PAMS Technical Documentation
NSB-8 Series Transceivers

Troubleshooting Instructions

Issue 1 01/02

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PWB Points (and Measurement Points)

The following figures are the most needed testpoints in the NSB-8 transceiver.

Figure 1: Picture of top testpoints

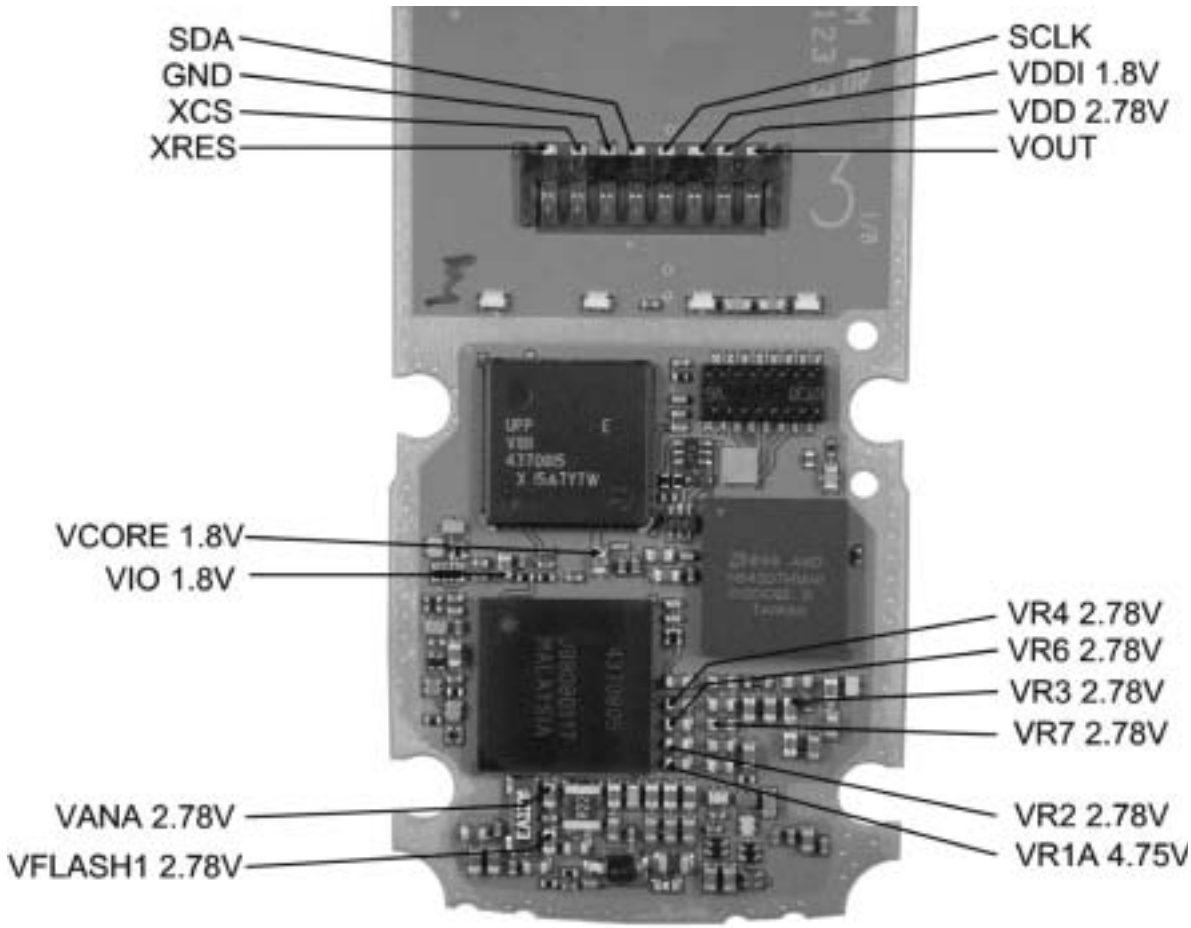


Figure 2: Picture of bottom testpoints

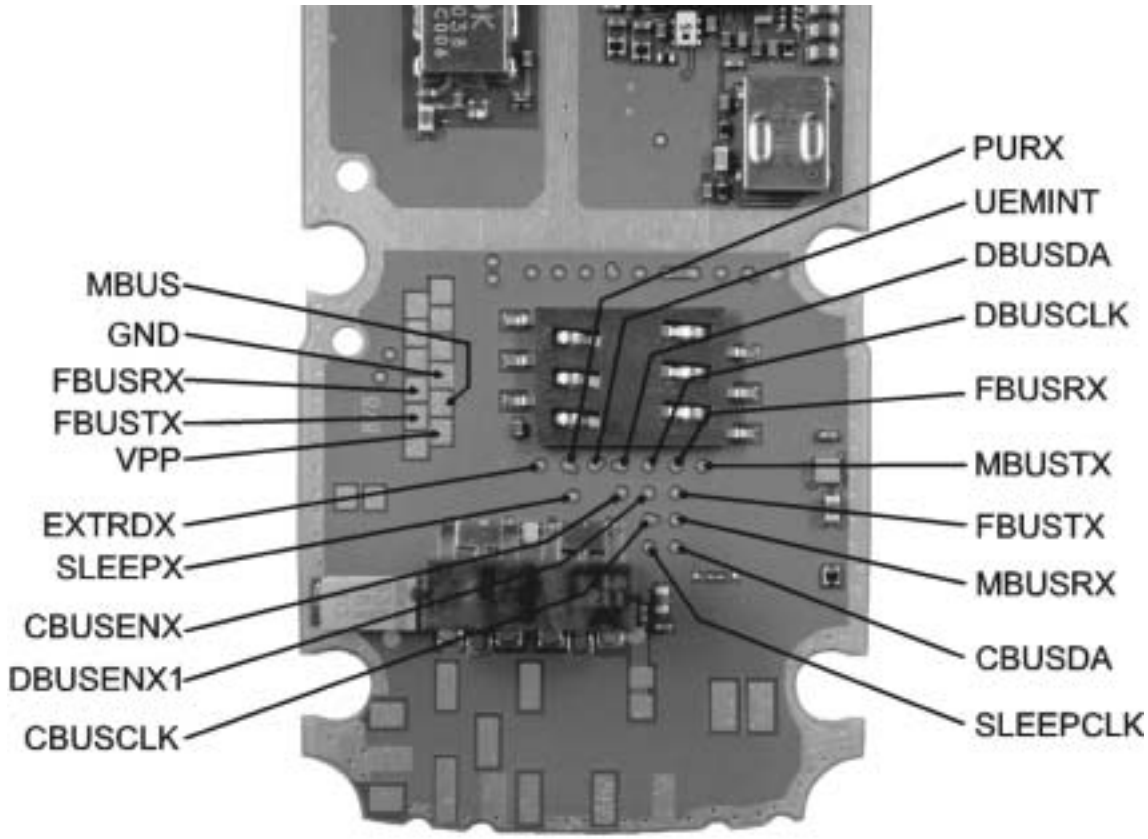


Figure 3: Top testpoints

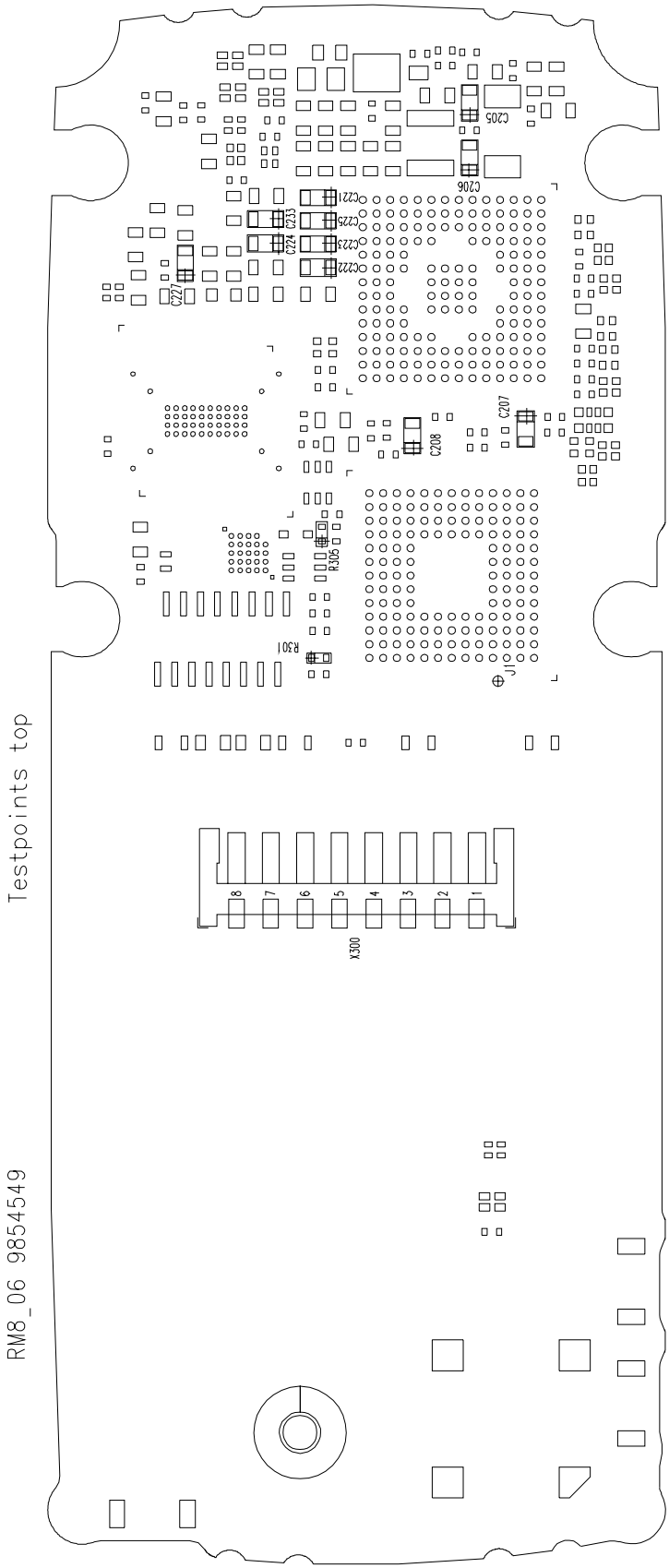


Figure 4: Bottom testpoints

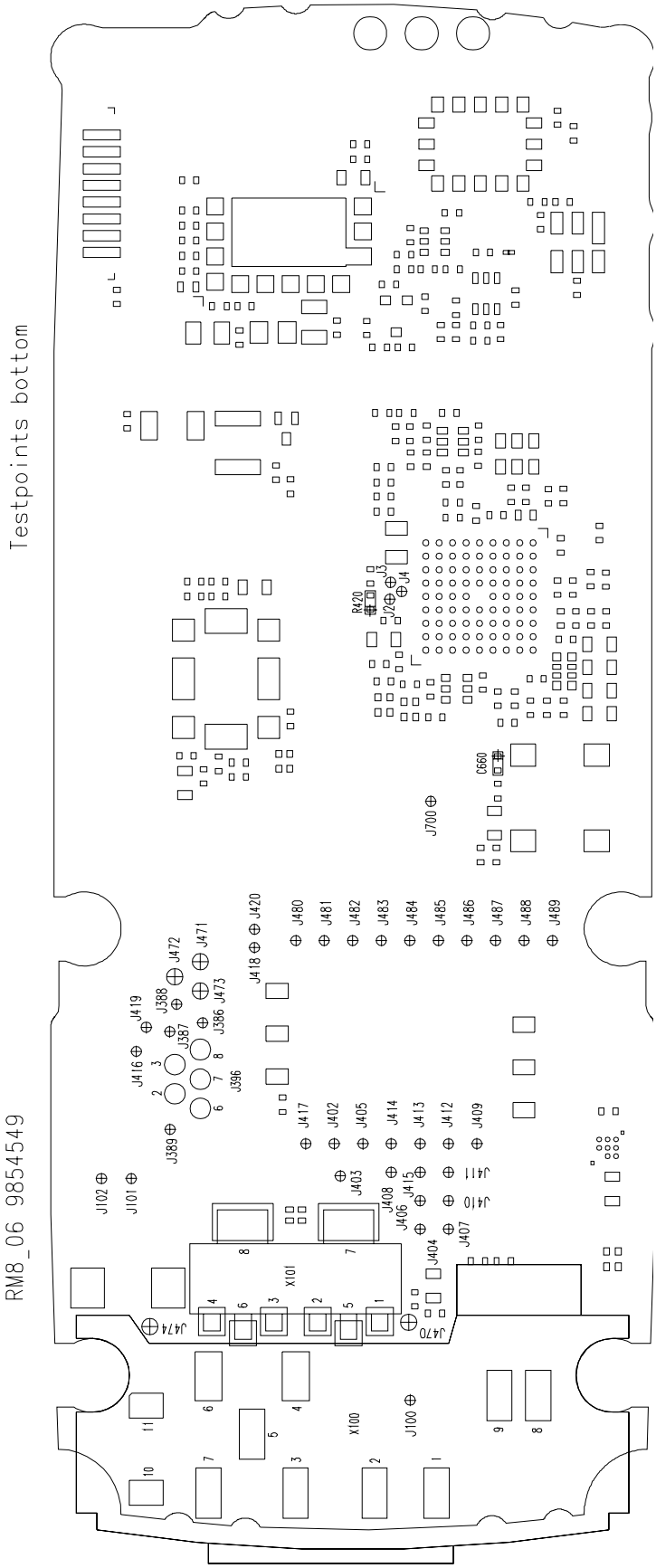


Table 1: Testpoints

REFERENCE	SIGNAL	NOTE
C205	VFLASH1	2.78 V regulator output UEM (D200) -> external FLASH memory
C206	VANA	2.78 V regulator output UEM (D200) -> internal and external analog circuitry
C207	VIO	1.8 V regulator output UEM (D200) -> internal and external logic circuitry
C208	VCORE	1.8 V programmable regulator output UEM (D200) -> UPP (D400)
C221	VR1A	4.75 V RF regulator output UEM (D200) -> HAGAR (N600)
C222	VR4	2.78 V regulator output UEM (D200) -> HAGAR (N600)
C223	VR6	2.78 V regulator output UEM (D200) -> HAGAR (N600)
C224	VR7	2.78 V regulator output UEM (D200) -> VCO (G650)
C225	VR2	2.78 V regulator output UEM (D200) -> transf balun (T700)
C227	VR3	2.78 V regulator output UEM (D200) -> HAGAR (N600) and VCTCXO (G660)
C660	RFCLK (26MHz)	Main clock oscillator 26 MHz, see Figure 5, “C660: RFCLK (26 MHz), VCTCXO (G660 pin 3) -> HAGAR (N600 pin H1),” on page 14 VCTCXO (G660) -> HAGAR (N600)
J1	RESET	Reset signal, see Figure 6, “J1: RESET, UPP (D400 pin D12) -> HAGAR (N600 pin E3),” on page 14 UPP (D400) -> HAGAR (N600)
J2	RFBUSDA	RFBUS data, see Figure 7, “J2: RFBUSDA, UPP (D400 pin F12) -> HAGAR (N600 pin E1),” on page 15 UPP (D400) -> HAGAR (N600)
J3	RFBUSCLK	RFBUS clock, see Figure 8, “J3: RFBUSCLK, UPP (D400 pin G11) -> HAGAR (N600 pin E2),” on page 15 and Figure 9, “J3: RFBUSCLK (closer look), UPP (D400 pin G11) -> HAGAR (N600 pin E2),” on page 16 UPP (D400) -> HAGAR (N600)
J4	RFBUSEN1	RFBUS enable, see Figure 10, “J4: RFBUSEN1, UPP (D400 pin G13) -> HAGAR (N600 pin D1),” on page 16 UPP (D400) -> HAGAR (N600)
J100	VBAT	Battery voltage pad for jig
J101	BSI	Battery size indicator for jig
J102	BTEMP	Battery temperature for jig

J386	SIMDATA	SIM data, see Figure 11, "J386: SIMDATA, UEM (D200 pin B2) <-> SIM CARD READER (X386 pin 4," on page 17 UEM (D200) <-> SIM CARD READER (X386)
J387	SIMRST	SIM reset, see Figure 12, "J387: SIMRST, UEM (D200 pin A2) <-> SIM CARD READER (X386 pin 2)," on page 17 UEM (D200) -> SIM CARD READER (X386)
J388	SIMCLK	SIM clock, see Figure 13, "J388: SIMCLK, UEM (D200 pin B3) <-> SIM CARD READER (X386 pin 3)," on page 18 UEM (D200) -> SIM CARD READER (X386)
J389	VSIM	SIM voltage 3 V or 1.8 V UEM (D200) -> SIM CARD READER (X386)
J396 PAD 2	FBUSTX	FBUS transmitted data, see Figure 14, "J396 PAD 2: FBUSTX (during flashing), UEM (D200 pin N5) -> SERVICE INTERFACE (J396 PAD 2)," on page 18 (during flashing) UEM (D200) -> SERVICE INTERFACE
J396 PAD 3	FBUSRX	FBUS received data, see Figure 15, "J396 PAD 3 FBUSRX (during flashing), SERVICE INTERFACE (J396 PAD 3) -> UEM (D200 pin P5)," on page 19 (during flashing) SERVICE INTERFACE -> UEM (D200)
J396 PAD 6	VPP	Flash programming voltage UEM (D200), SERVICE INTERFACE -> FLASH (D450)
J396 PAD 7	MBUS	One wire bidirectional serial bus, see Figure 16, "J396 PAD 7: MBUS (during flashing), UEM (D200 pin M6) <-> SERVICE INTERFACE (J396 PAD 7)," on page 19 (during flashing) UEM (D200) <-> SERVICE INTERFACE
J396 PAD 8	GND	Ground point for service interface
J402	PURX	Power Up Reset, see Figure 17, "J402: PURX, UEM (D200 pin C10) -> UPP (D400 pin K2)," on page 20 UEM (D200) -> UPP (D400)
J403	SLEEPX	Sleep enable, see Figure 18, "J403: SLEEPX, UEM (D200 pin B11) -> UPP (D400 pin L1)," on page 20 UEM (D200) -> UPP (D400)
J404	SLEEPCLK	Sleep clock, see Figure 19, "J404: SLEEPCLK, UEM (D200 pin D9) -> UPP (D400 pin H3)," on page 21 UEM (D200) -> UPP (D400)
J405	UEMINT	UEM interrupt, see Figure 20, "J405: UEMINT, UEM (D200 pin A10) -> UPP (D400 pin J2)," on page 21 UEM (D200) -> UPP (D400)
J406	CBUSCLK	CBUS clock, see Figure 21, "J406: CBUSCLK, UEM (D200 pin A8) -> UPP (D400 pin G1)," on page 22 UEM (D200) -> UPP (D400)
J407	CBUSDA	CBUS data, see Figure 22, "J407: CBUSDA, UEM (D200 pin B7) <-> UPP (D400 pin G2)," on page 22 UEM (D200) <-> UPP (D400)

J408	CBUSENX	CBUS enable, see Figure 23, "J408: CBUSENX, UEM (D200 pin C8) -> UPP (D400 pin F3)," on page 23 UEM (D200) -> UPP (D400)
J409	MBUSTX	MBUS transmitted data, see Figure 24, "J409: MBUSTX (during flashing), UPP (D400 pin E3) -> UEM (D200 pin C6)," on page 23 (during flashing) UPP (D400) -> UEM (D200)
J410	MBUSRX	MBUS received data, see Figure 25, "J410: MBUSRX (during flashing), UEM (D200 pin D6) -> UPP (D400 pin D3)," on page 24 (during flashing) UEM (D200) -> UPP (D400)
J411	FBUSTX	FBUS transmitted data, see Figure 26, "J411: FBUSTX (during flashing), UPP (D400 pin F1) -> UEM (D200 pin A7)," on page 24 (during flashing) UPP (D400) -> UEM (D200)
J412	FBUSRX	FBUS received data, see Figure 27, "J412: FBUSRX (during flashing), UEM (D200 pin C7) -> UPP (D400 pin E4)," on page 25 (during flashing) UEM (D200) -> UPP (D400)
J413	DBUSCLK	DBUS clock, see Figure 28, "J413: DBUSCLK, UEM (D200 pin D10) -> UPP (D400 pin K3)," on page 25 UEM (D200) -> UPP (D400)
J414	DBUSDA	DBUS data, see Figure 29, "J414: DBUSDA, UEM (D200 pin A11) <-> UPP (D400 pin L3)," on page 26 UEM (D200) <-> UPP (D400)
J415	DBUSENX1	DBUS enable, see Figure 30, "J415: DBUSENX1, UEM (D200 pin B10) -> UPP (D400 pin J3)," on page 26 UEM (D200) -> UPP (D400)
J416	EXTWRX	FLASH write enable, see Figure 31, "J416: EXTWRX (during flashing), UPP (D400 pin N9) -> FLASH (D450 pin A6)," on page 27 (during flashing) UPP (D400) -> FLASH (D450)
J417	EXTRDX	FLASH read enable, see Figure 32, "J417: EXTRDX, UPP (D400 pin L7) -> FLASH (D450 pin C10)," on page 27 UPP (D400) -> FLASH (D450)
J418	FLS2CSX	UPP (D400) -> TESTPOINT
J419	FLSCLK	FLASH clock, see Figure 33, "J419: FLSCLK, UPP (D400 pin N12) -> FLASH (D450 pin A4)," on page 28 UPP (D400) -> FLASH (D450)
J420	FLSCSX	FLASH chip enable, see Figure 34, "J420: FLSCSX, UPP (D400 pin N6) -> FLASH (D450 pin B9)," on page 28 UPP (D400) -> FLASH (D450)
J470	VBAT	Battery voltage
J471	GENTEST0/ STITxD	OSTRICH transmitted data UPP (D400) -> TESTPOINT
J472	GENTEST1/ STISClk	OSTRICH clock UPP (D400) -> TESTPOINT
J473	STIRxD	OSTRICH received data UPP (D400) -> TESTPOINT

J474	GND	Ground point
J480	JTMS	UPP (D400) -> TESTPOINT
J481	JTRst	UPP (D400) -> TESTPOINT
J482	JTDI	UPP (D400) -> TESTPOINT
J483	VCC	Supply voltage from 1.8 V VIO regulator
J484	JTDO	UPP (D400) -> TESTPOINT
J485	JTClk_ret	UPP (D400) -> TESTPOINT
J486	JTClk	UPP (D400) -> TESTPOINT
J487	EMU0	UPP (D400) -> TESTPOINT
J488	EMU1	UPP (D400) -> TESTPOINT
J489	GND	Ground point
J700	TXP	Transmitted power control, see Figure 35, "J700: TXP, UPP (D400 pin D11) -> HAGAR (N600 pin D5)," on page 29 (during call) UPP (D400) -> HAGAR (N600)
R301	PWRONX	Power on button, see Figure 36, "R301: PWRONX, POWER BUTTON (S300) -> UEM (D200 pin P7)," on page 29 POWER BUTTON -> UEM (D200)
R305	KLIGHT	Backlight enable, see Figure 37, "R305: KLIGHT, UEM (D200 pin F3) -> BACKLIGHT CIRCUITRY (V300 pins 2,3,5 and V301 pins 2,5,6)," on page 30 UEM (D200) -> BACKLIGHT CIRCUITRY (V300 and V301)
R420	RFCLK (13MHz)	Main clock 13 MHz, see Figure 38, "R420: RFCLK (13 MHz), HAGAR (N600 pin E4) -> UPP (D400 pin M5)," on page 30 HAGAR (N600) -> UPP (D400)
X100 PIN 1	GND	Ground point
X100 PIN 2	VCHAR	Charger voltage SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 3	XMICN	External mic (-) SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 4	XEARN	External earpiece (-) SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 5	XMICP	External mic (+) SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 6	HEADINT	Headset interrupt SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 7	XEARP	External earpiece (+) SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 8	VBAT (VIBRA)	Vibra supply voltage VBAT -> SYSTEM CONNECTOR (X100)

X100 PIN 9	VIBRA	Vibra control, see Figure 39, “X100 PIN 9: VIBRA, UEM (D200 pin G3) -> SYSTEM CONNECTOR (X100 pin 9),” on page 31 UEM (D200) -> SYSTEM CONNECTOR (X100)
X100 PIN 10	MIC (-)	Internal mic (-) SYSTEM CONNECTOR (X100) -> UEM (D200)
X100 PIN 11	MIC (+)	Internal mic (+) SYSTEM CONNECTOR (X100) -> UEM (D200)
X101 PIN 1	VBAT	Battery voltage BATTERY CONNECTOR (X101) -> VBAT
X101 PIN 2	BTEMP	Battery temperature BATTERY CONNECTOR (X101) -> UEM (D200)
X101 PIN 3	BSI	Battery size indicator BATTERY CONNECTOR (X101) -> UEM (D200)
X101 PIN 4	GND	Battery ground BATTERY CONNECTOR (X101) -> PHONE GROUND
X300 PIN 1	XRES	LCD reset, see Figure 40, “X300 PIN 1: XRES (startup), UPP (D400 pin A7) -> LCD CONNECTOR (X300 pin 1),” on page 31 UPP (D400) -> LCD CONECTOR (X300)
X300 PIN 2	XCS	LCD chip select, see Figure 41, “X300 PIN 2: XCS, UPP (D400 pin C7) -> LCD CONNECTOR (X300 pin 2),” on page 32 UPP (D400) -> LCD CONECTOR (X300)
X300 PIN 3	VSS	LCD ground LCD CONECTOR (X300) -> PHONE GROUND
X300 PIN 4	SDA	LCD data, see Figure 42, “X300 PIN 4: SDA, UPP (D400 pin B6) -> LCD CONNECTOR (X300 pin 4),” on page 32 UPP (D400) -> LCD CONECTOR (X300)
X300 PIN 5	SCLK	LCD clock, see Figure 43, “X300 PIN 5: SCLK, UPP (D400 pin C6) -> LCD CONNECTOR (X300 pin 5),” on page 33 UPP (D400) -> LCD CONECTOR (X300)
X300 PIN 6	VDDI	LCD logic voltage supply 1.8 V VIO 1.8 V -> LCD CONECTOR (X300)
X300 PIN 7	VDD	LCD voltage supply VFLASH1 2.78 V -> LCD CONECTOR (X300)
X300 PIN 8	VOUT	Booster output, see Figure 44, “X300 PIN 8: VOUT, LCD CONNECTOR (X300 PIN 8) -> C301 and C302,” on page 33 LCD CONNECTOR (X300) -> C301 and C302
X303 PIN 2	KEYB_LIGHT	Keyboard backlight current, see Figure 45, “X303 PIN 2: KEYB_LIGHT, BACKLIGHT CIRCUITRY (V300 pin 6) -> UI CONNECTOR (X303 pin 2),” on page 34 BACKLIGHT CIRCUITRY (V300) -> UI CONNECTOR (X303)

Figure 5: C660: ***RFCLK*** (26 MHz), VCTCXO (G660 pin 3) -> HAGAR (N600 pin H1)

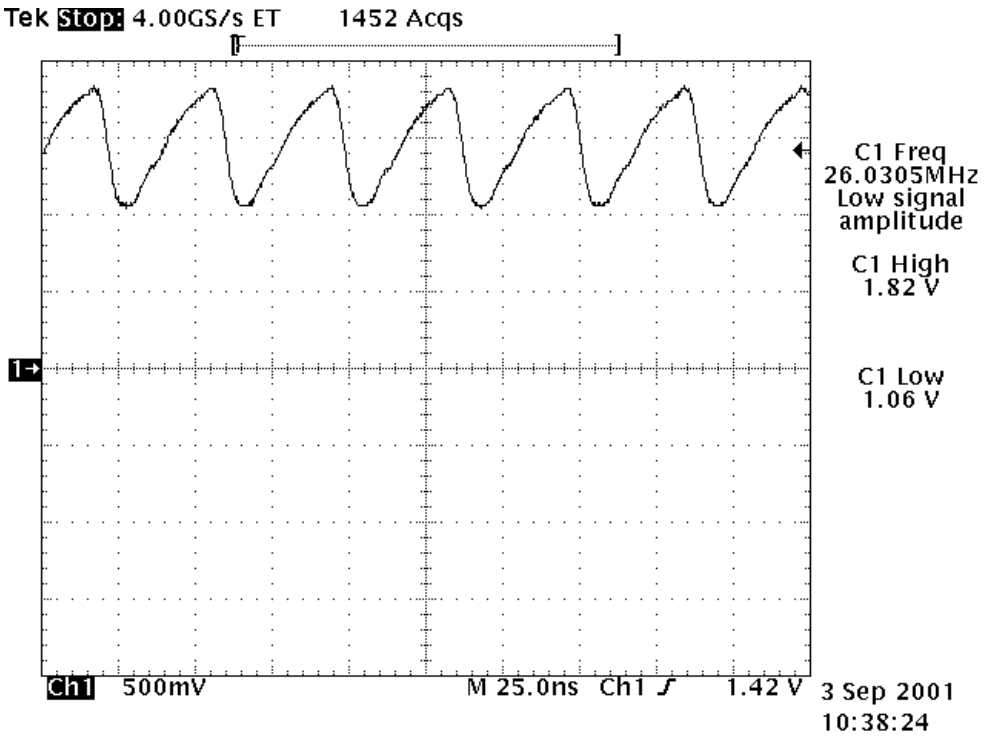


Figure 6: J1: ***RESET***, UPP (D400 pin D12) -> HAGAR (N600 pin E3)

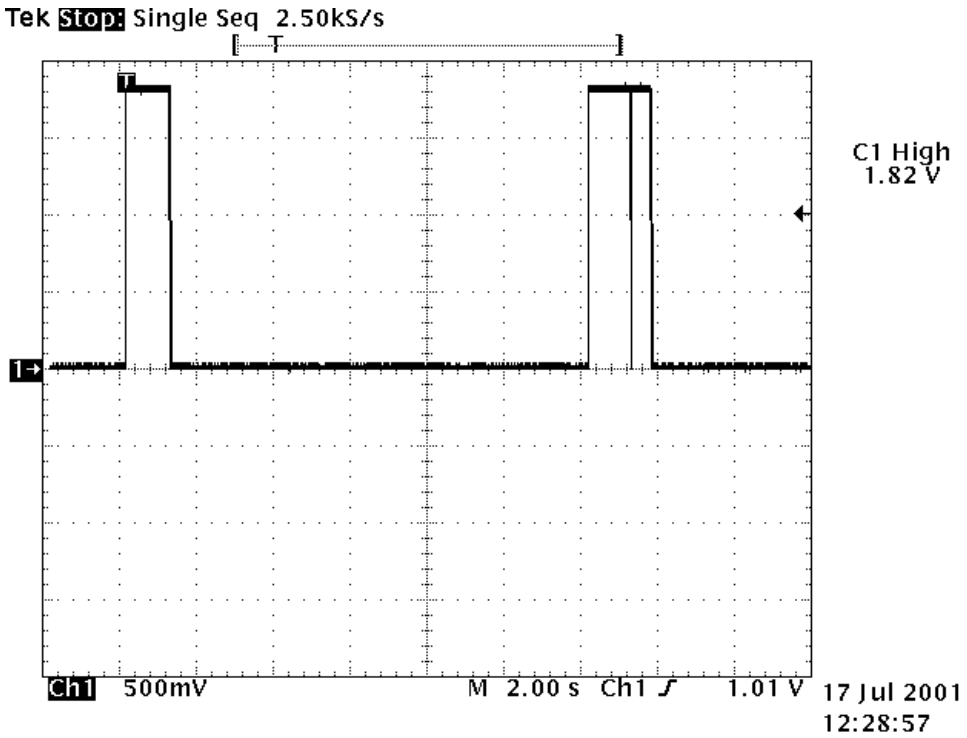


Figure 7: J2: ***RFBUSDA***, UPP (D400 pin F12) -> HAGAR (N600 pin E1)

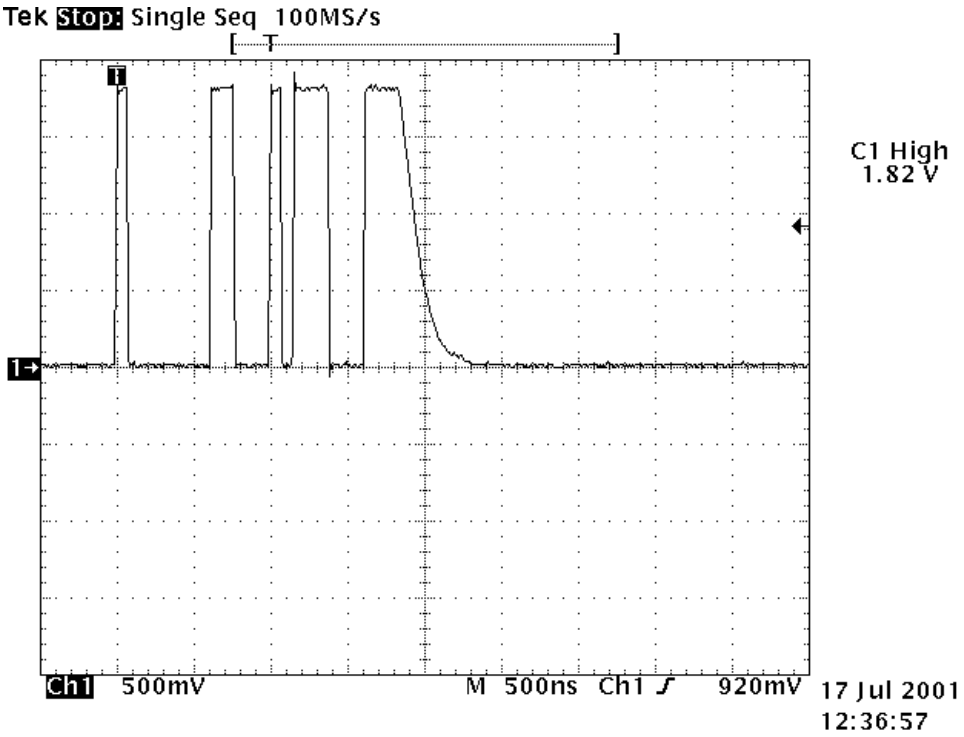


Figure 8: J3: ***RFBUSCLK***, UPP (D400 pin G11) -> HAGAR (N600 pin E2)

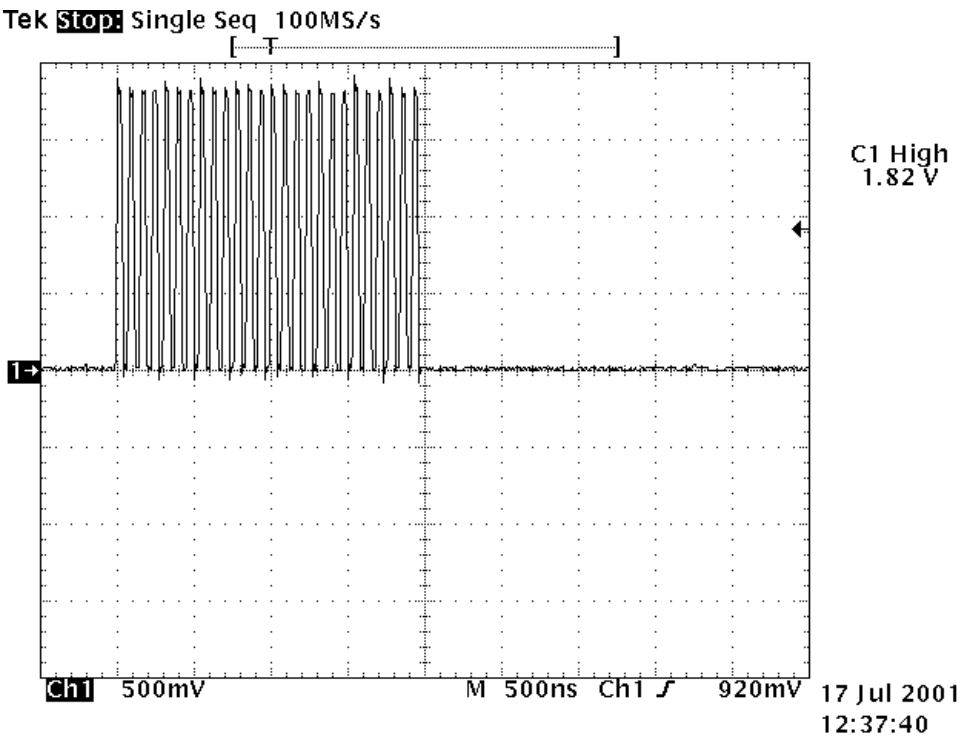


Figure 9: J3: ***RFBUSCLK*** (closer look), UPP (D400 pin G11) -> HAGAR (N600 pin E2)

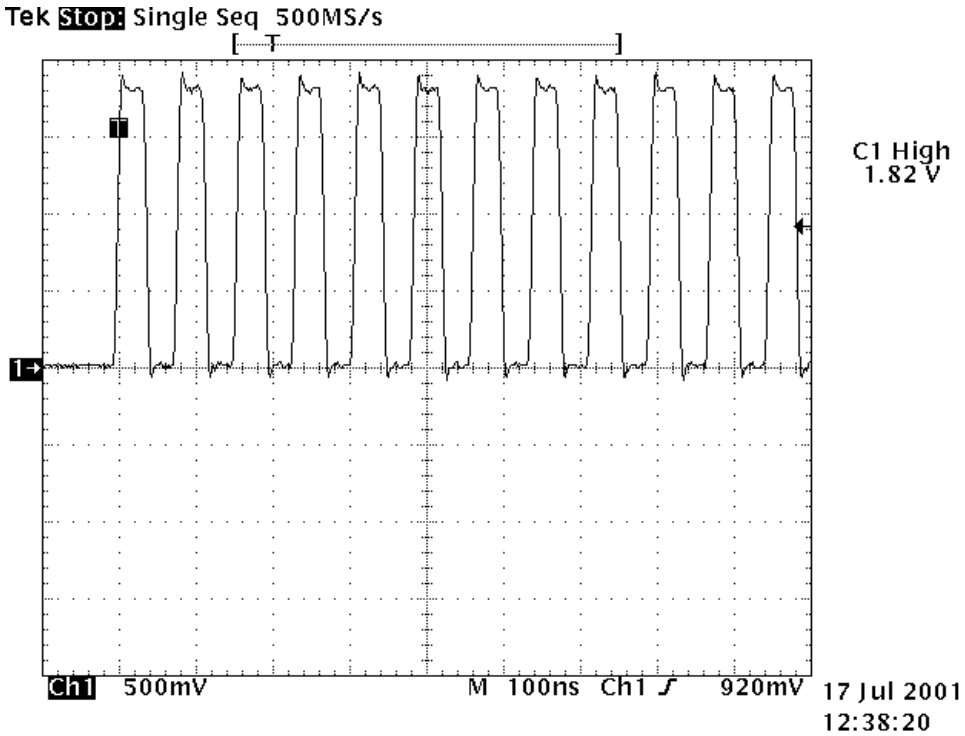


Figure 10: J4: ***RFBUSEN1***, UPP (D400 pin G13) -> HAGAR (N600 pin D1)

