Nokia Customer Care

Service Manual

RM-376 (Nokia 2608)

Mobile Terminal

Part No: (Issue 1)

COMPANY CONFIDENTIAL

Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Issue 1	06/2008	Shelly Wang	
	09/2008	Shelly Wang	update

Copyright

IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfill any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.
While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/email.
Please state:

- Title of the Document + Issue Number/Date of publication
- Latest Amendment Number (if applicable)
- Page(s) and/or Figure(s) in error

Please send to:

NOKIA CORPORATION
Nokia Mobile Phones Business Group
Nokia Customer Care
PO Box 86
FIN-24101 SALO
Finland
E-mail: Service.Manuals@nokia.com

Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.
Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.
Temperature extremes can affect the ability of your battery to charge.
For good operation times with Li-Ion batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.
Use the battery only for its intended purpose.
Never use any charger or battery which is damaged.
Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.
Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.
Do not dispose of batteries in a fire!
Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Nokia 2608 Service Manual Structure

(This page left intentionally blank.)

1- General Information

(This page left intentionally blank.)

Table of Contents

(This page left intentionally blank.)

■ Product features and sales packages

Hardware features

- 800MHz, IS95, CDMA2000 1xRTT
- Internal RF antenna
- Internal vibrating alert
- Internal hands free/music stereo speaker
- Speech codes: QCELP and EVRC,
- Micro USB charger

Display and keys

- Main display in 1.8"/128 x 160 pixel with 262K colors
- Keys: 4-way navigation key, Menu/OK key (center select), send &end key, browser key (long-press '0' key), power key, soft keys

Connectivity

- Micro USB 1.1 Full Speed

Software features

- Operating system: Real-Time Executive (REX) Operating System
- UI style: custom UI with Douglas 5 reference.
- HTTP 1.1
- WAP2.0 browsing (OMA Download server access through WAP Gateway. Also must support OMA DRM)
- BREW 3.1.5
- Show GIF, JPG and PNG image
- Voice Memo recording supported time at least 90 seconds
- 64 polyphonic ring chords and 25 pre-loaded ring tones. Support for MIDI,MP3, AAC, AAC+ and QCELP is required
- Calendar, alarm clock, calculator, stopwatch, world clock, count timer, to-do list, timers, key guard and notes/memo pad
- 3 pre-loaded themes (1 configurable carrier branded theme, 1 Nokia theme and 1 generic theme) and 10 pre-loaded wallpapers
- Downloadable ringtones and wallpapers via BREW
- SDK for 3rd party application development for BREW

Memory

- Internal memory (1.5MB)
- No external memory

Sales package

- Gift box
- Box insert (if applicable, may change due to box size): standard battery, travel charger, product literature, user guide, quick start guide, warranty information and carrier specific literature
- ATO items: engine, A-cover, key mat and battery cover

■ Mobile Enhancement

Data

Enhancement	Type
Connectivity Cable	CA-101

Power

Enhancement	Type
Battery 870 mAh	BL-5BT
Travel charger	AC-6U
Vehicle Power Charger	DC-6

Audio

Enhancement	Type
Mono Headset	HS-9
Stereo Headset	HS-49

Car

Enhancement	Type
Wireless plug-in car handsfree	n/a

■ Technical specifications

Transceiver general specifications

Unit	Dimensions (L x W x T) (mm)	Weight (g)	Volume (cm3)
Transceiver with BL-5BT 870 mAh li-ion battery	84 x 42 x 16.25	~70	47

Main RF characteristics for CDMA2000 Cell band 800

Parameter	Unit
Cellular system	CDMA2000(800 MHz band)
Rx frequency band	Band class 0: 869 – 894 MHz
Tx frequency band	Band class 0: 824 – 849 MHz

Output power	-60 dBm ~ 30 dBm
Number of RF channels	832
Channel spacing	30 kHz

Battery endurance

Battery	Talk time	Stand-by	Video call time	Music playback time
BL-5BT 870 mAh li-ion battery	At least 210 minutes (with standard battery)	At least 240hours (with standard battery)	NA	NA

Note: Operation times may vary depending on radio access technology used, operator network configuration and usage.

Charging time

AC-6U
No more than 3 hours (from empty to full battery)

(This page left intentionally blank.)

2- Service Tools and Service Concept

(This page left intentionally blank.)

Table of Contents

List of Tables

List of Figures

■ Service tools

Product Specific tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-376.

MJ-209	Module Jig	

The module jig offers engine module component level repair and analysis.
Features:

- connection interfaces for CDMA antenna
- galvanic connection to engine module test pads
- lid interconnection with test points for measurements
- connection to Displays, earpiece, headset and speakers

Note: There is one RF connection for CDMA

Table 1 MJ-209 attenuation table

Band (mid. ch.)	Channel	Frequency /MHz	Attenuation Loss / dB
800 TX		824 – 849 MHz	
800 RX		869 – 894 MHz	

	Set-up Guide
1	Prepare LCM module, FPC, board and MJ-209  
2	Connect LCM module and board using FPC 
3	Put 2 on MJ-209 
4	Close MJ-209  then start further testing

SS-190	Dome sheet Alignment Jig	

SS-190 is a jig to align the adhesive dome sheet assembly onto the PWB in the proper location during dome sheet replacement.

General tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-376

	RJ-230	Soldering	
	RJ-230 is a jig to support component level exchange with soldering machines for the engine module.		
	PK-83	AMS SW Protection Key (USB)	
	PK-83 is a hardware protection key with a USB interface to enable the use of the service software when connected to the USB port of the PC or Notebook. It is not possible to use the service software without PK-83		

Cables

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-376.

	CA-101	Micro USB cable	
	The CA-101 is a USB-to-micro USB data cable that allows connections between the PC and the phone.		
	PCS-1	Power Service Cable	
	The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled voltage.		
	CA-128RS	RF Test Cable	
	RF Test Cable for use with a Module Jig. CA-128RS RF cable allow RF function tests and RF tuning in CDMA Cell and PCS bands. Features include: • most accurate RF connection to phone module under test • low attenuation and small "ripple" over the width of each band **Note:** The RF Test Cable must be used for RF tuning.		
	SRT-6	Opening tool	
	SRT-6 is used to open phone covers.		

Service concepts

POS (Point of Sale) flash concept

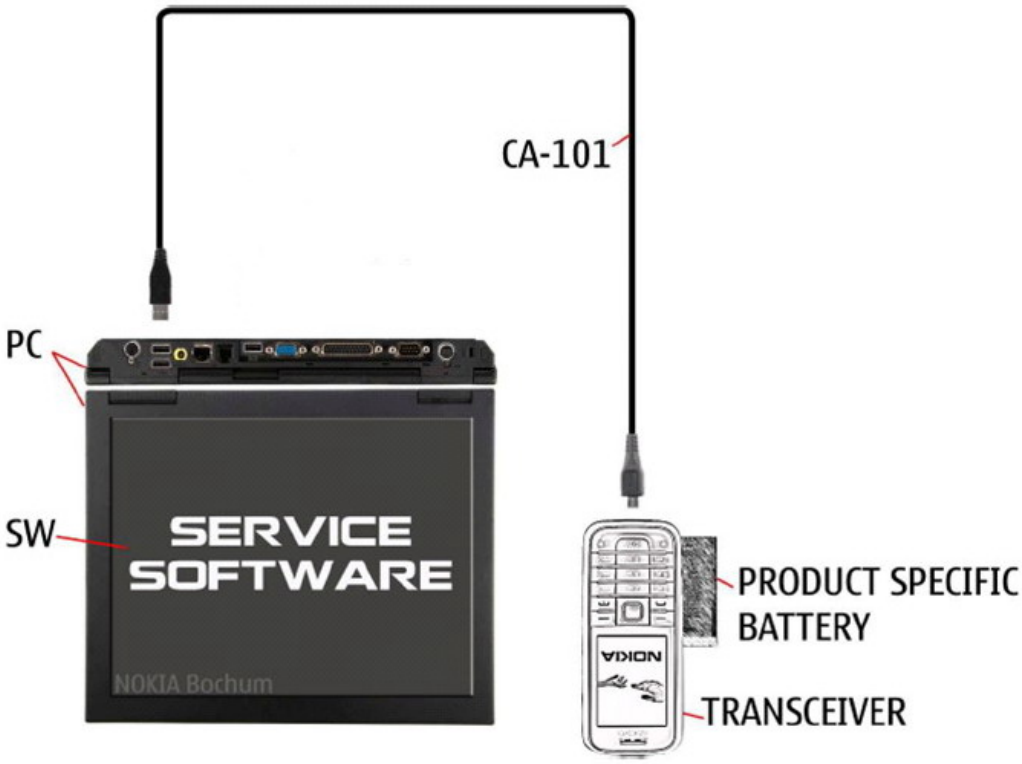


Figure 1 POS flash concept

Type	Description
Product specific tools	
BL-5BT	Battery
Other tools	
Nokia Care Suite	PC with Nokia Care Suite service software
Cables	
CA-101	Micro USB cable

Flash concept with Module Jig

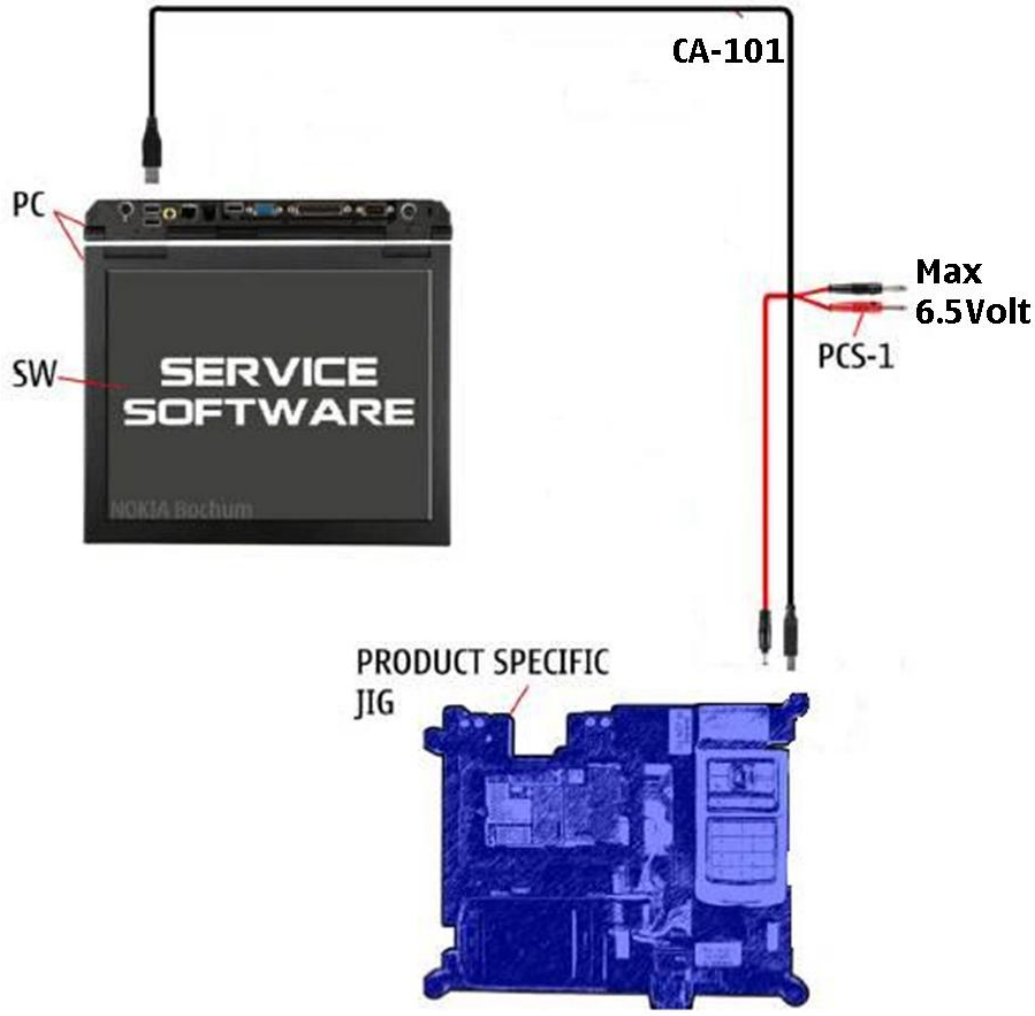


Figure 2 Flash concept with Module Jig

Type	Description
Product specific tools	
MJ-209	Module Jig
Other tools	
Nokia Care Suite	PC with Nokia Care Suite service software
Cables	
CA-101	Micro USB cable
PCS-1	Power Service Cable

Covers-off BB/RF Troubleshooting using Module Jig

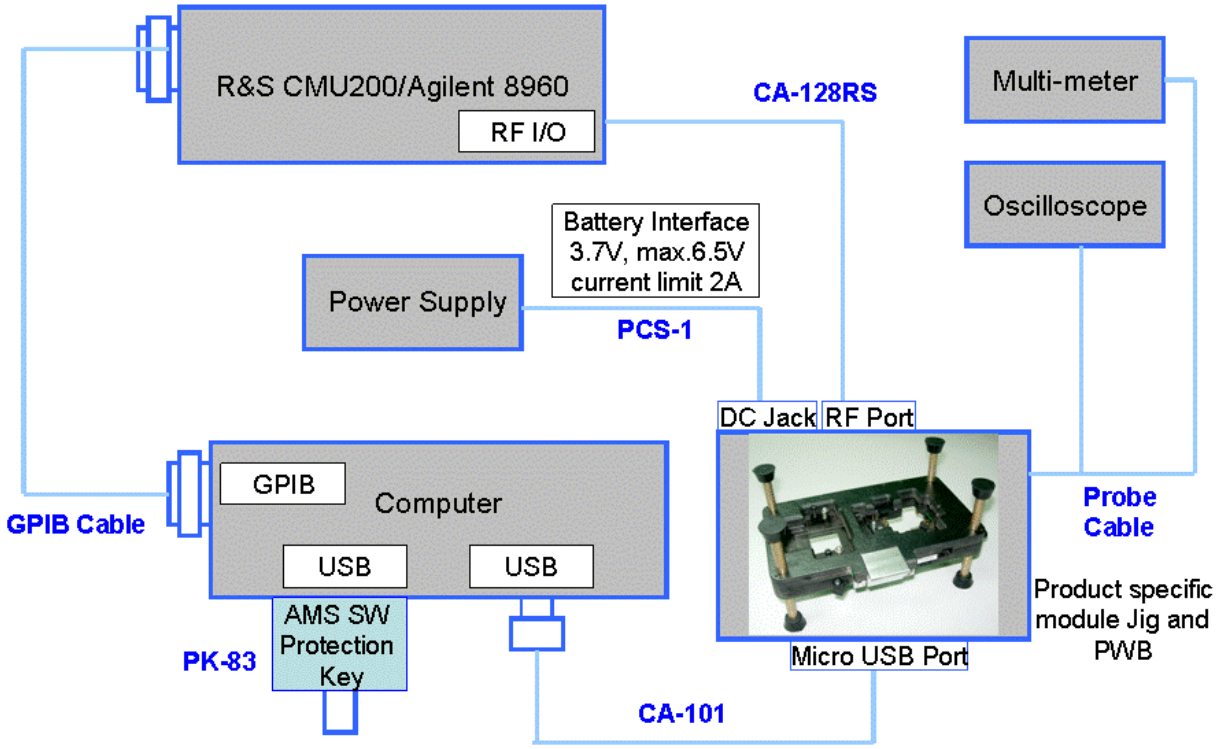


Figure 3 Cover-off BB/RF Troubleshooting using Module Jig

Type	Description
Product specific tools	
MJ-209	Module Jig
Other tools	
PK-83	AMS SW Protection Key (USB)
Nokia Care Suite	PC with Nokia Care Suite service software (L3 version)
R&S CMU200 with B89/PK800 module	CDMA CALL BOX
	Oscilloscope
	Multi-meter
	Probes used with Oscilloscope and Multi-meter
Cables	
CA-101	Micro USB cable
PCS-1	Power Service Cable
CA-128RS	RF Test Cable
	GPIB Cable

Automated Tuning and Alignment concept

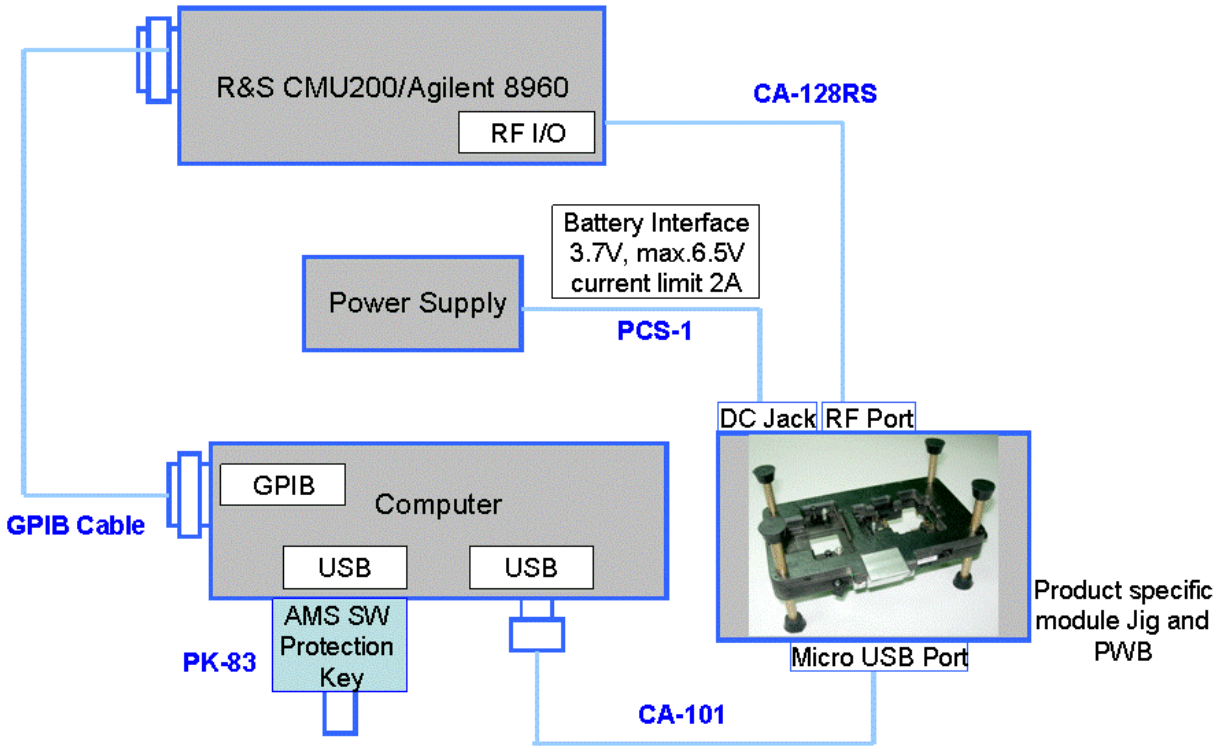


Figure 4 Automated Tuning and Alignment concept

Type	Description
Product specific tools	
MJ-209	Module Jig
Other tools	
PK-83	AMS SW Protection Key (USB)
Nokia Care Suite	PC with Nokia Care Suite service software (L3 version)
R&S CMU200 with B89/PK800 module	CDMA CALL BOX
Cables	
CA-101	Micro USB cable
PCS-1	Power Service Cable
CA-128RS	RF Test Cable
	GPIB Cable

(This page left intentionally blank.)

Nokia Customer Care

3- Baseband Troubleshooting

(This page left intentionally blank.)

Table of Contents

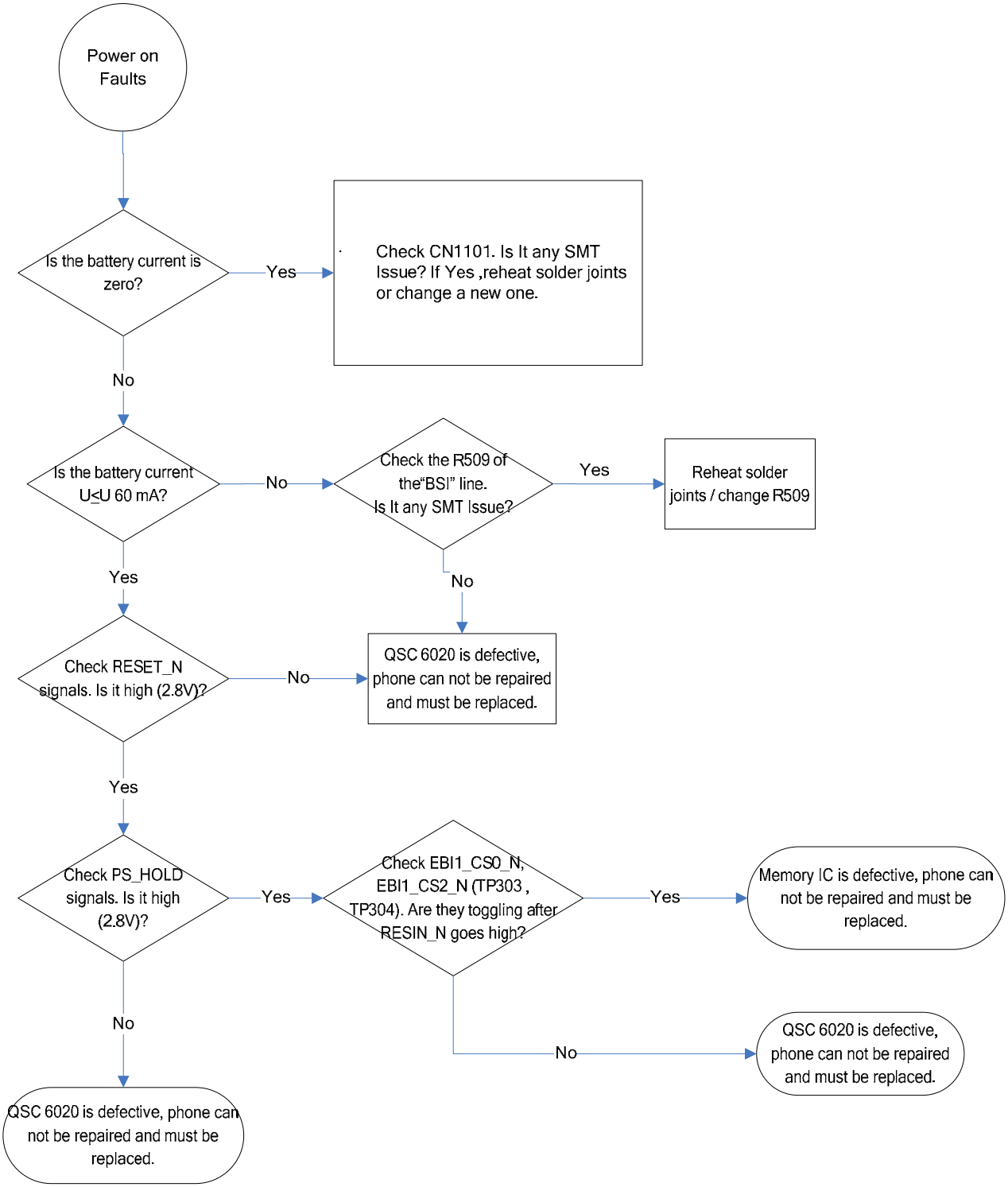
Troubleshooting overview

For practical reasons, troubleshooting is divided into two sections;

- Baseband troubleshooting
- RF troubleshooting

Dead or jammed device troubleshooting

Troubleshooting flow



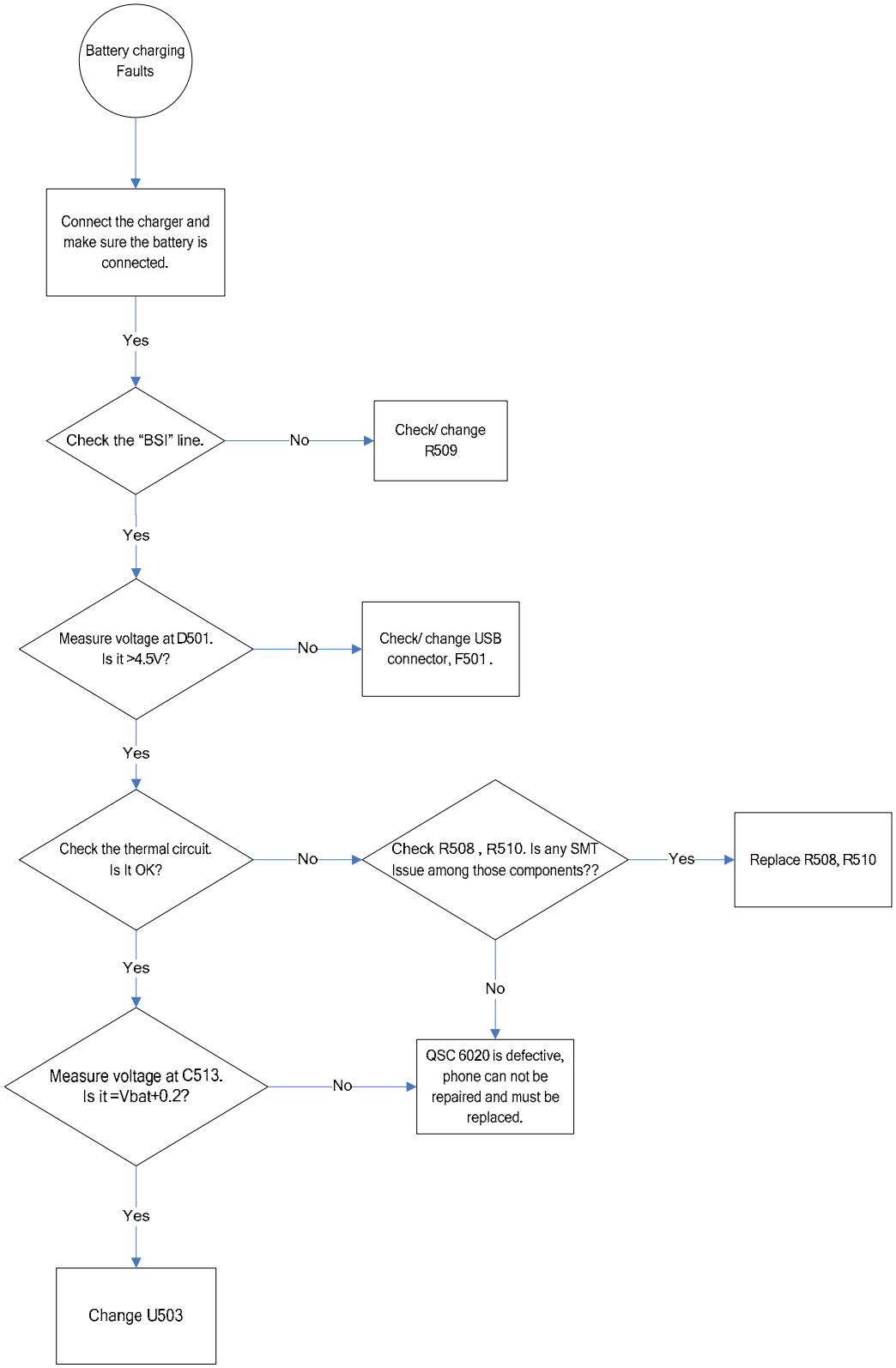
General power checking

Check the following voltages:

Signal name	Regulator	Sleep	Idle	Talk Mode	Notes	Supply
VREG RFRX	2.6 V					
VREG RFTX	2.6 V					
VREG USB	3.3 V					
VREG RUIM	2.85 V					
VREG TCXO	2.85 V					
VREG MSMA	2.6 V					
VREG MSME1	1.8 V					
VREG MSME2	2.9 V					
VREG MSMP	2.6 V					
VREG CORE	1.2 V					
MIC BIAS	1.8 V					

■ Charging troubleshooting

Troubleshooting flow



Keyboard troubleshooting

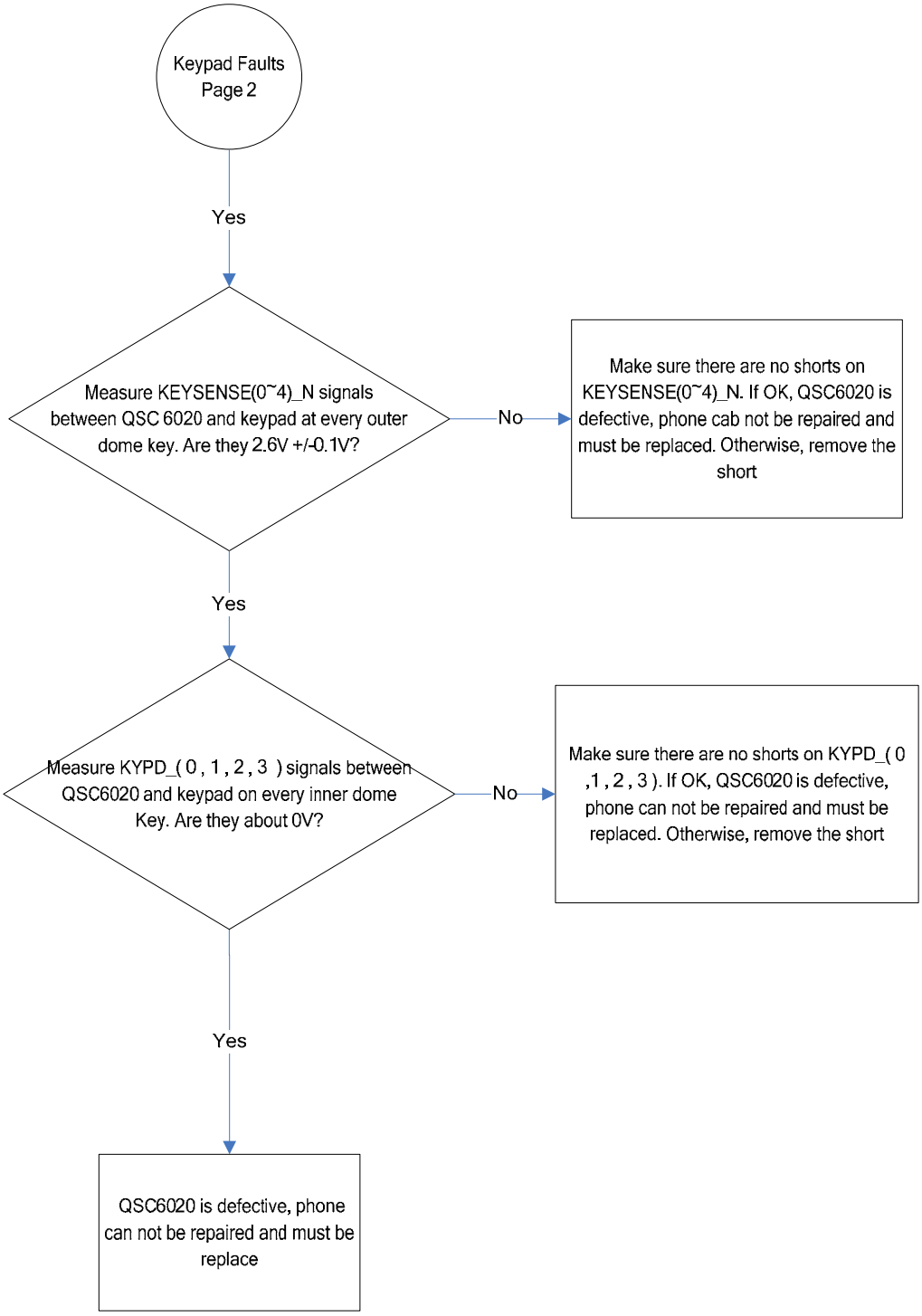
Context

There are two possible failure modes in the keyboard module:

- One or more keys can be stuck, so that the key does not react when a keydome is pressed. This kind of failure is caused by mechanical reasons (dirt, rust)
- Malfunction of several keys at the same time; this happens when one or more rows or columns are failing (shortcut or open connection). For a more detailed description of the keyboard and keymatrix, see section Keyboard.

