6-Troubleshooting Instructions

[This page left intentionally blank]

Table of Contents

Page No

List of Figures

Page No

[This page left intentionally blank]

Baseband Troubleshooting

Baseband test points

This document contains the Nokia 2600 troubleshooting diagrams.

Test points are described and listed in the A3 schematic diagrams.

Troubleshooting diagrams

In this section, Troubleshooting diagrams is provided for the most common problems of the Nokia 2600

NOTE : Since both D200 (UEM) and D400(UPP) are underfilled, they can not be replaced. If either D200 or D400 is defective, the whole PWB has be discarded.

Phone is dead

This means that the phone do not draw any current at all when supply is connected and/or powerkey is pressed.

It is assumed that the voltage supplied is 3.6 VDC. The UEM will prevent any functionality what so ever at battery/supply levels below 2.9 VDC.

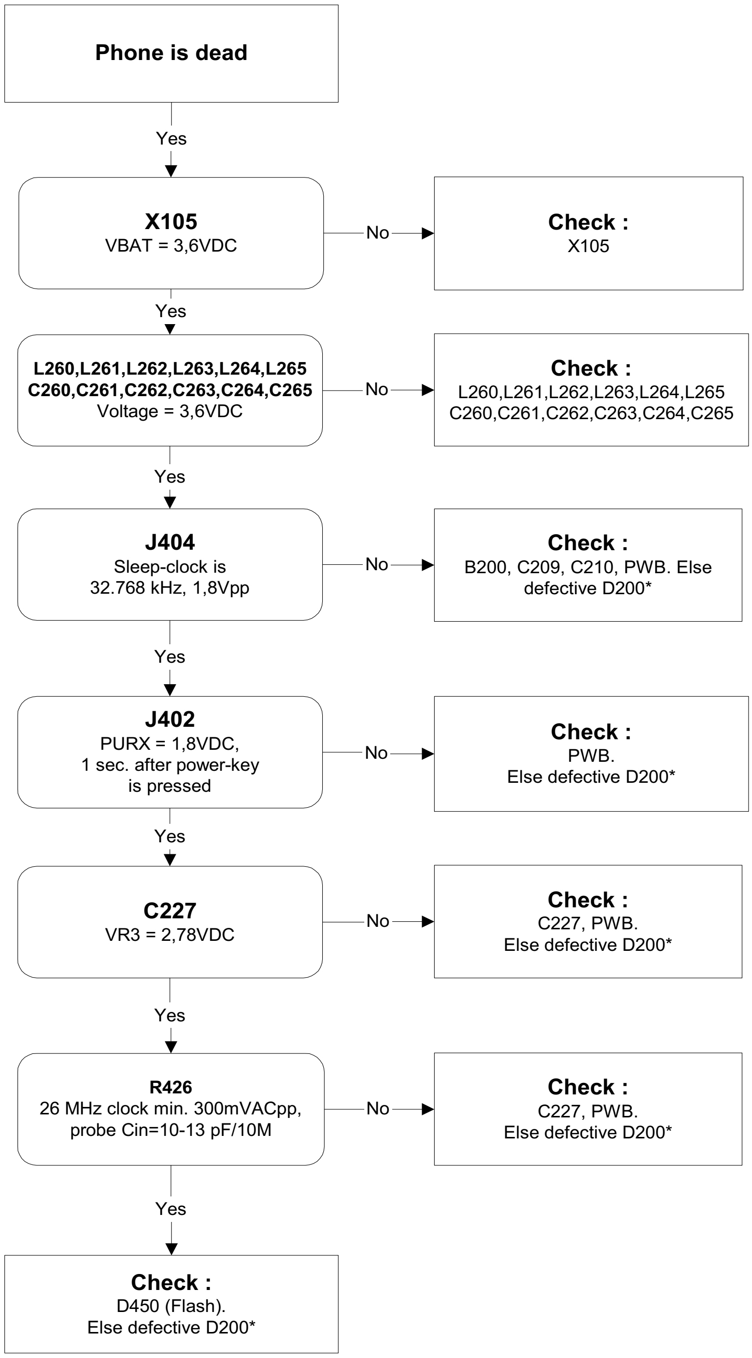


Figure 1:Phone is dead troubleshooting

Flash programming do not work

The flash programming can only be done via the pads on the PWB (J396).

In case of Flash failure in FLALI station, problem is most likely related to SMD problems. Possible failures could be short-circuit of balls under µBGAs (UEM, 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).

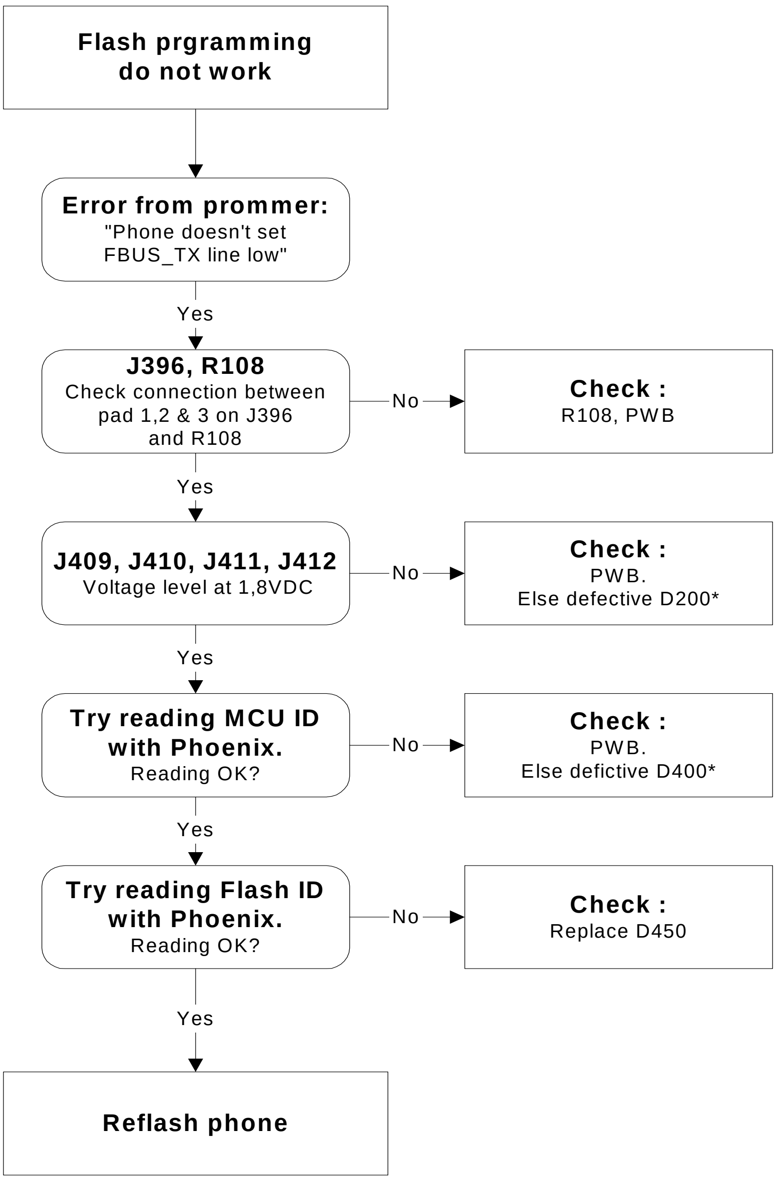


Figure 2:Flash programming fault

Power does not stay on or phone is jammed

If this kind of failure is presenting itself immediately after FLALI, it is most likely caused by ASICs missing contact with PWB.

If for some reason the MCU does not service the watchdog register within the UEM, the operations watchdog will run out after approximately 32 seconds. Unfortunately, the service routine can not be measured.

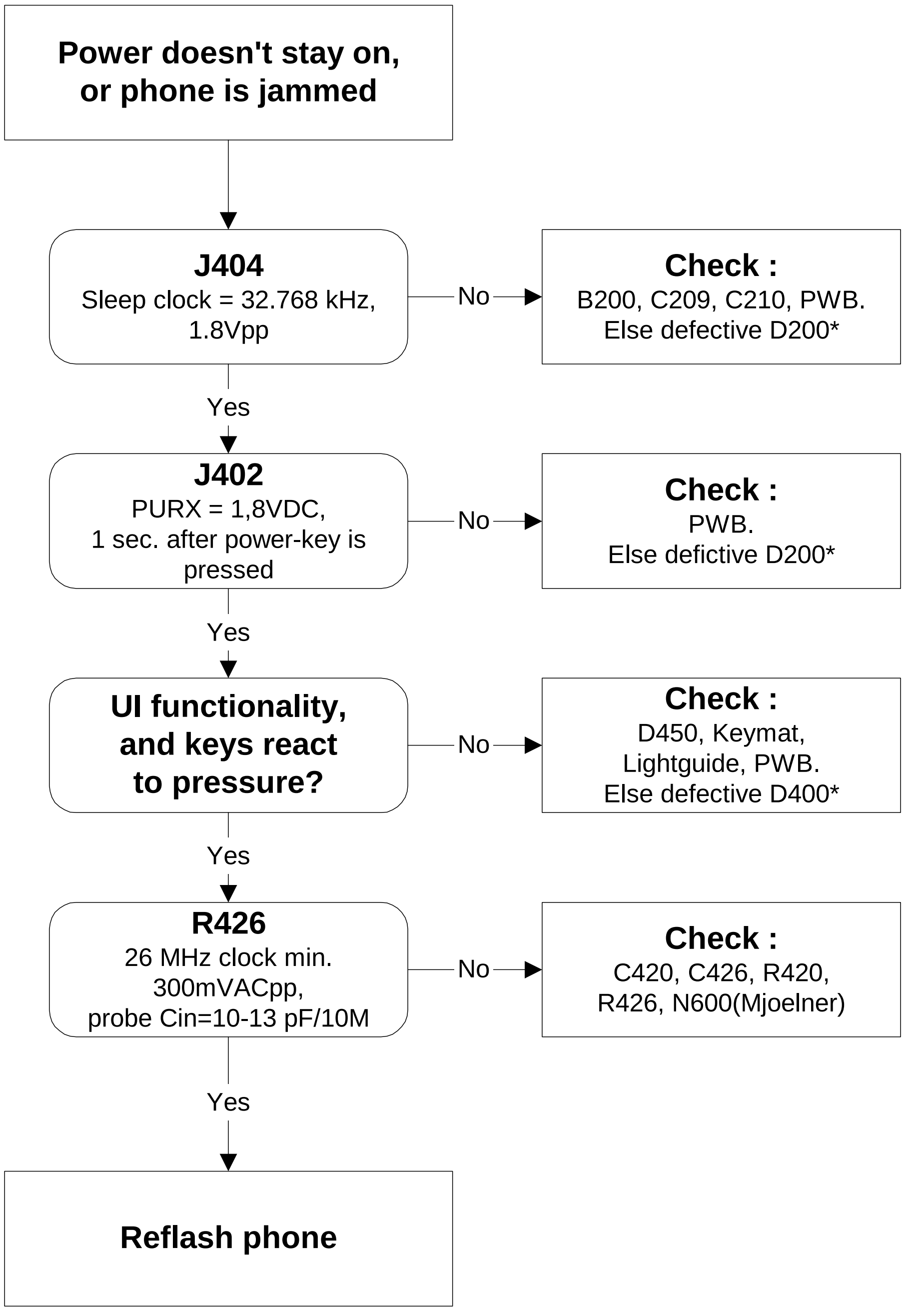


Figure 3:Phone jammed troubleshooting

Display information : "Contact Service"

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.

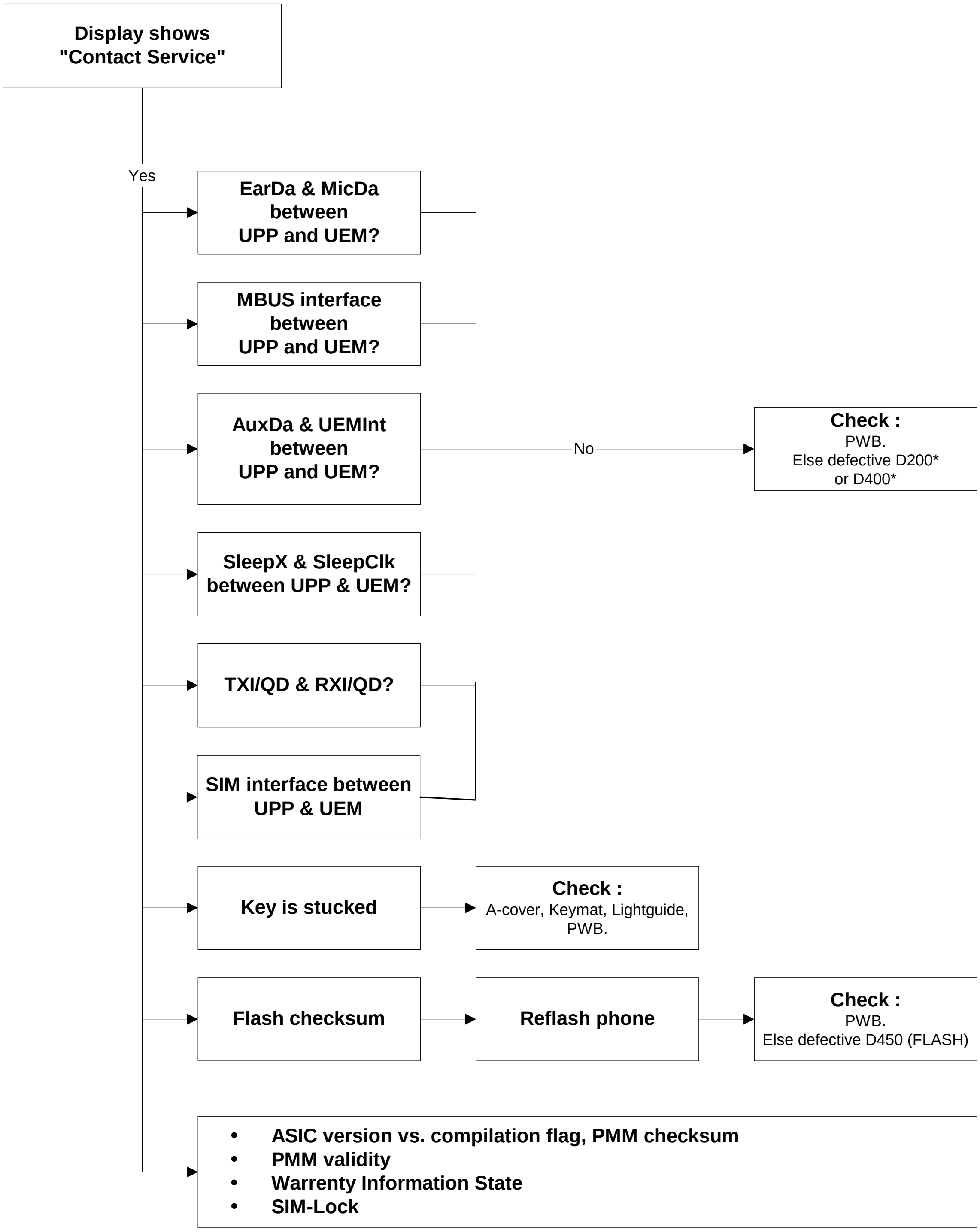


Figure 4:Troubleshooting when Contact Service message seen

The phone do not register to the network, or the phone cannot make a call

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 'burried' in one or more of the inner layers of the PWB.

First of all check that SIM LOCK is not causing the error by using a Test-SIM card and connect the phone to a tester.