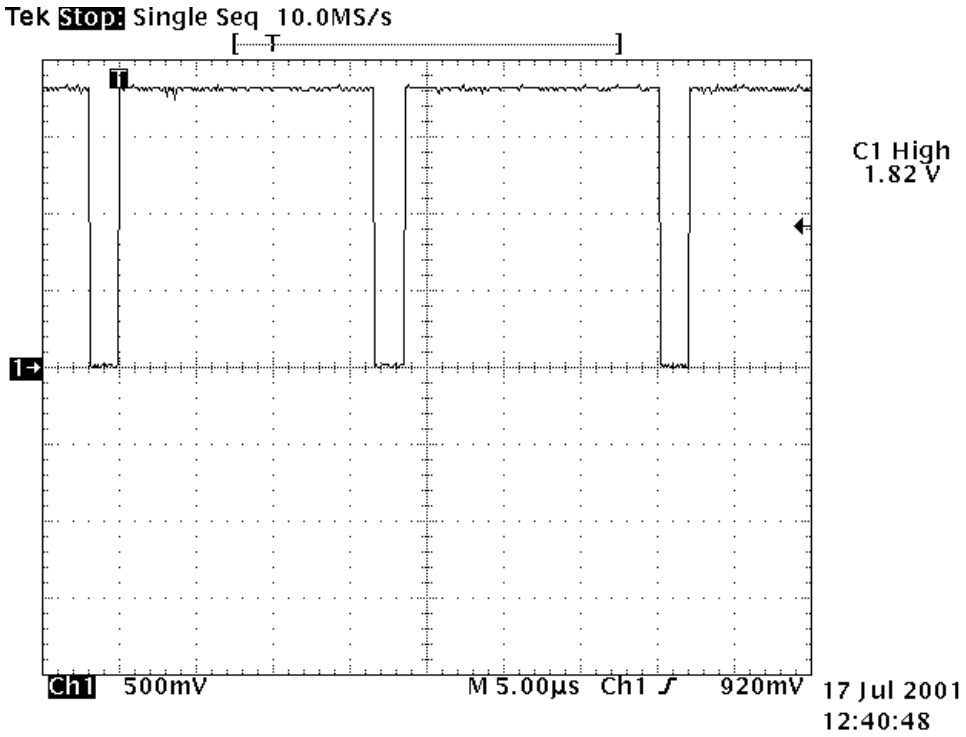


Figure 11: J386: ***SIMDATA***, UEM (D200 pin B2) <-> SIM CARD READER (X386 pin 4

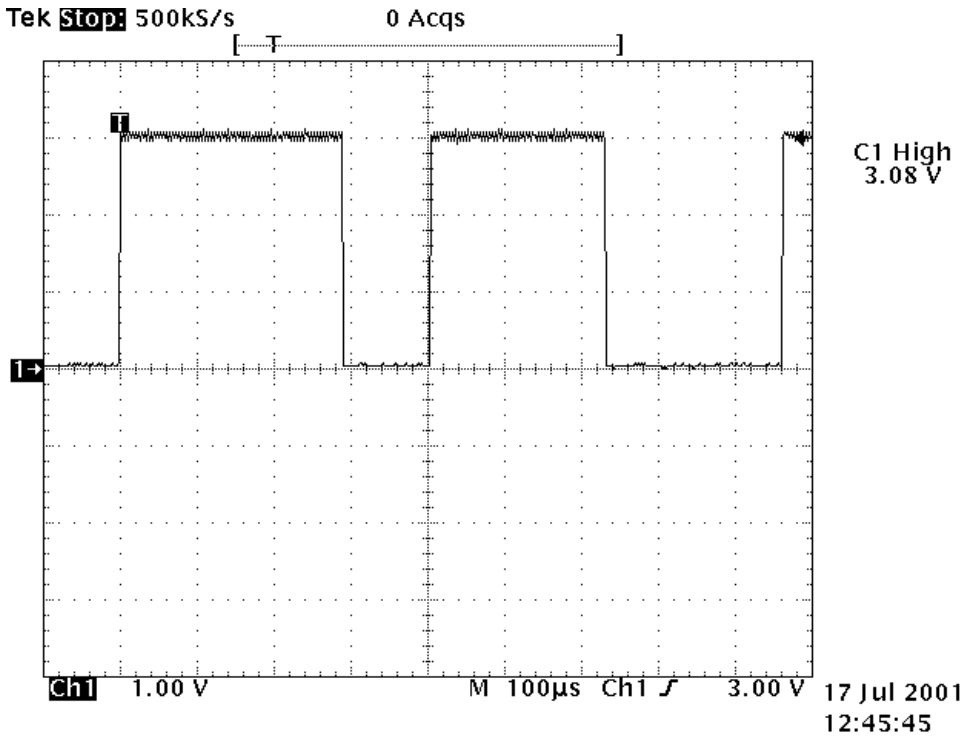


Figure 12: J387: ***SIMRST***, UEM (D200 pin A2) <-> SIM CARD READER (X386 pin 2)

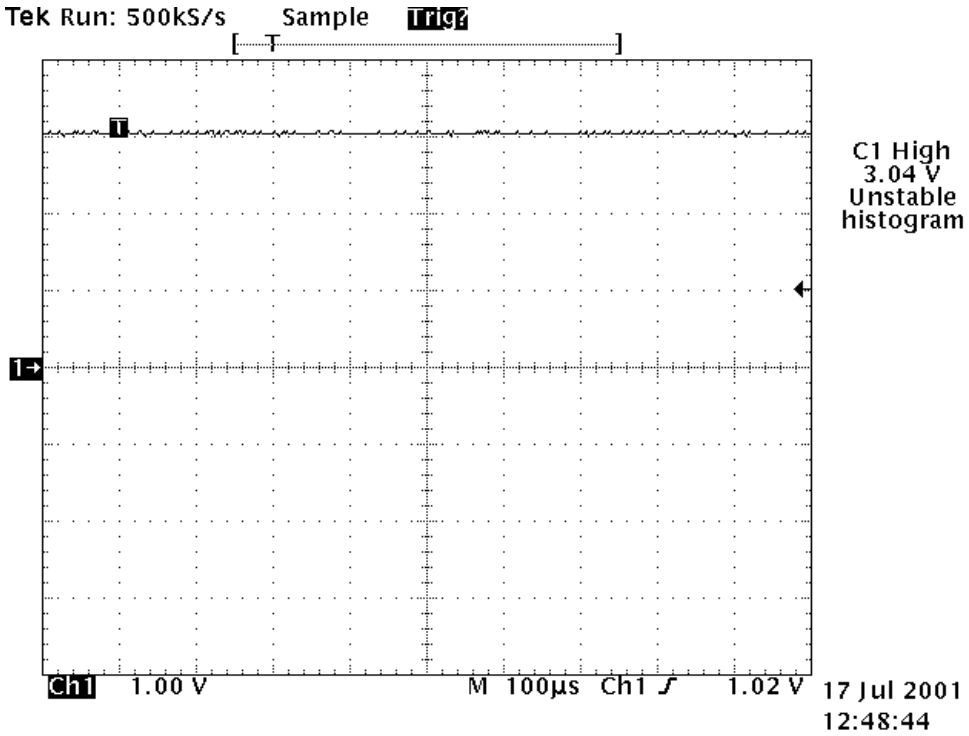


Figure 13: J388: ***SIMCLK***, UEM (D200 pin B3) <-> SIM CARD READER (X386 pin 3)

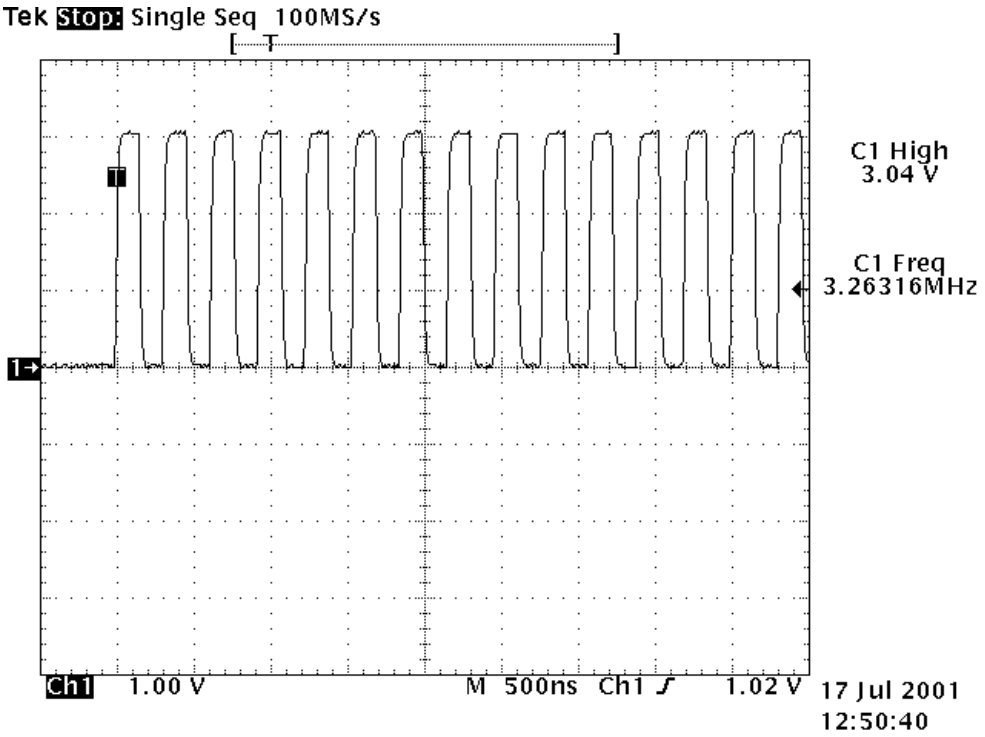


Figure 14: J396 PAD 2: ***FBUSTX*** (during flashing), UEM (D200 pin N5) -> SERVICE INTERFACE (J396 PAD 2)

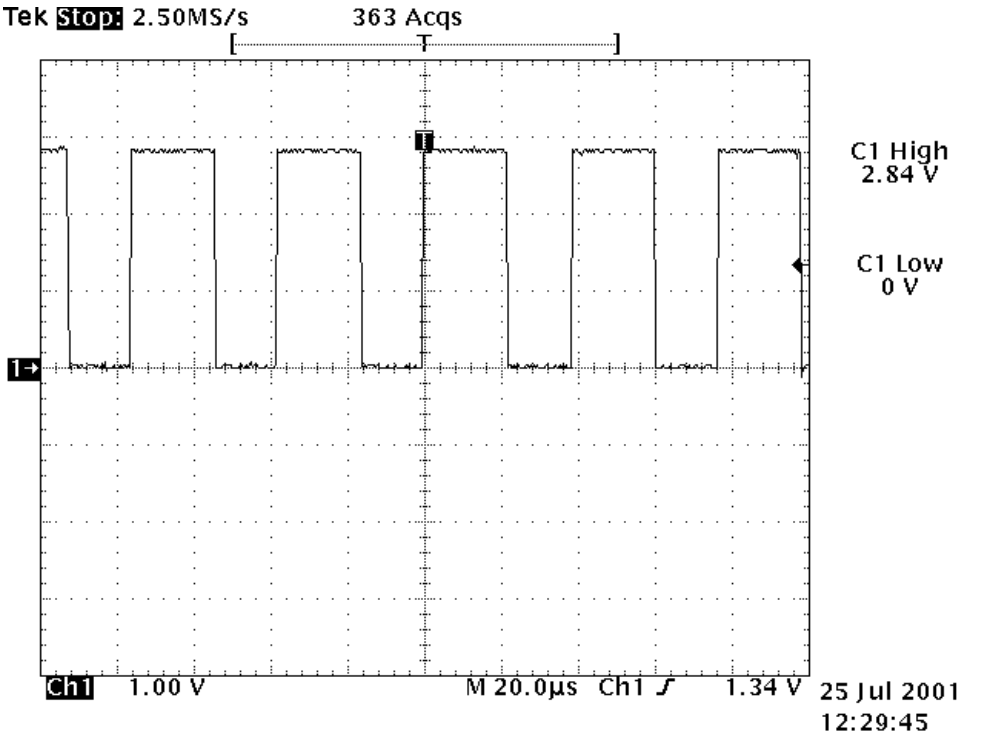


Figure 15: J396 PAD 3 ***FBUSRX*** (during flashing), SERVICE INTERFACE (J396 PAD 3) -> UEM (D200 pin P5)

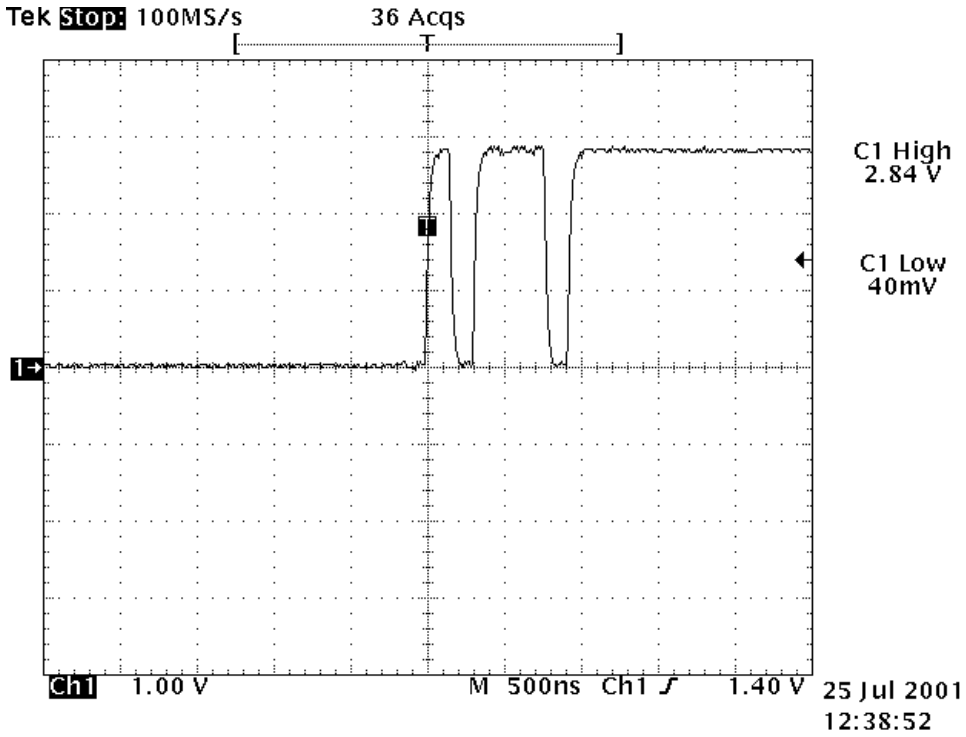


Figure 16: J396 PAD 7: ***MBUS*** (during flashing), UEM (D200 pin M6) <-> SERVICE INTERFACE (J396 PAD 7)

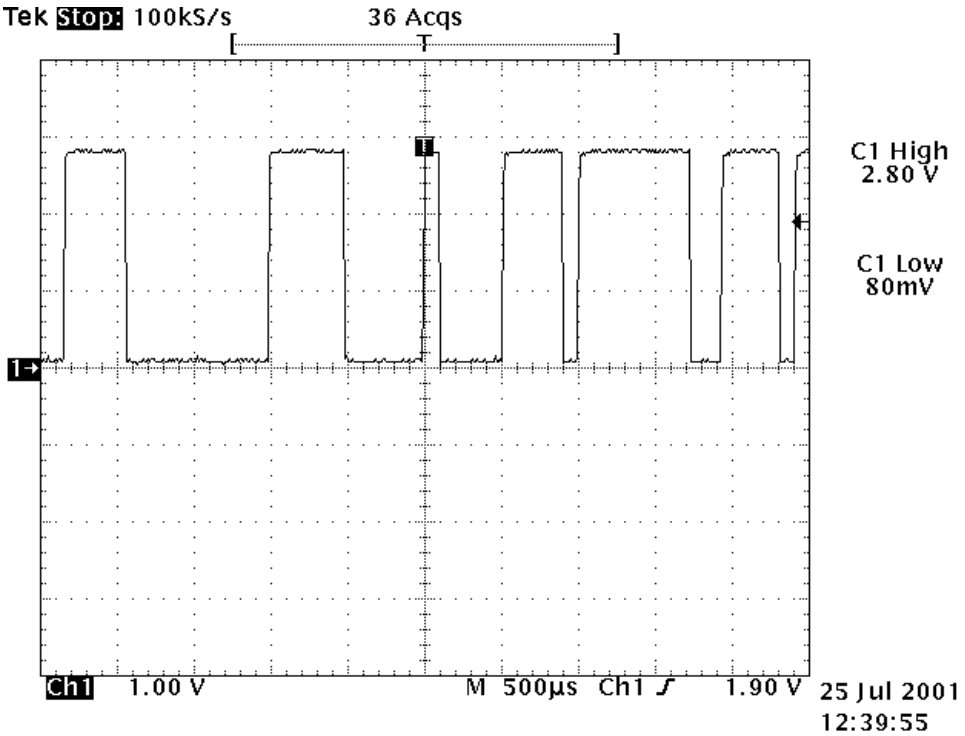


Figure 17: J402: ***PURX***, UEM (D200 pin C10) -> UPP (D400 pin K2)

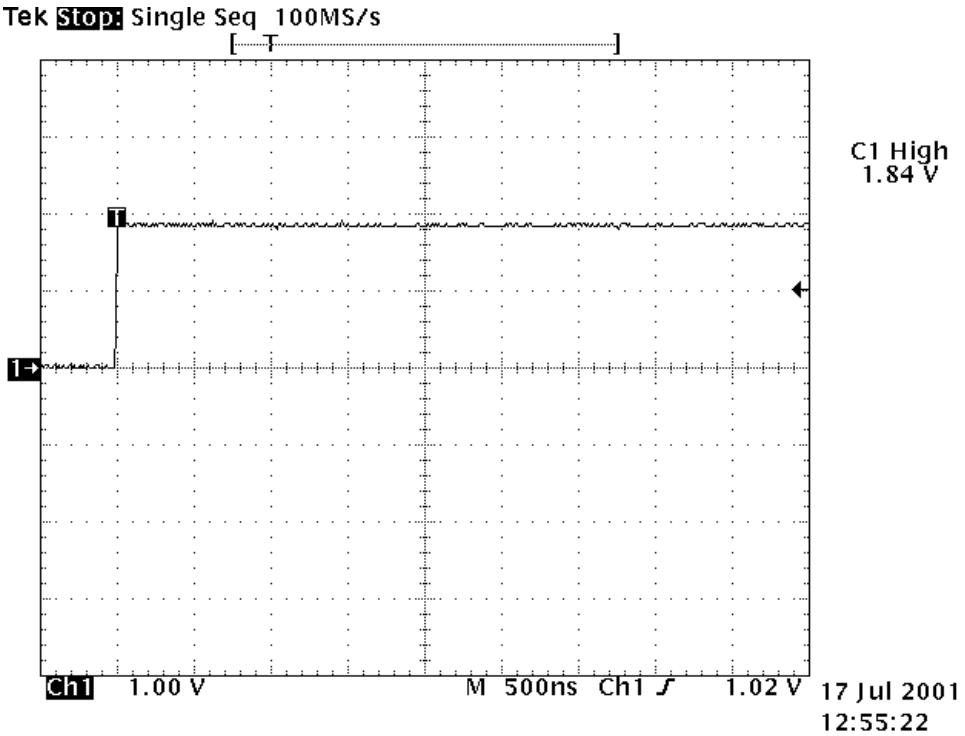


Figure 18: J403: ***SLEEPX***, UEM (D200 pin B11) -> UPP (D400 pin L1)

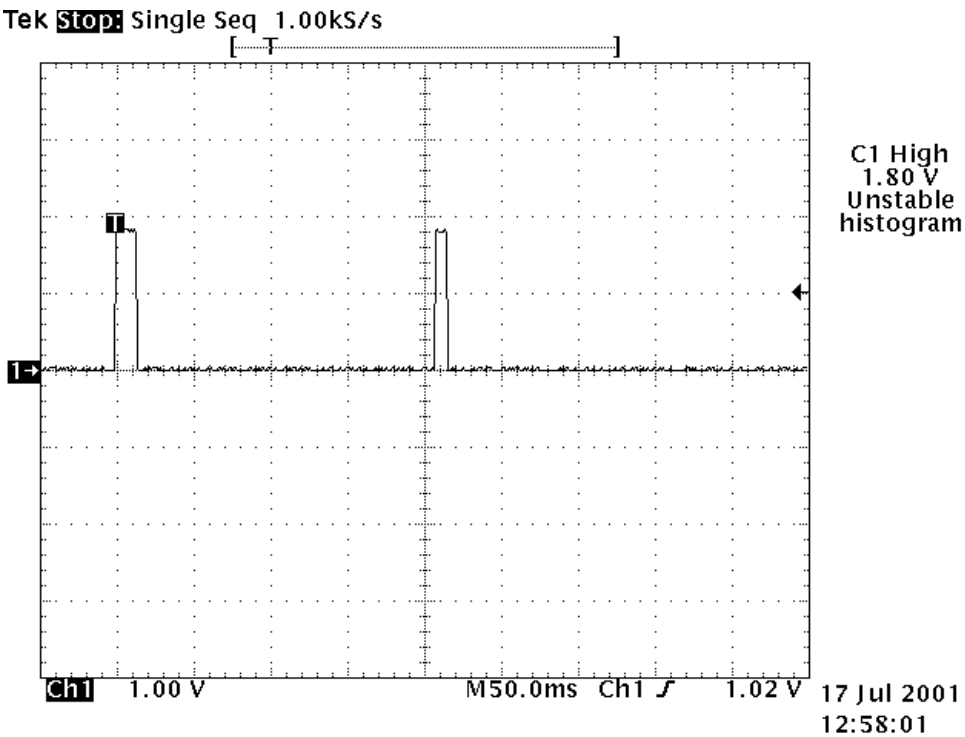


Figure 19: J404: ***SLEEPCLK***, UEM (D200 pin D9) -> UPP (D400 pin H3)

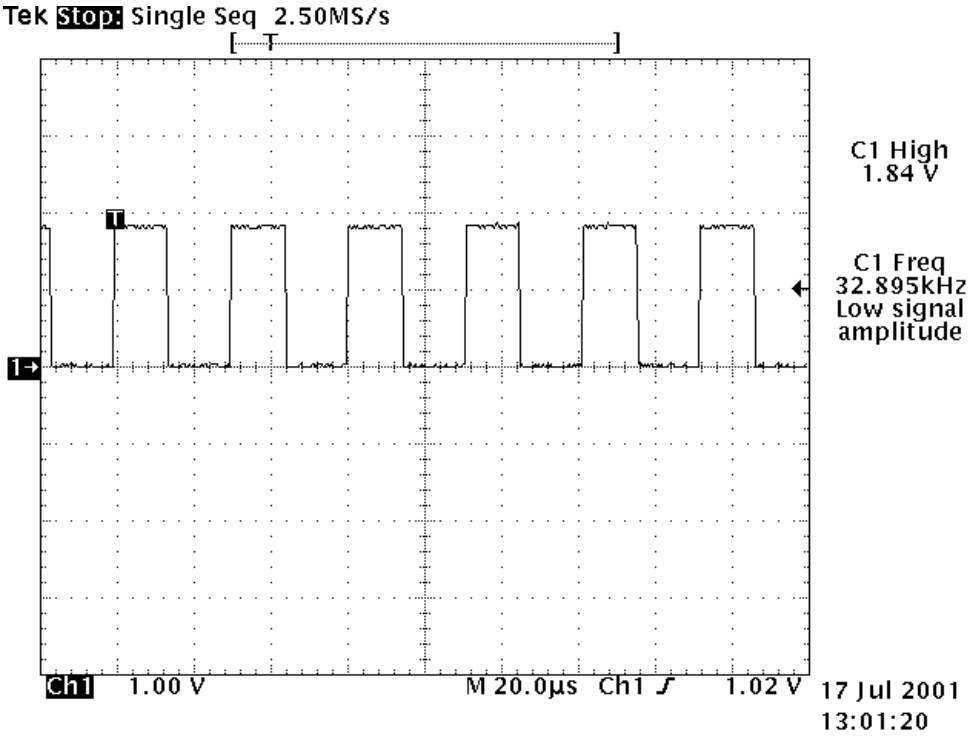


Figure 20: J405: ***UEMINT***, UEM (D200 pin A10) -> UPP (D400 pin J2)

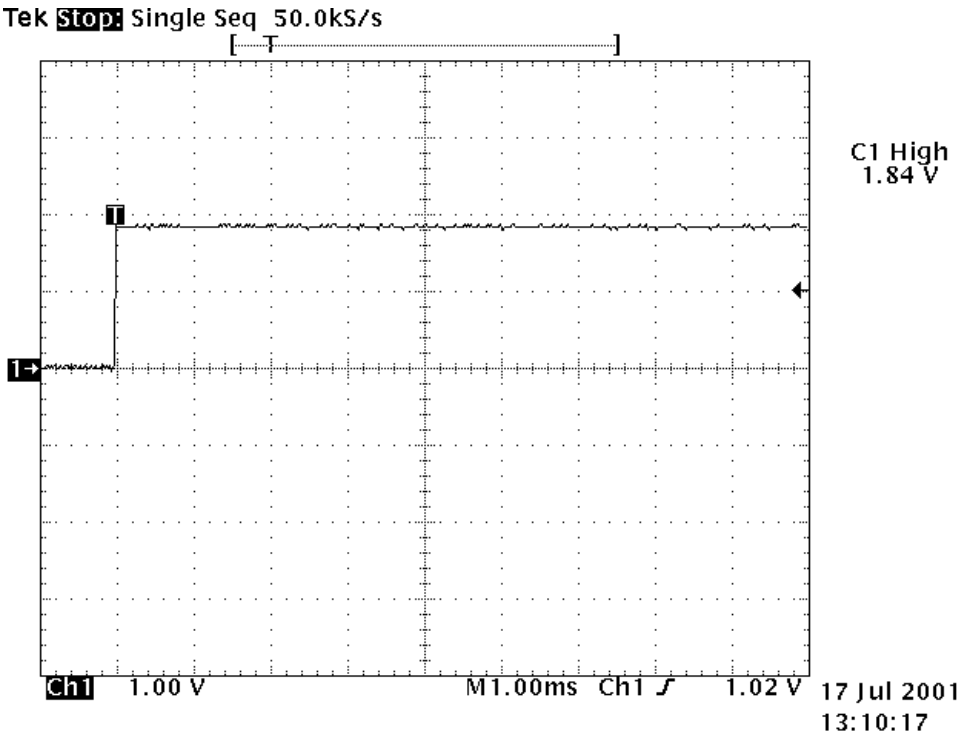


Figure 21: J406: ***CBUSCLK***, UEM (D200 pin A8) -> UPP (D400 pin G1)

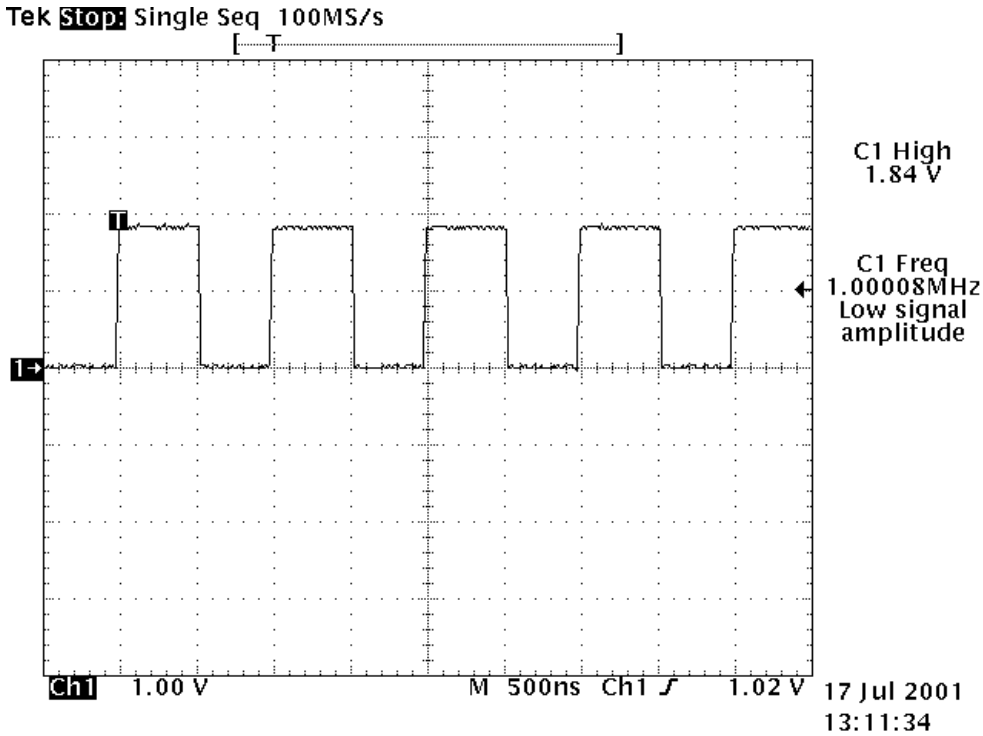


Figure 22: J407: ***CBUSDA***, UEM (D200 pin B7) <-> UPP (D400 pin G2)

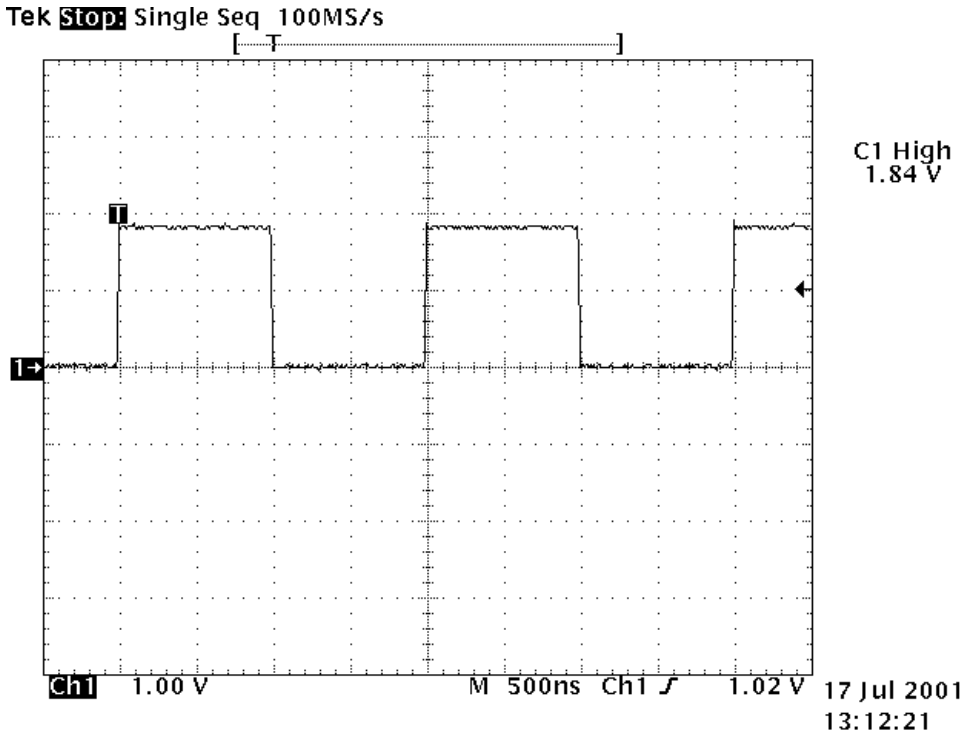


Figure 23: J408: ***CBUSENX***, UEM (D200 pin C8) -> UPP (D400 pin F3)

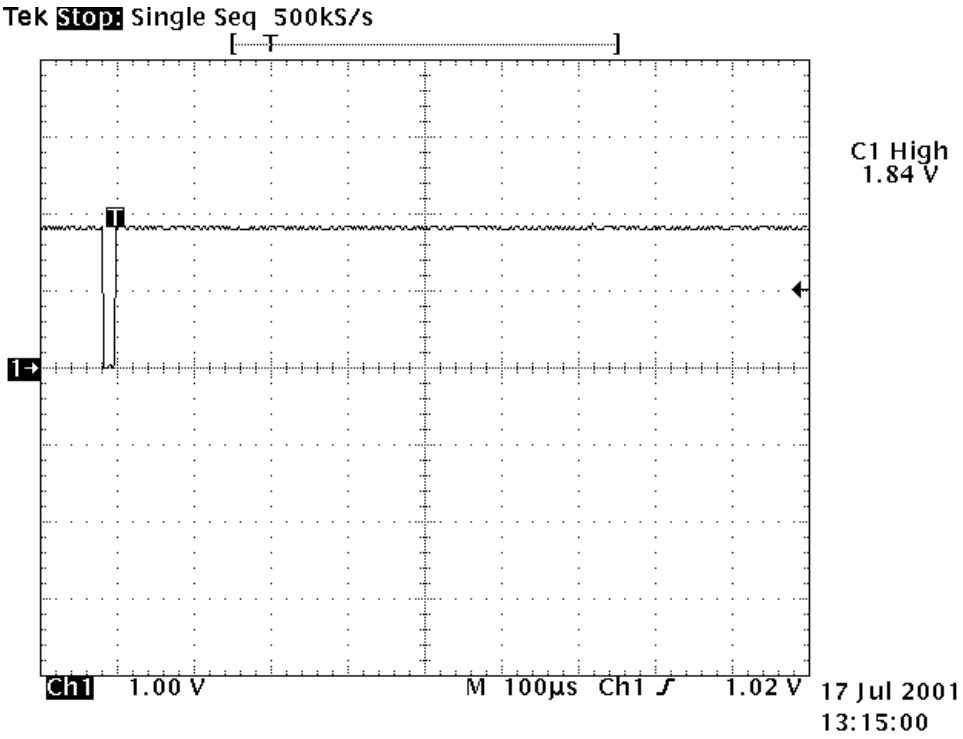


Figure 24: J409: ***MBUSTX*** (during flashing), UPP (D400 pin E3) -> UEM (D200 pin C6)

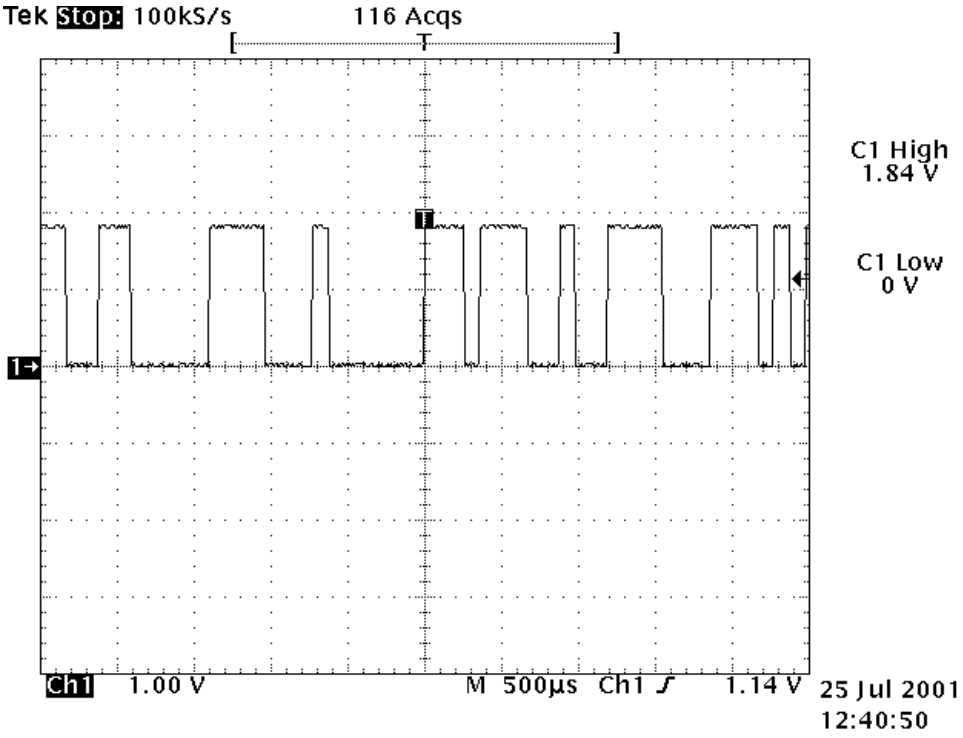


Figure 25: J410: ***MBUSRX*** (during flashing), UEM (D200 pin D6) -> UPP (D400 pin D3)

