WLR089 Xplained Pro PCB Specification

Table of Contents

1 General information

1.1 Board identification

Name: WLR089 Xplained Pro
Board identification number: A08-3068 Rev1

2 PCB specification

2.1 Manufacturing data

- Size: 60mm x 85.13mm
- PCB material: FR-4, 1.2mm thickness
- Layers: 4
- Finish: ENIG
- Minimum via hole size: 0.20 mm
- Minimum via pad size: 0.40 mm
- Minimum track width: 0.1 mm (3.937mil)
- Minimum spacing: 0.089 mm (3.5mil)
- Solder mask color: Dark BLUE
- Silk-screen color: White
- Controlled impedance on top side for differential USB tracks (0.178mm trace width and 0.127mm gap)

2.2 Layer stack up

Figure 2-1 shows the detailed layer stack up for this PCB.

Figure 2-1 Detailed layer stack up

Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.010mm	3.5	
1	Top Layer LF-signals	Copper	0.036mm		
	Dielectric1	FR-4	0.152mm	4.6	
2	GND	Copper	0.035mm		
	Dielectric 4	FR-4	0.733mm	4.6	
3	PWR	Copper	0.036mm		
	Dielectric 3	FR-4	0.152mm	4.6	
4	Bottom Layer LF-signals	Copper	0.036mm		
	Bottom Solder	Solder Resist	0.010mm	3.5	
	Bottom Overlay				

2.3 Gerber files

Table 2-1 Layer stack up corresponding Gerber files (listed from top to bottom)

File name	Description
WLR089_Xplained_Pro .GTP	Gerber file for top paste-mask
WLR089_WLR089_Xplained_Pro.GTO	Gerber file for top overlay (silkscreen)
WLR089_WLR089_Xplained_Pro.GTS	Gerber file for top solder-mask
WLR089_Xplained_Pro.GTL	Gerber file for top layer
WLR089_Xplained_Pro.G1	Gerber file for internal layer 1 (GND layer)
WLR089_Xplained_Pro.G2	Gerber file for internal layer 2 (power layer)
WLR089_Xplained_Pro.GBL	Gerber file for bottom signal layer
WLR089_Xplained_Pro.GBS	Gerber file for bottom solder-mask
WLR089_Xplained_Pro.GBO	Gerber file for bottom overlay (silkscreen)
WLR089_Xplained_Pro.GBP	Gerber file for bottom paste-mask
WLR089_Xplained_Pro.GM4	Gerber file for mechanical 4 layer (board dimension and Fab Note)
WLR089_Xplained_Pro.DRR	NC Drill report file
WLR089_Xplained_Pro_-RoundHoles.txt	Text file for Round holes
WLR089_Xplained_Pro_-SlotHoles.txt	Text file for Slot holes

2.4 Special via considerations

All vias are covered with solder mask on the top side of the board. On the bottom side vias that are used as test points have openings in the solder mask.

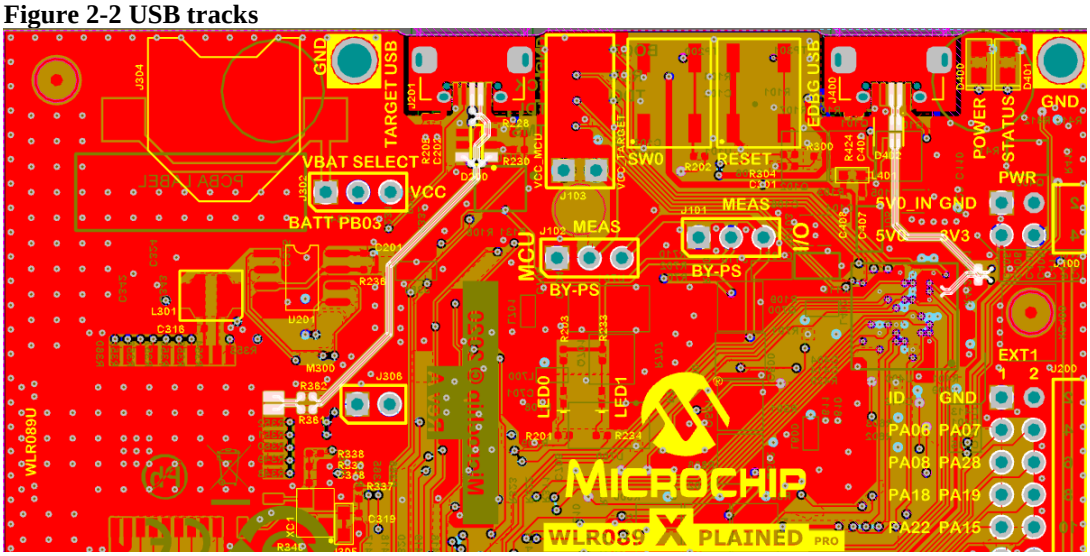
2.5 Placement of fabrication ID mark

The fabrication ID mark should be placed on the bottom side.

2.6 Controlled Impedance

Controlled impedance for USB tracks on top and bottom layer with 90 Ohms differential.

