Nokia Customer Care
2115i/2116/2116i (RH-66)
Mobile Terminals

RF Description and Troubleshooting

Contents

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Component Layouts

Figure 1 and Figure 2 show the main components of the 2115i/2116/2116i.

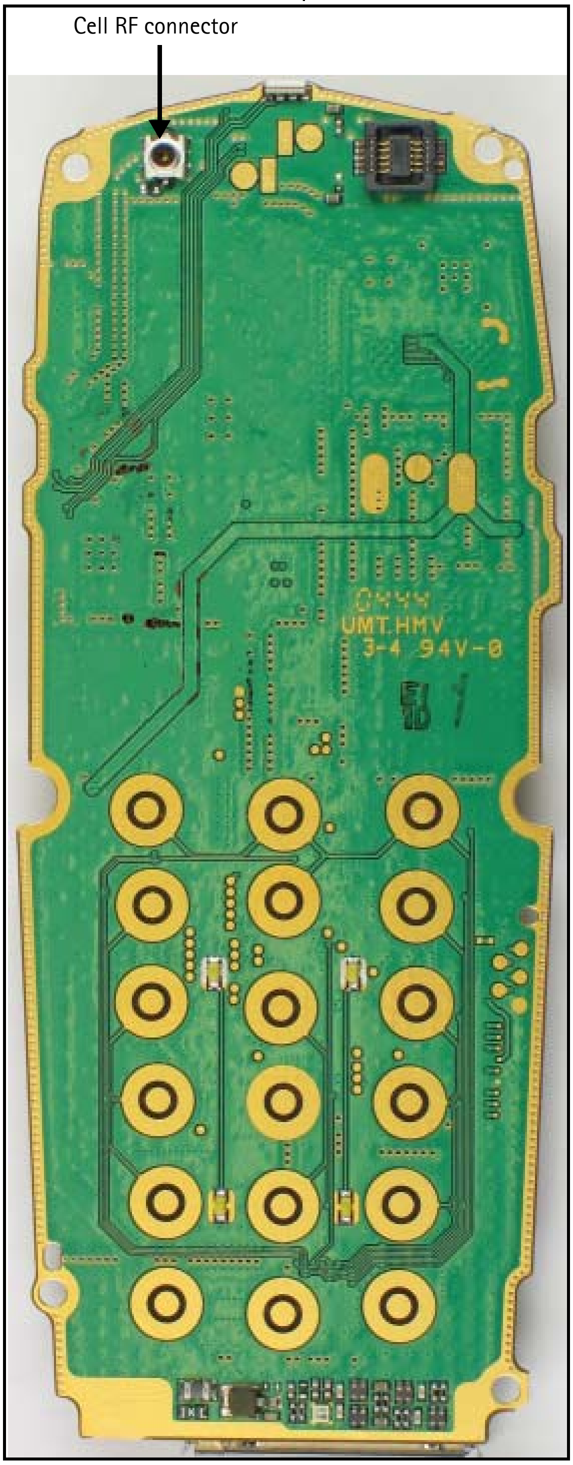


Figure 1: Component layout (top)

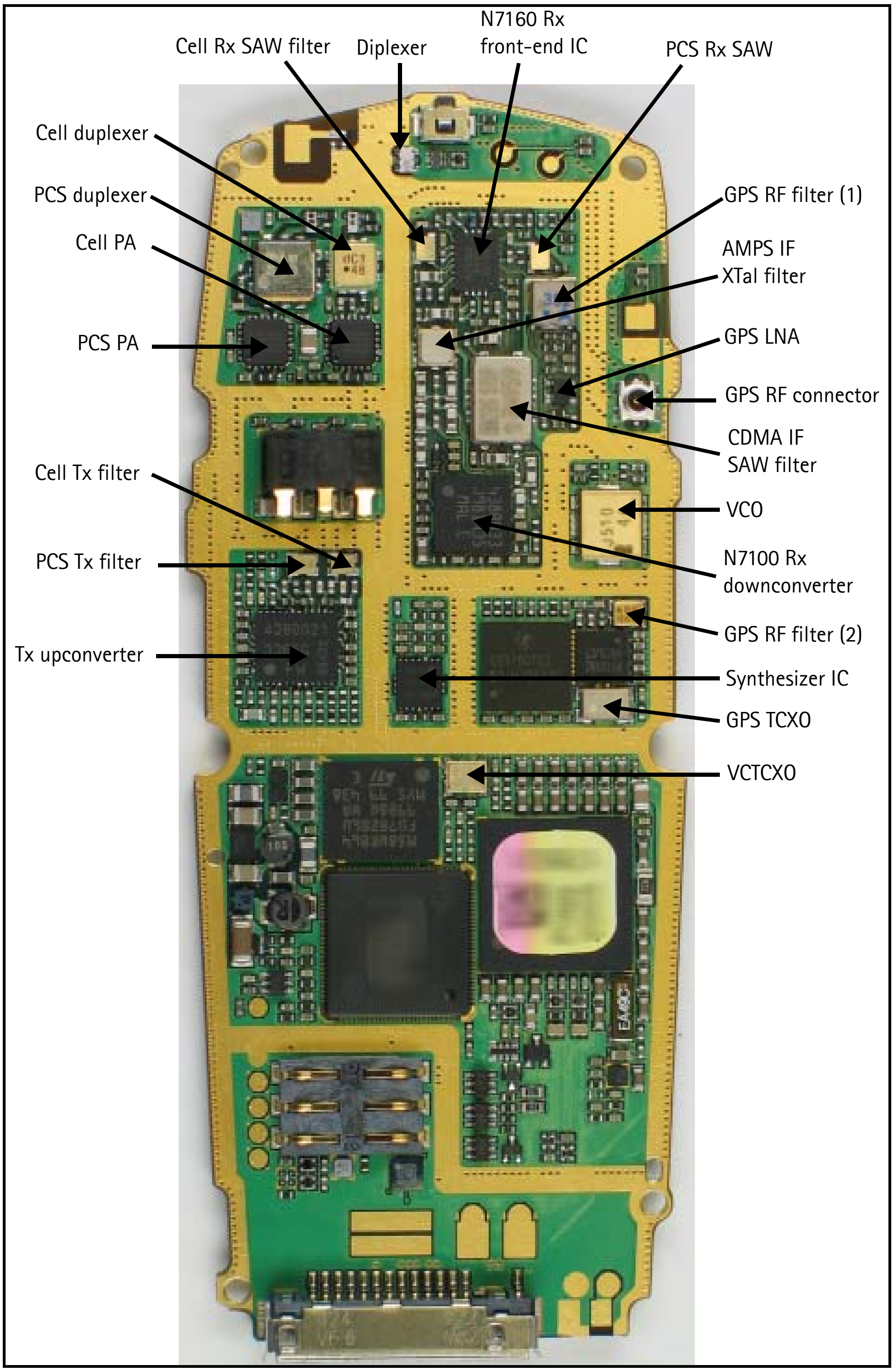


Figure 2: Component layout (bottom)

Phoenix Setup

Use the following steps to configure Phoenix for RF troubleshooting.

1. Connect RF test connector to a call box.
2. Connect the mobile terminal to a PC via the bottom connector, and connect a power supply.
3. Open the **Troubleshooting** menu, and click **Phone Control**.

   The **Phone Control** dialog box appears.
4. On the **Phone Control** dialog box, click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.

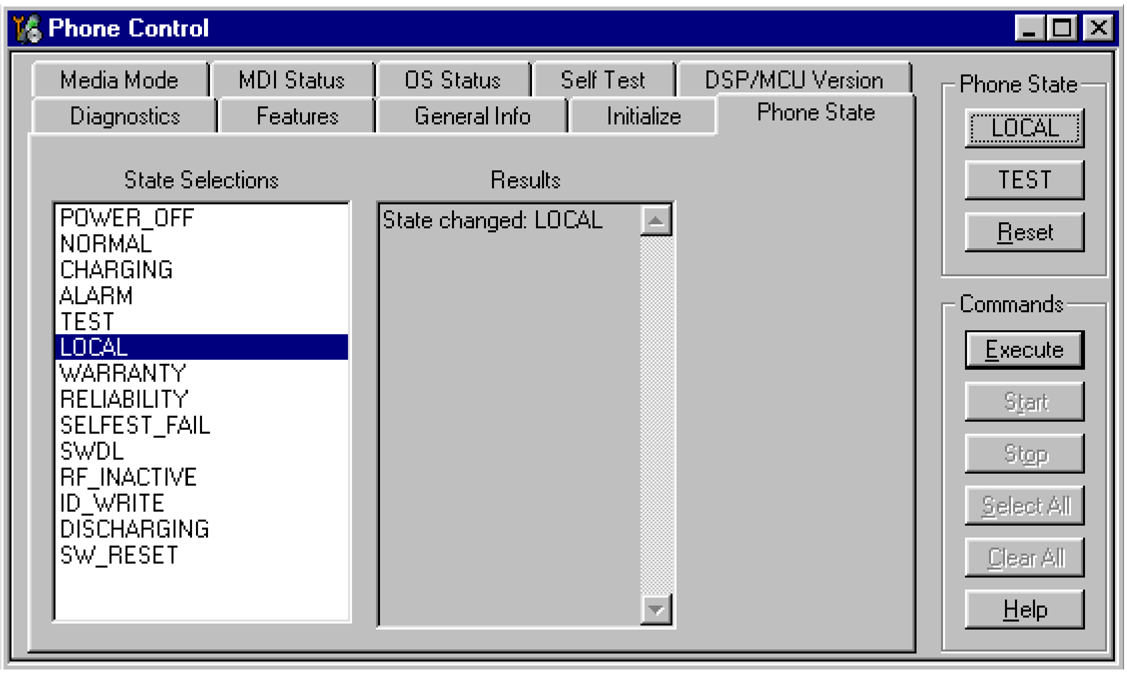


Figure 3: Phone Control dialog box

5. Use Table 1, "Phoenix Configuration," on page 6 to continue Phoenix configuration based on the band type.

Table 1: Phoenix Configuration

Cell	PCS	AMPS
1. On the RF Main Mode dialog box: • **Band** = Cell (CDMA) • **Channel** = 384 • **Mode** = Rx/Tx 2. Click **Set.** Be sure that the "RF Main Mode set successfully" message appears in the status bar. 3. On the **CDMA Control** dialog box: • **State** = Rho ON • **Band** = Cell • **Radio Configuration** = Mode 1: IS-95 Voice • Select the **Set default PDM values** check box. 4. Click **Execute.** 5. Configure the spectrum analyzer using the following values: • Center frequency = 836.52 MHz • Span = 100 MHz • Amplitude = 20 dBm • Attenuation = Auto • BW = Auto 6. Open the RF PDM Control dialog box, and click **Read Phone.** **Ensure the following values**: • **Tx AGC1** = 0 • **Tx AGC2** = -512 • **PA Gain** = 114 • Pout = +16 dBm • Current = 360 mA • Pout with AAS-10 at antenna connection = -8 dBm	1. On the RF Main Mode dialog box: • **Band** = PCS (CDMA) • **Channel** = 600 • **Mode** = Rx/Tx 2. Click **Set.** Be sure that the "RF Main Mode set successfully" message appears in the status bar. 3. On the **CDMA Control** dialog box: • **State** = Rho ON • **Band** = PCS • **Radio Configuration** = Mode 1: IS-95 Voice • Select the **Set default PDM values** check box. 4. Click **Execute.** 5. Configure the spectrum analyzer using the following values: • Center frequency = 1880 MHz • Span = 100 MHz • Amplitude = 20 dBm • Attenuation = Auto • BW = Auto 6. Open the RF PDM Control dialog box, and click **Read Phone.** **Ensure the following values**: • **Tx AGC1** = 0 • **Tx AGC2** = -512 • **PA Gain** = 207 • Pout = +8 dBm • Current = 300 mA • Pout with AAS-10 at antenna connection = -8 dBm	1. On the **AMPS Control** dialog box: • Click the **Tx Control** tab. • In the **Set Channel** field, type 384. • In the **Power Level** field, type 2. • Select the **Transmitter ON** option 2. Click **Execute.** 3. Configure the spectrum analyzer using the following values: • Center Frequency = 836.52 MHz • Span = 100 MHz • Amplitude = 20 dBm • Attenuation = Auto • BW = Auto 4. Open the RF PDM Control dialog box, and click **Read Phone.** **Ensure the following values**: • **Tx AGC1** = 0 • **Tx AGC2** = -512 • **PA Gain** = -200 • Pout = +17 dBm • Current = 370 mA • Pout w/ AAS-10 at antenna connection = -8 dBm