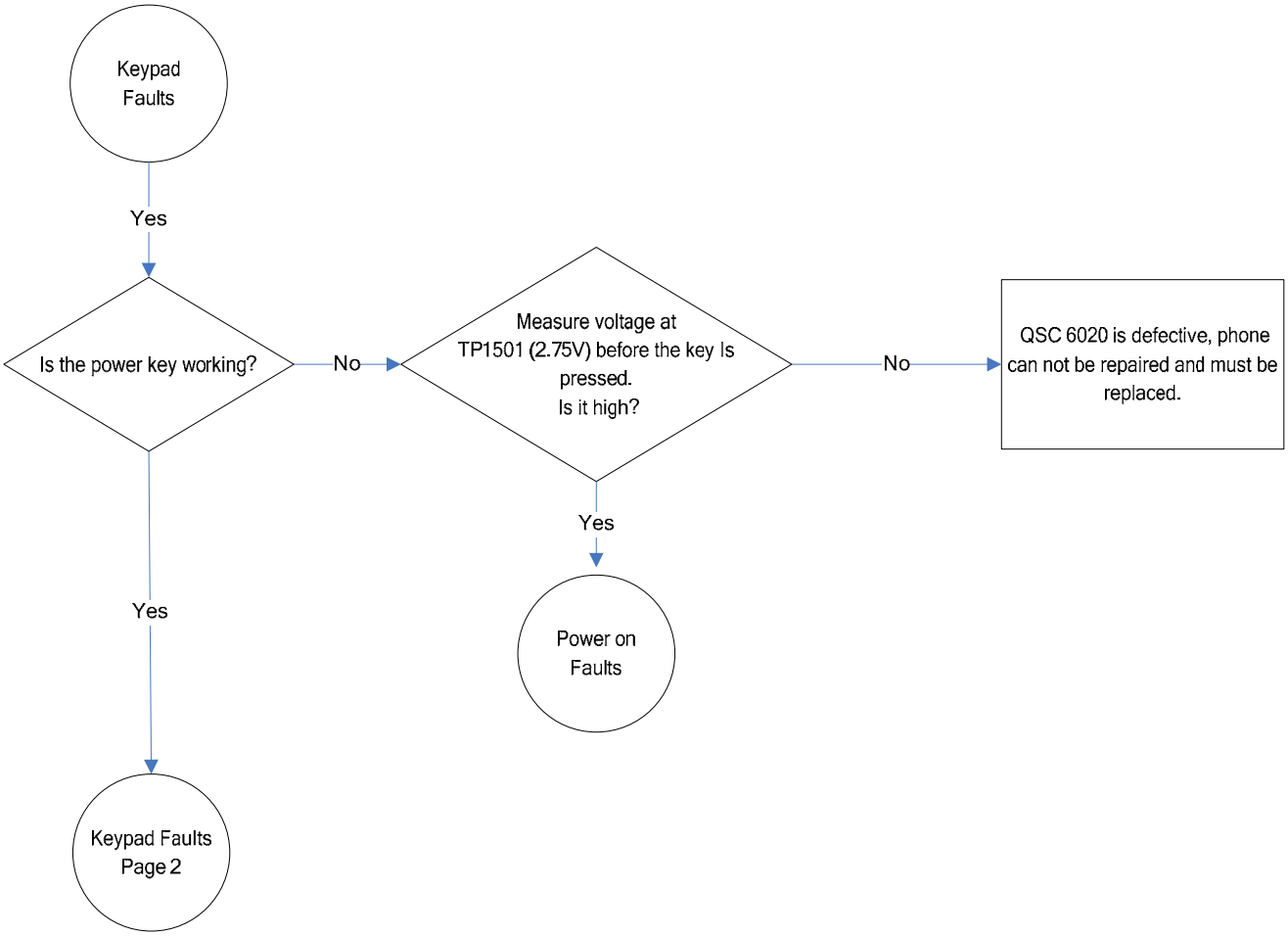
If the failure mode is not clear, start with the Keyboard Test in L3 PST.

Troubleshooting flow



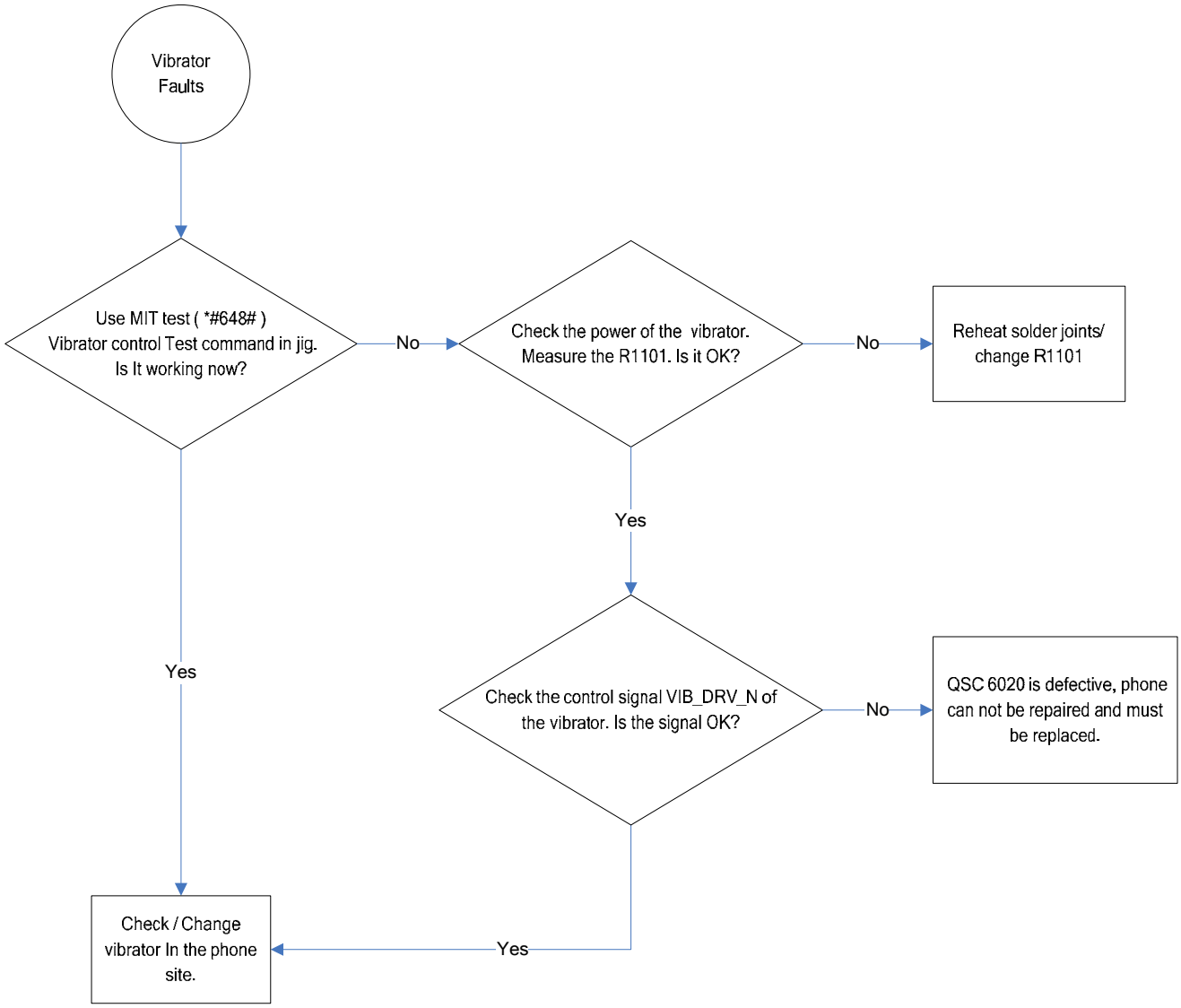
Power key troubleshooting

Troubleshooting flow



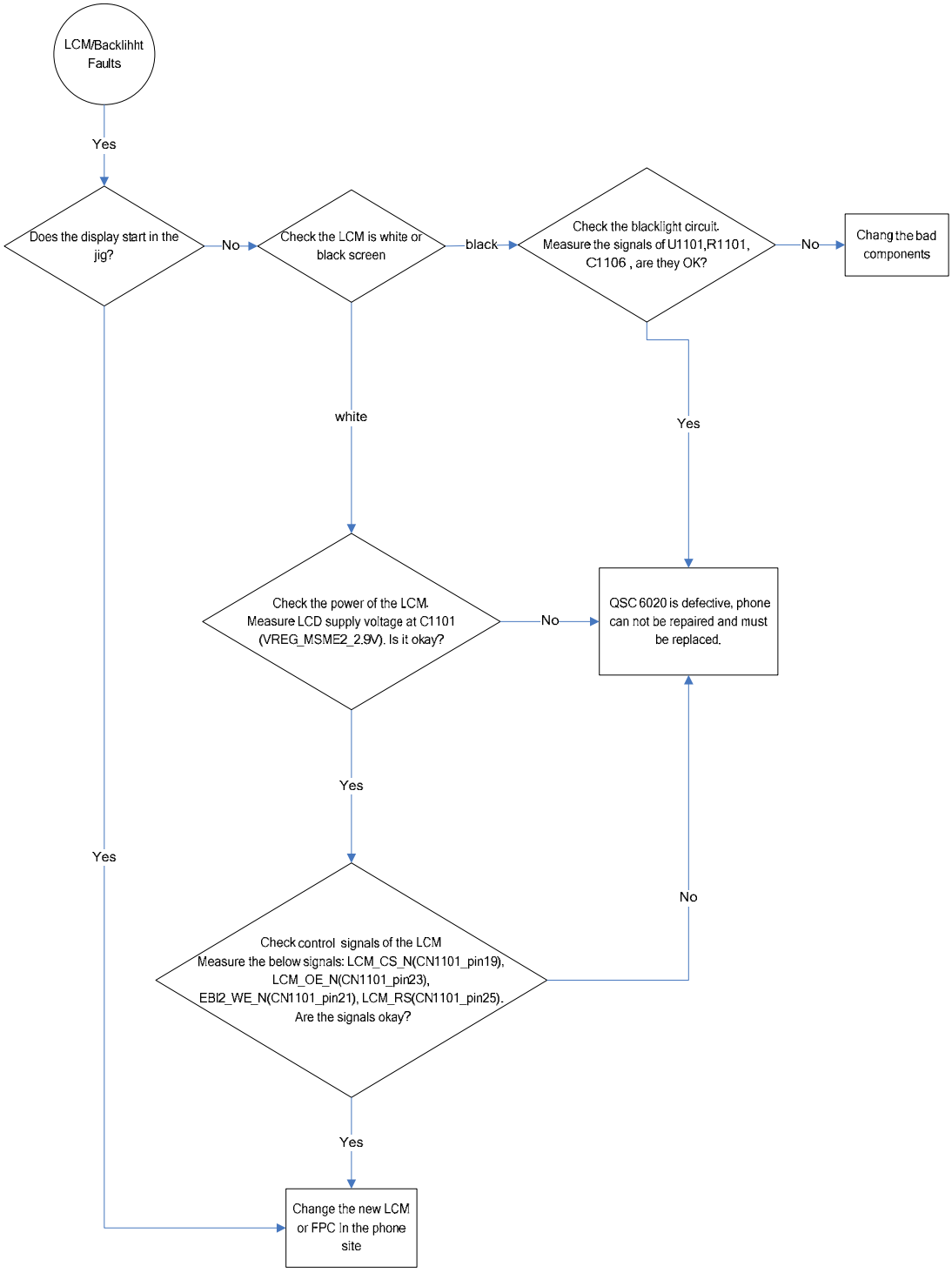
Vibra troubleshooting

Troubleshooting flow



■ Display module troubleshooting

Troubleshooting flow



Audio troubleshooting

Audio troubleshooting test instructions

Single ended external earpiece and differential internal earpiece/IHF outputs can be measured either with a single ended or a differential probe.

When measuring single ended, each output is measured against ground.

Note: Do not connect ground of single ended probe to 2nd signal of differential lines.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also, that when using a current probe, input signal frequency must be set to 2kHz.

The signal for input is single ended.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- Current probe (Internal handsfree PWM output measurement)
- service software, Nokia L3 PST Fx.xx
- Power supply 3.7V

Test procedure

Audio can be tested using MIT (*#648#). Four different audio loop paths can be activated:

- Receiver test
- Microphone test
- Speaker test
- Headset test

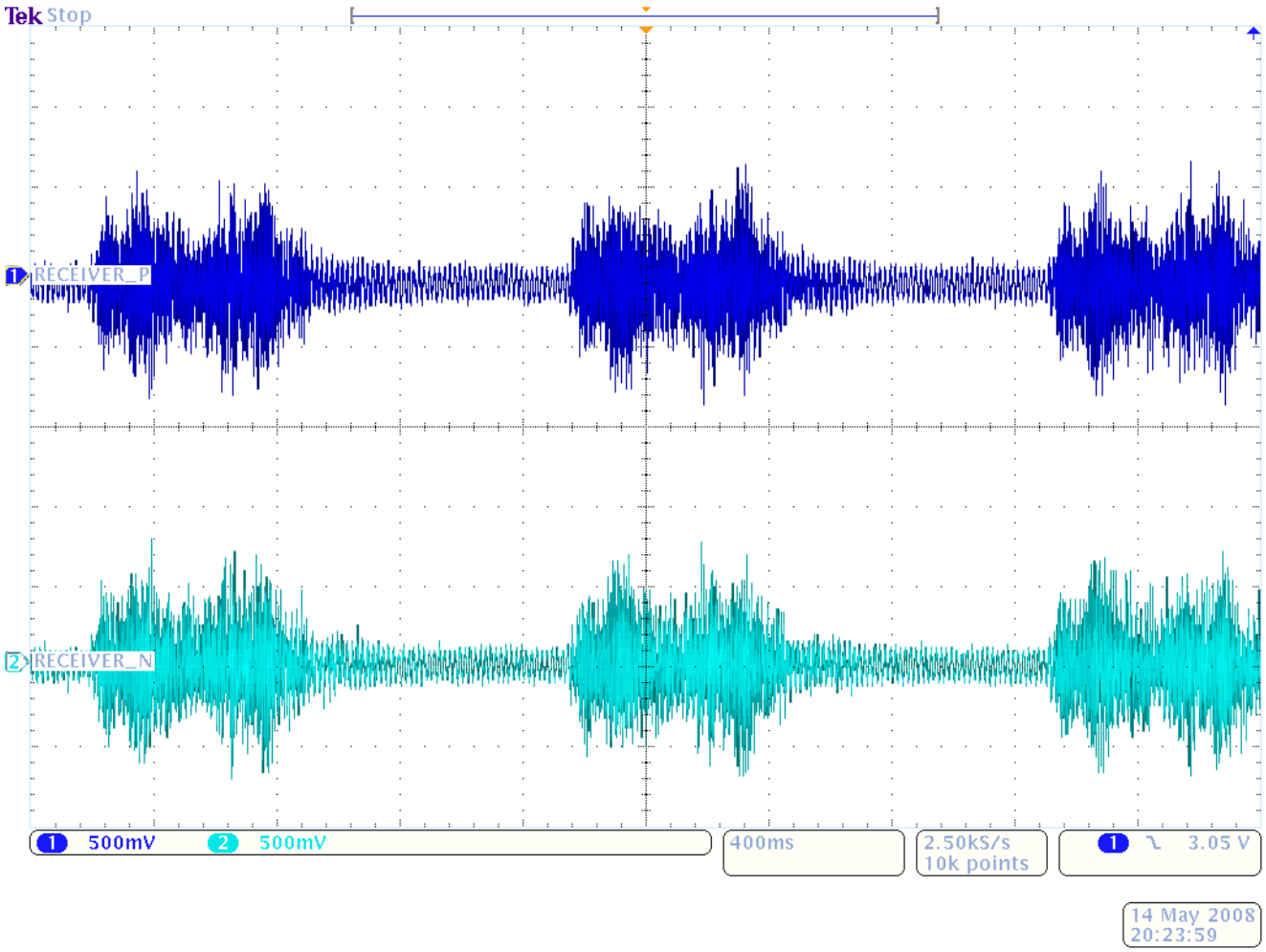
Correct pins an signals for each test see following table.

Audio loop tests and test results

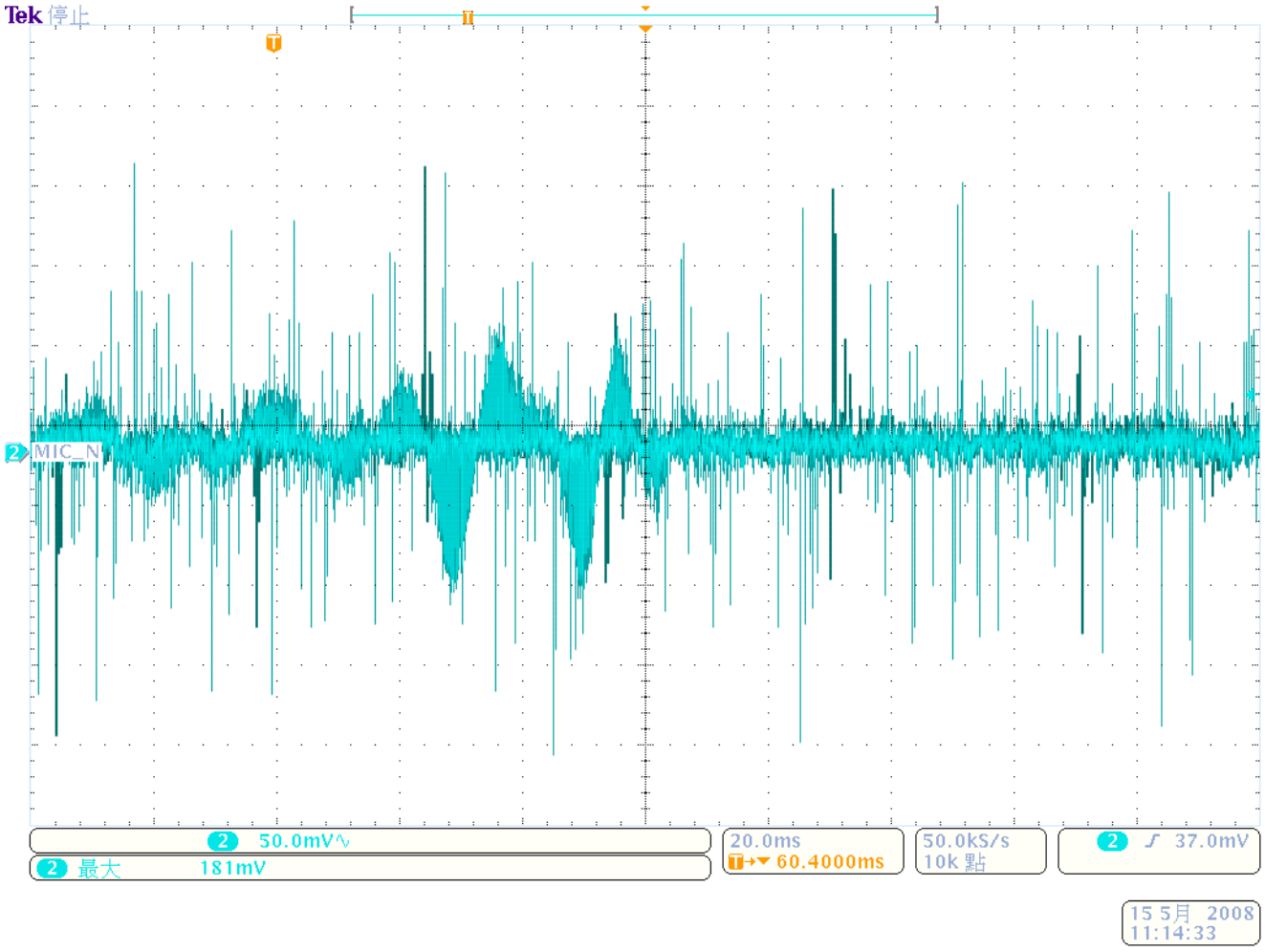
The results presented in the table apply, when no accessory is connected. Earpiece, internal mic and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured levels.

