

Troubleshooting Manual

C903



ABOUT

General information

The purpose of this document is to provide enhanced technical information for Sony Ericsson repair technicians in order to assist during service, repair and troubleshooting operations on Sony Ericsson mobile phones. It should be used as a complement to other repair instructions and tools as notified by the local Sony Ericsson representative.

To search for components throughout the entire document use the “search” function in Adobe Acrobat Reader 7.0 (or later version) and enter the component name or other word. Use zoom to enlarge.

For easier navigation of the document you can use the bookmarks that appear in the Bookmarks tab on the left side of the Adobe Acrobat Reader window. Each bookmark jumps to a page in the document.

Disclaimer

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Note

When disassembling and reassembling the phone the instructions and processes described in the Mechanical Working Instructions, the Generic Repair Manual and the Repair Center Handbook must be followed.

Revision History

Rev.	Date	Changes / Comments
1	06/19/2009	Initial revision.

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C903 Equipment List



Info: Additional information about the equipment used for TRS can be found in the following location: *CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf or matrix.xls – C Model Tab.*

Troubleshooting Fixture

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf
Part number: 1225-3244

Note! Additional information about the TRS Fixture Kit can be found in the Trouble Shooting Fixtures Setup Instructions document which is included in this TRS Manual.

Dummy Battery

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf
Part number: NTZ 112 533

Note! The resistance between GND and BDATA should be approximately 120 KOhm.

Instruments

Power Supply Channel 1 (VBATT)

Agilent 6632B or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Instrument Settings:

Voltage: **3.8 Volt**

Limiter: **2.0 A**

Note! Max cable length between the Power Supply Channel 1 VBATT and the dummy battery is 1 metre. The cable must have a capacity for at least 16A.

Power Supply Channel 2 (DCIO/SEPI)

Agilent 6632B or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Instrument Settings:

Voltage: **5.0 Volt**

Limiter: **2.0 A**

Oscilloscope

Agilent DSO7052A or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Digital Multimeter (DMM)

Fuke 83 or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Note! The 0, 64 mm Test Probes is recommended by Sony Ericsson when the DMM is in use, please see Picture 1.

Picture 1



Spectrum Analyzer

R&S FSL 9 kHz – 3 GHz or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

RF probe

HP 85024A or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Mobile Phone Tester

Yokogawa VC200 or similar

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

FM Signal Generator

R&S SMC100A or similar

Location: -

RF Adaptor

Adaptor 33 N-BNC-50-1

Adaptor to Signal Generator RF Output

See Picture 2

Location: -

Picture 2



PC Package & PC Software

PC Package (Computer)

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Urquell Fault Trace SW with project file

Location: CSPN – Repair Instructions – Electrical – C903, C903a – Trouble Shooting Application –

Project File: C903, C903a Project_R1A

Drivers

SEPI BOX Drivers

Location: <http://emma.extranet.sonyericsson.com> /– Drivers – DSS / SEPI / SEMUTS

SE Communication Interface SEPI BOX

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Part number: LTN 214 1484

See Picture 3.

Picture 3



Cables

USB Computer Cable

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

See Picture 4.

Picture 4



DSU-60/USB Cable

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Part number: KRY 101 1413

RF Test Cable Flexible

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Part number: RPM 119 885

See Picture 5.

Picture 5



SEPI Interface Cable – A1

Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf
Part number: KRY 101 1119/1
See Picture 6.

Picture 6



Power Cable RED to Power Supply Channel 1 (VBATT)

Maximum Length: 1m
Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Power Cable BLACK to Power Supply Channel 1 (VBATT)

Maximum Length: 1m
Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Customized Power Supply Channel 2 Cable (DCIO/SEPI)

Customize the cable according to following instructions below:
(Step 1, Step 2, Step 3 and Step 4)

Step 1:

Take the CST-75 battery charger and cut of the charger according to Picture 7.

Picture 7



Note! The Cable length must be exact 1.3 metre.

Step 2:

Connect the CST-75 charger Red or White wire to the Plus Output and the Black wire to the Minus (GND) Output at backside of the Power Supply Channel 2 (DCIO/SEPI) according to Picture 8.

Picture 8



Step 3:

Cut off insulating material from back side of the charger plug according to Picture 9.

Picture 9



Step 4:

Connect DCIO Cable and SEPI Interface Cable – A1 according to Picture 10.

Picture 10



Picture 11



Note! This is setup is wrong!

Connection Instructions for the Dummy Battery

This is correct setup when the Dummy Battery is in use.
See Pictures 12 and 13.

Picture 12



Picture 13



Customized FM Radio Cable

Step 1:

Use the Test lead BNC-4mm 1,5m Cable, see Picture 14.

Picture 14



Product Name: Test lead BNC-4mm 1,5m

Product Description: Test lead with 4 mm lab plugs at one end and a BNC plug at the other.

Manufacturer: PMK Germany

Location: <http://www.elfa.se/en/> or other supplier.

Part number: 46-310-40

Note! This is the ELFA part number.

Step 2:

Cut the Red Lab Plug connector according to Picture 15.

Picture 15



Step 3:

Use any Hands-Free (PHF) Cable and cut it according to Picture 16.

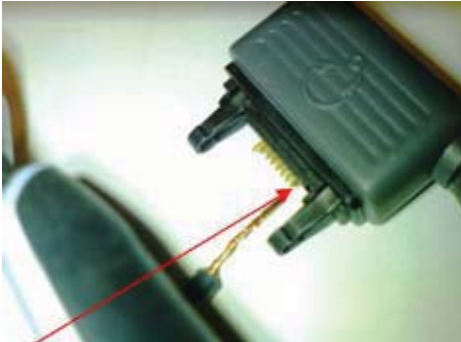
Picture 16



Note! Cable length should be at least 40cm.

Step 4:
Use only the Wire that is connected to PIN2 and cut off all others according to Picture 17.

Picture 17



Note! Use DMM instrument to ensure which of the wires are connected to PIN2 at Hands-Free (PHF) system connector plug.

Step 5:
Connect the Cable from the Picture 15 and Cable from the Picture 17 according to Picture 18.

Note! Use soldering iron for this action and then use insulating material to protect the contact point.

Picture 18



Test Cards

Local SIM
Any functional Local SIM Card
See Picture 19.

Picture 19



Test SIM GSM/UMTS
One Test SIM GSM/UMTS is needed to perform Current Consumption Test, see Picture 20.
Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf

Note! To buy a Test SIM GSM/UMTS, please contact your supplier of test equipment.

Picture 20



Sony Memory Stick M2
Any functional Memory Stick Micro M2 Card
See Picture 21.

Picture 21

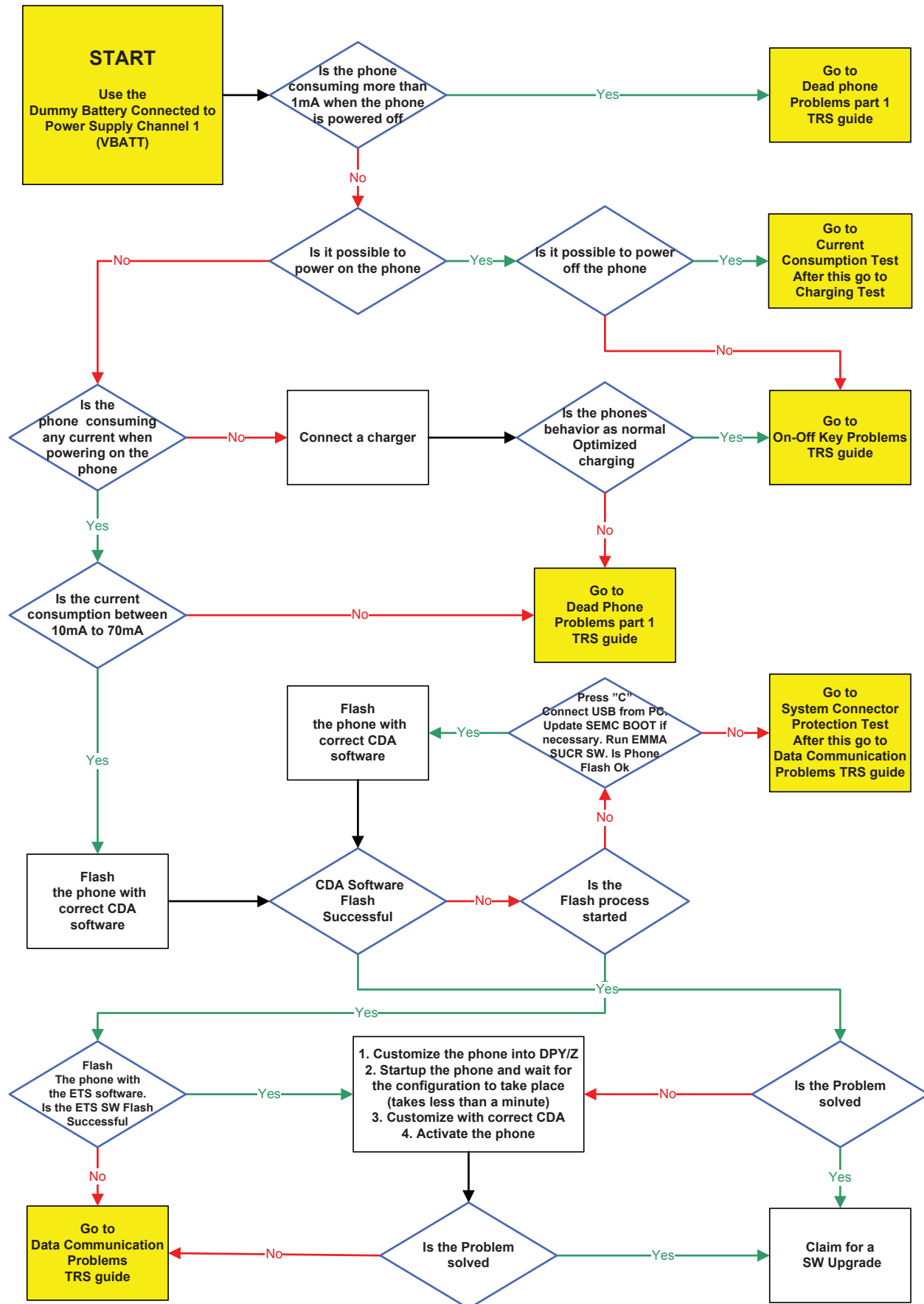


SMK RF Probe
Location: CSPN – Repair Instructions – Mechanical – Tool Catalogue – RepairToolsCatalogue.pdf
Part number: SXA 109 6356
See Picture 22.

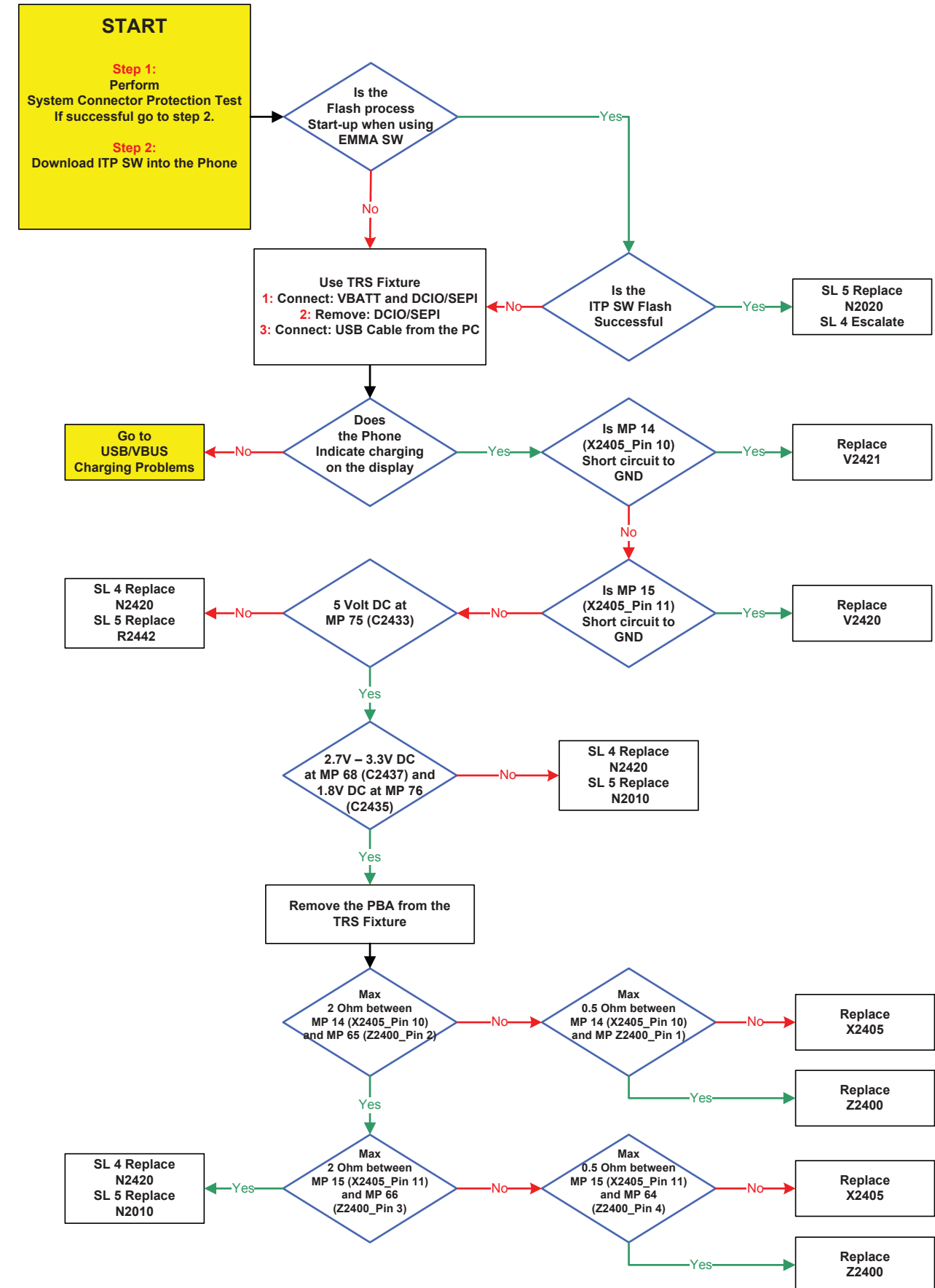
Picture 22

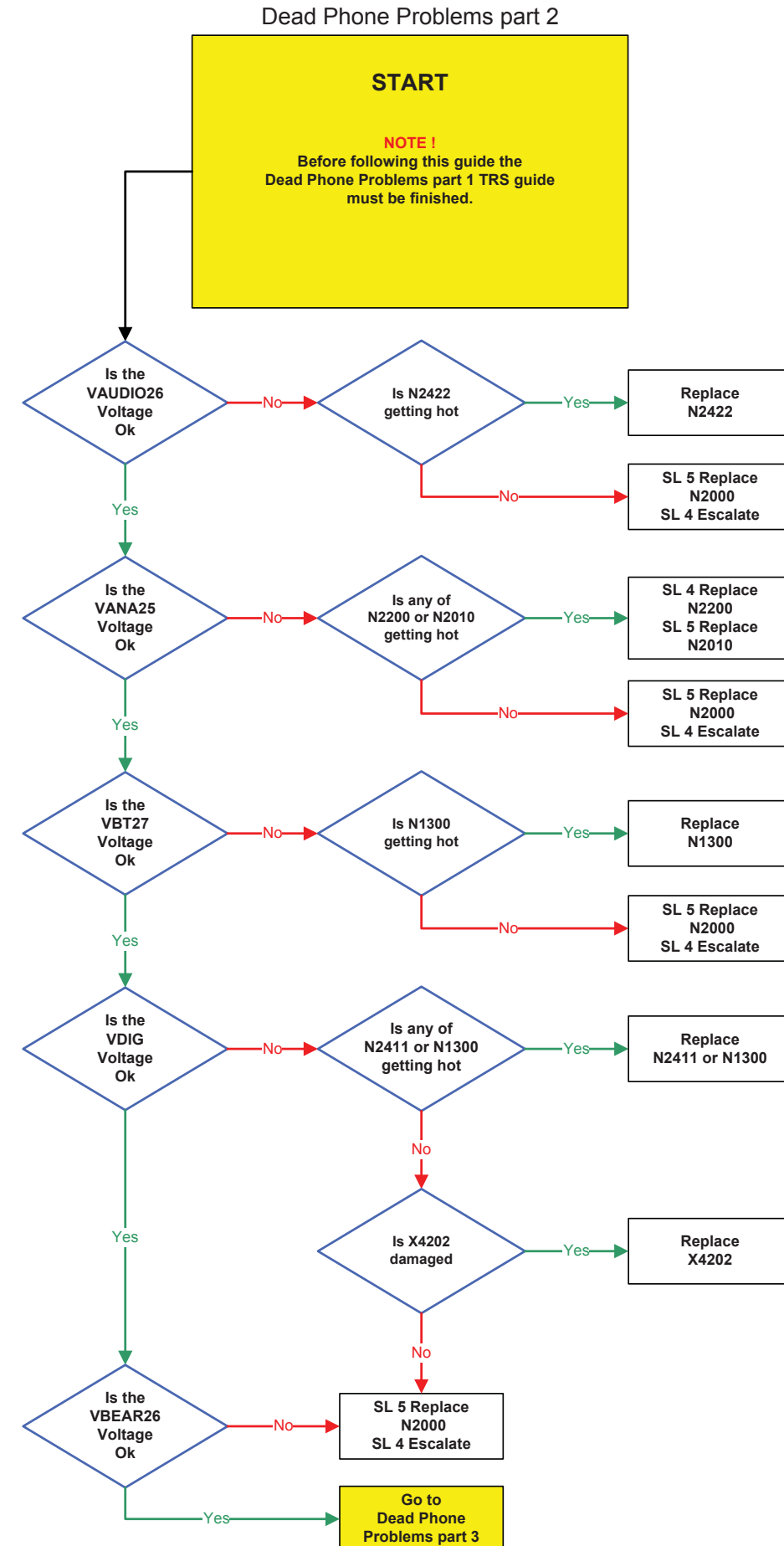
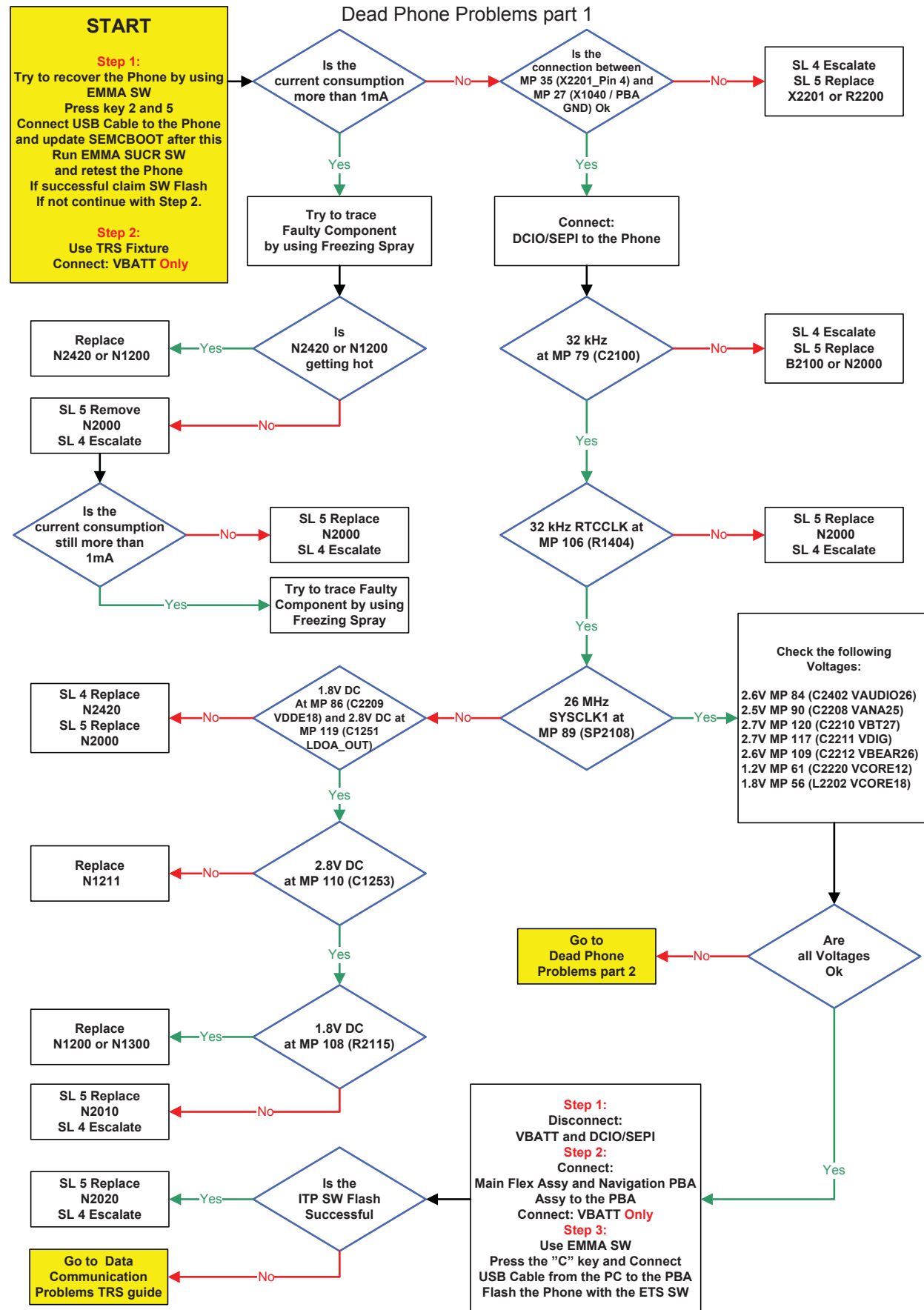