Tx Troubleshooting

Main Tx Components

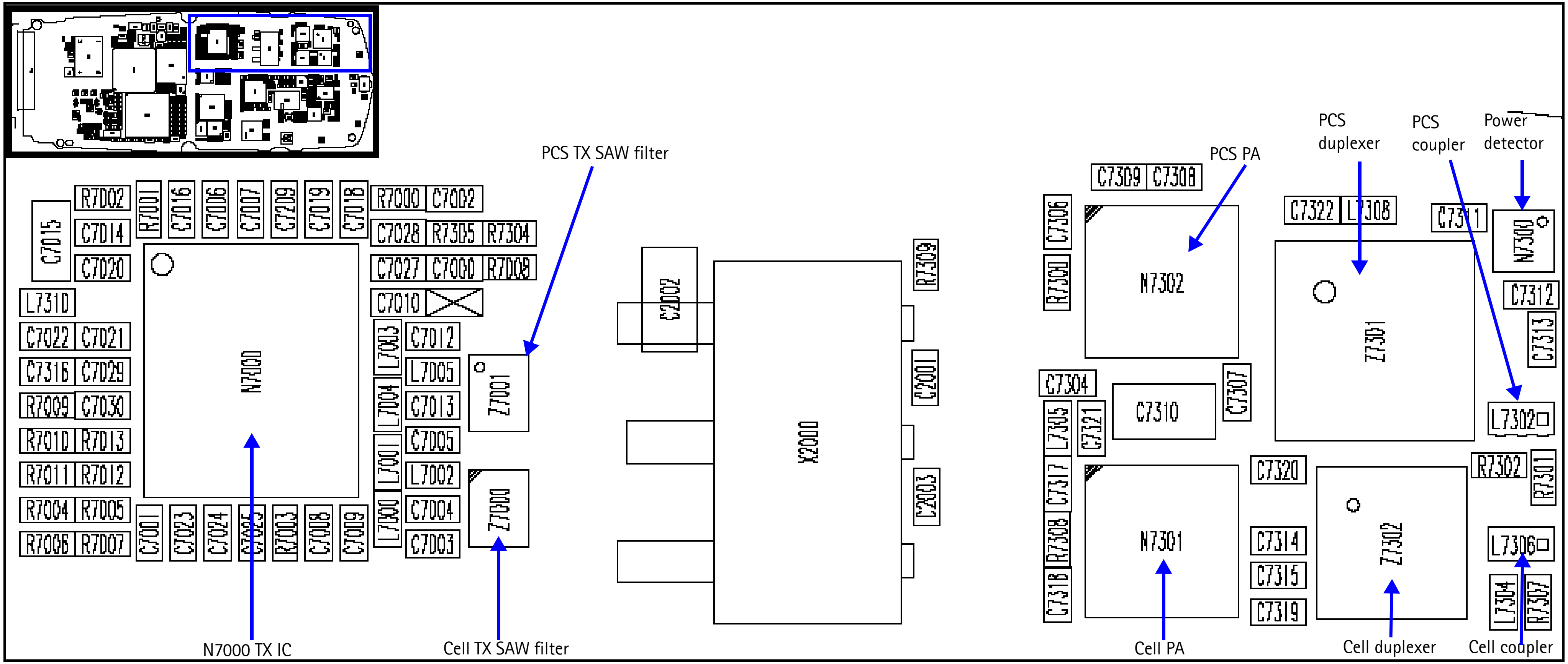


Figure 4: Tx components

Cell Transmitter Block Diagram

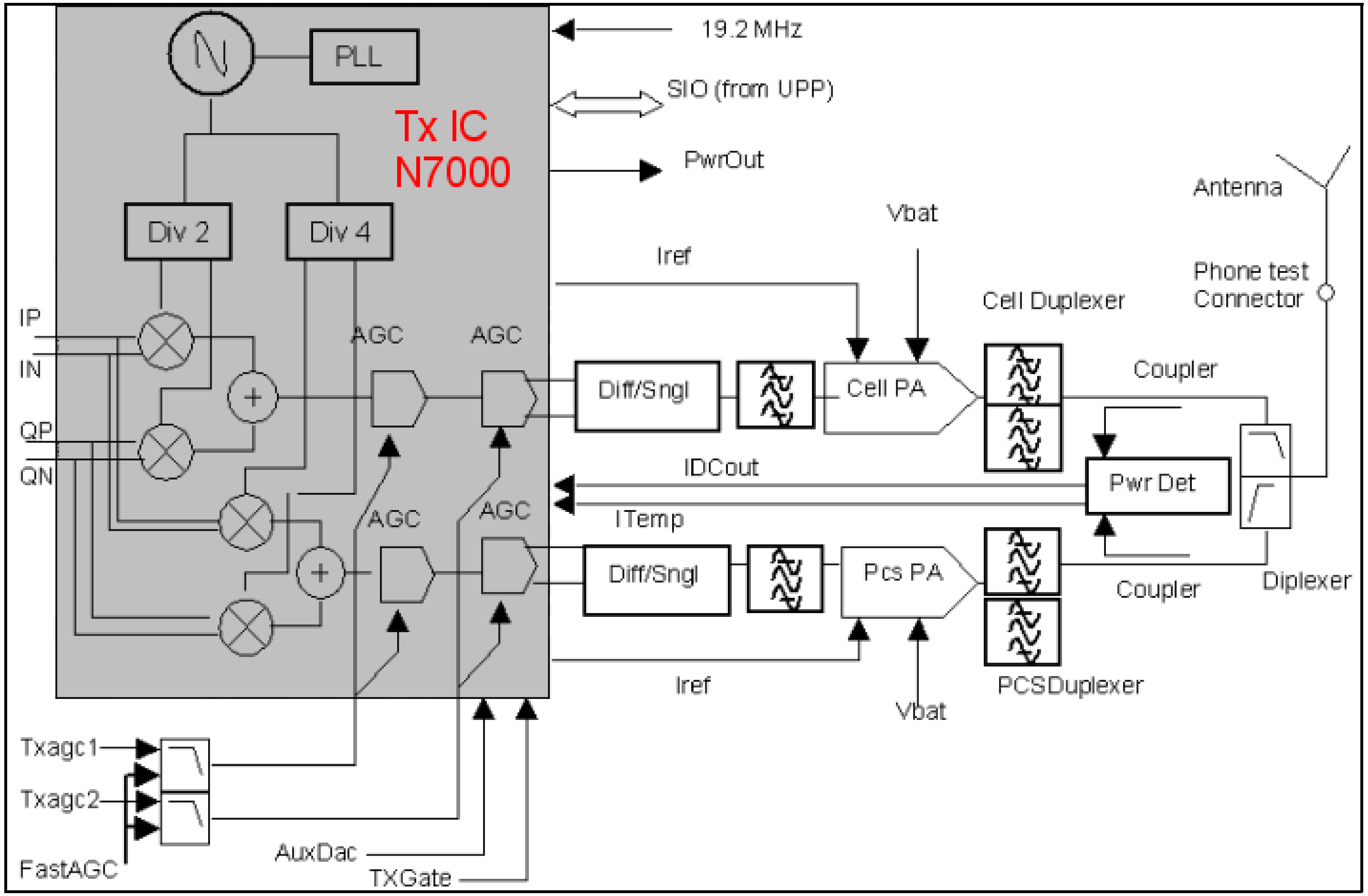


Figure 5: Tx system block diagram

Tx DC Test Points

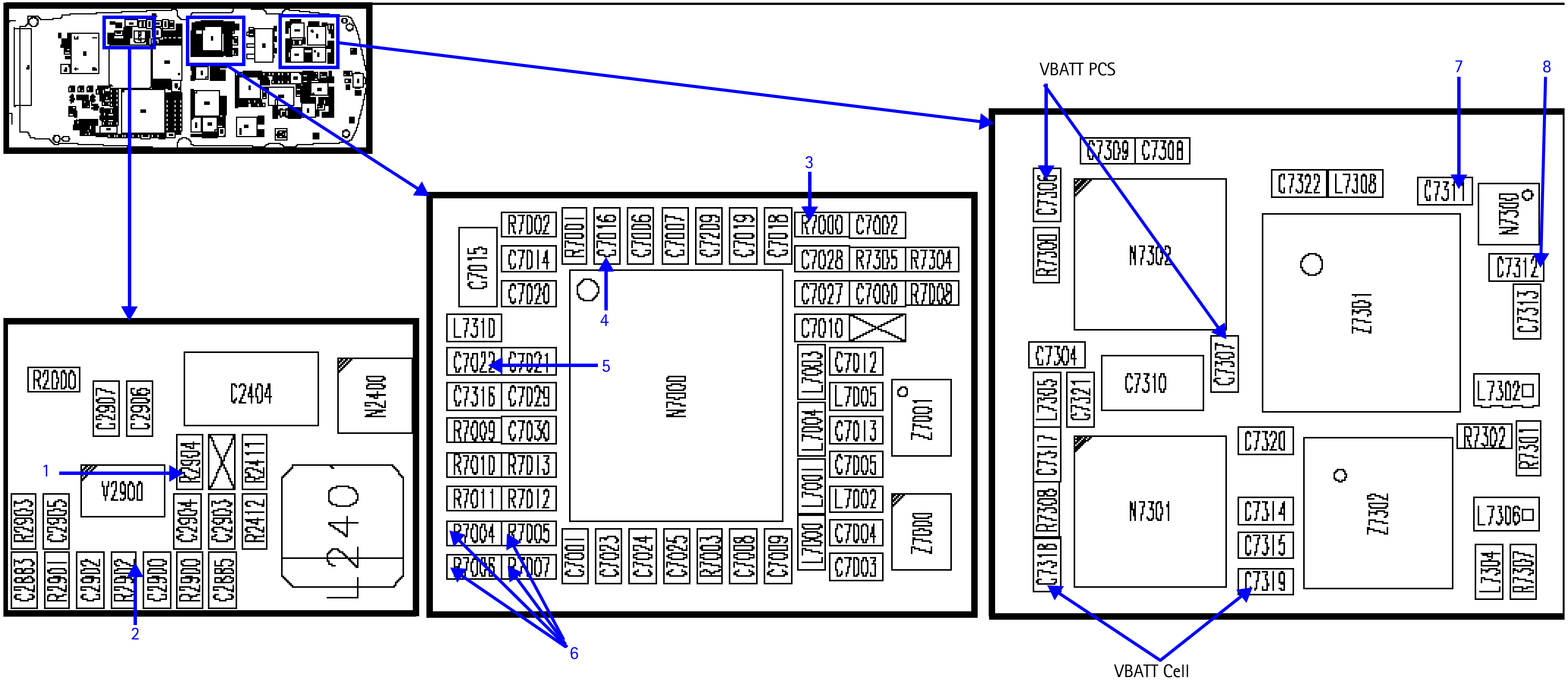


Figure 6: Tx DC test points

Table 2 shows the Tx DC test points shown in Figure 6.

Table 2: Tx DC Test Points

Test Point	Description	Value
1	AGC 1	From 0.1 to 1.8 V
2	AGC 2	From 0.1 to 1.8 V
3	VR6	2.8 V
4	Tx UHF LO lock voltage	1.2 V
5	VR1B	4.8 V
6	Tx IQ in	1.2 V With oscilloscope: 500 mV p-p
7	VR2 (power detector)	2.76 V
8	Power detector output	PCS: • 1.9 V at < 5 dBm • 1.6 V at 15 dBm • 0.8 V at 25 dBm Cell: • 1.9 V at < 5 dBm • 1.7 V at 15 dBm • 1.3 V at 25 dBm

Tx RF Test Points

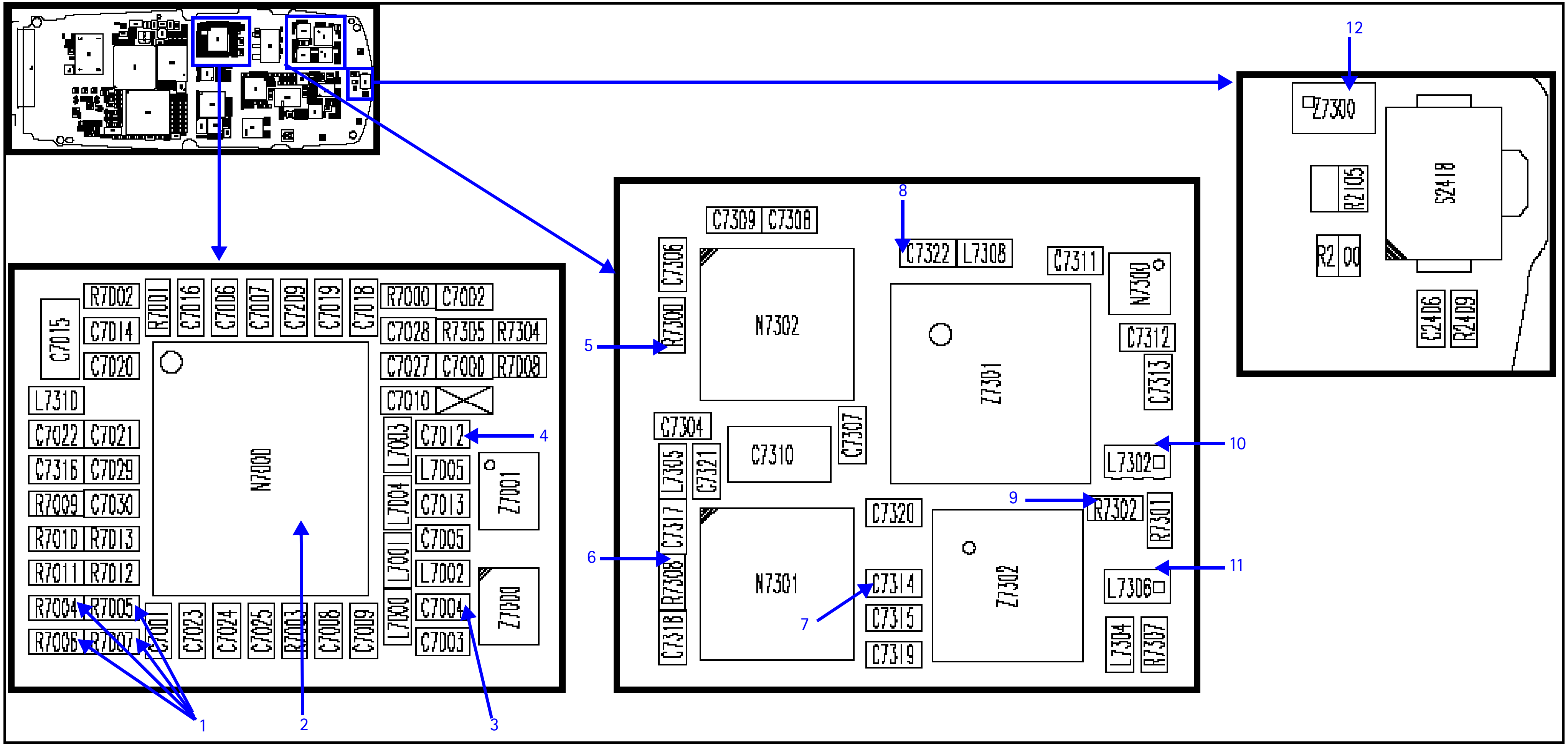


Figure 7: Tx RF Test Points

Table 3 shows the test points shown in Figure 7.

Table 3: Tx RF Test Points

Test Point	Description	Value
1	Tx IQ in with oscilloscope	500 mV p-p with +1.2 V offset
2	Tx UHF LO	Cell: 3346.08 MHz, -57 dBm PCS: 3760 MHz, -54 dBm
3	Cell/AMPS N7000 out	Cell: 836.25 MHz, -15 dBm AMPS: 836.25 MHz, dBm
4	PCS N7000 out	1880 MHz, -22 dBm
5	PCS PA in	-23 dBm
6	Cell/AMPS PA in	Cell: -15 dBm AMPS: -7 dBm
7	Cell/AMPS PA out	Cell: +11 dBm AMPS: +22 dBm
8	PCS PA out	-2 dBm
9	Power detector in	Cell: -8 dBm AMPS: +3 dBm PCS: -17 dBm
10	PCS coupler out	-1 dBm
11	Cell/AMPS coupler out	Cell: +8 dBm AMPS: +18 dBm
12	Diplexer out	Cell: +10 dBm AMPS: +19 dBm PCS: -17 dBm

TX DC Test Points

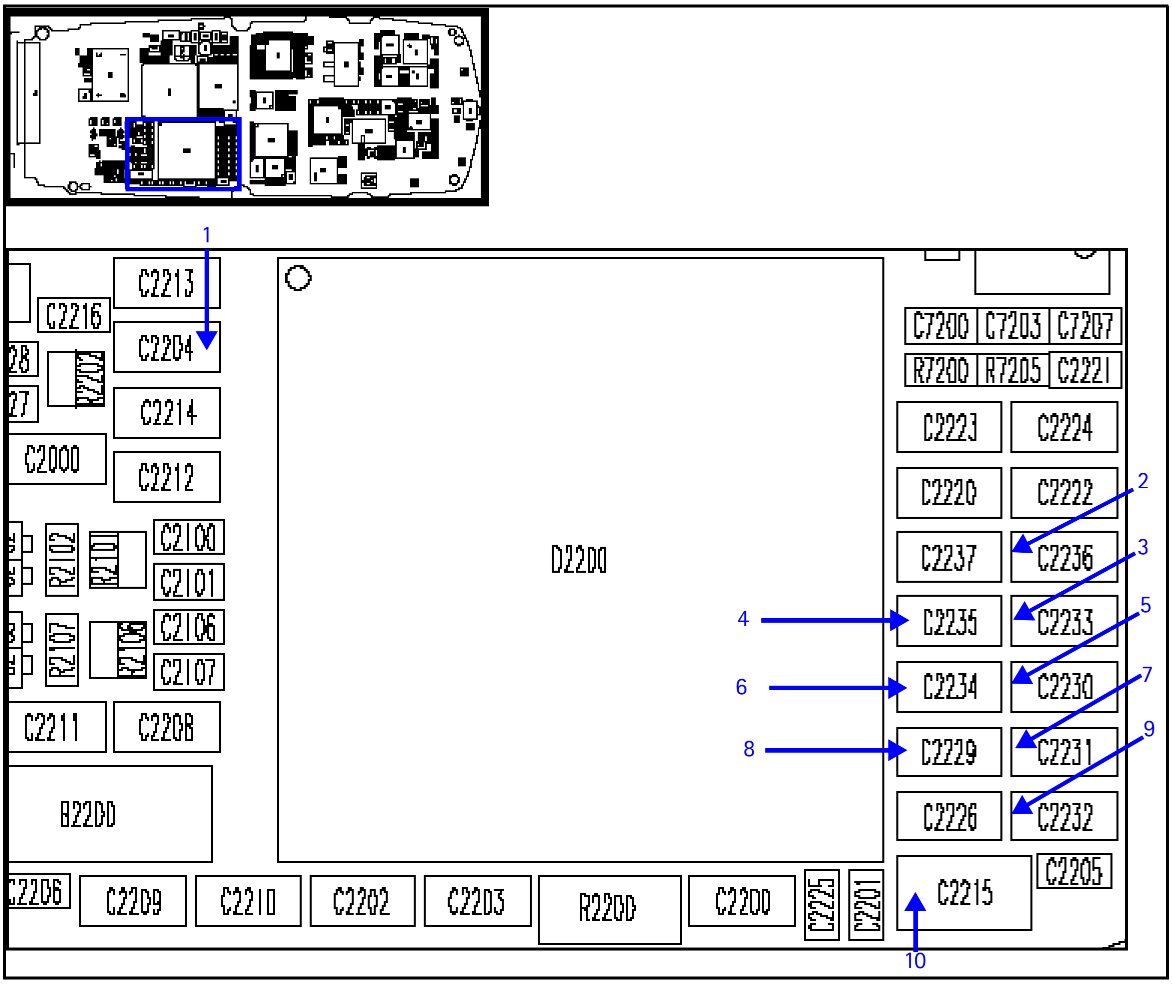


Figure 8: Bottom side Tx DC test points

Table 4 shows the Tx DC test points shown in Figure 8.

Table 4: Tx DC Test Points and RF Supply Line Resistance to Ground

Test Point	Description	Value	RF Supply Lines Resistance to Ground*	
1	VIO	1.8 V	>1MΩ to ground	N7100, N7000, UHF PLL
2	VR3	2.78 V (synthesizer)	>500kΩ to ground	VCTCXO
3	VR7	2.78 V (Rx)	~500kΩ to ground	N7100
4	VR5	2.78 V (Rx)	3.2~5.1Ω to ground	N7160, N7100
5	VR4	2.78 V (Rx)	4.3kΩ to ground	VCO
6	VR6	2.78 V (Tx)	300kΩ to ground	N7000
7	VR2	2.78 V (Tx)	7.5kΩ to ground	N7000, PA detector
8	VR1B	4.75 V (Tx)	>100kΩ to ground	N7000

Table 4: Tx DC Test Points and RF Supply Line Resistance to Ground (Continued)

Test Point	Description	Value	RF Supply Lines Resistance to Ground*	
9	VR1A	4.75 V (synthesizer)	>100kΩ to ground	UHF PLL
10	VBATT	From 3.2 to 4.7 V		
	V_{REF}RF1		45kΩ to ground	N7100

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

Receiver Troubleshooting

Rx System Block Diagram

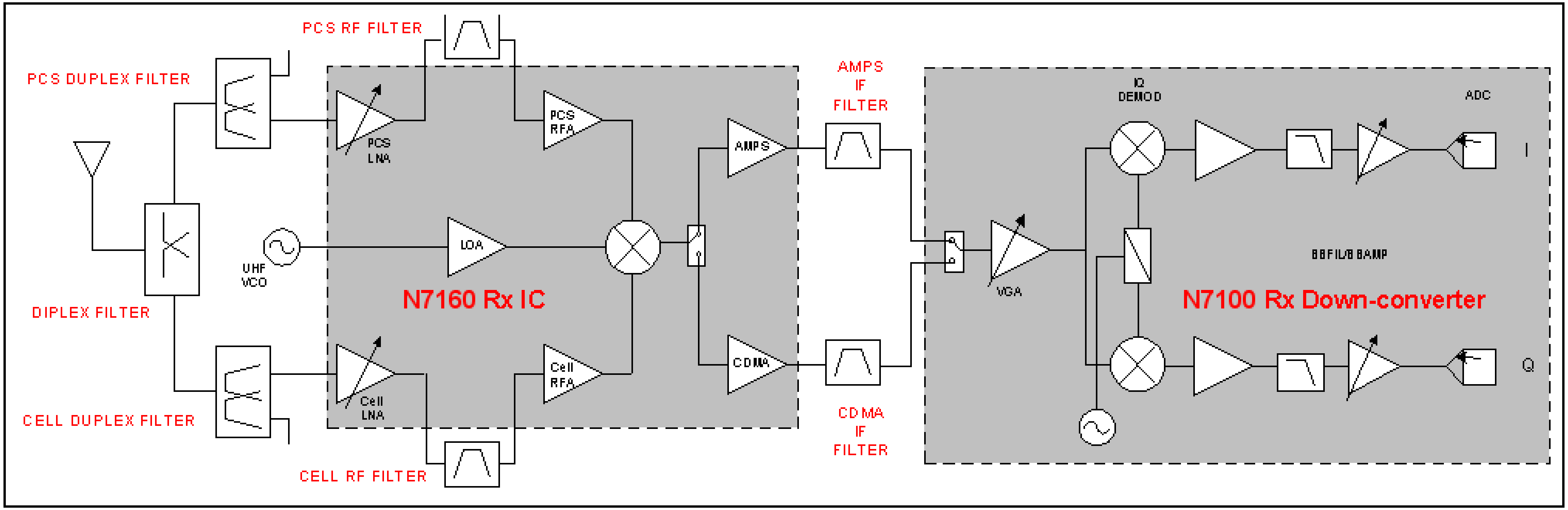


Figure 9: Rx RF system diagram

Cell Receiver Check from RF to IQ

Use the following values to check the CDMA Cell Rx functionality from RF to IQ output.