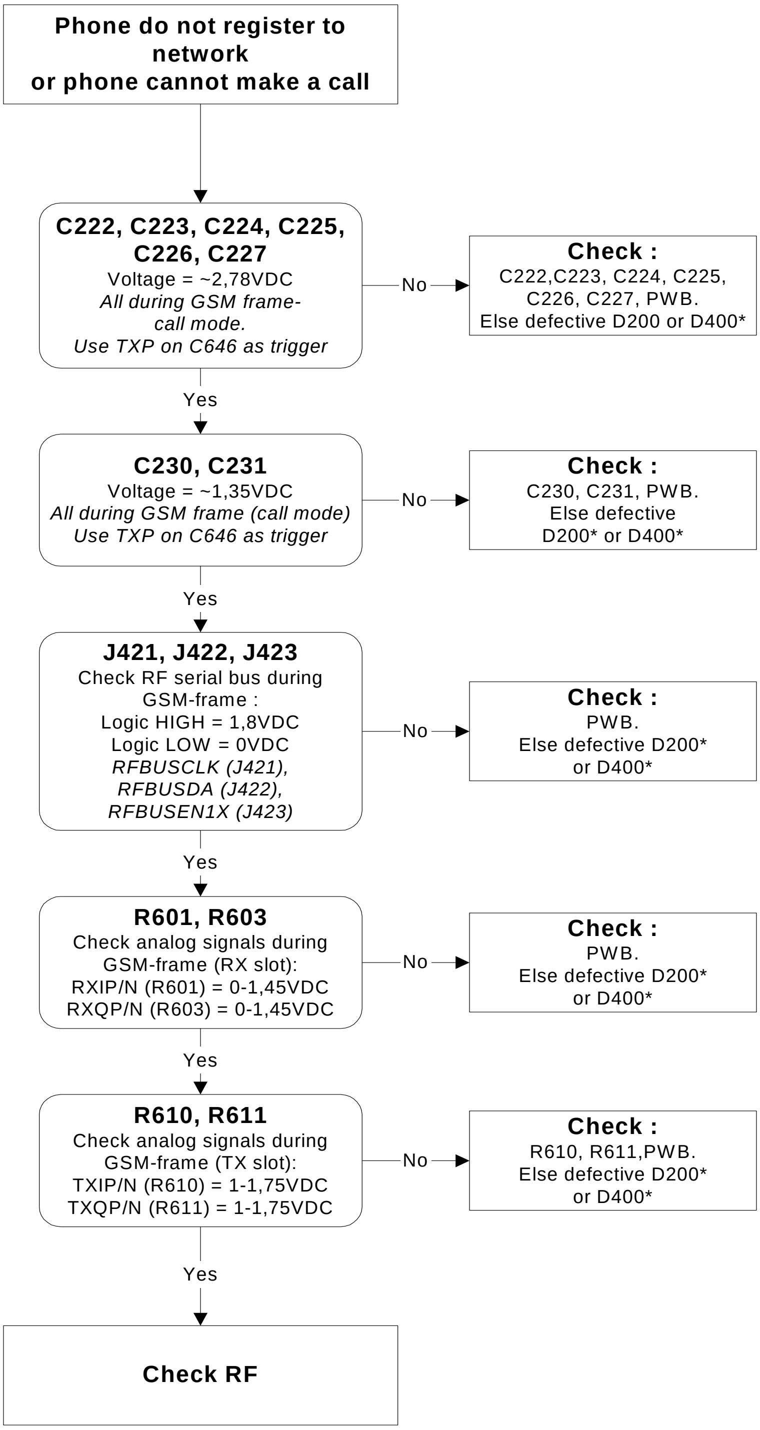


Figure 5:No call troubleshooting

SIM related faults

Insert SIM card fault

The hardware of the SIM interface from UEM (D200) to the SIM connector (X387) 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, whereafter it will display ”Insert SIM card”.

Figure 6:SIM troubleshooting

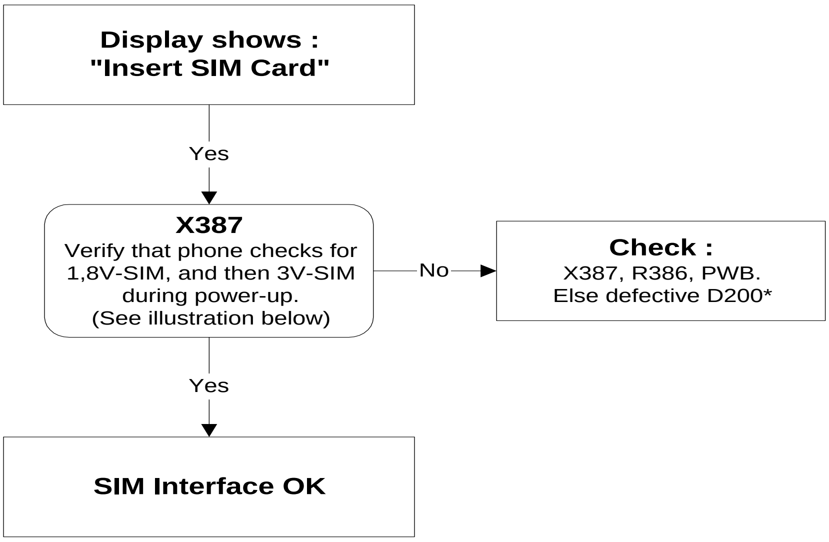
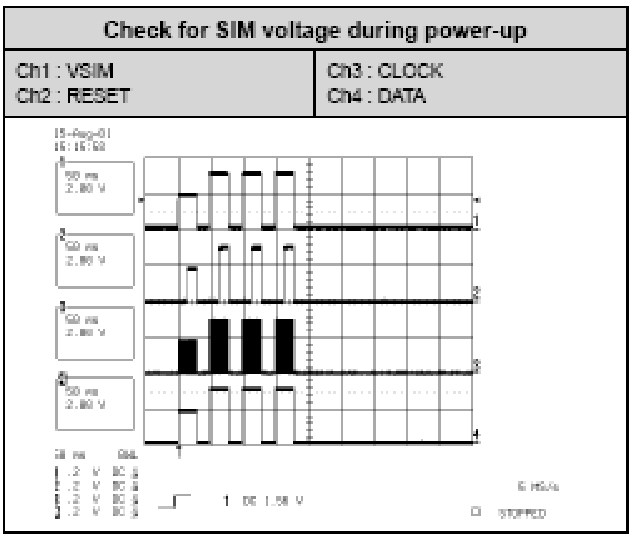


Figure 7:Signal diagram



Check for SIM voltage during power-up	
Ch1 : VSIM Ch2 : RESET	Ch3 : CLOCK Ch4 : DATA

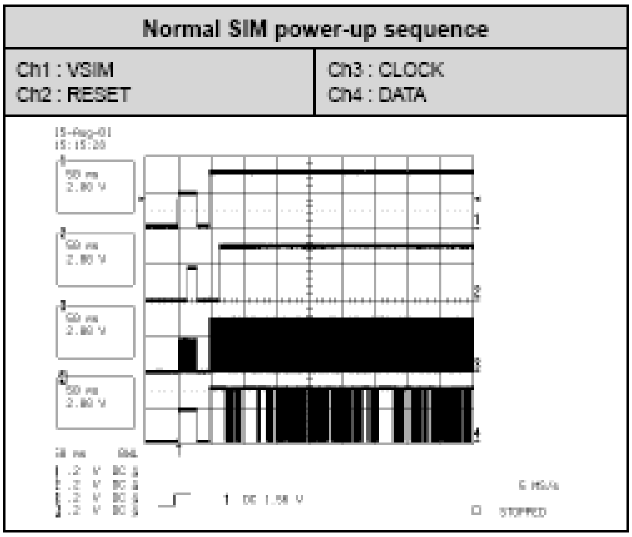
SIM-Card rejected

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.

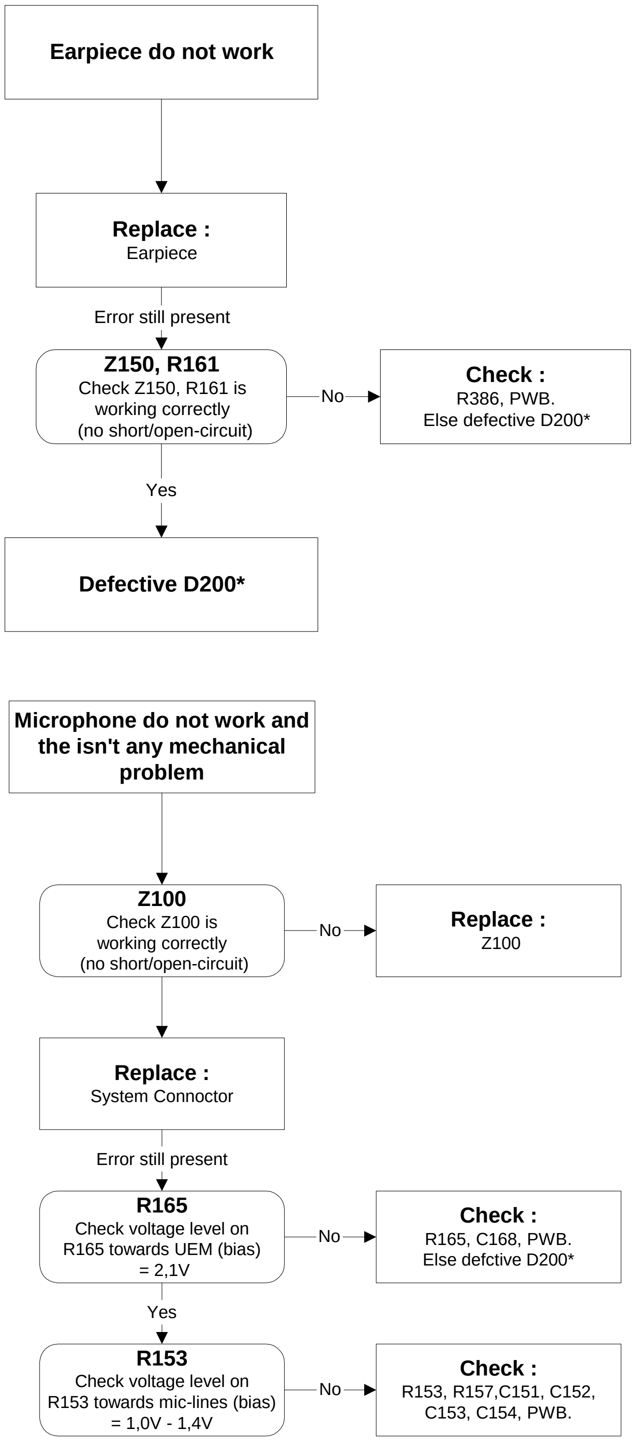
Normal SIM power-up sequence	
Ch1 : VSIM Ch2 : RESET	Ch3 : CLOCK Ch4 : DATA

Figure 8:Signal diagram



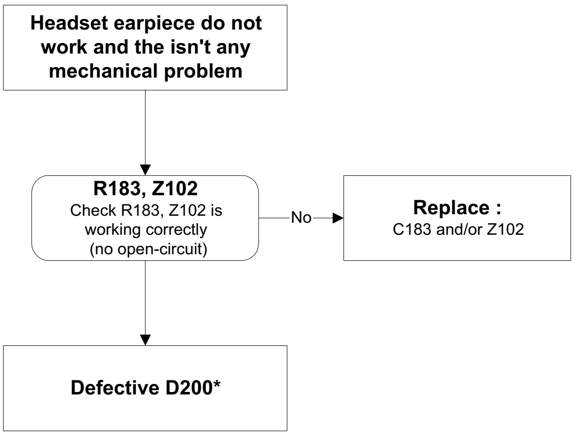
Audio related faults 1: Earpiece and microphone

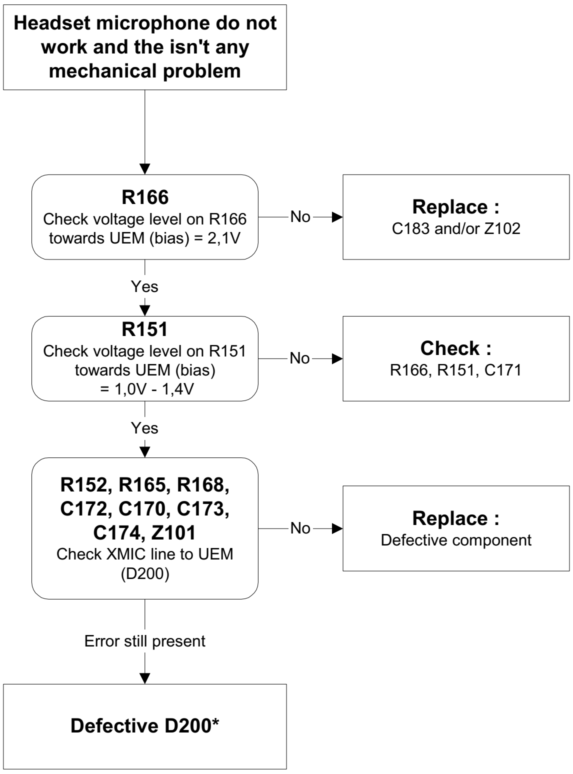
Figure 9:Top: Earpiece troubleshooting, bottom: Microphone troubleshooting



Audio related faults 2: Headset

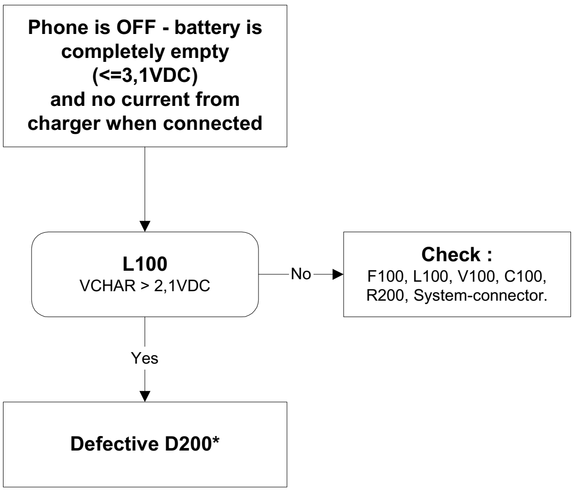
Figure 10:Headset troubleshooting

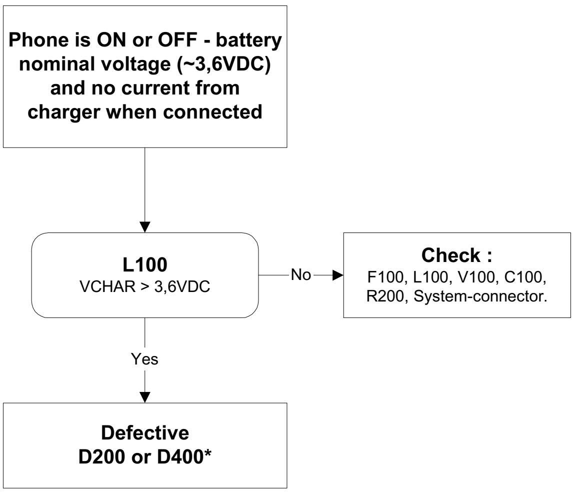




Charging failure troubleshooting

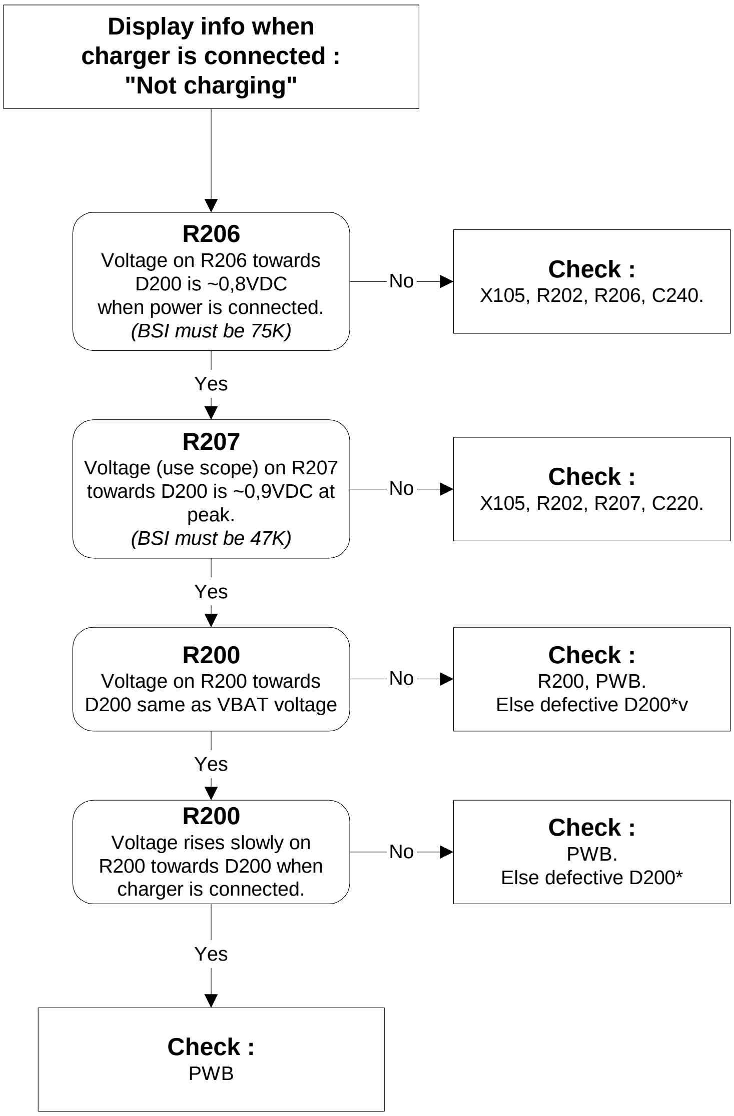
Figure 11:Charging troubleshooting 1





Charging troubleshooting 2

Figure 12:Charging troubleshooting 2



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 Analyser and a high-frequency 500 ohm passive probe, for example HP54006A. (Note that when measuring with the 500 ohm probe the signal will be around 20 dB attenuated. The values in the following will have these 20 dB subtracted and represent the real value seen on the spectrum analyser).