Measurement data

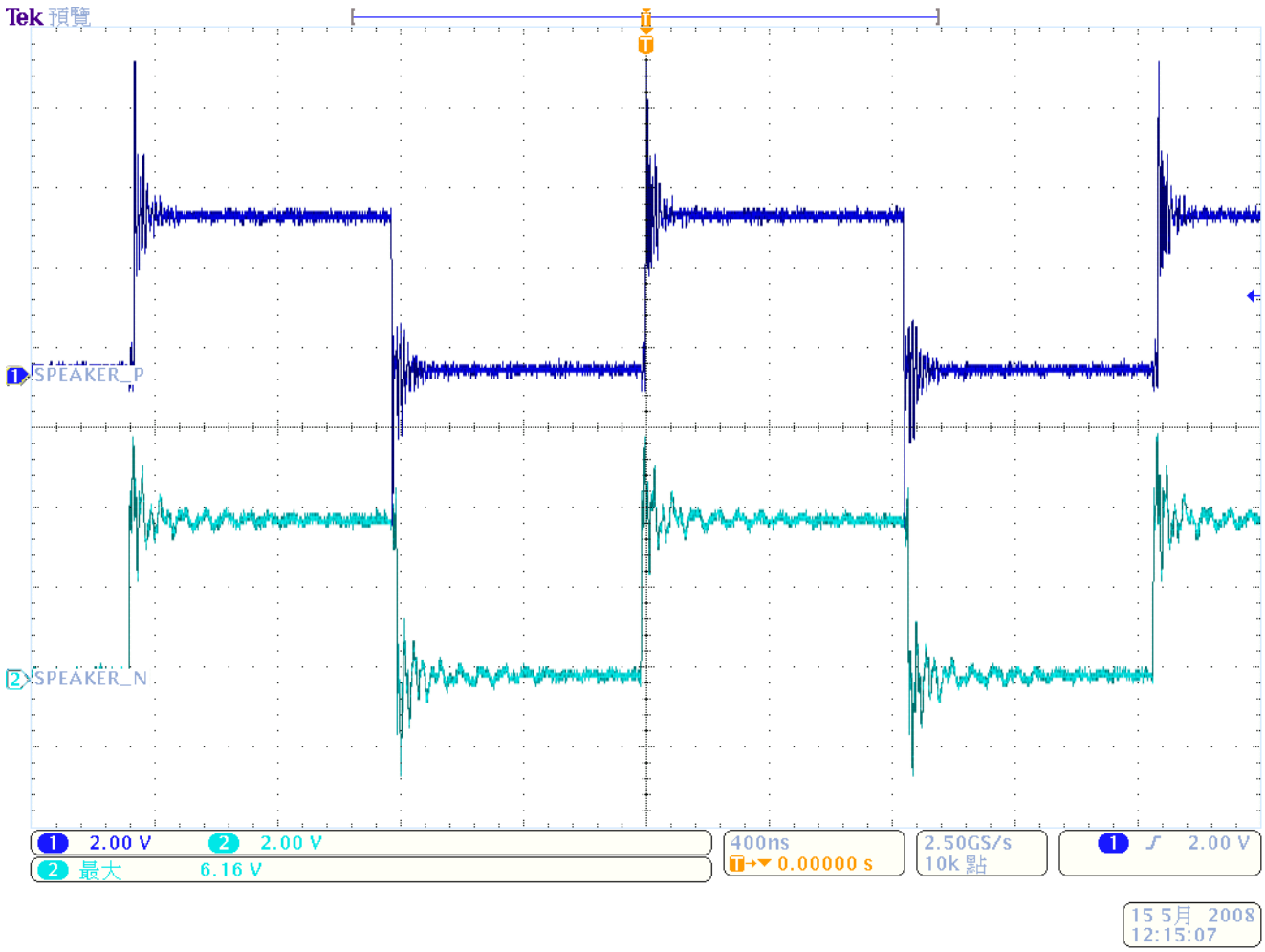
Receiver test



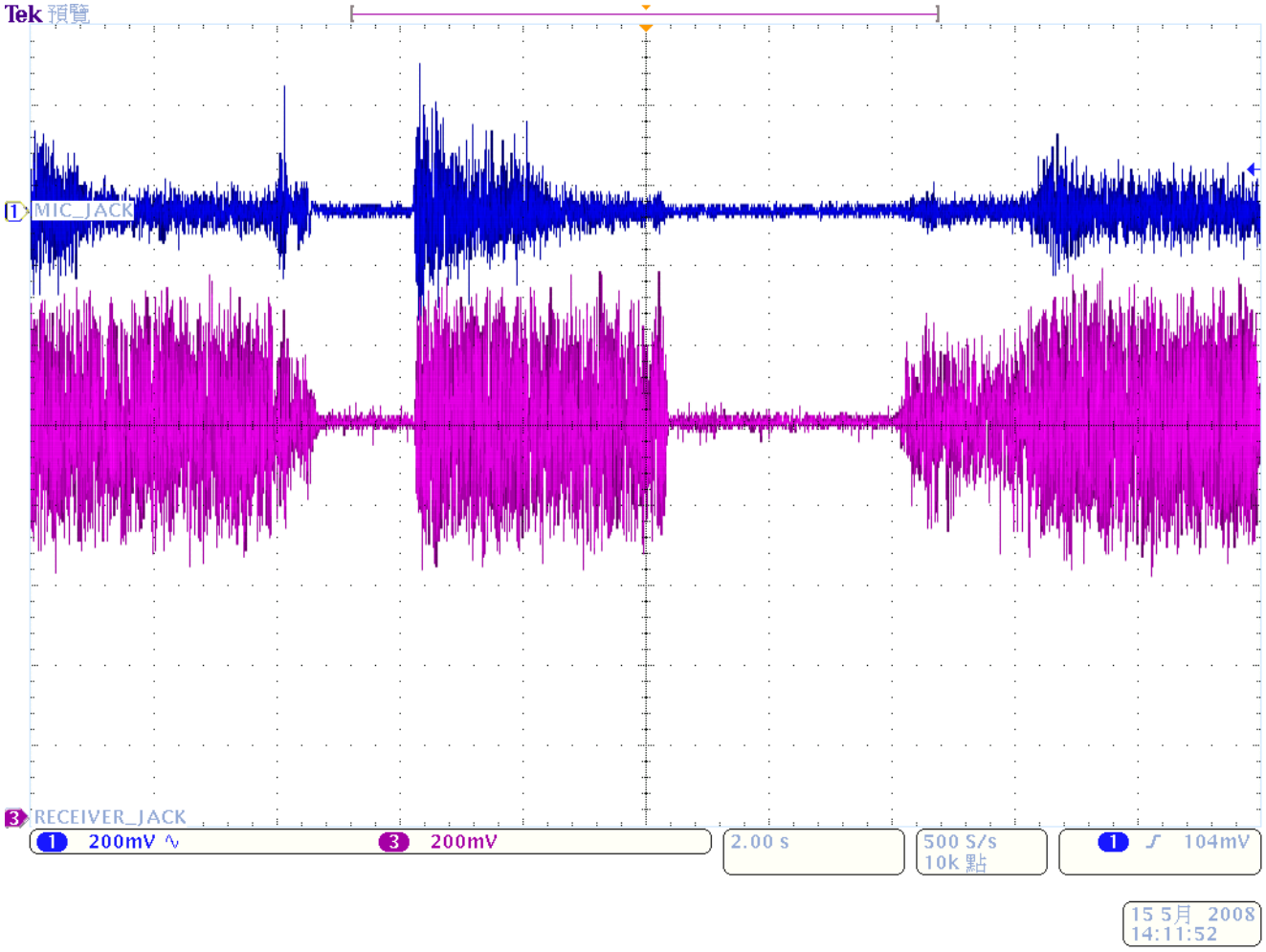
Microphone test



Speaker test

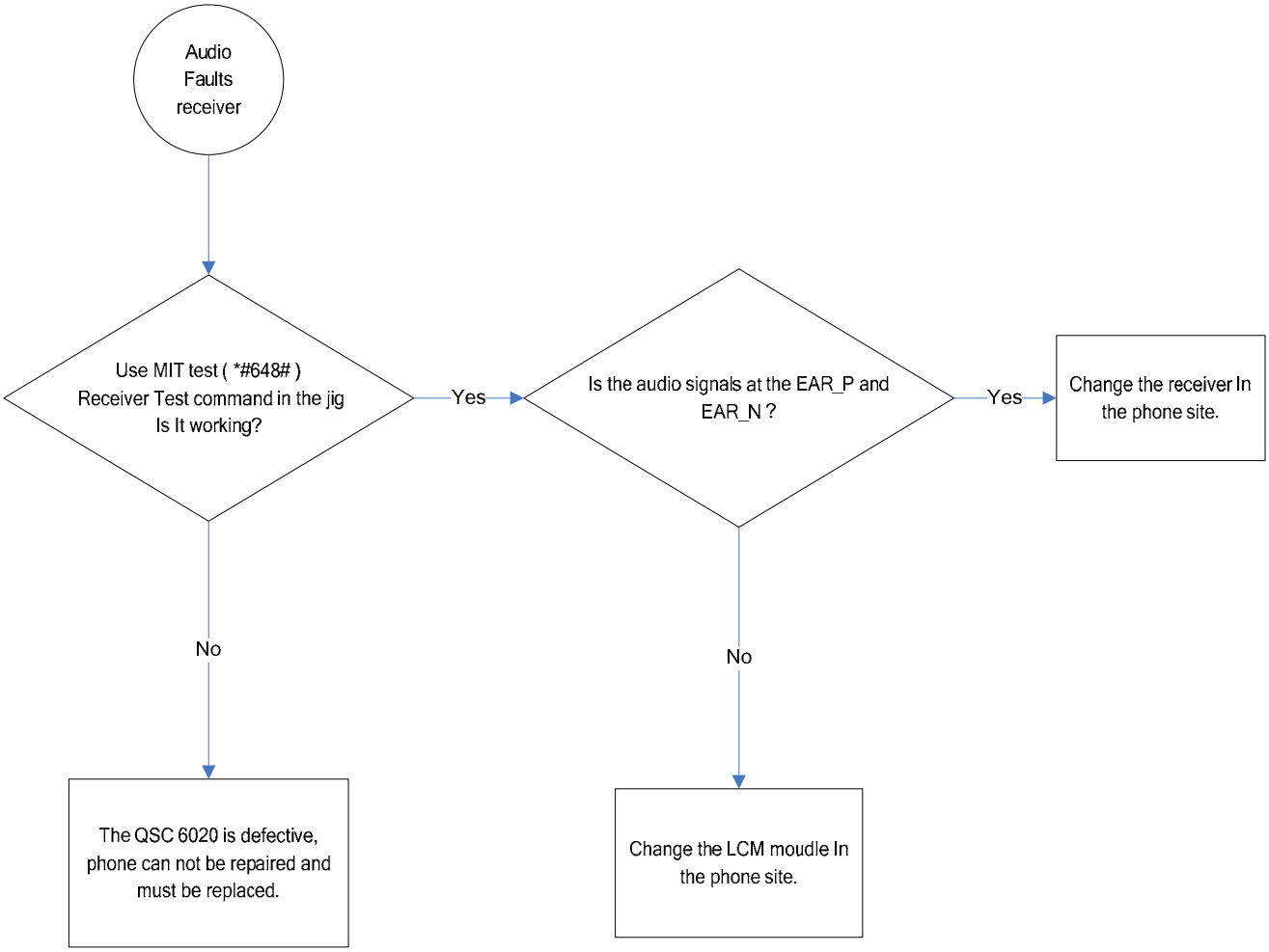


Headset test



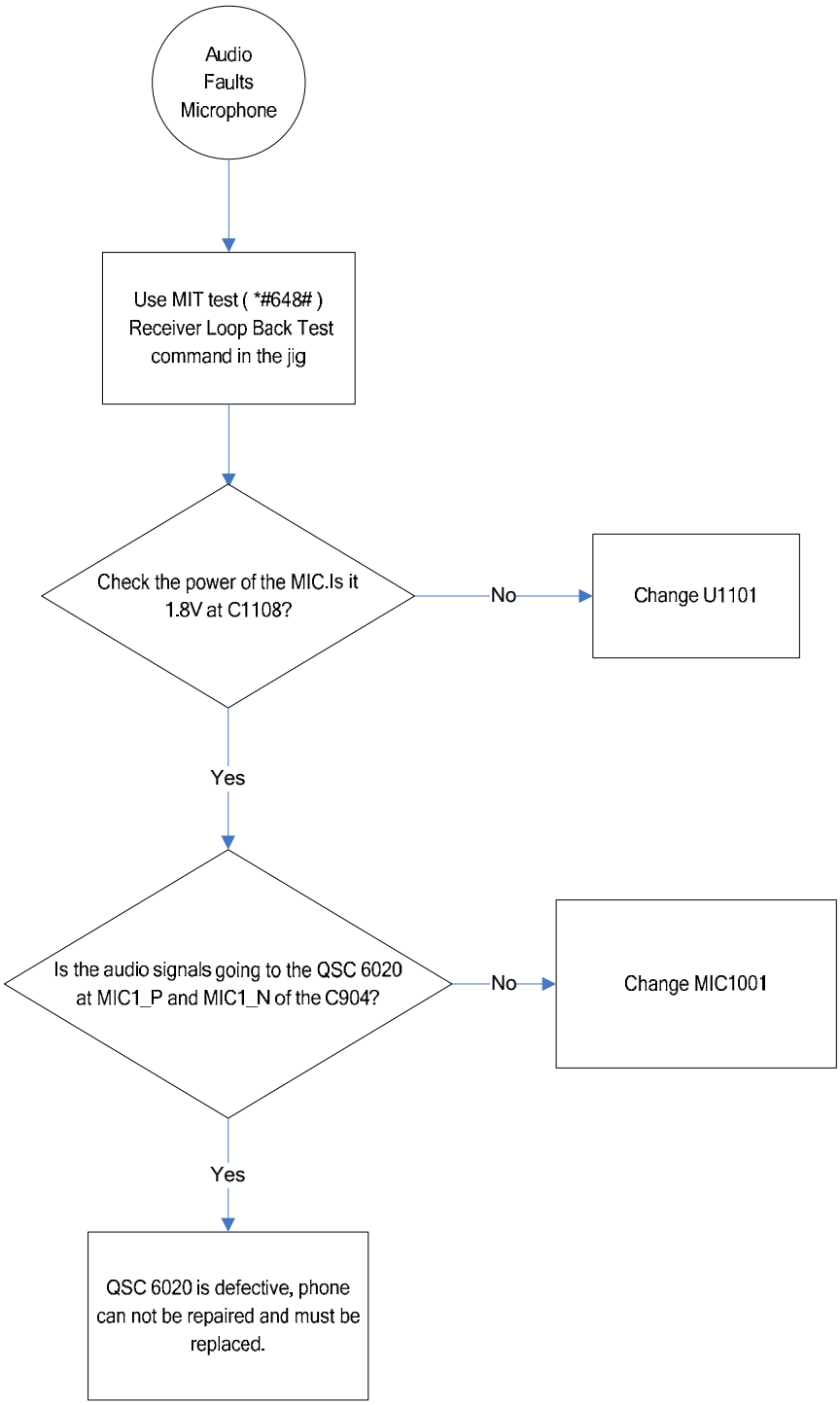
Internal receiver troubleshooting

Troubleshooting flow



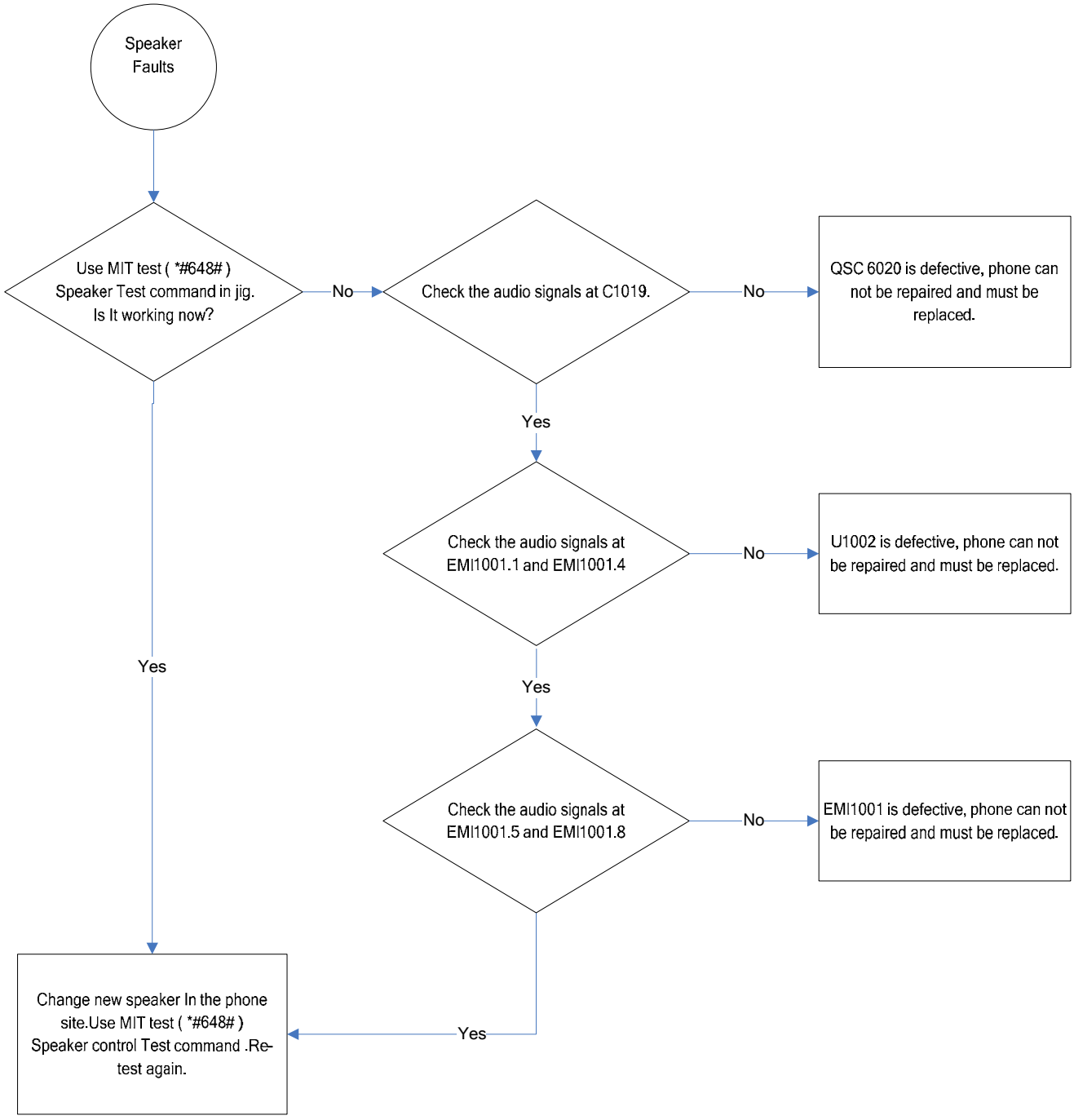
Internal microphone troubleshooting

Troubleshooting flow



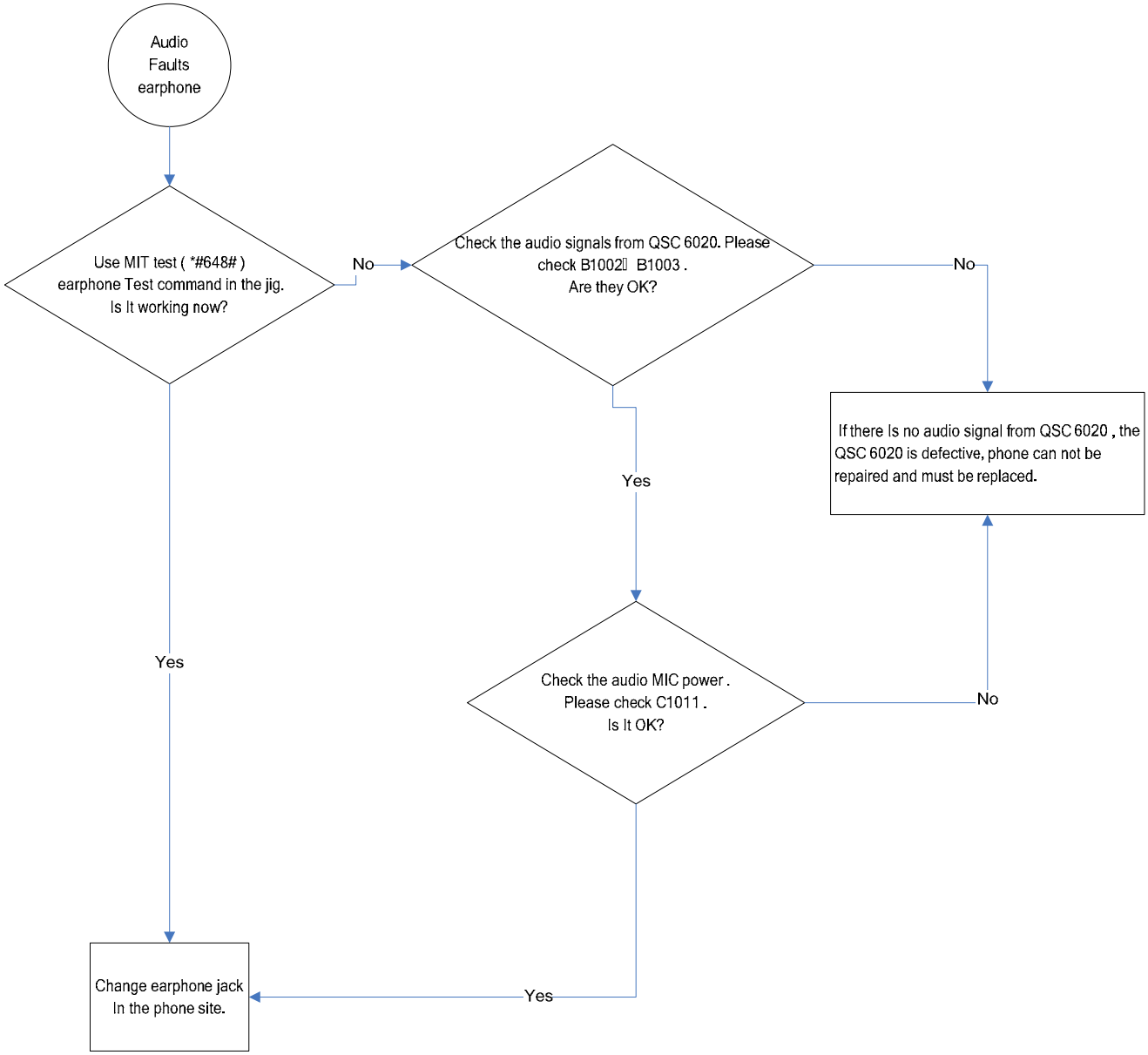
IHF speakers troubleshooting

Troubleshooting flow



External earphone troubleshooting

Troubleshooting flow



4- RF Troubleshooting

(This page left intentionally blank.)

Table of Contents

Figure

General RF troubleshooting

Introduction to RF troubleshooting

Most RF semiconductors are static discharge sensitive

ESD protection must be applied during repair (ground straps and ESD soldering irons).

Pre-baking (TBD)

These parts are moisture sensitive and must be pre-baked prior to soldering:

- RFIC xxxx
- PA xxxx

Discrete components

In addition to the key-components, there are a number of discrete components (resistors, inductors and capacitors) for which troubleshooting is done mainly by visual inspection.

Capacitors: check for short circuits.

Resistors: check value with an ohm meter.

Note: In-circuit measurements should be evaluated carefully

Measuring equipment

All measurements should be done using:

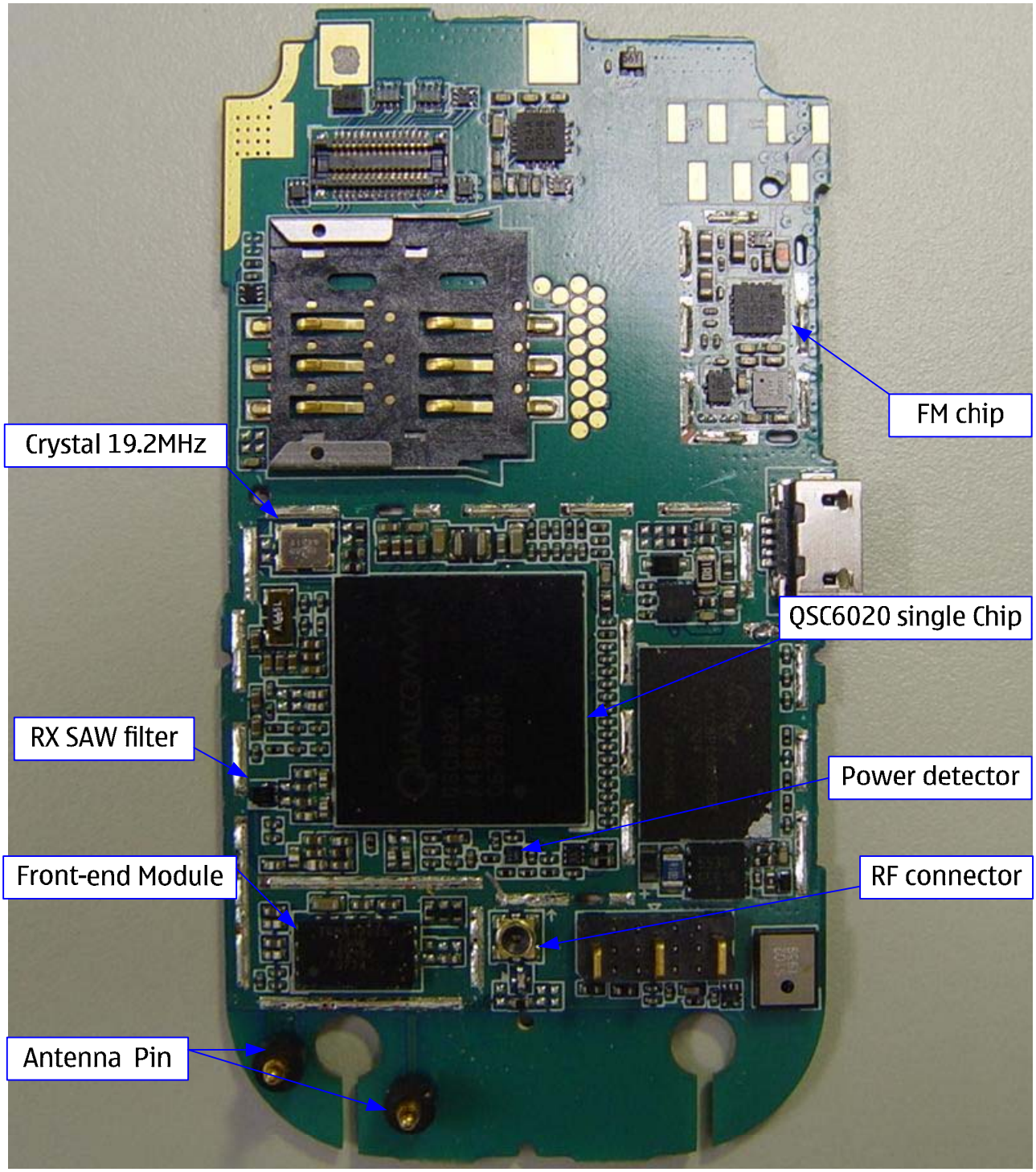
- An oscilloscope for low frequency and DC measurements. Recommended probe: 10:1, 10Mohm//8pF.Title of the Document + Issue Number/Date of publication
- A radio communication tester including RF generator and spectrum analyser, for example Rohde & Schwarz CMU200. (Alternatively a spectrum analyser and an RF generator can be used. Some tests in this guide are not possible to perform if this solution is chosen).

  Note: All measurements with an RF coupler should be performed in an RF-shielded environment because nearby base stations can disturb sensitive receiver measurements. If there is no possibility to use RF shielded environment, testing at frequencies of nearby base stations should be avoided.

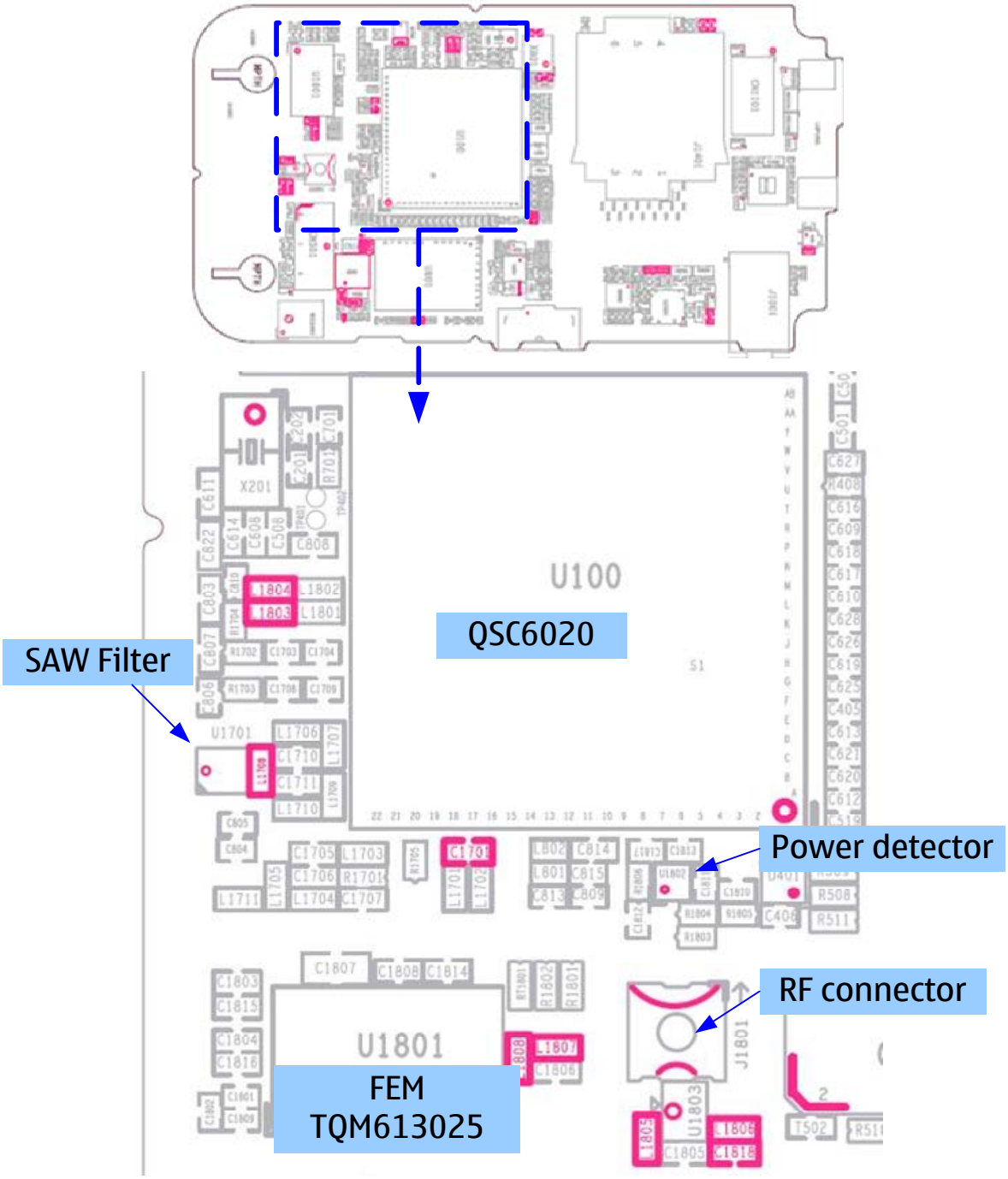
Level of repair

The scope of this guideline is to enable repairs at key-component level. Some key-components are not accessible, i.e. not replaceable. Please refer to the list of Non-replaceable RF components.

General information on RF troubleshooting



RF key components



General voltage checking

RF TX voltage checking

Steps

1. Set up the main board in the module jig. The phone should be in local mode.
2. Check the following:

#	Signal name	Test point	Voltage (all bands)
1	PA_ON	C1801.2	On :2.35~2.85V , Off :0V
2	PA_R0	C1802.2	Low mode :2.35~2.85V , High mode :0V
3	VREG_TCXO	C1809.2	On :2.85V , Off :0V
4	VPH_PWR	C1807.1	3.4~4.2V
5	VREG_RFTX	C814.1	2.65V

*

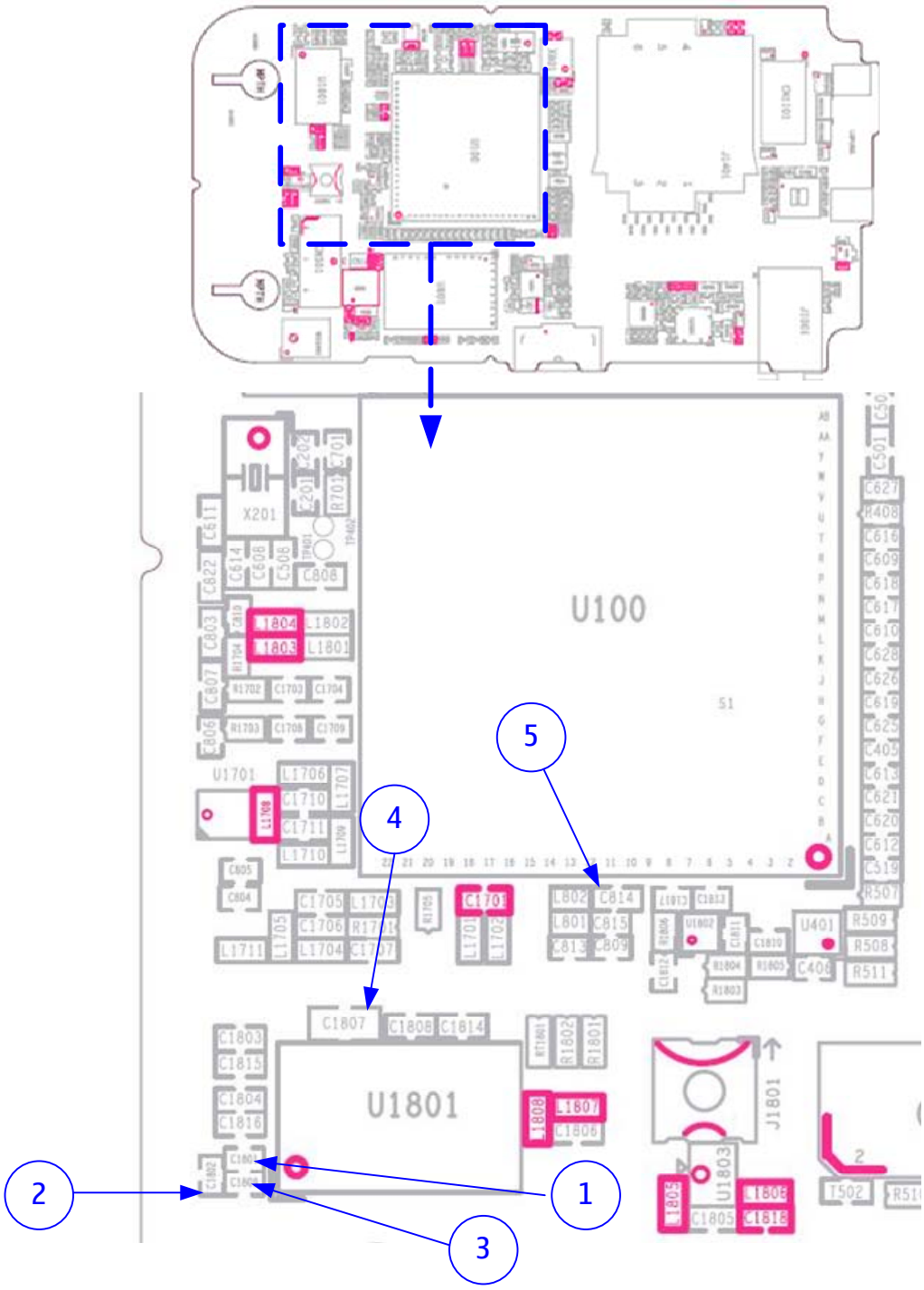


Figure 1 RF TX Path voltage checking test points

#	Description	Test Point	Value	RF Supply Lines Resistance to Ground
1	VREG_MSMP,	C608.1	2.6V	>290kΩ to ground
2	VPH_PWR,	C514.1	3.4~4.2V	>200kΩ to ground
3	VREG_MSMC,	C622.1	1.2V	>18kΩ to ground
4	VREG_MSMA,	C615.1	2.6V	>37kΩ to ground
5	VREG_TCXO,	C602.1	2.85V	~500kΩ to ground
6	VREG_RFRX,	C803.1	2.65V	>274kΩ to ground
7	VREG_RFTX,	C808.1	2.65V	~276kΩ to ground

Table 2 Bottom side TX voltage checking test points and RF Supply Line Resistance to Ground

**Note: Always measure resistance measure resistance with the phone powered off*

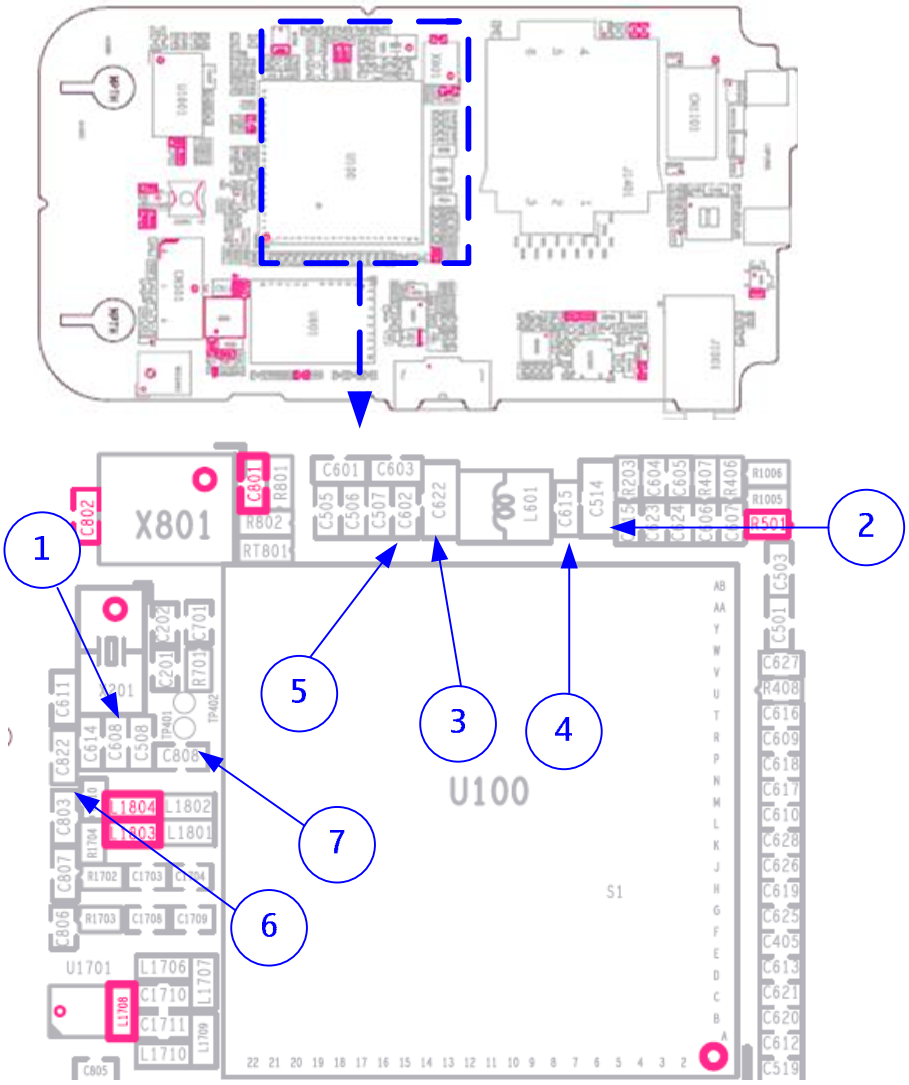


Figure 2 Bottom side TX voltage checking test point

RF RX voltage checking

#	Description	Test Point	Value
1	XO_19.2M	X801.1, X801.3	19.2 MHz
2	VREG_RFRX	C803.1	2.65V
3	Rx bias	R1705.2	122mV

Figure 3 RF RX voltage checking test point

RF CallTest in Nokia CDMA L3 PST Fx.x

Context

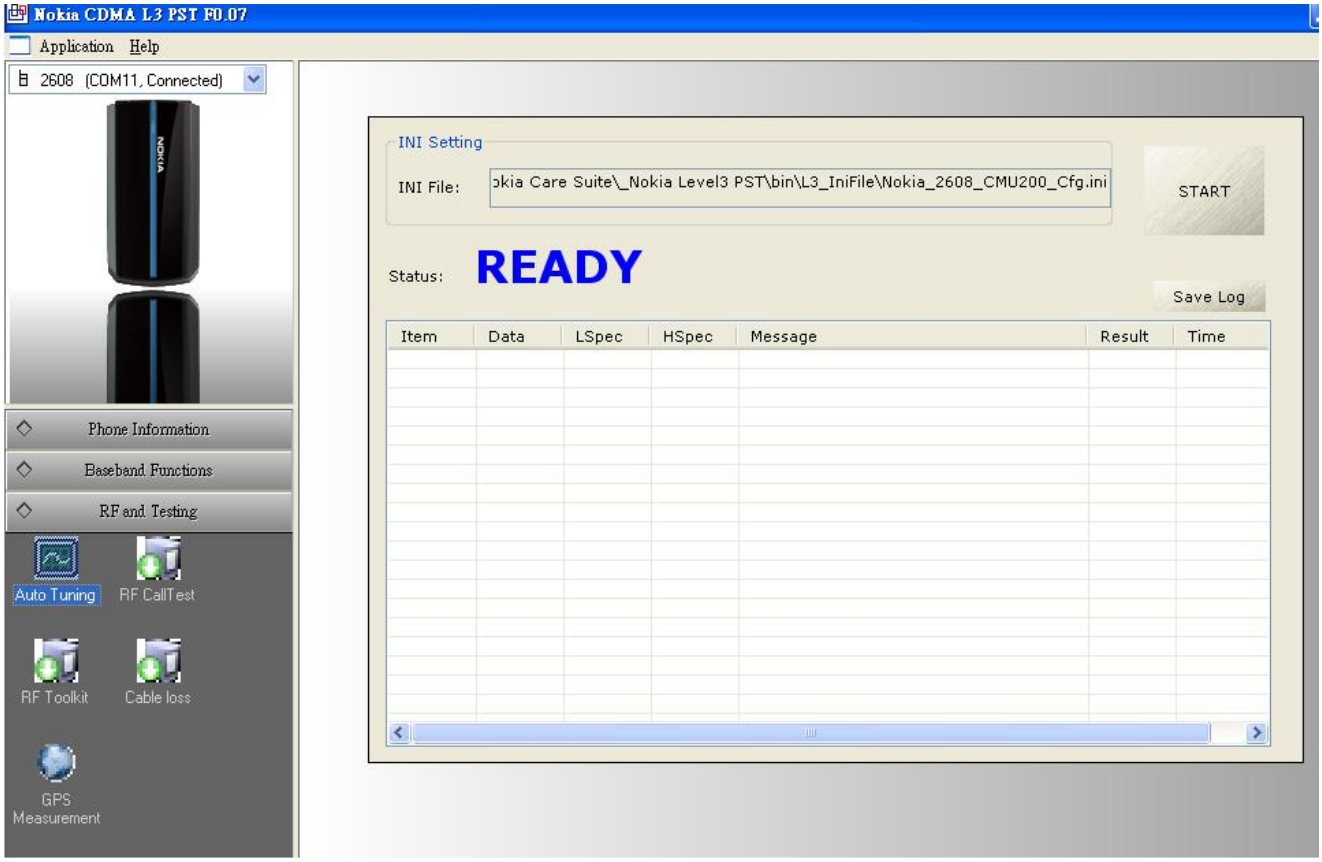
Always start the troubleshooting procedure by running the RF CallTest in Nokia CDMA L3 PST. If a test fails, please follow the diagram below.

If the phone is dead and you cannot perform the self tests, go to Dead or jammed device troubleshooting in the baseband troubleshooting section.

