



# Motorola V690 Service Manual

Rev 1.0

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## Chapter 1. GSM Overview

### 1-1 Overview of Mobile Terminal

A mobile ~~terminal~~~~handset~~~~device~~ (abbreviated to “mobile” thereafter) consists of four major modules conceptually. The four modules are Radio Frequency unit (RF), Base Band unit (BB), Software (SW) and ~~Mechanical~~ ~~Mechanics~~ (ME). Both RF and BB are ~~hardware~~~~design~~~~electrical circuitry~~, and SW is the controlling firmware inside the hardware to perform all mobile functions. ME ~~is~~ mainly plastic or metallic case as the handset housing~~that encloses the hardware for protection and appearance purpose.~~ ~~Since ME is actually less related to the core of a mobile device, it will not be described in the later section.~~

An example of mobile handset system is shown in the following figure. The “Modules” shown in the figure represents the core hardware and software.

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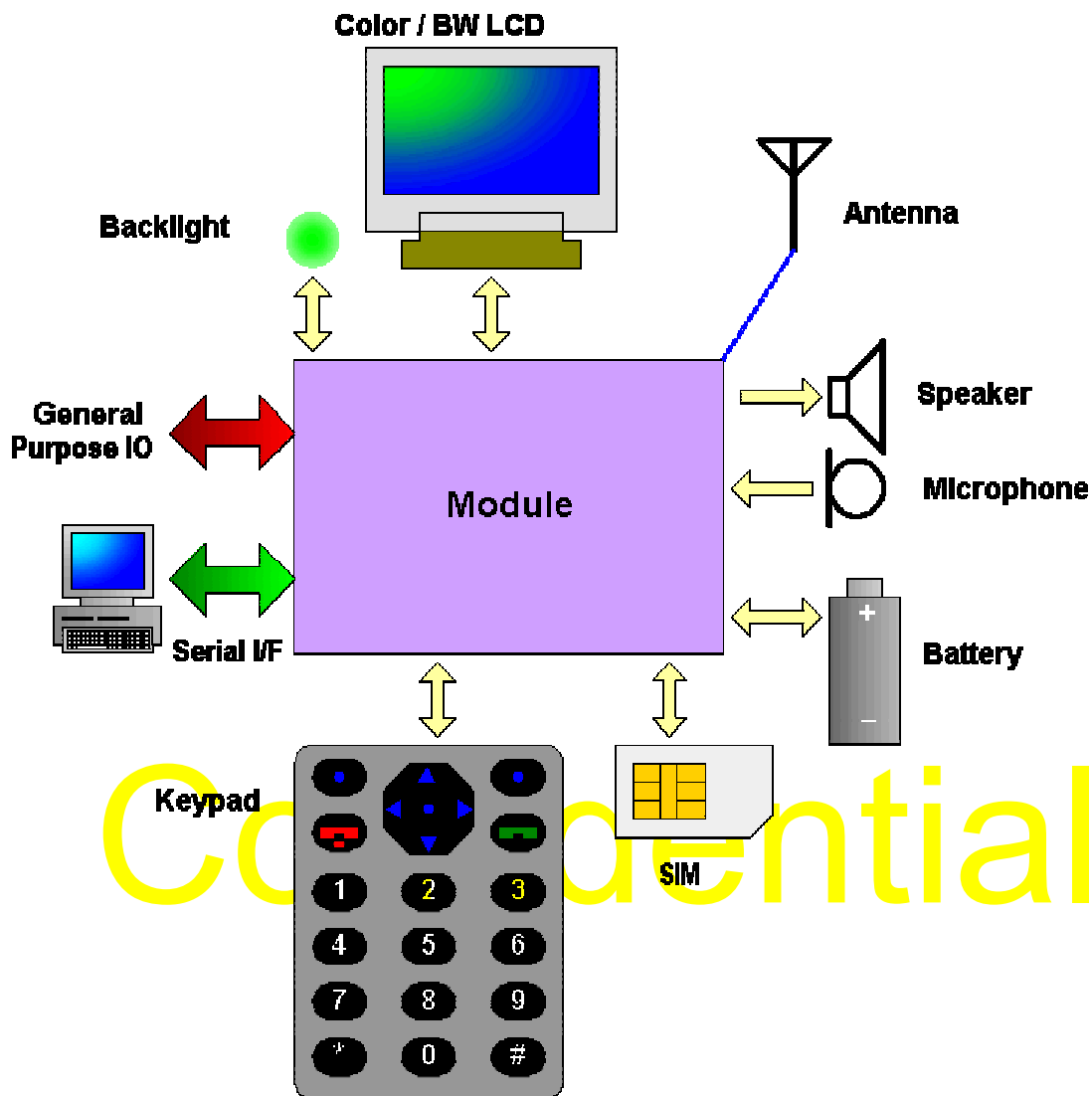


Fig. 1 Block Diagram of A Mobile Handset System

## 1.2 Overview of GSM System

The GSM system is based on TDMA+FDMA concept. TDMA incorporates the benefit of time-splitting technique to expand the capacity of the system, which means in the same frequency channel, by applying the TDMA technique it is possible to allow more users to access the network at the same time. Based on this concept, a “physical” channel consists of a continuous series of time slots with the same index (1 ~ 8, or sometimes indexed with 0 ~ 7). As a result, there are 8 physical channels on one frequency, or in other words, a physical channel is characterized by the frequency definition and the time slot index. The time slot index is always the same, however, the frequency definition can be one unique frequency

or a set of frequencies when frequency hopping is applied. The frequency hopping means that the frequency used is different for each occurrence of signaling (one TDMA frame), for example in frame N the frequency index 1 is used for signaling, and in the next TDMA frame a different index 35 is used. The pattern of frequency hopping is defined in GSM spec and must be described in channel assignment before communication between mobile and network starts.

The frequency spacing between two adjacent channels is 200 kHz. The carrier frequency ranges from around 900 MHz up to 1900 MHz. The period of a time slot (or called a “burst”) is about 577 μs. A TDMA frame comprises 8 time slots; with period of about 4.615 ms. A “logical” channel is a group of physical channels or part of the physical channels. For example, a traffic channel for speech can be composed of the series of time slot with index “1” on CH 1 (cf. GSM 05.01, 05.02). Note that the concept of “logical” channel is different from “physical” channel. The definition of physical channel is straightforward: each physical channel is defined by a unique frequency or a set of frequencies if hopping applied, and time slot index. For a logical channel, it can be part of a physical channel (e.g. SACCH) completely mapped onto one physical channel (FCH/SCH), or mapped onto several physical channels (BCCH/CCCH).

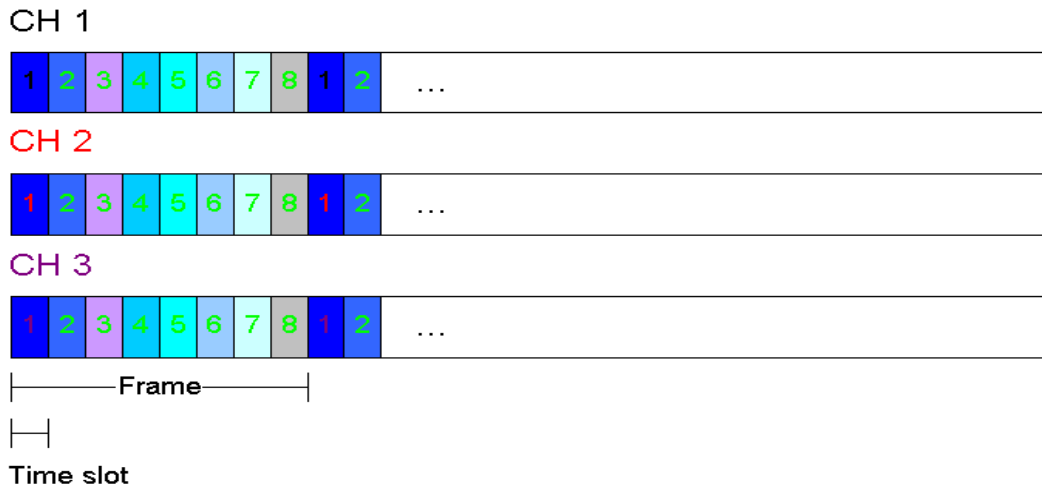
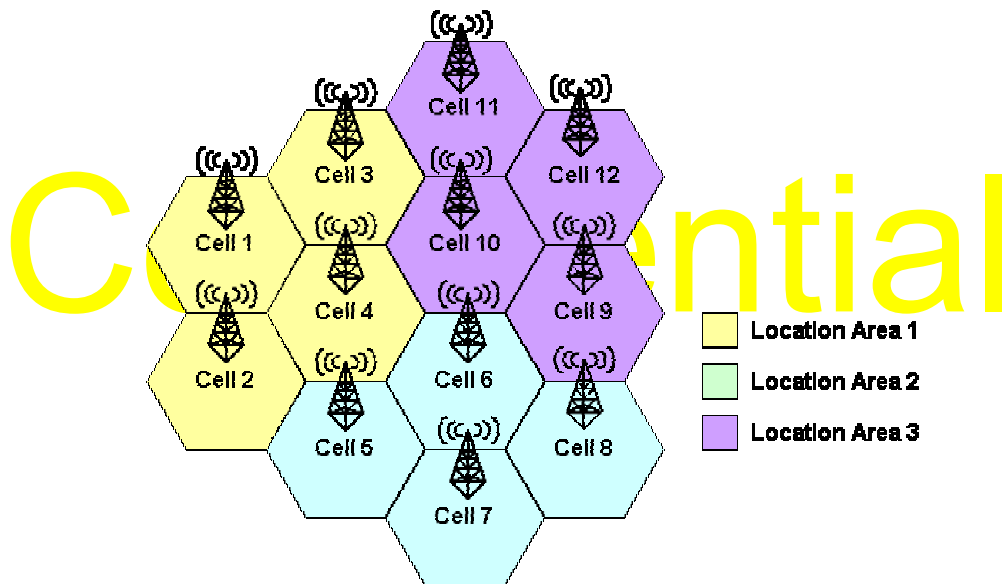


Fig. 2 GSM Physical Channel Structure

For GSM system to work correctly, the mobile device (and also the network end) must catch the correct frequency and timing to receive the information contained in the specific time slot. Therefore there are a lot of requirements in the RF and BB in both frequency accuracy and timing accuracy (cf. GSM

05.05).

In the network side, the corresponding basic communication unit is called “base station” or other more popular name “cell”. A base station is equipment similar to the mobile handset (but of course, much bigger and more complicated) allocated with one or more physical channels. A network (sometimes called “Public Land Mobile Network, PLMN) is comprised with several “Location Areas”, and each Location Area is comprised with several cells. In the earlier time when mobile network was originated the network model was based on the group of hexagon-shaped cell, so later a mobile network is sometimes called “cellular network”. Actually, the shape of a cell may not be hexagonal, but for graphical presentation of the network model, the hexagonal shape is often used.

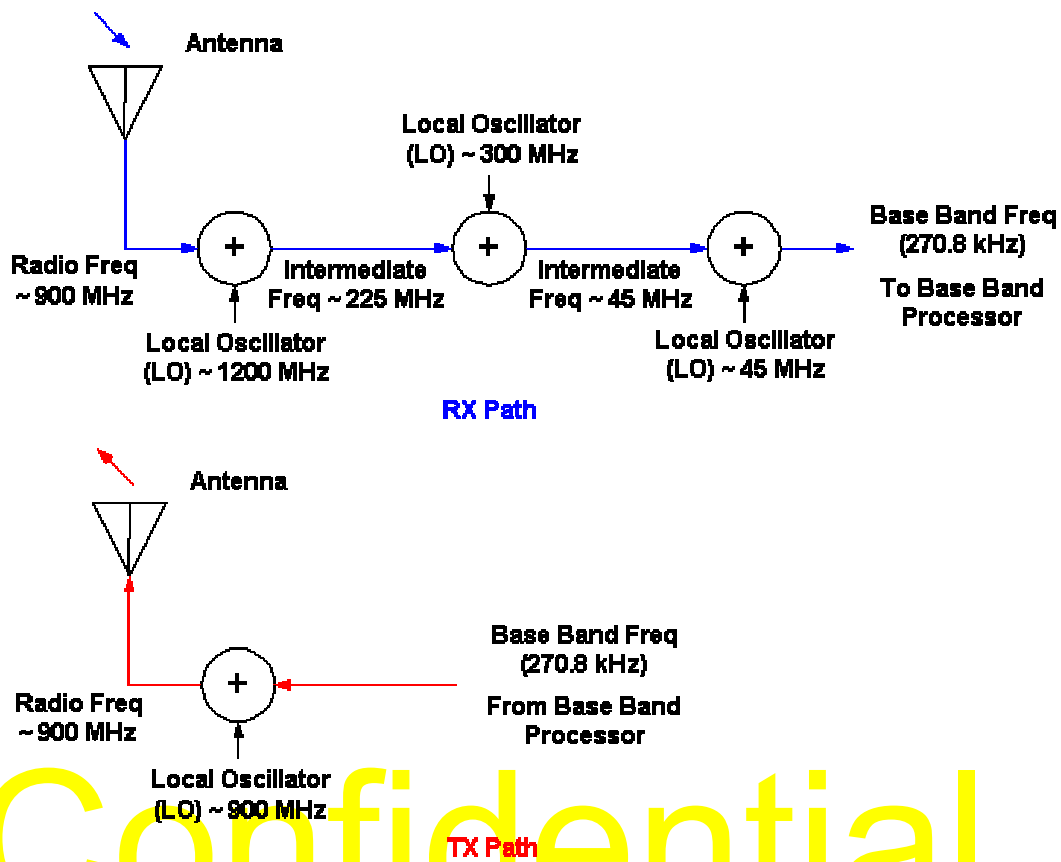


*Fig. 3 Example of Location Areas and Cells in A Network*

### 1-3 Radio Frequency

The RF module serves as the reception / transmission of radio frequency microwave signals. The frequency band ranges from around 800 MHz, up to 1900 MHz. The general (but traditional) concept of the RF module can be illustrated by Fig. 4.





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Fig. 4 Traditional RF Design (Conceptual)

Because the received RF signal is usually weak and dirty (mixed by other background noise), it is required to filter the received signal and then to obtain the wanted signal. In earlier time when the RF component design is not so advanced, it is a common design concept to split down the demodulation path into several stages, such that the filter design for each stage is much easier than to design a very narrow band pass filter in the RF range. But as technology evolves a new design called “direct conversion” is used such that there is no need to apply multiple stages for demodulation. This allows simpler and smaller design to fit the smaller form factor.

The requirements on RF module can be summarized as following.

- (1) Introduce as less as possible noise on demodulated signal (RX) – frequency error / bit (symbol) error
- (2) Introduce as less as possible noise on modulated signal (TX) – phase / frequency error
- (3) Follow strict burst timing such that the transmission of signal does not

- affect the adjacent time slots and frequency channels (requirement on ramping profile in both timing and spectrum)
- (4) Accuracy of received power level report (RX) – such that the network knows how much power the mobile device receives
  - (5) Accuracy of transmitted power level (TX) – such that the transmitted power is well controlled at the wanted level.

#### 1-4 Base band

The Base Band module generally covers all the hardware parts other than RF module. As shown in Fig. 1, except the RF module and antenna, the base band covers the core (CPU, DSP, analog circuits, memory chips) and the peripherals (LCD, keypad, ...etc). Another figure below shows the parts in the core BB module.

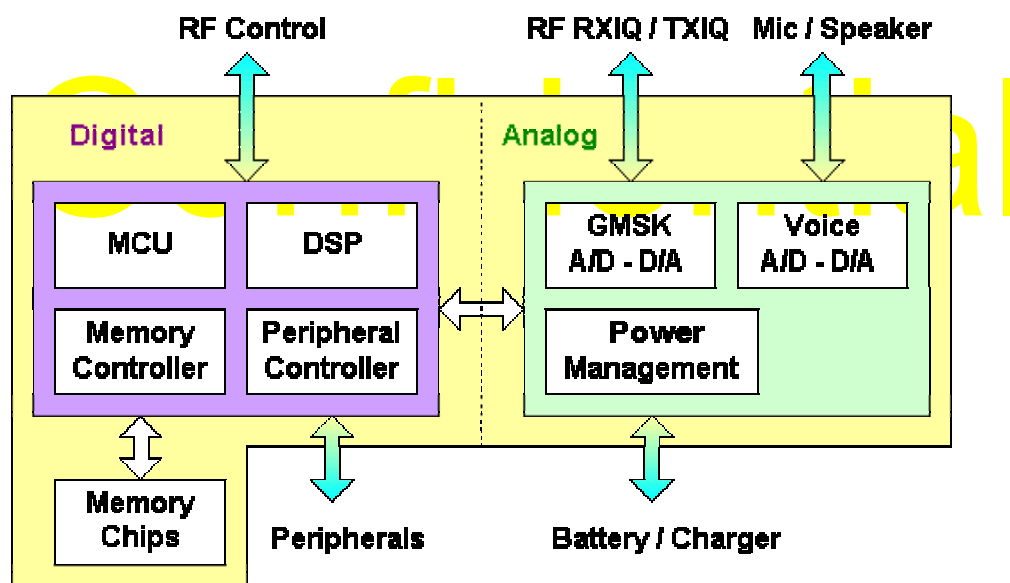


Fig. 5 Base Band Block Diagram

The MCU (Memory Controller Unit) and DSP (Digital Signal Processor) together form the computing core of the system. The software binary code is stored in the memory chip and is executed by the MCU. The variables are stored in another type of memory such as SRAM or SDRAM (often used in PDA-type smart phone). The peripheral controller provides hardware functions that help the software to control the peripherals as indicated in Fig. 1. Common peripherals include LCD, keypad, backlight, ringer generator (buzzer or melody), vibrator, RTC (Real Time Clock), SIM, UART (or USB),

GPIO, speaker / microphone, and external memory card interface if designed.

The analog part of the core module consists of several A/D - D/A (Analog to Digital, Digital to Analog) units and power management unit. The A/D – D/A units serve as the bridge between digital part and the analog peripherals, such as RF and audio (microphone / speaker). Most of the A/D - D/A paths are connected to DSP of the digital part, and the DSP works under the command of MCU to perform encode / decode of the digitized samples. For example, when RF receives signals from the antenna and demodulates the signal to obtain the base band signal at 270.8 kHz (RX I/Q signal), then the A/D unit in the analog part “digitizes” the analog signal into a stream of digital data and sends it to DSP. DSP then decodes the actual GSM data bits out from the digitized samples, and finally the data bits are sent to MCU for processing (refer to software section). In the reversed direction, if MCU wants to send some GSM data bits to the network, it sends the data to DSP and DSP encodes it then sends it to the D/A unit of the analog part, and the D/A unit generates the 270.8 kHz signal to RF, and finally RF modulates the signal with proper carrier signal and sends it to antenna. Note that all these operations are controlled by the MCU with precise timing.

One key point for base band and RF design is the safety issue. The mobile is a small device that transmits RF power, which can be harmful to human body if not well controlled. Therefore it is important to restrict the maximal power delivered by the mobile and to ensure that the power transmitted by the mobile does not affect human body too much – as specified in SAR (Specific Absorption Rate) requirements. Also to protect the mobile from static electrical shock damage, some ESD components must be used to absorb the unexpected high-voltage static electrical shocks.

## 1-5 Software

The SW is the soul of the entire system. All operations regardless GSM related or not are controlled by the software. There are four major parts in the software: Real-Time Operating System (RTOS), Man-Machine Interface (MMI), Protocol Stack (PS) and L1 Driver (DRV). The relationships among these four parts are shown in Fig. 6.

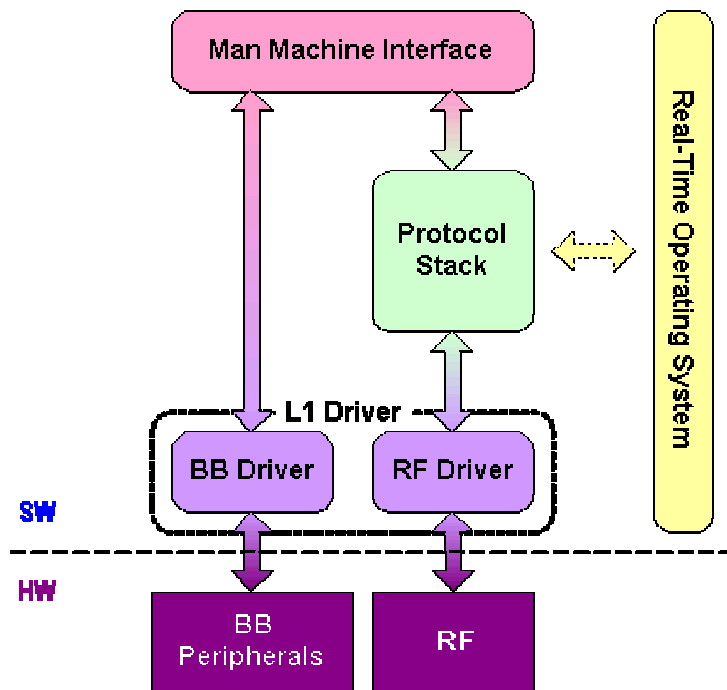


Fig. 6 Simple Diagram of Software Architecture

### 1-5-1 RTOS

The RTOS is a helper module in the software. It provides two major functions: thread scheduling and OS services.

### 1-5-2 MMI

It handles the interface between human and the mobile handset such as dialing, phone book, short message, incoming call / message alert indication, etc. Generally the MMI receives commands from user key press and responds the result on the display or other type of indicators (LED, audio, etc). This concept is common to interactive electronic devices but the MMI in the mobile handset system is specifically designed for handset use.

### 1-5-3 Protocol Stack

The Protocol Stack serves for GSM-specific protocol operations, to complete the required or necessary functions such as finding the best cell for communication, network search and registration, making calls, sending Short Messages. Part of protocol stack operations are automatically done (e.g. finding the best cell), the others are controlled by MMI (such as making a call). The protocol stack commands the L1 RF

driver to control the RF to complete the radio signaling.

To demonstrate that the mobile operates as GSM spec defines in the protocol perspective, it is often required to pass the test cases defined in GSM spec (11.10) in a certified test lab. This process is referred to “Type Approval” or “Full Type Approval (FTA)”.

#### 1-5-4 L1 Driver

It includes the driver for BB functions and the driver for RF. The driver for BB can receive commands from upper layer (mainly MMI) to complete operations through peripheral hardware, e.g. LCD display, or receive signals from peripheral hardware e.g. keypad and send indication to upper layer. The RF driver controls the RF part for protocol stack signaling.

It is also required that the mobile can communicate with external devices such as PC for the purpose of development, production or data transfer. The most common interface is UART (Universal Asynchronous Receiver/Transmitter), or in another more prevailing name, the RS232 interface (but RS232 only defines the electrical characteristics). A standard UART interface (refer to ITU V.110) consists of 9 pins, the pins are:

- a) TXD data transmission signal
- b) RXD data reception signal
- c) RTS Ready-To-Send signal, for hardware flow control (reception)
- d) CTS Ready-To-Send signal, for hardware flow control (transmission)
- e) DTR Data Terminal Ready signal, indication of terminal ready
- f) DSR Data Set Ready signal, indication of host ready
- g) DCD Data Carrier Detect, for earlier modem carrier signal detection
- h) RI Ring Indicator, for indication of incoming call
- i) GND Signal ground

Note that for some cases the signal pins used are reduced to TXD, RXD and GND only, and another flow control scheme – software flow control is used. This saves pin outs and space when the board is small. In the future, USB or other common serial link device and also be used for communication between mobile and external devices.

## 1-6 Operation Cycle of Mobile Handset

The operation cycle of a mobile handset starts from power on and ends at power off. Possible operations during active (i.e. between power on and power off) include finding a network, making calls, sending SMS, using phonebooks, configuring the phone, etc. In the following sections only GSM or system related operations are presented.

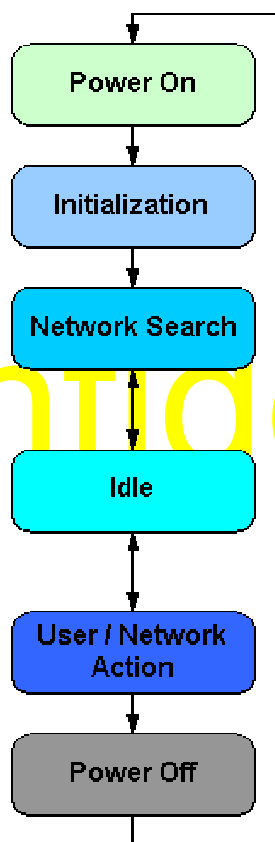


Fig. 7 Operation Cycle of Mobile Handset

### 1-6-1 Power On

While the mobile system is not powered by external power supply (charger) or battery, it is in power-off state. But note that for hardware alarm function to work the real time clock (RTC) must be powered by other standalone power source such as a button cell, or even directly from the main battery. In the power-off state, the system is not working (except for the RTC), and the power consumption is near zero.