Figure 2-2 USB tracks



3 Panelizing

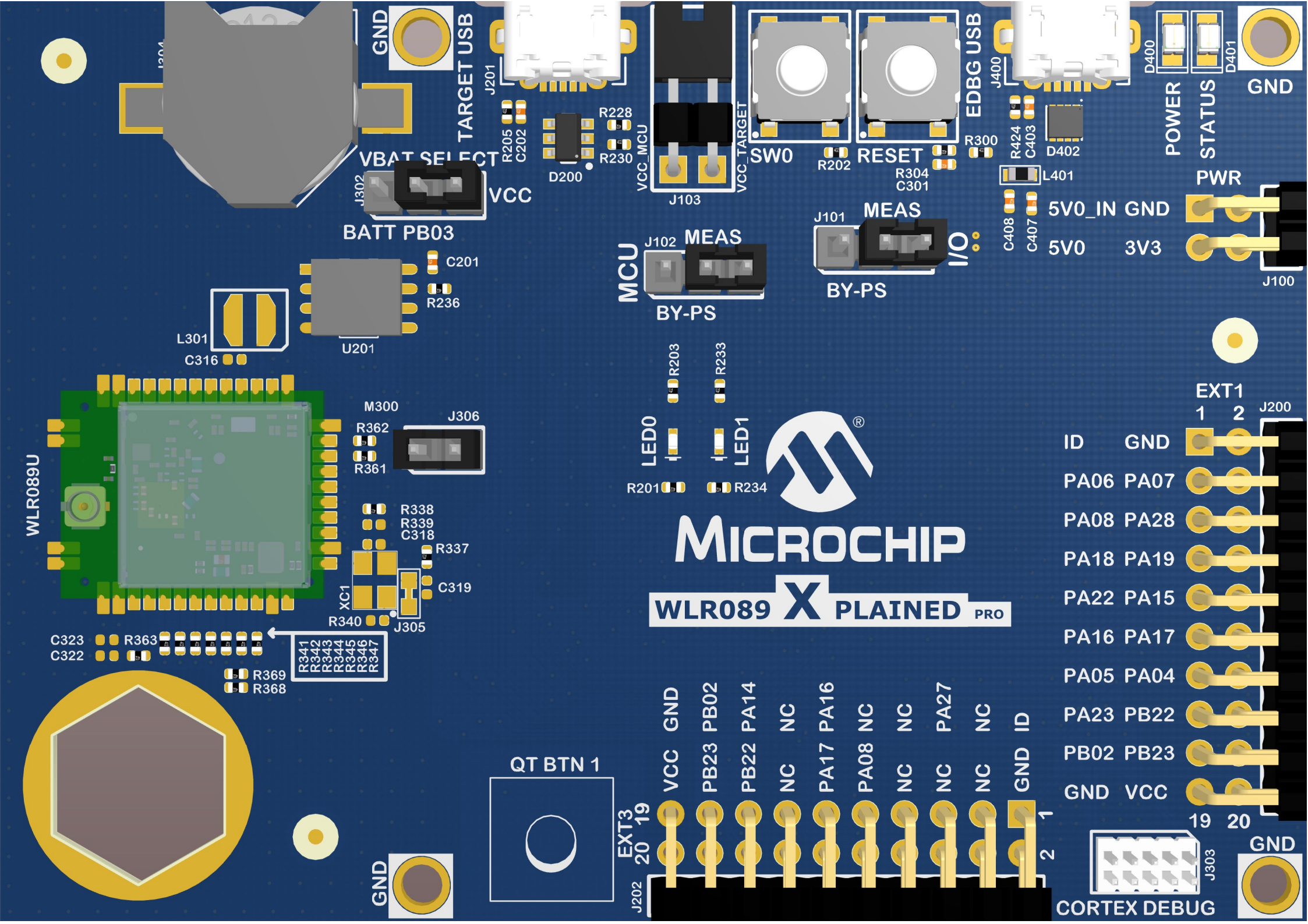
When making panels for this board the following issues should be considered.

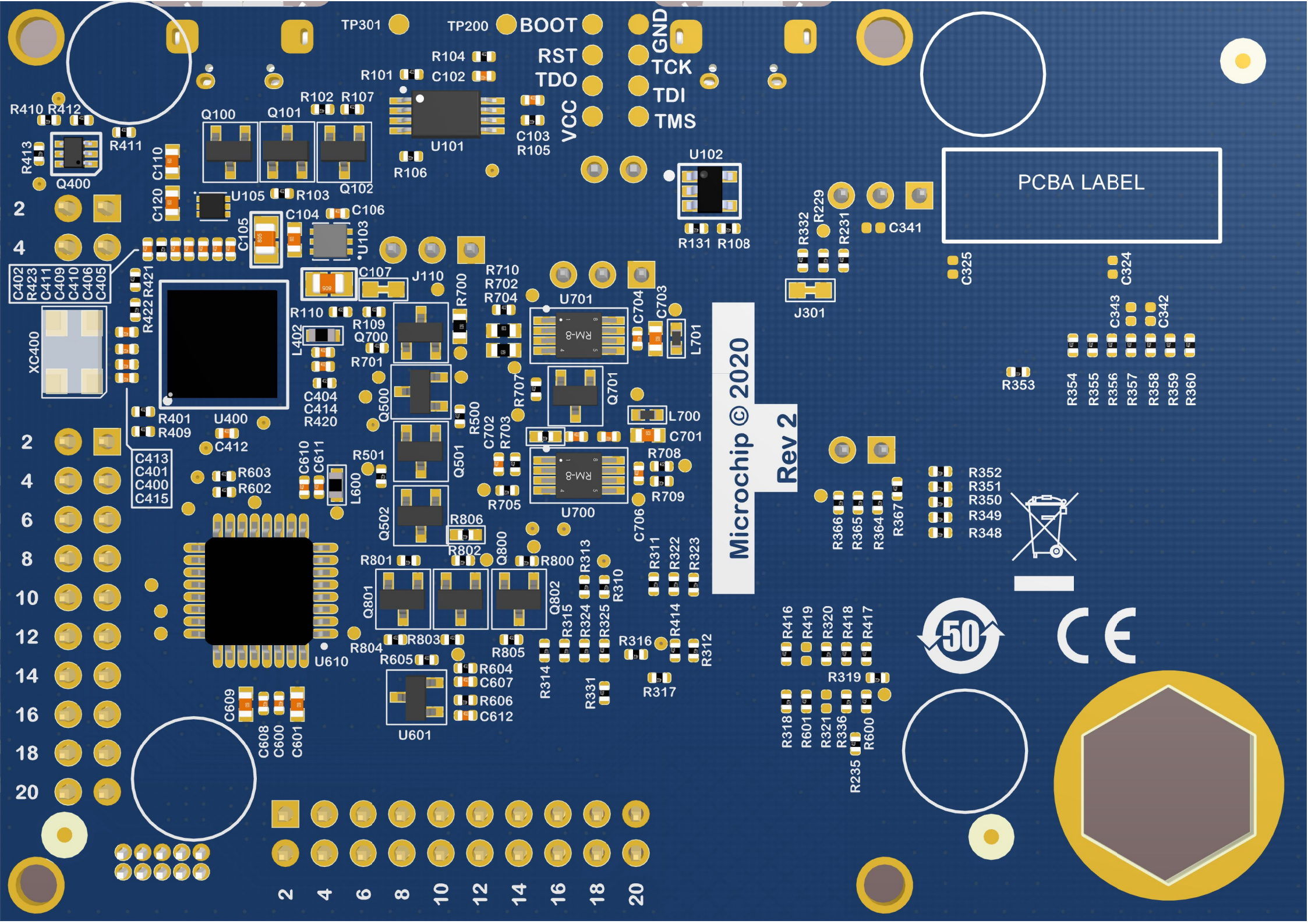
- Fiducial marks should be placed on the panel.