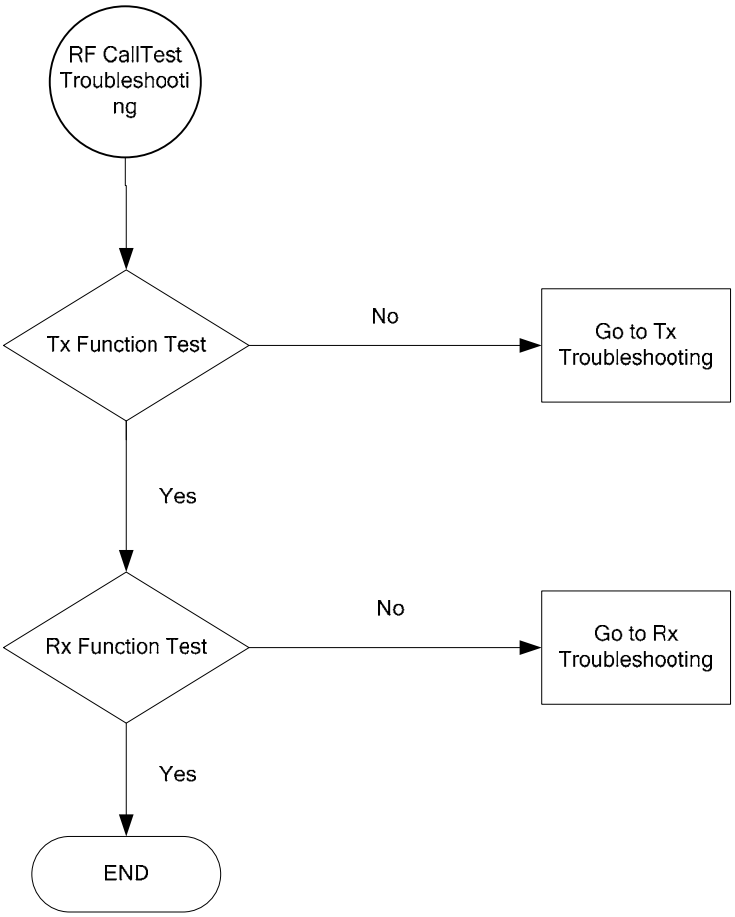
Setup for RX Troubleshooting

Use the following steps to configure FTM mode for RF troubleshooting.

1. Connect RF connector to a spectrum
2. Put PWB on the module jig, connect data service cable between PC and Module Jig and connect a power supply
3. Launch Nokia CDMA L3 PST Fx.x Service Software and run RF Toolkit function
4. The RF and Testing box appears
5. Select "RF and Testing"
6. Press "START" Button



Troubleshooting flow



■ Receiver troubleshooting

Introduction to receiver (RX) troubleshooting

RX can be tested by making a phone call or in local mode. For the local mode testing, use the RF CallTest in Nokia CDMA L3 PST service software.

The main RX troubleshooting measurement is RSSI reading. This test measures the signal strength of the received signal.

Setup for RX Troubleshooting

Use the following steps to configure FTM mode for RF troubleshooting.

1. Connect RF test connector to a CMU.
2. Connect mobile terminal to a PC via the Module Jig, and connect a power supply.
3. Open RF Toolkit in L3 program.
4. Set Start RF connection in " connection " box
5. Change to FTM in "phone mode setting" box.
6. Select a Band (Cellular) in "Band setting" box.
7. Write a channel in "RF channel setting" box.
   Cellular Band Test channel : 384
   < Set RF channel to 384 on CMU at the same time >
8. Select "0-LNA R0" in set LNA range box
9. Key in -92.6 in AGC box and then click "dBm to AGC" button.
   < Set RF level=-92.6 dBm on CMU >
10. Click "Get DVGA "button.(DVGA value is only operated in high gain mode)
11. Select "1--LNA R1" in set LNA range box
12. Key in -81.8 in AGC box, and then click "dBm to AGC" button.
    < Set RF level=-81.8 dBm on CMU >
13. Click "Get LNA offset "button.
14. Repeat 11-13 steps for getting LNA offsets of LNA2 and LNA3.
    <Key in -53.8 dBm and -43.8 dBm in AGC box corresponding to LNA2 and LNA3>

After testing, it's necessary to change to "Online" in "Phone mode setting" box.

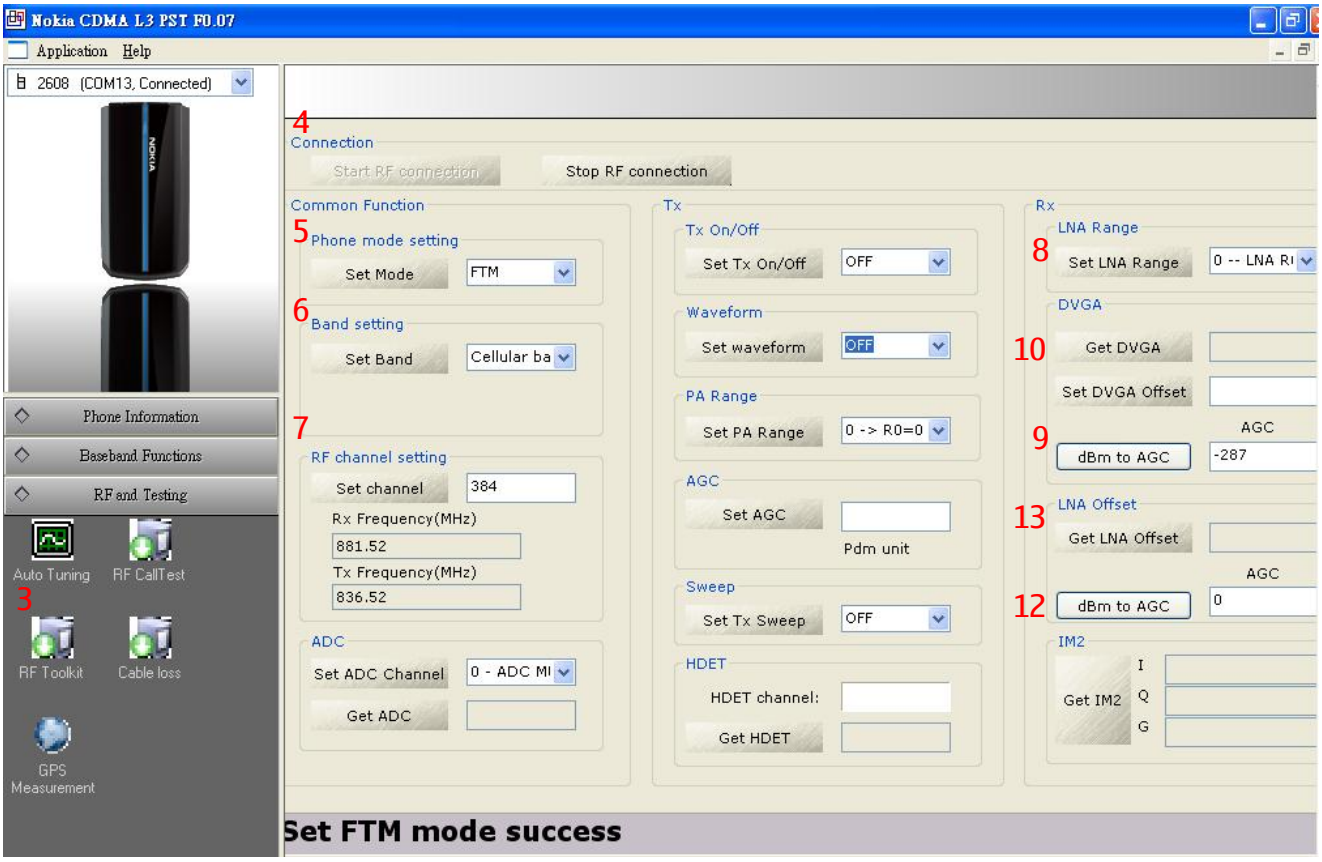


Figure4 RF Toolkit setup for RX troubleshooting

Cell Receiver Check DVGA and LNA offset value

LNA Range	DVGA	LNA1	LNA2	LNA3
Input RF level (dBm)	-92.6	-81.8	-53.8	-43.8
Reasonable offset value	10~70	80~152	160~277	280~430

Receiver RF test point

For the test points in below figure, an external signal source of –25 dBm was injected to the RF input. Set LNA GAIN STATE = 0 .The signal was then traced throughout the receiver chains. A CMU200 call box is recommended. (Open **non-signaling mode**, press the **SG** soft button, and then select **CW**.) Inject a continuous wave (CW) for Cell (881.52MHz) at a fixed –25 dBm power level. Measurements were taken with the RF Probe. Signal levels are approximate, and the accuracy may be +/- 2 dB or more depending on the probe position and grounding.

#	Test Point	Description	Value
1	C1806.2	RF Connector to FEM	-30dBm
2	C1814.1	FEM OUTPUT	-33dBm
3	L1701.1	LNA IN	-30dBm
4	L1711.1	RX SAW INPUT	-22dBm
5	C1711.1	RX SAW OUTPUT	-23dBm
6	L1709.2, L1707.1	RX MIXER IN	-27dBm

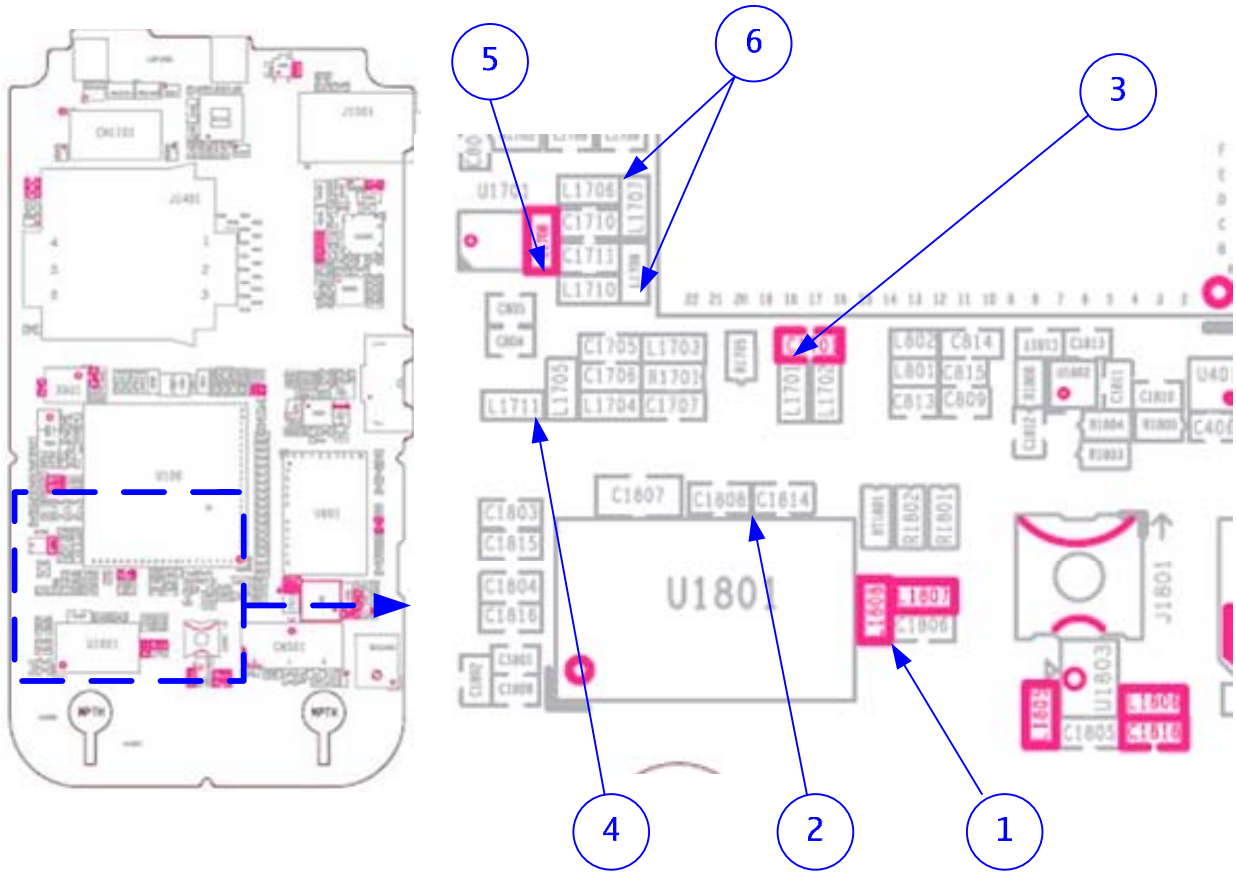
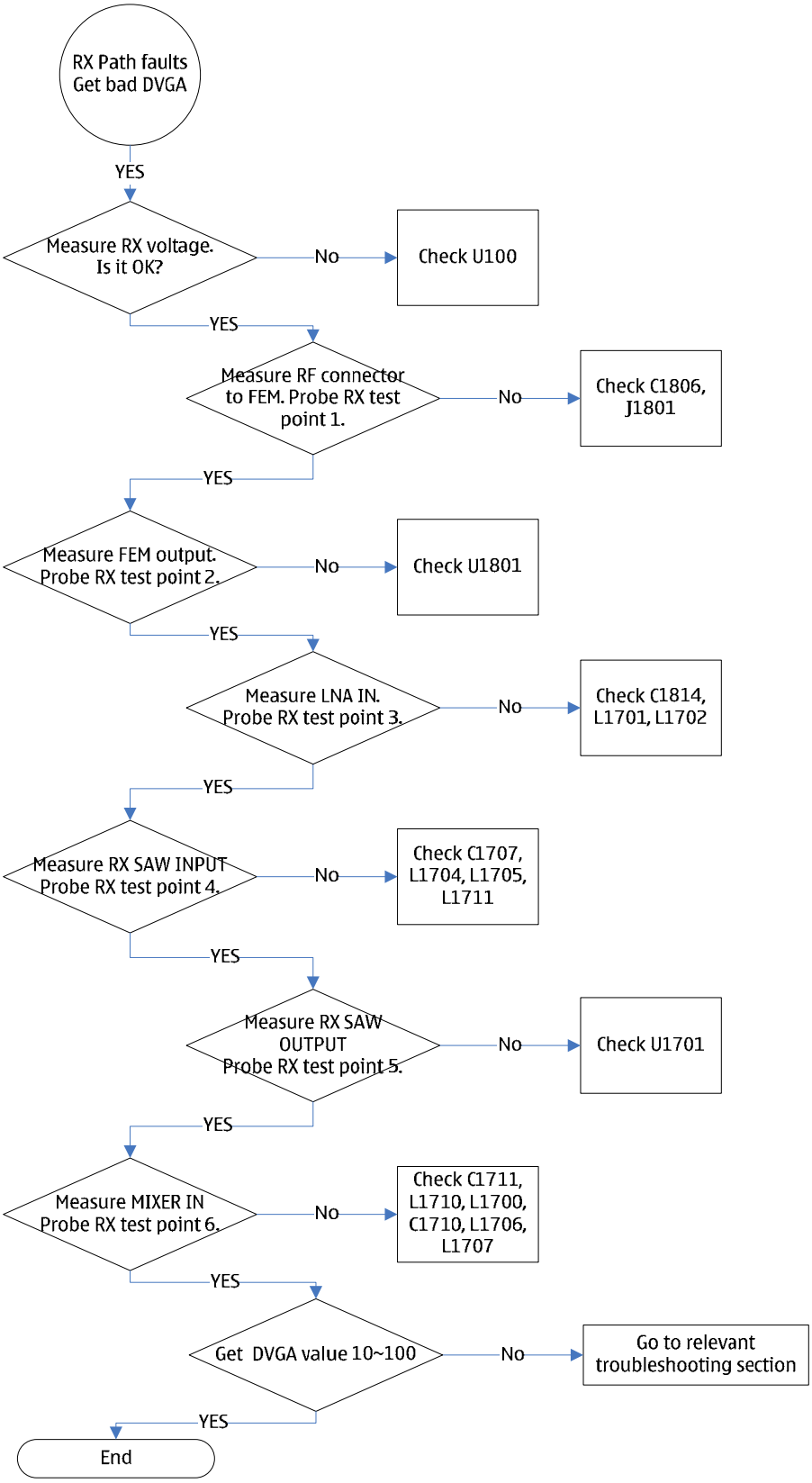


Figure 5 RX RF test points

CELL 800 RX Path Troubleshooting

Troubleshooting flow



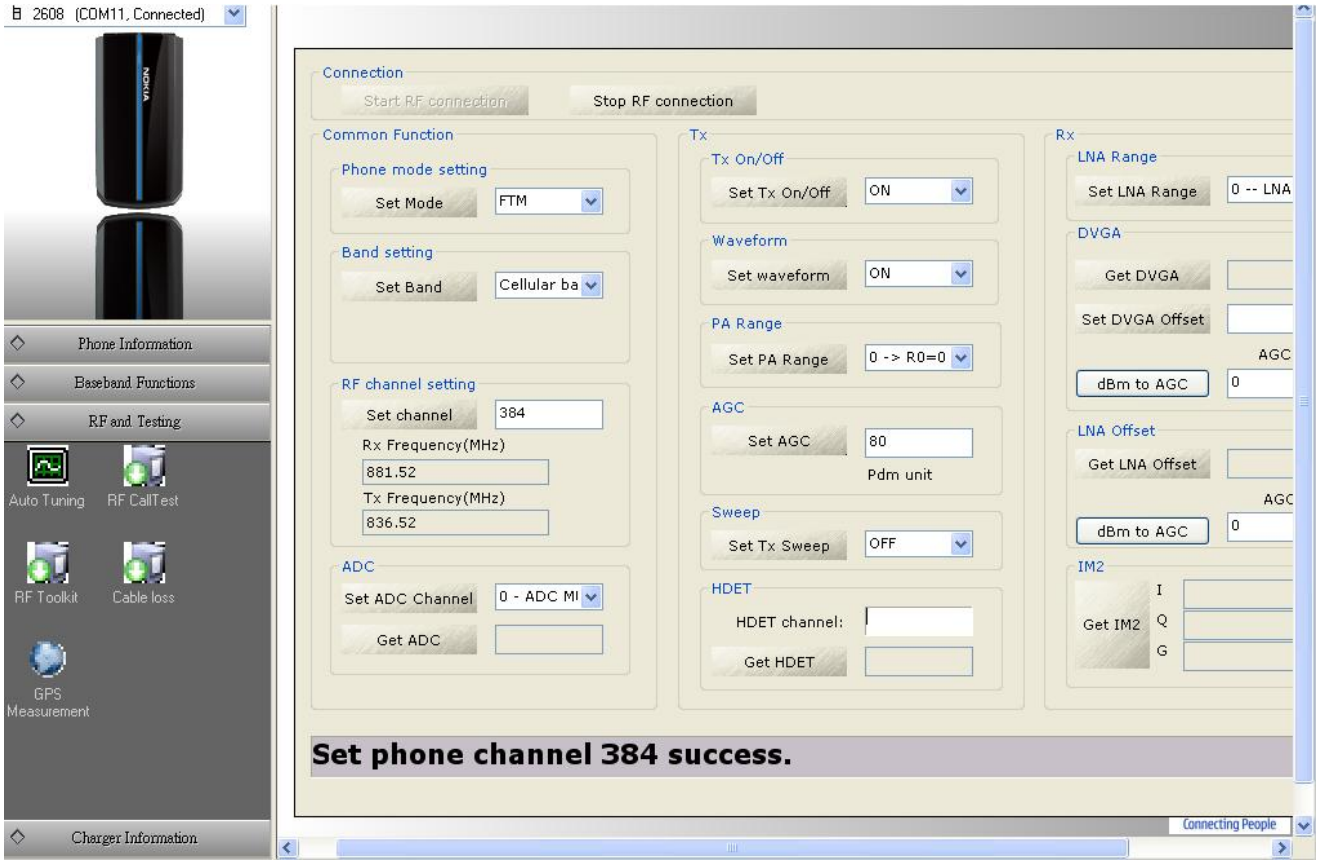
Note:

- *QSC6020 is underfilled and can not be replaced.*
- *Memory IC is underfilled and can not be replaced.*
- *The Shielding Cover can not be reused after removal.*
- *After using the heatgun, the domesheet needs to be replaced.*

■ Transmitter troubleshooting

Steps

1. Set the phone to normal mode
2. Use the following settings:



3. Check the basic TX parameters (i.e. power, phase error, modulation and switching spectrum), using a communication analyzer (for example CMU200).

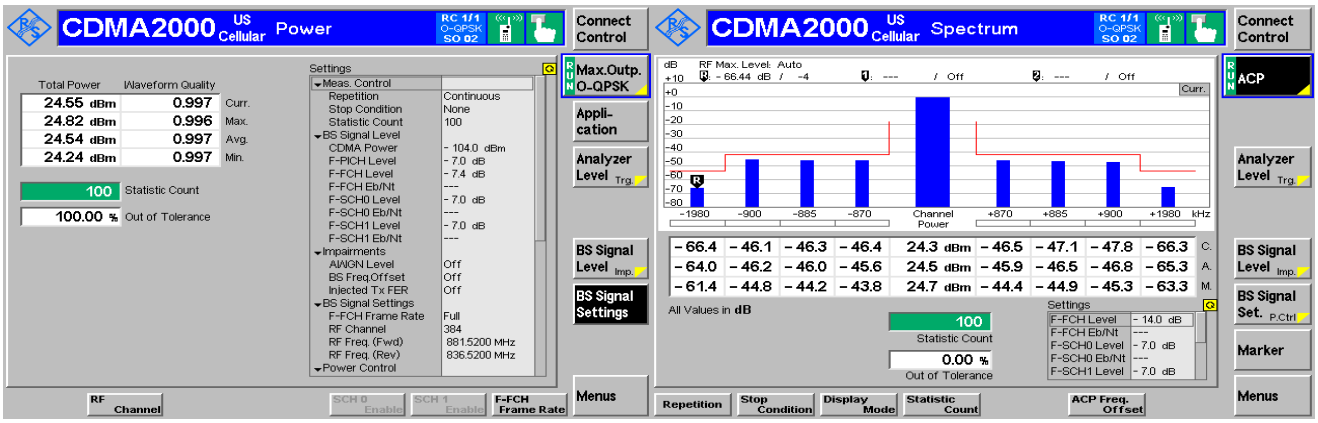


Figure 6 Typical readings

4. Change the power level (RF controls) and make sure the power reading follows accordingly.

Setup for TX Troubleshooting

Use the following steps to configure FTM mode for RF troubleshooting.

1. Connect RF connector to a spectrum
2. Put PWB on the module jig, connect data service cable between PC and Module Jig and connect a power supply
3. Launch Nokia CDMA L3 PST Fx.x Service Software and run RF Toolkit function
4. The RF Toolkit box appears
5. Set "Start RF connection"
6. Set "Set Mode" to "FTM"
7. Set "Set Band " to "Cellular band 800"
8. Set "Set Channel " to Channel "384"
9. Set "Set PA Range" to "1" --> "R0=1"
10. Set "Waveform" to "ON"
11. Set "Set TX on/off" to "ON"
12. Set "Set TX AGC" to "80"
13. Get HDET value by setting "Set ADC Channel" to "4" and "Get ADC".

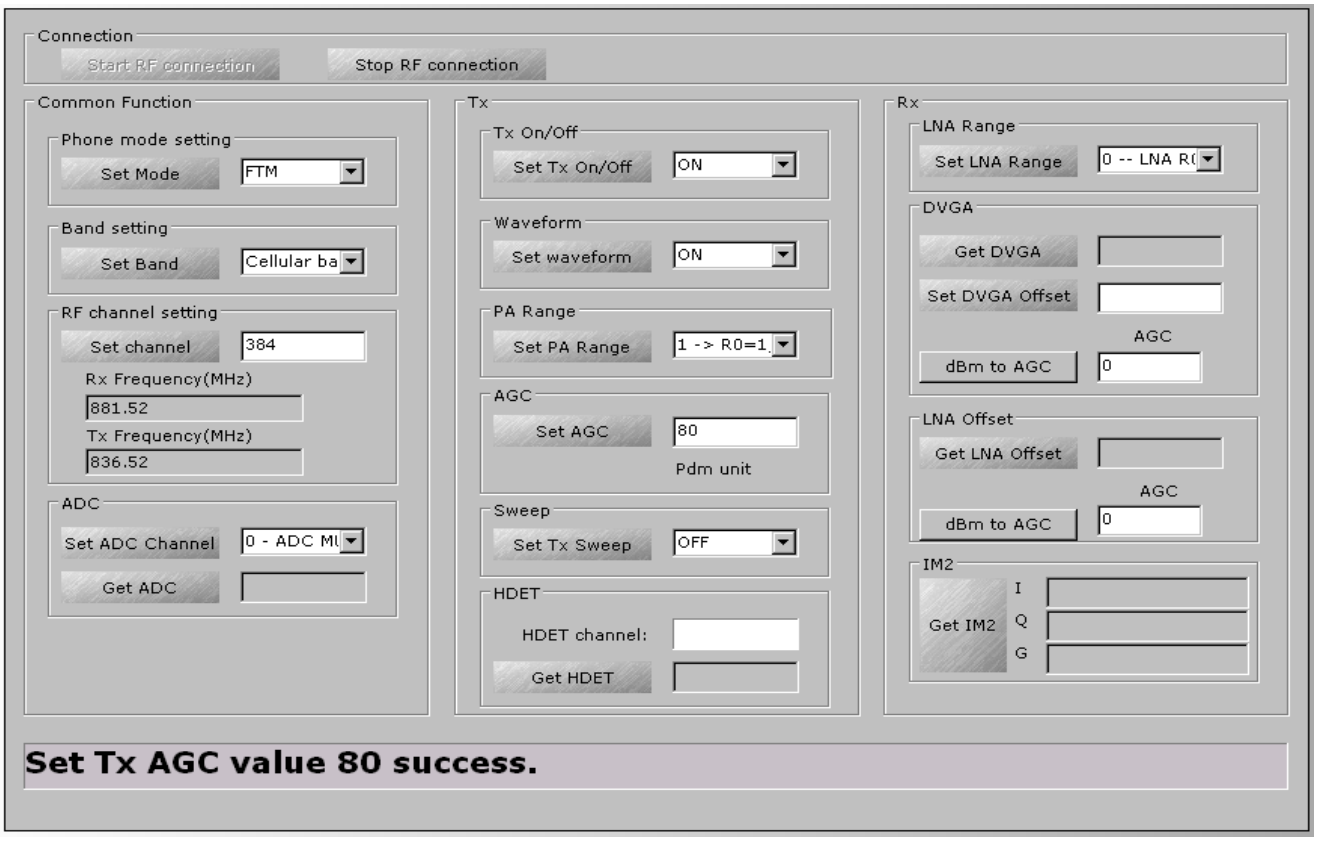


Figure 7 RF Toolkit setup for TX troubleshooting

Transmitter RF test point

#	Test Point	Description	Value
1	L1801.1, L1802.1	U100 DA differential output	-12 dBm
2	L1801.2, L1802.2, C1803.2, C1804.2	DA output to FEM input	-15dBm
3	C1806.2	FEM output (PA Low Gain MODE)	6 dBm
4	C1806.1	FEM output to RF connector (PA Low Gain MODE)	6dBm
5	J1801	RF connector (PA Low Gain MODE)	13dBm

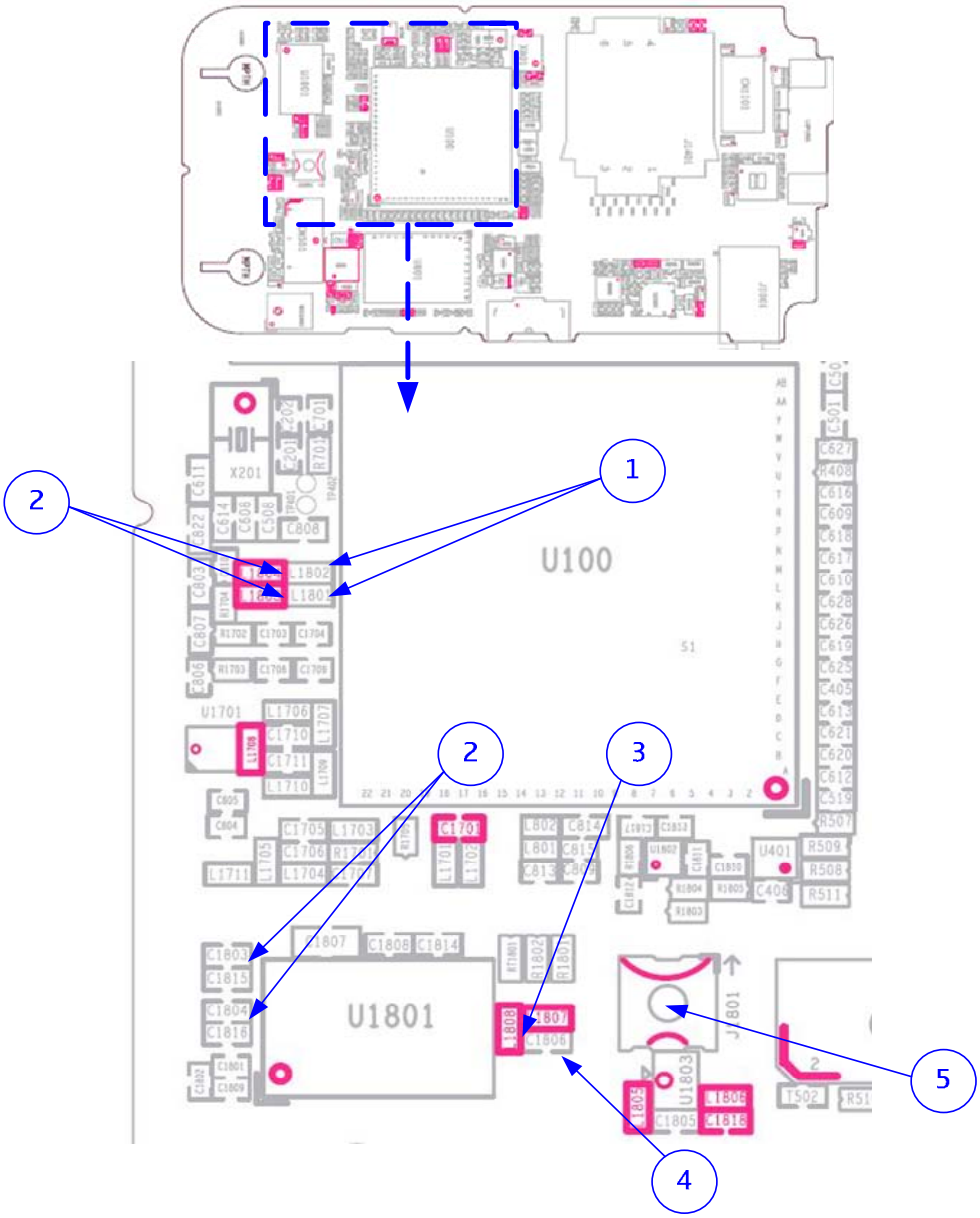
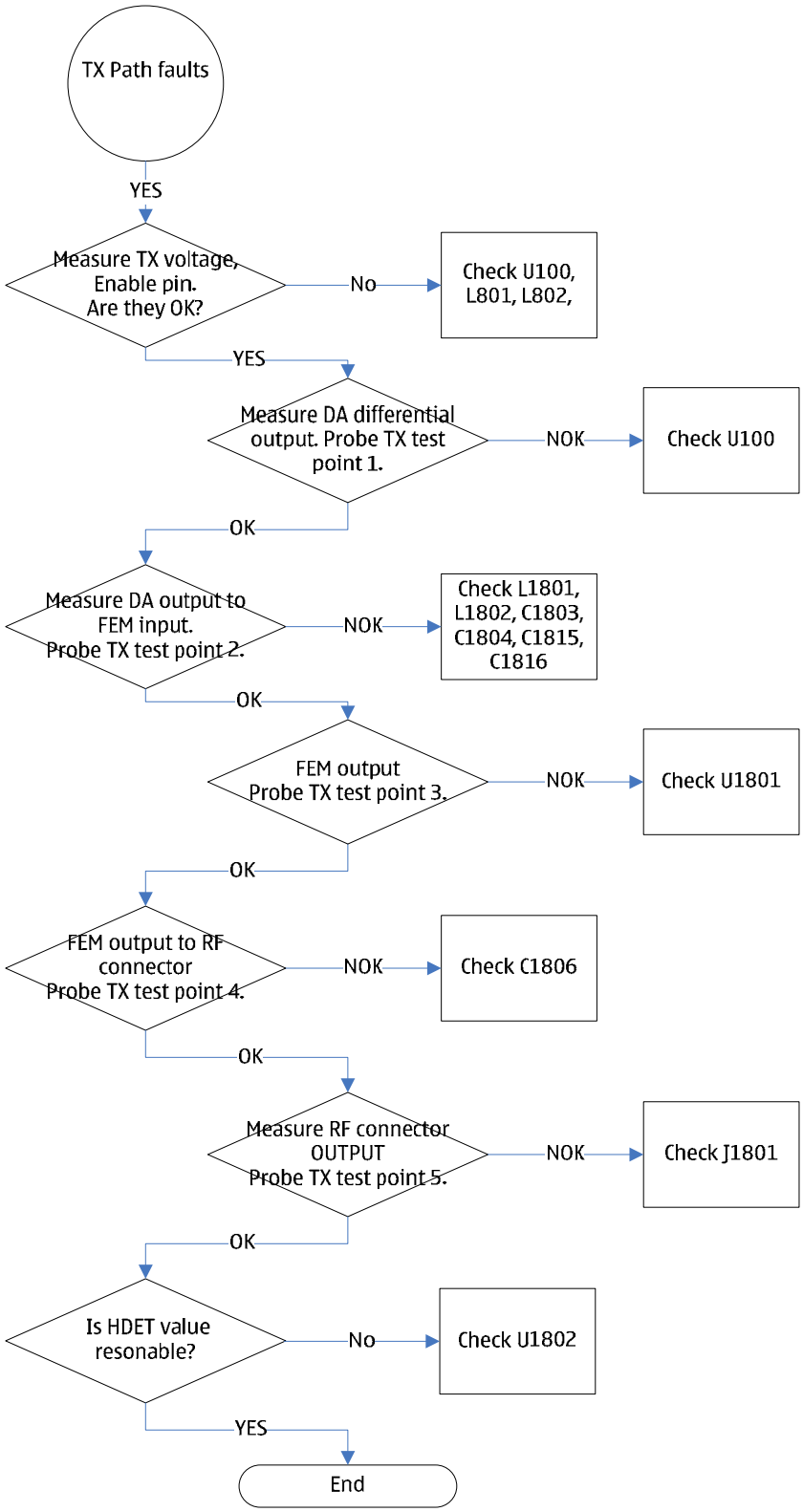