Several events can trigger the mobile to power-on state, such as key press of the power on key, plugging of the charger, time-up of the alarm (from RTC), and other hardware triggers. The trigger event depends on how the hardware is designed. After any of the power-on events are detected by the system, the system resets the CPU and other hardware modules. After CPU is reset, it begins to execute the software loaded in the non-volatile memory such as flash or ROM. Then it's the job of the software to take over the control of the system. The system now enters initialization state.

### 1-6-2 Initialization

For an embedded system like mobile handset, it is necessary and important to correctly initialize the entire system, for example: the memory system. After reset the access speed of the external memory is usually set to lowest by the hardware, because the chip designer does not know what the external memory chips will be used in the system, so it is the safest way to set it to slowest at beginning. After complete design of the system is done, the access speed of the external memory is fixed, so the software can change the access speed to the optimal range. Similarly, all hardware modules that are not self-initialized must be initialized by the software at initialization state.

In broader sense of initialization, it also includes initialization of the software modules. For example, if there are any global memory locations that need to be given initial values, they are initialized by the default values. Normally the initialization procedure takes about 1 to 2 seconds. After all hardware / software initialization is done, the software may try to determine the power on cause and the next step. If the power on is triggered by pressing the power on key, then it means the user wants to turn on the mobile, therefore the software enters the next state for network searching. If the power on is triggered by plugging of the charger, the software just shows some charging animation because the user may only want to charge the battery without using it, but he may of course turn on the mobile after a while for normal use. Similarly, if the mobile is powered on by the alarm, only visual or audio indication is presented to the user and the system waits for the next user action to determine the next step (power on or power off).

### 1-6-3 Network Search

When the mobile handset is powered on and goes through initialization procedure, the next important thing to do is to search the network for use. Since the mobile does not know where it is, complete synchronization procedure is required to get synchronized to the network. The “synchronization” procedure is important because the GSM network is based on very precise timing control.

The steps of network search can be briefly presented as following. All the steps involve both software and hardware (BB, RF).

First, the mobile has to measure the signal strength of the frequency channels. If no prior knowledge of the frequency channels around this area is obtained, the mobile needs to measure all the frequency channels allocated for the frequency band (for example, in standard GSM 900 band there are 124 channels).

Second, After the full measurement, the mobile tries to get synchronized to the frequency channels, one by one, and from the **strongest** one. If the mobile can get synchronized to one frequency channel, then this channel could be the control channel of a cell in the network (but note that the channel could be for other use even it has strong signal strength). Also note that not all the control channels are synchronized at the same timing. When changing to another cell the synchronization procedure has to be repeated.

Third, when the mobile gets synchronized to a cell, it has to read all the system information from that cell. The system information of the cell tells the mobile the network it belongs, as well as whether the cell is suitable for signaling use or not. If the mobile finds that the cell is not suitable for its use (not the network it searches, or not a suitable cell for signaling) it continues to get synchronized to the next strongest frequency channel, until it finds the best cell and stays on it. When this is done, it is usually called “camp on” – means that the mobile has successfully camped on a cell of the network it searches. And the network ID can be found in the SIM card. If SIM card is not inserted in the mobile, the mobile will try to search any network with cell of strongest signal strength, but the user will only be allowed to dial emergency only calls (112 or 999).

After the mobile camps on the network, it enters “idle” state.



#### 1-6-4 Idle

In idle state, the mobile waits for user instruction or paging from the network. The paging information from the network is periodic, such that the mobile only needs to “listen” to the periodic paging message broadcast by the network, without listening to every piece of message from the network (except for the necessary messages need to be updated periodically, like the system information). This is important because it implies that the mobile does not need to work for message receiving all the time. While the mobile is not receiving (no paging message or other messages to receive), it can enter power saving mode to reduce the power consumption. But as soon as there is any system interrupt occurs such as key press or timer interrupts, the system must react as quickly as possible.

During idle state the mobile is also responsible for cell change. That means, if the mobile is moving (due to user moving), the signal strength of surrounding cells will change, resulting that the original cell it camps on may no longer be the strongest one. If this happens, the mobile will switch to another cell and get synchronized to it. This operation is done without indication to the user.

If the mobile receives any user action or network paging, it then goes to User / Network Action state. If the mobile loses synchronization to any cell due to very low signal level or severe interference, it may goes back to network search state.

#### 1-6-5 User / Network Action

The user may want to make a call or receive a paging from network, and then the mobile prepares for such action. There are other actions requiring GSM protocol operations such as Short Message Services (SMS).

##### a) Random Access

When the mobile receives instructions from user or network for making a call, it first proceeds to “random access” procedure. This is quite similar idea as widely used in medium access technology found in the Ethernet or others, that when a client wants to make dedicated connection with the server, it sends some “access” messages to the server to indicate the request. The reason why it is called “random access” is that there might

be several clients trying to make connection with the server, and if it happens that the request messages from different clients “collide” each other, the messages will be corrupted and the server may not receive any access request message. Then, after waiting for a while if the client finds that there is no response from the server, it “randomly” delays for another while and then sends a new access request to the server, and repeats the procedure until the server finally receives the request, or the maximal number of trials is reached.

#### b) Channel Assignment

If a successful random access is acknowledged by the network, the network will then broadcast the response message together with the description of a dedicated channel (mainly the frequency and time slot allocated) for following communication. The mobile and the network then switches to the new channel at the same time, talking to each other to exchange some basic information (e.g. what number of the SIM is making the call, to which number it is trying to call). After this is done, the network may allocate a “traffic” channel for voice and also try to ring the remote party (the number that the user calls). After the remote party answers the call, the call is established successfully.

#### c) Handover / Channel Change

During the call, if the signal level or quality changes due to environment fading or user moving, the network may request the mobile to change the traffic channel. If the cell that holds the traffic channels cannot provide better communication quality but the other cells can, the network may also “handover” the mobile from the original cell to another cell that can provide better quality.

#### d) Back To Idle

When the call is ended, the network releases the traffic channel and the mobile goes back to idle state. Another case is that the signal quality is too bad to maintain the connection, or the mobile is placed in a very weak signal area, then the call could be dropped without indication to the user and the remote party. The mobile goes back to idle state automatically then.



#### 1-6-6 Power Off

There are 2 normal powers off conditions: the user presses the power key or the mobile detects extreme low battery voltage. Either condition brings the mobile back to power off state. The operation cycle is then completed.

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## Chapter 2 Product Specifications

Dimension		90.6x 47 x 22.6 mm	
Weight		90g	
LCD	Internal	Type	TFT
		Resolution	128*160
		Color	65K Color
	External	Type	Mono FSTN
		Resolution	96*16
		Color	B/W
Band		TriBand (EGSM900 + PCS1800 + DCS 1900)	
JAVA		MIDP 2.0	
Polyphonic ring tone		40 Polyphonic	
Camera	Flash	Super bright LED	
	Resolution	160x120 (QQVGA)	
		320x240 (QVGA)	
		640x480 (VGA) 128x160 (portrait)	
Digital Zoom	Up to 3X		
Battery	Capacity	730mA	
	Talk Time	Up to 3hr	
	Standby Time	Up to 250hrs	
Data support		GPRS 1U/4D	
Browser		WAP 1.2	
Product Type		Folder Type	
Messaging		SMS ,MMS	
Antenna		Internal	
I/O bus connector		TTA	

General Function	Specification
Frequency Range (E-GSM)	880-915 MHz Tx 925-960 MHz Rx
Frequency Range (DCS)	1710-1785 MHz Tx 1805-1880 MHz Rx
Frequency Range (PCS)	1850-1910 MHz Tx 1930-1990 MHz Rx
Channel Spacing	200 kHz
Channels	EGSM 174, DCS 374, PCS 299, carriers with 8 channels per carrier
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	<= 5 Degrees RMS, 20 Degrees peak
Duplex Spacing	E-GSM 45 MHz, DCS 95 MHz, PCS 80MHz
Frequency Stability	± 0.10 ppm of the downlink frequency(Rx)
Operating Voltage	+3.3V dc to +4.2V dc
Average Transmit Current	300 mA max
Average Stand-by Current	5 mA max
Dimensions	
Size (Volume)	
Weight	
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life	

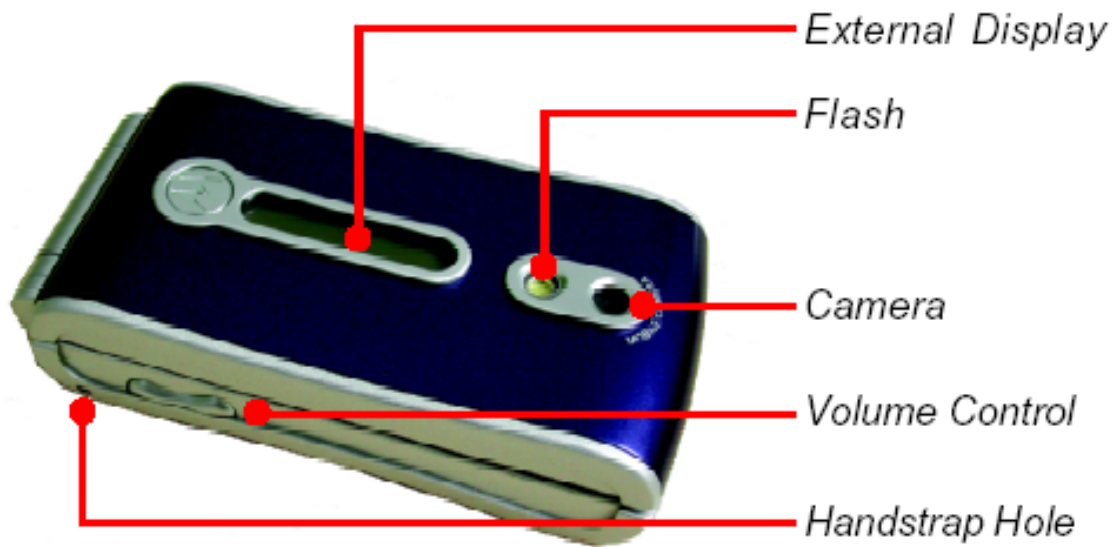
Transmitter Function Specification	
RF Power Output	33 dBm nominal GSM 900 29.5 dBm nominal GSM 1800 29.8 dBm nominal PCS
Output Impedance	50 ohms nominal
Spurious Emissions	<= -36 dBm from 0.1 to 1 GHz, <= -30 dBm from 1 to 4 GHz

Receiver Function Specification	
Receive Sensitivity	-107 dBm E-GSM, -106 dBm DCS 1800, -105 dBm PCS 1900
RX bit error rate (100k bits) Type II	< 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

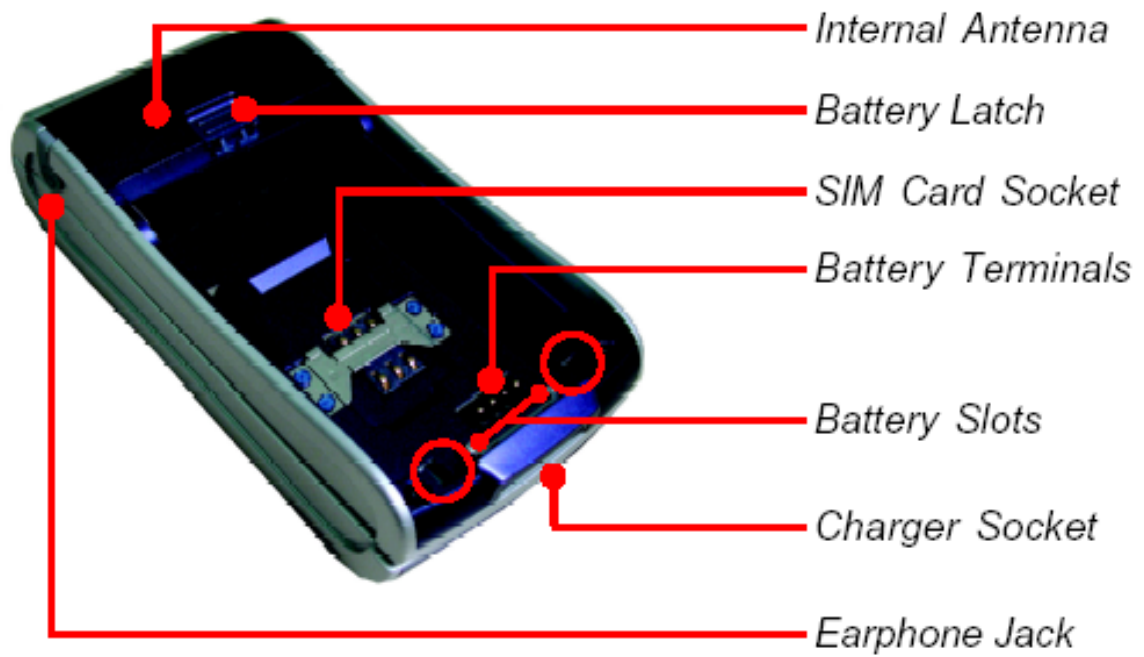
Speech Coding Function Specification	
Speech Coding Type	Regular pulse excitation / linear predictive coding with long term prediction (RPE LPC with LTP)
Bit Rate	13.0 kbps
Frame Duration	20 ms
Block Length	260 bits
Classes	Class 1 bits = 182 bits; Class 2 bits = 78 bits
Bit Rate with FEC Encoding	22.8 kbps

## Chapter 3. Configuration

### 3-1 Front

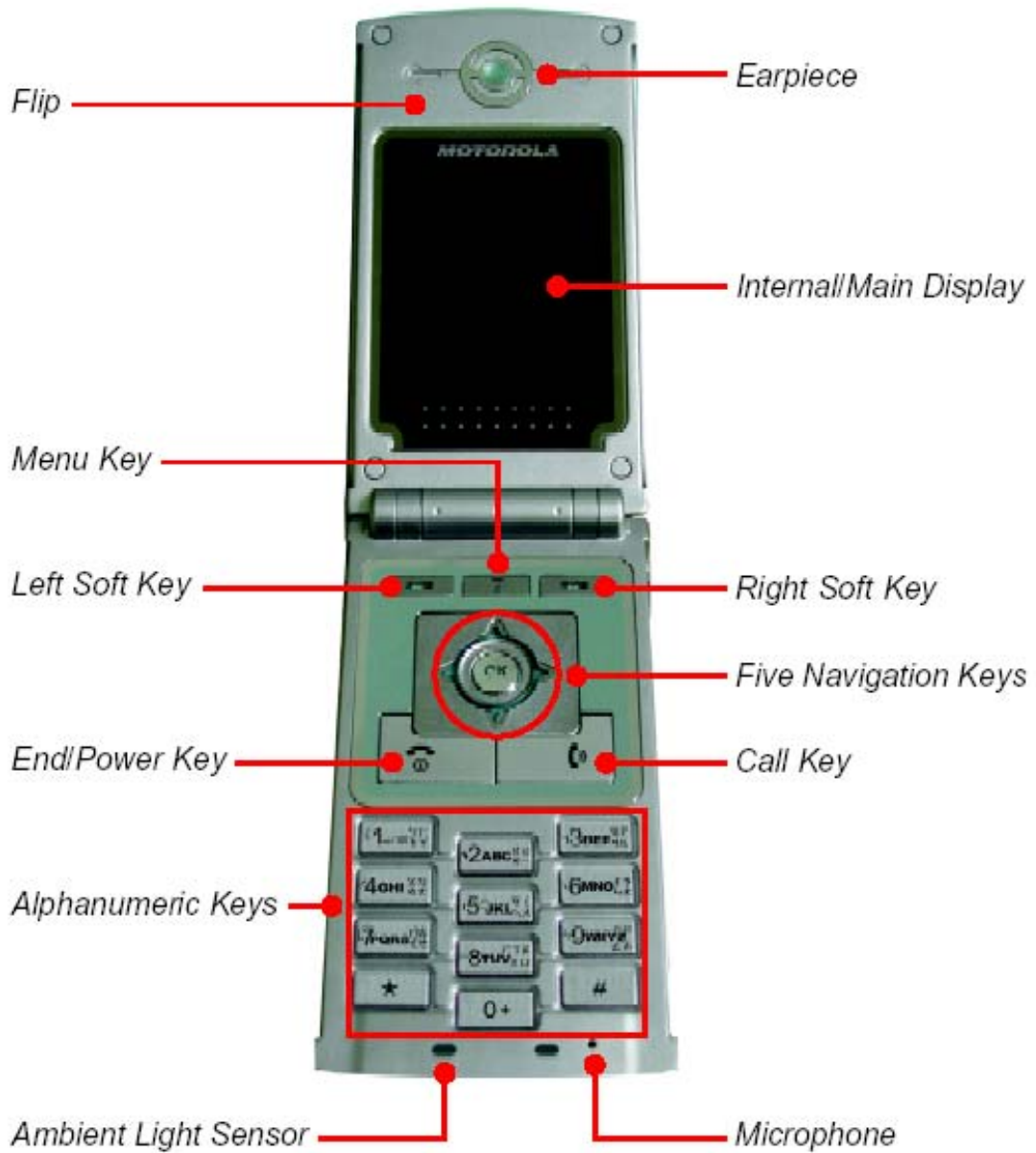


3-2 Rear view





### 3-3 Open view



## Chapter 4 Trouble Shooting

### 4-1. Test equipment and tools

- ✧ *PC*
- ✧ *PC ReDownload*
- ✧ *TORX T5 screwdriver*
- ✧ *Tweezers*

### 4-2. Re-download

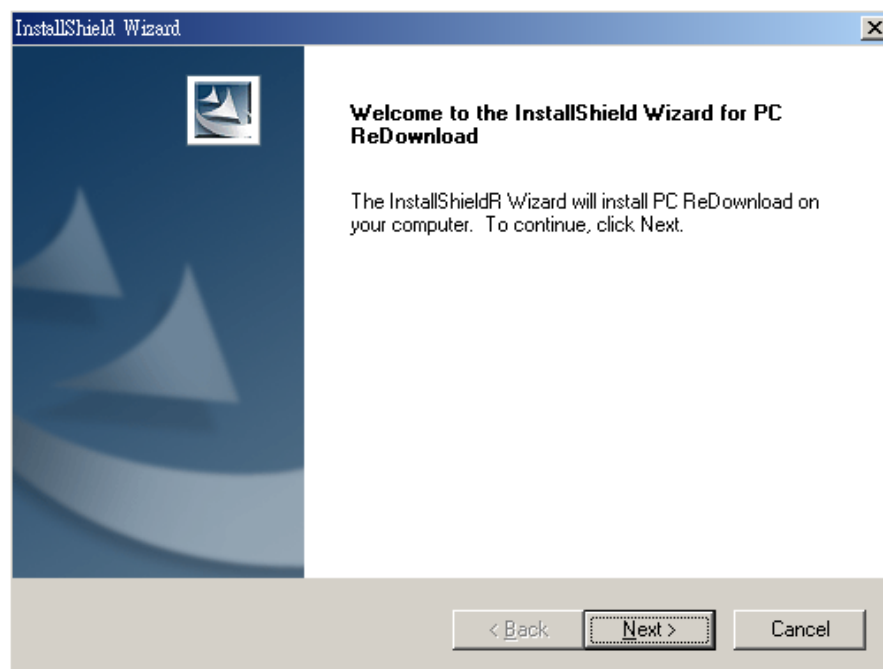
PC ReDownload is an application that lets engineer to re-download Smartphone on the local system. The main function of PC ReDownload is to update newest software version.

PC ReDownload works on Windows NT 4.0, Windows 2000, Windows XP and Windows 98 SE.

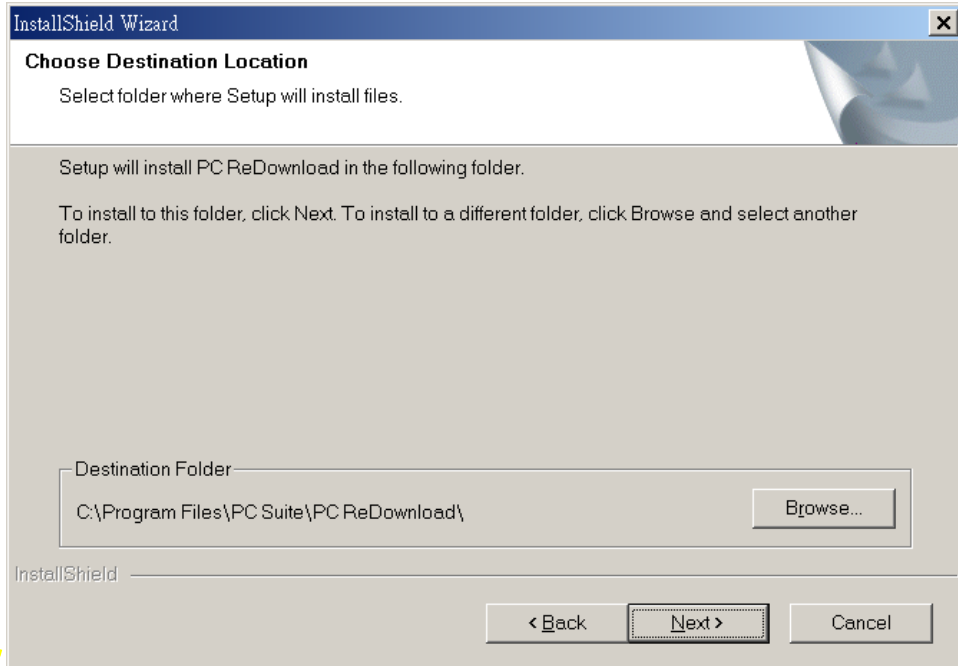
Double click the PC ReDownload setup file and follow the instruction to install the PC Suite -PC ReDownload Package.

#### 4.2.1 Install PC ReDownload

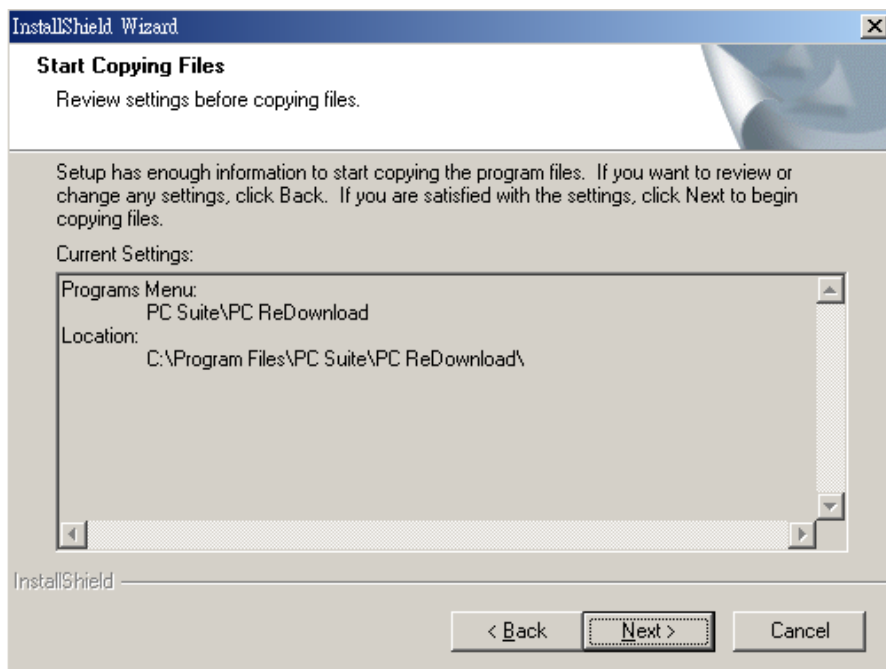
Simply execute the PC ReDownload file (PCReDownload.exe) to start up application.



