VS600 L1~L2
Service Training

voxtel®
THE ART OF COMMUNICATION

Agenda

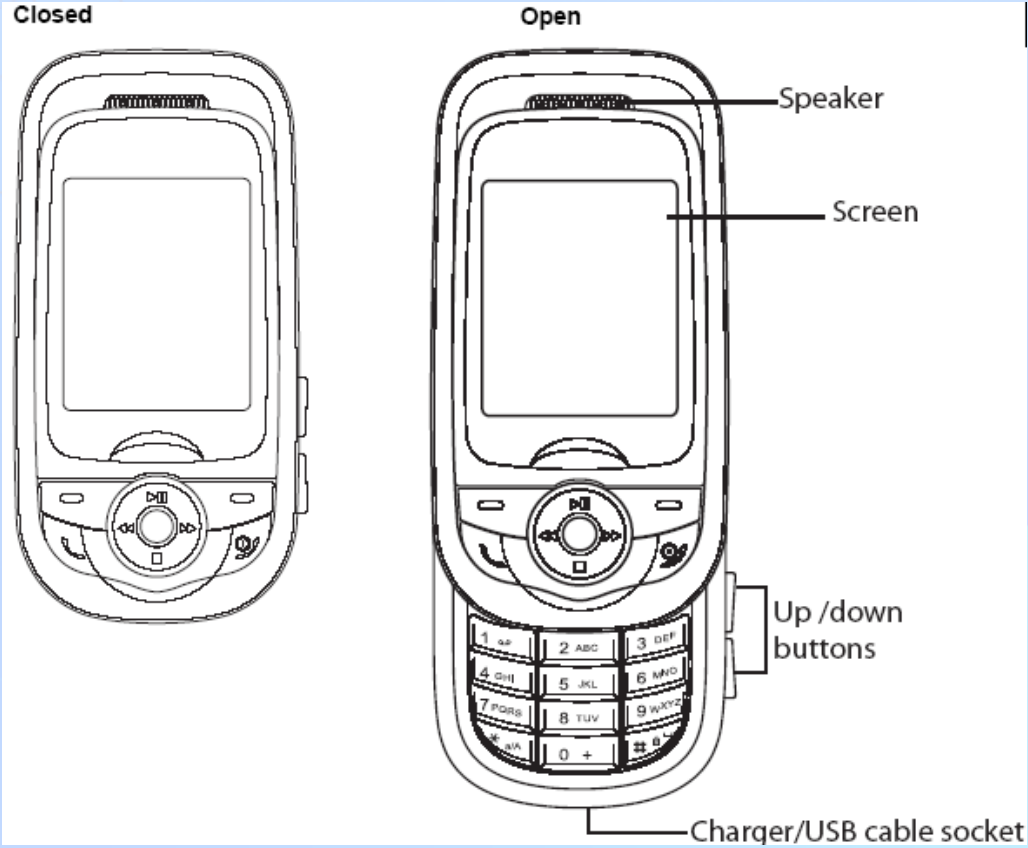
- Product Specification
- Disassembly / Assembly Procedure
- Software Download Procedure
- Troubleshooting

Product Spec

- Communications:
  - 900/1800/1900 GPRS Class 10
- Form factor
  - Semi-Auto Slider
  - Dimension:86.8x44.5x23.9
- Display & Camera
  - 1.8 ” 176x220 262K TFT-LCD
  - 1.3M CMOS Camera
- Messaging & Java
  - SMS/EMS/MMS 1.1
  - WAP2.0/OMA DRM
  - Java(JSR 185/JTWI)
- Storage
  - External Mini SD card (up to 1GB)
  - Internal 60MB memory
- Input
  - T9 Input
- Entertainment& Multimedia
  - 64 polyphonic ring tone/MP3 ring tone
  - JAVA Game
  - Imaging Editing
  - MP3 (Stereo)/MP4 Codec
- I/O
  - USB 1.1 (Mini USB connector)
  - Bluetooth

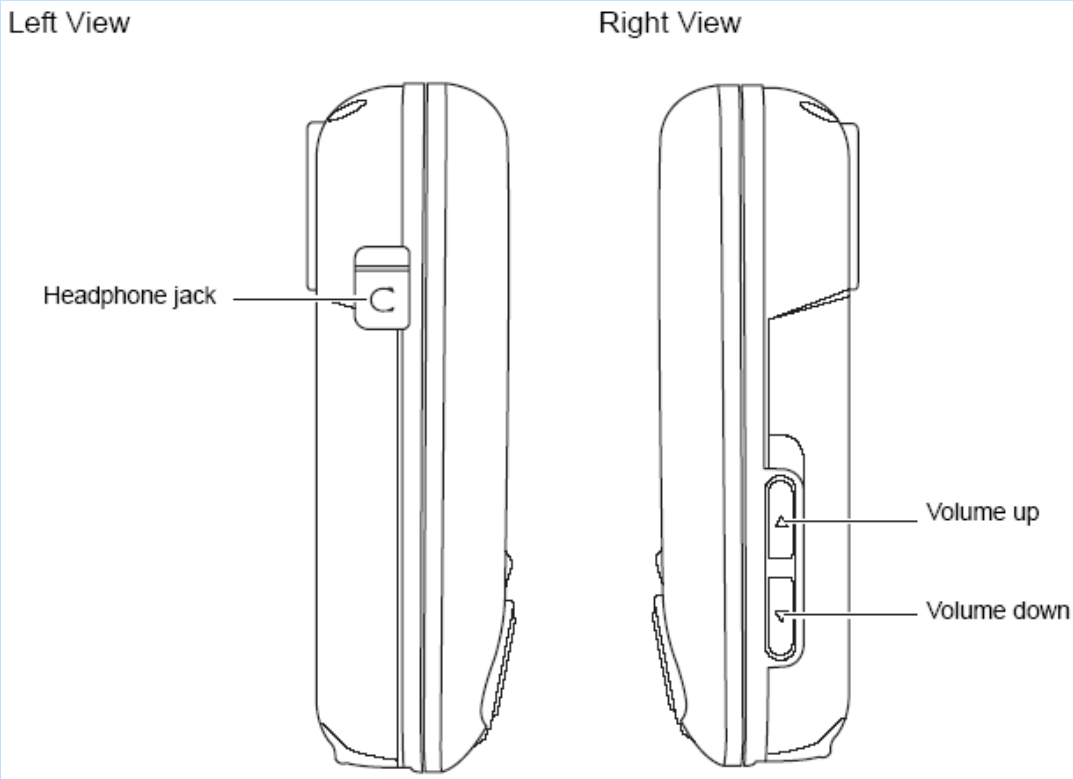
Features

- Front View



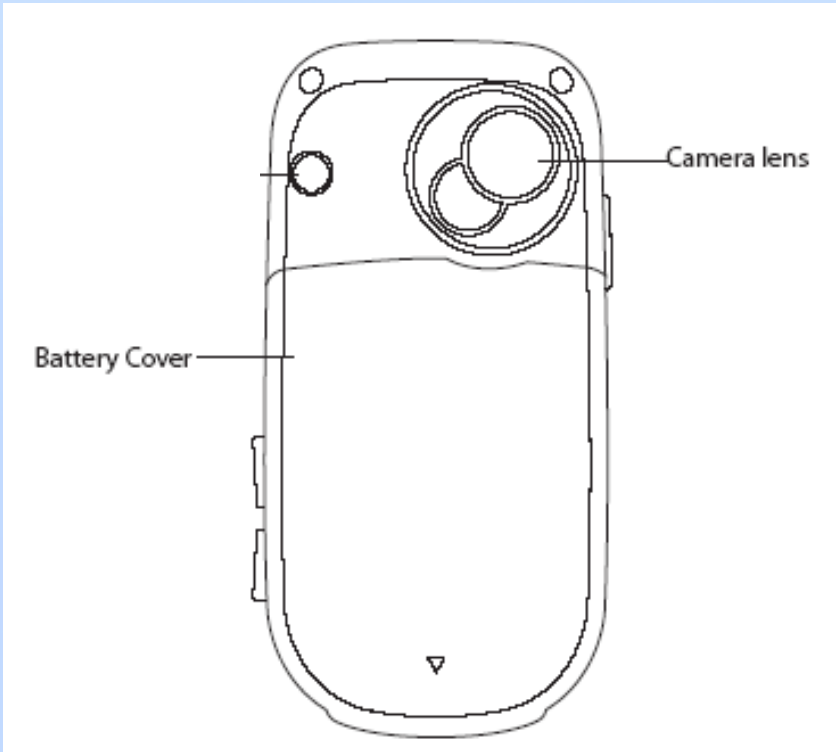
Features

- Side Views



Features

- Rear View



Feature Highlight

- Semi-auto slide form factor
- Built-in tri-band antenna(EGSM, DCS & PCS)
- 262K Colors TFT LCD 1.8” Display
- 1.3Mega Pixels CMOS Camera
- Bluetooth Headset Profile supported
- MP4 Video Recording / Playing included
- MP3 Player included
- Mini SD up to 1GB supported
- High volume of internal memory (60MB) included

Disassembly / Assembly Procedure

- The Purpose Of Disassembly

  In service level 1~2, it includes to replace key components. The following session is to introduce how to disassemble and assemble once the maintenance is completed.

- Tool Requirement
  - Torque Driver(T5) x 1
  - Plus Driver(No.0) x 1
  - Disassembly Tool(plastic blade) x 1
  - Tweezers x 1
  - Antistatic Mat & Wrist Strap are recommended.

Disassembly

- **Step1**

Place device-under-repair on a flat workbench and power it off.
Recommended tools: a pair of tweezers, a T5 screw driver,
a plus screw driver, and a plastic blade.

Disassembly

- **Step2**

Flip handset over then you would see the battery cover. Pull down the battery cover. Then take out the battery, SIM card and memory card if any.

Disassembly

- **Step3**

Release all 4 screws one by one.

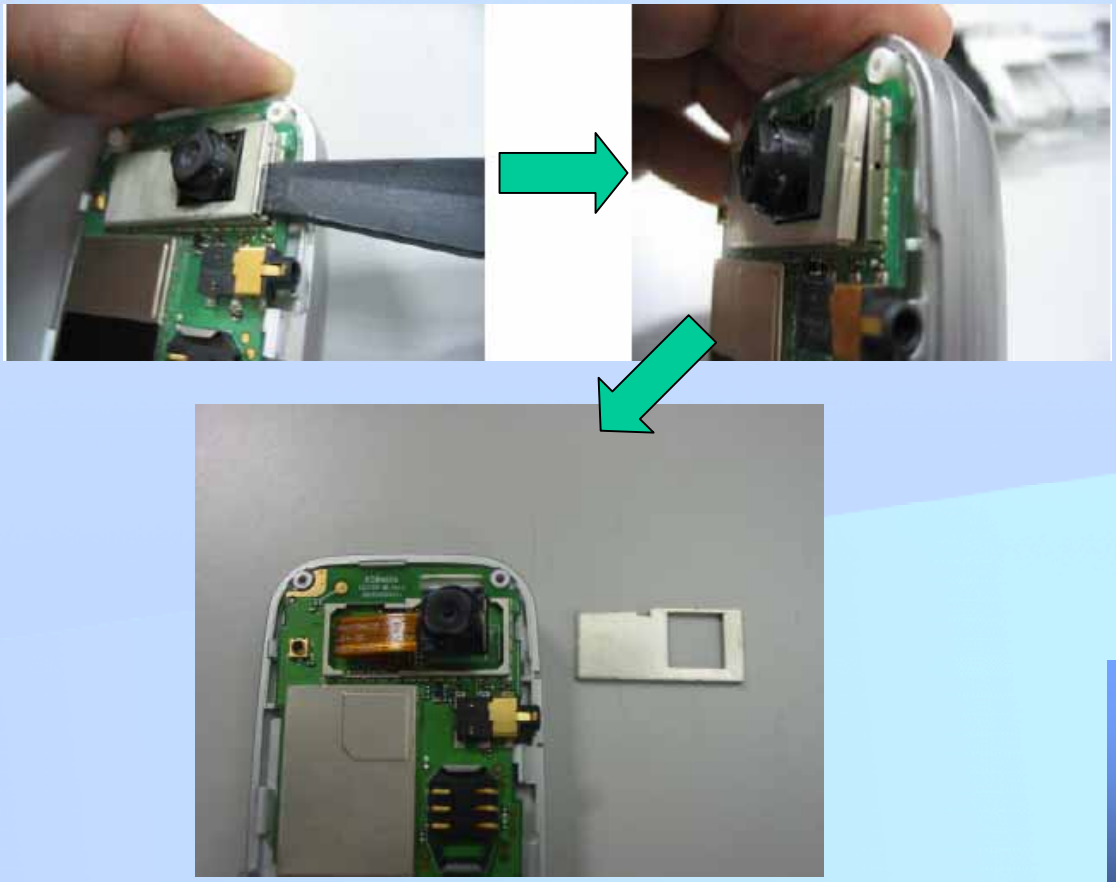
Disassembly

- **Step4**

Use plastic blade to disengage latches that secure the rear housing to the rear housing.

Disassembly

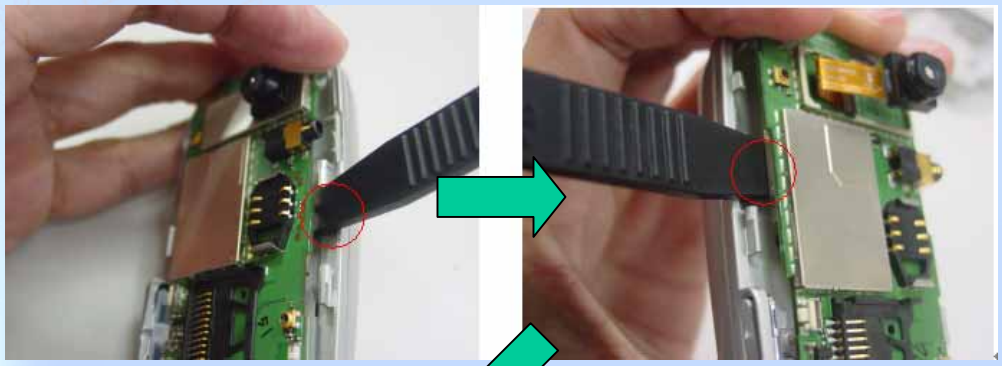
- **Step5**
  Use the plastic blade to pry the DSC holding from the right side.

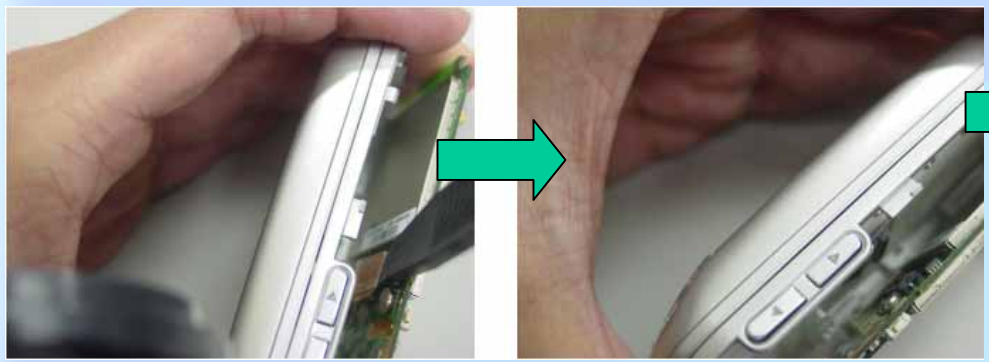


Disassembly

- **Step6**

Pry the main PCBA by inserting the plastic blade. Be careful with the board-to-board FPC. Use the blade to disengage the FPC from the main PCBA.