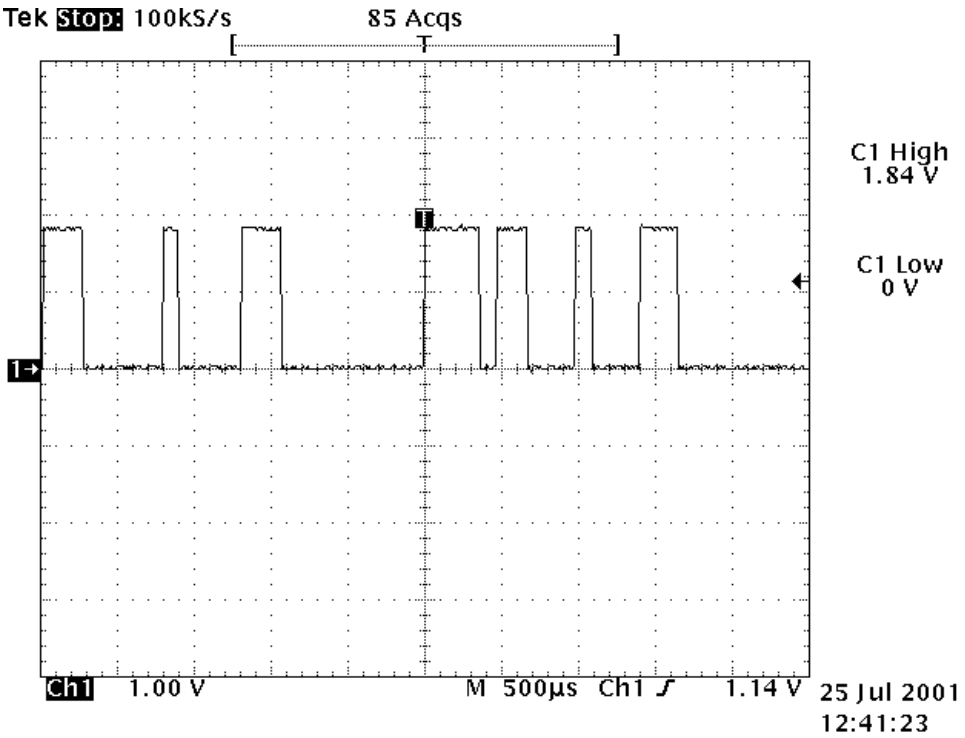


Figure 26: J411: ***FBUSTX*** (during flashing), UPP (D400 pin F1) -> UEM (D200 pin A7)

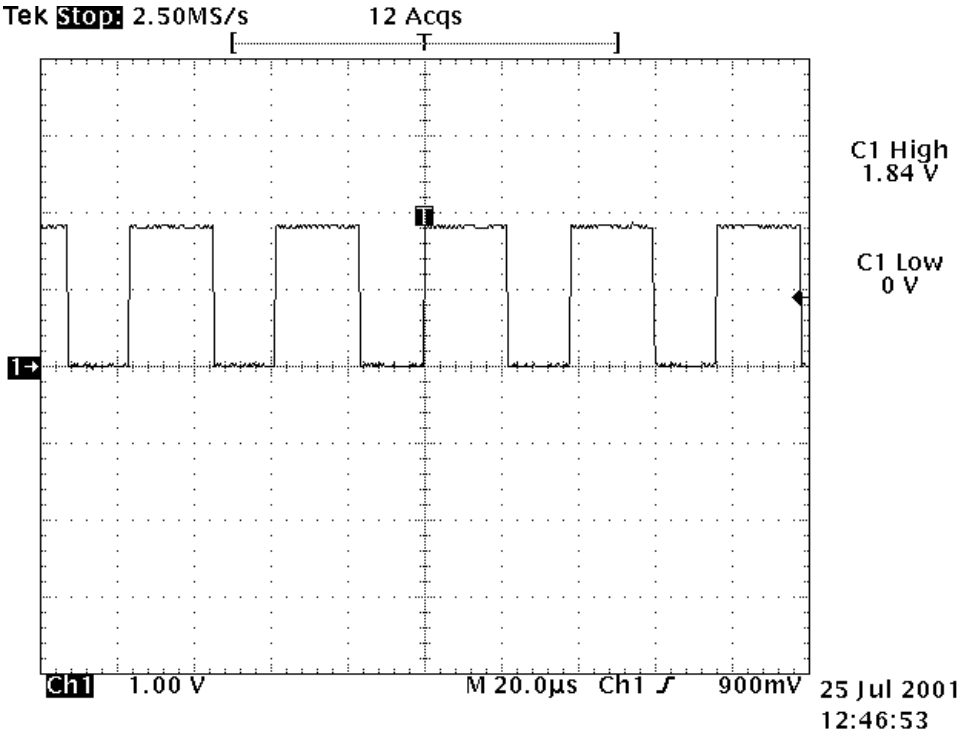


Figure 27: J412: ***FBUSRX*** (during flashing), UEM (D200 pin C7) -> UPP (D400 pin E4)

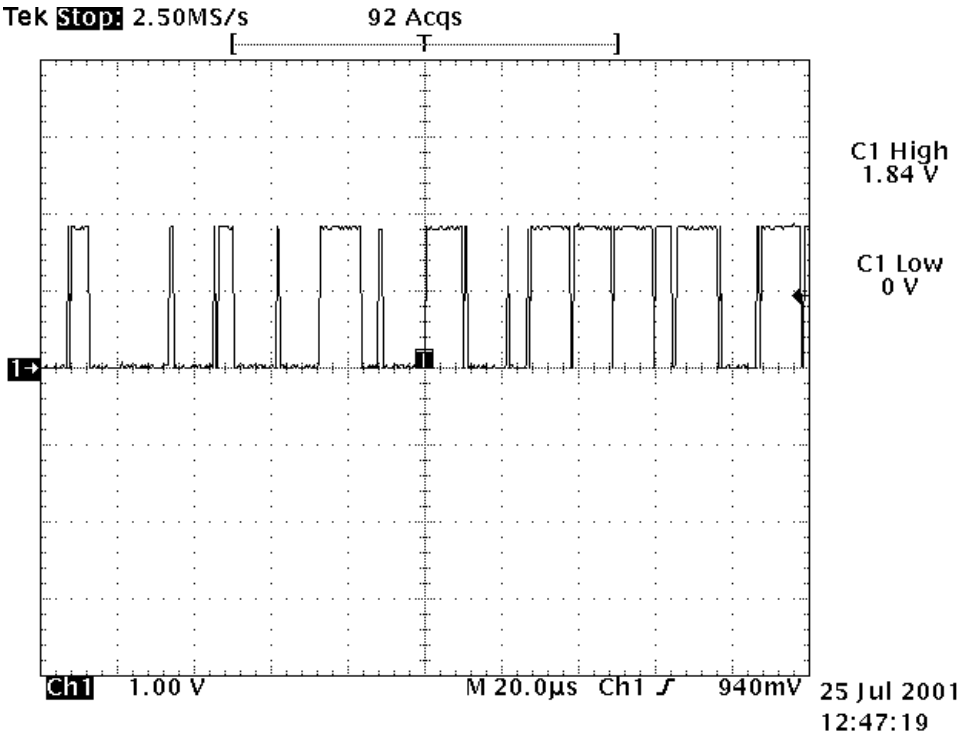


Figure 28: J413: ***DBUSCLK***, UEM (D200 pin D10) -> UPP (D400 pin K3)

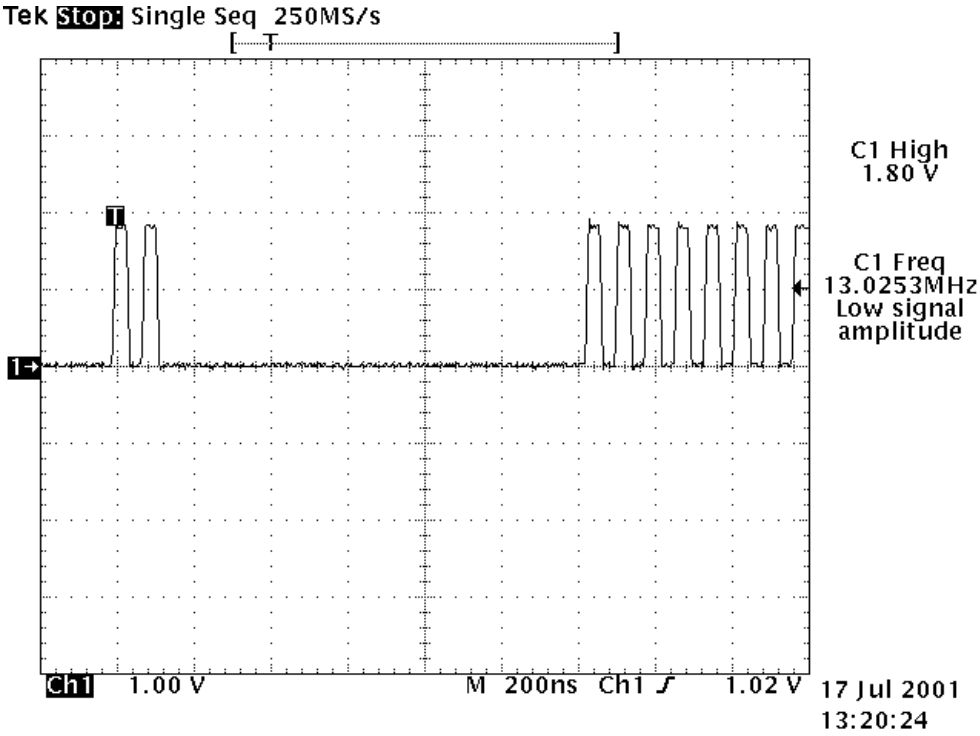


Figure 29: J414: ***DBUSDA***, UEM (D200 pin A11) <-> UPP (D400 pin L3)

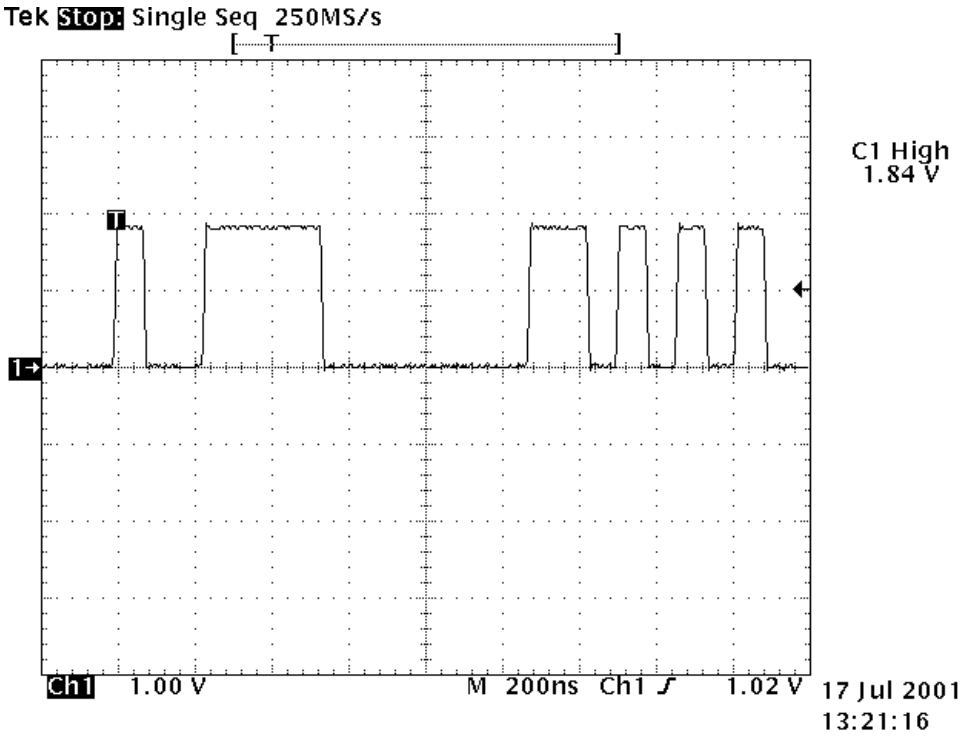


Figure 30: J415: ***DBUSENX1***, UEM (D200 pin B10) -> UPP (D400 pin J3)

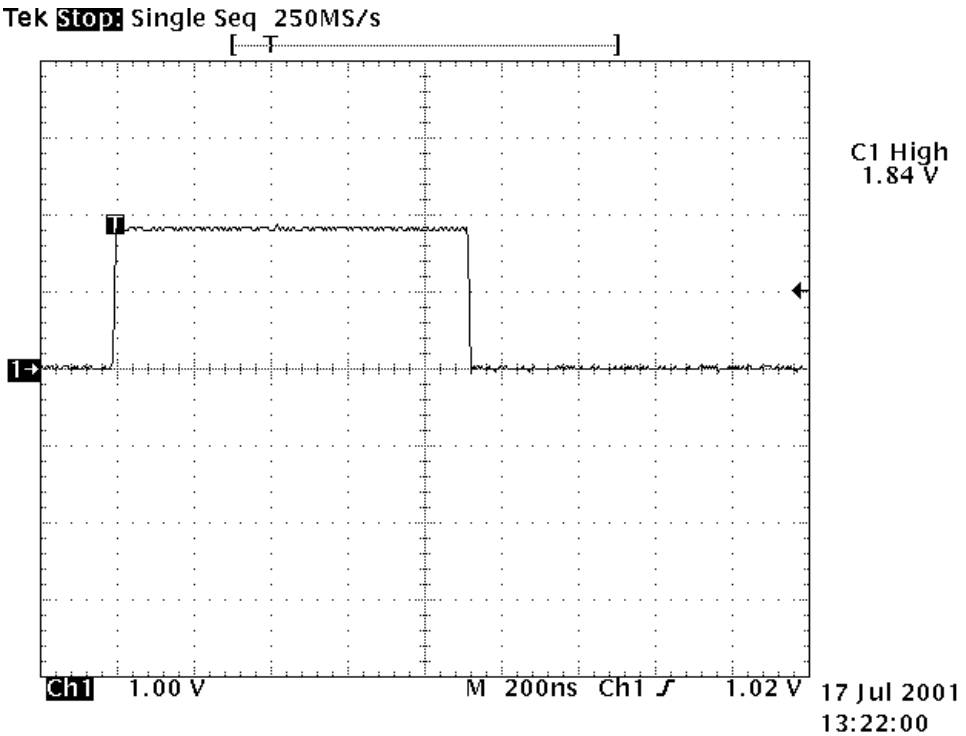


Figure 31: J416: ***EXTWRX*** (during flashing), UPP (D400 pin N9) -> FLASH (D450 pin A6)

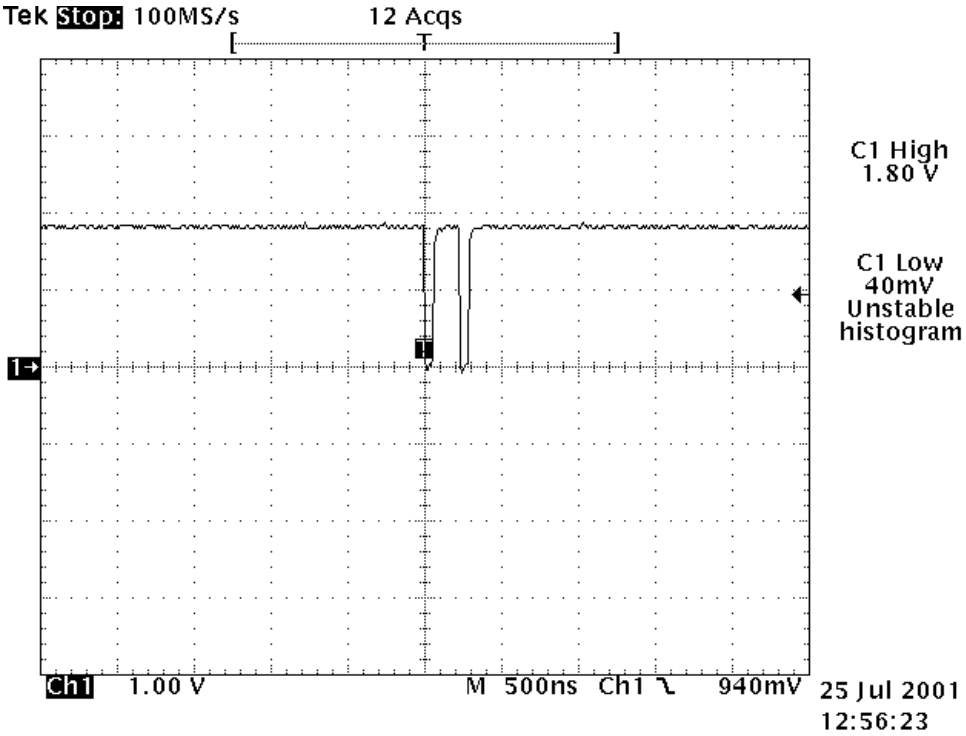


Figure 32: J417: ***EXTRDX***, UPP (D400 pin L7) -> FLASH (D450 pin C10)

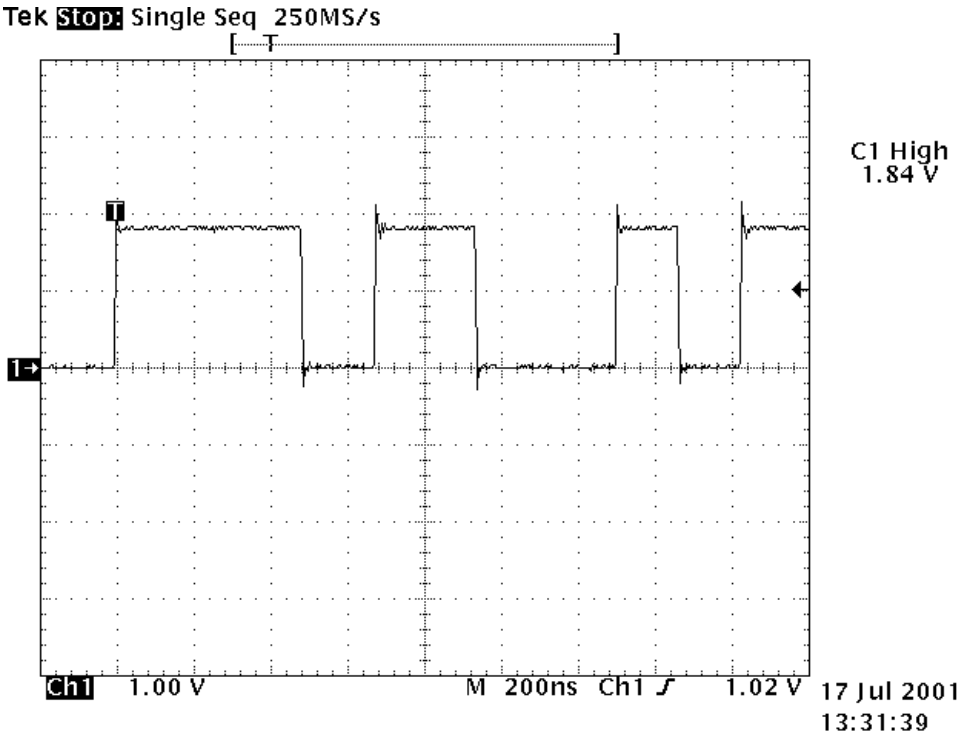


Figure 33: J419: ***FLSCLK***, UPP (D400 pin N12) -> FLASH (D450 pin A4)

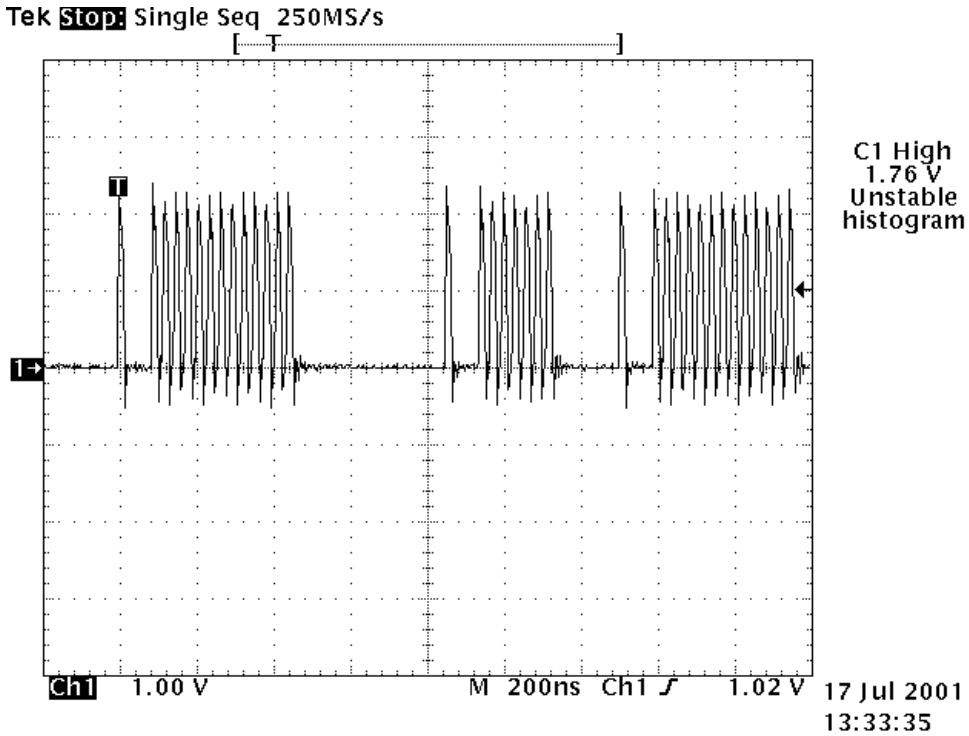


Figure 34: J420: ***FLSCSX***, UPP (D400 pin N6) -> FLASH (D450 pin B9)

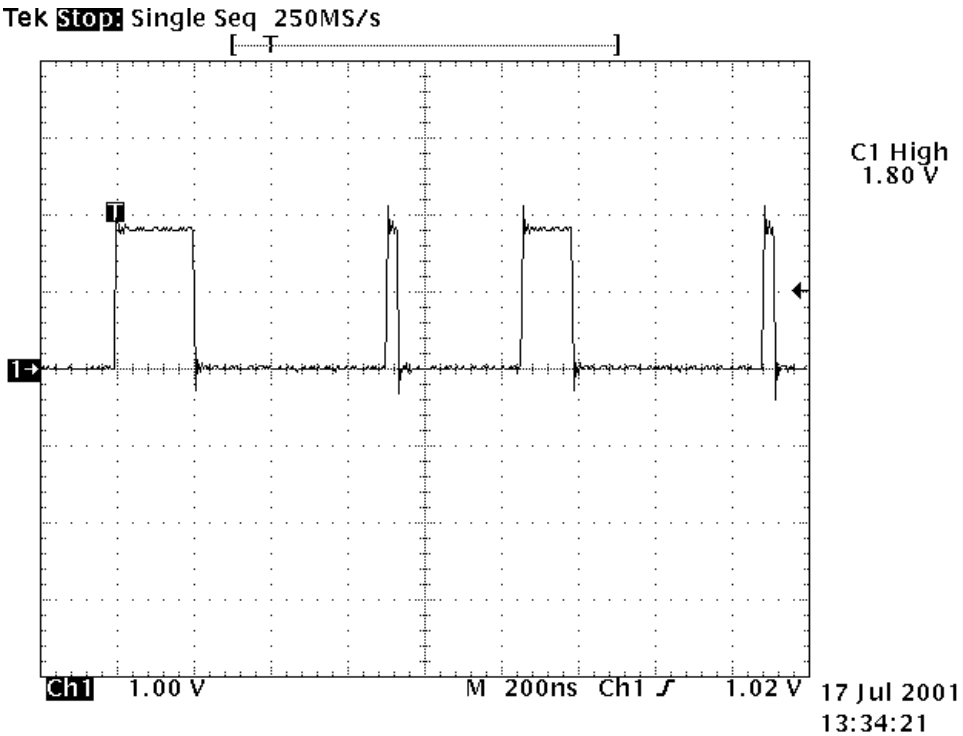


Figure 35: J700: ***TXP***, UPP (D400 pin D11) -> HAGAR (N600 pin D5)

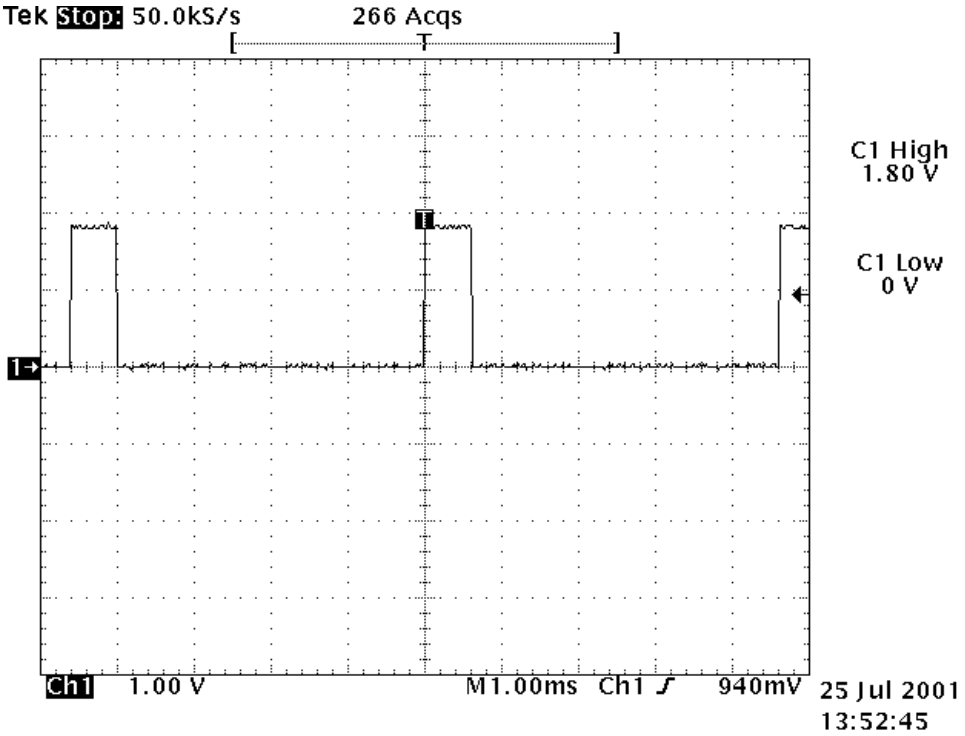


Figure 36: R301: ***PWRONX***, POWER BUTTON (S300) -> UEM (D200 pin P7)

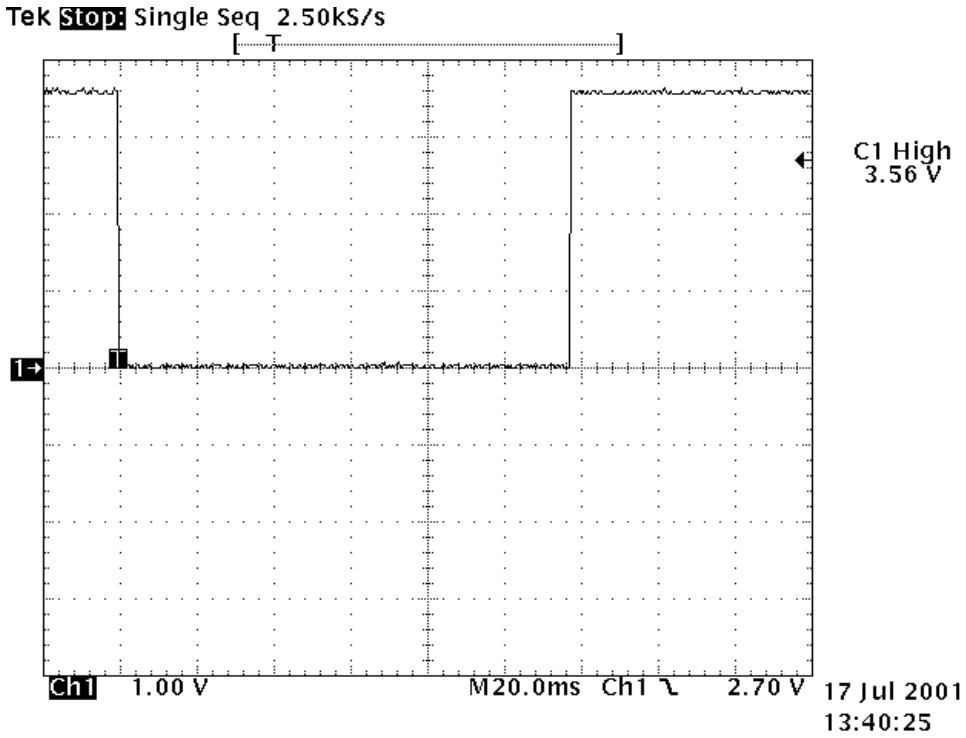


Figure 37: R305: ***KLIGHT***, UEM (D200 pin F3) -> BACKLIGHT CIRCUITRY (V300 pins 2,3,5 and V301 pins 2,5,6)

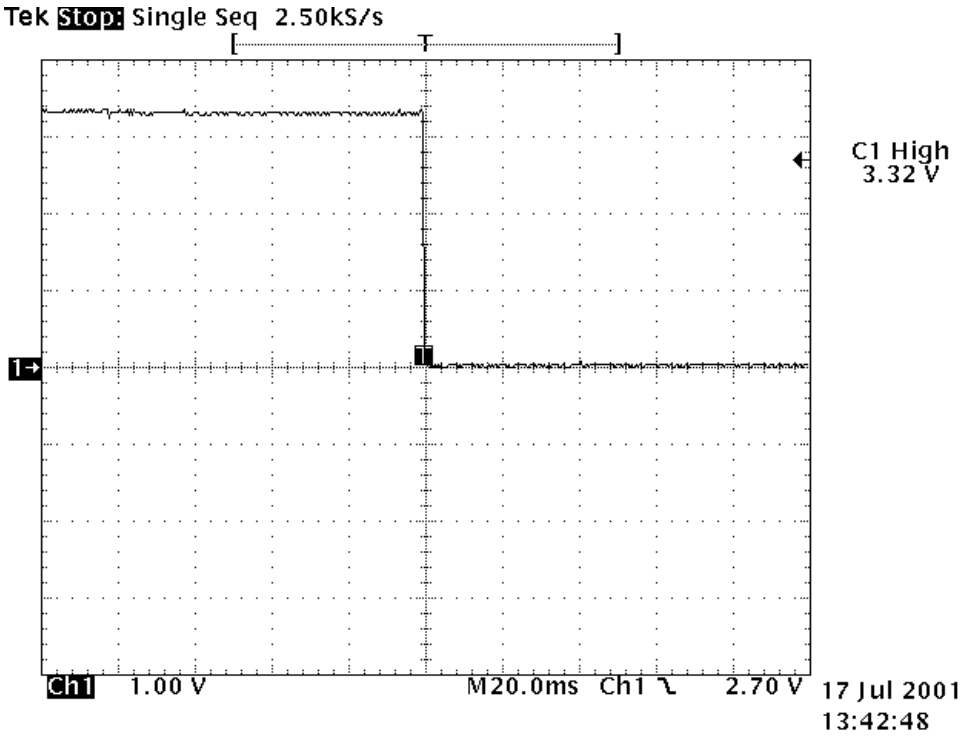


Figure 38: R420: ***RFCLK*** (13 MHz), HAGAR (N600 pin E4) -> UPP (D400 pin M5)

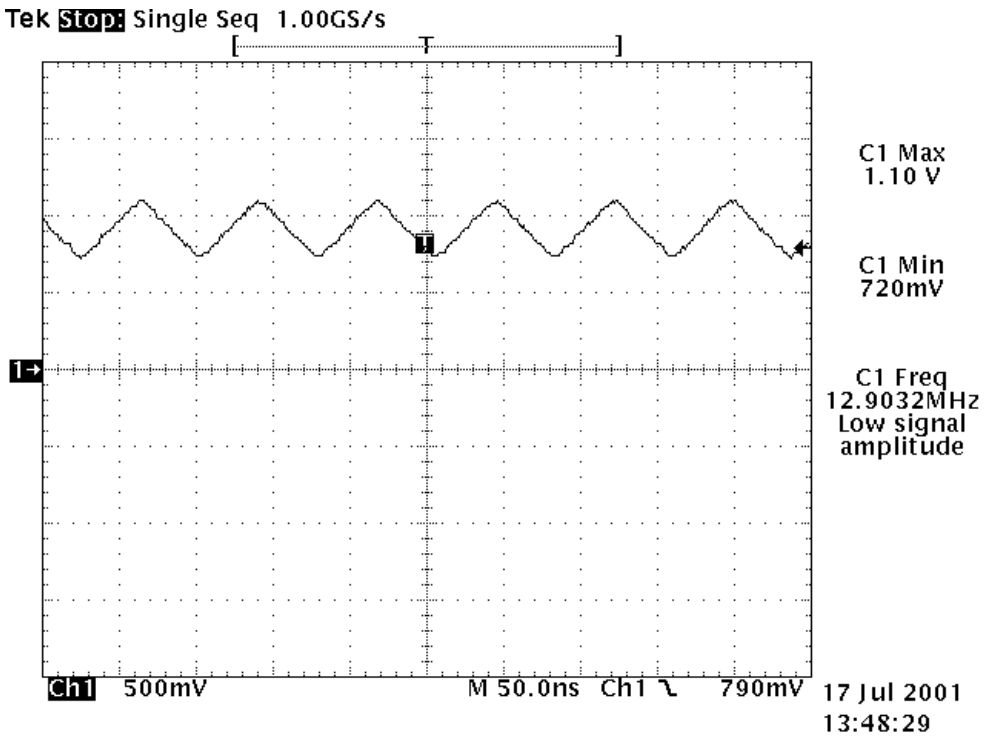


Figure 39: X100 PIN 9: ***VIBRA***, UEM (D200 pin G3) -> SYSTEM CONNECTOR (X100 pin 9)

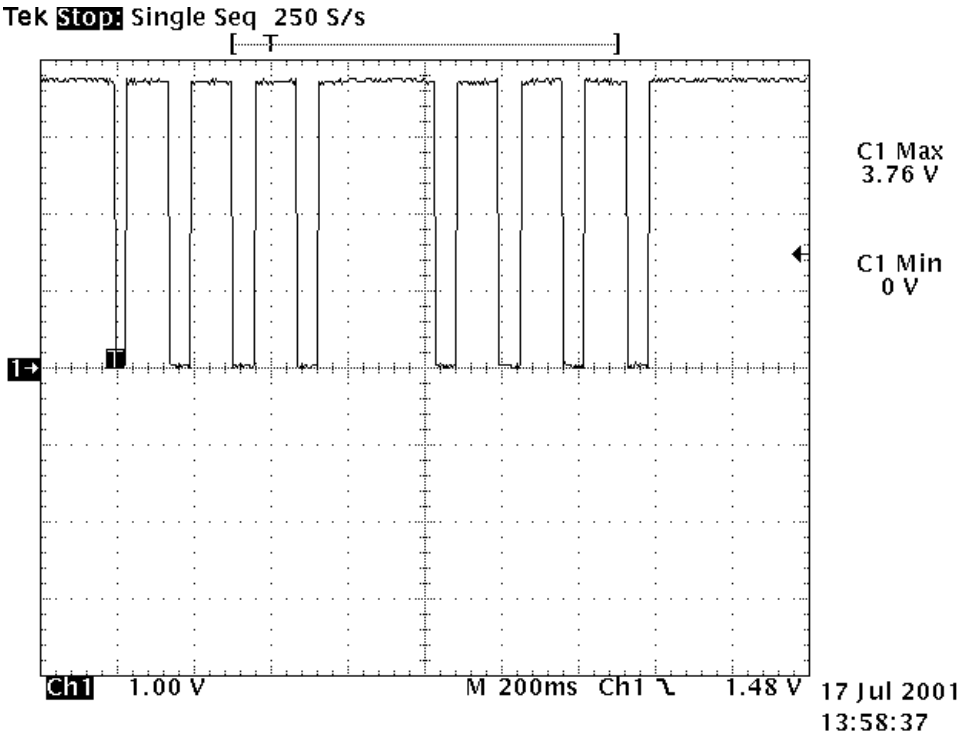


Figure 40: X300 PIN 1: ***XRES*** (startup), UPP (D400 pin A7) -> LCD CONNECTOR (X300 pin 1)

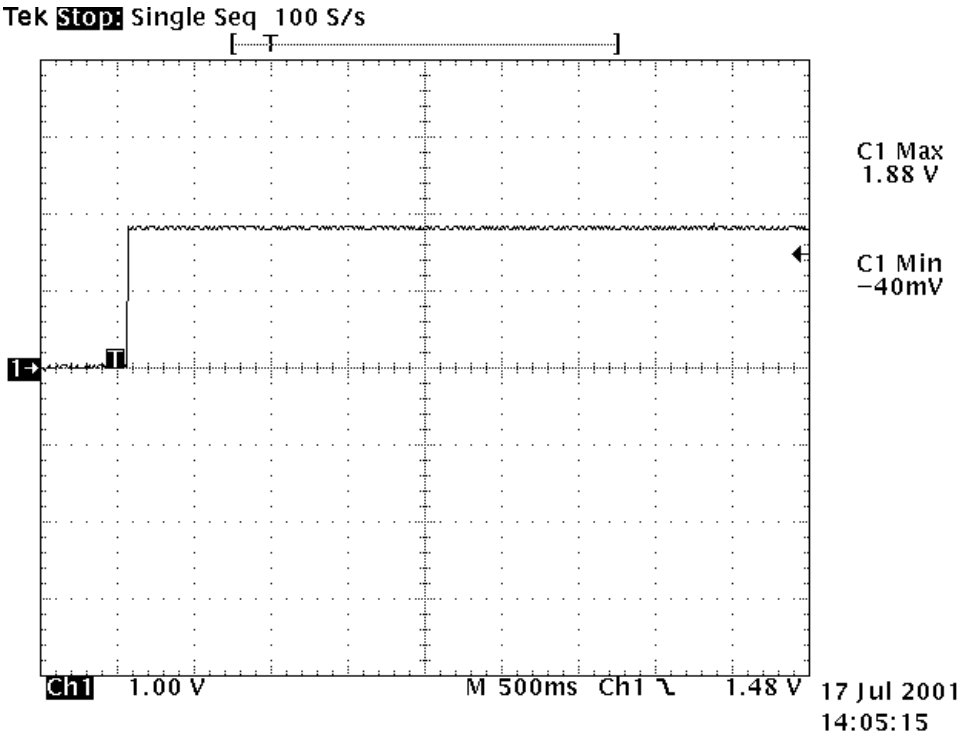


Figure 41: X300 PIN 2: ***XCS***, UPP (D400 pin C7) -> LCD CONNECTOR (X300 pin 2)

