Nokia Customer Care
2255 (RM-97)
Mobile Terminal

Baseband Description and Troubleshooting

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Introduction

The 2255 baseband module is a single-band Code Division Multiple Access (CDMA) engine and is based on the DCT4.0 standard. The baseband engine includes two major Application Specific Integrated Circuits (ASICs):

- Universal Energy Management Cost (UEMC)
- Universal Phone Processor (UPP)
- FLASH and SRAM memory
- D2200 — Universal Energy Management Cost (UEMC), which includes the audio circuits, charge control, and voltage regulators
- D2800 — Main phone processor, which includes system logic for CDMA, two Digital Signal Processors (DSPs), the Main Control Unit (MCU), and the memory

The BL-5C Li-ion battery is used as the main power source and has a nominal capacity of 970 mAh.

Power Up Sequence

When the mobile terminal is dead or jammed always check the Power Up Sequence of the baseband area. Verify all regulator and reset signals are correct to ensure proper power up of UEMC and UPP (see Figure 1).

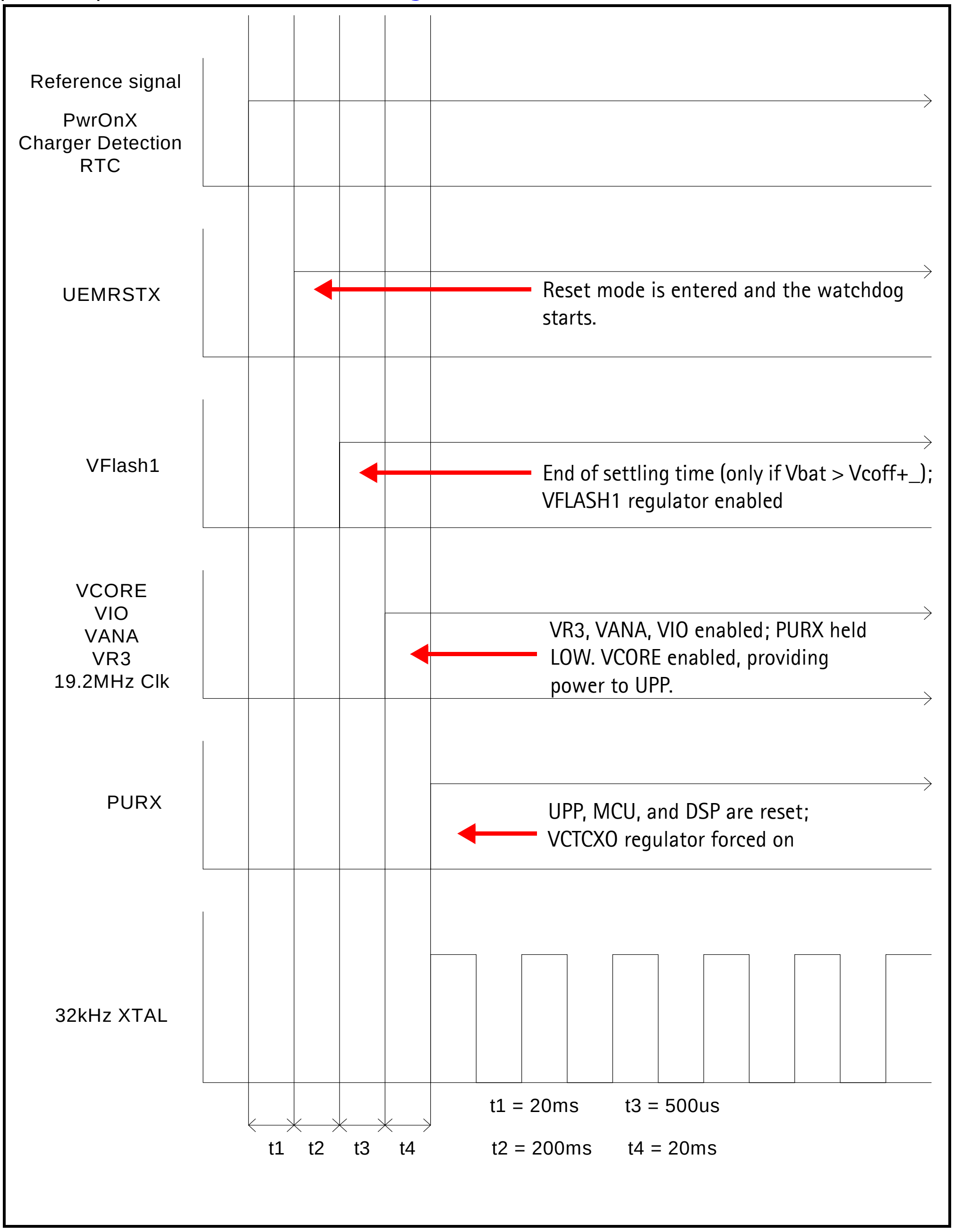

Figure 1: Power-on sequence and timing

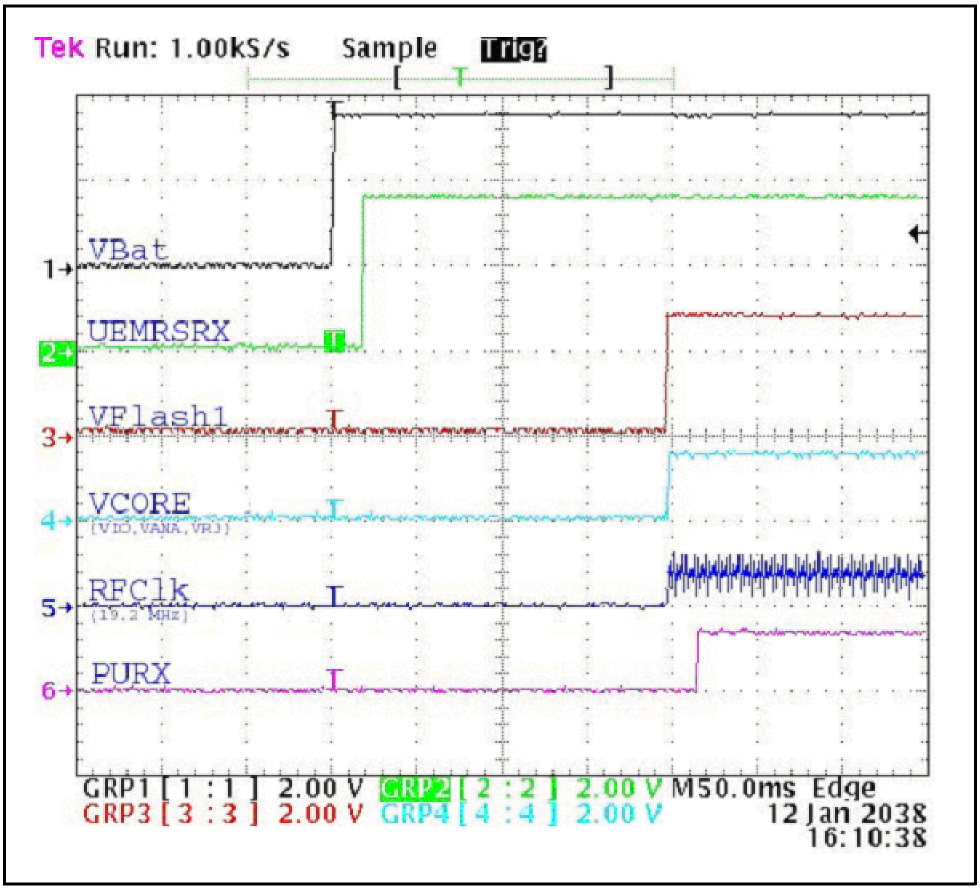

Figure 2: Measured power-on sequence and timing Flash Programming

Troubleshoot the power up sequence by performing the following checks:

- Check that Vbat gets to the mobile terminal and to UEMC
- Check that UEMRSTX is High
- Check that VFLASH1 is High
- Check Vcore and 19.2 MHz clock; if not check VR3
- Finally check PURX.

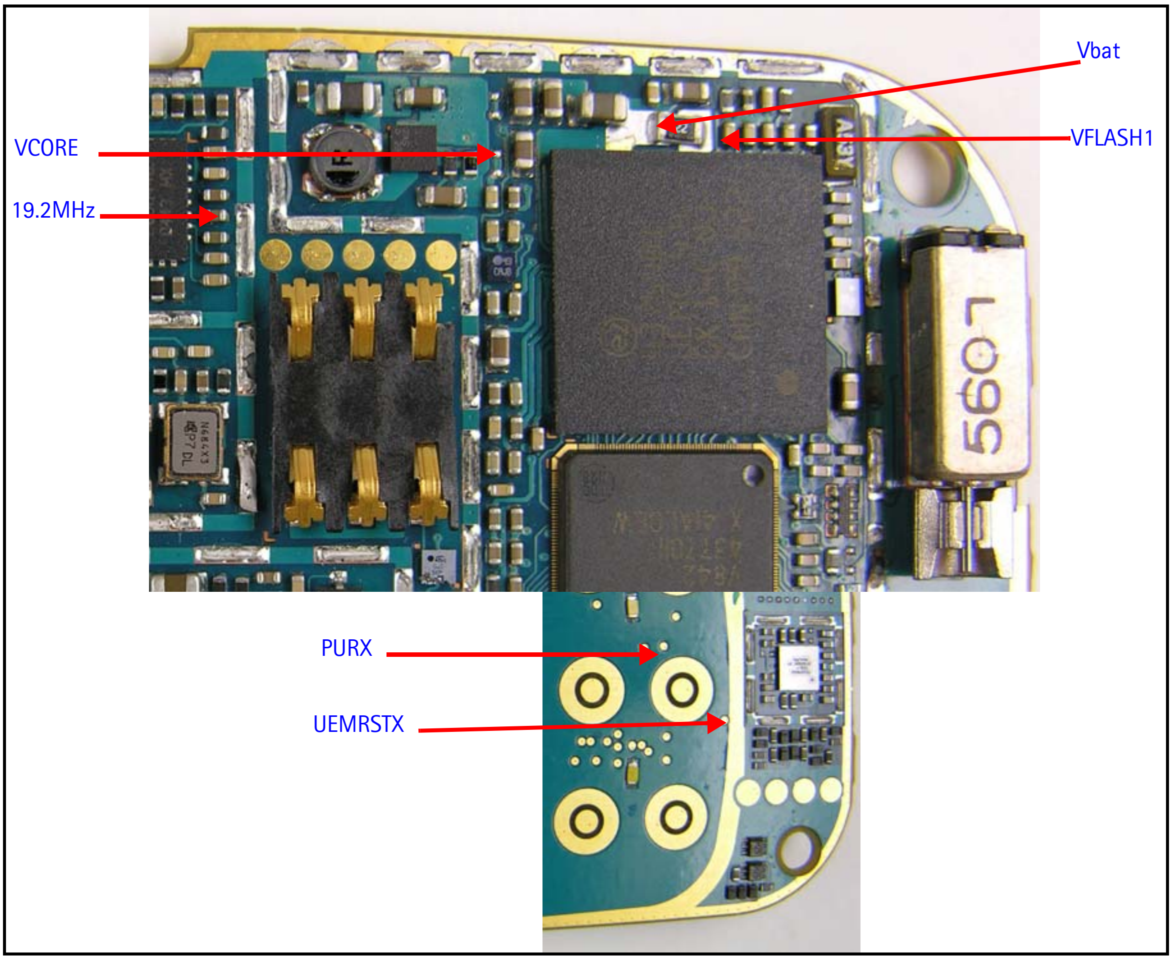

Figure 3: Power up test points

Flash Programming

Flashing Tool

Flash programming is done through the VPP, FBUSTX, FBUSRX, MBUS, and BSI signals.

When mobile terminal has entered flash programming mode, prommer will indicate to UEMC that flash programming will take place by writing 8-bit password to UEMC. The prommer will first set BSI to "1" and then use FBUSRX for writing and MBUS for clocking. The BSI is then set back to "0".

MCU will indicate to the prommer that it has been noticed, by using FBUSTX signal. The MCU then reports UPP type ID and is ready to receive a secondary boot code to it's internal SRAM.

BSI = Used to indicate to MCU that the prommer is connected and mobile terminal is in flashing mode

MBUS = Used as clock signal for synchronizing the serial communication between the prommer and MCU

FBUSRX = Data to UPP

FBUSTX = Data to prommer

VPP = 0v/ 1.8v/ 12v (read only/normal op. or slow programming/fast programming)

Figure 4 shows the DA-55 docking station adapter and Module Jig MJ-72.

Figure 4: DA-55 docking station adapter and MJ-72 module jig

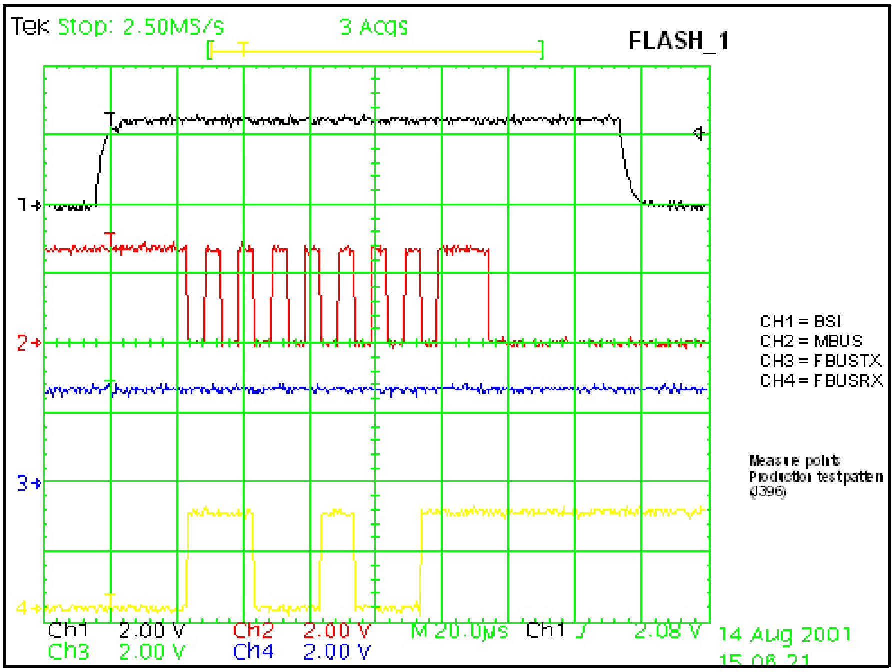

Figure 5: Flash programming mode

Figure 6 shows the mobile terminal connected to the DA-55 flash adapter.

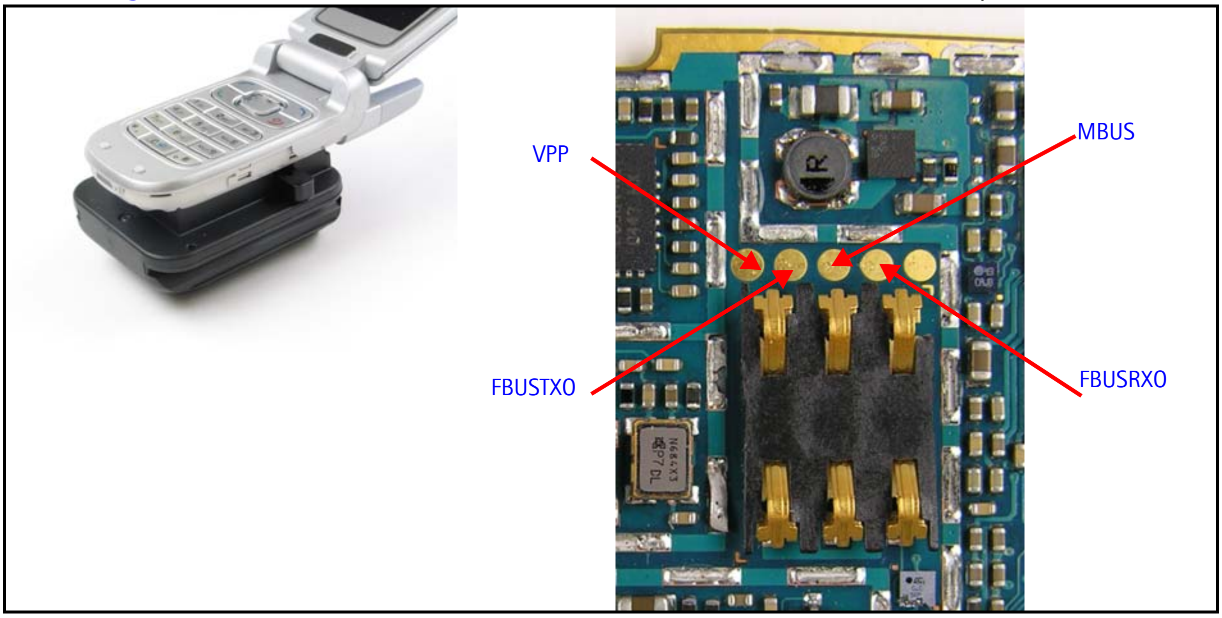

Figure 6: Flashing test points

Flashing Phoenix Interface

Run EZ Flash in Phoenix to flash the mobile terminal.