1. Start Phoenix in Local Mode with only the Rx path turned on.
2. Inject a –75 dBm CW signal of 881.82 MHz (i.e. 300 kHz offset from 881.52 MHz or 10 channels away).
3. Measure a 300 kHz tuning on the analyzer. You should see a typical -21 dBm IQ tuning for CDMA Cell.

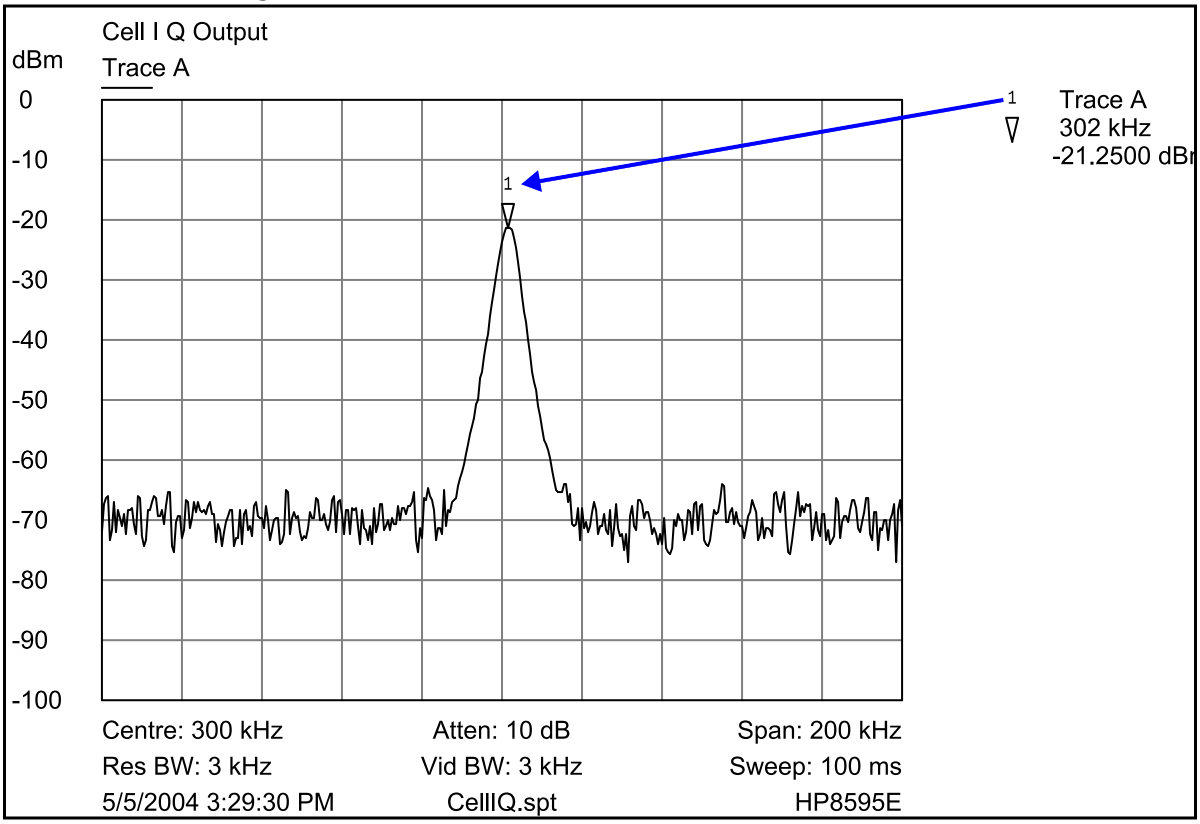
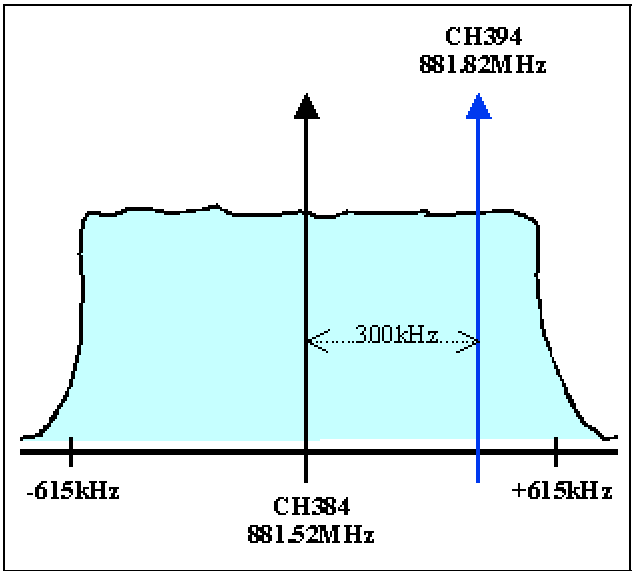


Figure 10: Receiver IQ level on CDMA Cell band

Figure 11 shows the Cell spectrum with an inject tone at -75 dBm, as well as the IQ output test points. Note that DC is present on the IQ output test points. All test points should be approximately equal.



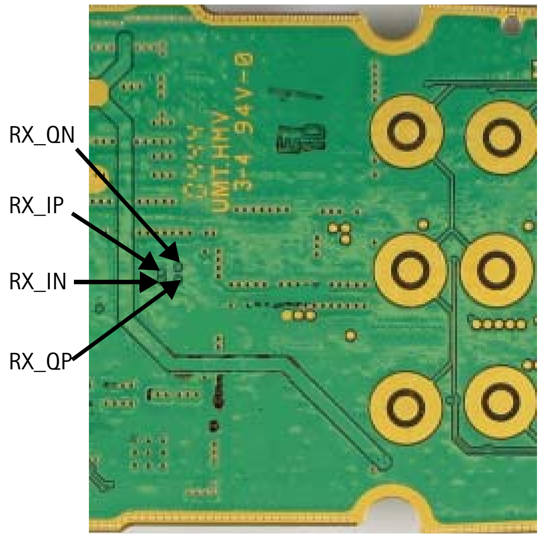


Figure 11: Cell spectrum (left) and IQ output test points (right)

PCS Receiver Check from RF to IQ

Use the following values to check the PCS receiver functionality from RF to IQ output.

1. Start Phoenix in Local Mode with only the Rx path turned on.
2. Inject a –75 dBm CW signal of 1960.5 MHz (i.e. 500 kHz offset from 1960 MHz or 10 channels away).
3. Measure a 500 kHz tuning on the analyzer. You should see a typical -22 dBm IQ tone for PCS. If the 300 kHz tone works but the 500 kHz tone does not, it is PCS possible that the baseband filter was not set by Phoenix.

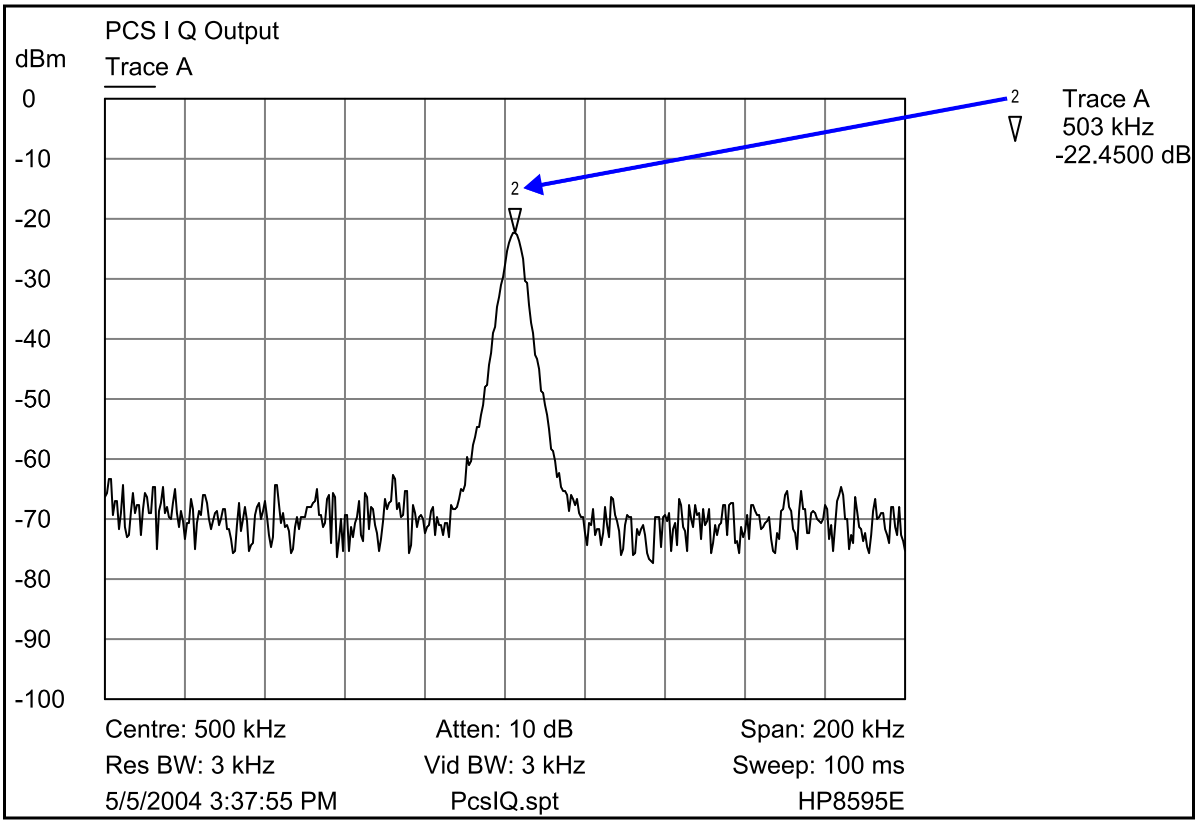


Figure 12: Receiver IQ Level on PCS Band

Figure 13 shows the PCS spectrum with an inject tone at -75 dBm, as well as the IQ output test points. Note that DC is present on the IQ output test points, and all test points should be approximately equal.

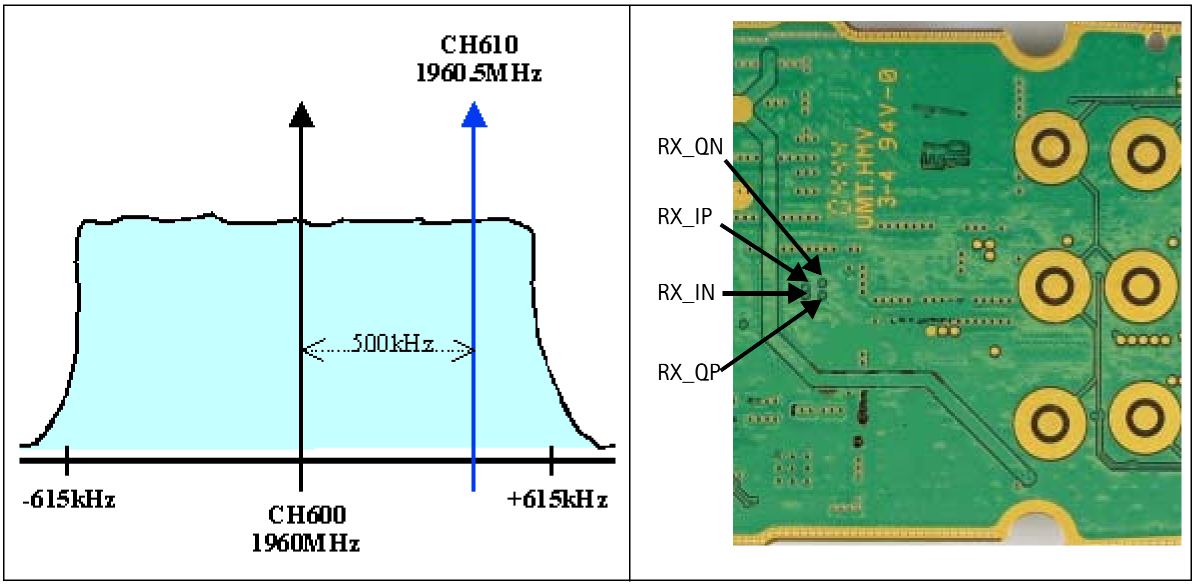


Figure 13: PCS spectrum (left) and IQ output test points (right)

AMPS Receiver Check from RF to IQ

Use the following steps to check the AMPS receiver functionality from RF to IQ output.

1. Start Phoenix in Local Mode with only the Rx path turned on.
2. Inject a –75 dBm CW signal of 881.53 MHz (i.e., 10 kHz offset from 881.52 MHz) into the RF.
3. Measure a 10 kHz tone on the analyzer. You should see a typical -20 dBm IQ tone for AMPS.

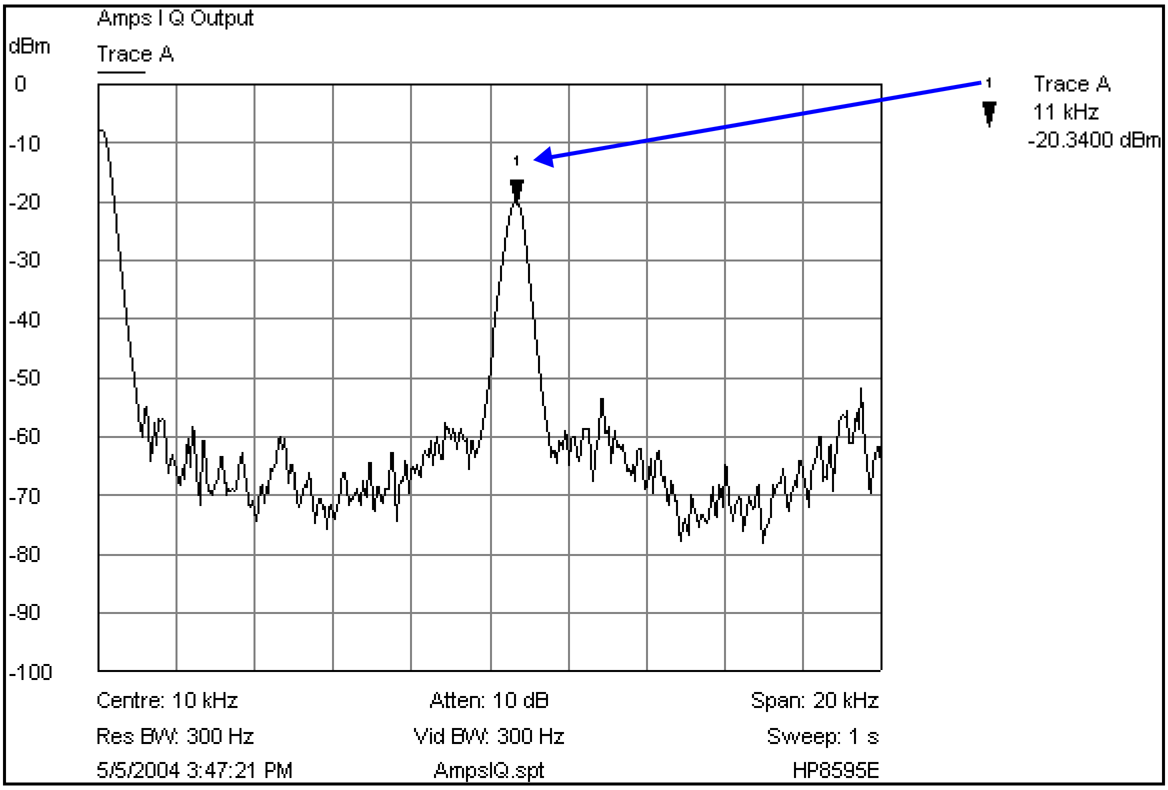


Figure 14: Receiver IQ Level on AMPS band

Figure 15 shows the AMPS spectrum with an inject tone at -75 dBm, as well as the IQ output test points. Note that DC is present on the IQ output test points, and all test points should be approximately equal.