Note that the testjig have 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). Mjoelner and Bifrost is 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 ohmmeter, 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 component placement

Figure 13:RF key components

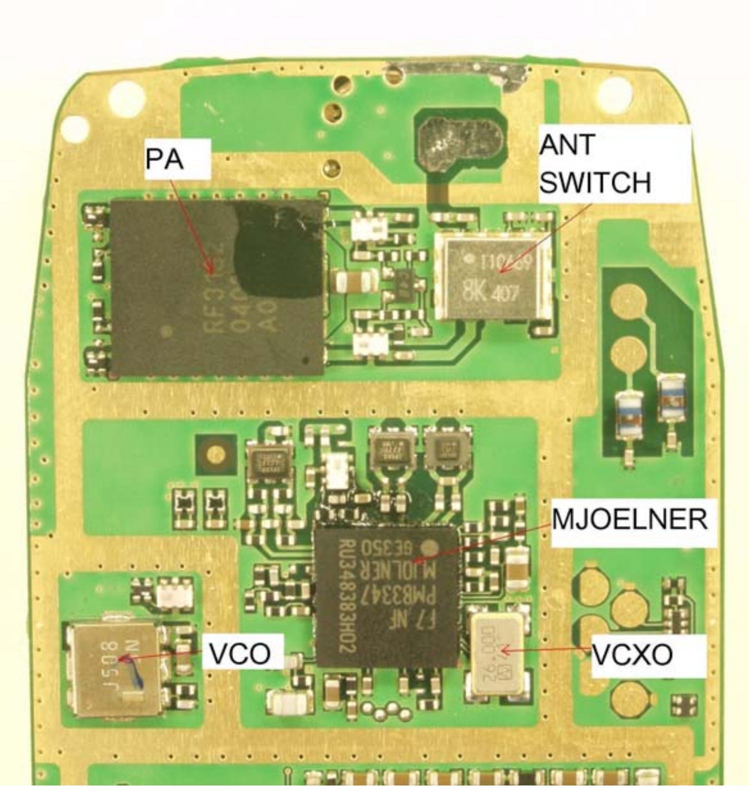


Table 1: RF component placement

N600	Mjoelner RF IC
Z601	PCN RX SAW
Z602	EGSM RX SAW
Z603	EGSM TX SAW
B600	26 MHz crystal
G600	VCO (4.0 GHz UHF VCO)
N700	Power Amplifier (PA)
Z700	RX/TX switch

Refer to the picture below for measuring points at the UEM (D200).

Figure 14:Supply points at UEM (D200)

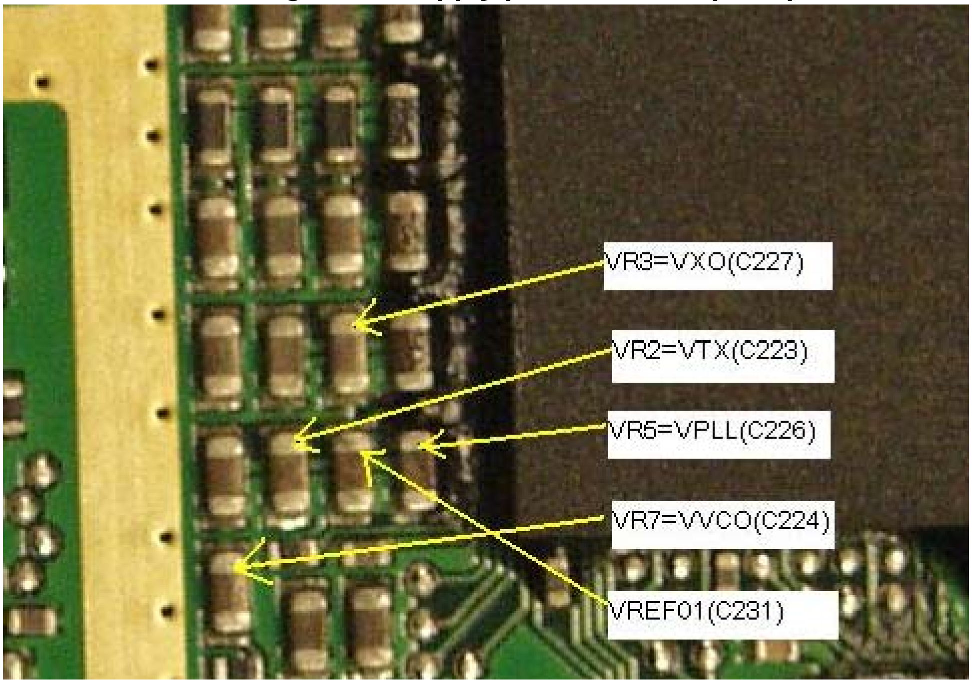
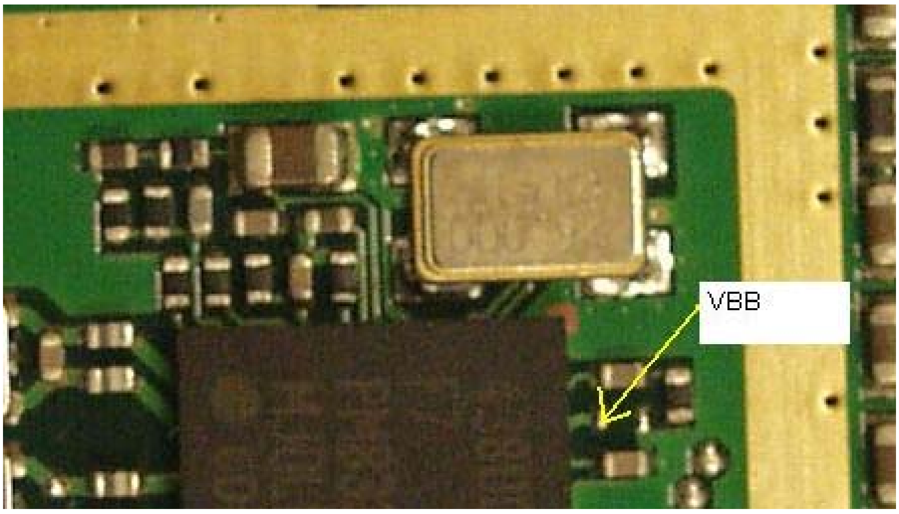


Figure 15:Supply point at Mjoelner (N600)



[This page left intentionally blank]

RH-60 Receiver Troubleshooting

General instructions for GSM850 RX troubleshooting

Connect the phone to a PC with the module repair jig.

Start Phoenix and establish connection to the phone

Phoenix commands

RF Controls .Band GSM 850 RX .Continuous mode

Channel 190 .AGC 8 FEG ON + 46 dB

The setup should now look like this:

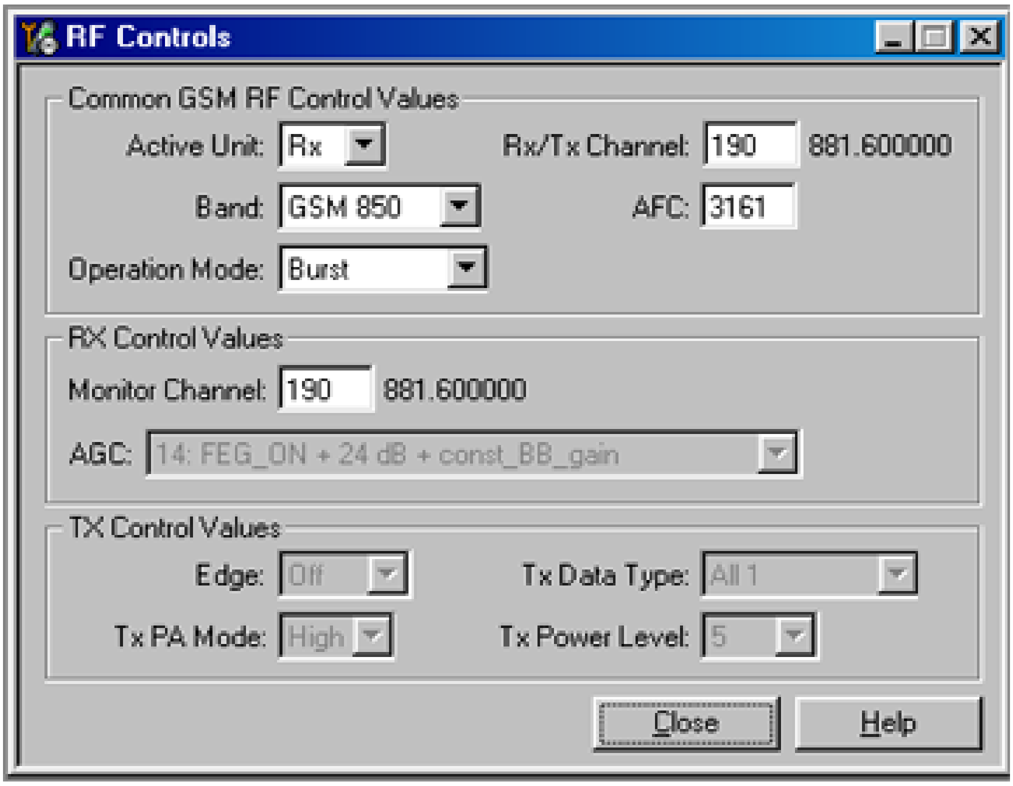
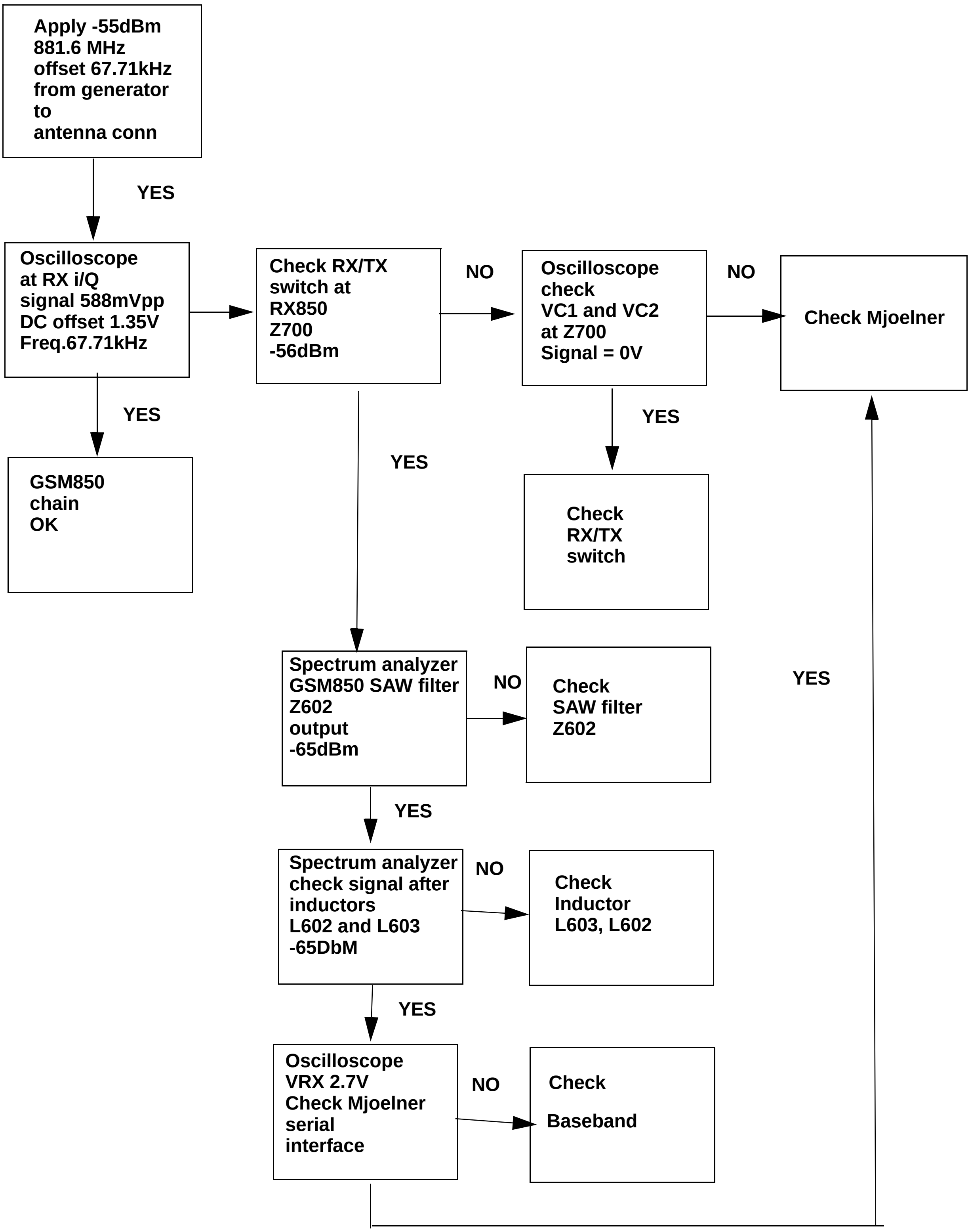


Figure 16:GSM850 RF controls window

Troubleshooting diagram for GSM850 receiver

Figure 17:GSM850 receiver troubleshootingt

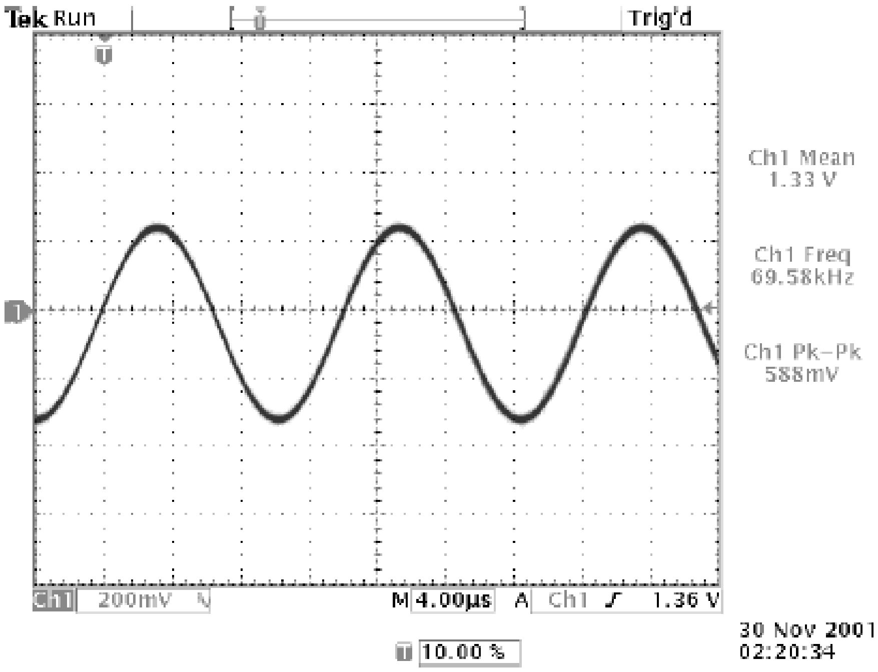


By measuring with an oscilloscope at RXIP or RXQP on a working GSM 850 receiver this picture should be seen.