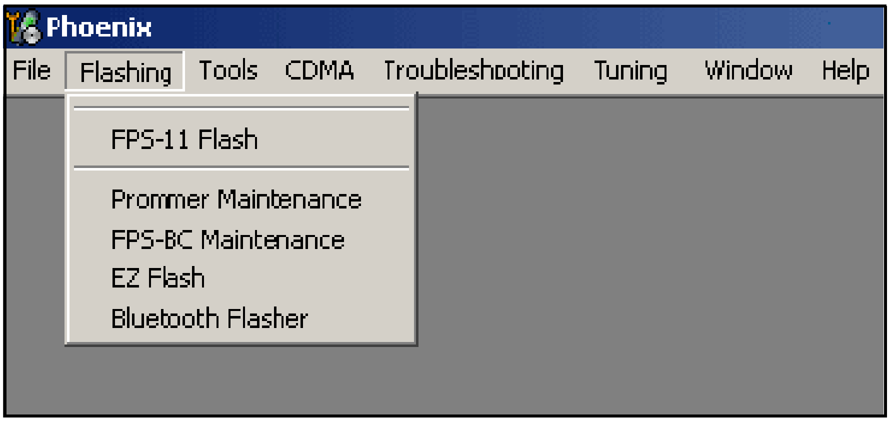

Figure 7: EZ Flash in Phoenix

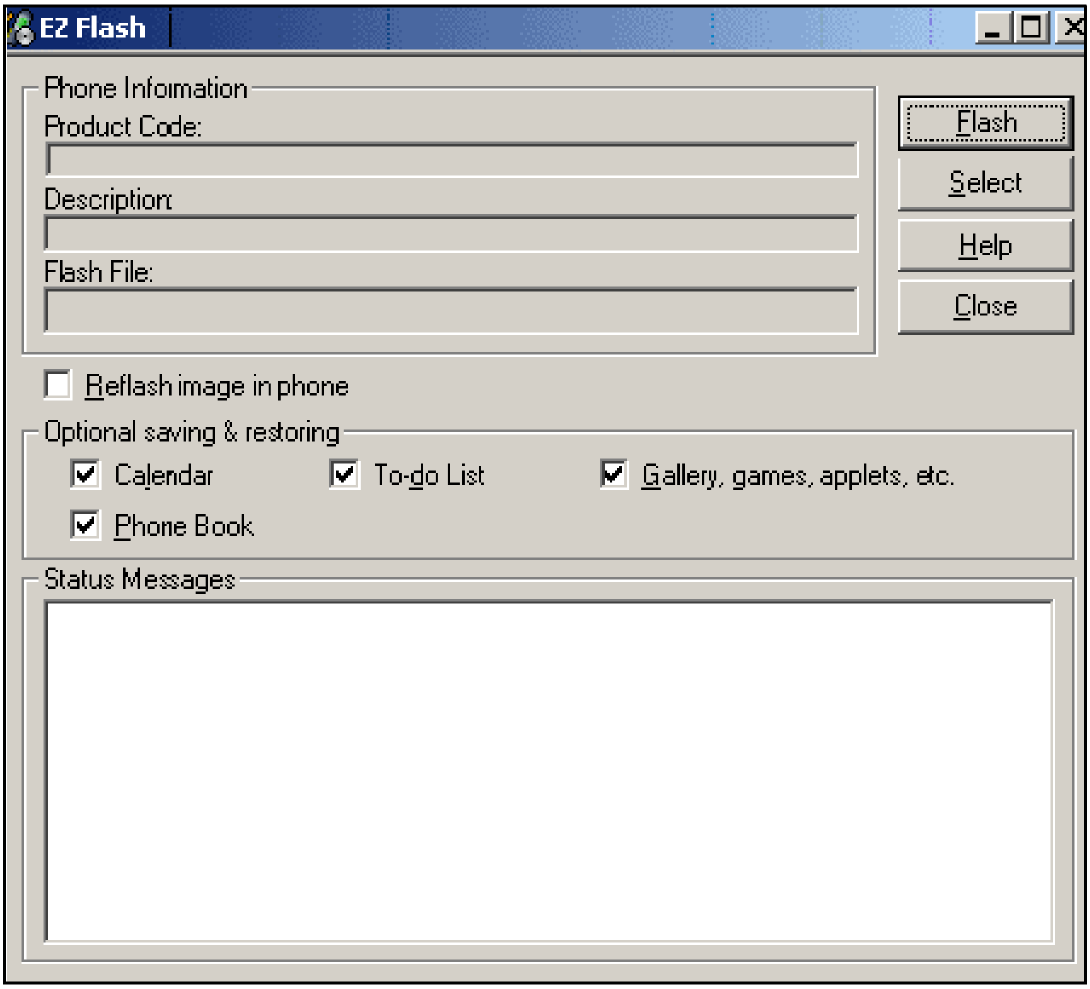

Figure 8: EZ Flash in Phoenix

Audio

How the Audio Works

The baseband supports three microphone inputs and two ear piece outputs. The microphone inputs are MIC1, MIC2, and MIC3:

- MIC1 input is used for the mobile terminal's internal microphone
- MIC2 input is used for Universal Headset
- MIC3 input is used for the FM Radio

Every microphone input can have either a differential or single-ended AC connection to the UEMC circuit. In the Nokia 2255, the internal microphone (MIC1) and external microphone (MIC2) for UHJ is single-ended. However, the Universal Headset interface is single-ended. The microphone signals from different sources are connected to separate inputs at the UEMC. Inputs for the microphone signals are differential types. Also, MICB1 is used for MIC1 and MIC2 uses VFlash1.

Figure 9: Audio components

Audio Troubleshooting

When troubleshooting the audio, make these common checks (see Figure 10):

- Perform visual inspection of all the ASIPs and the UEMC.
- Inject 1KHz signal into MiC1 and trace it to the earpiece. Only when using IHF signal will it be amplified by a factor of 5x.

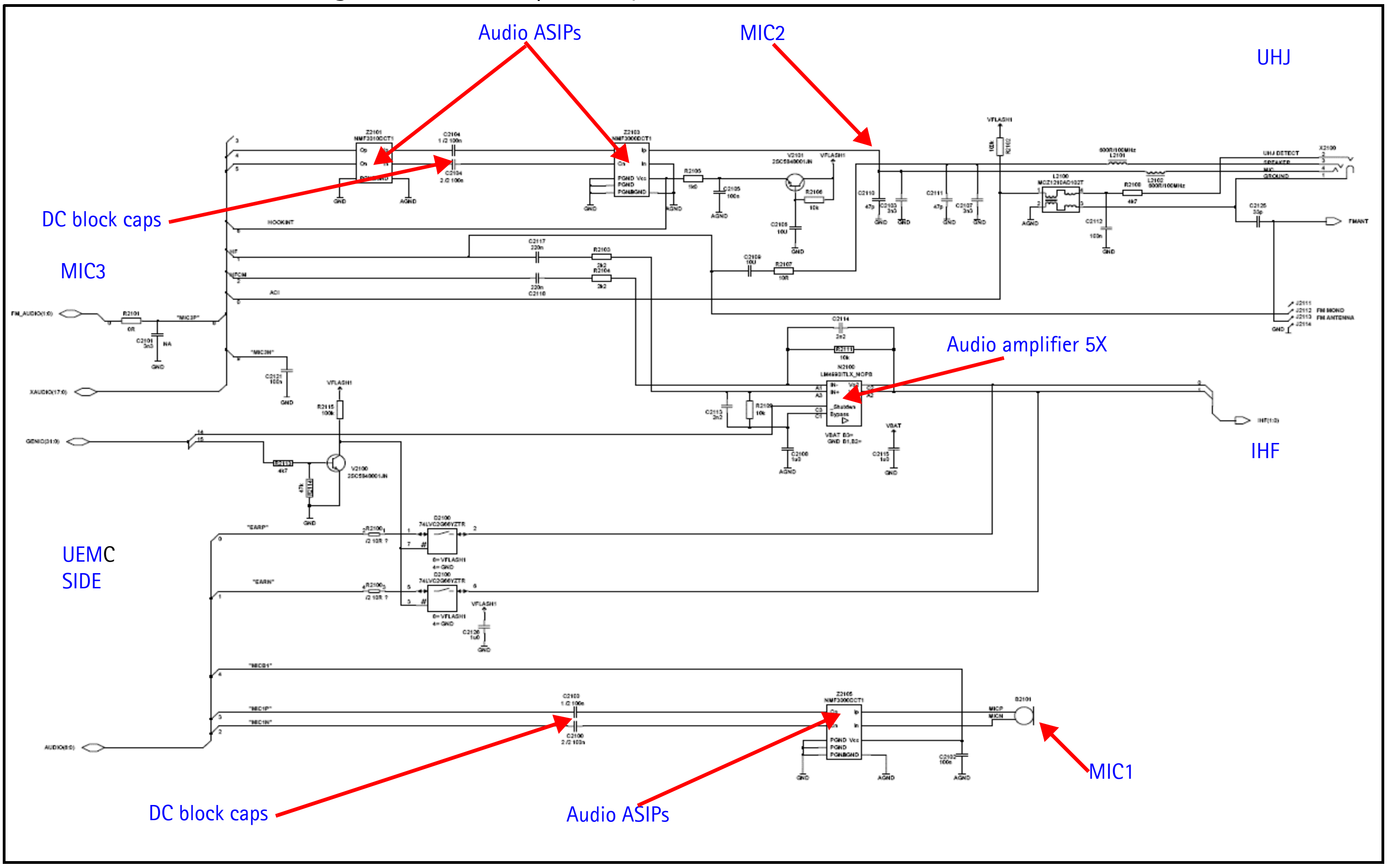

Figure 10: UEMC Side of Audio Diagram

- Make sure the audio amplifier and solder are ok
- Make sure the IHF speaker contacts are ok
- Make sure output is amplified by 5x. If not, check that the gain resistors network is correct

Audio Phoenix Interface

Run Audio Test in Phoenix to check the audio functionality.

MiC1- Use the first option to route the audio from the internal microphone to the headset speaker.

MiC2- Use the second option to route the audio signal from the headset microphone to internal earpiece.

MiC3 - Use the first and second options to test MIC3. Open channel and insert the universal headset. The UEMC automatically re-routes the audio signal to the UHJ.

Earpiece - Use the second option to hear audio from internal earpiece.

IHF - Use the fifth option to route audio signal to IHF speaker out.

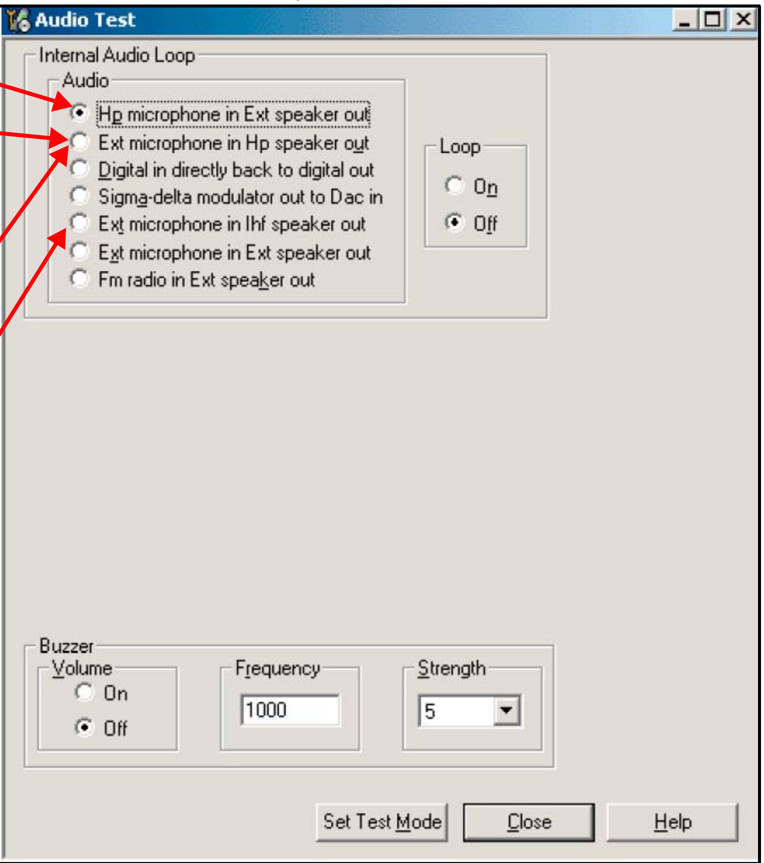

Figure 11: Audio Test in Phoenix

FM Radio

How the FM Radio Works

The UPP turns on the FM radio and sets the frequency using the CBUS serial interface as the communication channel. A high frequency FM radio signal comes in through RFIN1 Pin to the FM radio chip and gets demodulated into a low frequency signal and is sent to the UEMC for amplification. The amplified signal then gets routed back either to the universal headset.

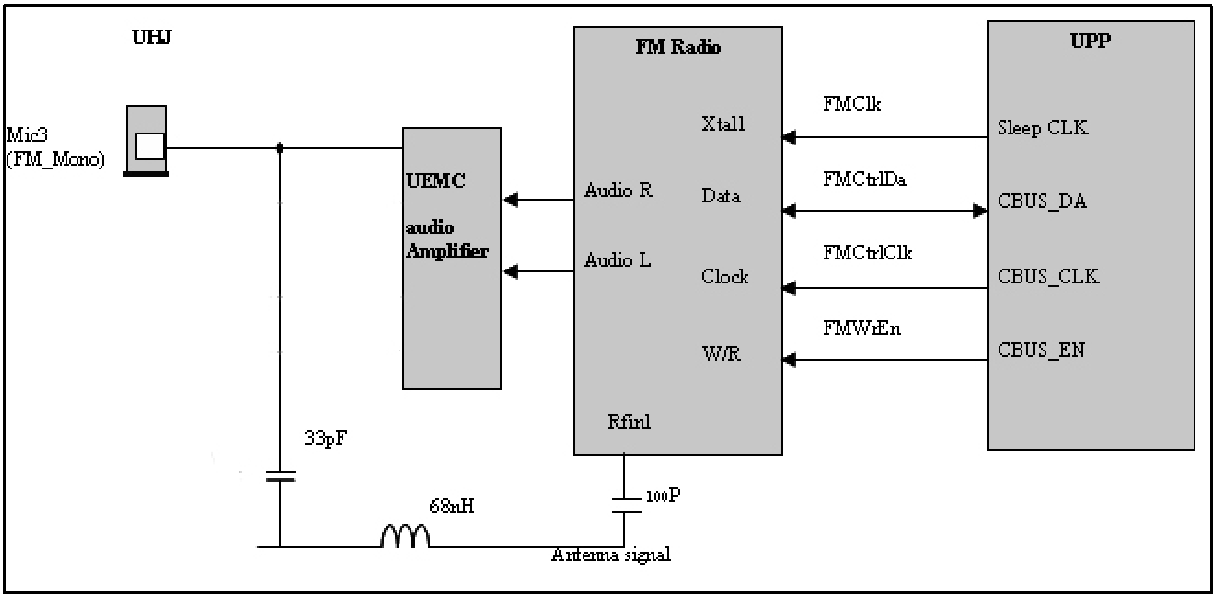

Figure 12: FM Radio (N356), Audio (N150), antenna, and digital interface connections

FM Radio Test

To hear the FM radio, you first connect headset to UHJ ports because the headset is an FM radio antenna. Connect the headset to UHJ port to control the FM radio using Phoenix. Using Phoenix change mobile terminal to local mode and launch the FM radio component to hear FM radio output.