Figure 8 TX RF test point

CELL 800 TX Path Troubleshooting

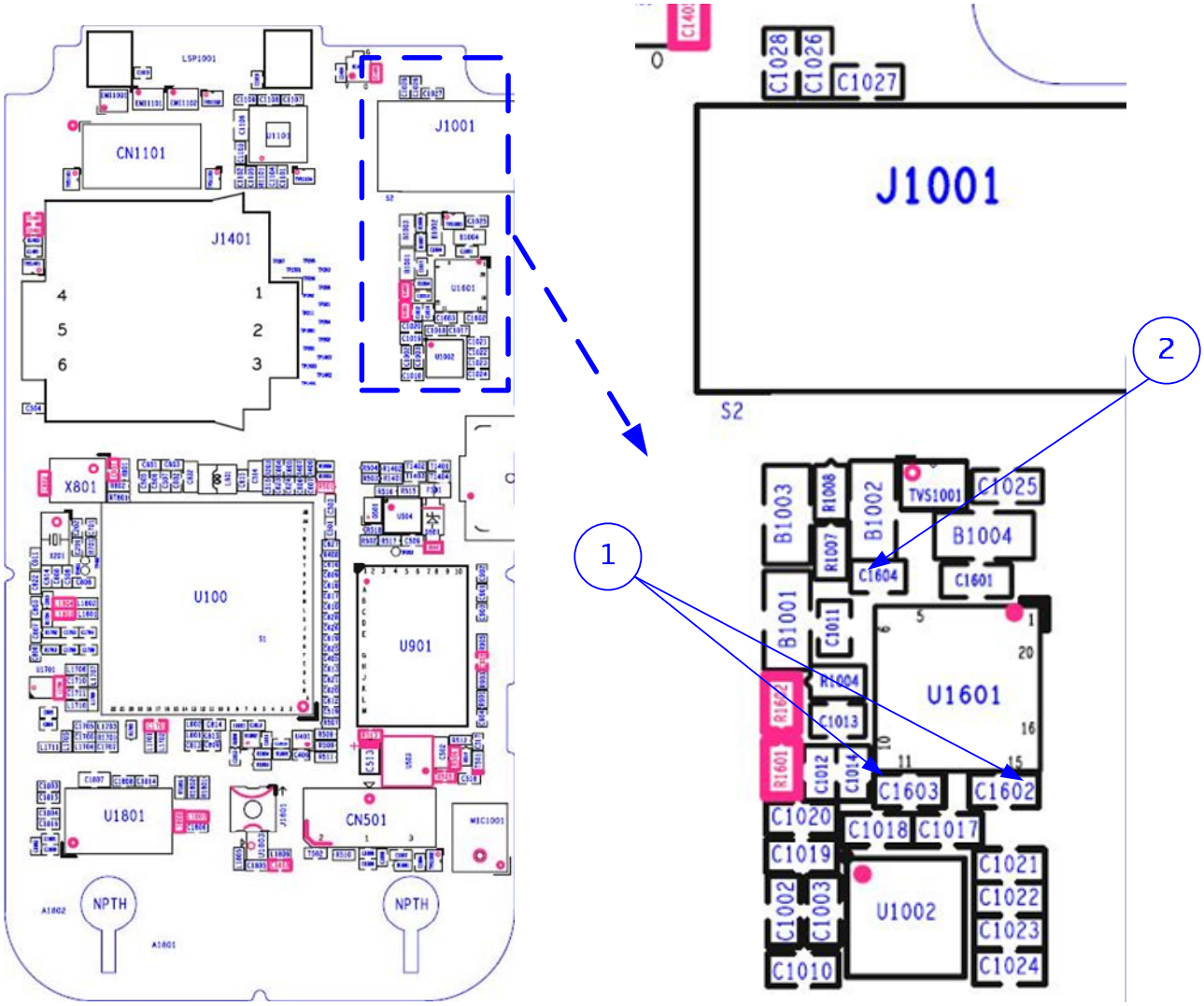
Troubleshooting flow



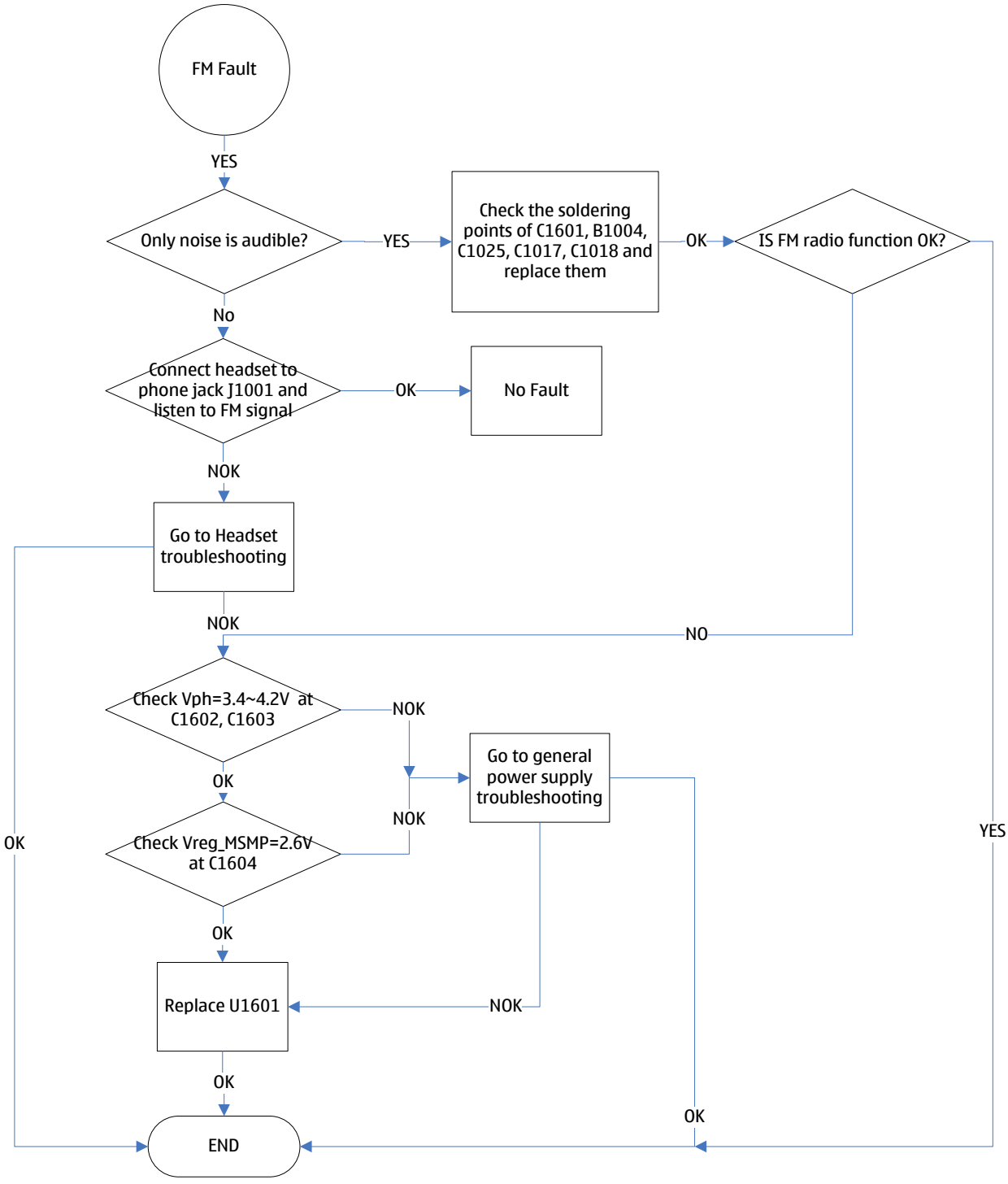
■ FM radio troubleshooting

FM Voltage Test Point

#	Test Point	Description	Value
1	C1602.1, C1603.1	Vph	3.4V~4.2V
2	C1604.2	Vreg_MSMP	2.6V



Troubleshooting flow



RF tunings

Introduction to RF tunings

Important: Only perform RF tunings if:

- one or more of the RF components have been replaced
- Flash memory chip is replaced or corrupted.

RF calibration is always performed with the help of a product-specific module jig, never with an RF coupler. Using an RF coupler in the calibration phase will cause a complete mistuning of the RF part.

Important: After RF component replacements, **always** use autotuning. Manual tunings are only required in rare cases.

Cable and adapter losses

RF cables and adapters have some losses. They have to be taken into account when the phone is tuned. As all RF losses are frequency dependent, the user has to act very carefully and understand the measurement setup. For RF attenuations of the module jig please refer to the Service tools section.

Auto tuning

This phone can be tuned automatically.
Autotune is designed to align the phone's RF part easier and faster. It performs calibrations, tunings and measurements of RX and TX. The results are displayed and logged in a result file, if initiated.

Hardware set up

Hardware requirements for auto tuning:

- PC (Windows 2000/XP) with GPIB card
- Power supply
- Product specific module jig
- Cables: CA-128RS (RF cable), CA-101 Micro USB cable, PCS-1 Power Service Cable and GPIB cable
- PK-83 AMS SW protection key
- Service Software, Nokia CDMA L3 PST Fx.x (x.x means version number)

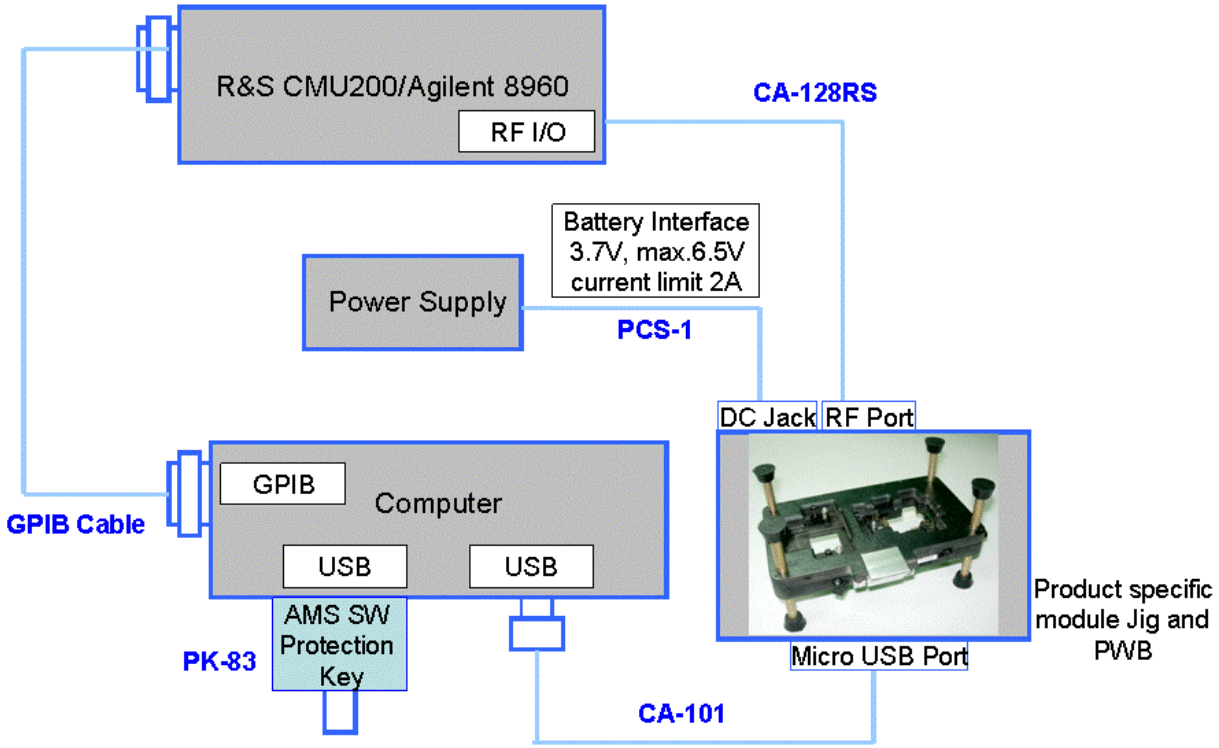


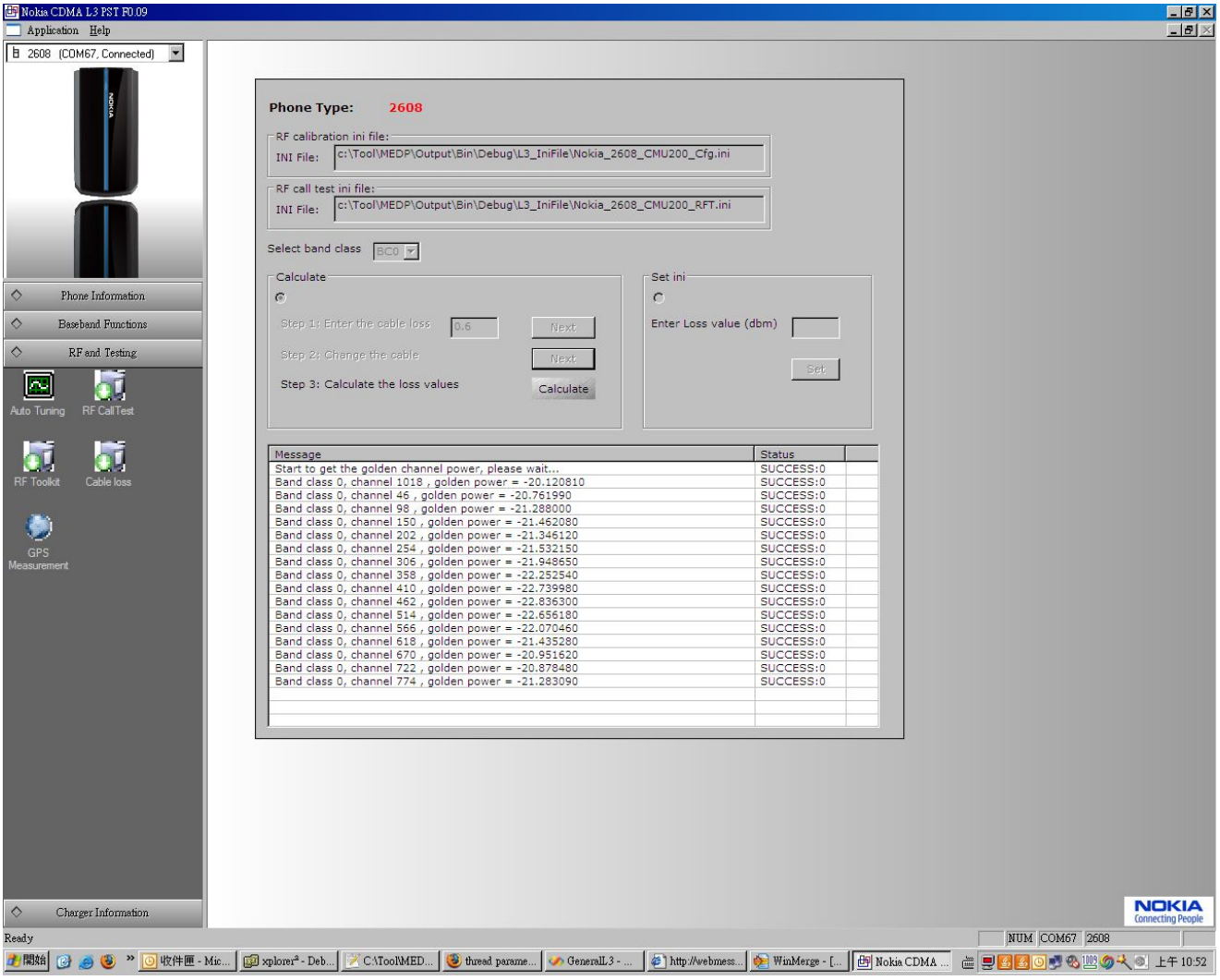
Figure 9 Auto tuning concept with CMU200/Agilent 8960

Service software preparations

Install the phone-specific data package. This defines the phone-specific settings.

RF cable loss setting procedure

1. Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in CDMA L3 PST Fx.x
2. Select "RF and Testing" and click "cable loss".
3. Select Band class to BC0 for 2608.
4. **If RF cable loss is known**, select "set ini" and enter the loss value.
5. **If RF cable loss is unknown**, select "calculate".
6. In order to create a golden phone, we utilize CA-128RS as RF cable and set the loss to 0.5 dB.
7. Change RF cable (extend or replace it) and click "next" button.
8. Calculate the loss value, click "calculate" button.



Nokia Customer Care

5- System Module and User Interface

(This page left intentionally blank.)

Table of Contents

■ Introduction

Phone description

The mobile terminal using a CDMA single mode engine (Cellular/ 800) with Qualcomm baseband consists of the following ASICs:

- Qualcomm Single Chip 6020, including RF transmitter and receiver, Baseband and Power management these three categories
- 32Mb Flash memory with 16Mb Psram memory

The QSC60X0 device represents QCT's next generation of chipset architecture and enhancements for voice and entry-level multimedia handsets. The QSC60X0 device integrates the Mobile Station Modem™ (MSM™) baseband, radioOne RF, and power management functionality into a single 15 × 15 mm mini scale package (MSP). These functions perform all of the signal processing and power management tasks within a mobile device. This architecture reduces handset complexity, cost, time to market, and board-space requirements while providing many of the most popular features and functions.

3G products based on the QSC60X0 device may include:

- Voice centric phones
- Music player enabled devices and applications
- Camera phones (requires the QSC6030 device)
- Entry level multimedia phones
- Other applications and devices

QSC60X0-based products benefit from enhanced security, text, graphic and picture messaging, high quality audio and speakerphone support, polyphonic ringtones, voice capture, MP3/AAC/AAC+ music playback, megapixel image capture, and other applications using the core Wireless Internet Lauchpad features.

The QSC60X0 solution also provides a seamless migration path from 2G to 3G services and applications, including the 4GV™ vocoder for increased voice capacity for CDMA2000® 1X networks. It is designed to exceed the specifications of mobile devices for worldwide cdmaOne™ and 3G 1xMC systems, including those based upon the IS-95A/B and IS-2000 standards.

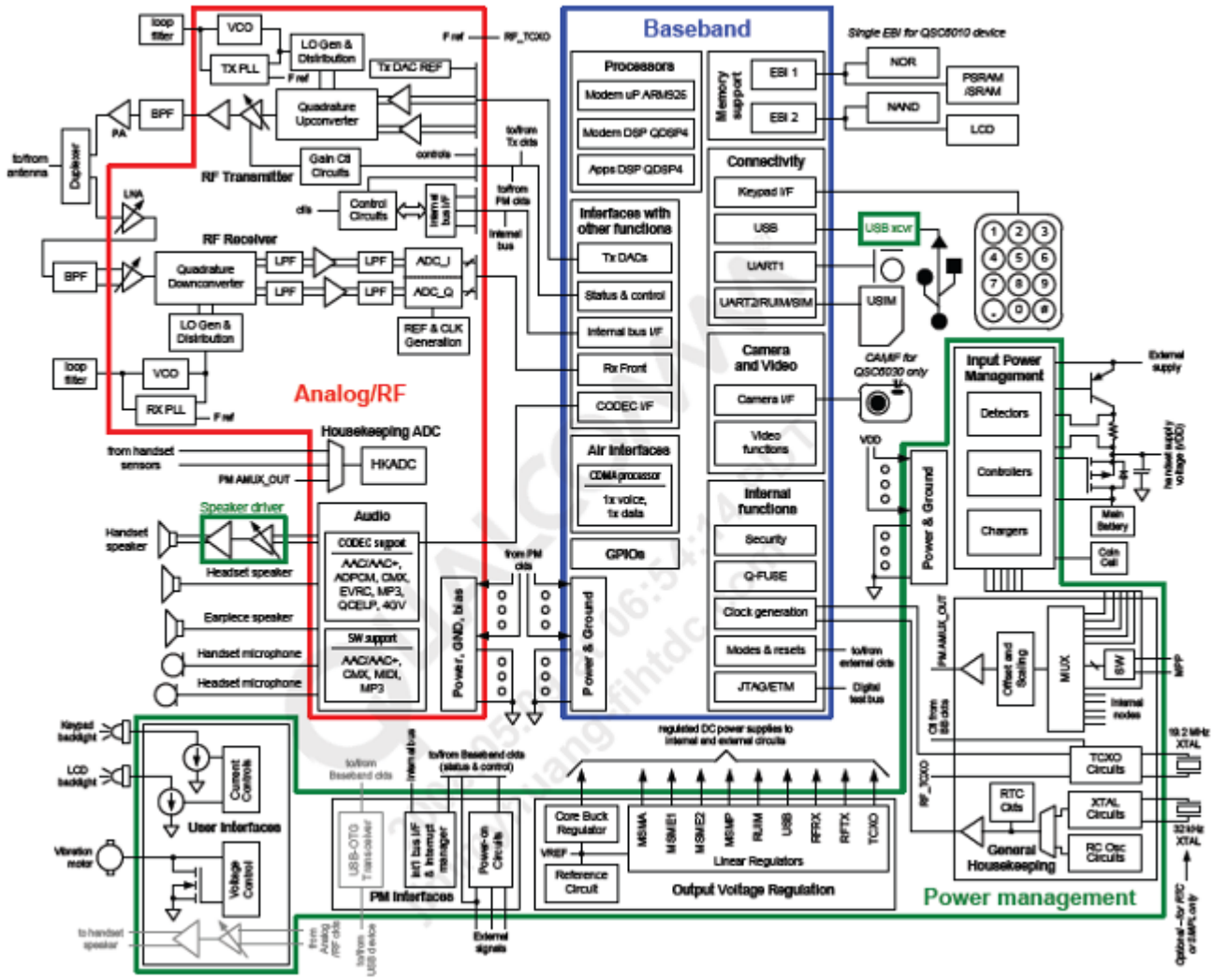
The QSC60x0 device extends the level of integration to include radio frequency and power management functions.

BL-5BT (870 mAh) lithium-ion battery is used as the main power source.

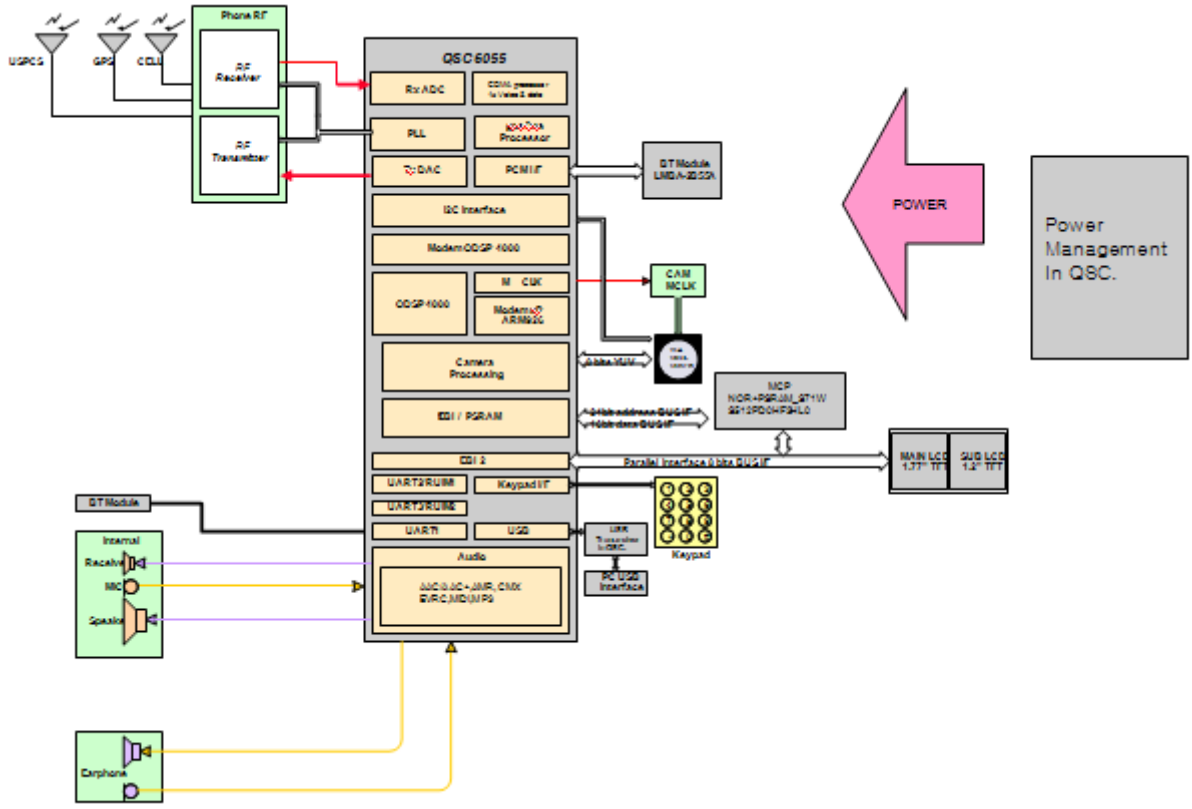
Key components

Function	Description	Item ref
Main chip	Qualcomm QSC6020	U100
PA		
Oscillators		
Memory	S71WS128PC0HF3SR0	U901
Battery	BL-5BT	
Battery connector		CN501
RF connector		
Charging IC	BQ24072	U503

System module block diagram



Board and module connections



■ Energy management

Battery and charging

BL-5BT battery

The 2608 uses a Lithium-Ion cell battery with a capacity of 870 mAh. QSC6020 reads the resistor inside the battery pack on the BSI line to identify the battery size. Different charging algorithm will be used for different battery sizes. The resistors are connected to the BSI pin inside the battery connector.

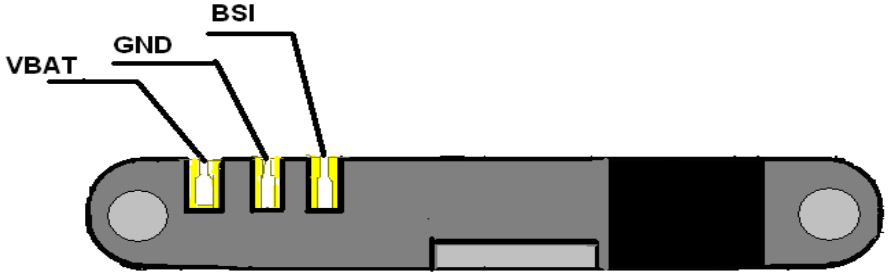


Figure 1 BL-5BT battery pack pin order

Battery connector

The battery connector is a blade connector. It has three blades;

- BSI (Battery size indicator)
- GND (Ground)
- VBAT (Battery voltage)

The BSI line is used to recognize the battery capacity by a battery internal pull down resistor.

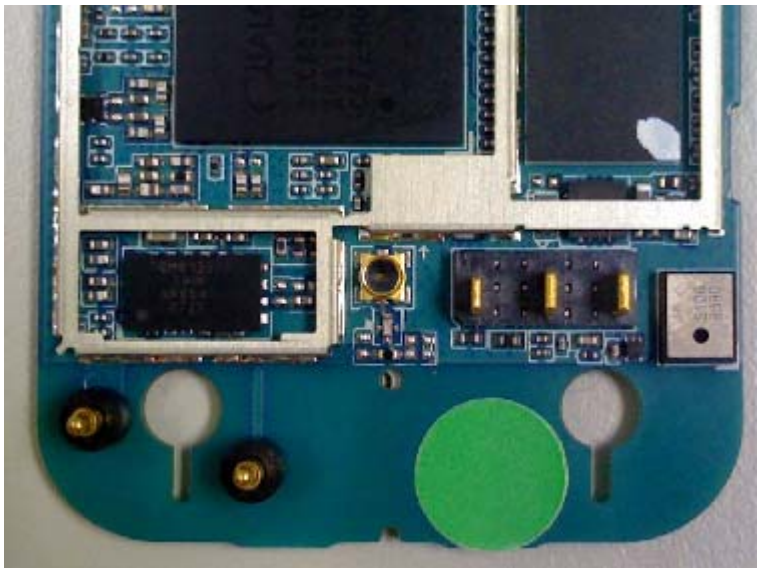


Figure 2 Battery Connector

Charging

This phone is charged through the Micro USB interface with the AC-6U travel charger.

Figure 3 AC-6U travel charger

The PM charge control is dependent on the charger type and the battery size. External components are needed for electromagnetic compatibility (EMC), and transient protection of the input to the baseband module. The charger's DC input is through the Micro USB connector. This mobile terminal supports AC-6U & DC-6 chargers.

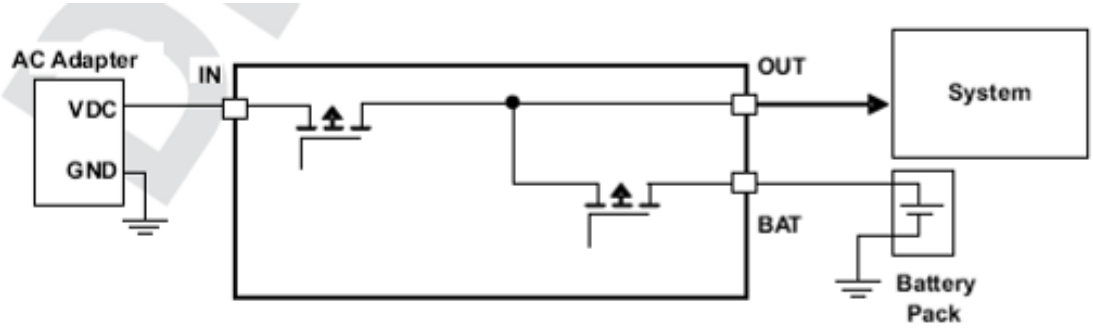


Figure 4 Simplied power flow diagram

Charger Detection

Connecting a charger creates a voltage on the DC_PWR of the Charging IC. Charging starts when the PM detects the DC_PWR input voltage level between 4.35V~6.6V and /PGOOD pin pulls to GND (/PGOOD is pin 7of charging IC). The charger detected when CHG_DEC_N_GPIO_53 pulls low (GND).

The battery is charged in three phases: conditioning, constant current , and constant voltage. In all charge phases, an internal control loop monitors the IC junction temperature and reduces the charge current if the internal temperature threshold is exceeded.

The charger power stage and charge current sense functions are fully integrated. The charger function has high accuracy current and voltage regulation loops, charge status display, and charge termination. The input current limit and charge current are programmable using external resistors.

