MOTOROLA

Service Manual
LEVEL III

TIMEPORT™
DIGITAL WIRELESS TELEPHONE

CDMA Timeport 270c

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MOTOROLA

Cellular Subscriber Sector

Contents

Timeport 270c

CDMA DUAL BAND TRI MODE PHONE

General:

This product (Timeport 270c) is based on CDMA Platform 2000 reference Architecture. This is a dual band Tri Mode Phone-1900 Mhz CDMA/ 800MHz CDMA/800 Mhz AMPS.

This is a candy bar form factor which is 19cc (with standard LiIon 650 Mah battery), weighs 120 gms and has a metallic paint housing.

The 128 X 100 pixels display is LCD full matrix with 4 rows and 16 character 5 line text area. EL backlighting with white holographic film. Improved usability with the new energy user interface. LED Backlighting for keypad. 4 way navigation control key(joystick style). Dedicated Power key on the top above the headset jack. Dedicated speaker phone keyt, Voice rec/voice memo key. 19 Keys on the keypad for energy support. Volume keys and smart key on the sides. Intergrated headset jack on the top.

Accessory Connector:17 pin CE bus connector, access to USB, Rs 232, power, ground, analog and digital audio. IrDa port on the top. External RF and smart module connector.

Timeport 270c has integrated speaker phone with a dedicated speaker phone key on the keypad.

Timeport 270c LOGIC CIRCUIT

The main chip sets of Platform 2000 reference architecture products consists of WALLY and CCAP IC. The memory chips are the FLASH and the RAM.

The WALLY includes the functionality of CPU + DSP + CSP + CIA. The WALLY is M-Core product (Motorola Proprietary) 32 bits.The CCAP IC works in Buck mode and provides the power management function of the phone. It also does the audio amplification and routing. It controls the 32Khz crystal, it interfaces with WALLY on 8 bit Parallel Bus. The communication to the accessories through the CSS bus connector is done through the CCAP IC. The audio through the external connector is digital. All audio interface is through CCAP IC- Alert, Phone Speaker, headset speaker & Microphone, External Speaker & Microphone, and Phone Microphone. Timeport 270c also has an integrated speaker phone which also works as alert.

The Wally IC integrates the functionality of Casper IC (which contains the MCU,

RIB, the CSP and the DSP) and CIA

Key features of the WALLY IC:

- M-Core integer processor, 32 bit RISC architecture
- 56600 NDE-UL DSP Core running at up to 70 Mhz @ 1.8V
- MCU-DSP interface
- CDMA signal processor (CSP3) ASIC
- 16 bit external memory interface for the MCU
- 8 bit parallel interface for CCAP
- 32-Input Interrupt Controller for the MCU
- Internal MCU ROM and RAM
- Special modules for CDMA mode (all are MCU peripherals):
- Dual 9.8304 M samples/sec 4-bit ADCs (RX I/Q with Receive AGC)
- Dual 4.9152 M samples/sec 9-bit DACs

- 13-bit linear CODEC
- 1-8bit, 2-10bit, 1-12bit measurement DAC
- 8-bit measurement ADC with 6 multiplexed inputs
- 10-bit AOC-loop control ADC and DAC (DSP peripheral)
- A UART with auto baud detection
- Universal serial bus (USB) interface module
- Serial Audio Port interface

Key features of the CCAP IC:

CCAP IC uses Buck converter mode with no 5V supply

- 8 bit parallel interface from Wally
- Buck and Boost converters
- 8-Linear voltage regulators
- 2-Hi end linear regulators w/ common reference (PA Drain regulators)
- External B+ clamp regulator
- 3 Microphone Amplifiers
- Differential audio interfaces to and from Wally
- Audio Amps, Multiplexers and Speaker & Alert Drivers
- Headset and Send/End key detection
- Battery charger
- 6 input 8 bit ADC
- Real time clock (RTC) with coin cell backup supply and coin cell charger
- Timer circuits
- CE bus interface
- Vibrator and Backlight regulator inside the CCAP IC

The external memory consists of 32 Mega bit 1.8V FLASH and 4 Mega bit 1.8V SRAM

The butt plug is a 17 pin CE bus connector , which supports the USB and RS232 Serial communications. CE bus runs at 1.8V.

Timeport 270c will not support the 3WB mode of communications.

Keypad connector is a 12 pin data no mating connector-keypad, compression type.

Display connector is a 9 pin data no mating connector-display. Compression type and this display module clips onto the sides of the board connecting to the connector.

32 Khz crystal controlled by CCAP IC for RTC and slotted mode operation.

The charging circuit consists of Fast charger which is similar to StarTac.

The accessory antenna port is present on the back side of the phone near the antenna.

All the logic parts and IC's are placed on one side and all RF parts and IC's are placed on another side of the PCB

Timeport 270c RF CIRCUIT

The RF circuit is somewhat similar to Dual band ST7867/V-T2267 product, the Timeport 270c phone contains FE IC (the front end IC)

The receiver contains two complete receiver paths : 800 Mhz path that is used by 800 Mhz analog and 800 Mhz CDMA signals, and a PCS band(1900 Mhz) path for PCS signal. The two paths have different RF, LO and IF frequencies.

The switching of the antenna and accessory antenna port is mechanical, normally close circuit with antenna connector, but when accessory RF cable is inserted in the accessory port the switch opens the circuit with antenna and closes the circuit with the accessory port.

For Frequencies and channel numbers look at the table in this manual

The FE IC contains the LNA's , interstage filtering and Mixers, the switching and gain of the LNA's is controlled by the control signals

ZIF/SYN IC extracts the broadband signal from the IF , demodulate the analog signal and sends it to the audio logic side for further processing.

ZIF/SYN IC controls the Main VCO ,the second LO and the TX offset VCO (in analog mode).

Timeport 270c uses the dual band VCO module for main

LO (one for the 800 mhz band and another for PCS band) The output is split into RX_LO and TX_LO

for both the bands.

Timeport 270c uses the ME3 IC - the mixer exciter IC

The ME3 IC allows to control the RF output power. The ME3 IC requires two LO's, one for PCS, and the other for the 800 Mhz band.

The IF pins (input to the ME3 IC) are the same for any band. The control signal (TX Att) at the AGC pins control the gain of the ME3 IC.

There is an external interstage RF filter between the mixer and exciter.

From the mixer the outputs take two different paths one for TX PCS band and another for TX 800 Mhz band.

ME3 IC has 50 dBM attenuator control (input IF level= -23dBM , max output TX level= 25dBM)

At the output of ME3 IC band filter are used , in the PCS path two split band filters are used.

Two stage PA in 800 Mhz band and three stage PA in PCS band .

PA operates in enhance mode, therefore requires positive gate voltage.

In Timeport 270c PA adjustable bias both Gate and Drain therefore the output power can be controlled by PA_B+ DAC and PA_Bias DAC besides ME3 IC (through Tx_Attn)

CDMA –PCS 1900 Mhz BAND

Performance specification:

General Frequency and channel information:

Channel No., Tx Frequency (Mhz), Rx Frequency (Mhz)

Channel No.	*Tx Frequency (Mhz)*	*Rx Frequency (Mhz)*
25	1851.25	1931.25
200	1860.00	1940.00
400	1870.00	1950.00
600	1880.00	1960.00
800	1890.00	1970.00
1000	1900.00	1980.00
1175	1908.50	1988.50

The 1900 MHz band is split into 6 blocks(ABCDEF) of channels. usually only one block is used in a given geographic area.
There are no "standard" primary and secondry channels.
The actual primary and secondry channel depends on which block is used.
The lower valid channel number is 25.
The higher valid number is 1175.
Total Number of valid channel numbers is 46.

CDMA 1900MHz Performance Specifications General.

Table 1:

Function	***Specification***
Frequency Range	1850 to 1910 MHz(tx), 1930 to 1990(RX)
RF Channel Bandwidth	1.25 MHz
Channels	46 (Channel number spaced at an increment of-25, beginning channel, #25 lowest frequency and ending channel number 1175 highest frequency)
Duplex Spacing	80 MHz
Frequency Stability	Center Frequency* +/- 8.5 $X10^{-8}$ +/- 150 Hz of incoming RX CDMA signal.
Operation Voltage	+3.6 V nominal (3.0 -4.4 V DC)
RF Power output	0.20 Watts - 23 dBm into 50 ohms (CDMA, nominal)
input/output impedance	50 ohms(nominal)
Spurious /Harmonic emissions	Complies with title 47, Part 22 of the code of federal regulations.
Vocoders	8kbps, 13kbps, EVRC
Transmit Time Error	+/- 1 US
Modulation Type	1M25D1W(1.25MHz bandwidth), OQPSK, G7W(CDMA)
Transmit Duty Cycle	Variable- full, 1/2, 1/4, 1/8 rate(CDMA Mode)
CDMA Transmit Waveform Quality(rho)	0.94
Receive Sensitivity	-104dBm(CDMA, 0.5% Static FER, 8kbps Vocoder)
Display	128X100 Pixel display. LCD full Matrix with 4 rows and 16 character 5 line text area.

Specifications

CDMA 800 MHz Channel Numbering
General information:

The 800 MHZ CDMA channel numbering evolved from the Amps analog system which shares the same spectrum.

The Amps channel spacing is 30 KHz, because the CDMA signal BW=1.25 MHz, the actual CDMA signal must be spaced every 41 channels

(41*30 KHZ = 1.23MHZ)

In a dual-mode system, CDMA signals would never accupy analog control channels 313 to 354.

A -System preferred channels : primary =283, Secondary = 691

B- System preferred channels : Primary =384, Secondary = 771

The lowest valid CDMA channel is 1013.

The highest valid CDMA channel is 777.

Table 2: Overall System CDMA 800MHz

Function	*Specification*
Frequency Range	824.04 - 848.97 MHz Tx, Channels 1 to 799, $f_{Tx} = 0.03 * N + 825$ MHz Channels 990 to 1023, $f_{Tx} = 0.03(N—1023) + 825$ MHz 869.04 - 893.97 MHz Rx Channels 1 to 799 is $f_{Rx} = 0.03 * N + 870$ MHz Channels 990 to 1023, $f_{Rx} = 0.03(N—1023) + 870$ MHz
Channel Spacing	30 KHz
Channels	832
Duplex spacing	45 MHz(amps)
Frequency Stability	+/- 2.5 ppm (Amps)
Operating Voltage	+3.6 v nominal (3.0v to 4.4 v DC)
Display	96 X 64 Pixel array Timeport 270c have a one line external display to allow viewing of caller ID and other phone status messages while the flip is closed.
RF Power Output	0.6 watts - 28.0 dBM into 50 ohms (AMPS, nominal) 0.25 watts - 24.0 dBM into 50 ohms (CDMA, nominal)
Input/Output Impedance	50 ohms (nominal)
Spurious / Harmonic Emissions	Complies with Title 47, Part 22 of the code of Federal Regulations.
Audio Distortion	Less than 5% at
Hum and Noise(C-MSG)	32 dBm below +/- 8kHz deviation(transmit and receive)
Modulation	F3: + 12 kHz for 100% at 1 kHz, AMPS (wide) 1M25D1W (1.25 MHz bandwidth) CDMA
Transmit Audio Response	6 dBm/octave pre-emphasis
Transmit Audio sensitivity	(AMPS) + 2.9 kHz deviation (nom.) @ 97 dBm SPL input @ 1 kHz
Transmit Duty Cycle	full, 1/2, 1/4, 1/8 rate (CDMA Mode)
CDMA Transmit Waveform Quality(Rho)	0.94
Receiver Sensitivity	-116 dBm (AMPS, SINAD, C-MSG weighted) Sinad 12dB or greater -104 dBm (CDMA, 0.5% Static FER) 0.5 % or less
Alternate Channel Desense Protection	-60 db@+/- 60kHz (Amps)

Table 3: Environmental

Function	*Specification*
Temperature Range	Operational -30 o C to +60 o C (-22 o F to +140 o F) Storage -55 o C to +85 o C (-67 o F to +185 o F) Thermal Shock -40 o C to +85 o C (-40 o F to +185 o F) meets Mil. Std. 810C
Shock	Exceeds EIA Standards RS152B (Section 15) and IS-19
Drop	Exceeds EIA Standards RS316B and IS-19
Humidity	95% Relative Humidity; meets EIA Standard IS-19
Vibration	Exceeds EIA Standards RS316B and IS-19
Salt Fog	Salt Solution fog at 35 o C (95 o F), tested for 48 hours
Dust	140 mesh blown silica flour test, tested for 5 hours
Notes:	• EIA (Electronic Industries Association) Standard RS152B states the minimum stan-dards for Land Mobile Communications, FM or PM transmitters 25-470 MHz. • EIA IS-19 states the recommended standards for 800 MHz cellular subscriber units. • EIA Standard RS316B states the standards for portable land mobile communications. • U.S. Military Standard 810D establishes uniform environmental test methods for deter-mining the resistance of equipment to the effects of natural and induced environments peculiar to military operations. • TIA/EIA/IS-98 Recommended Minimum Performance Standards for Dual-Mode Wide band Spread spectrum Cellular Mobile Stations.

Specifications subject to change without notice.

Foreword

Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. It is intended primarily to support basic servicing, which consists primarily of mechanical repairs and circuit board replacement.

Authorized distributors may opt to receive additional training to become authorized to perform limited component repairs. Contact your regional Customer Support Manager for details.

Replacement Parts Ordering

Motorola maintains a parts office staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Cellular products. Orders for all parts should be sent to the Motorola International Logistics Department at the following address:

Accessories and After market Division MotorolaPersonal Communications Sector

Schaumburg, IL 60196

International Motorolans that need to purchase parts should contact AAD via one of the following numbers:

Phone: 1-847-538-8023, Fax: 1-847-576-3023

However, domestic Motorolans should contact AAD via one of the following numbers:

Phone: 1-800-422-4210, Fax: 1-800-622-6210

http://accesssecure.mot.com/Accesspoint/cgi-bin2/SoftCart.exe/Accesspoint/quick.html?L+test+rkod3498+930004870

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Model and Kit Identification

Motorola products are specifically identified by an overall model number on the product label. In most cases, assemblies and kits which make up the equipment also have kit numbers stamped on them.

Service

Motorola's regional Cellular Subscriber Service Centers offer some of the finest repair capabilities available to Motorola Subscriber equipment users. The Cellular Subscriber Service Centers are able to perform computerized adjustments and repair most defective transceivers and boards. Contact your regional Customer Service Manager for more information about Motorola's repair capabilities and policy for in-warranty and out-of-warranty repairs in your region.

General Safety Information

CAUTION

Do not jump start vehicle or use an automotive battery charger while the vehicle adapter option and the portable radiotelephone are connected to the vehicle electrical system, as this may cause serious damage to the radio. Disconnect the radio by removing the cable kit fuses.

Portable Operation

DO NOT hold the radio so that the antenna is very close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if it is held in the same manner as you would hold a telephone handset, with the antenna angled up and over your shoulder. Speak directly into the mouthpiece.

DO NOT operate the telephone in an airplane.

DO NOT allow children to play with any radio equipment containing a transmitter.

Mobile Operation (Vehicle Adaptor)

As with other mobile radio transmitting equipment, users are advised that for satisfactory operation of the equipment and for the safety of personnel, it is recommended that no part of the human body shall be allowed to come within 20 centimeters of the antenna during operation of the equipment.

DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere. Mobile telephones are under certain conditions capable of interfering with blasting operations. When in the vicinity of construction work, look for and observe signs cautioning against mobile radio transmission. If transmission is prohibited, the cellular telephone **must be turned off** to prevent any transmission. *In standby mode, the mobile telephone will automatically transmit to acknowledge a call if it is not turned off.*

All equipment must be properly grounded according to installation instructions for safe operation.

Cellular Overview

Table 4:

Note
The following description is intended only as a preliminary general introduction to cellular systems. This description is greatly simplified and does not illustrate the full operating capabilities, techniques, or technology involved in cellular systems.

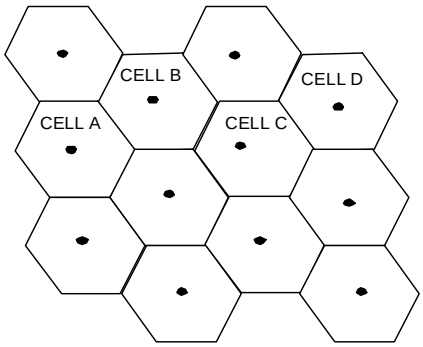
Overall Concept

Cellular systems are used to provide radio-telephone service in the frequency range of 824-894 MHz.

A cellular system provides higher call handling capacity and system availability than would be possible with conventional radiotelephone systems that require total system area coverage on every operating channel. The cellular system divides the system coverage area into several adjoining sub-areas, or cells.

Each cell contains a base station (cell site) which provides transmitting and receiving facilities. CDMA is a “spread spectrum” technology, which means that it spreads the information contained in a particular signal of interest over a greater bandwidth than the original signal. With CDMA, unique digital codes, rather than separate RF frequencies or channels are used to differentiate subscribers.

The codes are shared by both the mobile station and base station and are called “pseudo-random code sequences”. Since CDMA is a spread spectrum technology, all users share a range of the radio spectrum. CDMA cell coverage is dependent upon the way the network is designed. For each system 3 characteristics must be considered: coverage, quality, and capacity. These 3 must be balanced for desired lever of performance.



Some of the CDMA benefits are:

- Improved call quality with better and more consistent sound.
- Enhanced privacy.
- Variable rate vocoder.
- Soft hand off.

Hypothetical Cell System

Operation

In Figure 1: “Hypothetical Cell System”, the area bounded by bold lines represents the total coverage area of a cellular system. This area is divided into several cells, each containing a cell site base station which interfaces radiotelephone subscribers to the switching system. Since there are no reserved channels for each cell in CDMA, a user has a better chance of completing a call. Also, now there is no hard handoff between cell sites since all sites operate on the same frequency. This is called soft handoffs. In this system, subscribers in cell A & D simul-taneously operate in the same frequency. As a user moves from cell site to cell site, the base station monitors the signal strength of the user. Based on this signal strength, the base station decides which cell shall carry the call.

When a radiotelephone is in use well within a cell, the signal strength received at the cell site base station will be high. As the phone is moved towards the edge of the cell, its received signal strength decreases. Signal strength information therefore provides an indication of the subscriber’s distance from a cell’s base station. This change is handled automatically, and is completely transparent to the user. For example, assume that a cellular tele-phone initiates a call in cell A and then moves across the system area through cells B and C to cell D. As the phone moves into cell B, it is instructed to change to a different frequency that operates through the B cell on that frequency. A similar change is performed when the phone moves from cell B to cell C and again when the phone moves from cell C to cell D.

In this example, the radiotelephone has operated in four cell sites, through four cell sites, and on the same spread spectrum without interruptions in voice communications. As the radiotelephone leaves a cell, the frequency on which the phone and base station were operating is made available to another subscriber in that cell. Since this radiotelephone is dual mode, the radiotelephone can operate in either a CDMA system or Analog system.

Service Area

The area within which calls can be placed and received is defined by the system oper-ator. (Because this is a radio system, there is no exact boundary that can be drawn on a map.) If the portable is outside the radio service area, a No Svc (no service) message will appear on the phone’s display, and calls cannot be placed or received. If this happens during a conversation, the call is lost. Places where the ability to place or receive calls would be lost are in totally enclosed areas, such as underground parking garages, in buildings without windows, and in elevators. This situation would be indicated either by the No Svc message illuminating, or by the sound of either a fast busy signal or a high-low siren signal when call placement is attempted.

General usage in buildings having reason-able glass area is usually quite good. However, it may be necessary to move closer to a window to ensure reliable opera-tion.

PCS System

(Personal communication System) is identical to this cellular system except that the radio tele-phone service in the frequency range of 1850 MHZ to 1990 MHZ and the duplex spacing is 80 MHZ.

Timeport 270c Logic Circuit

The main chip sets of Platform 2000 reference architecture products consists of WALLY and CCAP IC. The memory chips are the FLASH and the RAM.

The WALLY includes the functionality of CPU + DSP + CSP + CIA.

The WALLY is M-Core product (Motorola Proprietary) 32 bits.

The CCAP IC works in Buck mode and provides the power management function of the phone. It also does the audio amplification and routing. It controls the 32Khz crystal, it interfaces with WALLY on 8 bit Parallel Bus. The communication to the accessories through the CE bus connector is done through the CCAP IC. The audio through the external connector is digital.

All audio interface is through CCAP IC- Speaker phone/Alert, Phone Speaker, headset speaker & Microphone, External Speaker & Microphone, and Phone Microphone.

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Key features of the WALLY IC:

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- 56600 NDE-UL DSP Core running at up to 70 Mhz @ 1.8V
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Key features of the CCAP IC:

CCAP IC uses Buck converter mode with no 5V supply

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- 8 bit parallel interface from Wally
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- 8-Linear voltage regulators
- 2-Hi end linear regulators w/ common reference (PA Drain regulators)
- External B+ clamp regulator
- 3 Microphone Amplifiers
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- Audio Amps, Multiplexers and Speaker & Speaker phone
- Headset and Send/End key detection
- Battery charger
- 6 input 8 bit ADC
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- Timer circuits
- CE bus interface
- Vibrator and Backlight regulator inside the CCAP IC

The external memory consists of 32 Mega bit 1.8V FLASH and 4 Mega bit 1.8V SRAM.

The butt plug is a 17 pin CE bus connector , which supports the USB and RS23 Serial communications. CE bus runs at 1.8V.

Timeport 270c will not support the 3WB or PST mode of communications.

Display connector is a 9 pin data no mating connector-display, it is compression type, the display module clips onto the sides of the board connecting to the connector.

Keypad connector is a 12 pin data no mating connector-keypad, compression type 32 Khz crystal controlled by CCAP IC for RTC and slotted mode operation.

The charging circuit consists of Fast charger which is similar to StarTac.

The accessory antenna port is present on the back side of the phone near the antenna.

All the logic parts and IC's are placed on one side and all RF parts and IC's are placed on another side of the PCB

Timeport 270c RF CIRCUIT

The RF circuit is somewhat similar to Dual band ST7867/V-T2267 product, the Timeport 270c phone contains FE IC (the front end IC).

The receiver contains two complete receiver paths : 800 Mhz path that is used by 800 Mhz analog and 800 Mhz CDMA signals, and a PCS band(1900 Mhz) path for PCS signal. The two paths have different RF, LO and IF frequencies.

The switching of the antenna and accessory antenna port is mechanical, normally close circuit with antenna, but when accessory RF cable is inserted in the accessory port the switch opens the circuit with antenna and closes the circuit with the accessory port.

For Frequencies and channel numbers look at the table in this manual. The FE IC contains the LNA's , interstage filtering and Mixers, the switching and gain of the LNA's is controlled by the control signals. ZIF/SYN IC extracts the broadband signal from the IF , demodulate the analog signal and sends it to the audio logic side for further processing.

ZIF/SYN IC controls the Main VCO ,the second LO and the TX offset VCO (in analog mode).

Timeport 270c uses the dual band VCO module

for main LO (one for the 800 mhz band and another for PCS band) The output is split into RX_LO and TX_LO for both the bands. Timeport 270c uses the ME3 IC - the mixer exciter IC. The ME3 IC allows to control the RF output power. The ME3 IC requires two LO's, one for PCS, and the other for the 800 Mhz band.

The IF pins (input to the ME3 IC) are the same for any band. The control signal (TX Att) at the AGC pins control the gain of the ME3 IC. There is an external interstage RF filter between the mixer and exciter. From the mixer the outputs take two different paths one for TX PCS band and another for TX 800 Mhz band. ME3 IC has 50 dBM attenuator control (input IF level= -23dBM , max output TX level= 25dBM). At the output of ME3 IC band filter are used , in the PCS path two split band filters are used.

Two stage PA in 800 Mhz band and three stage PA in PCS band. PA operates in enhance mode, therefore requires positive gate voltage. In Timeport 270c PA adjustable bias both Gate and Drain therefore the output power can be controlled by PA_B+ DAC and PA_Bias DAC besides ME3 IC (through Tx_Attn)

Theory of Operation

I. AMPS

RECEIVER

RECEIVER CIRCUITRY

The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex SAW filter – FL51. The RF signal is then routed to the Front End IC(FE IC) – U9917 , which contains LNA which provides a 10-12 dB gain to the received RF signal, and U9917 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.65Mhz.
The local oscillator signal which is input to the filter FL101 is 978 – 1004 Mhz. The VCO module U626 is controlled by the ZIF/SYN IC – U700.
The mixer output IF signal 109.65Mhz is routed through IF filter- FL160 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

RECEIVE AUDIO

DISC - signal an AMPS discriminator audio which is the output of FM demodulator in U700 is produced by mixing the IF signal with the second LO (which is controlled by U700) and then filtered. The audio on DISC line goes to WALLY IC-U1100 to be digitized. All receive audio filtering and gain control is performed in the digital domain within the WALLY which contains DSP, the processed RX audio is converted back to analog and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.
The CCAP - U1200 amplifies and route the audio signal(receive audio) to the speaker (phone speaker, boom speaker, external speaker or speaker phone). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the speakerphone.

TRANSMITTER

TRANSMITTER AUDIO

Audio from the Microphone (internal, boom or external) is routed through and amplified by CCAP – U1200 and then travel to the WALLY IC – U1100 on MIC1 and MICREF lines which is digitized by the CODEC inside the WALLY and the DSP present in WALLY performs the compression, pre-emphasis, limiting and band pass filtering function in the digital domain. All Amps signaling (SAT, ST, DTMF) is also generated in the digital domain by the DSP inside the

WALLY. The digitized amps TX audio signal is converted back to analog inside the WALLY and sent on FM line to the 154.8Mhz Tx offset VCO to modulate the transmitter frequency.

TRANSMITTER CIRCUITRY

The FM signal from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700. The Tx IF modulated signal 154.8Mhz is input to the ME3 IC – U400 where it get mixed with the 979 – 1004 Mhz local oscillator signal. The Tx signal then passes through the band pass filter FL404 into the Power Amplifier (PA) – U501 where it is amplified and the output passes through the isolator U550 and then through TX band pass mono block duplex SAW filter FL51 and through diplexer FL53 to the antenna or RF test port.

II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

RECEIVER

RECEIVER CIRCUITRY

The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex SAW filter – FL51. The RF signal is then routed to the Front End IC(FE IC) – U9917 , which contains LNA which provides three stage gain to the received RF signal based on its strength, and U9917 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.8Mhz.

The FE IC is controlled by WALLY through the following signals: FEIC_G1, FEIC_G2, and MODE.

The local oscillator signal which is input to the filter FL101 is 978 – 1004 Mhz. The VCO module U626 is controlled by the ZIF/SYN IC – U700.

The mixer output IF signal 109.8Mhz is routed through IF filter- FL150 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

RECEIVE AUDIO

Four outputs from U700 – RXIP, RXIM, RXQP, RXQM carries the base band signal of the receive digital call to the WALLY, the received QPSK data is gain controlled and converted to digital, the 1.2288 Mb/sec Rx data stream is then decoded by the CSP inside the WALLY to produce a signal containing only the desired data. The digital speech data is further decoded by the CELP vocoder a part of DSP within WALLY and then converted back into analog receive audio and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.

The CCAP - U1200 amplifies and route the audio signal (receive audio) to the speaker (phone speaker, boom speaker or external speaker). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the speaker phone.

TRANSMITTER

TRANSMITTER AUDIO

Audio from the Microphone (internal, boom or external) is routed through and amplified by CCAP – U1200 and then travel to the WALLY IC – U1100 on MIC1 and MICREF lines which is digitized by the CODEC inside the WALLY and the DSP present in WALLY processes by CELP variable rate vocoder and then processed by the modem (CSP) within the WALLY which produces the 1.2288Mb/sec CDMA data stream. This stream is then converted to analog signals and send to ZIFSYN IC on four lines TXIP, TXIM, TXQP, TXQM. This modulates on the TX IF (QPSK modulation) 154.8Mhz TX offset VCO.

TRANSMITTER CIRCUITRY

The four signals TXIP, TXIM, TXQP, TXQM from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700. The Tx IF modulated signal 154.8Mhz is input to the ME3 IC – U400 where it get mixed with the 979 – 1004 Mhz local oscillator signal. The Tx signal then passes through the band pass filter FL404 into the Power Amplifier (PA) – U900 where it is amplified and the output passes through the isolator U550 and then through TX band pass mono block duplex SAW filter FL51 and through diplexer FL53 to the antenna or RF test port.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

RECEIVER

RECEIVER CIRCUITRY

The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex ceramic filter – FL50. The RF signal is then routed to the Front End IC(FE IC) – U9917 , which contains LNA which provides three stage gain to the received RF signal based on its strength, and U9917 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.8Mhz.

The FE IC is controlled by WALLY through the following signals: FEIC_G1, FEIC_G2, and MODE.

The local oscillator signal RX_LO_PCS is 2039-2100 Mhz. The VCO module U636 is controlled by the ZIF/SYN IC – U700.

The mixer output IF signal 109.8Mhz is routed through IF filter- FL150 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

RECEIVE AUDIO

Four outputs from U700 – RXIP, RXIM, RXQP, RXQM carries the base band signal of the receive digital call to the WALLY, the received QPSK data is gain controlled and converted to digital, the 1.2288 Mb/sec Rx data stream is then decoded by the CSP inside the WALLY to produce a signal containing only the desired data. The digital speech data is further decoded by the CELP vocoder a part of DSP within WALLY and then converted back into analog receive audio and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.

The CCAP - U1200 amplifies and route the audio signal (receive audio) to the speaker (phone speaker, boom speaker or external speaker). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the speaker phone.

TRANSMITTER

TRANSMITTER AUDIO

Audio from the Microphone (internal, boom or external) is routed through and amplified by CCAP – U1200 and then travel to the WALLY IC – U1100 on MIC1 and MICREF lines which is digitized by the CODEC inside the WALLY and the DSP present in WALLY processes by CELP variable rate vocoder and then processed by the modem (CSP) within the WALLY which produces the 1.2288Mb/sec CDMA data stream. This stream is then converted to analog signals and send to ZIFSYN IC on four lines TXIP, TXIM, TXQP, TXQM. This modulates on the TX IF (QPSK modulation) 189.8Mhz TX offset VCO.

by 2 before being fed into the mixer.

TRANSMITTER CIRCUITRY

The four signals TXIP, TXIM, TXQP, TXQM from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700. The Tx IF modulated signal 189.8Mhz is input to the ME3 IC – U400 where it get mixed with the 2039-2100 Mhz local oscillator signal. The Tx signal then passes through the SPLIT BAND SAW filter FL401 into the Power Amplifier (PA) – U500 where it is amplified and the output passes through the isolator U551 and then through TX band pass mono block duplex ceramic filter FL50 and through diplexer FL53 to the antenna or RF test port.

FREQUENCY SYNTHESIZER CIRCUITRY

The phone contains three PLL frequency synthesizers controlled by U700.

1. The main VCO : there are two main VCO modules- a) one synthesizer controls the tunable 979 – 1004Mhz main local oscillator – U626, which is ON during Cellular or 800Mhz mode. b) another synthesizer controls the tunable 2039-2100Mhz main local oscillator – U636, which is ON during PCS or 1900Mhz mode.
2. The Tx offset VCO: there are two modes and two frequency at which this oscillator which is internal to U700 works, but the tank circuit is external. There are two tank circuits one for Cellular mode (800 Mhz) which will set 309.6Mhz frequency for the oscillator to oscillate on. Another tank circuit for PCS mode (1900Mhz) which will set 379.6Mhz frequency for the oscillator to oscillate on. The Tx offset frequency is divided by 2 before being fed into the mixer for modulation.
3. The second LO: the second local oscillator also operates in two modes with two different frequencies: For AMPS mode the frequency is 219.3Mhz and for CDMA mode at cellular or 800Mhz band and PCS or 1900Mhz band the frequency is 219.8Mhz. The tank circuit is external to the U700. The frequency is divided

All the synthesizers obtain their reference frequency from the 16.8Mhz reference oscillator.

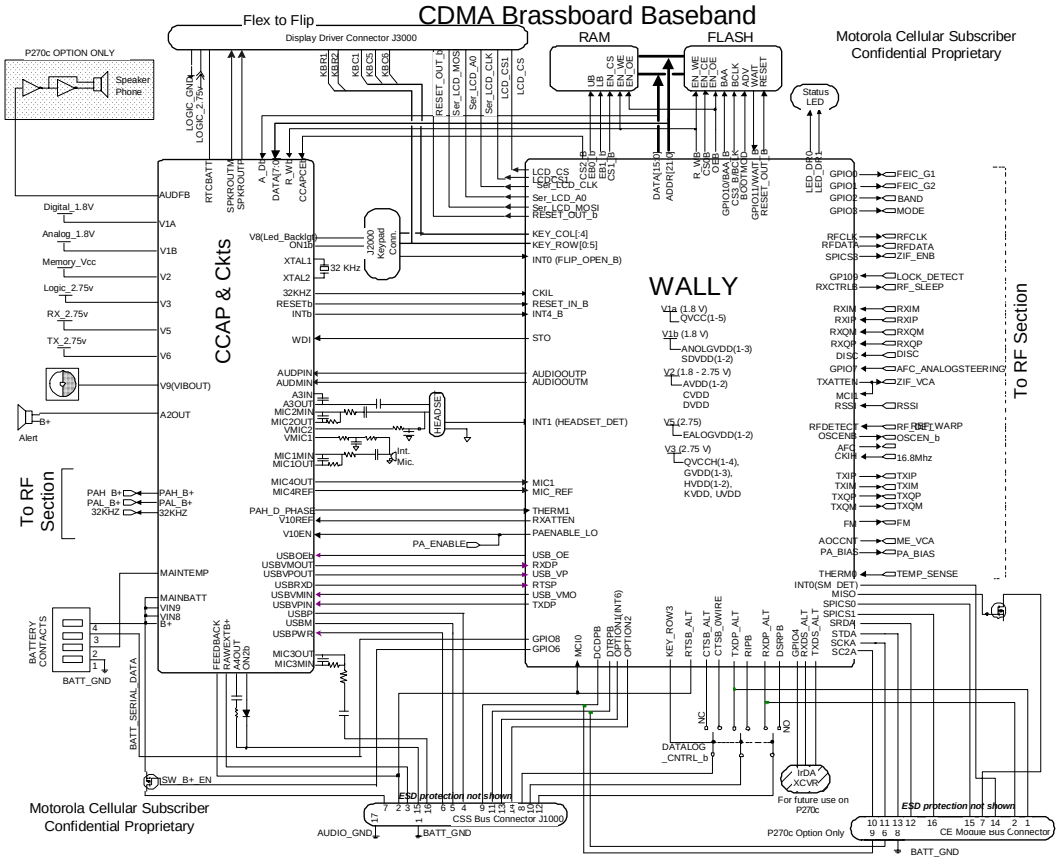
TRANSMIT POWER CONTROL CIRCUITRY

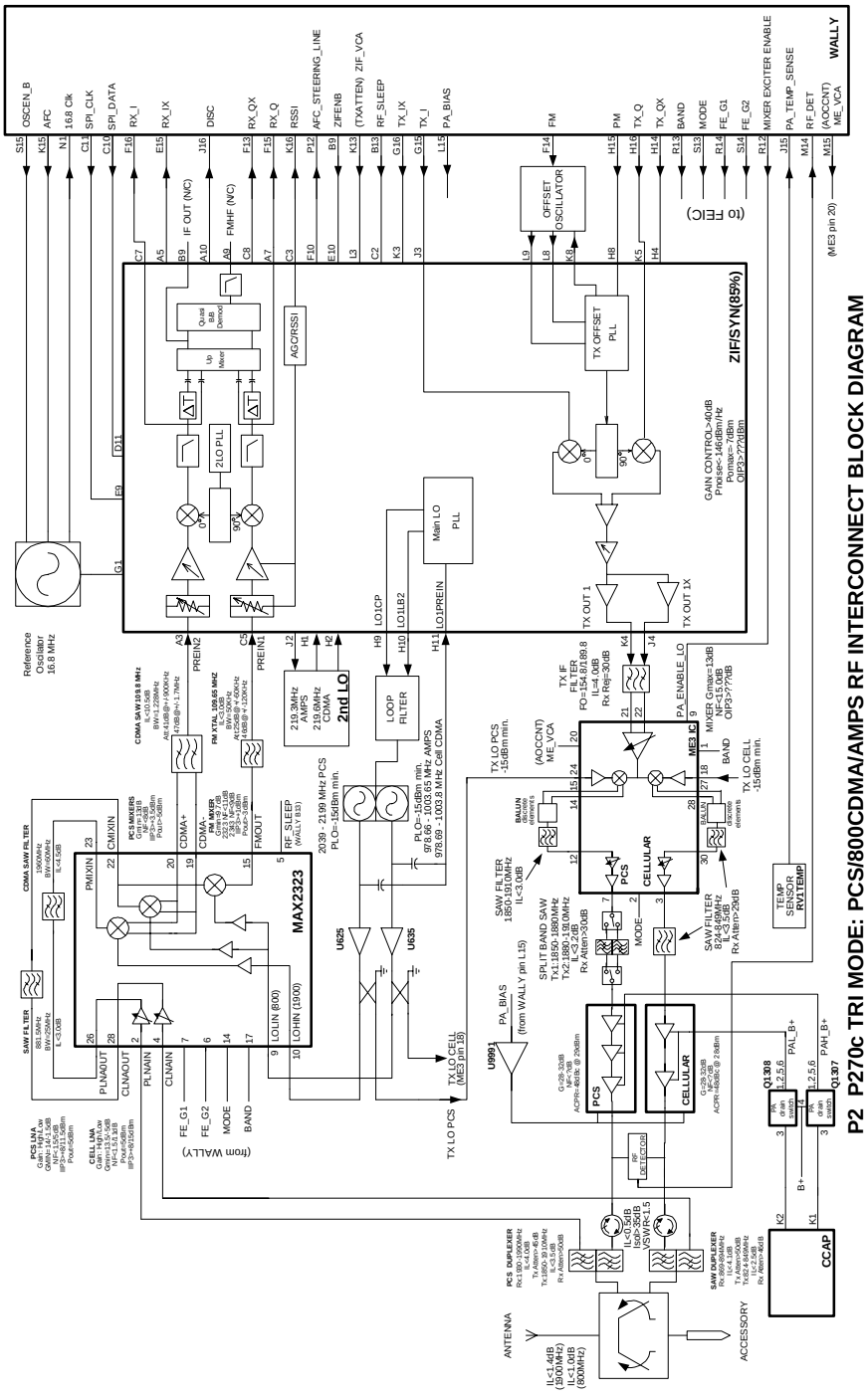
The transmit signal power (the output RF power) is controlled by the three control signals ZIF_VCA and ME_VCA from WALLY IC and PA_BIAS from CCAP IC. The output power is controlled at three places, ZIFSYN – U700 which has a gain control of max 40dB and ME3 IC- U400 which has a total gain of max 36dB and PA has a gain of max 27-32dB.

In Amps mode the power range is +8dBM to +28dBM. In CDMA mode the RF power range is from –50dBM to +23dBM.

In CDMA mode the power control operates in two mode: Open loop and Close loop. In open loop mode (at the beginning of registering – access probe) the power level is proportional to the received signal level, in close loop mode the power level is controlled by the CDMA cell based on the received signal strength at the cell site.

AUDIO LOGIC BLOCK DIAGRAM





P2 P270c TRI MODE: PCS/800CDMA/AMPS RF INTERCONNECT BLOCK DIAGRAM

Disassembly

Introduction

Care must be taken during the disassembly and reassembly of the unit in order to avoid damaging or stressing the housing and internal components. Ensure that a properly grounded high impedance conductive wrist strap is used while performing these procedures on electronic units.

Recommended Tools

The following tools are recommended for use during the disassembly and reassembly of the phone.

- Anti-Static Mat 6680387A95
- Ground Cord 6680334B36
- Wrist Band 4280385A59
- Plastic Prying Tool SLN7223A
- Rear Housing Removal Tool
- Dental Pick
- Tweezers
- T6 Torque Screw Driver

CAUTION

Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. An anti-static wrist band, connected to an anti-static (conductive) work surface, must be worn during all phases of disassembly, repair, and reassembly.

Disassembly Procedure

Refer to the disassembly instructions and photo sequence on the following pages.

Assembly Procedure

Once the unit is disassembled and the repair is carried out it then becomes obvious that to

assemble the unit, the procedure is the reverse of that previously completed for disassembly.

Antenna Removal:

Unscrew the Antenna with your thumb and fore-finger as shown.

Screw head Cover Removal:

Remove the Cover on the screw heads as shown in Fig.

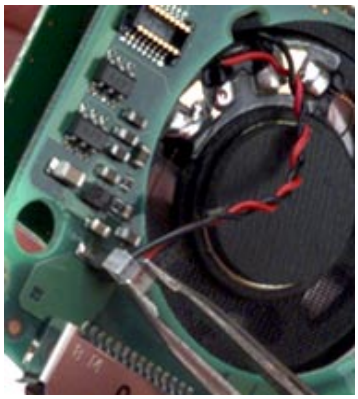
Battery Cover Removal:

Remove the battery cover as shown.

Rear Housing Removal:

Using a powered/torque-limited screwdriver set to (2.0 +/- 0.25 in-lb.) unscrew all six (6) Black Torx T-6 Self-Threading Screws starting with the (2) screws at the mid-section of the phone.

Gently knead the bosses at the base of the phone and the tongue-and-groove features around the edges of the housings to disengage the two assemblies.Disconnect the Smart Module Flex Connector to the Main PCB.

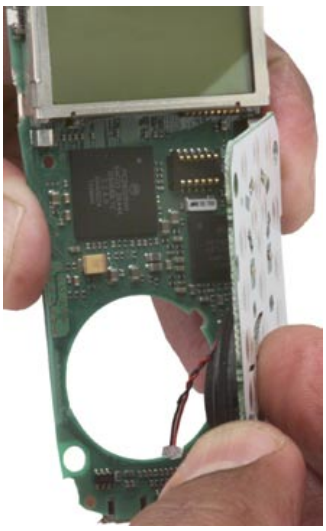


Main PC Board Removal:

Remove the Small Plug of the High Audio Speaker Wire from the Receptacle on the PC Board.The PC Board is disassembled.

Remove the High Audio Speaker from the keyboard as shown.

Remove the power button from the front housing.



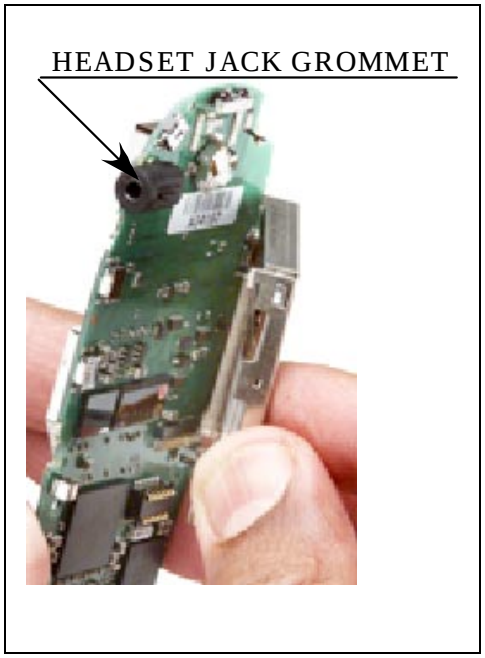
Keypad Board Removal:

Remove the keypad from the front housing as shown.

LCD Display, Antenna Guide Tube, Headset Jack Grommet and Coin Cell Removal

Remove the Antenna Guide Tube on the PC Board from the clip that holds it

Locate the Frame clips over feautres on the egde of the pc board where the display is located as shown in the picture. Gently pull away the tabs of the display away from the board to remove it.



V.60c/Timeport 270c/V.120c PRODUCT SUPPORT TOOLS

FLASHING/FLEXING/NAM PROGRAM-MING

All P2K products that include V.60c, Timeport 270c and V.120c are Wally based and are using the 17 pin CE Bus Connector which uses the USB and RS232 communication protocols. The following are the hardware and software requirements:

1. Personal computer with PST 2.3 software
2. Motorola test interface adapter box (junior board) - SYN8400A
3. Interface adapter power supply – SPN4029A or Wall charger SPN4278D
4. CE Bus cable SKN6304B

About Junior board operation:

To use USB mode plug the USB plug into the type B port provided on the back of the box. In this mode RS232 is turned off and only USB is allowed. Dip switches inside the box determines the mode of selection:

The Radio has two grooves on the two sidesThe Fixture has two guides and two retractable spring loaded clamps as shown. Retract the Retractable Clamps and Slide the radio into the fixture such that the two grooves onto the sides of the radio locate onto the two guides. Release the Clamps and they fit into the grooves of the radio holding it.

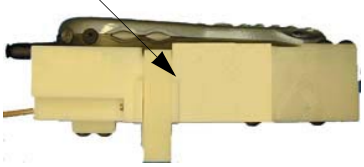
RF Port of the Radio

SWITCH NUMBER

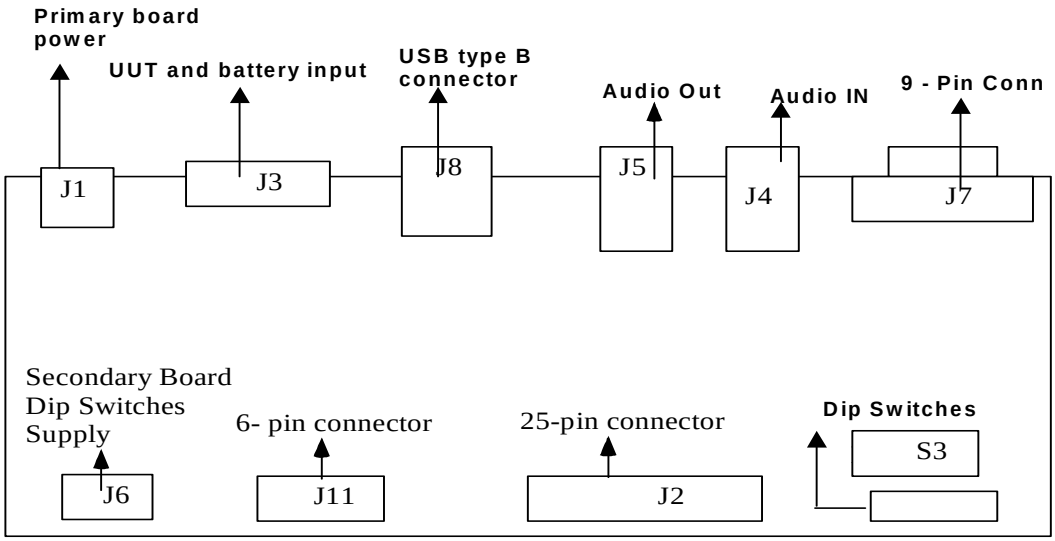
MODE Selection	1	2	3	4	5	6	7	8
Legacy TDMA flash	Down	Up	Up	Up	Up	Up	Up	Up
Legacy CDMA Serial Comm.	Up	Up	Down	Up	Up	Up	Up	Up
Legacy CDMA flash	Up	Up	Down	Up	Up	Up	Up	Up
Legacy CDMA datalog	Up	Down	Up	Up	Up	Up	Up	Up
P2K USB/ RS232	Up	Up	Up	Up	Up	Up	Up	Down
P2K Flash	Up	Down	Up	Up	Down	Up	Up	Up
P2K serial Comm.	Up	Down	Up	Up	Up	Down	Up	Up
USB	Up	Up	Up	Up	Up	Up	Up	Up

Fixture Part Number 6680334F30

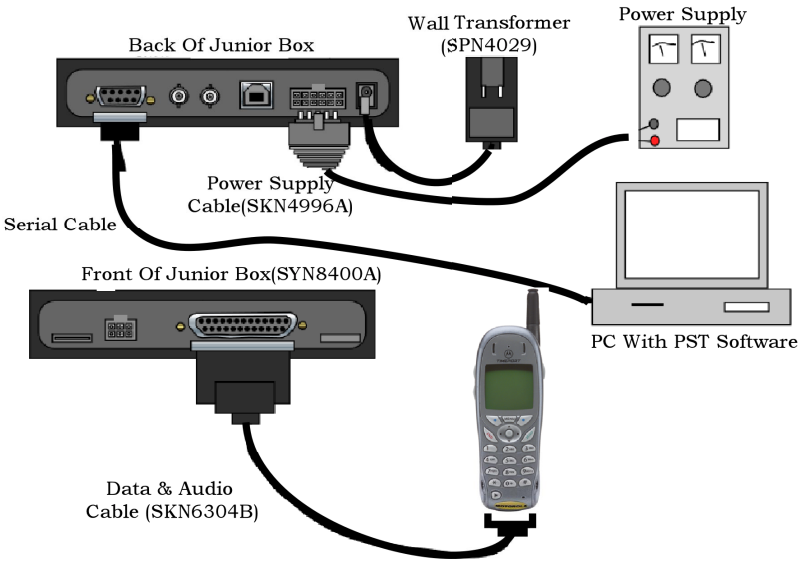
Spring Loaded Clamp (holds radio in place)



SYN8400A – JUNIOR BOARD



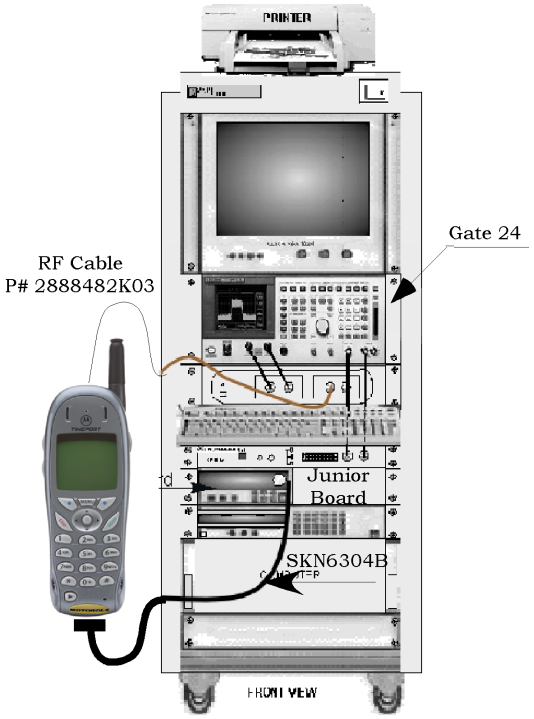
FLASHING STATION



TEST AND PHASING

Gate 24 supports the testing and phasing of all P2K products, obtain the phasing and test software that includes V.60c, Timeport 270c and V.120c. For more details on Test and Phasing contact International Service Engineering ISE-CDMA

Gate 24
For Phasing/Adjustment/Testing

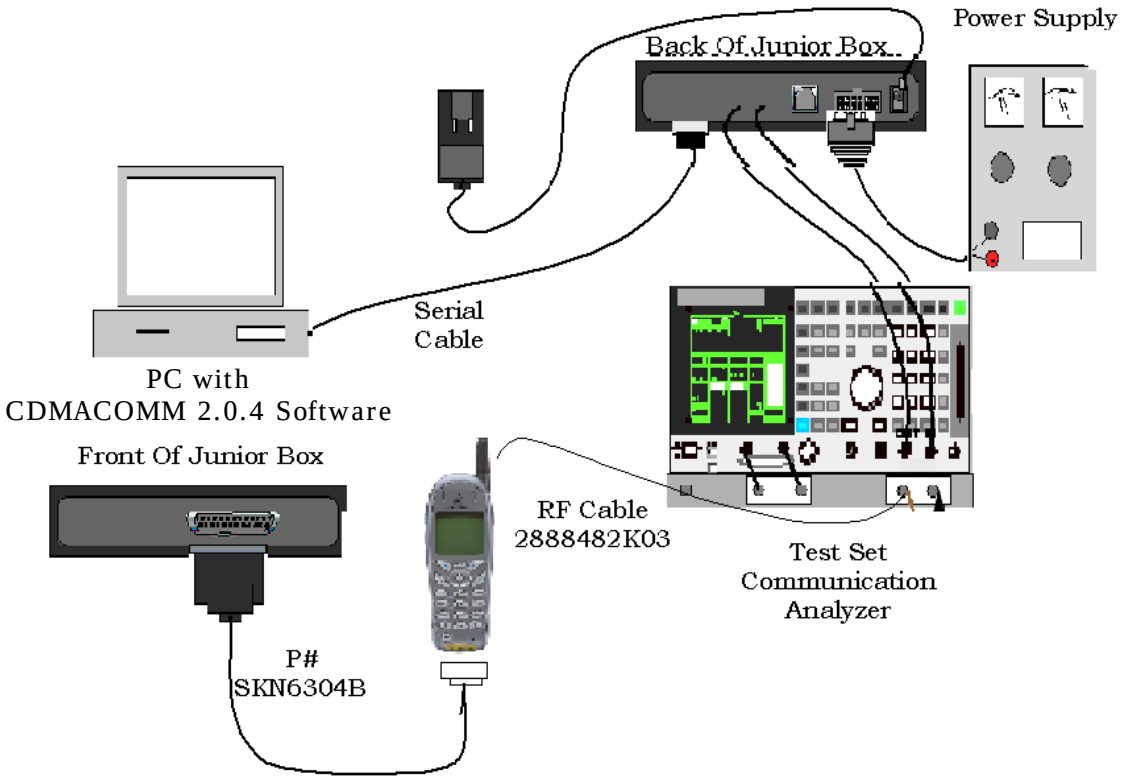


TESTING: General Procedure for Analog Testing

- Connect RF and CE BUS connectors to radio and set power supply to level specified in the 12M issue X8.
- Before selecting suspend or other suspended commands for the radio, Data Mode must be selected first. Select Data Mode. If Data Mode step was successful, a message displaying " Returned From Radio: data stream xxx " will appear in the status window. Only then, can you proceed with entering the Suspend command.
- Select the Suspend command. If the Suspend command was successful, the status window will turn green and display data sent and returned from the radio. The window will also display a message "P2K HEAD COMMAND =
- SUSPEND = = >

SUCCESSFUL". If the SUSPEND command was unsuccessful, the status window will turn red and display "Failed. Response = 0000,0". If any subsequent suspended commands sent to the radio fail, the status window will turn red and display a failed message.

- After the successful entry of Data Mode and Suspend, select and or set the fields highlighted in yellow as shown in the CDMAComm screen shot.



Loopback (Boom Mic Speaker)

Test Procedure

Select the SUSPEND button to put the phone into Suspend Mode.

Select CDMA 800 button under CP_MODE to put the radio in 800 CDMA Mode.

Under AUD_PATH command, set Input to 4 and Output to 6 to route Audio to/from Headset Jack. Under the AUD_LPB heading, select Vocoder 13K (CDMA) button to put the phone into full rate loopback mode.

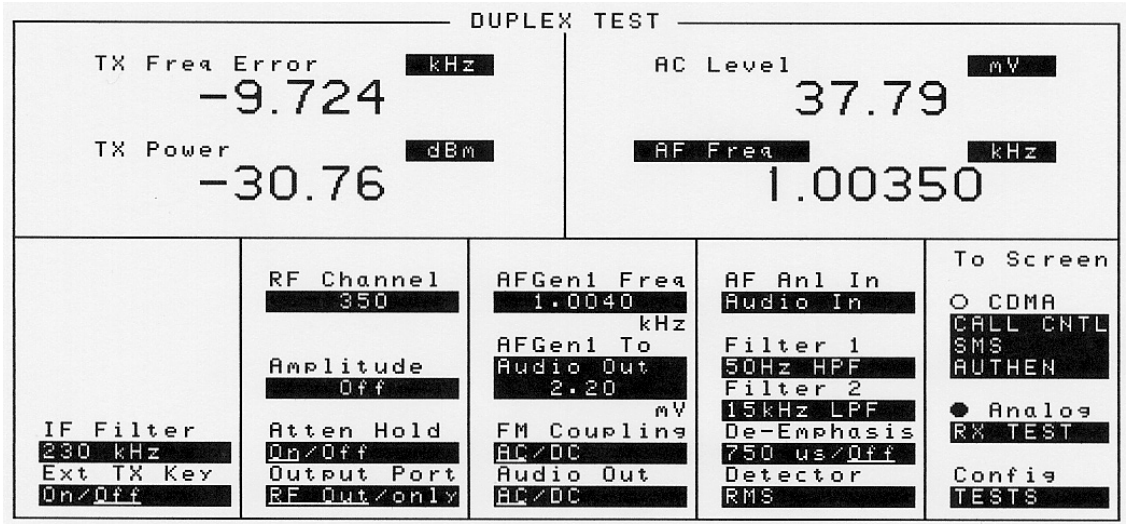
Set AUD_LVL to level 3.

See View 1.

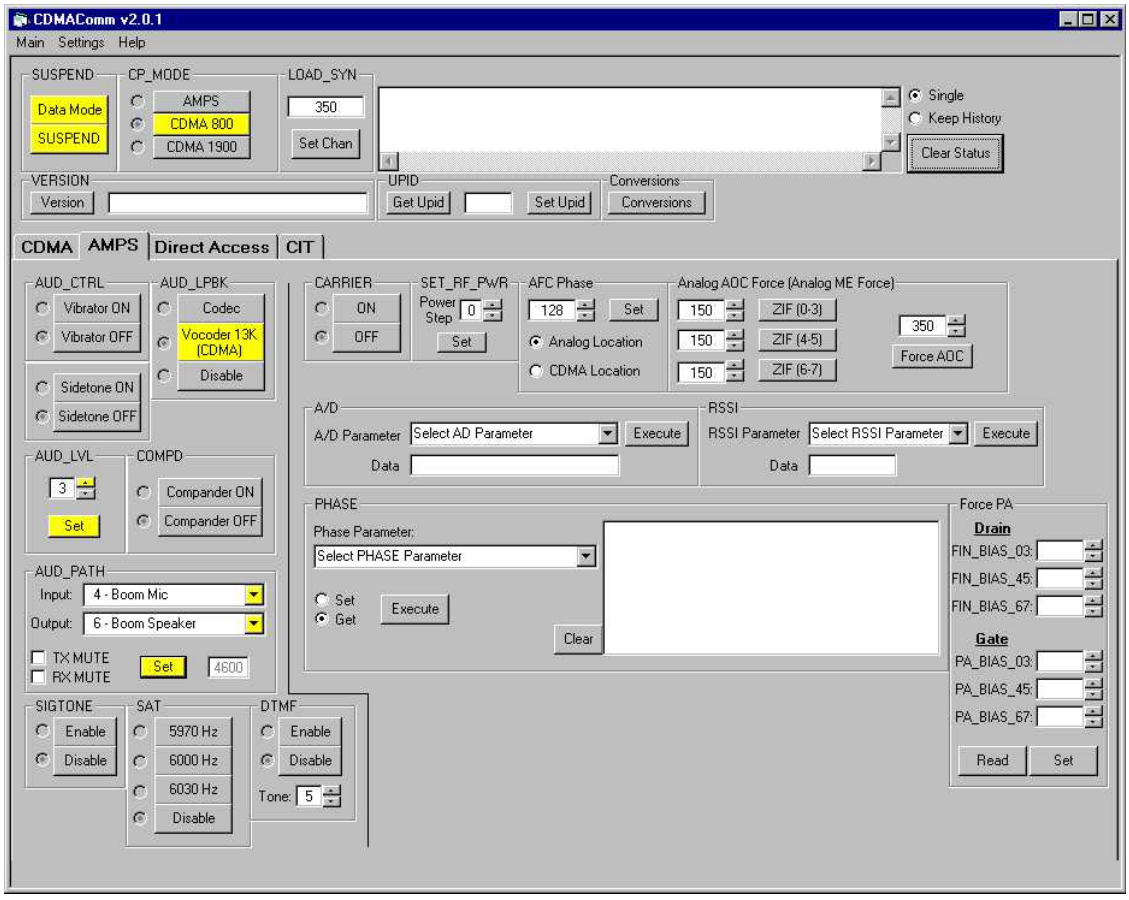
Connect the Audio Out (Boom Speaker) of the boom/audio plug thru a 32 ohm resistor to boom ground. Inject an audio tone of 1004Hz at 2.2mVrms into the Audio In (Boom Mic). within the specifications listed

Parameter	V.60c Lower Limit	V.60c Upper Limit
Mic Bias	2.0 VDC	2.6 VDC
Loopback	28.2 mVAC mVAC	56.4 mVAC
Jack Sense	1	1
Headset Jack Ground Sense	1	1

Set test set to 50Hz High Pass, 15KHz Low Pass filtering with De-Emphasis turned OFF. Measure the RMS audio signal at the Audio Out (Boom Speaker). The result should be within the specifications listed


DUPLEX TEST
TX Freq Error
kHz
-9.724
TX Power
dBm
-30.76
AC Level
mV
37.79
AF Freq
kHz
1.00350
IF Filter
230 kHz
Ext TX Key
On/Off
RF Channel
350
Amplitude
Off
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
Audio Out
2.20
mV
FM Coupling
AC/DC
Audio Out
AC/DC
AF Anl In
Audio In
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
RMS
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS

View 1


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 4 - Boom Mic
Output: 6 - Boom Speaker
TX MUTE
RX MUTE
Set
4600
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 0
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

DTMF Deviation

This phasing procedure is used to phase the deviation that results from normal audio levels.

Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	15
LOW_LIMIT	8.60kHz
TARGET	9.00kHz
HIGH_LIMIT	9.50kHz

Test Procedure

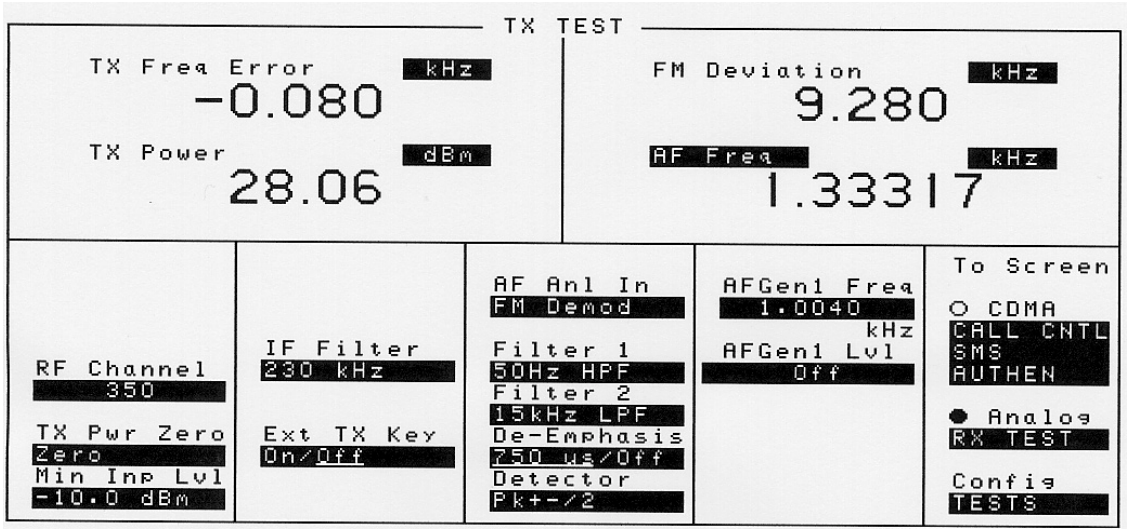
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to 1, TX MUTE, RX MUTE and select SET .
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under DTMF, select Enable and choose DTMF tone 5.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

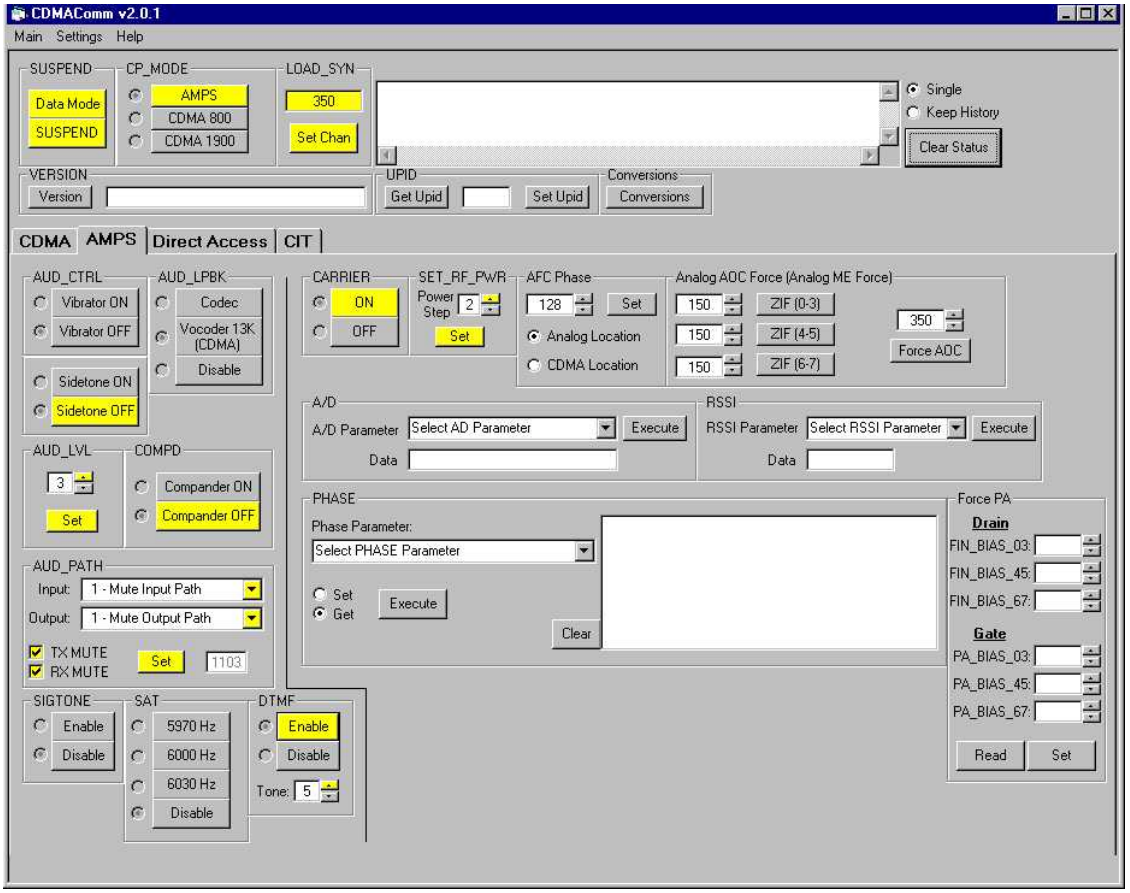
See View 2.

The Testset should be configured as follows:50 Hz HPF, 15 kHz LPF, 750 uSecDe-emphasis. Set equipment to measure FM Deviation.

Measure the peak frequency deviation in kHz.

View 2


TX TEST
TX Freq Error
-0.080
kHz
TX Power
28.06
dBm
FM Deviation
9.280
kHz
AF Freq
1.33317
kHz
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
Off
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
1103
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

Maximum Deviation

This phasing procedure is used to insure that the radio will produce an FM deviation no greater than a specified amount even in the event that the radio modulator is presented with a large audio signal.

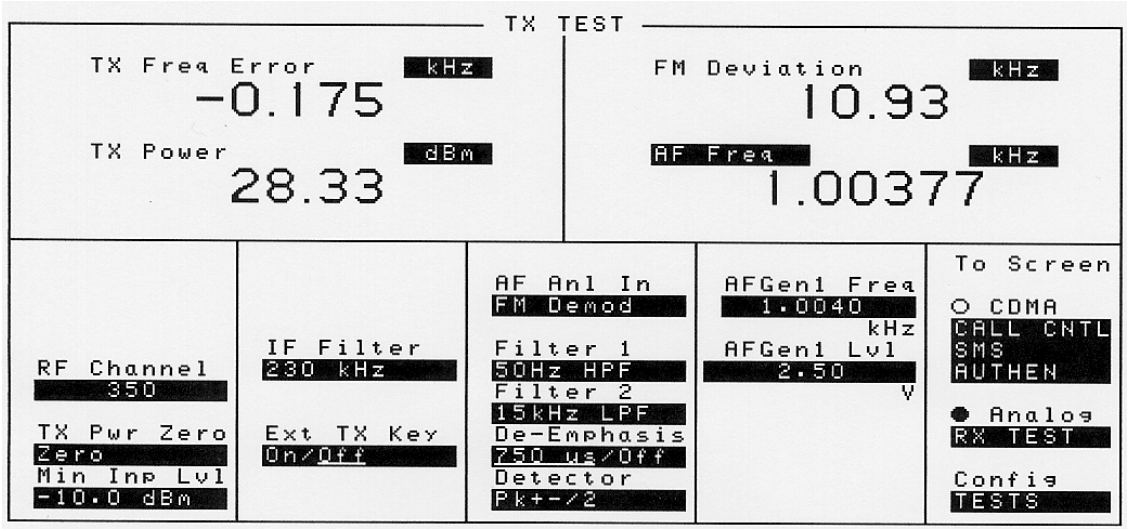
Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	15
LOW_LIMIT	10.5kHz
TARGET	11.0kHz
HIGH_LIMIT	11.5kHz

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL.***
- Under AUD_PATH heading, set Input to 3 and Output to 1, RX MUTE and select SET .
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

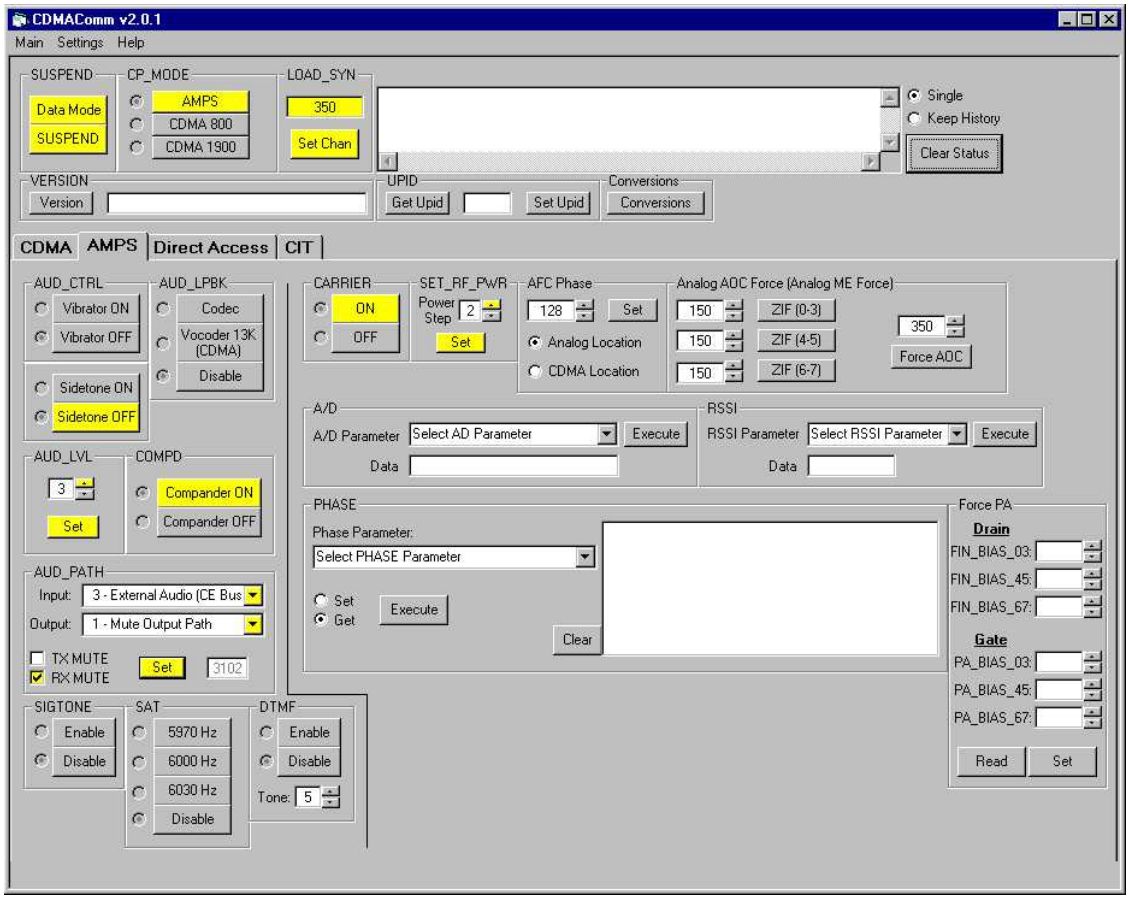
See View 3.

The Testset should be configured as follows: 15 kHz LPF, 50Hz HPF, 750uSec De-emphasis Inject a 1004 Hz, 2.5V rms audio signal into the audio-in pin of the Accessory connector. Set equipment to measure FM Deviation.

Measure the peak frequency deviation in kHz (Dev).


TX TEST
TX Freq Error
-0.175
kHz
TX Power
28.33
dBm
FM Deviation
10.93
kHz
AF Freq
1.00377
kHz
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
2.50
V
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS

View 3


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 3 - External Audio (CE Bus
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
3102
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

Microphone Audio Deviation

This phasing procedure is used to phase the deviation that results from normal audio levels.

Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	15
LOW_LIMIT	2.8kHz
TARGET	2.95kHz
HIGH_LIMIT	3.1kHz

Select the SUSPEND button to put the phone into Suspend Mode.