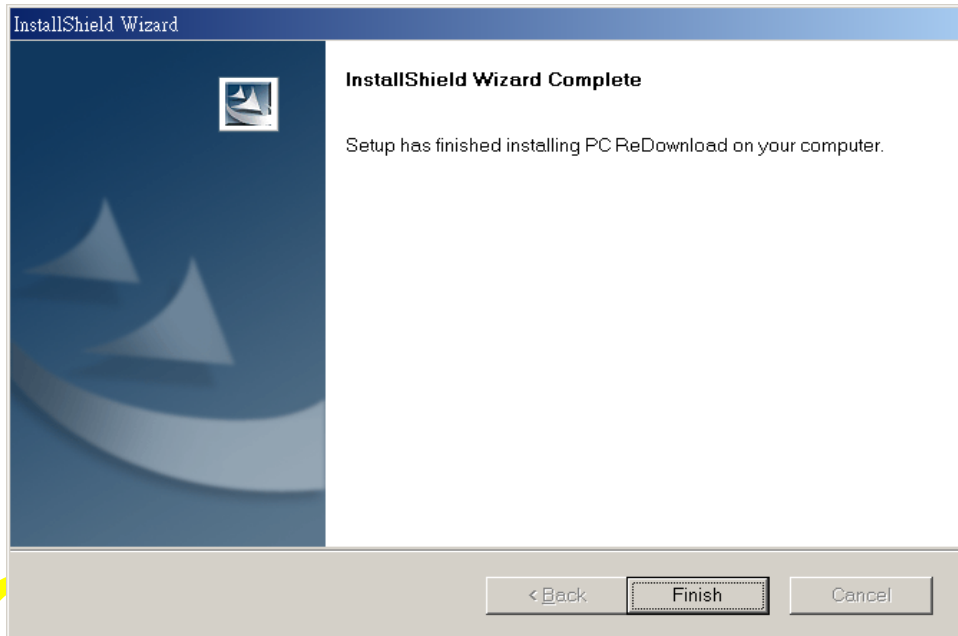
Choose your destination directory to setup, then press “NEXT” button.



Press Next to continues the process



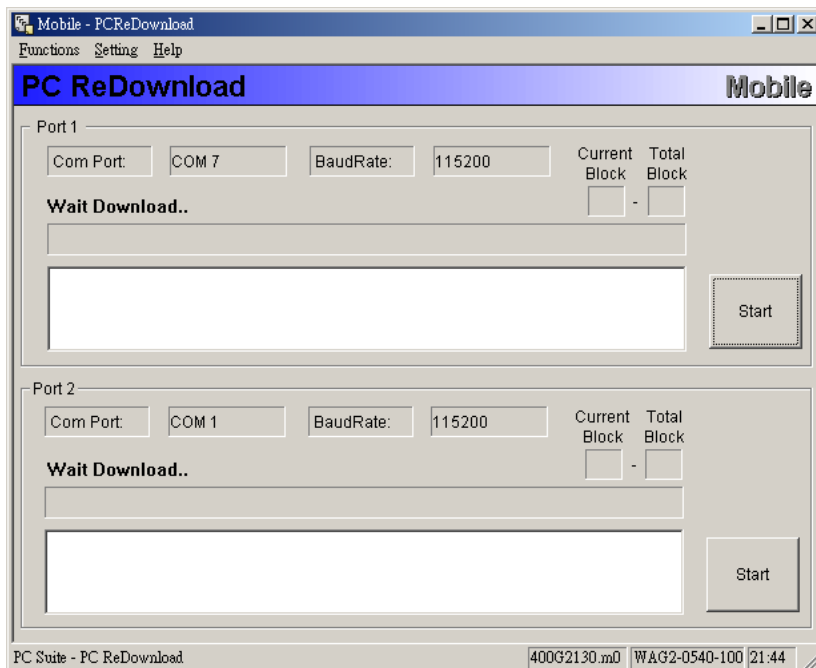
Press “Finish” to finish setup process.



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#### 4.2.2 Starting PC Redownload

Double click on the PC Redownload Icon to start re-download new firmware.



Select “Download Files” from “Setting” and choose appropriate re-download files (firmware and flash loader) and “Port 1” for communication information. After choosing active function, click the “Start” button to proceed the job. The process events will be displayed, include process status and messages. If there is any error occurs during process, the message also outputted. Each time exit PC ReDownload, it remembers the setting of download files and communication information.

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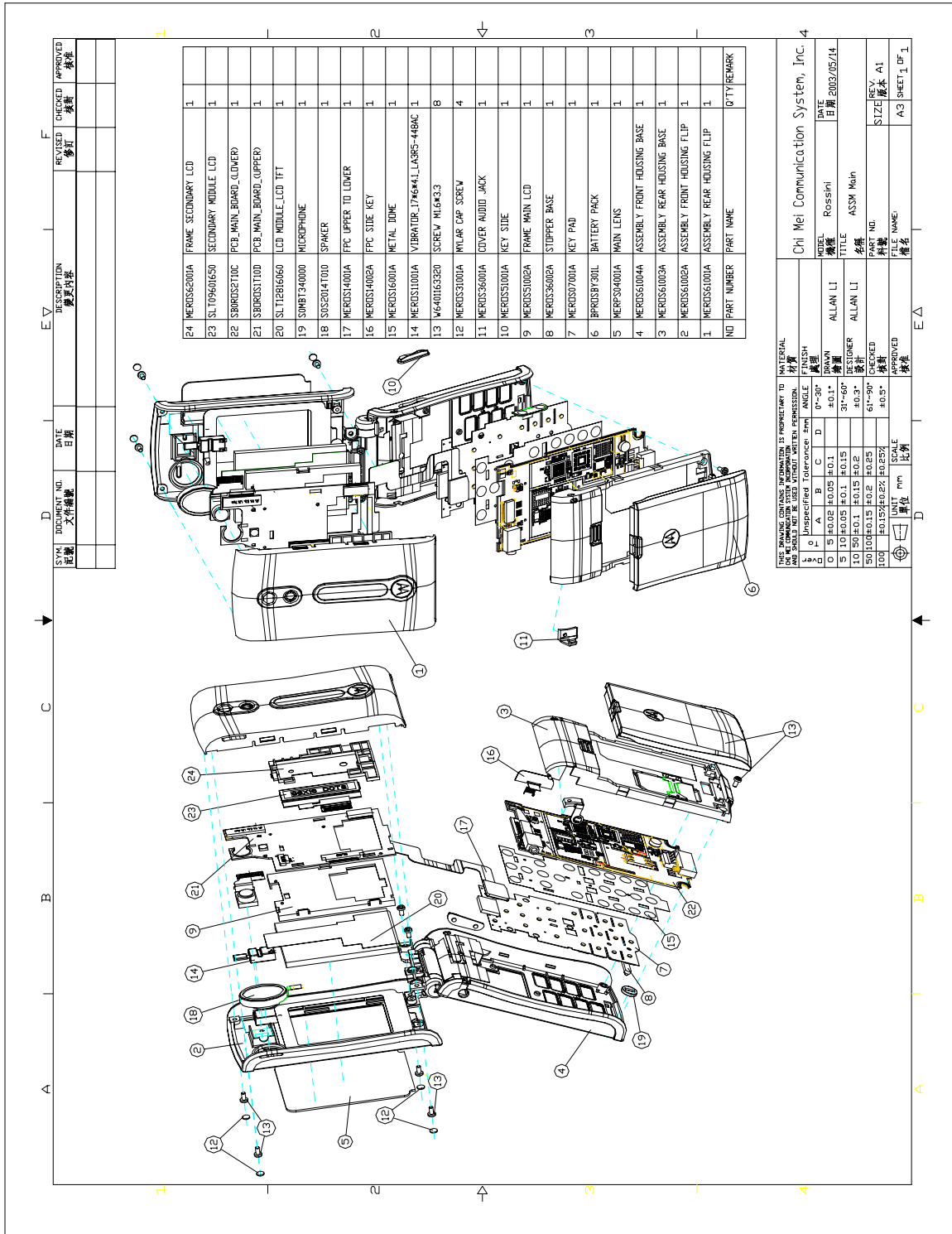
## 4-3 Level 1 and Level 2 repair

<b>Level 1 Repair (No screwdriver needed)</b>			
Item	Failure Description	Possible root cause	Repaired process
1	Phone can't turn on	Battery is discharged or defective.	Measure the voltage of battery. 1. Charging the battery 2. Replace a new one.
2	Battery can't pop out or scratch	The battery is defect.	Replace a new battery
<b>Level 2 Repair (Unscrew the phone but no PCBA repair needed)</b>			
Item	Failure Description	Possible root cause	Repaired process
1	Keypad doesn't function	Keypad bottom short	1. Using alcohol to wipe the keypad metal dome. 2. Replace a new metal dome
2	Speaker doesn't function	Component shift	1. Visually inspect if the contact point between speaker and PCB pads is contacting well. 2. Replace a new speaker
3	Microphone doesn't function	Component shift	1. Visually inspect if the contact point between machine and PCB pad is contacting well 2. Replace a new microphone
4	Main LCM or Sub LCM no display	FPC defect	1. Visually inspect if the connection between FPC cable and PCB is ok or FPC is damaged

			<ol style="list-style-type: none"> <li>2. Reconnect the FPC</li> <li>3. Replace a new LCM</li> </ol>
5	Camera no function	Crack on the FPC	<ol style="list-style-type: none"> <li>1. Visually inspect if the connection between FPC cable and PCB is ok</li> <li>2. Reconnect the FPC</li> <li>3. Replace a new camera</li> </ol>
6	Vibrator no function	Component shift	<ol style="list-style-type: none"> <li>1. Visually inspect if the vibrator is deform</li> <li>2. Replace a new vibrator</li> </ol>
7	Open or close the cell phone not smoothly	There is interference between the FPC and the knuckle	<ol style="list-style-type: none"> <li>1. Visually inspect the position of FPC</li> <li>2. Re-assemble</li> </ol>
<b>Level 2 Mechanical Parts Repair</b>			
1	Lens-Main LCD scratch		<p>Any of these mechanical parts are scratch, damage, or fall off. These parts can be repaired by replacing a new one. (Referring to Chapter 6 Disassembly and Assembly Tips )</p>
2	Lens-Secondary LCD scratch		
3	Case-A, B, C, or D Scratch		
4	Earphone Jack Keypad Side key,		

# Chapter 5 Exploded Diagram

## 5-1 Upper and Lower unit





## Chapter 6 Disassembly Tips

This chapter serves as a guideline to help the respective service personnel in the repairing of V 690 up to level 2. At Level 1 stage, technician can repair those components without using screwdriver or any special devices.

**Precautions:**

Please use tools appropriate to the specification set disassembly.

Do not press the unreasonable force at disassembly. The set may be damaged

A screwdriver is needed to assemble or disassemble the V690 Case-A, Case-B, Case-C, and Case-D. The size of the screwdriver is TORX T5.



*Electrical screwdriver with torque and rotation speed controller*

## 6.1 Level 1 Disassembling

Step 1: Press the battery latch and take out the battery



## 6.2 Level 2 Disassembling

Step 1: Remove 2 screws illustrated in the photo by screwdriver

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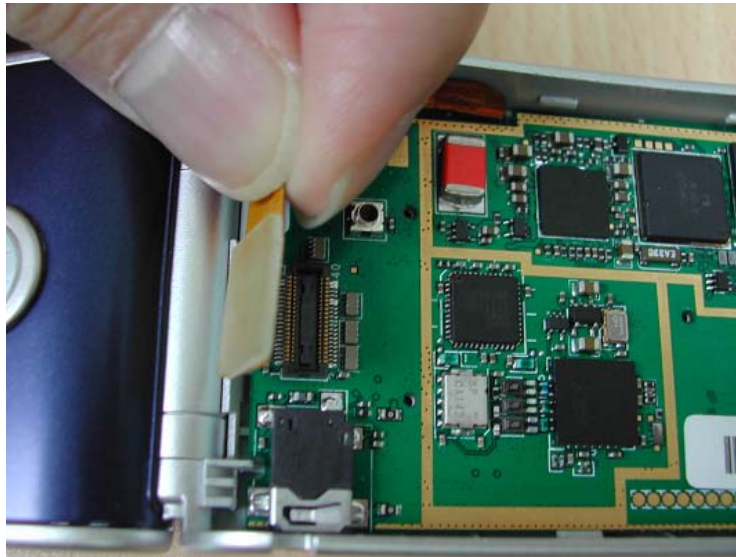
Step 2: Pull the right and left edge of Case-C (illustrated in the photo) to unlock Case-D



Step 3: Pull bottom side of Case-D upward to separate Case-D and Case-C



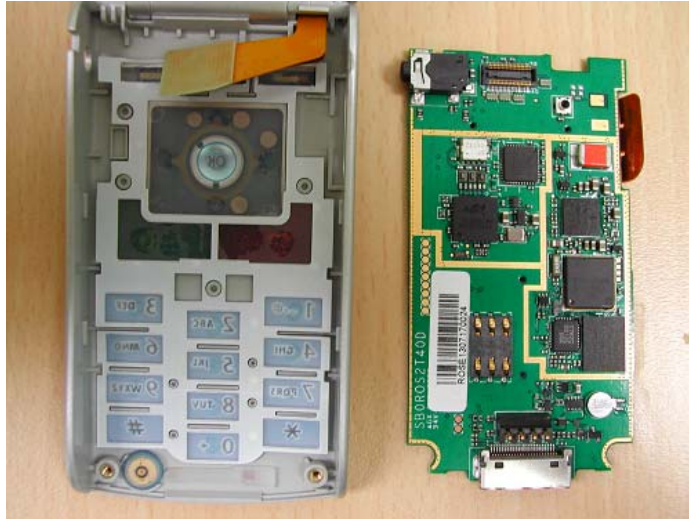
Step 4: Release the Board to Board FPC from lower PCB



Step 5: Lift up the lower PCB from right to left and be careful with the I/O connector (illustrate in the photo)



Step 6: Separation of Case-D and Case-C



Step 7: Remove the side key



Step 8: Use Tweezers to remove microphone



Step 9: Use Tweezers to remove 4 screw caps from Case-B. (Screw caps can't be recycled)



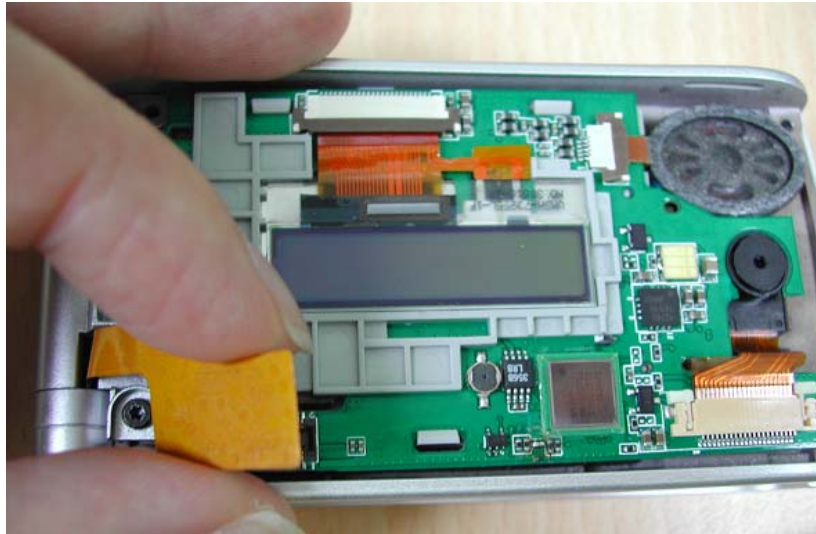
Step 10: Remove the 4 screws from Case-B



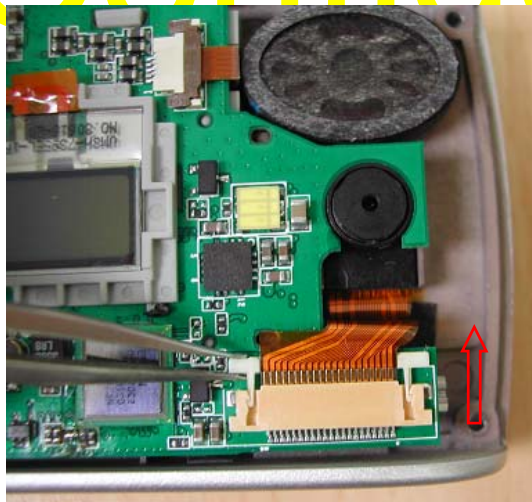
Step 11: Separated Case-A and Case B by fingernail. Exerted the pressure on the red dot where is illustrated in the photo and pulled upward. Do the same thing on the reverse side.



Step 12: Release the Board to Board FPC from the upper PCB

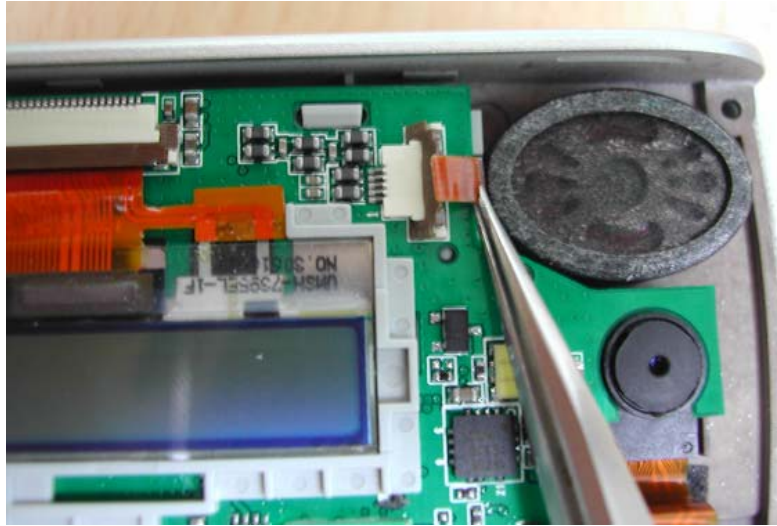


Step 13: Use Tweezers to release the Camera FPC. Push the direction where is illustrated in the photo.





Step 14: Use Tweezers to push the 5 pin connector upward and take out the Speaker FPC.



Step 15: Separate the upper PCB from Case-A



Step 16: Separation of upper PCB and Case-A



Step 17: Remove the Speaker



Step 18: Use Tweezers to remove the Camera



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Step 19: Remove the Vibrator



Step20: Separation of the whole mobile



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6.3 Level 1 Assembling



## 6.4 Level 2 Assembling

Step 1: Place Speaker, Camera and Vibrator into Case-A



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Step 2: Place the upper PCB (Main LCM facing down) into the Case-A.  
And connect the Speaker FPC , the board to board FPC, and Camera FPC



Step 3: Assemble Case-A and Case B



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Step 4: Fasten 4 screws



Step 5: Assemble 4 new screw caps on the hole of Case-B



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Step 6: Place keypad, side key and microphone into Case-C



Step 7: Place the lower PCB (Metal dome facing down) into Case-C. Put I/O connector into the hole first. Also, connect the Board to Board FPC



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Step 8: Assemble Case-C and Case-D





Step 9: Fasten 2 screws

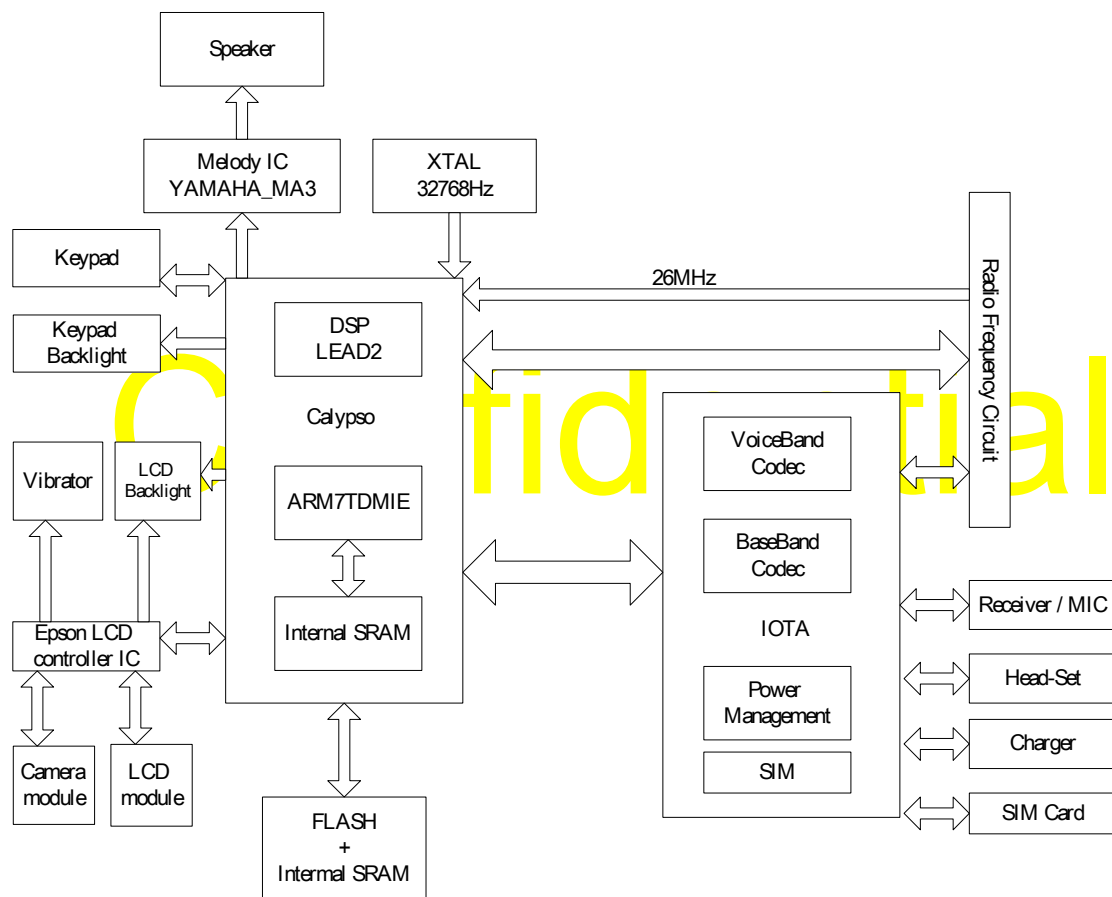


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## Chapter 7 Circuit Description

Generally, the circuit is divided into 2 parts: Baseband(BB) circuits and Radio Frequency(RF) circuits.

### 7.1 Baseband circuits



Block Diagram of Base-band Circuit

The Base-band circuits mainly consist of 5 chips: CALYPSO (HERCROM-400G2-PD751992GHH), IOTA (PTWL3014), Flash memory add external SRAM(Intel RD38F3040L0ZTQ0), Melody IC (YAMAHA MA-3), and Epson S1D13714 (LCD controller IC).

CALYPSO (U201) is a chip implementing the digital Base-band processes of a GSM/GPRS mobile phone. This chip combines a DSP sub-chip (LEAD2 CPU) with its program and data memories, a Micro-Controller core with emulation facilities (ARM7TDMIE), internal 8Kb of Boot ROM memory, 4M bit SRAM memory, a clock squarer cell, several compiled single-port or 2-ports RAM and CMOS gates.

The application of CALYPSO is the management of the GSM/GPRS Base-band processes through the GSM layer 1, 2 and 3 protocols as described in the ETSI standard with a specific attention to the power consumption in both GSM dedicated and idle modes, and GPRS (class 12) capability.

The IOTA-TWL3014 (U202), includes a complete set of Base-band functions that perform the interface and processing of the following voice signals, the Base-band in-phase (I) signal and quadrature (Q) signals, which support single-slot and multi-slot modes. The IOTA also includes associated auxiliary RF control features, supply voltage regulation, battery charging controls, and switch ON/OFF system analysis.

The IOTA interfaces with the digital Base-band device, Calypso, through a digital Base-band serial port (BSP) and a voice-band serial port (VSP). The signal ports communicate with a DSP core (LEAD). A micro-controller serial port (USP) communicates with the micro-controller core and a time serial port (TSP) communicates with the time processing unit (TPU) for real time control.

A specific module is dedicated to support the 3V Sim card interface. The module includes the generation of the Sim card supply voltage as well as level shifters to adapt the SIM card signal levels to the micro-controller I/O signal levels.

The IOTA also includes an on-chip voltage reference; under-voltage detection and power-on reset circuits.

The Flash memory and Internal SRAM (U501) is used to store code and other parameters. It contains 256M-bit Flash memory and 32M-bit SRAM

The YAMAHA MA-3 (U101) is a synthesizer LSI for mobile phone that realizes advanced game sounds designed for driving the speaker of the

mobile.

The Epson LCD controller IC S1D13714 (U102 in the upper board) is an LCDC solution designed with support for the digital video revolution in mobile products. The S1D13714 contains an integrated dual port camera interface and dual port LCD interface. It controls the LCD module, camera module, flash light, back-light, and vibrator in the upper board.

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## 7.2 Radio frequency circuits

The RF circuits consist of the transceiver (U603), Power amplifier (U611), T/R switch (U608), RF SAW Filter(U605, U606, U607), voltage regulator (U602), TCXO (U604), antenna switch (CON601), and some other components.

The TCXO (U604) is used to generate 26MHz signal. It's the fundamental frequency source of the Rossini circuits.