Signal amplitude peak-peak 789 mV

DC offset 1.2 V

Figure 18:RX850 I/Q signal waveform



General instructions for RH-60 GSM1900 RX troubleshooting

Connect the phone to a PC with the module repair jig.

Start Phoenix and establish connection to the phone

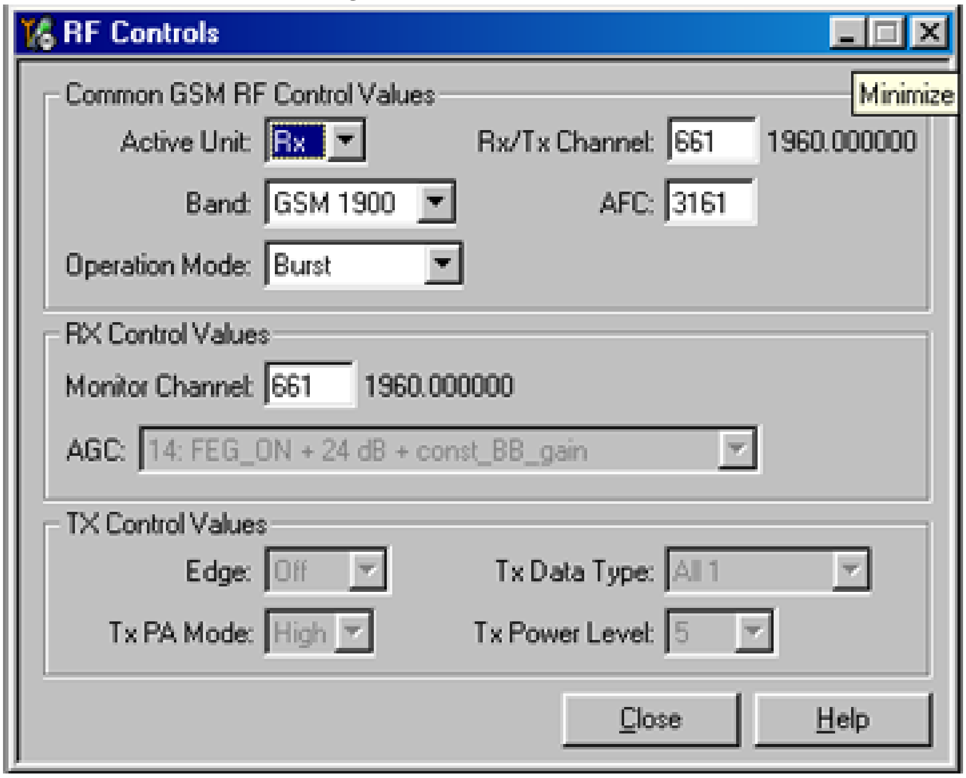
Phoenix commands

RF Controls .Band GSM 1900 RX .Continuous mode

Channel 661 .AGC 8 FEG ON + 46 dB

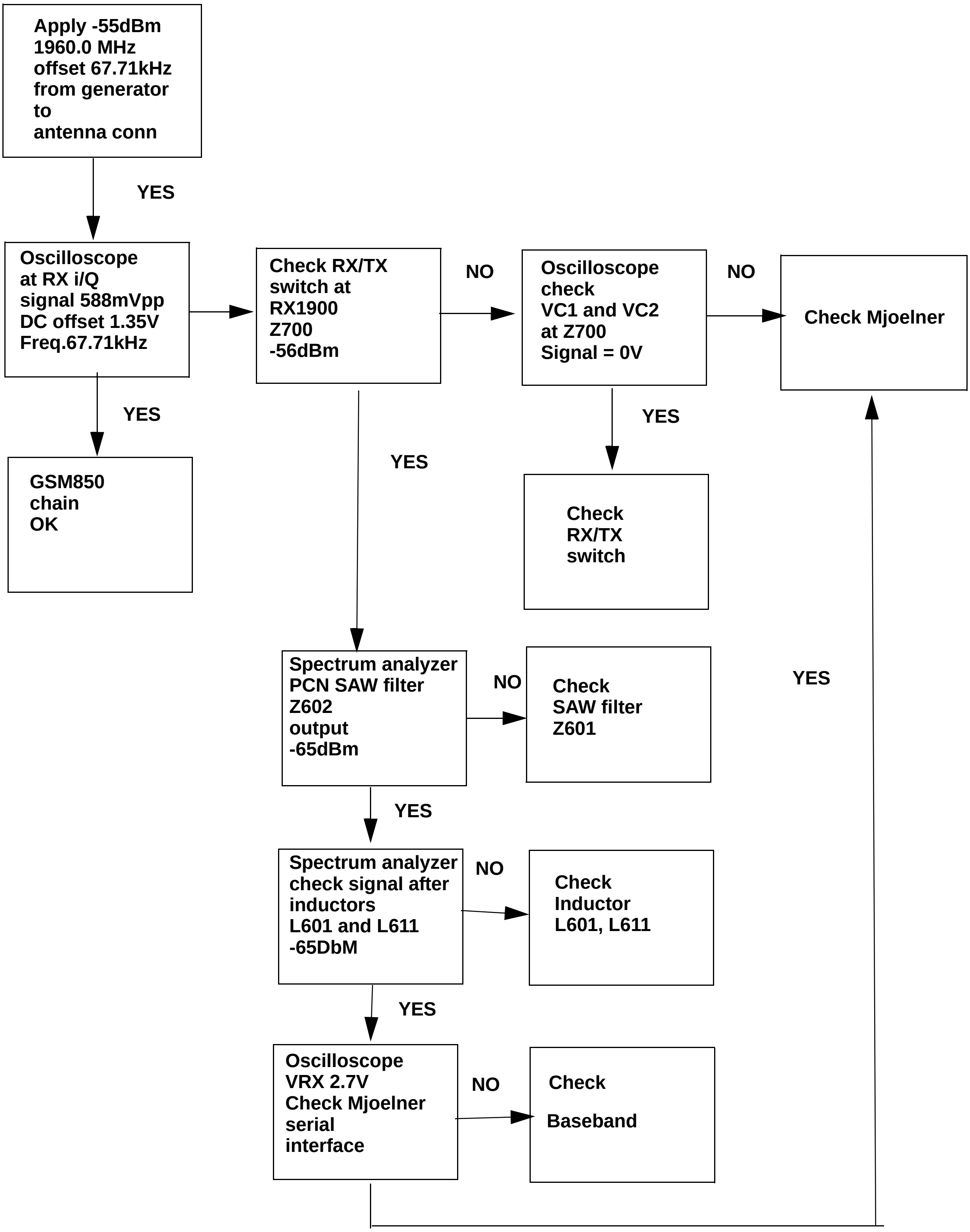
The setup should now look like this:

Figure 19:GSM1900 RF controls



Troubleshooting diagram for GSM1900 receiver

Figure 20:GSM1900 receiver troubleshooting diagram

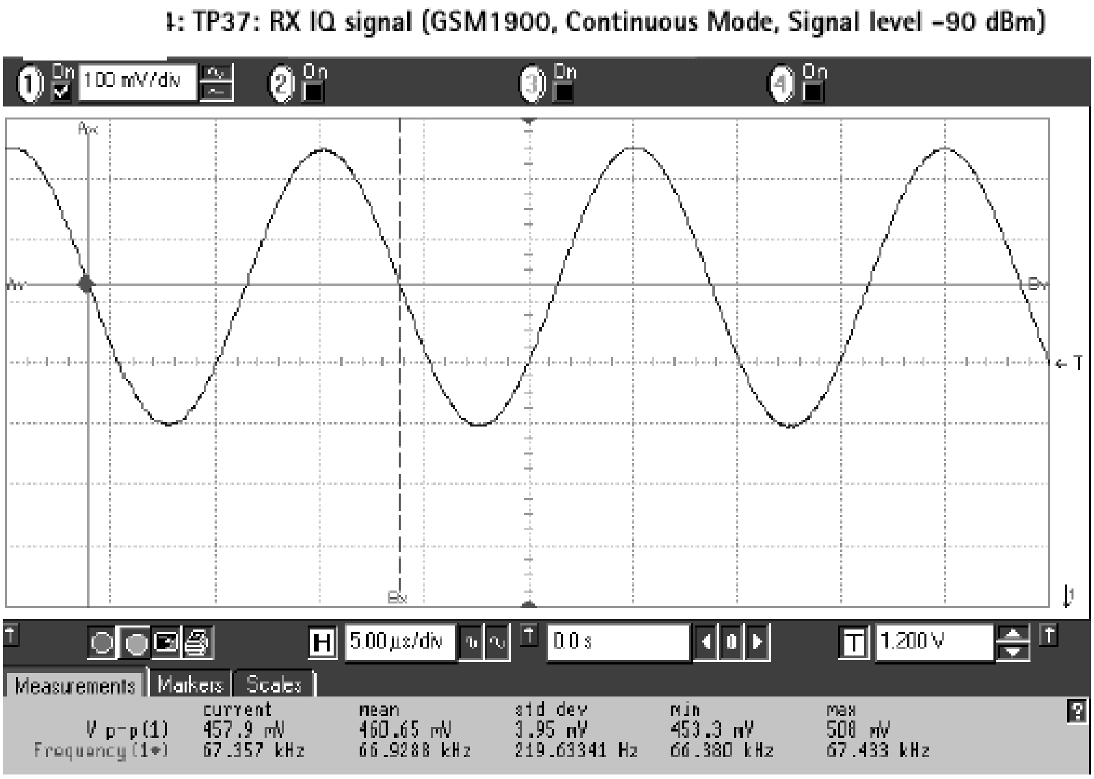


By measuring with an oscilloscope at RXIP or RXQP on a working GSM 1900 receiver this picture should be seen.

Signal amplitude peak-peak 460 mV

DC offset 1.2 V

Figure 21: RX1900 I/Q signal waveform



Measurement points in the receiver

Figure 22:RX measurements point at the RX/TX Switch - Z700

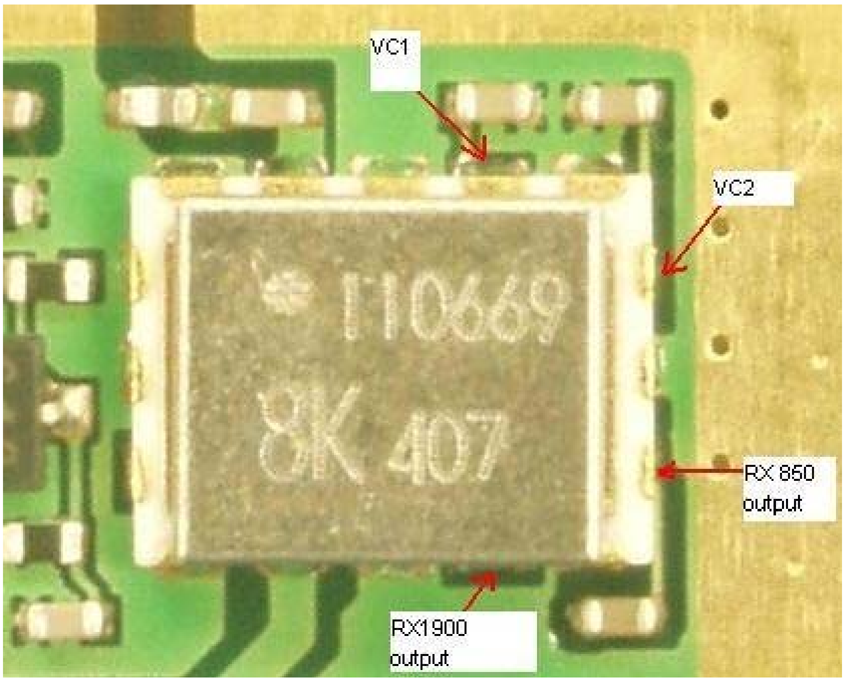


Figure 23:Measurements points at the RX-Filters – Z601/Z602

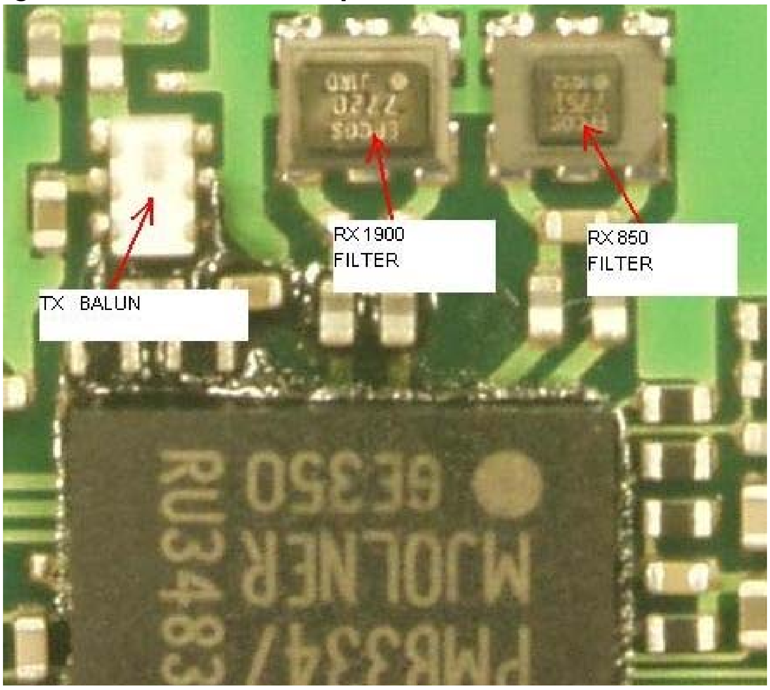
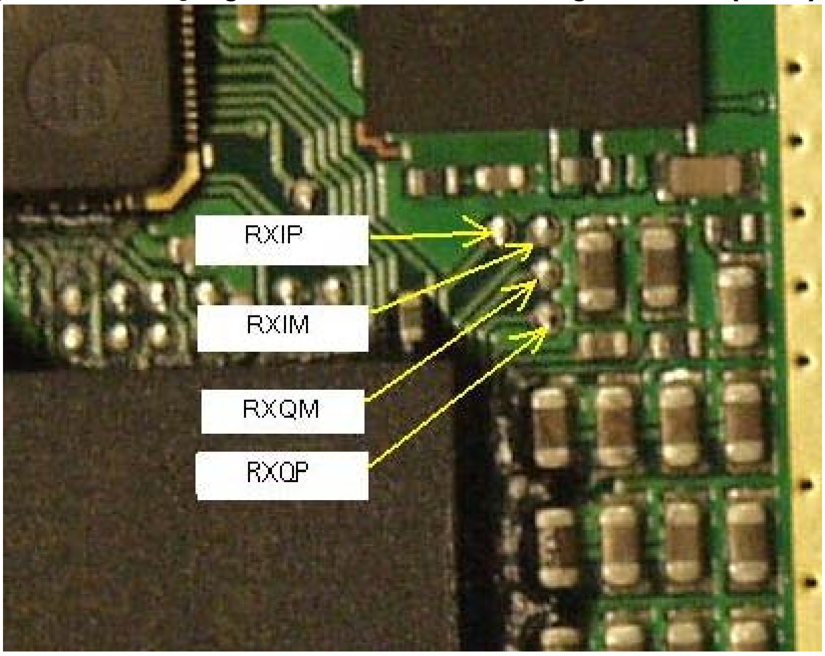