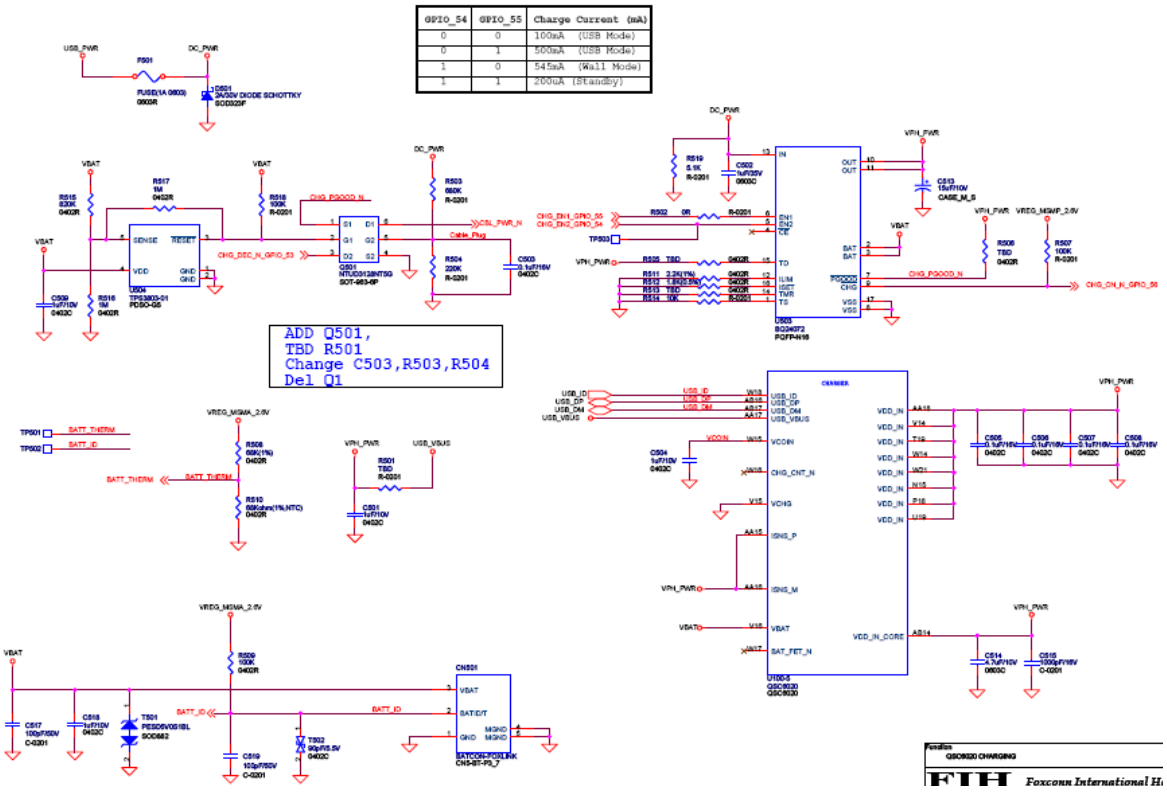


Figure 5 Mobile terminal charger circuit

Charger Control

In active mode, charging is controlled by charging IC. Charging voltage and current monitoring are used to limit charging into a safe area.

Cut Off MaxCurrent = 1.5A
MaxVoltage= 6.6V

Backup battery

When the main battery is not attached EM ASIC (N2200) goes in backup mode using back-up battery that supplies voltage to RTC in EM ASIC (N2200).

Normal and extreme voltages

Energy management is mainly carried out in the two Application Specific Integrated Circuits (ASICs) BETTY and AVILMA. These two circuits contain a number of regulators. In addition there are some external regulators too.
In the table below, normal and extreme voltages are shown when a BL-5BT battery is used.

Voltage	Voltage [V]	Condition
General Conditions		
Nominal voltage	3.7	
Lower extreme voltage	3.145	
Higher extreme voltage	4.230	
(fast charging)	4.230	
HW Shutdown Voltages		
Vmstr+	2.1 ± 0.1	Off to on
Vmstr+	2.1 ± 0.1	Off to on
SW Shutdown Voltages		
Sw shutdown	3.20	In call
Sw shutdown	3.20	In idle
Min Operating Voltage		
Vcoff+	2.9 ± 0.1	Off to on
Vcoff-	2.6 ± 0.1	On to off

Power key and system power-up

The QSC6020 controls the power up and reset. The baseband can power up in the following ways:

- Pressing the Power button, which means to ground the KPD_PWR_N ("KPD_PWR_N" pin in 2608 schematic) pin of the QSC6020
- Connecting the charger to the charger input.

After receiving one of the above signals, the PM will start to enter reset mode. The watchdog starts, and if the battery voltage is greater than its threshold (3V), a 6ms delay starts to allow MSM to settle. After this delay elapses, the VERG_MSMC regulator enables. Then, VERG_MSMP, VERG_MSMA & VERG_TCXO regulators are enabled in sequence after MSMC. There is a 120us (4 Sleep_Clocks) delays between each regulator's turn on. The PON_RESET_N ("RESIN_N" pin in 2608 schematic) line holds low for another 20ms and is sent to MSM. Resets are generated for the MSM's internal MCU and its internal DSP, and MSM sends TCXO_ON ("TCXO_EN" pin in 2608 schematic) signal to PM to enable TCXO. After PON_RESET_N goes high, MSM holds PS_HOLD at low state for 200ms and then drives PS_HOLD to high state. This will keep all regulators at on state in order to complete this power on sequence. KPD_PWR_N key can be released after PS_HOLD goes high.

The RESOUT_N from QSC6020 is used to reset flash memory during power up and to put the flash memory in power down during sleep mode. LCD_RS from QSC6020 is used to reset LCD module during power up. All baseband regulators are switched on when the PM is powered on. The QSC6020s internal watchdog runs and resets during normal operation. If the watchdog expires, it will generate a reset signal to reset to MSM status. Then, QSC6020 drives RESOUT_N and LCD_RS low to reset flash memory and LCD module. Below figure represents the PM start-up sequence from reset to power-on.

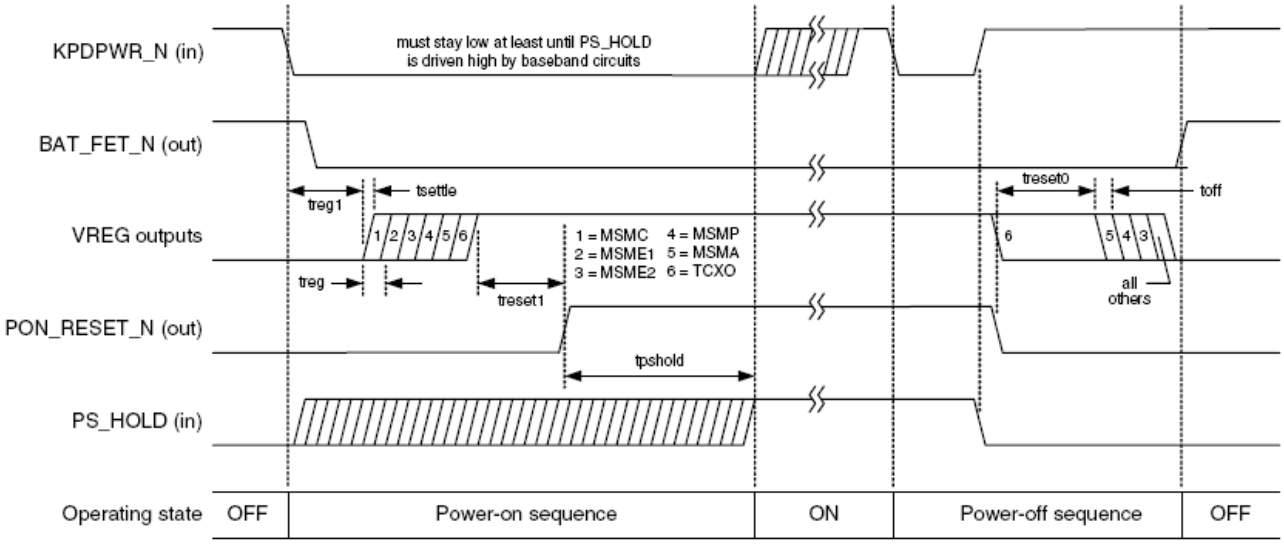


Figure 6 Power-on/Power-off sequence and timing

The mobile terminal can use the power key or a charger to power up.

Power Key

When the power key is pressed, the PM enters the power-up sequence. Pressing the power key causes the KPD_PWR_N (KPD_PWR_N pin in 2608 schematic) pin to GND. The KPD_PWR_N signal is not part of the keypad matrix. The power key is only connected to the PM. This means that when the power key is pressed, an interrupt will be generated to the MSM in order to power on the MCU. The MCU reads the QSC6020's interrupt register and notifies that it is a KPD_PWR_N interrupt. The MCU reads the status of the KPD_PWR_N signal using the control bus. If the KPD_PWR_N signal stays low for a certain time, the MCU accepts this as a valid power-on state and continues with the software baseband initialization. If the power key does not indicate a valid power-on situation, the MCU powers off the baseband.

Charger

Charging is controlled by start-up charging circuitry in order to detect and start charging in cases the main battery is empty and the PM has no supply.

External Supply Source is detected

Power off

While the PS_HOLD signal from the MSM is high, and the PM is in one of its power-on states. Under this condition, the PM continually monitors three events that could trigger a power-off sequence:

- The MSM drives the PS_HOLD signal low responding to the pressing of the keypad power button
- Battery voltage drops below power off threshold (Battery voltage < 3.2 V)
- The PM die temperature exceeds its "severe" over-temperature threshold

Modes of operation

Mode	Description
Power-off	In power-off mode, power (VPH_PWR) is supplied to the PM, RF PA, vibrator, and keypad backlight LED. During this mode, the current consumption is approximately 8.8 uA
Sleep	The mobile terminal enters sleep mode only when MSM makes the request to PM through the SBI bus. PM then enters Power Saving Mode, and the VREG_MSMC VREG_MSMP regulators remain in power-on stage. The 32.768 kHz crystal is enabled. TCXO buffers are off. All other functions and regulators are controlled individually via SBI and are typically disabled for minimum power dissipation. It exits the Sleep mode either by the expiration of a sleep clock counter in the PM or by some external interrupt (generated by a charger connection, key press, headset connection, etc.). The TCXO is shut down in sleep mode and the 32.768 kHz sleep clock oscillator is used as a reference clock for the baseband.
Active	In active mode, the mobile terminal operates normally. It scans channels, listens to a base station, transmits and processes information. There are several sub-states under the active mode. Depending on the mobile terminal's current state, there are states such as burst reception, burst transmission, etc. In active mode, this is a normal operating mode for PM. VREG_MSMC, VREG_MSMP, VREG_MSMA, VREG_RUIM, VREG_RFRX, VREG_RFTX, and VREG_TCXO regulators are all turned on. TCXO oscillator is enabled, and TCXO buffers are turned on. All other functions and regulators are controlled individually via SBI.
Charging	Charging mode can function in parallel with any other operating mode. A BSI resistor inside the battery pack indicates the battery type/ size. The resistor value corresponds to a specific battery capacity. The PM measures the battery voltage, temperature, size, and charging current. Charger control block inside the PM controls the charging current delivered from the charger to the battery and mobile terminal. The maximum battery voltage is limited by turning the PM switch off when the battery voltage reaches 4.2 V. The charging current is monitored by measuring the voltage drop across a 0.1 ohm resistor.

Power distribution

In normal operation, the baseband is powered by the mobile terminal's battery pack. The battery pack consists of one lithium-ion cell with a capacity of 870 mAh and safety and protection circuits.

The PM controls the power distribution to the whole mobile terminal, which includes the baseband and the RF regulators, but excludes the RF power amplifier (RF PA) RF power amplifier drains power from the battery directly. The battery provides power directly to the following parts of the system:

- PM
- RF PA
- Vibrator
- Keyboard , Electric torch light& LCD backlights

The heart of the power distribution is the power control block inside the PM. It includes all the voltage regulators and feeds the power to the entire system. The PM handles hardware power-up functions so that the regulators are not powered on and the power up reset (PURX) is not released if the battery voltage is less than 3 V.

The baseband is powered by the following PM regulators:

Table 1 Baseband Regulators

Regulator	Rating Current	Voltage	Notes
MSMC	300 mA	1.3 V	Always enabled except during power-off mode
MSMA	150 mA	2.60 V	Enabled only when the system is powered on (Off during sleep and power-off modes)
MSMP	300 mA	2.60 V	Always enabled except during power-off mode
RUIM	150 mA	2.85 V	Enabled only when RUIM card is used
TCXO	50 mA	2.85 V	Enabled only when the system is powered on (Off during sleep and power-off modes)
Note: All output regulators voltage accuracy +/-2%			

Below table includes the PM regulators for the RF.

Table 2 RF Regulators

Regulator	Rating Current	Voltage	Notes
RFRX1	150 mA	2.60 V	Enabled when the receiver is on
RFRX2	150 mA	2.60 V	Enabled when the receiver is on
RFTX	150 mA	2.60 V	Enabled when the transmitter is on
Note: All output regulators voltage accuracy +/-2%			

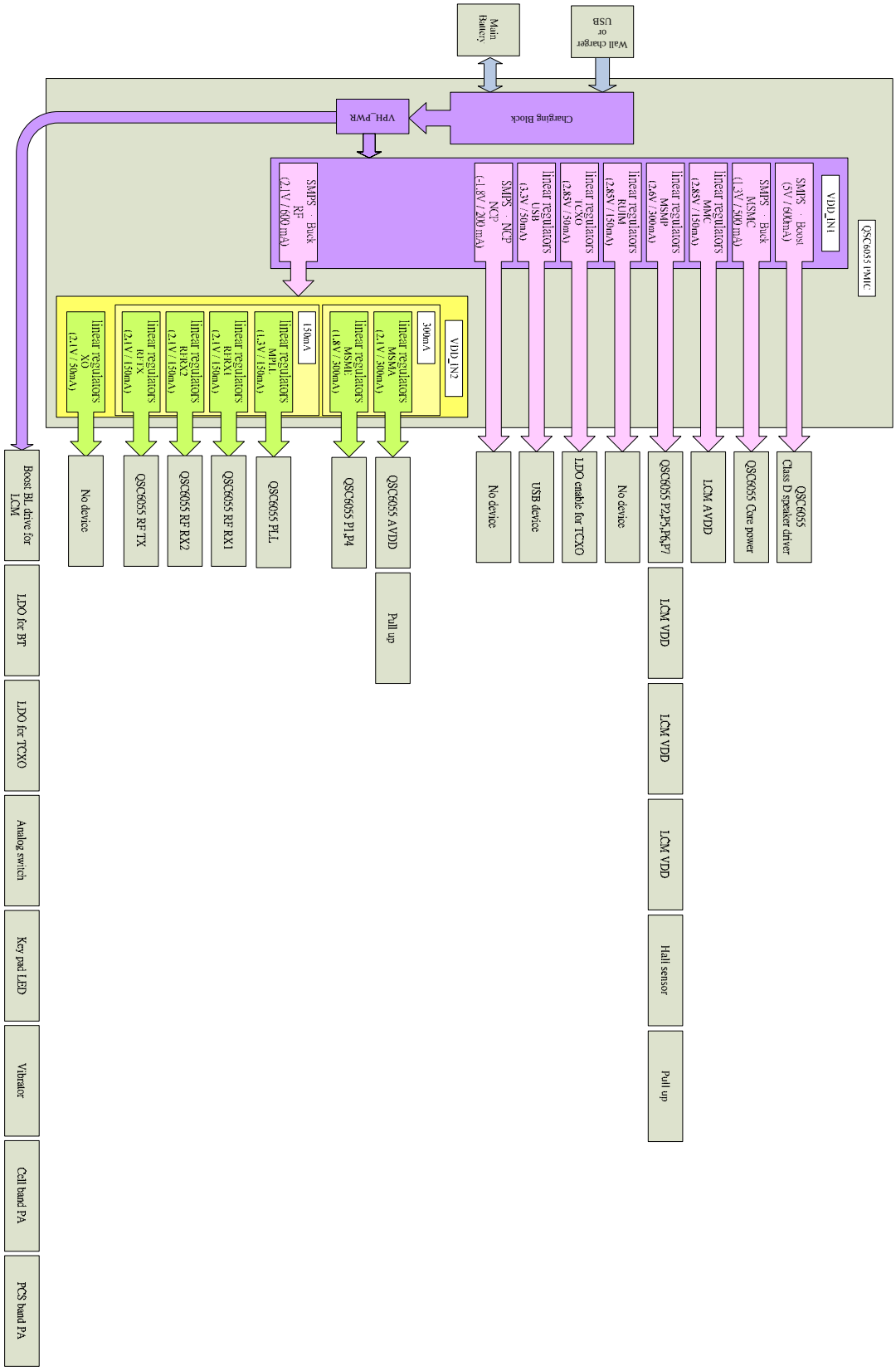


Figure 7 Power Distribution

Clock distribution

The QSC6020 derives its internal clock from two clock inputs, TCXO and SLEEP_CLK.

The main clock signal for the baseband generates from TCXO (Temperature-compensated crystal oscillator). The QSC6020's TCXO clock input supports the frequency 19.2 MHz +/-2ppm. The SLEEP_CLK provides a 32.768 kHz +/-20ppm clock source to drive the MSM controller into sleep mode. At this mode, most of the MSM is powered down and the TCXO is disabled.

System Clocks

The power management circuits include several clock circuits whose outputs are used for general housekeeping functions and elsewhere within the handset system. These circuits include the 19.2 MHz TCXO source, controller, and buffers; RC oscillator; 32 kHz crystal oscillator; SLEEP clock; and SMPS clock. The baseline configurations are shown in Figure 47, but some circuits offer multiple implementation options. Detailed descriptions of all these functions and their options (where applicable) are presented in the following subsections.

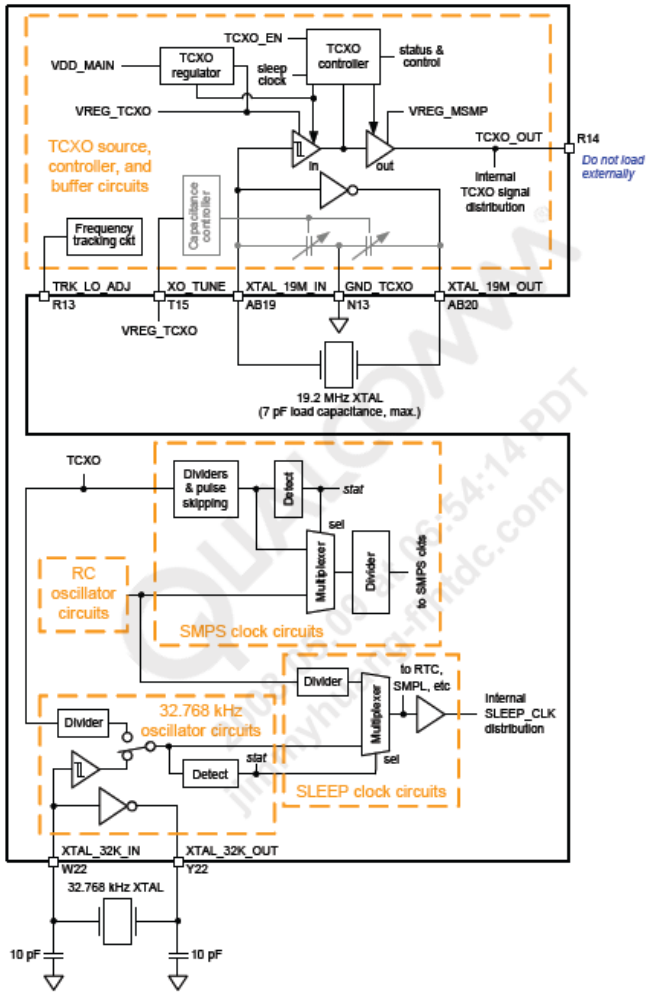


Figure 8 TCXO and SLEEP_XTAL Block Diagram

TCXO

The MSM device integrates a phase-locked loop from the TCXO clock input.

The PM optimizes TCXO operation that enables and disables appropriate circuits in the proper sequence. The controller is enabled by the signal from the MSM. When the selected transition occurs at TCXO_EN, the controller quickly enables the TCXO regulator and the input buffer, and begins counting SLEEP_CLK pulses. Within an initial power on period, the TCXO will be stabilized to its own calibrated frequency. This initial period, in units of 32.768 kHz clock pulses, is programmed into a timer within the controller. When the timer expires, the output buffer is enabled. It synchronizes with the TCXO input such that the TCXO_OUT signal is glitch free, only valid TCXO pulses are output.

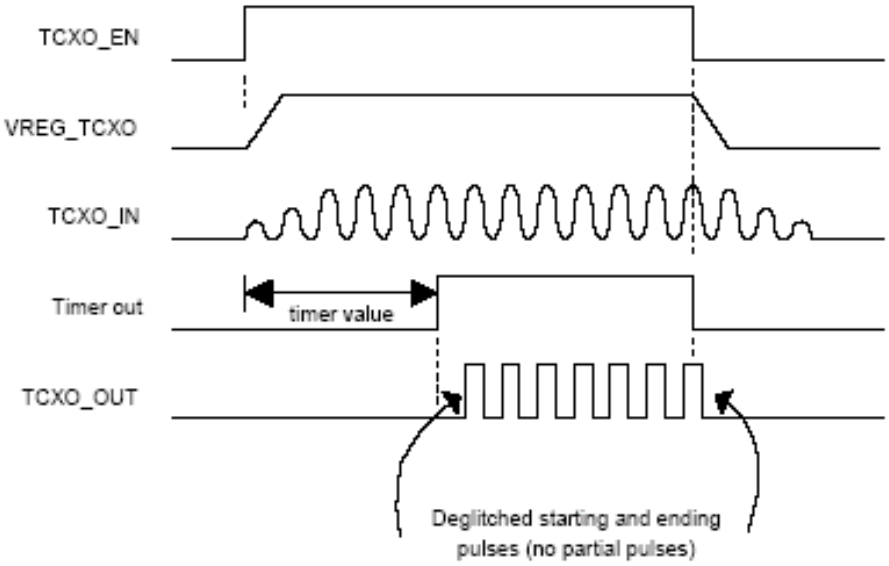


Figure 9 TCXO Enable Timing Diagram

The input buffer (TCXO_IN) accepts sinusoidal or square wave signals at or near 19.2 MHz. The input buffer (TCXO_IN) is powered from the TCXO regulator while the output buffer is powered by VREG_MSMP.

The regulator of TCXO is turned off after the TCXO_EN signal is removed. Upon power-up, the PM defaults to this SBI-controlled mode with the TCXO defaulted on. This assures the MSM will always have a clock available immediately at power-up even if TCXO_EN is low.

TCXO waveform (19.2MHz+/-2ppm)

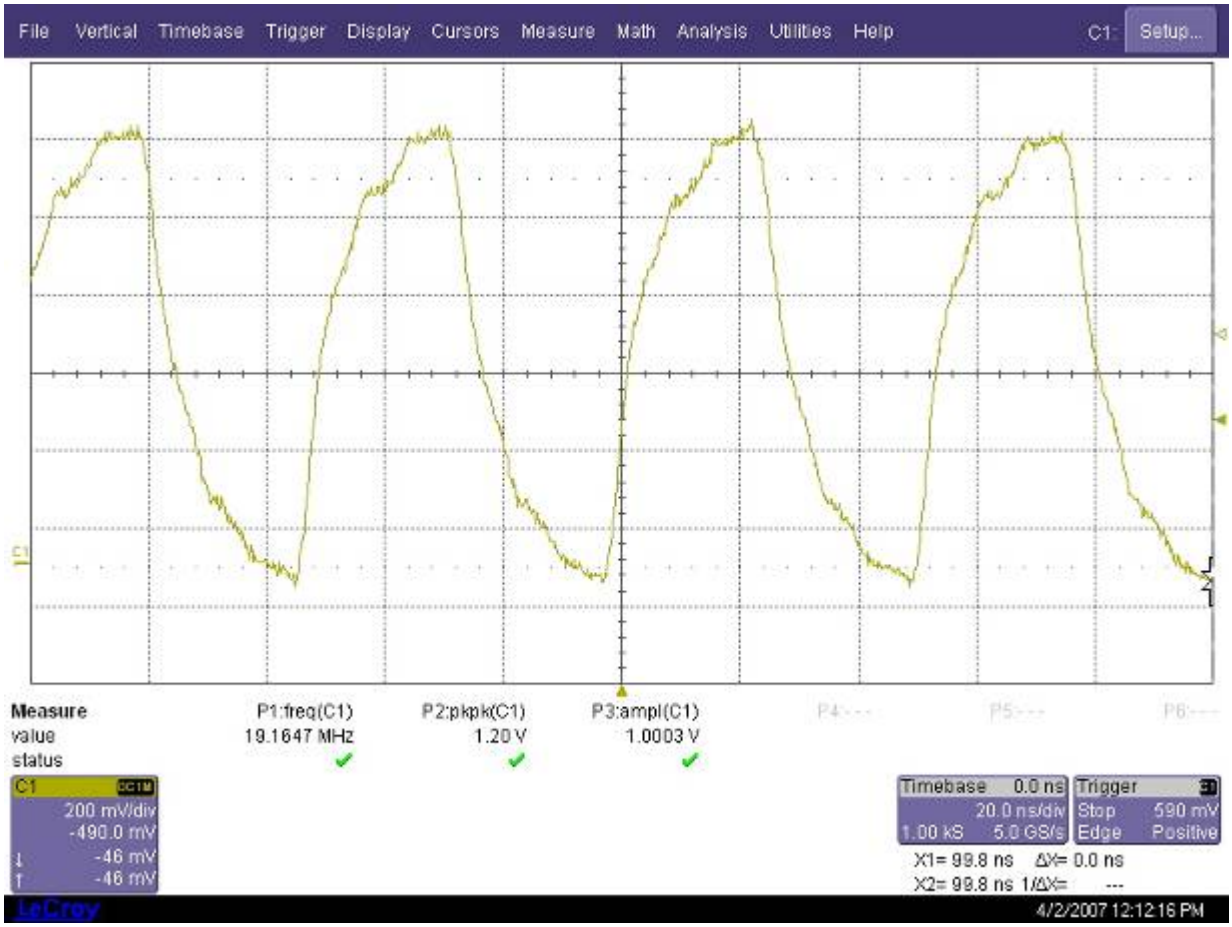


Figure 10 TCXO Timing at 25P[0P]C

SLEEP Crystal Circuit for 32.768kHz

The 32.768 kHz crystal oscillator is the primary SLEEP clock source when TCXO clocks are disabled to save power.

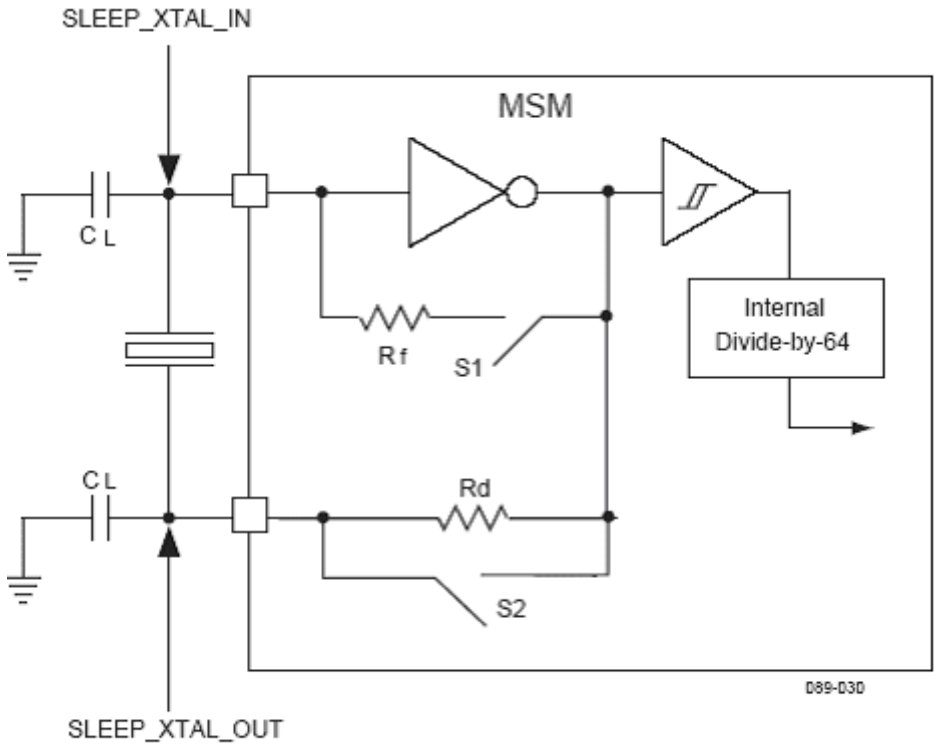


Figure 11 Sleep CLK Block Diagram

The 32.768 kHz crystal oscillator signal is generated by an external crystal (plus two shunt capacitors), which is supplemented by a PM internal inverter and buffer.

The crystal oscillator continues to run as long as a valid supply is present, even when the PM is powered down. This provides a continuous and accurate 32.768 kHz source. The oscillator halts when power from the external supply and main battery are removed.

The PM includes a circuit that continually monitors the crystal oscillator signal. If the crystal stops oscillating, the PM automatically switches to the RC oscillator and sends an MSM interrupt. Narrow pulses at the SLEEP_CLK output may occur during this switchover. The crystal oscillator dissipates little power, adjusting its bias current to the minimum required to maintain oscillation.

SLEEP Clock waveform (32.768KHz +/-20ppm)

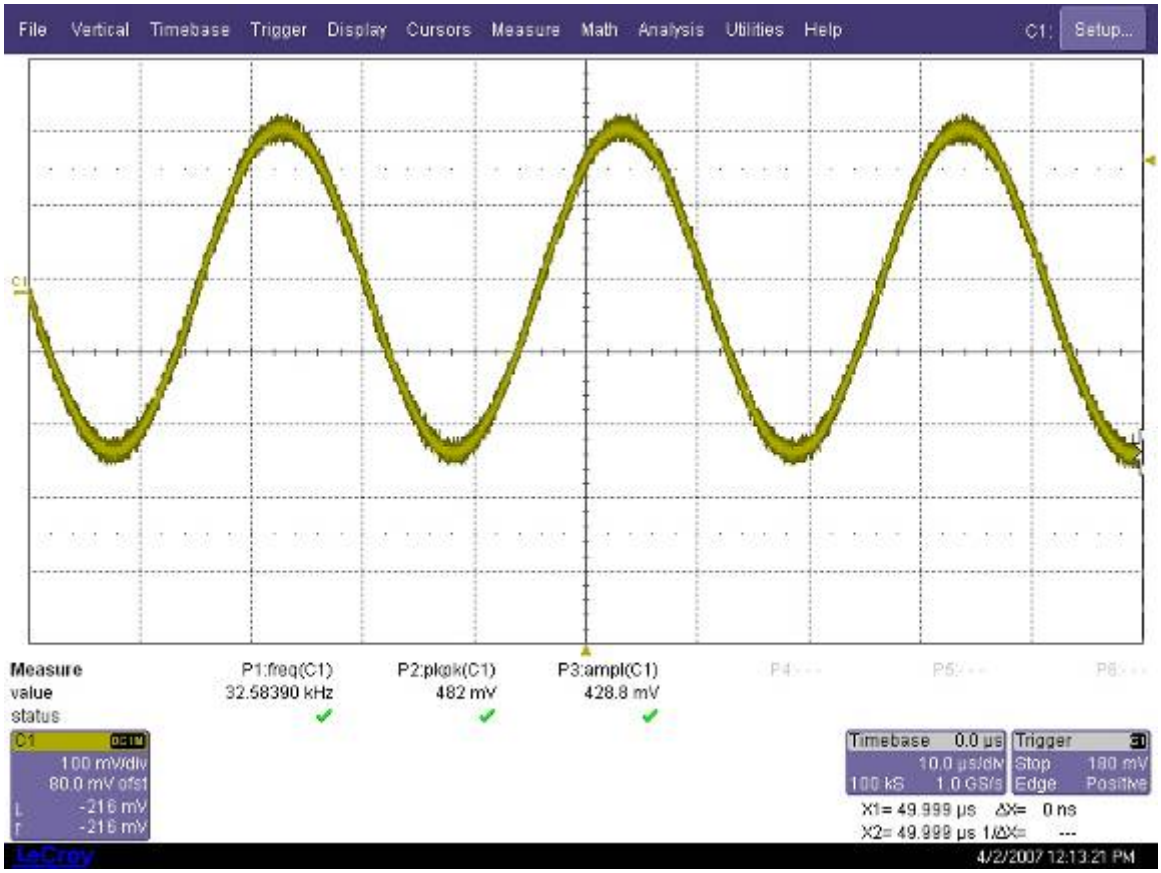


Figure 12 Sleep_CLK Timing at 25P[0P]C

SBI CLK Interface

A 9.6 MHz clock signal is used for DBUS, which is used by the MSM to transfer data between the PM and MSM.

