Nokia Customer Care
6235/6235i/6236i (RM-60)
Mobile Terminals

Baseband Description and Troubleshooting

Contents

Page

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Introduction

The 6235/6235i/6236i baseband module is a tri-mode, Code Division Multiple Access (CDMA), dual-band engine and is based on the DCT4.5 standard. The baseband engine includes two major Application Specific Integrated Circuits (ASICs):

- D2200 or UEMEK 2V0 — Universal Energy Management Enhanced Integrated Circuit (UEME IC), which includes the audio circuits, charge control, and voltage regulators
- D2800 or TIKUEDGE v1.1 — Main mobile terminal processor, which includes system logic for CDMA, two Digital Signal Processors (DSPs), the Main Control Unit (MCU), and the memory

The BL-6C Li-ion battery is used as the main power source and has a nominal capacity of 1070 mA/h.

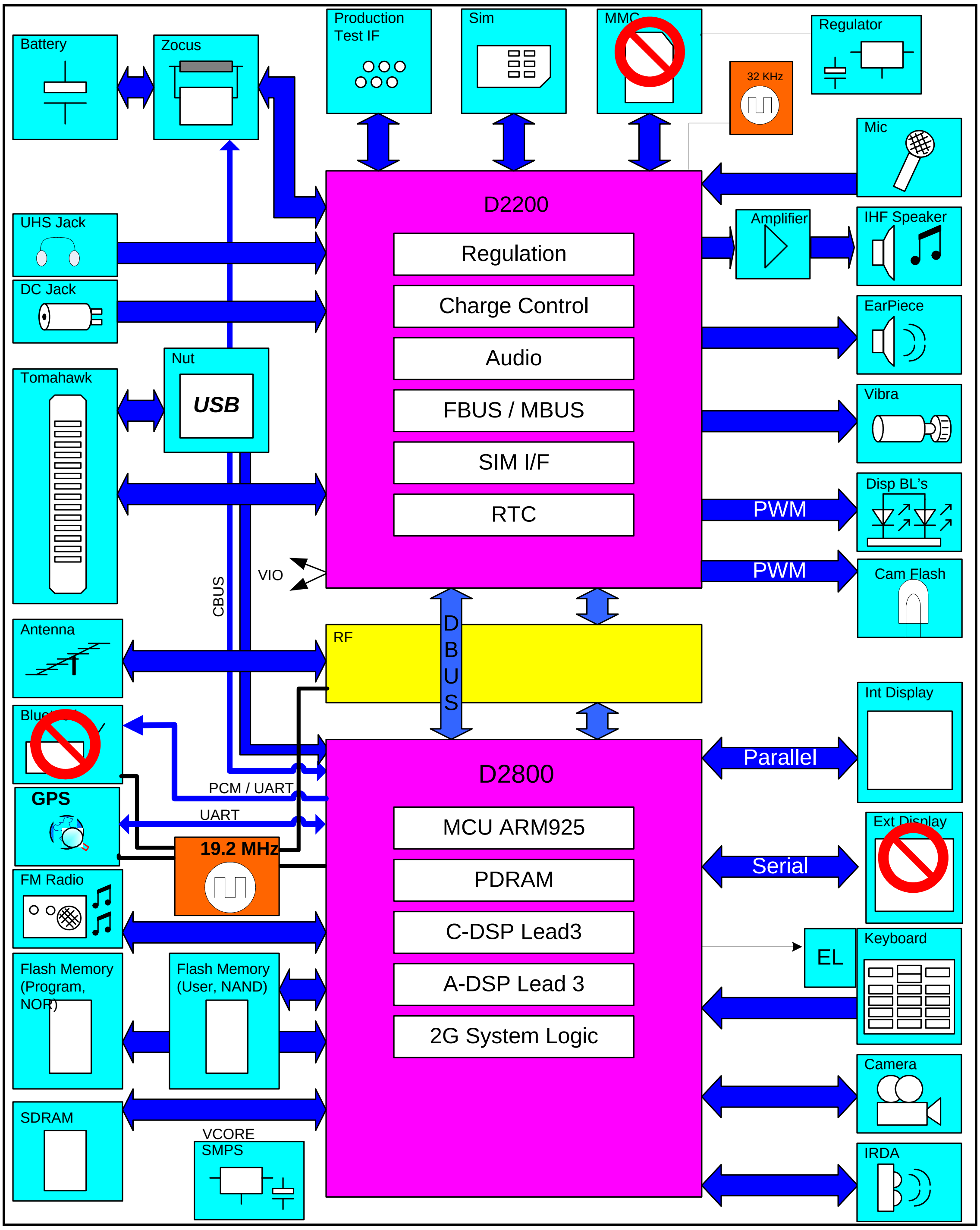

Figure 1: Baseband block diagram

Even though the Bluetooth, External Display and MMC components are on the ASICs, they are not used in the 6235/6235i/6236i baseband module.

Power Up Sequence

When phone 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 UEMEK and D2800 (see Figure 2).

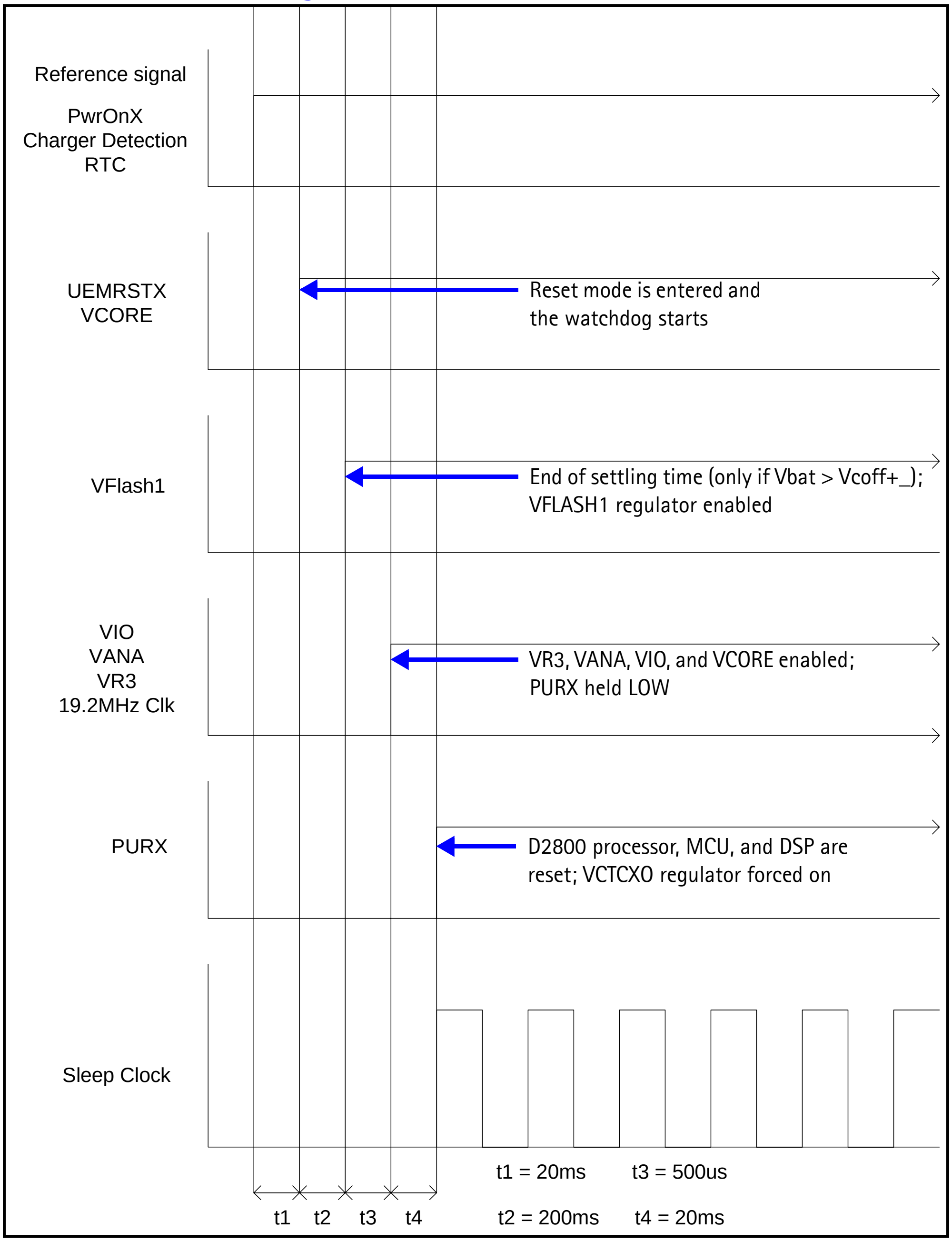

Figure 2: Power-on sequence and timing

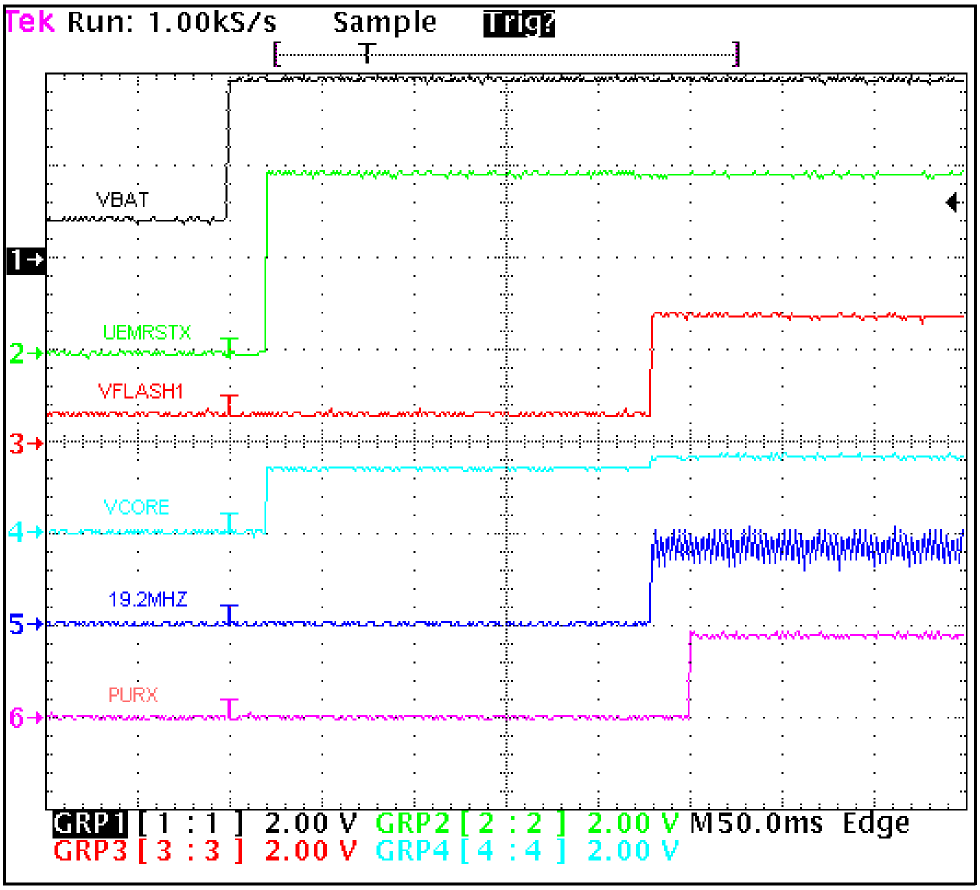

Figure 3: Power Up Sequence

Flash Programming

Flashing Tool

Figure 4 shows the DA-54 flashing tool.

Figure 4: DA-54 Flashing Tool

Flashing Phoenix Interface

Run EZ Flash in Phoenix to flash the phone.

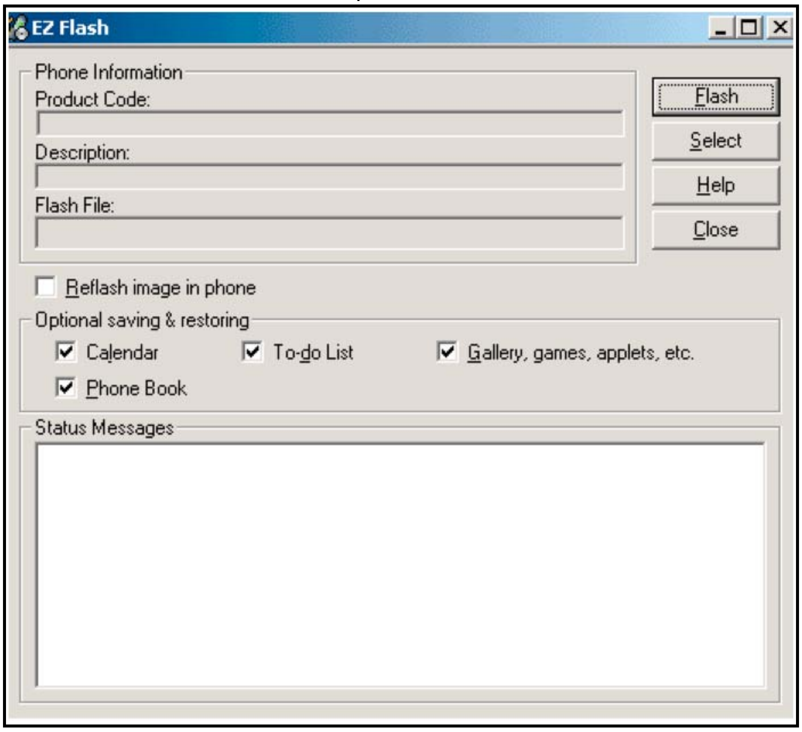

Figure 5: EZ Flash in Phoenix

Audio

How the Audio Works

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

- MIC1 input is used for the phone's internal microphone,
- MIC2 input is used for headsets (HDB-4),
- MIC3 input is used for the Universal Headset.

Every microphone input can have either a differential or single ended ac connection to UEMEK circuit. In the Nokia 6235/6235i/6236i, the internal microphone MIC1 and external microphone MIC2 for Pop-Part™ accessory detection are both differential. However, the Universal Headset interface is single ended. The microphone signals from different sources are connected to separate inputs at UEMEK. Inputs for the microphone signals are differential type. Also, MICB1 is used for MIC1 and MICB2 is used for MIC2 and MIC3 (Universal Headset).

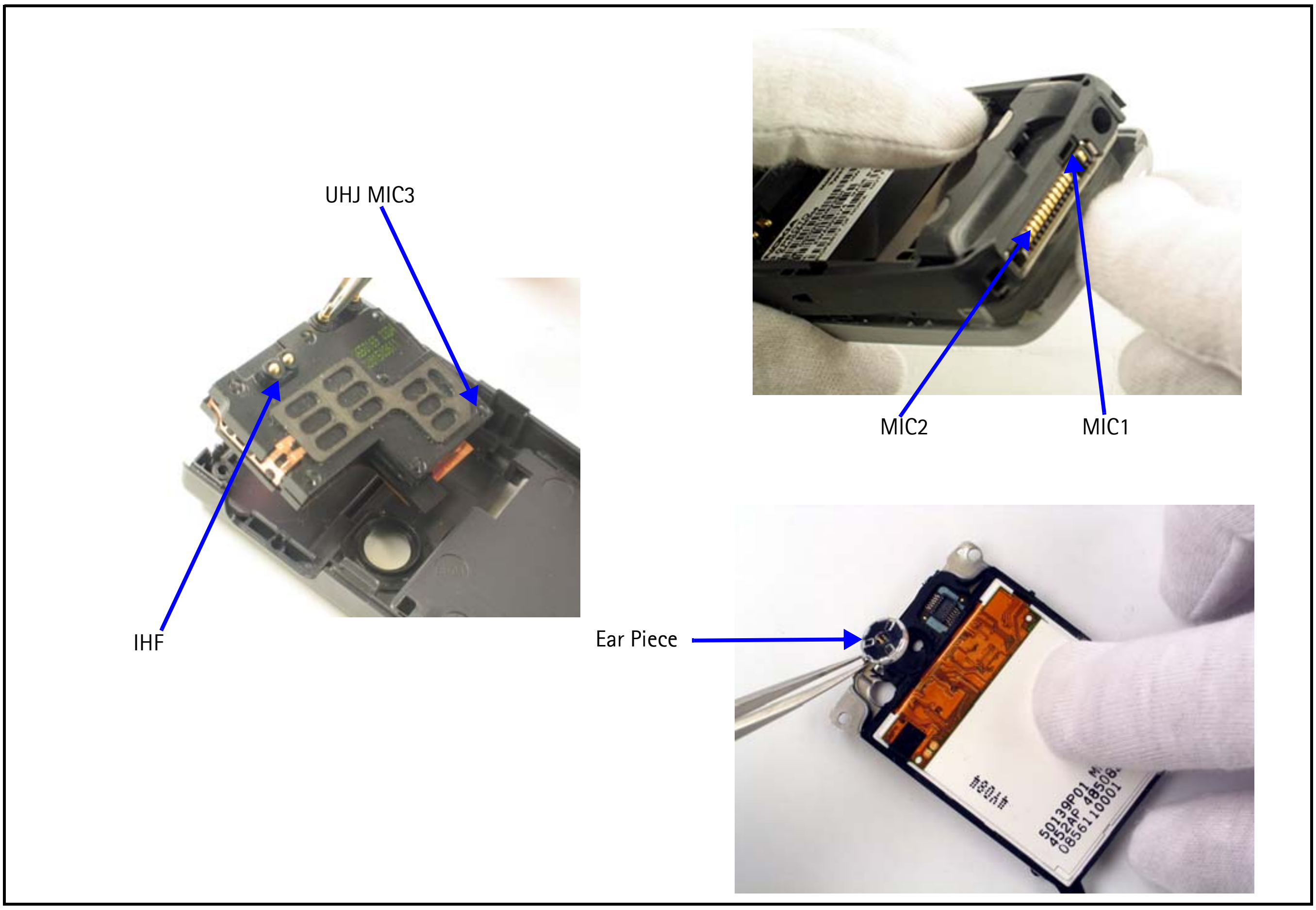

Figure 6: Audio components

Audio Troubleshooting

When troubleshooting the audio, make these common checks (see Figure 7):

- Performed visual inspection of all the ASIP's and UEMEK
- Inject 1KHz signal into MiC1 and trace it all the way to the ear piece. Only when using IHF signal will be amplify by a factor of 8.