The voltage regulator (U602) is used to offer stable, low-noise 2.8V. This 2.8V supplies all RF circuits except PA.

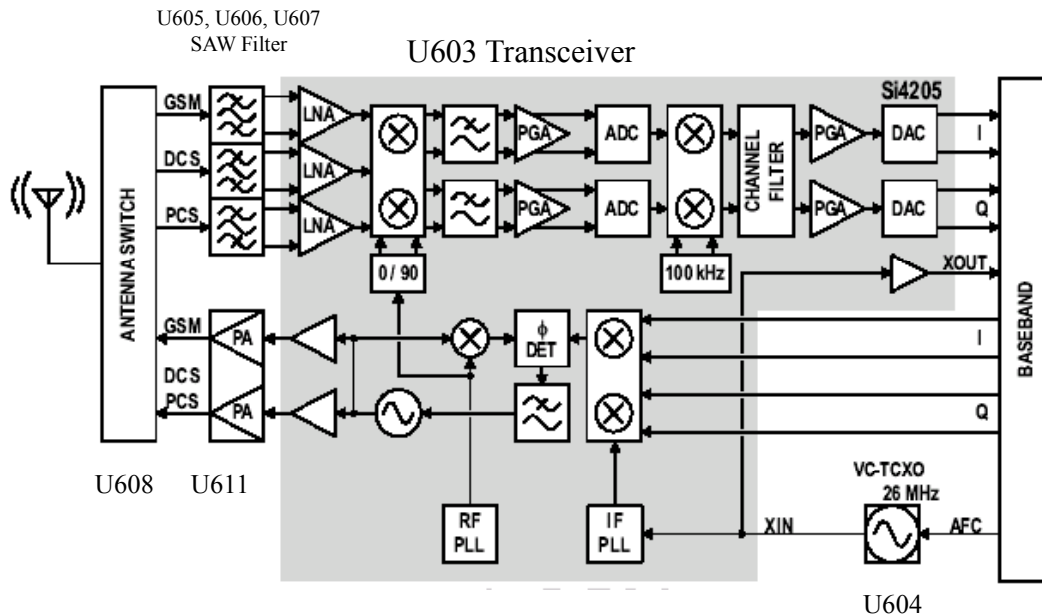
The transceiver (U603) is a complete RF front end for triple-band GSM and GPRS wireless communications. The transmit section interfaces between the baseband processor and the power amplifier. The receive section interfaces between the RF SAW filters and the baseband processor.

The T/R switch (U608) is used to switch the signal path to the direction of Transmit/Receive, GSM900/DCS1800/PCS1900 bands so that the signal goes to the correct path.

The RF SAW Filter (U605, U606, U607) is used to filter out-of band noise.

The PA (U611) is used to amplify uplink signal to the required signal strength.

### 7.3 Functional Description

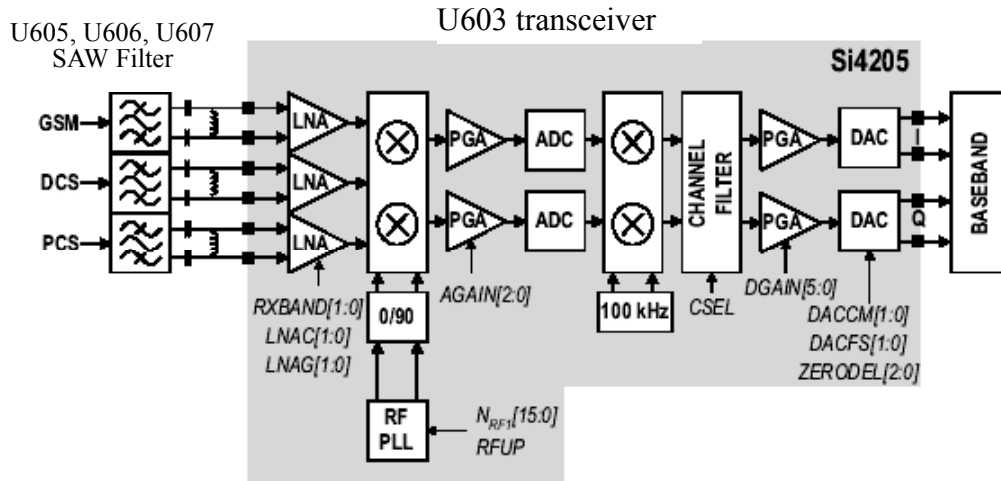


The transceiver U603 (Silicon Laboratories si4205) is a complete RF front end for multi-band GSM and GPRS wireless communications.

The receive section uses a digital low-IF architecture.

The transmit section is a complete up conversion path from the baseband subsystem to the power amplifier, and uses an offset phase locked loop (PLL) with a fully integrated transmit VCO. The frequency synthesizer includes integrated RF and IF VCOs, varactors and loop filters.

### 7.3.1 Receive section



The transceiver (U603) uses a low-IF receiver architecture which allows for the on-chip integration of the channel selection filters, eliminating the external IF SAW filter required in conventional superheterodyne architectures. Compared to a direct-conversion architecture, the low-IF architecture has a much greater degree of immunity to dc offsets.

Three differential-input LNAs are integrated in the transceiver (U603). The GSM input supports the GSM 850 (869–894 MHz) or EGSM 900 (925–960 MHz) bands. The DCS input supports the DCS 1800 (1805–1880 MHz) band. The PCS input supports the PCS 1900 (1930–1990 MHz) band.

A quadrature image-reject mixer downconverts the RF signal to a 100 kHz intermediate frequency (IF) with the RFLO from the frequency synthesizer. The RFLO frequency is between 1737.8 to 1989.9 MHz, and is divided by 2 for GSM 850 and E-GSM 900 modes. The mixer output is amplified with an analog programmable gain amplifier (PGA). The quadrature IF signal is digitized with high resolution A/D converters (ADCs).

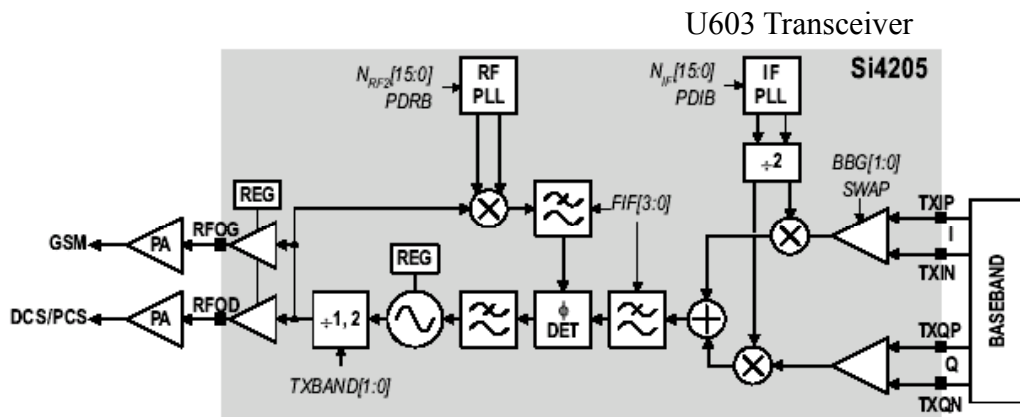
The ADC output is downconverted to baseband with a digital 100 kHz quadrature LO signal. Digital decimation and IIR filters perform channel selection to remove blocking and reference interference signals. After channel selection, the digital output is scaled with a digital PGA.

DACs drive a differential analog signal onto the RXIP, RXIN, RXQP and RXQN pins to interface to standard analog-input baseband ICs. No special processing is required in the baseband for offset compensation or extended dynamic range. The receive and transmit baseband I/Q pins can be multiplexed together into a 4-wire interface.

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### 7.3.2 Transmit section



The transmit (TX) section consists of an I/Q baseband upconverter, an offset phase-locked loop (OPLL) and two output buffers that can drive external power amplifiers (PA), one for the GSM 850 (824 to 849 MHz) and E-GSM 900 (880 to 915 MHz) bands and one for the DCS 1800 (1710 to 1785 MHz) and PCS 1900 (1850 to 1910 MHz) bands. The OPLL requires no external duplexer is needed to attenuate transmitter noise or spurious signals in the receive band, saving both cost and power. Additionally, the output of the transmit VCO is a constant-envelope signal which reduces the problem of spectral spreading caused by non-linearity in the PA.

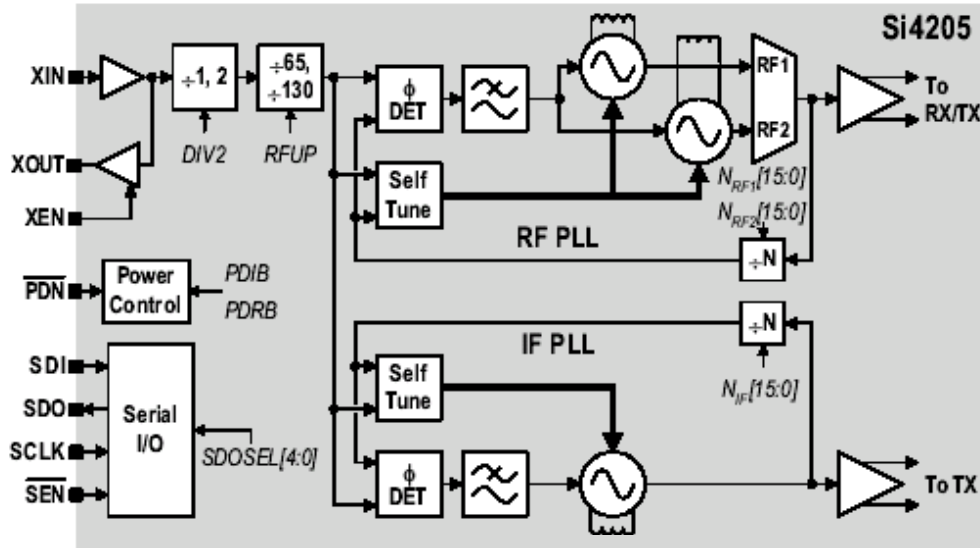
A quadrature mixer upconverts the differential in-phase (TXIP, TXIN) and quadrature (TXQP, TXQN) signals with the IFLO to generate a SSB IF signal which is filtered and used as the reference input to the OPLL. The IFLO frequency is generated between 766 and 896 MHz and internally divided by two to generate the quadrature LO signals for the quadrature modulator, resulting in an IF between 383 and 448 MHz. For the E-GSM 900 band, two different IFLO frequencies are required for spur management. Therefore, the IF PLL must be programmed per channel in the E-GSM 900 band. The IFLO frequencies are 798 MHz for GSM band except Tx in 895~900 MHz, 790 MHz for GSM band for Tx in 895~900 MHz, 766MHz for DCS band, and 854 MHz for PCS band.

The OPLL consists of a feedback mixer, a phase detector, a loop filter, and a fully integrated transmit VCO. The transmit VCO is centered between the DCS1800 and PCS1900 bands, and its output is divided by two for the GSM 850 and E-GSM 900 bands. The U407 generates the RFLO frequency between 1272 and 1483 MHz. To allow a single VCO to be used for the RFLO, high-side injection is used for the GSM 850 and E-GSM 900 bands, and low-side injection is used for the DCS 1800 and PCS 1900 bands.

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7.3.3 Frequency synthesizer

U603 transceiver



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The transceiver (U603) integrates two complete PLLs including VCOs, varactors, resonators, loop filters, reference, VCO dividers, and phase detectors. The RF PLL uses two multiplexed VCOs. The RF1 VCO is used for receive mode, and the RF2 VCO is used for transmit mode. The IF PLL is used only during transmit mode. All VCO tuning inductor are also integrated.

The IF and RF output frequencies are set by programming the N-Divider registers, NRF1, NRF2 and NIF. Programming the N-Divider register for either RF1 or RF2 automatically selects the proper VCO.

## Chapter 8 TROUBLESHOOTING

### 8.1 Baseband circuit troubleshooting

#### Base-band Test-points

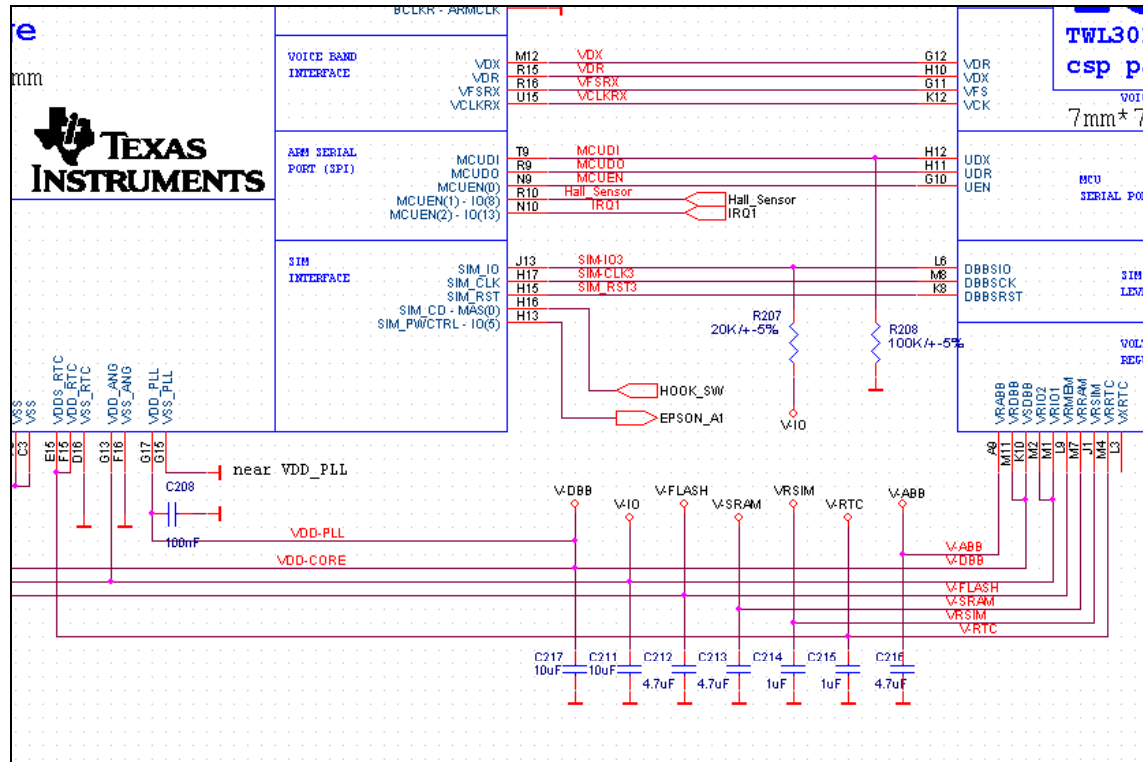
<i>Test-point</i>	<i>Net</i>	<i>Name</i>	<i>Condition</i>	<i>DC-level</i>	<i>Remark</i>
<b>Power supplies</b>					
C635	Vbat	Vbat	Power on	Nominal 3.6V	
C207	UPR	UPR	Power on	Nominal 3.6V	
C215	VRRTC	VRRTC	Active state	Nominal 1.5V	CALYPSO C035
C211	VRIO	VRIO	Active state	Nominal 2.8V	
C212	VRRAM	VRRAM	Active state	Nominal 2.8V	
C213	VRMEM	VRMEM	Active state	Nominal 2.8V	
C217	VRDBB	VRDBB	Active state	Nominal 1.5V	CALYPSO C035
C216	VRABB	VRABB	Active state	Nominal 2.8V	
<b>Clock</b>					
C632	26MHz	26M	Active State		
R205	OSC32K_O UT	OSC32K_O UT	Active State		
C203	OSC32K_IN	OSC32K_IN	Active State		
TP210	32768Hz	CLK32K	Active State		
<b>General</b>					
TP205	RX_IR	RX_IRDA	Download	Pulsed DC (0V ~ 2.8V)	
TP206	TX_IR	TX_IRDA	Download	Pulsed DC (0V ~ 2.8V)	
TP204	TMS	TMS	JTAG		
TP201	TDI	TDI	JTAG		
TP203	TCK	TCK	JTAG		
TP202	TDO	TDO	JTAG		
TP213	LDO_EN	LDO_ENAB LE	Melody		
<b>State Machine</b>					

TP207	PWON	PWON			
TP217	TESTRESE TZ	Reset IOTA			
TP212	ON_OFF	ON_OFF	Active State	High	
TP211	RESPWRO NZ	Digital baseband power-on- reset	Backup mode	High (0.8VRRTC)	
TP218	INT1	nFIQ	Fast interrupt	High	

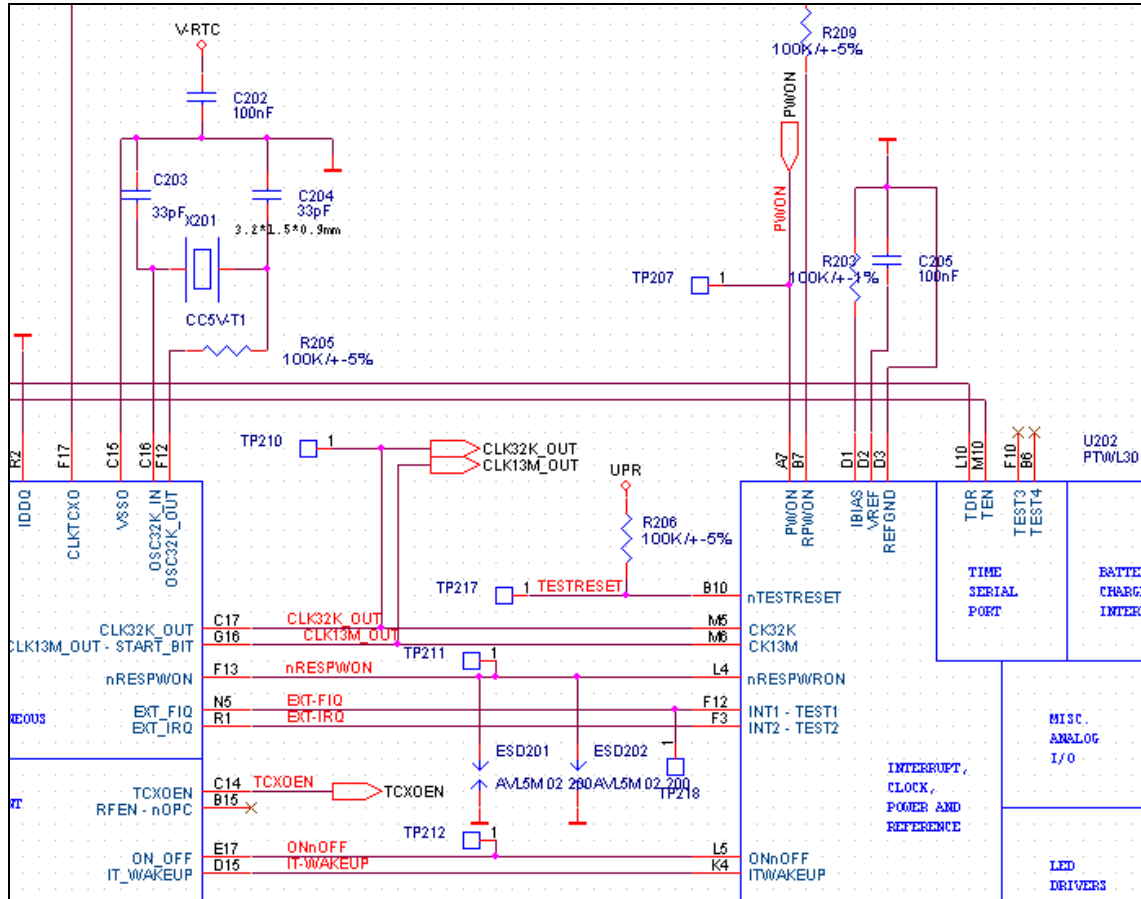
# Confidential

Test Points Schematics:

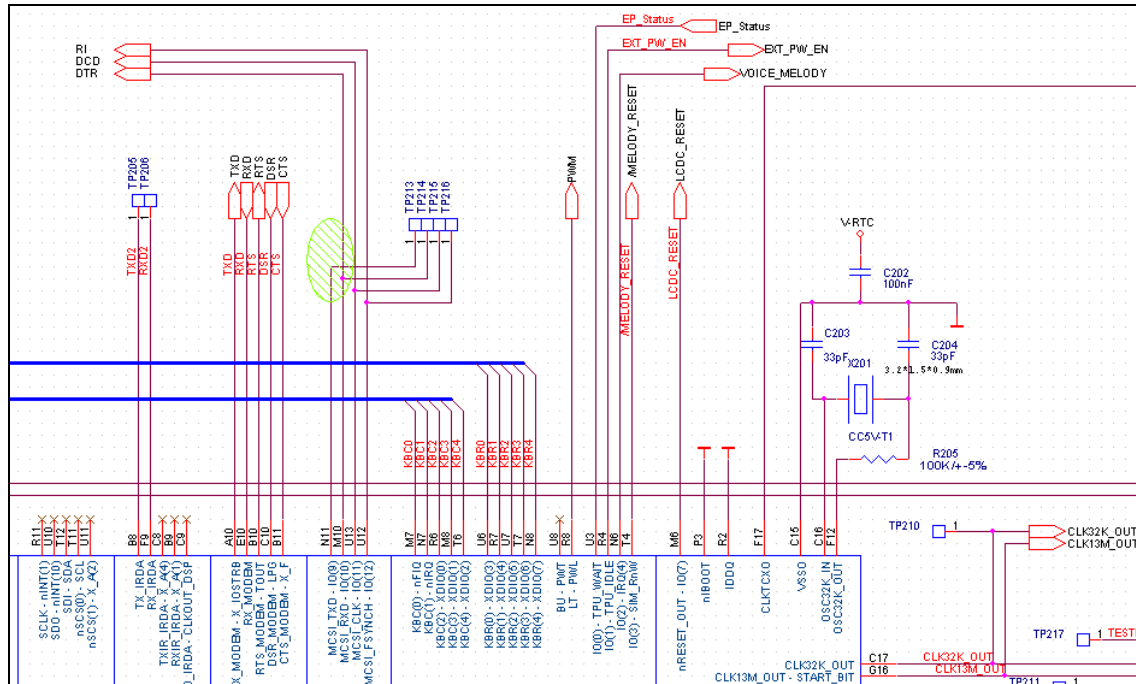
Power Test Points



### Clock Test points

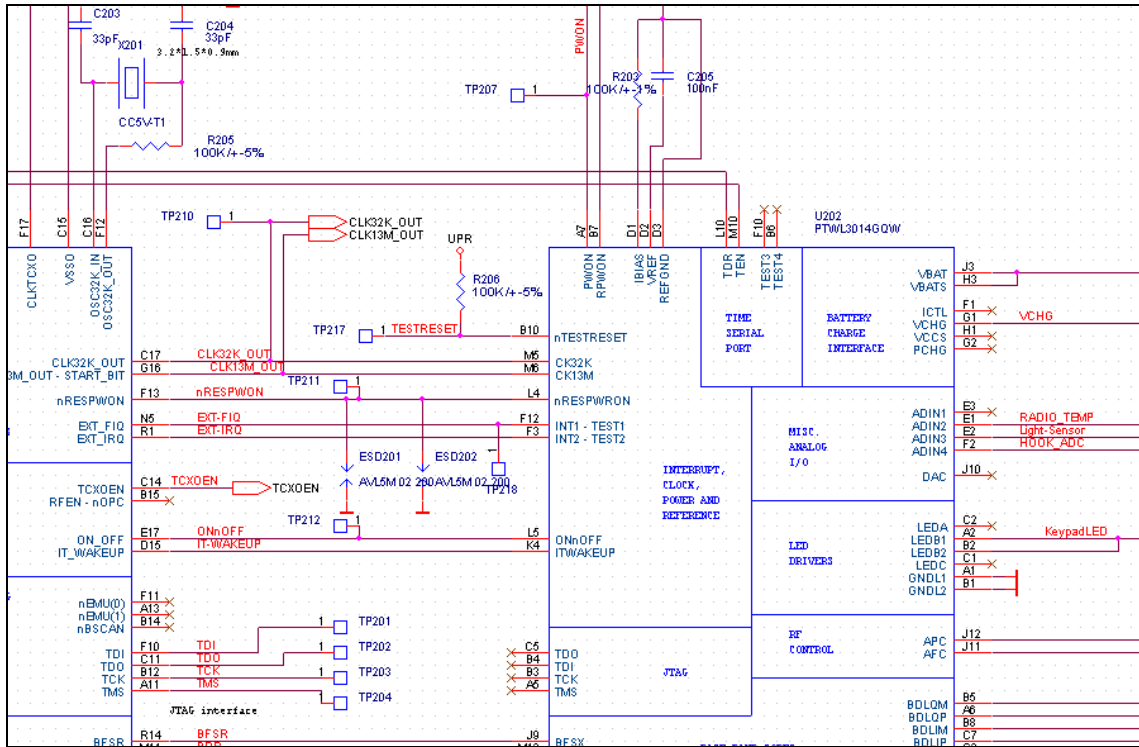


### General Test Points



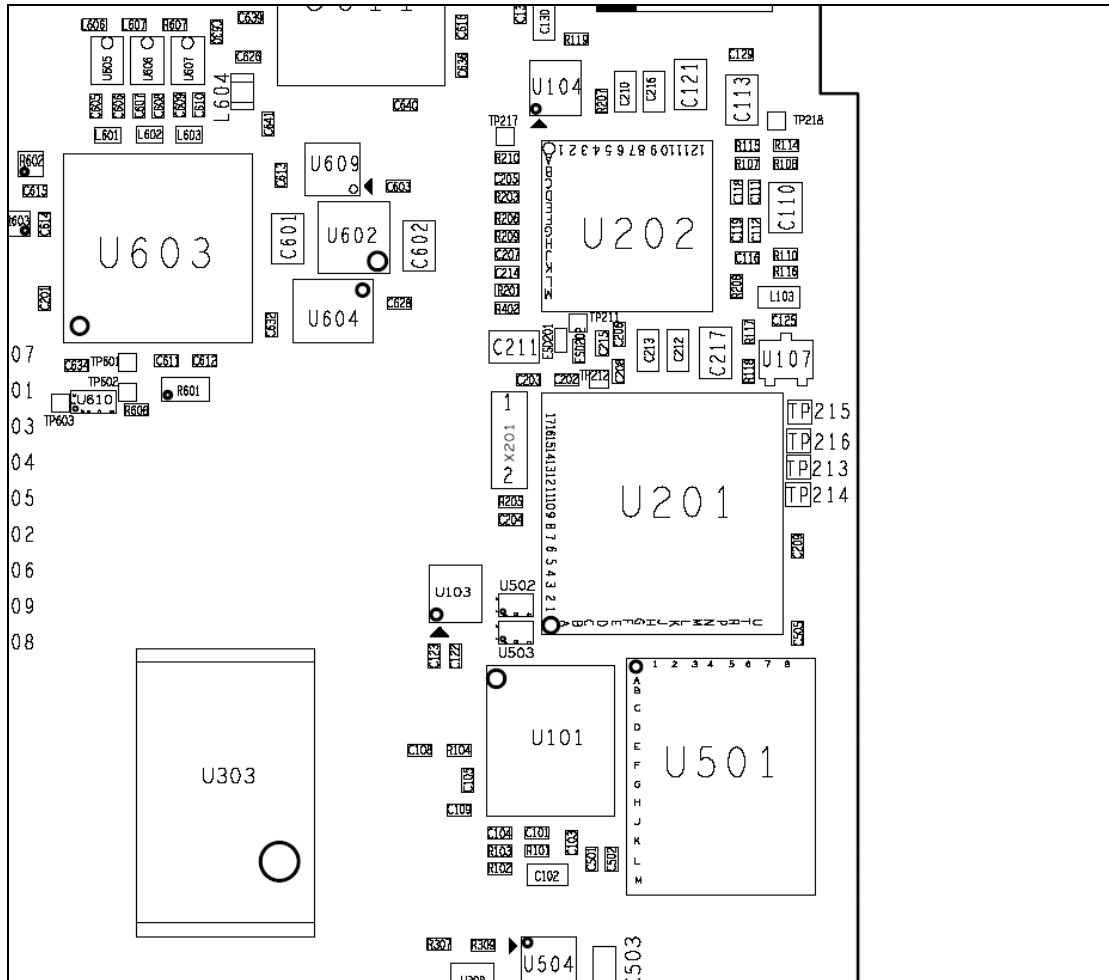


### State Machine Test Points



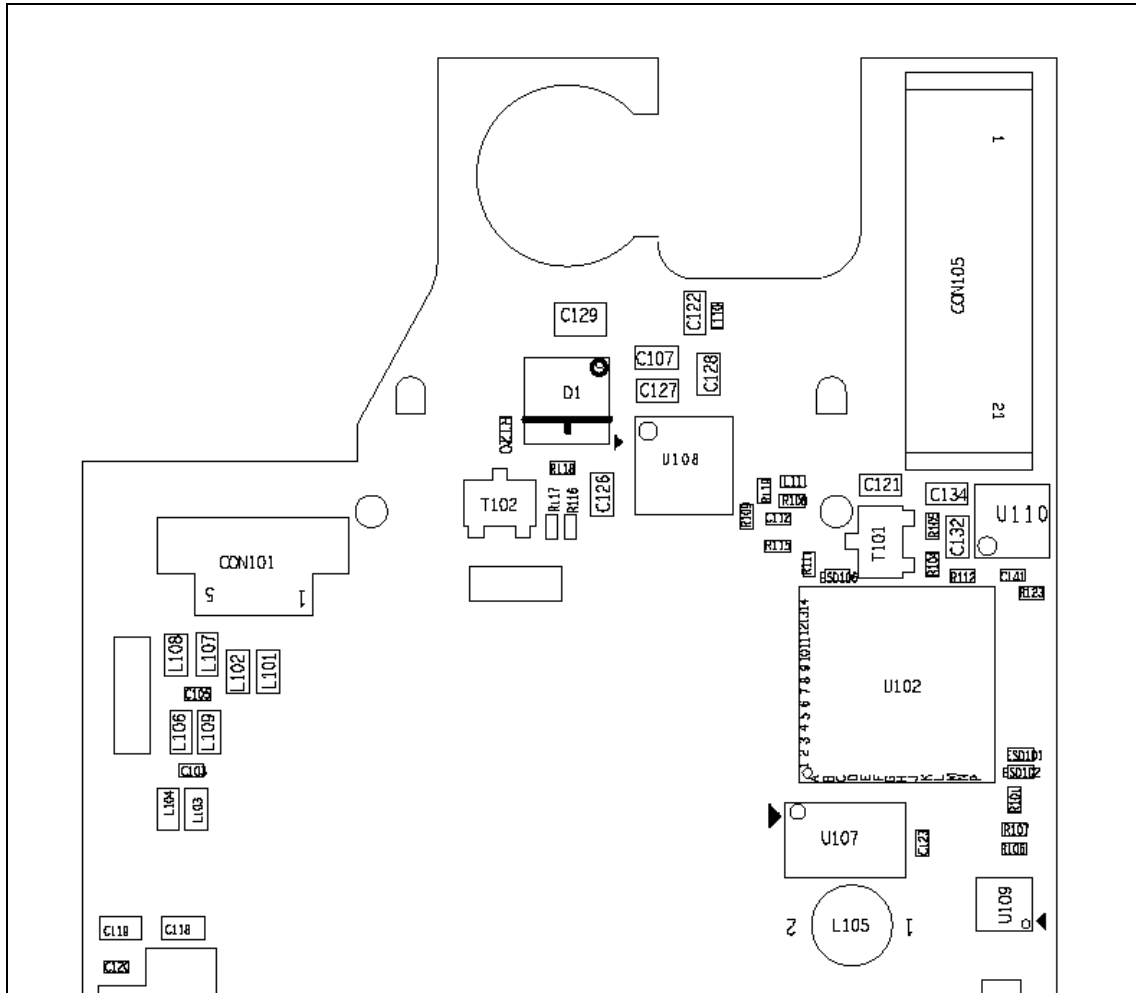
## 8.2 Baseband Key Component Placement

### Lower PCB



1. U201 CLYPSO
2. U202 IOTA
3. U501 Flash + SRAM
4. U101 YAMAHA MA-3

Upper PCB



1. U102 EPSON LCD/Camera Controller.
2. U106 White light LED driver IC
3. D1 White light LED
4. U107 EL drivers IC

## 8.3 Baseband Fault Finding Charts

### Phone is Dead

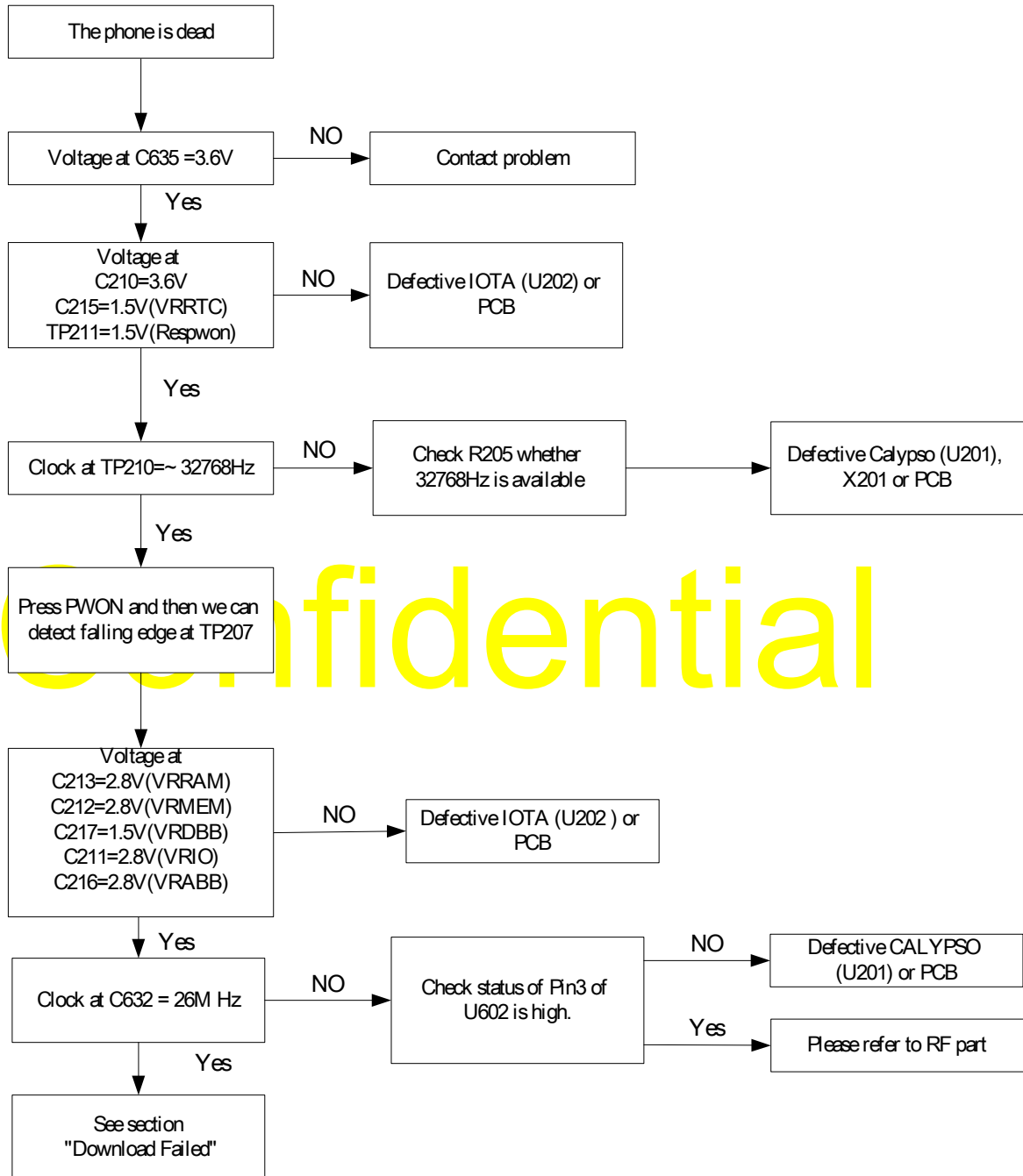
#### Causes of “Phone is Dead”

“Phone is dead” means that the phone cannot be powered on when the power has been supplied to it. Nominal supply voltage to the phone is 3.6V. If the main supply voltage is lower than 3.0 V, the phone does not start the power-on sequence. The causes of “Phone is Dead” could be one of the following reasons :

- ✧ Defective Mechanical Component (Battery Connector): CON302
- ✧ Defective Mechanical Component (Power Key): S424
- ✧ Defective IOTA: U202
- ✧ Defective Calypso: U201
- ✧ Defective Crystal: X201
- ✧ Defective RF\_LDO: U602
- ✧ Defective oscillator: U604
- ✧ Defective Flash + SRAM: U501
- ✧ Defective PCB

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### Faulting Finding Chart of "Phone is Dead"



## **Download Failed**

### **Causes of “Download Failed”**

The causes of Download failed could be one of the following reasons:

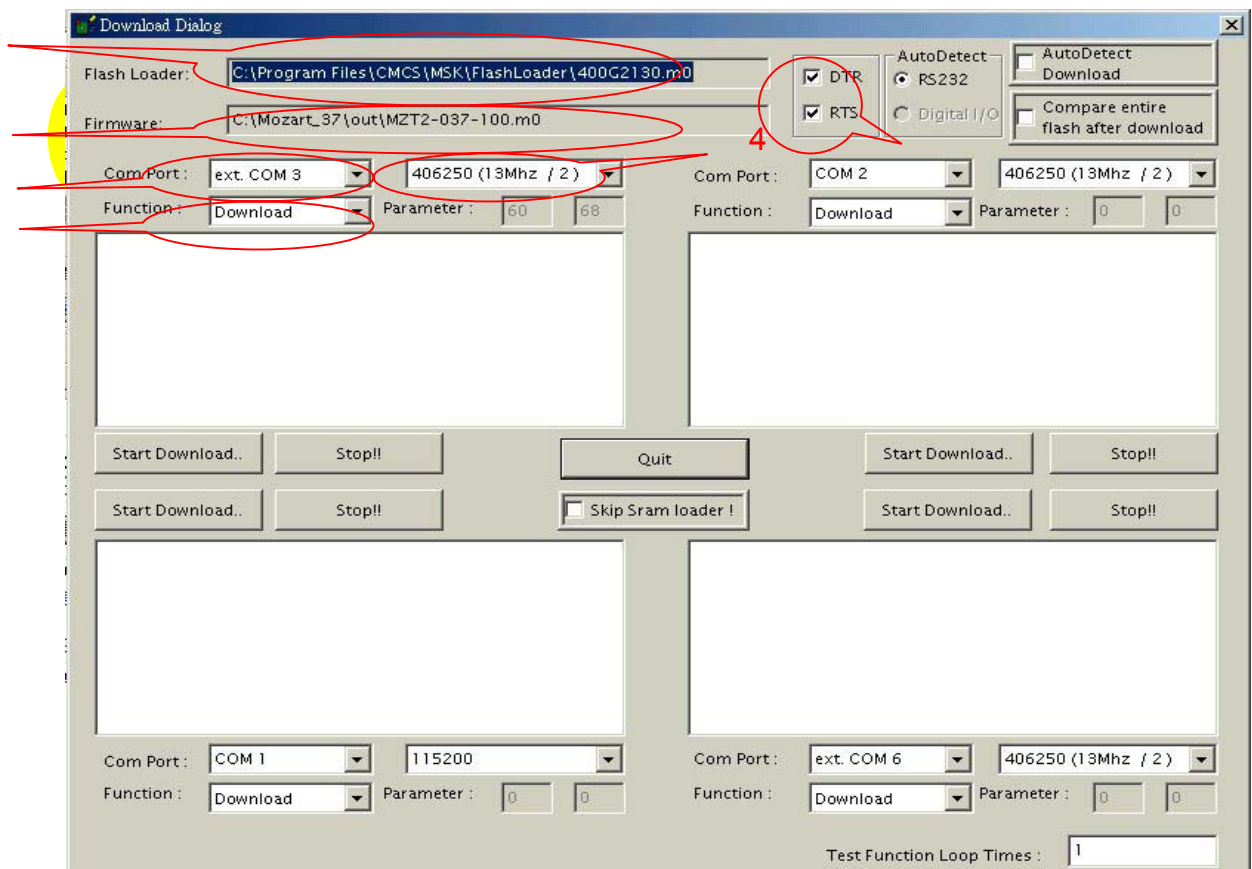
1. Wrong Download Tool Settings
2. System does not boot
3. Defective Calypso : U201
4. Defective IOTA : U202
5. Defective Flash Memory : U501
6. Defective PCB

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### Download Tool Settings

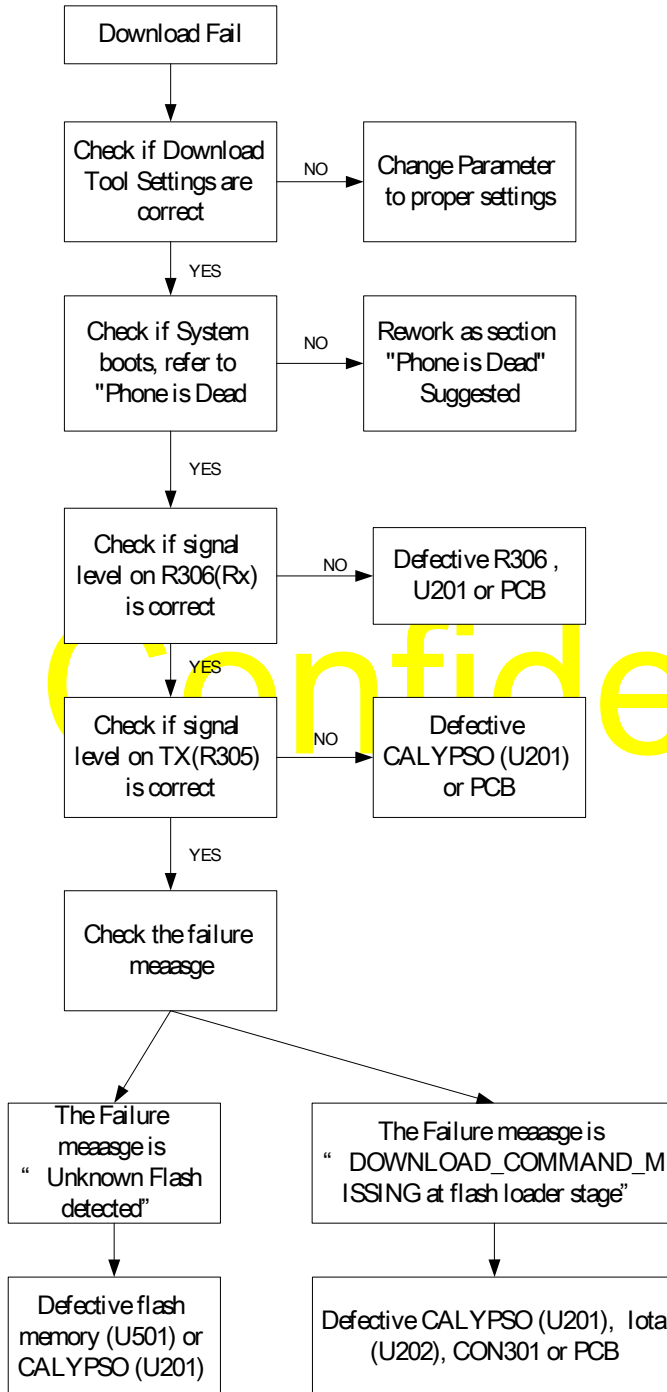
In order to download codes into Flash, the following settings have to be correct.

1. Boot loader: Has to select a proper version
2. Flash Program: Has to select a proper version
3. COM port: Has to select a proper port
4. Baud-rate: 406250
5. Function: Download
6. Hardware flow control: Both are selected (Both are unselected, when the download jig is used)



### Download Tool Settings

**Fault Finding Chart of “Download Failed”**



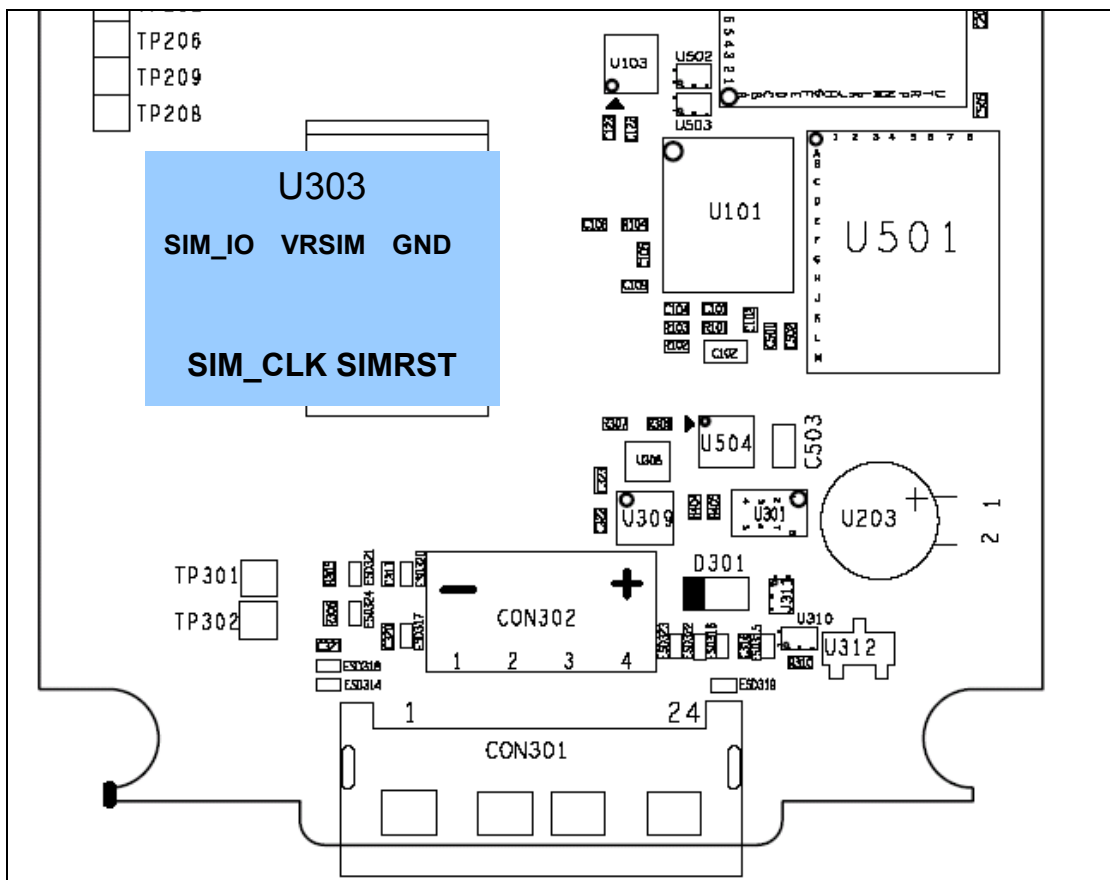
**Fault Finding Chart of “Download Failed”**



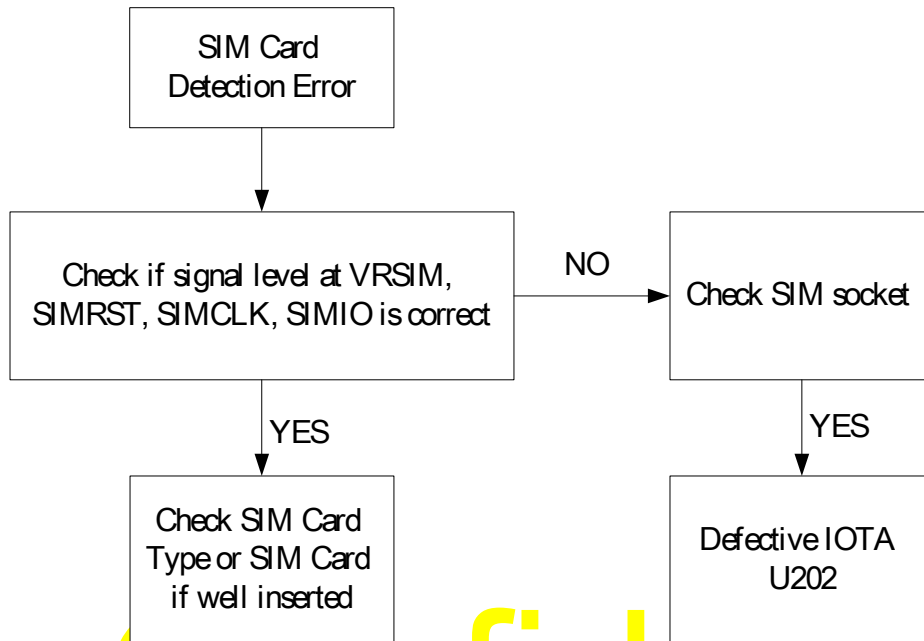
### SIM Card Detection Error

The SIM interface can be checked tested without a SIM Card. When the phone is switched on, all interface lines (VRSIM, SIMRST, SIMCLK, SIMIO) rises, first to 3V. From checking those responses, it is possible to find errors in the SIM interface without a SIM Card.

