

**Nokia Customer Care**

# ***Service Manual***

**RM-305; RM-306 (Nokia 1650)**

## **Mobile Terminal**

***Part No: 9200071 (Issue 2)***

***COMPANY CONFIDENTIAL***



# Nokia Customer Care

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## ■ Product selection

The RM-305 is the EU version of the telephone with a dual band transceiver unit designed for the GSM900 and GSM1800 networks.

The RM-306 is the US version of the telephone with a dual band transceiver unit designed for the GSM850 and GSM1900 networks.



Figure 1 RM-305/306 Product Picture

## ■ Display and keypad features

- High resolution color display (128x160 pixels)
- 4UI-style, 4-way navigation key including selection key
- Rubber keymat

## ■ Features

### Hardware features

- GSM E900/1800 (EU/APAC version)
- GSM 850/1900 (US version)
- Gefion Engine, UPP Costo, 4 layer PWB
- 7-11 earpiece +13mm speaker audio solution
- AMR/HR/FR(US version not included)/EFR codecs
- Internal antenna
- Charger plug

- System connector: Easy flash II
- Headset connector
- Internal vibrator
- User changeable front- and back covers
- SIM (1.8 and 3.0 V)

### Software features

- OS: CUI
- UI Style: Jack 4
- Phone sharing (Multi-phonebook and call duration record)
- MP3-grade ringing tones and 32 polyphonic ringing tones.
- FM Radio
- Flash light
- Analog clock

### UI features

Messaging	<ul style="list-style-type: none"> <li>• SMS messaging</li> <li>• Predictive text input</li> <li>• Asia-Pacific: English, Chinese Simplified, Chinese Traditional, Thai, Filipino, Vietnamese, Bahasa Indonesia, Bahasa Malaysia, Hindi</li> <li>• Europe and Africa: Danish, Dutch, English, French, Finnish, German, Icelandic, Italian, Portuguese, Spanish, Swedish, Norwegian, Turkish, Greek, Bulgarian, Ukrainian, Hebrew, Arabic, Slovakian, Czech, Hungarian, Polish, Romanian, Serbian, Croatian, Slovenian, Russian, Estonian, Latvian, Lithuanian</li> <li>• Non-predictive text input: Farsi, Zulu, Xhosa, Sesotho, Swahili, Merathi, Tamil, Gujarati, Bengali</li> </ul>
Memory functions	<ul style="list-style-type: none"> <li>• Phone book (up to 200 entries in internal phone memory; up to 250 entries on simcard.)</li> </ul>
Connectivity	<ul style="list-style-type: none"> <li>• Plug and play connector</li> </ul>
Call management	<ul style="list-style-type: none"> <li>• Speed dialing: up to 8 names (keys 2-9)</li> <li>• Last number redial from dialed calls list (dial key brings out the dialed calls list)</li> <li>• Automatic redial (max 10 attempts)</li> <li>• Automatic answer (works with headset or car kit only)</li> <li>• Call waiting, call hold, call divert, and call timer</li> <li>• Automatic and manual network selection</li> <li>• Vibrating alert</li> </ul>
Voice features	<ul style="list-style-type: none"> <li>• Integrated handsfree speaker</li> </ul>

Personalise	<ul style="list-style-type: none"> <li>• Graphics, icons, animations, logos</li> <li>• 3 games available . The selection of games depends on the region the phone is sold in (Snake, Dice, Rapid Rolls, Pocket Carrom.)</li> <li>• Ringing tones: Polyphonic tones and MP3 grade sound ringingtones.</li> </ul>
Phone features	<ul style="list-style-type: none"> <li>• Phone Features</li> <li>• Demo application accessible both with and without SIM mode.</li> <li>• Speaking clock &amp; speaking alarm</li> <li>• Prepaid tracker (network dependent service)</li> </ul>

## Mobile enhancements

### Mobile enhancements for RM-305/306

Table 1 Power

Type	Name
BL-5C	Battery 1020 mAh Li-Ion
AC-3	Light charger
AC-4	Light charger
AC-5	Light charger
HH-12	Holder Easy Mount
CA-44	Charger Adapter

Table 2 Car

Type	Name
CR-39	Nokia universal holder

Table 3 Audio

Type	Name
HS-40	Headset
HS-47	Mono Headset
HDA-11	TTY Adapter
MD-3	Music Speakers
MD-4	Mini Speakers

## ■ Technical specifications

### General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
Transceiver with Li-Ion battery pack	104x43x17	80	70

### Battery endurance

Talk time	
Battery: BL-5C 1020 mAh	Up to 300 min

Standby time	
Battery: BL-5C 1020 mAh	Up to 380 hours

**Note:** Variation in operation times will occur depending on SIM card, network settings and usage. Talk time is increased by up to 30% if half rate is active and reduced by 5% if enhanced full rate is active.

### Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-15 °C ... +55 °C	Specifications fulfilled
Reduced performance	-30 ...15 °C and +55°C ... +70 °C	Operational only for short periods
Intermittent or no operation	-40 °C ... -30 °C and +70 °C ... +85°C	Operation not guaranteed but an attempt to operate will not damage the phone
No operation or storage	<-40 °C and >+85 °C	No storage. An attempt to operate may cause permanent damage
Charging allowed	-15 °C ... +55 °C	
Long term storage conditions	0 °C ... +85 °C	
Humidity and water resistance		Relative humidity range is 5 to 95%. Condensed or dripping water may cause intermittent malfunctions. Protection against dripping water has to be implemented in (enclosure) mechanics. Continuous dampness will cause permanent damage to the module.

## Electrical characteristics

**Table 4 Normal and extreme voltages**

Voltage	Voltage (V)	Condition
General conditions		
Nominal voltage	3.90V	a
Lower extreme voltage	3.30V	b
Higher extreme voltage	4.30V	c
HW shutdown voltages		
V <sub>mstr+</sub>	2.1V ± 0,1V	Off to on
V <sub>mstr-</sub>	1.9V ± 0,1V	On to off
SW shutdown voltages		
SW shutdown	3. 1V	In call
SW shutdown	3. 2V	In idle
Min operating voltage		
V <sub>coff+</sub>	3. 1V ± 0,1V	Off to on
V <sub>coff-</sub>	2. 8V ± 0,1V	On to off
HW reset demands		
Min	1. 0V	d
Max	--	

- a. The nominal voltage is defined as being 15% higher than the lower extreme voltage. TA will test with this nominal voltage at an 85% range (0.85x3.9V<sup>a</sup> 3.3V).
- b. This limit is set to be above SW shutdown limit in TA.
- c. During fast charging of an empty battery, this voltage might exceed this value. Voltages between 4.20 and 4.60 might appear for a short while.
- d. The minimum battery cell voltage required for the reset circuitry to turn on. This is not confirmed by measures at pt.

**Table 5 Current consumption**

Condition	Min	Typical	Max	Unit
Call (MoU)		.		mA
GSM 850		225		
(E)GSM 900		208		
GSM 1800		188		
GSM 1900		168		
Idle (MoU)		2.0		mA
Power off	25	30	45	µA



# Nokia Customer Care

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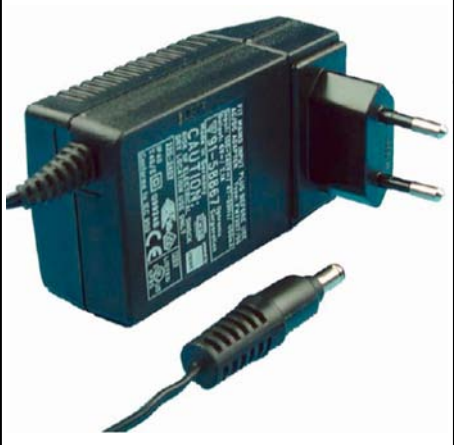



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■ **Service tools**



The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-305; RM-306, refer to various concepts.

	ACF-8	Universal power supply	
<p>ACF-8 universal power supply is used to power FPS-8. ACF-8 has 6V DC and 2.1A output.</p>			
	AXS-4	Service cable	
<p>The AXS-4 D9-D9 service cable is used to connect two 9 pin D connectors for example between PC and FPS-8. The cable length is 2 meters.</p>			
	CA-106DS	Easy flash II cable	
<p>The cable is used for connecting phone DC port to the flash prommer FPS-10.</p>			
	CA-10DS	Bi-directional Parallel Cable	
<p>Bi-Directional parallel cable included in FPS-8 sales pack.</p>			

	CA-111DS	Easy flash II cable	
<p>The cable is used for connecting phone DC port to either POS flashing device FLS-4S or to the PROMMER box FPS-11.</p>			
	CA-112DS	Easy flash II cable	
<p>The CA-112DS easy flash II cable is used for connecting phone DC port to the PROMMER facilities (FLS-5, FPS-20).</p>			
	CA-28DS	Service data cable	
<p>The CA-28DS service cable is used to connect FLS-4S to the POS flash adapter for supplying a controlled operating voltage and data connection.</p> <p><b>Note:</b> Old XCS-1 cable can be used as well.</p>			
	CA-31D	USB cable	
<p>The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.</p>			

	CA-35S	Power cable	
<p>CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.</p>			
	CA-41PS	Power cable	
<p>Power cable for connection of e.g. the JBV-1 docking station to the FPS-10 prommer box.</p>			
	CA-5S	DC cable	
<p>The DC cable CA-5S is used to connect JBV-1 to the phone charger jack for ADC/VCHAR/ICHAR calibration</p> <p><b>Note:</b> Old SCB-3 can be used as well.</p>			
	DA-49	Docking station adapter	
<p>The Docking Station adaptor is used for this phone in combination with JBV-1. The adapter supports flashing and energy management calibration.</p> <p>Features include:</p> <ul style="list-style-type: none"> <li>• compatible with the JBV-1</li> <li>• easy phone attachment and detachment.</li> <li>• reliable phone locking</li> <li>• switch for detecting phone</li> <li>• replaceable SIM interface</li> </ul>			

	DAU-9S	MBUS cable	
<p>The MBUS cable DAU-9S has a modular connector and is used, for example, between the PC's serial port and module jigs, flash adapters or docking station adapters.</p> <p><b>Note:</b> Docking station adapters valid for DCT4 products.</p>			
	FLC-2	DC cable	
<p>FLC-2 is used with a flash adapter to supply a controlled operating voltage.</p>			
	FLS-4S	Flash device	
<p>FLS-4S is a dongle and flash device incorporated into one package, developed specifically for POS use.</p>			
	FLS-5	Flash device	
<p>FLS-5 is a dongle and flash device incorporated into one package, developed specifically for POS use.</p> <p><b>Note:</b> FLS-5 can be used as an alternative to PKD-1.</p>			

	FPS-10	Flash prommer	
	FPS-8	FLASH prommer	

FPS-10 interfaces with:

- PC
- Control unit
- Flash adapter
- Smart card

FPS-10 flash prommer features:

- Flash functionality for BB5 and DCT-4 terminals
- Smart Card reader for SX-2 or SX-4
- USB traffic forwarding
- USB to FBUS/Flashbus conversion
- LAN to FBUS/Flashbus and USB conversion
- Vusb output switchable by PC command

FPS-10 sales package includes:

- FPS-10 prommer
- Power Supply with 5 country specific cords
- USB cable




**Note:** FPS-21 is substitute FPS-10 if FPS-10 has not been set up.






The flash prommer FPS-8 is used for example with flash adapters, docking station adapters and flash/docking stations. Power is supplied to FPS-8 from the universal power supply, ACF-8.





The sales pack includes:





- FPS-8 flash prommer
- FPS-8 activation sheet
- ACF-8 universal power supply
- AXS-4 service cable (D9-D9)
- Printer cable



	JBV-1	Docking station	
<p>The JBV-1 docking station is a general tool that has been designed for calibration and software update use. The JBV-1 is used together with a docking station adapter as one unit</p> <p>In calibration mode the JBV-1 is powered by an external power supply: 11-16V DC. When flashing the power for the phone must be taken from the flash prommer.</p> <p><b>Note:</b> JBV-1 main electrical functions are:</p> <ul style="list-style-type: none"> <li>• adjustable VBATT calibration voltage, current measurement limit voltage: VCHAR, current measurement: ICHAR</li> <li>• adjustable ADC calibration voltage via BTEM and the BSI signal</li> <li>• BTEMP and BSI calibration resistor</li> <li>• signal from FBUS to the phone via the parallel jig</li> <li>• control via FBUS or USB</li> <li>• Flash OK/FAIL indication</li> </ul>			
	MJ-130	Module jig	
<p>MJ-130 is meant for covers-off component level troubleshooting.</p>			
	PCS-1	Power cable	
<p>The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled voltage.</p>			

	PKD-1	SW security device	
<p>SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC. Without the device, it is not possible to use the service software. Printer or any such device can be connected to the PC through the device if needed.</p>			
	RJ-164	Soldering jig	
<p>RJ-164 is used for component de-soldering and soldering</p>			
	SA-41	RF Coupler	
<p>SA-41 RF Coupler is used for Go/No-Go test after changing components in the RF part of the phone. The SA-41 is mounted on the docking station adapter. <b>Note:</b> For RF attenuation values, please refer to the Service bulletin.</p>			
	SF-10	POS flash adapter	
<p>The POS flash adapter SF-10 allows FBUS/MBUS connections for flashing. Its bottom part is a rubber.</p>			
	SF-56	POS flash adapter	
<p>The POS flash adapter SF-56 allows FBUS/MBUS connections for flashing. Its bottom part is a clip.</p>			

 <p>The image shows a black, rectangular soldering paste spreader with a blue handle. A white label on the tool reads: NOKIA, SPS-1 077001, CR-3049, MADE IN FINLAND.</p>	SPS-1	Soldering Paste Spreader	
<p>The SPS-1 allows spreading of solder to the LGA components pads over the rework stencils.</p>			
 <p>The image shows a blue, triangular opening tool with a textured surface.</p>	SRT-6	Opening tool	
<p>SRT-6 is used to open phone covers.</p>			
 <p>The image shows a dark grey, rectangular alignment jig with several circular holes and two small gold pins on its top surface.</p>	SS-54	Alignment jig	
<p>Alignment jig is used to efficiently assemble the dome-sheet to the phone's PWB. The jig is made of EDS proof material.</p>			
 <p>The image shows a black, square rework stencil with several small rectangular openings.</p>	ST-30	Rework stencil	
<p>It is used together with RJ-51 to rework the Front End Module (FEM) N7700.</p>			

	ST-32	Rework stencil for N7600	
	<p>Rework stencil to be used together with RJ-72 for rework of N7600.</p>		
	SX-4	Smart card	
	<p>SX-4 is a BB5 security device used to protect critical features in tuning and testing. SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.</p>		
	XCS-4	Modular cable	
	<p>XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.</p>		
	XRS-6	RF cable	
	<p>The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment. SMA to N-Connector approximately 610 mm. Attenuation for:</p> <ul style="list-style-type: none"> <li>• GSM850/900: 0.3+-0.1 dB</li> <li>• GSM1800/1900: 0.5+-0.1 dB</li> <li>• WLAN: 0.6+-0.1dB</li> </ul>		

■ Service software concept

POS (Point of Sales) flash concept

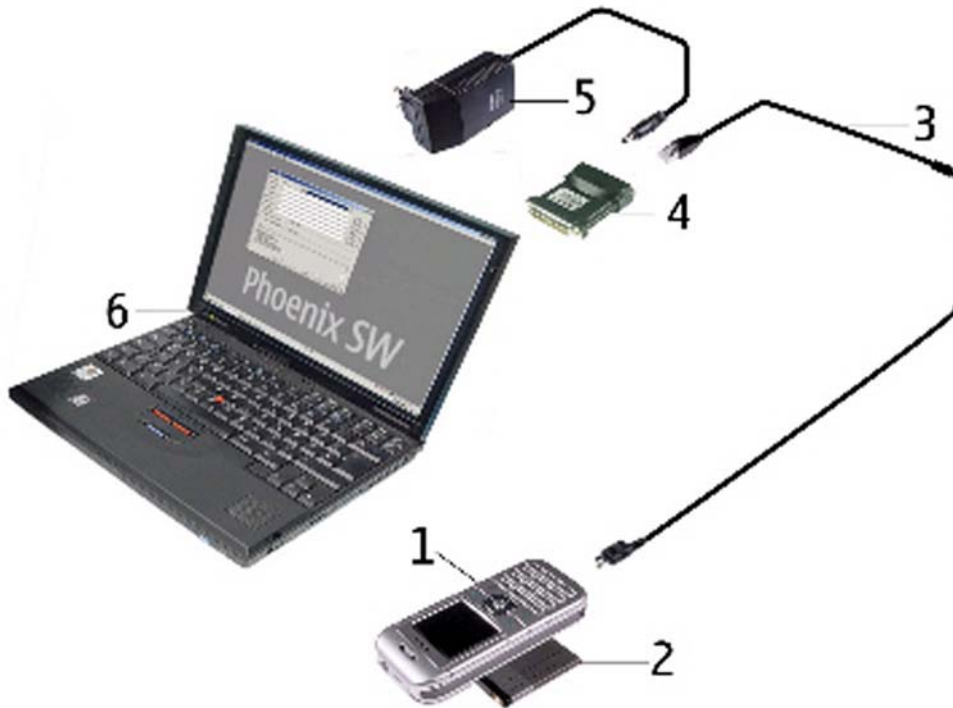
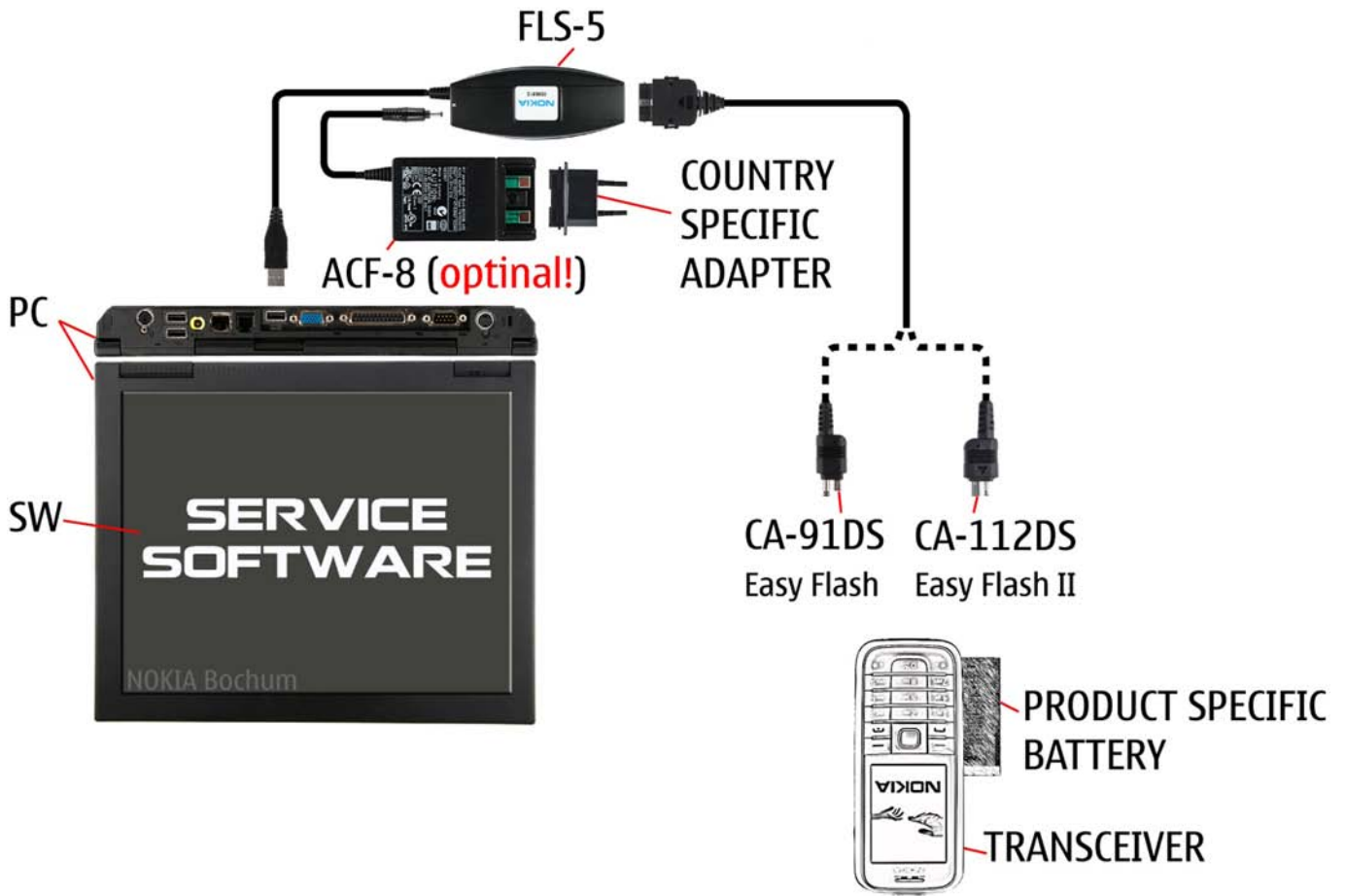


Figure 2 POS flash concept

Item	Description	Type
1	Phone	
2	Battery	
3	Easy flash cable II	CA-111DS
4	FLS-4S sales pack	FLS-4S
5	AC charger	ACF-8
6	PC with Service SW CD-ROM	

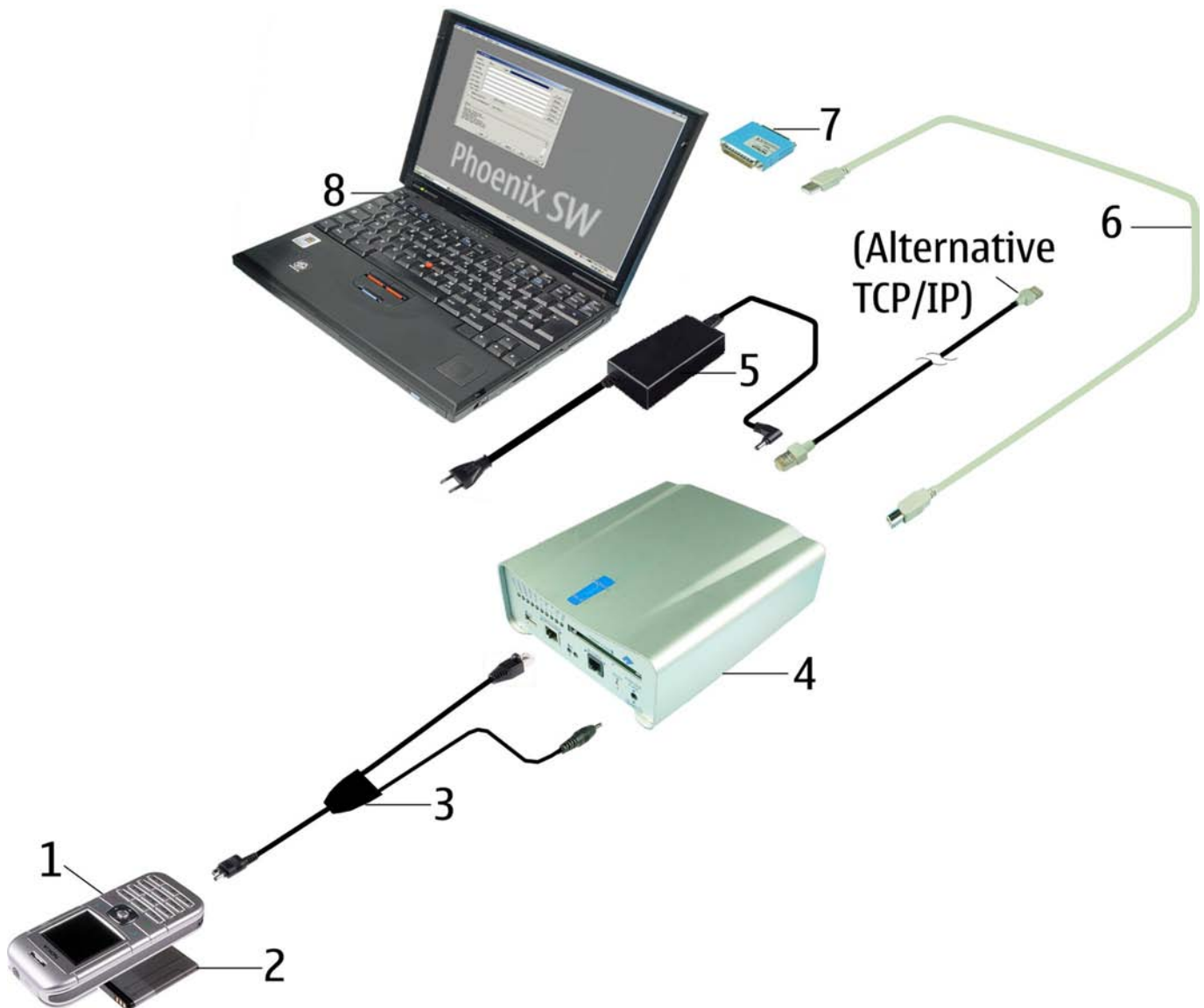
**POS flash concept with FLS-5**



**Figure 3 POS flash concept with FLS-5**



**FPS-10 Prommer box flash concept**



**Figure 4 FPS-10 Prommer box flash concept**

Item	Description	Type
1	Battery	BL-5C/BL-5CA
2	Phone	
3	Easy Flash cable II	CA-106DS
4	Flash prommer box sales pack	FPS-10
5	Power supply, included in FPS-10 sales package	AFC-8
6	USB A to B cable	CA-31D
7	Software protection key	PKD-1
8	Service SW (PHOENIX)	

**JBV-1 flash concept with FPS-10**

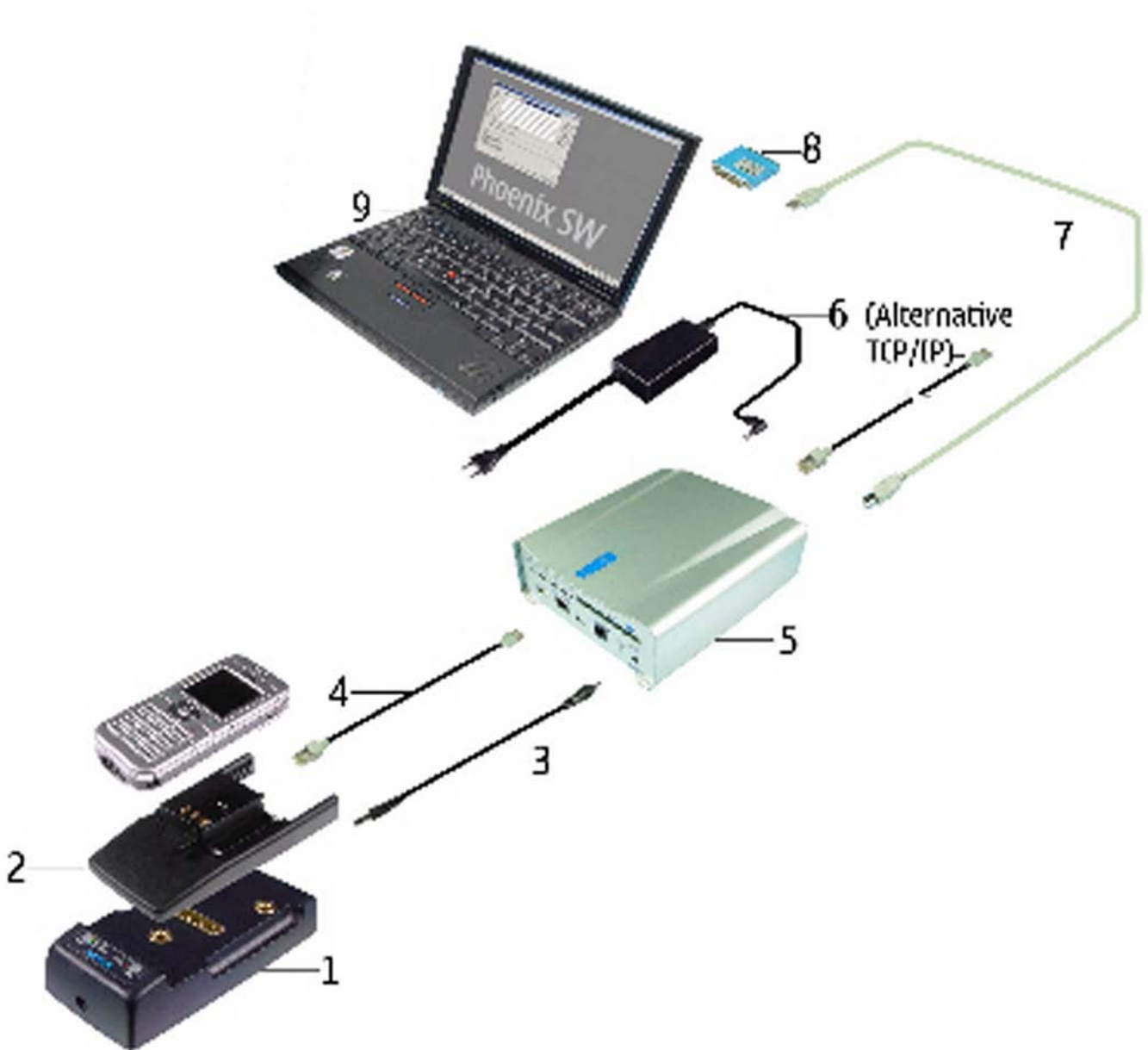


Figure 5 JBV-1 flash concept with FPS-10

Item	Description	Type
1	Docking station	JBV-1
2	Docking station adapter	DA-49
3	DC power cable	CA-41PS
4	Modular cable	XCS-4
5	Flash prommer box sales pack	FPS-10



Item	Description	Type
6	Power supply, included in FPS-10 sales package	AFC-8
7	USB A to B cable	CA-31D
8	Software protection key	PKD-1
9	Service SW (PHOENIX)	

**JBV-1 flash concept with FPS-8**

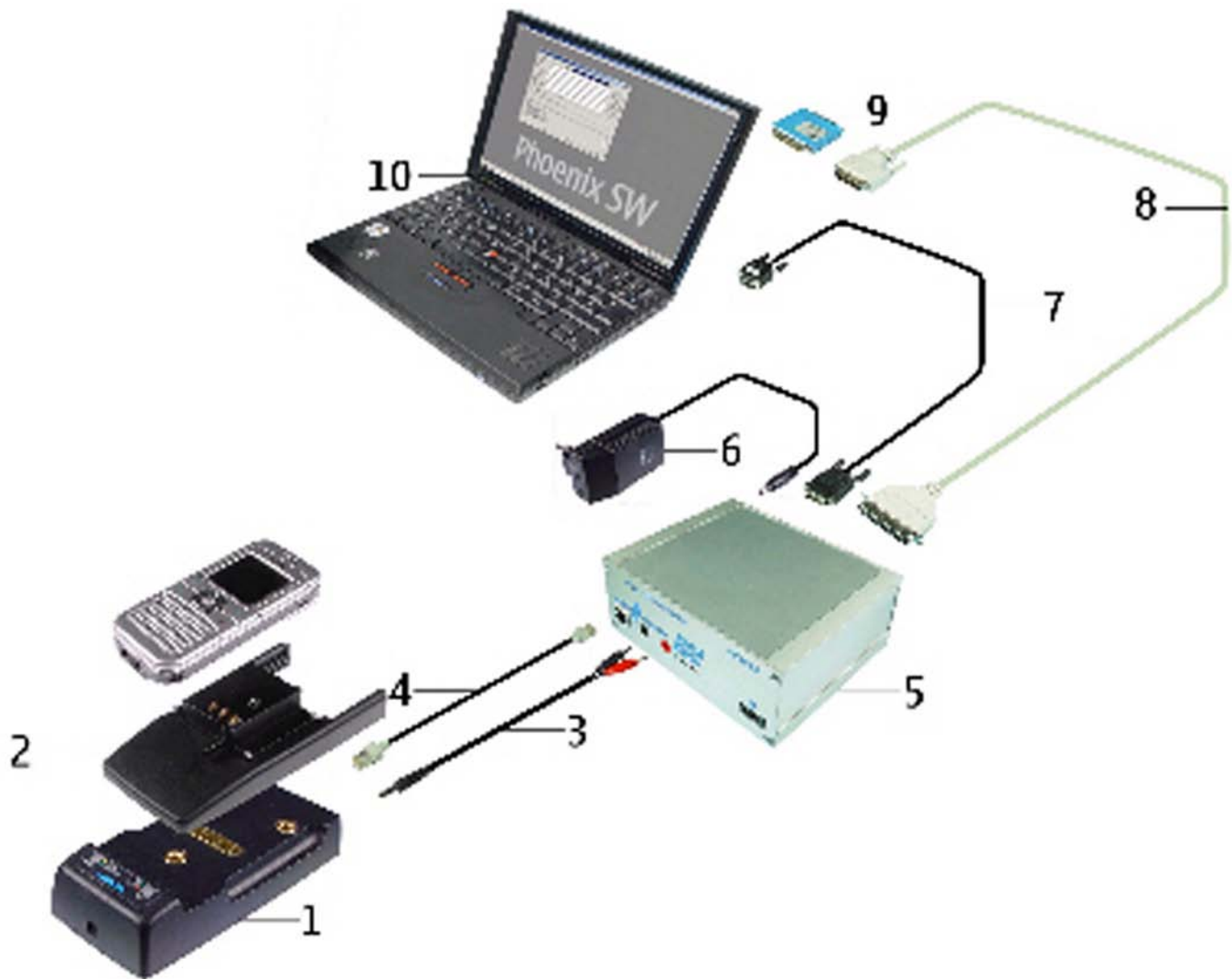


Figure 6 JBV-1 flash concept with FPS-8

Item	Description	Type
1	Docking station	JBV-1
2	Docking station adapter	DA-49
3	DC power cable	PCS-1
4	Modular cable	XCS-4
5	Flash prommer box sales pack	FPS-8

Item	Description	Type
6	Power supply, included in FPS-8 sales package	AFC-8
7	RS-232 (D9 – D9) cable, included in FPS-8 sales package	AXS-4
8	Printer cable, included in FPS-8 sales package	
9	Software protection key	PKD-1
10	Service SW (PHOENIX)	