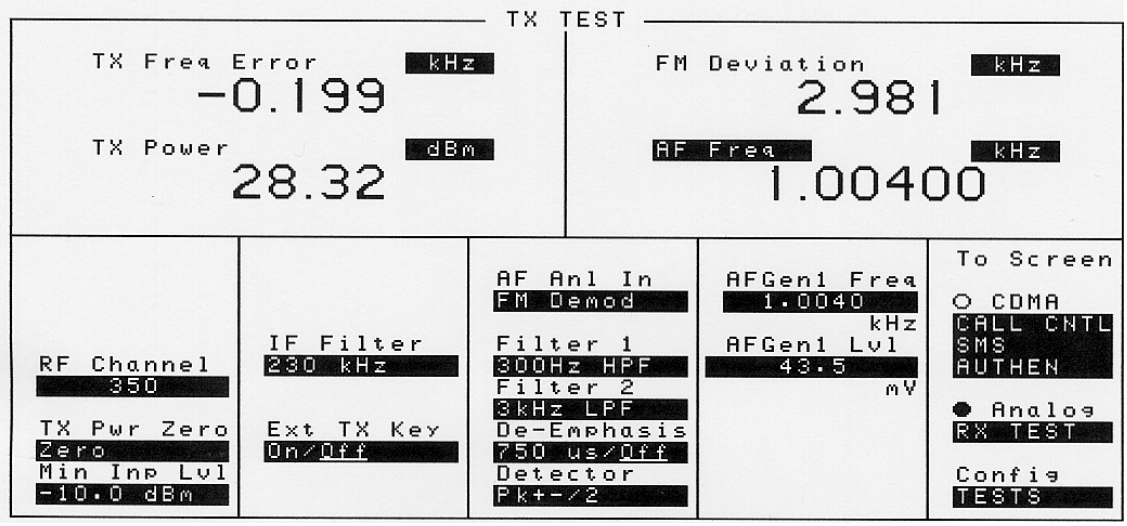
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 3 and Output to 1, RX MUTE and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

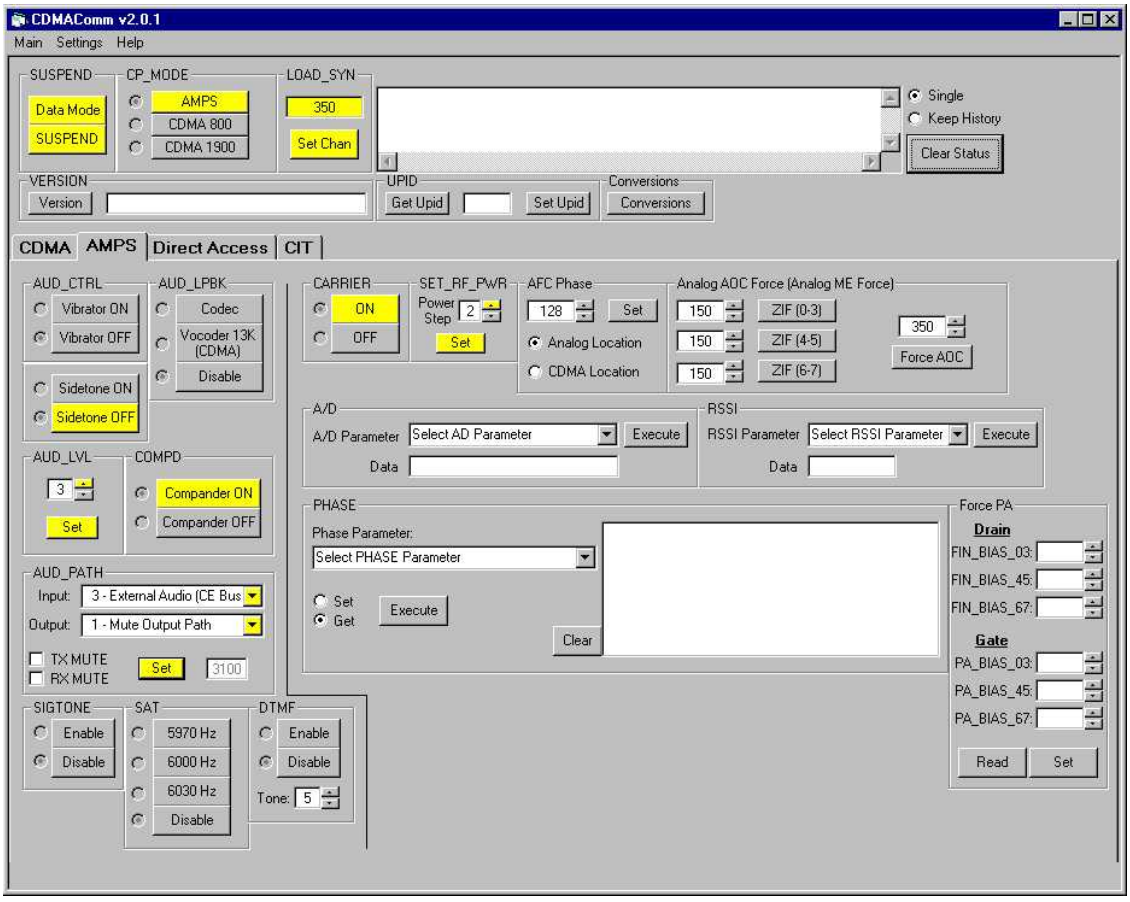
See View 4.

The Testset should be configured as follows: 300 Hz HPF, 3 kHz LPF, De-emphasis OFF. Inject a 1004Hz, 43.5mV rms audio signal in to the audio-in pin on the Accessory connector. Set equipment to measure FM Deviation.

Measure the peak frequency deviation in kHz.

View 4


TX TEST
TX Freq Error
kHz
-0.199
TX Power
dBm
28.32
FM Deviation
kHz
2.981
AF Freq
kHz
1.00400
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
300Hz HPF
Filter 2
3kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
43.5
mV
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 3 - External Audio (CE Bus
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
3100
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

RX Audio Gain

This phasing procedure is used to phase the deviation that results from normal audio levels.

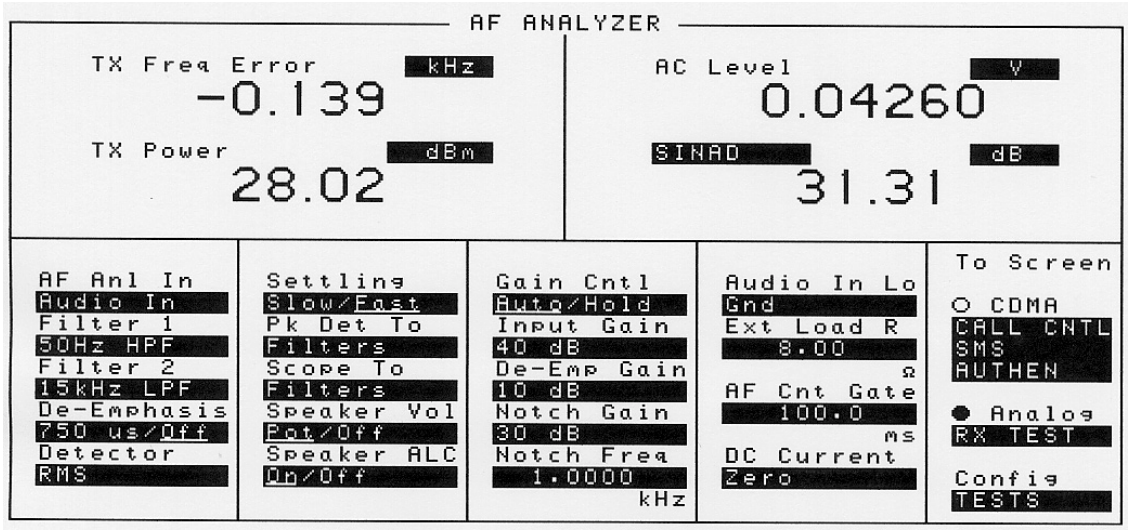
Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	7
LOW_LIMIT	34.4mV
TARGET	40mV
HIGH_LIMIT	45.6mV

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1and Output to 4, RX MUTE and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

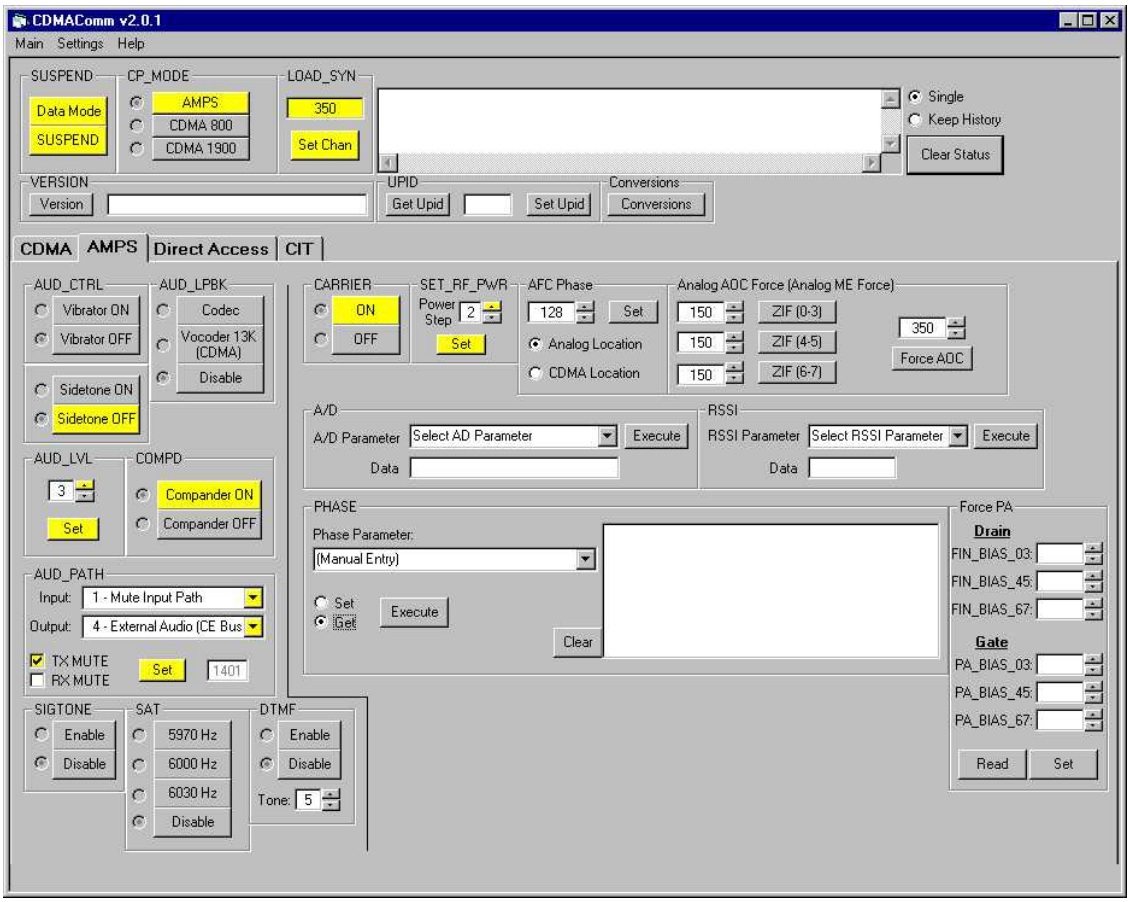
See View 5.

The Testset should be configured as follows: 15 kHz LPF, 50 Hz HPF, 750uSec De-emphasis. Input a -50 dBm signal modulated with a 1 kHz audio tone at 2.9 kHz peak deviation into the radio receiver. Set the audio analyzer to measure RMS audio input

Measure the audio level from the audio-out pin of the radio’s accessory connector


AF ANALYZER
TX Freq Error
kHz
-0.139
TX Power
dBm
28.02
AC Level
V
0.04260
SINAD
dB
31.31
AF Anl In
Audio In
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
RMS
Settling
Slow/Fast
Pk Det To
Filters
Scope To
Filters
Speaker Vol
Pot/Off
Speaker ALC
On/Off
Gain Cntl
Auto/Hold
Input Gain
40 dB
De-Emp Gain
10 dB
Notch Gain
30 dB
Notch Freq
1.0000
kHz
Audio In Lo
Gnd
Ext Load R
8.00
Ω
AF Cnt Gate
100.0
ms
DC Current
Zero
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS

View 5


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
CARRIER
ON
OFF
SET_RF_PWR
Power Step
2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
PHASE
Phase Parameter:
(Manual Entry)
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set
AUD_PATH
Input:
1 - Mute Input Path
Output:
4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
1401
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone:
5

RX Audio Muting

Test Limits	Level (dB)
Upper Limit	-40.0
Lower Limit	-90.0

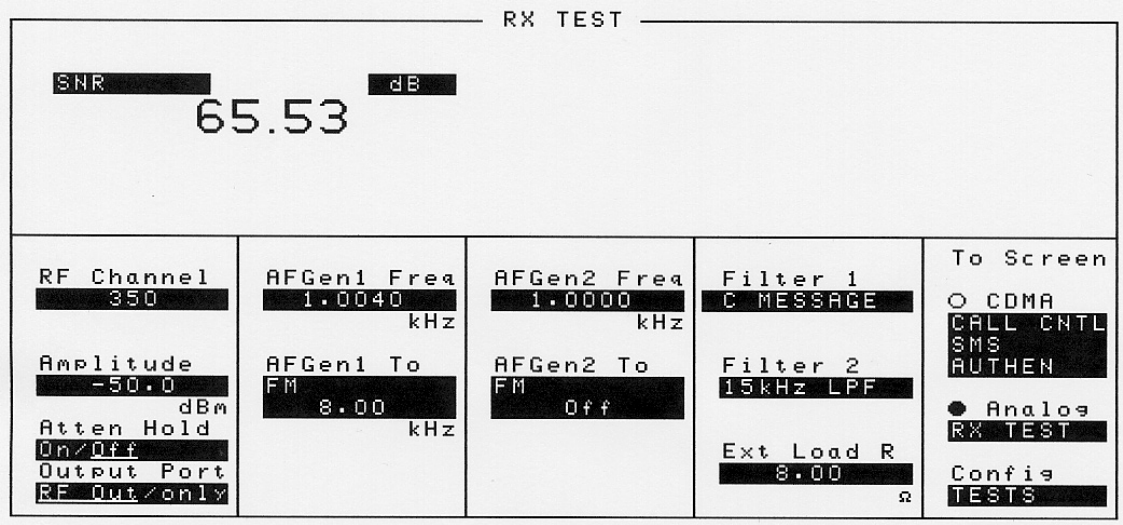
Set up the phone as follows:

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to 4 , TX MUTE and select SET .
- Set AUD_LVL to level 4.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

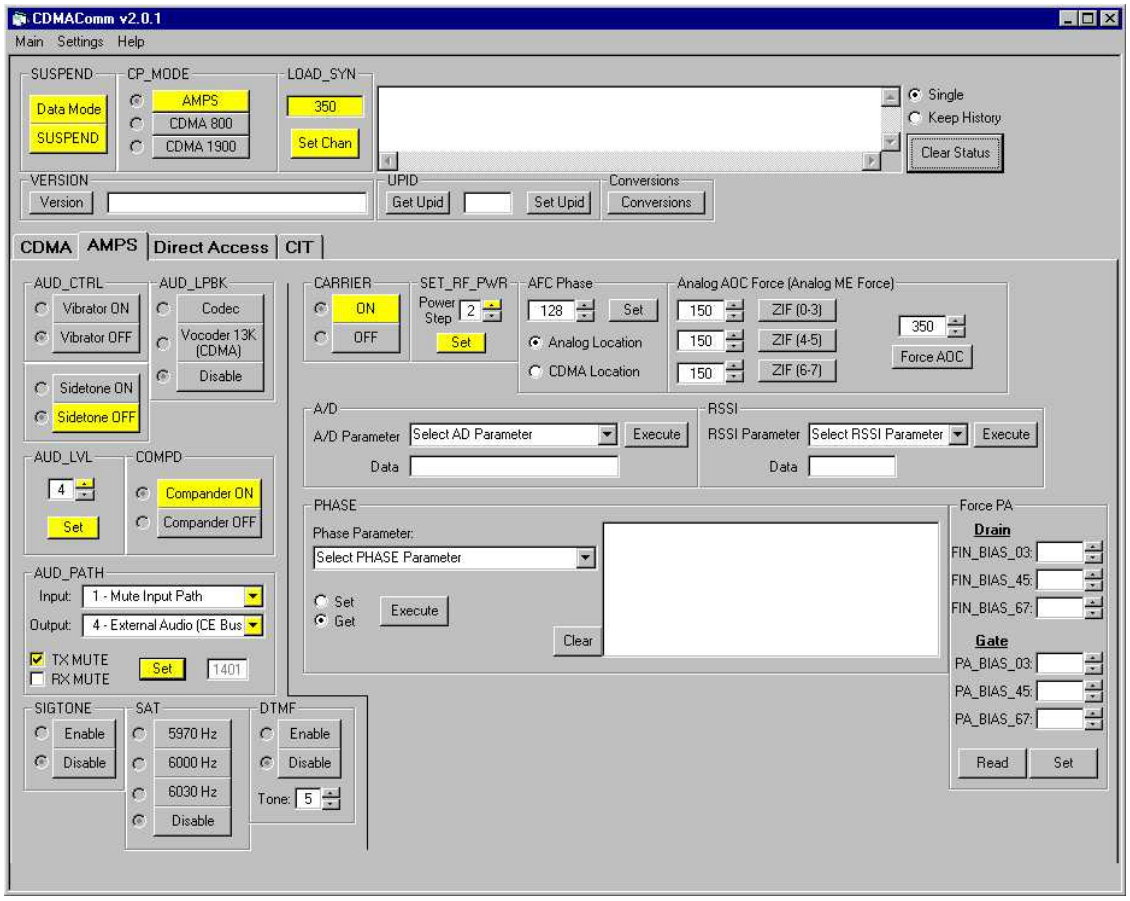
See View 6.

Set up the testset as follows: Apply an analog RF input signal at -50 dBm modulated with a 1004 Hz tone at 8 kHz peak deviation. Set the audio analyzer for 15 kHz LPF, C-message filtering, De-emphasis OFF, and RMS detector.

Measure the received audio signal at the audio-out pin of the Accessory connector. Reference the audio analyzer to the 1004 Hz tone. Use AUD_PATH to select path “1103h”. Measure the change in received audio level in dB with respect to the reference. The measured change in signal level must meet specifications.


RX TEST
SNR
65.53
dB
RF Channel
350
Amplitude
-50.0
dBm
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
FM
8.00
kHz
AFGen2 Freq
1.0000
kHz
AFGen2 To
FM
Off
Filter 1
C MESSAGE
Filter 2
15kHz LPF
Ext Load R
8.00
Ω
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS

View 6


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
4
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
1401
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

RX Distortion

Test Limits	Distortion Level (%)	Distortion Level (dB)
Upper Limit	5.0	-26.0
Lower Limit	0.1	-60.0

Set up the phone as follows:

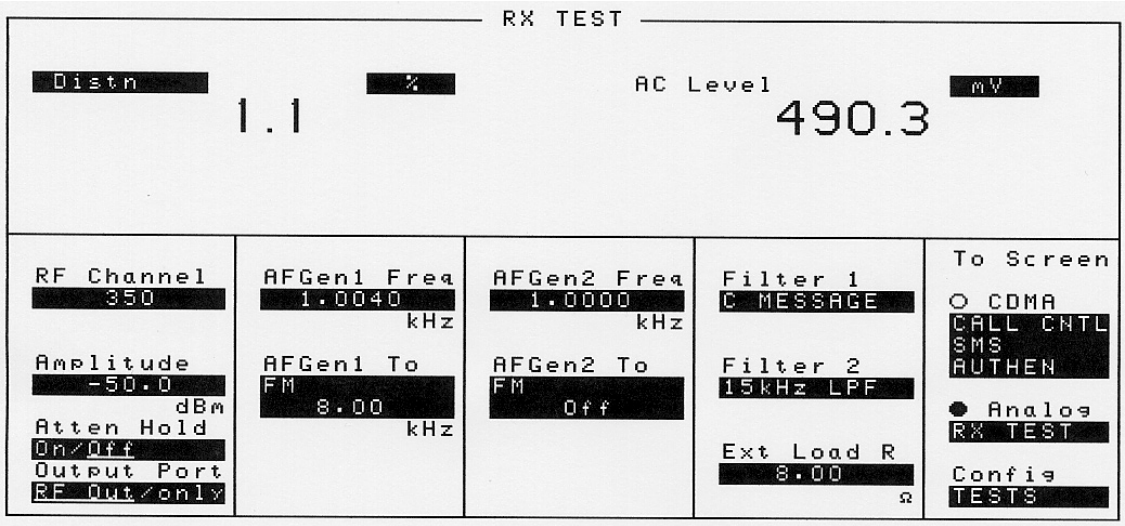
•

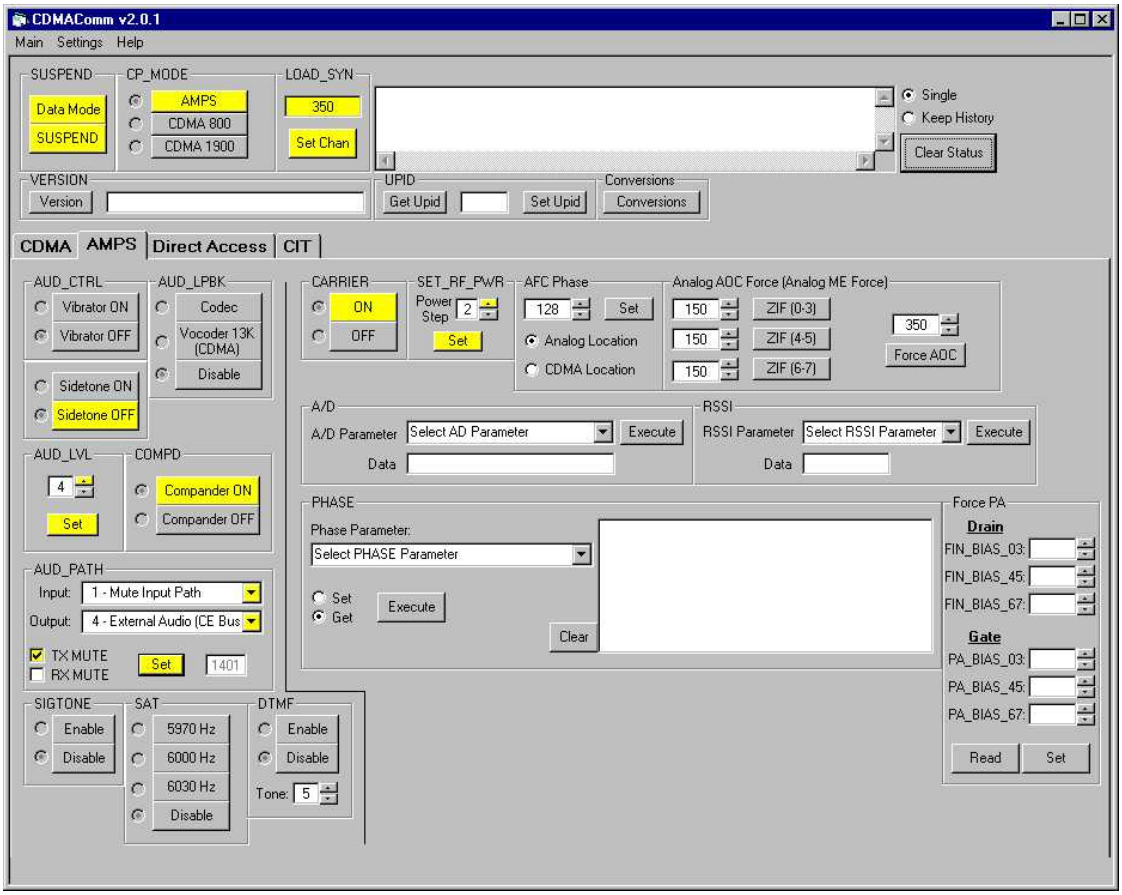
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to4, TX MUTE and select SET.
- Set AUD_LVL to level 4.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

See View 7.

Set up the test set as follows: Apply an analog RF input signal at -50 dBm modulated with a 1004 Hz tone at 8 kHz peak deviation. Set the audio analyzer for 15 kHz LPF, C-message filtering, De-emphasis OFF, and RMS detector. Measure the distortion of the received audio signal at the audio-out pin on the Accessory connector. Distortion must not exceed the specifications defined in Table.

View 7


RX TEST
Distn
1.1
%
AC Level
490.3
mV
RF Channel
350
Amplitude
-50.0
dBm
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
FM
8.00
kHz
AFGen2 Freq
1.0000
kHz
AFGen2 To
FM
Off
Filter 1
C MESSAGE
Filter 2
15kHz LPF
Ext Load R
8.00
Ω
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
4
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
1401
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AGC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AGC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

RX Hum and Noise

Rx Hum & Noise	Level (dB)
Upper Limit	-38
Lower Limit	-99

Set up the phone as follows:

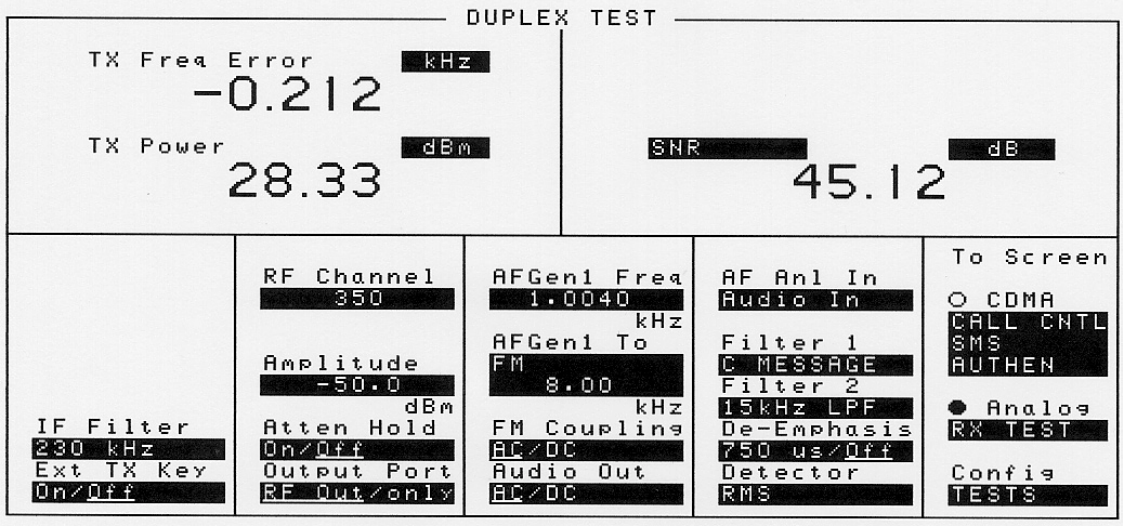
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading,set Input to 3 and Output to 4, and select SET.
- Set AUD_LVL to level 4.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

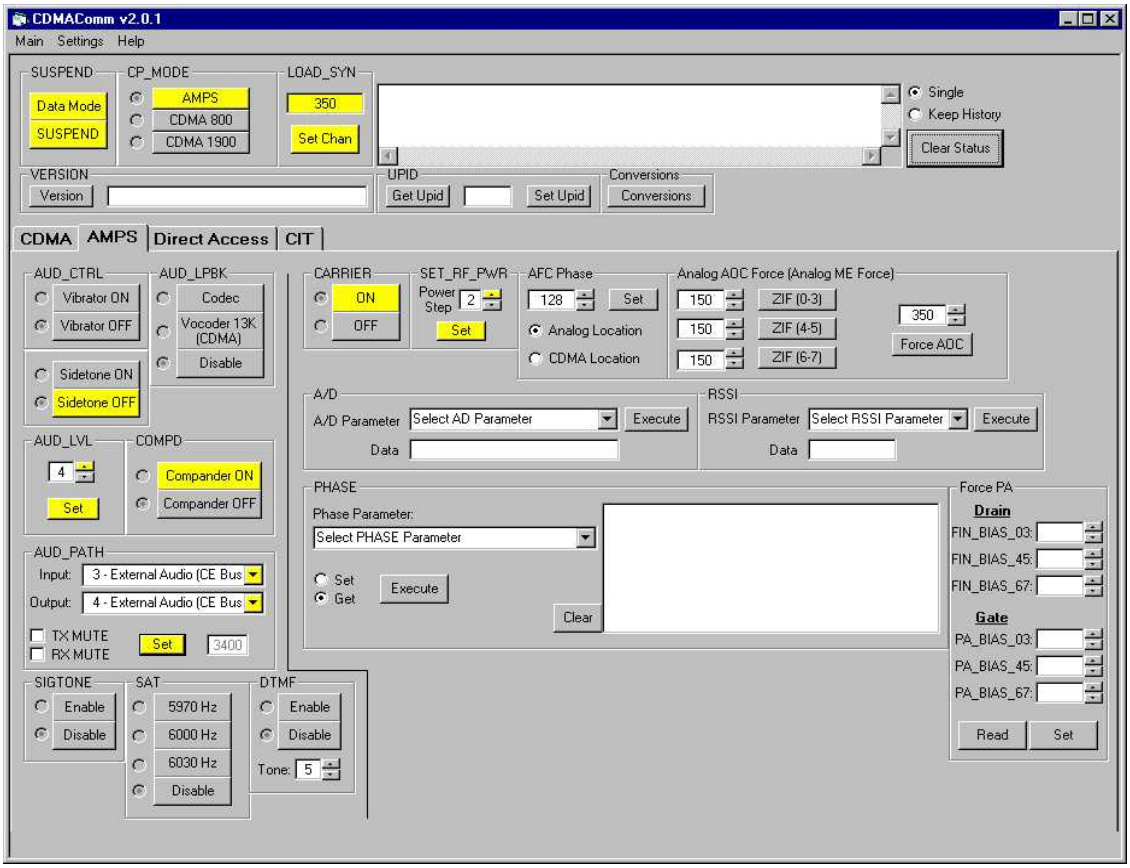
See View 8.

Set up the testset as follows: Apply an analog RF input signal at -50 dBm modulated with a 1004 Hz at 8 kHz deviation. Set the audio analyzer for 15 kHz LPF, C-message filtering, De-emphasis OFF, and RMS detector.

Measure the received audio signal at the Audio-Out pin of the Accessory connector. Reference the audio analyzer to the 1004 Hz tone. Remove the 1004Hz modulated tone from the RF input signal Measure the change in received audio level in dB with respect to the reference. The measured change in signal level must meet the specificationsdefined in Table.

View 8


DUPLEX TEST
TX Freq Error
kHz
-0.212
TX Power
dBm
28.33
SNR
dB
45.12
IF Filter
230 kHz
Ext TX Key
On/Off
RF Channel
350
Amplitude
-50.0
dBm
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
FM
8.00
kHz
FM Coupling
AC/DC
Audio Out
AC/DC
AF Anl In
Audio In
Filter 1
C MESSAGE
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
RMS
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
4
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 3 - External Audio (CE Bus
Output: 4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
3400
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

RX Response

Test Limits	Level at 300Hz	Level at 300khz
Upper Limit	11.5	-8.5
Lower Limit	4.4	-15.6

Set up the phone as follows:

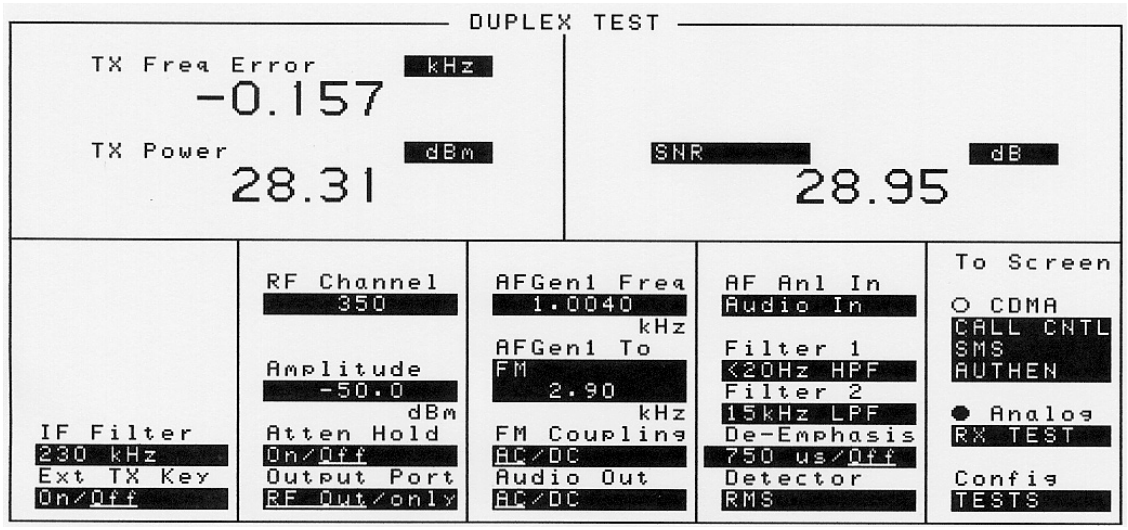
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading,set Input to 1 and Output to4, TX MUTE and select SET.
- Set AUD_LVL to level 4.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

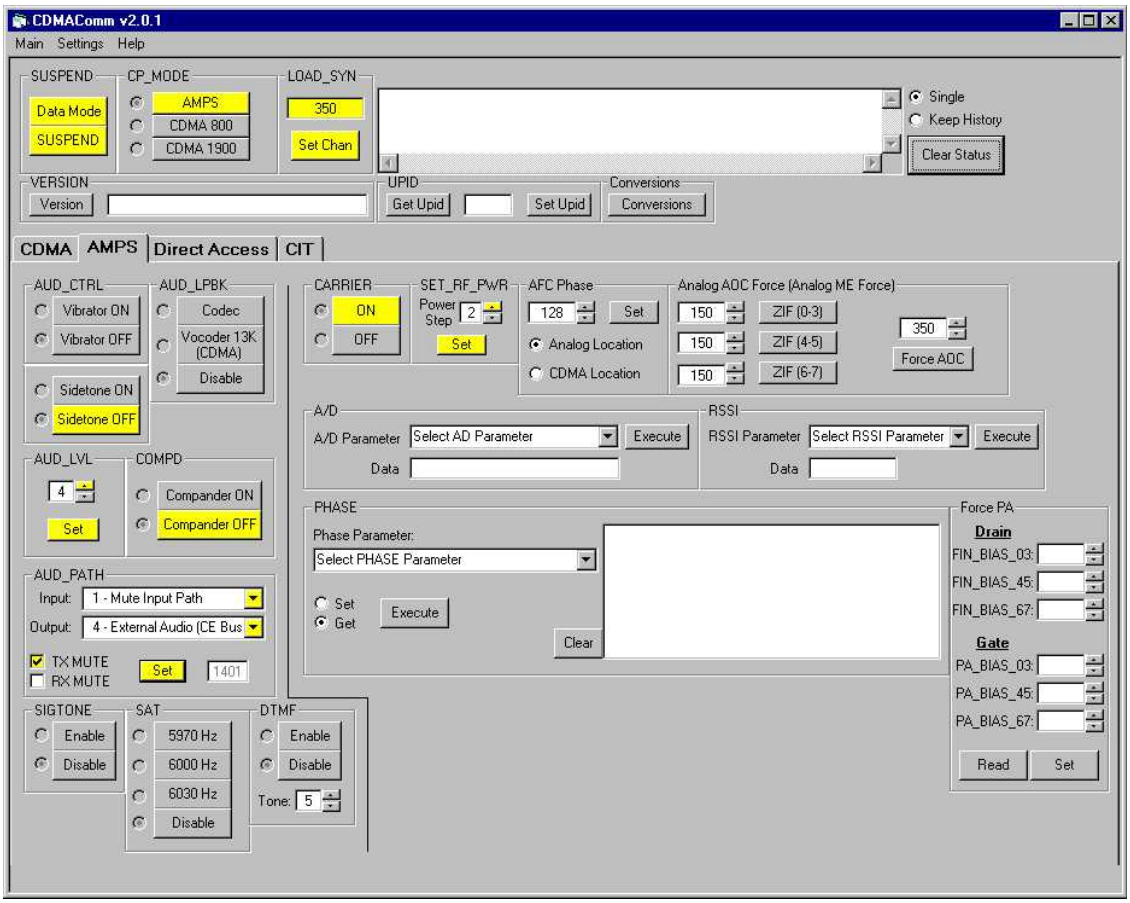
See View 9.

Set up the testset as follows: Apply an analog RF input signal at amplitude -50 dBm modulated with a 1004 Hz tone at 2.9 kHz peak deviation. Set the audio analyzer for 15 kHz LPF, 20 Hz HPF, De-emphasis OFF, and RMS Detector.

Measure the received audio at the audio-out pin on the Accessory connector. Reference the audio analyzer to the 1004 Hz tone. Vary the RF input signal modulation frequency to 300 Hz and 3 kHz. Measure the change in received signal level with respect to the reference. The measured change in signal level must be within the specifications defined in table

View 9


DUPLEX TEST
TX Freq Error
kHz
-0.157
TX Power
dBm
28.31
SNR
dB
28.95
IF Filter
230 kHz
Ext TX Key
On/Off
RF Channel
350
Amplitude
-50.0
dBm
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
FM
2.90
kHz
FM Coupling
AC/DC
Audio Out
AC/DC
AF Anl In
Audio In
Filter 1
<20Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
RMS
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
4
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
1401
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

SAT Deviation

This phasing procedure is used to phase the deviation that results from normal audio levels.

Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	15
LOW_LIMIT	1.9kHz
TARGET	2.0kHz
HIGH_LIMIT	2.1kHz

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to 1, TX MUTE, RX MUTE and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under SAT heading, select 6000 Hz SAT Tone.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

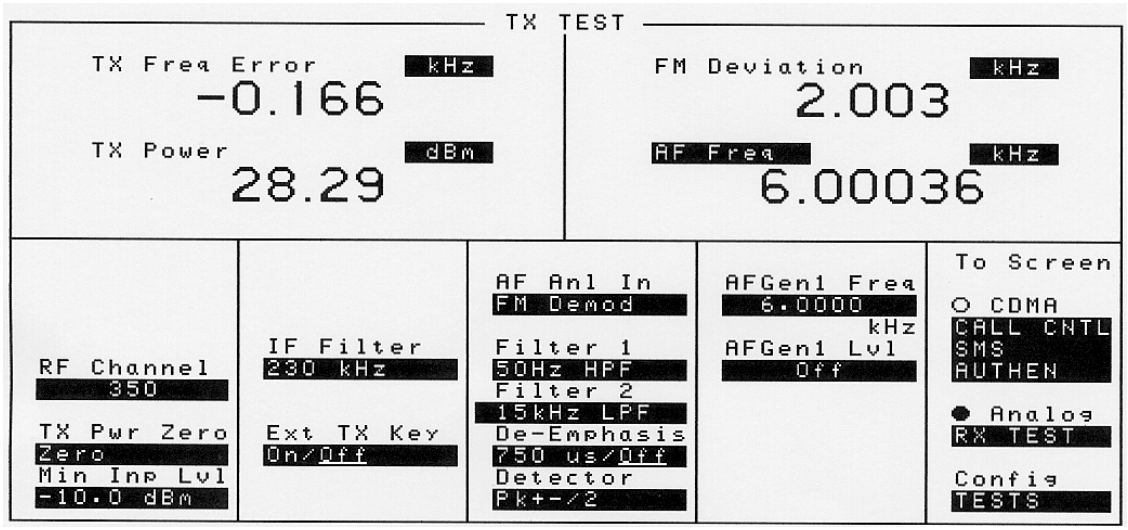
See View 10.

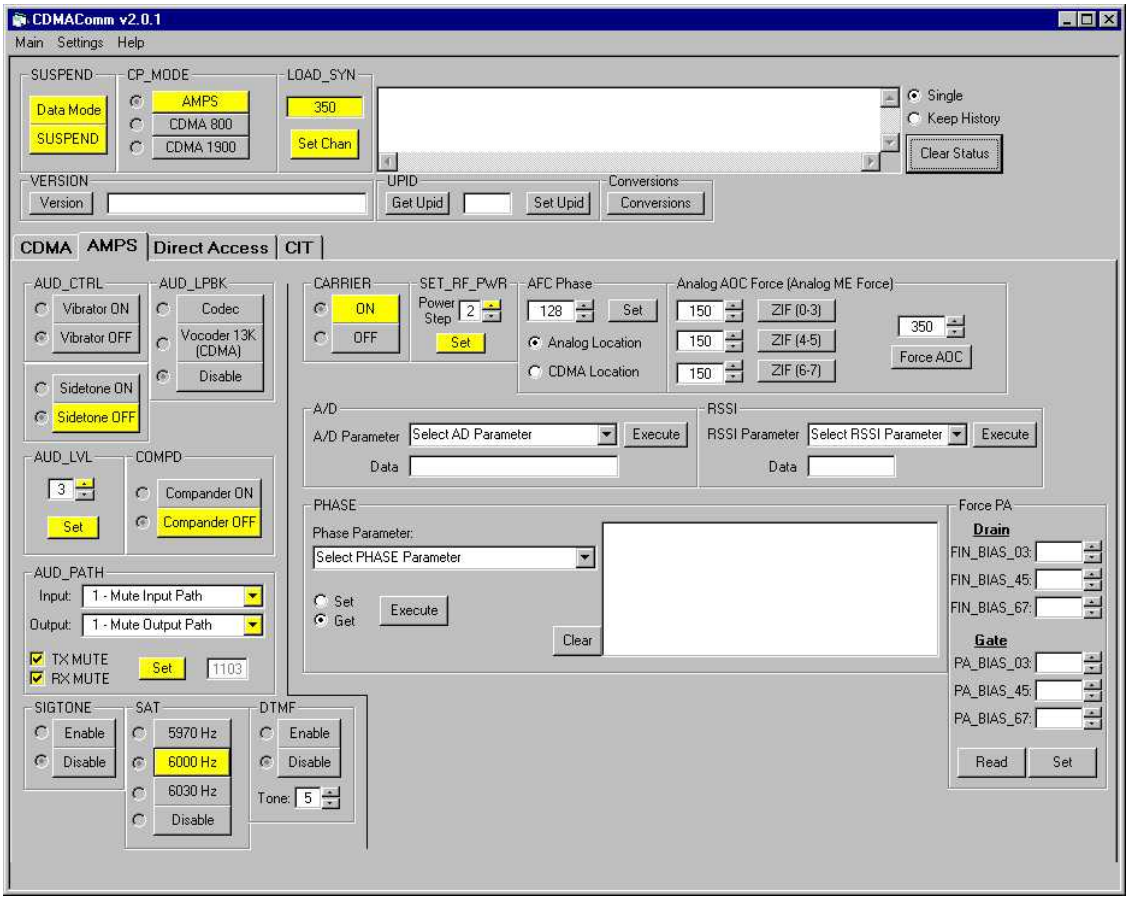
The Testset should be configured as follows:

*NOTE: The different testsets may require different filter settings for this test due to their internal filtering. HP8924's require calibration for this test due to the tolerances of the 6kHz BPF.

6 kHz BPF filtering, De-emphasis OFFInput a -50 dBm signal modulated with a 6kHz tone at 2 kHz peak deviation into the audio-in pin of the radio. Measure the peak frequency deviation in kHz.

View 10


TX TEST
TX Freq Error
kHz
-0.166
TX Power
dBm
28.29
FM Deviation
kHz
2.003
AF Freq
kHz
6.00036
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
6.0000
kHz
AFGen1 Lvl
Off
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA AMPS Direct Access CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
1103
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

Signalling Tone Deviation

This phasing procedure is used to phase the deviation that results from normal audio levels.

Parameter	Value
Test Voltage at Battery Terminals	3.60V
Test Voltage at Acc. Connector	4.40V
TEST_CHANNEL	350
MINIMUM_GAIN_SETTING	0
MAXIMUM_GAIN_SETTING	15
LOW_LIMIT	7.6kHz
TARGET	8.0kHz
HIGH_LIMIT	8.4kHz

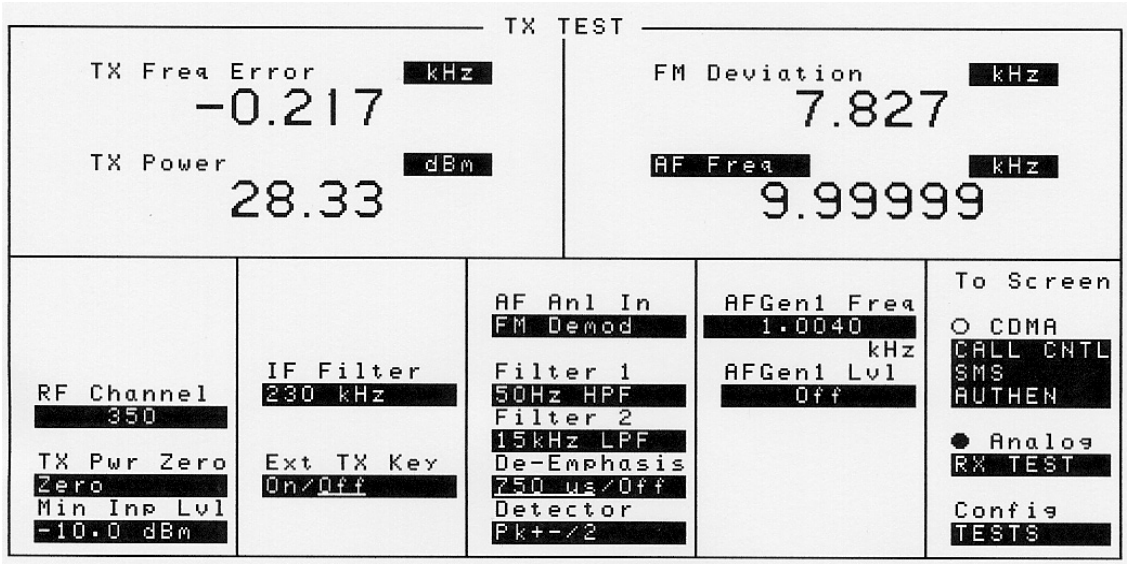
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to 1, TX MUTE RX MUTE and select SET
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under SIGTONE heading, select Enable.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

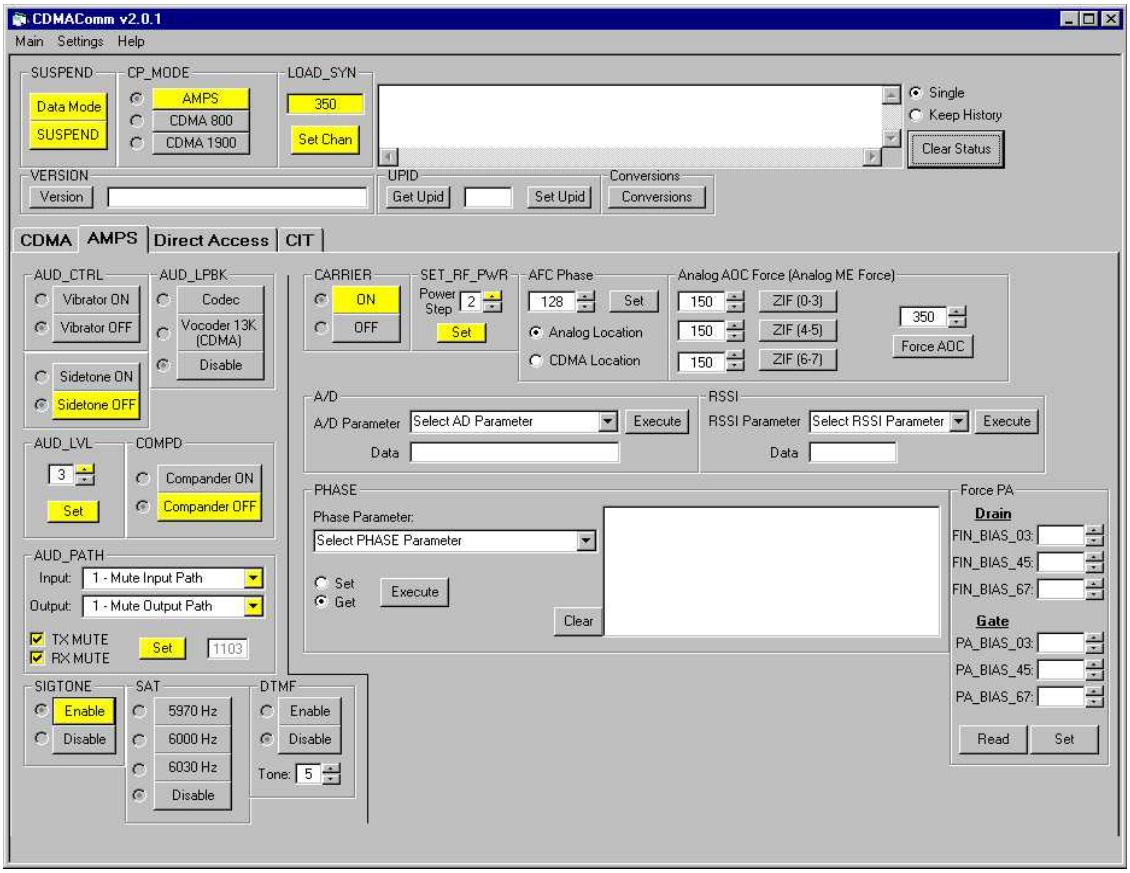
See View 11.

The Testset should be configured as follows: 15 kHz LPF, 50Hz HPF, 750uSec De-emphasis. Set equipment to measure FM Deviation.

Measure the peak frequency deviation in kHz.

View 11


TX TEST
TX Freq Error
kHz
-0.217
TX Power
dBm
28.33
FM Deviation
kHz
7.827
AF Freq
kHz
9.99999
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
Off
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
1103
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

RX Sensitivity (SINAD)

Parameter	Value
Lower Limit	12
Upper Limit	35
Channel(1)	991
Channel(2)	350
Channel(3)	799

Set up the phone as follows:

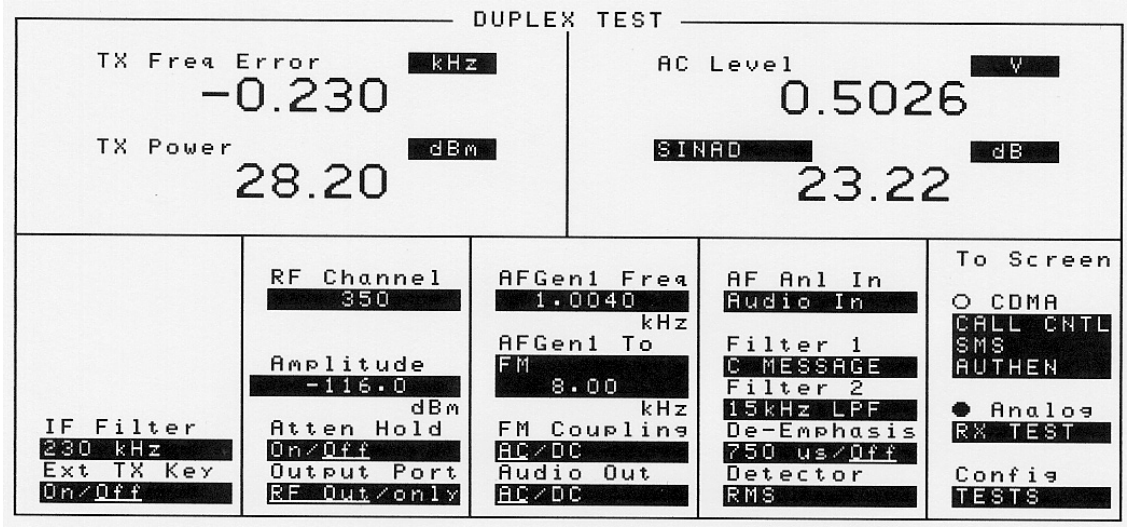
- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 1 and Output to 4, TX MUTE and select SET.
- Set AUD_LVL to level 4.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

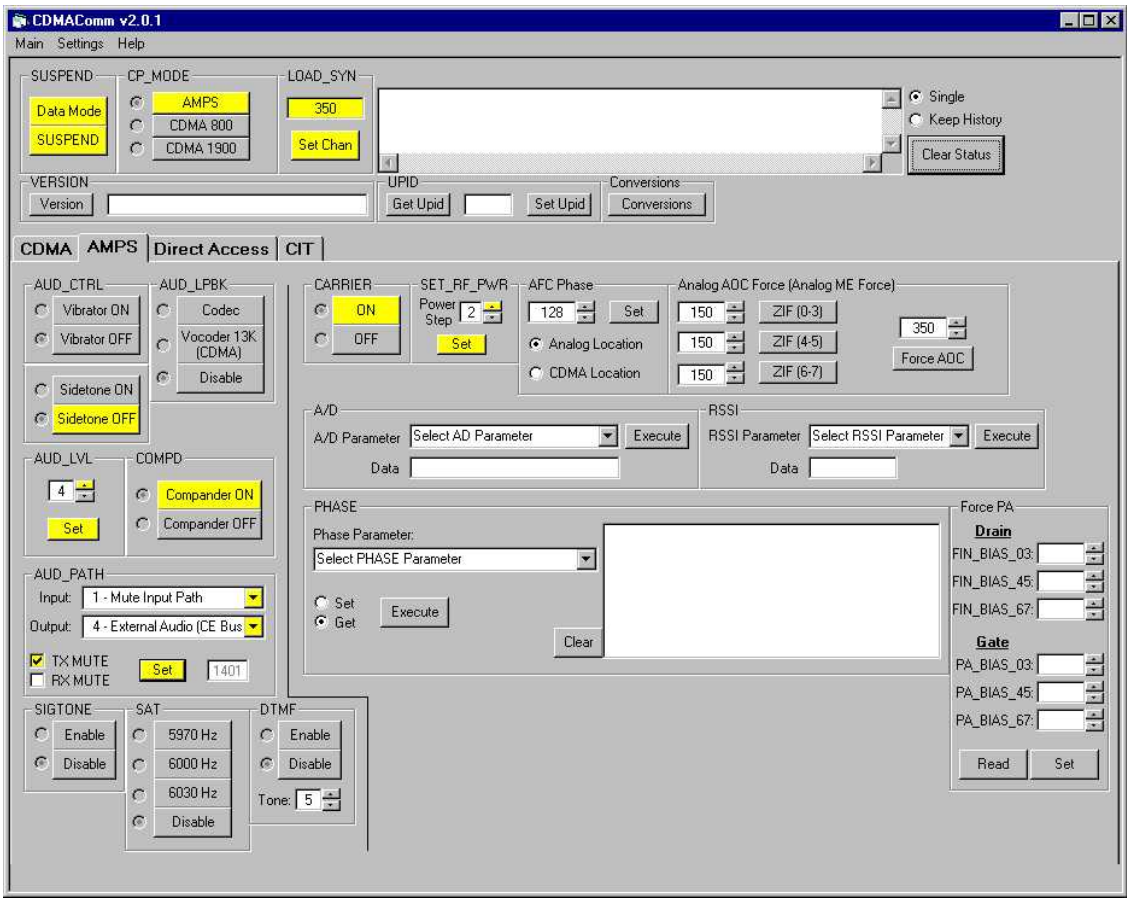
See View 12.

Set up the testset as follows: Apply an analog RF input signal at -116 dBm modulated with a 1004 Hz tone at 8 kHz peak deviation. Set the audio analyzer for 15 kHz LPF, C-message filtering, De-emphasis OFF, and RMS detector.

Measure SINAD of the received audio signal at the audio-out pin on the Accessory connector. The measured SINAD must meet the specifications defined in table.

View 12


DUPLEX TEST
TX Freq Error
kHz
-0.230
TX Power
dBm
28.20
AC Level
V
0.5026
SINAD
dB
23.22
IF Filter
230 kHz
Ext TX Key
On/Off
RF Channel
350
Amplitude
-116.0
dBm
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
FM
8.00
kHz
FM Coupling
AC/DC
Audio Out
AC/DC
AF Anl In
Audio In
Filter 1
C MESSAGE
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
RMS
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
4
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 1 - Mute Input Path
Output: 4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
1401
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

TX Audio Muting

Test Limits	Level (dB)
Upper Limit	-40
Lower Limit	-90

Set up the phone as follows:

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 3 and Output to1, RX MUTE and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

See View 13.

Set up the testset as follows: Set the analyzer to 750 µSec De-emphasis, 15 kHz LP filtering.

Detector: Peak (+/-) /2

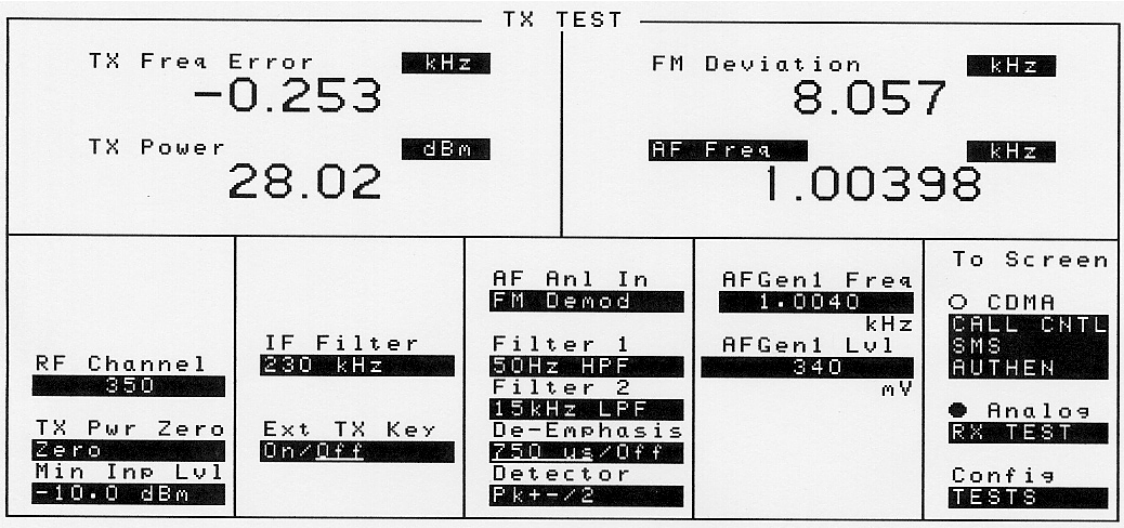
Input a 1004 Hz TX modulation signal to the audio-in pin of the Accessory connector at a level to get 8 kHz peak deviation. Set the audio analyzer for C-message filtering and RMS detector.

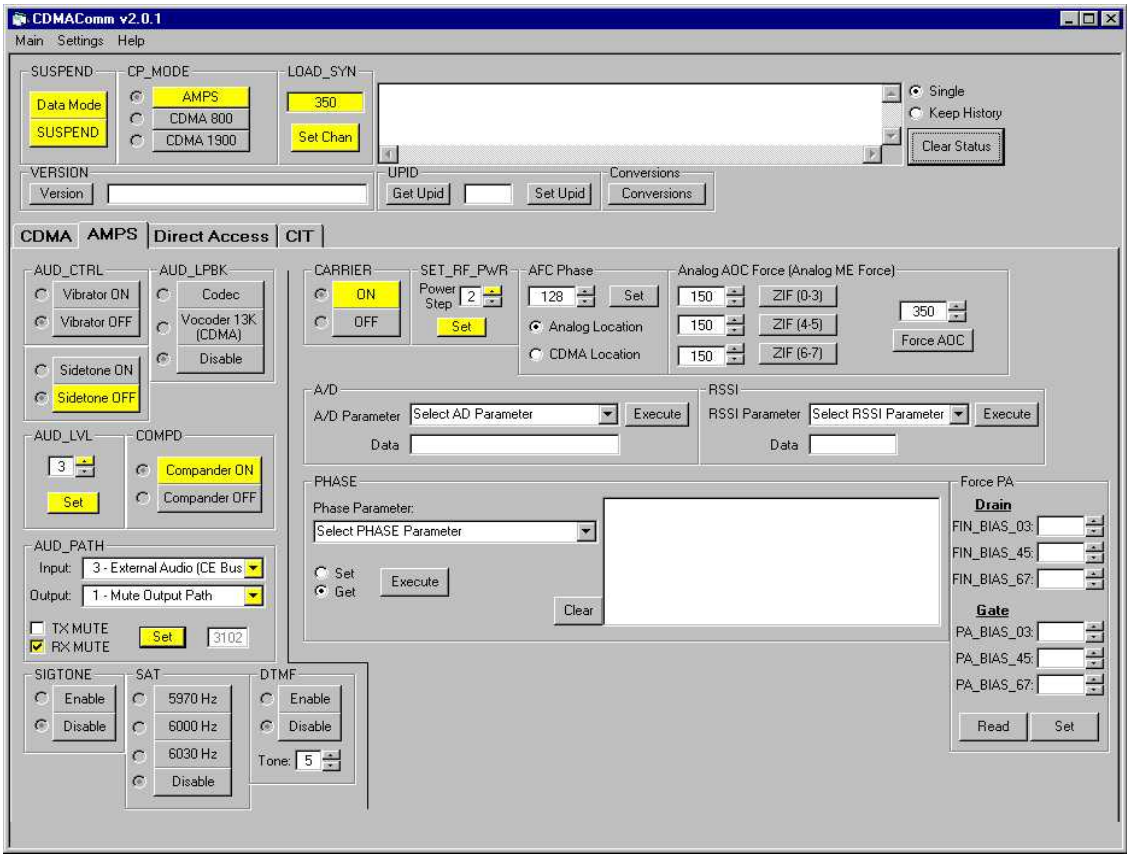
Measure the demodulated output from the modulation analyzer. Reference the audio analyzer to the 1004 Hz tone.

Use AUD_PATH to select path “1103h”.

Measure the change in dB level on the audio analyzer with respect to the reference. Measured change must meet the specification defined in table.

View 13


TX TEST
TX Freq Error
kHz
-0.253
TX Power
dBm
28.02
FM Deviation
kHz
8.057
AF Freq
kHz
1.00398
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
340
mV
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 3 - External Audio (CE Bus
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
3102
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

TX Distortion

Test Limits	Distortion Level (%)	Distortion Level (dB)
Upper Limit	5.0	-26.0
Lower Limit	0.1	-60.0

Set up the phone as follows:

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 3 and Output to 4 and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander ON.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

Seee View 14.

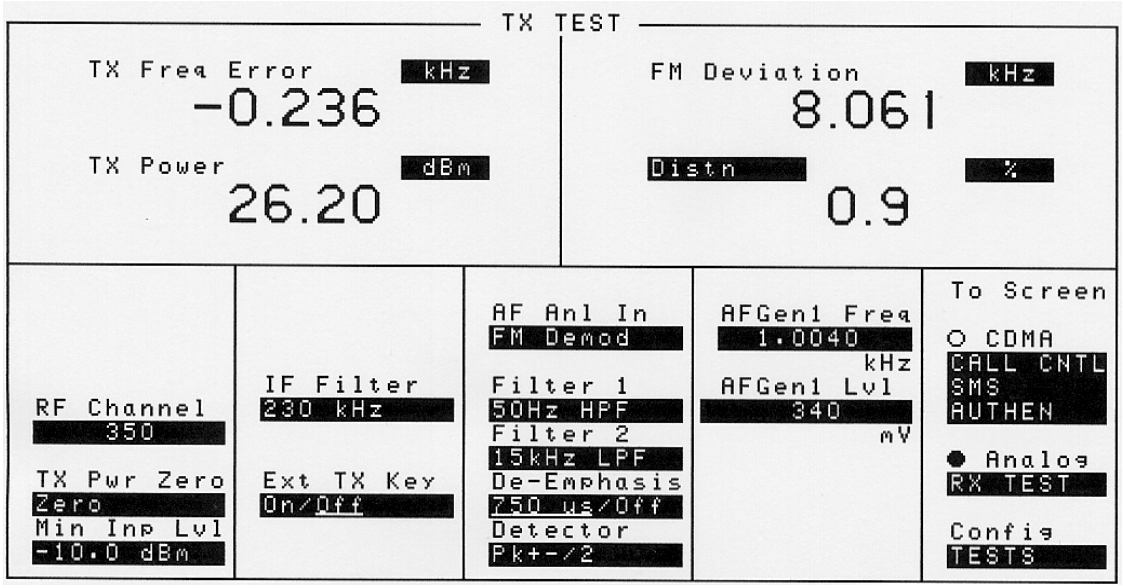
Set up the testset as follows: Set the Analyzer for 50 Hz HPF, 15 Khz LPF, and 750 µSec De-emphasis

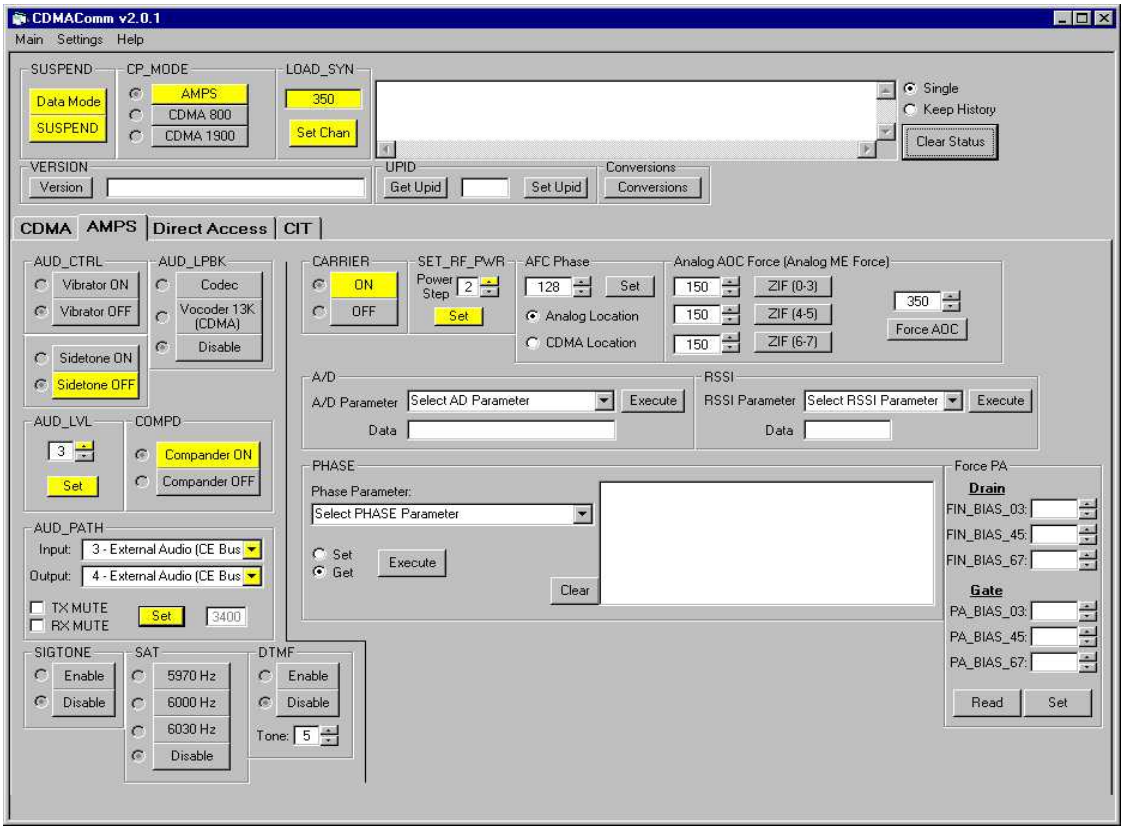
Detector: Peak (+/-) /2

Input a 1004 Hz modulating signal to the audio-in pin of the Accessory connector at a level to get 8 kHz peak deviation. Set the analyzer to C-message filtering and the detector to RMS. Measure the distortion.

The measured distortion must be less than the specifications defined in table.

View 14


TX TEST
TX Freq Error
kHz
-0.236
TX Power
dBm
26.20
FM Deviation
kHz
8.061
Distn
%
0.9
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
340
mV
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
CARRIER
ON
OFF
SET_RF_PWR
Power Step
2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set
AUD_PATH
Input:
3 - External Audio (CE Bus
Output:
4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
3400
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone:
5

TX Hum and Noise

TX Hum & Noise	Level (dB)
Upper Limit	-38
Lower Limit	-90

Set up the phone as follows:

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 3 and Output to 4 and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.
- Under COMPD, select Compander OFF.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

See View 15.

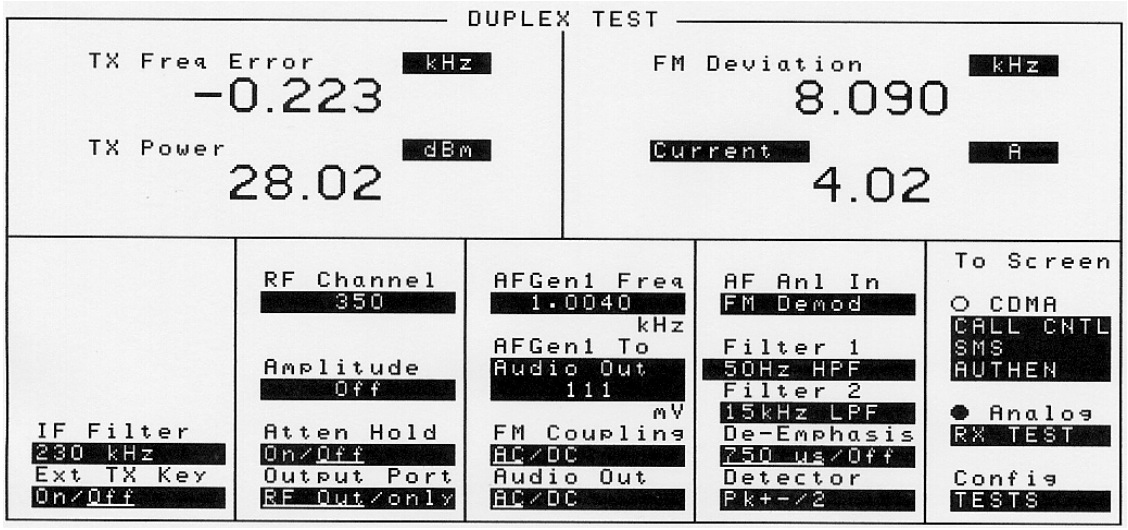
Set up the testset as follows:
750 µSec De-emphasis
50 Hz HPF
15 kHz LPF
Detector: Peak (+/-) /2

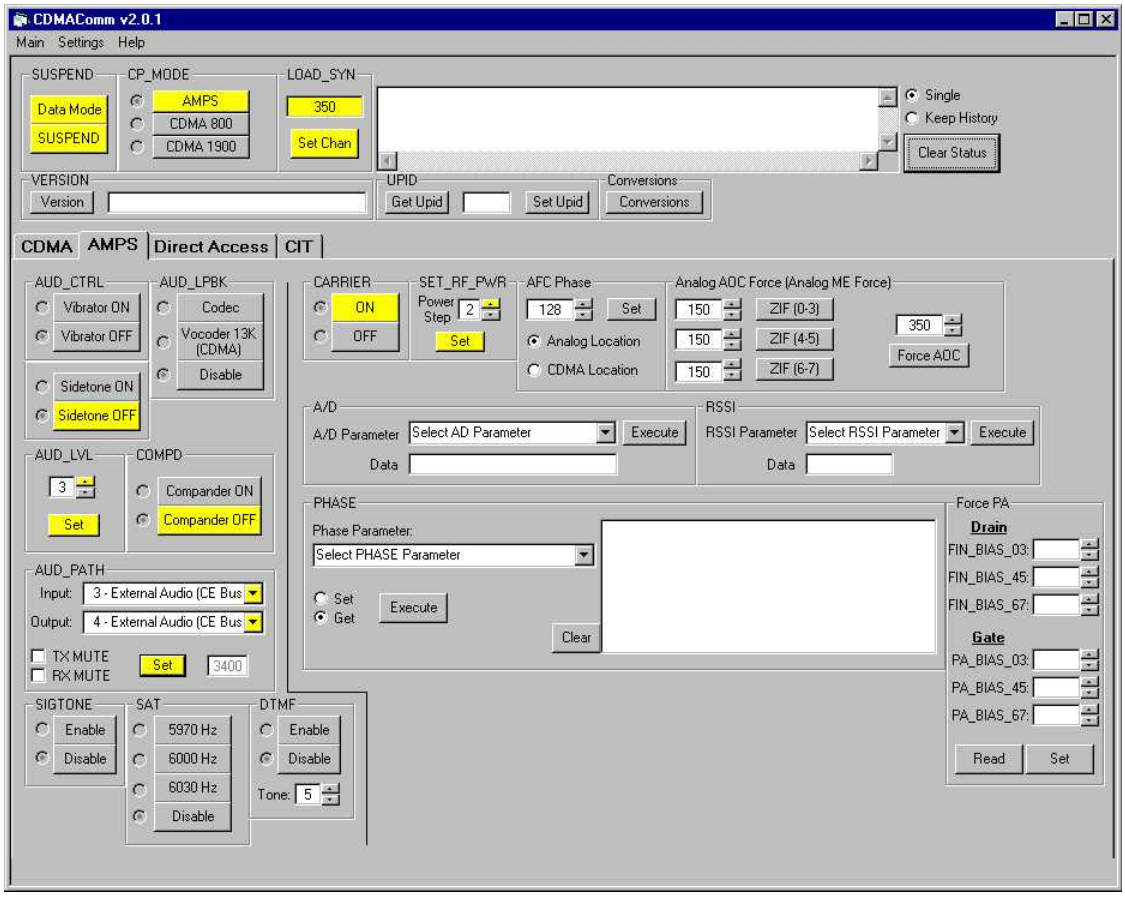
Input a 1004Hz modulation signal to the audio-in pin of the Accessory connector at a level to get 8 kHz peak deviation.

Change the analyzer for C-message filtering and RMS detector.

Measure the FM Deviation. Reference the audio analyzer to the 1004 Hz tone. Remove the Tx modulation signal from the audio-in pin of the Accessory connector and measure the change in dB level on the audio analyzer with respect to the reference. The measured change in signal level must meet the specifications defined in table.

View 15


DUPLEX TEST
TX Freq Error
kHz
-0.223
FM Deviation
kHz
8.090
TX Power
dBm
28.02
Current
A
4.02
IF Filter
230 kHz
Ext TX Key
On/Off
RF Channel
350
Amplitude
Off
Atten Hold
On/Off
Output Port
RF Out/only
AFGen1 Freq
1.0040
kHz
AFGen1 To
Audio Out
111
mV
FM Coupling
AC/DC
Audio Out
AC/DC
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
CARRIER
ON
OFF
SET_RF_PWR
Power Step
2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AGC Force (Analog ME Force)
150
ZIF (0-3)
150
ZIF (4-5)
150
ZIF (6-7)
350
Force AGC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set
AUD_PATH
Input:
3 - External Audio (CE Bus
Output:
4 - External Audio (CE Bus
TX MUTE
RX MUTE
Set
3400
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone:
5

TX Response

Test Limits	Level at 300Hz (dB)	Level at 3kHz (dB)
Upper Limit		10.5
Lower Limit	-13.5	4.9

Set up the phone as follows:

- Select the SUSPEND button to put the phone into Suspend Mode.
- Under CP_MODE, select the AMPS button to place the transceiver into Analog call processing mode.
- Under the LOAD_SYN heading, enter desired channel and select the Set Chan button to tune the radio to the ***TEST_CHANNEL***
- Under AUD_PATH heading, set Input to 3 and Output to 1, RX MUTE and select SET.
- Set AUD_LVL to level 3.
- Under AUD_CTRL, select Sidetone OFF.Under COMPD, select Compander OFF.
- Under SET_RF_PWR, set transceiver to power step 2.
- Under CARRIER, select ON to enable the analog carrier.