Power On/Off Problems

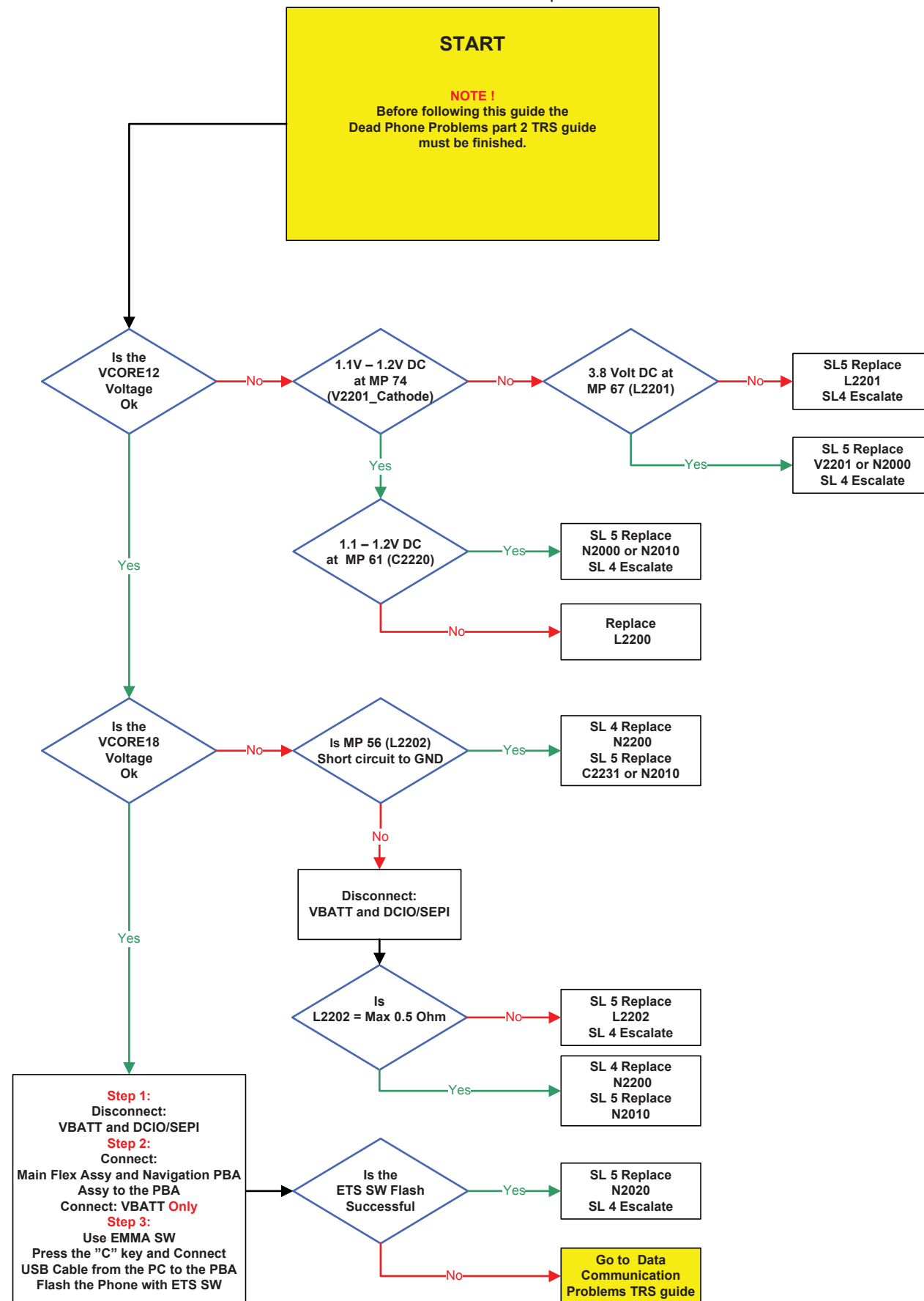


USB and Software Flash Problems

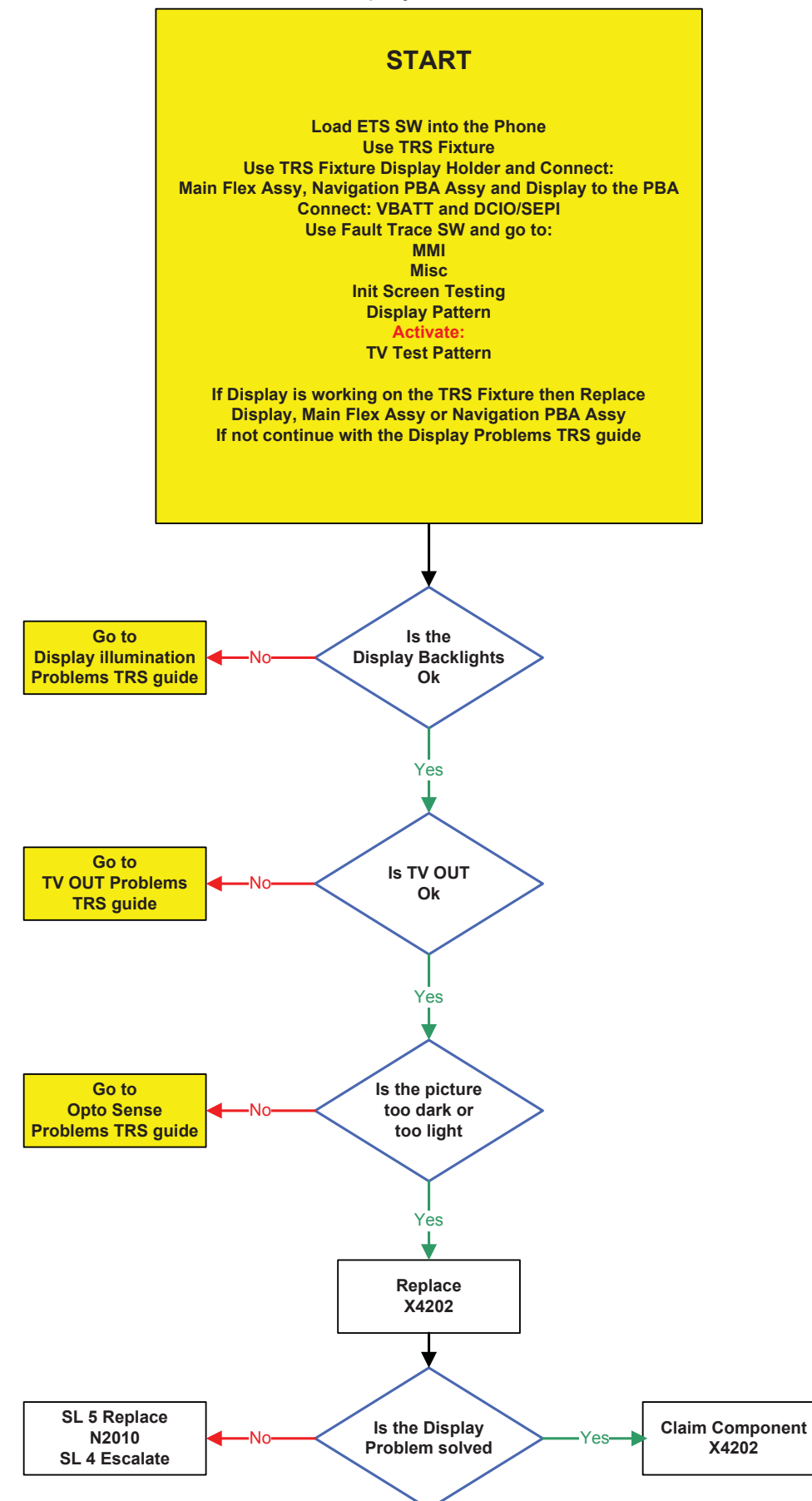




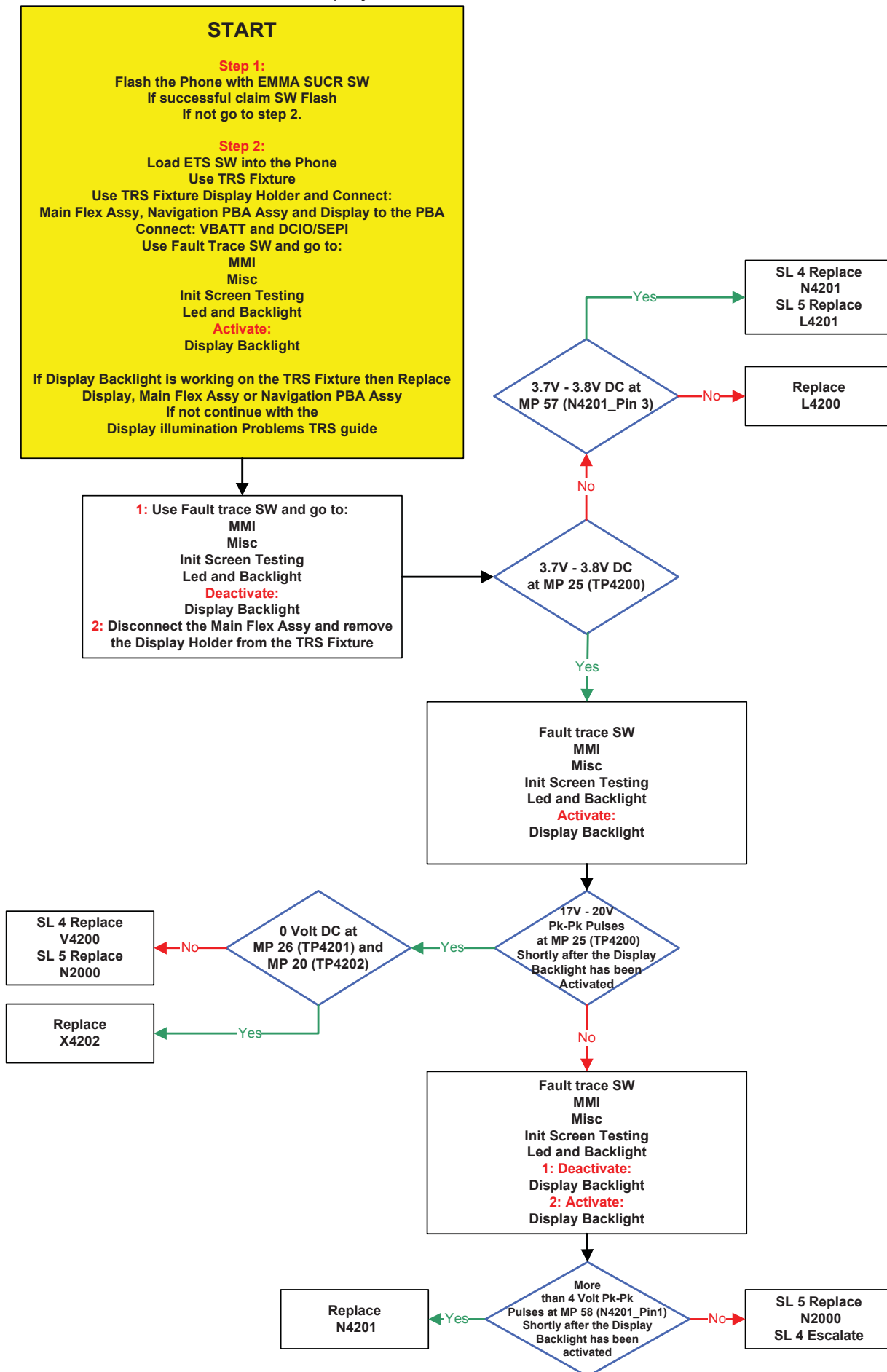
Dead Phone Problems part 3



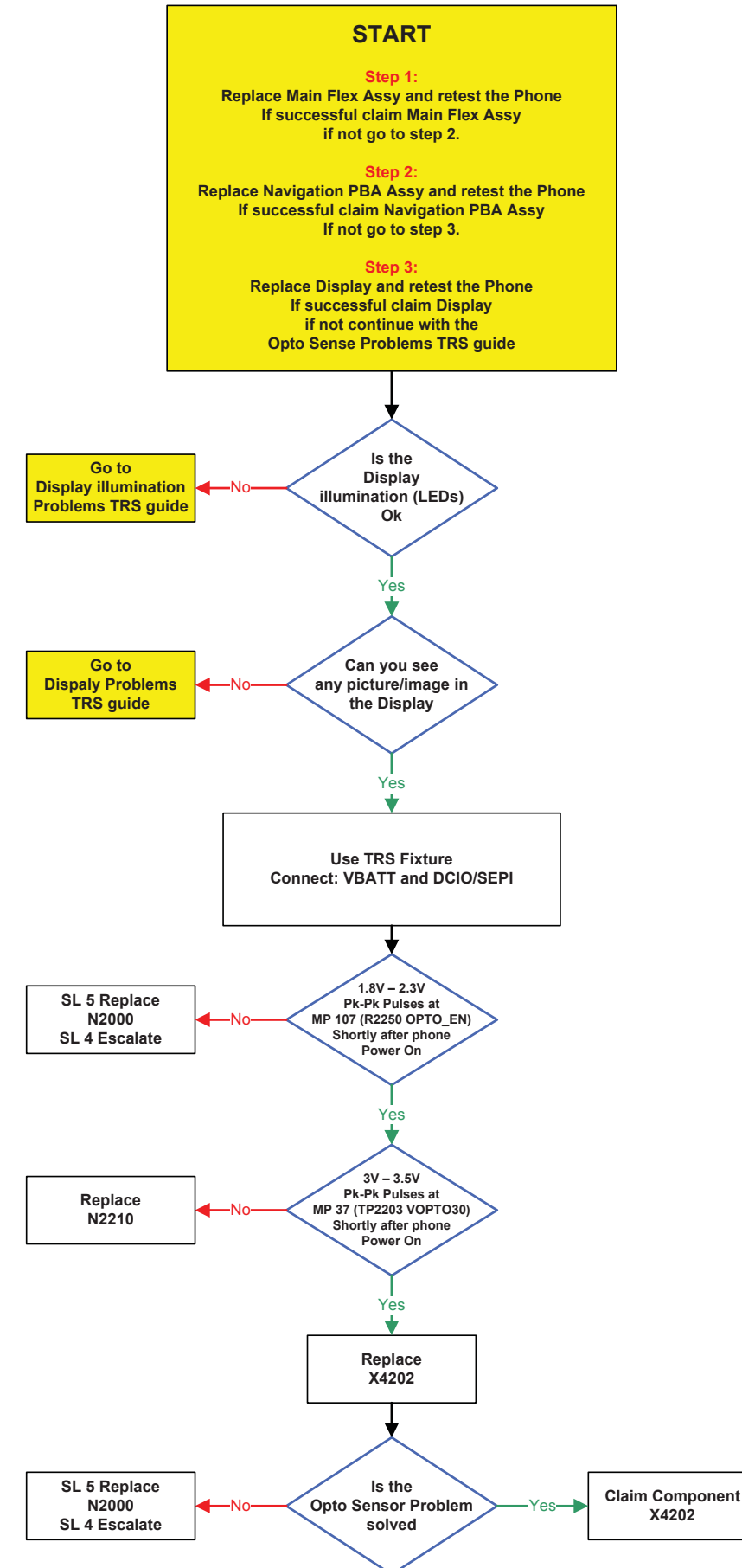
Display Problems



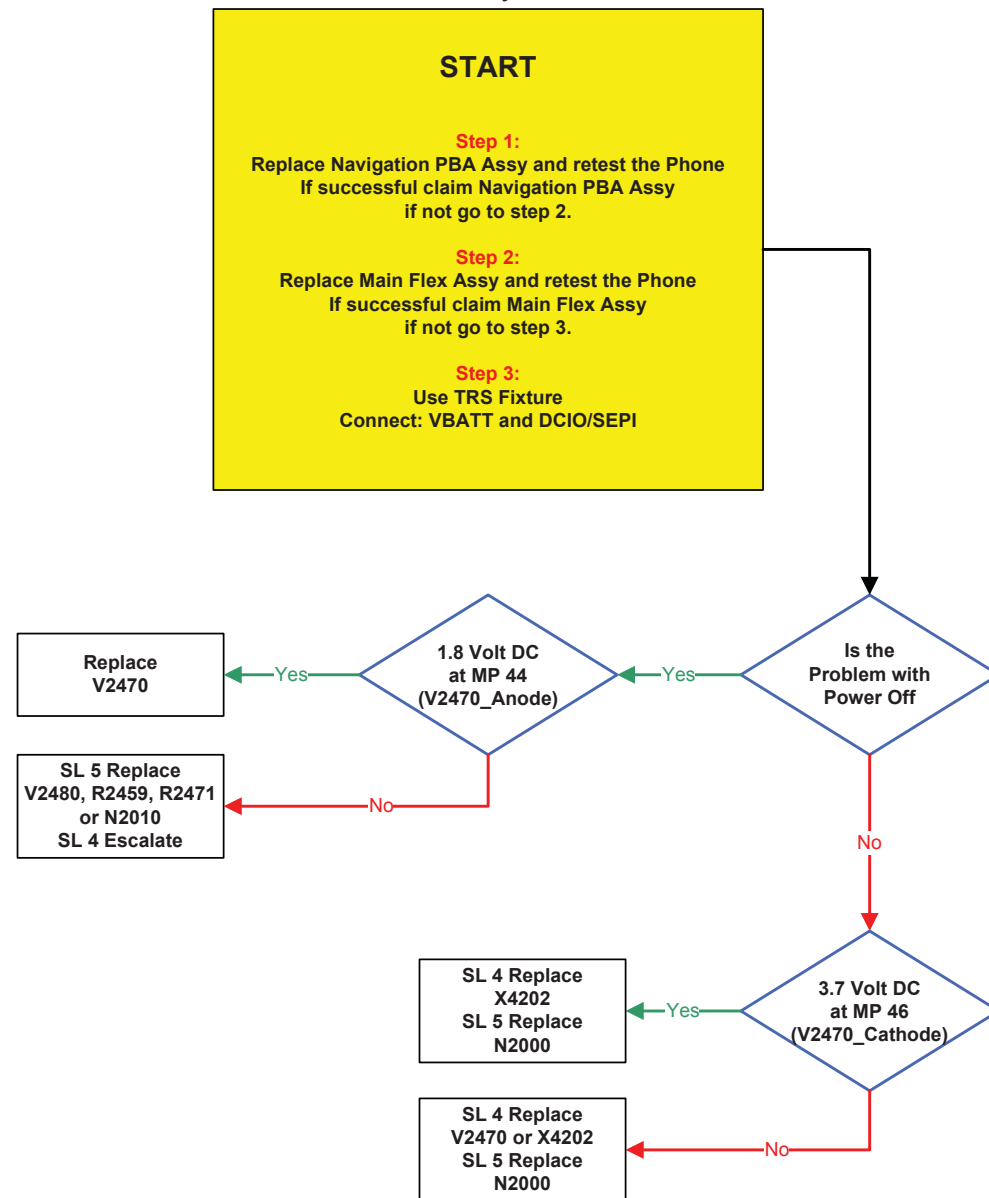
Display Illumination Problems



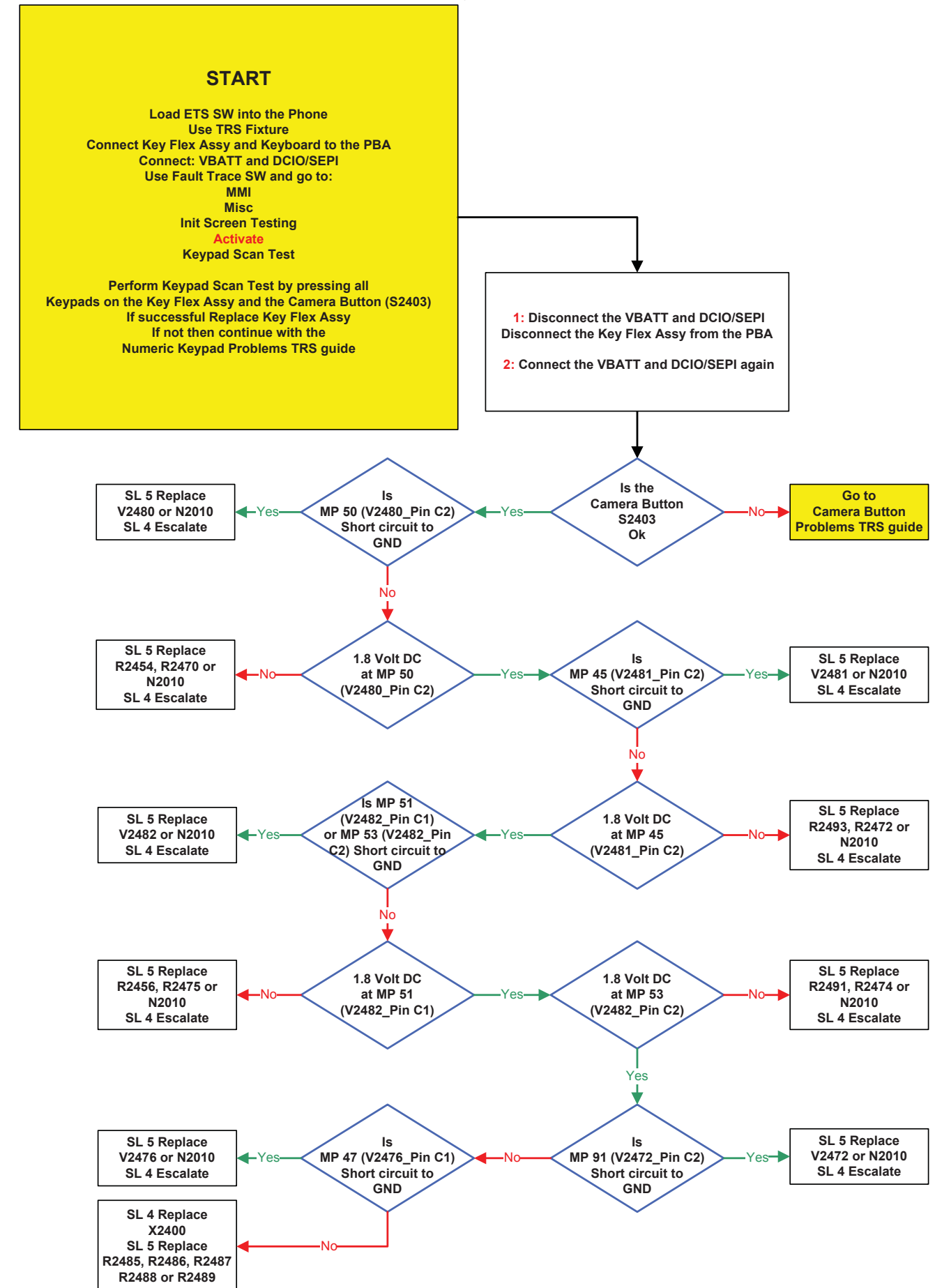
Opto Sense Problems



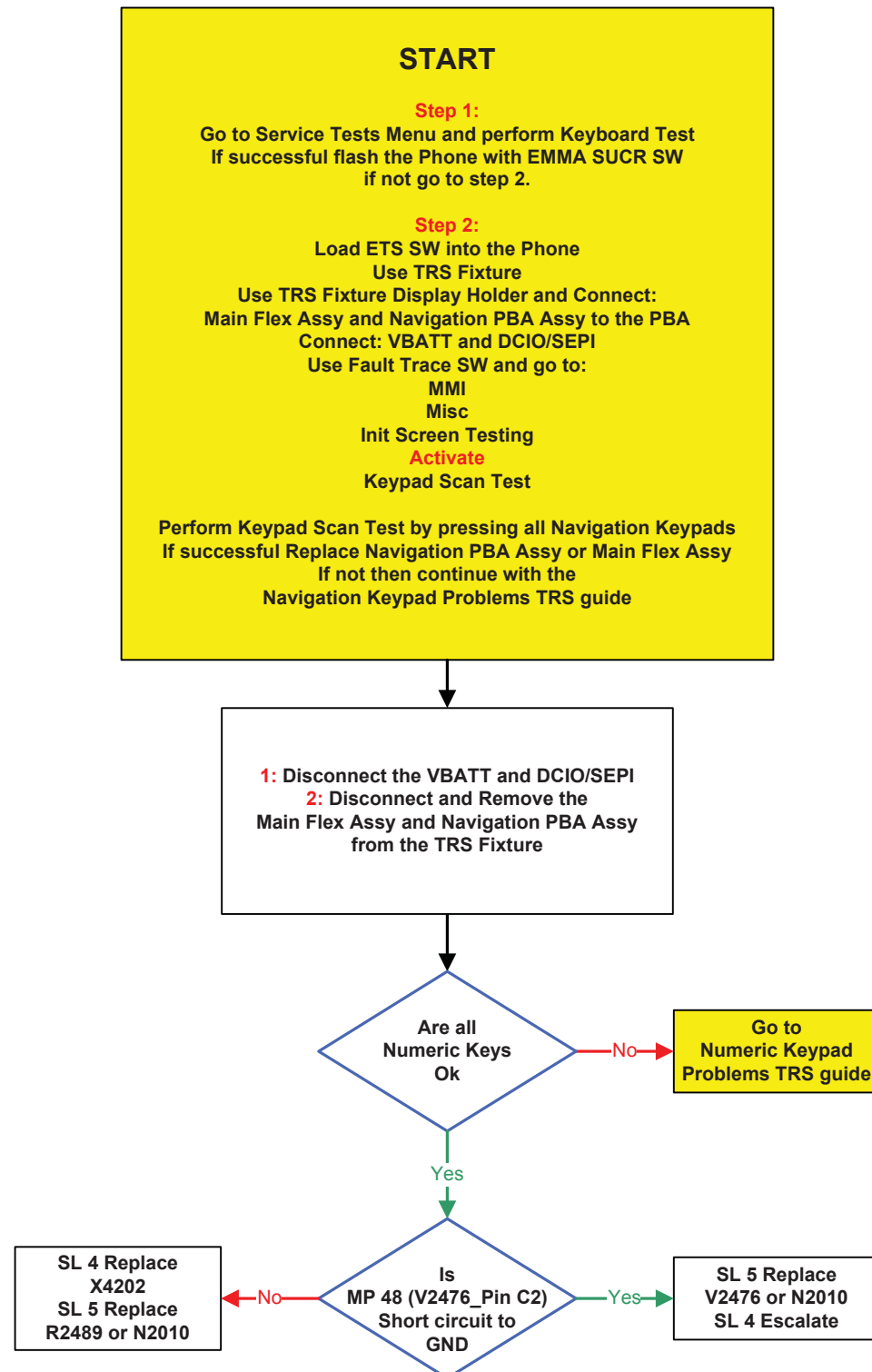
On-Off Key Problems



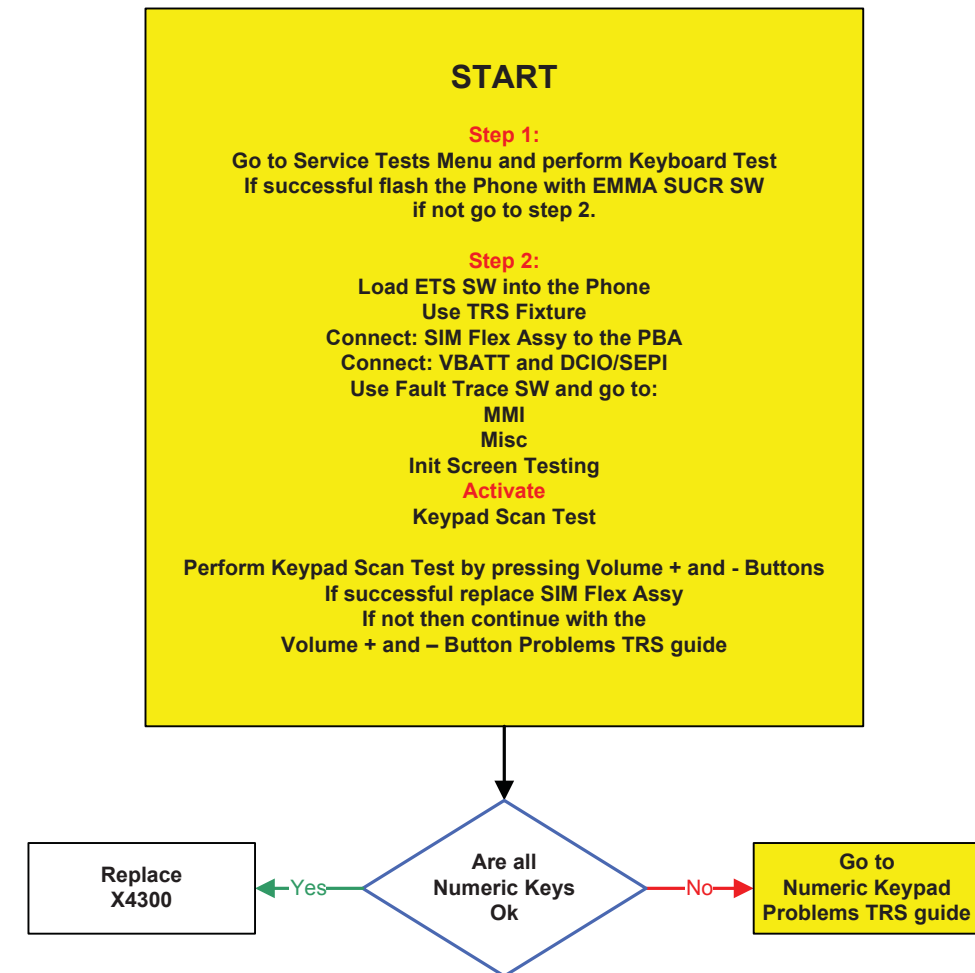
Numeric Keypad Problems



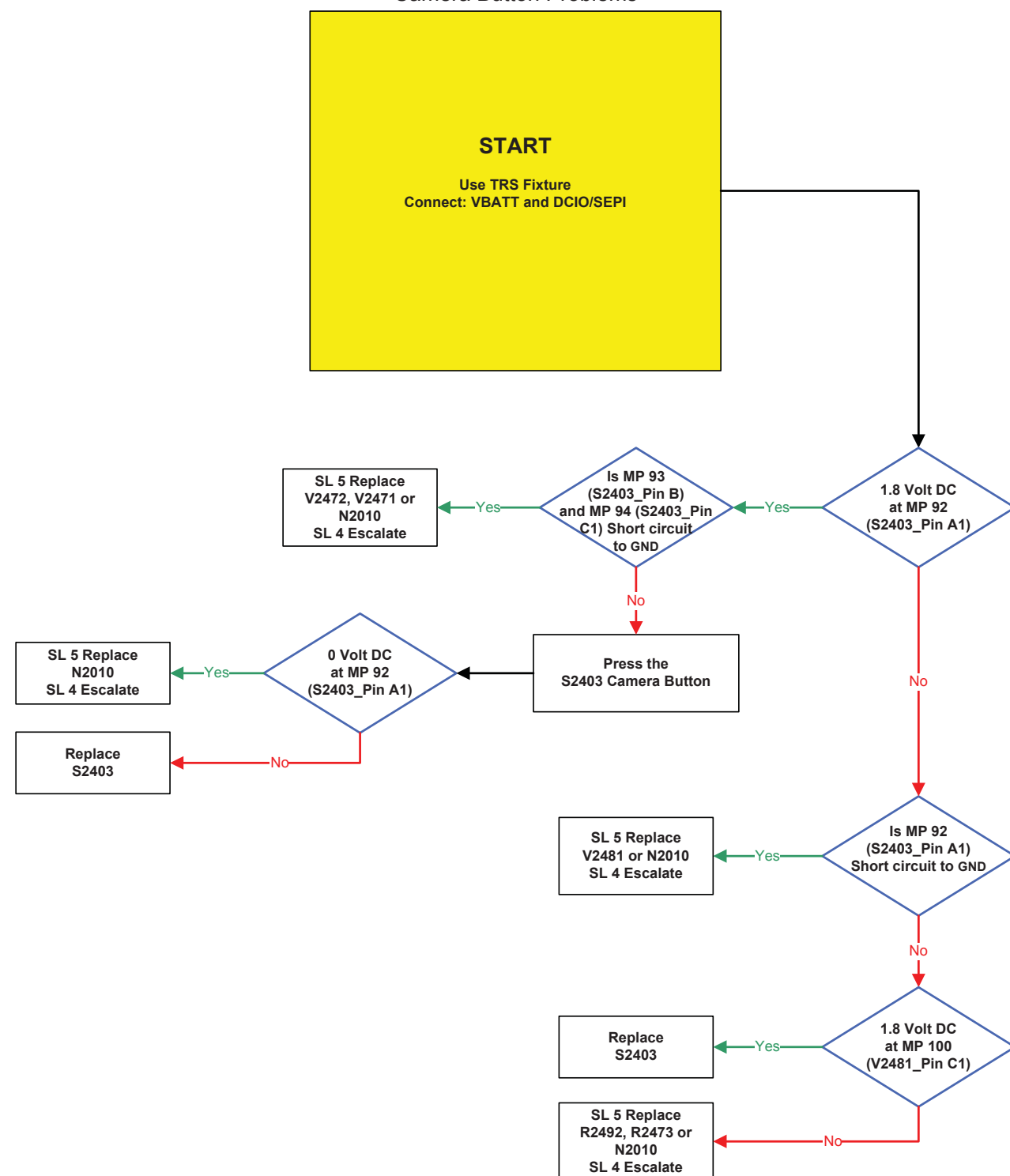
Navigation Keypad Problems



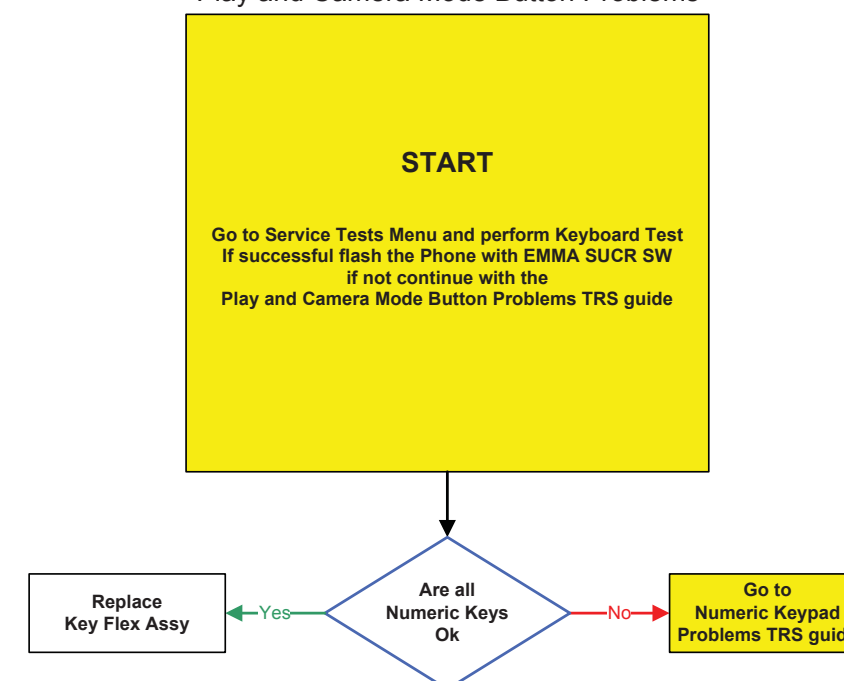
Volume + and - Button Problems



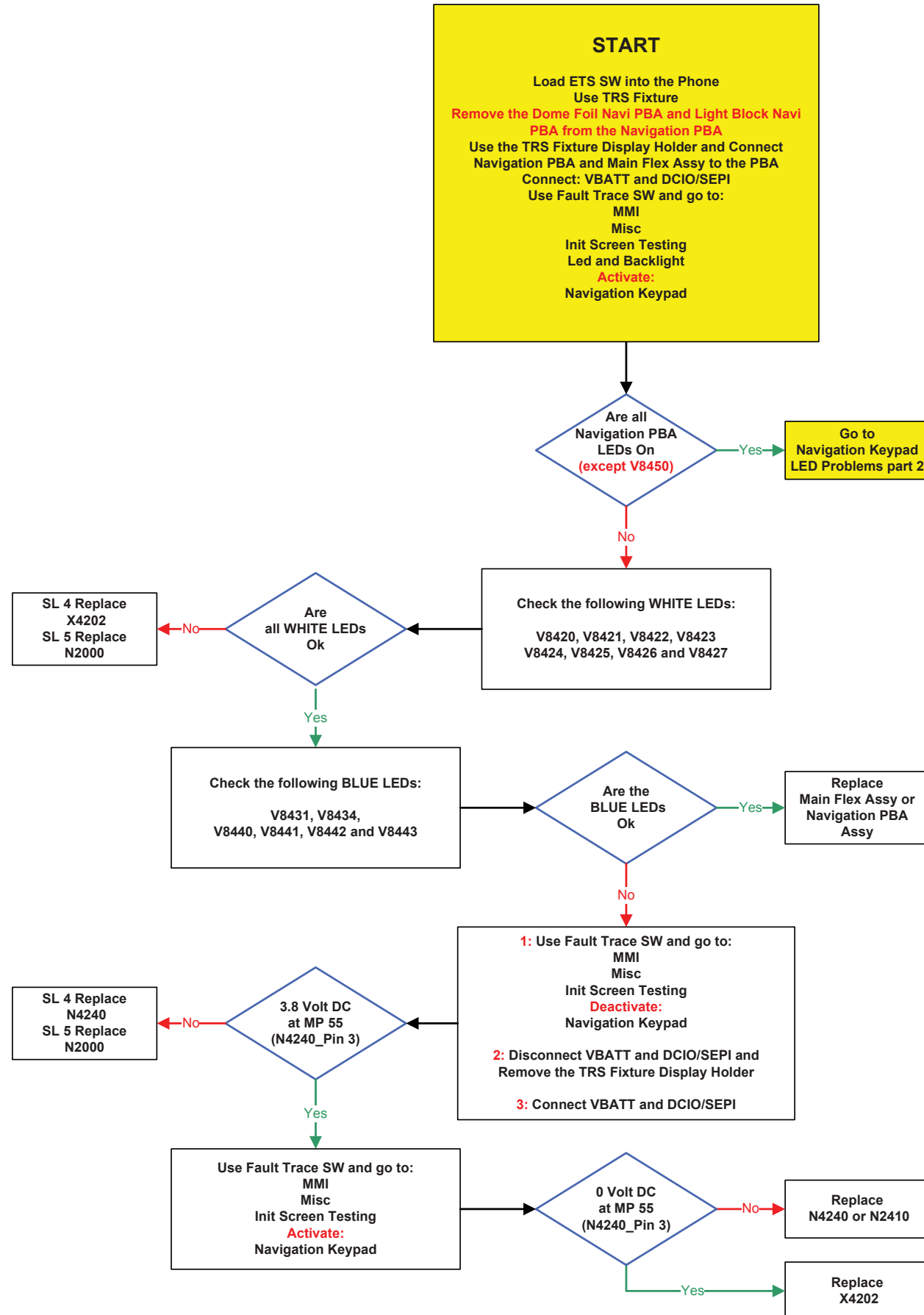
Camera Button Problems



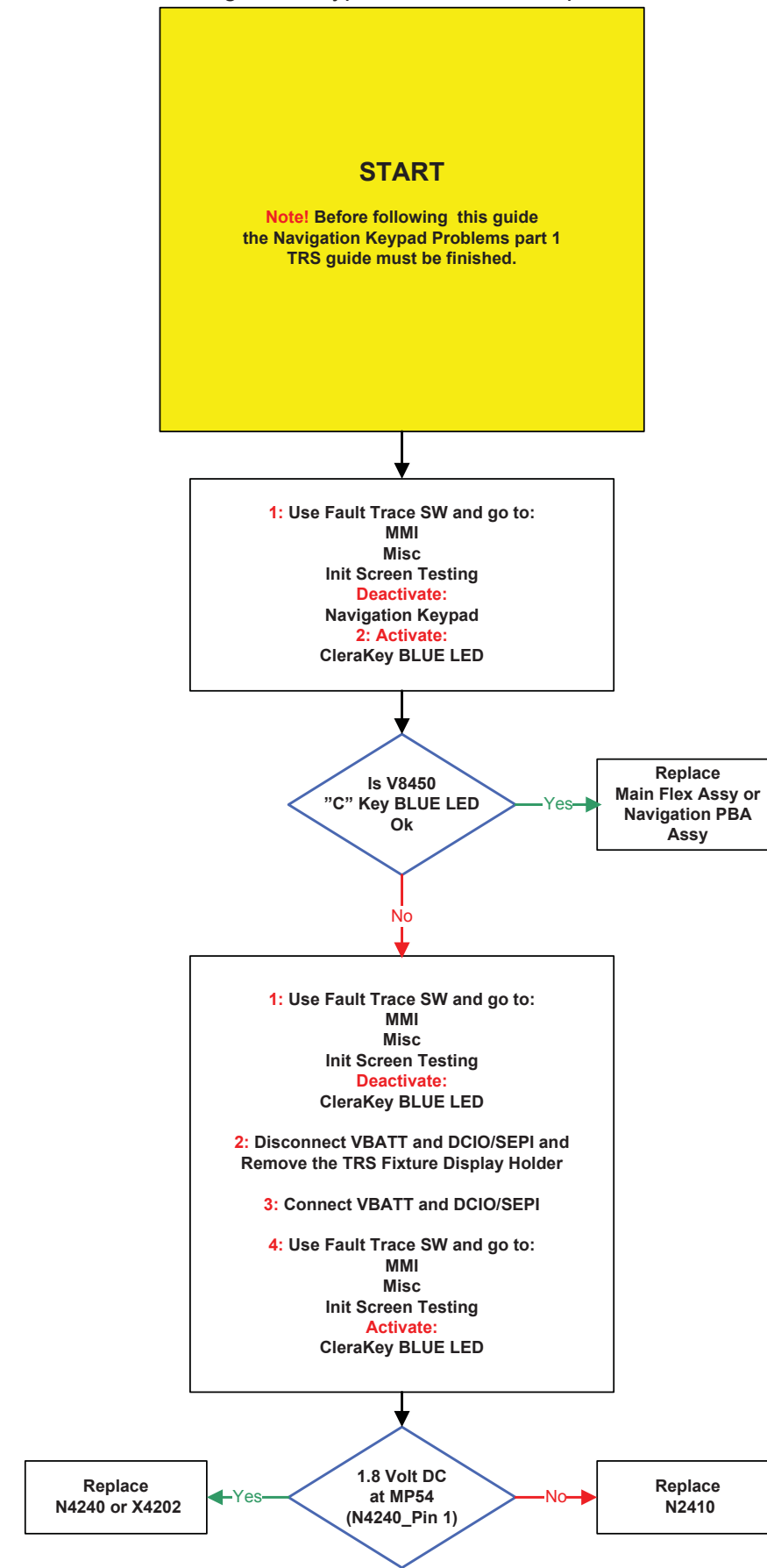
Play and Camera Mode Button Problems



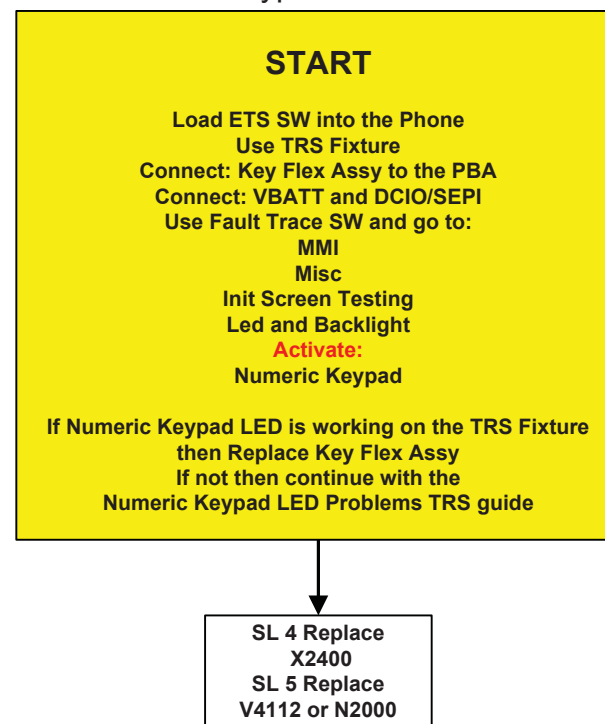
Navigation Keypad LED Problems part 1



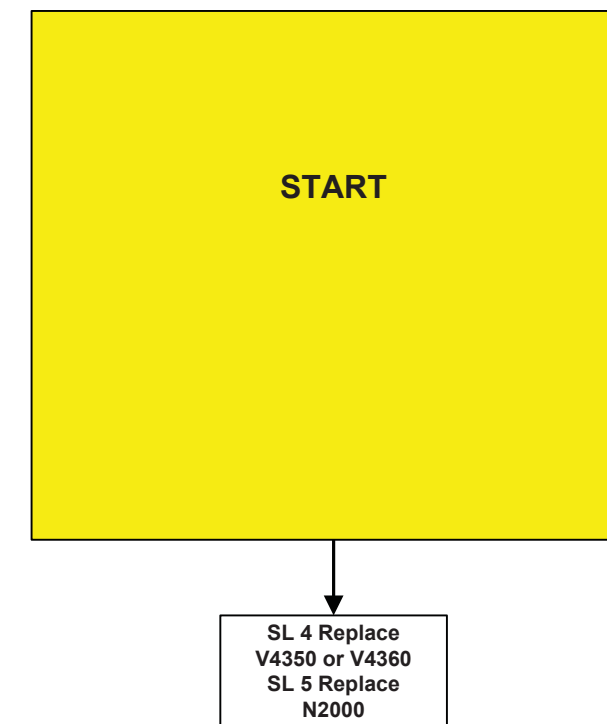
Navigation Keypad LED Problems part 2



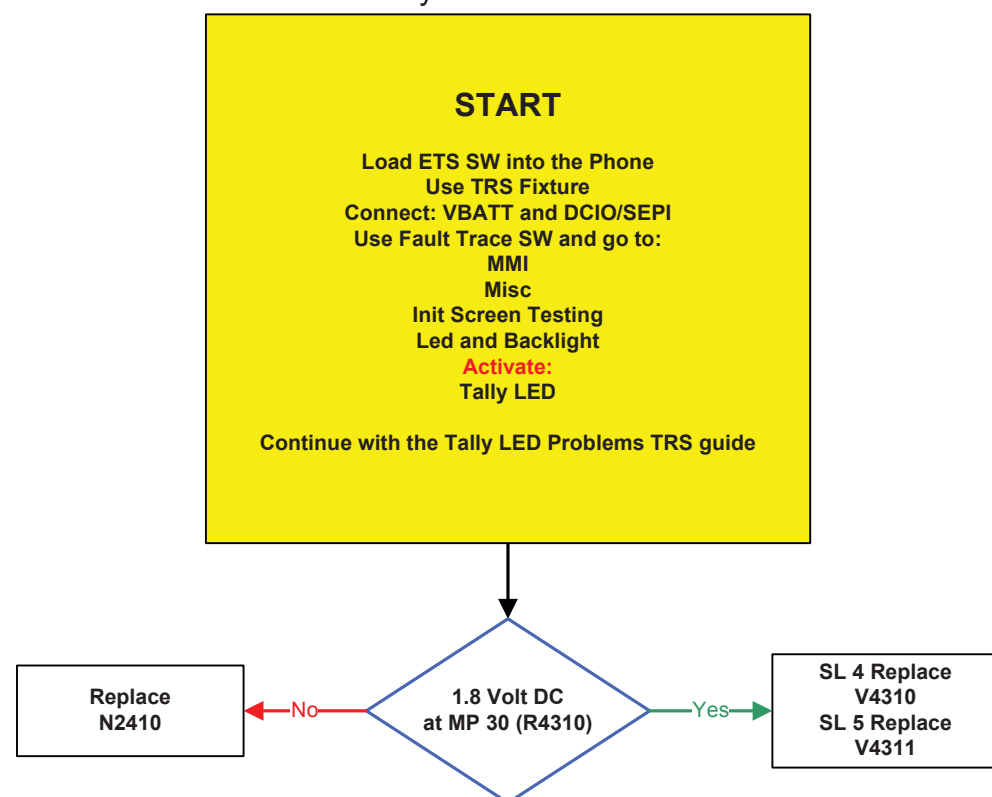
Numeric Keypad LED Problems



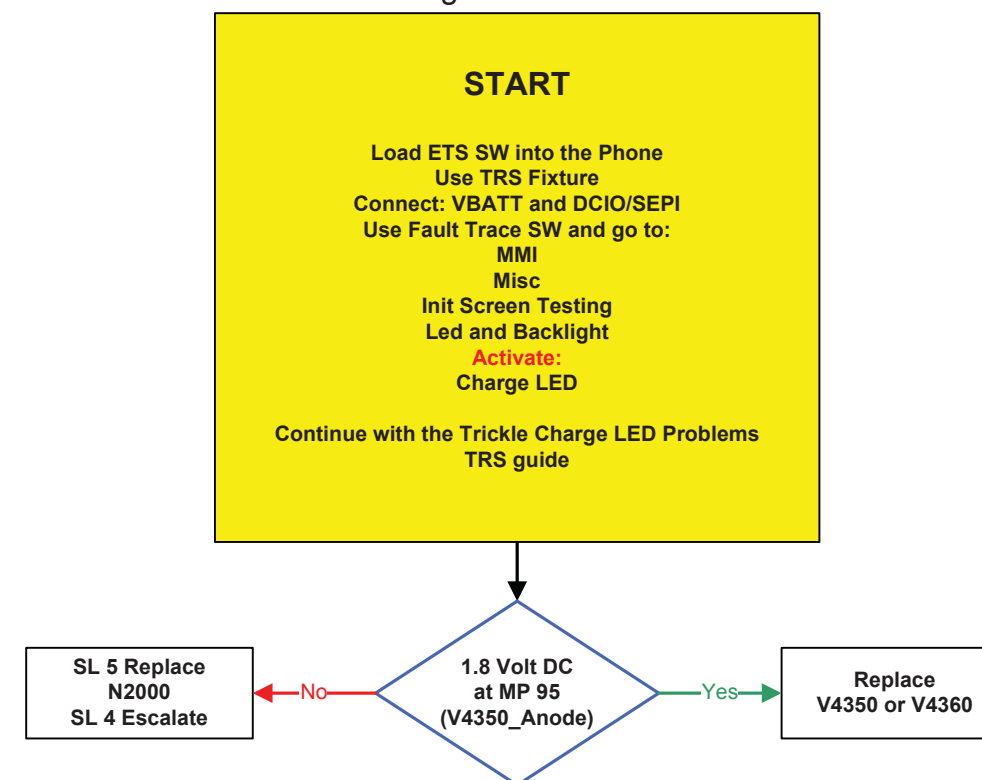
Camera Button LED Problems



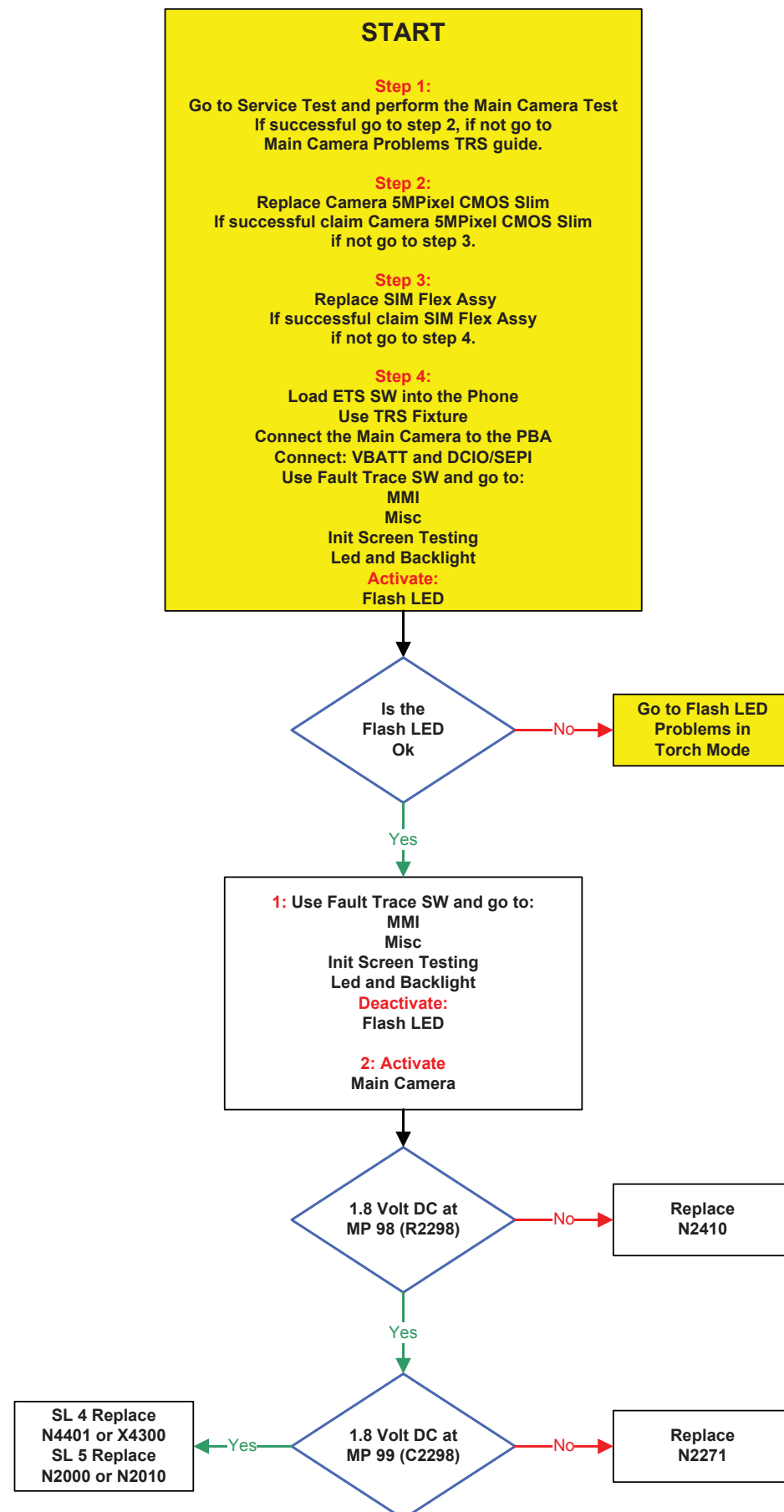
Tally LED Problems



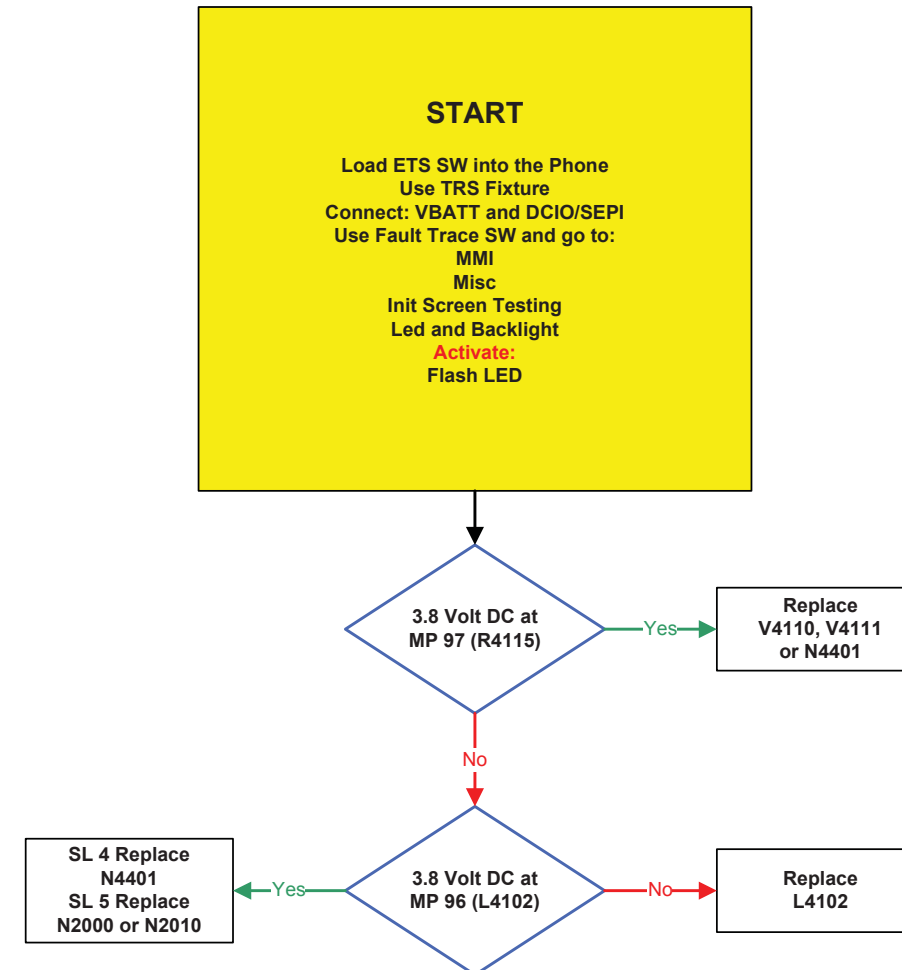
Trickle Charge LED Problems



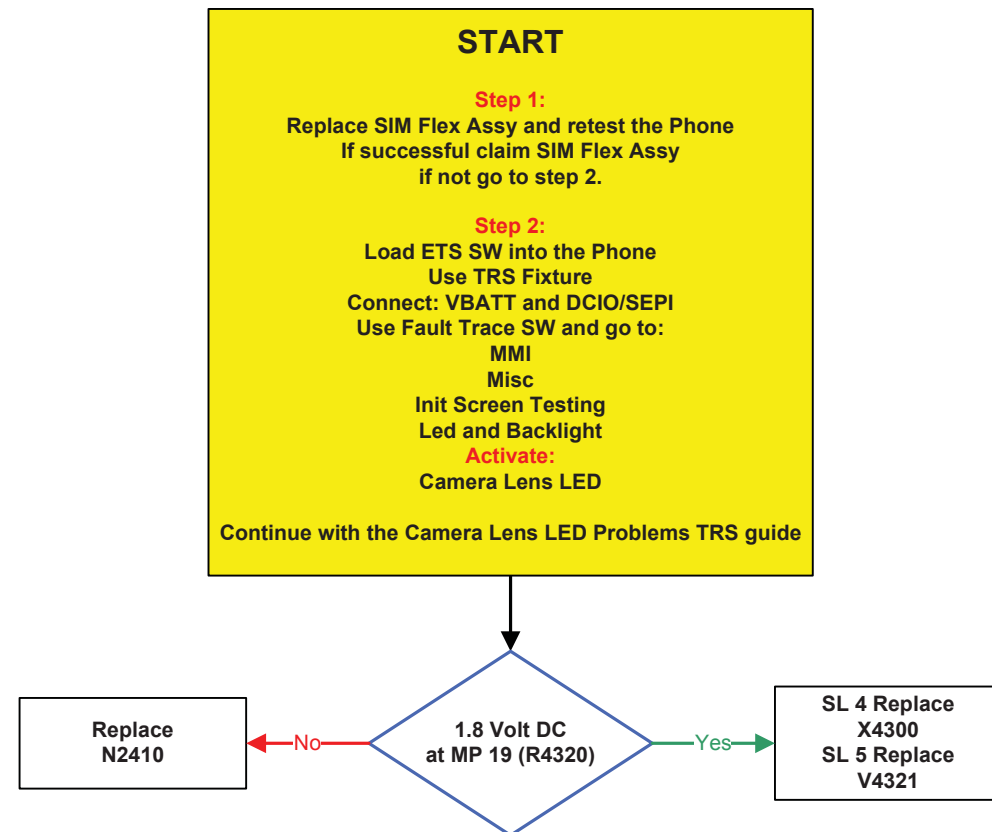
Flash LED Problems in Camera Mode



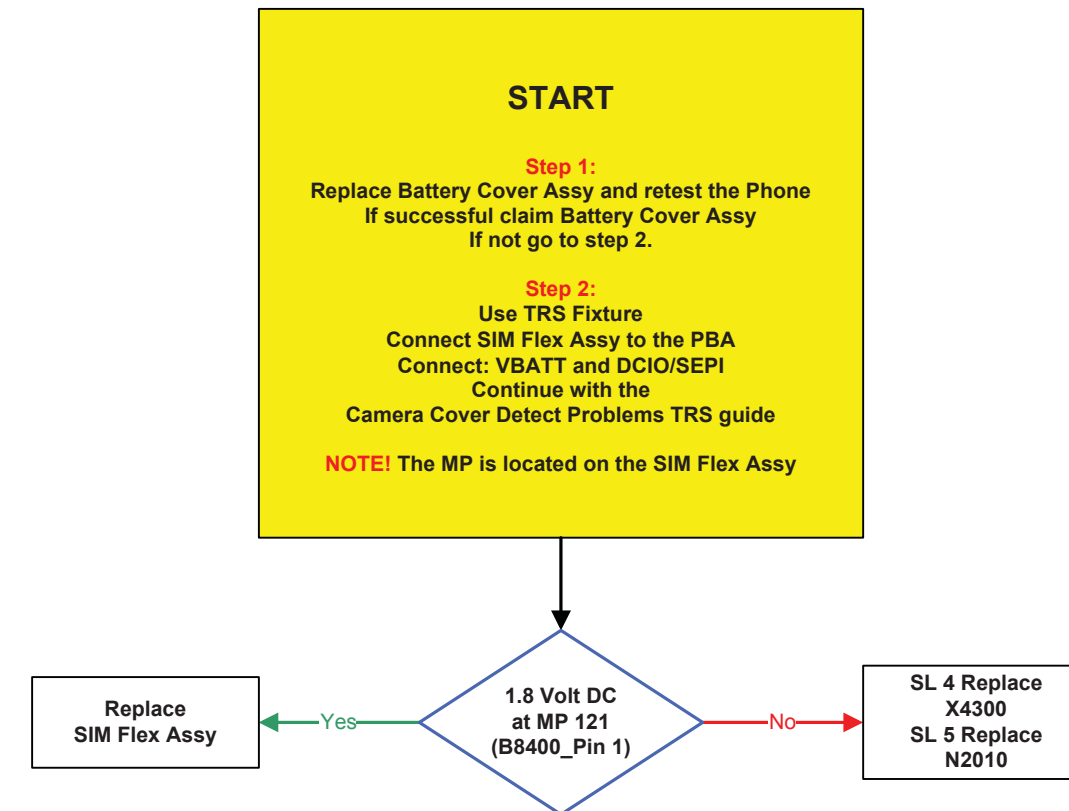
Flash LED Problems in Torch Mode



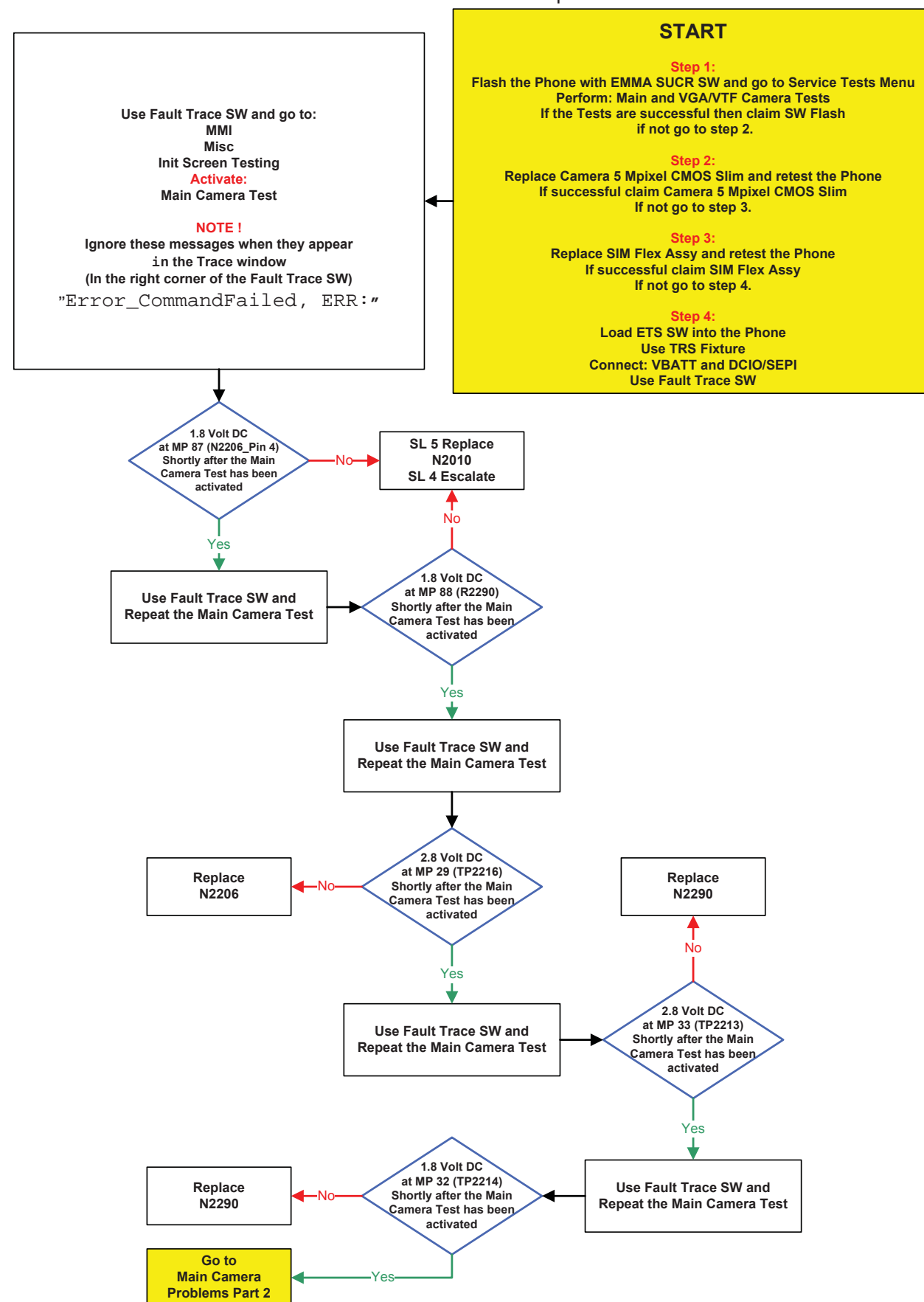
Camera Lens LED Problems



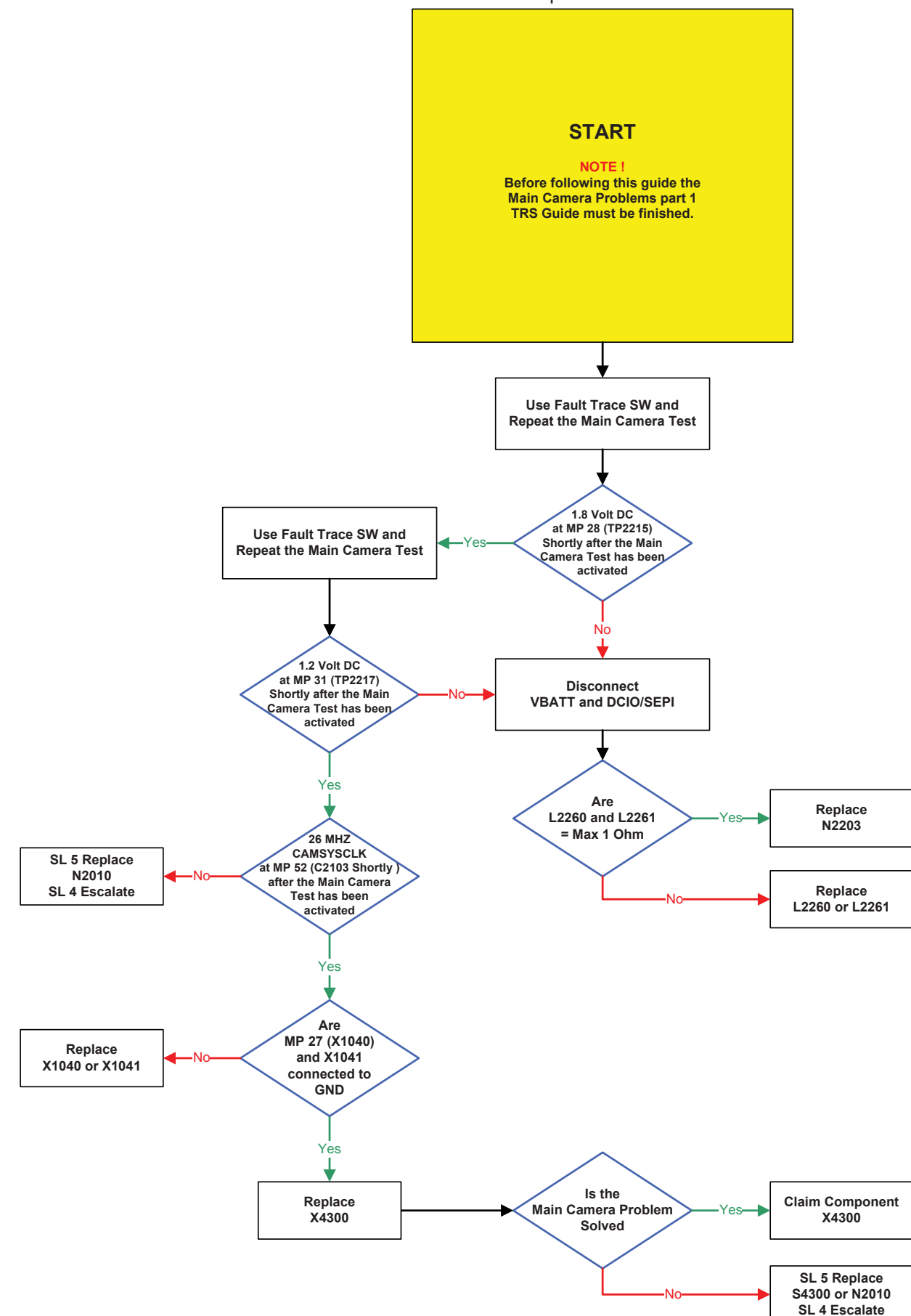
Camera Cover Detect Problems



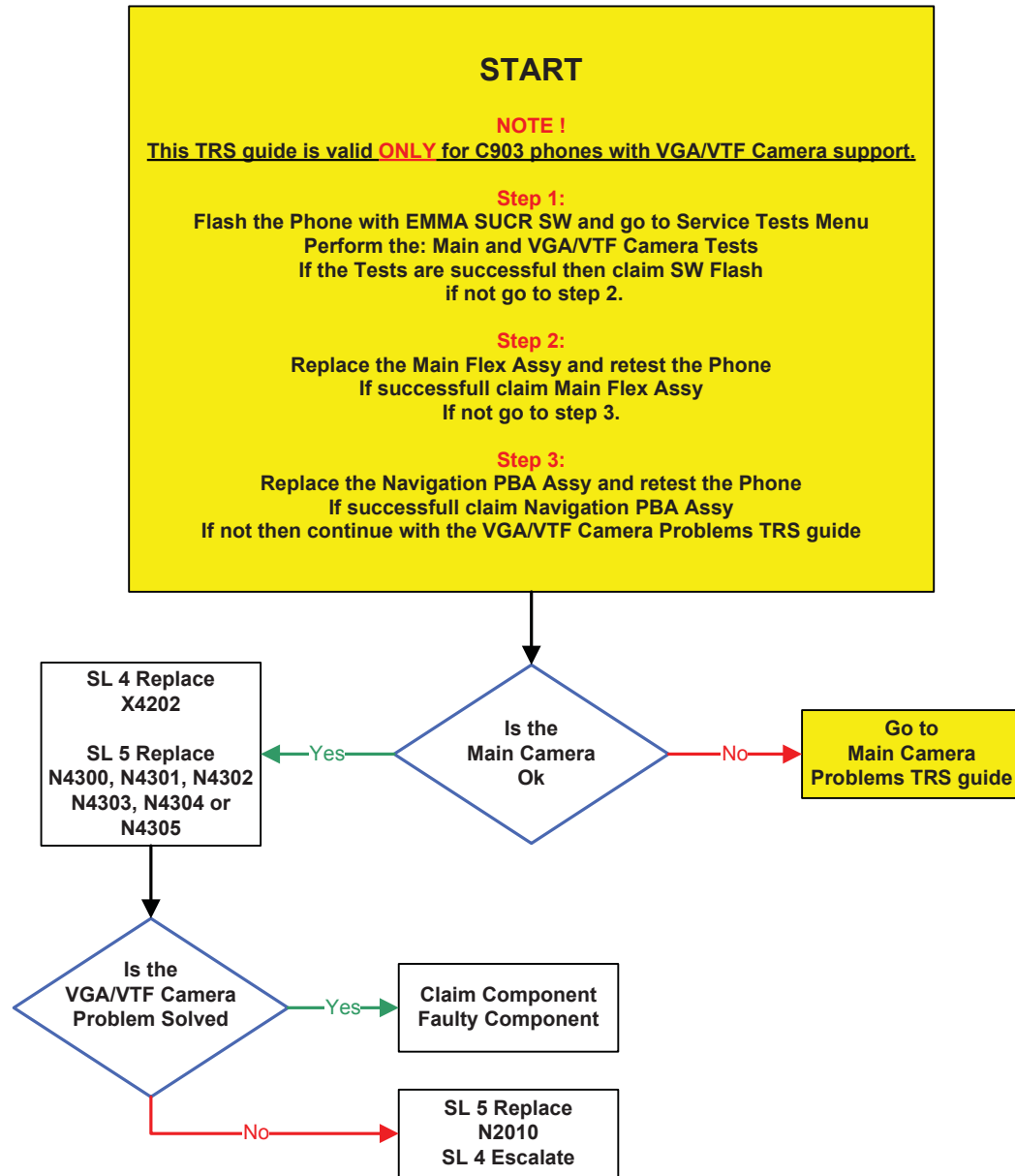
Main Camera Problems part 1



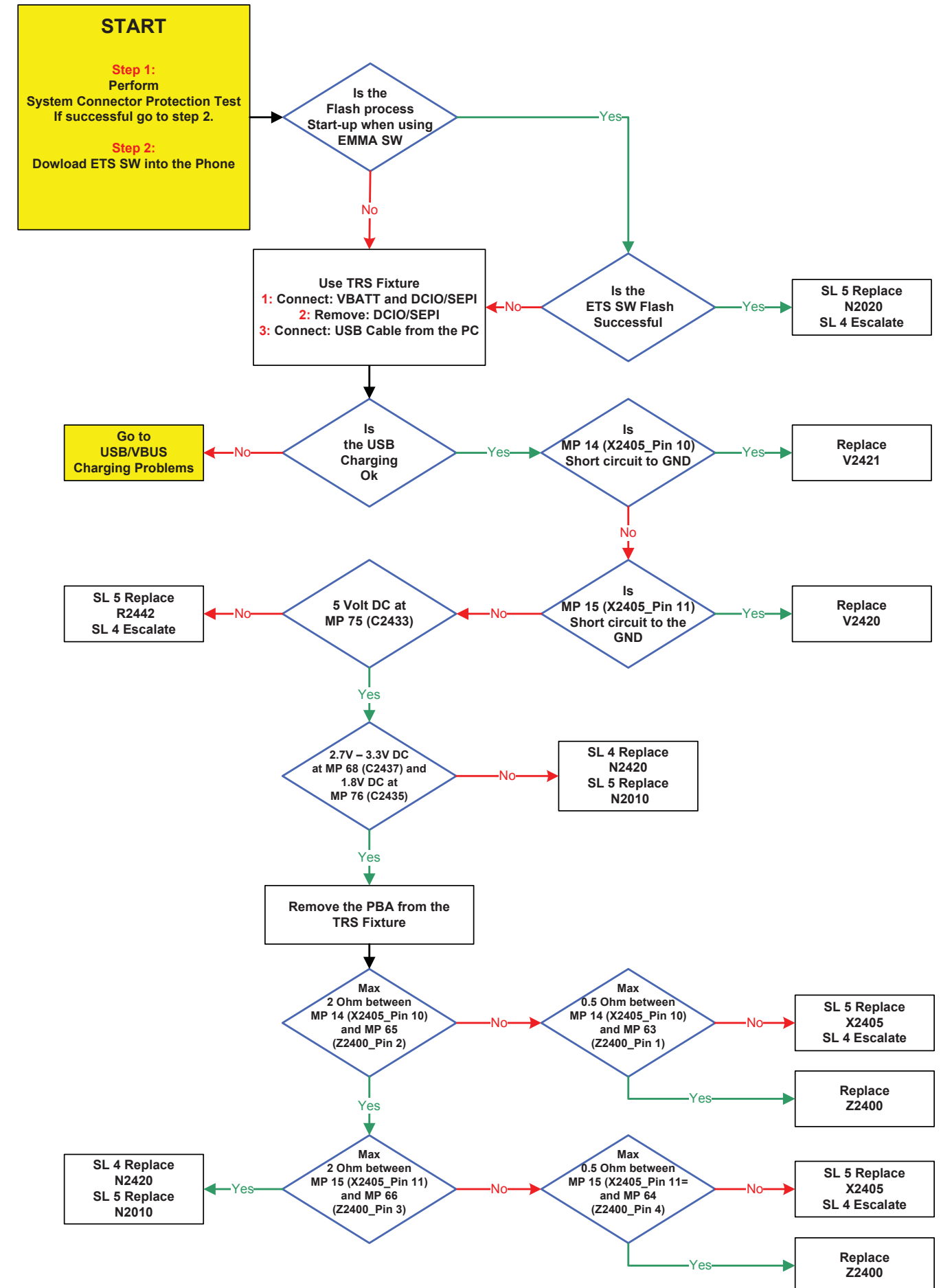
Main Camera Problems part 2



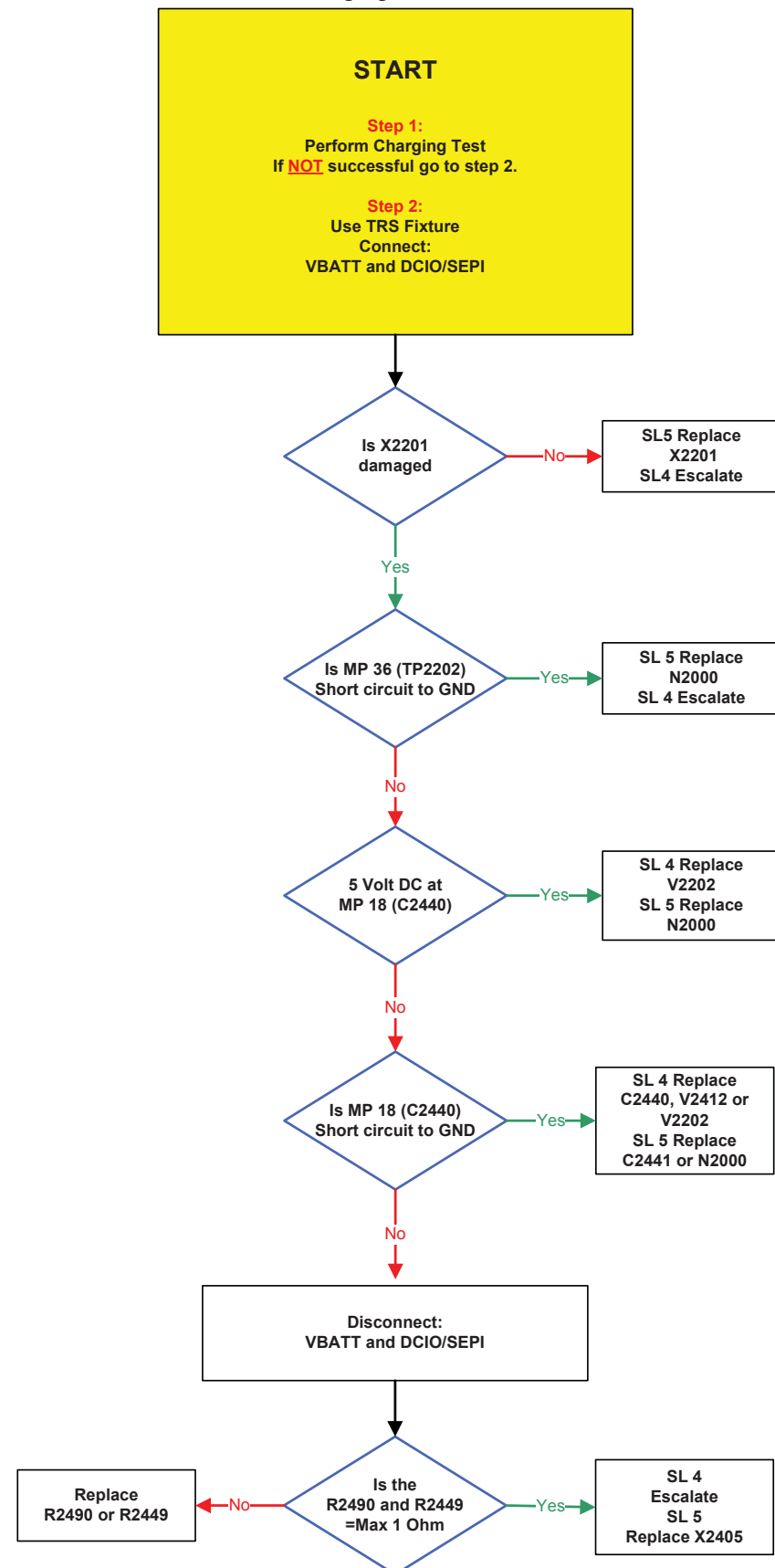
VGA/VTF Camera Problems



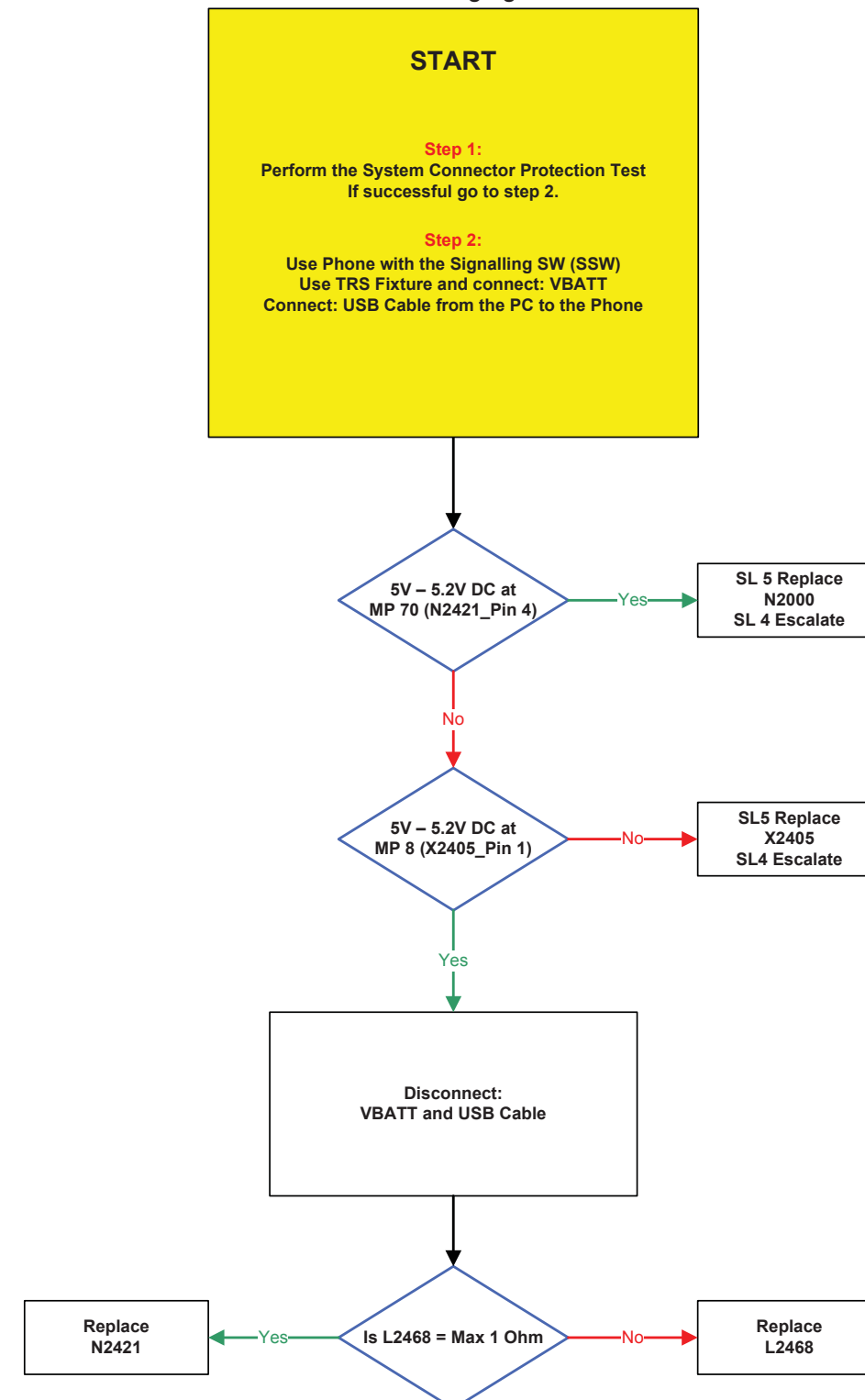
Data communication Problems



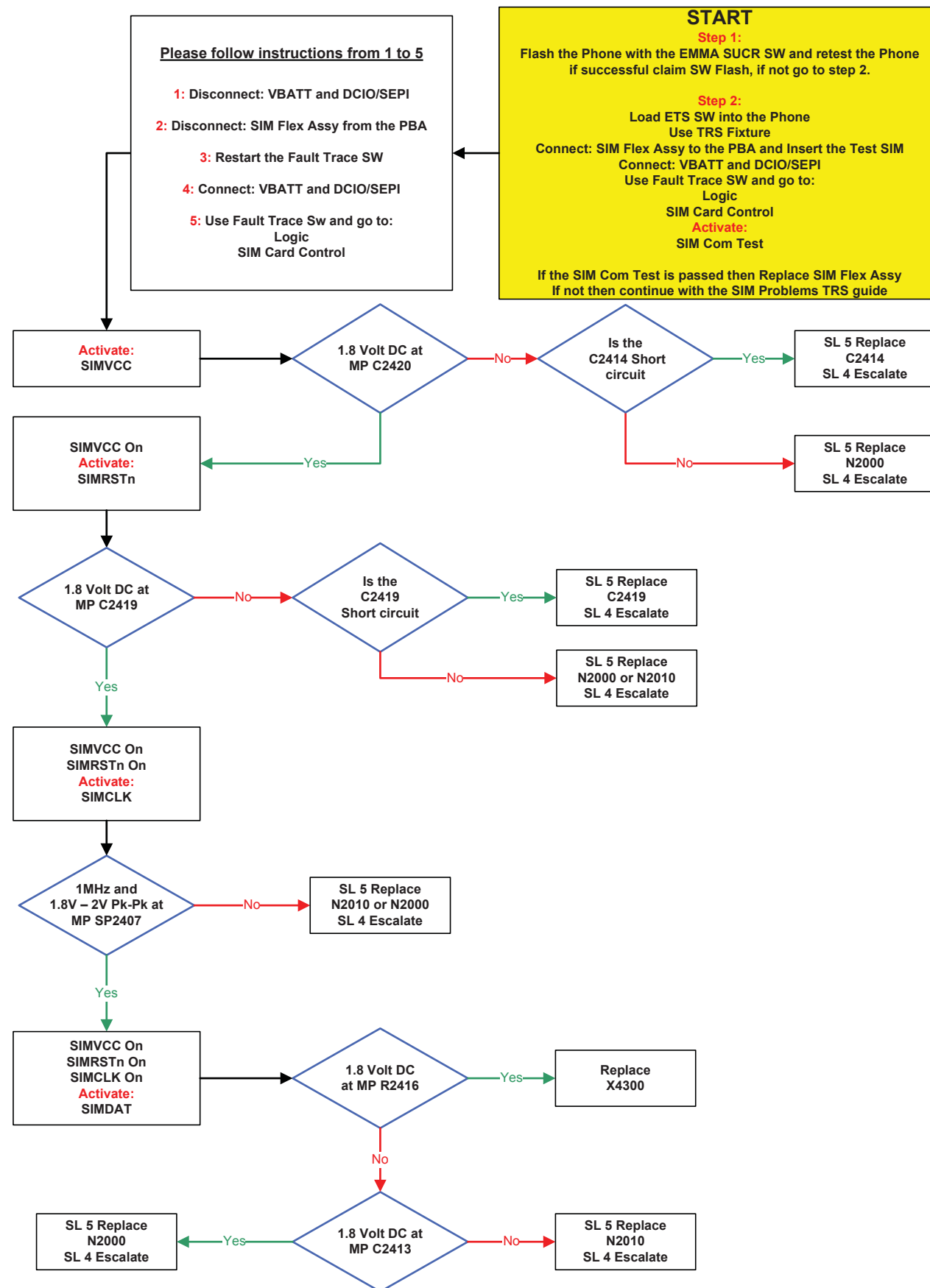
Charging Problems



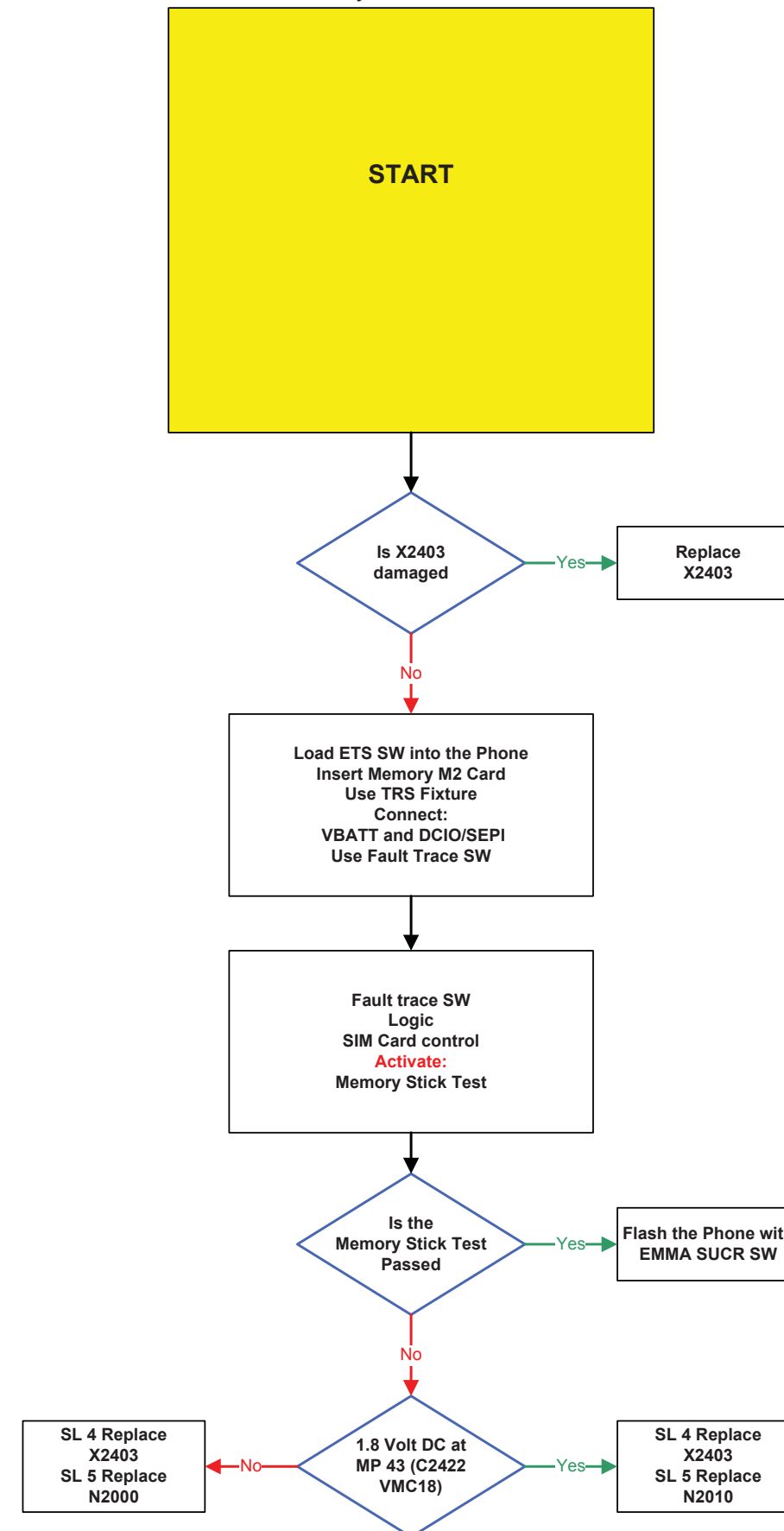
USB/VBUS Charging Problems



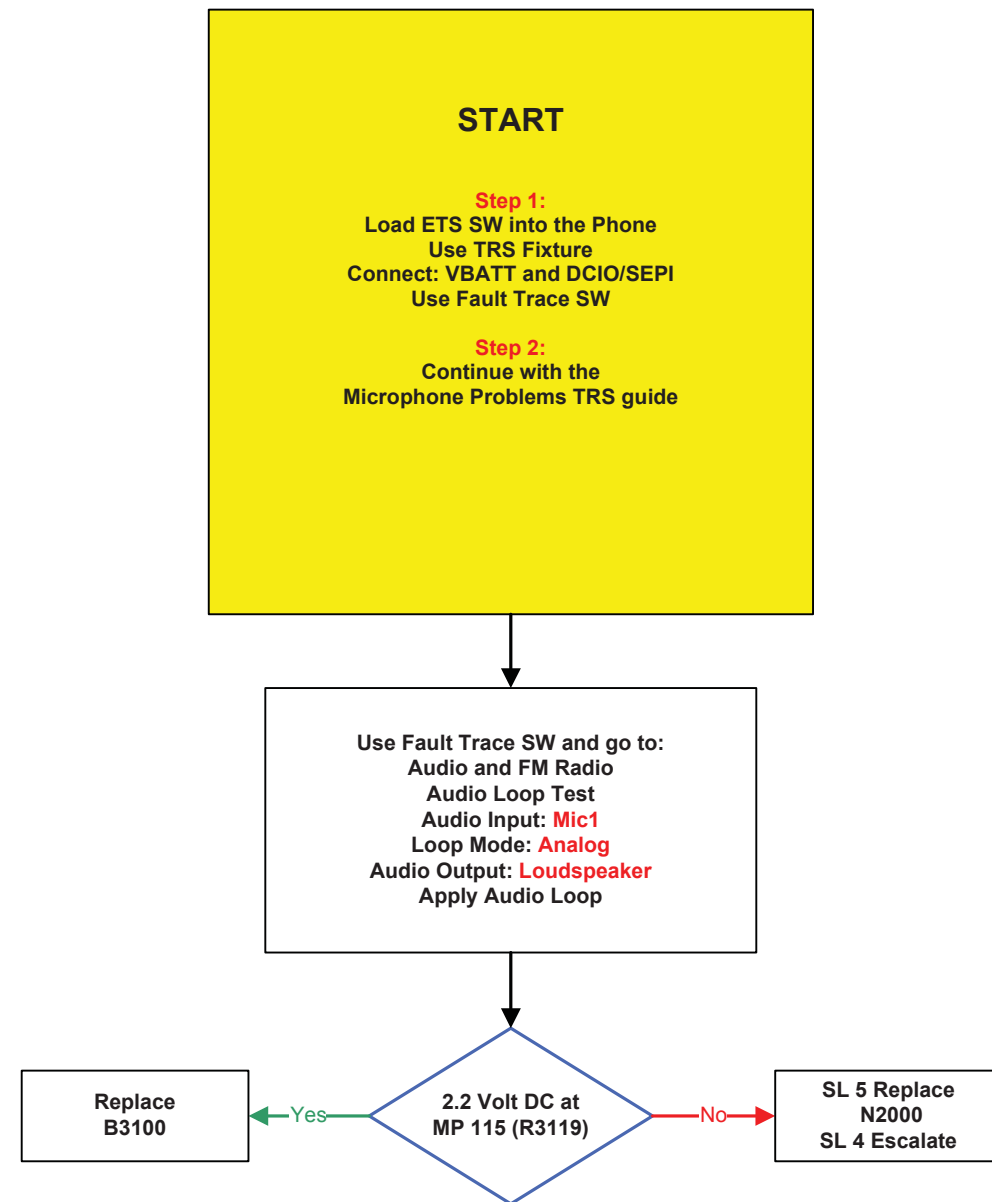
SIM Problems



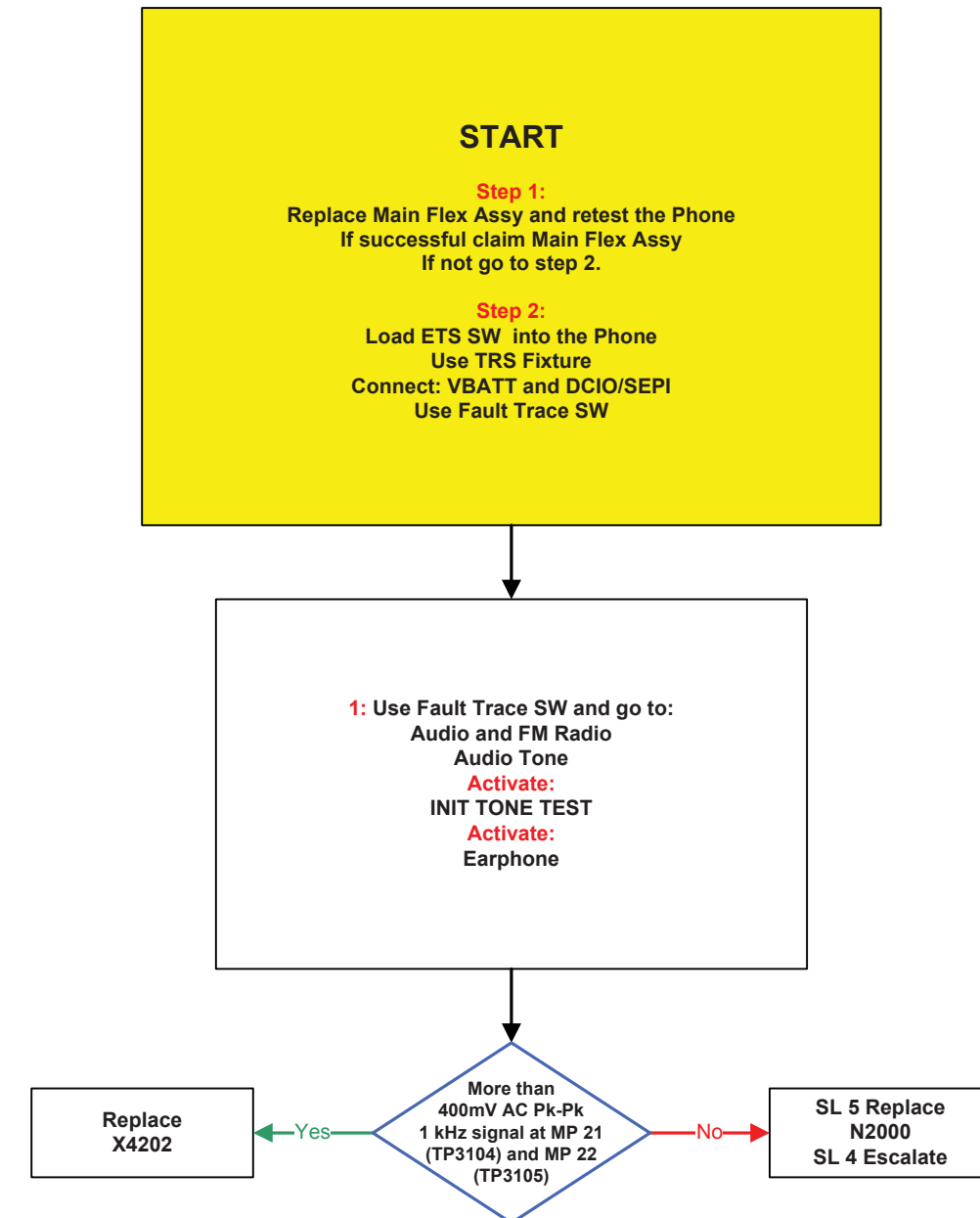
Memory Stick Problems



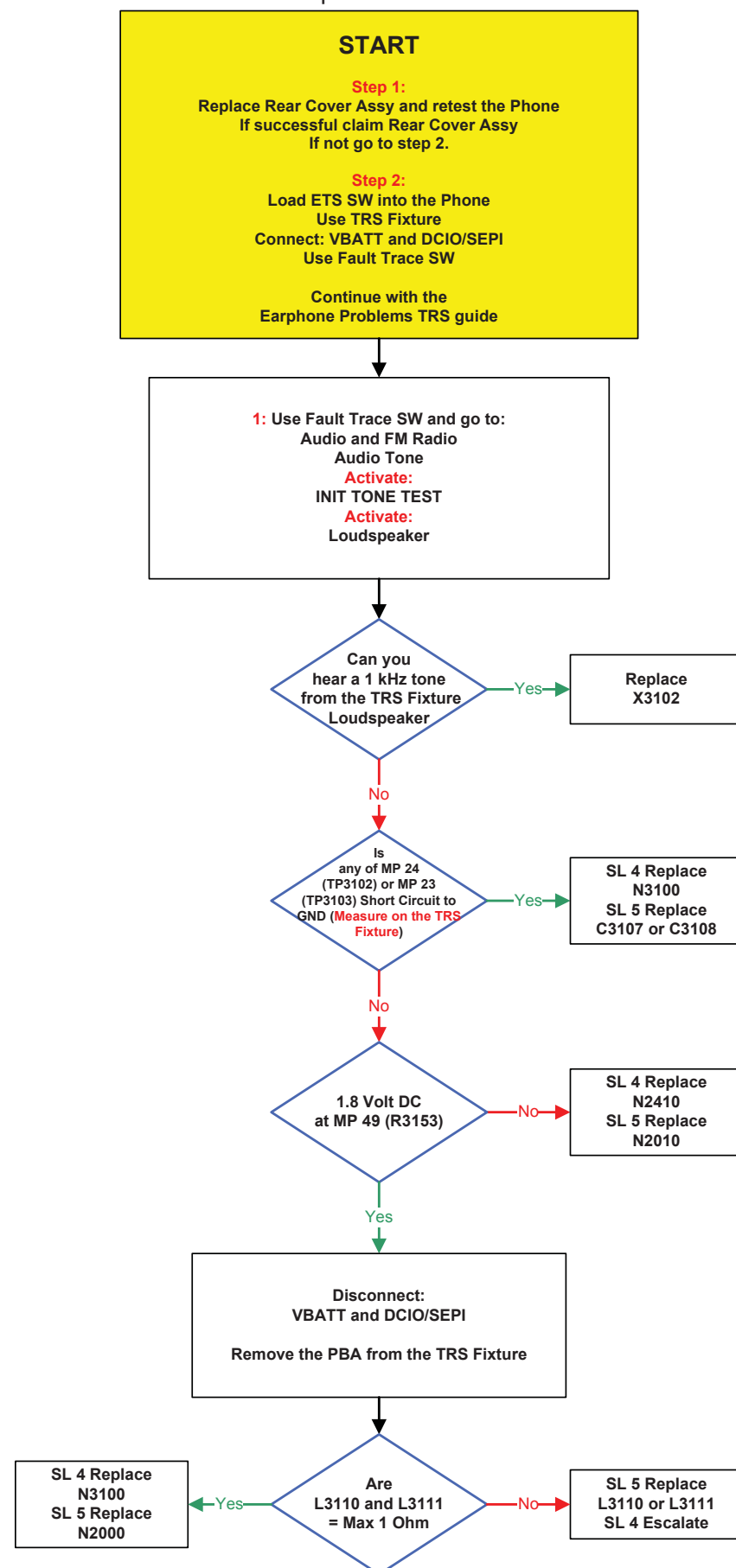
Microphone Problems



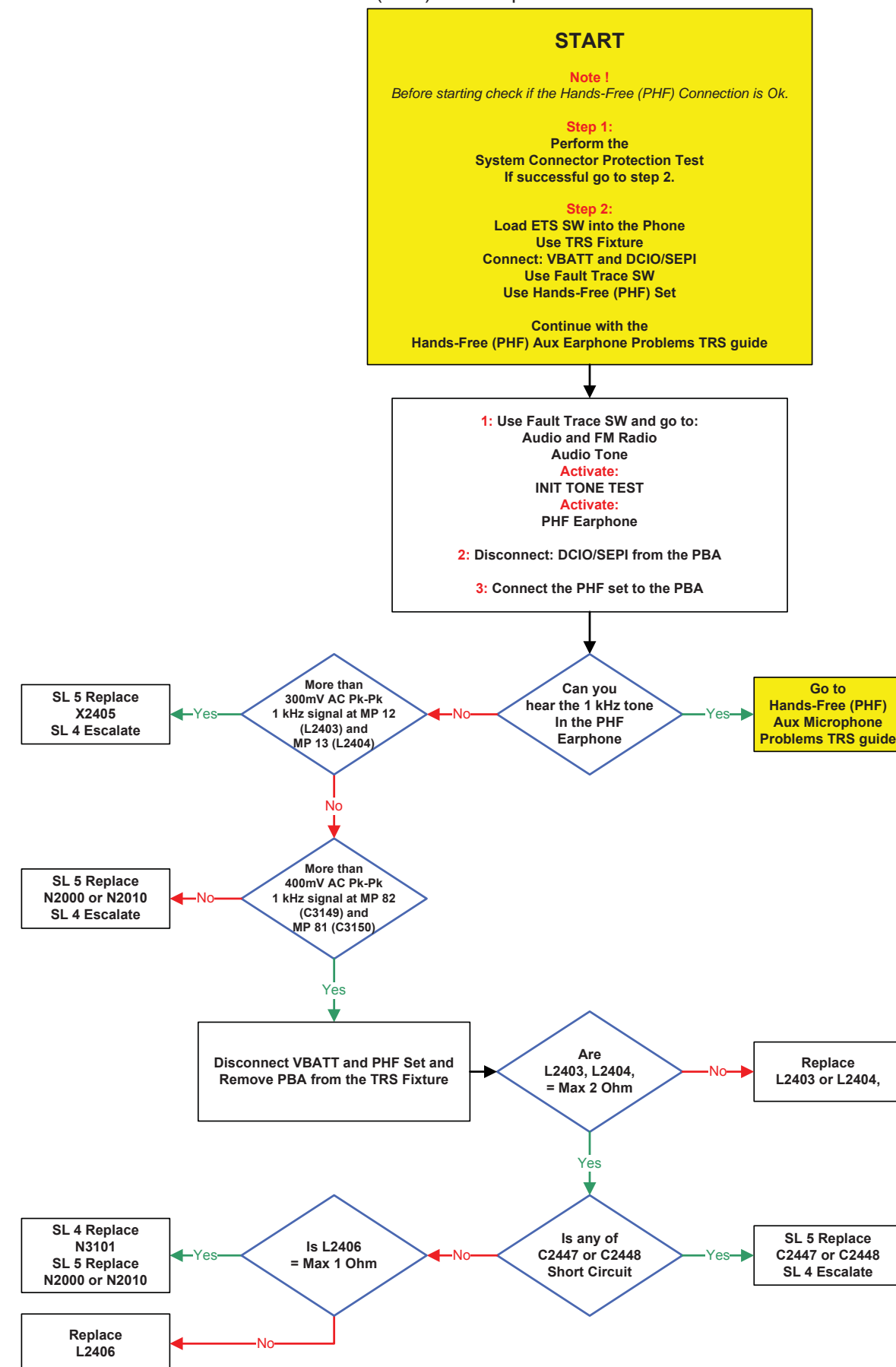
Earphone Problems



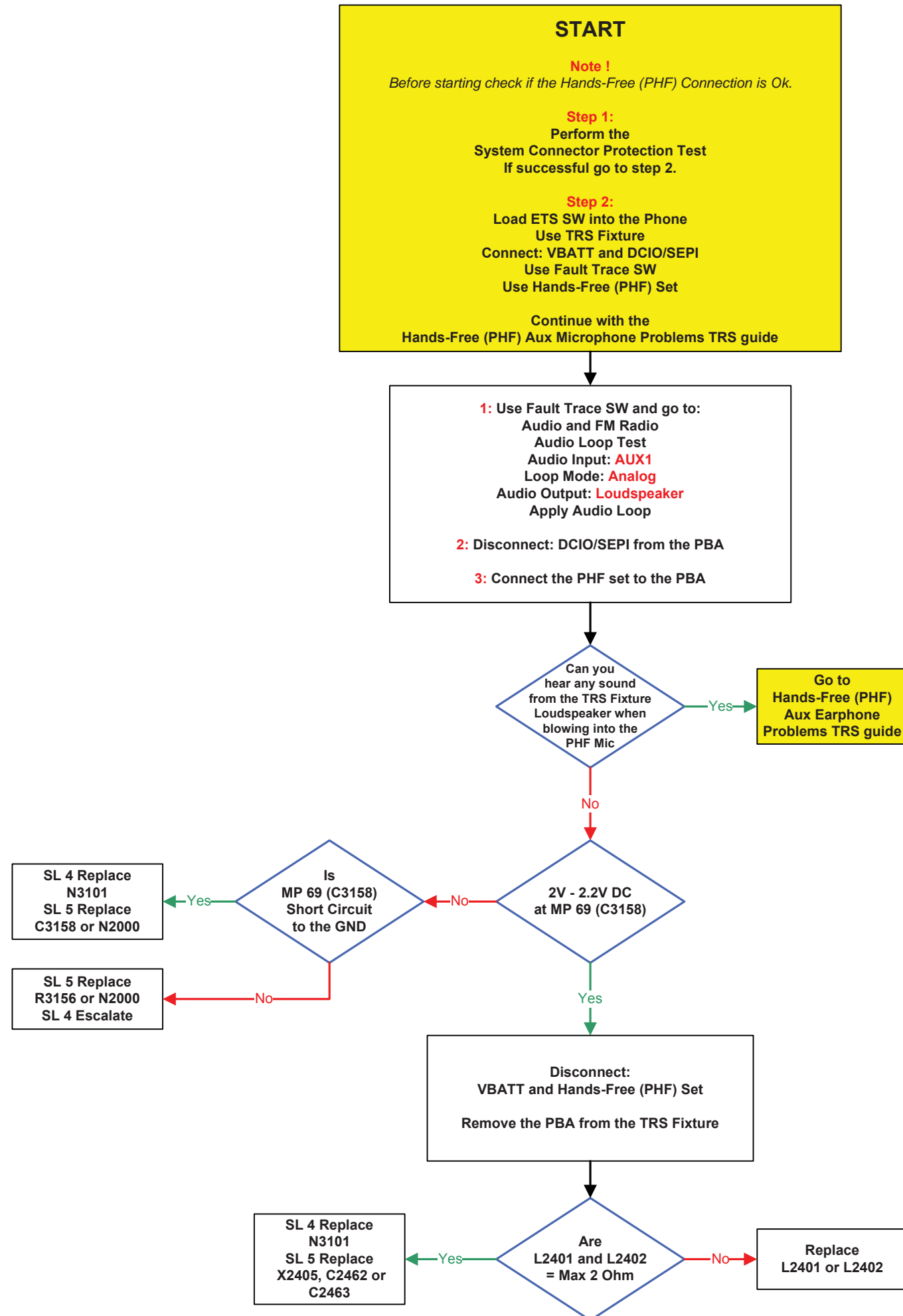
Loudspeaker Problems



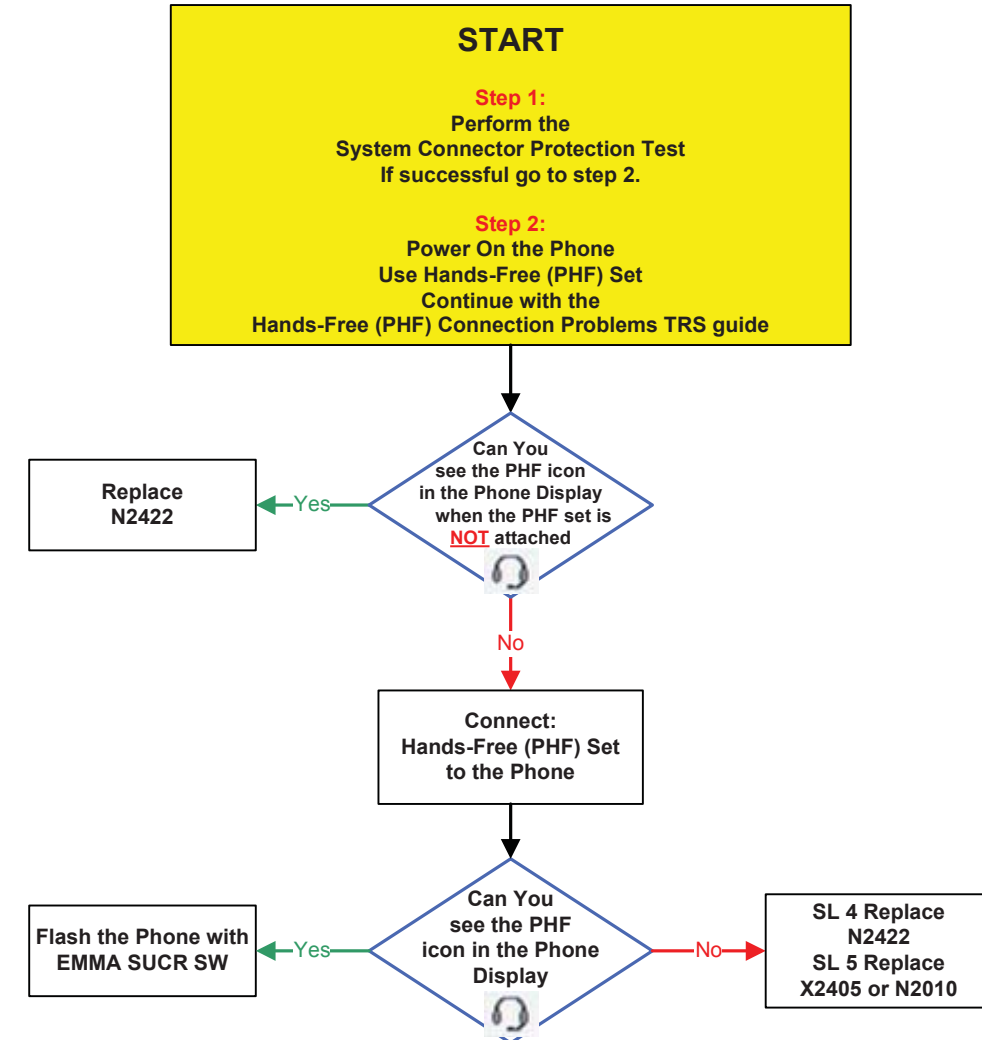
Hands-Free (PHF) Aux Earphone Problems



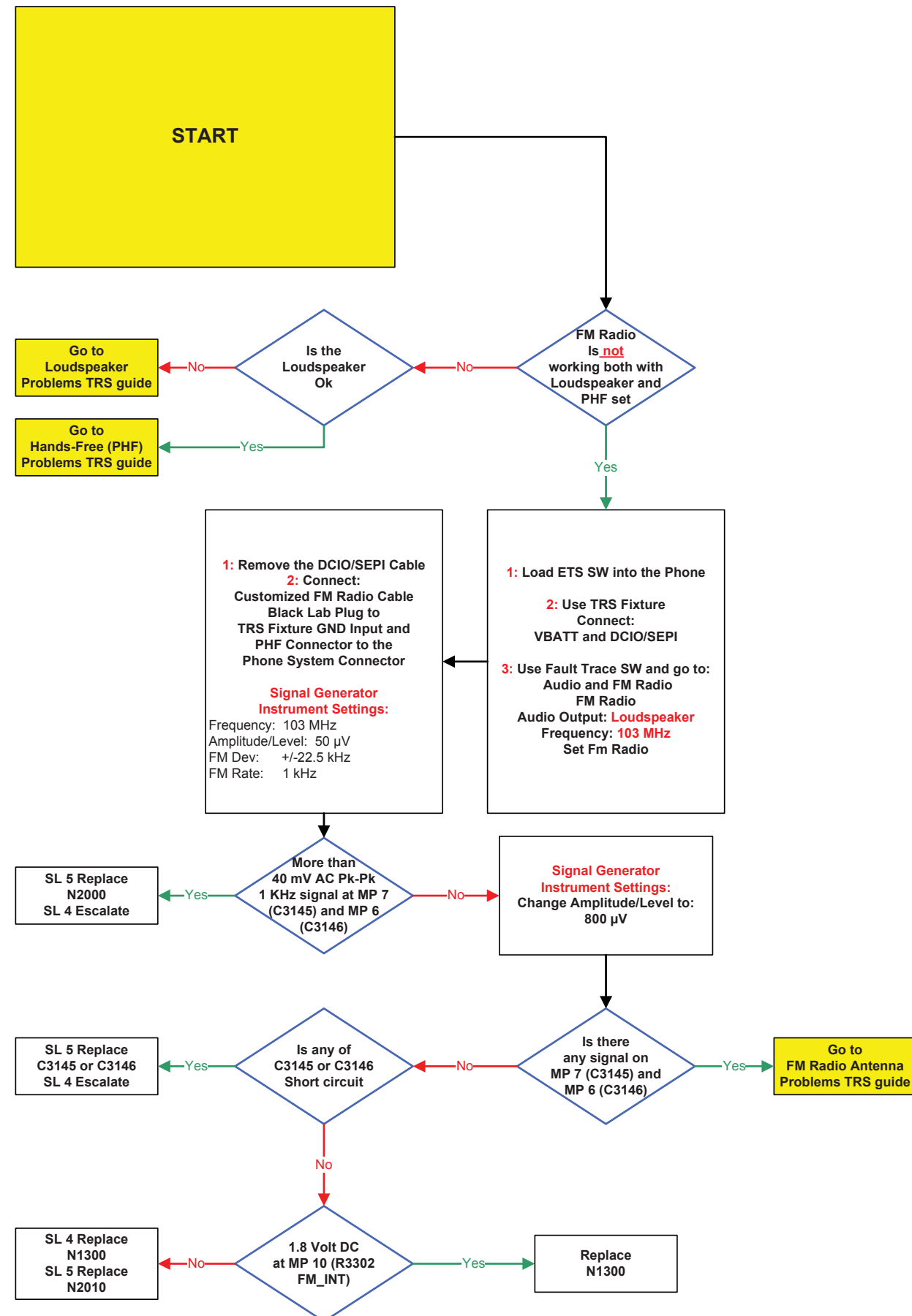
Hands-Free (PHF) Aux Microphone Problems