**Module jig (MJ-130) service concept**

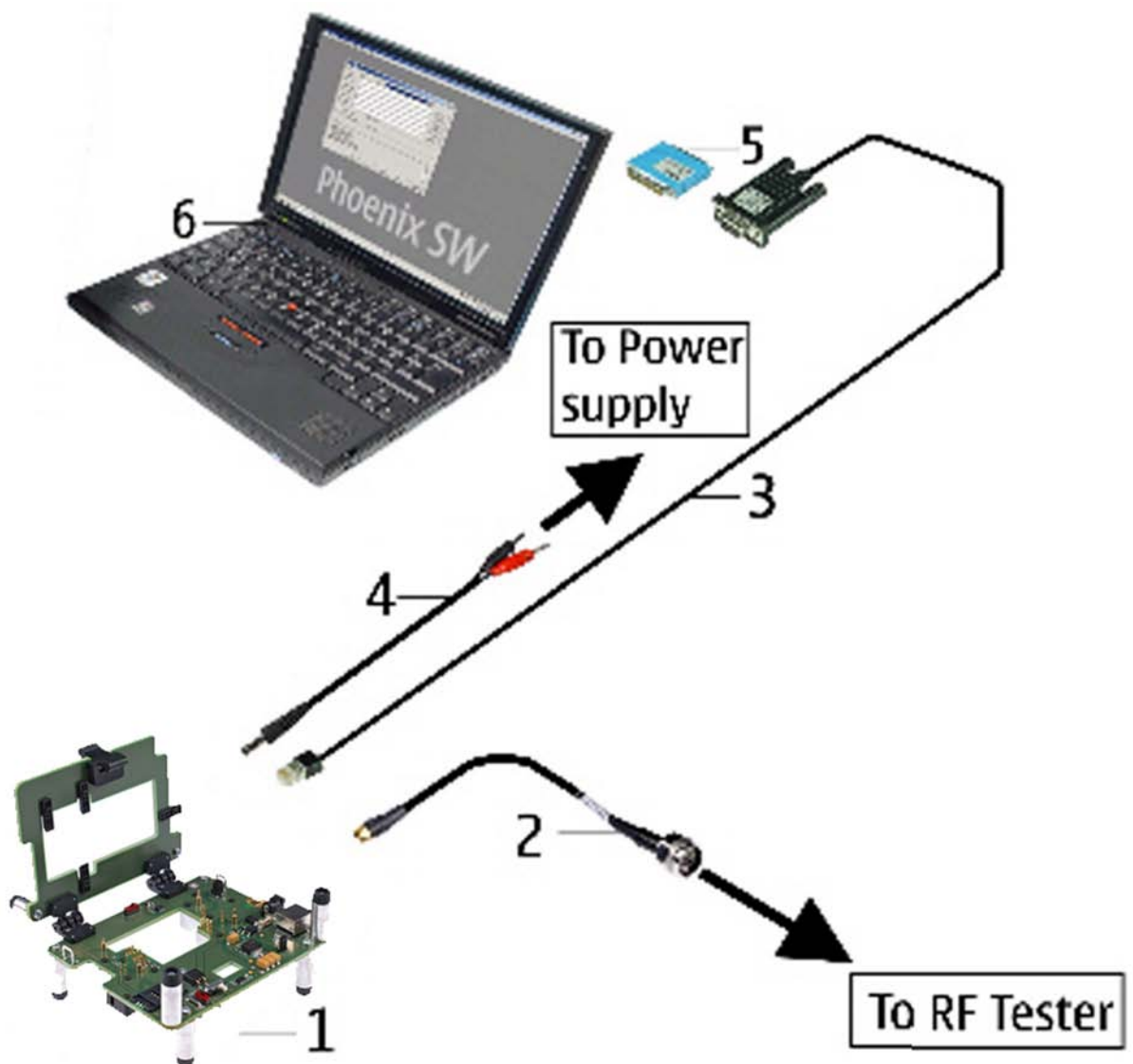


Figure 7 Module jig service concept

Item	Description	Type
1	Module jig	MJ-130
2	RF test cable	XCF-4

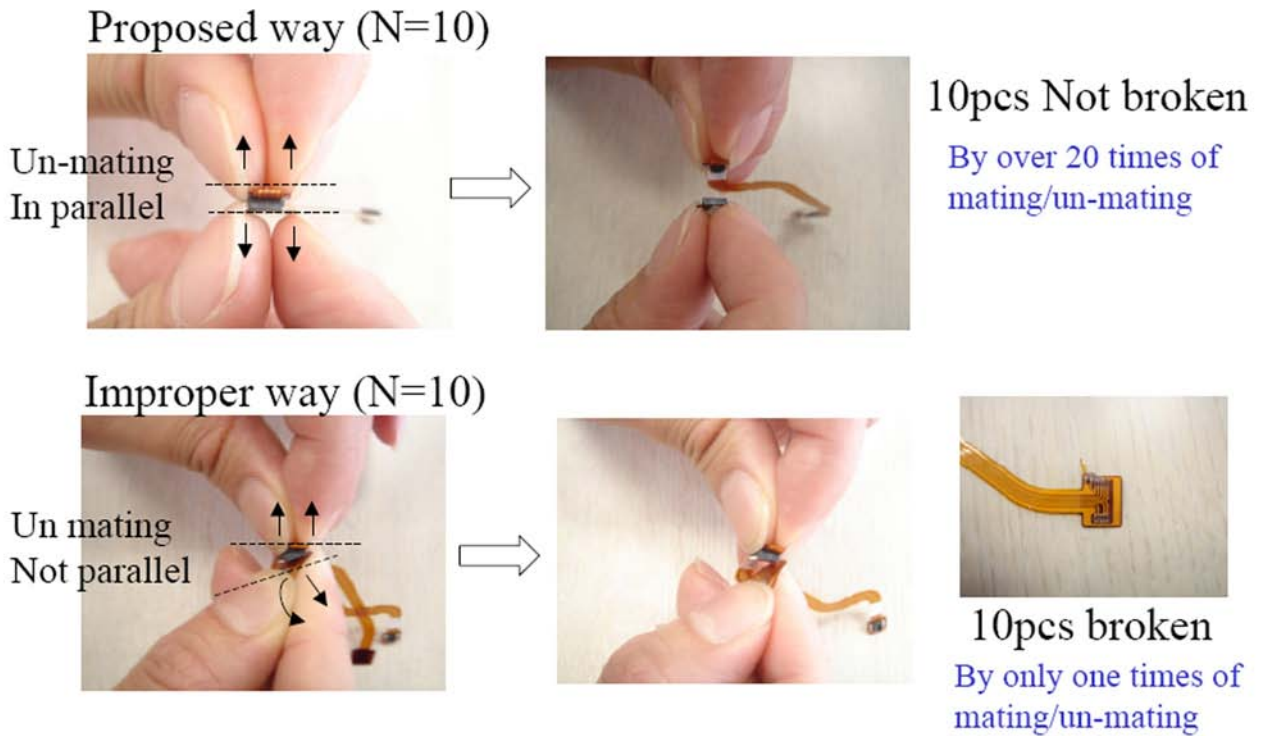
Item	Description	Type
3	Service MBUS/FBUS cable	DAU-9S
4	DC power cable	PCS-1
5	Software protection key	PKD-1
6	PC with Service SW (PHOENIX)	

## **3 — FPC's Disassembly and reassembly instructions**

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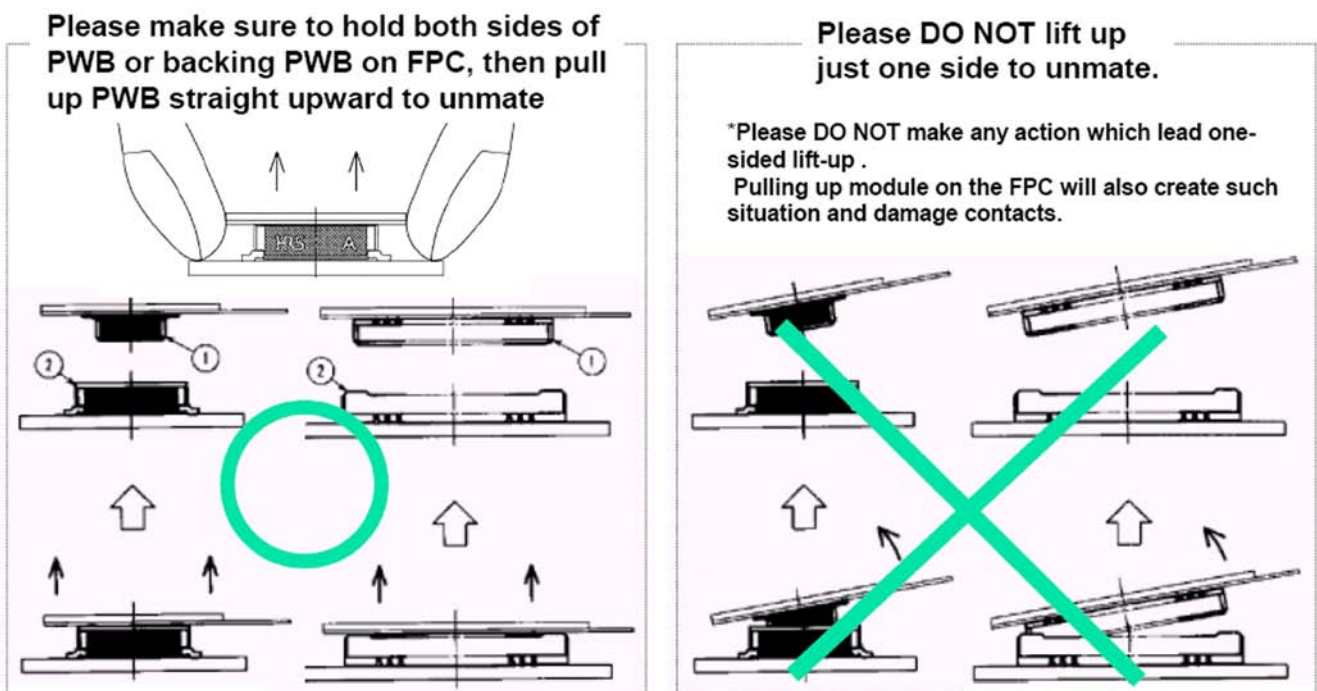
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■ **Result of mating/ unmating test of BtoB connector**



Our proposed way, no sample is broken among 10 samples by over 20 times of mating/un-mating. Improper way, every connector is easily broken by only one time of mating/un-mating.

■ **Mating/ unmating method of BtoB connector**



# Nokia Customer Care

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## ■ General baseband troubleshooting

### Important test points

#### Introduction

Measuring power suppliers is usually earlier step during troubleshooting. The following picture illustrates the test points for power suppliers.

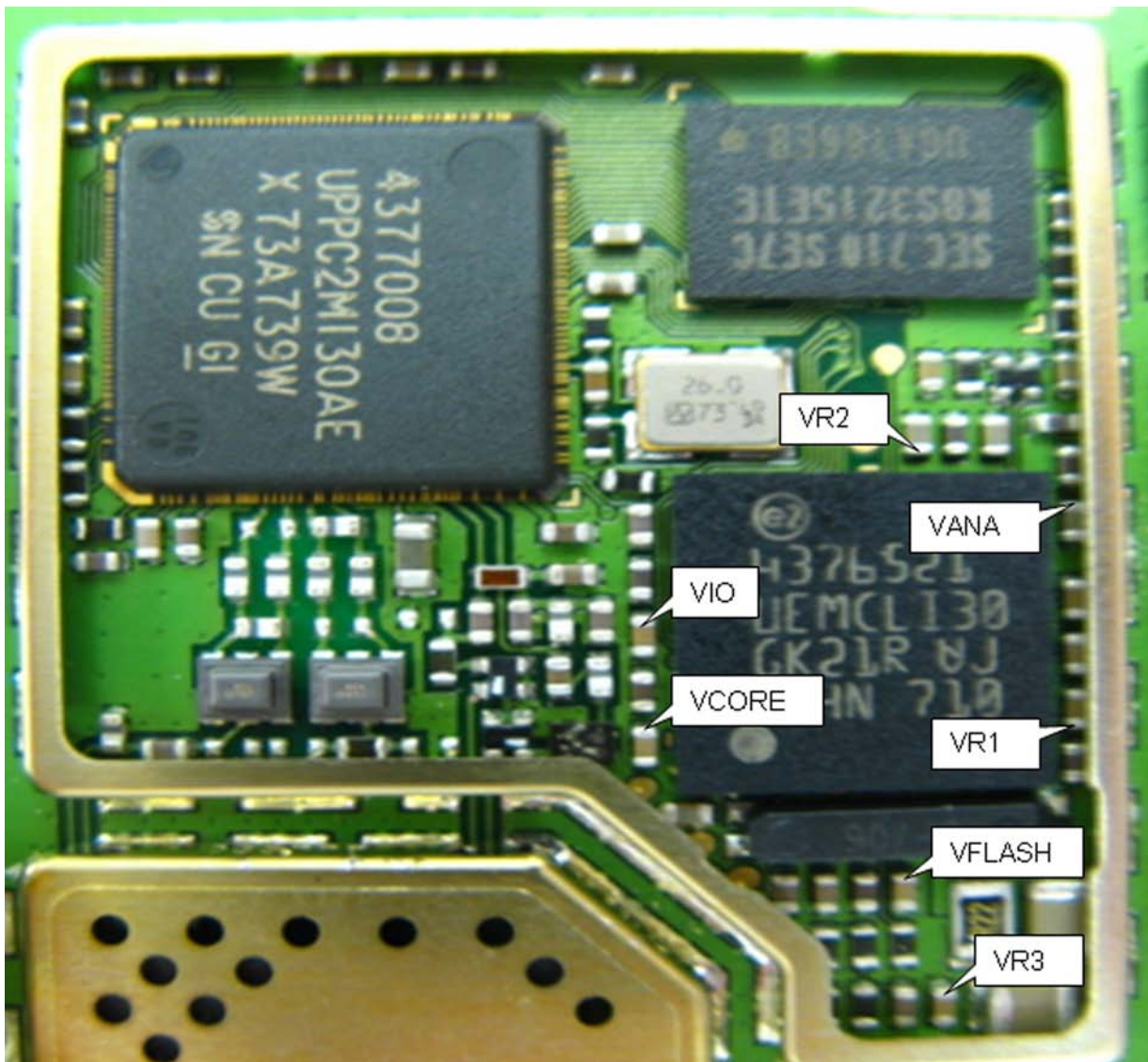


Figure 8 Test points for power suppliers

### Flash programming does not work

#### Troubleshooting flow

The flash programming can be done via the pads on the PWB (J2060).

In case of Flash failure in FLALI station, swap the phone and send it back to the care program for further analysis. Possible failures could be short-circuit of balls under  $\mu$ BGAs (UEMCLite, UPP, FLASH). Missing or misaligned components. In flash programming error cases the flash prommer can give some information about a fault. The fault information messages could be:

*Phone doesn't set FBUS\_TX line low*

Because of the use of uBGA components it is not possible to verify if there is a short circuit in control- and address lines of MCU (UPP) and memory (flash).

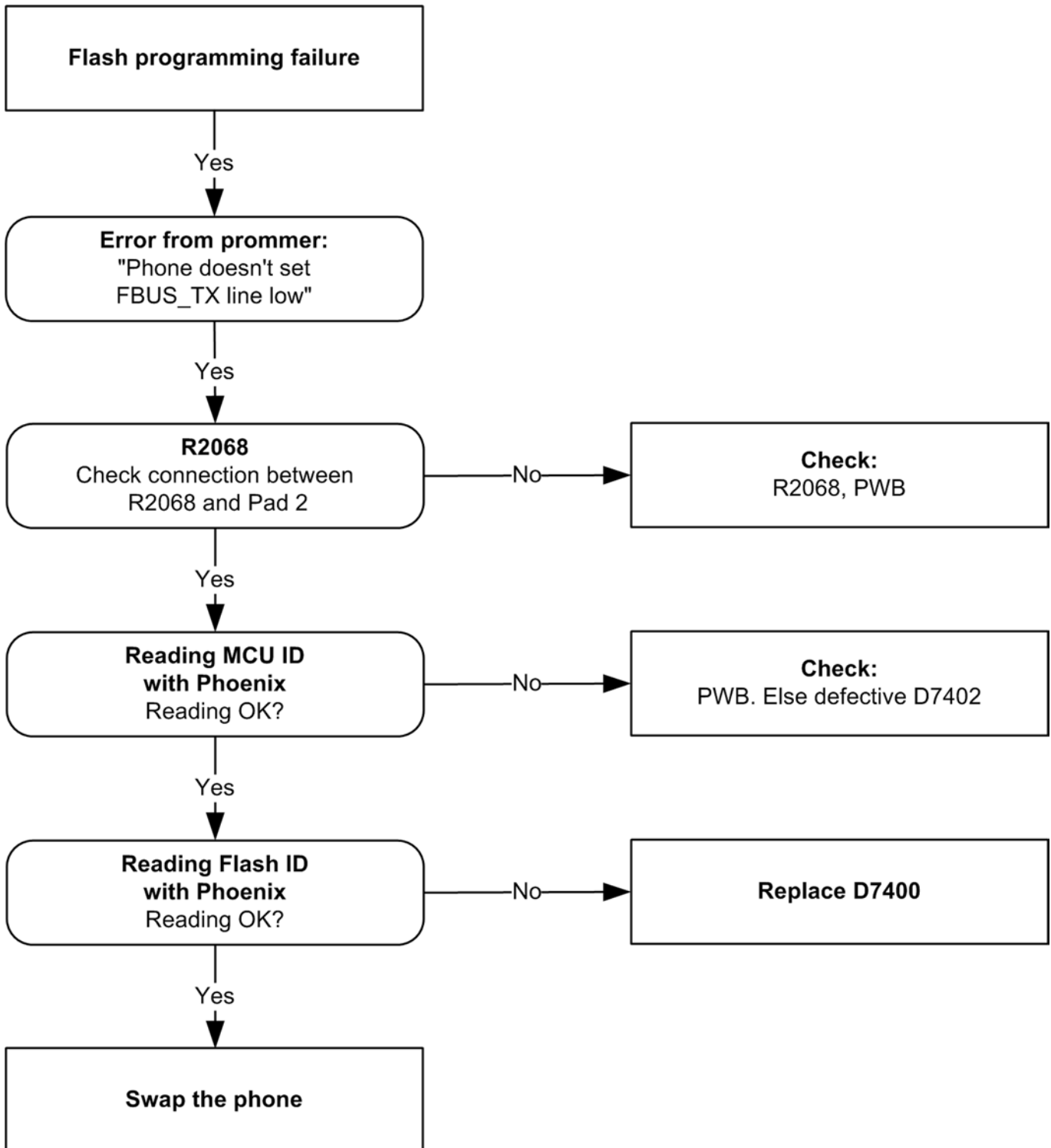


Figure 9 Flash programming fault

### Phone doesn't switch on

#### Troubleshooting flow

This means that the phone does not use any current at all when the supply is connected and/or power key is pressed. It is assumed that the voltage supplied is 3.6VDC. The UEMCLite/Litti will prevent any functionality at battery/supply levels below 2.9VDC.

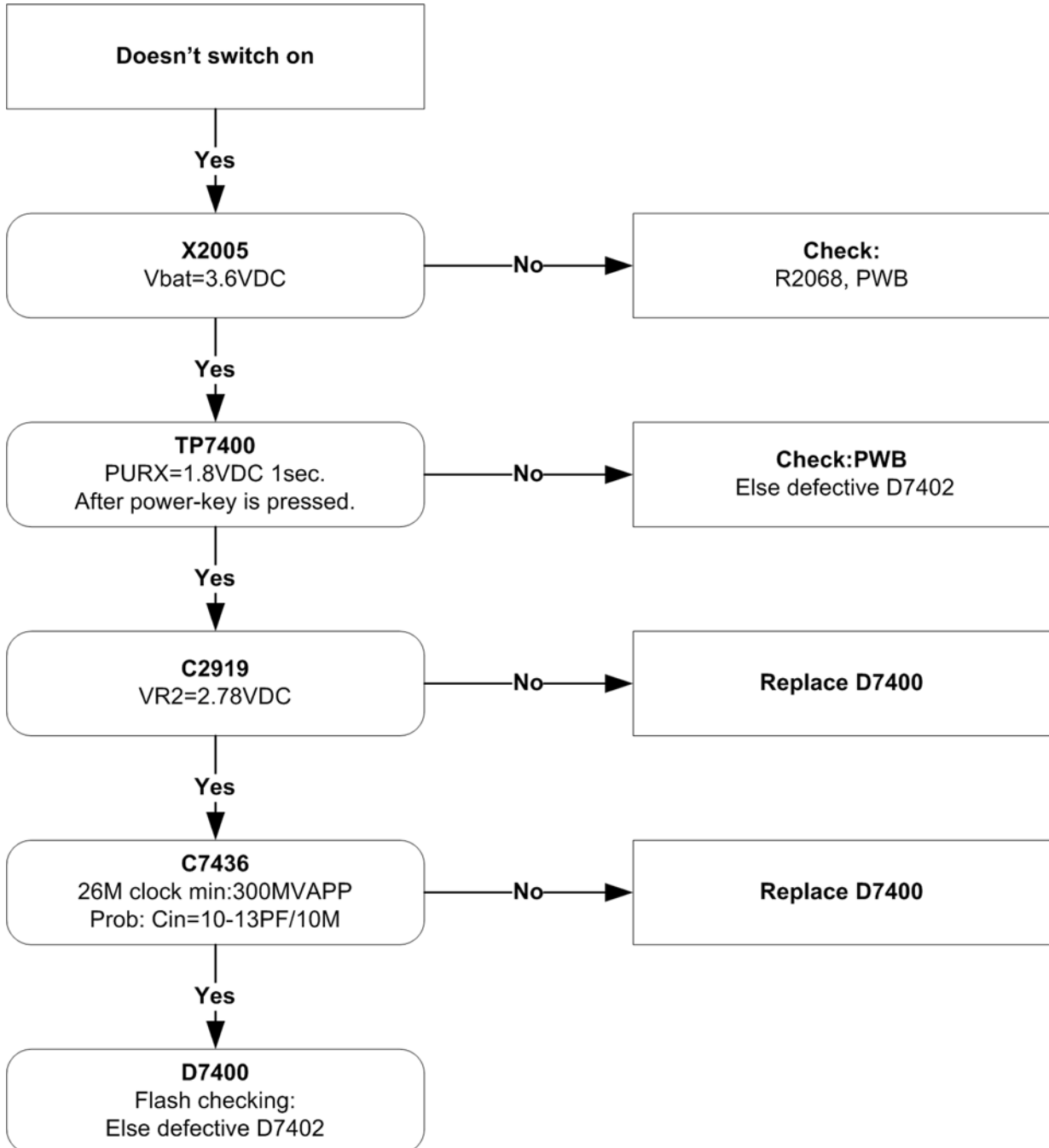


Figure 10 Troubleshooting when the phone doesn't switch on

## Switch off

### Troubleshooting flow

If this kind of a failure is presenting itself immediately after FLALI, it is most likely caused by ASIC's missing contact with PWB. If the MCU doesn't service the watchdog register within the UEMCLite, the operations watchdog will run out after approximately 32 seconds. Unfortunately, the service routine can not be measured.

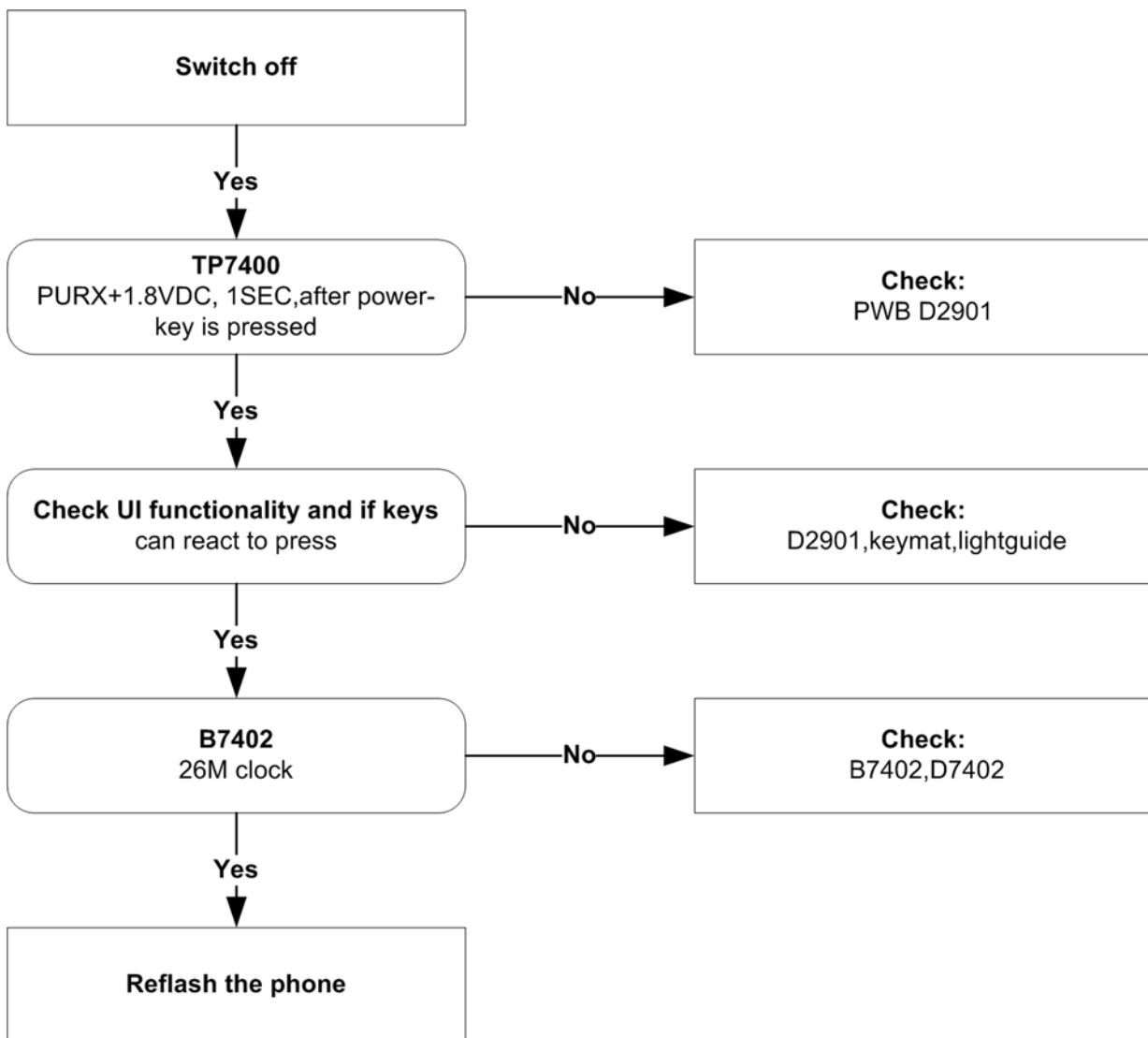


Figure 11 Switch off troubleshooting

## Display shows "Contact Service"

### Troubleshooting flow

This error can only happen at power up where several self-tests is run. If any of these test cases fails the display will show the message: "Contact Service".

It's individual test cases so the below lineup of error hunting's has no chronological order. Use common sense and experience to decide which test case to start error hunting at.

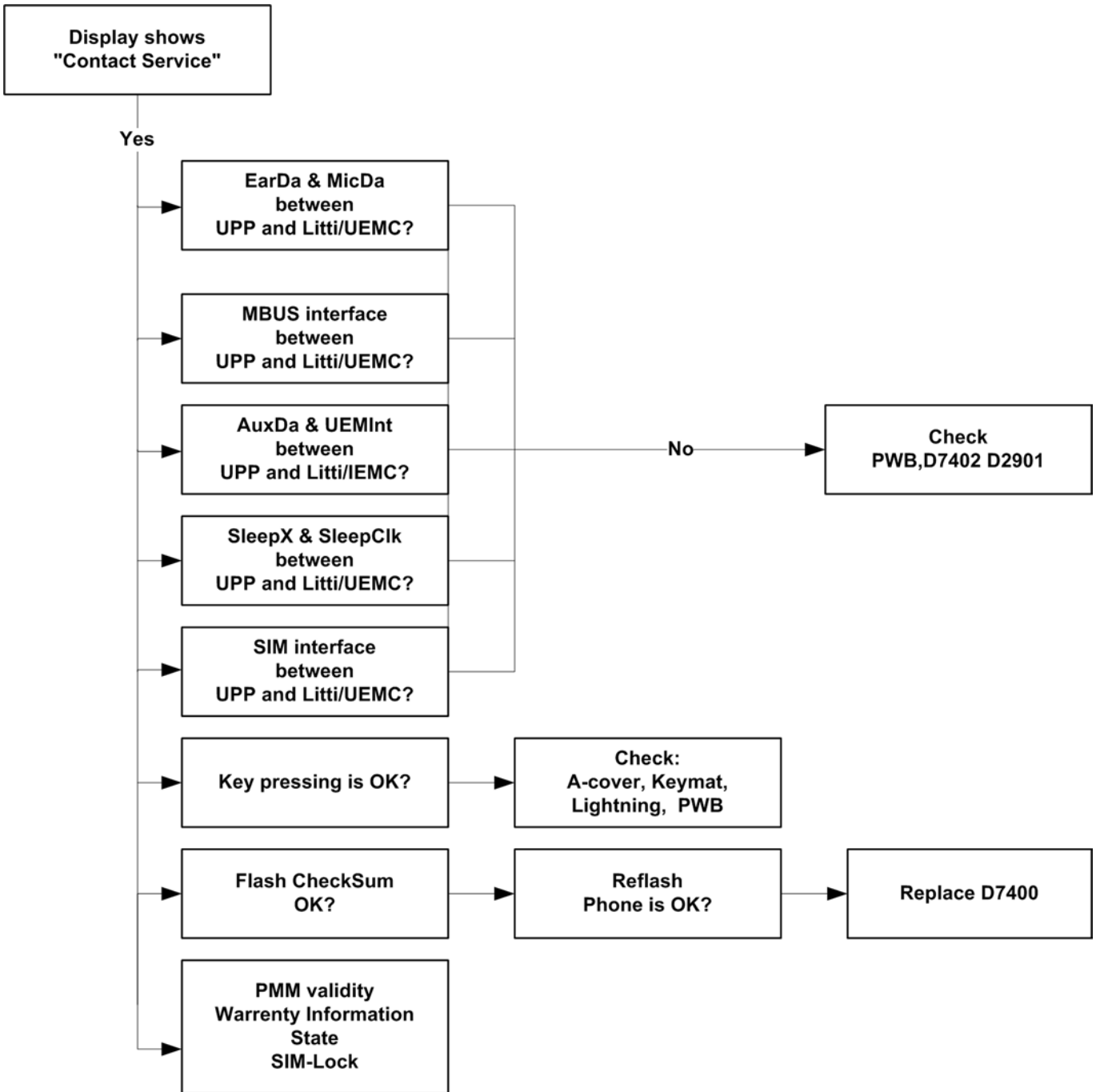


Figure 12 Troubleshooting when the "Contact Service" message is seen

**The phone does not register to the networks, or the phone can not make a call**

**Troubleshooting flow**

If the phone doesn't register to the network, the fault can be in either BB or RF. Only few signals can be tested since several signals is 'buried' in one or more of the inner layers of the PWB.

First of all verify that SIM LOCK is not the reason to cause phone cannot connect to network. The way is to check if the phone can connect to CMU200 by a test SIM card.

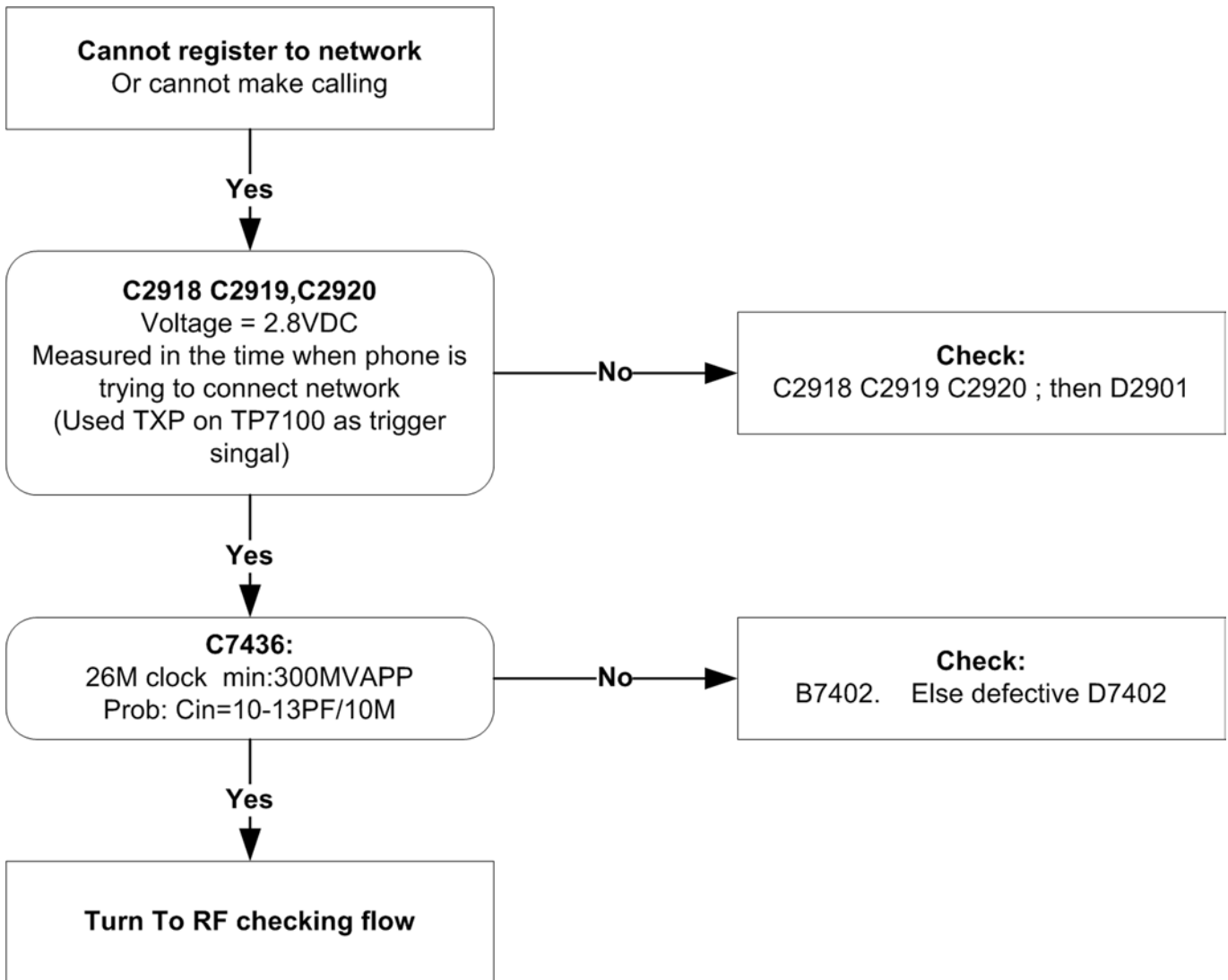


Figure 13 No registering or call

## ■ SIM related faults

### Insert SIM card fault

#### Troubleshooting flow

The hardware of the SIM interface from UEMC/Litti (D2901) to the SIM connector (X2700) can be tested without a SIM card. When the power is switched on the phone first check for a 1.8V SIM card and then a 3V SIM card. The phone will try this four times, where after it will display "Insert SIM card".