See View 16.

Set up the testset as follows: Set the Analyzer for 50 Hz HPF and 15 kHz LPF

Detector: Peak (+/-) /2

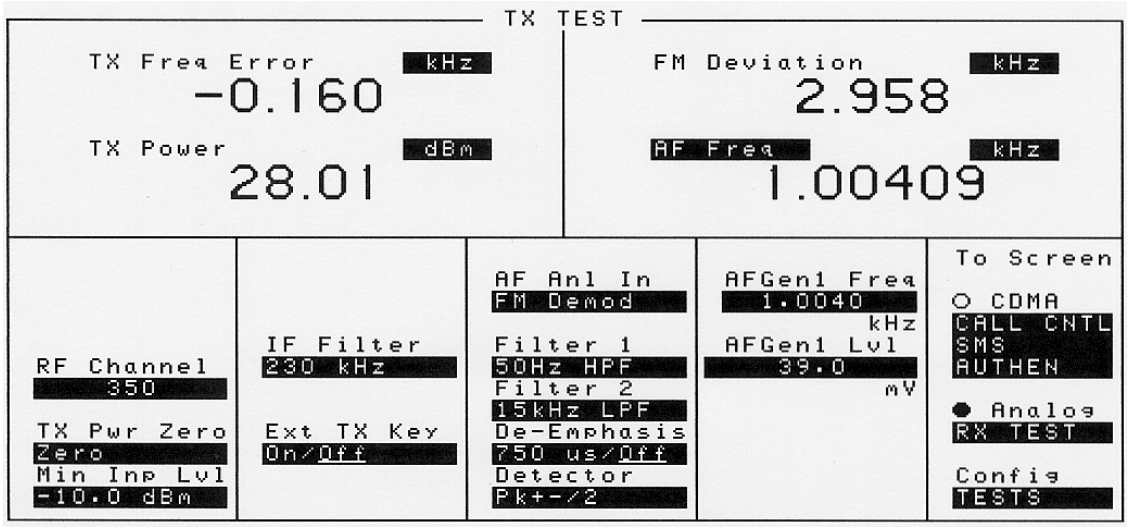
Input a 1004Hz modulating signal to the audio-in pin of the Accessory connector at a level to

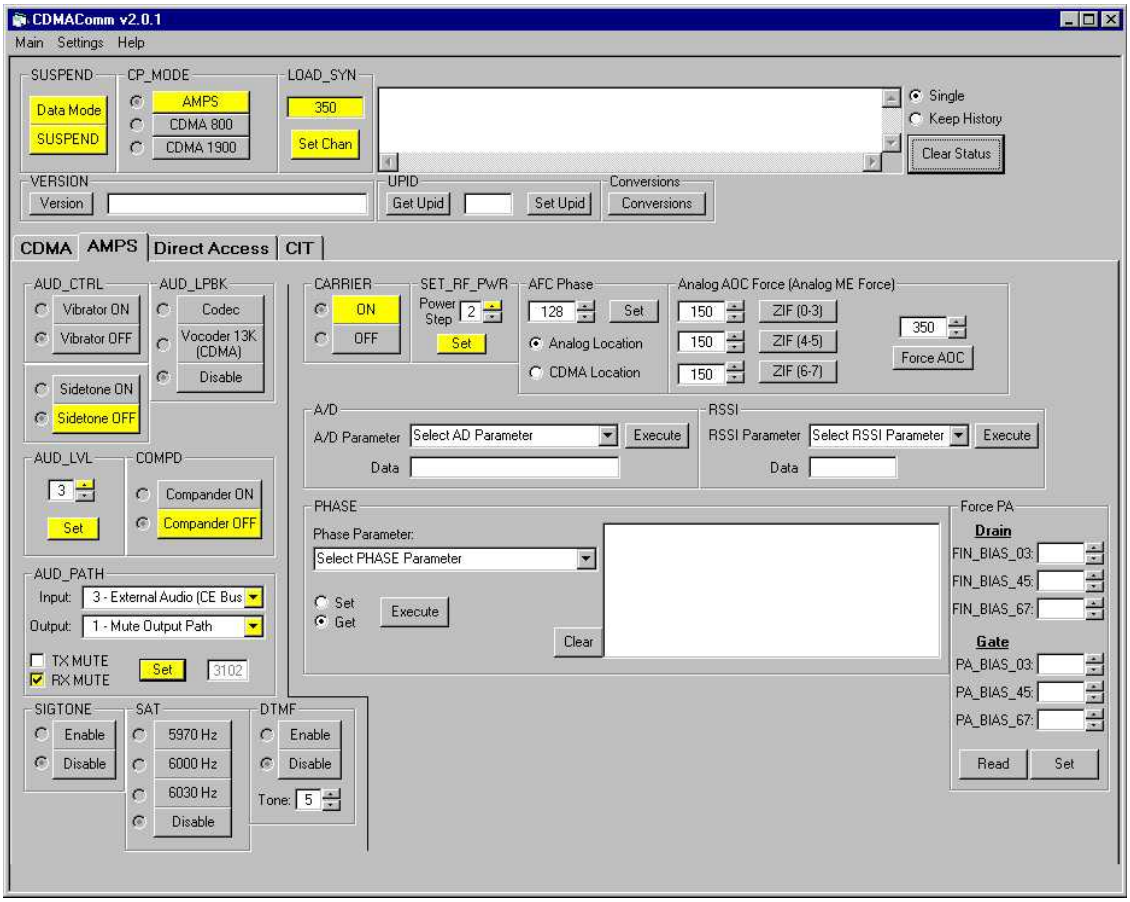
get 2.9 kHz peak deviation. Measure the FM Deviation.

Change the analyzer detector to RMS.

Reference the audio analyzer to the 1004 Hz tone. Vary the Tx modulation frequency to 300 Hz and 3 kHz. Measure the change in dB level on the audio analyzer with respect to the reference. The measured change must meet the specifications defined in table.

View 16


TX TEST
TX Freq Error
kHz
-0.160
TX Power
dBm
28.01
FM Deviation
kHz
2.958
AF Freq
kHz
1.00409
RF Channel
350
TX Pwr Zero
Zero
Min Inp Lvl
-10.0 dBm
IF Filter
230 kHz
Ext TX Key
On/Off
AF Anl In
FM Demod
Filter 1
50Hz HPF
Filter 2
15kHz LPF
De-Emphasis
750 us/Off
Detector
Pk+-/2
AFGen1 Freq
1.0040
kHz
AFGen1 Lvl
39.0
mV
To Screen
CDMA
CALL CNTL
SMS
AUTHEN
Analog
RX TEST
Config
TESTS


CDMAComm v2.0.1
Main Settings Help
SUSPEND
Data Mode
SUSPEND
CP_MODE
AMPS
CDMA 800
CDMA 1900
LOAD_SYN
350
Set Chan
Single
Keep History
Clear Status
VERSION
Version
UPID
Get Upid
Set Upid
Conversions
Conversions
CDMA
AMPS
Direct Access
CIT
AUD_CTRL
Vibrator ON
Vibrator OFF
Sidetone ON
Sidetone OFF
AUD_LPBK
Codec
Vocoder 13K (CDMA)
Disable
AUD_LVL
3
Set
COMPD
Compander ON
Compander OFF
AUD_PATH
Input: 3 - External Audio (CE Bus
Output: 1 - Mute Output Path
TX MUTE
RX MUTE
Set
3102
SIGTONE
Enable
Disable
SAT
5970 Hz
6000 Hz
6030 Hz
Disable
DTMF
Enable
Disable
Tone: 5
CARRIER
ON
OFF
SET_RF_PWR
Power Step 2
Set
AFC Phase
128
Set
Analog Location
CDMA Location
Analog AOC Force (Analog ME Force)
150
150
150
ZIF (0-3)
ZIF (4-5)
ZIF (6-7)
350
Force AOC
A/D
A/D Parameter
Select AD Parameter
Execute
Data
RSSI
RSSI Parameter
Select RSSI Parameter
Execute
Data
PHASE
Phase Parameter:
Select PHASE Parameter
Set
Get
Execute
Clear
Force PA
Drain
FIN_BIAS_03:
FIN_BIAS_45:
FIN_BIAS_67:
Gate
PA_BIAS_03:
PA_BIAS_45:
PA_BIAS_67:
Read
Set

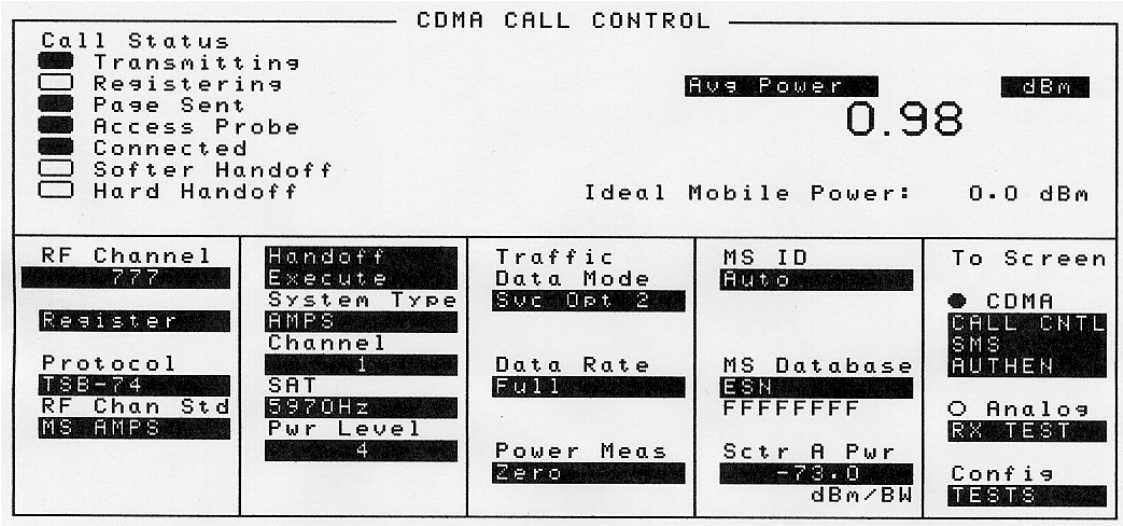
Receiver Sensitivity (FER)

Parameter	CDMA	PCS
LOW_CHANNEL	1013	25
MID_CHANNEL	350	650
HIGH_CHANNEL	735	1175
13KDATA_TRAF_LEVEL	-12.3dB	-12.3dB
RX_LEVEL	-104dBm (-102 dBM @ HOT Thermal)	-104dBm (-102 dBM @ HOT Thermal
FER_LIMIT	0.5% FER	0.5% FER

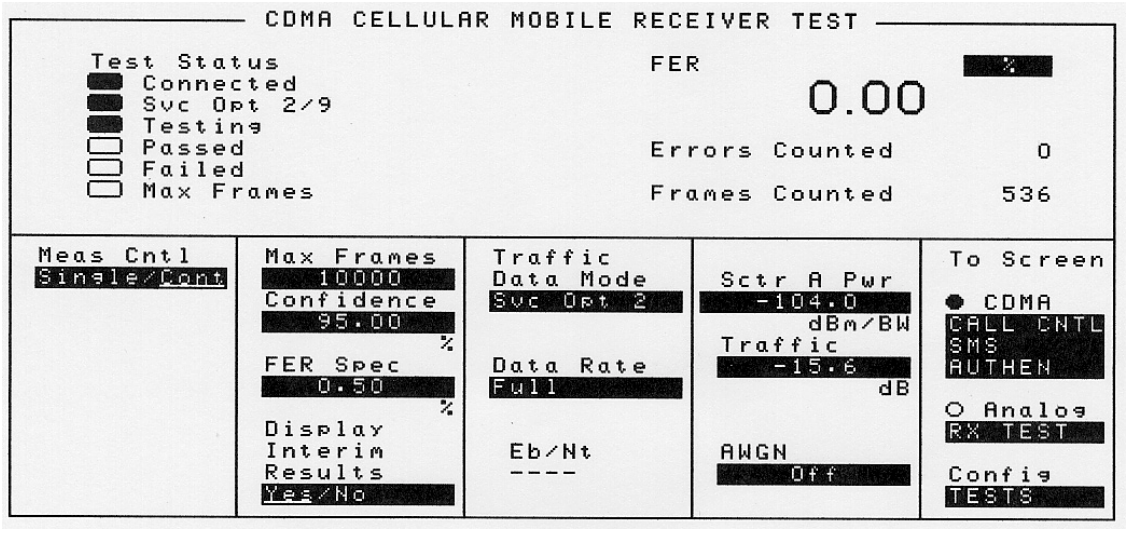
- Phone should be powered on and in a 13K/RateSet2 CDMA Full Rate Data Call.
- Depending on which Data Rate, set the Traffic Level accordingly to either ***13KDATA_TRAF_LEVEL***. See 800 or PCS Screen 1.
- When the call is established, reduce the RF amplitude to ***RX_LEVEL***.
- See 800 or PCS Screen 2.
- Measure FER over a maximum of 10000 frames to a confidence level of 95%.

The Frame Error Rate (FER) may not exceed ***FER_LIMIT*** as specified in table.

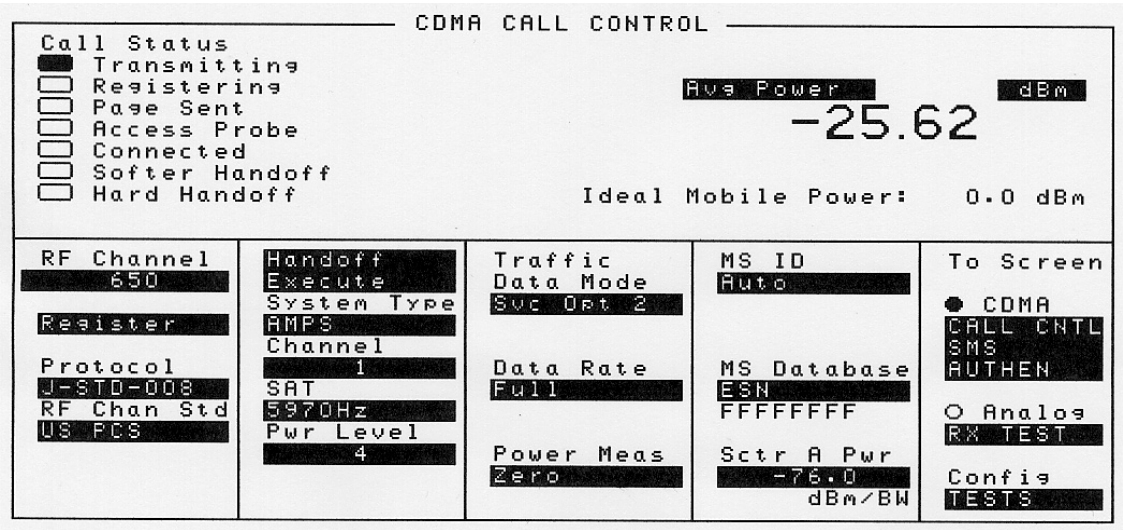
800 FER Screen 1



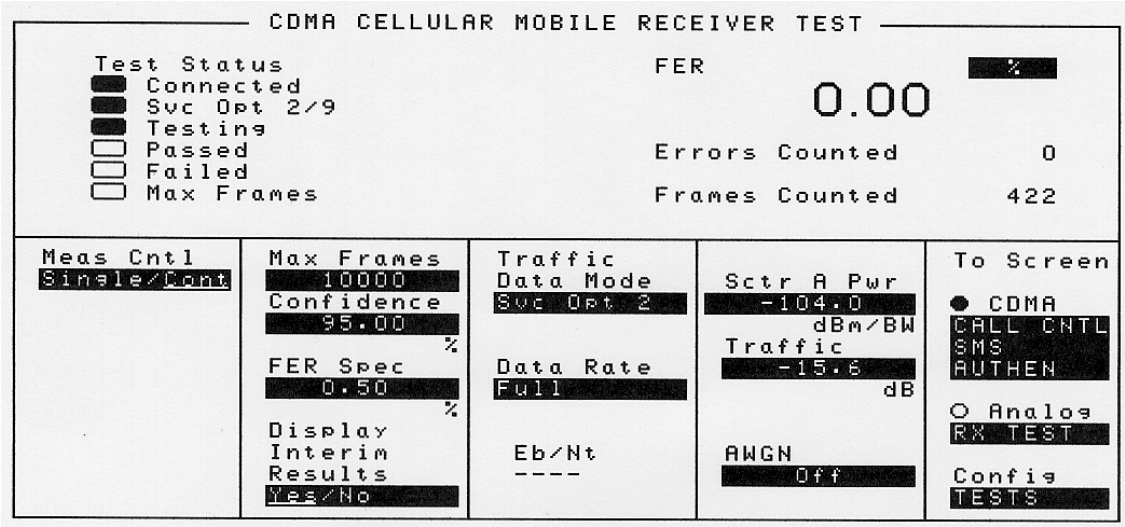
800 FER Screen 2



PCS FER Screen 1



PCS FER Screen 2



Receiver Sensitivity in the Presence of Noise (FER in AWGN)

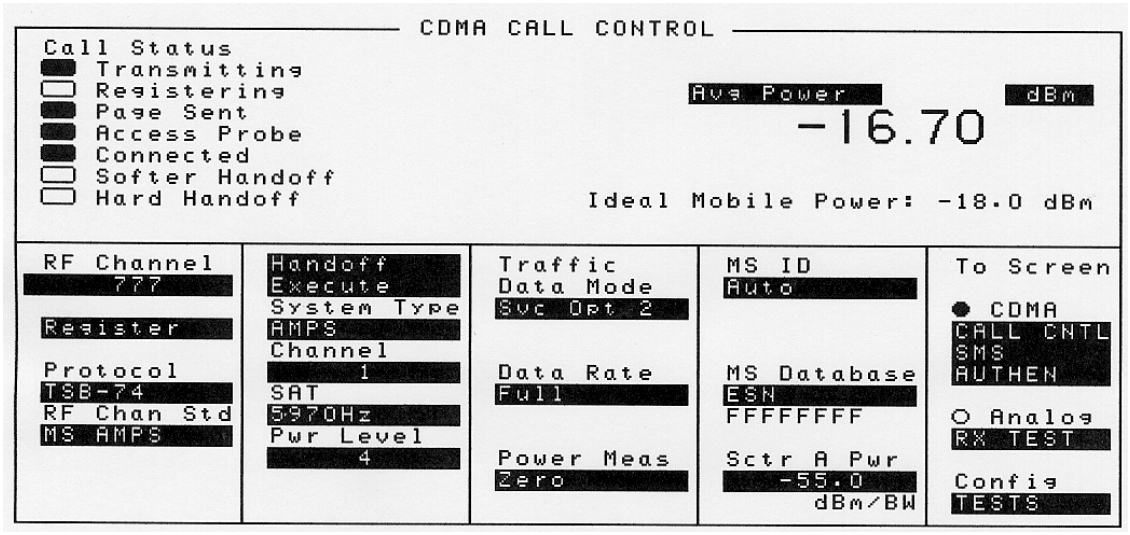
(Refer to Section 3.3.3 of IS-98C)

The test channels are given below:

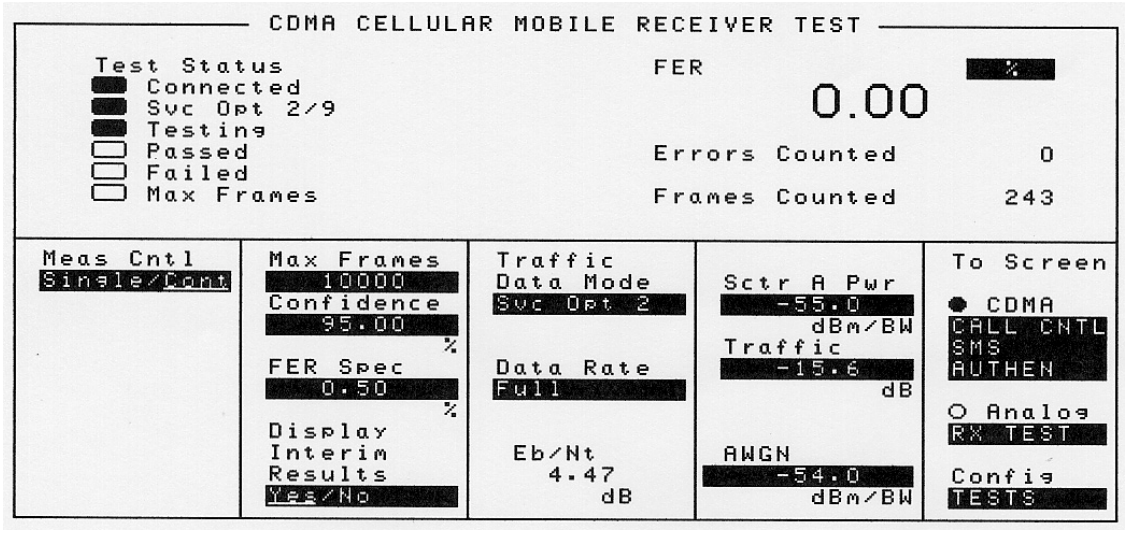
Parameter	CDMA	PCS
Test Voltage at Battery Terminals	3.60V	3.60V
Test Voltage at Acc. Connector	4.40V	4.40V
FER_LIMIT	0.5% FER	0.5% FER
RX_TEST_LEVEL	-55dBm	-55dBm
AWGN_LEVEL	-54dBm	-54dBm
13KDATA_TRAF_LEVEL	-12.4dB	-12.3dB
Low Test Channel	1013	25
Middle Test Channel	350	650
High Test Channel	735	1175

- Phone should be powered on and in a 13K/RateSet2 CDMA Full Rate Data Call.
- Depending on which Data Rate, set the Traffic Level accordingly to either ***13KDATA_TRAF_LEVEL***. See 800 or PCS FER AWGN SCREEN 1.
- Set the total Forward CDMA Channel power to ***RX_TEST_LEVEL***.
- Set the AWGN generator power to ***AWGN_LEVEL***.
- See 800 or PCS FER AWGN SCREEN 2
- Measure FER over a maximum of 10000 frames to a confidence level of 95%.
- Measured FER must be within the limits defined above in table.

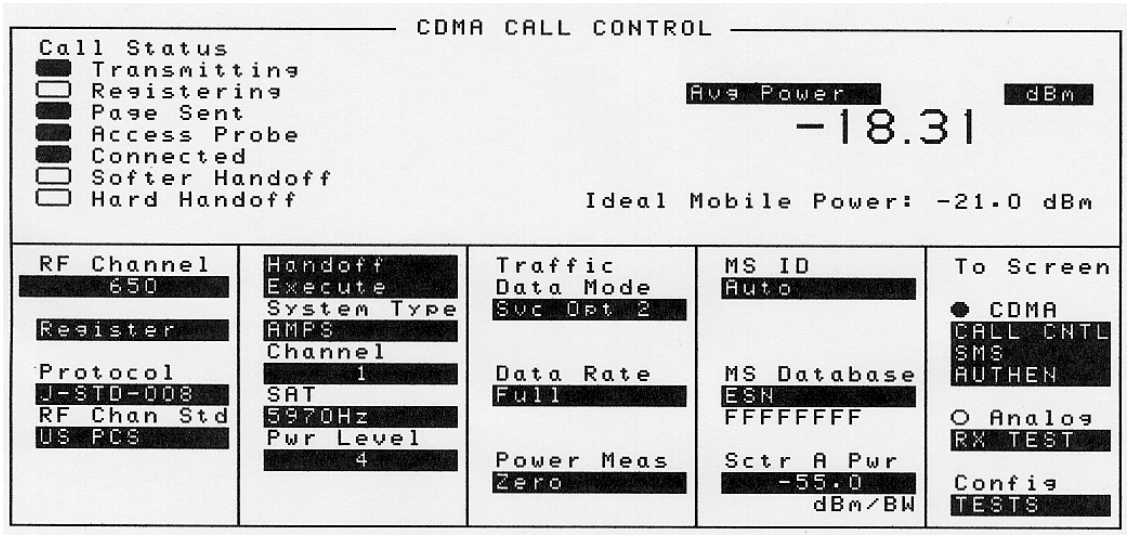
800 FERAWGN Screen 1



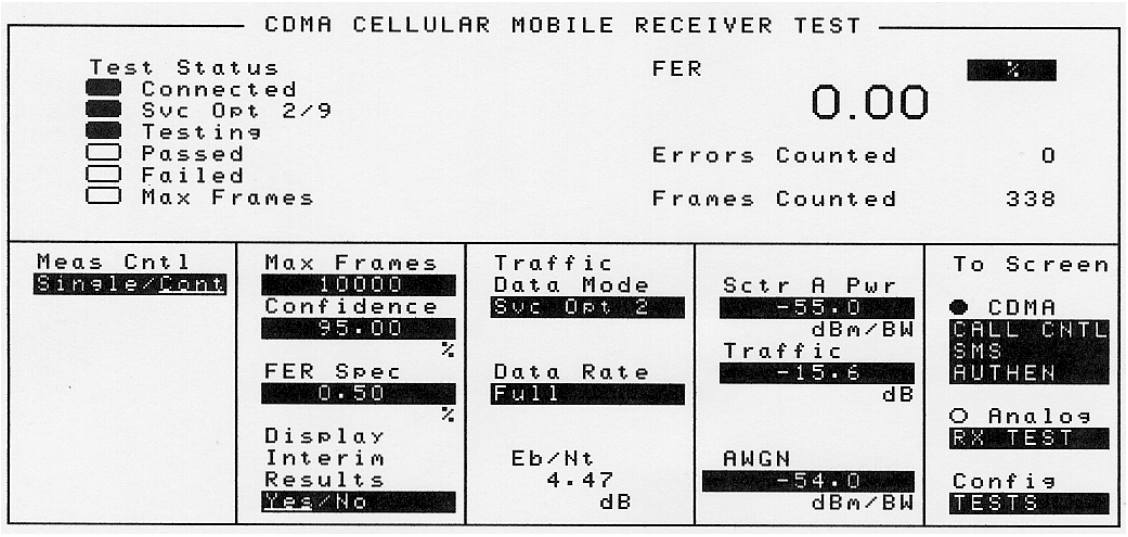
800 FER AWGN Screen 2



PCS FER AWGN Screen 1



PCS FER AWGN Screen 2



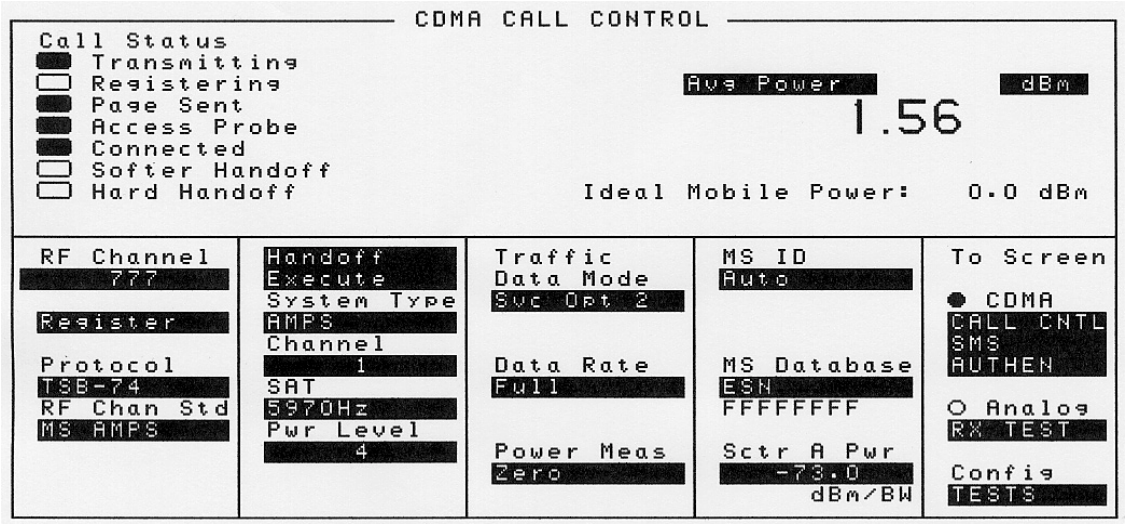
Quality (Rho)

Parameter	CDMA	PCS
RF_LEVEL	-73 dBm	-76 dBm
Upper Limit	1.000	1.000
Lower Limit	0.944	0.944

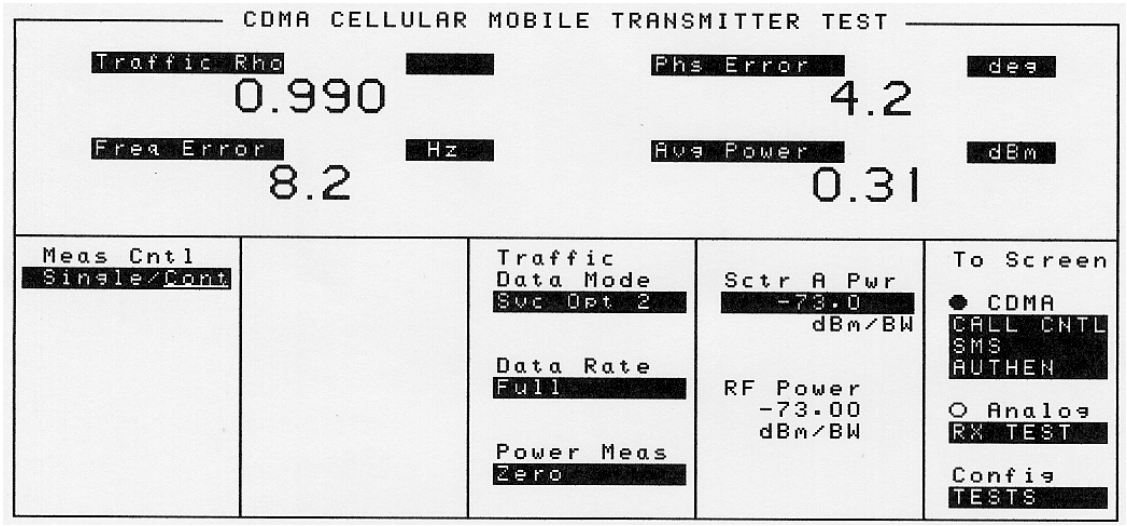
- Phone should be powered on and in a 13K/RateSet2 CDMA Full Rate Data Call.
- Use an RF Communications Test System to provide a CDMA RF Channel at amplitude **RF_LEVEL.**
- See 800 or PCS RHO SCREEN 1.
- Measure the transmitter waveform quality (Rho)
- The transmitter quality should be within the limits given in table.

See 800 or PCS RHO SCREEN 2.

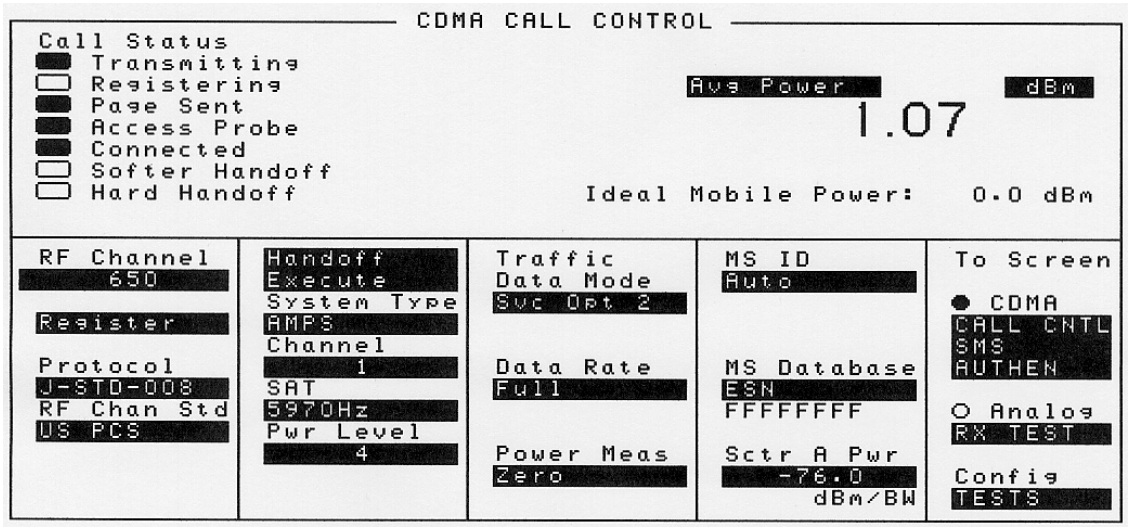
800 RHO Screen 1



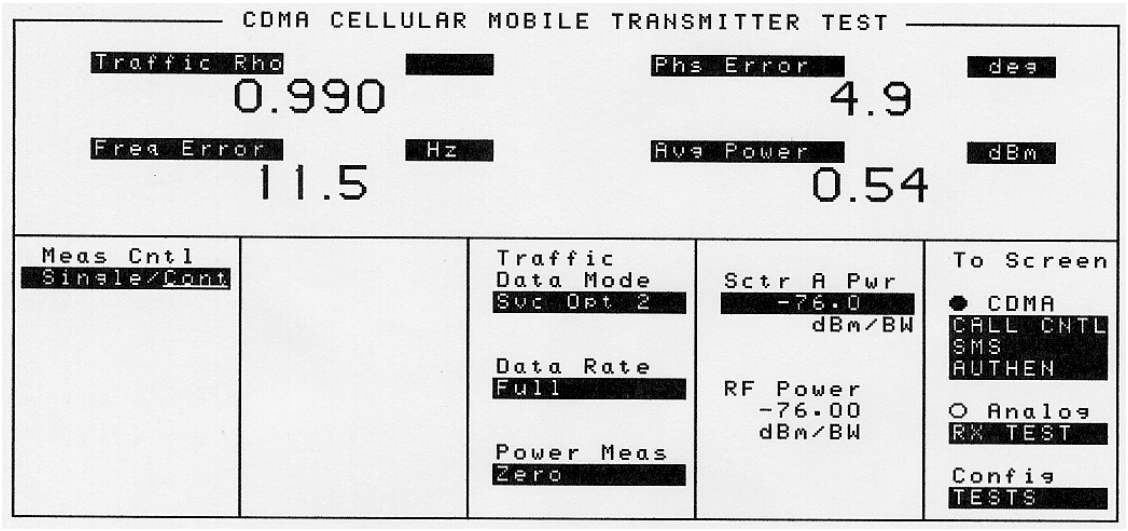
800 RHO Screen 2



PCS RHO Screen 1



PCS RHO Screen 2



Splatter at Maximum Output Power

Parameter	CDMA	PCS
Test Voltage at Battery Terminals	3.60V	3.60V
Test Voltage at Acc. Connector	4.40V	4.40V
RX_LEVEL	-104dBm	-104dBm
SPLATTER_LIMIT	-42dBc/ 30kHz	-42dBc/ 30kHz
FREQUENCY_OFFSET_HIGH	+0.885MHz	+1.25MHz
FREQUENCY_OFFSET_LOW	-0.885MHz	-1.25MHz
TEST_CHANNEL1	1013	25
TEST_CHANNEL2	350	600
TEST_CHANNEL3	777	1175

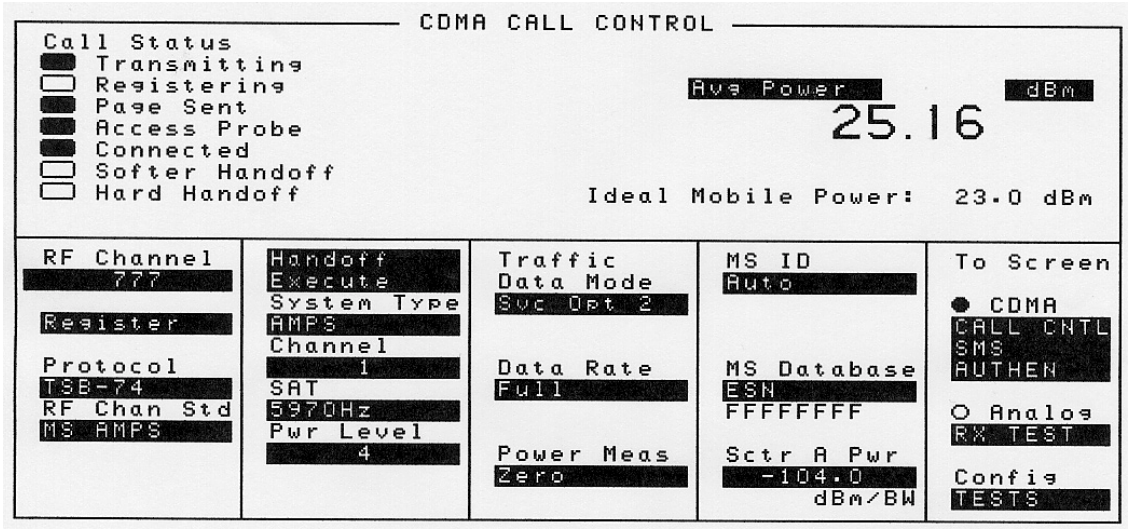
- Phone should be powered on and in a 13K/RateSet2 CDMA Full Rate Data Call. See 800 or PCS SPLATTER SCREEN 1.

NOTE: For a CMD80 test set which does not have a built in spectrum analyzer and cannot do Splatter measurements while in a call, the radio can be in Test Mode. The receiver is forced by using a Force RSSI_C_FILT to ***RX_LEVEL.*** Set the RX_ALG_CTL by using the PHASE command, Parameter "28" with data 0x0010. Then use the PHASE command, Parameter "21" with data ***RX_LEVEL*** in 11.4 format.

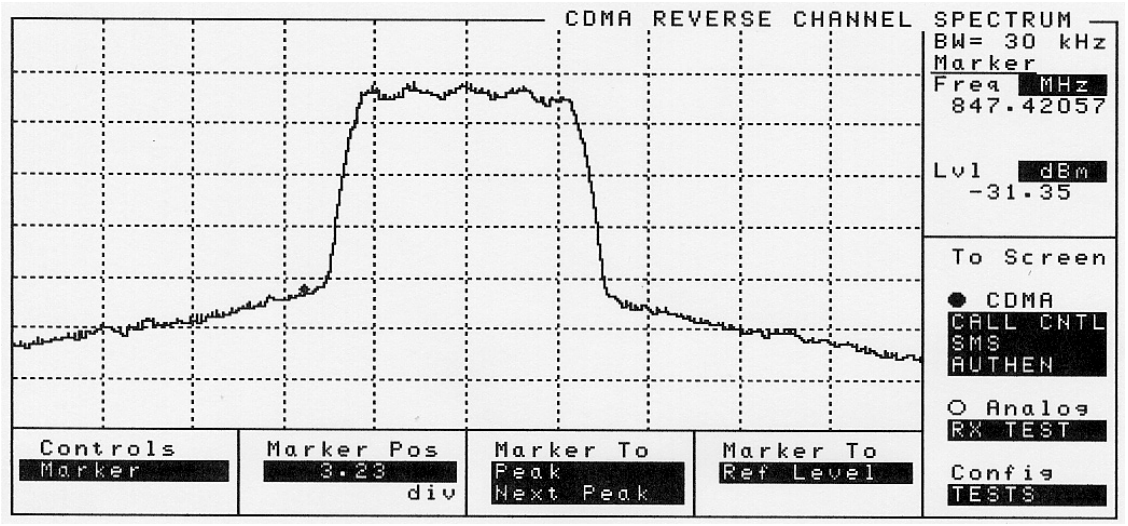
- Set the channel to ***TEST_CHANNEL***.
- Adjust the RX level into the Radio to ***RX_LEVEL***.
- Force the Radio to transmit full output power by sending Power Control Up-Bits continuously.
- Begin by measuring the total output power in a 1.23MHz Bandwidth. The total output power is then ***REFERENCE_POWER***.
- Check to make sure that ***REFERENCE_POWER*** > ***MAX_POWER***.
- Switch the power measurement instrument to measure in a 30kHz bandwidth.
- Offset by ***FREQUENCY_OFFSET_HIGH*** and ***FREQUENCY_OFFSET_LOW*** and measure the power at each.
- ***ADJ_CHANNEL_POWER*** is the higher of the two measured powers in dBm.

See 800 or PCS SPLATTER SCREEN 2.

800 Splatter Screen 1



800 Splatter Screen2



TROUBLE SHOOTING OR ANALYZING PHONE

P2K products V.60c, Timeport 270c and V.120c DO NOT support the previous CDMA Handset test mode commands. P2K platform products supports two different types of TEST MODE COMMAND :

1. COMPUTER TEST MODE COMMANDS (software)
2. SPECIAL HANDSET TEST MODE COMMANDS

IMPORTANT:

1. 1.DO NOT TURN THE TRANSMITTER ON IN CDMA MODE UNLESS YOU HAVE ATTACHED THE ANTENNA OR RF TEST PORT TO THE COMMUNICATION ANALYZER (HP8924, CMD80 Etc.)
2. IN CDMA MODE DO NOT USE CARRIER ON/OFF COMMAND, USE CDATA ON/OFF COMMAND

COMPUTER TEST MODE COMMANDS:

Requires a PC and testing software.

Download the Testing software CDMA Comm V2.0.1

Please read the Section **"Testing"** in this manual for more detail.

SPECIAL HANDSET TEST MODE COMMANDS:

P2K products also supports the handset test mode commands. This will help if you do not have a PC.

Five Keys and the display are used. The keys used are:

1. Menu key
2. Left soft key (to the left of Menu key denoted by -)
3. Right soft key (to the right of Menu key denoted also by -)
4. UP arrow key and
5. Down arrow key

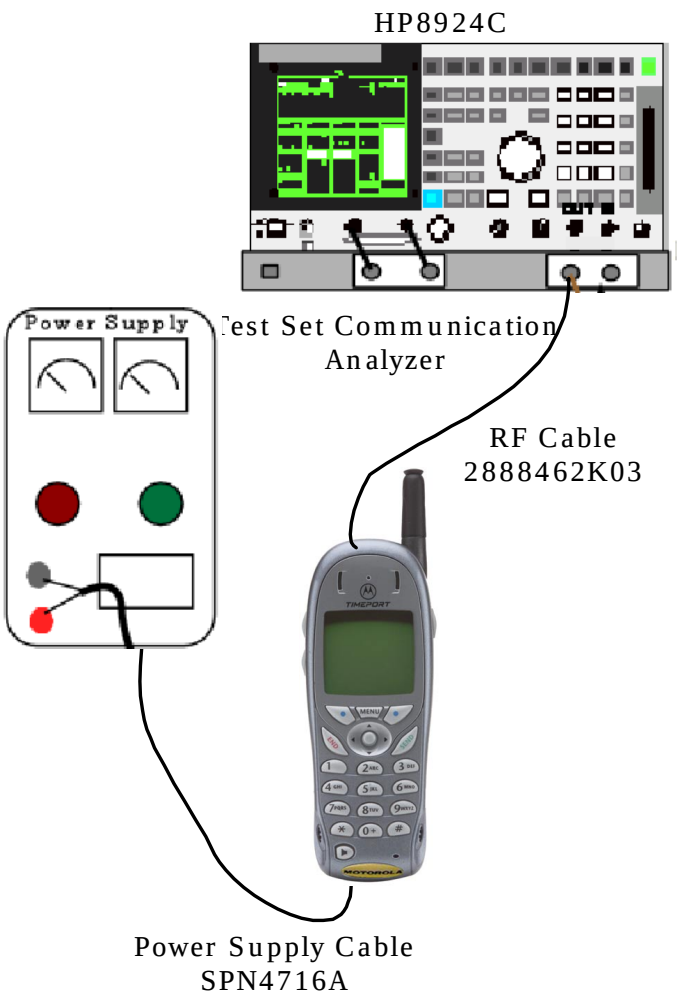
The soft keys to the Left and Right of the menu key are used to make the selection corresponding to their sides immediately above them in the display.

Procedure to use the Hand set test mode commands:

1. Attach the RF cable and the power supply to the UUT and to the Communication analyzer and power supply or can use phone battery.
2. Press the following keys in the right sequence:
3. Menu+0+7+3+8+8+7+* (do it fast)
4. Enter default security code 000000 then select OK with the Right soft key

(If the default security code is changed then obtain the new security code by using the support studio).

5. Scroll using Up or down key and select TEST MODE and then Right soft key to select
6. Scroll up or down key to select ENABLED and then Right soft key to select
7. Now the phone is in the FTS Mode
8. FTS mode has several screens of menu's(which if you get familiar could be helpful)
9. By selecting the NEXT from the display screen by pressing the Right soft key seven times brings the screen that shows the menu's that read CP Mode, Load synth etc. If this screen doesn't appear then you need to change the auto cycle byte.
10. Now use the UP/Down key to chose the commands, once you press any of up/ dwn keys on this screen the phone is now suspended in test mode.
11. Make the selection as required to test the phone
12. After you select or change any item you must press the right soft key to chose commit
13. For the items listed in this menu the explanation from the previous products test mode commands holds good. (eg. CP Mode means AMPS or CDMA 800 or PCS1900, Load synth means channel number etc.)
14. Phone will come out of test mode if the Menu and right soft key is pressed but the test mode remain enabled.
15. When you done with the trouble shooting make sure you go back in the same menu as listed in 5 and select DISABLED.
16. Once the commands are entered the keypad and the display can be taken out and the phone stays in the state as you have chosen as long as power is not disconnected.



Changing Auto cycle byte

1.Use the program CDMA COMM.0.4 version

2.Choose DIRECT ACCESS

3.Under SUSPEND click on DATA MODE then SUSPEND

4.At the bottom right corner you will see PARM - PARM PARAMETER

5.Choose from PARM PARAMETER 00 - AUTOCYCLE BYTE

6.Choose to READ then click EXECUTE

7.The data window will display the contents.

8.Record the byte. (so that after you finish troubleshooting replace the same data in the auto cycle byte)

9.Change the data byte to 06

10.Click on WRITE then click EXECUTE.

Entering Handset Test Command Mode

Enter the following on the handset to enter test command mode:

1. Menu + 0 + S + E + T + U + P + *
2. Enter the security code and press “OK” (right soft key)
3. Scroll down to “Test Mode” and press “SELECT”
4. Scroll to “Enabled” and click “SELECT”
5. Scroll using the right or left soft key to the Handset Test Command Menu

Upon scrolling up or down through the Handset Test Command Menu, the phone enters a suspended mode and must be restarted with the “Restart” option.

Menu Items

RESTART:

— After the phone enters handset test command mode, the only way to restart the phone is with the restart option.

DEFAULT:

— Currently not implemented but listed in the menu. This can be used to setup default test cases.

CP MODE: [AMPS, C 800, C 1900]

— Used to select the CP Mode of the phone.

LOAD SYNTH: [100 – 600]

— Used to select the channel used by the phone.

SET ATTN:

AMPS: [0, 1, 2, 3, 4, 5, 6, 7]

— Used to specify the attenuation of the AMPS power out.
— CDMA: [0 – 255]
— Used to specify the attenuation of the CDMA power out.

CARRIER: [ON, OFF]

— Used to enable or disable the carrier.

RX: [MUTE, UNMUTE]

— Used to mute or unmute RX audio.

TX: [MUTE, UNMUTE]

— Used to mute or unmute TX audio.

AUDIO LEVEL: [1 – 15]

— Used to select the audio level of the phone.

CDATA: [OFF, VAR RATE, FULL RATE, HALF RATE, QURT RATE, EGTH RATE]

— Used to modulate data onto the carrier (AMPS) or begin transmit of CDMA data.

ADC: [THERM0, THERM1, BUSMODE, RSSI, MCI0, MCI1, RF DETECT, EXT B, MAIN TEMP, CCAP THERM, B PLUS, MAIN BATT, RTC BATT]

— Used to perform A/D readings of the various selections.

SPKR: [NOCHNG, MUTE, HNDST, CEBUS, HEADST]

— Used to route the speaker audio.

MIC: [NOCHNG, MUTE, HNDST, CEBUS, HEADST]

— Used to route the microphone.

SIDE TONE: [ON, OFF]

— Used to create an audio loopback on the phone.

SIGNAL TONE: [ON, OFF]

— Used to enable or disable the signal tone.

SAT TONE: [ON, OFF]

— Used to modulate SAT onto the carrier (AMPS only).

COMPD: [ON, OFF]

— Used to specify the current mode of the compander.

DTMF: [OFF, 1, 2, 3, 4, 5, 6, 7, 8, 9]

— Used to generate the various DTMF tones.

SET AFC: [0-255]

— CNG <increment>: Used to change the AFC Warp Value on the screen by the increment displayed.

— COMMIT: Used to commit the AFC Warp Value, and change the increment value to an opposite and smaller number than the previously selected until the value is –1. Pressing COMMIT again will then change the value to the maximum increment step available.

VIBRATE: [ON, OFF]

— Used to specify the current state of the vibrator.

VERSION: [SOFTWARE MAJOR & MINOR, DSP ROM, DSP RAM]

— Used to display various version numbers.

INVM: [Verify, Changed]

— Used to default the NVM including all call timers.

RST NAM: [Verify, Changed]

— Used to default all NAMs to first-time power-up values.

LNA CTRL [Low /Mid / High]

— Gain settings to LNA

Troubleshooting

Introduction

Known good replacement parts and assemblies should be available to be used for troubleshooting by substitution, and for replacement of defective parts/assemblies. Defective circuit boards should be forwarded to the appropriate Motorola service facility for repair. Refer to the “Replacement Parts” section of this manual for a list of replacement part descriptions and part numbers.

CAUTION

Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. An ESD-safe workstation should be used when-ever a transceiver is opened.

Troubleshooting and Repair

Refer to the disassembly instructions located in the “Disassembly” section of this manual for instructions on removing parts/assemblies.

Testing after Repair

After any repair work has been carried out, the unit should be thoroughly tested to ensure that it operates correctly. This is especially important if the Logic / RF assembly is replaced.

For general repairs which do not include replacing the Logic/RF assembly, simply placing a call and checking signal strength, and transmit and recieve audio quality is normally sufficient.

When the Logic/RF assembly is replaced, the unit must have a comprehensive test on a CDMA cellular/PCS compatible communications analyzers. See “Testing” for further details. Placing a call on air is usually carried out at this stage to complete the testing procedure.

(Note: The field test guide will also provide you with additional information and help you in investingating a problem.

TROUBLESHOOTING

The goal in troubleshooting is to quickly narrow-down the possibilities to isolate a failure to a single faulty component. This is especially important before deciding to replace a multi-pin IC, filter, or other component that is difficult or risky to replace. Sometimes the problem will be visually obvious, for example: a cold solder joint, cracked chip, tombstone, etc. Other times, it will be necessary to measure a voltage.The RF/AL board level repair requires the following equipment: Personal Computer (with the troubleshooting software), Interface box(junior board)

I. NO TURN ON - DEBUG PROCEDURE

1. Turn on failed.
2. Visual check.
   — Check for any damaged parts.
3. Check short circuits.

   Apply 4.4V power supply with 1A current limit to CE flash cable.

   If the radio draw more than 0.5A, check all the CCAP regulators, make sure they are not shorted to ground.

   Else go to step 4
4. Switch R9972 to R9952 to tie WDG to high.
5. Check for the power route to CCAP B+.

   If B+ is present, go to step 6

   Else check VR1202 pin 1

   If there isn't a 4.4V on VR1202 pin 1

   Check J1000 and make sure it is placed correctly

   Else if there isn't a 4.4V on CR1050 pin 2

   Replace Q1305 and reflow CCAP if needed.

   Else check CR1050 and Q1306, make sure

   they are placed correctly.
6. Check CCAP regulator output voltage.

   If the voltages on the following regulators are correct , go to step 7.

   Analog_1.8V: 1.875V

   Digital_1.8V: 1.875V

   Memory_Vcc: 1.875V

   Logic_2.75V: 2.775V

   V4: 2.775V

   Rx_2.75V: 2.775V

   Else reflow CCAP or replace CCAP is reflow does not work.
7. Check the RTC clock from CCAP.

   If there is a 32.768 KHz clock on U326 pin 2go to step 8.

   Else if there is no clock on U326 pin 2 reflow CCAP.

   Else the phone running at CCAP internal clocks(32.768 KHz +/-

   50%), check the RTC crystal Y1170

   If there is no 32 KHz sine wave on Y1170, check C1171 and C1172, make

   sure they are placed correctly before replace Y1170.

   Else go to step 8.
8. Check the 16.8 MHz clock goes into Wally.

   If there is a 16.8 MHz clock at C1173, go to step 9.

   Else make sure the voltage on Q325 pin 2 and pin 3 are both 2.75V
9. Flash Analysis

   If the Flash_CS is toggling, go to step 10.

   Else reflow Flash or replace Flash if reflow does not work.
10. SRAM analysis

    IF SRAM_CS is toggling, go to step 11.

    Else reflow SRAM or replace SRAM if reflow does not work.
11. CCAP analysis

    If CCAP_CS is toggling, reflow Wally or replace Wally if reflow does not work.

    Else reflow CCAP or replace CCAP is reflow does not work.

12. Switch R9952 back to R9972.

If the phone turns on the first time during the debug process, wait 20~30 second to insure the software fully initialized the Flash SEEM.

II. GENERAL CHARGING FAILURES

-Charging icon not flashing
-Charging icon flashing but no charge current
-Charging icon flashing but charge current always greater than 500 mA
-Charging icon flashing but charge current unstable
-Charging Icon always shows fully charged
-No battery/charging Icon
-Invalid battery message

*Please note charging icon is located in upper right corner of main display. The shape of the icon is of a battery

Charging icon not flashing Debug tips:

- J1000 pins 1, 2, or 3 not connected
- EXTB+ pin of CCAP (pin D2 U1200) not making contact
- Q1305 may be missing or misplaced
- EXTBDRV pin of CCAP (pin E4 U1200) not making contact

Charging icon flashing but no charge current Debug tips:

- R1052, Q1050, CR1051 misplaced, missing, or bad
- CHRGC (pin C3 U1200) not making connection
- ISENSE (pin B2 U1200) shorted or not connected BATT+ (Battery Connector) intermittent

Charging icon flashing but charge current always greater than 500 mA debug tips:

- R1052 or Q1050 shorted, misplaced or bad
- CHRGC (pin C3 U1200) not making connection or shorted to ground
- ISENSE (pin B2 U1200) shorted or not connected
- CCAP charge current register always > 90 hex (bad U1200)

Charging icon flashing but charge current unstable debug tips:

- Q1306, R20214 or Q1309 misplaced, shorted, or bad
- CHRGC (pin C3 U1200) not making connection or shorted
- ISENSE (pin B2 U1200) shorted or not connected

Charging Icon always shows fully charged debug tips:

- BATT+ pin (Battery Connector) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly

No battery/charging Icon debug tips:

- BATT+ or BATT- pins (Battery Connector) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly
- MAINTEMP pin (pin D4 U1200) not connected properly
- TEMPBIAS pin (pin B1 U1200) not connected properly
- R9976 or R1244 not connected properly

Invalid battery message debug tips:

- BATT_Serial_data (pin 3 J870) not connected properly
- GPI08_0Wire (pin C9 U1100) not connected properly
- R1155 or R9917 not connected properly
- BATT+ or BATT- pins (J870 pins 1 or 4) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly

111. The Internal speaker: TROUBLE-SHOOTING

No Receive Audio.

(Test commands: Suspend, Internal speaker, Volume level, Speakerphone tone)

300000090000003600010000000

3000000A00000006000200002200

300000090000000500010000003

3000000B0000000000030000000002A

- Send The above test commands to generate a speakerphone tone to the speaker. If there is no audio, Probe J8000 A and J8000 B. If the signal is there yet no audio then check J3000 and the flex and the speaker.
- No signal at the J8000 A and J8000 B. Check signal at C1221 and c1212.
- If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with internal CCAP speaker amplifiers.
- If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

Tones present but no voice:

Amps mode.

(Test commands: Suspend,Amps mode, RF channel 100,Internal speaker,Volume level 3, compander off, side tone off)

300000090000003600010000000

300000090000000A0001000000

3000000B00000014000300000006400

3000000A00000006000200002201

300000090000000500010000003

300000090000000900010000000

300000090000000300010000004

- Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe C783 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-19mV rms, If there is no signal is coming out of the Audio out M/P then check the Wally. Other wise proceed to CCAP CDMA mode.

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic(suspend, cp mode CDMA, AUD_LPB, Handset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003200

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally

audio out M/P.

- If there is signal (+/-19mVrms), also tone can be heard on the speaker. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. If there is no tone it could be bad Wally CSP or RF section.
- If no signal then check the wally (provided Wally Mic1 has the same signal as the CE bus audio in).
- If there is signal(+/-19mVrms).

IV. The Headset speaker:
TROUBLESHOOTING

(Prior to trouble shooting make sure headset is detecting properly. Check the Headset jack or wall Int1(pin E8) or R20212.

No Receive Audio.

(Test commands: Suspend, Headset speaker, Volume level, Speakerphone tone)

300000090000003600010000000

3000000A00000006000200004600

300000090000000500010000003

3000000B000000000003000000002A

- Send The above test commands to generate a speakerphone tone to the headset speaker. If there is no audio, Probe J600 pin 3. If the signal is there yet no audio then replace J600.
- No signal at the J600 Pin 3, Check signal at C1221 and c1212. If signal is coming out of audiooutM/P, then check the CCAP and the parts that associated with A0A, A0B, A3 CCAP amplifiers.
- If signal is coming out of audiooutM/P, then check the CCAP and the parts that associated with AOA, AOB, A3 CCAP amplifiers.
- If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

Tones present but no voice:

Amps mode:

(Test commands:Suspend, Amps mode, RF channel 100,Headset speaker,Volume level 3, compander off, side tone off)

300000090000003600010000000

300000090000000A0001000000

3000000B000000140003000000640O

3000000A00000006000200004601

300000090000000500010000003

300000090000000900010000000

300000090000000300010000004

- Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe C783 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-19mVrms, If there is no signal is coming out of the Audio out M/P then check the Wally. Otherwise proceed to CCAP.

CDMA mode:

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic(suspend, cp mode CDMA, AUD_LPB, Headset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003600

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally audio out M/P.

- If no signal then check the Wally(provided Wally Mic1 has the same signal as the CE bus audio in).
- If there is signal(+/-19mVrms).
- If there is signal (+/-19mVrms), also tone can be heard on the speaker. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. If there is no tone it could be bad Wally CSP or RF section.

V. The CE Bus Audio_Out speaker: TROUBLE-SHOOTING

No Receive Audio on the Hands free Devices.

(Prior to trouble shooting make sure Accessories are detecting properly. If not see the appropriate section for trouble shooting)

(Test commands: Suspend, Headset speaker, Volume level, Speakerphone tone)

300000090000003600010000000

3000000A00000006000200003400

300000090000000500010000003

3000000B0000000000030000000002A

- Send The above test commands to generate a speakerphone tone to the Audio_out pin(CE Bus Connector Pin 15). If the signal is there yet no audio, may be a faulty CE Bus connector.
- No signal at the CE Connector Pin 15, Check signal at C1221 and c1212.

  If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with A0A, A1 and A4 CCAP amplifiers.

  If no signal is present at C1221 and c1212 then either defective Wally or

  cold solder missing power supply to the Wally.

Tones present but no voice:

Amps mode.

(Test commands: Suspend, Amps mode, RF channel 100, External speaker, Volume level 3, compander off, sidetone off)

300000090000003600010000000

300000090000000A0001000000

3000000B00000014000300000006400

3000000A00000006000200003401

300000090000000500010000003

300000090000000900010000000

300000090000000300010000004

- Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe C783 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-17mVrms, If there is no signal is coming out of the Audio out M/P then check the Wally. Otherwise proceed to CCAP.

CDMA mode:

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic(suspend,cp mode CDMA, AUD_LPB, Headset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003400

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally audiooutM/P.

If no signal then check the wally(provided Wally Mic1 has the same signal as the CE bus audio in).

If there is signal(+/-17mVrms).

If there is signal (+/-17mVrms), also tone is present on the CE bus audio. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. Route the audio through, if there is no tone it could be Wally CSP is bad.

VI. The Speakerphone: TROUBLESHOOTING

No Speakerphone tone or low Speakerphone tones

(Test commands: Suspend, Headset speaker, Volume level, Speakerphone tone)

3000000900000360001000000

3000000A00000006000200002300

3000000900000050001000007

3000000B0000000000003000000002A

- Send The above test commands to generate a speakerphone tone to the Speakerphone. If the signal is on the pin one of the Speakerphone, but no audible speakerphone low speakerphone inspect the speakerphone connections and Check pin 2 of the speakerphone for the DC voltage. Otherwise replace the Speakerphone.
- No signal at the Pin one of the Speakerphone, Check signal at C1221 and c1212.

  If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with A0A, A1 and A2 CCAP amplifiers.

  If no signal is present at C1221 and C1212 then either defective Wally or cold solder missing power supply to the Wally.

VII. Internal Microphone: TROUBLE-SHOOTING

No Tx audio with Internal Microphone.

CDMA Mode:

- Check the microphone and J5000 for proper connection. Replace the microphone and try to see if the problem go away. Other wise send the following test commands.
- 13K Loop back with internal speaker(suspend, cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
- 3000000900000360001000000
- 300000090000000A0001000001
- 3000000900000040001000003
- 3000000A00000006000200002200
- 3000000900000050001000003.
- This is a voice loop back call every thing said into the internal microphone ca be heard back on the internal speaker. If this test is passed originate CDMA voice loop back call with base station simulator and voice can't be heard while talking in to the microphone then it could be a bad Wally or it could be the modulator.

AMPS Mode:

Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.

- Press a Key and monitor the FM deviation. It should be around 9.5KHz.
- If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.
- If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.
- Tx Audio(suspend, cp mode amps 800, channel 100, audio path internal microphone, compander on, side tone off, power level 2, carrier on)
- 3000000900000360001000000
- 300000090000000A0001000000
- 3000000B0000001400030000006400
- 3000000A00000006000200002102
- 3000000900000090001000000
- 3000000900000030001000004
- 300000090000002D0001000003
- 3000000900000070001000001
- inject 6.2mVpk signal to the J5000 pin1 and monitor the Mic1out of the CCAP it should be around 62mvpk. If not check the parts that associated with amplifier A5 or it could be bad amplifier. If the output at the Mic1out is 62mVpk, then check the mic1 of the CCAP. If no or low output at the mic1 then re-flow or replace the CCAP.
- If the input to the Wally is good and check the

FM output of the Wally(Pin F14) it should be around 168mVpk. If there is no output then re-flow or replace the Wally.

VIII. Headset Microphone: TROUBLE-SHOOTING

No Tx audio with Headset Microphone.

CDMA Mode:

- Check the microphone and J600 for proper connection. Send the following test commands.
- 13K Loop back with internal speaker(suspend, cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
- 300000090000003600001000000
- 300000090000000A0001000001
- 30000009000000040001000003
- 3000000A00000006000200004600
- 300000090000000500010000003.
- This is a voice loop back call, every thing said into the Headset microphone can be heard back on the headset speaker. If this test is passed originate CDMA voice loop back call with base station simulator and voice can't be heard while talking in to the microphone then it could be a bad Wally or it could be the modulator/ demodulator.

AMPS Mode:

- Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.
- Press a Key and monitor the FM deviation. It should be around 9.5KHz.
- If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.
- If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.
- Tx Audio(suspend, cp mode amps 800, channel 100, audio path Headset microphone, compander on, side tone off, power level 2, carrier on)
- 300000090000003600001000000
- 300000090000000A0001000000
- 3000000B0000001400030000006400
- 3000000A00000006000200004102
- 300000090000000900010000000
- 300000090000000300010000004
- 300000090000002D0001000003
- 300000090000000700010000001
- inject 6.2mVpk signal to the J5000 pin1 and monitor the Mic2out of the CCAP it should be around 124mvpk. If not check the parts that associated with amplifier A6 or it could be bad amplifier. If the output at the Mic2out is 124mVpk, then check the mic1 of
- the CCAP. If no or low output(should be around 248mVpk) at the mic1 then re-flow or replace the CCAP.
- If the input to the Wally is good and check the FM output of the Wally(Pin F14) it should be around 336mVpk. If there is no output then re-flow or replace the Wally.

IX. External Microphone: TROUBLE-SHOOTING

No Tx audio with Headset Microphone.

CDMA Mode:

- Check the microphone and J1000 pin 15 for proper connection. Send the following test commands.
- 13K Loop back with internal speaker(suspend, cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
- 3000000900000360001000000
- 300000090000000A0001000001
- 3000000900000040001000003
- 3000000A00000006000200003400
- 3000000900000050001000003.
- This is a voice loop back call, Inject 43.5mVrms in to the External microphone and measure CE Bus Conn Pin 16. The level should be around 75mVrms. If this test is passed originate CDMA voice loop back call with base station simulator and no or low signal is received then it could be a bad Wally or it could be the modulator/demodulator.

AMPS Mode:

Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.

- Press a Key and monitor the FM deviation. It should be around 9.5KHz.
- If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.
- If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.
- Tx Audio(suspend, cp mode amps 800, channel 100, audio path Headset microphone, compander on, side tone off, power level 2, carrier on)

- 3000000900000360001000000
- 300000090000000A0001000000
- 3000000B0000001400030000006400
- 3000000A00000006000200003102
- 3000000900000090001000000
- 3000000900000030001000004
- 300000090000002D0001000003
- 3000000900000070001000001
- inject 62mVpk signal to the J5000 pin1 and monitor the Mic3out of the CCAP it should be around 62mvpk. If not, check the parts that associated with amplifier A7 or it could be bad amplifier. If the output at the Mic3out is 62mVpk, then check the mic1 of the CCAP.
- If no or low output(should be around 62mVpk) at the mic1 then re-flow or replace the CCAP.

If the input to the Wally is good and check the FM output of the Wally (at C658) it should be around 168mVpk. If there is no output then re-flow or replace the Wally.

Symptom	Probable Cause	Verification and Remedy
1. Phone will not turn on or stay on.	a) Battery either discharged or defective.	1. Measure battery voltage across a 50 ohm (>1 Watt) load. 2. If the battery voltage is <3.4 V DC, recharge the battery using the appropriate battery charger. 3. If the battery will not recharge, replace the battery.
	b) Battery connector open or misaligned.	1. Visually inspect the battery connectors on both the battery pack and the transceiver, including the solder connections from the battery connector to the main PC board. 2. Realign the contacts or, if necessary, replace either the battery or battery connector.
	c) RF/Audio-Logic Board defective.	1. Replace the keypad membrane with a known good part. 2. Temporarily connect 4.5 V DC to the battery contacts. 3. Depress the PWR button; if unit turns on and stays on, disconnect the power source and reassemble the phone with the new keypad membrane.
	d) Keypad board defective.	1. Replace keypad board assembly with a known good assembly. 2. Temporarily connect 4.5 V DC to the battery contacts. Depress the PWR button. 3. If the units turns on and stays on, discon-nect the power source and reassemble the phone with the new keypad board assembly.
	e) RF/AL Board Debugging Follow the no turn on Debug procedure.	1. Remove the RF/Audio-Logic Board. Substitute a known good board. 2. Temporarily connect 4.5 V DC to the battery contacts. 3. Depress the PWR button; if unit turns on and stays on, disconnect the power source and reassemble the phone with the new RF/Audio-Logic board and re-test phone.