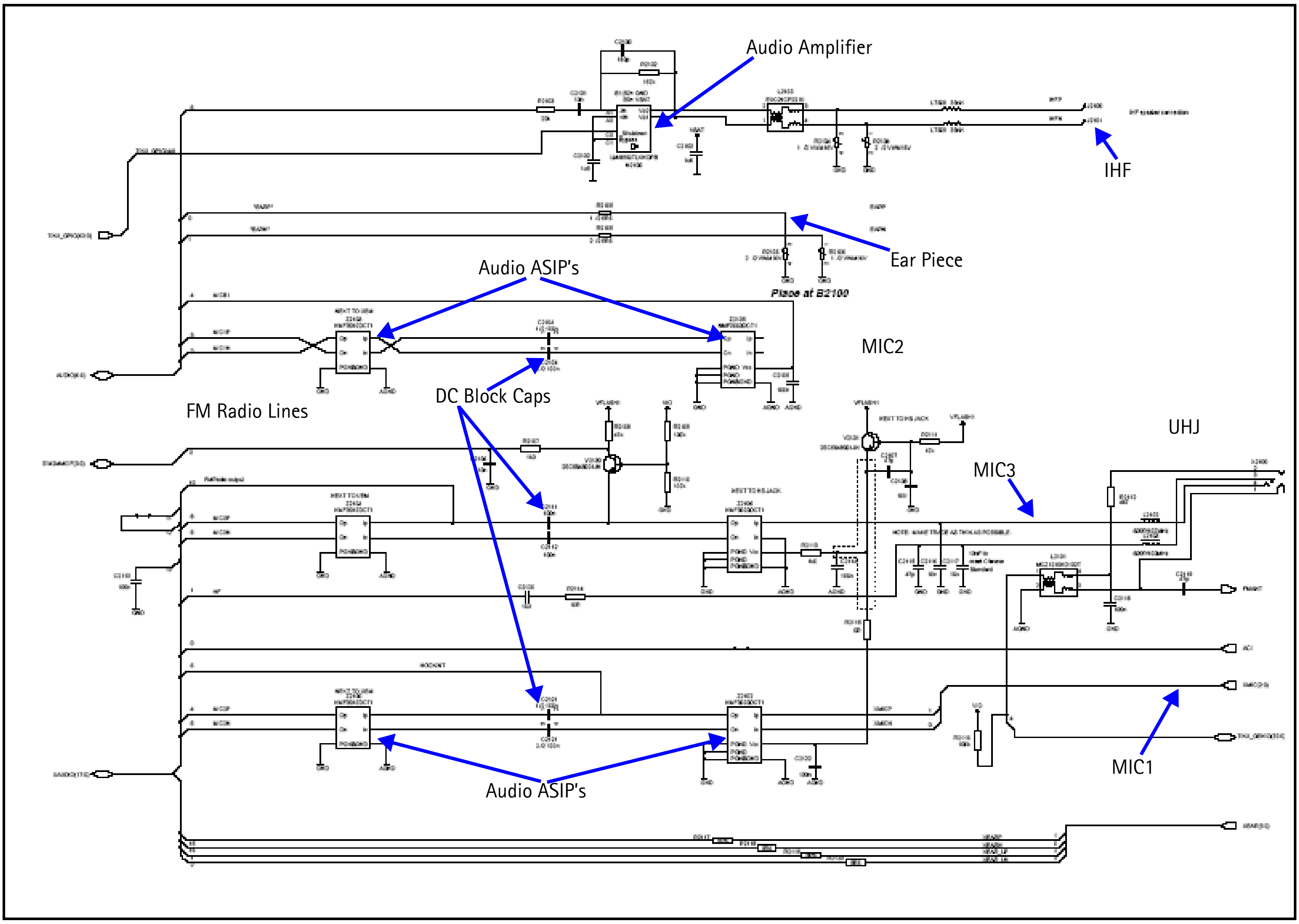

Figure 7: UEMEK Side of Audio Diagram

Audio Phoenix Interface

Run Audio Test in Phoenix to check the audio functionality.

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

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

MiC3 - To test MIC3 you need to use the first and second options. Open channel and insert the universal headset. The UEM automatically re-routes the audio signal to the UHJ.

Ear Piece - Use second option to hear something from internal ear piece.

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

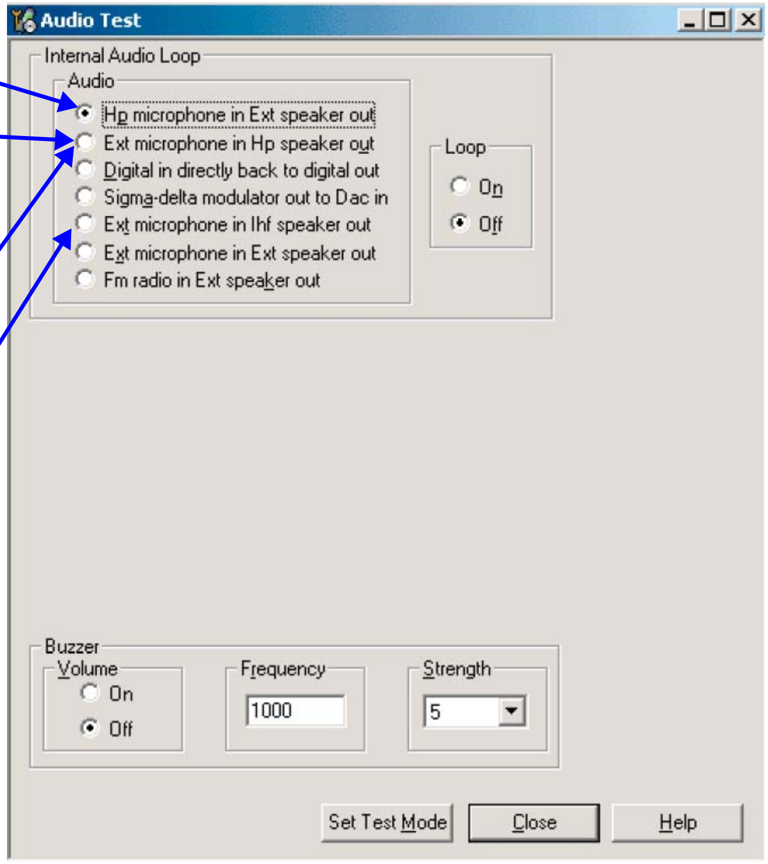

Figure 8: Audio Test in Phoenix

Camera

How the Camera Works

When you select the view finder to take a picture, the D2800 activates the camera by turning on GENIO(27) and GENIO(24)9.6MHz. Once the camera is initialized, D2800 sends control commands through the I2C (GENIO (25&26) interface. The camera takes a picture and sends data back to D2800 for processing through CCP lines. After D2800 finishes with all image processing, the image is stored in the flash memory.

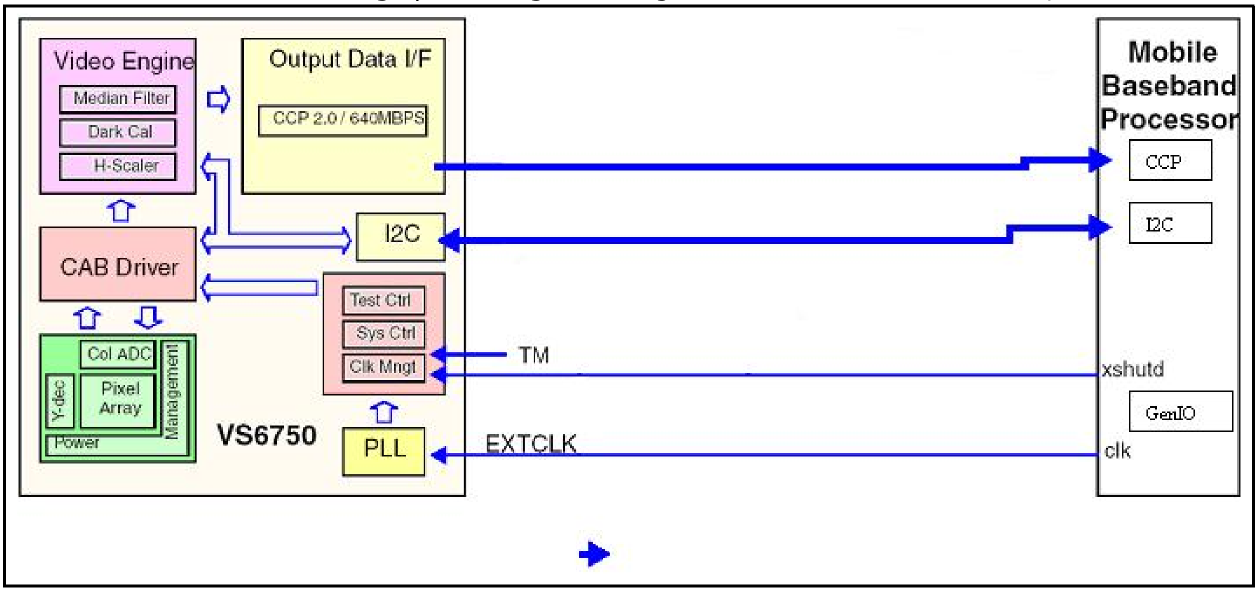

Figure 9: Camera and HWA connections to the baseband

Camera Troubleshooting

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

- Check Power Supply V2.8 and VDIG
- Check Sleepx is high
- Camera Enable GenIO(27) is high
- Check Camera Clk on GenIO(24)
- Check Control line I2C on GenIO 25& 26
- Check raw data lines going back to D2800
- Inspect camera socket and replace Camera
- Check D2800 for Solder problems and replace, if necessary

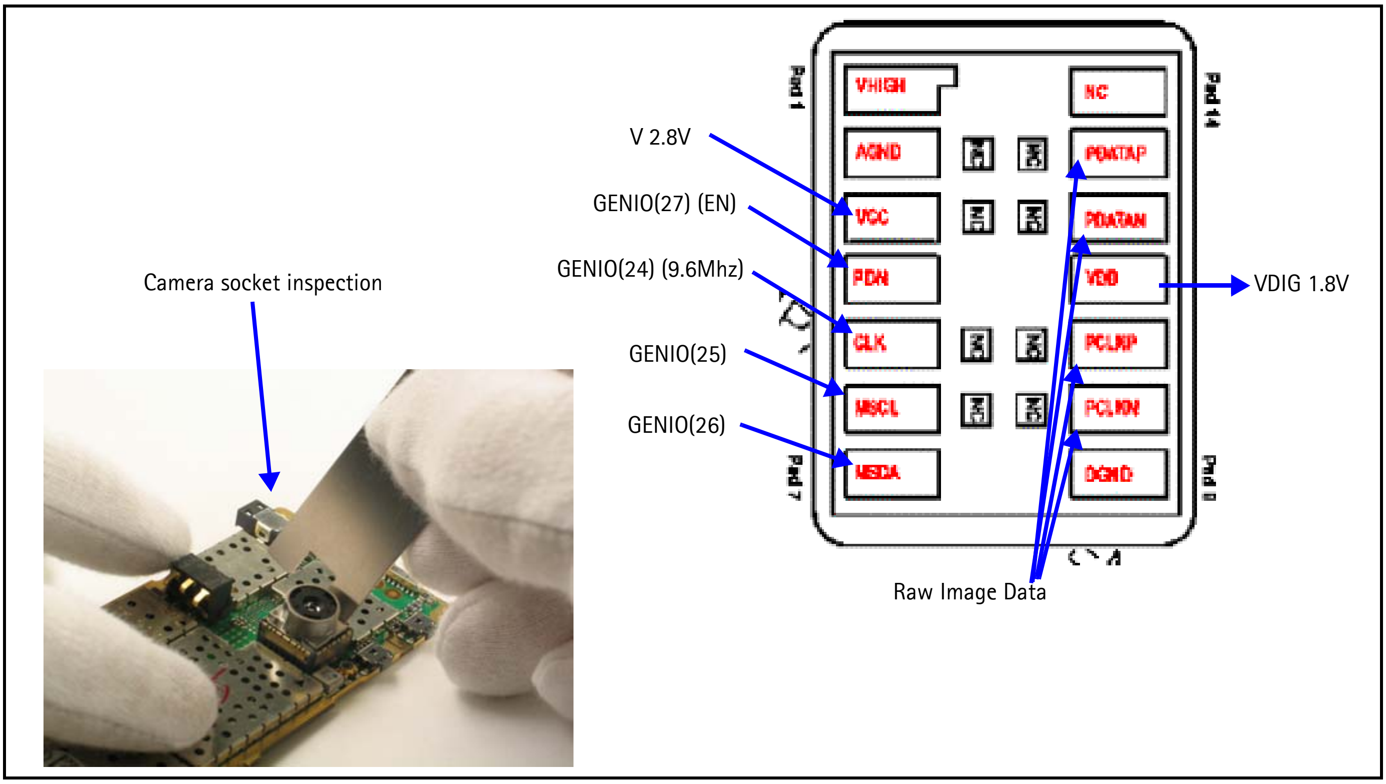

Figure 10: Camera socket and checkpoints

Camera Phoenix Interface

Run Camera Contol in Phoenix to check the camera functionality.

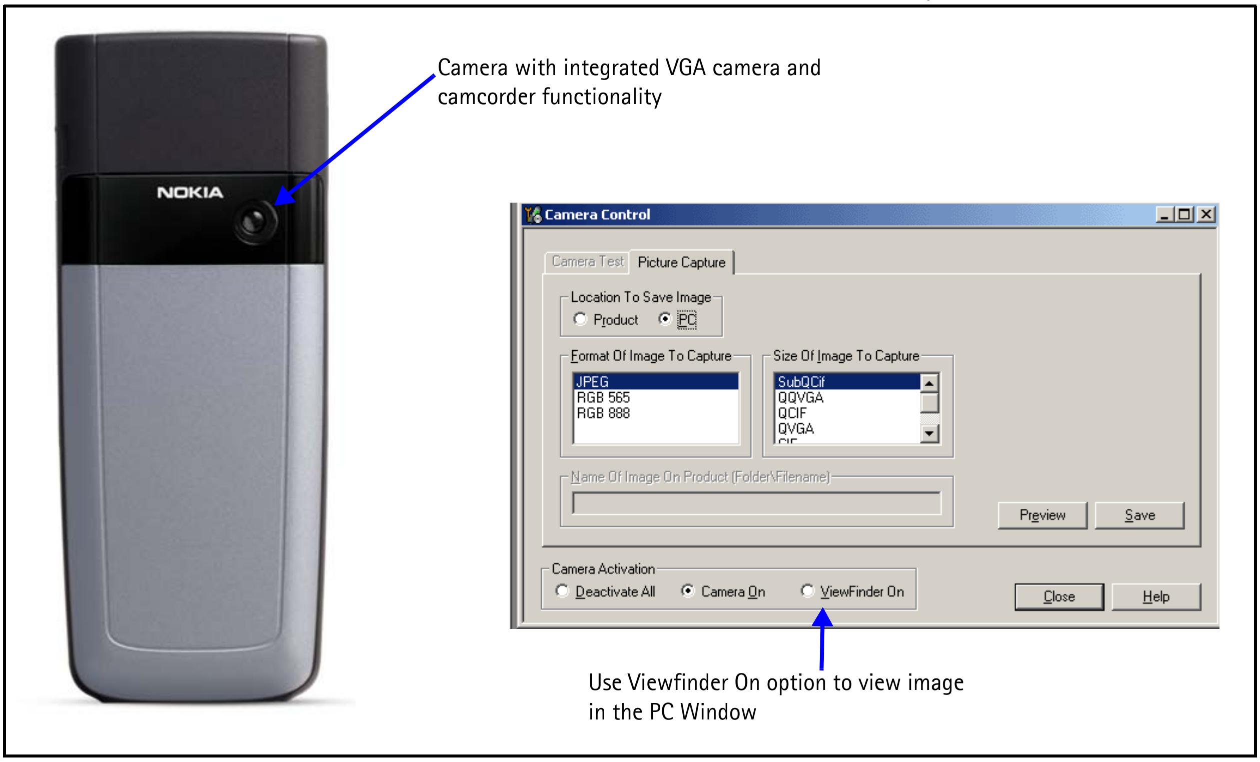

Figure 11: Camera Control in Phoenix

FM Radio

How the FM Radio Works

D2800 turns on the FM radio and sets the frequency using CBUS serial interface as the communication channel. A high frequency FM radio signal come in through RFIN1 Pin to the FM radio chip, then it gets demodulated into a low frequency signal and send to UEMEK for amplification. The amplify signal then get routed back to either universal headset or to the system connector for stereo headset.

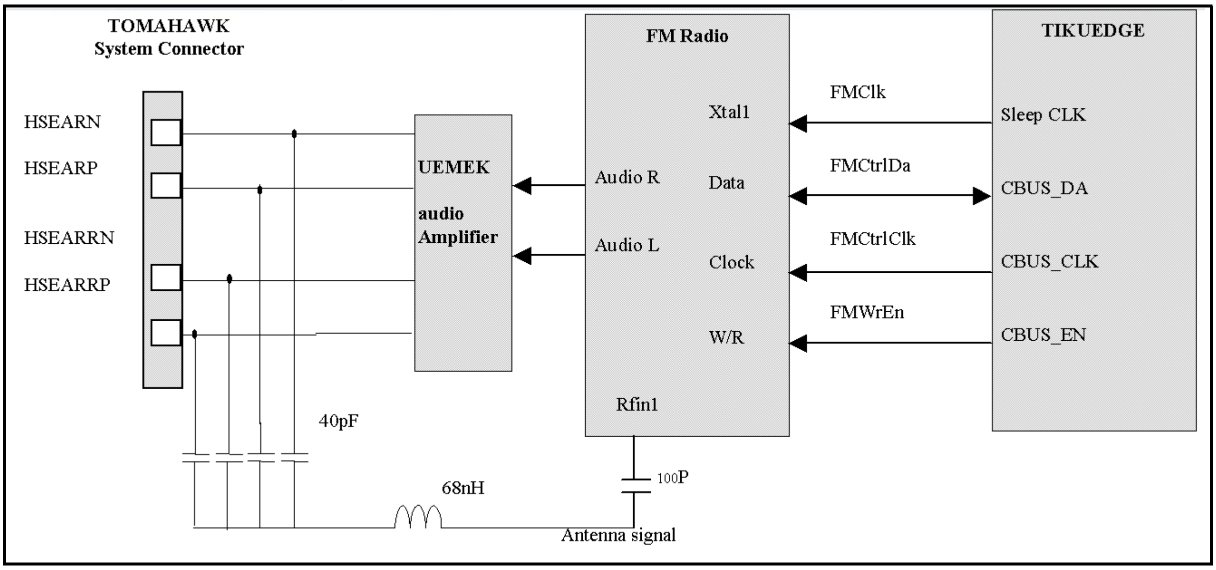

Figure 12: FM Radio (N356), Audio (N150), antenna, and digital interface connections

FM Radio Test

To hear the FM radio, you first connect headset to Pop-Part™ or UHJ ports because the headset will be an FM radio antenna. And you have to connect headset to UHJ port to control the FM radio by using Phoenix. But if you connect a headset (such as HDS-3) to Pop-Part™ connector, then you can't control the phone because you've already occupied the connection port (Pop-Part™), so in this case you have to have jumper wires on production test points (Fbus Tx/RX,GND).