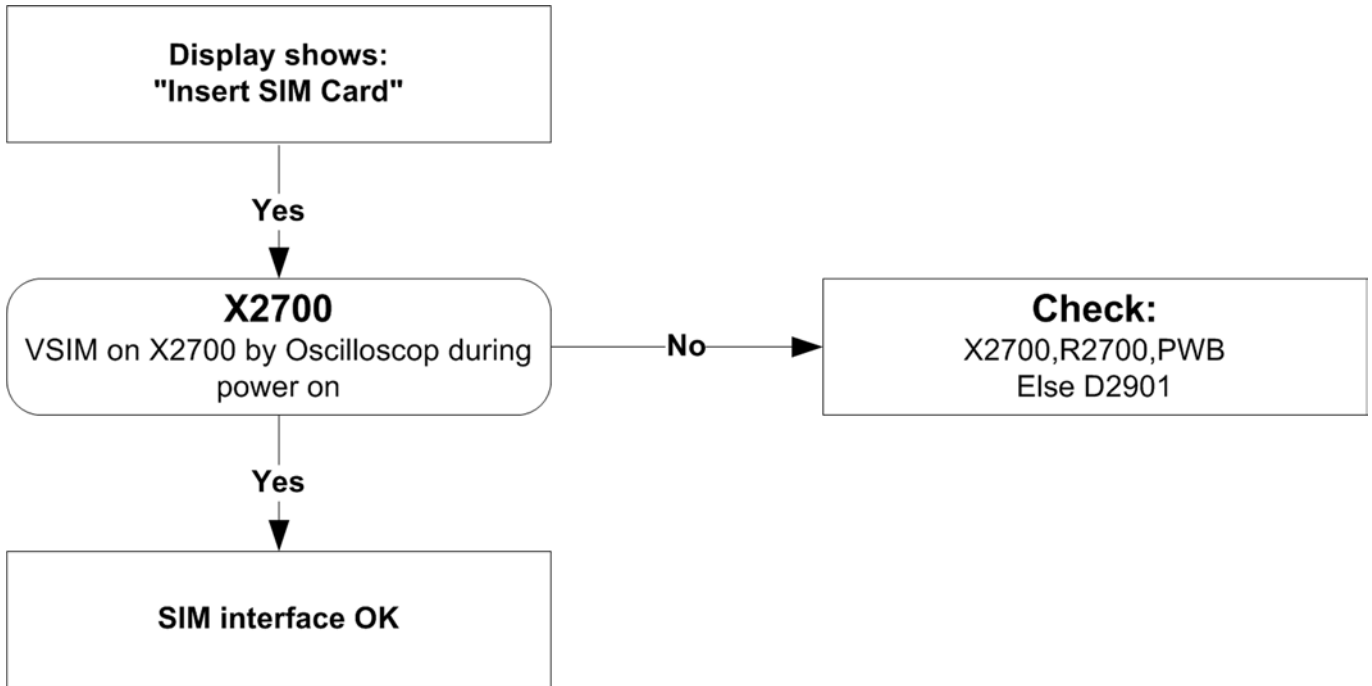


Figure 14 Insert SIM card fault

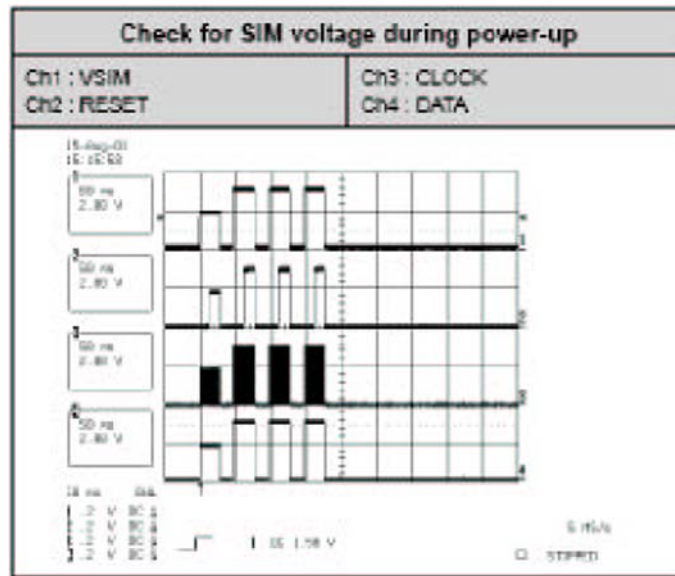


Figure 15 Signal diagram

### SIM card rejected

The error "SIM card rejected" means that the ATR message received from SIM card is corrupted, e.g. data signal levels are wrong. The first data is always ATR and it is sent from card to phone.

For reference a picture with normal SIM power-up is shown below.



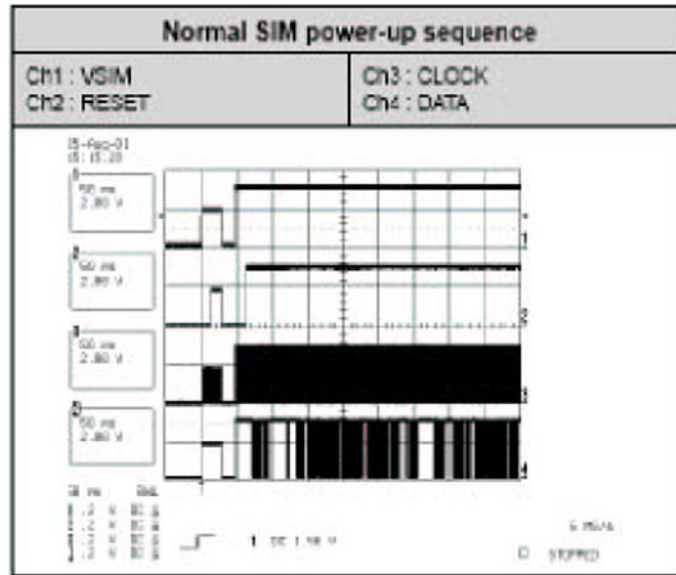


Figure 16 Signal diagram

■ **User interface**

**Blank display**

**Troubleshooting flow**

The display does not show any information at all.

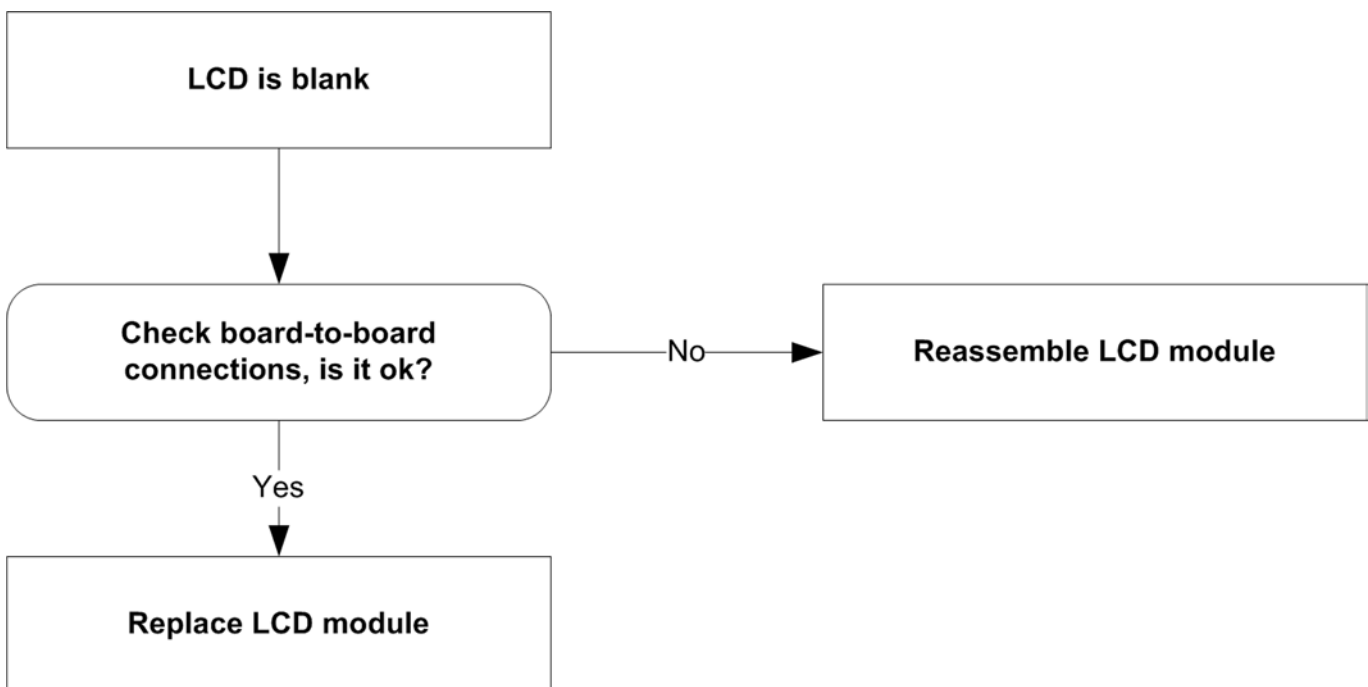


Figure 17 Blank display

**Display is corrupt**

The display contains missing or fading segments or color presentation is incorrect.



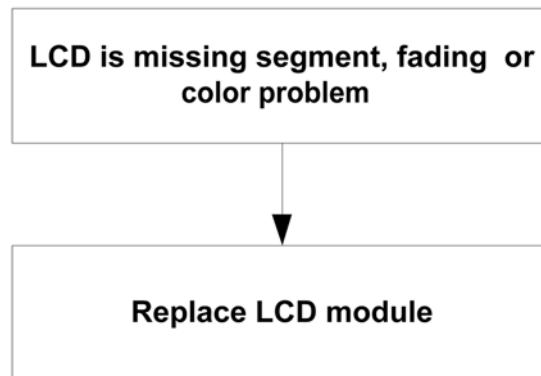


Figure 18 Display is corrupt

### Dead keys

One or more keys don't function at all.

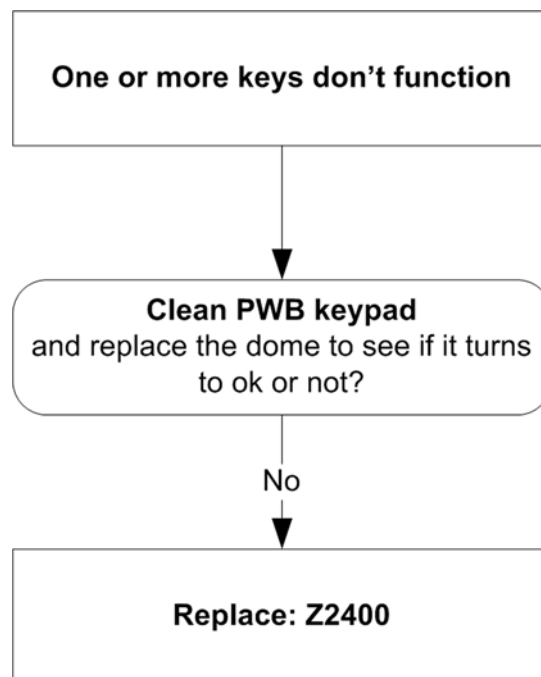


Figure 19 Dead keys

### No backlight for display or keys

#### Troubleshooting flow

There is no backlight on the display or on the keys.

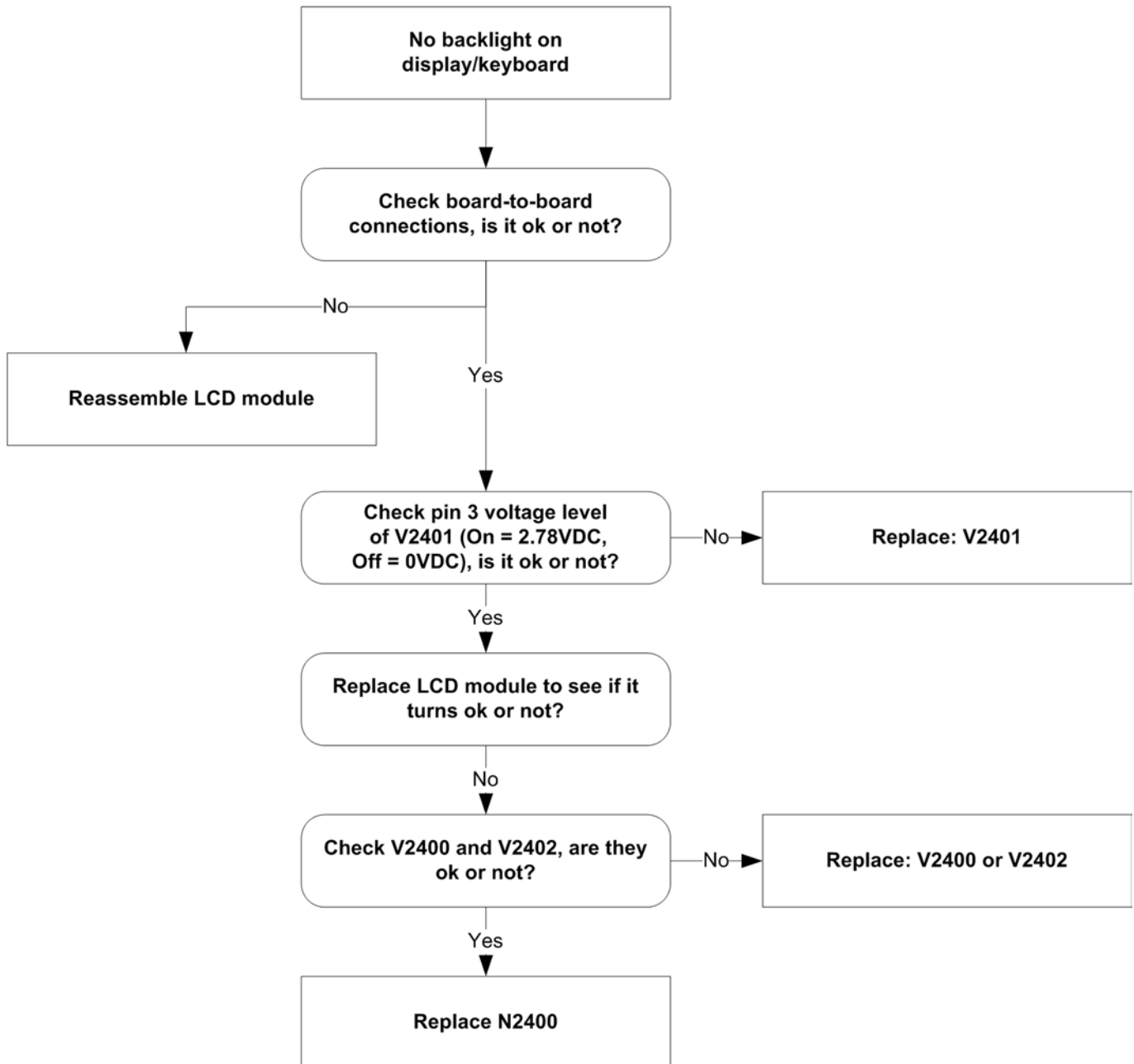


Figure 20 No backlight for display or keys

■ **Audio troubleshooting**

**Audio troubleshooting using phoenix**

**Troubleshooting flow**

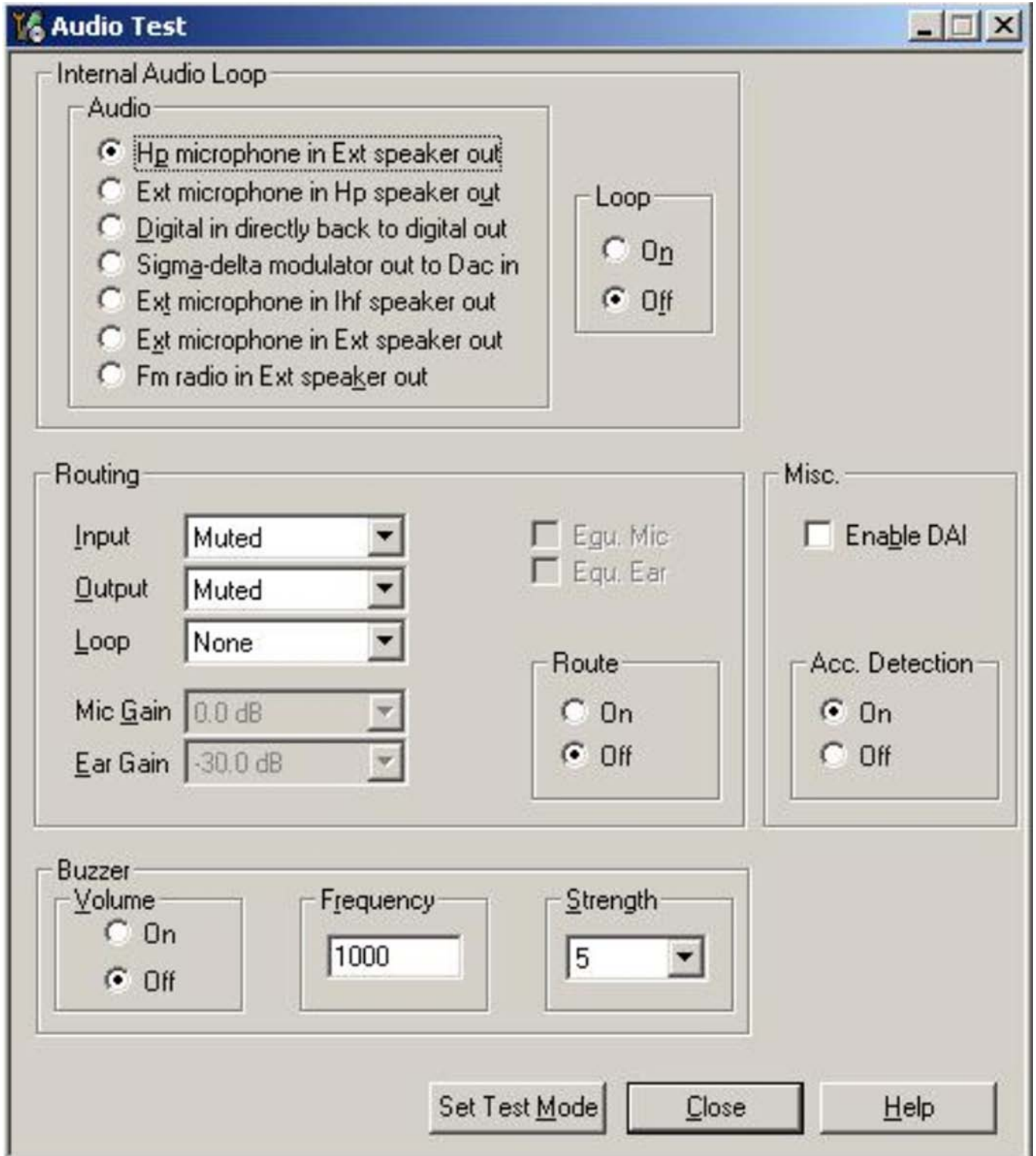


Figure 21 Phoenix audio test window

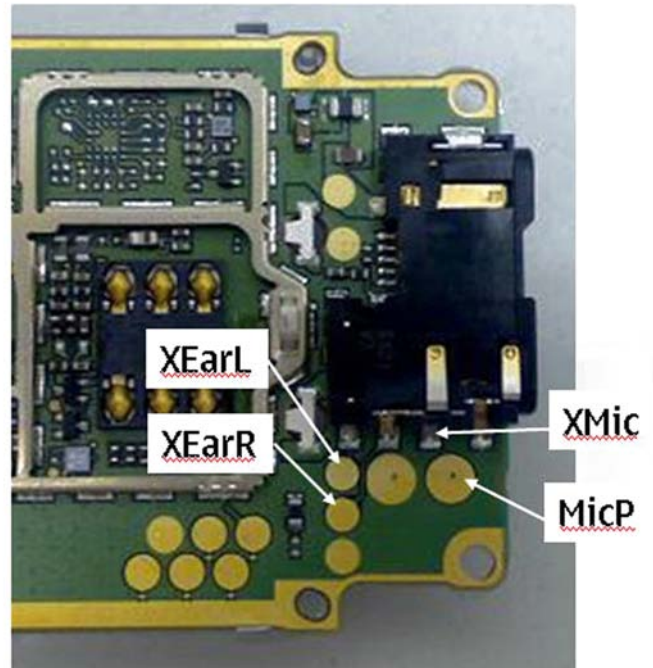


Figure 22 PWB audio test points

### Check microphone using "Hp microphone in Ext speaker out" loop

#### Steps

1. Connect phone with Phoenix.
2. Open "audio test" window from "Testing -> Audio test", as shown in *Figure Phoenix audio test window* above.
3. Select "Hp microphone in Ext speaker out"
4. Select "Loop" as "On"
5. Input sound at microphone port, for example 94dB SPL 1kHz.
6. Check if signal is detected at XEarL/R pads, shown in *Figure PWB audio test points* above.

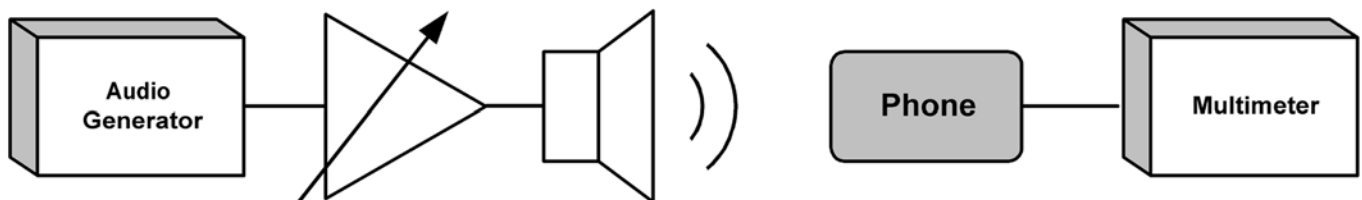


Figure 23 Test arrangement for microphone

### Check earpiece using "Ext microphone in Hp speaker out" loop

#### Steps

1. Connect phone with Phoenix.

2. Open "audio test" window from "Testing -> Audio test", as shown in *Figure Phoenix audio test window* above.
3. Select "Ext microphone in Hp speaker out"
4. Select "Loop" as "On"
5. Input signal to XMic/GND pads, as shown in *Figure PWB audio test points* above, for example 100mVpp, 1kHz.
6. Check if sound is heard in earpiece.

## Troubleshooting flow

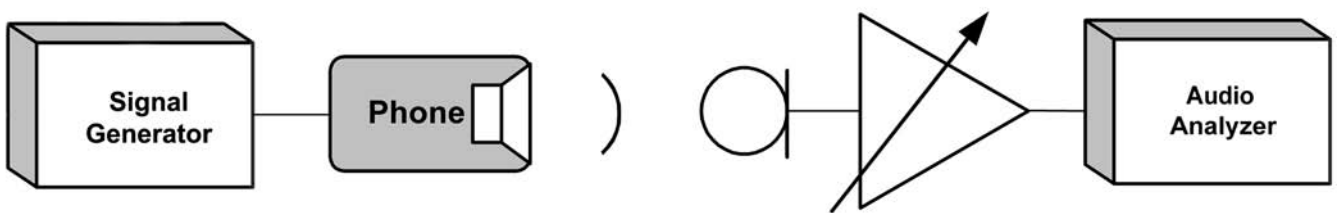


Figure 24 Test arrangement for earpiece

## Check IHF function using "Ext microphone in IHF speaker out" loop

### Steps

1. Connect phone with Phoenix.
2. Open "audio test" window from "Testing -> Audio test", as shown in *Figure Phoenix audio test window* above.
3. Select "Ext microphone in IHF speaker out"
4. Select "Loop" as "On"
5. Input signal to XMic/GND pads, as shown in *Figure PWB audio test points* above, for example 100mVpp 1kHz.
6. Check if sound is heard in IHF.

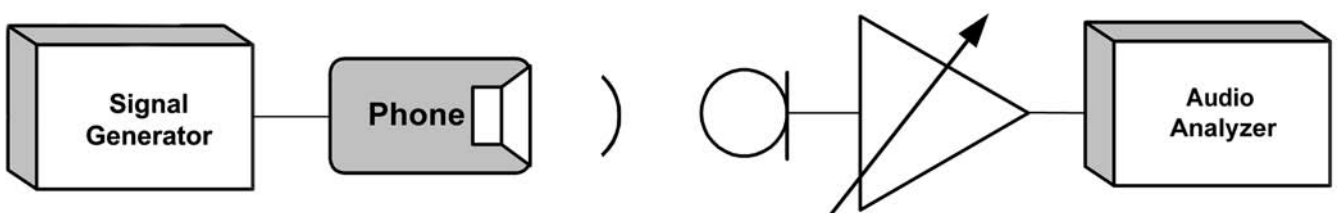


Figure 25 Checking IHF function by using "Ext microphone in IHF speaker out" loop

## Check vibra function using "Vibra control"

### Steps

1. Connect phone with Phoenix.
2. Open "Vibra control" window from "Testing -> Vibra control", as shown in the figure below.

3. Select suitable intensity value, for example 53 %.
4. Select "Vibra state" as "Enabled"
5. Click "Write".
6. Check if Vibra works.

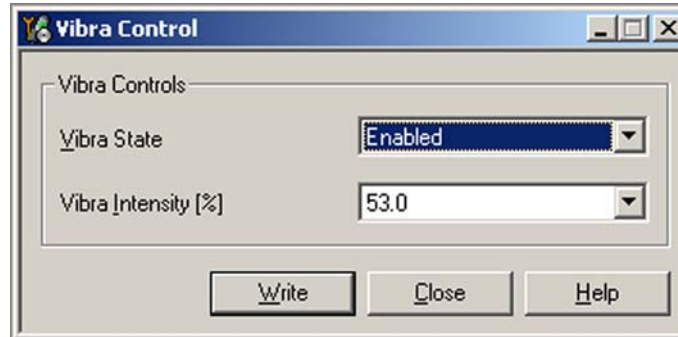


Figure 26 Checking vibra function by using vibra control

## Earpiece fault

### Troubleshooting flow

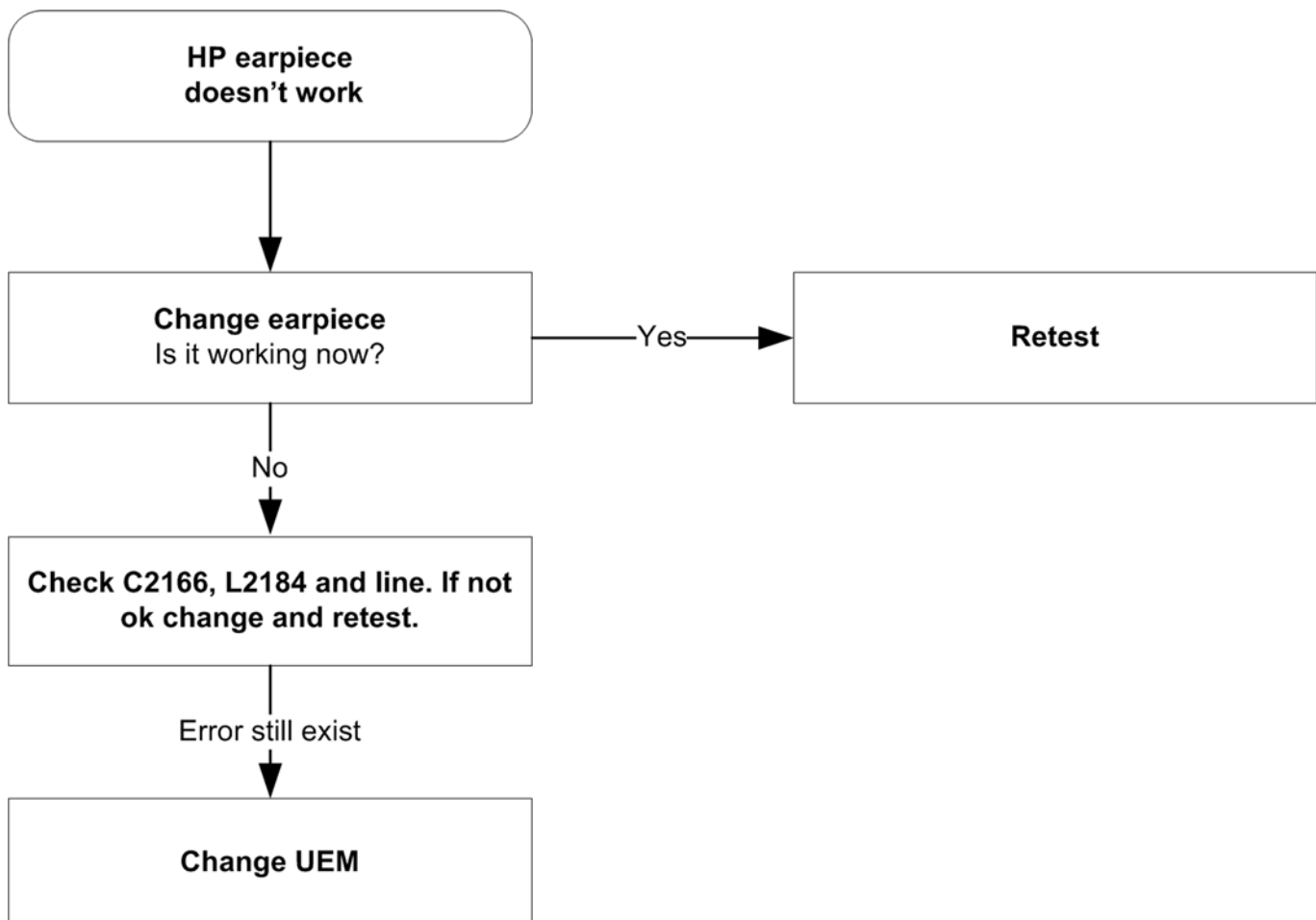


Figure 27 Earpiece fault flow chart

## IHF/ringing tone fault

### Troubleshooting flow

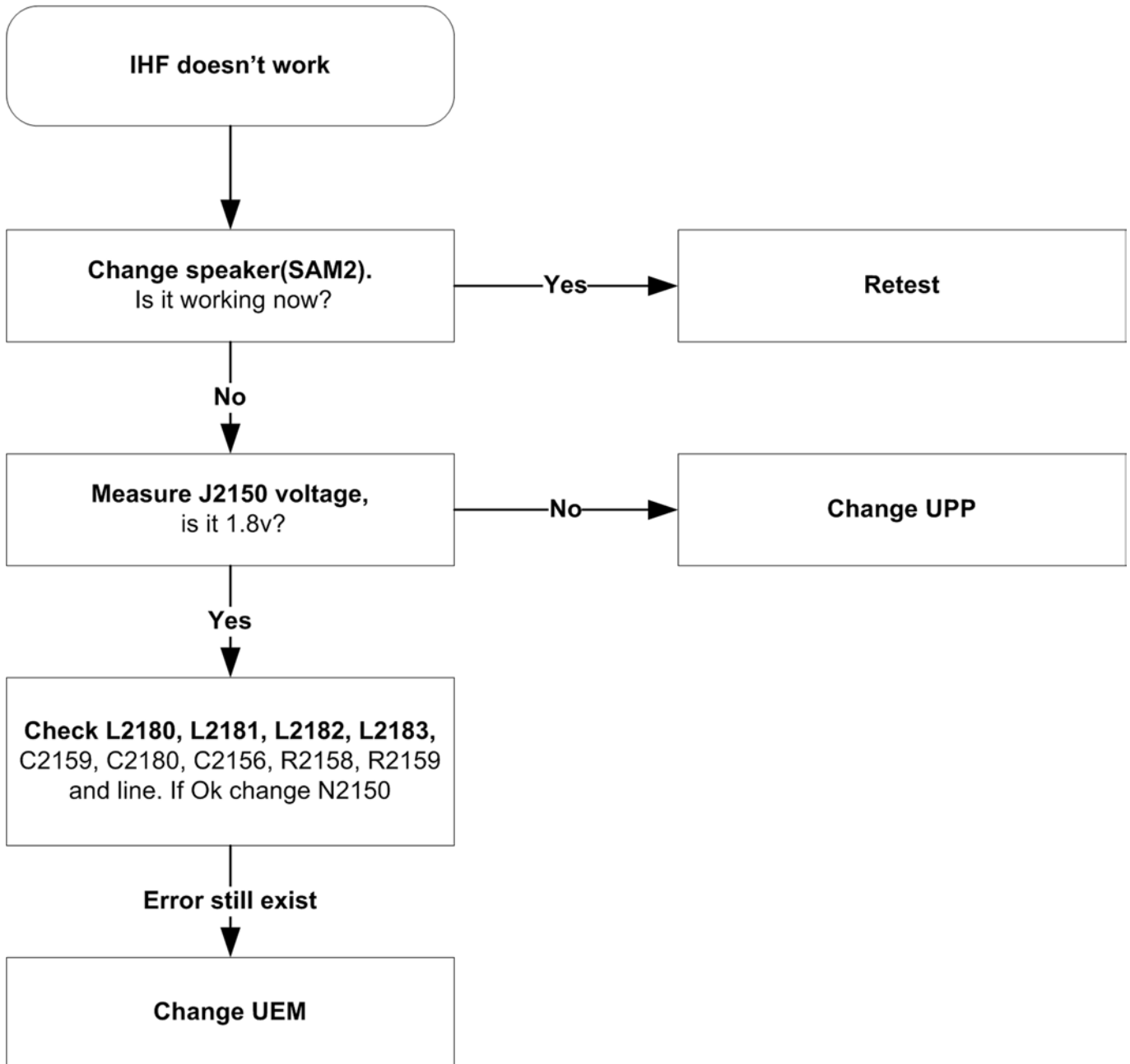


Figure 28 IHF/ring tone fault flow chart

## Microphone fault

### Troubleshooting flow

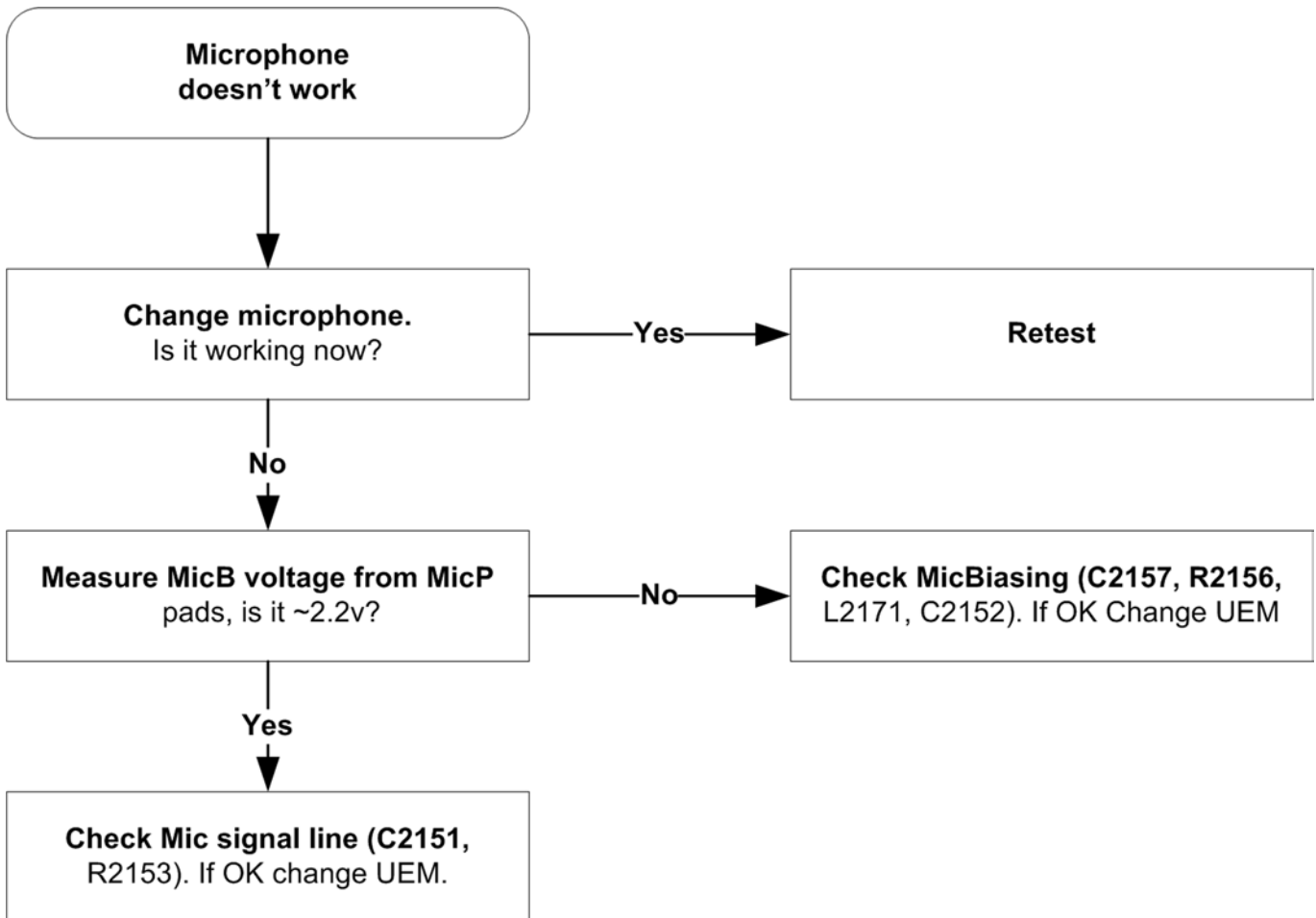


Figure 29 Microphone fault flow chart



## 5 — RF troubleshooting

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## ■ General RF troubleshooting

### General RF troubleshooting

Two types of measurements are used in the following. It will be specified if the measurement type is "RF" or "LF".