Symptom	Probable Cause	Verification and Remedy
2. Phone exhibits poor reception and/or erratic operation (such as calls frequently dropping, weak and/or distorted audio, etc.)	a) Defective antenna or damaged antenna connector. b) Defective RF/ Audio-Logic Board.	1. Make sure the antenna and antenna assembly is propershaft ferrule is screwed into the antenna socket. 2. Replace the antenna with a known good antenna. 3. Check for loose or damaged cans.
3. Display is erratic, or provides partial or nodisplay.	a) Defectivedisplay module. b) RF/Audio-Logic board defective.	1. Gain access to RF/Audio-Logic board or keypad board as described in the “Disassembly” section of this manual. 2. Check connection. If connection not at fault, proceed to b. Replace the RF/Audio-Logic Board
4. Alert ringer volume is distorted or too low.	a) Speakerphone ringer defective. b) RF/Audio-Logic board defective.	Replace the defective speaker or speakerphone with a known good speakerphone. Replace the RF/Audio-Logic Board
5. Transmit audio is weak, distorted, or dead.	a) Microphonedefective. b) RF/Audio-Logic board defective.	Replace defective microphone. Replace the RF/Audio-Logic Board
6. Receive audio is weak and/or distorted.	a) Speaker defective. b) RF/Audio-Logic board defective.	Replace defective speaker. Replace the RF/Audio-Logic Board

Nam Programming

UI Operation	Procedure
Enter the Programming Menu	1.MENU 0 S E T U P * 2.Enter the default code security code “000000”, then [ok] Note: If you have trouble opening the Programming Menu in step 1, try the following: after pressing MENU, immediately follow it with 0 when the display changes.
Program the phone number	1. Enter Programming Menu (see 1) 2. Select “User Activation” or “Extended NAM” 3. Select the appropriate NAM then press [CHANGE] 4. Highlight “MIN” and press [CHANGE] 5. Edit the number then press [OK] 6. If “MDN” is needed (Korea only?) then highlight “MDN” and repeat step 7.
Program the CDMA primary/secondary channels (for both system A & B)	1. Enter Programming Menu (see 1) 2. Select “Extended NAM” 3. Select the appropriate NAM then press [CHANGE] 4. Select “1st Channel A” then press [CHANGE] 5. Edit the number, then [OK] 6. Repeat steps 5 to 6 for other channels
Program the Analog primary/secondary channels (for both system A & B)	

Program the Home Syntem ID	1. Enter Programming Menu (see 1) 2. Select “User Activation” or “Extended NAM” 3. Select the appropriate NAM then press [CHANGE] 4. Select “CDMA Sys ID” then press [CHANGE] 5. Edit the number, then [OK]
Read ESN	1. Press MENU 2. Select “Settings” 3. Select “Phone Status” 4. Select “Other Information” 5. Select “ESN”
Read software version	1. Press MENU 2. Select “Settings” 3. Select “Phone Status” 4. Select “Other Information” 5. Select S/W Version
Set DTMF long/short mode	1. Press MENU 2. Select “Settings” 3. Select “Other Settings” 4. Select “Initial Setup” 5. Select “DTMF” then press [CHANGE] 6. Select the appropriate DTMF setting
"Set call processing mode (Analog Only, …)"	1. Press MENU 2. Select “Settings” 3. Select “Other Settings” 4. Select “Initial Setup” 5. Select “Network” 6. Select “Analog Only” then press [CHANGE] 7. Select the appropriate mode

Force preferred vocoder mode (8k, 13K, EVRC)	1. Enter Programming Menu (see 1) 2. Select “Vocode” then press [CHANGE] 3. Select the appropriate setting
Enable/disable voice privacy	Engine always request “voice privacy”. If the call has “voice privacy”, the display will show the icon.
Change station class mark (enable/ disable slotted mode)	
Change slot cycle index	
"Change call termination enabled indicator: MOB_TERM (MOB_TERM_FOR_NID, MOB_TERM_FOR_SID,MOB_TERM_HOME,and HOME_REG, FOR_NID_REG, FOR_SID_REG)"	
"Change service option (analog, 8/13k voice, 8/13k Markov, 8/13k loopback, …)"	
Disable/enable NAMPS	See procedure 8 for “analog only” option.
Program the A key	1. Enter Programming Menu (see 1) 2. Select “AKEY” then press [CHANGE]

"Originate, answer, and release a call"	Originate a Call 1. Enter the phone number from IDLE 2. Press “SEND” Answer a Call 1. Press RIGHT soft key [ANSWER] on the New Call dialog. Or 1. 1. Open the phone flip, if “Answer options”/”Open To Answer” is set to “yes” 2. Close the ohone flip
Read and delete Caller ID messages	Accessing “Recent Calls” 1. MENU 2. Recent Calls 3. Received Calls or Dialed Calls 4. RIGHT soft key [SELECT] Read Caller ID 1. Scroll to a message to delete 2. RIGHT soft key [VIEW] Delete Caller ID 1. Scroll to a message to delete 2. MENU 3. Delete 4. RIGHT soft key [SELECT] Or 1. Scroll to a message to delete 2. RIGHT soft key [VIEW] 3. MENU 4. Delete” 5. RIGHT soft key [SELECT]
Originate call with call forwarding activation/deactivation code	
Originate call with call forwarding no answer (CFNA) code	

Originate call with call forwarding busy (CFB) code	
Originate call with call forwarding busy (CFB) code	

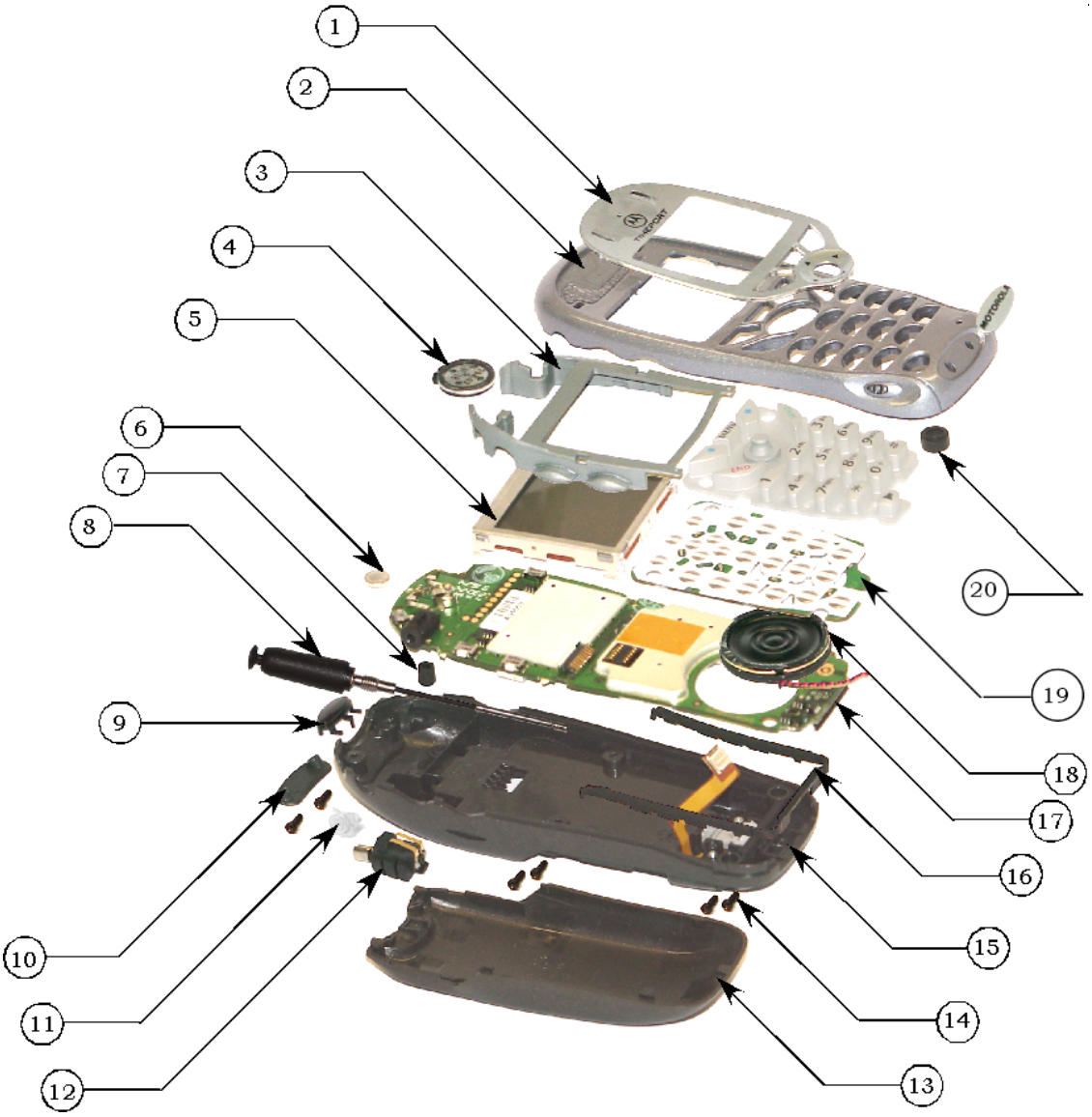


Table 1:

No.	Part Number	Description
1	Lens	6189397K01
2	Front Housing	1588000K01
3.	Display Gasket with Side Keys	3288093K01
4.	Speaker Felt	3288115K01
5.	Display	7289437K01
6.	Real Time Clock Battery	3003710K01
7.	RF Port Cover	0588197K02
8	Antenna	8588200K02
9	Infra Red Device Indicator	6188003K01
10	Screw Cover	1588728K01
	Screw Cover Adhesive	1188637K01
11	Power Button With Light Pipe	388001K01
12	Vibrator Motor	5989357K02
13	Battery Cover	1588092K01
14	Screws Torque Plus W/Auto ser 1.8	0309315B07
15	Rear Housing	0189415K01
16.	Acoustic Seal	3288639K01
17	PCB	Varies
18	Keyboard with ringer and Speaker Phone	0187586L01
19	Keypad	38890362K01
20	Microphone	5085600J01
21	Escutcheon Assy, Motorola Logo	1389502K03

Reference Des	Part Number	Description
A1161	4288099K01	CLIP ANT CONTACT P270c
A1162	4285986A01	"CLIP, ANTENNA"
C100	2113743N40	CAP CHIP 39.0 PF 5% COG
C1000	2113743N40	CAP CHIP 39.0 PF 5% COG
C1001	2113743N40	CAP CHIP 39.0 PF 5% COG
C1002	2113743N40	CAP CHIP 39.0 PF 5% COG
C1003	2113743N50	CAP CHIP 100 PF 5% COG
C1004	2113743N50	CAP CHIP 100 PF 5% COG
C1005	2113743N40	CAP CHIP 39.0 PF 5% COG
C1006	2113743N40	CAP CHIP 39.0 PF 5% COG
C1007	2113743N40	CAP CHIP 39.0 PF 5% COG
C1008	2113743N40	CAP CHIP 39.0 PF 5% COG
C1009	2113743N40	CAP CHIP 39.0 PF 5% COG
C101	2113743N40	CAP CHIP 39.0 PF 5% COG
C1010	2113743N40	CAP CHIP 39.0 PF 5% COG
C1011	2113743N40	CAP CHIP 39.0 PF 5% COG
C1012	2113743N40	CAP CHIP 39.0 PF 5% COG
C1013	2113743N40	CAP CHIP 39.0 PF 5% COG
C1014	2113743N40	CAP CHIP 39.0 PF 5% COG
C1016	2113928A01	CAP CER CHIP 1.0 UF 10V
C102	2113743N13	CAP CHIP 3.0 PF +-.25PF COG
C103	2113743N40	CAP CHIP 39.0 PF 5% COG
C104	2104801Z17	CAP CER NPO 3.0PF 16V 1005 SMD
C1051	2113743N40	CAP CHIP 39.0 PF 5% COG
C105DNP	2113743N01	CAP CHIP 0.5 PF +-.25PF COG
C107	2113743N13	CAP CHIP 3.0 PF +-.25PF COG
C109	2113743N40	CAP CHIP 39.0 PF 5% COG
C110	2113743N28	CAP CHIP 12.0 PF 5% COG
C1100	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1101	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1102	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1103	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1104	2113743L41	CAP CHIP 10000 PF 10% X7R
C1105	2113743L41	CAP CHIP 10000 PF 10% X7R
C1106	2113743L41	CAP CHIP 10000 PF 10% X7R
C1107	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1109	2113743L41	CAP CHIP 10000 PF 10% X7R
C1111	2113743N40	CAP CHIP 39.0 PF 5% COG
C1112	2113743N40	CAP CHIP 39.0 PF 5% COG
C1113	2113743L41	CAP CHIP 10000 PF 10% X7R
C1114	2113743L41	CAP CHIP 10000 PF 10% X7R
C1115	2113743L41	CAP CHIP 10000 PF 10% X7R
C1116	2113743L41	CAP CHIP 10000 PF 10% X7R
C1117	2113743L41	CAP CHIP 10000 PF 10% X7R
C1118	2113743L41	CAP CHIP 10000 PF 10% X7R

C1119	2113743L41	CAP CHIP 10000 PF 10% X7R
C1120	2113743L41	CAP CHIP 10000 PF 10% X7R
C1121	2113743L41	CAP CHIP 10000 PF 10% X7R
C1122	2113743L41	CAP CHIP 10000 PF 10% X7R
C1123	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1124	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1150	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1151	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1152	2113743L41	CAP CHIP 10000 PF 10% X7R
C117	2113743N26	CAP CHIP 10.0 PF 5% COG
C1171	2113743N36	CAP CHIP 27.0 PF 5% COG
C1172	2113743N26	CAP CHIP 10.0 PF 5% COG
C1173	2113743N46	CAP CHIP 68.0 PF 5% COG
C118	2104801Z06	CAP CER NPO 1.0PF 16V 1005 SMD
C119	2113743N28	CAP CHIP 12.0 PF 5% COG
C1200	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1206	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1208	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C121	2104801Z06	CAP CER NPO 1.0PF 16V 1005 SMD
C1212	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1215	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1216	2113743L19	CAP CHIP 1200 PF 10% X7R
C1217	2113743L05	CAP CHIP 330 PF 10% X7R
C1218	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1219	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1220	2113743L25	CAP CHIP 2200 PF 10% X7R
C1221	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1223	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1224	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1226	2113743L07	CAP CHIP 390 PF 10% X7R
C1227	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1228	2113743L09	CAP CHIP 470 PF 10% X7R
C1229	2113743E11	CAP CHIP .039 UF 10% X7R
C123	2113743Q07	CAP CHIP 1.5 PF +/-.1PF 20*40
C1230	2303770S08	CAP LYTIC POLY 33 20 8.0 SMD
C1231	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1234	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1237	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1238	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1239	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1240	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1241	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1242	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1245	2113928A01	CAP CER CHIP 1.0 UF 10V
C1247	2113928A01	CAP CER CHIP 1.0 UF 10V
C125	2113743N34	CAP CHIP 22.0 PF 5% COG
C1250DNP	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C1251	2113743L13	CAP CHIP 680 PF 10% X7R

C1252	2113743L17	CAP CHIP 1000 PF 10% X7R
C1253	2113743L21	CAP CHIP 1500 PF 10% X7R
C1254DNP	2113743L41	CAP CHIP 10000 PF 10% X7R
C1255	2113928A01	CAP CER CHIP 1.0 UF 10V
C1261	2113743L25	CAP CHIP 2200 PF 10% X7R
C127	2113743L17	CAP CHIP 1000 PF 10% X7R
C1270	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1287	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1288	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C1289	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C1290	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C1293	2113743L21	CAP CHIP 1500 PF 10% X7R
C1298	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C1300	2113743L41	CAP CHIP 10000 PF 10% X7R
C1301	2113743L41	CAP CHIP 10000 PF 10% X7R
C1302	2113743L41	CAP CHIP 10000 PF 10% X7R
C1303	2113743L41	CAP CHIP 10000 PF 10% X7R
C150	2113743L17	CAP CHIP 1000 PF 10% X7R
C151	2113743N29	CAP CHIP 13.0 PF 5% COG
C152	2113743N29	CAP CHIP 13.0 PF 5% COG
C153DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C154	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C155	2113743N50	CAP CHIP 100 PF 5% COG
C160	2113743L17	CAP CHIP 1000 PF 10% X7R
C161	2113743N40	CAP CHIP 39.0 PF 5% COG
C162	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C164	2109445U27	CAP CER COG 10 .1% 0402 SMD
C20163	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C20164	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C20165	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C20166	2113743L27	CAP CHIP 2700 PF 10% X7R
C20167	2113743L29	CAP CHIP 3300 PF 10% X7R
C20173	2113743L41	CAP CHIP 10000 PF 10% X7R
C20176	2113743L01	CAP CHIP 220 PF 10% X7R
C20177	2113743L27	CAP CHIP 2700 PF 10% X7R
C20178	2113743E20	CAP CHIP .10 UF 10%
C20180	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C20183	2113743L17	CAP CHIP 1000 PF 10% X7R
C20184DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C20185DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C20188	2104801Z17	CAP CER NPO 3.0PF 16V 1005 SMD
C20189	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C20190	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C20191	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C20192	2113743N46	CAP CHIP 68.0 PF 5% COG
C20193	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C20194	2113743N26	CAP CHIP 10.0 PF 5% COG
C20195	2113743N26	CAP CHIP 10.0 PF 5% COG

C20196	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C20197	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C20198	2113743N09	CAP CHIP 2.0 PF +-.25PF COG
C20199	2113743N40	CAP CHIP 39.0 PF 5% COG
C20200	2113743N40	CAP CHIP 39.0 PF 5% COG
C20201	2113743N40	CAP CHIP 39.0 PF 5% COG
C20202	2113743N40	CAP CHIP 39.0 PF 5% COG
C20203	2113743N40	CAP CHIP 39.0 PF 5% COG
C20204	2113743N40	CAP CHIP 39.0 PF 5% COG
C20205	2113743N40	CAP CHIP 39.0 PF 5% COG
C20206	2113743N40	CAP CHIP 39.0 PF 5% COG
C20207	2113743N40	CAP CHIP 39.0 PF 5% COG
C20208	2113743N40	CAP CHIP 39.0 PF 5% COG
C20209	2113743N40	CAP CHIP 39.0 PF 5% COG
C20212	2113743N40	CAP CHIP 39.0 PF 5% COG
C20214	2113743N40	CAP CHIP 39.0 PF 5% COG
C20215	2113743N40	CAP CHIP 39.0 PF 5% COG
C20216	2113743N40	CAP CHIP 39.0 PF 5% COG
C20217	2113743N40	CAP CHIP 39.0 PF 5% COG
C20218	2113743N40	CAP CHIP 39.0 PF 5% COG
C20219	2113743N40	CAP CHIP 39.0 PF 5% COG
C20220	2113743N40	CAP CHIP 39.0 PF 5% COG
C20221	2113743N40	CAP CHIP 39.0 PF 5% COG
C20222	2113743N40	CAP CHIP 39.0 PF 5% COG
C20223	2113743N40	CAP CHIP 39.0 PF 5% COG
C20224	2113743N40	CAP CHIP 39.0 PF 5% COG
C20226	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C20227	2113743N40	CAP CHIP 39.0 PF 5% COG
C20228	2113743N40	CAP CHIP 39.0 PF 5% COG
C20229	2113743N40	CAP CHIP 39.0 PF 5% COG
C20230	2113743N50	CAP CHIP 100 PF 5% COG
C20231	2113743N40	CAP CHIP 39.0 PF 5% COG
C20232	2113743N40	CAP CHIP 39.0 PF 5% COG
C20233	2113743N34	CAP CHIP 22.0 PF 5% COG
C20234	2113743N40	CAP CHIP 39.0 PF 5% COG
C20235	2113743L17	CAP CHIP 1000 PF 10% X7R
C20236	2113743N40	CAP CHIP 39.0 PF 5% COG
C20237	2113743L17	CAP CHIP 1000 PF 10% X7R
C20238	2113743N40	CAP CHIP 39.0 PF 5% COG
C20239	2113743L17	CAP CHIP 1000 PF 10% X7R
C20240	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C20242	2113743N40	CAP CHIP 39.0 PF 5% COG
C20243	2113743N40	CAP CHIP 39.0 PF 5% COG
C20244	2113743N40	CAP CHIP 39.0 PF 5% COG
C20245	2113743N40	CAP CHIP 39.0 PF 5% COG
C20246	2113743L17	CAP CHIP 1000 PF 10% X7R
C20247	2113743L17	CAP CHIP 1000 PF 10% X7R
C20248	2113743N58	CAP CHIP 4.0PF 16V .25PF COG

C20249	2113743N58	CAP CHIP 4.0PF 16V .25PF COG
C20250	2113743N40	CAP CHIP 39.0 PF 5% COG
C20251	2113743N40	CAP CHIP 39.0 PF 5% COG
C300	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C301	2113743L41	CAP CHIP 10000 PF 10% X7R
C302	2113743N42	CAP CHIP 47.0 PF 5% COG
C303	2113743N40	CAP CHIP 39.0 PF 5% COG
C304	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C305	2113743N14	CAP CHIP 3.3 PF +-.25PF COG
C325	2113743L41	CAP CHIP 10000 PF 10% X7R
C326	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C327	2113743L17	CAP CHIP 1000 PF 10% X7R
C328	2113743L25	CAP CHIP 2200 PF 10% X7R
C329	2113743N46	CAP CHIP 68.0 PF 5% COG
C402	2113743N21	CAP CHIP 6.2 PF + -.5PF COG
C403	2113743L41	CAP CHIP 10000 PF 10% X7R
C404	2113743L41	CAP CHIP 10000 PF 10% X7R
C405	2113743L41	CAP CHIP 10000 PF 10% X7R
C406	2113743N26	CAP CHIP 10.0 PF 5% COG
C408	2113743N07	CAP CHIP 1.5 PF +-.25PF COG
C410	2113743N40	CAP CHIP 39.0 PF 5% COG
C411	2113743N21	CAP CHIP 6.2 PF + -.5PF COG
C414	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C415	2113743N26	CAP CHIP 10.0 PF 5% COG
C417	2113743N07	CAP CHIP 1.5 PF +-.25PF COG
C419	2113743L41	CAP CHIP 10000 PF 10% X7R
C420	2113743N26	CAP CHIP 10.0 PF 5% COG
C421	2113743N26	CAP CHIP 10.0 PF 5% COG
C422	2113743N26	CAP CHIP 10.0 PF 5% COG
C423	2113743N26	CAP CHIP 10.0 PF 5% COG
C424	2113743N26	CAP CHIP 10.0 PF 5% COG
C425	2113743N28	CAP CHIP 12.0 PF 5% COG
C428	2113743N50	CAP CHIP 100 PF 5% COG
C429DNP	2113743N12	CAP CHIP 2.7 PF +-.25PF COG
C430	2113743N34	CAP CHIP 22.0 PF 5% COG
C431	2113743N26	CAP CHIP 10.0 PF 5% COG
C432	2113743N34	CAP CHIP 22.0 PF 5% COG
C435	2113743N26	CAP CHIP 10.0 PF 5% COG
C437	2113743L41	CAP CHIP 10000 PF 10% X7R
C439	2113743N40	CAP CHIP 39.0 PF 5% COG
C441	2113743N40	CAP CHIP 39.0 PF 5% COG
C442	2113743N40	CAP CHIP 39.0 PF 5% COG
C443	2113743N40	CAP CHIP 39.0 PF 5% COG
C446	2113743L41	CAP CHIP 10000 PF 10% X7R
C500	2113743N40	CAP CHIP 39.0 PF 5% COG
C501	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C502	2113743N42	CAP CHIP 47.0 PF 5% COG
C503	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%

C505DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C506	2113743N42	CAP CHIP 47.0 PF 5% COG
C508	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C509	2113743N19	CAP CHIP 5.1 PF + -.5PF COG
C510	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C512	2113743N20	CAP CHIP 5.6 PF + -.5PF COG
C513	2113743N42	CAP CHIP 47.0 PF 5% COG
C518	2113743L41	CAP CHIP 10000 PF 10% X7R
C519	2113743N40	CAP CHIP 39.0 PF 5% COG
C521	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C522DNP	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C523	2113743L41	CAP CHIP 10000 PF 10% X7R
C524	2113928A01	CAP CER CHIP 1.0 UF 10V
C525	2113743N26	CAP CHIP 10.0 PF 5% COG
C526	2113743N26	CAP CHIP 10.0 PF 5% COG
C527	2113743N30	CAP CHIP 15.0 PF 5% COG
C528	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C529	2113743N30	CAP CHIP 15.0 PF 5% COG
C531	2113743N30	CAP CHIP 15.0 PF 5% COG
C533	2113743N03	CAP CHIP 1.0 PF +-.25PF COG
C534	2104801Z17	CAP CER NPO 3.0PF 16V 1005 SMD
C535DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C537DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C538	2113743N30	CAP CHIP 15.0 PF 5% COG
C539	2113743N42	CAP CHIP 47.0 PF 5% COG
C540DNP	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C541	2113743N18	CAP CHIP 4.7 PF +-.25PF COG
C600	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C601	2113743E20	CAP CHIP .10 UF 10%
C602	2113743L41	CAP CHIP 10000 PF 10% X7R
C625	2113743N42	CAP CHIP 47.0 PF 5% COG
C628	2104801Z06	CAP CER NPO 1.0PF 16V 1005 SMD
C629	2113743N40	CAP CHIP 39.0 PF 5% COG
C635	2109445U25	CAP CER COG 8.2 .1% 0402 SMD
C636	2104801Z01	CAP CER NPO 0.5PF 16V 1005 SMD
C637	2113743N34	CAP CHIP 22.0 PF 5% COG
C638	2113743N26	CAP CHIP 10.0 PF 5% COG
C650	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C651	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C652	2113743N32	CAP CHIP 18.0 PF 5% COG
C653	2113743N28	CAP CHIP 12.0 PF 5% COG
C654	2113743L41	CAP CHIP 10000 PF 10% X7R
C655	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C656	2104801Z06	CAP CER NPO 1.0PF 16V 1005 SMD
C657	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C658	2113928A01	CAP CER CHIP 1.0 UF 10V
C659	2113743N50	CAP CHIP 100 PF 5% COG
C660	2113743L41	CAP CHIP 10000 PF 10% X7R

C700	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C701	2113743L17	CAP CHIP 1000 PF 10% X7R
C702	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C703	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C704	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C725	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C726	2113743L41	CAP CHIP 10000 PF 10% X7R
C728	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C729	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C730	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C750	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C751	2113743L41	CAP CHIP 10000 PF 10% X7R
C752	2113743L41	CAP CHIP 10000 PF 10% X7R
C753	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C754	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C775	2113928G01	CAP CER CHIP .22 UF 6.3V 10%
C776	2113743L25	CAP CHIP 2200 PF 10% X7R
C777	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C778	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C779	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C780	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C781	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C782	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C783	2113928P04	CAP CER CHIP 1.0UF 20% 6.3V
C9921	2113743L41	CAP CHIP 10000 PF 10% X7R
C9936	2113928A01	CAP CER CHIP 1.0 UF 10V
C9937	2113743E20	CAP CHIP .10 UF 10%
C9938	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C9944	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C9955	2113928A01	CAP CER CHIP 1.0 UF 10V
C9957	2113743K15	CER CHIP CAP .100UF
C9970	2113743L41	CAP CHIP 10000 PF 10% X7R
C9972	2113743L41	CAP CHIP 10000 PF 10% X7R
C9974	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C9975	2113743L41	CAP CHIP 10000 PF 10% X7R
C9976	2113743L41	CAP CHIP 10000 PF 10% X7R
C9977	2113743L41	CAP CHIP 10000 PF 10% X7R
C9978	2113743L41	CAP CHIP 10000 PF 10% X7R
C9979	2113743E20	CAP CHIP .10 UF 10%
C9980	2113743N40	CAP CHIP 39.0 PF 5% COG
C9981	2113743N40	CAP CHIP 39.0 PF 5% COG
C9983	2113743N40	CAP CHIP 39.0 PF 5% COG
C9984	2113743L41	CAP CHIP 10000 PF 10% X7R
C9987	2113743N09	CAP CHIP 2.0 PF +-.25PF COG
C9989	2113743L41	CAP CHIP 10000 PF 10% X7R
C9990	2113743N28	CAP CHIP 12.0 PF 5% COG
C9991	2113743N10	CAP CHIP 2.2 PF +-.25PF COG
C9992	2113743N40	CAP CHIP 39.0 PF 5% COG

CPL500	5885811G04	ISLTR CER MLTLYR 1800MHZ 2016
CPL625	5803703S01	COUPLER CER 4 PORT 991MHZ SMD
CPL635	5804632Z01	CPLR CER 4 POST 7020MHZ 2012
CR1050	4809653F02	RECT SCHOTTKY 1.0A UPS5817
CR1051	4809653F02	RECT SCHOTTKY 1.0A UPS5817
CR1150DNP	4809118D02	LED BICOLOR LNJ115W8POMT
CR1212	4809653F02	RECT SCHOTTKY 1.0A UPS5817
CR1750	4809606E02	DIODE DUAL ARRAY DAN222
CR1756DNP	4809606E07	DIODE DUAL ARRAY DA221
CR1759	4809606E07	DIODE DUAL ARRAY DA221
CR1760	4809877C08	DIODE VARACTOR 1SV279 SMD
CR300	4809877C08	DIODE VARACTOR 1SV279 SMD
CR500	4809948D13	DIODE RF SWITCH BA892 ESC
CR501	4809924D16	DIODE RF SCHOTKY HSMS-282K SMD
CR650	4809877C13	DIODE VARACTOR ISV305 SMD
CR651	4809877C08	DIODE VARACTOR 1SV279 SMD
CR652	4809948D10	DIODE PIN BAR63-03
E1	2462586G01	INDUCTOR CHIP FERRITE BEADS
FL160	9185838J01	FLTR XTAL 109.65MHZ 3.8MM SMD
FL30	9109239M08	FLTR SAW BP 1960MHZ 3X3MM SMD
FL403	9109247M03	FLTR SAW BP 836MHZ 3X3MM SMD
FL404	9103913K03	FLTR SAW TX 836MHZ SMD
FL409	9109239M04	FLTR SAW TX BP 1880MHZ SMD
FL53	9185906G08	FLTR CER DIPLEX 859\1920 3216
J2000-1	0988307K03	CONN COMPRESSION BD TO BD
J2000-10	0988307K03	CONN COMPRESSION BD TO BD
J2000-11	0988307K03	CONN COMPRESSION BD TO BD
J2000-12	0988307K03	CONN COMPRESSION BD TO BD
J2000-2	0988307K03	CONN COMPRESSION BD TO BD
J2000-3	0988307K03	CONN COMPRESSION BD TO BD
J2000-4	0988307K03	CONN COMPRESSION BD TO BD
J2000-5	0988307K03	CONN COMPRESSION BD TO BD
J2000-6	0988307K03	CONN COMPRESSION BD TO BD
J2000-7	0988307K03	CONN COMPRESSION BD TO BD
J2000-8	0988307K03	CONN COMPRESSION BD TO BD
J2000-9	0988307K03	CONN COMPRESSION BD TO BD
J3000-1	0988189K02	CONN LCD
J3000-11	0988189K02	CONN LCD
J3000-13	0988189K02	CONN LCD
J3000-15	0988189K02	CONN LCD
J3000-17	0988189K02	CONN LCD
J3000-3	0988189K02	CONN LCD
J3000-5	0988189K02	CONN LCD
J3000-7	0988189K02	CONN LCD
J3000-9	0988189K02	CONN LCD
J400	0780312N01	BRACKET BACKUP BATTERY
J4000-12	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-13	2888196K02	SM MOD BD TO BD CONN W/ TAPE

J4000-15	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-16	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-2	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-4	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-6	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J4000-8	2888196K02	SM MOD BD TO BD CONN W/ TAPE
J5000	3989576K01	CONT MIC PAD INNER
J5001	3989577K01	CONT MIC PAD OUTER
J600	0987837L01	CONN JACK 2.5MM DIA SMD
J7000-1	0909888M02	RECEPT XDCR SMD
J7000-2	0909888M02	RECEPT XDCR SMD
J8000A	3988213K01	EAR PIECE SPRING CONTACT
J8000B	3988213K01	EAR PIECE SPRING CONTACT
J870	0989368K01	CONN BATT
J9000-1	0987984K02	CONN RF
J9000-2	0987984K02	CONN RF
J9000-3	0987984K02	CONN RF
J9000-4	0987984K02	CONN RF
J9001	3988201K01	CONTACTOR ANT SENSOR 1
J9002	3988202K01	CONTACTOR ANT SENSOR 2
L101	2409154M62	IND CER MTLILYR 8.2 NH 1005
L113	2409154M06	IND CER MLTILYR 2.7NH 1005
L115	2409154M03	IND CER MLTILYR 1.5NH 1005
L1232	2589584K11	IND WW SHLD 47UH 20% 5X5MM
L1235	2409154M43	IND CER MTLILYR 39.0NH 1005
L1236DNP	2409154M64	IND CER MTLILYR 12.0NH 1005
L1237	2409154M02	IND CER MLTILYR 1.2NH 1005
L1238	2409154M02	IND CER MLTILYR 1.2NH 1005
L1242	2409154M61	IND CER MTLILYR 6.8 NH 1005
L1244	2409154M75	IND CER MLTILYR 100 NH 1005
L1245	2487319K03	IND CER WW 2.2NH 5% 1005 SMD
L152	2409646M98	IN CER MULTILYR
L153	2409414M16	IND CHIP WW 68 NH 5 % 2012
L160	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L161DNP	2409414M09	IND CHIP WW 18 NH 5 % 2012
L162	2404574Z13	IND CHIP WW 220NH 2% 2012 SMD
L20162	2409646M53	IN CER MULTILYR 5.6NH 1608
L20164	2409350L14	IND CER LZRETCH 18 NH 2 1608
L20167	2409154M75	IND CER MLTILYR 100 NH 1005
L20168	2409154M20	IND CER MLTILYR 39.0NH 1005
L20169	2409154M57	IND CER MTLILYR 3.3 NH 1005
L20171	2409154M55	IND CER MTLILYR 2.2 NH 1005
L20172	2409154M04	IND CER MLTILYR 1.8NH 1005
L20173	2409154M59	IND CER MTLILYR 4.7 NH 1005
L20174	2409154M19	IND CER MLTILYR 33.0NH 1005
L20175	2409154M09	IND CER MLTILYR 4.7NH 1005
L20176	2409154M08	IND CER MLTILYR 3.9NH 1005
L20177	2409154M52	IND CER MTLILYR 1.2 NH 1005

L21070	2409377M11	IND CHIP WW 39 NH 5% 1608
L21071	2409154M14	IND CER MLTILYR 12.0NH 1005
L21072	2409154M18	IND CER MLTILYR 33.0NH 1005
L300	2409414M11	IND CHIP WW 27 NH 5 % 2012
L400	2404574Z13	IND CHIP WW 220NH 2% 2012 SMD
L401	2404574Z13	IND CHIP WW 220NH 2% 2012 SMD
L404	2409154M62	IND CER MTLILYR 8.2 NH 1005
L409	2409154M11	IND CER MLTILYR 6.8NH 1005
L410	2409154M11	IND CER MLTILYR 6.8NH 1005
L411	2409154M65	IND CER MTLILYR 15.0NH 1005
L417	2409154M51	IND CER MTLILYR 1.0 NH 1005
L418	2409154M63	IND CER MTLILYR 10.0NH 1005
L419	2409154M65	IND CER MTLILYR 15.0NH 1005
L429DNP	2409154M61	IND CER MTLILYR 6.8 NH 1005
L500	2409154M09	IND CER MLTILYR 4.7NH 1005
L502	2409154M11	IND CER MLTILYR 6.8NH 1005
L504	2409154M09	IND CER MLTILYR 4.7NH 1005
L505	2409154M65	IND CER MTLILYR 15.0NH 1005
L506	2409154M61	IND CER MTLILYR 6.8 NH 1005
L507	2409154M08	IND CER MLTILYR 3.9NH 1005
L625	2409154M64	IND CER MTLILYR 12.0NH 1005
L635	2409154M57	IND CER MTLILYR 3.3 NH 1005
L636	2404554Z28	IND MTLY 10UH 10 1608 SHLD
L650	2462587V25	CHIP IND 18 NH 5% 0805
L651	2462587V30	CHIP IND 47 NH 5% 0805
L652	2413926D27	IND CER CHIP 220.0 NH 10%
L655	2409154M62	IND CER MTLILYR 8.2 NH 1005
M1	3985270C01	"CONTACT, MICROPHONE"
ON/OFF	4070354A01	LIGHT TOUCH SWITCH-SMD
Q1050	4809579E29	TSTR FET P-CHAN SI3443DV 6TSOP
Q1305	4809579E29	TSTR FET P-CHAN SI3443DV 6TSOP
Q1306	4809579E29	TSTR FET P-CHAN SI3443DV 6TSOP
Q1307	4809579E29	TSTR FET P-CHAN SI3443DV 6TSOP
Q1308	4809579E29	TSTR FET P-CHAN SI3443DV 6TSOP
Q1309	4809939C03	TSTR DUAL NPN/PNP UMH3
Q325	4809579E24	TSTR FET P-CHAN 2SJ347 SC90
Q580	4809579E02	TSTR MOSFET N-CHAN 25K1830
Q635	4809579E02	TSTR MOSFET N-CHAN 25K1830
Q652	4809579E02	TSTR MOSFET N-CHAN 25K1830
R100	0662057N05	RES. CHIP 18K 5% 20X40
R1003	0662057M26	RES. CHIP 10 5% 20X40
R1004	0662057M26	RES. CHIP 10 5% 20X40
R101	0662057N05	RES. CHIP 18K 5% 20X40
R1052	0609175L02	RES CHIP 0.25 1% .25W 1206
R1152	0662057M50	RES. CHIP 100 5% 20X40
R1153	0662057M64	RES. CHIP 390 5% 20X40
R1155	0662057M90	RES. CHIP 4700 5% 20X40
R1227	0662057U98	RES CHIP 7.5K 1% 1/16W

R1228	0662057V16	RES CHIP 36K 1% 1/16W
R1229	0662057V32	RES CHIP 150K 1% 1/16W
R1230	0662057V16	RES CHIP 36K 1% 1/16W
R1232	0662057M74	RES. CHIP 1000 5% 20X40
R1233	0662057V11	RES CHIP 22K 1% 1/16W
R1234	0662057V13	RES CHIP 27K 1% 1/16W
R1235	0662057V13	RES CHIP 27K 1% 1/16W
R1236	0662057V27	RES CHIP 100K 1% 1/16W
R1237	0662057V02	RES CHIP 10K 1% 1/16W
R1238	0662057M68	RES. CHIP 560 5% 20X40
R1239	0662057N23	RES. CHIP 100K 5% 20X40
R1240	0662057U85	RES CHIP 2.2K 1% 1/16W
R1241	0662057U85	RES CHIP 2.2K 1% 1/16W
R1243	0662057M90	RES. CHIP 4700 5% 20X40
R1244	0662057M98	RES. CHIP 10K 5% 20X40
R1249	0662057V11	RES CHIP 22K 1% 1/16W
R1250	0662057U43	RES CHIP 47 1% 1/16W
R1269	0662057M82	RES. CHIP 2200 5% 20X40
R1275	0662057M78	RES. CHIP 1500 5% 20X40
R150	0662057M84	RES. CHIP 2700 5% 20X40
R160	0662057M95	RES. CHIP 7500 5% 20X40
R20134	0662057M46	RES. CHIP 68 5% 20X40
R20135	0662057M01	RES. CHIP 0 5% 20X40
R20182	0662057N23	RES. CHIP 100K 5% 20X40
R20185	0662057N23	RES. CHIP 100K 5% 20X40
R20186	0662057N23	RES. CHIP 100K 5% 20X40
R20187	0662057M78	RES. CHIP 1500 5% 20X40
R20189	0662057M86	RES. CHIP 3300 5% 20X40
R20191	0662057N31	RES. CHIP 220K 5% 20X40
R20192	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R20195	0662057M01	RES. CHIP 0 5% 20X40
R20196	0662057M26	RES. CHIP 10 5% 20X40
R20197	0662057M01	RES. CHIP 0 5% 20X40
R20200	0662057M01	RES. CHIP 0 5% 20X40
R20201	0662057M01	RES. CHIP 0 5% 20X40
R20204	0662057N07	RES. CHIP 22K 5% 20X40
R20205	0662057N07	RES. CHIP 22K 5% 20X40
R20206	0662057M33	RES. CHIP 20 5% 20X40
R20208	0662057M90	RES. CHIP 4700 5% 20X40
R20209	0662057M90	RES. CHIP 4700 5% 20X40
R20210DNP	0662057M76	RES. CHIP 1200 5% 20X40
R20211	0662057N20	RES. CHIP 75K 5% 20X40
R20212	0662057V07	RES CHIP 15K 1% 1/16W
R20213	0662057M81	RES. CHIP 2000 5% 20X40
R20214	0662057M90	RES. CHIP 4700 5% 20X40
R20215	0662057N09	RES. CHIP 27K 5% 20X40
R20216	0662057N09	RES. CHIP 27K 5% 20X40
R20217	0655087A42	24 OHM 5% 1/16W

R20218	0655087A42	24 OHM 5% 1/16W
R20219	0662057N20	RES. CHIP 75K 5% 20X40
R20220	0662057M98	RES. CHIP 10K 5% 20X40
R20223	0662057M76	RES. CHIP 1200 5% 20X40
R20225	0662057M74	RES. CHIP 1000 5% 20X40
R20226	0662057M50	RES. CHIP 100 5% 20X40
R20227	0662057N43	RES. CHIP 680K 5% 20X40
R20229	0662057N23	RES. CHIP 100K 5% 20X40
R20230	0662057N23	RES. CHIP 100K 5% 20X40
R20231	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R20233	0662057M26	RES. CHIP 10 5% 20X40
R20234	0662057M26	RES. CHIP 10 5% 20X40
R20235	0662057N65	CHIP RES 10 M 5% 20X40
R20236	0662057M26	RES. CHIP 10 5% 20X40
R20237	0662057M26	RES. CHIP 10 5% 20X40
R20238	0662057M26	RES. CHIP 10 5% 20X40
R21112	0662057M26	RES. CHIP 10 5% 20X40
R21113	0662057M26	RES. CHIP 10 5% 20X40
R21114	0662057M26	RES. CHIP 10 5% 20X40
R21115	0662057M26	RES. CHIP 10 5% 20X40
R21116	0662057M26	RES. CHIP 10 5% 20X40
R21117	0662057M26	RES. CHIP 10 5% 20X40
R21118DNP	0662057M98	RES. CHIP 10K 5% 20X40
R21119DNP	0662057M01	RES. CHIP 0 5% 20X40
R21120DNP	0662057M01	RES. CHIP 0 5% 20X40
R21121	0662057M01	RES. CHIP 0 5% 20X40
R21122	0662057M42	RES. CHIP 47 5% 20X40
R21123	0662057M42	RES. CHIP 47 5% 20X40
R21124	0662057M42	RES. CHIP 47 5% 20X40
R21125	0662057M42	RES. CHIP 47 5% 20X40
R21126	0662057M42	RES. CHIP 47 5% 20X40
R21127	0662057M42	RES. CHIP 47 5% 20X40
R21128	0662057M42	RES. CHIP 47 5% 20X40
R21129	0662057M42	RES. CHIP 47 5% 20X40
R300	0662057M86	RES. CHIP 3300 5% 20X40
R301	0662057M98	RES. CHIP 10K 5% 20X40
R325	0662057M74	RES. CHIP 1000 5% 20X40
R326	0662057M92	RES. CHIP 5600 5% 20X40
R327	0662057N10	RES. CHIP 30K 5% 20X40
R328	0662057N23	RES. CHIP 100K 5% 20X40
R401	0662057M58	RES. CHIP 220 5% 20X40
R402	0662057M58	RES. CHIP 220 5% 20X40
R403	0662057M74	RES. CHIP 1000 5% 20X40
R500	0662057M71	RES. CHIP 750 5% 20X40
R501	0662057U89	RES CHIP 3.3K 1% 1/16W
R502	0662057M57	RES. CHIP 200 5% 20X40
R503	0662057U83	RES CHIP 1.8K 1% 1/16W
R505	0662057N11	RES. CHIP 33K 5% 20X40

R506	0662057M90	RES. CHIP 4700 5% 20X40
R507	0662057M91	RES. CHIP 5100 5% 20X40
R508	0662057M95	RES. CHIP 7500 5% 20X40
R510	0662057M50	RES. CHIP 100 5% 20X40
R511	0662057M50	RES. CHIP 100 5% 20X40
R513	0662057M43	RES. CHIP 51 5% 20X40
R517	0662057M76	RES. CHIP 1200 5% 20X40
R518	0662057M81	RES. CHIP 2000 5% 20X40
R519	0662057M62	RES. CHIP 330 5% 20X40
R520	0662057M83	RES. CHIP 2400 5% 20X40
R579	0662057M98	RES. CHIP 10K 5% 20X40
R600	0662057M46	RES. CHIP 68 5% 20X40
R601	0662057M74	RES. CHIP 1000 5% 20X40
R602	0662057M73	RES. CHIP 910 5% 20X40
R625	0662057M43	RES. CHIP 51 5% 20X40
R627	0662057M52	RES. CHIP 120 5% 20X40
R628	0662057M43	RES. CHIP 51 5% 20X40
R629	0662057M52	RES. CHIP 120 5% 20X40
R635	0662057M43	RES. CHIP 51 5% 20X40
R636	0662057M52	RES. CHIP 120 5% 20X40
R637	0662057M52	RES. CHIP 120 5% 20X40
R638	0662057M43	RES. CHIP 51 5% 20X40
R639	0662057N23	RES. CHIP 100K 5% 20X40
R651	0662057M95	RES. CHIP 7500 5% 20X40
R652	0662057M77	RES. CHIP 1300 5% 20X40
R653	0662057M96	RES. CHIP 8200 5% 20X40
R654	0662057V10	RES CHIP 20K 1% 1/16W
R655	0662057M50	RES. CHIP 100 5% 20X40
R656	0662057M84	RES. CHIP 2700 5% 20X40
R750	0662057M50	RES. CHIP 100 5% 20X40
R9935	0662057V02	RES CHIP 10K 1% 1/16W
R9936	0662057N06	RES. CHIP 20K 5% 20X40
R9938	0662057V07	RES CHIP 15K 1% 1/16W
R9947	0662057N33	RES. CHIP 270K 5% 20X40
R9948	0662057N15	RES. CHIP 47K 5% 20X40
R9949	0662057N07	RES. CHIP 22K 5% 20X40
R9950	0662057N07	RES. CHIP 22K 5% 20X40
R9962	0662057V17	RES CHIP 39K 1% 1/16W
R9963	0662057M98	RES. CHIP 10K 5% 20X40
R9964	0662057M26	RES. CHIP 10 5% 20X40
R9965	0662057M26	RES. CHIP 10 5% 20X40
R9966	0662057M26	RES. CHIP 10 5% 20X40
R9967	0662057M26	RES. CHIP 10 5% 20X40
R9968	0662057M26	RES. CHIP 10 5% 20X40
R9972	0662057M01	RES. CHIP 0 5% 20X40
R9976	0662057M98	RES. CHIP 10K 5% 20X40
R9977	0662057M50	RES. CHIP 100 5% 20X40
S_VA	4009368L08	SW TACT RT ANG 3 POLE 12SEAL

S_VDN	4009368L08	SW TACT RT ANG 3 POLE 12SEAL
S_VUP	4009368L08	SW TACT RT ANG 3 POLE 12SEAL
U1001	4813832P70	TRANS SUP 5.6V QUAD
U1002	4813832P70	TRANS SUP 5.6V QUAD
U103	5109768D08	IC TEMP SENSOR LM20BIM7X SC 70
U1300	5199443A01	IC FLASH MEM 2MX16 AM29BDL32
U1400	5109509A36	IC SRAM 256KX16 KM616FR4010ZI
U325	4809863M17	OSC MOD REF 16.8MHZ 5032 SMD
U326	5109522E22	IC SNGL AND GATE TC7S08FU
U400	5109940K29	IC MIX/EXC CDMA/AMPS ME3 32BCC
U401	5109572E39	IC GAAS SPDT RF SWITCH SC70-6
U402	5109572E39	IC GAAS SPDT RF SWITCH SC70-6
U500	5109730C25	MMIC GAAS RF PA 2000 5 MLP
U501	5109730C22	MMIC PA GAAS RF PA2000 4 MLP
U502	5109731C27	IC OP AMP SNGL LMV821M7 5SC70
U550	5803912K03	ISLTR CER TX 836MHZ 6MM SMD
U625	5109940K32	IC MMIC SI BUFF AMPL UPC8151TB
U626	4809283D34	OSC MOD VCO 991MHZ SMD
U635	5109940K32	IC MMIC SI BUFF AMPL UPC8151TB
U636	4809283D47	OSC MOD VCO 2070MHZ 5548 SMD
U700	5109879E34	IC BICMOS ZIF/SYNTH SC79882VHR
U9915	5109731C34	IC AUD AMP LM4877IBP MICRO 8CS
U9917	5109940K40	IC LNR MIXER 20 TSSOP1.3FEIC
U9998	2113743L41	CAP CHIP 10000 PF 10% X7R
VR1201	4813832C73	TRANS SUP QUAD 6.2V
VR1202	4813830C29	DIODE 16V ‘J1‘ MMSZ5246BT1
VR1203	4813832P70	TRANS SUP 5.6V QUAD
VR1204	4813832P70	TRANS SUP 5.6V QUAD
VR1205	4813832P70	TRANS SUP 5.6V QUAD
Y1170	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T1

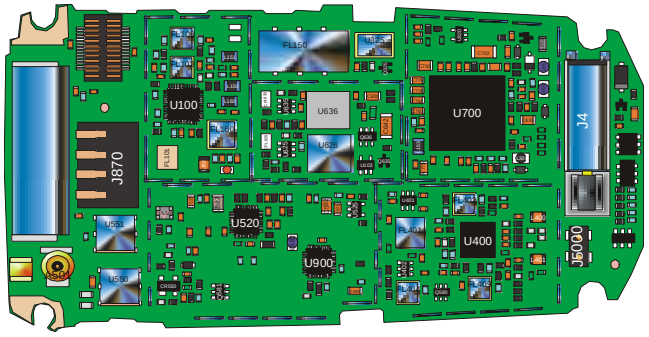
P2K Products-V.60c/Timeport 270c RF - Technical Training Manual

-V.60c RF

-Timeport 270c RF

RF- TABLE OF CONTENTS

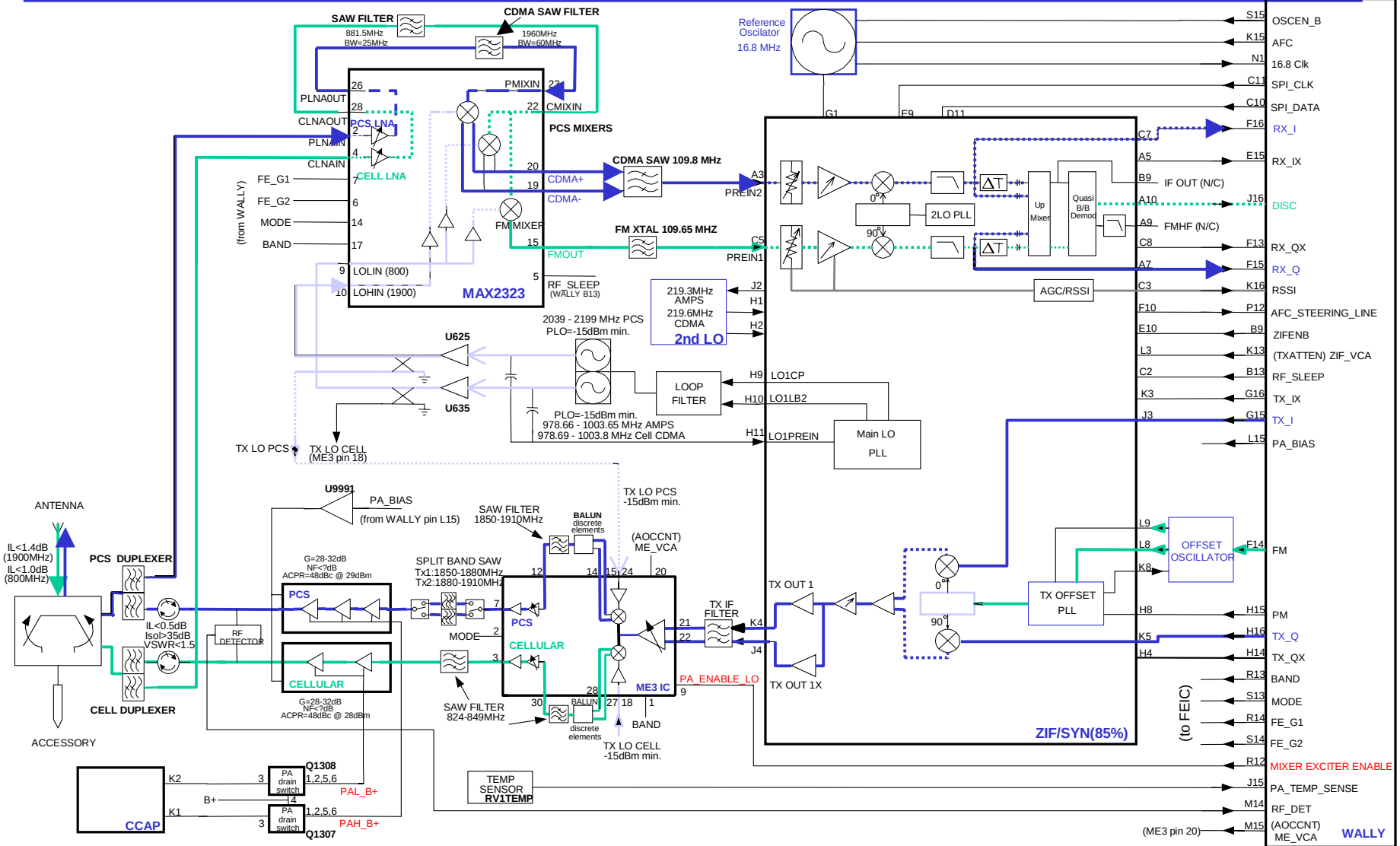
V.60c
RX 800 & PCS CIRCUIT



V.60c & Timeport 270c PCS & CELLULAR RF BLOCK

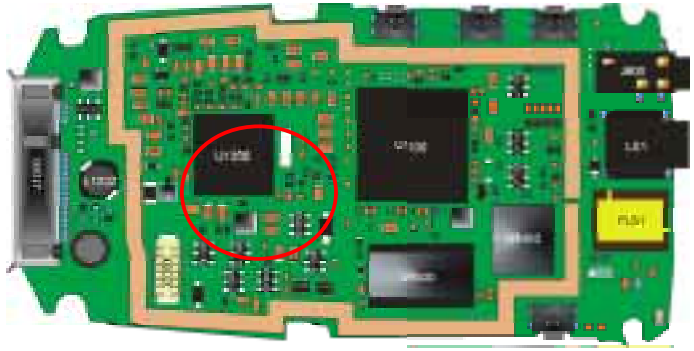
MOTOROLA

CDMA Service Support Engineering

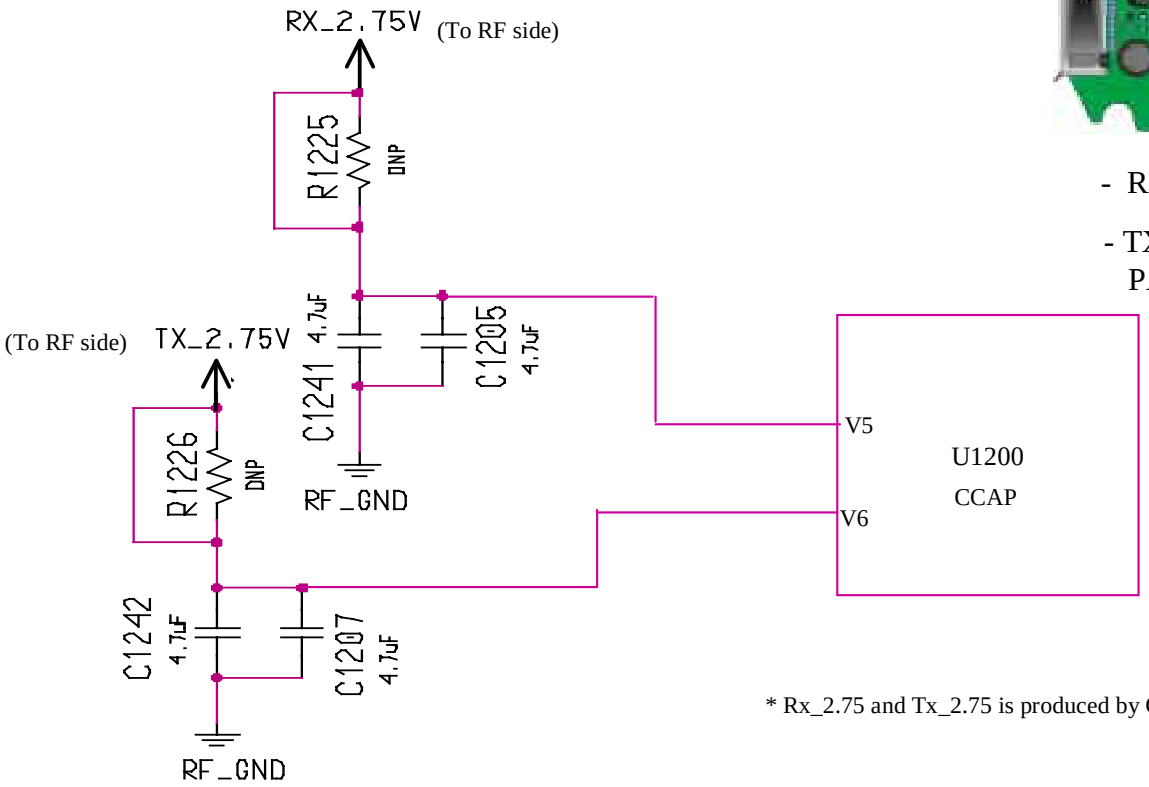


P2 Timeport 270c TRI MODE: PCS/800CDMA/AMPS RF INTERCONNECT BLOCK DIAGRAM

RF Power Supply & Switching

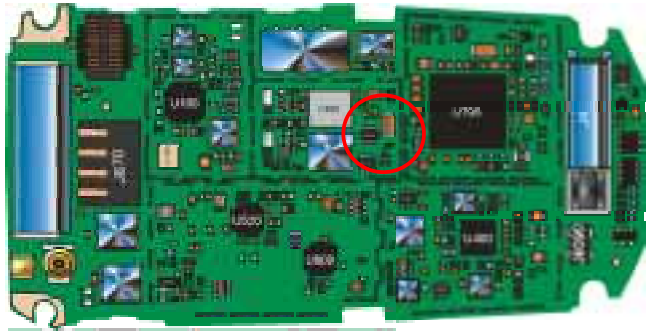


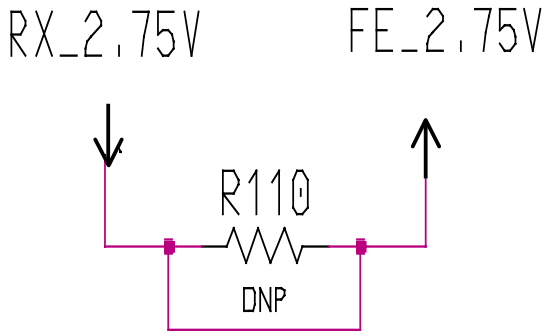
- RX 2.75 ON ALL TIME EXCEPT IN SLEEP MODE
- TX 2.75 ONLY ON WHEN TRANSMITTING
  PA ENABLE FROM U1100

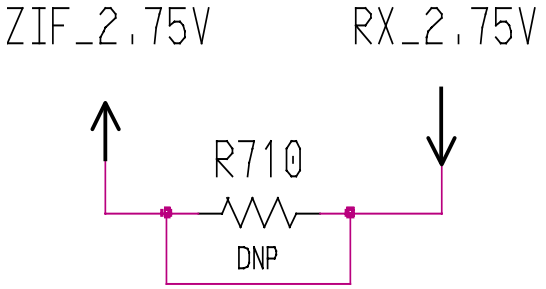


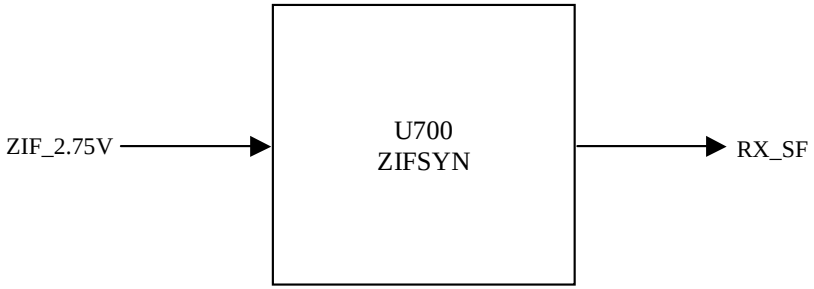
* Rx_2.75 and Tx_2.75 is produced by CCAP

RF Power Supply & Switching



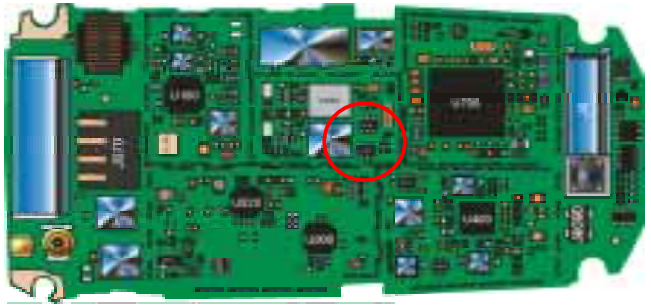


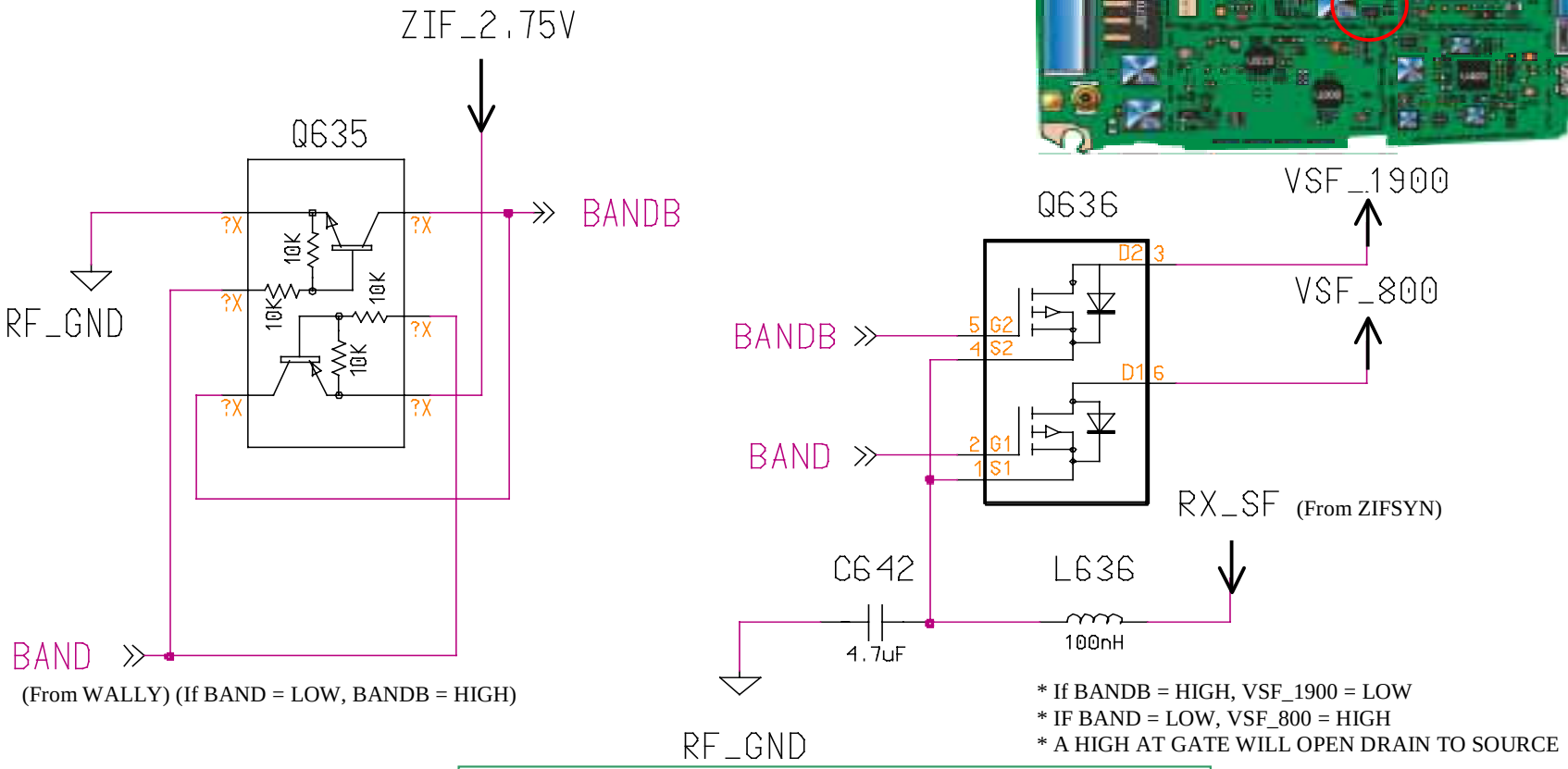




* Rx_SF is PRODUCED BY ZIFSYN,
* ZIFSYN Uses ZIF_2.75v to PRODUCE Rx_SF

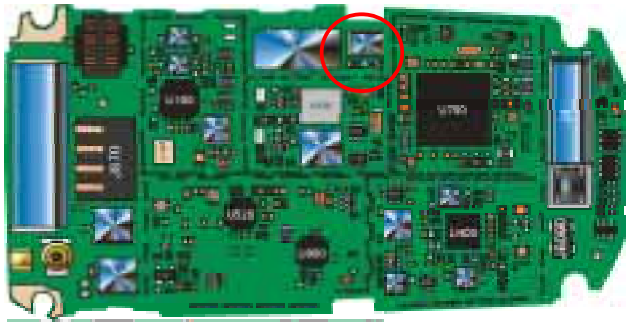
RF Power Supply & Switching

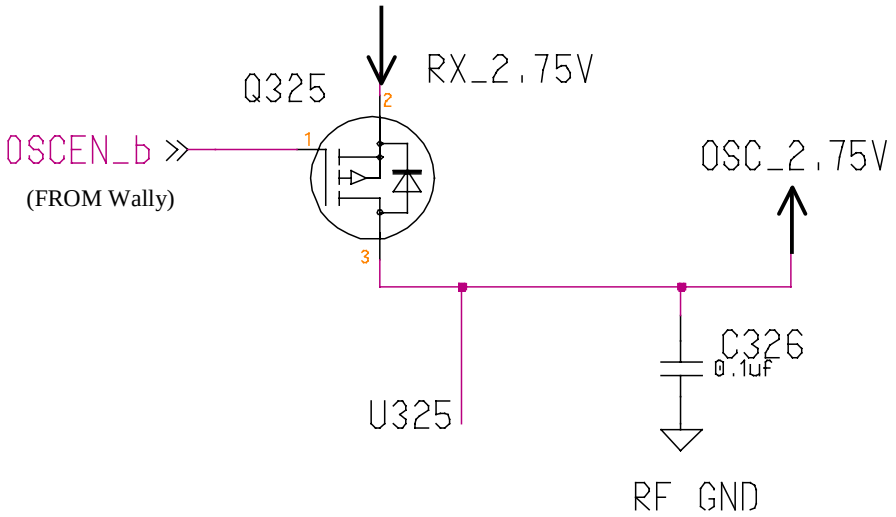


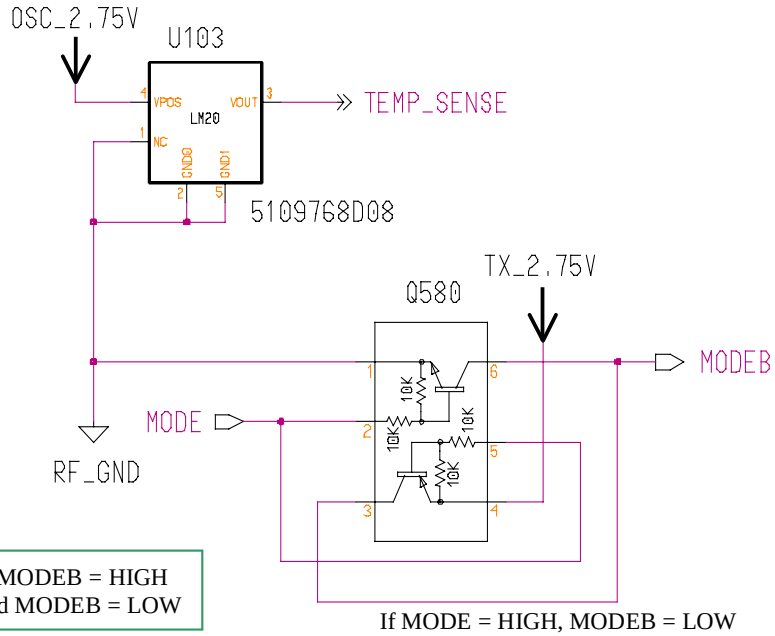


Note: In PCS MODE (1900MHz) BAND = HIGH and BANDB = LOW
In CELLULAR MODE (800MHz) BAND = LOW and BANDB = HIGH

RF Power Supply & Switching



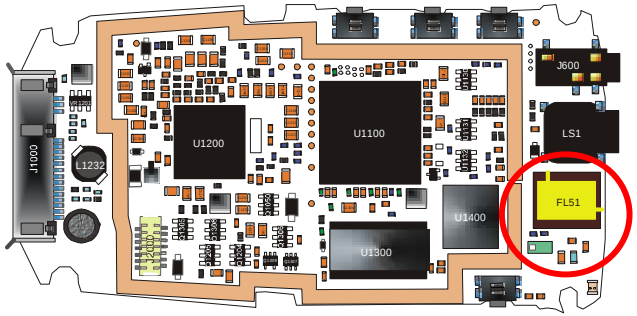




Note: In AMPS MODE, MODE = LOW and MODEB = HIGH
In CDMA MODE, MODE = HIGH and MODEB = LOW

If MODE = HIGH, MODEB = LOW

RX ANTENNA CIRCUIT



RX ANTENNA CIRCUIT

I. AMPS MODE OF OPERATION

RECEIVER

RECEIVER CIRCUITRY
The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex SAW filter – FL51.

II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

RECEIVER

RECEIVER CIRCUITRY
The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex SAW filter – FL51.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

RECEIVER

RECEIVER CIRCUITRY
The phone receives the RF signal from the Antenna or the RF test port, the received RF signal is routed through the Diplexer - FL53 to mono block duplex ceramic filter – FL50.

V.60c FEIC

FL100
9103913K04
800
C104
3.6pF
C105
DNP
RF_GND
IN
OUT
C107
8.2pF
C122
2.7pF
L114
18.0nH
RF_GND
855817
FL103
PCS
FE_2.75V
C119
12pF
L112
2.2nH
C120
2.2pF
C123
6.8pF
L115
5.6nH
C125
1.5pF
C103
39pF
L101
6.8nH
C?
.01uF
L?
39.0nH
U100
16
MAX2323
C109
39pF
L150
100nH
R150
2K
FROM FL50
RX
FROM FL51
HI - FREQ
LOW - FREQ
RX IF TO C151
RX PCS / CDMA 800
RX IF TO C152
R103
10
RF_SLEEP
C106
.01uF
R104
10
FEIC_G2
C108
.01uF
FEIC_G1
MODE
R100 20K
R101 13K
R108
10
BAND 2.75 for 1900
0 for 800+Analog
C115
.01uF
RX_LO_800
FROM C110
FROM C100
RX_LO_PCS
RX ANALOG
TO C161

FEIC CIRCUIT

I. AMPS MODE OF OPERATION

FL51. The RF signal is then routed to the Front End IC(FE IC) – U100 , which contains LNA which provides a 10-12 dB gain to the received RF signal, and U100 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.65Mhz.
The local oscillator signal which is input to the filter FL101 is 978 – 1004 Mhz. The VCO module U626 is controlled by the ZIF/SYN IC – U700.

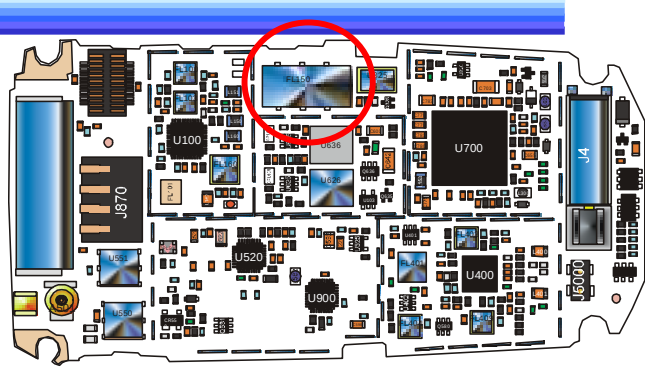
II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

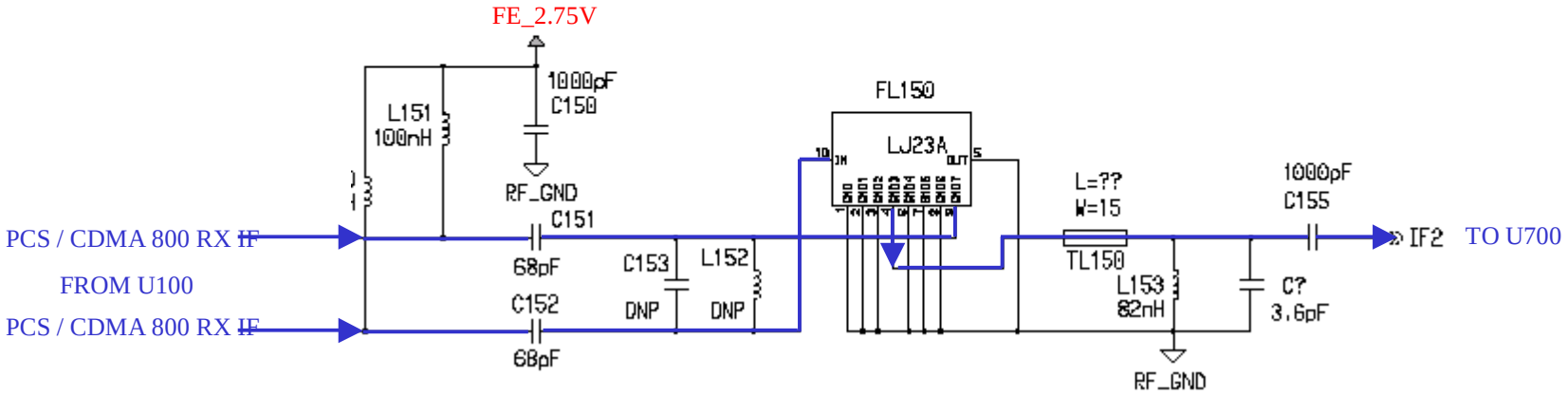
FL51. The RF signal is then routed to the Front End IC(FE IC) – U100 , which contains LNA which provides three stage gain to the received RF signal based on its strength, and U100 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.8Mhz.
The FE IC is controlled by WALLY through the following signals: FEIC_G1, FEIC_G2, and MODE.
The local oscillator signal which is input to the filter FL101 is 978 – 1004 Mhz. The VCO module U626 is controlled by the ZIF/SYN IC – U700.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

FL50. The RF signal is then routed to the Front End IC(FE IC) – U100 , which contains LNA which provides three stage gain to the received RF signal based on its strength, and U100 provides inter stage filtering and it contains Mixer which down converts the frequency of the signal to IF which is 109.8Mhz.
The FE IC is controlled by WALLY through the following signals: FEIC_G1, FEIC_G2, and MODE.
The local oscillator signal RX_LO_PCS is 2039-2100 Mhz. The VCO module U636 is controlled by the ZIF/SYN IC – U700.

PCS IF CIRCUIT





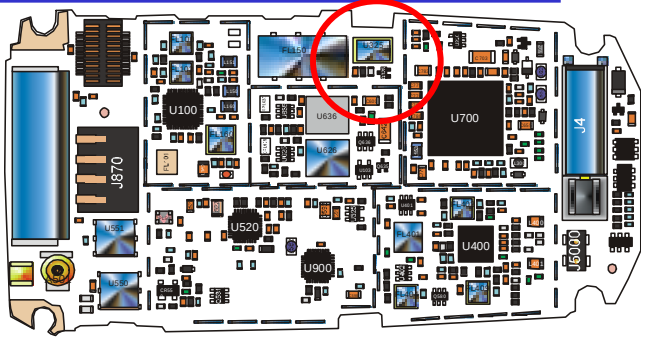
II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

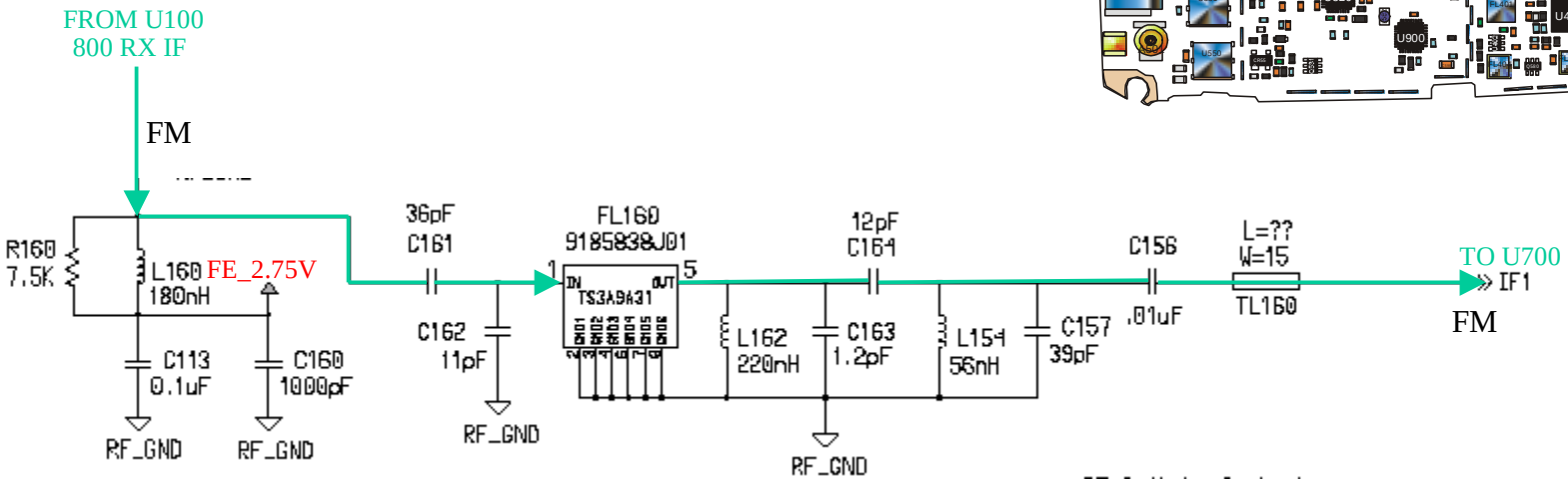
The mixer output IF signal 109.8Mhz is routed through IF filter- FL150 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

The mixer output IF signal 109.8Mhz is routed through IF filter- FL150 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

800 IF CIRCUIT

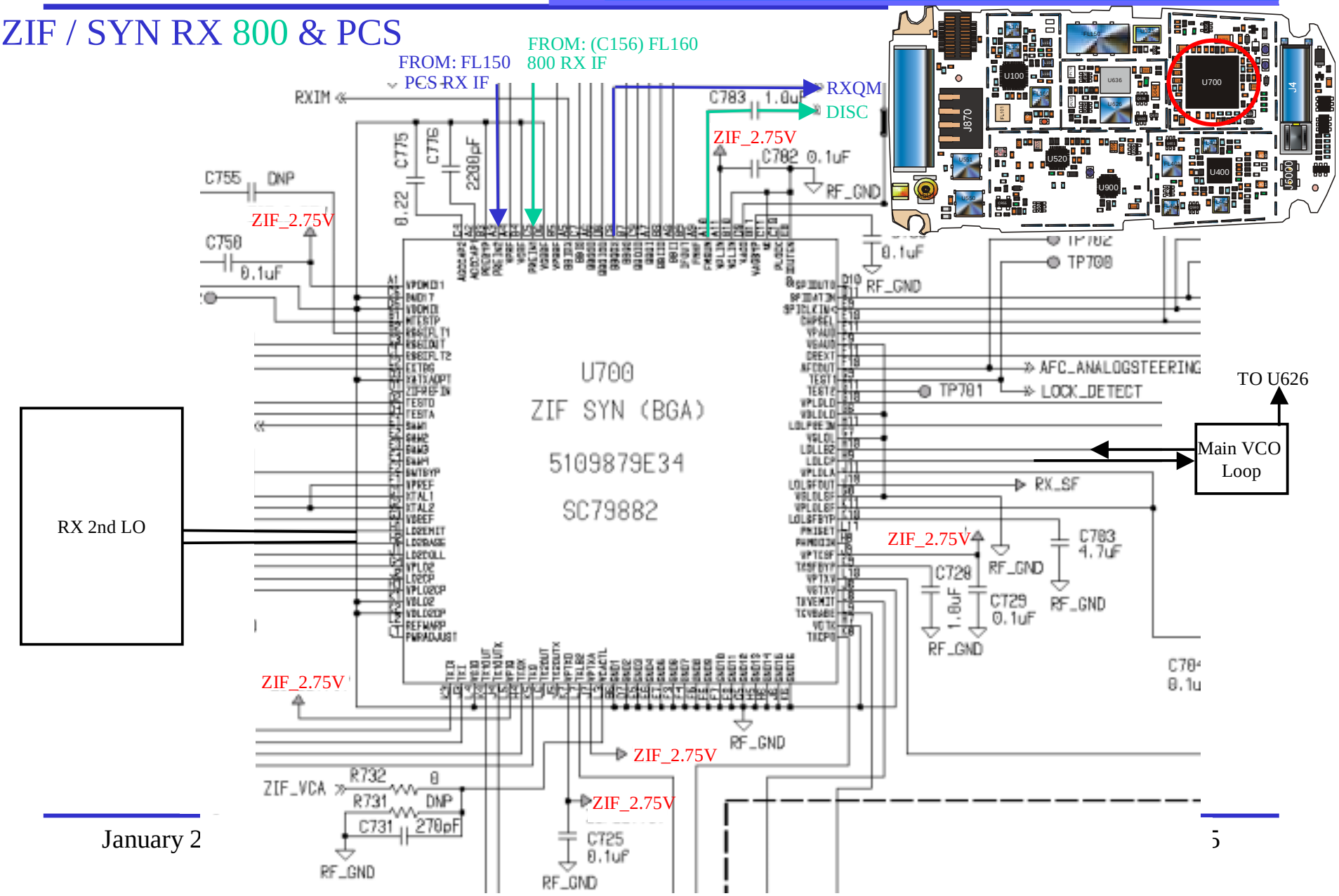




I. AMPS MODE OF OPERATION

The mixer output IF signal 109.65Mhz is routed through IF filter- FL160 into the ZIF/SYN IC U700 for mixing with the second LO ,filtering and demodulation.