4 Quality of silkscreen layers

The silkscreen layers for the PCB must be of high quality for several reasons:

- Very small text is used
- Text is close to pads and therefore the mask must be centered properly on the board
- The PCB is used for development boards and therefore the silkscreen is an essential part of the overall product quality.


GND
TARGET USB
J201
R205
C202
R228
R230
D200
VCC_MCU
J103
VCC_TARGET
SW0
R202
RESET
R304
C301
EDBG USB
J400
R300
R424
C403
D402
L401
C408
C407
D400
D401
POWER
STATUS
GND
VBAT SELECT
J302
VCC
BATT PB03
PWR
5V0_IN GND
5V0 3V3
J100
J101
MEAS
I/O
BY-PS
J102
MEAS
MCU
BY-PS
C201
R236
U201
L301
C316
EXT1
1 2
J200
ID GND
PA06 PA07
PA08 PA28
PA18 PA19
PA22 PA15
PA16 PA17
PA05 PA04
PA23 PB22
PB02 PB23
GND VCC
19 20
R203
R233
LED0
LED1
R201
R234
M300
R362
R361
J306
WLR089U
R338
R339
C318
R337
C319
XC1
R340
J305
C323
C322
R363
R341
R342
R343
R344
R345
R346
R347
R369
R368
MICROCHIP
WLR089 X PLAINED PRO
QT BTN 1
EXT3
19
20
J202
VCC GND
PB23 PB02
PB22 PA14
NC NC
PA17 PA16
PA08 NC
NC NC
NC PA27
NC NC
GND ID
1
2
J303
CORTEX DEBUG
GND