- RF measurements are done with a Spectrum Analyzer and a high-frequency probe, for example Agilent 85024A. (Note that the test jig has some losses which must be taken into consideration when calibrating the test system.)
- LF (Low frequency) and DC measurements should be done with a 10:1 probe and an oscilloscope. The probe used in the following is 10MW/8pF passive probe. If using another probe then bear in mind that the voltages displayed may be slightly different. Always make sure the measurement set-up is calibrated when measuring RF parameters on the antenna pad. Remember to include the loss in the module repair jig when realigning the phone.

Most RF semiconductors are static discharge sensitive, so ESD protection must be applied during repair (ground straps and ESD soldering irons). FEM and Uppcosto are moisture sensitive so parts must be pre-baked prior to soldering. Apart from key-components described in this document there are a lot of discrete components (resistors, inductors and capacitors) for which troubleshooting is done by checking if soldering of the component is done properly and checking if the component is missing from PWB. Capacitors can be checked for short-circuiting and resistors for value by means of an Ohm meter, but be aware in-circuit measurements should be evaluated carefully. In the following both the name EGSM and GSM850 will be used for the lower band and both PCN and GSM1900 will be used for the upper band.

### RF key components

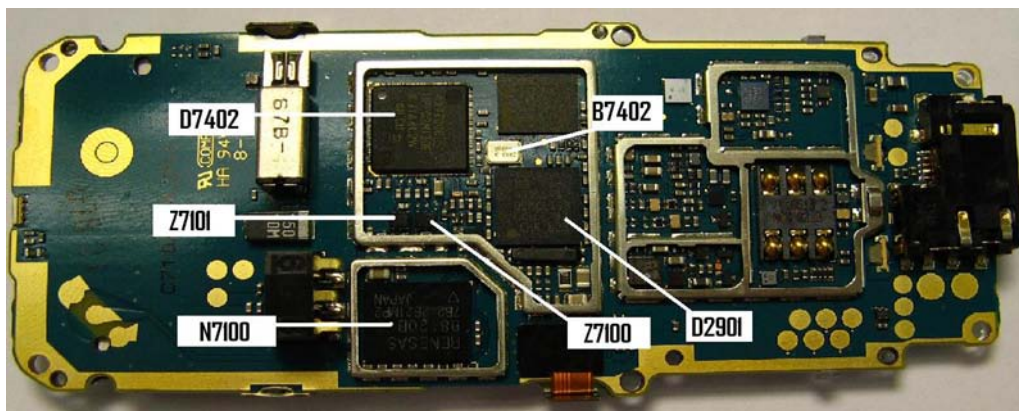


Figure 30 RF key components on PWB

N7100	FEM(PA & Antenna Switch)
D7402	Uppcosto
Z7101	EGSM850/900 RX SAW filter
Z7100	DCS1800/PCS1900 RX SAW filter
Z7102	EGSM850/900 TX filter
D2901	Litti
B7402	26 MHz crystal

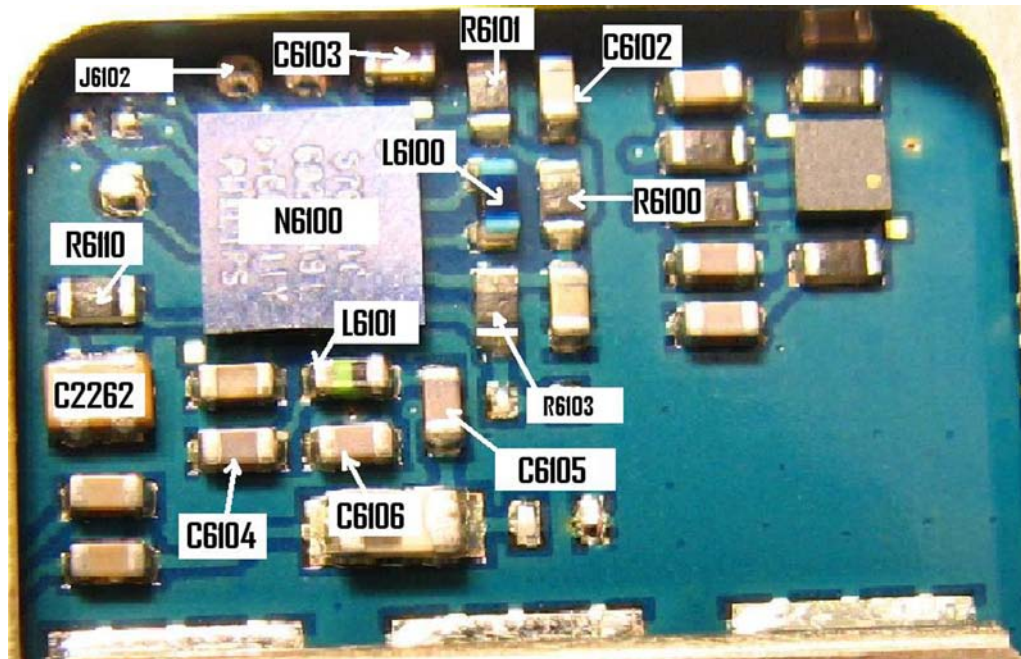


Figure 31 Test points on FM module

Refer to the picture below for measuring points at FEM (N7100) and Litti (D2901).



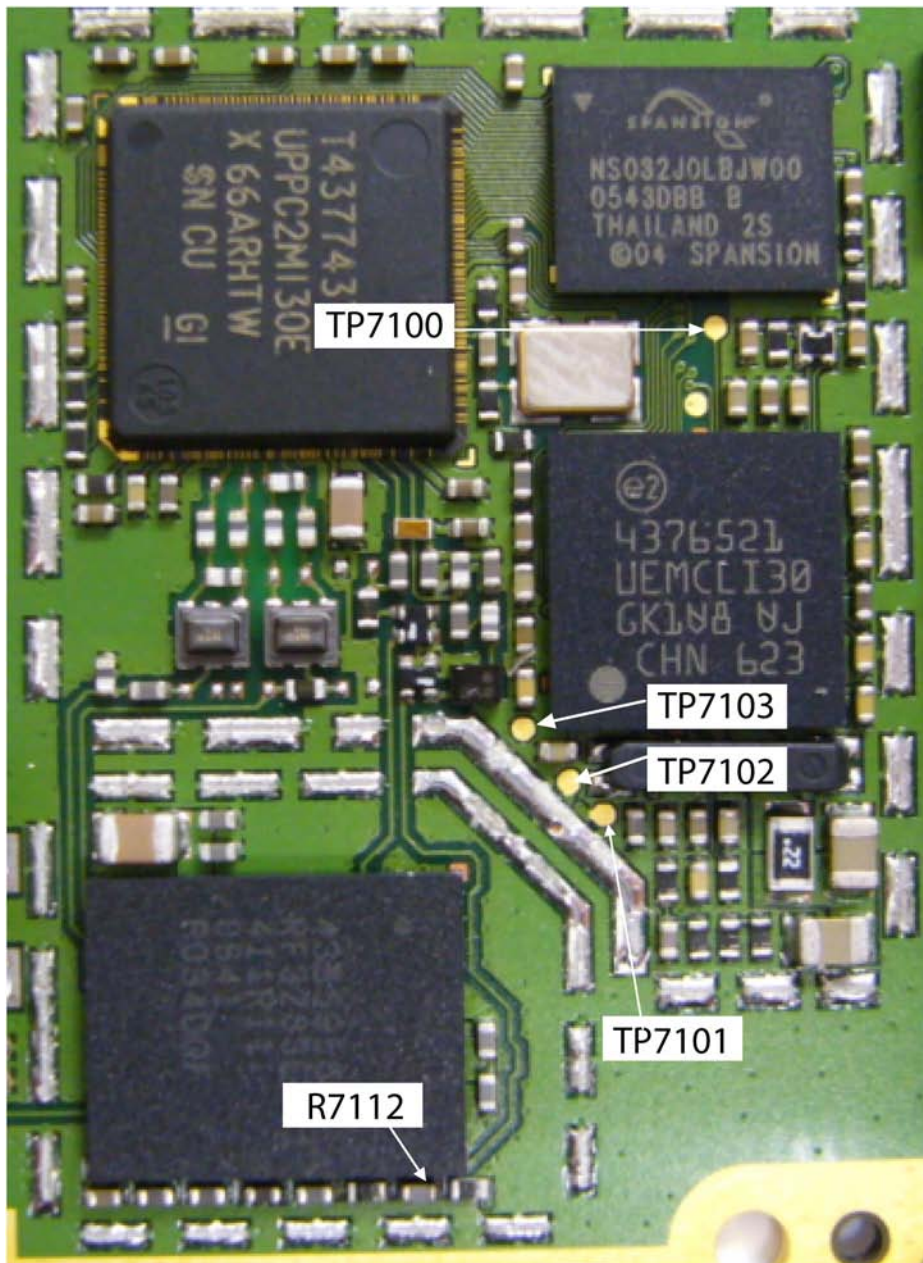


Figure 32 Supply and control points at FEM (N7100) and Litti (D2901)

TXP signal measured at Test Point TP7100

VC1 signal measured at Test Point TP7103

VC2 signal measured at Test Point TP7102

VC3 signal measured at Test Point TP7101

VPC signal measured at Test Point R7112

## ■ Auto tuning

### Context

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 requirements for auto tuning:

- PC (Windows 2000/NT) with GPIB card
- Power supply
- Product specific module jig
- Cables: 3 (alt.1) RF cable, 1 GPIB cable and DAU-9S
- Signal analyser (TX), signal generator (RX) and RF-splitter *or* one device including all.

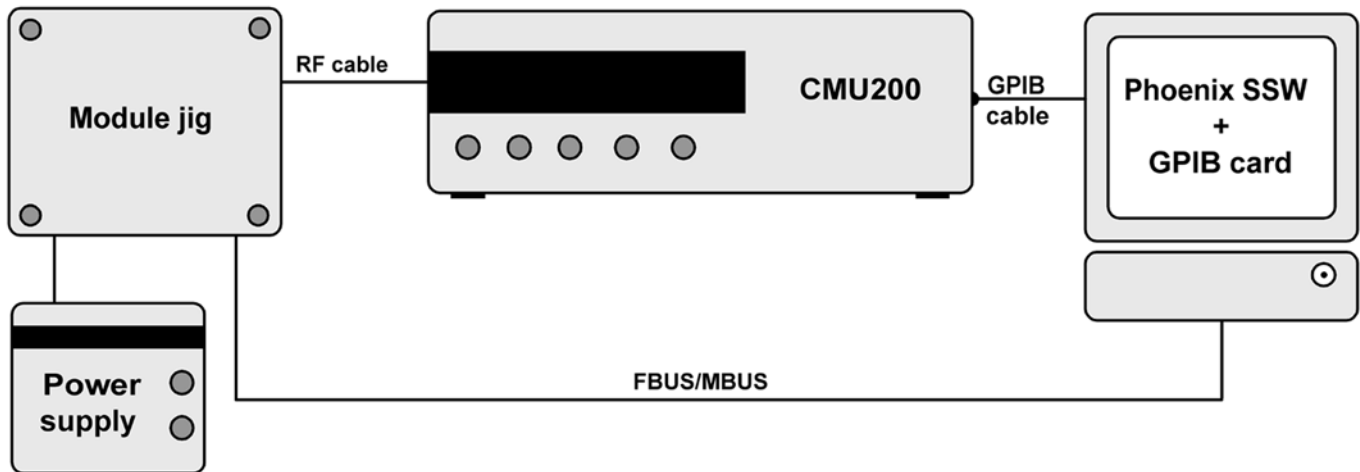


Figure 33 Auto tuning concept with CMU200

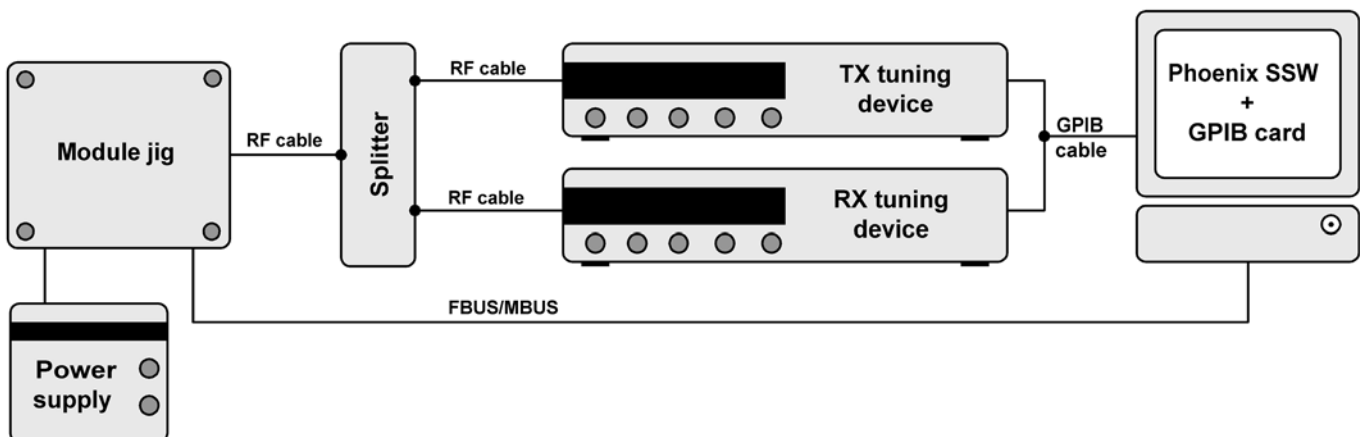


Figure 34 Auto tuning concept with RX and TX tuning devices and splitter

Copy the two phone specific ini-files, for example *rm\_13\_tunings.ini* and *autotune\_RM-13.ini*, to a phone specific folder, for example *|Phoenix|products|RM-13|*.

## Steps

1. Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in Phoenix.
2. The first time you are using automatic tuning on this phone model, on this computer, you will have to *Set loss* for cables and jigs.
3. To go to autotune, select *Tuning (Alt-U) > Auto-Tune (Alt-A)* from the menu.
4. If you need more assistance, please refer to the Phoenix *Help*.

## ■ Receiver GSM900/1800

### General instructions for GSM900 RX troubleshooting

#### Steps

1. Connect the phone to a PC with the module repair jig.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Active Unit: RX
  - ii Band: GSM 900
  - iii Operation Mode: Continuous mode
  - iv RX/TX Channel 37
  - v AGC: Gain 6

#### Results

The setup should now look like this:



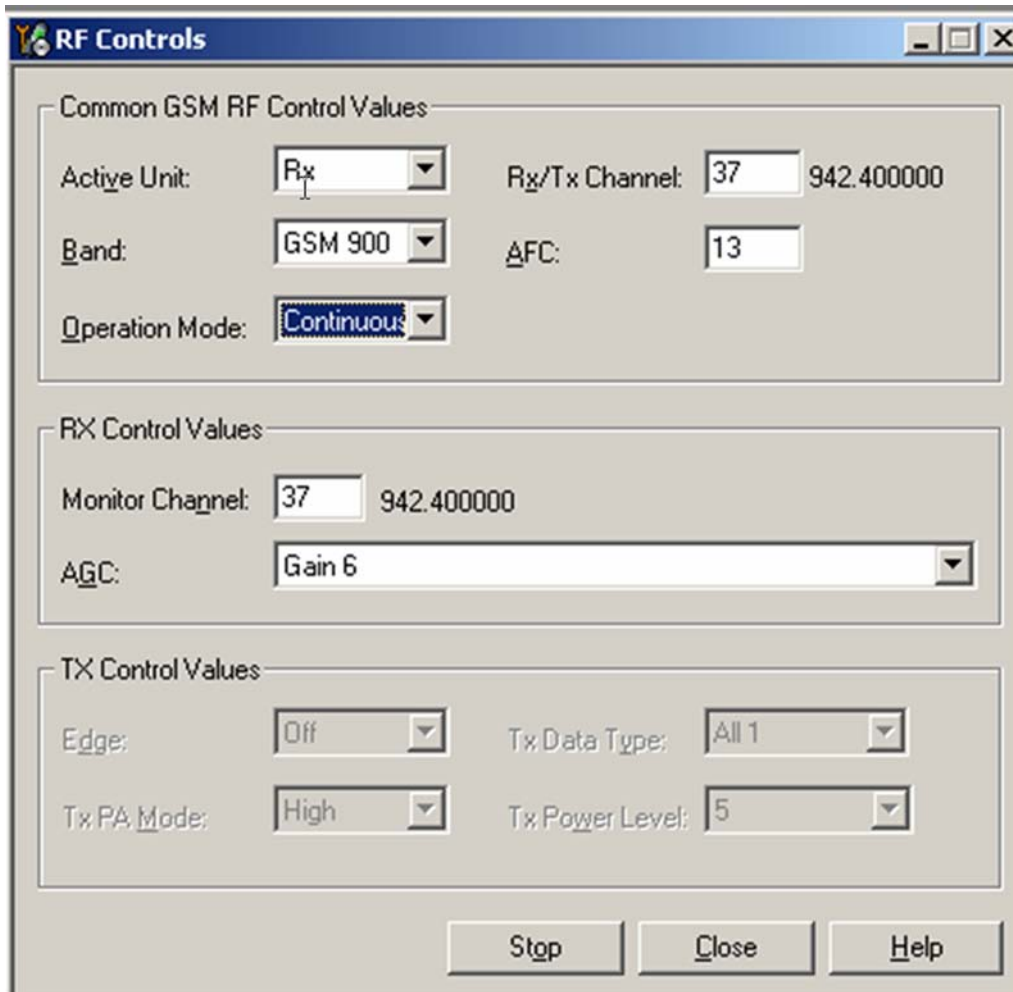
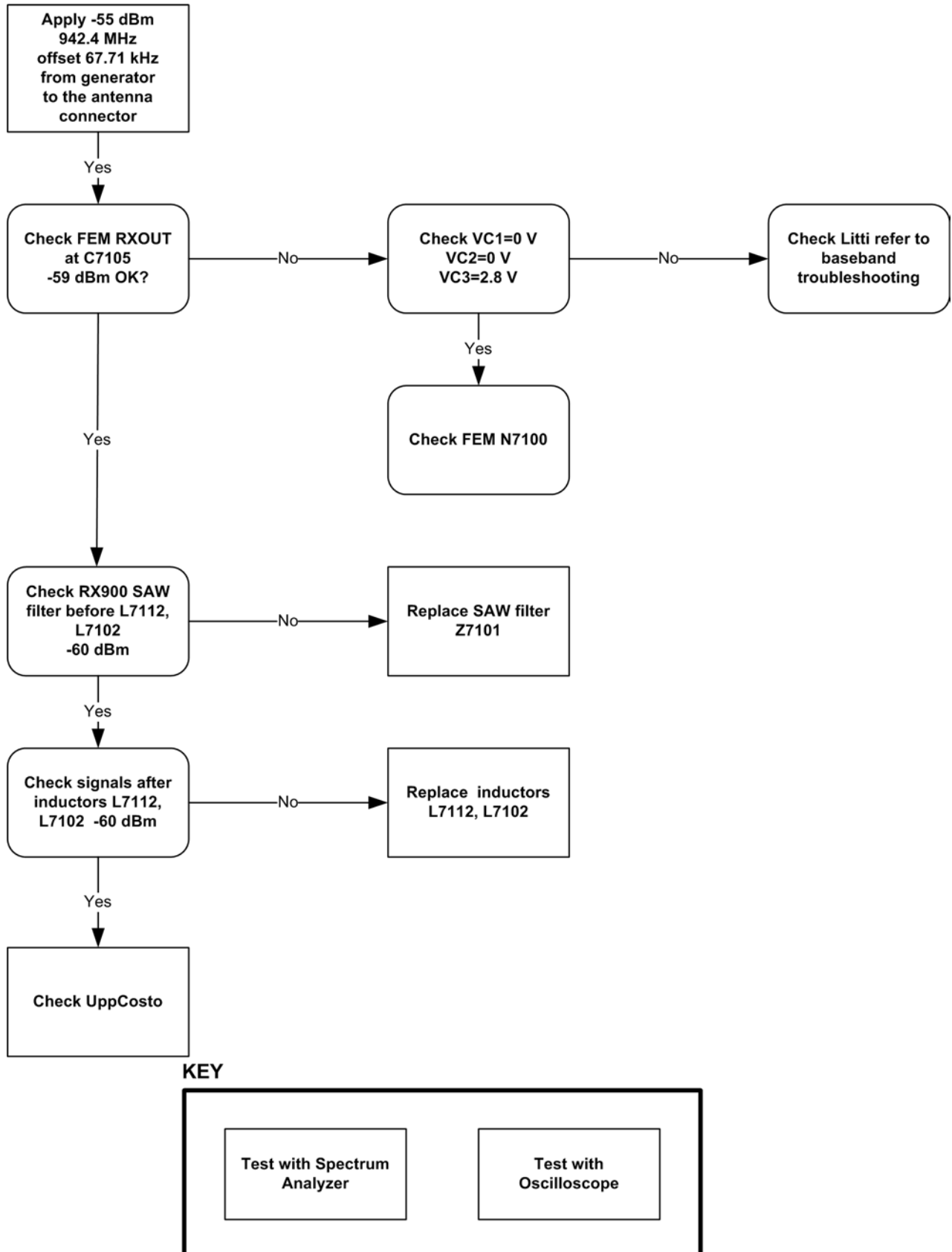


Figure 35 GSM900 RF controls window

**Troubleshooting diagram for GSM 900 receiver**

**Troubleshooting flow**



## General instructions for GSM 1800 RX troubleshooting

### Steps

1. Connect the phone to a PC with the module repair jig.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Active Unit: RX
  - ii Band: GSM 1800
  - iii Operation Mode: Continuous mode
  - iv RX/TX Channel 700
  - v AGC: Gain 6

### Results

The setup should now look like this:

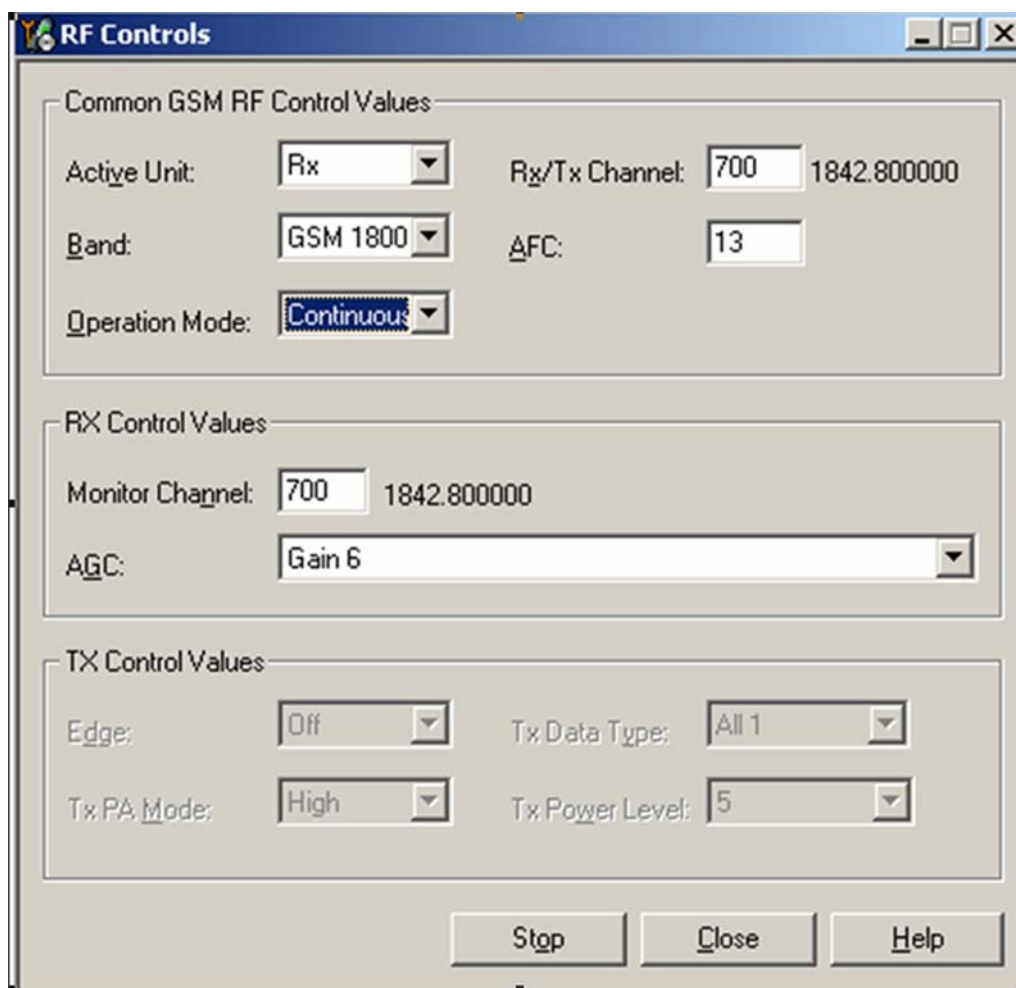
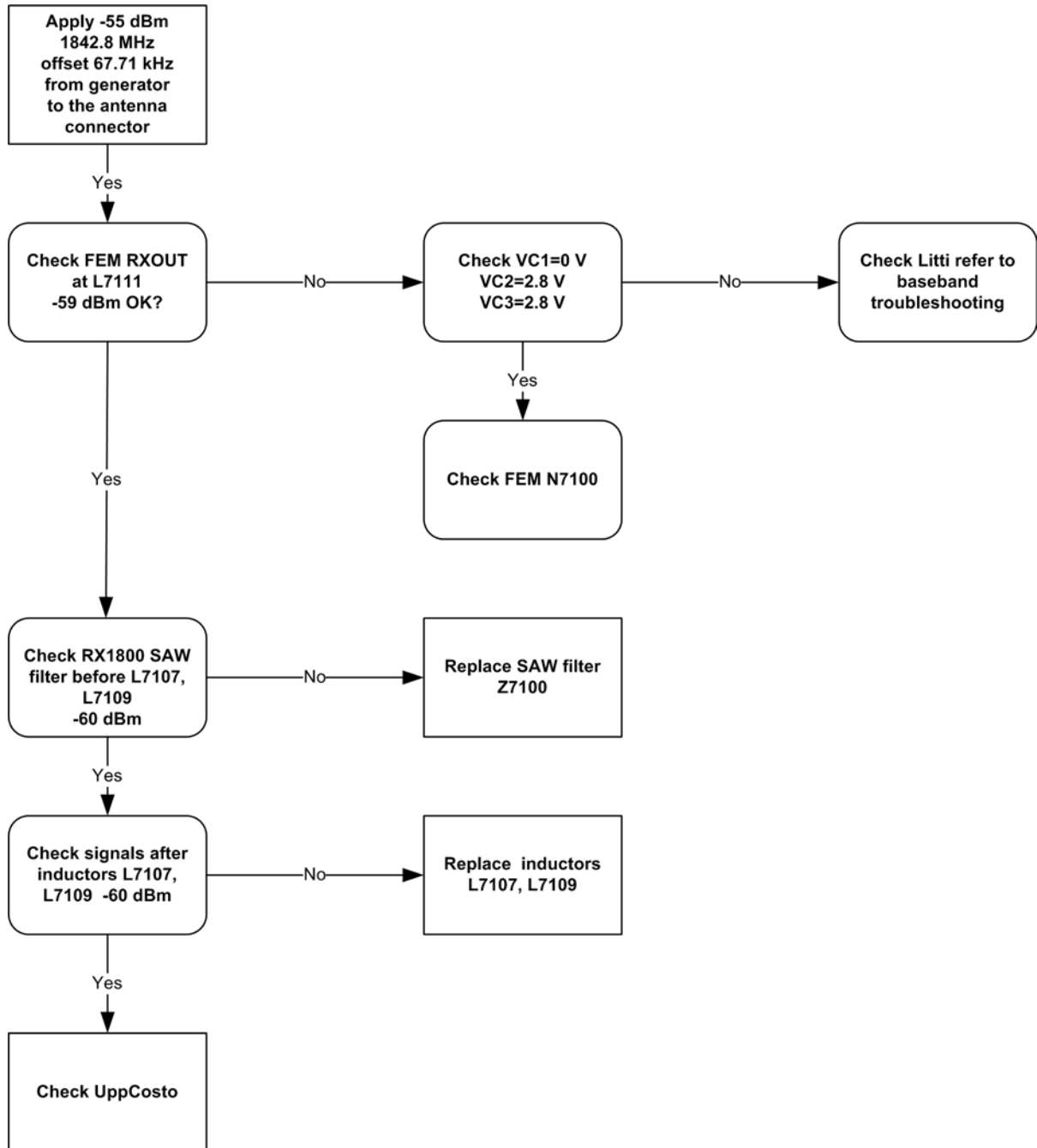
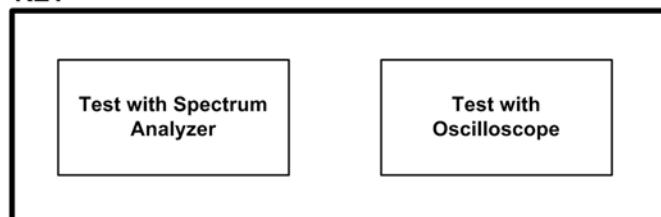


Figure 37 GSM1800 RF controls window

**Troubleshooting diagram for GSM 1800 receiver**



**KEY**



**Figure 38 GSM 1800 Receiver troubleshooting**

## Measurement points in the receiver

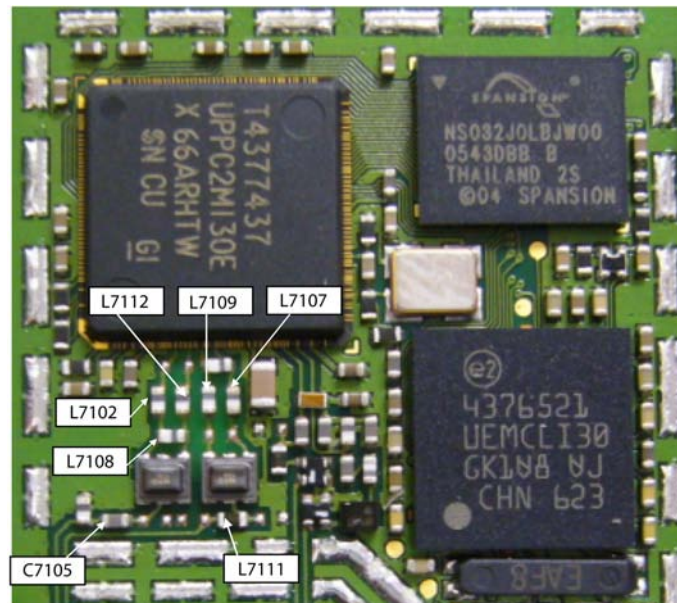


Figure 39 Measurement points at the RX SAW Filters - Z7101/Z7100

### ■ Receiver GSM850/1900

#### General instructions for GSM 850 RX troubleshooting

##### Steps

1. Connect the phone to a PC with the module repair jig.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Active Unit: RX
  - ii Band: GSM 850
  - iii Operation Mode: Continuous mode
  - iv RX/TX Channel 190
  - v AGC: Gain 6

##### Results

The setup should now look like this:

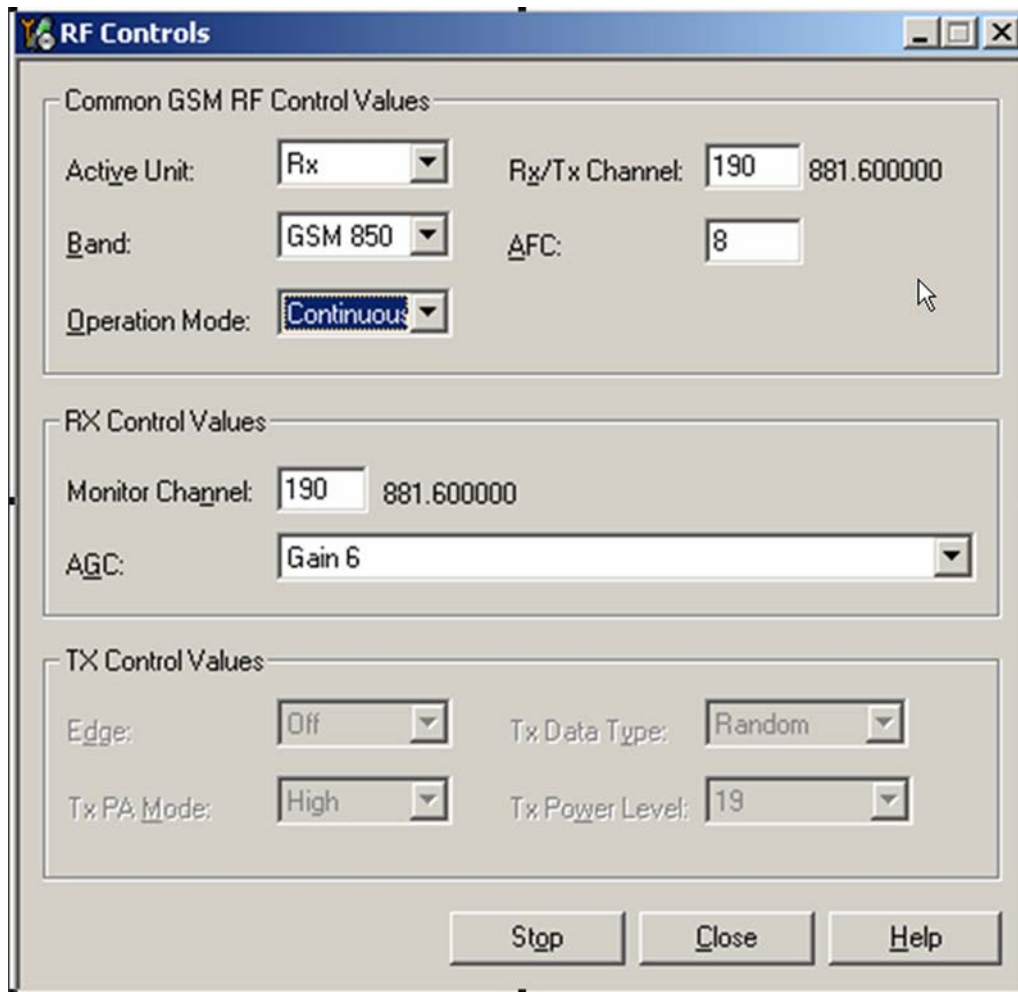
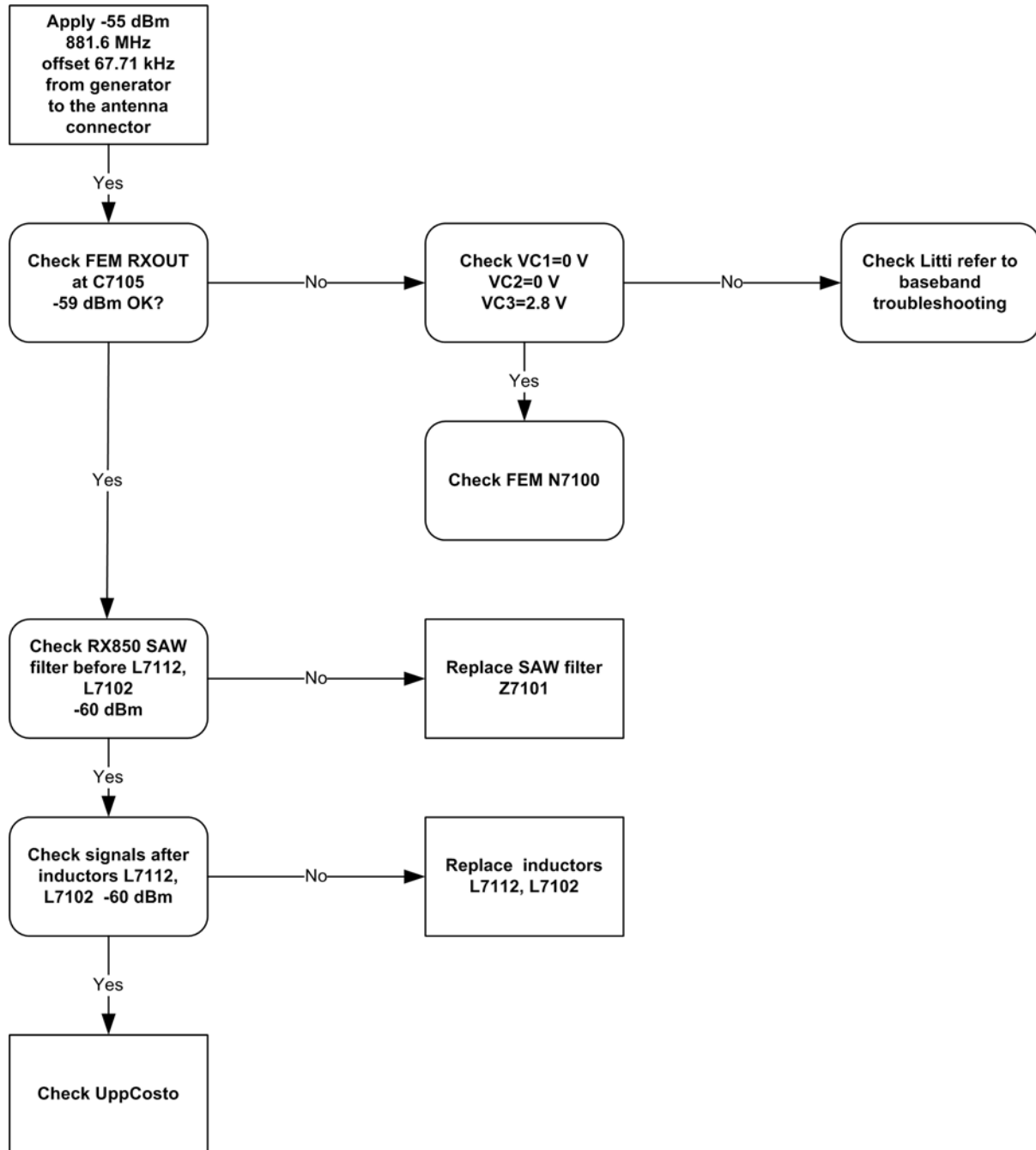
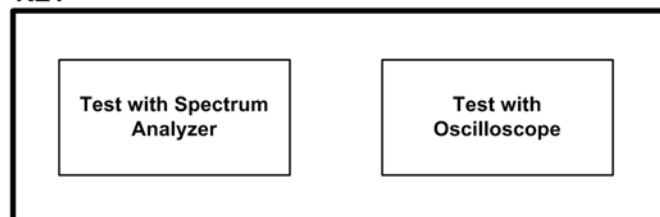


Figure 40 GSM850 RF controls window

**Troubleshooting diagram for GSM 850 receiver**



**KEY**



**Figure 41 GSM 850 Receiver troubleshooting**

## General instructions for GSM1900 RX troubleshooting

### Steps

1. Connect the phone to a PC with the module repair jig.
2. Start Phoenix and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Active Unit: Rx
  - ii Band: GSM 1900
  - iii Operation Mode: Continuous mode
  - iv RX/TX Channel 661
  - v AGC: Gain 6

### Results

The setup should now look like this:

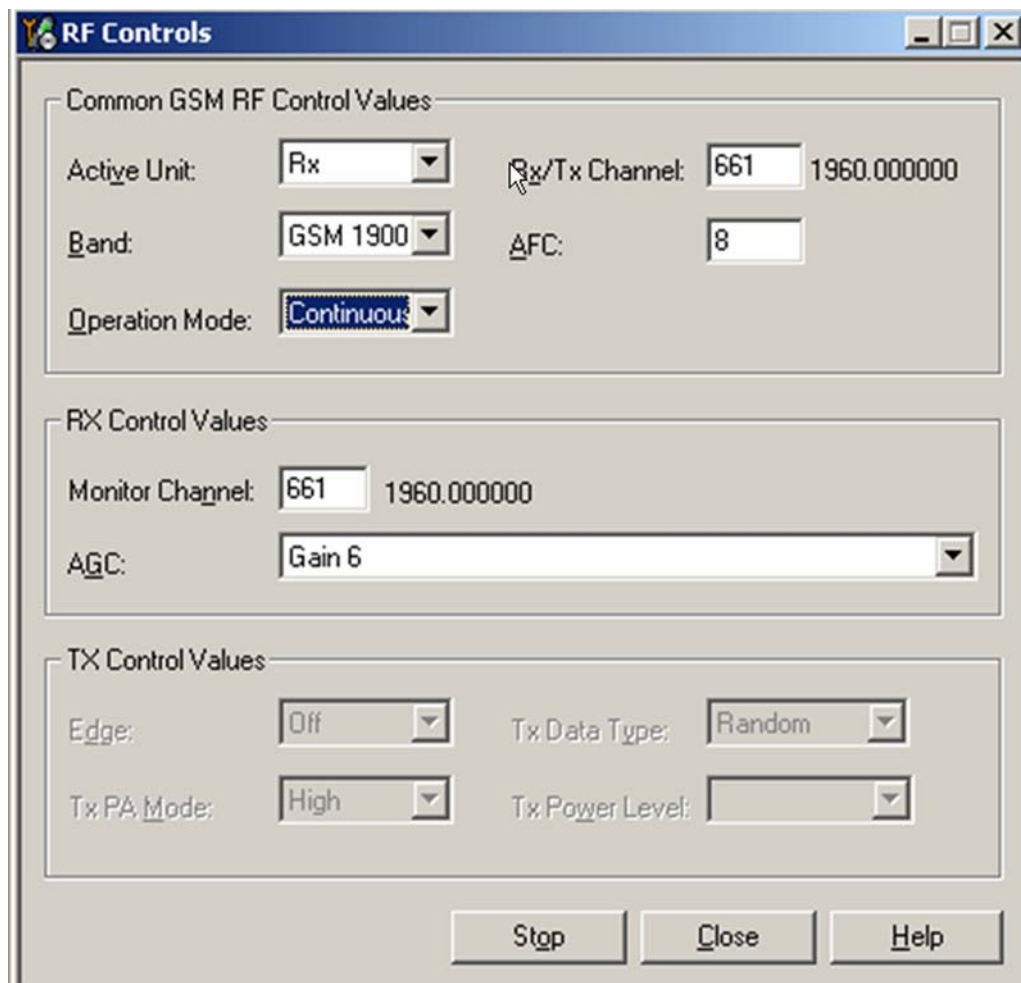
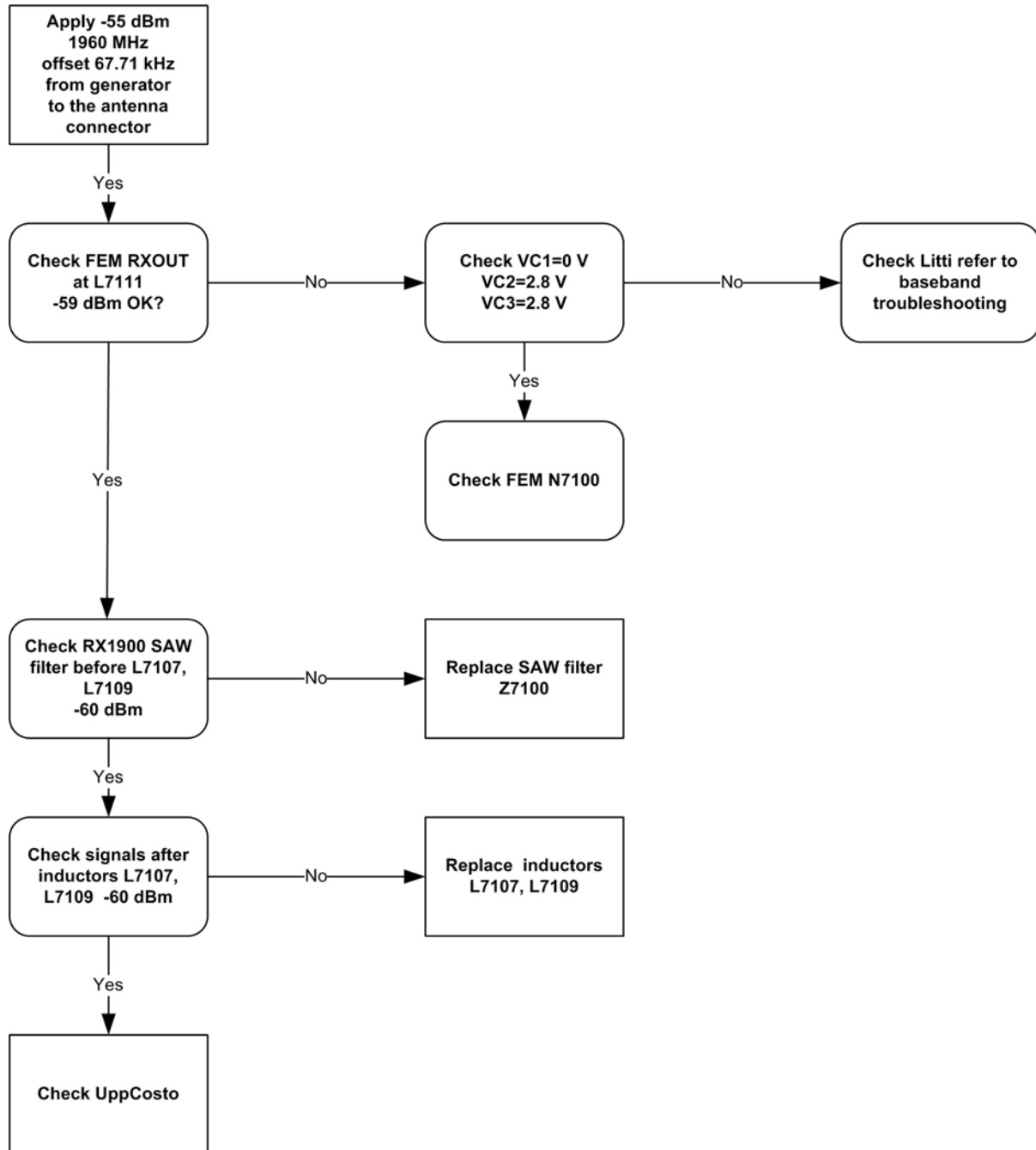


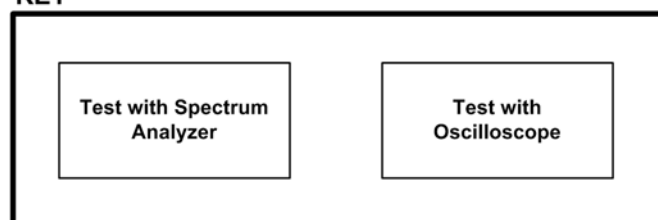
Figure 42 GSM 1900 RF controls window



**Troubleshooting diagram for GSM 1900 receiver**



**KEY**



**Figure 43 GSM 1900 Receiver troubleshooting**

## Measurement points in the receiver

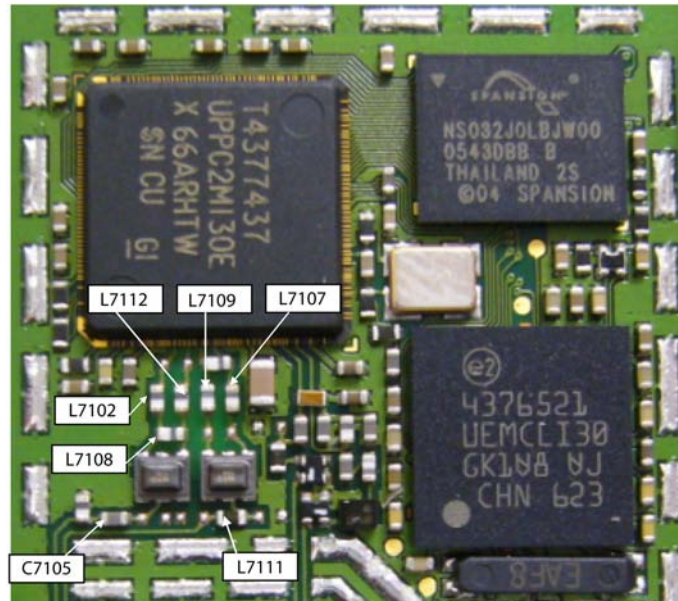


Figure 44 Measurement points at the RX SAW Filters – Z7101/Z7100

### ■ Transmitter GSM900/1800

#### General instructions for GSM 900 TX troubleshooting

##### Steps

1. Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to an attenuator at least 10dB before connected to the measurement equipment, otherwise the PA may be damaged.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Band: GSM 900
  - ii Active Unit: TX
  - iii TX Power Level: 5
  - iv TX Data Type: Random

##### Results

The setup should now look like this:

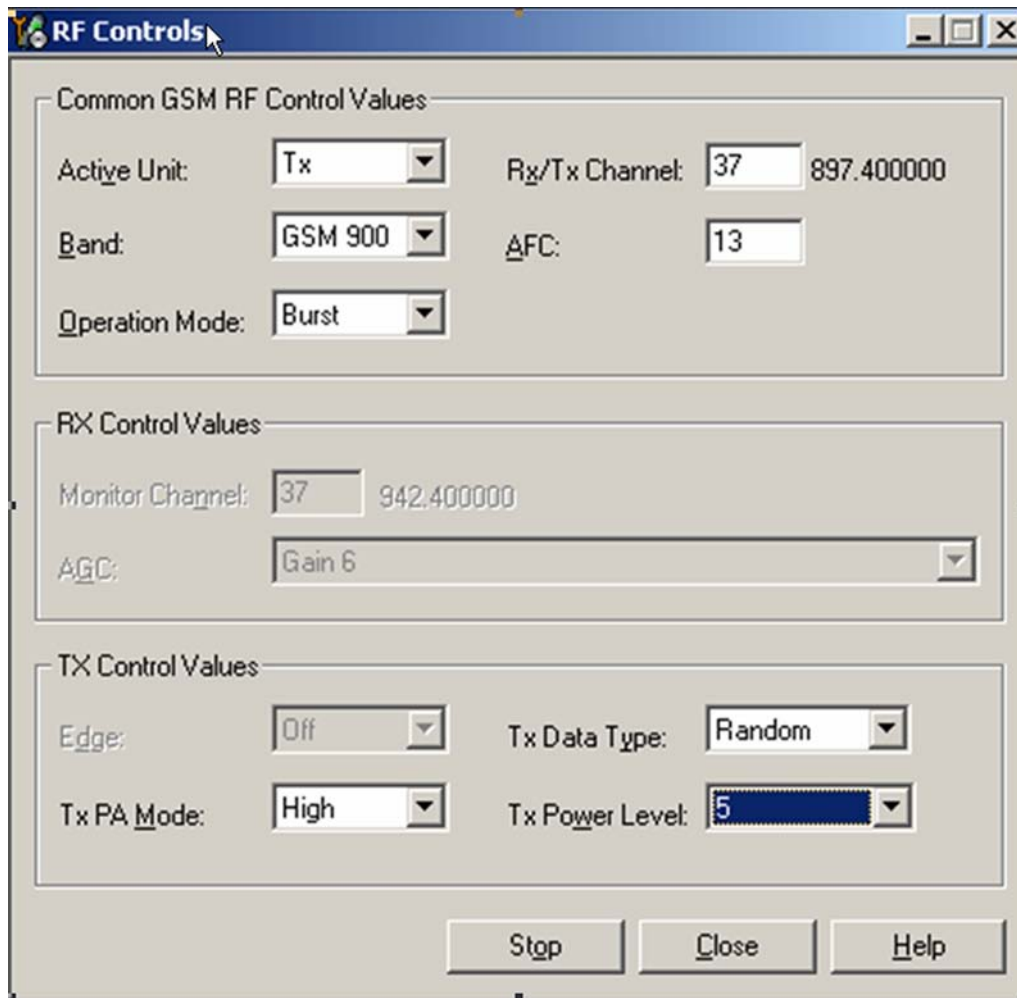
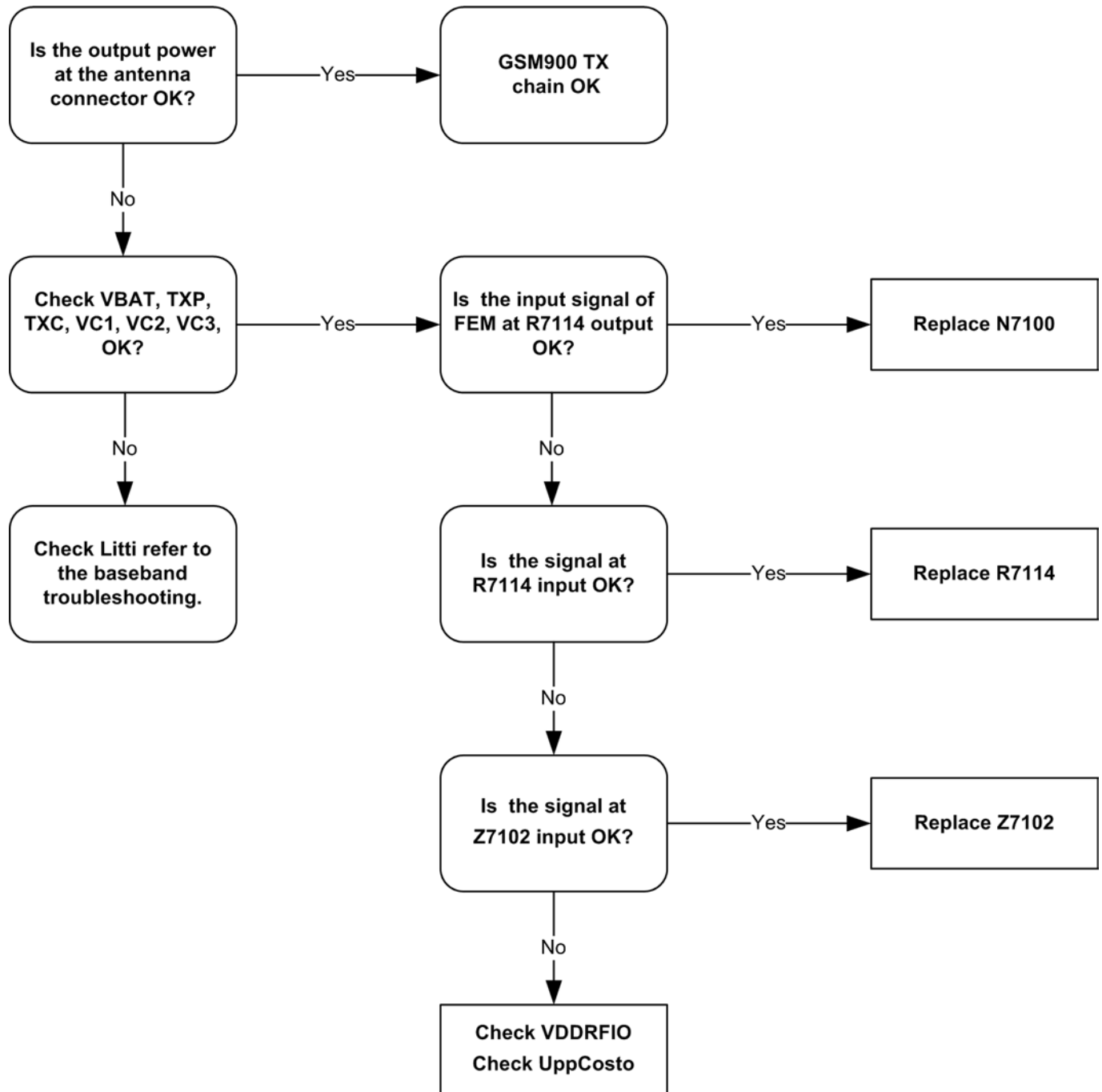


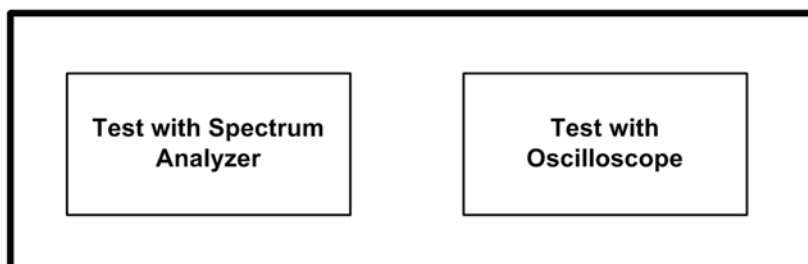
Figure 45 GSM 900 RF controls window

**Troubleshooting diagram for GSM 900 transmitter**

**Troubleshooting Flow**



**KEY**



### GSM900 TX output power

Measure the output power of the phone; it should be about 32.5dBm. Remember the cable loss is about 0.3dB.

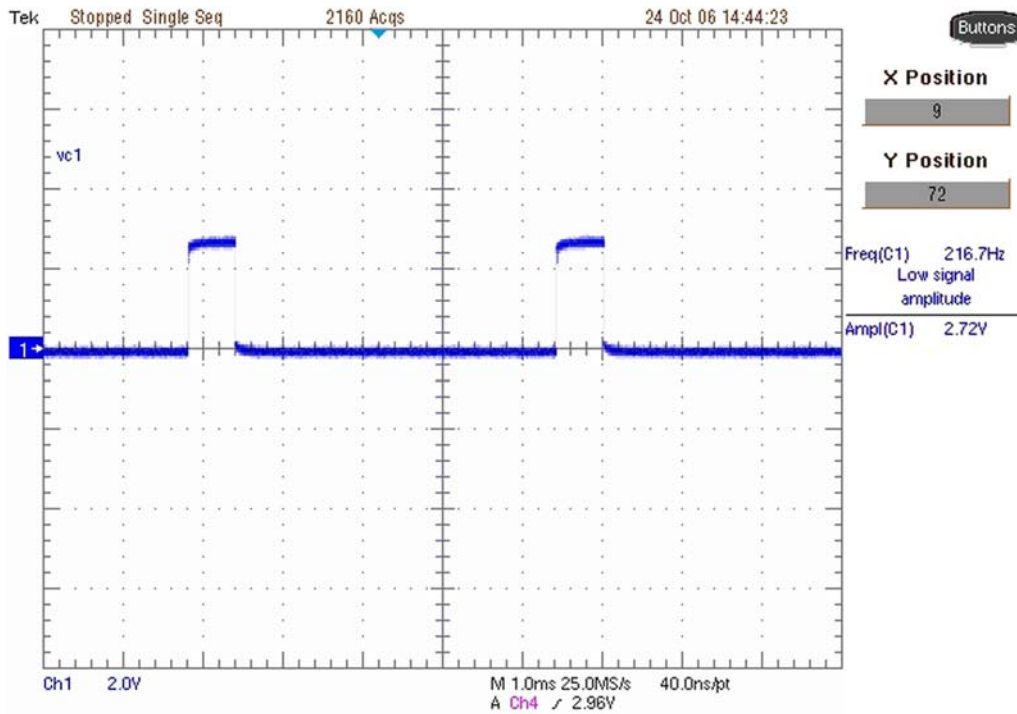


Figure 47 VC1 signal

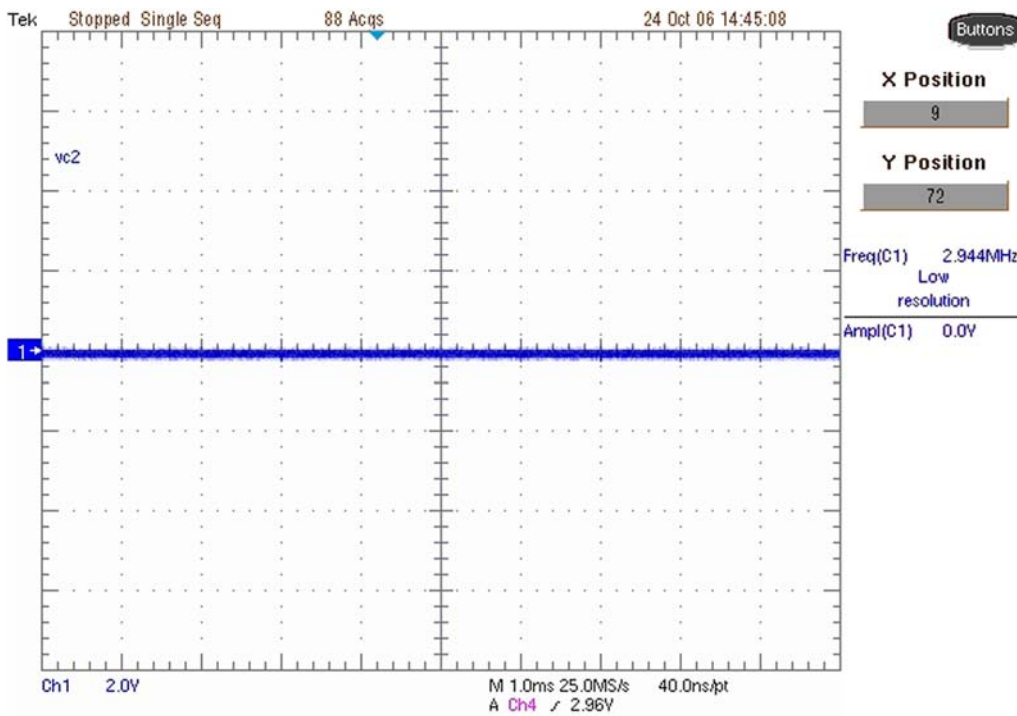


Figure 48 VC2 signal

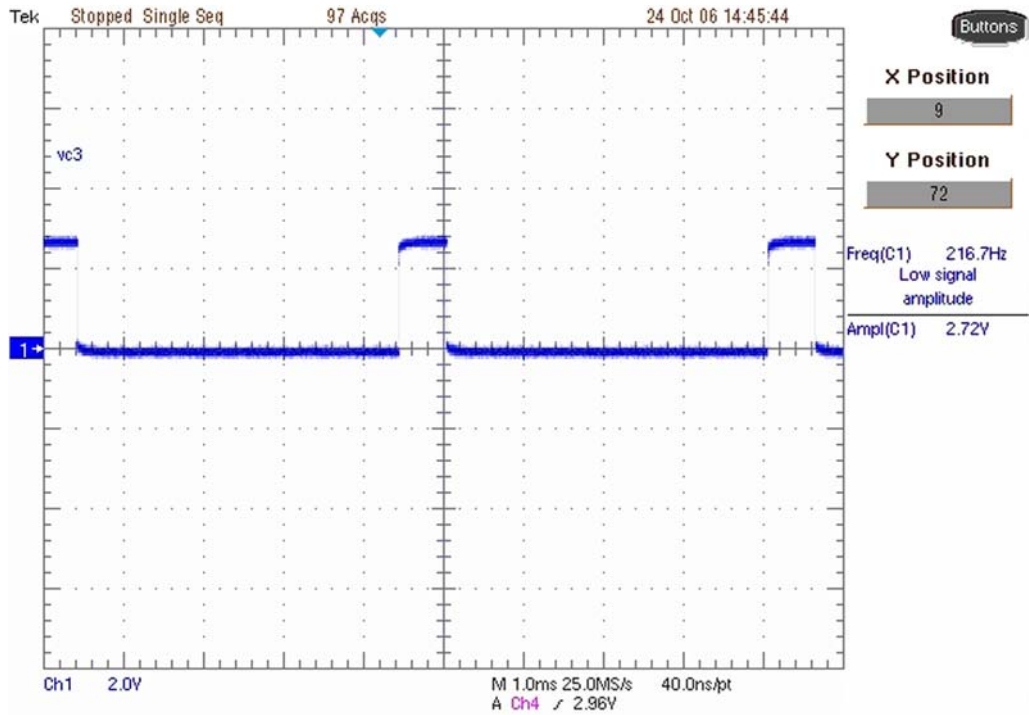


Figure 49 VC3 signal

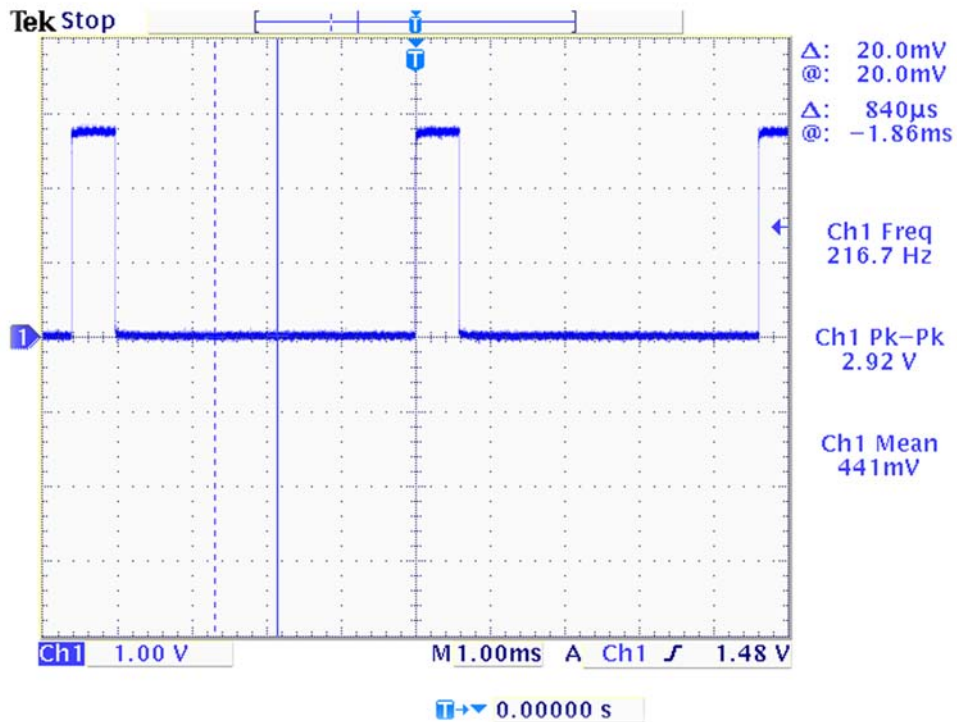


Figure 50 TXP signal



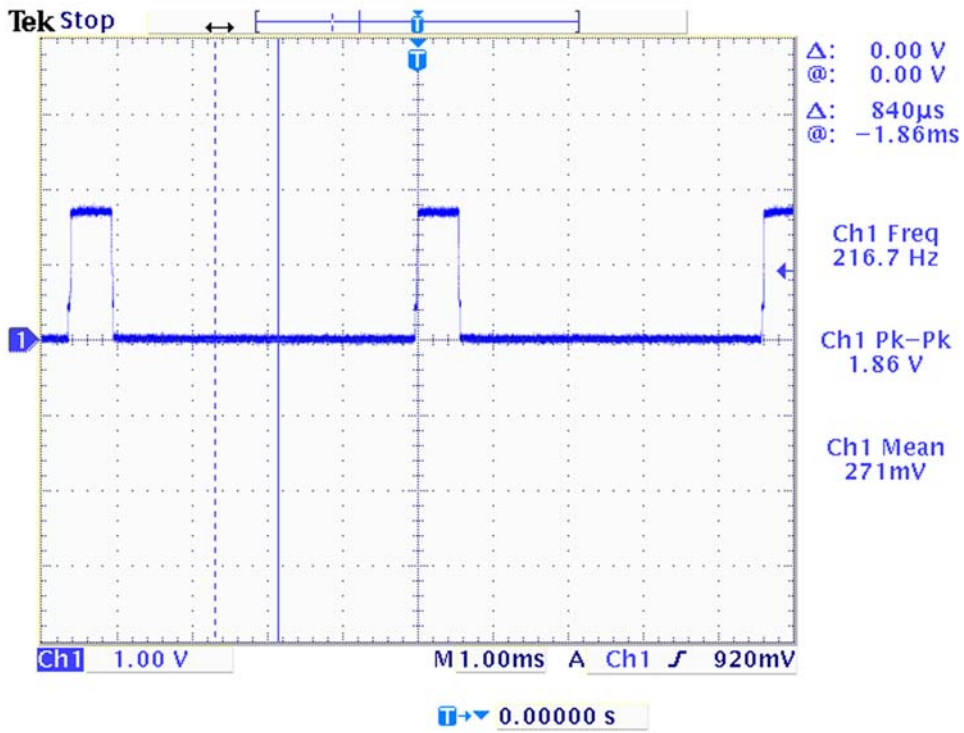


Figure 51 TXC signals at PCL5

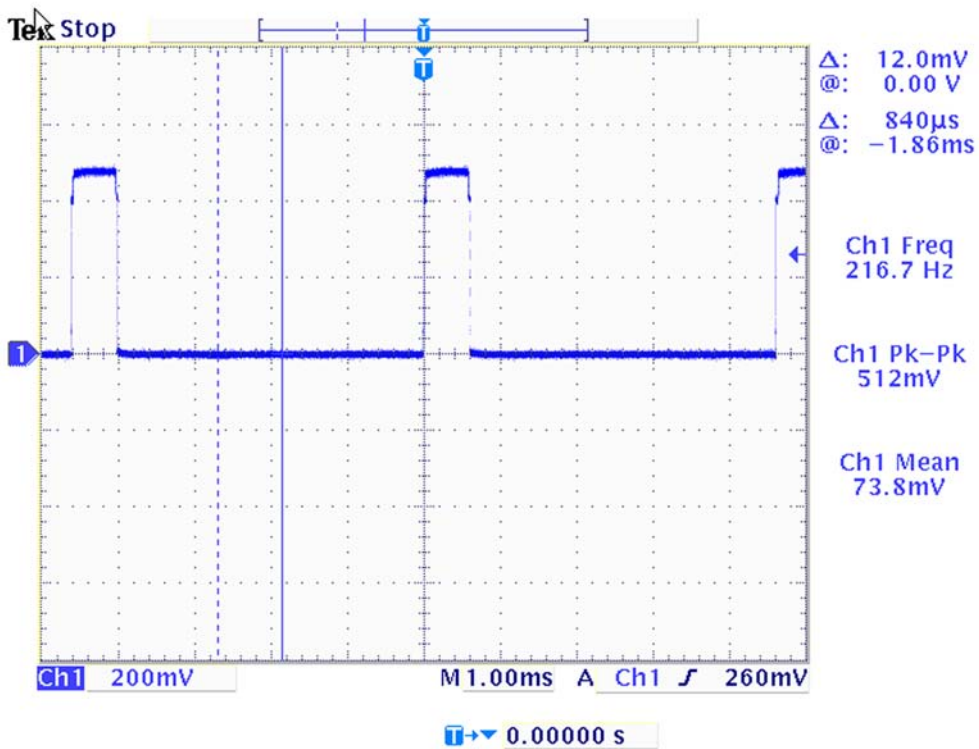


Figure 52 TXC signals at PCL19

## General instructions for GSM1800 TX troubleshooting

### Steps

1. Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to an attenuator at least 10dB before connected to the measurement equipment, otherwise the PA may be damaged.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Band: GSM 1800
  - ii Active Unit: TX
  - iii TX Power Level: 0
  - iv TX Data Type: Random