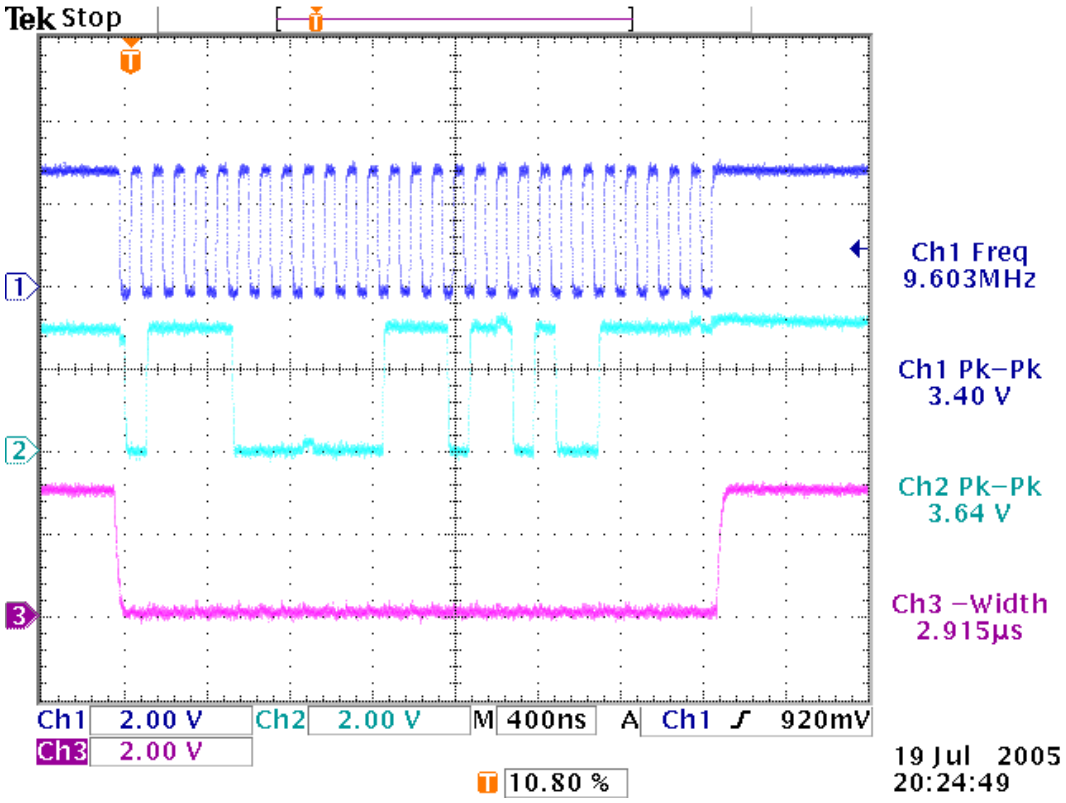


Figure 13 MSM to PM SBI Timing at 25P[0P]C

The system clock is stopped during sleep mode by disabling the VREG_TCXO. The TCXO is turned off by the PM regulator, which is from MSM's TCXO_EN output signal.

USB

USB (Universal Serial Bus) provides a wired connectivity between a PC and peripheral devices. It is a differential serial bus.

USB 1.1 is supported with full speed (12 Mbps).

Hot swap is supported, which means that USB devices may be plugged in/out at any time.

This phone is provided with a specific connector for micro USB.

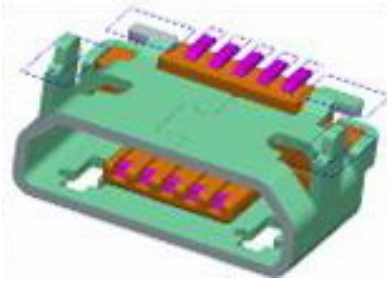


Figure 14 Micro USB Connector

Charger interface

This mobile terminal supports AC-6 & DC-6 chargers and be connected through this interface.

■ User Interface

Display module

The mobile terminal uses a TFT LCD. The interface uses a parallel bus to transfer the Command/ Data between QSC6020 and LCD. The main panel for 2608 is a 128x160 dot matrix TFT LCD module.

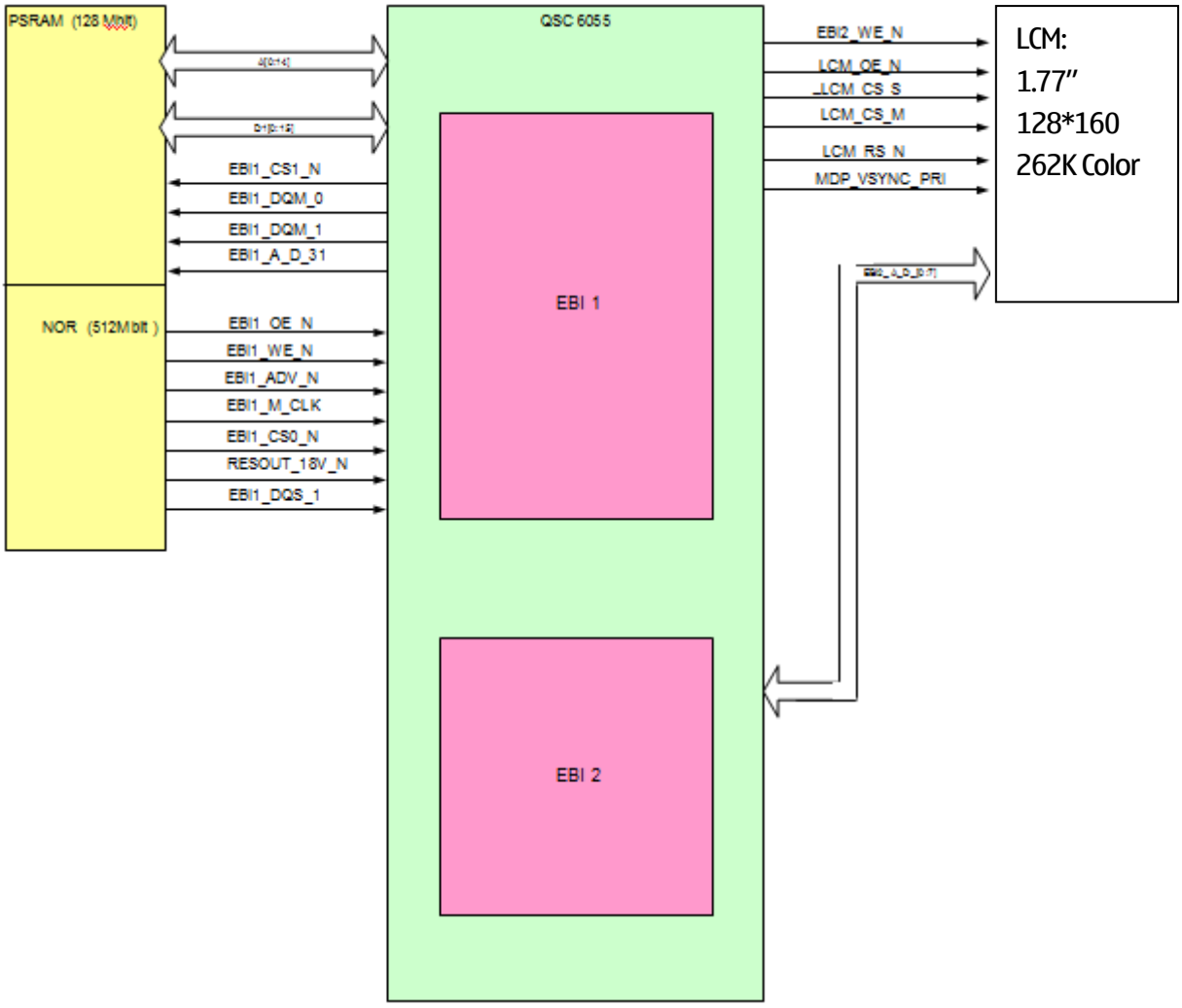


Figure 15 Display overview

Display characteristics

Item	Specification
Active area resolution	128RGB x160
Interface	CPU IF
Number of colors	262K color
Size	34mm x 46.4mm x 2.05mm
Illumination	2 white LEDs 250 cd/m2
Viewing angle	12 o'clock
Technology	AM-LCD

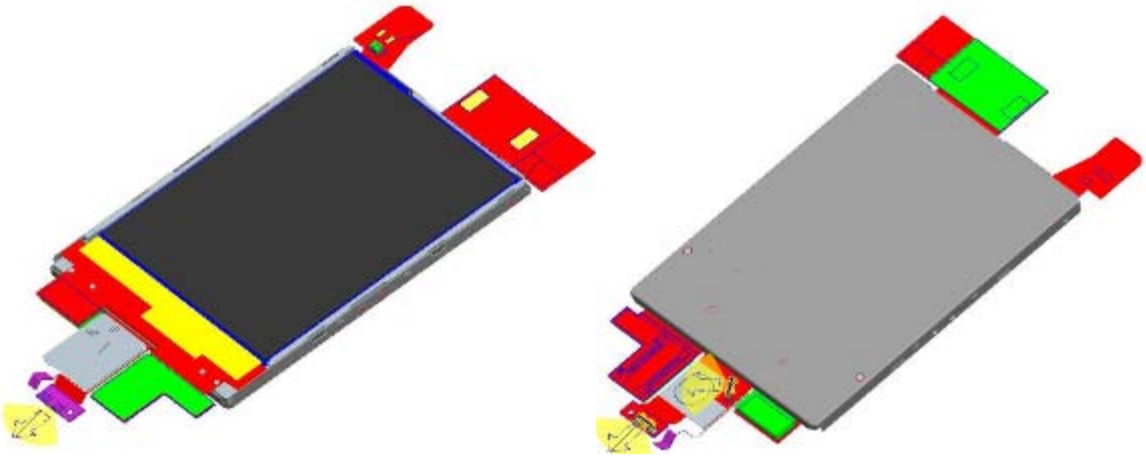


Figure 16 Display mechanical outline

Keyboard and other keys

The keyboard interface of the QSC6020 supports a 5x5 keyboard matrix. In this phone 5x4 sub matrixes are used (KEYSENSE0-4/KYPD0-3)

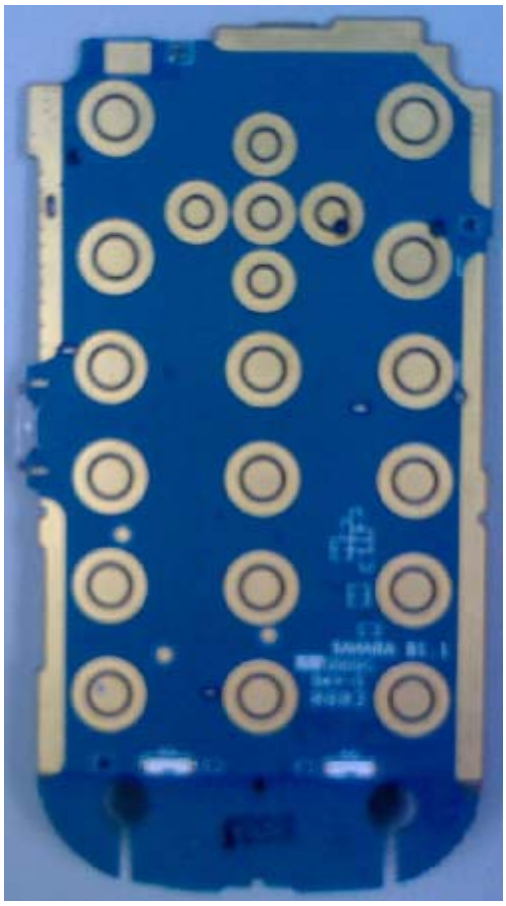


Figure 17 Keymat

KEY MATRIX	KEYSENSE_N0 GPIO_37	KEYSENSE_N1 GPIO_41	KEYSENSE_N2 GPIO_40	KEYSENSE_N3 GPIO_39	KEYSENSE_N4 GPIO_38
KYPD_0 GPIO_12	*	UP	5	8	SOFT_L
KYPD_1 GPIO_0	0	OK	DOWN	#	LEFT
KYPD_2 GPIO_36	7	Right	3	6	SEND
KYPD_3 GPIO_2	4	SOFT_R	2	9	1
KYPD_4 GPIO_1	SIDE_KEY_DOWN	SIDE_KEY_UP	TBD	TBD	TBD

Figure 18 RM-376 Key matrix

Audio concept

Audio HW architecture

The audio control and processing is provided by the QSC6020 which contains the audio codec, the MCU and DSP blocks. These blocks handle and process the audio data signals. The baseband supports 2 microphone inputs, 1 line inputs and three receiver (earpiece)/ speaker outputs.

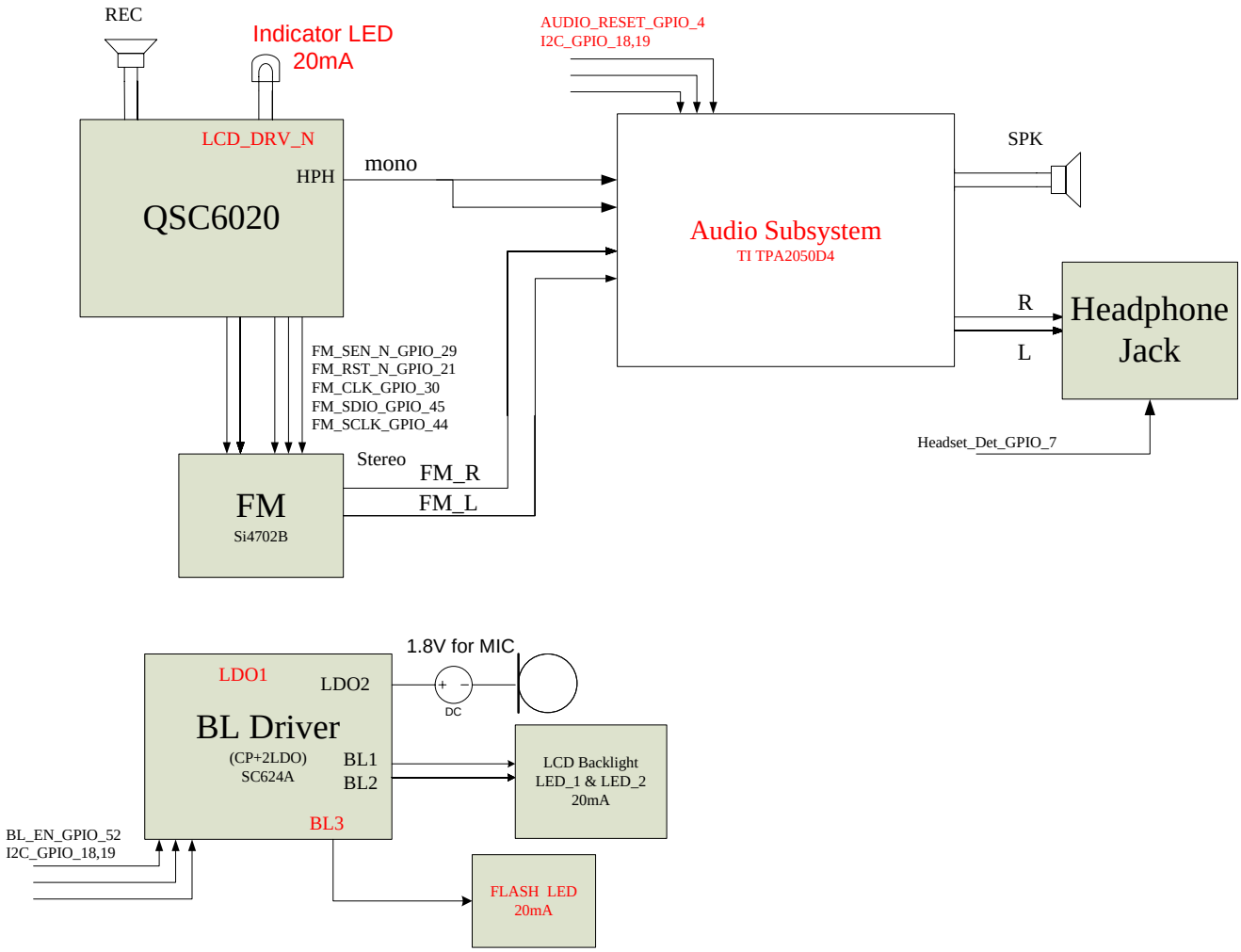


Figure 19 Audio HW architecture

Internal microphone

MIC1_P & MIC1_N inputs of 2608 schematic are used for the mobile terminal's internal microphone. MIC2_P & MIC2_N input are used for headsets.

Every microphone input can have either a differential or single-ended AC connection to the QSC6020 circuit. The internal microphone is differential signals. External headset microphone is single-ended.

VDD_MIC_BIAS_1.8V regulated voltage from LDO is used for microphone.

The MIC_BIAS output is used for external headset to provide 1 mA of current at 1.8 +/-0.11Volts DC.

The output power for the single-ended (MICROPHONE) output is typically -22dB +/- 3 dB (0dB=1V/Pa), output impedance is 300 ohm in 1k Hz (0dB=1V/Pa).

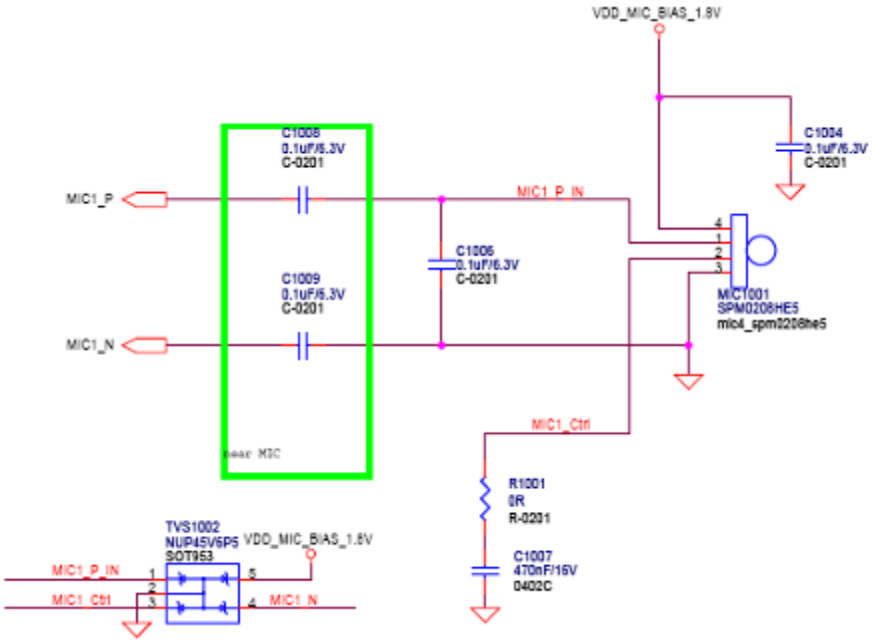


Figure 20 Internal microphone circuitry

Internal earpiece

EAR_P & EAR_N of QSC6020 output pins outputs are used for the mobile terminal's internal earpiece (receiver).

The earpiece (receiver) and external louder speaker are both differential signals that come from separate outputs at the QSC6020 are connected to different driver.

The output power for the differential earpiece output is typically 108 dB for +/- 3 dB, Impedance is 32 ohm in 1kHz.

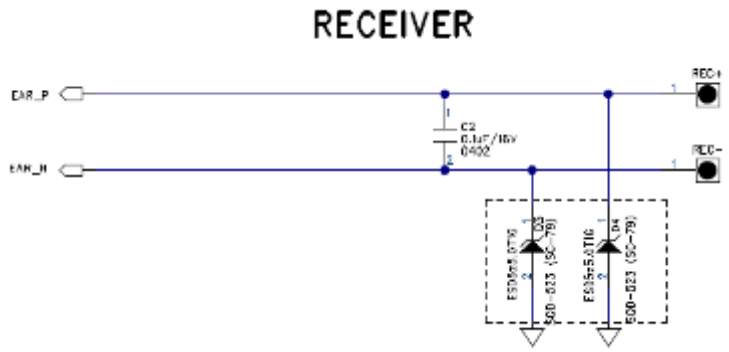


Figure 21 Internal earpiece circuitry

Internal speaker

The output power for the auxiliary speaker output is typically 0.6 W sine wave into impedance is 7 ohm in 1k Hz. The 2608 also supports a hands-free speaker.

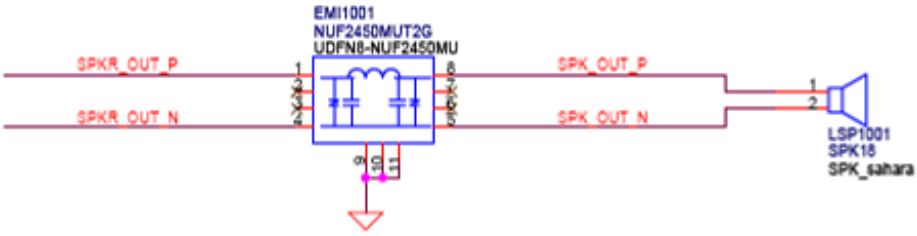


Figure 22 Internal speaker circuitry

Vibra circuitry

Vibra is used for Vibra alarm function.

The vibra motor is connected to QSC6020 via VIB_DRV_N.

Vibra is built into cover and connected via cable to plug on PWB.

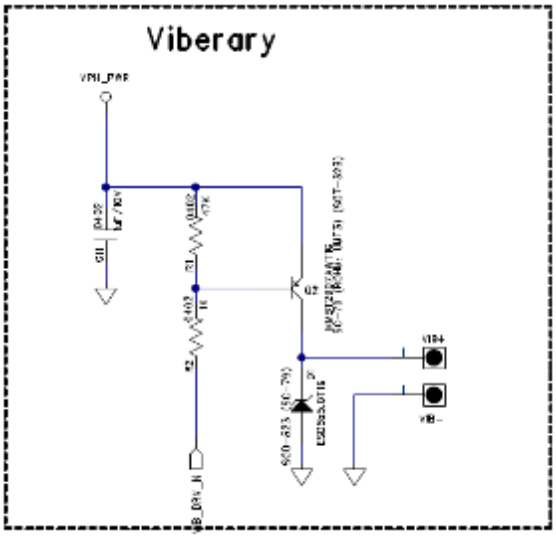


Figure 23 Vibra circuitry

AV Connector

The AV Connector consists of single ended mono or stereo audio output and mono audio input.

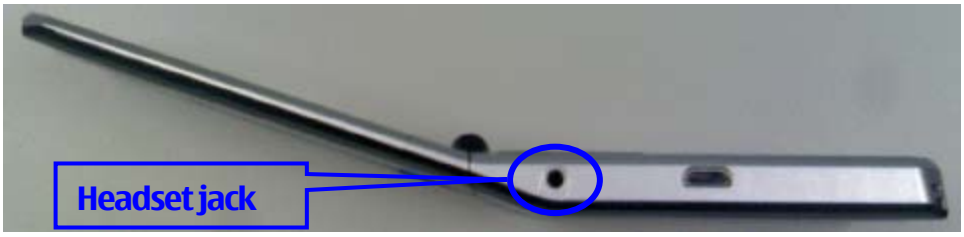


Figure 24 Headset jack port

The mobile terminal supports Nokia standard 2.5mm mono headset. The headset insertion to the mobile terminal is detected through pin 7 (HEADSET_DET) of the headset Jack, J1001. HEADSET_DET ("HEADSET_DET" pin in 2608 schematic) is low when headset not inserted. It becomes high when headset is inserted.

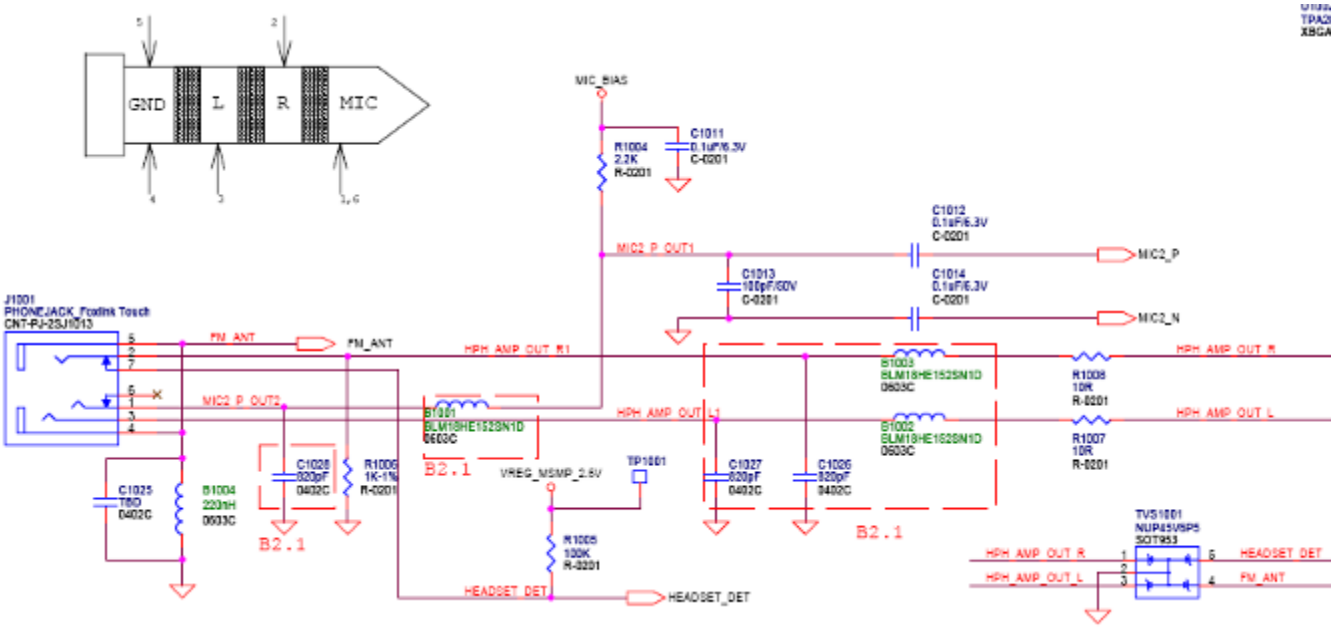


Figure 25 Headset detection circuitry

The following table shows the AV interface electrical characteristics.

Table 3 AV interface electrical characteristics

Signal name	Function/ Parameter	Min	Typ	Max	Unit	Note
HPH_AMP_OUT_L1	HS Ear L audio output	-	-	2	Vpp	SPR requirement
HPH_AMP_OUT_R1	HS Ear R audio output	-	-	2	Vpp	SPR requirement
MIC_BIAS	HS MIcbias Voltage	-	1.8	-	V	

Baseband technical specifications

External interfaces

Name of connection	Connector reference
USB	CN1401 (on engine PWB)
Battery connector	CN501 (on engine PWB)

Charger connector and charging interface connections & electrical characteristics

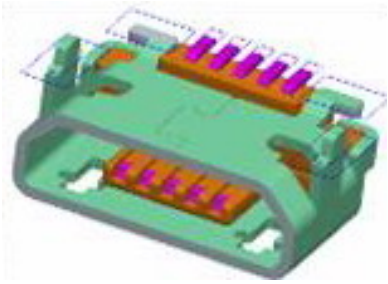


Figure 26 Charger connector

Table 4 Charging interface connections

Pin	Signal	I/O	Engine connection		Notes
1	Vchar	In	Charging IC (BQ24072)	IN (U503.13)	Charging voltage
2	Charge GND		Ground		Charger ground

Table 5 Charging IF electrical characteristics

Description	Parameter	Min	Max	Unit	Notes
Vchar	V Charge	0	28	V	Limit is given by charging IC
Vchar	I Charge		1.5	A	Limit is given by charging IC
Charge GND			1.5	A	

RF Description

Block diagram

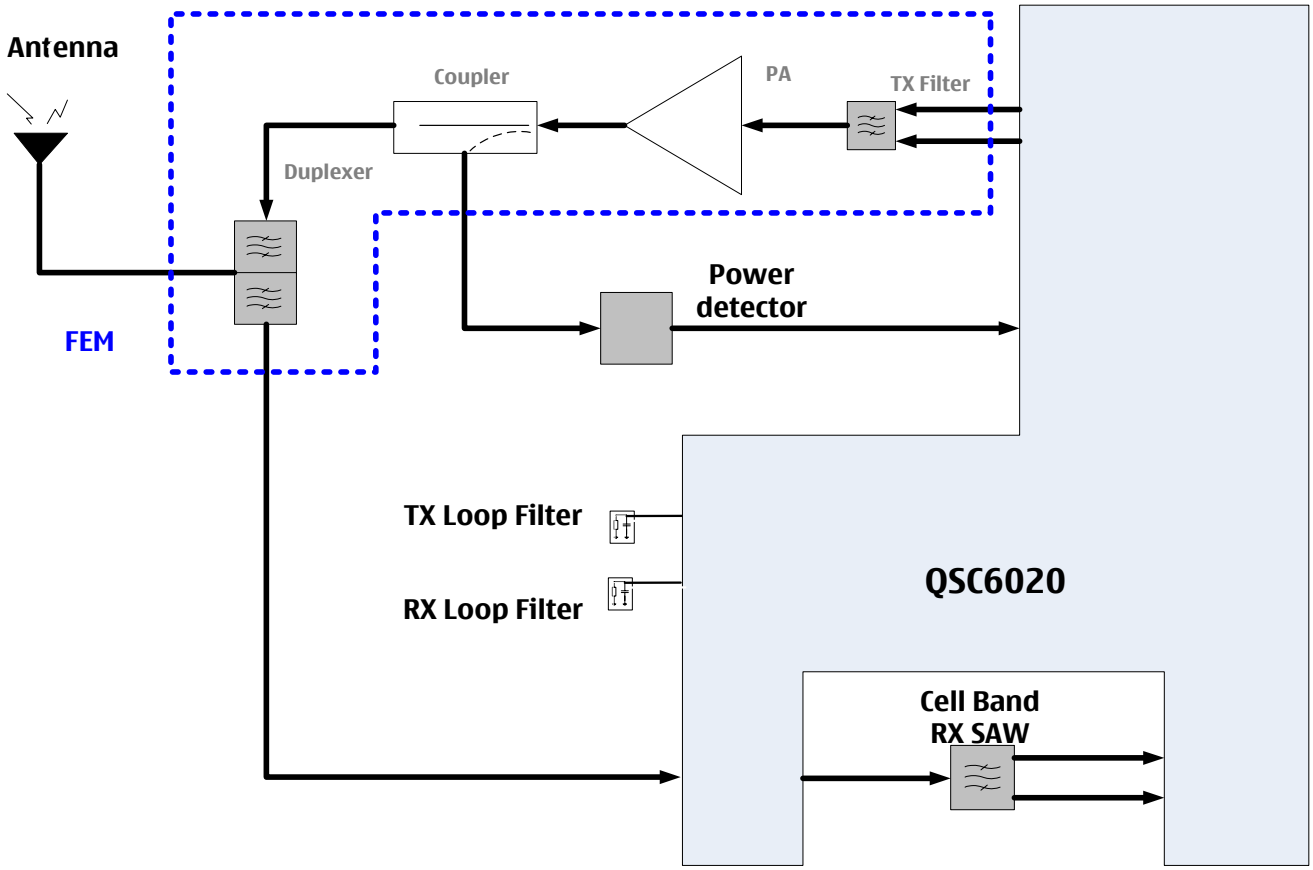


Figure 27 RF Block diagram using QSC6020

Receiver (RX)

The RF receiver is based upon the RFR6122 IC design, but includes significant innovative improvements. This zero-IF receive signal path also supports band class 0 (Rx bands of 869 to 894 MHz). The receive signal path includes the LNA, quadrature downconverter, analog baseband filters and buffers, and analog-to-digital converters (ADCs). Numerous secondary Rx functions are integrated as well: the Rx PLL, the Rx VCO circuit, Rx LO generation and distribution circuits, reference and clock circuits for the ADCs, and various interface, control, and status circuits.