TP301
TP200
BOOT
RST
TDO
VCC
GND
TCK
TDI
TMS
PCBA LABEL
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Rev 2
U101
U102
U105
U103
U701
U700
U400
U610
U601
Q100
Q101
Q102
Q400
Q700
Q500
Q501
Q502
Q701
Q800
Q801
Q802
J110
J301
XC400
L402
L600
L700
L701
C107
C412
C609
C608
C600
C601
R101
R102
R103
R104
R105
R106
R107
R108
R131
R229
R231
R332
C341
C325
C324
C343
C342
R353
R354
R355
R356
R357
R358
R359
R360
R348
R349
R350
R351
R352
R365
R366
R367
R364
R401
R409
R603
R602
R501
R806
R802
R801
R803
R804
R605
R604
R607
R606
R612
R805
R800
R313
R310
R311
R322
R323
R414
R316
R317
R312
R314
R315
R324
R325
R331
R416
R419
R320
R418
R417
R319
R318
R601
R321
R336
R600
R235
C110
C120
C104
C106
C105
C103
C102
C404
C414
C420
C610
C611
C413
C401
C400
C415
C703
C704
C702
C701
C706
R410
R412
R411
R413
R422
R421
R423
C402
C411
C409
C410
C406
C405
R710
R702
R704
R700
R707
R703
R705
R708
R709
R110
R109
R701
R500
R702
2
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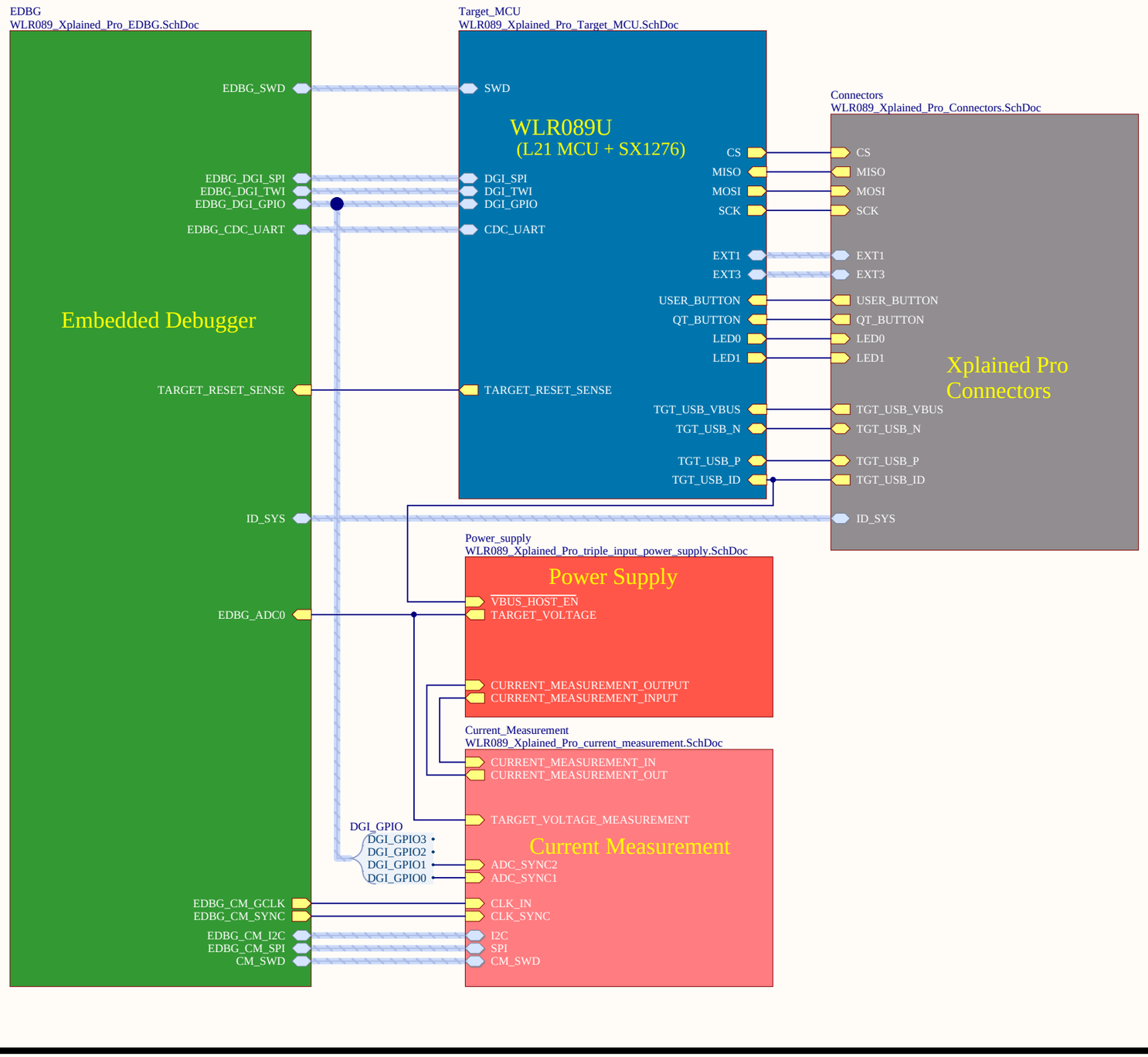
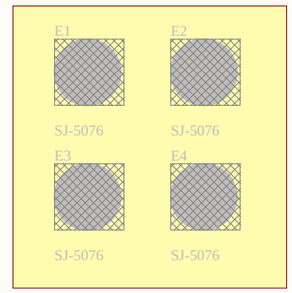
14
16
18
20

WLR089 Xplained Pro

Top Level Schematic





LABEL1

Product number/revision
Serial number

Label PCBA with Contains FCC&IC ID

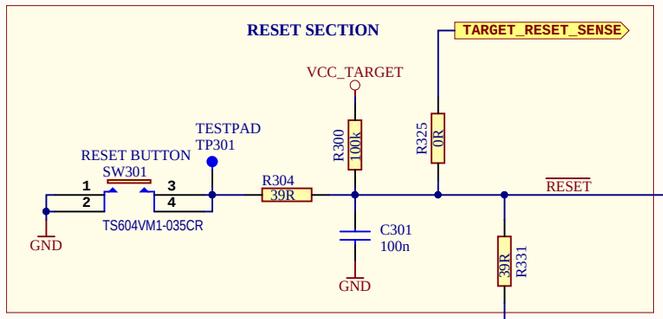
Microchip	*		
India	*		
	*		
Date:	9/15/2020	9:28:54 PM	PAGE: 1 of 11
Document number:			Revision: 1
TITLE: Top_Level_Schematics			
WLR089_Xplained_Pro_TopLevel.SchDoc			