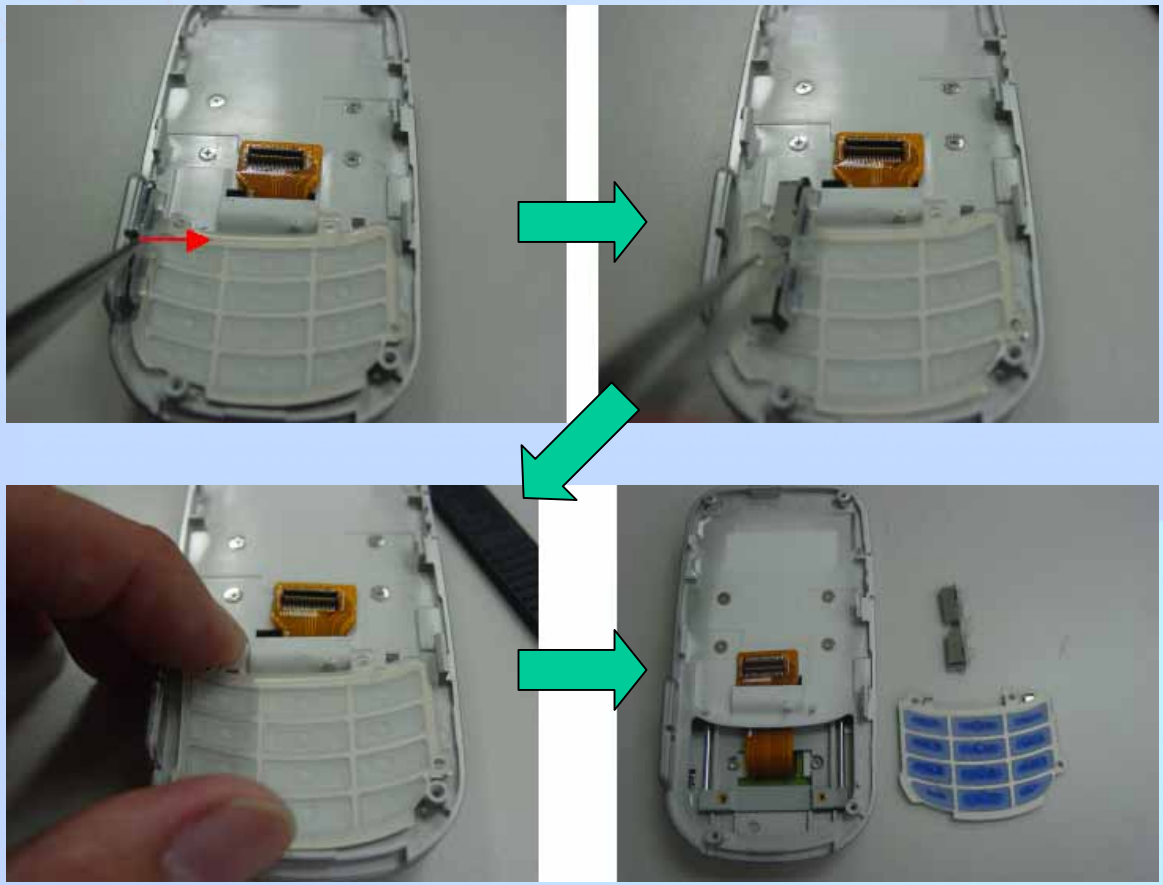




Disassembly

- **Step7**

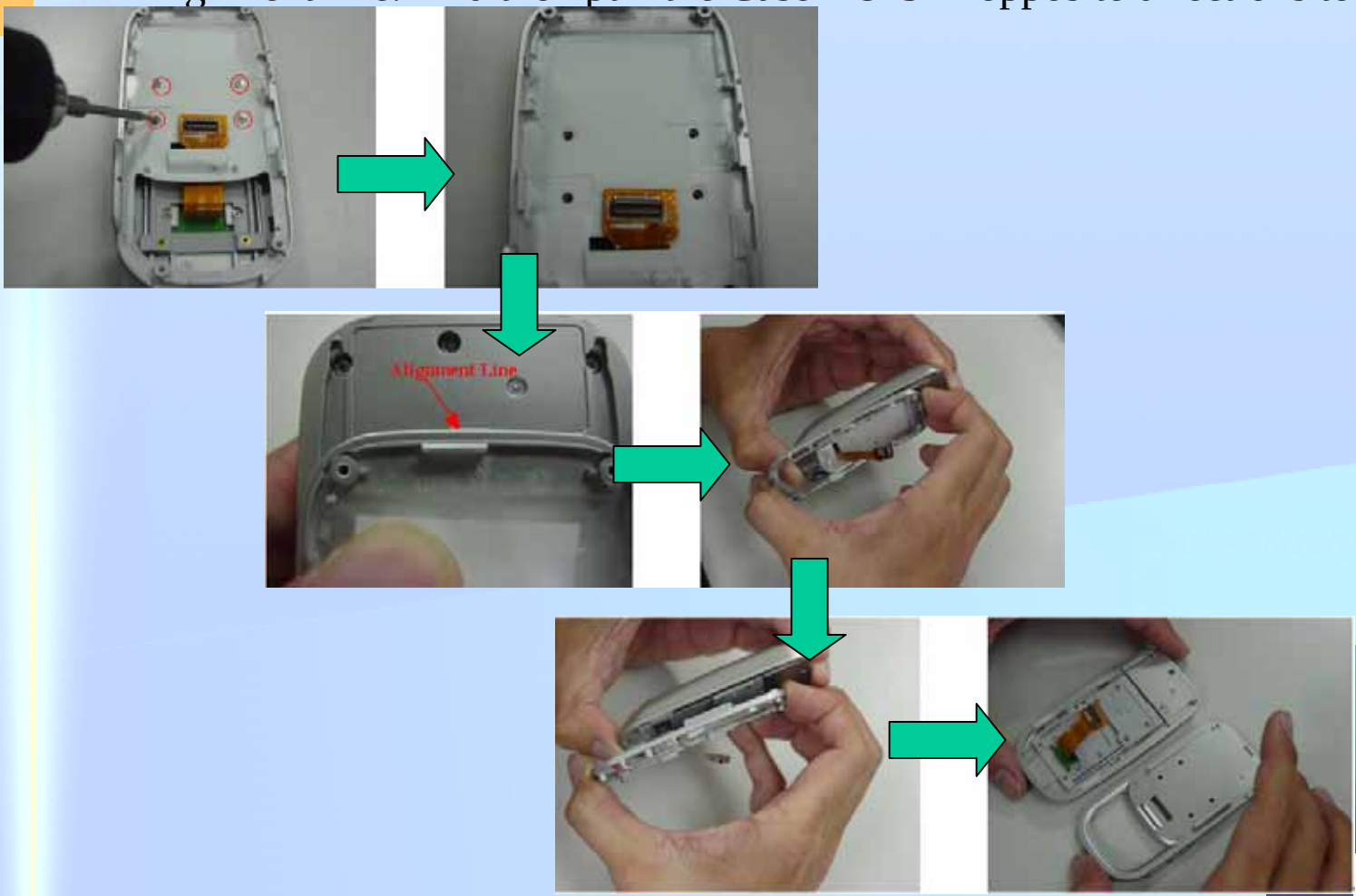
  Remove the side-key and numeric keypad



Disassembly

- **Step8**

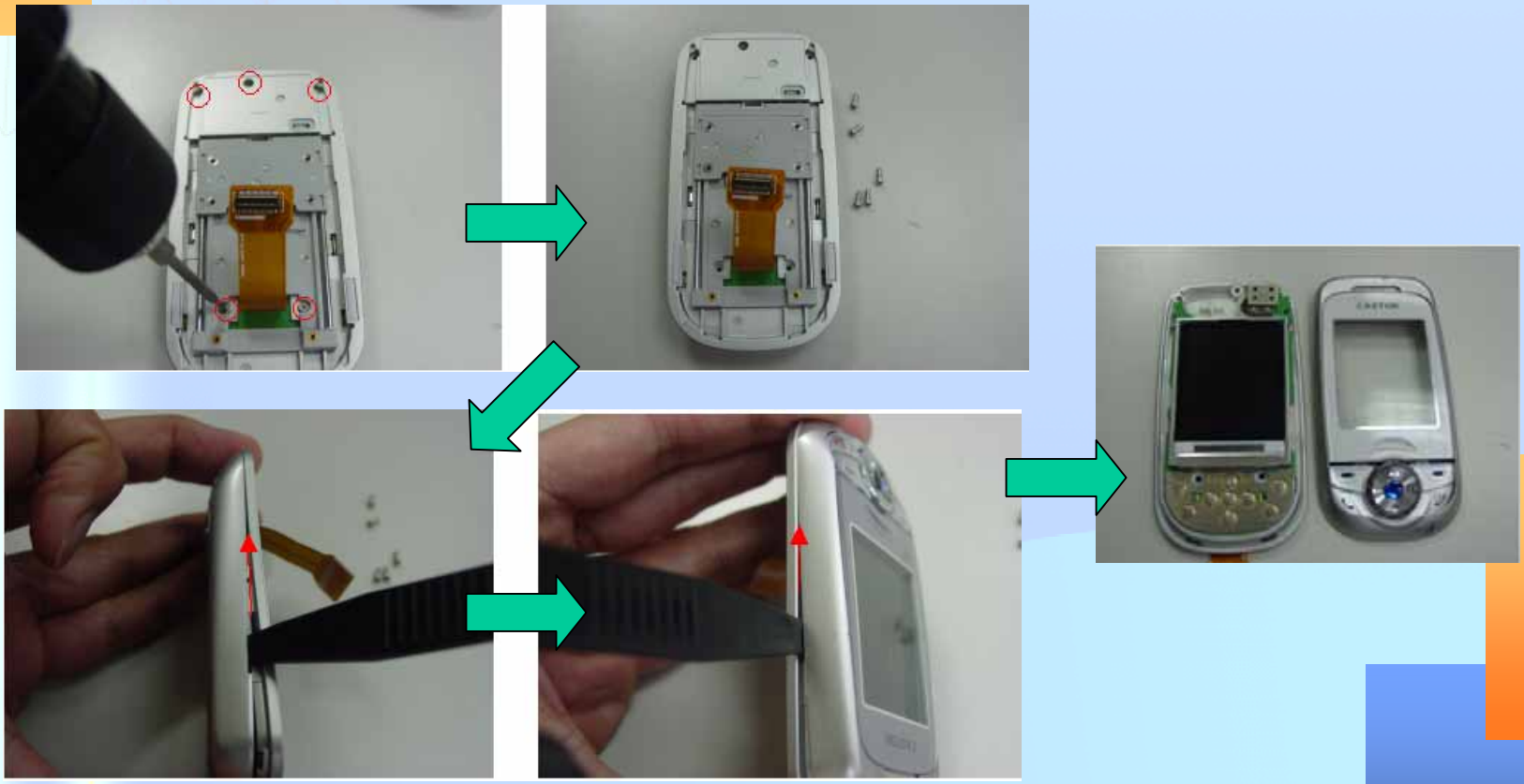
Unscrew the screws that secure the Case3. Next, align the Case3 with the Alignment line. And then pull the Case 2 & 3 in opposite directions to separate.



Disassembly

- **Step9**

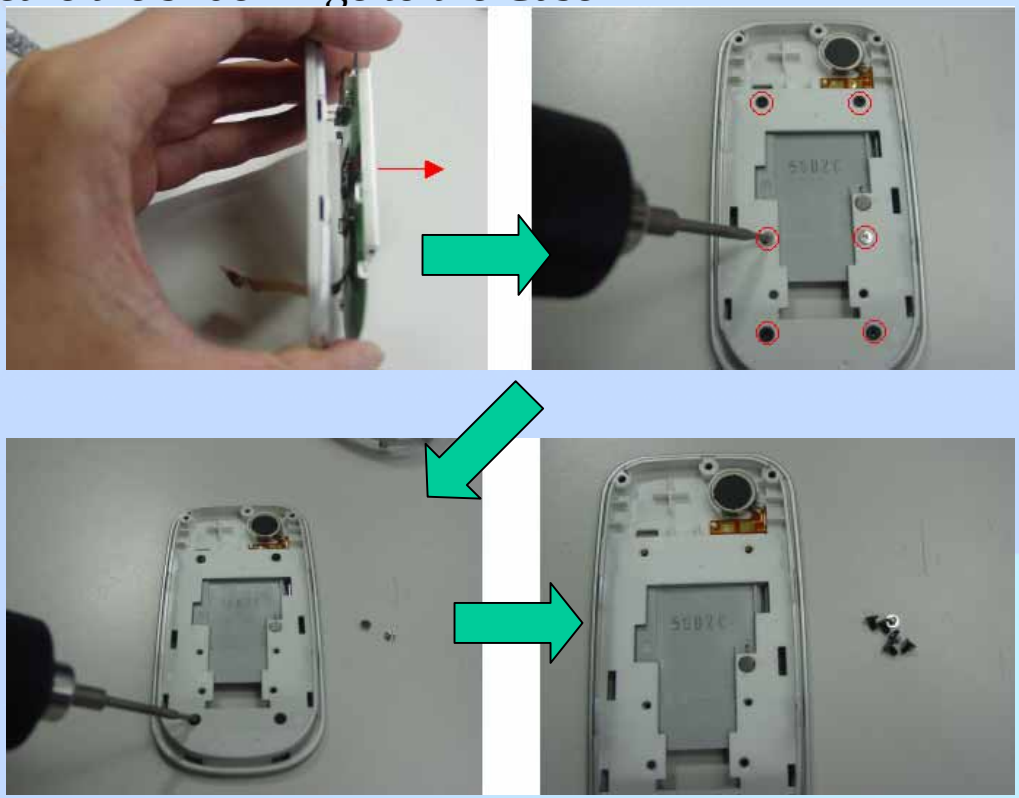
Unscrew the screws fasten on the Case2. And use the plastic blade to separate.



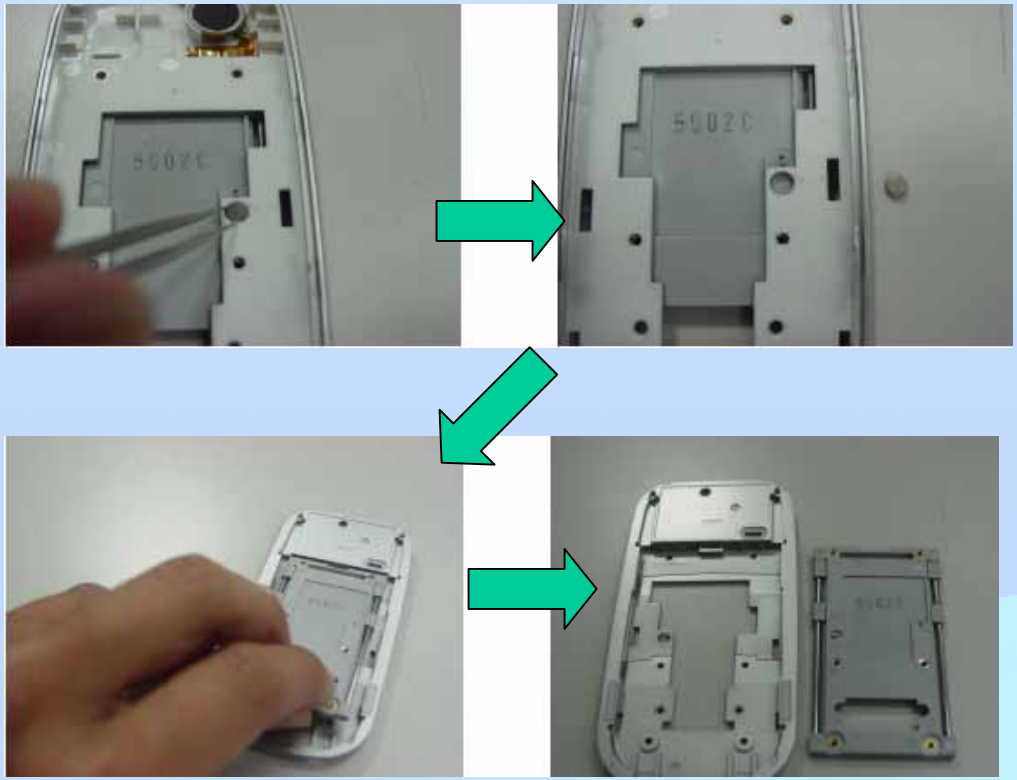
Disassembly

- **Step10**

Take out the upper PCBA and LCD module first. Next, remove screws that secure the slide hinge to the Case2