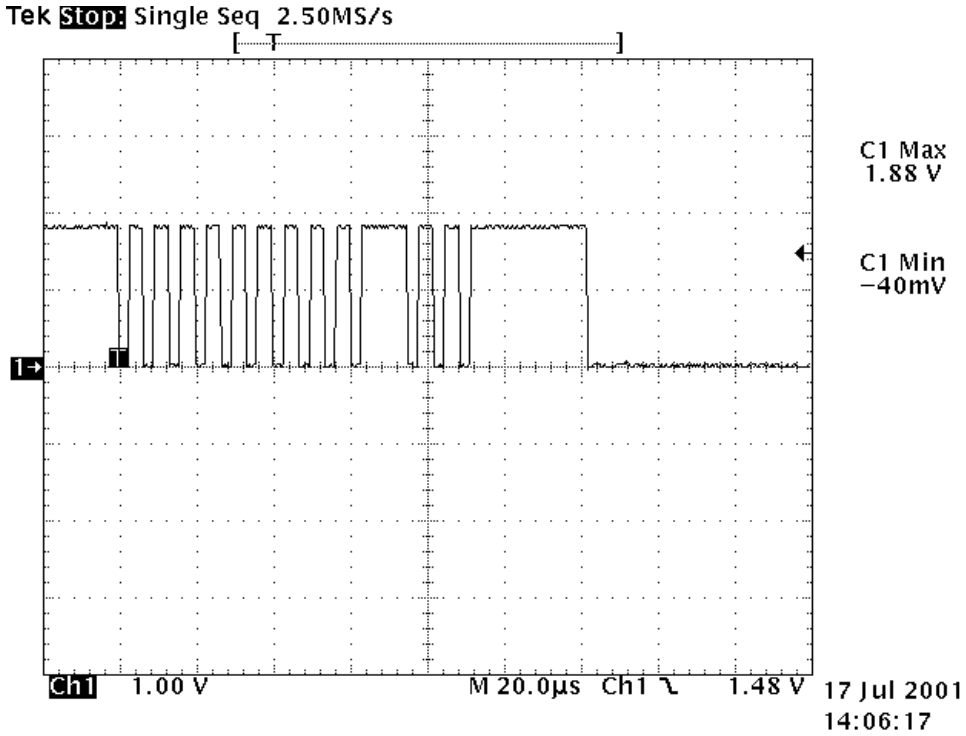


Figure 42: X300 PIN 4: ***SDA***, UPP (D400 pin B6) -> LCD CONNECTOR (X300 pin 4)

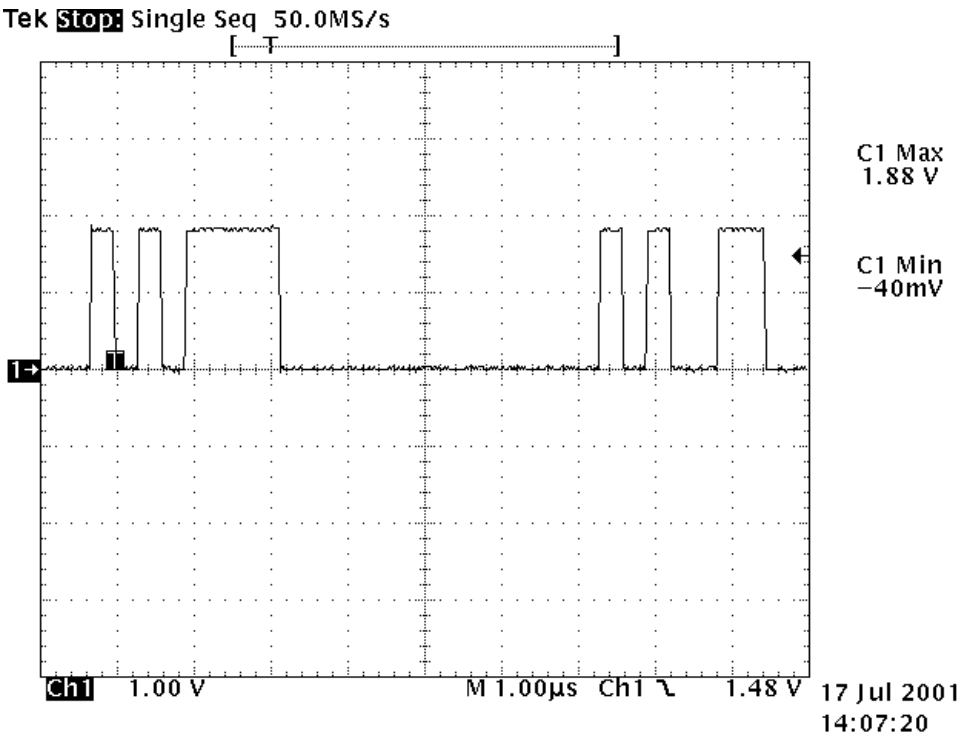


Figure 43: X300 PIN 5: ***SCLK***, UPP (D400 pin C6) -> LCD CONNECTOR (X300 pin 5)

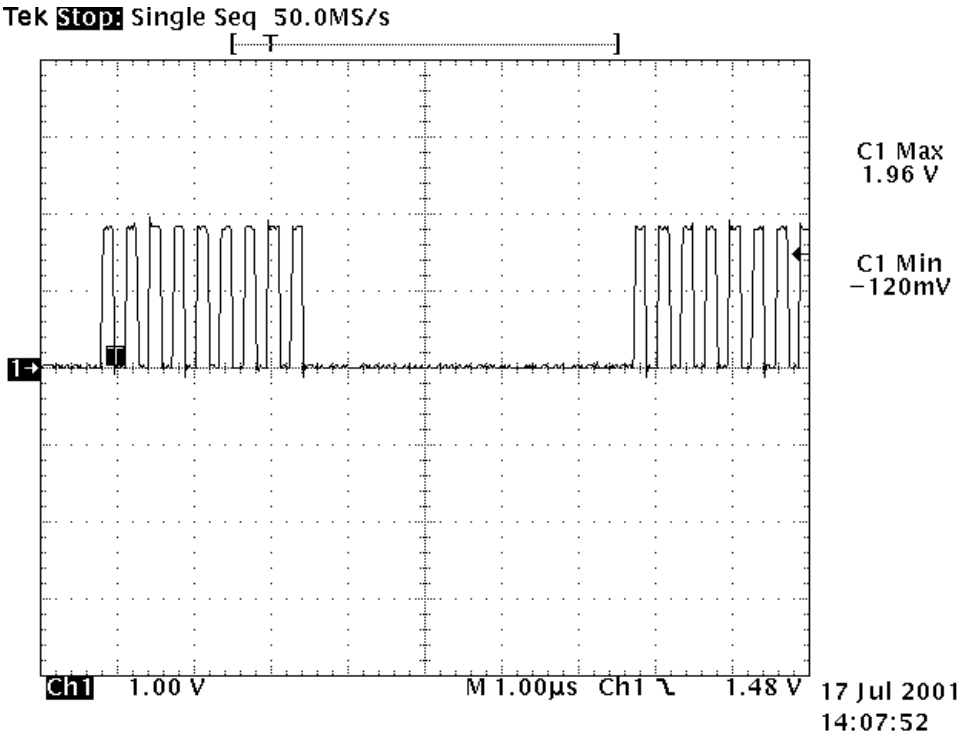


Figure 44: X300 PIN 8: ***VOUT***, LCD CONNECTOR (X300 PIN 8) -> C301 and C302

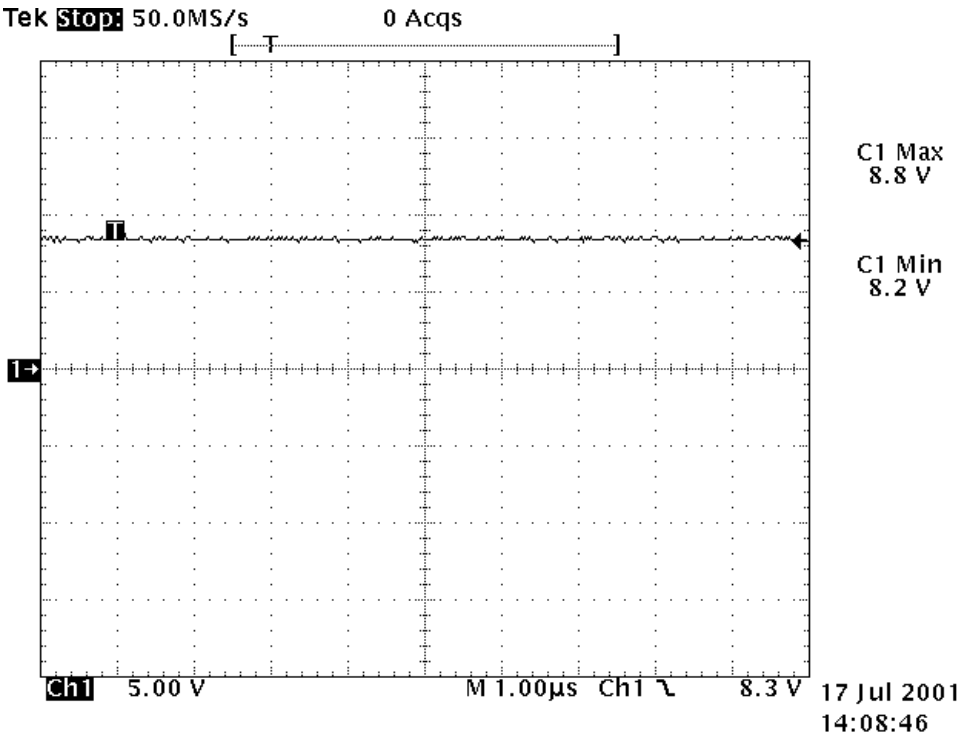
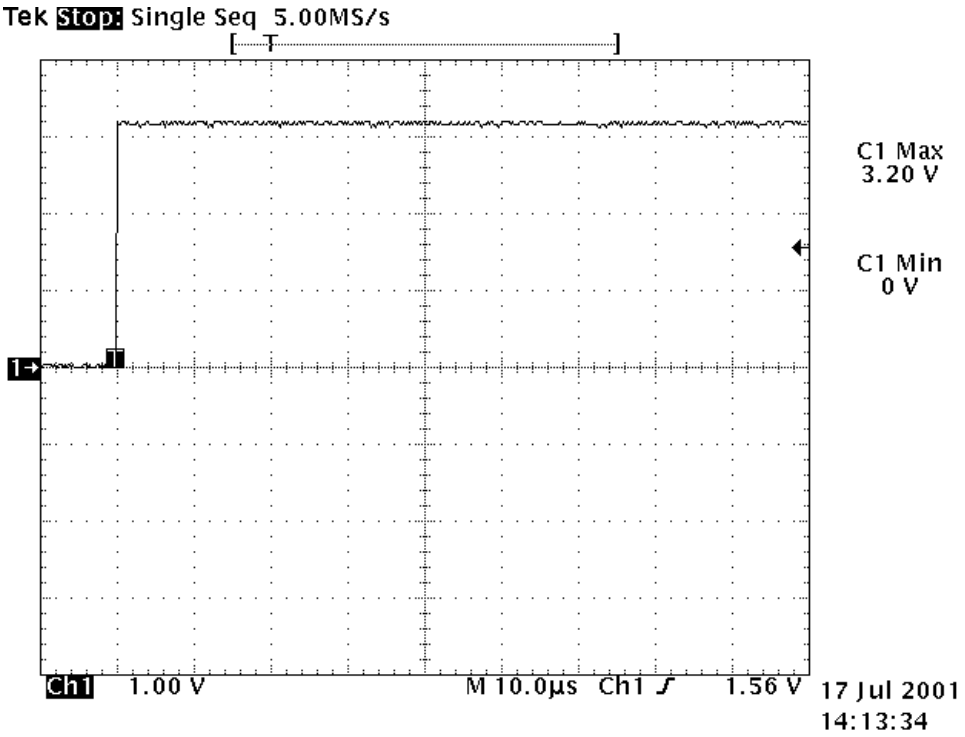


Figure 45: X303 PIN 2: ***KEYB_LIGHT***, BACKLIGHT CIRCUITRY (V300 pin 6) -> UI CONNECTOR (X303 pin 2)



Troubleshooting steps

The following hints should help to find the cause of the problem when the circuitry seems to be faulty. This trouble shooting instruction is divided into sections.

1 Phone is totally dead

2 Power does not stay on or the phone is jammed

3 Flash programming does not work

4 Display is not working

5 Plug in SIM card is out of order (insert SIM card).

6 Audio fault

7 Charging fault

The first thing to do is carry out a through visual check of the module. Ensure in particular that:

a) there are no mechanical damages

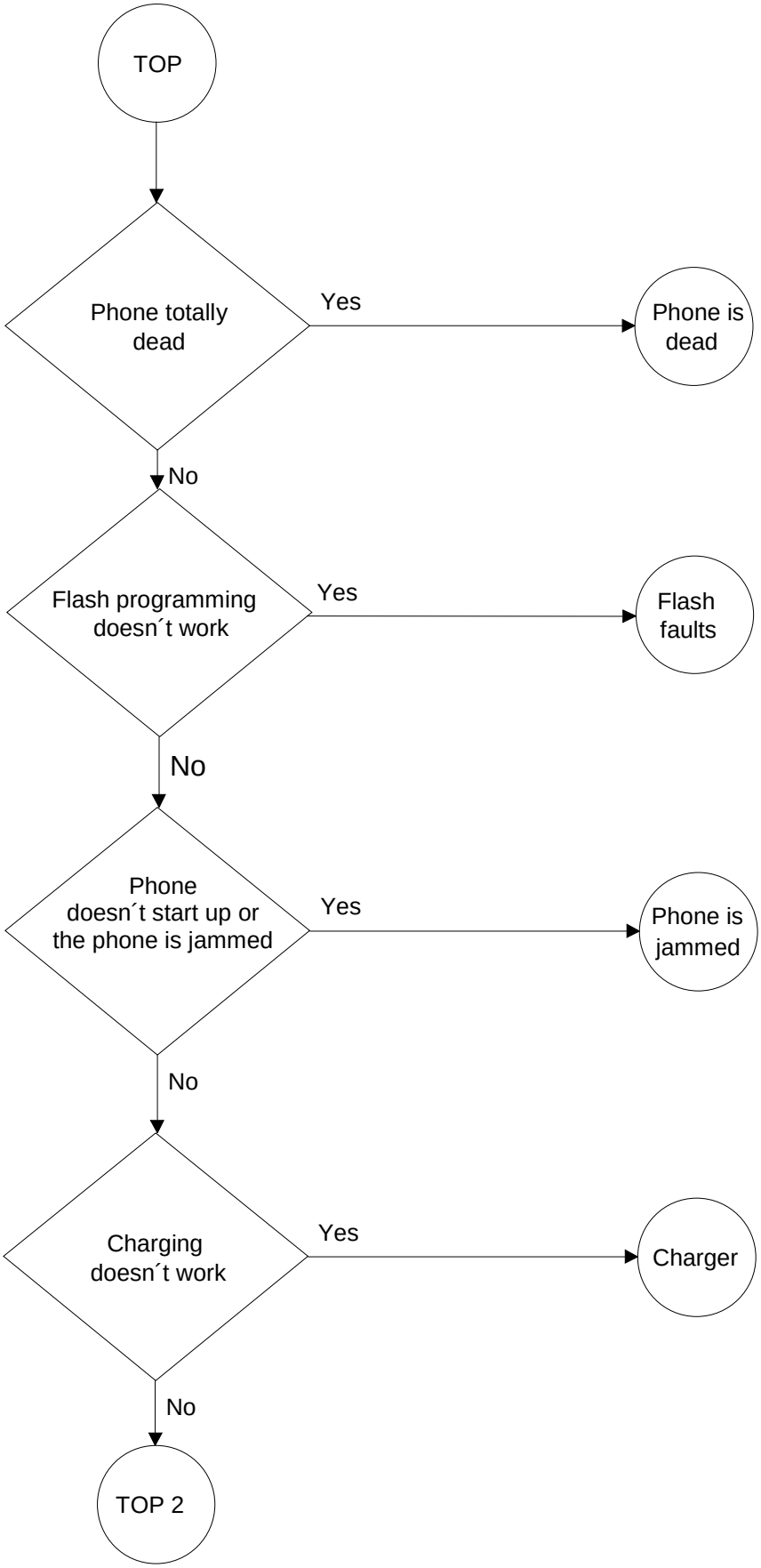
b) soldered joints are OK.

General instructions

Most semiconductors are static discharge sensitive! ESD protection must be taken care of during repair (ground straps and ESD soldering irons). HAGAR, PA, UEM, UPP, and Flash are moisture sensitive and must be pre-baked prior to soldering, if they have been out of their vacuum package longer than the specified time.

- Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with AXS-4 serial cable.
- Make sure that you have PKD-1 dongle connected to computer's parallel port.
- Connect DC power supply to module test jig with FLC-2 cable.
- Set the DC supply voltage to 3.9 V and set the module test jig (MJS-46) jumper connector to "bypass" position. VBAT must not exceed 5.15 V to avoid damaging the power amplifier (PA), if PA is active.
    - MJS-46's current consumption is ~ 9 mA. Note that MJS-46 is not protected against reverse voltage and there is a 2 A fuse which may blow if the phone is shortcircuited.
- When doing BB energy management (EM) calibrations use JBV-1 jig and DC supply voltage 12 – 15 V.
    - JBV-1's current consumption is ~ 40 mA with 3.9 V supply voltage and ~ 80 mA with 15 V supply voltage.
- Set the phone module to test jig and start Phoenix service software. Initialize connection to phone (use FBUS driver when using DAU-9S and COMBOX driver when using FPS-8).

Figure 46: Troubleshooting: Top



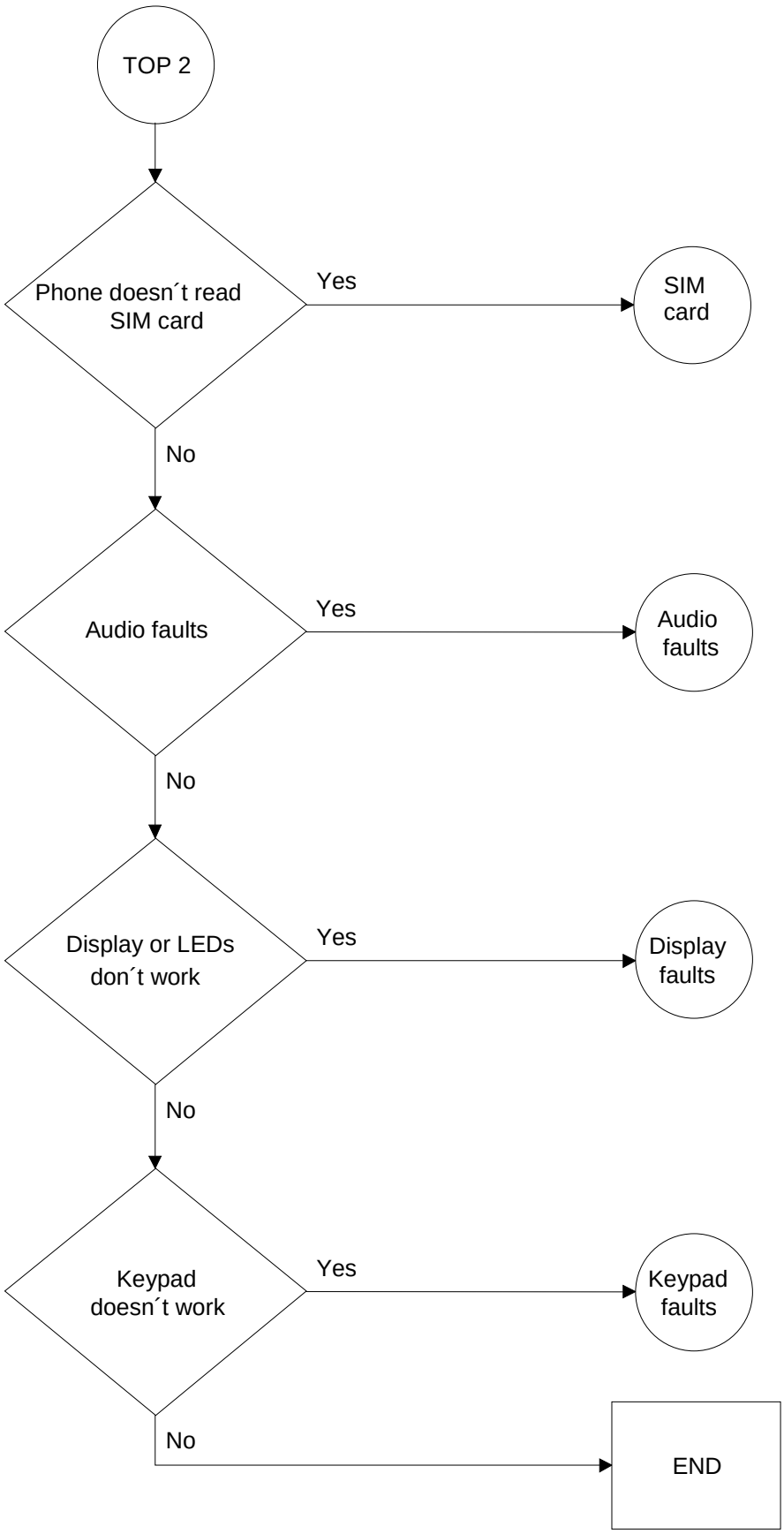


Figure 47: Phone is dead

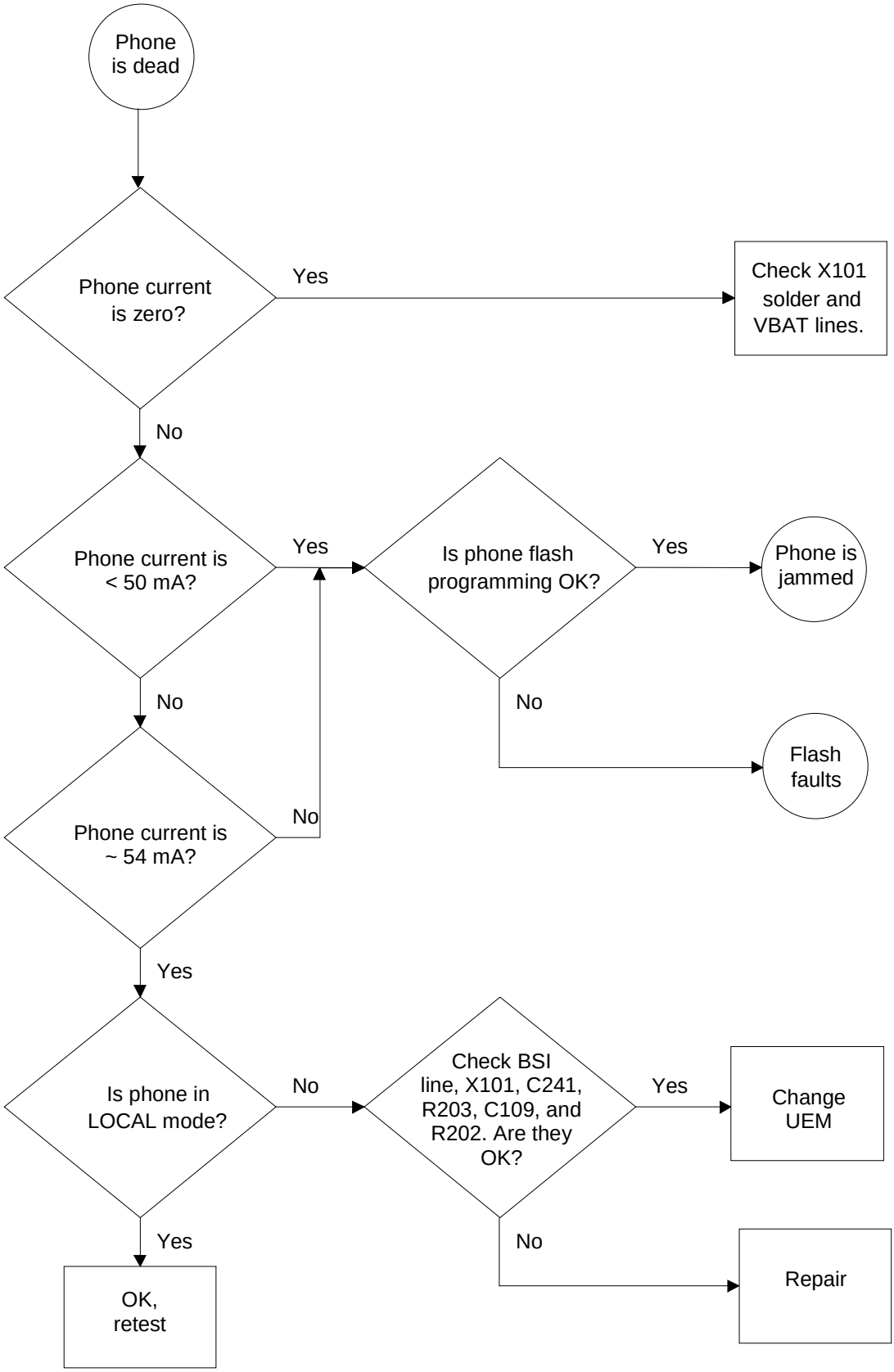
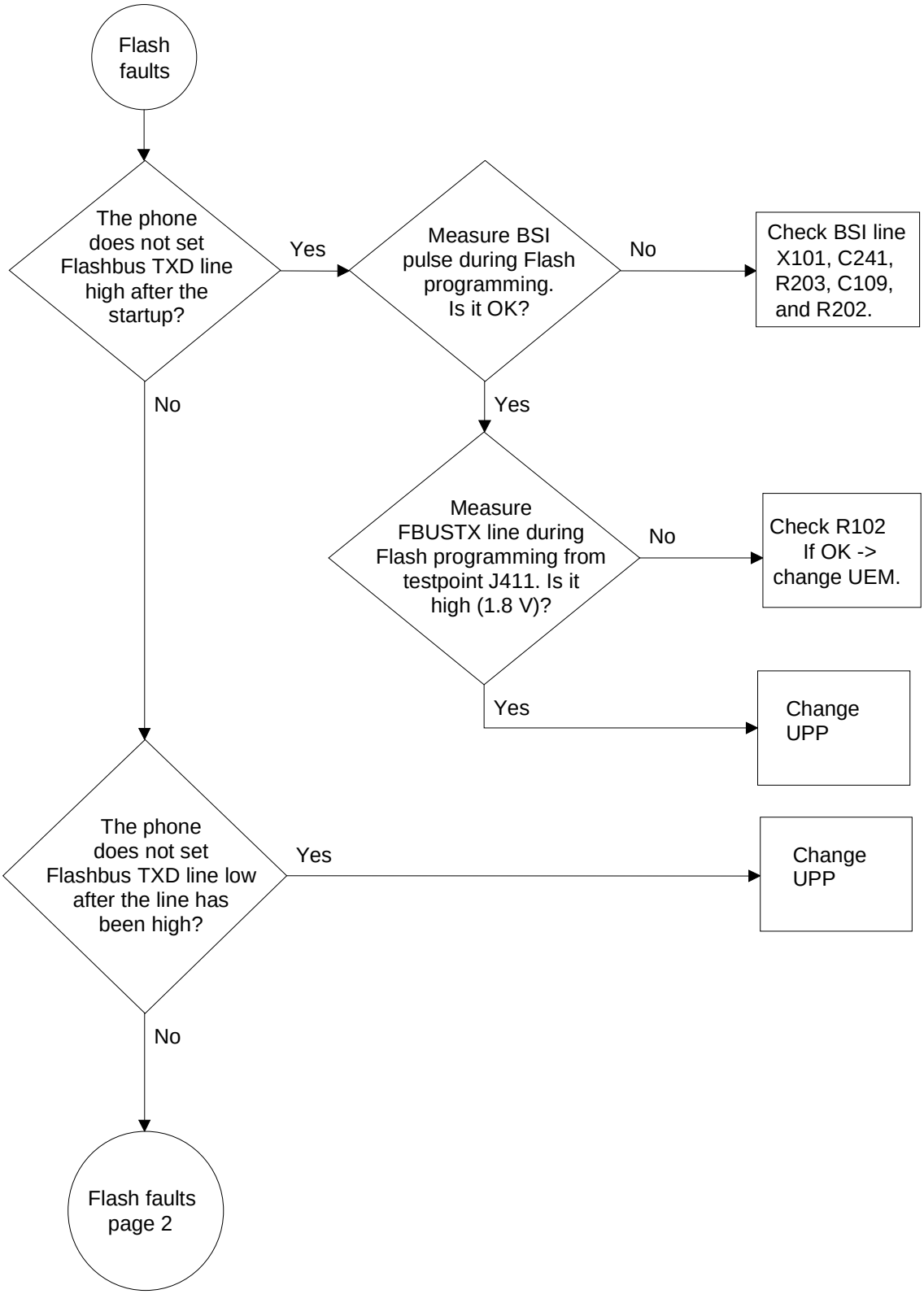


Figure 48: Flash Faults



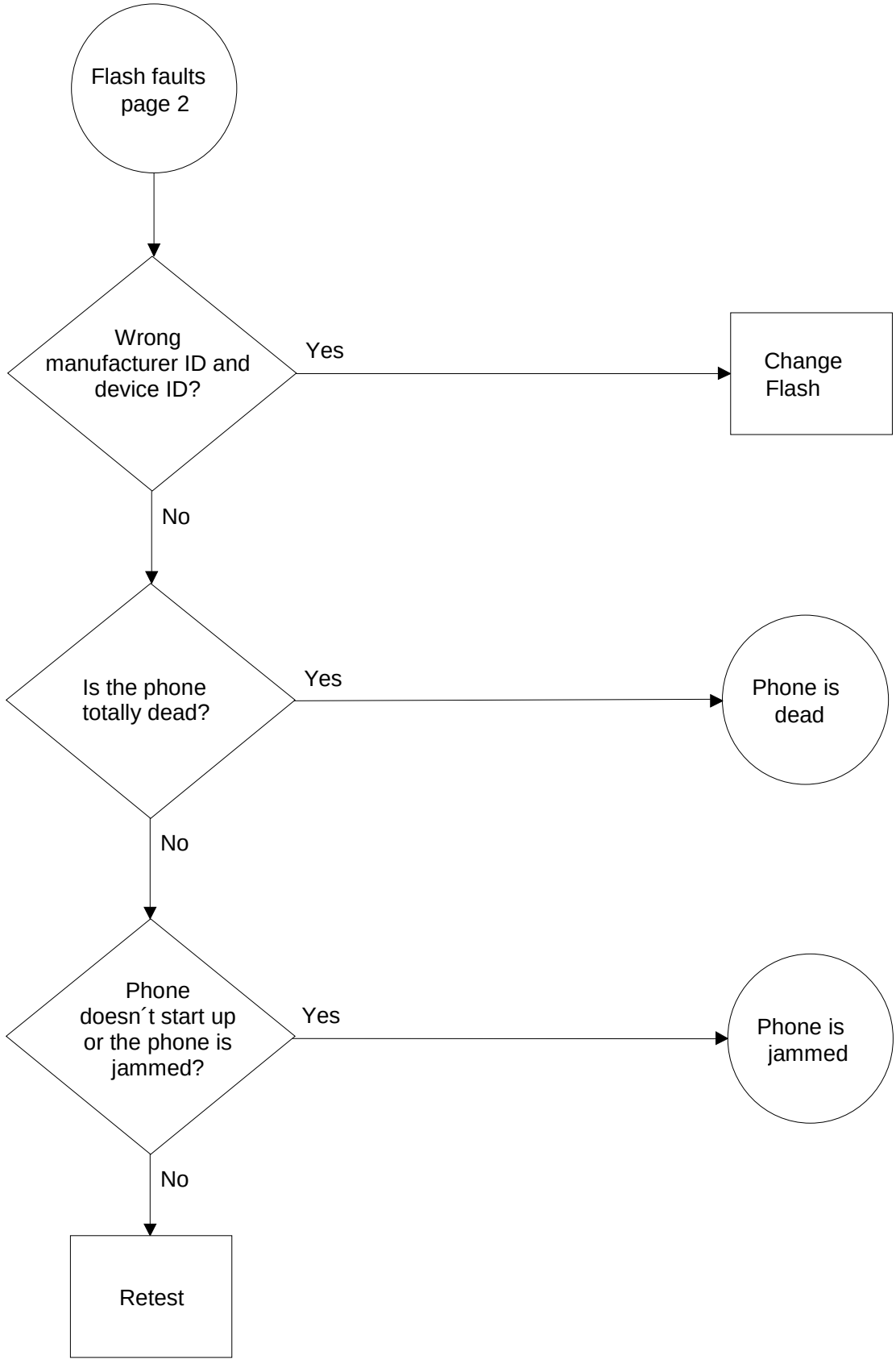
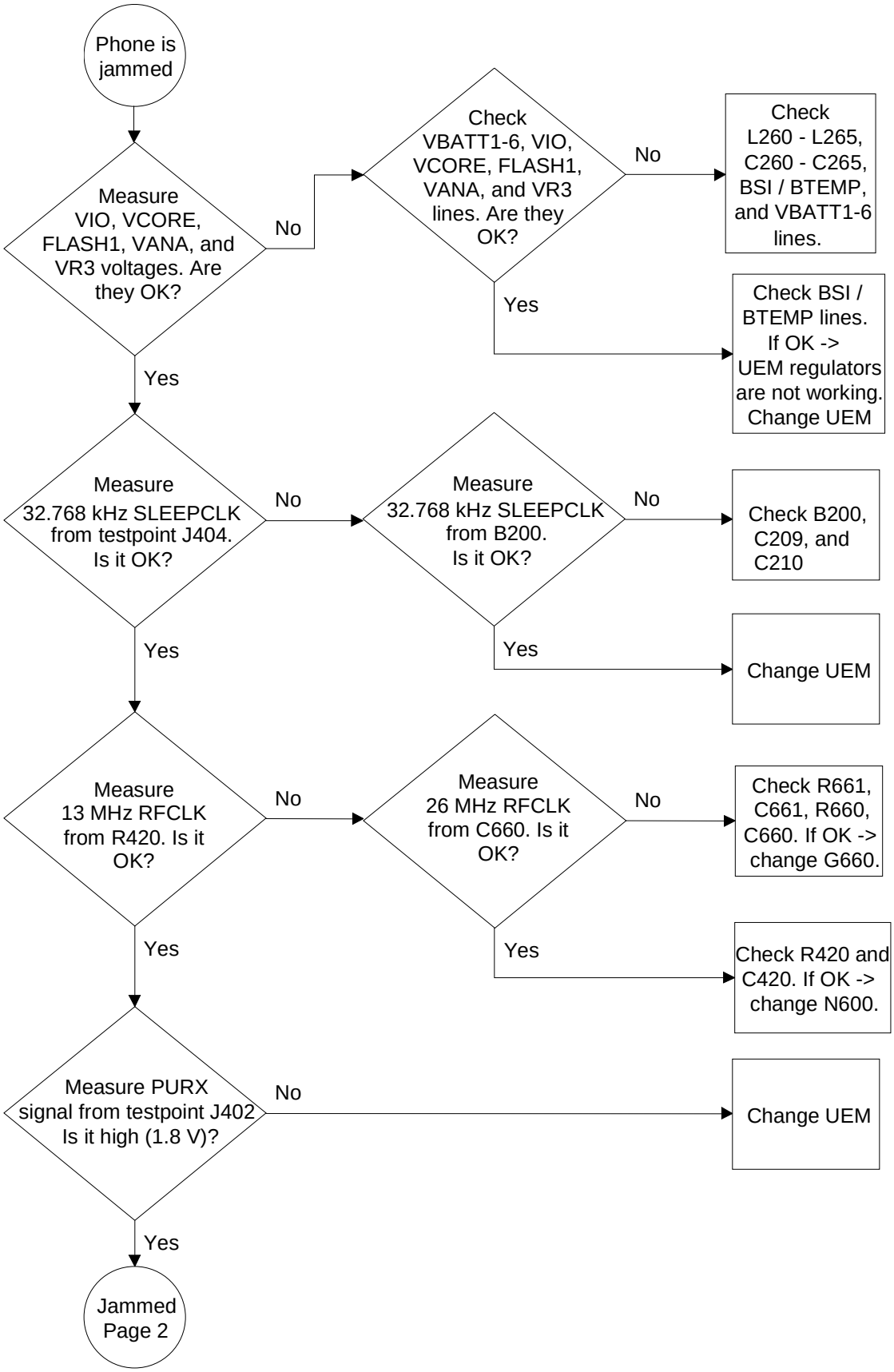


