

Troubleshooting Manual

C702



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.

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Revision History

Rev.	Date	Changes / Comments
1	10/31/2008	Initial revision.

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C702 Equipment List



Note: More additional information about the equipment used for TRS can be found in Repair Tools Catalogue on CSPN or on the following location: CSPN – Repair Instructions – Electrical – C702 – Equipment List.

TRS Fixture Kit

Location: CSPN-Repair Instructions-Electrical-C702-Equipment List

Dummy Battery

Location: CSPN-Repair Instructions-Electrical-C702-Equipment List

Part number: NTZ 112 533

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

Instruments

Power Supply Channel 1 VBATT

Agilent 6632B or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Instrument Settings:

Voltage: 3.8 Volt

Limiter: 2A

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

Note: Maximal cable length between the Power Supply Channel 1 VBATT and the dummy battery must be maximum 1m. The cable must have a capacity for at least 16A.

Note: It is very important to follow instrument settings instructions when performing the Battery Calibration Test.

Power Supply Channel 2 DCIO/SEPI

Agilent 6632B or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Instrument Settings:

Voltage: 5.0 Volt

Limiter: 2A

Note: It is very important to follow instrument setting instructions when performing the Current Calibration Test.

Oscilloscope

Tektronix TDS 2012 or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Digital Multimeter (DMM)

Fluke 83 or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

The 0, 64 mm Test Probes is recommended by Sony Ericsson when DMM is in use see picture 1.

Picture 1



Spectrum Analyzer

HP 8595E or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

RF probe

HP 85024A or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Mobile Phone Tester

Yokogawa VC230 or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

FM Signal Generator

Agilent E4433B 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-Level: Mechanical-Tool Catalogue

Urquell Fault Trace SW with project file

Location: CSPN-Repair Instructions-Electrical-C702-Trouble Shooting Application
Project File: C702 Project_R1A

Drivers

SEPI BOX Drivers
Location: EMMA III-Drivers-SEPI

SE Communication Interface SEPI BOX

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: LTN 214 1484
See Picture 3.

Picture 3



Cables

USB Computer Cable

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
See Picture 4.

Picture 4



DSU-60/USB Cable

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: KRY 101 1413

RF Test Cable Flexible

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: RPM 119 885
See Picture 5.

Picture 5



SEPI Interface Cable – A1

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
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-Level: Mechanical-Tool Catalogue

Power Cable BLACK to Power Supply Channel 1 VBATT

Maximum Length: 1m
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Customized Power Supply Channel 2 DCIO/SEPI Cable

To perform Current Calibration the phone must be supplied directly through the system connector. Customize the cable according to following instructions:

STEP 1:

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

Picture 7



Note: Cable length must be exact 1.3m.

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 Power Supply Channel 2 DCIO/SEPI according to Picture 8.

Picture 8



STEP 3:

Cut of isolation material from inside of the charger plug according to Picture 9.

Picture 9



STEP 4:

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

Picture 10



This is wrong setup see picture 11.

Picture 11



Power Supply Channel 2 DCIO/SEPI Cable Connection Setups

Correct DCIO/SEPI Cable setup when TRS Fixture is used.

Picture 12



Note: Example of DCIO/SEPI and K750 TRS Fixture Setup.

Correct DCIO/SEPI Cable setup when the Dummy Battery is used.

Picture 13



Picture 14



Customized FM Radio Cable

STEP 1:

Use Cable according to Picture 15

Picture 15



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 ELFA part number)

STEP 2:

Cut the Red lab plug according to Picture 16

Picture 16



STEP 3:

Use any Hands free (PHF) Cable and cut according to Picture 17

Picture 17



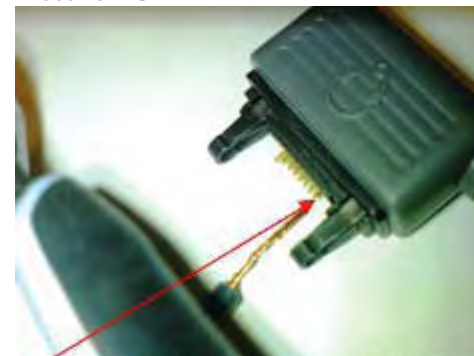
Note: Minimum Cable length 40 cm.

STEP 4:

Use only wire connected to Pin2 and cut all rest wires according to Picture 18.

Use digital multimeter instrument (DMM) and perform diode measurement to select wire connected to Pin2 at hands free system connector plug.

Picture 18



Pin2 (**Note:** Pin1 is not mounted)

STEP 5:

Connect by soldering cable from Picture 16 and cable from Picture 18 according to Picture 19.

Picture 19



Test Cards

Local SIM

Any functional Local SIM Card, see Picture 20

Picture 20



Test SIM GSM/UMTS

One Test SIM GSM/UMTS is needed to perform Current Consumption Test, see Picture 21.
Location: To buy a Test SIM GSM/UMTS, please contact your supplier of test equipment.

Picture 21



Sony Memory Stick M2

Any functional Memory Stick Micro M2 Card, see Picture 22

Picture 22



Rohde & Schwarz RF Shield Package (Box)

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Picture 23



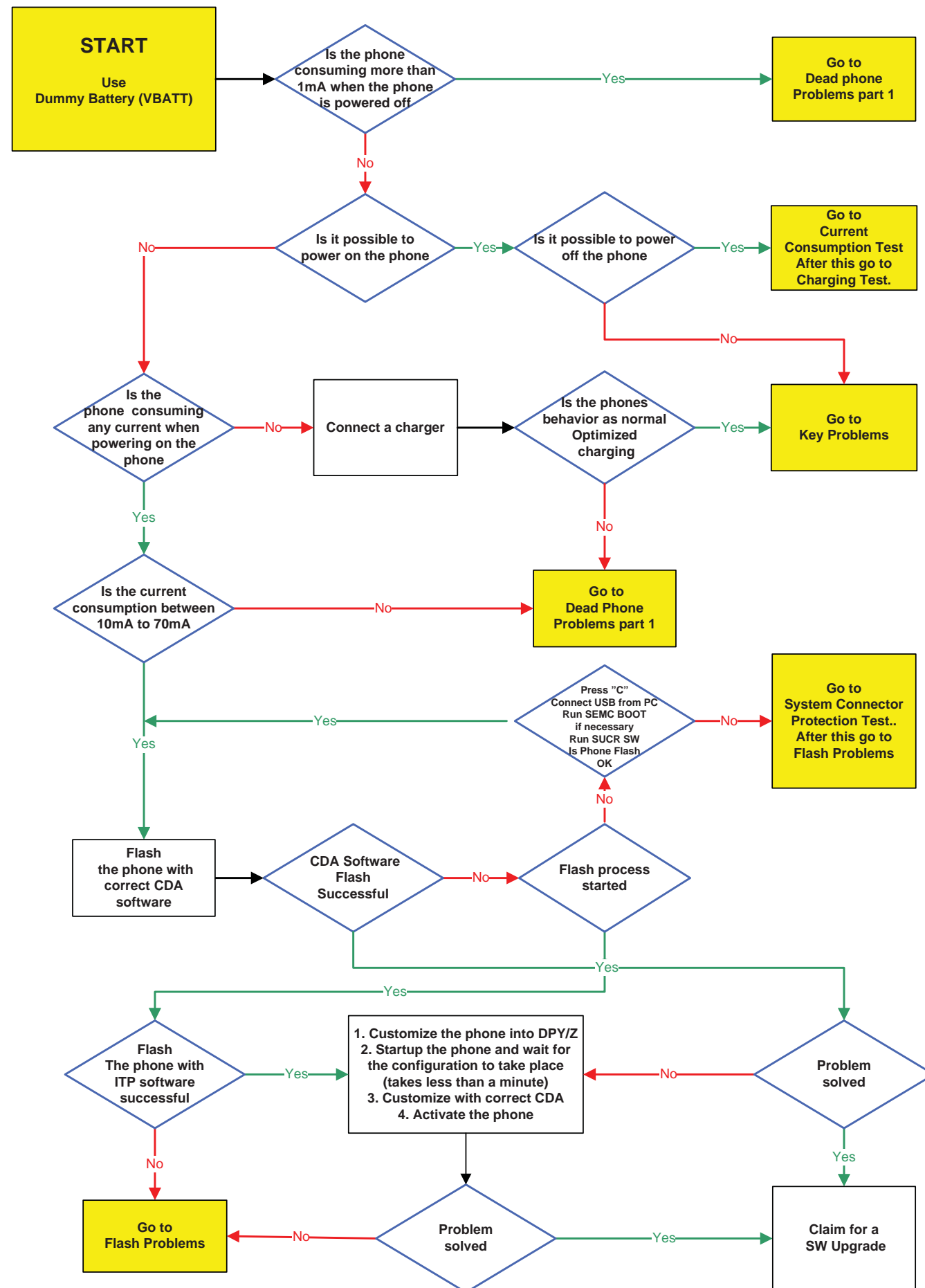
SMK RF Probe

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: SXA 109 6356

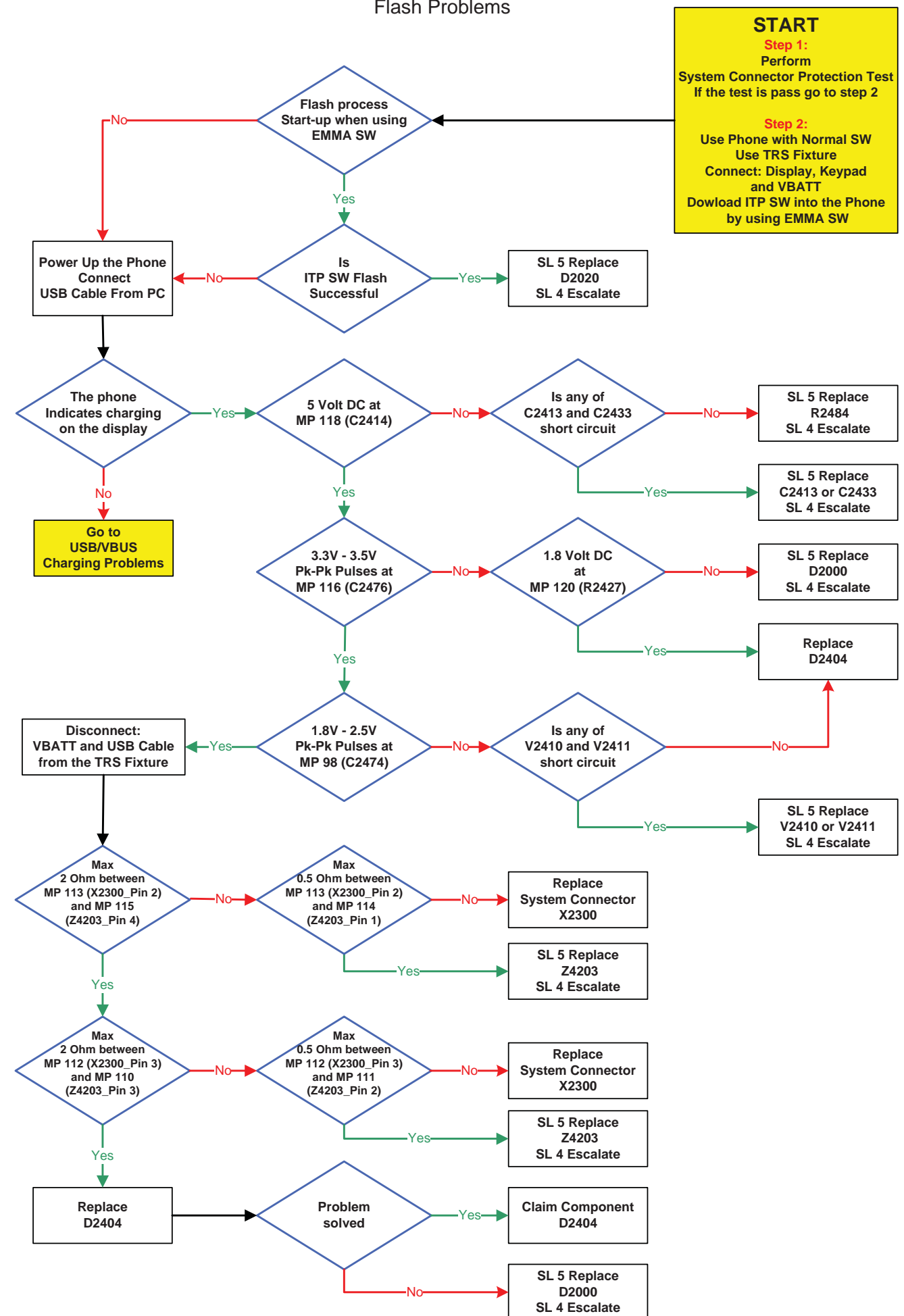
Picture 24

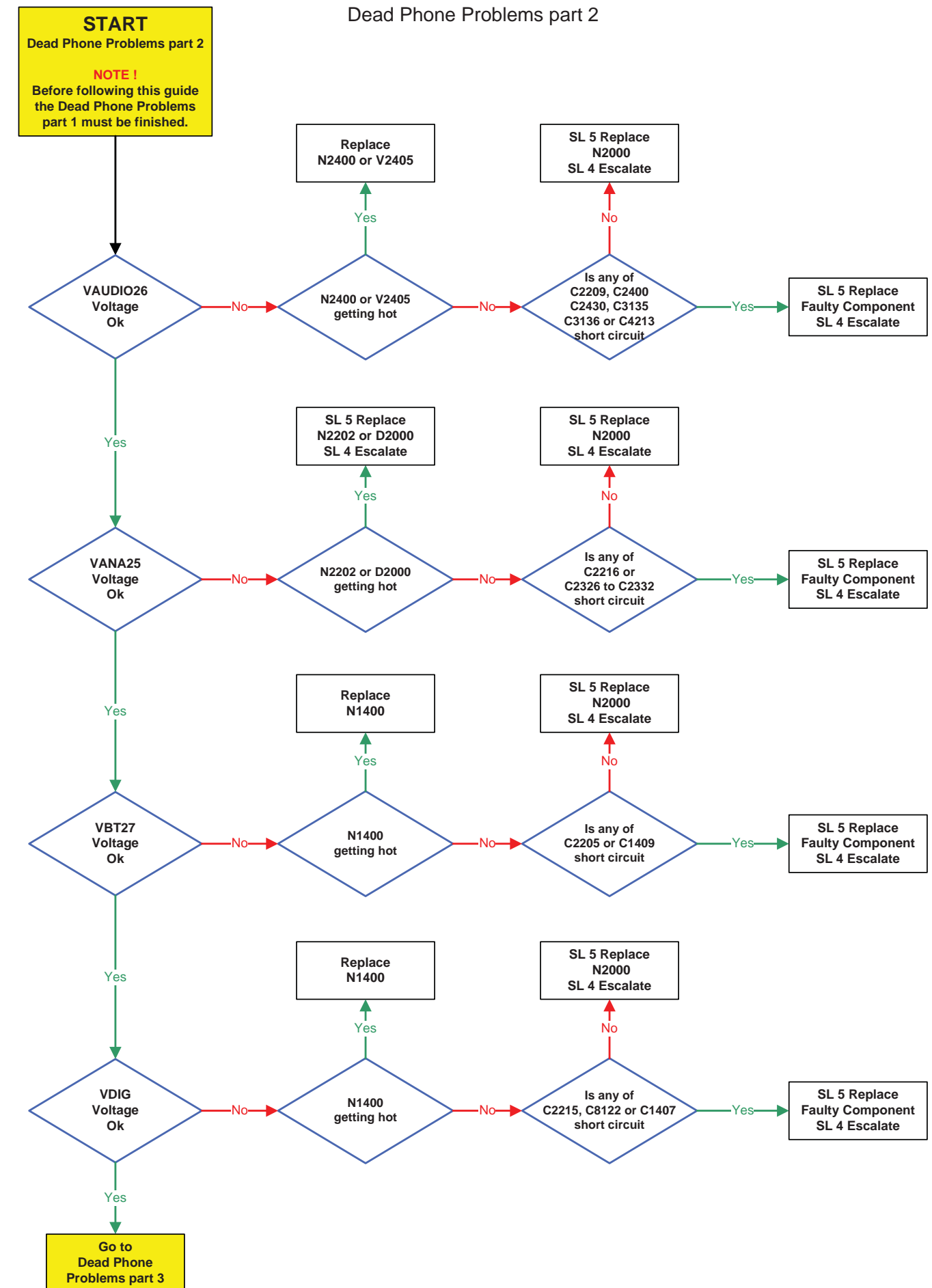
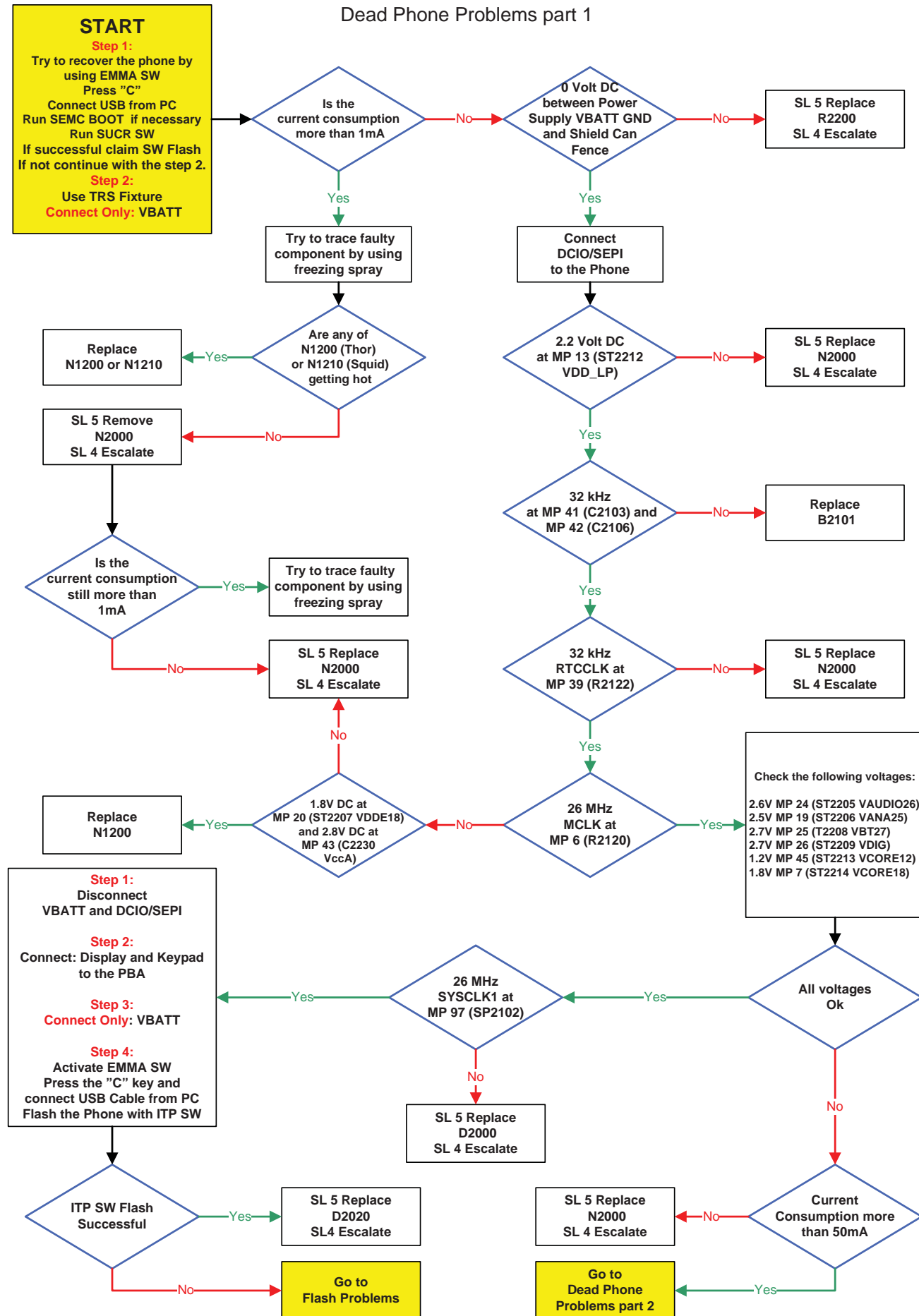


On/Off Problems

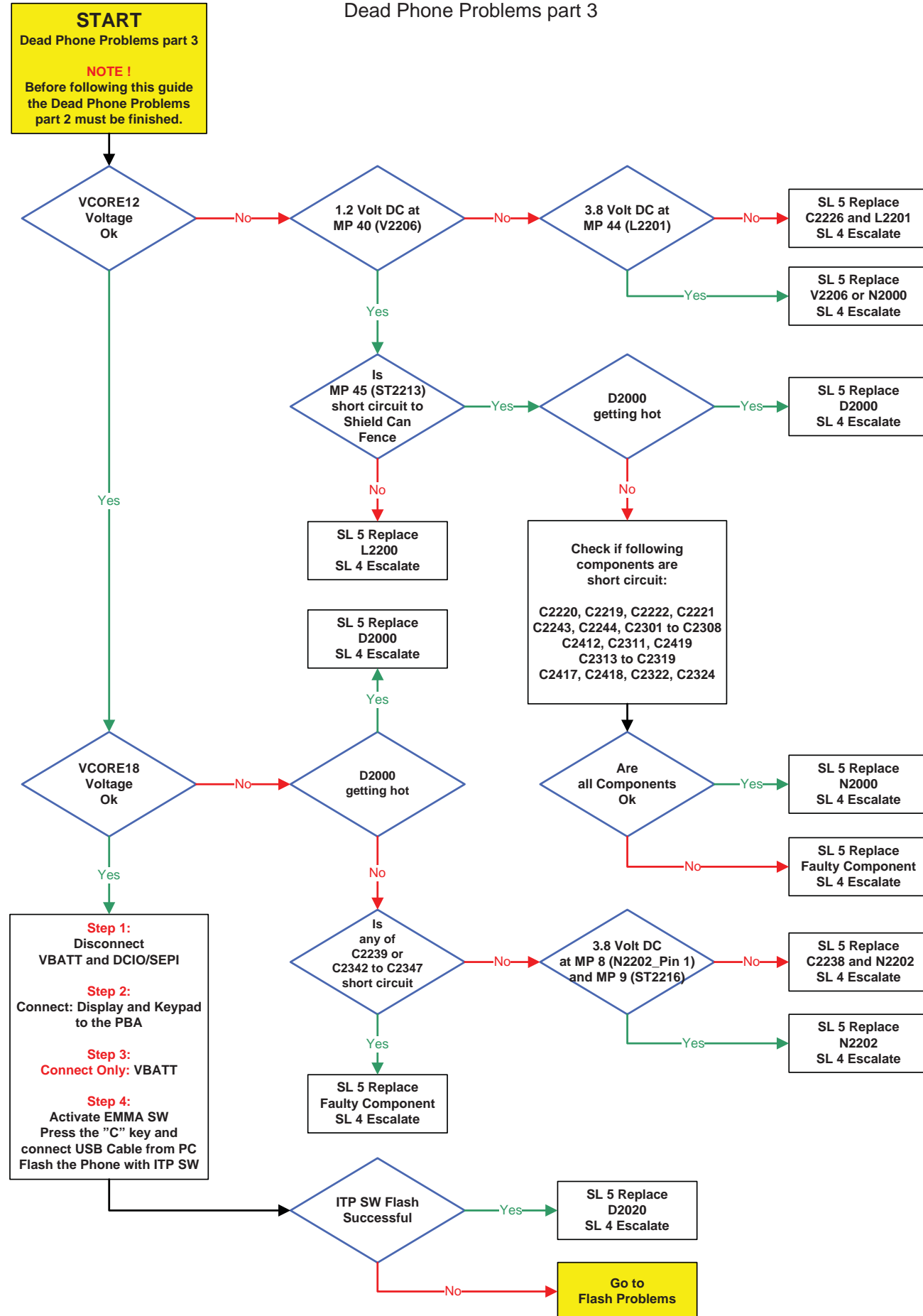


Flash Problems

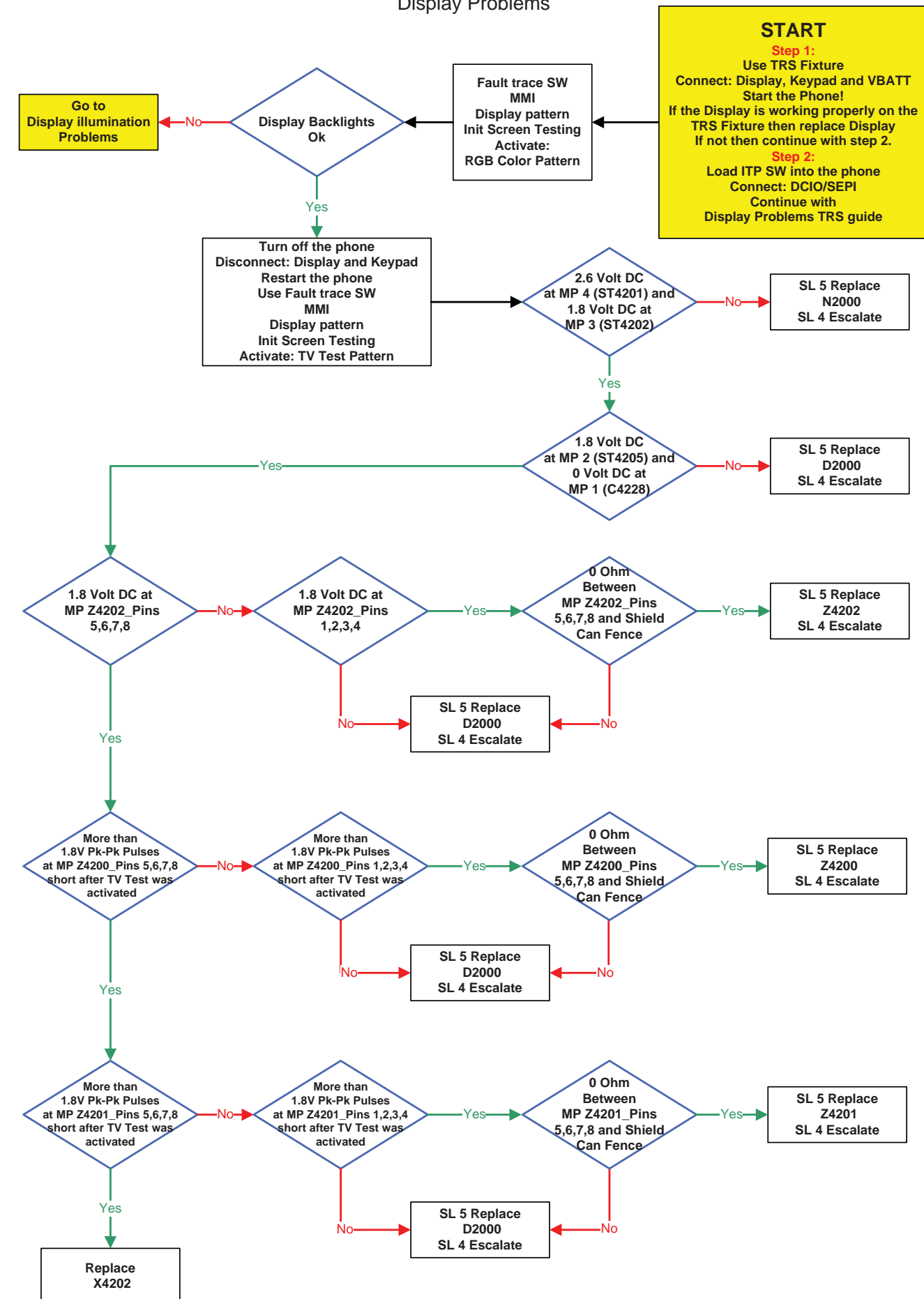


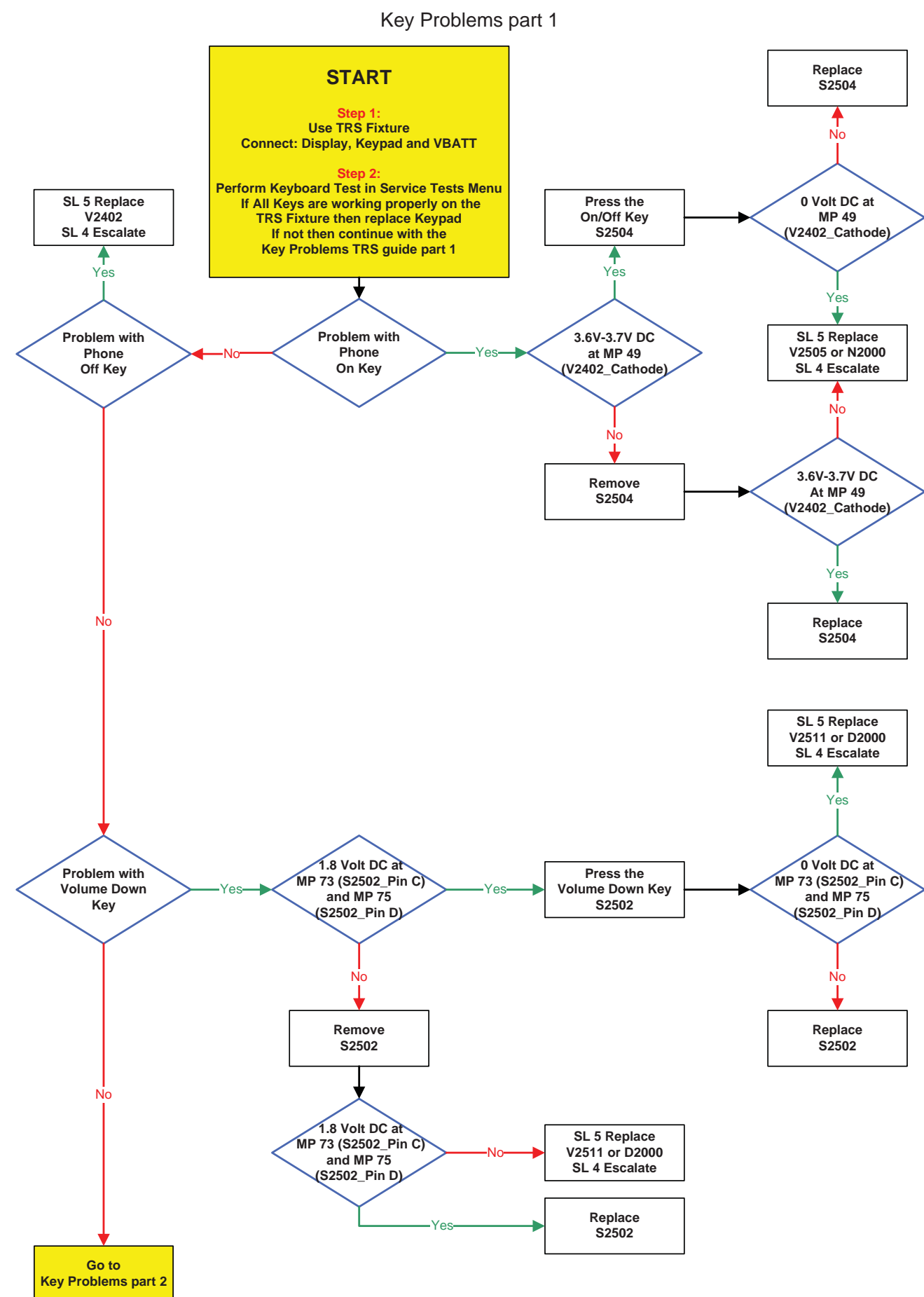
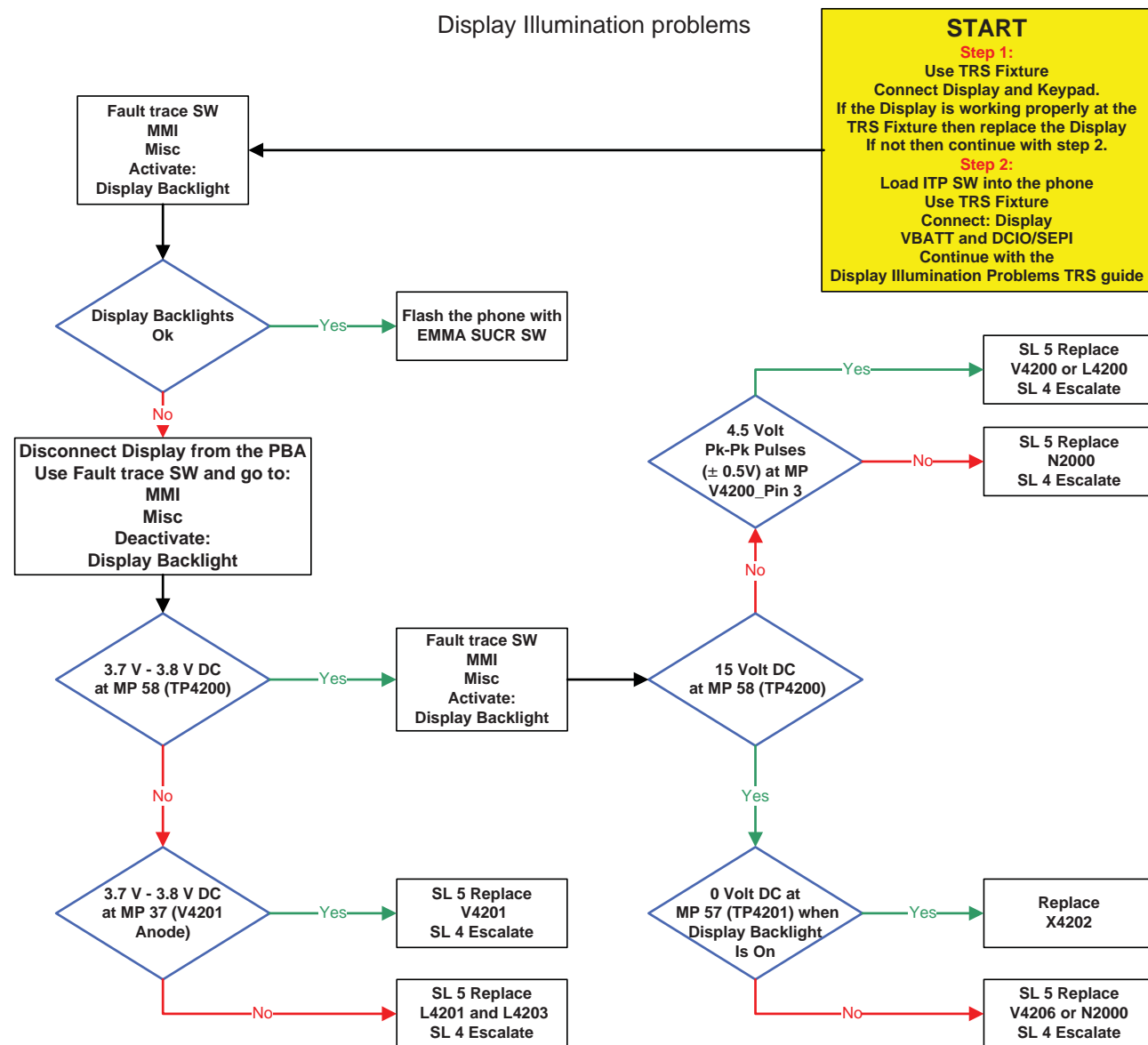


Dead Phone Problems part 3

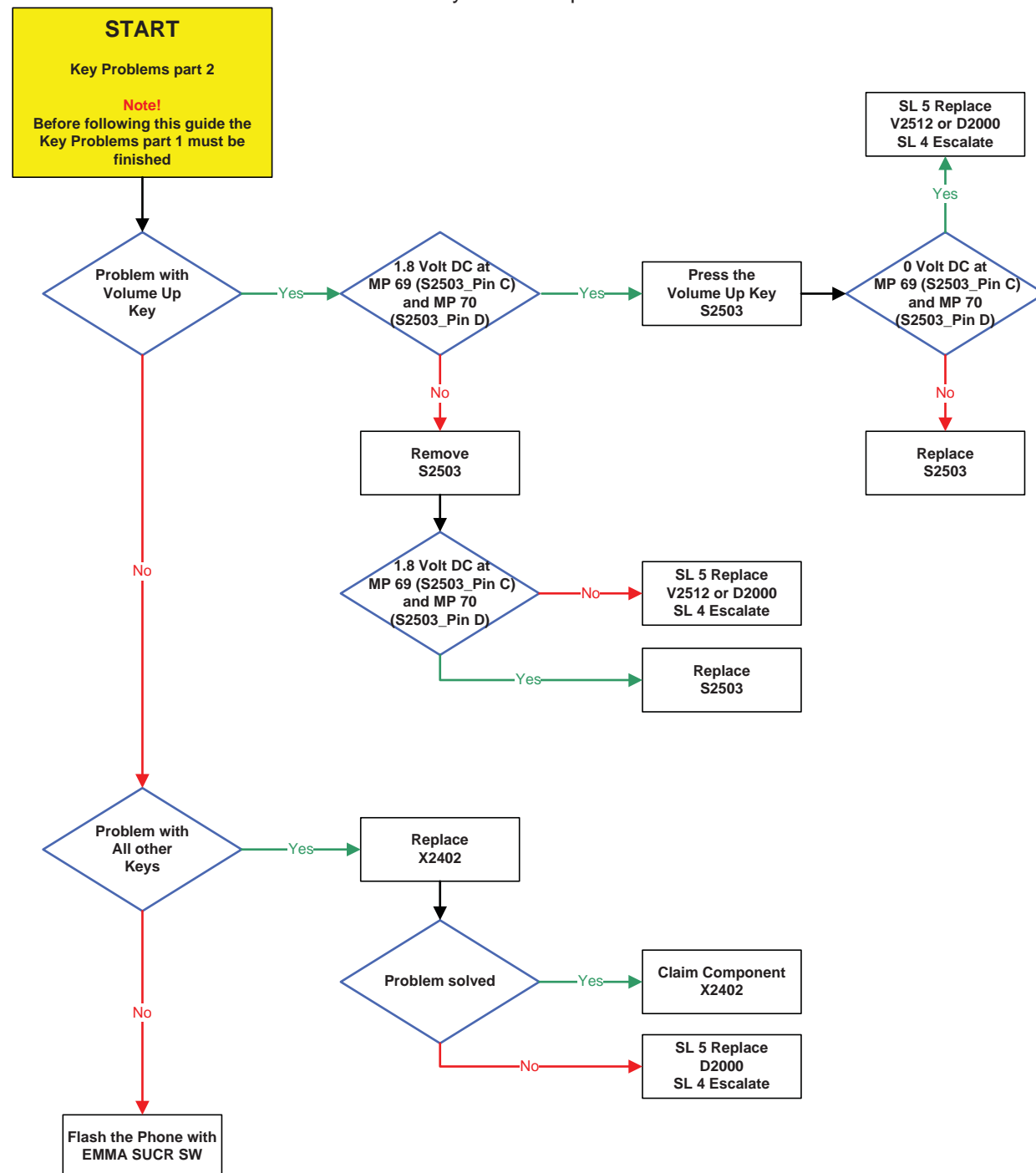


Display Problems

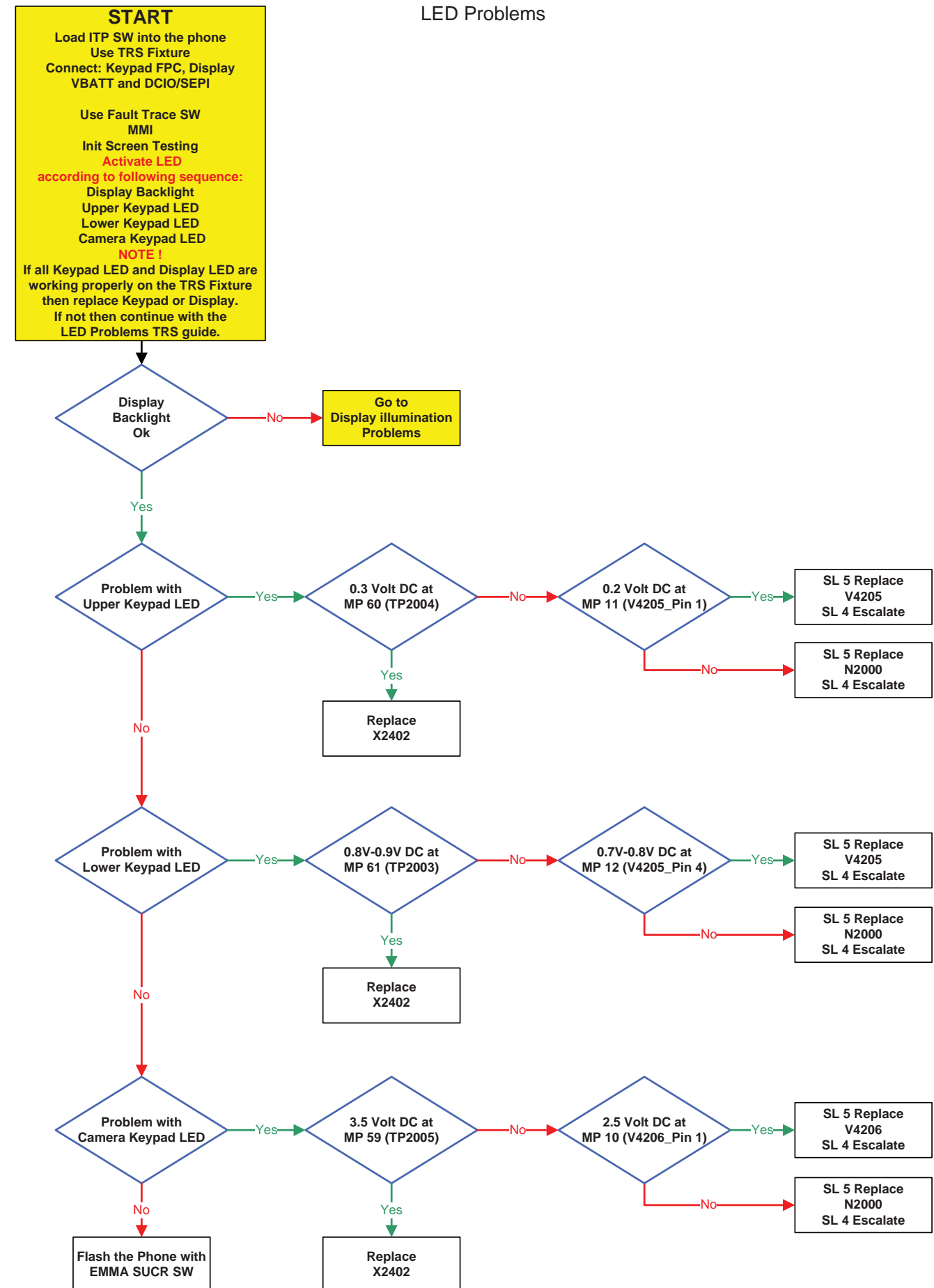




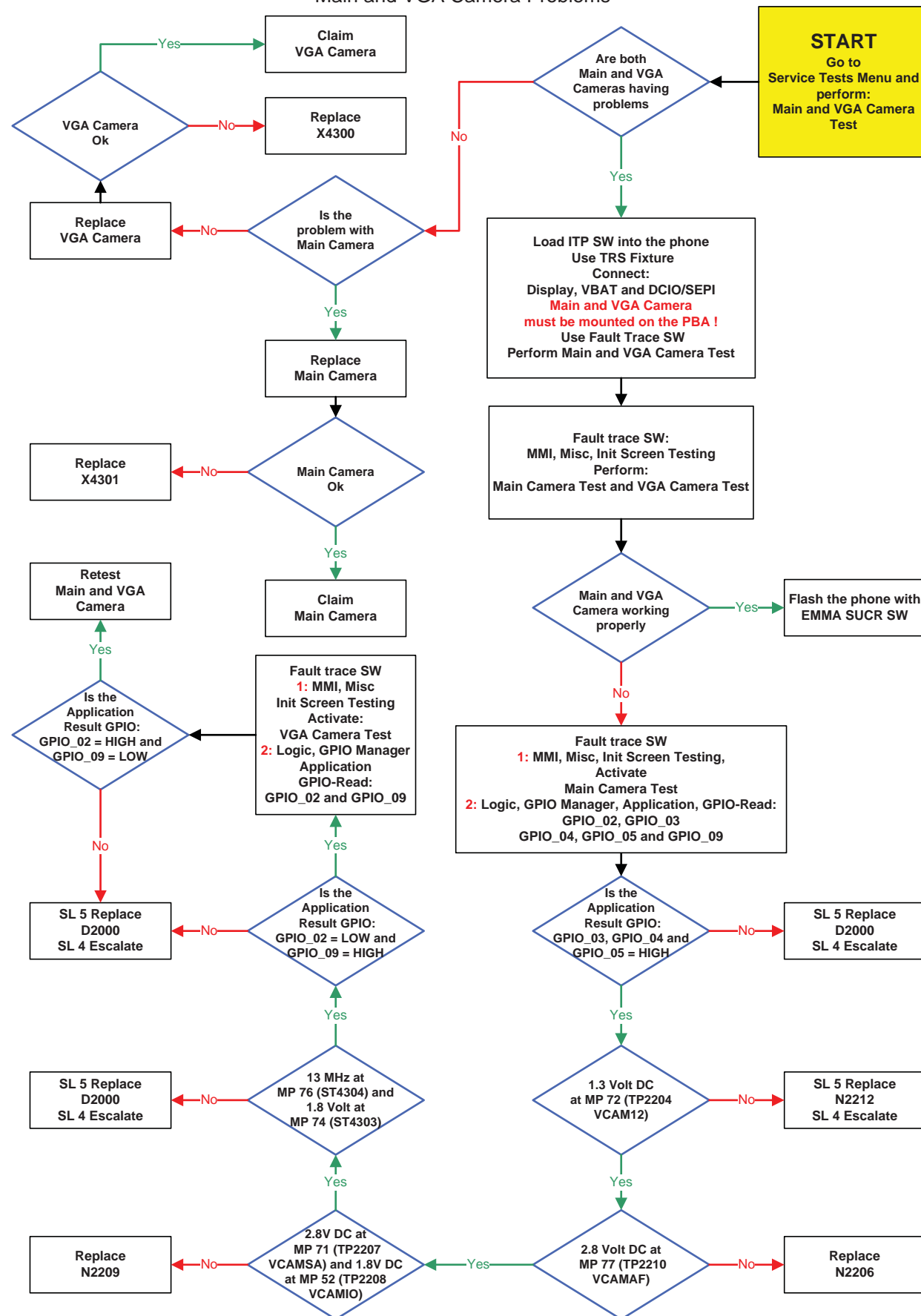
Key Problems part 2



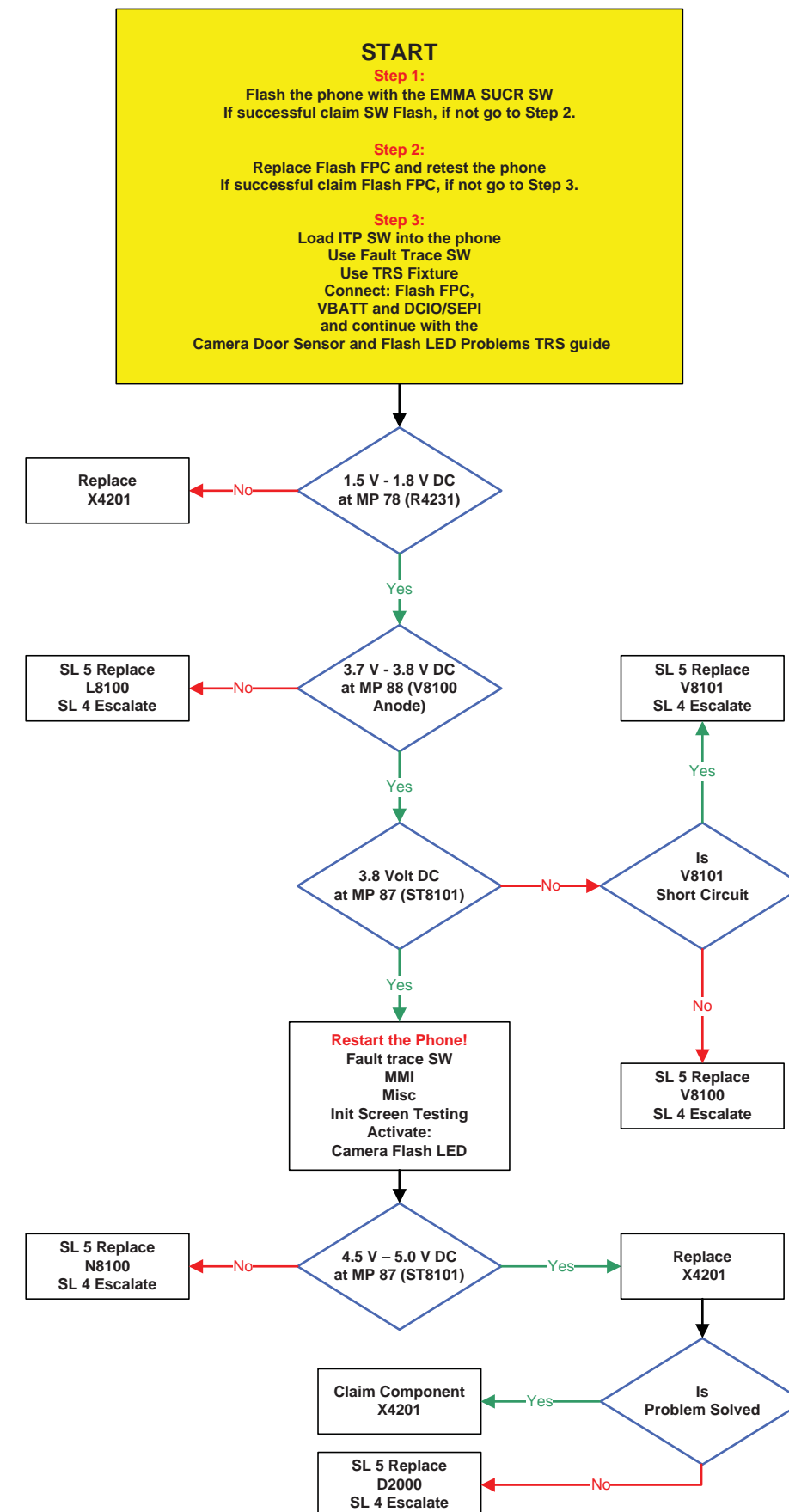
LED Problems



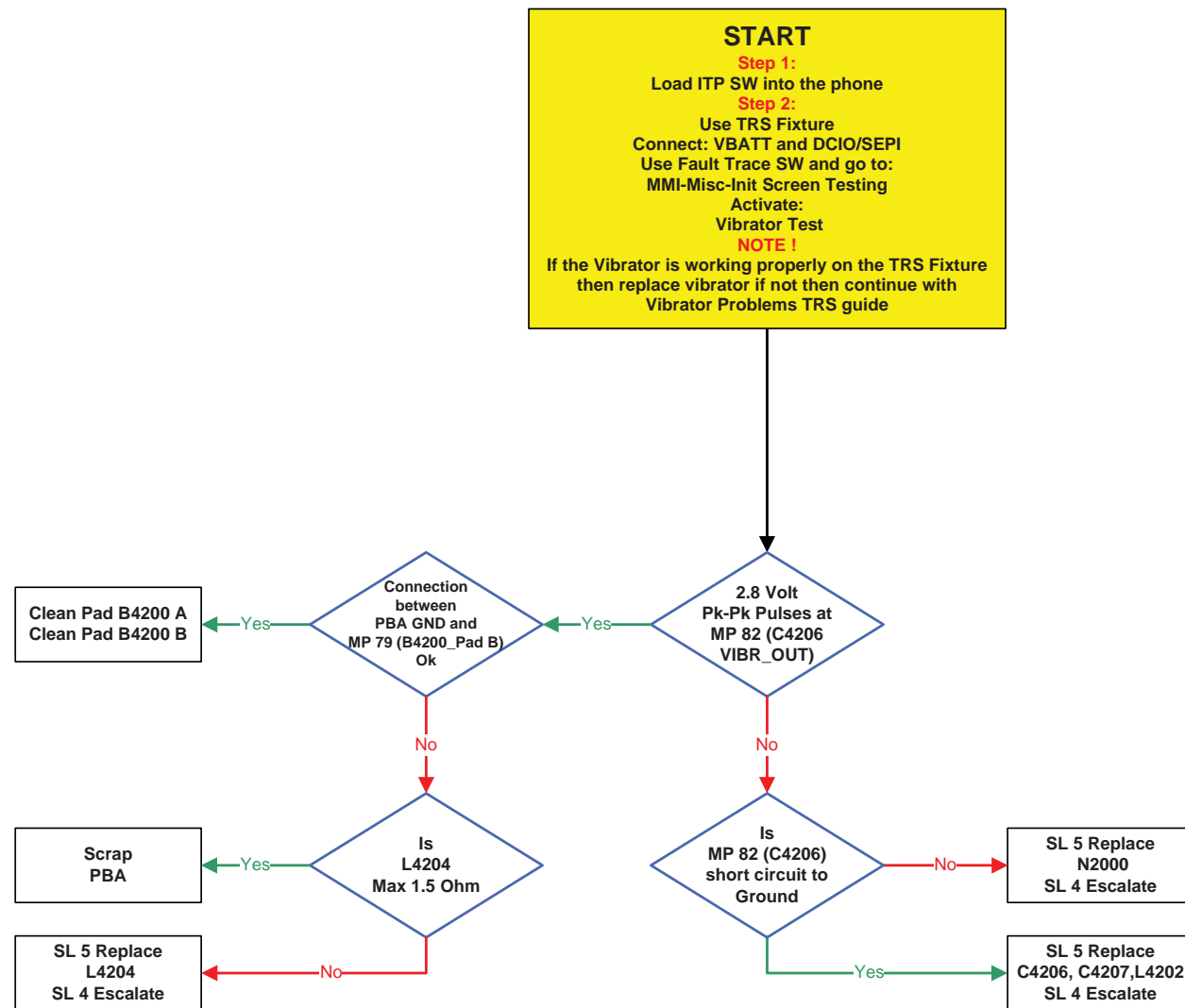
Main and VGA Camera Problems



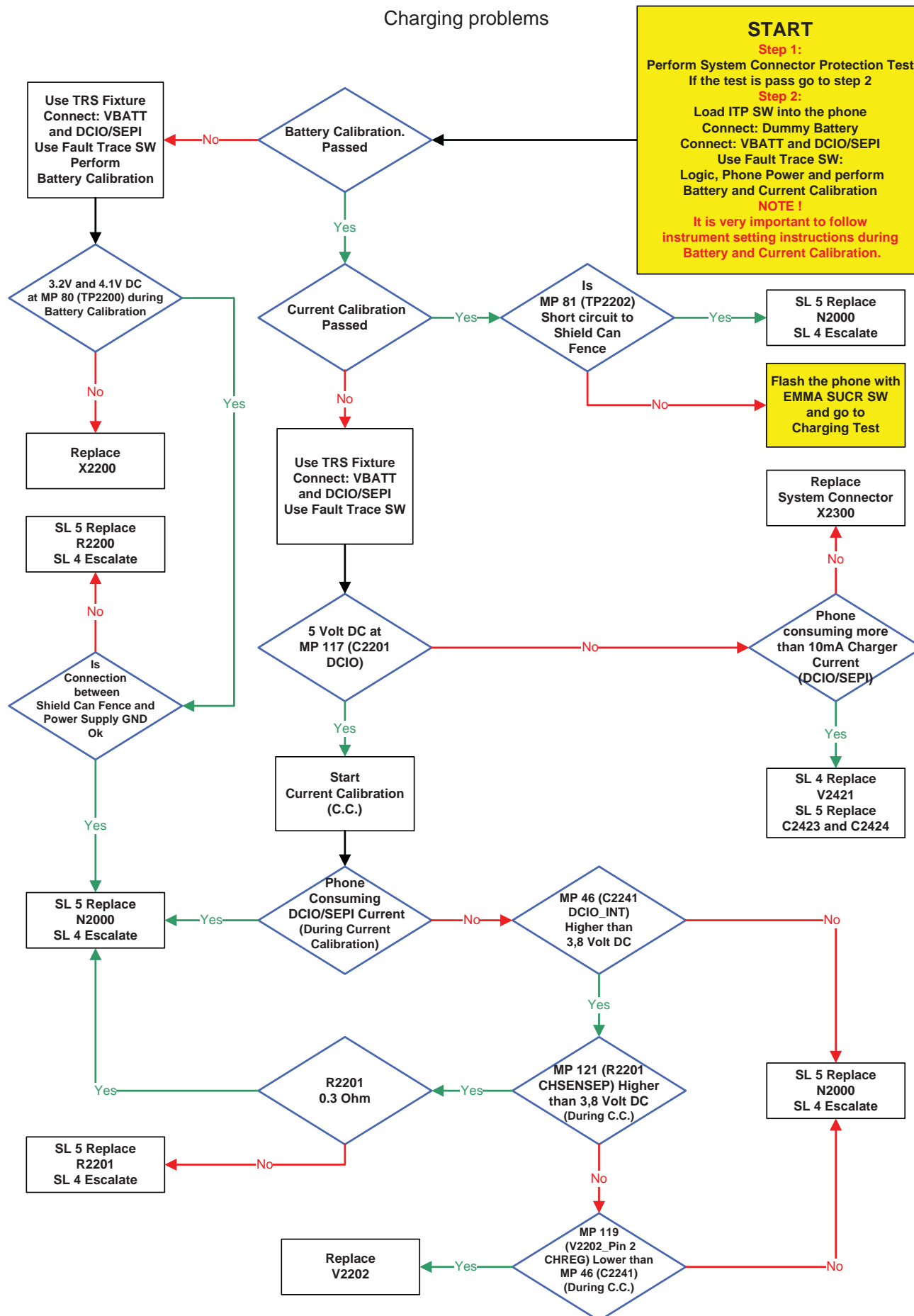
Camera Door Sensor and Flash LED Problems