FM Radio Troubleshooting

When troubleshooting the FM radio, make these common checks (see Figure 13):

- Check Power Supply VIO and VANA
- Check SleepCLK
- Check FMANT
- Check for activity on CBUS
- Check output of FM radio on VAFR for an audio signal with a 800mv DC-offset
- If the audio signal not correct (with 800mv DC-offset), then check FM radio chip for shorts, voids, and misalignments

- If the audio signal is correct (with 800mv DC-offset), then check the UEMC for shorts, voids, and misalignments
- If the UEMC and FM Radio Chip are correct, check the UHJ and headset

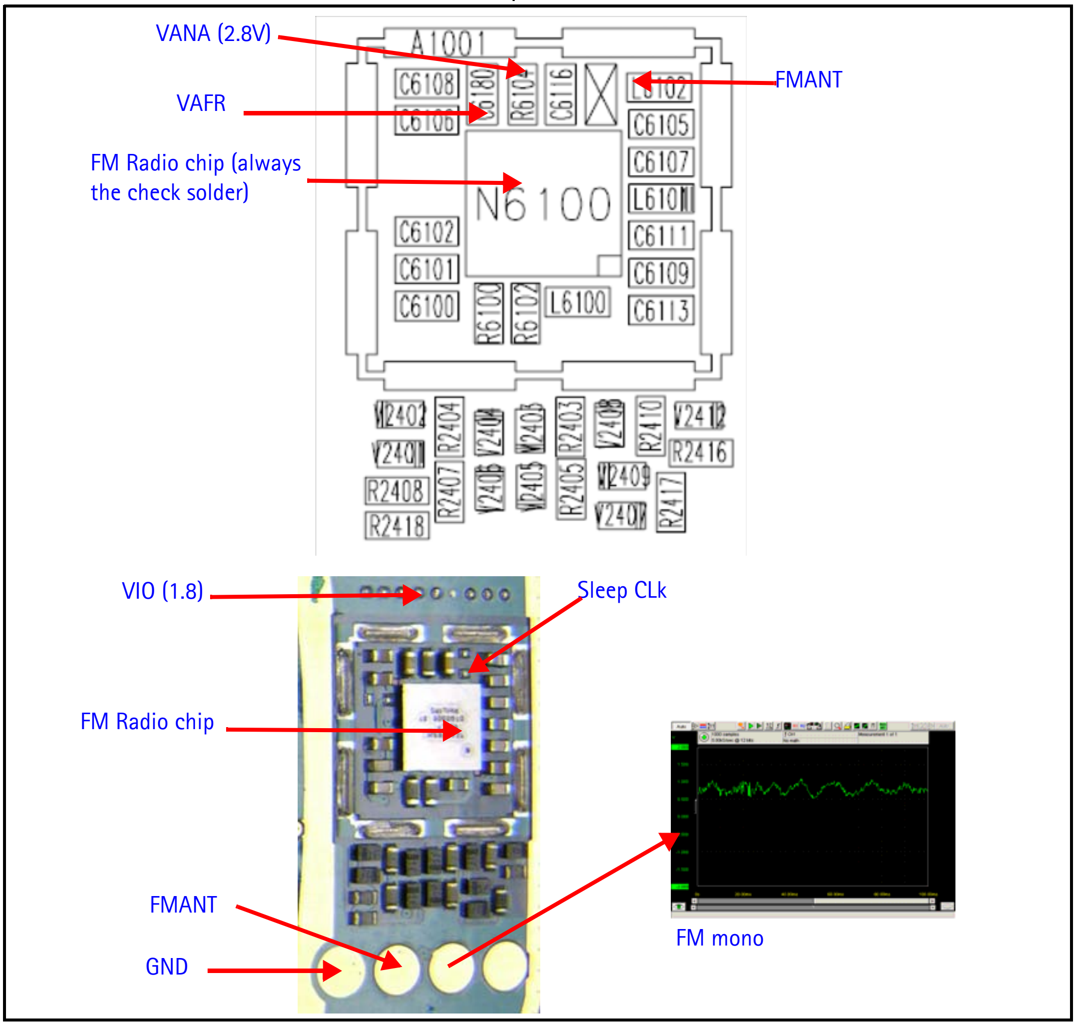

Figure 13: FM Radio Chip and Antenna

FM Radio Phoenix Interface

Checks for the FM radio that can be perform with Phoenix include:

- Verify the FM radio is working by connecting headset to UHJ
- Turn on the FM radio
- Set frequency and volume

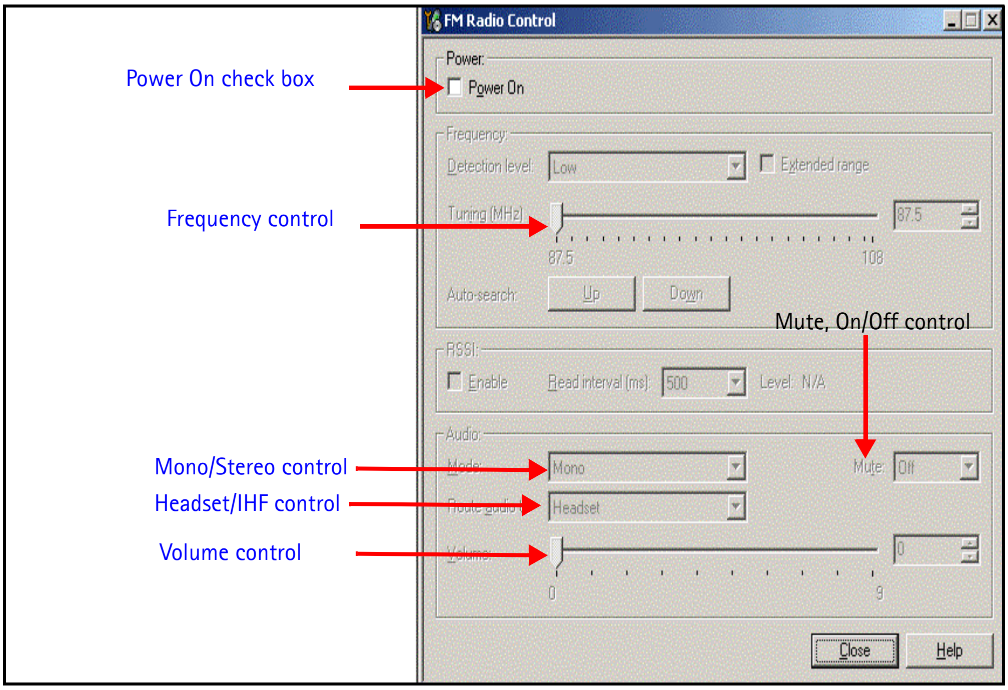

Figure 14: Phoenix FM Radio Control panel

Display

How the Display Works

Nokia 2255 has a color display (128 x 128 64K color depth), controlled by the UPP through a parallel interface.

Figure 15: Nokia 2255 UI Display

Display Troubleshooting

When troubleshooting the display, make these common checks (see Figure 16):

- Check that the display is connected properly and is making good contact with LCD connector. If no display, replace the LCD.
- Check the power supply VIO and VFlash1. If not correct, check the UEMC.
- Check that the LCD CLk is 2.4MHz
- Check the activity on the LCD test points. If no activity, check or replace D2800

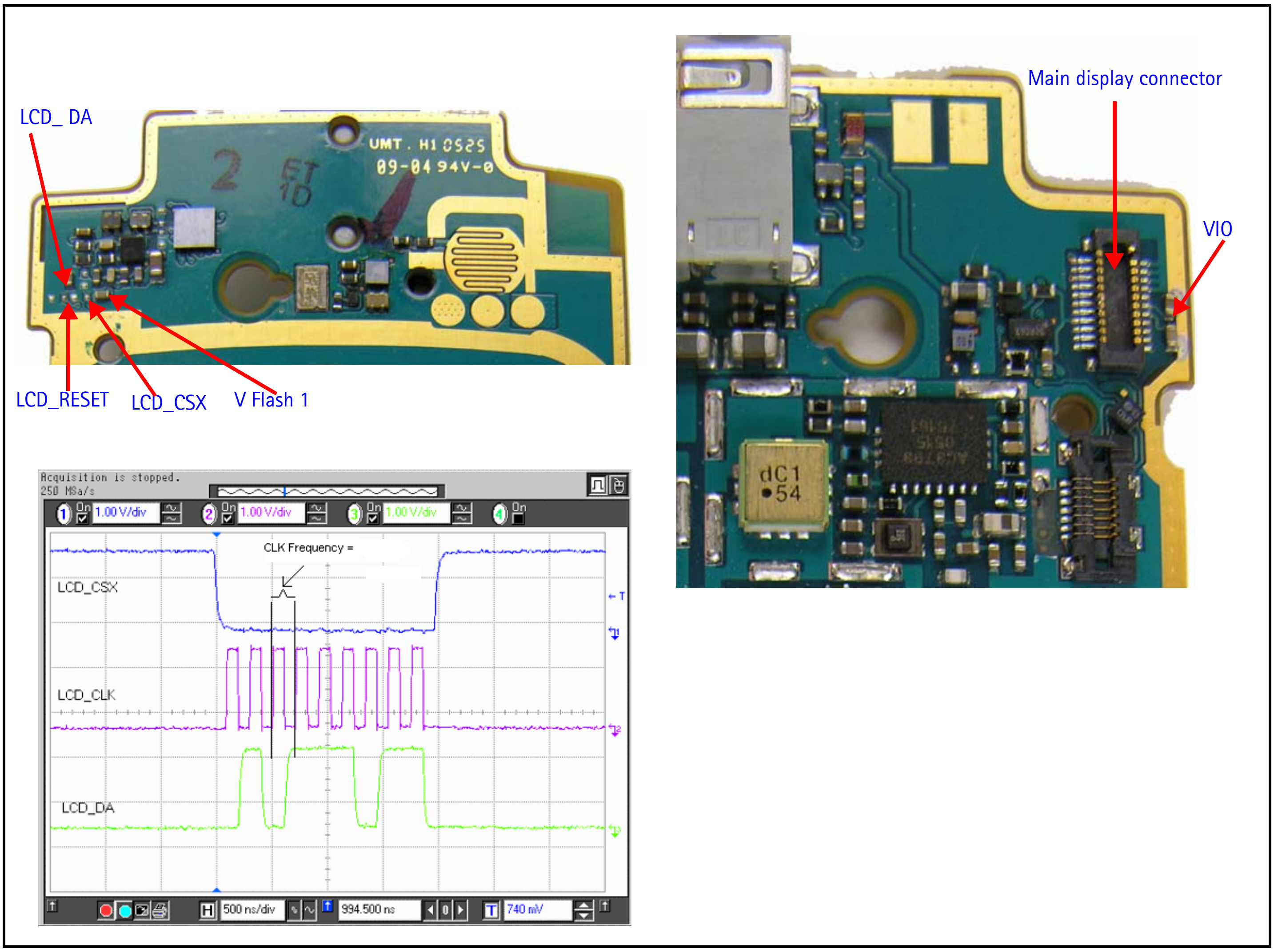

Figure 16: Display Chips and Frequency

Display Phoenix Interface

Run the Display Test and Display Tune in Phoenix to check the display.

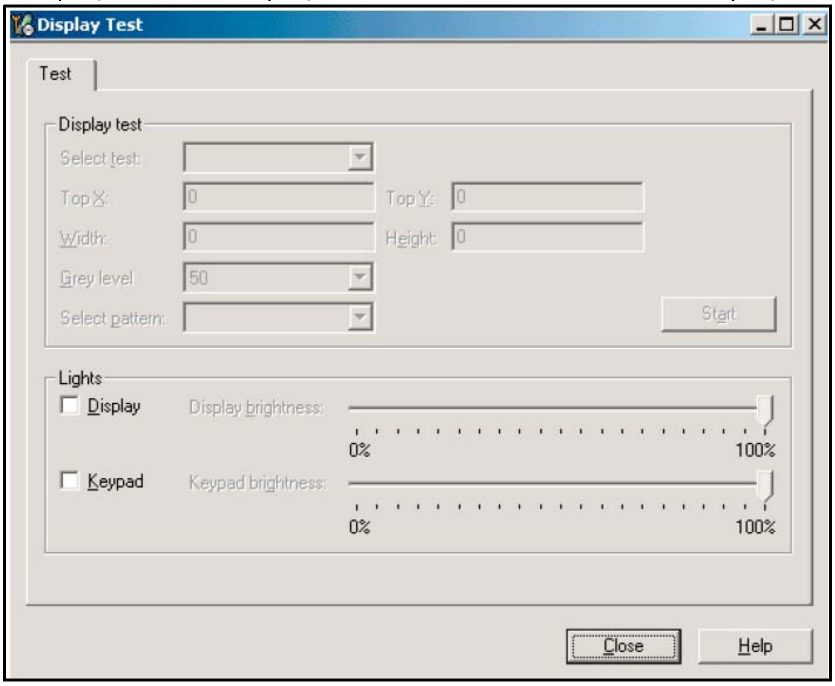

Figure 17: Phoenix Display Test option

Display and Keypad Backlight Schematic

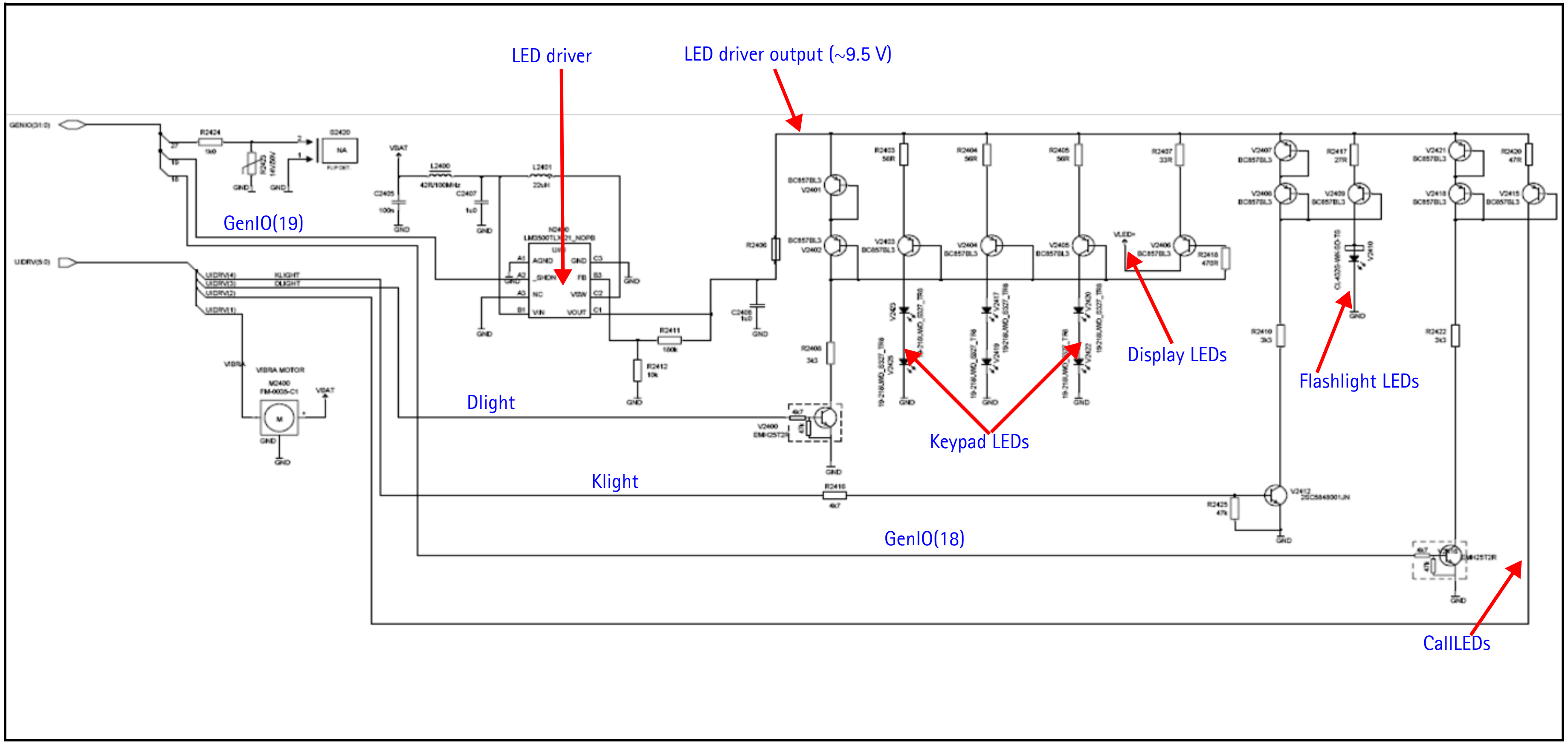

Figure 18: Display and keypad backlight schematic

The 2255 display, keypad, flashlight, and CallLED light are power by a single LED driver and controlled by both UEMC and UPP.