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 and VAFL
- If 6 is not correct, then Check FM radio chip for shorts, voids, and misalignments

- If 6 is correct, then Check EUMEK for shorts, voids, and misalignments
- If UEMEK and FM Radio Chip is correct, then check system connector

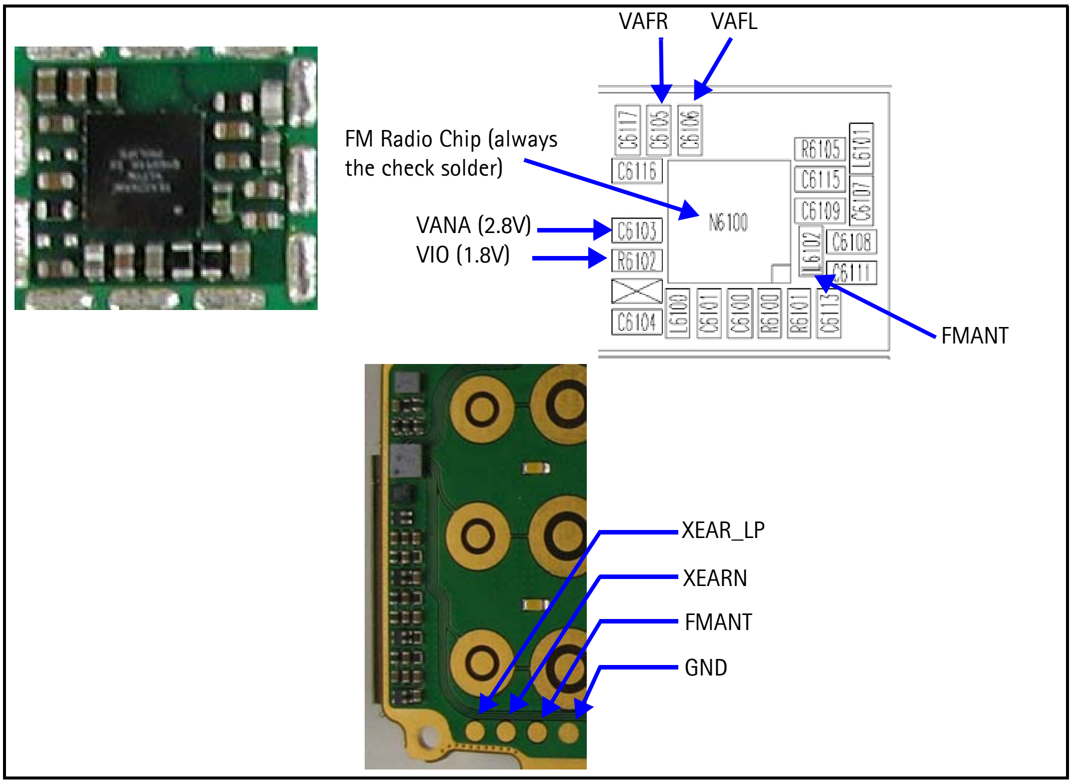

Figure 13: FM Radio Chip and Antenna

FM Radio Phoenix Interface

Checks for the FM radio that you can do with Phoenix include:

- Verify FM radio is working by connecting Headset to UHJ
- Turn on FM radio
- Set frequency and volume
- If FM radio is working then, retest on FinalUI

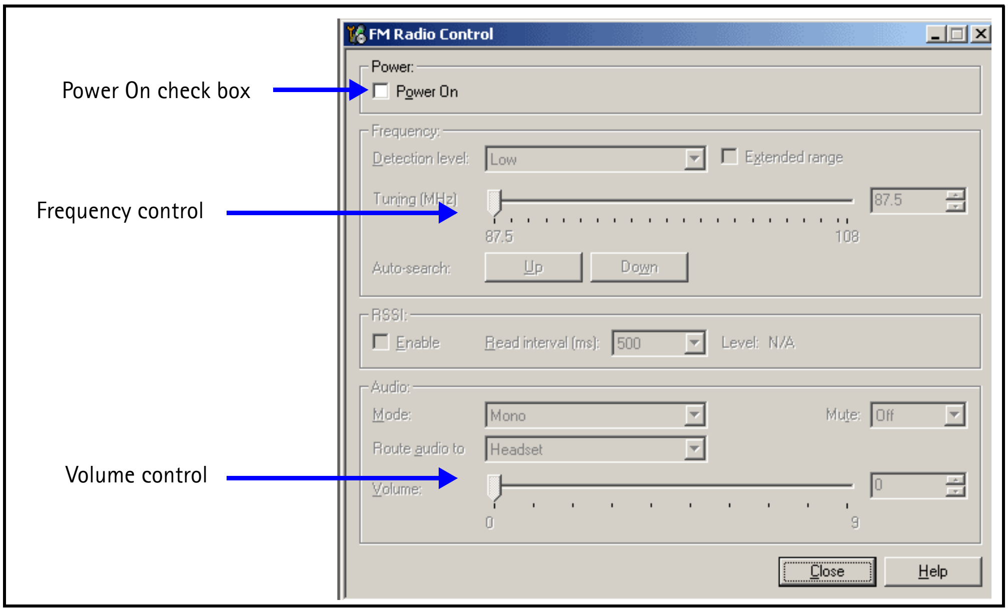

Figure 14: Phoenix FM Radio Control panel

USB (Universal Serial Bus)

How USB Interface Works

When Phone connects to a computer using a DKU-2 data cable the computer will provide Vbus (5V) to and pull down D+ a,d D – lines. The phone will respond by pulling the D+ line high. The computer acknowledges and start transferring data at 12Mbits/sec.

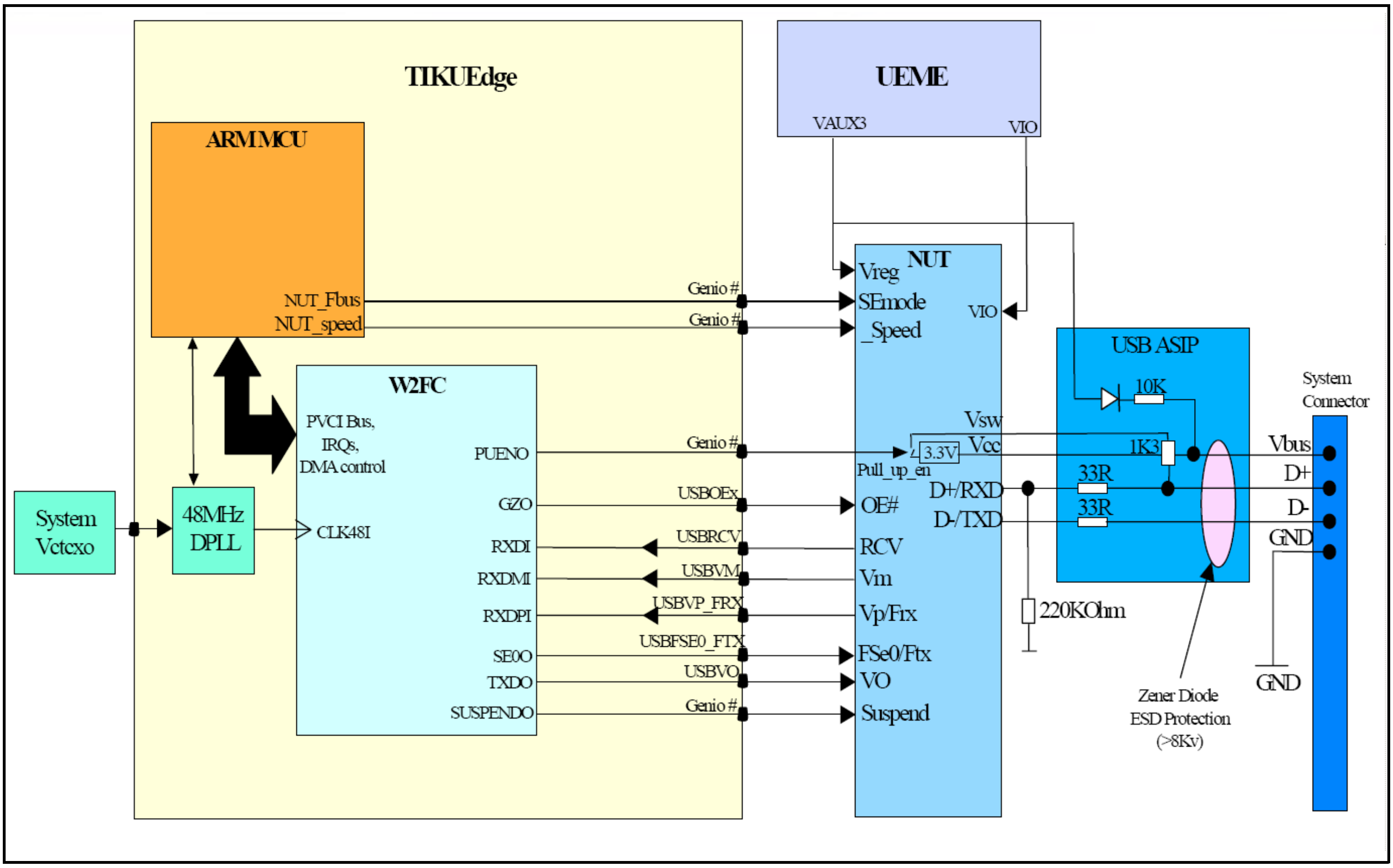

Figure 15: USB interface block diagram

USB Troubleshooting

First connect phone to computer using a DKU-2 data cable. Check under device manager to see if the computer recognizes the phone as a USB device. If the phone is recognizes, there is no hardware fault and you can stop troubleshooting.

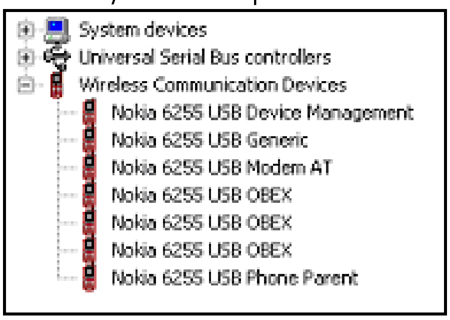

Figure 16: PC Device Manager

When troubleshooting UPS, make these common checks (see Figure 29 and Figure 30):

- Perform visual inspection on Pop-Part™ connector, ESD Protection, NUT Chip, and caps and Inductors

- Check Vout, Vflash1, and ACI Line. If not correct, check UEMEK under X-ray or change part.
- Check for activity on the USB D+ and USB D – lines, if nothing check D2800 under X-ray or change part.

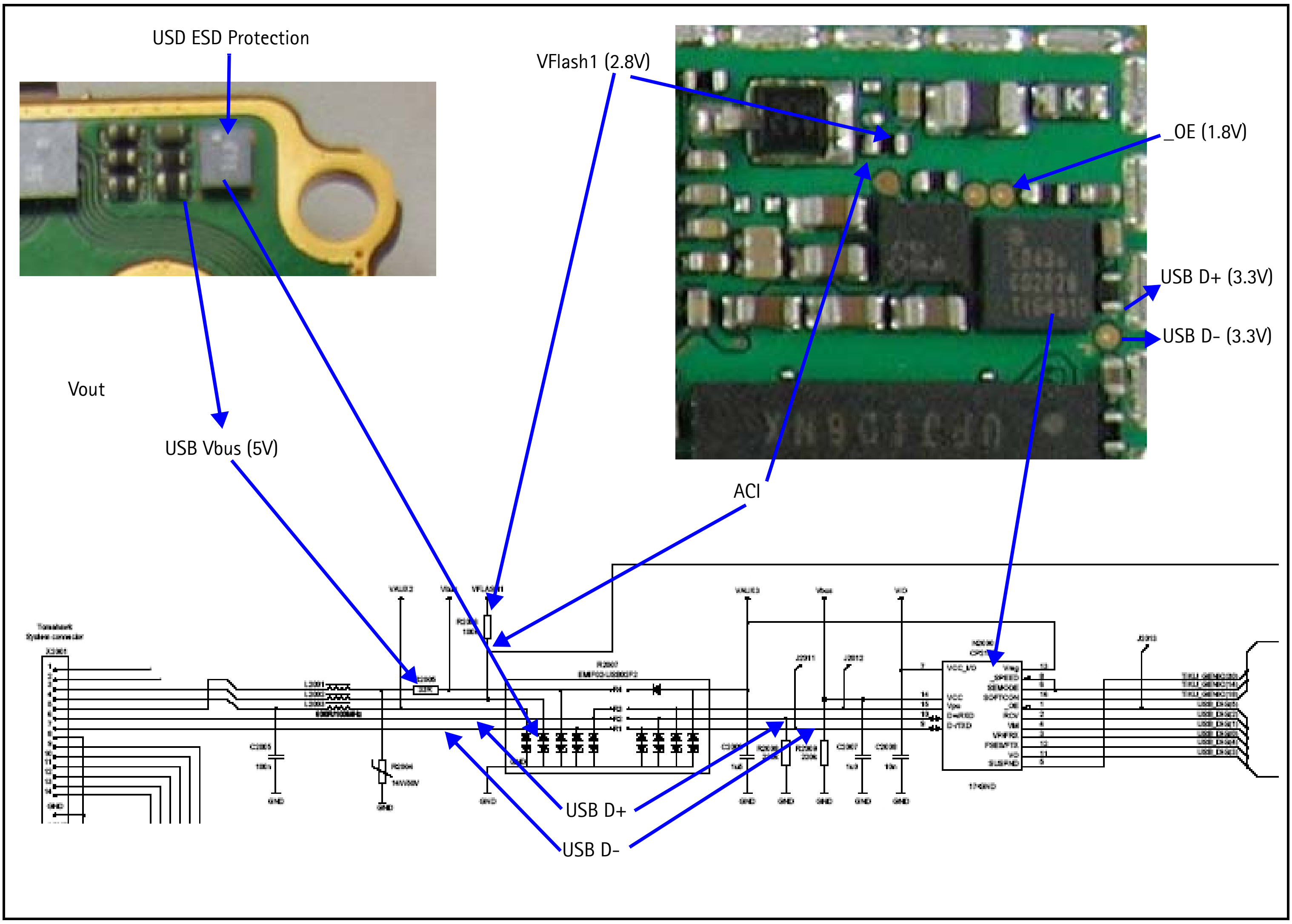

Figure 17: USB Chip and Diagram

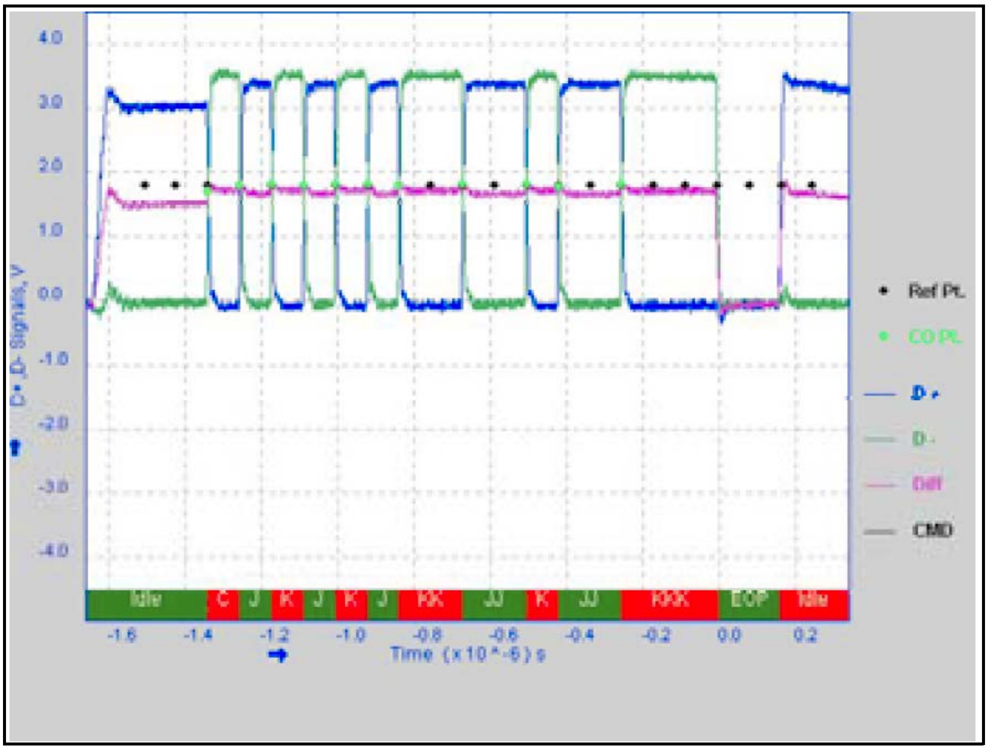

Figure 18: USB Vout

USB Phoenix Interface

Run the USB Tests in Phoenix to check the USB functionality:

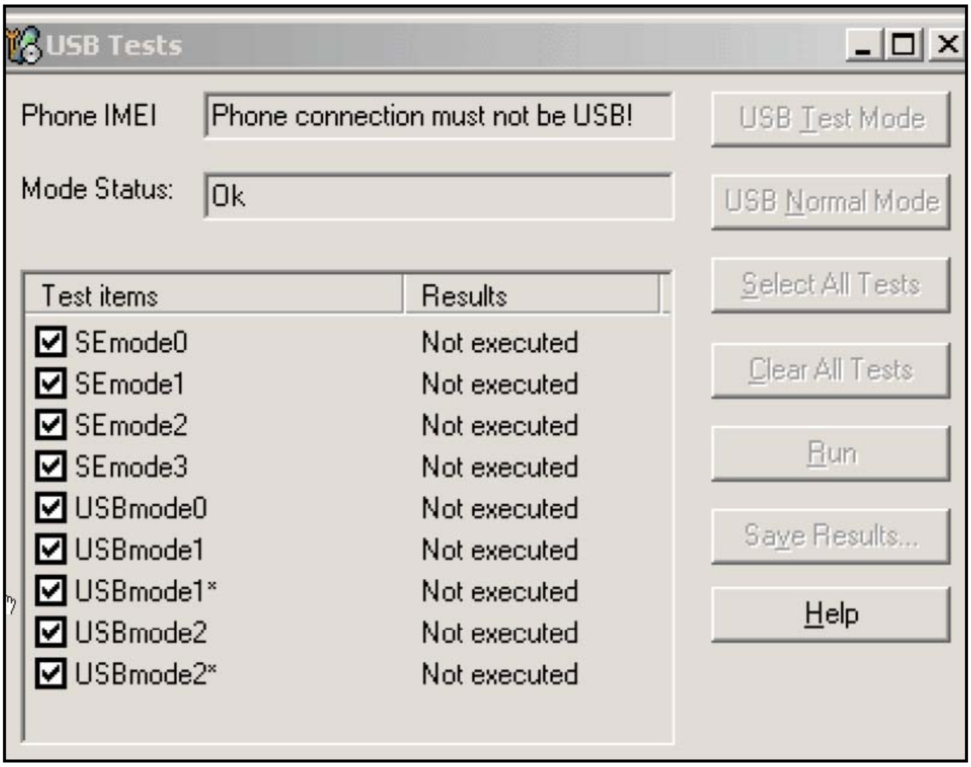

Figure 19: USB Phoenix Interface

Display

How the Display Works

Nokia 6235/6235i/6236i has a large 128 x 128 display with 65,536, that D2800 controls through a serial interface and UEMEK powers using VIO and VFlash1.