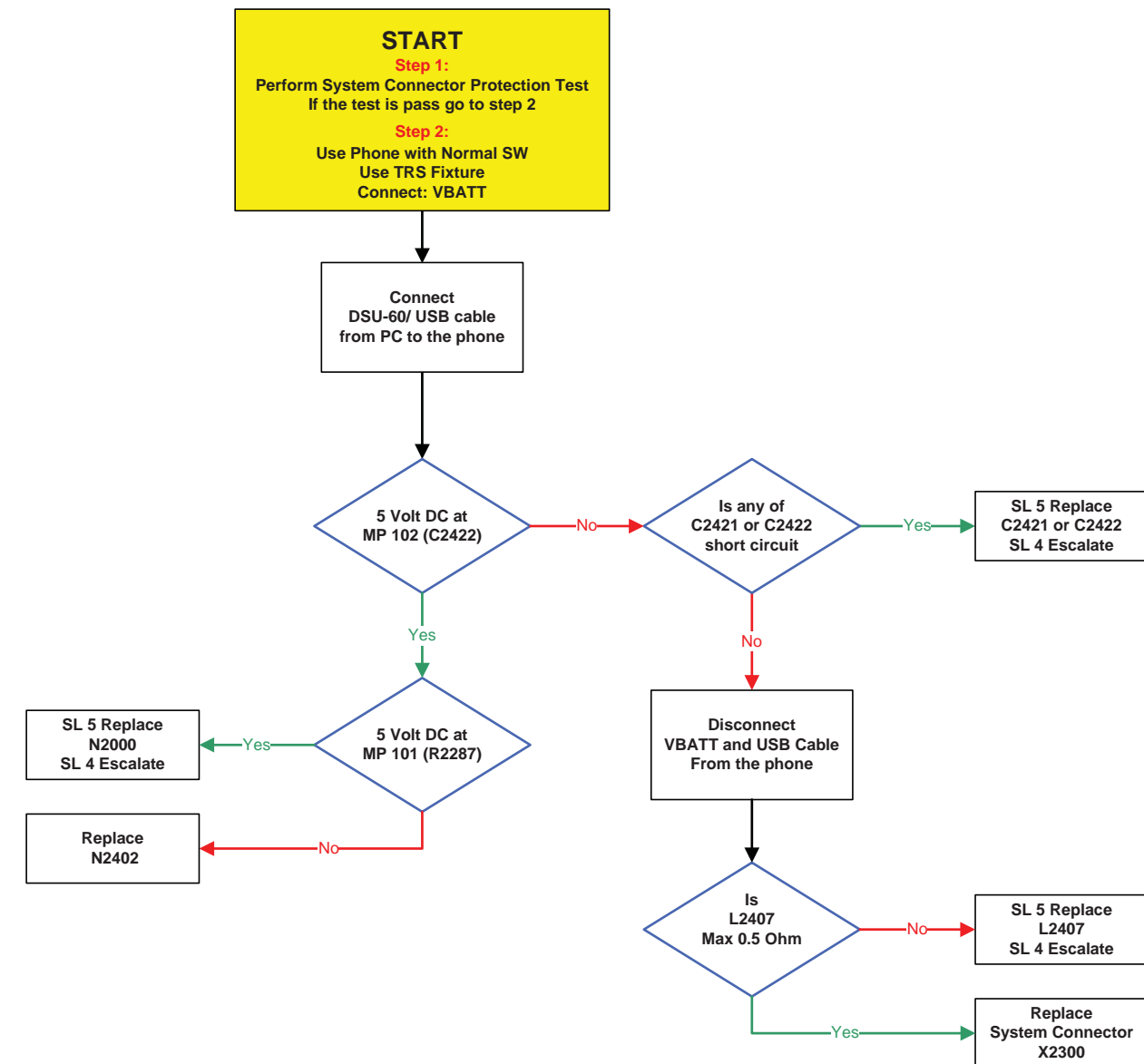
Vibrator Problems



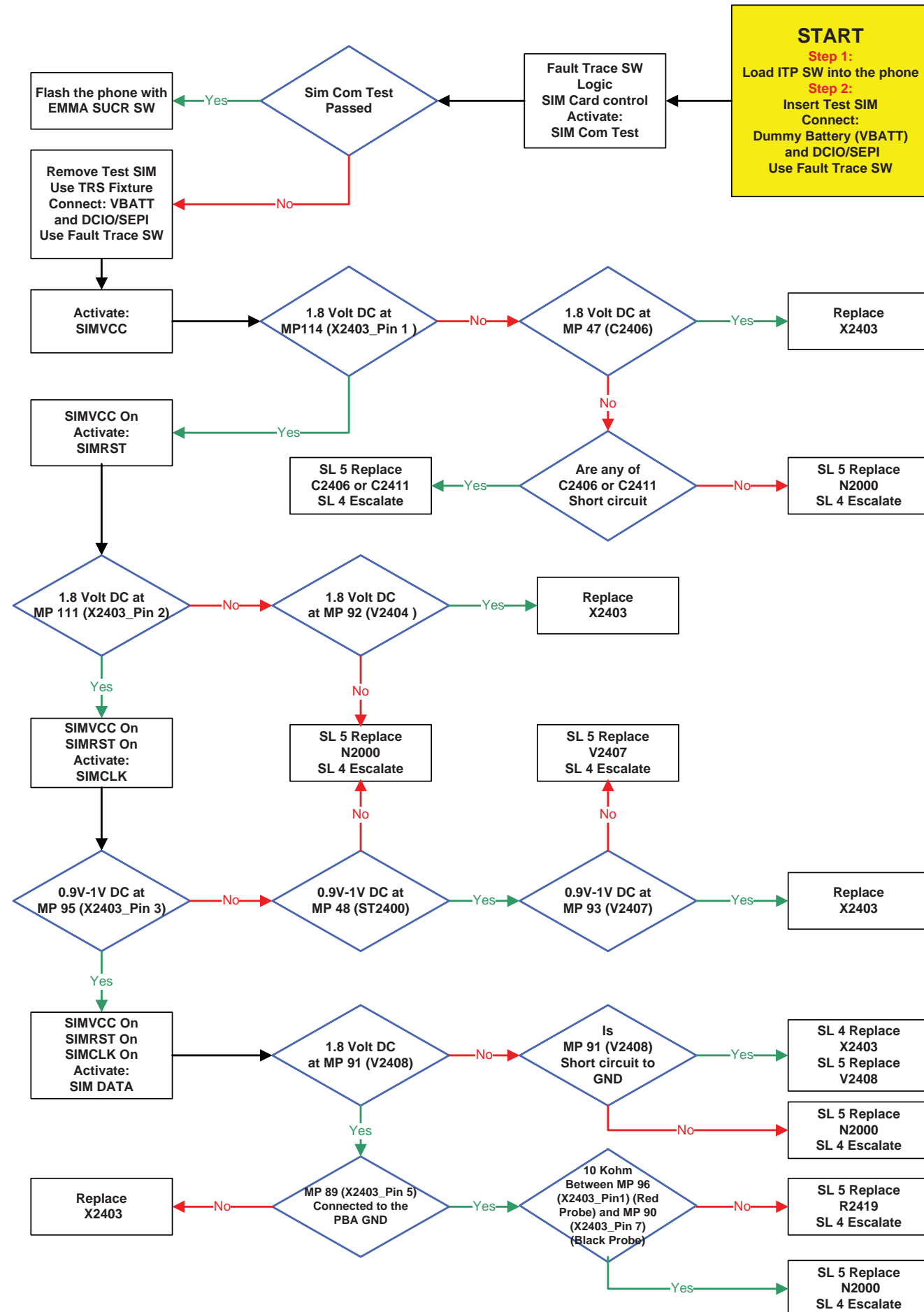
Charging problems



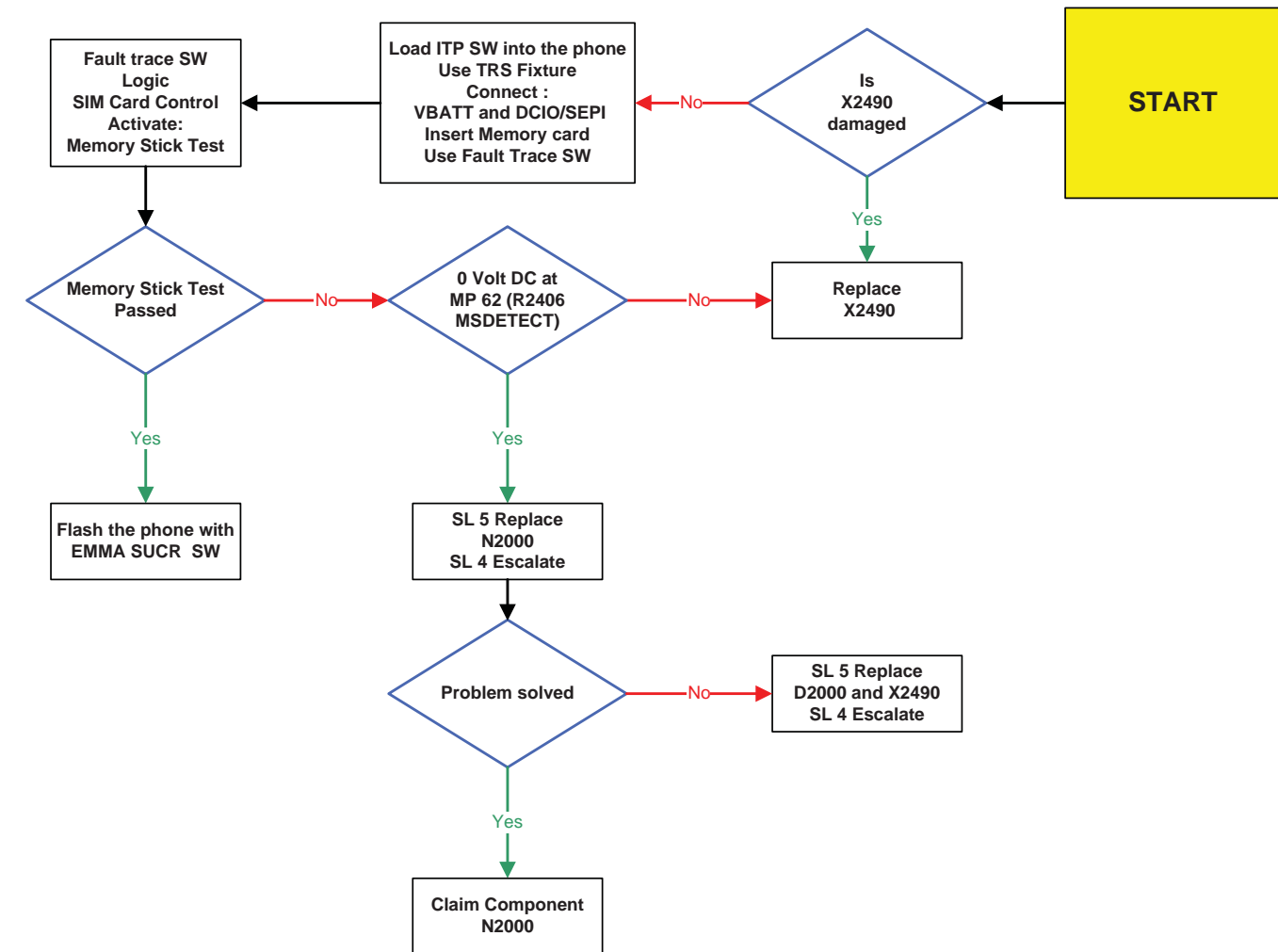
USB/VBUS Charging Problems



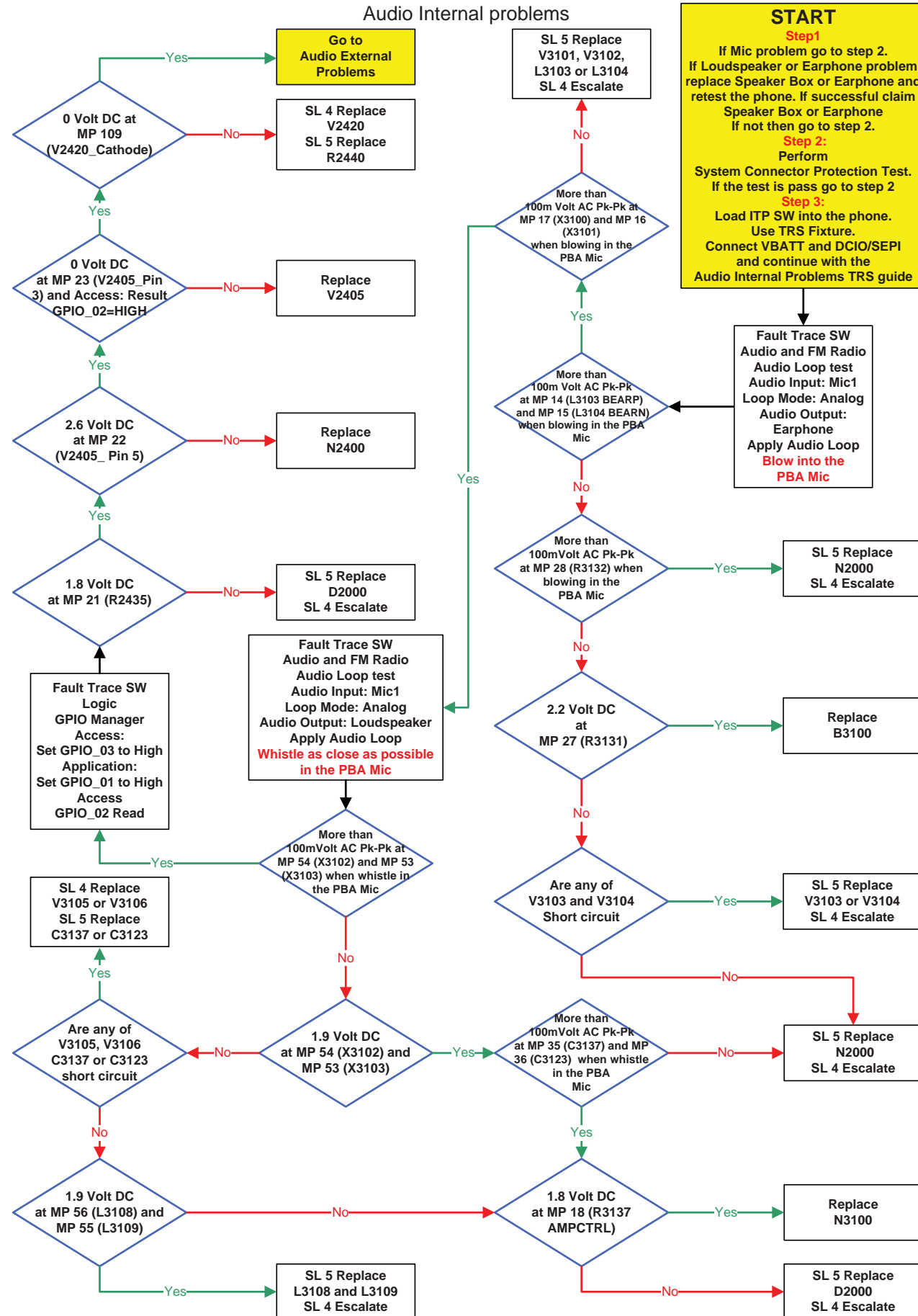
SIM Problems



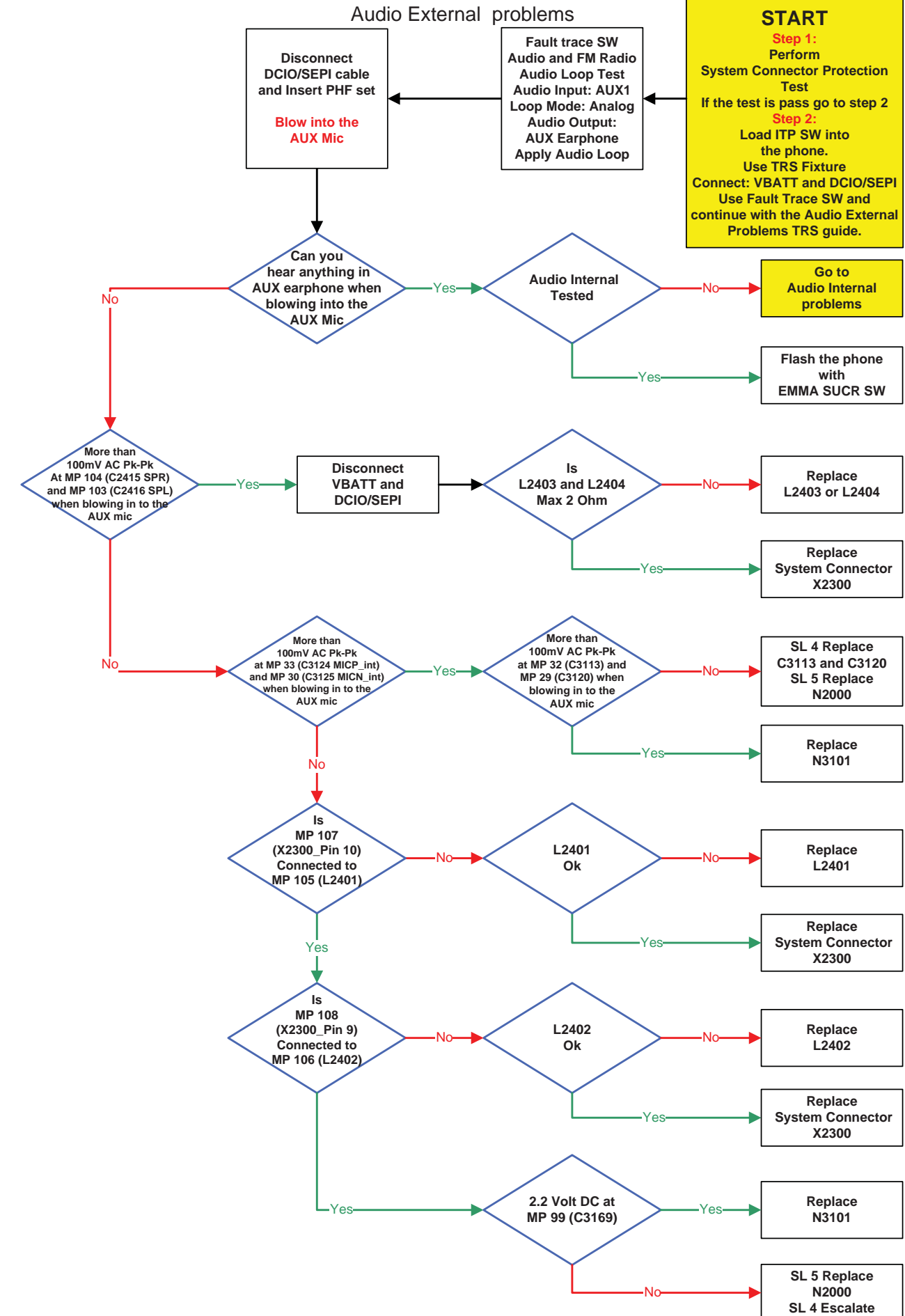
Memory Stick Problems



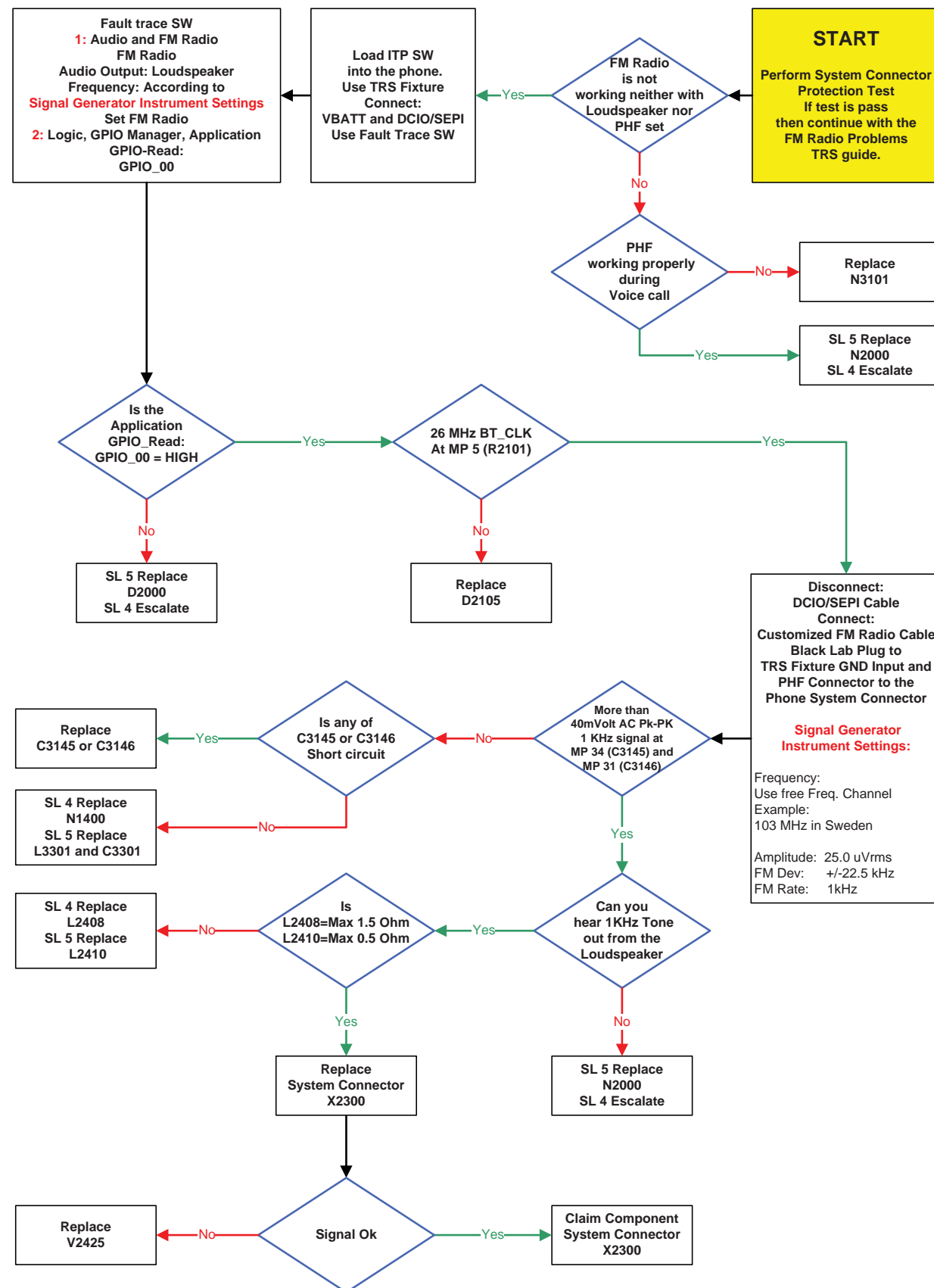
Audio Internal problems



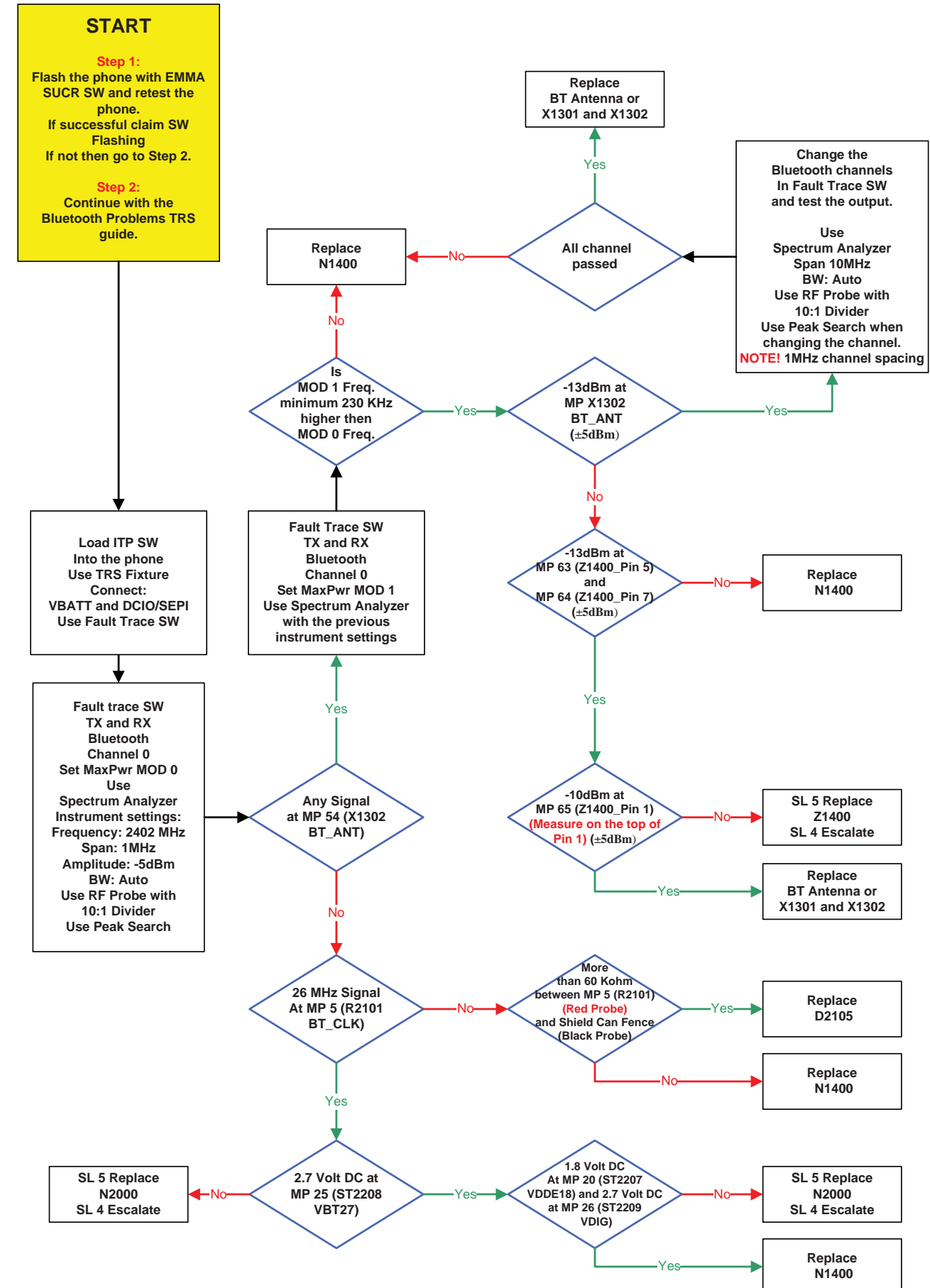
Audio External problems

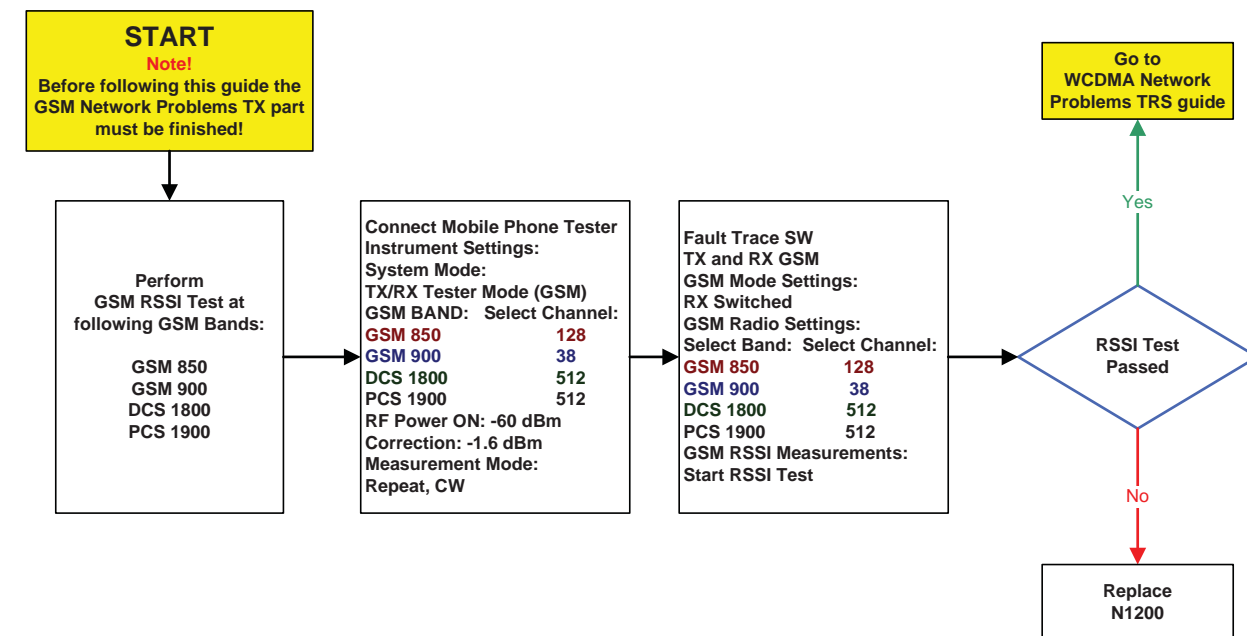
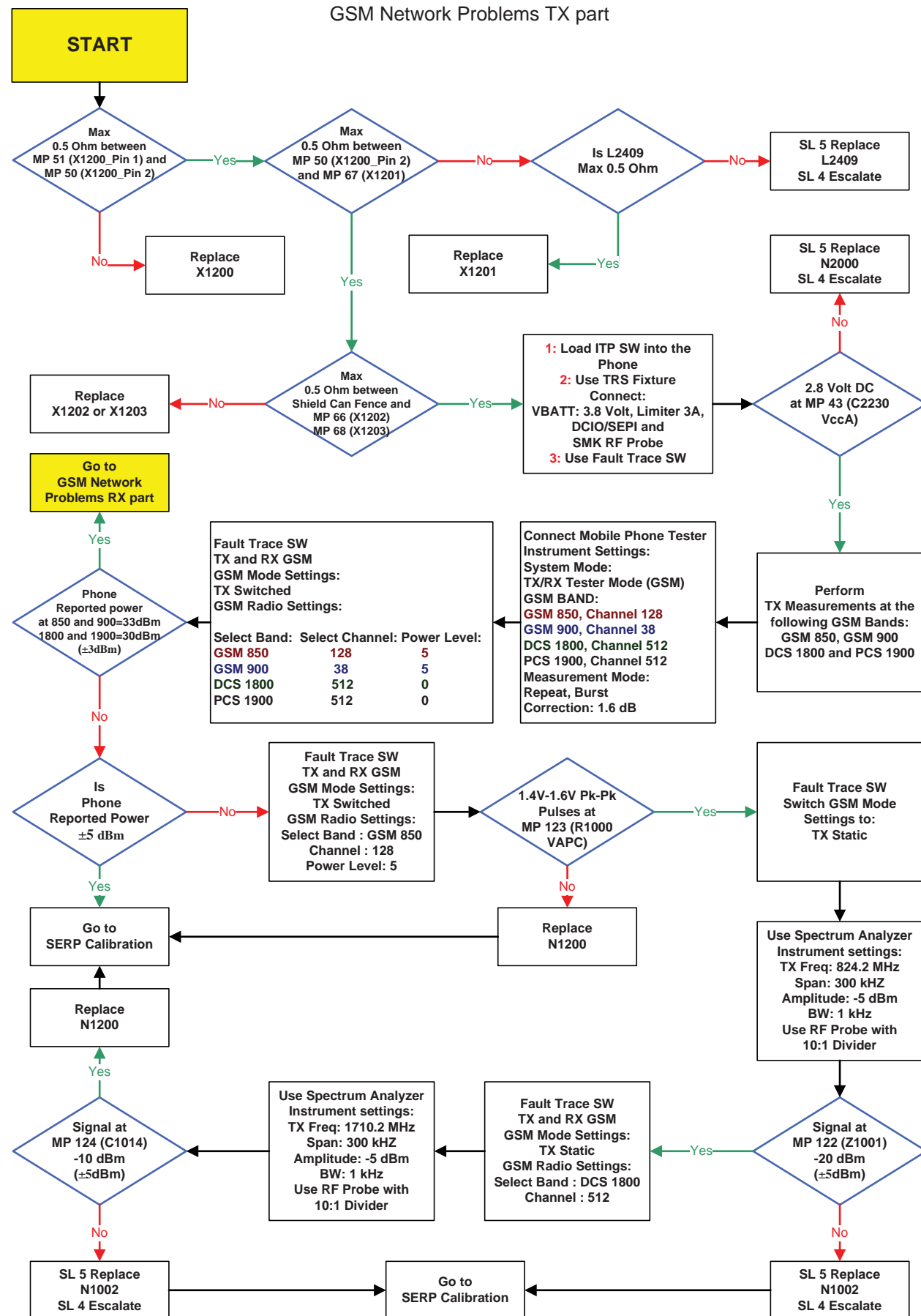


FM Radio Problems

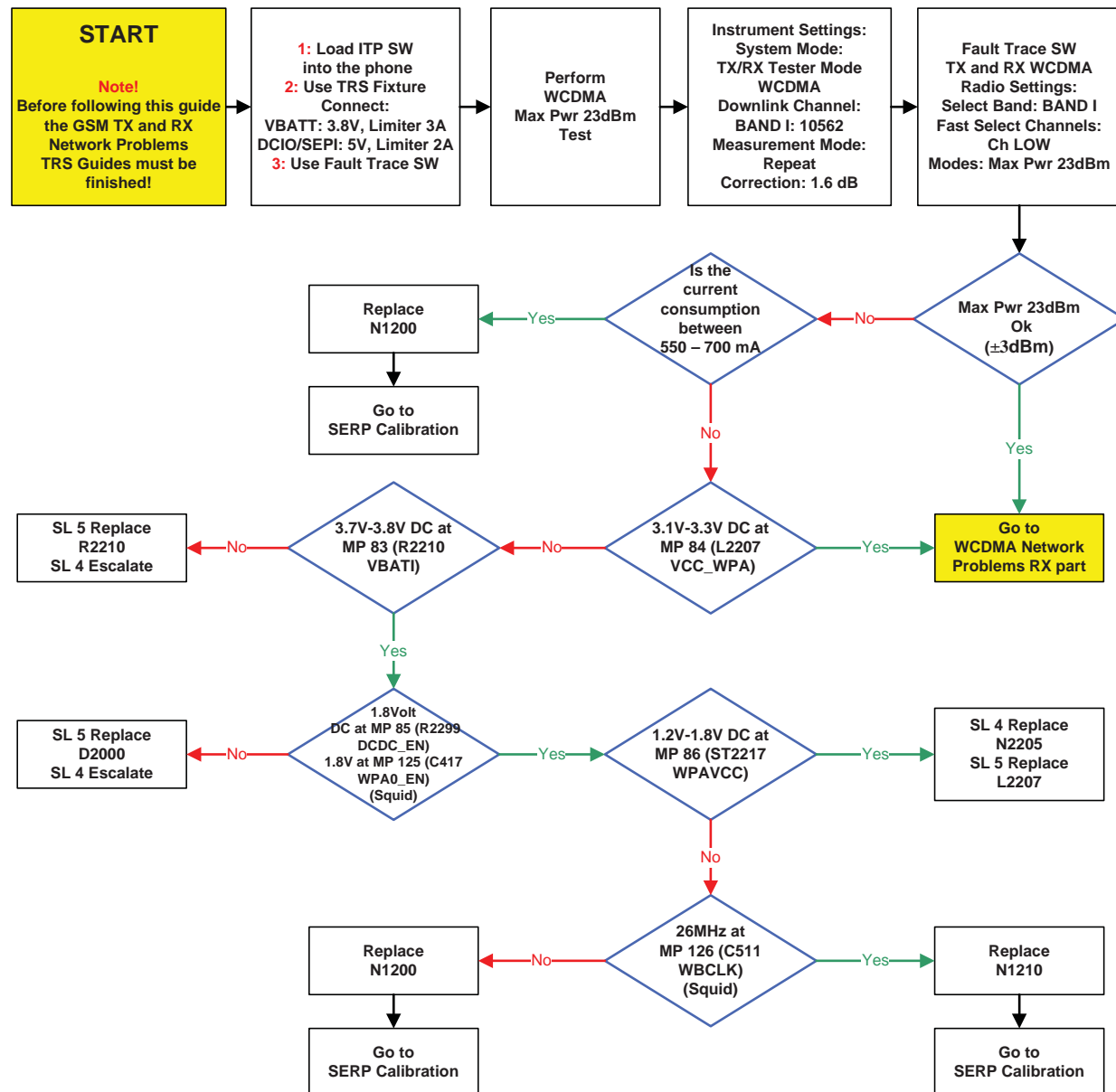


Bluetooth Problems

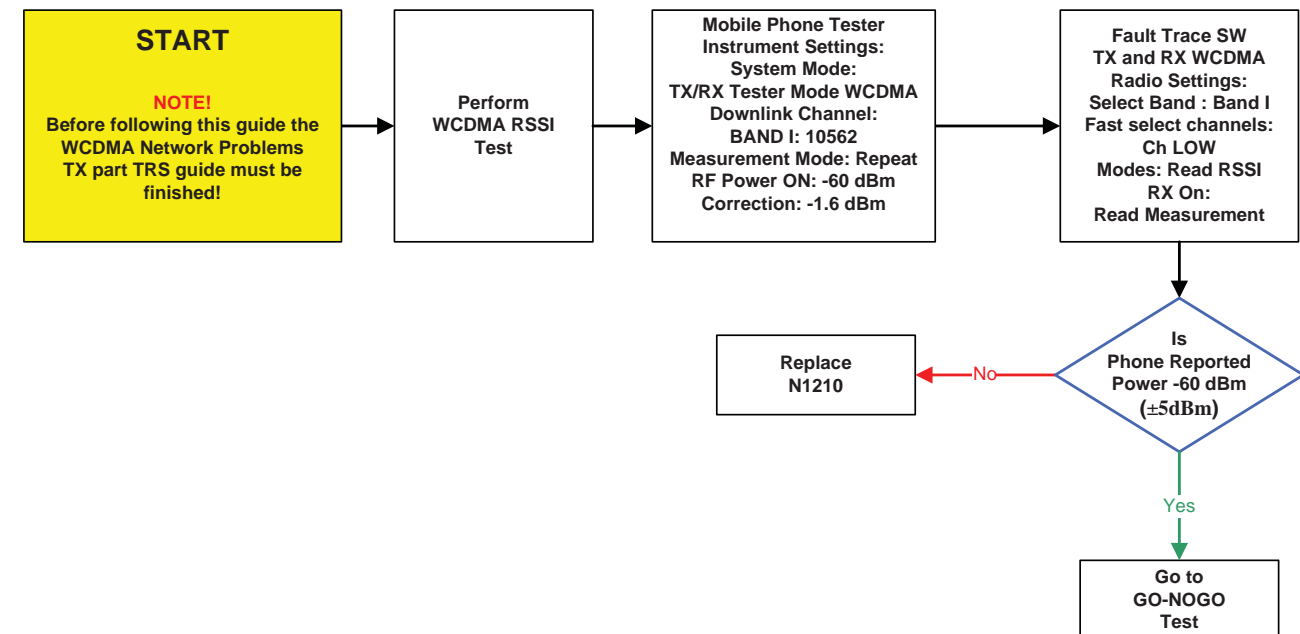




WCDMA Network Problems TX part

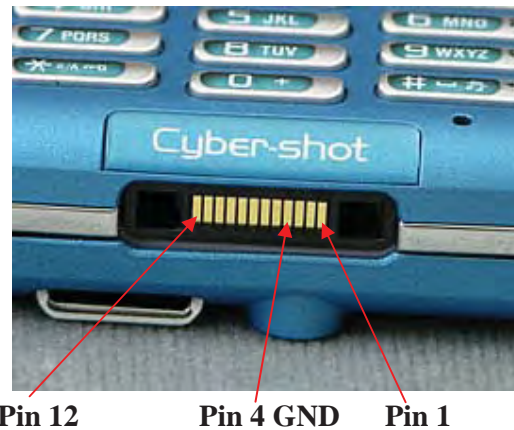


WCDMA Network Problems RX part



System Connector Protection Test

Perform Diode and Ohm measurements with a Multimeter
Connect the black probe to ground (Pin 4 at system connector)



Pin 12 Pin 4 GND Pin 1

Pin at X2300	Diode Measurements/Volt	Ohm Measurements/Ohm	SL 4 Action	SL 5 Action
1	OL	91K	V2421 if lower V2202 if lower X2300 if higher	L2411 if higher N2000 if higher or lower
2	0.8 – 1.0	150K – 400K	V2411 if lower D2424 if higher or lower X2300 if higher	Z4203 if higher
3	2.6	150K – 400K	V2410 if lower D2424 if higher or lower X2300 if higher	Z4203 if higher
4	GND	GND	X2300 if higher	No Action
5	1.5	1.5K	X2300 if higher L2405 if higher V2420 if lower	R2440 if higher R2436 if higher
6	OL	OL	Not Connected	Not Connected
7	1.8	2.2K	L2404 if higher N3101 if higher or lower X2300 if higher	R2482 if higher C2425 if lower
8	1.8	2.2K	L2403 if higher N3101 if higher or lower X2300 if higher	R2481 if higher C2416 if lower
9	1.0	1K	L2402 if higher N3101 if higher or lower X2300 if higher	R2488 if higher C2437 if lower
10	2.1	12K	L2401 if higher N3101 if higher or lower X2300 if higher	R2487 if higher C2436 if lower
11	0	1.3	L2408 if higher X2300 if higher	No Action
12	OL	OL	N2402 if higher or lower X2300 if higher	L2407 if higher C2421 if lower C2422 if lower

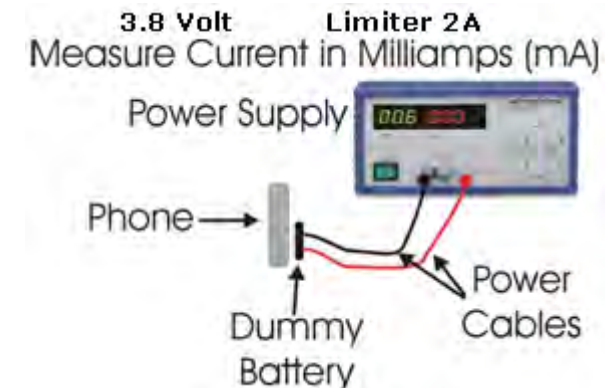
Current Consumption Test

Step 1:

Insert Local SIM Card and use the phone with the Normal SW (SSW) and dummy battery connected to Power Supply Channel 1 VBATT according to Picture 1.
Instrument settings: Voltage: 3.8 Volt, Limiter 3A.

Measure the current when Phone is off. Check the current consumption at Power Supply Channel 1 VBATT.

Picture 1



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:

Start the phone:

Measure the deep sleep current max 6mA typical between **0-3mA**.
Make sure that the operator is running with deep sleep. (This operation can be switched off by operator if the network is busy).

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

Step 3 with Mobile Phone Tester Instrument

Insert Test SIM Card and use the phone with the Normal SW (SSW) and dummy battery connected to Power Supply Channel 1 VBATT according to Picture 1.
Instrument settings: Voltage: 3.8 Volt, Limiter 3A.

Use Mobile Phone Tester Instrument in signalling mode directly connected to the phone with RF Connector or use Shield Box if not possible. **Phone Display** must be **on** during these tests to get correct current measurements.

Perform Radio TX measurements at GSM and WCDMA Band and compare with limits according to text below.

- Transmitter current **850 MHz** at Ch: 128 power level 5. Typical **375mA**
- Transmitter current **900 MHz** at Ch: 1 power level 5. Typical **450mA**
- Transmitter current **1800 MHz** at Ch: 512 power level 0. Typical **365mA**

- Transmitter current **1900 MHz** at Ch: 512 power level 0. Typical **365mA**
- Transmitter current **WCDMA BAND I** Low RX Ch: 10562 at 23dBm output power. Max **700mA**

If current consumption is not correct, the fault could be fixed by running SERP calibration, if not then go to **GSM and WCDMA Network problems TRS guides**.
If the current consumptions are equal to test limits then go to **Charging Test**.

Step 4 with Fault Trace SW application:

- Flash the phone with ITP SW
- Use TRS Fixture
- Connect the:

Power Supply Channel 1 VBATT:
Instrument settings: Voltage: 3.8 Volt, Limiter 3A

Power Supply Channel 2 DCIO/SEPI
Instrument settings: Voltage: 5 Volt, Limiter 2A

- Connect DCIO/SEPI Cable to the phone

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

- **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

- **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

- **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

- **Max TX Power WCDMA BAND I**

Fault Trace SW settings:

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

Compare current consumption during Max TX Power Tests with the current consumption limits below.

- Transmitter current **850 MHz** at Ch: 128 power level 5. Typical **255mA**
- Transmitter current **900 MHz** at Ch: 1 power level 5. Typical **255mA**
- Transmitter current **1800 MHz** at Ch: 512 power level 0. Typical **225mA**
- Transmitter current **1900 MHz** at Ch: 512 power level 0. Typical **225mA**
- Transmitter current in **WCDMA BAND I** Low RX Ch: 10562 mode at max power level 23 dBm and Rx on. Typical **615mA**

Tolerance: ±10%

If current consumption is not correct, the fault could be fixed by running SERP calibration, if not then go to **GSM and WCDMA Network problems TRS guides**.

If the current consumptions are equal to the sheet then go to **Charging Test**.

Battery and Current Calibration Test

Use Phone with the ITP SW

Instrument settings for the Battery Calibration Test

Power Supply Channel 1 VBATT:

X Volt according to the Fault Trace SW Test Instructions:

Fault Trace SW-Logic-Phone Power-Battery Calibration and follow test instructions.
Limiter: 2A.

Power Supply Channel 2 DCIO/SEPI:

5.0 Volt

Limiter: 2A

If test is performed at the Core Level then use dummy battery according to the Equipment List for this test. If using TRS Fixture no dummy battery is needed.

Note: Maximal cable length between Power Supply Channel 1 VBATT and the dummy battery or TRS Fixture must be 1m. The cable must have a capacity for at least 16A.

Limits Table for the Battery Calibration Test

Voltage Level on VBATT	Min	Max	UNIT
3.2 Volt	263	351	DEC (mV)
3.2 Volt	107	15F	HEX (mV)
4.1 Volt	789	877	DEC (mV)
4.1 Volt	315	36D	HEX (mV)

Instrument settings for the Current Calibration Test

If test is performed at the Core Level then use dummy battery according to the Equipment List for this test. If the TRS Fixture is used no dummy battery is needed.

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

Note: Maximal cable length between Power Supply Channel 1 VBATT and the dummy battery or TRS Fixture must be 1m. The cable must have a capacity for at least 16A.

Note: Length of the Power Supply Channel 2 DCIO/SEPI customized cable must be exact 1,3m.

Power Supply Channel 1 VBATT:

3.8 Volt

Limiter 2A

Power Supply Channel 2 DCIO/SEPI:

5.0 Volt

Limiter: 2A

Use dummy battery according to the Equipment List for this test.

Limits Table for the Current Calibration Test

Measured Current	Name	Min	Max	Unit
100mA	DCIO Current	50	150	mA
800mA	DCIO Current	725	875	mA

Backup Capacitor Test

To perform this test use:

- Phone with ITP 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 done **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 between 681 and 800 go to Interval 2, if 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.

If the readings is out of limits replace **C2217** Backup Capacitor.

If the problem is not solved then SL 5 Replace N2000 SL 4 Escalate.

Charging Test

To perform this test use:

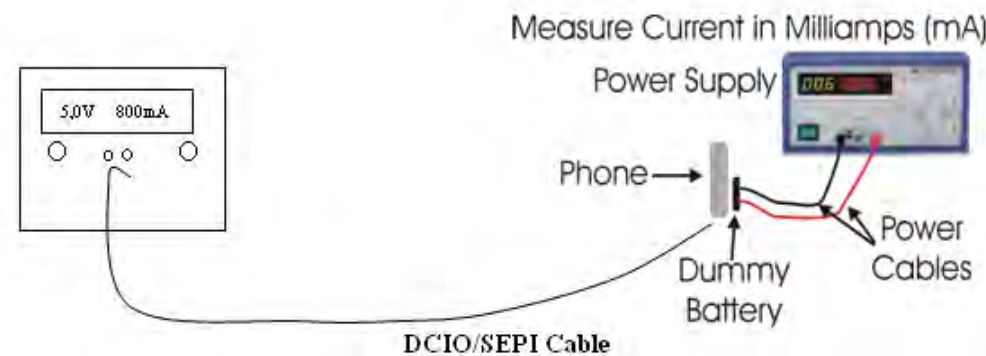
- Phone with the Normal SW (SSW)
- Dummy Battery connected to Power Supply Channel 1 VBATT
Note! The resistance between GND and BDATA should be approximately 120 KOhm
- Power Supply Channel 1 VBATT instrument settings:
Voltage: 3.0 to 4.2 Volts, according to VBATT row in the Reference Table.
Limiter: 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 shut down when changing VBATT voltage.
- Take a note of Current measurements at Power Supply Channel 2 DCIO/SEPI and Display charging indicator status, X seconds after DCIO/SEPI cable has been inserted according to Test Time row in the reference table below.
- Compare test results with reference table below, tolerance +/-20%.

Reference Table

VBATT x Volt	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2
Test Time x sec.	15s	15s	15s	30s	30s	30s	30s	30s	30s	30s	30s	30s	40s
DCIO/SEPI Current mA	250	250	250	500	500	500	500	800-1000	800-1000	800-1000	800-1000	500-750	0
Display indicate charging	Nothing	Nothing	Nothing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Fully Charged



Power Supply Channel 1 VBATT must allow reverse current.

If the charging current is **Not** equal to the reference table 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 that the phone battery is working properly.

Measure the voltage at the battery to check 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 disabled in Fault Trace SW when performing this test.

The purpose of this test is to check the following items:

- Verify that the ASIC is correctly mounted, the communication works and that the revision is correct.

The tested ASICs are:

- D2000 (Anja)
- N2000 (Vera)
- N1400 (Bluetooth and FM Radio ASIC)
- N1200 (Thor)
- N1430 (A-GPS Module)

To perform this test use:

- Phone with ITP 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 return value table:

ASIC	Description	Part number	Return value (hex)
D2000	CPU (Anja)	1200-0186	0xC9
N2000	Power Management (Vera)	1000-8142	0xC7
N1400	Bluetooth Firmware Revision Chip ID	1200-6182	0x5,0x1 0x0,0x0,0x0,0x0 Will always return 0 on STLC because Chip ID is not supported.
N1400	FM Radio	1200-6182	0x800
N1200	GSM Radio Module (Thor) Revision R1A: Revision R1B:	1200-0158	0x7 0x8
N1430	A-GPS Module	1200-0700	254,0,253,192,0,242,113,9,16,252

Voltages to N2000

MP	PBA GND	MP 80 (TP2200)	MP 81 (TP2202)	Power sup 3.80 V
	GND	VBATI	BDATA	
Phone Off	0.00V	3.8V	0.00V	
Phone On	0.00V	3.8V	0.00V	

Voltages from N2000

MP	MP 24 (ST2205)	MP 19 (ST2206)	MP 20 (ST2207)	MP 25 (ST2208)	MP 26 (ST2209)	
	VAUDIO26	VANA25	VDDE18	VB27	VDIG	
	0.00V	0.00V	0.00V	0.00V	0.00V	Power sup 0.00 Volt
Phone Off	0.00V	0.00V	0.00V	0.00V	0.00V	Power sup 3.80 Volt
Phone On	2.6V	2.5V	1.8V	2.7V	2.7V	Power sup 3.80 Volt

Voltages from N2000

MP	MP 45 (ST2213)	MP 43 (C2230)	MP C2218	MP ST2210	
	VCORE12	VccA	VDD_LP	VBACKUP	
	0.00V	0.00V	2.2V	2.2V	Power sup 0.00 Volt
Phone Off	0.00V	0.00V	2.2V	2.2V	Power sup 3.80 Volt
Phone On	1.2V	2.8V	2.2V	2.2V	Power sup 3.80 Volt
			C2217	Fully charged	

Clocks to N2000

MP	MP 41 (C2103) & MP 42 (C2106)	
	32kHz	
Phone Off	32.768kHz	Power sup 0.00 Volt
Phone On	32.768kHz	Power sup 3.80 Volt

Clocks from N2000

MP	MP 39 (R2122)	
	RTCCLK	
Phone Off	0Hz	Power sup 3.80 Volt
Phone On	32.768kHz	Power sup 3.80 Volt

VCORE18 from N2202

MP	MP 7 (ST2214)	
	VCORE18	
Phone Off	0.00V	Power sup 0.00 Volt
Phone On	1.8V	Power sup 3.80 Volt

WCDMA N1210

Use Fault Trace SW to activate and deactivate WCDMA Radio

MP	MP 84 (L2207)	MP 86 (ST2217)	MP 85 (R2299)	Power sup 3.80 Volt
	VCC_WPA	WPAVCC	DCDC_EN	
WCDMA Radio Off	0.00V	0.00V	0.00V	
WCDMA Radio On	3.1V-3.3V	1.2V-1.8V	1.8V	

Bluetooth N1400

Use Fault Trace SW to activate and deactivate Bluetooth

MP	MP 26 (ST2209)	MP 20 (ST2207)	MP 25 (ST2208)	MP 5 (R2101)	Power sup 3.80 Volt
	VDIG	VDDE18	VB27	BT_CLK	
Bluetooth Off	2.7V	1.8V	2.7V	26MHz	
Bluetooth On	2.7V	1.8V	2.7V	26MHz	

FM Radio N1400

Use Fault Trace SW to activate and deactivate FM Radio

MP	MP 80 (TP2200)	MP 20 (ST2207)	MP 5 (R2101)	Power sup 3.80 Volt
	VBATI	VDDE18	BT_CLK	
FM Radio Off	3.8V	1.8V	26MHz	
FM Radio On	3.8V	1.8V	26MHz	

Main and VGA Camera

Use Fault Trace SW to activate and deactivate Main and VGA Camera. Main and VGA Camera must be connected to the PBA

MP	MP 72 (TP2204)	MP 77 (TP2210)	MP 71 (TP2207)	MP 52 (TP2208)	MP 76 (ST4304)	MP ST4312	
	VCAM12	VCAMAF	VCAMSA18	VCAMIO	CAMSYSCLK	CAMRESn	
Main Camera Off	0.00V	0.00V	0.00V	0.00V	0Hz	0.00V	
Main Camera On	1.3V	2.8V	2.8V	1.8V	13MHz	1.8V	

Charging

Charging off 1:

DCIO/SEPI not connected.

Charging off 2:

DCIO/SEPI connected.

Charging 100mA:

Fault Trace SW:

Start Current Calibration----->

Set VBATT to 3.8

Note: The Current Calibration

Test must be repeted if current

consumtion going under 50mA

at Power Supply Channel 2

when you performing this

measurements.

Use

Charging 800mA:

Fault Trace SW:

Start Current Calibration-->Set VBATT

to 3.8V-->Perform Step1

Note: The Current Calibration

Test must be repeted if current

consumtion going under 725mA

at Power Supply Channel 2 when

you performing this

measurements.

MP	MP 117 (C2201)	MP 46 (C2241)	MP 119 (V2202_Pin2)	MP 121 (R2201)	Power sup 3.8 Volt
	DCIO	DCIO_INT	CHREG	CHSENSEP	
Charging off 1	0.00V	3.6V	3.2V	3.8V	Charger voltage 0.0 Volt
Charging off 2	5.0V	4.7V	4.7V	3.8V	Charger voltage 5.0 Volt
Charging 100mA	5.0V	4.8V	3.8V	3.8V	Charger voltage 5.0 Volt
Charging 800mA	4.5V	4.3V	2.3V	4.2V	Charger voltage 5.0 Volt

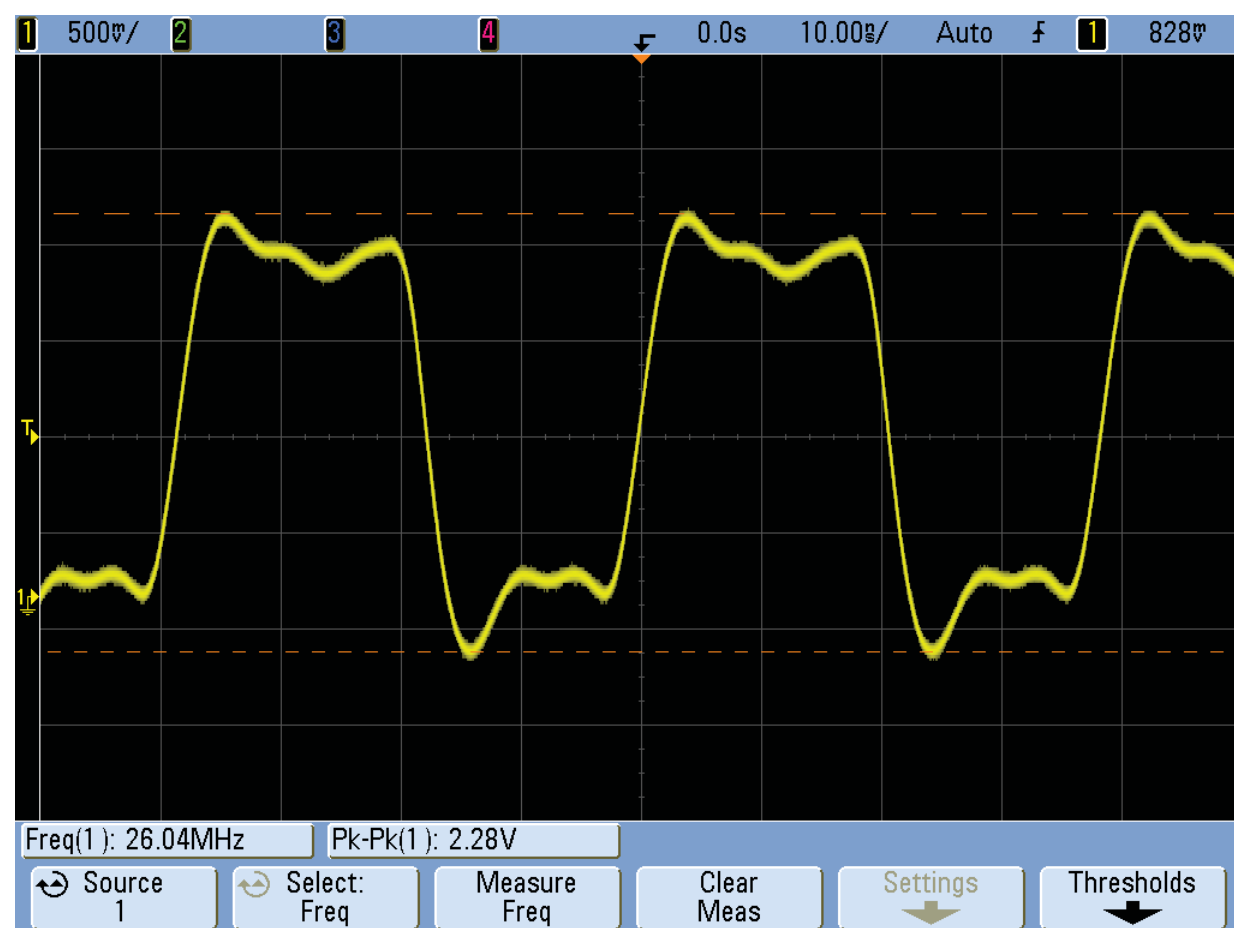
VBUS

USB cable connected to PC

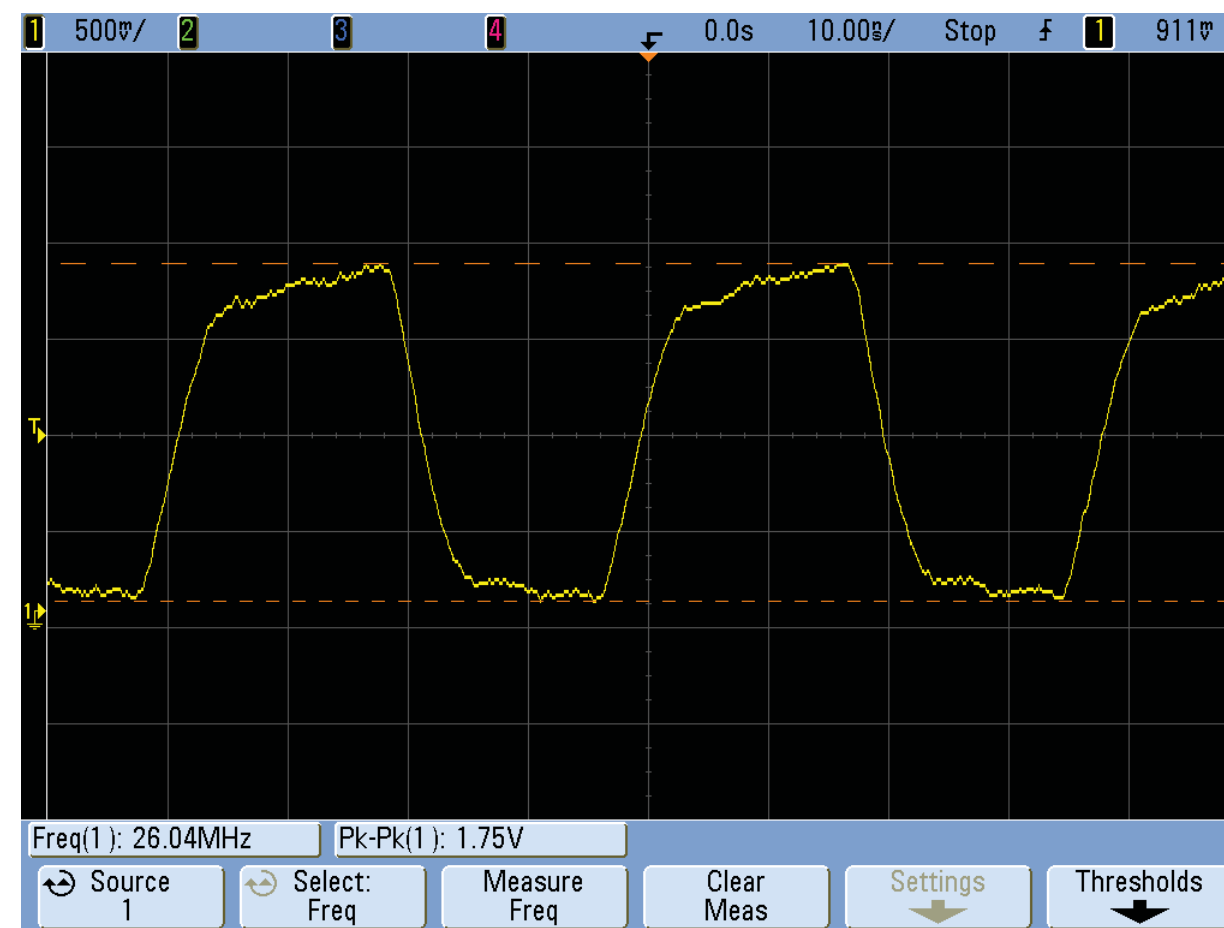
MP	MP 101 (R2287)	Power sup 3.80 Volt
	VBUS	
USB Cable disconnected from the phone	0.00V	
USB Cable connected to the phone	5.0V	

MCLK 26MHz from N1200

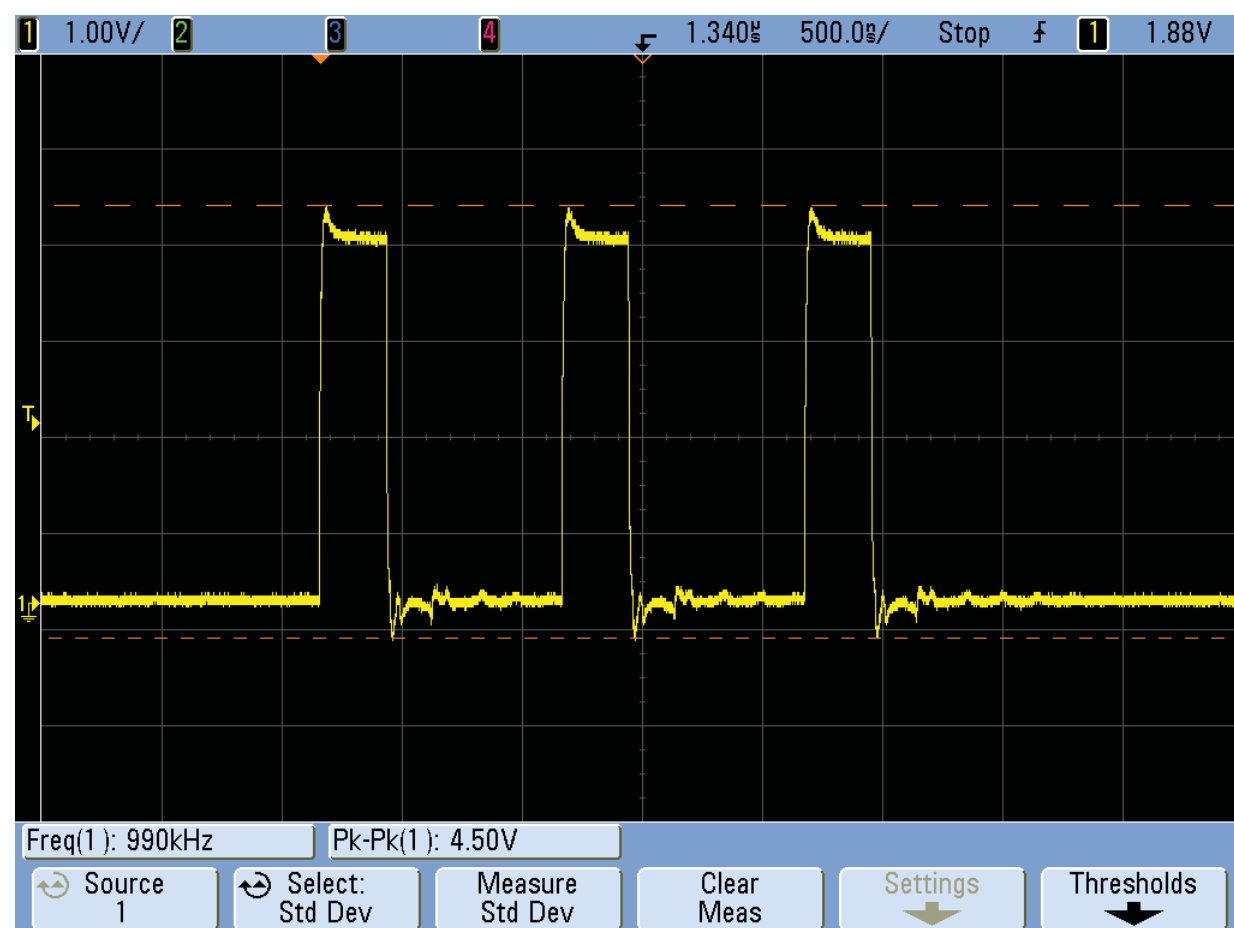
MP	MP 6 (R2120)	
	MCLK	
Phone Off	0Hz	Power sup 3.80 Volt
Phone On	26MHz	Power sup 3.80 Volt



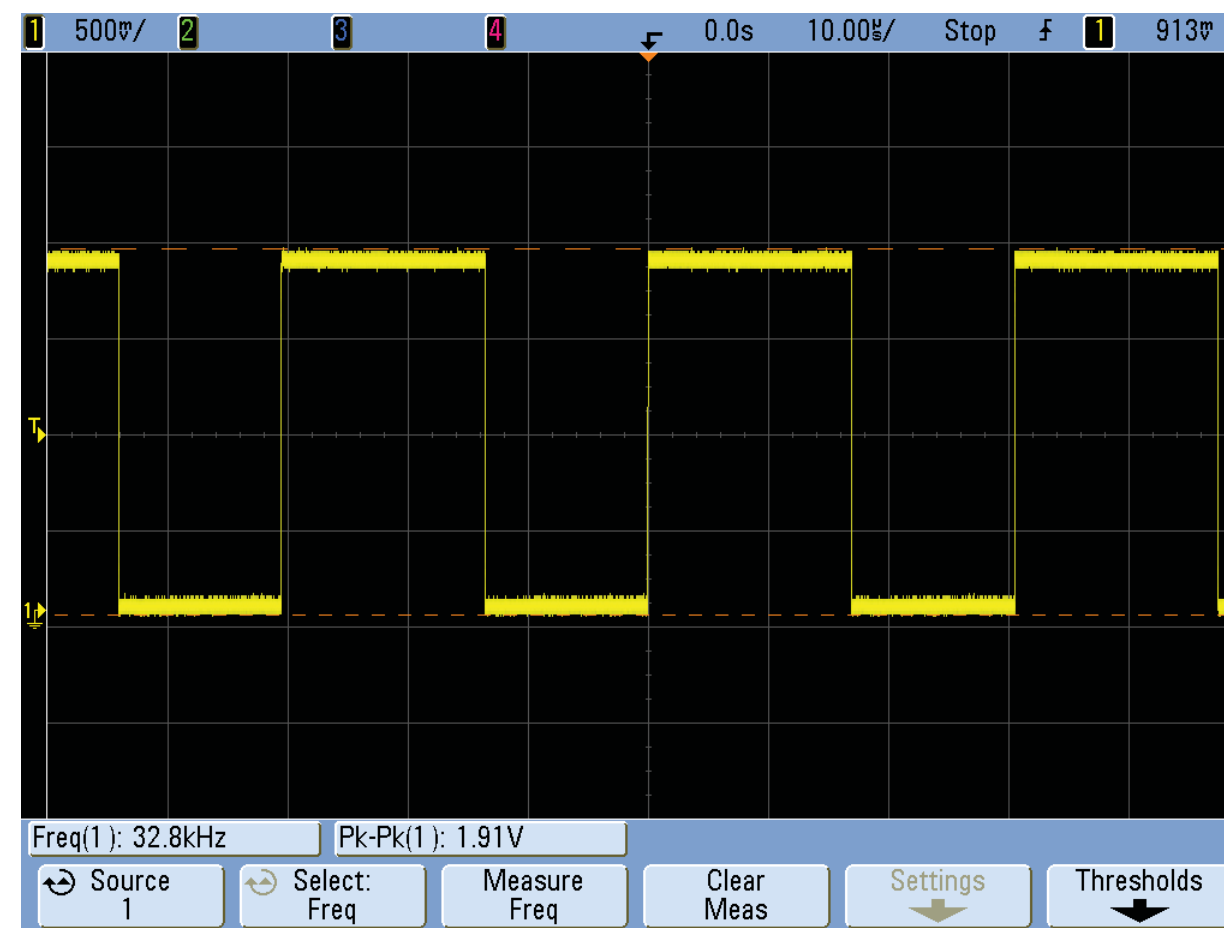
MP 5 (R2101 BT_CLK)