GENIO(19) coming out of UPP turns on the LED driver. Then the Dlight comes up, activating the current mirror and turning on the display and keypad backlight.

To turn on the flashlight, UPP turns on the LED driver by enabling GENIO (19) high and UEMC turns on the current mirror by enabling Klight.

To turn on the CallLED, UPP turns on LED driver by enabling GENIO(19) and turning on the current mirror by enabling GEN IO (18).

Display Backlight Troubleshooting

When troubleshooting the display backlight, make these common checks (see Figure 19):

- Perform visual inspection of LCD connector and LED Driver circuitry
- If the display backlight does not turn on, check VLED +(~8V)
- If there, then you can assume the driver is working properly and the LED inside the display might be faulty. Change display.
- If the VLED + is not ok, check Vin (~Vbat) are present on driver inputs. If not check power supply connection
- If Vin is Ok then check that the output of the LED driver Vout is (~9.5V)
- If Vout is ok, check the current mirror transistors for wrong orientation, bad solder or misalignments. This sets the driver output.
- If Vout is not ok check the FB voltage (~.5v).
- Check that the output setting resistors are ok and the right value
- If the LED brightness is low or to bright check that the Rset resistor is 33 Ohms providing (~17mA) to the display LEDs.

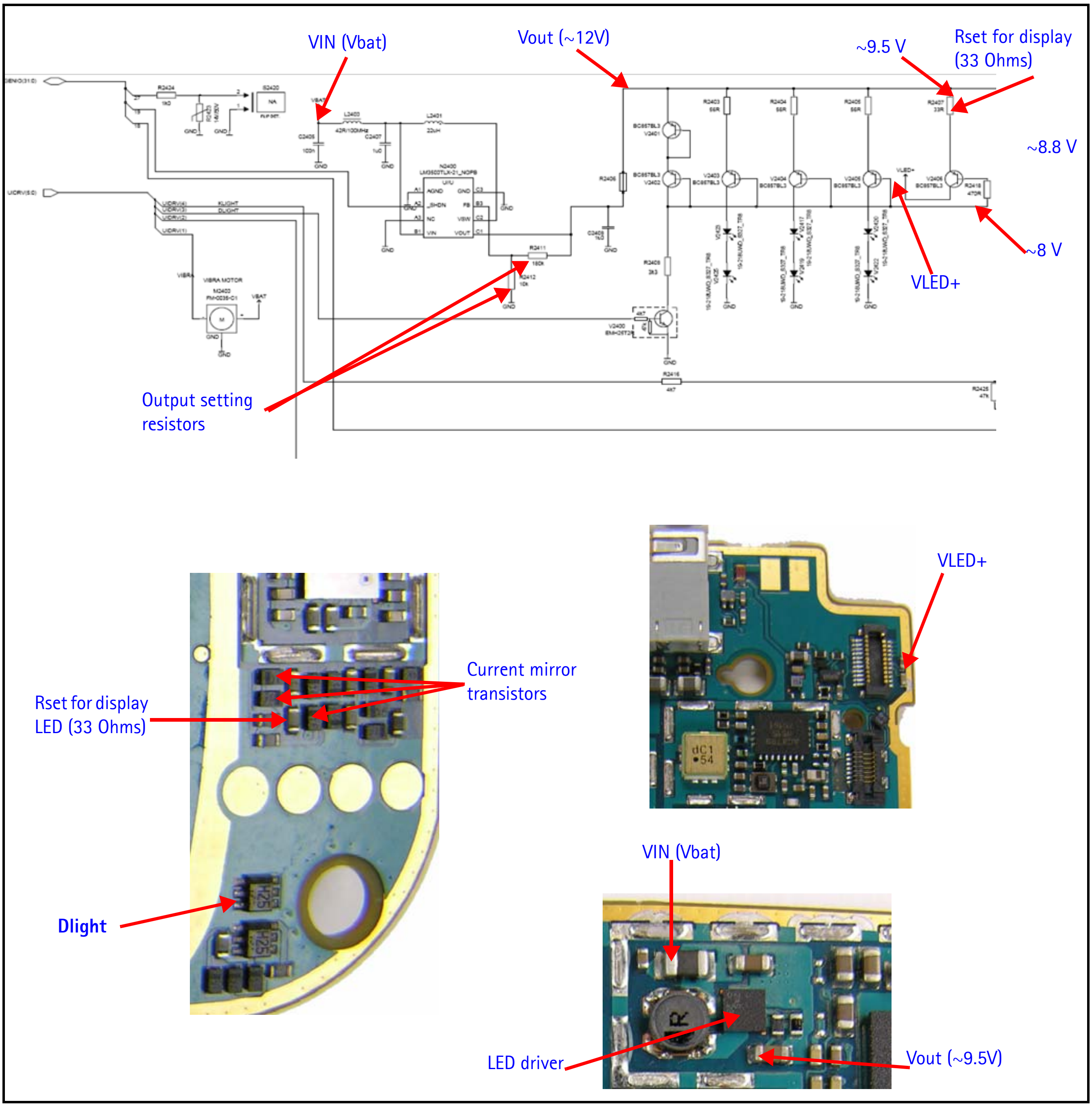

Figure 19: Display Backlight Chip and Diagram

Keypad Backlight

Keypad Backlight Troubleshooting

When troubleshooting keypad backlight, make these common checks (see Figure 20 and Figure 21):

- Perform visual inspection of all the components including LEDs
- If Keypad LEDs do not turn on check Vout +(~9.5V). If ok then you can assume the driver is working properly and the LED's or the current mirror circuitry is faulty.
- If Vout is not ok check Vin (~Vbat) is present on driver inputs. If not, check the power supply connection
- If Vin is ok then check the output of the LED driver Vout is (~9.5V), if not ok replace driver and inductor
- If Vout is ok then check the current mirror transistors for wrong orientation, bad solder or misalignments
- If LED brightness is low or to bright check that the Rset resistor is 56 Ohms providing (~10mA) to display LEDs

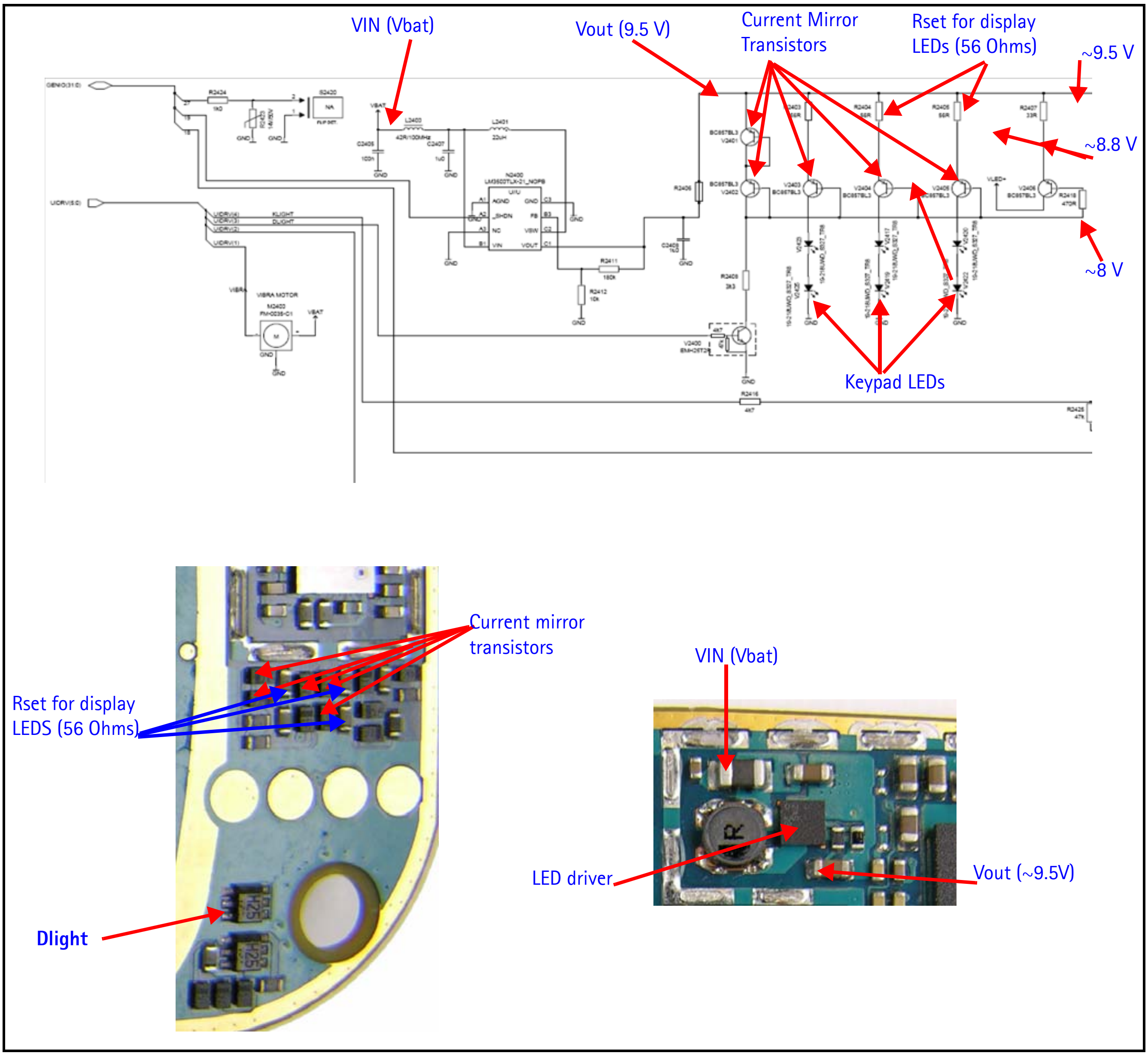

Figure 20: Keypad Backlight Chip and Diagram

Backlight Display Phoenix Interface

Run the Display Test in Phoenix to check the keypad backlight.

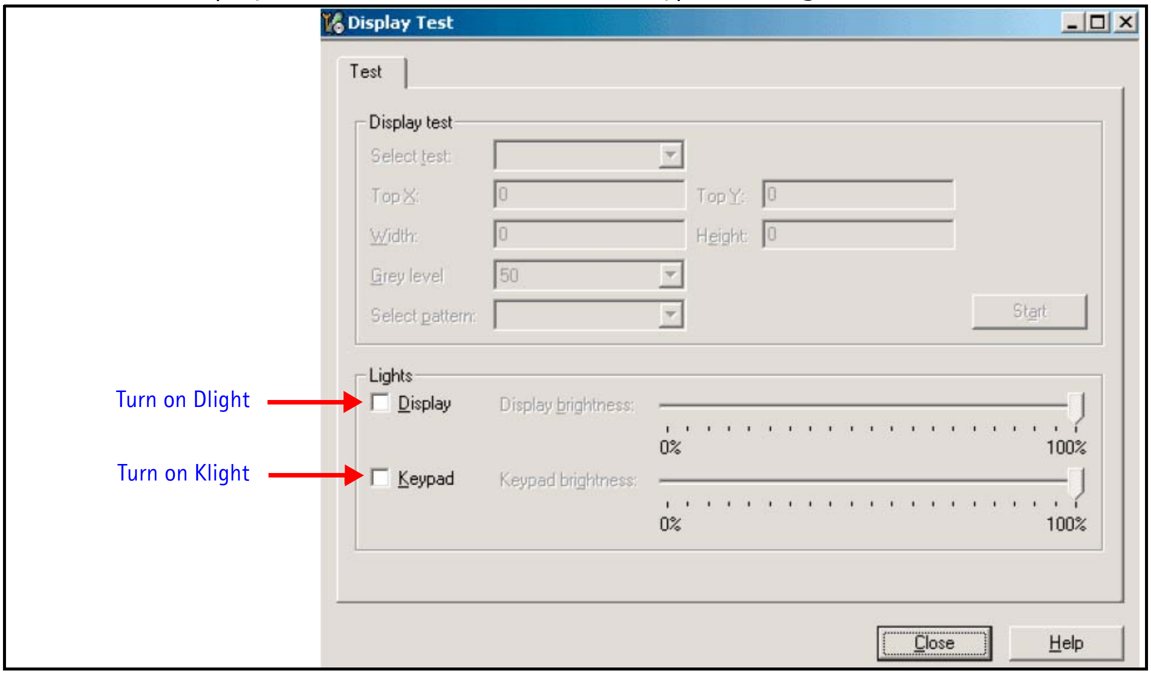

Figure 21: Phoenix Display Test option

UIM Card

How the UIM Card Works

The Nokia 2255 supports two types of UIM cards that work at 1.8V and 3.0V. When the mobile terminal is switched on with a UIM card, the UPP sends a 1.8V signal to the UIM card and waits for the UIM card's response and identification. After a wait period, if there is no answer from the UIM card, the mobile terminal will send another signal at 1.8V. In this case UEMC acts as a level shifter and raises the signal to 3.0V. If there is still no response, the mobile terminal will not allow access. If there is a response, then the mobile terminal powers up.