### Results

The setup should now look like this:

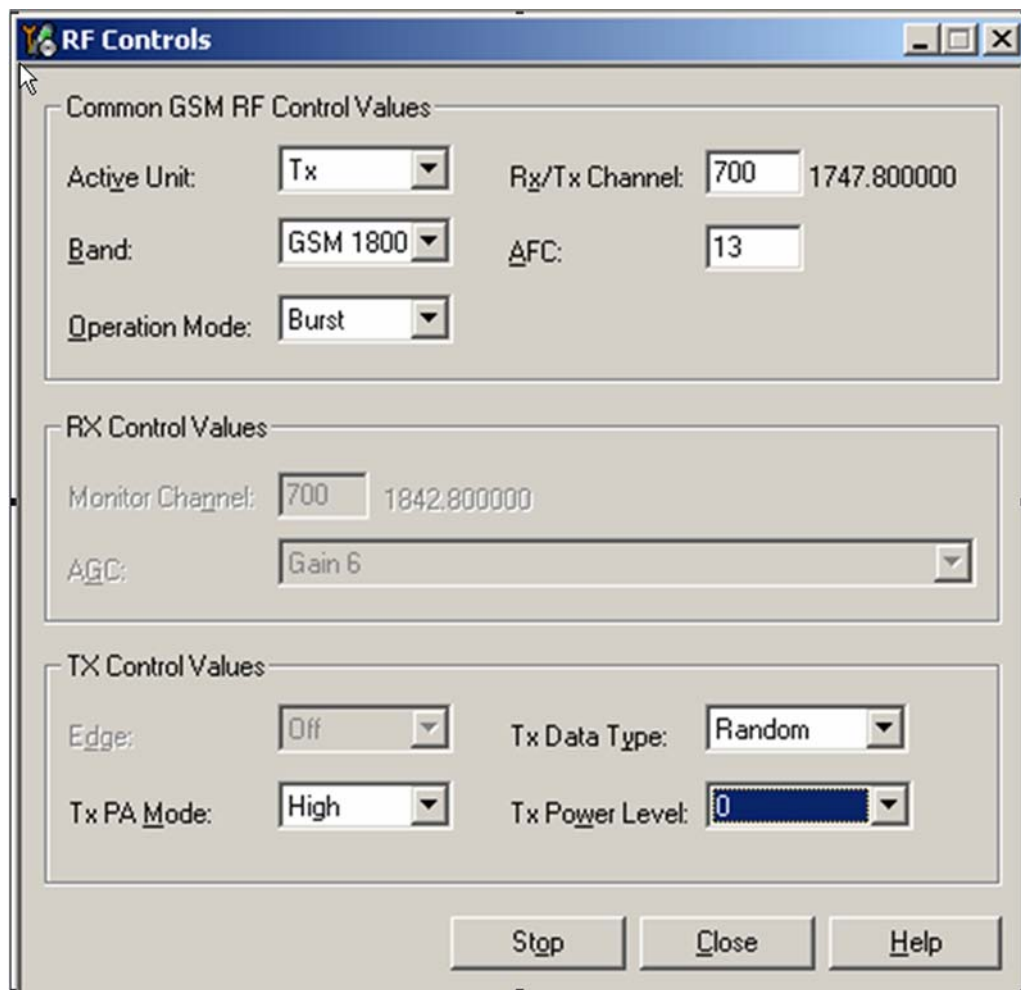
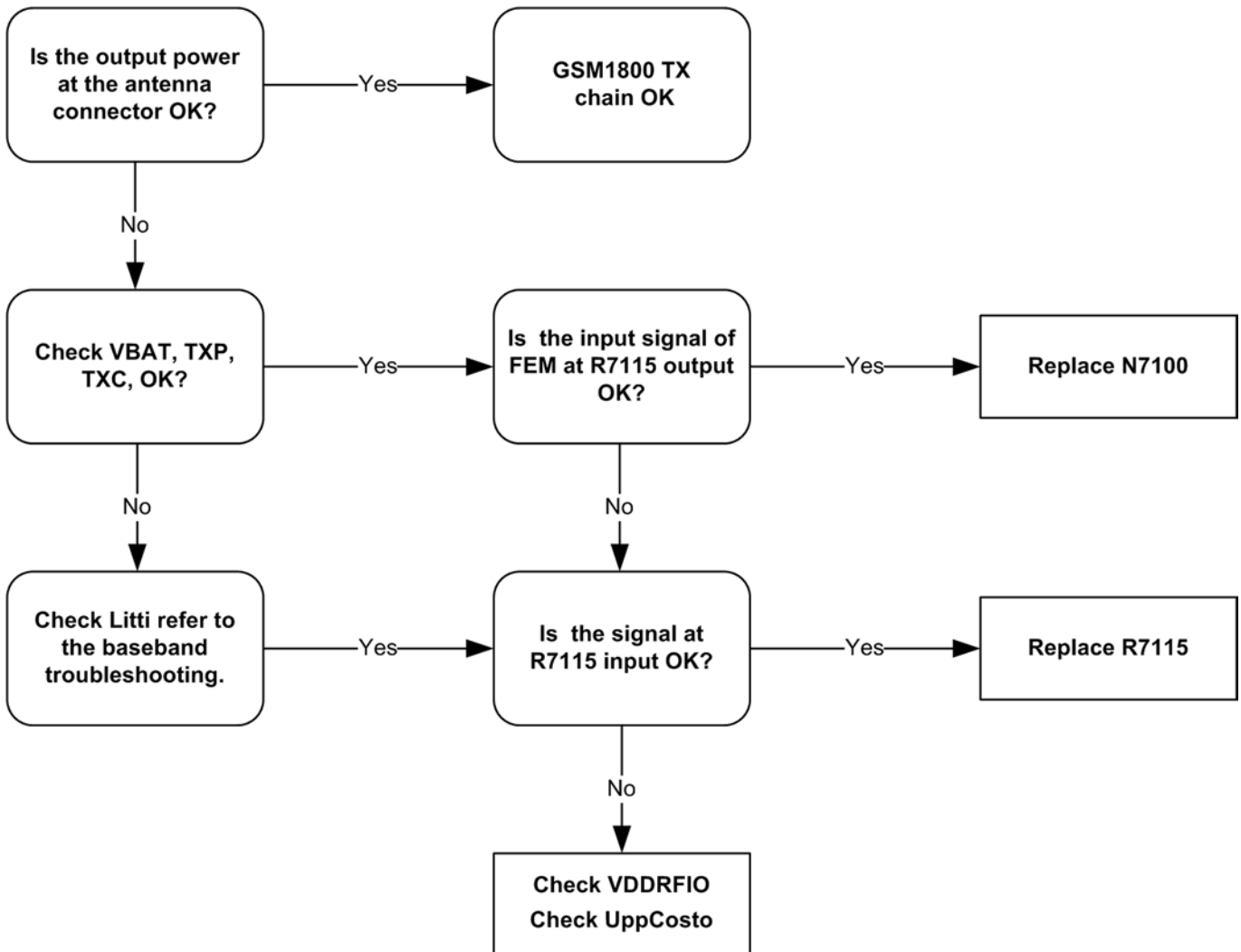


Figure 53 GSM 1800 RF controls window



**Troubleshooting diagram for GSM 1800 transmitter**

**Troubleshooting flow**



**KEY**

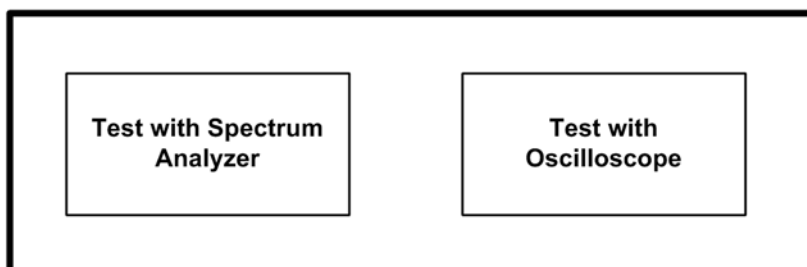


Figure 54 GSM 1800 Transmitter troubleshooting

**GSM1800 TX output power**

Measure the output power of the phone; it should be about 29.5dBm. Remember the cable loss is about 0.5dB.

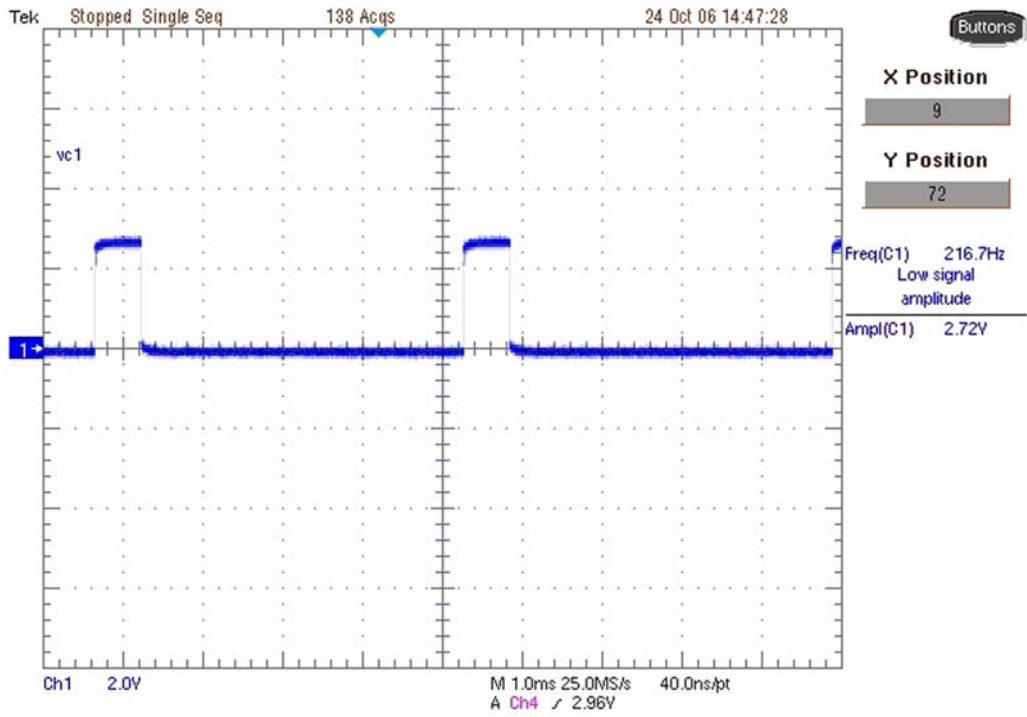


Figure 55 VC1 signal

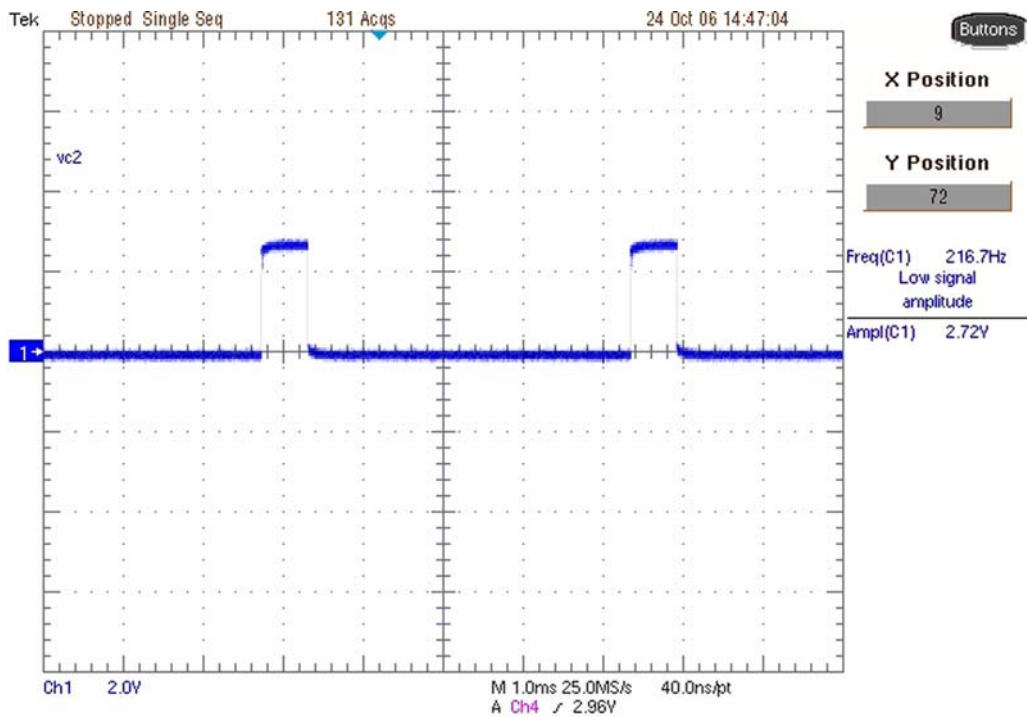


Figure 56 VC2 signal

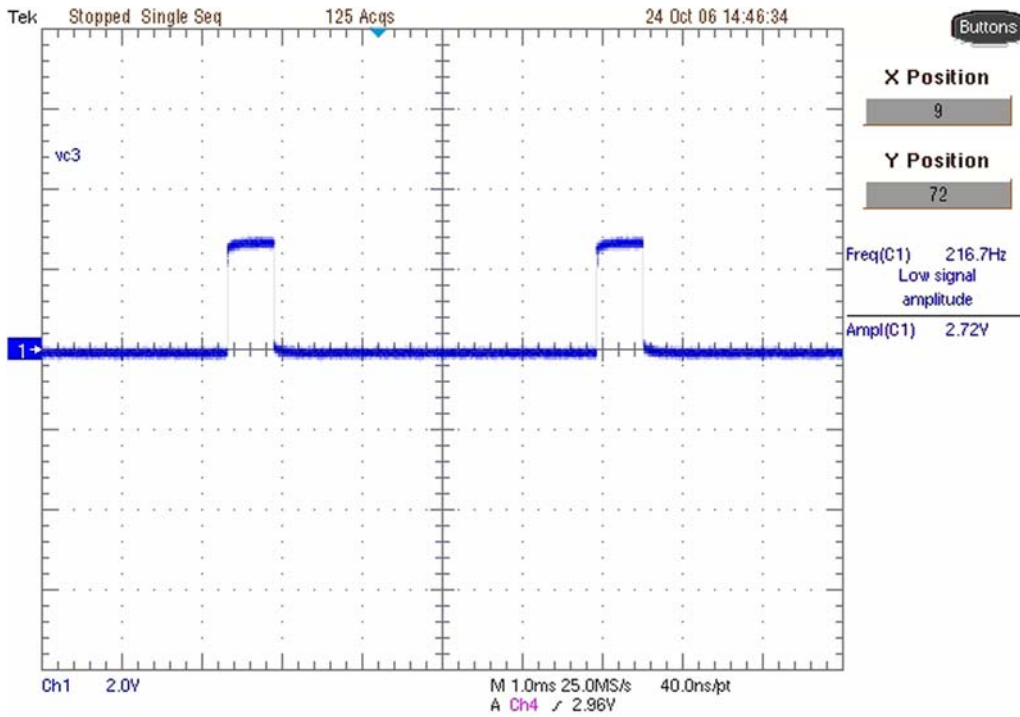


Figure 57 VC3 signal

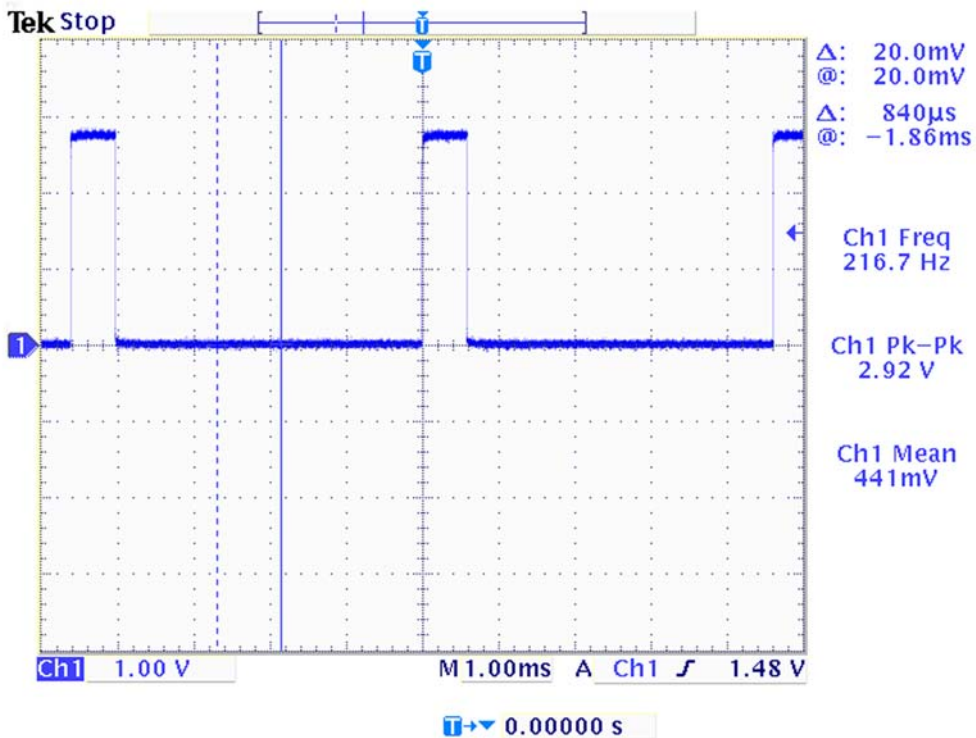


Figure 58 TXP signal

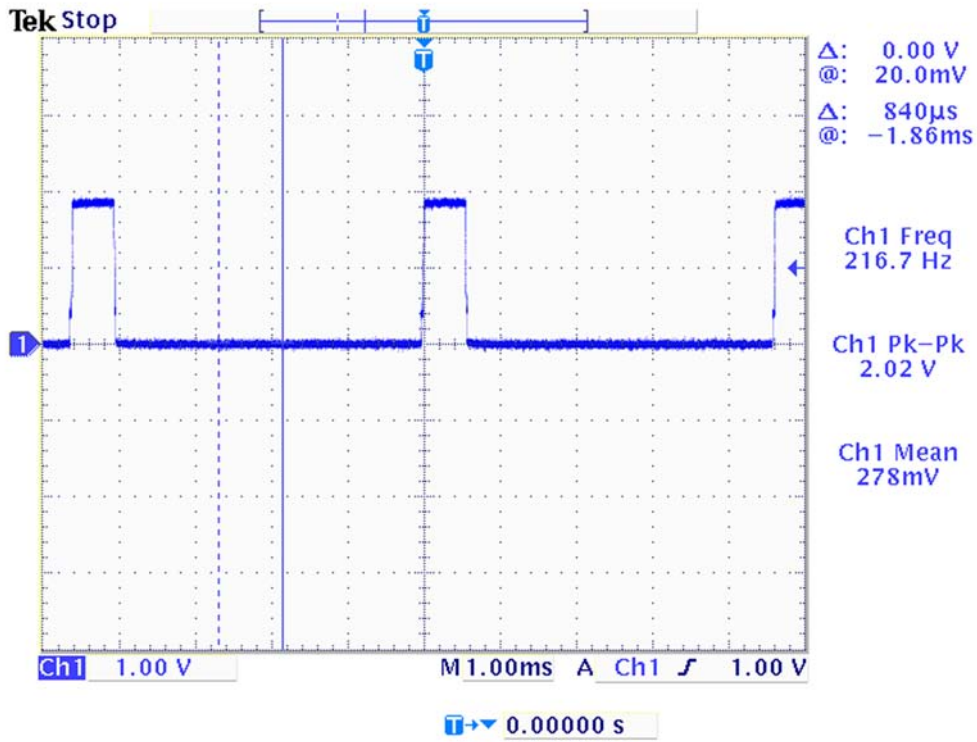


Figure 59 TXC signals at PCL0

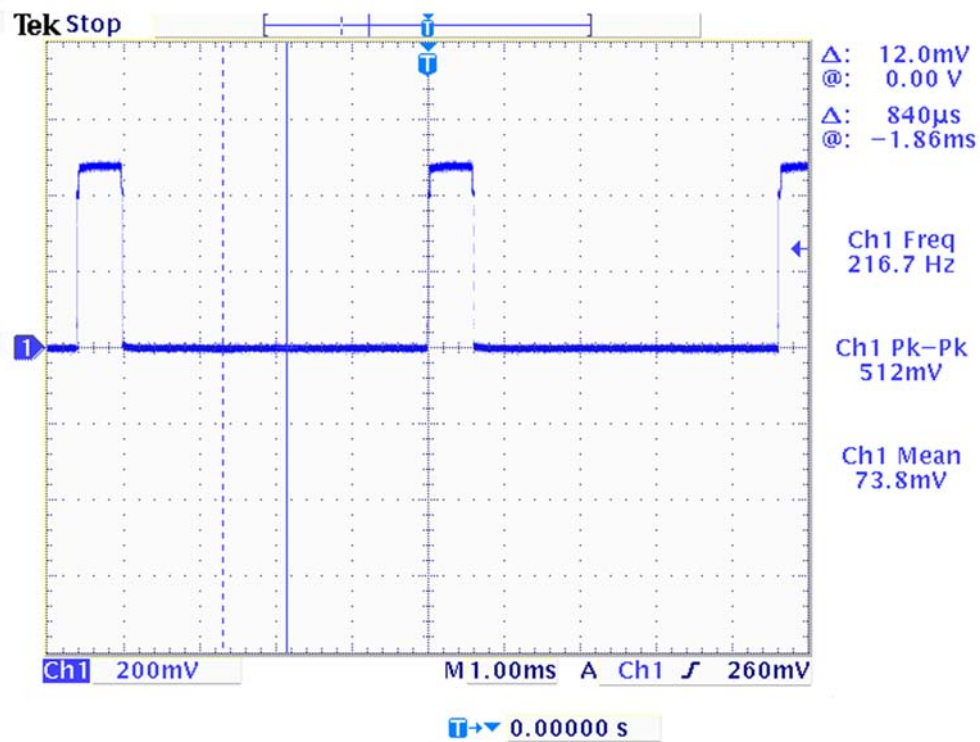


Figure 60 TXC signals at PCL15

## ■ Transmitter GSM850/1900

### General instructions for GSM 850 TX troubleshooting

#### Steps

1. Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to an attenuator at least 10dB before connected to the measurement equipment, otherwise the PA may be damaged.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Band: GSM 850
  - ii Active Unit: TX
  - iii TX Power Level: 5
  - iv TX Data Type: Random

#### Results

The setup should now look like this:

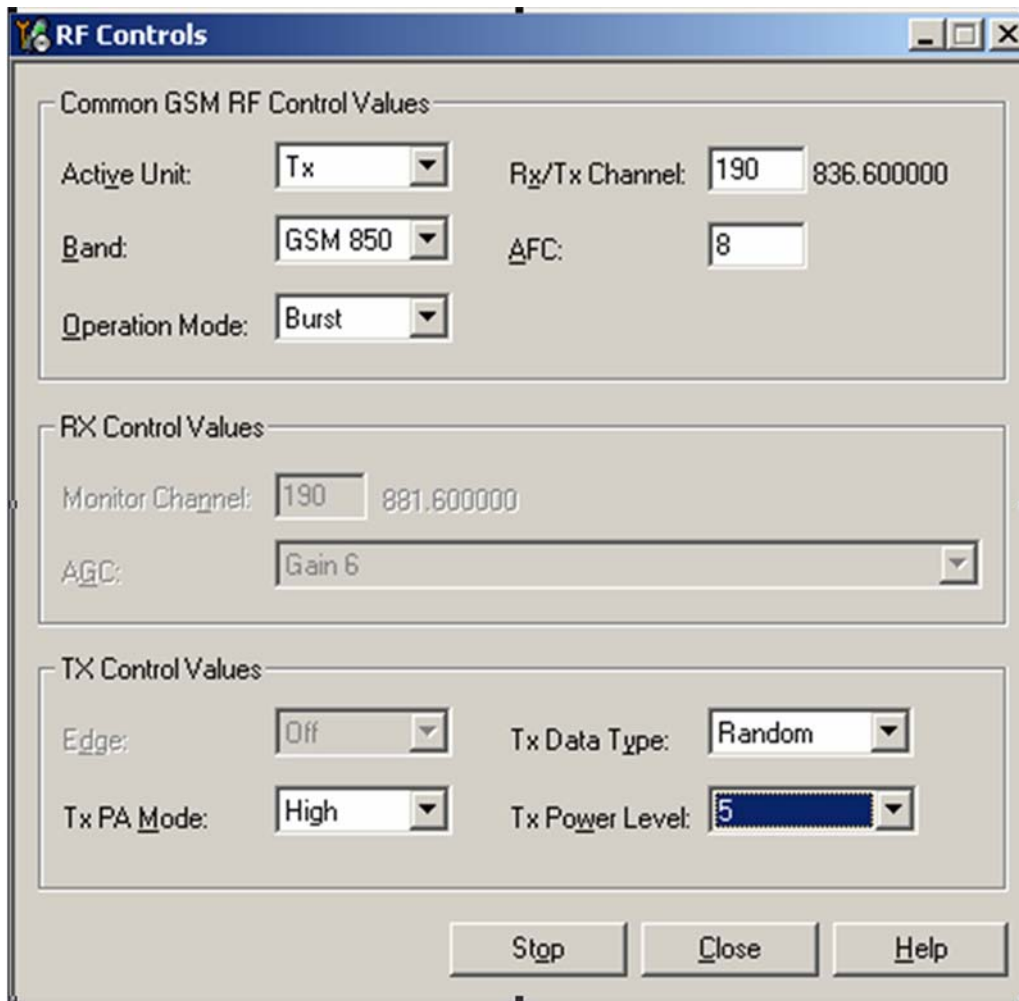
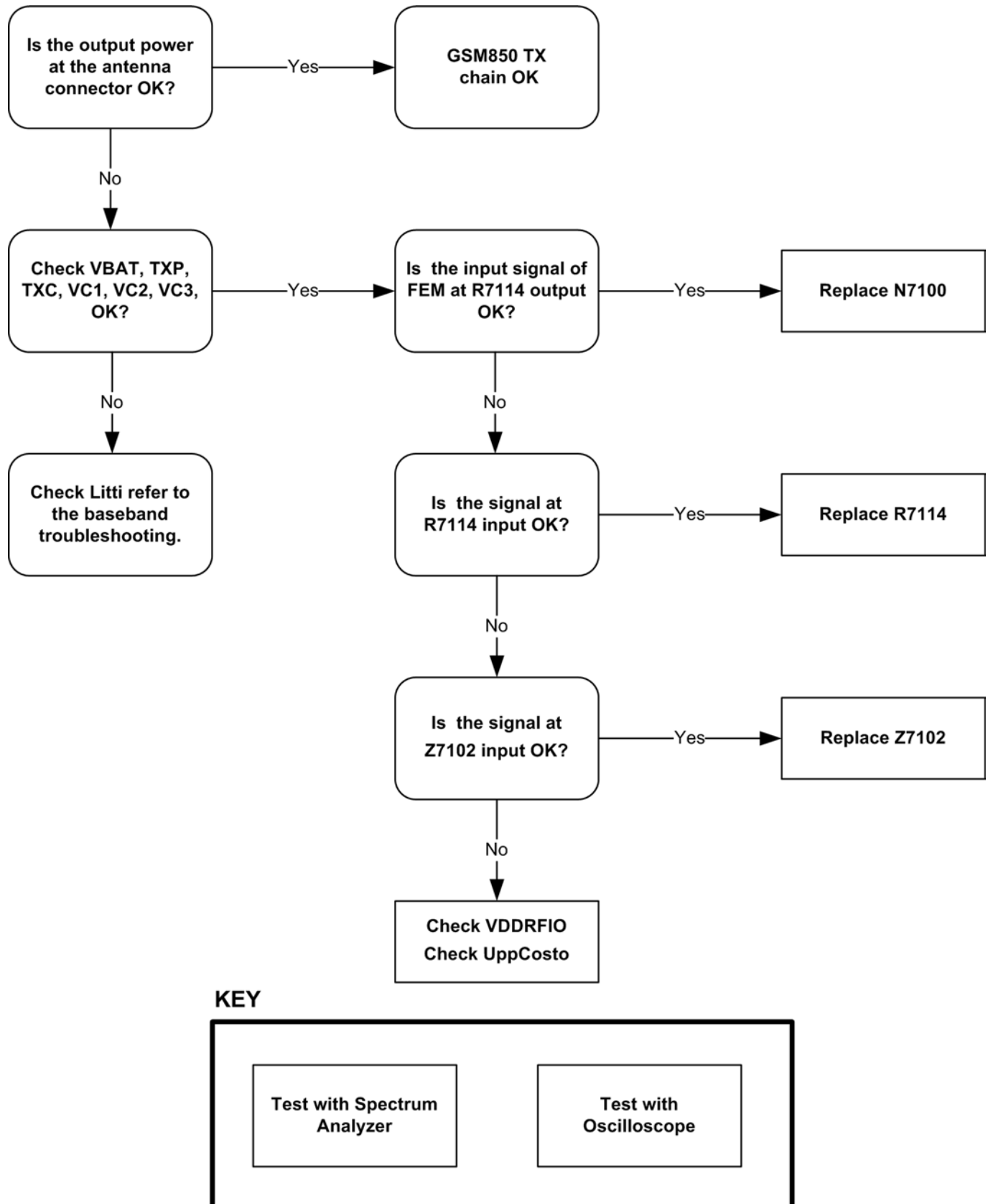


Figure 61 GSM 850 RF controls window

**Troubleshooting diagram for GSM 850 transmitter**

**Troubleshooting flow**





### GSM850 TX output power

Measure the output power of the phone; it should be about 32.5dBm. Remember the cable loss is about 0.3dB.