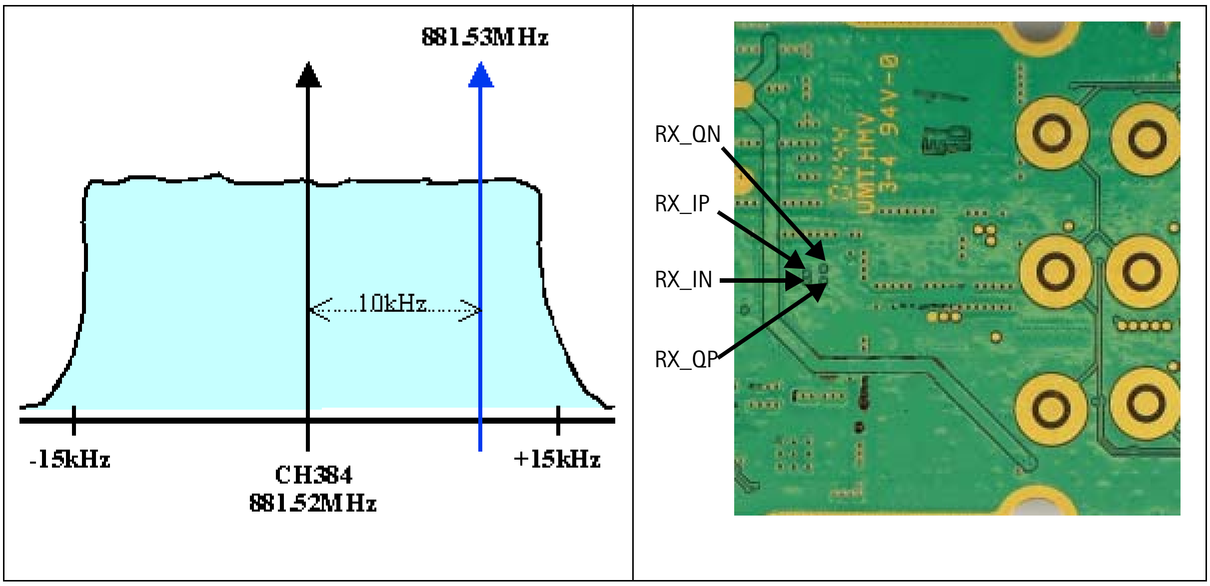


Figure 15: AMPS spectrum (left) and IQ output test points (right)

Receiver DC Test Points

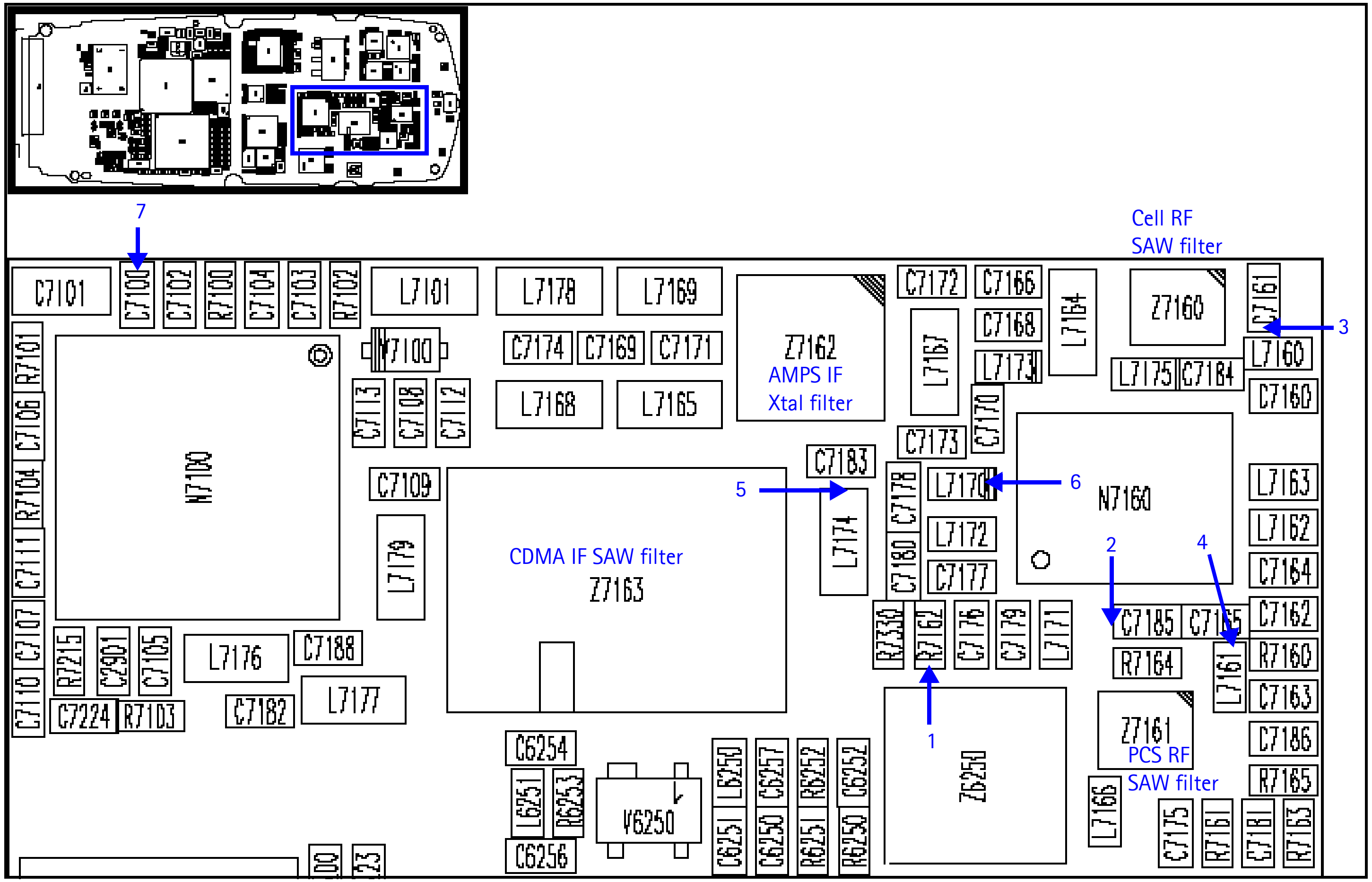


Figure 16: Rx DC troubleshooting test points

Table 5 includes the descriptions and values for Rx DC troubleshooting test points shown in Figure 16.

Table 5: Rx DC Test Points

Test Point	Description	Value
1	LO Vdd	2.6 VDC LO Amp Vdd supply lines for Cell and PCS
2	RFA Vdd	2.8 VDC RF Amp Vdd supply line for Cell band
3	C_LNA Vdd	2.8 VDC External Vdd supply line for Cell LNA
4	P_LNA Vdd	2.8 VDC External Vdd supply line for PCS LNA
5	IFA Vdd	2.8 VDC IF Amp Vdd supply line for CDMA and AMPS IFs
6	IFA Vdd	2.8 VDC IF Amp Vdd supply line for CDMA and AMPS IFs
7	RX LO lock voltage	1.2 to 1.7 VDC

Receiver RF Test Points

For the test points in Figure 17, an external signal source of –25 dBm was injected to the RF input. The signal was then traced throughout the receiver chains. An Agilent 8960 call box is recommended. (Open **Call Setup**, press the **Active Cell** soft button, and then select **CW.**)

Inject a continuous wave (CW) signal for PCS (1960MHz) or Cell/AMPS (881.52MHz) at a fixed –25 dBm power level. Measurements were taken with the AAS-10 RF Probe. Signal levels are approximate, and the accuracy may be +/- 2 dB or more depending on the probe position and grounding.

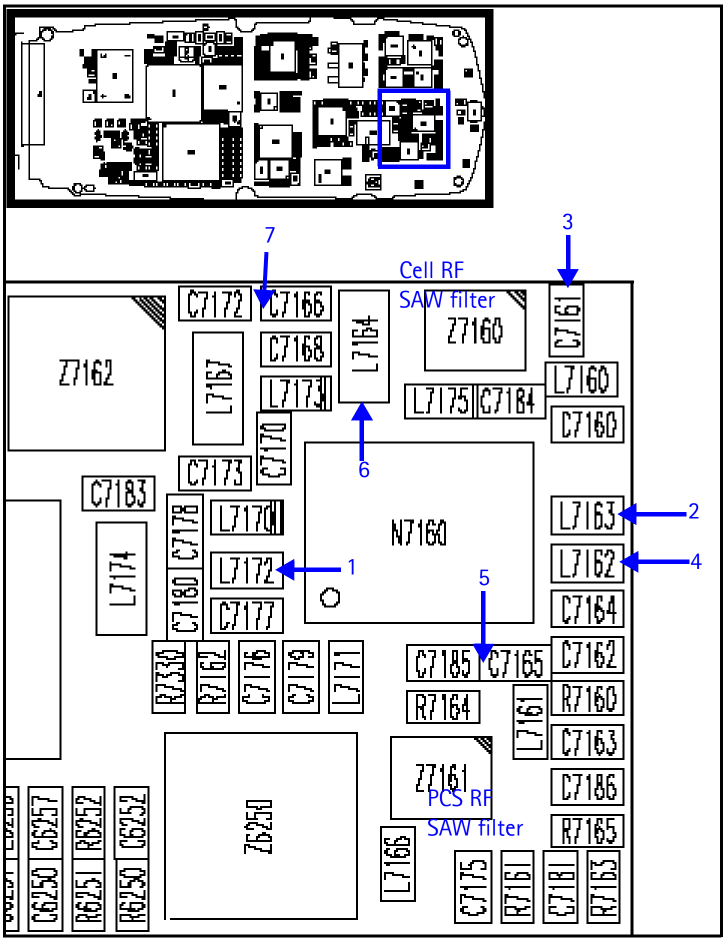


Figure 17: Receiver RF troubleshooting test points

Table 6 includes the descriptions and values for Rx RF troubleshooting test points shown in Figure 17.

Table 6: Rx RF Troubleshooting Values

Test Point	Description	Value
1	PCS_CEL_LO (from VCO)	Cell: 1009.62MHz at -8 dBm PCS: 2088.1MHz at -14 dBm
2	Cell CH384 (from duplexer)	881.52MHz at -31dBm
3	Cell CH384 (to RF SAW)	High gain: 881.52MHz at -20 dBm Low gain: 881.52MHz at -36 dBm
4	PCS CH600 (from duplexer)	1960MHz at -40 dBm
5	PCS CH600 (to RF SAW)	High gain: 1960MHz at -30 dBm Low gain: 1960MHz at -45 dBm

Table 6: Rx RF Troubleshooting Values (Continued)

Test Point	Description	Value
6	IF MIX OUT (from N7160)	High gain: 128.1MHz at -20 dBm Low gain: 128.1MHz at -37 dBm
7	IFA_in (to N7160)	High gain: 128.1MHz @ -15 dBm Low gain: 128.1MHz @ -32 dBm

Receiver IF Test Points

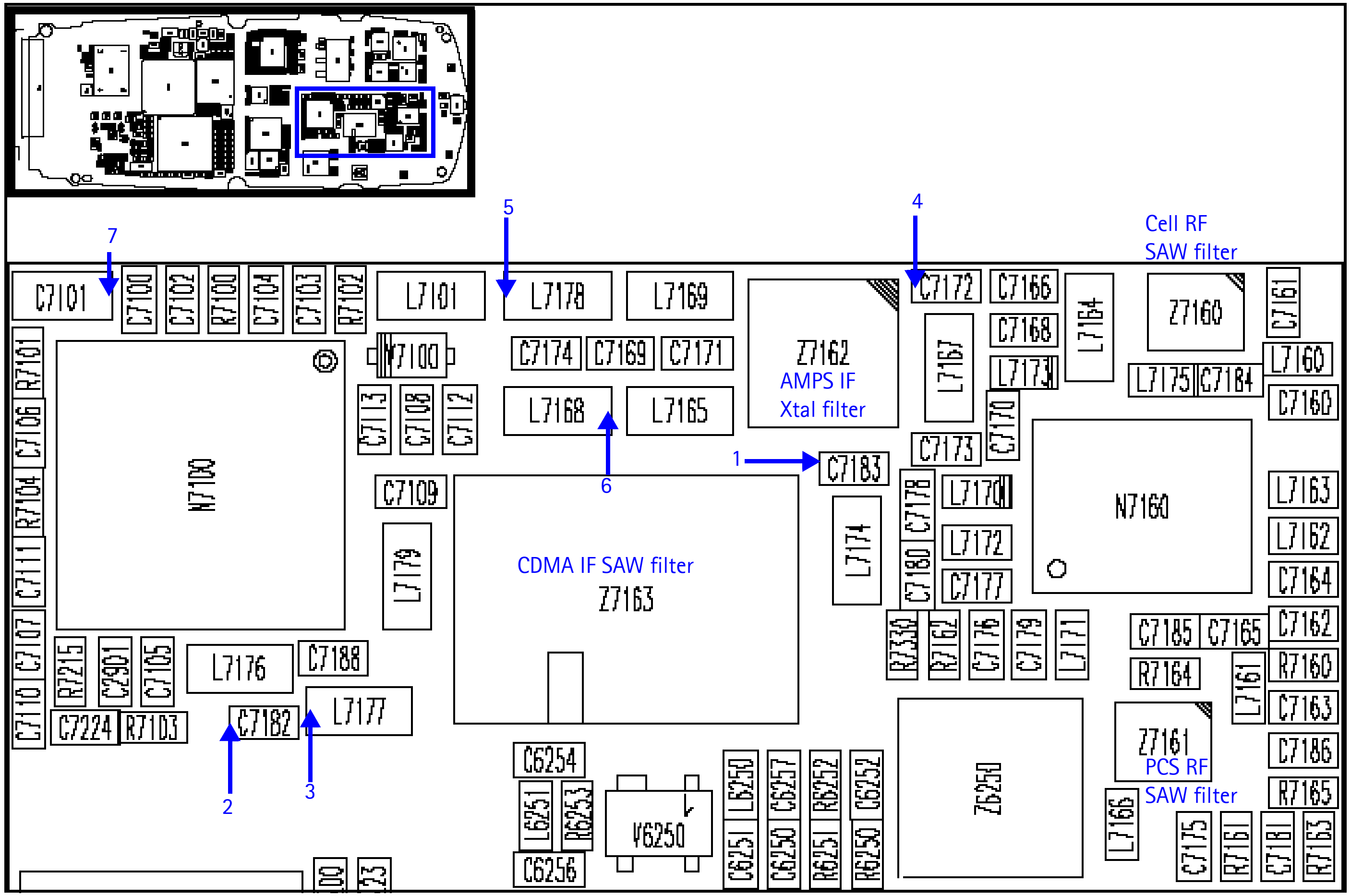


Figure 18: Rx IF troubleshooting test points

Table 7 includes the descriptions and values for Rx IF troubleshooting test points shown in Figure 18.

Table 7: Rx IF Troubleshooting Values

Test Point	Description	Value
1	CDMA IF (to SAW)128.1 MHz	Cell channel 384: • High gain: -6 dBm • Low gain: -23 dBm PCS channel 600: • High gain: -6 dBm • Low gain: -20 dBm
2	CDMA_IF_P (to N7100)128.1 MHz	Cell channel 384: • High gain: -18 dBm • Low gain: -35 dBm PCS channel 600: • High gain: -18 dBm • Low gain: -32 dBm
3	CDMA_IF_N (to N7100)128.1 MHz	Cell channel 384: • High gain: -18 dBm • Low gain: -35 dBm PCS channel 600: • High gain: -18 dBm • Low gain: -32 dBm
4	AMPS IF (to MCF)128.1 MHz	Cell channel 384: • High gain: -17 dBm • Low gain: -34 dBm
5	AMPS_IF_N (to N7100)128.1 MHz	Cell channel 384: • High gain: -23 dBm • Low gain: -41 dBm
6	AMPS_IF_P (to N7100)128.1 MHz	Cell channel 384: • High gain: -23 dBm • Low gain: -41 dBm
7	Rx VHF Lo 256.2 MHz	-60 dBm

Receiver Logic Input Voltages

Following are the measure logic levels for the Rx front end (N7160).

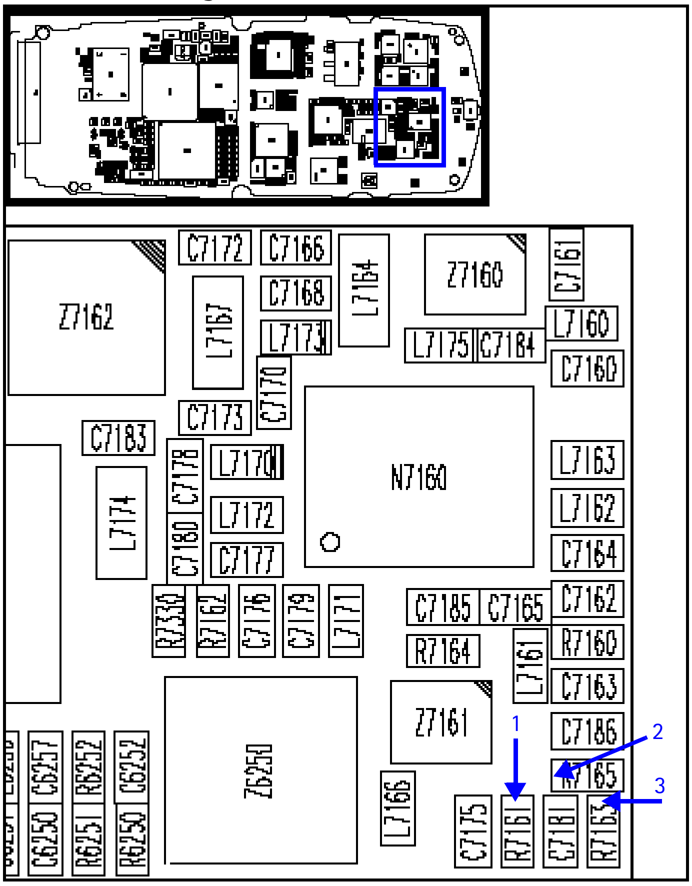


Figure 19: Rx logic input voltages

Table 8 includes the logic level values for the Rx front end.