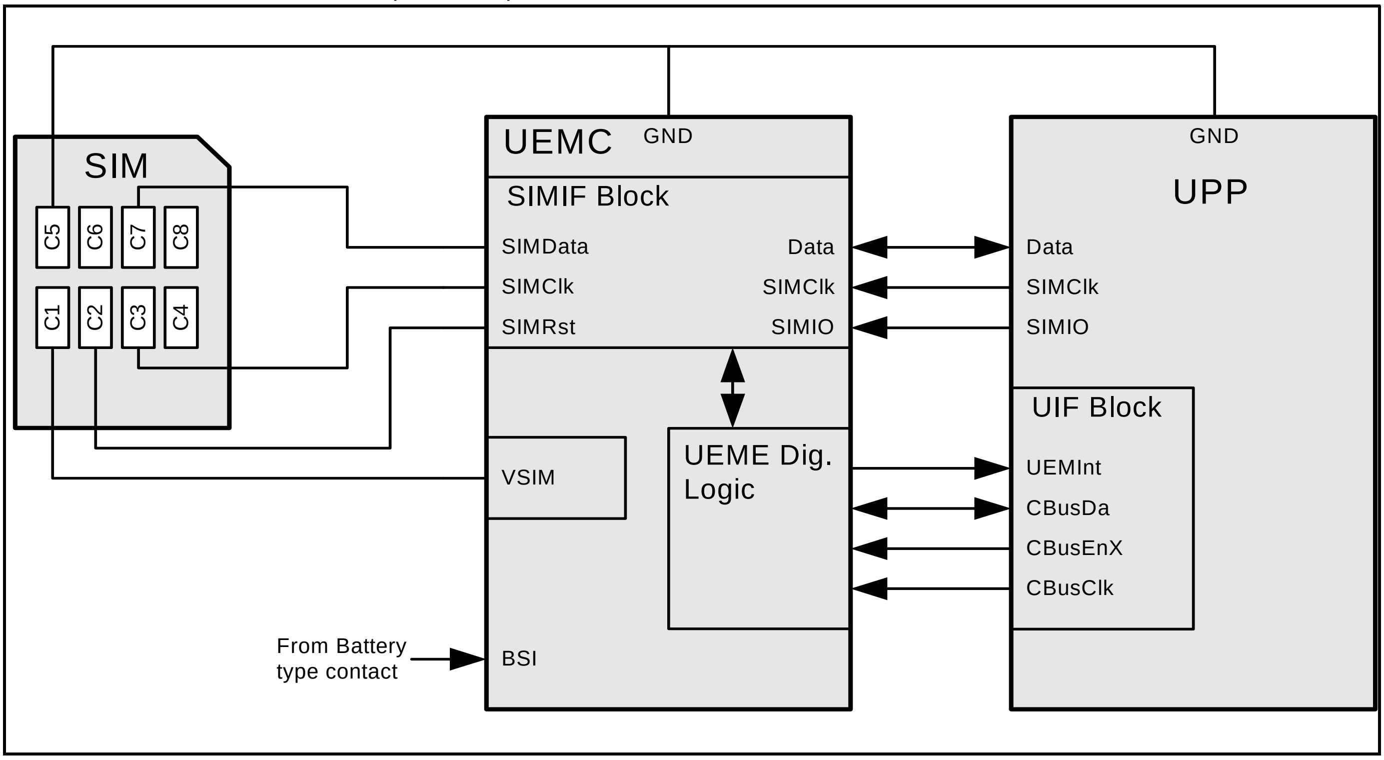

Figure 22: UIM Card Block Diagram

UIM Card Troubleshooting

When troubleshooting UIM cards, make these common checks (see Figure 23 and Figure 24):

- Check Vsim 1.8V or 3.0V. Vsim comes from UEMC and goes through the SIM ESD protection chip. Check for bad or damaged solder joints. Replace chips if necessary.

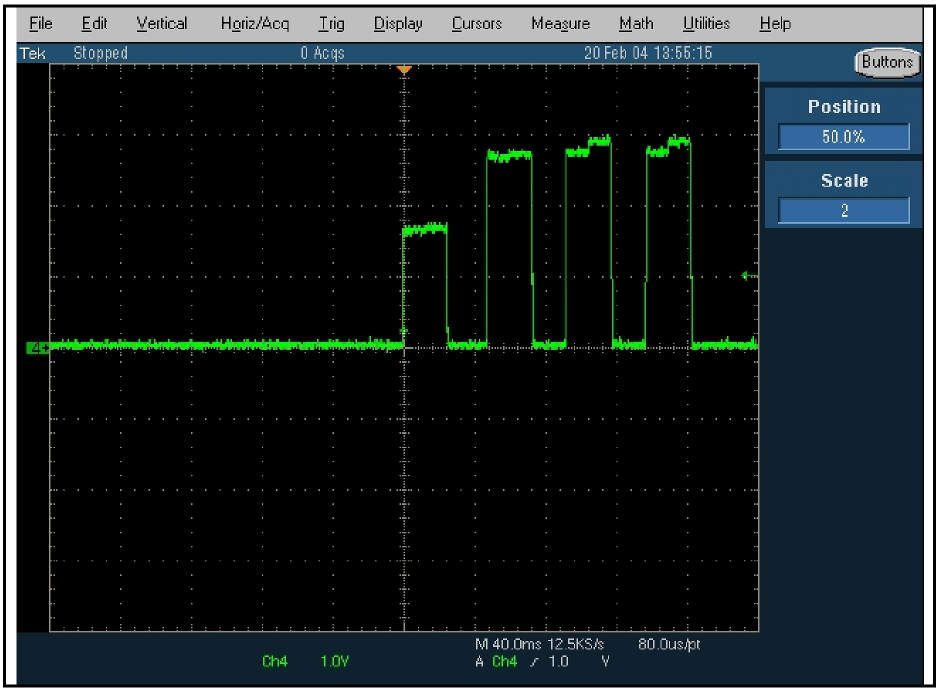

Figure 23: Vsim check

- Check detection sequence

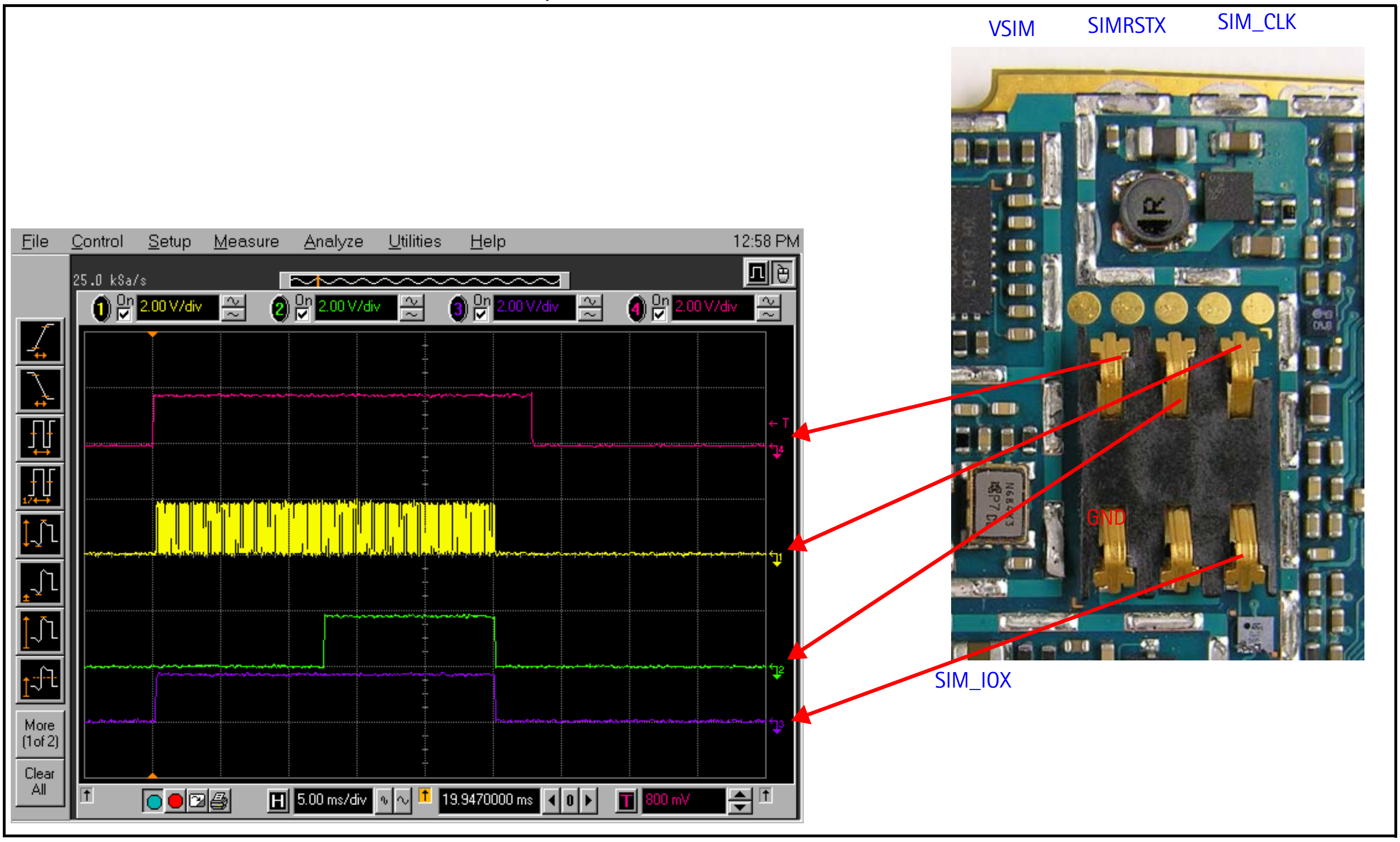

Figure 24: Detection sequence

- Verify communication signals

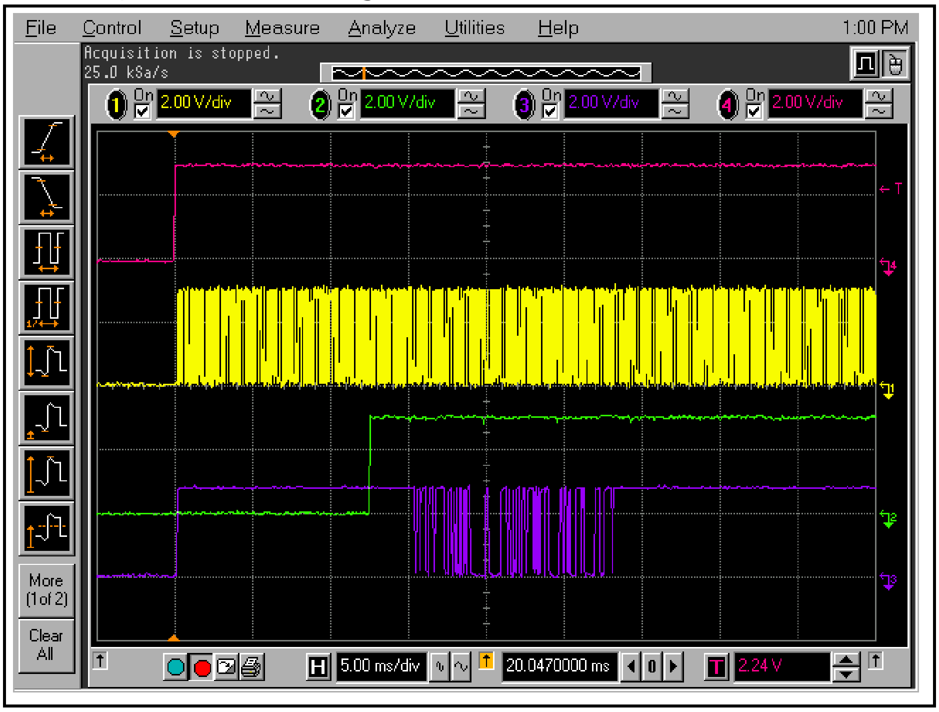

Figure 25: Communication signals

- If no signals are present: (1) check contacts on Sim connector are correct, (2) check ESD chips are correct, and (3) check the UEMC is correct. Replace damaged parts if necessary.

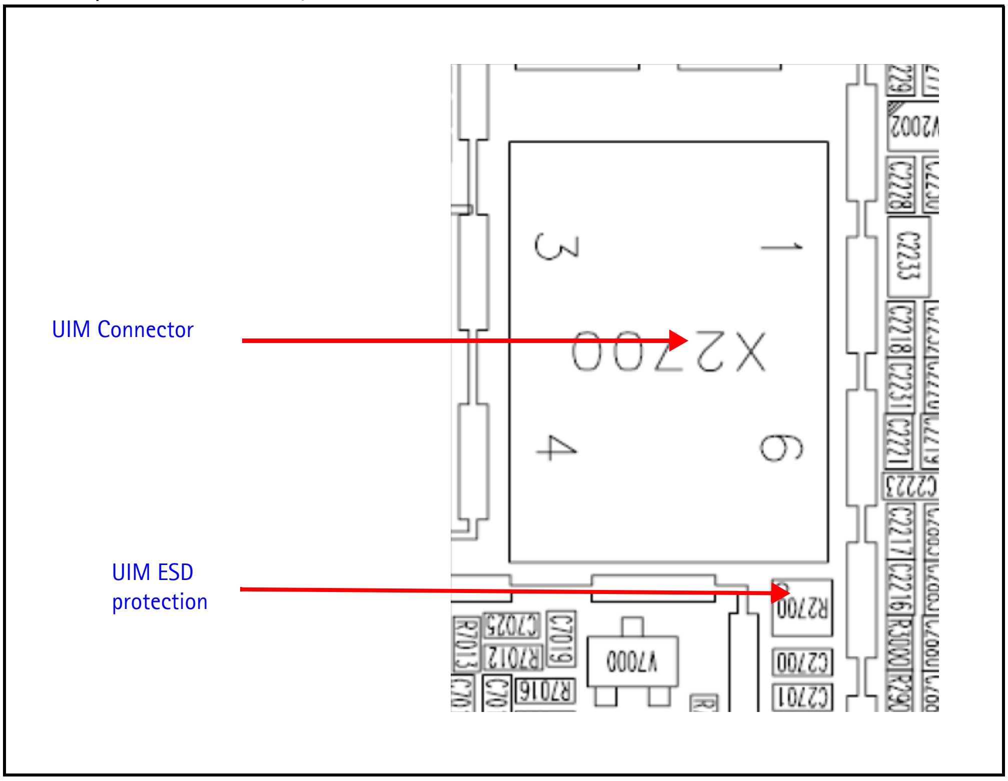

Figure 26: Vsim check

UIM Card Phoenix Interface

Run the SIM-Lock Status in Phoenix to test a SIM (or UIM) card.

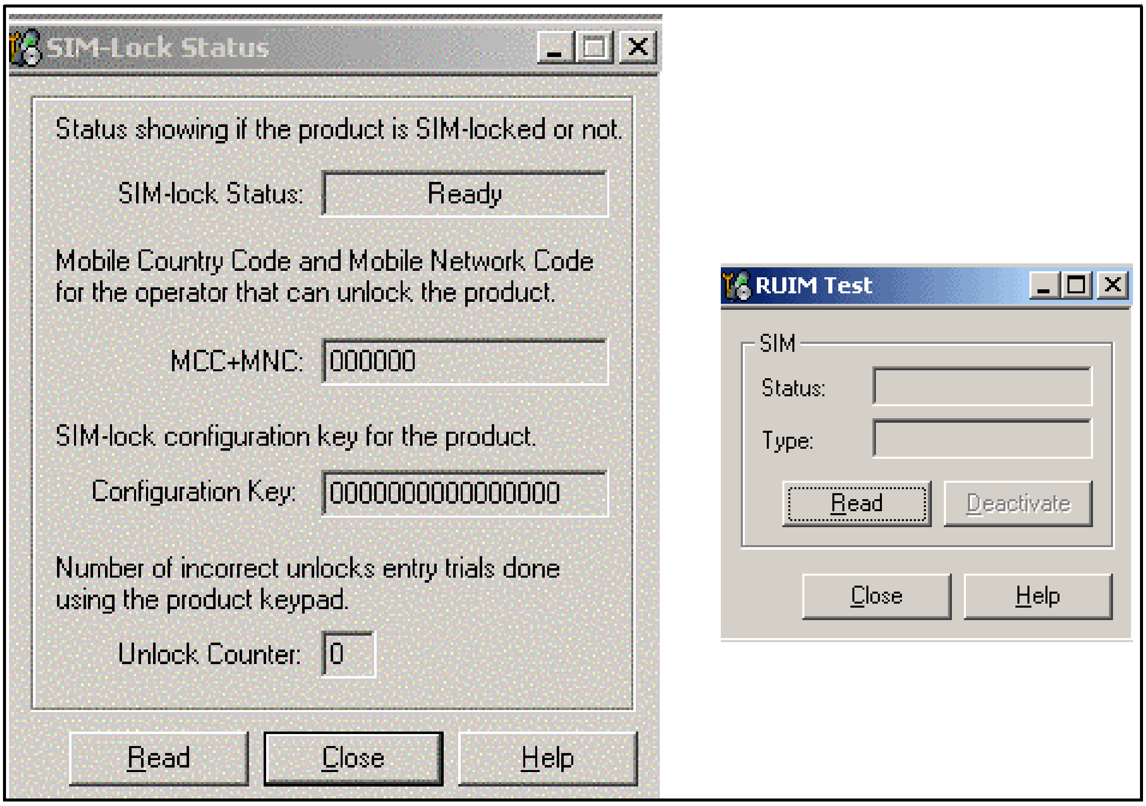

Figure 27: Phoenix SIM Testing options

Battery Interface Circuit

Figure 28 illustrates the battery interface circuit. The BSI voltage level for different power-up modes:

- normal mode - 1.23V
- for the test mode - 170MV
- local mode - 90MV

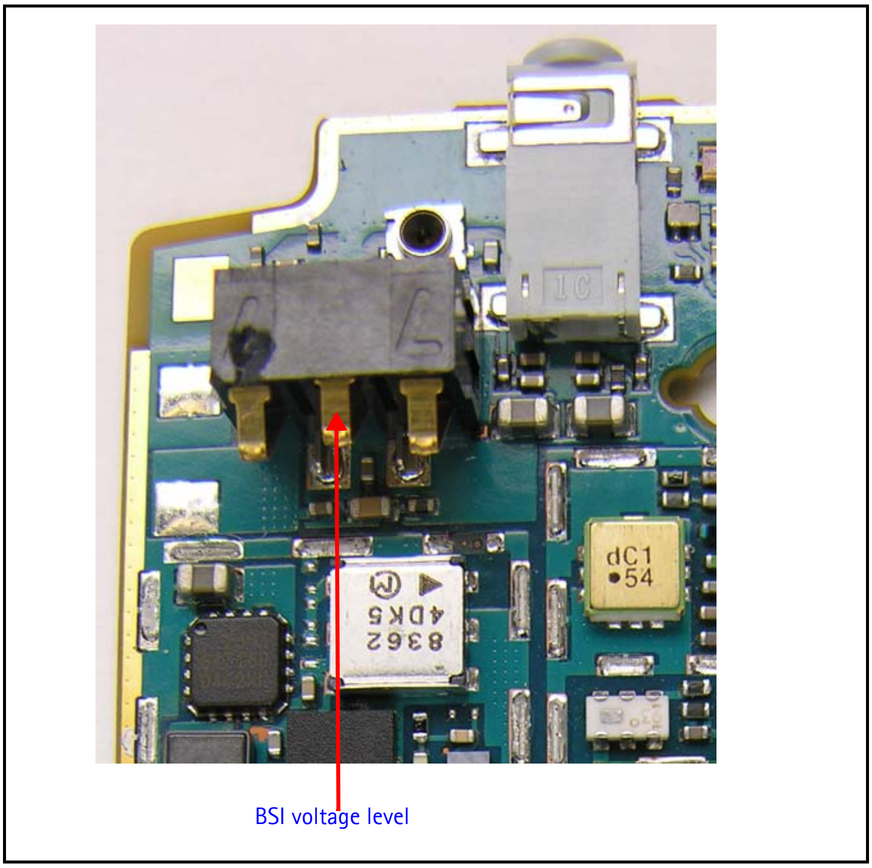

Figure 28: Battery Interface Circuit

Charging

When troubleshooting battery charging, make these common checks (see Figure 29, Figure 30 and Figure 31):

- Does the battery bar scroll?

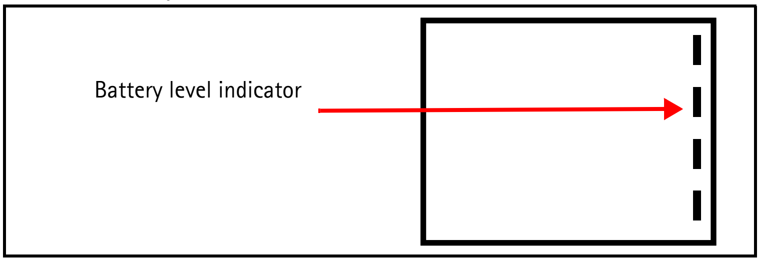

Figure 29: Battery indicator bar

- Measure voltage at V2000. Is it >3VDC?

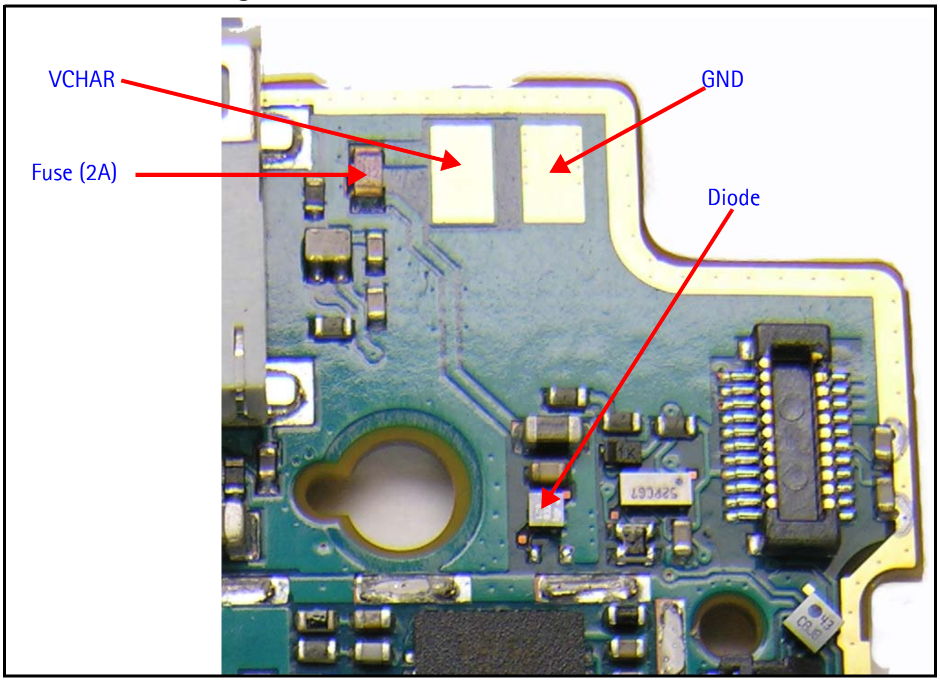

Figure 30: Charging layout

- Measure BTEMP at V2000. Is it ~25*C? If not, replace the UEMC.

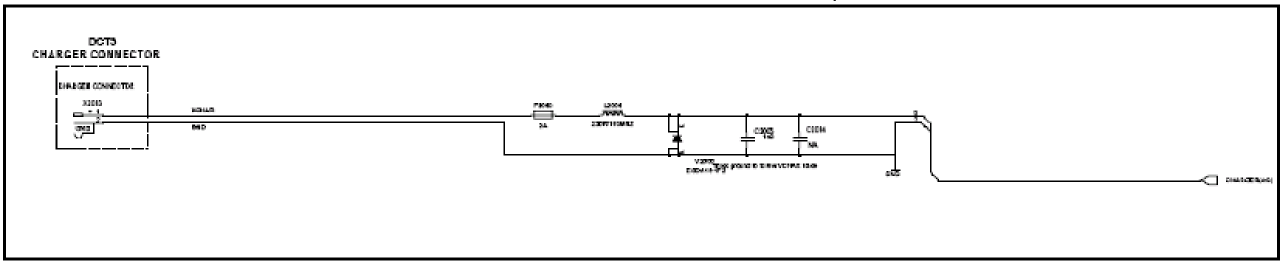

Figure 31: Charging diagram

- Remove the fuse at F2000 and measure the current. Is it ~850mA? If not, replace the UEMC.

Common Problems

The following section has a list of common problems, along with some standard checks.

No Communication During Flash

- Make sure there is a good connection between flash adaptor and the mobile terminal
- The mobile terminal has to be powered by prommer (FPS-8)
- Check the Baseband regulators VR3, VIO, VCORE, VFLASH1
- The mobile terminal will not able to flash without 19.2Mhz clock into UPP
- Check that 32Khz Clock is present
- Check BSI, MBUS, FBUSRx, FBUSTx, PURX, SLEEPX for bad solder joints between UEMC and UPP
- Check the Flash bus signal and VPP voltage level

No Communication During Alignment

- Check all connections between test fixture, cables and the mobile terminal
- Make sure the mobile terminal is in Local Mode. If not, check BSI signal level
- Make sure the mobile terminal is programmed/flashed

Failed Self Test/Calibrate

- Make sure the mobile terminal is in local mode
- Make sure power supply provides enough current (usually approximately 500mA and 2A for tuning)
- Use the troubleshooting guide's flow chart to verify the failed circuit
- Check the signals and voltage levels as described in the troubleshooting guide

Mobile Terminal Not Powering Up

Refers to when no power causes the mobile terminal to not able to flash, not to get into local mode and similar problems.

- Check the baseband regulators – VR3, VIO, VFLASH1, VCORE dc/dc, PURX
- Check VCTCXO 19.2MHz signal at UPP input
- Check that 32Khz Clock is present
- Check power-up sequence
- Check the Flash IC, flash bus signals, and voltage level

Shut Down After 32 Seconds

- Check for the absence of 32KHz SleepCLK

- Check for incorrect SleepX signal levels
- Check if ESN number is corrupted

No Audio

- Check for bad contacts or damaged ear piece
- Check for bad connections at mic
- Check for broken or bad solder joint of passive components
- Verify the audio signal paths using BaseBand “audio test” component with Phoenix as described in the troubleshooting guide

Key Pads Malfunction

- Check for protective film left on back of the key dome if a new one was installed
- Check for corrosion on both the key pads and key dome
- Check if flash software was corrupted
- Check for bad joint from UPP to Interface
- Check for pins shorted on or bad on ESD ASIP Z2400

No LCD Display

- Check for bad connections
- Check for a cracked or damaged display
- Probe test points as described in the troubleshooting guide for missing for incorrect signal level

Phoenix Tools

Baseband menu items in Phoenix Guide.