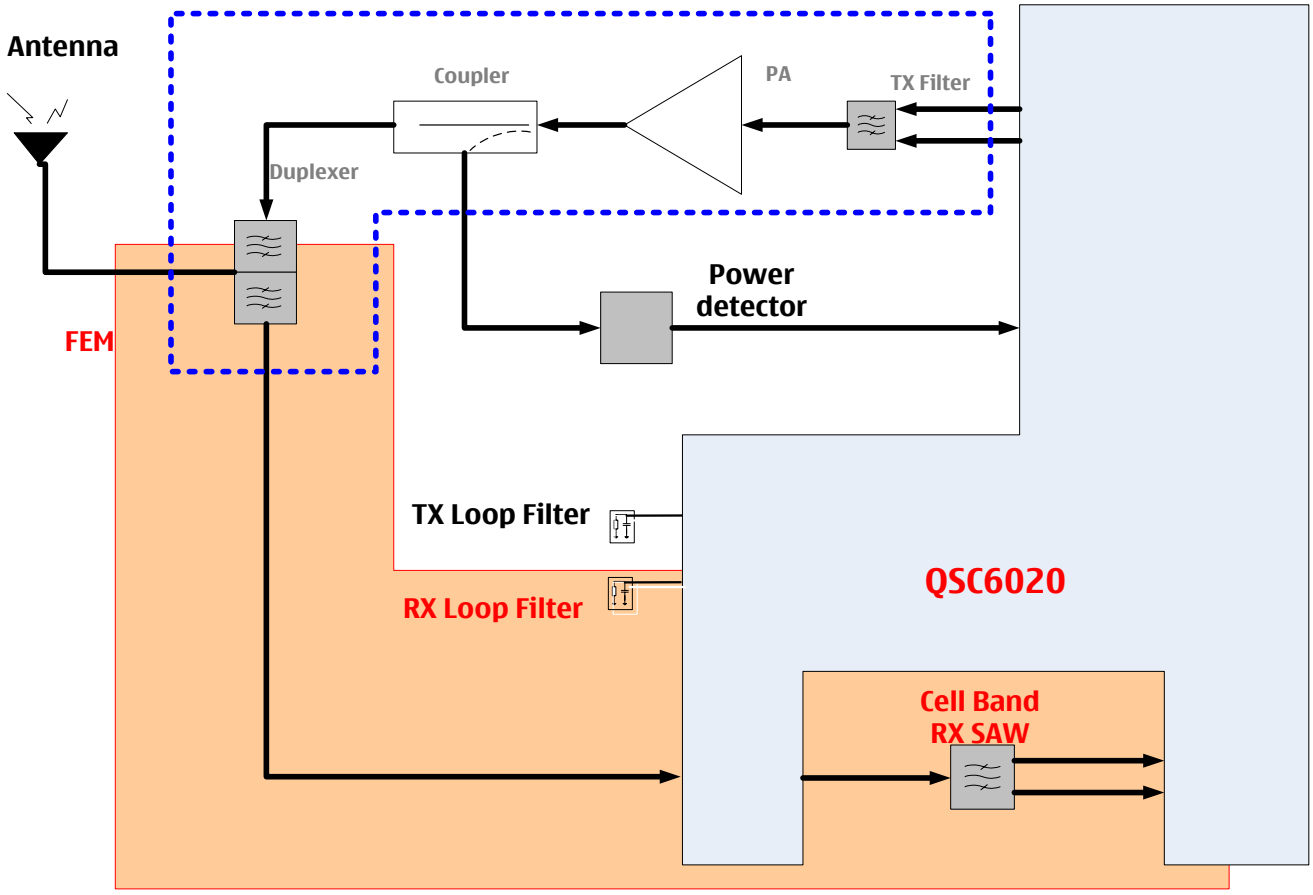


Figure 28 RX System block diagram

Transmitter (TX)

The RF transmitter is based upon the well-established RFT6122 IC design, but improved to include the latest innovations. It provides the zero-IF transmit signal path for cellular-CDMA transmission as defined by band class 0 within the CDMA2000 standard (Tx bands of 824 to 849 MHz). The transmit signal path includes baseband amplifiers, quadrature upconversion, gain control RF amplification, and an output driver amplifier. Numerous secondary Tx functions are integrated as well: a reference for the transmit DACs, the Tx phase-locked loop, the Tx VCO circuit, Tx LO generation and distribution circuits, and various interface, control, and status circuits.

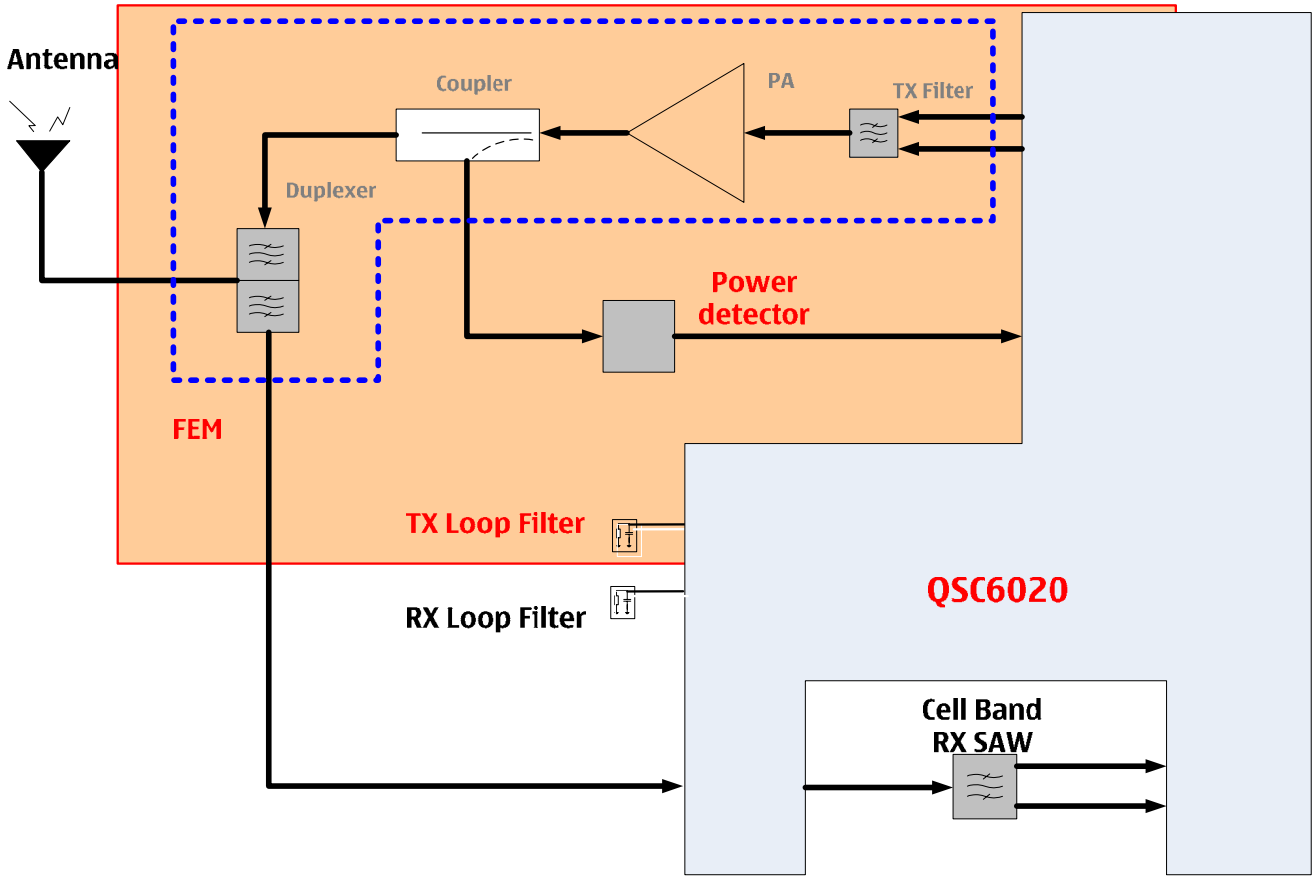


Figure 29 TX System block diagram

FM Radio Description

The Si4702 integrates the complete tuner function from antenna input to stereo audio output for FM broadcast radio reception. The Si4702 accepts a 32.768 kHz reference clock to the RCLK pin. The Si4702 is based on the superior, proven performance of Silicon Laboratories' Aero architecture offering unmatched interference rejection and leading sensitivity. The device uses the same programming interface as the Si4700 and supports multiple bus-modes. Power management is also simplified with an integrated regulator allowing direct connection to a 2.7 to 5.5 V battery.

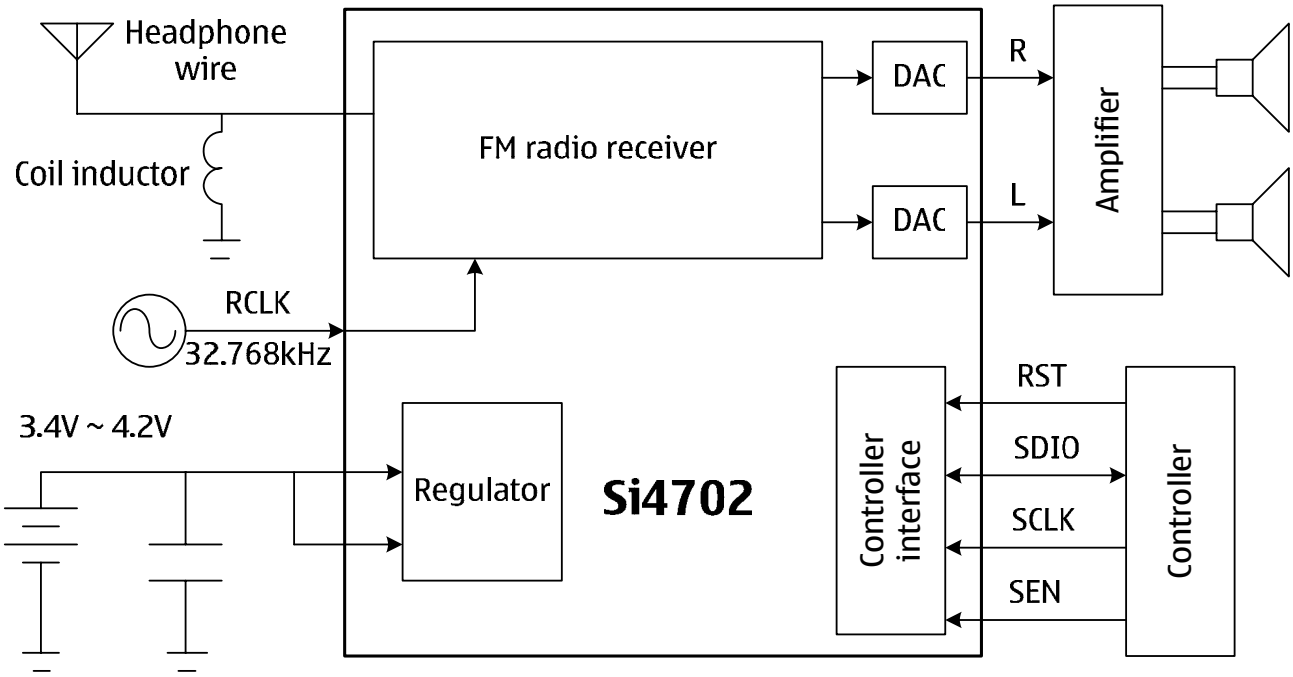


Figure 30 FM radio block diagram

■ Frequency mappings

CDMA 800 frequencies

Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)
991	824.04	869.04	5	825.15	870.15	42	826.26	871.26	79	827.37	872.37	116	828.48	873.48
992	824.07	869.07	6	825.18	870.18	43	826.29	871.29	80	827.4	872.4	117	828.51	873.51
993	824.1	869.1	7	825.21	870.21	44	826.32	871.32	81	827.43	872.43	118	828.54	873.54
994	824.13	869.13	8	825.24	870.24	45	826.35	871.35	82	827.46	872.46	119	828.57	873.57
995	824.16	869.16	9	825.27	870.27	46	826.38	871.38	83	827.49	872.49	120	828.6	873.6
996	824.19	869.19	10	825.3	870.3	47	826.41	871.41	84	827.52	872.52	121	828.63	873.63
997	824.22	869.22	11	825.33	870.33	48	826.44	871.44	85	827.55	872.55	122	828.66	873.66
998	824.25	869.25	12	825.36	870.36	49	826.47	871.47	86	827.58	872.58	123	828.69	873.69
999	824.28	869.28	13	825.39	870.39	50	826.5	871.5	87	827.61	872.61	124	828.72	873.72
1000	824.31	869.31	14	825.42	870.42	51	826.53	871.53	88	827.64	872.64	125	828.75	873.75
1001	824.34	869.34	15	825.45	870.45	52	826.56	871.56	89	827.67	872.67	126	828.78	873.78
1002	824.37	869.37	16	825.48	870.48	53	826.59	871.59	90	827.7	872.7	127	828.81	873.81
1003	824.4	869.4	17	825.51	870.51	54	826.62	871.62	91	827.73	872.73	128	828.84	873.84
1004	824.43	869.43	18	825.54	870.54	55	826.65	871.65	92	827.76	872.76	129	828.87	873.87
1005	824.46	869.46	19	825.57	870.57	56	826.68	871.68	93	827.79	872.79	130	828.9	873.9
1006	824.49	869.49	20	825.6	870.6	57	826.71	871.71	94	827.82	872.82	131	828.93	873.93
1007	824.52	869.52	21	825.63	870.63	58	826.74	871.74	95	827.85	872.85	132	828.96	873.96
1008	824.55	869.55	22	825.66	870.66	59	826.77	871.77	96	827.88	872.88	133	828.99	873.99
1009	824.58	869.58	23	825.69	870.69	60	826.8	871.8	97	827.91	872.91	134	829.02	874.02
1010	824.61	869.61	24	825.72	870.72	61	826.83	871.83	98	827.94	872.94	135	829.05	874.05
1011	824.64	869.64	25	825.75	870.75	62	826.86	871.86	99	827.97	872.97	136	829.08	874.08
1012	824.67	869.67	26	825.78	870.78	63	826.89	871.89	100	828	873	137	829.11	874.11
1013	824.7	869.7	27	825.81	870.81	64	826.92	871.92	101	828.03	873.03	138	829.14	874.14
1014	824.73	869.73	28	825.84	870.84	65	826.95	871.95	102	828.06	873.06	139	829.17	874.17
1015	824.76	869.76	29	825.87	870.87	66	826.98	871.98	103	828.09	873.09	140	829.2	874.2
1016	824.79	869.79	30	825.9	870.9	67	827.01	872.01	104	828.12	873.12	141	829.23	874.23
1017	824.82	869.82	31	825.93	870.93	68	827.04	872.04	105	828.15	873.15	142	829.26	874.26
1018	824.85	869.85	32	825.96	870.96	69	827.07	872.07	106	828.18	873.18	143	829.29	874.29
1019	824.88	869.88	33	825.99	870.99	70	827.1	872.1	107	828.21	873.21	144	829.32	874.32
1020	824.91	869.91	34	826.02	871.02	71	827.13	872.13	108	828.24	873.24	145	829.35	874.35
1021	824.94	869.94	35	826.05	871.05	72	827.16	872.16	109	828.27	873.27	146	829.38	874.38
1022	824.97	869.97	36	826.08	871.08	73	827.19	872.19	110	828.3	873.3	147	829.41	874.41
1023	825	870	37	826.11	871.11	74	827.22	872.22	111	828.33	873.33	148	829.44	874.44
1	825.03	870.03	38	826.14	871.14	75	827.25	872.25	112	828.36	873.36	149	829.47	874.47
2	825.06	870.06	39	826.17	871.17	76	827.28	872.28	113	828.39	873.39	150	829.5	874.5
3	825.09	870.09	40	826.2	871.2	77	827.31	872.31	114	828.42	873.42	151	829.53	874.53
4	825.12	870.12	41	826.23	871.23	78	827.34	872.34	115	828.45	873.45	152	829.56	874.56

Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)
153	829.59	874.59	190	830.7	875.7	227	831.81	876.81	264	832.92	877.92	301	834.03	879.03
154	829.62	874.62	191	830.73	875.73	228	831.84	876.84	265	832.95	877.95	302	834.06	879.06
155	829.65	874.65	192	830.76	875.76	229	831.87	876.87	266	832.98	877.98	303	834.09	879.09
156	829.68	874.68	193	830.79	875.79	230	831.9	876.9	267	833.01	878.01	304	834.12	879.12
157	829.71	874.71	194	830.82	875.82	231	831.93	876.93	268	833.04	878.04	305	834.15	879.15
158	829.74	874.74	195	830.85	875.85	232	831.96	876.96	269	833.07	878.07	306	834.18	879.18
159	829.77	874.77	196	830.88	875.88	233	831.99	876.99	270	833.1	878.1	307	834.21	879.21
160	829.8	874.8	197	830.91	875.91	234	832.02	877.02	271	833.13	878.13	308	834.24	879.24
161	829.83	874.83	198	830.94	875.94	235	832.05	877.05	272	833.16	878.16	309	834.27	879.27
162	829.86	874.86	199	830.97	875.97	236	832.08	877.08	273	833.19	878.19	310	834.3	879.3
163	829.89	874.89	200	831	876	237	832.11	877.11	274	833.22	878.22	311	834.33	879.33
164	829.92	874.92	201	831.03	876.03	238	832.14	877.14	275	833.25	878.25	312	834.36	879.36
165	829.95	874.95	202	831.06	876.06	239	832.17	877.17	276	833.28	878.28	313	834.39	879.39
166	829.98	874.98	203	831.09	876.09	240	832.2	877.2	277	833.31	878.31	314	834.42	879.42
167	830.01	875.01	204	831.12	876.12	241	832.23	877.23	278	833.34	878.34	315	834.45	879.45
168	830.04	875.04	205	831.15	876.15	242	832.26	877.26	279	833.37	878.37	316	834.48	879.48
169	830.07	875.07	206	831.18	876.18	243	832.29	877.29	280	833.4	878.4	317	834.51	879.51
170	830.1	875.1	207	831.21	876.21	244	832.32	877.32	281	833.43	878.43	318	834.54	879.54
171	830.13	875.13	208	831.24	876.24	245	832.35	877.35	282	833.46	878.46	319	834.57	879.57
172	830.16	875.16	209	831.27	876.27	246	832.38	877.38	283	833.49	878.49	320	834.6	879.6
173	830.19	875.19	210	831.3	876.3	247	832.41	877.41	284	833.52	878.52	321	834.63	879.63
174	830.22	875.22	211	831.33	876.33	248	832.44	877.44	285	833.55	878.55	322	834.66	879.66
175	830.25	875.25	212	831.36	876.36	249	832.47	877.47	286	833.58	878.58	323	834.69	879.69
176	830.28	875.28	213	831.39	876.39	250	832.5	877.5	287	833.61	878.61	324	834.72	879.72
177	830.31	875.31	214	831.42	876.42	251	832.53	877.53	288	833.64	878.64	325	834.75	879.75
178	830.34	875.34	215	831.45	876.45	252	832.56	877.56	289	833.67	878.67	326	834.78	879.78
179	830.37	875.37	216	831.48	876.48	253	832.59	877.59	290	833.7	878.7	327	834.81	879.81
180	830.4	875.4	217	831.51	876.51	254	832.62	877.62	291	833.73	878.73	328	834.84	879.84
181	830.43	875.43	218	831.54	876.54	255	832.65	877.65	292	833.76	878.76	329	834.87	879.87
182	830.46	875.46	219	831.57	876.57	256	832.68	877.68	293	833.79	878.79	330	834.9	879.9
183	830.49	875.49	220	831.6	876.6	257	832.71	877.71	294	833.82	878.82	331	834.93	879.93
184	830.52	875.52	221	831.63	876.63	258	832.74	877.74	295	833.85	878.85	332	834.96	879.96
185	830.55	875.55	222	831.66	876.66	259	832.77	877.77	296	833.88	878.88	333	834.99	879.99
186	830.58	875.58	223	831.69	876.69	260	832.8	877.8	297	833.91	878.91	334	835.02	880.02
187	830.61	875.61	224	831.72	876.72	261	832.83	877.83	298	833.94	878.94	335	835.05	880.05
188	830.64	875.64	225	831.75	876.75	262	832.86	877.86	299	833.97	878.97	336	835.08	880.08
189	830.67	875.67	226	831.78	876.78	263	832.89	877.89	300	834	879	337	835.11	880.11

Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)
338	835.14	880.14	375	836.25	881.25	412	837.36	882.36	449	838.47	883.47	486	839.58	884.58
339	835.17	880.17	376	836.28	881.28	413	837.39	882.39	450	838.5	883.5	487	839.61	884.61
340	835.2	880.2	377	836.31	881.31	414	837.42	882.42	451	838.53	883.53	488	839.64	884.64
341	835.23	880.23	378	836.34	881.34	415	837.45	882.45	452	838.56	883.56	489	839.67	884.67
342	835.26	880.26	379	836.37	881.37	416	837.48	882.48	453	838.59	883.59	490	839.7	884.7
343	835.29	880.29	380	836.4	881.4	417	837.51	882.51	454	838.62	883.62	491	839.73	884.73
344	835.32	880.32	381	836.43	881.43	418	837.54	882.54	455	838.65	883.65	492	839.76	884.76
345	835.35	880.35	382	836.46	881.46	419	837.57	882.57	456	838.68	883.68	493	839.79	884.79
346	835.38	880.38	383	836.49	881.49	420	837.6	882.6	457	838.71	883.71	494	839.82	884.82
347	835.41	880.41	384	836.52	881.52	421	837.63	882.63	458	838.74	883.74	495	839.85	884.85
348	835.44	880.44	385	836.55	881.55	422	837.66	882.66	459	838.77	883.77	496	839.88	884.88
349	835.47	880.47	386	836.58	881.58	423	837.69	882.69	460	838.8	883.8	497	839.91	884.91
350	835.5	880.5	387	836.61	881.61	424	837.72	882.72	461	838.83	883.83	498	839.94	884.94
351	835.53	880.53	388	836.64	881.64	425	837.75	882.75	462	838.86	883.86	499	839.97	884.97
352	835.56	880.56	389	836.67	881.67	426	837.78	882.78	463	838.89	883.89	500	840	885
353	835.59	880.59	390	836.7	881.7	427	837.81	882.81	464	838.92	883.92	501	840.03	885.03
354	835.62	880.62	391	836.73	881.73	428	837.84	882.84	465	838.95	883.95	502	840.06	885.06
355	835.65	880.65	392	836.76	881.76	429	837.87	882.87	466	838.98	883.98	503	840.09	885.09
356	835.68	880.68	393	836.79	881.79	430	837.9	882.9	467	839.01	884.01	504	840.12	885.12
357	835.71	880.71	394	836.82	881.82	431	837.93	882.93	468	839.04	884.04	505	840.15	885.15
358	835.74	880.74	395	836.85	881.85	432	837.96	882.96	469	839.07	884.07	506	840.18	885.18
359	835.77	880.77	396	836.88	881.88	433	837.99	882.99	470	839.1	884.1	507	840.21	885.21
360	835.8	880.8	397	836.91	881.91	434	838.02	883.02	471	839.13	884.13	508	840.24	885.24
361	835.83	880.83	398	836.94	881.94	435	838.05	883.05	472	839.16	884.16	509	840.27	885.27
362	835.86	880.86	399	836.97	881.97	436	838.08	883.08	473	839.19	884.19	510	840.3	885.3
363	835.89	880.89	400	837	882	437	838.11	883.11	474	839.22	884.22	511	840.33	885.33
364	835.92	880.92	401	837.03	882.03	438	838.14	883.14	475	839.25	884.25	512	840.36	885.36
365	835.95	880.95	402	837.06	882.06	439	838.17	883.17	476	839.28	884.28	513	840.39	885.39
366	835.98	880.98	403	837.09	882.09	440	838.2	883.2	477	839.31	884.31	514	840.42	885.42
367	836.01	881.01	404	837.12	882.12	441	838.23	883.23	478	839.34	884.34	515	840.45	885.45
368	836.04	881.04	405	837.15	882.15	442	838.26	883.26	479	839.37	884.37	516	840.48	885.48
369	836.07	881.07	406	837.18	882.18	443	838.29	883.29	480	839.4	884.4	517	840.51	885.51
370	836.1	881.1	407	837.21	882.21	444	838.32	883.32	481	839.43	884.43	518	840.54	885.54
371	836.13	881.13	408	837.24	882.24	445	838.35	883.35	482	839.46	884.46	519	840.57	885.57
372	836.16	881.16	409	837.27	882.27	446	838.38	883.38	483	839.49	884.49	520	840.6	885.6
373	836.19	881.19	410	837.3	882.3	447	838.41	883.41	484	839.52	884.52	521	840.63	885.63
374	836.22	881.22	411	837.33	882.33	448	838.44	883.44	485	839.55	884.55	522	840.66	885.66

Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)
523	840.69	885.69	560	841.8	886.8	597	842.91	887.91	634	844.02	889.02	671	845.13	890.13
524	840.72	885.72	561	841.83	886.83	598	842.94	887.94	635	844.05	889.05	672	845.16	890.16
525	840.75	885.75	562	841.86	886.86	599	842.97	887.97	636	844.08	889.08	673	845.19	890.19
526	840.78	885.78	563	841.89	886.89	600	843	888	637	844.11	889.11	674	845.22	890.22
527	840.81	885.81	564	841.92	886.92	601	843.03	888.03	638	844.14	889.14	675	845.25	890.25
528	840.84	885.84	565	841.95	886.95	602	843.06	888.06	639	844.17	889.17	676	845.28	890.28
529	840.87	885.87	566	841.98	886.98	603	843.09	888.09	640	844.2	889.2	677	845.31	890.31
530	840.9	885.9	567	842.01	887.01	604	843.12	888.12	641	844.23	889.23	678	845.34	890.34
531	840.93	885.93	568	842.04	887.04	605	843.15	888.15	642	844.26	889.26	679	845.37	890.37
532	840.96	885.96	569	842.07	887.07	606	843.18	888.18	643	844.29	889.29	680	845.4	890.4
533	840.99	885.99	570	842.1	887.1	607	843.21	888.21	644	844.32	889.32	681	845.43	890.43
534	841.02	886.02	571	842.13	887.13	608	843.24	888.24	645	844.35	889.35	682	845.46	890.46
535	841.05	886.05	572	842.16	887.16	609	843.27	888.27	646	844.38	889.38	683	845.49	890.49
536	841.08	886.08	573	842.19	887.19	610	843.3	888.3	647	844.41	889.41	684	845.52	890.52
537	841.11	886.11	574	842.22	887.22	611	843.33	888.33	648	844.44	889.44	685	845.55	890.55
538	841.14	886.14	575	842.25	887.25	612	843.36	888.36	649	844.47	889.47	686	845.58	890.58
539	841.17	886.17	576	842.28	887.28	613	843.39	888.39	650	844.5	889.5	687	845.61	890.61
540	841.2	886.2	577	842.31	887.31	614	843.42	888.42	651	844.53	889.53	688	845.64	890.64
541	841.23	886.23	578	842.34	887.34	615	843.45	888.45	652	844.56	889.56	689	845.67	890.67
542	841.26	886.26	579	842.37	887.37	616	843.48	888.48	653	844.59	889.59	690	845.7	890.7
543	841.29	886.29	580	842.4	887.4	617	843.51	888.51	654	844.62	889.62	691	845.73	890.73
544	841.32	886.32	581	842.43	887.43	618	843.54	888.54	655	844.65	889.65	692	845.76	890.76
545	841.35	886.35	582	842.46	887.46	619	843.57	888.57	656	844.68	889.68	693	845.79	890.79
546	841.38	886.38	583	842.49	887.49	620	843.6	888.6	657	844.71	889.71	694	845.82	890.82
547	841.41	886.41	584	842.52	887.52	621	843.63	888.63	658	844.74	889.74	695	845.85	890.85
548	841.44	886.44	585	842.55	887.55	622	843.66	888.66	659	844.77	889.77	696	845.88	890.88
549	841.47	886.47	586	842.58	887.58	623	843.69	888.69	660	844.8	889.8	697	845.91	890.91
550	841.5	886.5	587	842.61	887.61	624	843.72	888.72	661	844.83	889.83	698	845.94	890.94
551	841.53	886.53	588	842.64	887.64	625	843.75	888.75	662	844.86	889.86	699	845.97	890.97
552	841.56	886.56	589	842.67	887.67	626	843.78	888.78	663	844.89	889.89	700	846	891
553	841.59	886.59	590	842.7	887.7	627	843.81	888.81	664	844.92	889.92	701	846.03	891.03
554	841.62	886.62	591	842.73	887.73	628	843.84	888.84	665	844.95	889.95	702	846.06	891.06
555	841.65	886.65	592	842.76	887.76	629	843.87	888.87	666	844.98	889.98	703	846.09	891.09
556	841.68	886.68	593	842.79	887.79	630	843.9	888.9	667	845.01	890.01	704	846.12	891.12
557	841.71	886.71	594	842.82	887.82	631	843.93	888.93	668	845.04	890.04	705	846.15	891.15
558	841.74	886.74	595	842.85	887.85	632	843.96	888.96	669	845.07	890.07	706	846.18	891.18
559	841.77	886.77	596	842.88	887.88	633	843.99	888.99	670	845.1	890.1	707	846.21	891.21

Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)	Channel	TX(MHz)	RX(MHz)
708	846.24	891.24	745	847.35	892.35	782	848.46	893.46
709	846.27	891.27	746	847.38	892.38	783	848.49	893.49
710	846.3	891.3	747	847.41	892.41	784	848.52	893.52
711	846.33	891.33	748	847.44	892.44	785	848.55	893.55
712	846.36	891.36	749	847.47	892.47	786	848.58	893.58
713	846.39	891.39	750	847.5	892.5	787	848.61	893.61
714	846.42	891.42	751	847.53	892.53	788	848.64	893.64
715	846.45	891.45	752	847.56	892.56	789	848.67	893.67
716	846.48	891.48	753	847.59	892.59	790	848.7	893.7
717	846.51	891.51	754	847.62	892.62	791	848.73	893.73
718	846.54	891.54	755	847.65	892.65	792	848.76	893.76
719	846.57	891.57	756	847.68	892.68	793	848.79	893.79
720	846.6	891.6	757	847.71	892.71	794	848.82	893.82
721	846.63	891.63	758	847.74	892.74	795	848.85	893.85
722	846.66	891.66	759	847.77	892.77	796	848.88	893.88
723	846.69	891.69	760	847.8	892.8	797	848.91	893.91
724	846.72	891.72	761	847.83	892.83	798	848.94	893.94
725	846.75	891.75	762	847.86	892.86	799	848.97	893.97
726	846.78	891.78	763	847.89	892.89			
727	846.81	891.81	764	847.92	892.92			
728	846.84	891.84	765	847.95	892.95			
729	846.87	891.87	766	847.98	892.98			
730	846.9	891.9	767	848.01	893.01			
731	846.93	891.93	768	848.04	893.04			
732	846.96	891.96	769	848.07	893.07			
733	846.99	891.99	770	848.1	893.1			
734	847.02	892.02	771	848.13	893.13			
735	847.05	892.05	772	848.16	893.16			
736	847.08	892.08	773	848.19	893.19			
737	847.11	892.11	774	848.22	893.22			
738	847.14	892.14	775	848.25	893.25			
739	847.17	892.17	776	848.28	893.28			
740	847.2	892.2	777	848.31	893.31			
741	847.23	892.23	778	848.34	893.34			
742	847.26	892.26	779	848.37	893.37			
743	847.29	892.29	780	848.4	893.4			
744	847.32	892.32	781	848.43	893.43			

6- Glossary

(This page left intentionally blank.)

A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analouge converter
DAC	Digital-to-analouge converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package
DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool

FR	Full rate
FSTN	Film compensated super twisted nematic
GMSK	Gaussian Minimum Shift Keying
GND	Ground, conductive mass
GPIB	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Associasion
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode
LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC,	mic Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architechture
OMAP	Operations, maintenance, and administartion part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory

PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver
SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noice ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)

(This page left intentionally blank.)