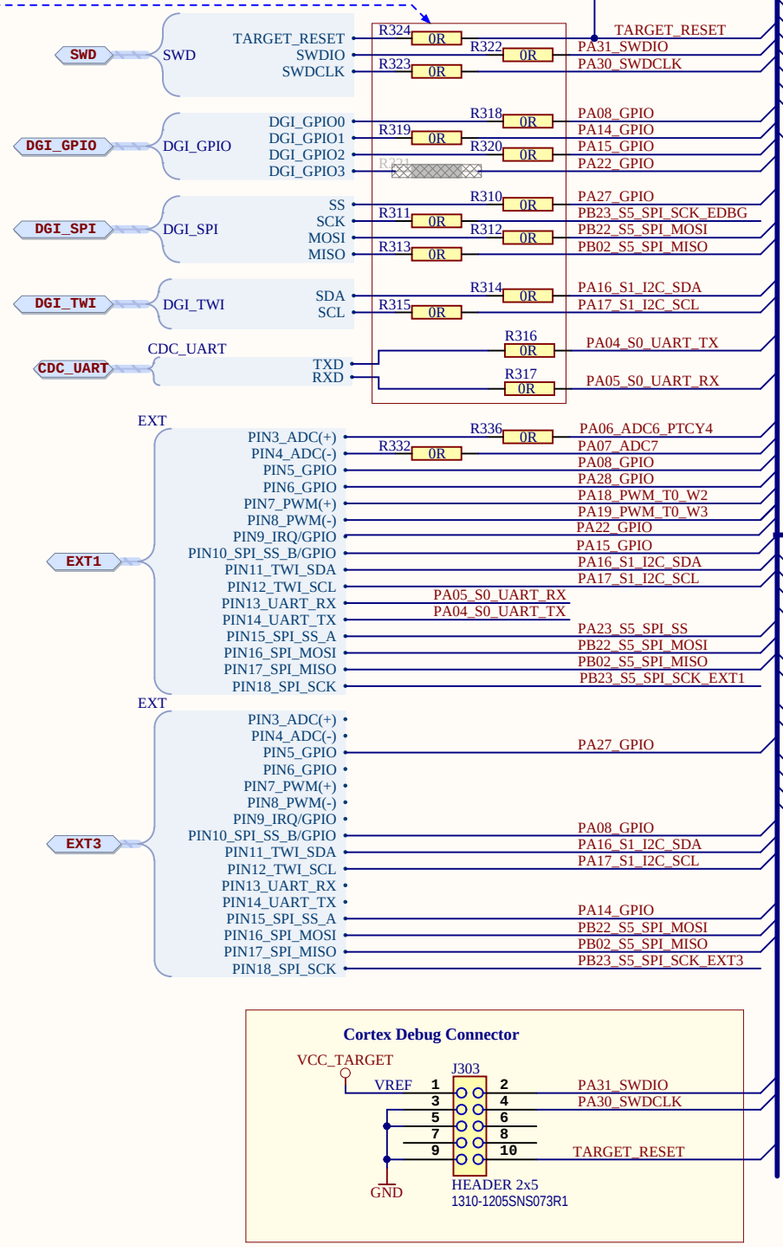
WLR089U Module Section

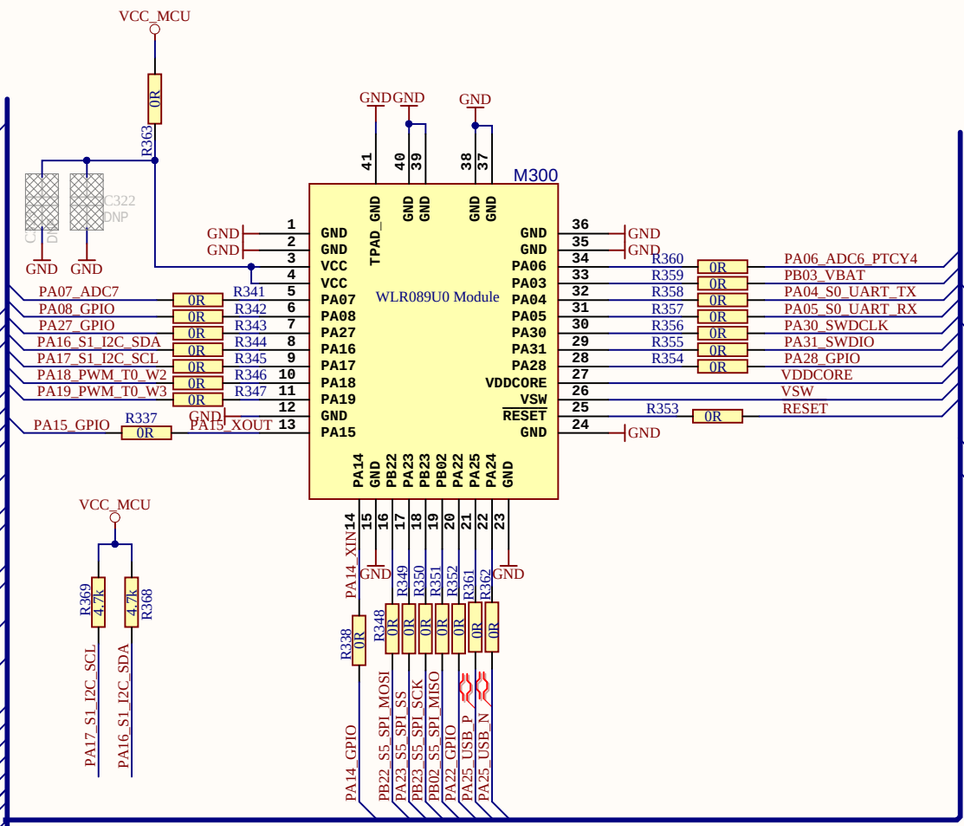
For evaluation of low voltage operation (down to 1.8V) the board has to be powered by an external source through pin 4 of the PWR header (J100) and an external debugger has to be connected to J303.

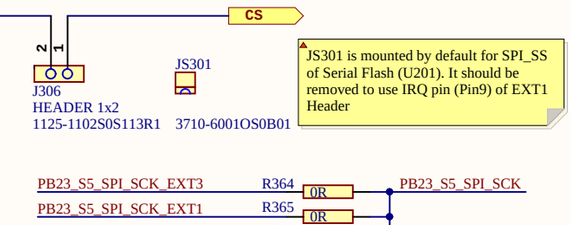
When evaluating low voltage operation the Embedded Debugger (EDBG) has to be disconnected in order to prevent powering through IO, this can be done by de-soldering 0-ohm reistors on all signals from the EDBG to the WLR089U Module.

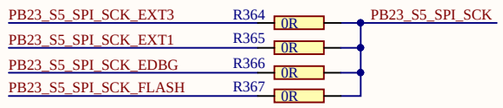
For more details please refer to the hardware users guide.