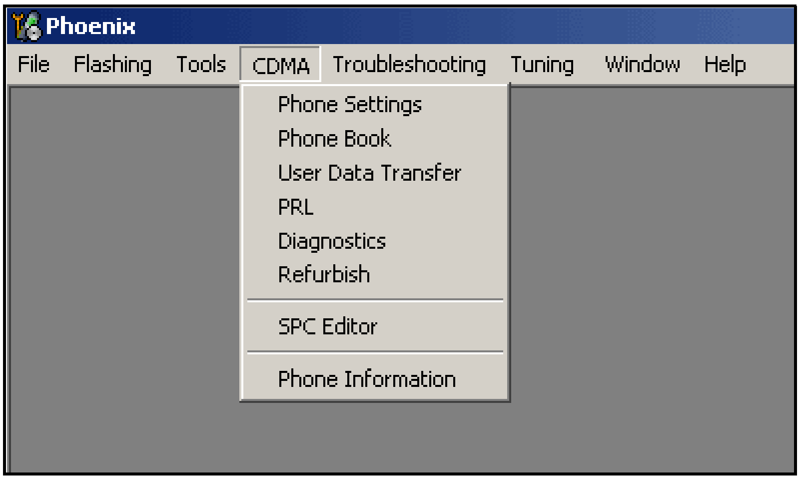

Figure 32: CDMA menu in Phoenix

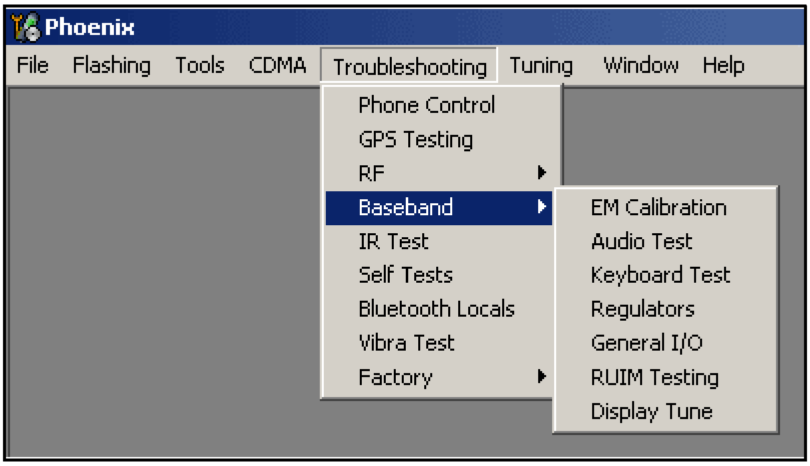

Figure 33: Baseband Troubleshooting menu in Phoenix

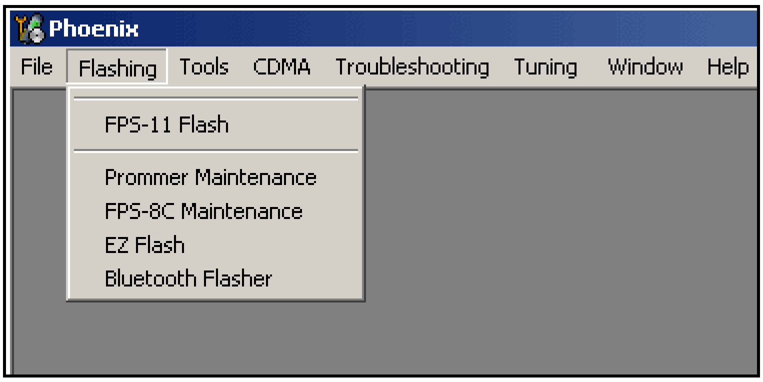

Figure 34: Flashing menu in Phoenix

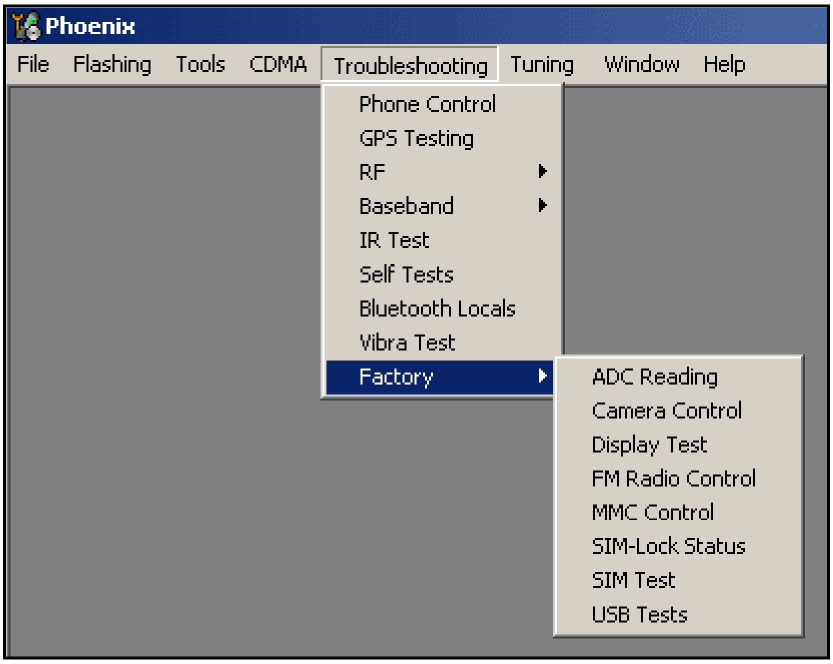

Figure 35: Troubleshooting Factory menu in Phoenix

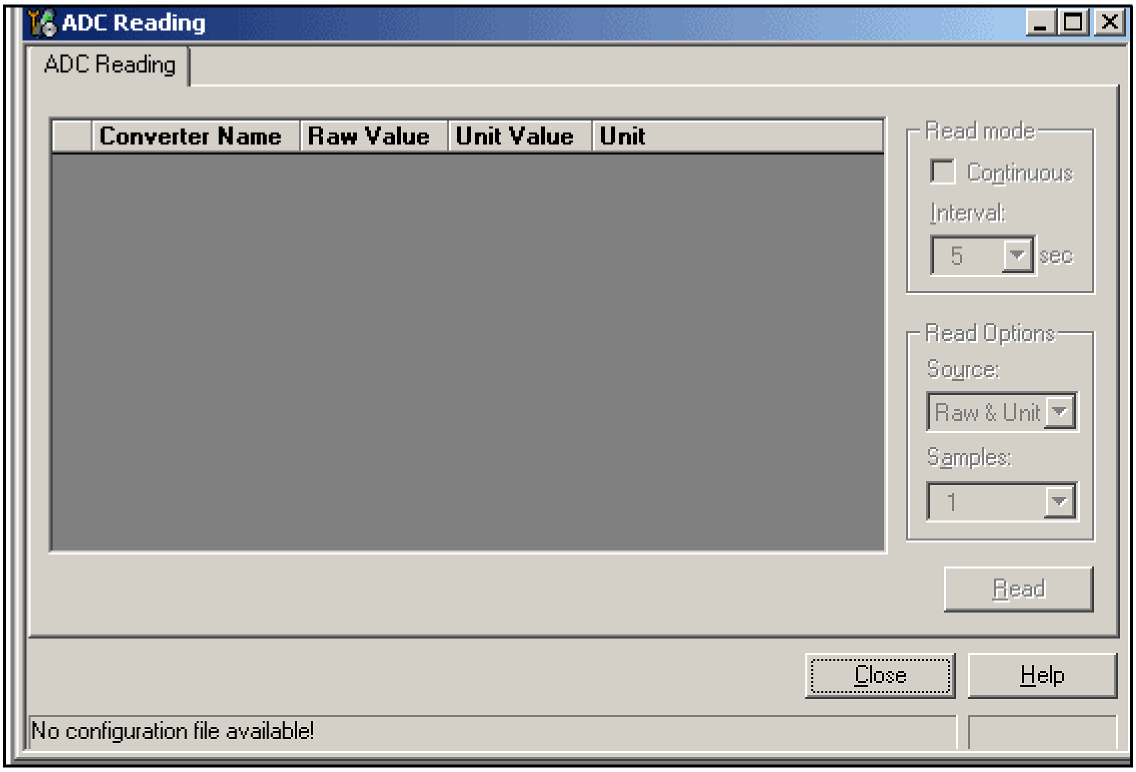

Figure 36: ADC menu in Phoenix

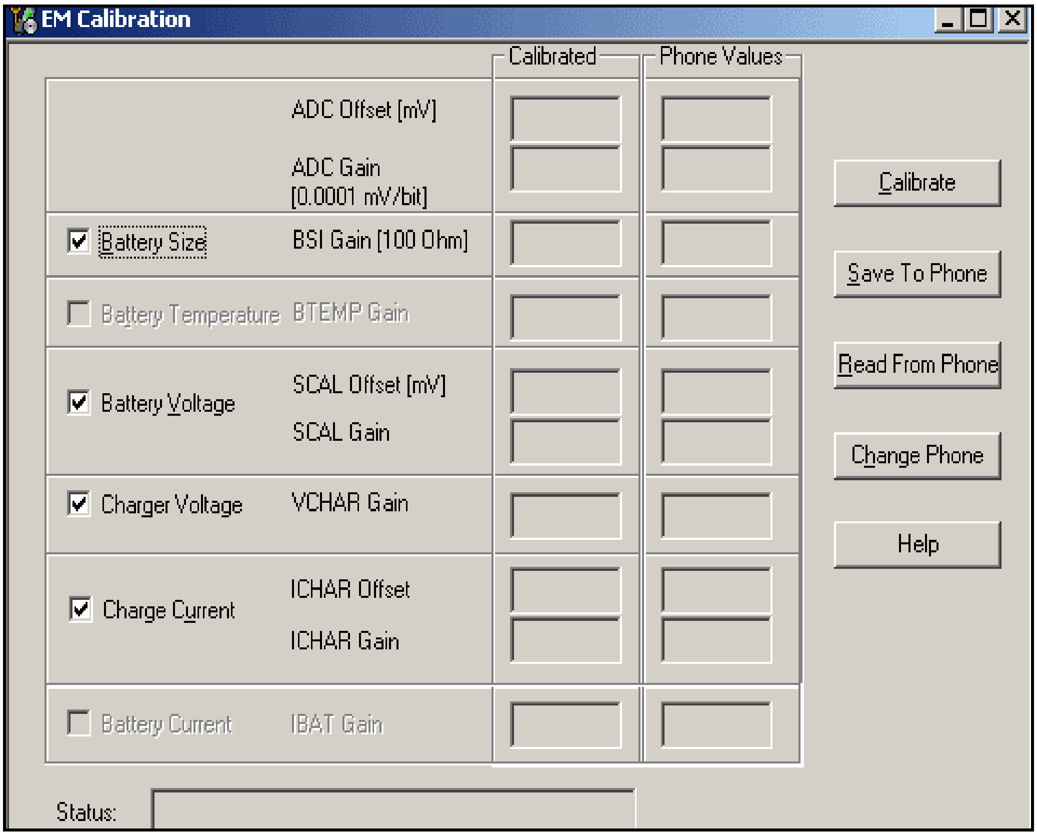

Figure 37: EM Calibration menu in Phoenix

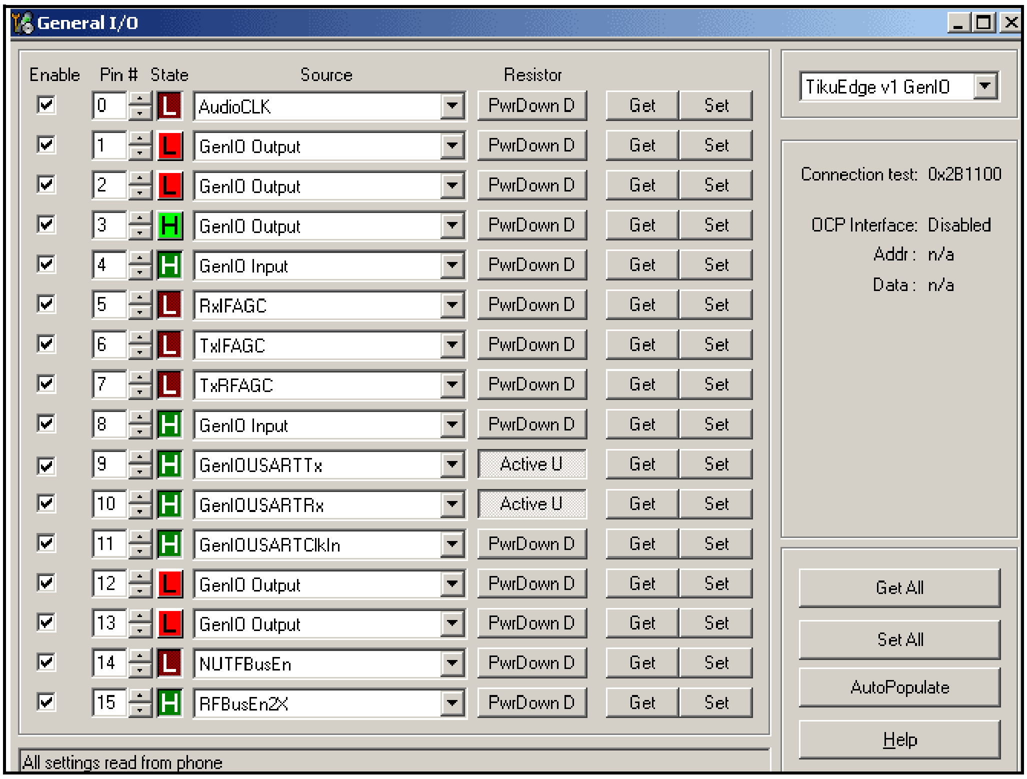

Figure 38: General IO and GPIO menu in Phoenix

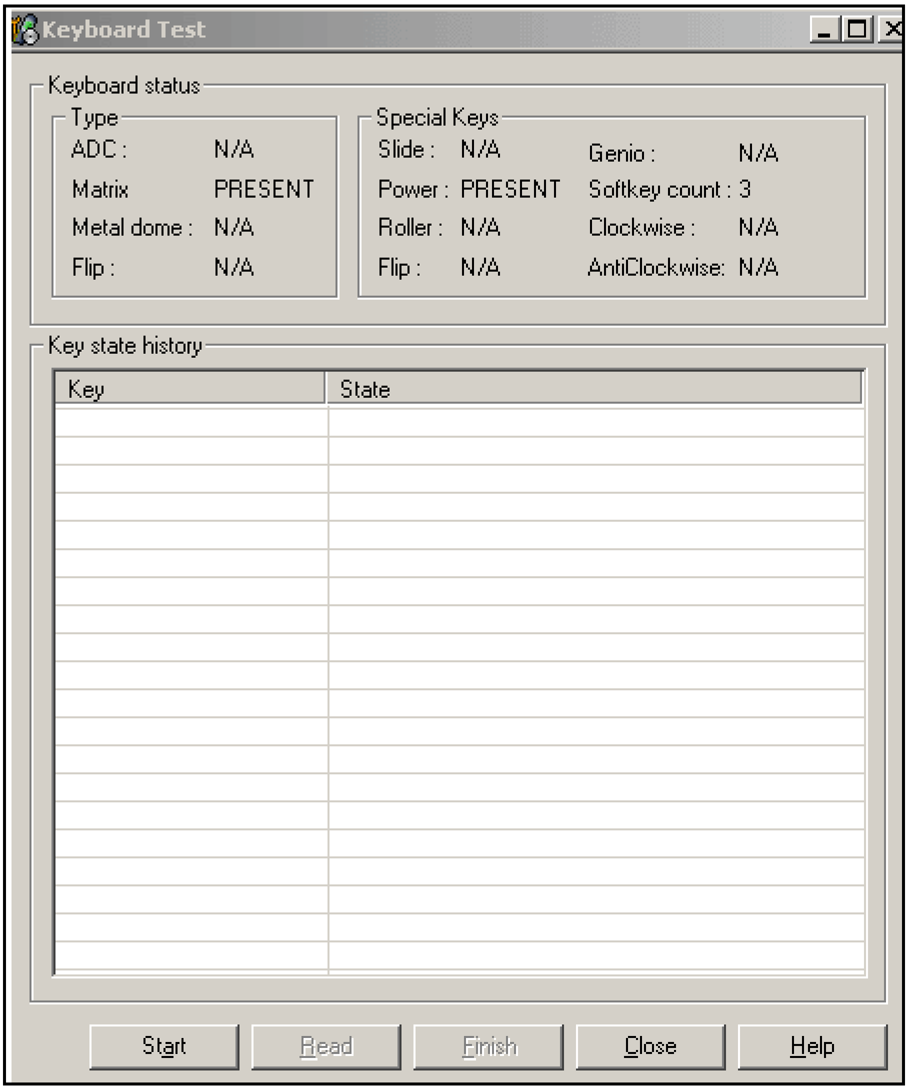

Figure 39: Keyboard Test menu in Phoenix