Figure 20: Nokia 6235/6235i/6236i Display

Display Troubleshooting

When troubleshooting the display, make these common checks (see Figure 21):

- Check display is connected properly and is making good contact. If not correct, try replacing the LCD.
- Check the Power Supply VIO and VFlash1. If not correct, check UEMEK.
- Check activity on the LCD test points. If no activity, check or replace D2800.

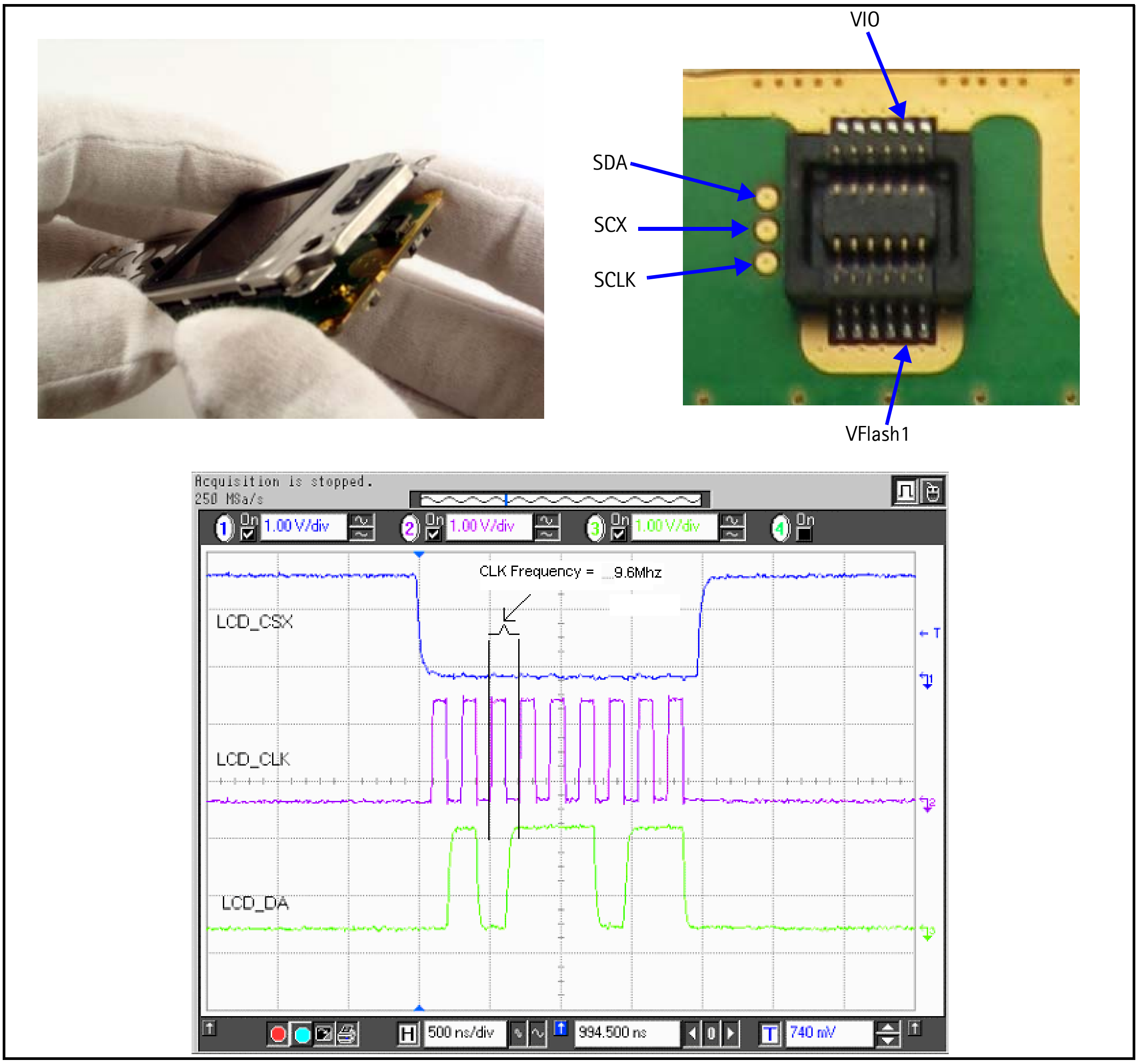

Figure 21: Display Chips and Frequency

Display Backlight Troubleshooting

When troubleshooting the display backlight, make these common checks (see Figure 29 and Figure 30):

- Perform visual inspection of LCD connector and LED Driver circuitry
- If display backlight is not turning on, check VLED +(~10V) and VLED – (~.5V) on display connector.
- If there, then you can assume the driver is working properly and the LED inside the display might be bad. Try changing display.
- Check VLED + and VLED – on Display Driver circuitry.
- Check Dlight is enable high (~4V). If not correct, check UEMEK.

- Check Rset (33 Ohms)
- Check Vbat(~4V) and Vin(~4V) are present. If not, check power supply connection.

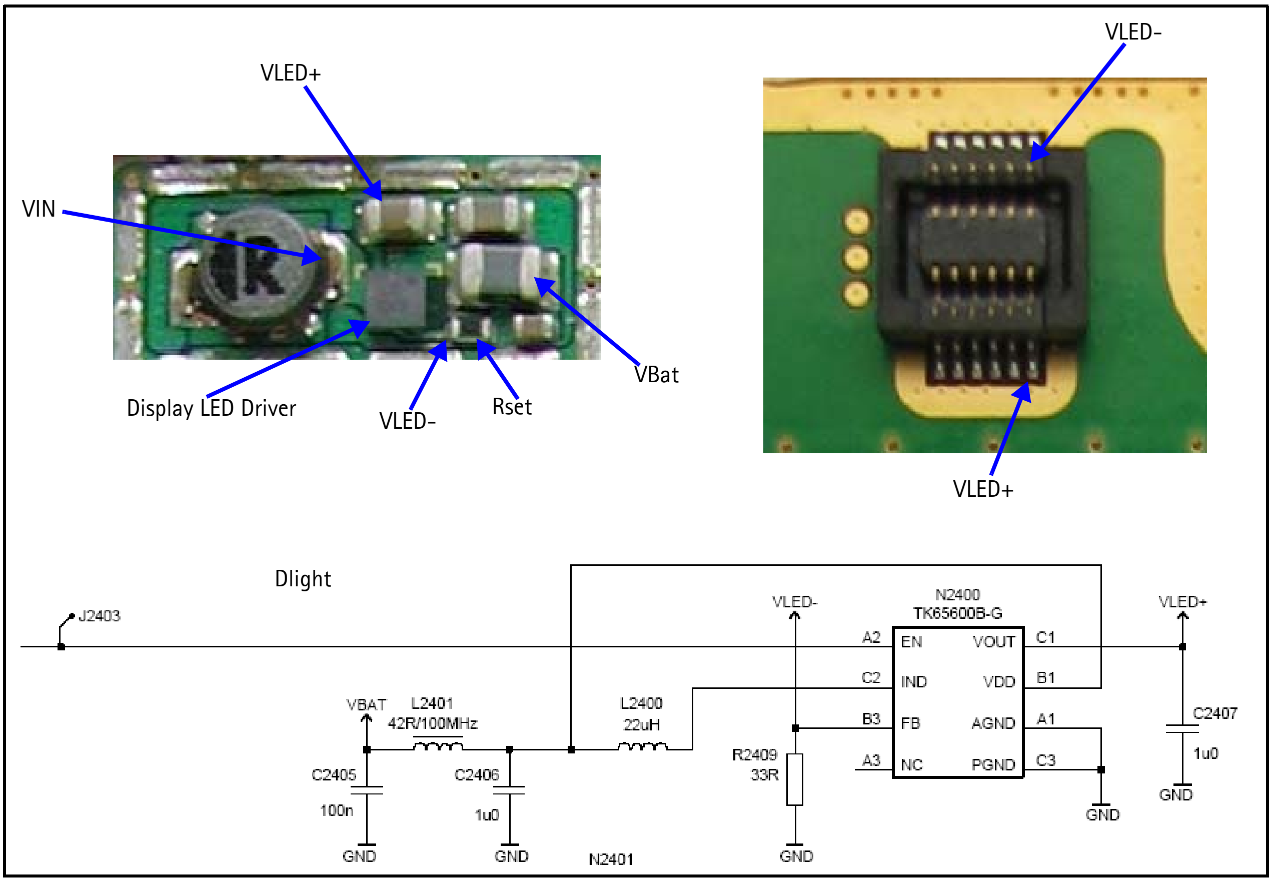

Figure 22: Display Backlight Chip and Diagram

Display Phoenix Interface

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

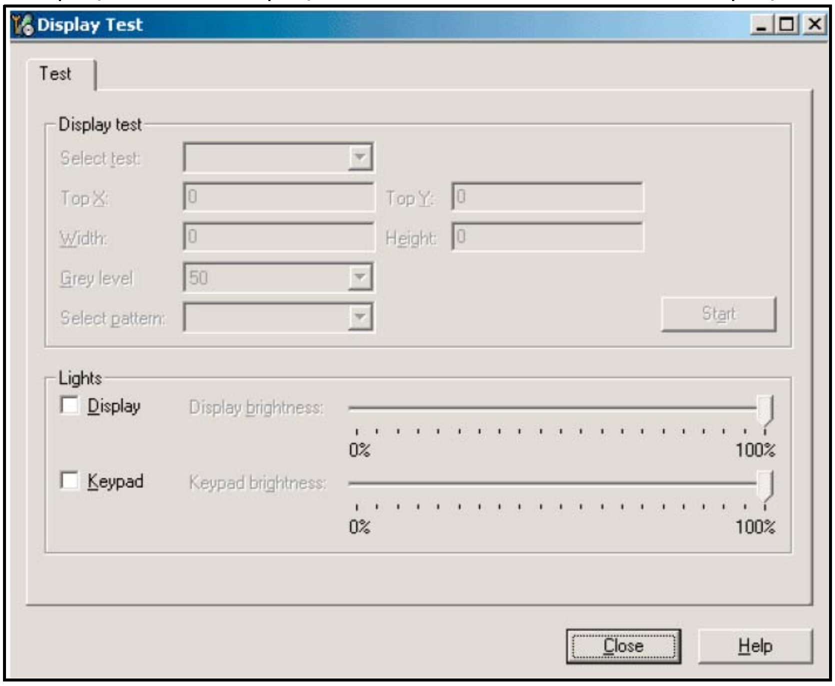

Figure 23: Phoenix Display Test option

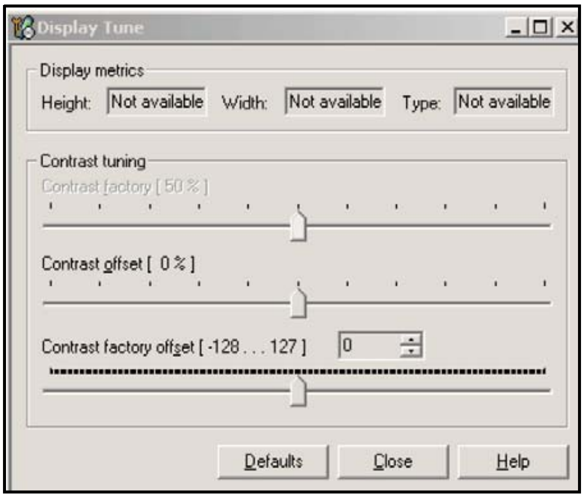

Figure 24: Phoenix Display Tune option

Keypad Backlight

How the Keypad Backlight Works

Klight coming out of UEMEK controls the keypad backlight LED's. Dlight enables the LED driver, which is a constant current supply for all the keypad LED in parallel. The current is set for all the branches by Rset which in this case is 12k Ohms and equates to 10mA through each LED.

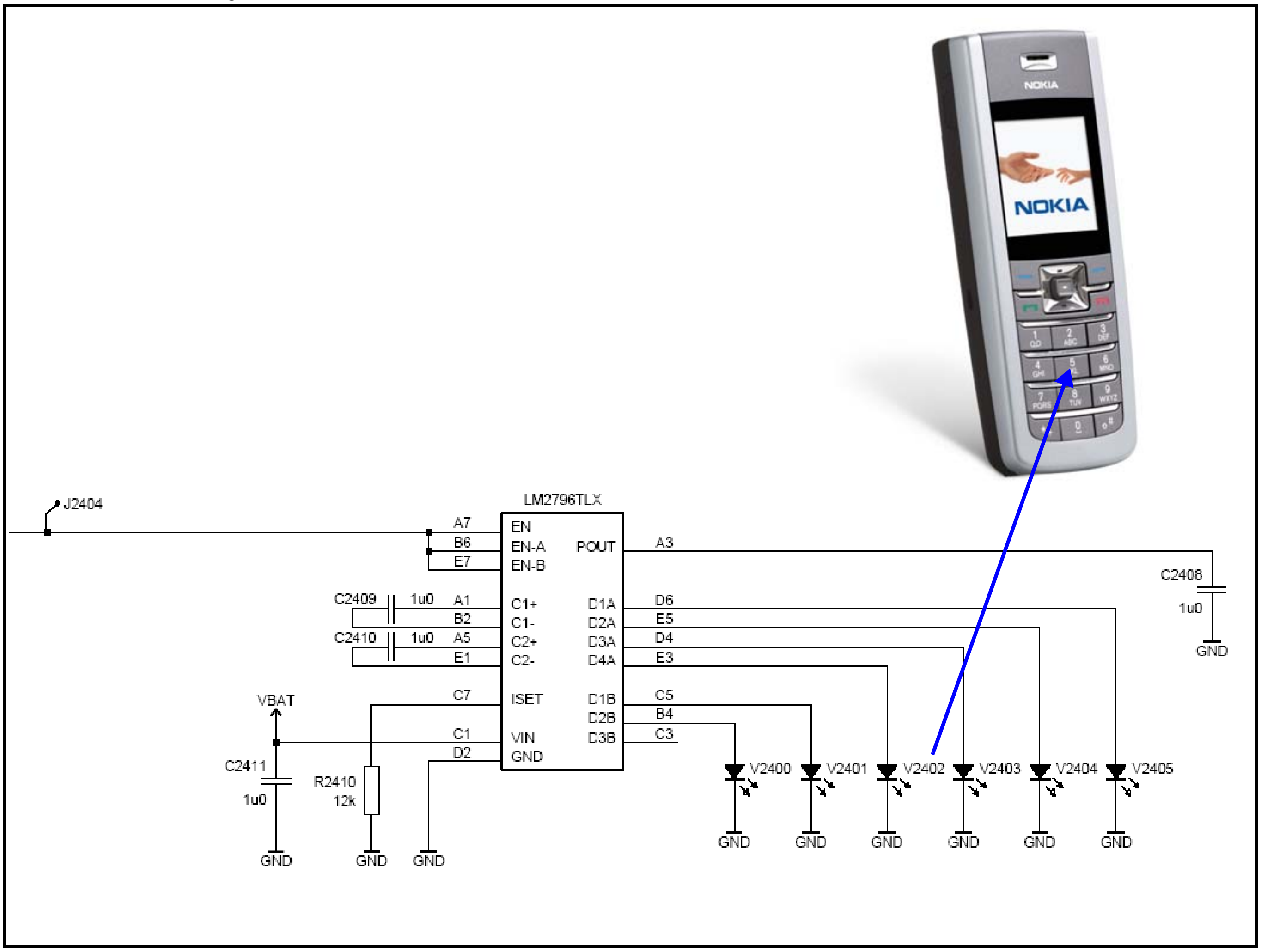

Figure 25: Keypad Backlight Diagram

Keypad Backlight Troubleshooting

When troubleshooting keypad backlight, make these common checks (see Figure 29 and Figure 30):

- Performed visual inspection of all the components including LED's
- Check Vbat to make sure Driver has power
- Check Klight to make sure driver is enable by UEMEK. If not correct, check UEMEK
- If light are too dim or too bright, check Rset. Rset controls the current going through the LED's.
- Check Vout to make sure LED's are getting power, if still not working change LED. Make sure LED orientation is correct.