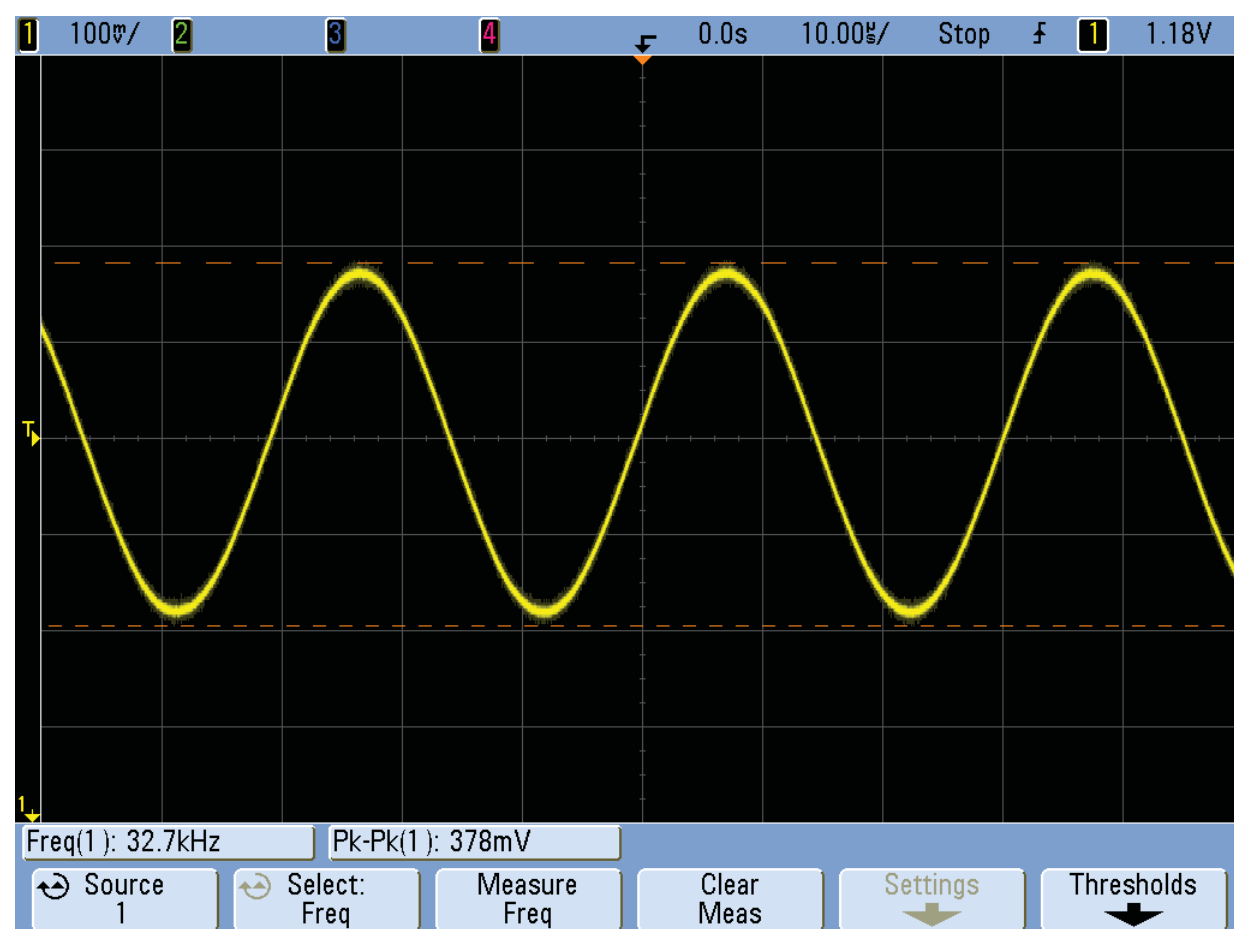
MP 6 (R2120 MCLK)



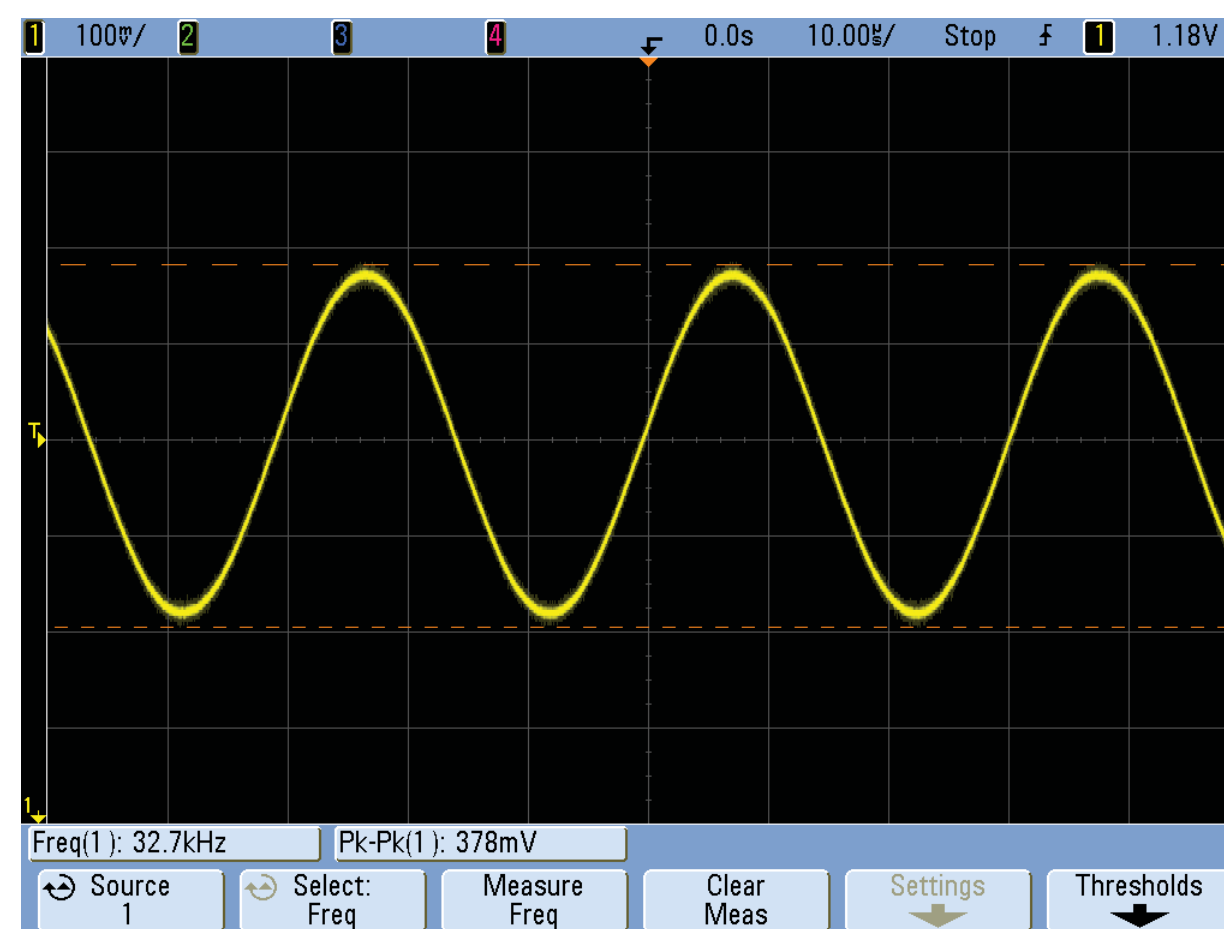
MP 38 (V2400_Pin 3)



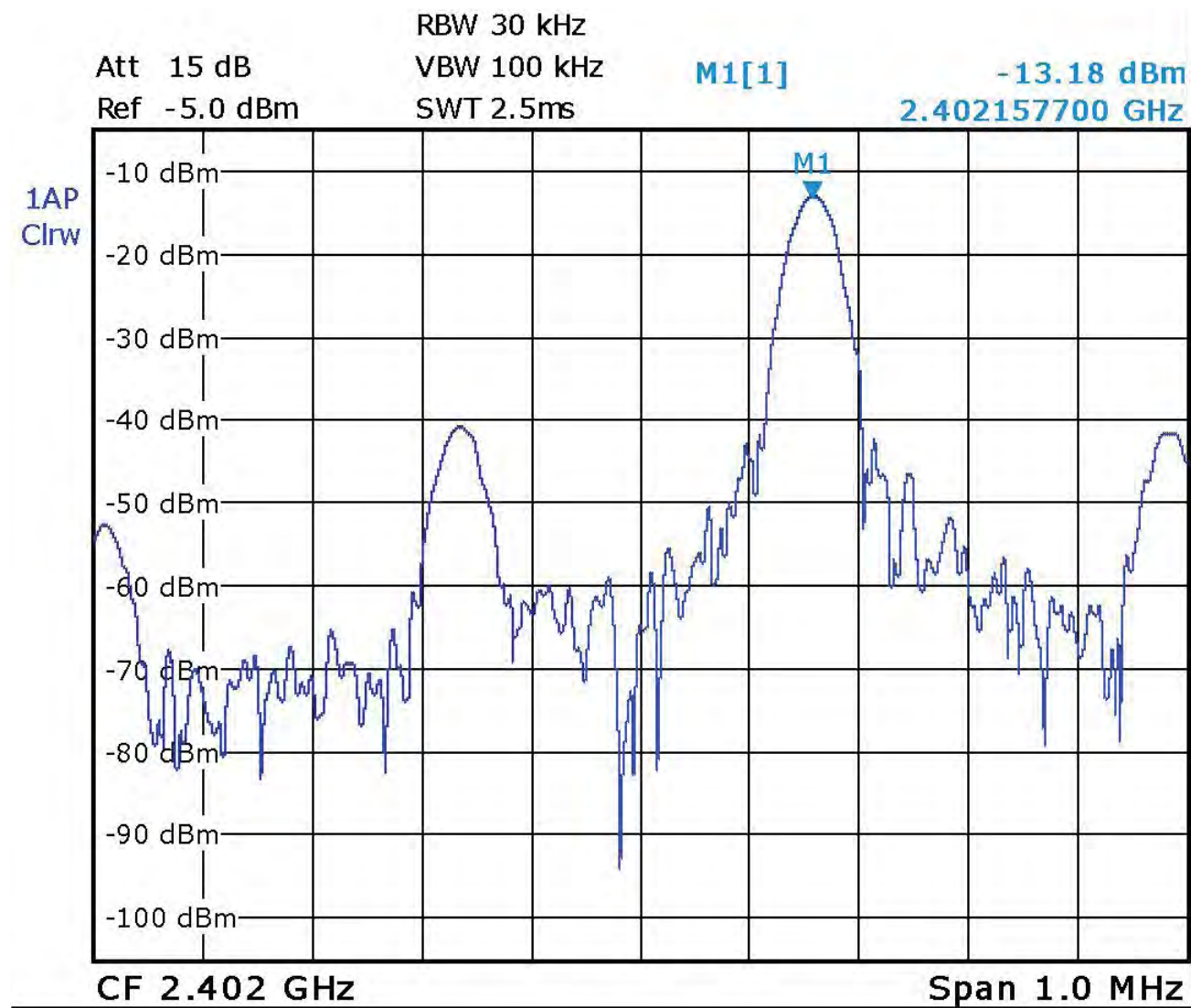
MP 39 (R2122_RTCCLK)



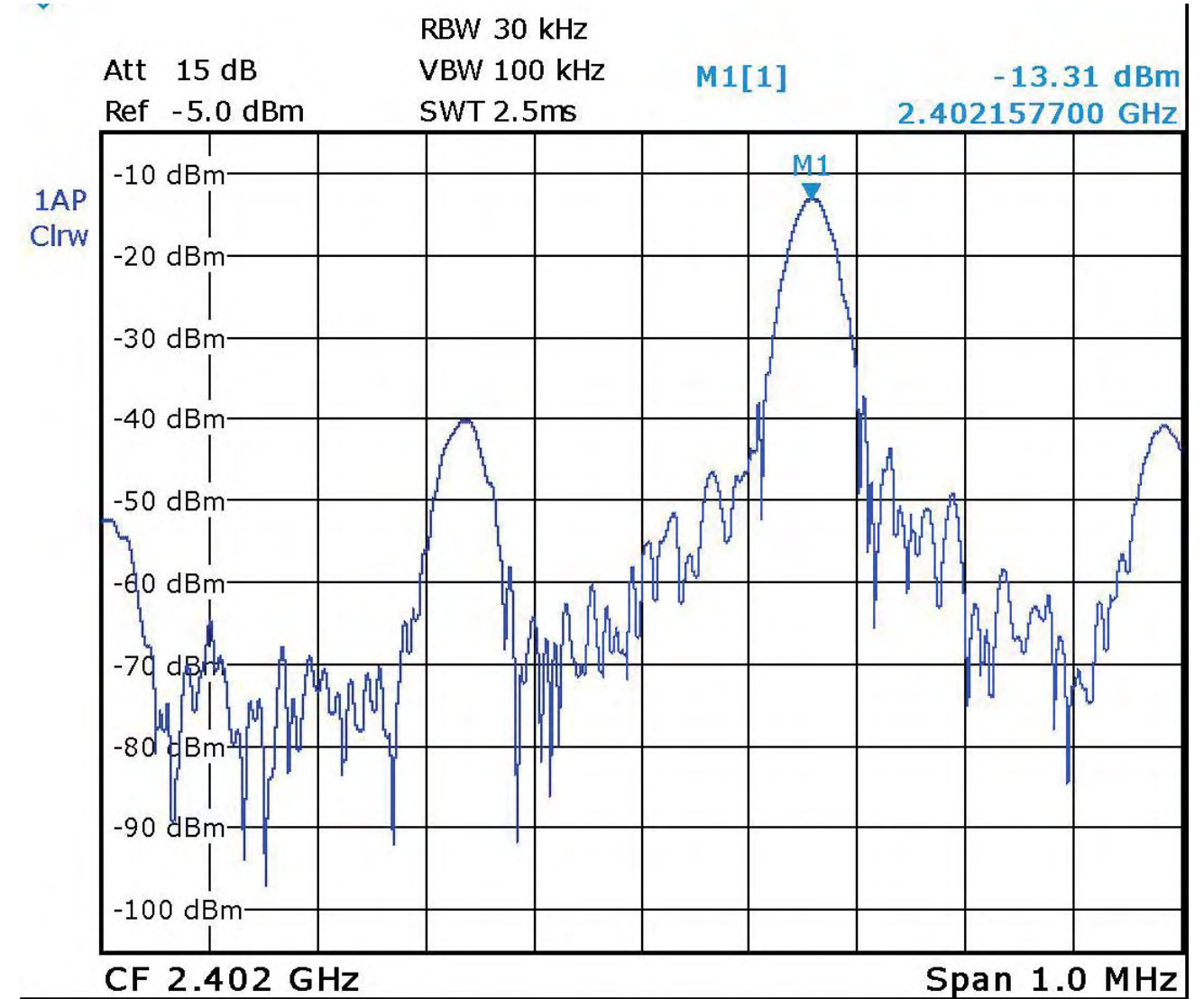
MP 41 (C2103 32 kHz)



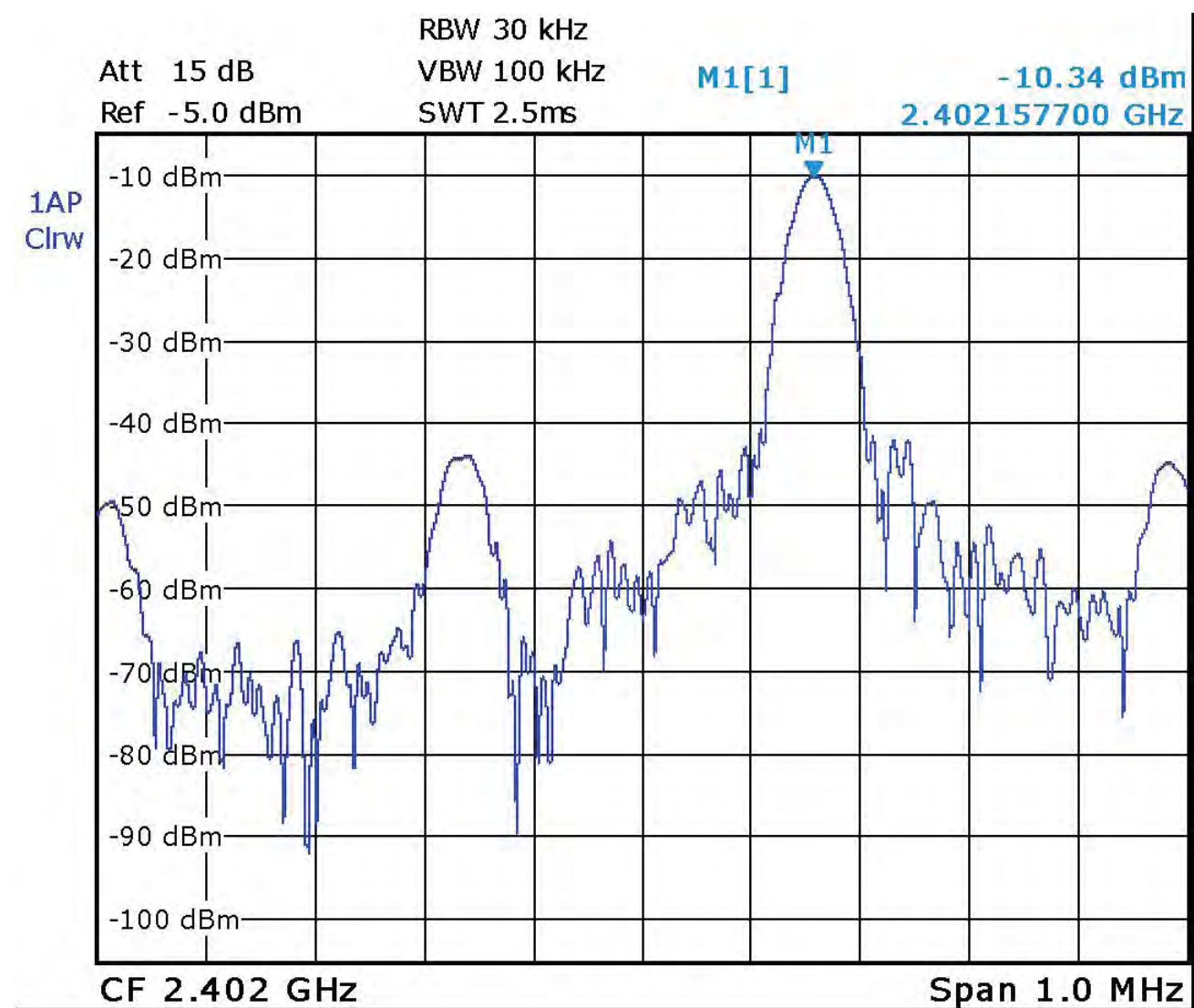
MP 42 (C2106 32 kHz)



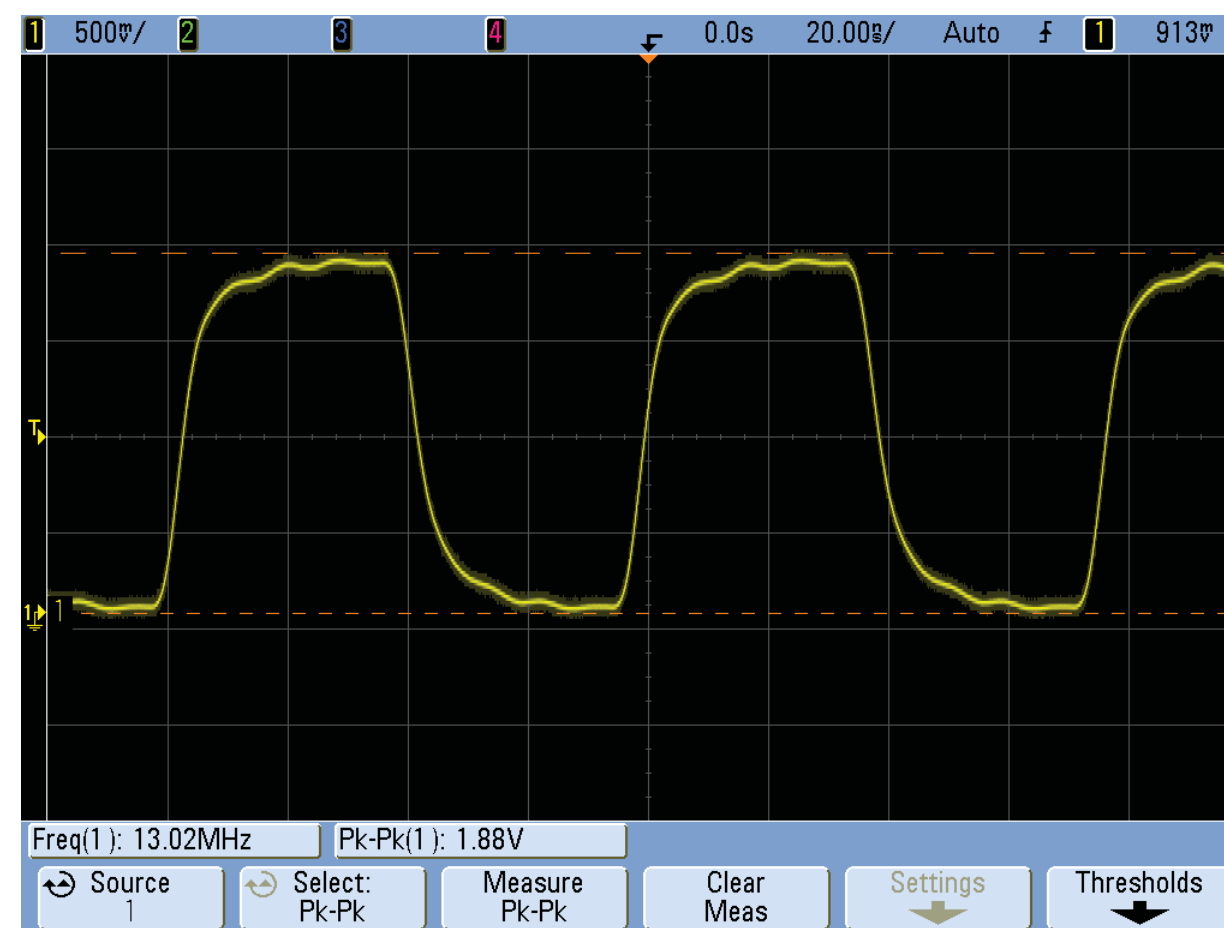
MP 63 (Z1400_Pin 5)



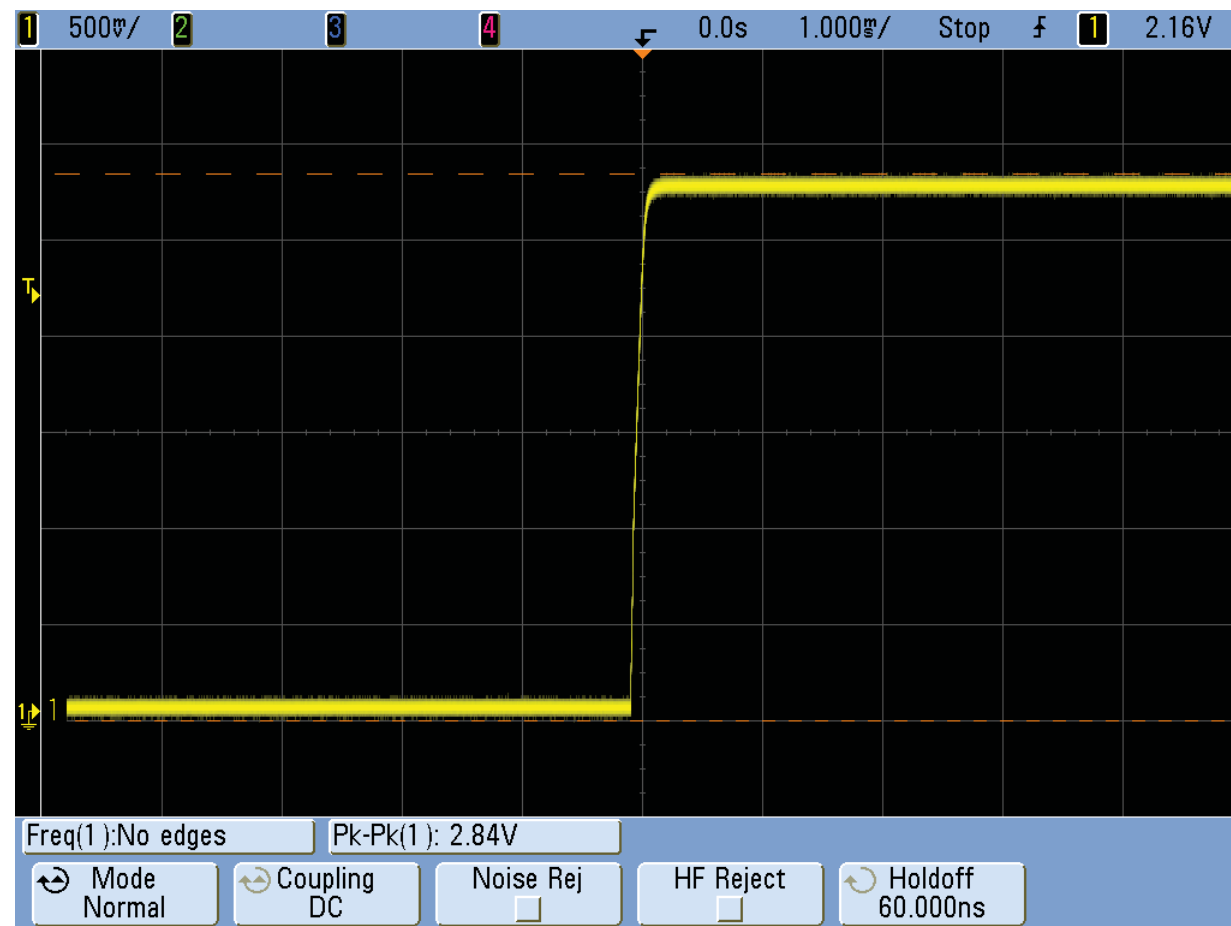
MP 64 (Z1400_Pin 7)



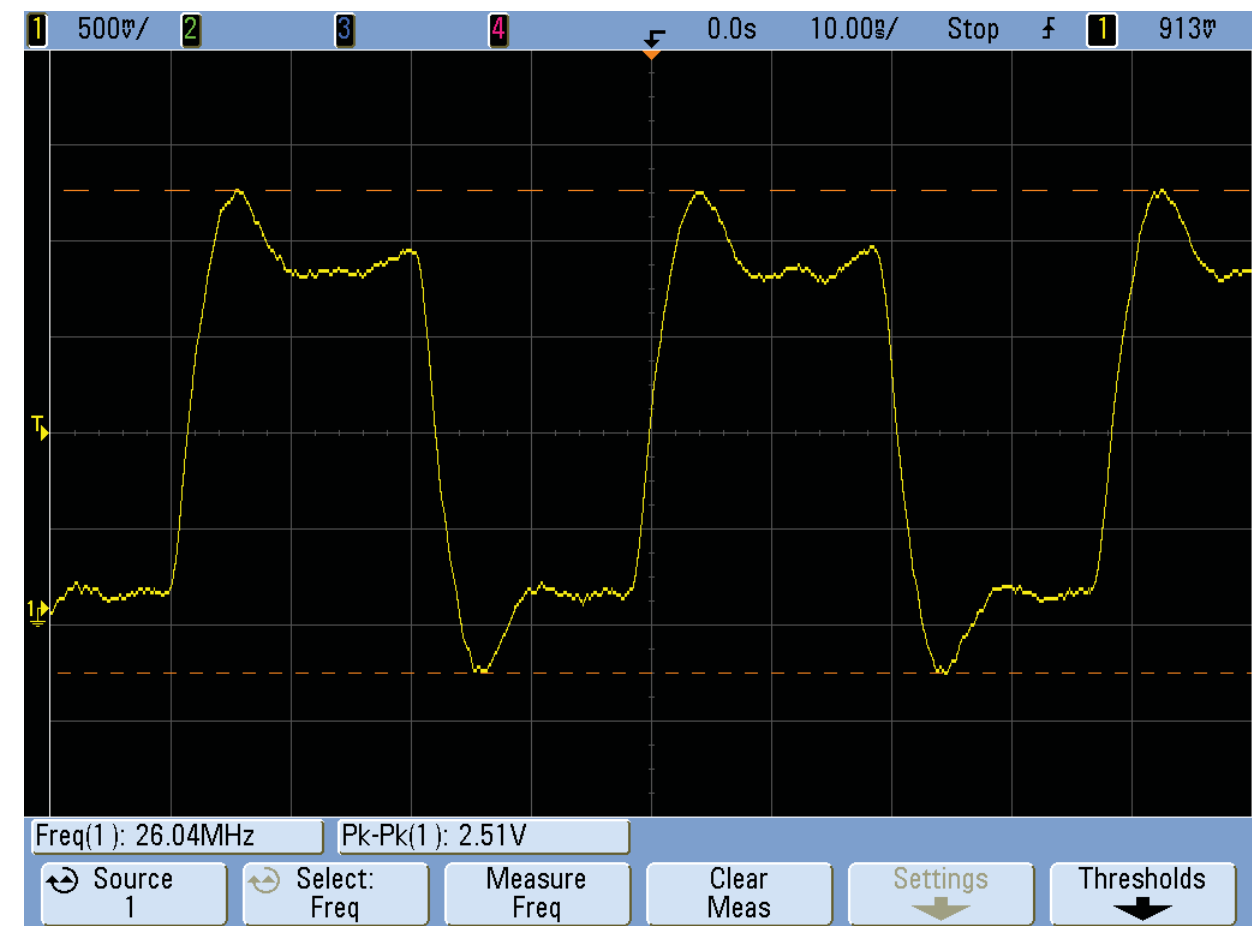
MP 65 (Z1400_Pin 1)



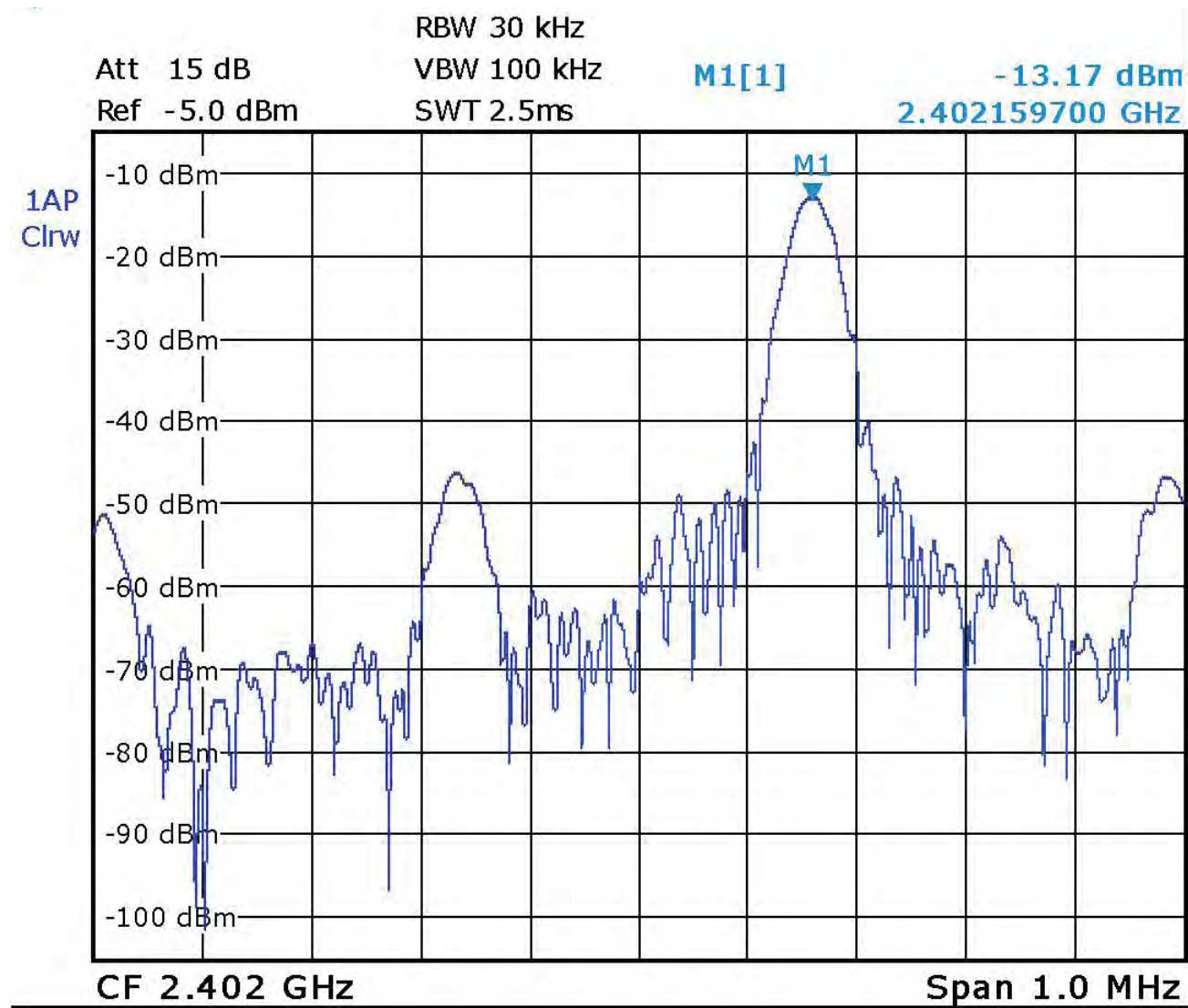
MP 76 (ST4304 13 MHz)



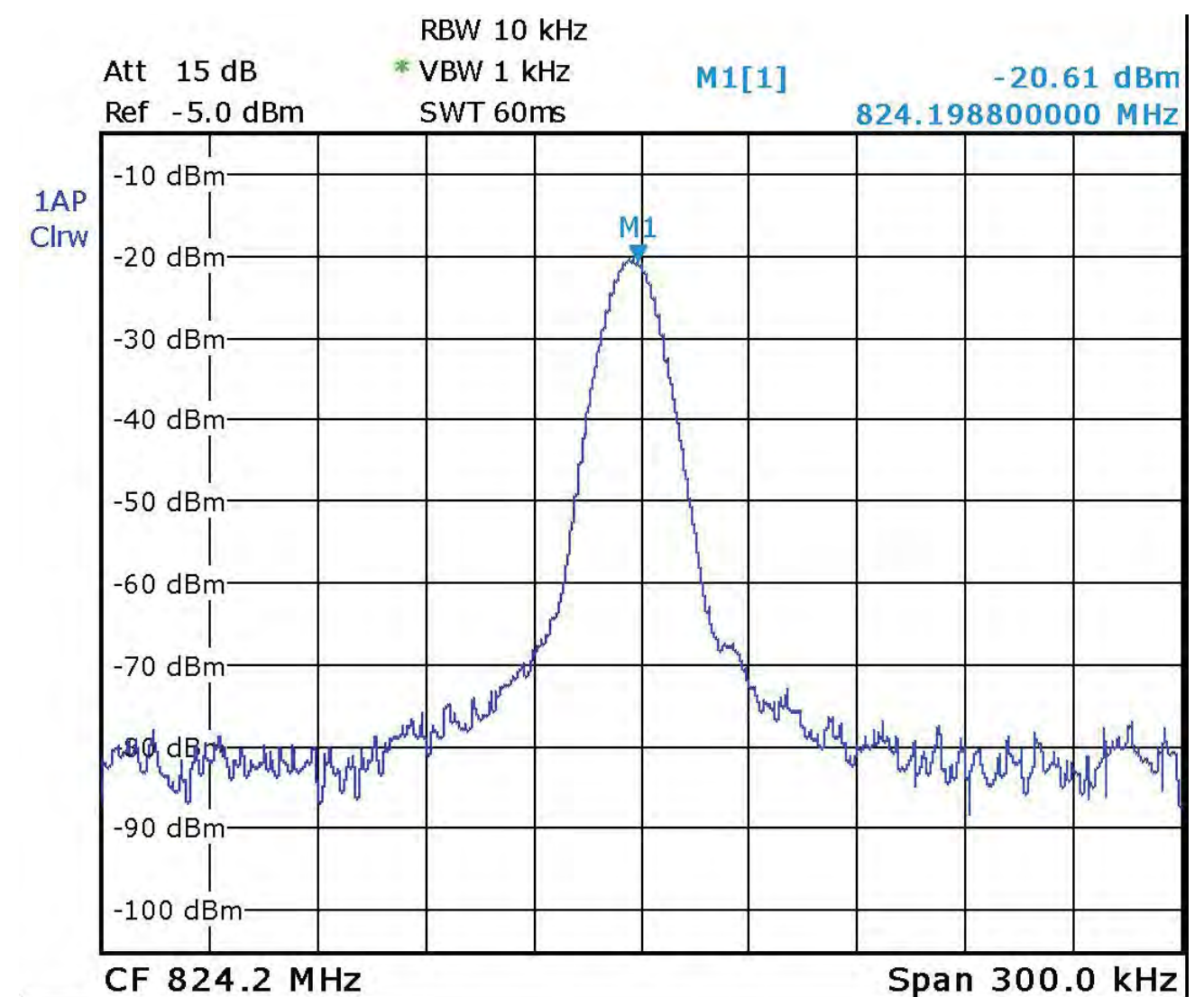
MP 82 (C4206)



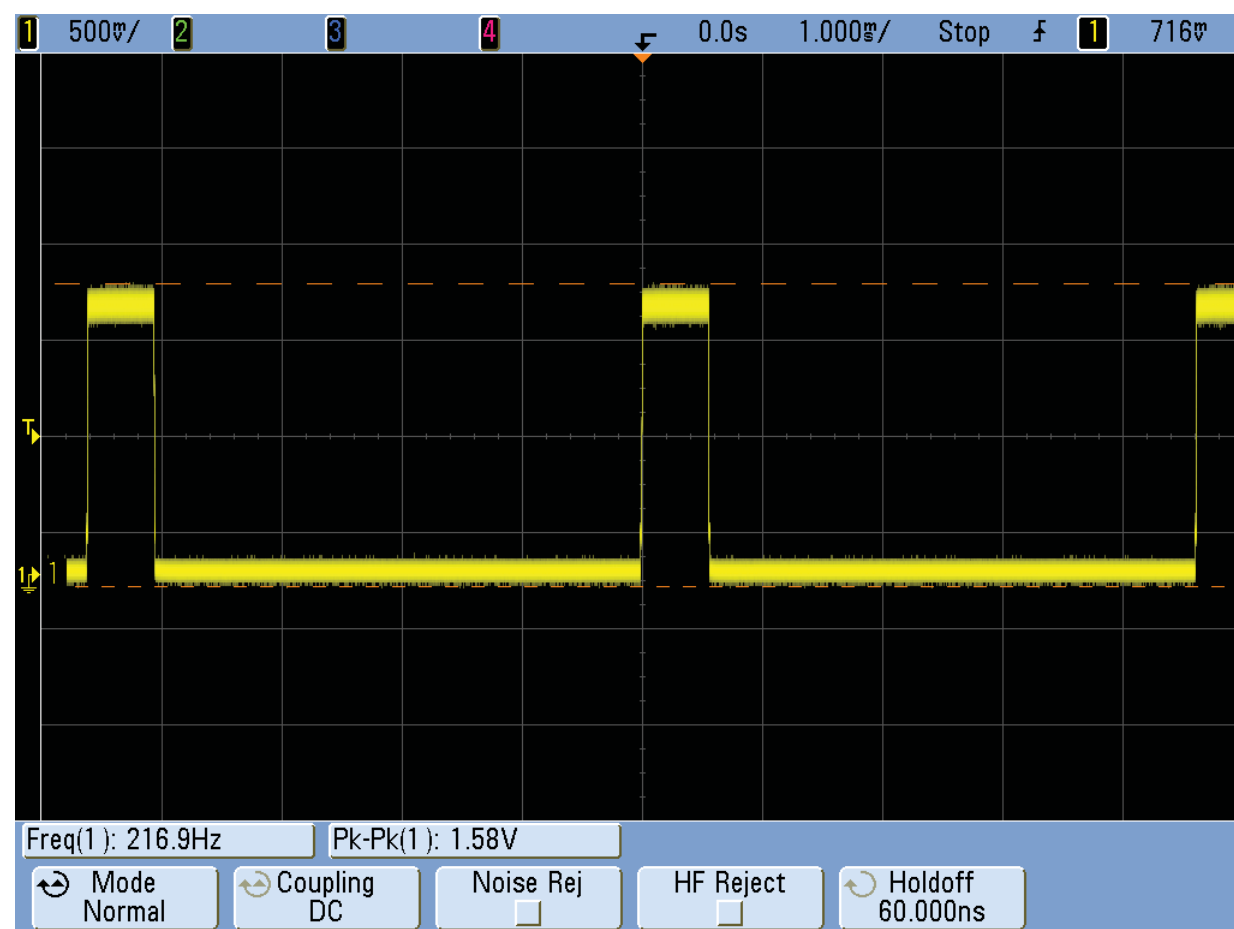
MP 97 (SP2102 SYSCLK1)



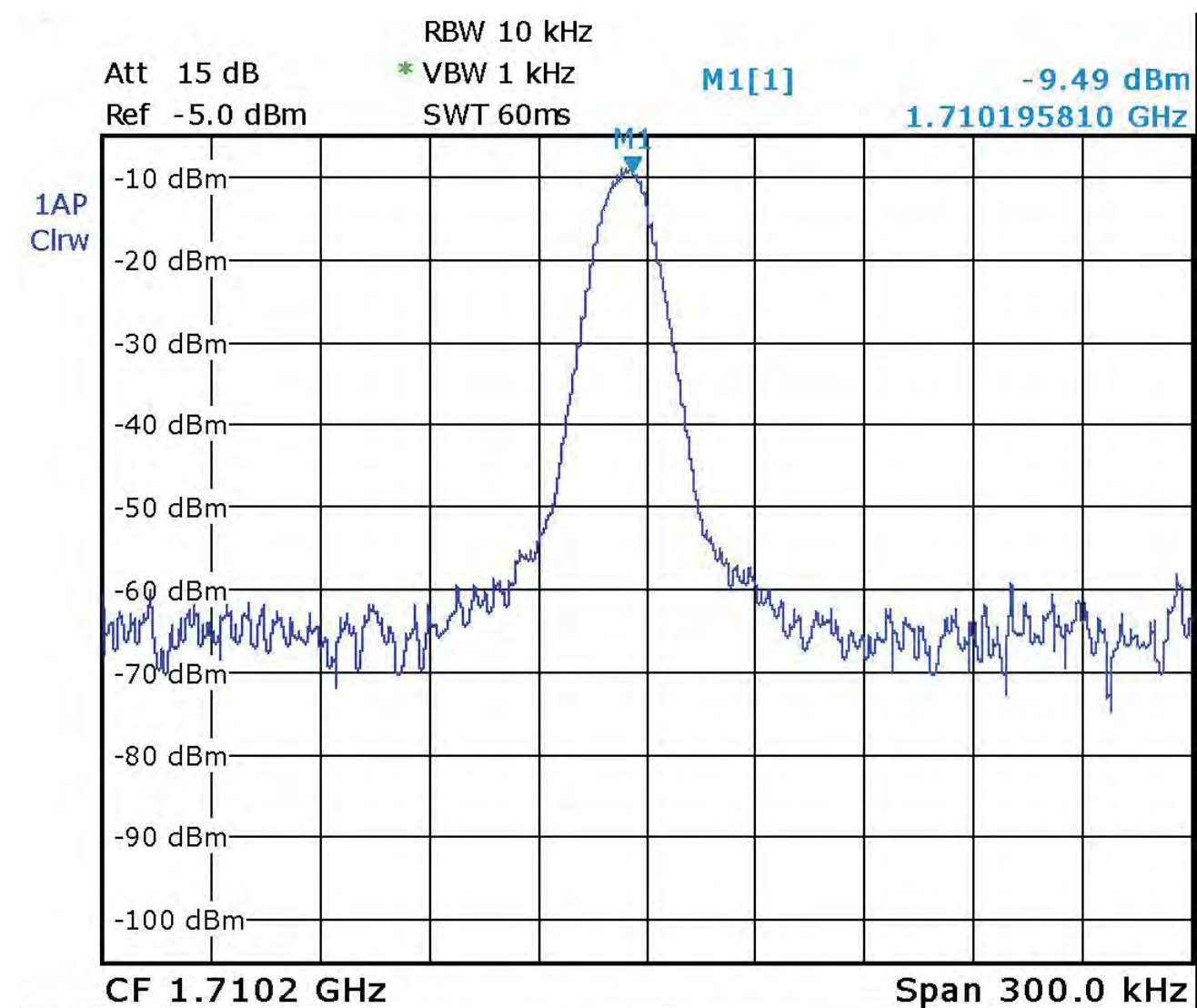
MP 100 (X1302 BT_ANT)



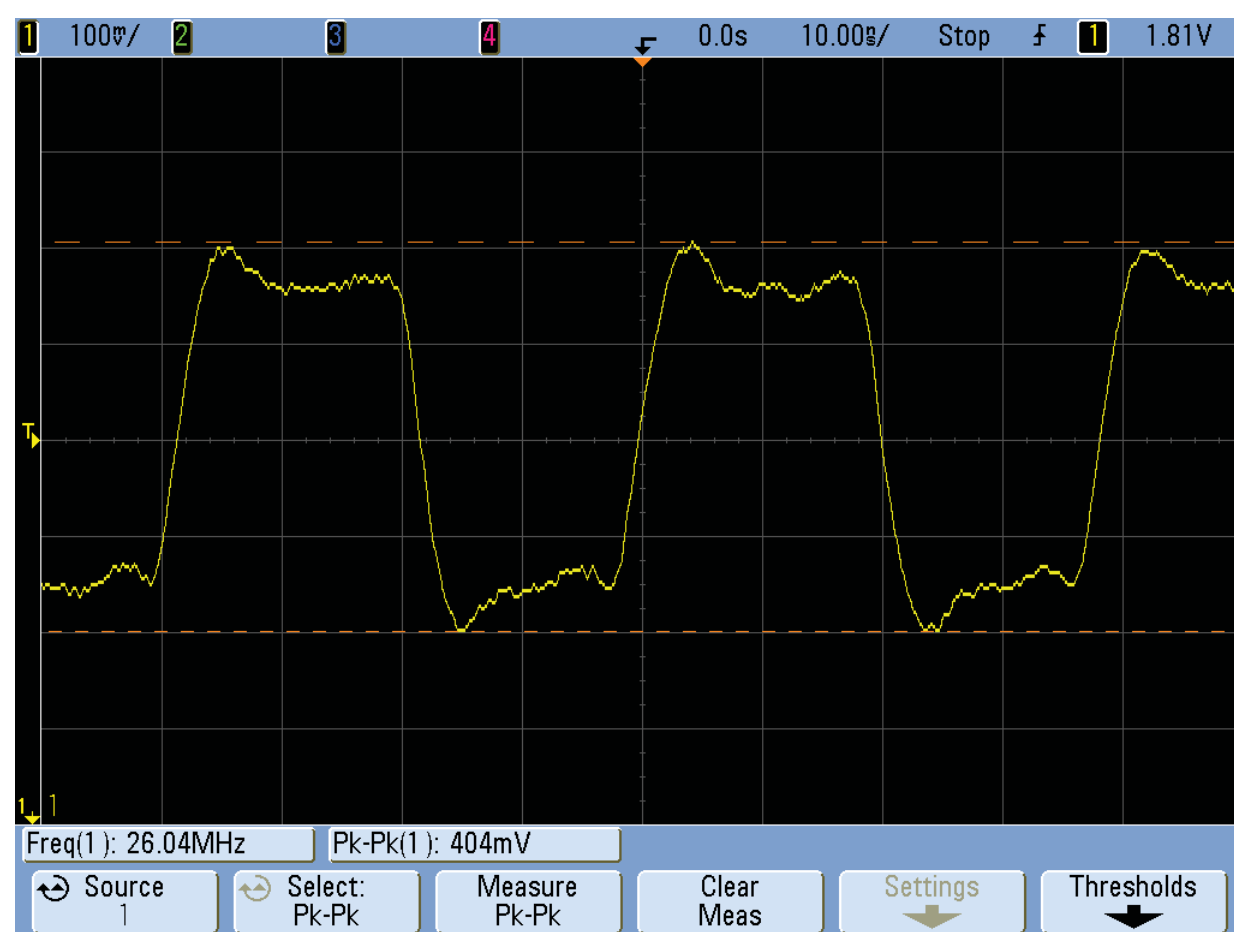
MP 122 (Z1001 THOR)



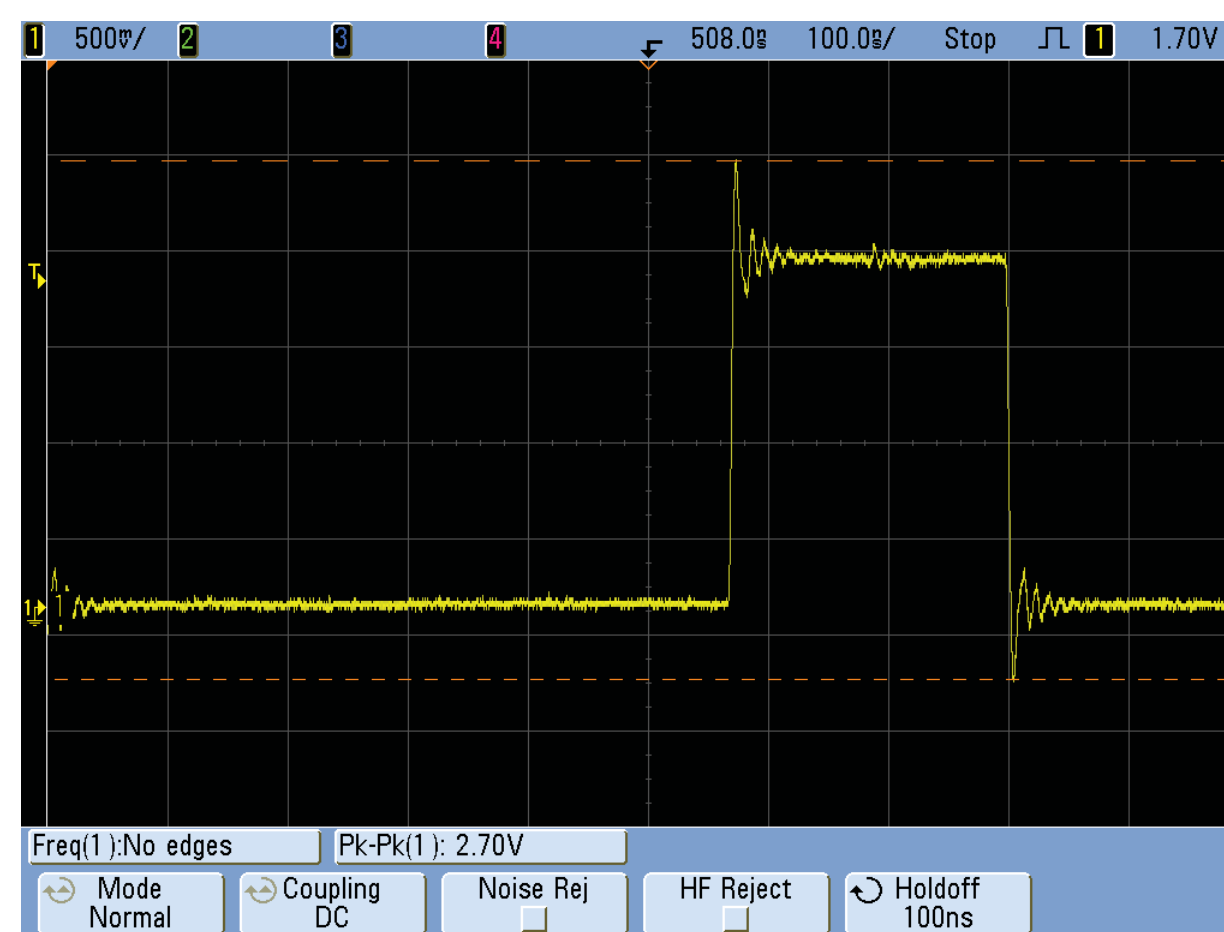
MP 123 (R1000 VAPC THOR)



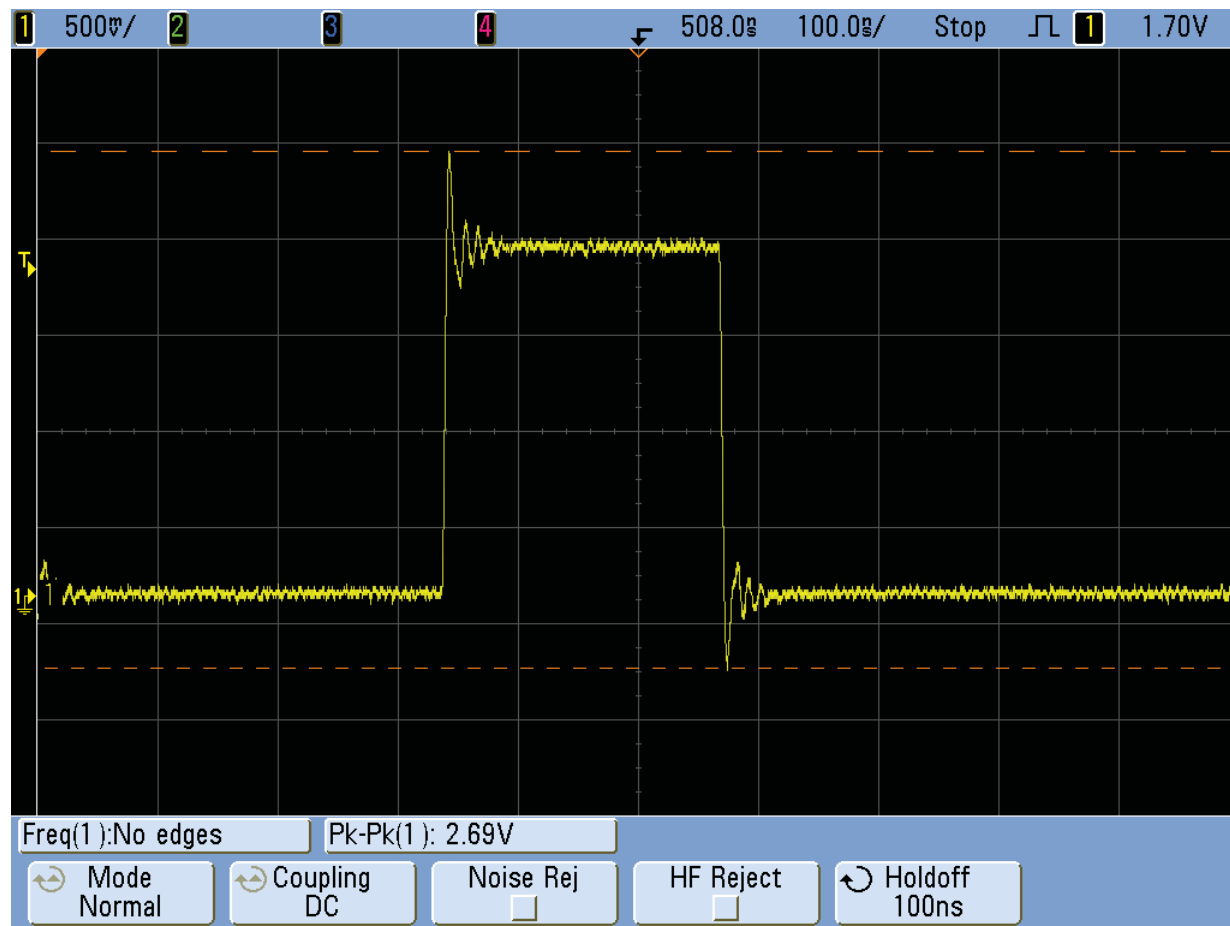
MP 124 (C1014 THOR)



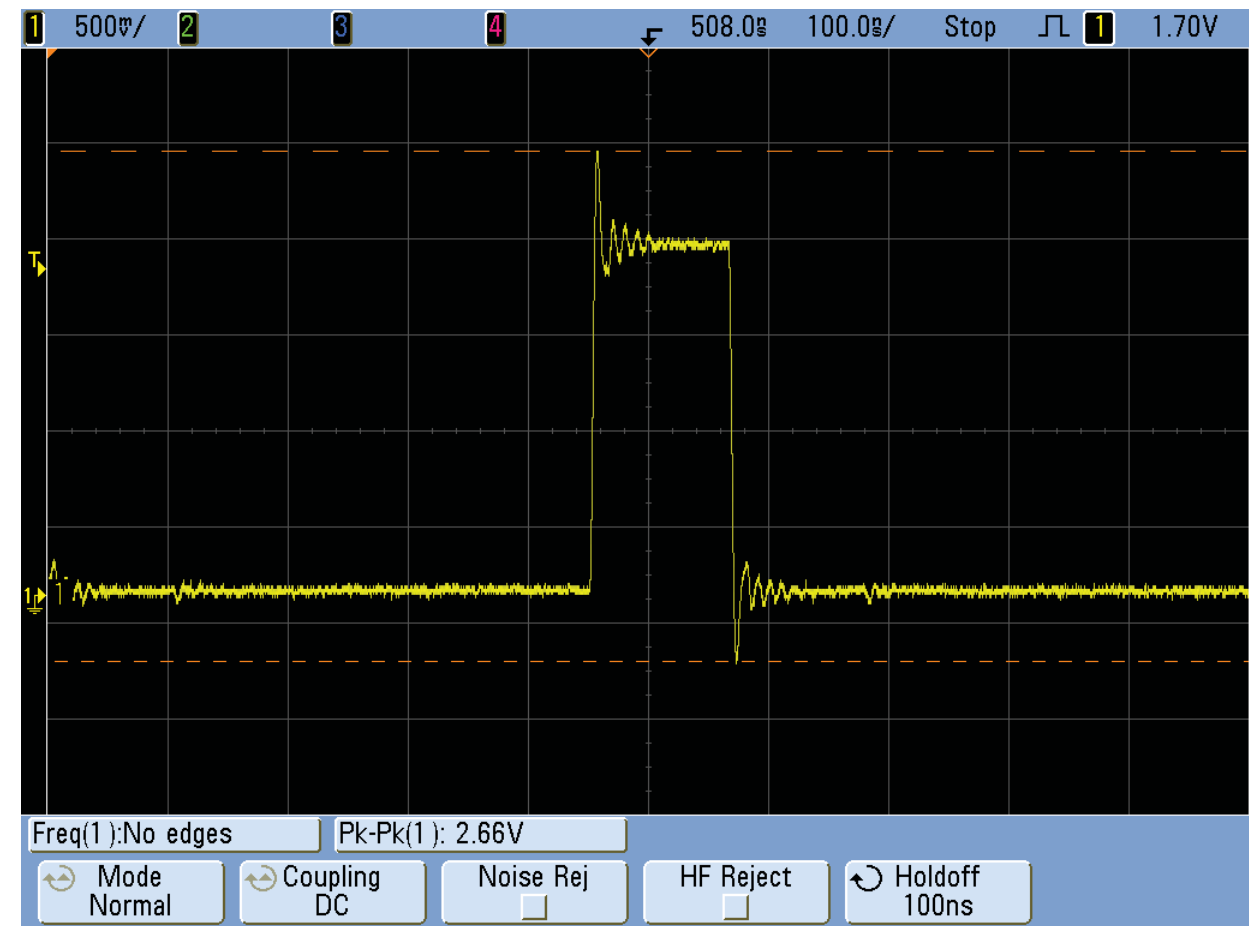
MP 126 (C511 WBCLK SQUID)