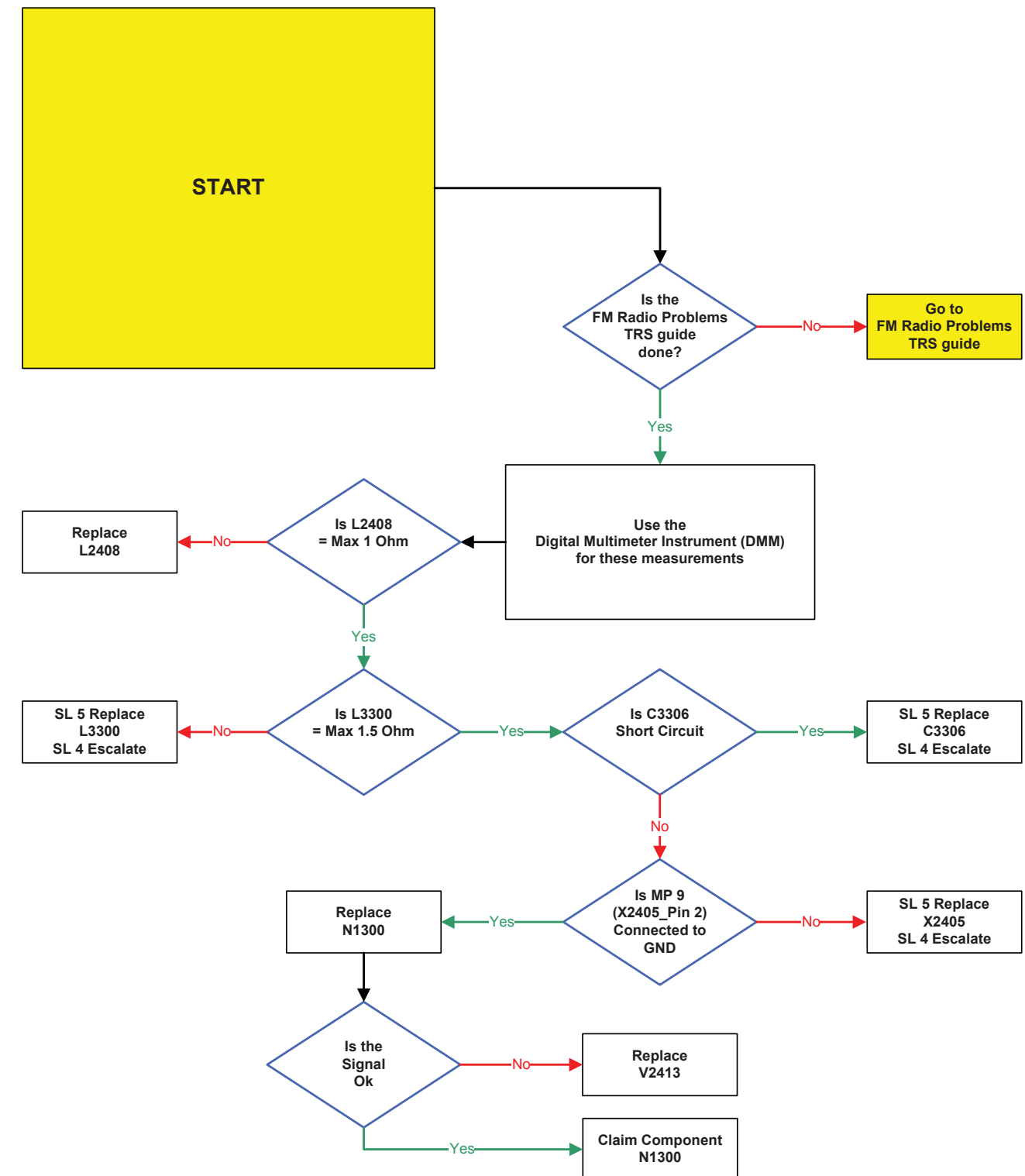
Hands-Free (PHF) Connection Problems



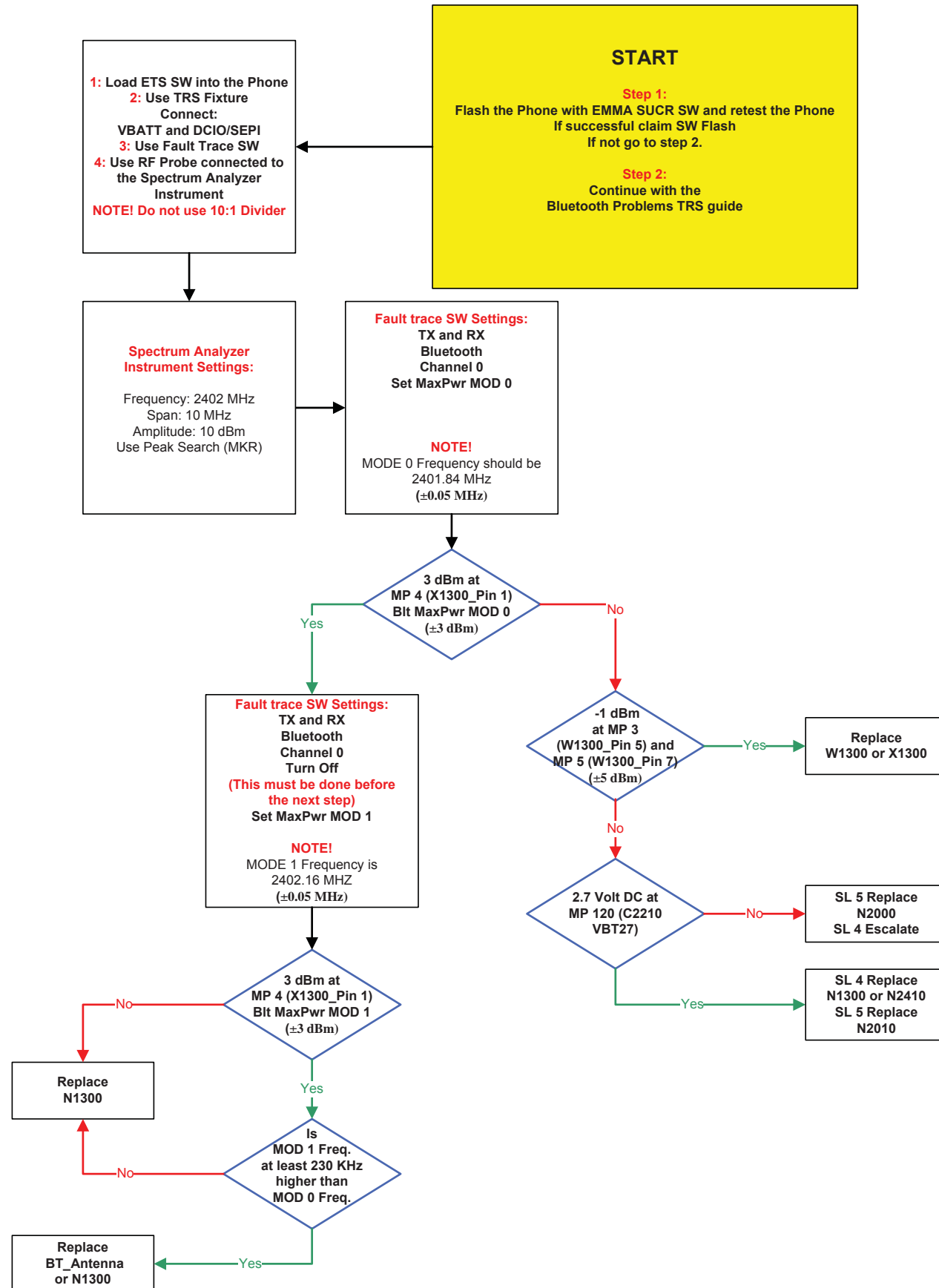
FM Radio Problems



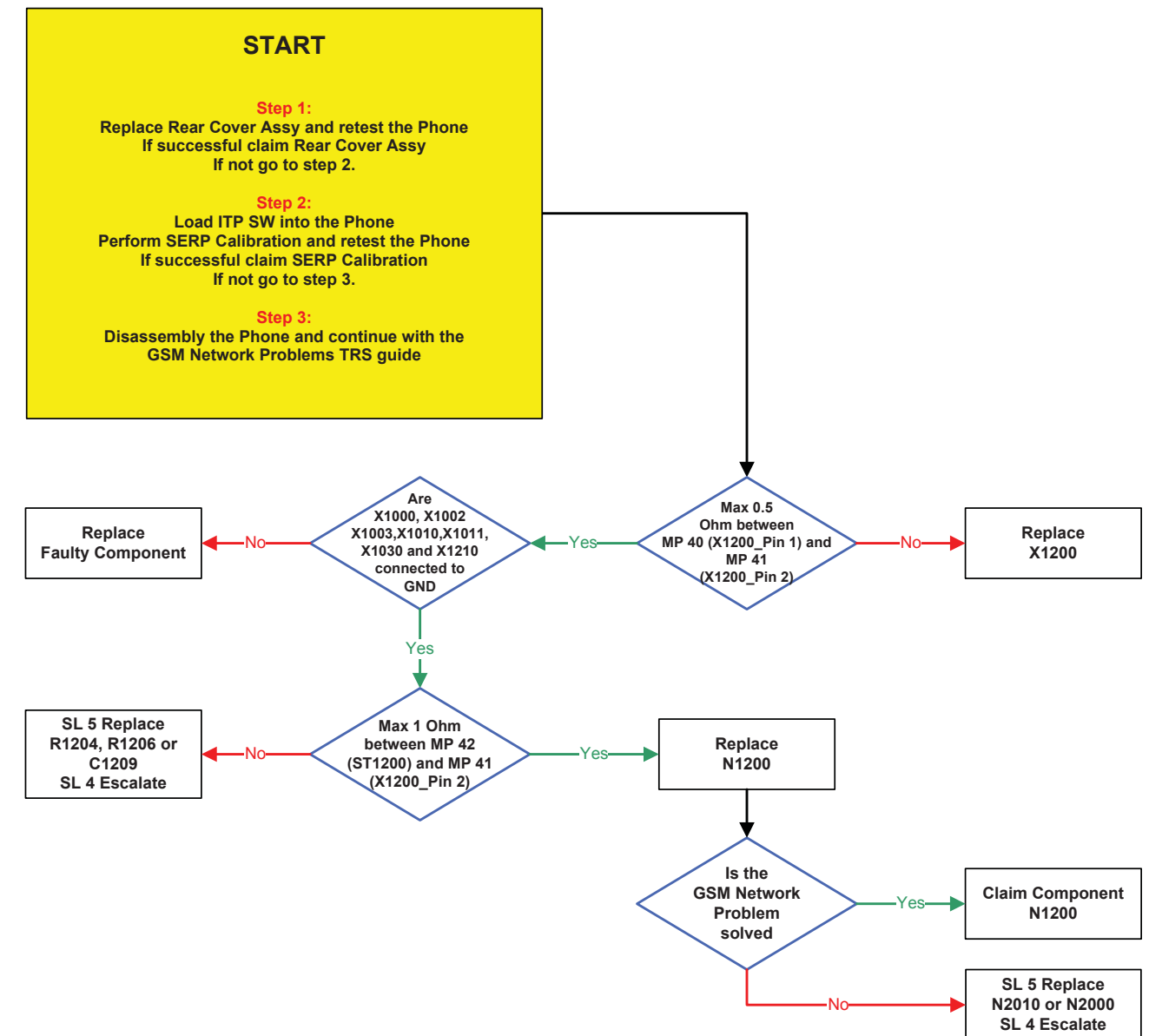
FM Radio Antenna Problems



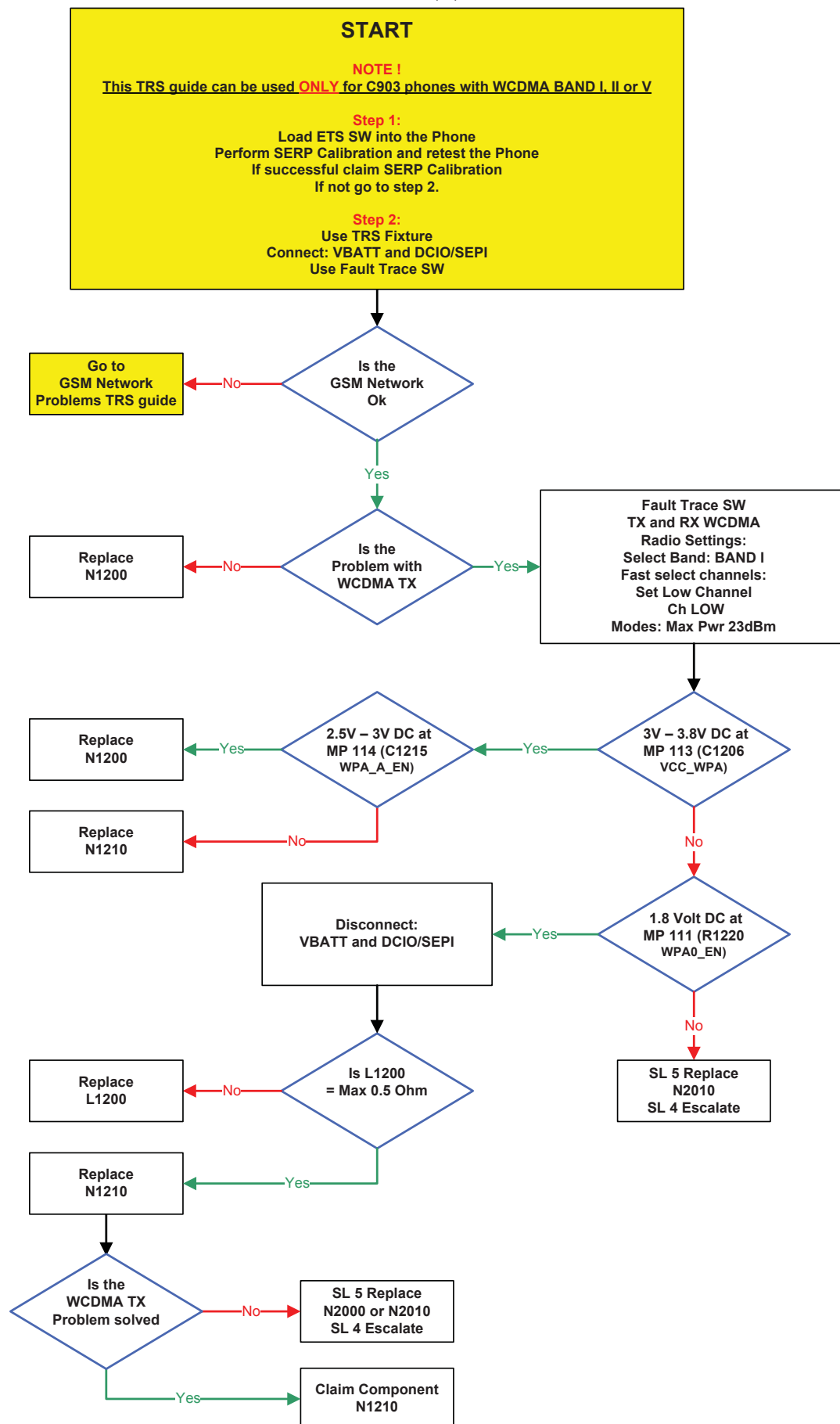
Bluetooth Problems



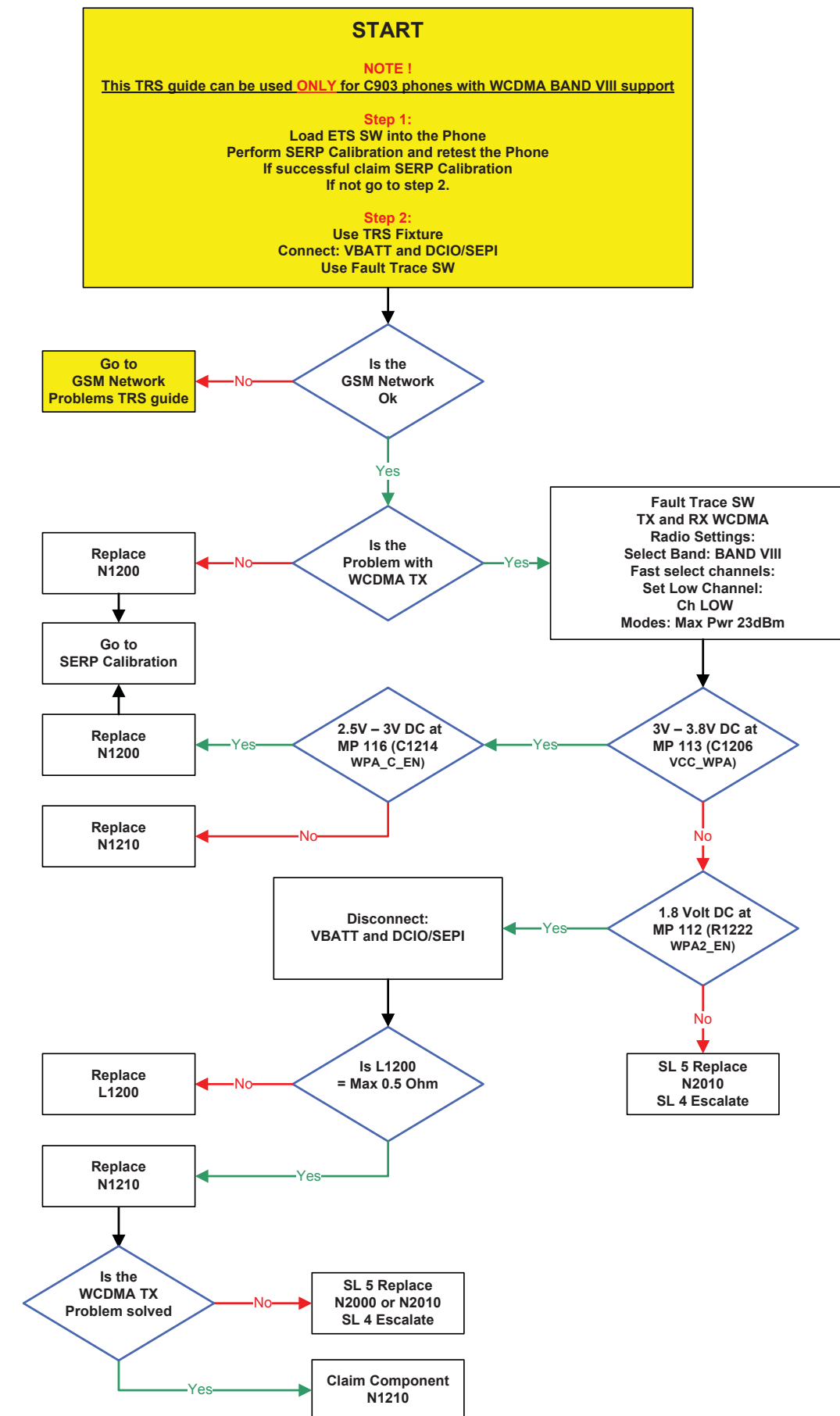
GSM Network Problems



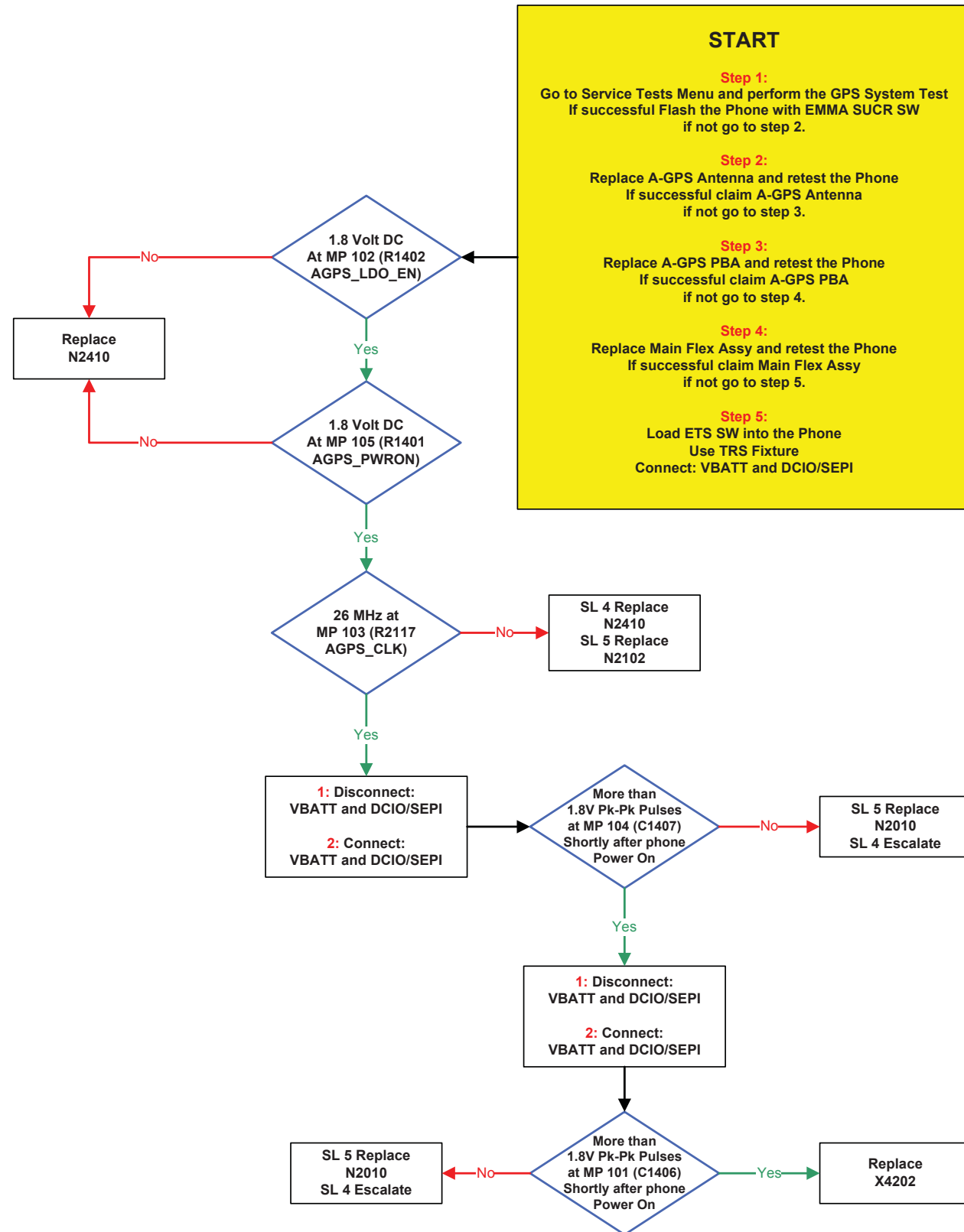
WCDMA BAND I,II,V Network Problems



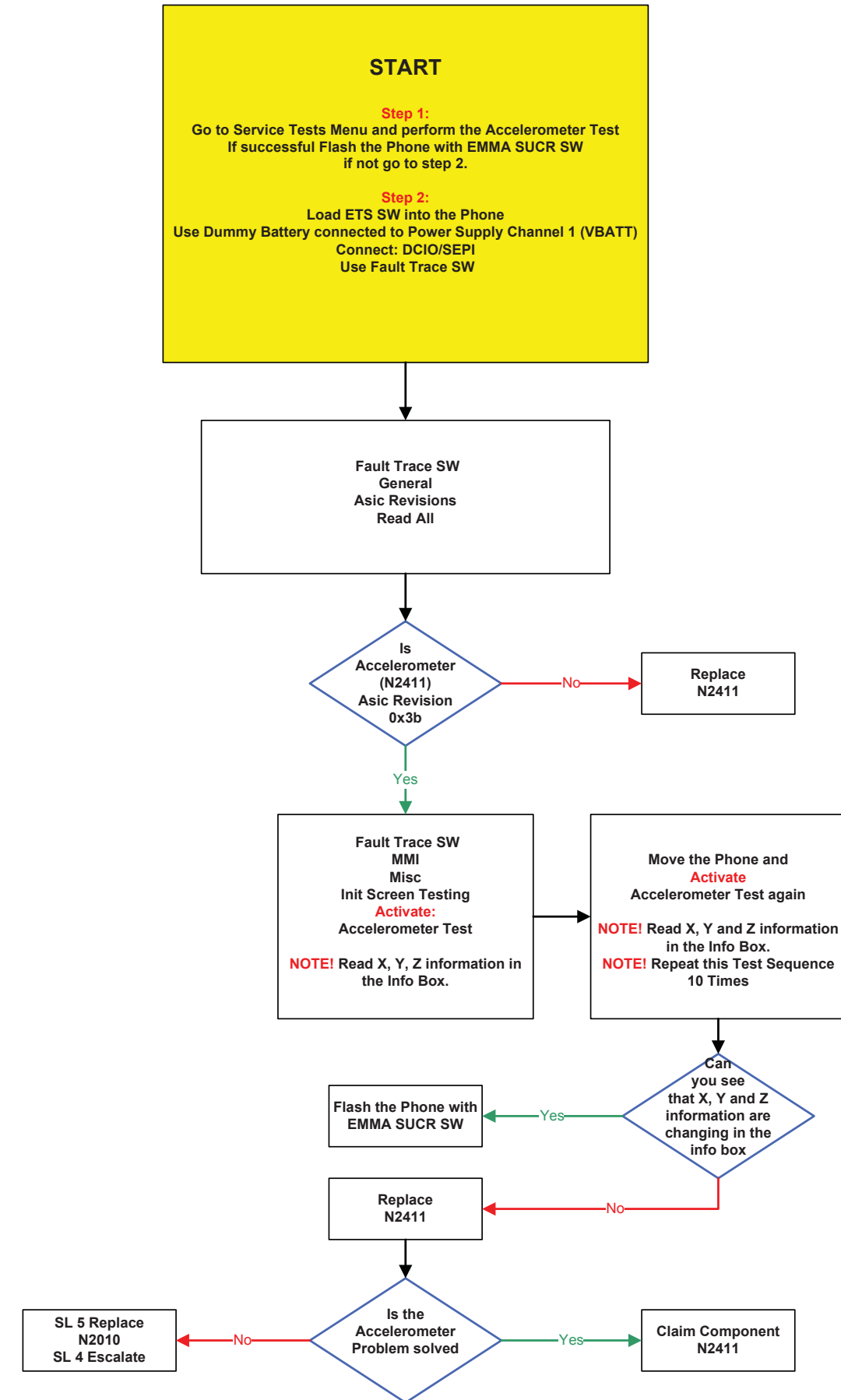
WCDMA BAND VIII Network Problems



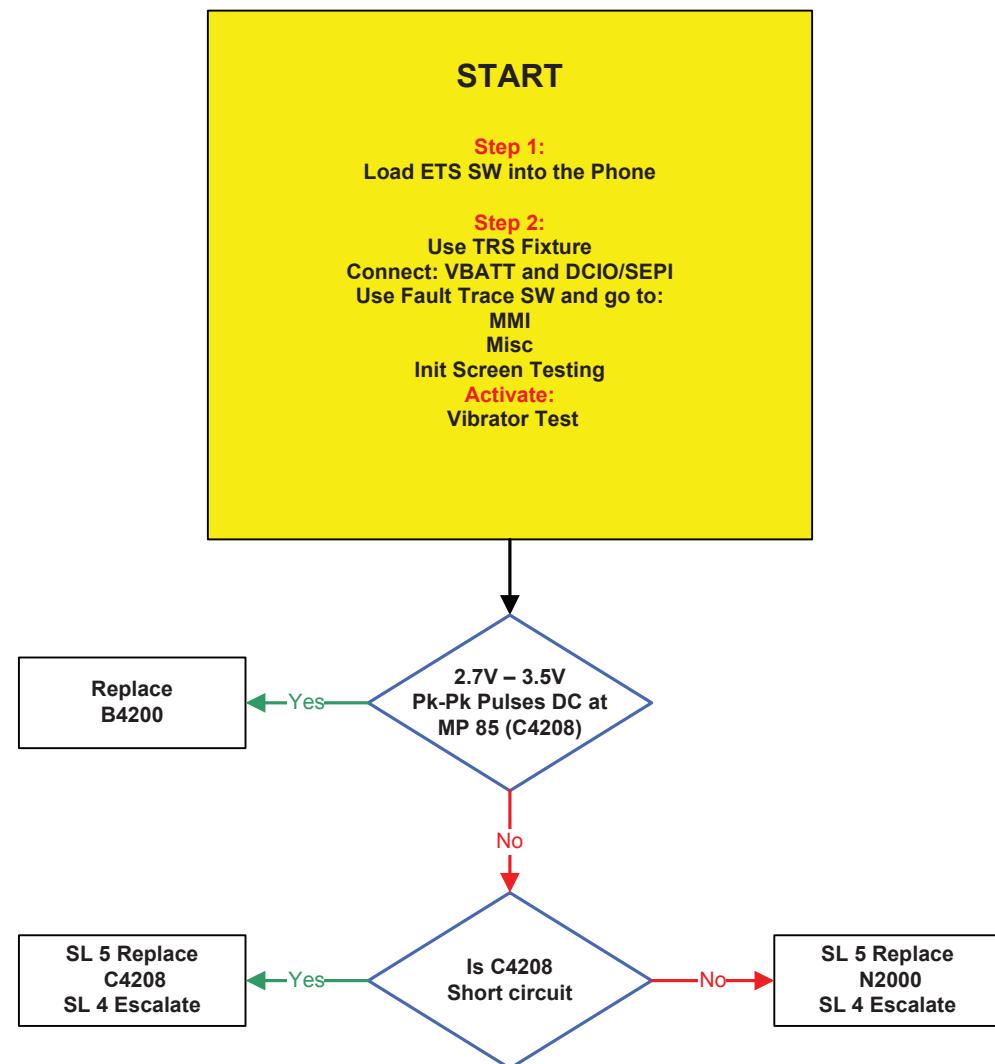
A-GPS Problems



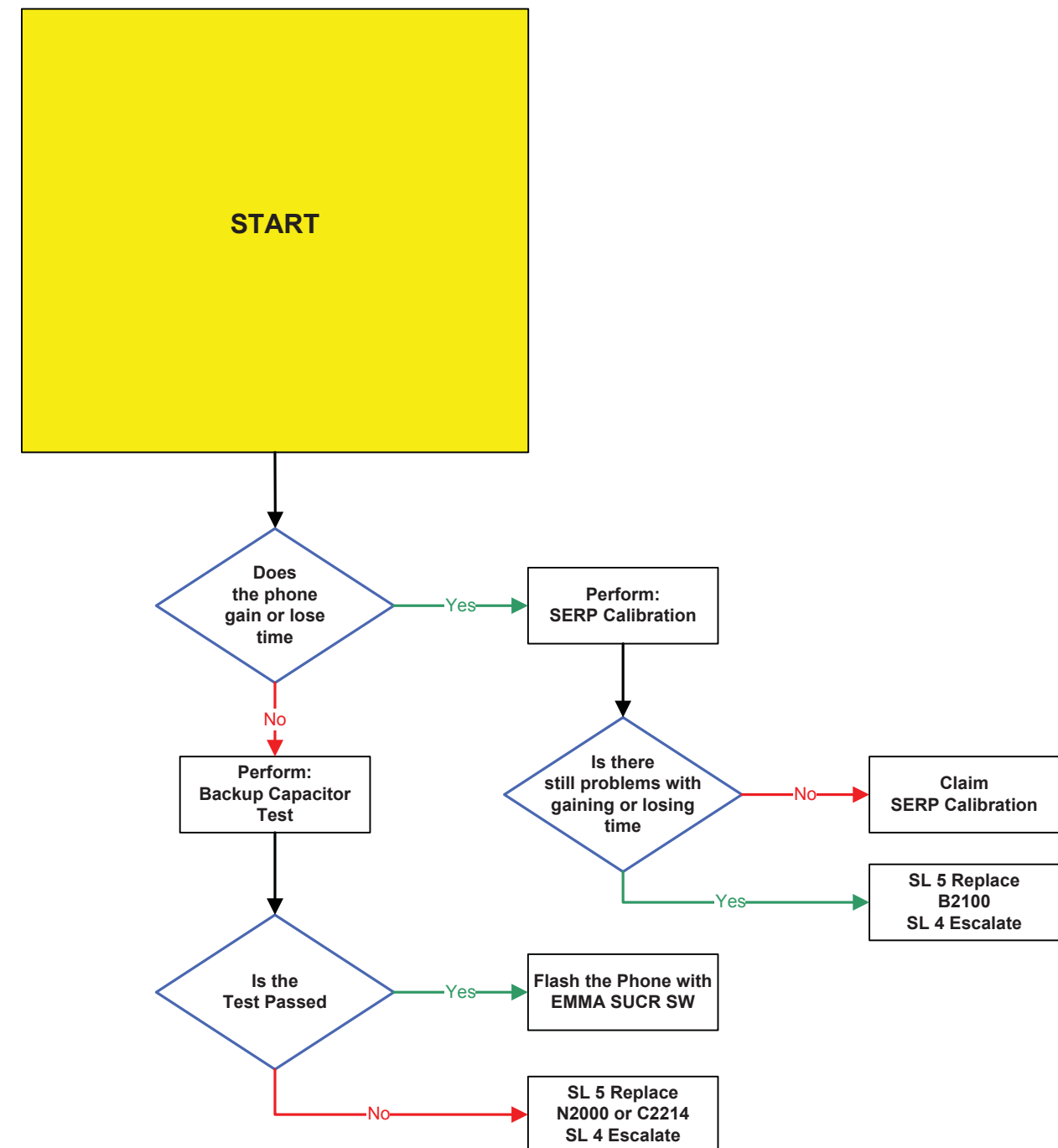
Accelerometer Problems



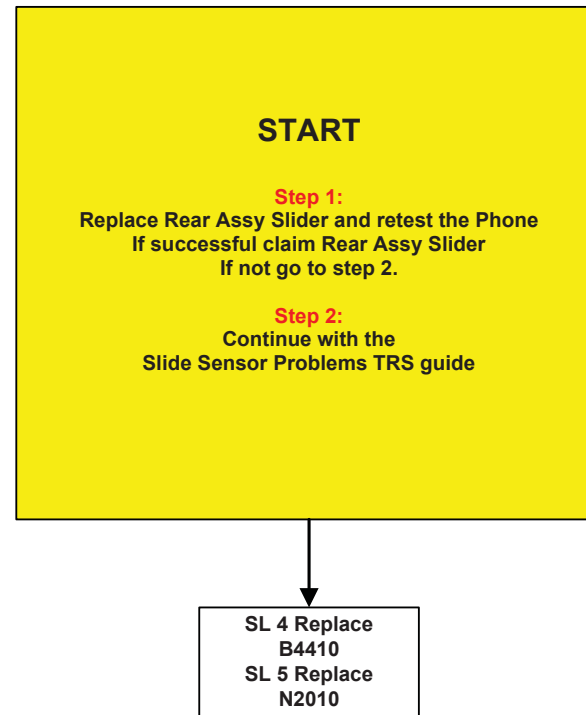
Vibrator Problems



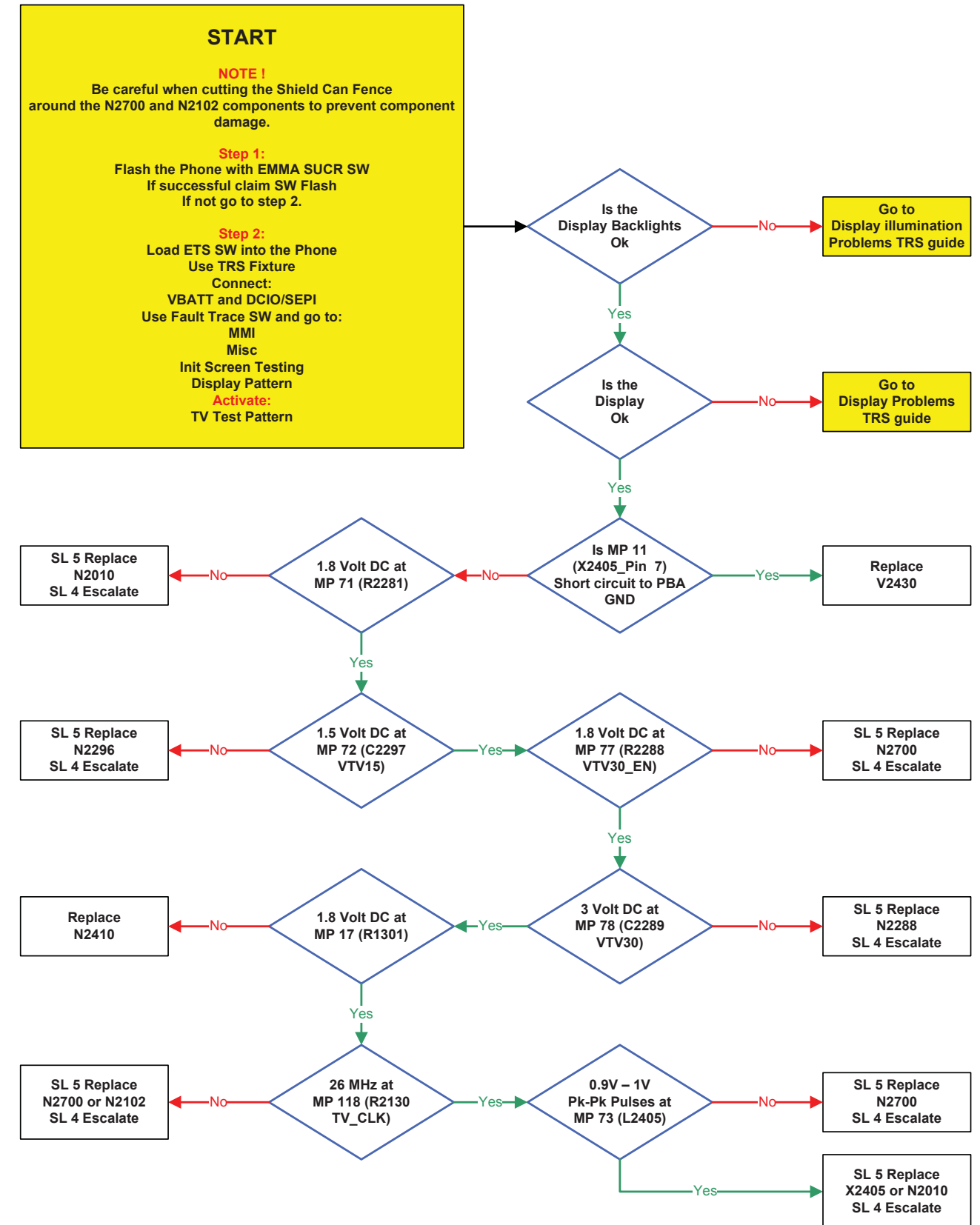
Real Time Clock Problems



Slide Sensor Problems



TV OUT Problems



System Connector Protection Test

Perform the Ohm measurements by using the DMM instrument (Fluke).

Note! The Battery must be removed from the Phone during this test.

Note! Connect the Black probe to the X2405_PIN 9 (GND).



PIN_1 PIN_9 GND PIN_12

System Conn. X2405 (PIN Position)	Ohm Measurements (Ohm)	SL 4 (Repair Action)	SL 5 (Repair Action)
1	0L	L2468 N2421 if lower C2439 if lower	X2405
2	0	L2406 if higher	X2405 if higher
3	10k - 12k	L2401 if higher N3101 if lower or higher	X2405 if higher C2462 if lower
4	0.9k – 1.1k	L2402 if higher N3101 if lower or higher	X2405 if higher C2463 if lower
5	0.9k – 2.2k	L2403 if higher N3101 if lower or higher	X2405 if higher C2448 if lower
6	0.9k – 2.2k	L2404 if higher N3101 if lower or higher	X2405 if higher C2447 if lower
7	75	V2430 if lower	X2405 if higher C2445 if lower L2405 if higher C2444 if lower N2700 if lower or higher
8	350k – 700k	V2417 if lower N2422 if lower or higher	X2405 if higher R2434 if higher R2468 if higher
9	0 Ohm GND	R2449 if higher	X2405 if higher
10	35k – 0L	Z2400 V2421 if lower N2420 if lower	X2405 R2445 C2461 if lower
11	250k – 360k	Z2400 if higher V2420 if lower N2420 if lower or higher	X2405 if higher R2446 if higher C2460 if lower
12	85k – 110k	R2490 if higher V2412 if lower V2202 if lower C2440 if lower	C2441 if lower

Current Consumption Test

Step 1:

Insert a Local SIM Card and use the phone with the Signalling SW (SSW).

Use Dummy Battery connected to Power Supply Channel 1 (VBATT).

Instrument settings: Voltage: 3.8 Volt, Limiter 3A.

Note! The Dummy Battery should have approximately 120K Ohm resistance between GND and BDATA.

Measure the current consumption when Phone is turned off.

Take a note of the current consumption at Power Supply Channel 1 (VBATT).

The Current consumption in off mode should be less than 1mA.

If more than 1mA go to [Dead Phone Problems part 1 TRS guide](#).

Step 2:

Turn the Phone On:

Measure the deep sleep current max 6mA typical between **0-3mA**. Make sure that the operator is running with deep sleep mode.

Note! This operation can be switched off by operator if network is busy or heavily-loaded.

If phone using more than 6mA, then go to EMMA and run Software Update Contents Refresh (SUCR SW).

Step 3 with Fault Trace SW application:

- Flash the phone with ETS SW
- Use Dummy Battery connected to the Power Supply Channel 1 (VBATT)
- Use Fault Trace SW

Connect the:

- Dummy Battery connected to the Power Supply Channel 1 (VBATT):
Instrument settings: Voltage: 3.8 Volt, Limiter 3 A
- Connect DCIO/SEPI to the phone:
Instrument settings: Voltage: 5 Volt, Limiter 2 A

Perform the following tests:

- **Max TX Power GSM 850 MHz**

Fault Trace SW settings:

TX and RX GSM

GSM Mode Settings:

TX Switched

GSM Radio Settings:

Select Band: GSM 850

Channel: 128

Power Level: 5

Limits GSM 850 MHz

- Transmitter Current Limits: **300mA**
- **Tolerance: ±20%**

- Max TX Power GSM 900 MHz

Fault Trace SW settings:

TX and RX GSM
GSM Mode Settings:
TX Switched
GSM Radio Settings:
Select Band: GSM 900
Channel: 1
Power Level: 5

Limits GSM 900 MHz

- Transmitter Current Limits: **200mA**
- **Tolerance: ±20%**

- Max TX Power DCS 1800 MHz

Fault Trace SW settings:

TX and RX GSM
GSM Mode Settings:
TX Switched
GSM Radio Settings:
Select Band: DCS 1800
Channel: 512
Power Level: 0

Limits DCS 1800 MHz

- Transmitter Current Limits: **200mA**
- **Tolerance: ±20%**

- Max TX Power PCS 1900 MHz

Fault Trace SW settings:

TX and RX GSM
GSM Mode Settings:
TX Switched
GSM Radio Settings:
Select Band: PCS 1900
Channel: 512
Power Level: 0

Limits PCS 1900 MHz

- Transmitter Current Limits: **160mA**
- **Tolerance: ±20%**

- Max TX Power WCDMA BAND I

Note! Valid only for W995 with WCDMA BAND I support.

Fault Trace SW settings:

TX and RX WCDMA
Radio Settings:
Select Band: BAND I
Fast Select Channels: Ch LOW
Modes: Max Pwr 23dBm

Limits WCDMA BAND I

- Transmitter Current Limits: **600mA**
- **Tolerance: ±20%**

- Max TX Power WCDMA BAND II

Note! Valid only for W995 with WCDMA BAND II support.

Fault Trace SW settings:

TX and RX WCDMA
Radio Settings:
Select Band: BAND I
Fast Select Channels: Ch LOW
Modes: Max Pwr 23dBm

Limits WCDMA BAND I

- Transmitter Current Limits: **640mA**
- **Tolerance: ±20%**

- Max TX Power WCDMA BAND V

Note! Valid only for W995 with WCDMA BAND V support.

Fault Trace SW settings:

TX and RX WCDMA
Radio Settings:
Select Band: BAND I
Fast Select Channels: Ch LOW
Modes: Max Pwr 23dBm

Limits WCDMA BAND I

- Transmitter current: **650mA**
- **Tolerance: ±20%**

- Max TX Power WCDMA BAND VIII

Note! Valid only for the W995 with WCDMA BAND VIII support.

Fault Trace SW settings:

TX and RX WCDMA
Radio Settings:
Select Band: BAND I
Fast Select Channels: Ch LOW
Modes: Max Pwr 23dBm

Limits WCDMA BAND I

- Transmitter current: **560mA**
- **Tolerance: ±20%**

If the current consumption is out of the test limits then try to solve the problem by running SERP Calibration.

If there are still problems with the current consumption then go to the following TRS guides:

**GSM Network problems,
WCDMA I, II, V Network Problems or
WCDMA VIII Network Problems**

If the current consumption is within the test limits then go to: **Charging Test.**

Backup Capacitor Test

To perform this test use:

- Phone with the ETS SW
- Power Supply Channel 1 VBATT: Instrument settings: Voltage: 3.8V, Limiter: 2A
- Power Supply Channel 2 DCIO/SEPI: Instrument settings Voltage: 5V, Limiter: 2A

This test should be performed in 3 steps:

Step1:

Measure the voltage at the Backup Capacitor by using **Fault Trace SW- Logic - ADC Values – Read ADC Value** (Reading 1).

Step2:

This step should be made **30 seconds** after Step 1. Measure the voltage at the Backup capacitor by using **Fault Trace SW - Logic – ADC Values - ADC Channels – Read ADC Value** (Reading 2).

Step3:

Compare the difference between Reading 1 and Reading 2 with the reference table below. If the Reading 1 value is between 50 and 680 go to Interval 1, if it is between 681 and 800 go to Interval 2, if it is between 801 and 880 go to Interval 3 and compare with the Reading 2 – Reading 1 Min and Max Limits.

Reference Table:

	Min	Max	Unit
Absolute readout Reading 1	50	880	Dec

Reading 1 (Dec)	Reading 2 – Reading 1 (Dec)	
	Min	Max
Interval 1 (50 – 680)	20	210
Interval 2 (681 – 800)	5	30
Interval 3 (801 – 880)	0	10

Note! The upper table contains the absolute limits for the readouts. The lower table contains the allowed delta between the first and the second readout, separated in time with 30 seconds.

Note! If the readings are out of limits then **SL 5 replace C2214** (Backup Capacitor) if the problem persists then **SL 5 Replace N2000 SL 4 Escalate**.

Charging Test

To perform this test use:

- Phone with the Signalling SW (SSW)
- Dummy Battery connected to Power Supply Channel 1 (VBATT)
Note! The Dummy Battery should have approximately 120K Ohm resistance between GND and BDATA.
- Power Supply Channel 1 (VBATT)
Instrument settings:
Voltage: from 3.0 Volt to 4.2 Volt, according to VBATT row in the Reference Table.
Limiter: 2A
- Power Supply Channel 2 (DCIO/SEPI)
Instrument settings:
Voltage: 5V
Limiter: 2A

Test instructions:

- Disconnect the DCIO/SEPI Cable between each measurement and wait for phone to shutdown before changing VBATT voltage.
- Take a note of current measurements at Power Supply Channel 2 DCIO/SEPI and display charging indicator X seconds after DCIO/SEPI cable has been inserted according to the Test Time row in the reference table below.
- Compare the test results with the reference table below, tolerance +/-20%.

Reference Table

VBATT x Volt	3.0v	3.1v	3.2v	3.3v	3.4v	3.5v	3.6v	3.7v	3.8v	3.9v	4.0v	4.1v	4.2v
Test Time x sec.	15s	15s	15s	25s	25s	25s	35s	35s	35s	35s	35s	25s	45s
DCIO/SEPI Current mA	250mA	250mA	250mA	500mA	600mA	700mA	900mA	900mA	900mA	900mA	900mA	900mA	0mA
Display indicates charging	Nothing	Nothing	Nothing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Fully Charged

Note! The Power Supply Channel 1 (VBATT) must allow reverse current.

If the charging current is **NOT** equal to the reference table then go to: [Charging Problems TRS Guide](#)

If the charging current is equal to the reference table then insert the normal battery and test the charging current to verify if the phone battery is working properly.

Measure the voltage at the battery to define the current level.

If the battery is receiving the right current, then the phone and the battery are working properly.

ASIC Revision Test

Note! The Keypad Scan Test must be *Deactivated* during this test.

Purpose:

- Verify that the ASICs are correctly mounted, that the communication works and that the revisions are correct.

The tested ASICs are:

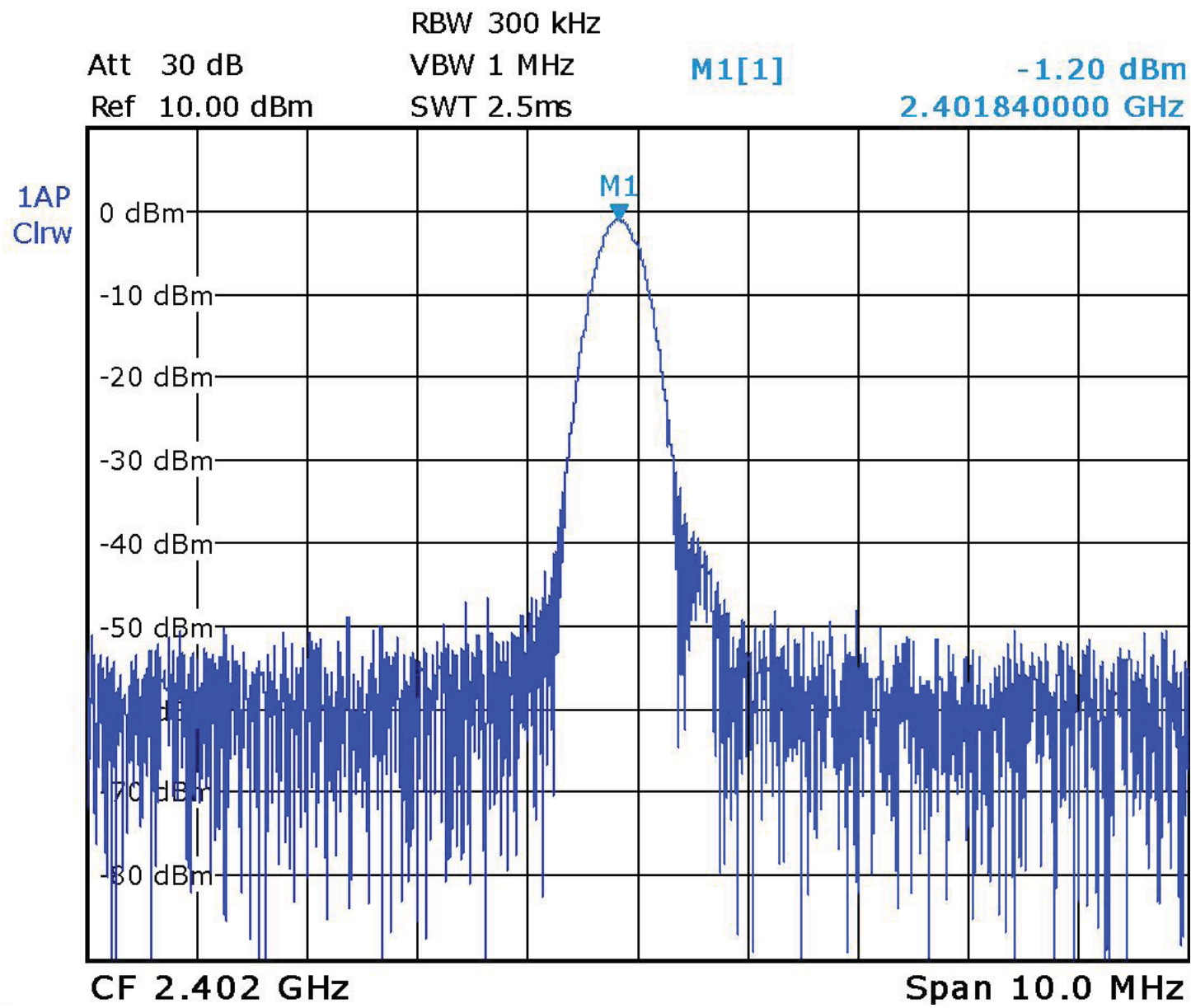
- N2010 (Kajsa)
- N2000 (Vera)
- N1300 (Bluetooth and FM Radio ASIC)
- N2411 (Accelerometer)
- N8300 (A-GPS Module)

To perform this test use:

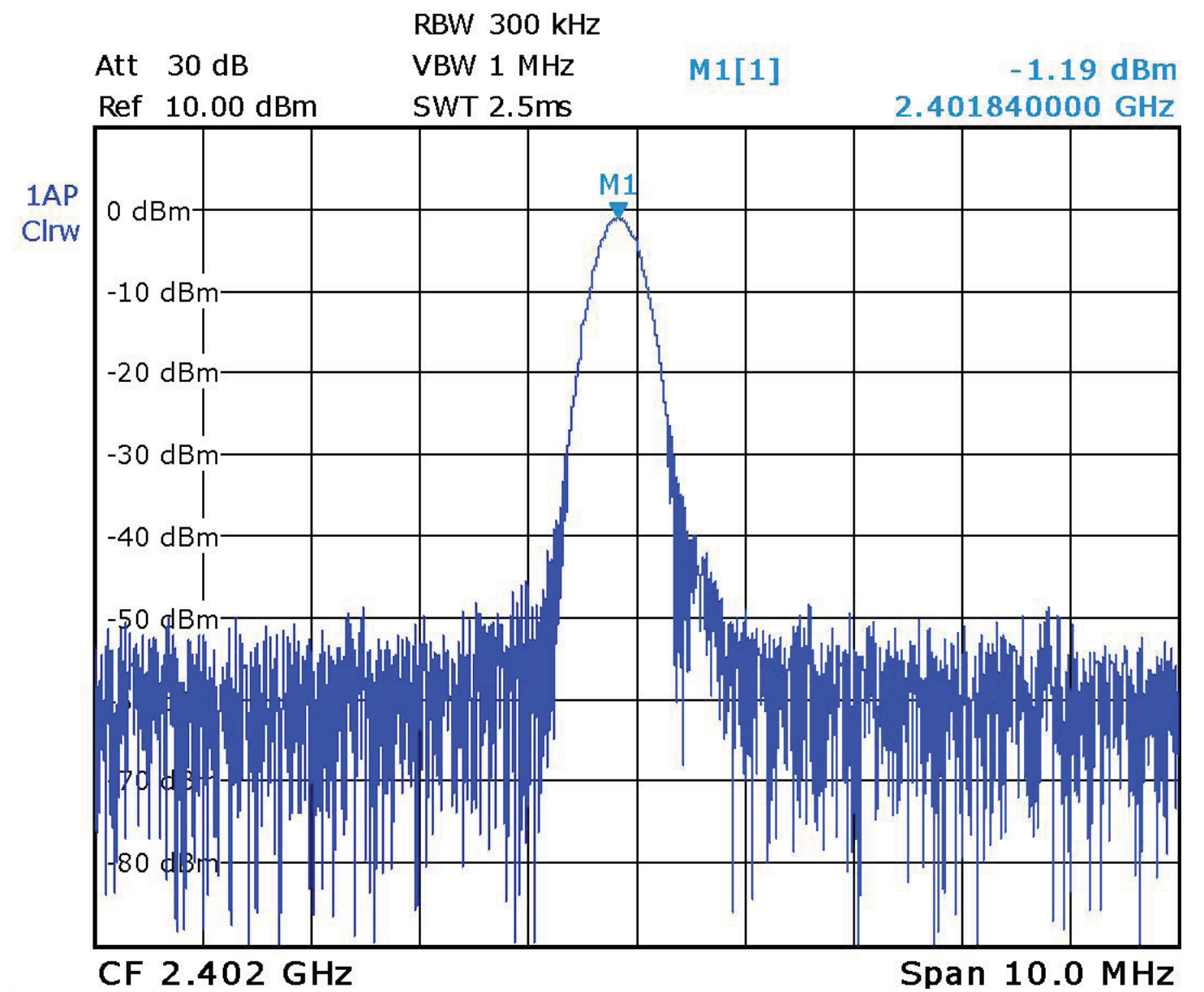
- Phone with the ETS SW
- TRS Fixture
- Power Supply Channel 1 VBATT (Voltage: 3.8V, Limiter: 2A)
- Power supply Channel 2 DCIO/SEPI (Voltage: 5V, Limiter: 2A)
- Fault Trace SW and go to: General – Asic Revisions – Read All

Reference Table:

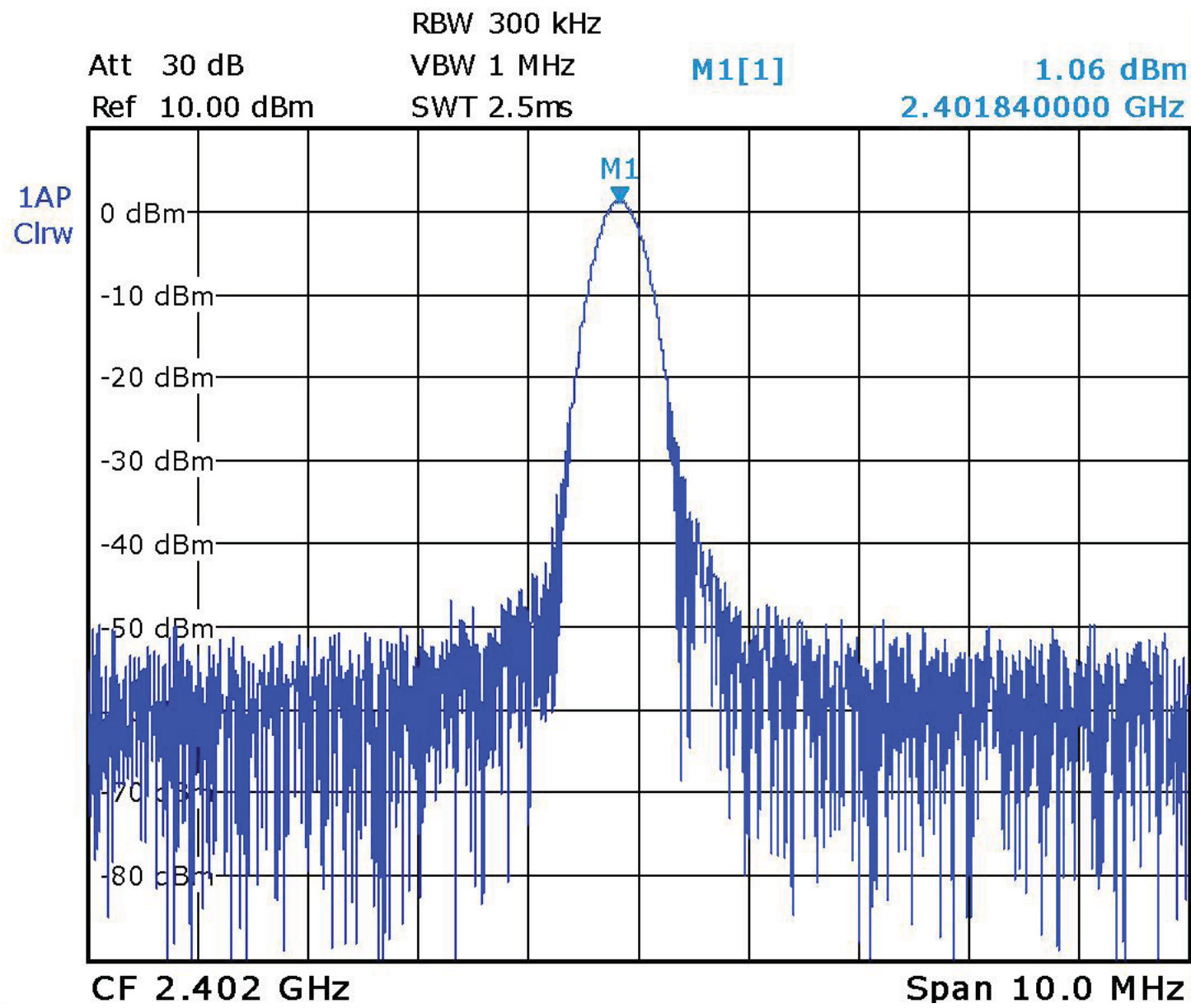
ASIC	Part number	Description	Return value (hex)
N2010	1210-4190	CPU (Kajsa)	0xE9
N2000	1202-0639	Power Management (Vera)	0xC8
N1300	1200-9840	Bluetooth:	
		Firmware Revision	0x5,0x3
		Chip ID	0x0,0x0,0x0,0x0 Will always return 0 on STLC because Chip ID is not supported.
N2411	1202-1676	Accelerometer	0x3b
N8300	1200-0700	A-GPS Module	254,0,253,192,0,242,113,9,16,252 Note! The A-GPS module must be connected to the PBA during this test.
N1300	1200-9840	FM Radio	When FM Radio is On : 0x1253 When FM Radio is Off : 0x1200



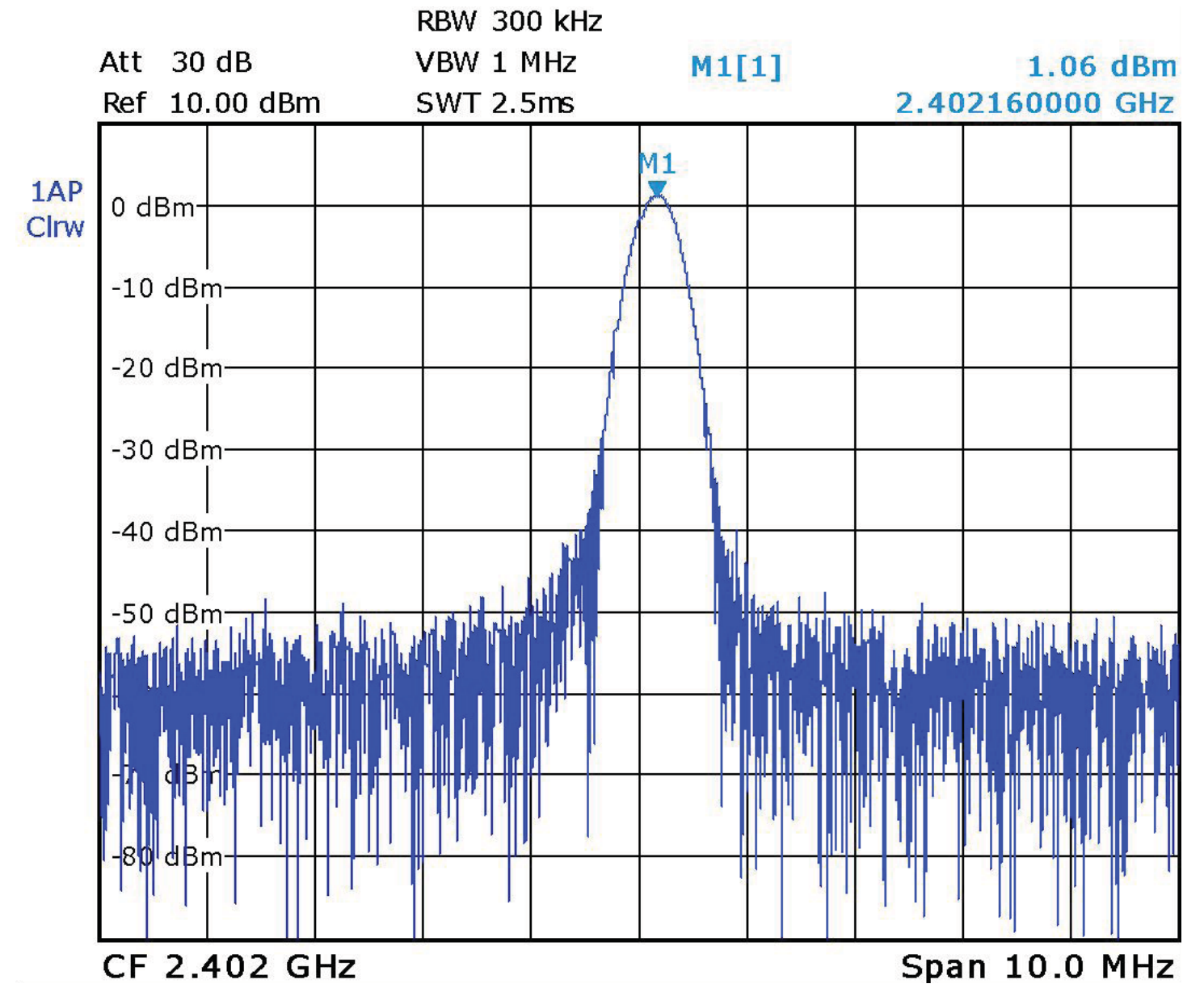
MP 3 (W1300_Pin 5)



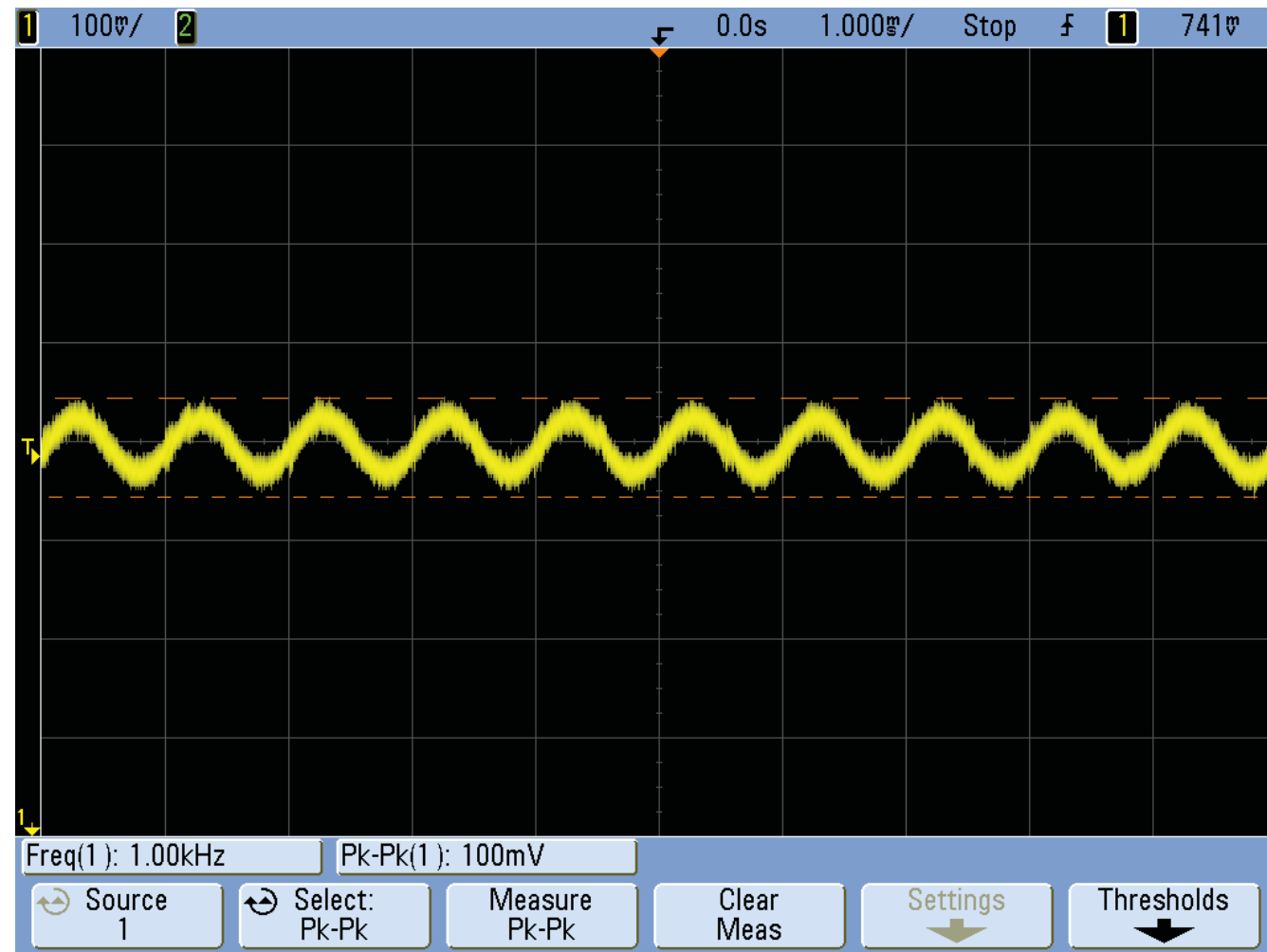
MP 5 (W1300_Pin 7)



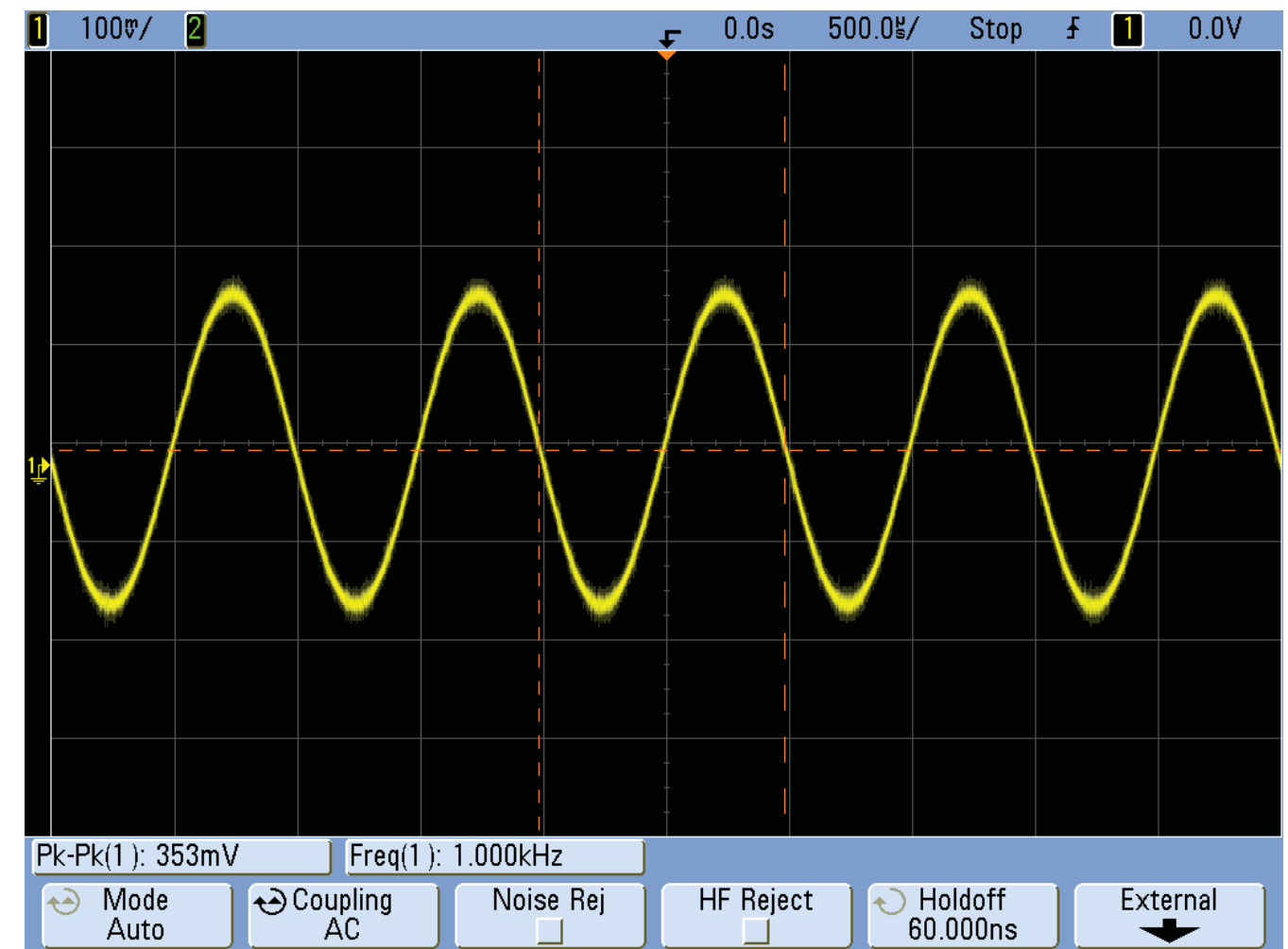
MP 4 (X1300_Pin 1 Blt MaxPwr MOD 0)



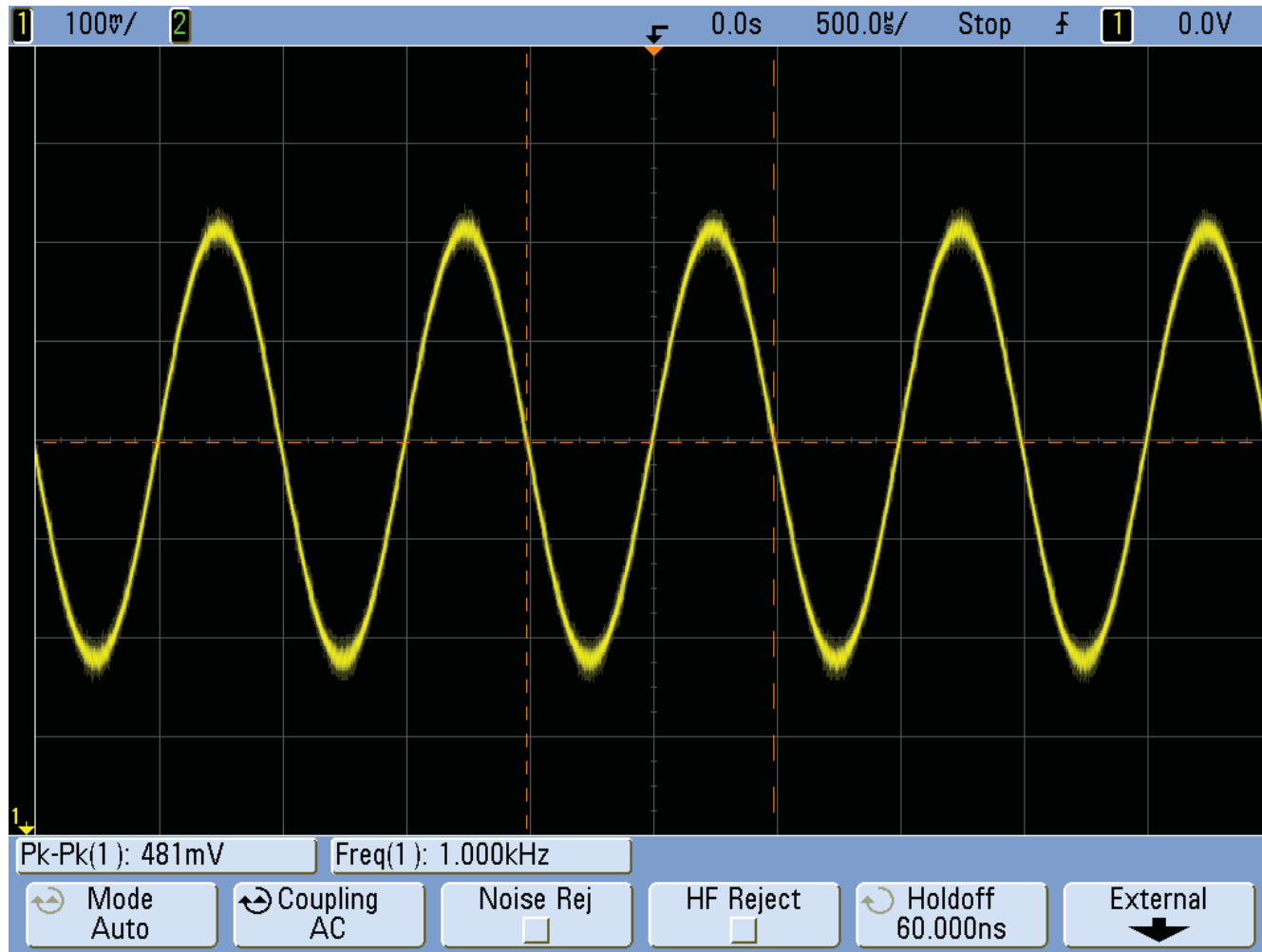
MP 4 (X1300_Pin 1 Blt MaxPwr MOD 1)



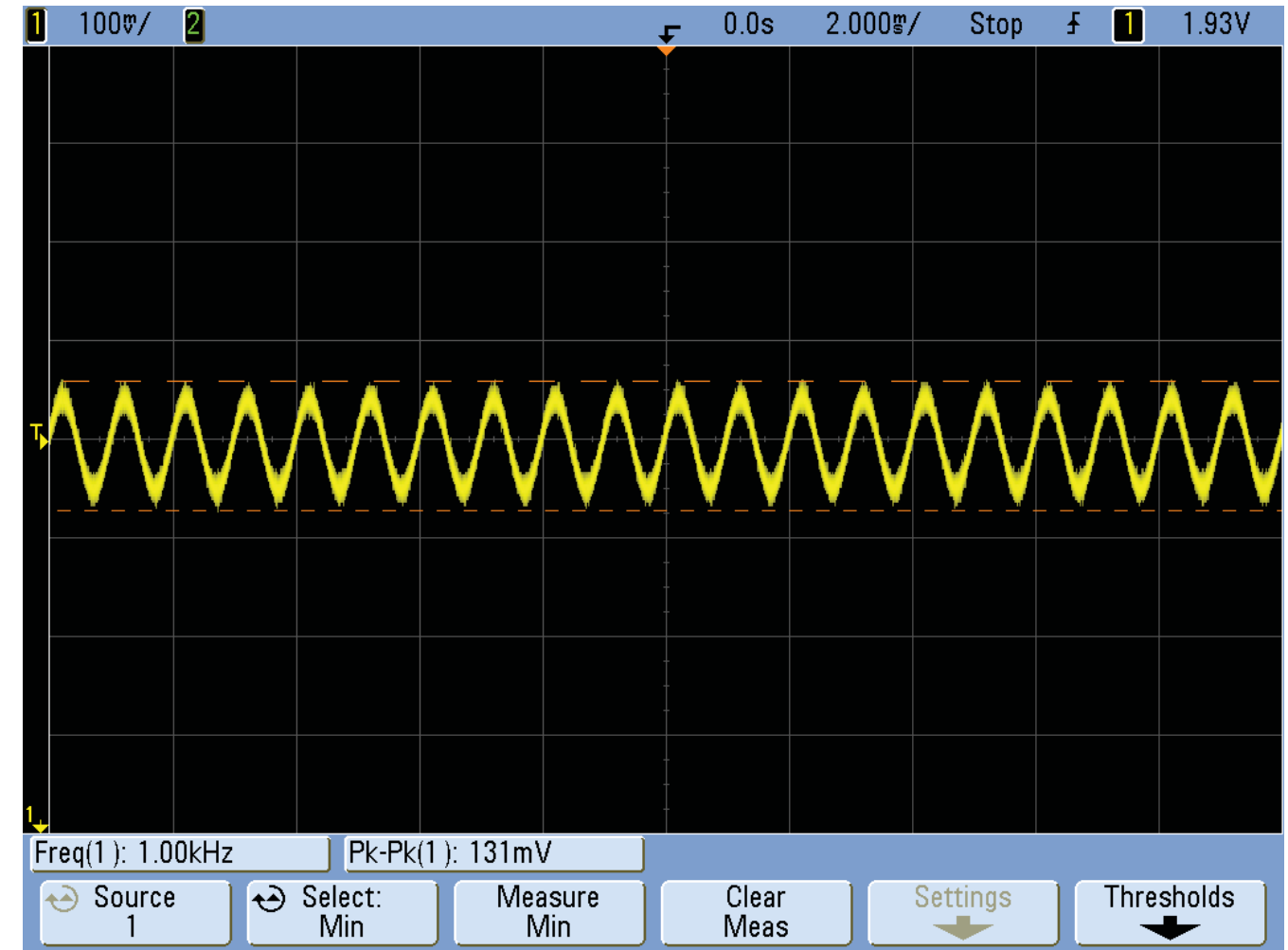
MP 6, 7 (C3146 and C3145)



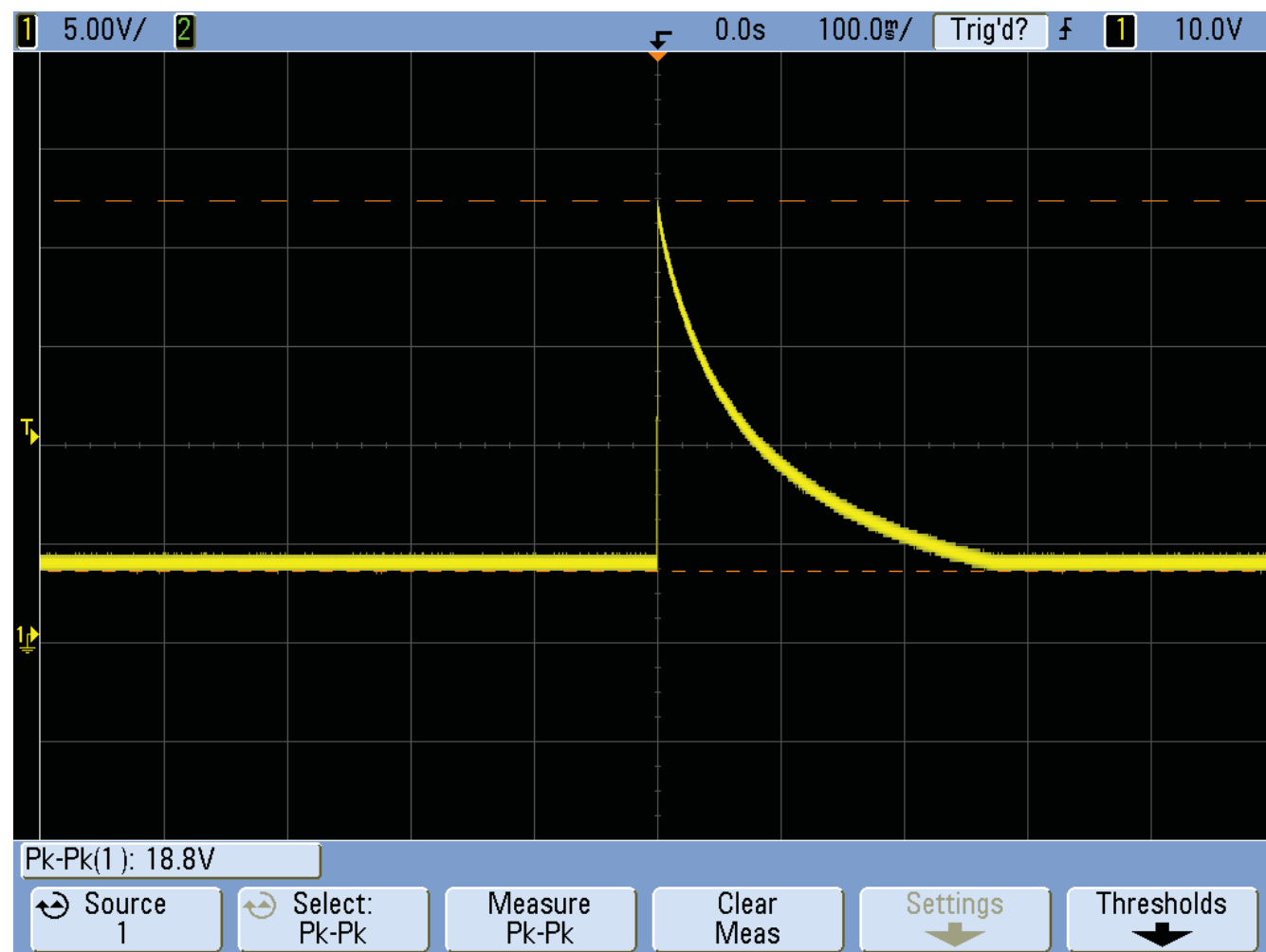
MP 12, 13 (L2403, L2404)



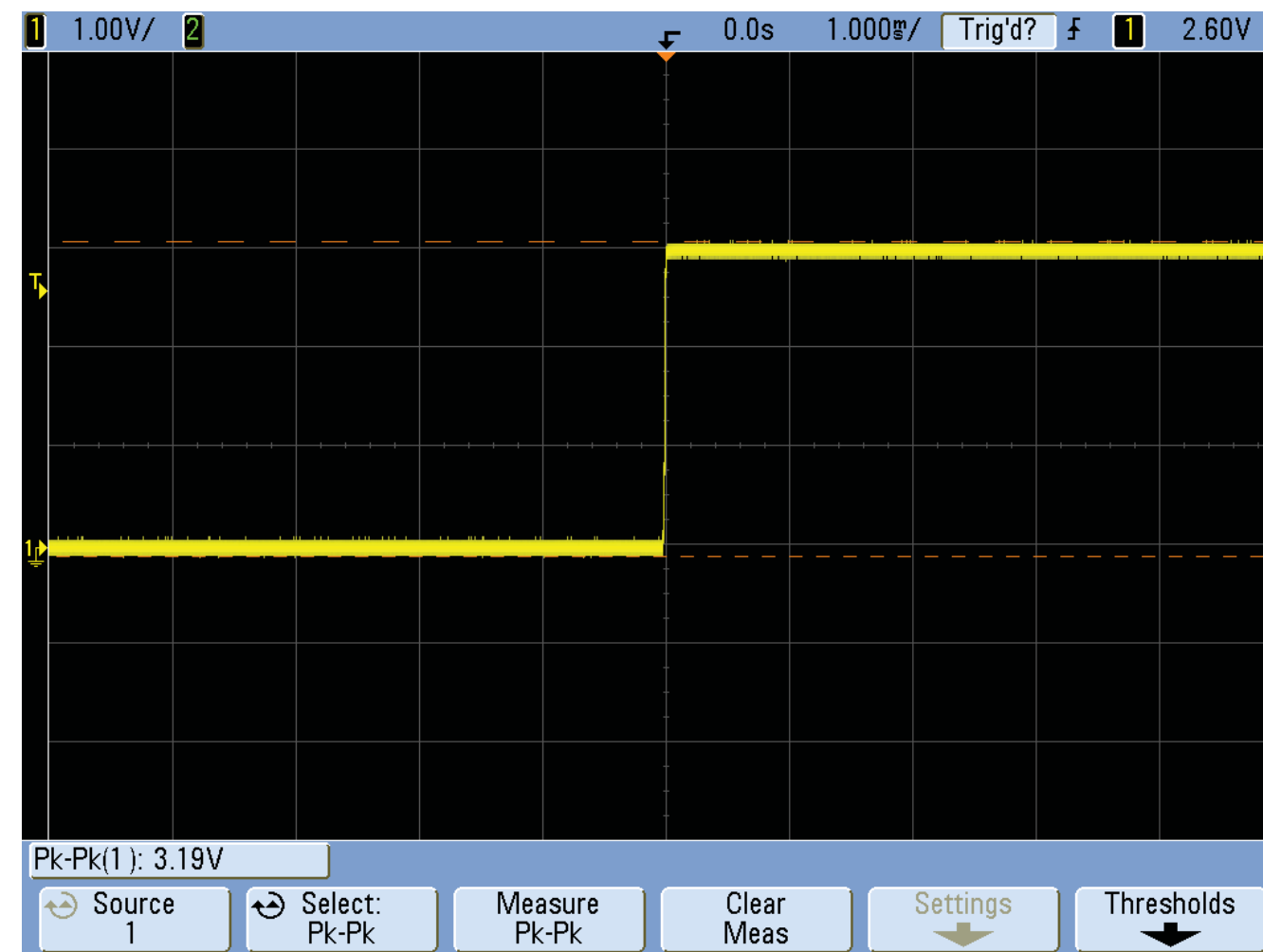
MP 21, 22 (TP3104, TP3105)



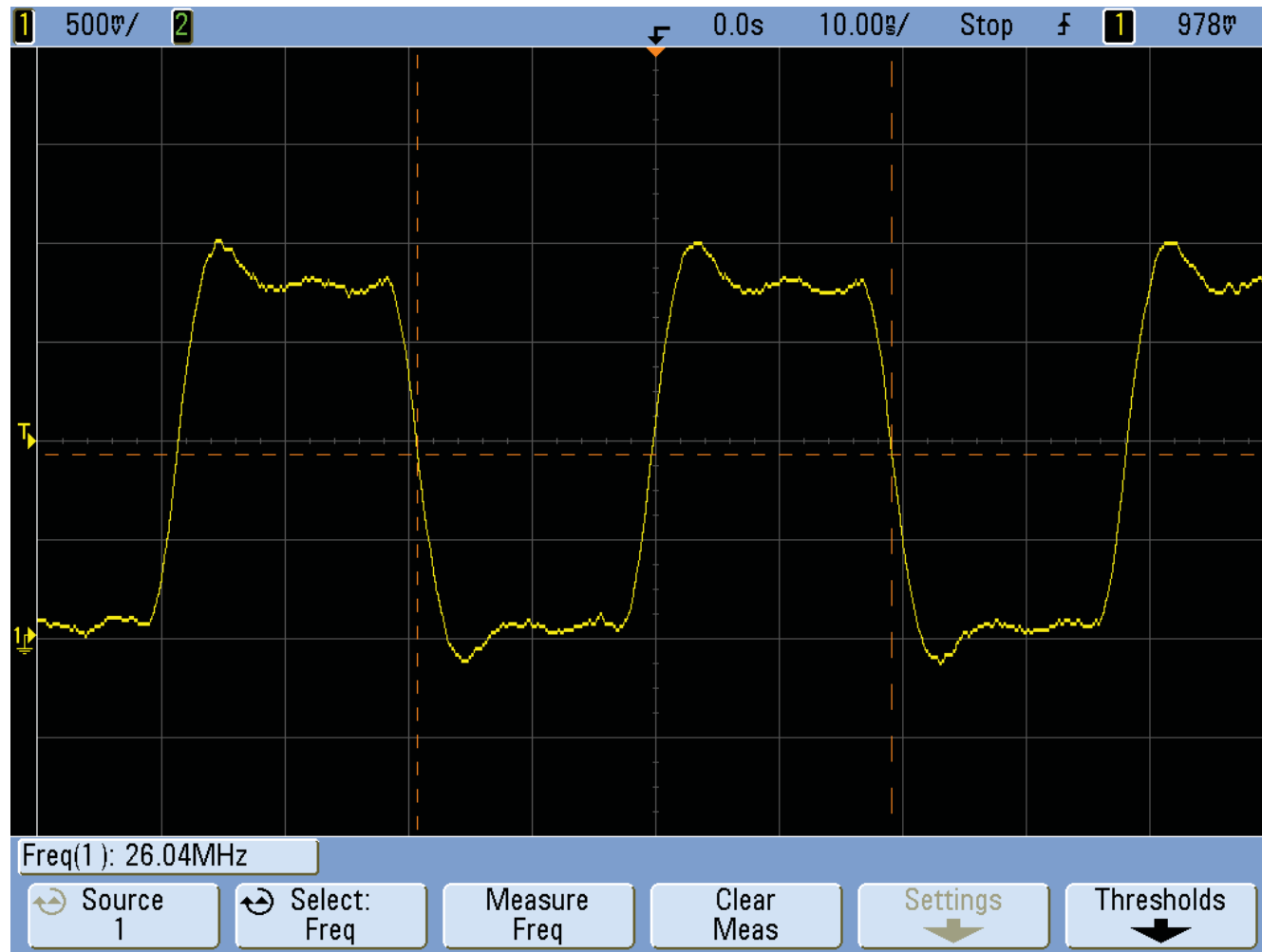
MP 23, 24 (TP3103, TP3102)



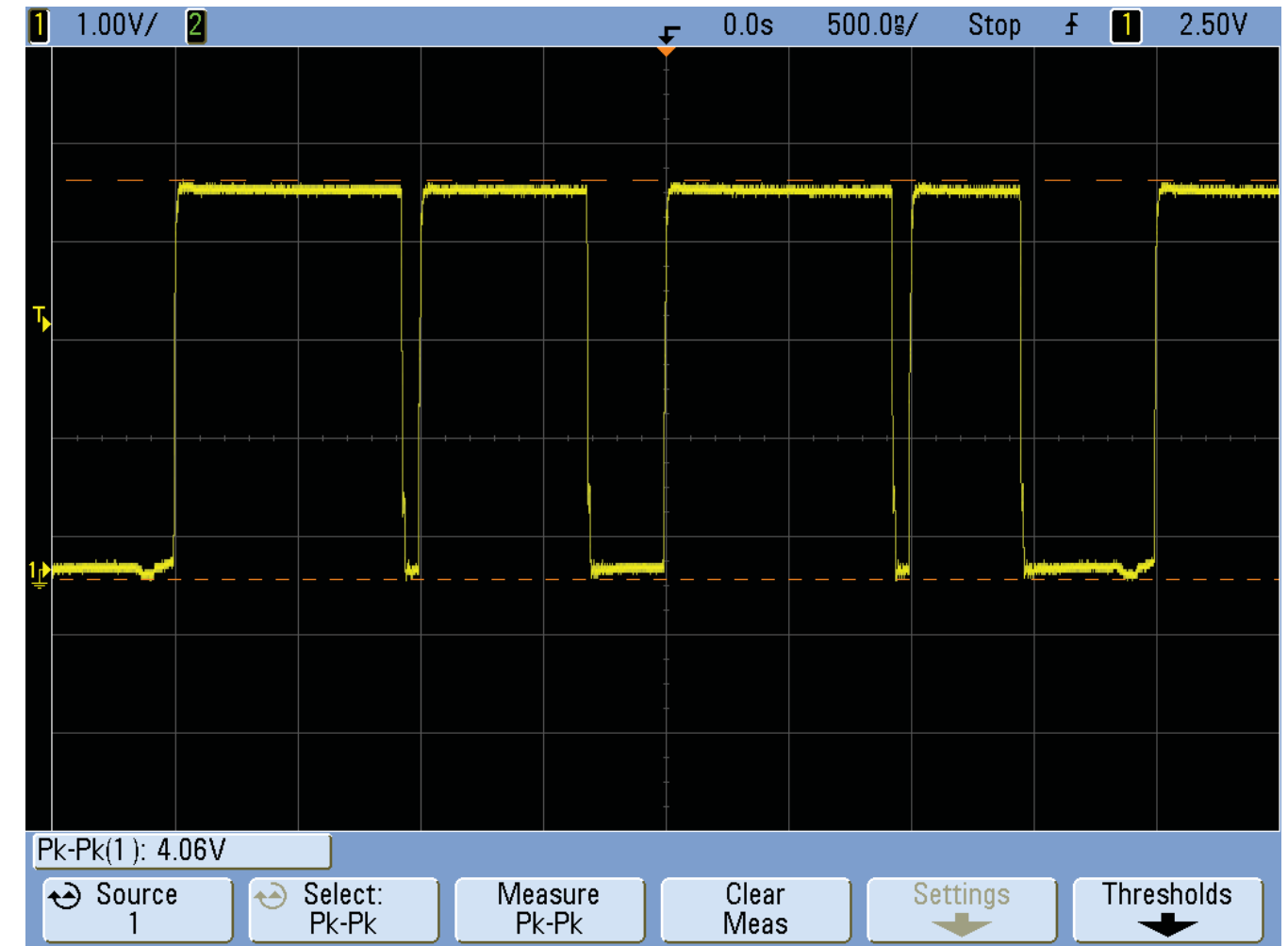
MP 25 (TP4200)



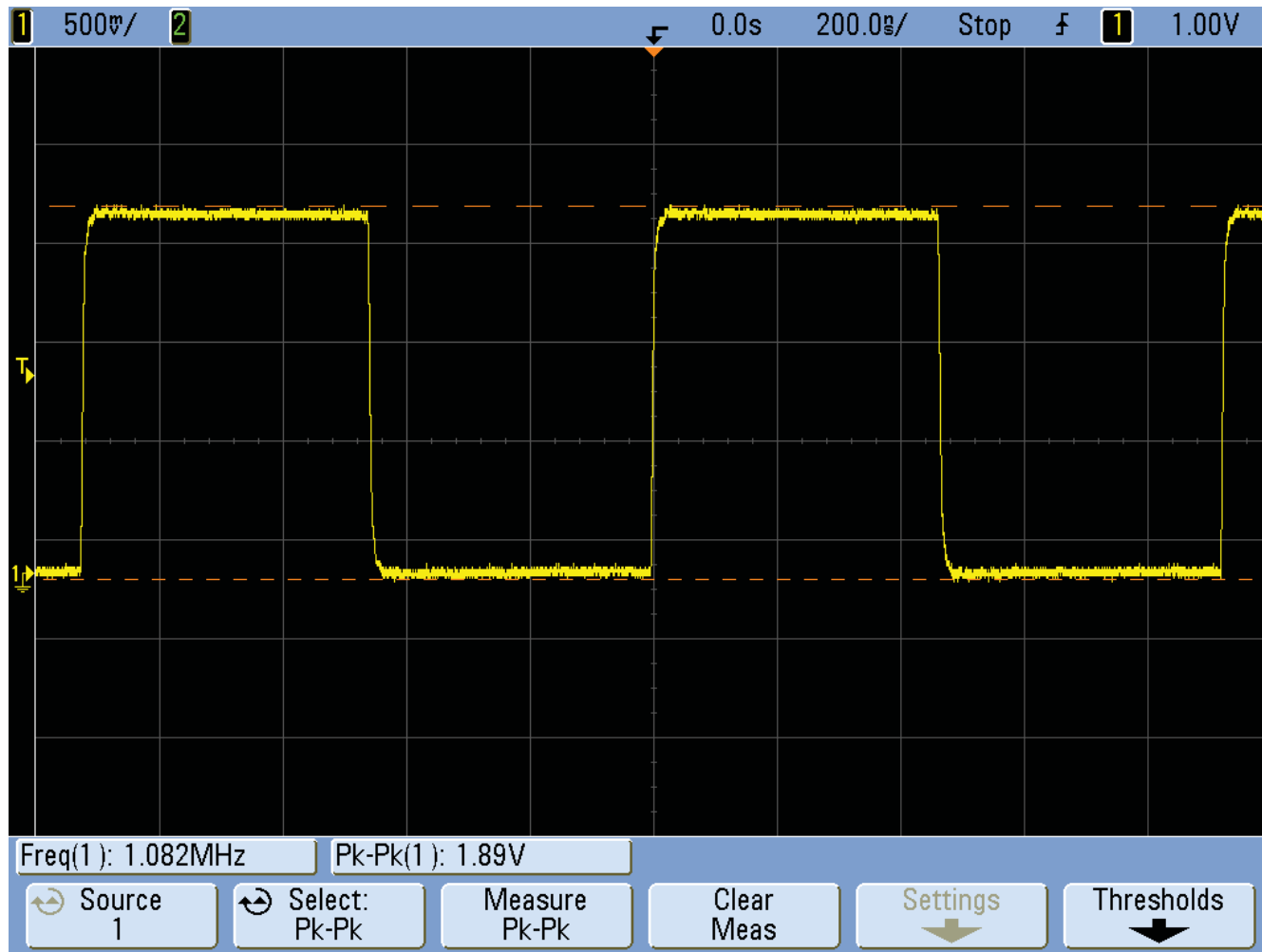
MP 37 (TP2203 VOPTO)



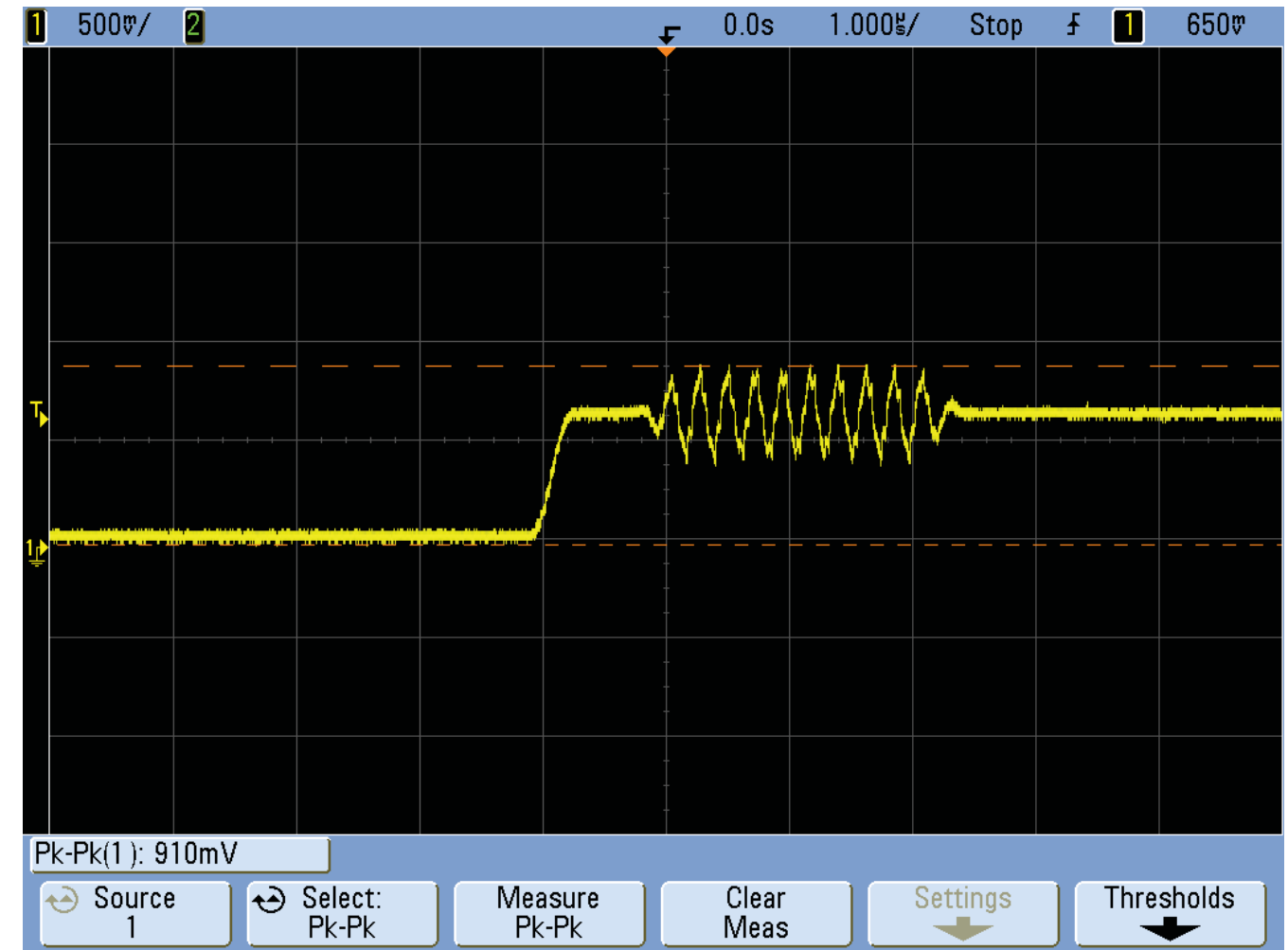
MP 52 (C2103 26MHz CAMSYSCLK)



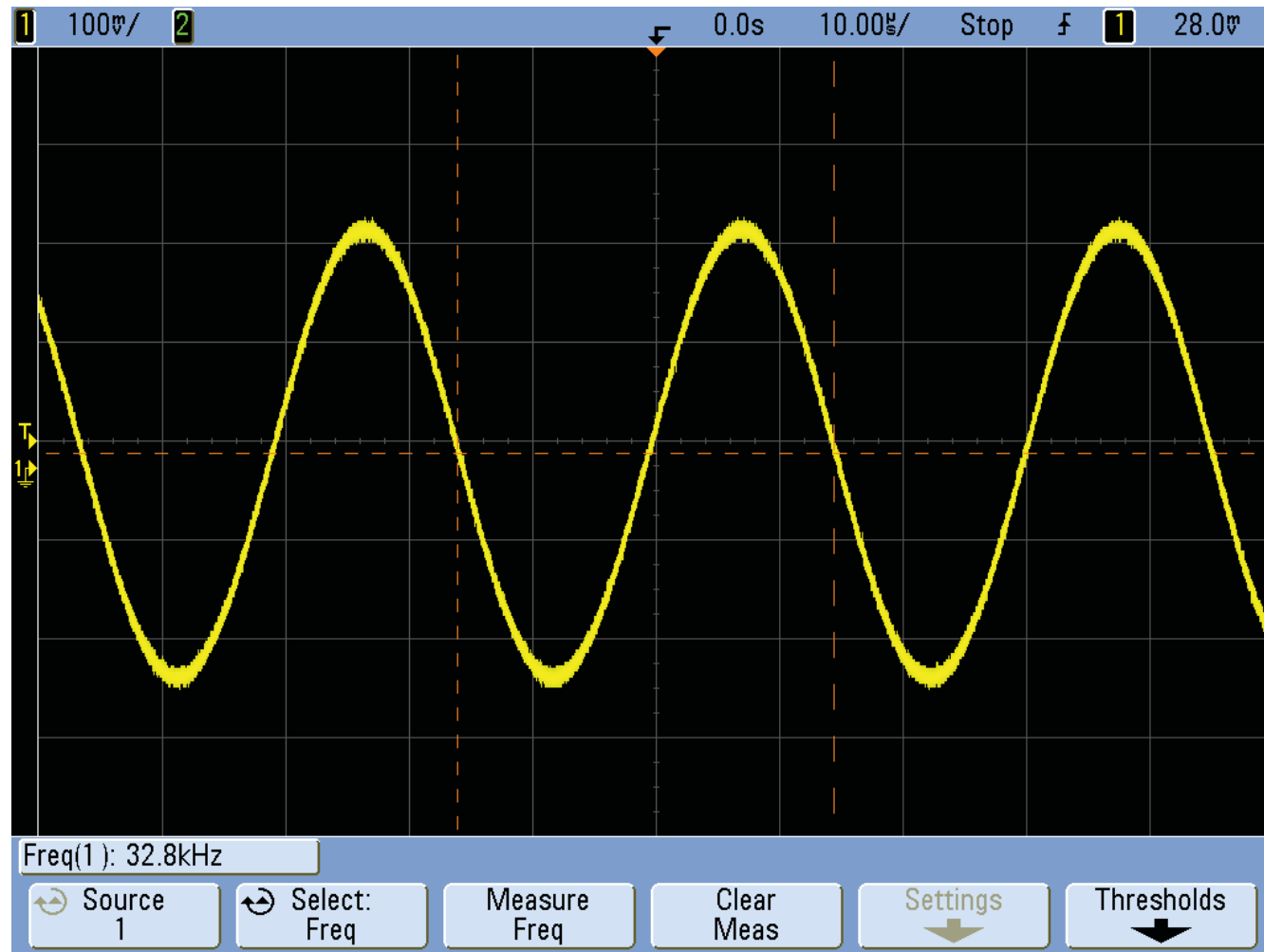
MP 58 (N4201_Pin 1)