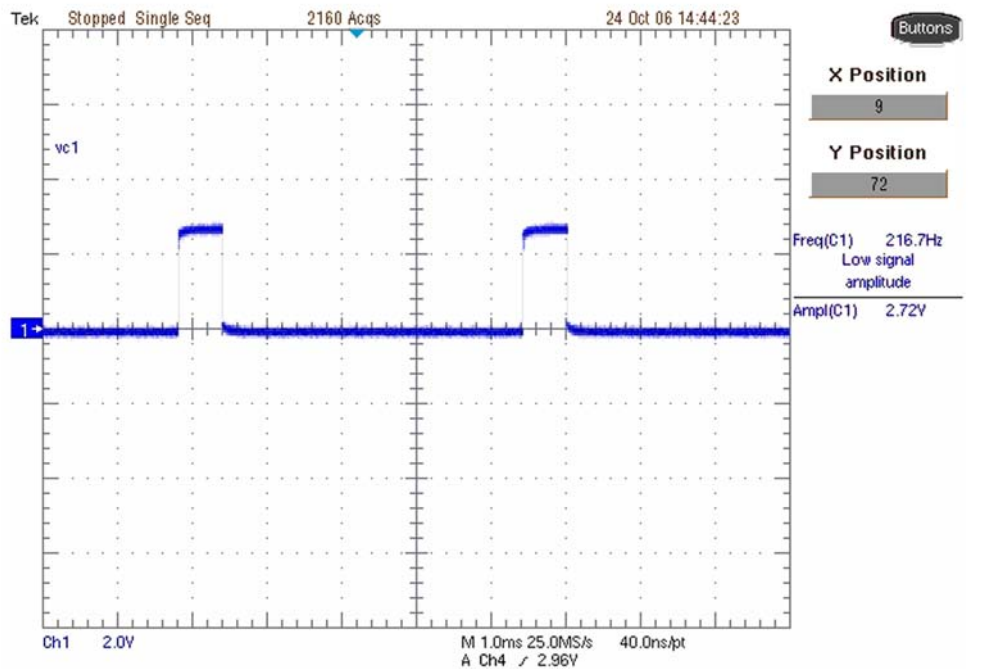


Figure 63 VC1 signal

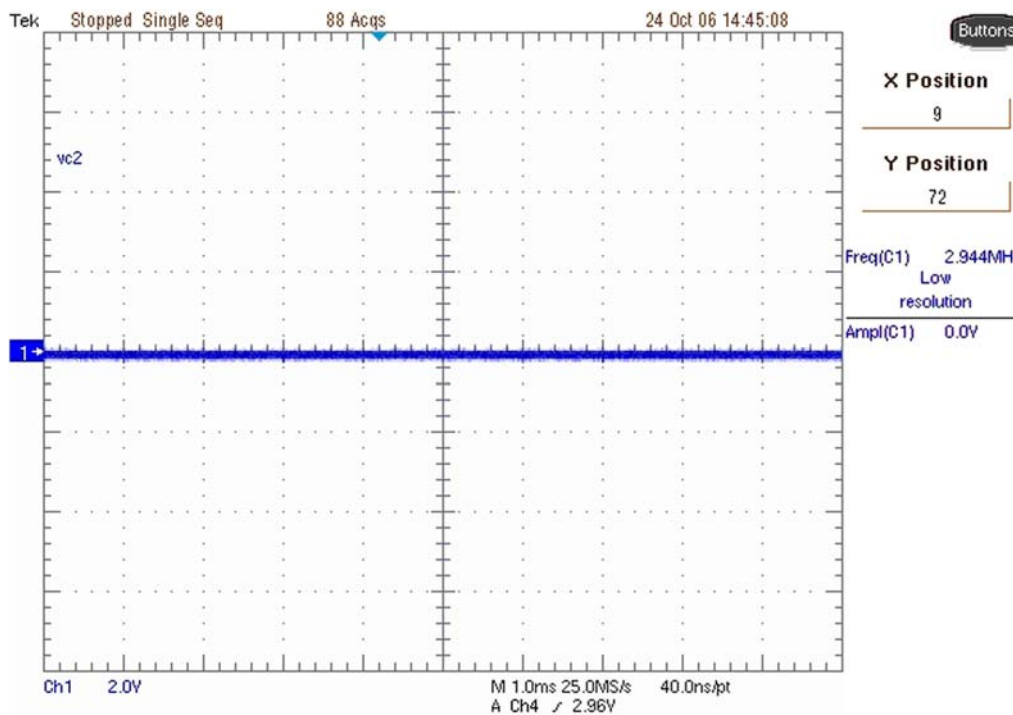


Figure 64 VC2 signal



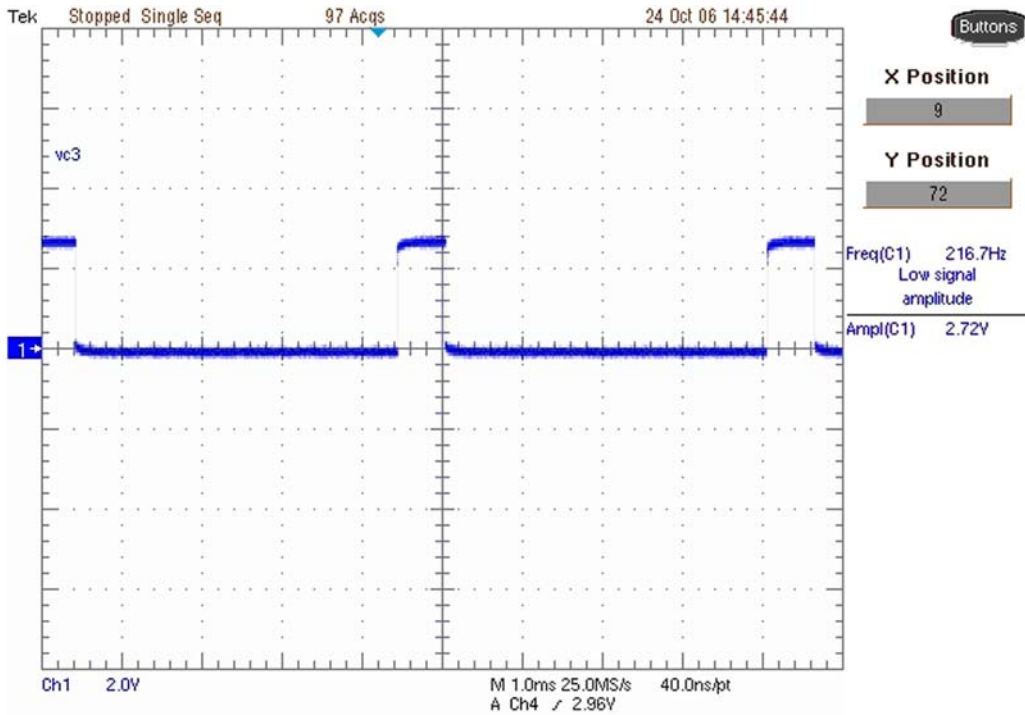


Figure 65 VC3 signal

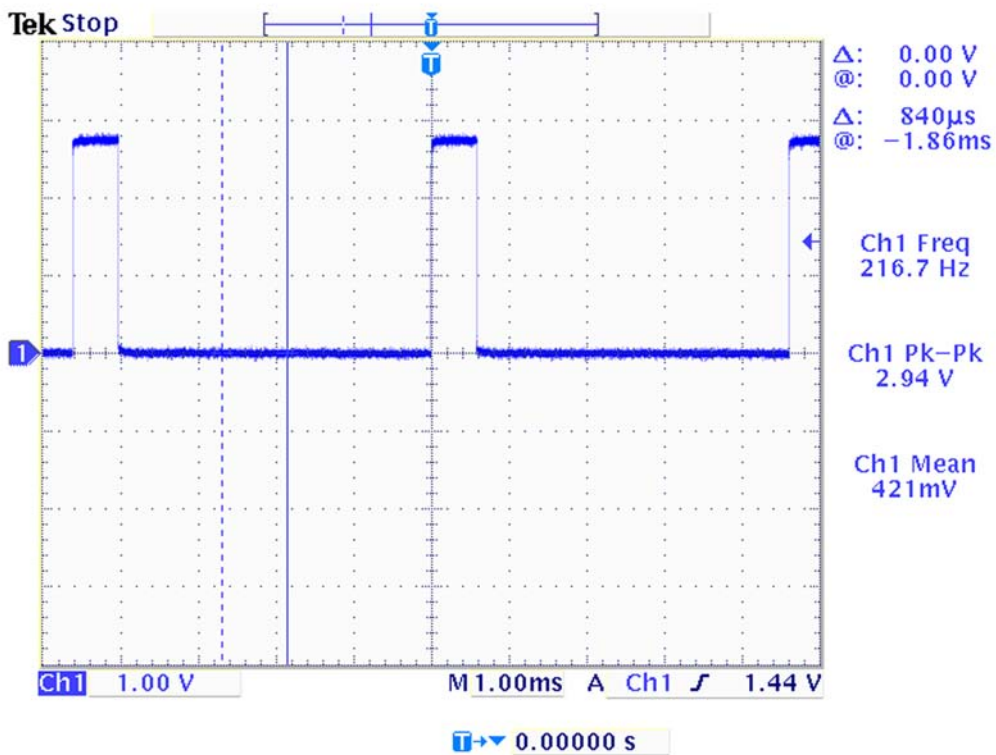


Figure 66 TXP signal

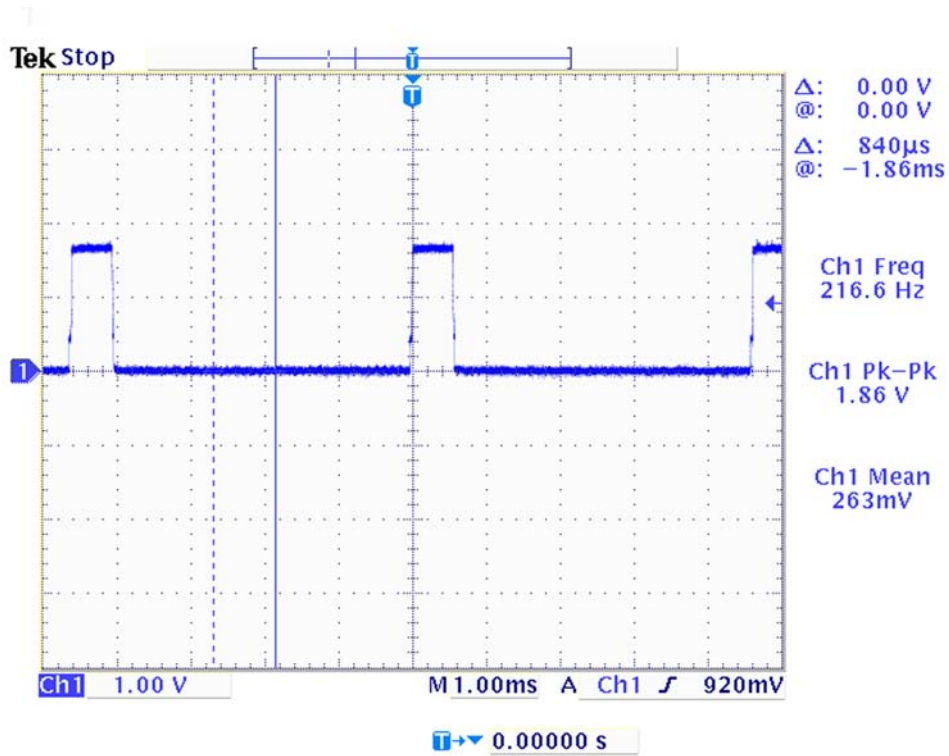


Figure 67 TXC signals at PCL5

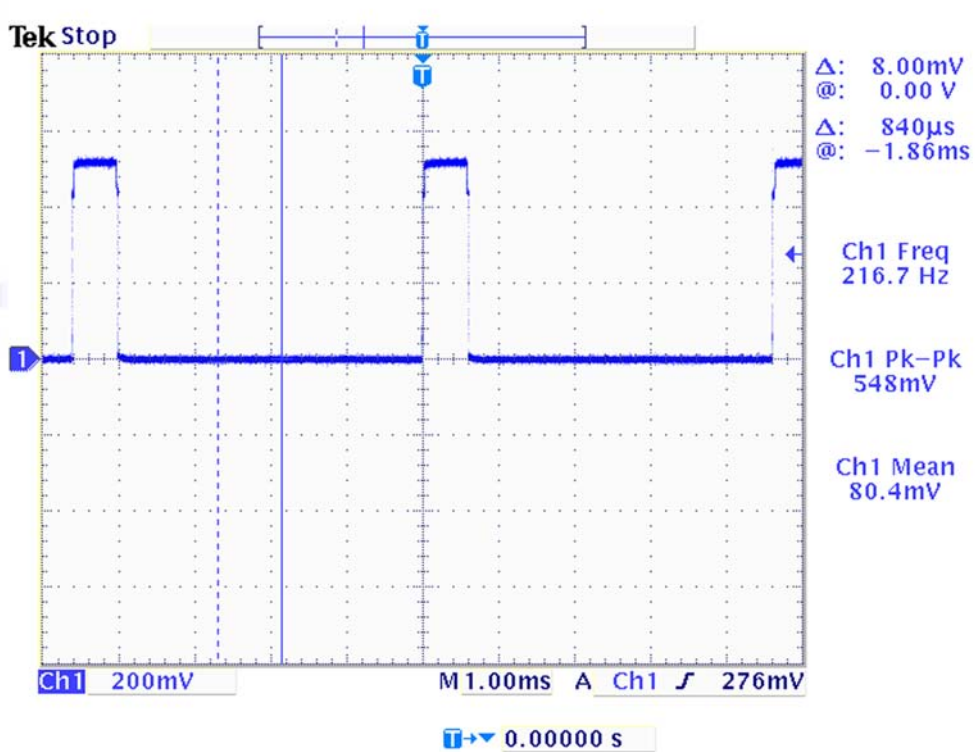


Figure 68 TXC signals at PCL19

## General instructions for GSM1900 TX troubleshooting

### Steps

1. Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to an attenuator at least 10dB before connected to the measurement equipment, otherwise the PA may be damaged.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.
3. Select File and Scan product.
4. Wait a while for the PC to read the information from the phone.
5. Select Testing and RF Controls.
6. Set the parameters as follows:
  - i Band: GSM 1900
  - ii Active Unit: TX
  - iii TX Power Level: 0
  - iv TX Data Type: Random
7. The setup should now look like this:

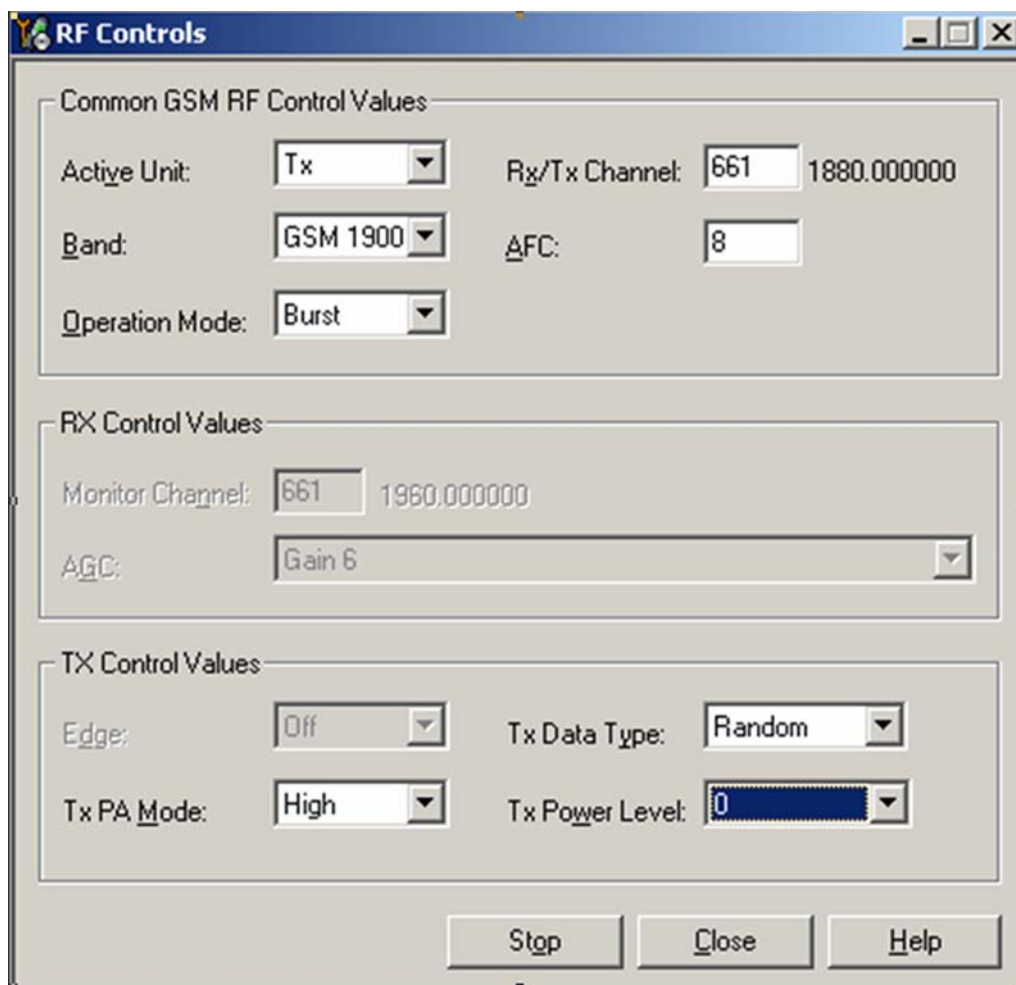


Figure 69 GSM 1900 RF controls window

### Troubleshooting diagram for GSM 1900 transmitter

#### Troubleshooting flow

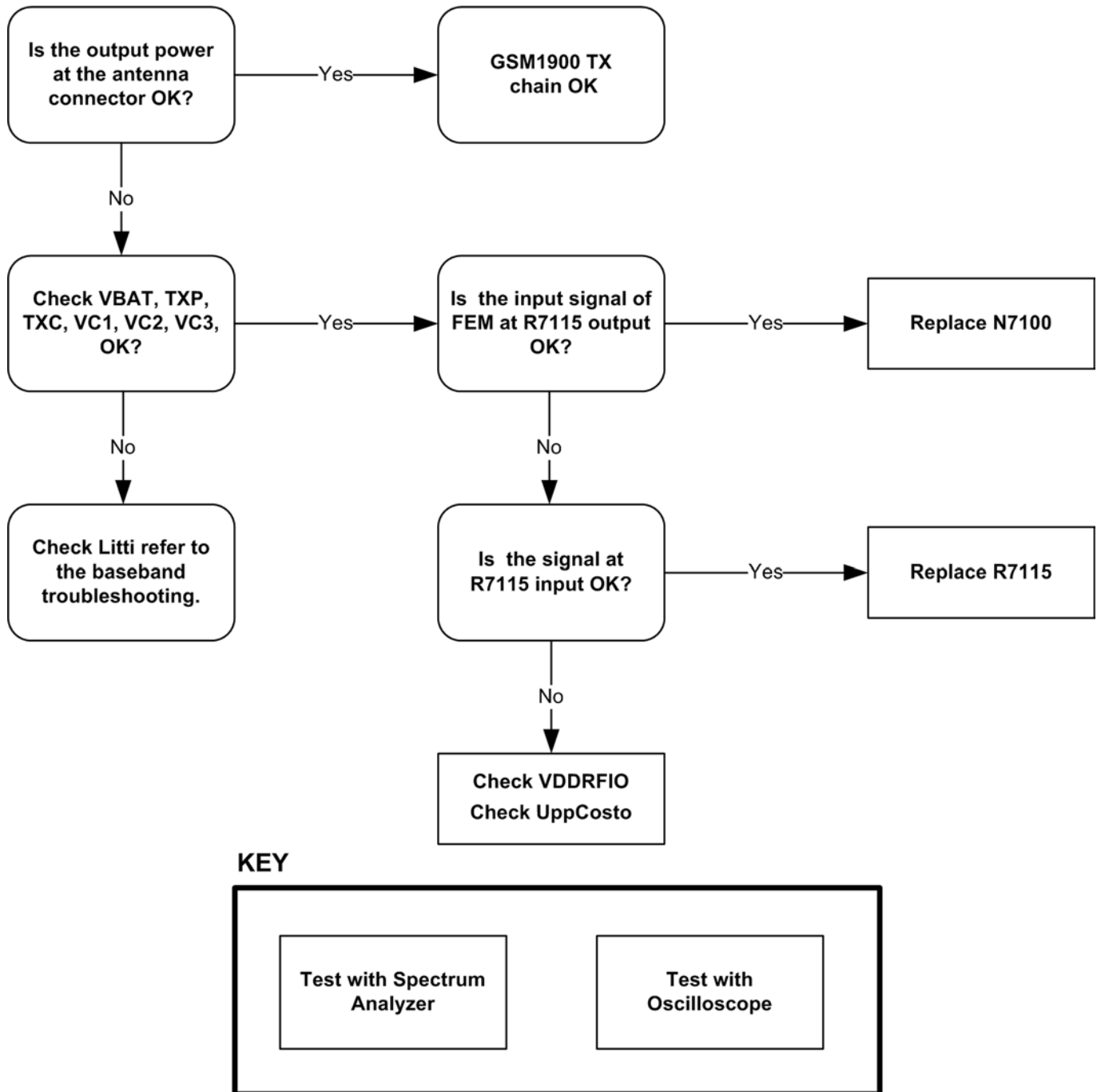


Figure 70 GSM 1900 transmitter troubleshooting

#### GSM1900 TX output power

Measure the output power of the phone; it should be about 29.5dBm. Remember the cable loss is about 0.5dB.

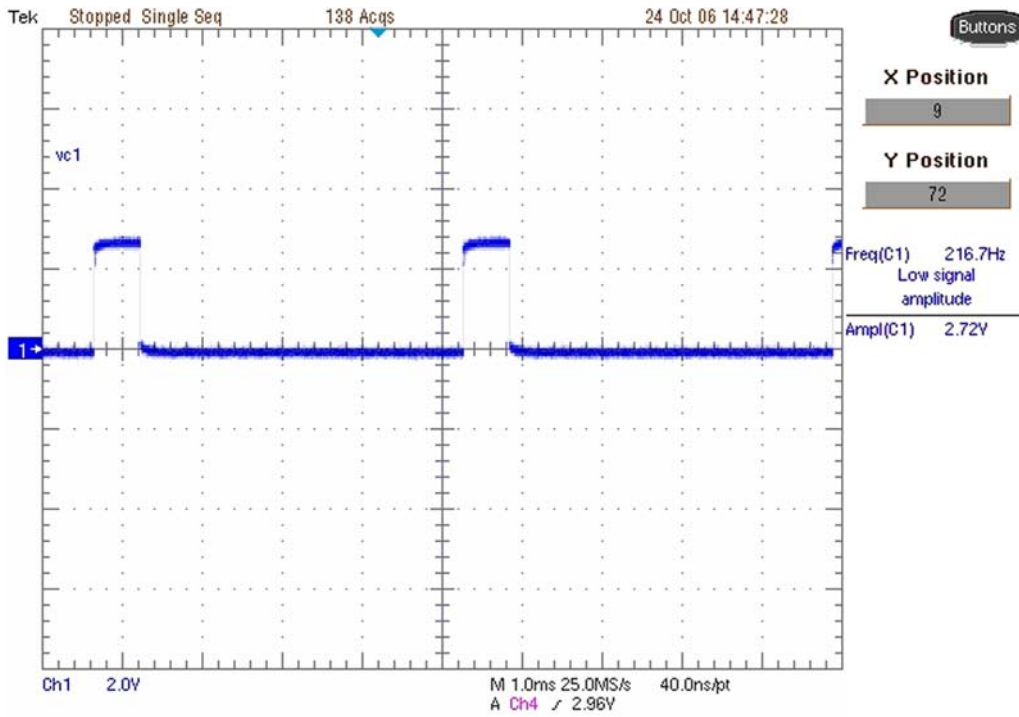


Figure 71 VC1 signal

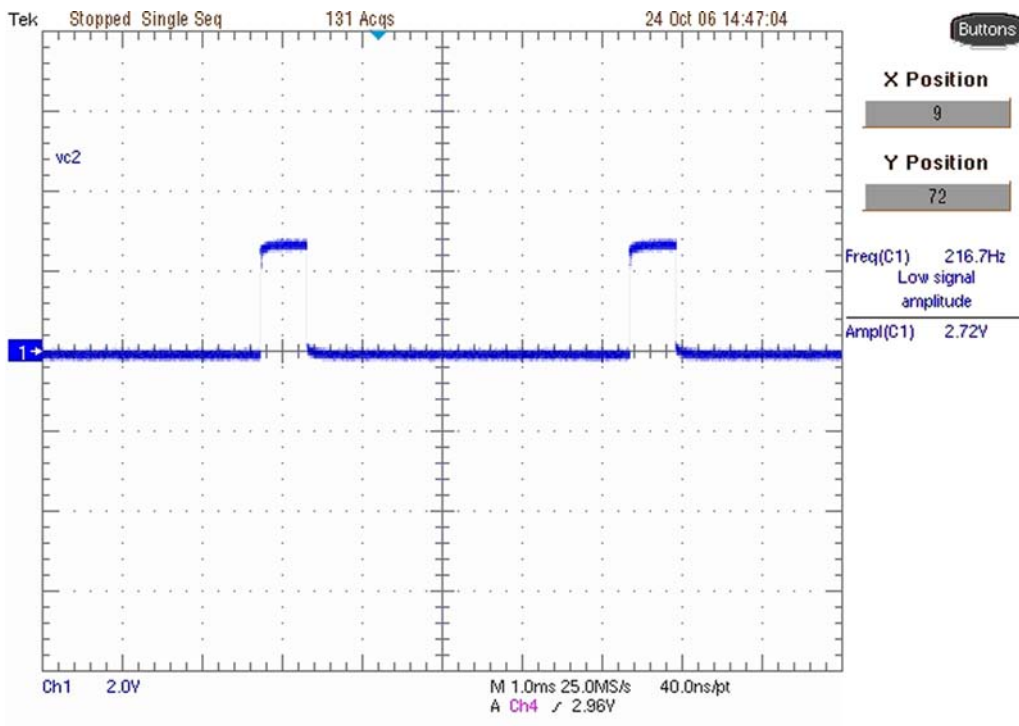


Figure 72 VC2 signal

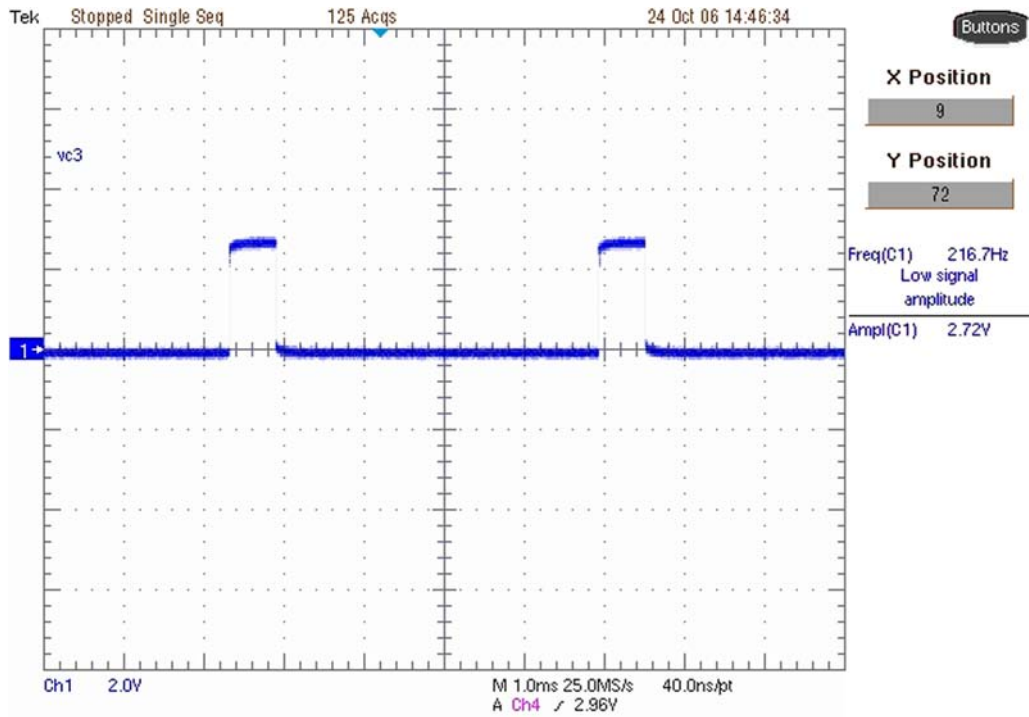


Figure 73 VC3 signal

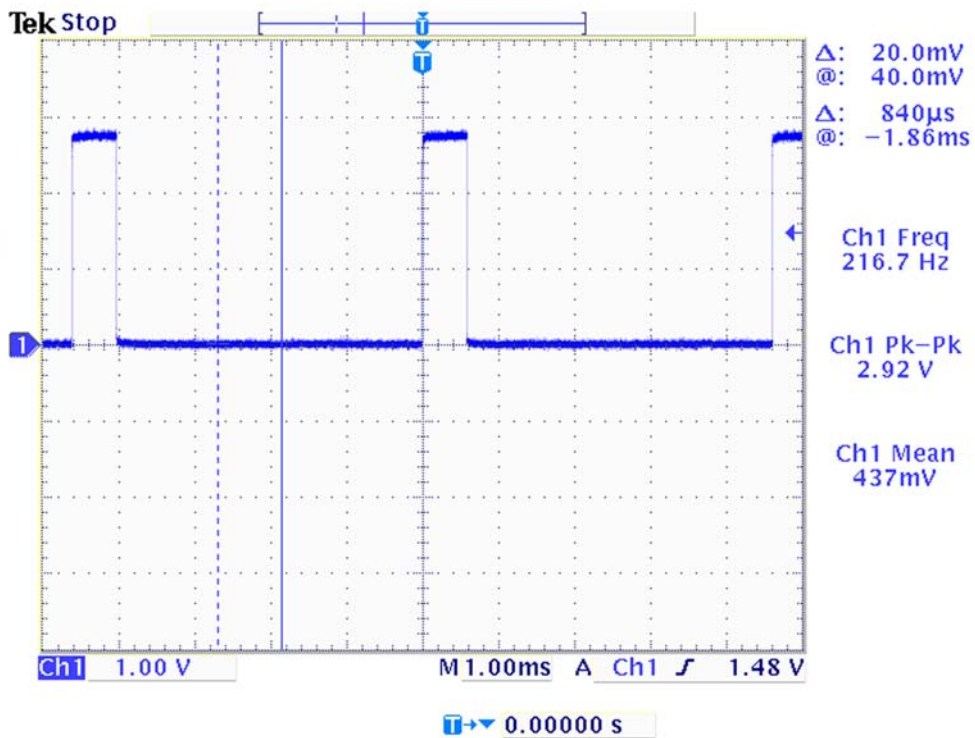


Figure 74 TXP signal



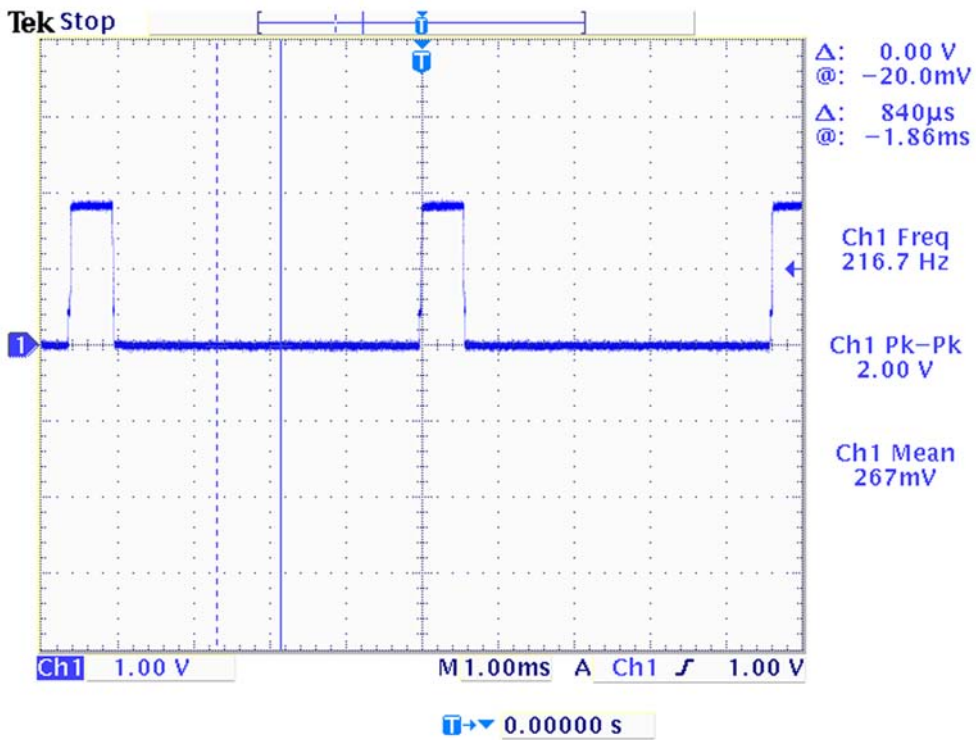


Figure 75 TXC signals at PCL0

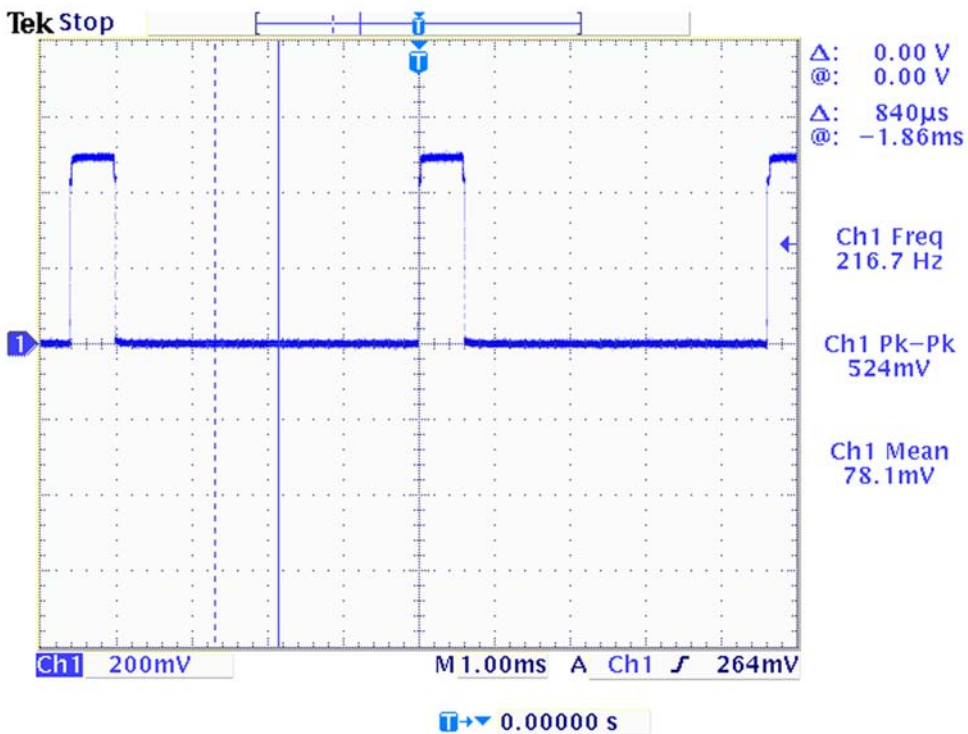


Figure 76 TXC signals at PCL15

## ■ Crystal troubleshooting

### Introduction

#### 26 MHz Reference Oscillator (VCX0)

The 26 MHz oscillator is located near the UPPCosto IC (D7402). The coarse frequency for this oscillator is set by an external crystal (B7402).

The 26 MHz signal from the crystal can be measured by probing C7436. The level at this point is approx. 276mVpp. Example Signal Measured at VCX0 output (C7436).

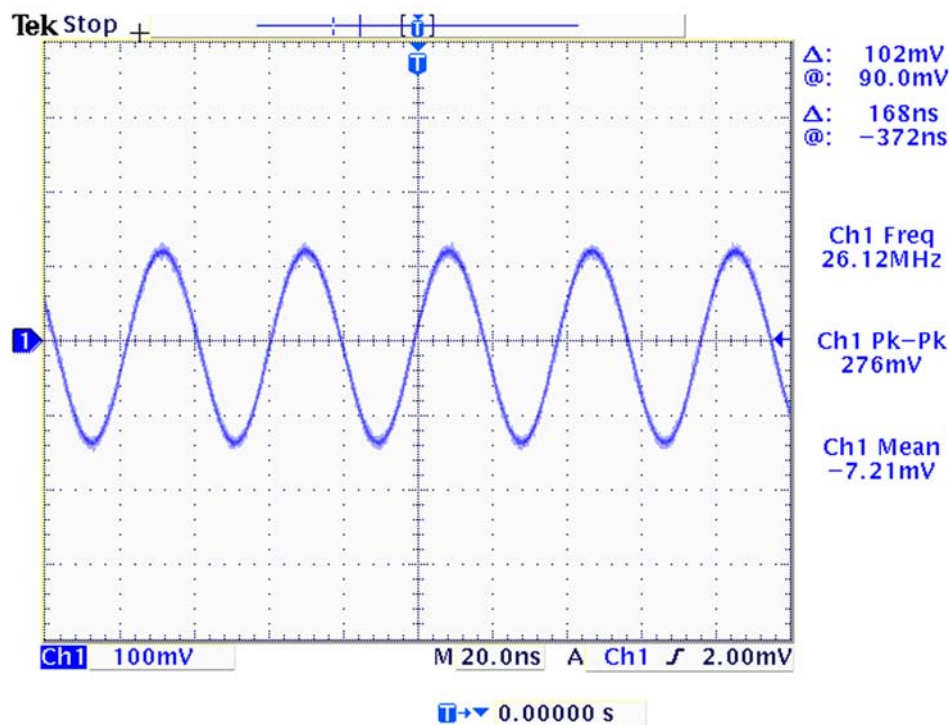


Figure 77 Crystal output signal waveform

## ■ FM radio troubleshooting

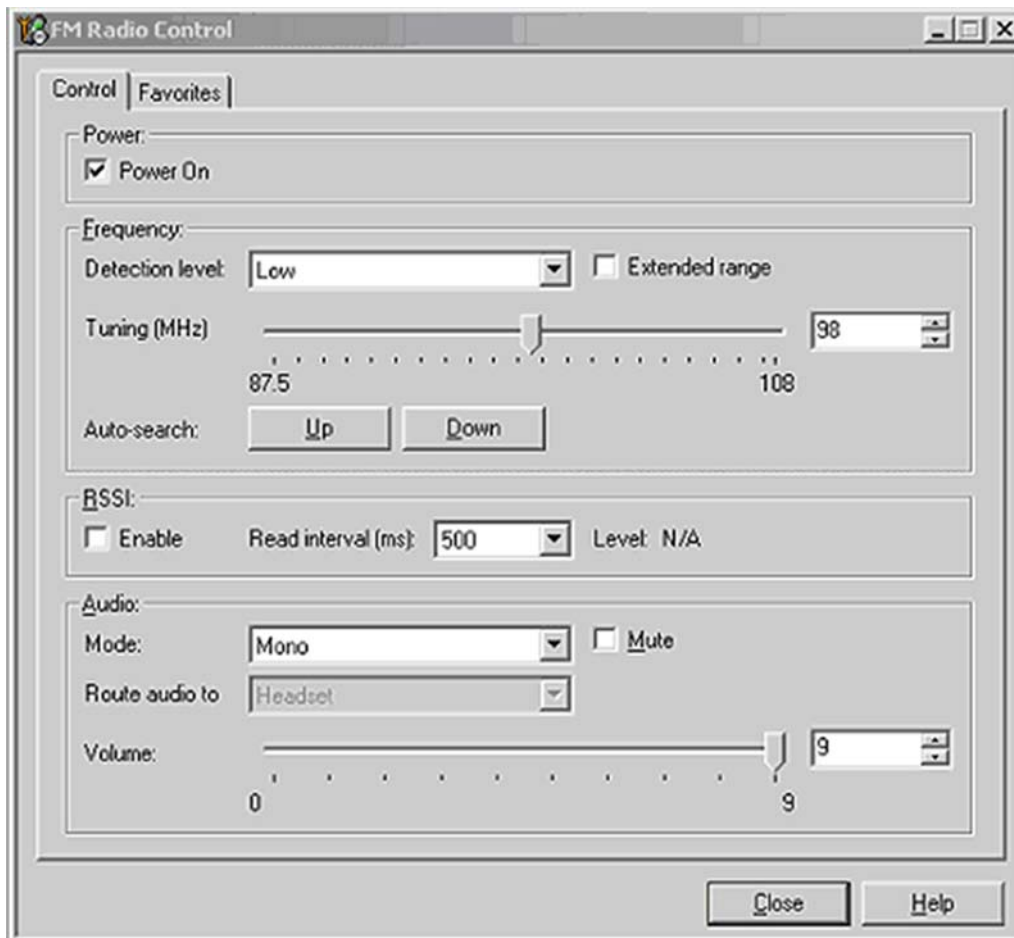
### FM radio troubleshooting

#### Steps

1. Connect the phone to a PC with the module repair jig.
2. Start *Phoenix* and establish a connection to the phone with the data cable e.g. FBUS.