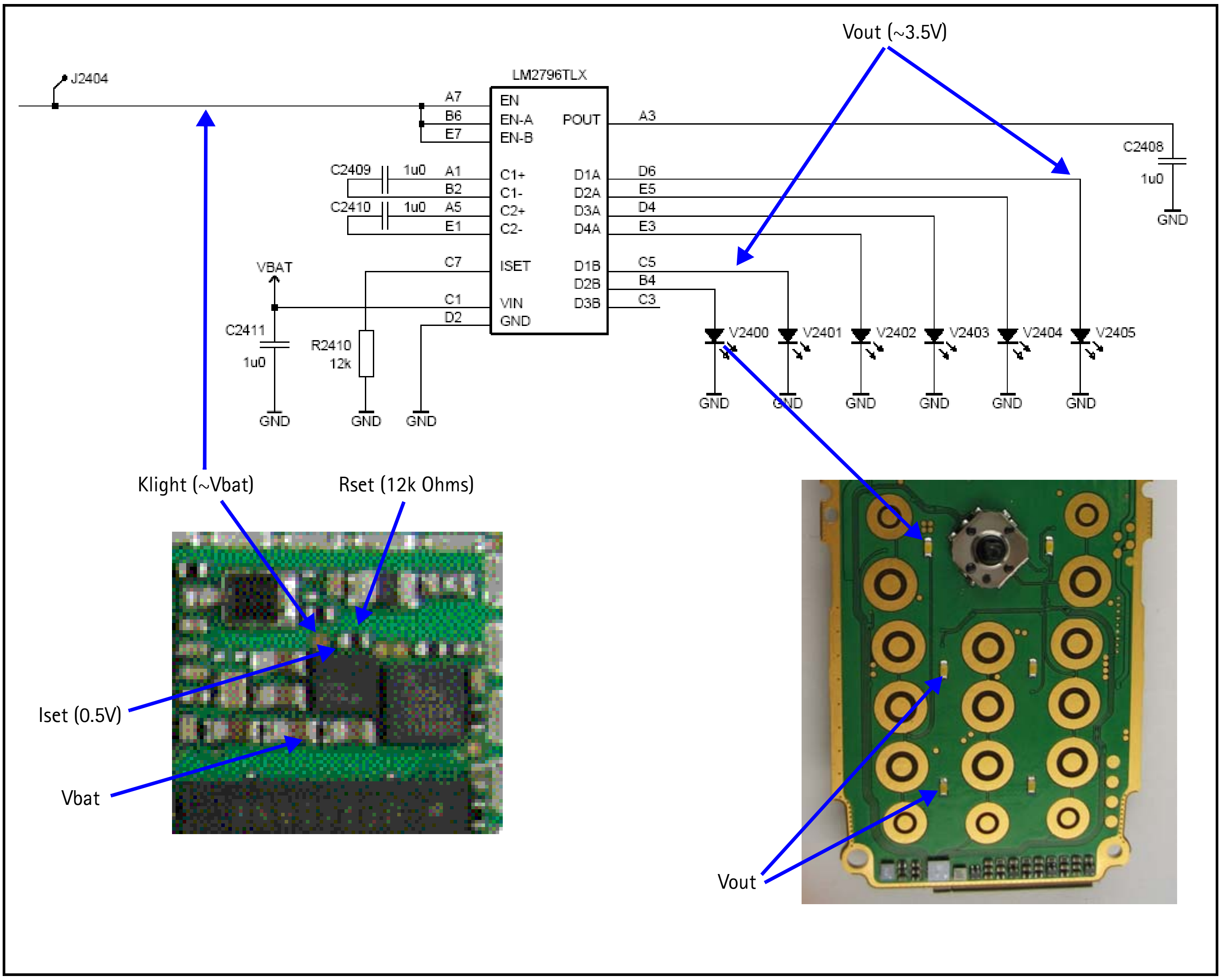

Figure 26: Keypad Backlight Chip and Diagram

Keypad Backlight Display Phoenix Interface

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

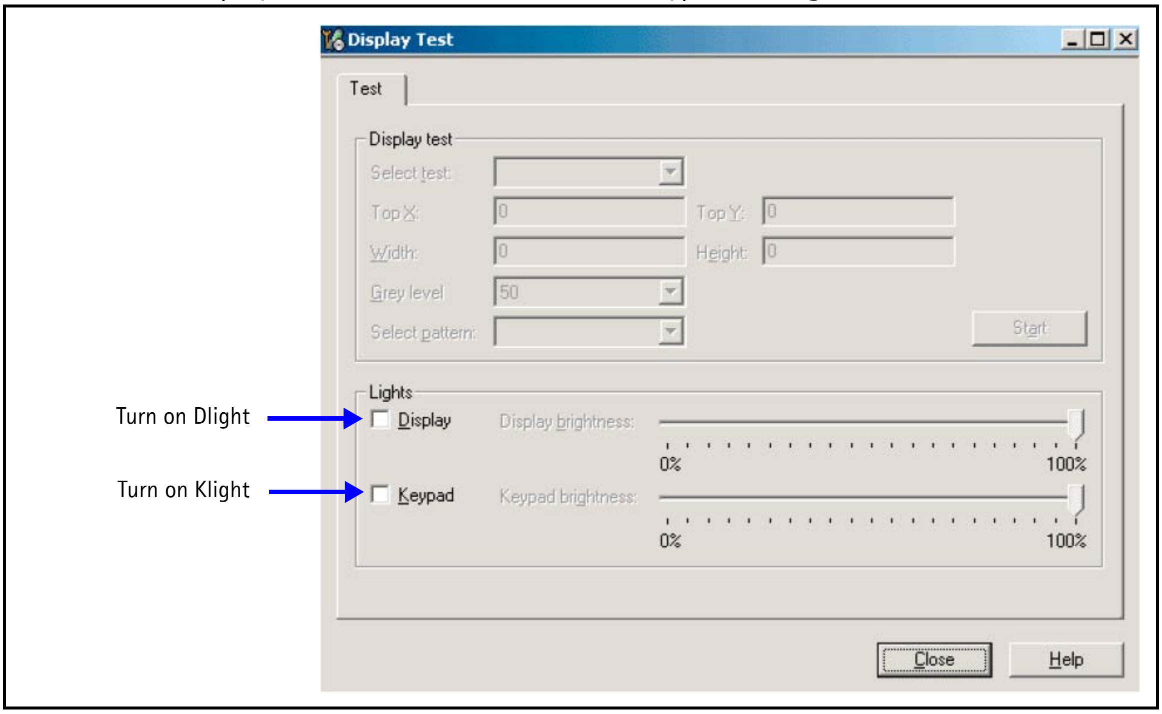

Figure 27: Phoenix Display Test option

GPS

How GPS Works

This is a 911 GPS service only. This means that when you dial 911, the GPS turns on by using Vcore from the external DC-DC and VIO from UEMEK. GPS communicates with D2800 using the UART interface. This turns on the BB chip and the RF chip. They synchronize with the phone using the 19.2Mhz clock. The phone locates the closest satellite and downloads the location coordinates to send them to the Emergency desk.

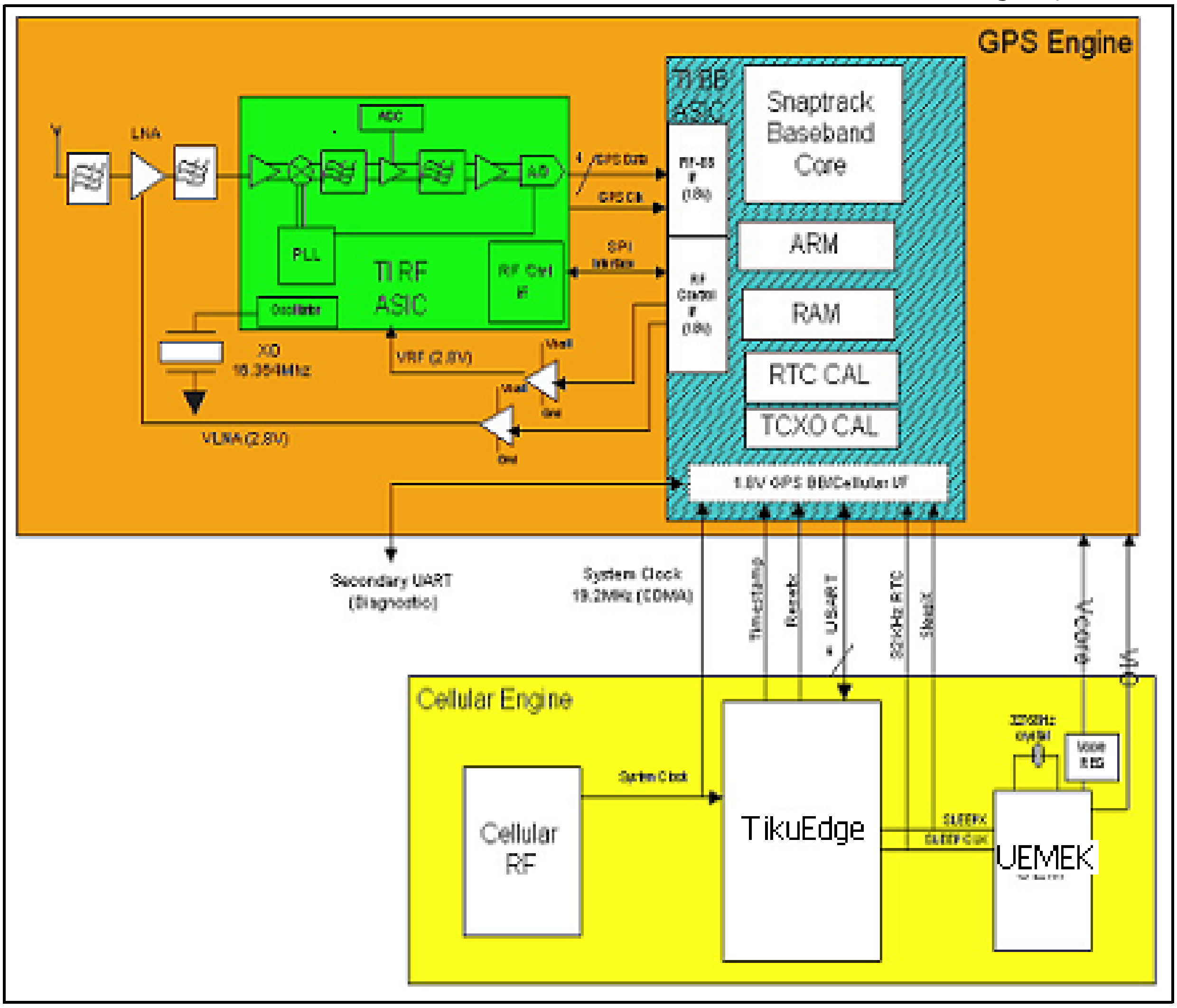

Figure 28: GPS Block Diagram

GPS Troubleshooting

When troubleshooting GPS, make these common checks (see Figure 29 and Figure 30):

- Check the Power Vcore and VIO
- Check that GPS_RF_CLk = 19.2Mhz
- Check the GPS_EN_Reset
- Check that Sleep_CLK = 32.768kHz
- Check that VRF_GPS = 2.78
- Check that the GPS clock = 16.384Mhz
- Run Test Mode 1 on Phoenix
- Check USART activity
- Check SPI activity

- Check RF Data and Clk activity

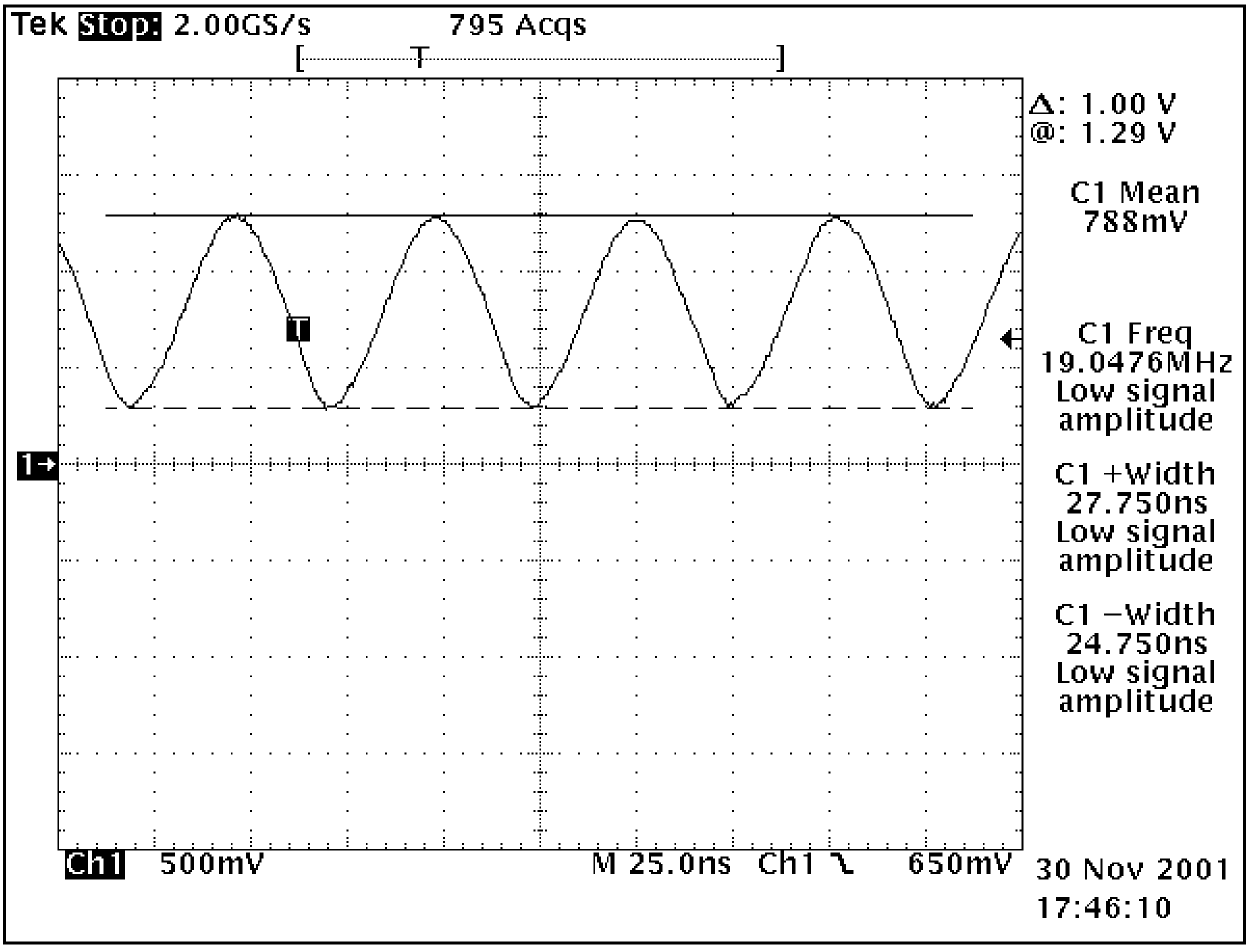

Figure 29: GPS Power VCore or VIO

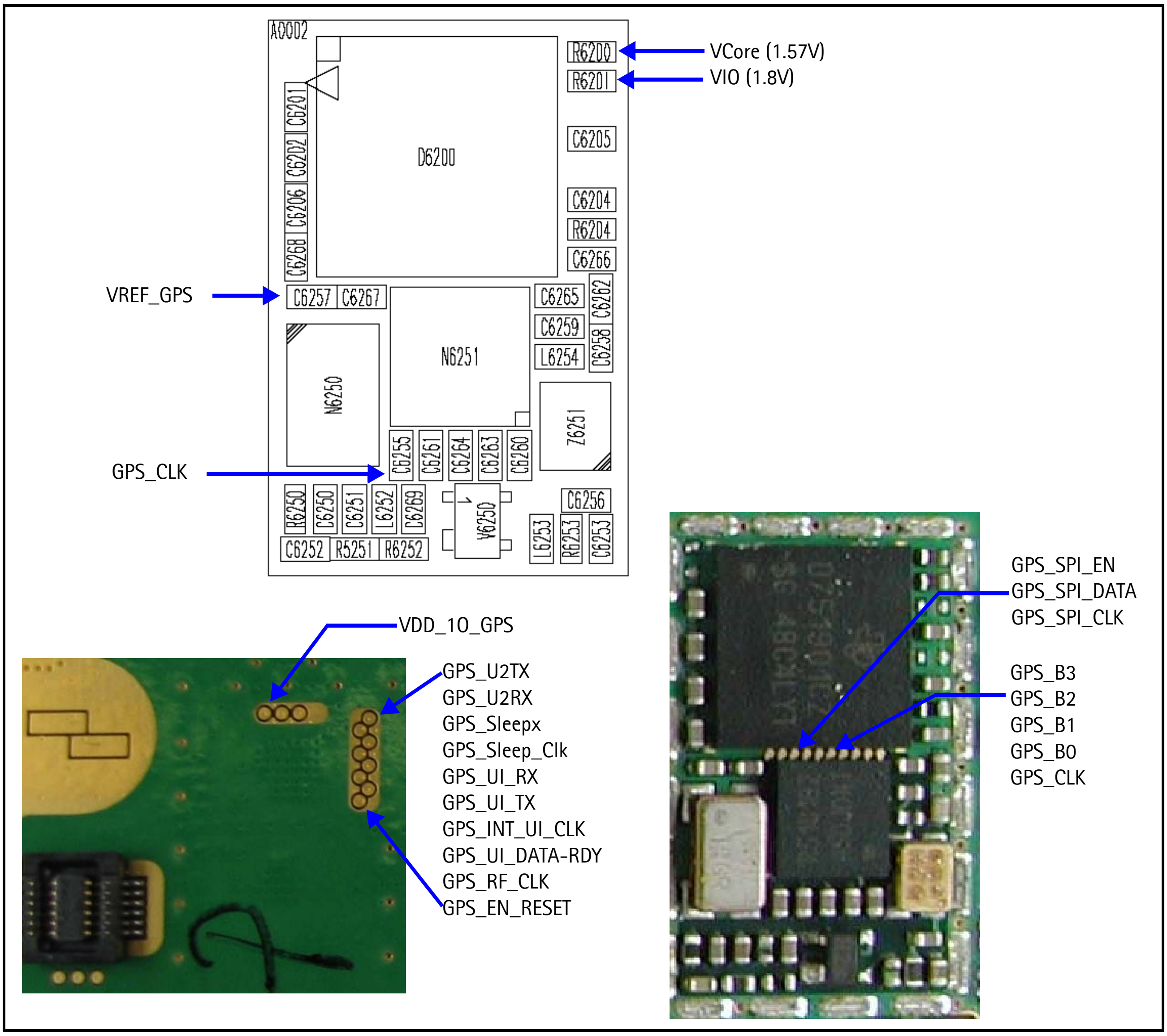

Figure 30: GPS Chip

GPS Phoenix Interface

Run the GPS Quick Test in Phoenix to check the GPS BB.

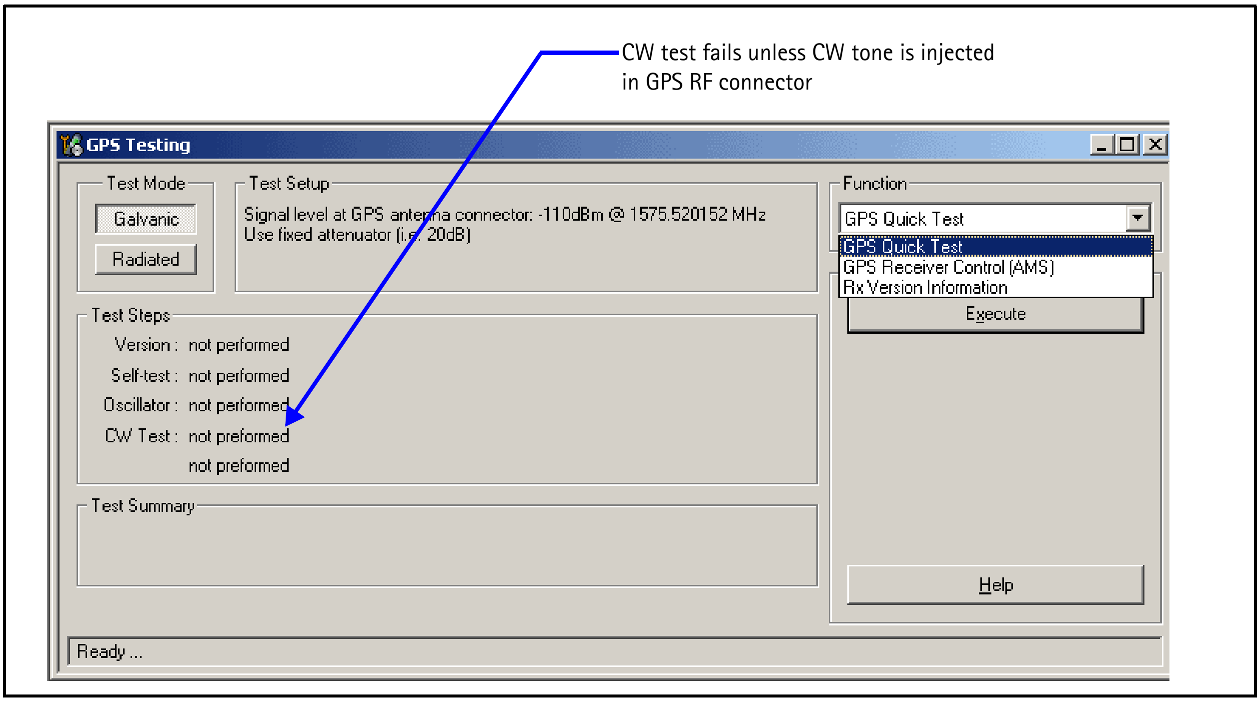

Figure 31: Phoenix GPS Testing option

SIM Card

How SIM Card Works

Nokia 6235/6235i/6236i supports two types of SIM cards that work at 1.8V and 3.0V. When you power up your phone with a SIM card, D2800 sends a 1.8V signal to the SIM card and waits for the SIM card's response and identification. After a wait period, if there is no answer from the SIM card, the phone will send another signal at 1.8V. In this case

UEMEK acts as a level shifter and raises the signal to 3.0V. If there is still no response, the phone does not allow access. If there is a response, then phone powers up.