ZIF / SYN RX 800 & PCS



RX ZIF/SYN CIRCUIT

I. AMPS MODE OF OPERATION

RECEIVE AUDIO

DISC - signal an AMPS discriminator audio which is the output of FM demodulator in U700 is produced by mixing the IF signal with the second LO (which is controlled by U700) and then filtered. The audio on DISC line goes to WALLY IC-U1100 to be digitized. All receive audio filtering and gain control is performed in the digital domain within the WALLY which contains DSP, the processed RX audio is converted back to analog and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.

The CCAP - U1200 amplifies and route the audio signal(receive audio) to the speaker (phone speaker, boom speaker or external speaker). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the alert.

II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

RECEIVE AUDIO

Four outputs from U700 – RXIP, RXIM, RXQP, RXQM carries the base band signal of the receive digital call to the WALLY, the received QPSK data is gain controlled and converted to digital, the 1.2288 Mb/sec Rx data stream is then decoded by the CSP inside the WALLY to produce a signal containing only the desired data. The digital speech data is further decoded by the CELP vocoder a part of DSP within WALLY and then converted back into analog receive audio and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.

The CCAP - U1200 amplifies and route the audio signal (receive audio) to the speaker (phone speaker, boom speaker or external speaker). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the alert.

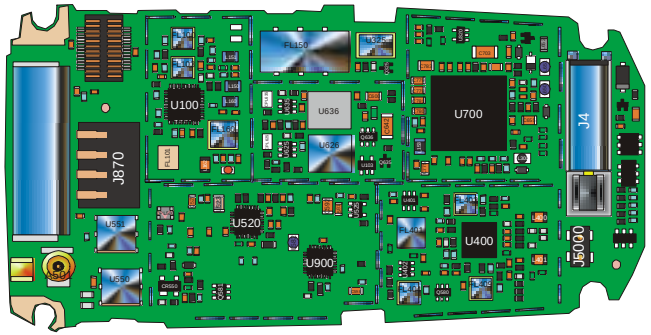
III. CDMA PCS (1900Mhz) MODE OF OPERATION

RECEIVE AUDIO

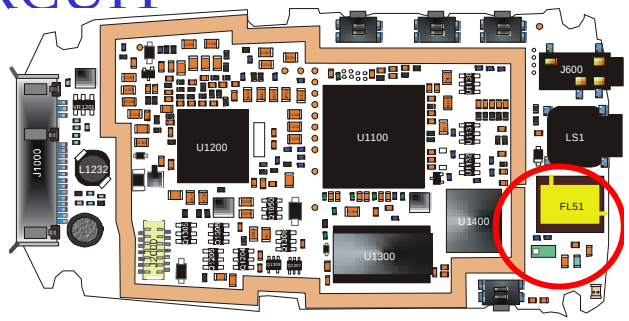
Four outputs from U700 – RXIP, RXIM, RXQP, RXQM carries the base band signal of the receive digital call to the WALLY, the received QPSK data is gain controlled and converted to digital, the 1.2288 Mb/sec Rx data stream is then decoded by the CSP inside the WALLY to produce a signal containing only the desired data. The digital speech data is further decoded by the CELP vocoder a part of DSP within WALLY and then converted back into analog receive audio and routed to CCAP IC – U1200 on signals AUDIO_P and AUDIO_M.

The CCAP - U1200 amplifies and route the audio signal (receive audio) to the speaker (phone speaker, boom speaker or external speaker). The alert tone originates in WALLY IC and follows the same path as receive audio except from CCAP it is routed to the alert.

V.60c
TX 800 & PCS CIRCUIT



TX 800 & PCS ANTENNA CIRCUIT



TX ANTENNA CIRCUIT

I. AMPS MODE OF OPERATION

The TX IF is send to U900 where it is amplified and the output passes through the isolator U550 and then through TX band pass mono block duplex SAW filter FL51 and through diplexer FL53 to the antenna or RF test port.

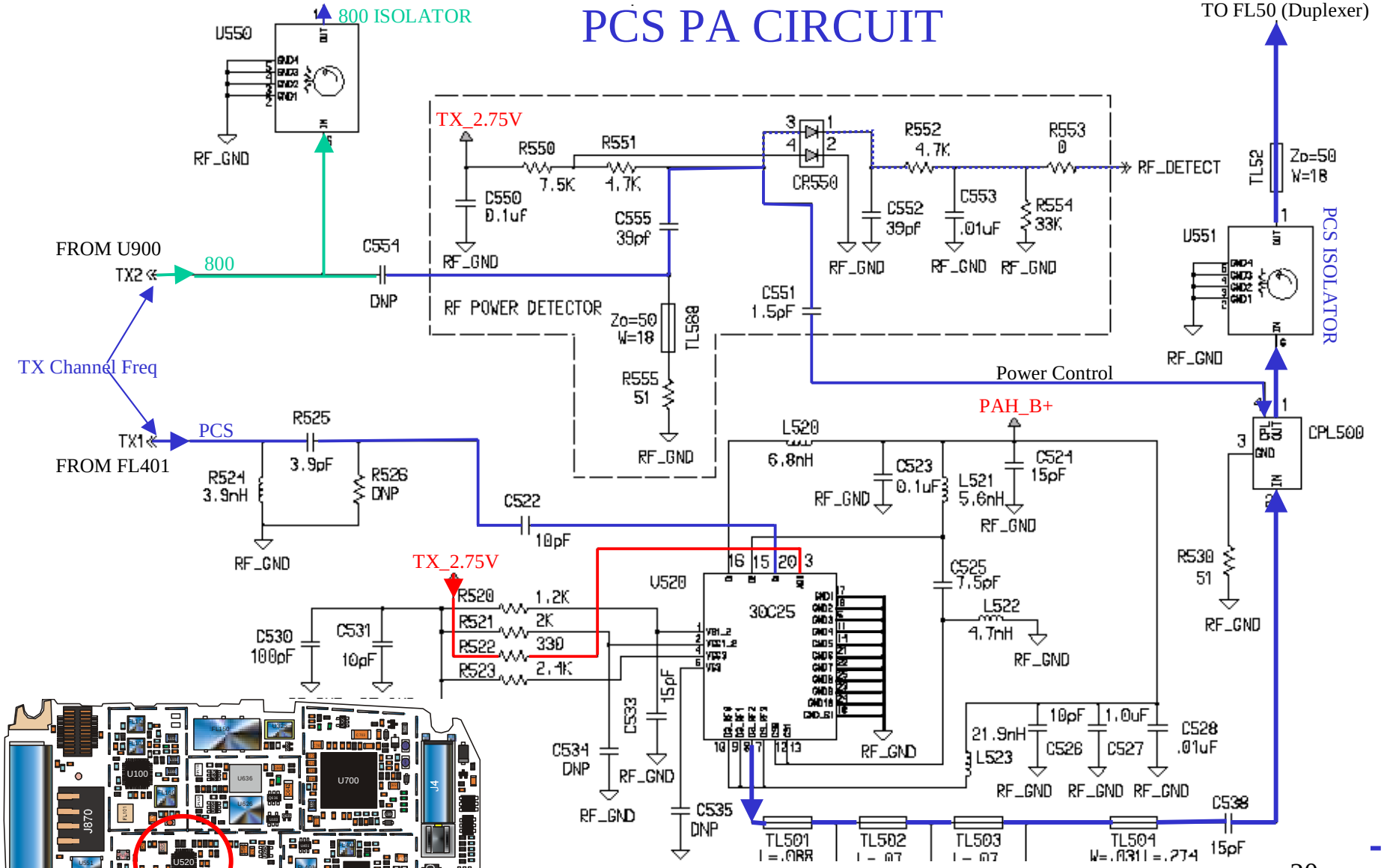
II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

The TX IF is send to U900 where it is amplified and the output passes through the isolator U550 and then through TX band pass mono block duplex SAW filter FL51 and through diplexer FL53 to the antenna or RF test port.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

The TX IF is send to U520 where it is amplified and the output passes through the isolator U551 and then through TX band pass mono block duplex ceramic filter FL50 and through diplexer FL53 to the antenna or RF test port.

PCS PA CIRCUIT



PCS PA CIRCUIT

III. CDMA PCS (1900Mhz) MODE OF OPERATION

The Tx signal is send through the SPLIT BAND SAW filter FL401 into the Power Amplifier (PA) – U520 where it is amplified.

800 PA CIRCUIT

800 PA CIRCUIT

I. AMPS MODE OF OPERATION

The Tx signal is send through the band pass filter FL404 into the Power Amplifier (PA) – U900 where it is amplified .

II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

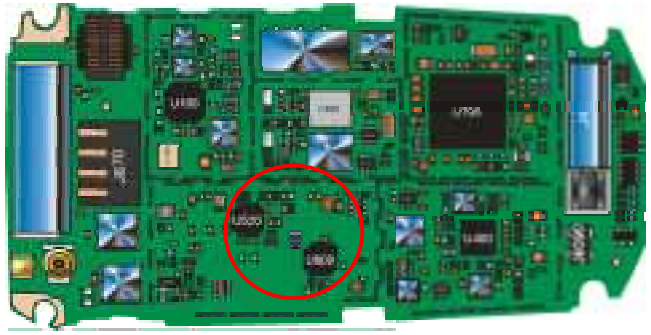
The Tx signal is send through the band pass filter FL404 into the Power Amplifier (PA) – U900 where it is amplified .

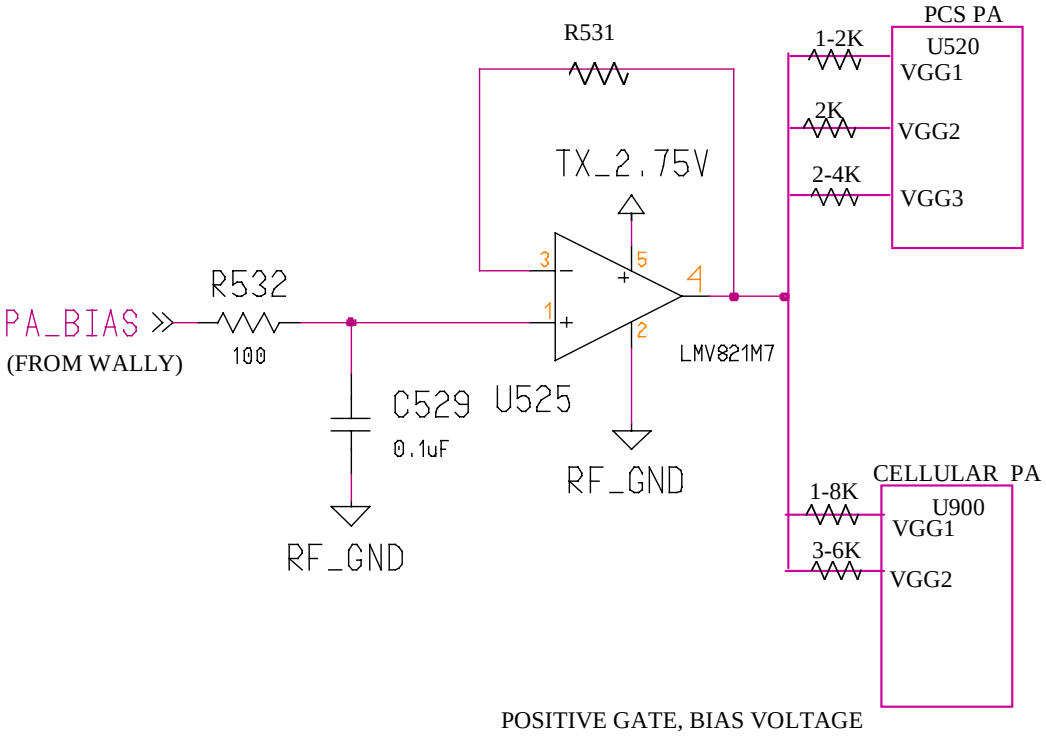
P2K PRODUCTS
TX POWER CONTROL IN CDMA SYSTEM

Theory and overview:

1. CDMA system has many users simultaneously transmitting on the same frequency, this requires the system to be able to apply very precise power control to each individual phone.
2. From the base station's standpoint, every signal, no matter how near or far from the cell site, must appear to arrive at the same signal strength.
3. To do this CDMA phone follow two simple power control scheme: Open-loop power control and Closed-loop power control.
4. The challenge for a CDMA phone is the large range of power that the phone needs to operate over; 73dB, this is too much for any power detector to handle, therefore an accurate power phasing is imperative.
5. It is also imperative to characterize the receive path and the transmit path over the range of power, and also to correct for frequency and temperature variations.
6. There are 3 variable gain stages that are controllable, each contributing to that total of 73dB range: ZIF VCA, and two stages of the ME.
7. The gain of the PA is also variable, and this needs to be taken into account when setting the gain of the other three. With all of this variable gain available the phone has no trouble operating over the 73dB dynamic range, and more.
8. The power control signal lines are: ZIF_VCA, ME_VCA, PA_BIAS, PA_B+

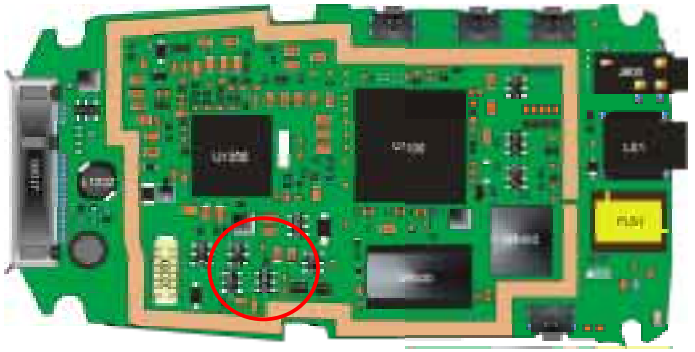
PA Gate Supply



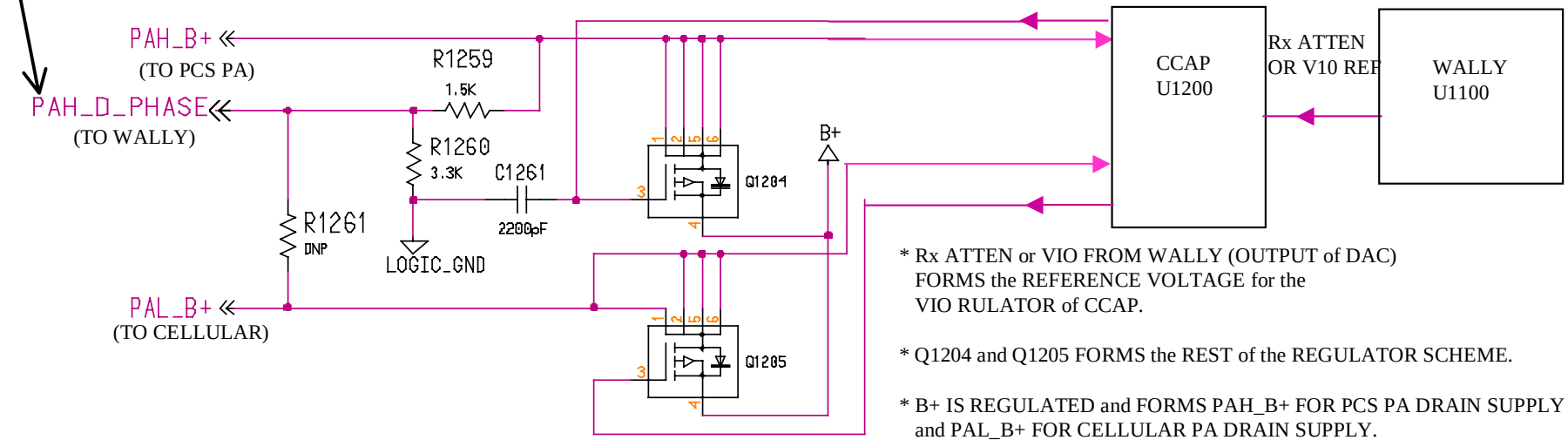


POSITIVE GATE, BIAS VOLTAGE

PA Drain Supply



PAH_D_PHASE IS THE FEEDBACK TO WALLY



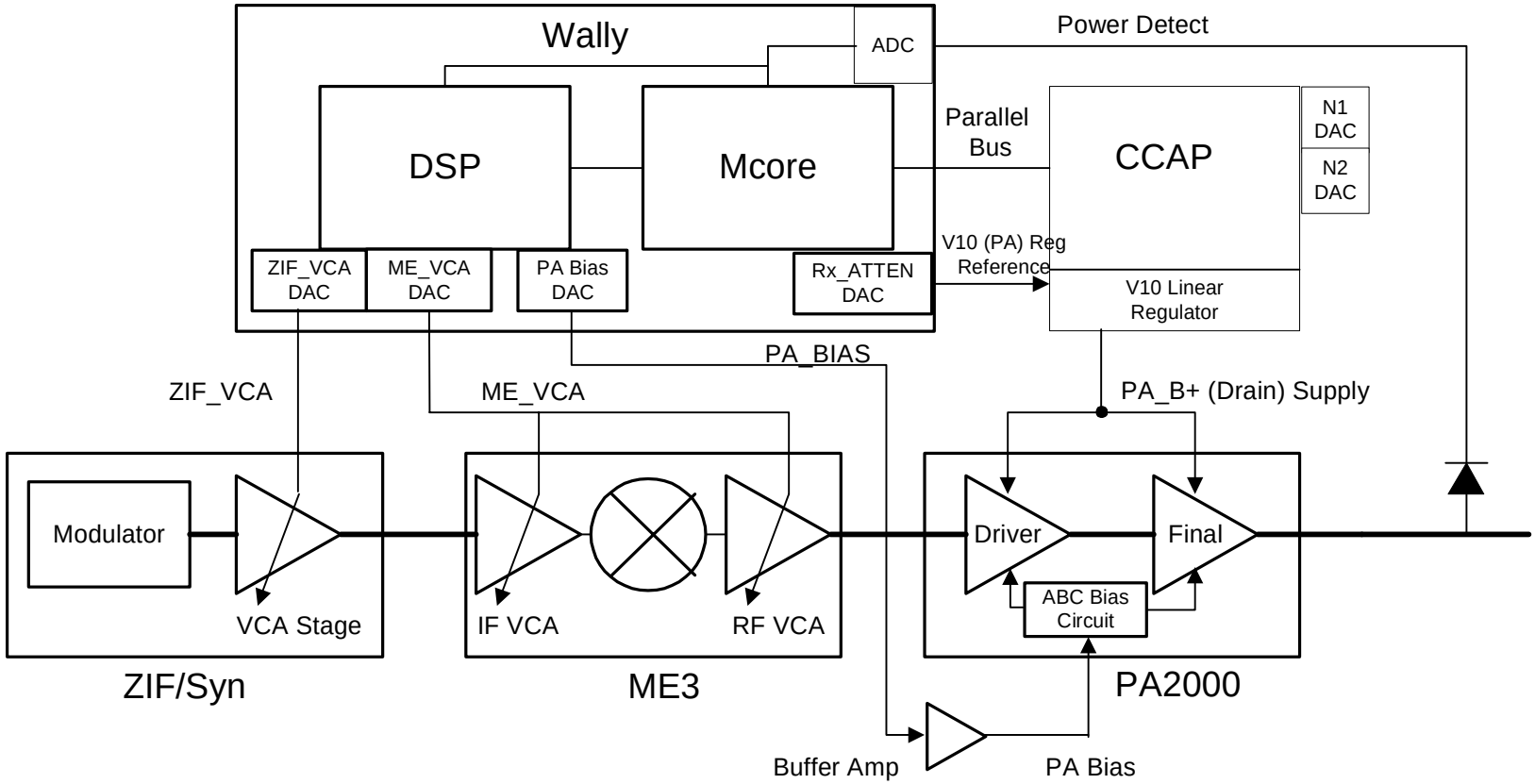
* Rx ATTEN or VIO FROM WALLY (OUTPUT of DAC) FORMS the REFERENCE VOLTAGE for the VIO RULATOR of CCAP.

* Q1204 and Q1205 FORMS the REST of the REGULATOR SCHEME.

* B+ IS REGULATED and FORMS PAH_B+ FOR PCS PA DRAIN SUPPLY and PAL_B+ FOR CELLULAR PA DRAIN SUPPLY.

* PAH_D_PHASE FEED BACK to WALLY (DAC) to CORRECT ANY INACCURACY.

TX POWER CONTROL IN CDMA SYSTEM



Tx power control (contd.)

CDMA TRANSCEIVER PHASED STAGES:

1. RECEIVER
   * Each of the three LNA states(two for PCS) for DSP RSSI
   * Each of the three LNA states(two for PCS) for MCU RSSI
2. TRANSMITTER
   * PA Drain (PA_B+) supply (not phased -- a pre-determined table is loaded.)
   * PA Gate Bias (PA_Bias)
   * ZIF/SYN VCA
   * ME_VCA

RECEIVER PHASING

RSSI is phased for each of the LNA gain states
RSSI is phased for each of the DSP and MCU RSSI A/Ds
Each table is 8-chords in size
Eight incremental measurements are taken at input powers from -95 dBm to -30 dBm
RSSI curve is inverted prior to storing in NVM.

Details of PA Phasing in Variable PA Bias Region:

The variable PA bias region is pre-defined
The NVM Tables are 16 chords in size
The endpoints, of each chord in the variable PA bias region, are known
PA drain supply is not phased.
- -Drain voltage is controlled with Rx_ATTEN DAC
- -Rx_ATTEN DAC values stored in NVM FINAL_BIAS_TABLE

At each endpoint, the desired quiescent current value is obtained by adjusting PA gate voltage.
- -Gate voltage is controlled with PA_BIAS DAC
- -PA_BIAS DAC values stored in NVM PA_BIAS_TABLE

ZIF/VCA Phasing:

Choosing upper limit DAC value of ZIF_VCA

The ZIF_VCA curve is divided into 16 chords

Take a few power measurements, but mostly interpolate the endpoints

The factory is currently doing a linear progression from about -40 dBm to -60 dBm.

ME_VCA Phasing:

The ME_VCA is divided up into 32 chords of equal length beginning at the cross-over point.

The ME_VCA phasing is essentially split into three distinct sections:

- the section below the variable PA bias region
- within the variable PA bias region
- the section above the variable PA bias region.

The endpoints must line-up with the endpoints of the PA phasing tables.

Maximum Output Power:

RF detector is used for monitoring output power

Maximum power is limited to DMAX_LIMIT

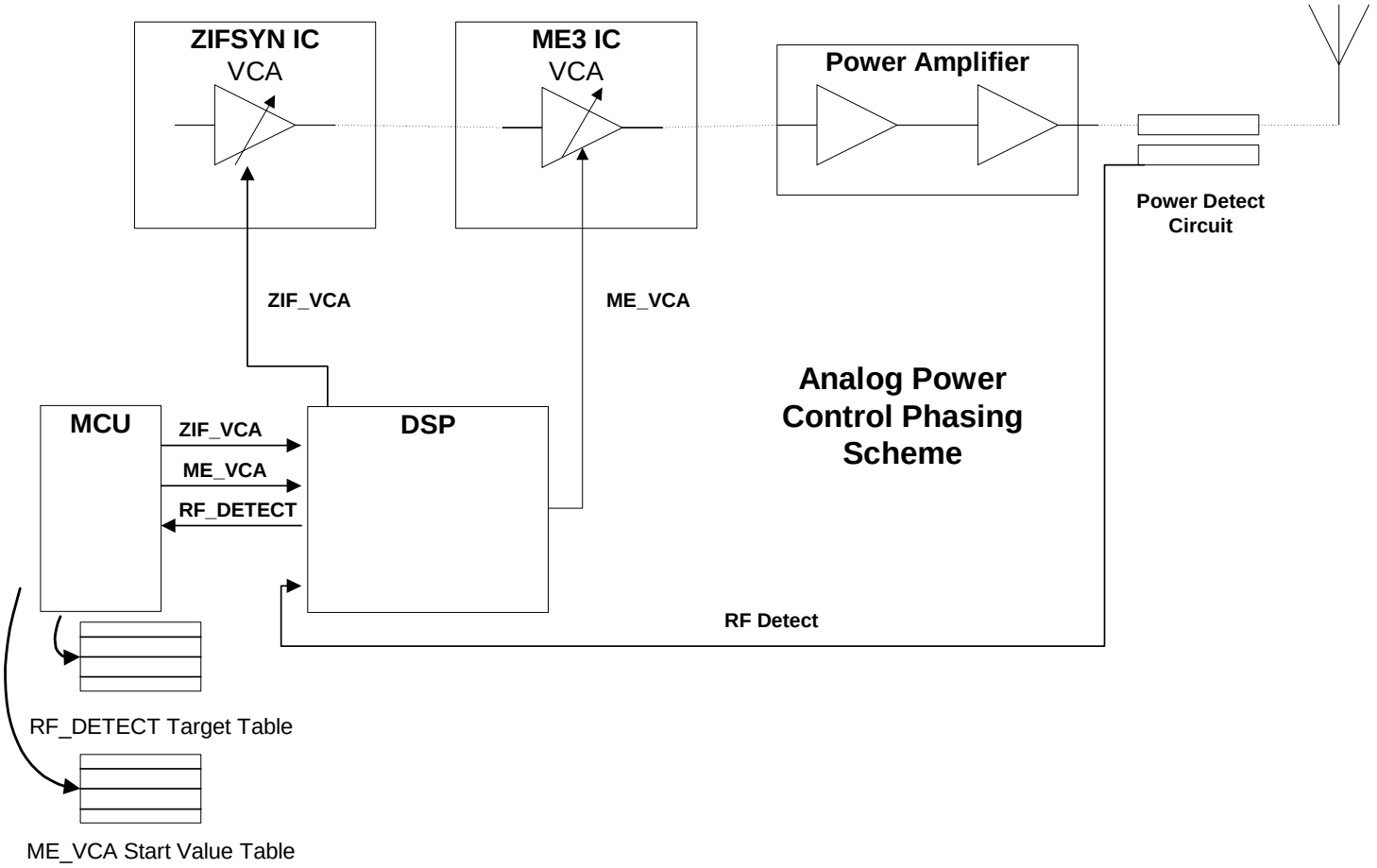
DMAX_LIMIT is a RF_DET ADC count corresponding to the maximum output power.

Maximum power is phased across frequency at 16 specific channels.

The difference in RF_DET ADC count at the phased channel, with respect to the RF_DET ADC count on the reference channel, is stored in the TX_DMAX_FREQ Table.

The correction value must be divided by 4 prior to storing into the TX_DMAX_FREQ table.

Analog Phasing:



Analog AOC:

The Automatic Output Control (AOC) is enabled, in test mode, by default.

The AOC is disabled when ME_VCA DAC is forced

AOC is re-enabled upon LOAD-SYNTH, POUT or CARRIER ON

Analog Phasing (with PA phased)

1) Store values for ZIF_VCA DAC
2) Tune to reference channel
3) Turn on carrier and SET ATTEN to output power level
4) Force and adjust ME_VCA DAC until desired target power is met.
5) Record the ME_VCA DAC value and RF_DET value
6) Repeat steps 3 to 5 until all power steps have been phased.
7) Tune to channel for across the band frequency phasing

8) Set power step to 3

9) At each test channel, adjust ME_VCA DAC until target power is met. Calculate the difference of ME_VCA and RF_DET counts with that on reference channel.

10) Store all results using PHASE command, Parameter 0x00.

Frequently Asked Questions about Tx Power Phasing:

Q: What is the order of phasing the transmitter lineup?

-The PA is always phased first. The ME3 and ZIF/SYN VCAs are set to zero so that no RF is at the input of the PA. The PA drain is set to the desired voltage, and then the PA gate is phased such that the quiescent bias current level is reached.
A table is created which represents the PA drain voltage (Rx_ATTEN DAC) vs. output power, and PA gate voltage (PA_BIAS DAC) vs. output power.

-The ME3 VCA is next. The ME_VCA DAC values for specific desired output power levels are determined. To do this, the ZIF/SYN VCA is set to its maximum operating voltage (VCA_Splatter limit), and the PA bias voltages are set with respect to the desired output power level. A table of ME_VCA DAC values versus output power is created based on interpolation of the measurements taken and possibly curve fitting.

-The ZIF/SYN VCA is phased last. The PA bias voltages are set with respect to the desired output power level. The ME_VCA DAC is set to its minimum phased value, and the ZIF/SYN DAC vs. output power relationship is determined in the region from cross-over down to approximately -60 dBm.

Q: How is the PA quiescent bias current measured?

With the transmitter turned on, and no RF input power into the PA (set ME_VCA and ZIF_VCA to 0 DAC counts), the PA is placed in a pinch-off condition. Measure the total amount of current being drawn by the radio. This is the *reference current level*.

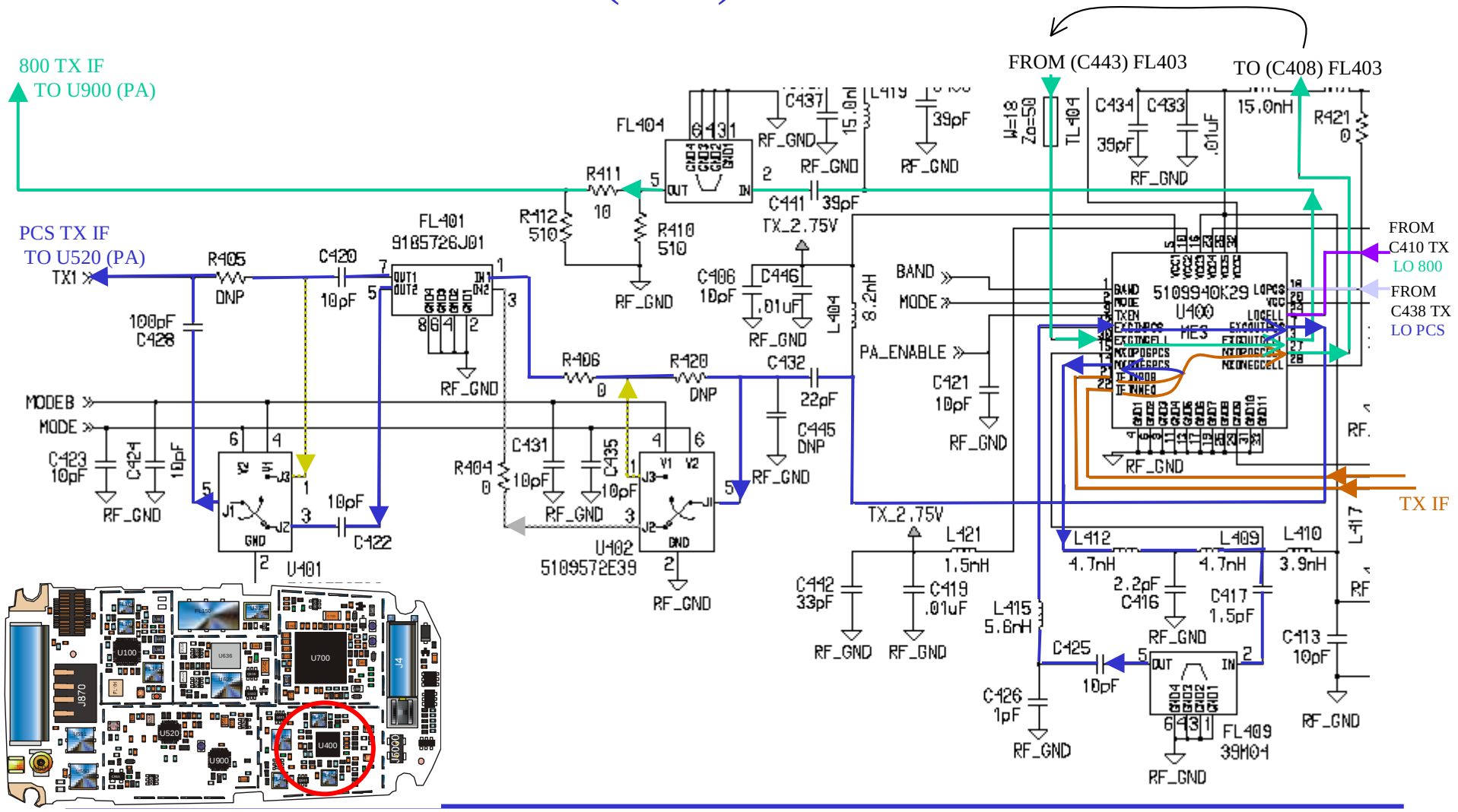
With the PA drain voltage set to a pre-determined value, adjust the PA gate voltage until the *reference current level* increases by the amount of quiescent bias current desired.

Q: Why isn't the PA drain phased like the PA gate?

The PA drain is set based on a desired voltage. Presently, the factories do not have a simple method of probing for this voltage when setting the RX_ATTEN DAC. Therefore, one has to rely on the calibrated RX_ATTEN DAC count to adjust the V10 regulator to the correct PA drain voltage.

The PA gate is phased by setting a quiescent bias current. The current meter on the source power supply is adequate for this phasing procedure.

EXCITER (ME3) 800 & PCS CIRCUIT



ME3 (EXITER) CIRCUIT

I. AMPS MODE OF OPERATION

The Tx IF modulated signal 154.8Mhz is input to the ME3 IC – U400 where it get mixed with the 979 – 1004 Mhz local oscillator signal.

II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

The Tx IF modulated signal 154.8Mhz is input to the ME3 IC – U400 where it get mixed with the 979 – 1004 Mhz local oscillator signal.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

The Tx IF modulated signal 189.8Mhz is input to the ME3 IC – U400 where it get mixed with the 2039-2100 Mhz local oscillator signal.

ZIF / SYN TX 800 & PCS

RX 2nd LO
(AMPS only)

PCS = 219.6MHz
AMPS = 219.3MHz

CDMA = 2 dBm
AMPS = 2 dBm
(At C304)

U700
ZIF SYN (BGA)
5109879E34
SC79882

TO U626

Main VCO
Loop

FROM
WALLY

TXIM
TXIP
TXQM
TXQP

TX I & Q

TX I & Q
TO: U400

FM

ZIF_2.75V

TX ZIF/SYN CIRCUIT

I. AMPS MODE OF OPERATION

TRANSMITTER CIRCUITRY
The FM signal from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700.

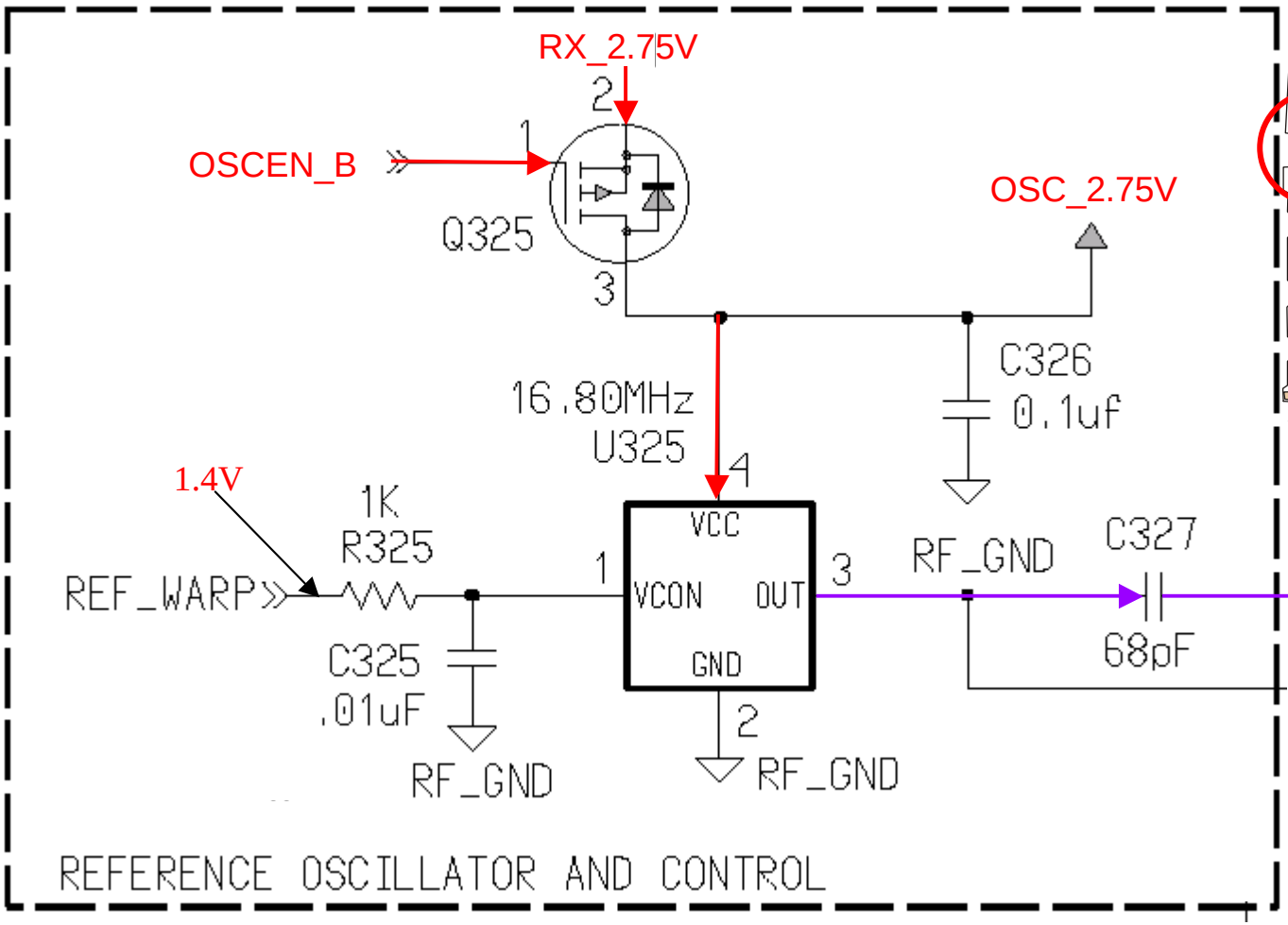
II. CDMA CELLULAR (800Mhz) MODE OF OPERATION

TRANSMITTER CIRCUITRY
The four signals TXIP, TXIM, TXQP, TXQM from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700.

III. CDMA PCS (1900Mhz) MODE OF OPERATION

TRANSMITTER CIRCUITRY
The four signals TXIP, TXIM, TXQP, TXQM from WALLY modulates the Tx offset VCO signal which is external but controlled by ZIF/SYN – U700.

REFERENCE OSC & CTL CIRCUIT



REF, OSC, MAIN VCO & SYNTHESIZER CIRCUITRY

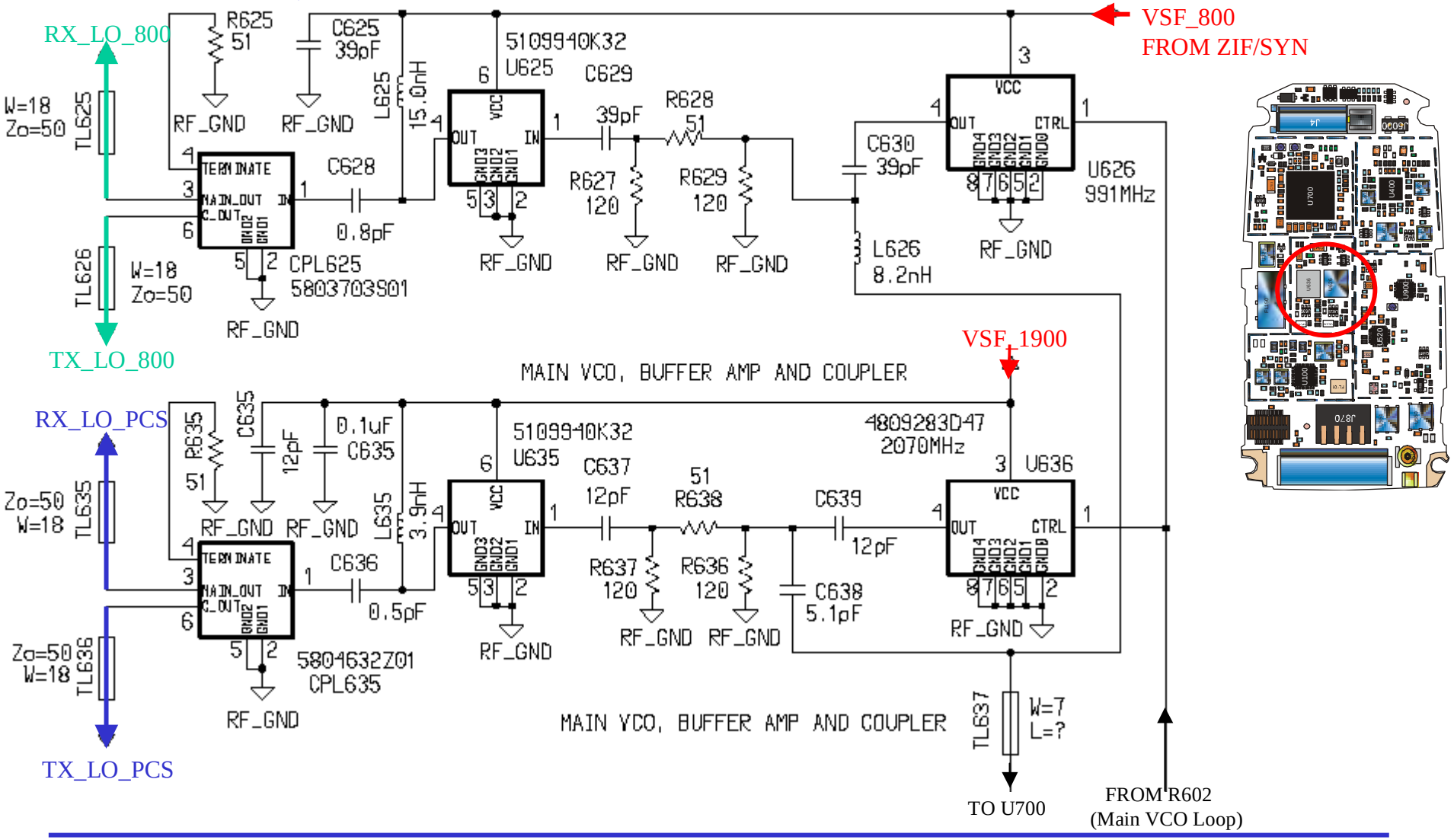
FREQUENCY SYNTHESIZER CIRCUITRY

The phone contains three PLL frequency synthesizers controlled by U700.

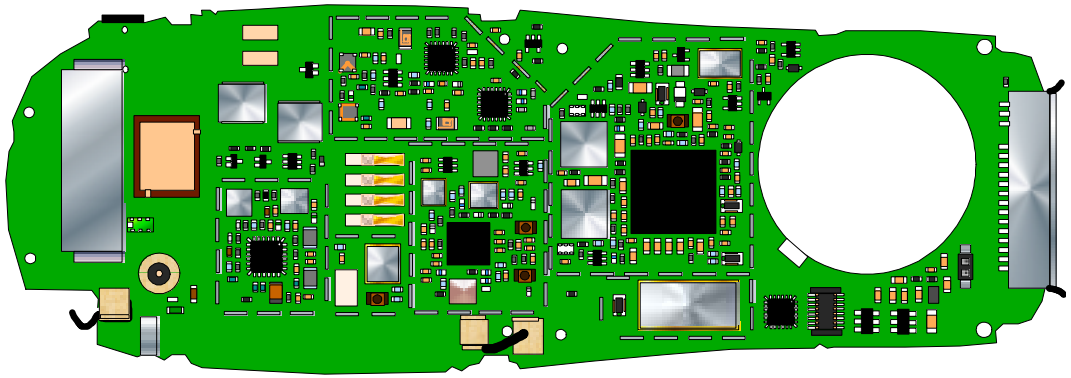
1. The main VCO : there are two main VCO modules- a) one synthesizer controls the tunable 979 – 1004Mhz main local oscillator – U626, which is ON during Cellular or 800Mhz mode. b) another synthesizer controls the tunable 2039-2100Mhz main local oscillator – U636, which is ON during PCS or 1900Mhz mode.
2. The Tx offset VCO: there are two modes and two frequency at which this oscillator which is internal to U700 works, but the tank circuit is external. There are two tank circuits one for Cellular mode (800 Mhz) which will set 309.6Mhz frequency for the oscillator to oscillate on. Another tank circuit for PCS mode (1900Mhz) which will set 379.6Mhz frequency for the oscillator to oscillate on. The Tx offset frequency is divided by 2 before being fed into the mixer for modulation.
3. The second LO: the second local oscillator also operates in two modes with two different frequencies: For AMPS mode the frequency is 219.3Mhz and for CDMA mode at cellular or 800Mhz band and PCS or 1900Mhz band the frequency is 219.8Mhz. The tank circuit is external to the U700. The frequency is divided by 2 before being fed into the mixer.

All the synthesizers obtain their reference frequency from the 16.8Mhz reference oscillator.

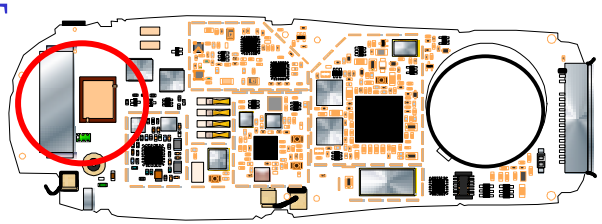
MAIN VCO, BUFFER AMP & COUPLER CIRCUIT

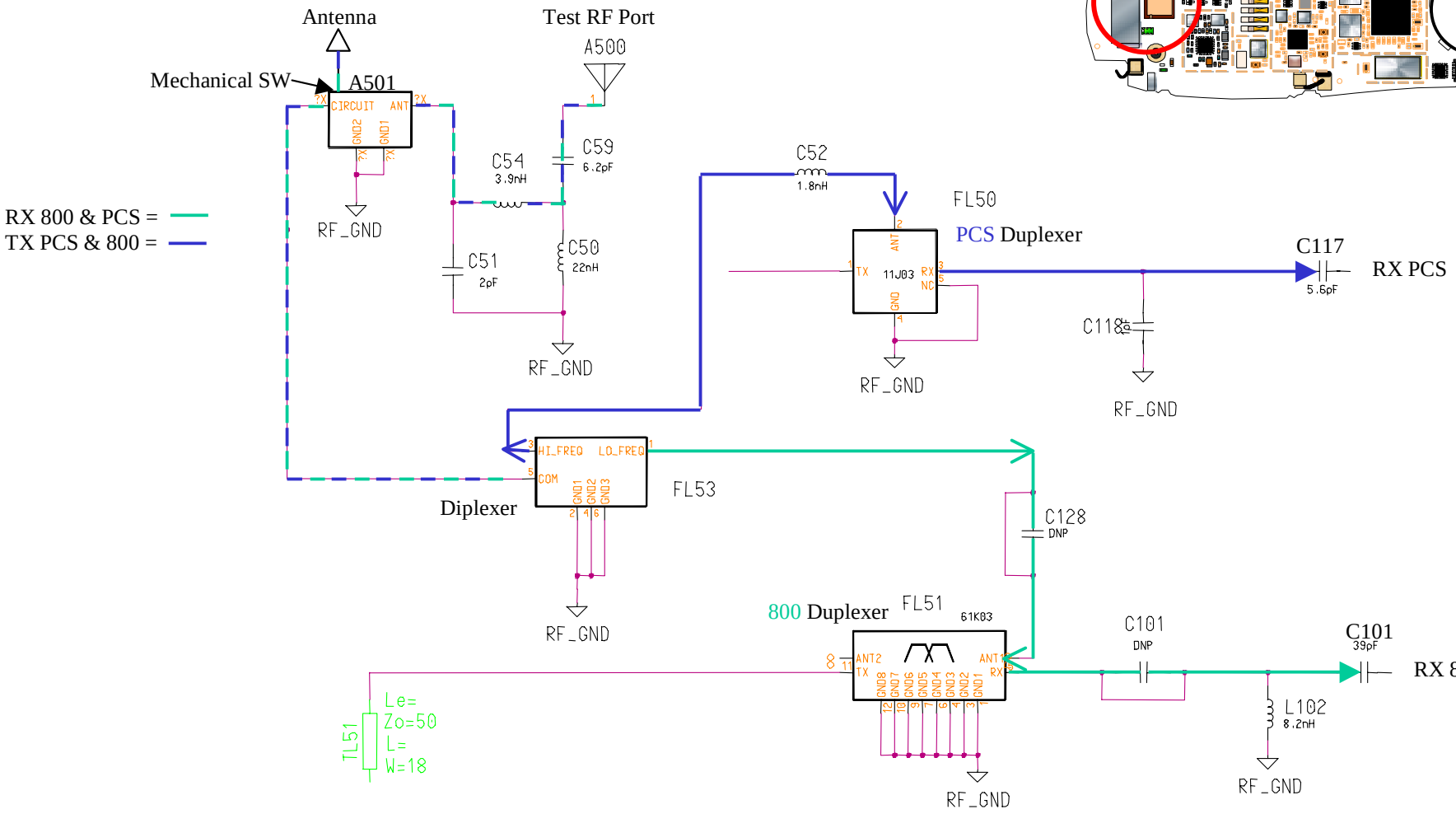


Timeport 270c
RX 800 & PCS CIRCUIT

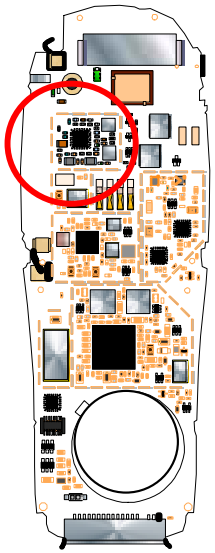


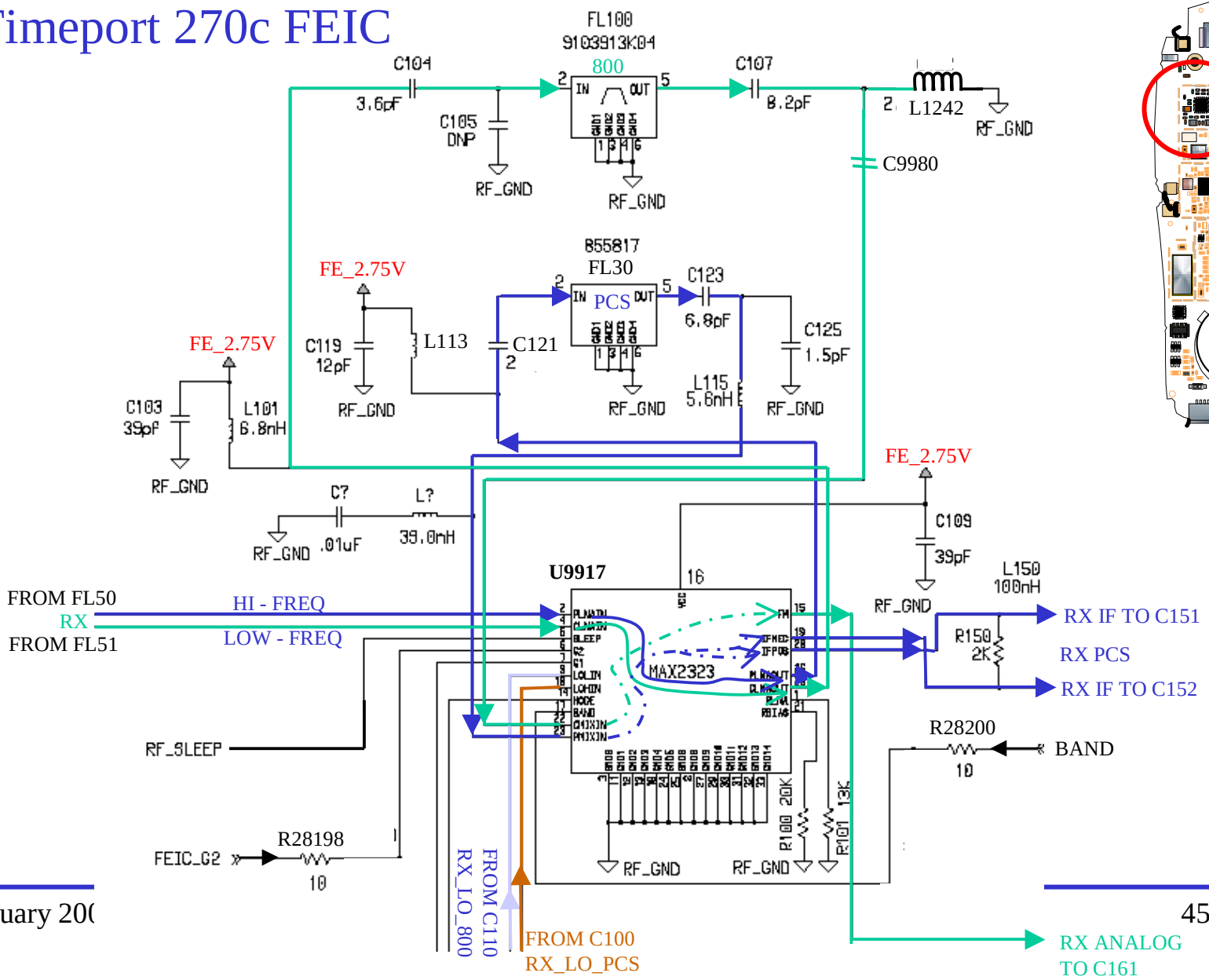
RX ANTENNA CIRCUIT



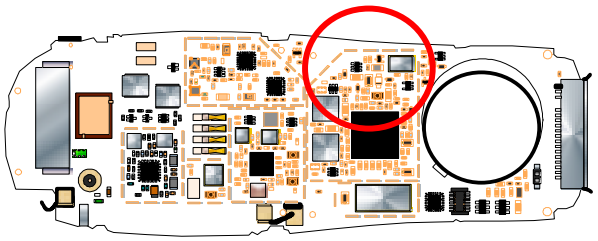


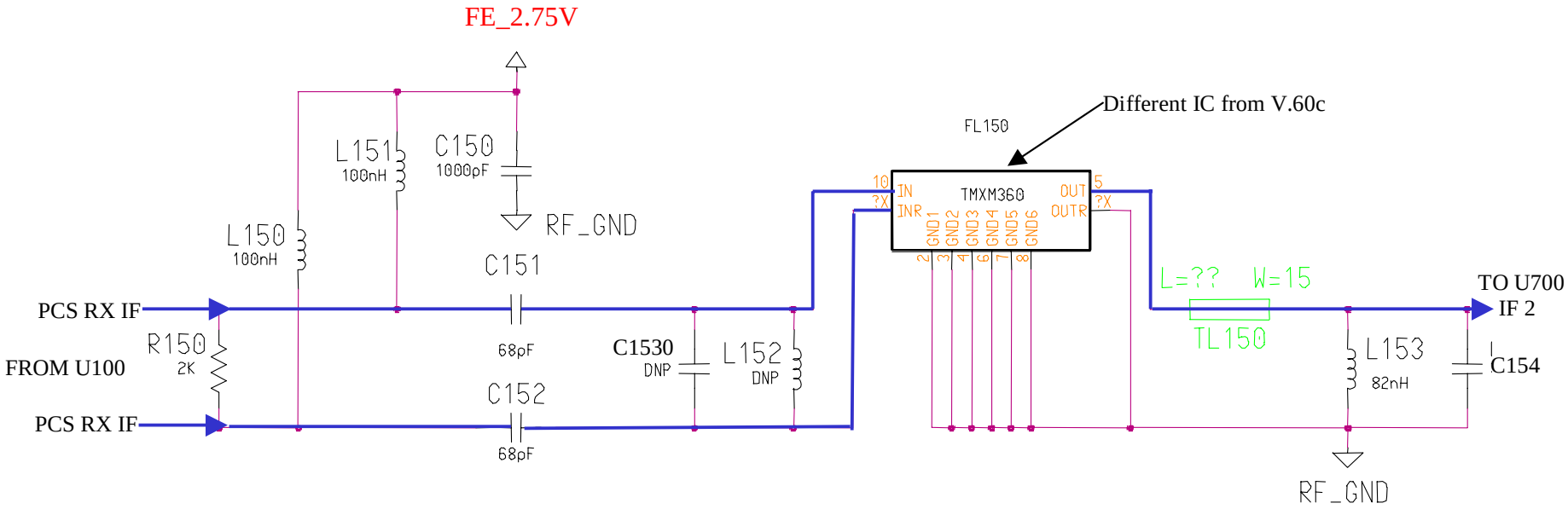
Timeport 270c FEIC



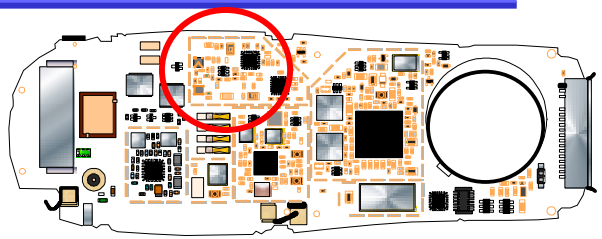


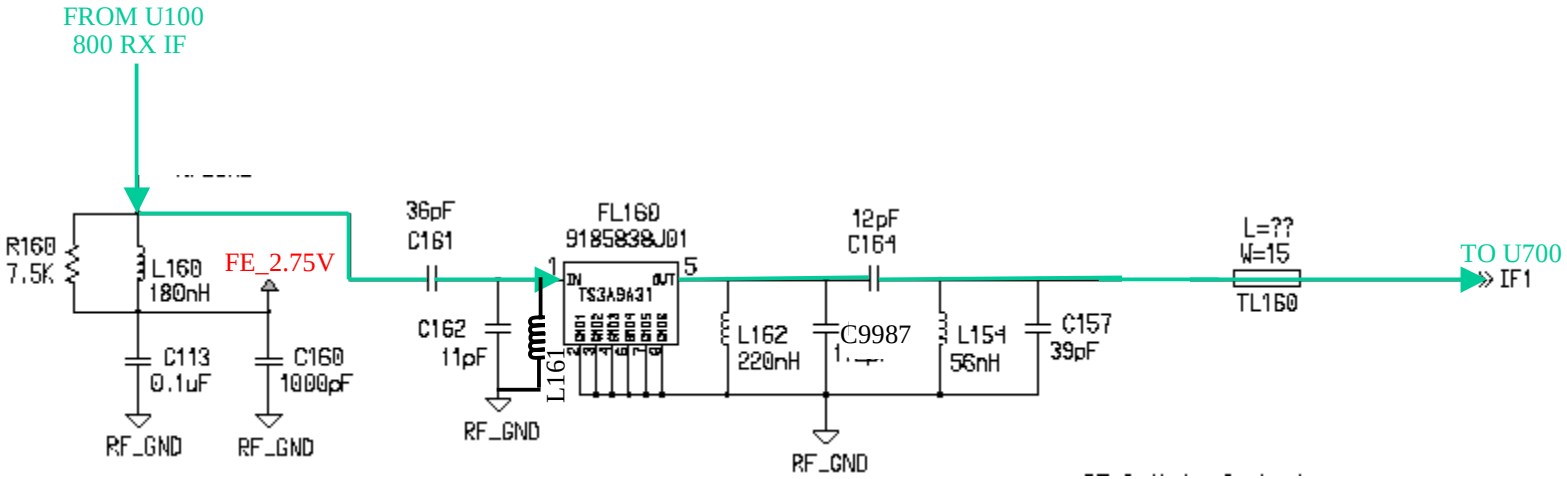
PCS IF CIRCUIT



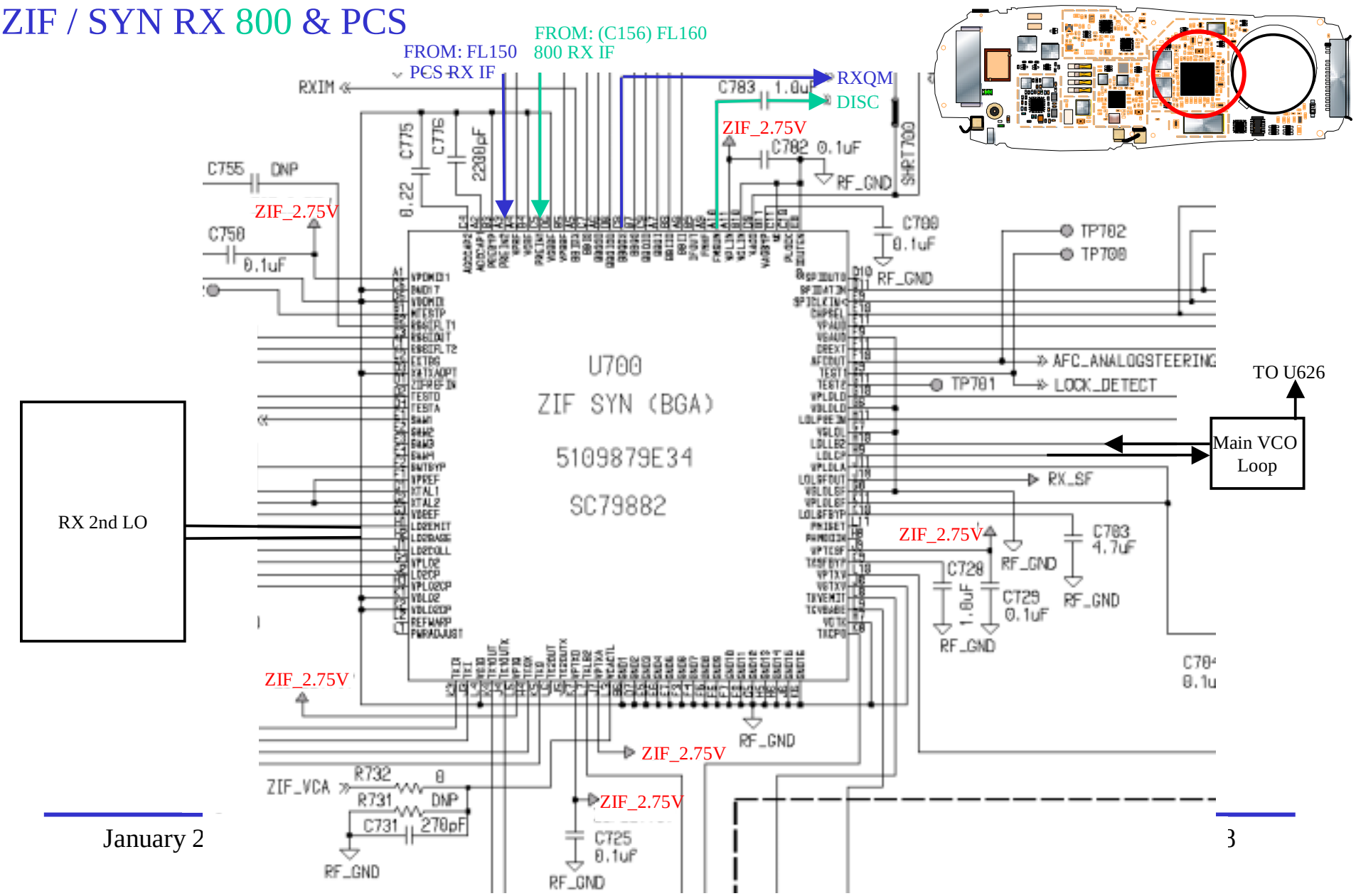


800 IF CIRCUIT

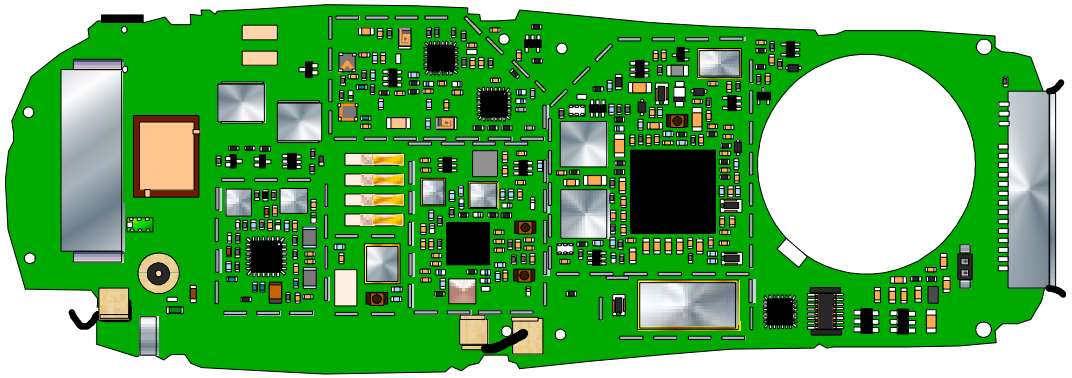




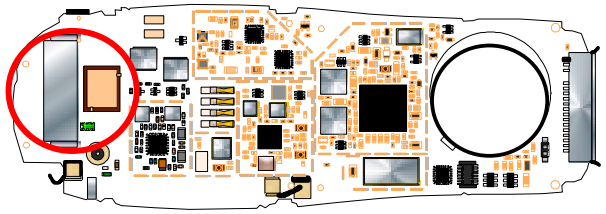
ZIF / SYN RX 800 & PCS



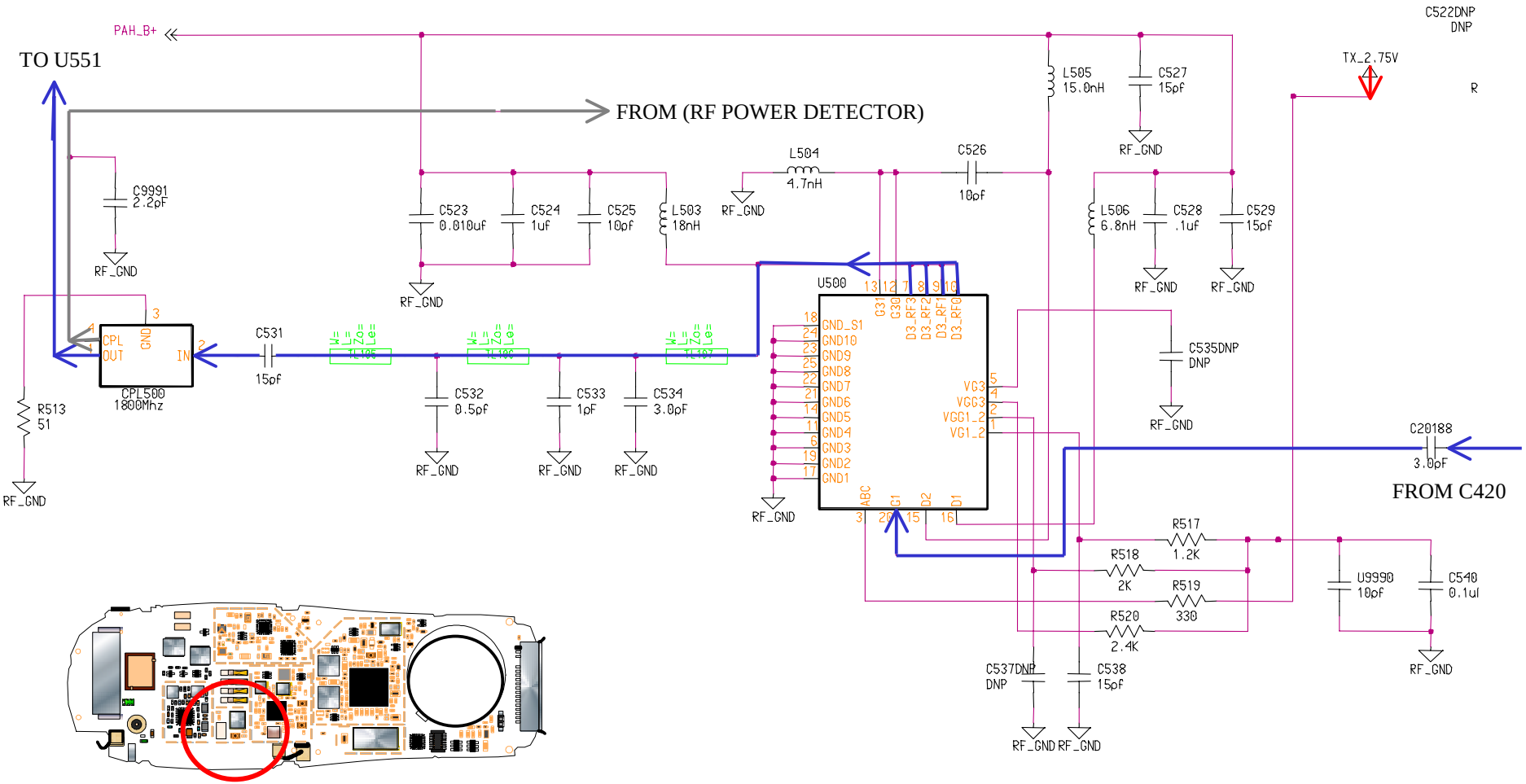
Timeport 270c
TX 800 & PCS CIRCUIT



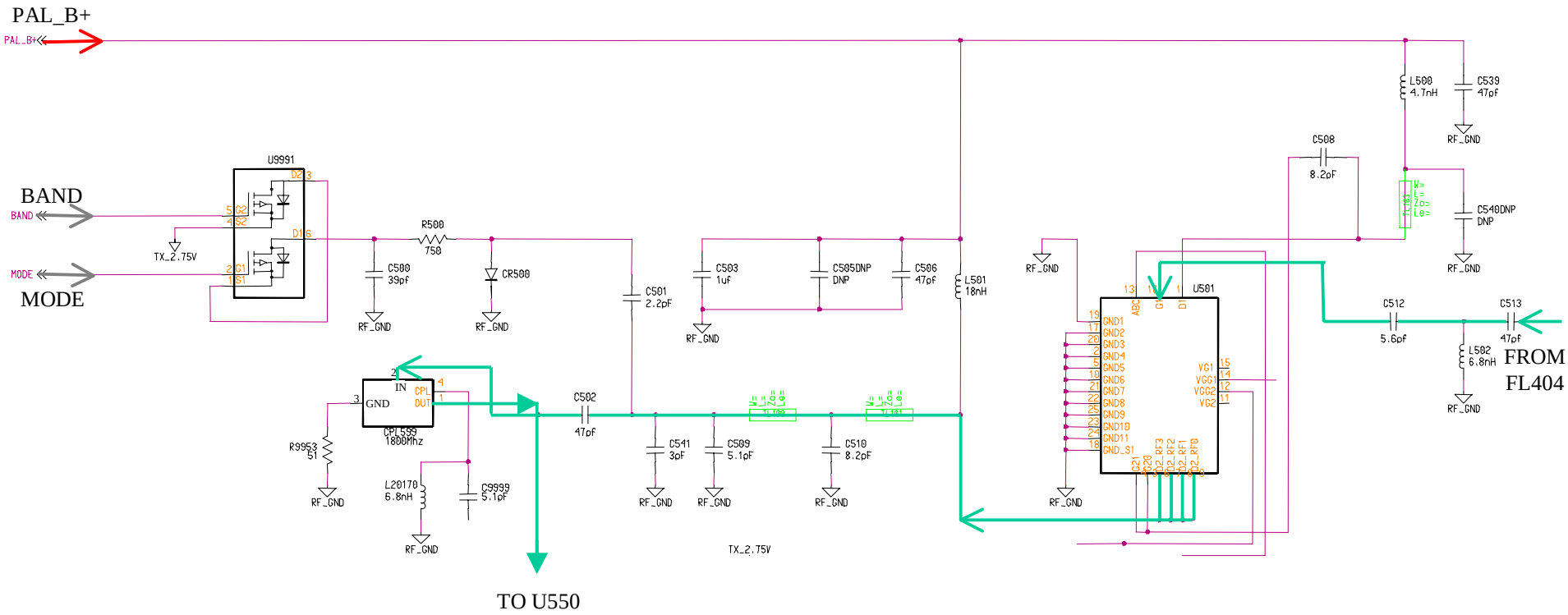
TX 800 & PCS ANTENNA CIRCUIT



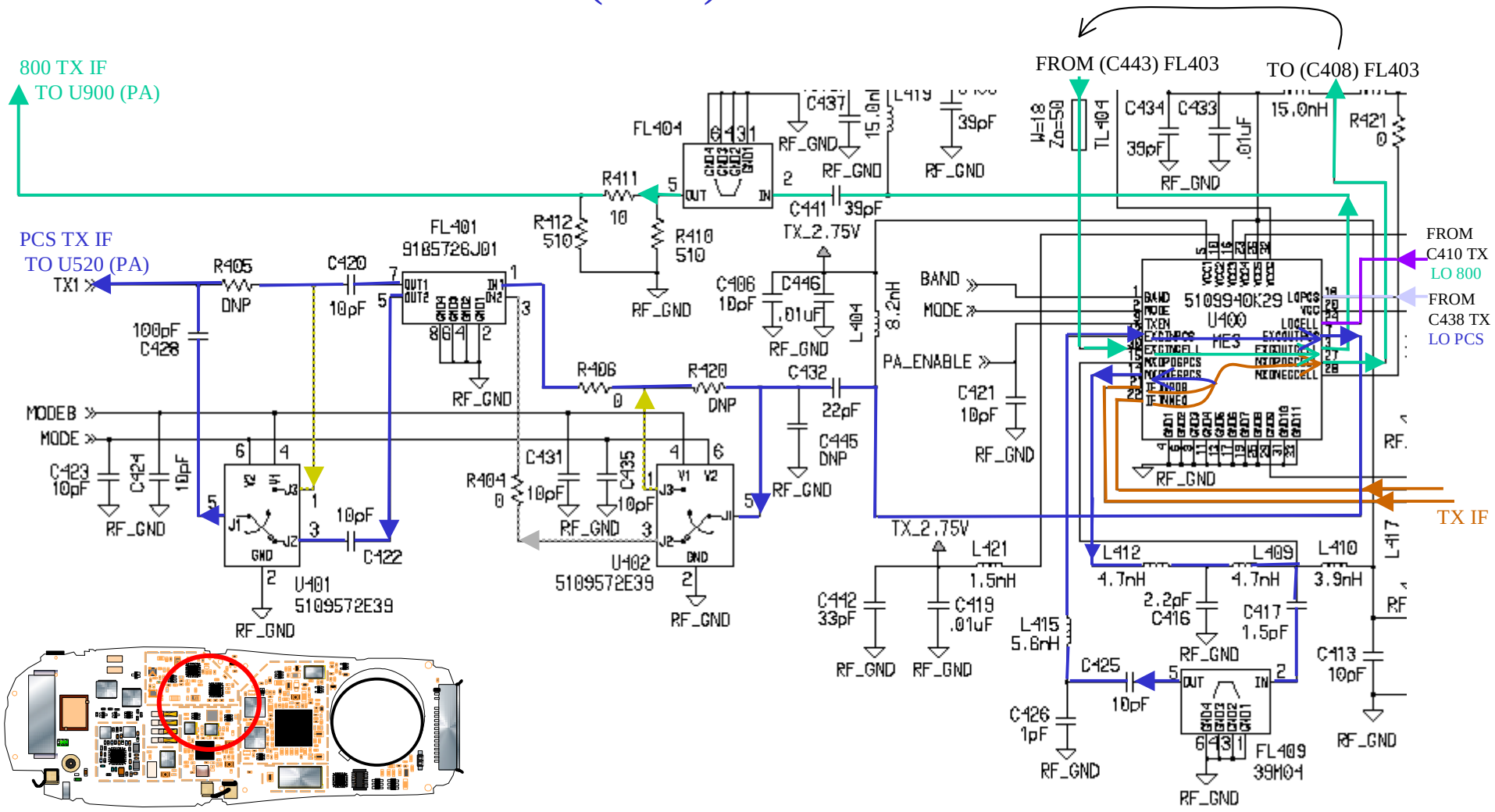
PCS PA CIRCUIT



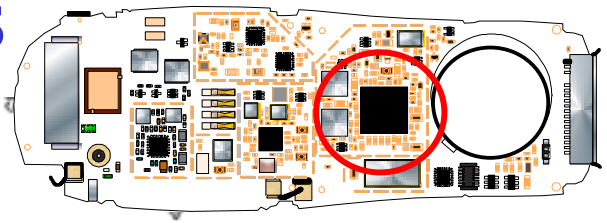
800 PA CIRCUIT



EXITER (ME3) 800 & PCS CIRCUIT



ZIF / SYN TX 800 & PCS



RX 2nd LO
(AMPS only)