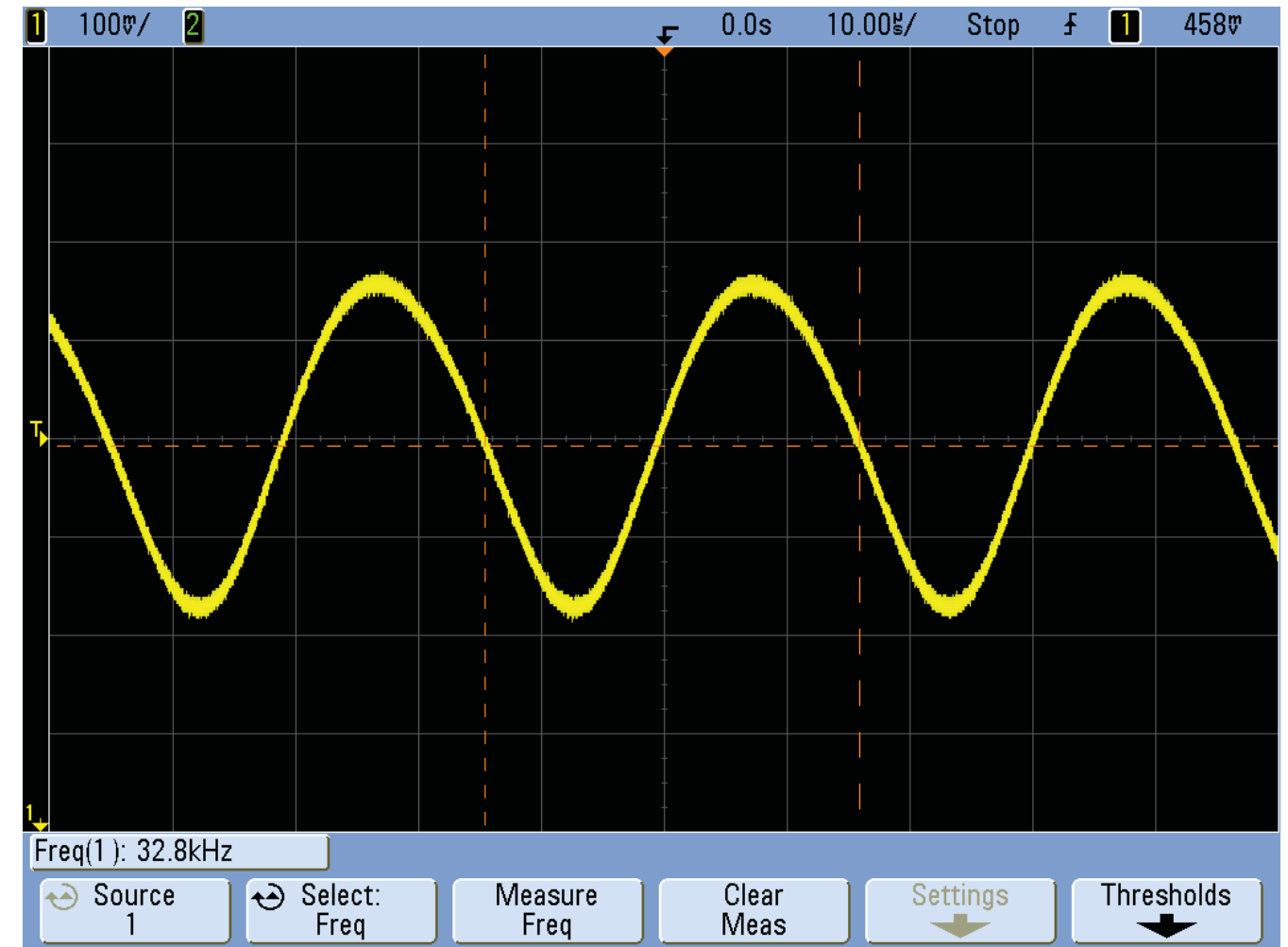
MP 59 (SP2407 SIMCLK)



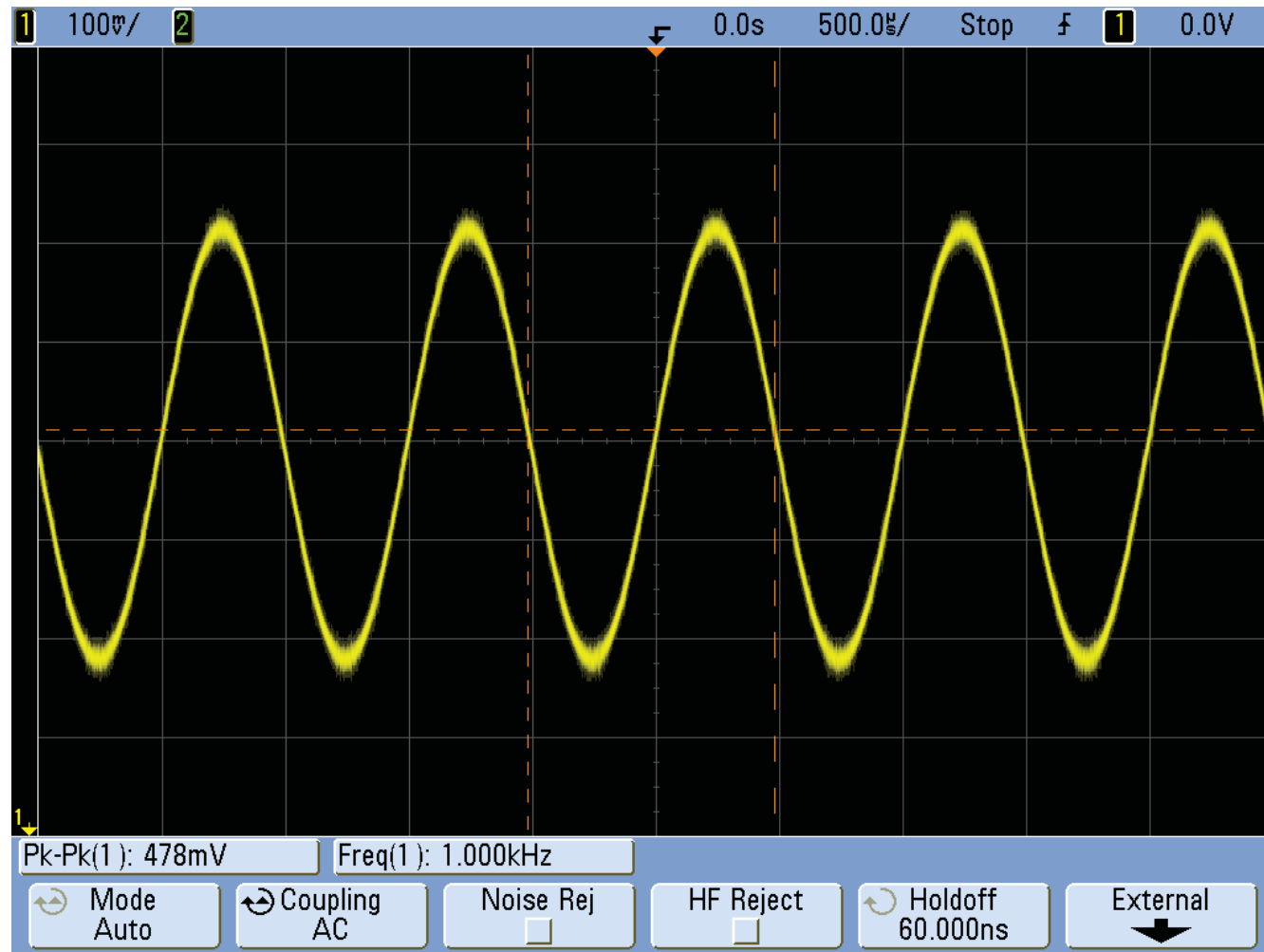
MP 73 (L2405 TVOUT)



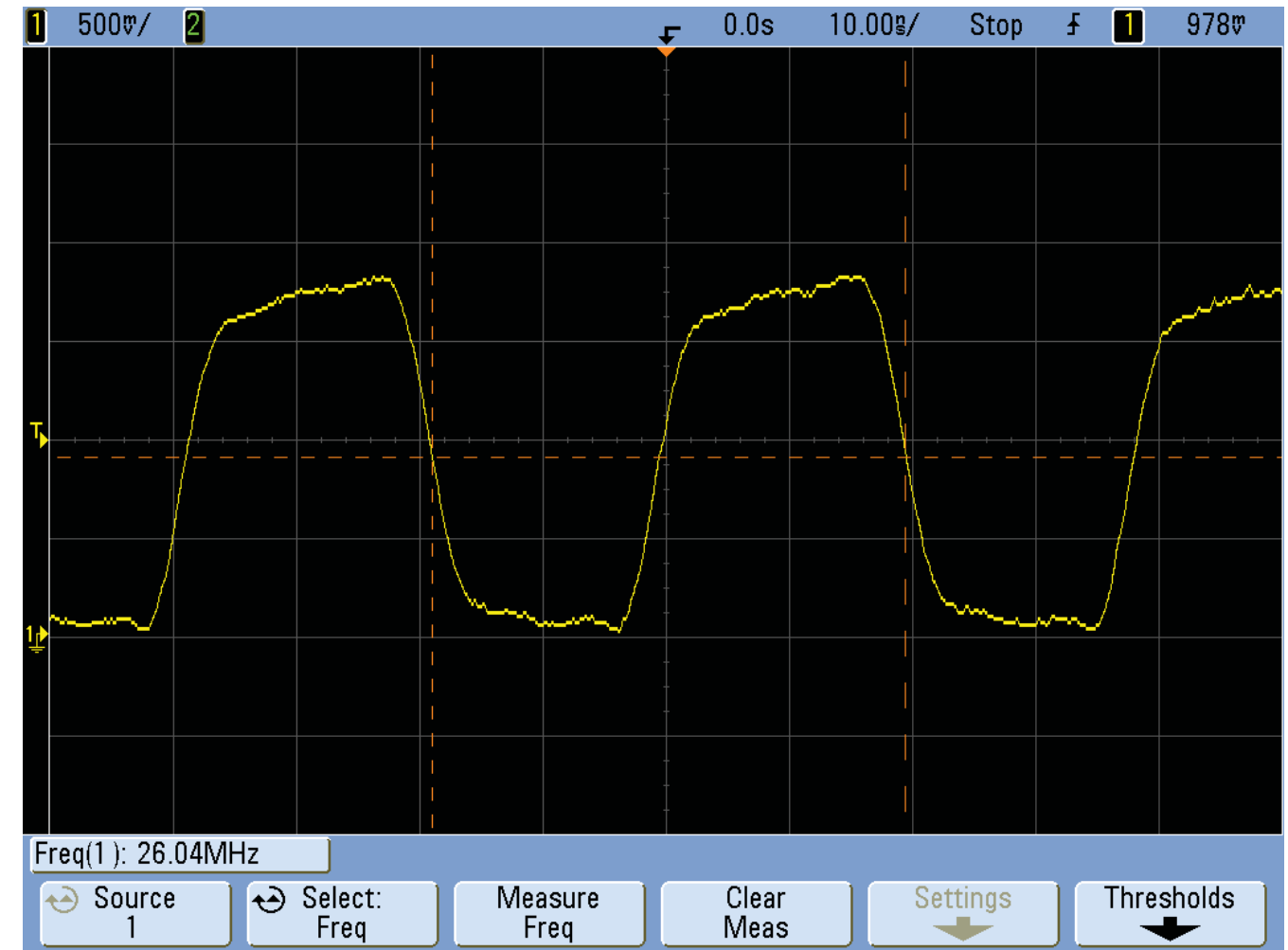
MP 79 (C2100)



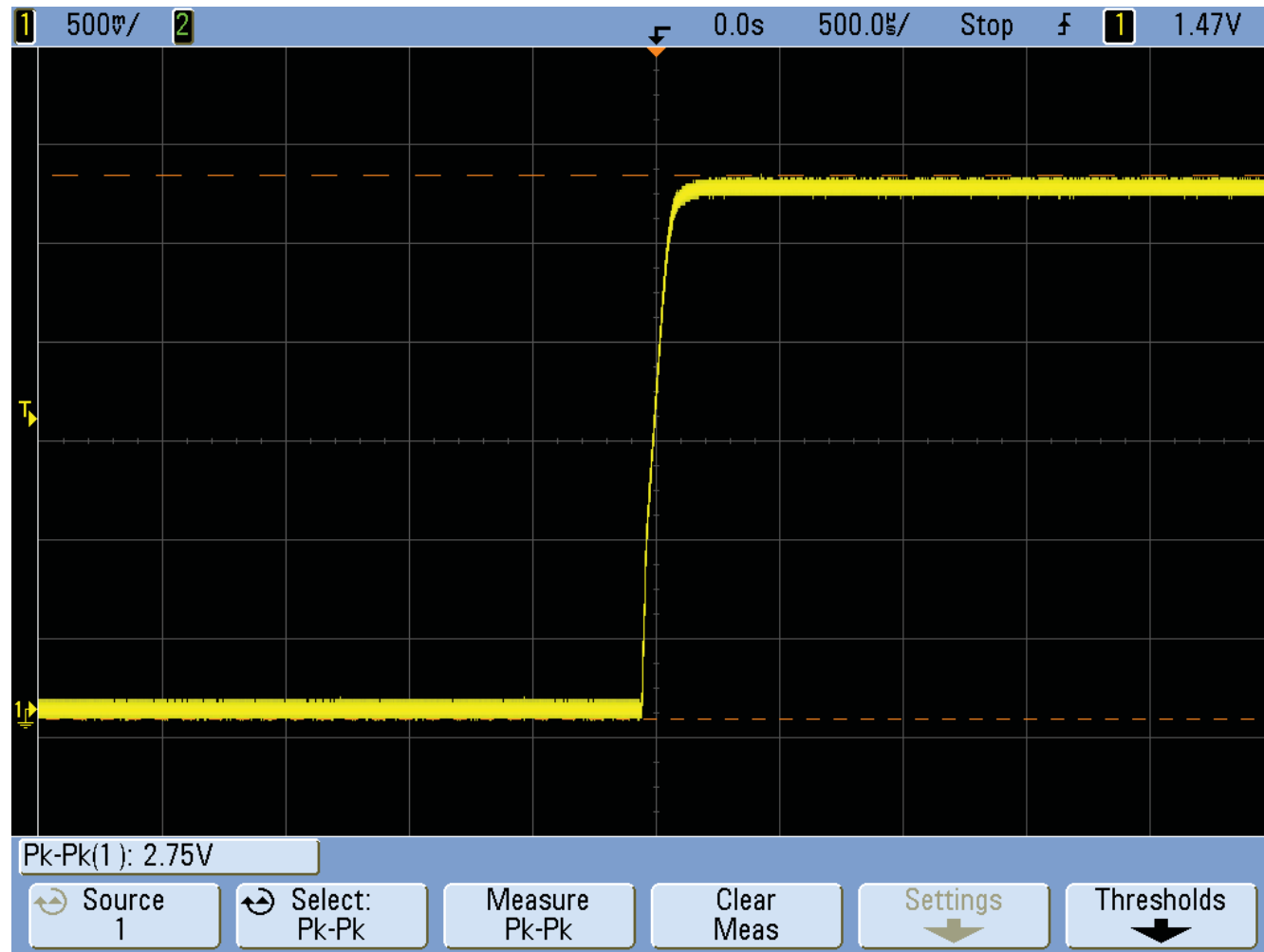
MP C2101



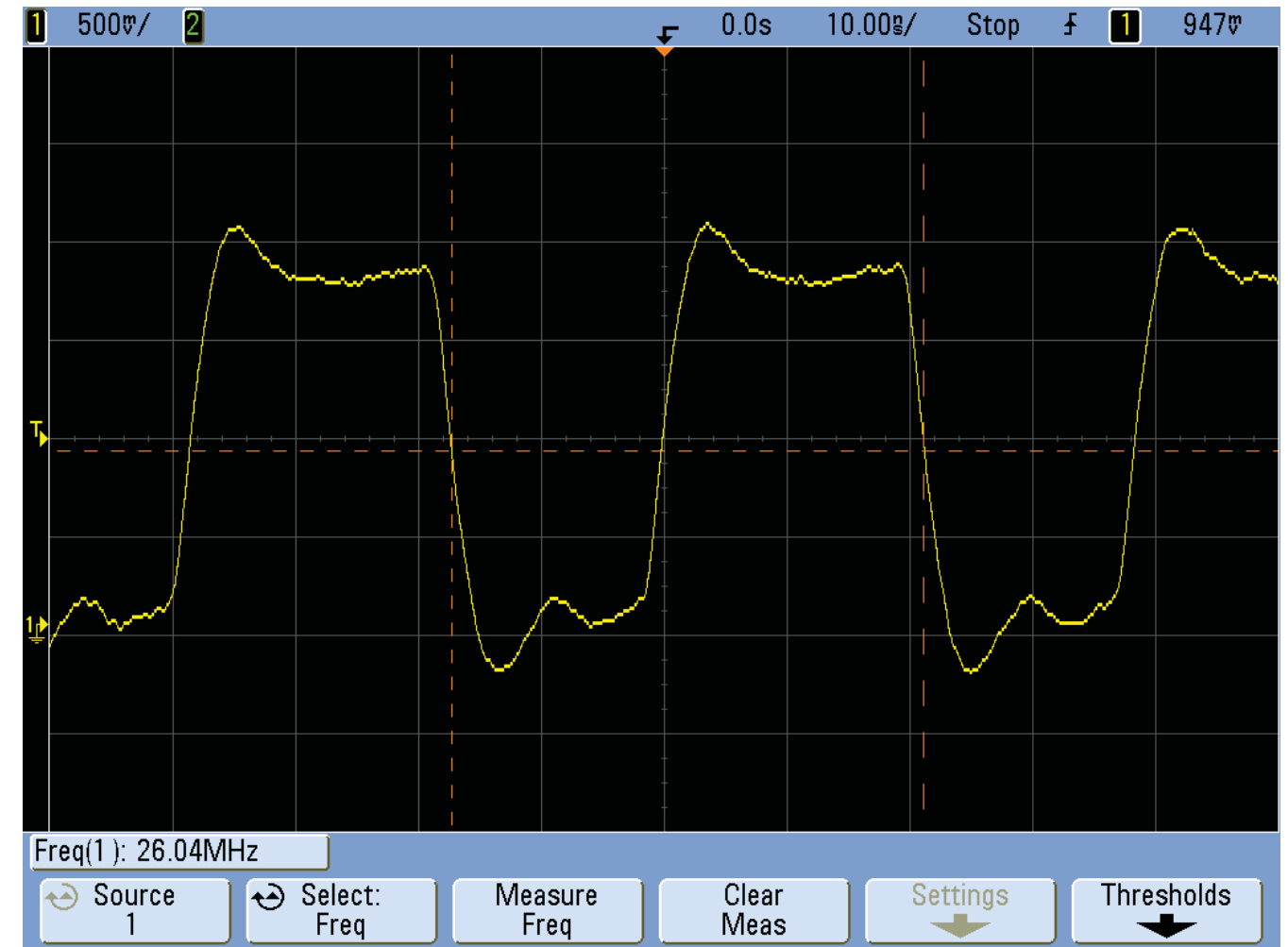
082 MP C3149 (AUXO2_OUT) and MP 3150 (AUXO1_OUT)



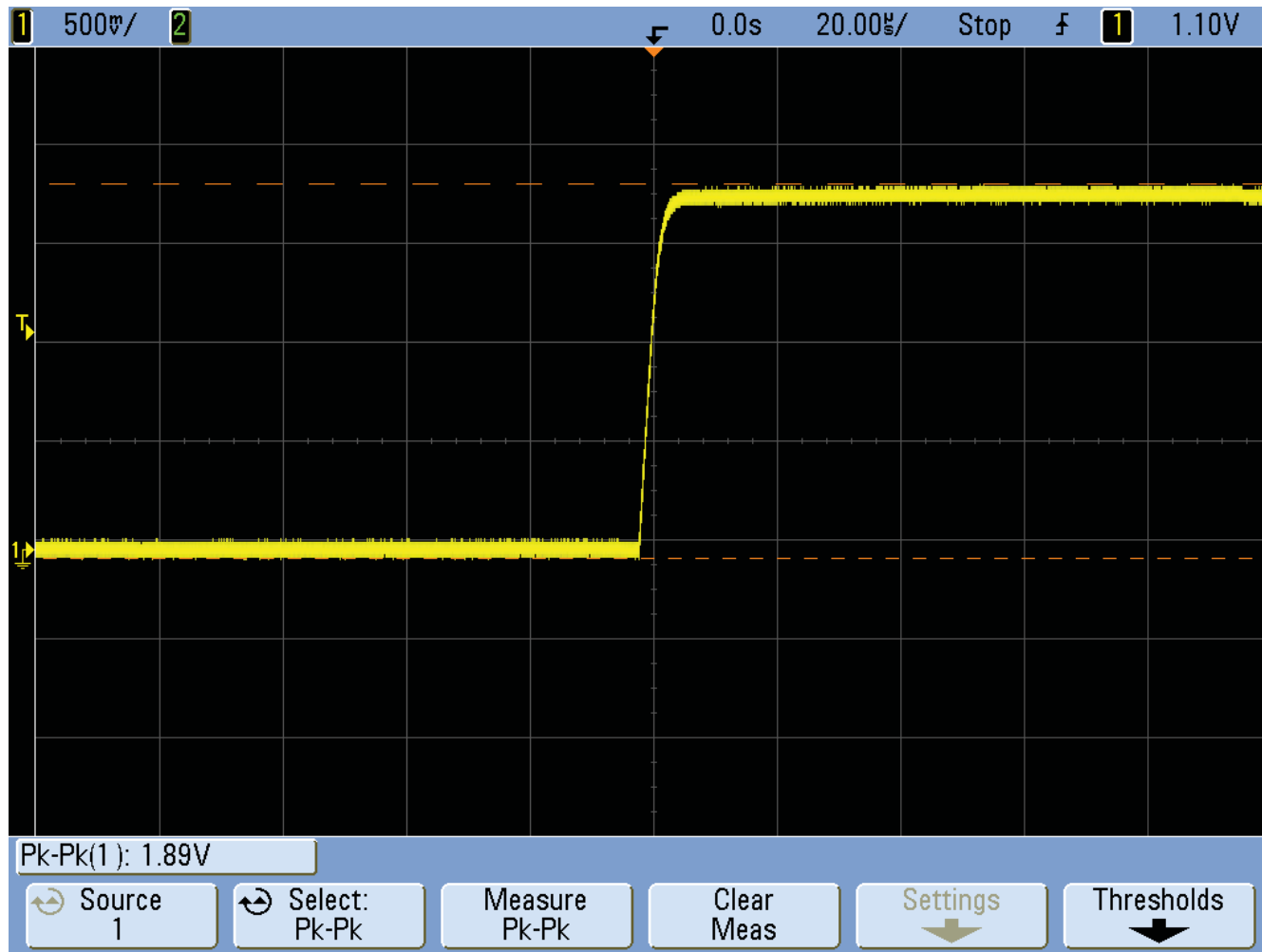
MP R2122 BT_CLK



MP 85 (C4208 VIBR_OUT)

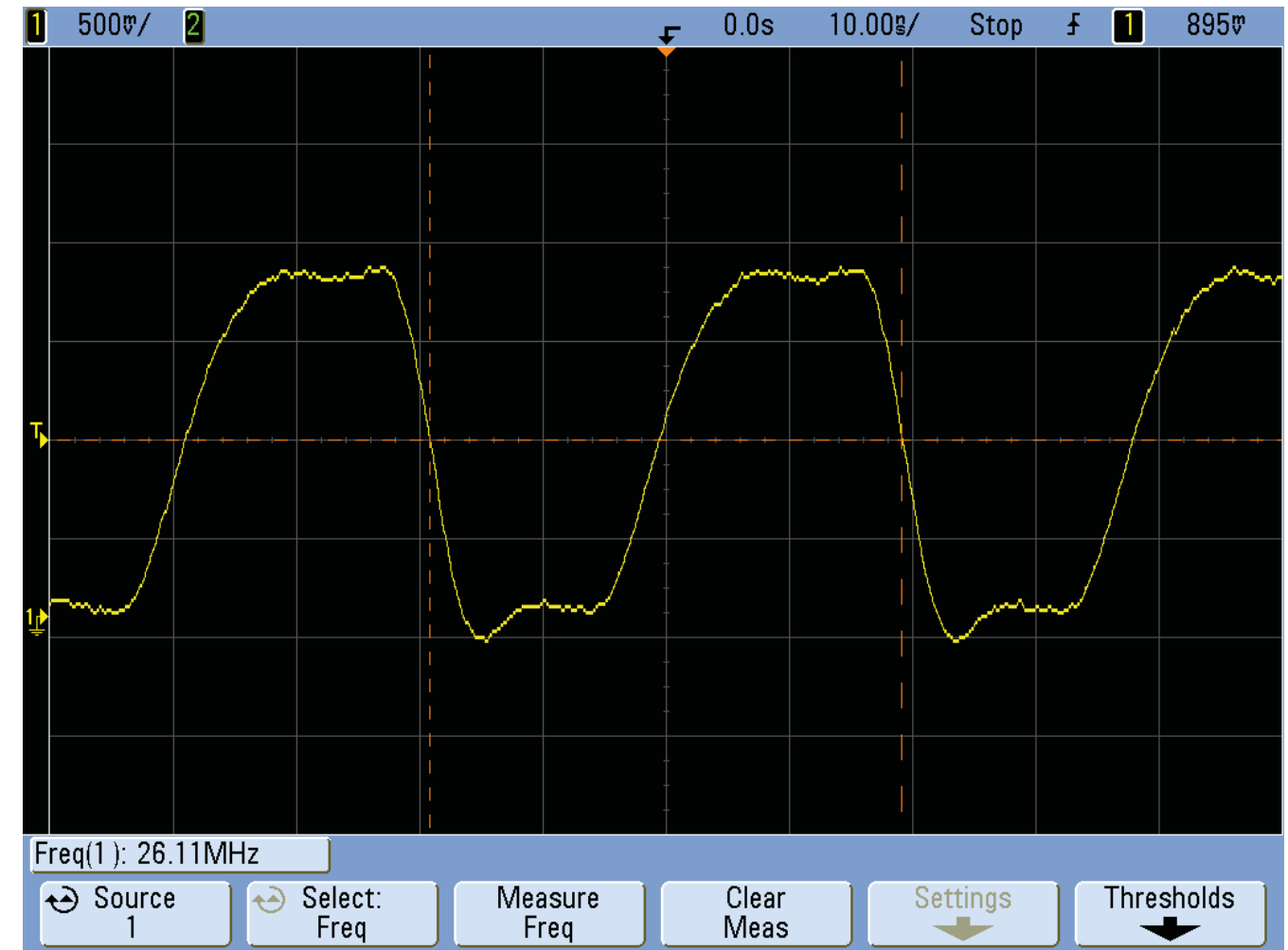


MP 89 (SP2108 26 MHz SYSCLK1)

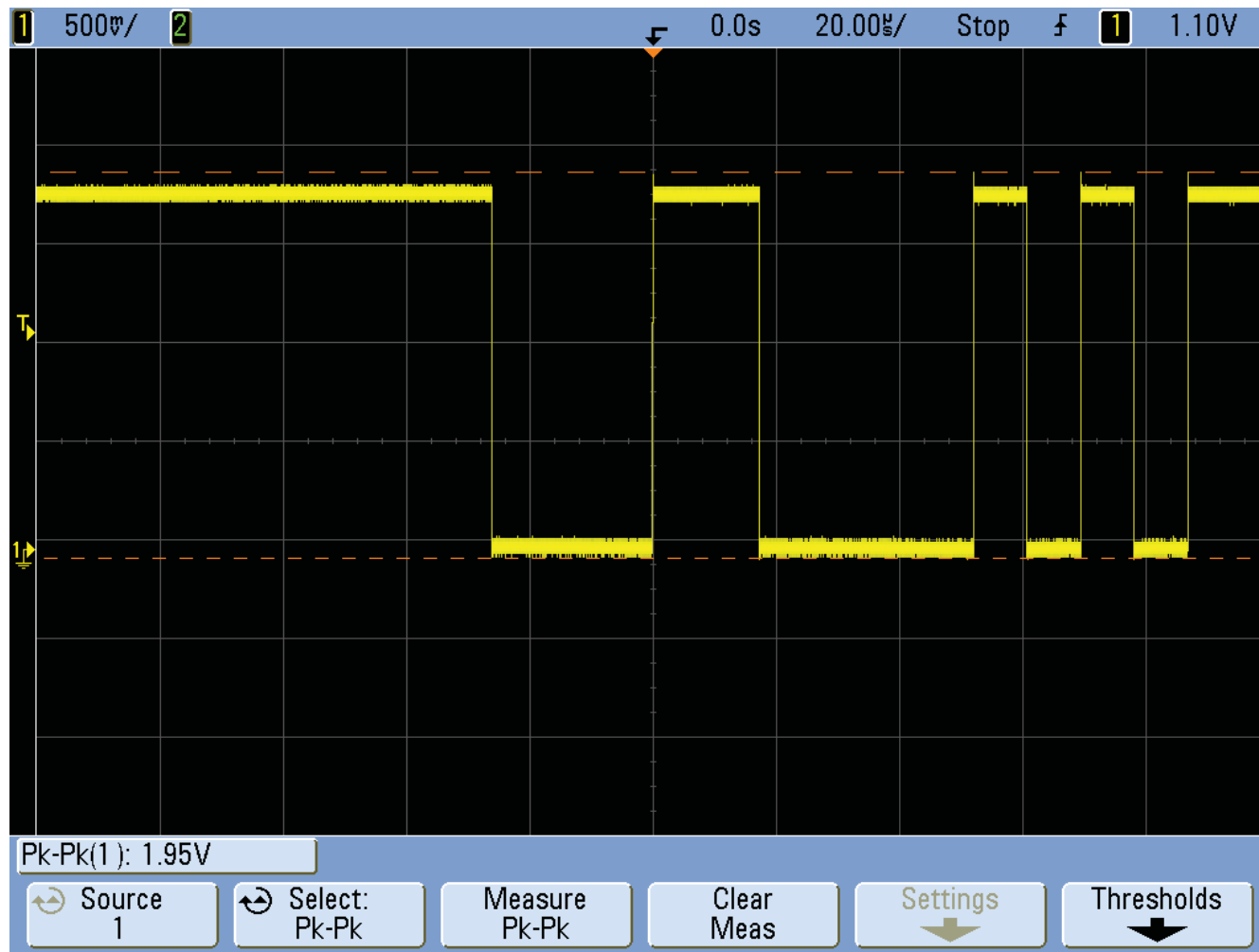


MP 101 (C1406)

Shortly after the phone is powered on



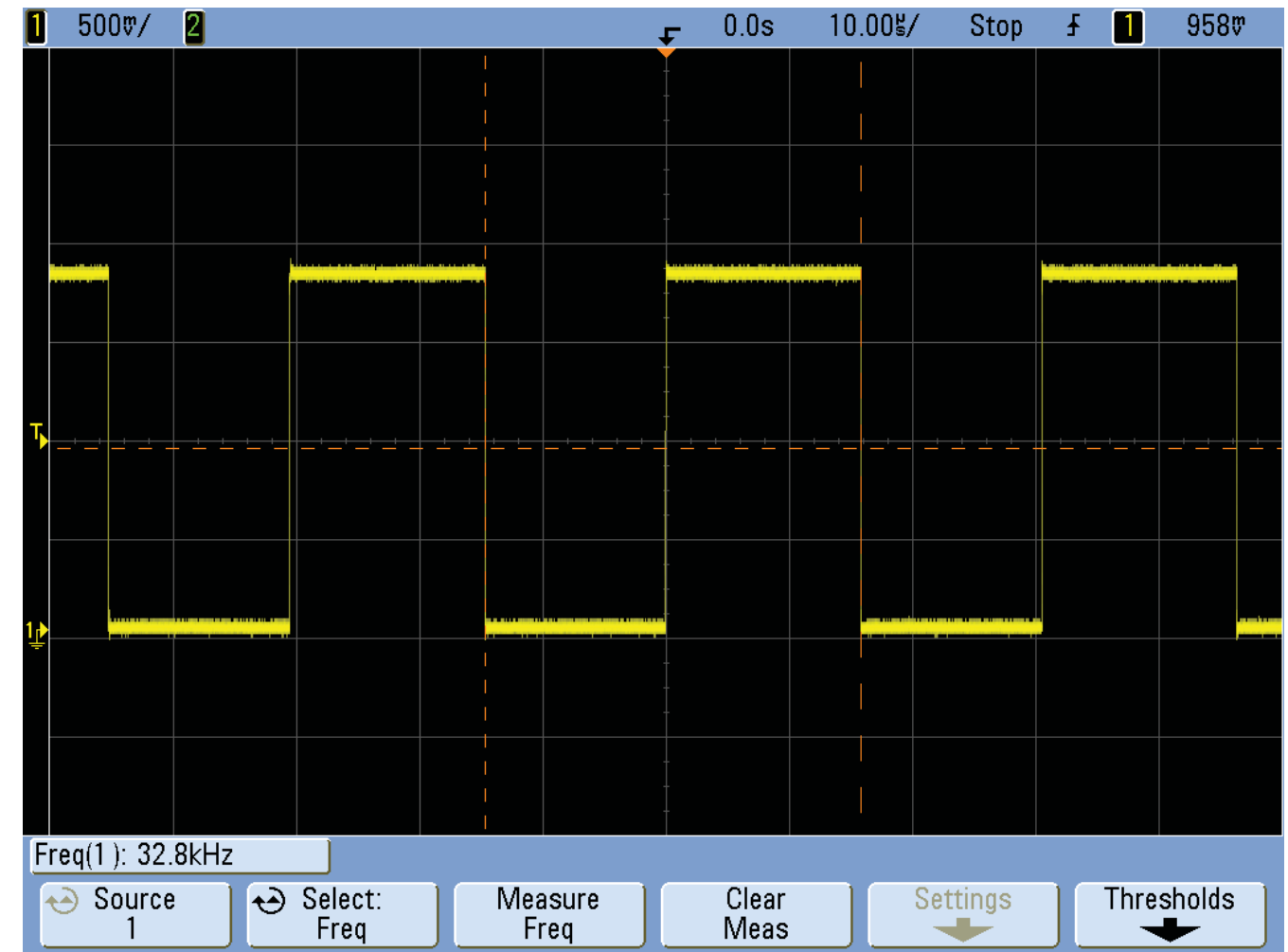
MP 103 (R2117 AGPS_CLK 26MHz)



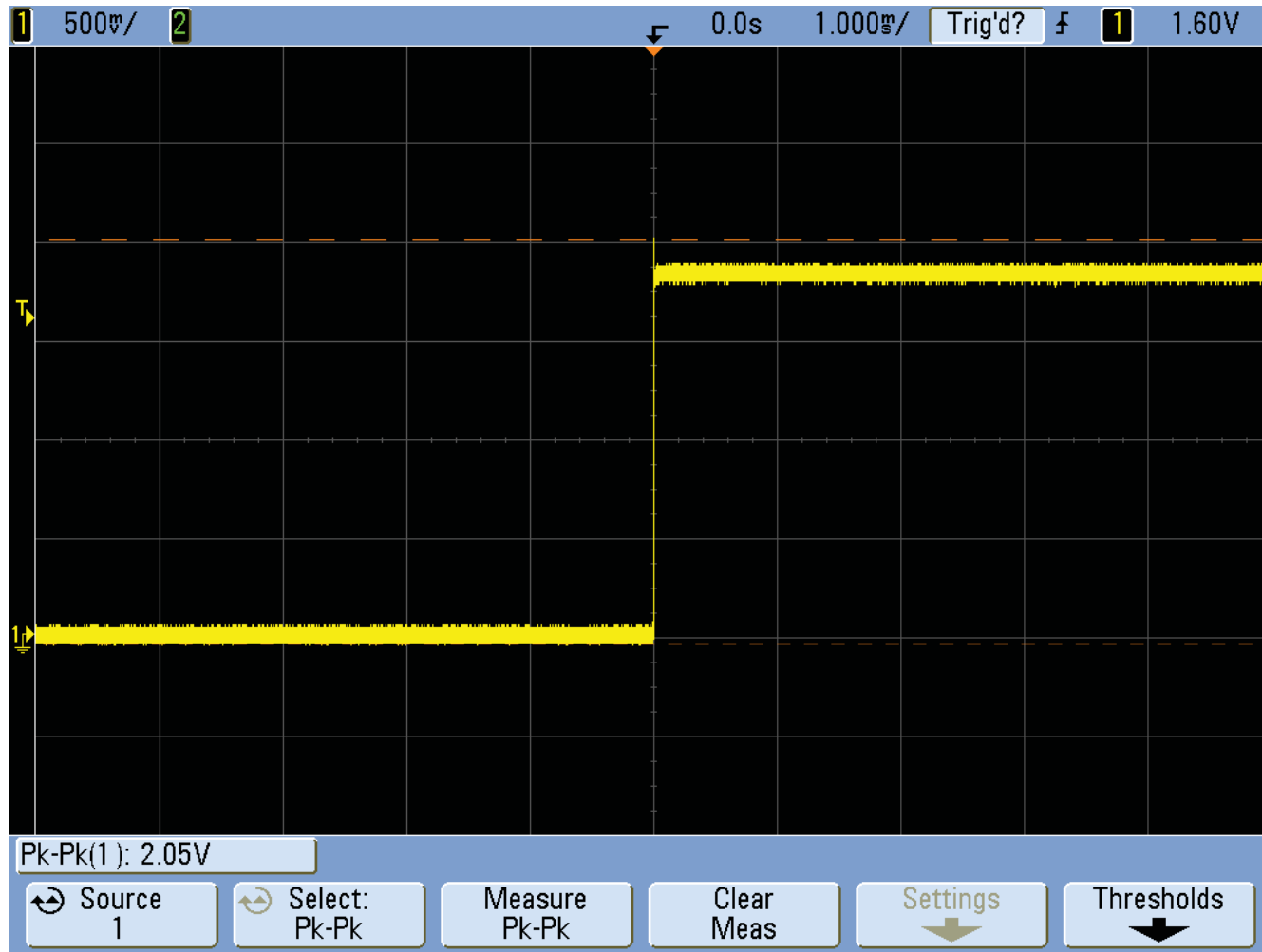
MP 104 (C1407)

Shortly after the phone is powered on

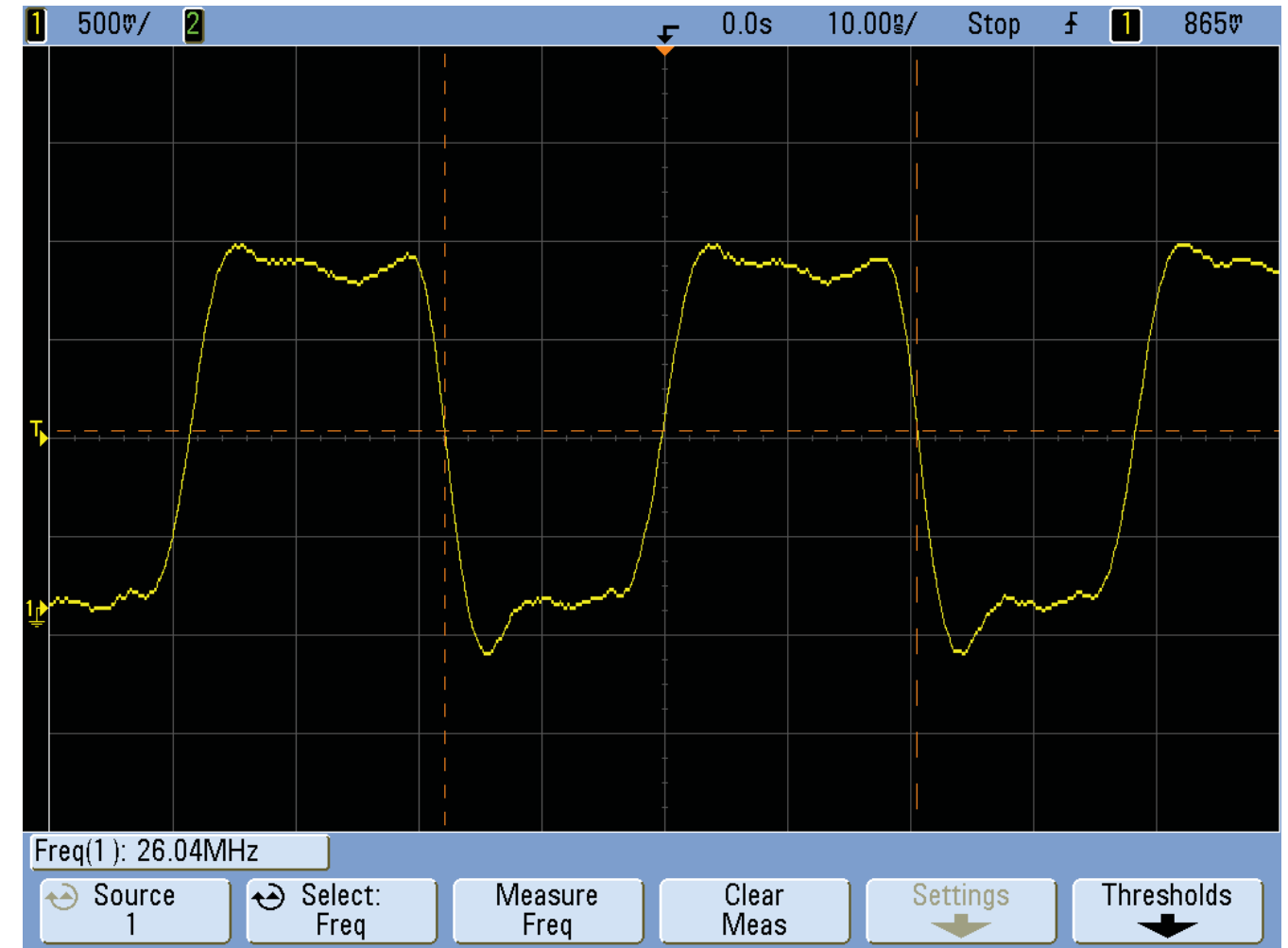
Note: This is an example! The shape of the signal can be different.



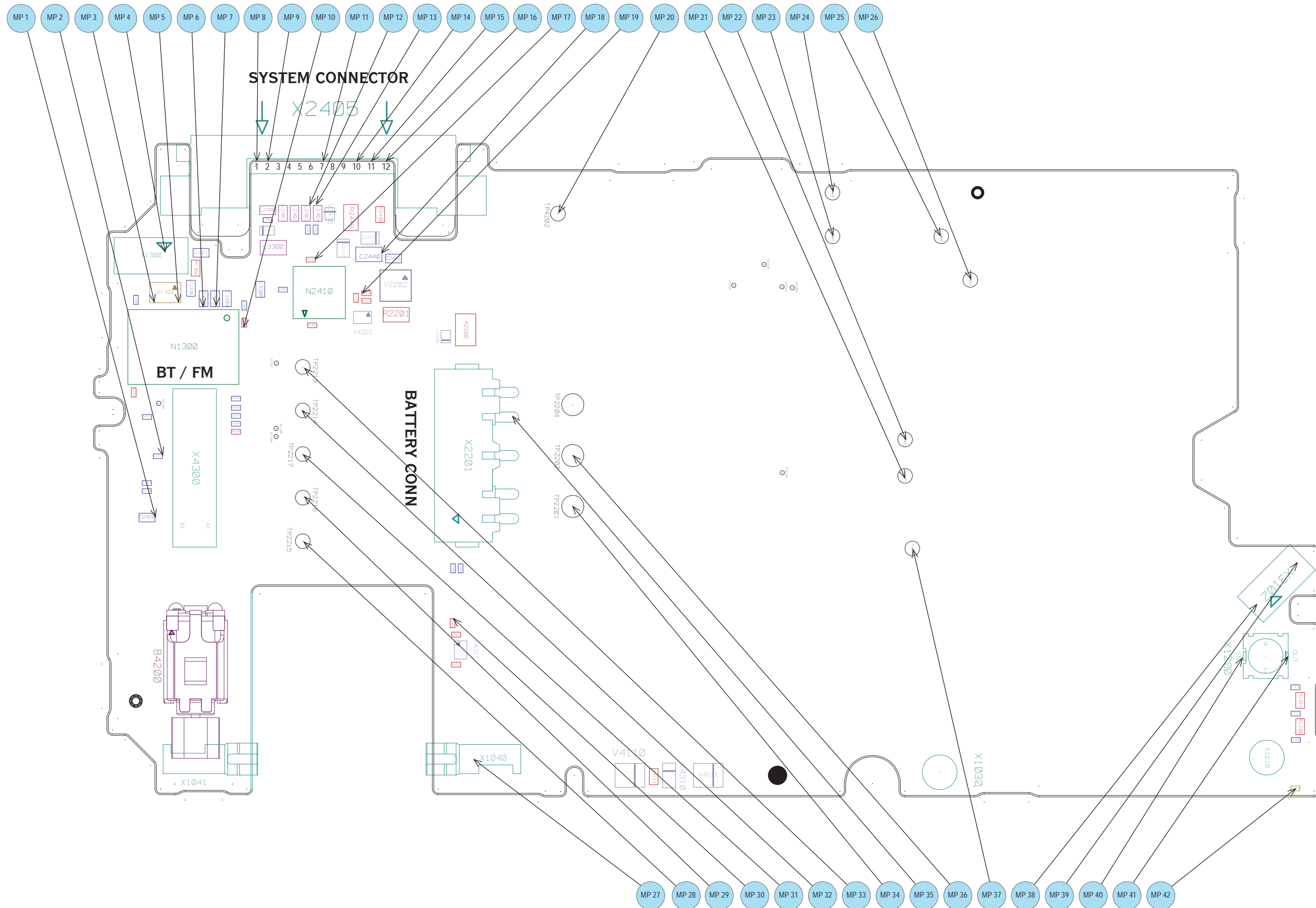
MP 106 (R1404 32 kHz RTCCLK)

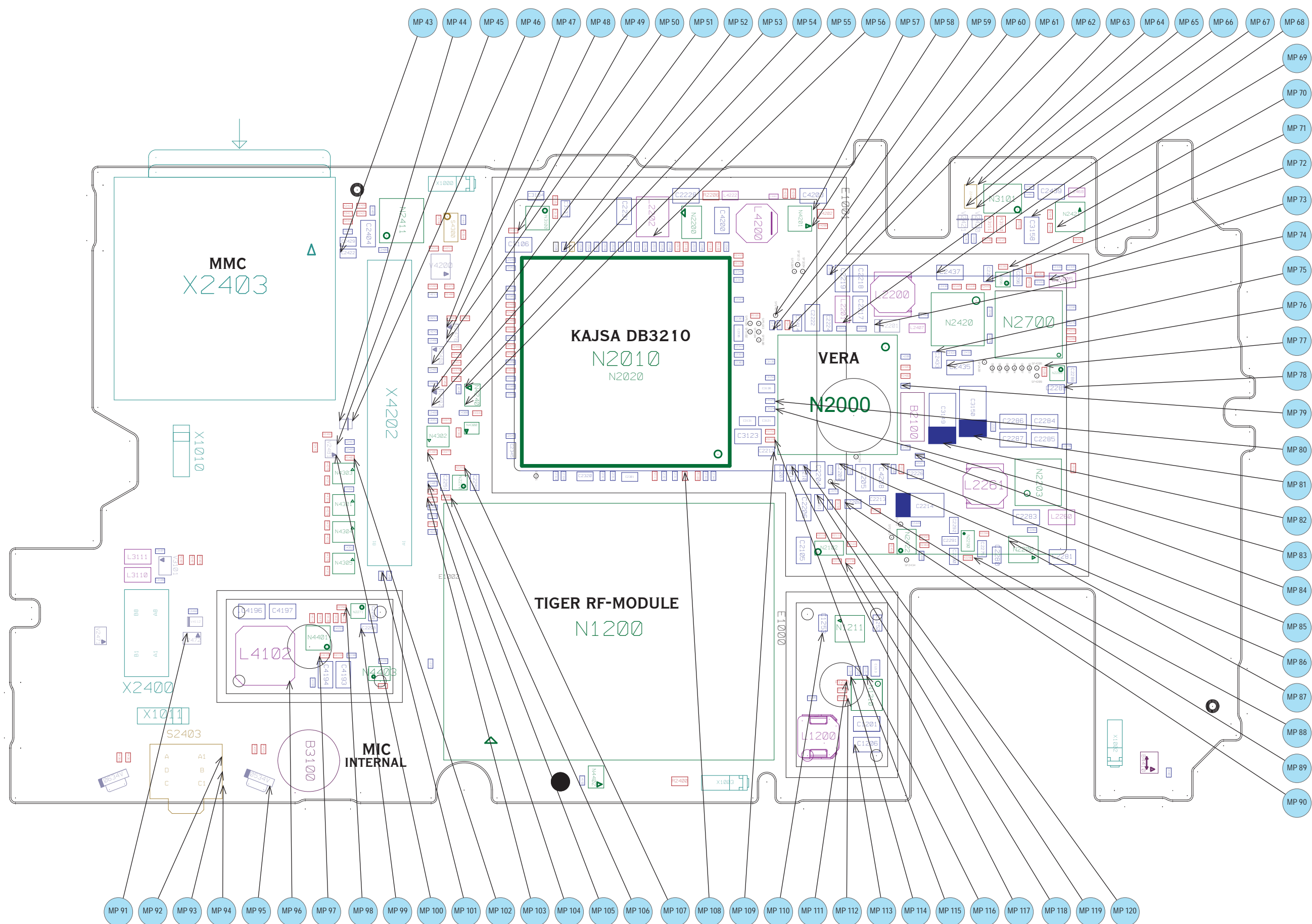


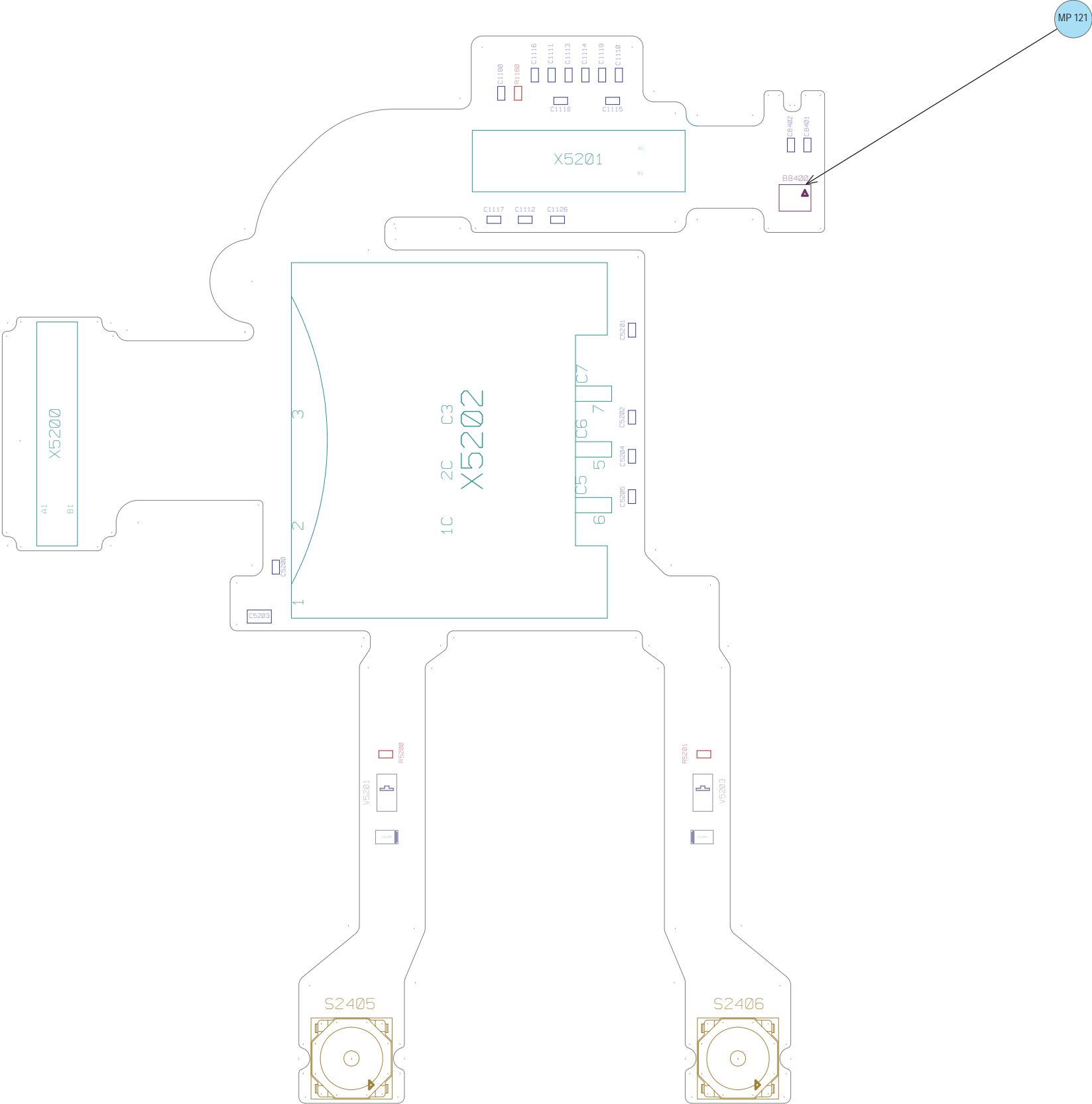
MP 107 (R2250 OPTO_EN)

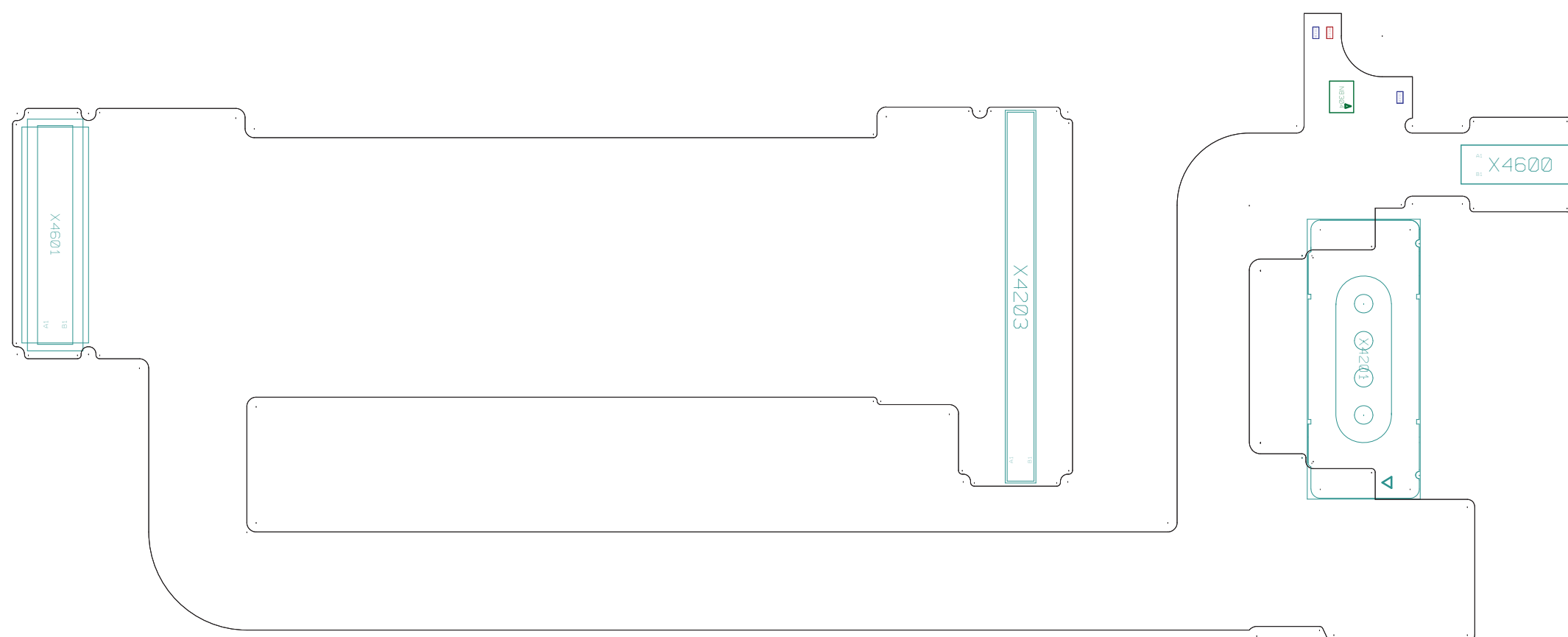


MP 118 (R2130 26 MHz TV_CLK)

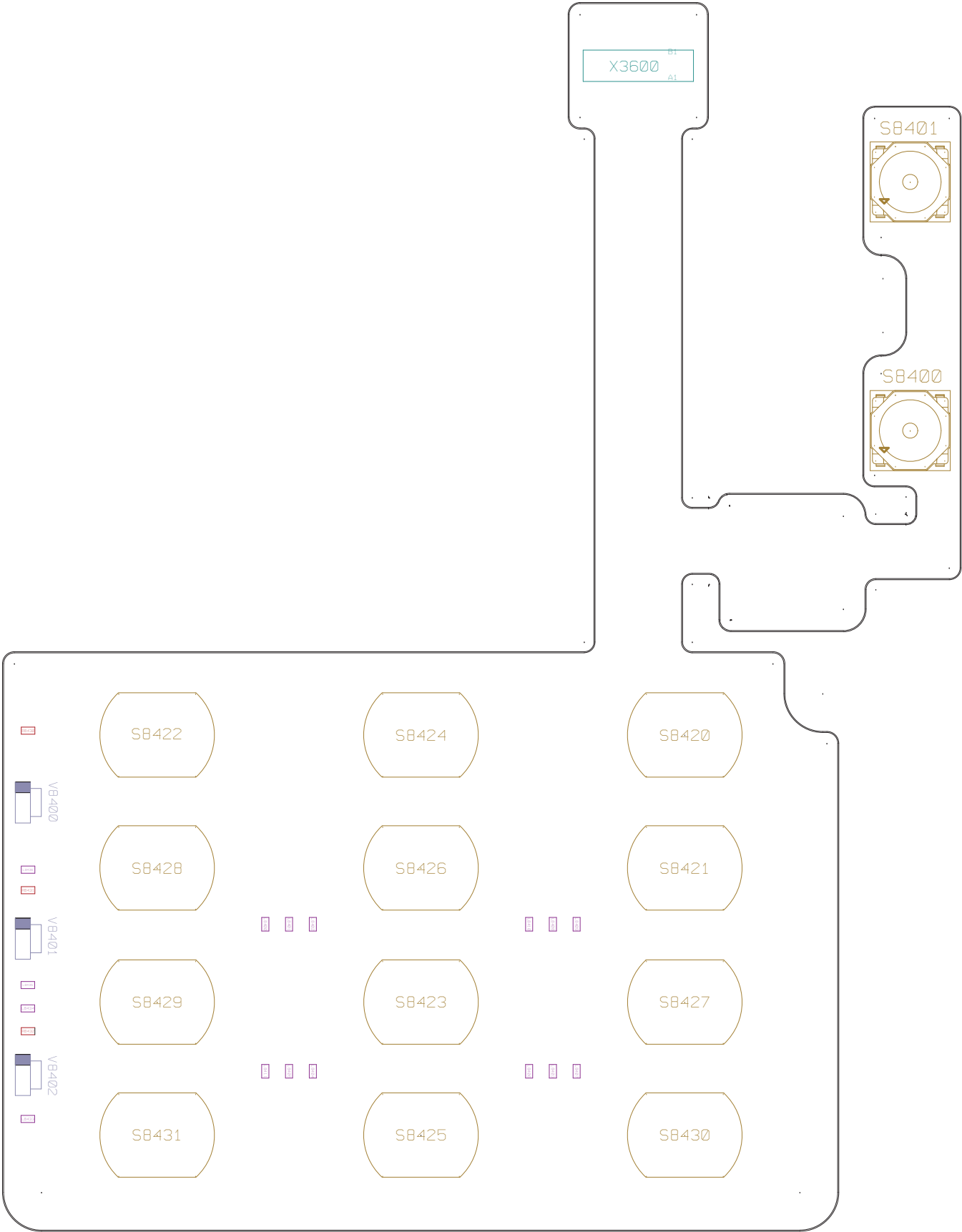


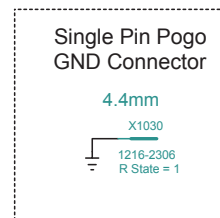
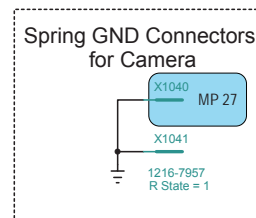
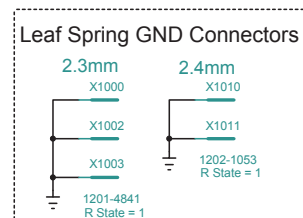
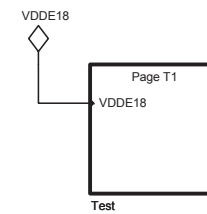


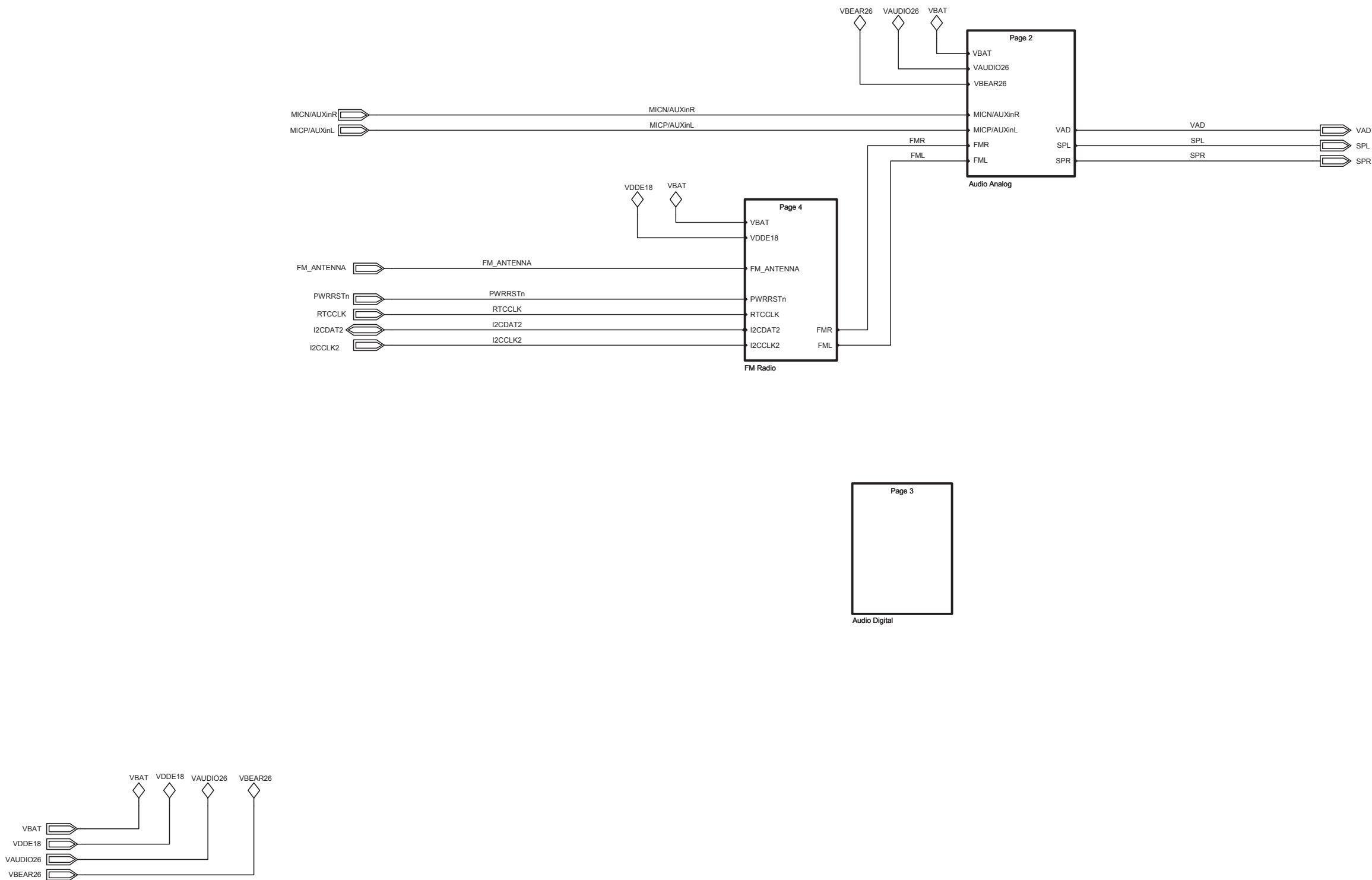




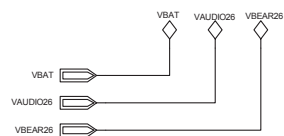
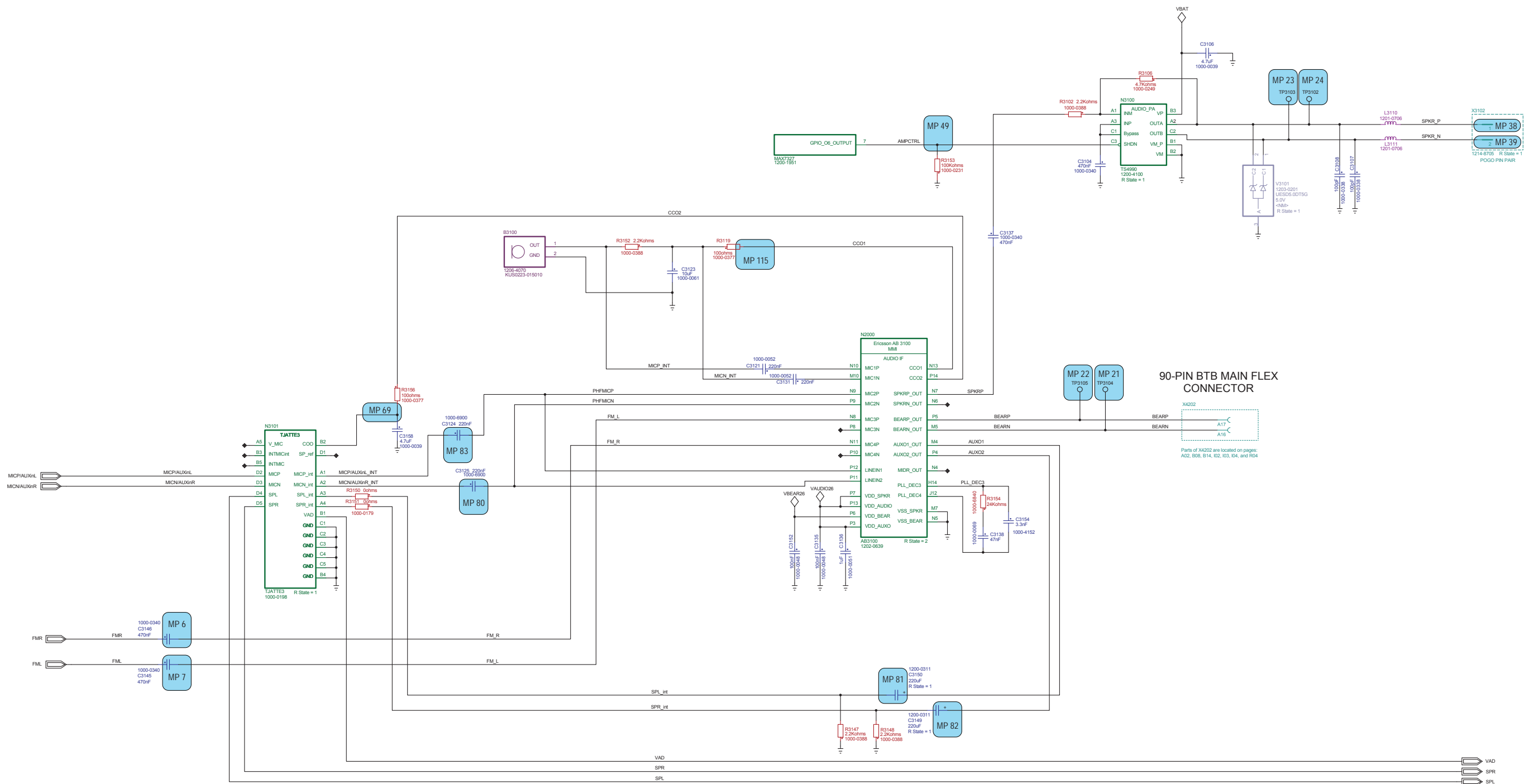




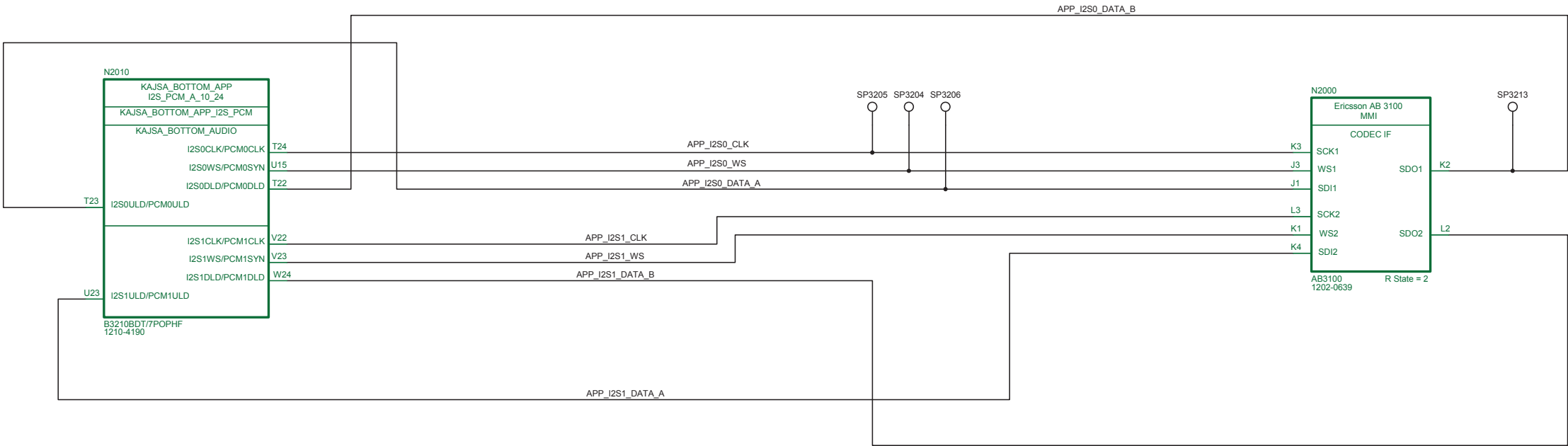




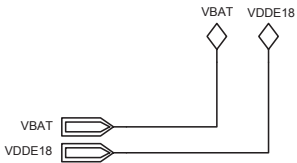
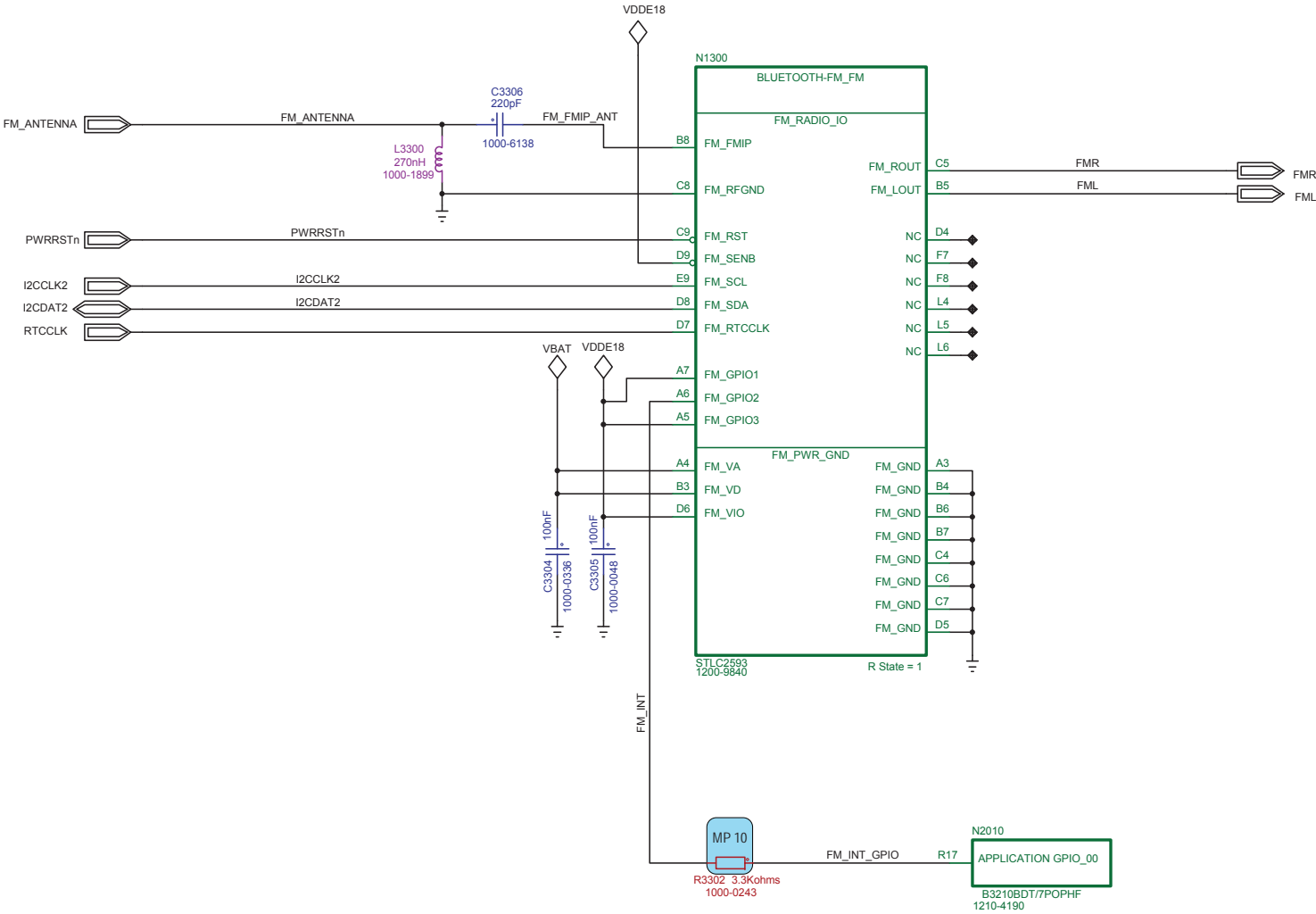
Made for	
Audio	
Audio Top	
Document Nr	Revision
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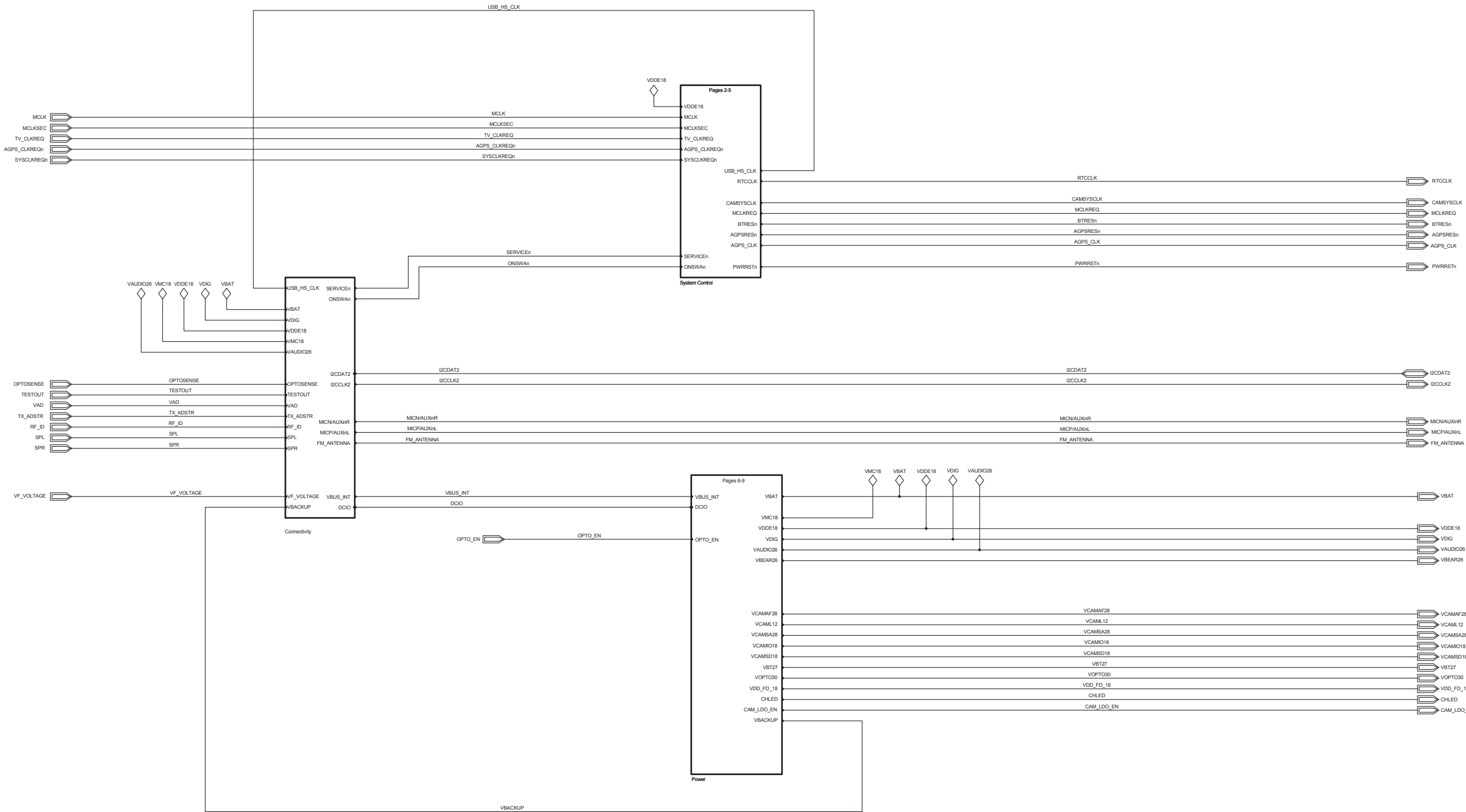
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Document Nr	Revision
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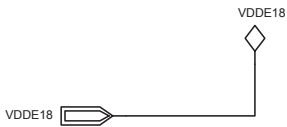
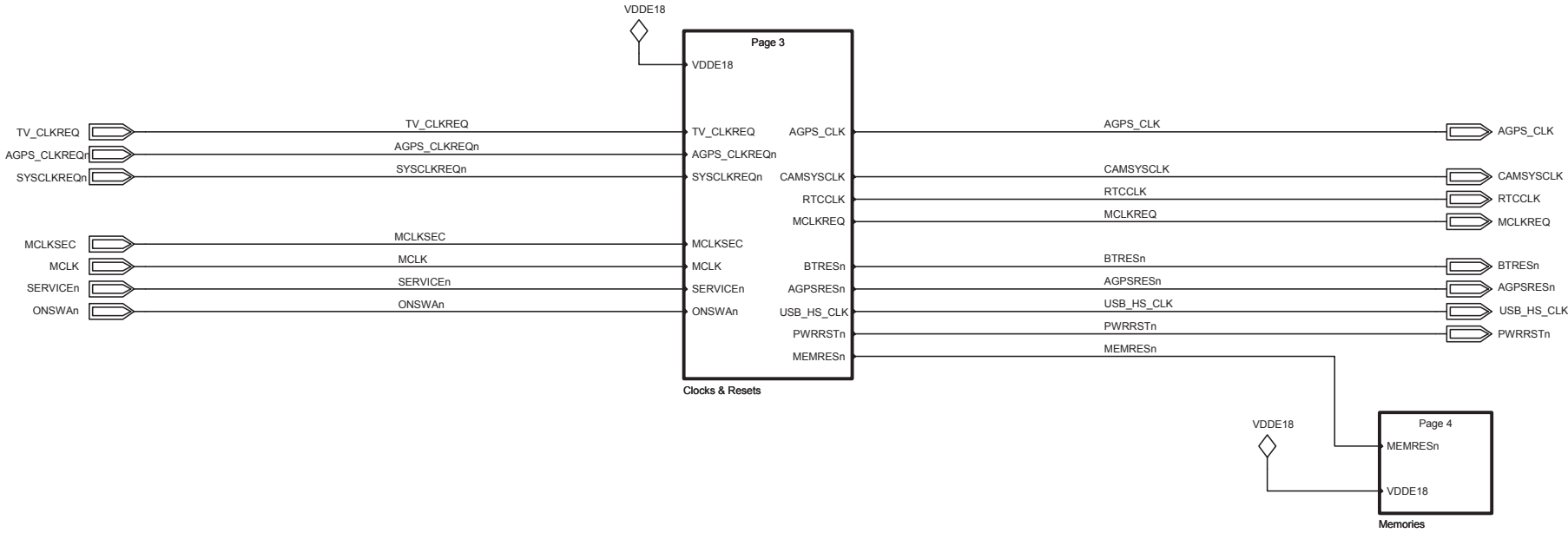
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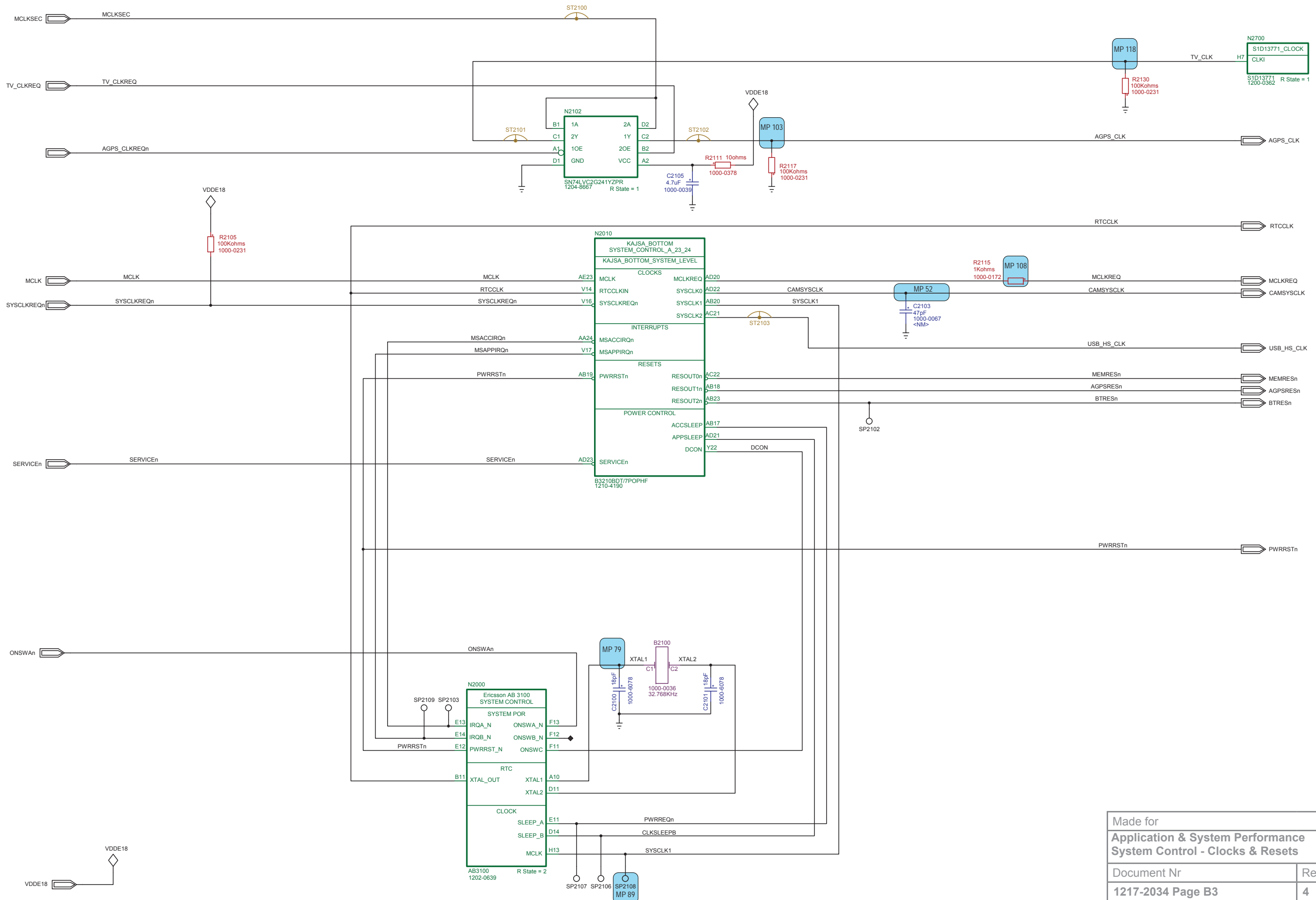
Made for	
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Document Nr	Revision
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Made for	
Application & System Performance Top	
Document Nr	Revision
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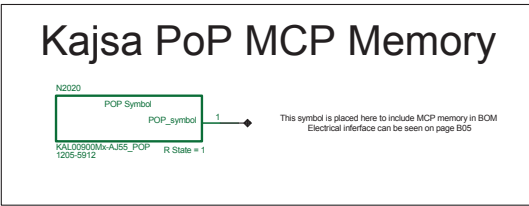
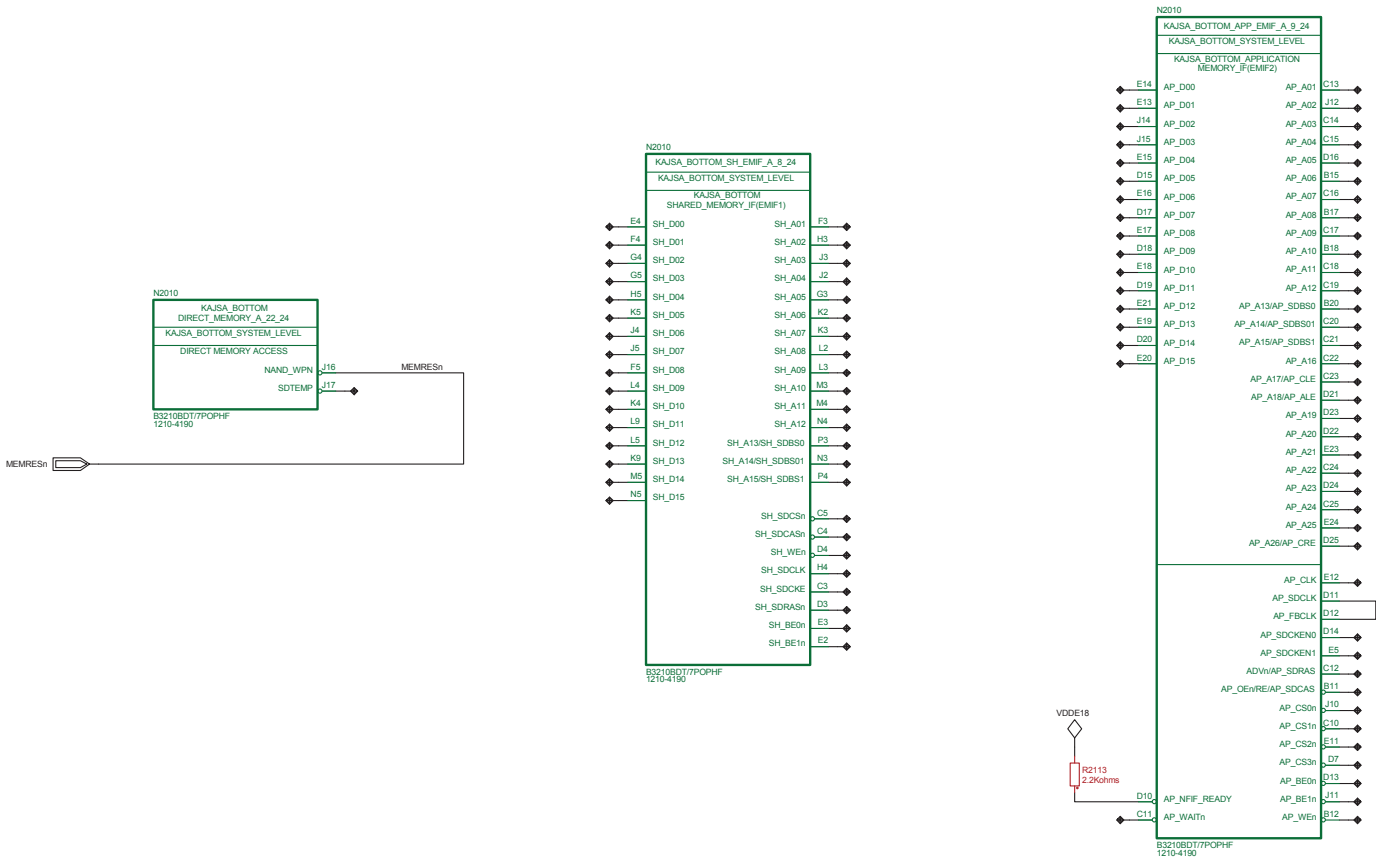