Table 8: Rx Front-end Logic Levels

Mode	Logic Input Voltages		
	1 IF_SEL	2 BAND	3 GAIN_CTL
Cell CDMA high gain	0 V	0.1 V	2.75 V
Cell CDMA low gain	0 V	0.1 V	0 V
PCS CDMA high gain	0 V	2.68 V	2.75 V
PCS CDMA low gain	0 V	2.68 V	0 V
AMPS high gain	2.76 V	0.1 V	2.76 V
AMPS low gain	2.76 V	0.1 V	0 V

If the logic levels are significantly off (+/- 0.2 V), replace the N7160 and re-measure. If the voltages are still out of specifications, refer to the *Baseband Description and Troubleshooting* chapter.

Synthesizer Troubleshooting

Faulty synthesizers can cause both Rx and Tx failures during tuning, in addition to the VCTCXO tuning. However, first check for the presence of various LO signals and their proper levels. The 19.2 MHz reference clock is needed for the mobile terminal to power up. Therefore, if everything fails, check for the presence of 19.2 MHz. The level of 19.2 MHz is also important because the UPP is very sensitive and can still pick up a very weak 19.2 MHz clock, which can result in the mobile terminal constantly resetting. See "19.2 MHZ VCTCXO Reference Clock" on page 30 for more information.

The following synthesizers are used:

- Dual-band UHF with separate PLL IC and VCO
  - 1009.62 MHz for channel 384 in Cell/AMPS
  - 2088.1 MHz for channel 600 in PCS
- Tx UHF with PLL inside N7000 IC
  - 3296.16 ~ 3395.88 MHz for Cell and AMPS
  - 3700 ~ 3819.9 MHz for PCS
- Rx VHF with PLL inside N7100 IC
  - 256.2 MHz for Cell, AMPS, and PCS

Incorrect PLL Frequencies

Following are possible causes for incorrect PLL frequencies:

- Incorrect power supplies to the PLL portion
- Control line to the VCO
- Loop filter or resonator components missing or incorrectly installed
- 19.2 MHz reference clock is missing or low
- Component failure (PLL IC, N7100, N7000, VCO, or VCTCXO)

Synthesizer Block Diagram

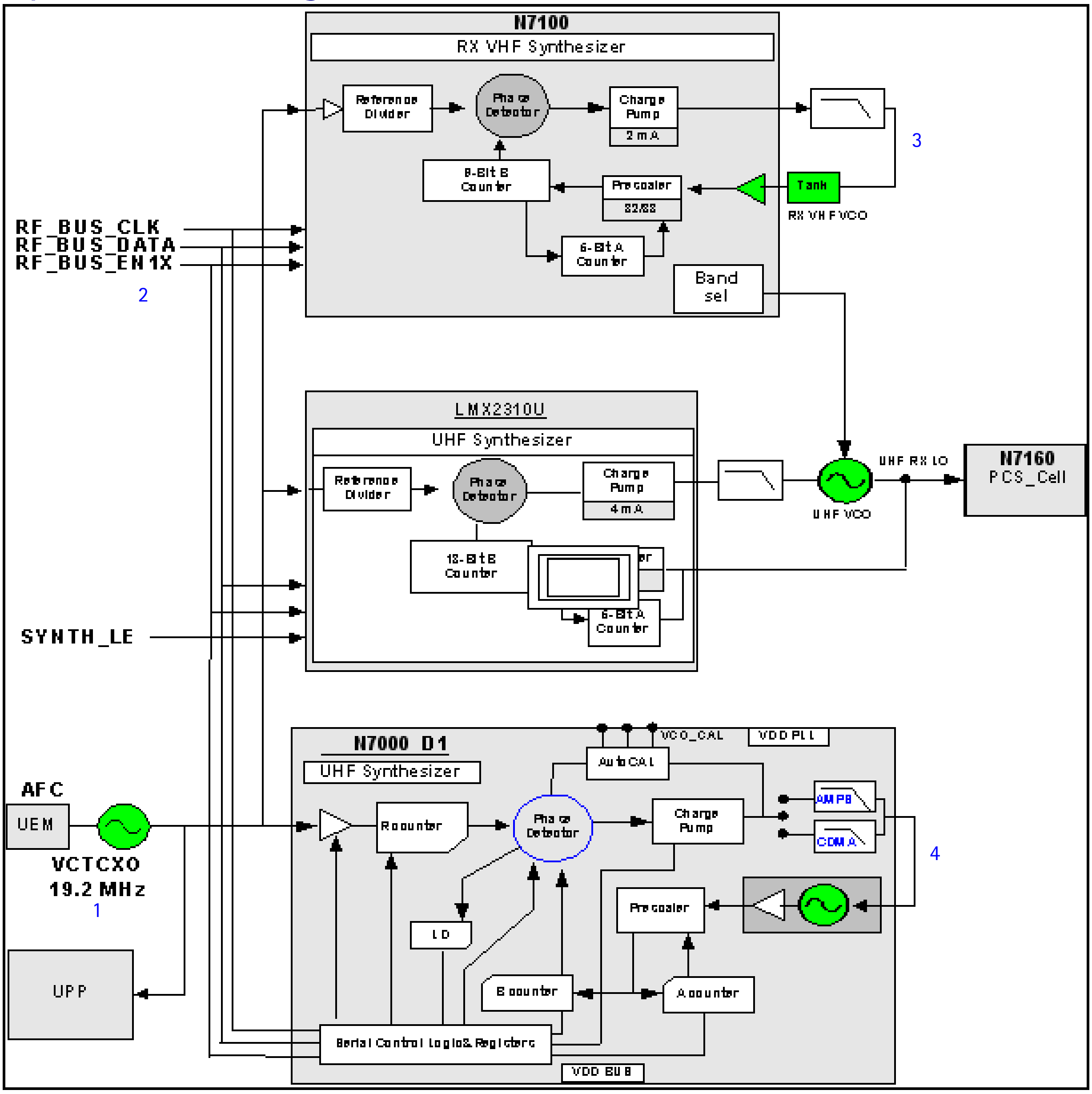


Figure 20: Synthesizer block diagram

Table 9 includes the component values shown in Figure 20.

Table 9: Synthesizer Block Diagram Component Values

Item	Description	Value
1	VCTCXO	19.2 MHz
2	UHF LO	1009.62 MHz (Cell channel 384) 2088.1 MHz (PCS channel 600)
3	Rx VHF LO	256.2 MHz
4	Tx UHF LO	3395.88 MHz 3819.90 MHz

19.2 MHZ VCTCXO Reference Clock

The VCTCXO frequency is a 19.2 MHz reference signal. Without 19.2 MHz, the mobile terminal does not power up. This signal goes to N7100, N7000, UHF PLL, and the UPP. Use a high impedance probe to check for the presence of the signal at the following points:

- F_REF_TX, clock reference to N7000, should be ~ -9 dBm
- F_REF_RX, clock reference to N7100, should be ~ -9 dBm
- CLK19M2_UPP, clock reference to UPP, should be ~ -9 dBm and ~2 dB less in the other side on R517

If you do not see the VCTCXO signal at any of these points, check to see if there is voltage at the following points:

- VR3, main supply line for VCTCXO circuitry, should be 2.78 VDC
- AFC voltage, should be between 1 and 3 V, and should be adjustable with the AFC slider on the **RF PDM Control** dialog box in Phoenix. If the AFC voltage is missing, check the UEMC.

Measuring the AFC Voltage

1. Measure the DC voltage at R7205.

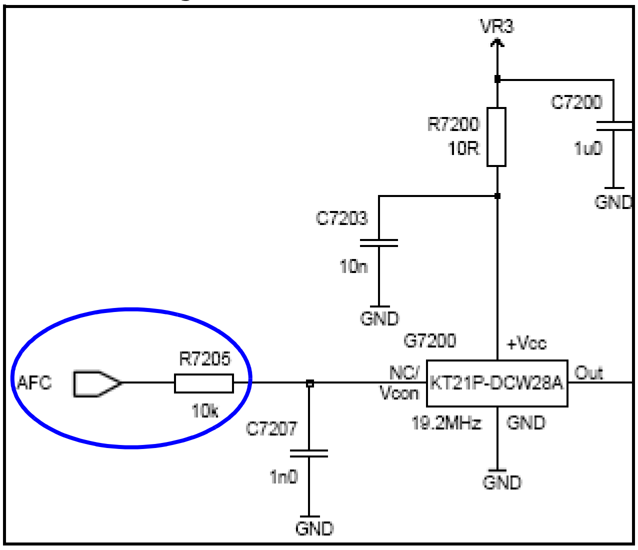


Figure 21: AFC voltage measurement location at R7205

2. Open the **RF PDM** dialog box component in RF.

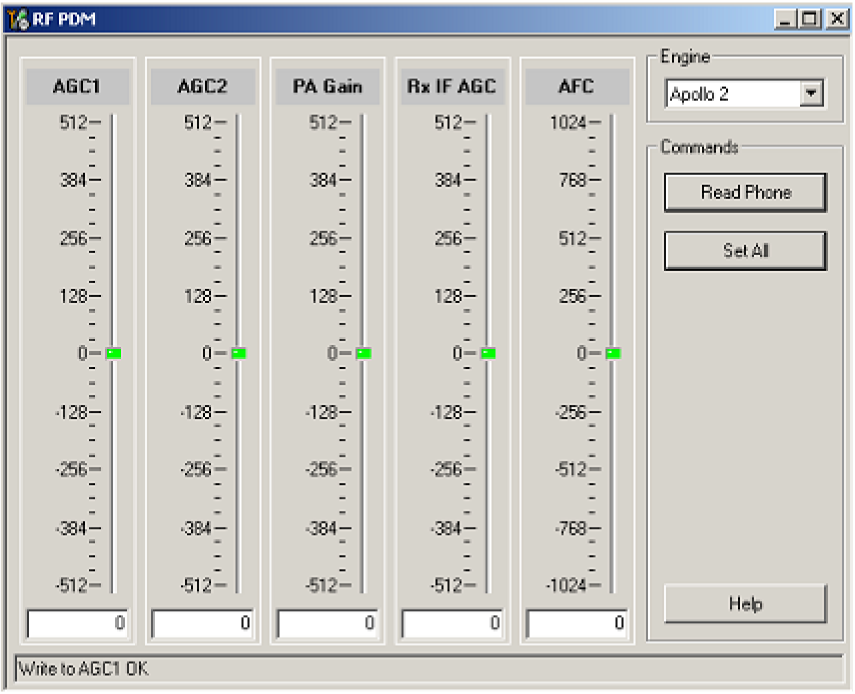


Figure 22: RF PDM dialog box for AFC measurement

Typical voltages observed are as follows:

- AFC PDM[0] = 1.3 V
- AFC PDM[-1024] = 0.8 V
- AFC PDM[1023] = 2.5 V

VCTCXO Manual Tuning

You can manually tune the VCTCXO to verify when a mobile terminal is tuned incorrectly or if the mobile terminal cannot make a call. To verify, monitor the RF signal at the output of the mobile terminal.

Use the following steps to set up a CW signal:

1. On the **Phone Control** dialog box, click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.

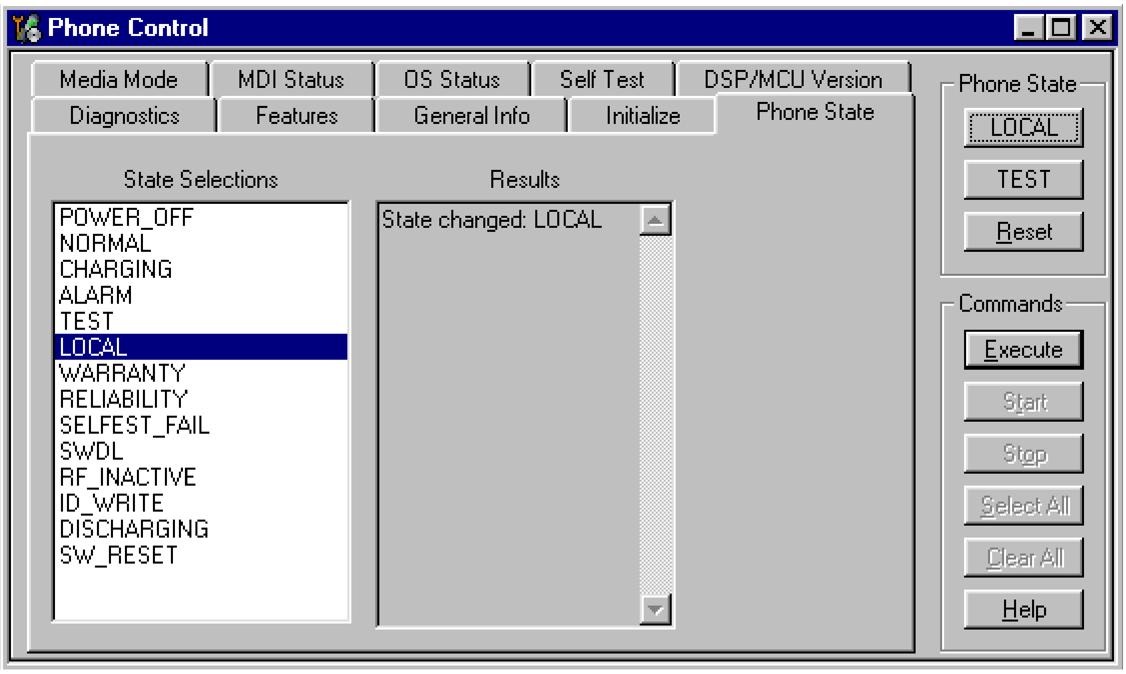


Figure 23: Phone Control dialog box

2. Click the **Execute** button.
3. Open the **Troubleshooting** menu, point to **AMPS**, and click **AMPS Control**.

   The **AMPS Control** dialog box appears.
4. Click the **Tx Control** tab, and type the following values:
   - **Channel** = 384
   - **Power Level** = 5
   - Select the **Transmitter On** option.
5. Select the **Rx RFI** tab, make sure **AFC Control** is not selected, and click **Execute**.
6. The next step depends on the type of measurement equipment you are using:
   - Spectrum analyzer: Set the center frequency to 836.52 MHz, set the span to 2 MHz, and establish a marker at 836.52 MHz.
   - HP8960: Set the callbox System Type to AMPS, set the ACC channel to 384, and use the Frequency Accuracy measurement to center the VCTCXO (minimum frequency error).

7. Use RF PDM to adjust the AFC to center the VCTCXO. The tuning range is approximately +/- 10kHz. Adjust the AFC so that the output signal is within +/-150Hz. If using the spectrum analyzer, narrow the span to 1 kHz or less.