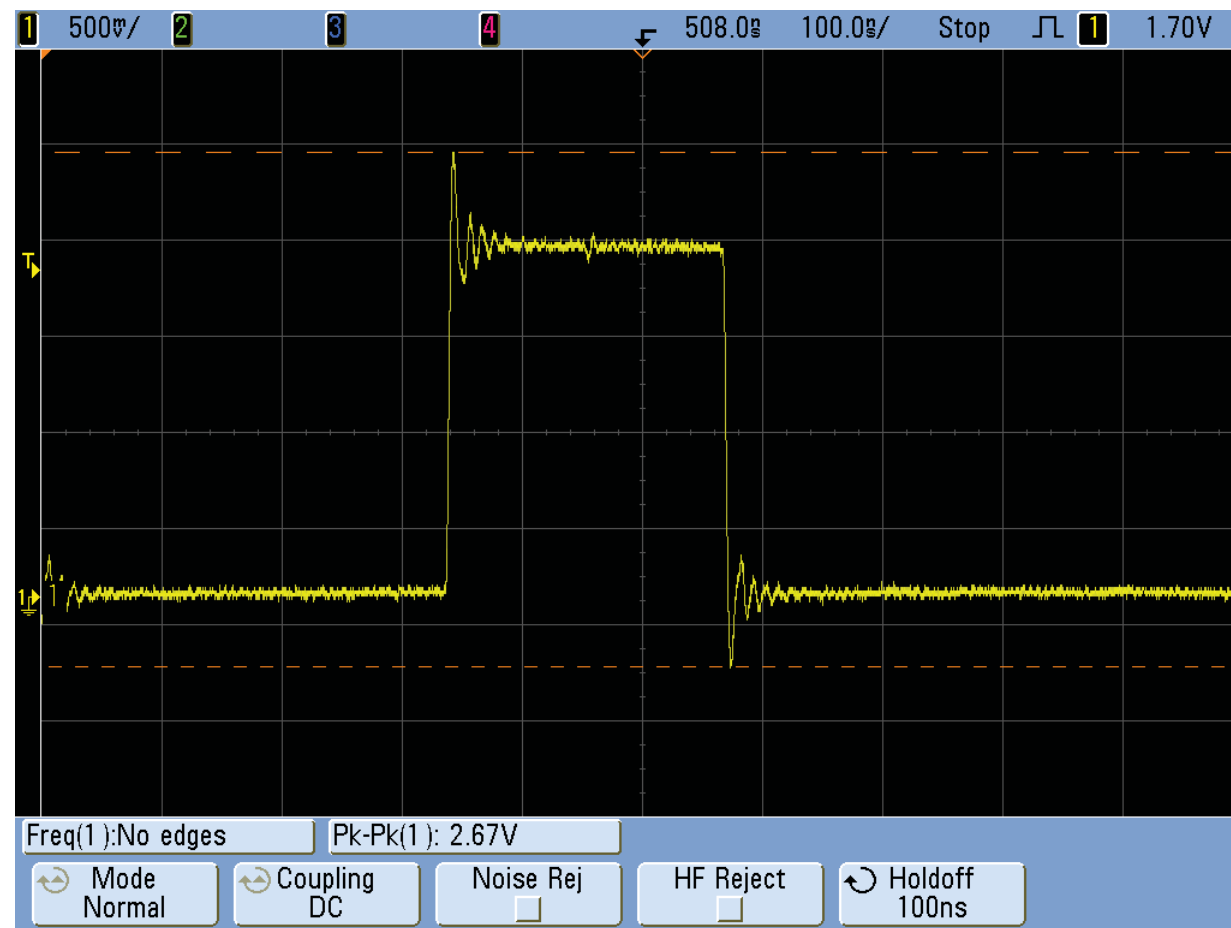
MP Z4200_Pin 1 and 5



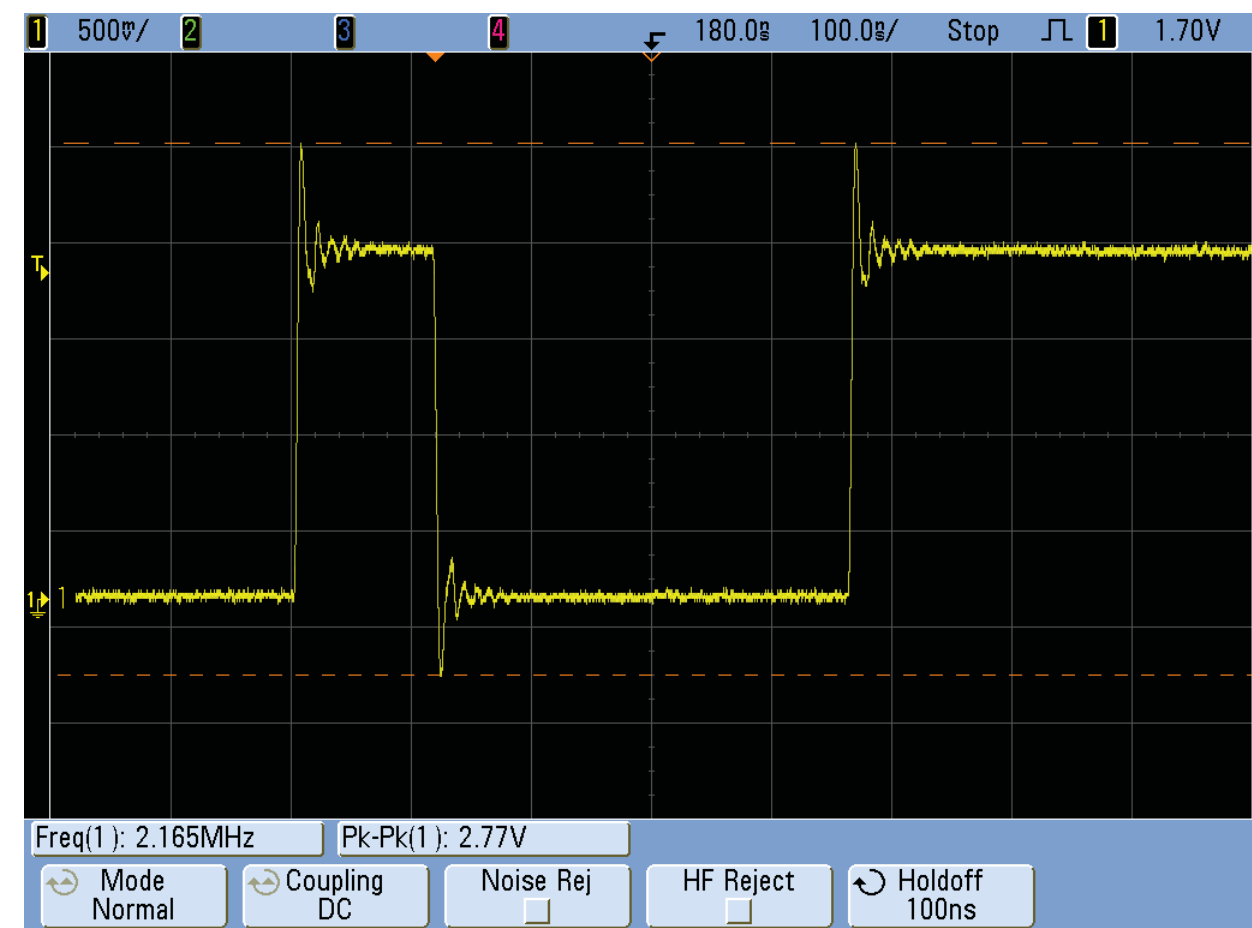
MP Z4200_Pin 2 and 6



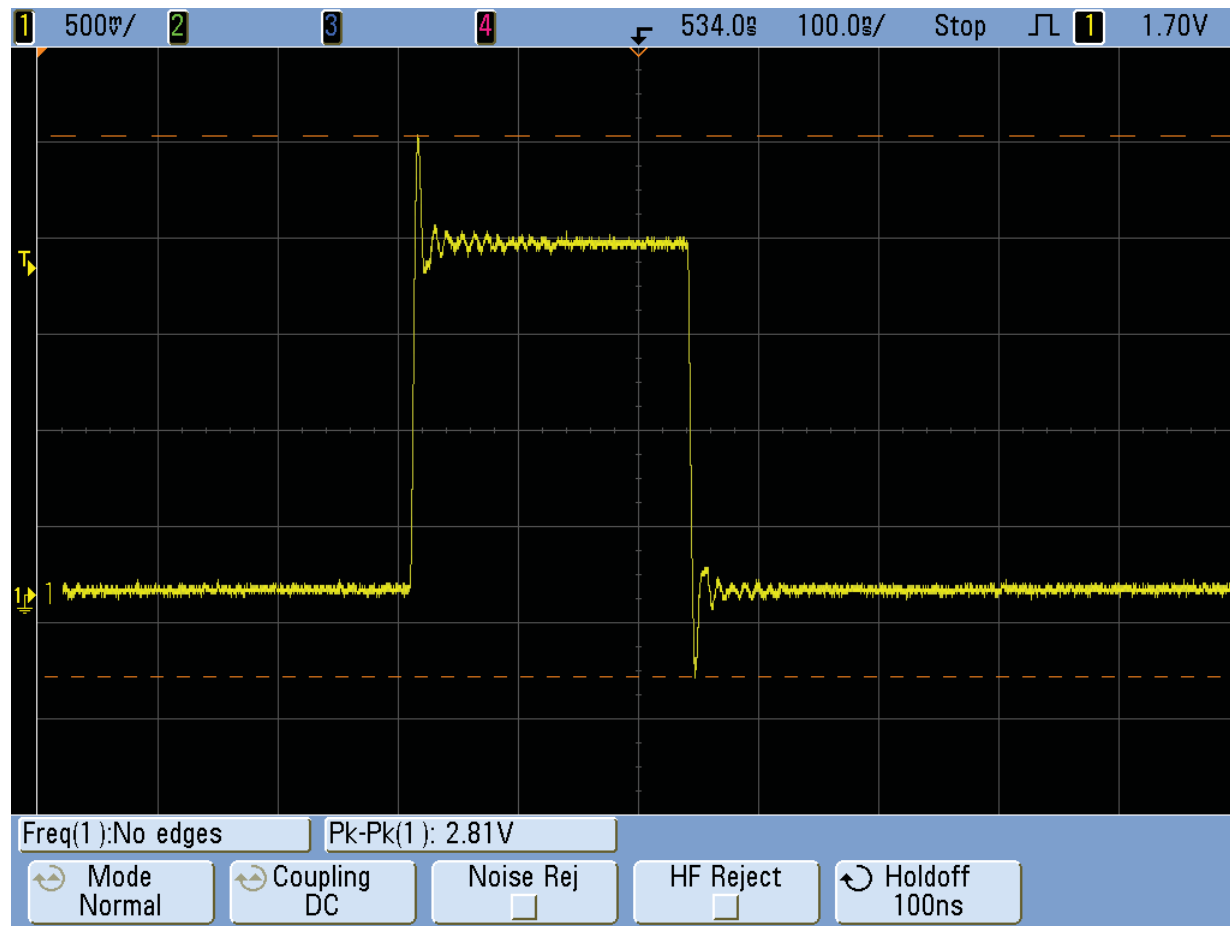
MP Z4200_Pin 3 and 7



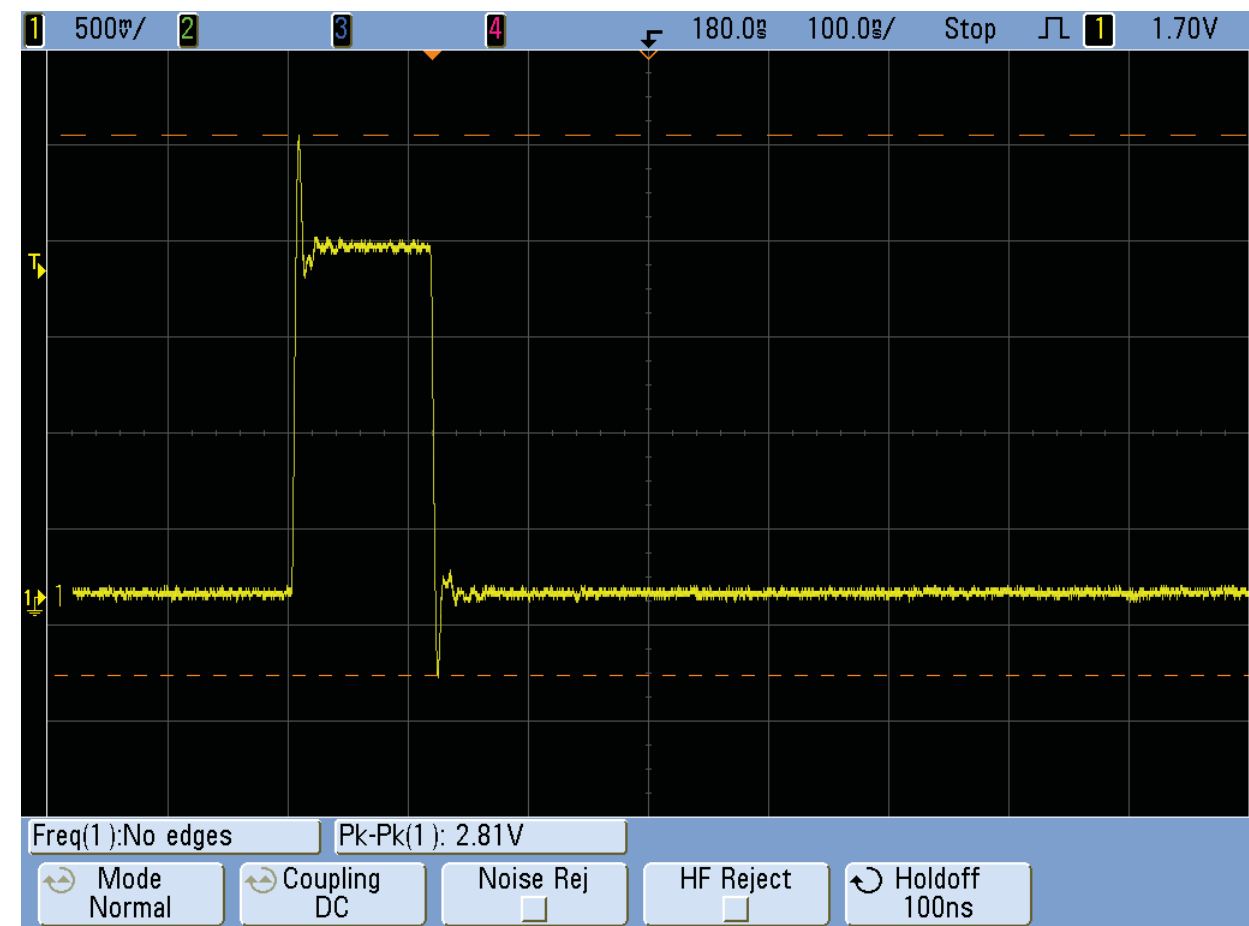
MP Z4200_Pin 4 and 8



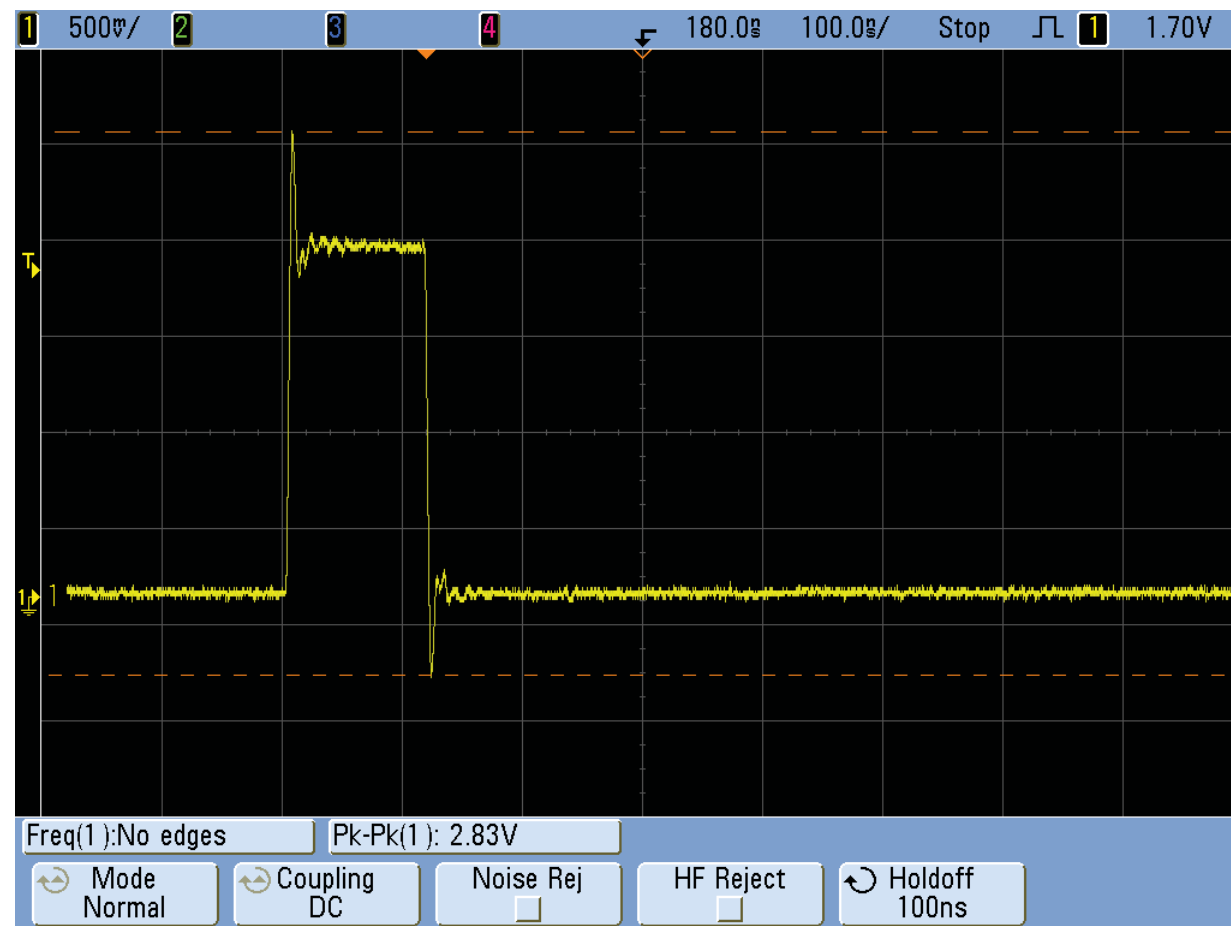
MP Z4201_Pin 1 and 5



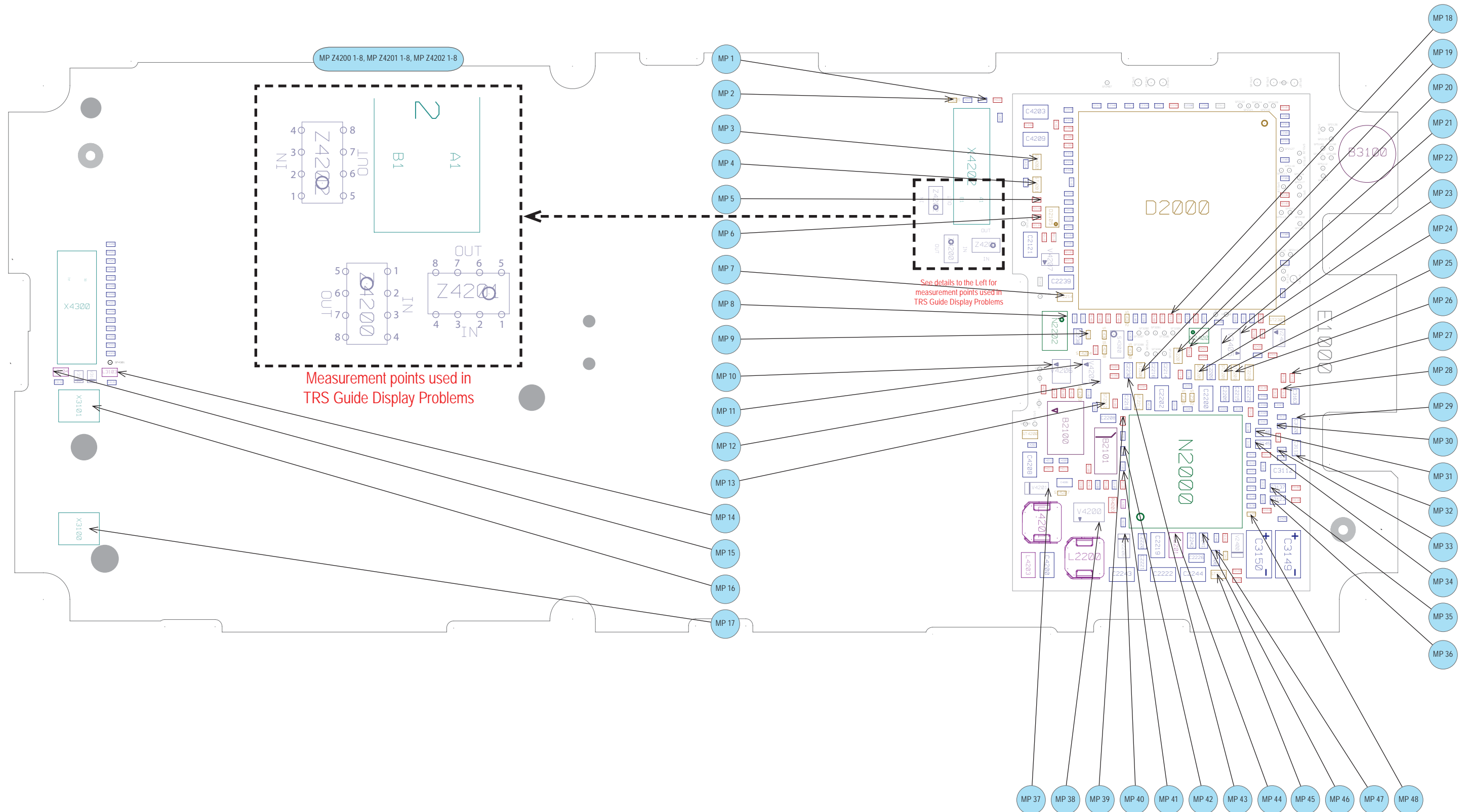
MP Z4201_Pin 2 and 6



MP Z4201_Pin 3 and 7

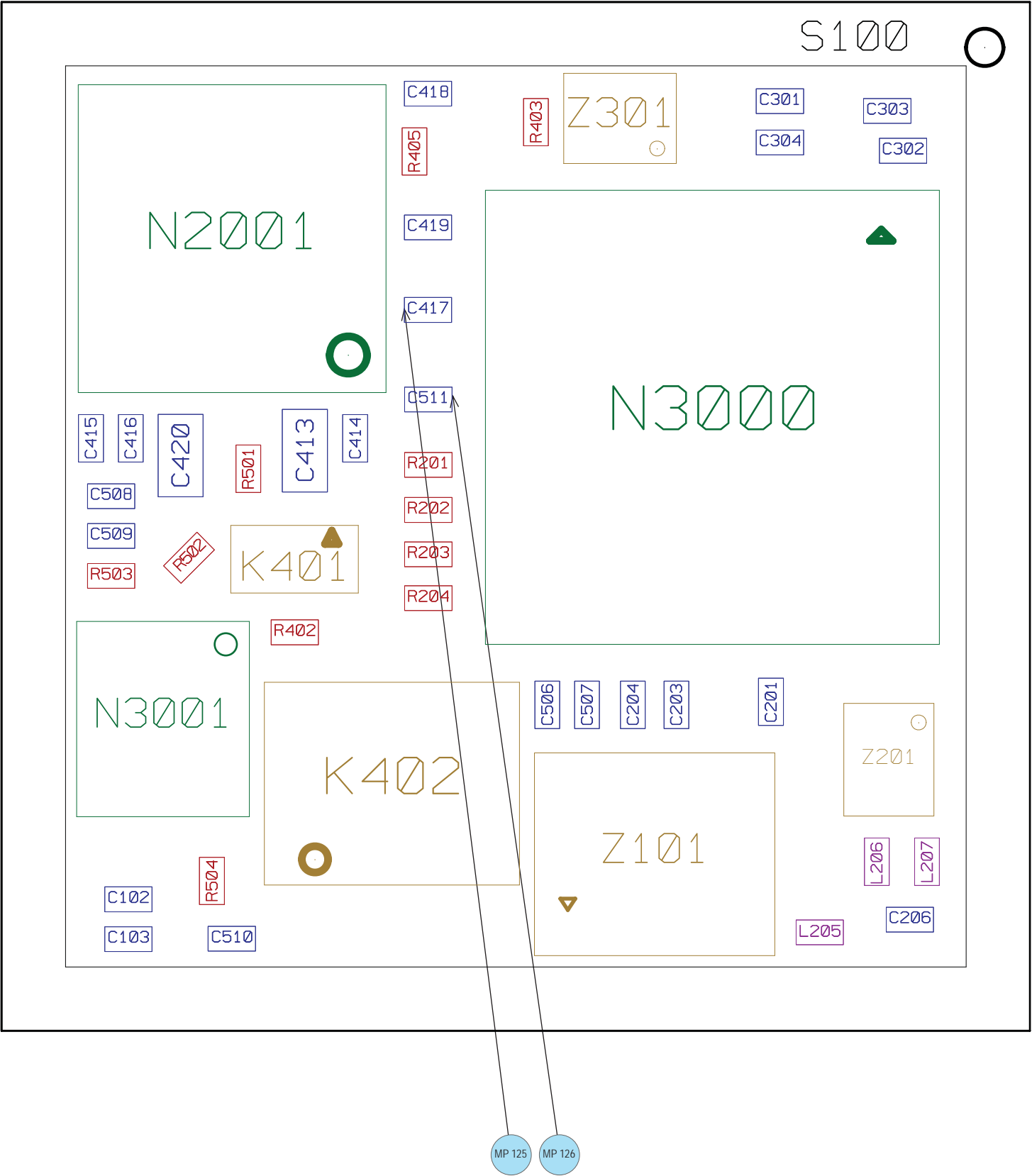


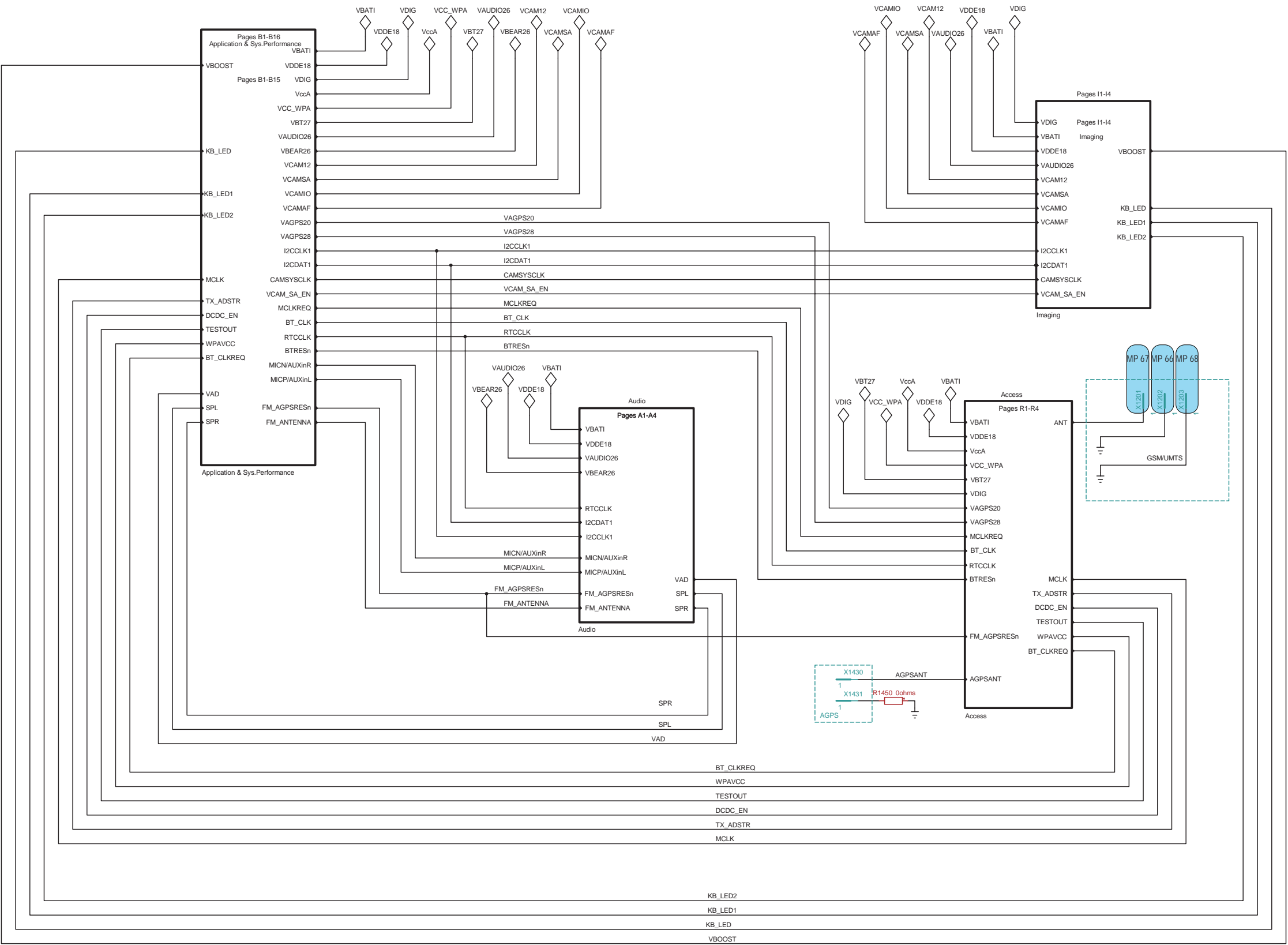
MP Z4201_Pin 4 and 8





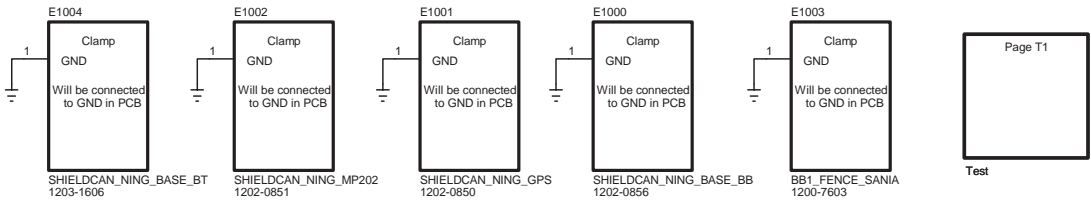




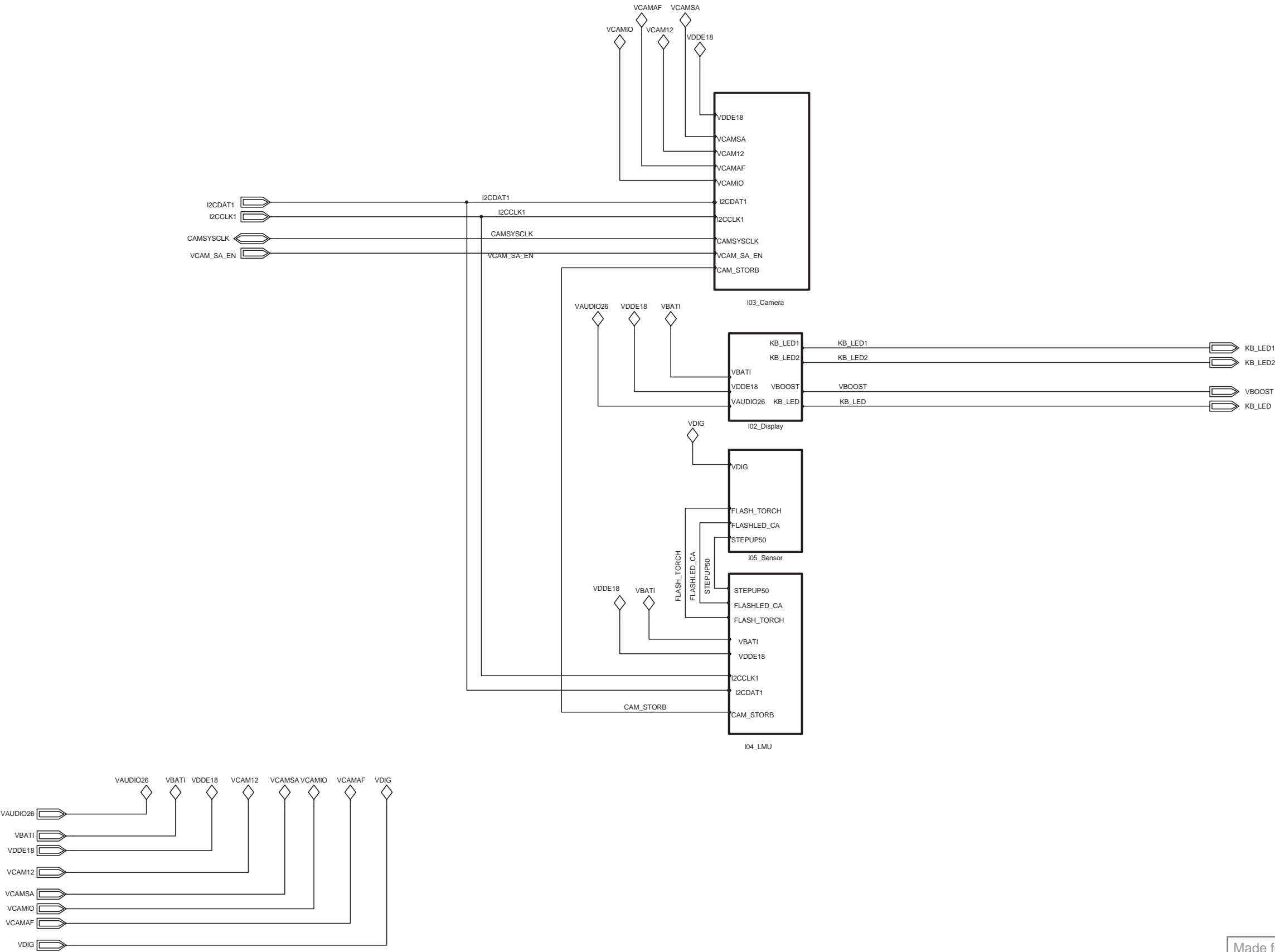


Access side GPIO mapping		
Port	Usage	
AccGPIO00	USB_HSSTP	
AccGPIO01	USB_HSDIR	
AccGPIO02	CTMS	
AccGPIO03	CFMS_AID	
AccGPIO04	USB_HS_INCLK	
AccGPIO05	USB_HSNXT	
AccGPIO06	USB_HSDATA4	
AccGPIO07	USB_HSDATA5	
AccGPIO08	USB_HSDATA6	
AccGPIO09	USB_HSDATA7	
AccGPIO10	UART3_RX	
AccGPIO11	UART3_TX	
AccGPIO12	UART3_CTS	
AccGPIO13	UART3_RTS	
AccGPIO14	BT_SPL_INT	
AccGPIO15	AGPS_PWRON	
AccGPIO16	USB_HSCHIP_SEL	
AccGPIO17	AGPS_SYNC	
AccGPIO18	USB_HSDATA3	
AccGPIO19	BT_SPL_CSn	
AccGPIO20	BT_SPL_DI	
AccGPIO21	BT_SPL_DO	
AccGPIO22	BT_SPL_CLK	
AccGPIO23	AGPS_LDO_EN	

Application side GPIO mapping		
Port	Usage	
AppGPIO00	FM_INT	
AppGPIO01	APP_LOG	
AppGPIO02	CAMIRO	
AppGPIO03	CAM_IO_EN	
AppGPIO04	VCAM_SA_EN	
AppGPIO05	CAM_CORE_EN	
AppGPIO06	FLASH_EN	
AppGPIO07	LMU_RSTn	
AppGPIO08	CAMRESn	
AppGPIO09	CIF_STANDBY	
AppGPIO10	ACTIVE_LENS	
AppGPIO11	OV_FLAG	
AppGPIO12	MSDETECT	
AppGPIO13	AMPCTRL	
AppGPIO14	not use	
AppGPIO15	DCON	



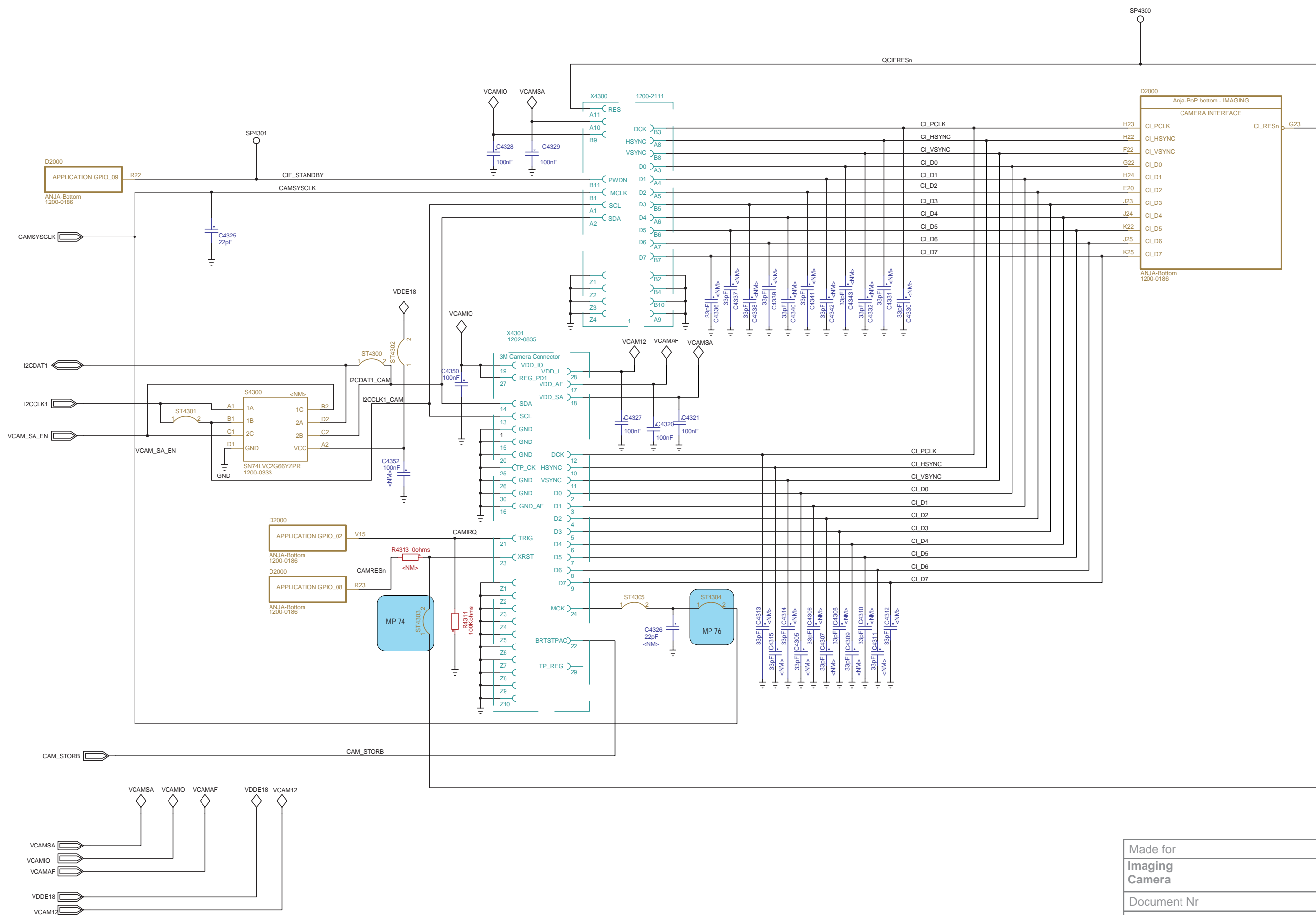
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Document Nr 1202-6029 Page 1	Revision 2

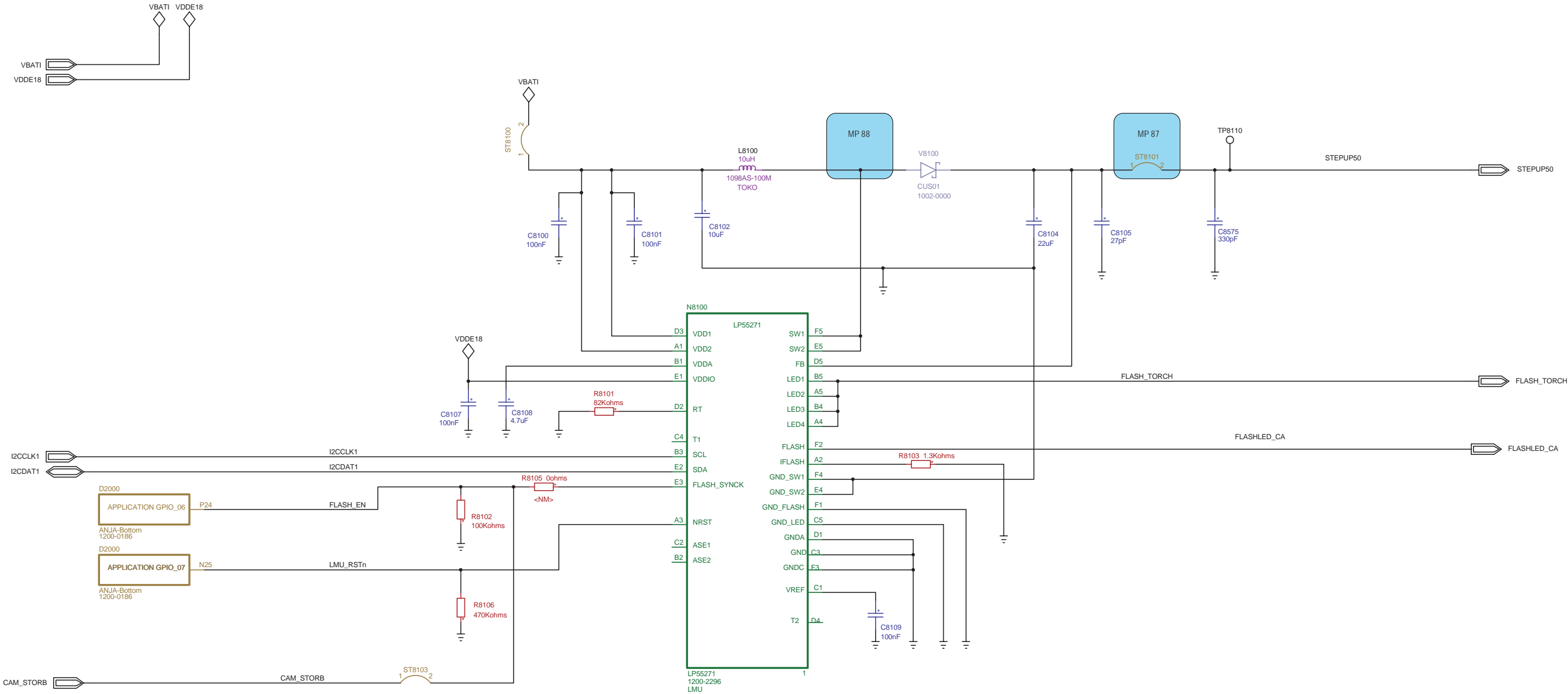


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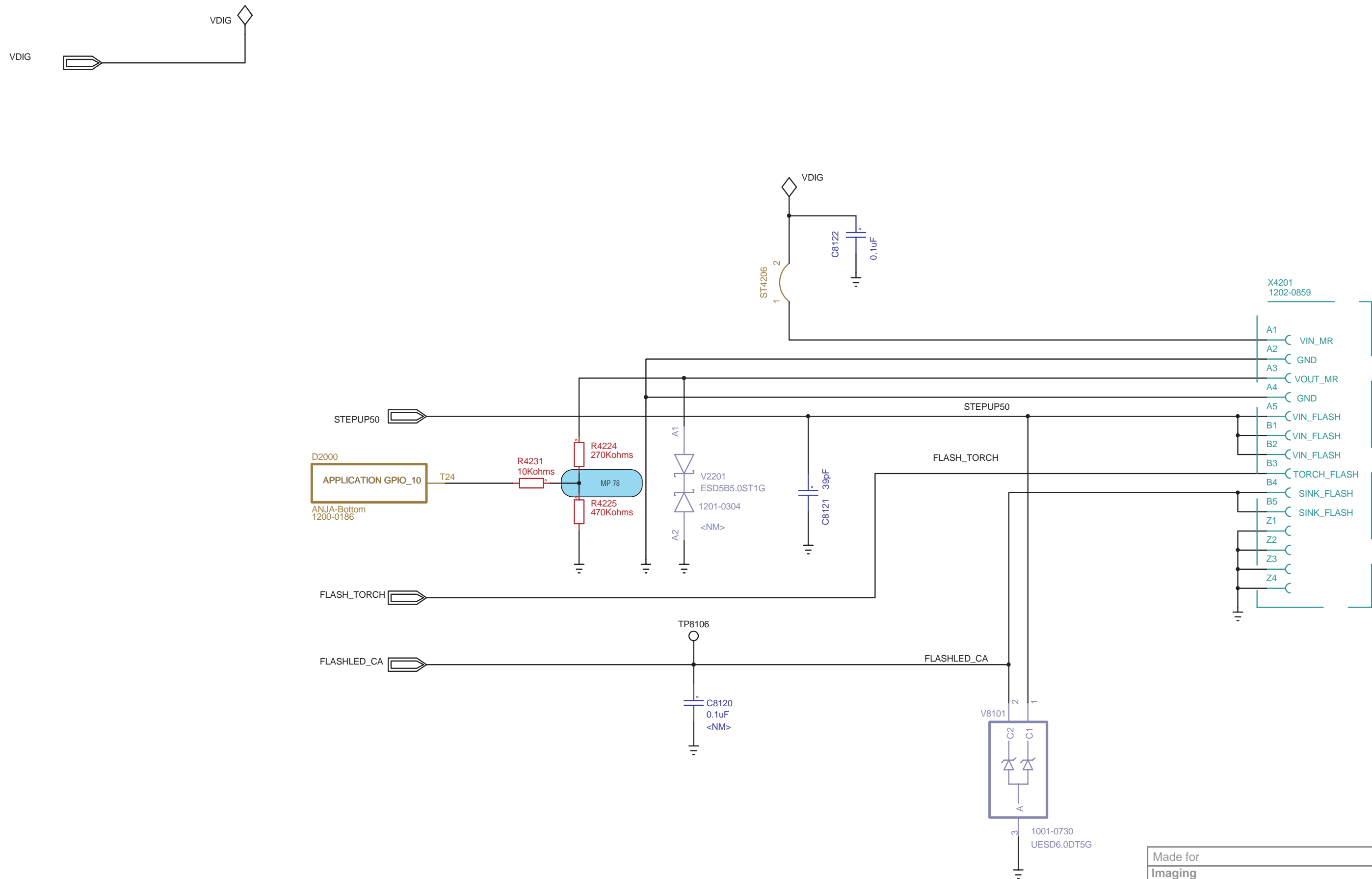


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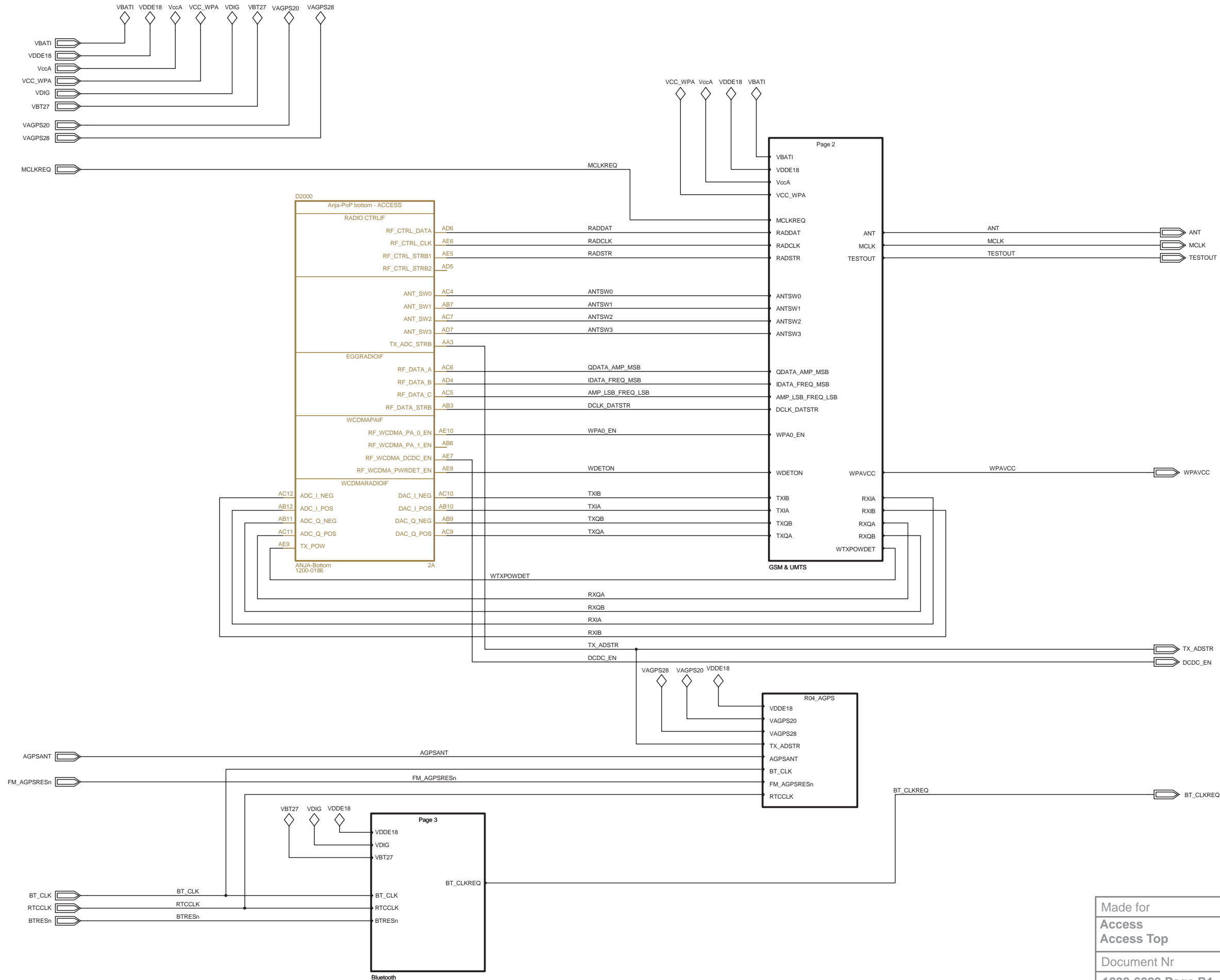




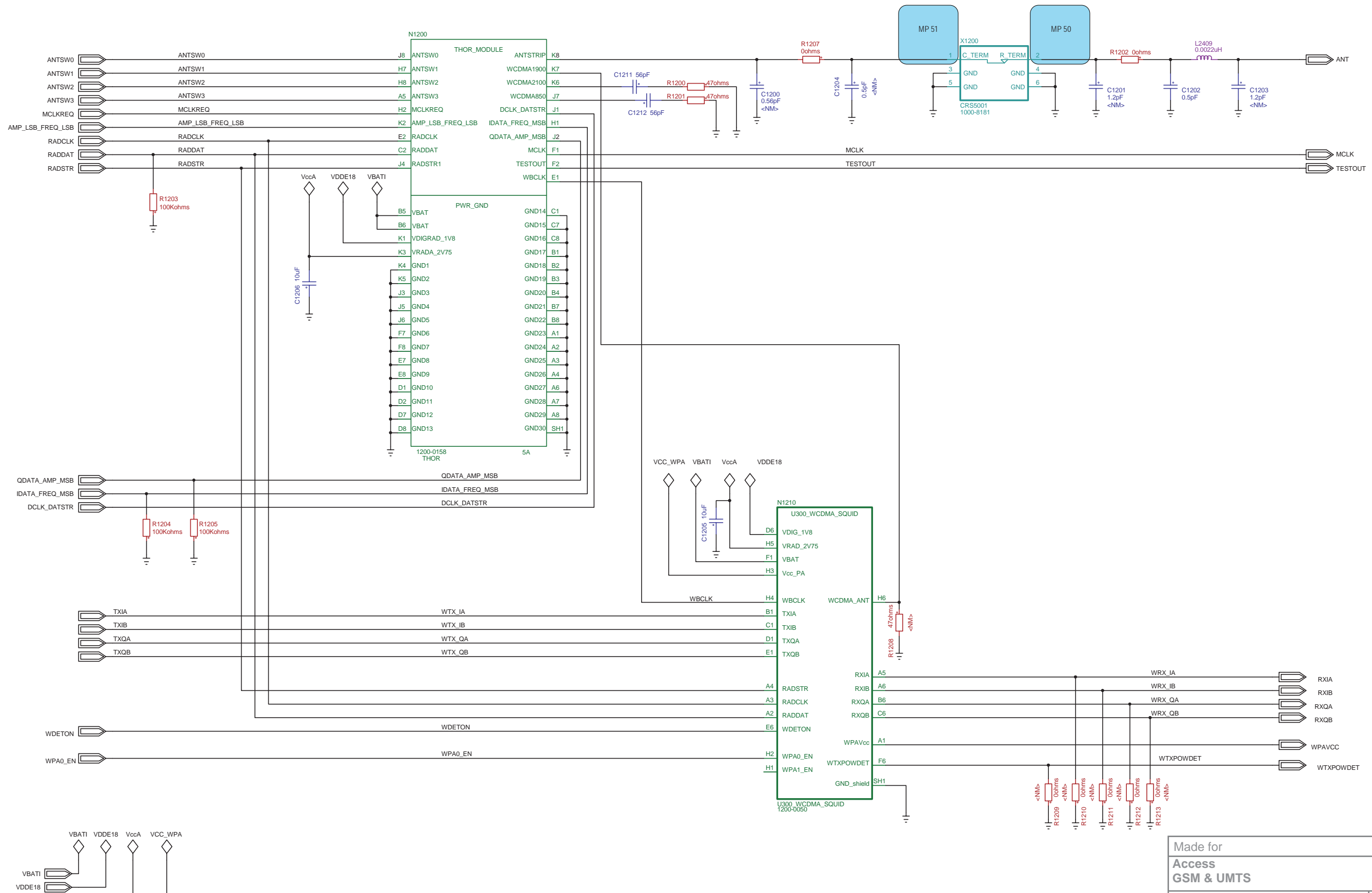
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Document Nr	Revision
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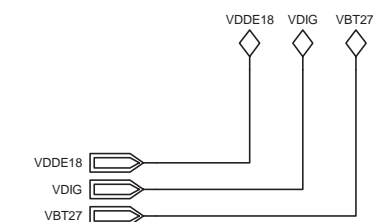
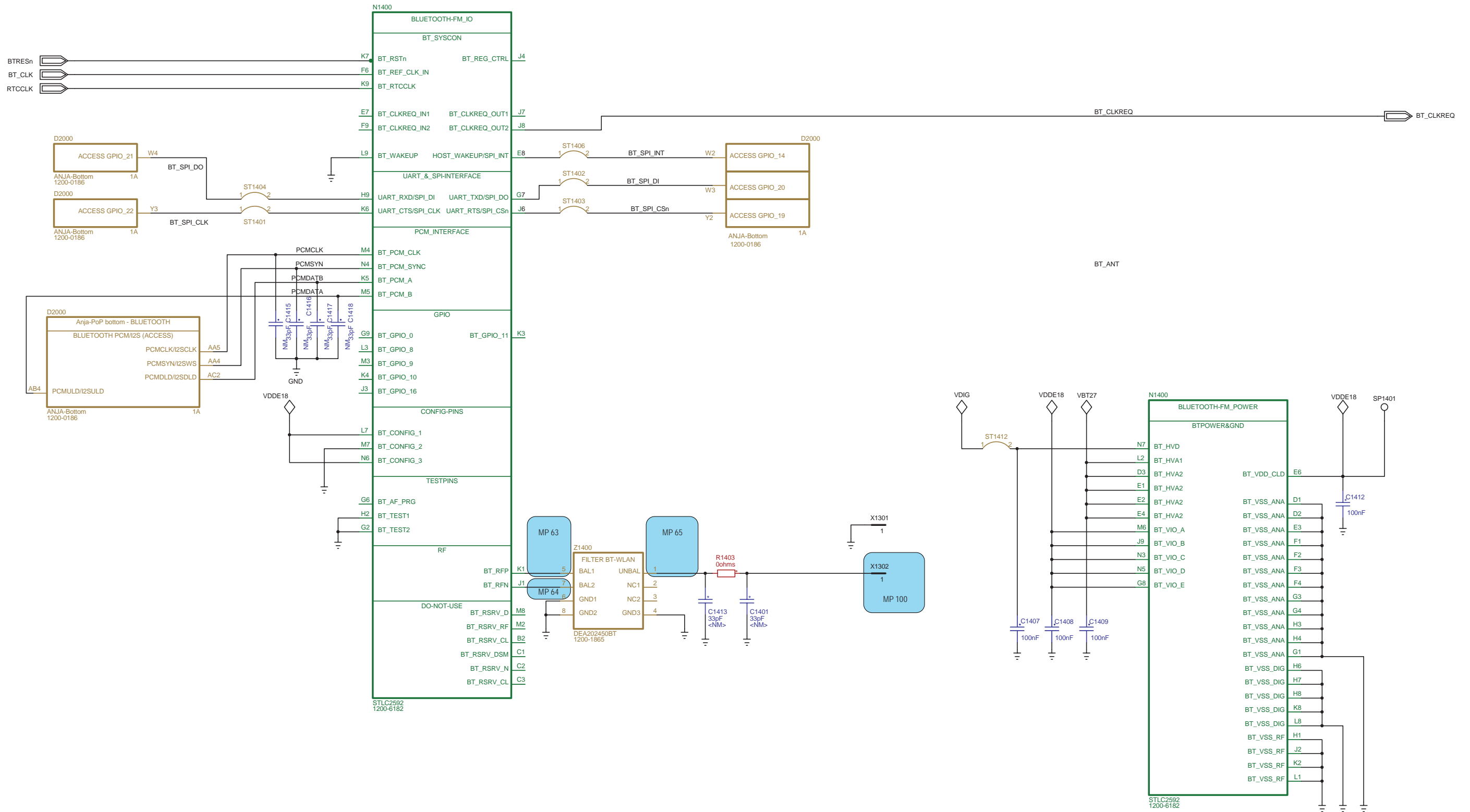


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Document Nr	Revision
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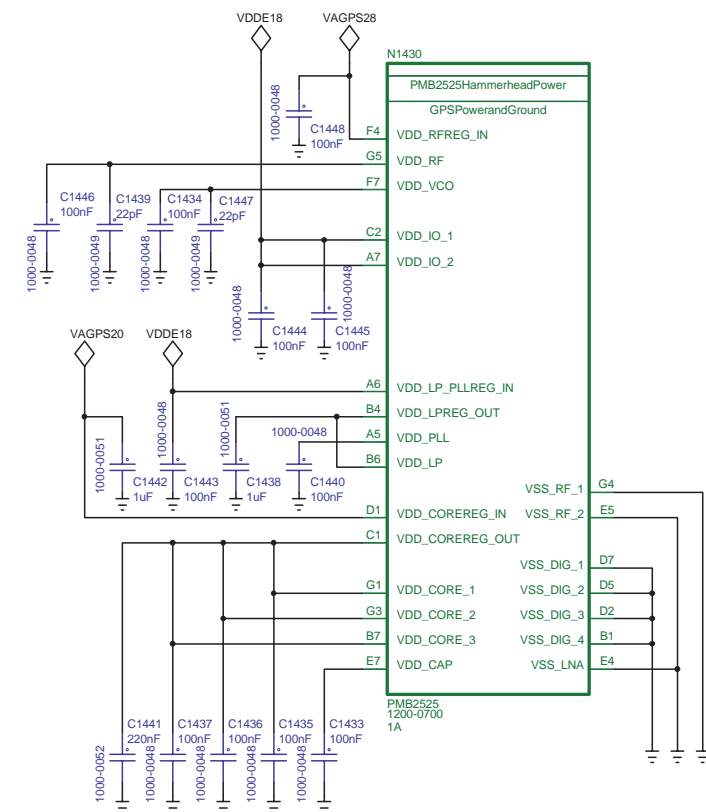


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Access	
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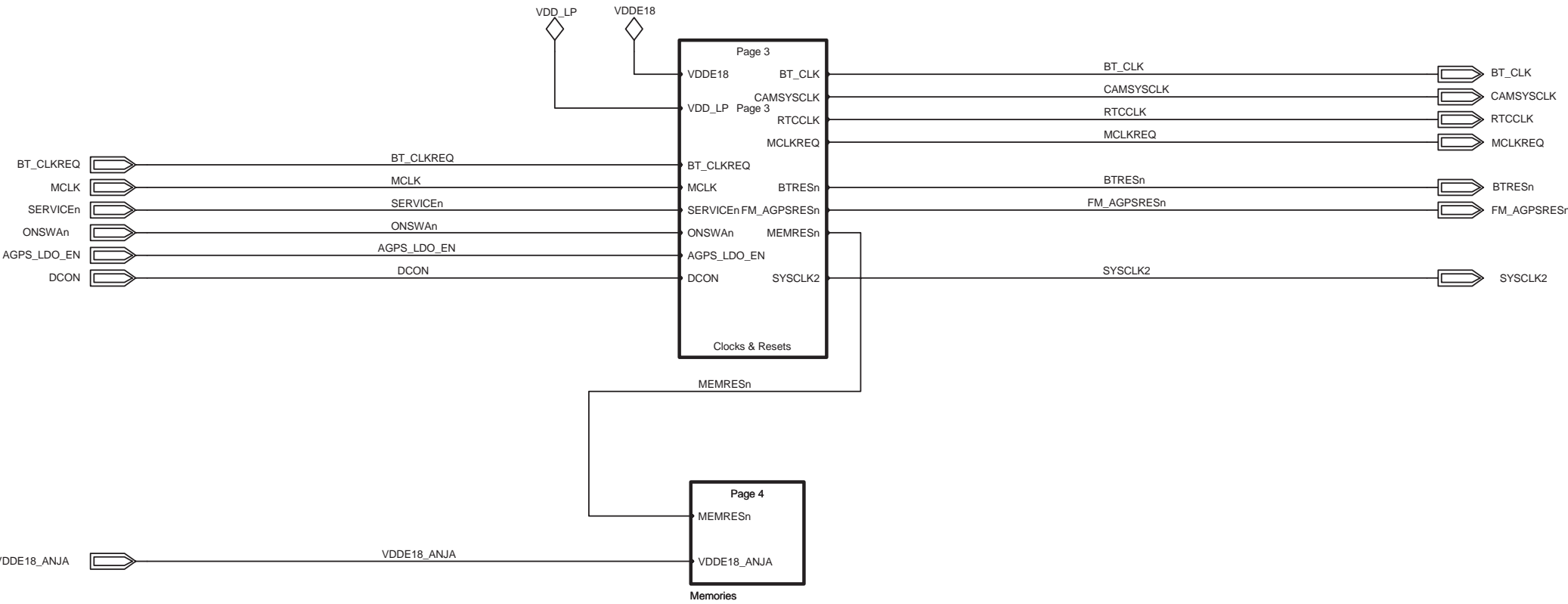
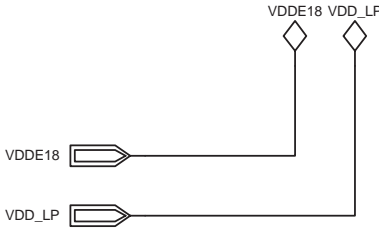


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Document Nr	Revision
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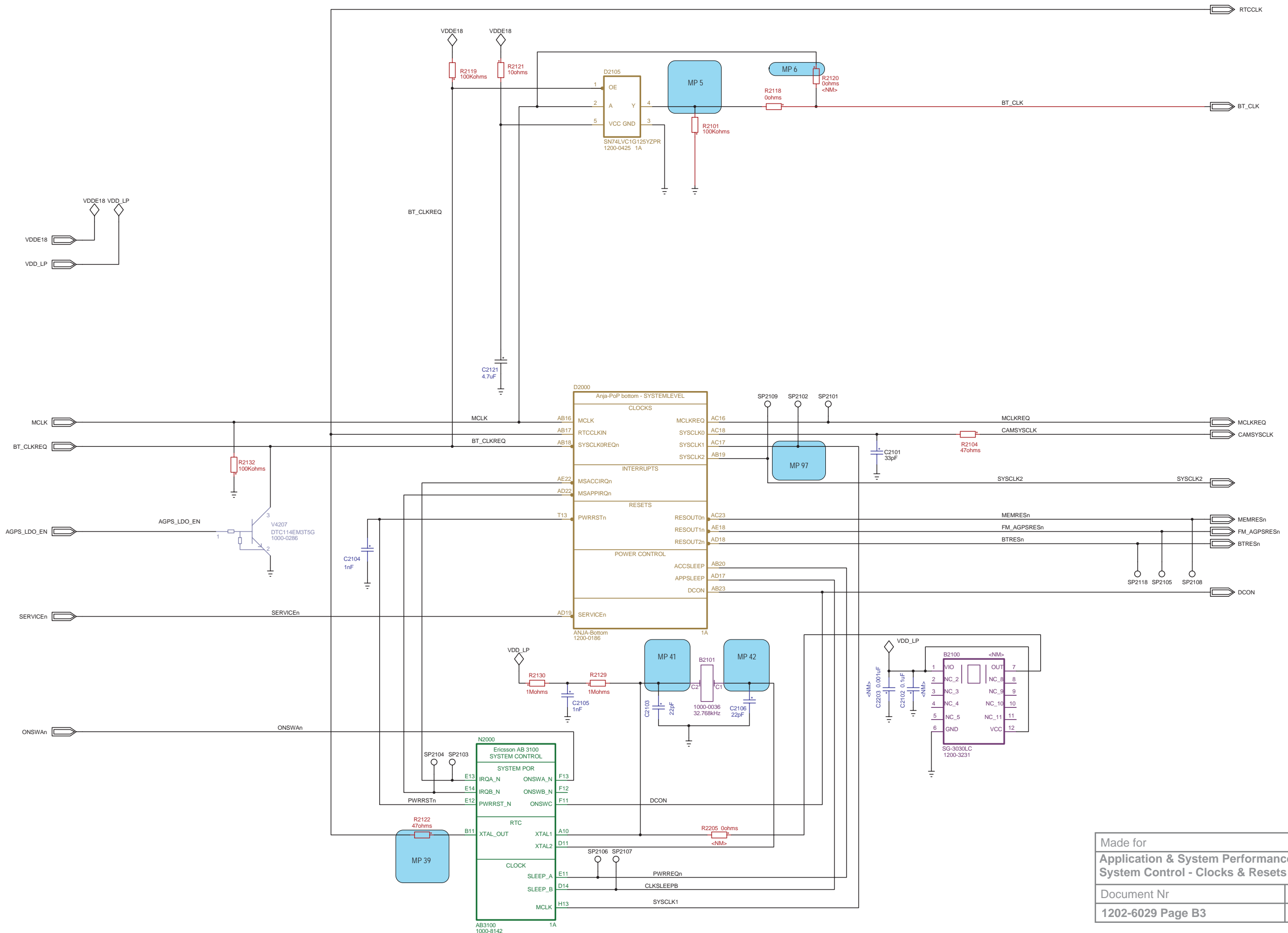