Made for	
Application & System Performance System Top	
Document Nr	Revision
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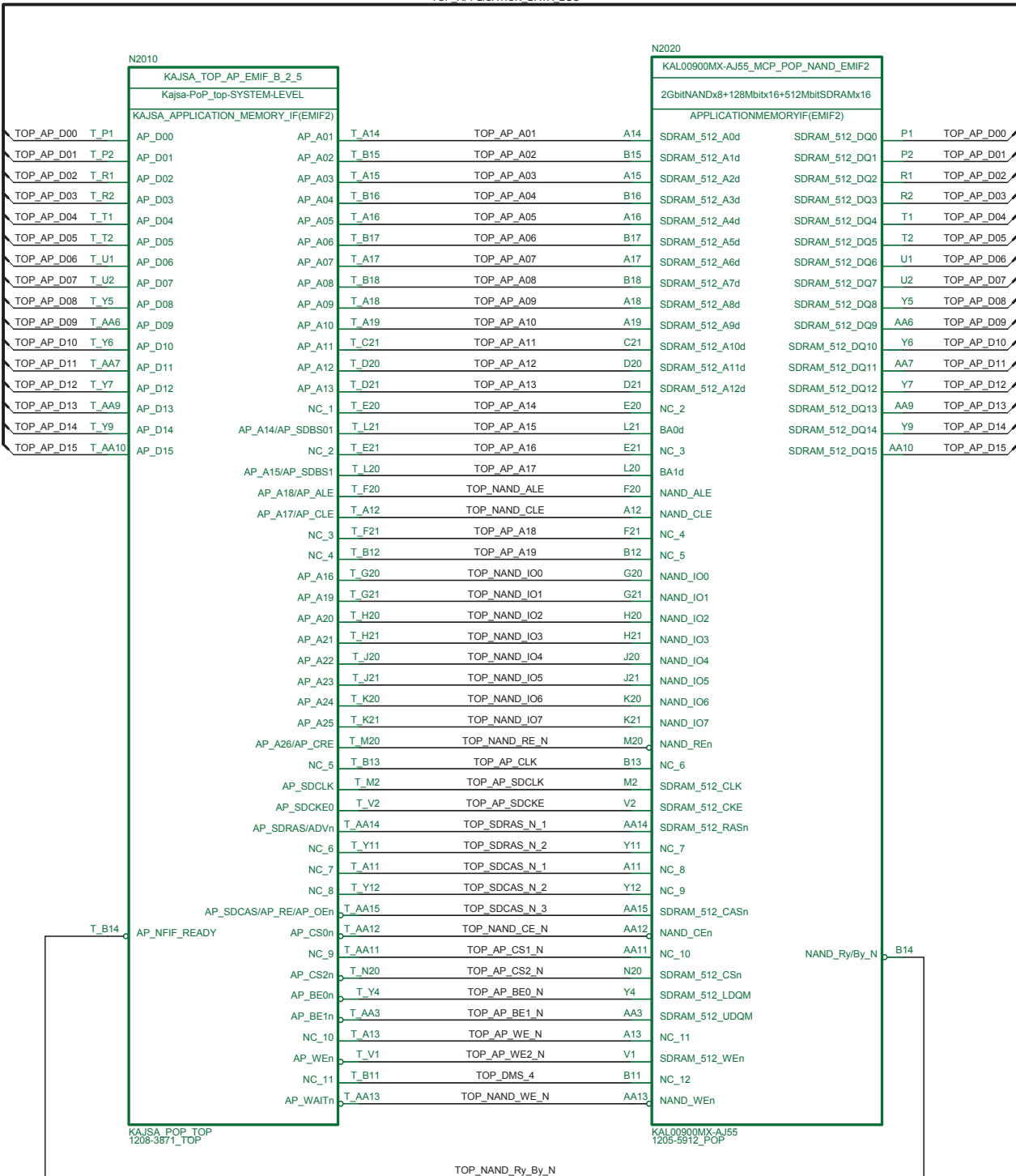
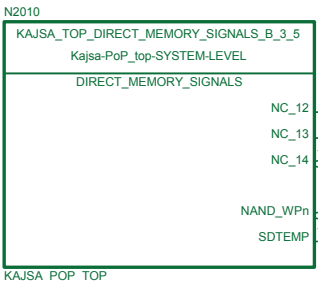
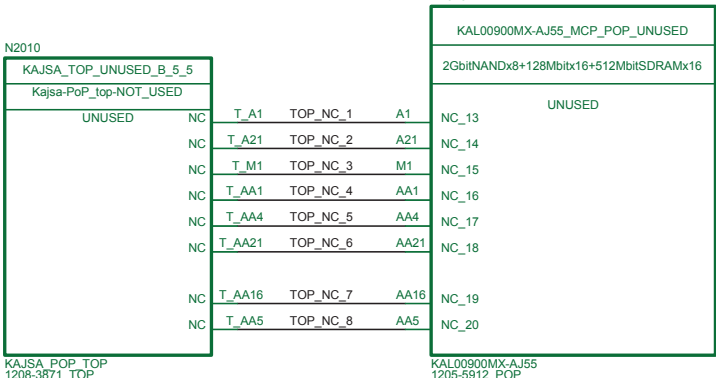
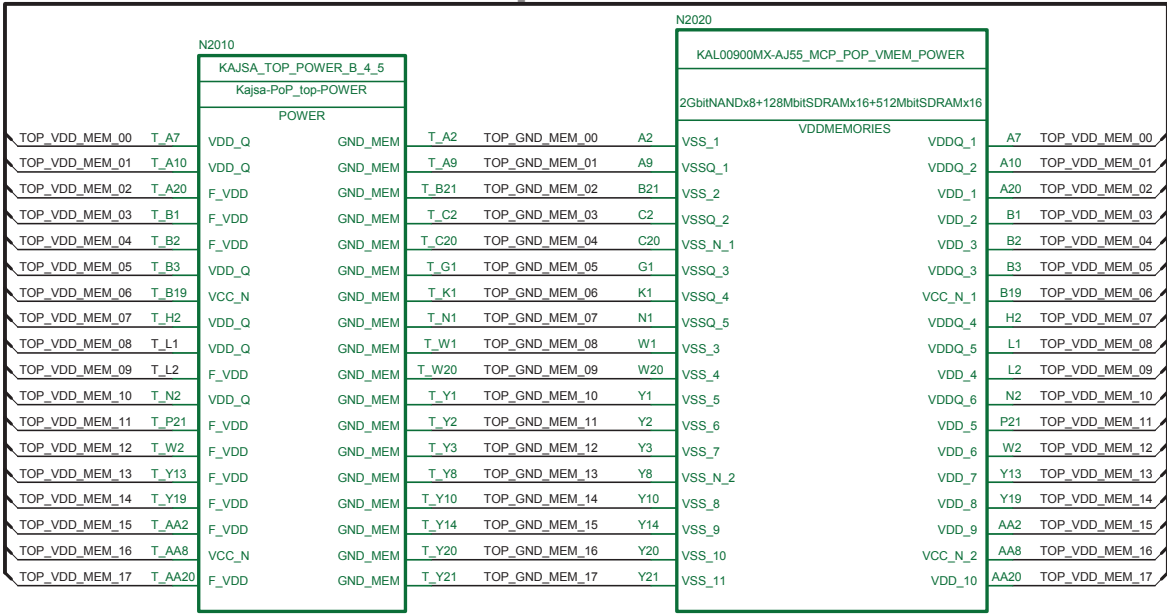
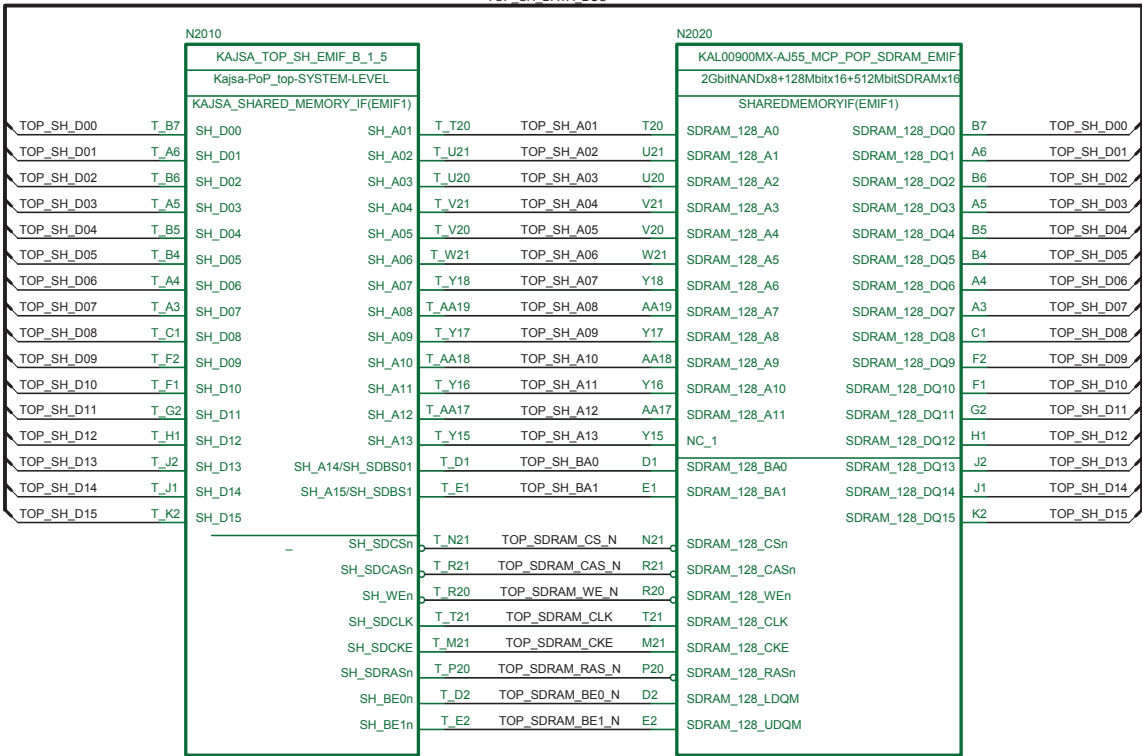
Made for	
Application & System Performance	
System Control - Clocks & Resets	
Document Nr	Revision
1217-2034 Page B3	4

Even if these pins (EMIF) are left unconnected, they are still active due to PoP interface.



Made for	
Application & System Performance System Memories	
Document Nr	Revision
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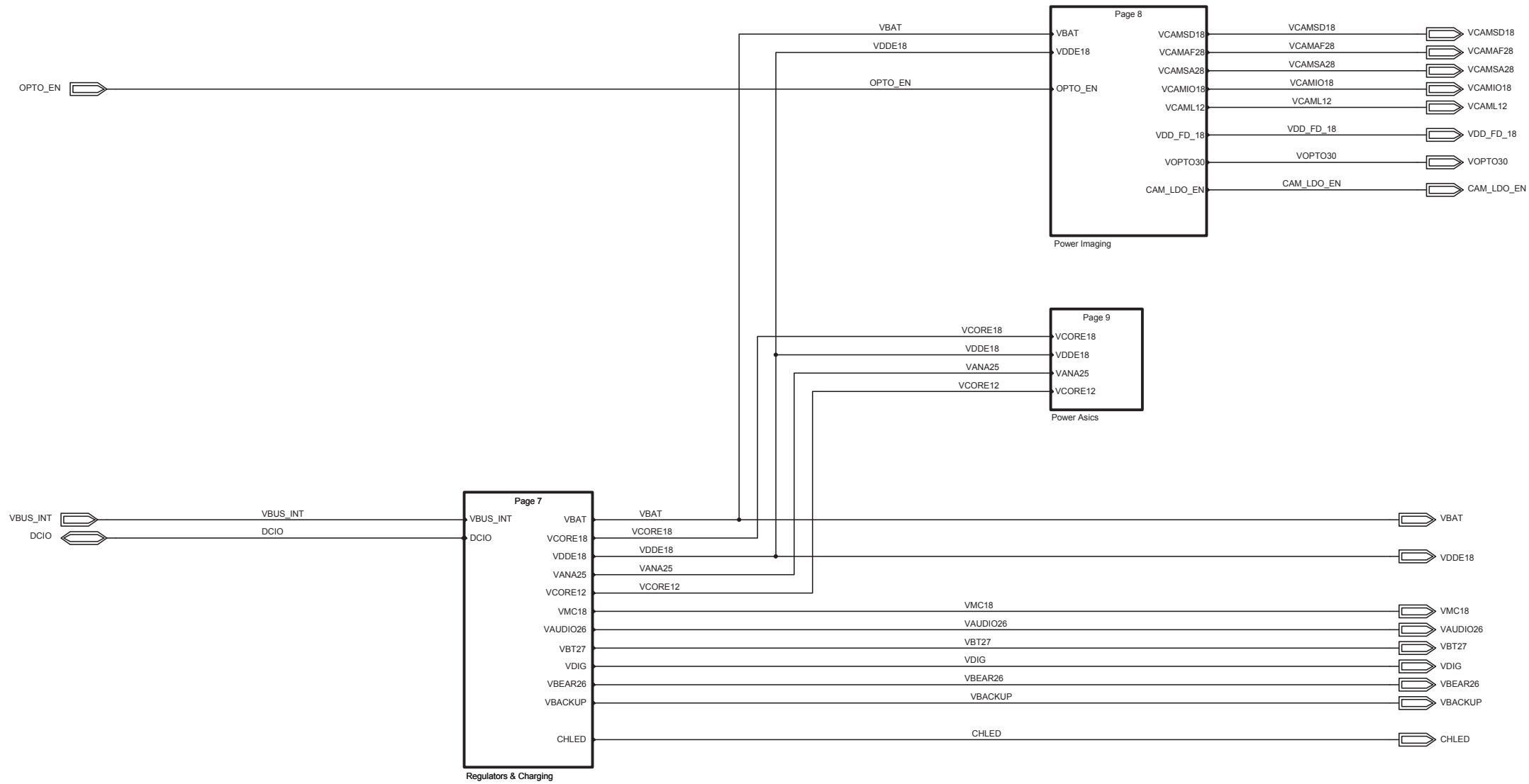
Kajsa Pop Top and Memory PoP connection
Not to be included in packaging



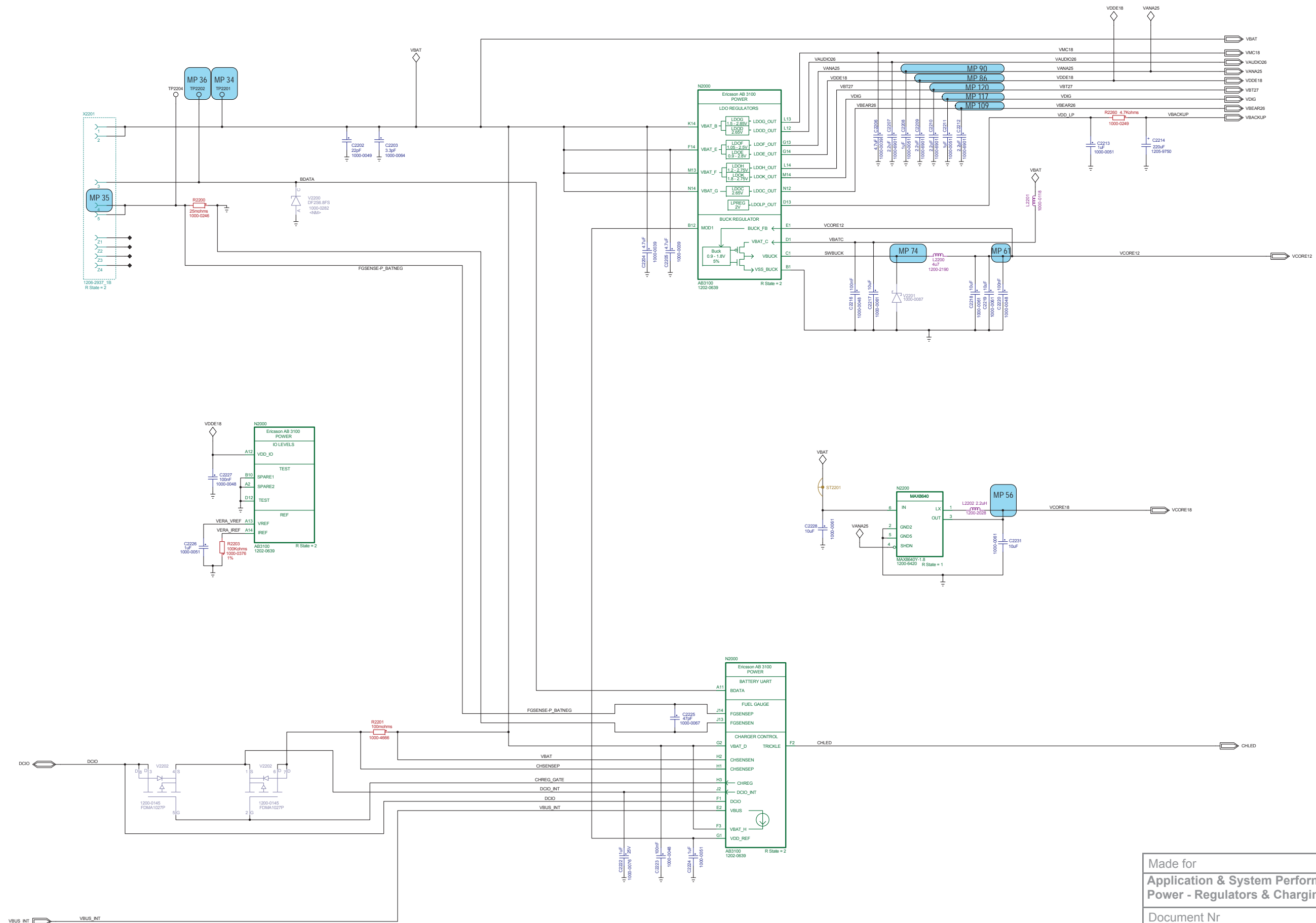
Made for

Application & System Performance
System PoP IF

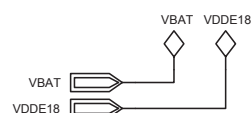
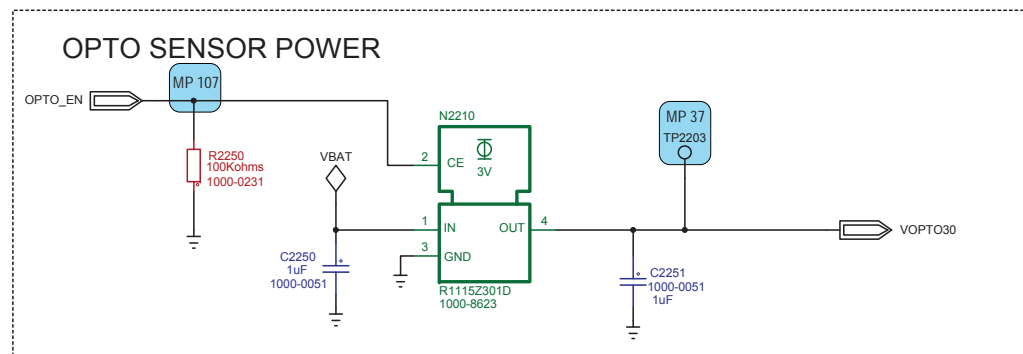
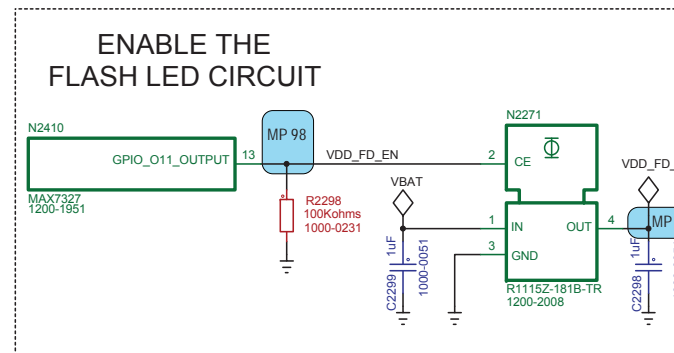
Document Nr	Revision
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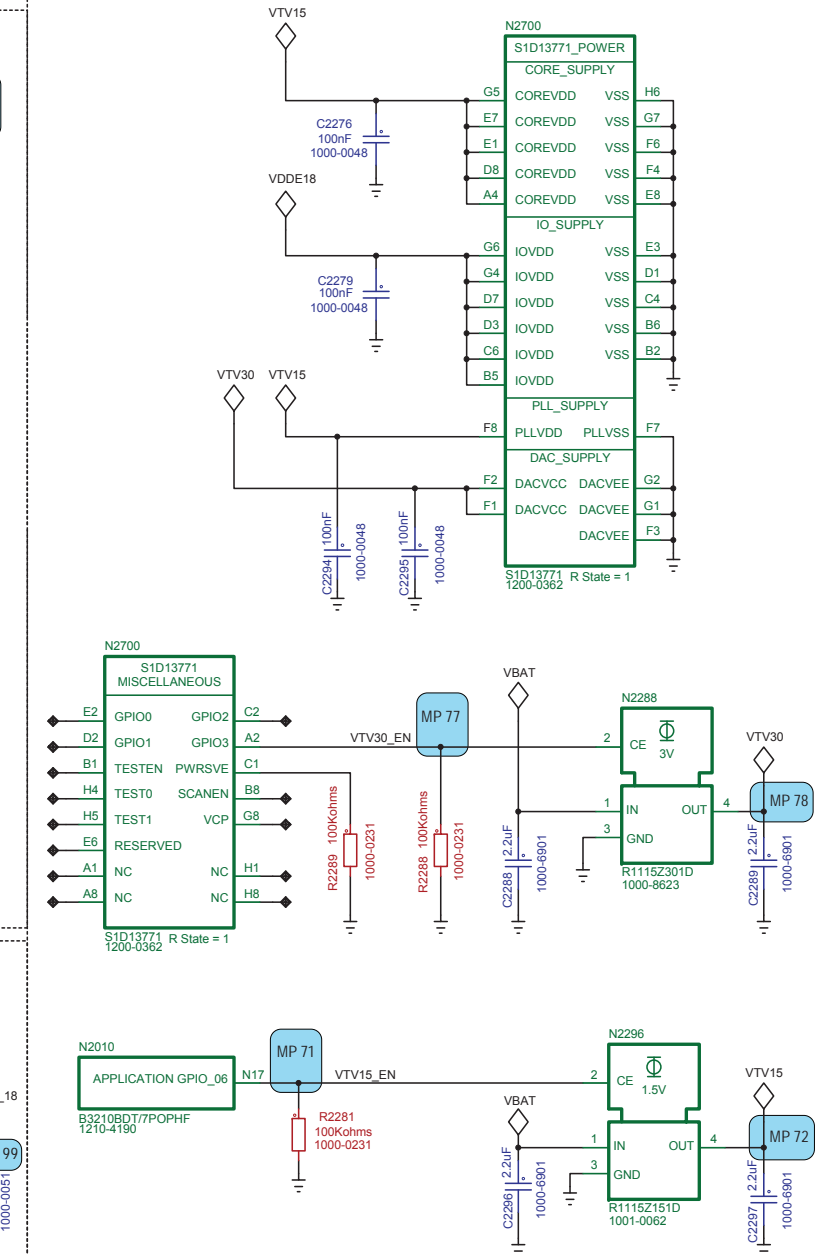
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Application & System Performance	
Power Top	
Document Nr	Revision
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Made for	
Application & System Performance	
Power - Regulators & Charging	
Document Nr	Revision
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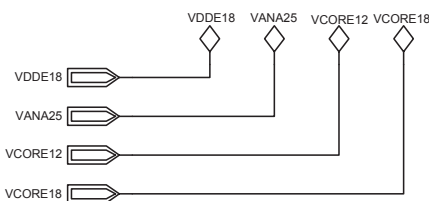
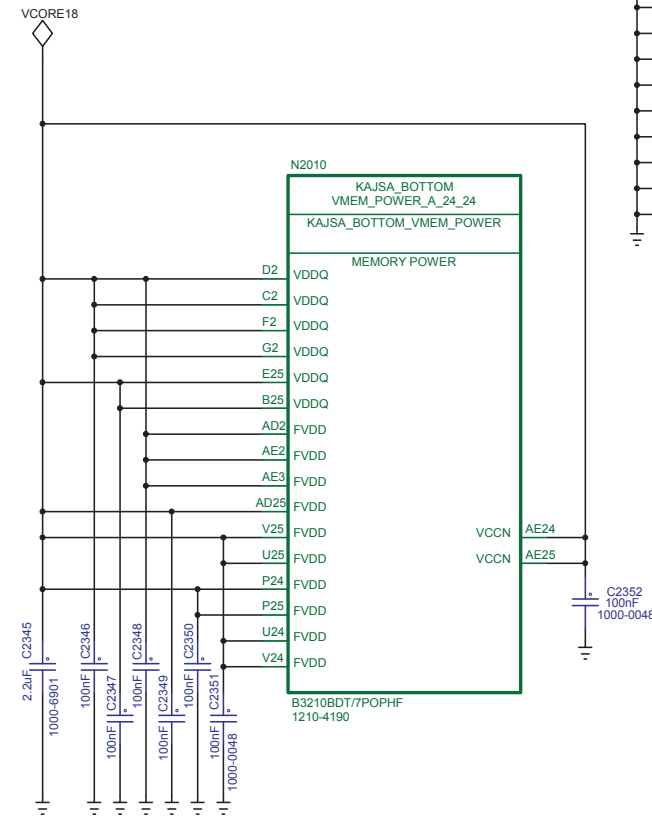
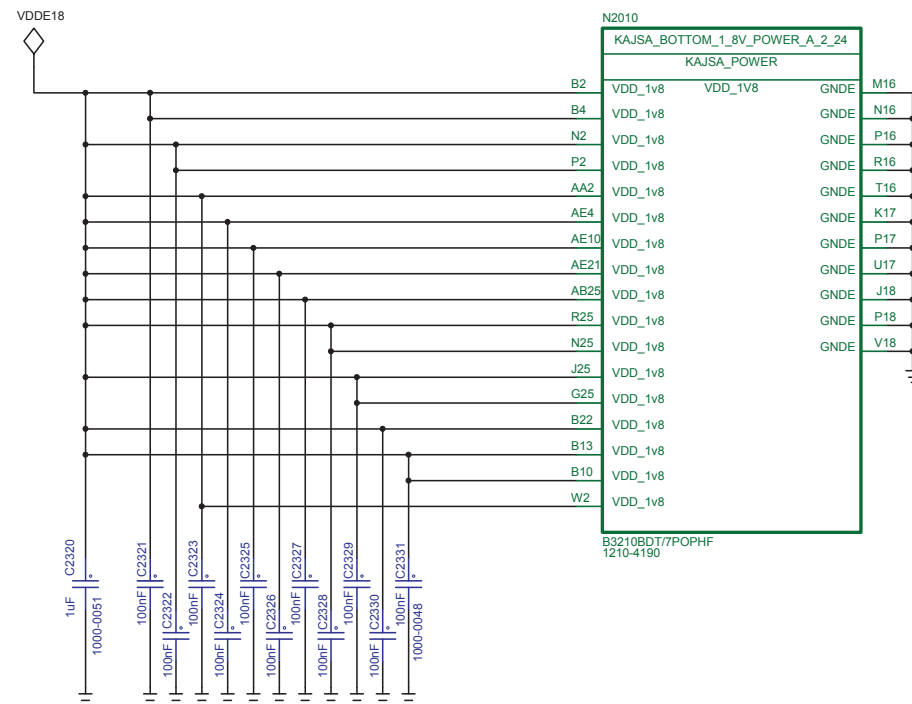
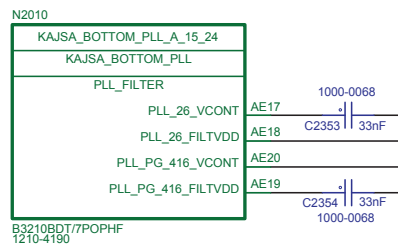
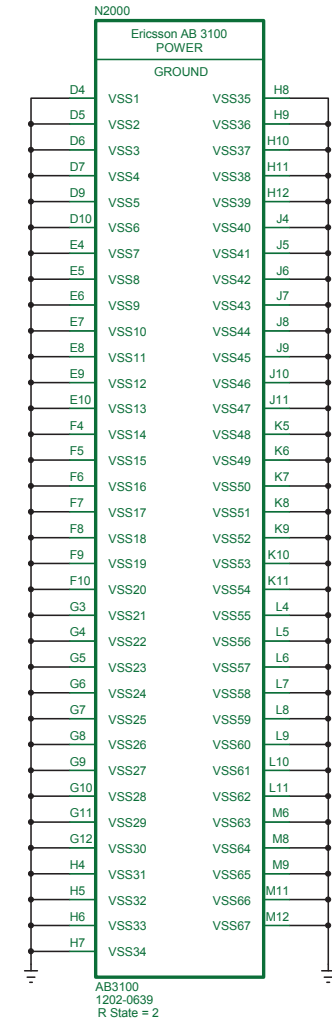
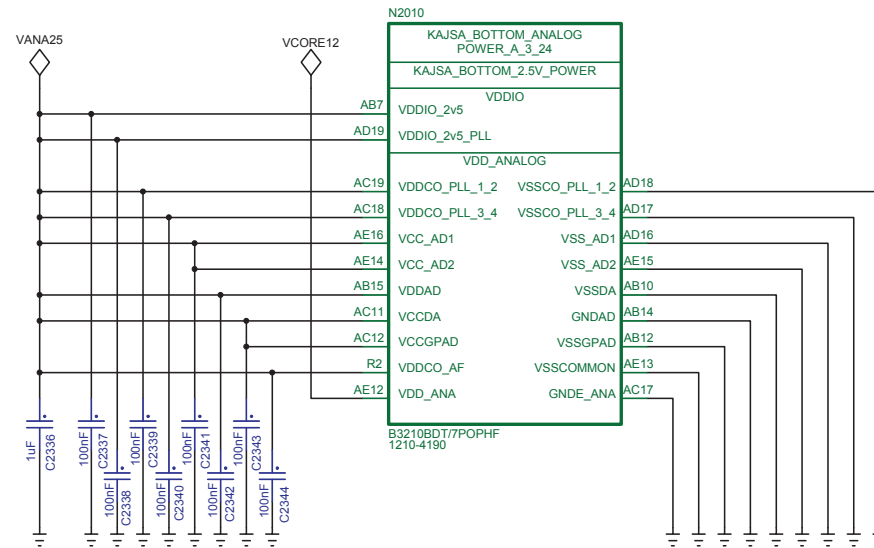
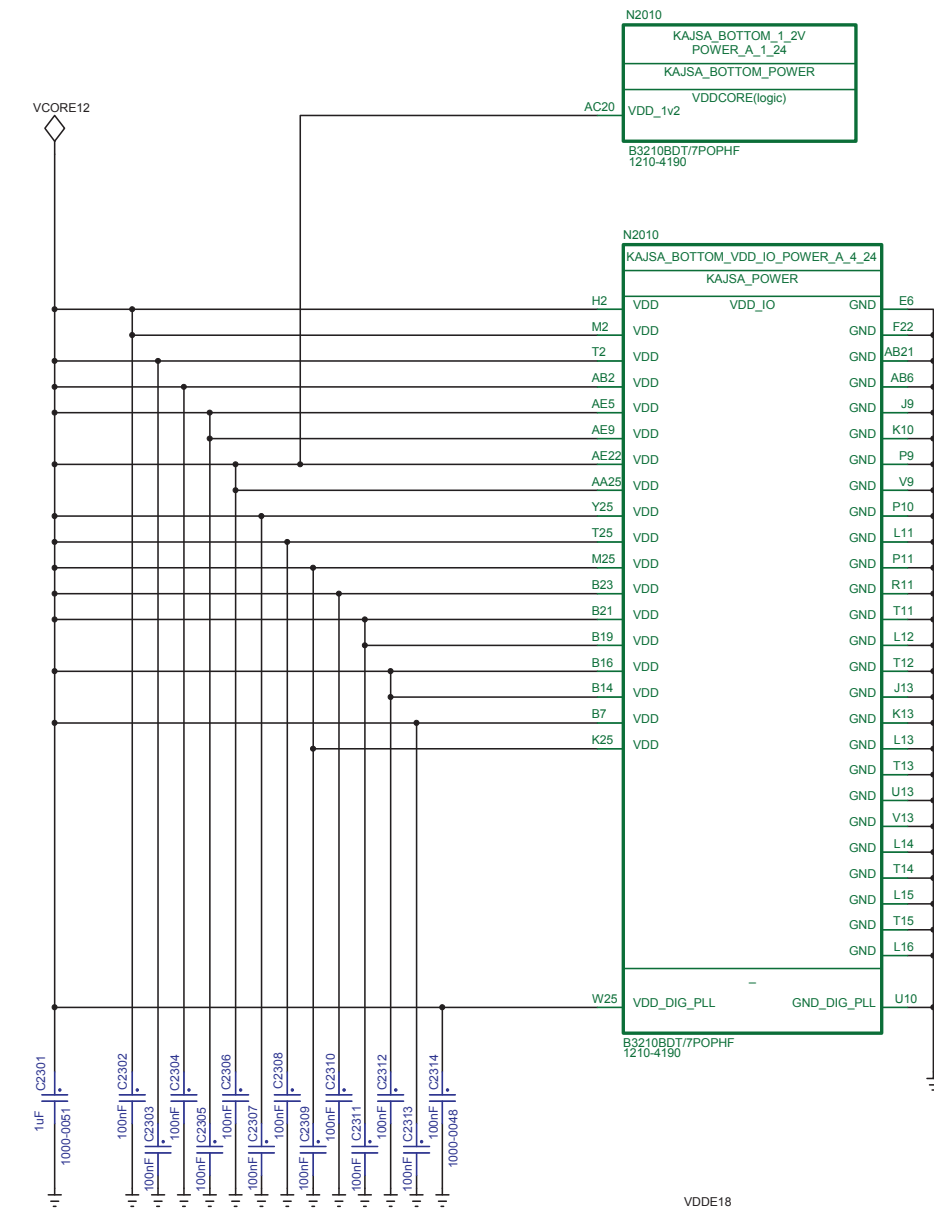


TV OUT POWER

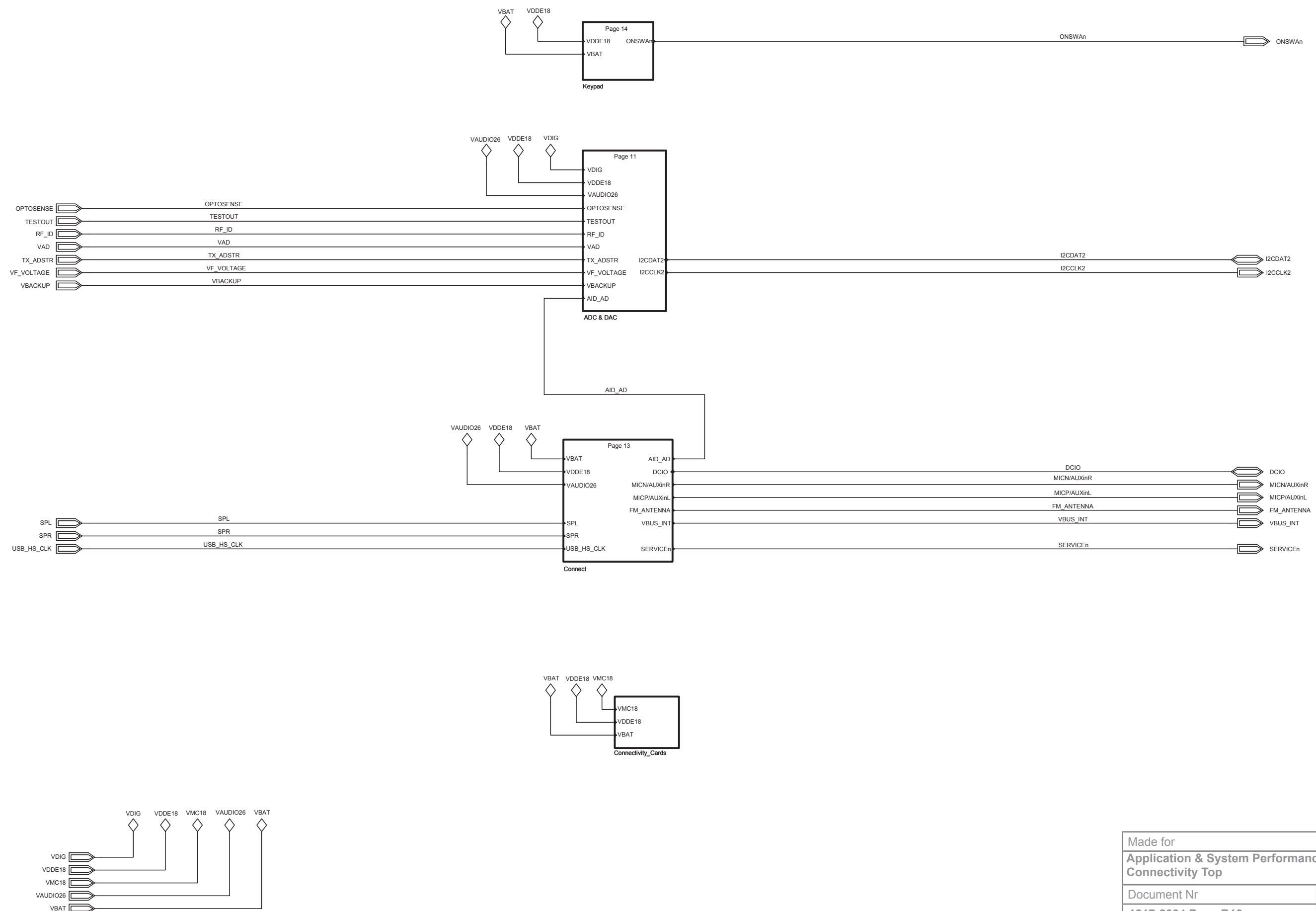


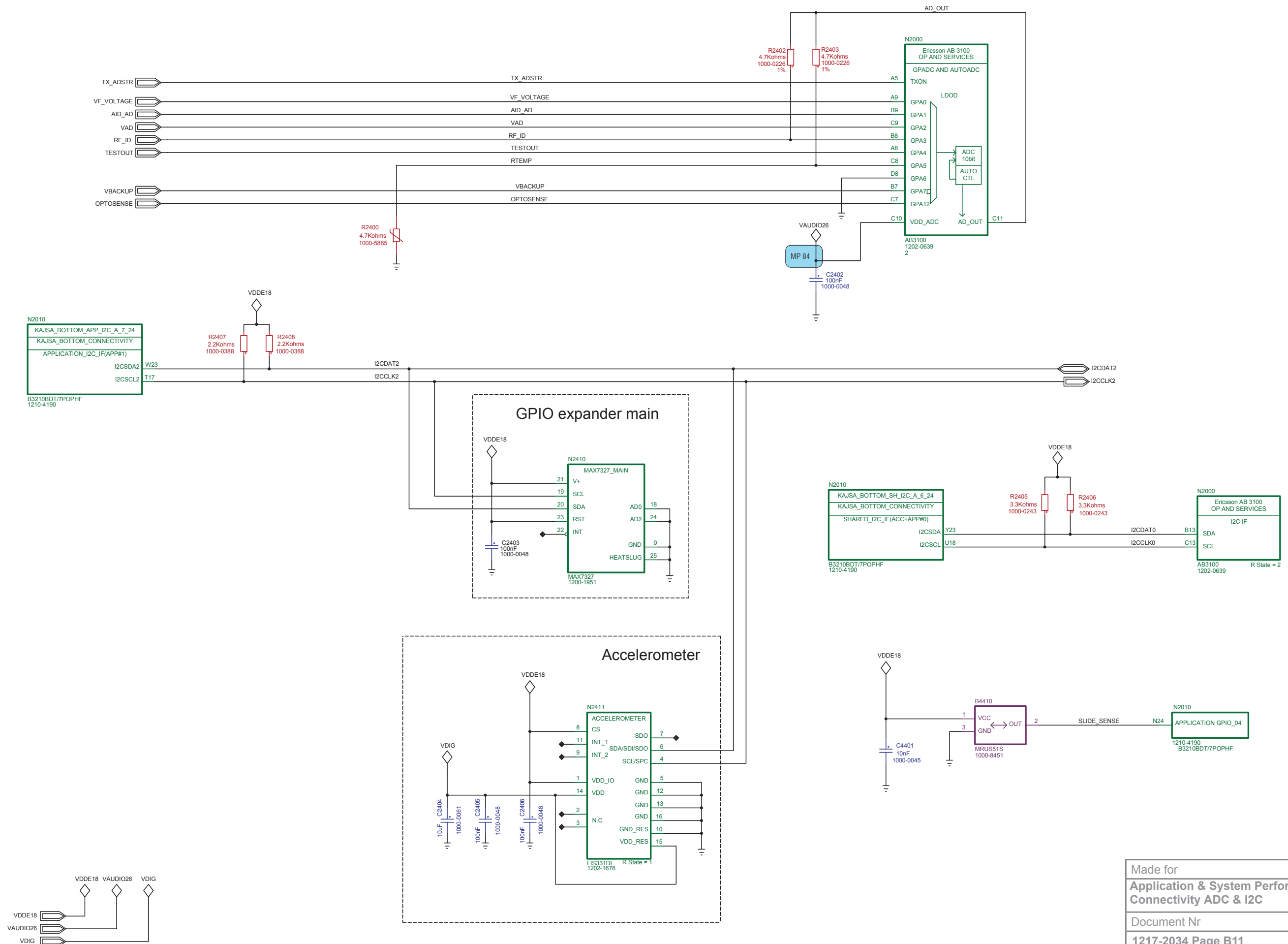
Made for
Application & System Performance
Power - Imaging

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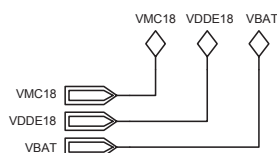
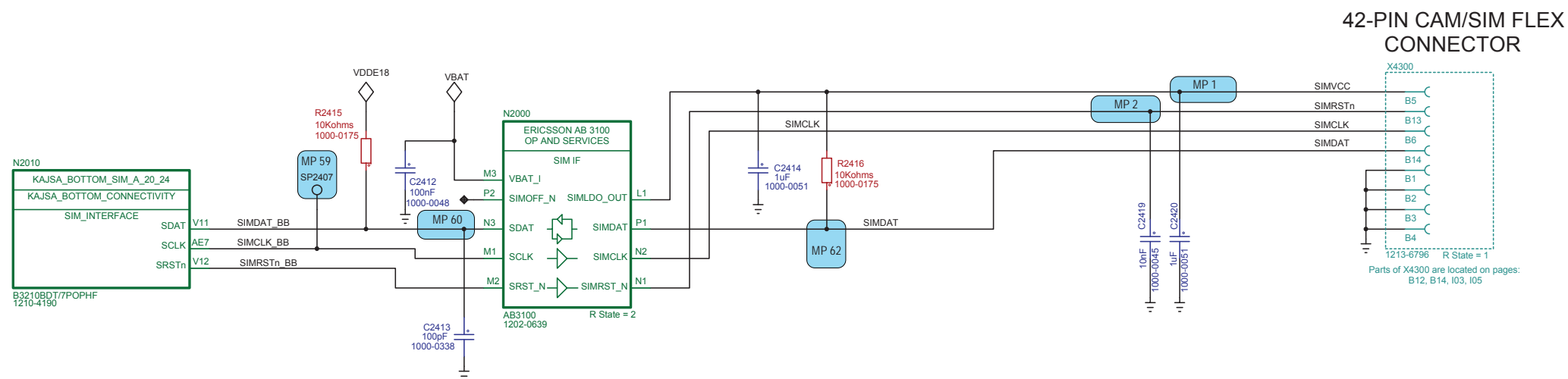
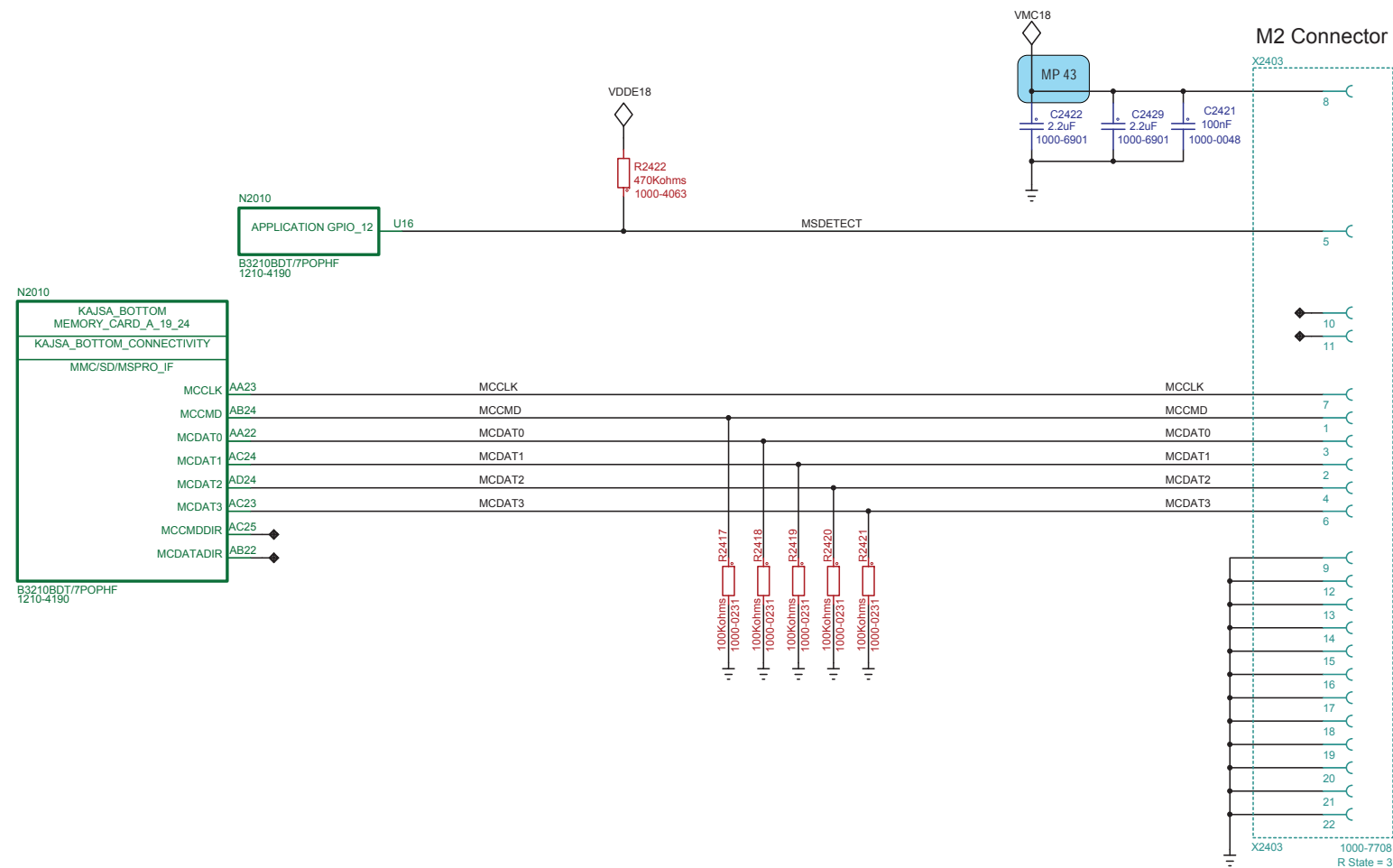


Made for	
Application & System Performance Power ASICs	
Document Nr	Revision
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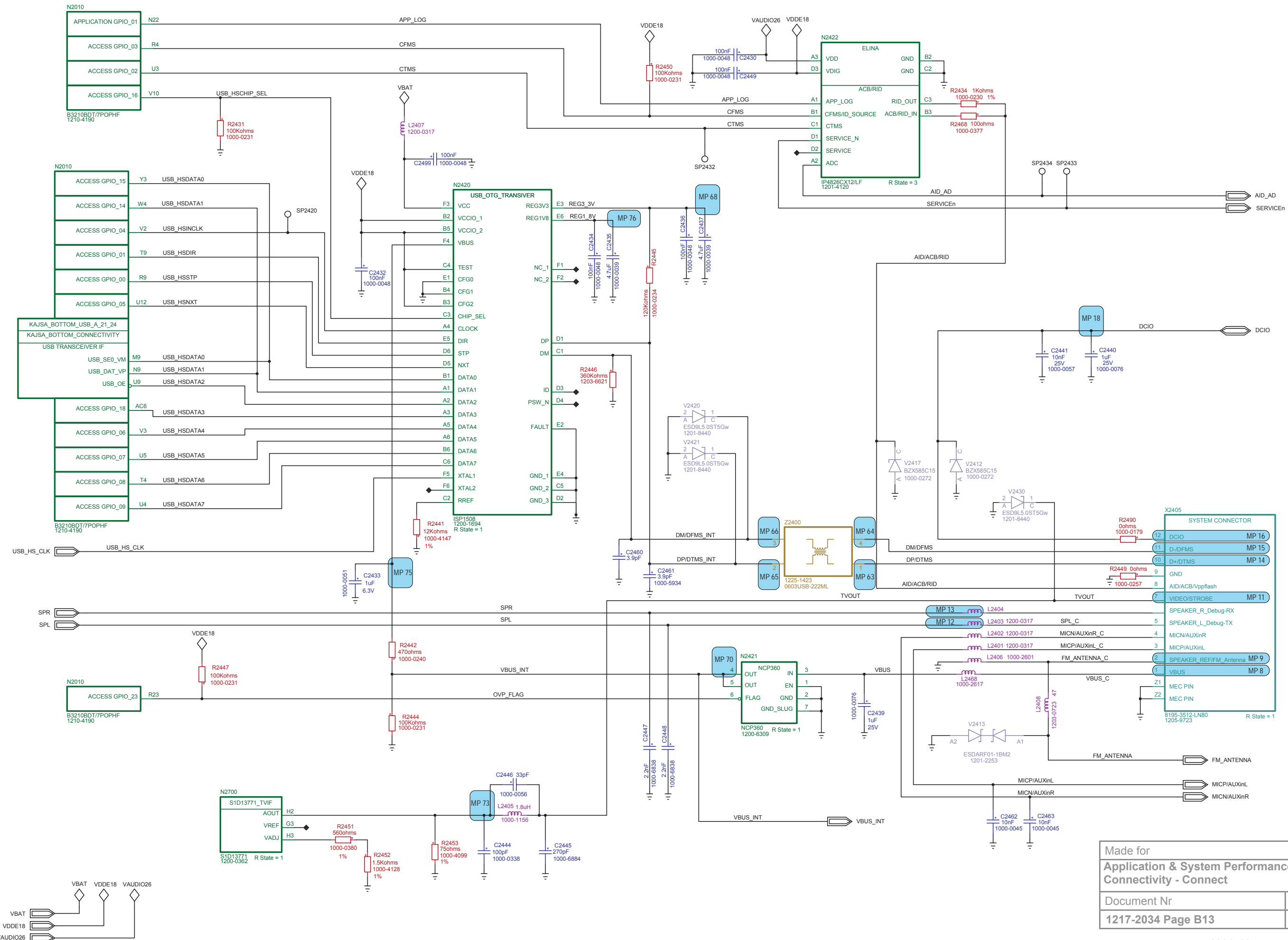




Made for	
Application & System Performance Connectivity ADC & I2C	
Document Nr	Revision
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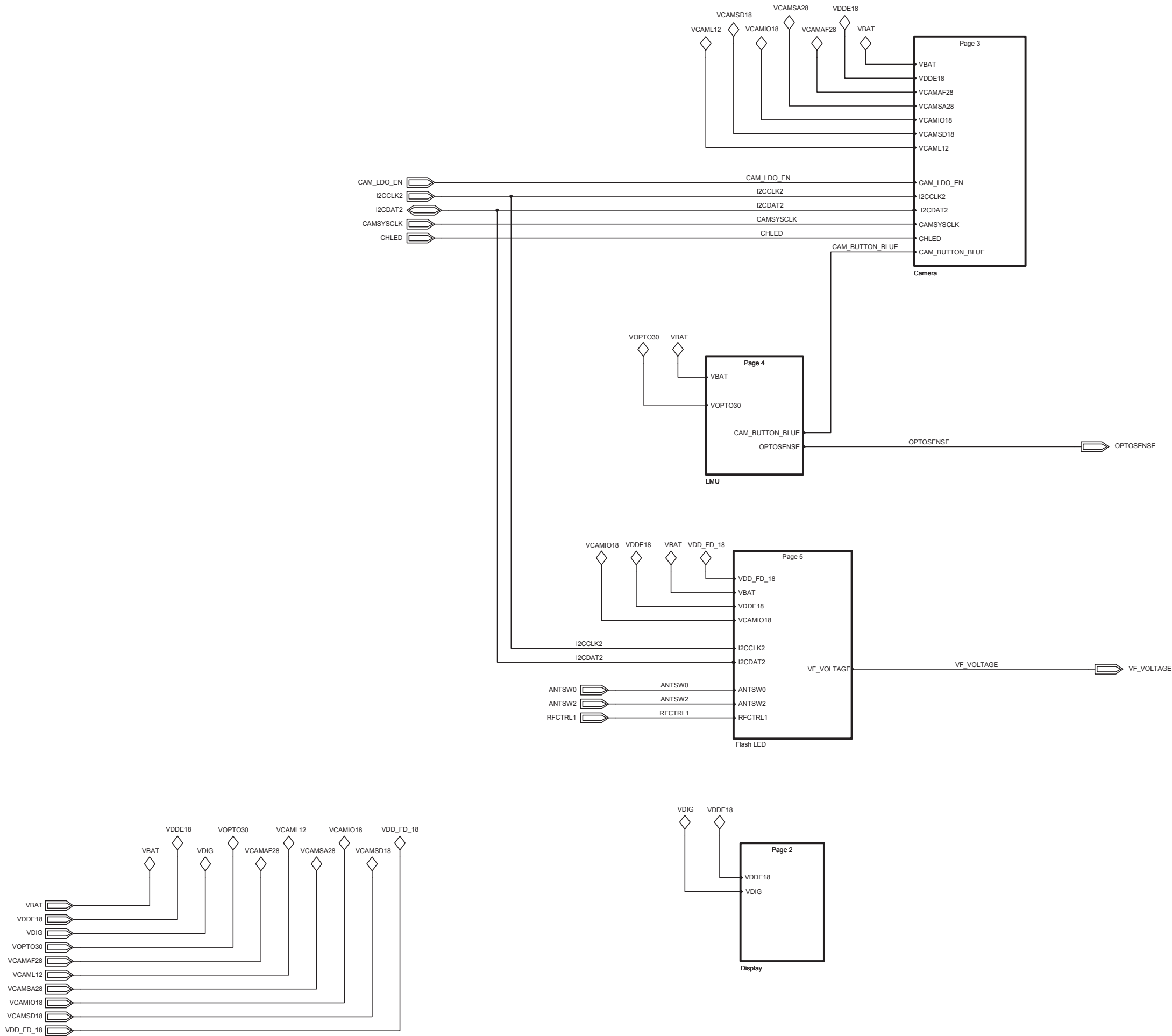


Made for	
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Document Nr	Revision
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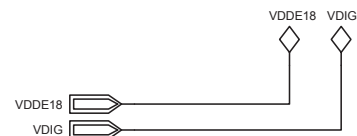
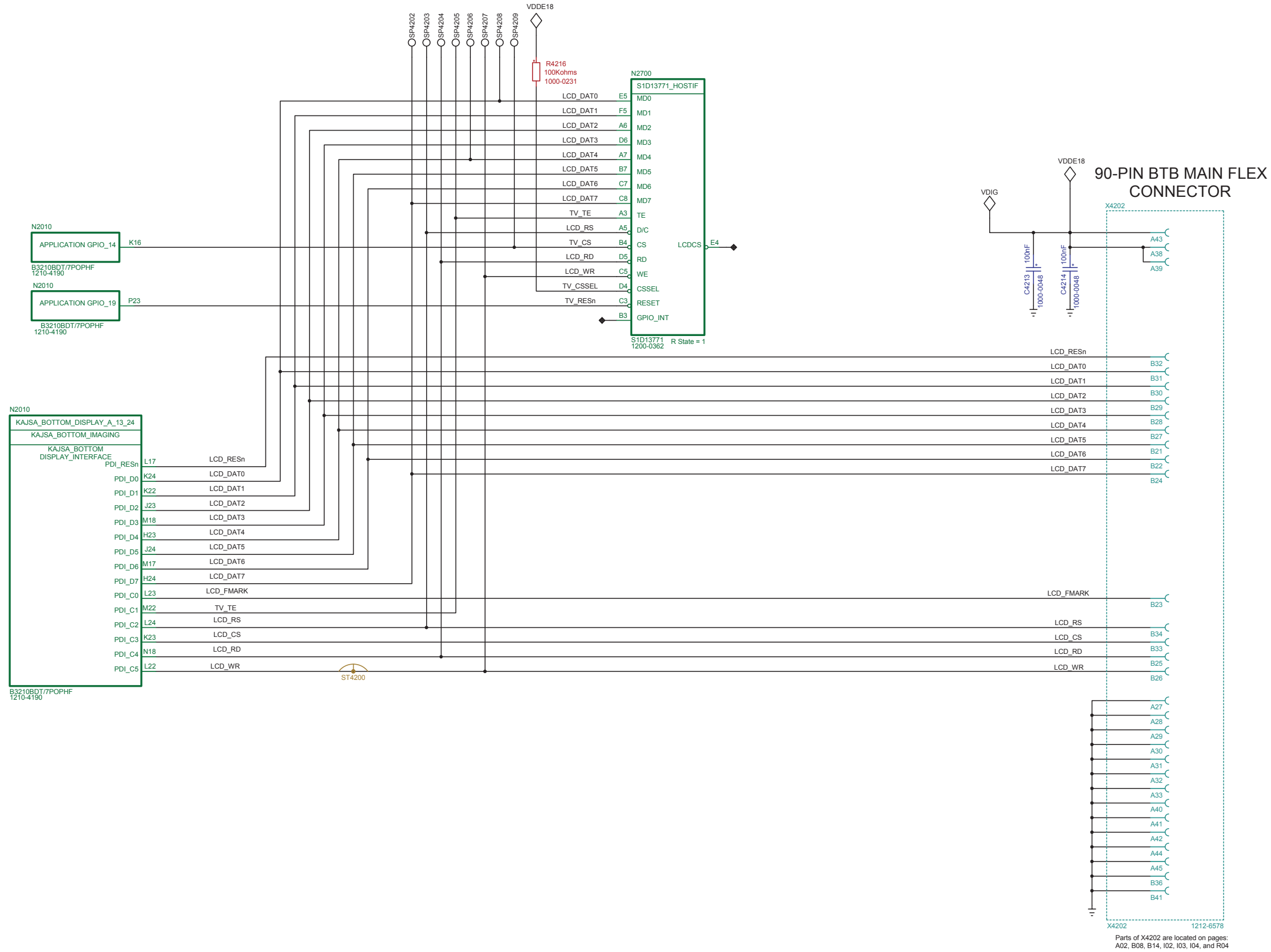


Made for	
Application & System Performance	
Connectivity - Connect	
Document Nr	Revision
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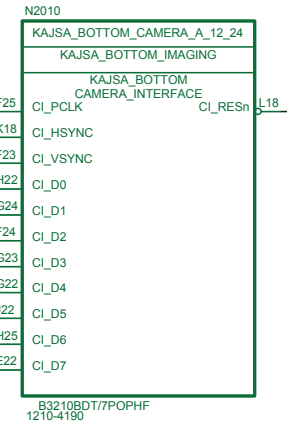
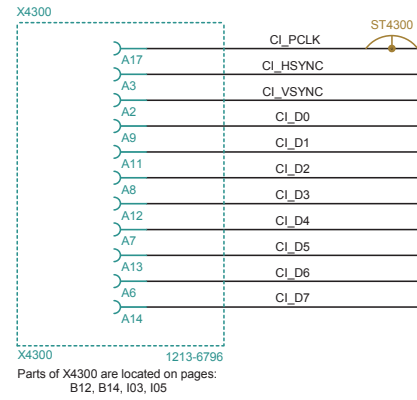


Made for	
Imaging Top	
Document Nr	Revision
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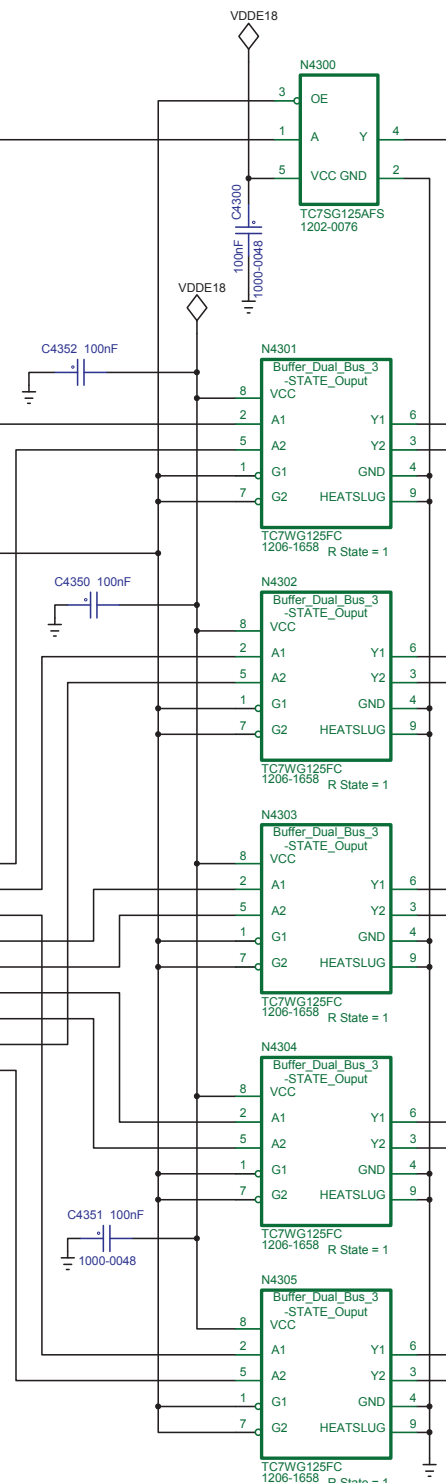
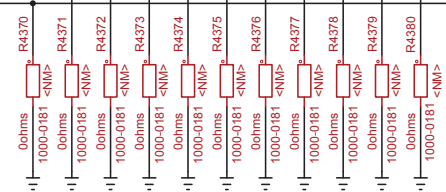
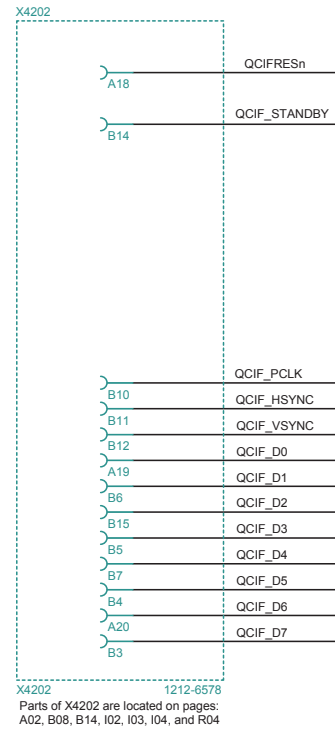


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Imaging Display	
Document Nr	Revision
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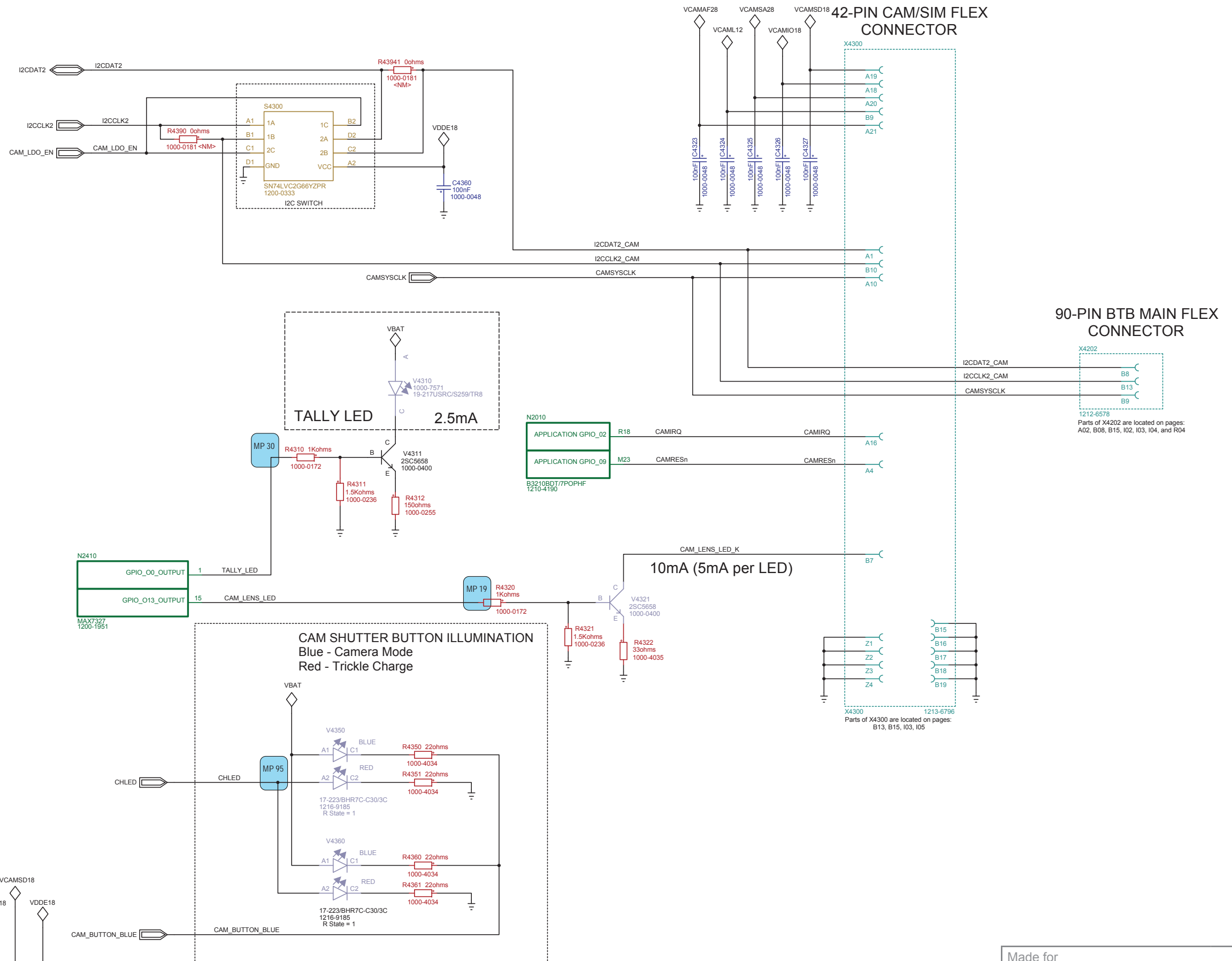
42-PIN CAM/SIM FLEX CONNECTOR



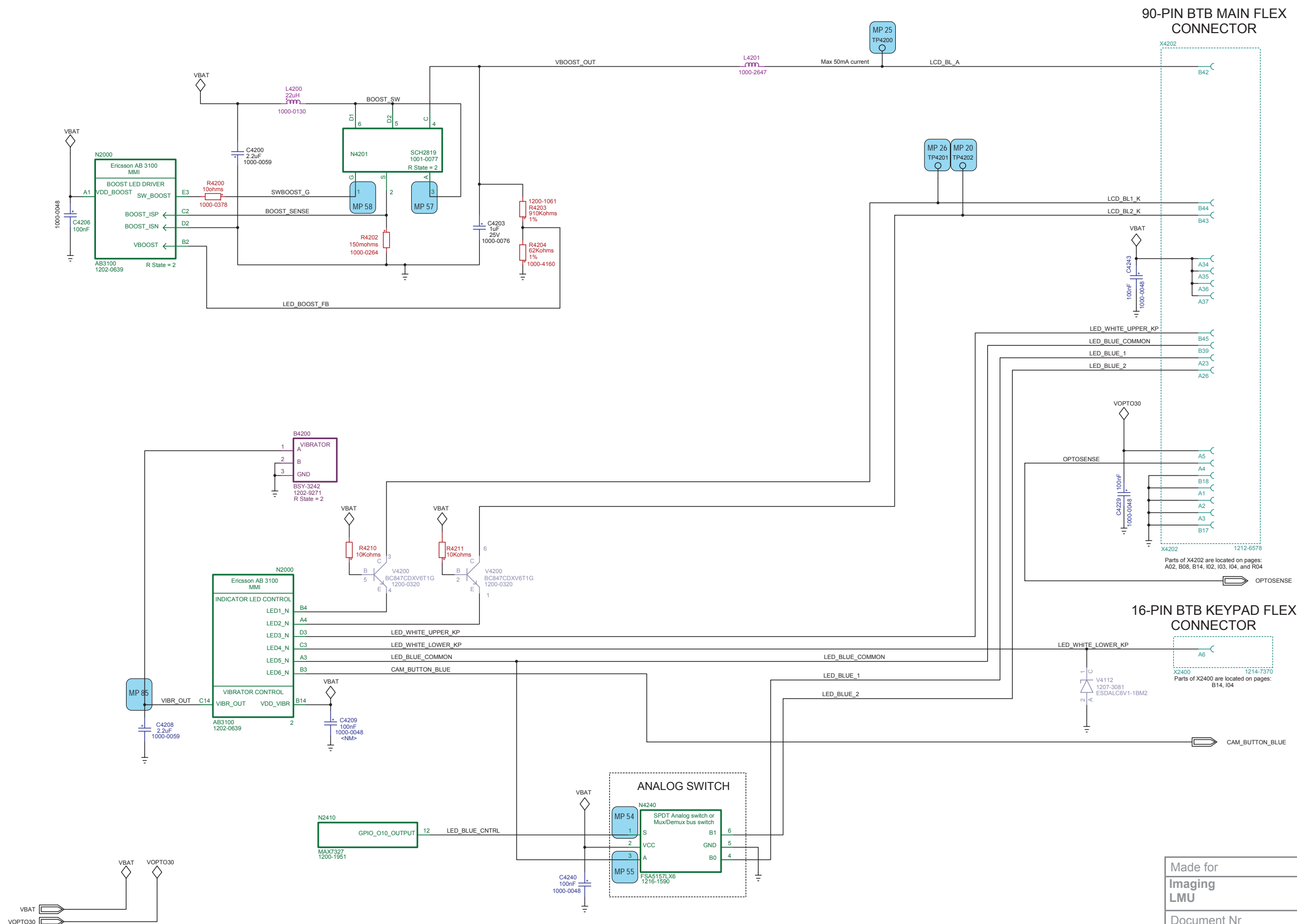
90-PIN BTB MAIN FLEX CONNECTOR



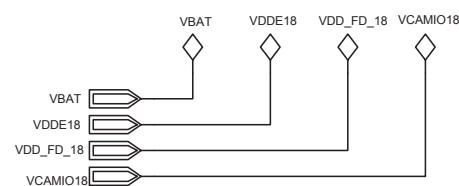
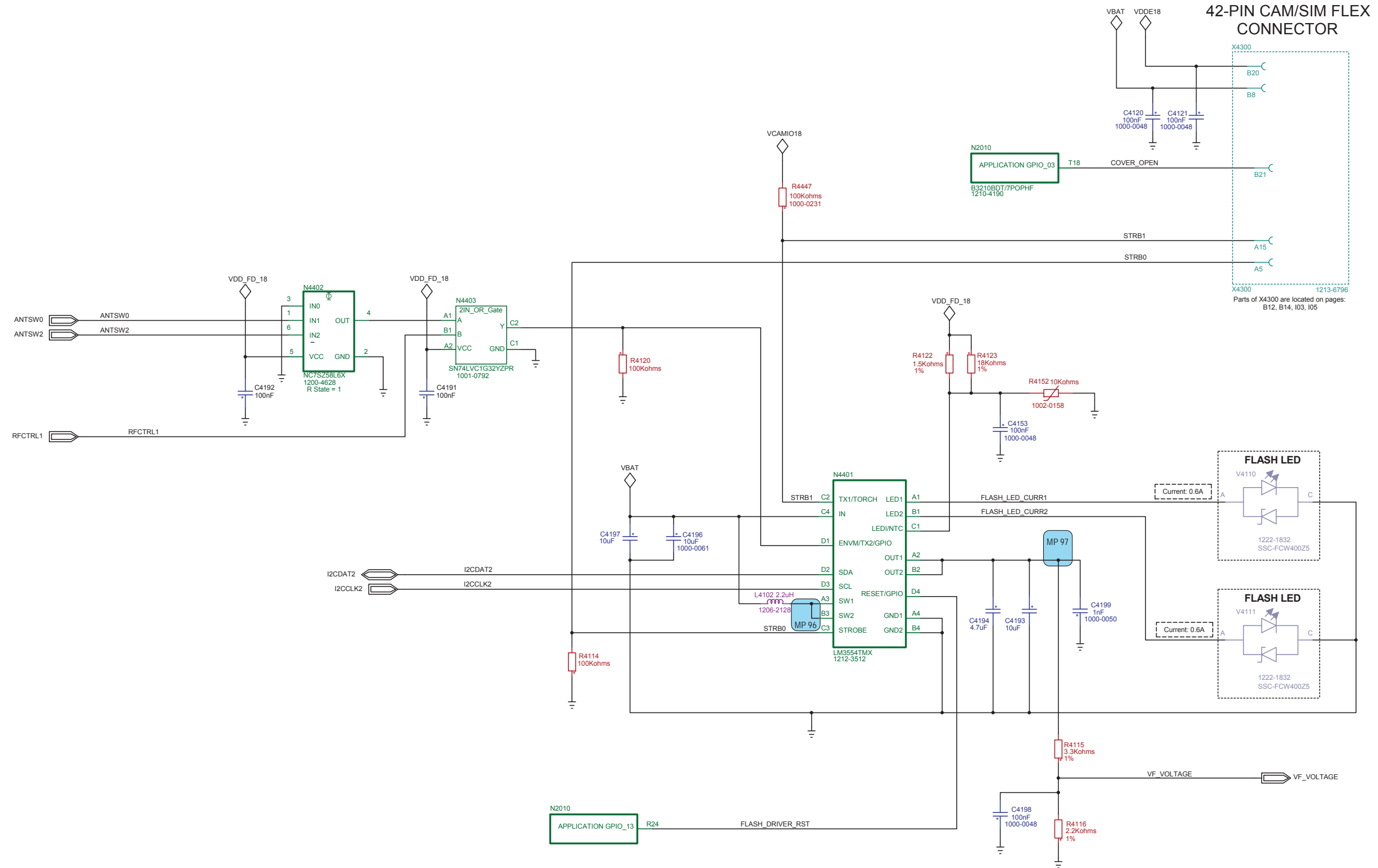
Made for	
Imaging Camera	
Document Nr	Revision
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Made for	
Imaging Camera	
Document Nr	Revision
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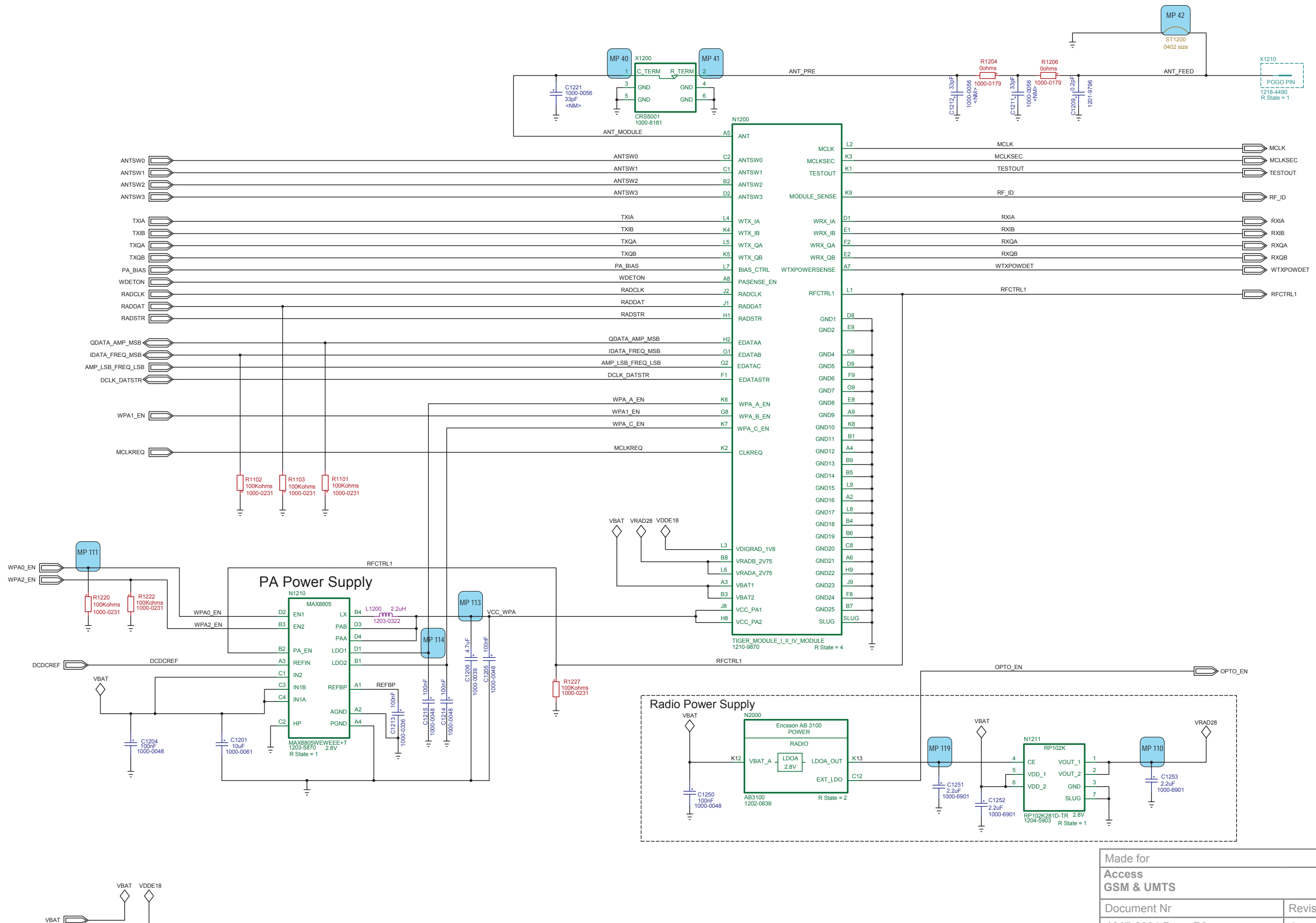