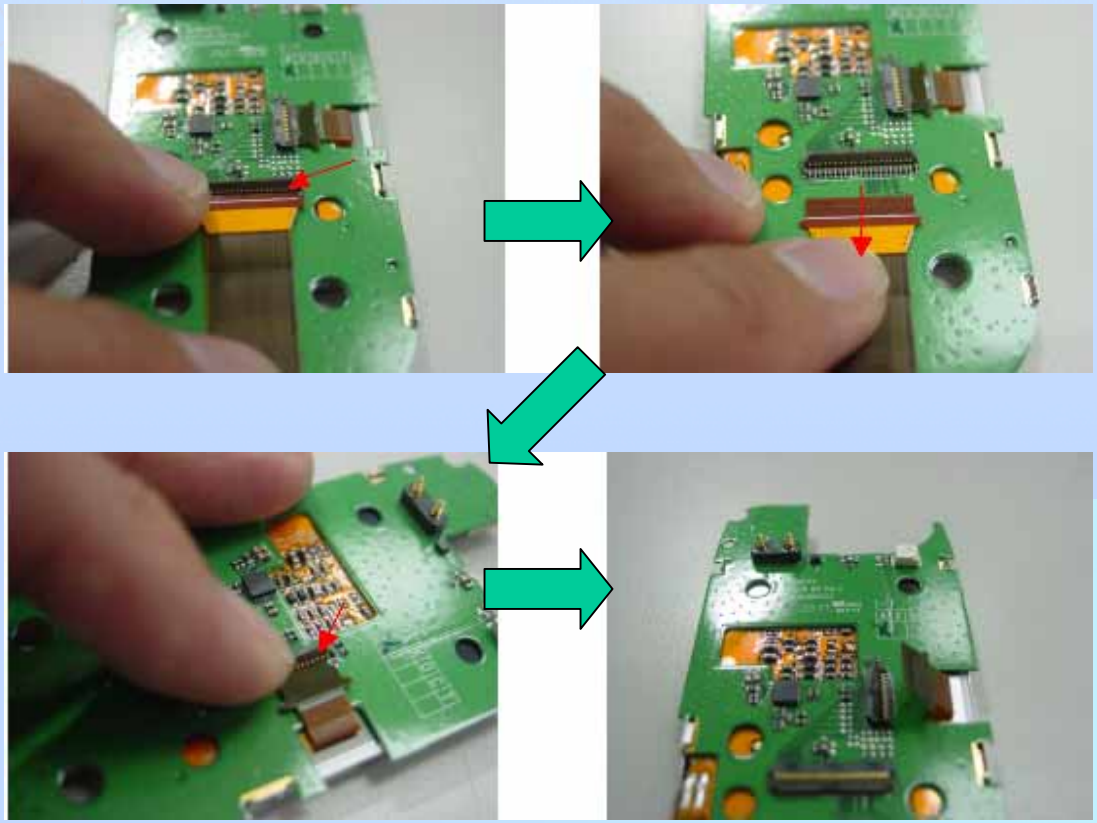
Disassembly



Disassembly

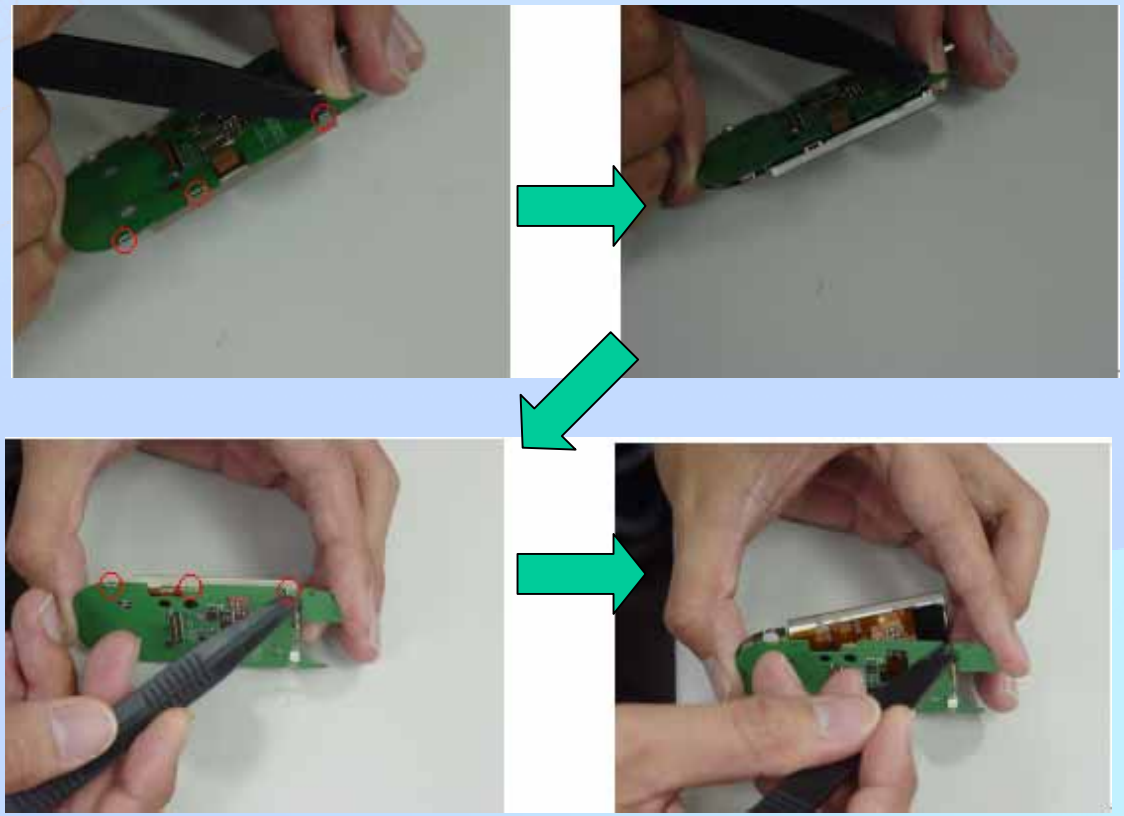
- **Step11**

  Unleash B-to-B FPC and LCM FPC



Disassembly

- **Step13**
  Disengage the latches that secure the LCM frame to the upper PCBA.



Key Parts After Disassembling

Assembly Procedure

- Once the defective handset has been repaired , the unit must be reassembled. Simply follow the reverse sequence of the disassembly procedure.

Software Download

- The Purpose Of Software Download

VS600 needs “software download” when a new feature needs to be added or a known bug is fixed.

- System Requirement

Operating System: WinNT / Win2000 / WinXP

Communication Tool: Voxtel Download Tool

CPU: Pentium3 500MHz or higher

Hard Drive: At least 10MB free space

RAM: 128MB

Input Device: Keyboard & mouse

Cable: RS232 cable + USB2COM cable

(provided by Voxtel)

Software Download

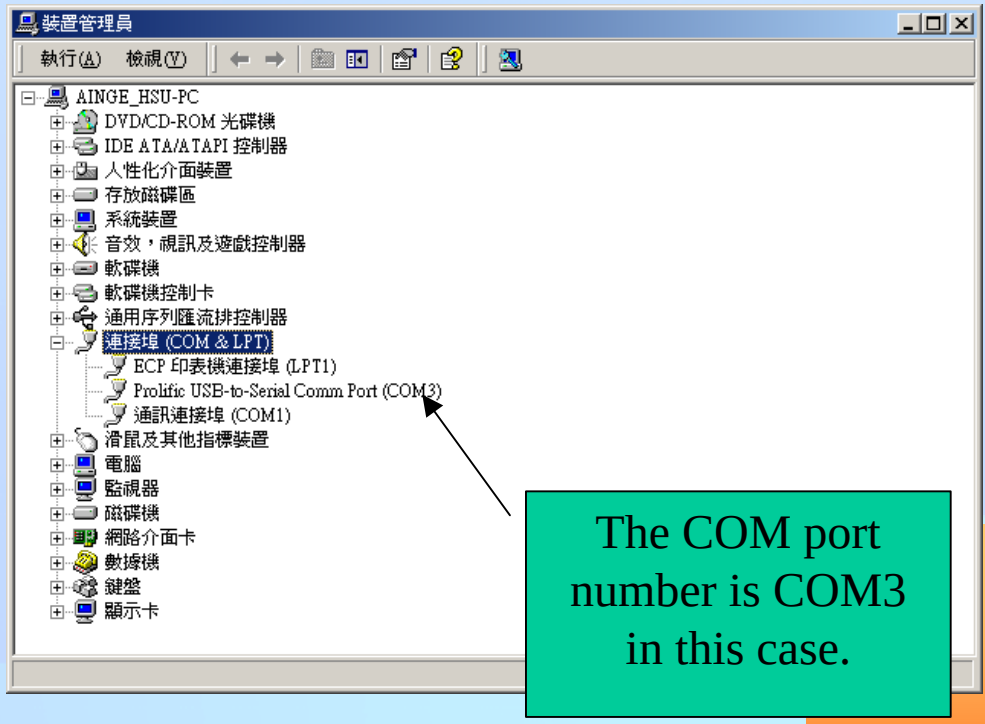
- Setup the USB2COM Download cable

1. Before insert USB2COM cable to PC, please install the driver first.
2. There will be a directory “(US-001)USB To Serial Cable V1.1” in the provided CD. Please run the installation program: “Driver Installer.exe” in the “98~XP” directory if your OS is windows 98~XP. We don’t support other OS currently.
3. After installing the driver of USB2COM cable. The program will ask you to restart the computer.
4. After re-booting the computer and completing the setup procedure, please insert the USB2COM cable and there will be a new COM port (Profilic USB to serial Com port) appeared in your system. You can check it at DEVICE MANAGER in Control Panel.

Software Download

5. Please note the COM Port number shown in DEVICE MANAGER.

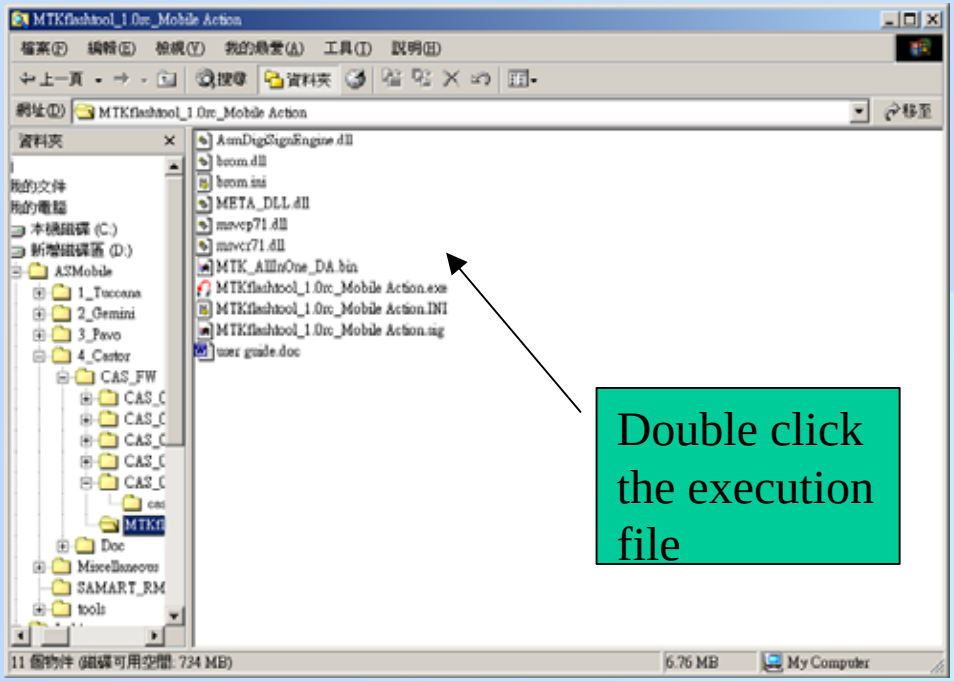
   In Download Tool, the corresponding port number must be set.



Software Download

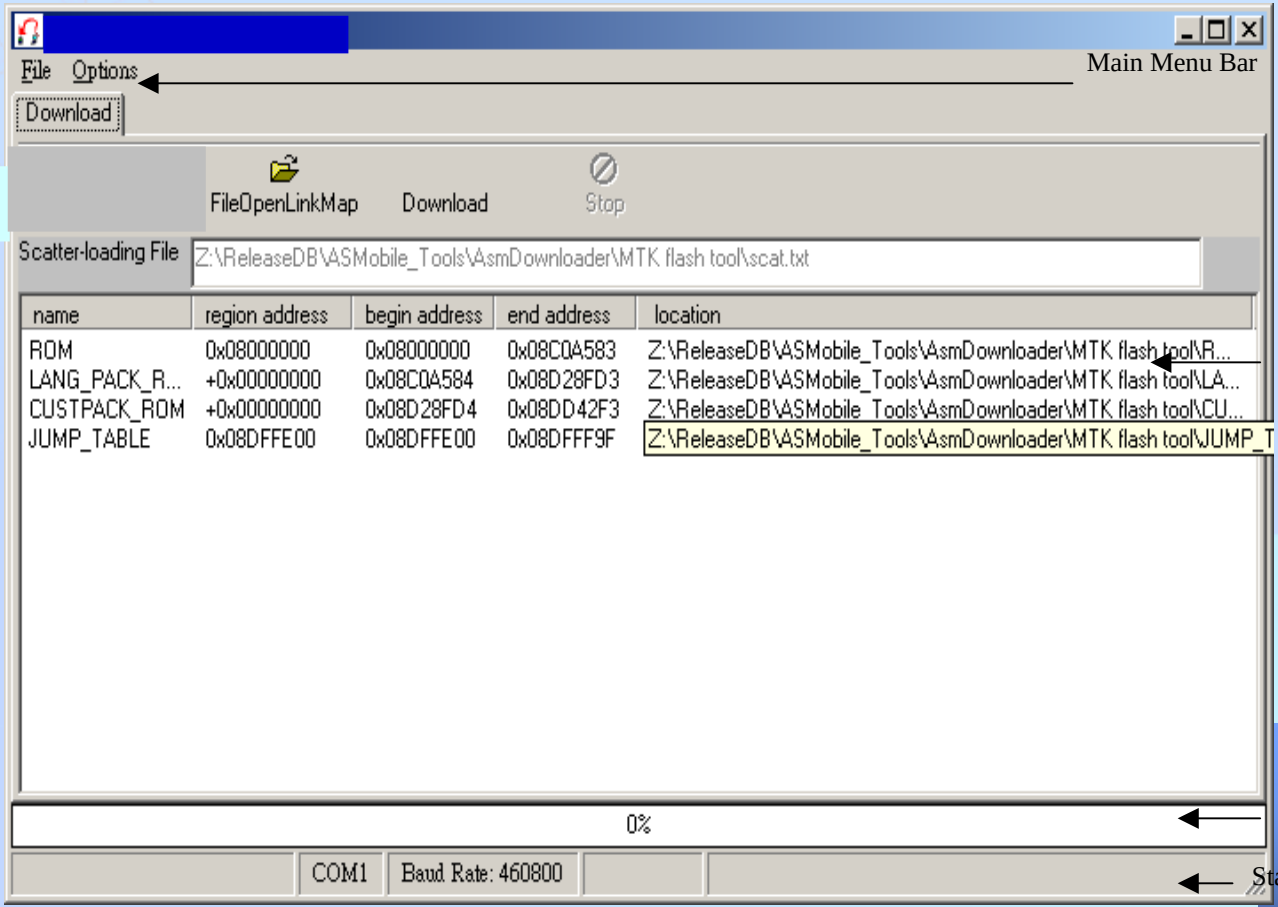
- Setup the Download Tool

1. Download Tool can be obtained from Voxtel. Put all related files in one folder.
2. Double click the execution file to open the DL tool.