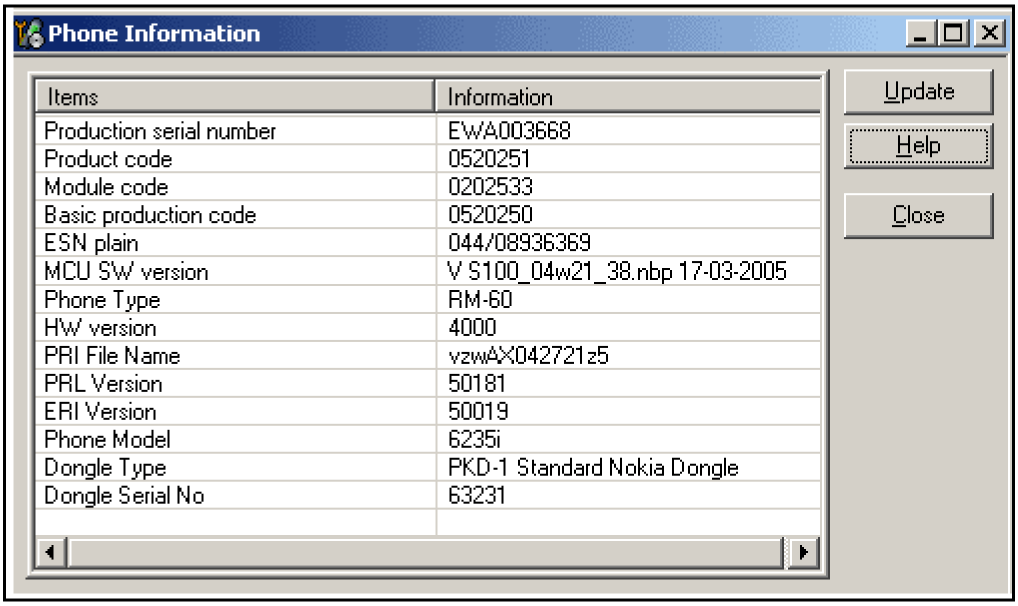

Figure 40: Phone Information menu in Phoenix

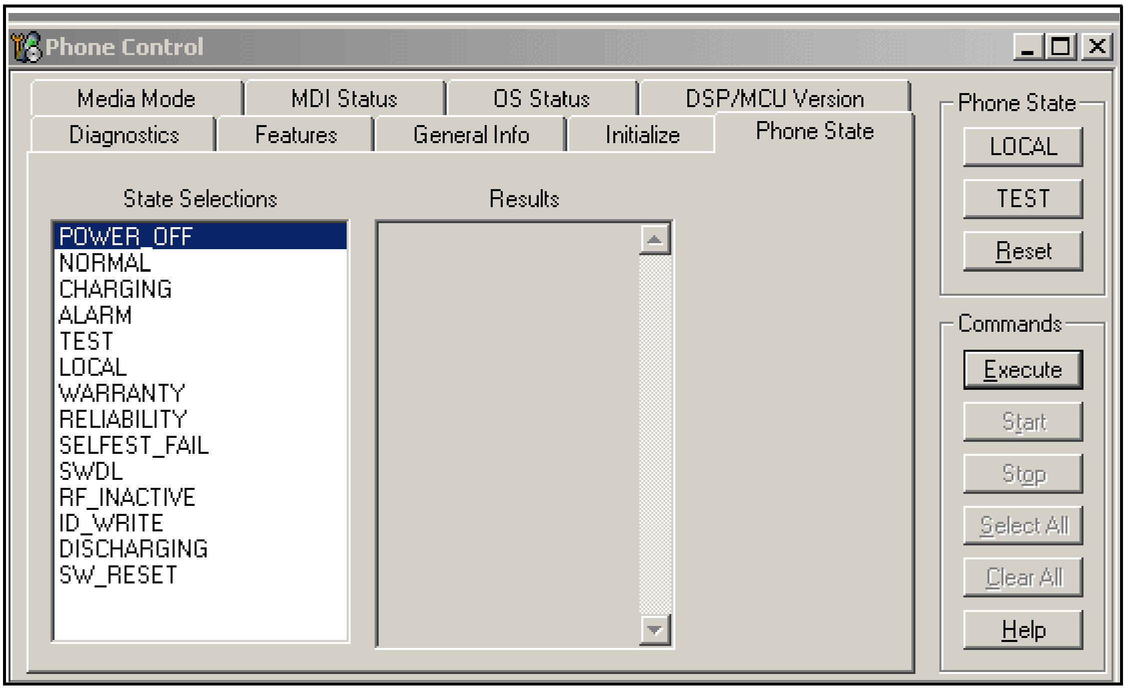

Figure 41: Phone Control menu in Phoenix

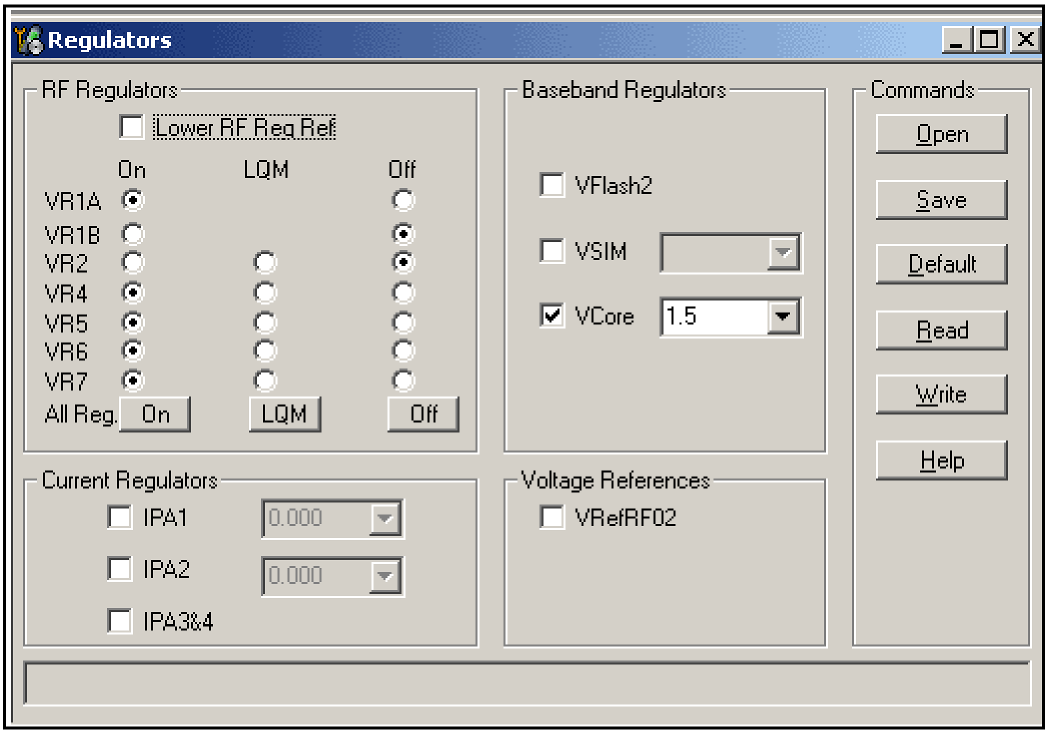

Figure 42: Regulator Control menu in Phoenix

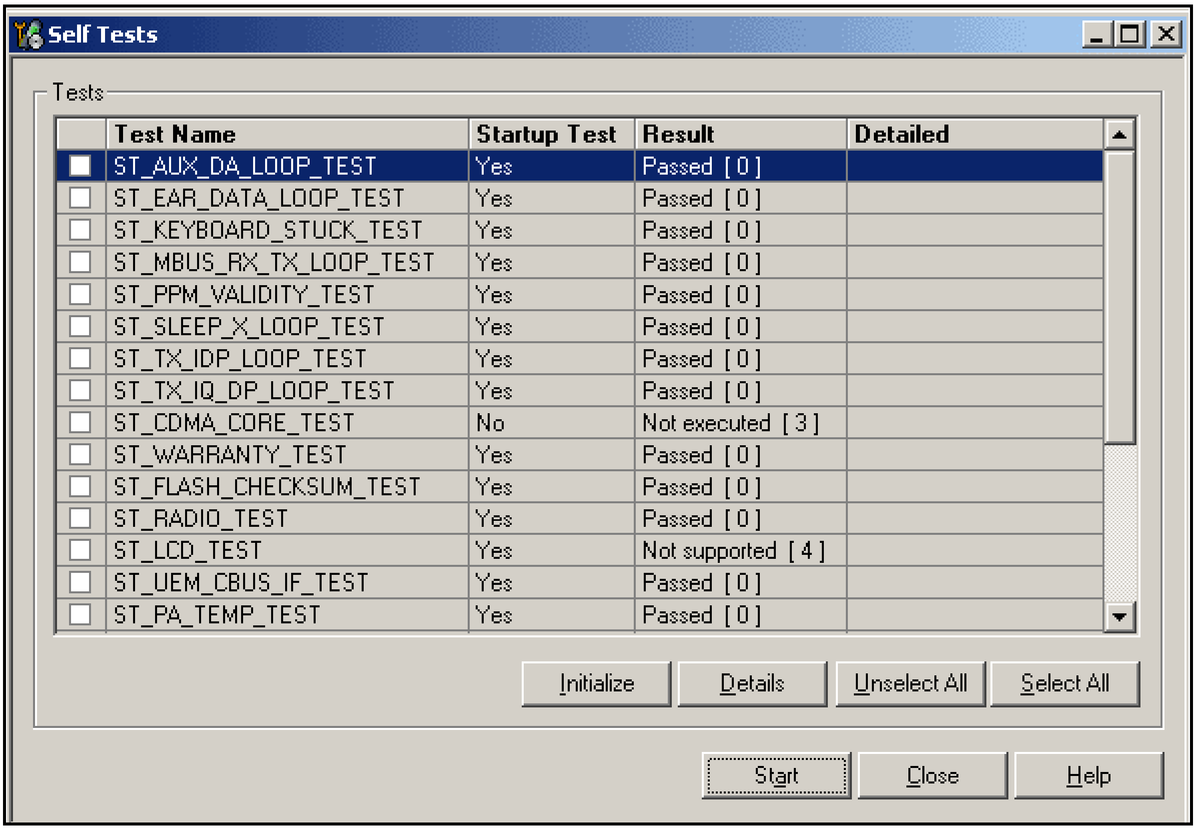

Figure 43: Self-test menu in Phoenix

Reference

Signal references

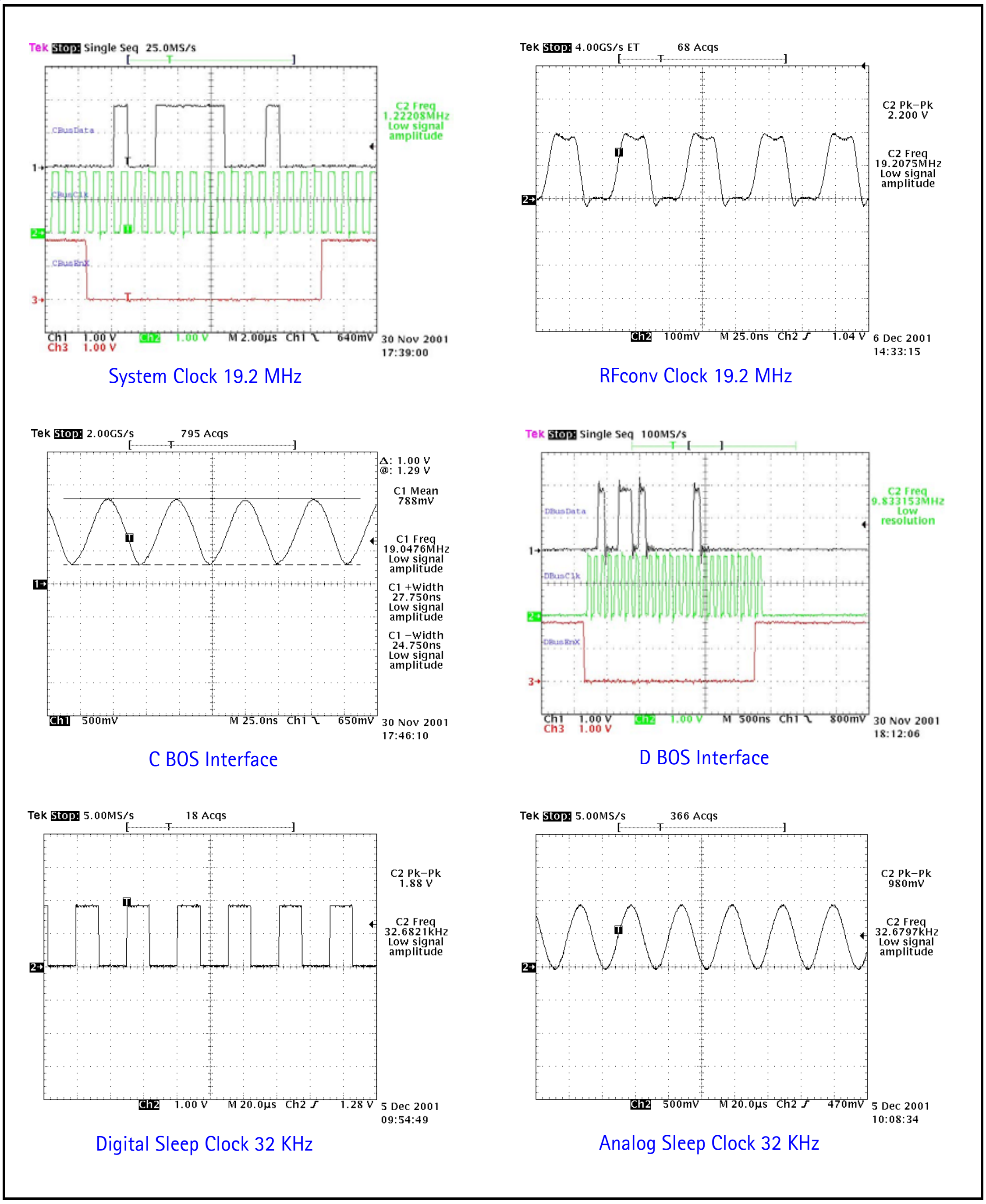

Figure 44: Signal References

Main PWB Overview

Test point map - bottom

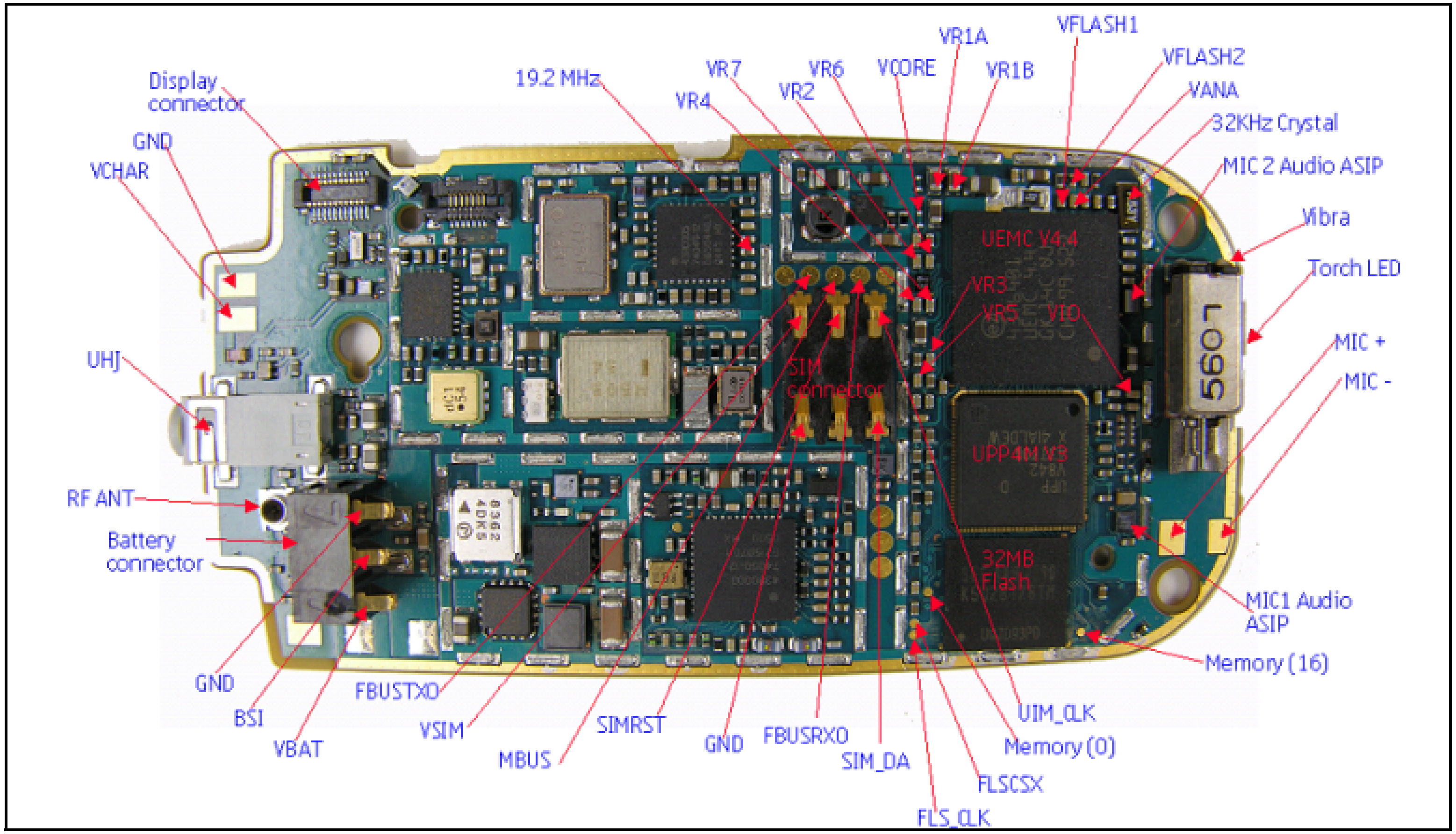

Figure 45: test points – bottom

Test point map – top

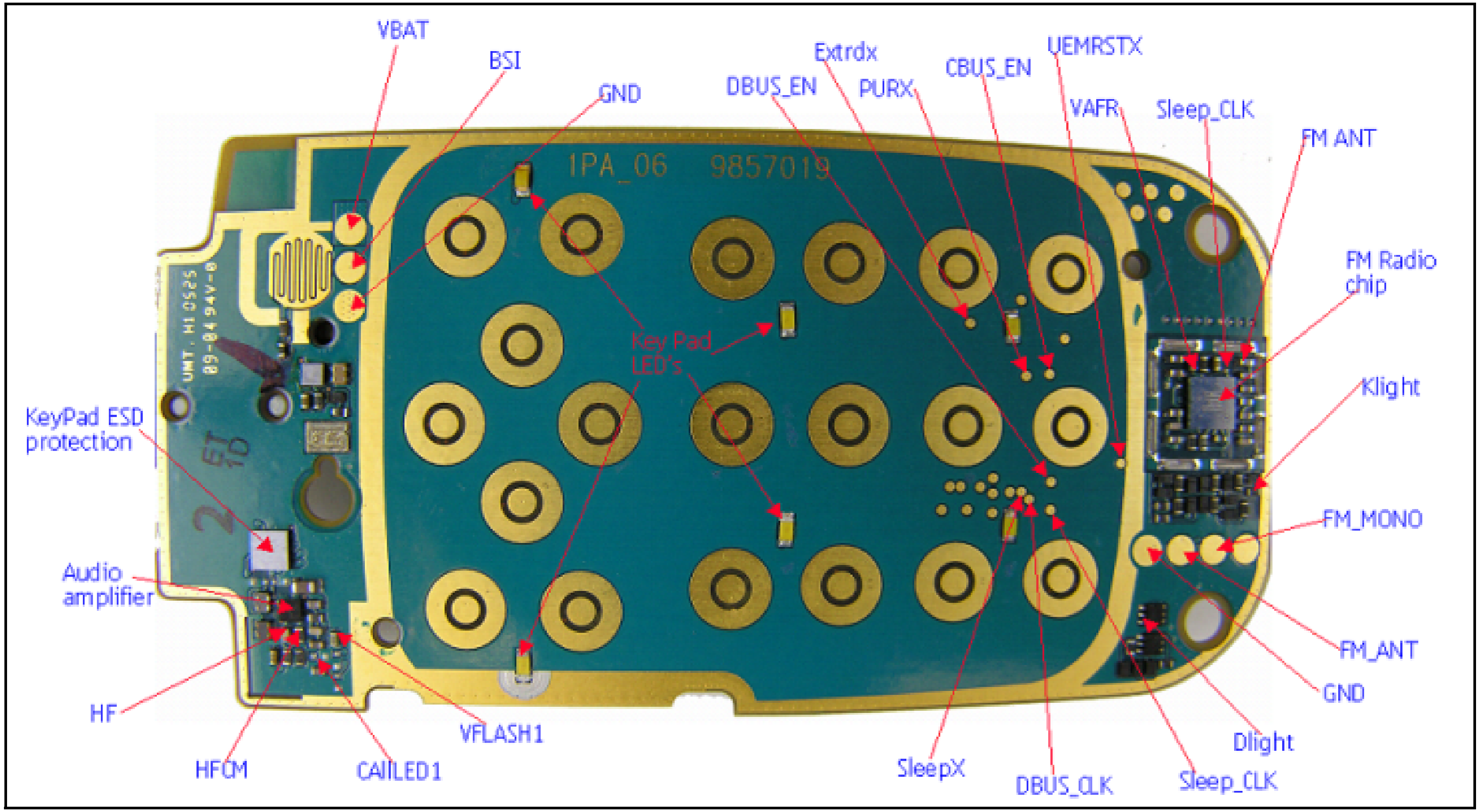

Figure 46: test points – top

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