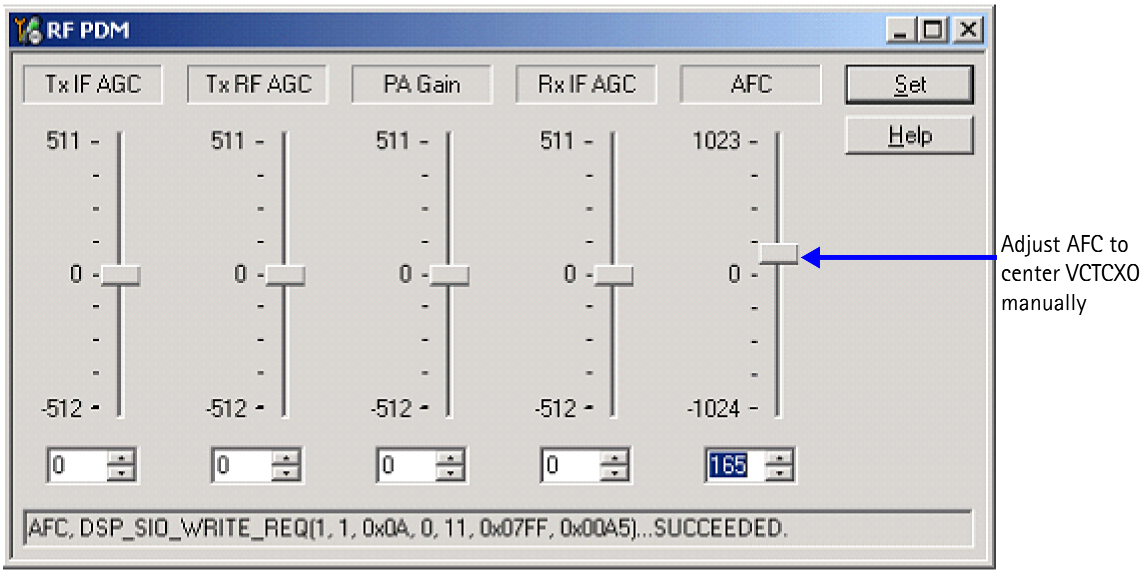


Figure 24: RF PDM dialog box

8. If the VCTCXO does not tune, replace the UEMC.

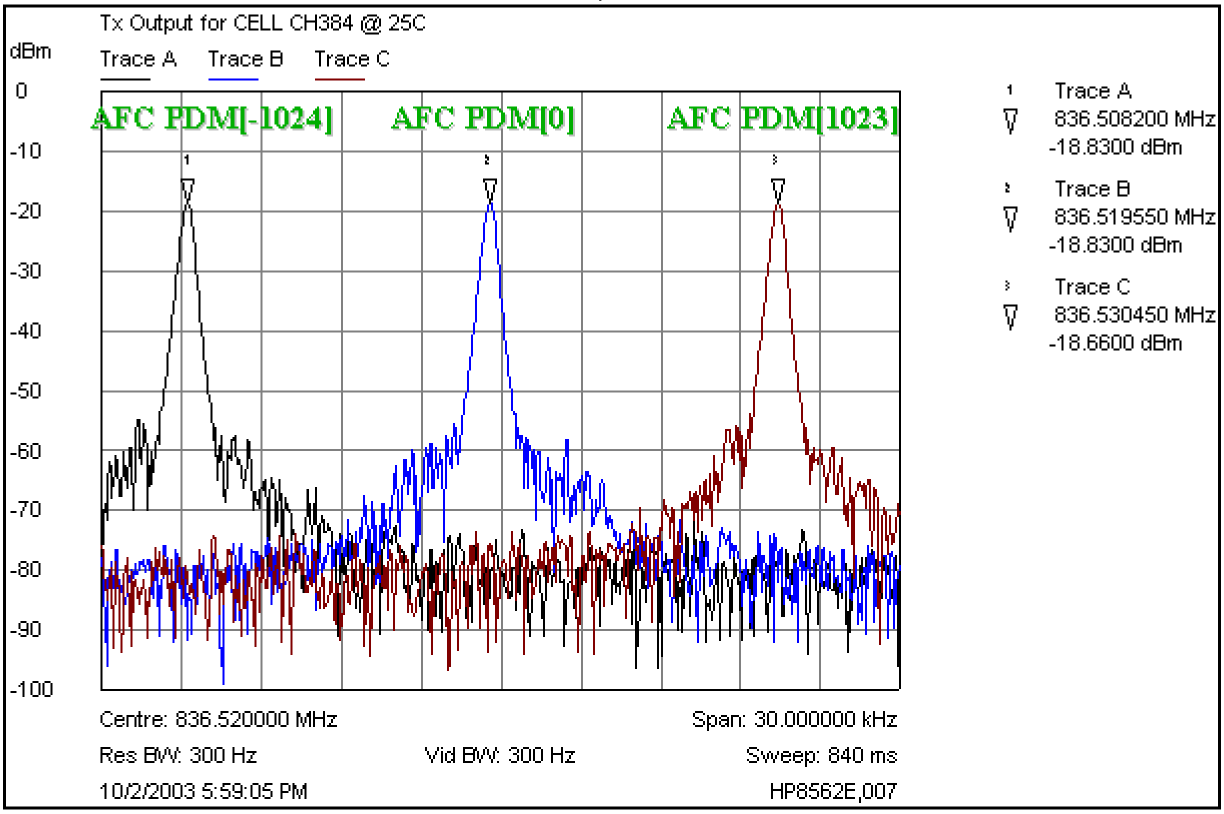


Figure 25: Tx output for Cell channel 384 at 25C

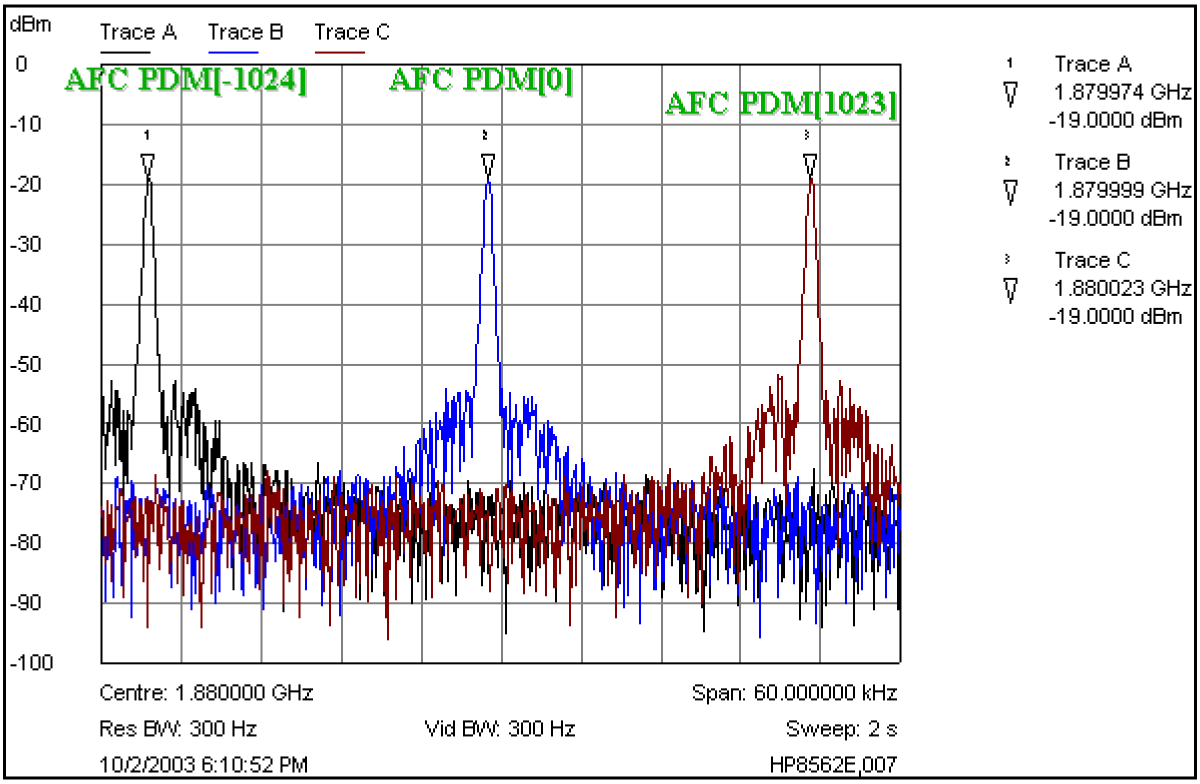


Figure 26: Tx output for PCS channel 600 at 25C

VCTCXO Test Points

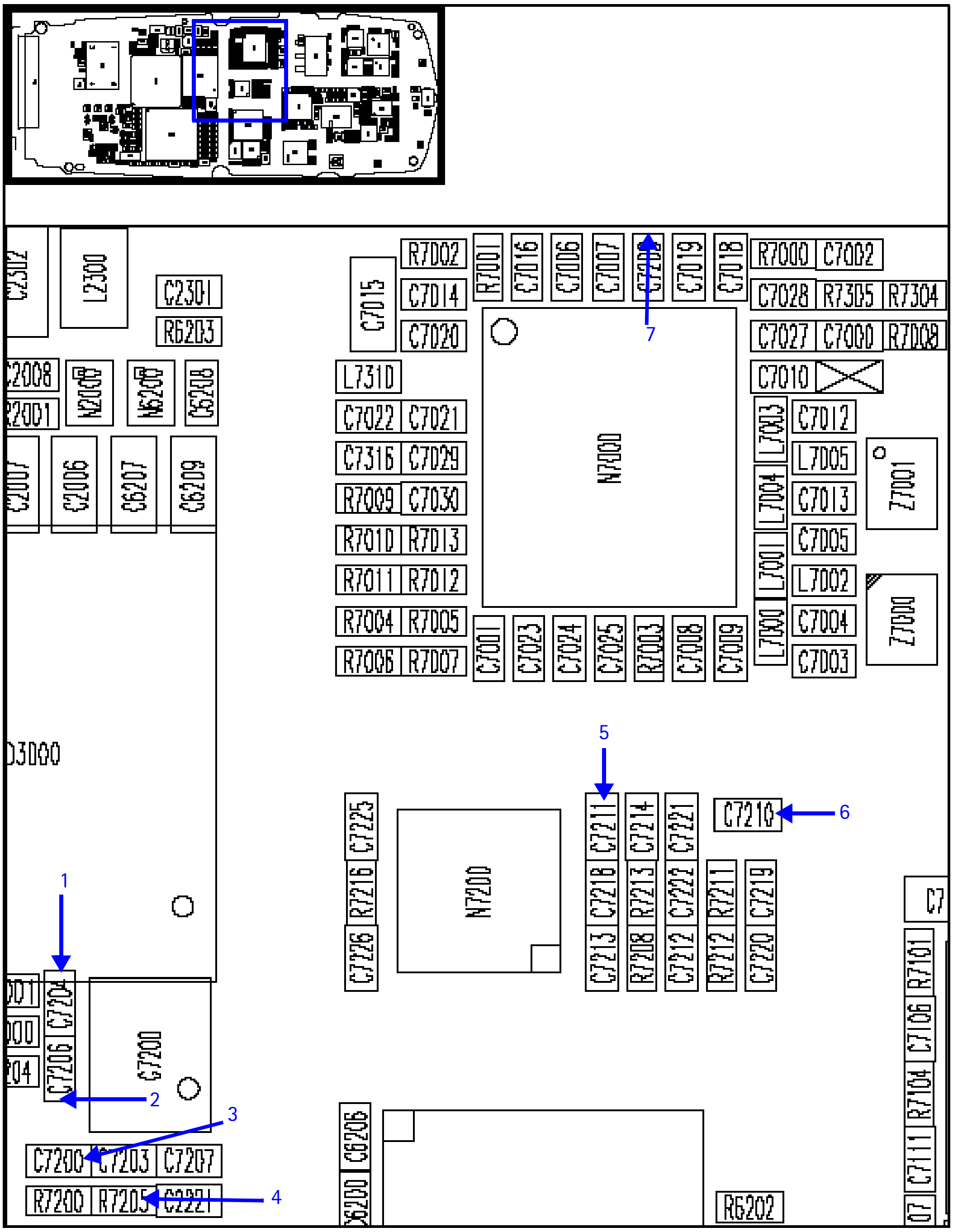


Figure 27: VCTCXO test points

Table 10 shows the values and description for the VCTCXO test points in Figure 27.

Table 10: VCTCXO Test Point Values and Descriptions

Test Point	Description
1	CLK19M2_UPP to UPP
2	CLK19M2_GPS to GPS module
3	VR3: 2.8 V
4	AFC voltage: DC between 1 and 3 V: • 1.3 V for PDM 0 • 0.8 V for PDM -1024 • 2.5 V for PDM 1023
5	Oscillator in to UHF PLL
6	F_REF_RX to N7100
7	F_REF_TX to N7000

Receiver UHF Synthesizer

The UHF LO frequency varies with the channel. Use the following steps to troubleshoot the UHF synthesizer using Phoenix.

1. Open the **RF** menu, and click **Frequency Calculator**.

The **Frequency Calculator** dialog box appears.

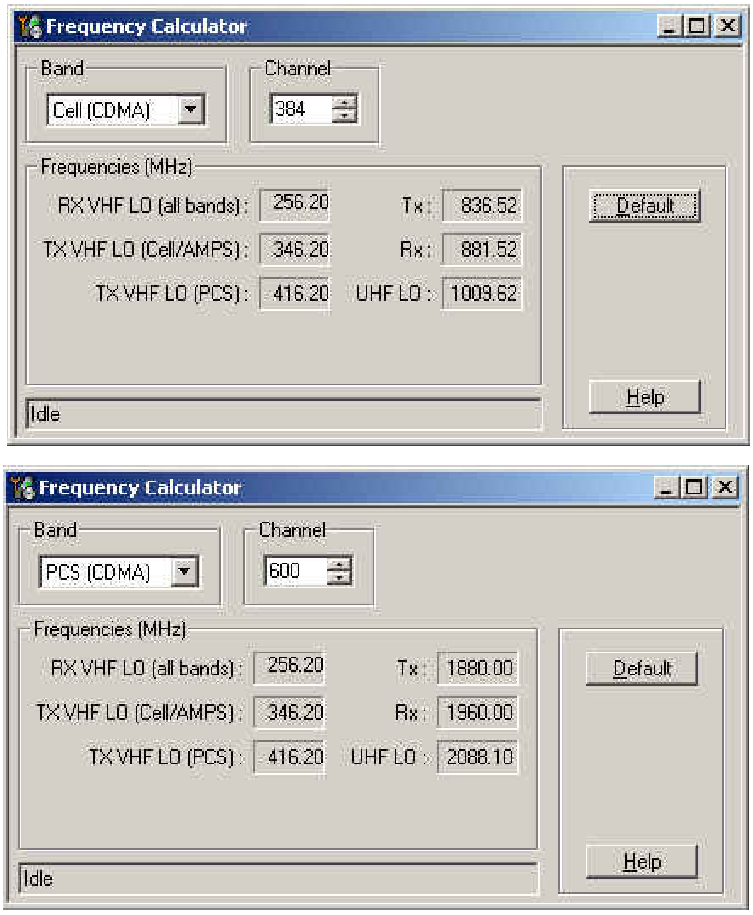


Figure 28: Frequency Calculator dialog box for Cell (top) and PCS (bottom)

2. Check to see if the LO is locked. Set a channel and check the output of the UHF LO at L502 within a very narrow span of 100 KHz. The LO should be virtually immobile.
3. Measure for nominal UHF LO signal levels using an RF probe.
4. If you do not see the presence of any LOs, check the DC voltages at the following locations:
    - VR1A (R503), the supply line for UHF_PLL_IC, should be 4.76 VDC
    - VR4 (R510), supply line for VCO_IC, should be 2.76 VDC
5. Check lock voltage at C514, which should be between 1 and 3 V.
6. Check the RF return at R504.

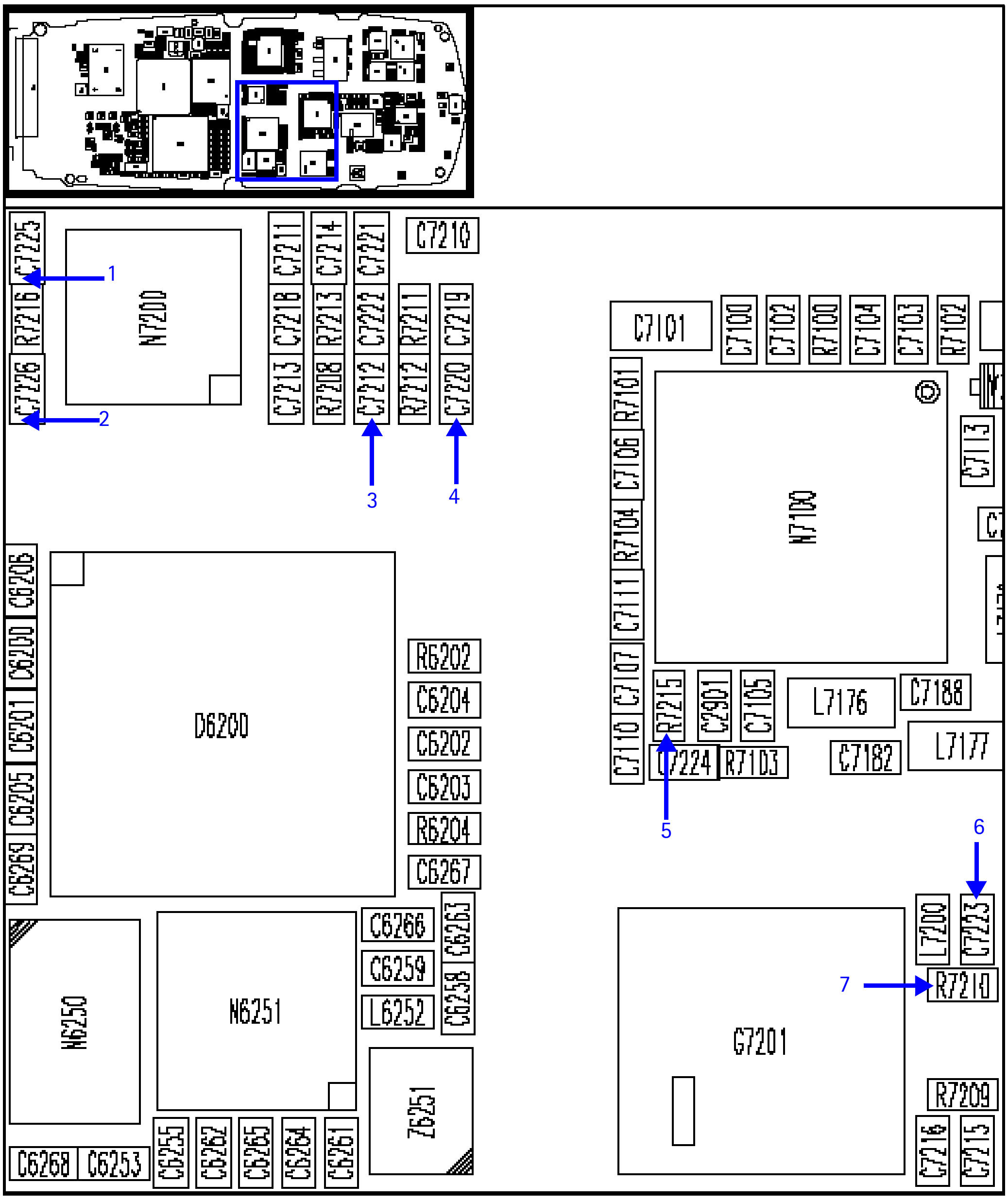


Figure 29: UHF synthesizer test points

Table 11 shows the values and description for the UHF synthesizer test points in Figure 29.