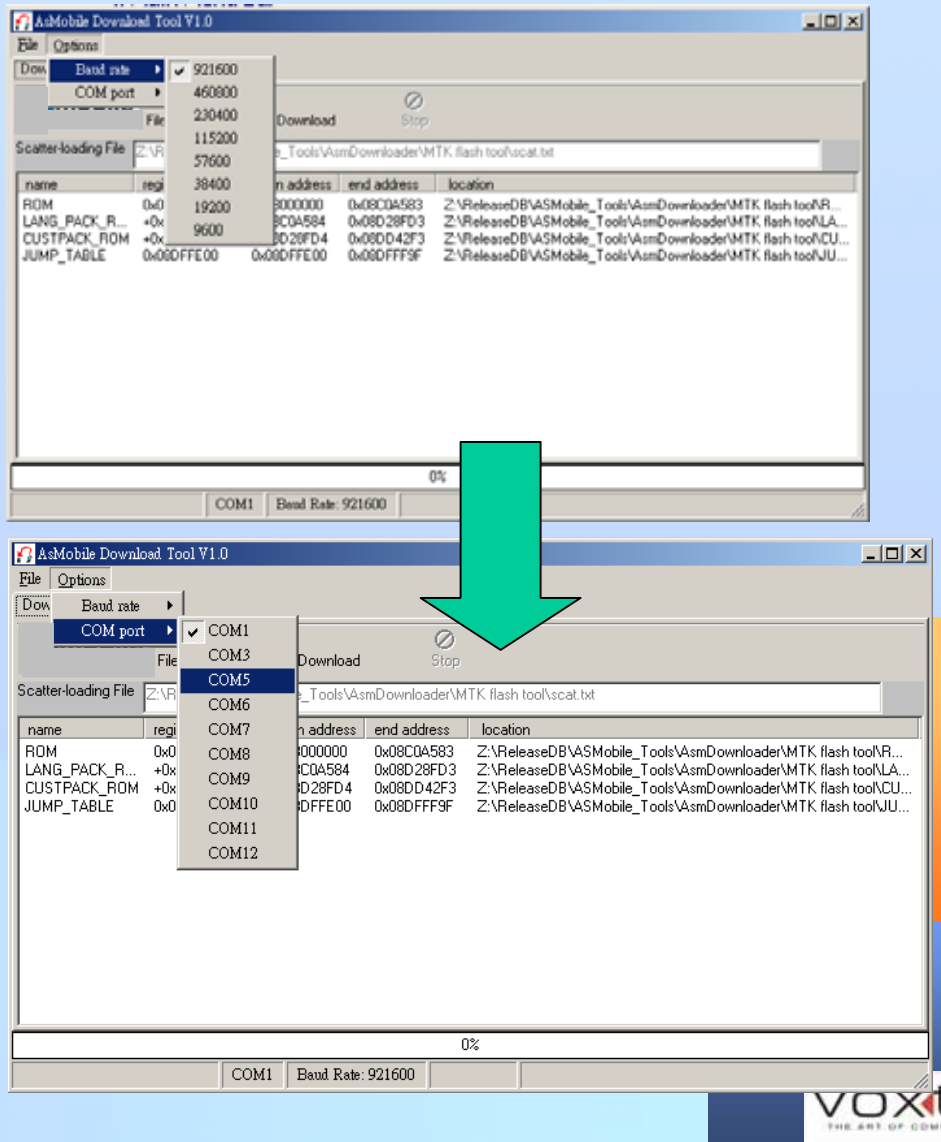
Software Download

3. The UI will pop up like below:



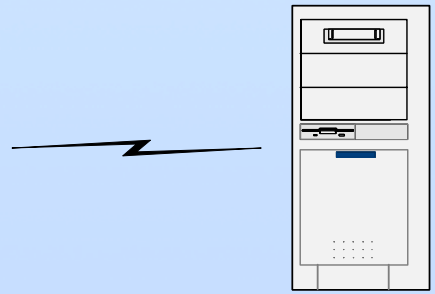
Software Download

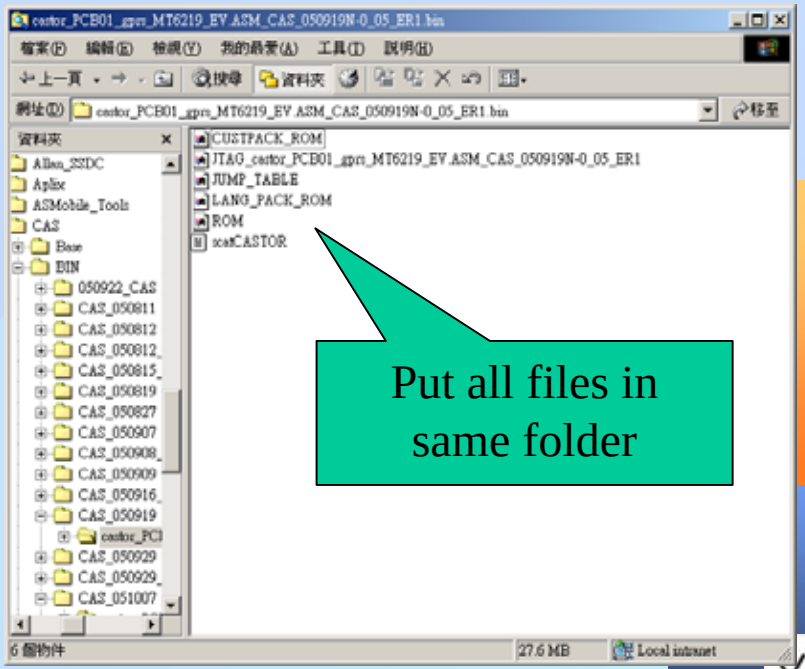
4. Select the corresponding Baud rate (ex. 921600) and COM port number



Software Download

5. Turn off VS600 under service. Then, connect VS600 to the PC (as the service platform) via Voxtel Download Cable.
6. Upgrade software can be obtained from Voxtel. Put all files in same folder in the local PC.

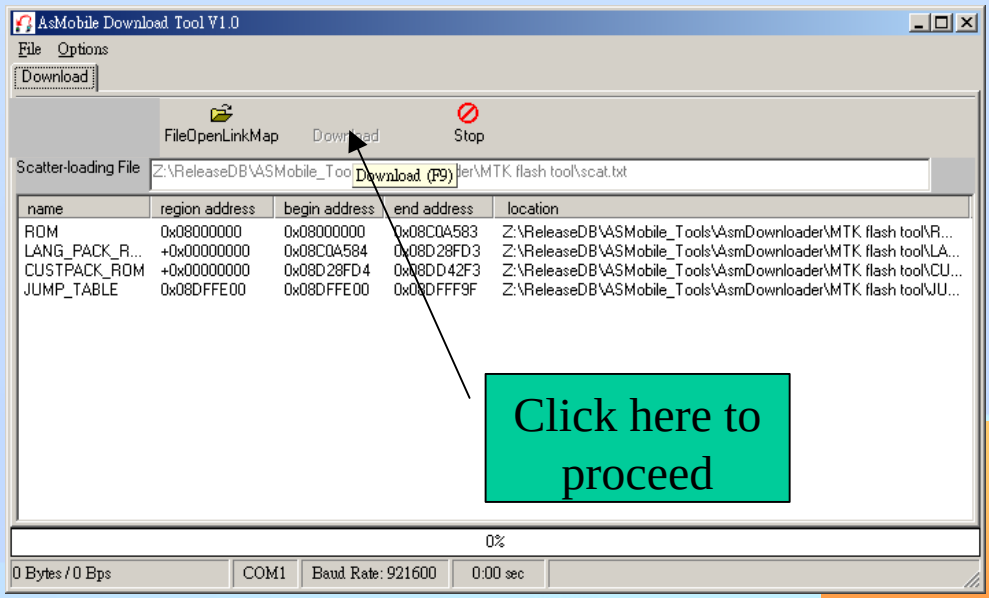




Software Download

7. Click the FileOpenLinkMap to select the corresponding scatCastor.txt

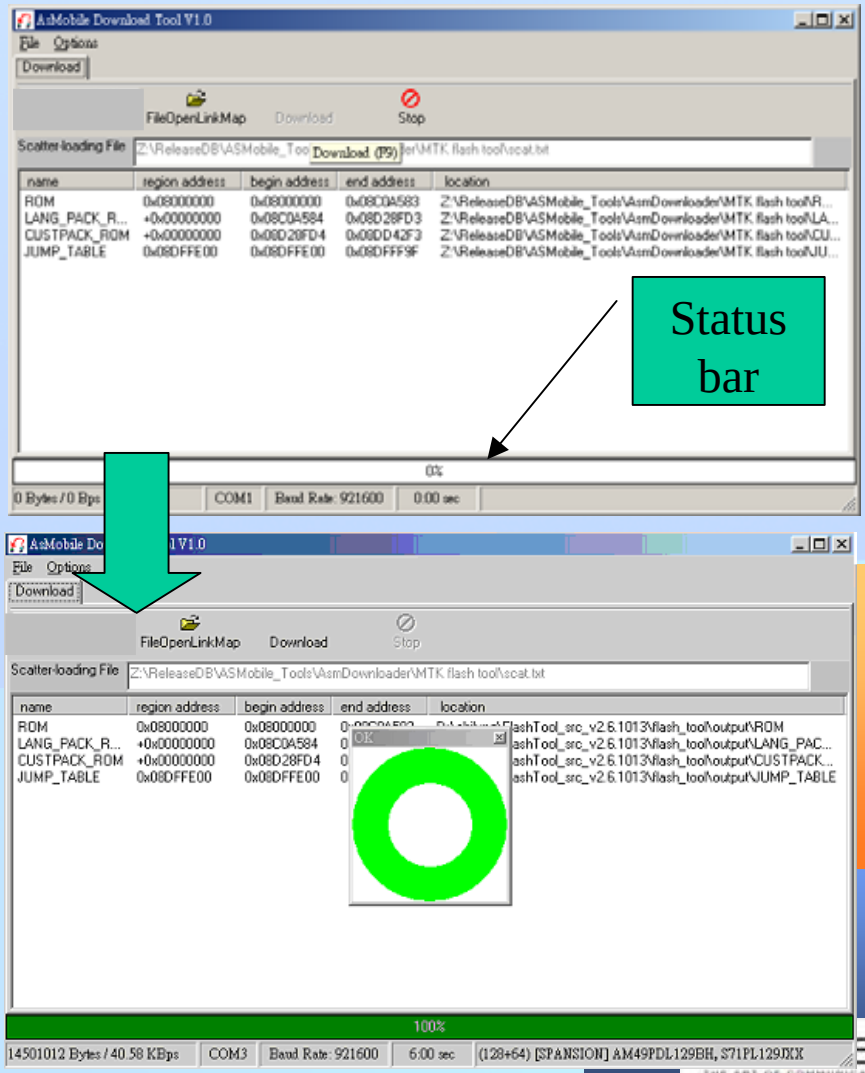
8. Next, click the Download button to initiate the downloading procedure.



Software Download

9. Depress the End key of VS600 to begin downloading. The downloading progress can be seen in the status bar.

10. After successfully proceeding the download, a OK message will pop up. It normally takes few minutes to complete SW download.



Software Download

11. After completion of the Software Download, please unplug the Download Cable and depress the END KEY to turn on VS600. Be noted that it takes a bit longer time to turn on for the first time after downloading.

Depress the END KEY to power on VS600. You can check the version number by entering ***504#.

Manual MMI Test

- VS600 provides a Factory Mode for Manual MMI Test.
  - Enter ***504# in idle menu to get into Factory Mode
  - Enter *#06# in idle menu to retrieve the unique IMEI code of the handset.
- An intact or being-repaired handset should pass all test items listed in the Factory Mode.

Manual MMI Test

- Test Items under Factory Mode (listing the most significant ones)
  - Version
  - Keypad
  - Echo Loop
  - Headset
  - RTC
  - LCD
  - Vibrator
  - Ring Tone
  - Receiver
  - Loud Spk
  - Camera
- RTC test will automatically turn off the handset and power on a few seconds later. It means RTC function is correct.
- Bluetooth Mode for R&D purpose. For service purpose, just check that handset can successfully proceed the pairing with a Bluetooth headset.

Troubleshooting

SYMTPOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
1.Handset will not turn on or stay on	a.) Battery either discharged or defective	Measure battery voltage across a 50ohm load. If the battery voltage is <3.25 V_{dc}, recharge the battery using the appropriate battery charger. If the battery will not recharge, replace the battery. If battery is not at fault, proceed to b.
	b.) Battery terminals open or misaligned.	Visually inspect the battery terminals on bother the battery and the handset. Realign and, if necessary, either replace the battery or refer to a Level 3 Service Facility for battery connector replacement. If battery terminals are not at fault, proceed to c.
	c.) Main board assembly defective.	Remove the main board assembly. Substitute a known good PCB assembly and temporarily reassemble the handset. Depress the PWR button; if handset turns on and stays on, disconnect the DC power source and reassemble the handset with a new main board assembly. If the unit still cannot turn on, after reassembled with a new main board, try to replace a known good FPC (flexible printed circuit).

Troubleshooting

2. Handset exhibits poor reception or erratic operation such as frequently dropping calls or distorted audio.	a.) Antenna defective	Check connection between the antenna and the main board assembly. If the connection is okay, substitute a known good antenna. If the fault is still present, proceed to b.
	b.) Main board assembly defective	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new PCB assembly.
3. Display is erratic, or provides partial or no display.	a.) Mating connections to or from main board faulty.	Check general condition of FPC and FPC connector. If the FPC and connector are good, check that the LCD module
	b.) LCD module defective	Substitute a known good LCD module. Verify that the fault has been cleared. Next reassemble the handset.

Troubleshooting

4. Incoming call alert audio distorted or volume is too low.	a.) 2-in-1loudspeaker defective	Substitute a known good loudspeaker. If the fault is still present, proceed to b.
	b.) Upper board assembly defective	Replace a known good upper board assembly. Verify that the fault has been cleared and reassemble the handset with the new upper board assembly.
5 . Handset transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice.)	a.) Microphone defective	Replace the microphone as described in the disassembly procedure. If fault is not cleared, proceed to b.
	b.) Main board assembly defective	Replace a known good main board assembly. Verify that the fault has been cleared and reassemble the handset with the new main board assembly.

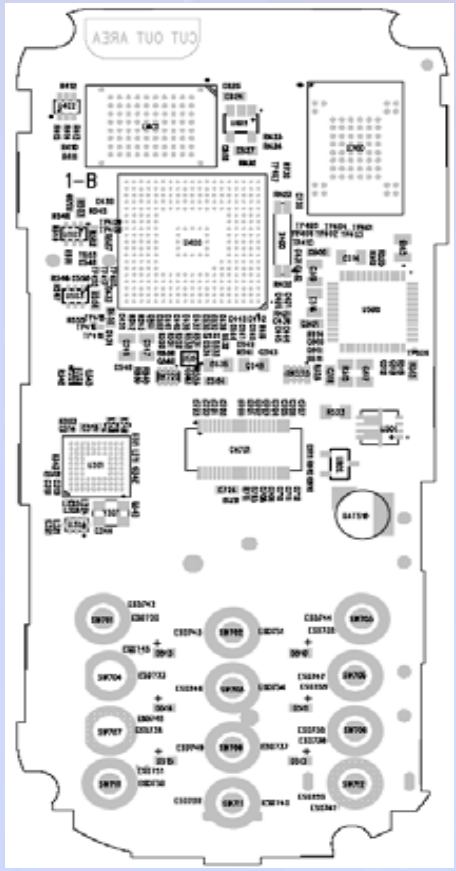
Troubleshooting

6. Received audio from receiver is weak or distorted.	a.) Connections to or from main board assembly defective	Check connection from the earpiece to the main board assembly. If the connector is not fault, proceed to b.
	b.) 2-in-1 loudspeaker defective	Temporarily replace the speaker assembly with a known good one. Ensure good connection by placing a call and verify the improvement in earpiece audio. If fault is cleared, reassemble the handset with the good assembly. If not, proceed to c.
	c.) Main board assembly defective	Replace a known good main board assembly. Verify that the fault has been cleared and reassemble the handset with the new main board assembly.
7. Handset will not recognize or accept SIM card.	a.) SIM card defective	Check the SIM card contacts for dirt. Clean if necessary, and check if fault has been cleared. If the contacts are clean, insert a known good one into the handset. Turn on the handset and verify that the SIM card has been accepted. If fault is still present, proceed to b.
	b.) Main board assembly defective	Replace a known good main board assembly. Verify that the fault has been cleared and reassemble the handset with the new main board assembly.