Figure 24:RX I/Q signals, baseband shielding can UEM (D200)



RH-60 transmitter troubleshooting

Measurement points for the transmitter

Figure 25: TX measurement points in the PA (N700) shielding can

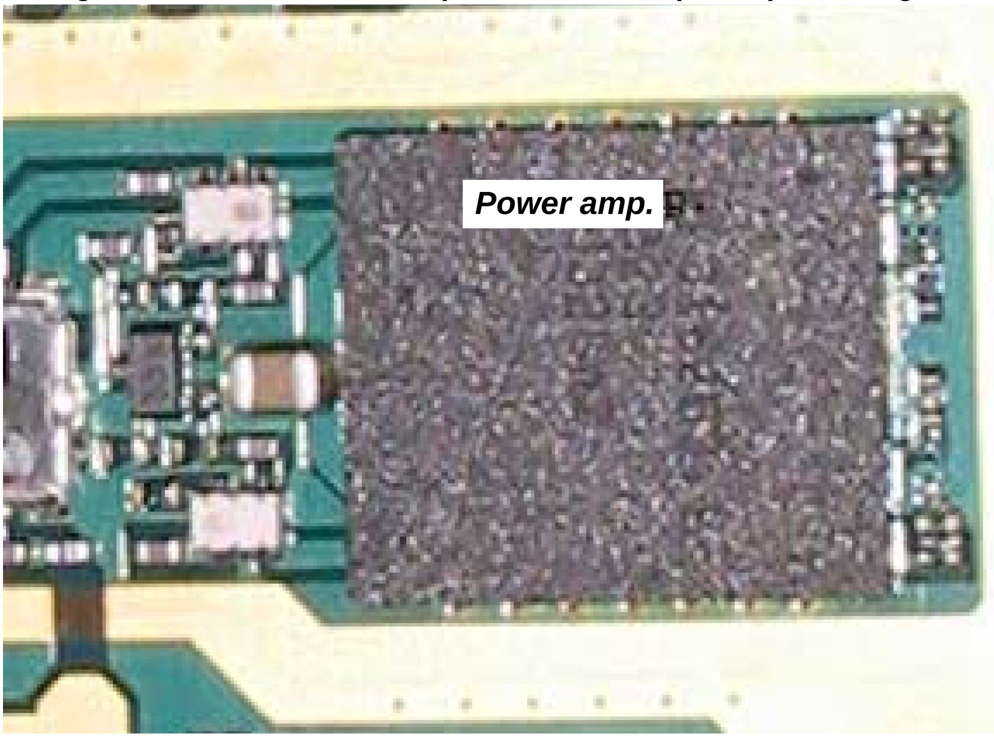
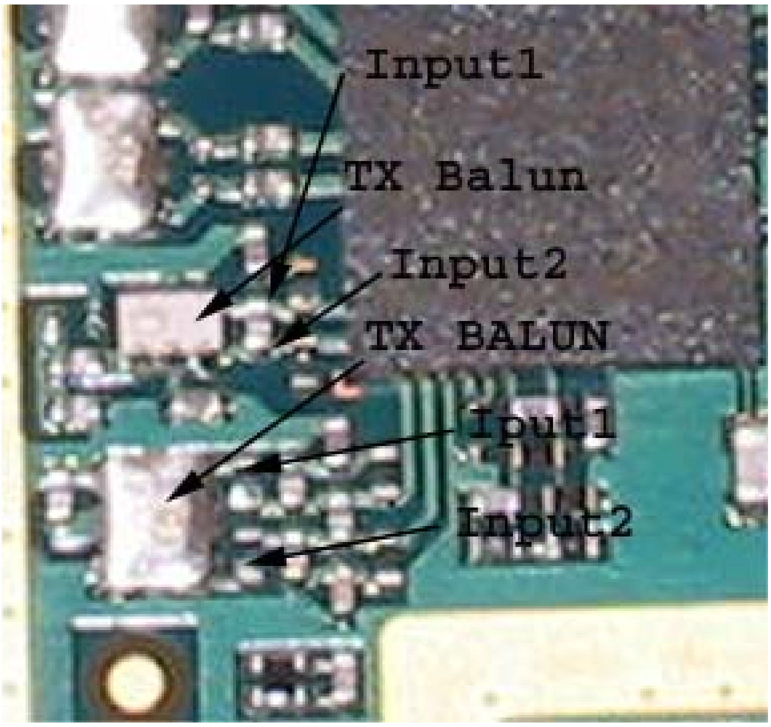


Figure 26:TX measurement point in Mjolner (N600) shielding can



General instructions for RH-60 GSM TX troubleshooting

Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to measurement equipment or to at least a 10-dB attenuator, otherwise the PA may be damaged.

Start Phoenix-Service-Software and establish a connection to the phone e.g. FBUS.

Select File and Product: Gemini

Select: Maintenance, Testing and RF Controls

Band:GSM 850

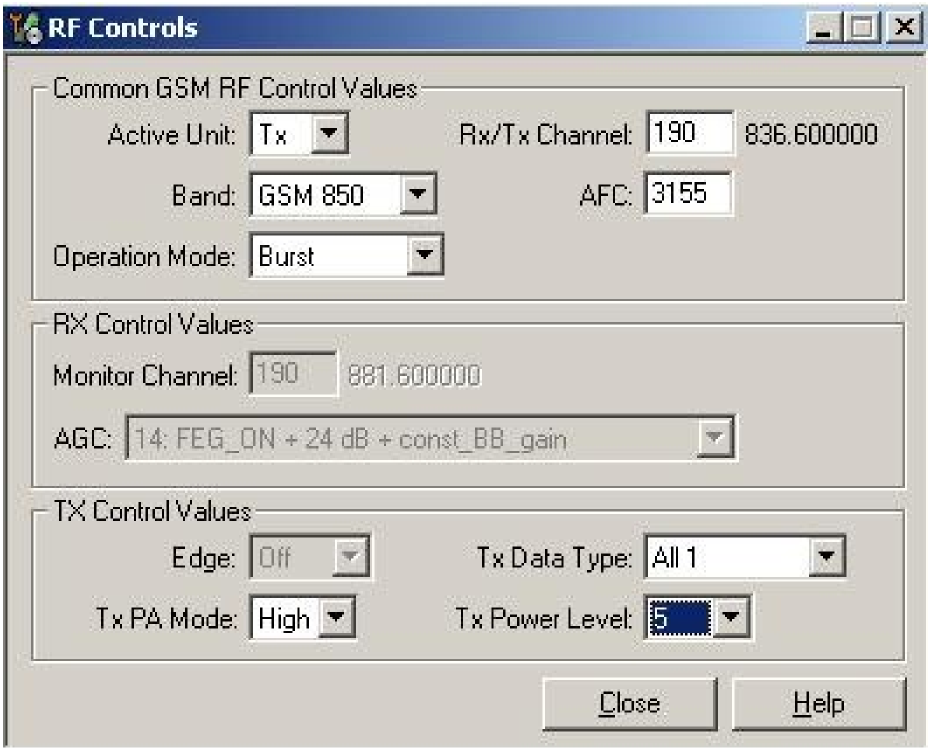
Active Unit:TX

Tx Power Level:5

Tx Data Type:Random

Your screen should look like:

Figure 27::GSM850 RF controls window

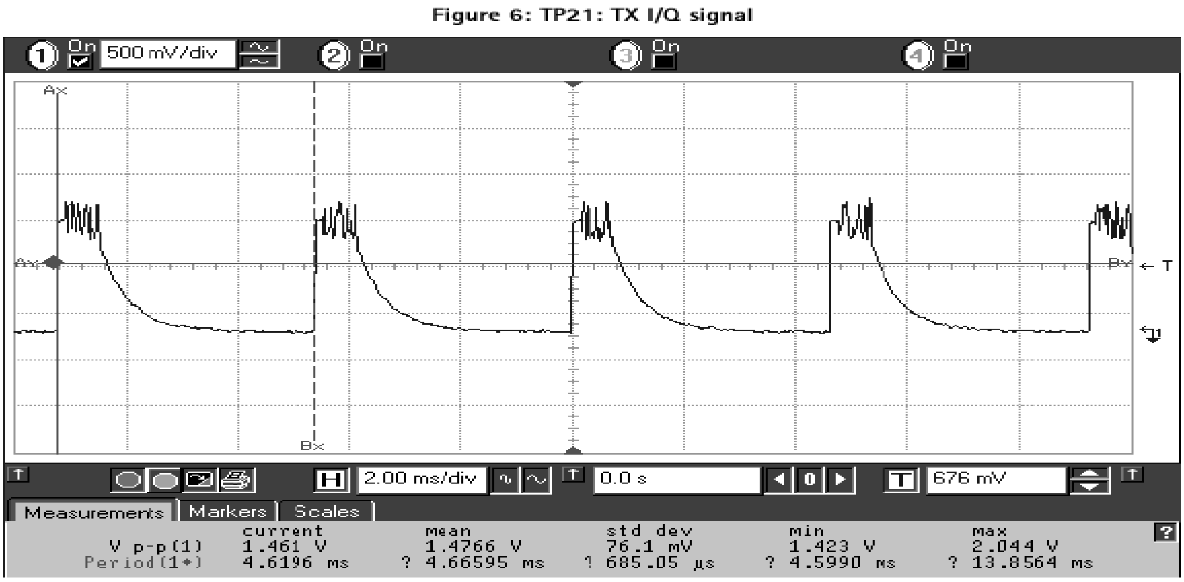


GSM850 TX output power

Measure the output power of the phone; it should be around 32.1 dBm.

Remember the loss in the jig; around 0.3 dB.

Figure 28:VPCTRL_G & TXC



General instructions for RH-60 GSM1900 TX troubleshooting

Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to measurement equipment or to at least a 10-dB attenuator, otherwise the PA may be damaged.

Start Phoenix-Service-Software and establish a connection to the phone e.g. FBUS.

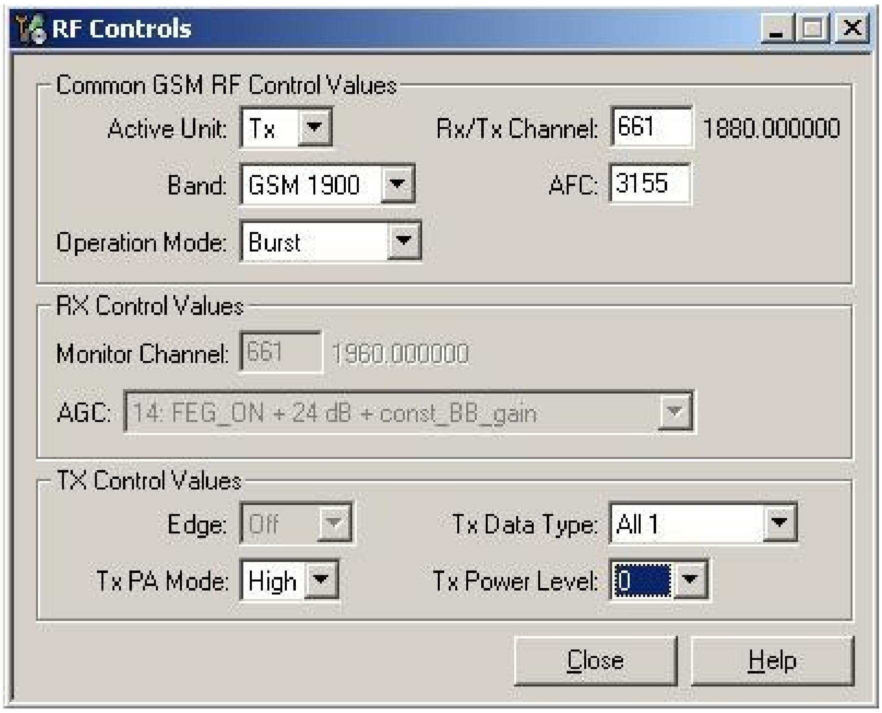
Phoenix commands

RF Controls .Band GSM 1900 RX .Continuous mode

Channel 661

Your screen should look like:

Figure 29:GSM1900 RF controls screen shot



GSM1900 TX output power

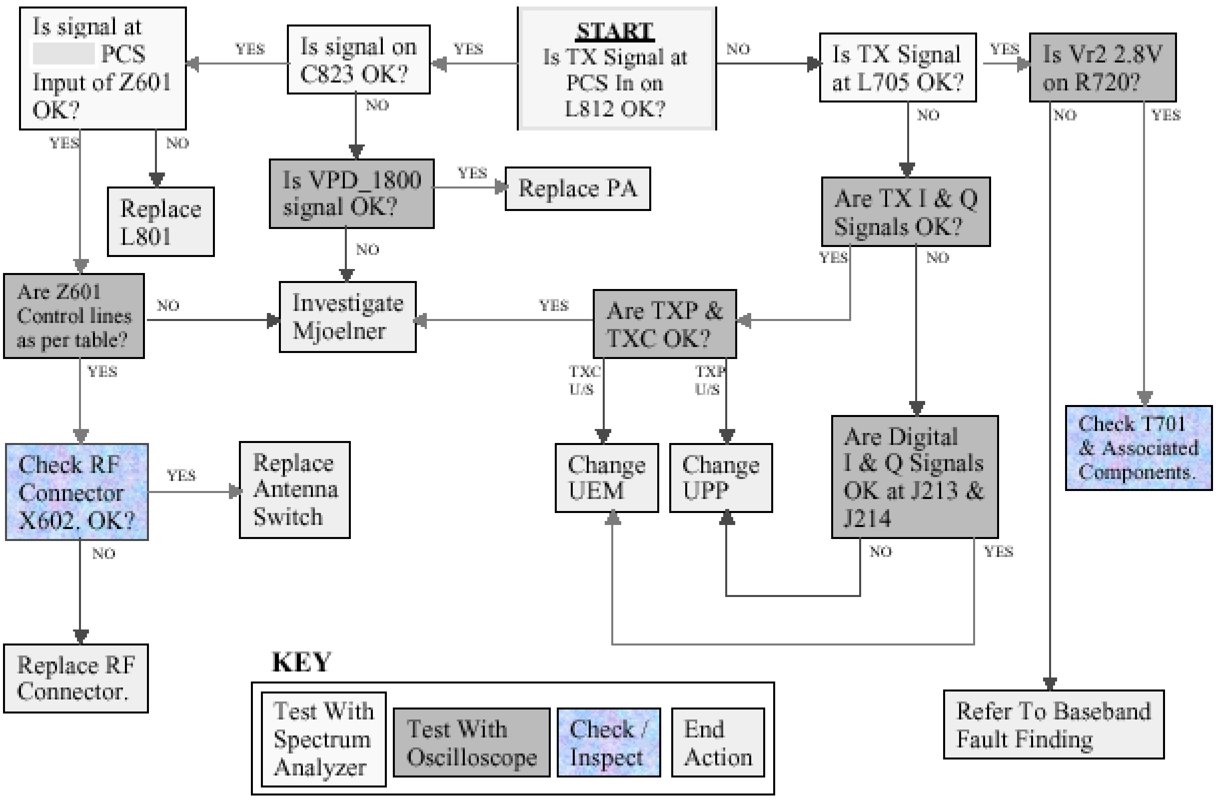
Measure the output power of the phone.

It should be around 29.7 dBm.

Remember the loss in the jig; around 0.7 dB.

Troubleshooting diagram for GSM1900 TX

Figure 30:GSM1900 TX troubleshooting



[This page left intentionally blank]

General Instructions for RH-59 GSM900 RX Trouble-shooting

Connect the phone to a PC with the module repair jig.