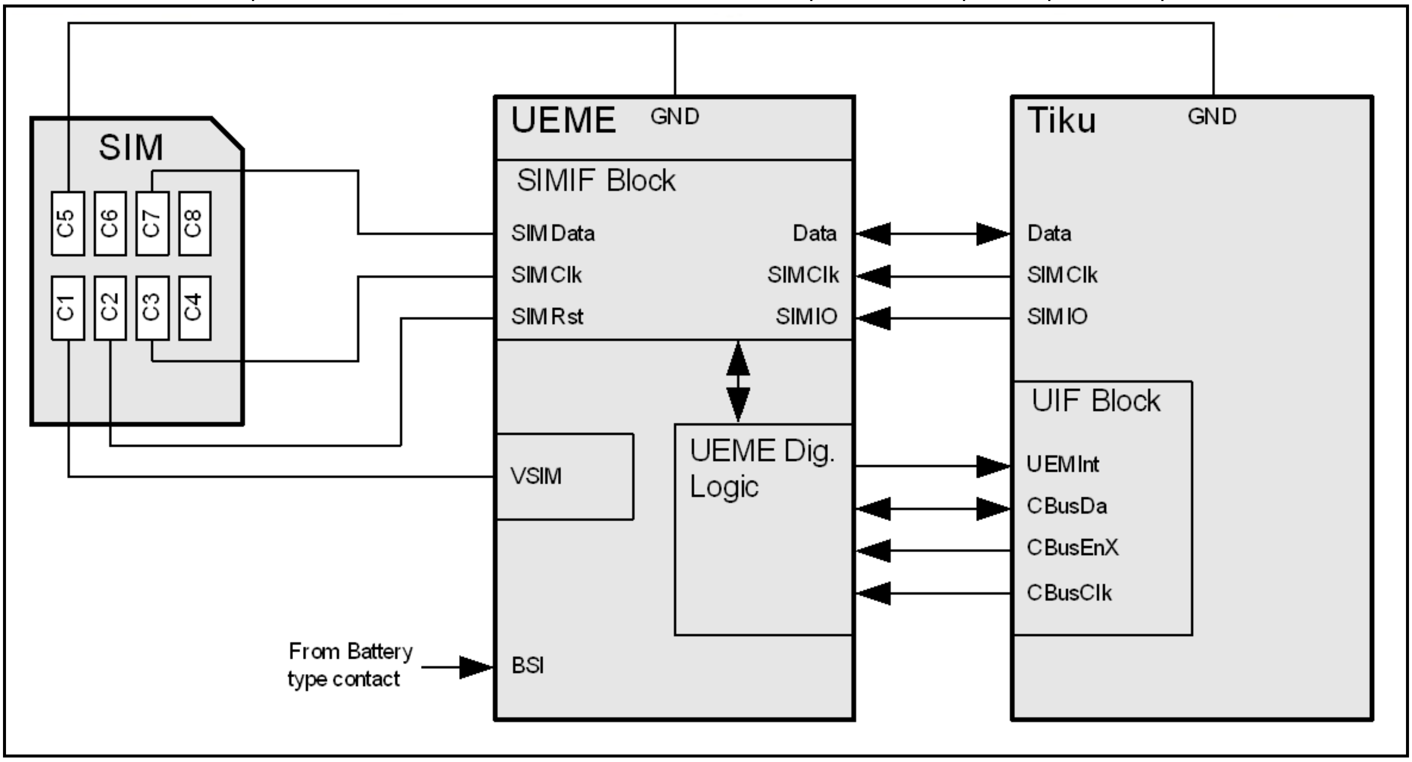

Figure 32: SIM Card Block Diagram

SIM Card Troubleshooting

When troubleshooting SIM cards, make these common checks (see Figure 29 and Figure 30):

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

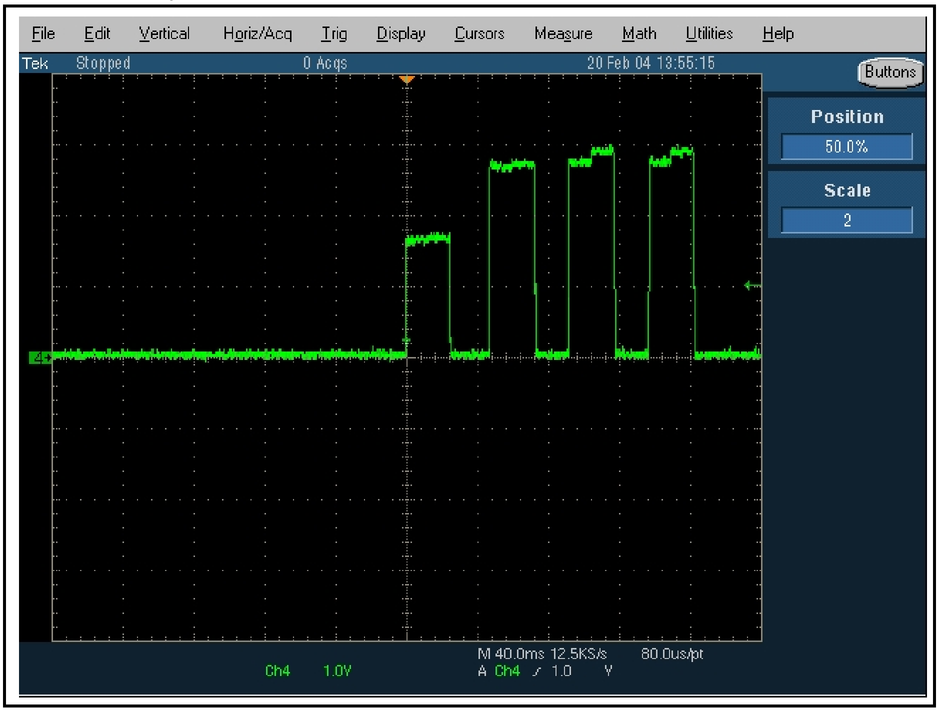

Figure 33: Vsim check

- Check Detection sequence

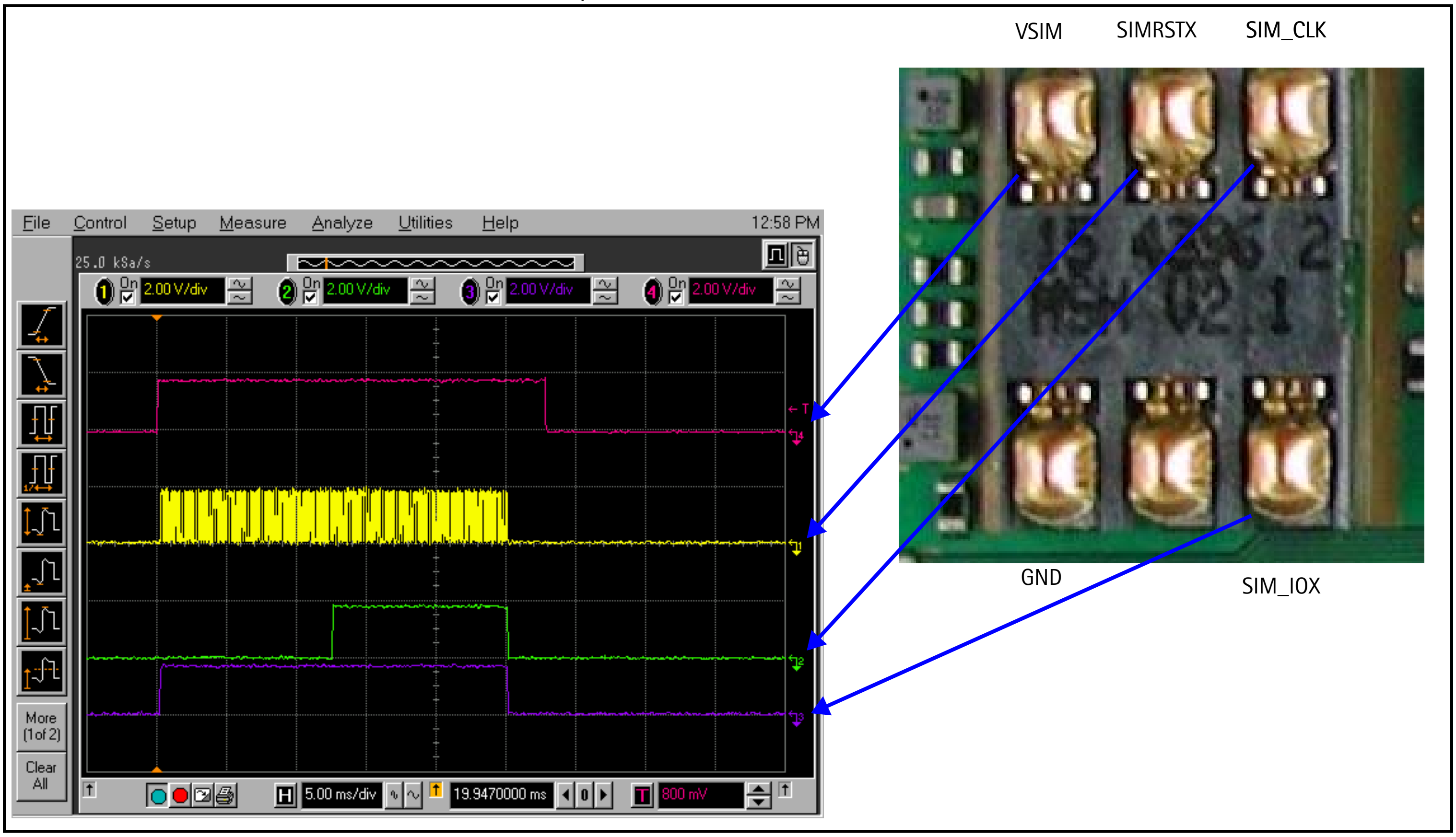

Figure 34: Detection sequence

- Verify communication signals

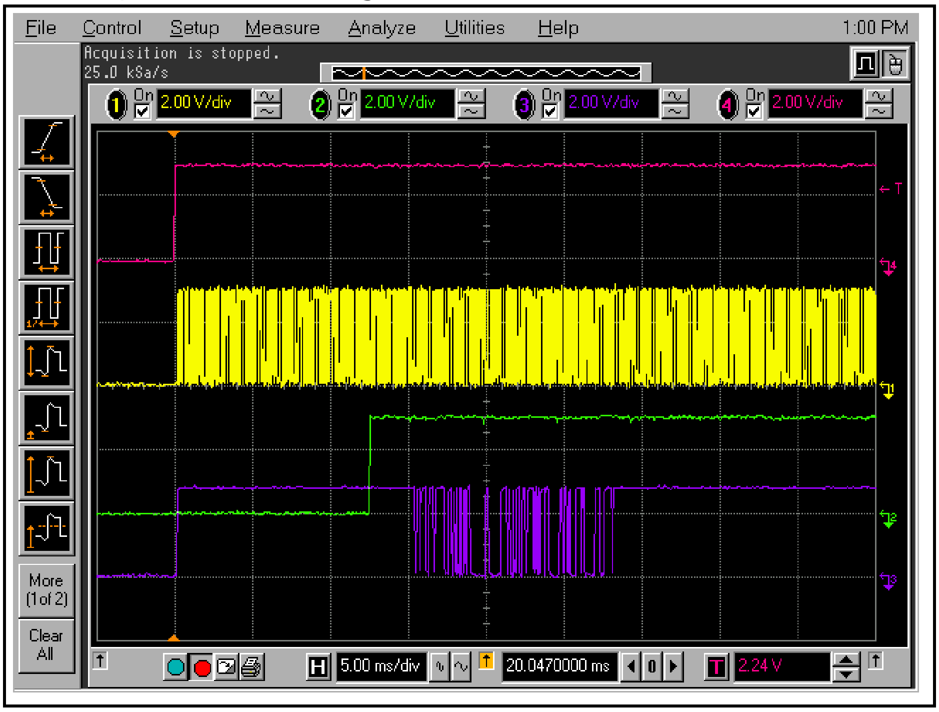

Figure 35: Commuication signals

- If no signals are present: (1) check contacts on Sim Connector are correct, (2) check ESD Chips are correct, and (3) check UEMEK are correct. Replace damaged parts, if necessary.

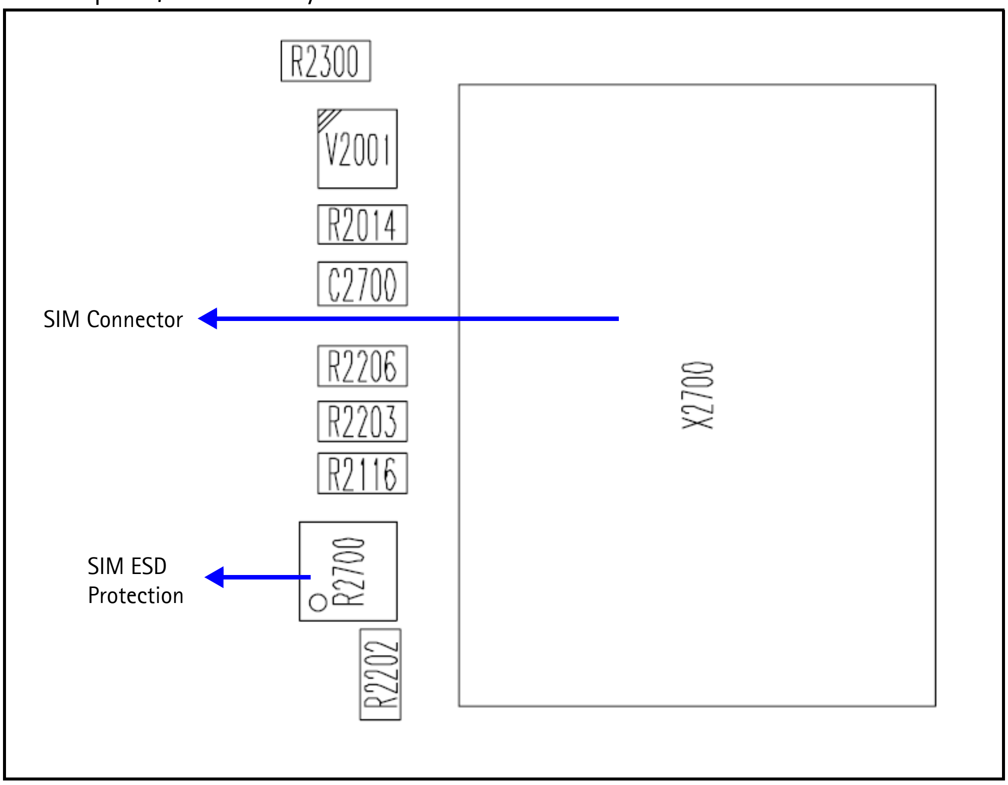

Figure 36: Vsim check

Sim Card Phoenix Interface

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

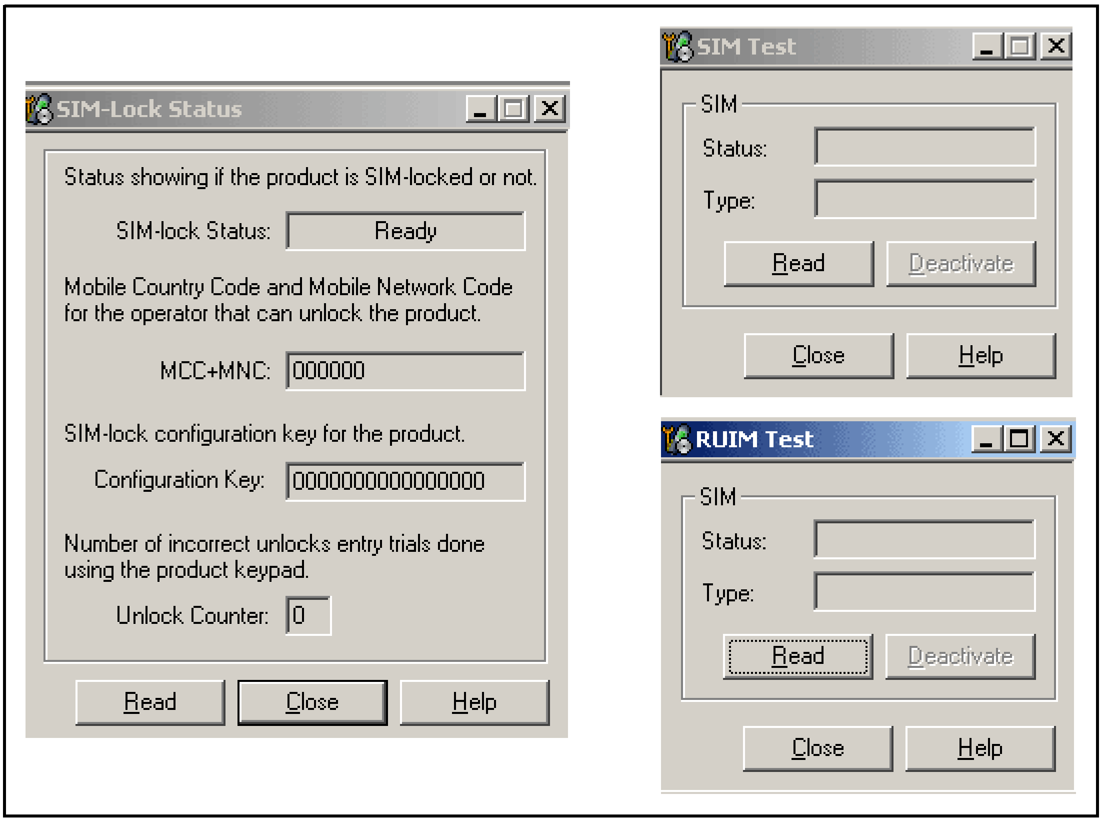

Figure 37: Phoenix SIM Testing options

Infrared

How Infrared Works

D2800 enables the infrared (IR) module by switching high GenIO (23). The UEMEK provides two power supplies to the infrared module: VIO for digital Logic and Vflash1 for infrared supply. The Vbat powers up the IR LED. This interface receives data from and transmits data to peripheral equipment through the IrRX and IrTX line.