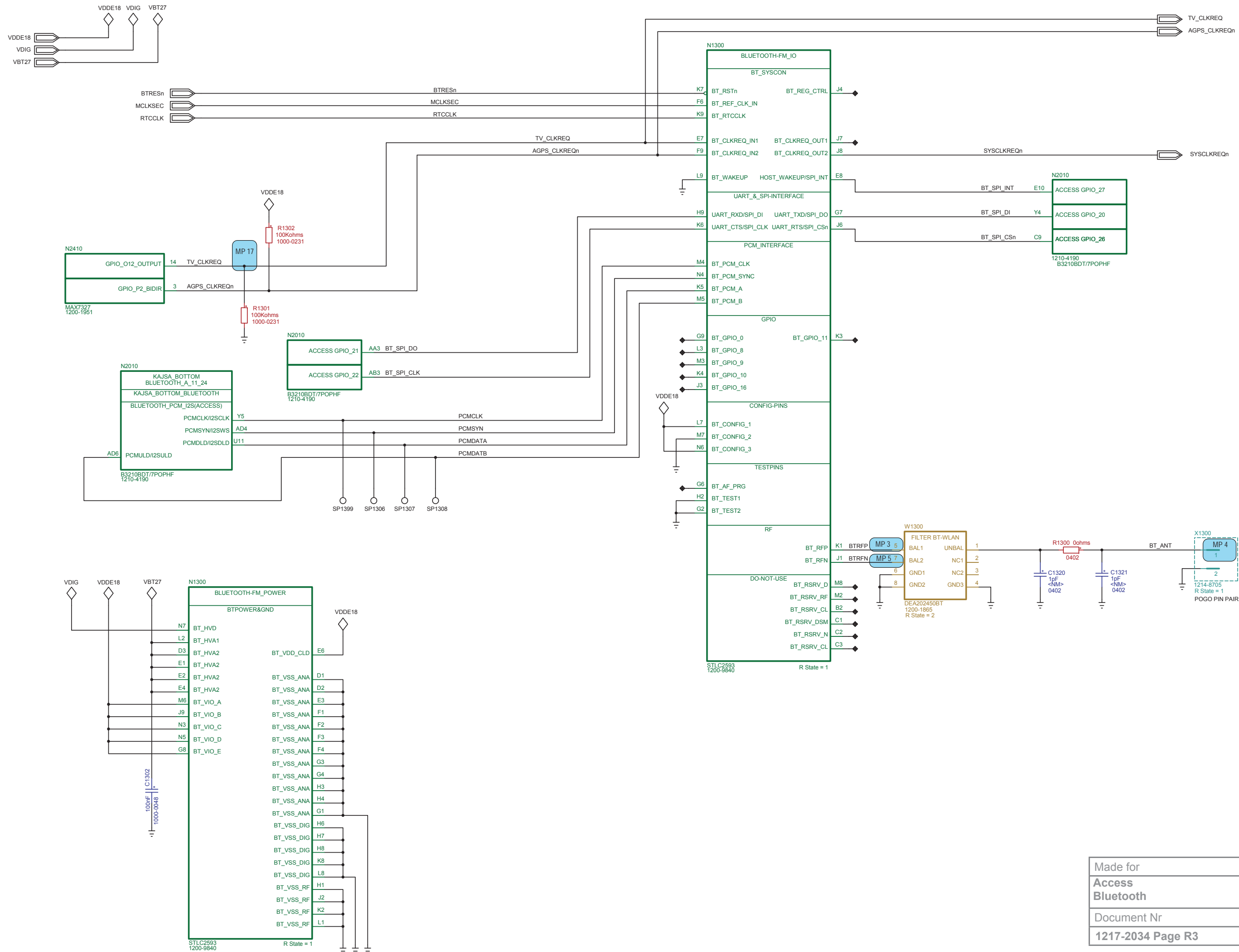
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Document Nr	Revision
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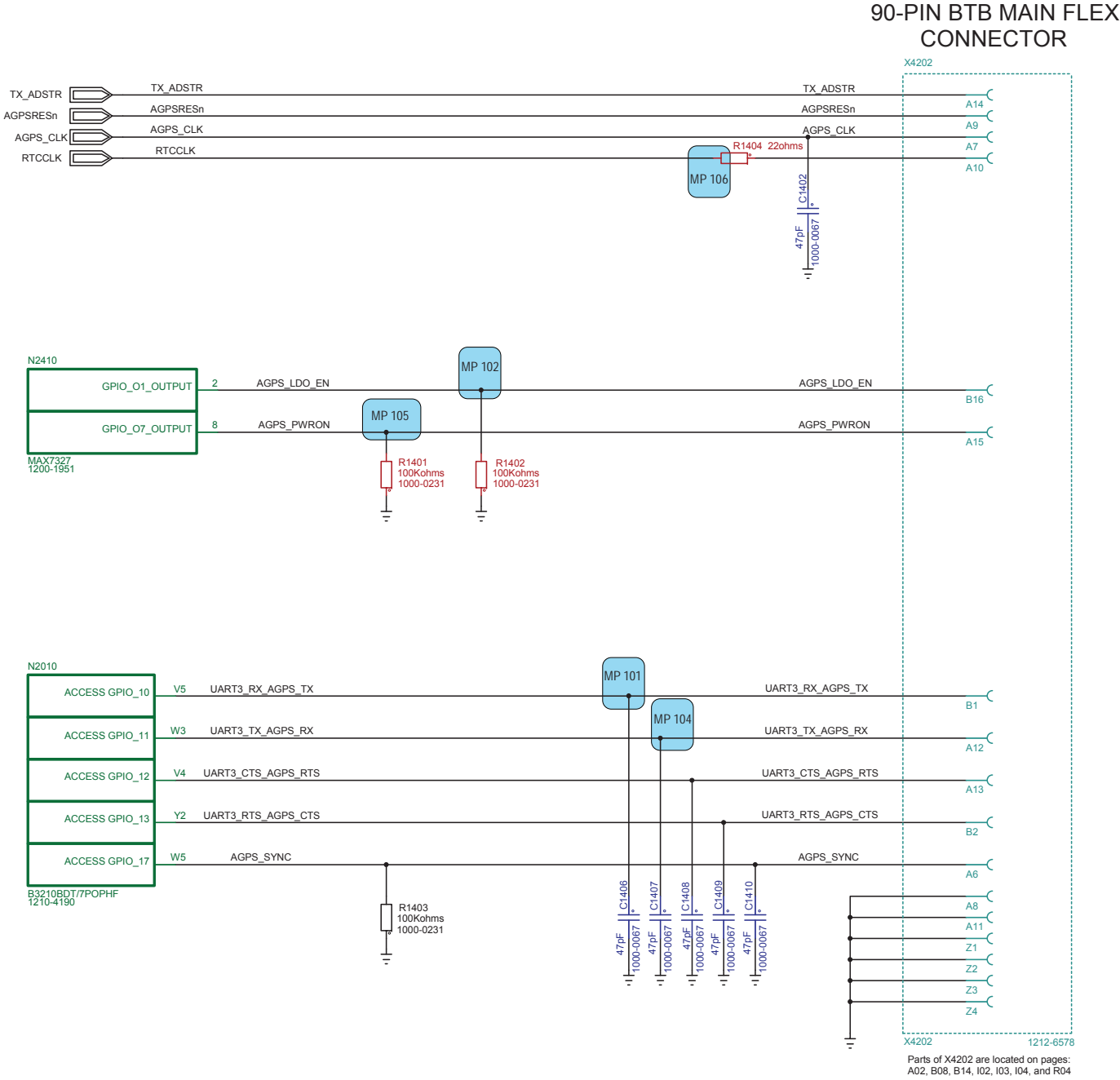
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Document Nr	Revision
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1228-1147 rev. 1 81 (129)

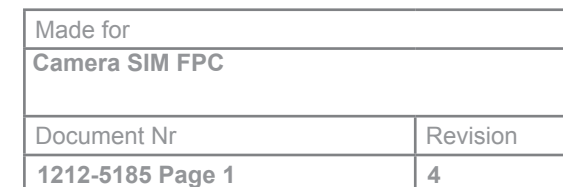




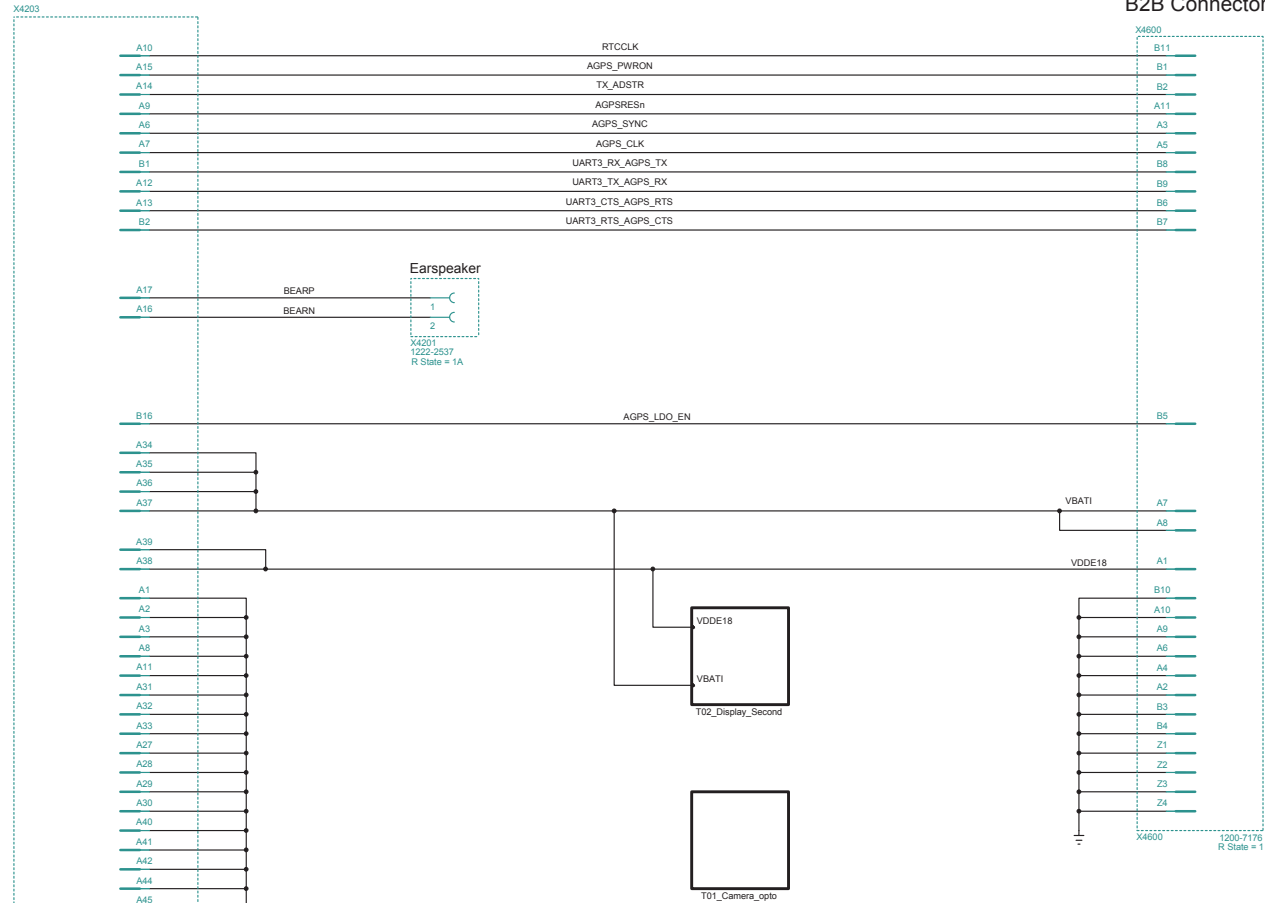
Made for	
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Document Nr	Revision
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Made for	
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Document Nr	Revision
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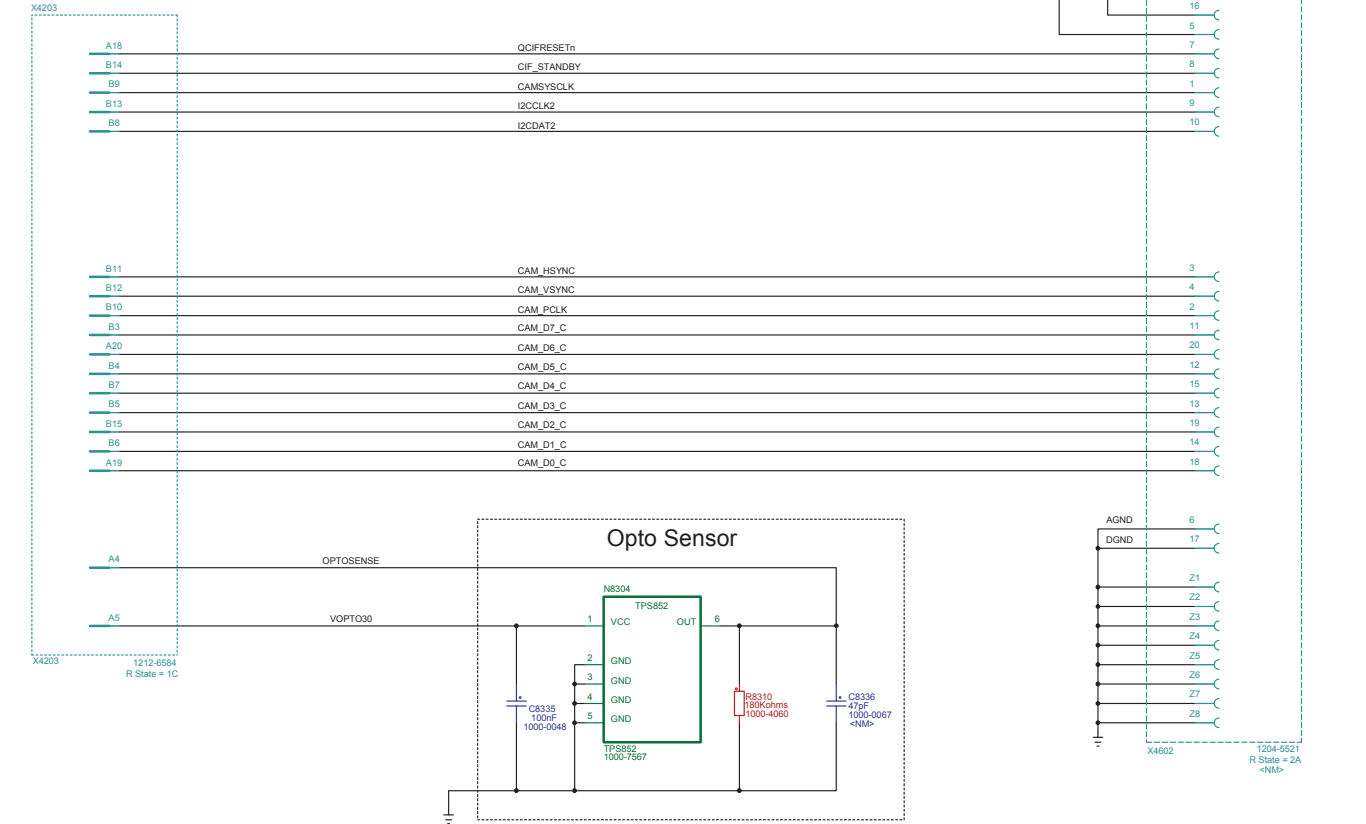
90 pin Main Board
B2B Connector



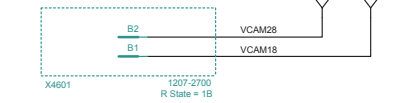
90 pin Main board
B2B Connector



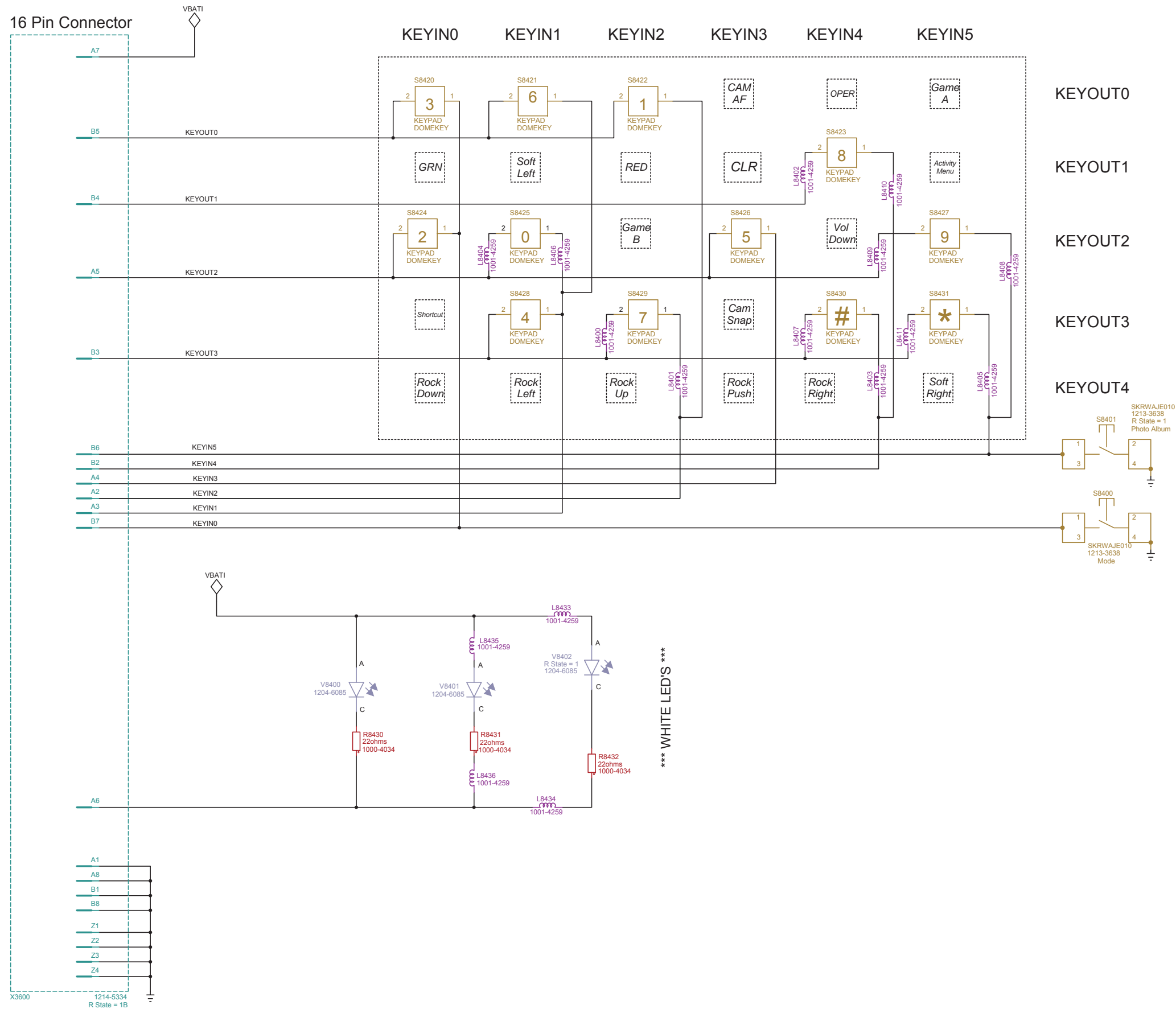
90 pin Main Board
B2B Connector



50 pin Display Keypad
B2B Connector

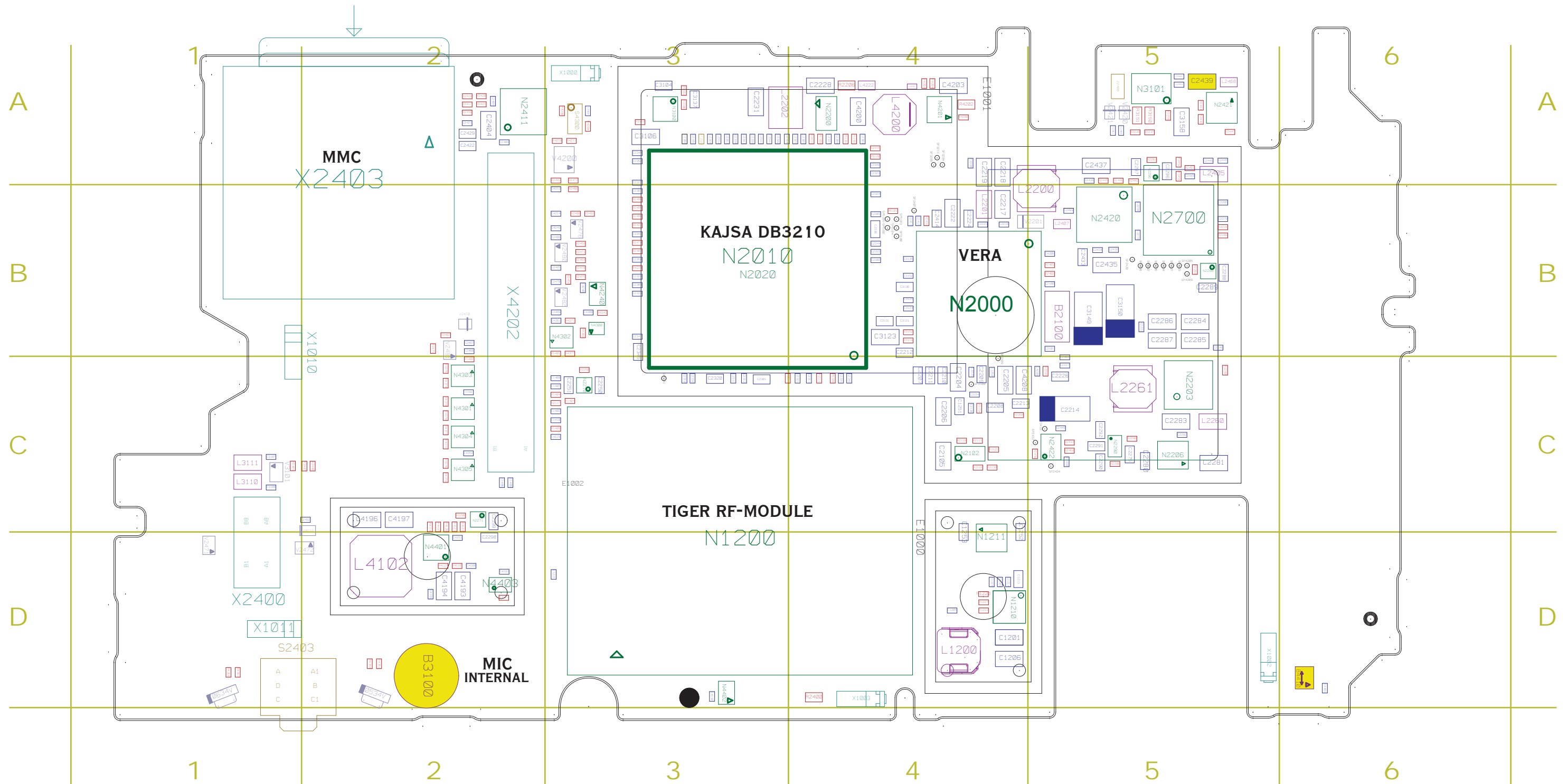


Lower Keypad Matrix





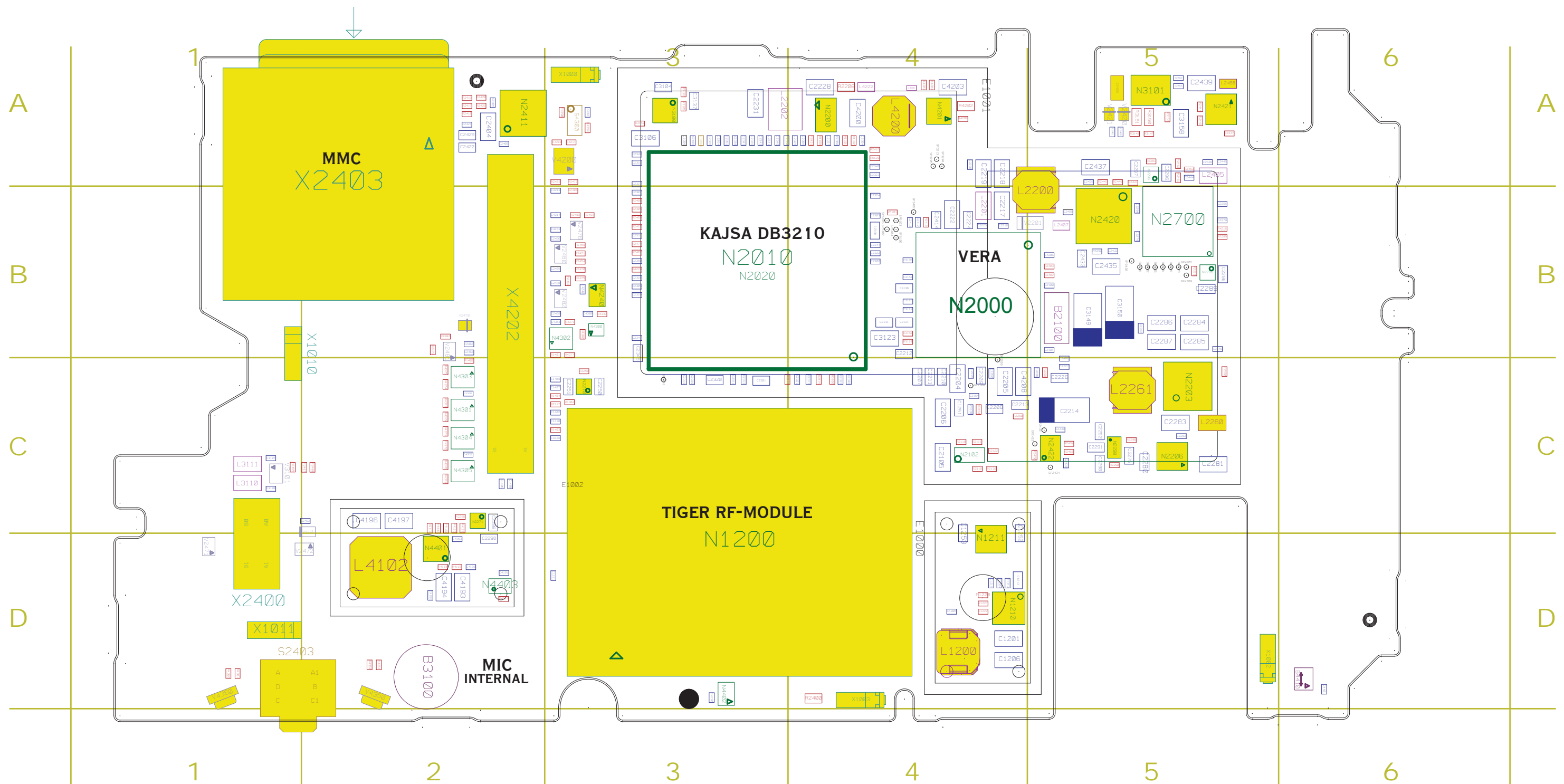
R - Replaceable
See Appendix for
more information.



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B3100	1206-4070	D2	C1408	1000-0067	C3	C2214	1205-9750	C5	C2250	1000-0051	C3	C2291	1000-0051	C5	C2309	1000-0048	B3	C2330	1000-0048	C3	C2350	1000-0048	B3	C2432	1000-0048	B5	C2499	1000-0048	B5	C3152	1000-0048	B4	C4213	1000-0048	B3
B4410	1000-8451	D6	C1409	1000-0067	C2	C2216	1000-0048	B4	C2251	1000-0051	C3	C2292	1000-6901	C5	C2310	1000-0048	C3	C2331	1000-0048	C4	C2351	1000-0048	B3	C2433	1000-0051	B5	C3104	1000-0340	A3	C3154	1000-6840	C4	C4214	1000-0048	B3
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R - R
See A
more i

R - Replaceable
See Appendix for
more information.



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R - Replaceable
See Appendix for
more information.

C903 Function Overview



General Information

Size

97 x 49 x 16 mm

Weight

96 grams

Colors

Lacquer Black
Techno White
Glamour Red

Screen

Main screen: 262,144 colour TFT, scratch-resistant
Resolution: 240 x 320 pixels
Size: 2.4 inches

Phone memory

Up to 130MB
Memory card support: Memory Stick Micro™ (M2™)

Talk time

GSM/GPRS: Up to 10 hrs
UMTS: Up to 4 hrs

Standby time

GSM/GPRS: Up to 400 hrs
UMTS: Up to 350 hrs

Video call time:

Video call time: Up to 1 hr 30 min

Networks

G903:

GSM/GPRS/EDGE 850/900/1800/1900
UMTS/HSUPA 900/2100

C903a:

GSM/GPRS/EDGE 850/900/1800/1900
UMTS/HSUPA 850/1900/2100

Note! The Network support depends on variant and market.

Features

Camera

5 megapixel camera
Auto Focus
Up to 16x digital zoom
Smart Contrast
Smile Shutter™
Face Detection
BestPic™
Photo Fix
Photo Flash
Picture and video blogging
Video Recording
Image and Video Stabilizer
Snapfish™

Music

Media player
Album art
Mega Bass™
PlayNow™
TrackID™
Bluetooth™ stereo (A2DP)
Music tones (MP3/AAC)

Web

Access NetFront™ Web browser
Web feeds
Photo feeds

Communication

Polyphonic ringtones
Speakerphone
Vibrating alert
Video calling (by main camera if no VGA camera)
Note! Video Calling support depends on variant and market.

Messaging

Email
Exchange ActiveSync®
Text messaging (SMS)
Picture messaging (MMS)
Chat View
Instant messaging
Predictive text input
Sound recorder

Design

Auto rotate
Picture wallpaper
Wallpaper animation

Entertainment

Media
3D games
Motion gaming (support)
Java
FM radio with RDS
Video streaming
Video viewing
Walk Mate
Tracker
TV-out
YouTube™

Organiser

Alarm clock
Calculator
Calendar
Flight mode
Notes
Phone book
Stopwatch
Tasks
Timer

Location-based services

aGPS
Geotagging of photos
Google Maps™
Wayfinder Navigator (3-month trial version)

Connectivity

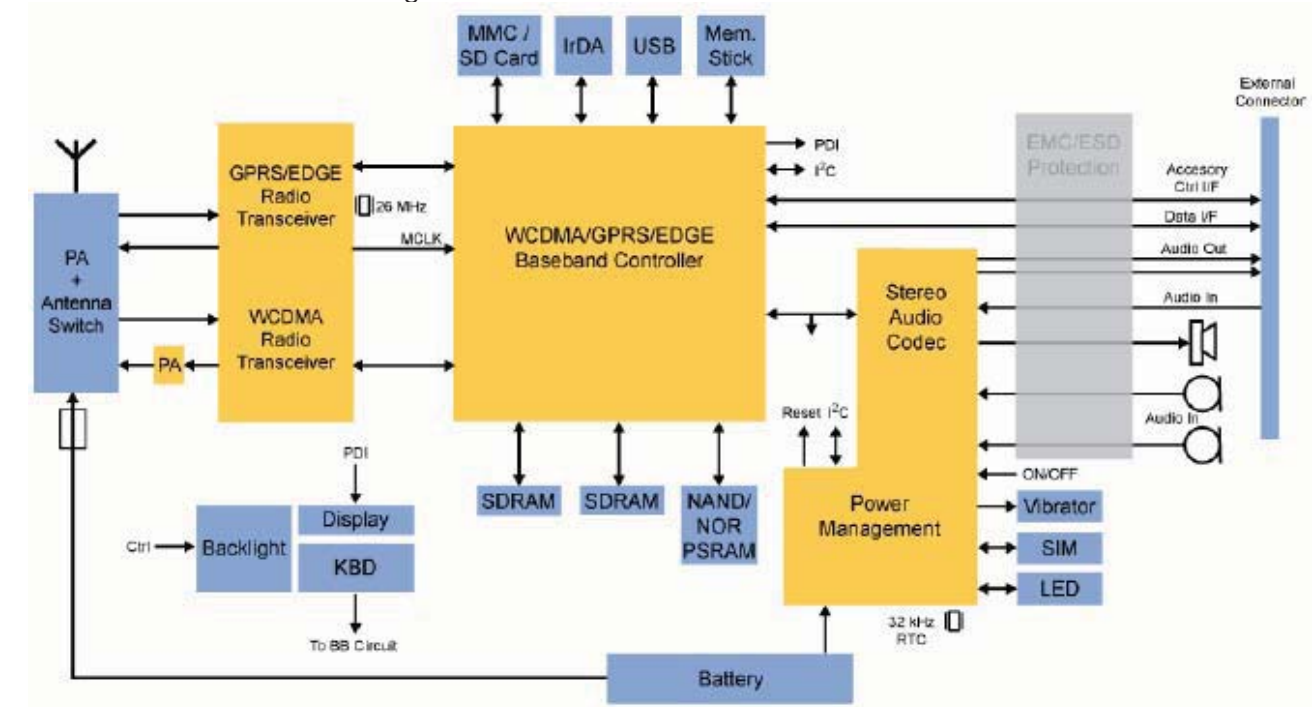
Bluetooth™ technology
Modem
Synchronization
USB mass storage
USB support

Hardware Overview

Platform Information

The C903 and C903a are using the U365 platform provided by Ericsson Mobile Platform (EMP).

The U365 Platform Block Diagram Overview:



Baseband Part

Analog Baseband Controller N2000 (Vera)

This component is not replaceable on SL 4 because Baseband calibration is required. The analog baseband controller is the main power management circuit. It has converters and regulators that generate a number of supply voltages, each optimized for its load.

The analog baseband controller is a mixed digital and analog device that supports the following circuitry:

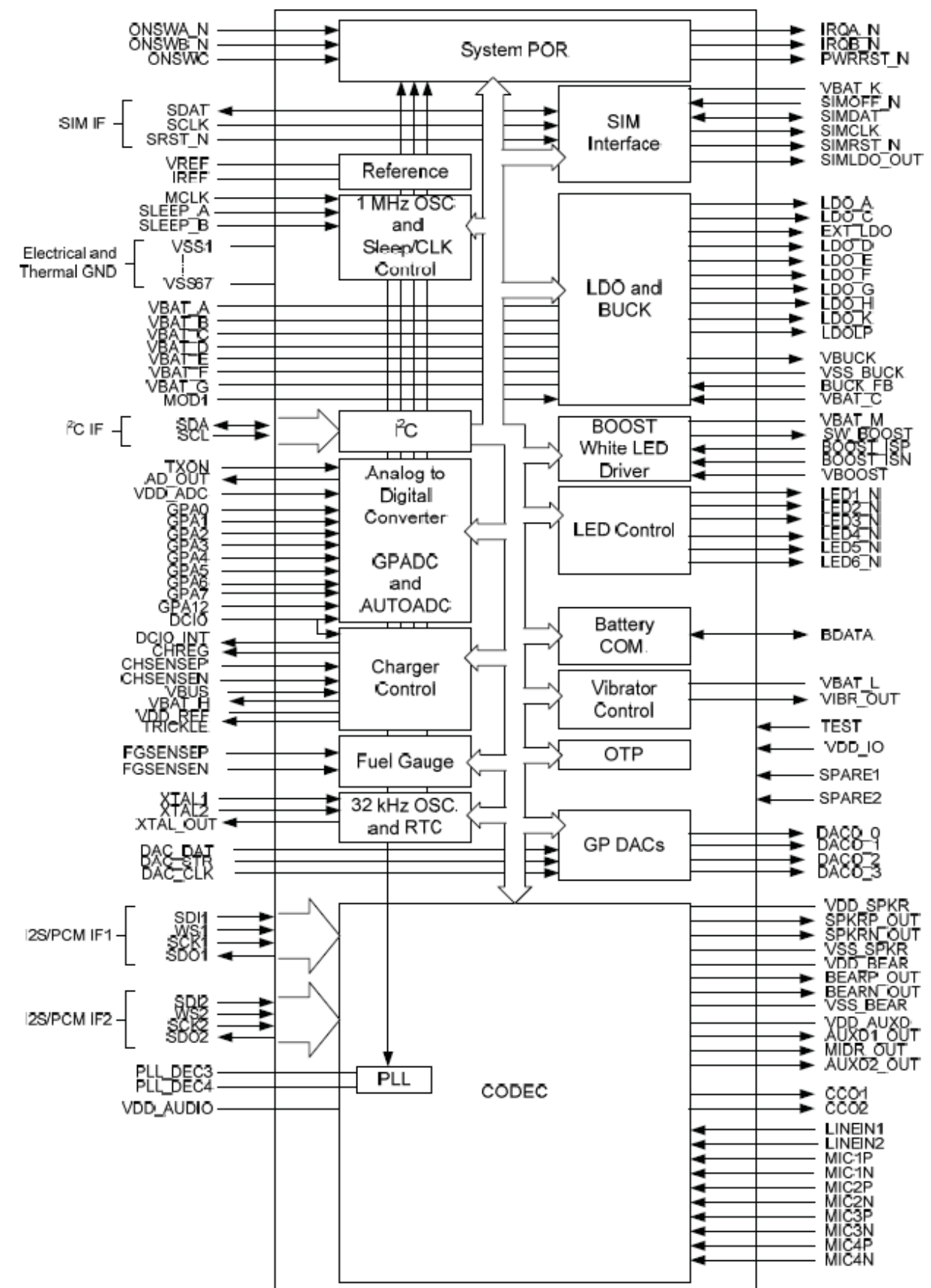
- Power management circuitry
- Voltage regulation circuitry
- Eight Low Dropout (LDO) regulators and low power regulator
- 600 mA integrated Buck regulator
- Boost step-up DC/DC converter for White Light Emitting Diode (WLED) driving
- Battery charging and communication circuitry
- Battery fuel gauging circuitry
- Analog-to-Digital Converter (ADC)
- Digital-to-Analog Converter (DAC)
- SIM interface
- Six programmable LED drivers
- Accurate band gap reference
- Vibrator driver
- Real Time Clock (RTC)
- 8-byte One-Time Programmable (OTP) memory
- Pulse Code Modulation (PCM) voice coder/decoder
- PCM audio coder/decoder
- Microphone interface
- Stereo line input
- Earphone driver
- Earpiece driver
- 8-Ω speaker driver / Stereo line output

The analog baseband controller is controlled by an I2C™ interface. It also comprises the main power management circuits, equipped with a number of converters and regulators for generating the required supply voltages.

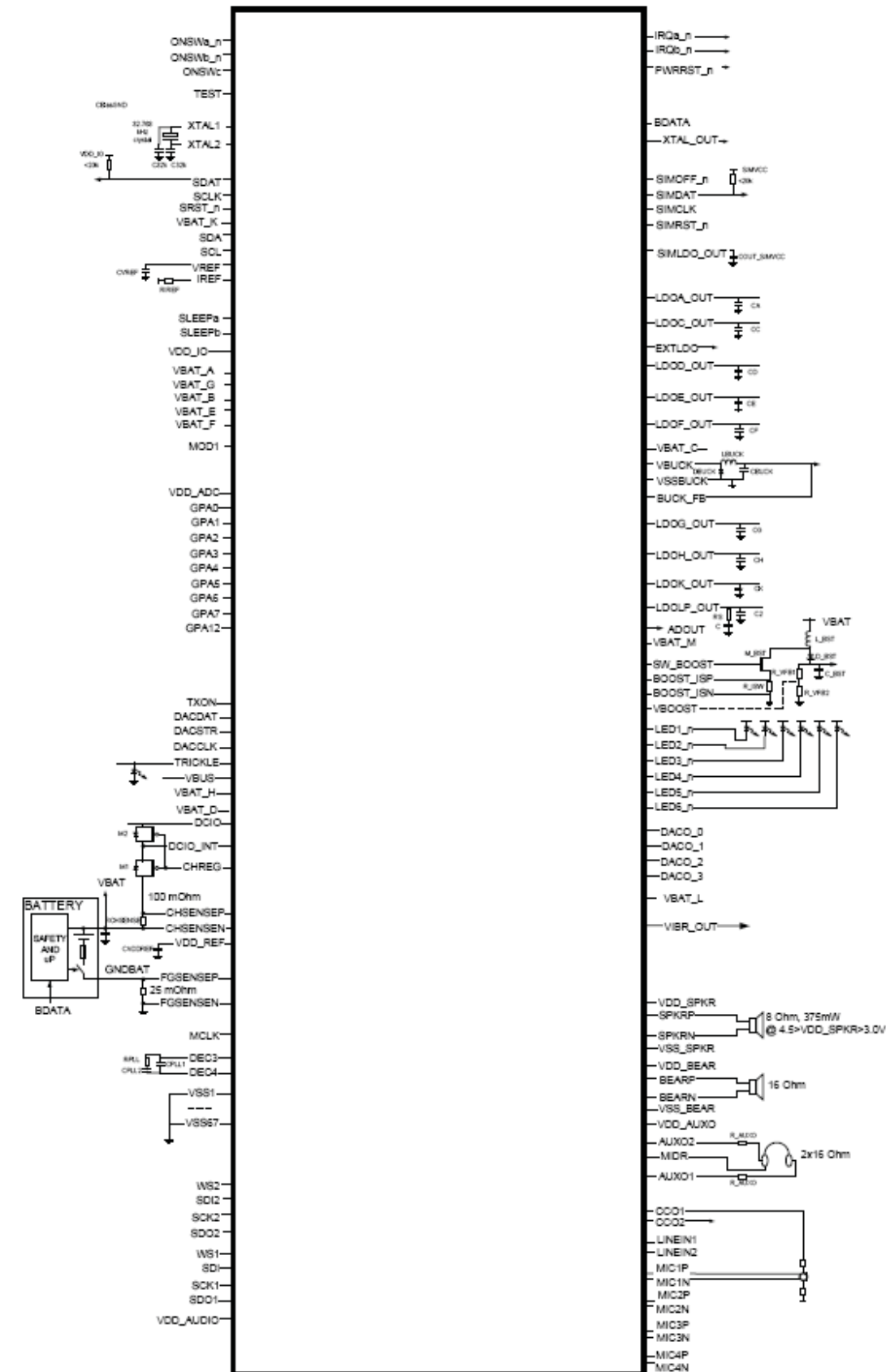
The analog baseband controller supports the following features:

- Lithium battery
- Full audio CODEC functionality
- Supports stereo audio sampling rates of 8/16 kHz voice coding/decoding and 44.1/48 kHz for high quality audio recording/playback (for example MIDI and MP3 applications)
- Double CODEC I2S/PCM interfaces
- Flexible microphone interface
- Integrated headphone amplifiers
- Integrated earpiece amplifiers
- Integrated speaker amplifier
- Integrated flexible audio mixing functionality
- Boost driver capable of driving up to four WLEDs in series, supplying 50 mA
- Designed to meet power management demands of GSM and WCDMA
- Automated power management ADC to relieve CPU
- Battery identification and communication
- Single-terminal charger and accessory power interface for compact connector design
- Integrated USB charging
- OTP memory
- Integrated hardware fuel gauge to accurately monitor battery capacity
- Reduced number of external components as a result of integrated programmable LED and vibrator drivers
- 32 kHz real time clock with alarm wake up capability
- Designed to support two host controllers.

Functional Blocks of the Analog Baseband Controller:



Connection Diagram of the Analog Baseband Controller:



Charger Control

A programmable charger is used for battery charging. Limits can be set for the output voltage at CHSENSE- and the output current from DCIO through the sense resistor to CHSENSE-. The programmable charger is enabled or disabled by the assertion/negation of the external signal DCIO. Parts of the programmable charger are activated and deactivated depending on the level of VBAT. The rest of the programmable charger is activated and deactivated through I2C.

The programmable charger supports the following functions:

- Constant current charging
- Constant voltage charging
- Trickle charging
- PWM controlled charging
- Over-voltage and over current detection
- Watchdog termination
- DCIO assertion/removal detection
- Voltage and current measure functions
- Low resistive path (reverse mode)

The programmable charger is able to control the voltage and limit the current to a load seen at CHSENSE-. The programmable charger can also be run in PWM mode to turn the charging on and off in accordance with the particular period and duty cycle. When the charging is on, it is set to the current and voltage selected by I2C.

A low resistive path from VBAT to DCIO can be formed when DCIO is not detected. When this setting is done in the appropriate registers, a lowering of CHREG to 0 V turns on the external pass device. The pass device is automatically turned off when an external source is detected on DCIO, or when the watchdog termination block times out. The watchdog termination block must be active when the external switch is enabled, both in normal charging mode and in the low resistive path mode. The watchdog is set through the serial interface, and if it has not been set again before timeout, the watchdog turns off the external switch. The watchdog is disregarded during trickle charging. When no battery is present, the system can be booted and supplied from DCIO by applying the correct voltage on DCIO.

USB Charger

The analog baseband controller contains a standalone USB charger. The USB charger has a separate input and incorporates full functionality during low VBAT.

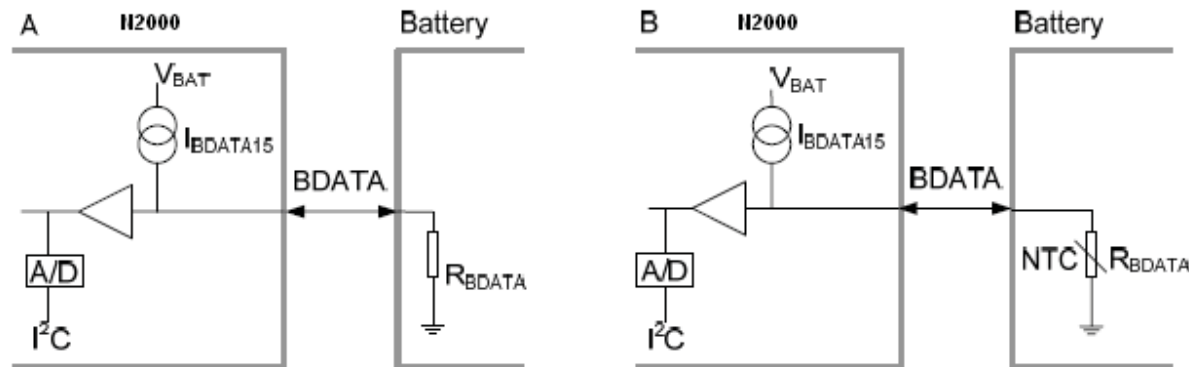
The programmable charger supports the following functions:

- Trickle charging
- Constant current charging
- Watchdog termination
- Trickle LED indication
- VBUS assertion/removal detection

Resistance Identification and Temperature Measurement

The resistance identification mode utilizes the constant current source to feed the battery data output while monitoring the voltage at the battery data node with general purpose ADC the conversion is started through I2C.

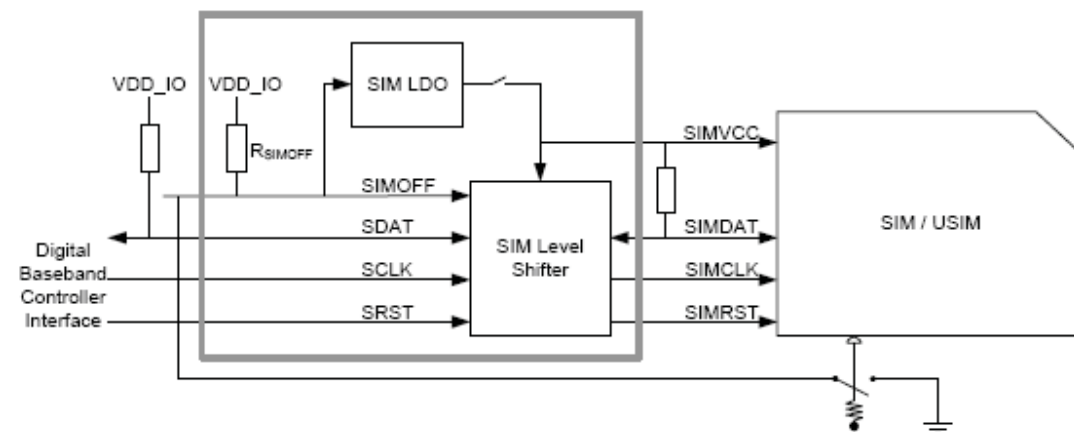
Resistance Identification (A) and Temperature Measurement (B):



SIM Interface

The SIM interface supplies level is shifting between the digital baseband controller and the SIM/USIM card. Moreover, hard-wired SIM deactivation functionality manages removal of a SIM card that has not been powered down.

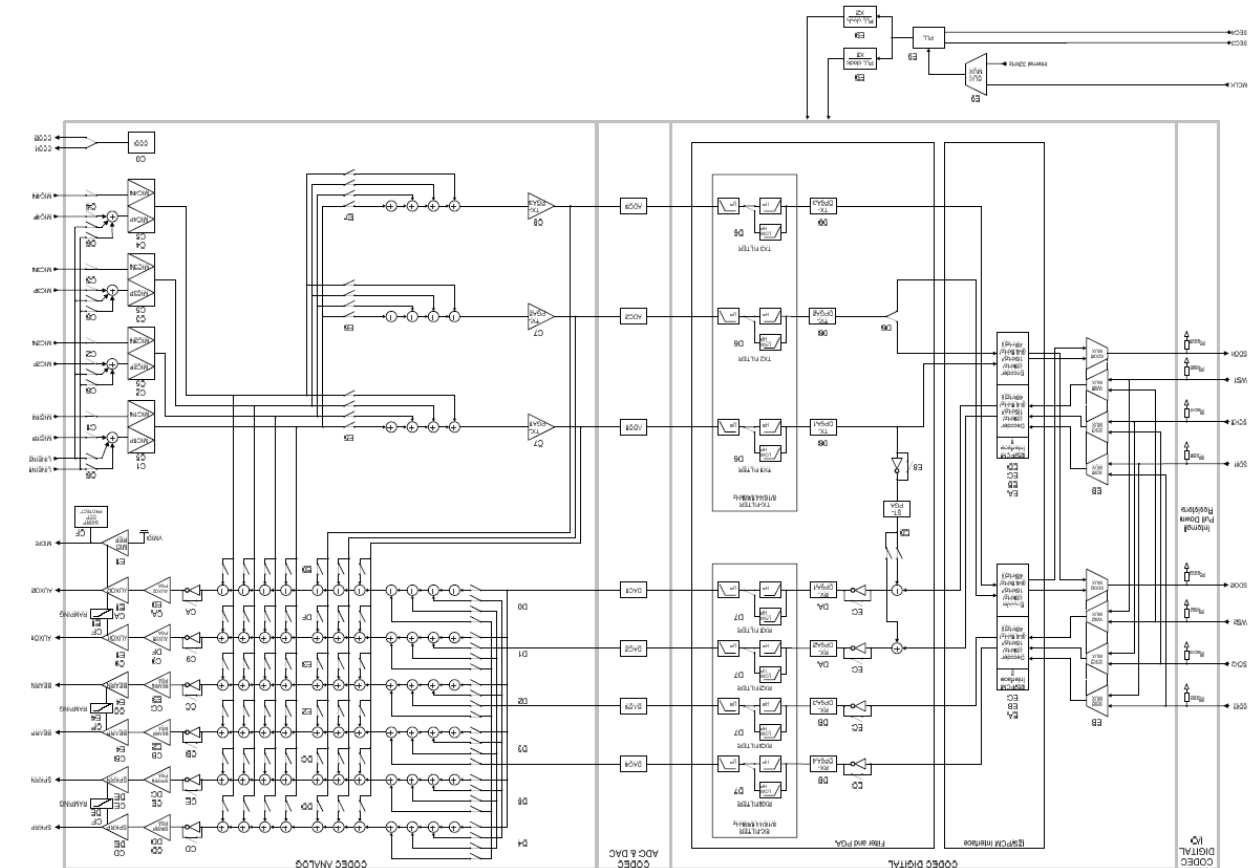
Block Diagram of the SIM Interface:



CODEC Overview

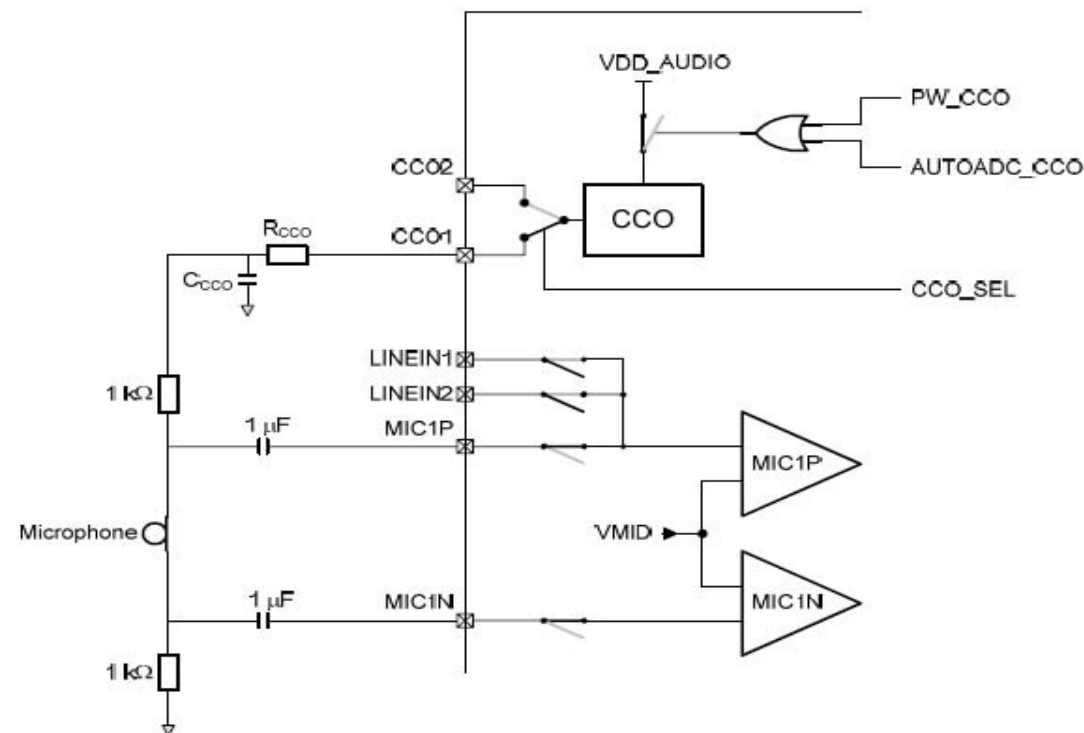
The CODEC is encoding analog audio signals and analog voice signals into digital signals using Analog to Digital converters (ADCs). This is done in the coder section of the CODEC, also named the TX path (transfer section). The CODEC is also decoding digital audio signals and digital voice signals into analog signals using DACs. This is done in the decoder section of the CODEC, also named the RX path (receiver section).

CODEC Block Schematic:



CODEC CCO Voltage Source

There is an internal voltage source CCO that provides the necessary drive current for electret microphones. The voltage source is I²C programmable to 2.2 V or 2.4 V. The source can be disabled during standby. A typical use case with a microphone connected to MIC1 and the CCO is shown in picture below.



Earphone Amplifier

The earphone amplifiers (BEARP and BEARN) are mainly intended to be differentially configured and drive a low impedance dynamic transducer (earpiece) but they can also be single ended configured. The BEARP and BEARN amplifiers can be powered down by the I²C. The amplifiers can exhibit high impedance to 1.4V or low impedance to ground when powered-down. Fifty-one gains are available for BEARP and BEARN: from +15dB down to -60dB in 1.5dB steps. When the BEARP and BEARN outputs are operating in differential mode, an I²C selectable bit must invert one of the inputs.

Speaker Amplifier

The speaker amplifiers, SPKRP and SPKRN, are intended to drive a low impedance (8Ω) speaker in a differential mode or to be used as a stereo configured line output amplifier supporting external high power amplifiers. The output buffer shall exhibit low impedance to ground when powered-down and the current consumption shall be minimal. When the SPKRP and SPKRN outputs are operating in differential mode, an I²C selectable bit must invert one of the inputs.

Digital Baseband Controller (CPU) N2010 (Kajsa)

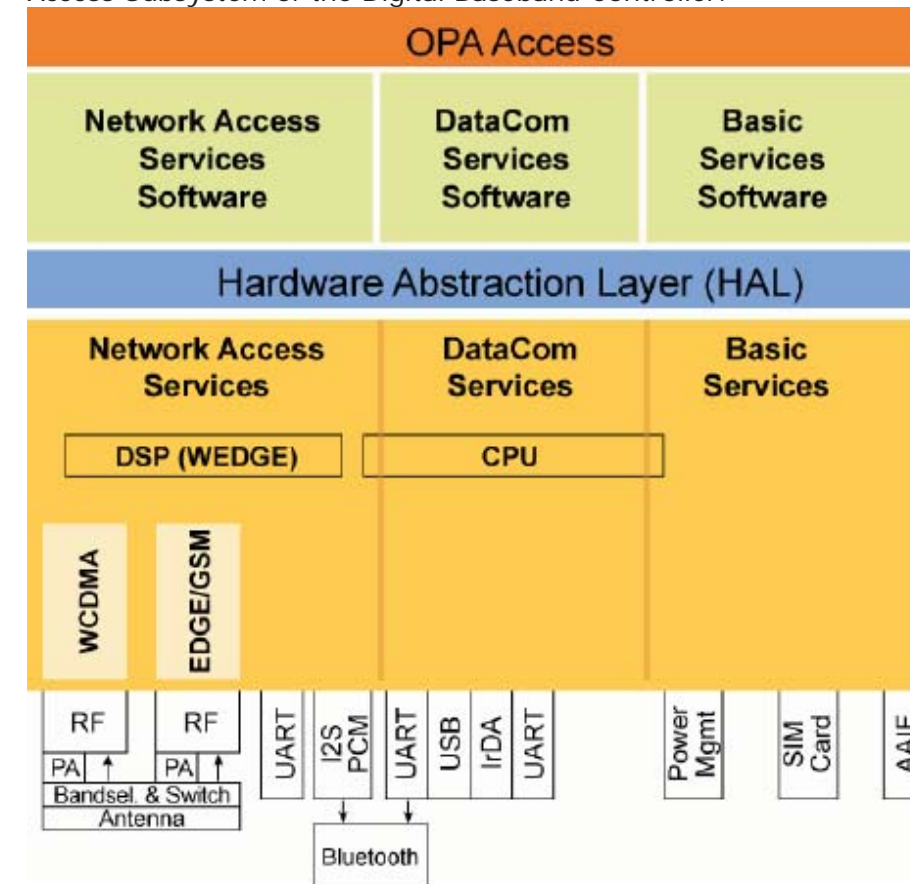
This component is not replaceable on SL 4 because Baseband calibration is required. The Digital Baseband Controller is divided in two subsystems: Access and Application

Access Subsystem

All modem functionality in the digital baseband controller resides in the Access subsystem. This includes EDGE/GPRS/GSM interface, WCDMA interface, USB, IrDA, and other peripheral modules. The control CPU is an ARM926 and a DSP is used for signal processing and layer one control code.

The main communication between the blocks in the Access subsystem is done through the Advanced High-performance Bus (AHB) matrix, which is a set of control buses connecting the different parts together. A block called Syscon is responsible for distributing clocks and resets to all parts of the Access subsystem. This block is under SW control. The Access subsystem is connected to the Shared EMIF, an interface for communication with an external SDRAM. The Shared EMIF is shared between the Access subsystem and the Application subsystem.

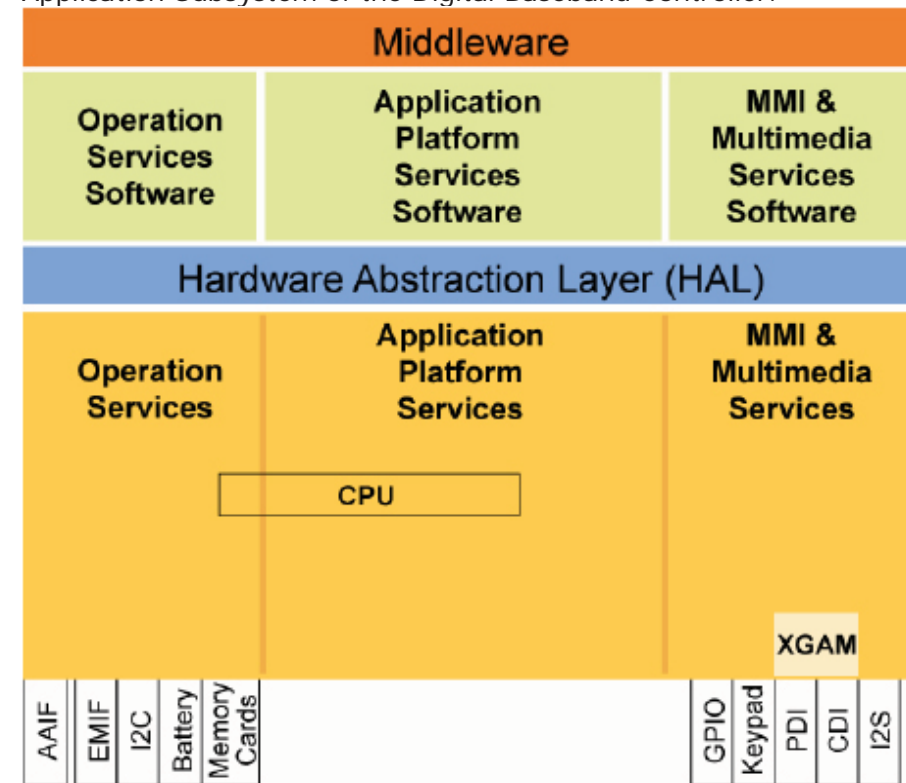
Access Subsystem of the Digital Baseband Controller:



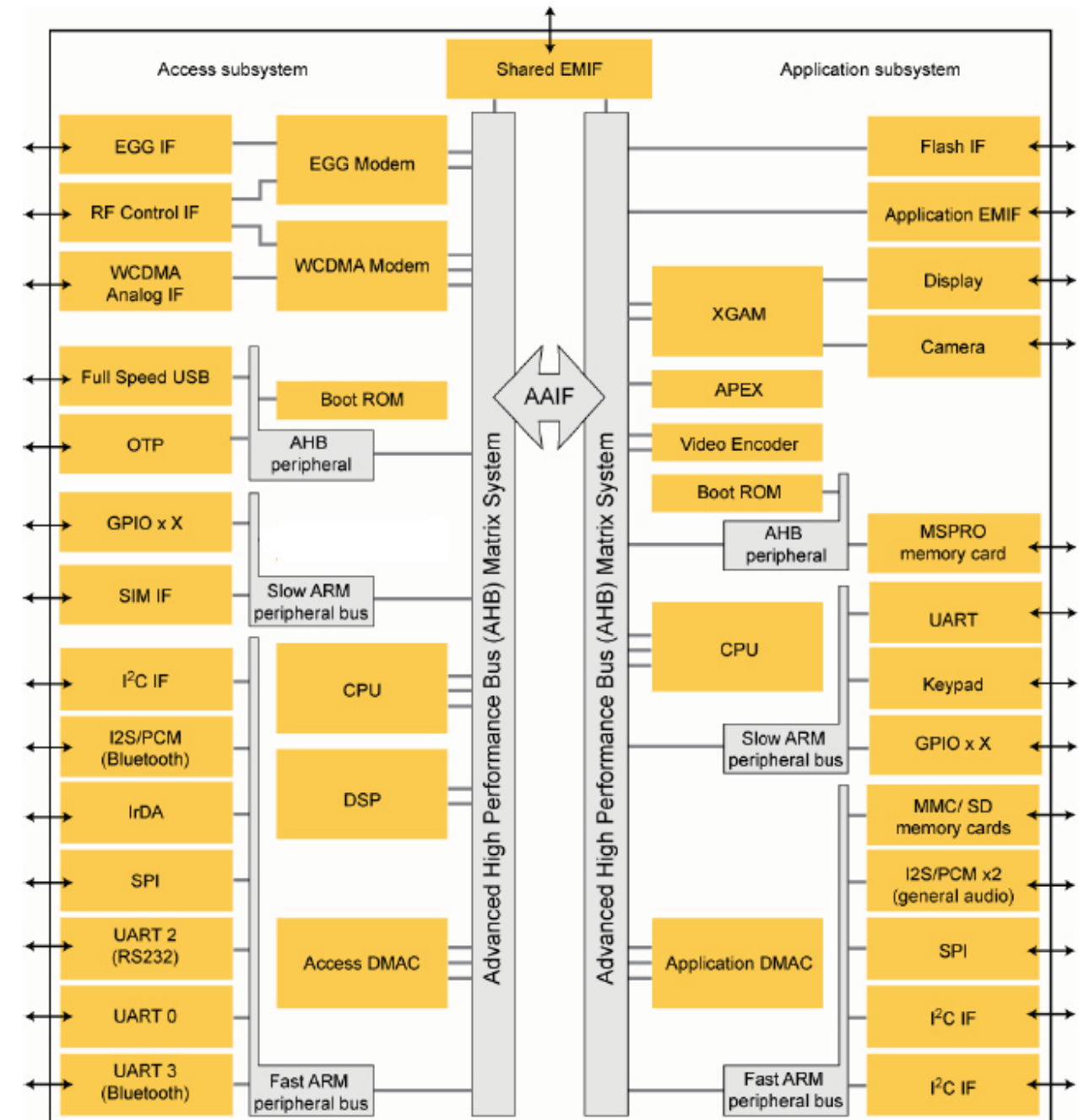
Application Subsystem

The Application subsystem contains functionality related to functions such as MMI, graphics, audio and memory media. The control CPU is an ARM926 with three external memory interfaces, one shared with the Access subsystem and two dedicated for the Application subsystem. The Application subsystem contains several blocks. The main communication between the blocks is done through the Advanced High performance bus (AHB) matrix, which is a set of control buses connecting the different parts. A block called Syscon is responsible for distributing clocks and resets to all parts of the Application subsystem. This block is under SW control. The Application subsystem is connected to the Shared EMIF that is used for code execution or data storage. In addition, a dedicated EMIF that support SDRAM or static memory like NOR, PsRAM or NAND are also available. The Application EMIF is a general interface for communication with, for example external SDRAM, PSRAM, NOR flash, NAND flash and companion chips

Application Subsystem of the Digital Baseband Controller:



The functional blocks of the Digital Baseband Controller:



Keypad

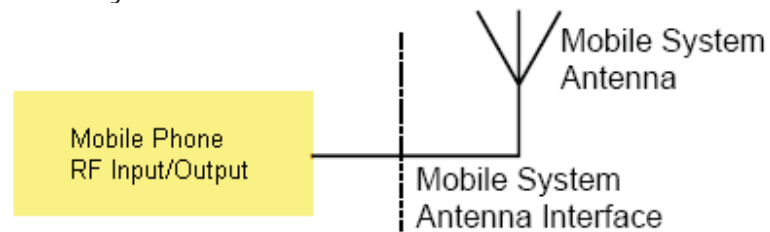
The keypad interface block supports up to 30 keys with 65 columns and 6 rows and operates in both scan and idle mode. The keypad scan is performed by software. Any transition in the state of the column inputs is written directly to the register. The keypad interface differentiates between single key presses, simultaneous presses of any keys with a function key, and any key releases. The period between successive scans is programmable over the range 5 ms to 80 ms, in 5 ms steps. During scan mode, the keypad generates an interrupt whenever a valid keypad state change occurs (including a release of any pressed keys). The scan function is disabled during system power-up. The keypad is able to detect at least four simultaneous key presses. Not all combinations are supported.

Radio Part

Antenna

The mobile system antenna interface connects the Wideband Code Division Multiple Access (WCDMA) and Global System for Mobile Communication (GSM) input/output to the antenna of the Mobile Phone. It is a bi-directional RF interface containing signals in the range 800 MHz to 2.2 GHz. The mobile system antenna interface is the interface between the Mobile Phone Radio Frequency (RF) input/output and the mobile system antenna. The interface handles the GSM 850, EGSM 900, GSM 1800, GSM 1900 and WCDMA Band I, II and V, RF inputs/outputs.

Mobile System Antenna Interface:



Radio Module N1200 (Tiger)

Front End

The Front End block connects the proper block in the radio system to the antenna. The Front End has two inputs for EDGE/GSM/GPRS, one for low band (850/900 MHz) and one for high band (1800/1900 MHz). The EDGE/GSM/GPRS power amplifier output is filtered by the low pass filter in the Front End and then connected to the antenna through a switch. In receive mode, the EDGE/GSM/GPRS signal from the antenna passes through the switch to one of the four receive SAW filters. The SAW filter provides receive band selectivity. In GSM/GPRS/EDGE systems, transmit and receive operations are divided in time and the switch connects the proper block in accordance with the mode of operation (that is, transmit or receive; one at a time).

In WCDMA the transmit outputs from the WCDMA transceiver are filtered by an external SAW filter that cleans up the spectrum. The SAW filter output is connected to the power amplifier, one for each band. For power control, a sample of the transmit output is taken by a directional coupler and converted to a DC level by the power detection circuit. This signal is used to control the transmitter output power. The transmit signal passes through an isolator and then a duplexer. The duplexer output is selected by the switch in the Front End for connection to the antenna. In WCDMA receive mode the signal from the antenna is switched by the Front End to the correct duplexer. The output from the duplexer is connected to the LNA input in the WCDMA receiver.

Transceiver

The transceiver is a multi-mode transceiver for WCDMA/EGDE/GPRS/GSM. The EDGE/GPRS/GSM part of the transceiver use a digital baseband interface that is shared between received and transmitted data. The receive interface is based on I and Q data and the transmitter interface is based on envelope and frequency data. The WCDMA part of the transceiver use differential analog in-phase and quadrature-phase interfaces, which is an IQ-interface, in the receiver and the transmitter data paths.

Frequency Generation

The 26 MHz reference signal is used as the reference for the on-chip synthesizers. To cover the required frequency range, the integrated Voltage Controlled Oscillator (VCO) operates at twice the frequency for band 1800/1900/2100, and at four times the desired frequency for band 800/900. The two synthesizers are controlled through the serial bus from the access side of the digital baseband controller.

EDGE/GPRS/GSM Transmitter Part

Polar modulation transmitter architecture based on the direct phase/frequency modulation/synthesizer architecture is implemented for GSM, GPRS and EDGE. This architecture has the capability of generating both the GSM/GPRS constant envelope GMSK modulation and the linear EDGE 8-PSK modulation in a very cost efficient way. The motivation for a polar modulation transmitter architecture compared to traditionally linear architectures is to reduce the output noise (thus eliminating the need for off-chip filters) reduce the power consumption by utilizing non-linear switching analog signal processing blocks, and to eliminate the need for an RF isolator.

In brief, the phase/frequency modulator in this polar modulation architecture is a sigma-delta controlled fractional-N frequency synthesizer with an additional frequency insertion point after the loop filter at the input of the VCO. The Phase-locked Loop (PLL) has two information inputs: the divider ratio in the feedback path and a direct path to the VCO. The phase locked loop generates the radio frequency carrier including the phase modulation information at the desired channel frequency.

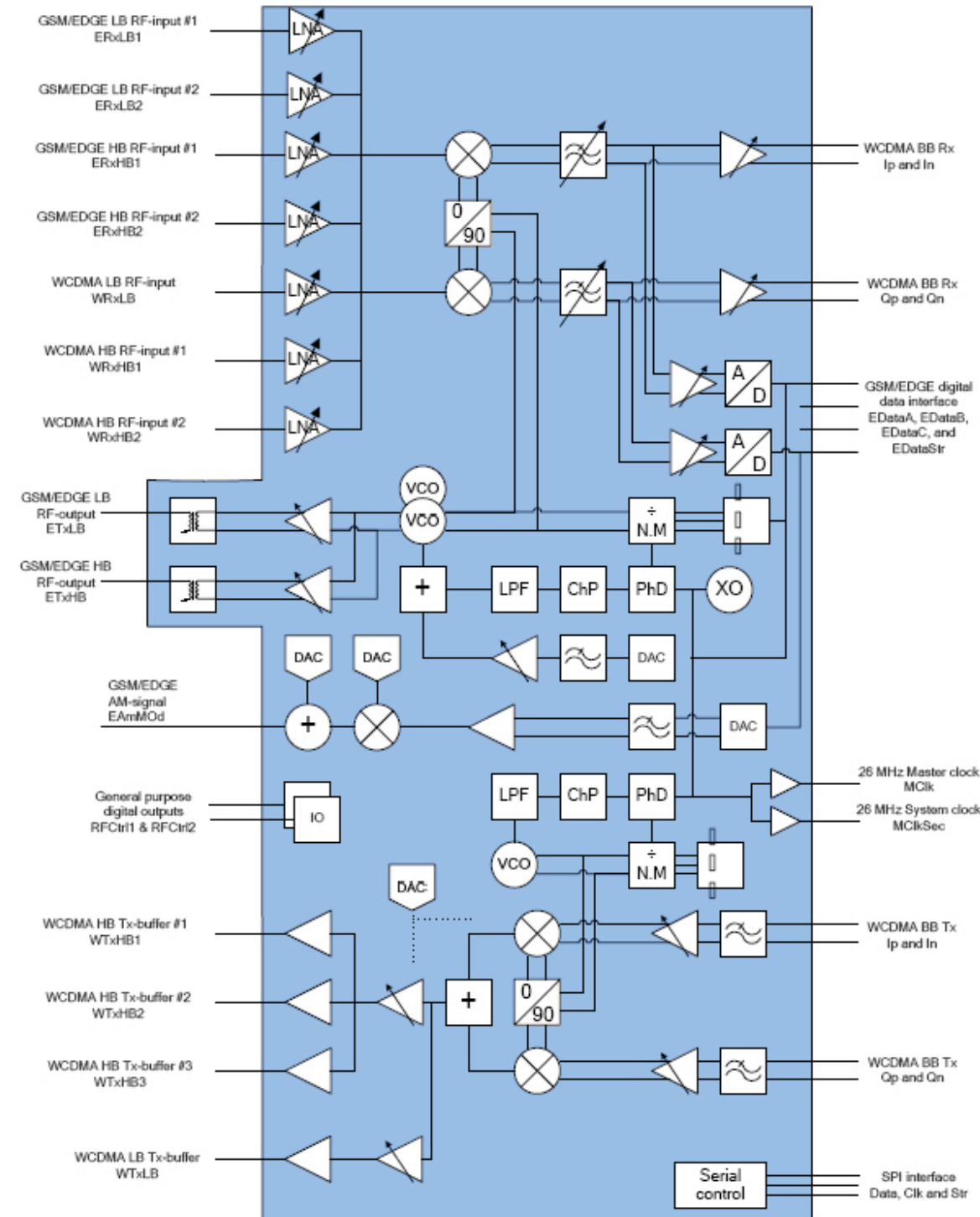
WCDMA Transmitter Part

The WCDMA transmitter architecture is an on frequency linear direct up-conversion IQ-modulator. The in-phase and quadrature-phase reconstruction filters are fully integrated and a programmable gain amplifier implements the gain control. An external SAW filter between the WCDMA circuit and the power amplifier is used to improve noise performance. After the power amplifier, the signal is sent through an isolator and through the duplex filter, which directs the transmit signal to the antenna connector through the antenna switch. The supply voltage and bias of the power amplifier are adapted depending on the output power to achieve high efficiency at every transmitter power level. A high efficiency DC/DC converter regulates the supply voltage and the bias operation point is controlled by a D/A-converter in the WCDMA radio circuit.

Receiver Part

The receiver architecture is a direct down-conversion zero-IF receiver with integrated low-pass filters. The complete receiver with seven Low Noise Amplifiers (LNAs), one for each supported band, is integrated on chip. After the down-conversion, the in-phase and quadrature-phase components are low pass filtered and if the receiver is in EDGE/GPRS/GSM mode the signals are fed to the integrated high dynamic range sigma-delta A/D-converters.

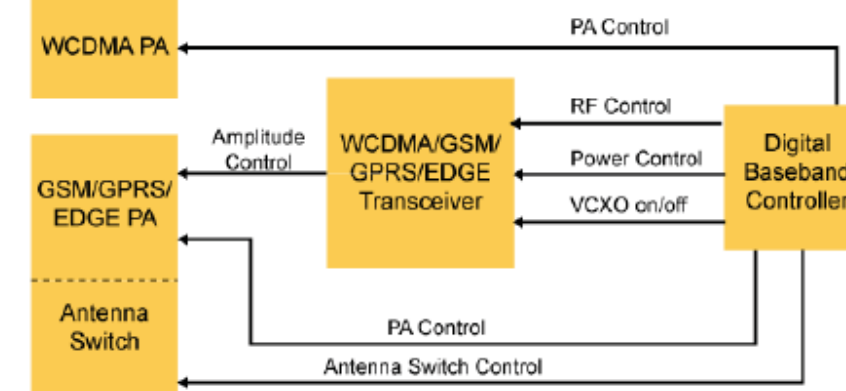
Ericsson RF 3300 Block Diagram:



RF System Control

The access side of the digital baseband controller controls the overall radio system. In both EDGE/GSM/GPRS and WCDMA air interface mode, the digital baseband controller controls the radio system through a three-wire serial bus. The digital baseband controller also manages PA band control and the antenna switch mechanism in the front end module. The 26 MHz VCXO clock residing in the transceiver is turned on only when required and initiated by the digital baseband controller.

The control flow for the RF system:



EDGE/GPRS/GSM

TX Frequency, Channel and Power Level Range:

GSM 850:

TX Frequency Range: 824,2 MHz – 848,8 MHz
Channel Range TX: 128 – 251
Power Level: Min 19 – Max 5

GSM 900:

TX Frequency Range: 890,2 MHz – 914,8 MHz
Channel Range TX: 1 - 124
Power Level: Min 19 – Max 5

EGSM 900:

TX Frequency Range: 880,2 MHz – 889,8 MHz
Channel Range TX: 975 - 1023
Power Level: Min 19 – Max 5

DCS 1800:

TX Frequency Range: 1710,2 MHz – 1784,8 MHz
Channel Range TX: 512 – 885
Power Level: Min 15 – Max 0

PCS 1900:

TX Frequency Range: 1850,2 MHz – 1909,8 MHz
Channel Range TX: 512 - 810
Power Level: Min 15 – Max 0

RX Frequency and Channel Range:

GSM 850:

RX Frequency Range: 869,2 MHz – 893,8 MHz
Channel Range RX: 128 – 251

GSM 900:

Frequency Range: 935,2 MHz – 959,8 MHz
Channel Range RX: 1 - 124

EGSM 900:

RX Frequency Range: 925,2 MHz – 934,8 MHz
Channel Range RX: 975 – 1023

DCS 1800:

RX Frequency Range: 1805,2 MHz – 1879,8 MHz
Channel Range RX: 512 – 885

PCS 1900:

RX Frequency Range: 1930,2 MHz – 1989,8 MHz
Channel Range RX: 512 - 810

WCDMA

Note! WCDMA Network support depends on variant and market.

TX and RX Frequency and Channel Range**Band I:**

Channel Range TX: 9612 - 9888
TX Frequency Range: 1920 – 1980 MHz
Channel Range RX: 10562 - 10838
RX Frequency Range: 2110 – 2170 MHz

Band II:

Channel Range TX: 9262 - 9538
TX Frequency Range: 1850 – 1910 MHz
Channel Range RX: 9662 - 9938
RX Frequency Range: 1930 – 1990 MHz

Band IV:

Channel Range TX: 1312 - 1513
TX Frequency Range: 1710 – 1755 MHz
Channel Range RX: 1537 – 1738
RX Frequency Range: 2110 – 2155 MHz

Band V:

Channel Range TX: 4132 – 4233
TX Frequency Range: 824 – 849 MHz
Channel Range RX: 4357 – 4458
RX Frequency Range: 869 – 894 MHz

Band VIII

Channel Range TX: 2712 – 2863
TX Frequency Range: 880 – 915 MHz
Channel Range RX: 2937 – 3088
RX Frequency Range: 925 – 960 MHz

Bluetooth and FM Radio

The Blt/FM Radio circuit combines Bluetooth and FM tuner functionality into one.

Bluetooth

The Bluetooth implementation is compliant with Bluetooth specification 2.1 + EDR. The Bluetooth™ transceiver has frequency channels with 1 MHz separation from 2402 to 2480 MHz. The same band is used for both transmission and reception. This gives 79 frequency channels.

Receiver

The Bluetooth section implements a low-IF receiver for Bluetooth modulated input signals. The radio signal is taken from a balanced RF input and amplified by an LNA. The mixers are driven by two quadrature LO signals, which are locally generated from a VCO signal running at twice the frequency. The I and Q mixer output signals are band pass filtered by a poly-phase filter for channel filtering and image rejection. The output of the band pass filter is amplified by a VGA to the optimal input range for the A/D converter. Further channel filtering is done in the digital part. The digital part demodulates the GFSK, π/4-DQPSK or 8-DPSK coded bit stream by evaluating the phase information. RSSI data is extracted. Overall automatic gain amplification in the receive path is controlled digitally. The RC time constants for the analog filters are automatically calibrated on chip.

Transmitter

The transmitter uses the serial transmit data from the Bluetooth Controller. The transmitter modulator converts this data into GFSK, π/4-DQPSK or 8-DPSK modulated I and Q digital signals for respectively 1, 2 and 3 Mbps transmission speed. These signals are then converted to analog signals that are low pass filtered before up-conversion. The carrier frequency drift is limited by a closed loop PLL.

FM Radio**FM Receiver**

The receiver uses a digital low-IF architecture. The receive (RX) section integrates a low noise amplifier (LNA) supporting the worldwide FM broadcast band (76 to 108 MHz). An automatic gain control (AGC) circuit controls the gain of the LNA to optimize sensitivity and rejection of strong interferers. An image-reject mixer down converts the RF signal to low-IF. The quadrature mixer output is amplified, filtered and digitized with high resolution analog-to-digital converters (ADCs). This advanced architecture allows the use of digital signal processing (DSP) to perform channel selection, FM demodulation and stereo audio processing.