### SIM Socket



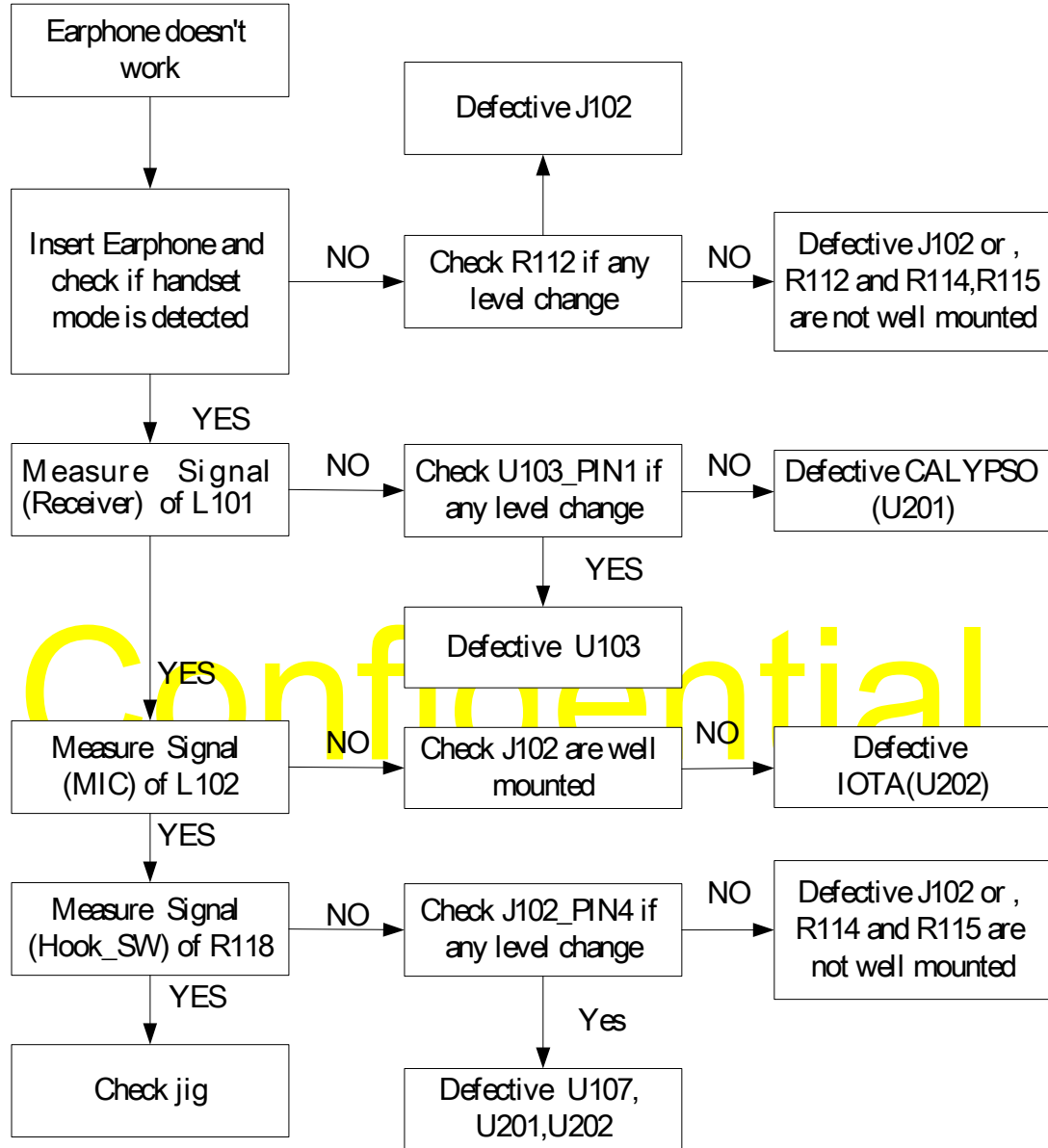
### Fault Finding Chart of "SIM Card Error"



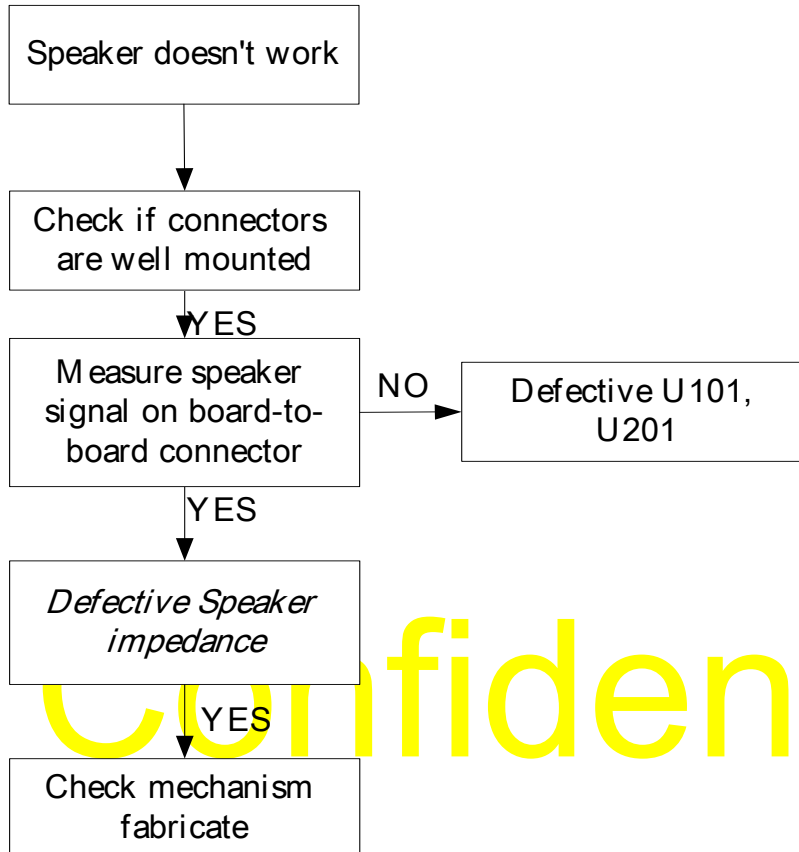
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**Audio Fail**

**Headset failed--Fault Finding Chart of "Headset failed"**



**Speaker failed -- Faulting Finding Chart of "Speaker failed"**



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**Microphone Failed--** Faulting Finding Chart of “Microphone failed”

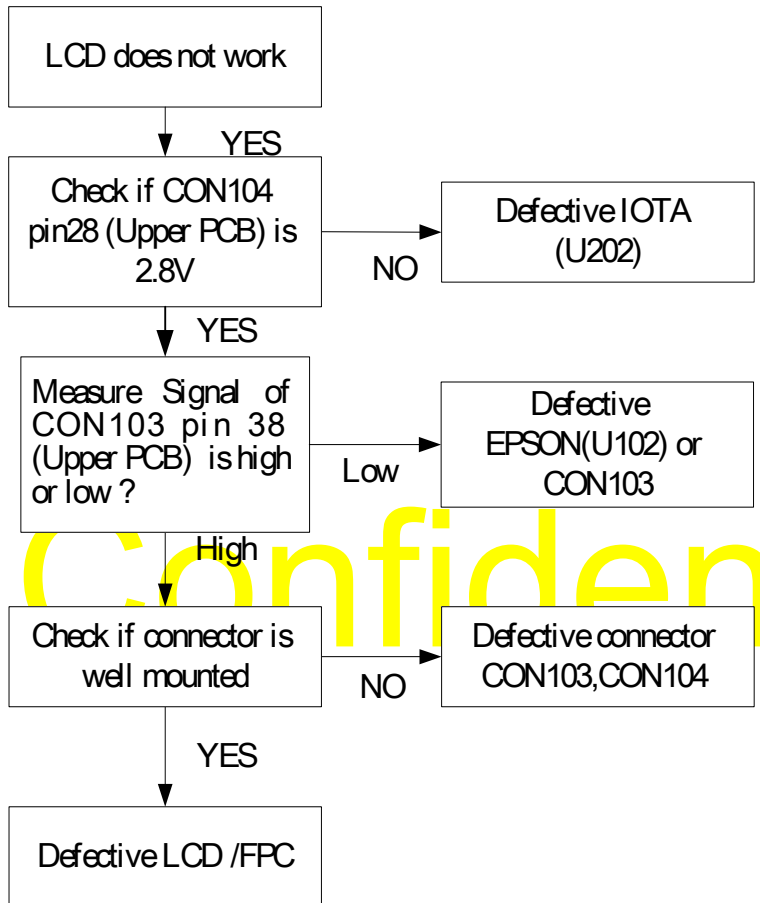


**Receiver failed--** Faulting Finding Chart of "Receiver failed"

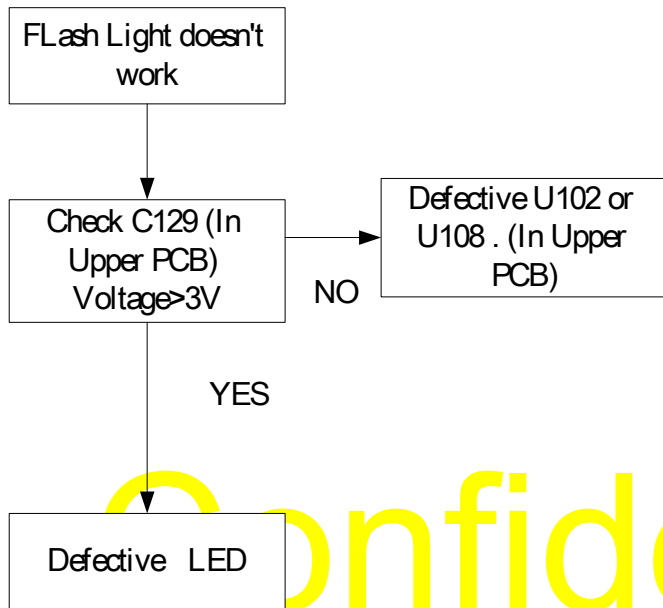


**LCM Faults**

**LCD failed-- Faulting Finding Chart of "LCD failed"**



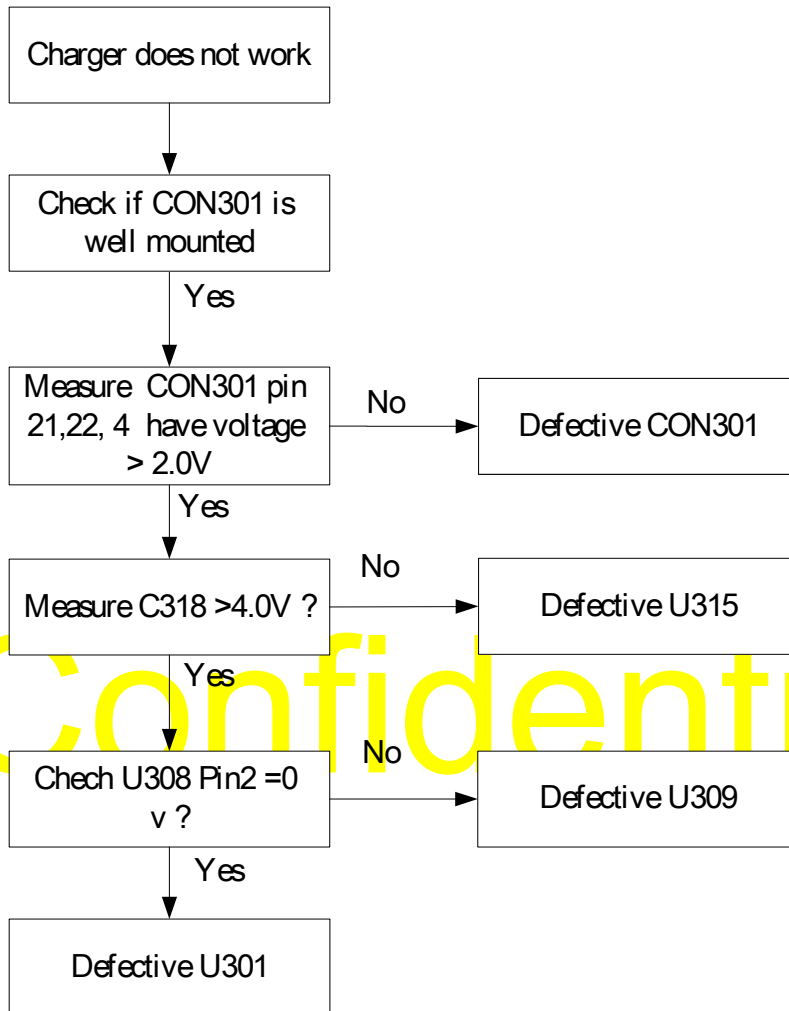
**Flash Light Failed--** Faulting Finding Chart of “Flash light failed”



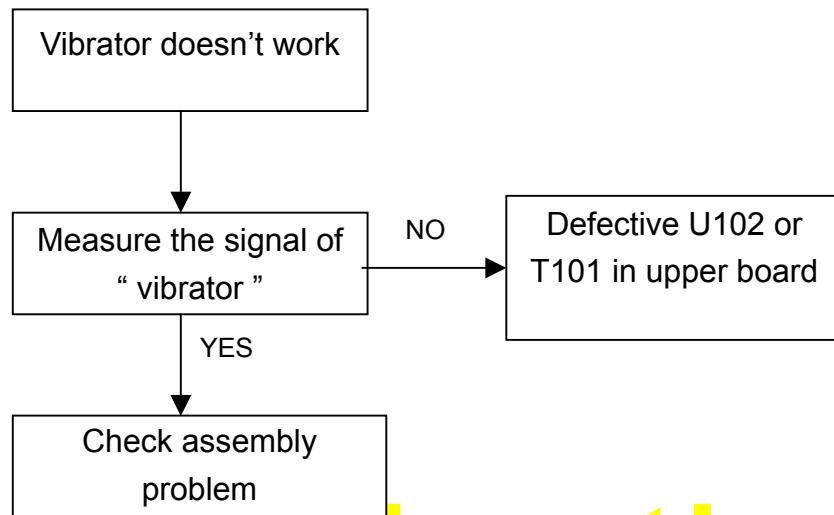
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**Charger Failed**—Faulting Finding Chart of “Charger failed”



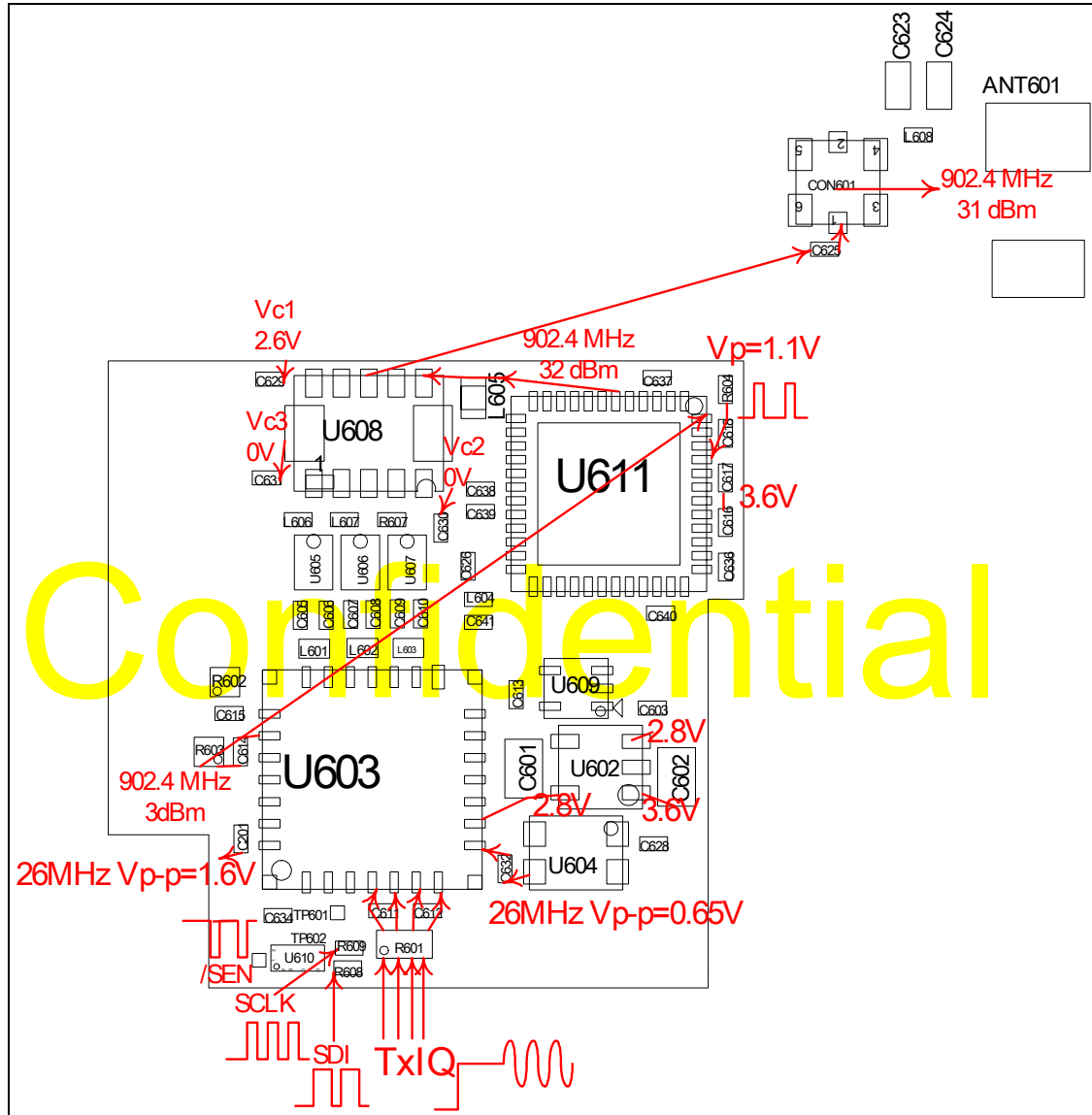
**Vibrator Failed--** Faulting Finding Chart of “Vibrator failed”



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### 8.4 Radio Frequency circuit troubleshooting

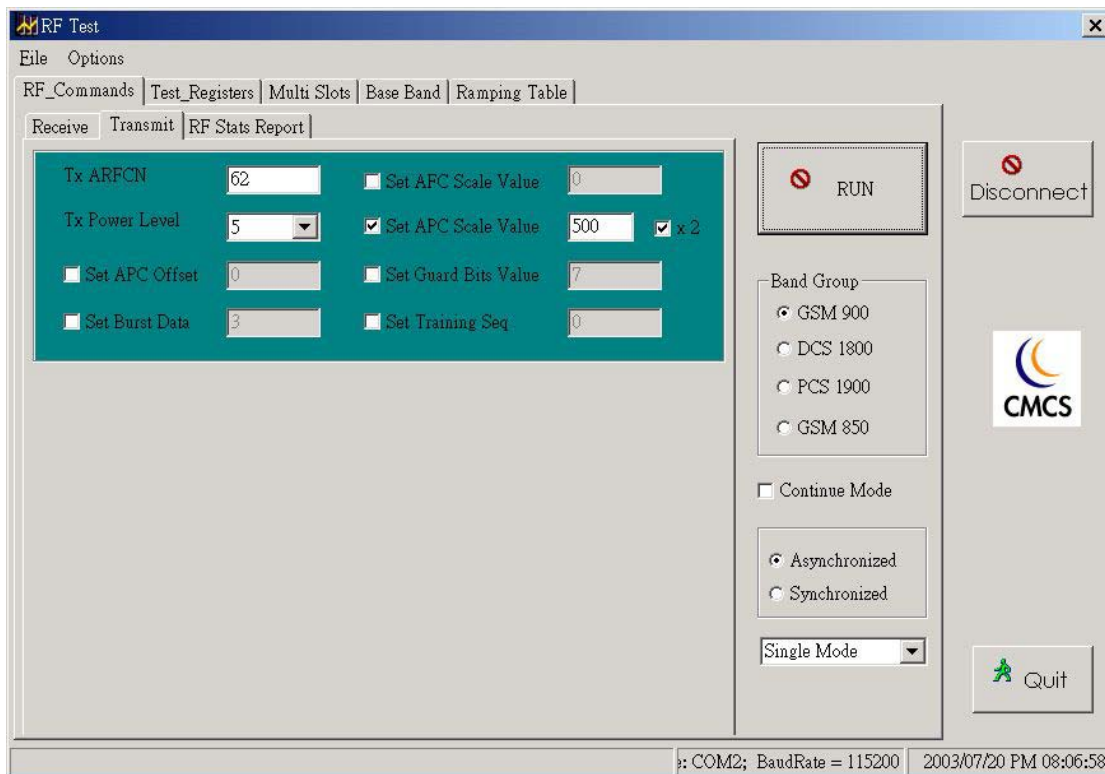
#### RF signal diagram in GSM900 Tx mode



Measurement Setting:

Computer setting:

Open “MSK” program. Press the “RF Test Panel” button. Choose the “Transmit” mode. Press the “Connect” button. Set “Tx ARFCN” to “62”. Mark the “Set APC Scale Value” and set the value to “500”. Mark the “x2” option. Set the BandGroup to “GSM900”. Then Press the “Run” button.



Agilent 8960 setting: Press the “Call Setup” button. Set the “Operating Mode” to “Test”. Choose “Test Function” to “CW”. Set Call Parms: Set “RF Gen Band” to “EGEM”. Set “RF Gen Channel” to “62”. Set “Expected Power” to “30” dBm. Press the “Measurement Selection” button. Choose the “Power vs Time” and “Phase & Frequency Error” to measurement. Then see if it is pass or fail.

CMU200 setting: Press the “Menu Select” button. Select the “GSM 900 Non-Signaling” mode. Then press “Enter” button.

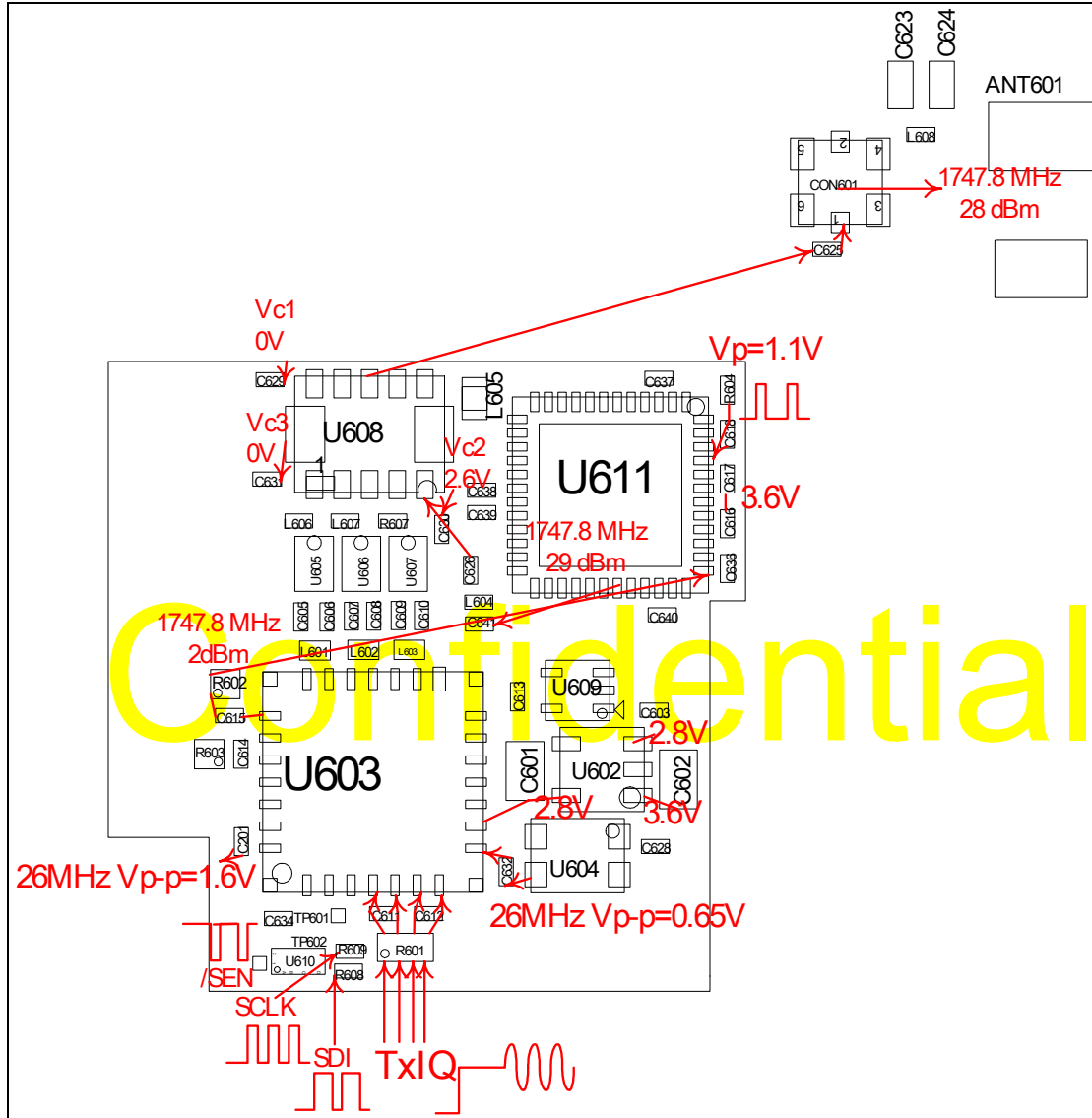
Press “Analyzer Setting”. Set “Channel” to “62”. Then see the measurement results.