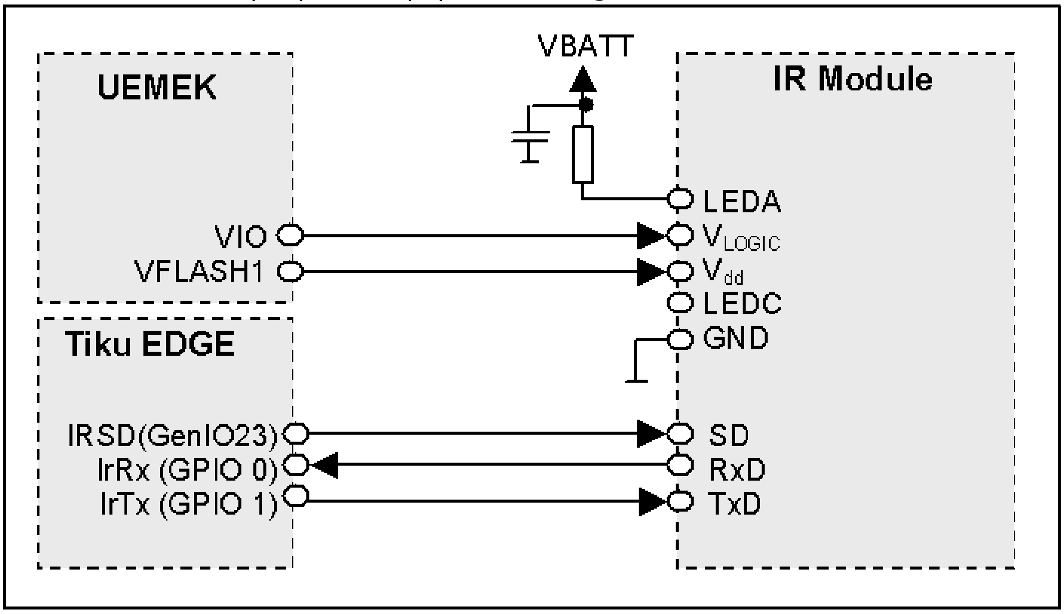

Figure 38: Infrared Block Diagram

Infrared Troubleshooting

When troubleshooting infrared, make these common checks (see Figure 39):

- Performed a good visual inspection on infrared module and caps
- Check for power supplies VIO, Vflash1, and Vbat
- If VIO and VFlash1 is not correct, check UEMEK
- Check GenIO(23) is enable high
- Check for activity on IRTX and IRRX line,when transmitting or receiving
- If GenIO(23) or IRTX and IRRX are not working, check D2800

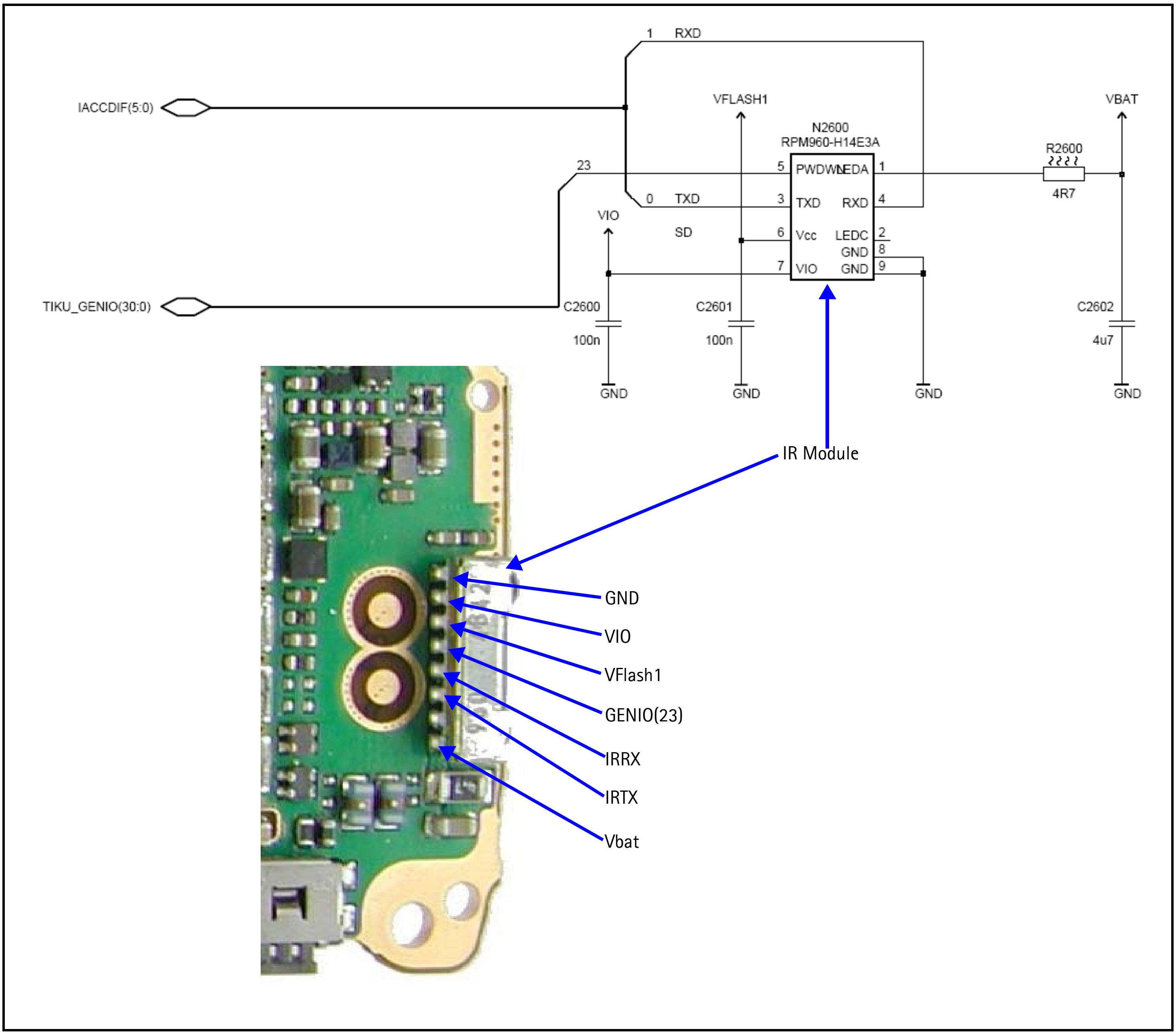

Figure 39: Infrared Chip and Diagram

Infrared Phoenix Interface

Run the IR Test in Phoenix to test infrared.

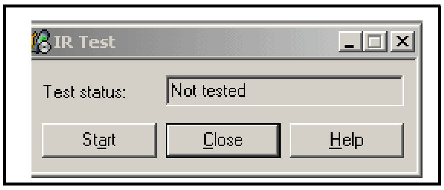

Figure 40: Phoenix IR Test options

System Connector

Figure 41 provides a mapping for the system connetor.

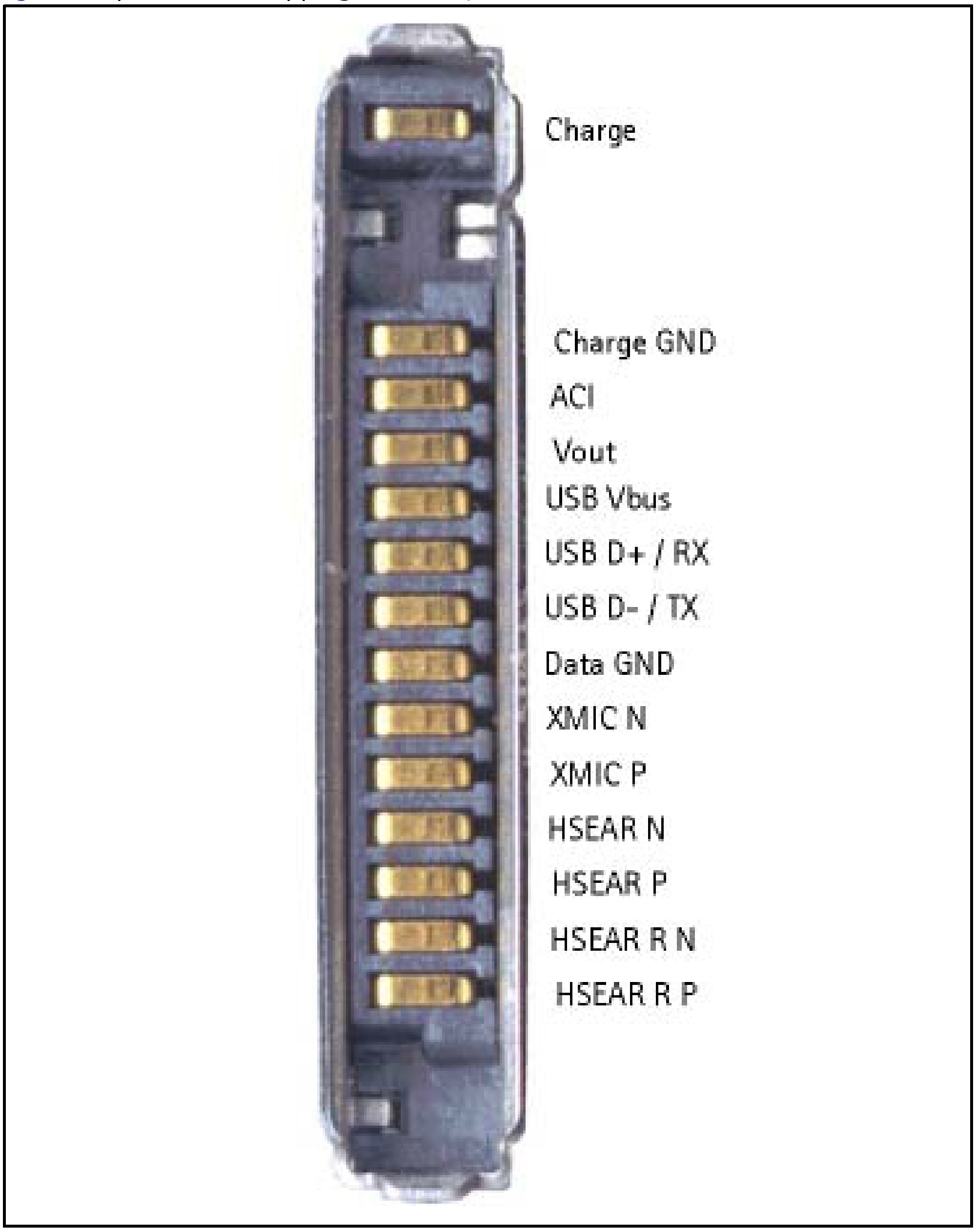

Figure 41: System Connector

Accessory Detection

Figure 42 provides a diagram that display how the phone detects accessories. Dummy accessories pull down to GND ACI Line. Smart accessories pull down ACI line with a 56K Ohm resistor allowing communication between accessory and UEMEK.

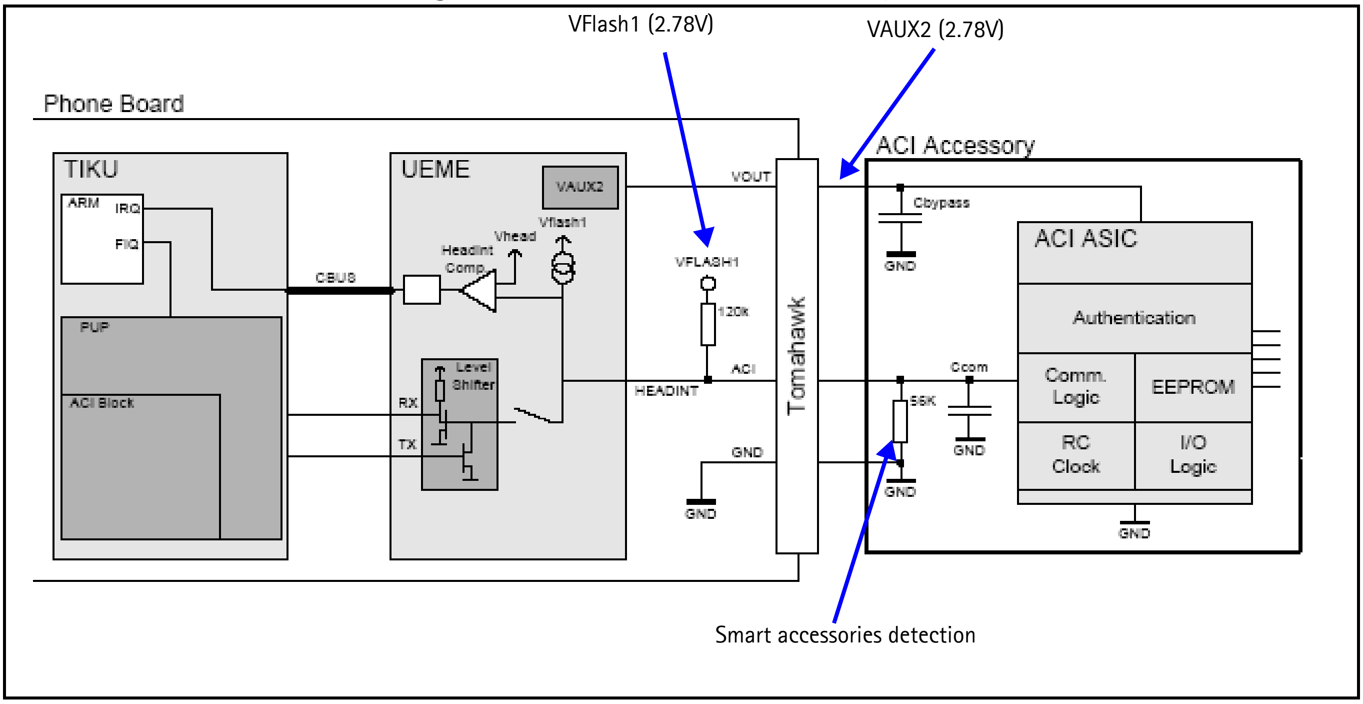

Figure 42: Accessory Detection Diagram

Battery (Lynx) Interface Circuit

Figure 43 provides a diagram of the battery interface circuit. The BSI voltage level for the normal mode is 1.23V, for the test mode is 170MV, and for the local mode is 90MV.