Troubleshooting

8. Vibrator feature not functioning.	a.) Vibrator defective	Replace vibrator as described in the disassembly procedure. If the fault is still present, proceed to b.
	b.) Upper board assembly defective	Replace a known good upper board assembly. Verify that the fault has been cleared and reassemble the handset with the new upper board assembly.
9. Internal charger not working	Faulty charger circuit on main board assembly	Insert a selection of batteries to verify. If the fault is still present, replace a known good main board assembly. Verify that the fault has been cleared and reassemble the handset with the new main board assembly.
10. No or weak audio when using headset	a.) Headset plug not pushed fully home.	Ensure the headset plug is fully seated in the jack.
	b.) Faulty jack on main board assembly.	Replace a known good main board assembly. Verify that the fault has been cleared and reassemble the handset with the new main board assembly.

VS600 L3 service training (Base-Band)



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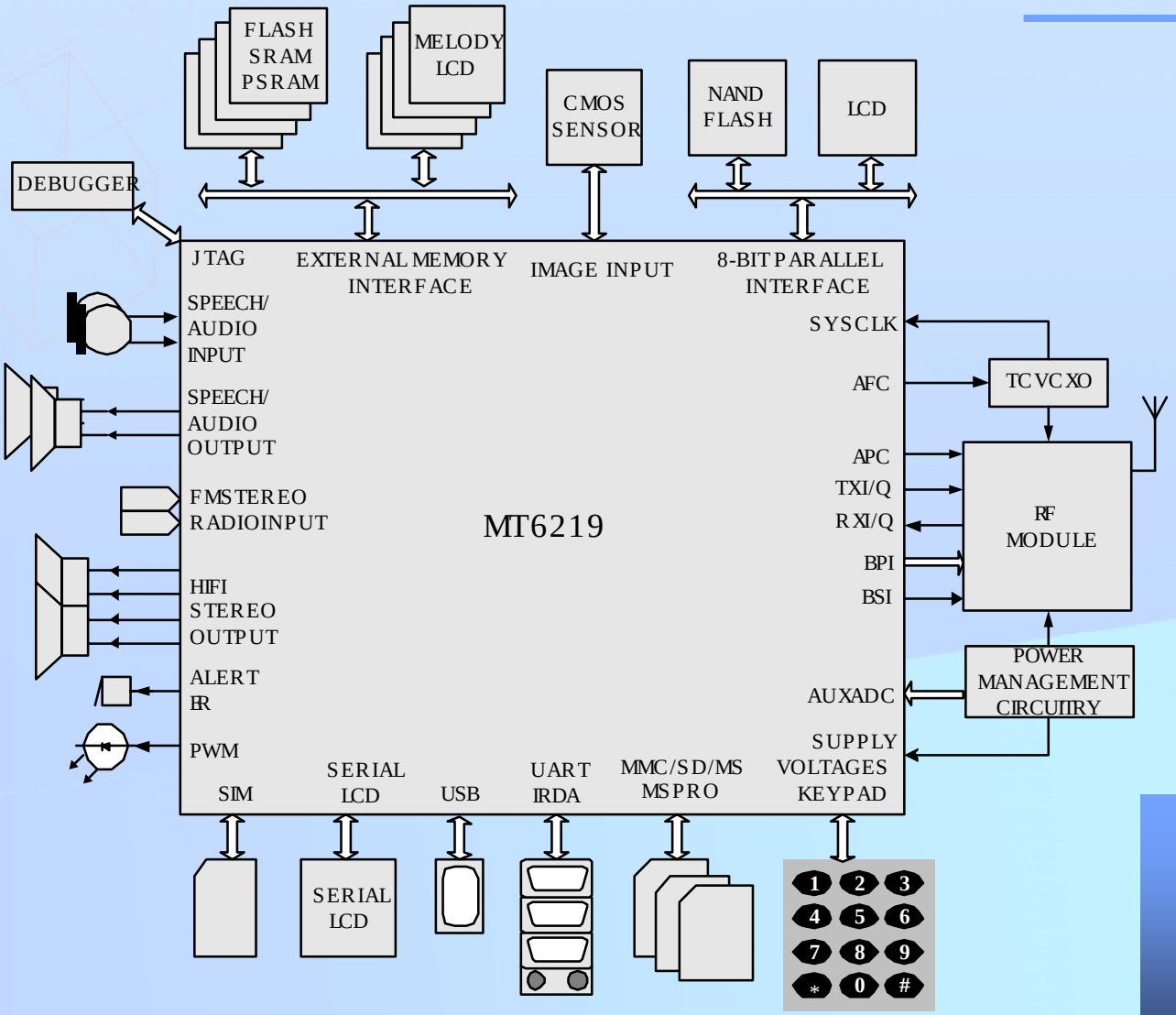
Agenda

- System Specification
- Block Diagram
- PCB Overview
- Related Performance

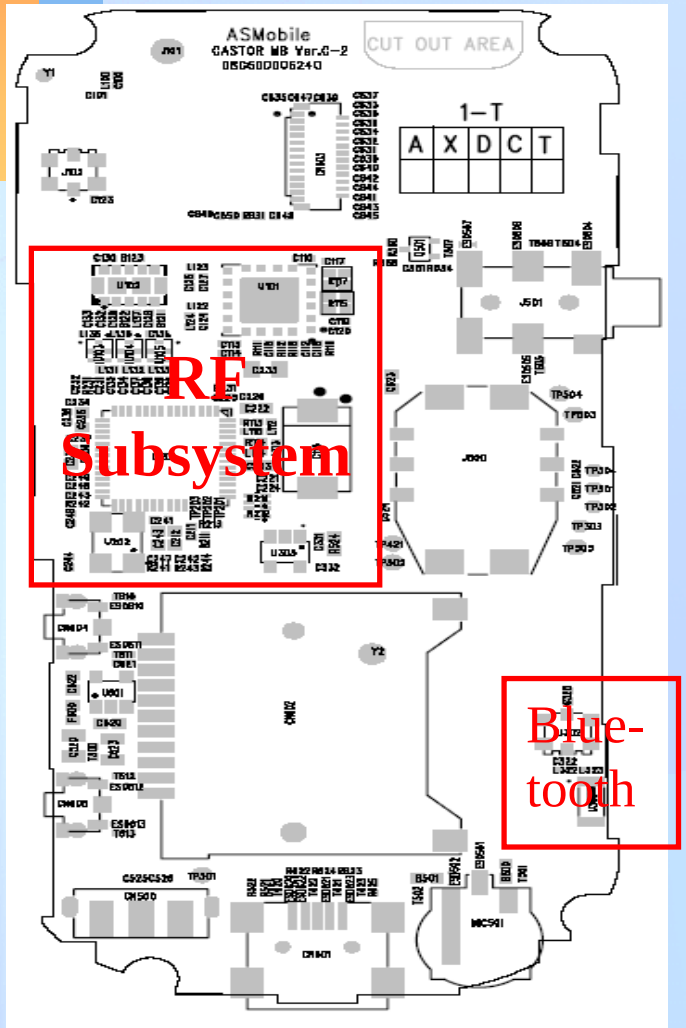
System Specification

- VS600 employs Mediatek MT6219 as its processor
  - Microprocessor:MT6129
  - Power Management IC:MT6305
  - Memory IC: MCP 128+32Mb, Spansion
    NAND 64MB, Samsung (60MB free for end-user)
  - Digital Camera: 1.3M pixels CMOS, Asia Optical
  - LCD Display: 1.8” 262K TFT LCD, Jemitek

Block Diagram

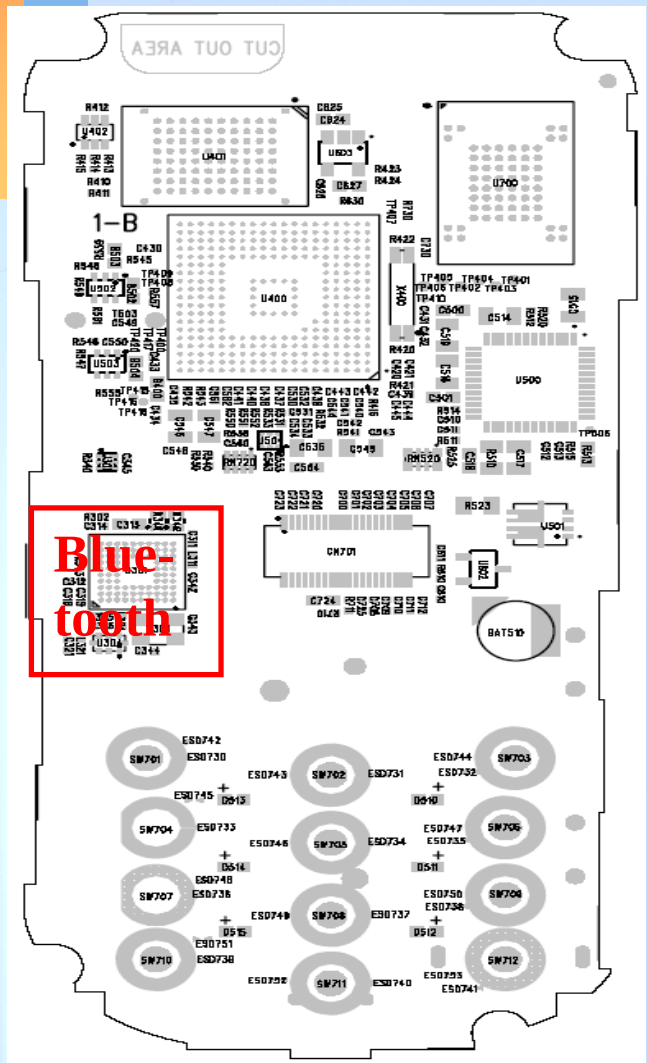


Main PCB-Bottom



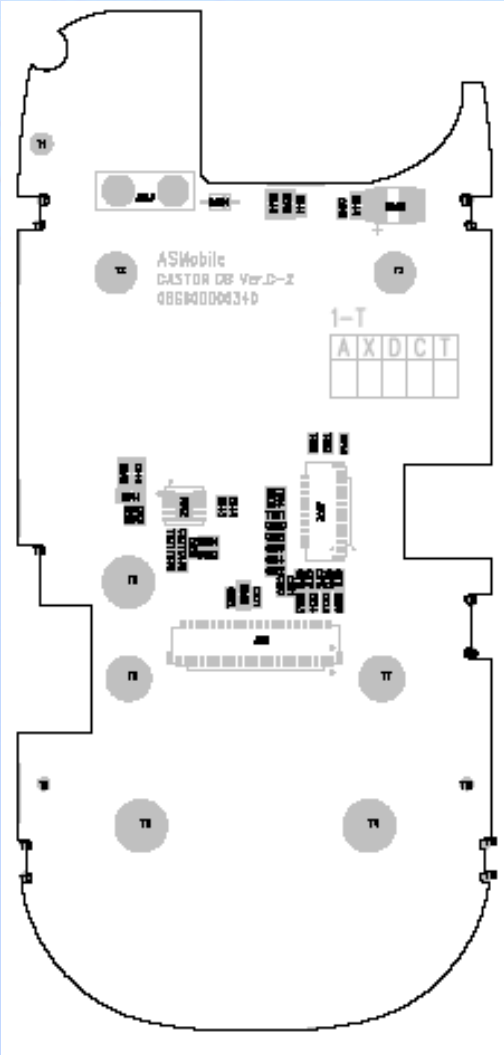
Item	Description
1	CMOS connector (CN603)
2	Phone Jack (J501)
3	SIM card connector (J500)
4	Mini-SD card Connector (CN602)
5	Mini-USB connector (CN601)
6	Microphone (MIC501)

Main PCB-Top



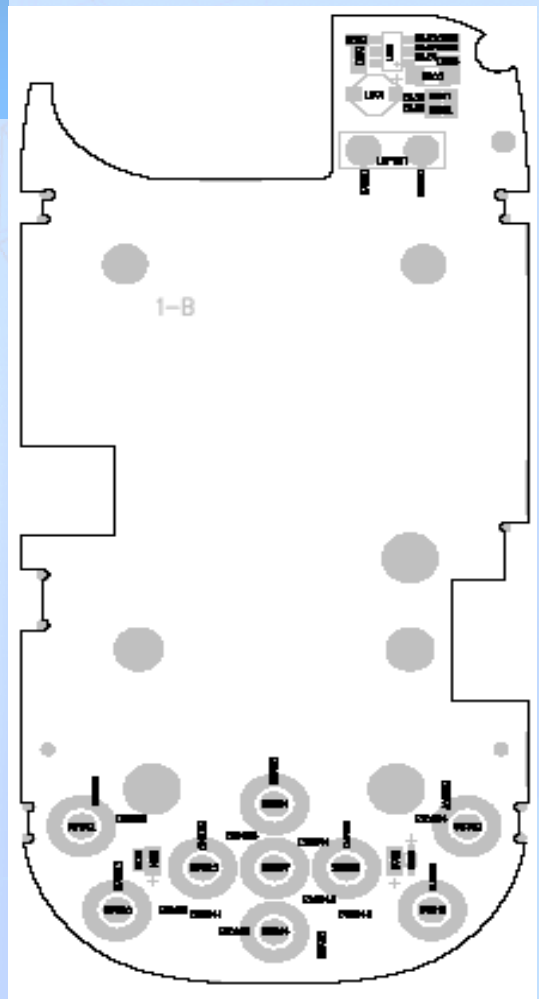
Item	Description
1	MCP 128+32 Mb (U401)
2	NAND Flash 64MB (U700)
3	MT6219 (U400)
4	Power Management IC (U500)
5	RTC (X400)
6	P-MOSFET (U501)
7	Coin battery (BAT510)
8	B-to-B connector (CN701)
9	White LED (D510~D515)

Upper PCB-Bottom



Item	Description
1	Vibrator connector (J803)
2	LCD module connector (J802)
3	B-to-B connector (J801)

Upper PCB-Top

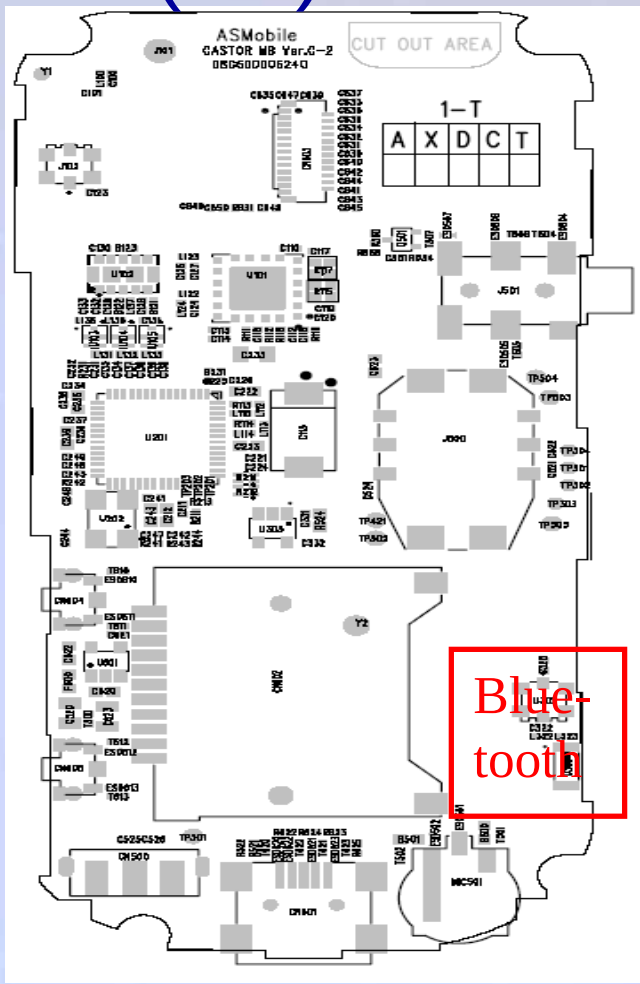


Item	Description
1	2-in-1 loudspeaker connector (LSP801)