PCS = 219.6MHz
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CDMA = 2 dBm
AMPS = 2 dBm
(At C304)

U700
ZIF SYN (BGA)
5109879E34
SC79882

TO U626
Main VCO Loop

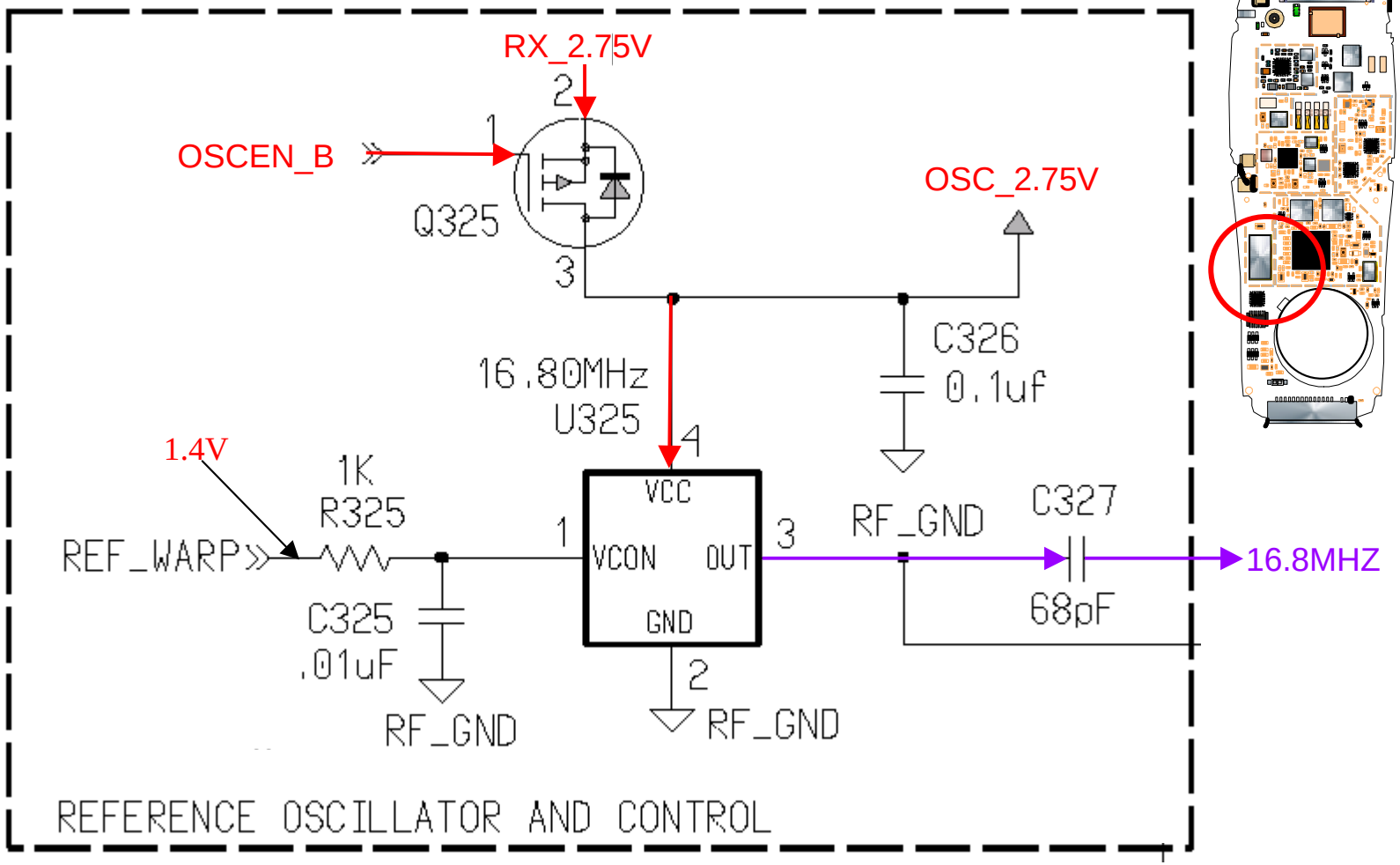
FROM WALLY
TXIM
TXIP
TXQM
TXQP
TX I & Q

TX I & Q
TO: U400

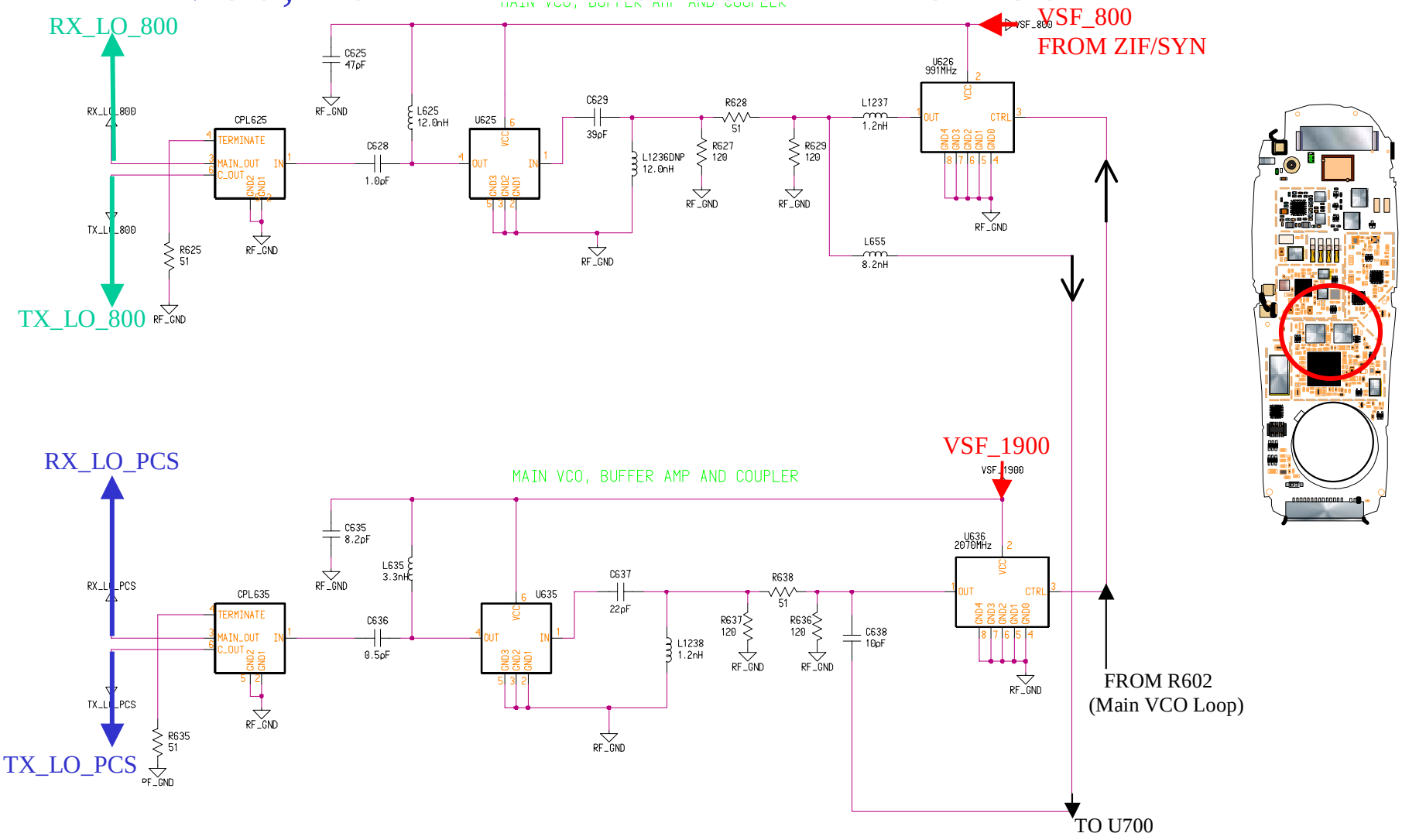
FM

RXIM
C783 1.0uF
DISC
ZIF_2.75V
C782 0.1uF
RF_GND
SHRT700
C775 0.22
C776 2200pF
C755 DNP
C750 0.1uF
C799 0.1uF
TP702
TP700
TP701
AFC_ANALOGSTEERING
LOCK_DETECT
RX_SF
C728 1.0uF
C729 0.1uF
C783 4.7uF
ZIF_VCA
R20135 0
R731 DNP
C731 270pF
C725 0.1uF

REFERENCE OSC & CTL CIRCUIT



MAIN VCO, BUFFER AMP & COUPLER CIRCUIT



P2K Products Technical Training Manual

-V.60c

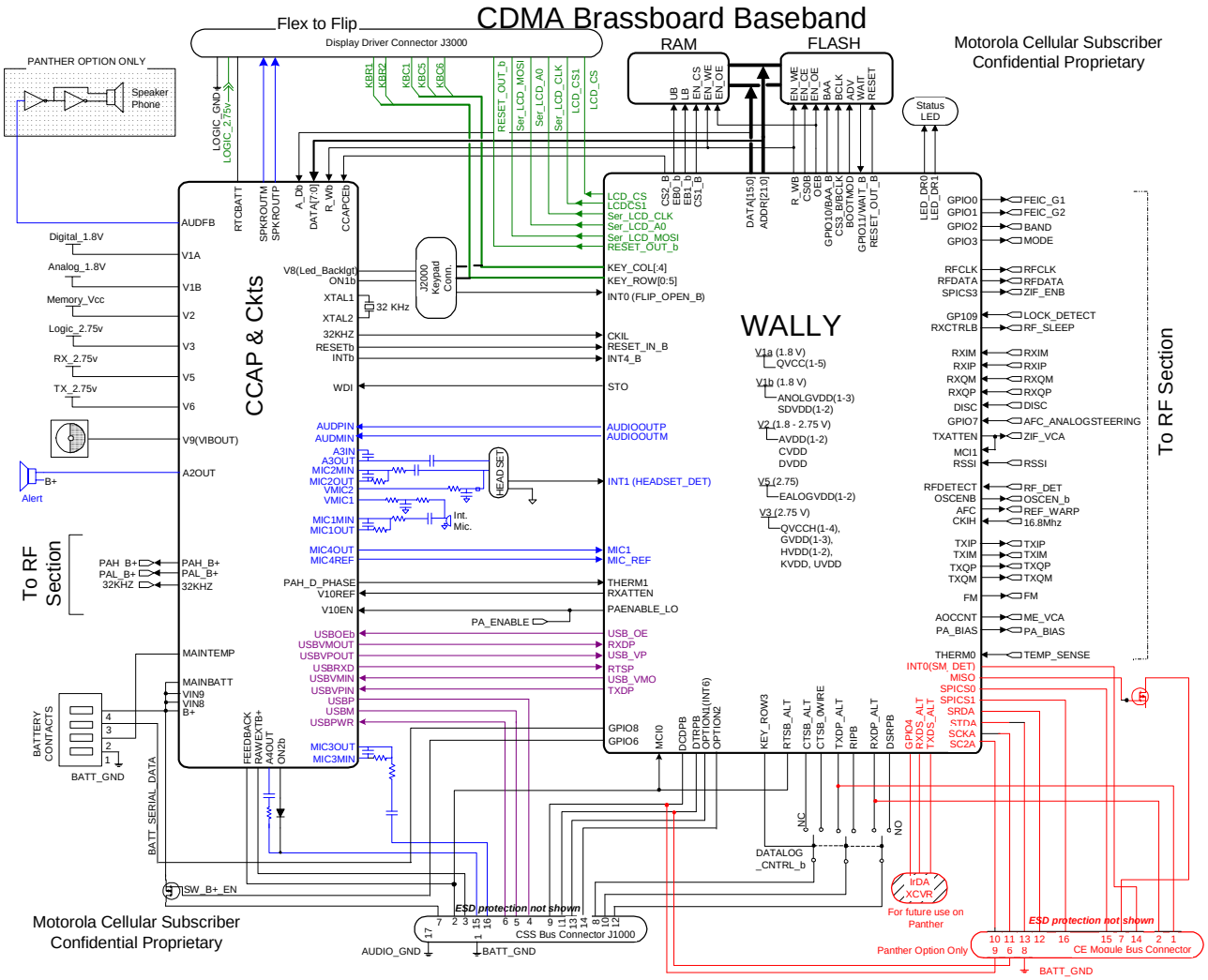
-Timeport 270c

-V.120c

AUDIO LOGIC

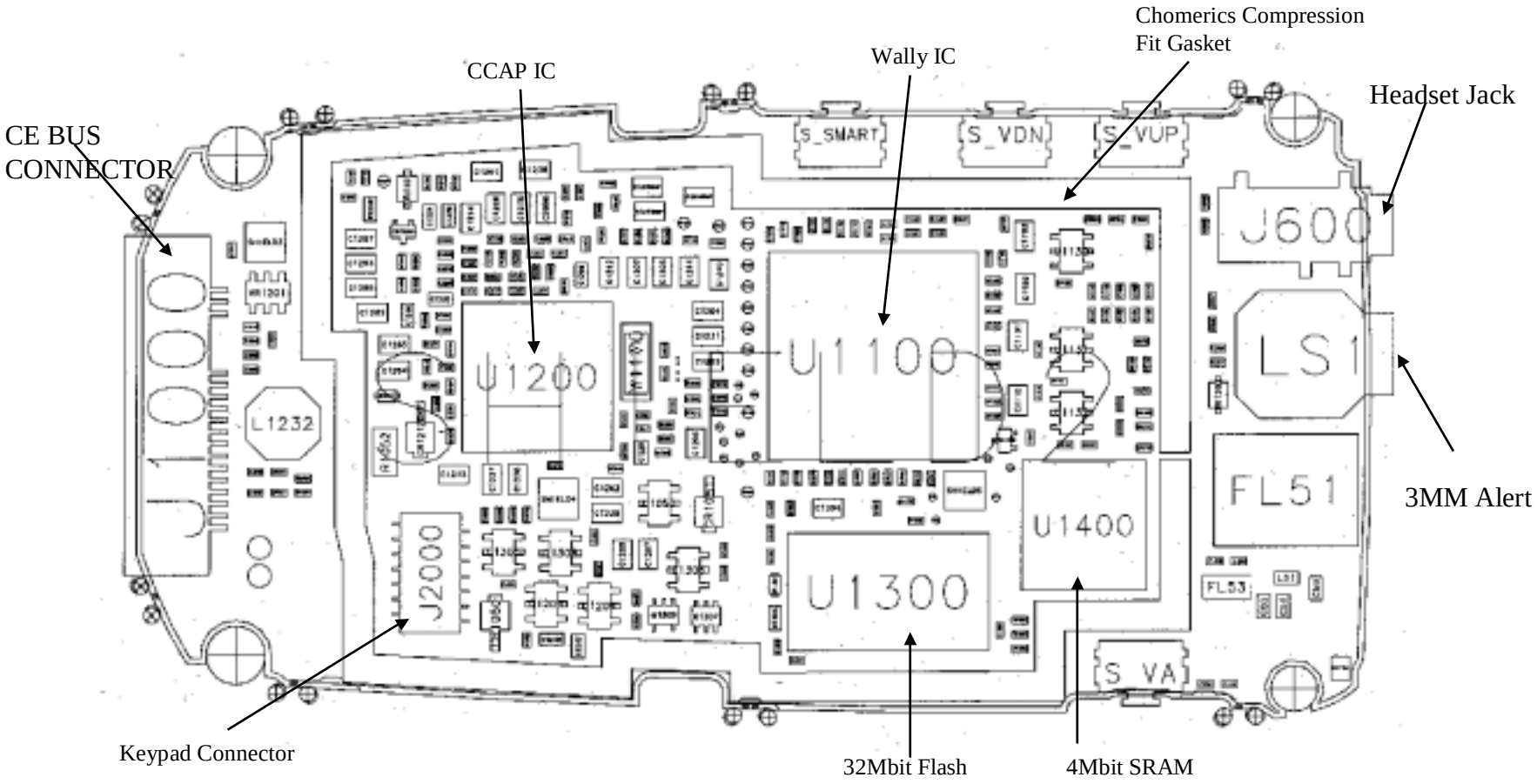
P2K Platform Audio Logic

AUDIO LOGIC- TABLE OF CONTENTS

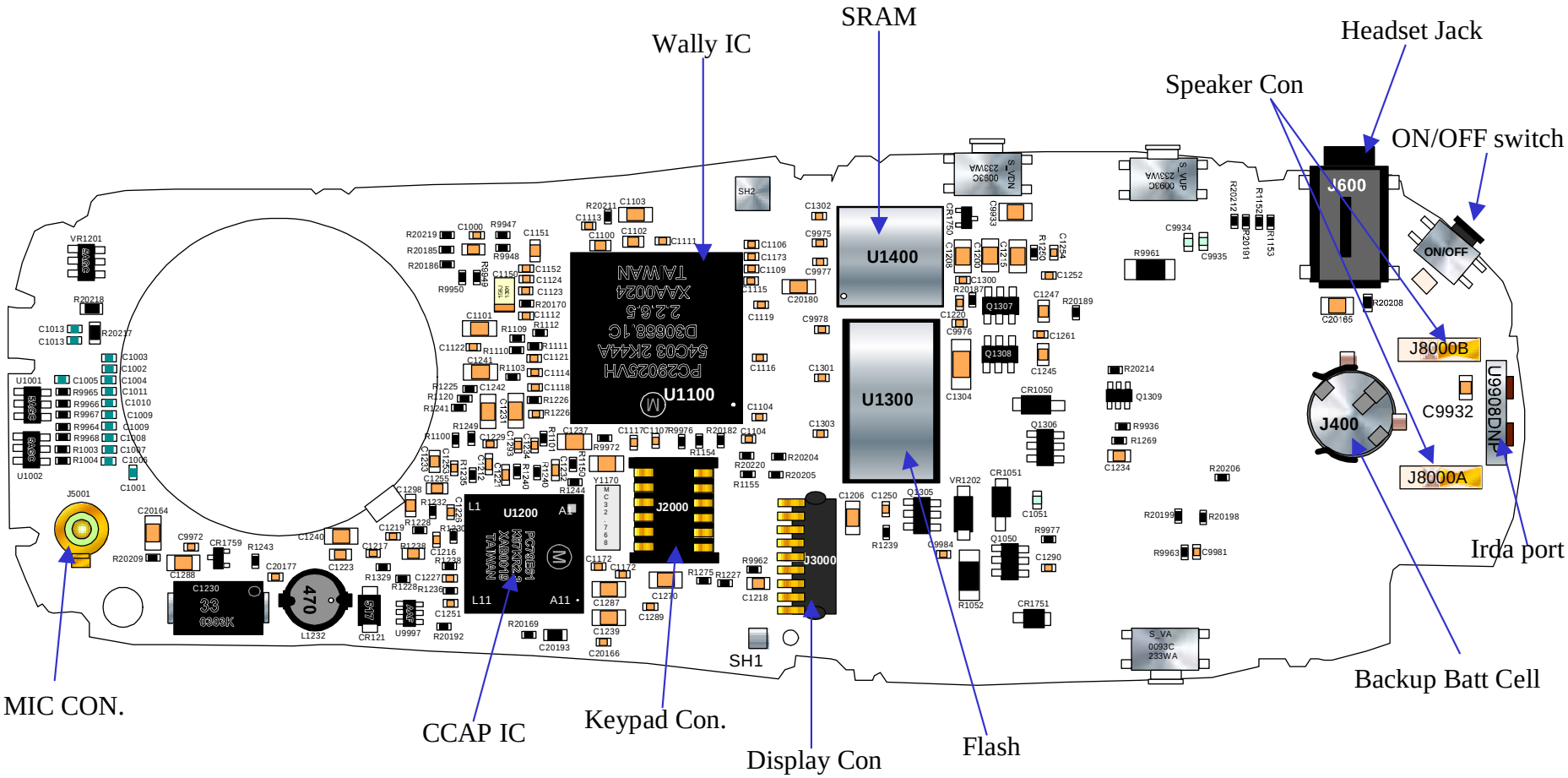


Motorola Cellular Subscriber
Confidential Proprietary

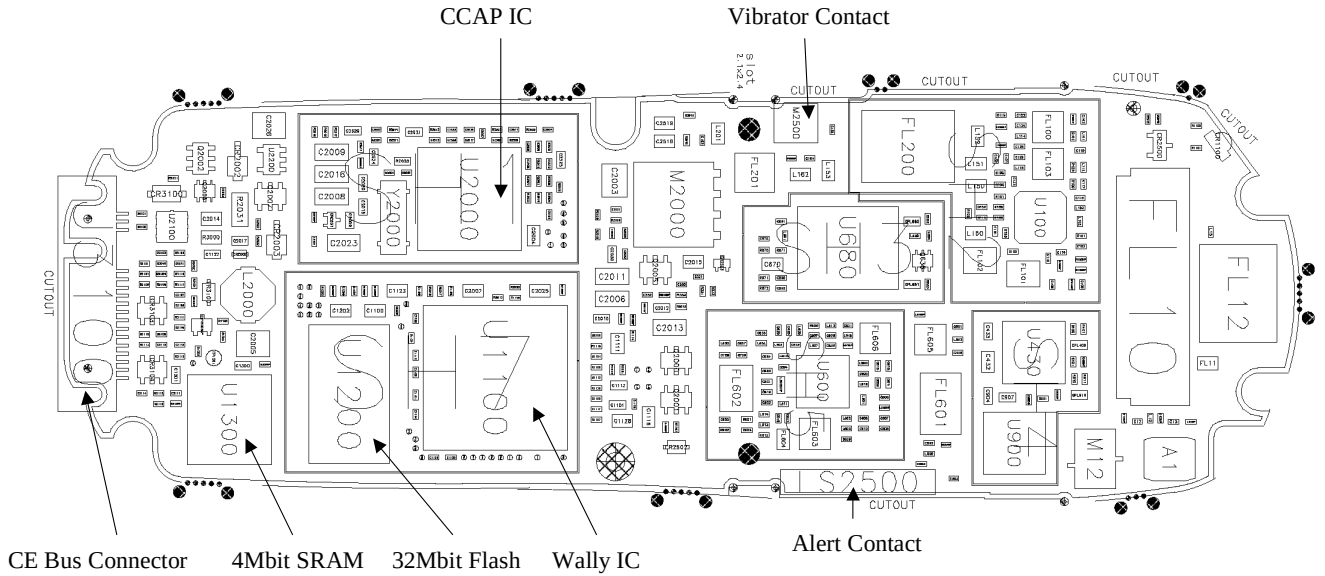
Logic side layout - V.60c



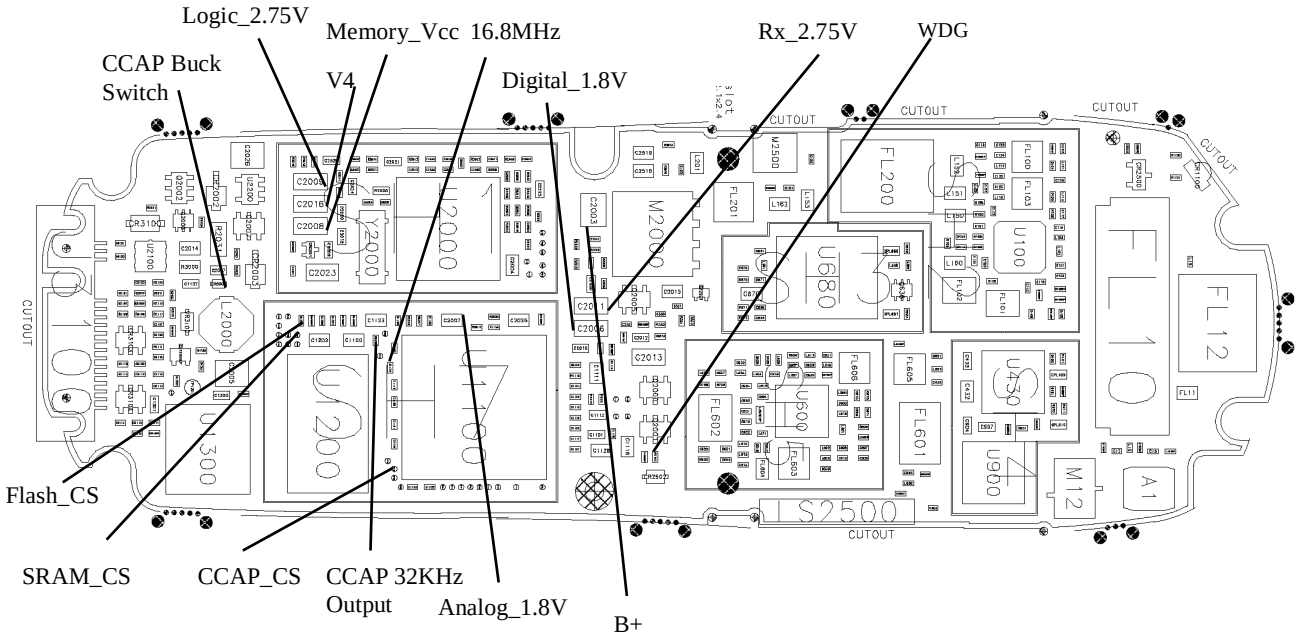
Logic Side Layout - Timeport 270c



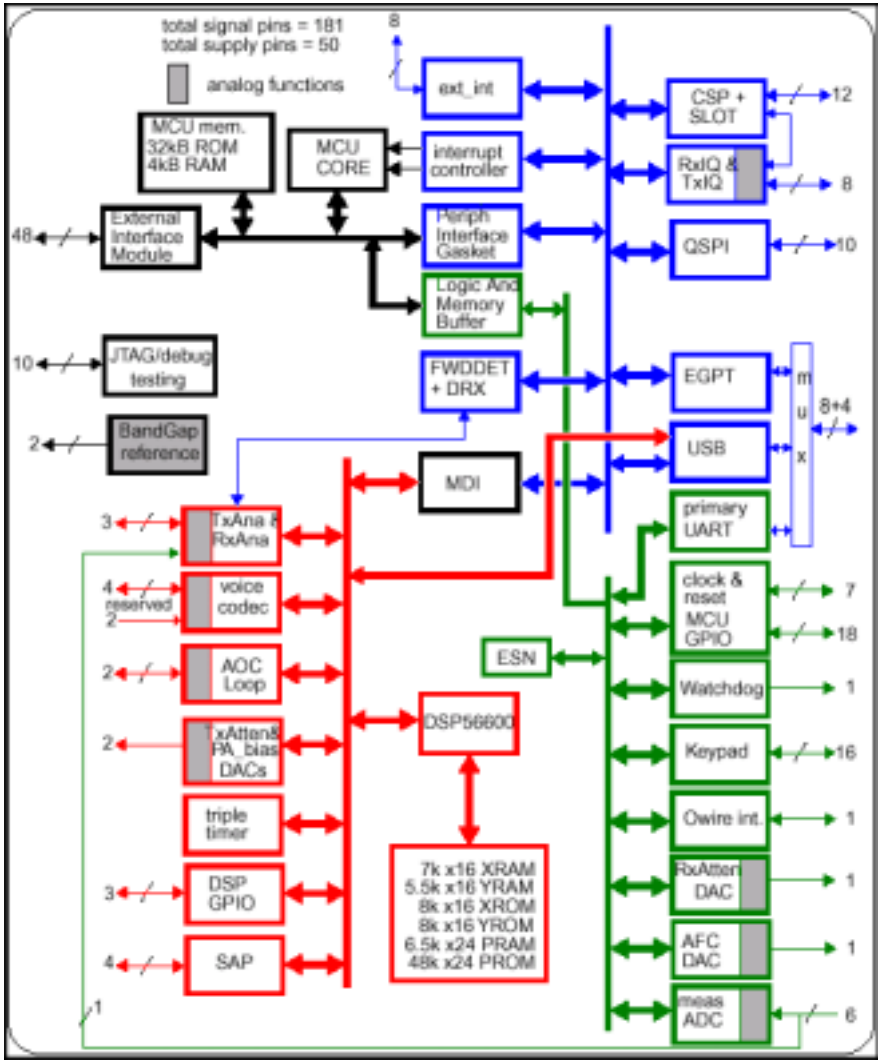
Logic Side Layout : V.120c



Logic Side Layout : V.120c



WALLY Internal Block Diagram



Key features of the WALLY IC:

- M-CORE Integer processor; 32-bit RISC architecture
- 56600 NDE-UL DSP Core running at up to 70MHz @ 1.8V
- MCU-DSP interface with 1K x 16 shared memory
- CDMA Signal Processor (CSP3) ASIC
- 16 bit External memory interface for the MCU
- 8 bit parallel interface for CCAP
- 32-Input Interrupt Controller for the MCU
- Internal MCU ROM & RAM
- Special modules for CDMA Mode (all are MCU peripherals):
- Dual 9.8304 M samples/sec 4-bit ADCs (RX I/Q with Receive AGC)
- 13-bit linear CODEC
- 1-8 bit, 2-10bit , 1-12-bit measurement DAC
- 8-bit measurement ADC with 6 multiplexed inputs
- 10-bit AOC-loop control ADC and DAC (DSP peripheral)
- A UART with Auto Baud Detection
- Universal Serial Bus (USB) Interface module
- Serial Audio Port interface.
- Electrical Serial Number (ESN)

WALLY POWER SUPPLY

1. Audio_2.75v --- from Rx_2.75v-- CCAP

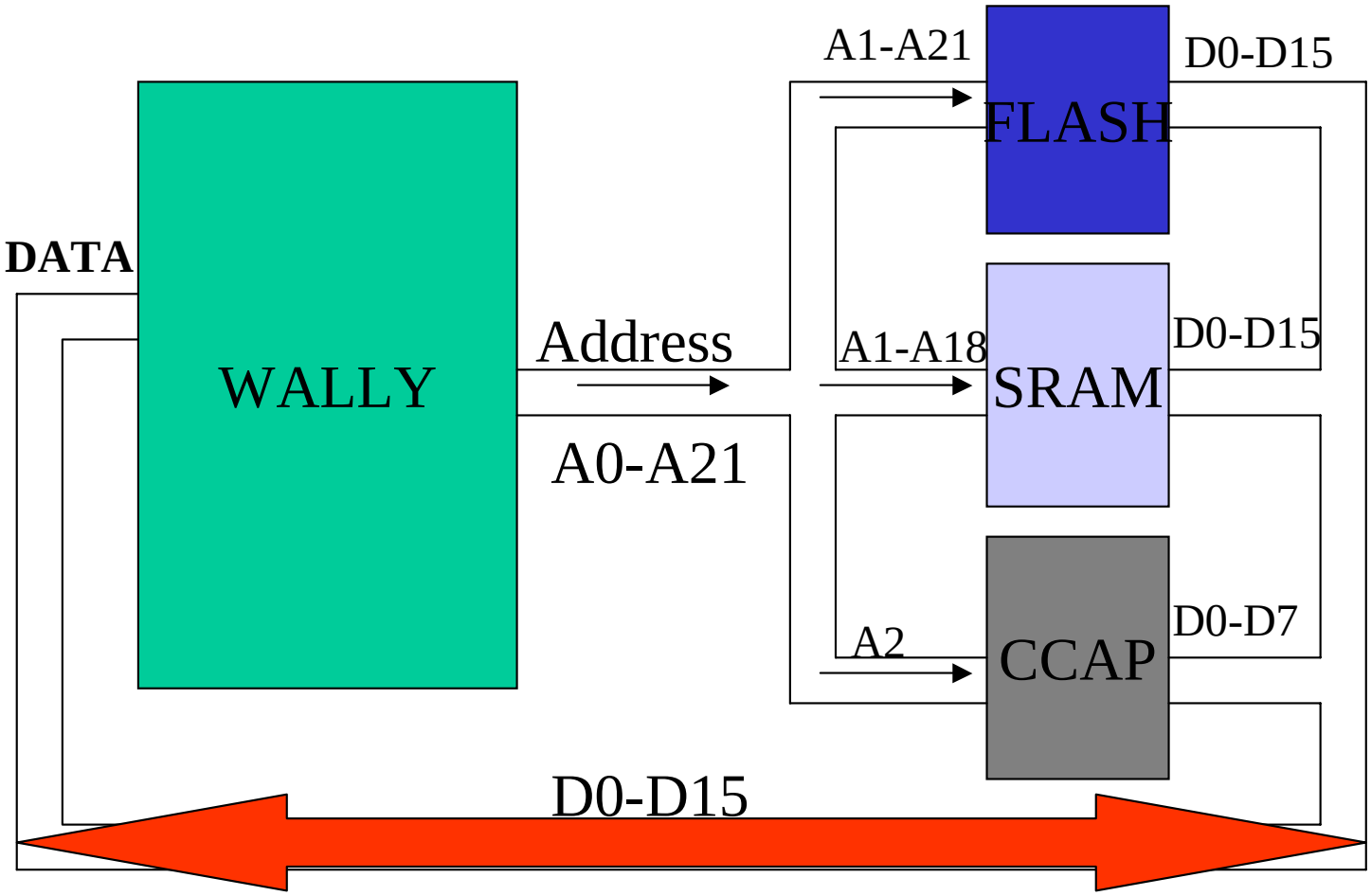
2. Wally_Analog_1.8v --- from Analog_1.8v -- CCAP

3. Wally_2.75v --- from Logic_2.75v -- CCAP

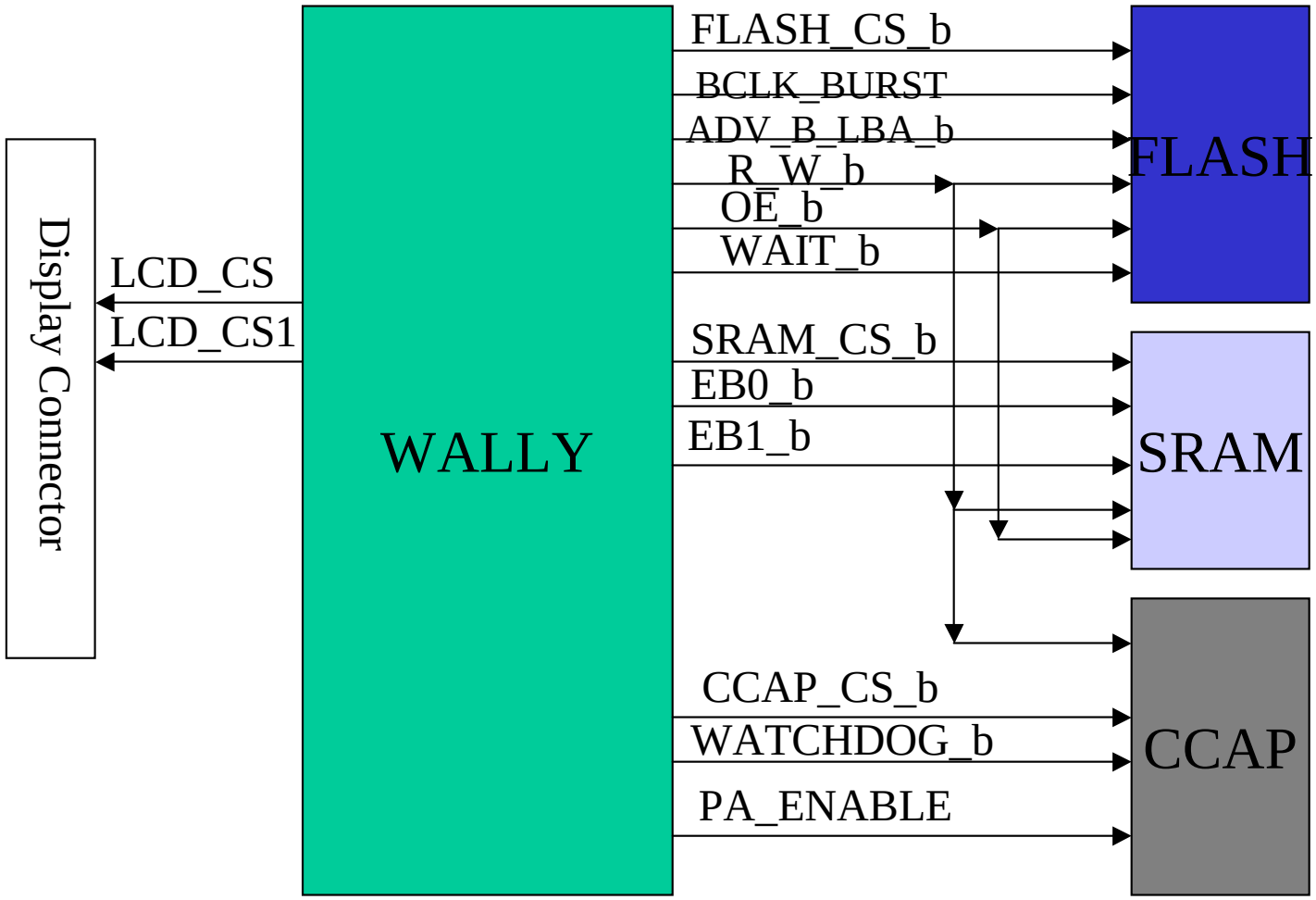
4. Wally_Digital_1.8v --- from Digital_1.8v -- CCAP

5. Wally_Memory_VCC --- from Memory_VCC -- CCAP

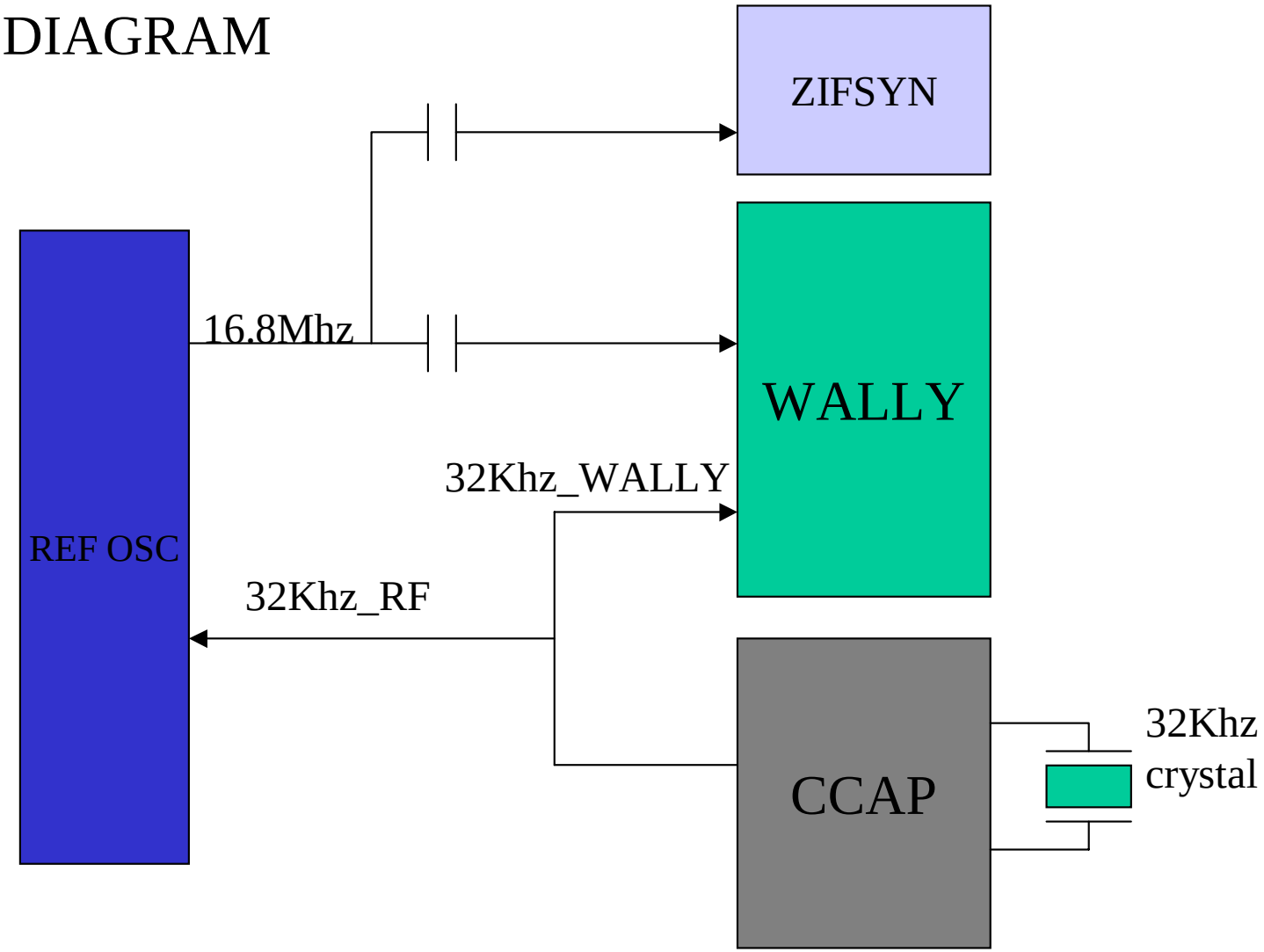
WALLY - ADDRESS AND DATA BUS



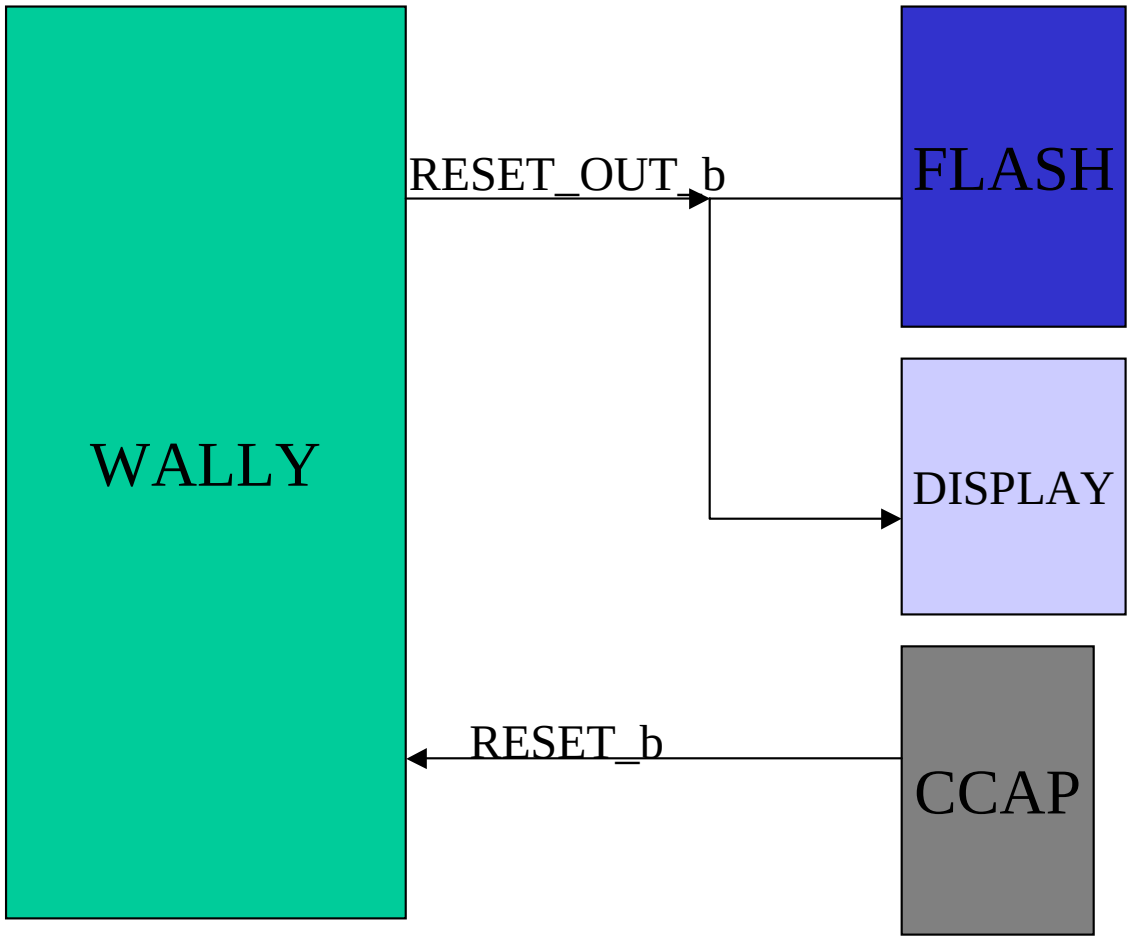
WALLY CHIP-SELECT AND CONTROL SIGNALS



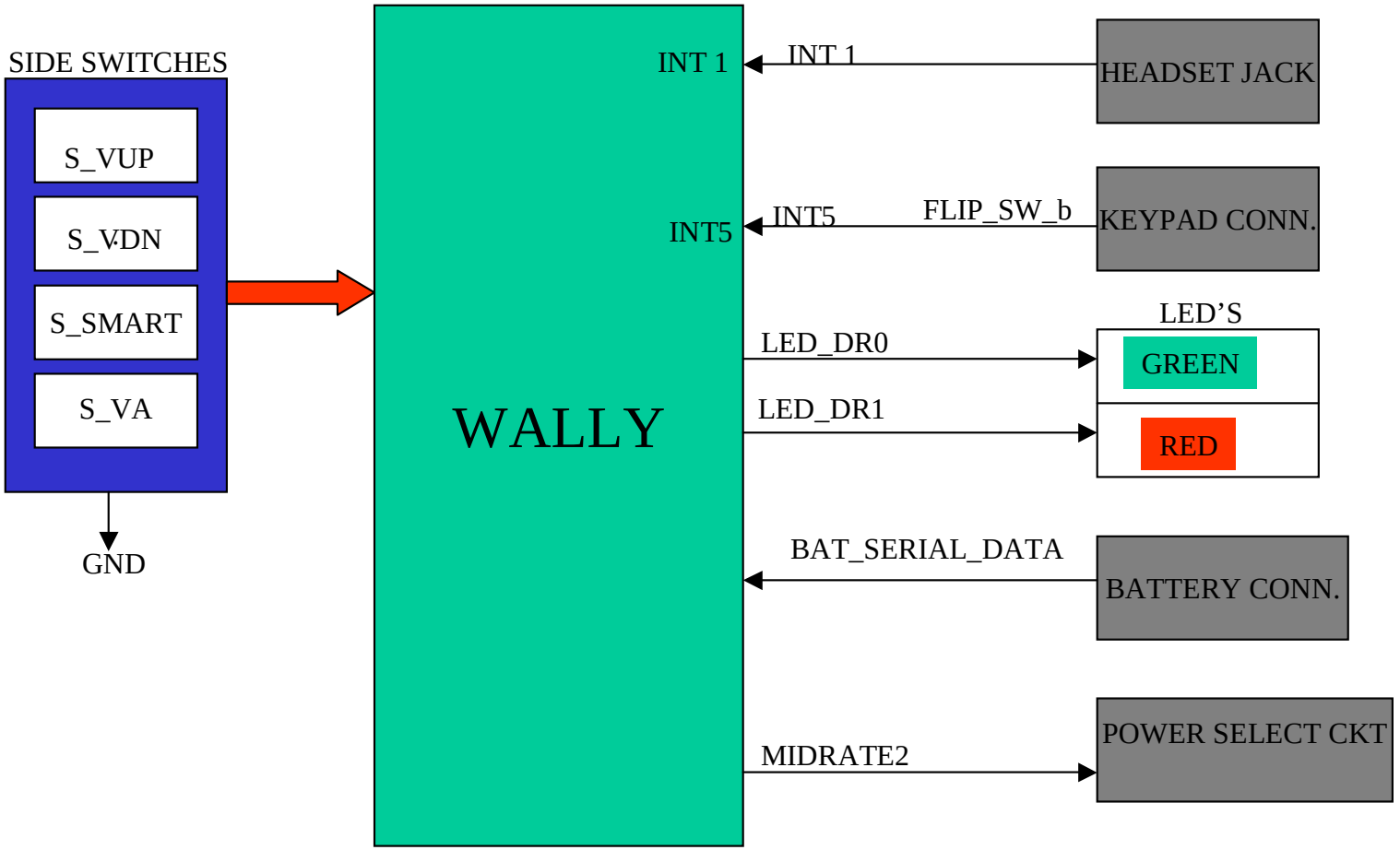
CLOCK DIAGRAM



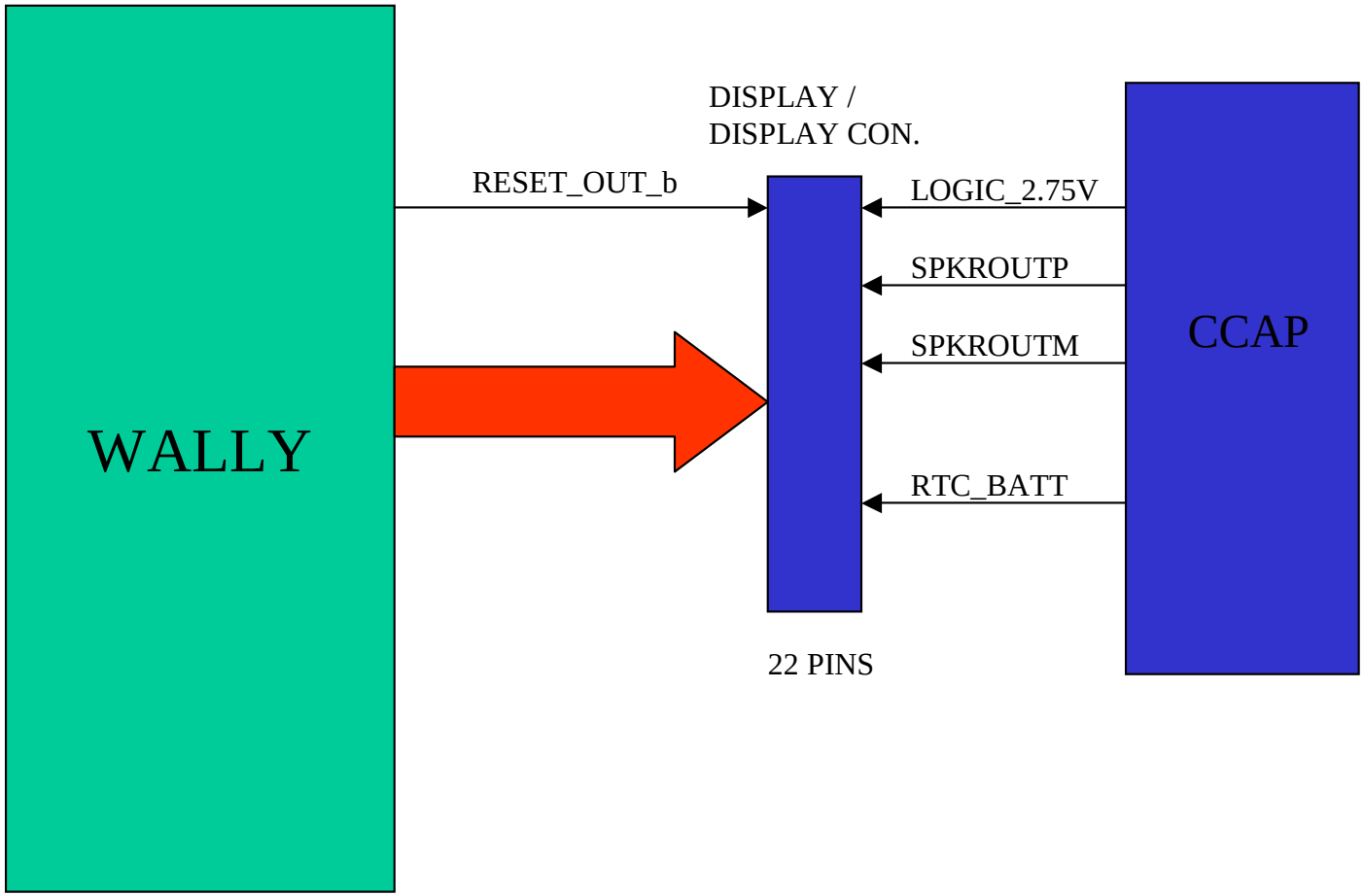
RESET SCHEME



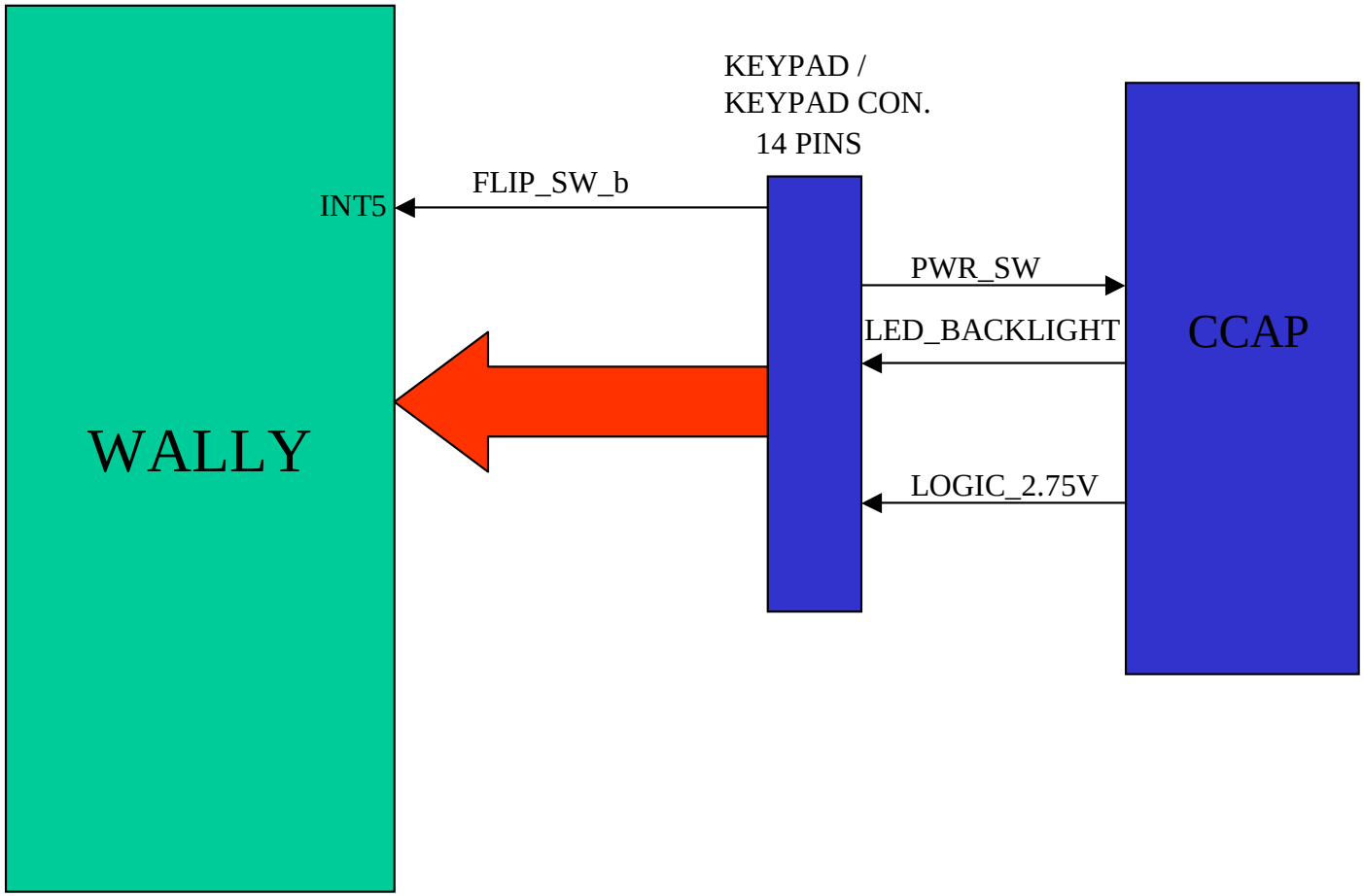
WALLY INTERFACE - MISCELLANEOUS



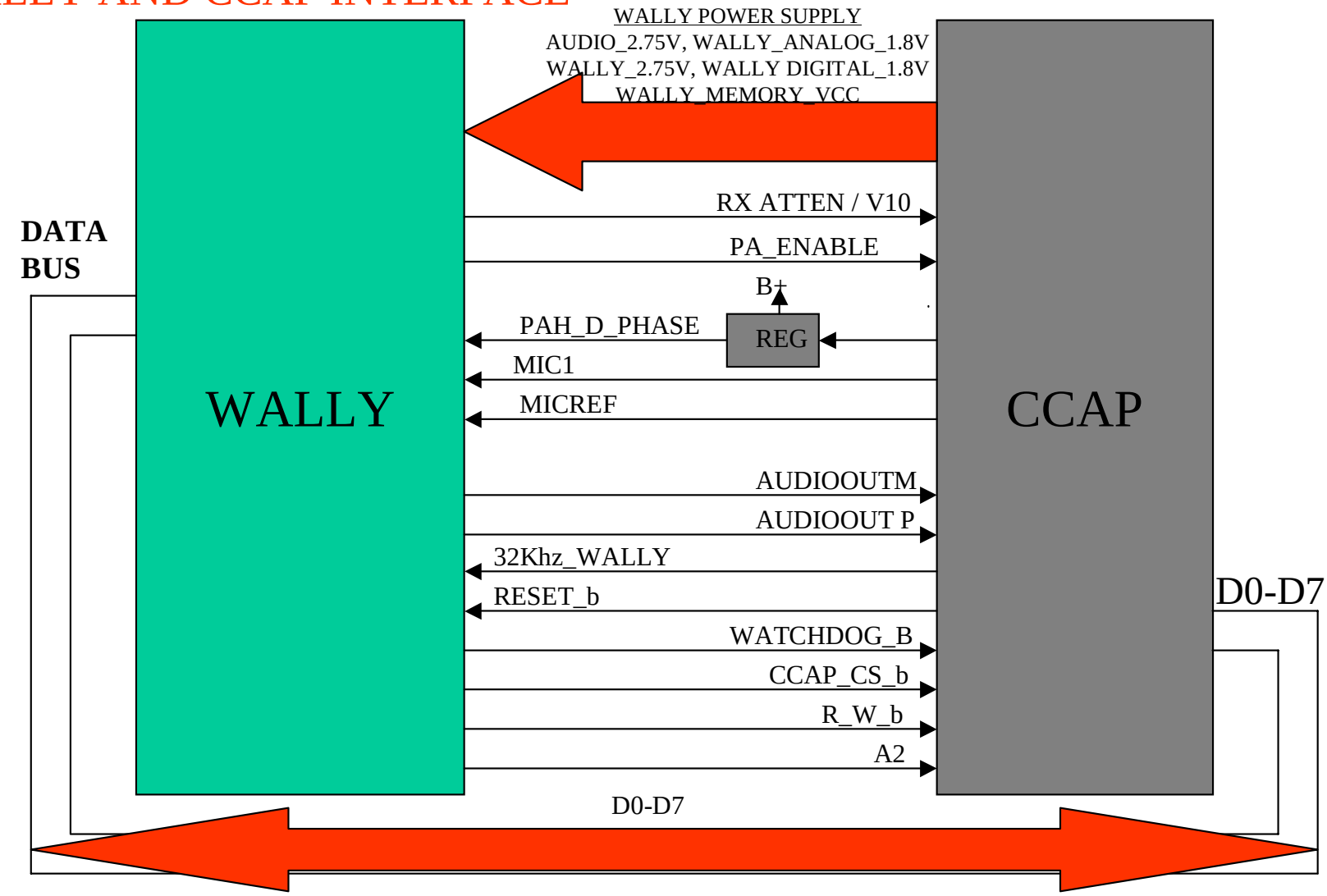
WALLY INTERFACE - DISPLAY / DISPLAY CONNECTOR



WALLY INTERFACE - KEYPAD / KEYPAD CONNECTOR



WALLY AND CCAP INTERFACE



Platform 2K Memory

3 MEMORY SECTORS

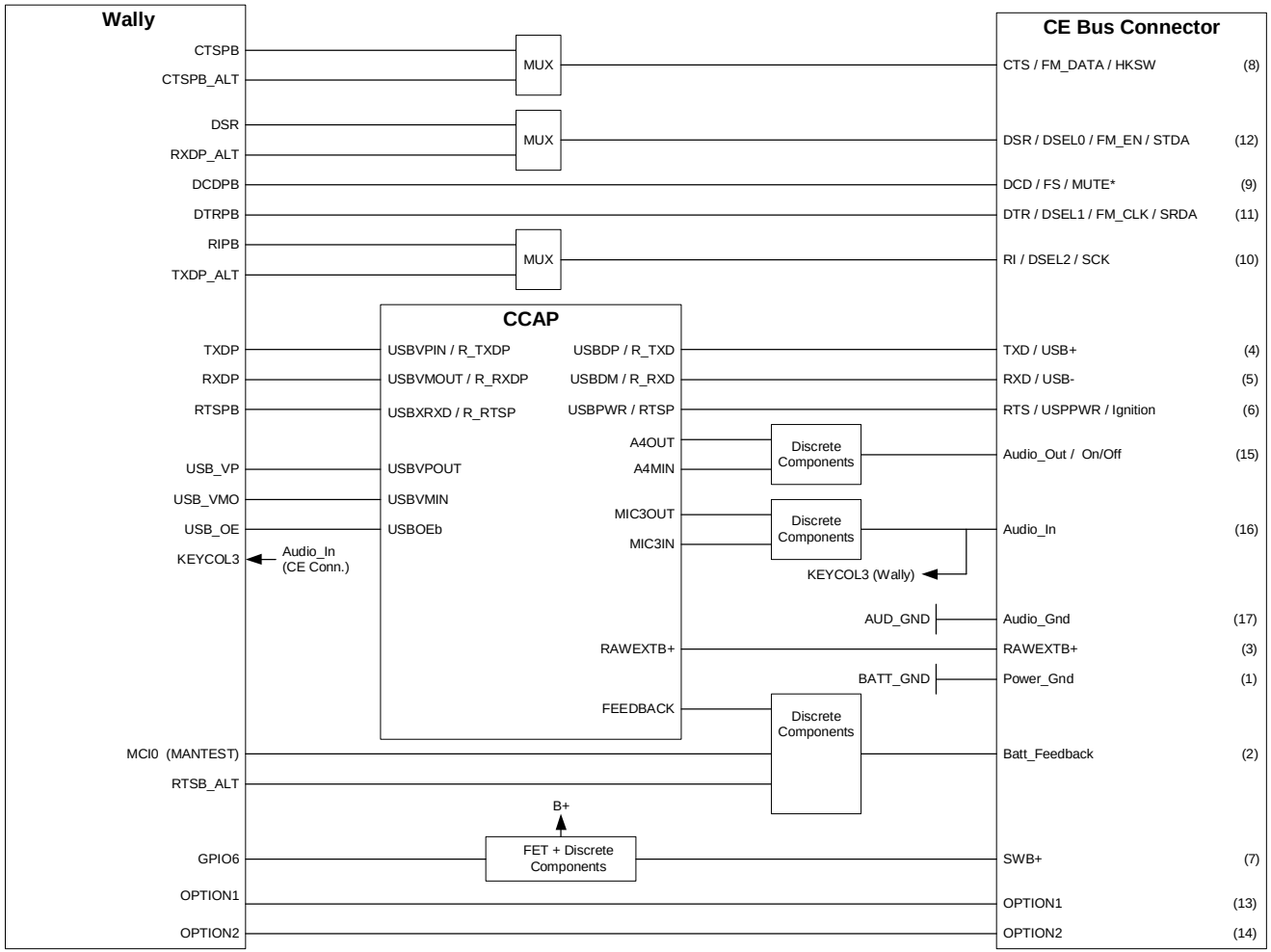
1. FLASH MEMORY - 32Mbits
   (i) SEEM ELEMENTS (Old EEEPROM functionality)
   - FLEX
   - NAM
   - NVM
   - PRL

   (ii) BOOT CODE

   (iii) MAIN CODE

2. SRAM (4 Mbits)
3. WALLY has internal RAM & ROM (for MCU & DSP)

CE Bus CCAP -Wally Interconnection



Pin No.	Signal Name (Short Form)	Power / Default States	USB	Bluetooth (RS232 / SSI)	RS232 (8 wire)	USB / RS232 (6wire)	JTAG	TTY
1	Power Ground (GND)	GND	GND	GND	GND	GND	GND	GND
2	Battery Feedback (BATT_FDBK)	BATT_FDBK	BATT_FDBK	BATT_FDBK	BATT_FDBK	RTS	BATT_FDBK	BATT_FDBK
3	External Power (EXTB+)	EXTB+	EXTB+	EXTB+	EXTB+	EXTB+	EXTB+	EXTB+
4	USB+ / TXD (D+)		D+	TXD	TXD	D+	TDO	
5	USB- / RXD (D-)		D-	RXD	RXD	D-	TDI	
6	USB Power / Ignition / Send/End / RTS (USB_PWR)		USB_PWR	RTS	RTS	USB_PWR	RESET-IN	
7	Switched Battery (SWB+)	SWB+	SWB+	SWB+	SWB+	SWB+	SWB+	SWB+
8	Hook Switch / FM_DATA / CTS (HKSW)		HKSW	CTS	CTS	CTS	Mcu_DE	
9	MUTE* / FS / DCD (MUTE*)			FS	DCD	DCD	Dsp_DE	
10	DUMB_SEL2 / SCK / RI (DSEL2)	DSCEN	DSCEN	SCK	RI	TXD	TCK	DSEL2
11	DUMB_SEL1 / FM_CLOCK / SRDA / DTR (DSEL1)			SRDA	DTR	DTR	TMS	DSEL1
12	DUMB_SEL0 / FM_EN / STDA / DSR (DSEL0)			STDA	DSR	RXD	TRST	DSEL0
13	Option 1 (OPT1)	UPLink	UPLink	OPT1	OPT1	OPT1	OPT1	OPT1
14	Option 2 (OPT2)	DNLink	DNLink	OPT2	OPT2	OPT2	OPT2	OPT2
15	Audio Out On/Off (AUDIO_OUT)	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT
16	Audio In (AUDIO_IN)	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN
17	Audio Ground (AUDIO_GND)	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND

Pin No.	Signal Name (Short Form)	Desktop Speaker Phone	FM Radio Headset	Clip-on Speaker Phone	EIHF	Smart Audio : General	Smart Audio : Telematics	Smart Audio : DAI Test Box
1	Power Ground (GND)	GND	GND	GND	GND	GND	GND	GND
2	Battery Feedback (BATT_FDBK)	BATT_FDBK		BATT_FDBK	BATT_FDBK	BATT_FDBK	BATT_FDBK	BATT_FDBK
3	External Power (EXTB+)	EXTB+		EXTB+	EXTB+	EXTB+	EXTB+	EXTB+
4	USB+ / TXD (D+)	USB+		TXD	TXD	TXD	TXD	TXD
5	USB- / RXD (D-)	USB-		RXD	RXD	RXD	RXD	RXD
6	USB Power / Ignition / Send/End / RTS (USB_PWR)	USB_PWR	SEND / END		IGN	RTS	RTS	RTS
7	Switched Battery (SWB+)	SWB+	SWB+	SWB+	SWB+	SWB+	SWB+	SWB+
8	Hook Switch / FM_DATA / CTS (HKSW)	HKSW	FM_DATA		HKSW	CTS	CTS	CTS
9	MUTE* / FS / DCD (MUTE*)	MUTE*	MUTE*	MUTE*	MUTE*		MUTE*	FS
10	DUMB_SEL2 / SCK / RI (DSEL2)	DSEL2	DSEL2	DSEL2	DSEL2	DSEL2	DSEL2	DSEL2 / SCK
11	DUMB_SEL1 / FM_CLOCK / SRDA / DTR (DSEL1)	DSEL1	DSEL1/ FM_CLK	DSEL1	DSEL1	DSEL1	DSEL1	DSEL1 / SRDA
12	DUMB_SEL0 / FM_EN / STDA / DSR (DSEL0)	DSEL0	DSEL0 / FM_EN	DSEL0	DSEL0	DSEL0	DSEL0	DSEL0 / STDA
13	Option 1 (OPT1)	OPT1	OPT1	OPT2	OPT2	OPT2	OPT2	OPT2
14	Option 2 (OPT2)	OPT2	OPT2	OPT1	OPT1	OPT1	OPT1	OPT1
15	Audio Out On/Off (AUDIO_OUT)	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT	AUDIO_OUT
16	Audio In (AUDIO_IN)	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN	AUDIO_IN
17	Audio Ground (AUDIO_GND)	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND	AUDIO_GND

P2K Accessories Detection Matrix

Category	Accessory	OPT1	OPT2	USBPWR	AUD_IN	DSEL2	DSEL1	DSEL0	RAWEXTB+	Batt_Fdbk	Remark
Power	Rapid SMPS (RTC)	X	X	X	X	X	X	X	present	80.6K ohms	
	Vehicle Power Adaptor	X	X	X	X	X	X	X	present	80.6K ohms	
	Mid-Rate SMPS	X	X	X	X	X	X	X	present	25.5K ohms	
	Economy Mid-Rate Linear	X	X	X	X	X	X	X	present	25.5K ohms	
	Dual Pockets Desktop Charger	X	X	X	X	X	X	X	present	80.6K or 25.5K ohms	always assume DTC attached when EXTB+ present
USB	USB Data Cable	1	1	>4.0V	1	X	X	X	X	X	Phone identifies specific USB device through USB
	ProInstall Hands Free Car Kit	1	1	>4.0V	1	X	X	X	X	X	Phone identifies specific USB device through USB
RS232	RS232 Data Head	0	1	X	1	X	X	X	X	X	
Bluetooth	Bluetooth Clip-on	0	1	X	0	X	X	X	X	X	
Dump	TTY Device	1	0	X	1	0	0	0	X	X	
Accessory	Desktop SpeakerPhone	1	0	X	1	0	0	1	X	X	
	PTT Headset	1	0	X	1	0	1	0	X	X	Not Supported by PCS phone
	FM Radio Headset	1	0	X	1	0	1	1	X	X	
	IrDA Adaptor	1	0	X	1	1	0	0	X	X	
	Clip-on Speakerphone	1	0	X	1	1	0	1	X	X	
	Smart Audio Device	1	0	X	1	1	1	0	X	X	Note 1
	Easy Install Hands Free car Kit	1	0	X	1	1	1	1	X	X	
Heaset Jack	Mono Send-End Headset	X	X	X	X	X	X	X	X	X	Headset plug pull interrupt low (Note 2)

Note 1 : Smart Audio Device support analog audio and RS232 for control. These devices will further identify themselves over RS232 when queried by the phone. Some Smart Audio Devices such as the DAI test box may support SSI instead of analog audio; control and identification of this Smart Audio Device type is still done over RS232.

Note 2 : Phone will take priority on Mono Send-End headset insertion; audio will be routed to headset jack immediately.