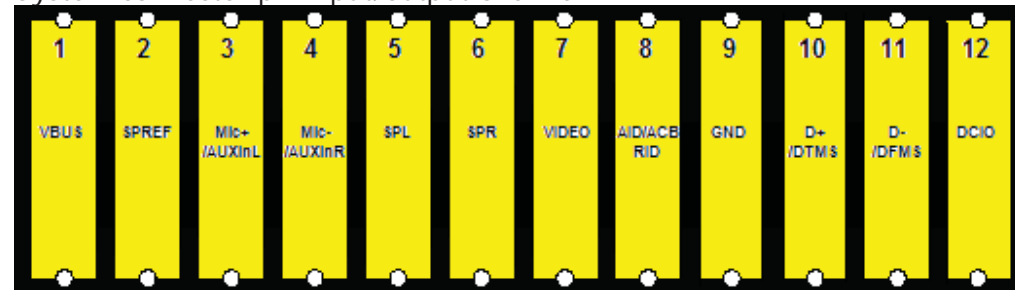
Tuning

The receiver uses frequency synthesizer technology including a completely integrated VCO. The frequency synthesizer generates the quadrature local oscillator signal used to downconvert the RF input to a low intermediate frequency. The VCO frequency is locked to the reference clock and adjusted with an automatic frequency control (AFC) servo loop during reception. The tuning frequency is defined as: Freq (MHz) = Spacing (kHz) × Channel + Bottom of Band (MHz)

External Connectors

External units are connected to the transceiver by means of a 12-pin connector on the bottom of the phone.

System connector pin input/output overview:



Clocks

Clock Distribution

The clocking for the access and application subsystems is separated. This means that the subsystems can wake up or go to sleep mode independently. The access subsystem is clocked by the 26 MHz Voltage Controlled Crystal Oscillator (VCXO) located in the GSM/EDGE circuit. When the access subsystem has a job to do, the Master Clock (MCLK) signal is requested from the RF part. Most other clocks needed within the access subsystem are generated from the MCLK. Some minor parts like sleep timer and cable detect use the 32 kHz real-time clock. The 32 kHz real-time clock clocks the application subsystem, and all other internal clocks needed within the application subsystem are generated from this clock. However, when audio is transferred between the application and the access subsystems, the MCLK is used.

Master Clock (26 MHz)

The 26.00 MHz VCXO-based MCLK is distributed as a square wave signal from the GSM/EDGE circuit. In order to have full control over the load on the MCLK, only the access side of the digital baseband controller is allowed to request the MCLK. However, by indirect means also the application side CPU can issue the request. A VCXO-based square wave is also distributed to the WCDMA circuit, but is turned on only upon a command from the digital baseband controller.

Real-time Clock (32.768 kHz)

A 32.768 kHz crystal oscillator provides a low frequency clock whenever the platform has power. This clock is used to keep the Real-Time Clock (RTC) block functioning, so that the platform can keep track of the time and date. The low frequency clock is generated in the analog baseband controller and distributed to the digital baseband controller, and if necessary to external devices like Bluetooth, FM radio and A-GPS.

A-GPS

The Assisted GPS functionality in the phone is realized with the Global Locate Hammerhead GPS module. The Global Locate Hammerhead belongs to the Type 2 GPS solutions. The PMB 2525 Hammerhead II GPS IC is a GPS single chip device containing a complete radio frequency front-end as well as the signal processing functionality in a single die. The device allows the usage of assistance data by supporting A-GPS (assisted GPS) standards (RRLP, RRC, OMA SUPL). One of three serial interfaces, UART, I²C or SPI, is used for communication with the host system.

Clock Reference Frequency

The platform provides two reference frequencies, a 32.768 kHz clock (RTCCLK) from the Analog Baseband Controller, and a 26 MHz reference clock (SYSCLK) from the Digital Baseband Controller. The RTCCLK is used by the phone real time clock function. The RTCCLK is distributed to the A-GPS module as a logical square wave. SYSCLK is derived from the reference modulation clock MCLK to the platform access system and is distributed from the Digital Baseband Controller to the A-GPS module. This 26 MHz clock is synchronized with the cellular network to an accuracy of ± 0.1 ppm. Automatic frequency updates can also cause large frequency corrections, with associated phase discontinuities. In order to isolate the A-GPS module for the unstable effects of SYSCLK, an external reference clock is required. This external reference frequency provided by a TCXO is required to provide a clock with very high short term stability. The frequency of the TCXO is calibrated against the cellular reference clock by the A-GPS module enabling the use of a more economical less accurate TCXO.

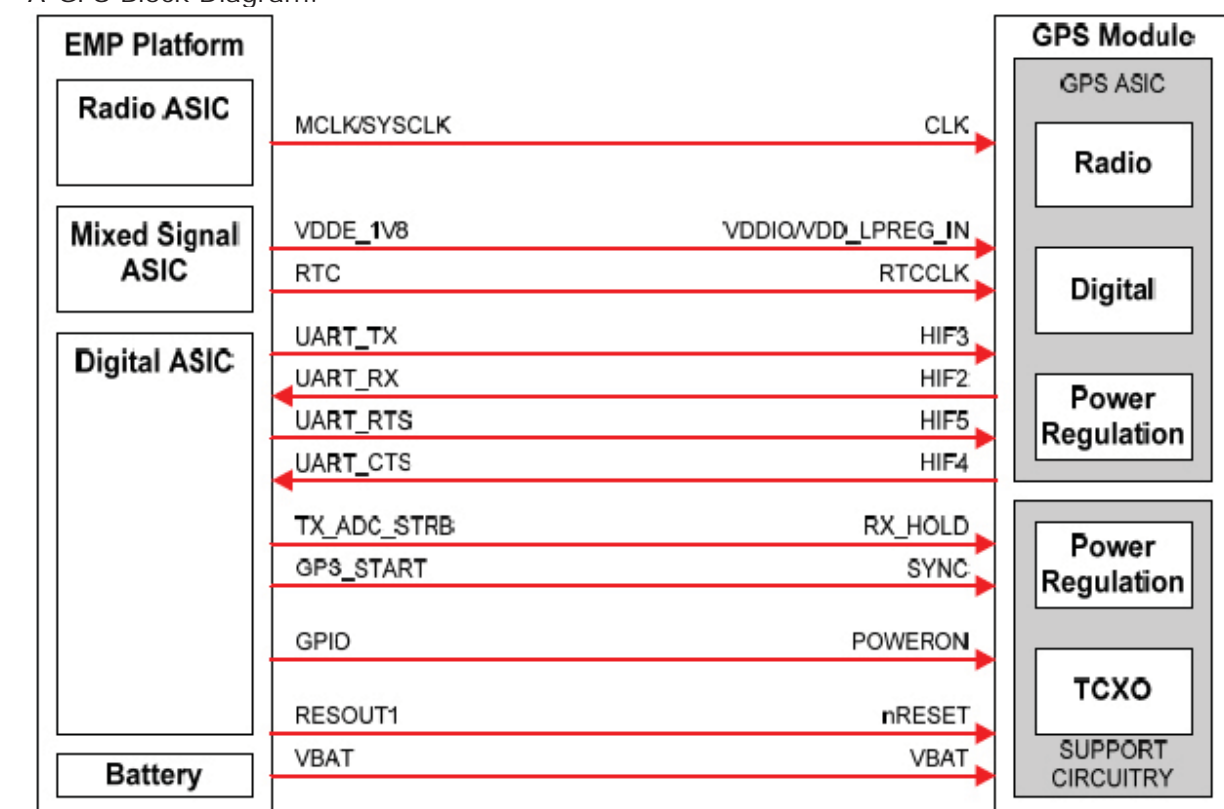
Interface and Control

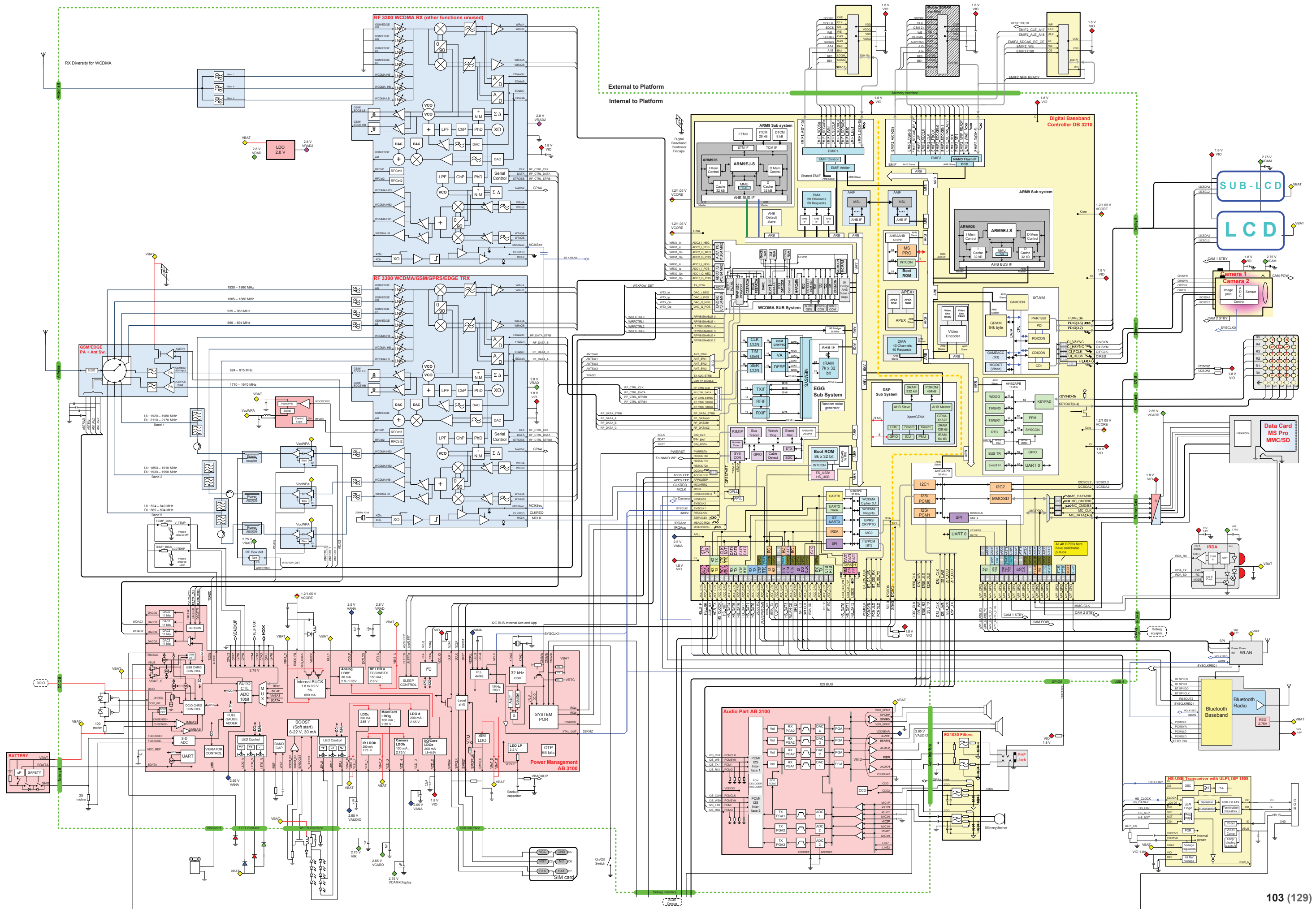
The Interface and control consists of system timing and control. The control interface includes a communication link where both data and control information are transferred between platform and the A-GPS module. Data and command information is transferred using a full-duplex Universal Asynchronous Receiver Transmitter (UART) interface.

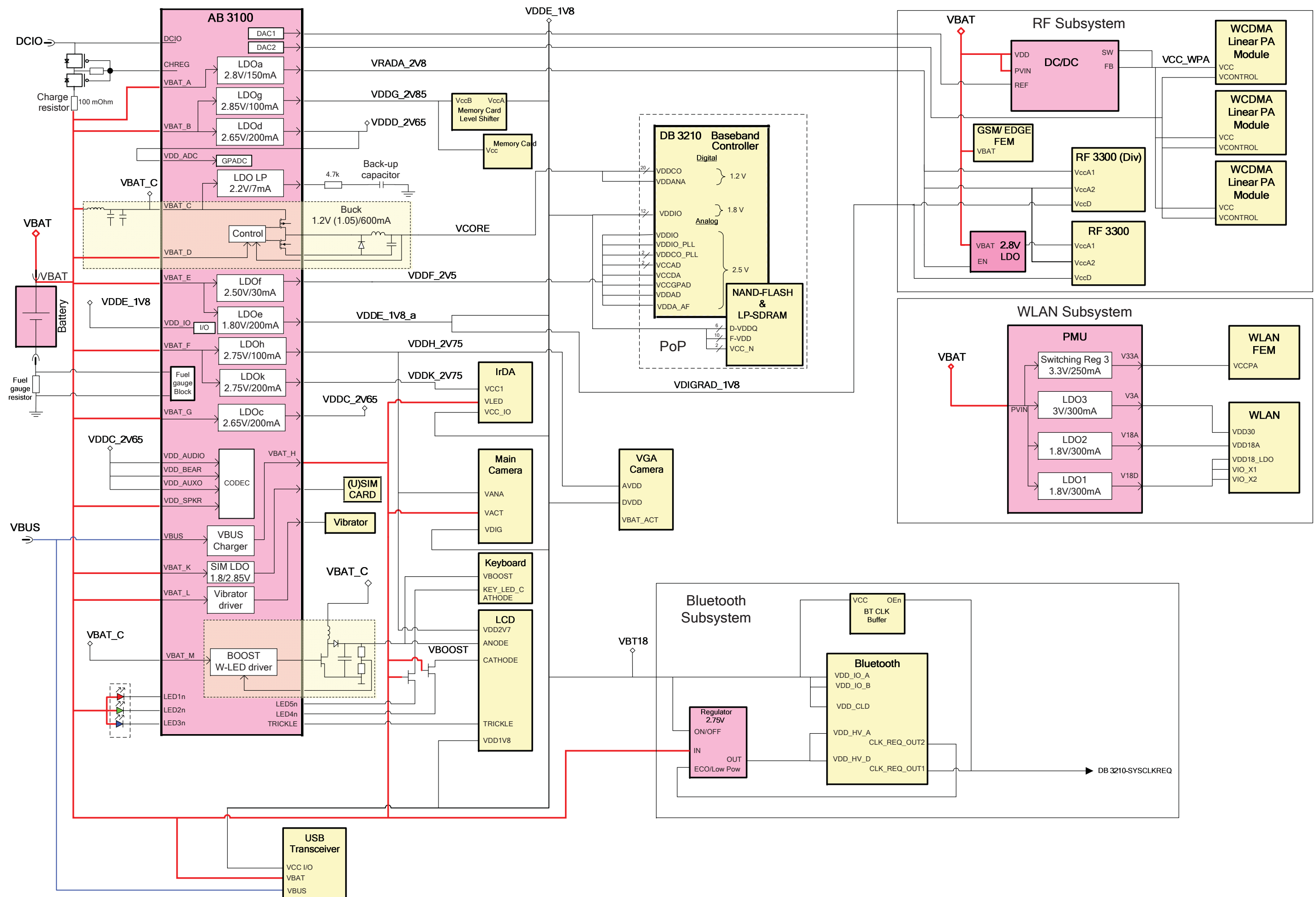
Other control signals include the following:

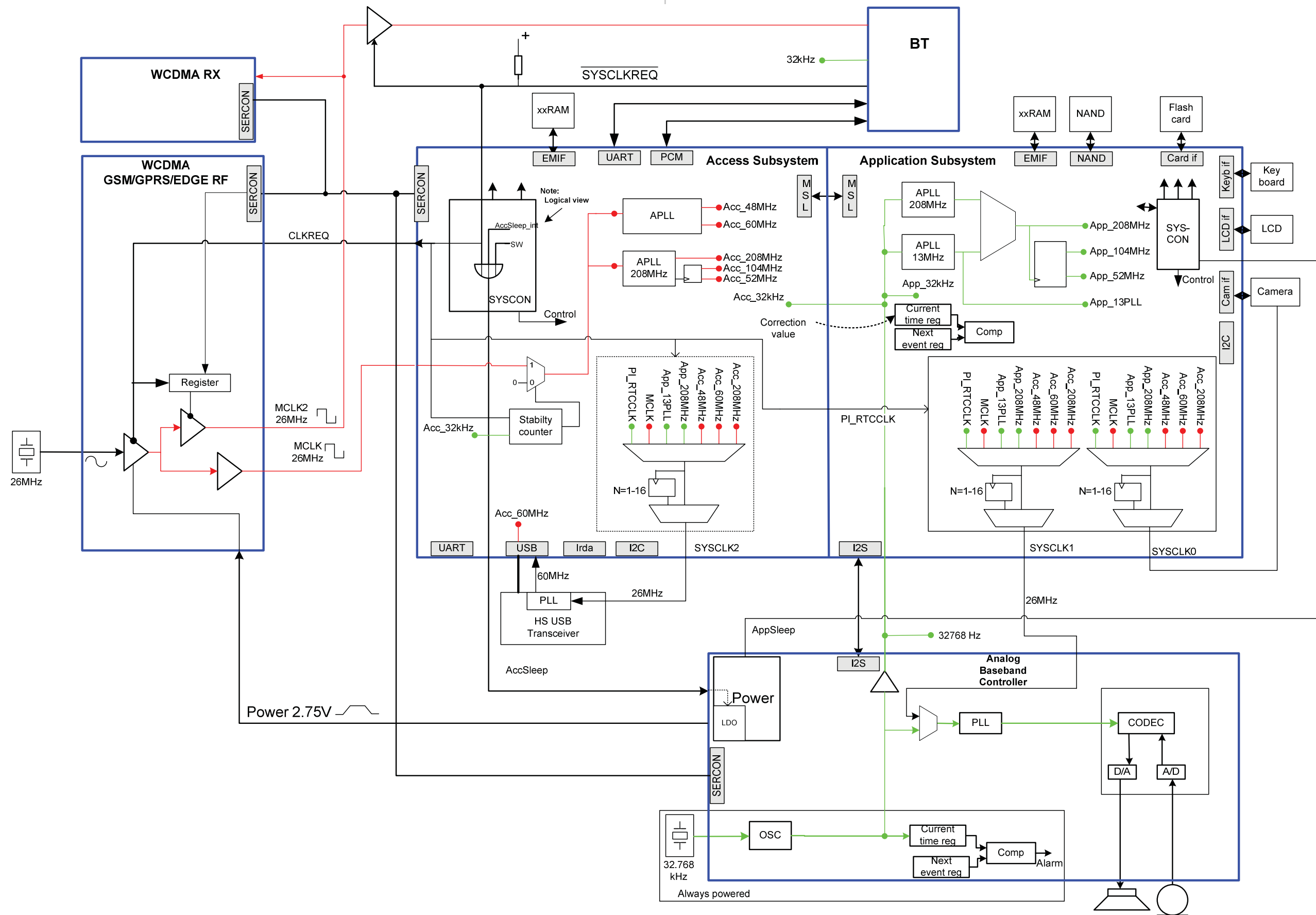
- A GPIO or platform reset used as a reset signal (nRESET) to the GPS module.
- A Transmission On signal (TXON/ RX_HOLD), is used to indicate to the A-GPS module when the ME is transmitting. The A-GPS modules receiver is disabled whilst the ME is transmitting.
- A hardware timing pulse (GPSSTART/SYNC) providing the A-GPS module with a highly accurate timing reference. The A-GPS is able to accurately synchronize its GPS time to this reference pulse.
- A GPIO used as an enable (POWERON) signal to the GPS module.
- A GPIO used for power control for the GPS module.

A-GPS Block Diagram:









Replaceable Components

EXPLANATION OF ABBREVIATIONS USED IN THE COLUMN 'COMMENTS' BELOW

COMPONENT LOCATION

P = Primary Side

S = Secondary Side

REPAIR METHOD

HA = Hot Air (removal & mounting)

HA/ST = Hot Air for removal - Soldering Tool for mounting

BH = Bottom Heat

BGA = BGA Station

CALIBRATION

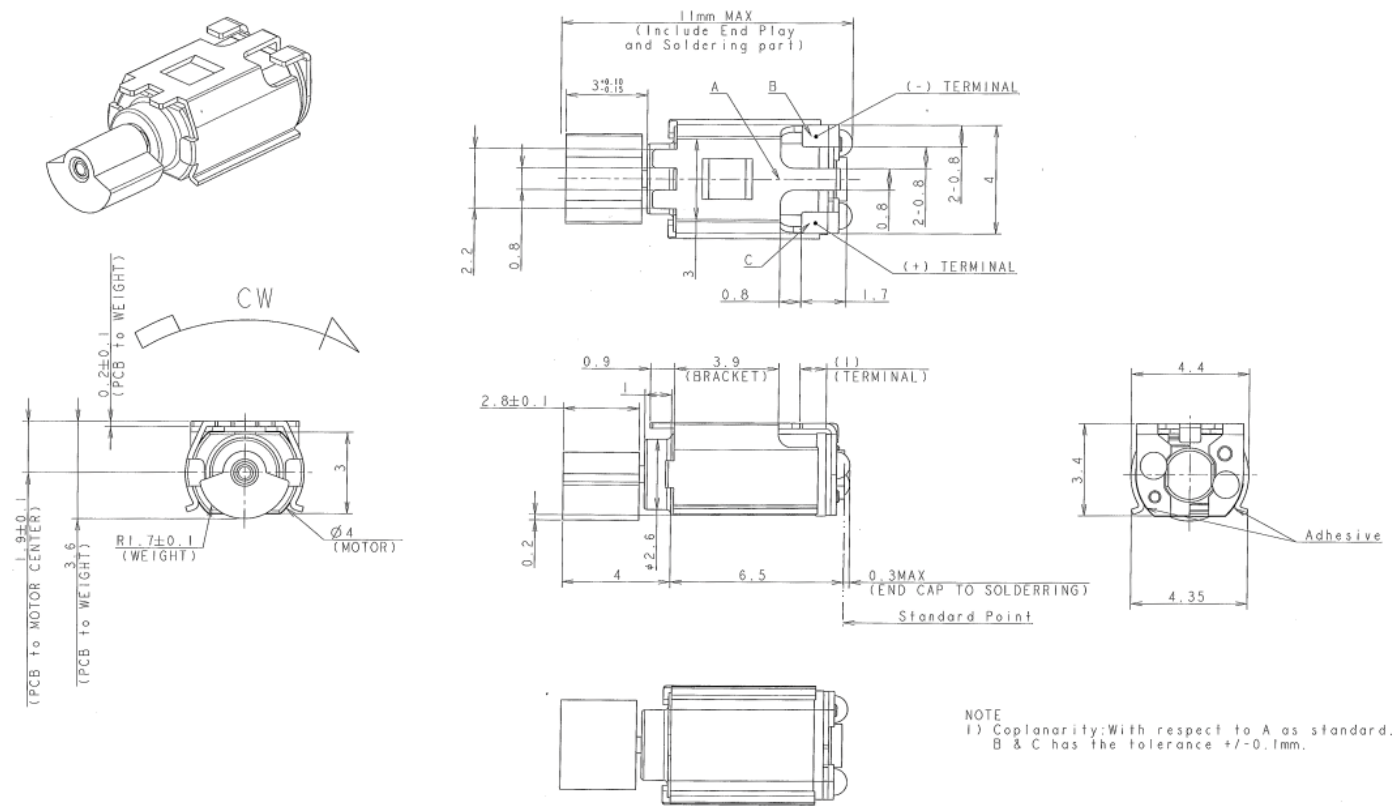
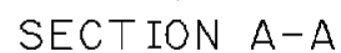
C = Calibration of the phone is required after replacing the component

Calibration to be done by authorized centers only!

Position	Designation	Part no.	Comments	Page
B3100	Microphone	1206-4070	S HA+BH	107
B4200	SMD Vibrator	1202-9271	P HA+BH	107
B4410	IC Flip Sense	RYN901920/1	S HA	107
C2439	Capacitor Ceramic 1,0 uF +/-10% 25,0 V	RJC5163237/1	S HA	
C2440	Capacitor Ceramic 1,0 uF +/-10% 25,0 V	RJC5163237/1	P HA	
E1000	Shield Can	1216-2817	S BGA	
E1002	Shield Can	1216-2817	S BGA	
L1200	Inductor Wirewound	1203-0322	S HA	108
L2200	Inductor Wirewound 4.7 ##H	1200-2190	S HA	108
L2260	120ohm 0603 2A 50mohm Bead	REG70605/15R1	S HA	
L2261	Inductor Wirewound 4.7 ##H	1200-2190	S HA	108
L2401	Inductor	REG70618/20	P HA	108
L2402	Inductor	REG70618/20	P HA	108
L2403	Inductor	REG70618/20	P HA	108
L2404	Inductor	REG70618/20	P HA	108
L2406	1kohm 0402 0.2A 0.9ohm	REG70618/4	P HA	108
L2408	Transformer	REG70609/06	P HA	108
L2468	Filter 1.0 GHz 0402	REG70618/18	S HA	
L4102	Inductor Wirewound	1206-2128	S HA	108
L4200	Inductor Wirewound	REG7245372/22	S HA	108
N1200	Pre-bumped Tiger Band 1,8 Tiger 1,2,5	1218-1880 1218-1883	S BGA C S BGA C	
N1210	IC Linear	1203-5870	S HA	109
N1211	IC Voltage Regulator	1204-5903	S HA	109
N1300	Bluetooth and RDS FM radio tuner	1200-9840	P BGA	110
N2200	IC Vreg MAX8640, 1.8V	1200-6420	S HA	110
N2203	IC Vreg	1200-0110	S HA	110
N2206	IC Voltage Regulator	1204-5903	S HA	109
N2210	LDO, 3.0V, 150mA, CS-4	RYT113955/7	S HA	111
N2271	IC Voltage Regulator	1200-2008	S HA	111

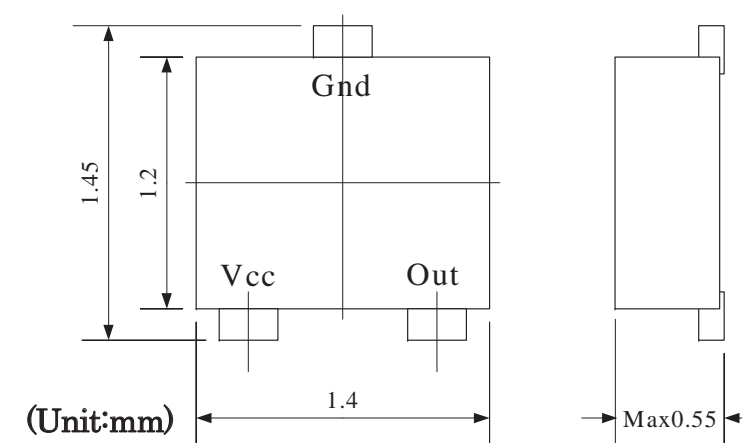
Position	Designation	Part no.	Comments	Page
N2290	IC Voltage Regulator	RYT113997/4	S HA	111
N2410	IC IF 3.5x3.5x0.8 thin QFN	1200-1951	P HA	112
N2411	ASIC Accelerometer	1202-1676	S HA	112
N2420	IC IF ISP1508 ES3 (3.5*3.5*0.8)	1200-1694	S HA	112
N2421	IC ESD Prot UDFN 6 2x2 mm	1200-6309	S HA	113
N2422	ASIC Baseband	1201-4120	S HA	113
N3100	IC FLIP CHIP 9-PIN	1200-4100	S HA	113
N3101	ASIC Tjatte3 CSP20	ROP1013074/1R1A	S HA	114
N4201	Transistor	RYN901936/1	S HA	114
N4240	IC IF Micropak-6	1216-1590	S HA	114
N4401	IC Dri CS-16	1212-3512	S HA	114
R2449	Resistor 0, Ohm +/-50m 63 mW K0603	REP623001/0	P HA	114
R2490	Resistor 0.0 Ohm +/-5% NA mW K0402	REP622001/0	P HA	
S2403	Input Switch	1214-8115	S HA/SI BH	115
V2202	Transistor	RYN122910/1	P HA	115
V2412	Diode	RKZ223905/2	P HA	115
V2413	Diode Protection 0.7 V SOD-882	1201-2253	P HA	115
V2417	Diode	RKZ223905/2	P HA	115
V2420	Diode	1201-8440	S HA	115
V2421	Diode	1201-8440	S HA	115
V2430	Diode	1201-8440	P HA	115
V2470	Diode Schottky 0,28 V	1200-2065	S HA	115
V4110	LED White	1222-1832	P HA/BH C	116
V4111	LED White	1222-1832	P HA/BH C	116
V4200	Trans Array	1200-0320	S HA	116
V4310	LED Red	RKZ433942/1	P HA	116
V4350	LED	1216-9185	S HA	116
V4360	LED	1216-9185	S HA	116
W1300	Filter	RTN202941/1	P HA	117
X1000	Conn Leaf Spring	1201-4841	S HA	117
X1002	Conn Leaf Spring	1201-4841	S HA	117
X1003	Conn Leaf Spring	1201-4841	S HA	117
X1010	Conn Leaf Spring 1p	1202-1053	S HA	117
X1011	Conn Leaf Spring 1p	1202-1053	S HA	117
X1030	Conn Pogopin 1p	1216-2306	P HA	117
X1040	Conn Leaf Spring 1p	1216-7957	P HA	
X1041	Conn Leaf Spring 1p	1216-7957	P HA	
X1200	Antenna switch conn	RPT79947R1A	P HA/ST	118
X1210	Conn Pogopin 1p 3.5 mm	1218-4490	P HA	118
X1300	Conn Pogopin 2p	1214-8705	P HA BH	118
X2400	Conn BtB Receptacle 16p	1214-7370	S HA BH	118
X2403	Memory Card Conn	RNK87147/2R2B	S BGA	119
X3102	Conn Pogopin 2p	1214-8705	P HA BH	119
X4202	Conn BtB Receptacle 90p	1212-6578	S BGA	119
X4300	Conn BtB Receptacle 42p	1213-6796	S BGA	120
Z2400	Filter	1225-1423	S HA	120

B4200 Vibr Bar Analog DC W350 BSY-3242 1202-9271



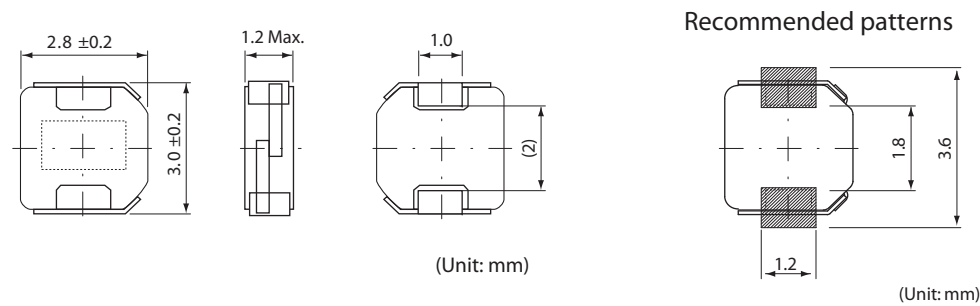
NOTE
1) Coplanarity: With respect to A as standard.
B & C has the tolerance $\pm 0.1\text{mm}$.

B4410 IC 1000-8451



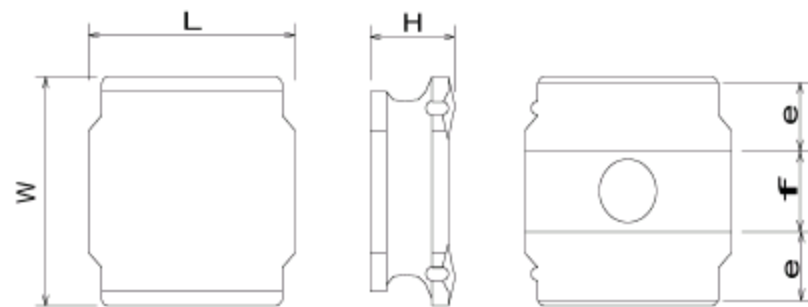
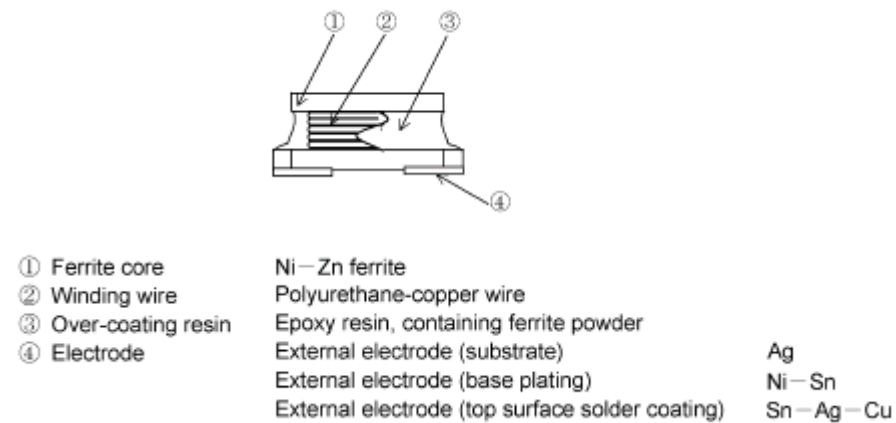
L1200 Inductor WW 2,2 uH 20% 3.0X2.8X1.2 1203-0322

Dimensions in mm and tolerance 0.2 mm unless noted. Weight: 41 mg



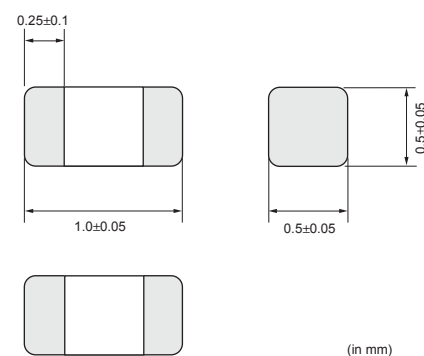
L2200, L2261 Ind WW 4,7 uH 3.0X3.0X1.0 1200-2190

Dimensions in mm and tolerance 0.1 mm unless noted.

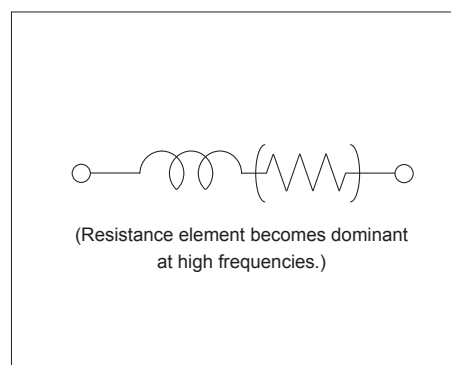


L2401-04 Ind Chip 0.0 H +/- 25% 0402 1200-0317

Dimension

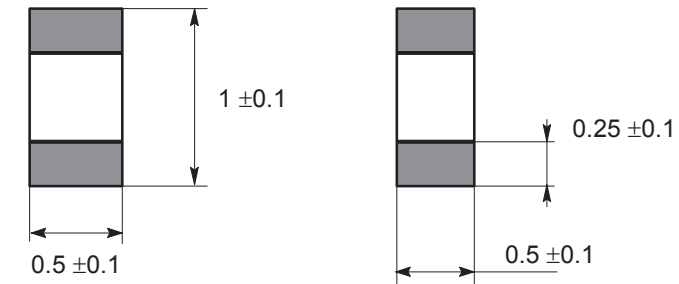


Equivalent Circuit



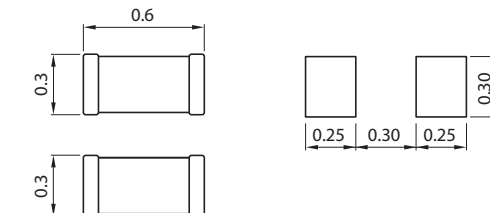
L2406 1kohm 0402 0.2A 0.9ohm Bead 1000-2601

Dimensions in mm.



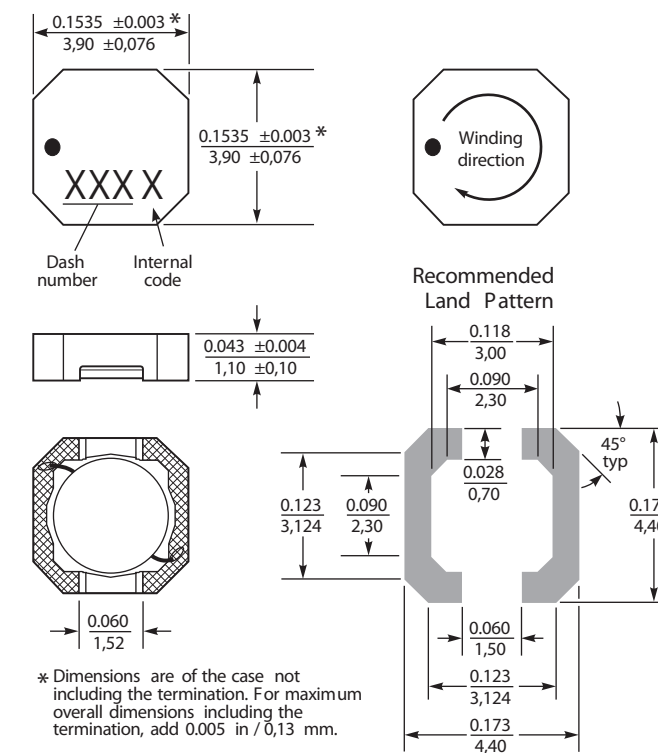
L2408 Tformer +/- 25% 0, H K0201 1203-0723

Dimensions in mm.

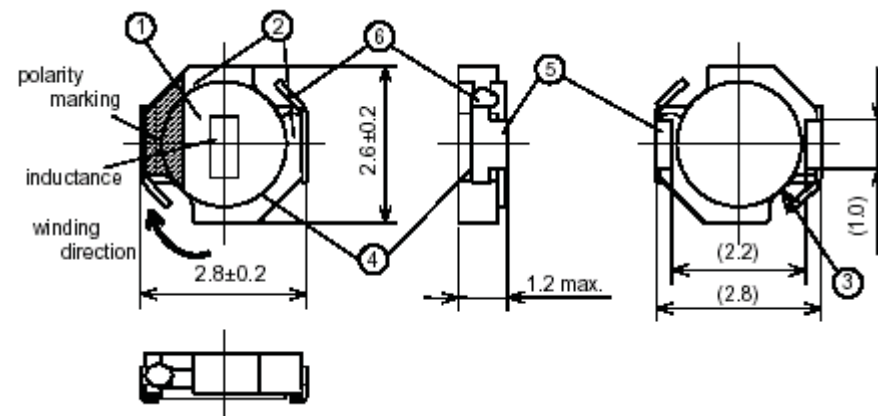


L4102 Ind WW 2.2 uH 20% 3.9X3.9X1.1 1206-2128

Dimensions in mm and tolerance 0.1 mm unless noted.



L4200 22uH 2.6x2.8x1.2 0.33A 0.76ohm 1000-0130

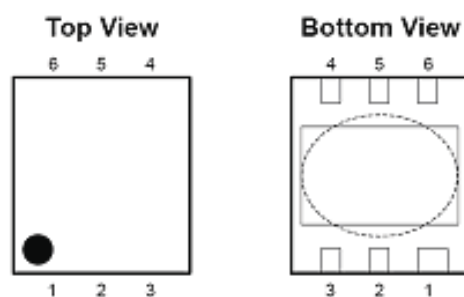


6	SOLDER	Sn:Cu
5	TERMINAL	TINNED PHOSPHOR BRONZE (t=0.08mm, Ni 0.5µm+ Sn: 4µm)
4	GLUE	EPOXY
3	WINDING WIRE	ENAMELLED COPPER WIRE
2	SHIELD CORE	FERRITE
1	DR CORE	FERRITE
No.	ITEM	MATERIAL

N1211, N2206 IC Vreg PLP1820-6 1204-5903

PIN CONFIGURATIONS

• PLP1820-6



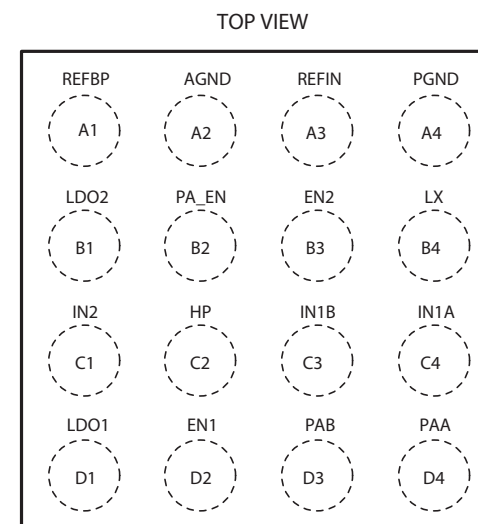
• PLP1820-6*

Pin No.	Symbol	Description
1	V_{OUT}	Output Pin
2	V_{OUT}	Output Pin
3	GND	Ground Pin
4	CE	Chip Enable Pin
5	V_{DD}	Input Pin
6	V_{DD}	Input Pin

* Tab in the parts have GND level.
(They are connected to the back side of this IC.)
Do not connect to other wires or land patterns.

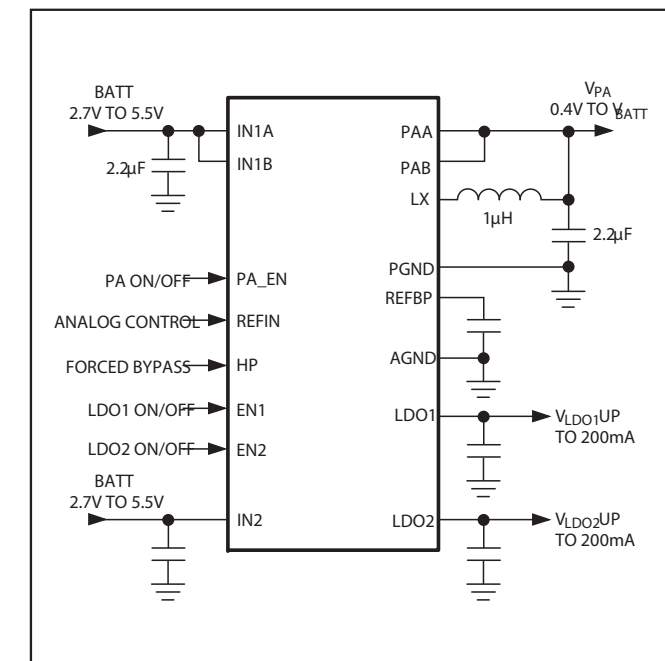
N1210 IC Lin WLP-16 1203-5870

Pin Configuration



(BUMP IN BOTTOM)
16-Bump, 2mm × 2mm WLP

Typical Operating Circuit

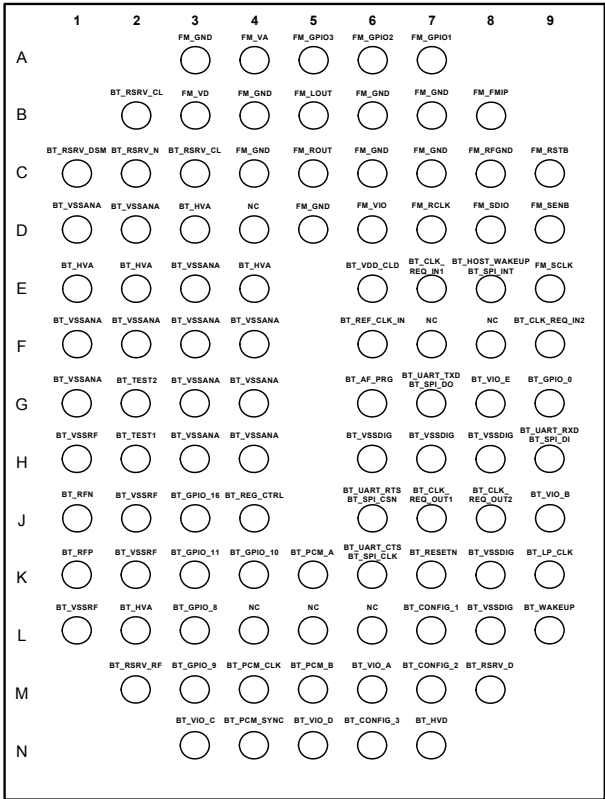


Pin Description

PIN	NAME	FUNCTION
A1	REFBP	Reference Noise Bypass. Bypass REFBP to AGND with a 0.22µF ceramic capacitor to reduce noise on the LDO outputs. REFBP is internally pulled down through a 1k Ω resistor during shutdown.
A2	AGND	Low-Noise Analog Ground
A3	REFIN	DAC-Controlled Input. The output of the PA step-down converter is regulated to $2 \times V_{REFIN}$. When V_{REFIN} reaches $0.465 \times V_{IN2}$, bypass mode is enabled.
A4	PGND	Power Ground for PA Step-Down Converter
B1	LDO2	200mA LDO Regulator 2 Output. Bypass LDO2 with a 1µF ceramic capacitor as close as possible to LDO2 and AGND. LDO2 is internally pulled down through a 1k Ω resistor when this regulator is disabled.
B2	PA_EN	PA Step-Down Converter Enable Input. Connect to IN ₂ or logic-high for normal operation. Connect to GND or logic-low for shutdown mode.
B3	EN2	LDO2 Enable Input. Connect to IN ₂ or logic-high for normal operation. Connect to AGND or logic-low for shutdown mode.
B4	LX	Inductor Connection. Connect an inductor from LX to the output of the PA step-down converter.
C1	IN2	Supply Voltage Input for LDO1, LDO2, and Internal Reference. Connect IN2 to a battery or supply voltage from 2.7V to 5.5V. Bypass IN2 with a 2.2µF ceramic capacitor as close as possible to IN2 and AGND. Connect IN2 to the same source as IN1A and IN1B.
C2	HP	High-Power Mode Set Input. Drive HP high to invoke forced bypass mode. Bypass mode connects the input of the PA step-down converter directly to its output through the internal bypass MOSFET. Drive HP low to disable the forced bypass mode.
C3, C4	IN1B, IN1A	Supply Voltage Input for PA Step-Down Converter. Connect IN1 ₂ to a battery or supply voltage from 2.7V to 5.5V. Bypass the connection of IN1 ₂ with a 2.2µF ceramic capacitor as close as possible to IN1 ₂ and PGND. IN1A and IN1B are internally connected together. Connect IN1 ₂ to the same source as IN2.
D1	LDO1	200mA LDO Regulator 1 Output. Bypass LDO1 with a 1µF ceramic capacitor as close as possible to LDO1 and AGND. LDO1 is internally pulled down through a 1k Ω resistor when this regulator is disabled.
D2	EN1	LDO1 Enable Input. Connect to IN2 or logic-high for normal operation. Connect to AGND or logic-low for shutdown mode.
D3, D4	PAB, PAA	PA Connection for Bypass Mode. Internally connected to IN1 ₂ using the internal bypass MOSFET during bypass mode. PA ₂ is connected to the internal feedback network. Bypass PA ₂ with a 2.2 μ F ceramic capacitor as close as possible to PA ₂ and PGND.

N1300 Module Bluetooth + FM WF-BGA100 1200-9840

Pinout Top View



Pin Description and Assignment

The table shows the pin list of the STLC2593.

In columns "Reset" and "Default after reset", the "PD/PU" shows the pads implementing an internal pull-down/up for the internal Bluetooth section.

The column "Reset" shows the state of the pins during hardware reset; the column "Default after reset" shows the state of the pins after the hardware reset state is left, but before any software parameter download.

The column "Type" describes the pin directions:

- I for Input (All inputs have a Schmitt trigger function.)
- O for Output
- I/O for Input/Output
- O/I for tri-state output

For the output pin the default drive capability is 2 mA, except for pin K3 (BT_GPIO_11) and pin L3 (BT_GPIO_8) where it is 8 mA such that when used for Class 1, these 2 pins can be used for a switch control in a cheaper way.

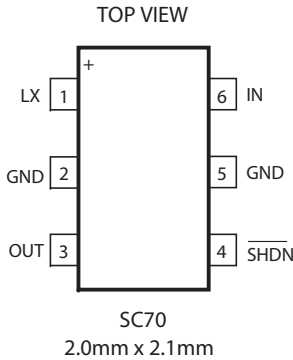
The STLC2593 Pin List (Functional and Supply)

Bluetooth Section					
Name	Pin #	Description	Type	Reset ⁽¹⁾	Default ⁽²⁾ after reset
Clock and Reset Pins					
BT_RESETN	K7	Global reset - active low	I	Input	Input
BT_REF_CLK_IN	F6	Reference clock input ⁽³⁾			
BT_LP_CLK	K9	Low power clock input			
SW Initiated Low Power mode					
BT_CLK_REQ_OUT_1	J7	Wake-up signal to Host (Active high or Active low, depending on configuration pins)	I/O ⁽⁴⁾	Input PD/PU, depends on config	Output depends on config
BT_CLK_REQ_OUT_2	J8	Wake-up signal to Host. Active low (SPI mode only)		Input PU	I/O depends on config
BT_CLK_REQ_IN_1	E7	Clock request input (Active high)		Input PD	Input PU
BT_CLK_REQ_IN_2	F9	Clock request input (Active low)		Input PU	Input PU
BT_HOST_WAKEUP/ BT_SPI_INT	E8	Wake-up signal to Host or SPI interrupt	I/O	Input PD	Output
BT_WAKEUP	L9	Wake-up signal to Bluetooth (Active high)		Input ⁽⁵⁾	Input
UART Interface					
BT_UART_RXD/ BT_SPI_DI	H9	UART receive data SPI data in	I/O ⁽⁴⁾	Input PD	Input PD
BT_UART_TXD/ BT_SPI_DO	G7	UART transmit data SPI data out			Input PD
BT_UART_CTS/ BT_SPI_CLK	K6	UART clear to send SPI clock		Input PU	Input PU
BT_UART_RTS/ BT_SPI_CSN	J6	UART request to send SPI chip select			Output low Input PU
PCM Interface					

Bluetooth Section					
Name	Pin #	Description	Type	Reset ⁽¹⁾	Default ⁽²⁾ after reset
BT_PCM_SYNC	N4	PCM frame signal	I/O ⁽⁴⁾	Input PD	Input PD
BT_PCM_CLK	M4	PCM clock signal			
BT_PCM_A	K5	PCM data			
BT_PCM_B	M5	PCM data			
JTAG Interface					
BT_GPIO_9	M3	JTAG_TDI or GPIO	I/O ⁽⁴⁾	Input PU ⁽⁶⁾	Input PU ⁽⁶⁾
BT_GPIO_11	K3	JTAG_TDO or GPIO		Input PD ⁽⁶⁾	Input PD ⁽⁶⁾
BT_GPIO_10	K4	JTAG_TMS or GPIO		Input PU ⁽⁶⁾	Input PU ⁽⁶⁾
BT_GPIO_16	J3	JTAG_NTRST (Active low) or Alternate function		Input PD ⁽⁶⁾	Input PD ⁽⁶⁾
BT_GPIO_8	L3	JTAG_TCK or GPIO		Input PD ⁽⁶⁾	Input PD ⁽⁶⁾
General Purpose Input/Output Pins					
BT_GPIO_0	G9	General purpose I/O	I/O ⁽⁴⁾	Input PD	Input PD
Configuration Pins					
BT_CONFIG_1	L7	Configuration signal	I	Input	Input
BT_CONFIG_2	M7				
BT_CONFIG_3	N6				
RF Signals					
BT_RFP	K1	Differential RF port	I/O		
BT_RFN	J1				
Power Supply					
BT_HVA	L2	Power supply (Connect to 2.75 V)			
	D3				
	E1				
	E2				
BT_HVD	E4	1.65 V to 2.85 V I/Os supply ⁽⁷⁾			
	N7				
	M6				
	N3				
BT_VIO_A	M6				
BT_VIO_C	N3				
BT_VIO_D	N5				
BT_VIO_E	G8	1.17 V to 2.85 V I/Os supply ⁽⁷⁾			
BT_VIO_B	J9				
BT_VDD_CLD	E6	System clock supply 1.65 V to 2.85 V (Connect to BT_VIO_A in case of a digital reference clock input, to BT_VSSANA in case of an analog reference clock input.)			
Bluetooth Section					
Name	Pin #	Description	Type	Reset ⁽¹⁾	Default ⁽²⁾ after reset
BT_VSSDIG	H6	Digital ground			
	H7				
	H8				
	K8				
	L8				
BT_VSSANA	D1	Analog ground			
	D2				
	E3				
	F1				
	F2				
	F3				
	F4				
	G1				
	G3				
	G4				
	H3				
H4					
BT_VSSRF	H1	RF ground			
	L1				
	J2	RF regulator ground			
BT_TEST1	H2	Test pin	I/O	Input ⁽⁸⁾	Input ⁽⁸⁾
BT_TEST2	G2				
BT_AF_PRG	G6				
FM Radio Section					
FM_GND	A3	FM ground (connect to ground plane on PCB)			
	B4				
	B6				
	B7				
	C4				
	C6				
	C7				
	D5				
FM_VA	A4	Analog supply voltage (may be connected directly to battery)			
FM_VD	B3	Digital supply voltage (may be connected directly to battery)			
FM_GPI01	A7	General purpose FM input/output	I/O	Input/Output	Input/Output
FM_GPI02	A6				
FM_GPI03	A5				
FM_FIMP	B8	FM RF input			
FM_ROUT	C5	FM right audio output			
FM_LOUT	B5	FM left audio output			
FM_RFGND	C8	FM RF ground (connect to ground plane on PCB)			
FM_RSTB	C9	FM reset (Active low) input	I	Input low	Input high
FM_VIO	D6	FM I/O supply voltage			
FM_RCLK	D7	FM External reference oscillator input	I	Input	Input
FM_SDIO	D8	FM Serial data input / output	I/O	Input/Output	Input/Output
FM_SENB	D9	FM Serial enable input (active low)	I	Input	Input
FM_SCLK	E9	FM Serial clock input	I	Input	Input
Other Pins					
BT_RSRV_CL	B2	Test pin (Leave unconnected) ⁽⁹⁾			
BT_RSRV_D	C3				
BT_RSRV_DSM	M8				
BT_RSRV_N	C1				
BT_RSRV_RF	M2				
BT_REG_CTRL	J4	Regulator control pin ⁽¹⁰⁾	I/O	Input PD	Output high
NC	D4	Any use ⁽¹¹⁾			
	F7				
	F8				
	L4				
	L5				
	L6				

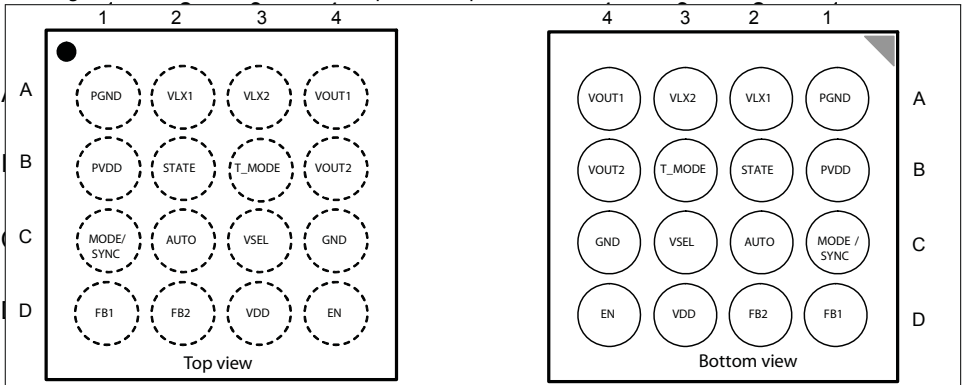
- Pin behaviour during HW reset (BT_RESETN low).
- Pin behaviour immediately after HW reset and internal chip initialization, but before SW parameter download.
- See also pin BT_VDD_CLD.
- Reconfigurable I/O pin. The functionality of these I/Os can be configured through software parameter download.
- Should be strapped to BT_VSSDIG if not used.
- JTAG mode.
- Described in section 4.3.
- To be strapped to BT_VSSANA.
- Pin is ST - reserved for test function and it must be soldered to an isolated pad (not connected to anything, just floating).
- Described in section 5.8.
- Pin is not connected internally in the package; any connection can be done on board, in order to ease the board layout.

N2200 IC Vreg SC70 1200-6420



N2203 IC Vreg 1200-0110

Pin assignment in TFBGA 3x3 mm - 16 bumps 0.5 mm pitch

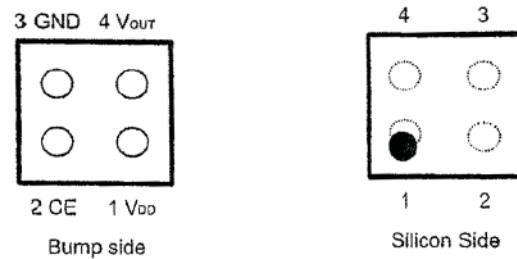


STw4141 pin description

Pin	Symbol	Description
A1	PGND	Power ground
B1	PVDD	Power supply voltage
C1	MODE/SYNC	MODE/SYNC = High to forced PWM mode MODE/SYNC = Low to forced PFM mode MODE/SYNC = 600 kHz - 1.5 MHz external clock synchronization in PWM
D1	FB1	Feedback 1
A2	VLX1	External inductor connection pin 1
B2	STATE	Output STATE pin allow the user to monitor operation mode of the product STATE = High - PFM mode STATE = Low - PWM mode If not used must be left unconnected.
C2	AUTO	PWM/PFM automatic switch control pin AUTO = High - PWM/PFM mode automatic switch ENABLED AUTO = Low - PWM/PFM mode automatic switch DISABLED PWM/PFM mode controlled by MODE/SYNC pin)
D2	FB2	Feedback 2
A3	VLX2	External inductor connection pin 2
B3	T_MODE	Input signal for test mode selection. This pin must be connected to GND.
C3	VSEL	Voltage selection input VSEL = High - VOUT1 = 1.8V, VOUT2 = 1.2V (valid for STA1) VSEL = Low - VOUT1 = 1.8V, VOUT2 = 1.0V (valid for STA1)
D3	VDD	Signal supply voltage
A4	VOUT1	Output voltage 1
B4	VOUT2	Output voltage 2
C4	GND	Signal ground
D4	EN	Enable Input: EN = Low - Device in shutdown mode, EN = High - Enable device This pin must be connected either to VDD or GND.

N2210, N2288 IC Vreg 1000-8623

PIN CONFIGURATION



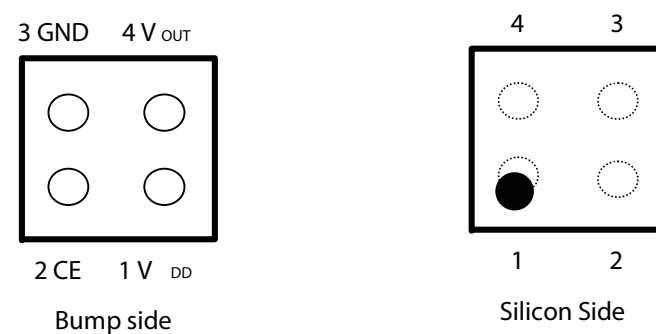
PIN DESCRIPTIONS

Pin No.	Symbol	Description
1	V _{DD}	Input Pin
2	CE	Chip Enable Pin
3	GND	Ground Pin
4	V _{out}	Output pin

N2271 IC Vreg 1200-2008

PIN CONFIGURATION

● WL-CSP4-P4



PIN DESCRIPTIONS

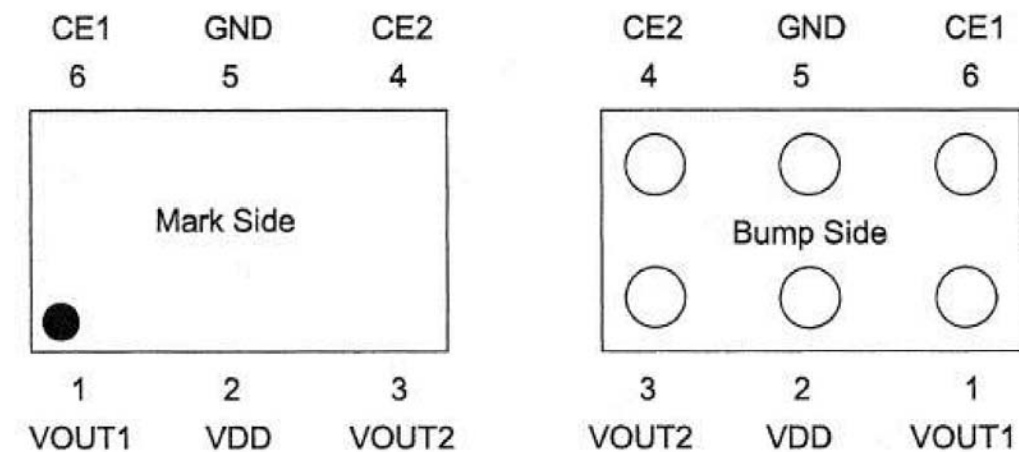
● R1115Z

Pin No.	Symbol	Description
1	V _{DD}	Input Pin
2	CE	Chip Enable Pin
3	GND	Ground Pin
4	V _{OUT}	Output pin

N2290 IC Vreg 1000-8638

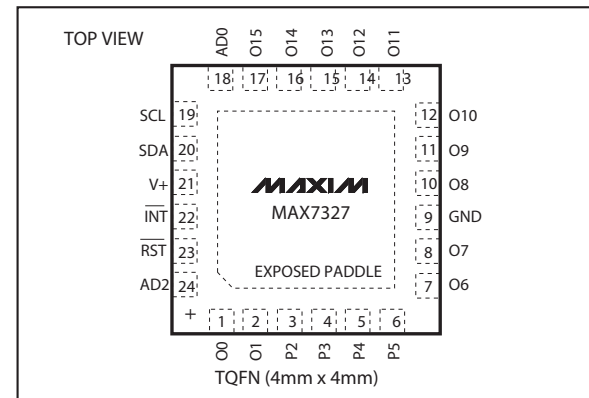
Pin Description

Pin No.	Symbol	Pin description
1	VOUT1	Output Pin of Voltage Regulator 1 (VR1)
2	VDD	Power Supply Pin
3	VOUT2	Output Pin of Voltage Regulator 2 (VR2)
4	CE2	Chip Enable Pin for Voltage Regulator 2 (VR2)
5	GND	Ground Pin
6	CE1	Chip Enable Pin for Voltage Regulator 1 (VR1)



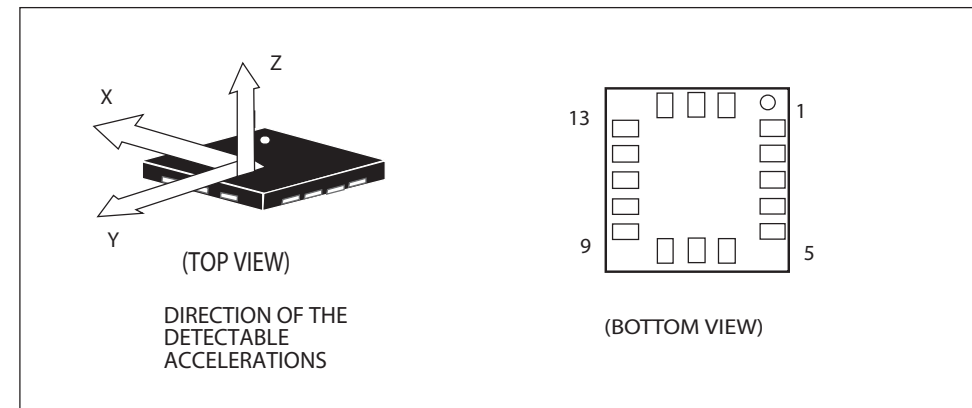
N2410 IC IF 3.5x3.5x0.8 thin QFN 1200-1951

Pin Configurations



N2411 ASIC Accelerometer 1202-1676

Pin connection

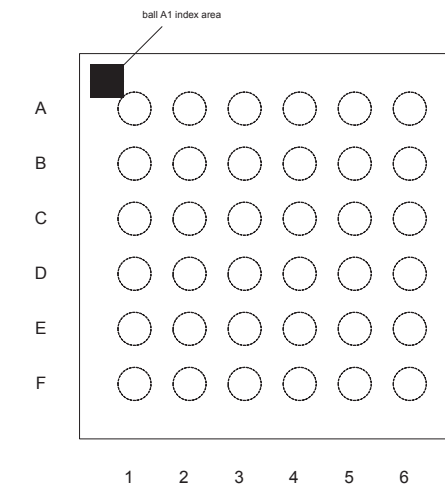


Pin description

Pin#	Name	Function
1	Vdd_IO	Power supply for I/O pins
2	NC	Not Connected
3	NC	Not Connected
4	SCL SPC	I ² C Serial Clock (SCL) SPI Serial Port Clock (SPC)
5	GND	0V supply
6	SDA SDI SDO	I ² C Serial Data (SDA) SPI Serial Data Input (SDI) 3-wire Interface Serial Data Output (SDO)
7	SDO	SPI Serial Data Output I ² C less significant bit of the device address
8	CS	SPI enable I ² C/SPI mode selection (1: I ² C mode; 0: SPI enabled)
9	INT 2	Inertial interrupt 2
10	Reserved	Connect to Gnd
11	INT 1	Inertial interrupt 1
12	GND	0V supply
13	GND	0V supply
14	Vdd	Power supply
15	Reserved	Connect to Vdd
16	GND	0V supply

N2420 IC IF 3.5X3.5X0.8 1200-1694

Pin Diagram



ISP1508 TFBGA36 pinout (top view)

Pin Description

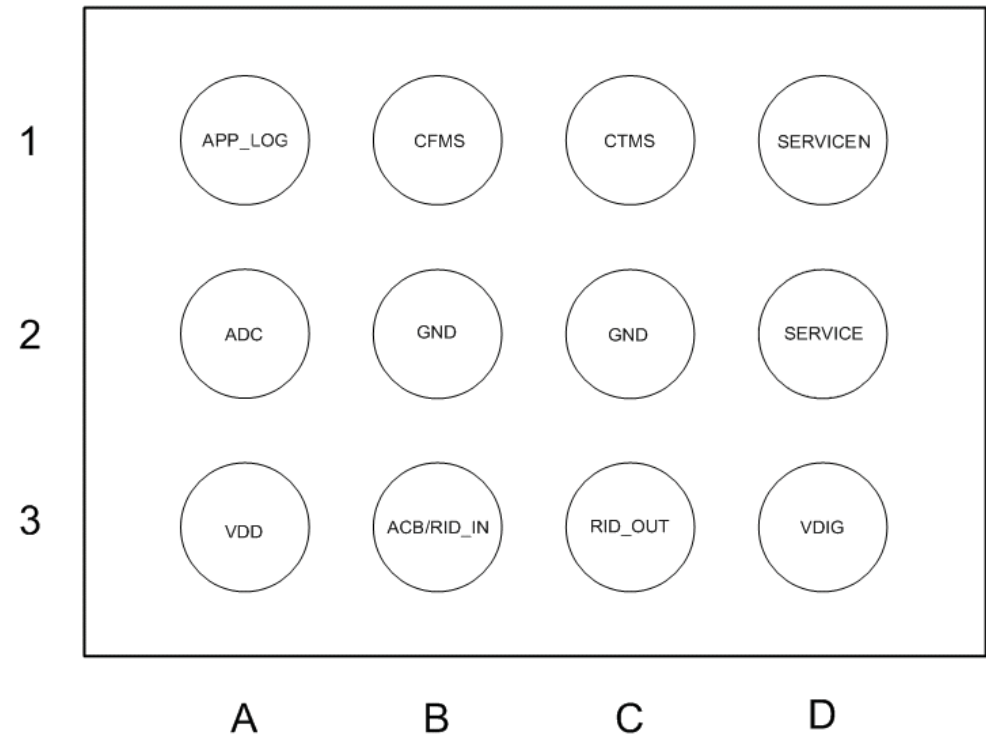
Symbol ¹	Ball No	Type ²	Description
RREF	C2	AI/O	Resistor reference. Connect through 12kΩ ±1% to GND.
DM	C1	AI/O	Connect to D- pin of the USB connector <ul style="list-style-type: none"> USB mode: D- input/output UART mode: TXD output
DP	D1	AI/O	Connect to D+ pin of the USB connector <ul style="list-style-type: none"> USB mode: D+ input/output UART mode: RXD input
FAULT	E2	I	Input for Vbus digital over-current or fault detector signal. If this pin is not in use, connect it to GND Plain input, 5V tolerant
ID	D3	I	identification (ID) pin of the mini-USB cable. If this pin is not in use, leave this pin open(there's internal pull-up). Plain input, TTL
VBUS	F4	AI/O	Connect to VBUS pin of the USB connector.
VCC	F3	P	Input supply voltage or battery source. Nominally 3.0V to 4.5V. Note: Below 3.0V, USB FS and LS transactions are not guaranteed to work though some devices may work with ISP1508 at these voltages.
PSW_N	D4	OD	Controls an external, active low VBUS power switch or charge pump. An external pull up resistor is required. Open drain,output, 5V tolerant.
REG3V3	E3	P	3.3V regulator output for USB mode or 2.7V regulator output for UART mode; requiring parallel 0.1 uF and 4.7 uF capacitors. Internally powers ATX and other analog circuits. Should not be used to power external circuits.
XTAL1	F5	AI/O	Crystal/clock input. 1.8V peak input allowed. Frequency depends on status on CFG1 and CFG2 pins.
XTAL2	F6	AI/O	Crystal output. If crystal is not in use, leave this pin open
CHIP_SEL	C3	I	Active HIGH chip select input. <ul style="list-style-type: none"> When this pin is none-active, ULPI pins will be in 3-state and the chip

¹ Symbol names ending with underscore N (for example, NAME_N) indicate active low signals

² I=input; O=output; I/O = Digital Input/Output; OD = Open Drain Output; AI/O = Analog Input/Output; P = Power or Ground pin

N2422 ASIC BB Elina 1201-4120

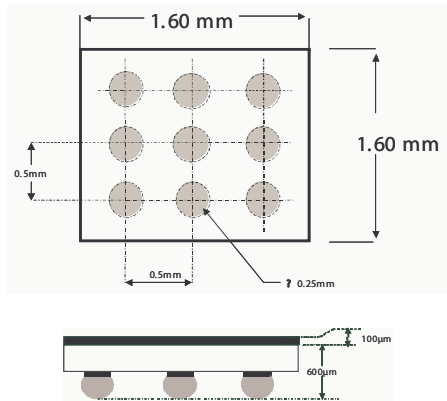
Pin-out, top view; bumps down.



N3100 IC FLIP CHIP 9-PIN 1200-4100

Dimensions

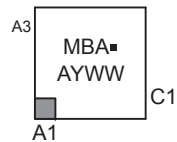
Dimensions in mm and tolerance 0.1 mm unless noted. Approximate Weight: 2.0 mg



- Die size: 1.60 x 1.60 mm ±30µm
- Die height (including bumps): 600µm
- Bump Diameter: 315µm ±50µm
- Bump Diameter Before Reflow: 300µm ±10µm
- Bump Height: 250µm ±40µm
- Die Height: 350µm ±20µm
- Pitch: 500µm ±50µm
- Coplanarity: 60µm max
- * Back coating height: 100µm ±10µm

* Optional

MARKING
DIAGRAMS



- MBA = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

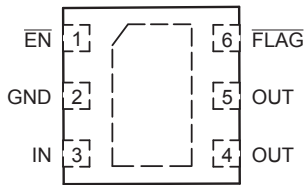
MARKING
DIAGRAMS



- Product and assembly code: XXX
A90 from Tours
908 from Singapore
90K from Shenzhen
- Three digits Datecode: YWW
- E symbol for lead-free only
- The dot is for marking pin A1

N2421 IC ESD Prot UDFN 6 2x2 mm 1200-6309

PIN CONNECTIONS

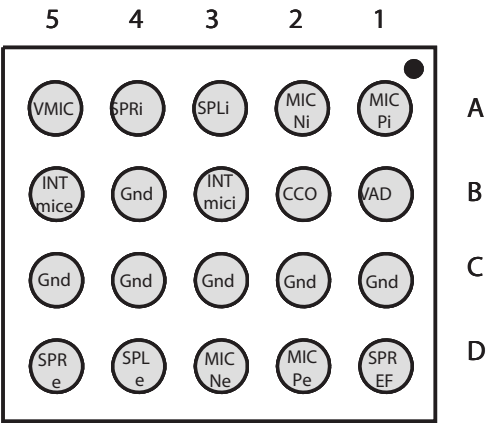


PIN FUNCTION DESCRIPTION

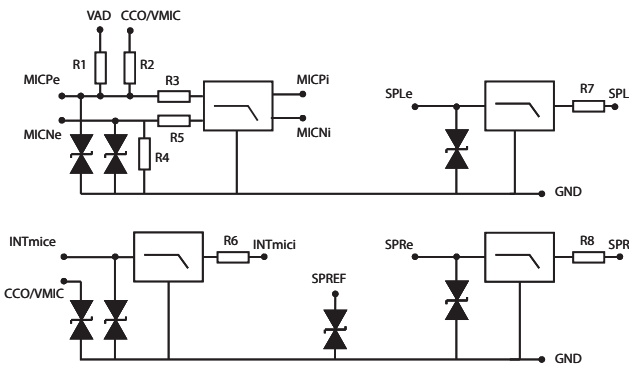
Pin No.	Name	Type	Description
1	EN	INPUT	Enable Pin. The device enters in shutdown mode when this pin is tied to a high level. In this case the output is disconnected from the input. To allow normal functionality, the EN pin shall be connected to GND to a pull down or to a I/O pin. This pin does not have an impact on the fault detection.
2	GND	POWER	Ground
3	IN	POWER	Input Voltage Pin. This pin is connected to the VBUS. A 1 µF low ESR ceramic capacitor, or larger, must be connected between this pin and GND.
4, 5	OUT	OUTPUT	Output Voltage Pin. The output is disconnected from the VBUS power supply when the input voltage is above OVLO threshold or below UVLO threshold. A 1 µF capacitor must be connected to these pins. The two OUT pins must be hardwired to common supply.
6	FLAG	OUTPUT	Fault Indication Pin. This pin allows an external system to detect a fault on VBUS pin. The FLAG pin goes low when input voltage exceeds OVLO threshold. Since the FLAG pin is open drain functionality, an external pull up resistor to VCC must be added.

N3101 ASIC Tjatte3 1000-0198

Pin configuration (Bump side)

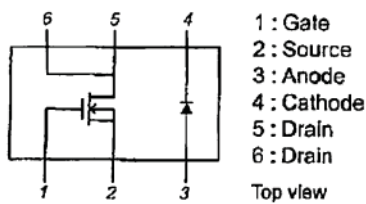


Electrical diagram



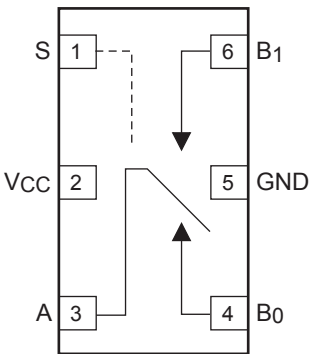
N4201 Trans N-ch FET 1001-0077

Electrical Connection



N4240 IC IF Micropak-6 1216-1590

Pin Assignments



Truth Tables

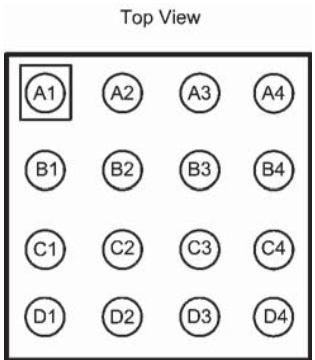
Control Input(s)	Function
LOW Logic Level	B ₀ Connected to A
HIGH Logic Level	B ₁ Connected to A

Pin Descriptions

Pin Names	Function
A, B ₀ , B ₁	Data Ports
S	Control Input

N4401 IC Dri CS-16 1212-3512

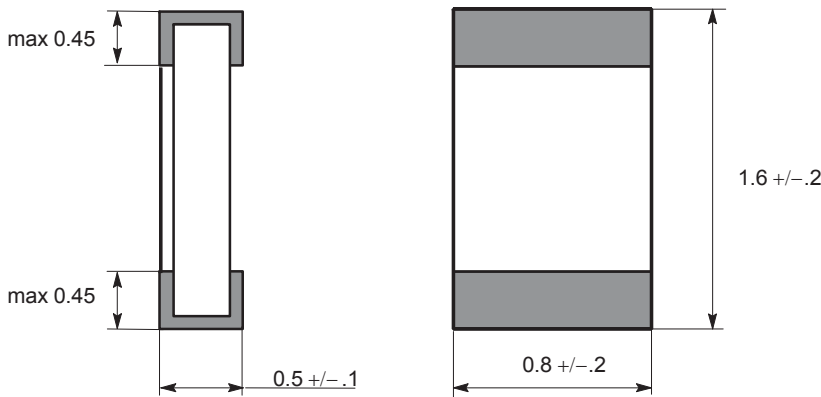
Connection Diagram



Pin Descriptions

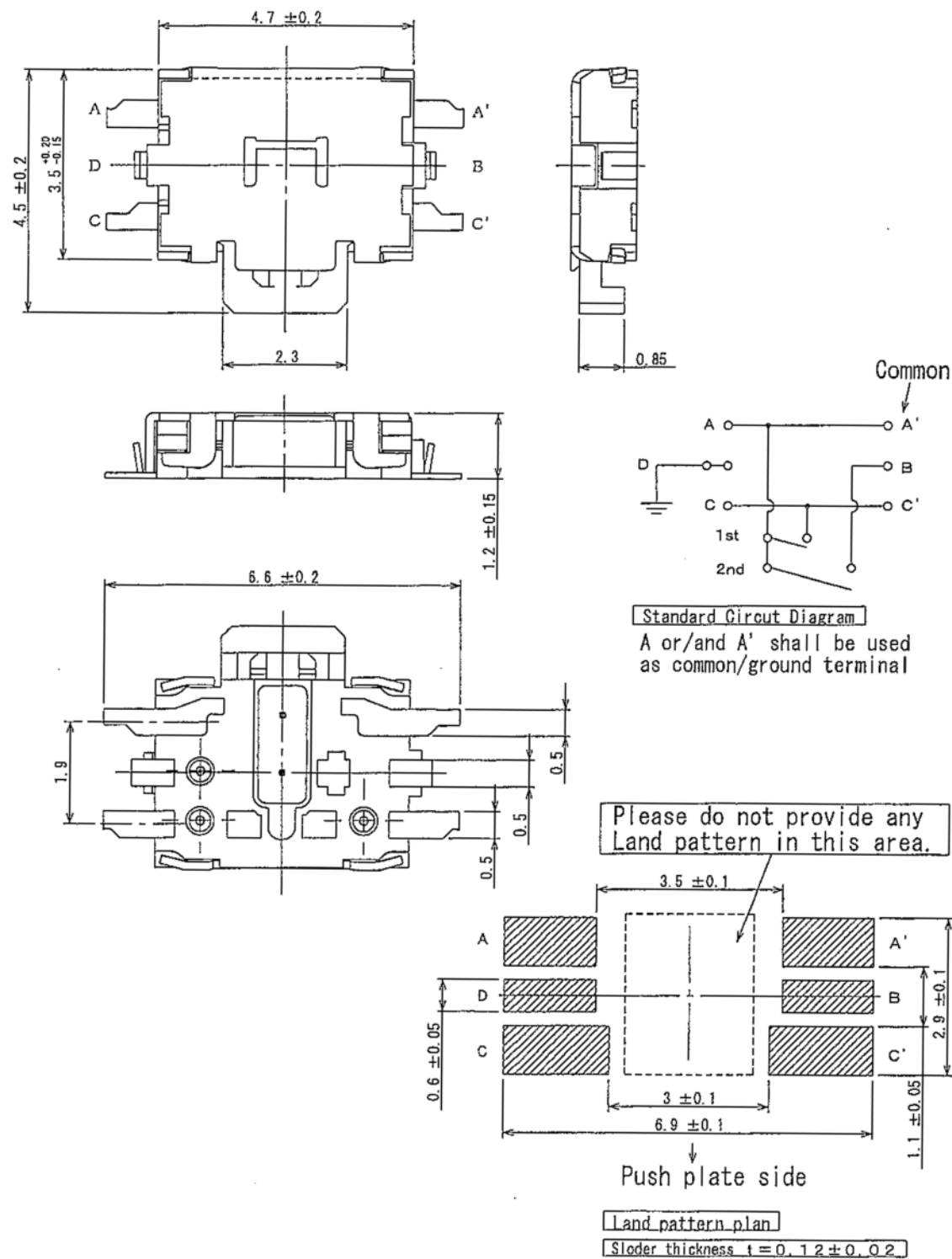
Pin	Name	Function
A1	LED1	High Side Current Source Output for Flash LED.
A2, B2	OUT	Step-Up DC/DC Converter Output.
A3, B3	SW	Drain Connection for Internal NMOS and Synchronous PMOS Switches.
A4, B4	GND	Ground
B1	LED2	High Side Current Source Output for Flash LED.
C1	LED1/NTC	LED Temperature Sensing .
C2	TX1/TORCH	Configurable as a RF Power Amplifier Synchronization Control Input or Hardware Torch Enable.
C3	STROBE	Active High Hardware Flash Enable. Drive STROBE high to turn on Flash pulse.
C4	IN	4.7μF ceramic capacitor.
D1	ENVM/TX2/GPIO	Synchronization Input.
D2	SDA	Serial Data Input/Output.
D3	SCL	Serial Clock Input.
D4	RESET /GPIO	Active Low Hardware Reset, or programmable general purpose logic input/output.

R2449 Resistor 0, Ohm +/-50m 63 mW K0603 1000-0257

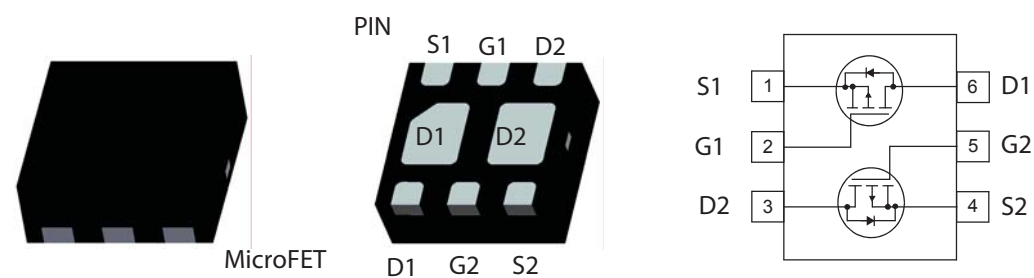


S2403 Input Switch Side Push Dual action switch 1214-8115

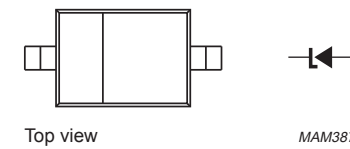
General dimension tolerance : ± 0.1
() dimensions are reference dimensions.



V2202 Trans P-ch FET MLP 2X2-6L 1200-0145



V2412, V2417 Diode Zener 15, V SOD523 1000-0272

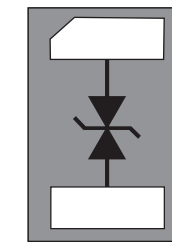
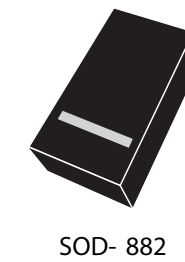


The marking bar indicates the cathode.