3. Phoenix settings shall be as follows:



**Figure 78 Phoenix Settings**

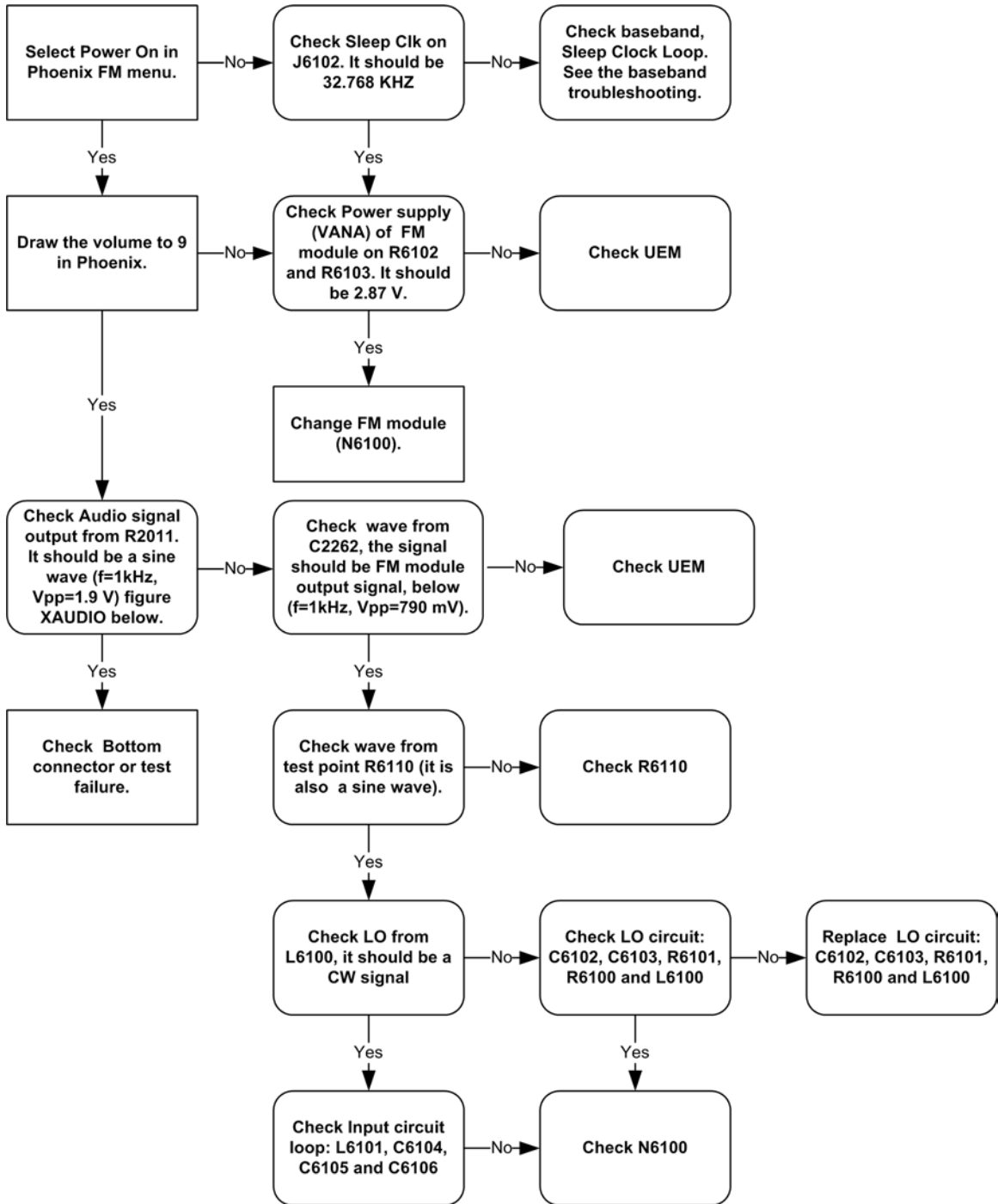
4. Establish input of a standard FM signal to the FM module.

5. Signal generator settings shall be as follows:

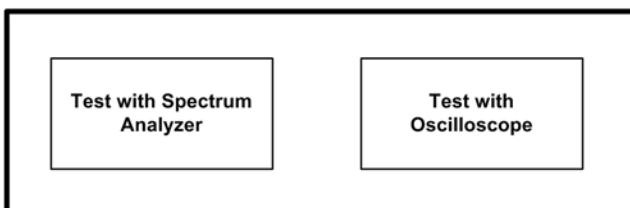
- i Frequency: 98 MHz
- ii Level: -60 dBm
- iii FM deviation: 22.5 kHz
- iv LFGEN frequency: 1kHz

**FM radio troubleshooting diagram**

**Troubleshooting flow**



**KEY**



# Nokia Customer Care

## 6 — System module

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## ■ Block diagram

### System module block diagram

The main functionality of the BB4.1 is concentrated on two ASICs, the digital/RF ASIC is called the UPPCosto and the mixed signal ASIC, the LITTI. The program code is stored in the external FLASH memory. The simplified BB4.1 block diagram is presented below.

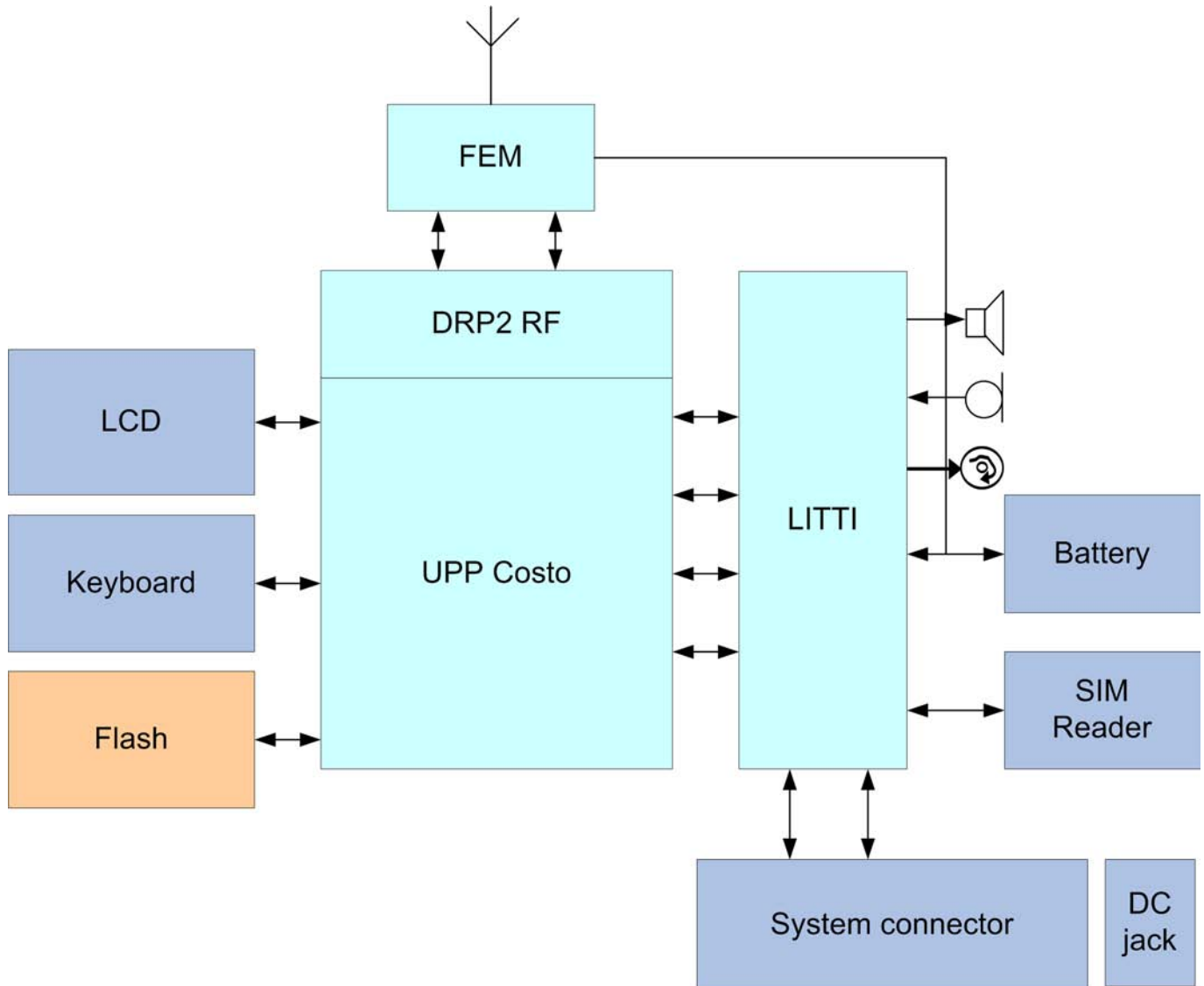


Figure 80 Module block diagram

### Functional description

The UPPCosto ASIC is designed to work in DCT4 cellular phone engines developed only for GSM. It is based on UPP2M\_v2, but with integrated Digital Radio Processor (DRP2).

## ■ Baseband description

### UPPCosto

UPPCosto includes 2MBit internal RAM, ARM7 Thumb 16/32-bit RISC MCU core, LEAD3 16-bit DSP core, ROM for MCU boot code and all digital control logic. UPPCosto also contains the major part of the RF system.

## LITTI

LITTI is the mixed signal ASIC used in the GSMCost 4.0 engine. The main functionality is: Voltage regulation, battery charge control, audio codec, A/D conversion, various drivers, Real Time Clock (RTC), system logic, and digital interfaces.

### Modes of operation

BB4.1 has five different functional modes:

- No supply: In NO\_SUPPLY mode, the phone has no supply voltage.
- Acting Dead: If the phone is off when the charger is connected, the phone is powered on but enters a state called "Acting Dead". To the user, the phone acts as if it was switched off.
- Active: In the Active mode the phone is in normal operation, scanning for channels, listening to a base station, transmitting and processing information.
- Sleep: In sleep mode VCTCX0 is shut down and 32 kHz sleep clock oscillator is used as reference clock for the base band.
- Charging: Charging can be performed in any operating mode.

### Audio function description

#### Audio

The basic audio structure and communication between HW-audio modules and the audio ASIC's is illustrated in the block diagram below.

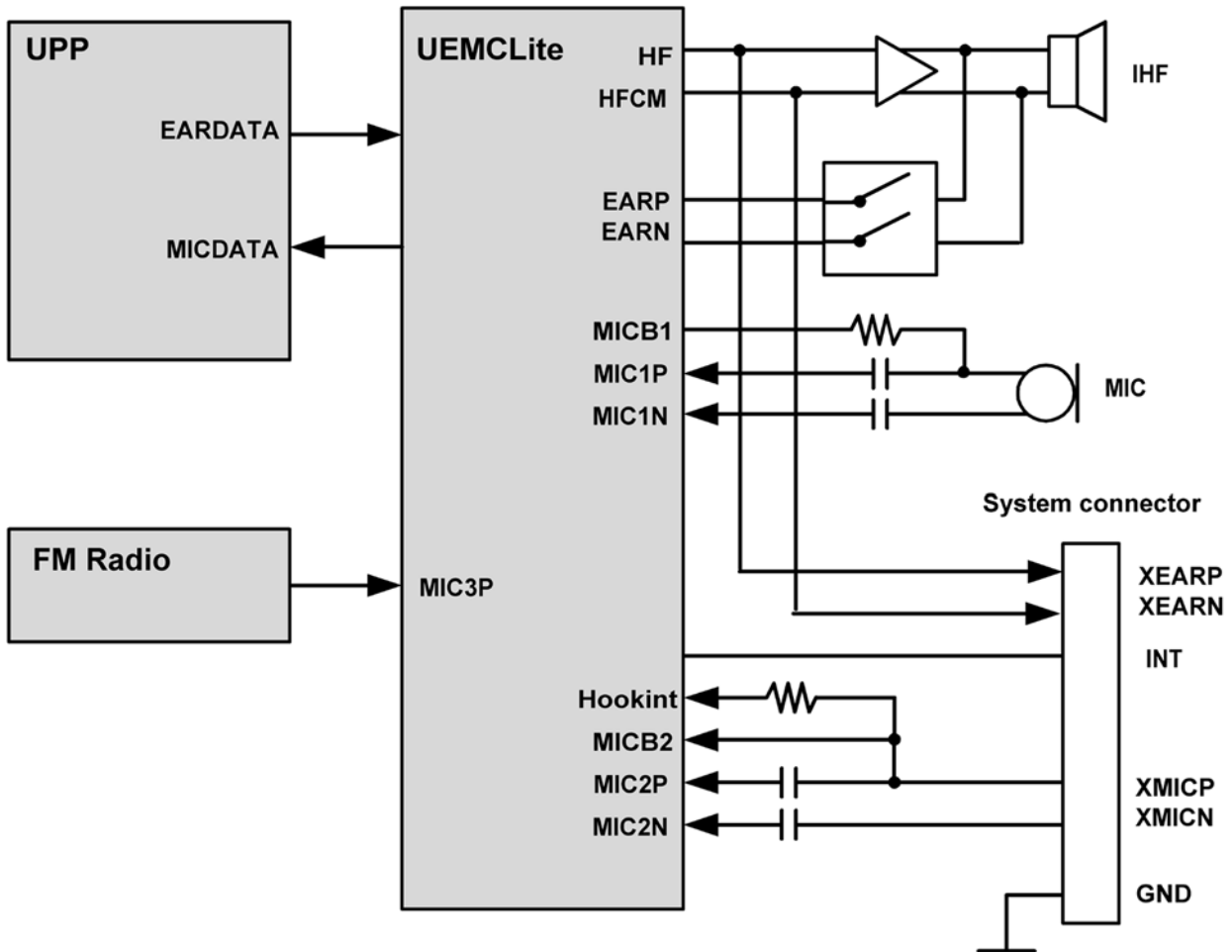


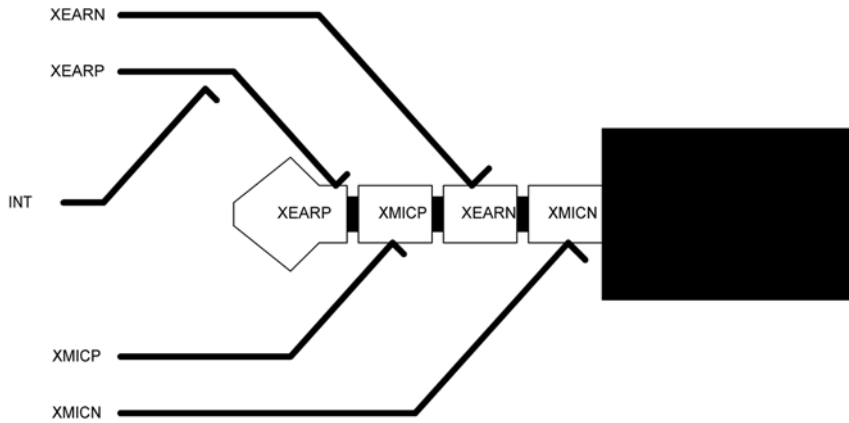
Figure 81 Audio block diagram

The audio control is taken care of by UEMCLite, which contains the MCU and audio codec. Input and output selection, and gain control is performed inside UEMCLite. DTMF-tones and other audio tones are generated and encoded by UPP and transmitted to UEMCLite for decoding.

The vibra has is driven by PWM signal, generating vibration by rotating an un-balanced mass (counter weight). The vibration signal is for example used as a silent alert call.

### External audio connector

The system connector, containing a 4-pole Jack plug, gains the access to the external audio interface. The Jack plug, which is integrated in the system connector, contains a mechanical switch, which is used to detect the connection of the accessories. The configuration for the 4-pole Jack-plug is shown in the following figure.



**Figure 82 4-pole jack plug for audio accessory**

**Table 6 Connector for External Audio Accessories**

Line symbol	Function
XMICP	External microphone signal input
XMICN	External microphone signal input
XEARP	External earphone signal output
XEARN	External earphone signal output
INT	Accessory detection
GND	Ground (Only used by PPH-1)

## External signals and connections

**Table 7 System connector**

Pin	Signal
1	GND
2	*
3	XMICIN
4	XEARN
5	XMICP
6	XEARP
7	HEADINT



■ **Interfaces**

**RF/BB Interface**

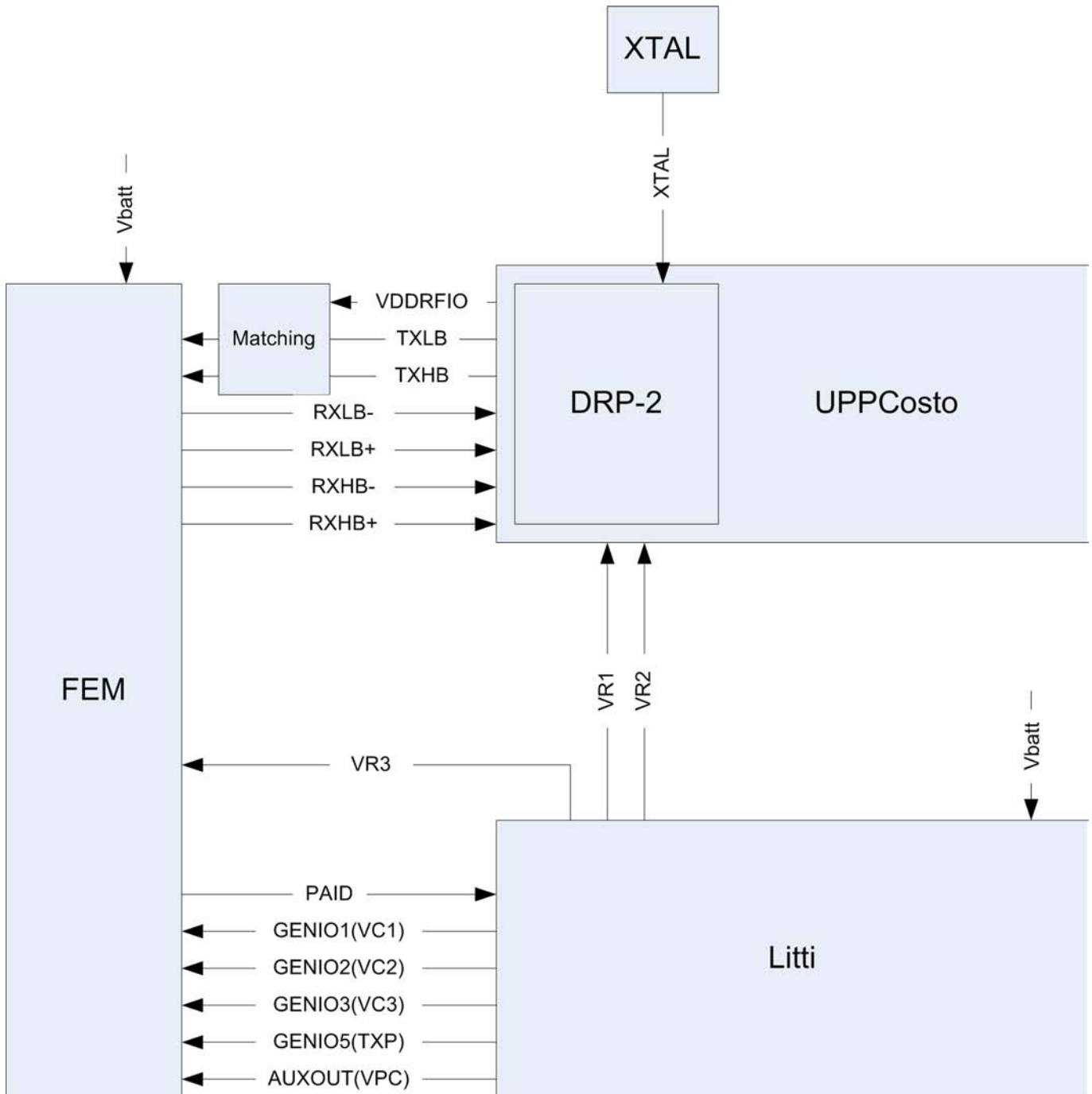


Figure 83 RF/BB Interface

**LCD interface**

The display is controlled by phone processor UPPcosto.

The LCD module is connected to the PWB by a flex PWB with 10-pin BtB connector.

## Keyboard

A 5 X 4 matrix keyboard consists of 20 keys, one 10-channel integrated passive filter arrays with downstream ESD protection of >8KV connect the matrix keyboard to UPPcosto.

The layout is shown in Keyboard layout in UI side.

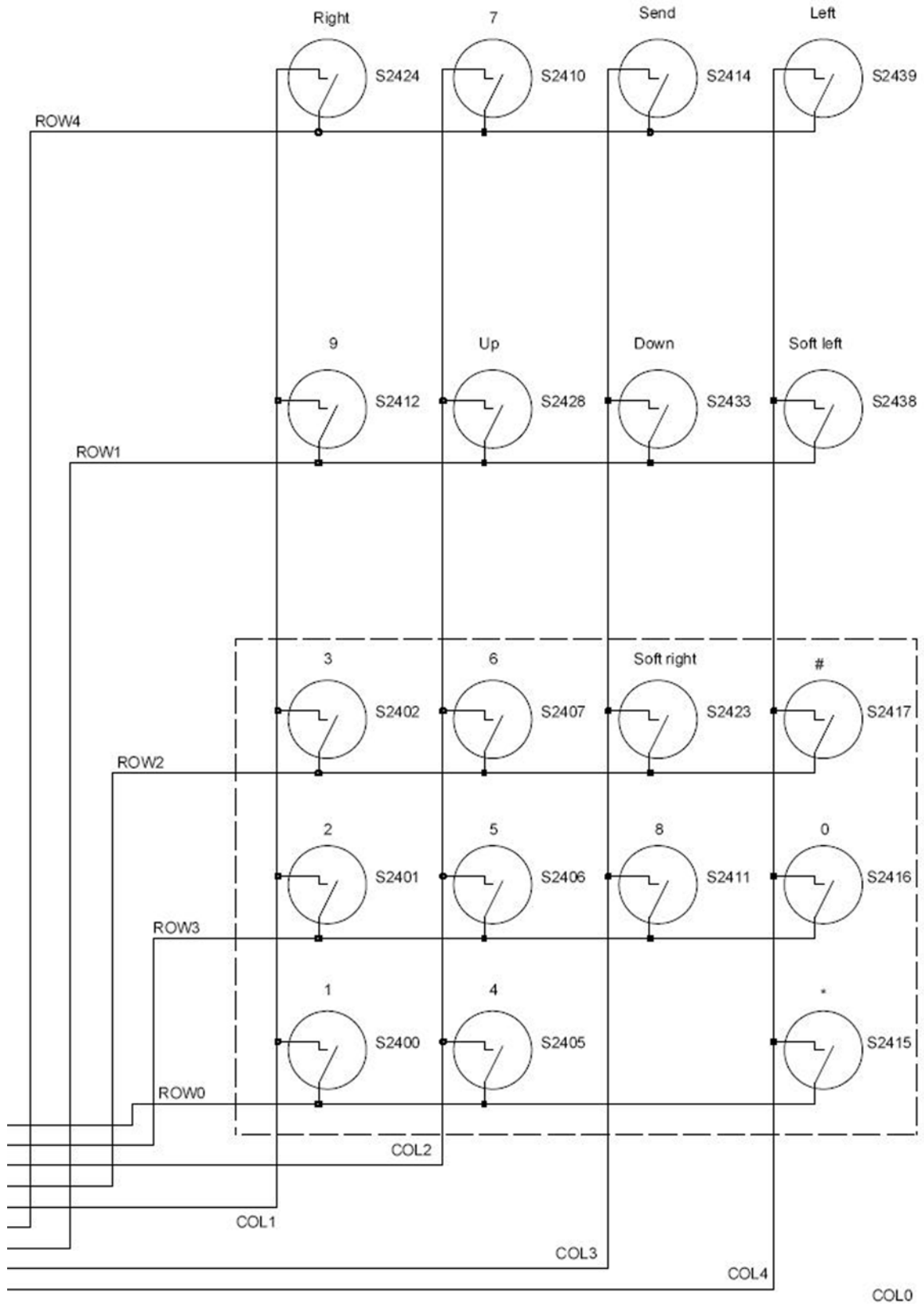


Figure 84 Keyboard schematics

## SIM interface

The SIM interface is programmed to support 3V and 1.8V SIMs.

The SIM interface is the electrical interface between the Subscriber Identity Module Card (SIM Card) and mobile phone.

**Table 8 SIM interface**

Pin	Name	Parameter	Min	Typ	Max	Unit	Notes	
1	VSIM	1.8V SIM Card	1.6	1.8	1.9	V	Supply voltage	
		3V SIM Card	2.8	3.0	3.2	V		
2	SIMRST	1.8V SIM Card	0.9xVSI M		VSIM	V	SIM reset (output)	
			0		0.15xVSIM			
		3V SIM Card	0.9xVSI M		VSIM	V		
			0		0.15xVSIM			
3	SIMCLK	Frequency		3.25		MHz		
		Trise/Tfall			50	ns		
		1.8V Voh	0.9xVSI M		VSIM	V		
		1.8V Vol	0					
		3V Voh	0.9xVSI M		VSIM	V		
		3V Vol	0					
4	DATA	1.8V Voh	0.9xVSI M		VSIM	V	SIM data (output)	
		1.8V Vol	0		0.15xVSIM			
		3V Voh	0.9xVSI M		VSIM			
		3V Vol	0		0.15xVSIM			
			1.8V Vih	0.7xVSI M		VSIM	V	SIM data (input)
			1.8V Vil	0		0.15xVSIM		Trise/Tfall max 1us
			3V Vil	0.7xVSI M		VSIM		
			3V Vil	0		0.15xVSIM		
5	NC					Not connected		
6	GND	GND	0		0	V	Ground	

VSIM specified in regulator section in this document

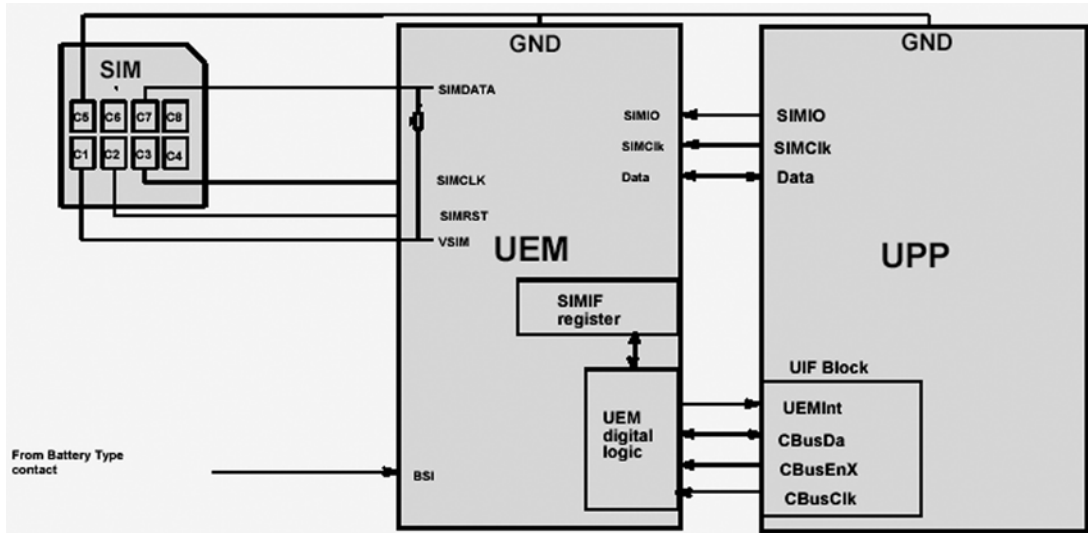


Figure 85 SIM interface block diagram

**Battery connector**

Table 9 Battery IF

Signal	From	To	Min	Nom	Max	Condi-tion	Note
GND	Global	Batt (-)					Global GND
VBAT		Batt (+)	3.1		5.4		Battery Voltage
BSI		LITTI	0		2.78		Analog input, Battery Size Indicator Resistor, 100 kohm pull up to 2.78V (VBB1).

**Battery BL-5C**

- Type: BL-5C
- Technology: Li-Ion, 4.2 V charging, 3.1 V cut-off
- Capacity: 1020 mAh.

The BSI resistor is placed on the main PWB as the telephone supports only one battery capacity. Further a BSI connection is added to the Flash interface. The battery temperature is measured by a NTC resistor placed on the main PWB, opposite to the Battery. Battery pack has an impedance of 130 - 150 mΩ (0 – 45 °C).

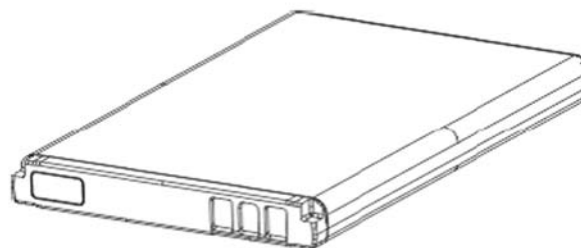
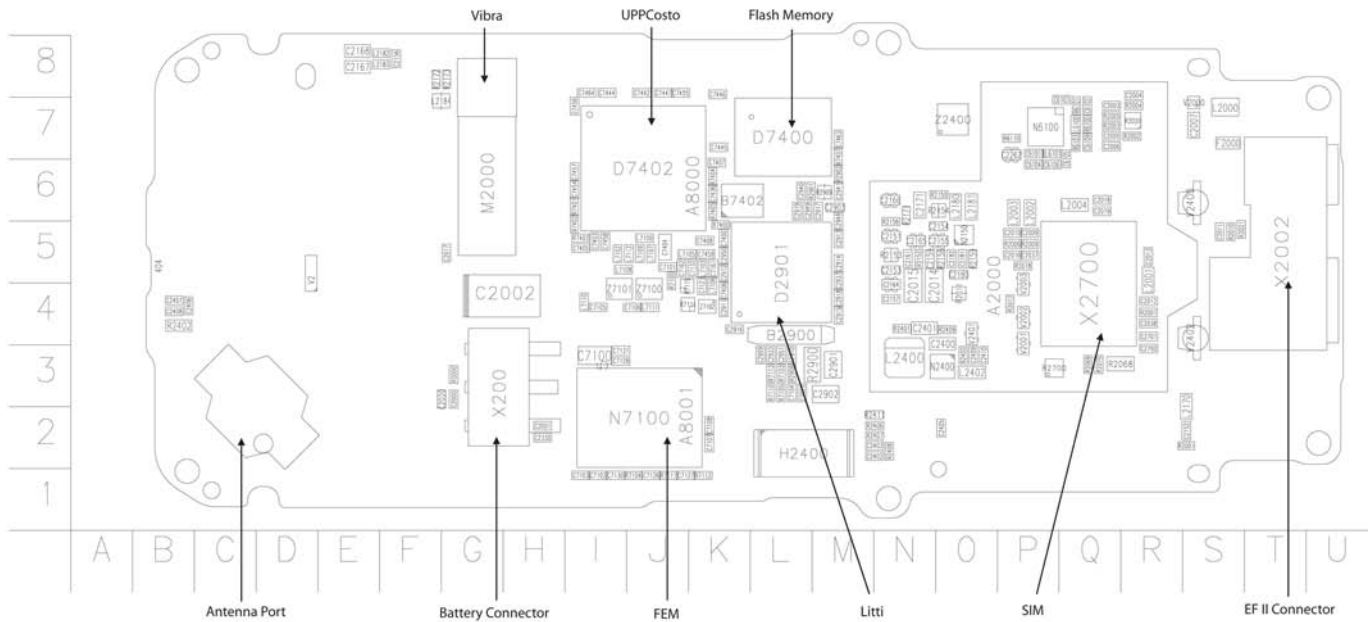


Figure 86 BL-5C battery block

**PWB outline**



**Figure 87 PWB top side component placement**

**RF description**

**Frequency band, power and multi-slot class**

The requirements leads to the specification in the table below:

**Table 10 Frequency bands and TX power class**

System	Frequency band	TX power class
GSM850	Tx: 824 - 849 MHz	4 (33 dBm)
	Rx: 869 - 894 MHz	
GSM900	Tx: 880 - 915 MHz	4 (33dBm)
	Rx: 925 - 960 MHz	
GSM1800	Tx: 1710 - 1785 MHz	1 (30dBm)
	Rx: 1805 - 1880 MHz	
GSM1900	Tx: 1850 - 1910 MHz	1 (30 dBm)
	Rx: 1930 - 1990 MHz	

**Transmitter Architecture Description**

The transmitter in DRP2 is based on the frequency synthesizer with a direct frequency/phase modulation capability. The frequency synthesizer is implemented as an All Digital PLL (ADPLL), where the FCW is digital modulated by filtered TX data. The fundamental frequency of the RF oscillator in the ADPLL is running around 3.6GHz, which is divided by 4 or 2 to generate CW frequencies in the lower and upped bands of interest. The TX data are feed into two points of the ADPLL. The GMSK modulated output signal of the ADPLL block are fed into Pre-Power Amplifier (PPA) buffer.

The GMSK output signal from the PPA is fed into a front end module (FEM). A 2dB attenuator is added between the PPA and the FEM.

### **Digitally Controlled X-tal Oscillator**

The Digitally Controlled X-tal Oscillator (DCXO) provides the reference clock for the DRP2 and for the digital baseband. The only external component is the crystal (and a series capacitor).

# Nokia Customer Care

## Glossary



A/D-converter	Analogue-to-digital converter
ACI	Accessory Control Interface
ADC	Analogue-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
CDMA	Code division multiple access
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
CSD	Circuit-switched data
CSR	Cambridge silicon radio
CSTN	Colour Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analogue converter
DAC	Digital-to-analogue 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
DTM	Dual Transfer Mode
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evolution
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compatibility
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
GPIO	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HSDPA	High-speed downlink packet access
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
ICHA	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Association

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	Multiprotocol 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
MTP	Multipoint-to-point connection
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architecture
OMAP	Operations, maintenance, and administration part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x and BB5
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™	Reduced function PopPort™ interface
RFBUS	Serial control Bus For RF

RSK	Right Soft Key
RS-MMC	Reduced size Multimedia Card
RSS	Web content Syndication Format
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-noise ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCP/IP	Transmission control protocol/Internet protocol
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
UPnP	Universal Plug and Play
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
WCDMA	Wideband code division multiple access
WD	Watchdog
WLAN	Wireless local area network
XHTML	Extensible hypertext markup language
Zocus	Current sensor (used to monitor the current flow to and from the battery)