Start Phoenix and establish connection to the phone

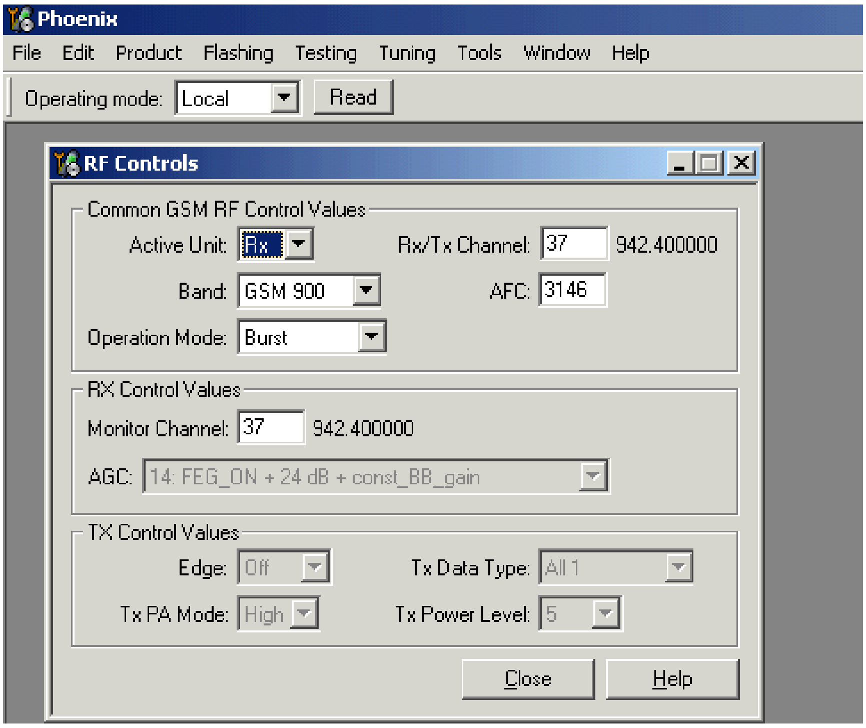
Phoenix commands

RF Controls .Band GSM 900 RX .Continuous mode

Channel 37. AGC 8 FEG ON + 46 dB

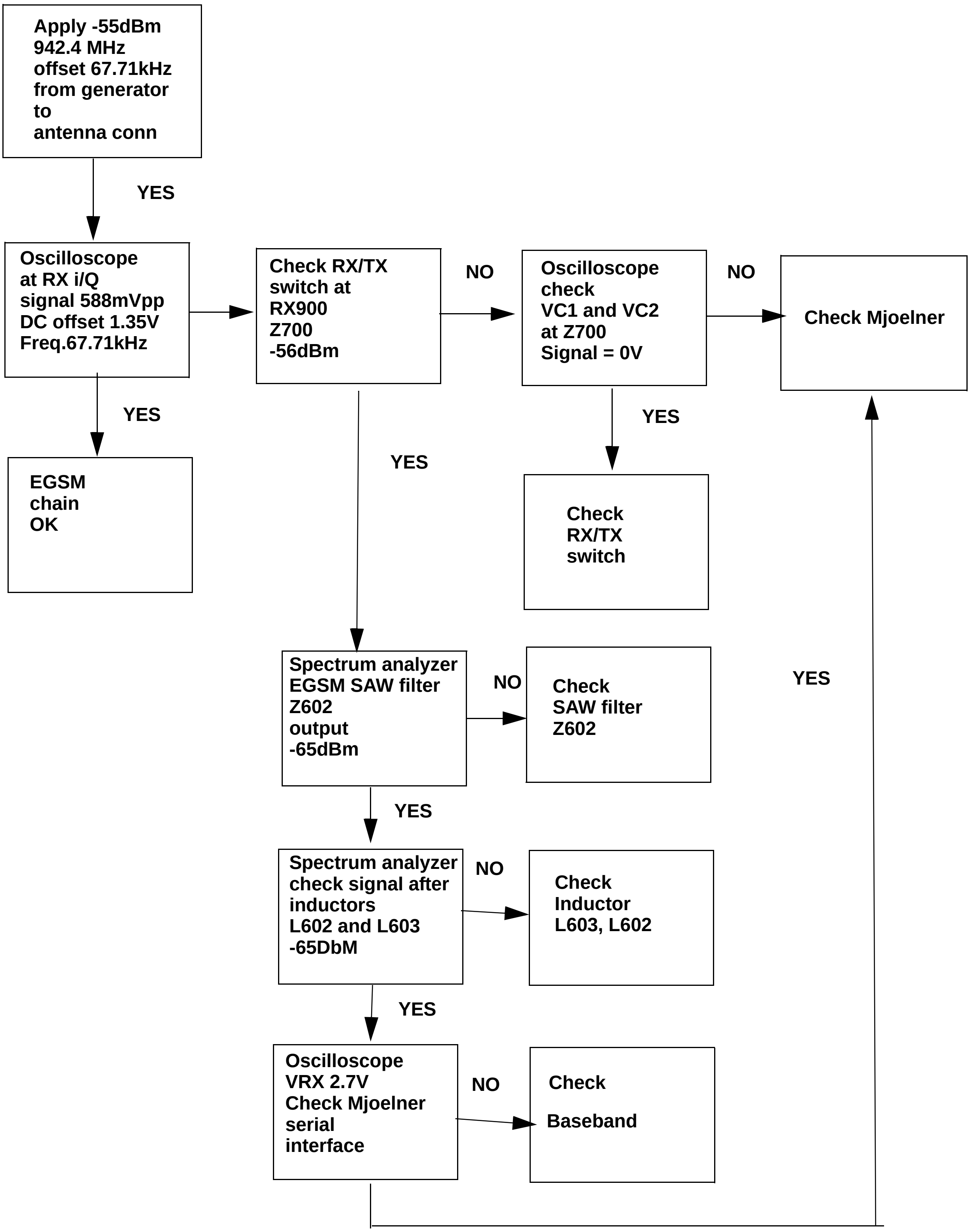
The setup should now look like this:

Figure 31:GSM900 RF controls window



Troubleshooting chart for GSM900 receiver

Figure 32:EGSM receiver troubleshooting chart

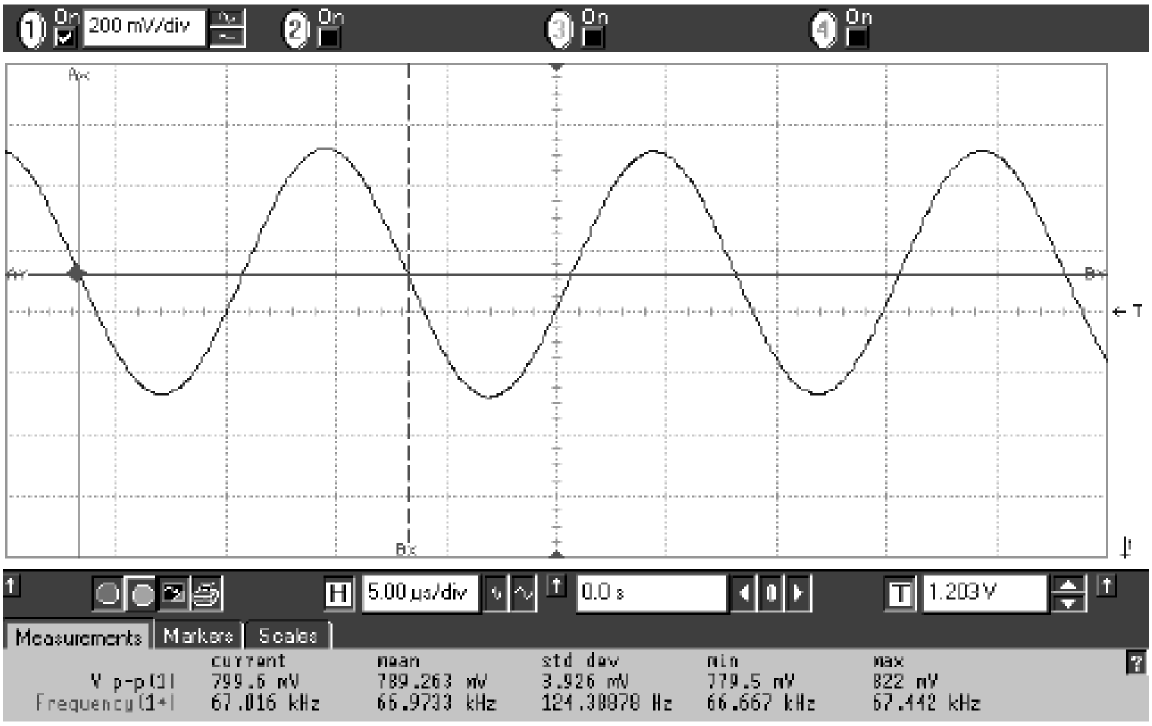


By measuring with an oscilloscope at RXIP or RXQP on a working GSM 900 receiver this picture should be seen.

Signal amplitude peak-peak 789 mV

DC offset 1.2 V

Figure 33:RX900 I/Q signal waveform



General instructions for GSM1800 RX troubleshooting

Connect the phone to a PC with the module repair jig.

Start Phoenix and establish connection to the phone

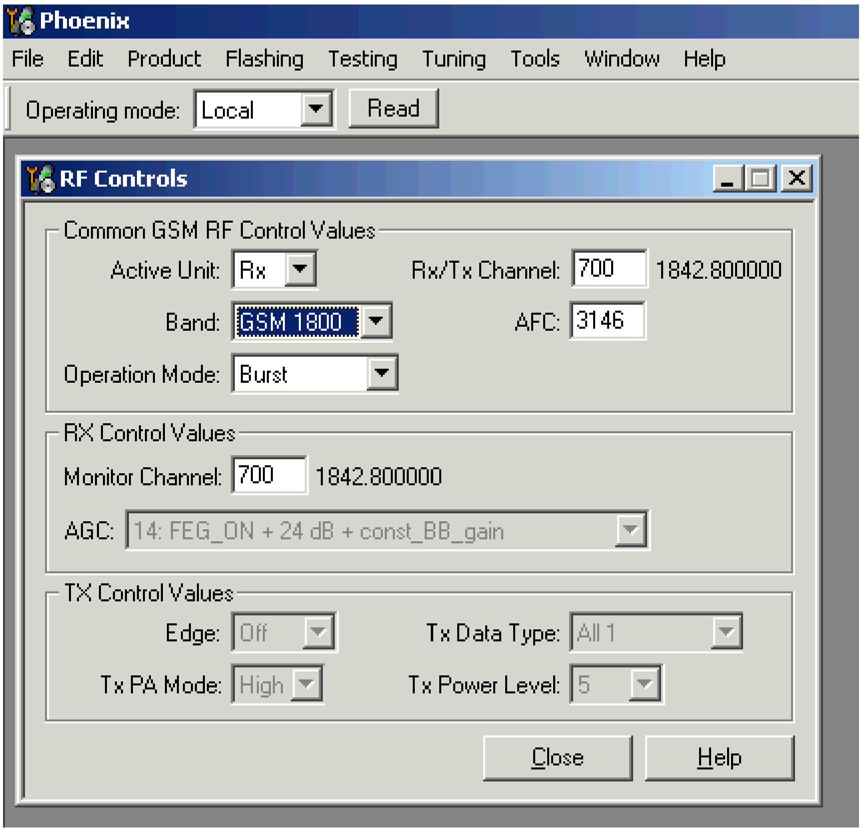
Phoenix commands

RF Controls .Band GSM 1800 RX .Continuous mode

Channel 700 .AGC 8 FEG ON + 46 dB

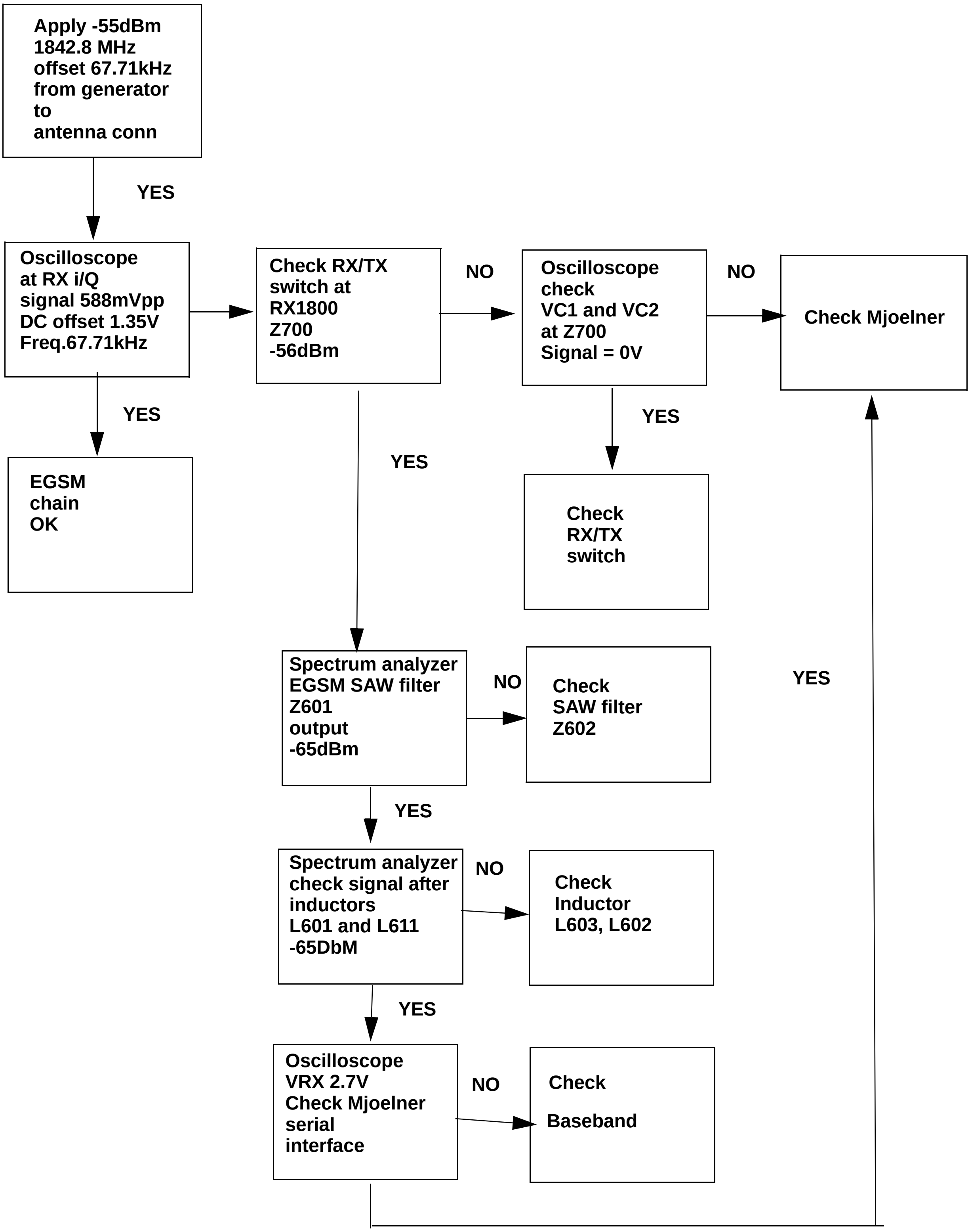
The setup should now look like this:

Figure 34:GSM1800 RF control window



Troubleshooting chart for GSM1800 receiver

Figure 35:GSM1800 receiver troubleshooting chart

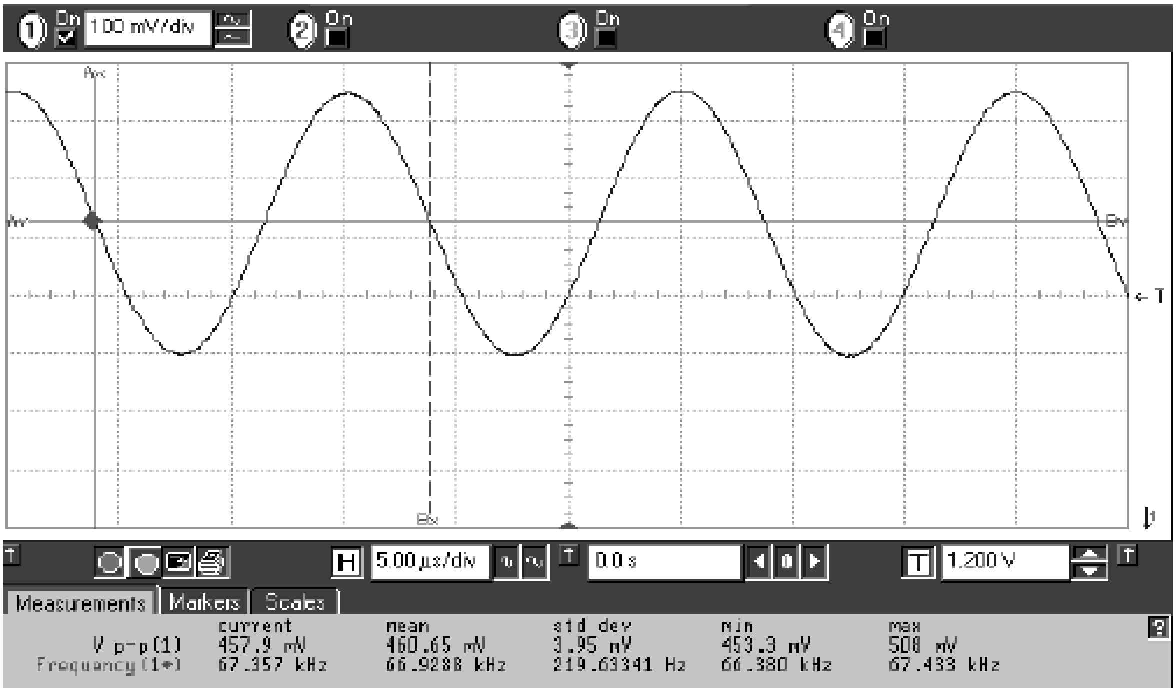


XIP or RXQP on a working GSM 1800 receiver this picture should be seen.