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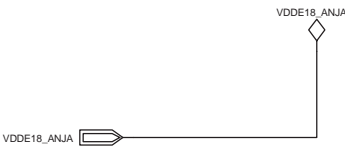
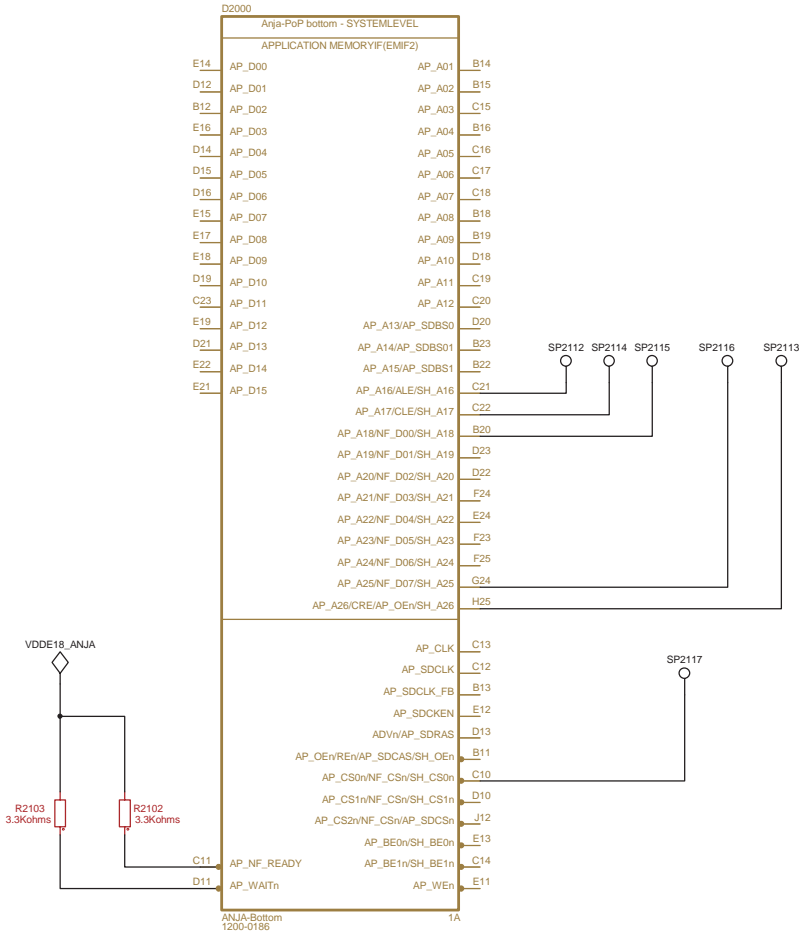
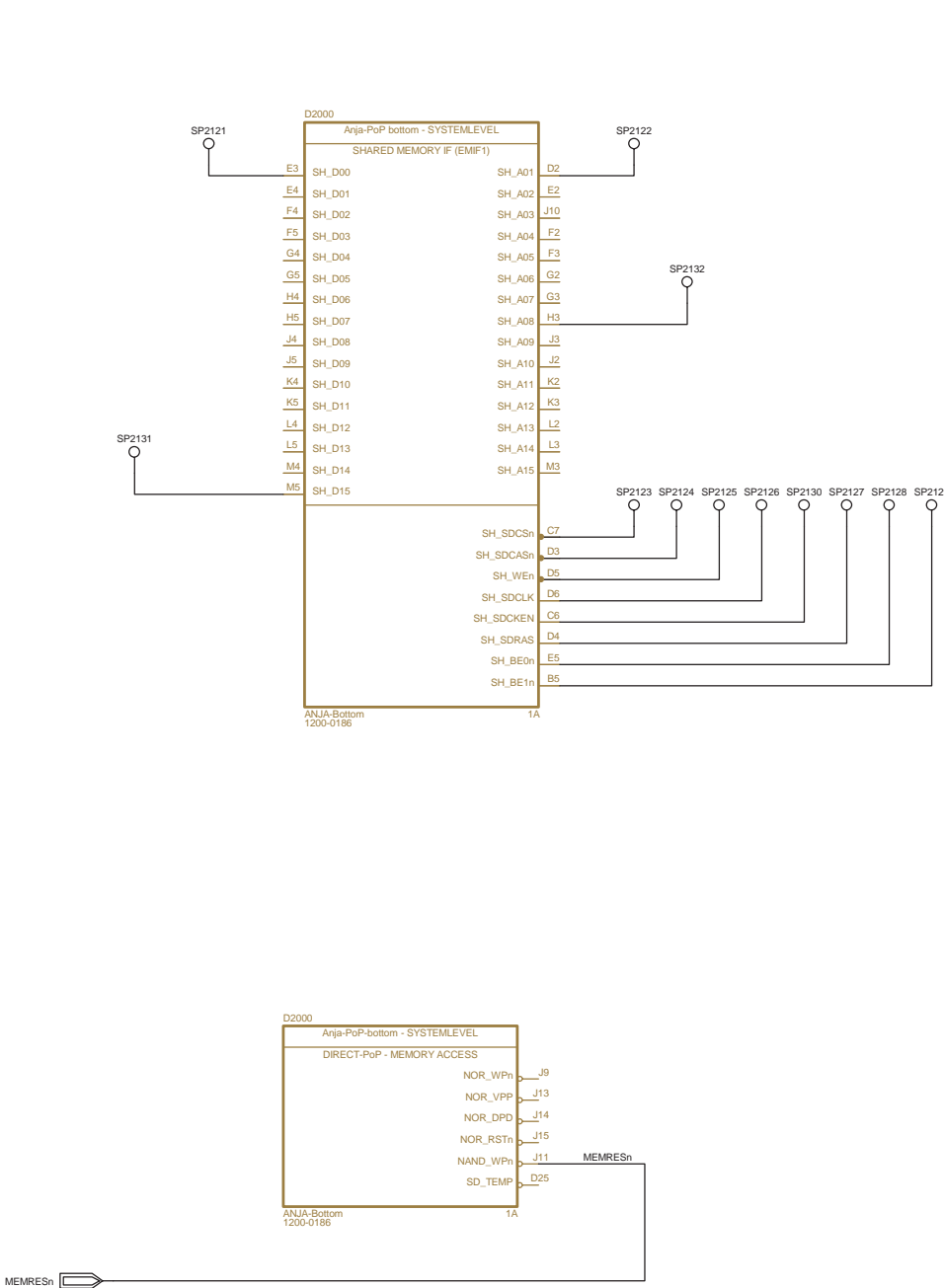




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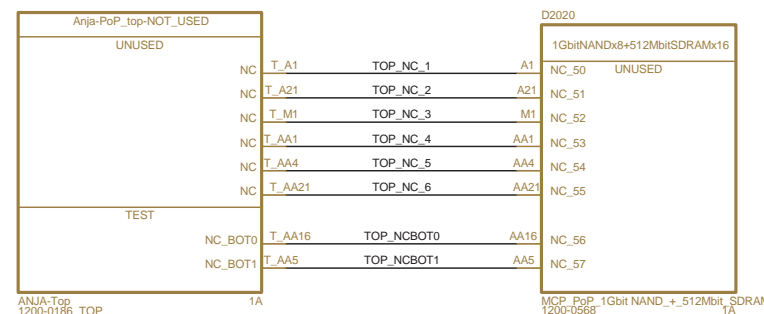
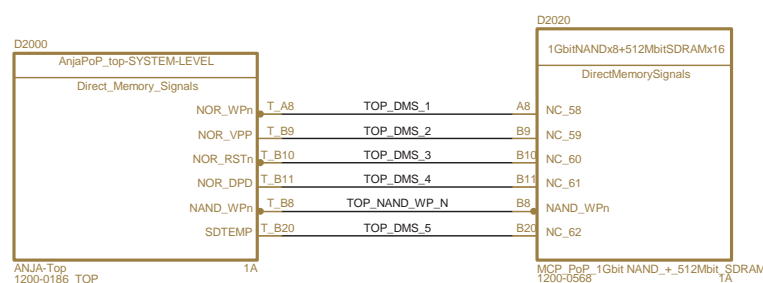
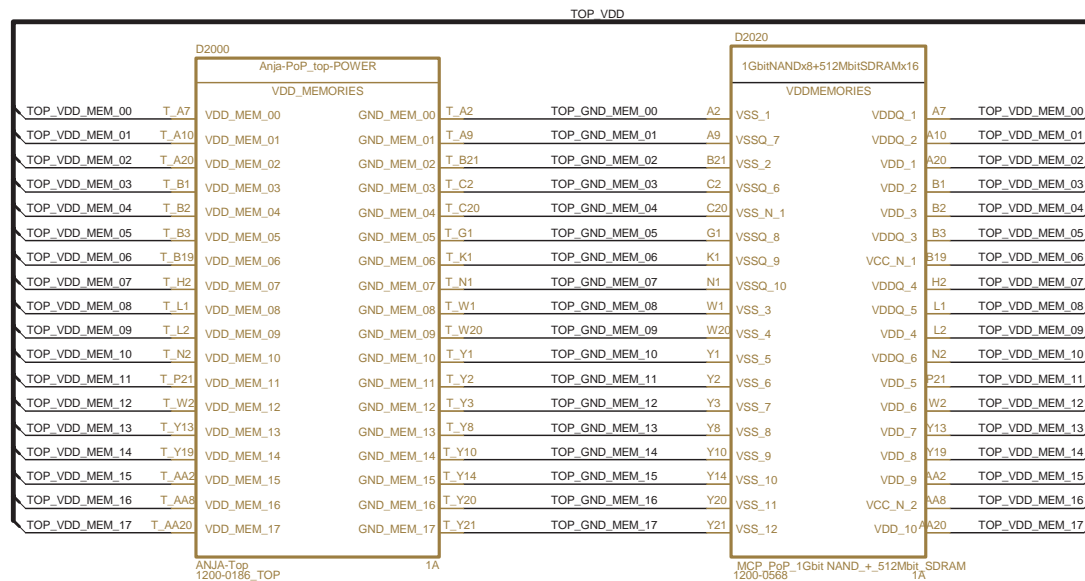
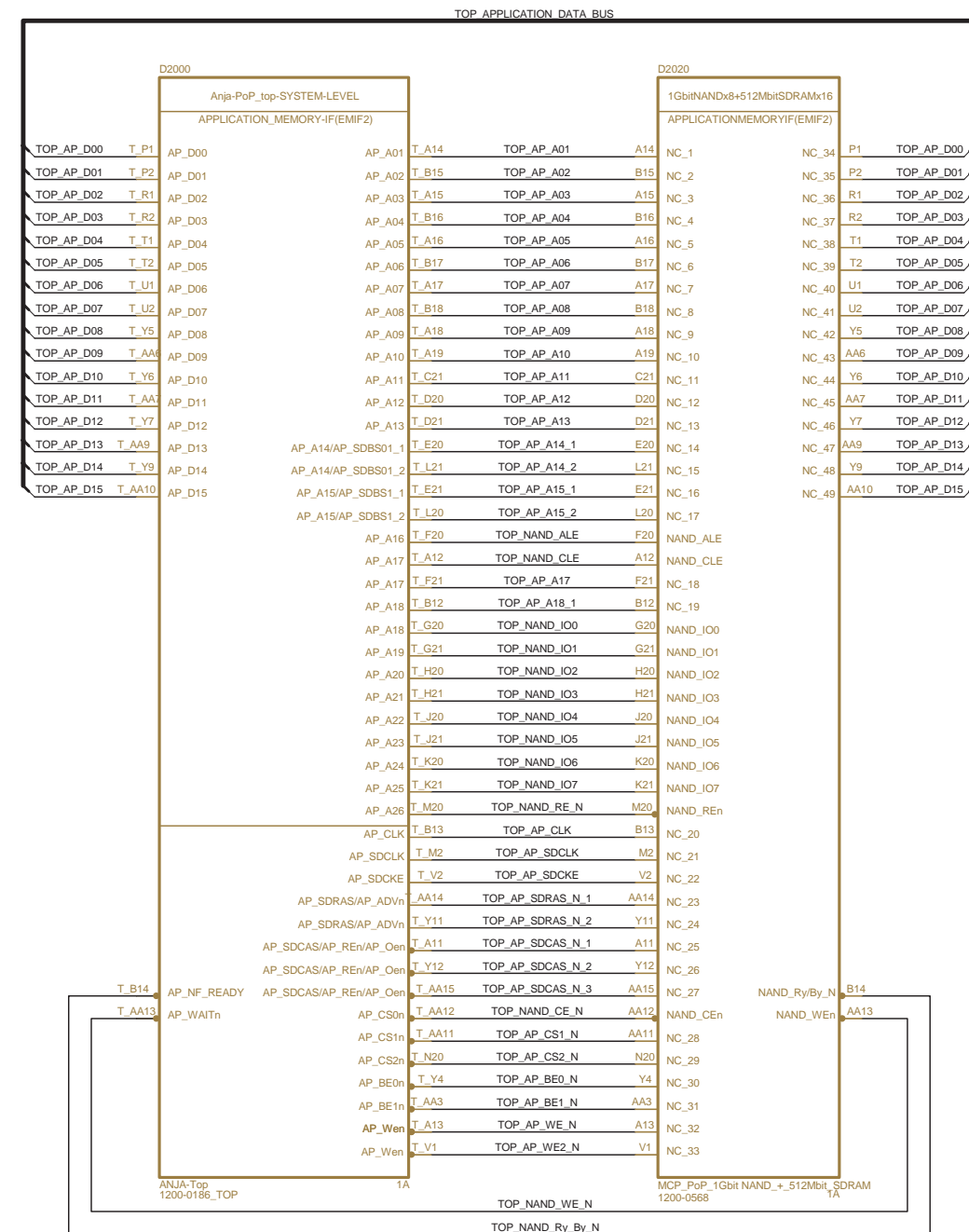
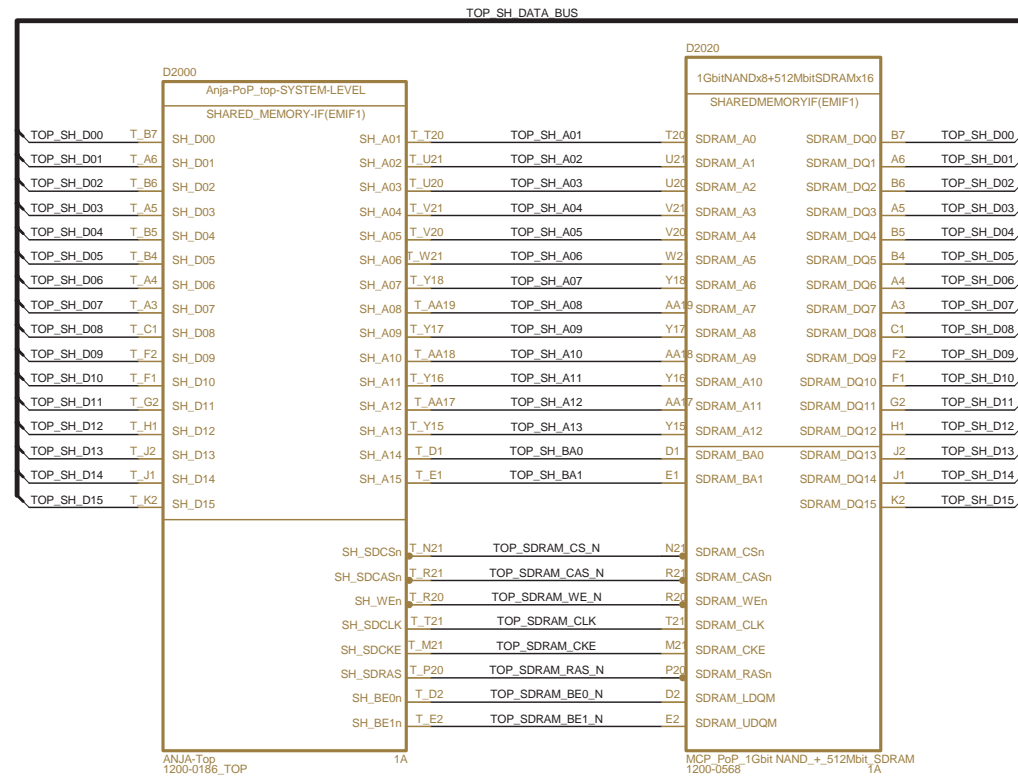


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Application & System Performance System Control - Clocks & Resets	
Document Nr	Revision
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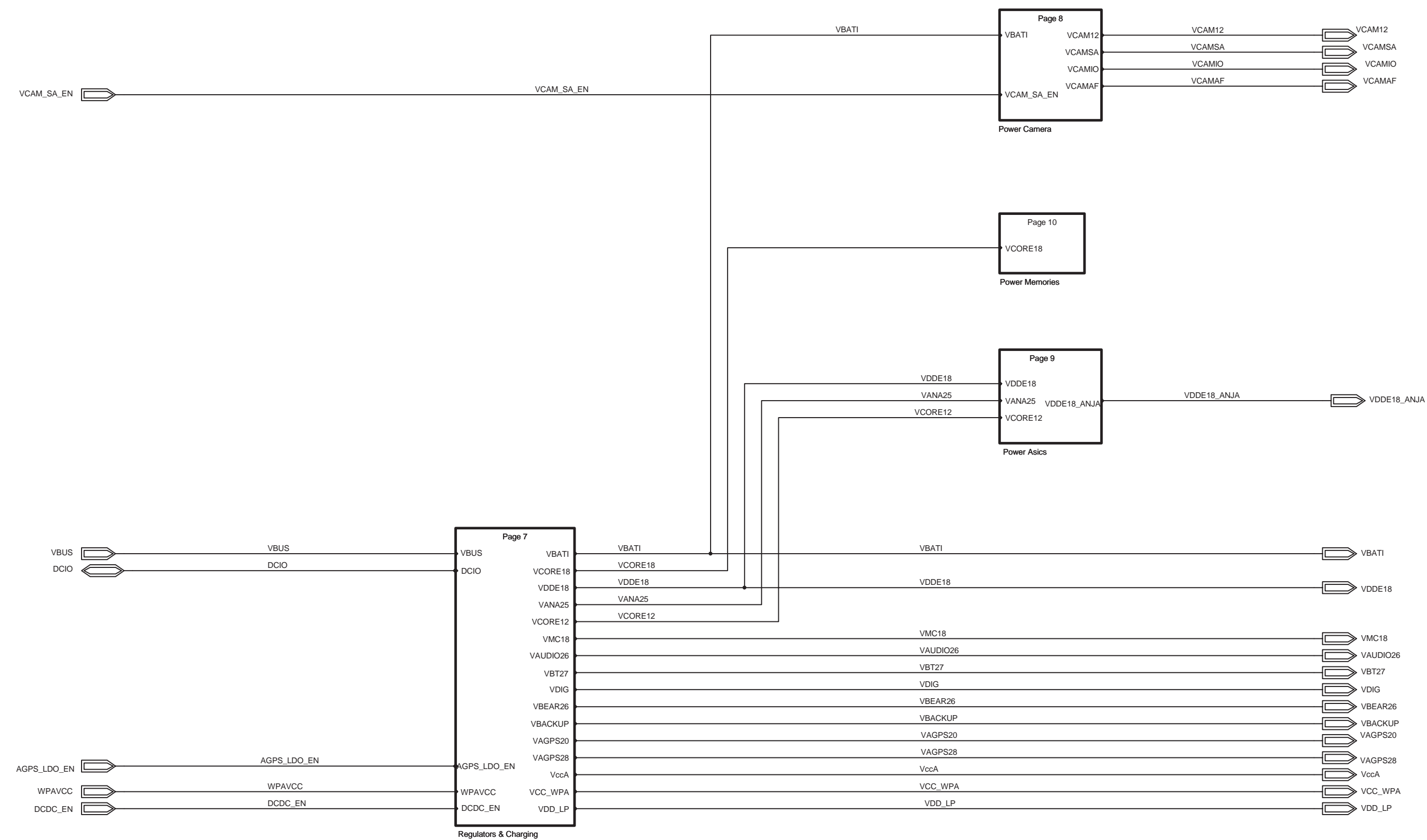


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Document Nr	Revision
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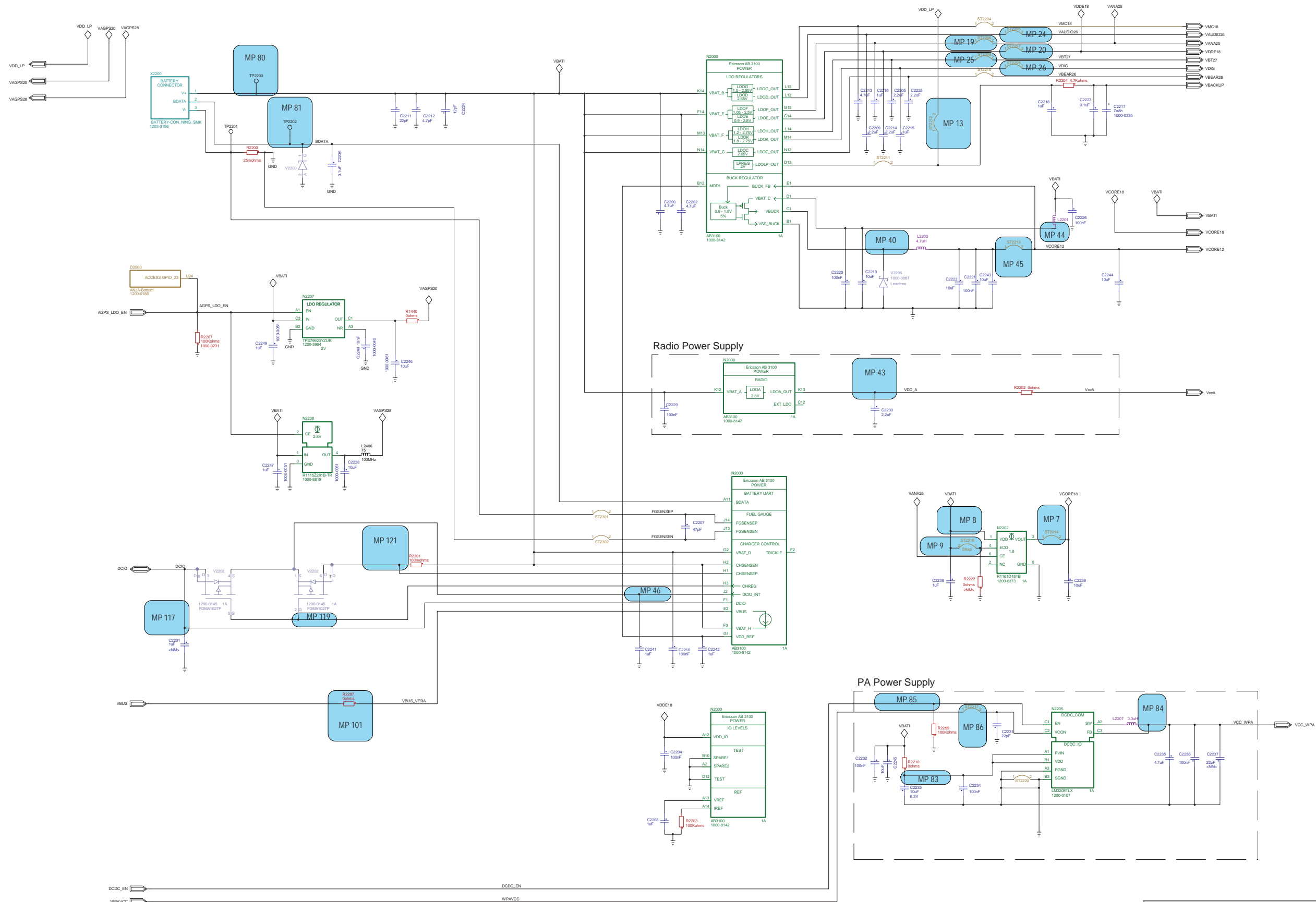
Interface between Anja PoP top and PoP-mounted memories



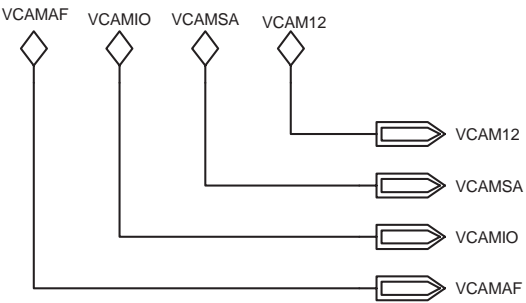
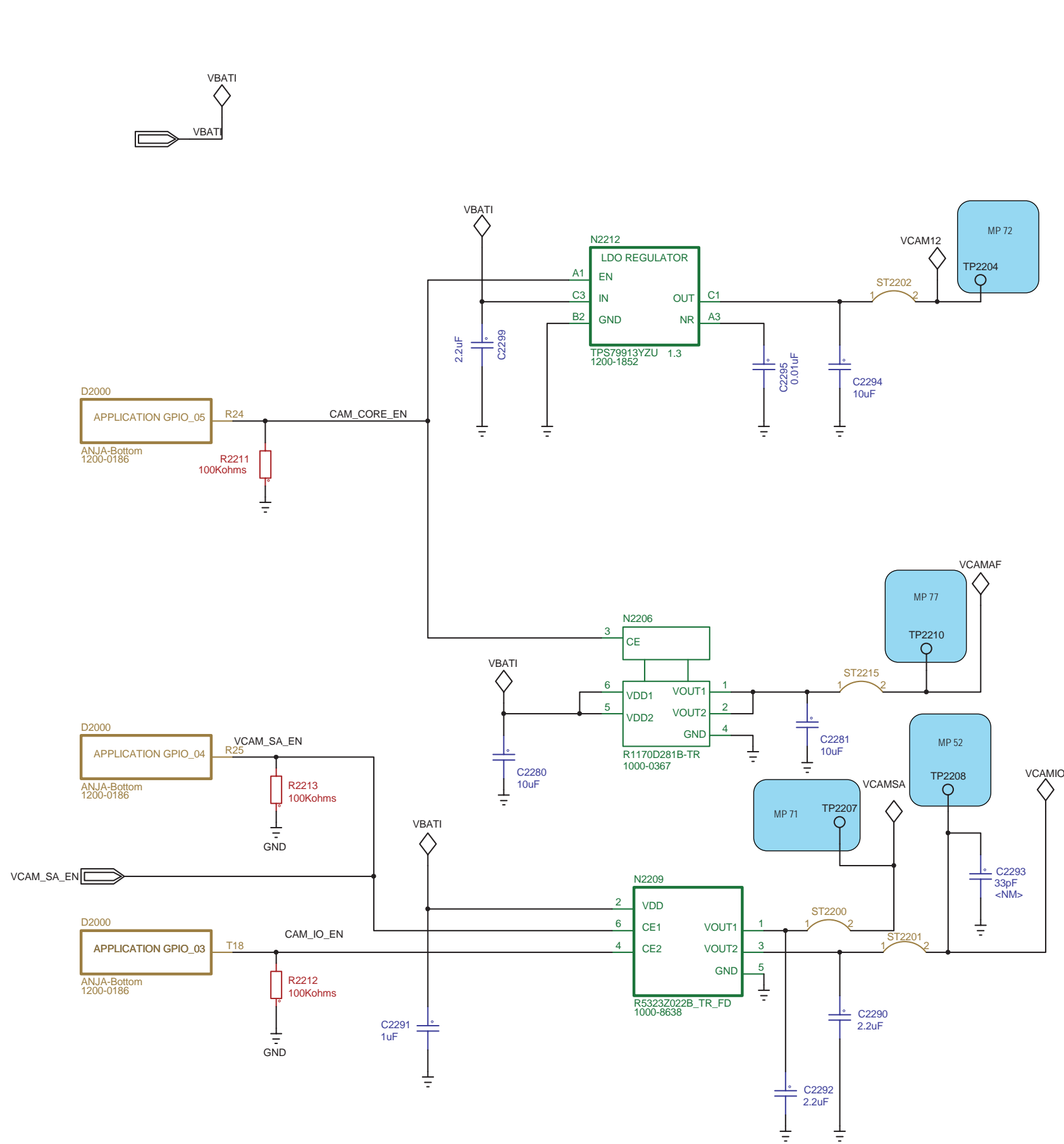
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1202-6029 Page B6	2

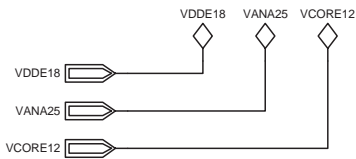
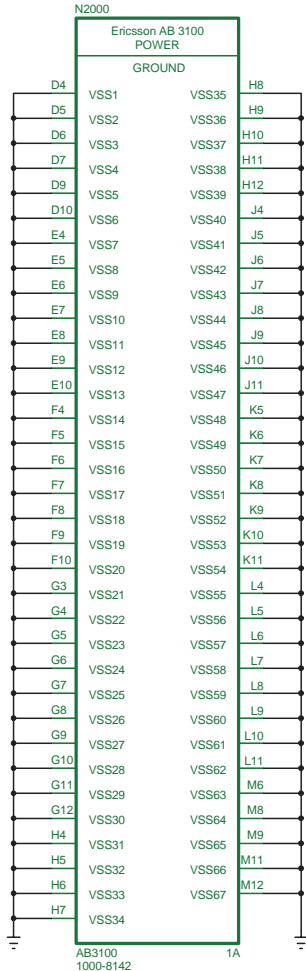
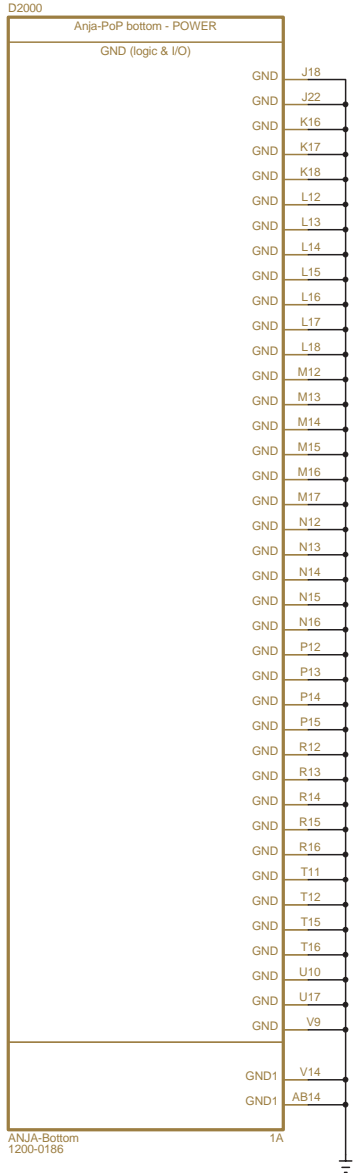
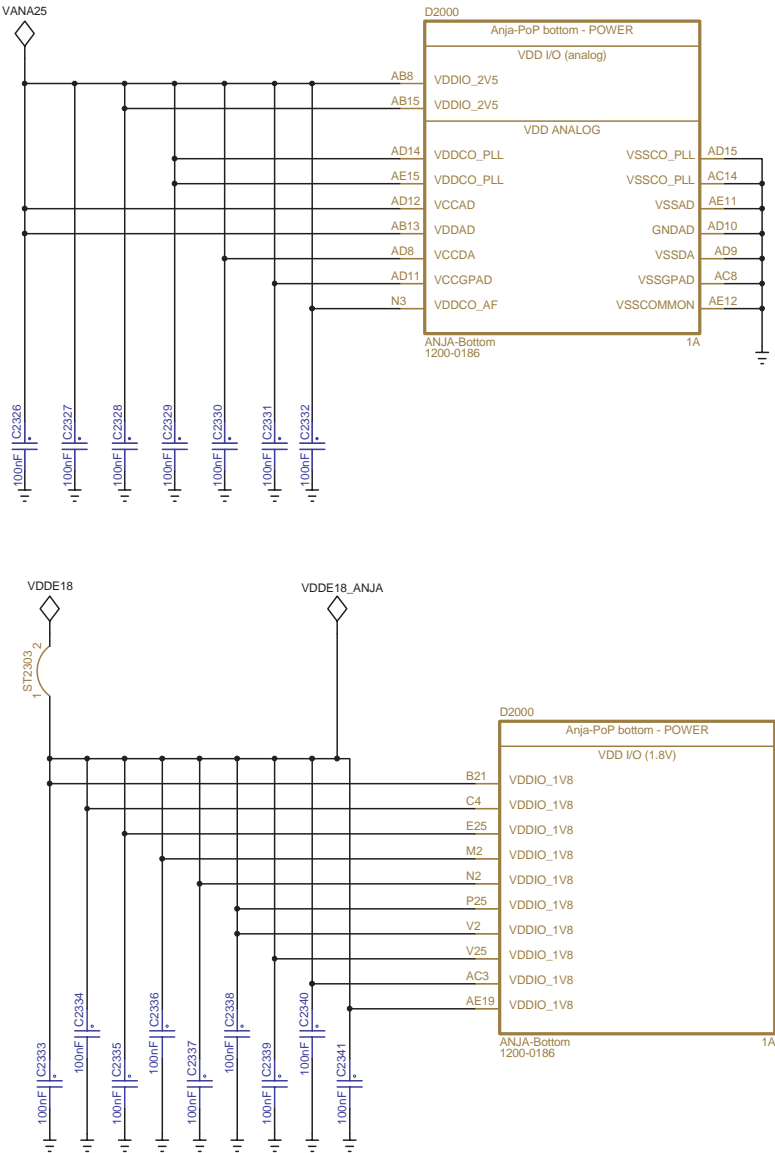
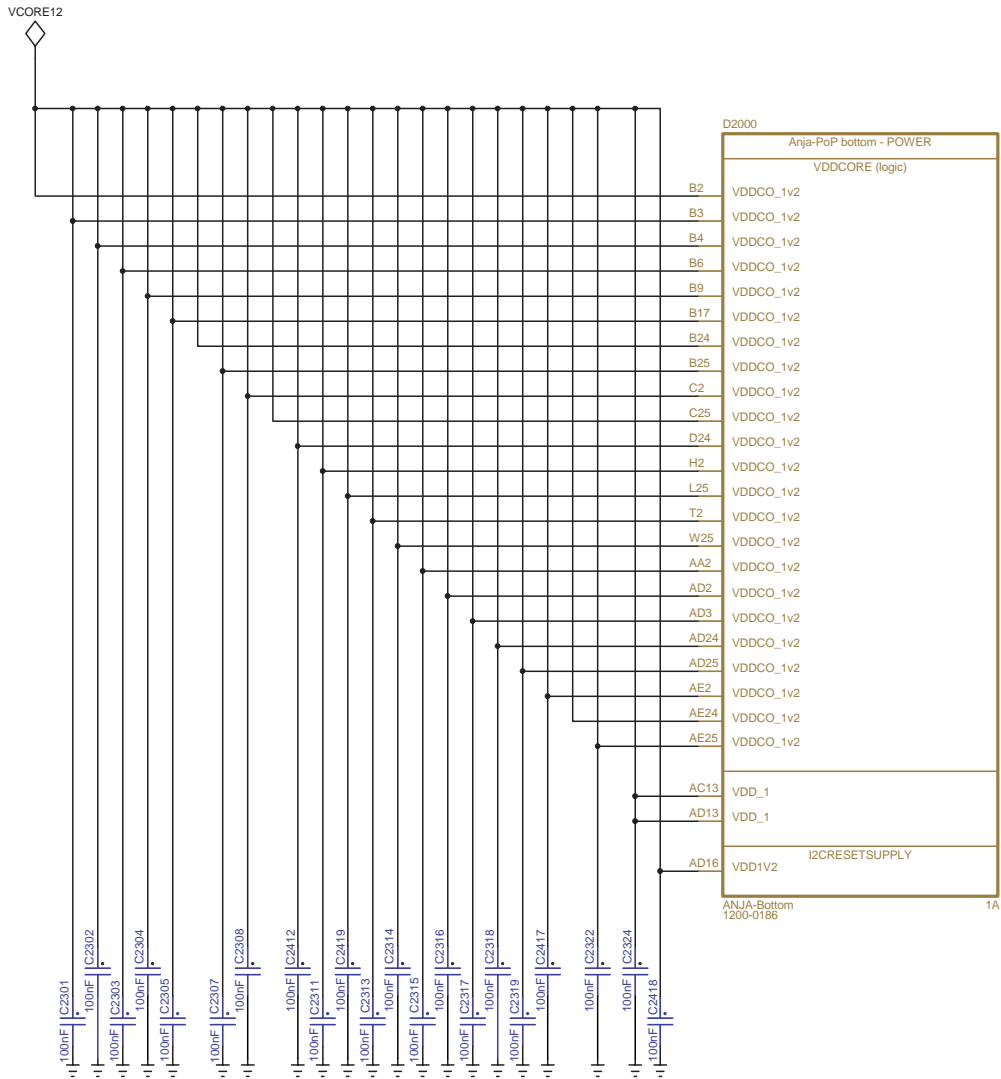


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Document Nr	Revision
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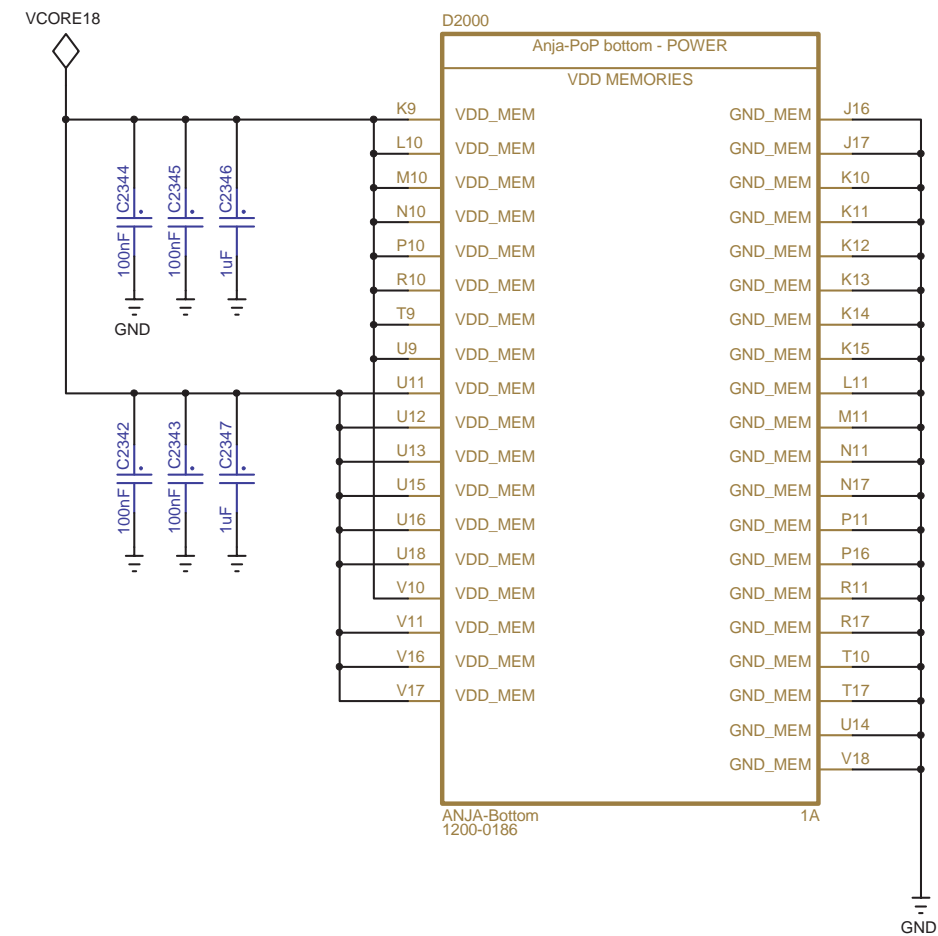


Maximum current
VCAMSA = 76mA
VCAMIO = 25mA
VCAMAF = 190mA
VCAM12 = 180mA

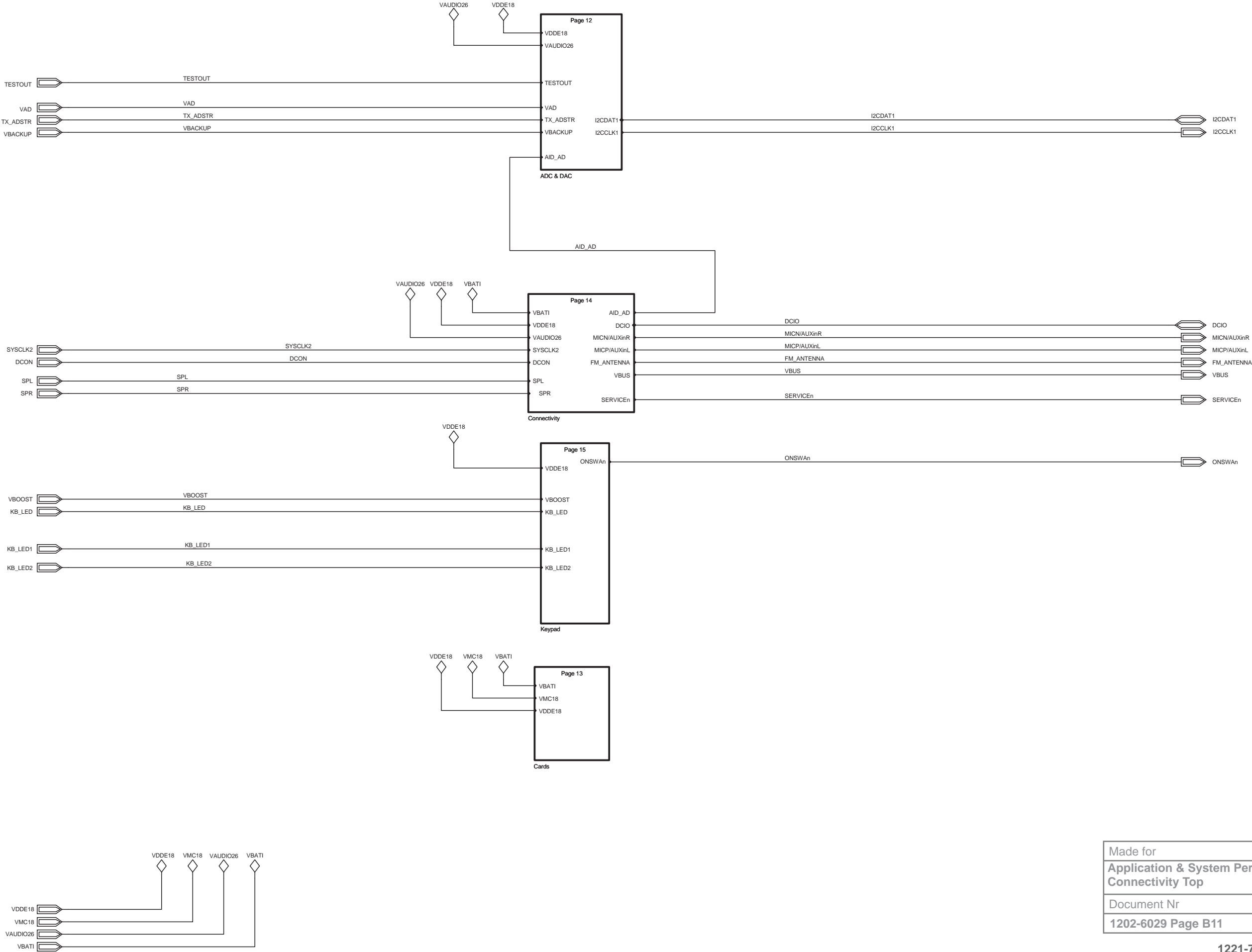
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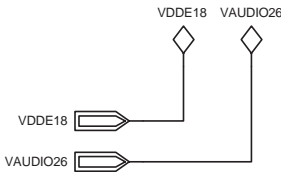
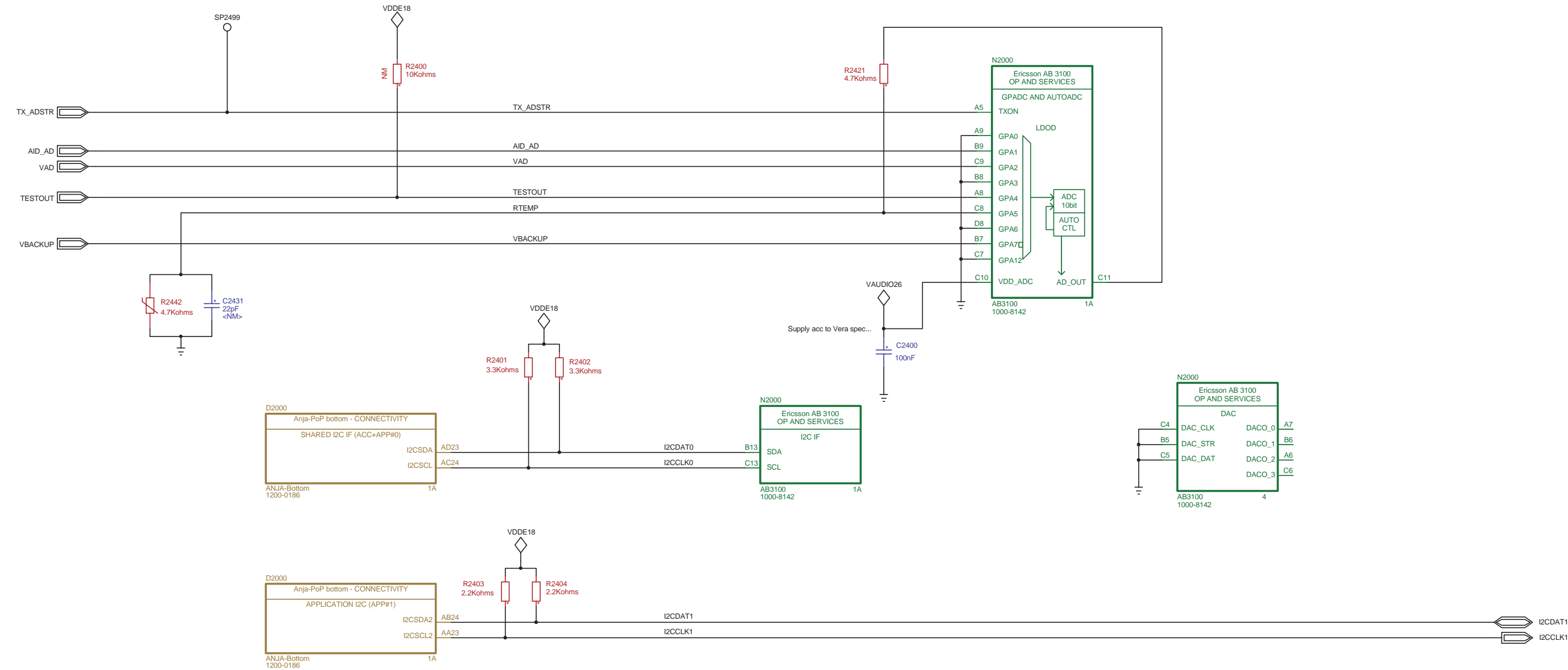
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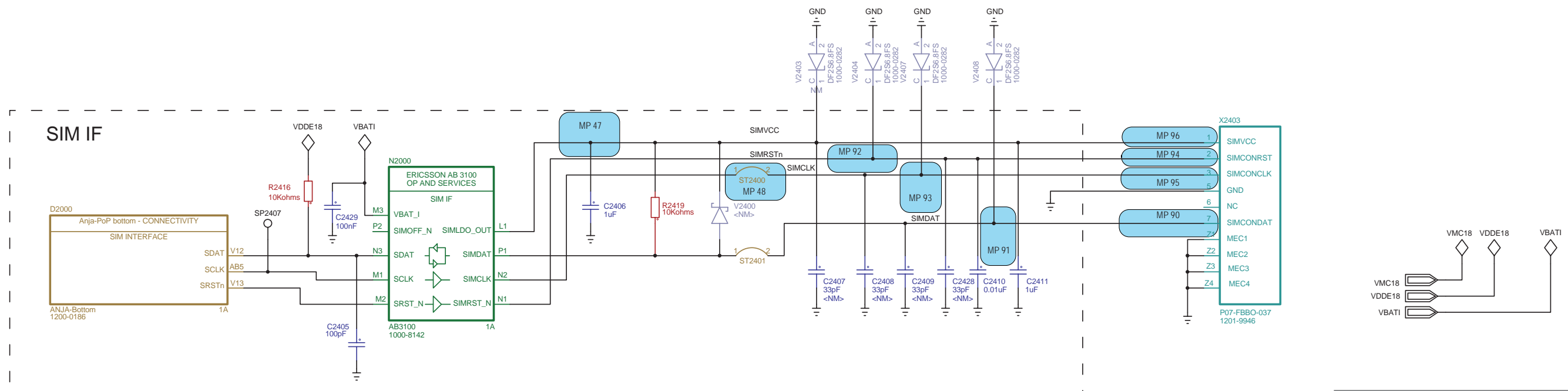
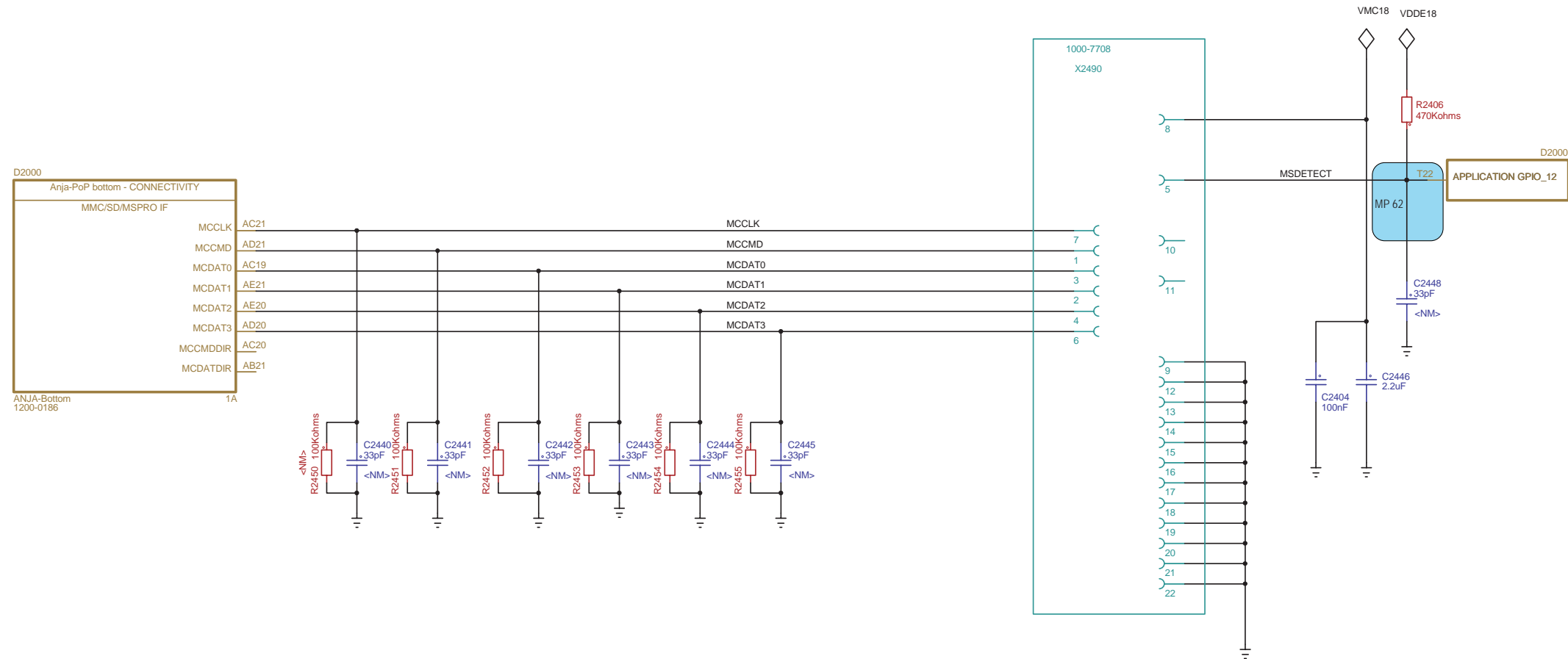
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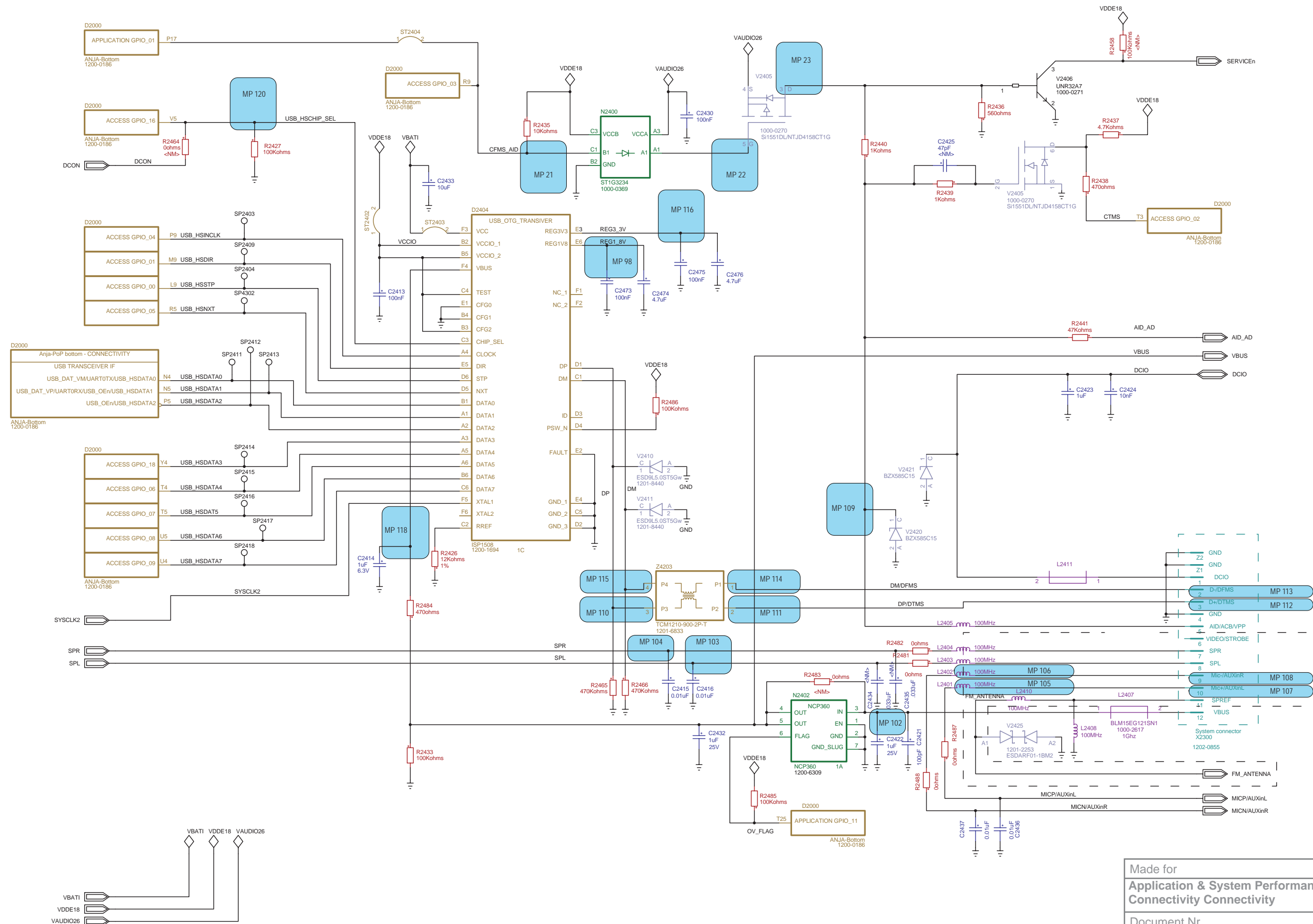
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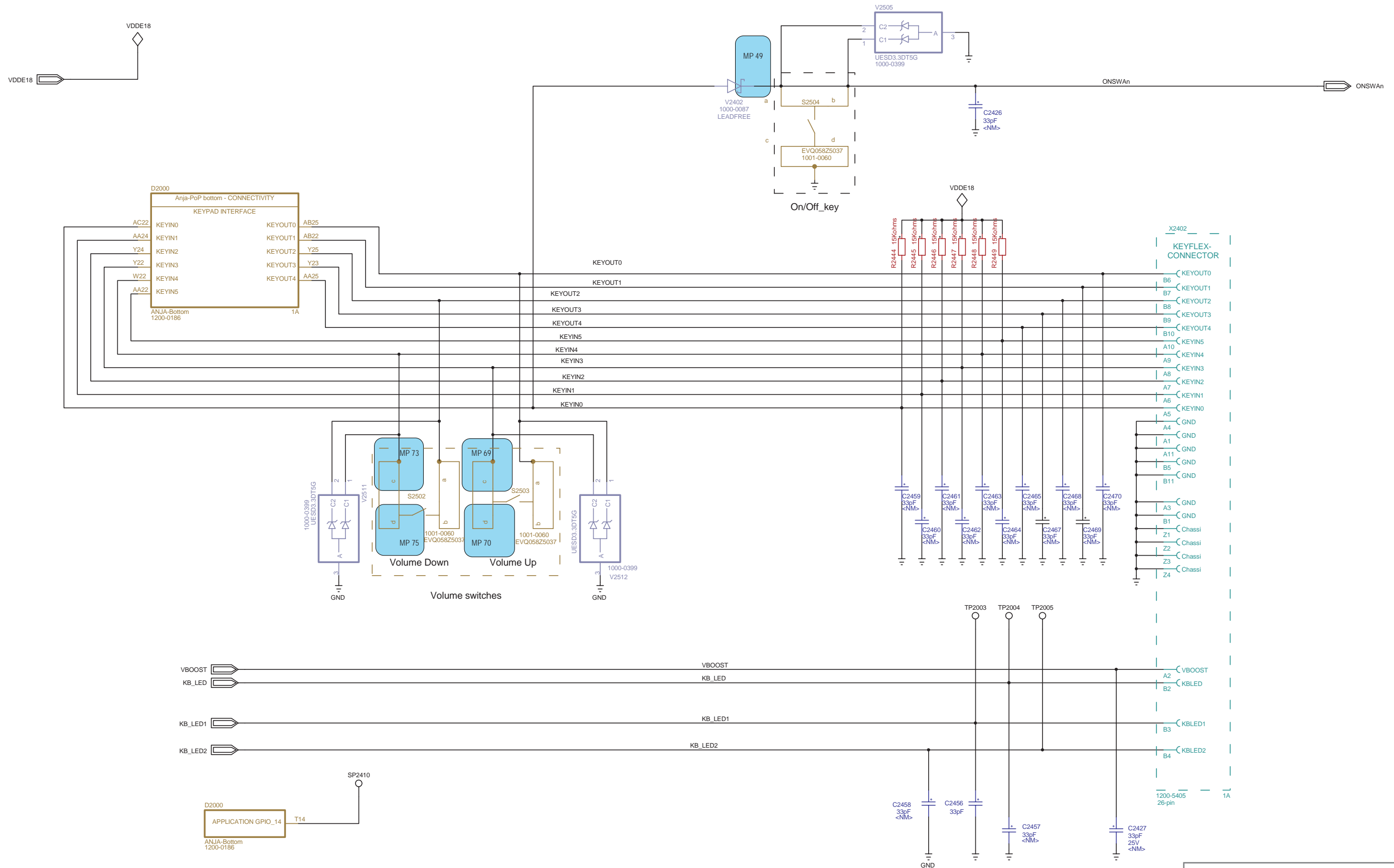
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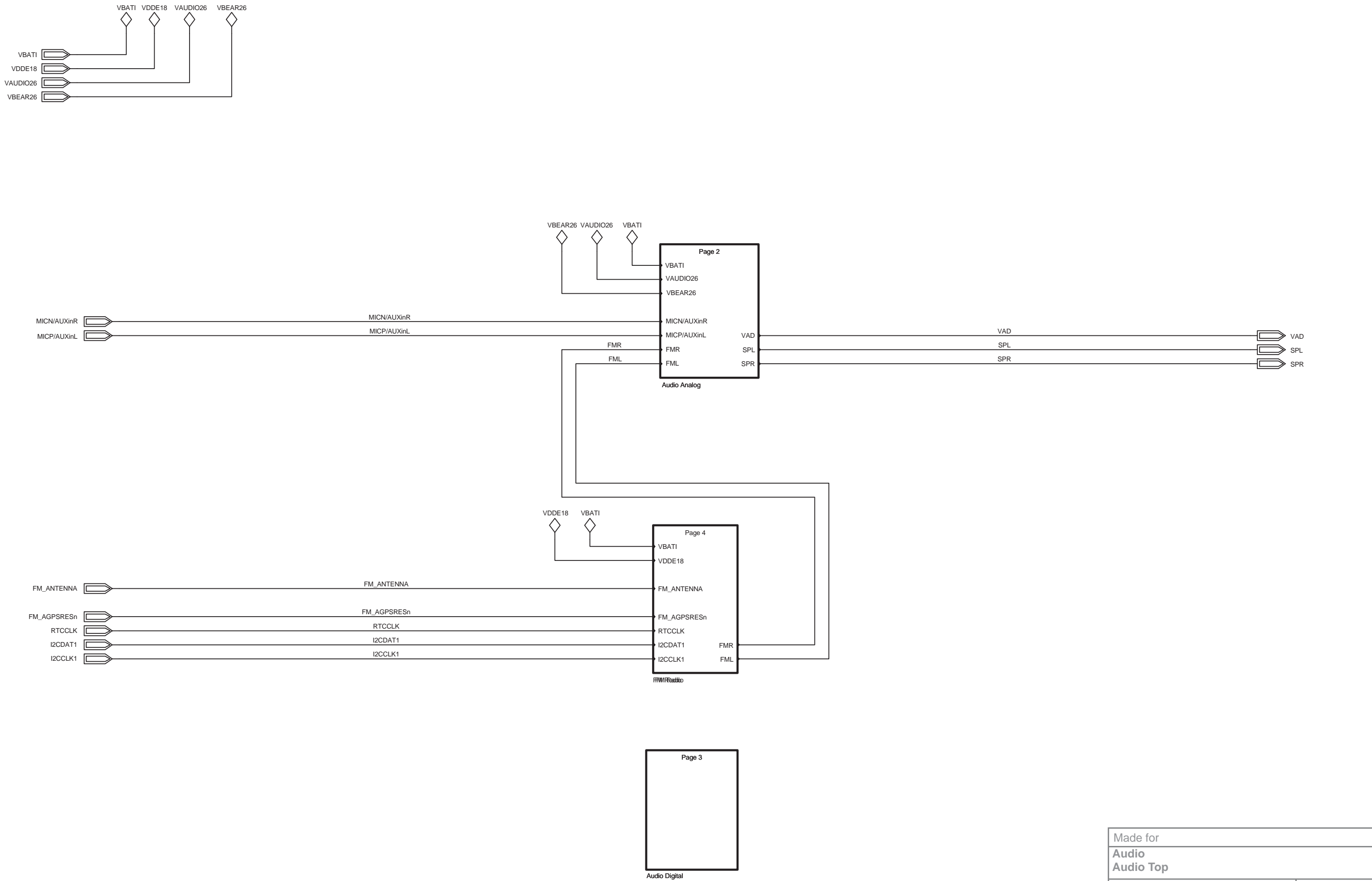
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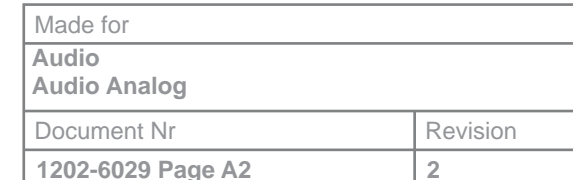
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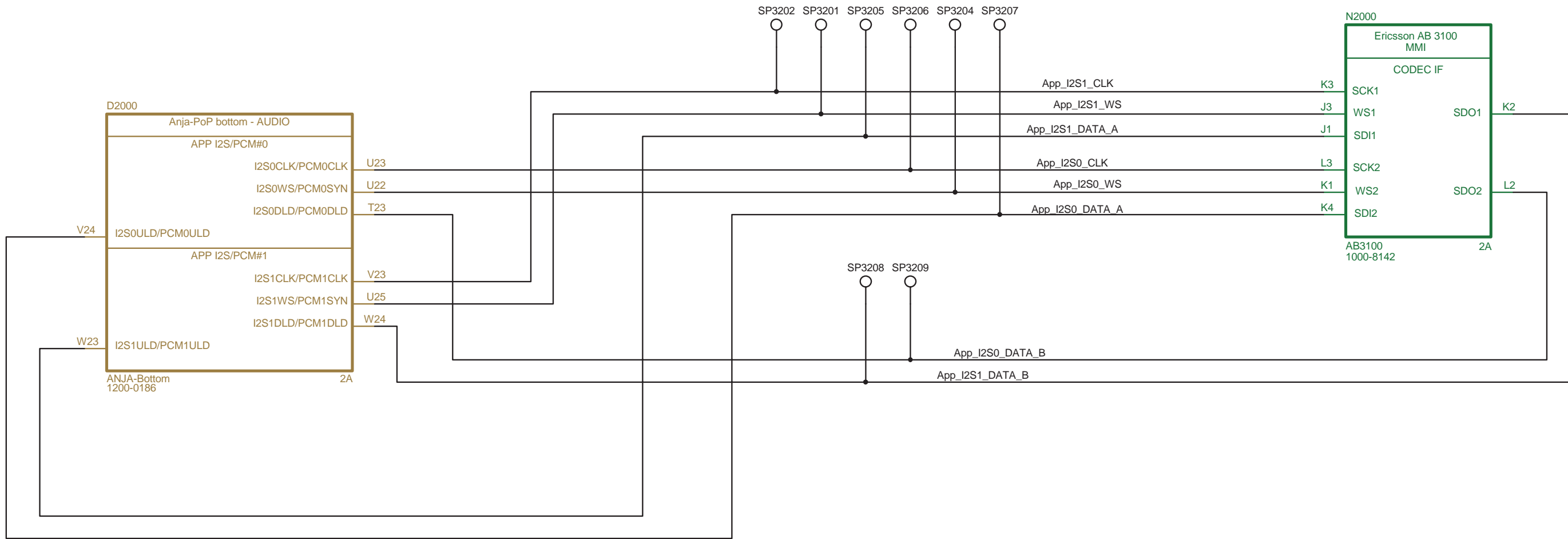