Related Performance

Operating Range	
Battery mode	Power On： 3.4V < Vbat < 4.3V Power Off： Hardware: Vbat < 3.2V, Software: Vbat < 3.4V Low Battery Alert： Vbat = 3.4V
Charging mode	Maximum Charge Current： 500mA Maximum Charge Voltage： 5.5V Maximum Charge Time： less than 3 Hours
Power consumption	
Talk mode	Maximum Current： (320mA) @ GSM band, PO = 32dBm Maximum Current： (250mA) @ DCS band, PO = 29dBm
Sleep mode	Maximum Current： (6mA) @ paging rate = 2 Maximum Current： (3.5mA) @ paging rate = 9
GPRS mode, 1 TX slot	Maximum Current： (320mA) @ GSM band, PO = 32dBm Maximum Current： (250mA) @ DCS band, PO = 29dBm

VS600 L3 service training (RF)



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Agenda

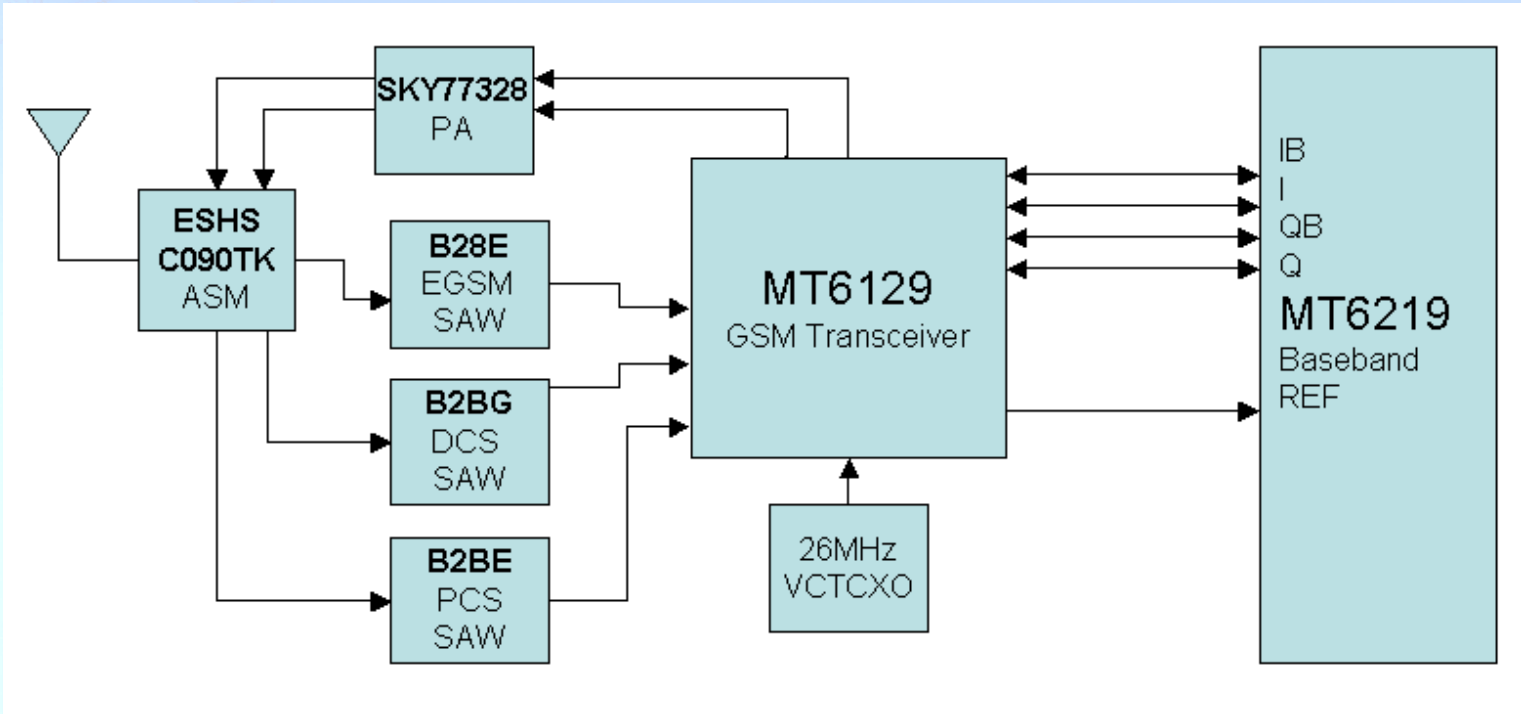
- System Specification
- Block Diagram
- PCB Overview

Specifications

- GSM / GPRS
  - Transceiver IC: MT6129(MTK), quad-band & GPRS class 12
  - Power Amplifier: SKY77328(SKYWORKS), quad-band & GPRS class 12
  - SAW Filters:Fujitsu B28E(EGSM), B2BG(DCS) & B2BE(PCS)
  - VC-TCXO: 26MHz
- Bluetooth
  - Bluetooth IC: CSR, Bluetooth V1.1 and V1.2 compliant
  - BALUN Filter: Murata band-pass filter, 2450MHz
  - Chip Antenna for Bluetooth: ACX, 2400MHz
  - VC-TCXO: 26MHz

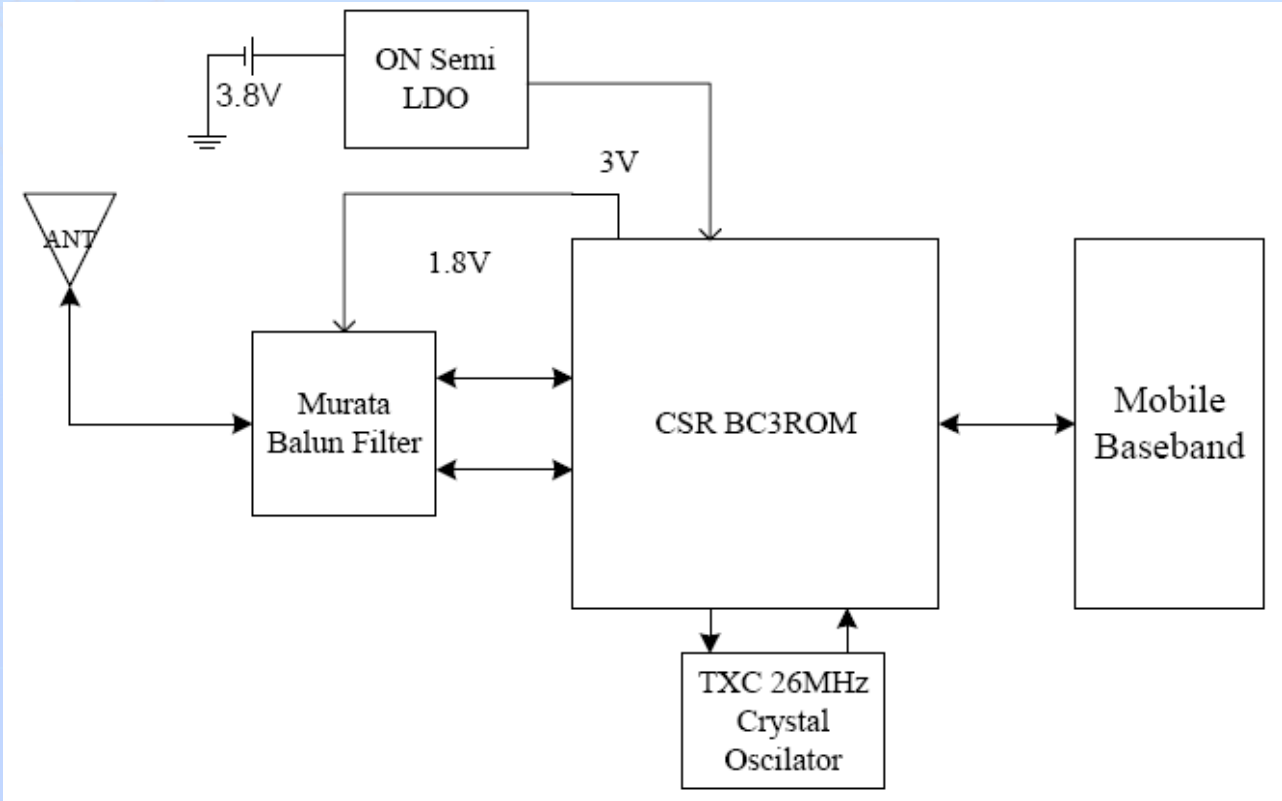
Block Diagram

- GSM / GPRS Transceiver

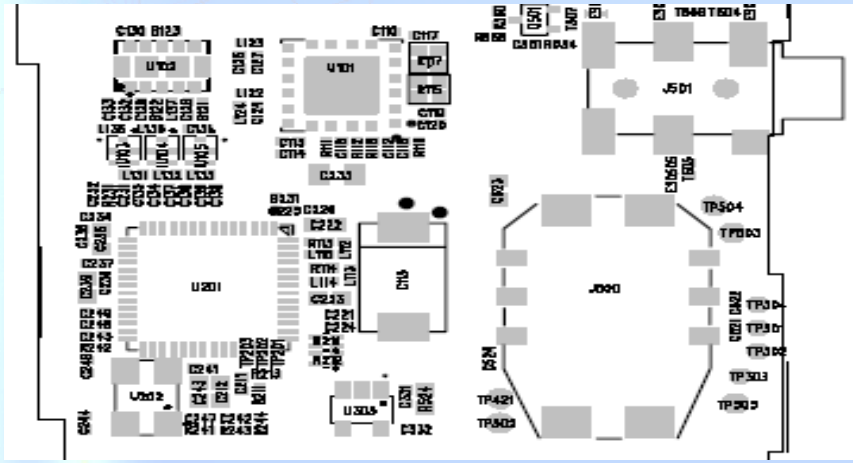


Block Diagram

- Bluetooth

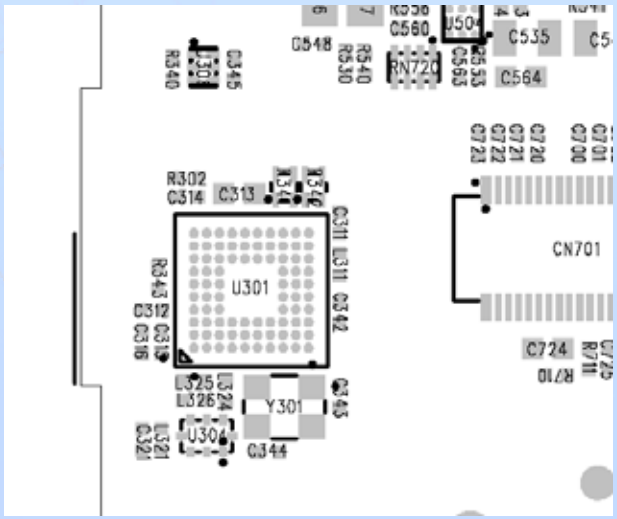


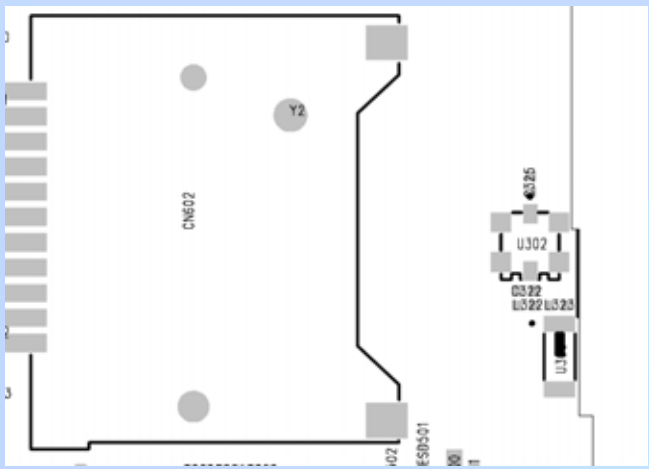
Frond-end & Transceiver



Item	Description
1	SAW filter (U103 ~U105)
2	Power Amplifier (U101)
3	Transceiver (U201)
4	VC-TCXO (U202)
5	Car kit connector (J102)
6	Antenna Switch (U102)

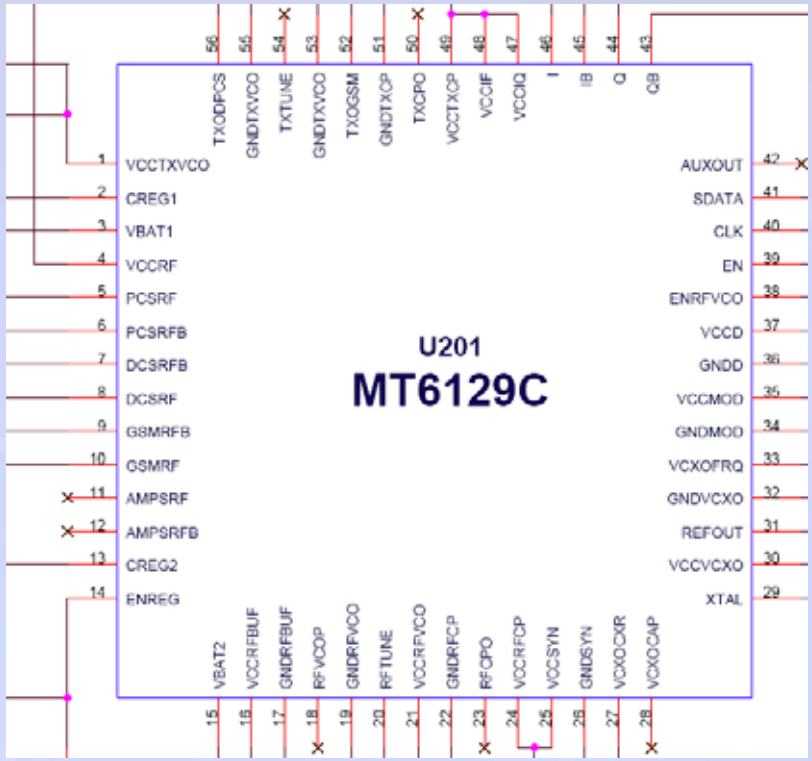
Bluetooth





Item	Description
1	CSR BT IC (U301)
2	XTAL (Y301)
3	BALUN filter (U304)
4	Car kit connector (U302)
5	Chip antenna (U303)