Signal amplitude peak-peak 460 mV

DC offset 1.2 V

Figure 36:RX1800 I/Q signal waveform



Measurement points in the receiver

Figure 37:RX measurements point for the RX/TX Switch - Z700

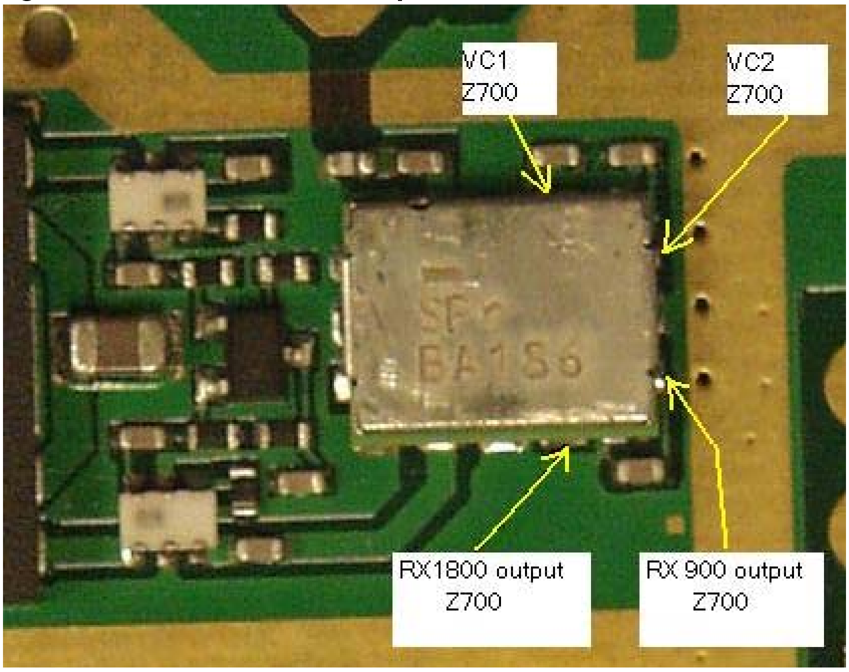


Figure 38:Measurements points for the RX-Filters – Z601/Z602

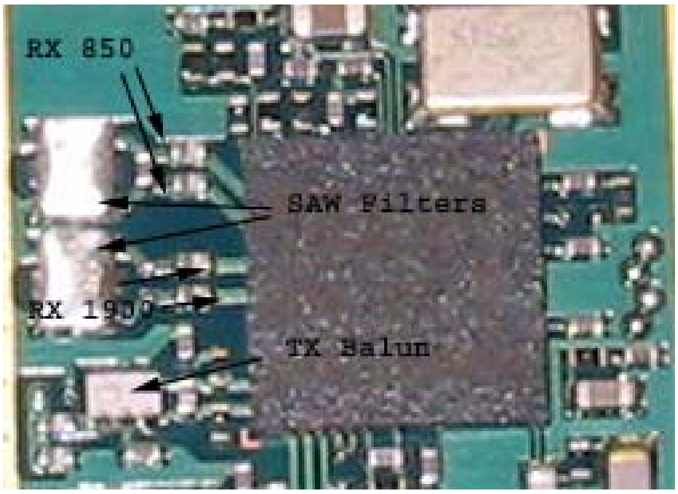
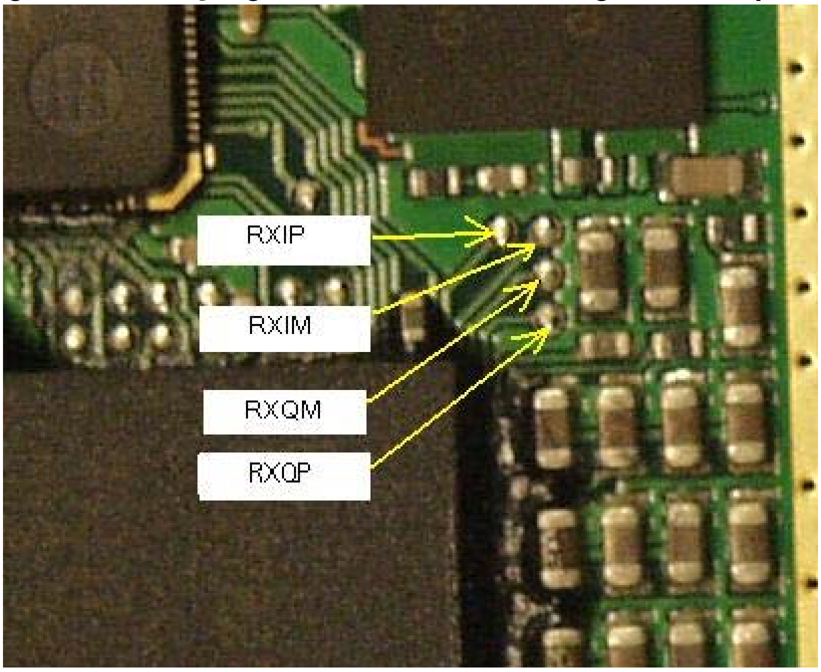


Figure 39:RX I/Q Signals, baseband shielding can UEM (D200)



RH-59 Transmitter troubleshooting

Measurement points for the transmitter

Figure 40: TX measuremnet points for the PA (N700) shielding can

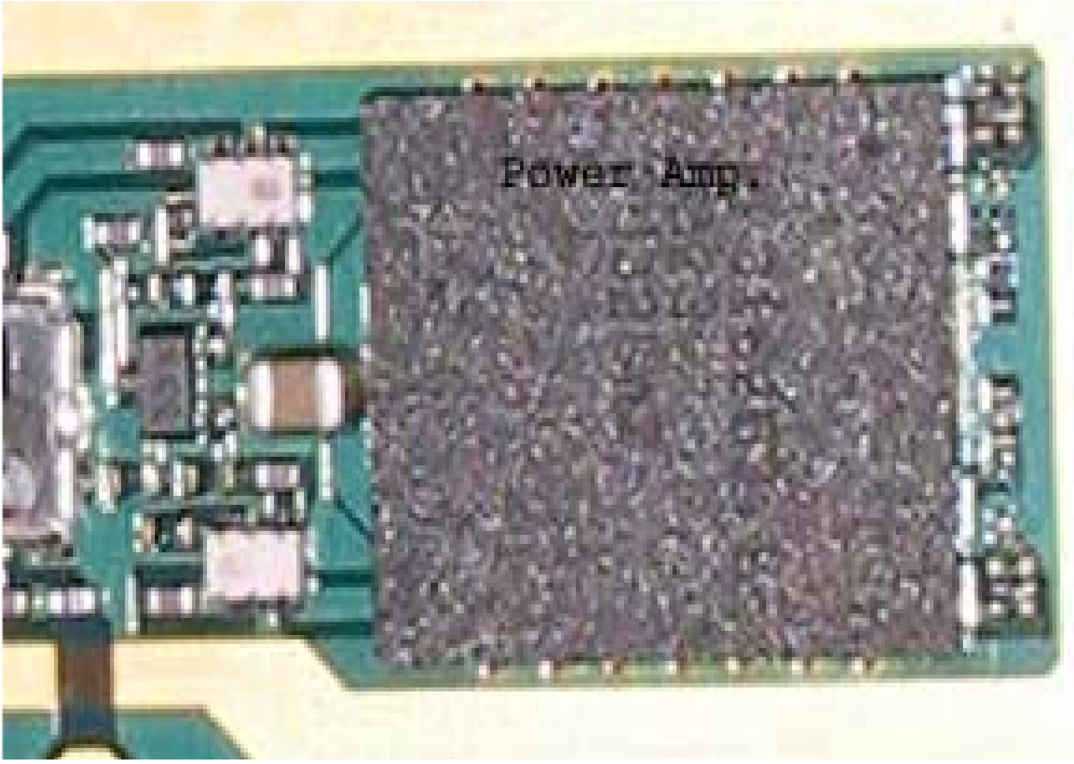
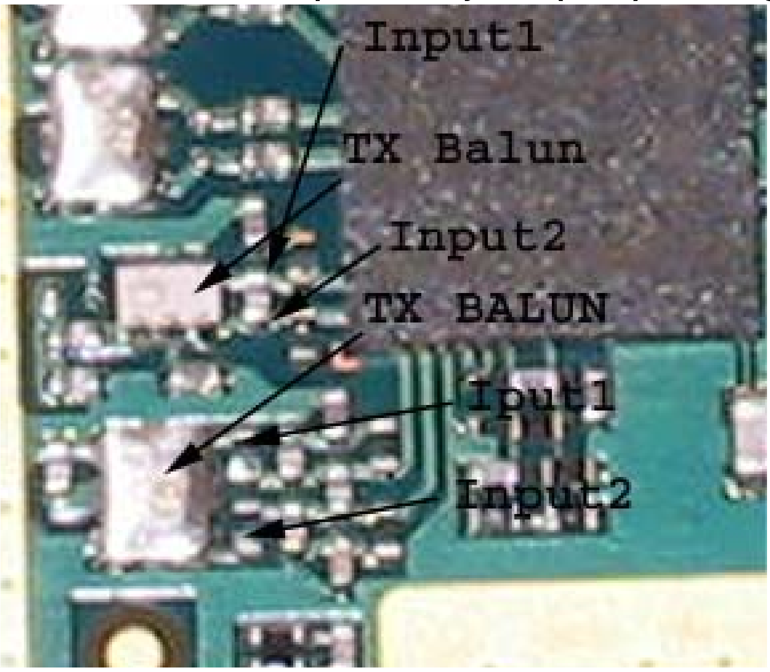


Figure 41:TX measurement point for Mjolner (N600) shielding can



General instructions for RH-59 GSM TX troubleshooting

Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to measurement equipment or to at least a 10-dB attenuator, otherwise the PA may be damaged.

Start Phoenix-Service-Software and establish a connection to the phone e.g. FBUS.

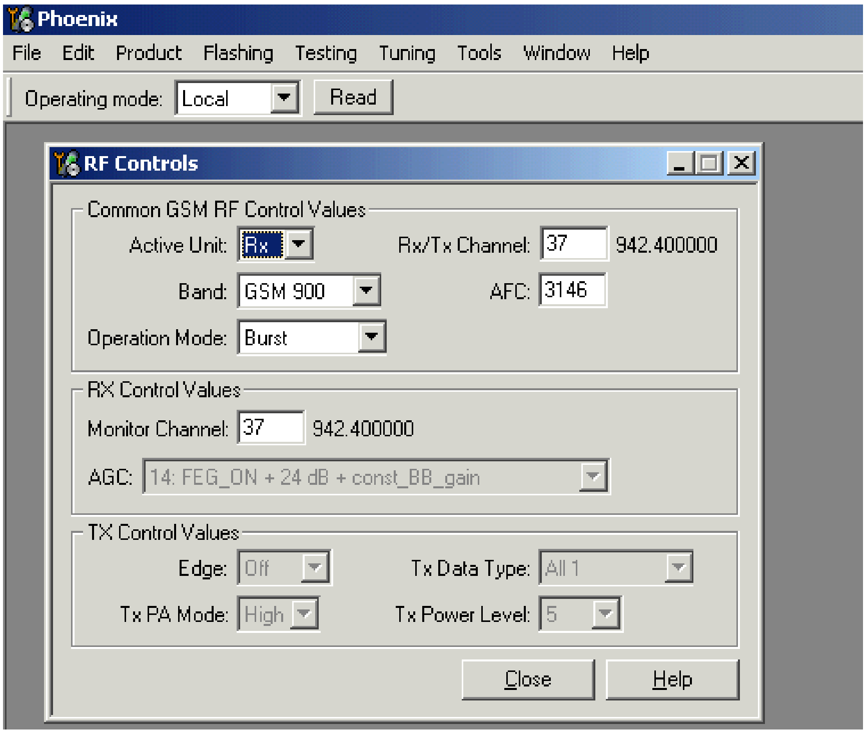
Select File and Product: RH-59

Select: Maintenance, Testing and RF Controls

Band:	GSM 900
Active Unit:	TX
Tx Power Level:	19
Tx Data Type:	All 1

Your screen should look like:

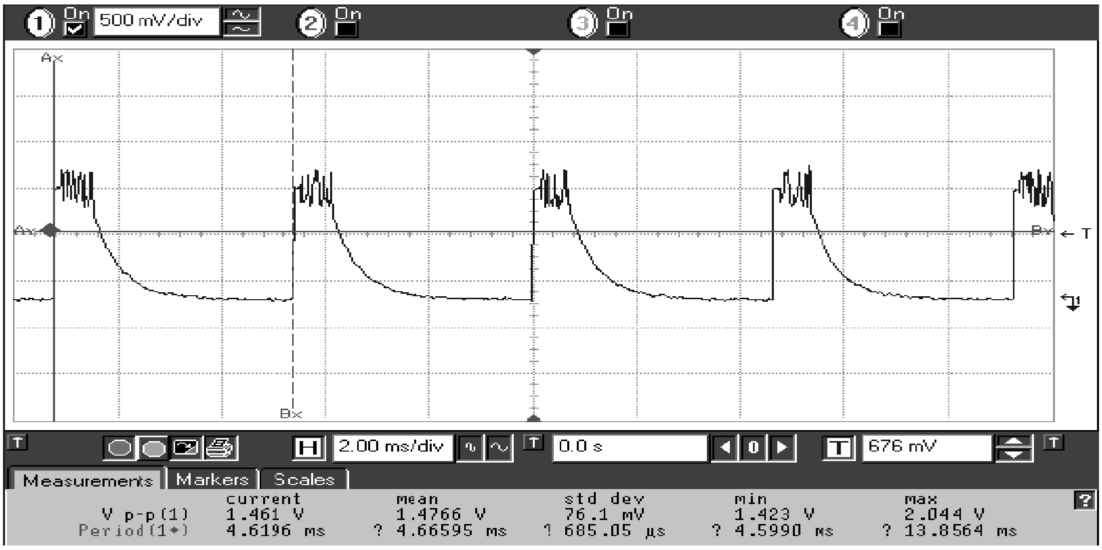
Figure 42:GSM900 RF controls window



Measure the output power of the phone; it should be around 32.1 dBm.