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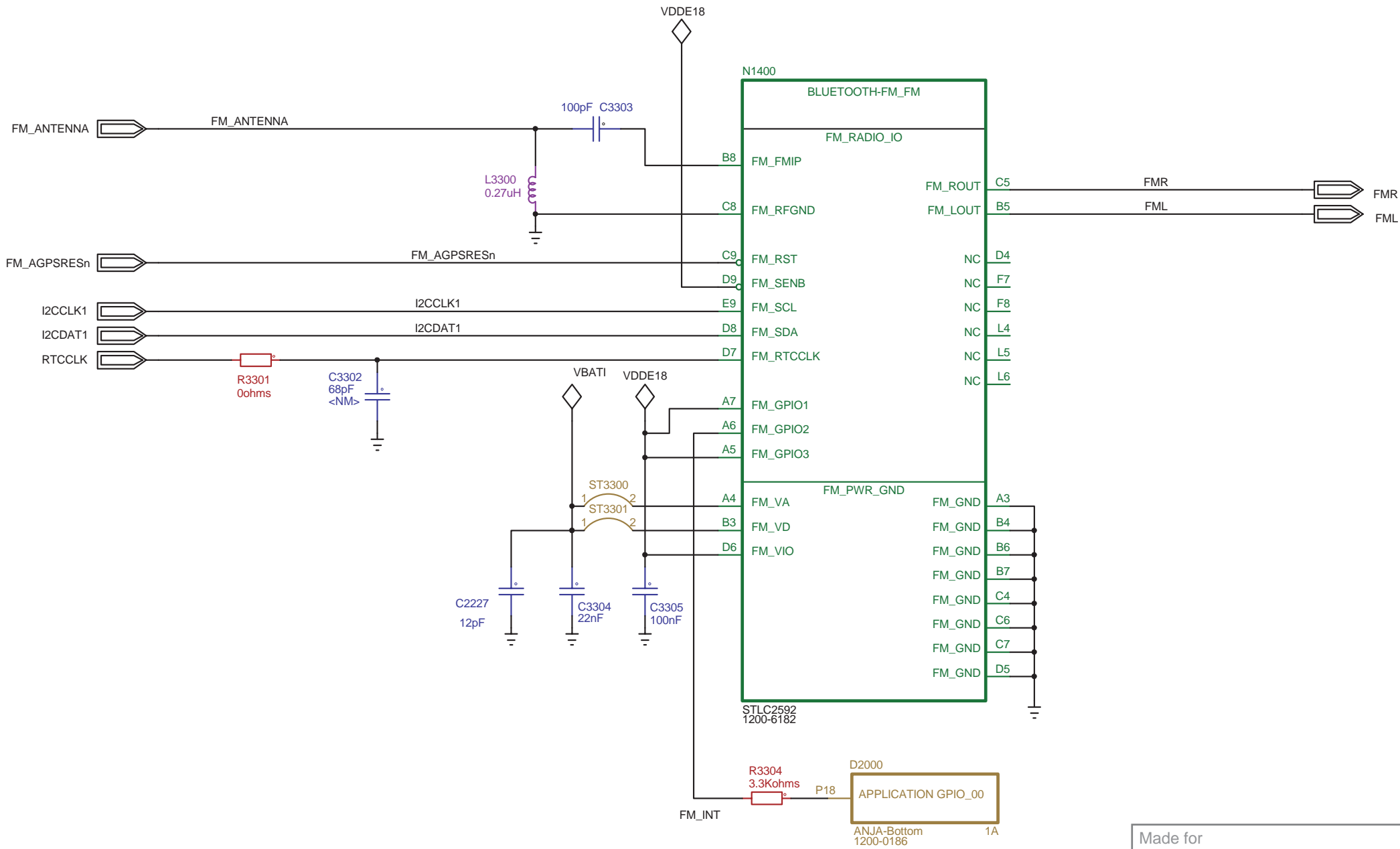
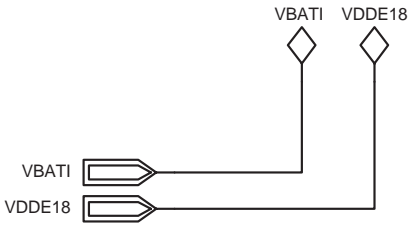


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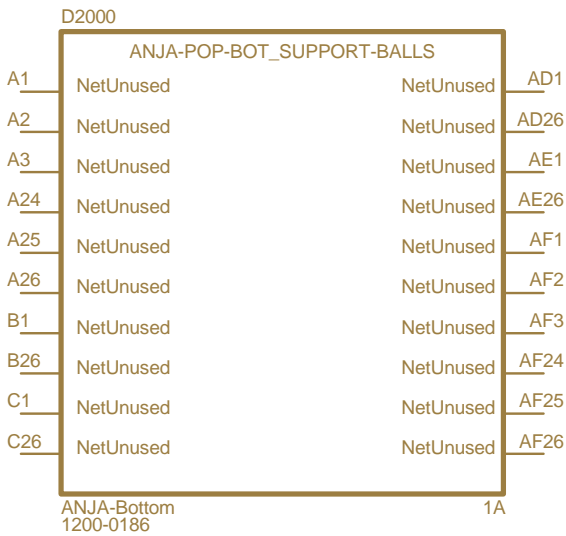
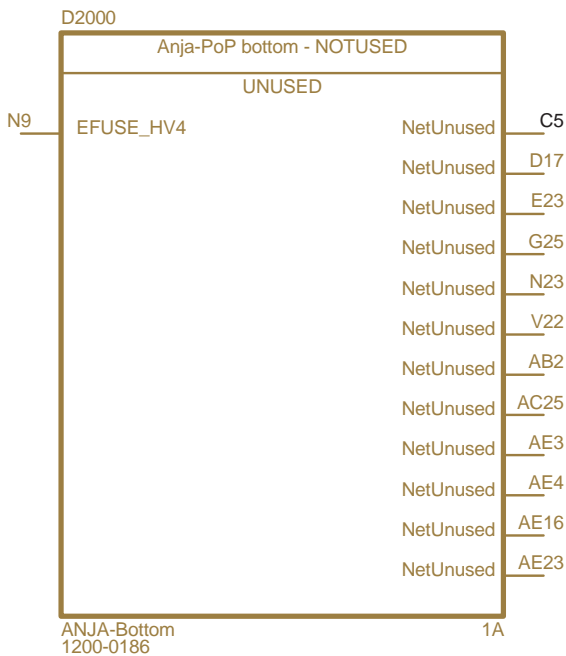
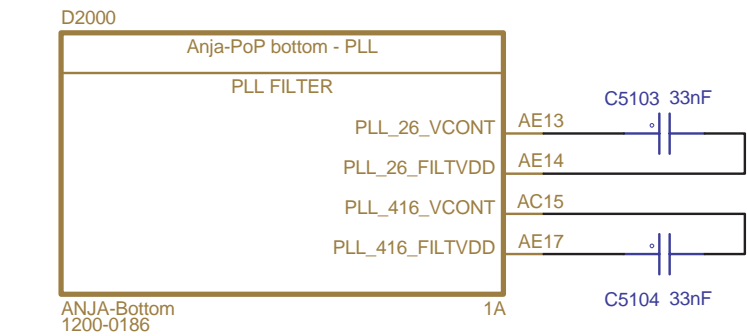
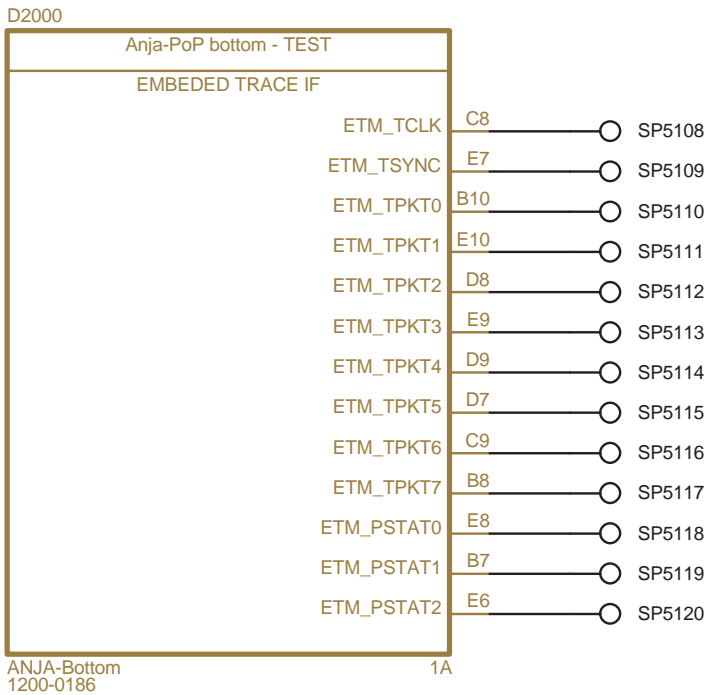
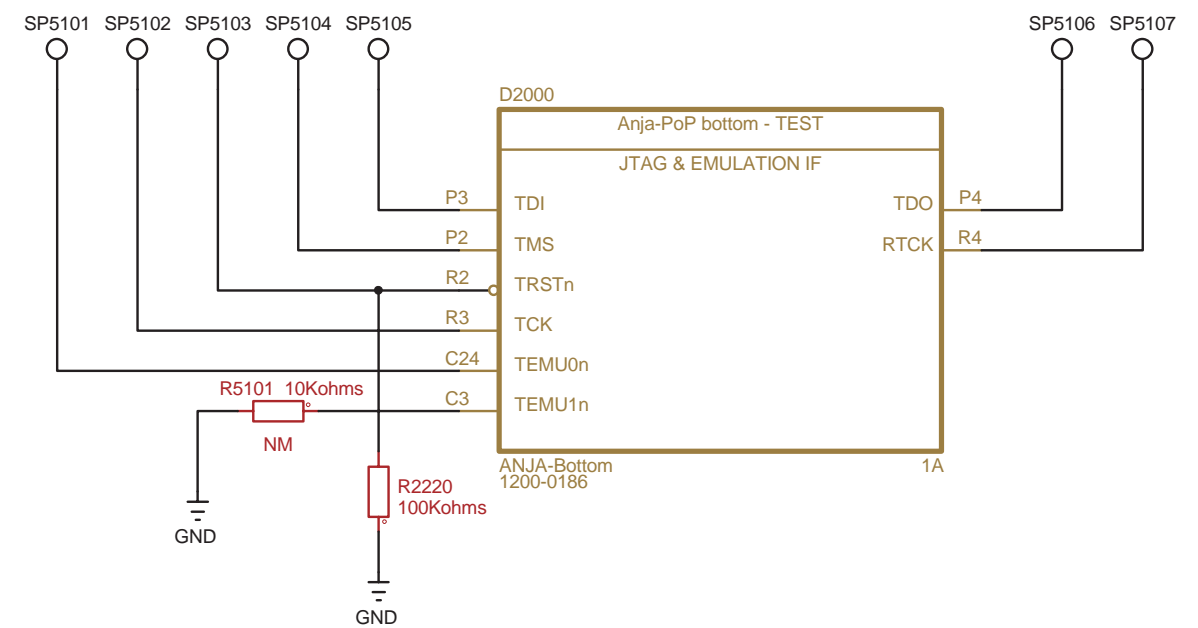




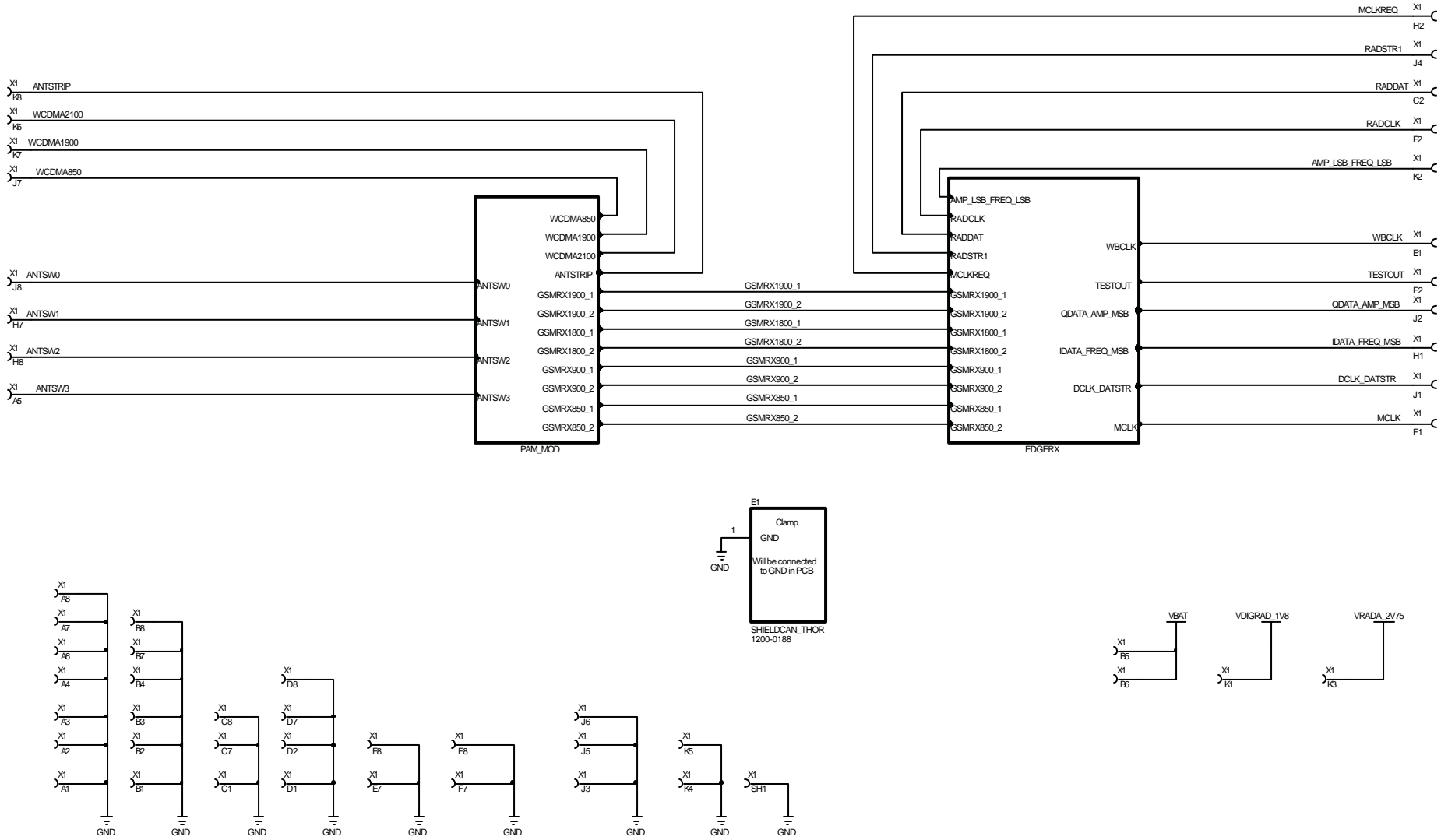
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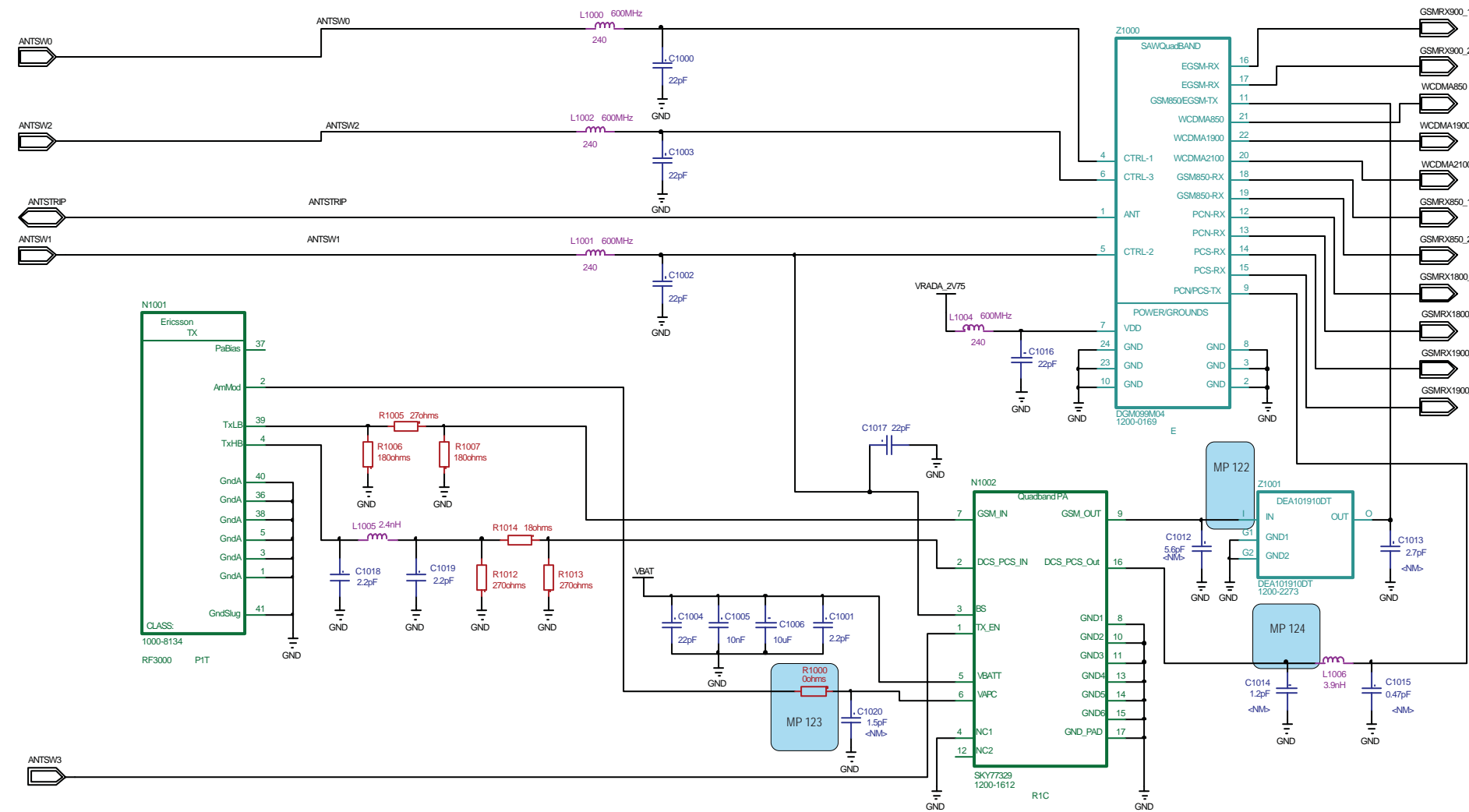
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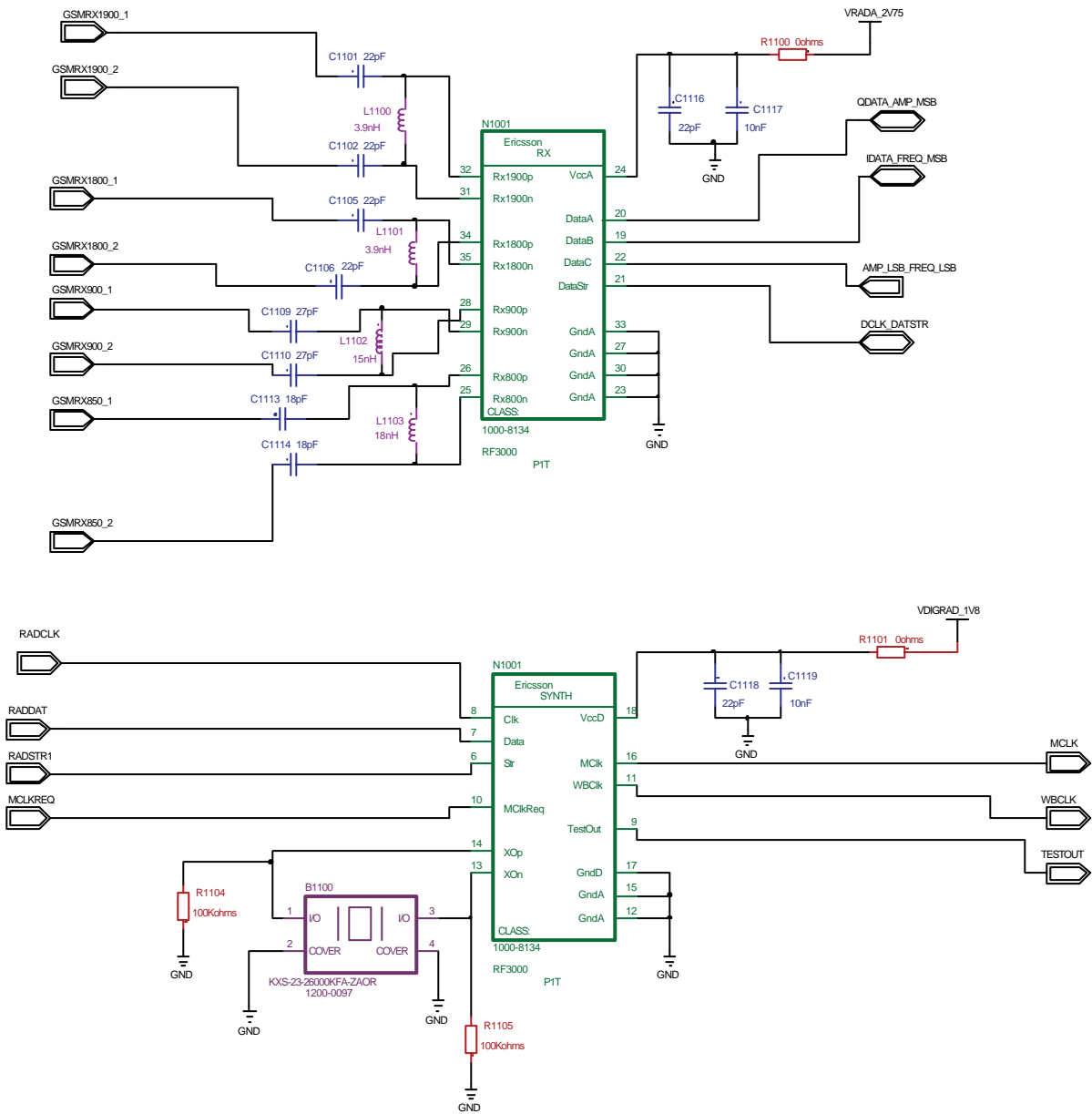
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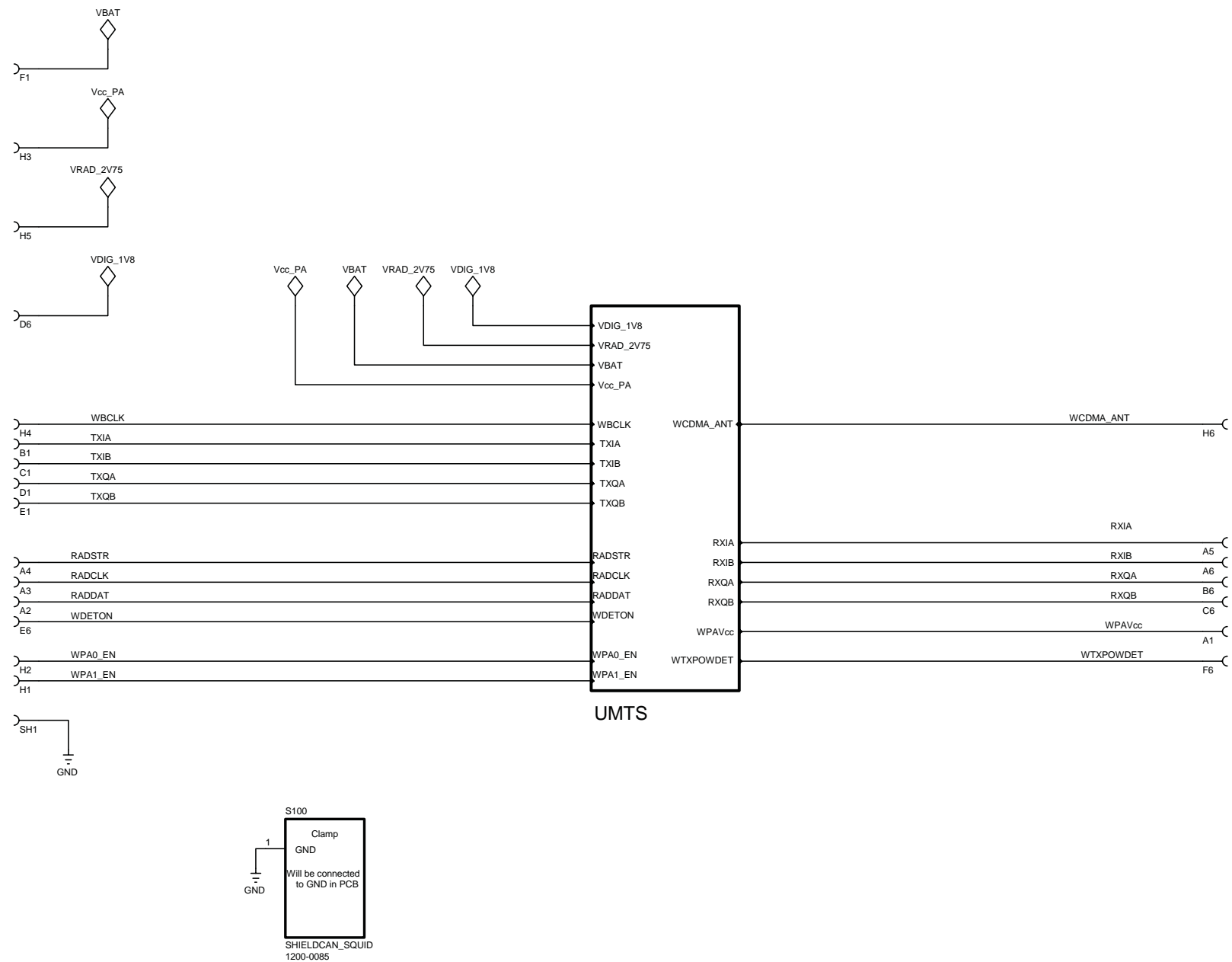
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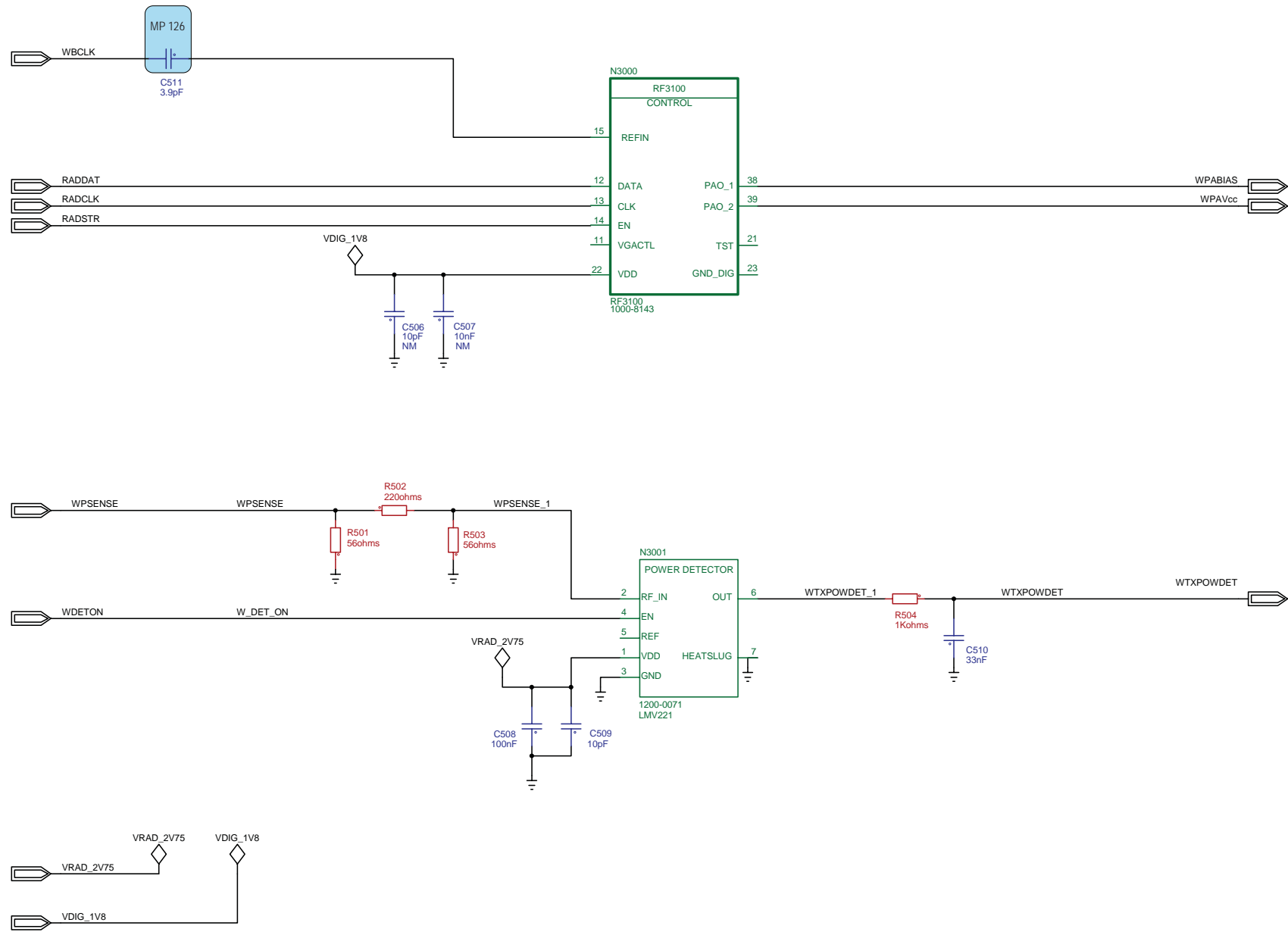
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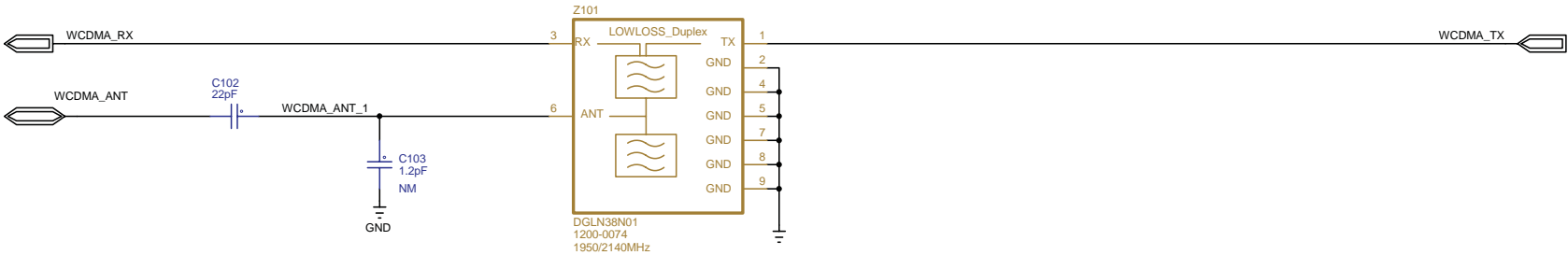
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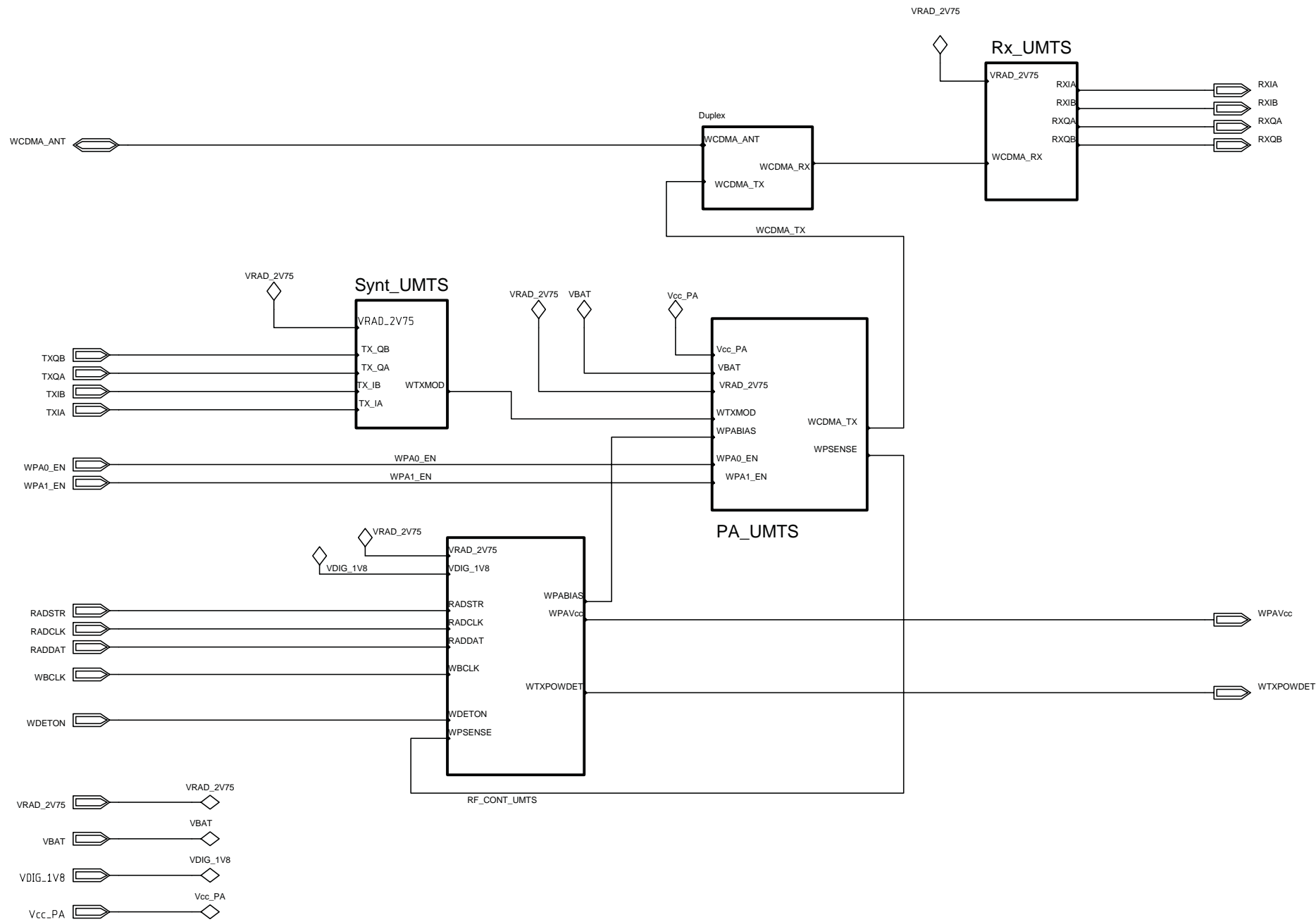
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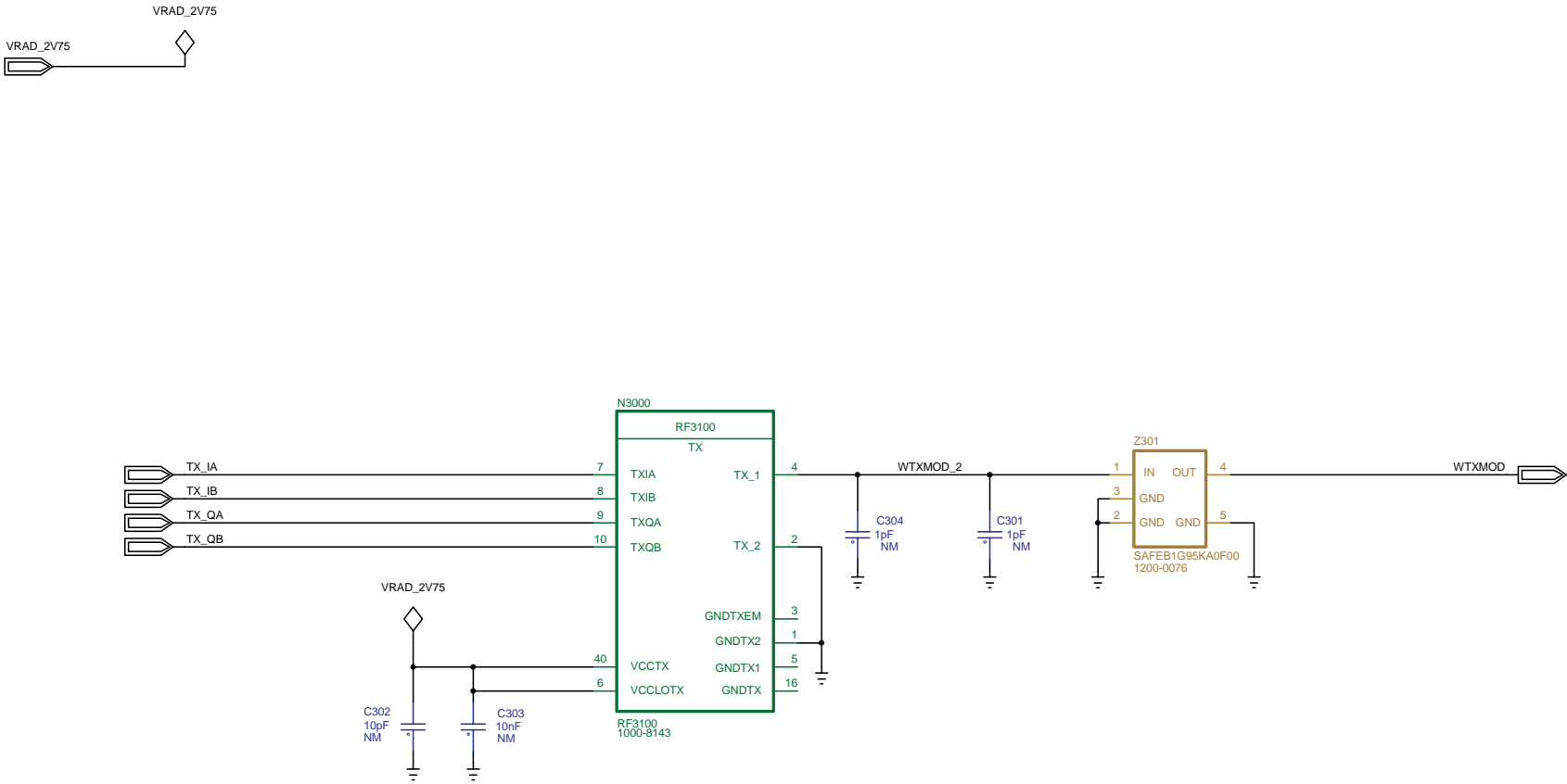


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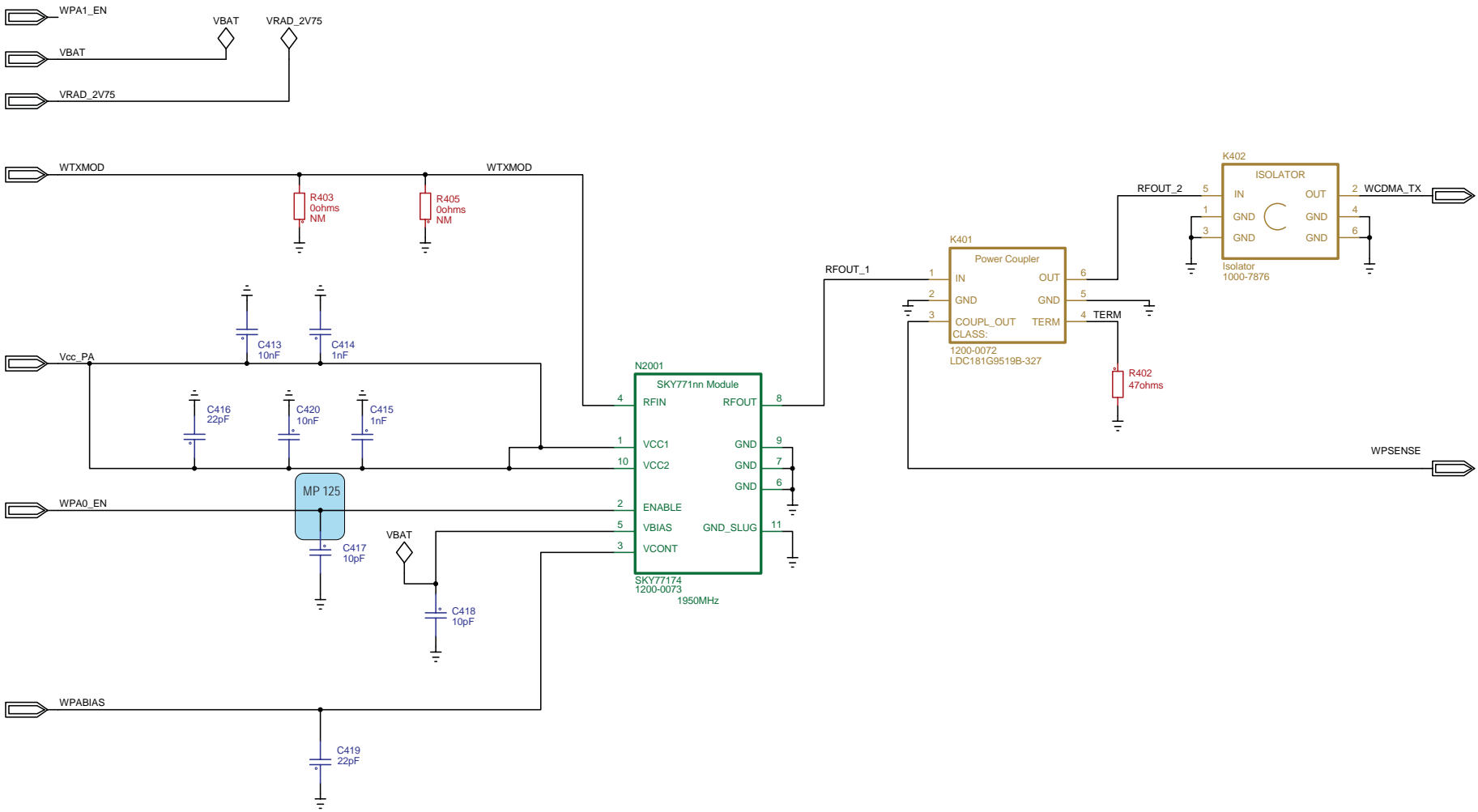


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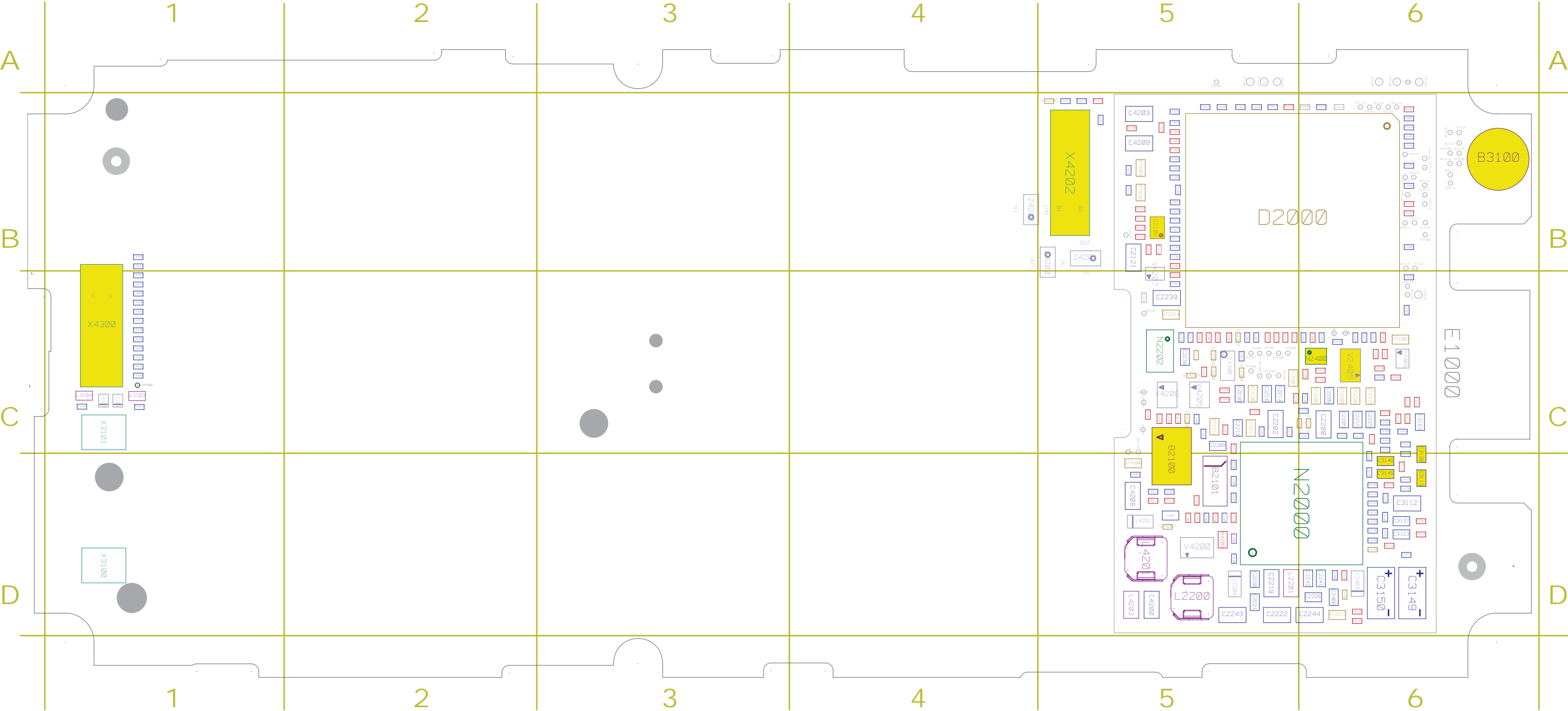
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1200-0064 Page 6	6



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C2215	1000-0051	C6	C2302	1000-0048	B6	C2328	1000-0048	B5	C2417	1000-0048	B5	C3140	1000-0056	D6	C4213	1000-0048	B5	N2000	1202-0639	D6	R2132	1000-0231	B5	R2438	1000-0240	C6	R3138	1000-0172	C6	V4205	1200-0320	C5			
C2216	1000-0051	C5	C2303	1000-0048	B6	C2329	1000-0048	B5	C2418	1000-0048	B5	C3141	1000-0056	C1	C4214	1000-0048	B5	N2202	1200-0373	C5	R2202	1000-0181	C5	R2439	1000-0172	C6	R3304	1000-0243	C6	V4206	1200-0320	C5			

R - Replaceable
See Appendix for
more information.



R - Replaceable
See Appendix for
more information.

C702 Overview



General Information

Screen: 262,144 color TFT
Resolution: 240 x 320 pixels
Size: 2.2 inches

Phone memory: Up to 150 MB
Memory Stick Micro™ (M2™) support

Talk time GSM: Up to 6.5 hrs
Standby time GSM: Up to 300 hrs
Talk time UMTS: Up to 2.5 hrs
Standby time UMTS: Up to 300 hrs

Camera

3.2 megapixel camera, Auto focus, 2x digital zoom, Photo fix, Photo light, Video recording, Picture blogging,

Music

Media player, Mega Bass™, Music tones (MP3/AAC), PlayNow™, TrackID™

Internet

Access NetFront™, Web browser, RSS feeds

Communication

Polyphonic ring tones, Speakerphone, Vibrating alert, Video calling

Messaging

Email, Instant messaging, Picture messaging (MMS), Predictive text input, Sound recorder
Text messaging (SMS)

Design

Navigation key, Picture wallpaper, Wallpaper animation

Entertainment

3D games, FM radio, Java, Media, Video streaming, Video viewing

Organizer

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

Connectivity

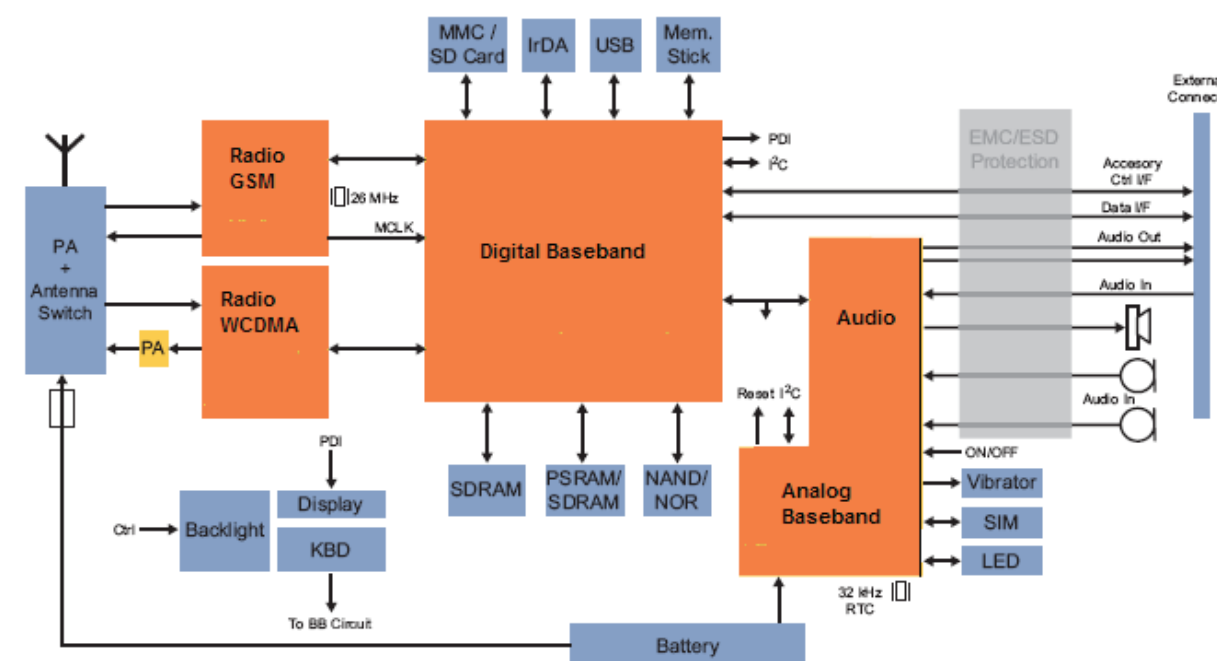
Bluetooth™ technology, Modem, aGPS, PictBridge, Synchronization, USB mass storage, USB support

Networks

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

Hardware Overview

The C702 using U360 2.0 platform provided by Ericsson Mobile Platform (EMP)



Baseband Part

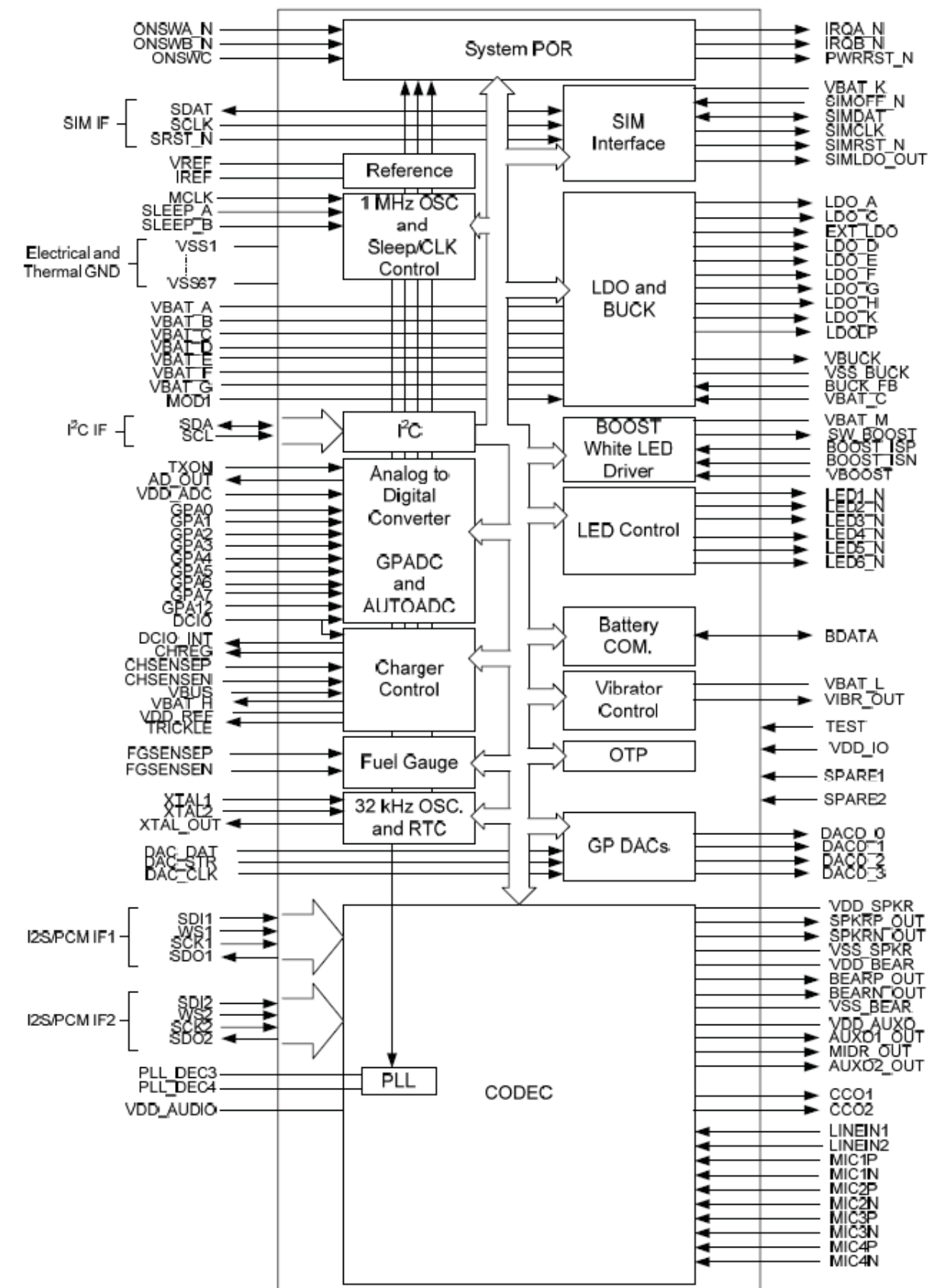
Analog Baseband Controller Power Management N2000 (Vera)

This component is not replaceable on SL 4 because Baseband calibration is required. The analog baseband controller is a mixed digital and analog device that supports the following circuitry:

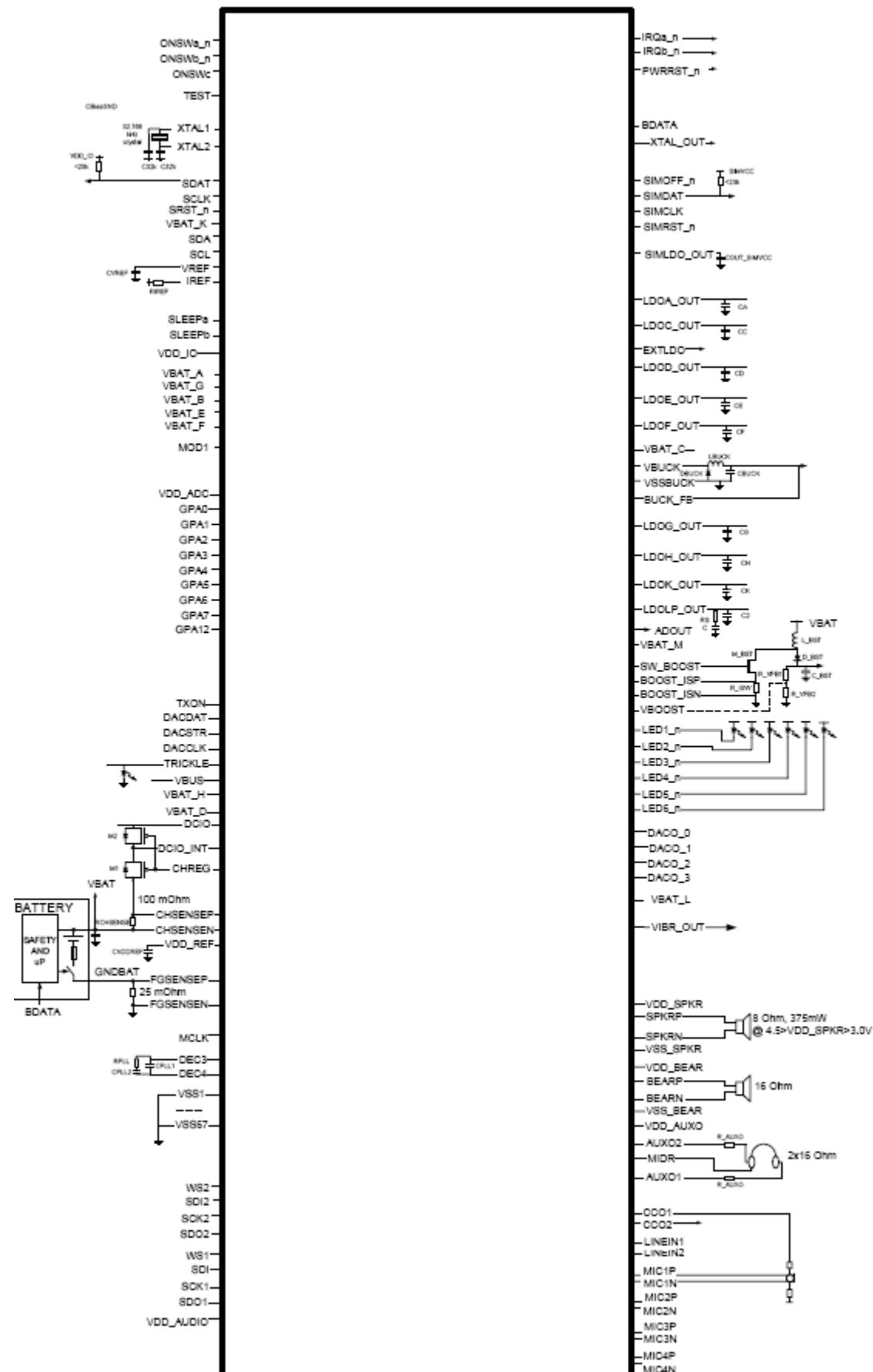
- Power management circuitry
- Voltage regulation circuitry
- Eight Low Dropout (LDO) regulators and low power regulator
- 600 mA integrated Buck regulator
- Boost step-up DC/DC converter for White Light Emitting Diode (WLED) driving
- Battery charging and communication circuitry
- Battery fuel gauging circuitry
- Analog-to-Digital Converter (ADC)
- SIM interface
- Six programmable LED drivers
- Accurate band gap reference
- Vibrator driver
- Real Time Clock (RTC)
- Eight-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.

Functional Blocks of the Analog Baseband Controller:



Connection Diagram:



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

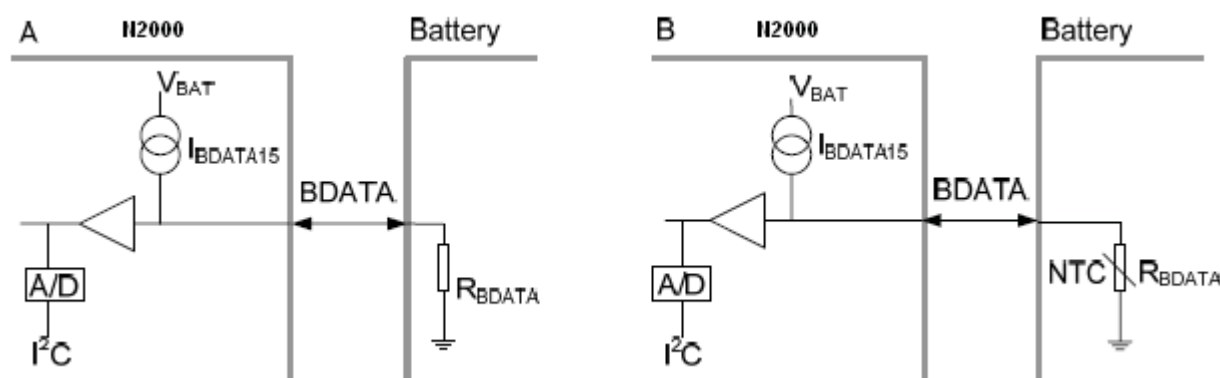
The analog baseband controller contains a standalone USB charger. The USB charger has a separate input and incorporates full functionality during low VBAT.

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.

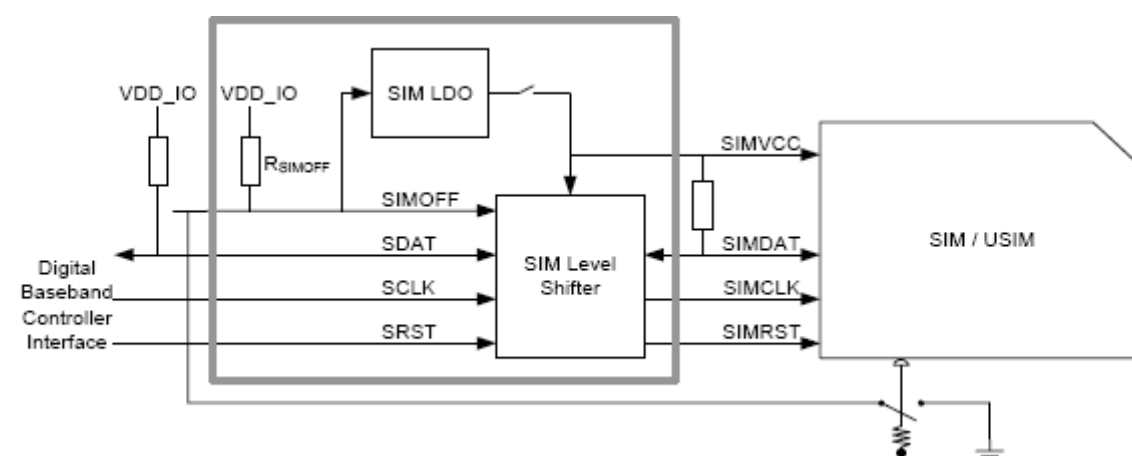


Resistance Identification (A) and Temperature Measurement (B)

SIM Interface

The SIM interface supplies level 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.