VS600 L4 service training



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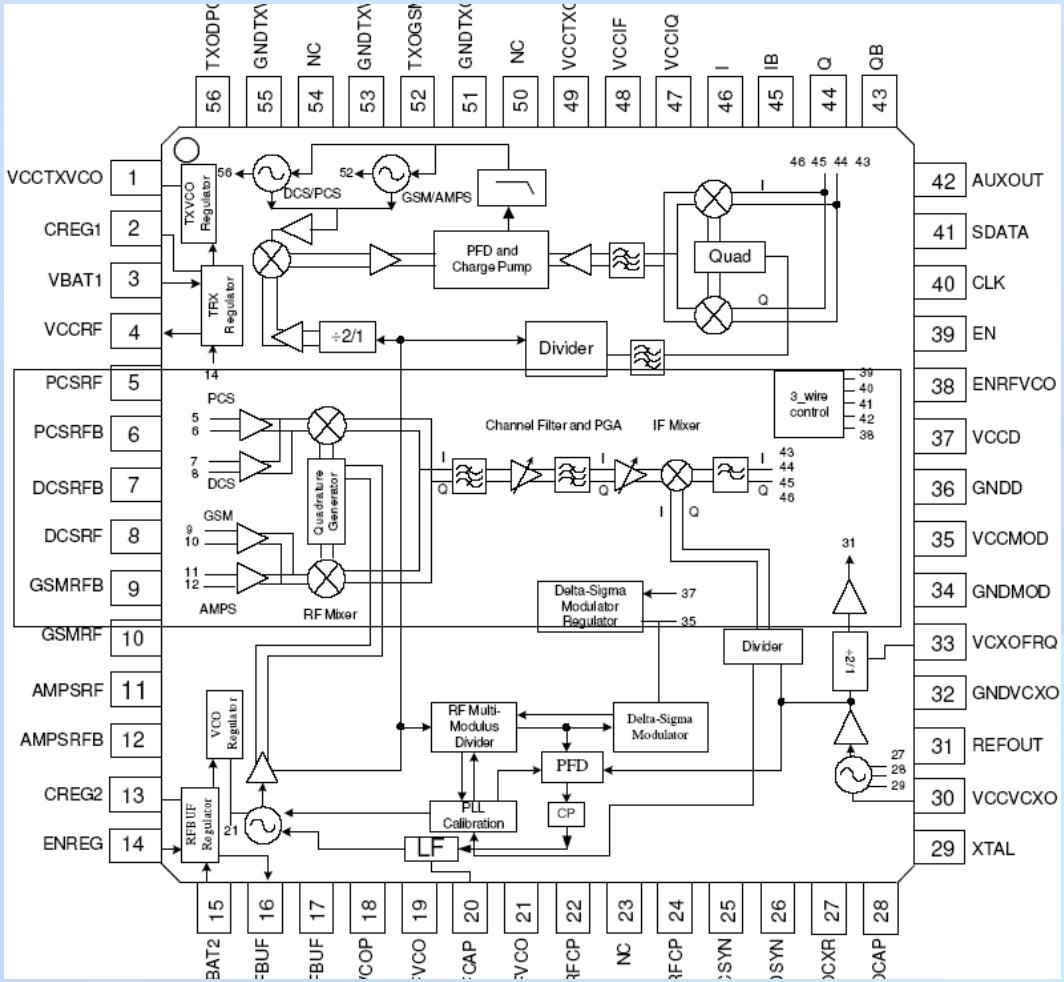
THE ART OF COMMUNICATION

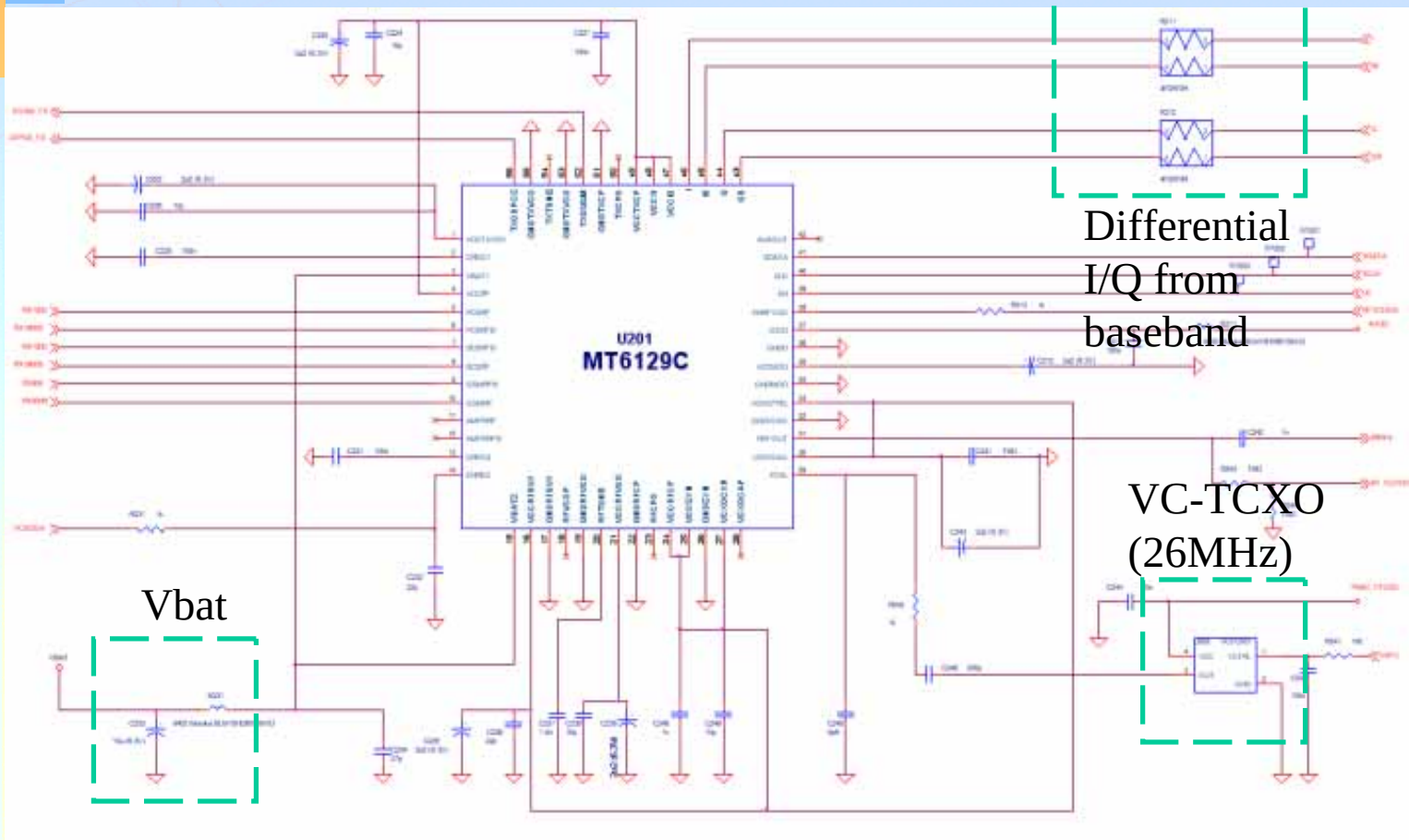
Agenda

- Schematics
- Key Components
- Calibration for Transmitter
- Trouble shooting

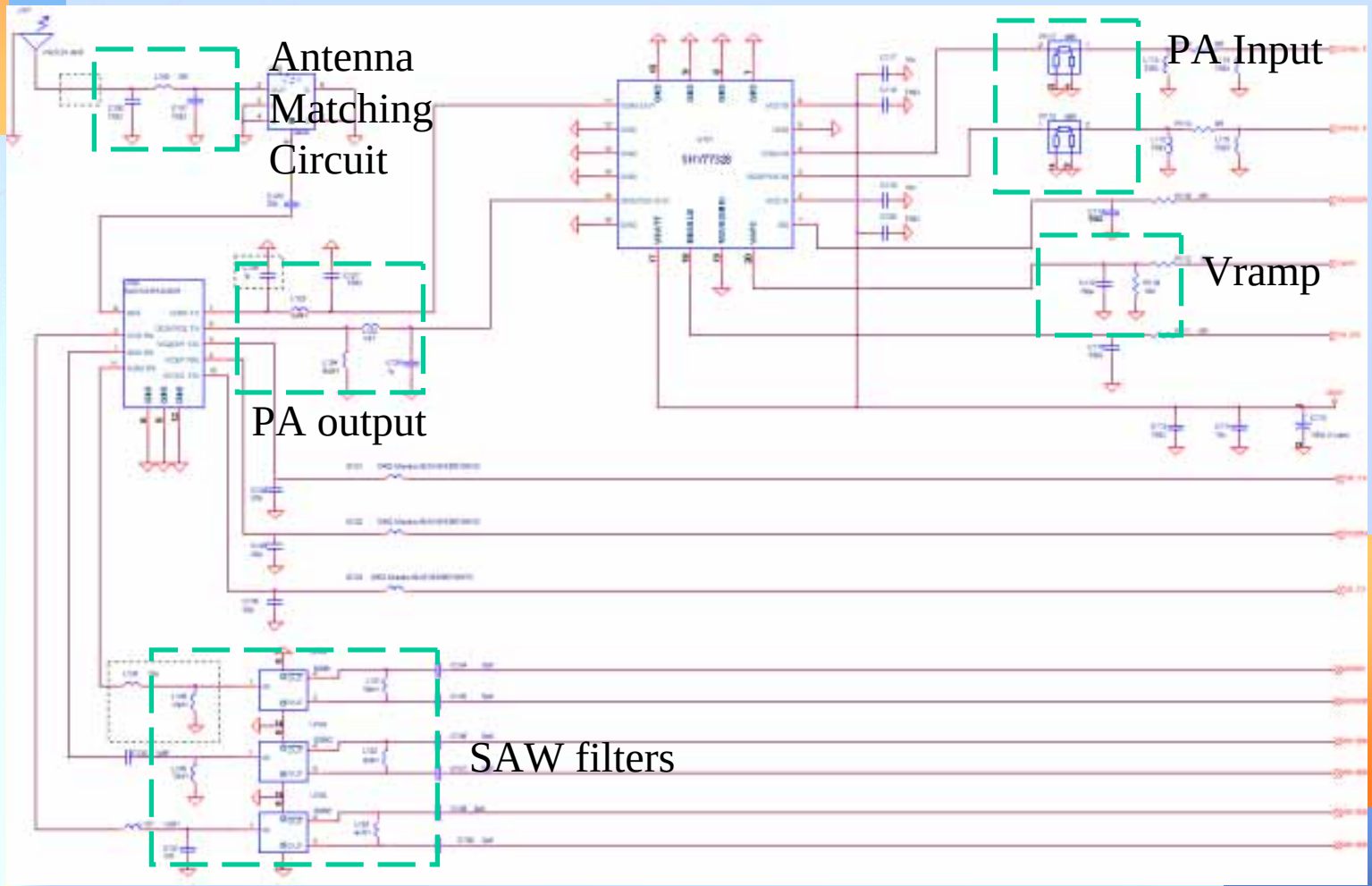
MT6129


VCCTXVCO 1
CREG1 2
VBAT1 3
VCCRF 4
PCSRF 5
PCSRFB 6
DCSRFB 7
DCSRF 8
GSMRFB 9
GSMRF 10
AMPSRF 11
AMPSRFB 12
CREG2 13
ENREG 14
42 AUXOUT
41 SDATA
40 CLK
39 EN
38 ENRFVCO
37 VCCD
36 GNDD
35 VCCMOD
34 GNDMOD
33 VCXOFRQ
32 GNDVCXO
31 REFOUT
30 VCCVCXO
29 XTAL
56 TXODPC
55 GNDTXV
54 NC
53 GNDTXV
52 TXOGSM
51 GNDTXC
50 NC
49 VCCTXC
48 VCCIF
47 VCCIQ
46 I
45 IB
44 Q
43 QB
15 VBAT2
16 RFBUF
17 RFBUF
18 VCOP
19 VCO
20 CAP
21 VCO
22 RFCP
23 NC
24 RFCP
25 SYN
26 SYN
27 XCXR
28 XCAP
TXVCO Regulator
TRX Regulator
VCO Regulator
RFBUF Regulator
DCS/PCS
GSM/AMPS
PFD and Charge Pump
÷2/1
Divider
Quad
3_wire control
Channel Filter and PGA
IF Mixer
PCS
DCS
GSM
AMPS
Quadrature Generator
RF Mixer
Delta-Sigma Modulator Regulator
RF Multi-Modulus Divider
Delta-Sigma Modulator
PFD
CP
PLL Calibration
LF

Schematics


U201
MT6129C
Differential
I/Q from
baseband
VC-TCXO
(26MHz)
Vbat

Schematics

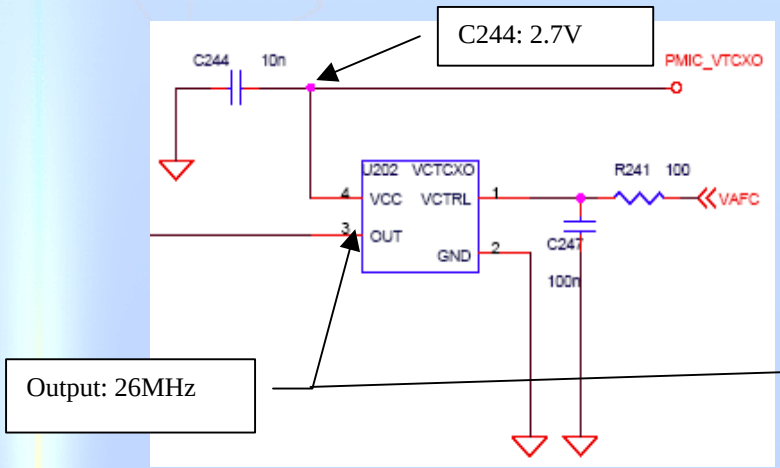

Antenna
Matching
Circuit
PA Input
Vramp
PA output
SAW filters

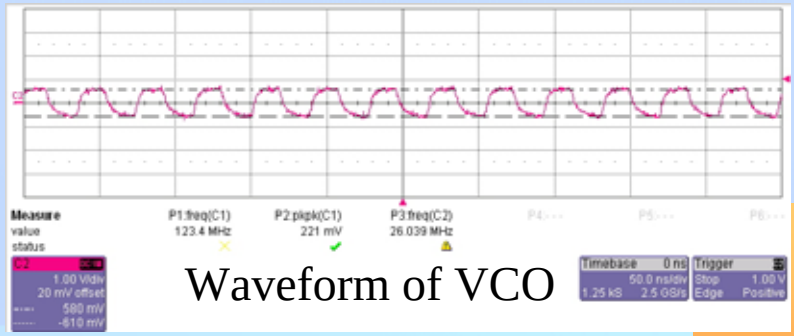
Troubleshooting-RX

- Test Equipment
  - DC power source
  - Signal Generator
  - Spectrum Analyzer
  - Oscilloscope
  - PC with Voxtel Meta Tool
- Service personnel must be skilled with aforementioned equipment and experienced with mobile phone maintenance.

VC-TCXO

- If VC-TCXO is the suspected root cause, please check that it's output frequency and V_{cc} to verify.

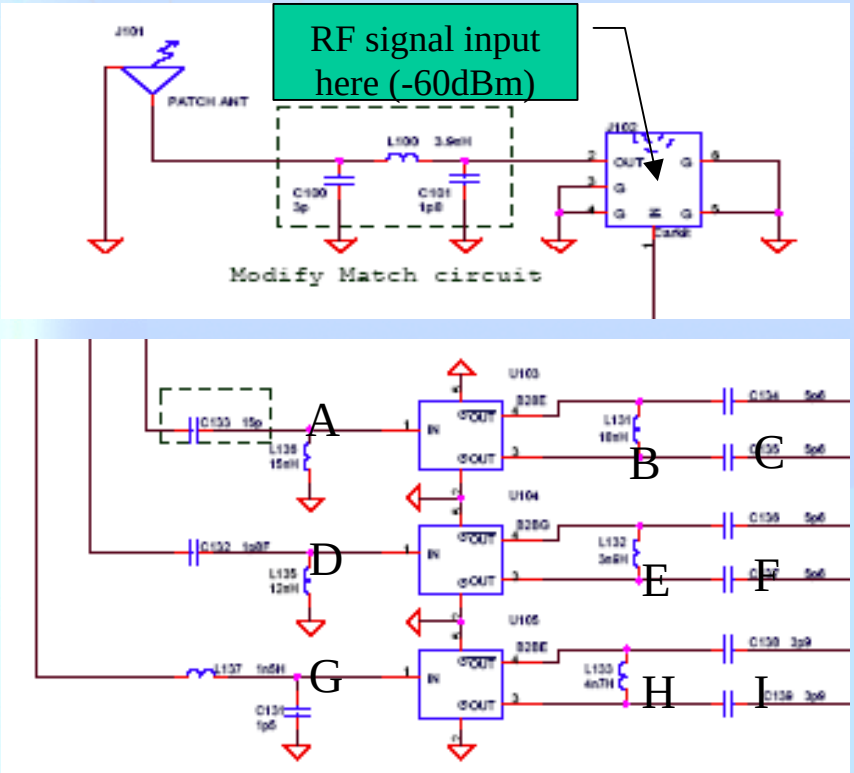




Waveform of VCO

Frond-end

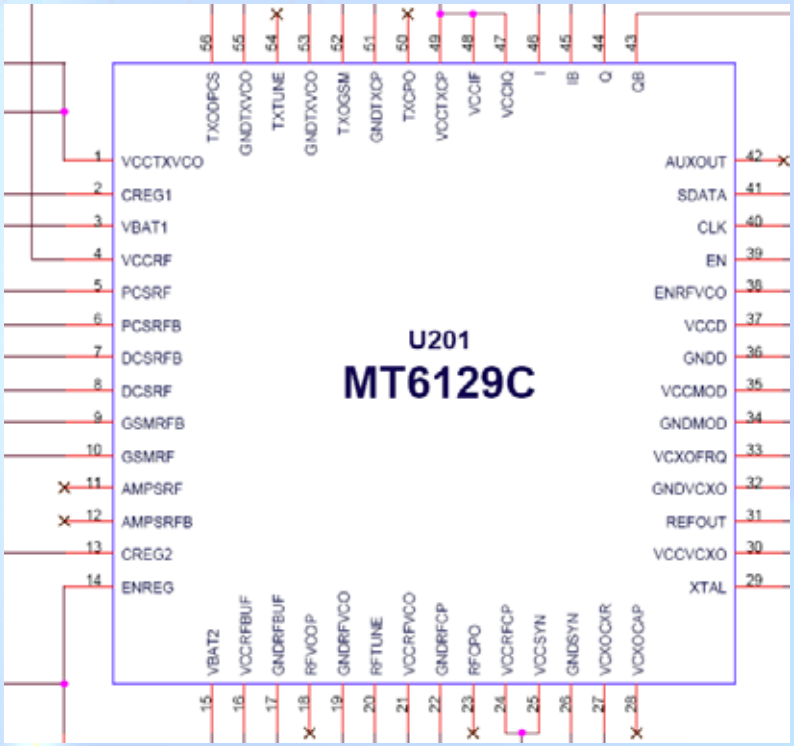
- If the RF front end is the suspected root cause, please check the path loss on the receiver path. Be noted that power off the handset before proceeding this test.