CE BUS AND COMMUNICATIONS NOTES:

1. P2K PRODCUTS SUPPORTS TWO SERIAL COMMUNICATION PROTOCOLS,
   I. USB (Universal Serial Bus) II. RS232
2. USB : USES: flashing phones, Desktop Speaker phone, Pro-installed car kit
3. USB needs USB cable to interface with Personal computer.
4. RS232: USES: In factory for testing and phasing phones, flashing phones(will eventually phase out)
5. RS232 needs RS232 Data head to interface to PC.
6. USB and RS232 (3 wire) communications takes place through CCAP interface.
7. CE BUS pin 2 - dual functions- BATTFDBK and MANTST
8. BATTFDBK used for controlled power dissipation by the charger.
9. MANTST is used to detect the type of charger (Full rate, Mid rate, and Invalid).
10. Initially CCAP (ADC) reads the voltage on this pin (pin 2) and then determines the charger type and then the BATTFDBK signal is active.
11. SWB+: is the power supply for speaker phone, RS232 data head, FM radio, and blue tooth clip on. When external supply present SWB+ should be low.
12. SWB+ is used to communicate(through toggling high or low) with desk top charger. High to charge front pocket, and when charging is over toggles low.

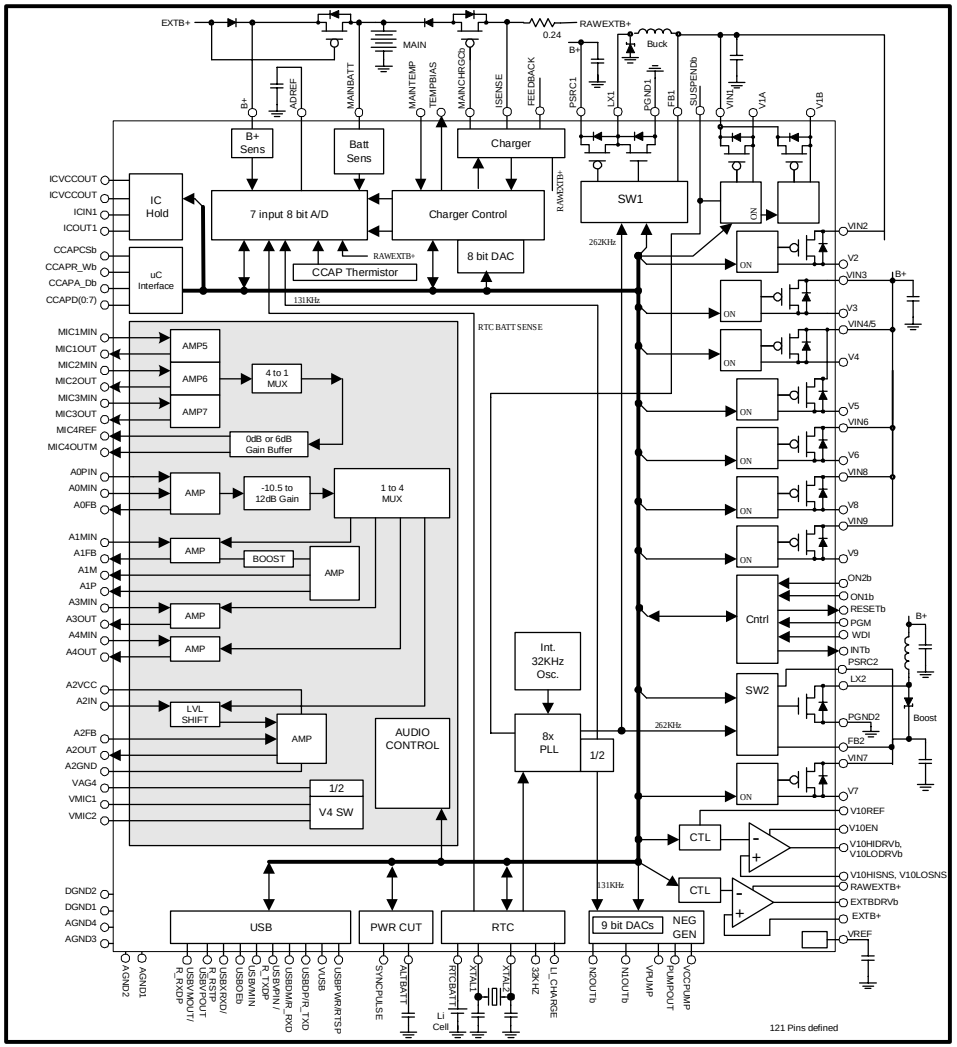
CE CONNECTOR SIGNAL NAMES & COMMUNICATION MODE

COMMUNICATION MODE OR ACCESSORY						
DESKTOP CHARGER	**TRAVELLING CHARGER**	**USB**	**RS232**	**RS232 (8 WIRE)**	**BLUE TOOTH**	**FM RADIO**
BATT_FEEDBACK/ MANTEST	BATT_FEEDBACK/ MANTEST	USB+	TXD	TXD	STDA	FM-DATA
SW_B+	RAWEXTB+	USB-	RXD	RXD	SRDA	FM_EN
RAWEXTB+	GND	USB_PWR	RTS	RTS	FS	FM_CLK
GND		GND	SW_B+	CTS	SCK	MUTE*
			GND	DSR		
				DCD		
				DTR		
				RI		

ACCESSORIES DETECTION SIGNALS

OPTION 1
OPTION 2
AUDIO_IN
USBPWR
DSEL0
DSEL1
DSEL2
BATT_FEEDBACK/MANTEST

CCAP Internal Block Diagram



Key features of the CCAP IC:

- 8 bit parallel interface from Wally
- Buck & Boost Converters
- 8-Linear Voltage regulators
- 2-Hi End Linear Regulators w/ common Reference (PA Drain regulators)
- External B+ Clamp Regulator
- 3 Microphone Amplifiers
- Differential audio interfaces to & from Wally
- Audio Amps, Multiplexers and Speaker & Alert Drivers
- Headset & Send / End key detection
- Battery Charger
- 6 input 8 bit ADC
- Real Time Clock (RTC) with coin cell backup supply and coin cell charger
- Timer circuits
- CE bus interface

CCAP FUNCTIONALITY NOTES:

1. REGULATORS:

***Buck mode of operation - input voltage higher than generated voltages.**

***External B+ nominal is 4.4V, Battery voltage nominal is 3.6V**

***Minimum Ext_B+ voltage is <3.6V, Minimum Battery voltage is <3.05V**

***V1A --> Digital 1.8v**

***V1B --> Analog 1.8v**

***V2 --> Memory Vcc**

***V3 --> Logic 2.75V**

***V4 --> used internally**

***V5 --> Rx_2.75V**

***V6 --> Tx_2.75V**

***V8 --> Keypad BL**

***V9 --> Vibrator**

***V10-->PA Drain Voltage, Raw Ext B+ to Ext B+ switch(Over voltage protection)**

***Buck switches uses internal(to CCAP) 262Khz clock**

CCAP FUNCTIONALITY NOTES:

2. OVER VOLTAGE PROTECTION:

***If Raw Ext B+ goes above 7.0V the switch is turned off- no Ext B+.**

***External B+ is clamped at 5.7v maximum if the Raw Ext B+ goes above 5.7V But less than 7.0V**

***During Mid rate charging when in call the Ext B+ is switched off.**

3. REAL TIME CLOCK AND COIN CELL INTERFACE:

***Contains internal 32Khz clock**

***External 32Khz clock - 32 Khz crystal**

***Internal 32 Khz clock runs off V4 regulator**

***External 32 Khz crystal runs off Logic 2.75V and when Logic 2.75V not present it runs off coin cell.**

***Rechargeable RTC Batt will sustain for a week, charge through CCAP, when the RTC Batt voltage reaches 2.9V the charging stops. Charging range is 2.4V to 2.9V**

***RTC Batt also used during PWR CUT.**

CCAP FUNCTIONALITY NOTES:

4. POWER CUT:

***Contains power cut circuitry , this circuit will sustain the state of phone for a power cut event which normally last for than a second.**

5. AUDIO INTERFACE:

*** 3 Microphone Amplifiers**

*** Differential audio interfaces to and from Wally.**

***Audio Amps, Multiplexers and Speakers and Alert drivers.**

6. A to D converters:

***B+ , BATT+, RAW EXTB+, RTC BATT, Battery Thermistor**

7. CE BUS INTERFACE:

*** USB and 3 wire RS232**

8. BATTERY CHARGER

POWER UP

Power Up Sequence

1. Power is applied.
2. RAWEXTB+ routed to B+.
3. CCAP internal 32khz turns on.
4. V4 turns on.
5. ANALOG_1.8v and DIGITAL_1.8v turn on.
6. MEMORY_VCC turns on.
7. LOGIC_2.75V and Rx_2.75/Audio_2.75V turn on.
8. External 32khz oscillator turns on.
9. CCAP allows RESET_B to go high.
10. Microprocessor wakes up.

Power Up Sequence (cont.)

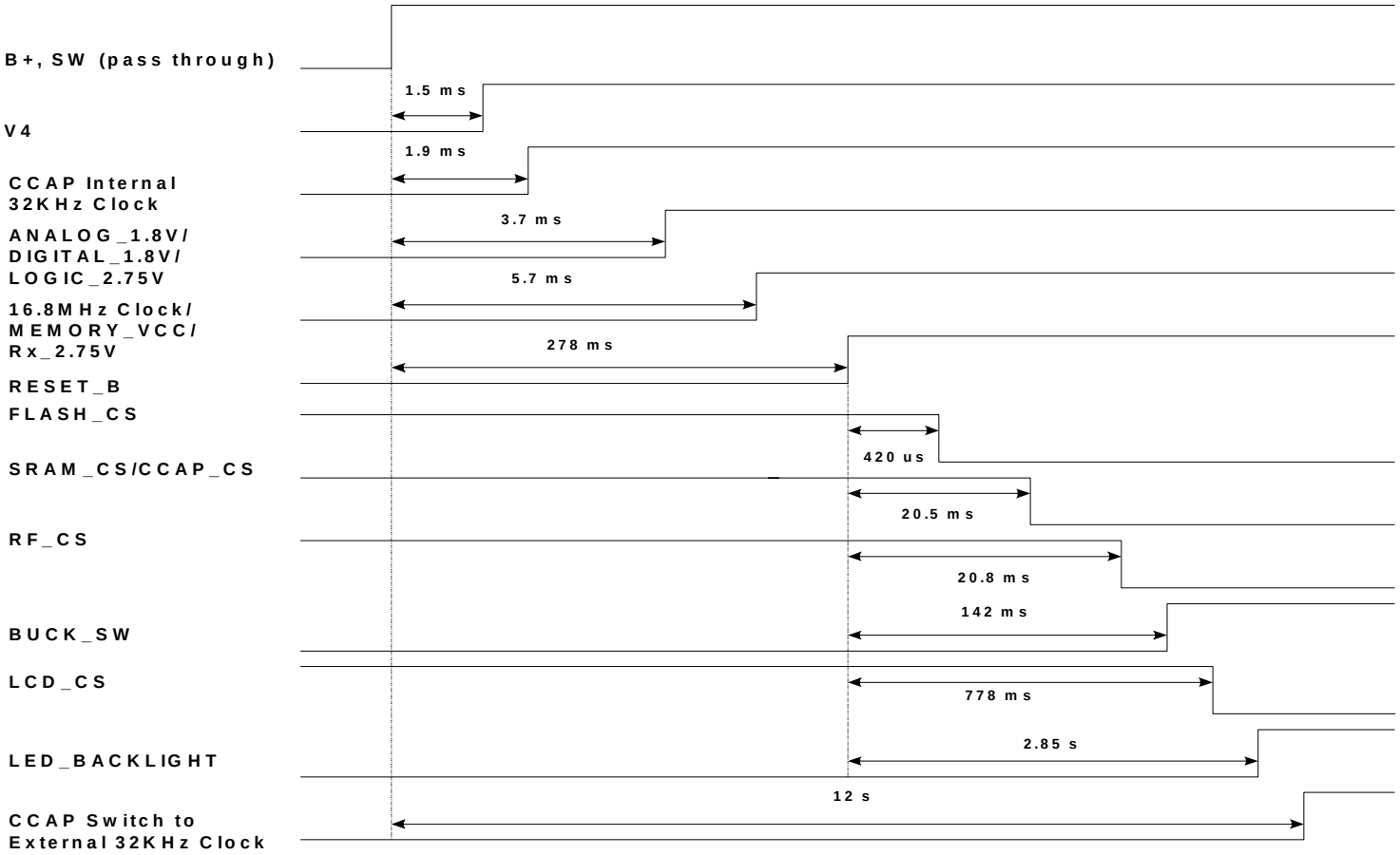
11. Microprocessor performs the following:

- 16.8mhz clock is turned on.
- Access flash, move boot code into SRAM.
- (Or boots internally from Wally)
- Initialize WDOGTIMER.

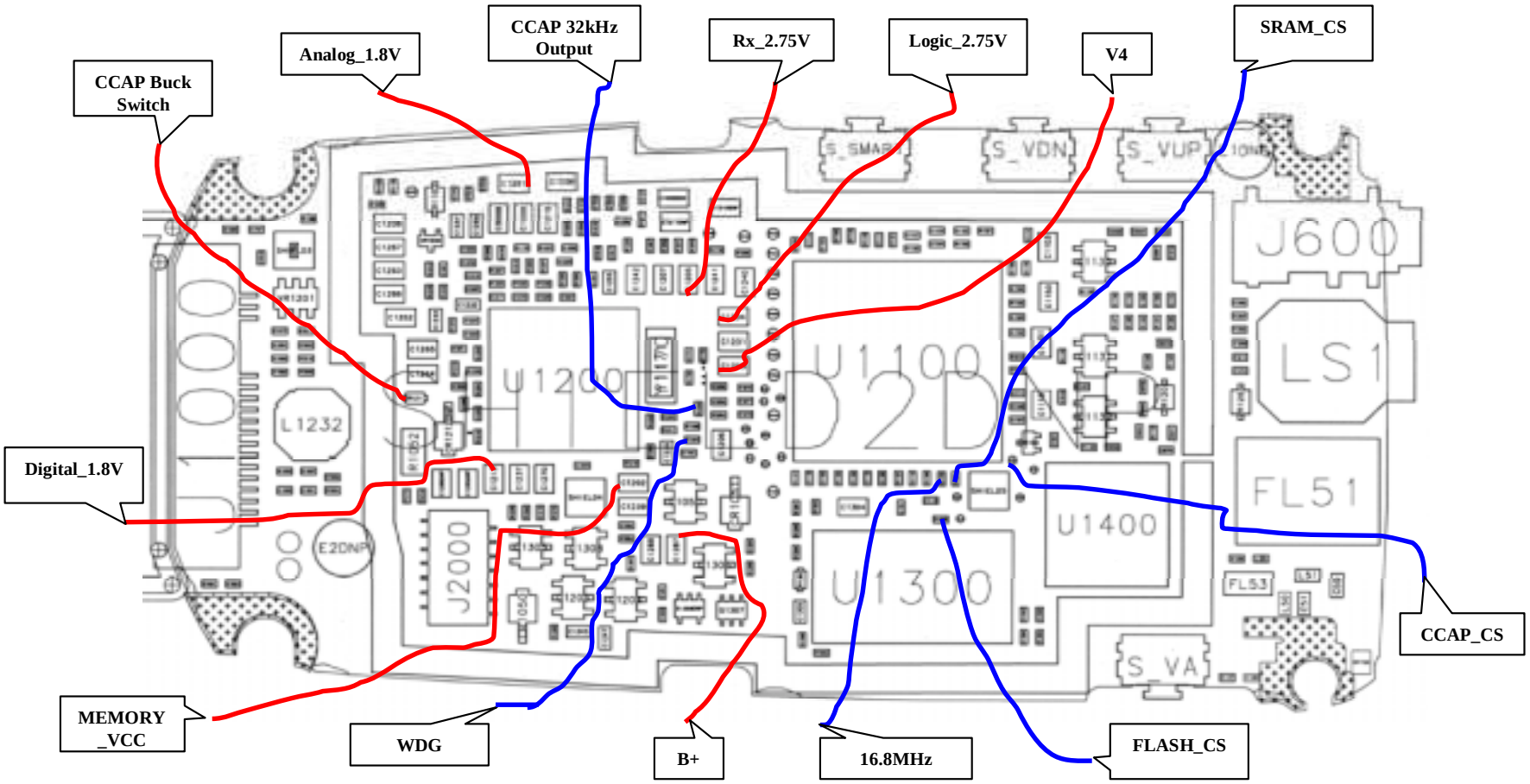
12. Access Flash, checking for main code. On the first time power up, the radio will initialize the SEEM area of Flash.

- Buck switcher turns on.
- EL turns on.
- DSP Starts running code.

Turn On Timing



Logic Side Layout



Power down debug procedure

1. Turn on failed.

• Visual check.

- Make sure there is no missing part.
- Check all the ICs, make sure they are all placed correctly.
- Make sure all the parts that have the polarity marks are placed in the right direction.

3. Check short circuits.

Apply 4.4V power supply with 1A current limit to CE flash cable.

If the radio draw more than 0.5A, check all the CCAP regulators, make sure they are not shorted to ground.

Else go to step 4

4. Switch R1108 to R1107 to tie WDG to high.
5. Check for the power route to CCAP B+.

If B+ is present, go to step 6

Power Down Debug procedure(cont.)

Else check VR1202 pin 1

If there isn't a 4.4V on VR1202 pin 1

Check J1000 and make sure it is placed correctly

Else if there isn't a 4.4V on CR1050 pin 2

Replace Q1305 and reflow CCAP if needed.

Else check CR1050 and R1306, make sure they are placed correctly.

6. Check CCAP regulator output voltage.

If the voltages on the following regulators are correct , go to step 7.

Analog_1.8V:	1.875V
Digital_1.8V:	1.875V
Memory_Vcc:	1.875V
Logic_2.75V:	2.775V
V4:	2.775V
Rx_2.75V:	2.775V

Power Down Debug procedure(cont.)

Else reflow CCAP or replace CCAP is reflow does not work.

7. Check the RTC clock from CCAP.
   If there is a 32.768 KHz clock on R1253, go to step 8.
   Else if there is no clock on R1253, reflow CCAP.
   Else the phone running at CCAP internal clocks(32.768 KHz +/- 50%), check the RTC crystal Y1170
   If there is no 32 KHz sine wave on Y1170, check C1171 and C1172, make sure they are placed correctly before replace Y1170.
   Else go to step 8.
8. Check the 16.8 MHz clock goes into Wally.
   If there is a 16.8 MHz clock at C1173, go to step 9.
   Else make sure the voltage on Q325 pin 2 and pin 3 are both 2.75V
9. Flash Analysis

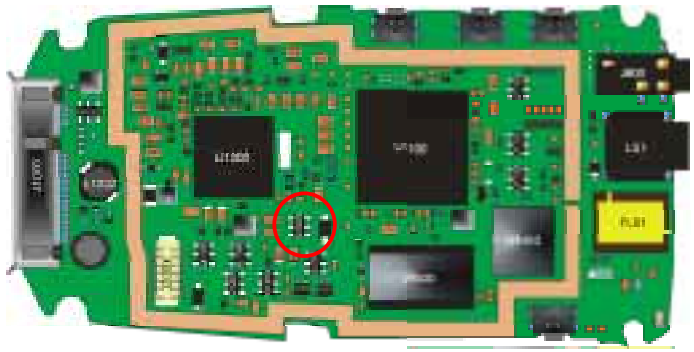
Power Down Debug procedure(cont.)

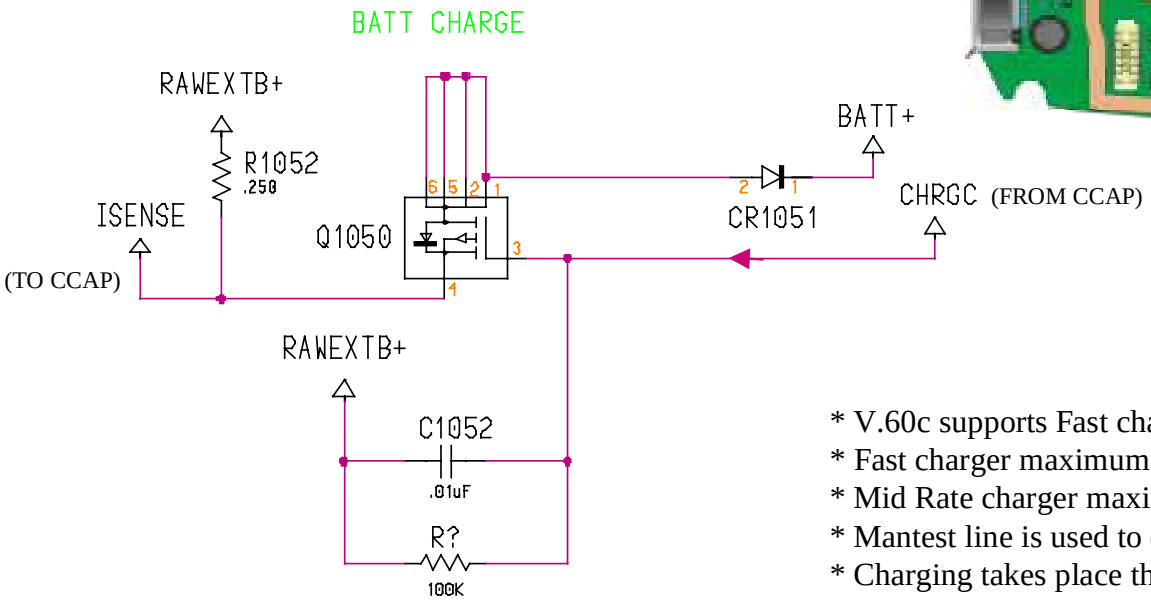
If the Flash_CS is toggling, go to step 10.
Else reflow Flash or replace Flash if reflow does not work.

10. SRAM analysis
    If SRAM_CS is toggling, go to step 11.
    Else reflow SRAM or replace SRAM if reflow does not work.
11. CCAP analysis
    If CCAP_CS is toggling, reflow Wally or replace Wally if reflow does not work.
    Else reflow CCAP or replace CCAP is reflow does not work.
12. Switch R1107 back to R1108.

If the phone turns on the first time during the debug process, wait 20~30 second to insure the software fully initialed the Flash SEEM.

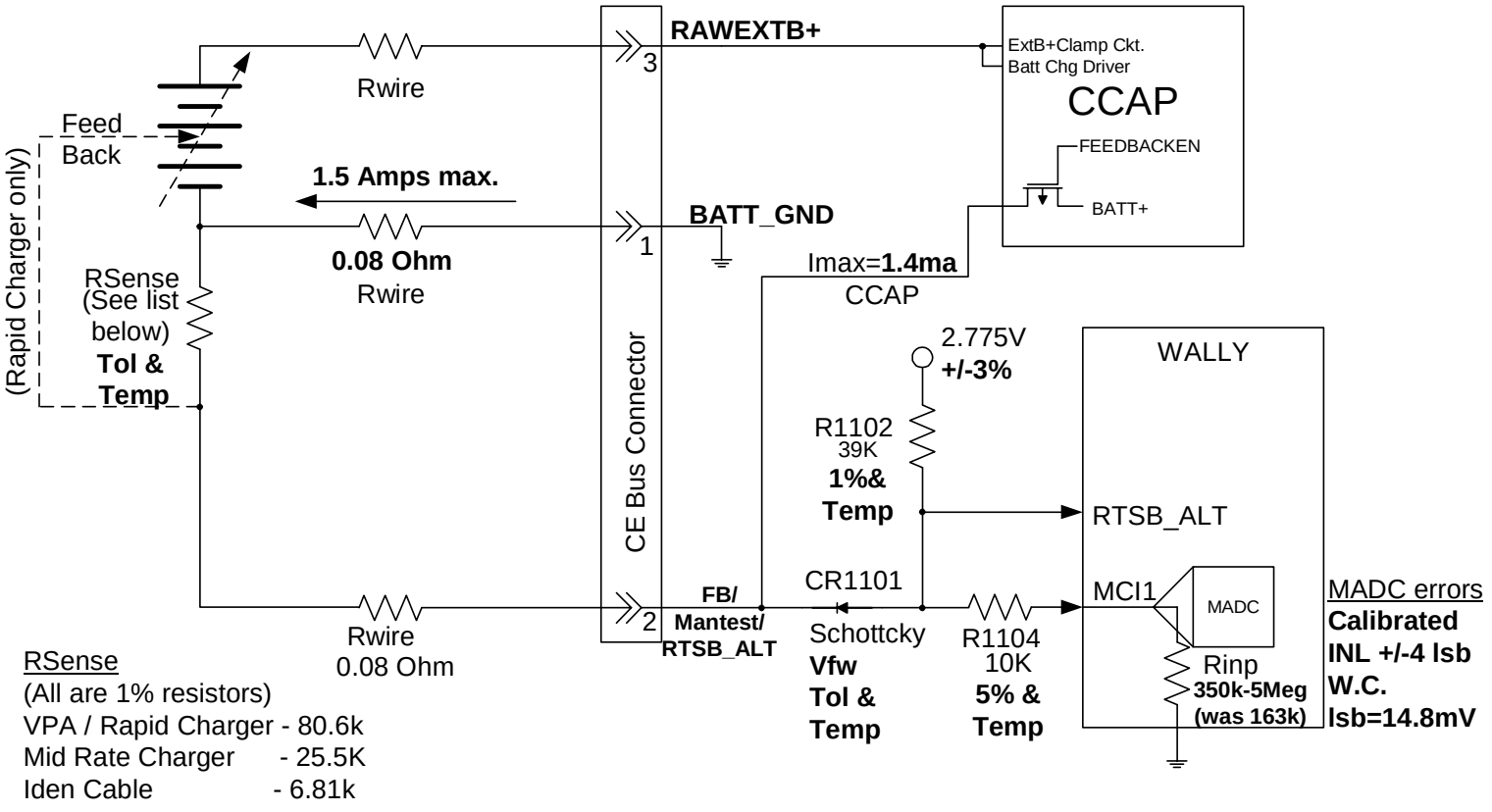
Internal Charger





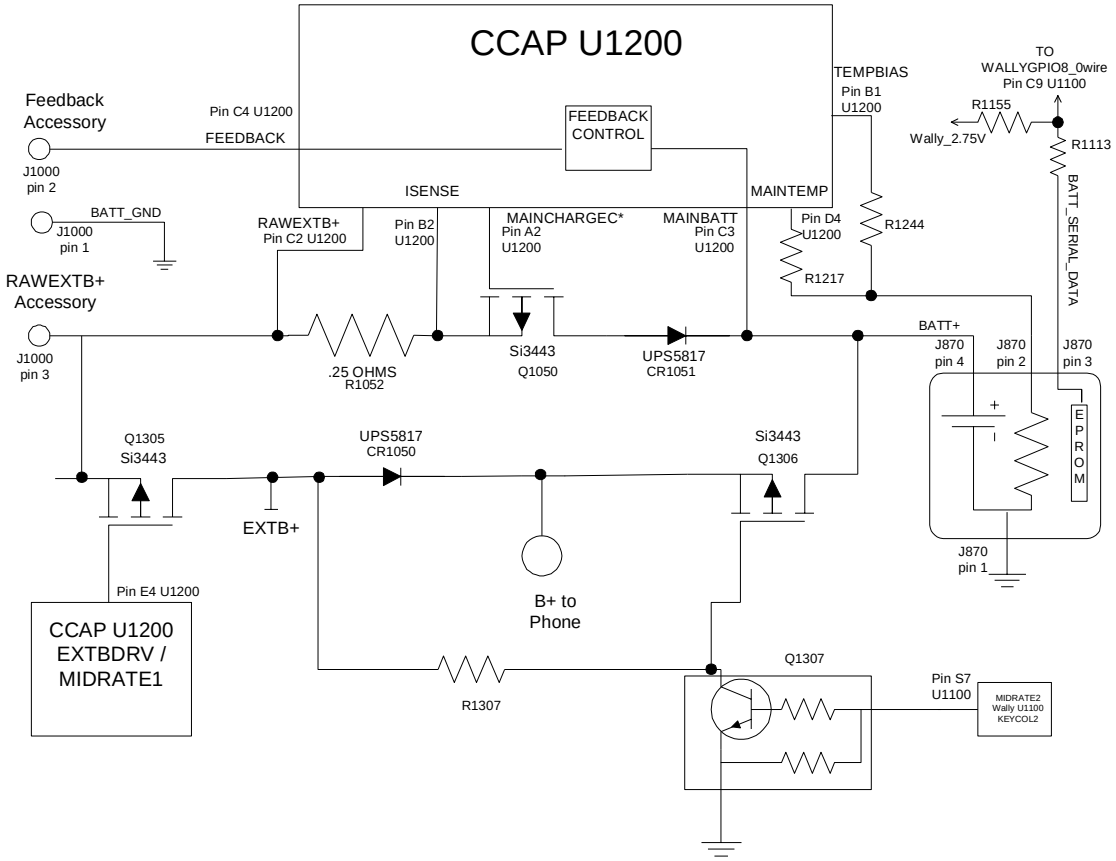
* V.60c supports Fast charger and Mid Rate charger.
* Fast charger maximum current supply is 500 mA.
* Mid Rate charger maximum current supply is 300mA.
* Mantest line is used to detect the type of charger attached.
* Charging takes place through Q1050 which is controlled by CCAP IC through the CHRGC line.
* CCAP IC monitors the charging current through ISENSE line.
* Other control signals: Battery serial data, Battery thermistor, Battery+, Batter feed back.

P2000 Platform Charger Detection



Multiplexed; Battery Feed Back / Mantest / RTSB_ALT

CDMA P2K Charger Circuitry



Charging With Fast Charger

When charging a battery with a fast charger the path of current for charging is from RAWEXTB+ through R1052, Q1050, CR1051 and then to the battery. The other path from RAWEXTB+ to B+ is for general power for the phone.

Charging with a Midrate

When charging a battery with a Midrate charger the path of current for charging is from RAWEXTB+ through R1052, Q1050, CR1051 and then to the battery.

The path for general radio current will be from RAWEXTB+ to B+ except when phone is transmitting, whereby the current will come from the

charging path and the battery itself.

General Charging Failures

- Charging icon not flashing
- Charging icon flashing but no charge current
- Charging icon flashing but charge current always greater than 500 mA
- Charging icon flashing but charge current unstable
- Charging Icon always shows fully charged
- No battery/charging Icon
- Invalid battery message

*Please note charging icon is located in upper right corner of main display. The shape of the icon is of a battery

Charging icon not flashing

Debug tips

- Fast charger not detected, see accessory detection section
- J1000 pins 1, 2, or 3 not connected
- EXTB+ pin of CCAP (pin D2 U1200) not making contact
- Q1305 may be missing or misplaced
- EXTBDRV pin of CCAP (pin E4 U1200) not making contact

Charging icon flashing but no charge current

Debug tips

- R1052, Q1050, CR1051 misplaced, missing, or bad
- CHRGC (pin C3 U1200) not making connection
- ISENSE (pin B2 U1200) shorted or not connected
- BATT+ (pin 4 J870) intermittent

Charging icon flashing but charge current always greater than 500 mA
Debug tips

- R1052 or Q1050 shorted, misplaced or bad
- CHRGC (pin C3 U1200) not making connection or shorted to ground
- ISENSE (pin B2 U1200) shorted or not connected
- CCAP charge current register always > 90 hex (bad U1200)

Charging icon flashing but charge current unstable
Debug tips

- Q1306, R1307 or Q1307 misplaced, shorted, or bad
- CHRGC (pin C3 U1200) not making connection or shorted
- ISENSE (pin B2 U1200) shorted or not connected

Charging Icon always shows fully charged debug tips

- BATT+ pin (J870 pin 4) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly

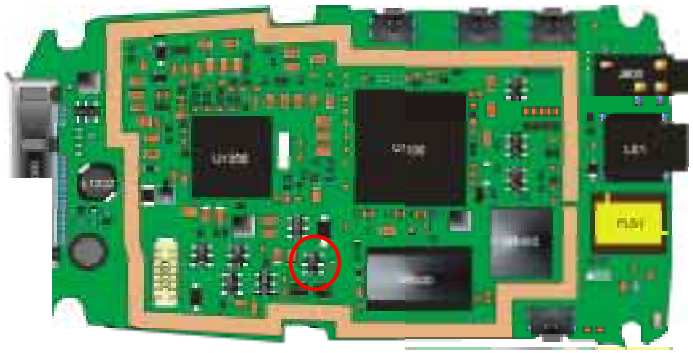
No battery/charging Icon debug tips

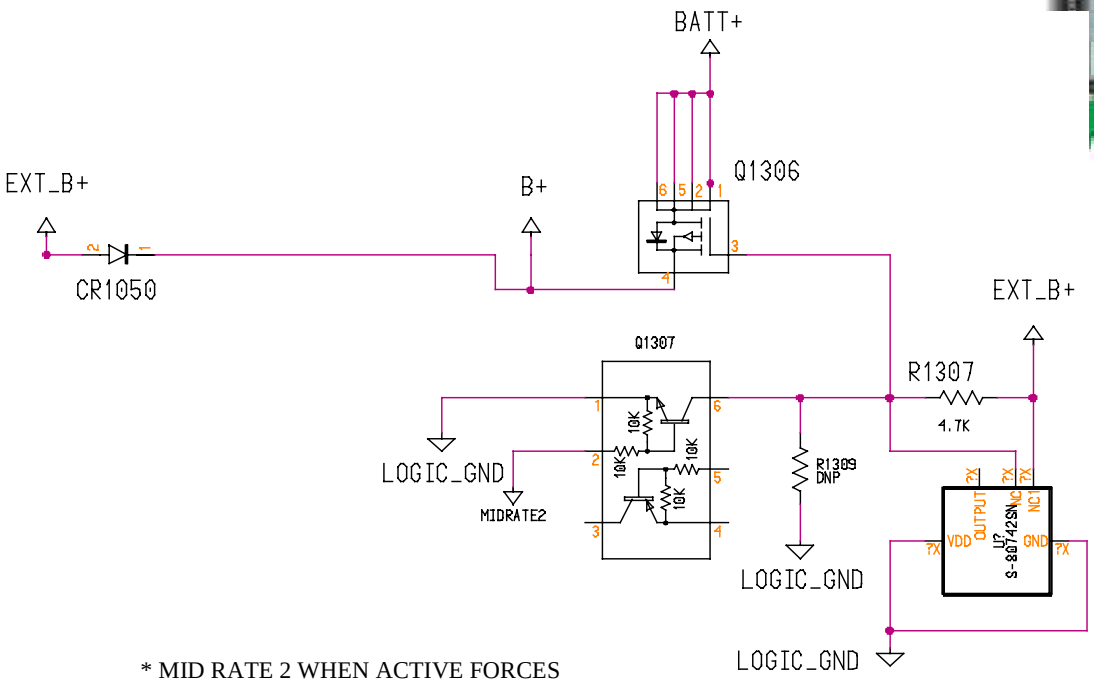
- BATT+ or BATT- pins (J870 pins 1 or 4) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly
- MAINTEMP pin (pin D4 U1200) not connected properly
- TEMPBIAS pin (pin B1 U1200) not connected properly
- R1217 or R1244 not connected properly

Invalid battery message dubug tips

- BATT_Serial_data (pin 3 J870) not connected properly
- GPI08_0Wire (pin C9 U1100) not connected properly
- R1155 or R1113 not connected properly
- BATT+ or BATT- pins (J870 pins 1 or 4) not connected properly
- MAINBATT pin (pin C3 U1200) not connected properly

Power Select

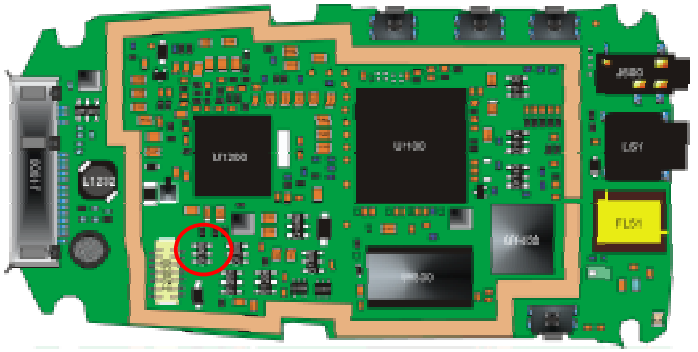


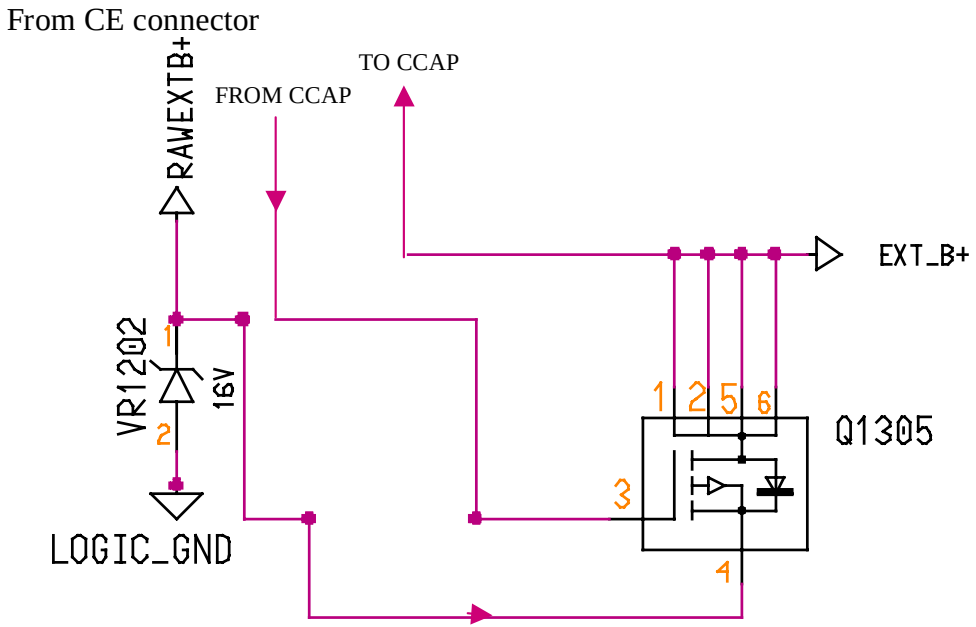


* MID RATE 2 WHEN ACTIVE FORCES Q1306 TO TURN ON and CONNECT BATT+ to B+, This is DONE DURING MID RATE CHARGING and in a CALL.

* Q1306 ACTS LIKE a SWITCH
* IF EXT_B+ is LESS THAN 3.6v, Q1306 CONNECTS BATT+ To B+
* IF EXT_B+ is ABOVE 3.6v, q1306 ISOLATES BA+

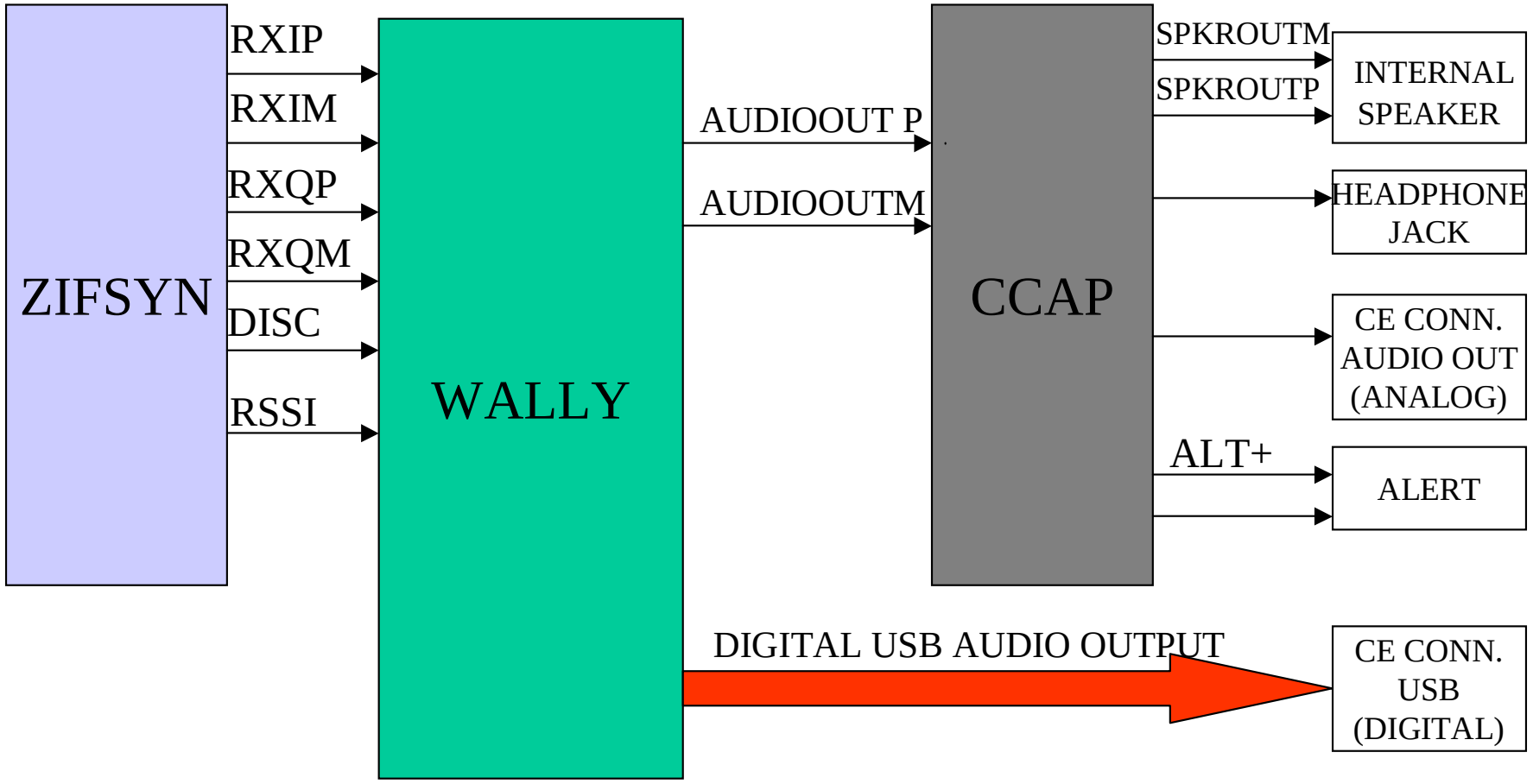
Raw EXT B+ Switching & Over Voltage Protection



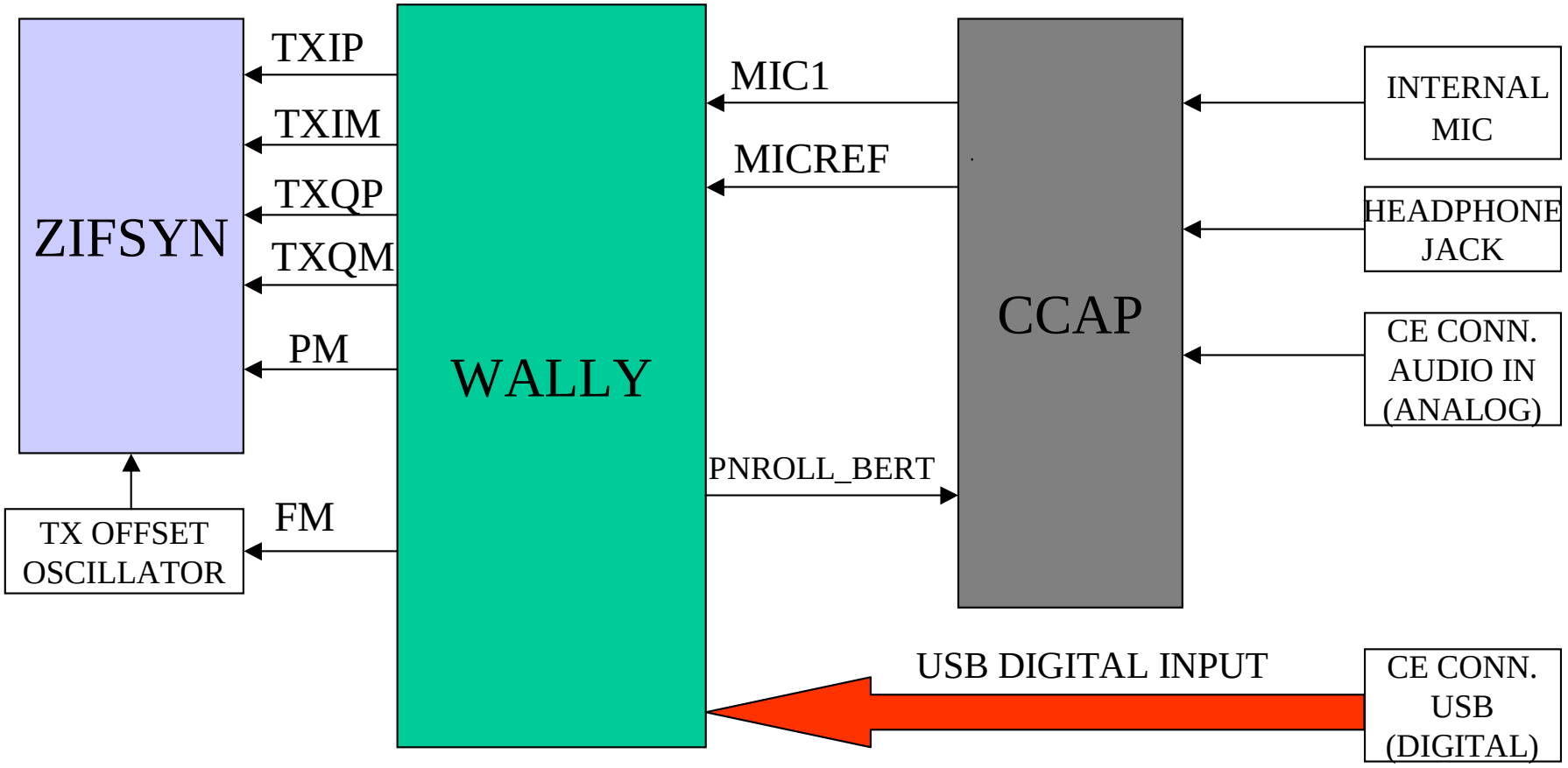


*If RAWEXTB+ exceeds 7.00V the CCAP IC turns off the switch Q1305 and there will be no EXT_B+
* EXT_B+ is clamped at maximum 5.70V
* The switch Q1305 is also switched off during mid rate charging and in a call.
* A low on the Gate will turn on the switch Q1305

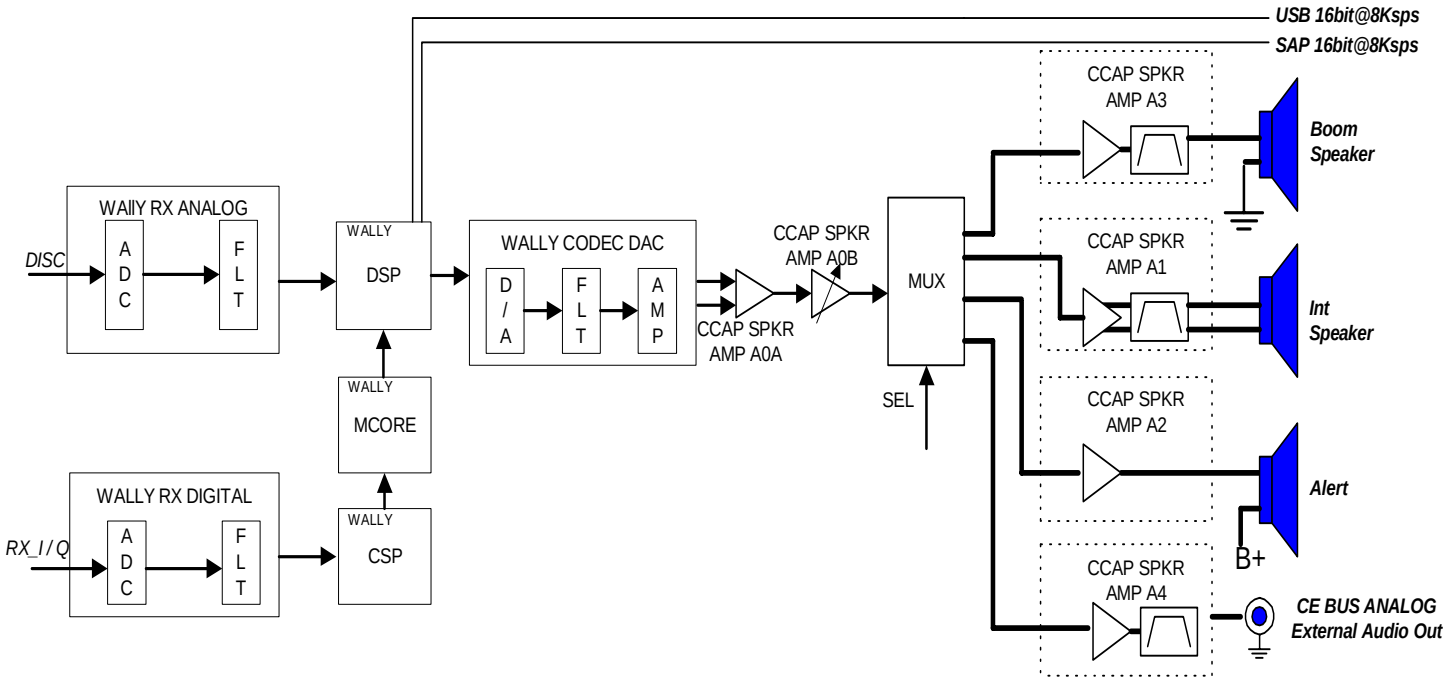
AL SIDE - AUDIO ROUTING AND SUPPORTING SIGNALS RECEIVE



AL SIDE - AUDIO ROUTING AND SUPPORTING SIGNALS TRANSMIT



Receive Audio
Block Diagram



Operation

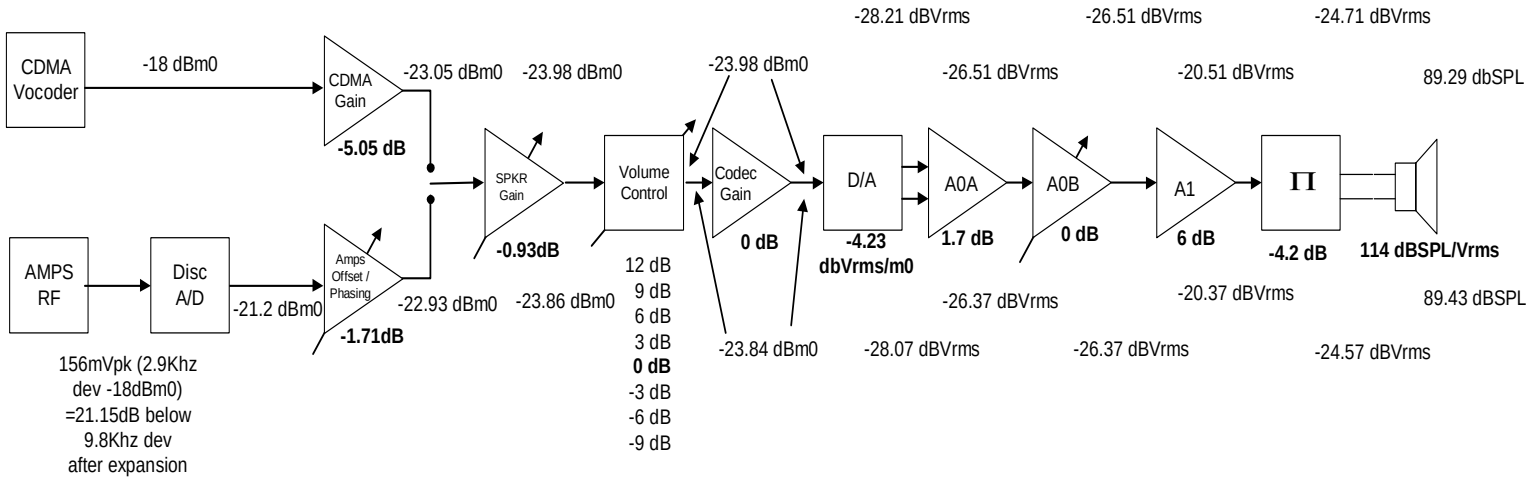
- The CDMA phones use a WALLY chip to handle all digital functions. An analog audio output is sent to CCAP, which provides an output buffer and performs switching functions.

- The V.60c forward audio sections have five possible audio paths: internal speaker, headset speaker, Alert, external CE bus analog audio and Digital USB audio.

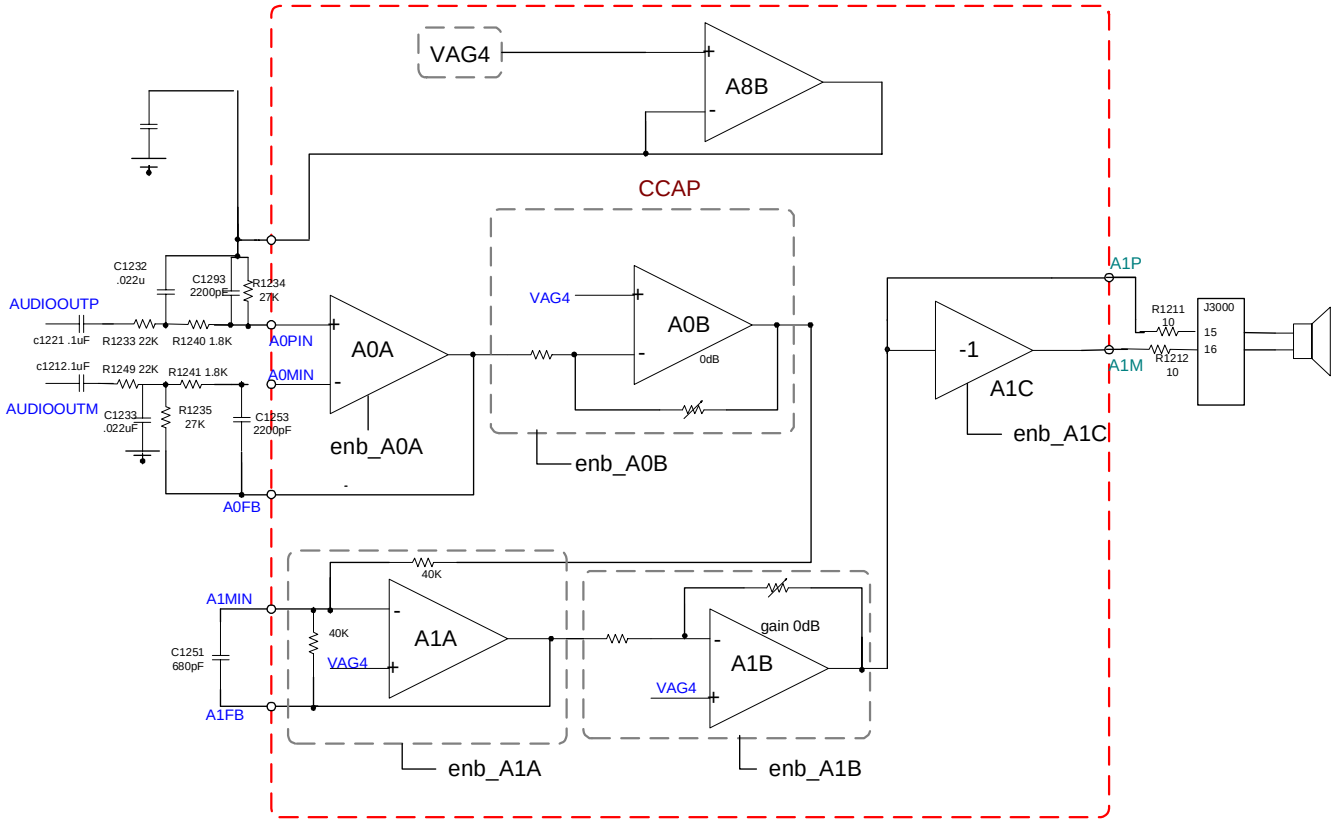
- There are two IC's that handle the audio: Wally and CCAP. Wally digitizes the Discriminator or RxI/Q output from the ZIF/SYN and passes to the DSP or CPU or CSP for further processing.

- DSP sends the processed audio to the CODEC to convert to the analog audio. CCAP buffers the analog output from the Wally and drives the selected transducer one at a time.

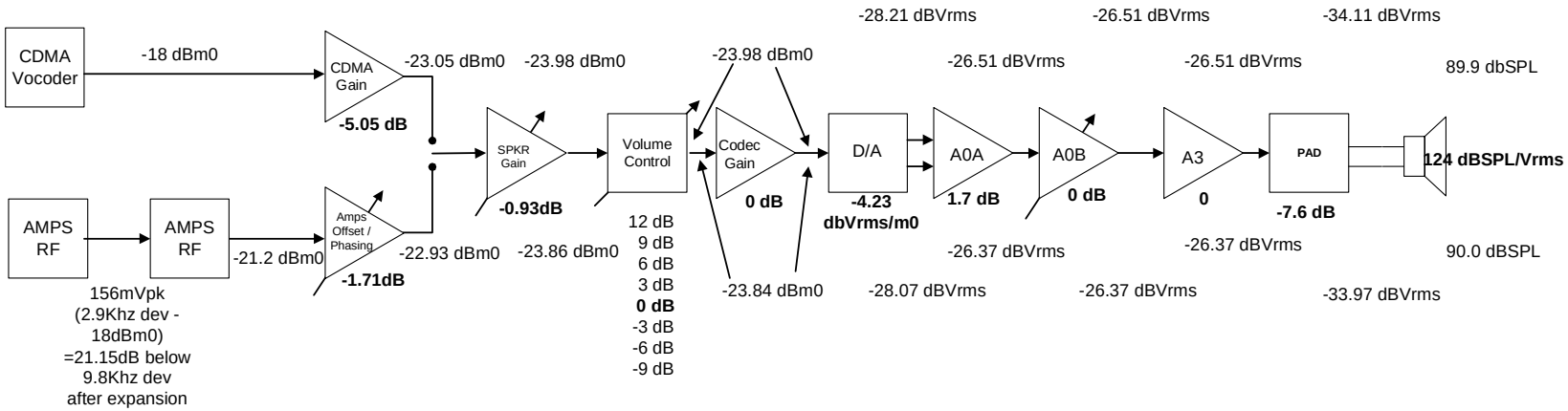
Internal Speaker Gain Lineup



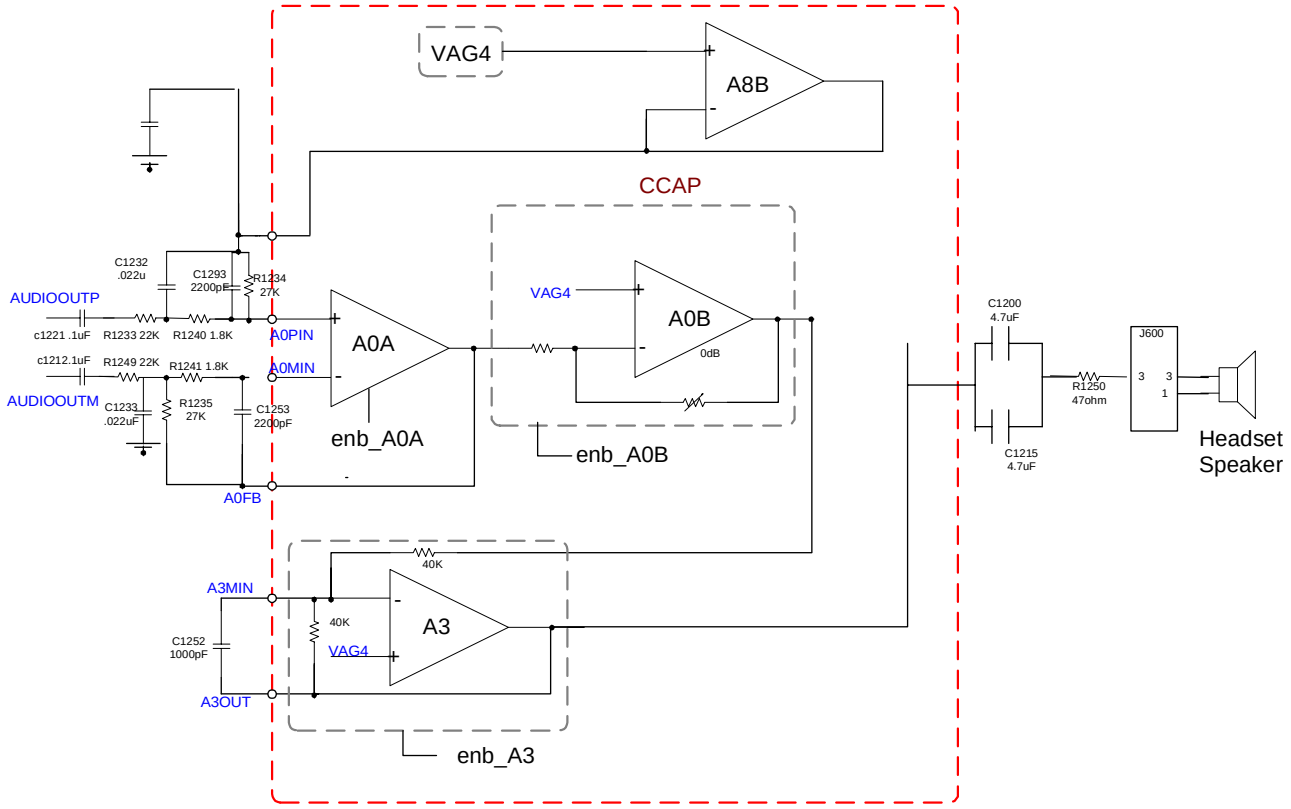
1.4 CCAP Block Diagram (Internal speaker)



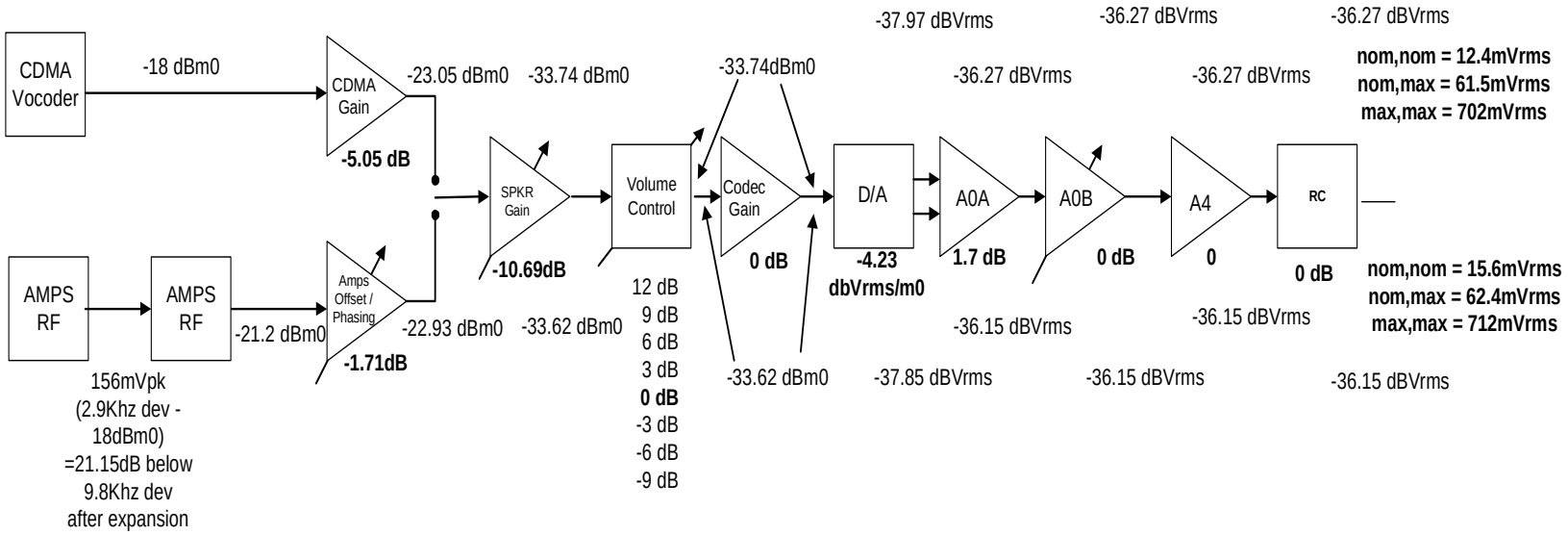
Headset Speaker Gain Lineup



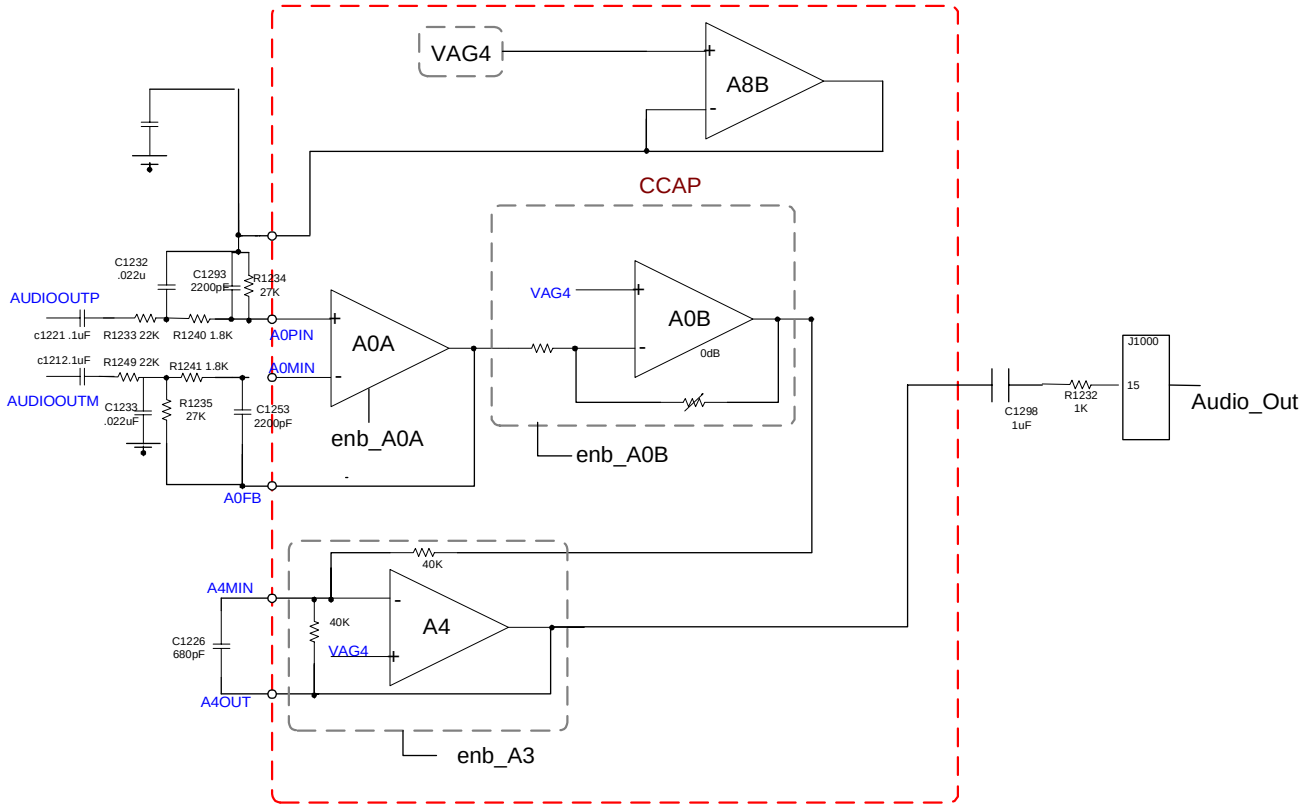
CCAP Headset speaker Block Diagram



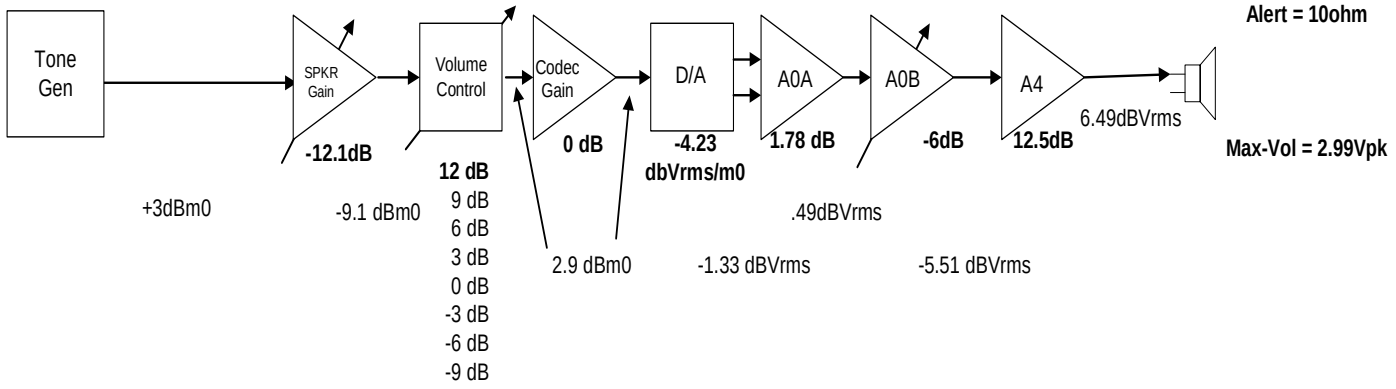
Clip-On, EIHF, Desk Top Speaker Phone Gain Lineup



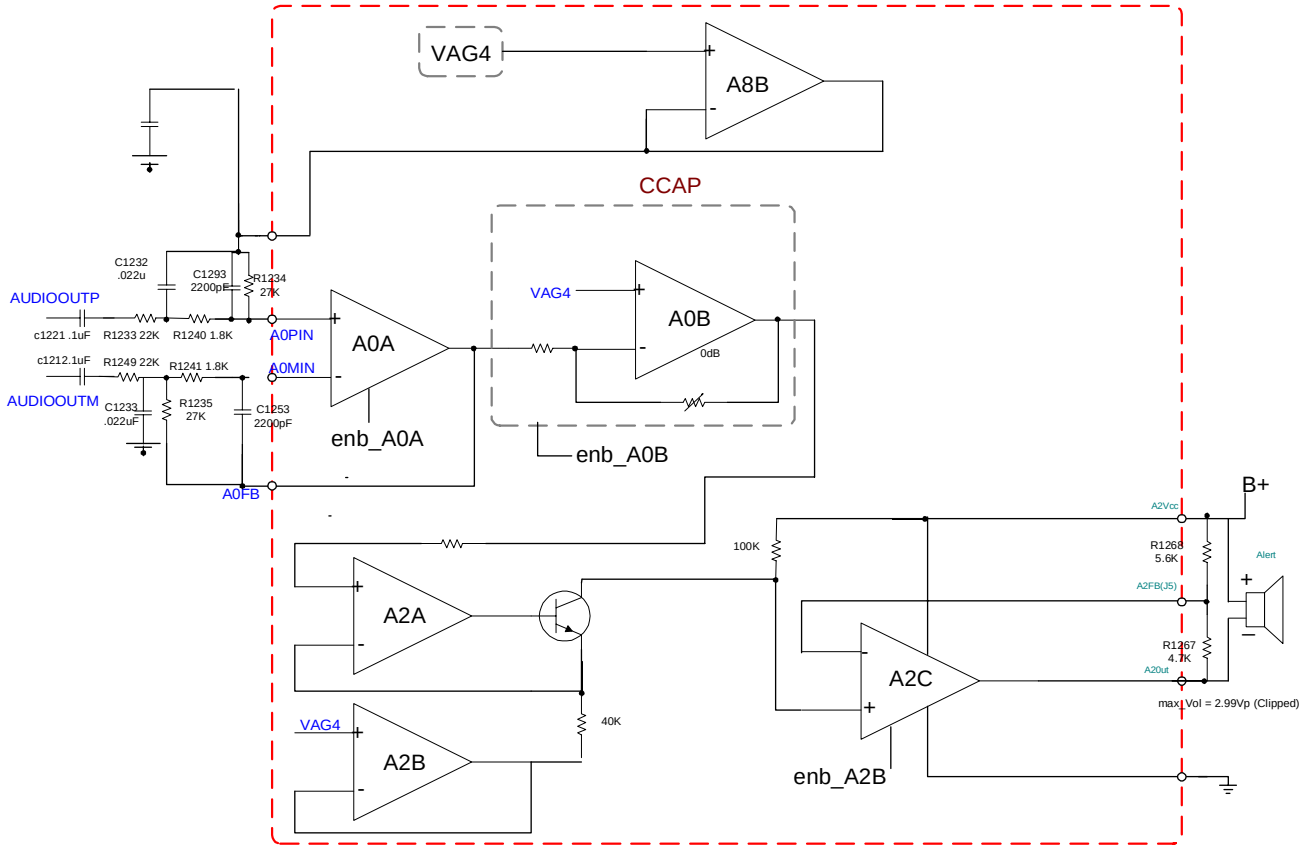
CCAP CE Bus Analog Audio out Block Diagram



Alert Gain Lineup

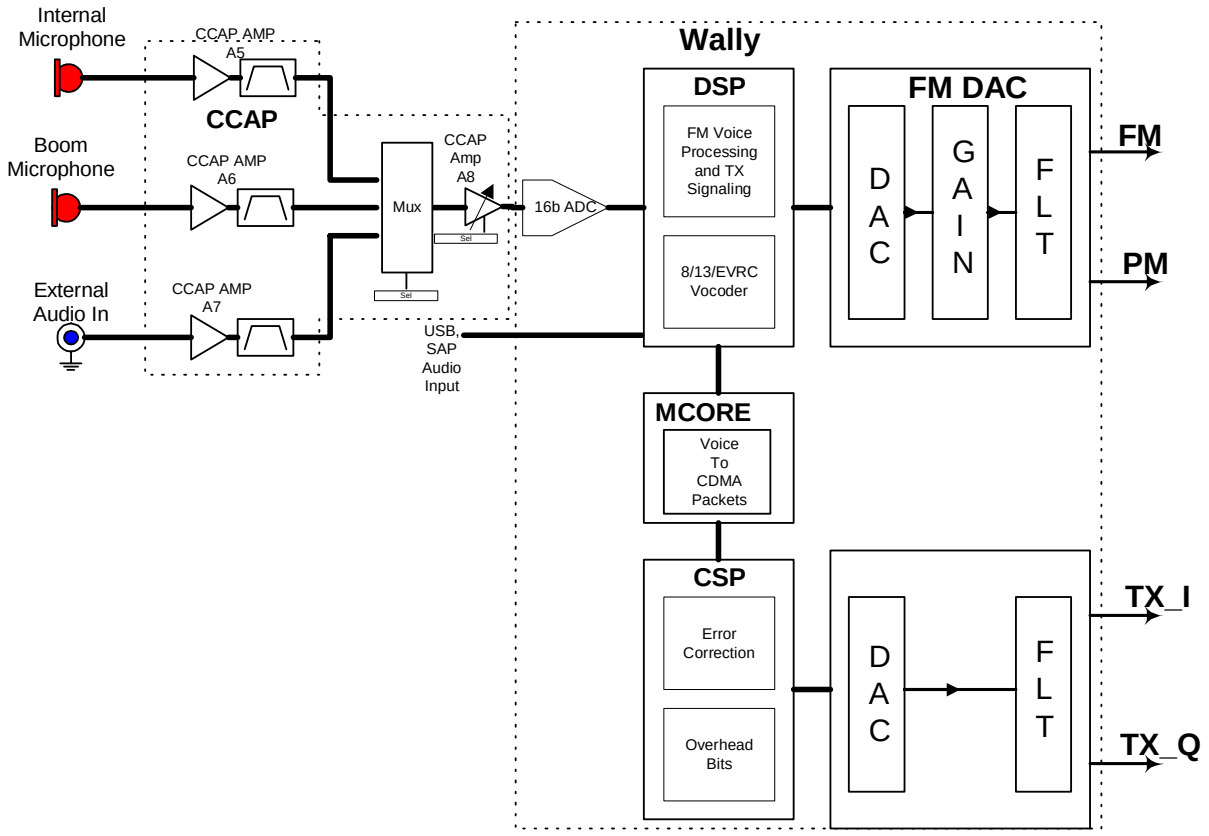


CCAP Alert Block Diagram



Transmit Audio

Block Diagram



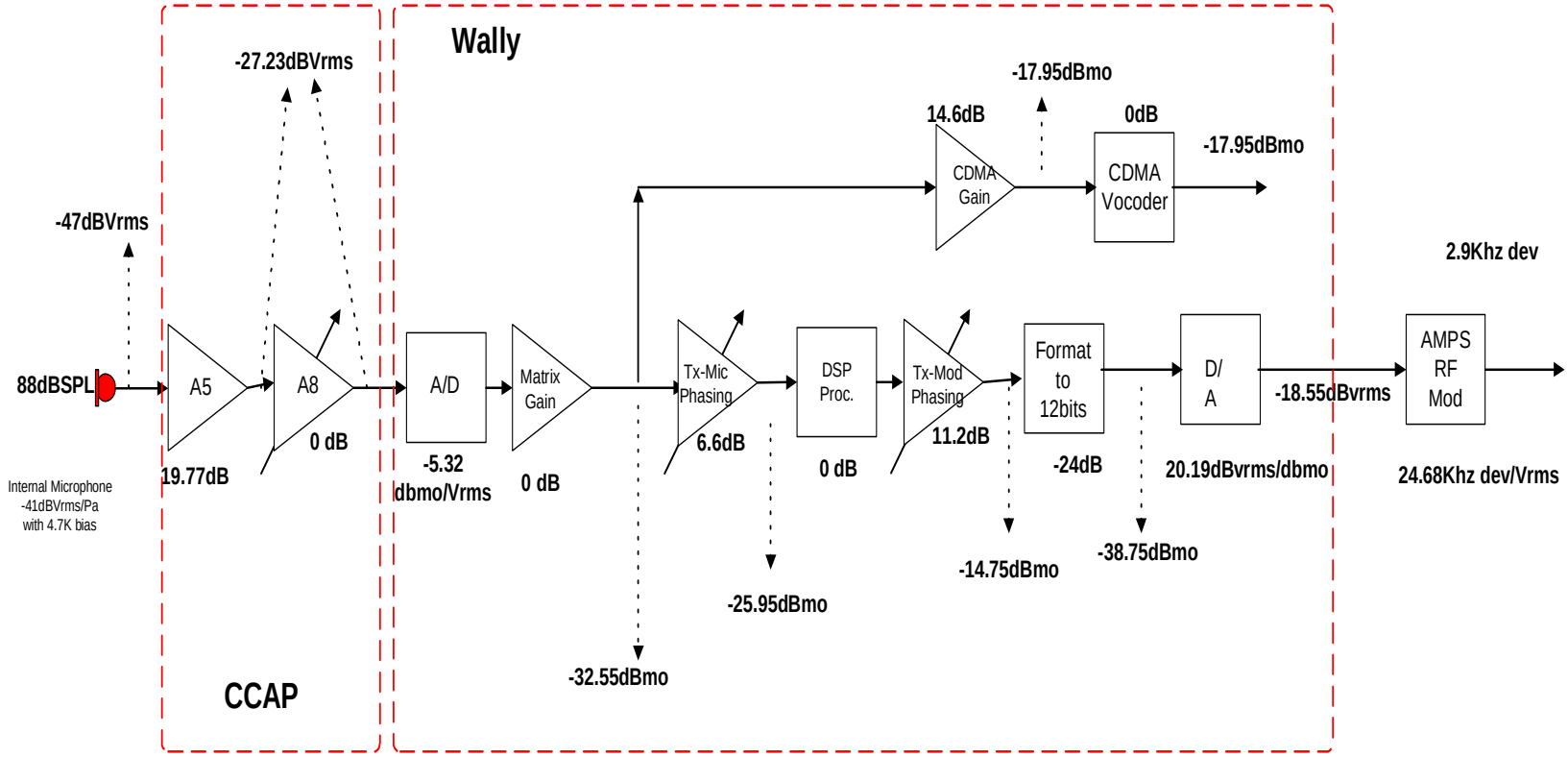
Operation

• The Reverse Audio path is comprised of the Internal, Headset, External microphones, USB digital input, CCAP Input Audio section, Wally Input CODEC and DSP.