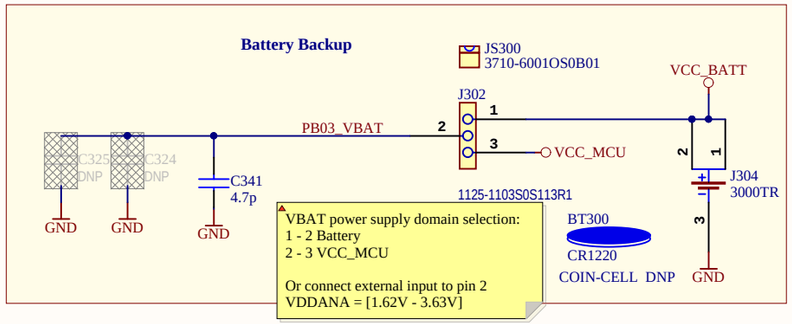












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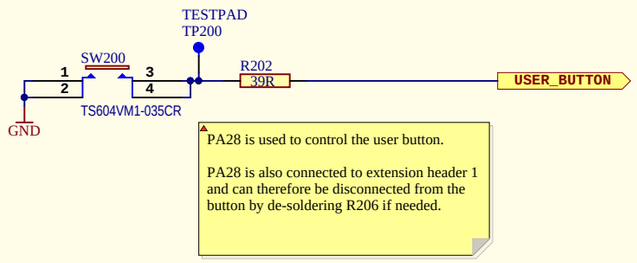
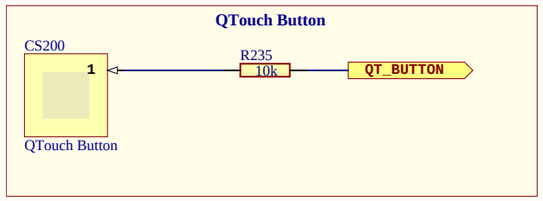
Document number:			Revision 1
TITLE: Target_MCU_Section			
WLR089_Xplained_Pro_Target_MCU.SchDoc			