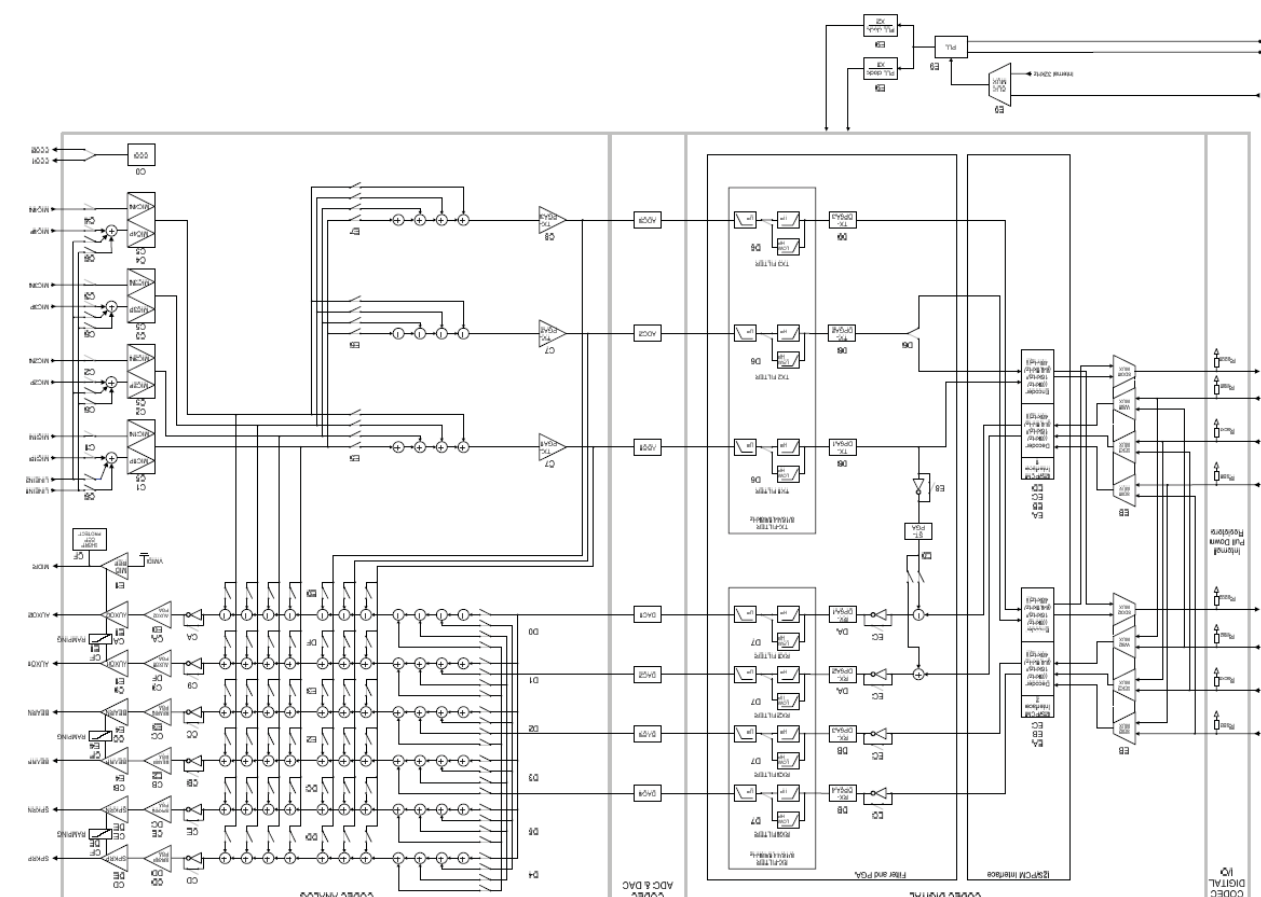
Block Diagram of the SIM Interface:



CODEC Overview

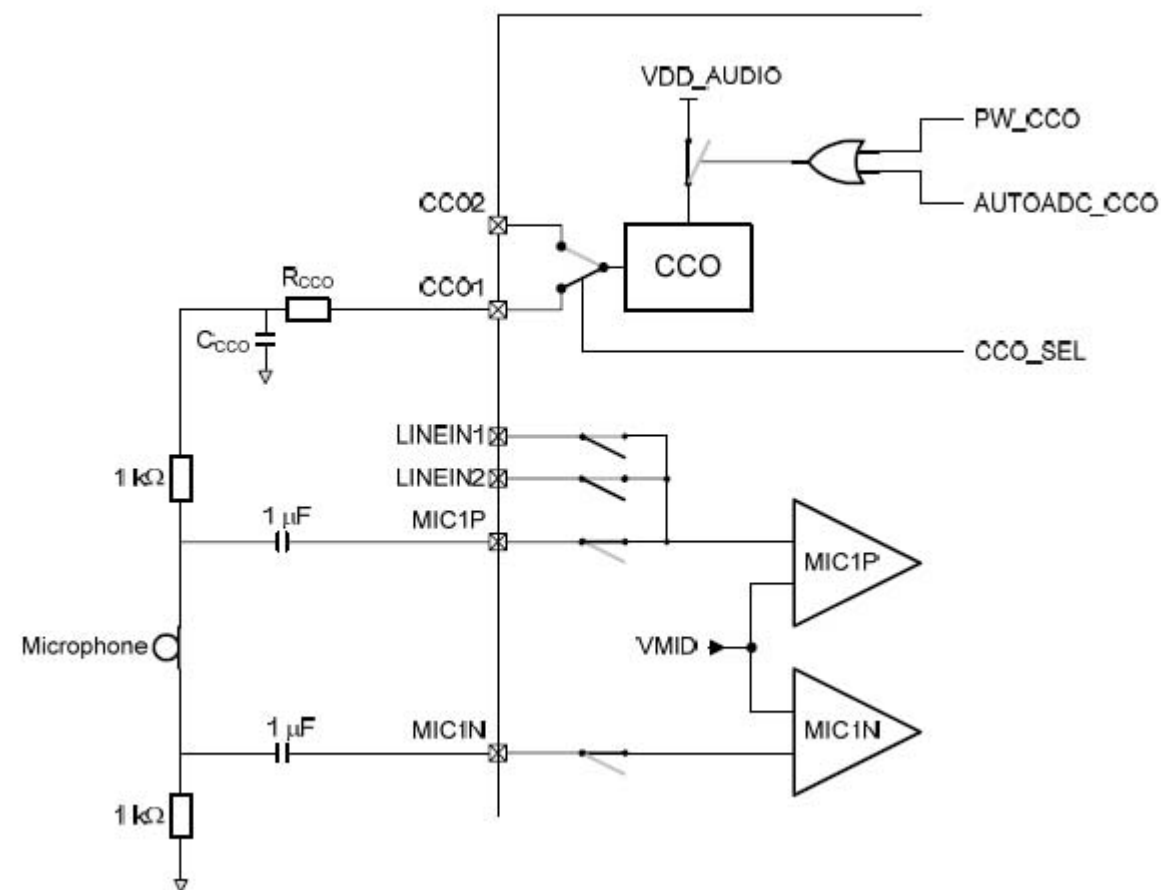
The CODEC is encoding analog audio signals and analog voice signals into digital signals using ADCs. This is done in the coder section of the CODEC, also named the TX path (transfer section). The CODEC is also decoding digital audio signals and digital voice signals into analog signals using DACs. This 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 1.4 V or low impedance to ground when powered-down. Fifty-one gains are available for BEARP and BEARN: from +15 dB down to -60 dB in 1.5 dB steps. When the BEARP and BEARN outputs are operating in differential mode, an I2C selectable bit must invert one of the inputs.

Digital Baseband Controller (CPU) D2000 (Anja)

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

- Application
- Access

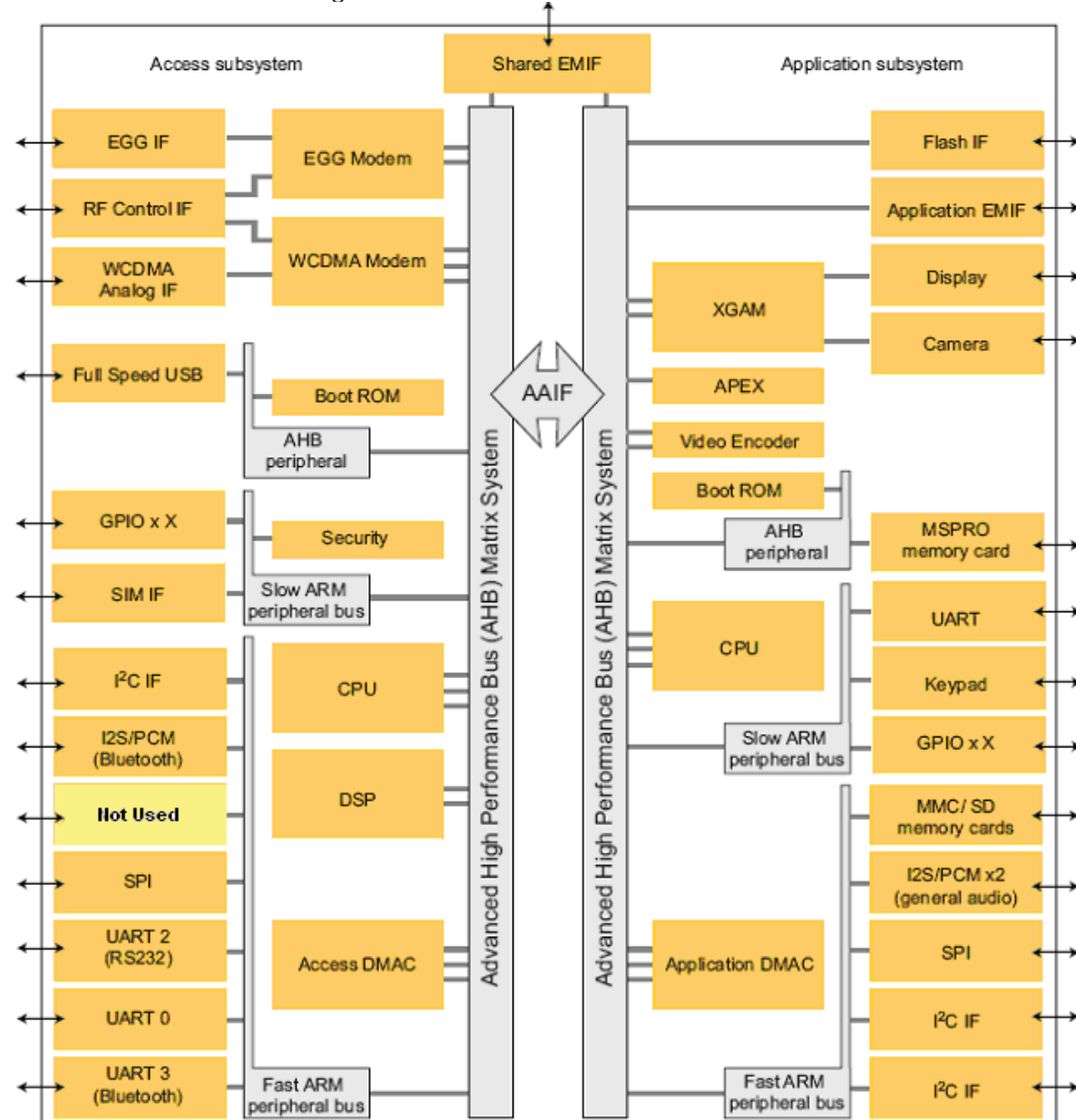
Access Subsystem

All modem functionality in the digital baseband controller resides in the Access subsystem. This includes EDGE/GPRS/GSM interface, WCDMA interface, USB, 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 interface has 39 signals (including one chip select) and supports memory sizes up to 512 Mbit. The Shared EMIF is shared between the Access subsystem and the Application subsystem.

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 and a Flash IF 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. The Application EMIF has a total of 56 signals (including a maximum of 7 chip selects if GPIO is used) and can be set in several different modes to support different types of memory combinations.

Functional blocks of the Digital Baseband Controller:



Keypad

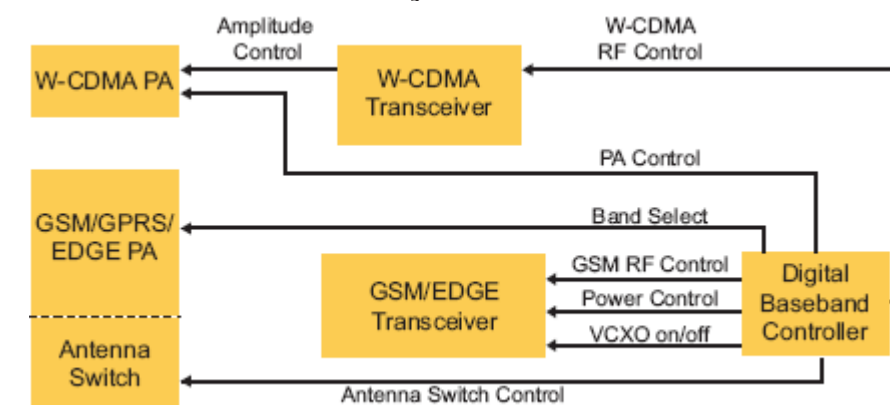
The keypad interface block supports up to 30 keys with 65 columns and 6 rows and operates in both scan and idle mode. The keypad scan is performed by software. Any transition in the state of the column inputs is written directly to the register. The keypad interface differentiates between single key 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.

RF System Control

The access subsystem 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 3-wire serial bus.

The digital baseband controller D2000 (Anja) also manages PA band control and the antenna switch mechanism in the front end module. The 26 MHz VCXO clock residing in the GSM/GPRS/EDGE transceiver is turned on only when required. The digital baseband controller D2000 (Anja) initiates turning on of the clock. The GSM/GPRS/EDGE RF system requires control, which is temperature dependent. The temperature within the RF system is estimated by a voltage measurement performed by the analog baseband controller N2000 (Vera).

The control flow for the RF system:

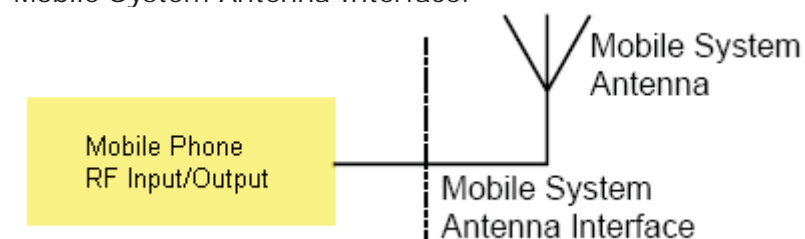


Radio Part

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, RF inputs/outputs.

Mobile System Antenna Interface:



Radio Modules

GSM/GPRS/EDGE Radio Module N1200 (Thor)

The Front End module block connects the proper block in the radio system to the antenna. The Front End module has two inputs for GSM/GPRS/EDGE, one for low band and one for high band. The GSM/GPRS/EDGE power amplifier output is filtered by the low pass filter in the Front End module and then connected to the antenna through a switch and duplexer. In receive mode, the GSM/GPRS/EDGE signal from the antenna passes through the duplexer and switch to one of the four internal receive SAW filters. The SAW filter provides receive band selectivity and converts the unbalanced receive signal to a differential signal required by the GSM/GPRS/EDGE receiver. 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 the GSM, DCS, and PCS bands. The module is shielded using fence and lid technology. The main components contained are transceiver ASIC, PA module, Front End Module and X-tal.

Frequency Generation

The 26 MHz reference signal is used as the reference for the on-chip synthesizer. To cover the required frequency range, the integrated Voltage Controlled Oscillator (VCO) operates at twice the frequency for band 1800/1900, and at four times the desired frequency for band 850/900.

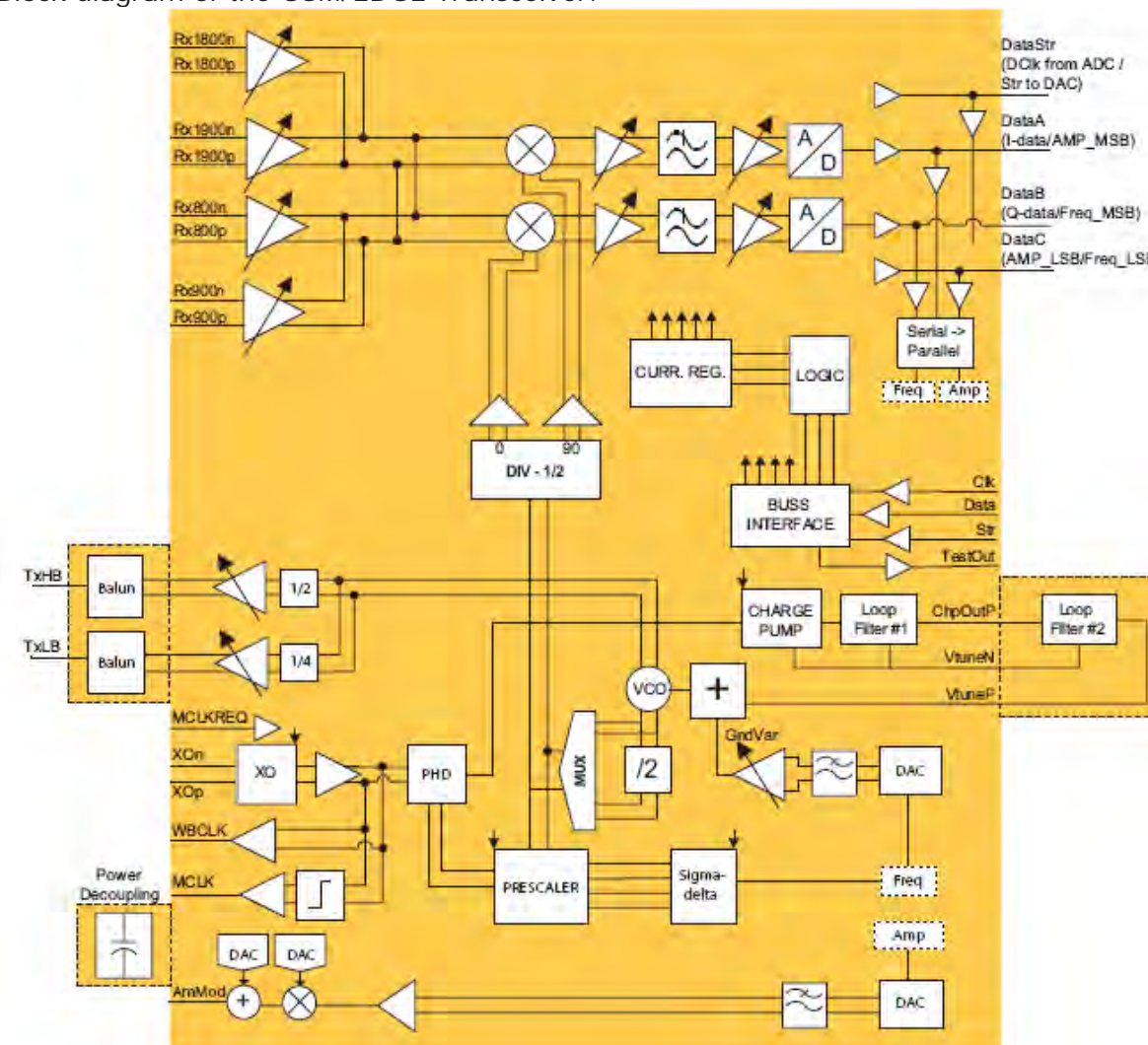
GSM/GPRS/EDGE Transceiver

The GSM/GPRS/EDGE transceiver use a digital interface that is shared between receive and transmit data. The receive interface is based on I and Q data and the transmitter interface is based on envelope and frequency data. The quad band GSM/GPRS/EDGE transceiver has the following general features:

The GSM/EDGE transceiver has the following features:

- Individual low-noise amplifiers for the 850, 900, 1800 and 1900 MHz frequency bands with a common quadrature mixer
- Fully integrated VCO with dividers to generate both receive and transmit frequencies
- I and Q baseband receive channel amplifiers with on-chip antialiasing filtering
- I and Q receiver sigma-delta A to D converters
- Digital interface for the receive I and Q channel
- Multi modulus prescaler for direct VCO modulation in transmit mode
- Integrated phase detector with programmable charge pump
- Transmit output buffer with controllable output power level
- Transmit baluns integrated
- Digital interface for the transmit frequency and amplitude modulation
- 3-wire serial bus interface for control, configuration, and test
- Deep power down function
- Programmable power level to power amplifier (PA)

Block diagram of the GSM/EDGE Transceiver:



Transmitter

The transmitter block consists of the following sub-blocks:

A separate block is used to convert the digital bit streams from the baseband into parallel words to be used in the DAC and the Sigma Delta modulator. This block also includes programmable delays for optimizing delays between the different modulation paths. The combined DAC and LP-filter is used to convert the digital words of the digital block into analog signals. The second FM-path is used to add the high frequency part of the FM to the VCO. It also includes an auto-tuning block that compensates VCO gain variations. The AM-block converts the differential voltage from the DAC to a single-ended output that drives the PA. The output is scaled according to the desired output power, and an offset can be added for PA linearization. The TX-buffer is used to drive the PA with the correct power level. A divide by 2 or 4 block is used to generate the correct output frequency from the 4 GHz VCO.

TX Frequency, Channel and Power Level Range:

GSM 850:

Frequency Range: 824,2 MHz – 848,8 MHz

Channel Range: 128 – 251

Power Level: Min 19 – Max 5

GSM 900:

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

EGSM 900:

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

DCS 1800:

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

PCS 1900:

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

Receiver

The receiver is a homodyne receiver with direct conversion of the received radio channel to baseband I and Q channels. The analog signals are converted to digital bit streams in a sigma delta A/D converter. The receiver block consists of a front-end with separate LNAs for each band and a common quadrature mixer. The front-end block is followed by a baseband block with active antialiasing filters that also suppress blocking signals and interferers. After the baseband block is a fully integrated Analog to Digital Converter of sigma delta structure with high dynamic range. The digital output signals are sent over a serial interface to the digital base-band circuit for further processing and detection.

RX Frequency and Channel Range

GSM 850:

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

GSM 900:

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

EGSM 900:

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

DCS 1800:

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

PCS 1900:

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

**WCDMA Radio Module
N1210 (Squid)**

In WCDMA the differential transmit outputs from the WCDMA transceiver are filtered by an external SAW filter. The SAW filter cleans up the spectrum and also provides a single ended drive signal to the power amplifier. 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 a switch in the N1200 (Thor) module for connection to the antenna. In WCDMA receive mode the signal from the antenna is switched by the duplexer inside N1200 module (Thor). The output from the duplexer is amplified by one of the low noise amplifiers in the LNA/SAW module, then filtered by an integrated receive SAW filter. The SAW filter converts the unbalanced receive signal to a differential signal required by the WCDMA receiver. The N1200 (Thor) module supplies the N1210 (Squid) module with a 26 MHz clock (WBCLK) and the antenna switch functionality. The module is shielded using fence and lid technology.

Frequency Generation

The transmitter and receiver frequency synthesizers and the VCOs are fully integrated in the WCDMA radio circuit. The signal from the crystal oscillator is used as a reference for the synthesizers. The two synthesizers are controlled through the serial bus from the access subsystem of the digital baseband controller.

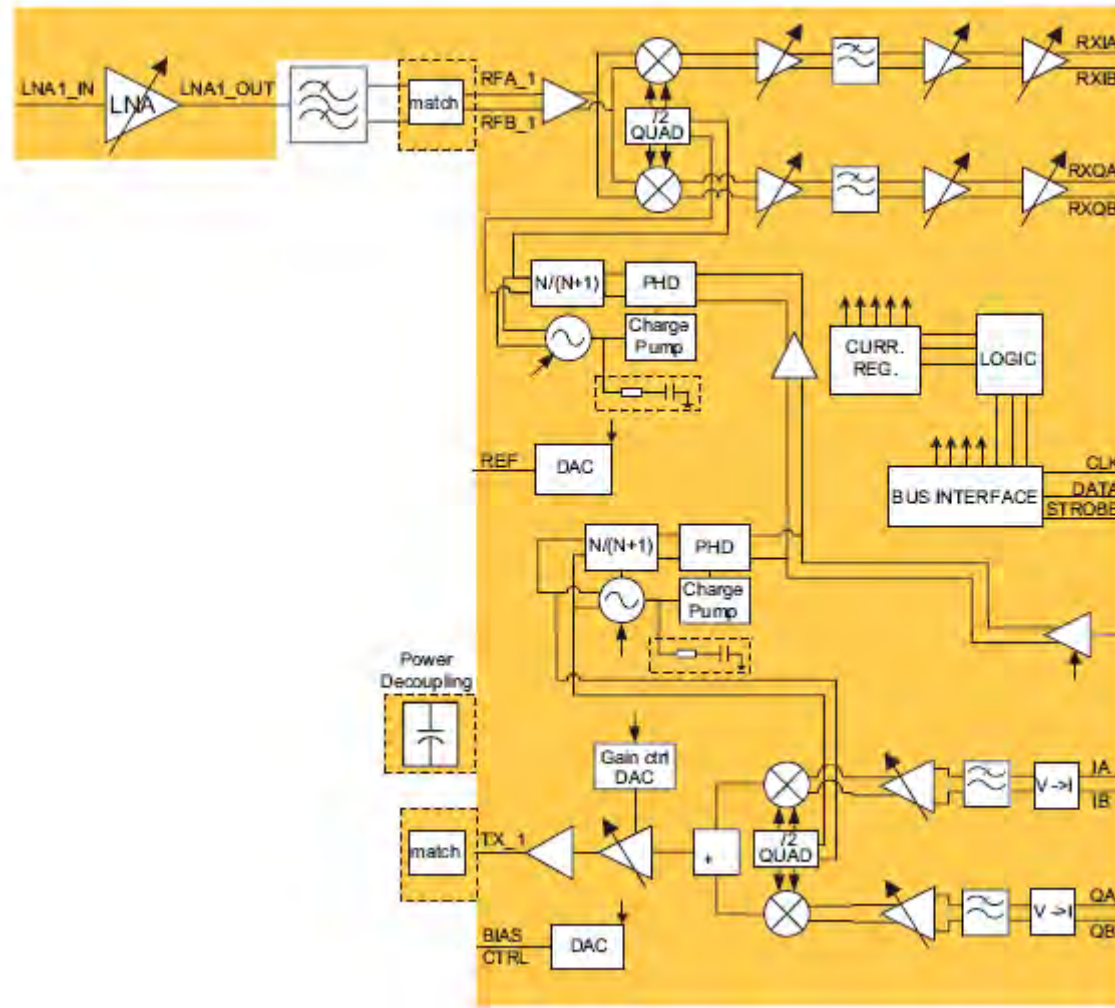
WCDMA Transceiver

The WCDMA transceiver uses differential analog in-phase and quadrature-phase Interfaces; that is, an IQ-interface, both in the receiver and transmitter information path. The receiver part of the transceiver consists of an RF front end, a channel filter, and Automatic Gain Control (AGC), and the transmitter part consists of an analog voltage baseband I and Q interface, an up mixer and an RF VGA. Each part has an RF VCO and an RF fractional-N synthesizer PLL. All functions are controlled by a 3-wire serial programmable bus.

WCDMA BAND I is covered by Squid Module.

Band I (TX Frequency Range: 1920 – 1980 MHz, RX Frequency Range: 2110 – 2170 MHz)

WCDMA Transceiver Block Diagram:



Transmitter

The TX IQ modulator has differential voltage I and Q inputs. It converts input signals to RF output frequency and is designed to achieve LO and image suppression. The transmit output stage provides at least +5 dBm at maximum power control at the differential output. Gain is set through the 3-wire bus. Two 10-bit DAC are used to control the DC/DC converter and the PA gain. Those DACs are controlled through the 3-wire-bus. One 11-bit DAC is used to control the variable gain output of the transceiver chip. The transceiver chip output feeds the constant gain power amplifier, which means that the transceiver chip sets the phone's output power.

Receiver

The receiver converts the antenna RF signal down to a Zero Intermediate Frequency (ZIF). The first stage after the duplexer is a single-ended LNA with a 23 dB gain step. This LNA is followed by a SAW filter. The LNA and SAW filter are integrated in the LNA/SAW module. The output from the LNA/SAW module goes to the input of the N300 circuit (Inside the Mammoth module) and is buffered by an amplifier and then sent to the IQ down-mixer, which consists of two mixers in parallel driven by quadrature phase LO signals. The In phase (I) and Quadrature phase (Q) ZIF signals are then low pass filtered to provide protection from high frequency offset interferer and fed into the channel filter. The front-end zero IF I and Q outputs are applied to the integrated low-pass channel filter. The filter is self-calibrated with a cut-off frequency around 2.15 MHz.

Bluetooth and FM Radio

The STLC2592 circuit N1400 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 first stage of the receiver is an external antenna filter, which suppresses unwanted frequencies. The receiver is of a "near-zero" IF receiver architecture. The local oscillator is generated by a frequency synthesizer, which allows the receiver to be set at frequencies in intervals of 1 MHz. The synthesizer is controlled from the logic part. The received signal is sampled in the logic for later signal processing.

Transmitter

The synthesizer generates the TX frequency which modulated by the BT baseband block. It is then amplified. The BT system is a class 1 device with maximum of +4 dBm output power (minimum setting is about -50 dBm).

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

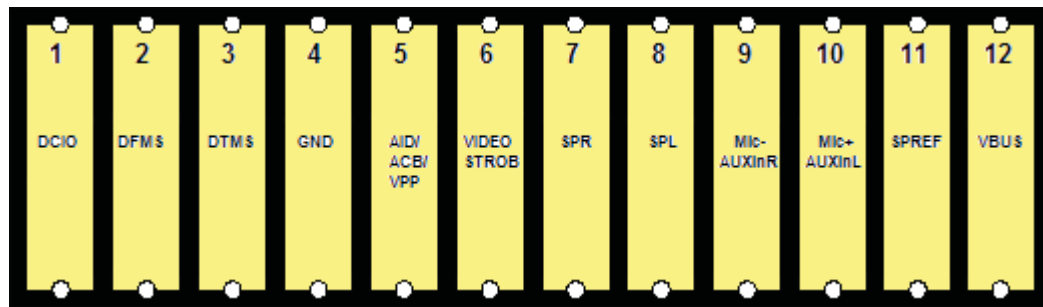
The receiver uses frequency synthesizer technology including a completely integrated VCO. The frequency synthesizer generates the quadrature local oscillator signal used to downconvert the RF input to a low intermediate frequency. The VCO frequency is locked to the reference clock and adjusted with an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

$$\text{Freq (MHz)} = \text{Spacing (kHz)} \times \text{Channel} + \text{Bottom of Band (MHz)}$$

External Connectors

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

System connector (X2300) pin out:



Clocks

Clock Distribution

The clocking for the access and application subsystems is separated. This means that they can wake up or go to sleep mode independently. The access subsystem is clocked by the 26 MHz Voltage Controlled Crystal Oscillator B1100 (VCXO) located in the Thor Radio Module (N1200). 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 N1001 inside the Thor Radio Module (GSM/GPRS/EDGE). 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 (WBCLK) is also distributed to the Squid Radio Module (WCDMA), 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 (B2101) provides a low frequency clock whenever the phone has power. This clock is used to keep the Real-Time Clock (RTC) block functioning, so that the phone can keep track of the time and date. The low frequency clock is generated in the analog baseband controller N2000 (Vera) and distributed to the digital baseband controller D2000 (Anja), 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.

Clock Reference Frequency

The A-GPS module is using two reference frequencies, a 32.768 kHz clock (RTCCLK) from the N2000 (Vera), and a 26 MHz reference clock (SYSCLK) from the D2000 (Anja). The RTCCLK is used for the real time clock function. The RTCCLK is distributed to the A-GPS module (N1430)

as a logical square wave. SYSCLK is derived from the reference modulation clock MCLK from the access system and is distributed from the D2000 (Anja) to the A-GPS module (N1430). This 26 MHz clock is synchronized with the cellular network to an accuracy of ± 0.1 ppm. SYSCLK does not however provide an absolute reference to 26 MHz. Owing to the effects of Doppler under normal (extreme) operational conditions, the absolute accuracy of the cellular reference cannot be guaranteed better than ± 0.5 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 (B1430) is required to provide a clock with very high short term stability. The frequency of the TCXO (B1430) is calibrated against the cellular reference clock by the A-GPS module enabling the use of a more economical less accurate TCXO (B1430).

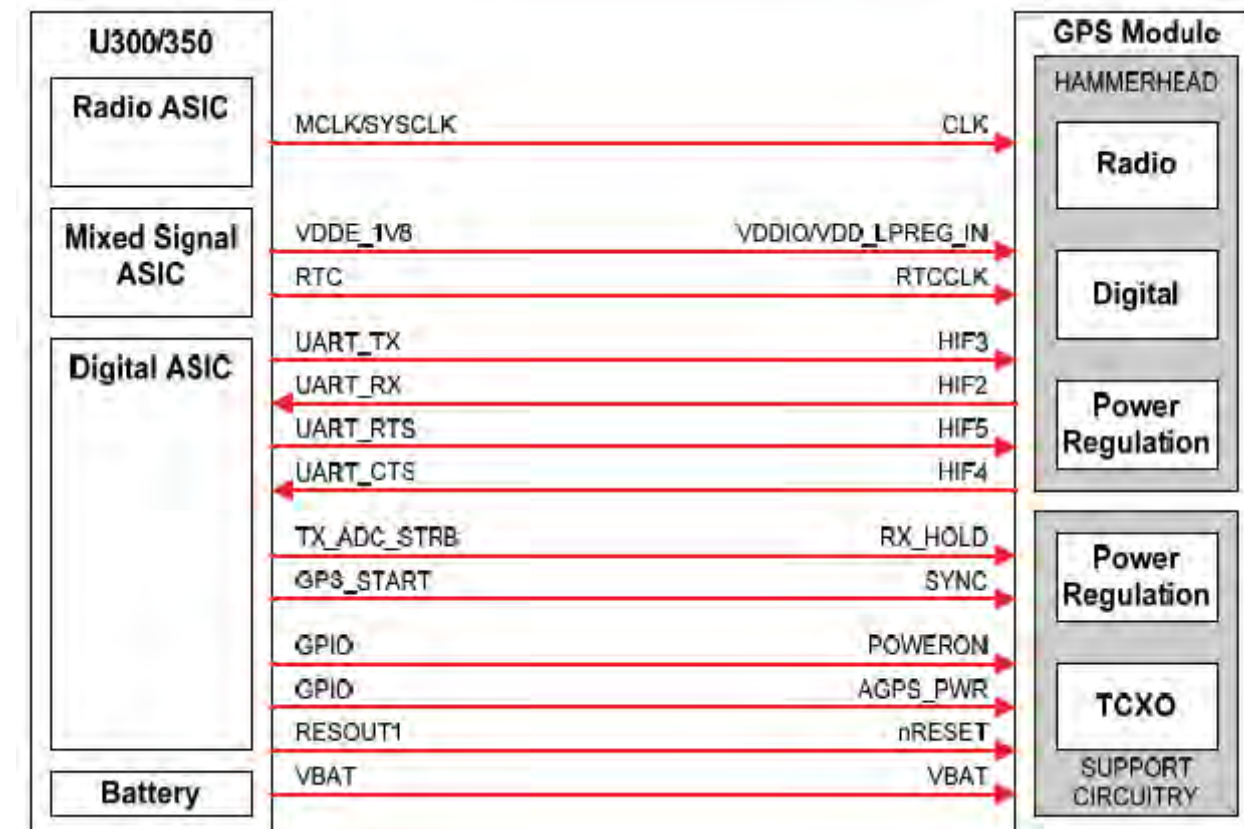
Interface and Control

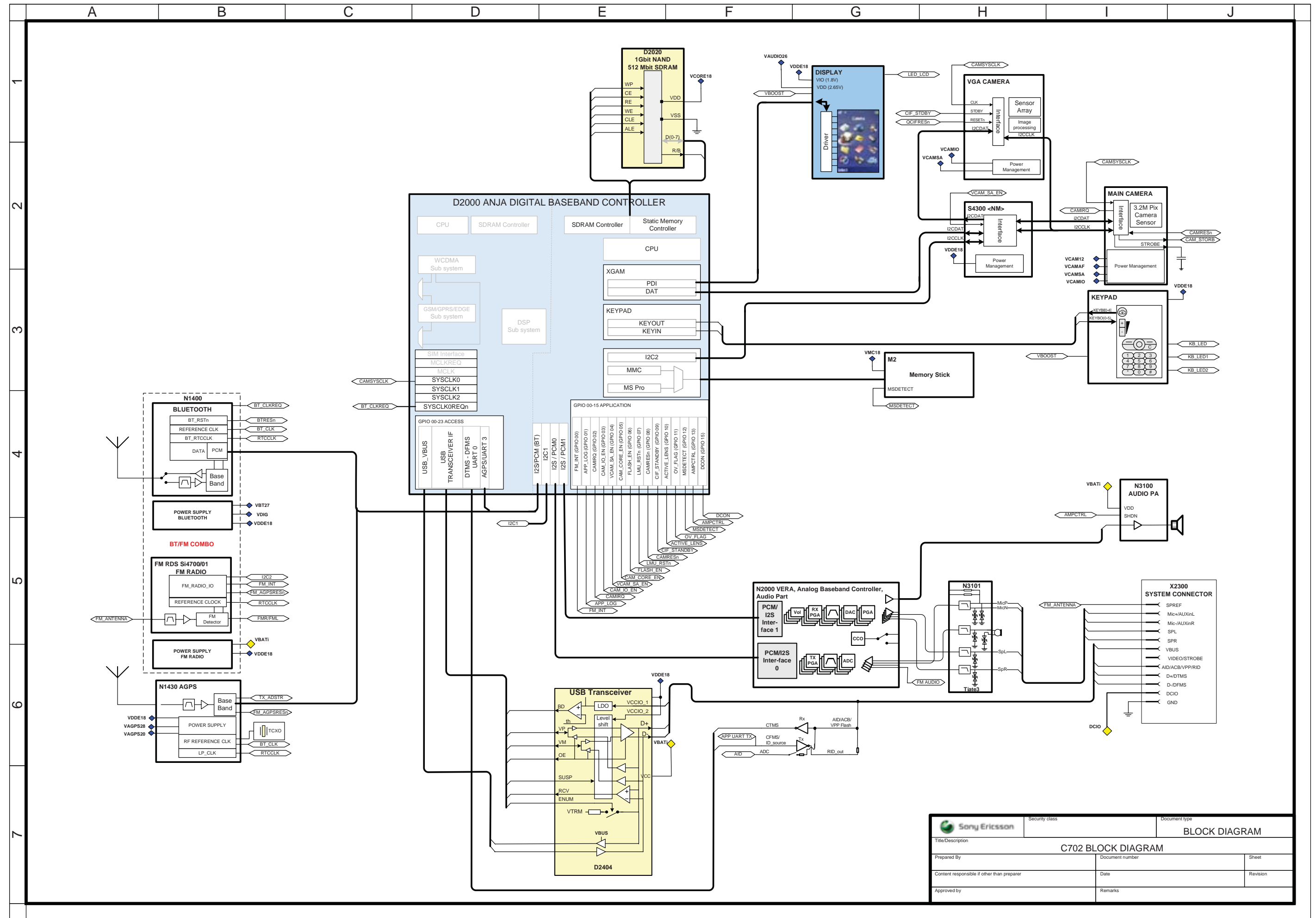
The Interface and control consists of system timing and control. The control interface includes a communication link where both data and control information are transferred between the platform and the A-GPS module. Data and command information is transferred using a full-duplex Universal Asynchronous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

Other control signals include the following:

- A GPIO 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 phone is transmitting. The A-GPS modules receiver is disabled whilst the phone is transmitting.
- A hardware timing pulse (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:





Sony Ericsson		Security class	Document type
Title/Description		BLOCK DIAGRAM	
Prepared By		C702 BLOCK DIAGRAM	
Content responsible if other than preparer		Document number	Sheet
Approved by		Date	Revision
		Remarks	



Part list Main Board

Contains only components that are possible to replace on the main board.
Pos. number refers to the components position number on the board.

Some components are noted as MSL X. These components are moisture-sensitive and are rated at various levels (MSL):

- Level 1:** Unlimited floor life; does not require dry pack or re-baking.
- Level 2:** 1 year floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 2A:** 4 week floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 3:** 168 hours floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 4:** 72 hours floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 5:** 48 hours floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 5A:** 24 hours floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 6:** 6 hours floor life; ≤ 30 °C; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.

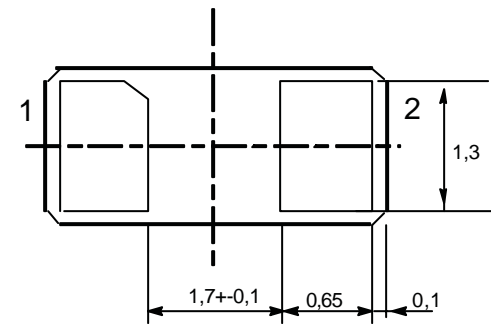
NOTE! RF Calibration by using SERP can only be done by authorized repair centers.
Fence modification according to Working Instruction Electrical.

F = Front side, B = Back side.

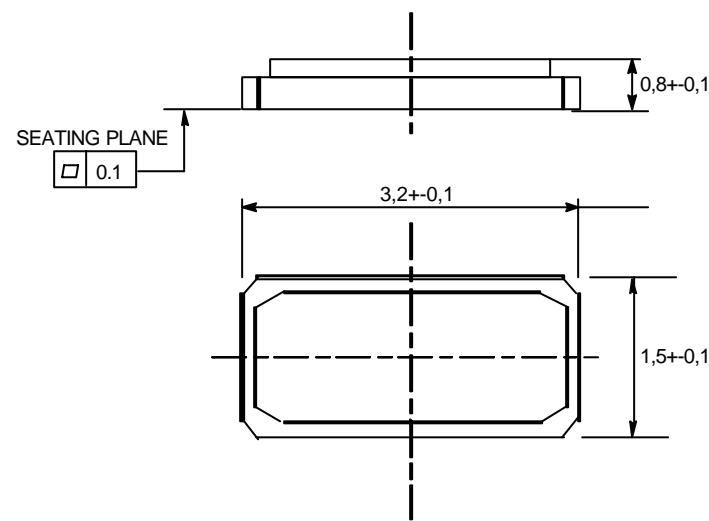
Side	Pos.	Description	Part Number	Comments	Page
F	B2101	Crystal 32,768 kHz	RTM501911/1	Require calibration (SERP)	98
F	B3100	Microphone	RLC509429/5		98
B	C2217	Capacitor 70,0 mF 3,3 V	RJE3551335/7		
F	C3113, C3120, C3145, C3146	Capacitor Ceramic 470,0 nF +/-10% 6,3 V	RJC5163026/47	MSL1	
F	D2105	IC Single Bus Buffer Gate	1200-0425		98
B	D2404	USB ULPI transceiver	1200-1694		98
B	E1001	Shield Can	1202-0850	Shielding Can GPS	
B	E1002	Shield Can	1202-0851	Shielding Can MP202	
B	E1003	Shield Can	1200-7603	Shielding for DC-DC of UMTS	
B	E1004	BT Shielding Fence	1203-1606		
B	L2401, L2402, L2403, L2404, L2405, L2408	Inductor 0.0 H $\pm 25\%$	REG70618/20	MSL1	98

Side	Pos.	Description	Part Number	Comments	Page
B	N1200	Pre-bumped, Mod Radio EDGE Thor GSM/EDGE	1203-6579	Require calibration (SERP) MSL R5A	99
B	N1210	Pre-bumped Squid Radio UMTS/WCDMA Module	1204-1674	Require calibration (SERP) UMTS Only MSL R5A	99
B	N1400	Module Bluetooth + FM STLC2592	1200-6182	MSL3	100
B	N1430	IC A-GPS Hammerhead 2	1200-0700		100
B	N2205	DC/DC Converter	RYT 113 7838/1		101
B	N2206	Voltage Regulator 2,8V	RYT1137822/1		
B	N2209	2ch-LDO, Vout1=2.8V, Vout2=1.8V, WL-CSP6	RYT113997/4		
F	N2400	1-BIT Level Translator	RYT109914/1		
B	N2402	IC ESD Prot UDFN 6 2x2 mm	1200-6309	MSL1	101
B	N3100	Audio PA	RYT 101 7841/2		101
B	N3101	ASIC Tjatte3 CSP20	ROP1013074/1	MSL1	102
B	S2502, S2503 S2504	Input Switch Side Push	RMD10116/9		102
B	V2202	Trans P-ch FET MLP 2X2-6L	RYN122910/1		102
F	V2405	MOSFET Complementary N P 20 V (D S)	RYN901918/2		102
B	V2420, V2421	Diode Zener 15, V SOD523	RKZ 223 905/2	MSL1	102
B	V2425	Diode Protection 0.7 V SOD-882	1201-2253		103
B	V3105, V3106	Zener Diode, ESD Protection	RKZ 223 911/1		103
B	X1200	Antenna Switch Conn	RPT79947		103
B	X1201, X1202, X1203	Internal Antenna Connector	SND10625		103
B	X1301, X1302 X1430, X1431	Connector	SND90158		103
B	X2200	Battery Connector	1203-3156		104
B	X2300	System Connector	1202-0855		104
B	X2402	Keypad Connector	RNV799036		104
B	X2403	SIM Connector	1201-9946		104
B	X2490	MS-Micro Pico Holder	RNK87147/2		105
F	X4201	B to B Connector	1202-0859		105
F	X4202	Conn BtB Receptacle 26p	1202-9266		105
F	X4300	VGA Camera Connector	RNV 799 045/22	UMTS Only	105
B	X4301	Camera Socket	1202-0835		106

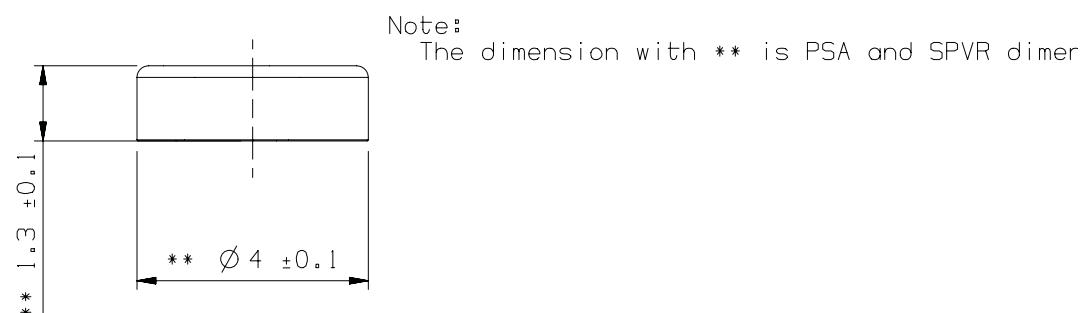
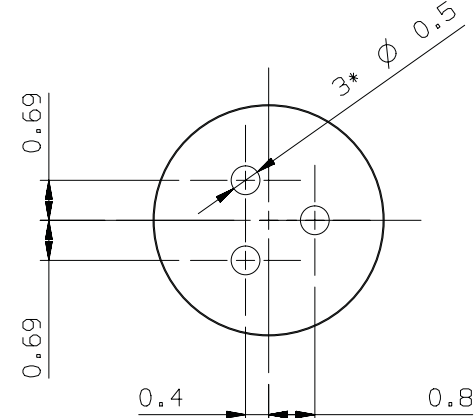
B2101 Crystal 32768 Hz RTM 501 911/1



Terminal	Symbol	Function
1, 2	IN/OUT	Crystal input / output

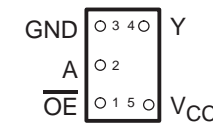


B3100 Microphone RLC09429/5



D2105 IC Single Bus Buffer Gate 1200-0425

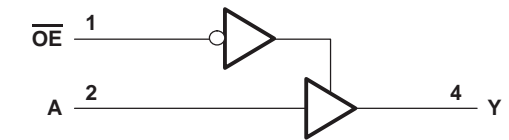
(BOTTOM VIEW)



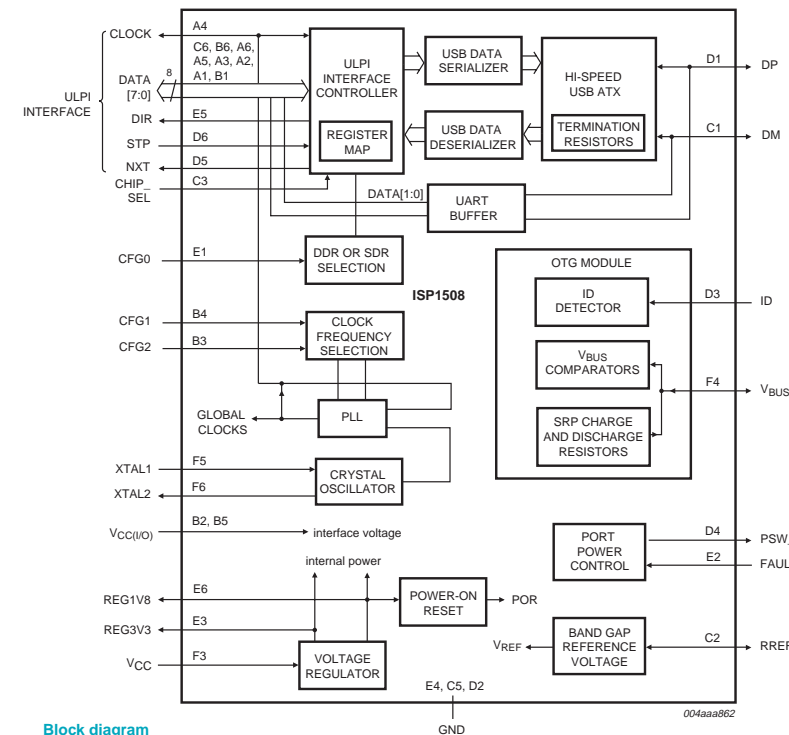
FUNCTION TABLE

INPUTS		OUTPUT
OE	A	Y
L	H	H
L	L	L
H	X	Z

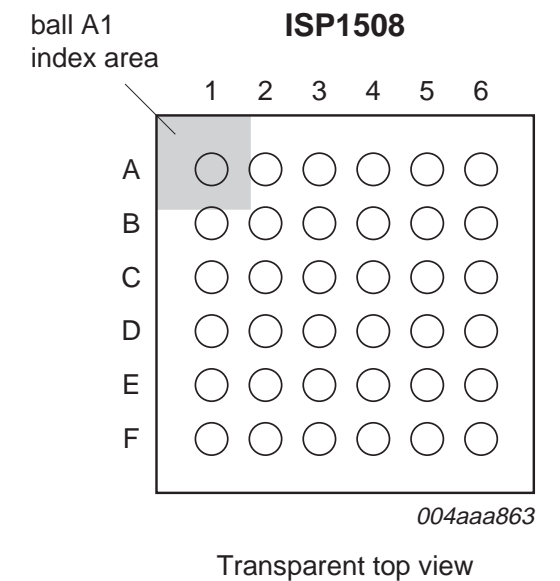
logic diagram (positive logic)



D2404 USB ULPI Transceiver 1200-1694



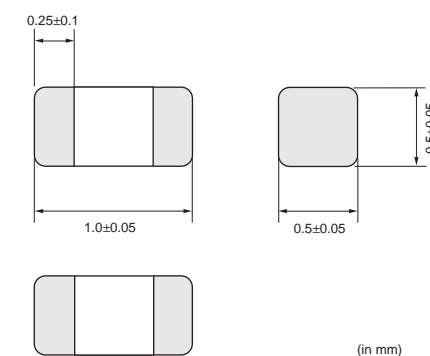
Block diagram



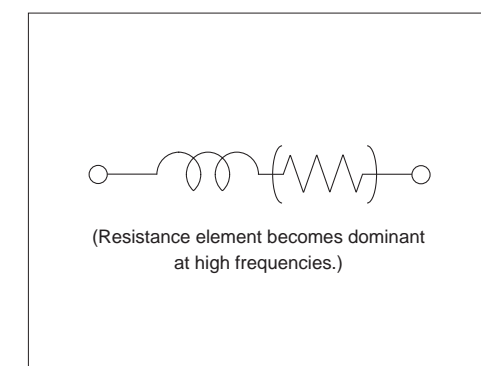
Pin configuration

L2401, 02, 03, 04, 05, 08 Inductor 0,0 H +/- 25% REG70618/20

■ Dimension

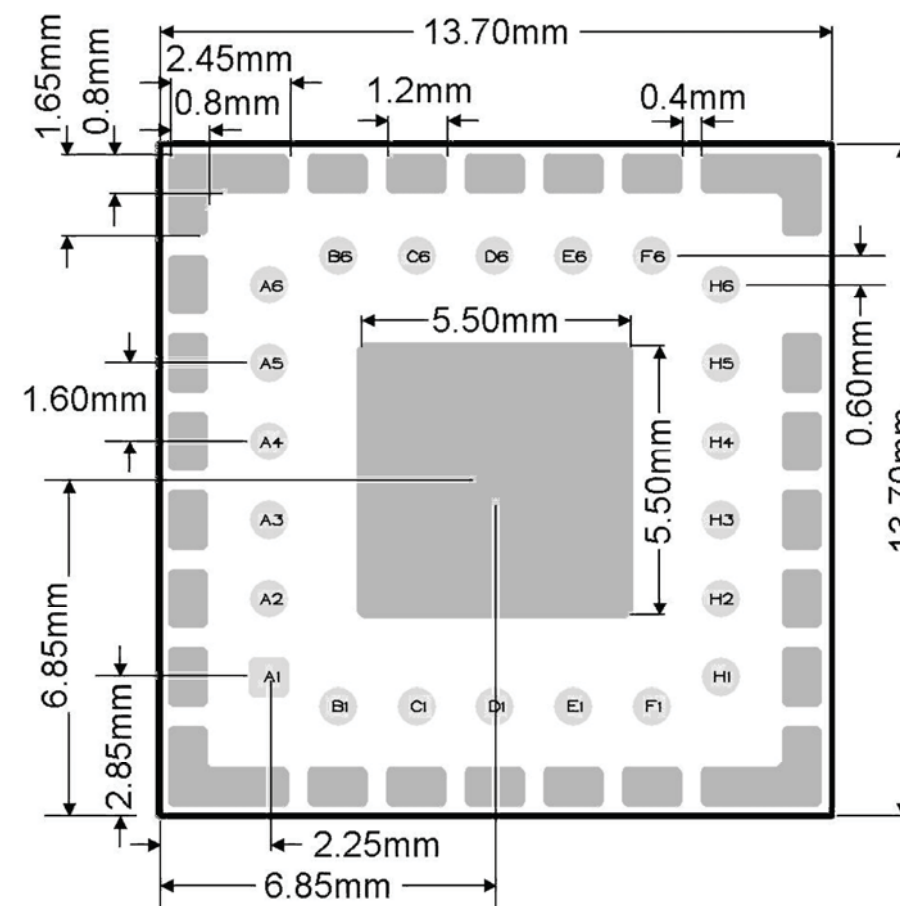


■ Equivalent Circuit



N1210 Pre-bumped Squid Radio UMTS/WCDMA Module 1204-1674

TOP VIEW

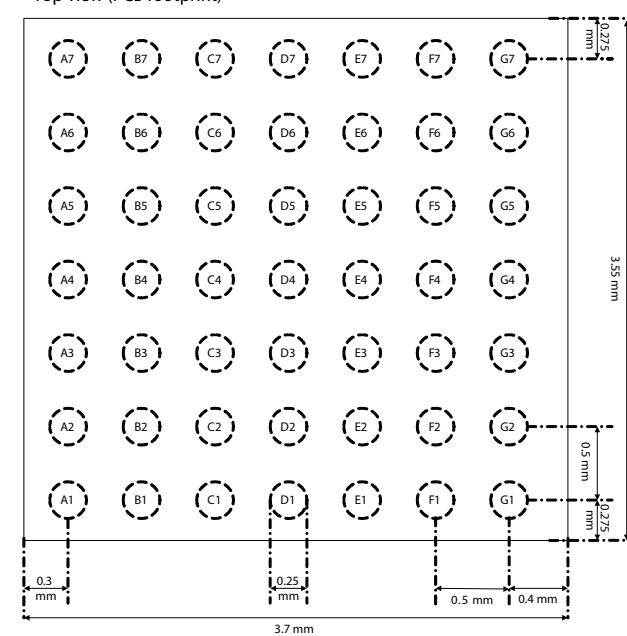


Pins / Signal cross-reference:

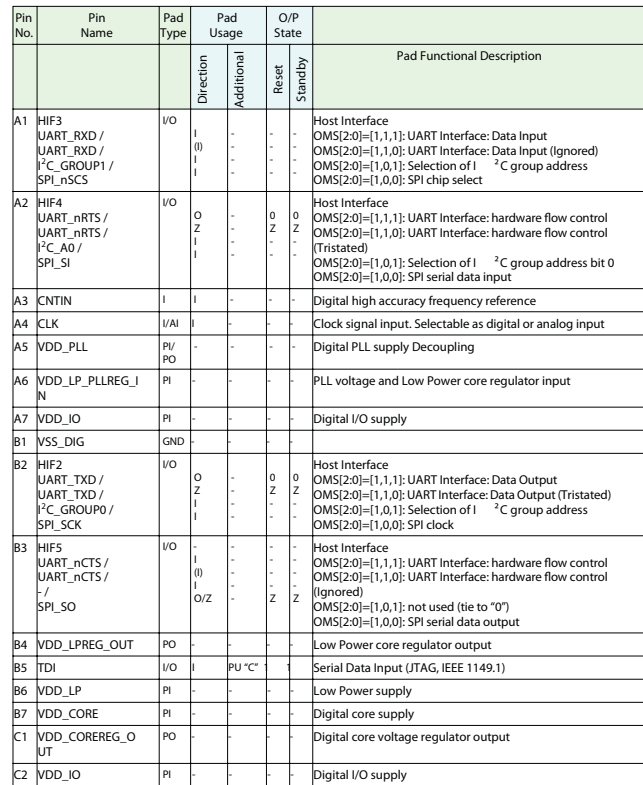
Pin name	Signal
A1	WPAVcc
A2	RADDAT
A3	RADCLK
A4	RADSTR
A5	RXIA
A6	RXIB
B1	TXIA
B6	RXQA
C1	TXIB
C6	RXQB
D1	TXQA
D6	VDIG_1V8
E1	TXQB
E6	WDETON
F1	VBAT
F6	WTXPOWDET
H1	WPA1_EN
H2	WPA0_EN
H3	VCC_PA
H4	WBCLK
H5	VRAD_2V75
H6	WCDMA_ANT

N1430 IC A-GPS Hammerhead 2 1200-0700

Top view (PCB footprint)



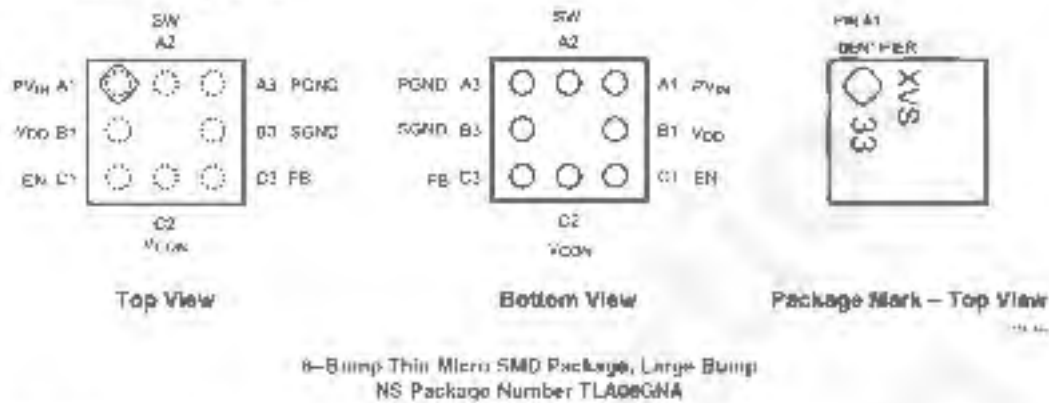
C3	HIF0 -/ / I ² C_SCL /	I/O	I	-	-	-	-	Host Interface OMSI[2:0]=[1,1,1]: not used (tie to '0') OMSI[2:0]=[1,0,0]: not used (tie to '0') OMSI[2:0]=[0,0,0]: I^2C clock OMSI[2:0]=[1,0,0]: not used (tie to '0')
C4	HIF1 -/ / I ² C_SDA /	I/O	I	I ² C I/O	OD	-	Z	Host Interface OMSI[2:0]=[1,1,1]: not used (tie to '0') OMSI[2:0]=[1,0,0]: not used (tie to '0') OMSI[2:0]=[1,0,1]: I^2C data OMSI[2:0]=[1,0,0]: not used (tie to '0')
C5	TDO	I/O	O	-	-	Z	Z	Serial Data Output (JTAG, IEEE 1149.1)
C6	TC _K	I/O	I	PD "C"	0	0	0	Clock (JTAG, IEEE 1149.1)
C7	nTRST	I/O	I	PD "A"	0	0	0	Reset Input (JTAG, IEEE 1149.1)
D1	VDD_COREREG_IN	PI	-	-	-	-	-	Digital core voltage regulator supply
D2	VSS_DIG	GND	-	-	-	-	-	
D3	OMSI1	I/O	I	-	-	-	-	Operational mode select / Bus interface select
D4	SYNC	I	I	-	-	-	-	Digital reference time pulse
D5	VSS_DIG	GND	-	-	-	-	-	
D6	TMS	I/O	I	PU "C"	-	-	-	State Machine Control Signal (JTAG, IEEE 1149.1)
D7	VSS_DIG	GND	-	-	-	-	-	
E1	RTCLK	I/O	I	Hyst	-	-	-	32.768kHz clock signal input
E2	POWERON	I/O	I	-	0	0	0	Power On signal to chip
E3	OMSO	I/O	I	-	-	-	-	Operational mode select / Bus interface select
E4	VSS_LNA	GND	-	-	-	-	-	
E5	VSS_RF	GND	-	-	-	-	-	
E6	MIX_IN_PLUS	AI	AI	-	-	-	-	Differential mixer input
E7	VDD_CAP	P/I/O	P/I/O	-	-	(Z)	(Z)	RF Digital Supply Decoupling
F1	nINTR	I/O	I	OD	Z	Z	Z	Interrupt request signal to host
F2	RX_HOLD	I/O	I	-	-	-	-	RX_HOLD signal (From host to indicate that the host is transmitting)
F3	nRESET	I/O	I	Hyst	0	0	0	Chip reset signal
F4	VDD_RFREG_IN	PI	-	-	-	-	-	RF voltage regulator input
F5	EXT_LNA_CTRL0	AI/O	O	-	-	-	-	External LNA control
F6	MIX_IN_MINUS	AI	AI	-	-	-	-	Differential mixer input
F7	VDD_VCO	P/I/O	P/I/O	-	-	(Z)	(Z)	Buffer capacitor for VCO supply
G1	VDD_CORE	PI	-	-	-	-	-	Digital core supply
G2	OMS2	I/O	I	-	-	-	-	Operational mode select
G3	VDD_CORE	PI	-	-	-	-	-	Digital core supply
G4	VSS_RF	GND	-	-	-	-	-	
G5	VDD_RF	P/I/O	-	-	-	-	-	RF Analog Supply Decoupling
G6	VSS	AI	AI	-	-	-	-	
G7	N.C.	AO	AO	-	-	-	-	This ball should be left unconnected



Pad Type	Description	Comments
GND	Chip Ground	All signals are referred to this
P I	Power In	Supply to a voltage domain
P O	Power Out	Regulator Output
P I/O	Power Out	Supply to a voltage domain and regulator Output
I/O	Digital Signal Pad	All Digital Pads are I /O Pads which are configured internally as required. - All are configured as Push-Pull except those marked as OD (open drain) - All have hysteresis by default, but is only mentioned when it is required for correct system operation.
AI	Analog Input	
AO	Analog Output	
AI/O	Analog Input/ Output	Bidirectional analog pad.
PU	Internal Pull Up	
PD	Internal Pull Down	

N2205 DC/DC Converter RYT 1137838/1

Connection Diagrams



Order Information

Order Number	Package Marking (Note)	Supplied As
LM3205T1	XVS/33	250 units, Tape-and-Reel
LM3205TLX	XVS/33	3000 units, Tape-and-Reel

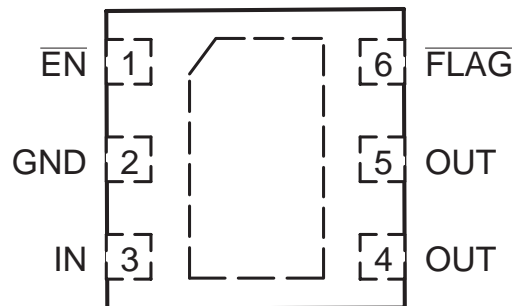
Note: The actual physical placement of the package marking will vary from part to part. The package marking 'X' is designated for core code 'X' and 'VS' for core code 'VS'. Both will vary in production. '33' designates device type and package size. 'TL' designates the device type number.