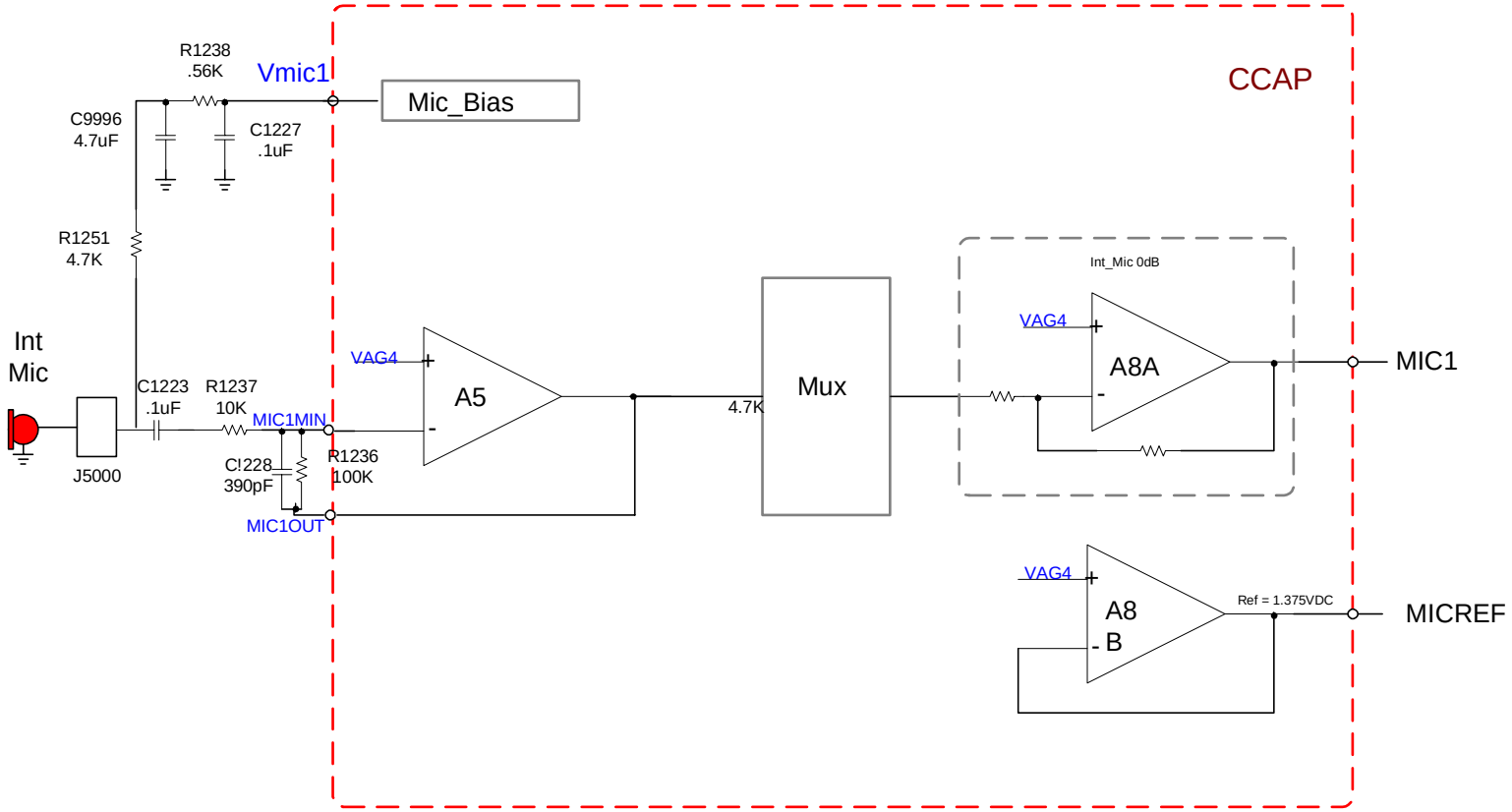
•In analog mode, the remaining audio path is comprised of the FM/PM DACs.

• In digital mode, the remaining audio path is comprised of the Mcore, CSP and the TX I/Q DACs.

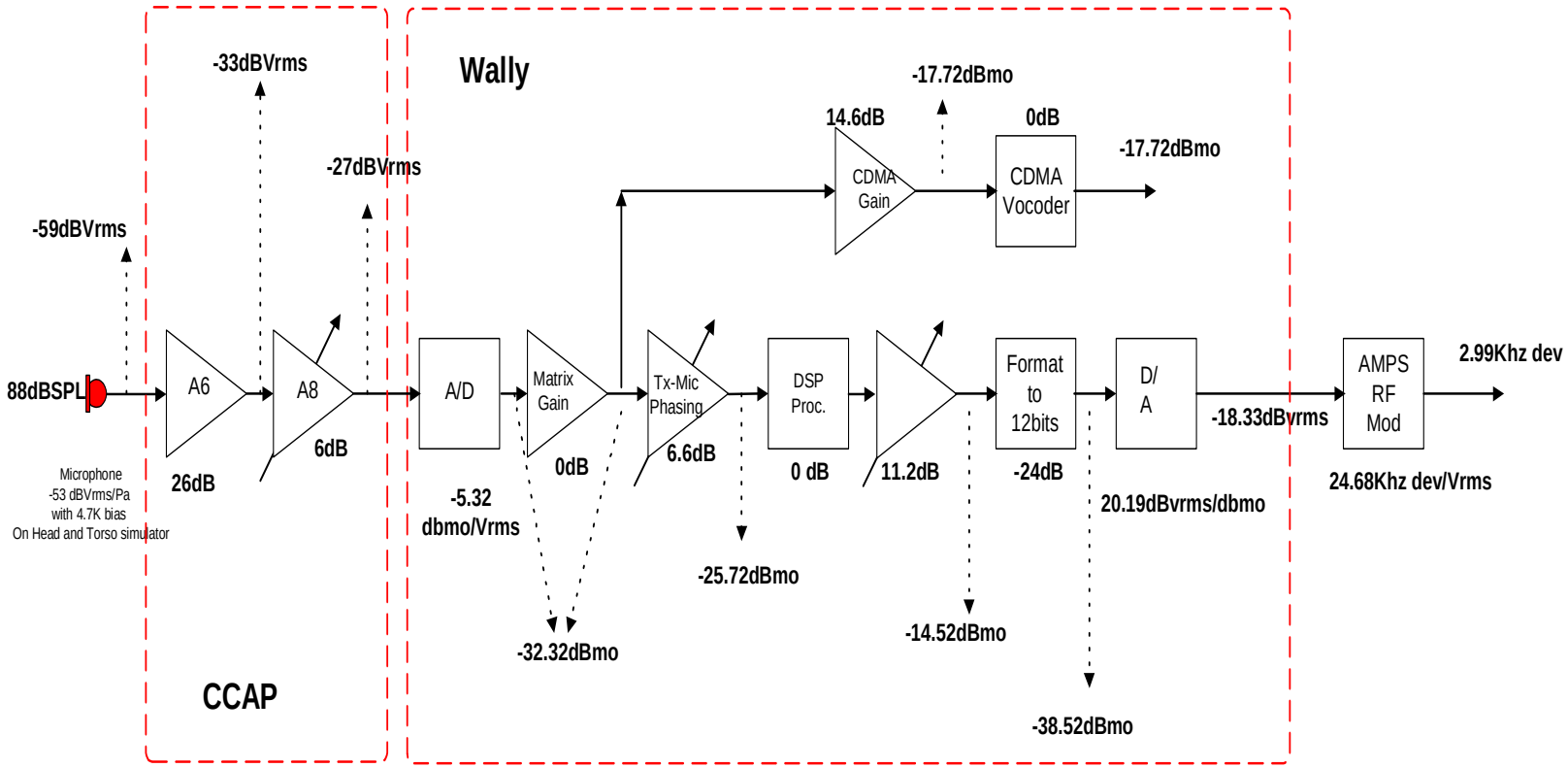
Internal Microphone Gain Lineup



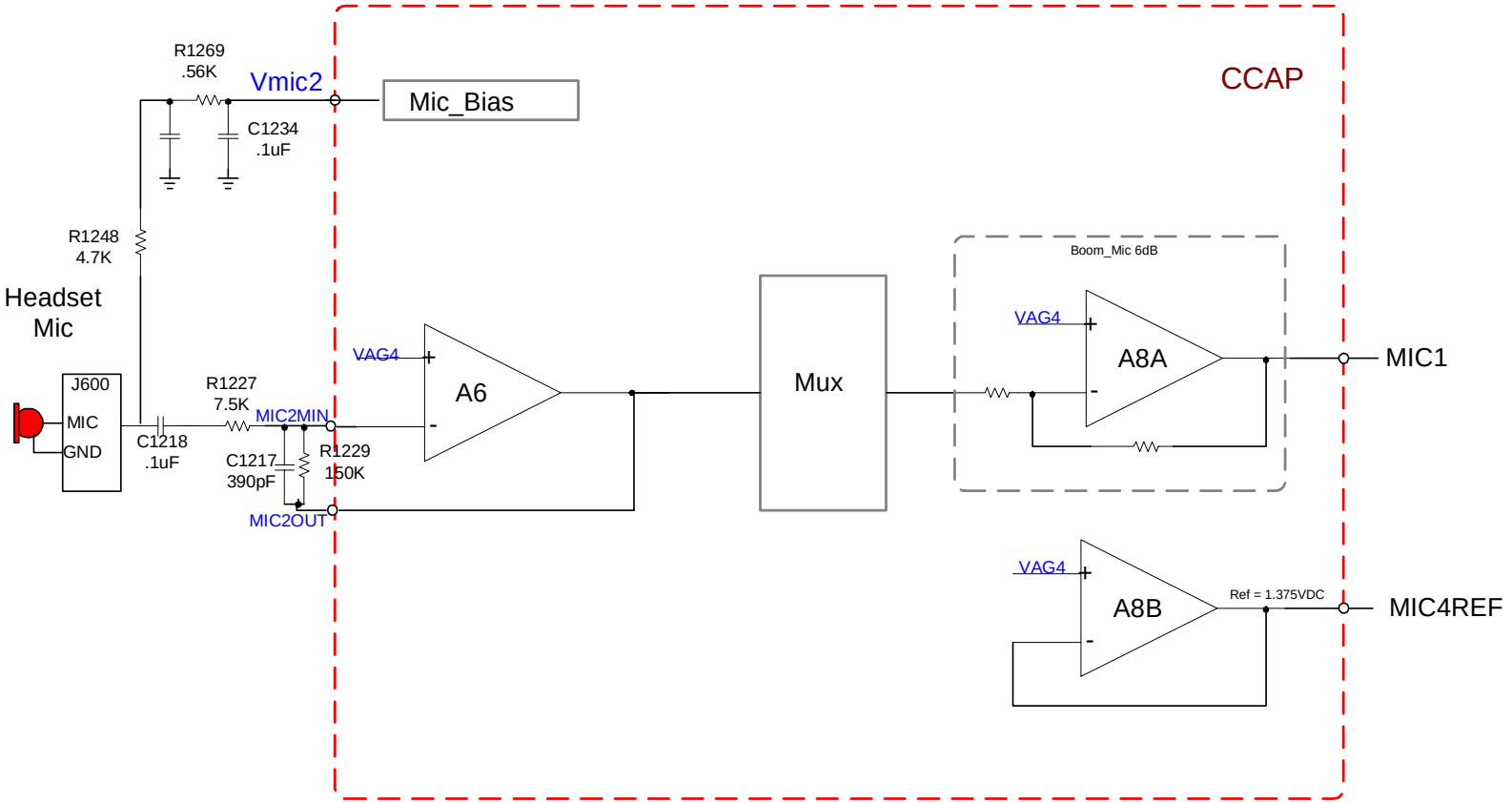
Internal Microphone CCAP Gain Lineup



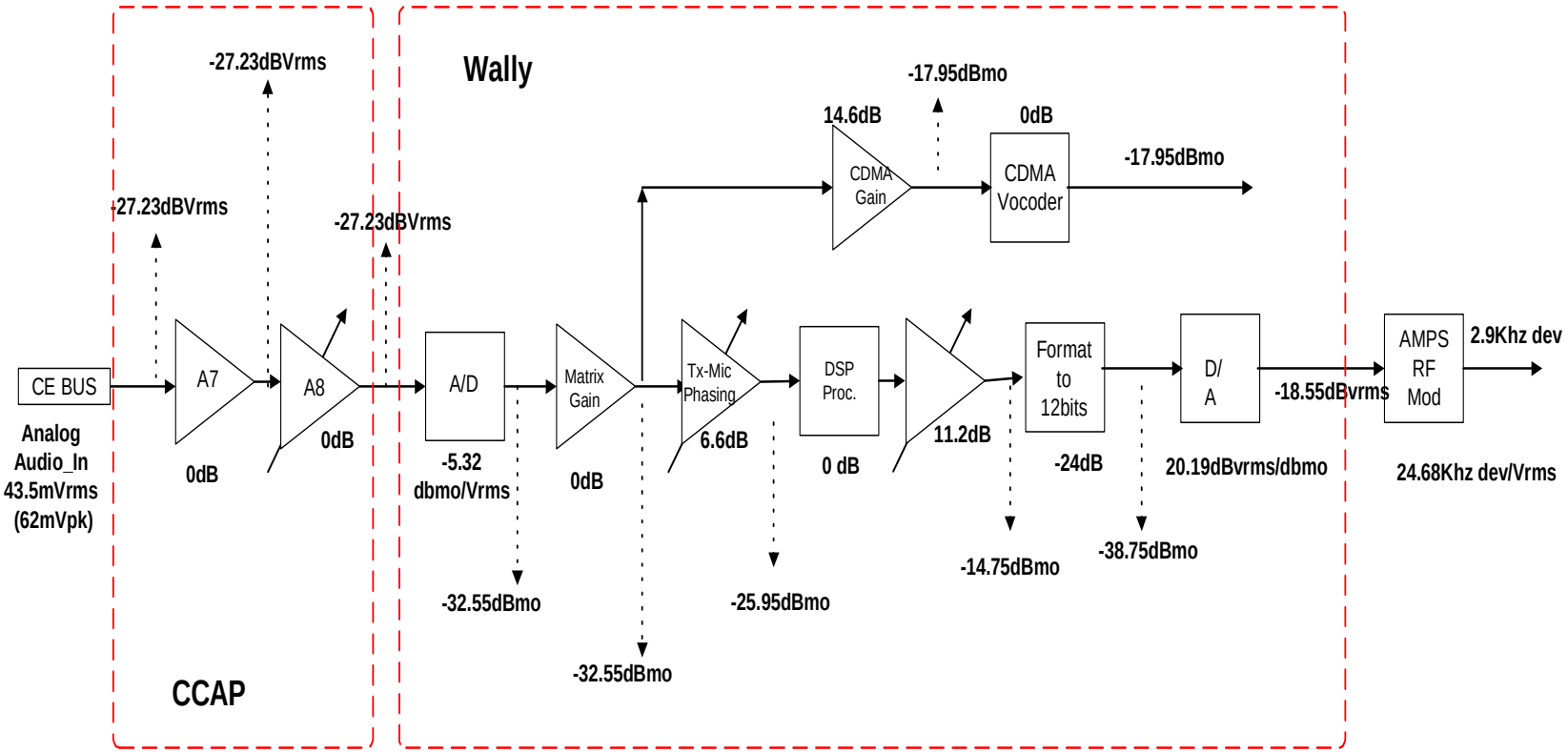
Headset Microphone Gain Lineup



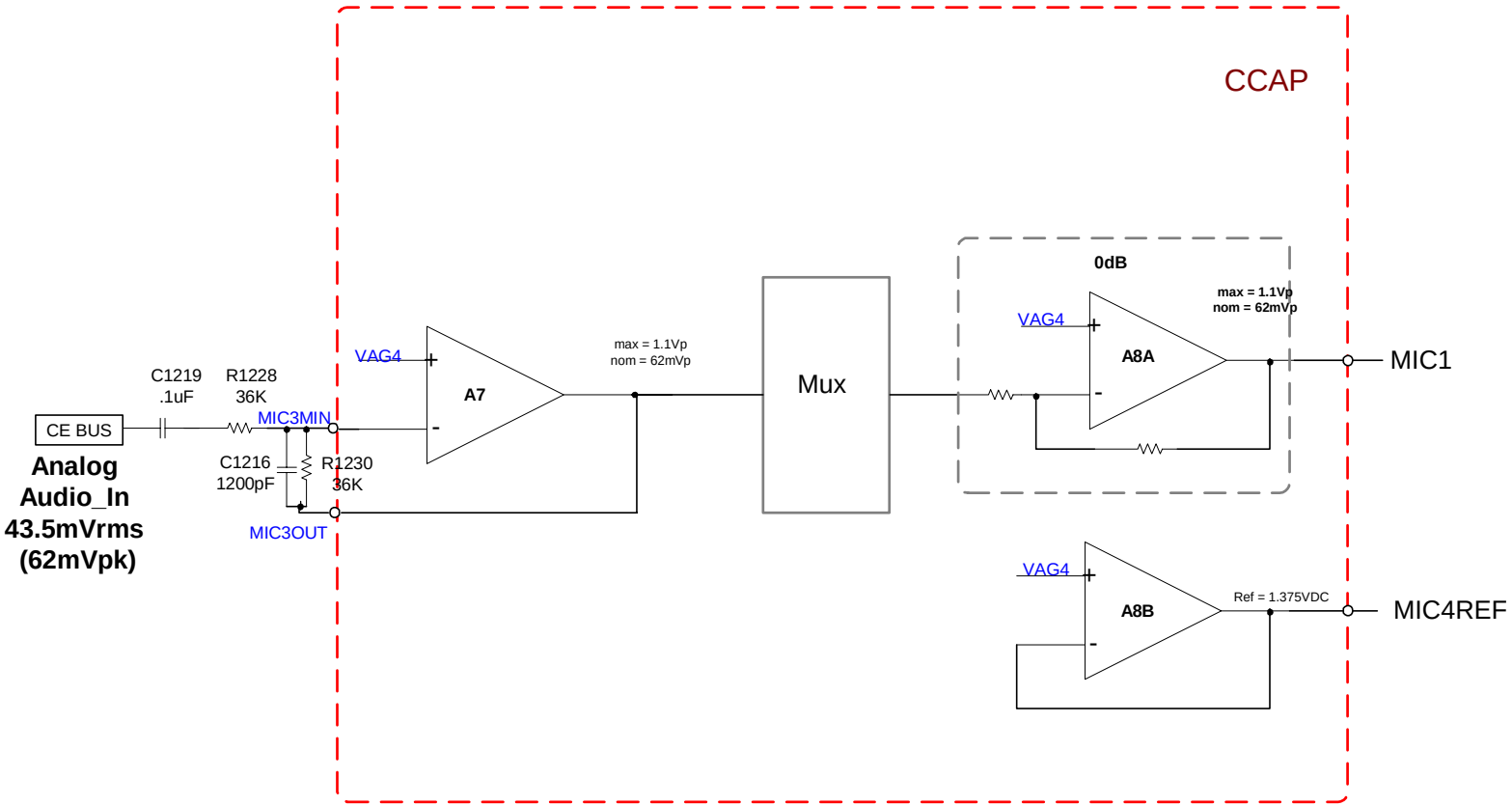
Headset Microphone CCAP Gain Lineup



External Microphone Gain Lineup



External Microphone CCAP Gain Lineup

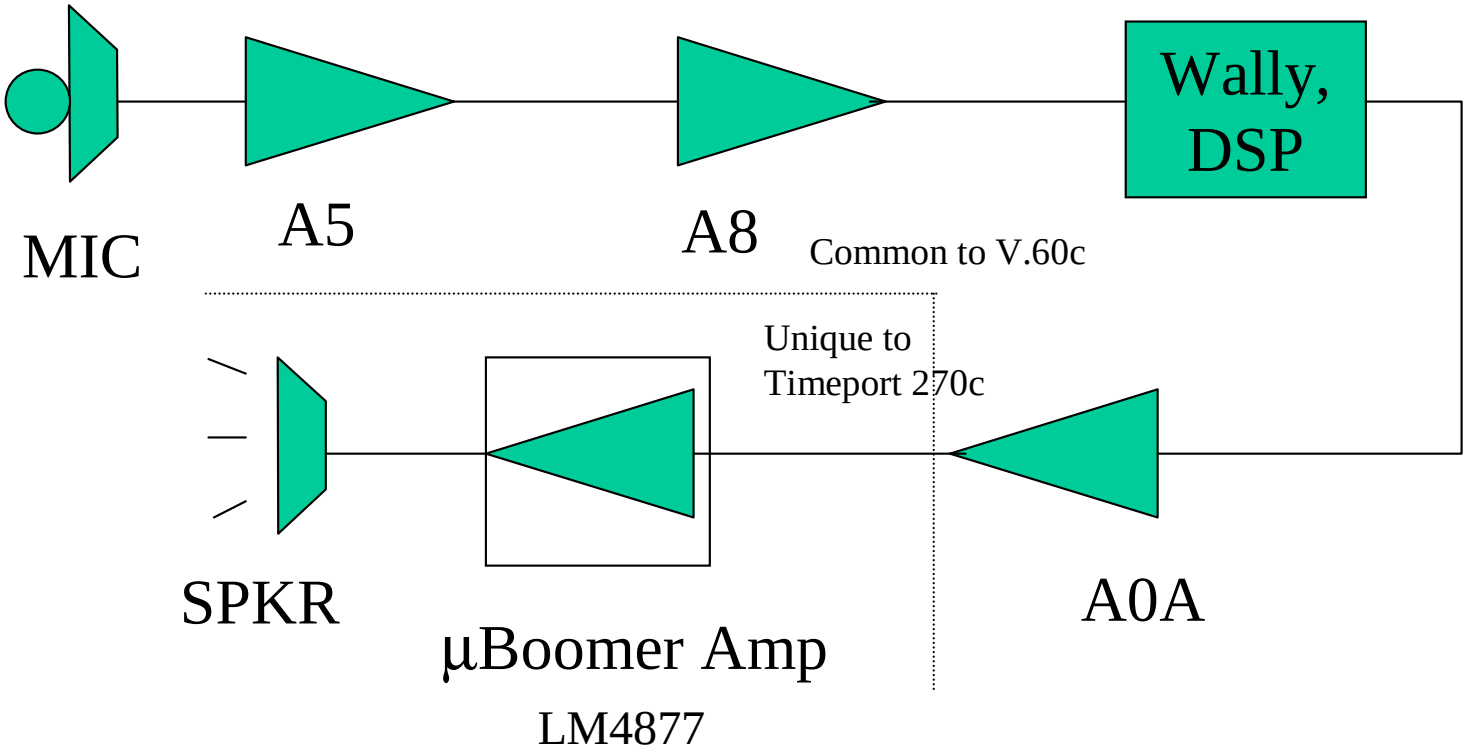


CDMA Timeport 270c SPEAKERPHONE

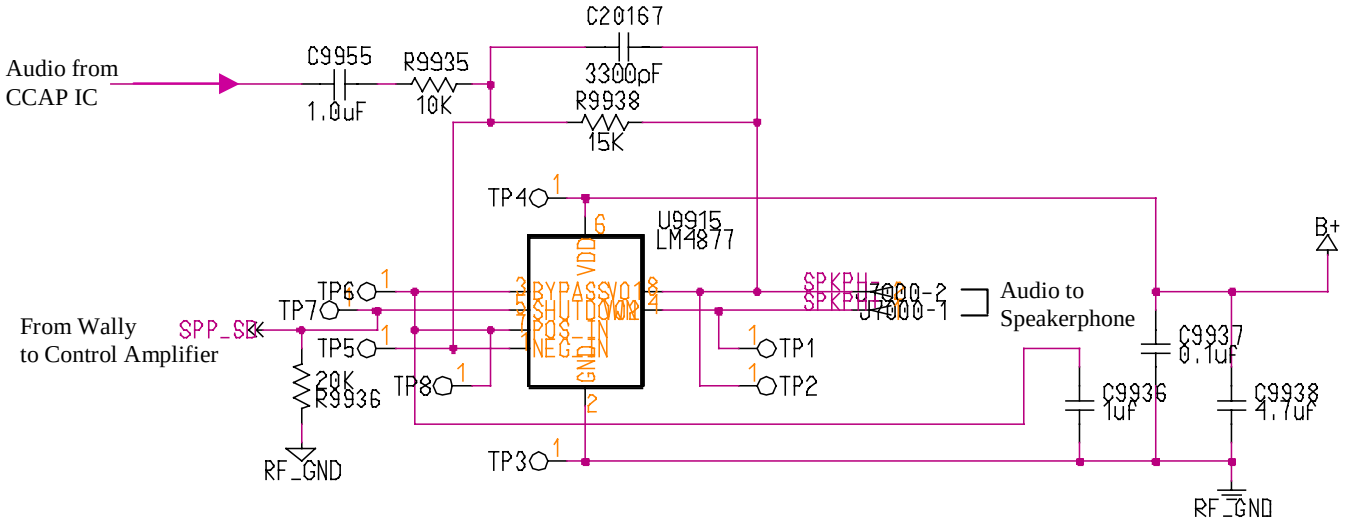
Speakerphone Theory of Operation

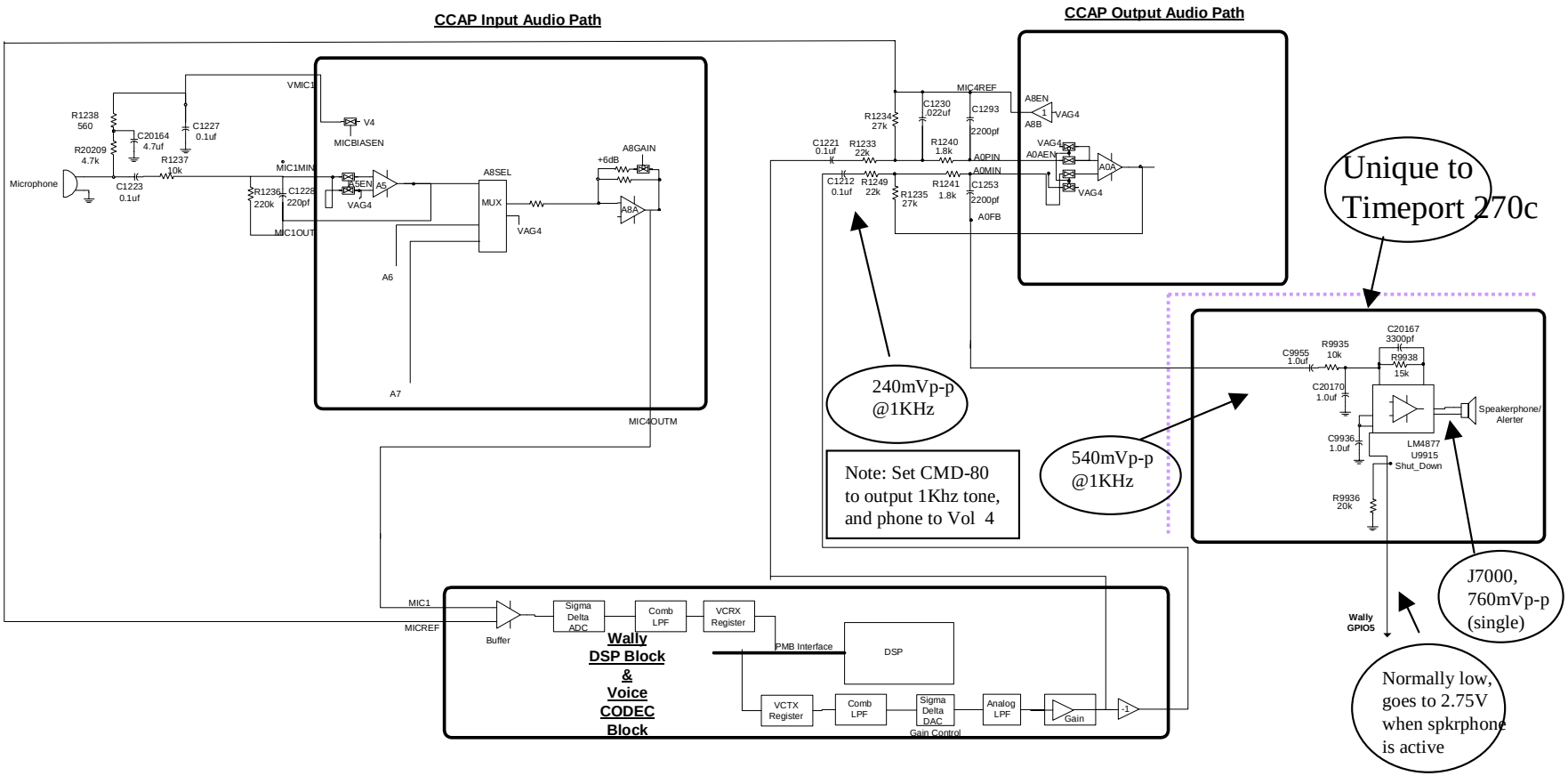
- Speakerphone will function only while on a call (safety reasons): Engage phone on a CDMA or AMPS call and activate by pressing speakerphone button.
- Speakerphone TX path (talking into Mic) is using same microphone except different input Gain due to distance between user and phone. (2 feet typical)
- Speakerphone Output path is unique from Wally output (Actually A0A output from CCAP) and uses its own external amplifier (Boomer Amp) to drive an 8 ohm built in speaker to as high as 1/2 Watt.
- Unlike V.60c (which has a separate Alert), Timeport 270c uses Speakerphone as an Alert (ringer).

SpeakerPhone Path



Timeport 270c CDMA Speakerphone External Amplifier





Panther CDMA Spkeakerphone path Block Diagram

Possible symptoms of Speakerphone Mal-function

- J7000 is not connected
- Defective Spkr (typical 8Ω impedance)
- µBoomer Reflow / BGA Alignment to pads
- Bad CCAP / A0A Not enabled
- No trigger from Wally to Pull GPIO 5 high (GPIO low is Boomer shutdown mode)
- Routing (Spkrphone circuitry is actually located on RF side)

Quick-Check

- Check if Alerter is working - Do you hear Ring?
  When you change ringer type from MENU, it sends out a test ring - does it ring? No..Continue with Speakerphone debug.

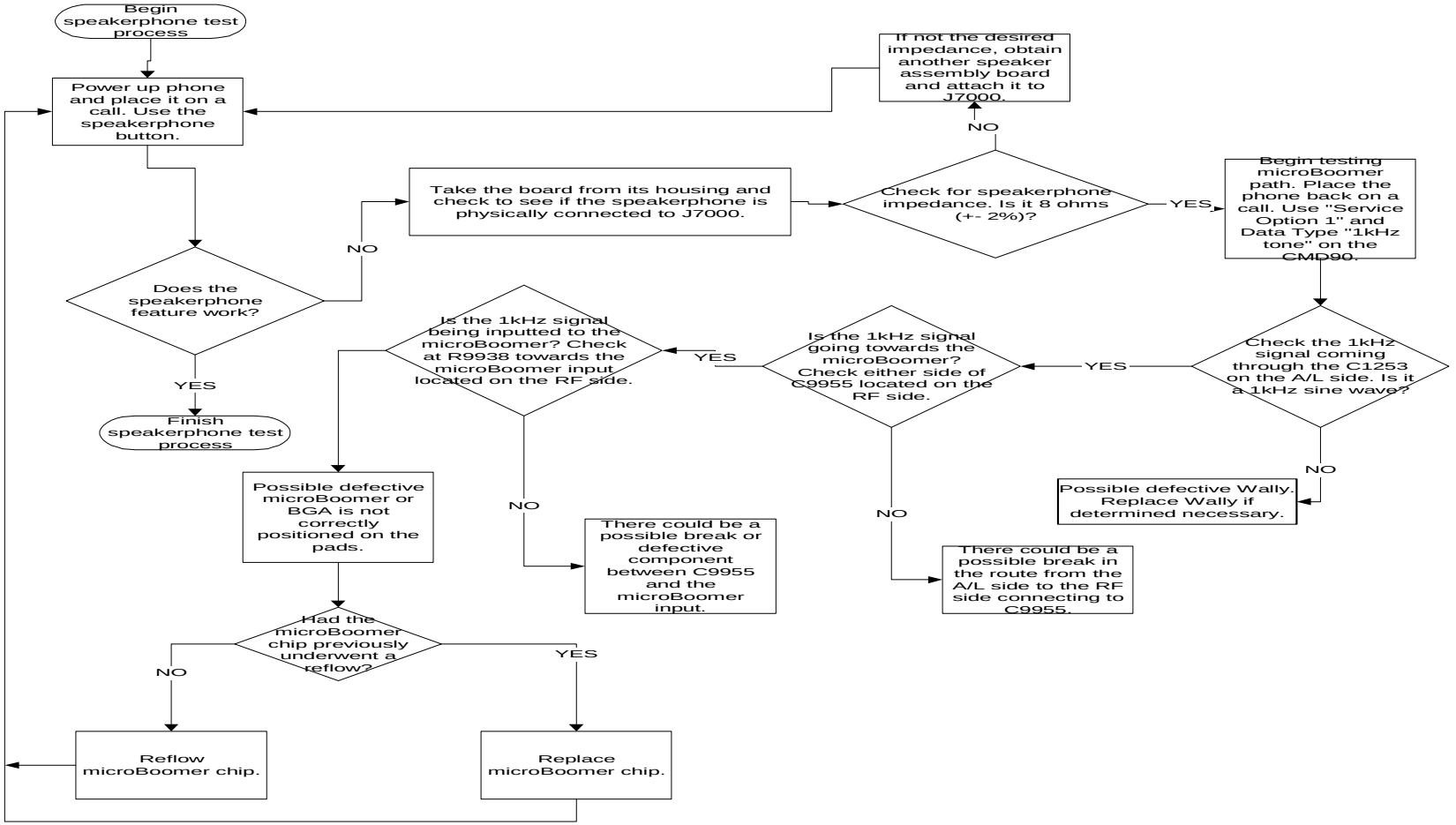
- Setup Phone on a Call with 1kHz tone output from CMD80, without activating speakerphone, listen to it on receiver.
  Is there a tone? Yes..Continue with Speakerphone debug.
  (No means something in Wally or other problem)

- Open the phone and check to see if Speakerphone assembly is connected. J7000 connector from Speaker to Main board may be left unconnected.

List of Equipment/Setup

- CMD-80 Base-station Simulator
  (Setup: Call from CMD-80
  Output 1Khz tone - select
  Receiver quality, select
  Audio Meas., select Harm.
  Distortion - this will generate
  1Khz tone)
- Set Phone Spk On, Volume at 4 bars
- Textronics 754D scope or equivalent
- DMM

Detail Debug Flowchart



TROUBLESHOOTING: The Internal speaker

General Approach: goal in troubleshooting is to quickly narrow-down the possibilities to isolate a failure to a single faulty component. This is especially important before deciding to replace a multi-pin IC, filter, or other component that is difficult or risky to replace. Sometimes the problem will be visually obvious, for example: a cold solder joint, cracked chip, tombstone, etc. Other times, it will be necessary to measure a voltage

No Receive Audio.

(Test commands: Suspend, Internal speaker, Volume level, Alert tone)

300000090000003600010000000

3000000A000000060002000022000

300000090000000500010000003

3000000B000000000003000000002A

• Send The above test commands to generate a alert tone to the speaker. If there is no audio, Probe J3000 pin 15 and 16. If the signal is there yet no audio then check J3000 and the flex and the speaker.

• No signal at the J3000 Pin 15 and 16. Check signal at C1221 and c1212.

  • If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with internal CCAP speaker amplifiers.

  • If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

Tones present and but no voice.

Amps mode.

(Test commands: Suspend, Amps mode, RF channel 100, Internal speaker, Volume level 3, compander off, side tone off)

30000009000000360001000000
30000009000000A0001000000
3000000B000000140003000006400
3000000A00000006000200002201
30000009000000050001000003
30000009000000090001000000
30000009000000030001000004

• Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe Wally J16 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-19mVrms, If there is no signal is coming out of the Audio out M/P then check the wally. Other wise proceed to CCAP(similar to section 1.6).

CDMA mode.

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic (suspend,cp Mode CDMA, AUD_LPB, Handset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003200

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally audio out M/P.

- If no signal then check the wally (provided Wally Mic1 has the same signal as the CE bus audio in).
- If there is signal(+/-19mVrms), then proceed with section 1.6.
- If there is signal (+/-19mVrms), also tone can be heard on the speaker. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. If there is no tone it could be bad Wally CSP or RF section.

TROUBLESHOOTING: The Headset speaker

(Prior to trouble shooting make sure headset is detecting properly. Check the Headset jack or wall Int1(pin E8) or R1257.

No Receive Audio.

(Test commands: Suspend, Headset speaker, Volume level, Alert tone)

300000090000003600010000000

3000000A00000006000200004600

300000090000000500010000003

3000000B000000000003000000002A

• Send The above test commands to generate a alert tone to the headset speaker. If there is no audio, Probe J600 pin 3. If the signal is there yet no audio then replace J600.

• No signal at the J600 Pin 3, Check signal at C1221 and c1212.

  • If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with A0A,A0B,A3 CCAP amplifiers.

  • If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

Tones present and but no voice.

Amps mode.
(Test commands: Suspend, Amps mode, RF channel 100, Headset speaker, Volume level 3, compander off, side tone off)
300000090000003600010000000
300000090000000A0001000000
3000000B000000140003000000 6400
3000000A00000006000200004601
300000090000000500010000003
300000090000000900010000000
300000090000000300010000004

• Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe Wally J16 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-19mVrms, If there is no signal is coming out of the Audio out M/P then check the wally. Other wise proceed to CCAP(similar to section 2.2).

CDMA mode.

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic (suspend,cp mode CDMA, AUD_LPB, Headset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003600

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally audio out M/P.

- If no signal then check the wally(provided Wally Mic1 has the same signal as the CE bus audio in).
- If there is signal(+/-19mVrms), then proceed with section 2.2
- If there is signal (+/-19mVrms), also tone can be heard on the speaker. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. If there is no tone it could be bad Wally CSP or RF section.

TROUBLESHOOTING: The CE Bus Audio_Out speaker

No Receive Audio on the Hands free Devices.
(Prior to trouble shooting make sure Accessories are detecting properly. If not see the appropriate section for trouble shooting)
(Test commands: Suspend, Headset speaker, Volume level, Alert tone)
300000090000003600010000000
3000000A00000006000200003400
300000090000000500010000003
3000000B0000000000030000000002A

• Send The above test commands to generate a alert tone to the Audio_out pin(J1000 pin15). If the signal is there yet no audio, may be a faulty CE Bus connector.

• No signal at the J1000 Pin 15, Check signal at C1221 and c1212.
  • If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with A0A,A1 and A4 CCAP amplifiers.
  • If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

Tones present and but no voice.

Amps mode.

(Test commands: Suspend, Amps mode, RF channel 100, External speaker, Volume level 3, compander off, side tone off)

300000090000003600010000000
300000090000000A0001000000
3000000B0000001400030000006400
3000000A00000006000200003401
300000090000000500010000003
300000090000000900010000000
30000009000000030001000004

• Send The above test commands set the HP8924 to analog RX test mode. Set the channel to 100 and deviation of 2.9Khz with 1004Hz tone. Probe Wally J16 pin to see if the level coming out of the DISC of the ZIF/SYN. The level should be around 110mVrms. With 110mV to the DISC of the Wally, the Audio out M/P should measure around +/-17mVrms, If there is no signal is coming out of the Audio out M/P then check the wally. Other wise proceed to CCAP(similar to section 3.2).

CDMA mode.

a) Send the following test commands.

13K Loop back with internal speaker and internal Mic (suspend,cp mode CDMA, AUD_LPB, Headset path UN-muted, Aud_Lvl 3)

300000090000003600010000000

300000090000000A0001000001

300000090000000400010000003

3000000A00000006000200003400

300000090000000500010000003

b) Inject 43.5mVrms, 1Khz signal to the CE bus analog audio check the Wally audio out M/P.

- If no signal then check the wally(provided Wally Mic1 has the same signal as the CE bus audio in).
- If there is signal(+/-17mVrms), then proceed with section 2.2.
- If there is signal (+/-17mVrms), also tone tone is present on the CE bus audio. Then place the radio into call with base station test set(HP8924) with service option 1 with 1Khz tone enabled. Route the audio through If there is no tone it could be Wally CSP of RF section is bad.

TROUBLESHOOTING: The Alert

No Alert tone or low Alert tones
(Test commands: Suspend, Headset speaker, Volume level, Alert tone)
300000090000003600010000000
3000000A000000060002000023 00
300000090000000500010000007
3000000B00000000000300000002A

• Send The above test commands to generate a alert tone to the Alert. If the signal is on the pin one of the Alert, but no audible alert low alert inspect the alert connections and Check pin 2 of the alert for the DC voltage. Otherwise replace the Alert.

• No signal at the Pin one of the Alert, Check signal at C1221 and c1212.
  • If signal is coming out of audio out M/P, then check the CCAP and the parts that associated with A0A,A1 and A2 CCAP amplifiers.
  • If no signal is present at C1221 and c1212 then either defective Wally or cold solder missing power supply to the Wally.

TROUBLESHOOTING: Internal Microphone

No Tx audio with Internal Microphone.

CDMA Mode:

• Check the microphone and J5000 for proper connection. Replace the microphone and try to see if the problem go away. Other wise send the following test commands.

• 13K Loop back with internal speaker(suspend,cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
300000090000003600010000000
300000090000000A0001000001
300000090000000400010000003
3000000A00000006000200002200
300000090000000500010000003.

• This is a voice loop back call every thing said into the internal microphone ca be heard back on the internal speaker. If this test is passed originate CDMA voice loop back call with base station simulator and voice can't be heard while talking in to the microphone then it could be a bad Wally or it could be the modulator.

AMPS Mode:

Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.

• Press a Key and monitor the FM deviation. It should be around 9.5KHz.

Internal Microphone(contd.)

•If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.

•If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.

Tx Audio(suspend, cp mode amps 800, channel 100, audio path internal microphone, compander on, side tone off, power level 2, carrier on)

300000090000003600010000000
300000090000000A0001000000
3000000B0000001400030000006400
3000000A00000006000200002102
300000090000000900010000000
300000090000000300010000004
300000090000002D0001000003
300000090000000700010000001

• inject 6.2mVpk signal to the J5000 pin1 and monitor the Mic1out of the CCAP it should be around 62mvpk. If not check the parts that associated with amplifier A5 or it could be bad amplifier. If the output at the Mic1out is 62mVpk, then check the mic1 of the CCAP. If no or low output at the mic1 then re-flow or replace the CCAP.

• If the input to the Wally is good and check the FM output of the Wally(Pin F14) it should be around 168mVpk. If there is no output then re-flow or replace the Wally.

TROUBLESHOOTING: Headset Microphone

No Tx audio with Headset Microphone.

CDMA Mode:

• Check the microphone and J600 for proper connection. Send the following test commands.

• 13K Loop back with internal speaker(suspend, cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
300000090000003600010000000
300000090000000A0001000001
300000090000000400010000003
3000000A000000060002000046000
300000090000000500010000003.

• This is a voice loop back call, every thing said into the Headset microphone can be heard back on the headset speaker. If this test is passed originate CDMA voice loop back call with base station simulator and voice can't be heard while talking in to the microphone then it could be a bad Wally or it could be the modulator/demodulator.

AMPS Mode:

Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.

• Press a Key and monitor the FM deviation. It should be around 9.5KHz.

Headset Microphone(contd.)

•If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.

•If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.

Tx Audio(suspend, cp mode amps 800, channel 100, audio path Headset microphone, compander on, side tone off, power level 2, carrier on)

300000090000003600010000000
300000090000000A0001000000
3000000B0000001400030000006400
3000000A00000006000200004102
300000090000000090001000000
300000090000000030001000004
300000090000002D0001000003
300000090000000070001000001

• inject 6.2mVpk signal to the J5000 pin1 and monitor the Mic2out of the CCAP it should be around 124mvpk. If not check the parts that associated with amplifier A6 or it could be bad amplifier. If the output at the Mic2out is 124mVpk, then check the mic1 of the CCAP. If no or low output(should be around 248mVpk) at the mic1 then re-flow or replace the CCAP.

• If the input to the Wally is good and check the FM output of the Wally(Pin F14) it should be around 336mVpk. If there is no output then re-flow or replace the Wally.

TROUBLESHOOTING: External Microphone

No Tx audio with Headset Microphone.

CDMA Mode:

• Check the microphone and J1000 pin 15 for proper connection. Send the following test commands.

• 13K Loop back with internal speaker(suspend, cp mode CDMA, AUD_LPB, Handset path, Audio_Level 3)
300000090000003600010000000
300000090000000A0001000001
300000090000000400010000003
3000000A000000060002000034 00
300000090000000500010000003.

• This is a voice loop back call, Inject 43.5mVrms in to the External microphone and measure J1000 pin 16. The level should be around 75mVrms. If this test is passed originate CDMA voice loop back call with base station simulator and no or low signal is received then it could be a bad Wally or it could be the modulator/demodulator.

AMPS Mode:

Originate Analog call with HP8924 then switch to analog DUPLEX SCREEN.

• Press a Key and monitor the FM deviation. It should be around 9.5KHz.

External Microphone(contd.)

•If there is no deviation, monitor the FM output of the Wally with scope. The peak level should be around 530mVpk. If no signal is present, replace Wally. If Signal is there, but no deviation, proceed with modulator trouble shooting section.

•If the deviation is correct, then end the call and send the following test commands. And switch HP8924 screen to analog Tx test with RF channel set to 100.

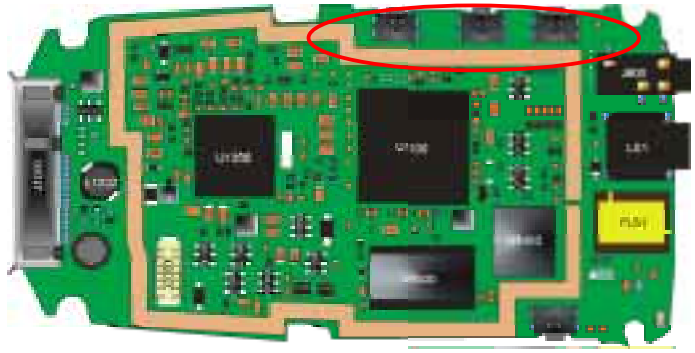
Tx Audio(suspend, cp mode amps 800, channel 100, audio path Headset microphone, compander on, side tone off, power level 2, carrier on)

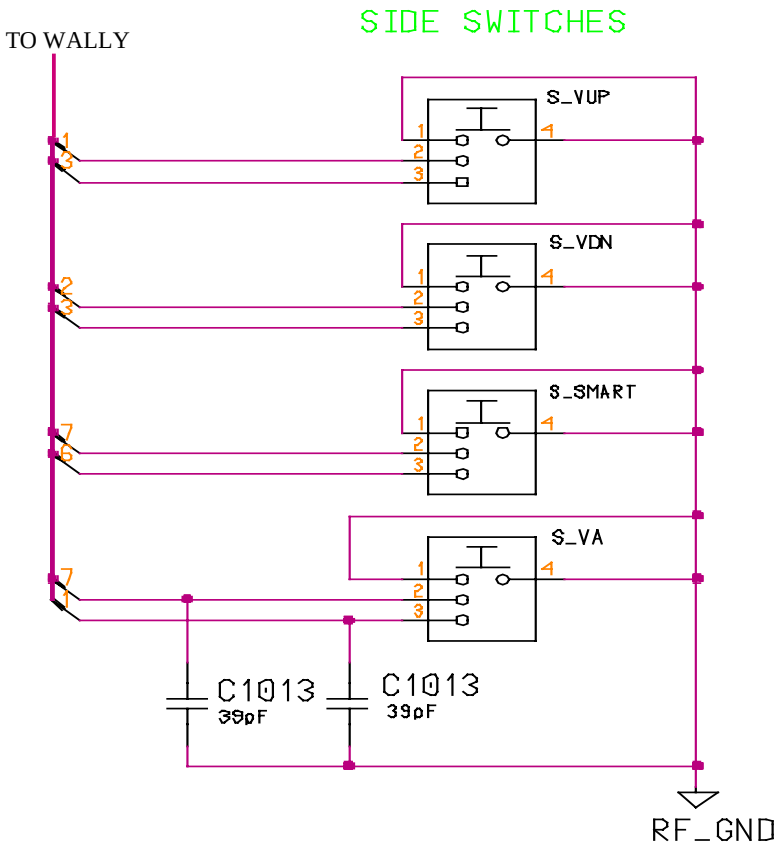
300000090000003600010000000
300000090000000A0001000000
3000000B0000001400030000006400
3000000A00000006000200003102
300000090000000090001000000
300000090000000030001000004
300000090000002D0001000003
300000090000000070001000001

• inject 62mVpk signal to the J5000 pin1 and monitor the Mic3out of the CCAP it should be around 62mvpk. If not, check the parts that associated with amplifier A7 or it could be bad amplifier. If the output at the Mic3out is 62mVpk, then check the mic1 of the CCAP. If no or low output(should be around 62mVpk) at the mic1 then re-flow or replace the CCAP.

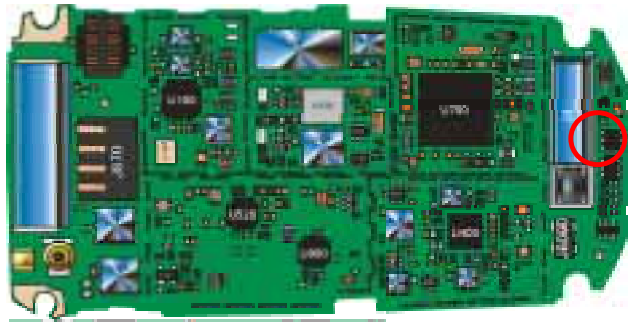
• If the input to the Wally is good and check the FM output of the Wally(Pin F14) it should be around 168mVpk. If there is no output then re-flow or replace the Wally.

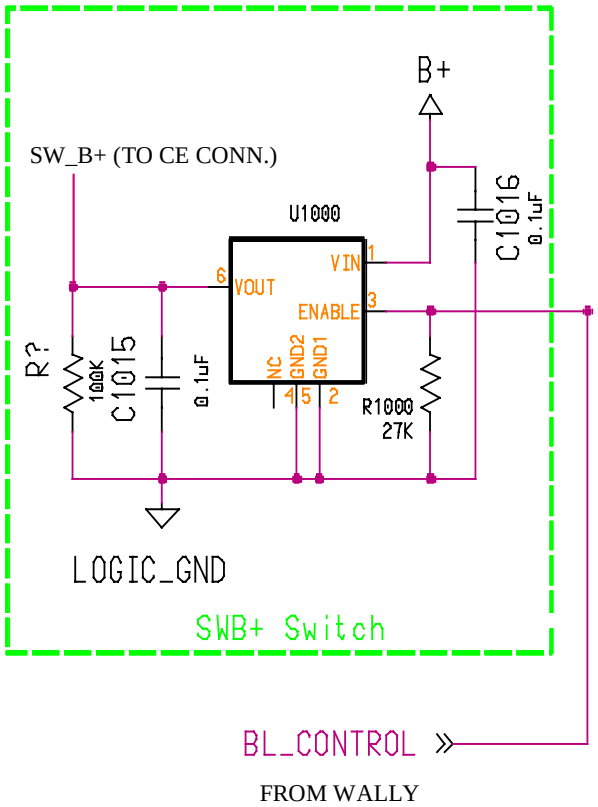
Side Switches





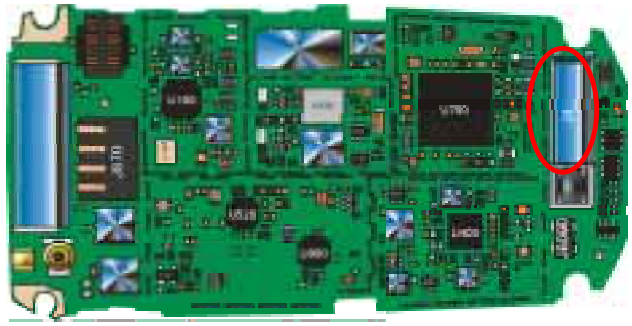
SW_B+ Switch

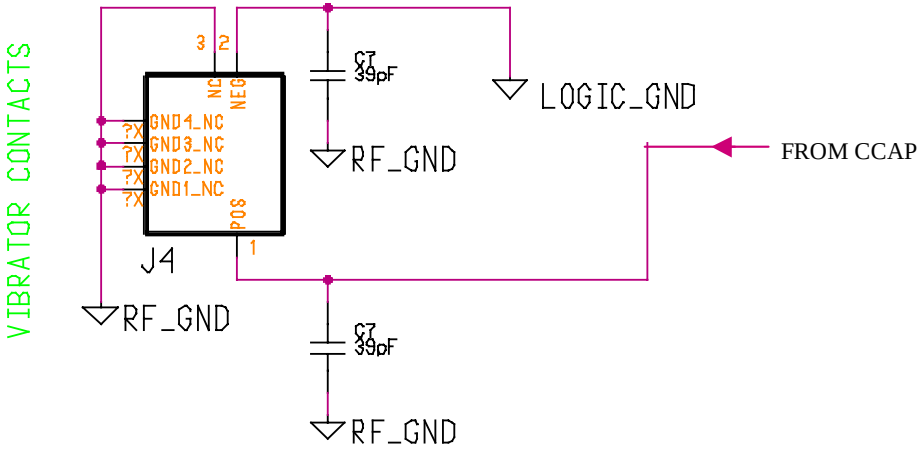




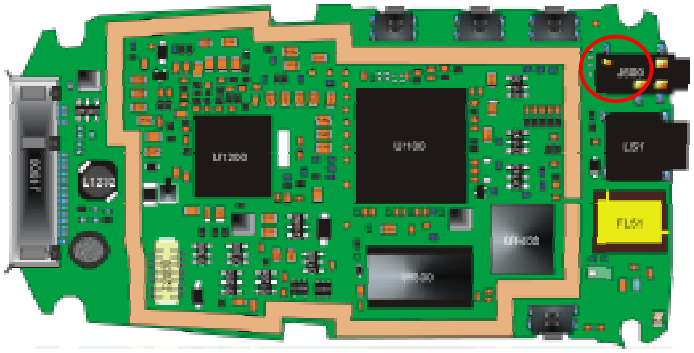
* Accessories like Blue tooth, Speaker phone, FM radio is powered by SW_B+
* U1000 switches B+ to SW_B+ when Wally turns it on through BL_Control going high.

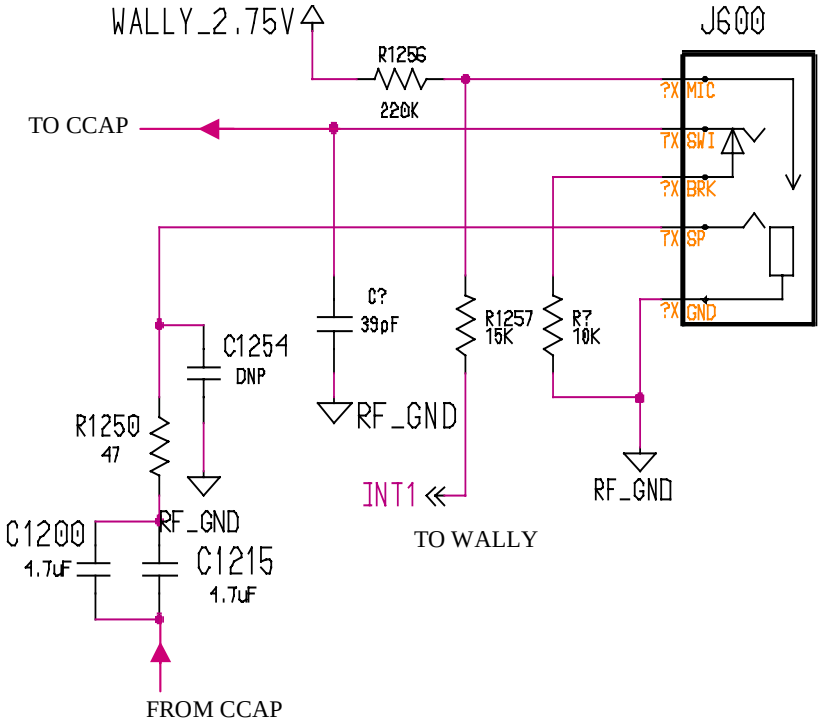
Vibrator



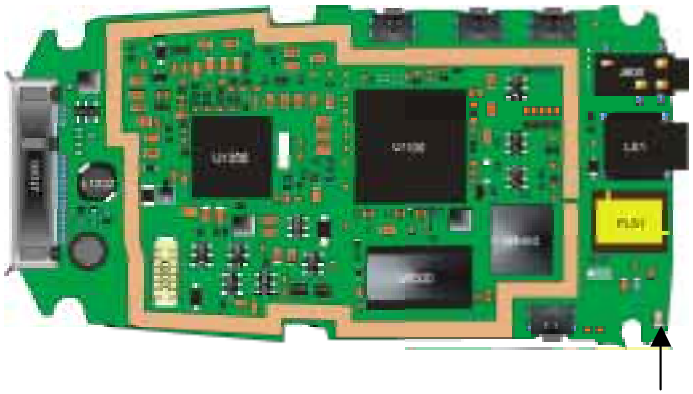

VIBRATOR CONTACTS
3
2
NC
NEG
GND4_NC
GND3_NC
GND2_NC
GND1_NC
POS
1
J4
C7
39pF
C7
39pF
LOGIC_GND
RF_GND
RF_GND
RF_GND
FROM CCAP

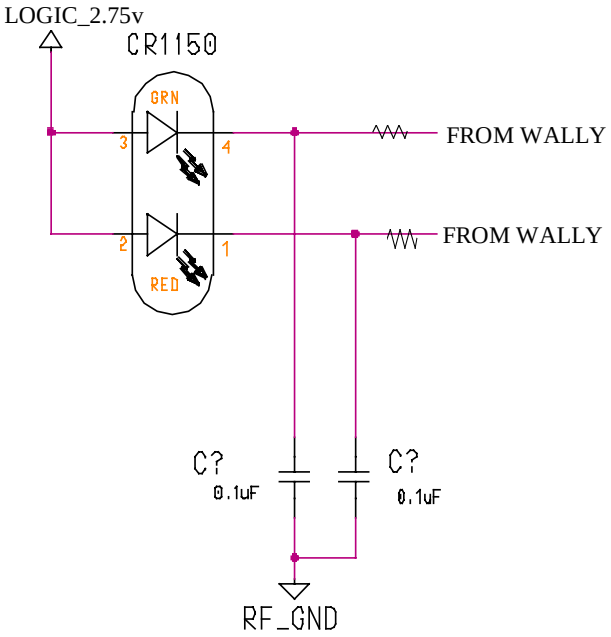
Headset Jack





LED





* WALLY PROVIDES GND

V.120c
FM Radio Headset Overview

- Phone will detect the state of the Option pins and the dumb select pins when the external device is connected to the phone
- After the FM headset has been detected and identified, the Dumb Select lines 0 & 1 are set as FM Enable and Clock.
- Wally will communicate with the external FM headset via the 5 pins, namely: FM_DATA, FM_CLK, FM_EN, Mute* and Send/End.
- FM_DATA provides a bi-directional communication between the phone and the external FM radio. FM_CLK is the clock signal is driven by Wally.
- To read from the FM IC, FM_EN is pulled LOW. To write to the FM IC, FM_EN is pulled HIGH.
- Wally will be able to command the FM IC to perform the following function:
  1)To tune receive frequency of the FM IC to a pre-set station.
  2)To perform Up/Down SEEK command to find the next available headset station that exceed a programmable signal strength threshold.
  3) To be able to read from the FM IC the current frequency it is tuned to.
  4) Send Mute* signal
- SEND/END button, Audio In&Out.

• Picture of FM Radio headset.

Trouble Shooting (FM Radio Headset)

- **Step 1**: When the headset is inserted into the phone, 'RADIO' message appeared at the lower right side of LCD. Otherwise, the headset is not detected by the phone.

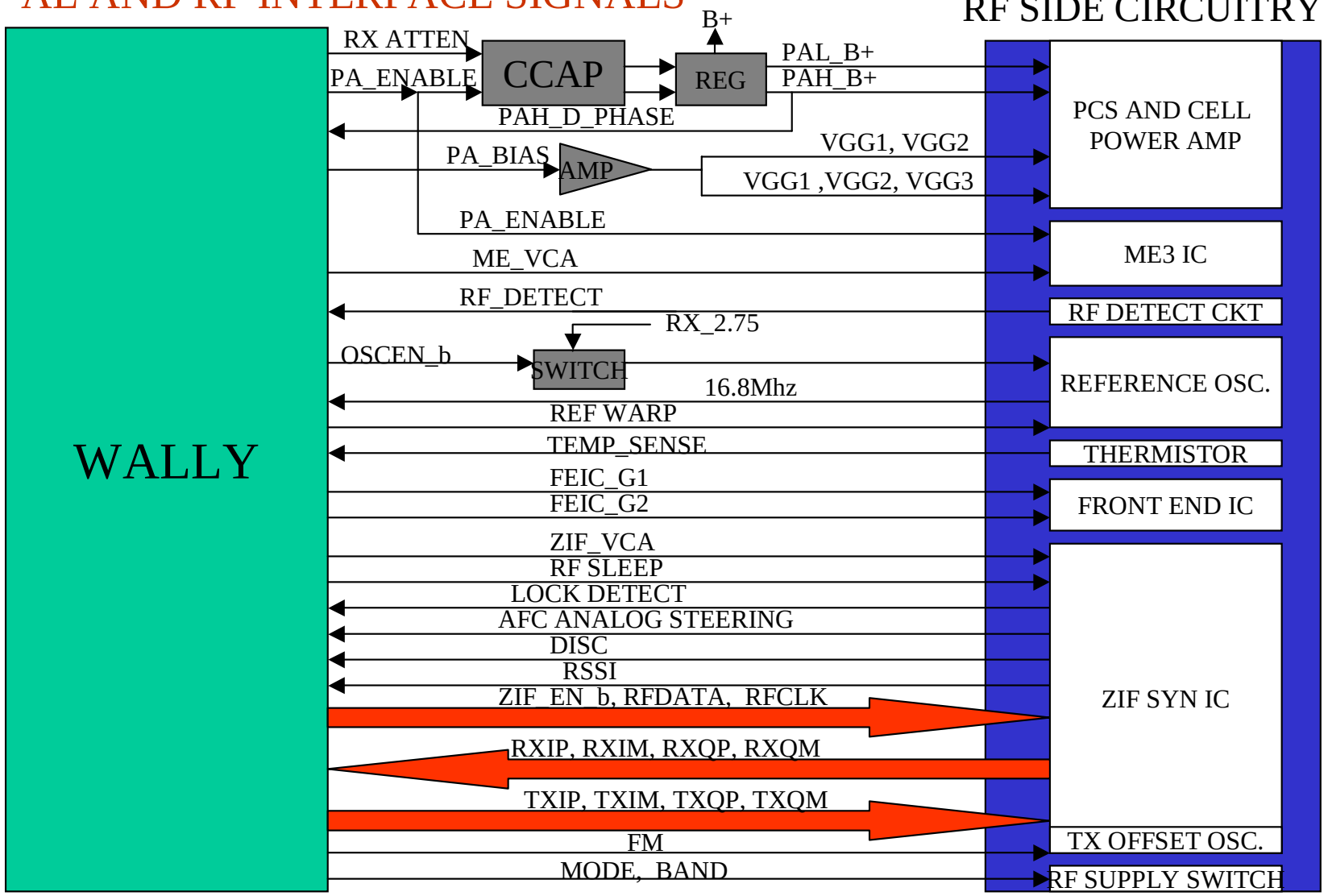
- **Step2** : With no detection, check Option 1, 2 '10' and DUMB_SEL0, 1, 2 be '110' of CE connector. If the logic level is correct, Wally problem.

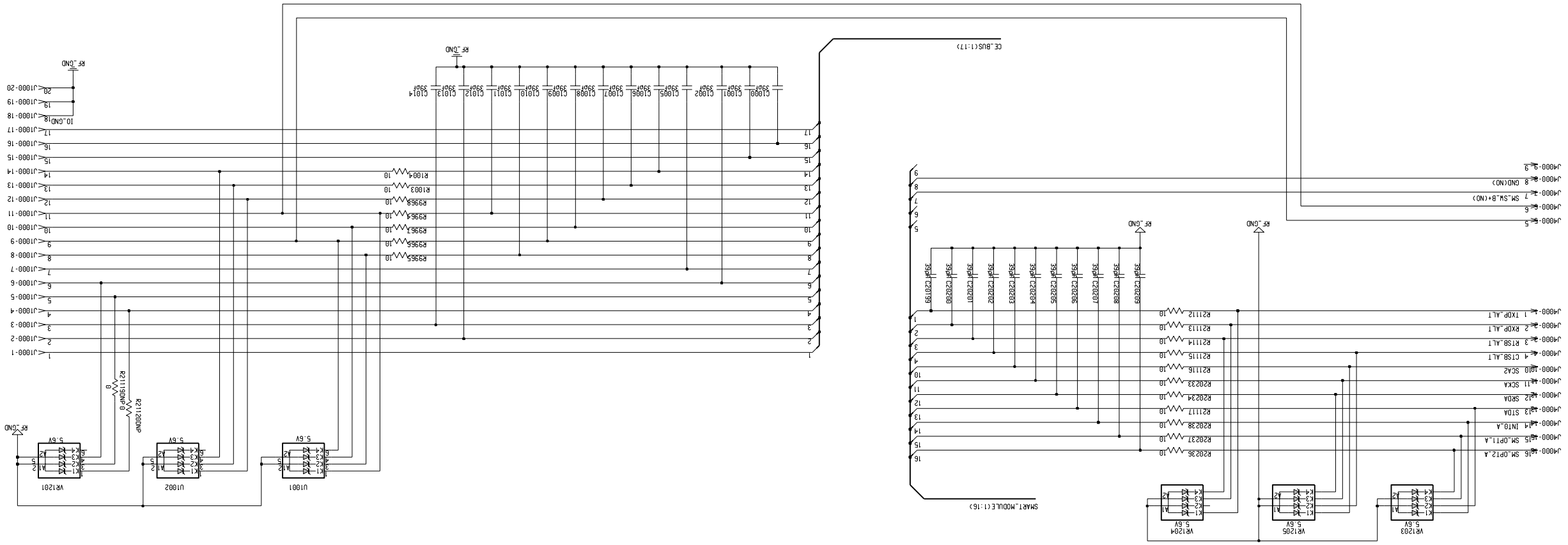
- **Step3** : For checking CH tuning. If hard to be tuned or generating noise, check the signals of SWB+(7), FM_Data(8), FM_CLK(11) and FM_EN(12) or weak FM signal strength of the phone. If the timing and level of the signals have some problem, Wally problem.

- **Step4** : If the signals are correct then change the headset. And check Step3 again.

- **Step5** : Incoming call while listening of FM, push SEND & END button and confirm to hear the call thru earphone. , check Audio In/Out signals(Pin 16 &15) and Send/End line(Pin 6).

AL AND RF INTERFACE SIGNALS




CE_BUS(1:17)
SMART_MODULE(1:16)
RF_GND
BATT+
J830
CONTACT
POS THERMOUT
-61HEMOUT2
BATT_SERIAL_DATA
BATT_TEMP
C1000 39pF
C1001 39pF
C1002 39pF
C1005 39pF
C1006 39pF
C1007 39pF
C1008 39pF
C1009 39pF
C1010 39pF
C1011 39pF
C1012 39pF
C1013 39pF
C1014 39pF
R1004 10
R1003 10
R9958 10
R9956 10
R9957 10
R9955 10
R9954 10
J4000-1 SM_SW_B+(ND)
J4000-2 GND(ND)
J4000-3
J4000-4
J4000-5
J4000-6
J4000-7
J4000-8
J4000-9
J4000-10 TXDP_ALT
J4000-11 RXDP_ALT
J4000-12 RTSB_ALT
J4000-13 CTSB_ALT
J4000-14 SCL2
J4000-15 SCLA
J4000-16 SDA2
J4000-17 SDLA
J4000-18 IN10_A
J4000-19 SM_OPT1_A
J4000-20 SM_OPT2_A
C2020 39pF
C2021 39pF
C2022 39pF
C2023 39pF
C2024 39pF
C2025 39pF
C2026 39pF
C2027 39pF
C2028 39pF
C2029 39pF
C2030 39pF
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
R2111 10
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R2111 10
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R2111 10
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R2112 0
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J1000-1
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J1000-10
J1000-11
J1000-12
J1000-13
J1000-14
J1000-15
J1000-16
J1000-17
J1000-18 IO_GND
J1000-19
J1000-20
VR1201 5.6V
U1002 5.6V
U1001 5.6V
VR1204 5.6V
VR1205 5.6V
VR1203 5.6V