Mode		Expected Value
EGSM	A	-64dBm @ 950MHz
	B	-65dBm @ 950MHz
	C	-65dBm @ 950MHz
DCS	D	-64dBm @ 1850MHz
	E	-65dBm @ 1850MHz
	F	-65dBm @ 1850MHz
PCS	G	-64dBm @ 1950MHz
	H	-65dBm @ 1950MHz
	I	-65dBm @ 1950MHz

Transceiver _1

- If front end isn't the root cause, recommend checking MT6129's neighboring circuits.

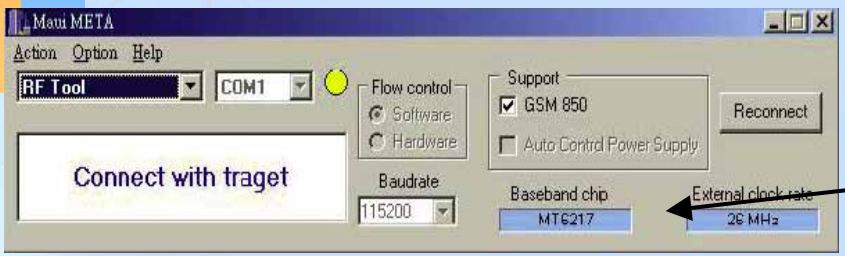


Pin#	Description
#21	2V (20ms, pulse)
#14 #27 #37	2.8V
#30 #33 #38	2.8V (20ms, pulse)
#31	26MHz (V_{p-p} 800mV)

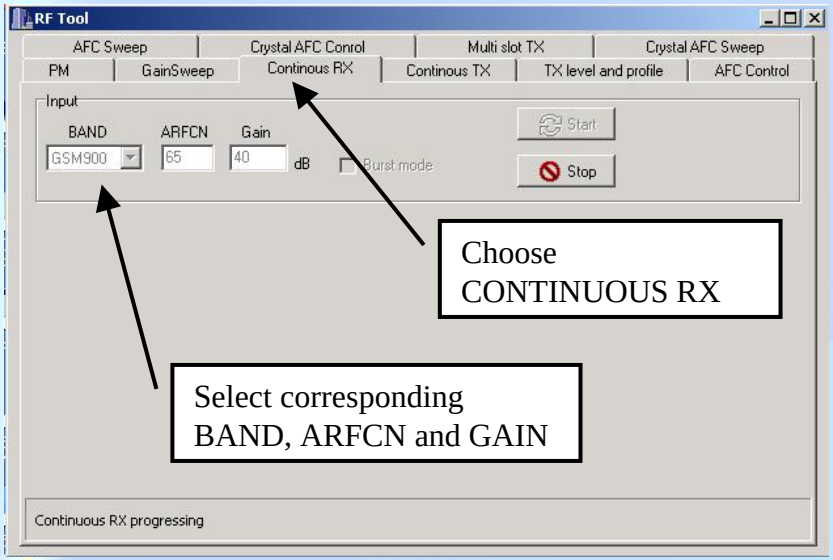
Transceiver_2

- If the neighboring circuits is correct, then proceed to check MT6129 itself.
- To performance the test on MT6129, it requires an oscilloscope and a PC with MauiMETA.
- If the defective PCBA can’t pass the test, please re-solder or replace MT6129.

META Tool For RX

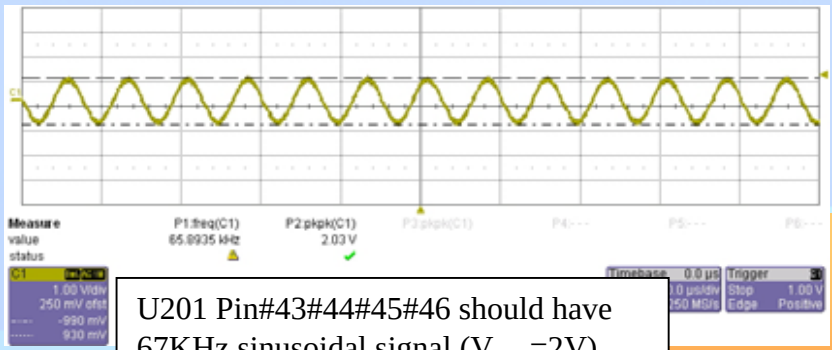


Configure the environment setting



Choose CONTINUOUS RX

Select corresponding BAND, ARFCN and GAIN



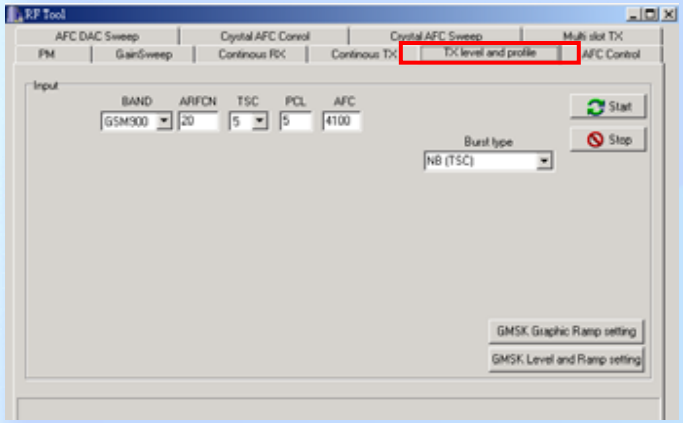
U201 Pin#43#44#45#46 should have 67KHz sinusoidal signal (V_{p-p} =2V)

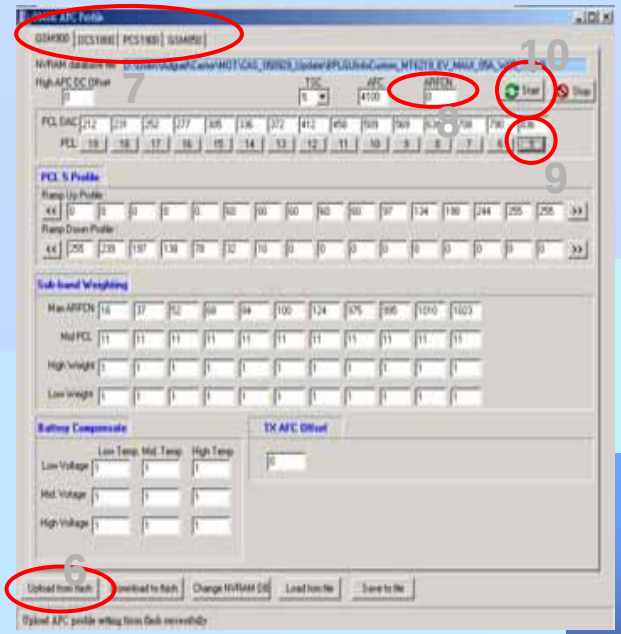
Troubleshooting-TX

- Test Equipment
  - DC power source
  - Signal Generator
  - Spectrum Analyzer
  - Oscilloscope
  - PC with Voxtel Meta Tool
- Service personnel must be skilled with aforementioned equipment and experienced with mobile phone maintenance.

Transceiver

- In order to verify the performance of MT6129C, we need the Maui META to initiate the TEST MODE.
- Please provide a 3.8V DC source to the handset and use the oscilloscope to measure the suggested test points .



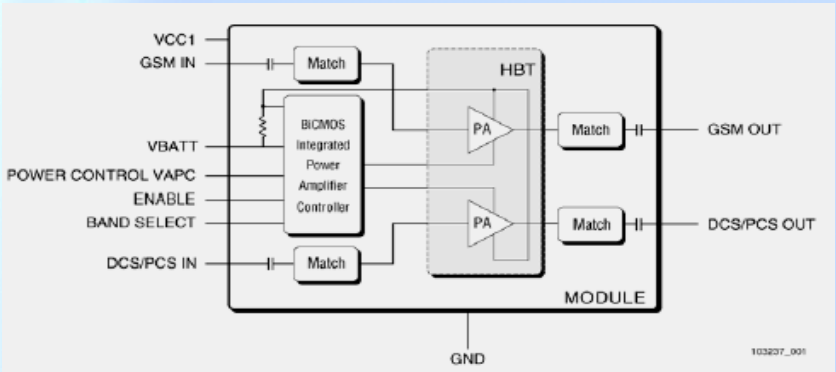


- Please check Pin # 1, #3 and #15 first.

Pin #	Pin Name	VoltageLevel	Location	Signal Type
1	**VCCTXVCO**	**1.5V**	**C222**	**Burst**
3	**VBAT1**	**3.8V**	**B231**	**Continuous**
4	VCCRF	2.7V	C223	Continuous
15	**VBAT2**	**3.7V**	**B231**	**Continuous**
16	VCCRFBUF	2.8V	C235	Continuous
21	VCCRFVCO	2V	C239	Continuous
24	VCCRFCP	2.8V	C249	Continuous
25	VCCSYN	2.8V	C249	Continuous
30	VCCVCXO	2.8V	C243	Continuous
33	VCXOFRQ	2.8V	C235	Continuous
35	VCCMOD	2V	C212	Continuous
37	VCCD	2.8V	B211	Continuous
38	ENRFVCO	2.8V	R213	Continuous

Power Amplifier

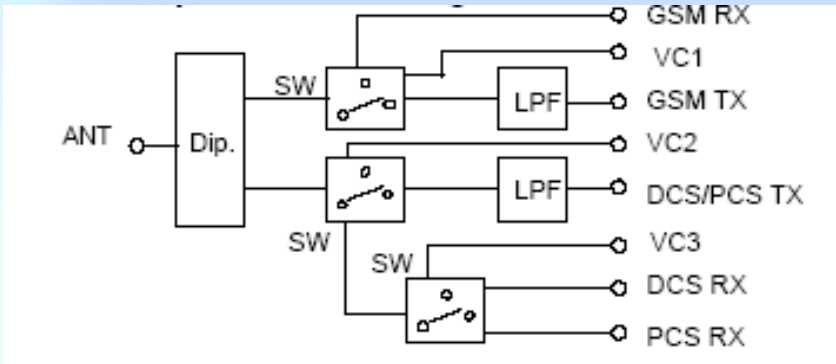
- SKY77328 is a tri-band power amplifier. It is used to boost the amplitude of transmitting signals from transceiver. It's a high current consumption and moisture sensitive component.



Name	Type	Description
VBat	Supply	Voltage of Battery (Typ. 3.8V)
PA_EN	Logic	Enable (Typ. 2.8V)
BS	Logic	L: GSM900; H: DCS/PCS
Vapc	Analog	0.2~2.1V
RF in	RF	RF input (0~6dBm)

Antenna Switch

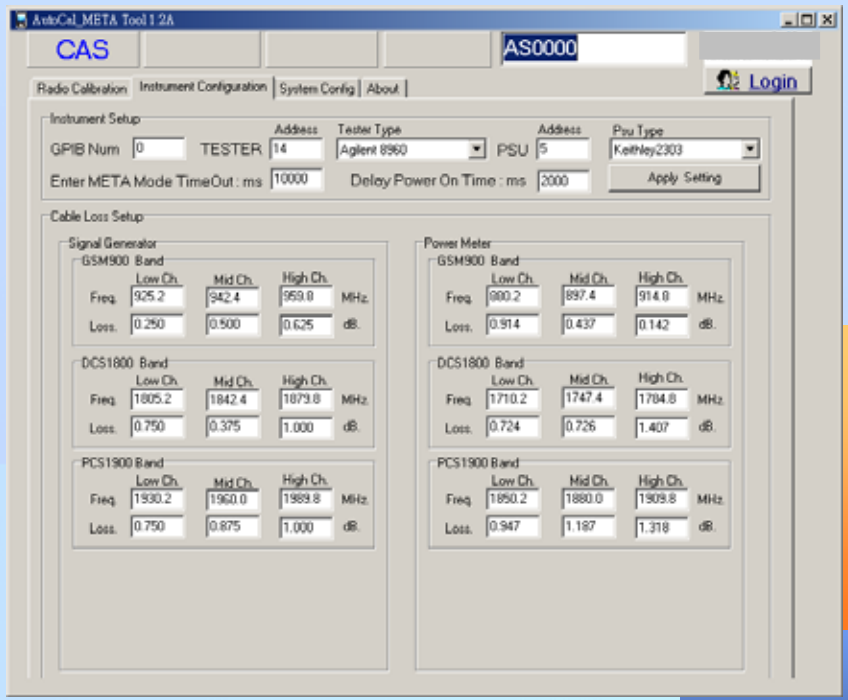
- 085TK is a tri-band antenna switch, which has 3 RX ports and 2 TX ports.



mode	VC1	VC2	VC3	Current
GSM_TX	2.6V	0V	0V	8mA
DCS/PCS_TX	0V	2.6V	0V	8mA
GSM_RX	0V	0V	0V	0.01mA
DCS_RX	0V	0V	0V	0.01mA
PCS_RX	0V	0V	2.6V	0.8mA

Calibration Tool

- After maintenance of MT6129C (Transceiver) or SKY77328 (Power Amplifier), we need to re-calibrate the RF subsystem. AutoCal_Meta is used for calibration.
- It requires an Agilent 8690, a Keithly DC source and a PC with AutoCal_Meta. You also need a RS232 cable for connection between PC and handset.

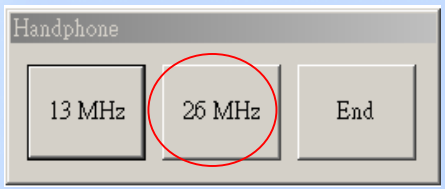


Troubleshooting_Bluetooth

- Test Equipment
  - DC power source
  - Spectrum Analyzer
  - Oscilloscope
  - PC with CSR Bluesuite, BlueCore-Handphone CW generator
- Service personnel must be skilled with aforementioned equipment and experienced with mobile phone maintenance.

TX Measurement

- Open “BlueCore-Handphone CW generator”. It will activate the Blue IC’s TX measurement mode.
- The frequency selection is needed to set to 26MHz.



Pin#	Expected Value
C311, C312	3V DC
L326	3dBm @ 2441MHz
U302	0dBm @ 2442MHz
C343, C344	350mVpp @ 26MHz

Crystal Trimming

- Open” CSR BlueSuite”_”PS Tool” for activate the test mode for Crystal trimming. Please select *Crystal frequency trim.*
- Change the decimal (0~63) and then proceed to TX measurement to check all test points.
- If the measured value is beyond the expected value, change the decimal again and proceed the TX measurement again.