Table 11: UHF Synthesizer Test Point Values and Descriptions

Test Point	Description	Values
1	VR4	2.8 V
2	VPLL	2.8 V
3	VR1A	4.8 V

Table 11: UHF Synthesizer Test Point Values and Descriptions (Continued)

Test Point	Description	Values
4	Lock voltage	DC between 0.8 and 3.4 V, S/B 1.2 V at center frequency
5	BAND_SEL_VCO	Cell = 0 VDC PCS = 2.8 VDC
6	UHF LO: PCS_CEL_LO return to N7160 PCS_CEL_LO return to UHF PLL	Cell: -11 dBm PCS: -18 dBm
7		Cell channel 384: 1009.62 MHz > -9 dBm PCS channel 600: 2088.10 MHz > -16 dBm

Rx VHF LO

The Rx VHF LO operates at a fixed frequency of 256.2 MHz. It is the second LO for down-conversion to I and Q for baseband processing. Use the following guidelines when troubleshooting:

- Monitor the probing point at C7101 for the N7100 LO. A locked and stable 256.2 MHz with an amplitude of ~ –60 dBm should be observed on the spectrum analyzer (~ -2 dBm at C7104 if using a high impedance probe).
- Monitor the control voltage at C7100. The control voltage in a locked state should be between 1.2 and 1.7 VDV for the proper operation of the N7100 LO.

Rx VHF LO (N7100) Schematic

The following partial schematic is for general reference only. See the *Schematics* chapter for a detailed version.

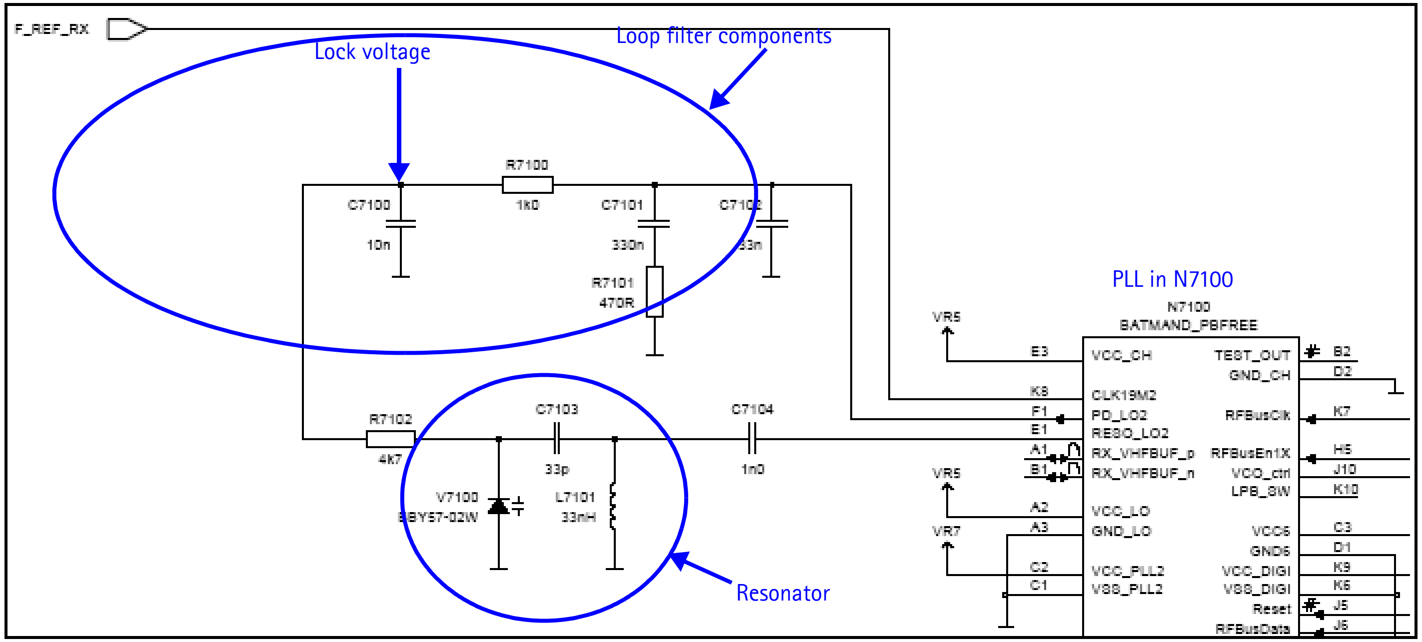


Figure 30: Rx VHF LO (N7100) schematic (partial view)

Figure 31 shows the Rx VHF LO test points.

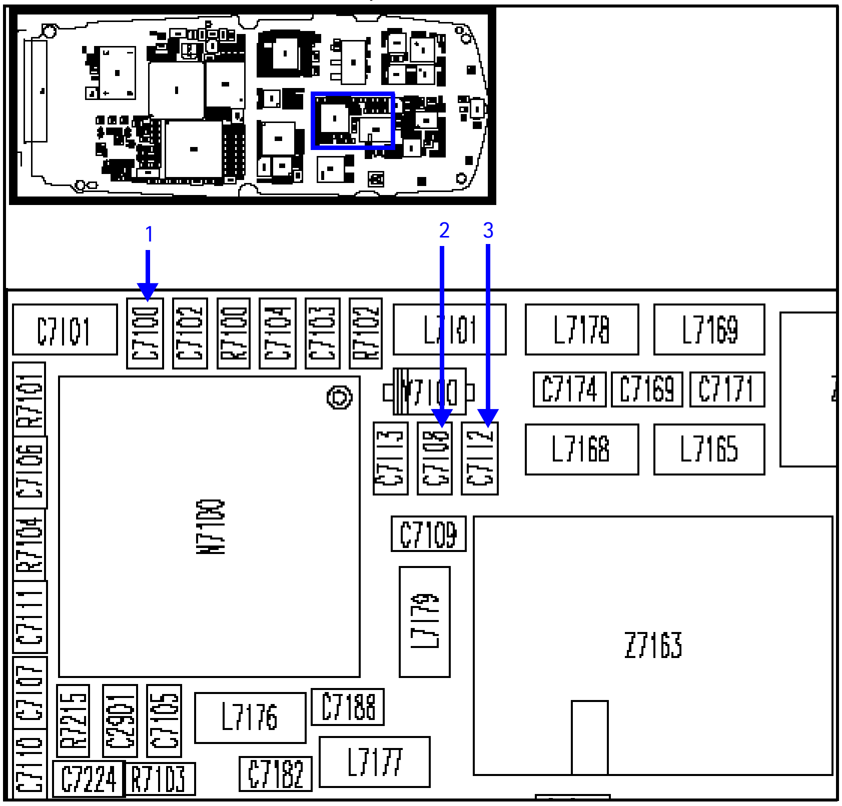


Figure 31: Rx VHF LO test points

Table 12 gives the description and values for the test points as shown in Figure 31.

Table 12: Rx VHF LO Test Points

Test Point	Description	Value
1	RX LO lock voltage	1.2 to 1.7 VDC
2	VR7	2.8V
3	VR5	2.8V

Tx UHF LO

There are two fixed LOs: 3296.16~3395.88 MHz for Cell band and 3700~3819.90 MHz for PCS band. This is the first LO for up-conversion. Monitor the control voltage at C7014. At this control voltage, the N7000 LO is locked and should be between 1.2 and 1.8 VDC.

TX UHF LO Schematic

The following partial schematic is for general reference only. See the *Schematics* chapter for a detailed version.

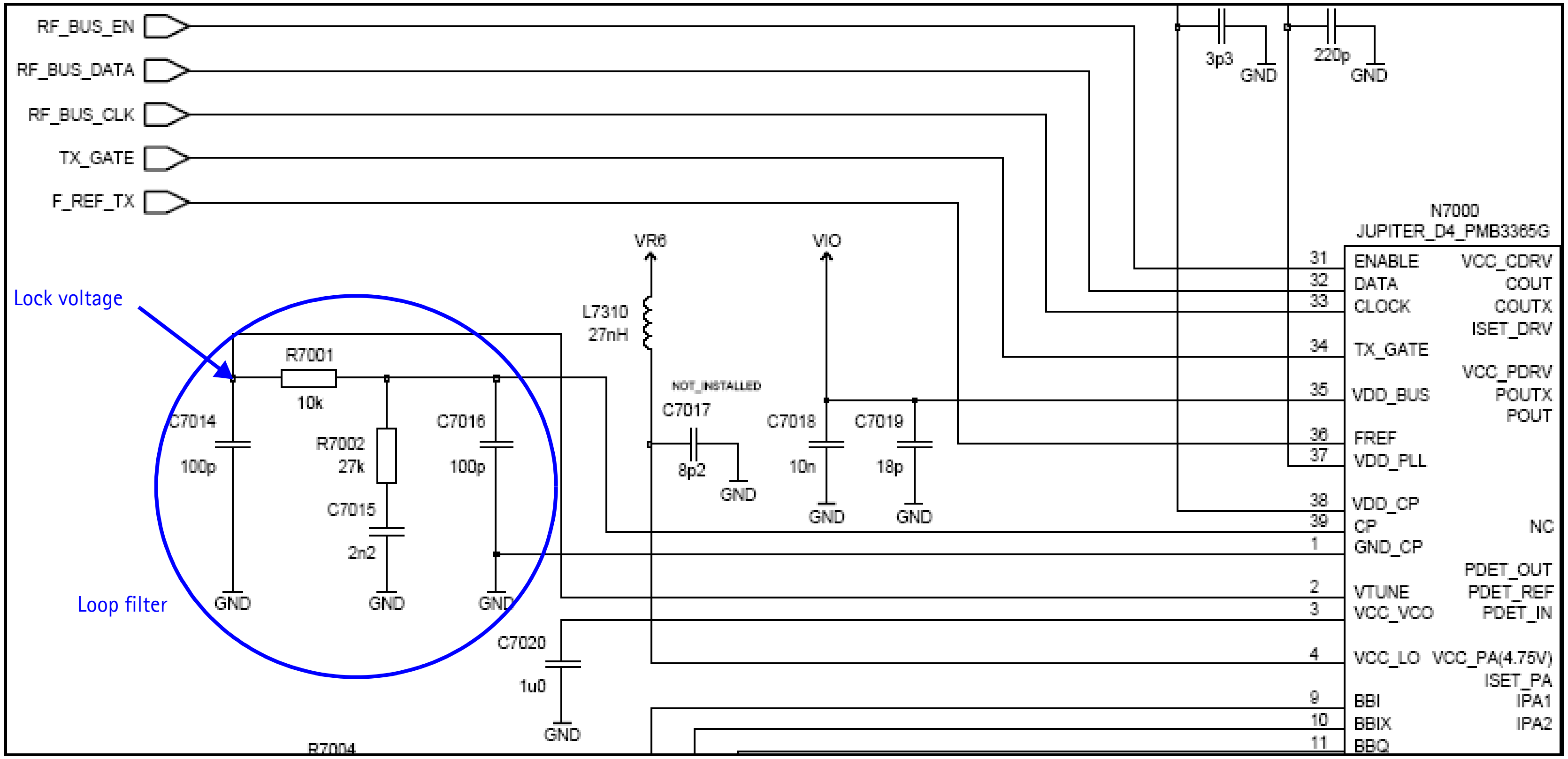


Figure 32: Tx UHF LO schematic (partial view)

Figure 33 shows the Tx UHF LO test points.

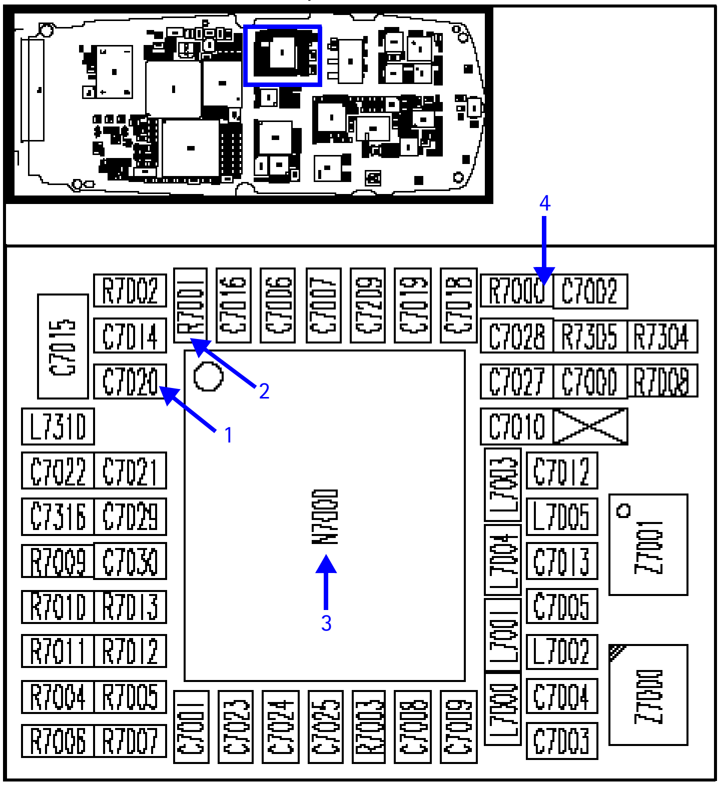


Figure 33: Tx UHF LO (N7000) test points

Table 13 gives the description and values for the test points as shown in Figure 33.

Table 13: Tx UHF LO Test Points

Test Point	Description	Value
1	VCC_VCO	2.3 V
2	Lock voltage	DC between 1.2 and 1.8 V
3	Measure frequency by probing the top of the chip	PCS: 3760 MHz (channel 600) -54 dBm Cell: 3346.08 MHz (channel 384) -57 dBm
4	VR6	2.8 V

GPS RF Troubleshooting

Following is the GPS RF block diagram.

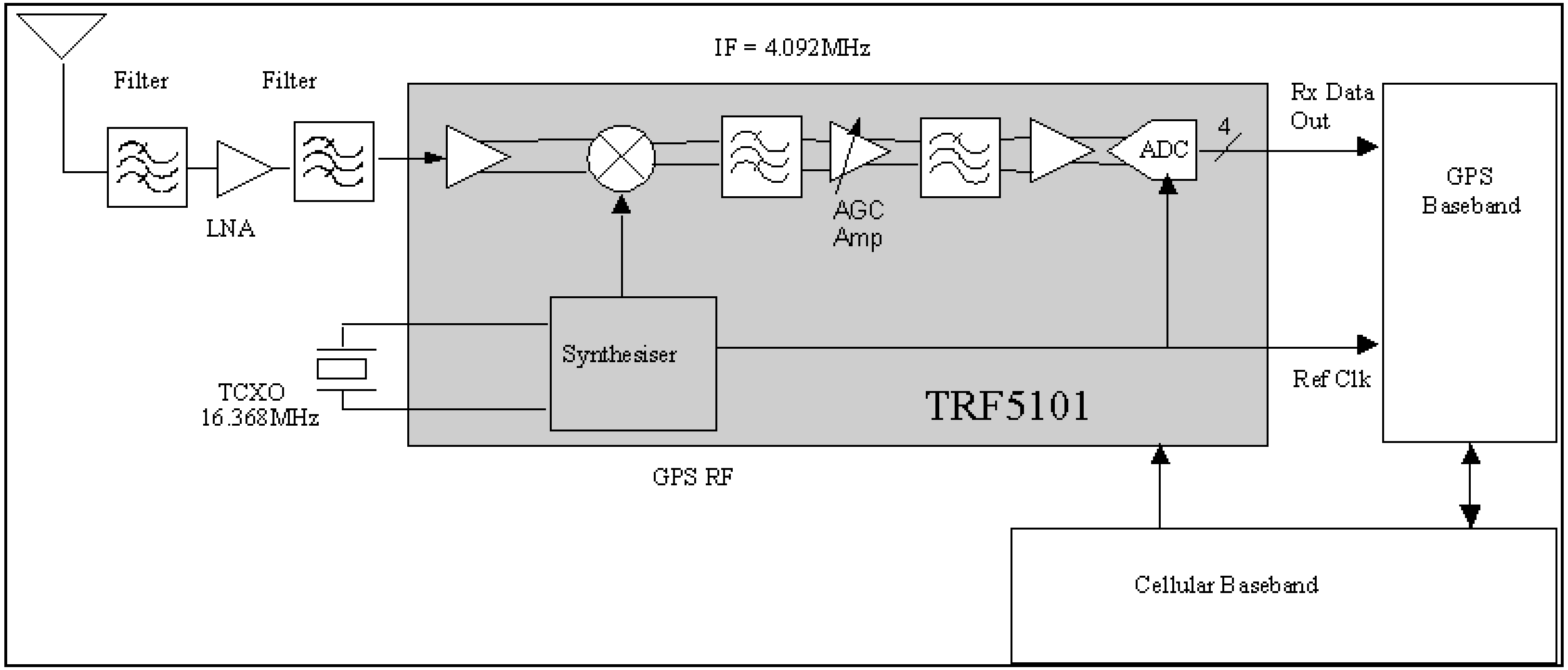


Figure 34: GPS RF block diagram

GPS RF General Testing

In radiated testing the CW level has to be higher because of the attenuation in pad + cable + coupler. With a -20 dB pad, the signal level in the signal generator is ~ -110 dBm + cable attenuation + 20 dB + 18 dB. The CW analysis allows end-to-end spectral purity to be assessed during manufacturing and development.