Xplained Pro Connectors

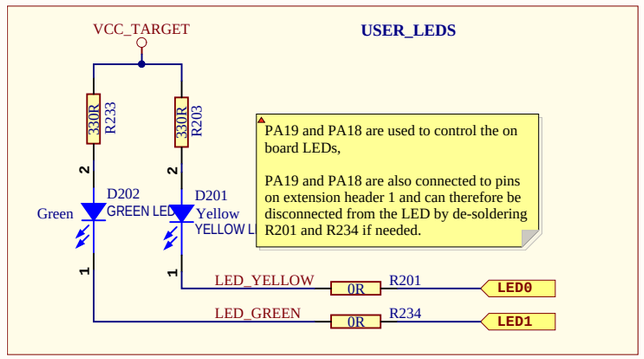
USER_BUTTON



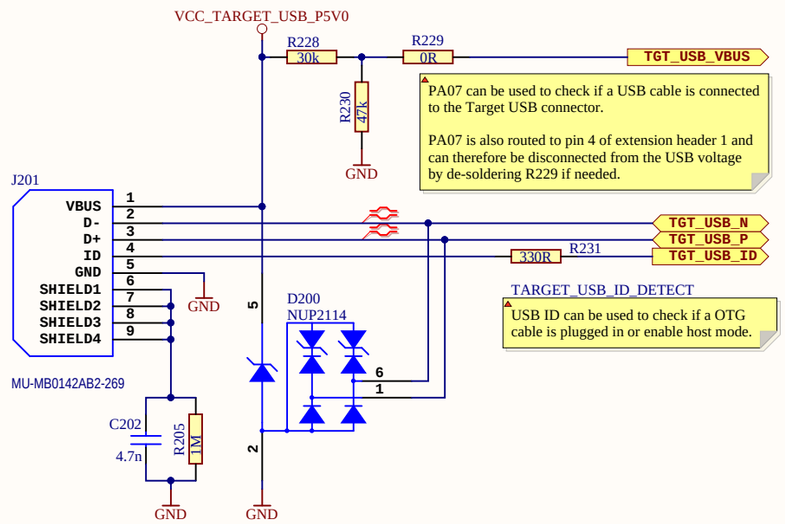
QTouch Button



USER_LEDS

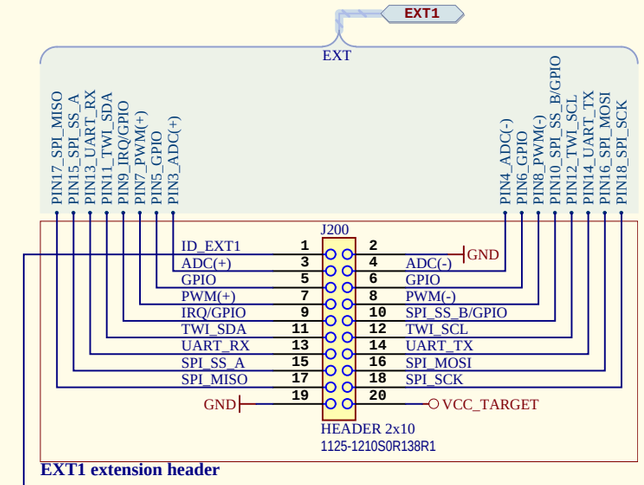


Target MCU USB



Xplained Pro Extension Headers

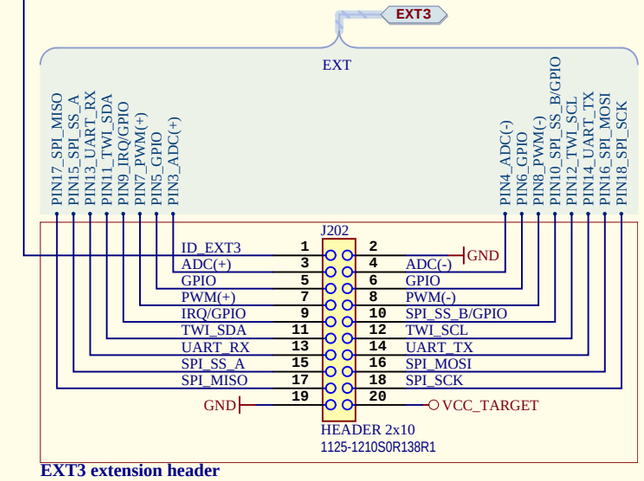
Extension Header-1



EXT1 extension header

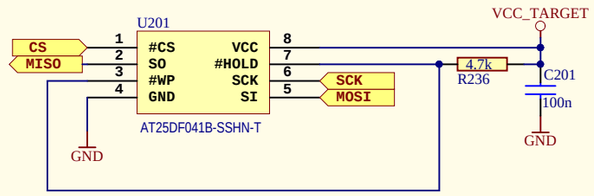
ID_SYS
ID_SYS
ID_3
ID_1

Extension Header-3



EXT3 extension header

Serial Flash



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India	*		
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Document number:			Revision 1
TITLE: Connectors_Peripherals_Section			
WLR089_Xplained_Pro_Connectors.SchDoc			

Power Supply Section

Power inputs to the Xplained PRO:	
VCC_EXT_P5V0	This power input can be used to power the whole board and it has a higher priority than the USB power inputs.
VCC_EDBG_USB_P5V0	EDBG USB power input. This supply is used when VCC_EXT_P5V0 is not present.
VCC_TARGET_USB_P5V0	Target MCU USB power input. It is used to power the whole board when no other 5V power supply is present.

Other voltages:	
VCC_P5V0	This supply is connected to either VCC_EXT_P5V0, VCC_EDBG_USB_P5V0 or VCC_TARGET_USB_P5V0 based on the availability and priority ot these supplies.
VCC_P3V3	Regulated 3.3V from VCC_P5V0
VCC_TARGET	Target supply voltage (Target MCU and Peripherals)

Power Connector

VCC_TARGET, J100 HEADER 2x2 1125-1202S0R138R1, GND, VCC_EXT_P5V0, VCC_P5V0

Polarity protection

Q100 IRLML6402

Input voltage detection

Q101 IRLML6402, R103 100k, R102 39k, R107 47k, Q102 2N7002,215, GND

INPUT_VOLTAGE_DETECTED

Each FET in the power path has a RDSon of <50mOhm@VGS= -5V with a current of up to 20A
That means we can expect a maximum voltage drop across the FETs of 50mV@500mA, 100mV@1A and 200mV@2A.
For USB host mode we need a voltage between 4.4V to 5.25V so the drop that we have is ok.

Power multiplexer

U101 TPS2113PWR (STAT, EN, VSNS, ILIM, IN1, OUT, IN2, GND)
R101 1M, R106 390R, C102 100n, C103 100n, R104 1M, R105 1M
VCC_EDBG_USB_P5V0, VCC_TARGET_USB_P5V0, VCC_P5V0, GND

The current through this switch is limited with the 390 Ohms resistor to IL = 250/Rlimit = 641 mA. This is a typical value and according to the datasheet we can expect a minimum of 510 mA and a maximum of 800 mA.
The switch (TPS2113A) has a on-resistance of typically 84 mOhm (and maximal 110mOhm).

3.3V linear regulator EDBG and CM

U105 TLV70033DSET (IN, OUT, EN, NC, GND, NC)
C110 4.7uF, C120 4.7uF
VCC_EDBG_P3V3, VCC_CM_P3V3, GND

Iout max = 200mA
Accuracy 2%
Low noise: 48 uVrms (10 Hz to 100 kHz)
Dropout 150mV at full load
Quiescent current 55 uA (no load)
Current limit max 860 mA
Thermal shutdown
Minimum capacitance required on output is 0.1uF (with less than 200mOhm ESR)

5V POWER SWITCH FOR USB OTG

U102 STMPS2161STR (IN, OUT, GND, EN, FAULT)
VCC_P5V0, VCC_TARGET_USB_P5V0, VCC_TARGET, R108 100k, R131 100k, GND, VCC_TARGET
VBUS_HOST_EN

VBUS control:
The state of the ID line will determine if VBUS is enabled for HOST mode. If ID is GROUNDED, VBUS will be enabled. For the 4 other states (RID_A, RID_B, RID_C and FLOATING), the VBUS can be provided by the connected peripheral/host and the switch will be open.

This can be overrided by driving the pin low.

The logic state of the IO pin can be read dircetly for use with either GROUNDED or FLOATING ID pin, but for the other 3 states reading with an ADC is recommended.

J101 (Power to peripherals):
Place jumper on 1-2 for bypassing current measurement for VCC_TARGET.

Place jumper on 2-3 for including VCC_TARGET in current measurement.

Power supply muxing

The target peripheral and the MCU can be powered either directly from the regulator or from the current measurement circuitry. When powered from the current measurement the supply voltage will vary from 3.3 V to 3.2 V due to the voltage drop over the current measurement shunt resistor.

JS100 3710-6001OS0B01, J101 1125-1103S0S113R1, VCC_TARGET

3.3V linear regulator Target

U103 (IN, NC, EN, GND, NR/FB, GND), TPS73533DRVT
C105 22u, C104 4.7uF, C106 10n, C107 22u, GND
VCC_P5V0, VCC_P3V3, J110, VCC_CM_IN_P3V3
R109 47k, R110 47k, TARGET_VOLTAGE

500mA low noise LDO voltage regulator
Noise: 28uVrms
Accuracy 2%
Dropout 280 mV at full load
Quiescent current 46 uA
Current limit 1170 mA
Thermal shutdown

CURRENT_MEASUREMENT_INPUT
CURRENT_MEASUREMENT_OUTPUT

J102 (Power to MCU):
Place jumper on 1-2 for bypassing current measurement for VCC_MCU.

Place jumper on 2-3 for including VCC_MCU in current measurement.