The failure of Frequency Error does not matter because it’s not calibrated in test mode.

The current consumption for this mode is about 0.21A.

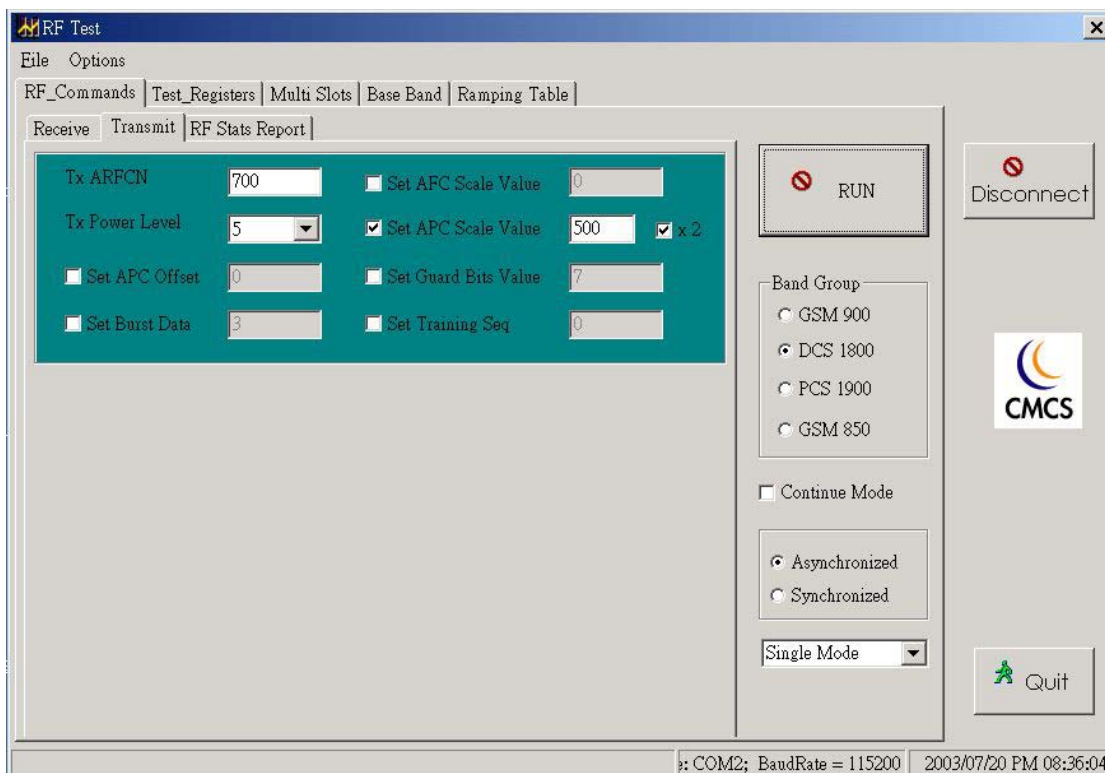
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### RF signal diagram in DCS1800 Tx mode



Setting:

Open “MSK” program. Press the “RF Test Panel” button. Choose the “Transmit” mode. Press the “Connect” button. Set “Tx ARFCN” to “700”. Mark the “Set APC Scale Value” and set the value to “500”. Mark the “x2” option. Set the BandGroup to “DCS1800”. Then Press the “Run” button.



Agilent 8960 setting: Press the “Call Setup” button. Set the “Operating Mode” to “Test”. Choose “Test Function” to “CW”. Set Call Params: Set “RF Gen Band” to “DCS”. Set “RF Gen Channel” to “700”. Set “Expected Power” to “30” dBm. Press the “Measurement Selection” button. Choose the “Power vs Time” and “Phase & Frequency Error” to measurement. Then see if it is pass or fail.

CMU200 setting: Press the “Menu Select” button. Select the “GSM 1800 Non-Signaling” mode. Then press “Enter” button.

Press “Analyzer Setting”. Set “Channel” to “700”. Then see the

measurement results.

The failure of Frequency Error does not matter because it's not calibrated in test mode.

The current consumption for this mode is about 0.16A.

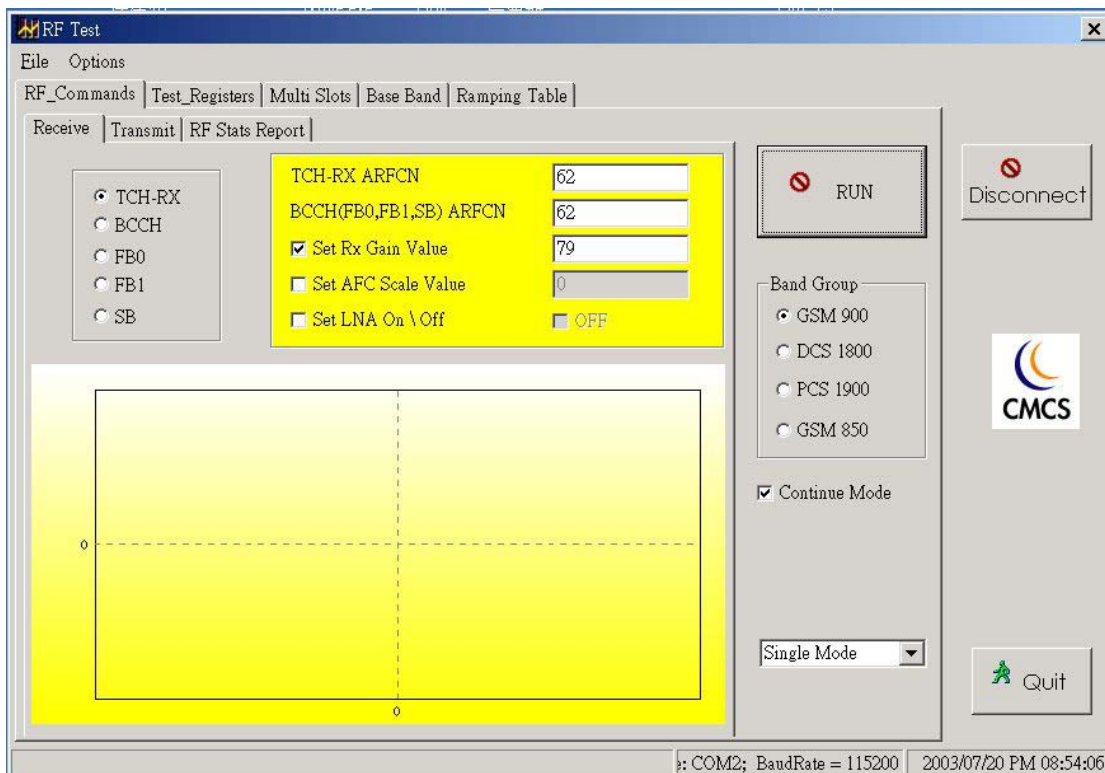
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### Setting:

Open “MSK” program. Press the “RF Test Panel” button. Choose the “Transmit” mode. Press the “Connect” button. Set “TCH-RX ARFCN” to “62”. Mark the “Set Rx Gain Value” and set the value to “79”. Set the BandGroup to “GSM900”. Mark the “Continuous Mode”. Then Press the “Run” button.



Agilent 8960 setting: Press the “Call Setup” button. Set the “Operating Mode” to “Test”. Choose “Test Function” to “CW”. Set Call Parms: Set “RF Gen Power” to “-30” dBm. Set “RF Gen Band” to “EGSM”. Set “RF Gen Channel” to “62”. Set “RF Gen Freq” to “947.467” MHz.

CMU200 setting: Press the “Menu Select” button. Select the “GSM 900 Non-Signaling” mode. Then press “Enter” button.

Press “Generator”. Set “Channel” to “62”. Set “RF Level” to “-30dBm” and set it “on”. Set “Frequency Offset” to 67kHz. Set “Bit Modulation” to “Off”. Set “Transmission” to “Continuous”. Then see the measurement

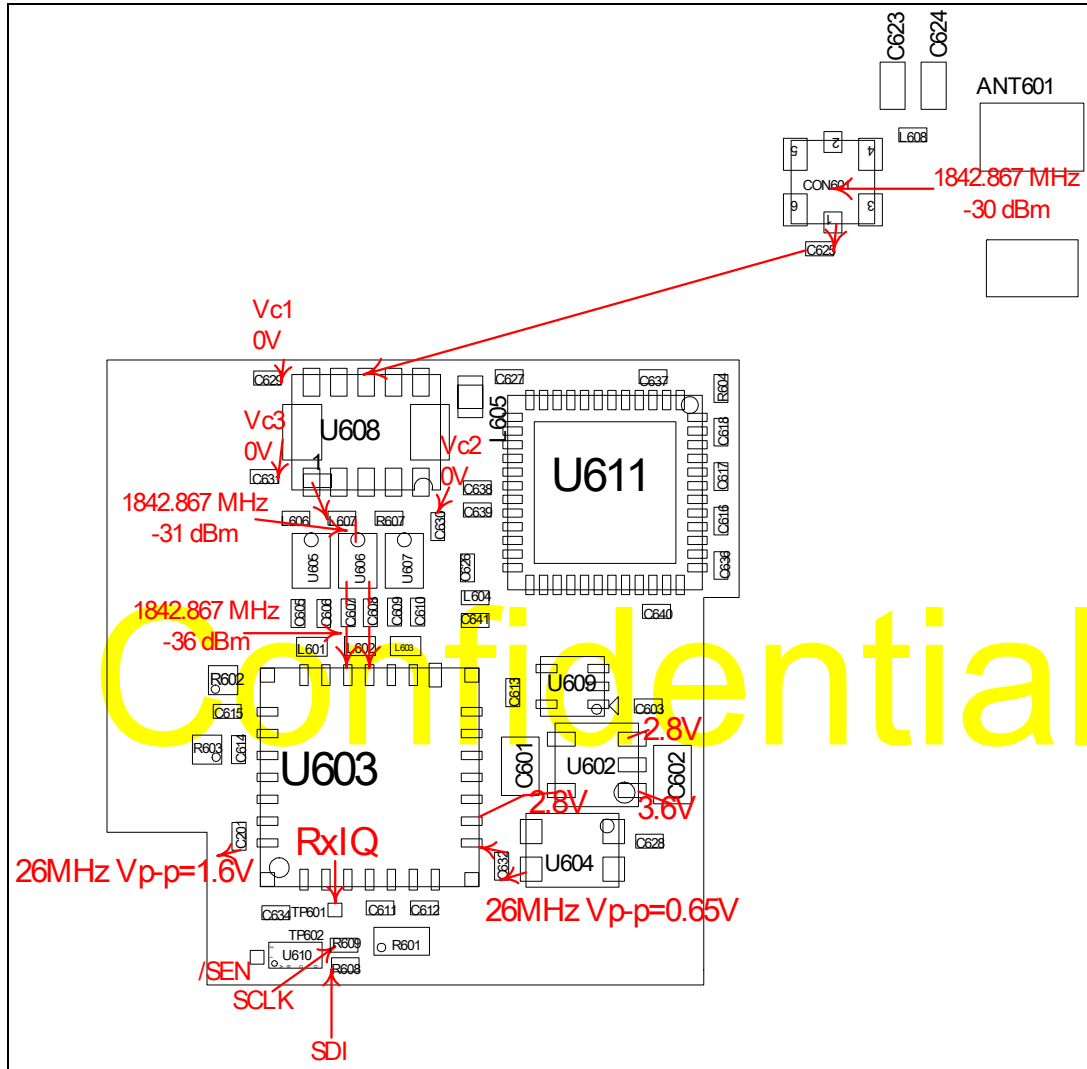
results.

Then measure the RxIQ signal by the oscilloscope. If input = $-30\text{dBm}$ , the waveform for RxIQ is 67.7 kHz square wave with  $V_{p-p} = 1.8\text{V}$ . If input = $-95\text{dBm}$ , the waveform for RxIQ is 67.7 kHz sinusoidal wave with  $V_{p-p} = 1.2\text{V}$ .

If the waveform for RxIQ is the same as above, then the GSM900 Rx is OK.

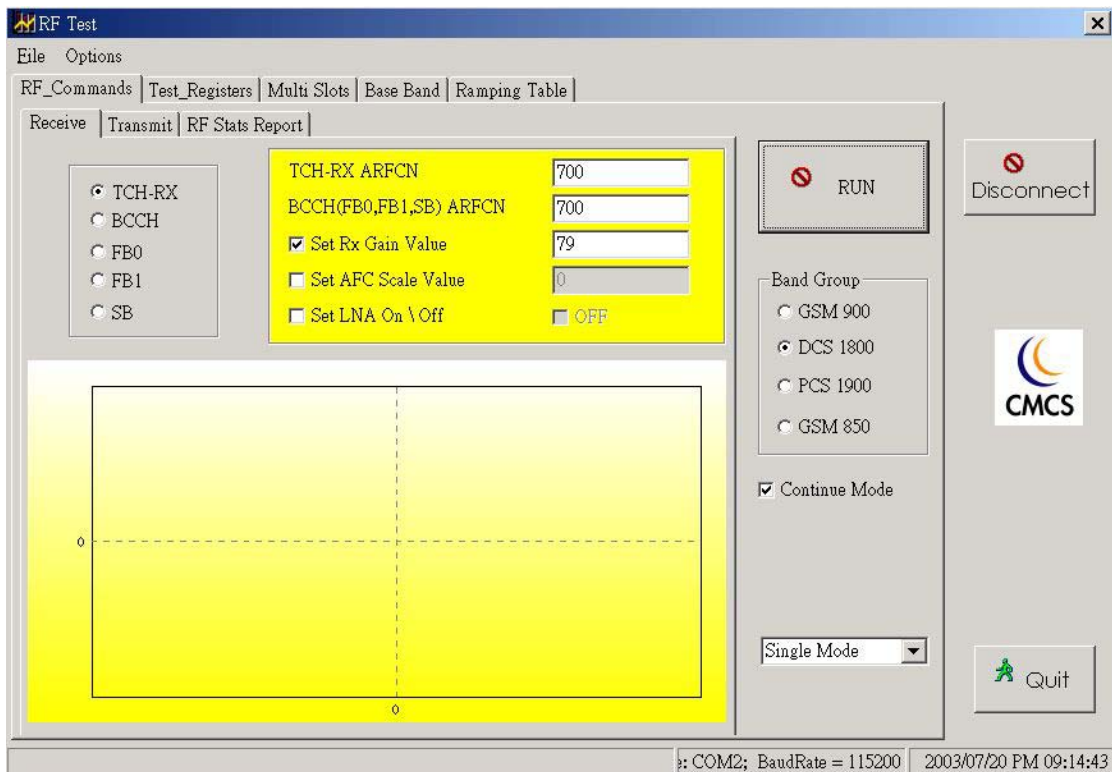
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### RF signal diagram in DCS1800 Rx mode



Setting:

Open “MSK” program. Press the “RF Test Panel” button. Choose the “Transmit” mode. Press the “Connect” button. Set “TCH-RX ARFCN” to “700”. Mark the “Set Rx Gain Value” and set the value to “79”. Set the BandGroup to “DCS1800”. Mark the “Continuous Mode”. Then Press the “Run” button.



Agilent 8960 setting: Press the “Call Setup” button. Set the “Operating Mode” to “Test”. Choose “Test Function” to “CW”. Set Call Parms: Set “RF Gen Power” to “-30” dBm. Set “RF Gen Band” to “DCS”. Set “RF Gen Channel” to “700”. Set “RF Gen Freq” to “1842.867” MHz.

CMU200 setting: Press the “Menu Select” button. Select the “GSM 1800 Non-Signaling” mode. Then press “Enter” button.

Press “Generator”. Set “Channel” to “700”. Set “RF Level” to “-30dBm” and set it “on”. Set “Frequency Offset” to 67kHz. Set “Bit Modulation” to

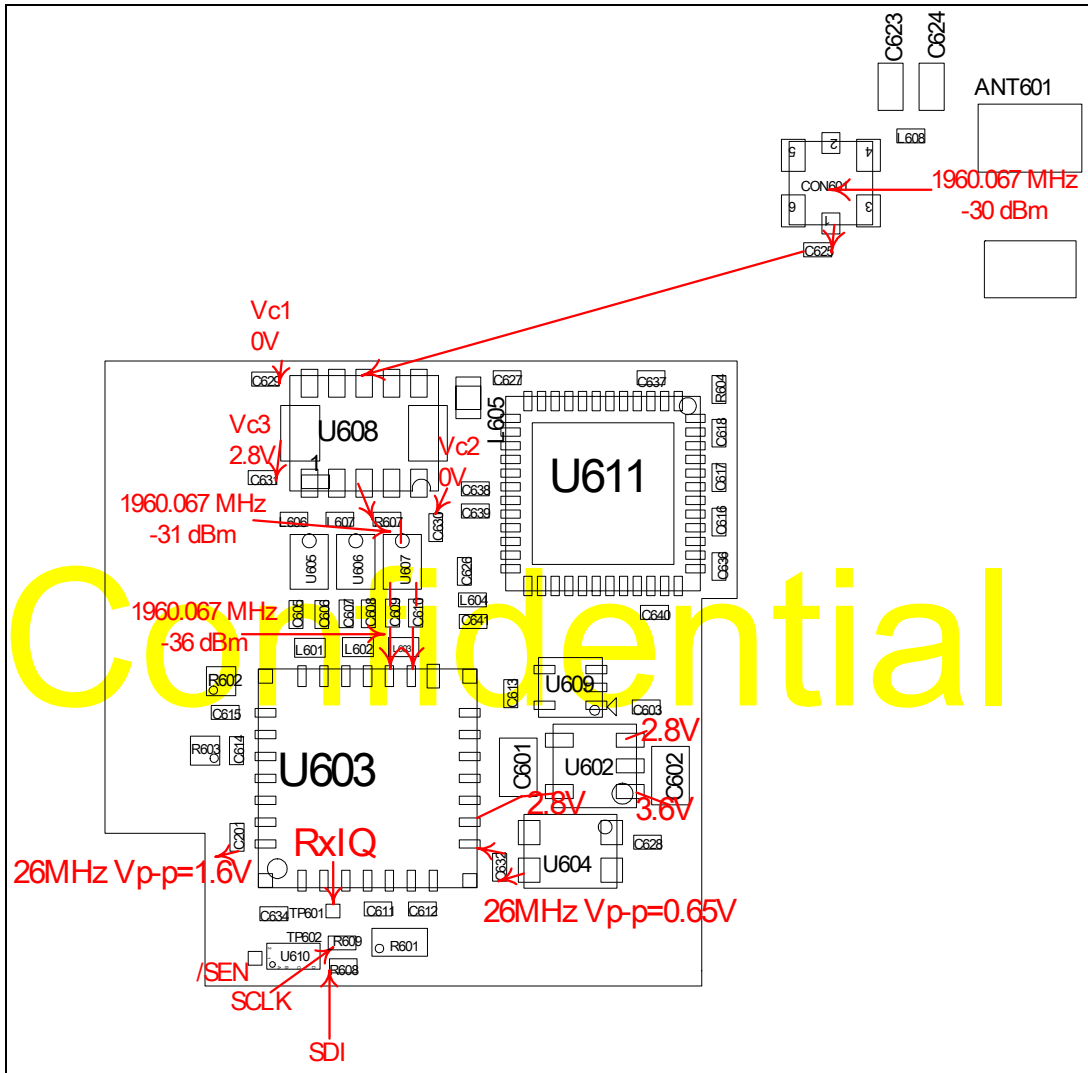
“Off”. Set “Transmission” to “Continuous”. Then see the measurement results.

Then measure the RxIQ signal by the oscilloscope. If input =-30dBm, the waveform for Rx IQ is 67.7 kHz square wave with  $V_{p-p} = 1.8V$ . If input =-95dBm, the waveform for Rx IQ is 67.7 kHz sinusoidal wave with  $V_{p-p} = 1V$ .

If the waveform for RxIQ is the same as above, then the DCS1800 Rx is OK.

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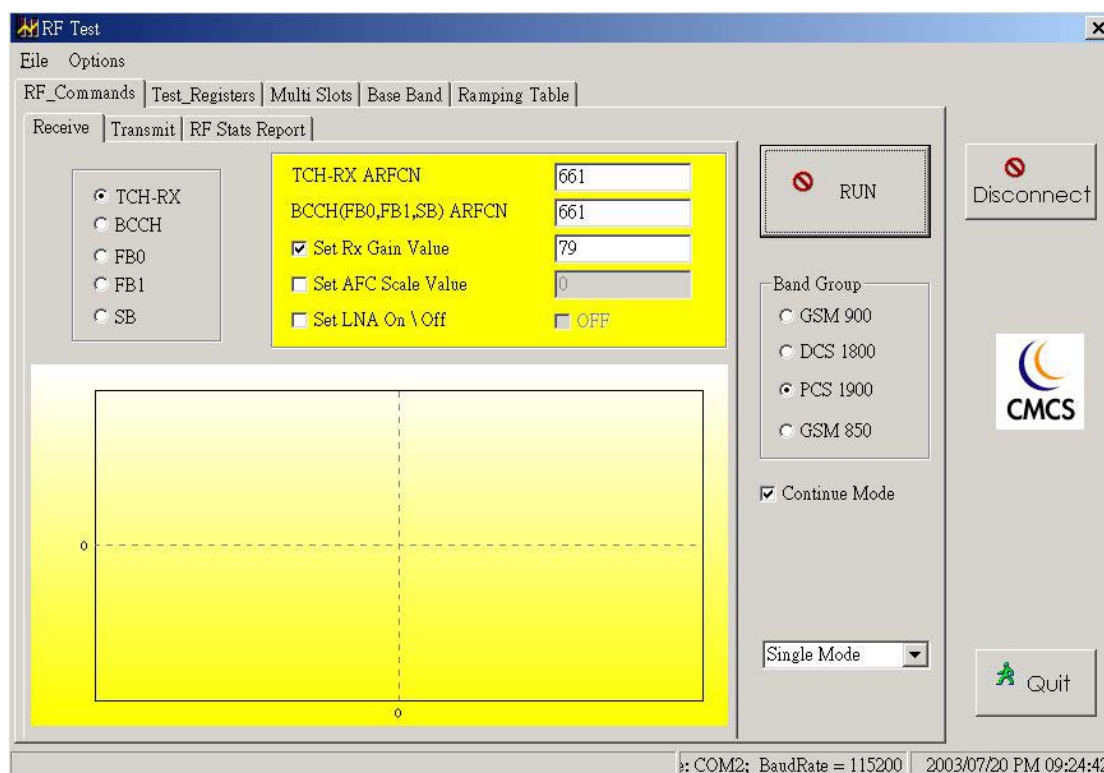
**RF signal diagram in PCS1900 Rx mode**



Setting:

Computer setting:

Open “MSK” program. Press the “RF Test Panel” button. Choose the “Transmit” mode. Press the “Connect” button. Set “TCH-RX ARFCN” to “661”. Mark the “Set Rx Gain Value” and set the value to “79”. Set the BandGroup to “PCS1900”. Mark the “Continuous Mode”. Then Press the “Run” button.



Agilent 8960 setting: Press the “Call Setup” button. Set the “Operating Mode” to “Test”. Choose “Test Function” to “CW”. Set Call Parms: Set “RF Gen Power” to “-30” dBm. Set “RF Gen Band” to “PCS”. Set “RF Gen Channel” to “661”. Set “RF Gen Freq” to “1960.067” MHz.

CMU200 setting: Press the “Menu Select” button. Select the “GSM 1900 Non-Signaling” mode. Then press “Enter” button.