1. On the **Phone Control** dialog box, click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.

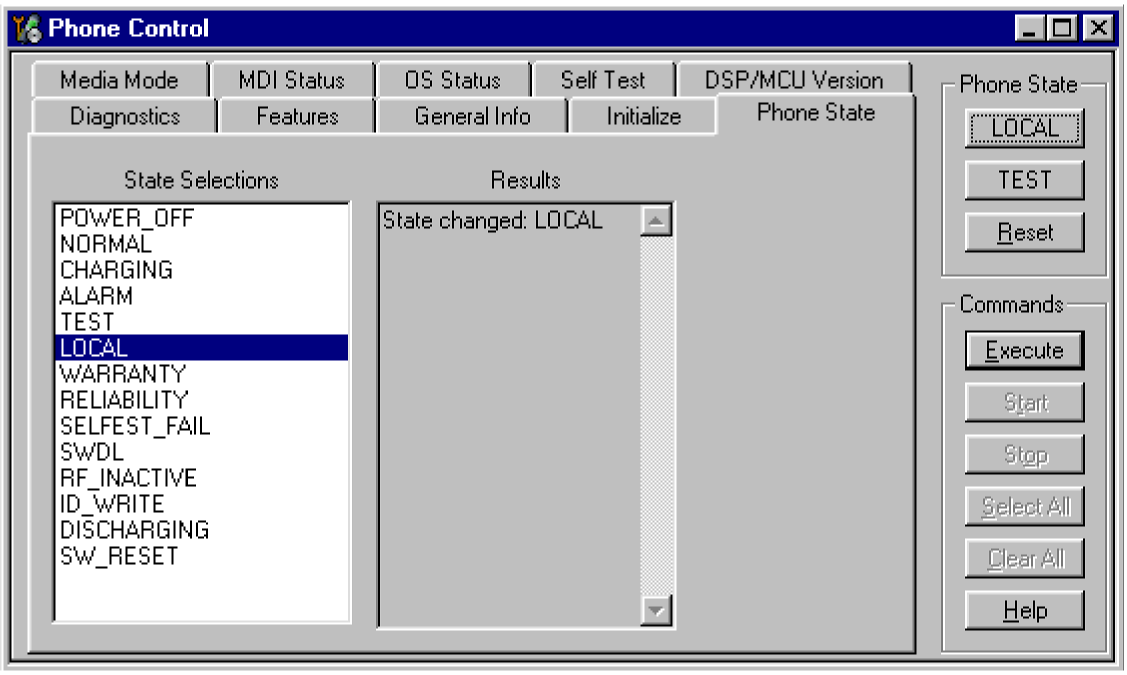


Figure 35: Phone Control dialog box

2. Inject a -110 dBm tone at 1575.52 MHz at the GPS connector (X6250) with a signal generator or a call box.

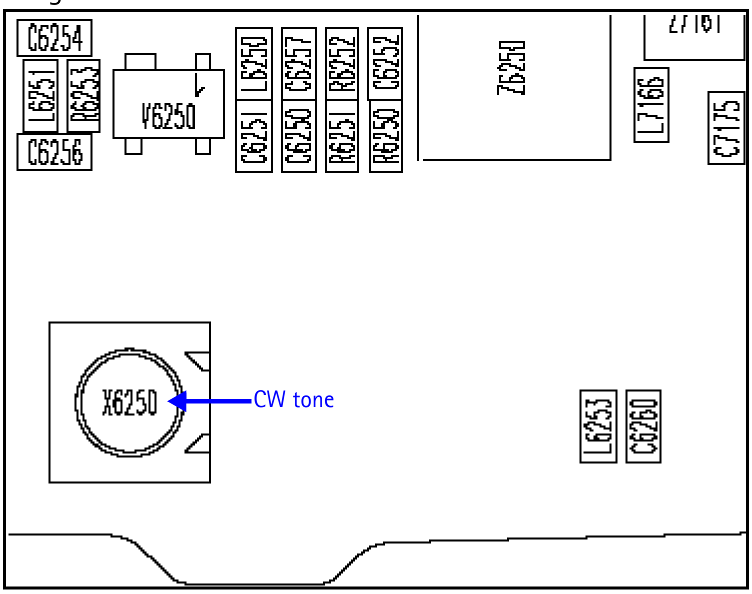


Figure 36: GPS antenna port

3. Open the **Troubleshooting** menu, and click **GPS Control**.

   The **GPS Control** dialog box appears.

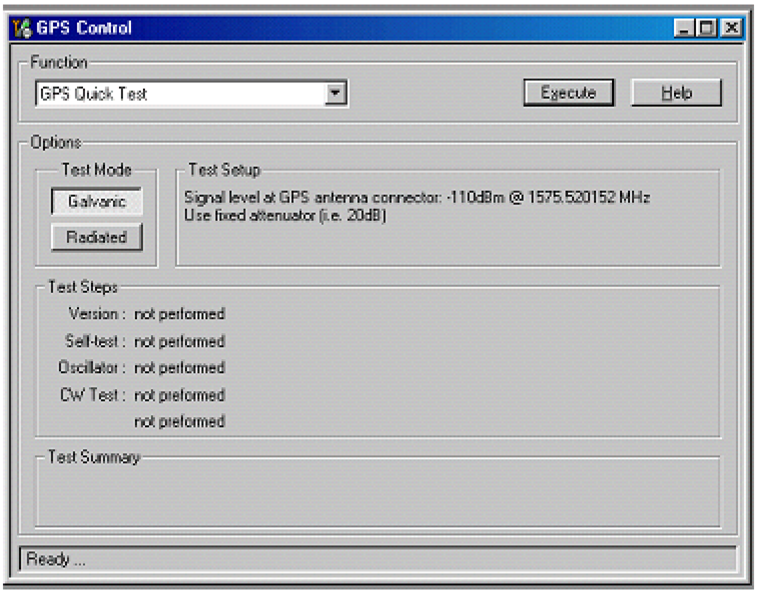


Figure 37: GPS Control dialog box

4. Select **GPS Quick Test** in the **Function** area, and ensure that the **Test Mode** area shows a value of **Galvanic**.
5. Click **Execute**.

Self-test Failure

If the test fails, repeat steps 1—5 in the "GPS RF General Testing" section. If the test fails again, continue with the following self-test failure troubleshooting:

1. Verify the DC voltages at VRF_GPS and VDD_IO_GPS.
2. Inspect all GPS circuit elements around D6200.
3. If the elements pass a visual inspection, replace the D6200.

Oscillator Failure

1. Inspect all GPS circuit elements around N6250.
2. If the elements around N001 are okay, replace N6250.

CW Test Failure

1. Check that the signal generator is on and sourcing a signal to the GPS RF input port (X6250).
2. Inspect all GPS RF circuit elements.
3. Inspect all GPS circuit elements around D6250.
4. If the elements are okay, replace the GPS RF IC (N6251).

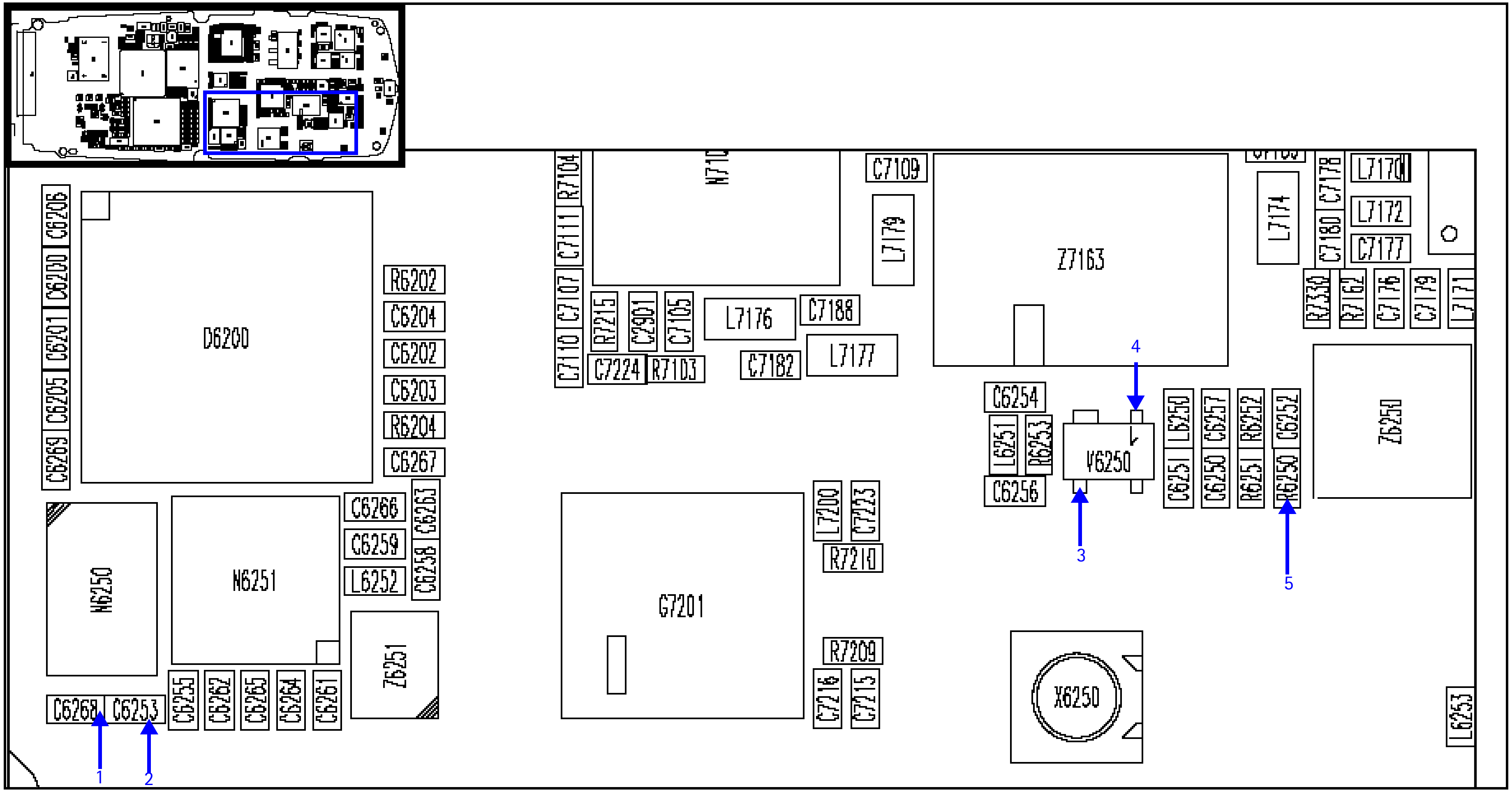


Figure 38: GPS test points

Table 14 gives the description and values for the test points as shown in Figure 38.

Table 14: GPS Test and DC Test Point Values

Test Point	Description	Value (V)
1	VDD_IO_GPS	1.8
2	TCXO Vcc	2.8
3	LNA Vcc	1.5
4	LNA_Base	0.8
5	VRF_GPS	2.8

GPS RF Test Points

Use the following steps for RF testing:

1. Open the **Troubleshooting** menu, and click **GPS Control**.

   The **GPS Control** dialog box appears.

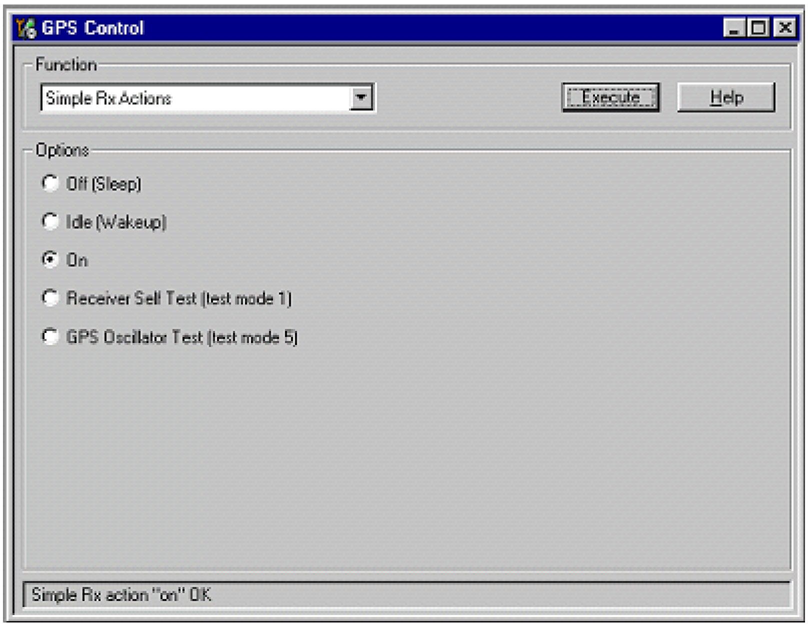


Figure 39: GPS Control dialog box

2. Select **Simple Rx Actions** in the **Function** area.
3. Select **On** in the **Options** area, and click **Execute**.
4. Inject a -50 dBm tone at 1575.52 MHz into the GPS connector (X6250) with a signal generator or call box.
5. Measure the test points with either a voltmeter or an AAS-10B probe with a spectrum analyzer set at a center frequency of 1575.25 MHz and a span of 500hh kHz. (All points are 1575.52 MHz, except for TCXO, which is at 16.368 MHz.)

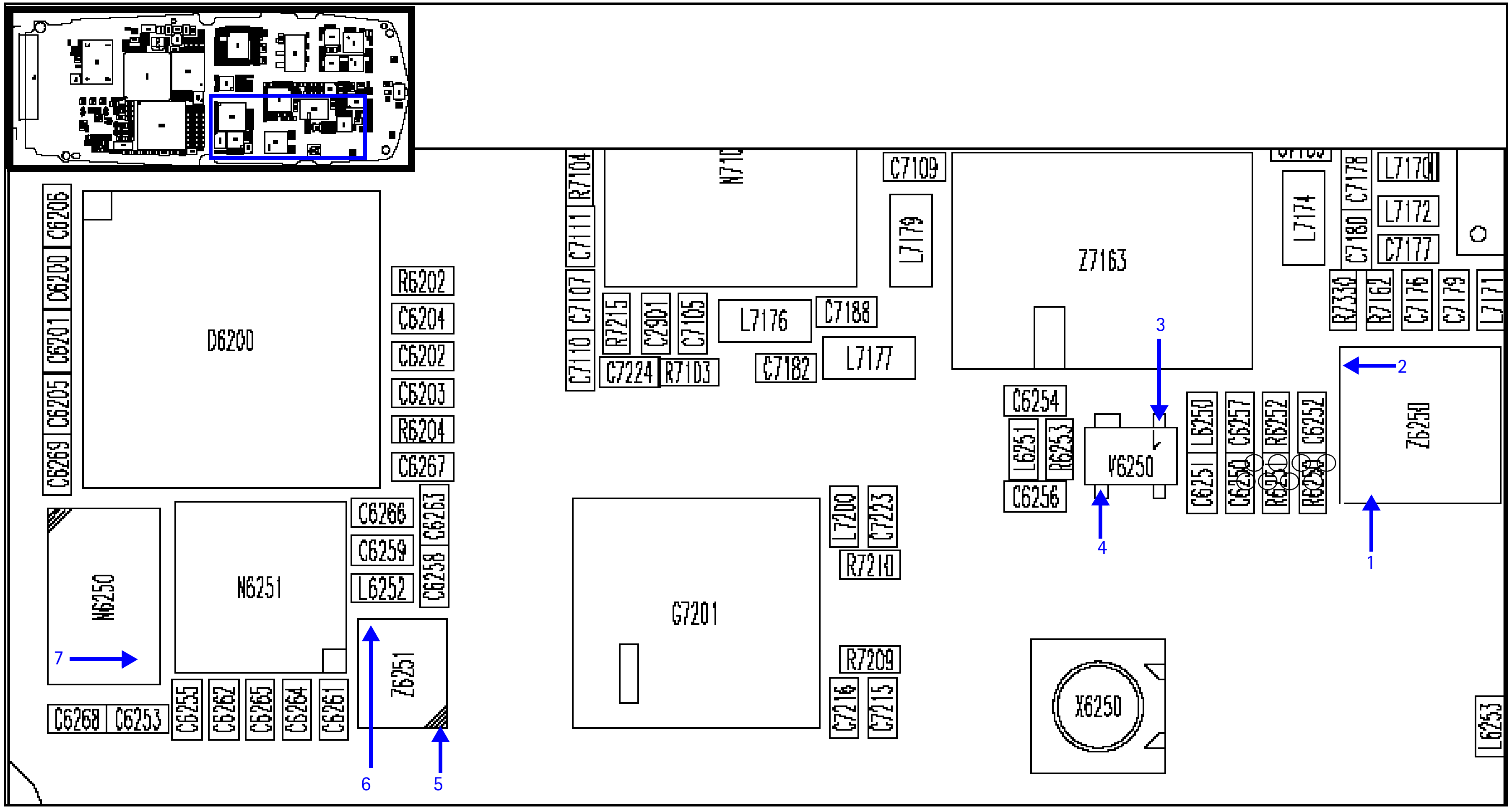


Figure 40: GPS RF test points

Table 15 includes the values for the test points in Figure 40.

Table 15: GPS RF Test Point Values

Test Point	Description	Values (dBm)
1	1st RF filter in	-62
2	1st RF filter out	-65
3	GPS LNA in	-63
4	GPS LNA out	-45
5	2nd RF filter in	-46
6	2nd RF filter out	-46
7	GPS TCXO out (16.368 MHz)	-3