Figure 49: Phone is jammed



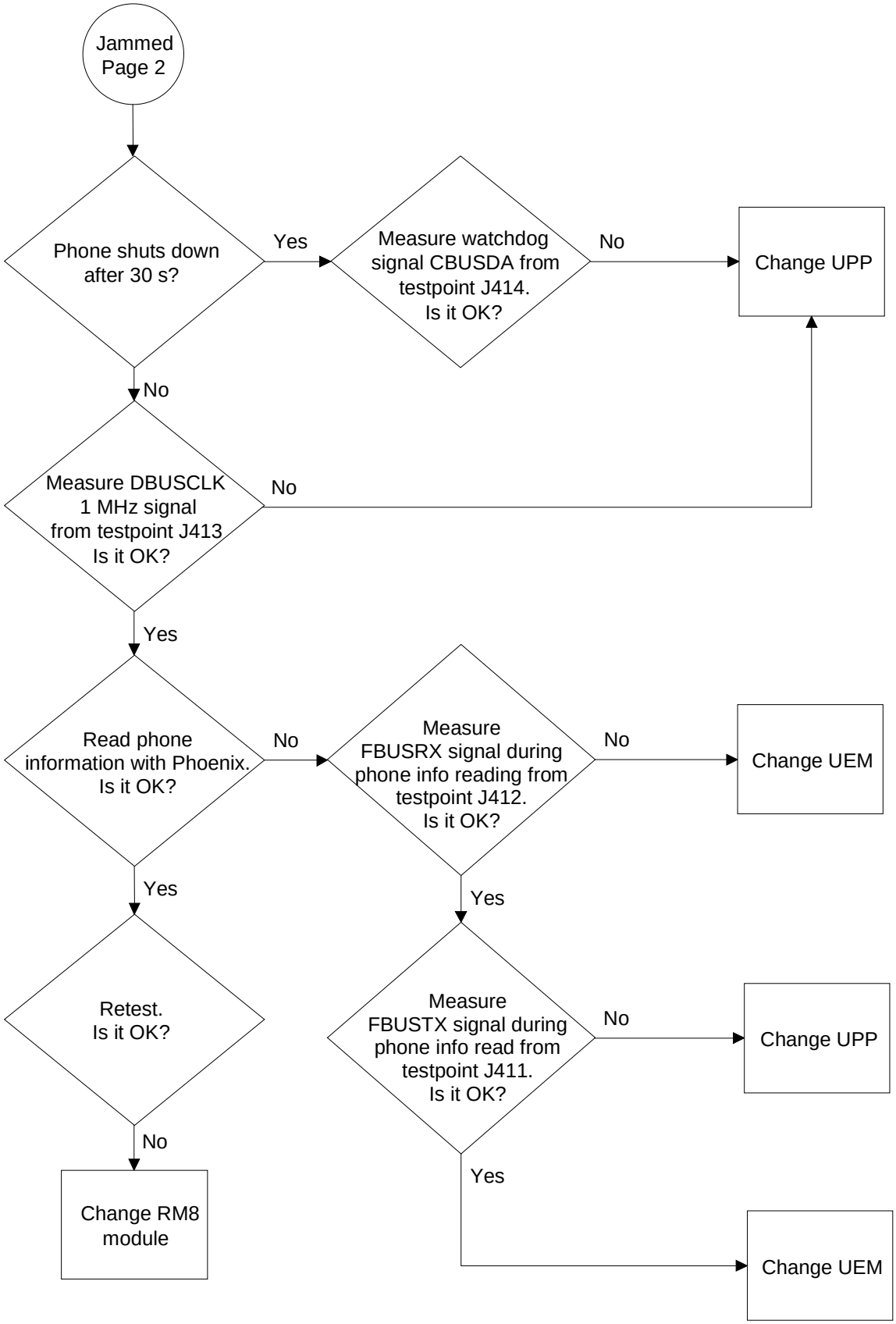


Figure 50: Charging Faults

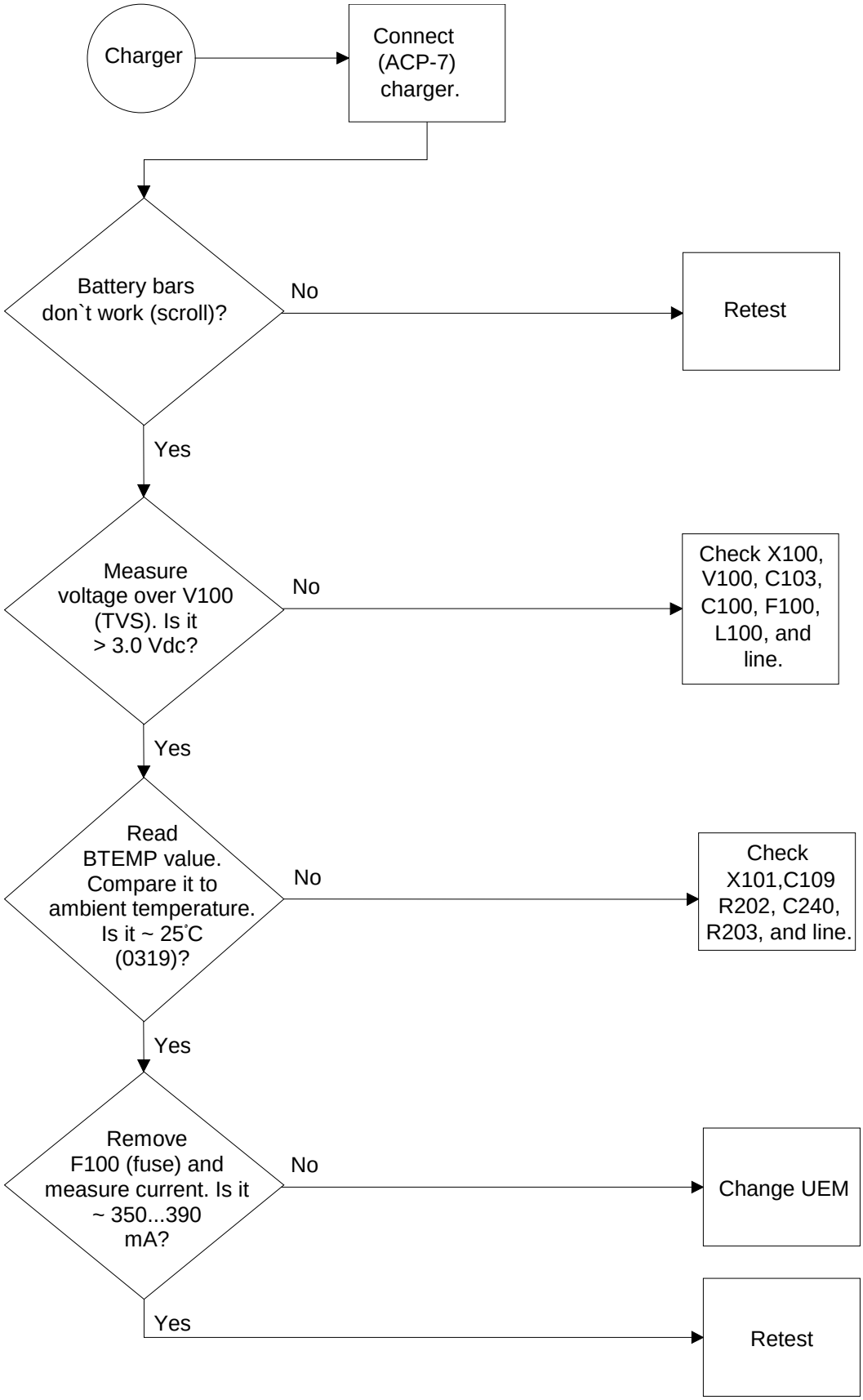


Figure 51: SIM Card

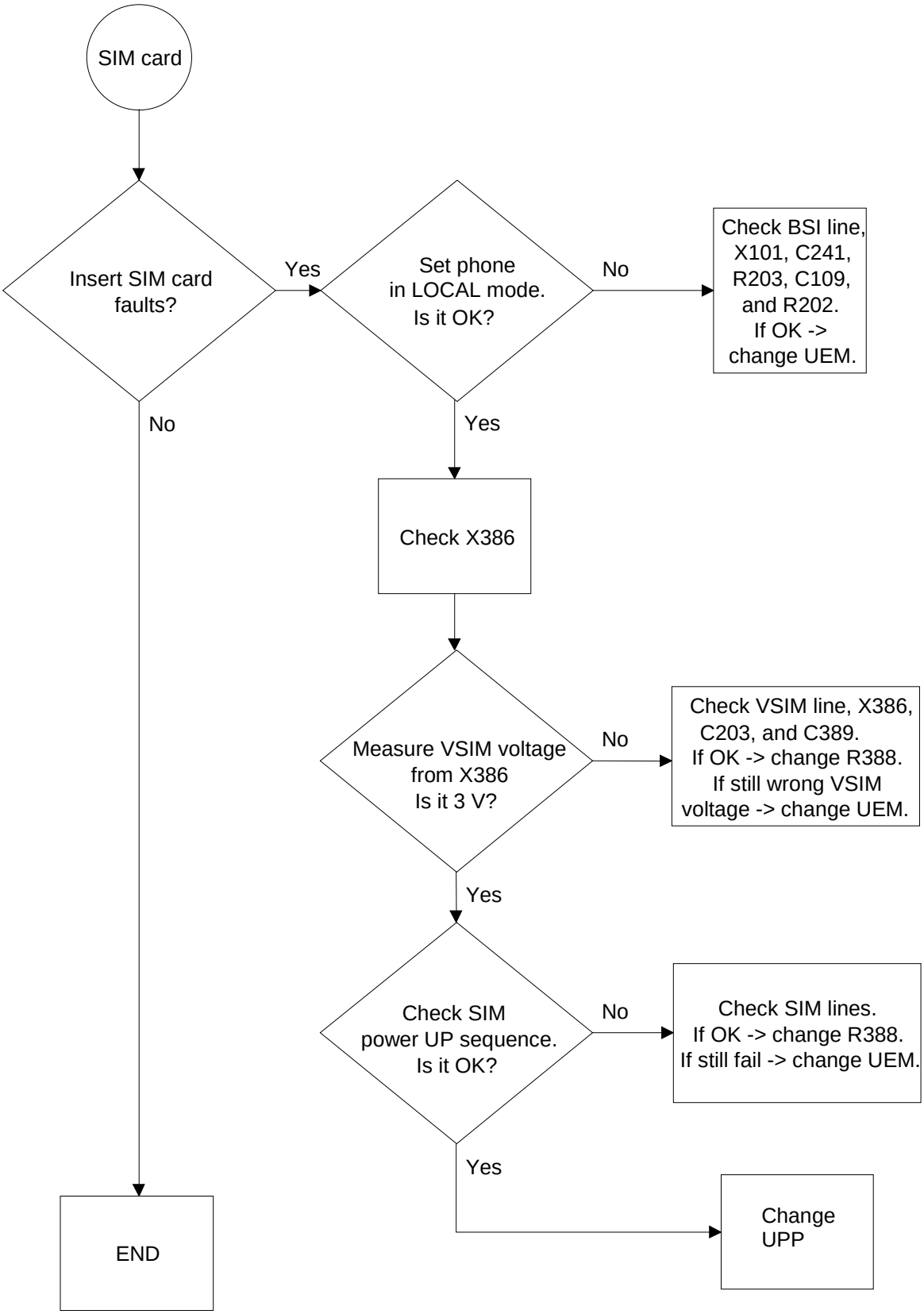
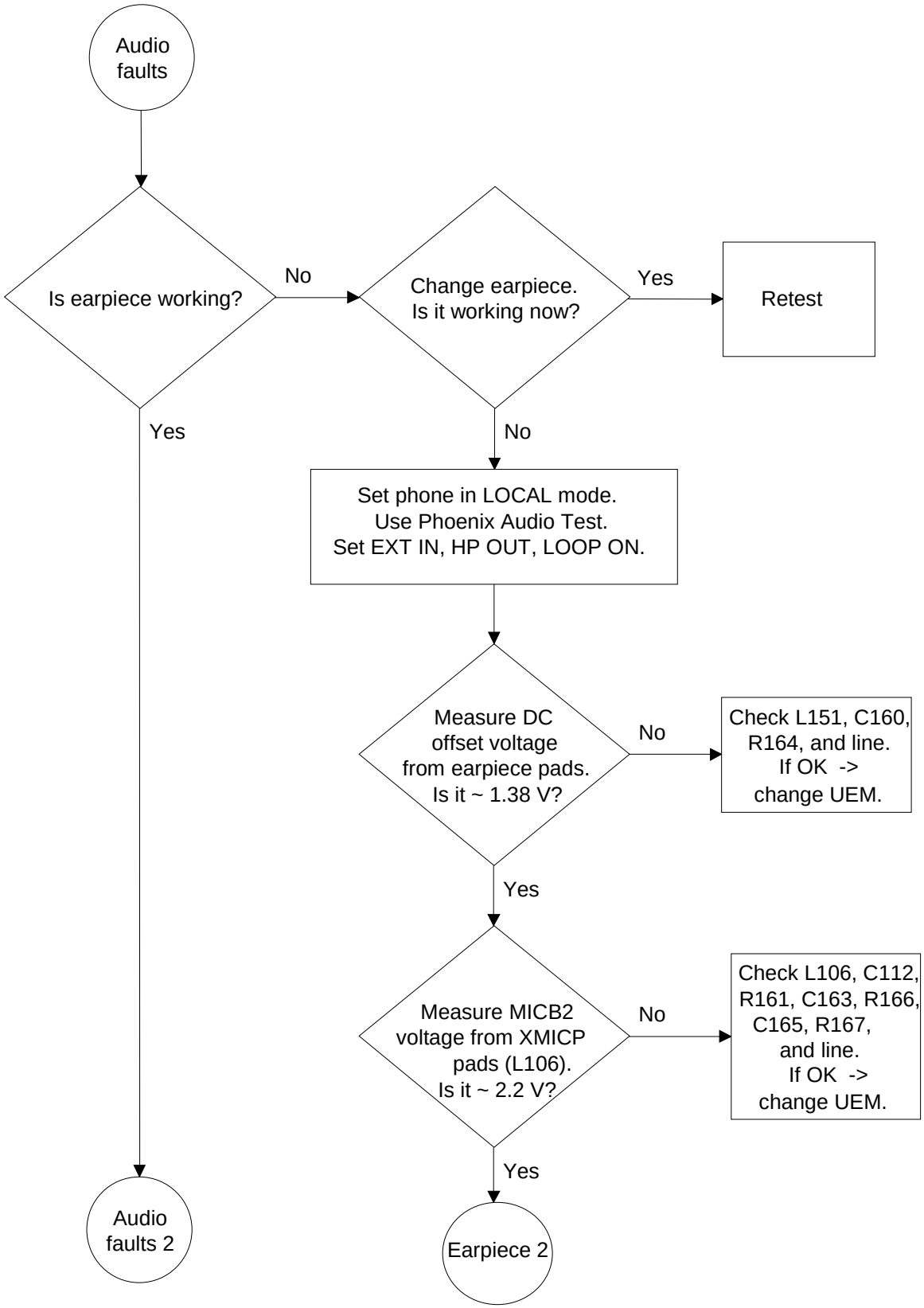
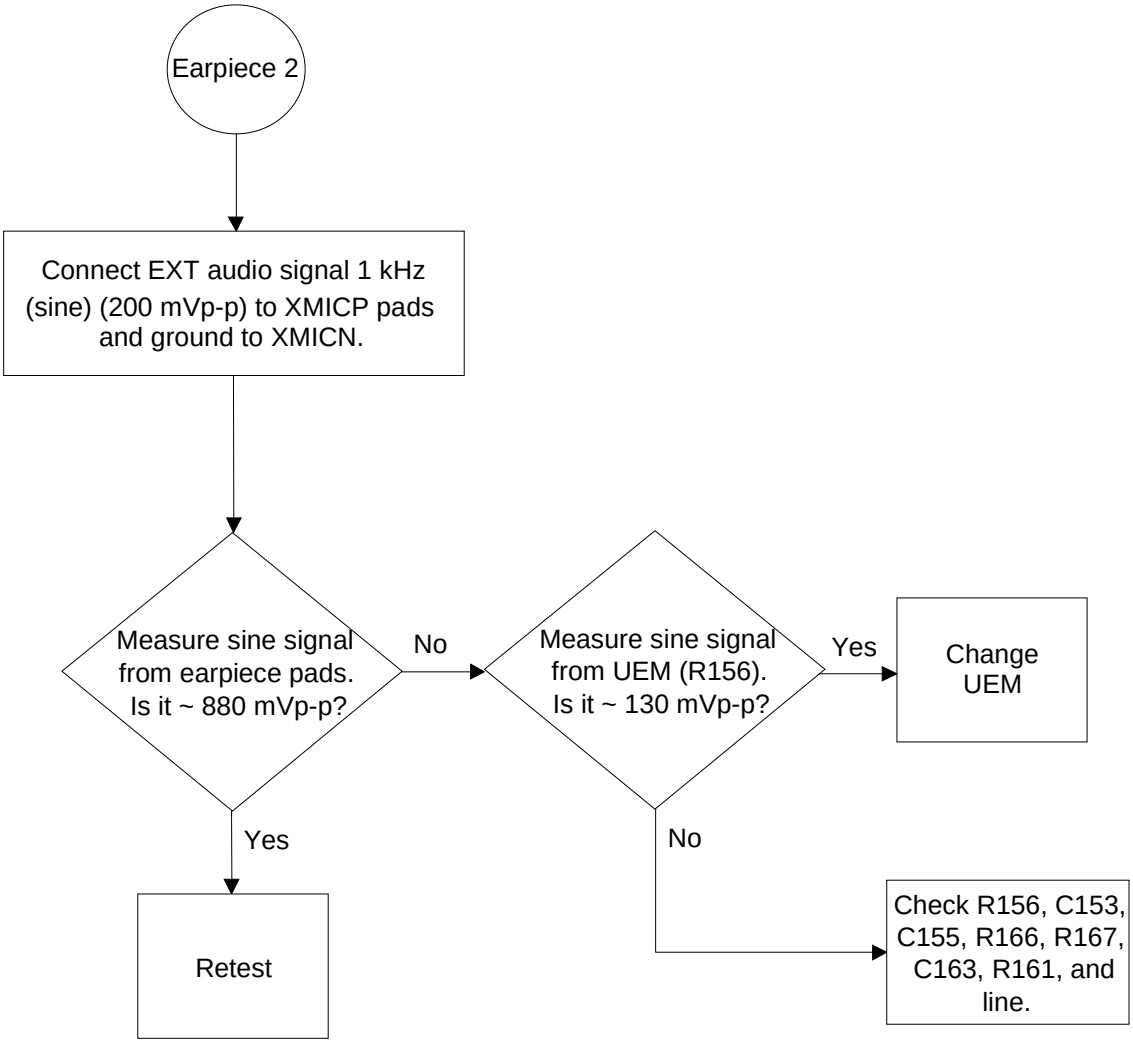
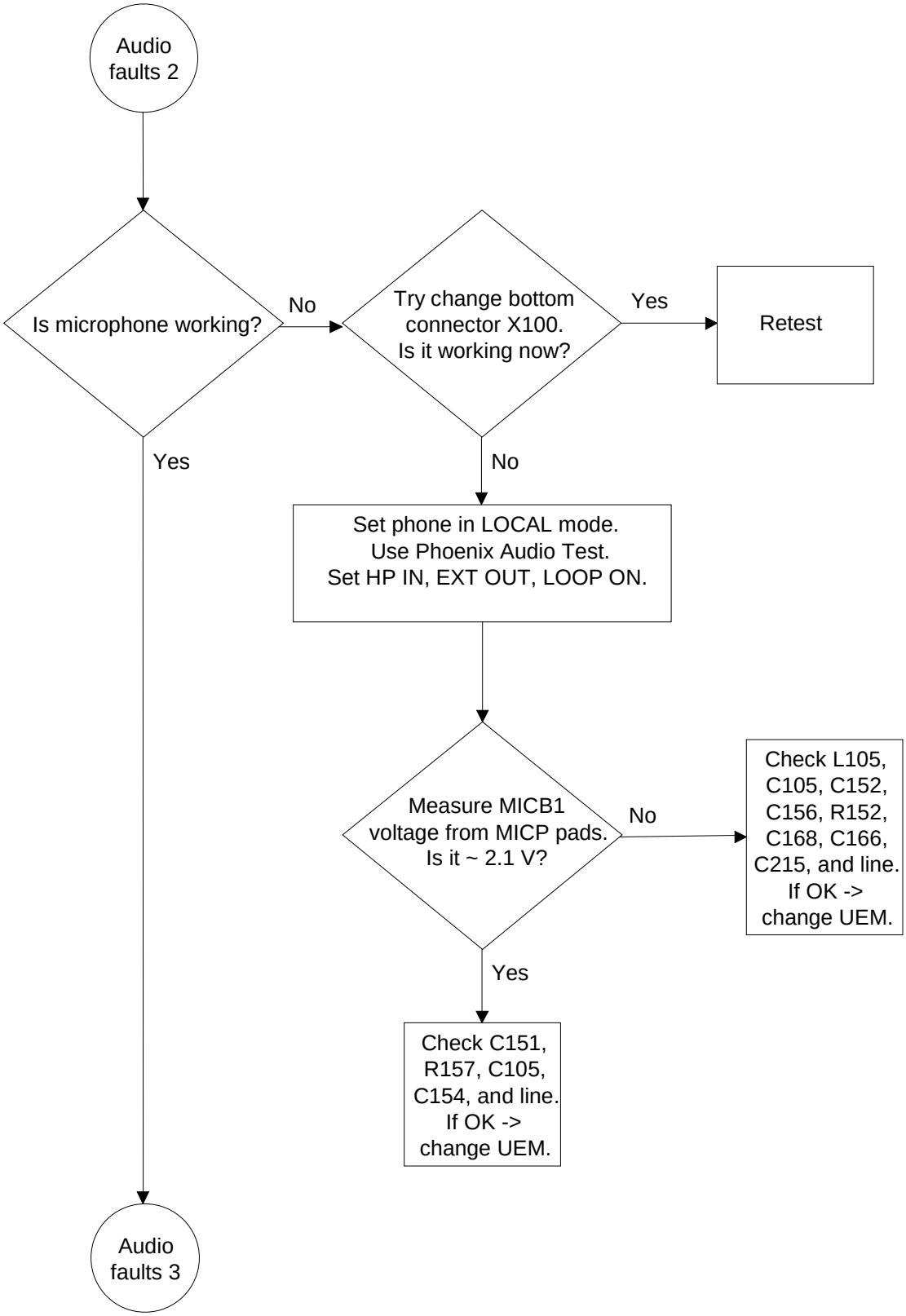


Figure 52: Audio Faults







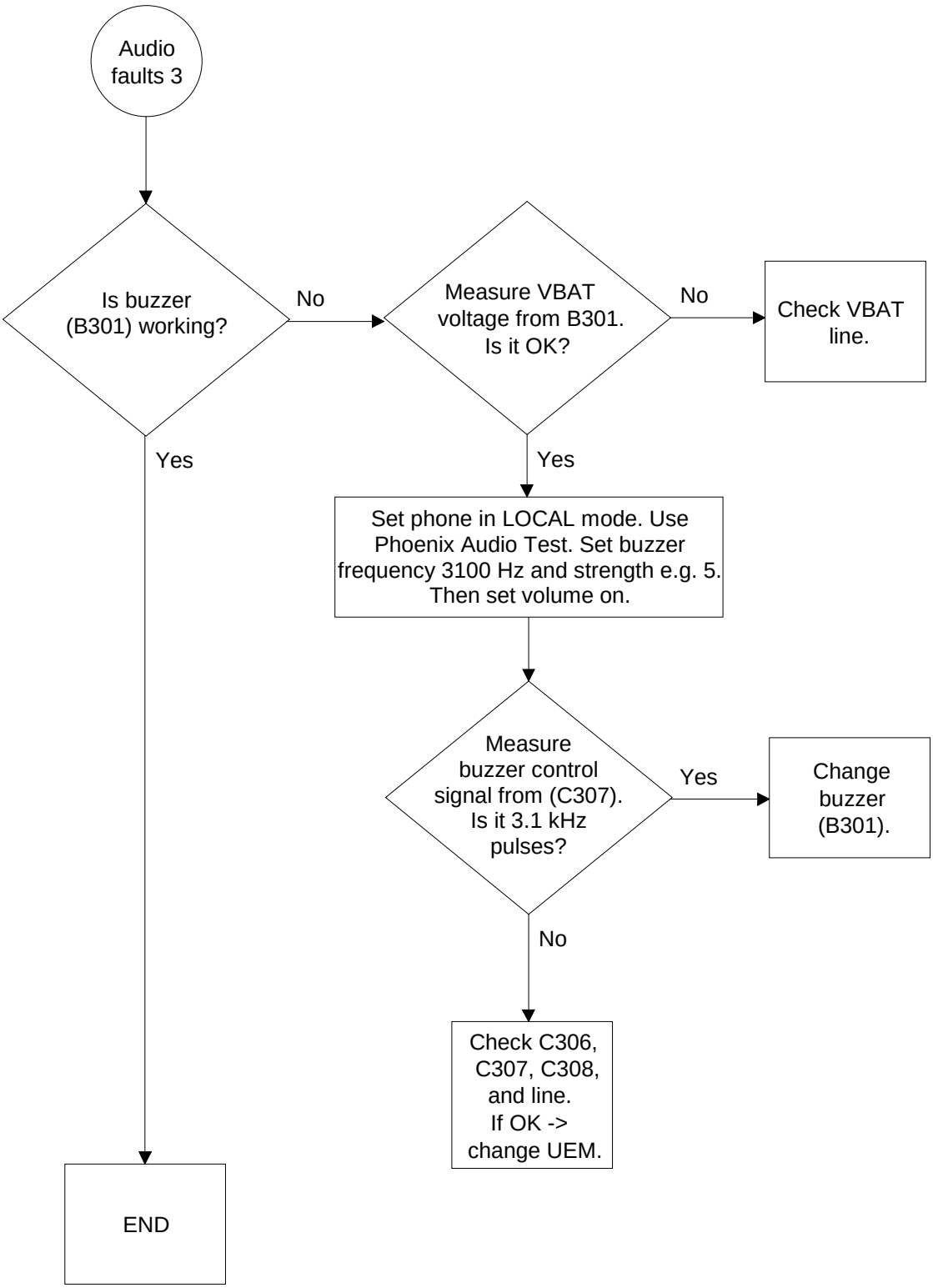
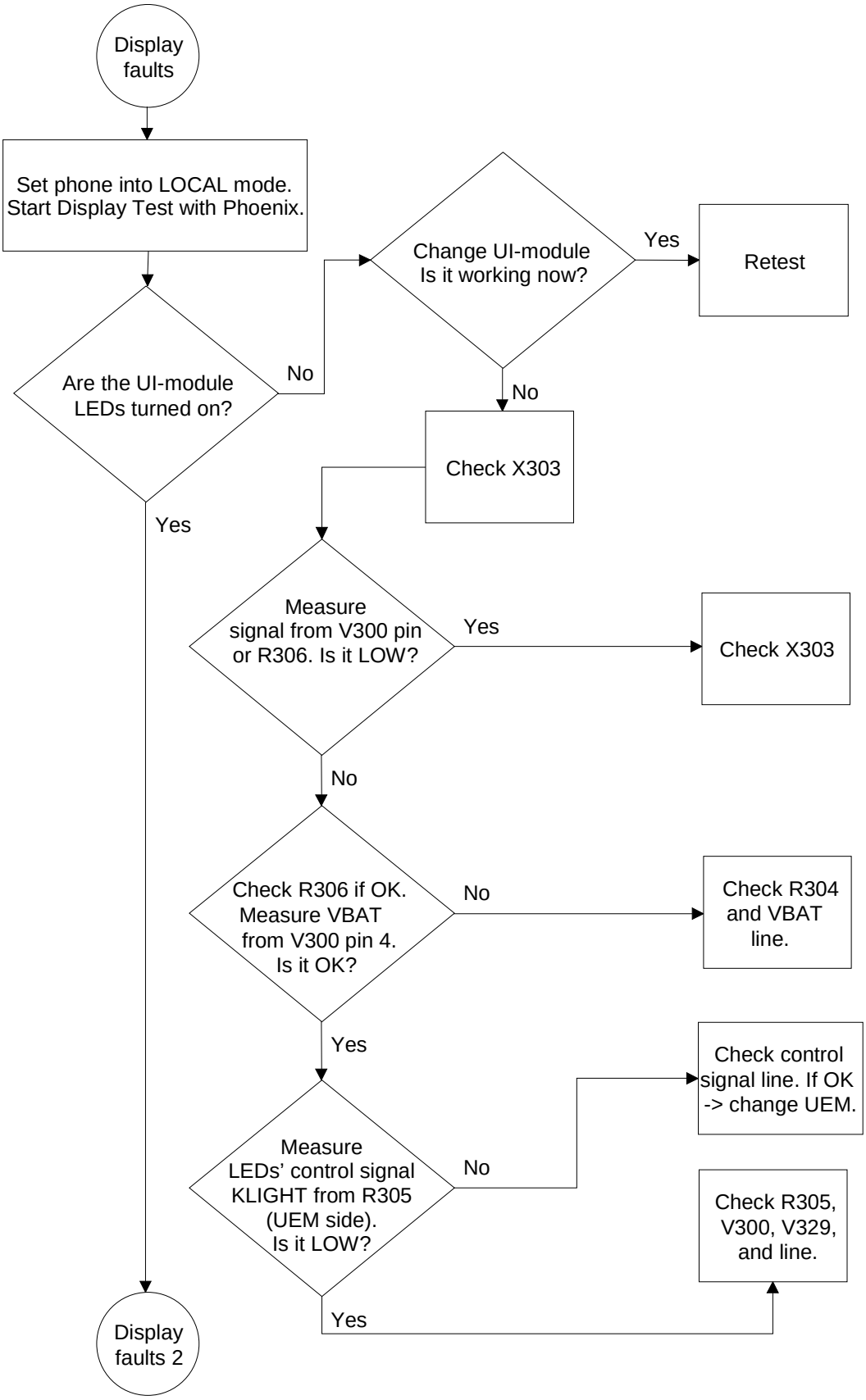
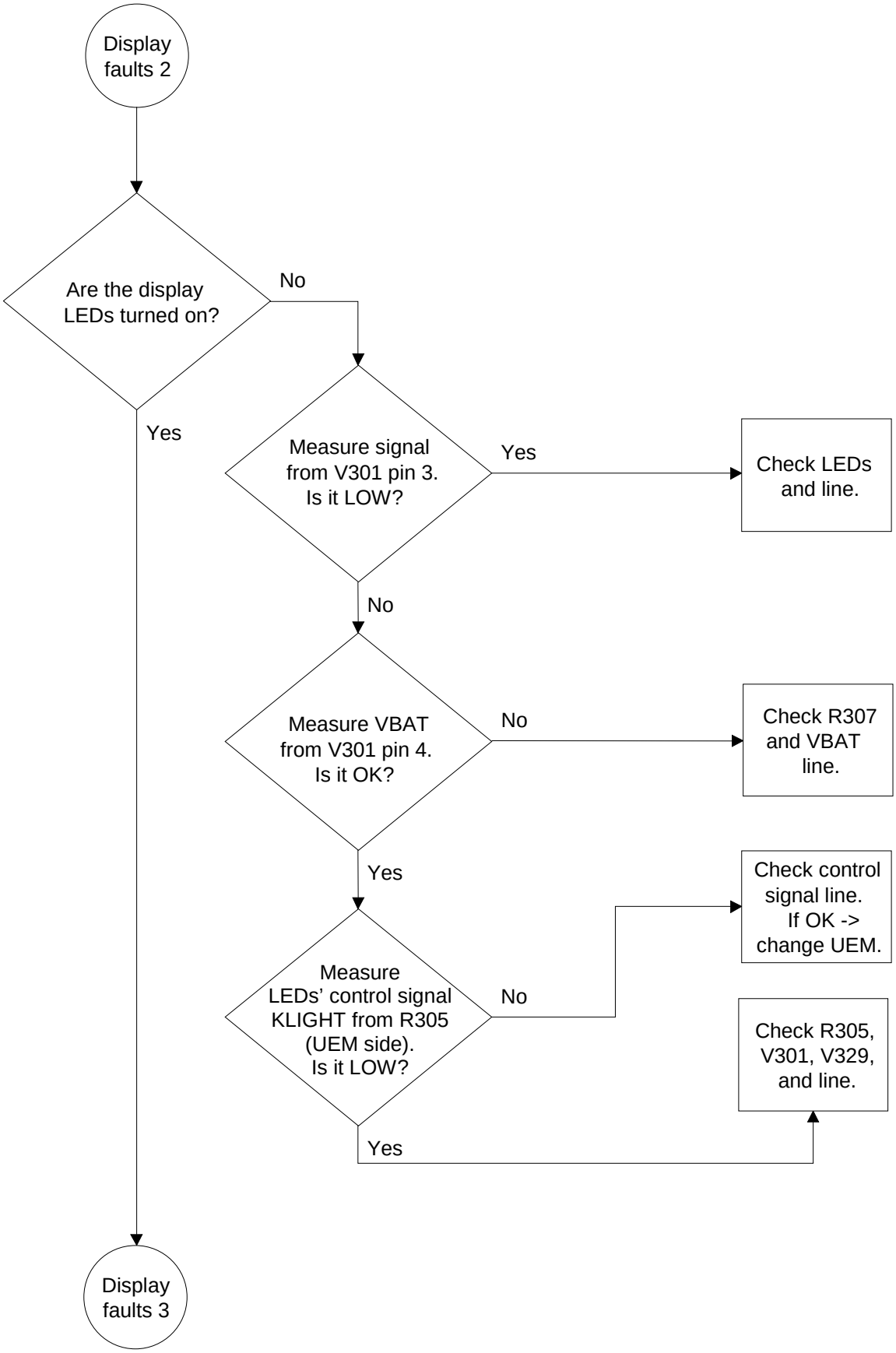