Press “Generator”. Set “Channel” to “661”. Set “RF Level” to “-30dBm” and set it “on”. Set “Frequency Offset” to 67kHz. Set “Bit Modulation” to “Off”. Set “Transmission” to “Continuous”. Then see the measurement results.



Then measure the RxIQ signal by the oscilloscope. If input = $-30\text{dBm}$ , the waveform for Rx IQ is 67.7 kHz square wave with  $V_{p-p} = 1.8\text{V}$ . If input = $-95\text{dBm}$ , the waveform for Rx IQ is 67.7 kHz sinusoidal wave with  $V_{p-p} = 0.8\text{V}$ .

If the waveform for RxIQ is the same as above, then the PCS1900 Rx is OK.

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## Trouble Shooting Instruction

First inspect the module by eyes to see if there is any visual mistake.

If there is any problem with download or MSK RF test tool, first check with the 26MHz signal (C632). If it's wrong, then check with U602 (2.8V voltage regulator) pin5 to see if it's 2.8V. If it's 2.8V, there may be some error in U604 (TCXO). Then replace U604 (TCXO). If it's not 2.8V, then check U602 (2.8V voltage regulator) pin3 (TCXOEN) to see if it's 2.8V. If it's not 2.8V, there may be some error in U201. If U602 (2.8V voltage regulator) pin3 is 2.8V and U602 (2.8V voltage regulator) pin1 is 3.6V but U602 (2.8V voltage regulator) pin5 is not 2.8V, there is some error in U602 (2.8V voltage regulator). Then replace the U602 (2.8V voltage regulator).

If there is 26MHz signal in C632 but no 26MHz in C201, then check with U603 & C201.

If the MSK RF test tool can be used, then check with the Tx/Rx function.

First check with GSM900 Tx mode. Refer to "RF signal diagram in GSM900 Tx mode" for more detail.

See the Agilent 8960 or CMU200 measurement results. If it's pass, the GSM900 Tx is OK.

If it's fail, check to see if U602 (voltage regulator) function properly.

Then check R603 to see if there is 902.4 MHz signal.

If there is 902.4 MHz signal in R603 but the power read in Agilent 8960 is error, then there may be some error in U611 (PA) or U608 (T/R switch). Check L605 to see if the power after U611 (PA) is correct. If it's error, check the R604 (Ramp signal). If the Ramp signal is wrong, there may be some error in U202. If the Ramp signal is right and the current consumption is wrong, there may be some problems in U611 (PA). If the power after U611 (PA) is correct but the power after U608 (T/R switch) is wrong, then check the U608 (T/R switch) control voltage. If the control voltage is correct, then there is some error in U608 (T/R switch). If the control voltage is wrong, check the control voltage (U609, U603 pin24, pin25)

If there is no 902.4 MHz signal in R603, the TX PLL is not locked. Check C632 to see if 26MHz is correctly fed. If 26MHz is not correctly fed, then check with U604 TCXO. Check with U602 pin 5 to see if 2.8V is correctly fed.

Also check with C611, C612 (TxIQ) and SCK, SDI, SDO to see if these signals are correct. If TxIQ is wrong, there may be some error in U202. If SCK, SDI, SDO are wrong, there maybe some problem in U201.

If the power read in Agilent 8960 is correct but the phase/frequency error or spectrum due to modulation is worse than specifications, check with U603 and U604.

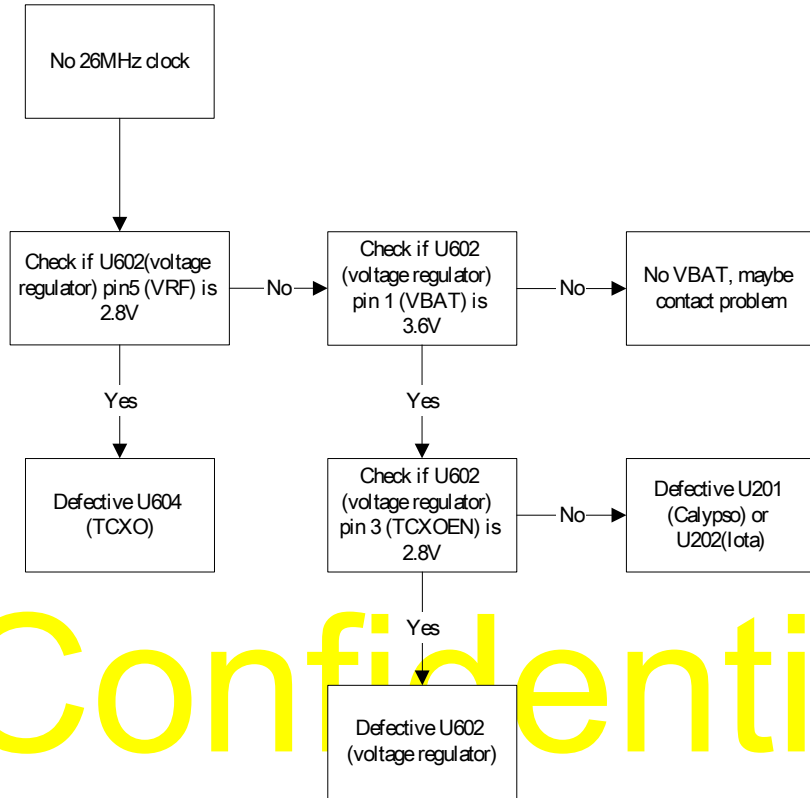
For the troubleshooting of DCS1800 Tx mode, refer to above description and the "RF signal diagram in DCS1800 Tx mode" for more details.

If the problem is bad sensitivity, then refer to the "RF signal diagram in GSM900 Rx mode", "RF signal diagram in DCS1800 Rx mode", "RF signal diagram in PCS1900 Rx mode" for more details.

For the Rx problem, trace the Rx signal path. Also notice to see if L601, L602, L603 is soldered properly.

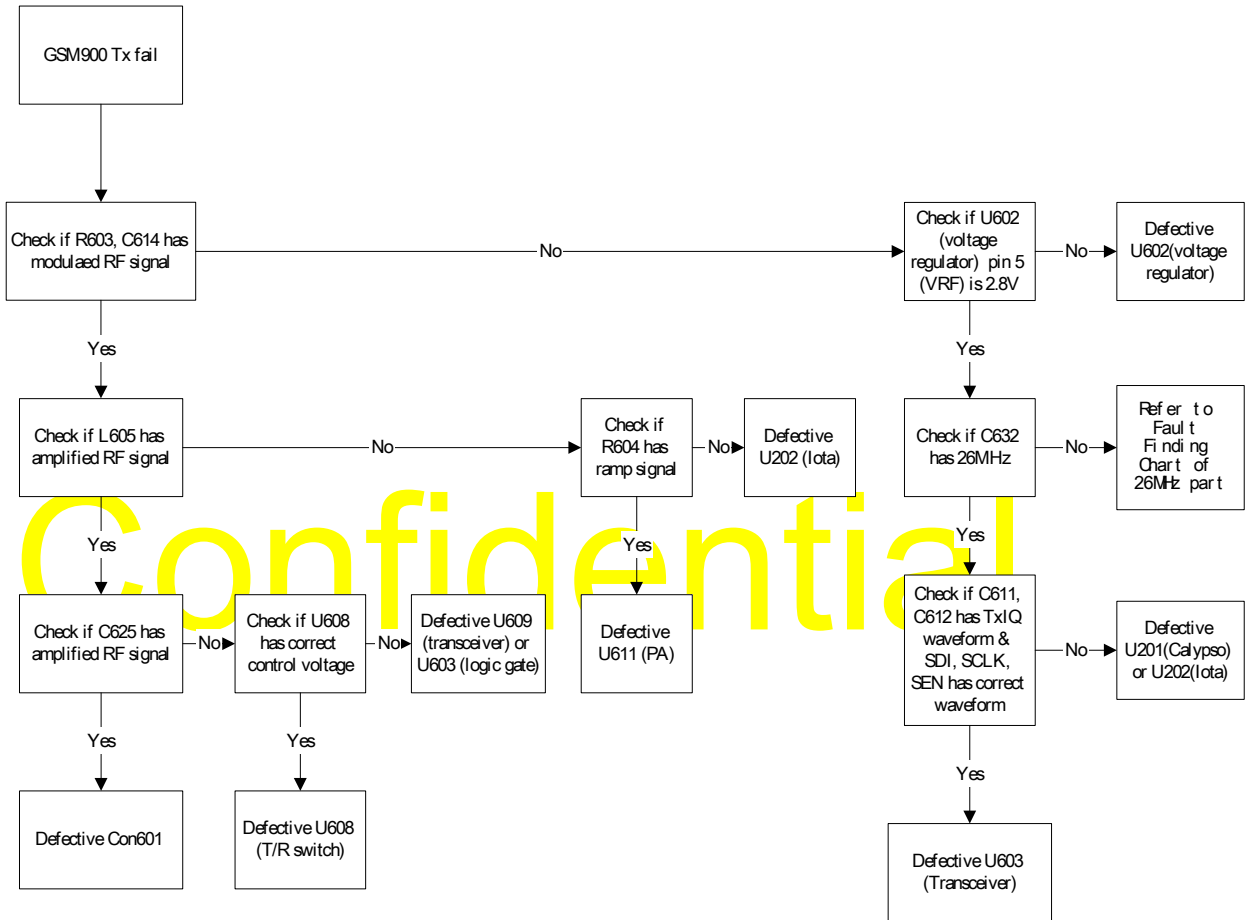
If the transmitter/receiver is OK but still has some problem in AFC calibration, there may be some problem in U202.

**Fault Finding chart of 26MHz clock part**

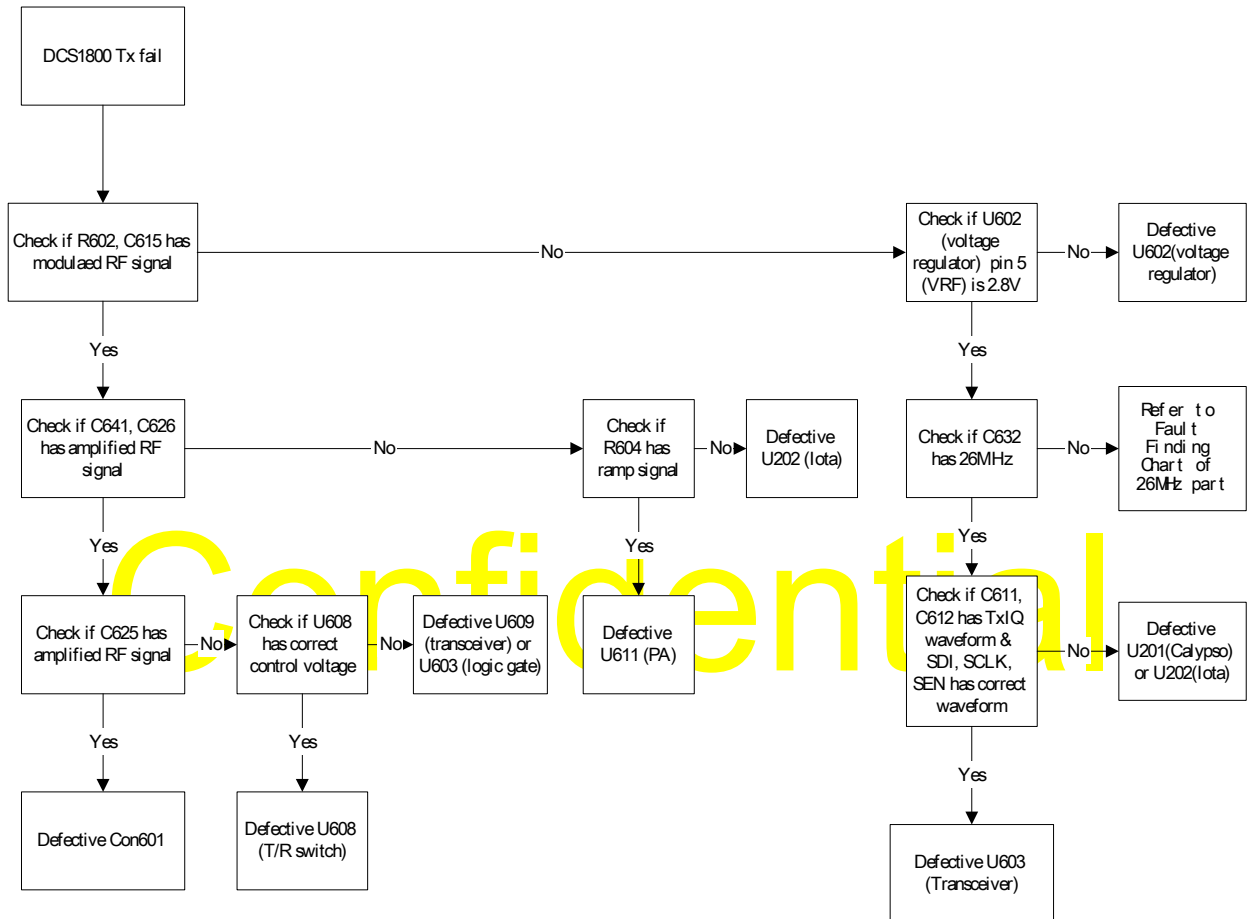


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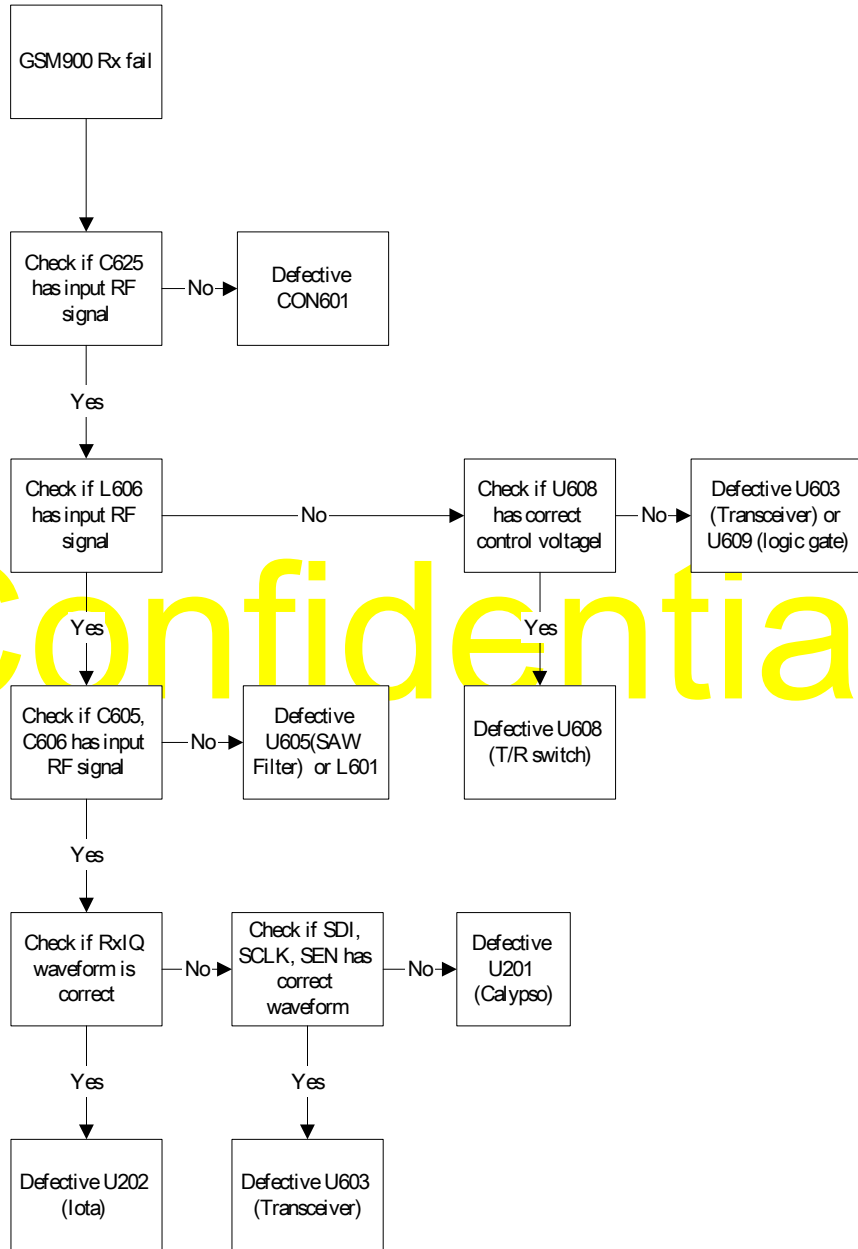
### Fault Finding chart of GSM900 Tx part



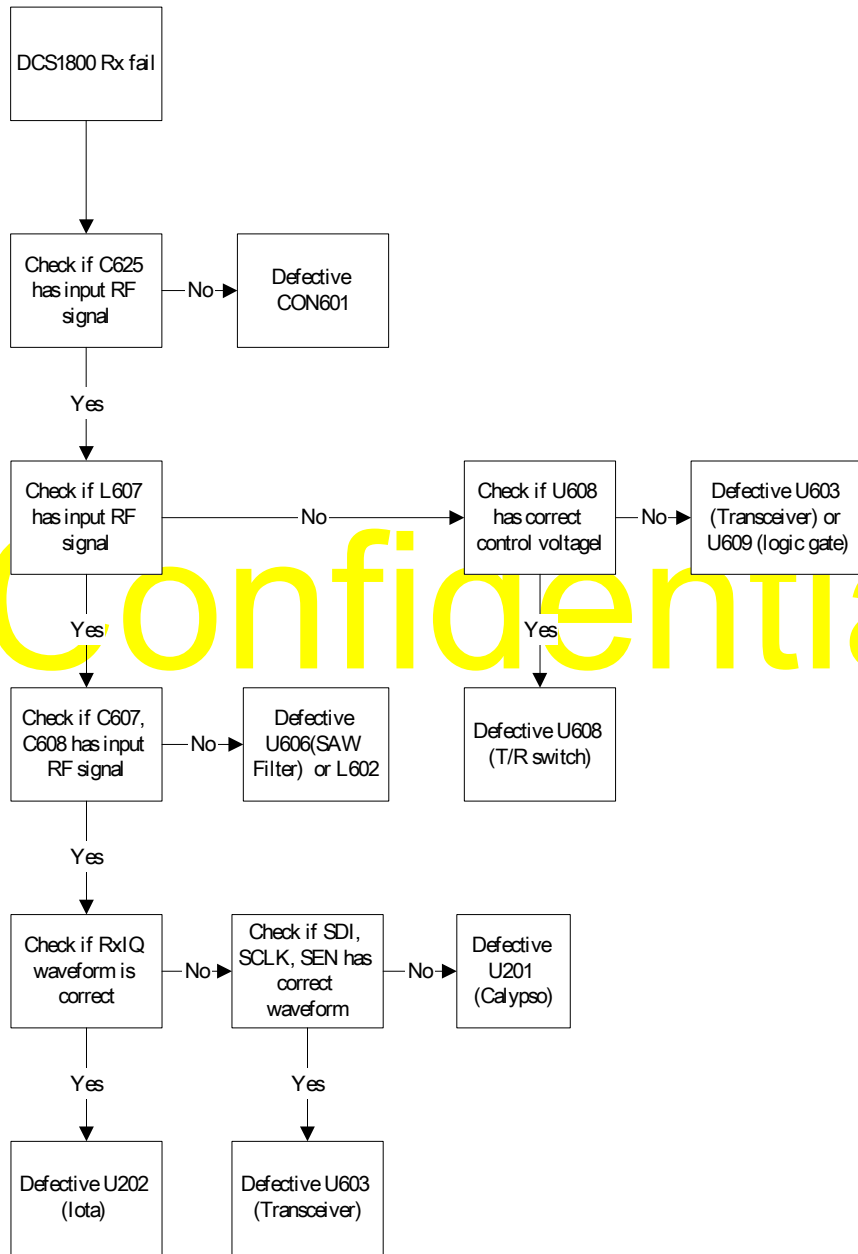
### Fault Finding chart of DCS1800 Tx part



### Fault Finding chart of GSM900 Rx part



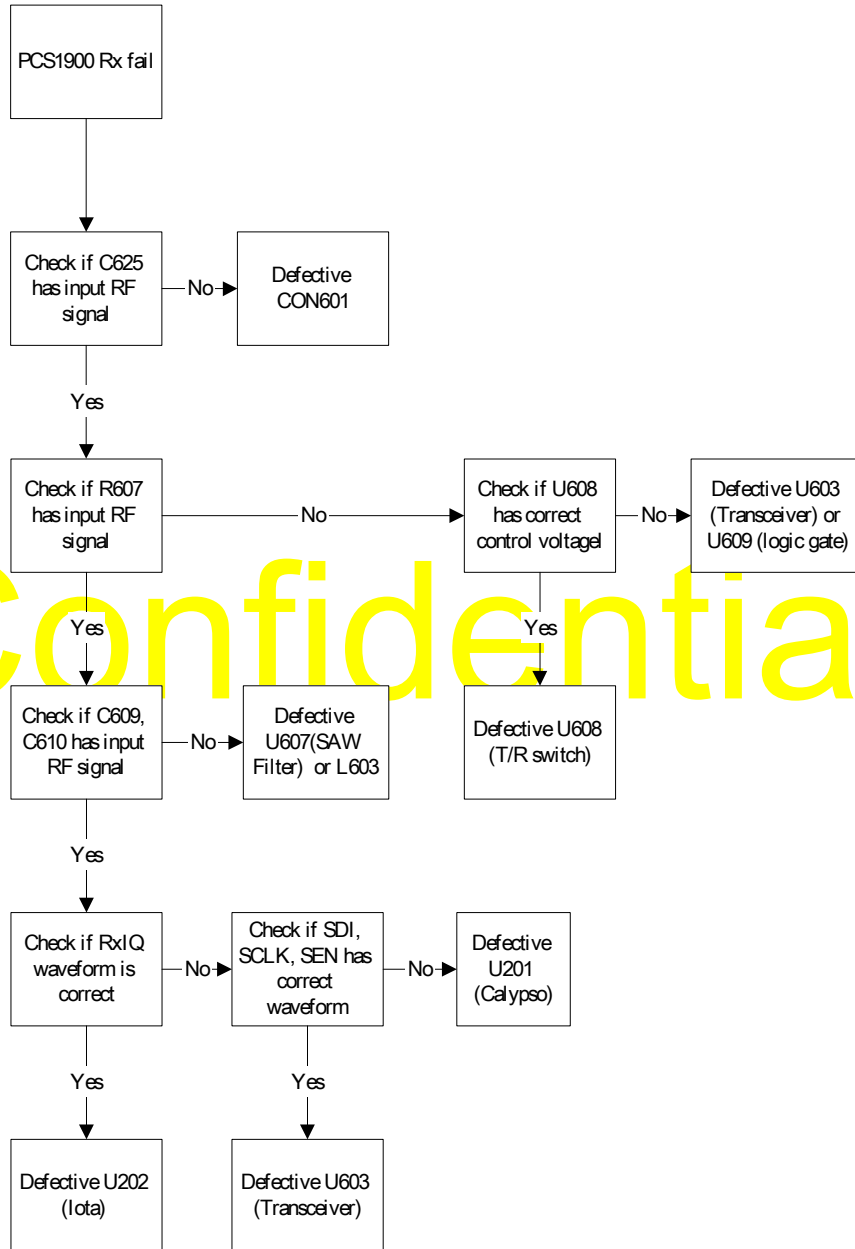
### Fault Finding chart of DCS1800 Rx part



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### Fault Finding chart of PCS1900 Rx part



## Chapter 9 Spare Part List

Item	Part Number	Description	Q'ty
1	MEROS61001A	Assembly Rear Housing Flip	1
2	MEROS61002A	Assembly Front Housing Flip	1
3	MEROS61004A	Assembly Front Housing Base	1
4	MEROS61003A	Assembly Rear Housing Base	1
5	MEROS07001A	Key Pad	1
6	MEROS36002A	Stopper Base	1
7	MEROS51001A	Key Side	1
8	MEROS31001A	Mylar Cap Screw	1
9	W6401163320	SCREW	8
10	MEROS51002A	Frame Main LCD	1
11	MEROS11001A	VIBRATOR	1
12	MEROS16001A	Metal Dome	1
13	MEROS14002A	FPC SIDE KEY	1
14	MEROS14001A	FPC UPPER TO LOWER	1
15	SLT12816060	LCD Module_LCD Type	1
16	S0C86103000	CAMERA MODULE_	1
17	MEROS36001A	Cover Audio Jack	1
18	S0M23427020	MICROPHONE	1
19	S0S20149010	Two Way Speaker	1
20	MEROS04001A	Main Lens	1
21	SLT09601650	LCD Module_LCD Type	1
22	MEROS62001A	Frame Secondary LCD	1



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