Pin Descriptions

Pin #	Name	Description
A1	PV _{IN}	Power Supply Voltage Input to the internal PFET switch.
B1	V _{DD}	Analog Supply Input.
C1	EN	Enable Input. Set this digital input high for normal operation. For shutdown, set low.
C2	V _{CON}	Voltage Control Analog Input. V _{CON} controls V _{OUT} in PWM mode.
D1	FB	Feedback Analog Input. Connected to the output of the output filter capacitor.
D2	SGND	Analog and Control Ground.
A3	PGND	Power Ground.
A2	SW	Switch node connection to the internal PFET switch and NFET synchronous rectifier. Connect to an inductor with a saturation current rating that exceeds the maximum Switch Peak Current Limit specification of the LM3205.

N2402 IC ESD Prot UDFN 6 2x2 mm 1200-6309

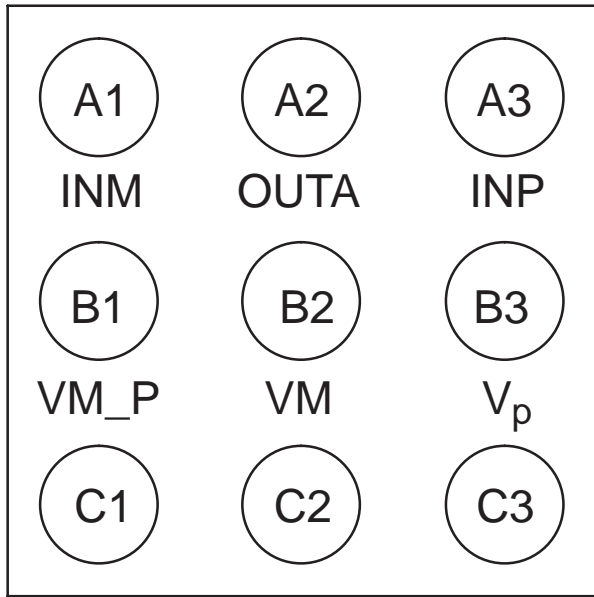
PIN CONNECTIONS



N3100 Audio PA RYT1017841/2

PIN CONNECTIONS

9-Pin Flip-Chip CSP



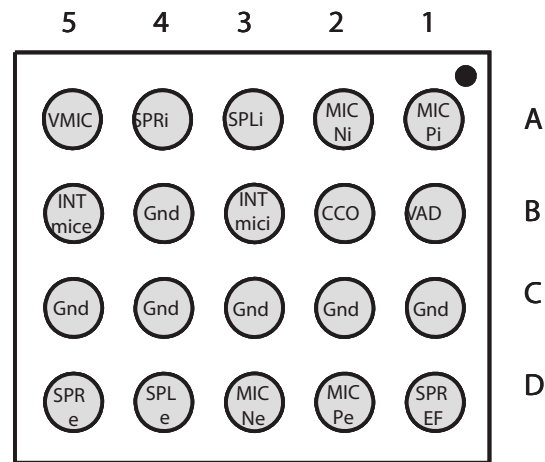
BYPASS OUTB SHUTDOWN
(Top View)

PIN DESCRIPTION

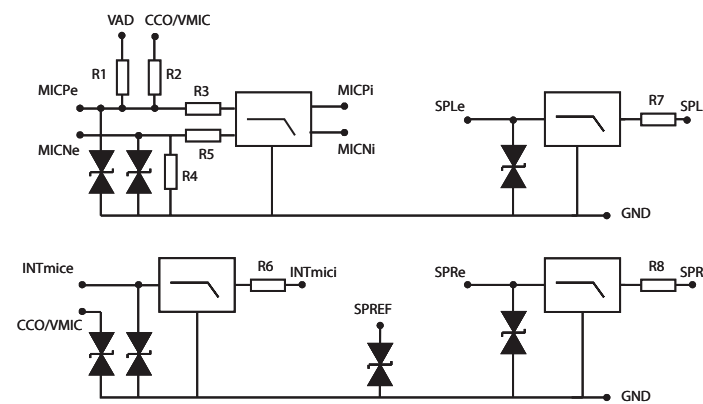
Pin	Type	Symbol	Description
A1	I	INM	Negative input of the first amplifier, receives the audio input signal. Connected to the feedback resistor R _f and to the input resistor R _{in} .
A2	O	OUTA	Negative output of the NCP2892. Connected to the load and to the feedback resistor R _f .
A3	I	INP	Positive input of the first amplifier, receives the common mode voltage.
B1	I	VM_P	Power Analog Ground.
B2	I	VM	Core Analog Ground.
B3	I	V _p	Positive analog supply of the cell. Range: 2.2 V–5.5 V.
C1	I	BYPASS	Bypass capacitor pin which provides the common mode voltage (V _p /2).
C2	O	OUTB	Positive output of the NCP2892. Connected to the load.
C3	I	SHUTDOWN	The device enters in shutdown mode when a low level is applied on this pin.

N3101 ASIC Tjatte3 CSP20 ROP1013074/1

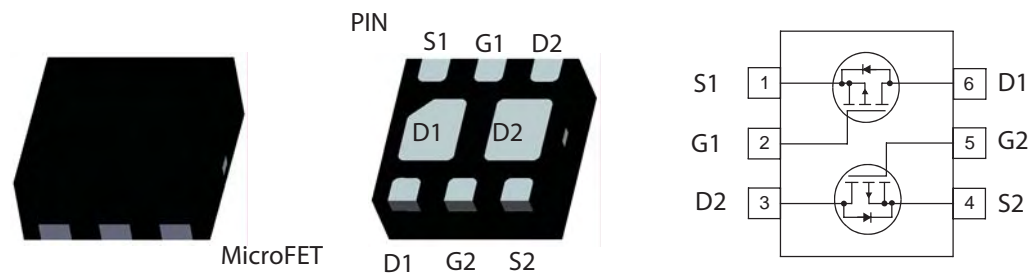
Pin configuration (Bump side)



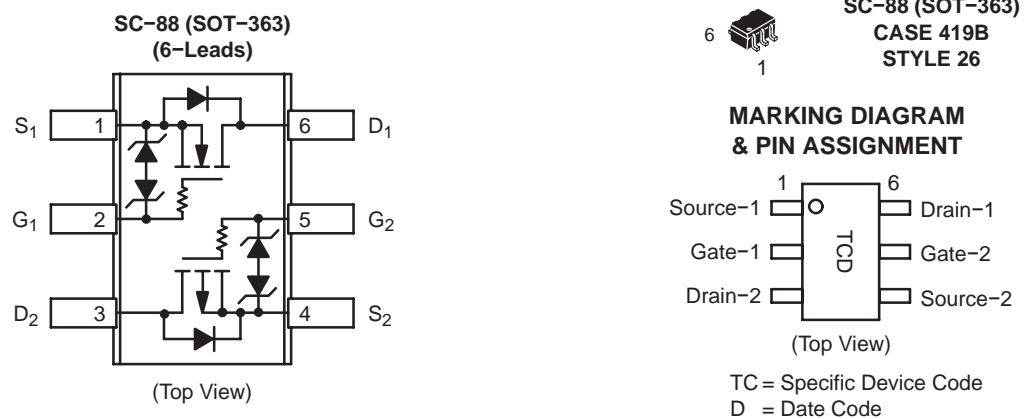
Electrical diagram



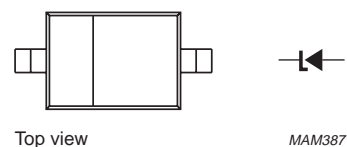
V2202 Trans P-ch FET MLP 2x2-6L RYN122910/1



V2405 MOSFET Complementary N P 20 V (D S) RYN901918/2



V2420, V2421 Diode Zener 15 V SOD523 RKZ223911/1

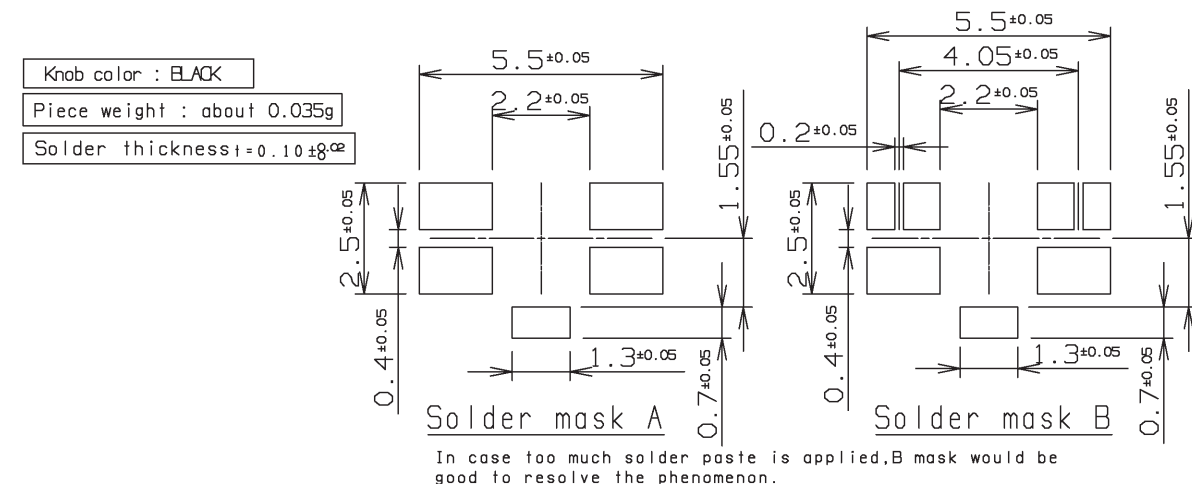
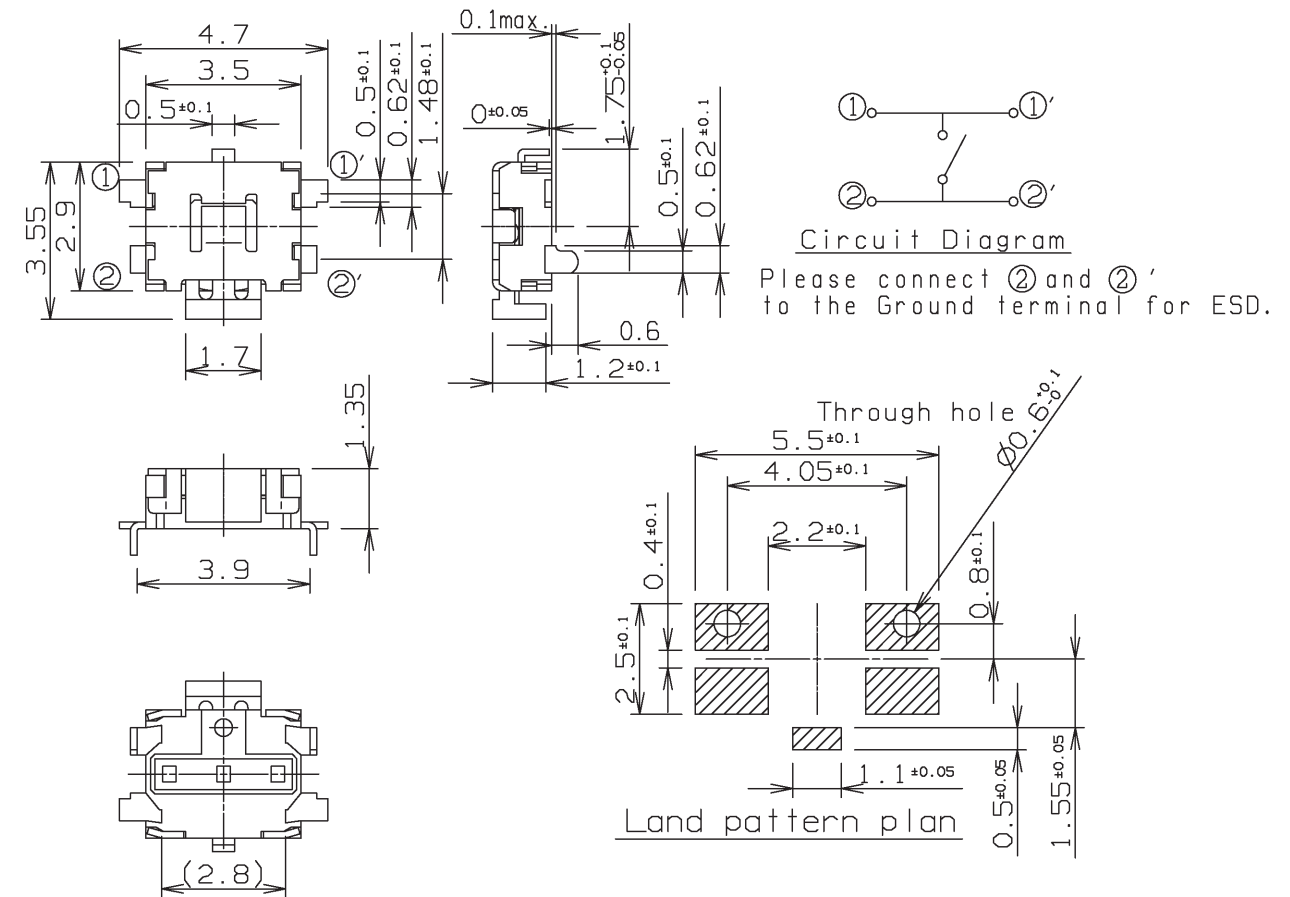


PINNING

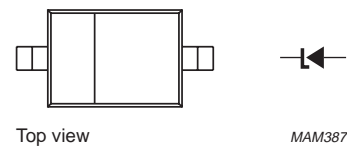
PIN	DESCRIPTION
1	cathode
2	anode

S2502, S2503, S2504 Input Switch Side Push RMD10116/9

General dimension tolerance : ± 0.2
() dimensions are reference dimensions.



V2425 Diode Protection 0,7 V SOD-882 1201-2253



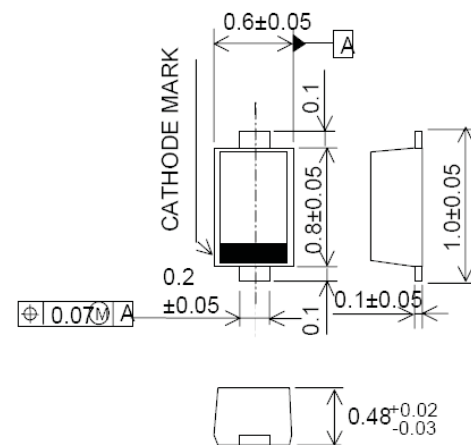
The marking bar indicates the cathode.

PINNING

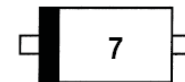
PIN	DESCRIPTION
1	cathode
2	anode

V3105, V3106 Zener Diode ESD Protection RKZ223911/1

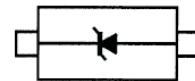
Unit in mm



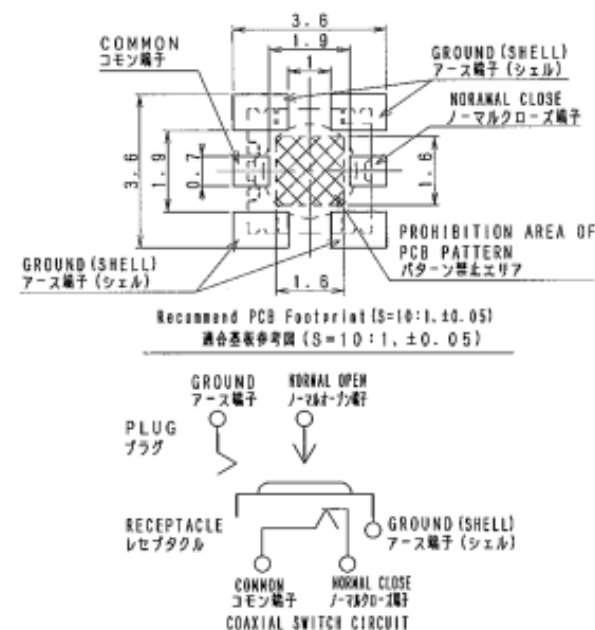
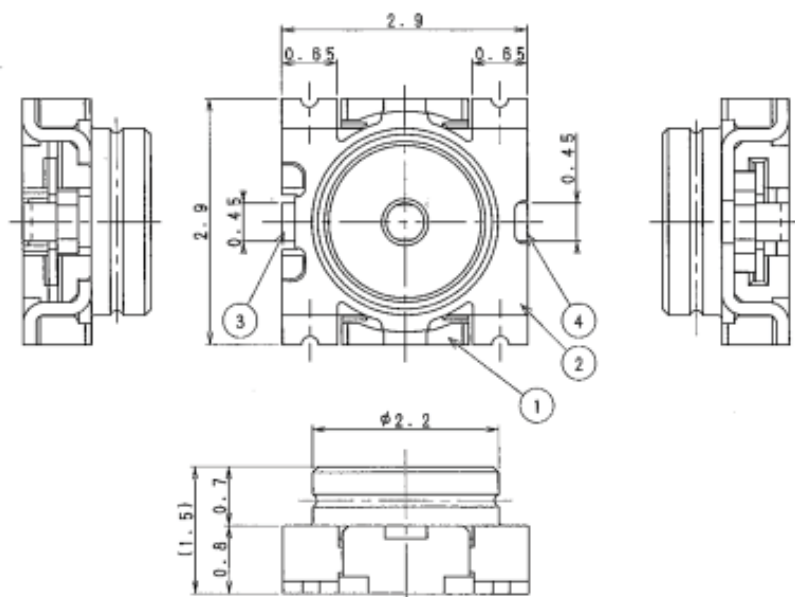
Marking



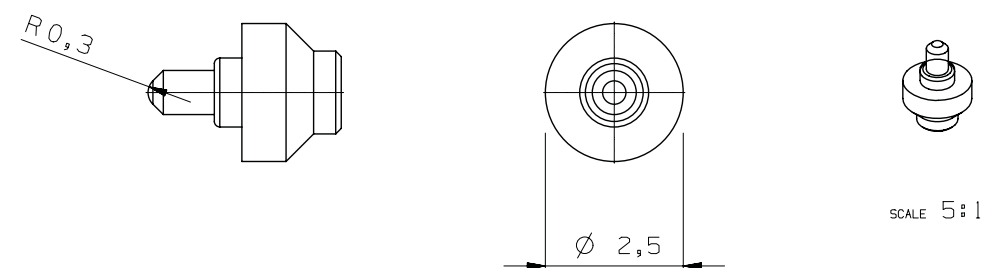
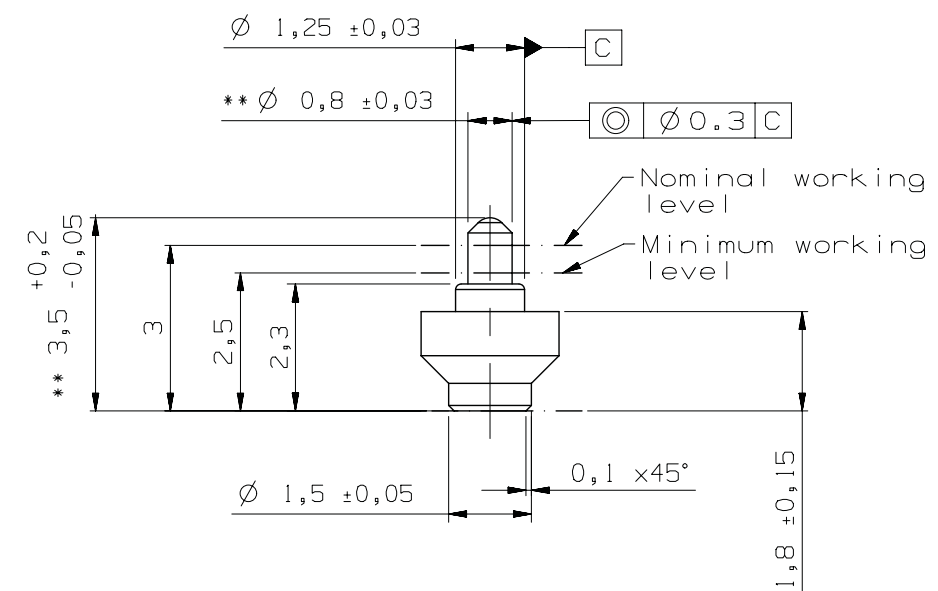
Equivalent Circuit (Top View)



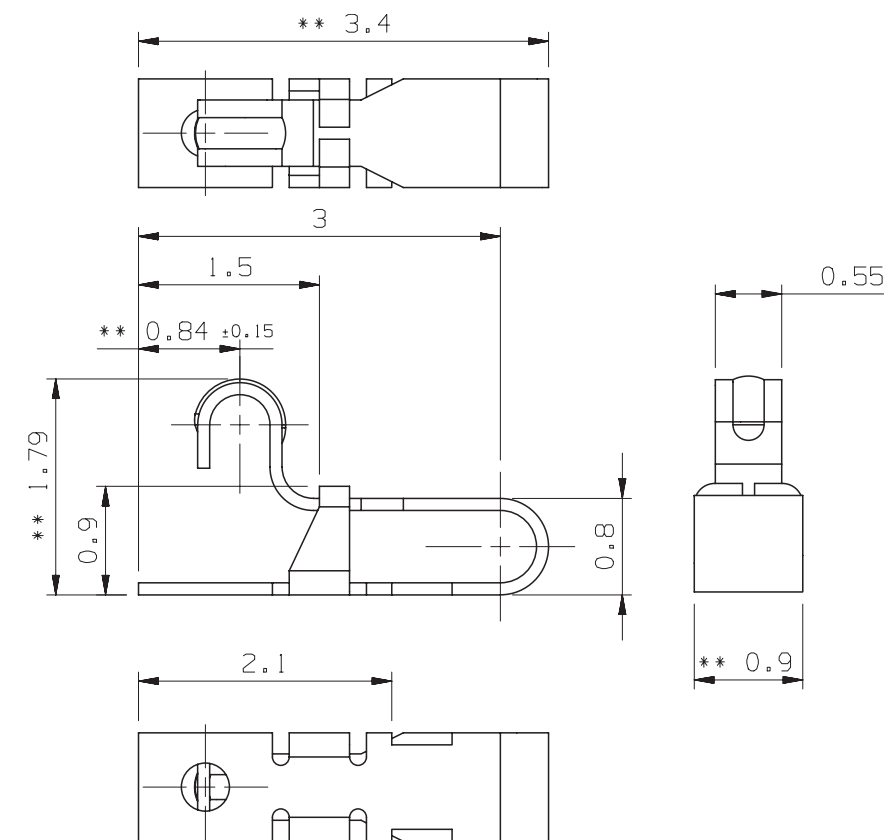
X1200 Antenna Switch Conn RPT79947



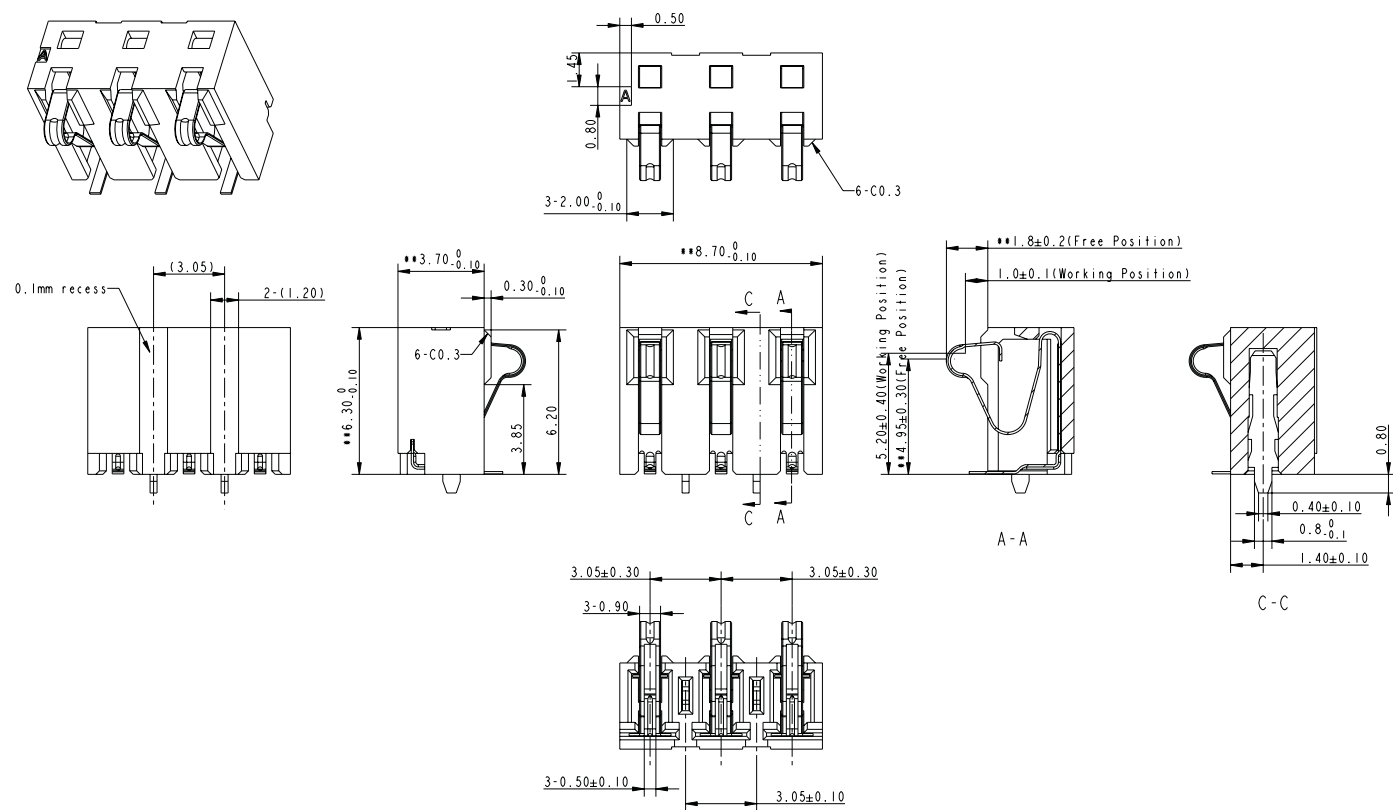
X1201, X1202, X1203 Internal Antenna Connector SMD10625



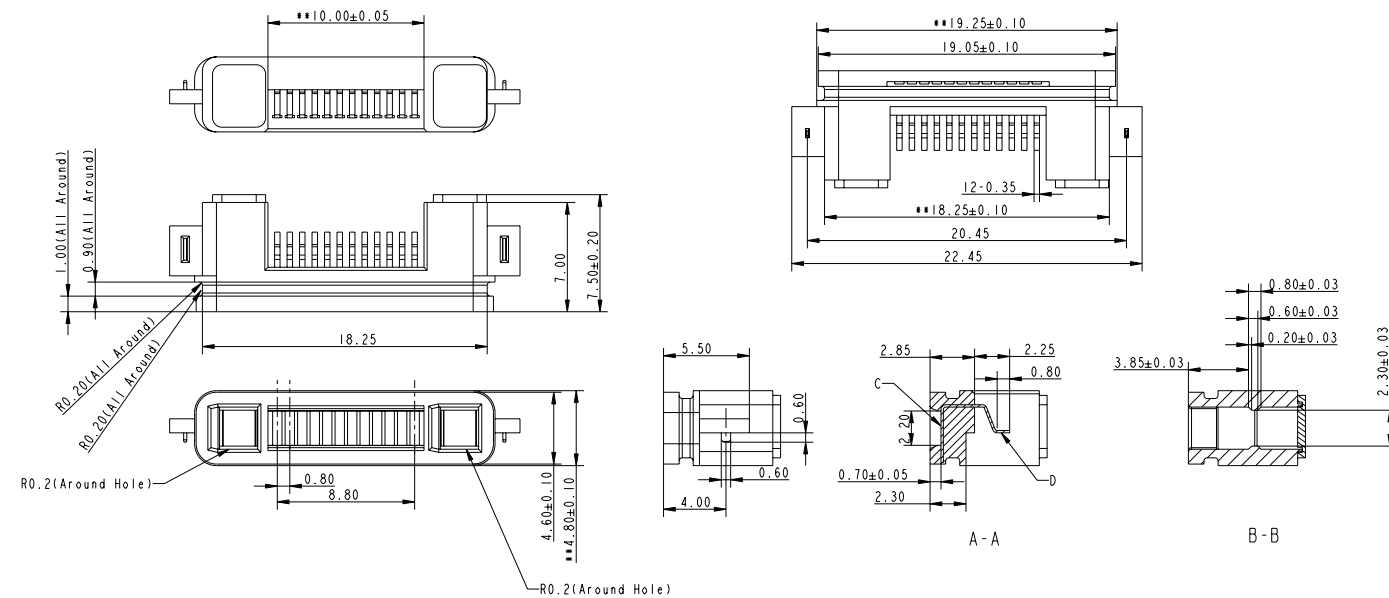
X1301, X1302, X1430, X1431 Connector SND90158



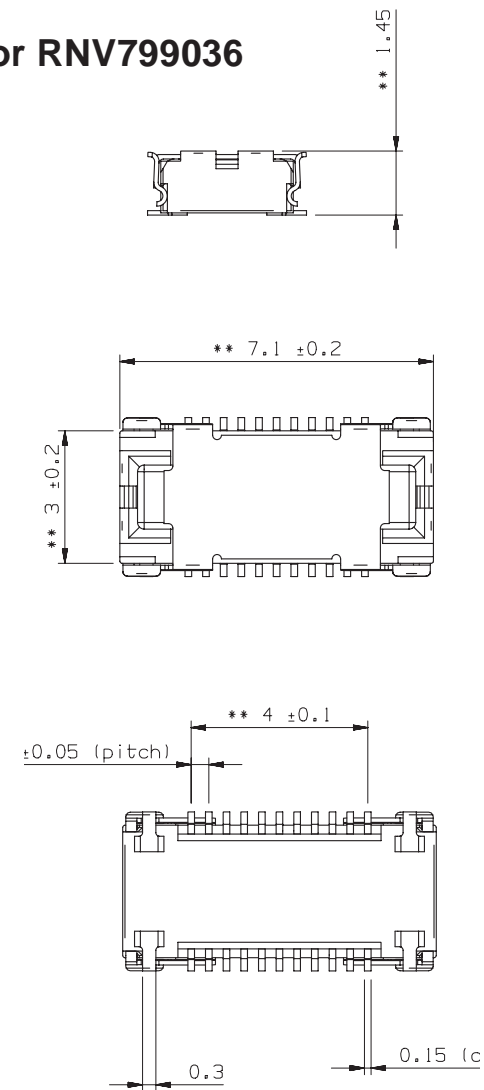
X2200 Battery Connector 1203-3156



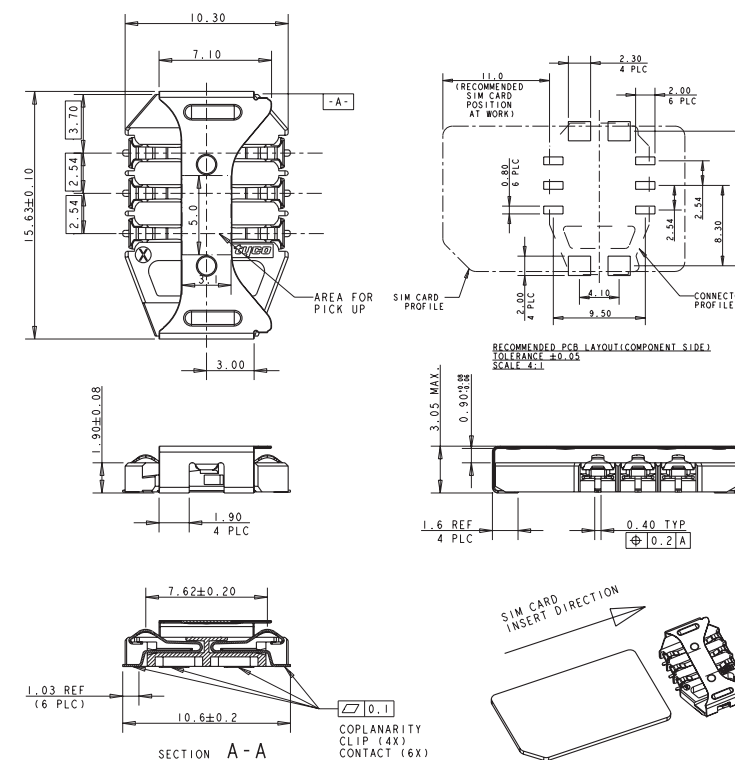
X2300 System Connector 1202-0855



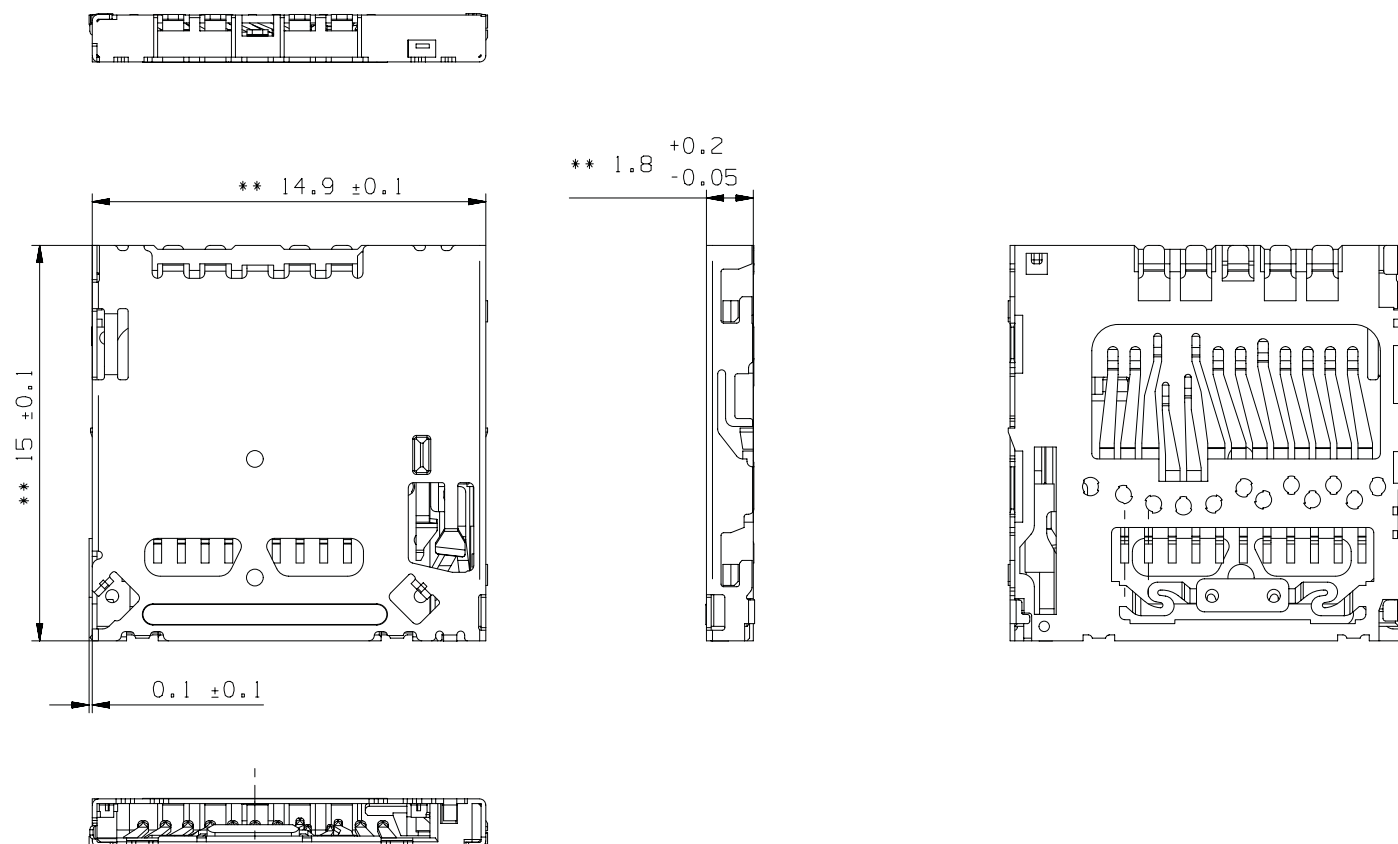
X2402 Keypad Connector RNV799036



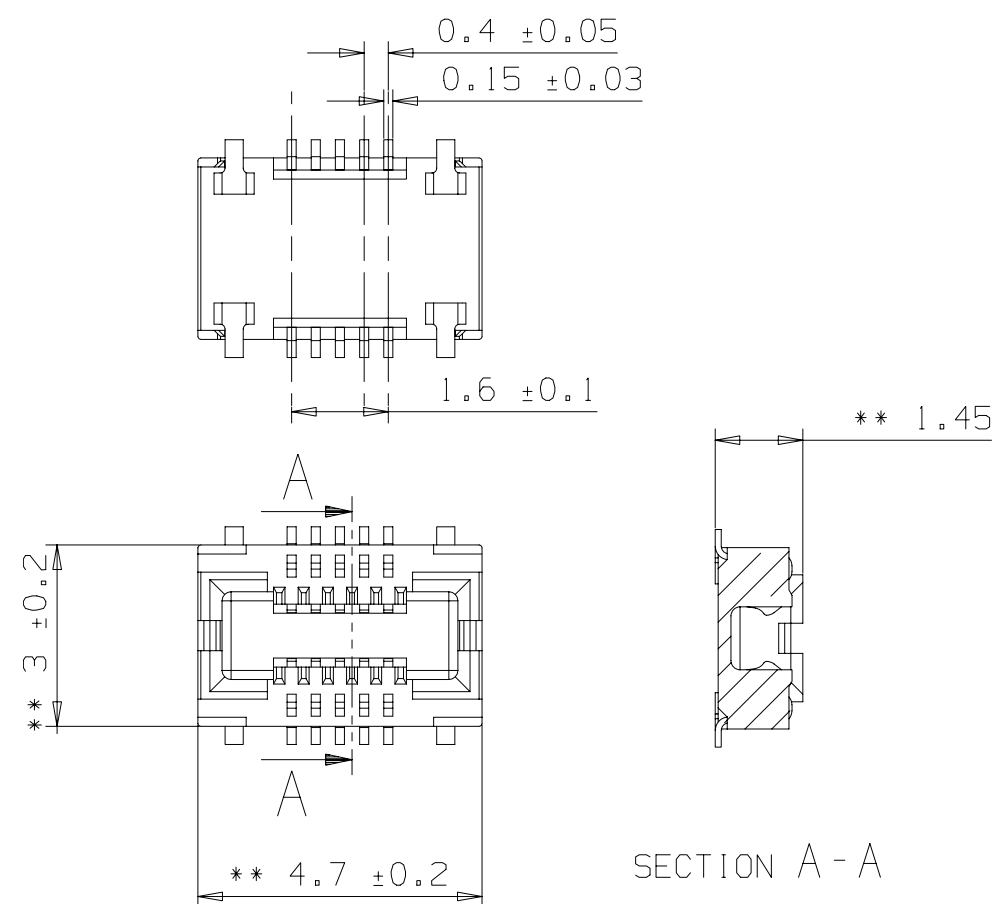
X2403 SIM Connector 1201-9946



X2490 MS-Micro Pico Holder RNK87147/2

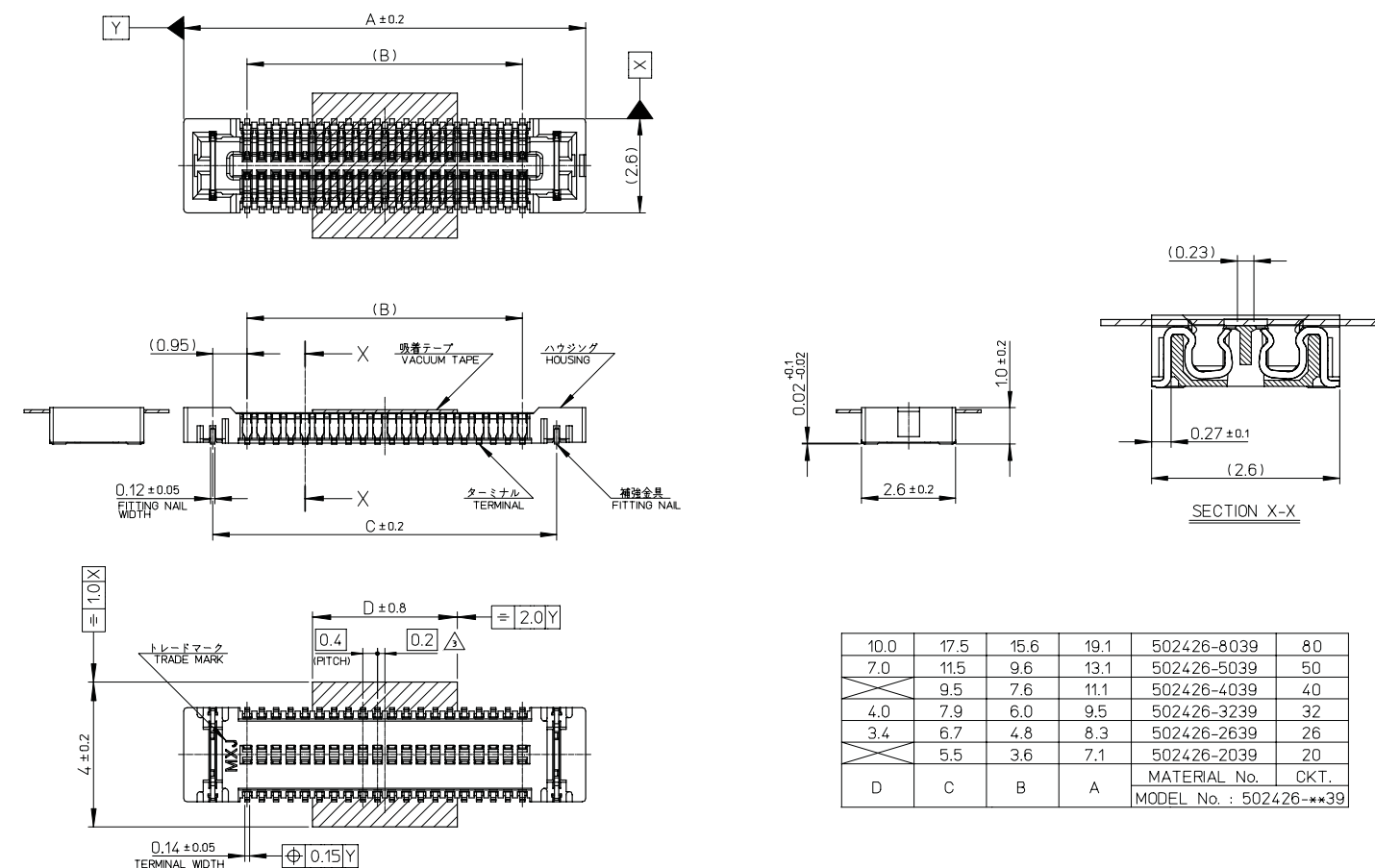


X4201 B to B Connector 1202-0859

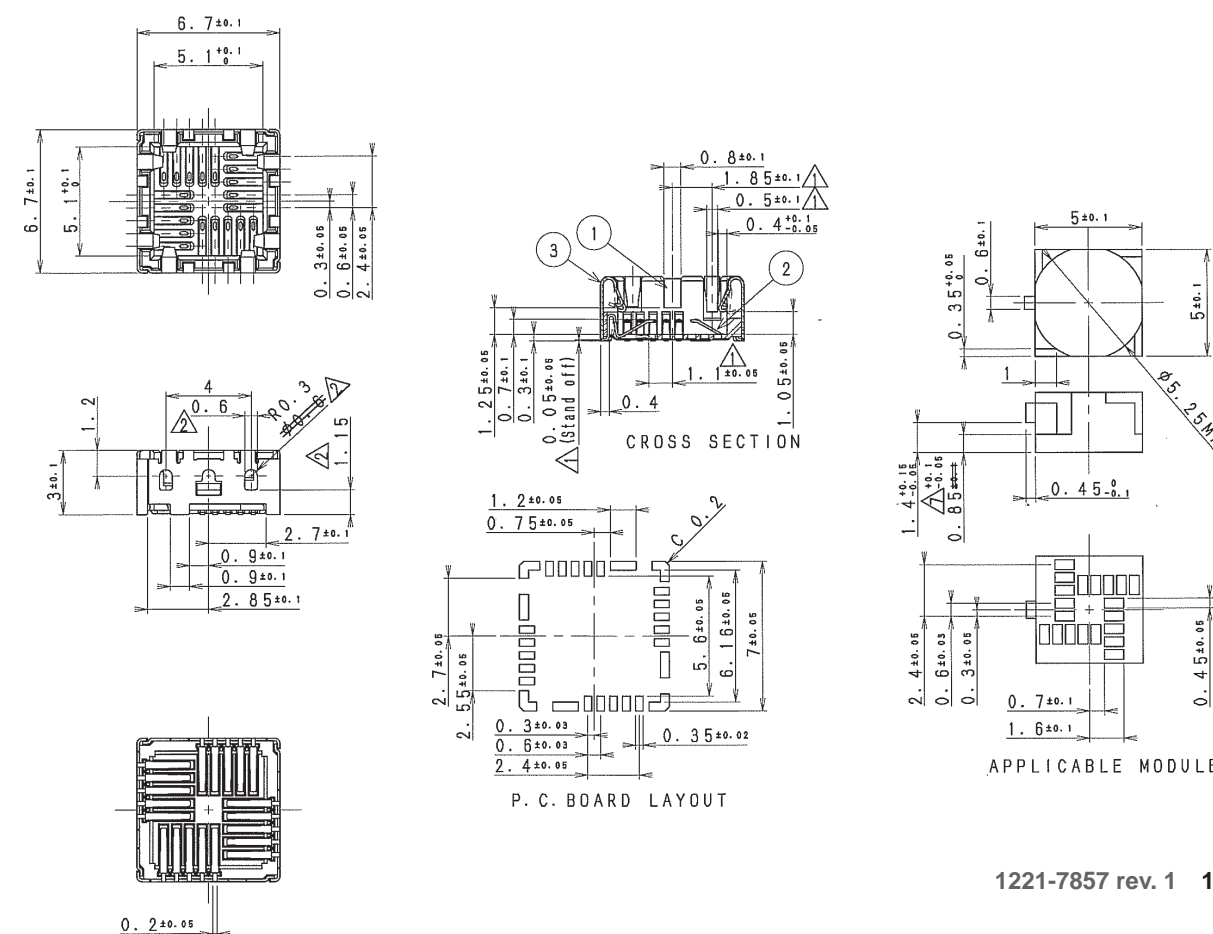


SECTION A-A

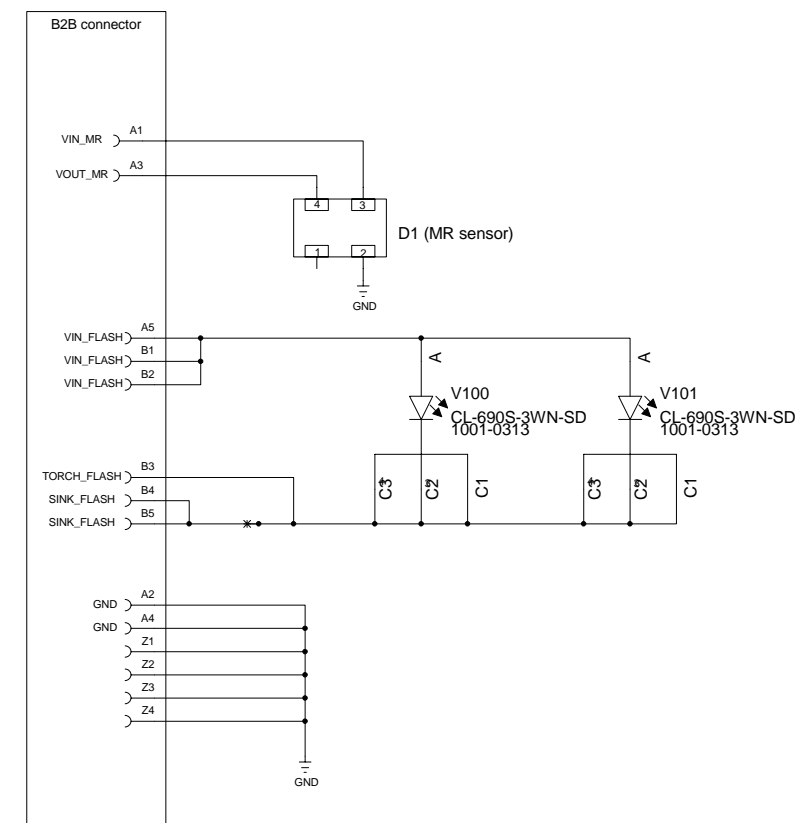
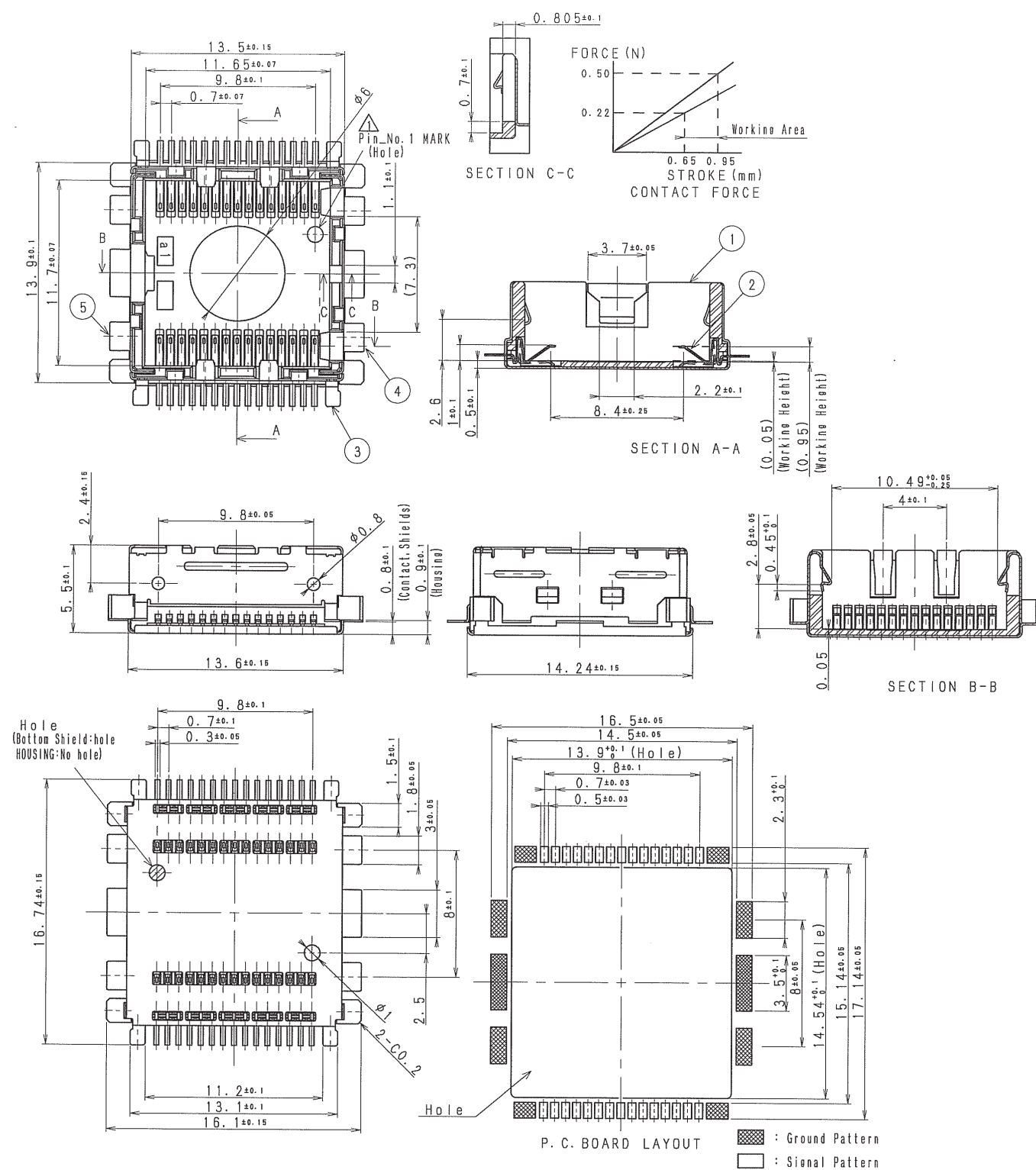
X4202 Conn BtB Receptacle 26p 1202-9266



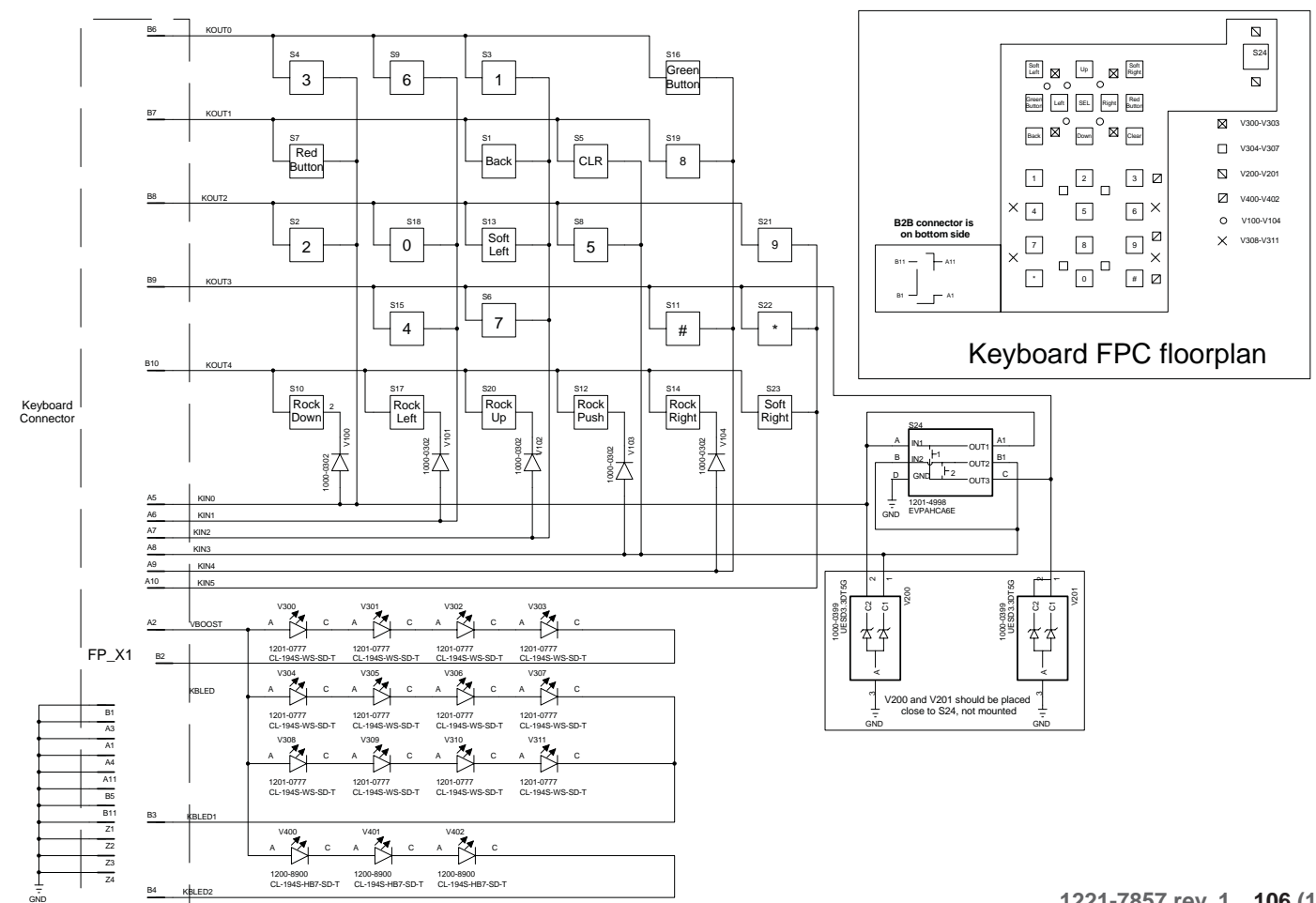
X4300 VGA Camera Connector RNV799045/22



Flash FPC Schematics



Keyboard FPC Schematics



Troubleshooting Software Documentation

Introduction

Using this software you can control most parts and functions of all Sony Ericsson mobile phones. It is a GUI (Graphical User Interface) for the commands implemented in the ITP (Integrated Test Program). 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.

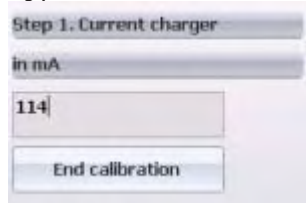
More information about the test limits can be found in the product specific Troubleshooting Manual and in the **Read Limits Table** in the **Battery and Current Calibration Test** document.

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.

Fault Trace SW Error Messages

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

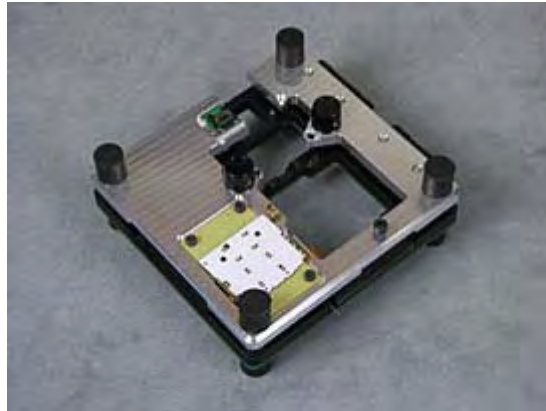
CERR: Error_CommandDoesNotExist, ERR

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

Troubleshooting Fixture Setup Instructions

Top-view of the TRS Fixture, see picture 1.

Picture 1



The bottom of the TRS Fixture, see picture 2.

Picture 2



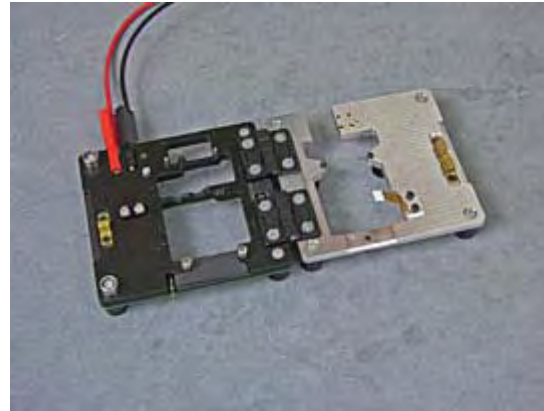
Open the TRS Fixture according to picture 3.

Picture 3



Connect Power Supply Channel 1 VBATT (Black and Red plugs) according to picture 4.

Picture 4



Insert SIM Card if needed according to picture 5.

Picture 5



Insert Memory Card if needed according to picture 6.

Picture 6



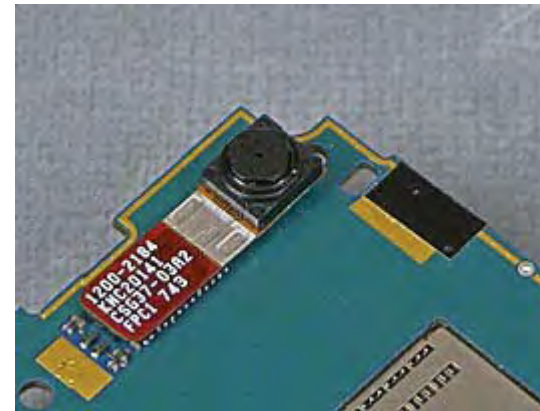
Connect Main Camera directly to the PBA if needed, according to picture 7.

Picture 7



Connect VGA Camera directly to the PBA if needed, according to picture 8.

Picture 8



Connect Flash FPC directly to the PBA if needed, according to picture 9.

Picture 9



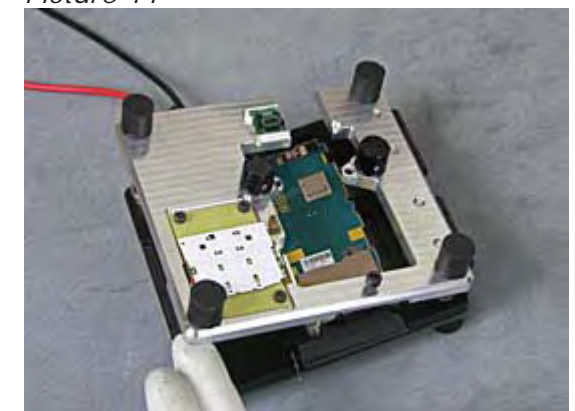
Place the PBA by using Guide Pin mounted inside the TRS Fixture according to picture 10.

Picture 10



Close the TRS Fixture according to pictures 11 and 12.

Picture 11



Picture 12



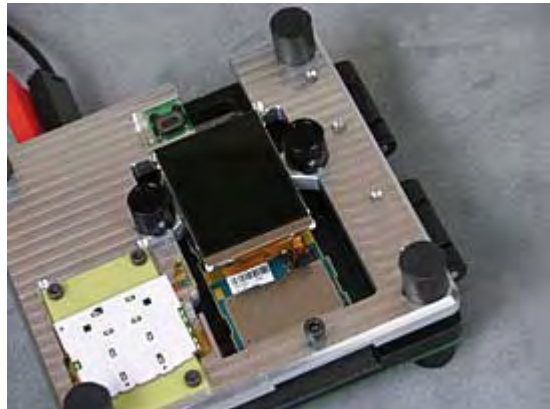
Connect Display if needed, according to picture 13.

Picture 13



Place the Display on TRS Fixture according to picture 14.

Picture 14



Lock the Display with locking screw according to picture 15.

Picture 15



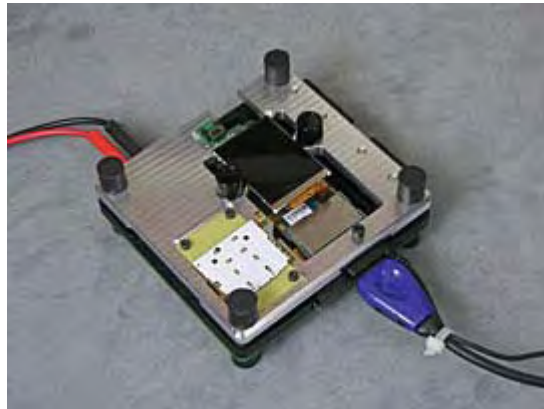
Connect the Keypad Flex Cable to the board-to-board connector mounted on the PBA when Keypad is in use according to picture 16.

Picture 16



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

Picture 17



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

Picture 18



Connect SMK RF Probe to the PBA by using RF Connector Frame according to picture 19.

Picture 19



Secure the SMK RF Probe with the RF Probe locking device (RF Connector) according to picture 20.

Picture 20



Connect the Customized FM Radio Cable according to **Step 1** and **Step 2**.

Step 1:
Connect the Black Lab Plug to the TRS Fixture GND input according to picture 21.

Picture 21



Step 2:
Connect the Hands-Free (PHF) connector to the Phone system connector (X2300) according to picture 22.

Picture 22



Please see the picture 23 for the final Customized FM Radio Cable connection setup with the TRS Fixture.

Picture 23



The Pin mounted inside of the TRS Fixture marked with "RED" arrow can be used as MP TRS Fixture GND or grounding for the oscilloscope probe, see picture 24.

Picture 24