Figure 53: Display faults





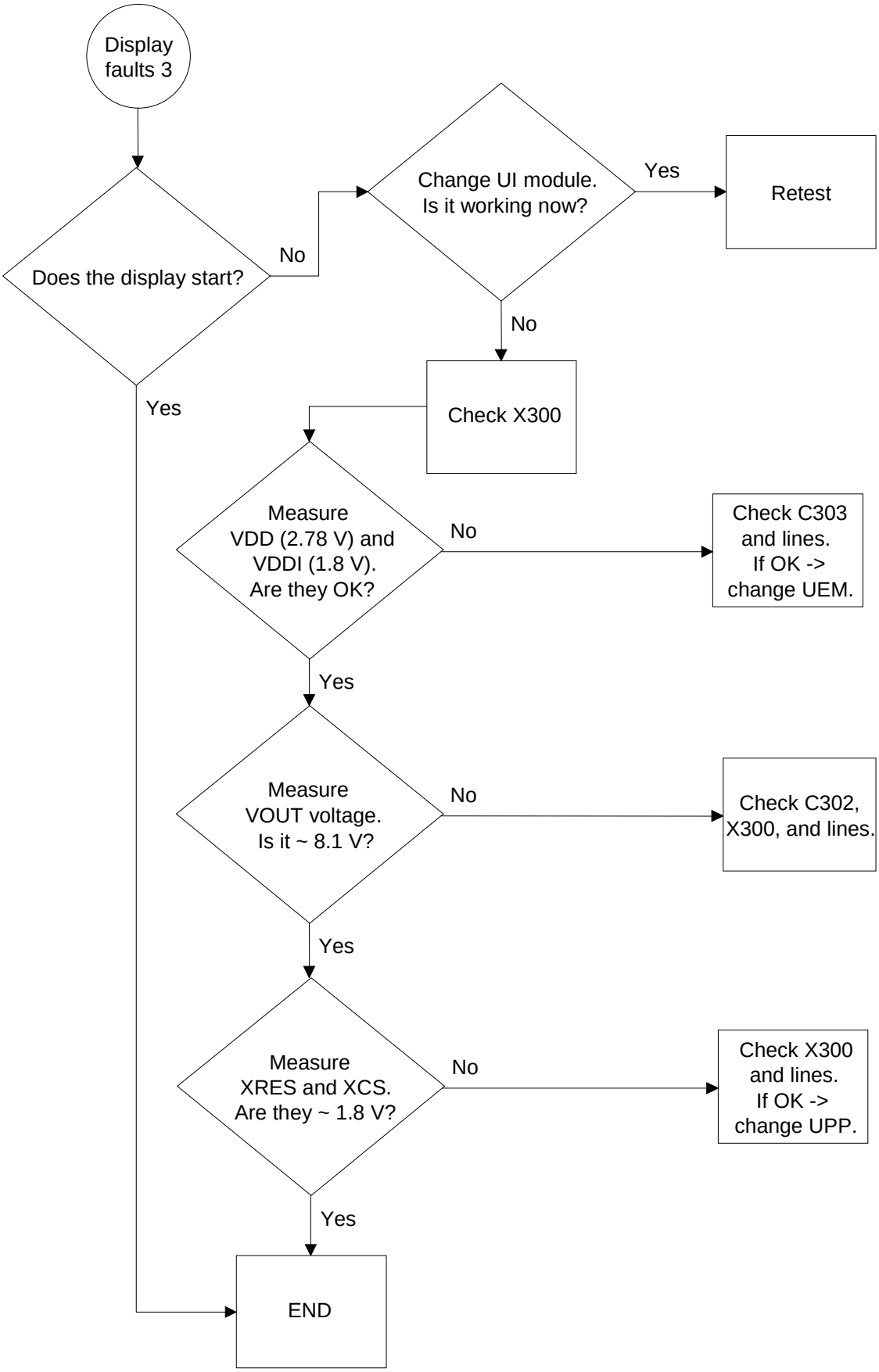
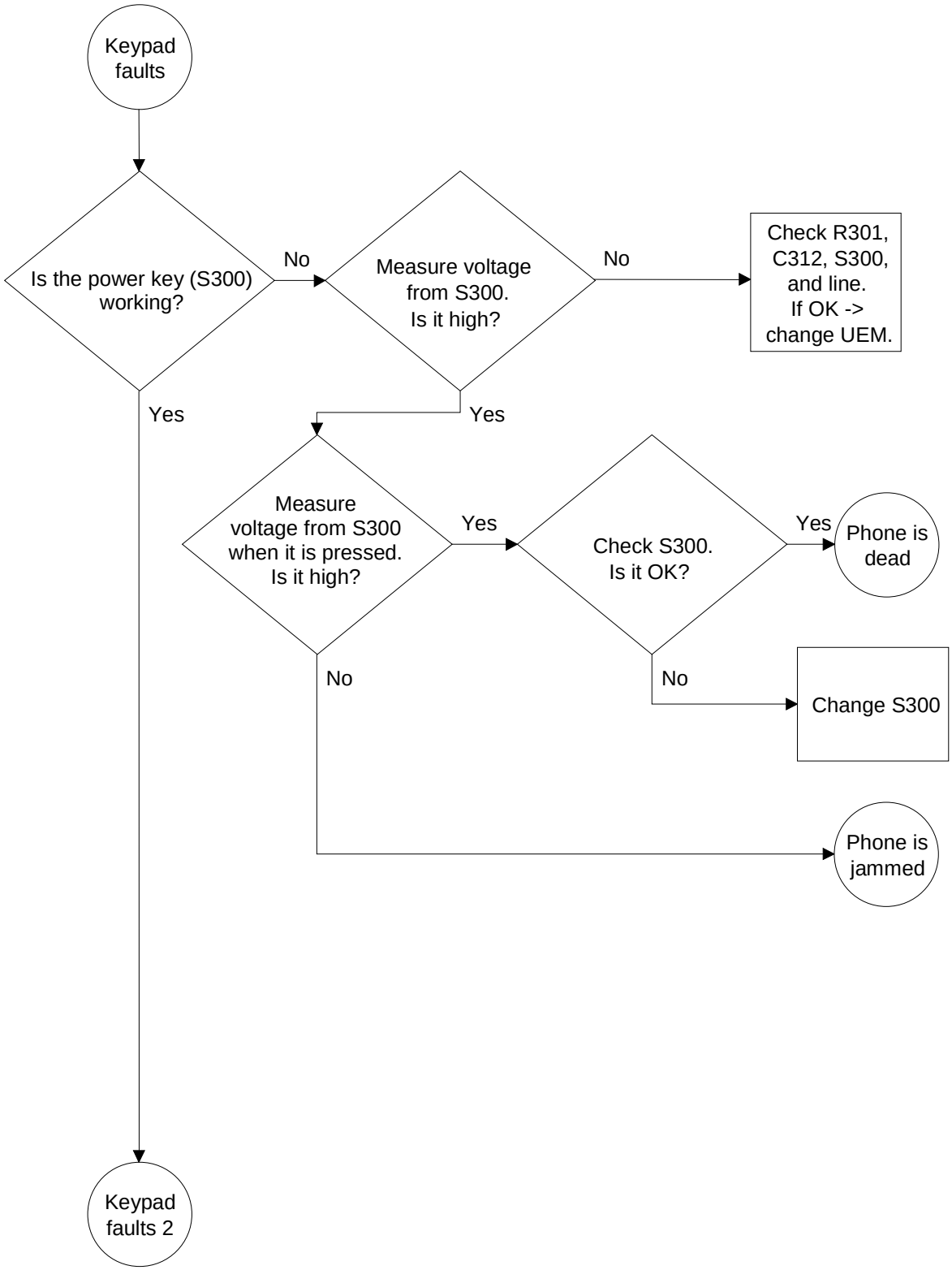
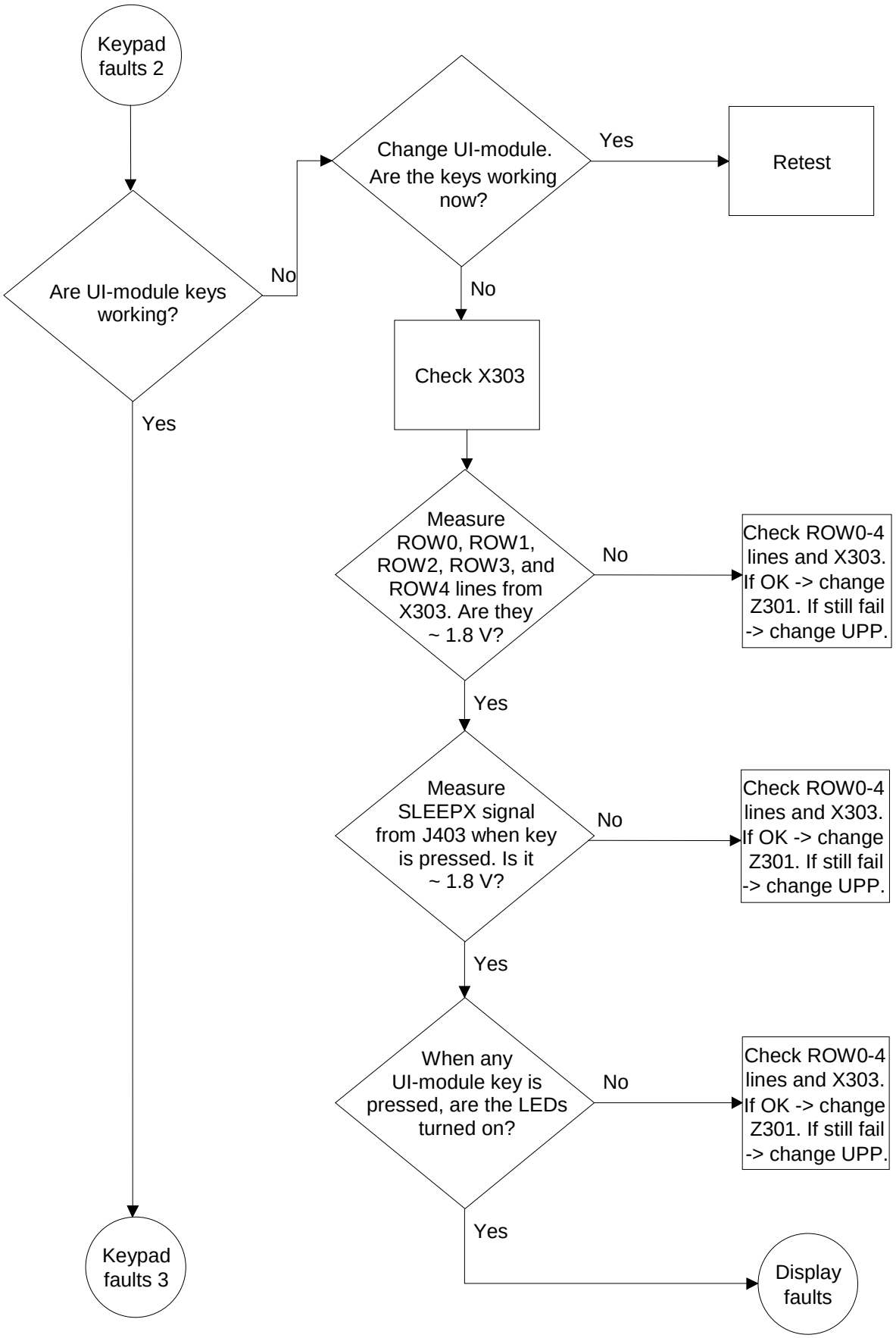
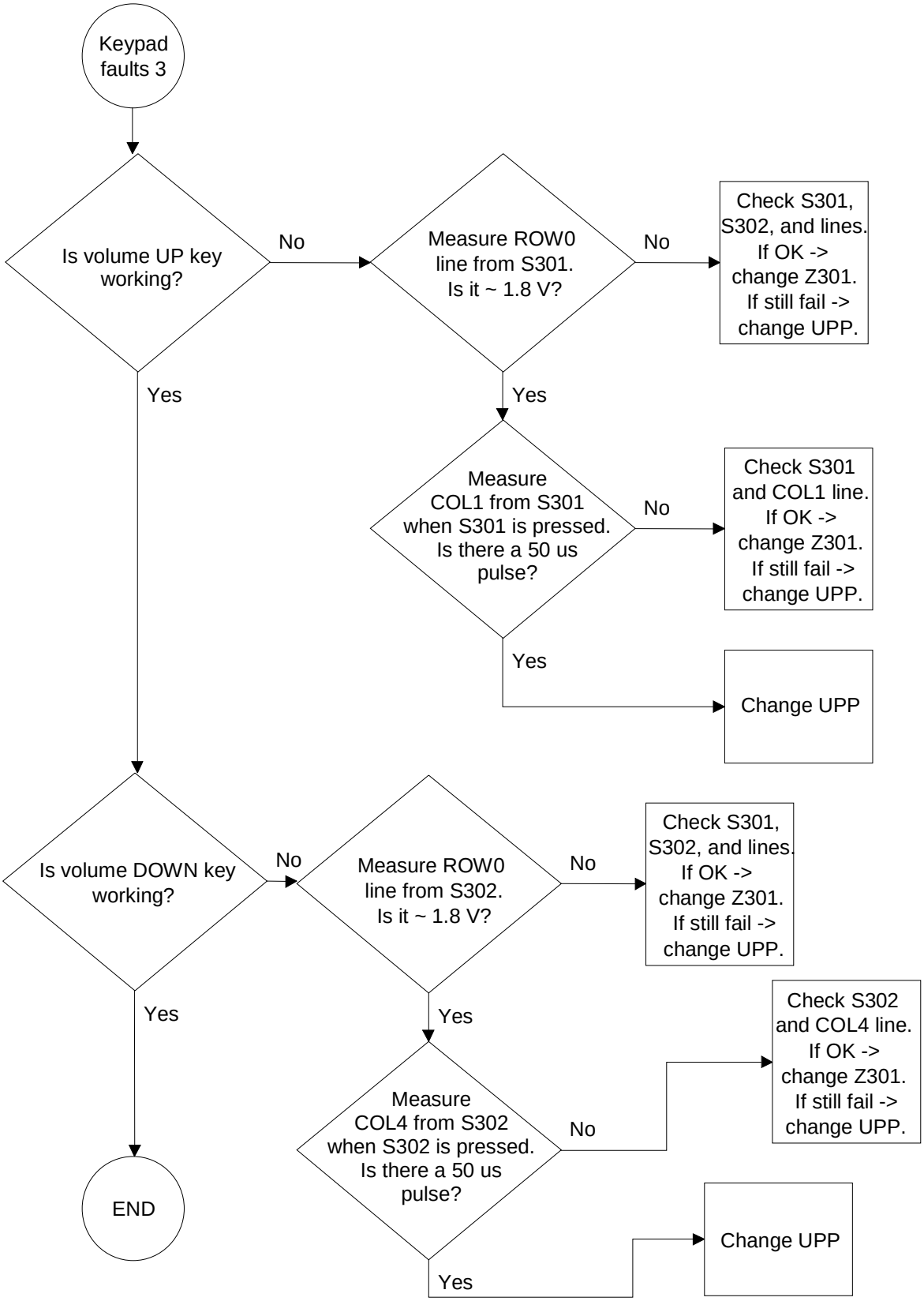


Figure 54: Keypad Faults



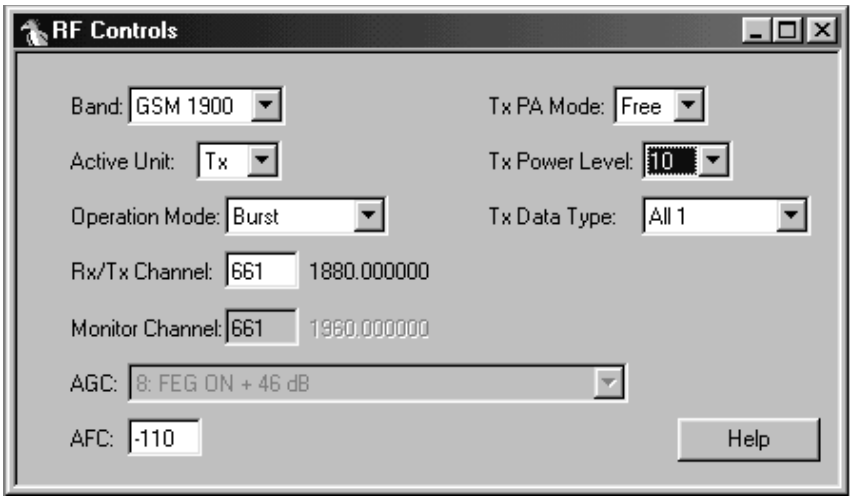




RF Troubleshooting

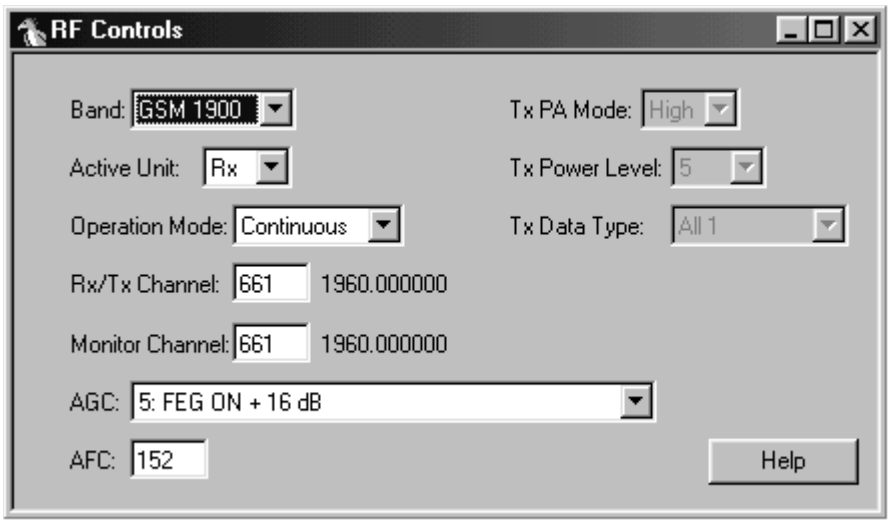
Phone Settings for TX Troubleshooting

TX – burst mode
Channel 661
PCL 10



Phone Settings for RX Troubleshhoting

RX – continous mode
Traffic channel 661
AGC value 5
+ signal generator feeds –55 dBm to antenna pad



NO TX GSM 1900

8 Check 26MHz VCTCXO G660 at (test point) TP20. (frequency deviation <100Hz) Check also TP3 2.8VDC.
9 Check TX IQ signals at TP21. If not OK change UEM.
10 Check 1880MHz CH661 at TP22 if OK go to 8.
11 Check supply voltages for HAGAR at TP 4, 5, 6, 8: 2.8VDC; TP10 1.35VDC and TP1 4.8VDC if not OK change UEM.
12 Check SDATA at TP51, SCLK TP53, SLE TP52.
13 Check TXC at TP23 and TXP at TP24
14 Check frequency of VCO G650 at TP40 (3760MHz/CH661, TX-mode). If not OK check TP7 2.8VDC and TP41 ~1.6VDC. If TP41 is 4.8VDC, the VCO doesn't work in all probability. If all HAGAR signals are OK probably HAGAR is broken -> change HAGAR N600.
15 Check 1880MHz at TP25 if not OK check Vbatt at TP9 3.9VDC, also check TP26 and TP27. Change PA if necessary.
16 Check 1880MHz at TP30 if not OK, check TP28. Also check TP29 squarewave 2.8Vpp at burst mode. If TP28 and TP29 OK change Z500 (Antenna switch).

NO RX GSM 1900

1 Check 26MHz VCTCXO G660 at (test point) TP20. (frequency deviation <100Hz) Check also TP3 2.8VDC.
2 Check RX signal level 1960MHz at TP31 if not OK change Z500.
3 Check RX signal level at TP32 in not OK change Z520
4 Check RX signal level at TP33 if not OK check voltages at TP33 2.7VDC , TP34 2.7VDC , TP35 0VDC. If TP33 not OK check L550 and R550. If components are OK change V550. If that doesn't help change HAGAR N600.
5 Check RX signal level at TP36 If not OK change Z551.
6 Check RX IQ signals at TP37 (also in burst-mode). If not OK check HAGAR supply voltages at TP4, 5, 6, 8: 2.8VDC; TP10 1.35VDC and TP1 4.8VDC if not OK change UEM.
7 Check SDATA at TP51, SCLK TP53, SLE TP52.
8 Check frequency of VCO G650 at TP40 (3920MHz/CH661, RX cont.-mode). If not OK check TP7 2.8VDC and TP41 ~2.9VDC. If TP41 is 4.8VDC, the VCO doesn't work in all probability. If all HAGAR signals are OK probably HAGAR is broken -> change HAGAR N600.
9 If all signal and voltage levels are OK change UEM.

Please note that you can view the RF testpoint diagram and RF testpoint PWB layout in the Schematics section of this document.