Remember the loss in the jig; around 0.3 dB.

Figure 43:VPCTRL_G and TXC signal



PCN Transmitter general instructions for PCN TX troubleshooting

Apply a RF-cable to the RF-connector to allow the transmitted signal act as normal. RF-cable should be connected to measurement equipment or to at least a 10-dB attenuator, otherwise the PA may be damaged.

Start Phoenix-Service-Software and establish a connection to the phone e.g. FBUS.

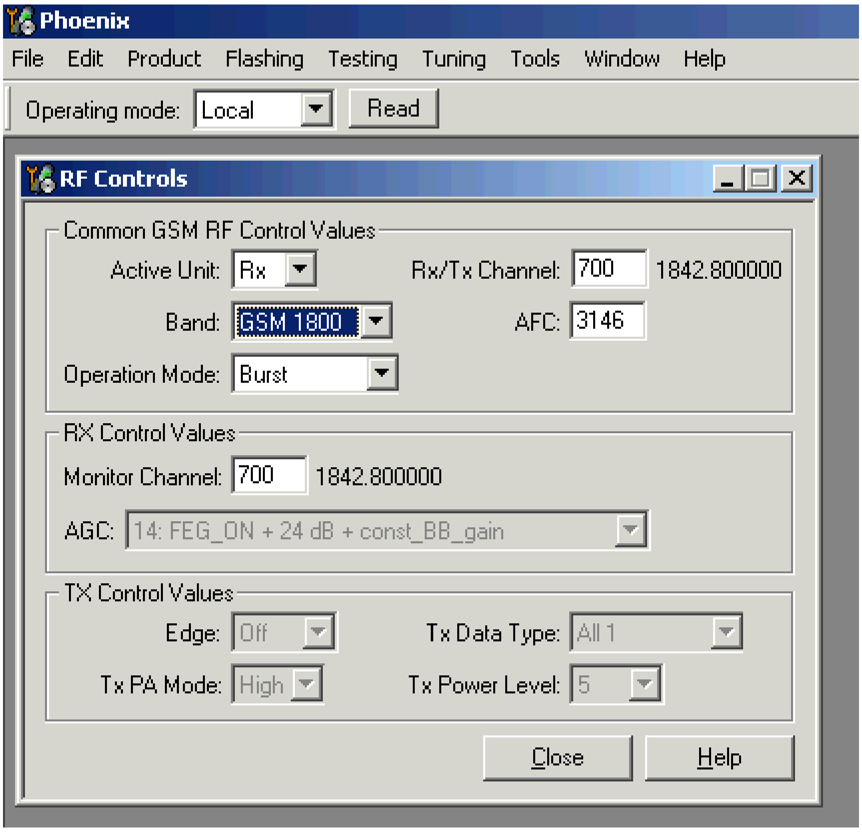
Phoenix commands

RF Controls .Band GSM 1800 RX .Continuous mode

Channel 700 .AGC 14 FEG ON + 24 dB

Your screen should look like:

Figure 44:RF controls window



Measure the output power of the phone; it should be around 29.5 dBm. Remember the loss in the jig; around 0.7 dB.

Troubleshooting chart for PCN transmitter: refer to Figure 30 “GSM 1900 transmitter trouble-shooting diagram on page 33.

Note! The word PCS in “start” block should be PCN if this block is used for RH-59 troubleshooting.

Synthesizer

There is only one PLL synthesizer generating Local Oscillator frequencies for both RX and TX in both bands (PCN and EGSM). The VCO frequency is divided by 2 for PCN operation or by 4 for EGSM operation inside the Mjoelner IC.

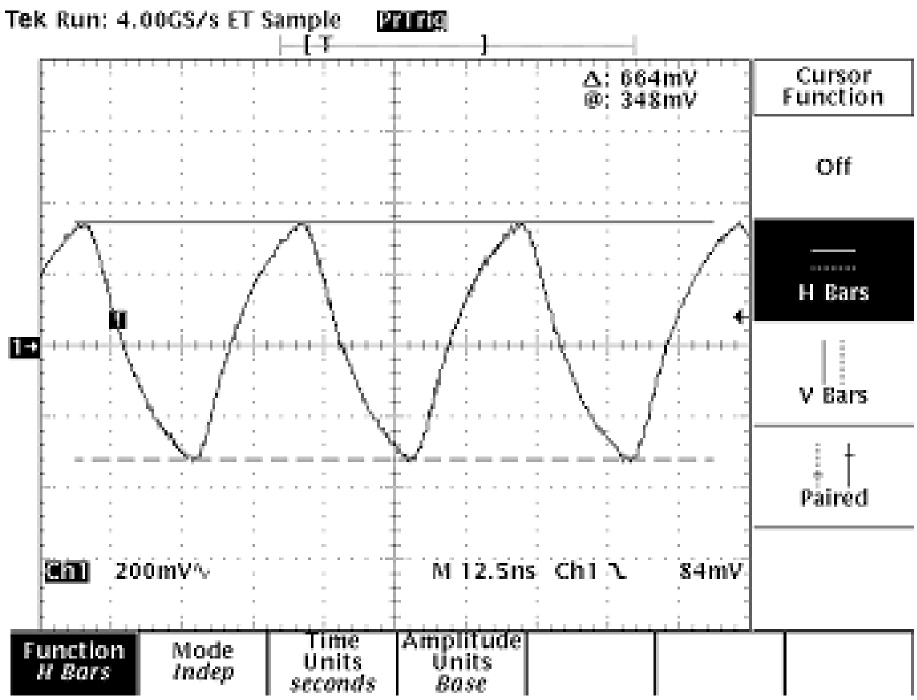
26 MHz reference oscillator (VCXO)

The 26 MHz oscillator is located in the Mjoelner IC (N600). The coarse frequency for this oscillator is set by an external crystal (B600). The reference oscillator is used as a reference frequency for the PLL synthesizer and as the system clock for BaseBand. The 26MHz signal is divided by 2 to achieve 13MHz inside the UPP IC (D400).

The 26 MHz signal from the VCXO can be measured by probing R425 (must be measured on the UPP side of R425 i.e. the end **not** connected to C425). The level at this point is approx. 700mVpp. Frequency of this oscillator is adjusted by changing the AFC-register inside the Mjoelner IC. This is done via the Mjoelner serial interface.

Example Signal Measured at VCXO output (R425)

Figure 45: VCXO 26 MHz waveform



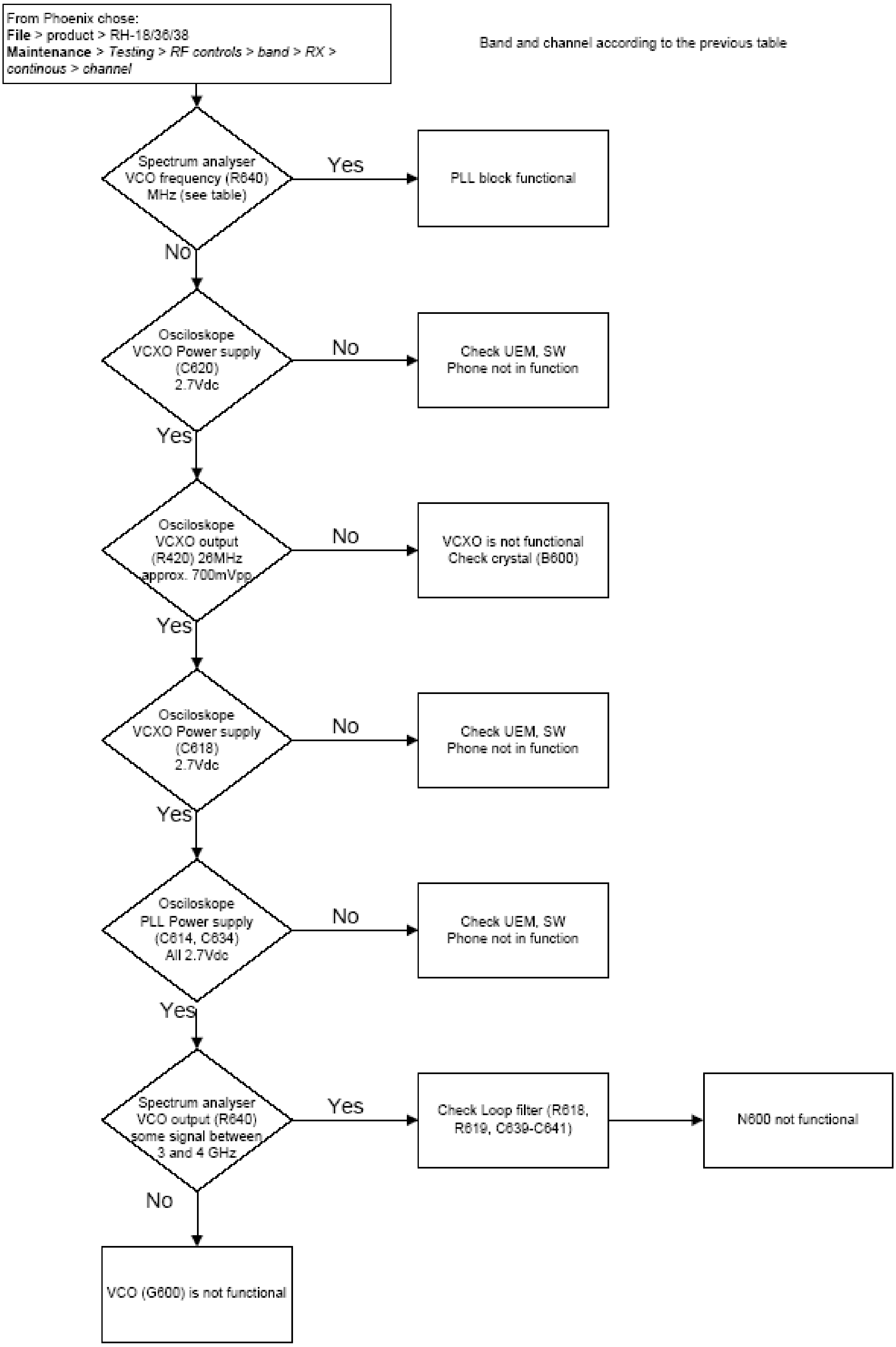
VCO

The VCO is an ASIC with all the frequency determining parts inside.

In order to reduce the requirements of the tuning voltage and coverage of the VCO, the VCO core is composed of four VCOs in parallel. This VCO circuit enables a very wide tun-ing range of 3.4 - 4.0 GHz .

Troubleshooting diagram for PLL Synthesizer

Figure 46:PLL Troubleshooting diagram



Phone fails after power on

If the phone stops working a short time after the power is turned ON, a possible reason for this could be that the 26MHz system clock signal is not getting to the UPP clock-input in BaseBand. In this case check the following:

1Turn on the phone and check

2VCXO Power supply (C620) = 2.7V

3VCXO output (R425 – end **not** connected to C425) is 26MHz and approx. 700mVpp

If this is not the case check the reference crystal (B600) and Mjolner (N600) as well as R425, R426, C425, C426.

Measurement points for the VCXO

Figure 47:Figure 22: Measurement point for VCXO supply

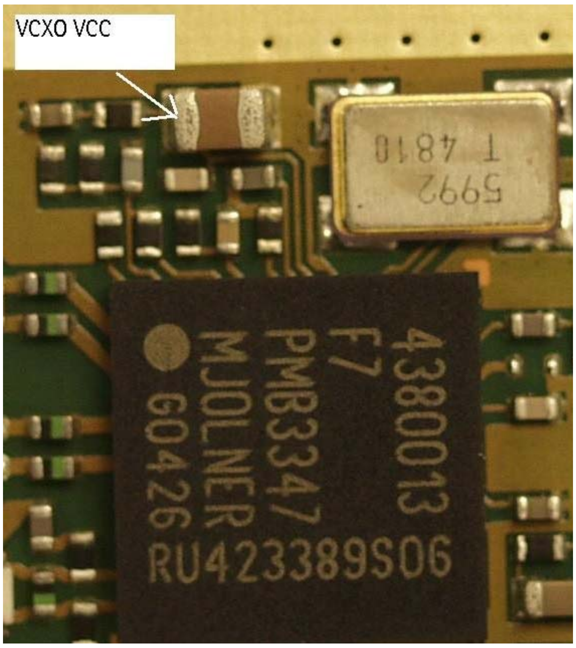
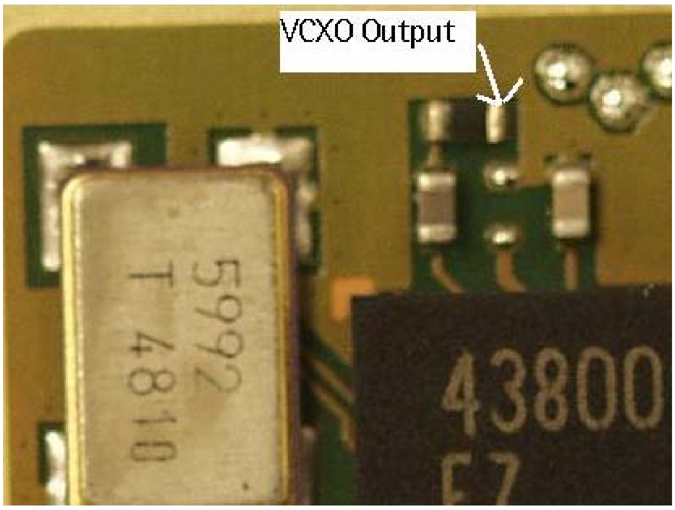
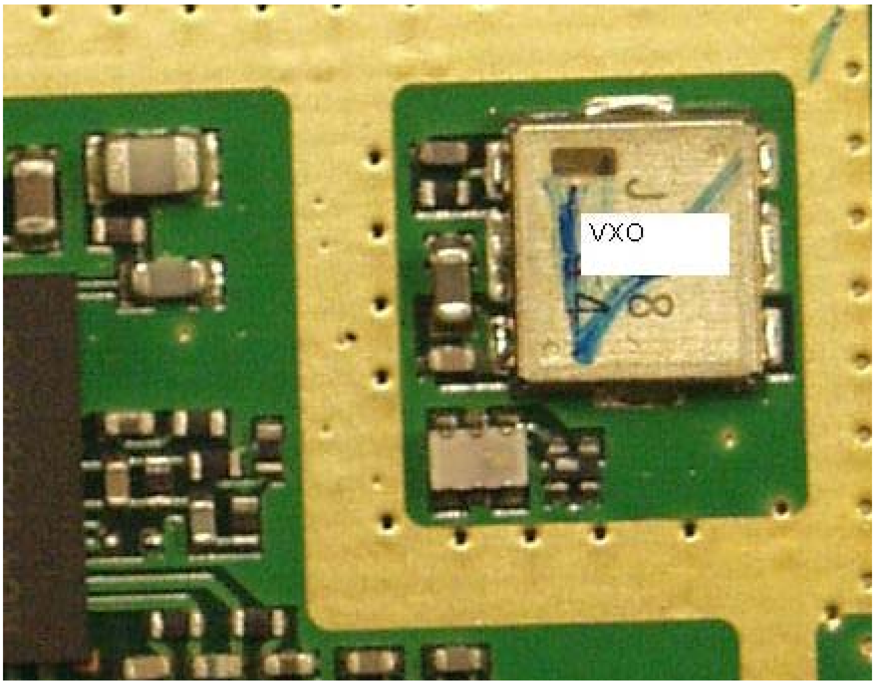


Figure 48:Figure 23: Measurement point for VCXO output



Measurement points at the PLL/VCO

Figure 49:Measurement point for PLL



[This page left intentionally blank]