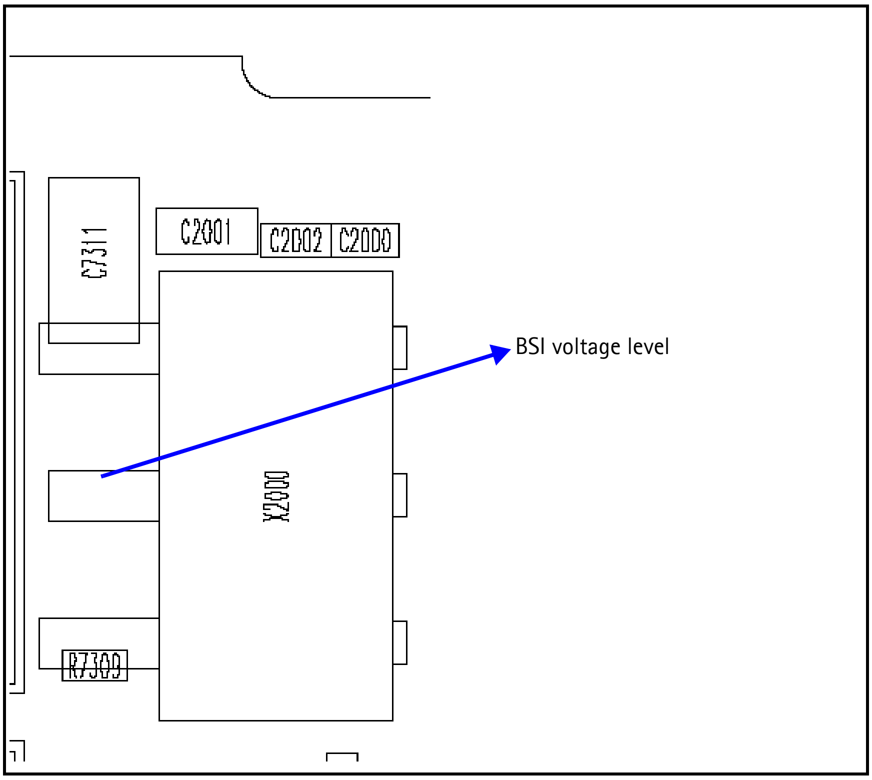

Figure 43: Battery Interface Circuit

PWB Overview

Bottom Board

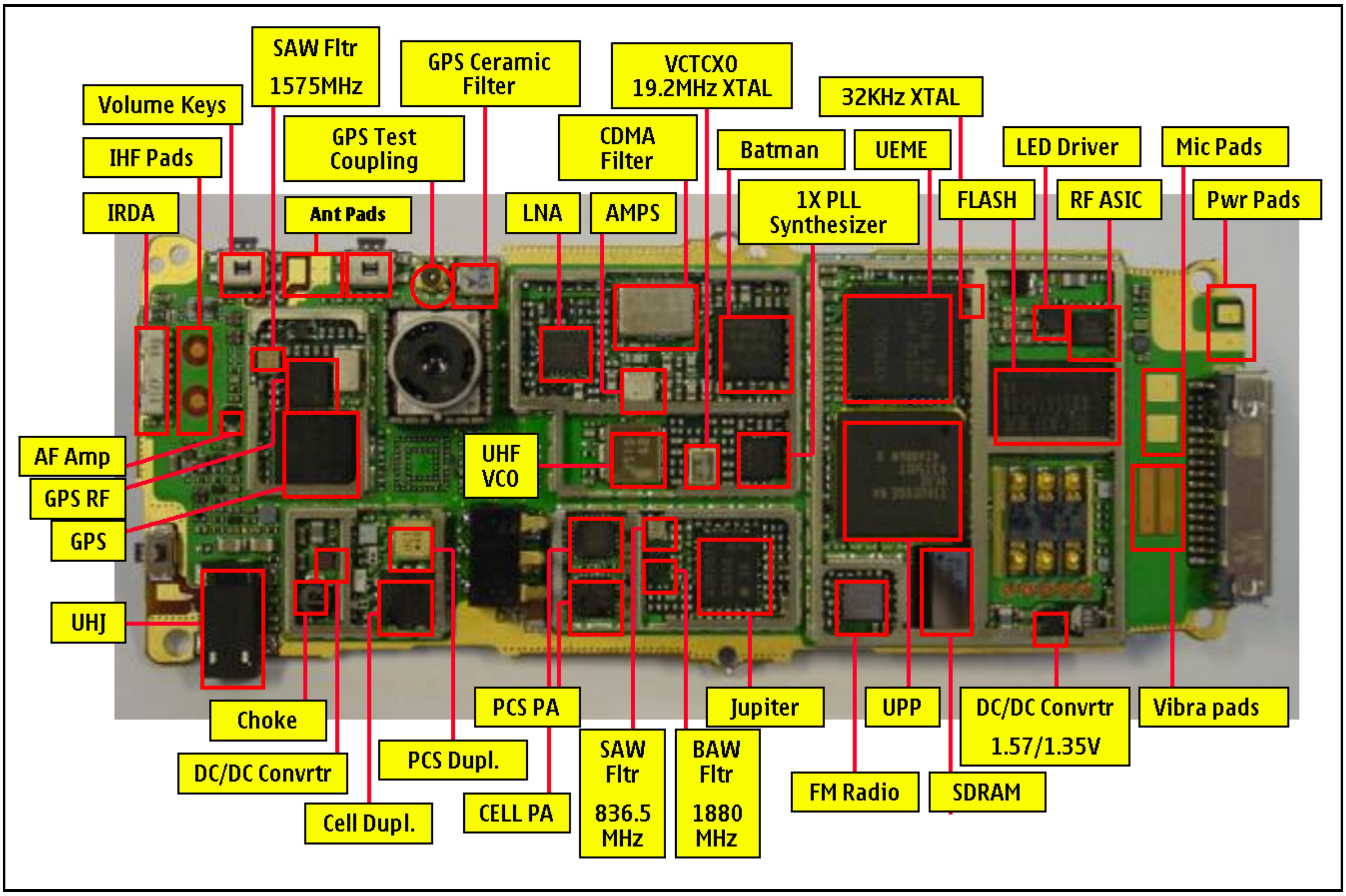

Figure 44: PWB – Bottom

Top Board

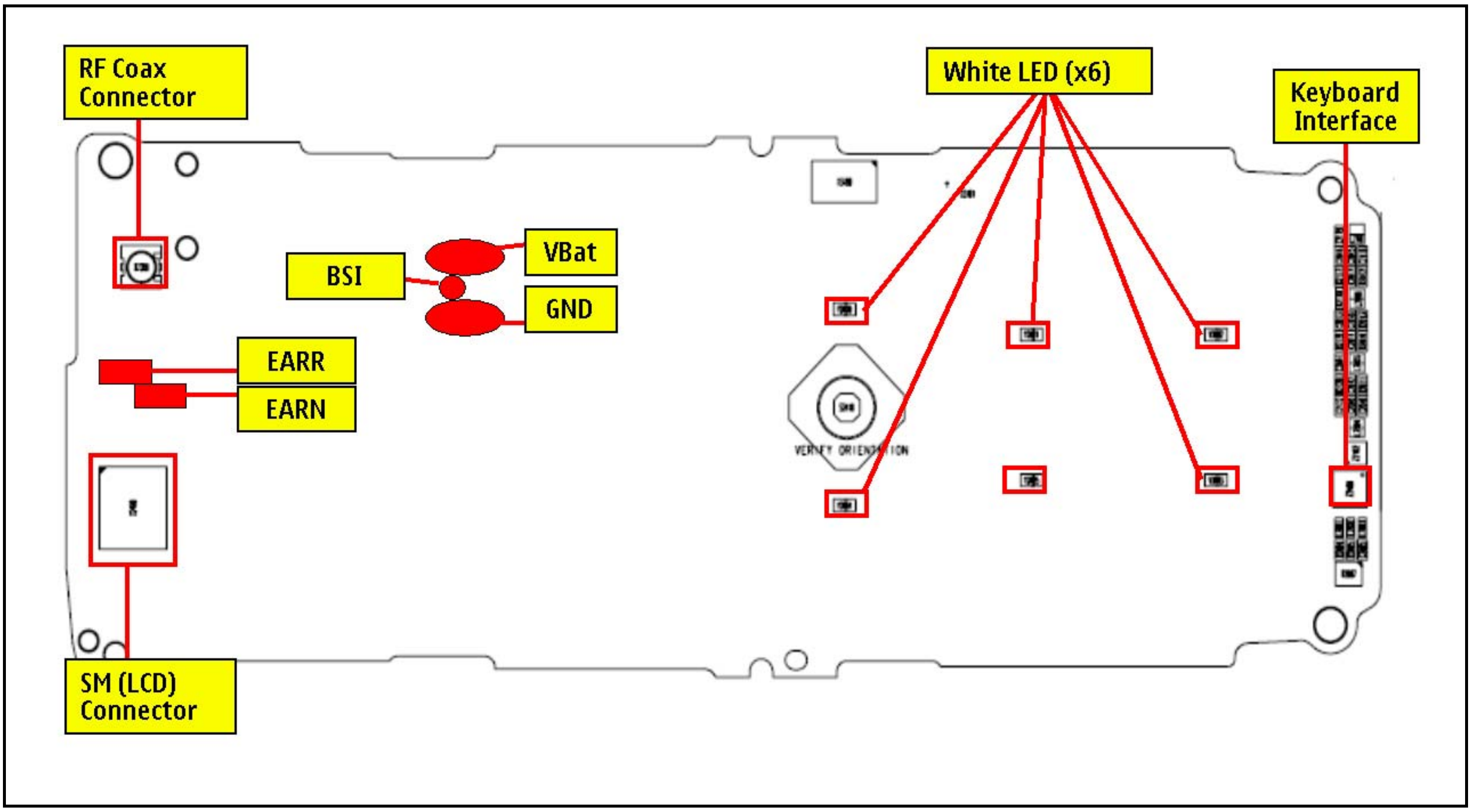

Figure 45: PWB – Top

Main Test Points

Current Test Points

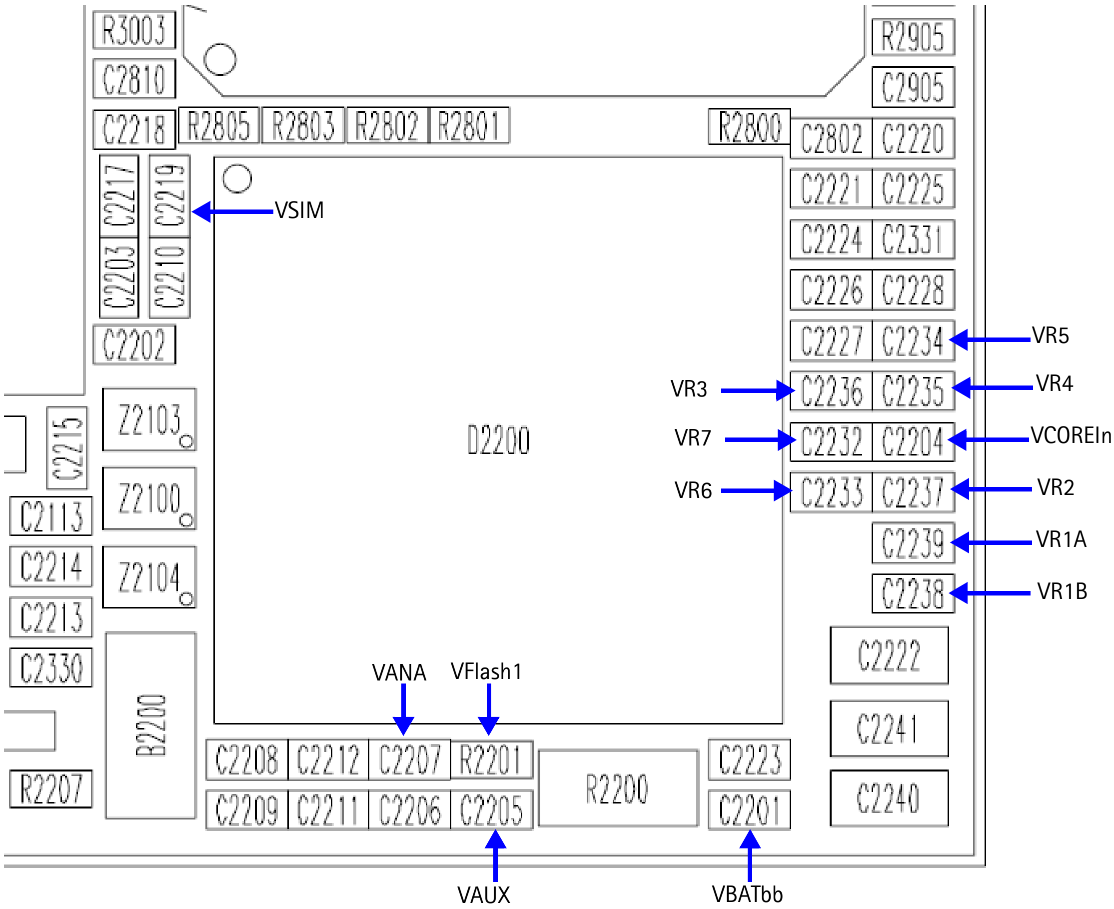

Figure 46: Current Test Points

Current too High at Zero Test

Check the following points, if the current is too high at zero (see Figure 46 and Figure 47):

1. Is the VBAT contact intact?
2. Measure BB regulator voltage levels:
   - VANA—2.78V
   - VIO—1.8V
   - VCORE—1.35V/1.05V @ Sleep
   - VFlash1—2.78V
   - VR3—2.78V

3. Is System clock at 19.2MHz
4. Is Sleep Clock at 32kHz
5. If all the above checks pass, then check whether terminal is jammed or a flash fault exists.

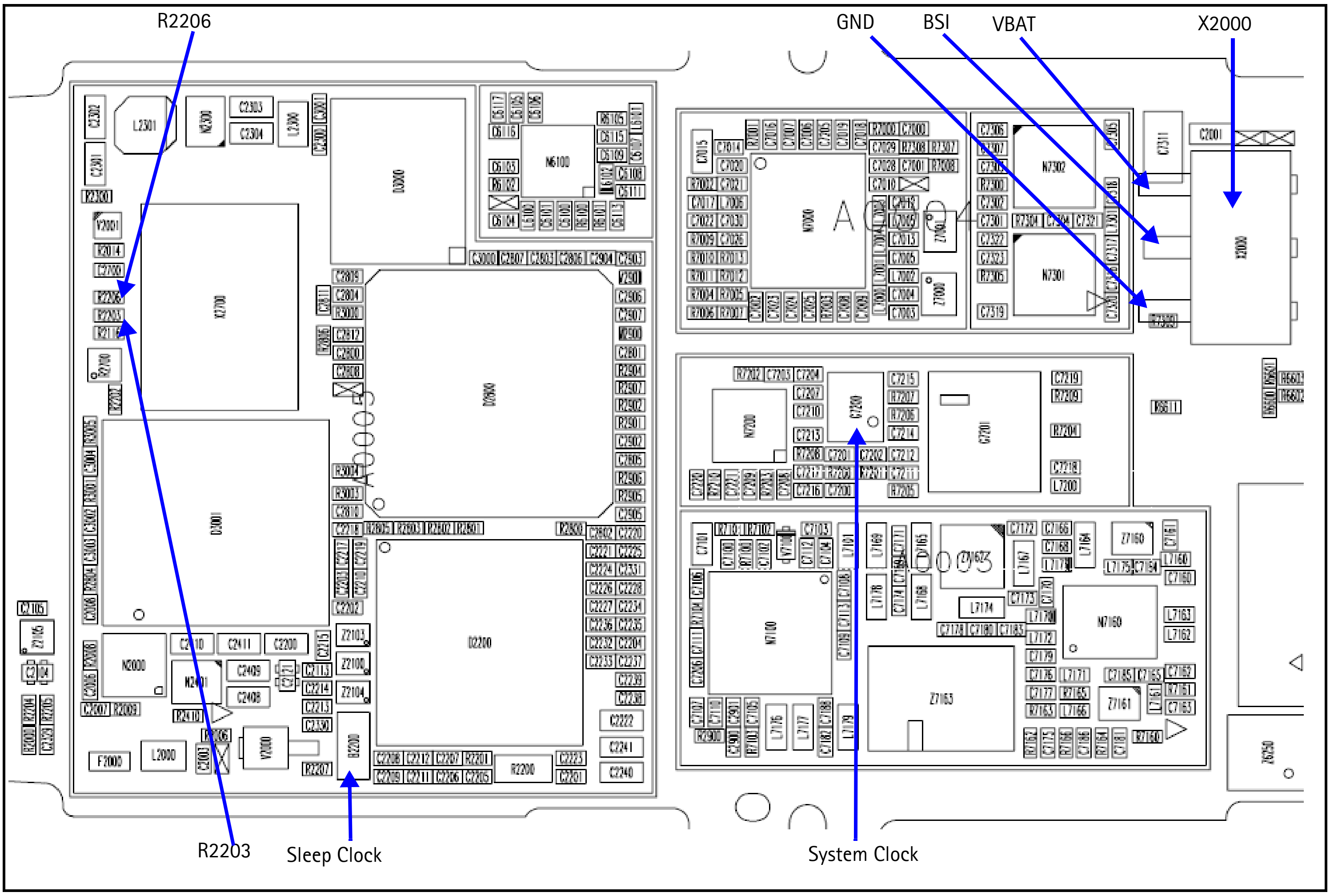

Figure 47: Test Points when current too high

Terminal in Local Mode Test

Check the following points, to see if terminal is in local mode (see Figure 47):

1. Is the BSI line at X2000?
2. Is the BSI line at R2203?
3. Is the BSI line at R2206?
4. Is Sleep Clock at 32kHz?
5. Is System Clock at 19.2kHz

Display Test

Check the following points for the display (see Figure 47):

1. Is the VBAT voltage at X2000?
2. Is the VBAT voltage at C2000?
3. Is the BSI line at R2206?
4. Is the BSI line at R2203?
5. Is Sleep Clock at 32kHz?
6. Is System Clock at 19.2kHz

Charging Test

Check the following points, charging (see Figure 48):

1. Does the battery bar scoll work?
2. Measure the BTEMP at V2000, check if it is at 25 degrees C. If not, replace the UEM.
3. Remove fuse at F2000 and measure current, check if it is at 850mA. If not, replace the UEM.
4. Measure the voltage at V2000, check if it is at 3VDC.

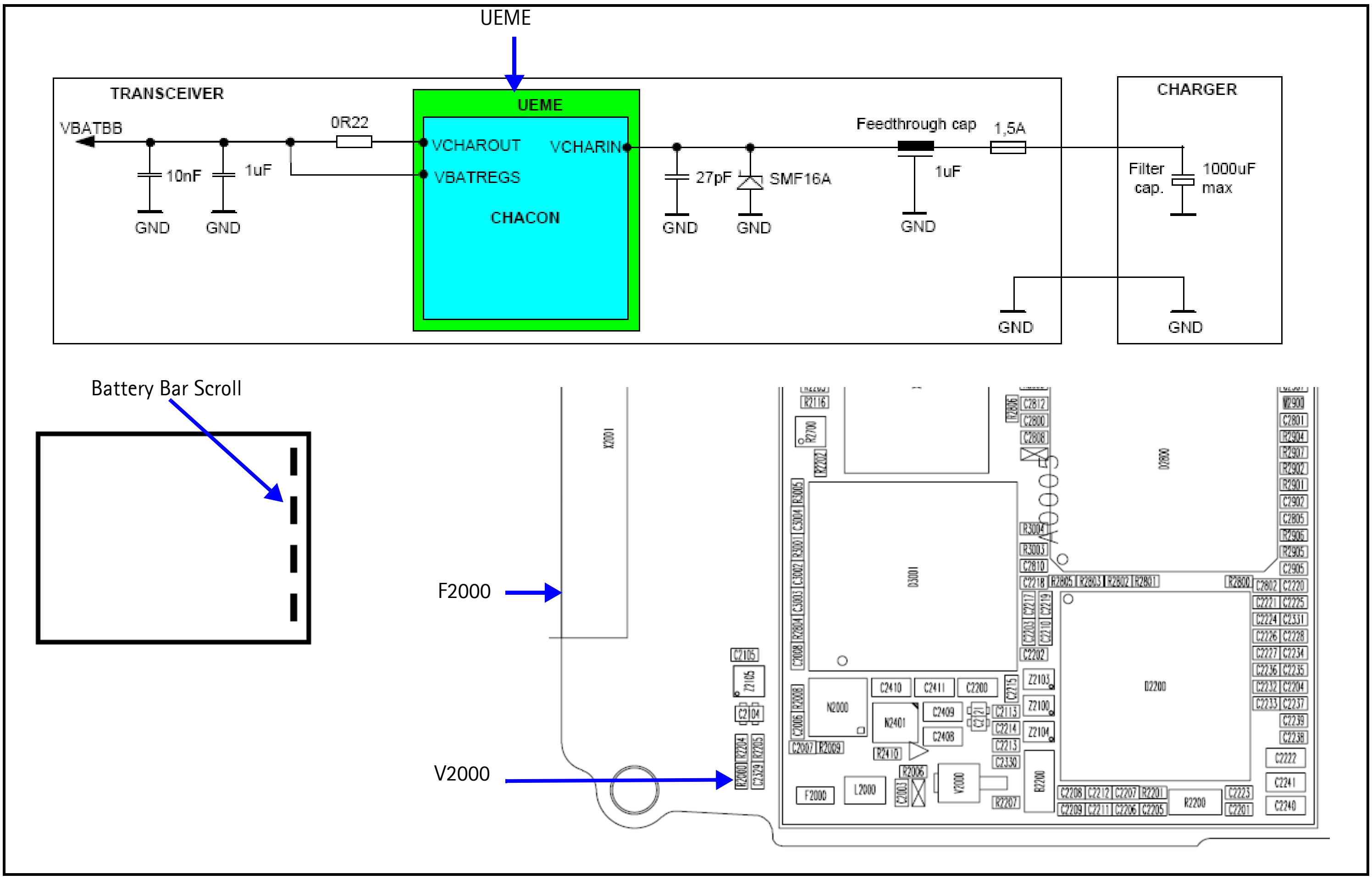

Figure 48: Charging Checks

Common Problems

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

No Communication During Flash

- Make sure good connection between flash adaptor and phone
- Phone has to be powered by prommer (FPS-8)
- Check Baseband regulators VR3, VIO, VCORE, VFLASH1
- Phone will not able to flash without 19.2Mhz clock into UPP
- Check BSI, MBUS, FBUSRx, FBUSTx, PURX, SLEEPX for bad solder joints between UEM and UPP
- Check Flash bus signal and VPP voltage level

No Communication During Alignment

- Check all connection between test fixture, cables and phone
- Make sure phone is in Local Mode check BSI signal level if not

- Make sure phone was programmed/flashed

Failed Self Test/Calibrate

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

Phone Not Powering Up

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

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

Shut Down After 32 Seconds

- Check for the absence of 32KHz SleepCLK
- Check for incorrect SleepX and PURX signal levels
- Check if ESN number was corrupted

No Audio

- Check for bad contacts or damaged earpiece
- 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 Z300

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