Measurements points for AMS and production repair

TX Troubleshooting points

Figure 55: TP 20

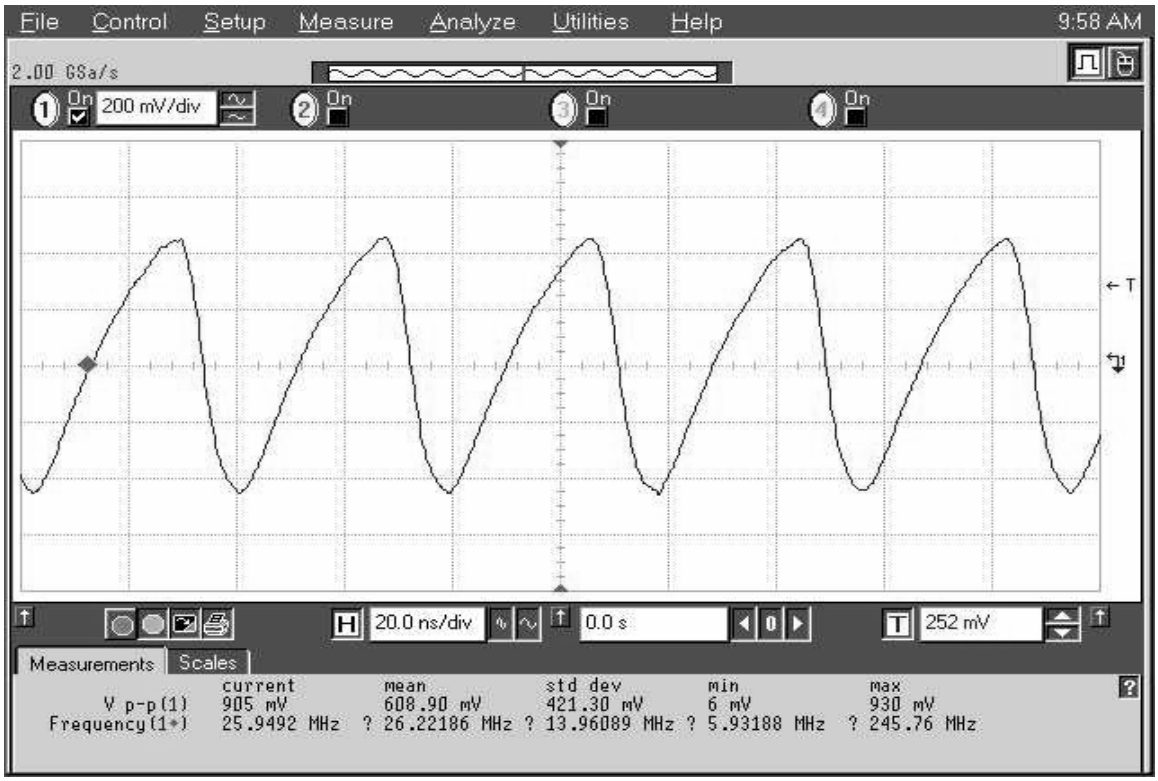


Figure 56: TP 21

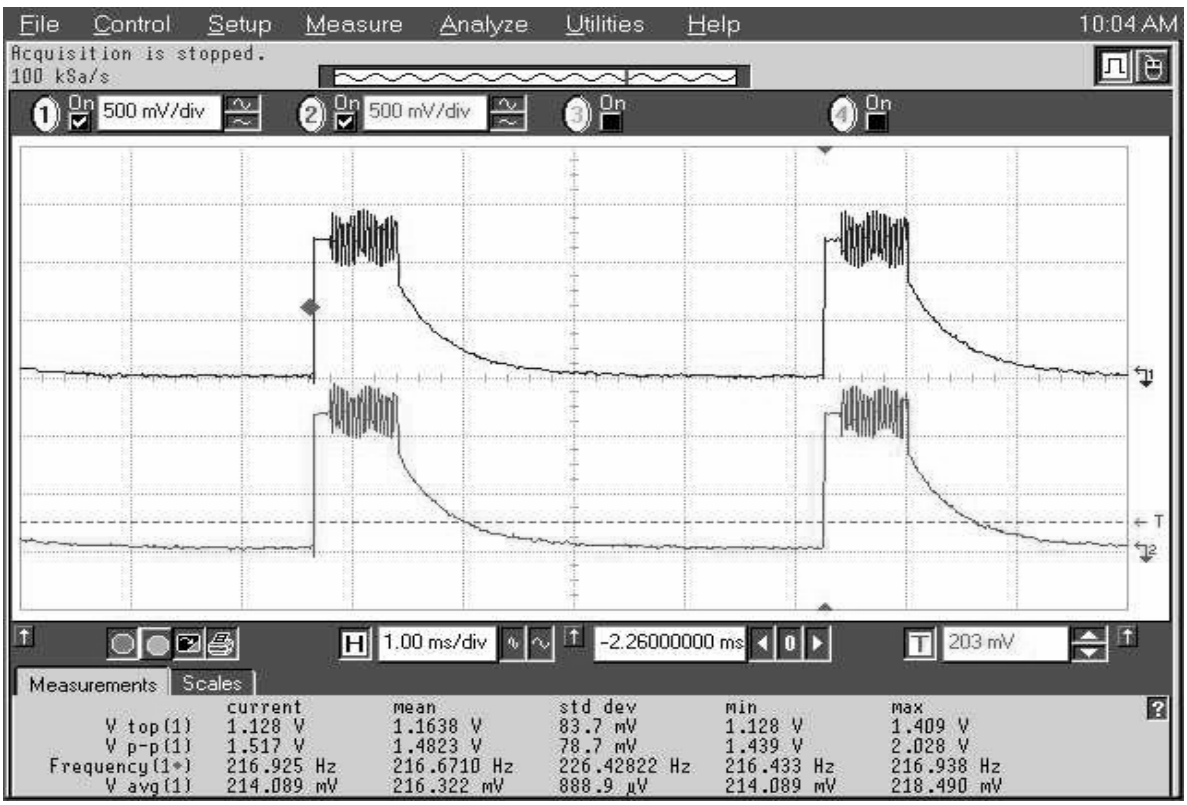


Figure 57: TP 22

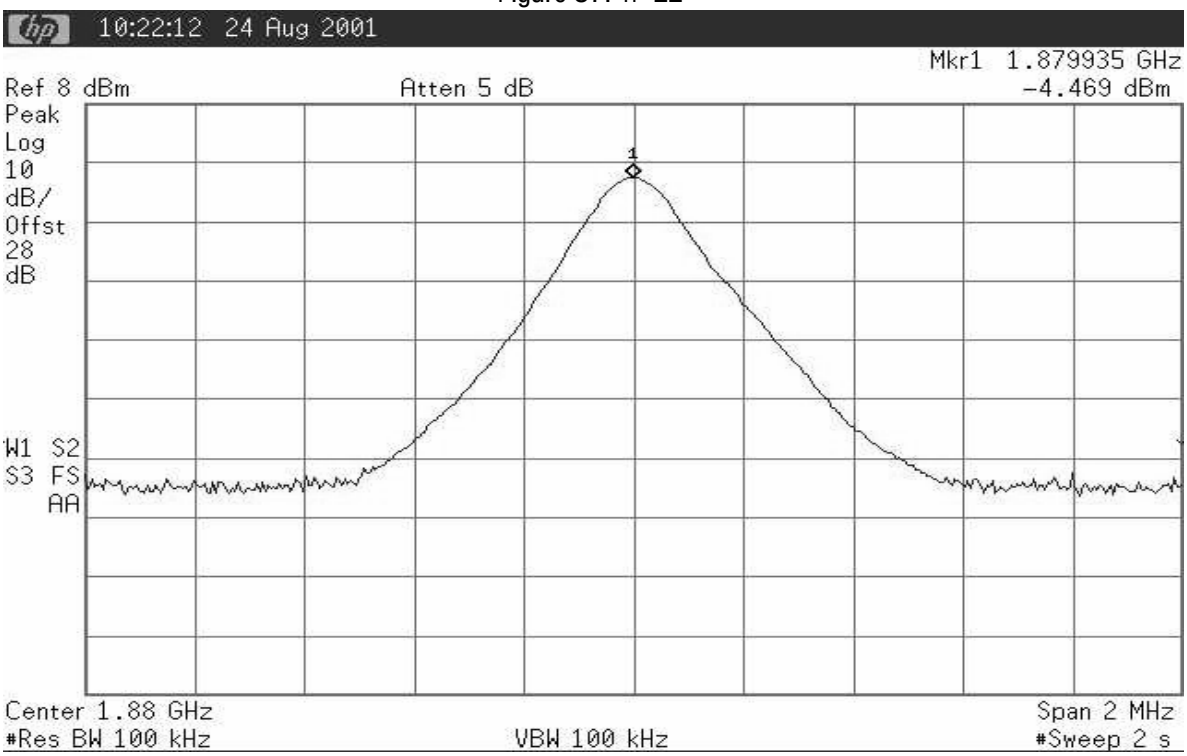


Figure 58: TP 51, 52, 53

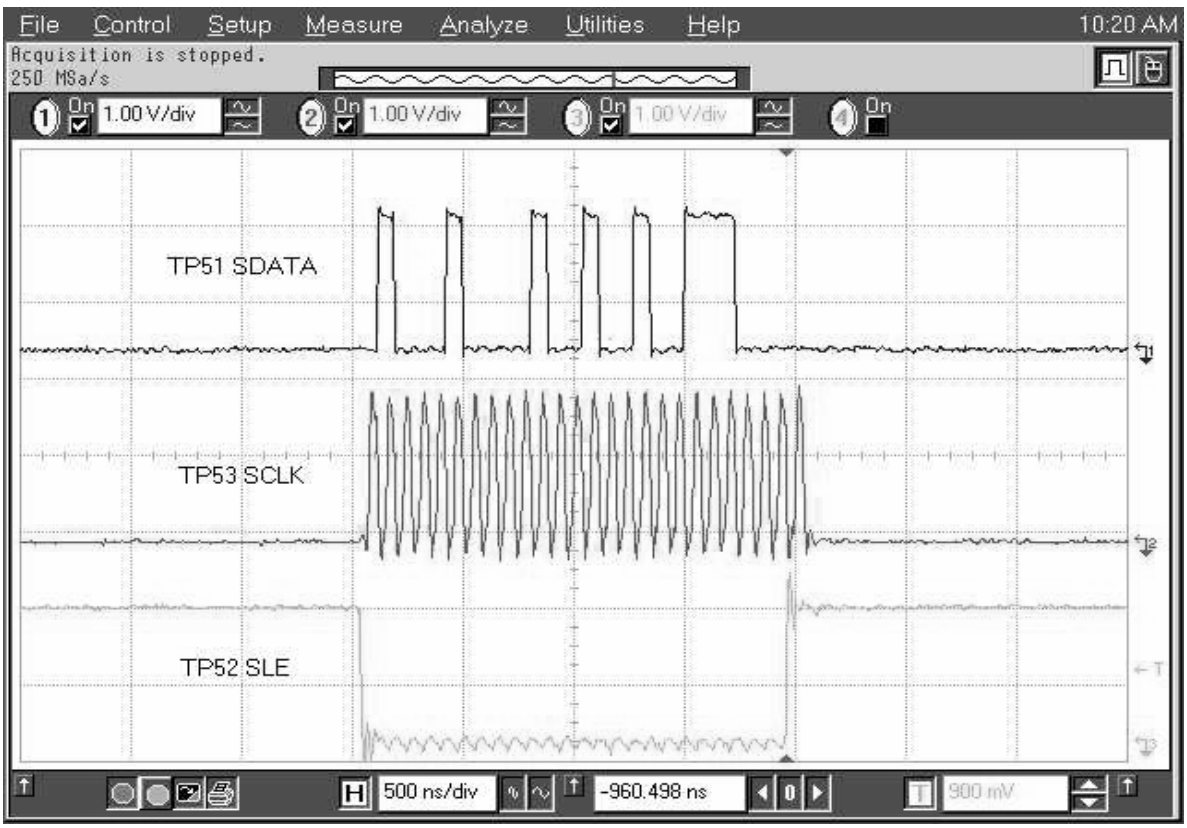


Figure 59: TP 23, 24

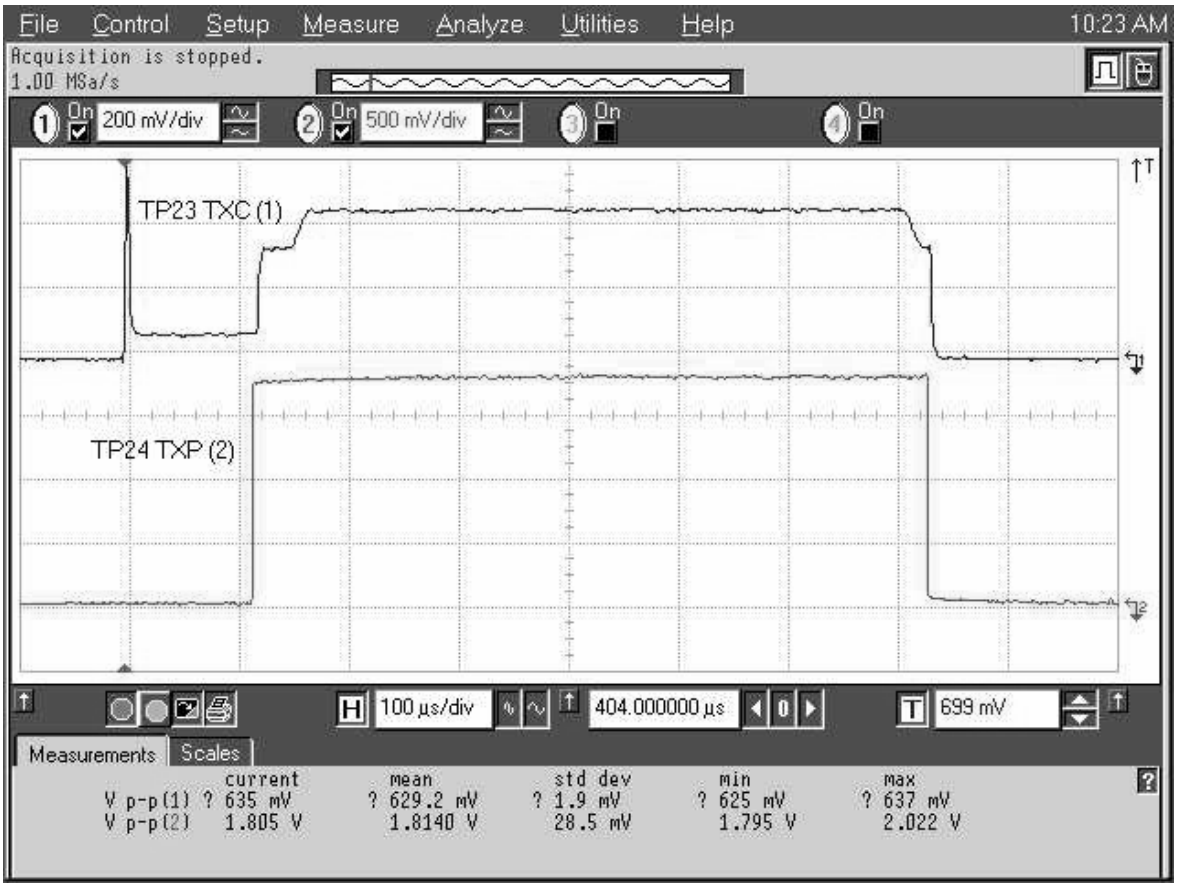


Figure 60: TP 40

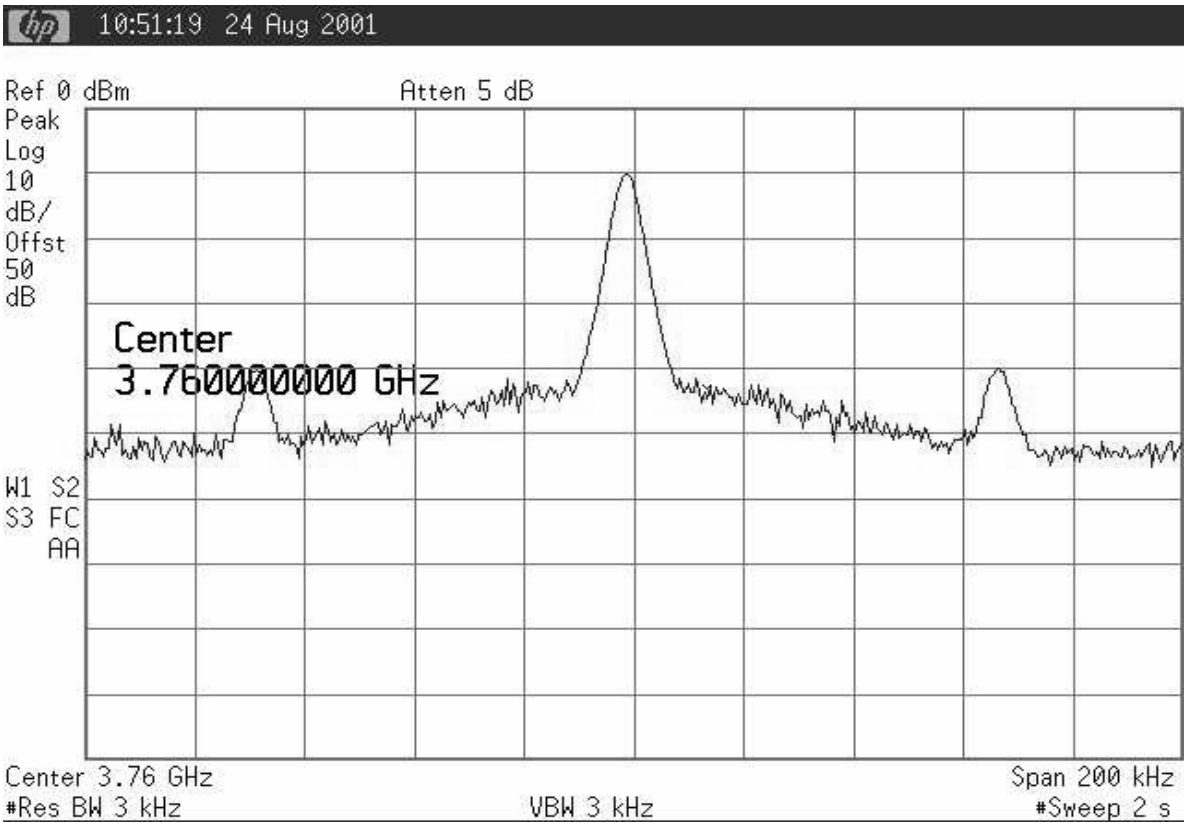


Figure 61: TP 25, 28

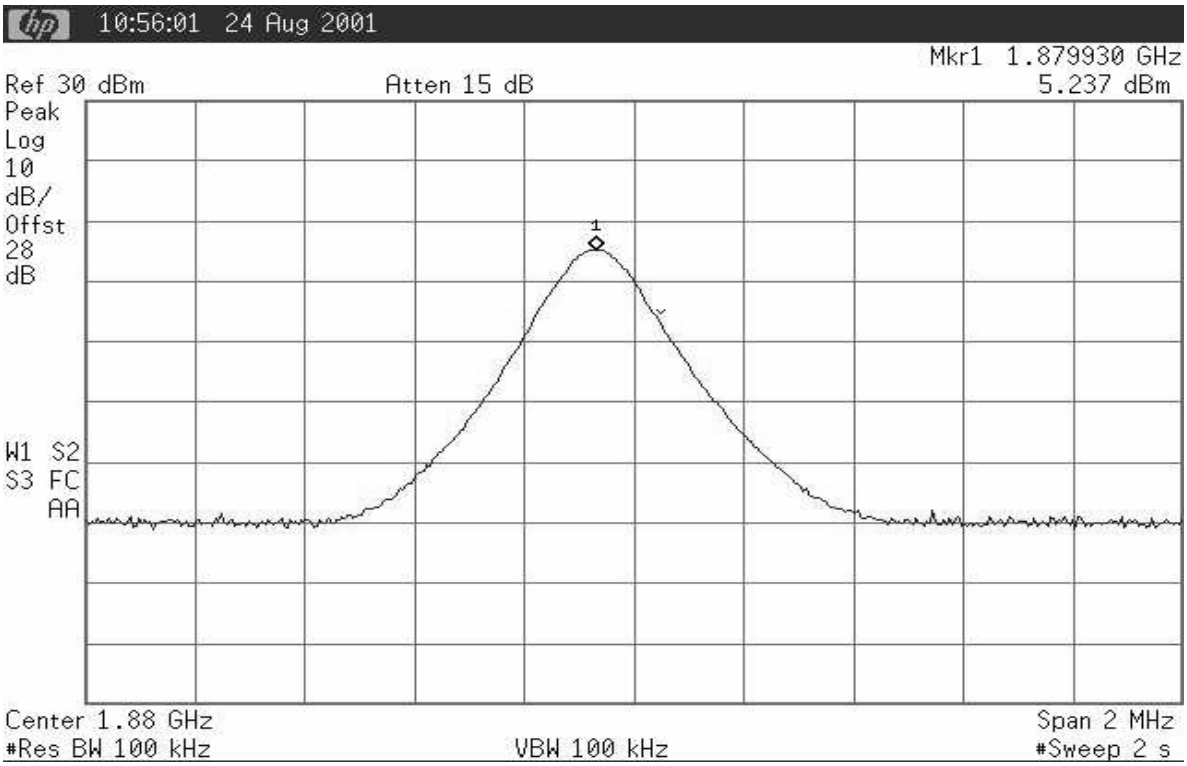


Figure 62: TP 26, 27

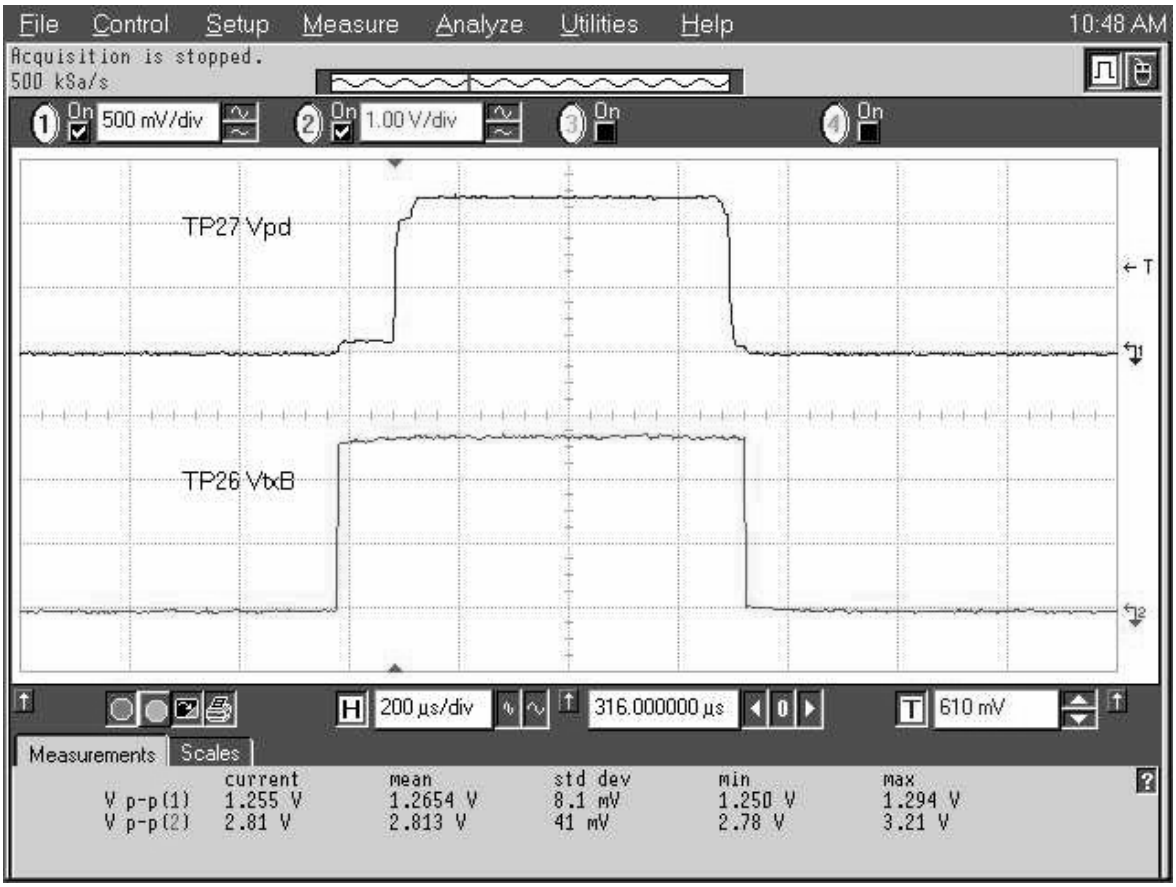


Figure 63: TP 30

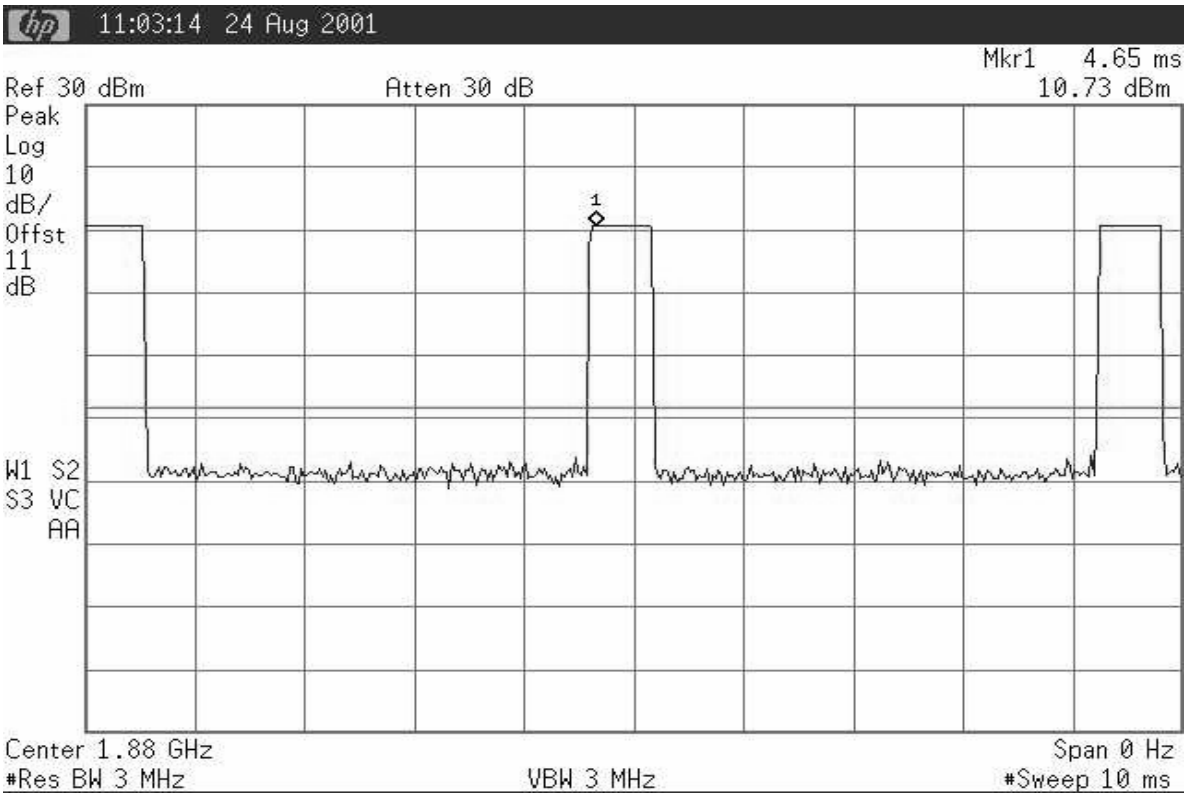


Figure 64: TP 29

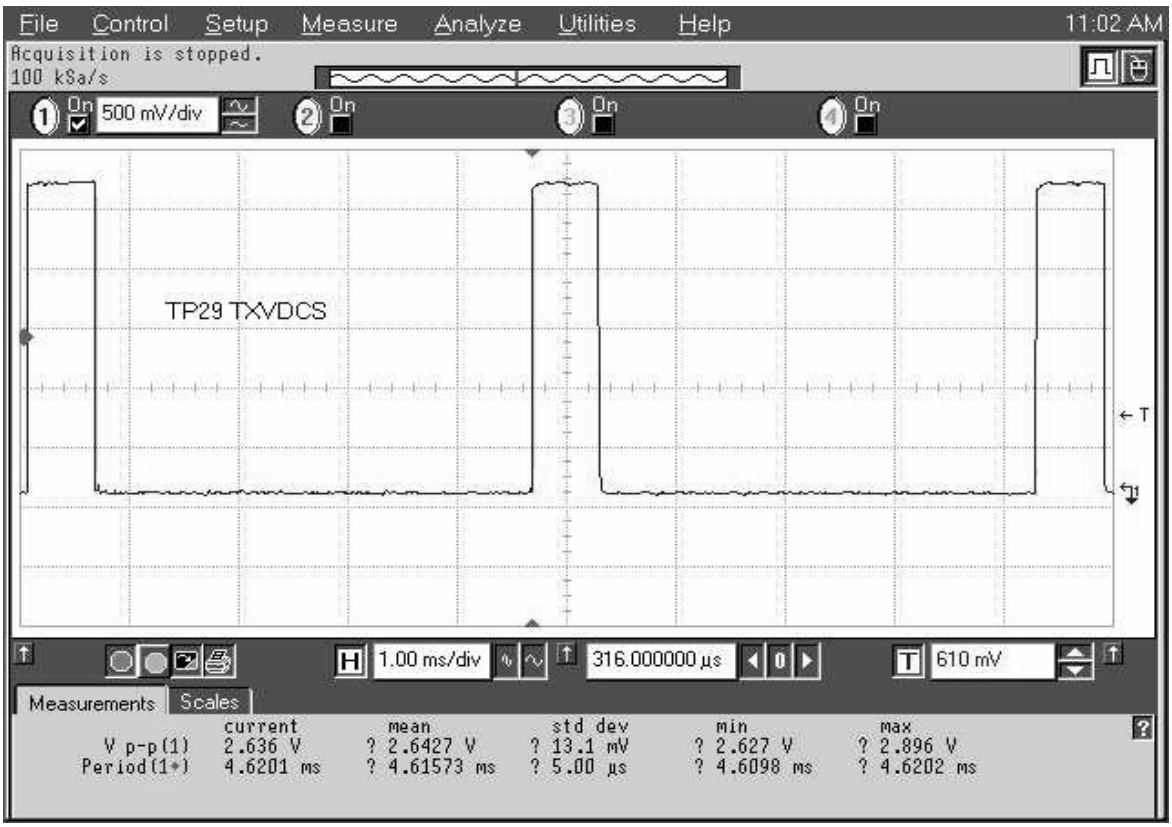
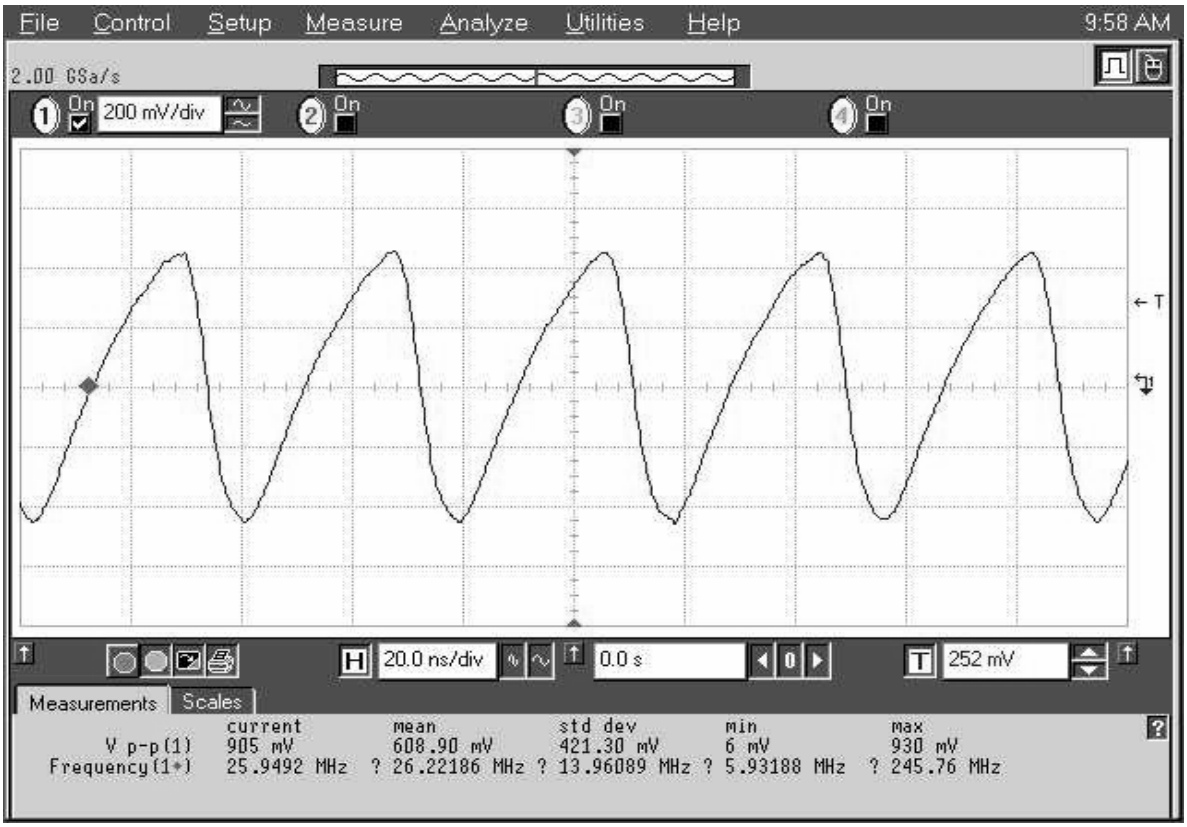


Figure 65: TP 20



RX Troubleshooting points

Figure 66: TP 20

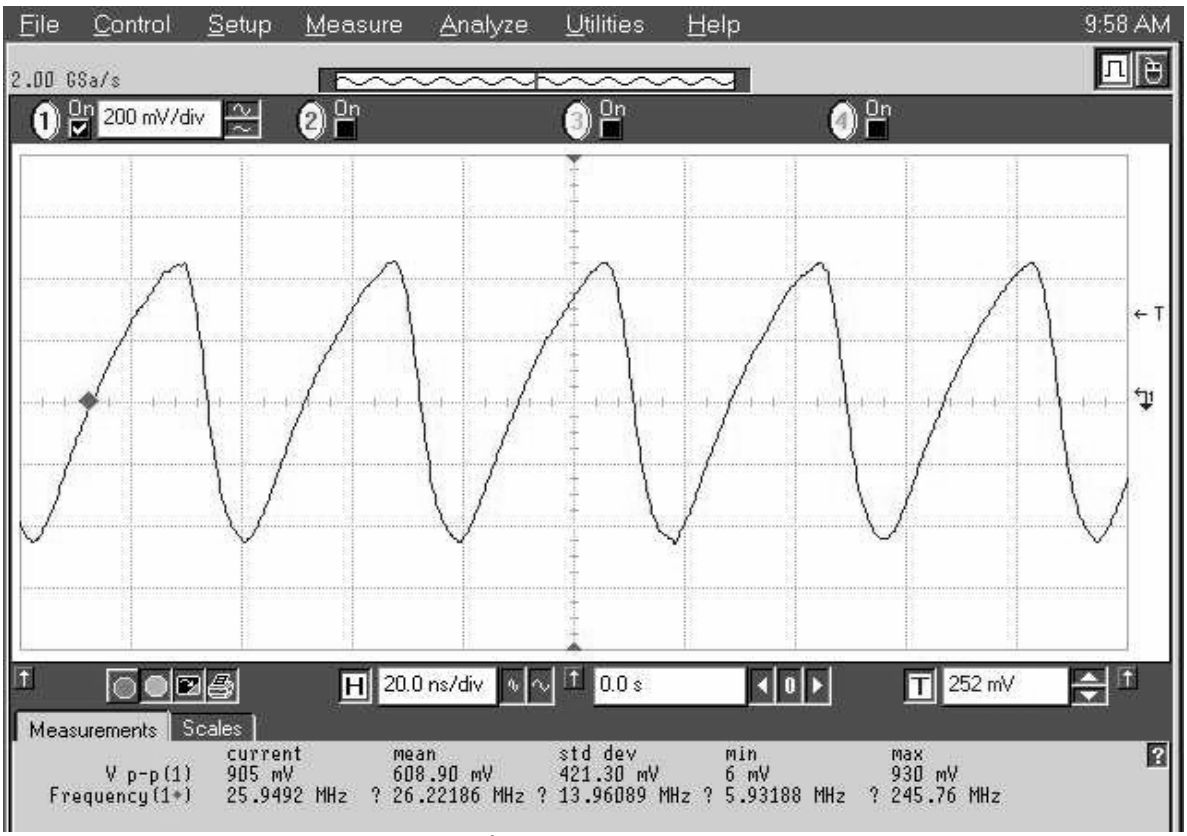


Figure 67: TP 31, 32

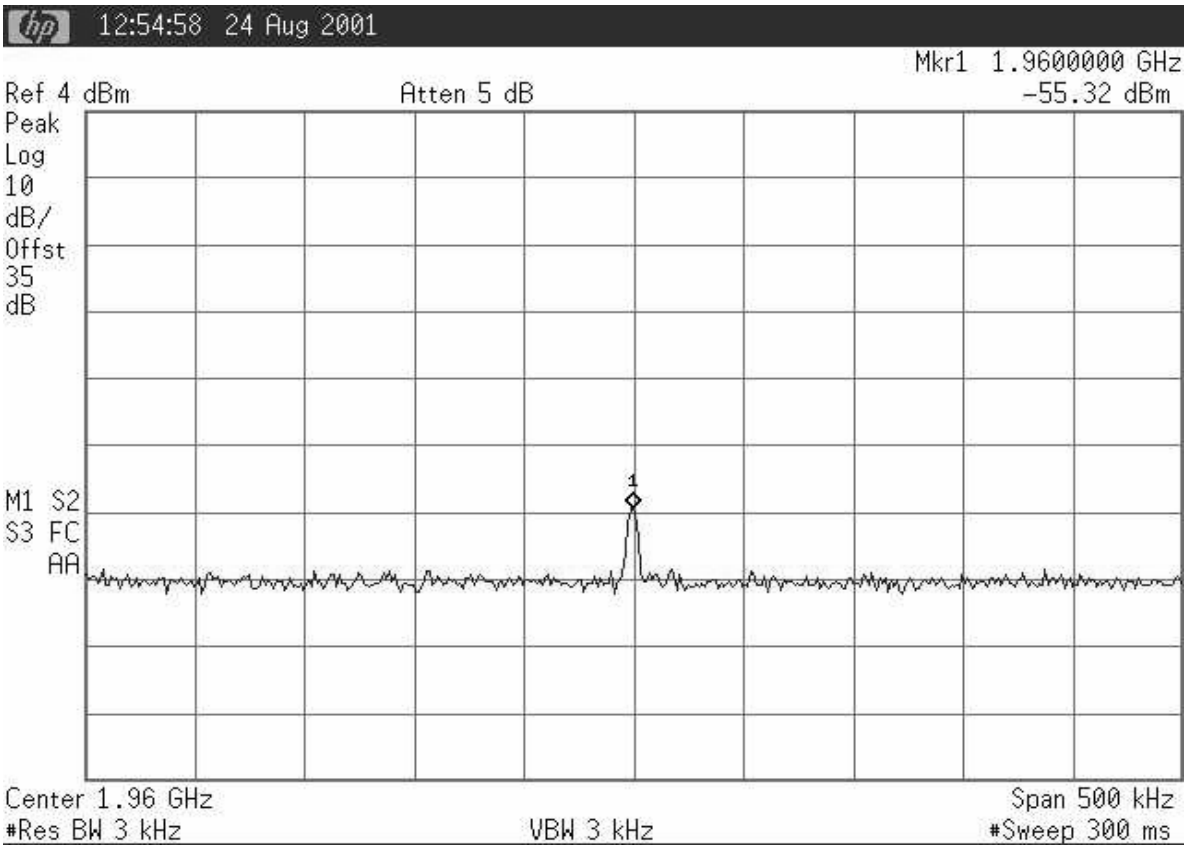


Figure 68: TP 33

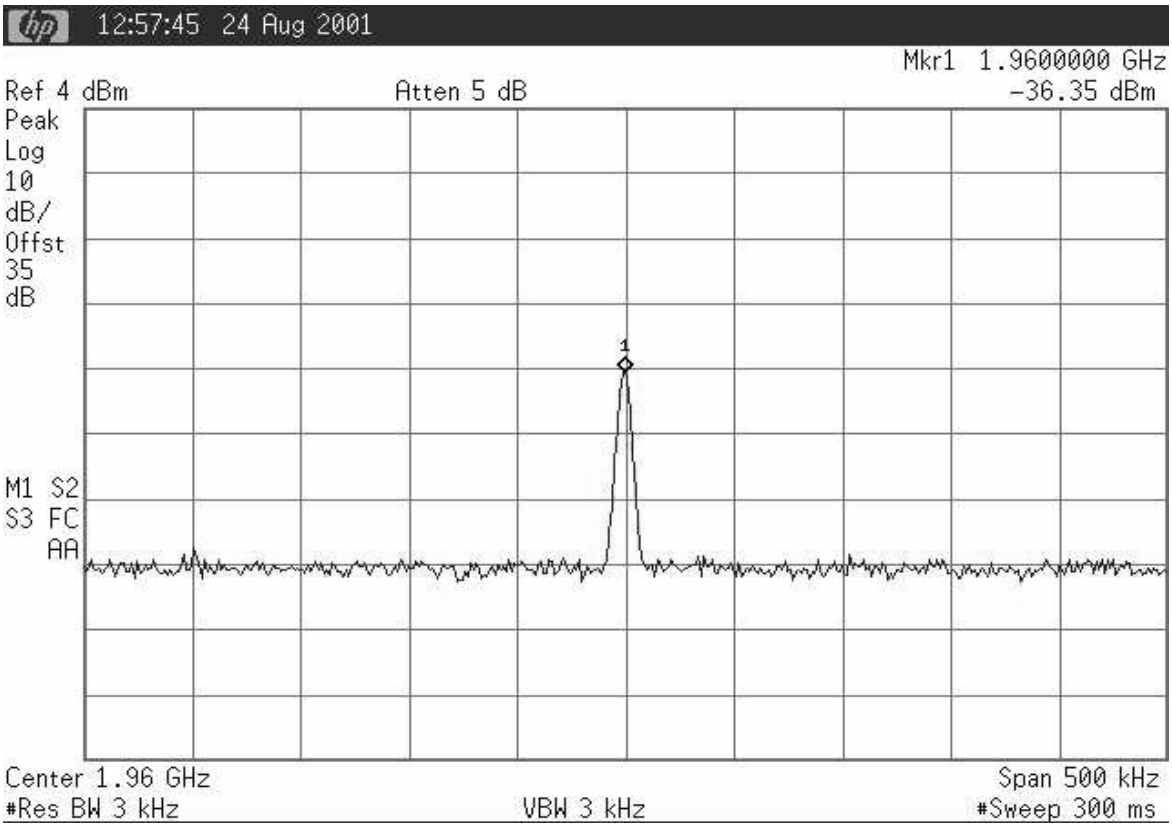


Figure 69: TP 36

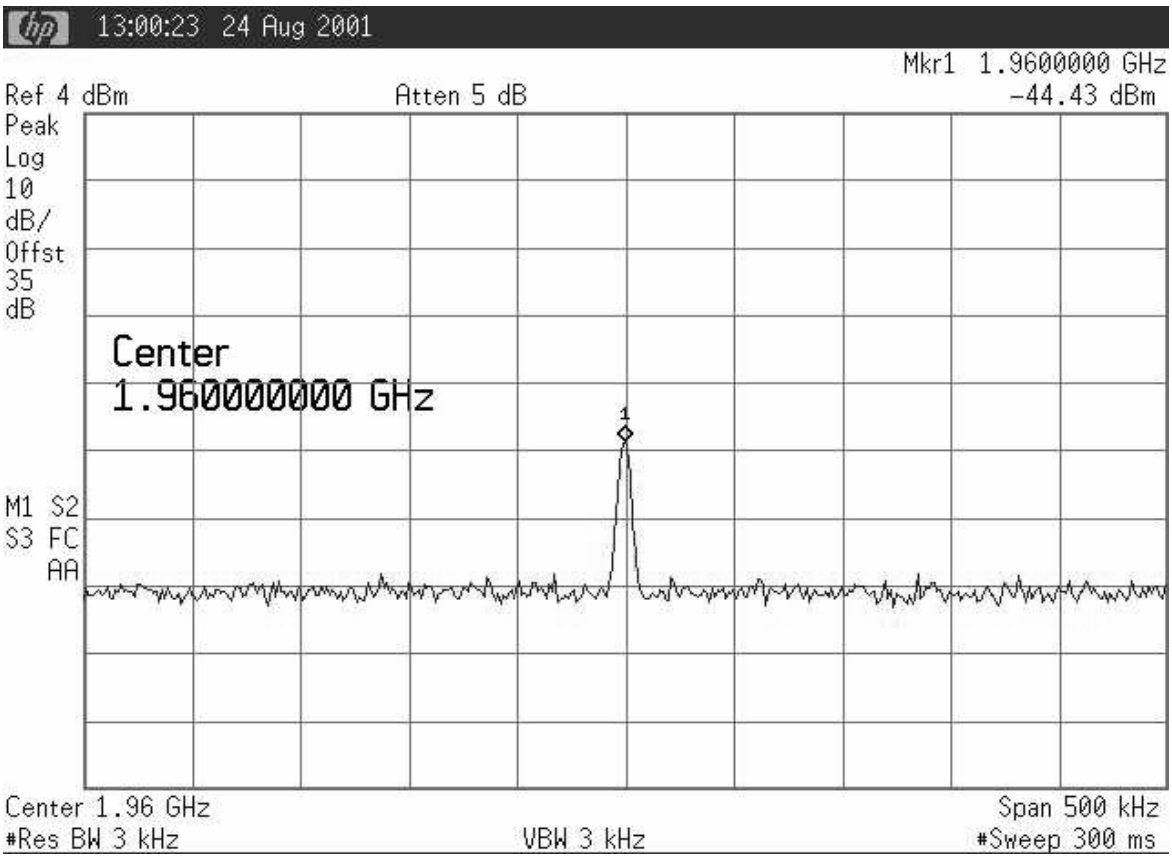


Figure 70: TP 37 (RX continuous mode)

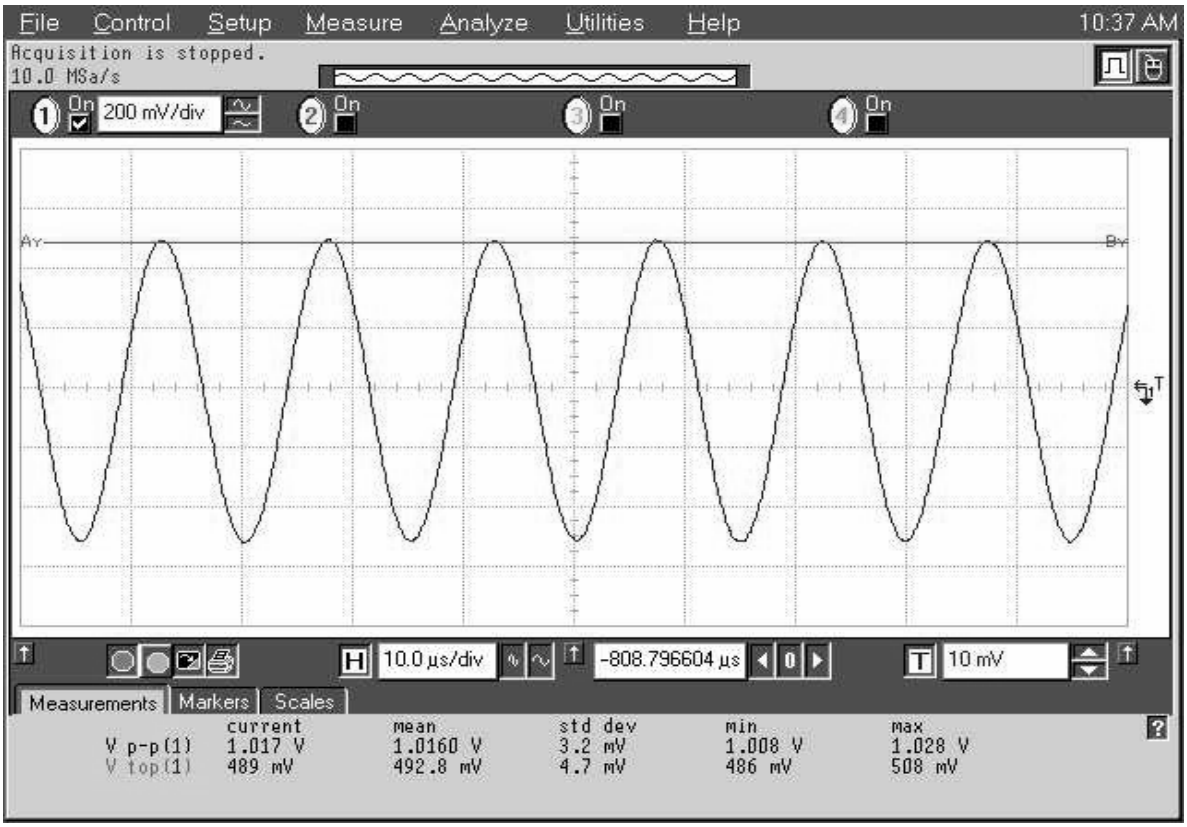


Figure 71: TP 37 (RX burst mode)

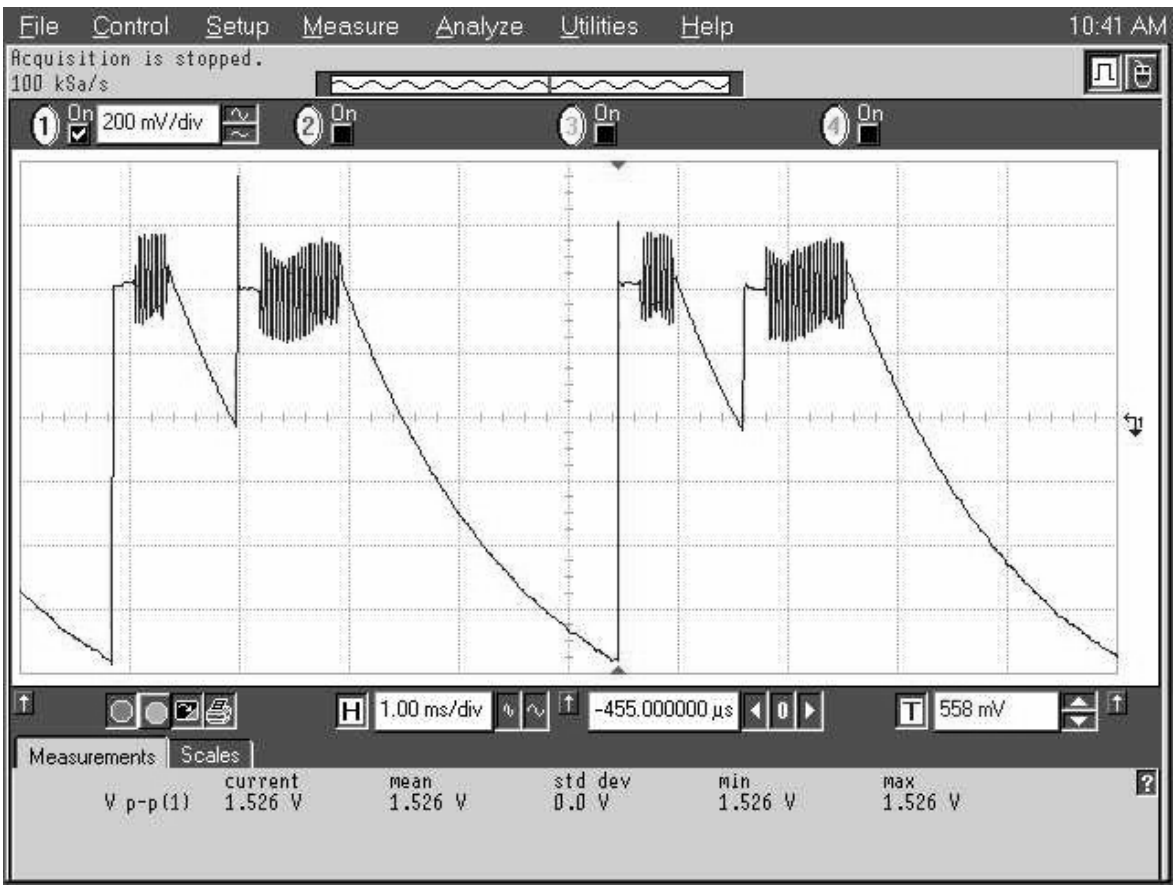


Figure 72: TP 51, 52, 53

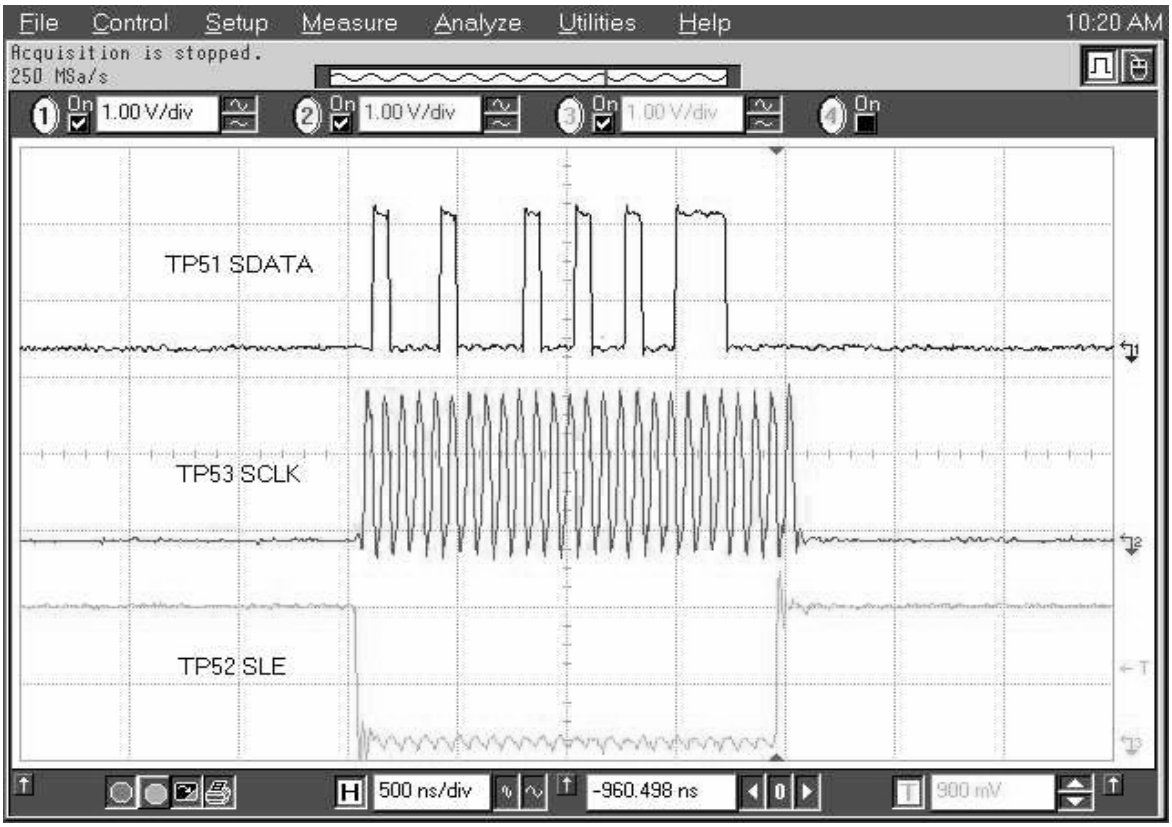
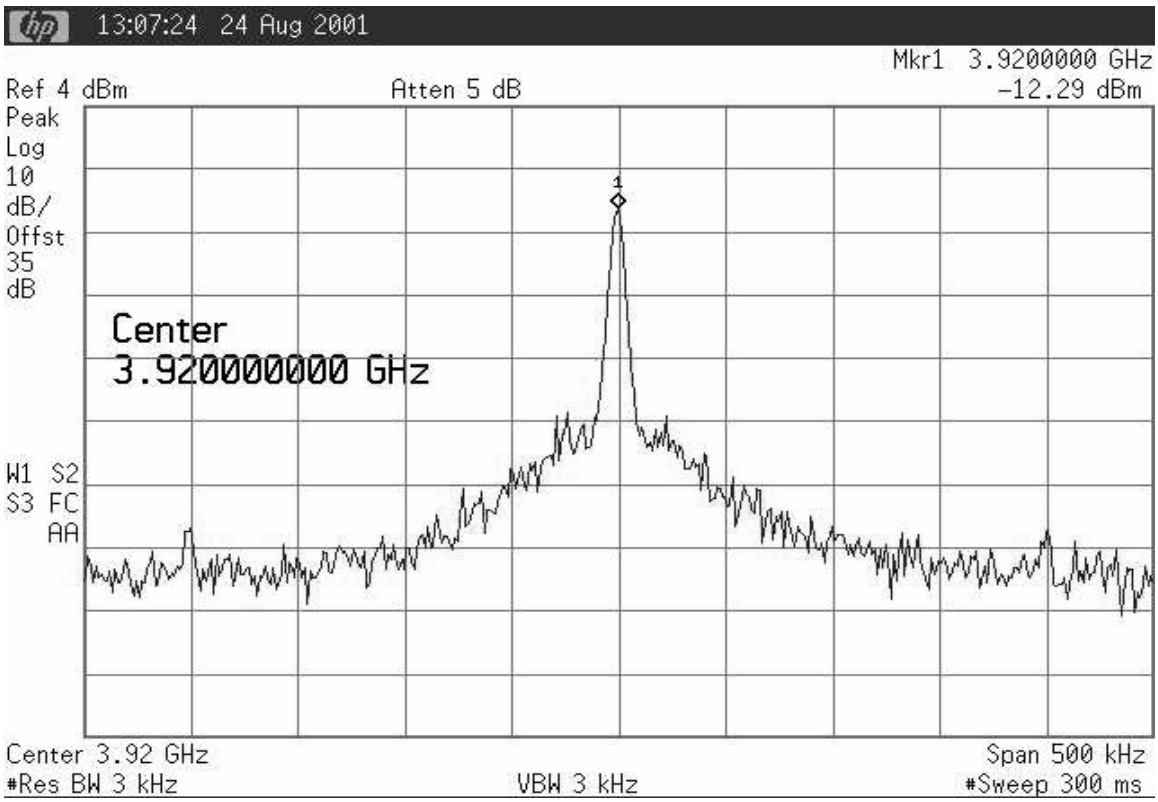


Figure 73: TP 40



RF Tuning and Calibration Instructions

Phoenix is used to control the phone.

TX tunings

When changing any TX components, all TX tunings need to be done.

Equipment's needed for TX tuning:

- Spectrum analyzer
- Computer with Phoenix -software

TX Output power tuning

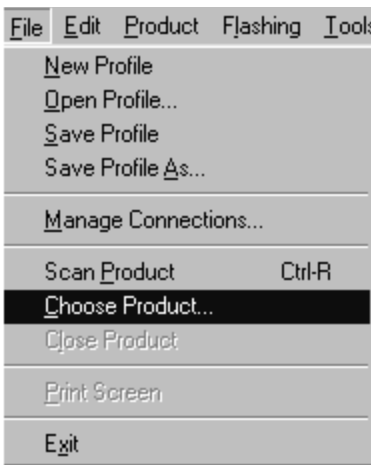
Spectrum analyzer setting for TX output power tuning

- Frequency: 1880MHz
- Span: 0Hz
- RBW/VBW: 3MHz
- SweepTime: 5ms
- RefLevel: +30dBm

Note: Cable and test fixture attenuation. Tuning is easier to do when using VIDEO-trigger on spectrum analyzer.

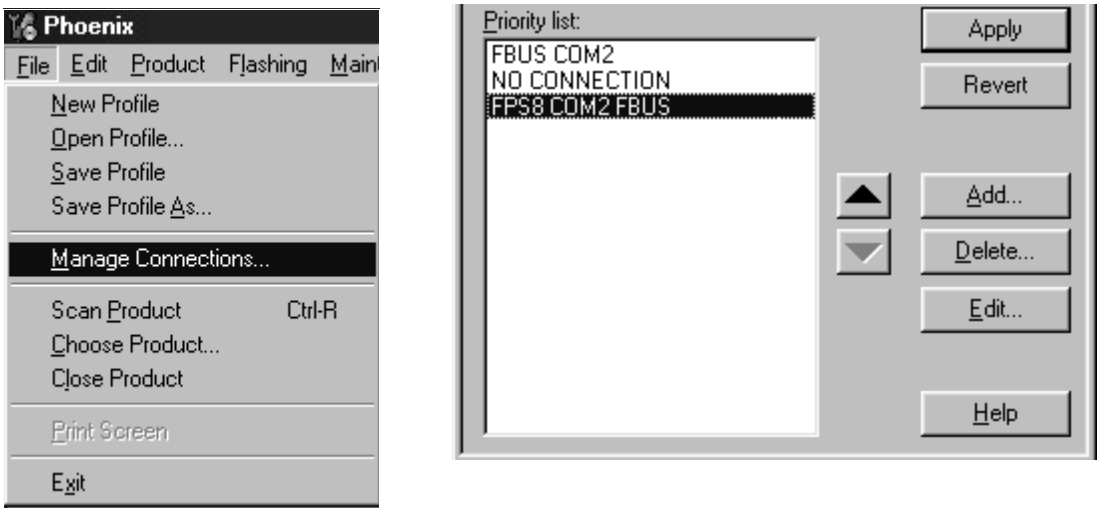
1 Start the Phoenix service software

2 Scan product (Ctrl + R) Software should automatically detect NSB-8. If product is not found, choose product manually.

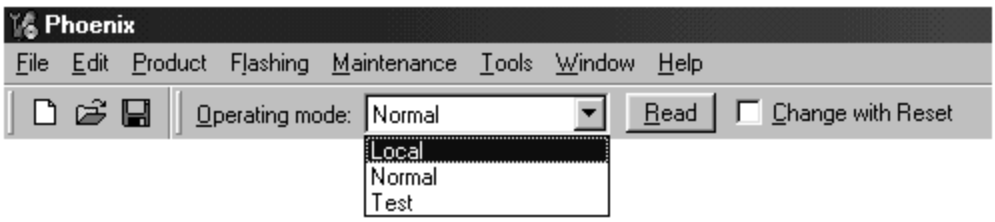


Phoenix should initialize connection automatically. If it does not, initialize the connec-

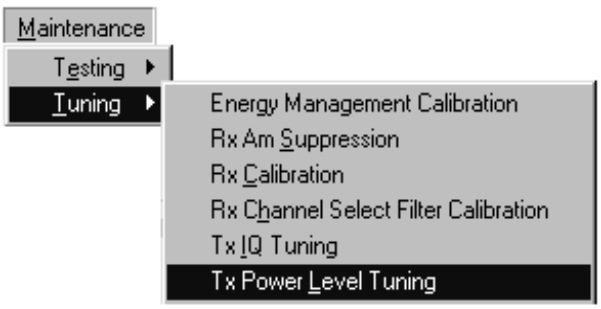
tion from FILE - Manage Connections -menu.