PINNING

PIN	DESCRIPTION
1	cathode
2	anode

V2413 Diode Protection 0.7 V SOD-882 1201-2253



V2420-21, V2430 Diode Protection 5, V SOD-923 1201-8440

MARKING DIAGRAM



D = Specific Device Code
M = Date Code

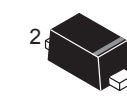


SOD-923
CASE 514AB



V2470 Diode Schottky 40.0 V SOD-923 1200-2065

40 V SCHOTTKY BARRIER DIODE



SOD-923
CASE 514AA
PLASTIC

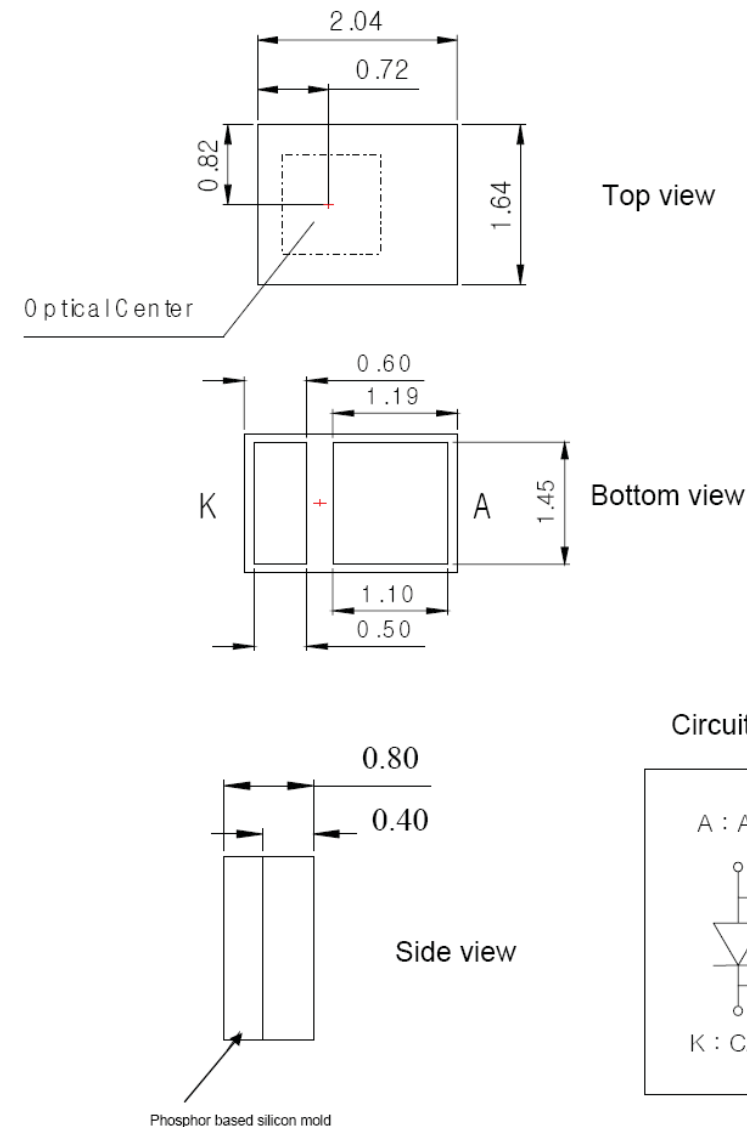
MARKING DIAGRAM



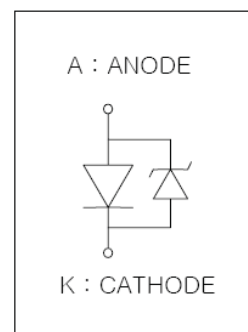
M = Specific Device Code
M = Month Code
■ = Pb-Free Package
(Note: Microdot may be in either location)

V4110, V4111 LED White 2,04x1,64x0,8 1222-1832

Dimensions

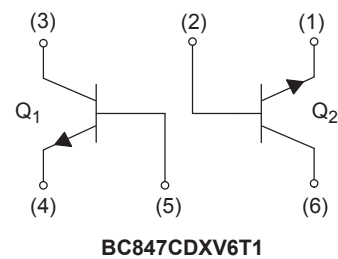


Circuit Diagram



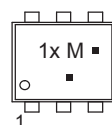
Dimensions in mm.
Tolerance ± 0.1 mm unless otherwise noted.

V4200 Trans Array 1200-0320



SOT-563
CASE 463A
PLASTIC

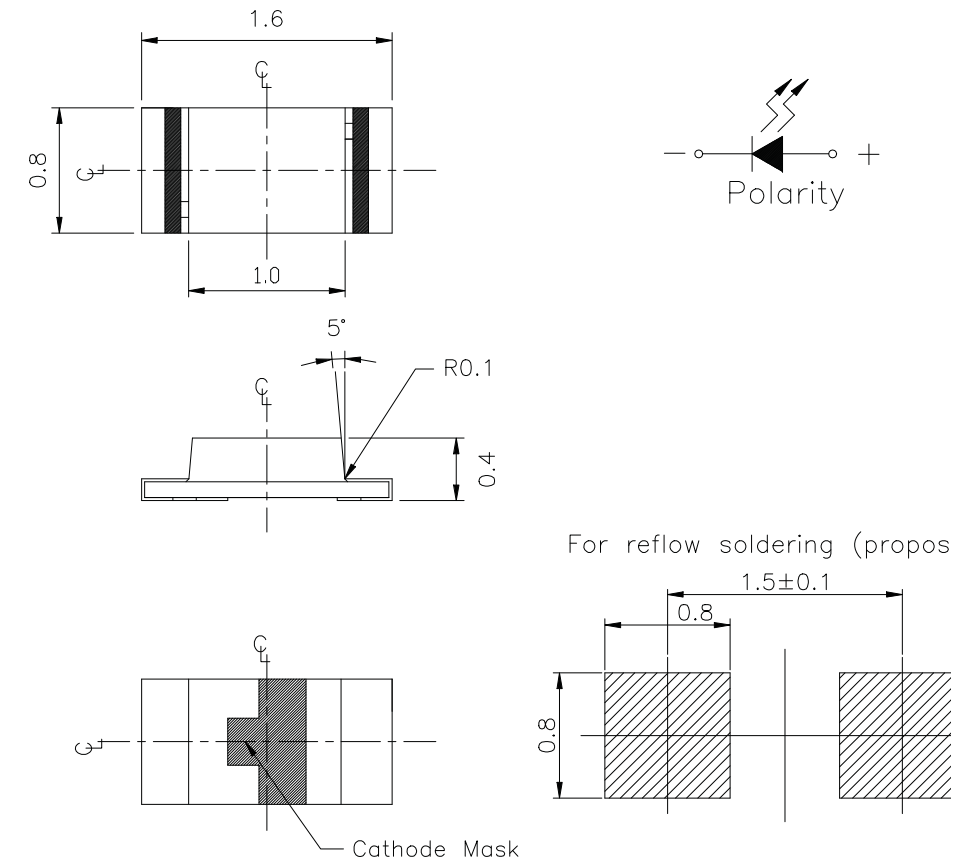
MARKING DIAGRAMS



1x = Device Code
x = G or M
M = Date Code
■ = Pb-Free Package
(Note: Microdot may be in either location)

V4310 LED Red 1000-7571

Package Outline Dimensions

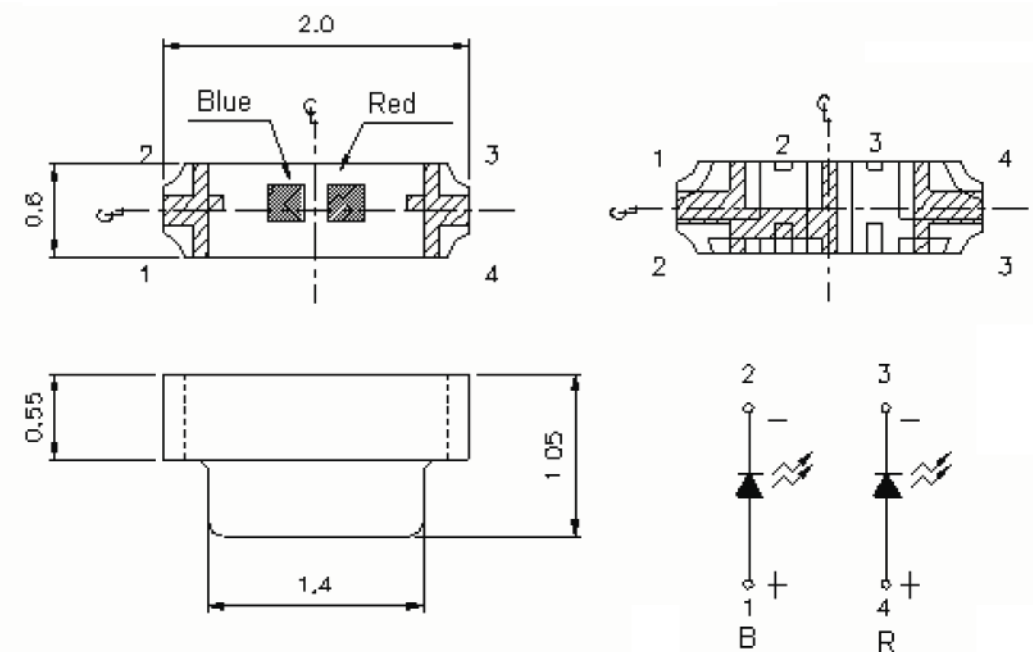


Note: The tolerances unless mentioned is ± 0.1 mm, Unit = mm

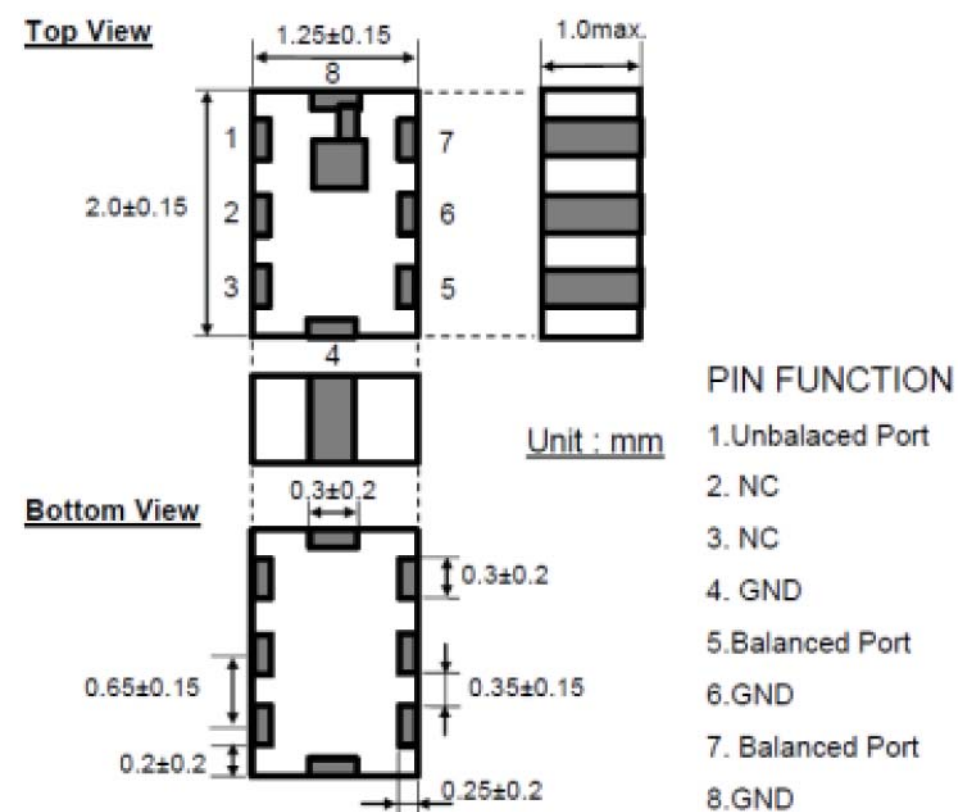
V4350, V4360 LED Blue/Red 2.0X1.05X0.6 1216-9185

Dimensions

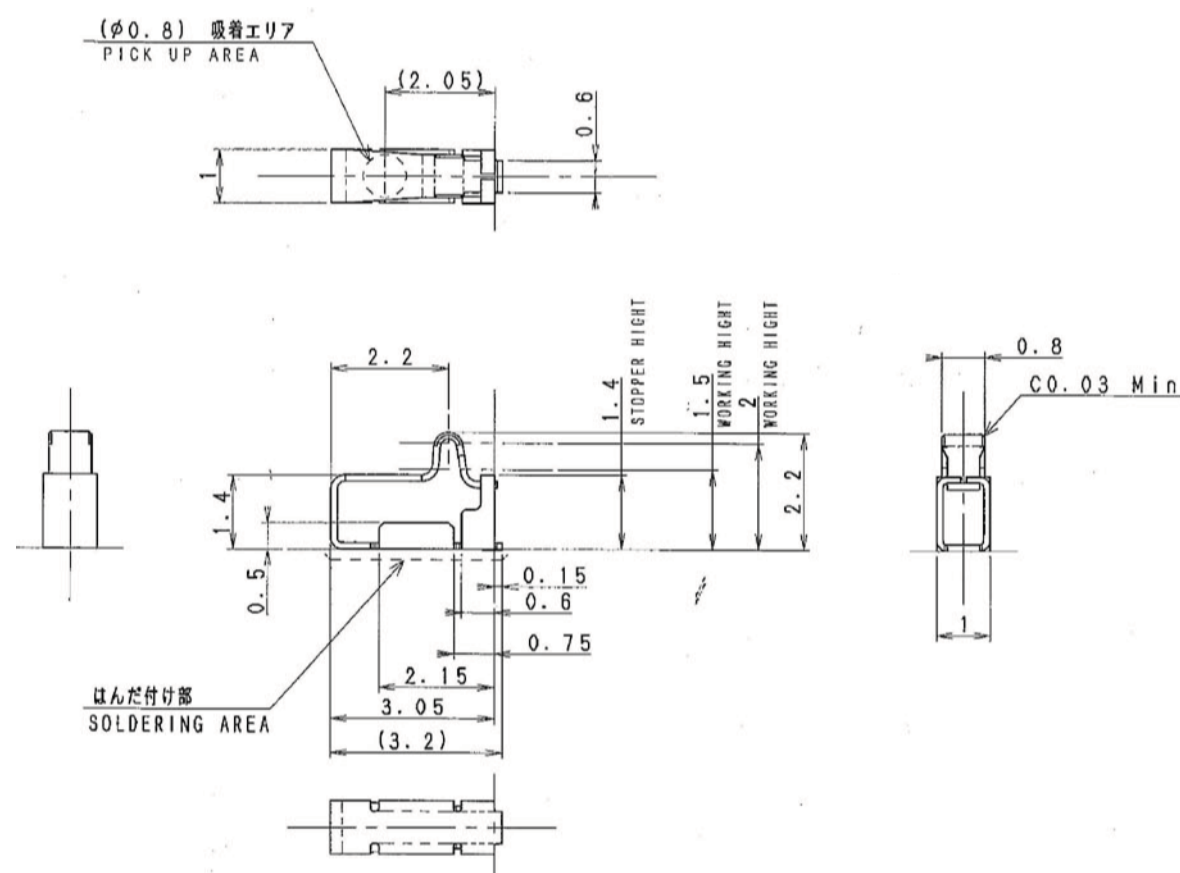
Dimensions in mm and tolerance 0.1 mm unless noted.



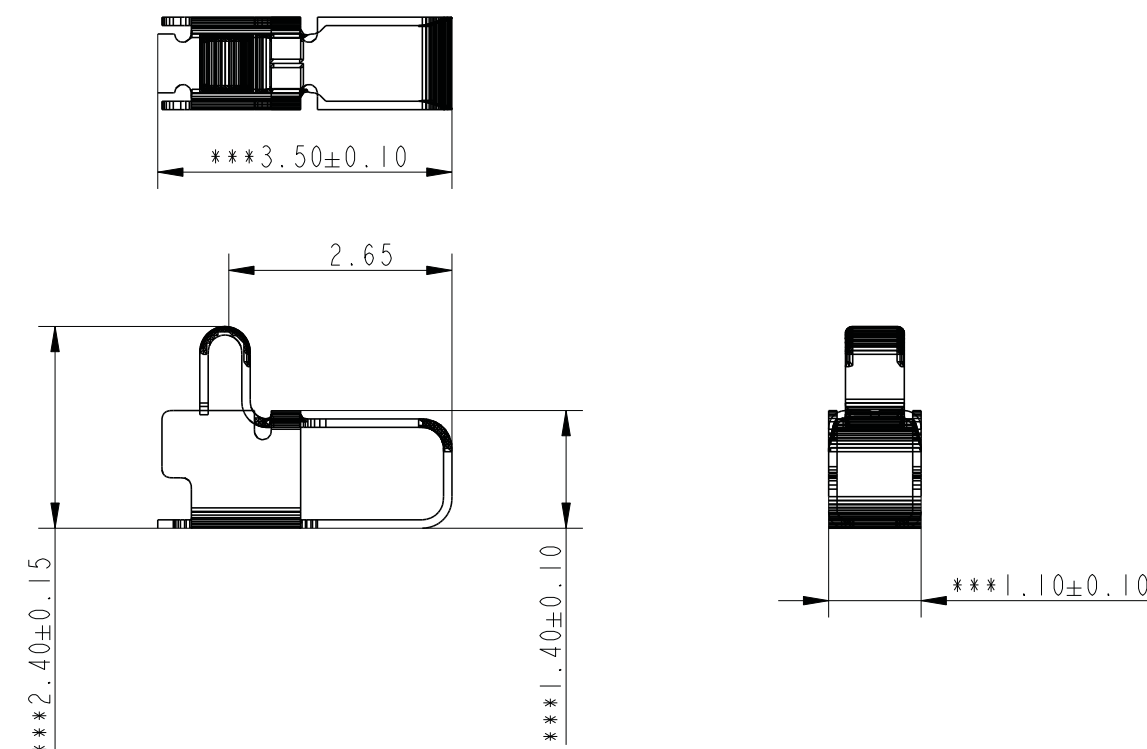
W1300 Filter 2.45 GHz 1200-1865



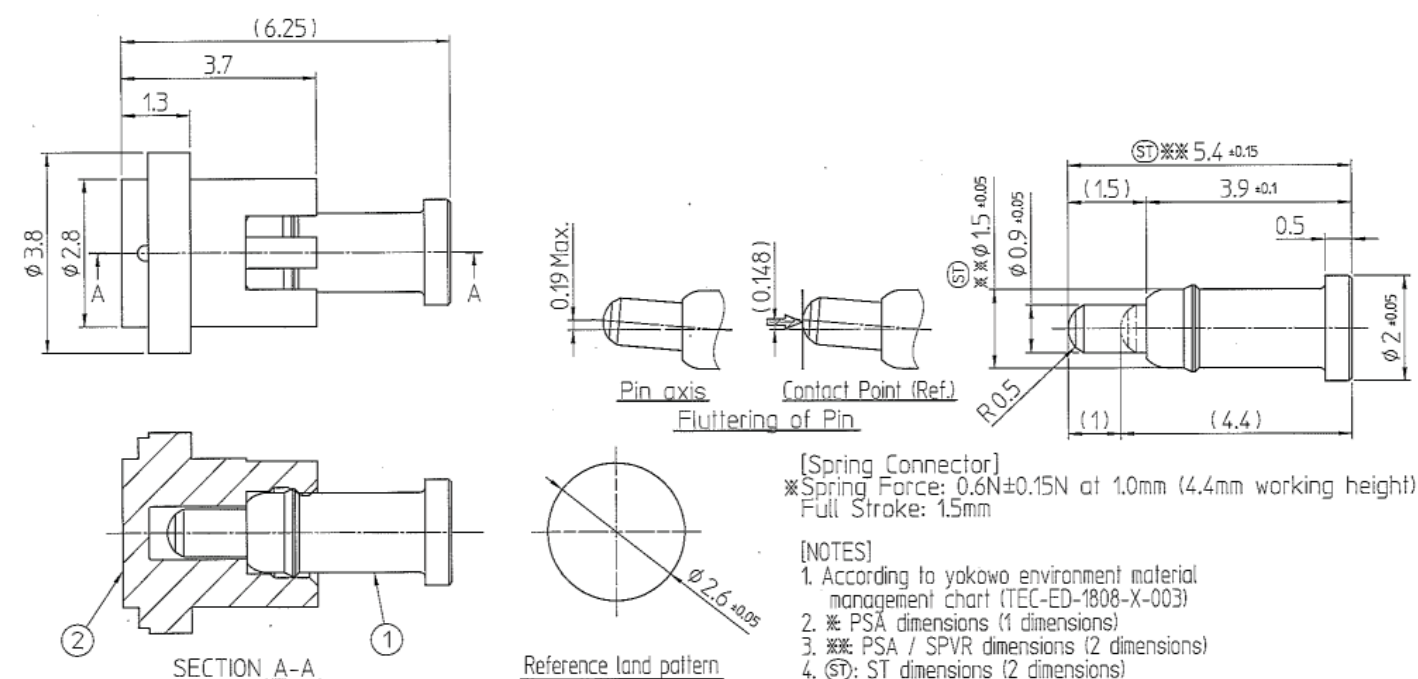
X1000, X1002, X1003 Conn Leaf Spring 1201-4841



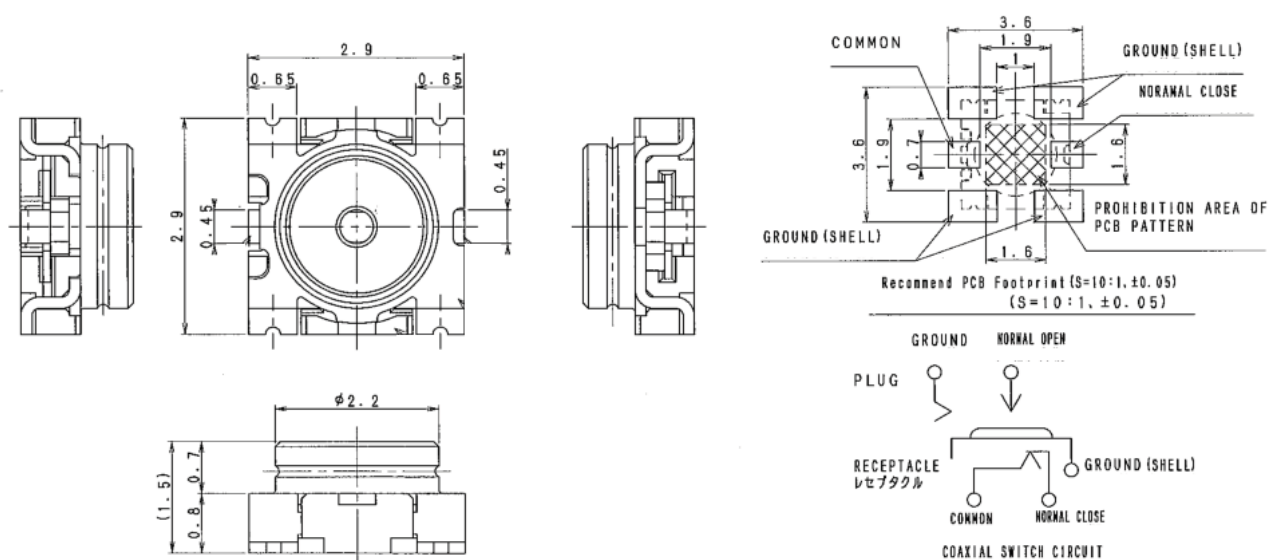
X1010-11 Conn Leaf Spring 1p 1202-1053



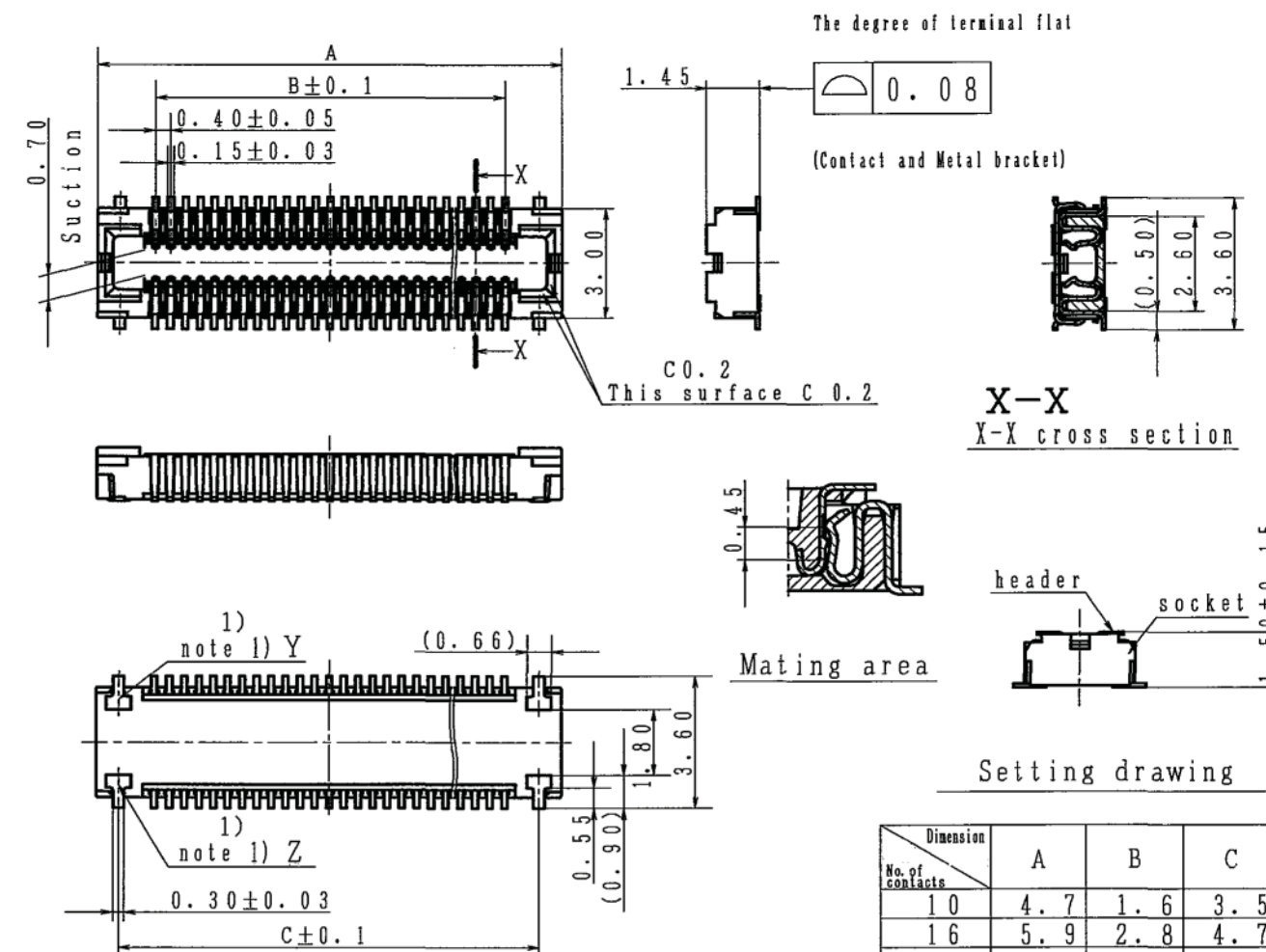
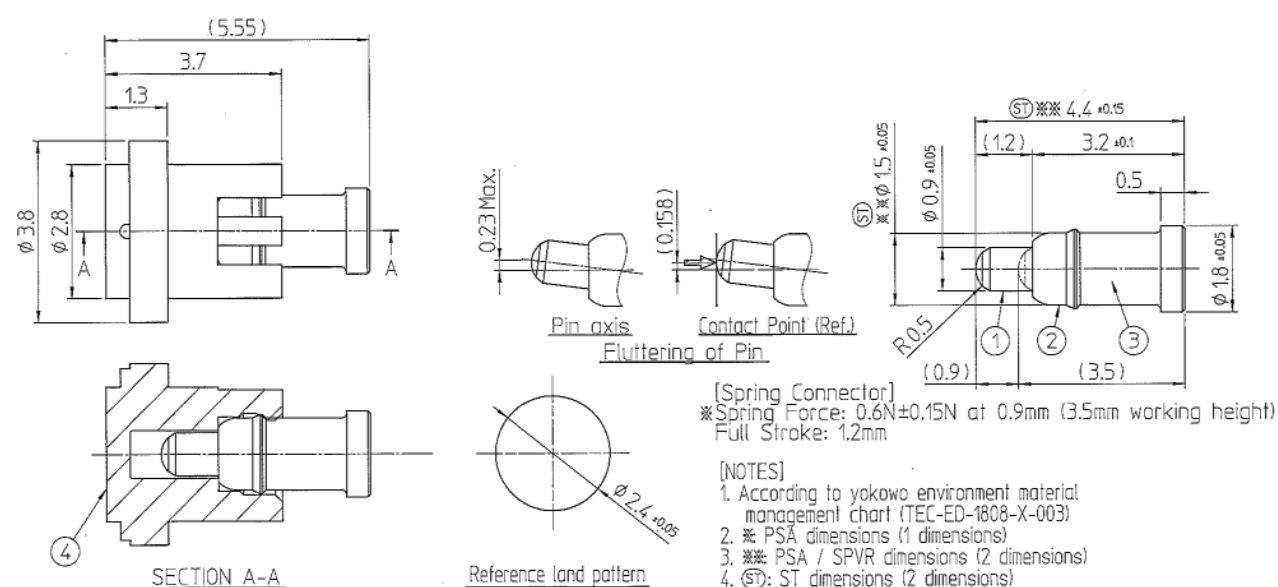
X1030 Conn Pogopin 1p work height 4,4 mm 1216-2306



X2400 Conn BtB Receptacle 16p 1214-7370

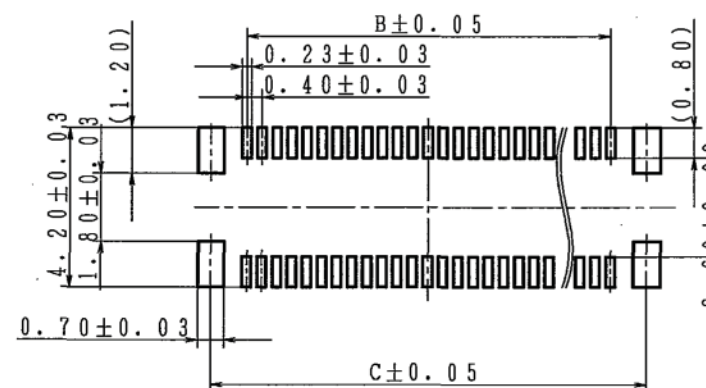


X1210 Conn Pogopin 1p 3.5 mm working height 1218-4490



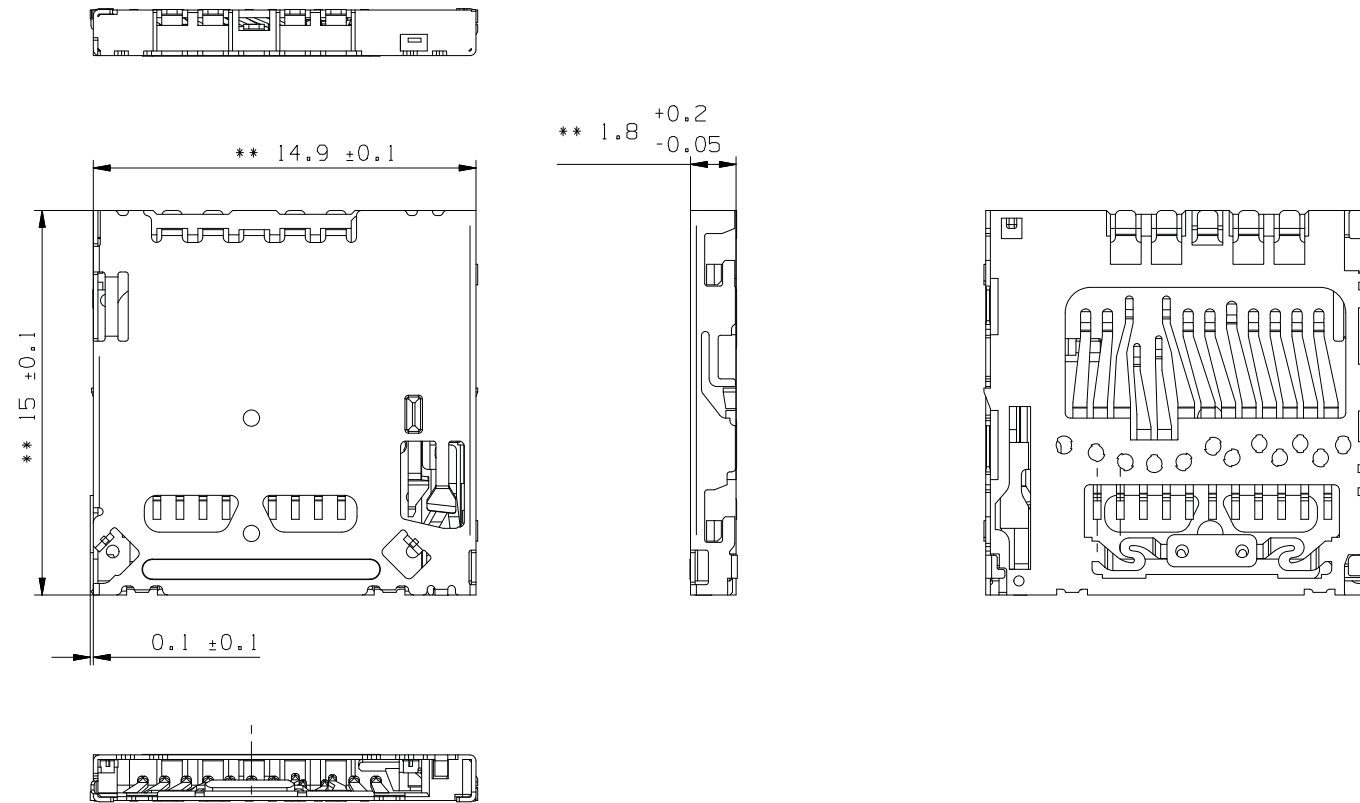
Recommended PC board pattern
(mounting pad layout)

(TOP VIEW)

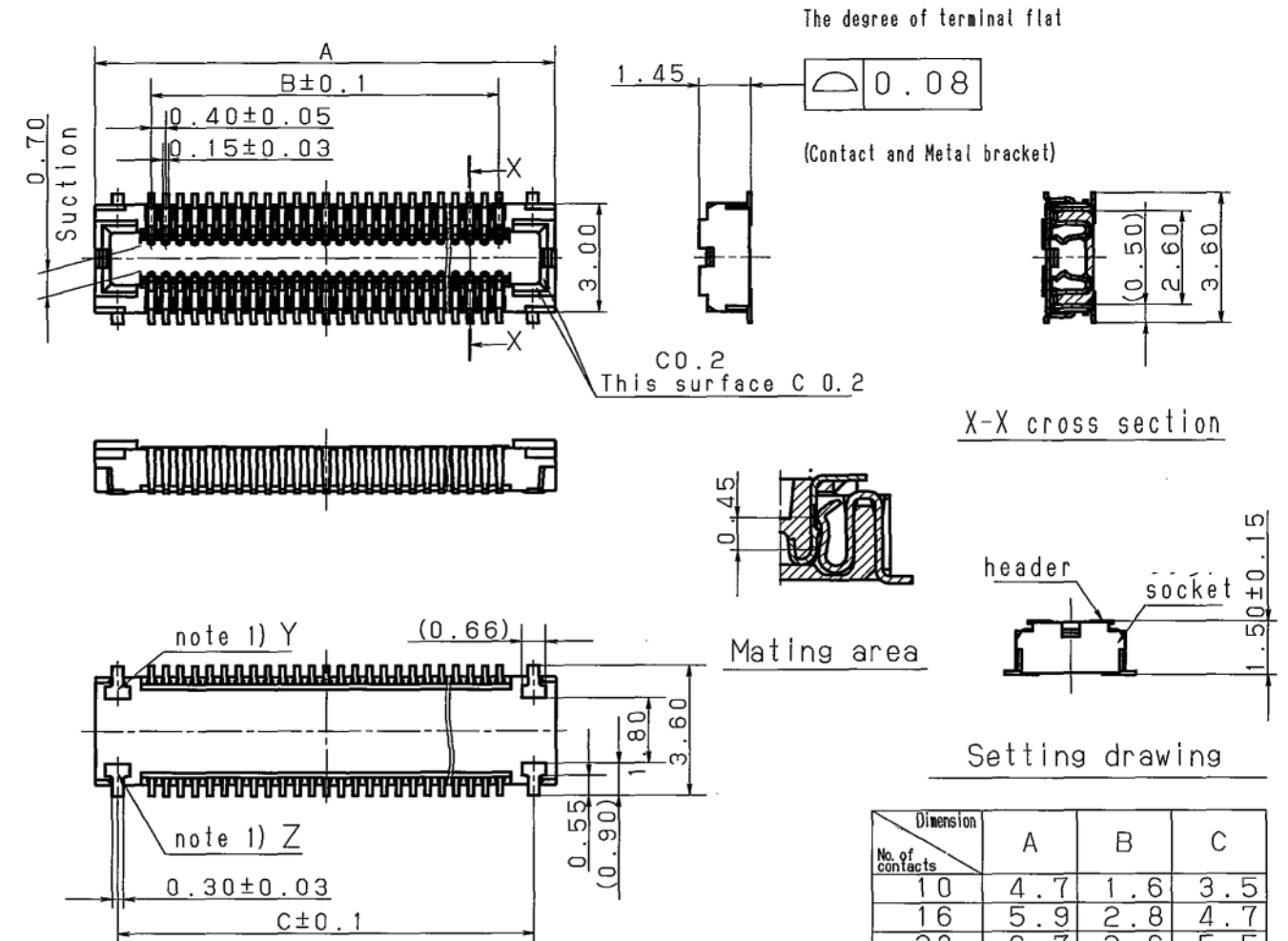


Dimension No. of contacts	A	B	C
1 0	4. 7	1. 6	3.
1 6	5. 9	2. 8	4.
2 0	6. 7	3. 6	5.
2 2	7. 1	4. 0	5.
2 4	7. 5	4. 4	6.
2 6	7. 9	4. 8	6.
2 8	8. 3	5. 2	7.
3 0	8. 7	5. 6	7.
3 2	9. 1	6. 0	7.
3 4	9. 5	6. 4	8.
3 6	9. 9	6. 8	8.
3 8	10. 3	7. 2	9.
4 0	10. 7	7. 6	9.
4 4	11. 5	8. 4	10.
5 0	12. 7	9. 6	11.
5 4	13. 5	10. 4	12.
5 6	13. 9	10. 8	12.
6 0	14. 7	11. 6	13.
7 0	16. 7	13. 6	15.
8 0	18. 7	15. 6	17.
9 0	20. 7	17. 6	19.
1 0 0	22. 7	19. 6	21.

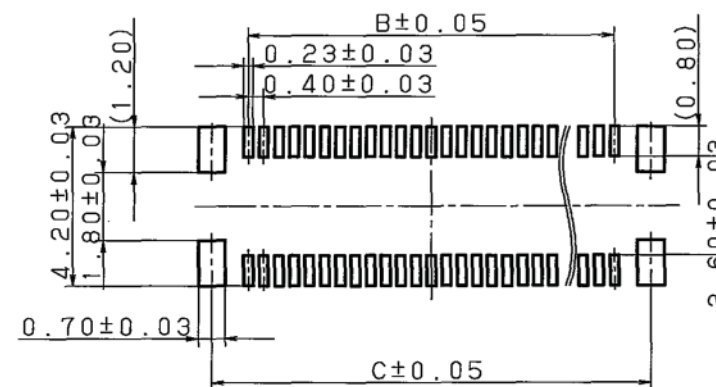
X2403 Card Conn 1000-7708



X4202 Conn BtB Receptacle 90p mating height 1,5 mm 1212-6578

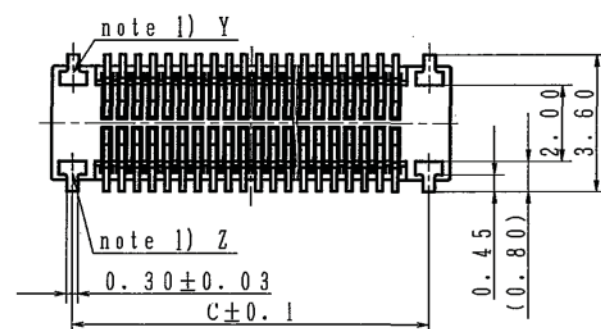
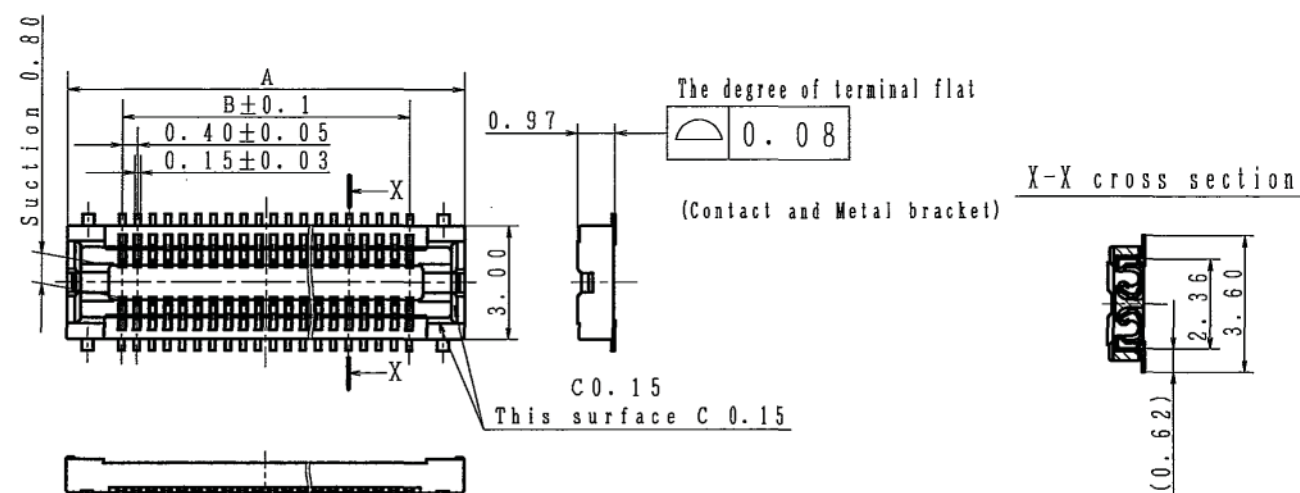


Recommended PC board pattern
(mounting pad layout)
(TOP VIEW)

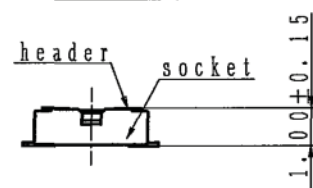


Note 1) Because the metal bracket Y and X are the unified structure, they are connected electrically.

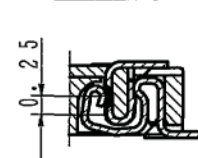
X4300 Conn BtB Receptacle 42p mating height 1 mm 1213-6796



Setting drawing

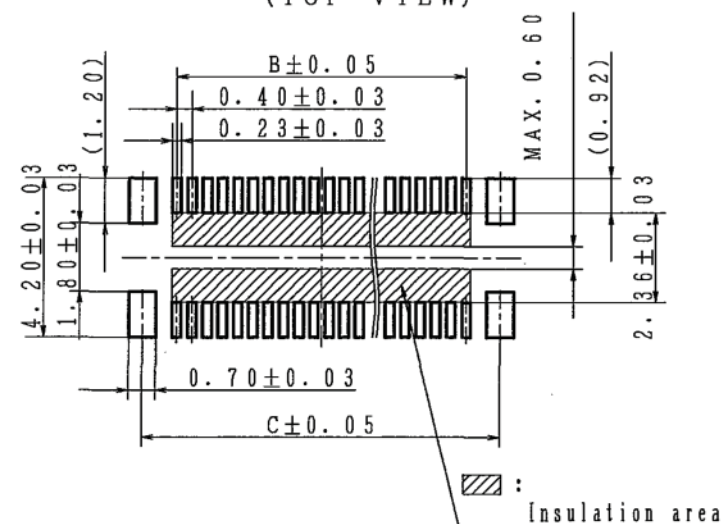


Mating area



Recommended PC board pattern
(mounting pad layout)

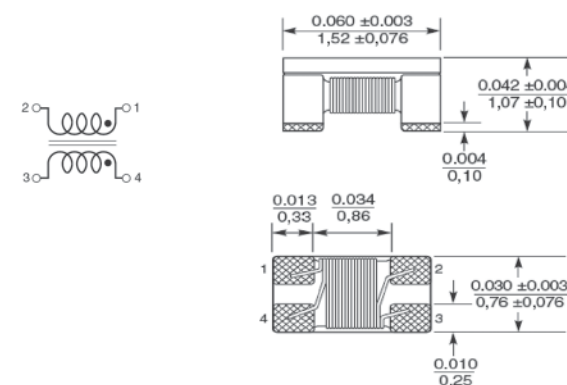
(TOP VIEW)



Dimension No. of contacts	A	B	C
1 0	4. 5	1. 6	3. 4
1 2	4. 9	2. 0	3. 8
1 6	5. 7	2. 8	4. 6
1 8	6. 1	3. 2	5. 0
2 0	6. 5	3. 6	5. 4
2 2	6. 9	4. 0	5. 8
2 4	7. 3	4. 4	6. 2
2 6	7. 7	4. 8	6. 6
2 8	8. 1	5. 2	7. 0
3 0	8. 5	5. 6	7. 4
3 2	8. 9	6. 0	7. 8
3 4	9. 3	6. 4	8. 2
3 6	9. 7	6. 8	8. 6
3 8	10. 1	7. 2	9. 0
4 0	10. 5	7. 6	9. 4
4 2	10. 9	8. 0	9. 8
4 4	11. 3	8. 4	10. 2
4 6	11. 7	8. 8	10. 6
4 8	12. 1	9. 2	11. 0
5 0	12. 5	9. 6	11. 4
5 4	13. 3	10. 4	12. 2
6 0	14. 5	11. 6	13. 4
6 4	15. 3	12. 4	14. 2
7 0	16. 5	13. 6	15. 4
8 0	18. 5	15. 6	17. 4

Note 1) Because the metal bracket Y and Z are the unified structure, they are connected electrically.

Z2400 Filter 0.0 MHz 1.52*0.76*1.07 1225-1423



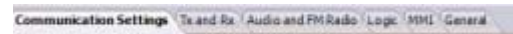
Troubleshooting Software Documentation

Introduction

Using this software you can control most parts and functions of all Sony Ericsson mobile phones. It is a GUI (**G**raphical **U**ser **I**nterface) for the commands implemented in the ITP (**I**ntegrated **T**est **P**rogram). The software communicates with the phone through standard serial communication over a USB/RS232 interface (SEPI).

Note: *The Troubleshooting Software application is to be used with the Troubleshooting Manual and the Troubleshooting fixture kit.*

The functions in the Troubleshooting Software application are divided into three main sections: **Communication Settings**, **Radio Control** and **Base Band Controls**. These main sections are presented under six different tabs.



All settings and functions are collected under these six main tabs.

Communication Settings

All settings for the communication between the Troubleshooting Software application and the phone are presented under the Communication Settings Tab.

Radio Controls

Note: *Some parts of Radio Control functions may not be implemented since they are not supported by the ITP SW.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

All Radio Control Functions implemented in the Troubleshooting Software are presented under the **Tx and Rx** tab. The main radio functions of the mobile phone presented in this tab are:

- GSM radio part
- WCDMA radio part
- Bluetooth radio part

In the GSM and the WCDMA radio control part the following radio functions can be controlled: Transmitter (TX) and Receiver (RX)

In the Bluetooth radio control part only the Transmitter (TX) function is supported.

Base Band Controls

Note: *Some parts of Base Band Control functions may not be implemented since they are not supported by the ITP SW.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available for all products.*

The functions for Base Band Control are presented under the following four different tabs:

Audio and FM Radio

Used for setting Audio Loop mode and test the functionality of the FM Radio.

Logic

Used to:

- Read out of the ADC channels
- Control or Test of SIM and Memory Stick Card
- Perform of Battery and Current Calibration
- Check Radio and Display temperature
- Etc.

GPIO Manager

Used to control GPIO ports at the Access and Application CPU.

Note: *It is very important to follow the GPIO activation sequence according to the Troubleshooting Guide instructions when the GPIO manager is used to avoid Hardware or SW function interruption.*

MMI

Used for:

- Main and VGA Camera Tests
- Camera Door Test
- Keyboard Scan Test
- Vibrator Test
- LED and Backlight Tests
- Xenon Flash Test
- Display Test
- Etc.

General

Used to:

- Read out Software and Product Data Information flashed into the phone
- Perform ASIC Revision test
- Perform available Self tests

Equipment Setup

Note: During calibration the accurate voltage from VBATT must be within ± 0.015 V. If this is not fulfilled it will cause a faulty calibration. For more information about recommended power supply units, see the Repair Tool Catalogue in CSPN under the Mechanical level. The Power Supply Channel 1 VBATT must allow reverse current.

Note: Before starting calibration test, the phone must be flashed with ITP Software.

Instructions for Customization of Power Supply Channel 2 DCIO/SEPI Cable

To perform Current Calibration the phone must be powered directly through the system connector. Customize the cable according to following instructions: Take the CST-75 battery charger and cut off the charger according to picture 1. **Length of the cable must be exact 1.3m.** Connect the CST-75 charger **Red** or **White** cable to the **Positive (+) Output** at Power Supply and the **Black** cable to the **Negative (GND) Output** at the Power Supply according to picture 2. Cut off isolation material from inside of the charger plug according to picture 3.

Picture 1



Picture 2



Picture 3



Power Supply Channel 2 DCIO/SEPI Cable Connection Setup

Note: The Power Supply Channel 1 (VBATT) must allow reverse current.

Note: The maximal cable length between the Power Supply Channel 1 VBATT and the dummy battery must not exceed 1m. The cable must have a capacity for at least 16A.

Picture 4



Correct DCIO and SEPI A1 Cable setup when the Troubleshooting Fixture is used.

Picture 5



Correct DCIO and SEPI A1 Cable setup when a Dummy Battery is used.

Picture 6



This setup between DCIO and SEPI A1 Cable is WRONG!

Note: Voltage and Current settings for the Power Supply Channel 1 VBATT and 2 DCIO/SEPI can be found in the Equipment List included in the Product Specific Troubleshooting Manual.

Note: Instructions about the Troubleshooting fixture connections with the External RF connector, Display, SIM Card, Memory Stick Card, Keyboard etc. can be found in Troubleshooting Fixture Connection Instruction included in the Product Specific Troubleshooting Manual.

System Requirements

Note: *Before start using the Troubleshooting Software, the phone must be flashed with ITP SW.*

The system requirements for running the application are:

- At least a Pentium III 500 MHz, with 128 MB of RAM
- Win2000 or Win XP
- One free USB connector
- USB Computer Cable
- At least 1024x768 display resolution. (1152x864 is recommended.)
- SEPI Drivers must be installed
- SEPI BOX
- SEPI A1 Cable
- Phone Specific Dummy Battery
- Phone Specific TRS Fixture
- CST-75 Charger cable
- One Dual or Two Single Channel Power Supplies

TX and RX - Tab

Communication Functions

Note: *Some parts of the Communications functions may not be implemented since they are not supported by ITP Software.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

GSM

GSM Mode Settings

Used for selecting of the GSM radio mode. The following Radio Modes are available:

- TX and RX Switched
- TX and RX Static

Note: *In the TX Switched mode all parameters are available (Band, Channel and Power Level). In the TX Static mode the control of Power Level is hidden and the transmitter works with a predefined DAC value. This is done to protect the power amplifier against overheating.*

GSM Radio Settings

Used for Channel and Power Level control of the selected GSM Band. The TX and RX frequency value for selected band and channel will be presented in the TX and RX frequency box.

1. Select the desired GSM band. Available options are **GSM 850** (Ch 128...251), **GSM 900** (Ch 1...124), **EGSM 900** (Ch 975...1023), **DCS 1800** (Ch 512...885) and **PCS 1900** (Ch 512...810).
2. Use default value or select desired channel.
3. Use default value or select desired power level.

Note: *Any GSM band not used by the Mobile Phone will be unavailable in the GSM Radio Settings.*

GSM RSSI measurements

This measurement is only possible to perform when RX Switched mode is selected. Use the Mobile Phone Tester instrument for feeding a signal to the mobile phone's receiver. For Instrument and Phone's settings go to Troubleshooting Manual – GSM Network problems.

1. Select RX Switched Mode.
2. Select desired GSM band and Channel.
3. Go to GSM RSSI Measurements and Start RSSI Test.

Note: *The RSSI Test can be performed differently from product to product due to the limited ITP Software support.*

WCDMA

Note: *Unused WCDMA Bands will not be available in the WCDMA Radio Settings.*

Note: *For some products the TX and RX WCDMA Channels range can be reduced due to the limited product functionality or Test Instrument limitation. This is done to avoid wrong and incorrect measurement results.*

Radio Settings

Used for TX and RX Channels control of the selected WCDMA Band. The TX and RX Channels frequency for selected band will be presented in the TX and RX frequency box.

1. Select the desired WCDMA band. Available options are **Band I** (TX Ch 9612...9888, RX Ch 10562...10838), **BAND II** (TX Ch 9262...9538, RX Ch 9662...9938), **BAND IV** (TX Ch 1312...1513, RX Ch 1537...1738), **BAND V** (TX Ch 4132...4233, RX Ch 4357...4458) and **BAND VIII** (TX Ch 2712...2863, RX Ch 2937...3088)
2. Use default value or select desired TX or RX channel.

Fast select channels

Set High Channel: The High Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Set Mid Channel: The Mid Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Set Low Channel: The Low Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Modes

Max Pwr 23dBm set the Phone to transmit with maximum power at the selected Band and TX Channel. The limit is 23dBm.

Min Pwr Max -50dBm set the Phone to transmit with minimum power at the selected Band and TX Channel. The limit is -50dBm.

Read RSSI set the Phone in RX mode at the selected Band and RX Channel.

Out Pwr level x dBm set the Phone in TX mode at the desired power level value at the selected Band and TX Channel (Power level range to choose is: from -50dBm to 23dBm).

INP/OUT Pwr check set the Phone to transmit with maximum power and switch the receiver On at the selected Band and TX/RX Channel

Reset output set the Phone in WCDMA Off mode.

Rx on

Read measurement read the RSSI and report the result at Phone reported power. This function can only be used when the Receiver is On.

Note: *The RSSI Measurement can be performed differently from product to product due to the limited ITP Software support.*

VCO and VCXO Functions

Note: *These calibrations are only possible to perform when RX static mode is selected.*

Note: *These calibrations may not be possible to implement for all products due to limitations in ITP Software.*

VCO Calibration (TX)

Uses the default values in the TP to adjust the varactor diode to a pre-determined operating point, so that the loop voltage of the TXVCO (measured with an ADC) is within the valid range and the optimal value is chosen. The optimal value is defined as: The CVCO value that gives loop voltages within the limits for both high and low channel and that has the lowest maximum loop voltage.

The optimum value is stored in GDFS.

VCXO Control

Used to fine tune the VCXO to **MCLK** frequency by calibrating the DAC that sets the VCXO control voltage. It is also used to verify the VCXO tuning range. When transmission is in Switched TX mode you are allowed to calibrate the VCXO oscillator controlling the DAC value on the AFC pin.

1. Switch the GSM tester to GSM900, Ch1.
2. Read the stored VCXO value from the GDFS by clicking the "**Read from GD**" button.
3. Start transmitting by clicking the "**TX Switched**" mode button.
4. To apply the VCXO DAC value you set, click the "**Set VCXO**" button.
5. Check your GSM tester.
6. Set the frequency error as close to 0 Hz as possible by using the up/down arrows and then click the "**Set VCXO**" button again.
7. The button "**Mean Value**" sets the value to 1024.
8. When the procedure is finished, click on "**Save VCXO**" button to store the calibrated value in GDFS.

VCO Calibration (RX)

Uses the default values in the TP to adjust the varactor diode to a pre-determined operating point, so that the loop voltage of the RXVCO (measured with an ADC) is within the valid range, and the optimal value is chosen. The optimal value is defined as: The CVCO value that gives loop voltages within the limits for both high and low channel and that has the lowest maximum loop voltage.

The optimum value is stored in GDFS.

Audio and FM Radio - Tab

Audio & Radio Functions

Note: *Some parts of Audio and FM Radio may not be possible to implement for all products due to limitations in ITP Software.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

Audio Loop Test

1. Select desired Audio Loop Test
2. Click "**Apply Audio Loop**" to start the test.
3. To switch off the loop, select **OFF** from **Audio Output** and click "**Apply Audio Loop**".

Audio input:

- **Mic1** is the internal microphone.
- **Aux1** is the input from the system connector.

Loop mode:

- **Analogue**, where the loop is set before and after the AD/DA conversions.
- **Digital/DSP** loop, where the DSP signal processing also affects to the audio signal.
- **CPU/PCM** loop, where the loop is set between the PCM audio signals.
- **Dictaphone** loop.

Audio output:

- **Earphone** is the internal Earpiece speaker of the unit.
- **AUX earphone** connected to the system connector.
- **Loudspeaker** is the internal loudspeaker of the unit.
- **OFF** is used to switch off the currently used Audio Loop.

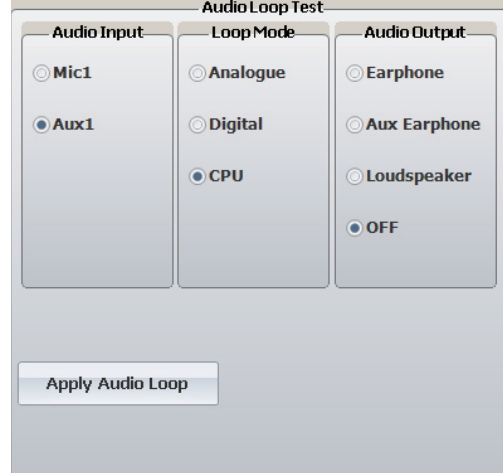
Examples of different Audio Loop Test setups in Fault Trace SW.

Picture 9



K800 Project Setup

Picture 10



K850 Project Setup

Note: Audio output and input pins can be used by disconnecting the blue SEPI connector from the phone after the audio loop has been applied. Now the Portable Handsfree can be connected to the System Connector. After function test operation, disconnect the PHF or external audio device from the System Connector and connect the SEPI cable to proceed with other Audio Loop Tests.

FM Radio

- To activate the FM radio, click at the **Set FM Radio** button.
- To turn off the FM radio, click at the **Turn OFF FM Radio** button.

Audio output

Used for selecting Audio Output from the FM Radio. Most common Audio Outputs for all projects are AUX Stereo (Portable Handsfree, PHF) or Loudspeaker.

Frequency in MHz

Frequency range box for the FM Radio. The frequency value can be selected in two different ways:

- The first one is with up/down spin buttons
- The second one is to type it directly into the Frequency field.

When typing directly into the Frequency field, the Frequency Span should be 100 KHz when changing from one frequency to another. The Frequency Range used in the Troubleshooting Software is from 87.50 MHz to 108.00 MHz.

Examples of different FM Radio Test setups in the Troubleshooting Software

Picture 11



K850 Project FM Radio Setup

Picture 12



K800 Project FM Radio Setup

Logic – Tab

Logic Functions

Note: Some of the Logic functions may not be possible to implement for all products due to limitations in the ITP Software.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

Battery Calibration

Note: To perform this test only Power Supply channel 1 is needed. Make sure that the correct voltage values are set for each test step, otherwise the test will fail.

The Battery Calibration test is similar to the Battery Calibration test performed in the factory environment.

1. Click **1. Battery Calibration**.
2. Click **SET VBATT to 3.2 Volt**.
3. Adjust Power Supply channel 1 (the dummy battery) to 3.2 V.
4. Click **VBAT1**.
5. Click **SET VBATT to 4.1 Volt**.
6. Adjust Power Supply channel 1 to 4.1 V and click **VBAT2**.
7. Adjust Power Supply channel 1 to 3.8 V and click **SET VBATT to 3.8 Volt**.
8. The test result (**Passed** or **Failed**) will now be displayed.

When the measured values are within the limits the calibration will be passed otherwise the test will be failed. The compensation factor will be calculated and stored in the GDFS.

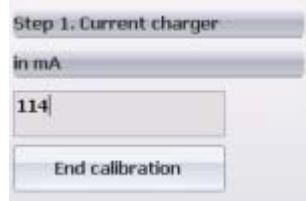
More information about the test limits can be found in the product specific Troubleshooting Manual and in the **Read Limits Table** in the **Battery and Current Calibration Test** document.

Current Calibration

The Current Calibration test is similar to the Current Test for the charging algorithm in the factory environment.

Note: For a correct and accurate result, perform the **Battery Calibration Test** before current calibration. To perform this test you will need both channel 1 and 2 from the Power Supply.

1. Click **2. Current Calibration**.
2. Adjust channel 1 (the dummy battery) to 3.8 V.
3. Click button **SET VBATT to 3.8 Volt**.
4. Note the measured current for channel 2 (the customized charger with SEPI).
5. Type in the measured current (in mA) in the text box.



In this example the current is measured to 114 mA.

6. Press **Enter**.
7. The phone will switch to charging with 800mA. Note the measured current value result at Power Supply Channel 2 DCIO/SEPI.
8. Type the new value in the text box.
9. Press **Enter**.
10. The test result (**Passed** or **Failed**) will now be displayed.

When the measured values are within the limits the calibration will be passed otherwise the test will be failed. The compensation factor will be calculated and stored in the GDFS.

More information about the test limits can be found in the product specific Troubleshooting Manual and in the **Read Limits Table** in the **Battery and Current Calibration Test** document.

ADC Values

1. Select the desired ADC Channel.
2. Click **Read ADC value**.

- The measured value will be presented in both hex and decimal info boxes.
- N/A means that the General Purpose port is not used by this phone or this port is not supported by ITP.
- If a port is missing in the Troubleshooting SW that port is not supported by the ITP SW.

SIM Card Control

This section controls the SIM interface in the phone.

SIM VCC: Voltage for the SIM Card will be activated.

SIM RESET, SIM DATA and **SIM CLOCK:** Activate the Reset, Data and Clock signals for the SIM Card.

SIM Com Test: Checks the communication with the SIM Card.

The test result (**Passed** or **Failed**) will be displayed in the info box.

Note: A SIM card must be inserted and a card reader connected to run this test.

Memory stick test checks the communication with the Memory stick card.

The test result (**Passed** or **Failed**) will be displayed in the info box.

Note: A Memory stick card must be inserted and a Memory card reader connected to run this test.

End Calibration

Ends the calibration and no data will be stored.

Go Idle for 2 sec

The unit will be set to IDLE mode for 2 seconds.

Reboot Phone

IPT command **KILL** will be send and the phone will restart.

Radio Temperature

The value of the Radio Temperature will be displayed in the info box.

Display Temperature

The value of the Display Temperature will be displayed in the info box.

GPIO Manager Functions

Set GPIO port at Access and/or Application CPU to High or Low and Read Out status of the port.

MMI – Tab

Functions

Note: Some parts of MMI functions may not be possible to implement for all products due to limitations in the ITP Software.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

Display Pattern

Activate different test patterns on the display.

LED and Backlight

Activate/Deactivate LEDs and Backlights on the phone.

Misc

Activate/Deactivate tests such as:

- Main Camera Test
- VGA Camera Test

- Camera Door Test
- Vibrator Test
- Keyboard Scan Test
- Etc.

Note: *When one test has been deactivated the phone will be restarted.*

General – Tab

Functions

Note: *Some parts of General functions may not be possible to implement for all products due to limitations in ITP Software.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

Software Information

This function is used to display the following information stored into the phone:

- ITP version
- IMEI number
- OTP number
- CID number
- PAF status
- Lock Status
- Etc.

Note: *The OTP number must match the IMEI number otherwise the IMEI has been changed.*

Note: *Some of these functions may not be available for all products due to security reasons.*

Product Data

This function displays production data stored in the phone, such as:

- First Identification (Serial Nr.)
- PBA Nr.
- PBA Rev.
- DPY Nr. (Sales Unit)
- Etc.

ASIC Revisions

This function displays the types and revisions of the different ASICs. To find out more information about which components are included in this test go to the **ASIC Revision Test** document **included in** the product specific **Troubleshooting Manual**.

Self Test

This function runs available self tests on the Phone.

1.

...timeout when reading

Check the following items:

- Connection between Power Supply Channel 2 (DCIO) and SEPI A1 cable (Se picture 4, 5 and 6).
- If the SEPI BOX works properly (The Green LED at the SEPI BOX must be on).
- If the USB cable between SEPI BOX and PC is connected properly.
- If the phone has been flashed with the correct ITP version.
- If VBATT and DCIO Power Supply instruments are on.

2.

...timeout when writing

...timeout when reading

Check if the correct COM Port is selected in Troubleshooting Software - Communication Settings Tab

3.

...Port has not been succesfully opened timeout

- Check if COM Port is connected
- Check if the correct Phone Project File is loaded
- Restart the Troubleshooting Software application and try again

4.

Command failed due to:

.... Error_InvalidParameter, ERR

or

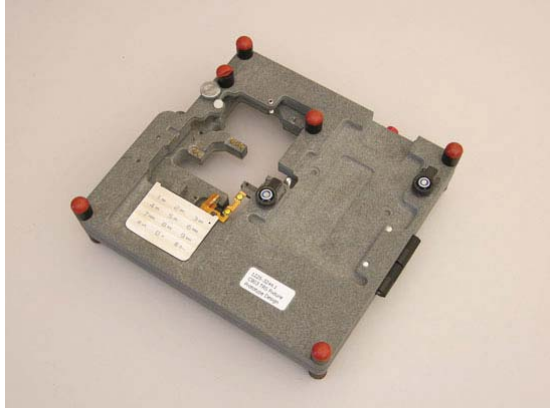
CERR: Error_CommandDoesNotExist, ERR

- Check if the correct Phone Project File is loaded
- Check if the phone has been flashed with the correct ITP version.

Troubleshooting Fixture Setup Instruction

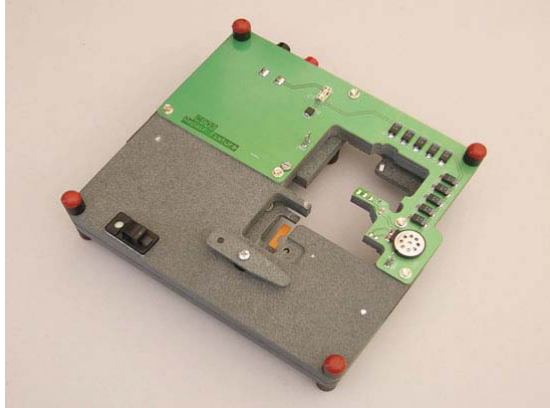
Top-part overview of the TRS Fixture, see picture 1.

Picture 1



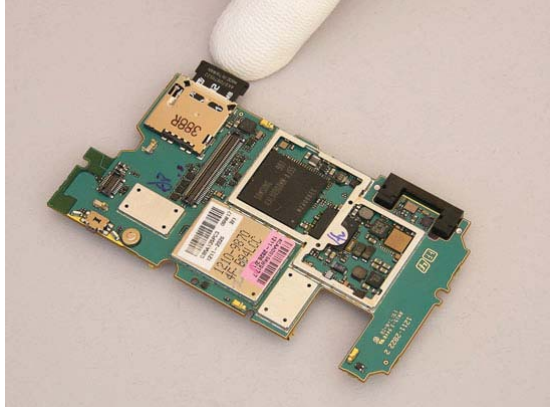
Bottom-part overview of the TRS Fixture, see picture 2.

Picture 2



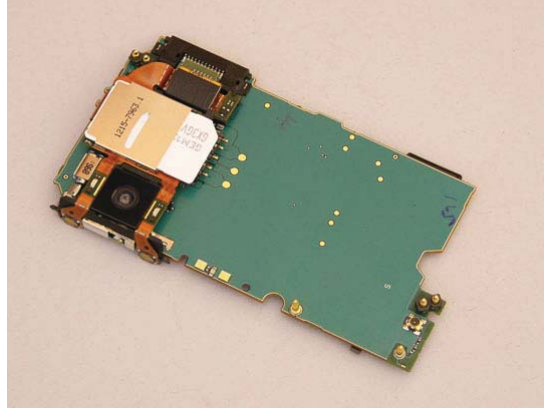
Insert Memory Card if needed according to picture 3.

Picture 3



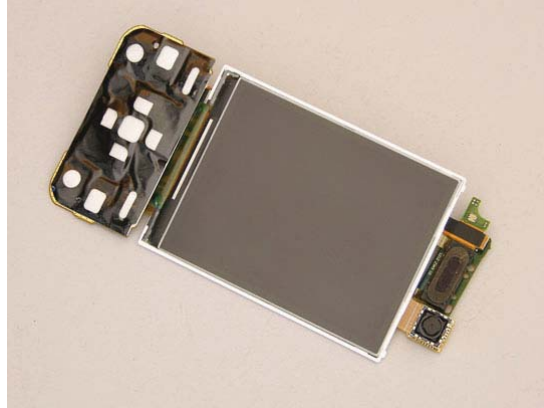
When the Camera 5 MPixel CMOS Slim and the SIM Flex Assy with the SIM Card Inserted is in use, connect directly to the PBA according to picture 4.

Picture 4

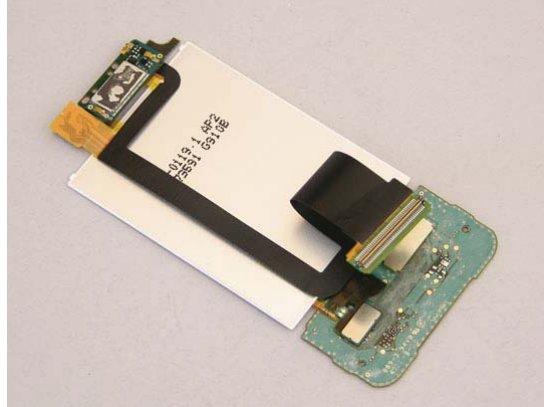


Connect Main Flex Assy, Navigation PBA Assy and the Display according to pictures 5 and 6.

Picture 5

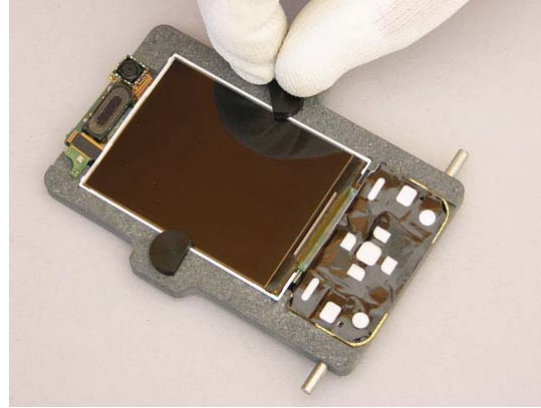


Picture 6

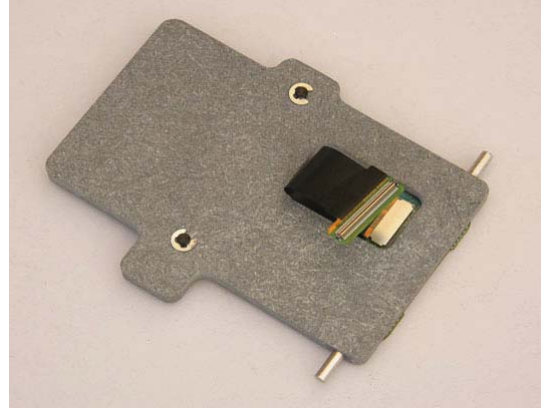


Place Main Flex Assy, Navigation PBA Assy and the Display into the TRS Fixture Display Holder and secure by using the locking screws, see pictures 7 and 8.

Picture 7

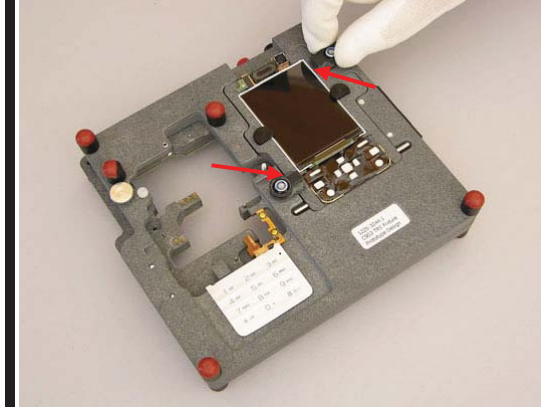


Picture 8



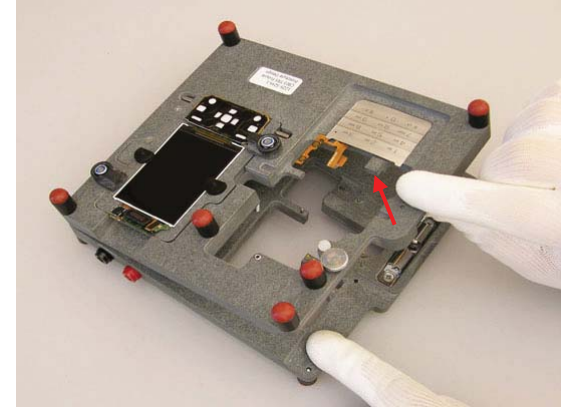
Place the TRS Fixture Display Holder into TRS Fixture and secure by using the locking screws according to picture 9.

Picture 9



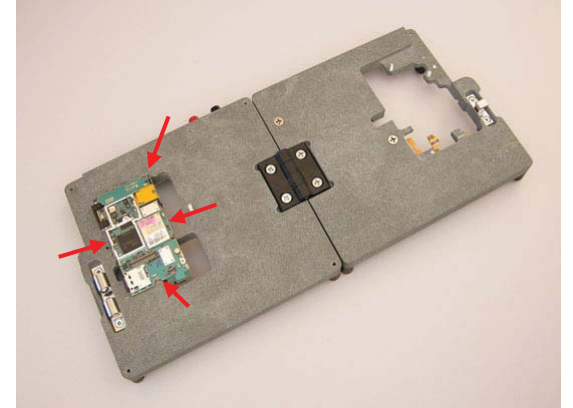
Open the TRS Fixture according to picture 10.

Picture 10



Place the PBA by using the Guide Pin mounted inside the TRS Fixture according to picture 11.

Picture 11



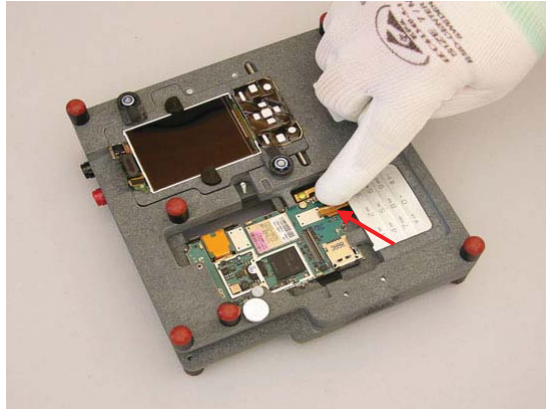
Close the TRS Fixture according to picture 12.

Picture 12



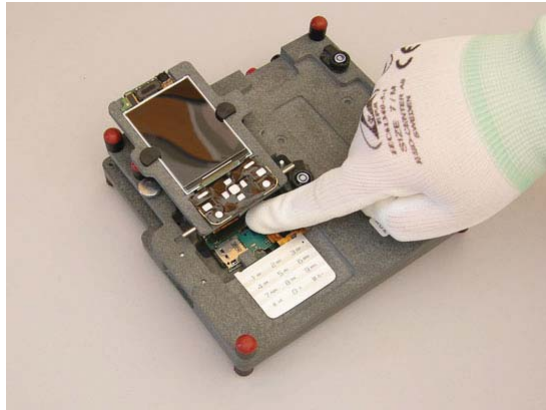
Connect the Key Flex Assy directly to the PBA when Keyboard is in use according to picture 13.

Picture 13



When the Display, Navigation Keypad, Earphone, VGA-VTF Camera or A-GPS Module is needed then use the TRS Fixture Display Holder and connect the Main Flex Assy directly to the PBA see pictures 14 and 15.

Picture 14

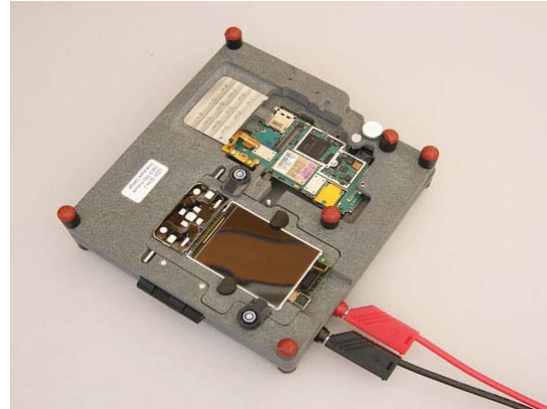


Picture 15



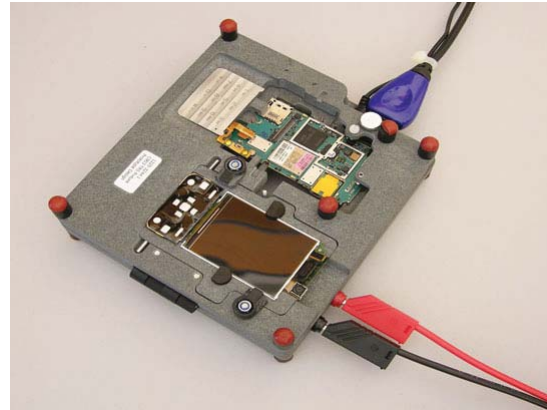
Connect Power Supply Channel 1 (VBATT) Black and Red Lab Plugs to the TRS Fixture according to picture 16.

Picture 16



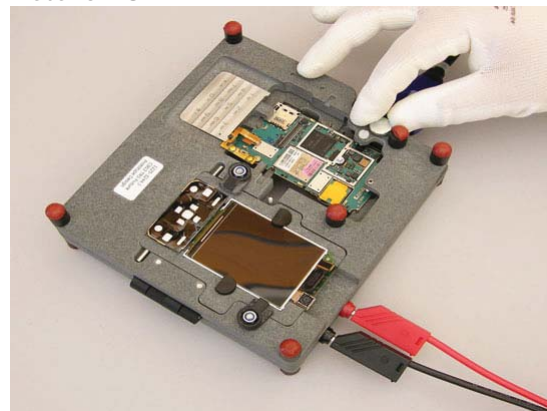
Connect the Power Supply Channel 2 Cable (DCIO/SEPI) according to picture 17.

Picture 17



Secure the DCIO/SEPI Cable by using the locking screw according to picture 18.

Picture 18



Connect the Customized FM Radio Cable according to Step 1 and 2, see picture 19.

Step 1:

Connect the Black Lab Plug to the TRS Fixture GND input.

Step 2:

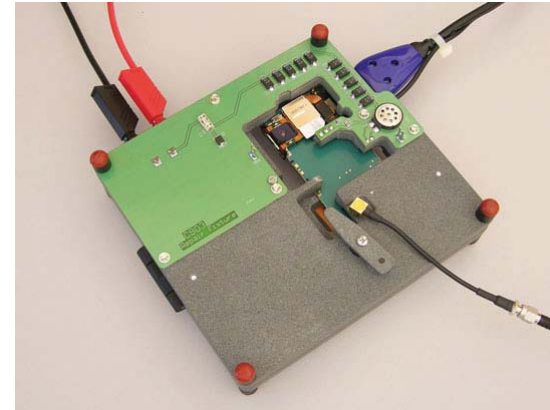
Connect the Hands-Free (PHF) connector to the Phone system connector (X2405).

Picture 19



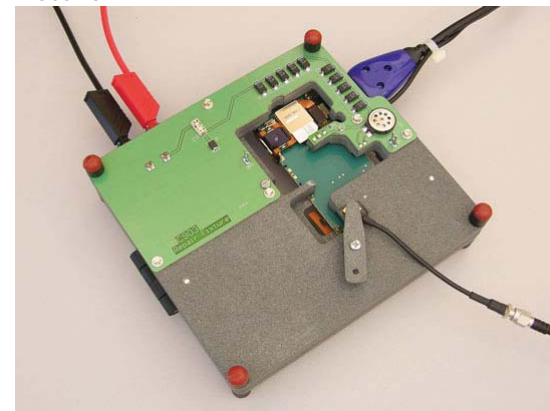
Connect the RF Cable Flexible with SMK RF Probe to the X1200 RF Switch according to picture 20.

Picture 20



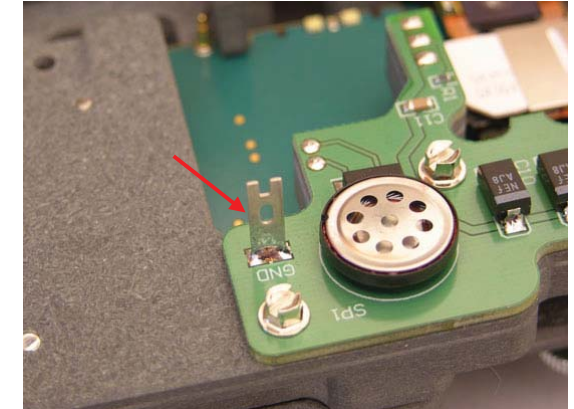
Secure the SMK RF Probe with the RF Probe locking device according to picture 21.

Picture 21

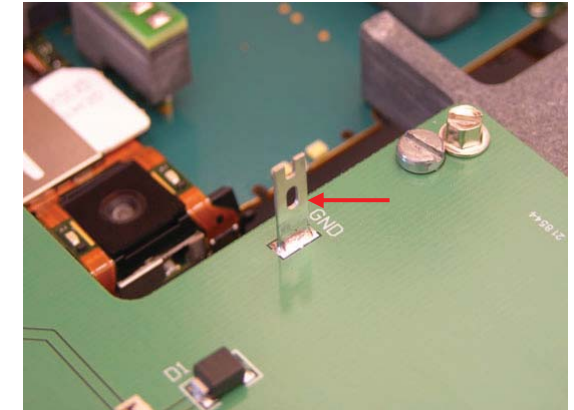


The PINs marked with GND text on the Bottom-part of the TRS Fixture can be used as an MP TRS Fixture GND or grounding for the oscilloscope probe, see pictures 22 and 23.

Picture 22



Picture 23



The PIN mounted inside TRS Fixture can be used as an MP TRS Fixture GND or grounding for the oscilloscope probe see picture 24.

Picture 24