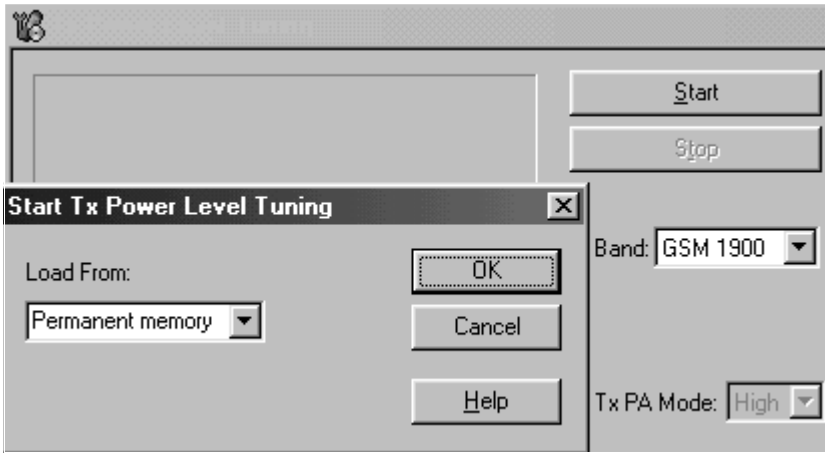
3 Then change the operating mode to Local.



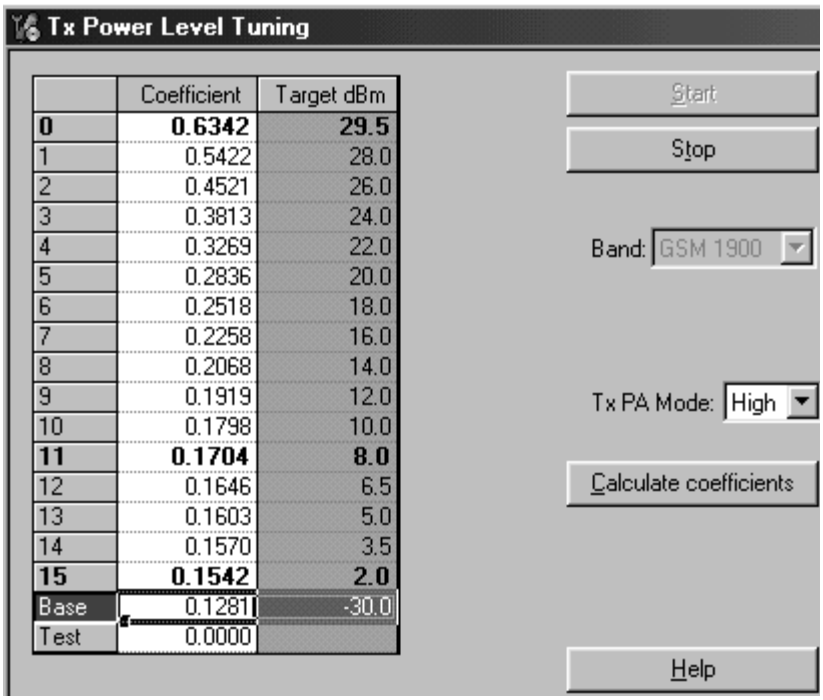
4 Select Tuning from Maintenance –menu and choose TX power level tuning.



5 Press Start and load tuning values from Permanent memory.



6 Adjust tuning values.



Note: It is only necessary to adjust Base (-30dBm), PCL 15, 11 and 0. After that it is possible to use Calculate coefficients –function to linearize other values.

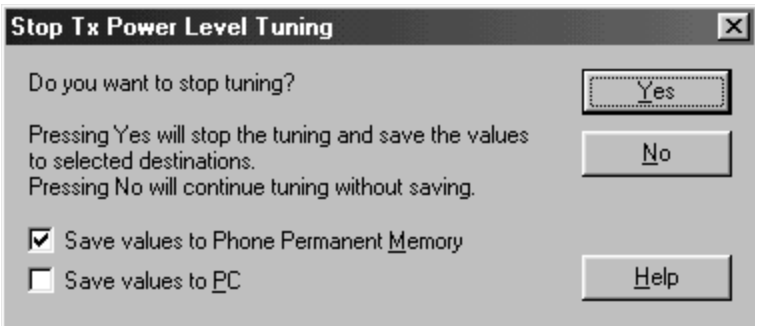
Tuning target of 29.5 dBm, for PCL 0, is aimed for phone without mechanics when tuning in service jig. Mechanics are increasing TX power level about 0.5 dBm.

TX Power target of PCL 0 is 30 dBm for phone with mechanics.

TX Power Tuning targets and limits:

Power level	RF Power at antenna pad	Tuning target tolerance	Testing limits
0	29.5 dBm	+/- 0.1 dBm	+0.2 … -0.5 dB 29.7 … 29.0 dBm
1	28.0 dBm	+/- 0.5 dBm	+/-1 dB
2	26.0 dBm	+/- 0.5 dBm	+/-1 dB
3	24.0 dBm	+/- 0.5 dBm	+/-1 dB
4	22.0 dBm	+/- 0.5 dBm	+/-1 dB
5	20.0 dBm	+/- 0.5 dBm	+/-1 dB
6	18.0 dBm	+/- 0.5 dBm	+/-1 dB
7	16.0 dBm	+/- 0.5 dBm	+/-1 dB
8	14.0 dBm	+/- 0.5 dBm	+/-1 dB
9	12.0 dBm	+/- 0.5 dBm	+/-1.5 dB
10	10.0 dBm	+/- 0.5 dBm	+/-1.5 dB
11	8.0 dBm	+/- 0.5 dBm	+/-1.5 dB
12	6.5 dBm	+/- 0.5 dBm	+/-1.5 dB
13	5.0 dBm	+/- 0.5 dBm	+/-1.5 dB
14	3.5 dBm	+/- 1.0 dBm	+/-2.0 dB
15	2.0 dBm	+/- 1.0 dBm	+/-2.0 dB
Base	-30 dBm	+/- 1.0 dBm	+/-2.0 dB
Test			

7 When tuning values are correct; save them to Phone Permanent Memory



New tuning values will be in use immediately.

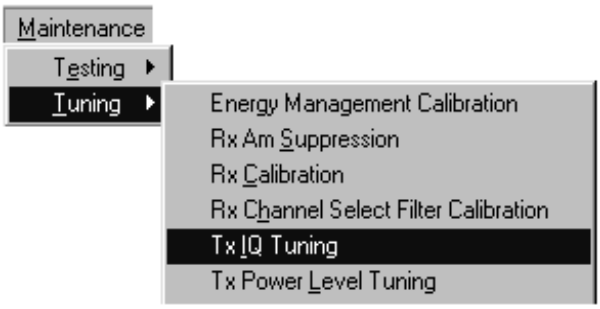
--> Close TX Power Level Tuning window

TX IQ tuning

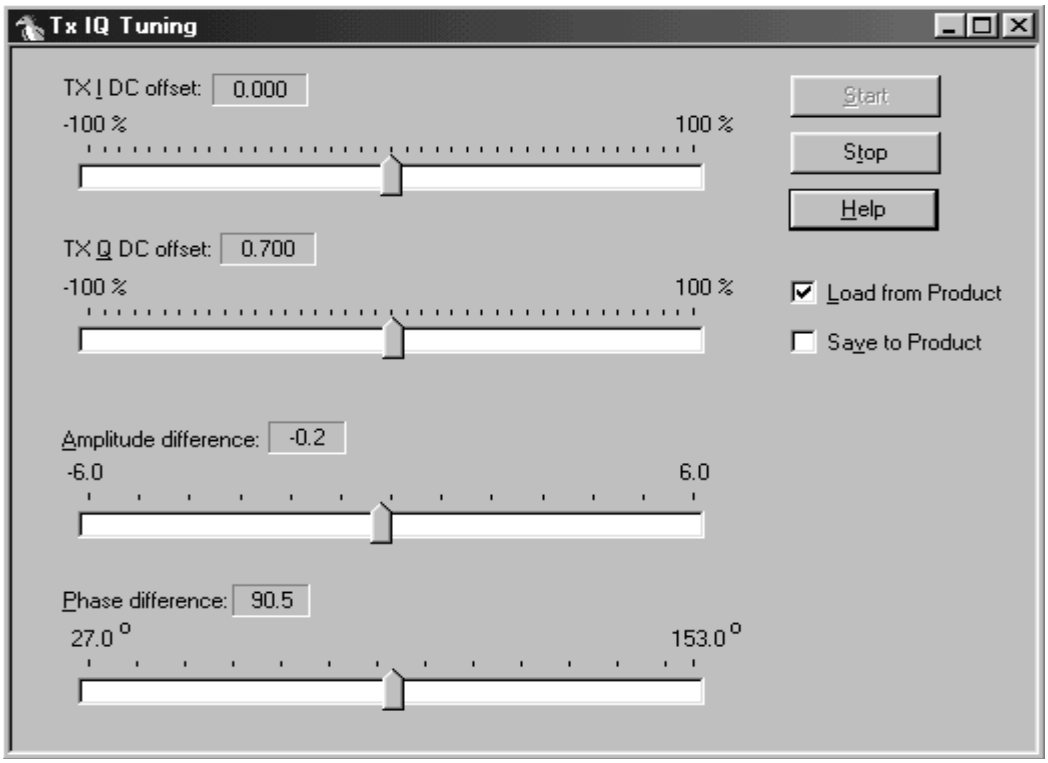
Spectrum analyzer setting for TX IQ tuning:

- Frequency: 1880MHz
- Span: 200kHz
- RBW/VBW: 10kHz
- SweepTime: 2s
- RefLevel: +20dBm

1 Select Tuning from Maintenance –menu bar and choose TX IQ Tuning.

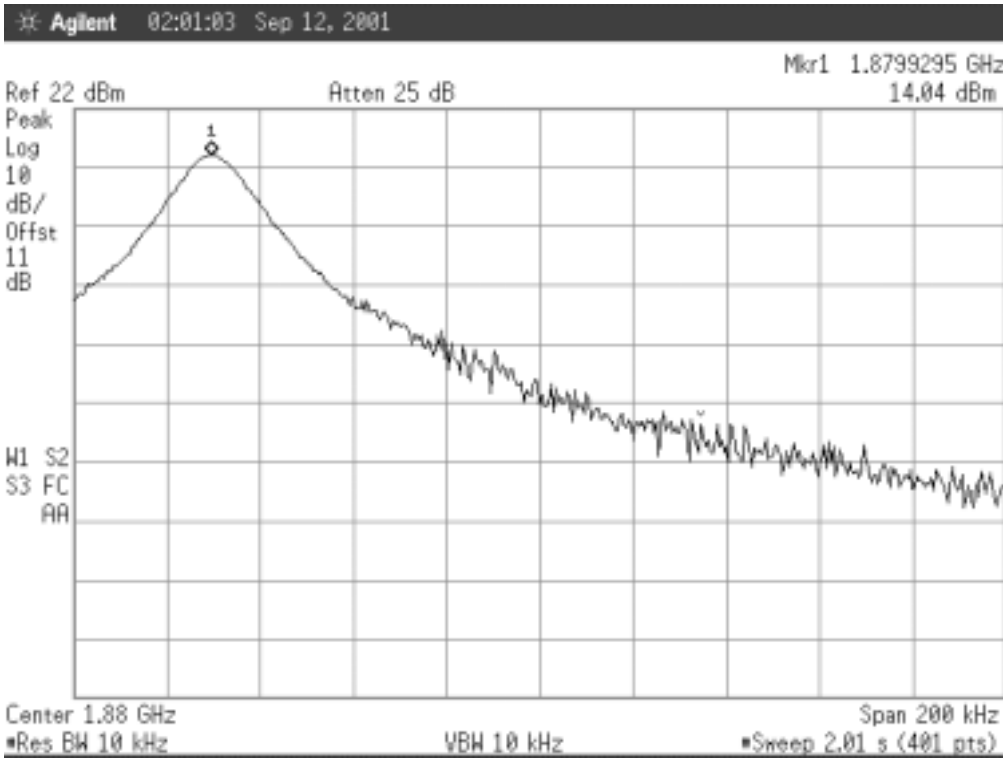


2 Load tuning values from Product and Start –tuning.



Adjust tuning values so that IQ spectrum is balanced (see example picture below, data ‘

All 1').



3 Choose **Save to Product** and **Stop** tuning.

--> Close **Tx IQ Tuning** window.

RX tunings

When changing any RX components, all RX tunings need to be done.

1 Channel select filter

2 RX tuning GSM1900 (gain step A1 ... A9 tuning)

3 AM suppression GSM1900 (to minimize AM signal disturbance)

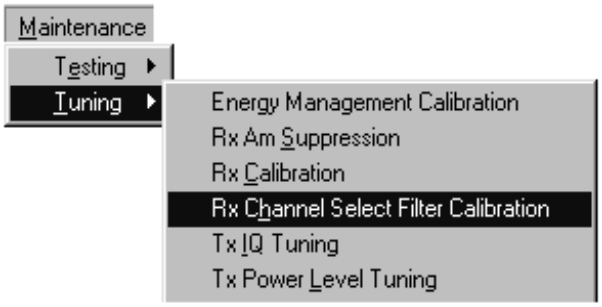
Equipment needed for RX tuning:

- Signal generator with AM-Modulation
- Computer with Phoenix -software

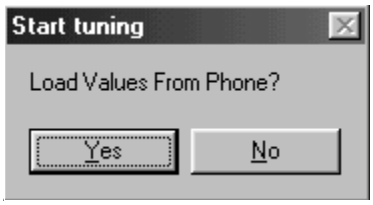
Channel select filter calibration

1 Choose product and initialize connection as in TX output power tuning procedure (Steps 1 and 2)

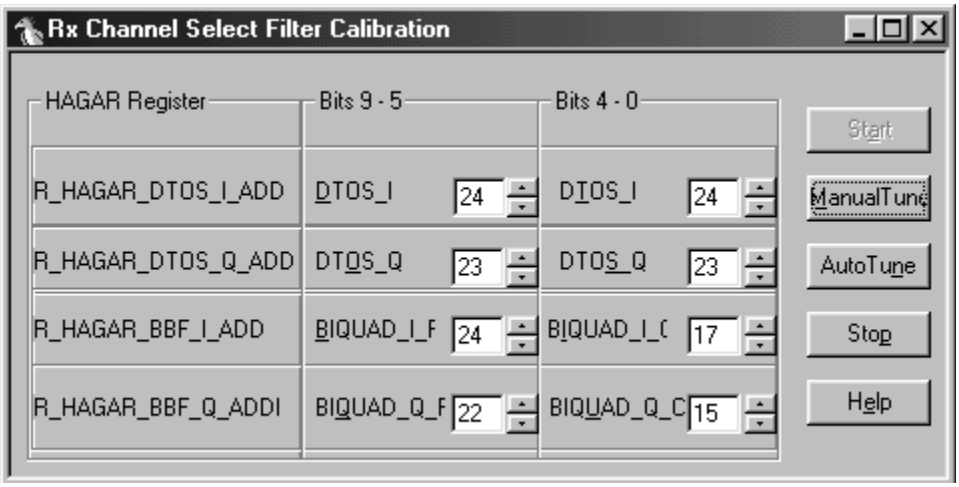
2 Select Tuning from Maintenance –menu bar and choose RX Channel Select filter Calibration.



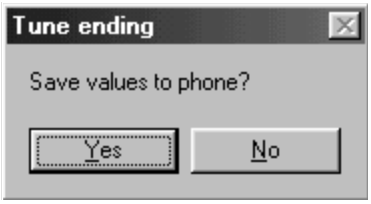
3 Load tuning values from phone.



4 Use Auto Tune to calibrate Channel Select filter.



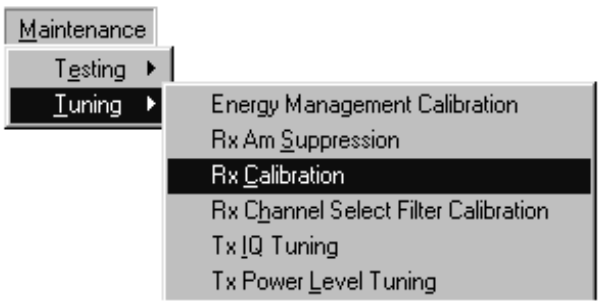
After tuning, select **Stop** and save the values onto the phone.



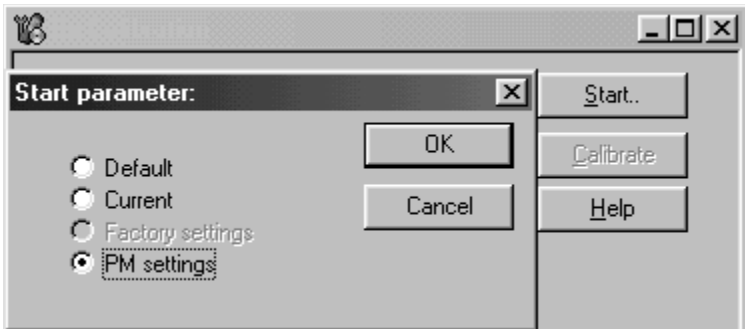
5 Close the **Rx Channel Select Filter Calibration** window.

RX tuning GSM1900

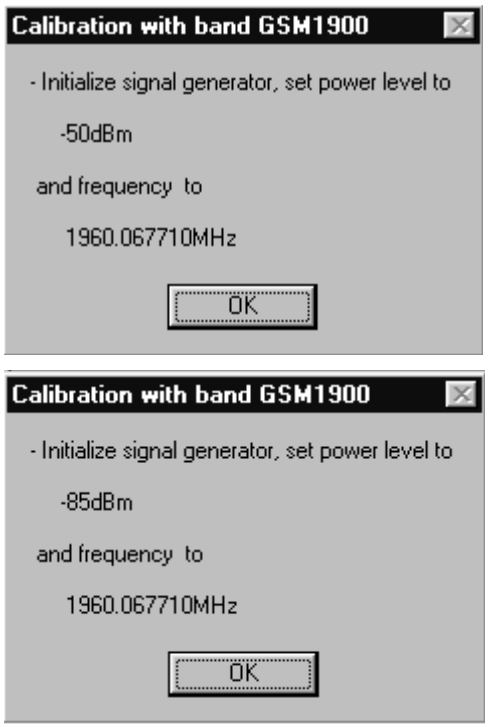
1 Select **Tuning** from Maintenance –menu bar and choose **RX Calibration.**



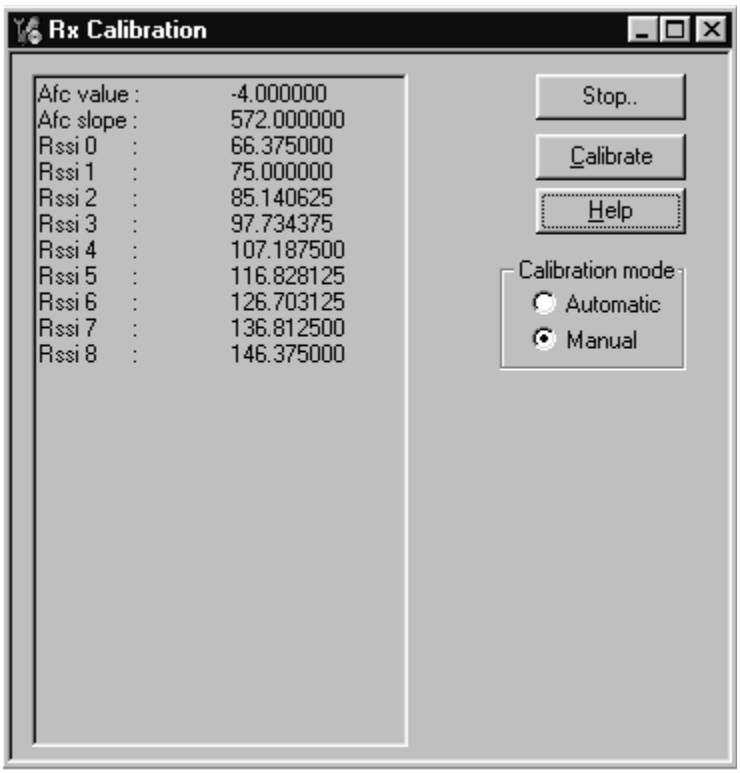
2 Start **Manual tuning** with **PM Setting.**



3 Choose **Calibrate** and adjust signal generator accordingly.



4 **Stop** and **Save** new calibration values to phone.



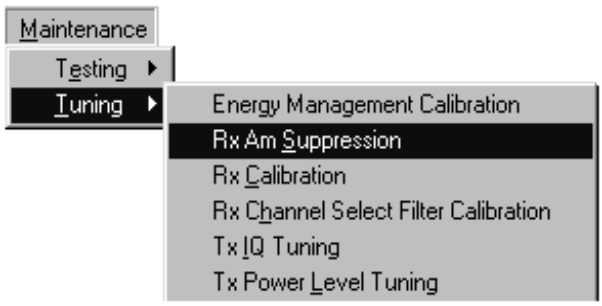
--> Close **Rx Calibration** window.

RX Calibration limits:

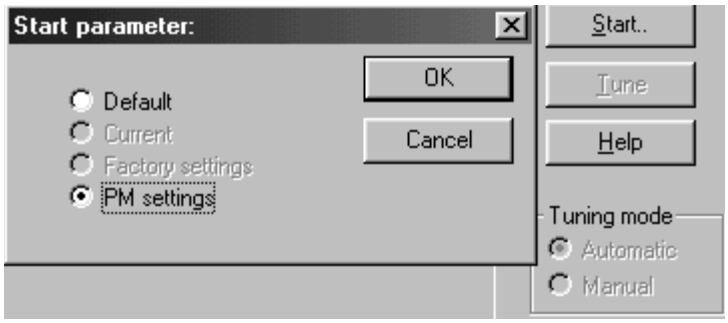
RSSI 0	60	70
RSSI 2	70	80
RSSI 3	80	90
RSSI 4	90	100
RSSI 4	100	110
RSSI 5	110	120
RSSI 6	120	130
RSSI 7	130	140
RSSI 8	140	150
Check AFC_slope	0	1000
Check AFC_value	-500	500

AM suppression tuning

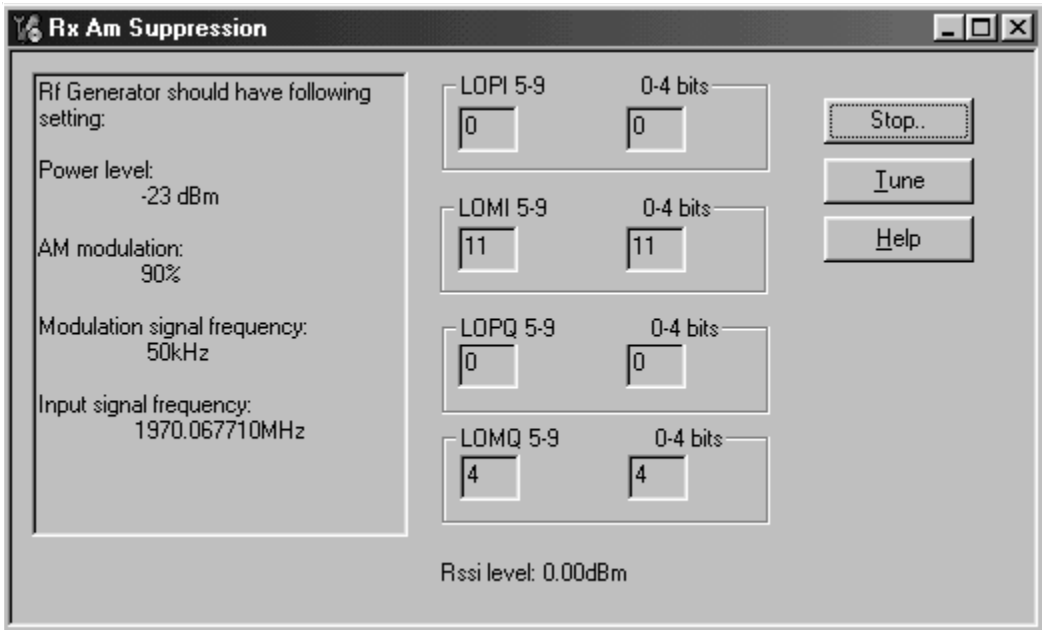
1 Select Tuning from Maintenance –menu bar and choose RX Am Suppression.



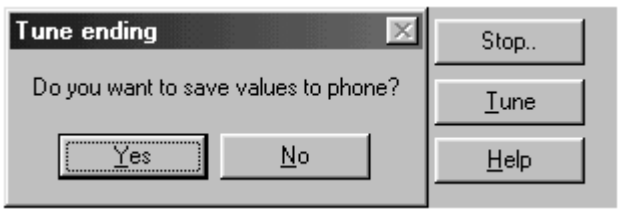
2 Start tuning with PM settings.



3 Adjust signal generator accordingly and Tune.



4 Stop and save values to phone.



--> Close Rx Am Suppression window.

Rx Am Suppression limits:

LOP_I	0	1023
LOM_I	0	1023
LOP_Q	0	1023
LOM_Q	0	1023
RSSI	-120	-92

RF Service Tools

MJS-46 Module Jig

All RF tunings should be performed in MJS-46 Jig. When using Test Jig MJS-46, the reference level attenuation is 0.1 dB + cable loss.

JVB-1 Docking Station, MJF-6 Adapter and coupler CPL-6

The reference level attenuation for Docking Station JBV-1 + MJF-6 adapter with antenna coupler CPL-6 is approximately 4 dB +cable loss.There can be minor differences between CPL-6 antenna couplers, but maximum distribution is +-0.3dBm. Attenuation can varie between antenna couplers. There is differences in attenuations between low and high channel, but those can be ignored.

Coupler attenuation calibration

When Docking Station with MJF-6 and CPL-6 inside the shield box JSX-1 is used, then calibration procedure is following:

- Measure one known phone in **MJS-46 Module Jig** in Ch 661, the output power **(P1)** should be 29.5dBm +- 0.2dB. Remember the jig loss 0.1dB and cable loss.
- Assemble the measured phone in to mechanics
- Put the phone in to the JBV-1 Docking Station, without **JXS-1 Shield Box**
- Measure the output power **(P2)** in Ch 661
- The attenuation **(A1)** of the antenna coupler is: A1=(P1+0.5dBm)-P2
- (**Note!** Mechanics will increase output power 0.5dB)

Typical coupler (CPL-6) attenuation is 4.0dB. If measurements are done without **JXS-1 Shield Box**, the same value can be used in TX and RX.

If using shielded box **JSX-1**, additional loss is needed separately for LO, MID and HI Channels. Typical loss values are: LO= 5.7dB, MID=2.3dB and HI=0.5dB

Functionality Testing Limits

When checking the phone's functionality in the JBV-1 docking station with a coupler, the TX power may vary to some degree. TX power levels 14 and 15 should be ignored, as the coupler's response is not reliable. The following table lists the TX output power tolerances, when CPL-6 is used for measuring:

Table 2: TX Output Power Tolerances

PCL	Target (dBm)	Tolerance (dBm)
0	29.5	+/-3
1	28	+/-3
2	26	+/-3
3	24	+/-3
4	22	+/-3
5	20	+/-3
6	18	+/-3
7	16	+/-3
8	14	+/-4
9	12	+/-4
10	10	+/-4
11	8	+/-4
12	6.5	+/-4
13	5	+/-4
14	3.5	+/-5
15	2	+/-5

JXS-1 Shield Box

Metal shielded box, mentioned to avoid disturbing RF signals, has a great effect to TX output power, Bit error and Signal Strength reporting results, since the surface of shielded box is reflecting RF-waves and therefore changing RF performance.

In following pictures the behavior of JVB-1 Docking Station with MJF-6 adapter is presented in JXS-1 Shield Box and without the box (coupler).

The measurements are done in the following conditions:

- Temperature +25 °C (77 °F)
- NOKIA 8390 Cellular Phone
- NOKIA JXS-1 Shield Box
- NOKIA JBV-1 Docking station with antenna coupler (1900 MHz)
- RF-Attenuation for MJF-6 and cable is 4.5dB

Figure 74: Power 30 dBm

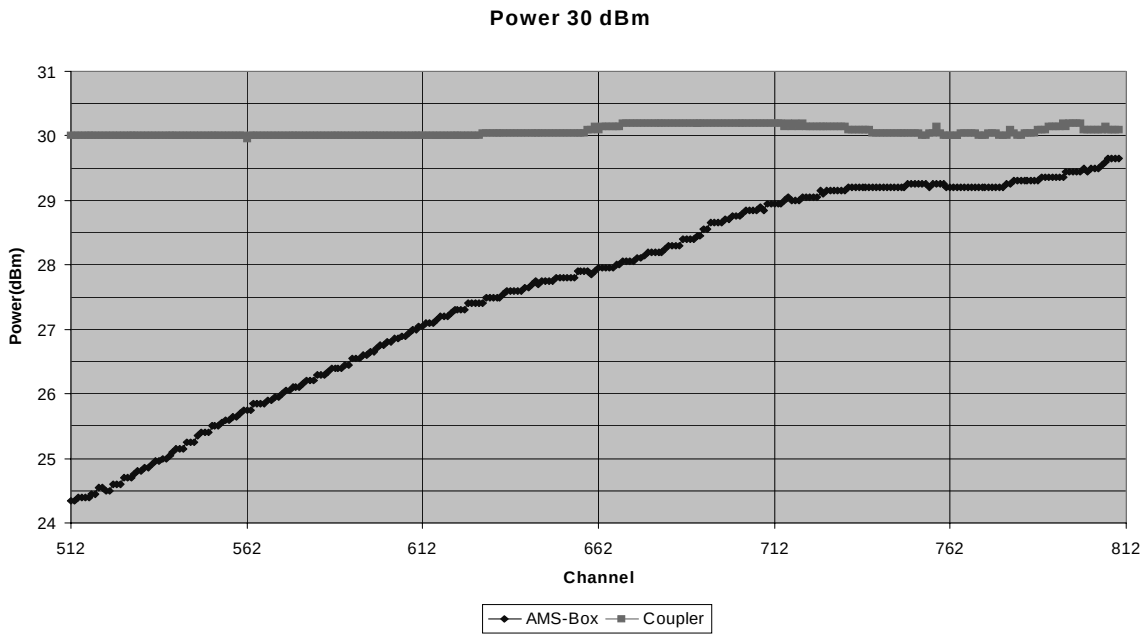


Figure 75: Phase error RMS

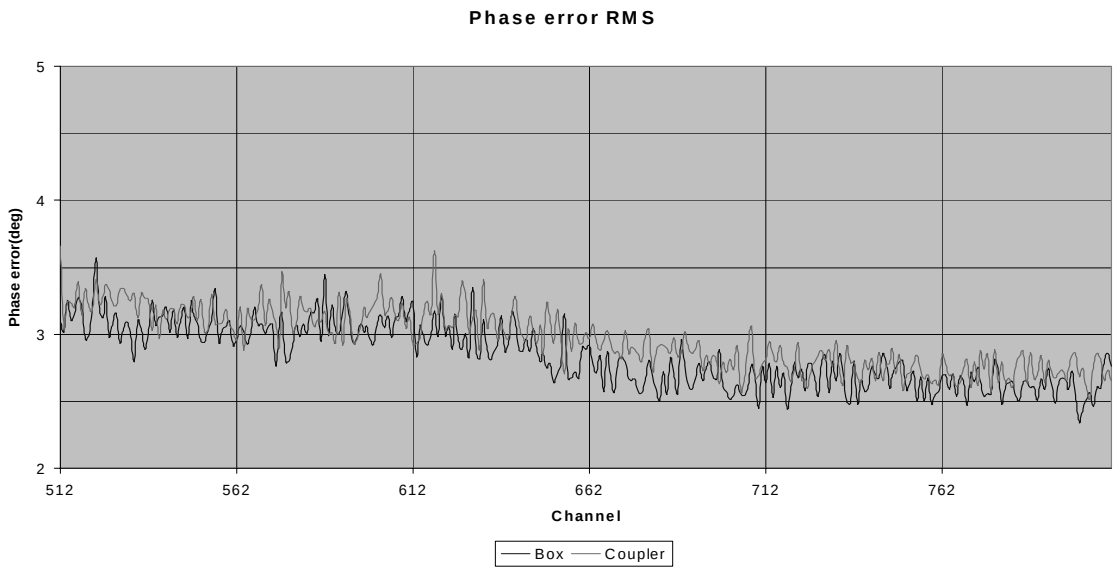


Figure 76: Signal Strength Reading

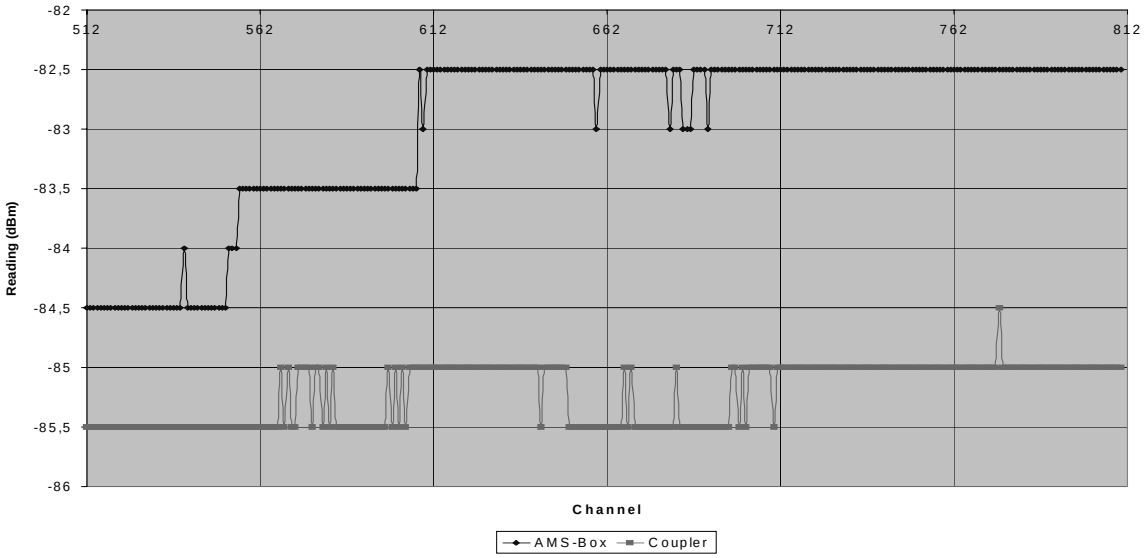
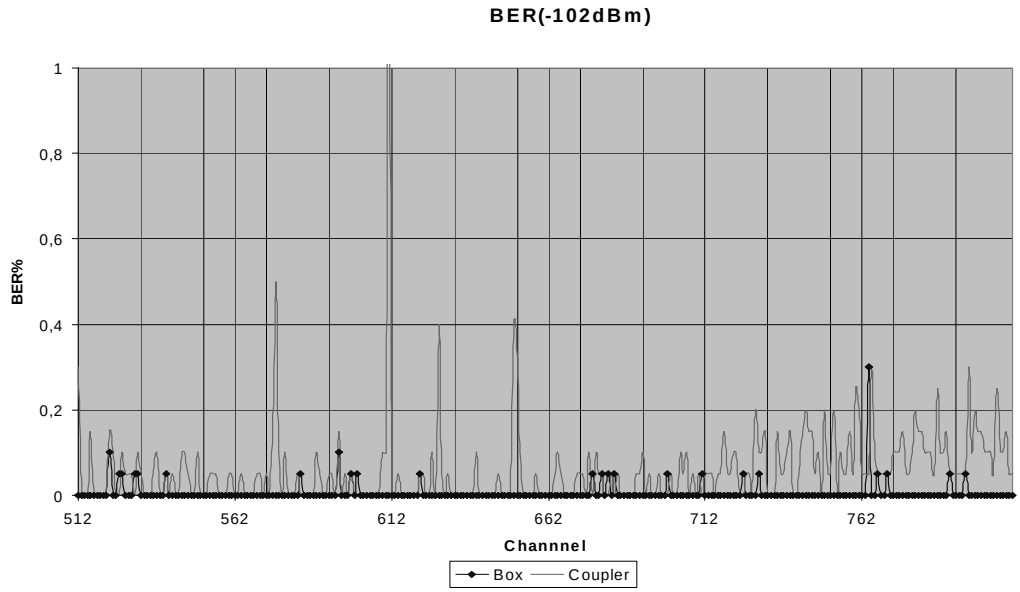


Figure 77: BER(-102 dBm)



When using JXS-1 shield box different RF attenuations have to be used. It is recommended that in the shield box all measurement are performed only on channel 661 and additional 2.5 dBm loss in added to Reference level offset, so that total RF attenuation caused by JXS-1 shield box and CPL-6 Adapter is 6.5 dBm+ cable loss.

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