JS102 3710-6001OS0B01, J102 1125-1103S0S113R1, VCC_MCU, J103 Pin header 1x2 right angle, JS101 3710-6001OS0B01

Current measurements via external tools can be done either via this header or from the supply muxing header (this header is kept for compatibility reasons to the other Xplained Pro boards)

Microchip Norway	*		
Vestre Rosten 79	*		
N-7075 TILLER	*		
NORWAY			
Date:	9/15/2020	9:28:54 PM	PAGE: 6 of 11
Document number:			Revision 1
TITLE: Power_Supply_Section			
WLR089_Xplained_Pro_triple_input_power_supply.SchDoc			

Embedded Debugger

VCC_EDBG_P3V3
R401 1k
R409 1k
ID_SYS
ID_SYS
ID_3
ID_1
ID3
ID1
EDBG_CM_GCLK
SPI
SS
SCK
MOSI
MISO
EDBG_CM_SPI
EDBG_CM_SPI_SS
EDBG_CM_SPI_SCK
EDBG_CM_SPI_MOSI
EDBG_CM_SPI_MISO
I2C
SCL
SDA
EDBG_CM_I2C
EDBG_CM_SCL
EDBG_CM_SDA
Connect the test points during startup of the EDBG to force it into bootloader mode. The test points should be covered with solder so that it is easier to get a good contact.
TESTPAD TP400
TESTPAD TP401
EDBG_FORCE_BOOT
GND
XC400
12.00MHz
C400 22p
C401 22p
GND
GND
XIN0
XOUT0
TARGET_RESET_EDBG
SWDCLK
SWDIO
TARGET_RESET
SWDCLK
SWDIO
SWD
EDBG_SWD
TARGET_RESET
SWDCLK
SWDIO
SWD
CM_SWD
EDBG Power and Status LEDs
VCC_EDBG_P3V3
D400
17-21SYGC/S530-E2/TR8
D401
EL17-21UYC/A3
R410 1M
R411 330R
R412 330R
Q400B
2N7002DW
Q400A
2N7002DW
R413 1M
GND
GND
EDBG_CDC_UART
CDC_UART
TXD
RXD
Current limiters, 10mA @3.3V
R414 330R
EDBG_CDC_USART_RX
EDBG_CDC_USART_TX
EDBG_DGI_GPIO
DGI_GPIO
DGI_GPIO0
DGI_GPIO1
DGI_GPIO2
DGI_GPIO3
R416 330R
R417 330R
R418 330R
DGI_GPIO0
DGI_GPIO1
DGI_GPIO2
DGI_GPIO3
EDBG_DGI_SDA
EDBG_CM_SCL
EDBG_CM_SDA
EDBG_FORCE_BOOT
EDBG_ADC0
EDBG_ADC0
EDBG_DGI_TWI
DGI_TWI
SDA
SCL
EDBG_DGI_SCL
ID1
TARGET_RESET_EDBG
EDBG_CM_SPI_MOSI
U400
AT32UC3A4256J-C1UR
PA00 / PA18
PA01 / PA17
PA02 / PX47
PA03
PA04
PA05
PA06 / PA13
PA07 / PA19
PA08
PA09
PA10
PA11
PA12 / PA25
PA14 / PX11
PA15 / PX45
PA16
PA20 / PA18
PA21 / PX22
PA22 / PX20
PA23 / PX46
PA24 / PX17
PA26 / PB05
PA27
PA28
PA29
PA30
PA31
PC00 / PX14
PC01
PC02
PC03
PC04
PC05
PB00
PB01
PB02
PB03
PB04
PB06
PB07
PB08
PB09
PB10
PB11
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PX01
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PX03
PX04
PX05
PX06
PX07
PX08
PX09
PX10
PX12
PX13
PX15 / PX32
PX16 / PX53
PX19 / PX59
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PX31
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DPHS
DMFS
DPFS
USB_VBIAS
TCK
TDI
TDO
TMS
RESET_N
VDDANA
GNDANA
VDDIN
VDDCORE
GNDCORE
VDDIN
GNDPLL
VDDIO
GNDIO
EDBG_CM_SPI_MISO
ID3
EDBG_CM_SPI_SCK
SWDCLK
SWDIO
EDBG_CM_GCLK
EDBG_CM_RESET
EDBG_CM_SWDCLK
EDBG_CM_SWDIO
POWER_LED_CTRL
STATUS_LED_CTRL
TARGET_RESET_SENSE
EDBG_CM_SYNC
EDBG_SPI_DGI_MISO
EDBG_SPI_DGI_MOSI
EDBG_SPI_DGI_SCK
EDBG_SPI_DGI_SS
Current limiter, 10mA @3.3V
R420 330R
MISO
MOSI
SCK
SS
DGI_SPI
EDBG_DGI_SPI
TARGET_RESET_SENSE
EDBG_CM_SYNC
EDBG_JTAG_TCK
EDBG_JTAG_TDI
EDBG_JTAG_TDO
EDBG_JTAG_TMS
EDBG_RESET_N
TP402
TP403
TP404
TP405
TP406
TP407
VCC_EDBG_P3V3
Programming interface of the embedded debugger. The test points will be connected by needles in the test fixture for programming. GND test point is TP400.
Input filter on USB power input.
VCC_EDBG_USB_P5V0
L401
BLM18PG471SN1
C407 1nF
C408 1nF
GND
GND
VCC_EDBG_USB_P5V0
EDBG_USB_HS_N
EDBG_USB_HS_P
EDBG_USB_FS_N
EDBG_USB_FS_P
R421 39R
R422 39R
C402 10p
R423 6.81k
GND
GND
VCC_EDBG_P3V3
E402
BLM18PG471SN1
C404 100n
C405 2.2uF
C406 1nF
GND
GND
GND
VCC_EDBG_P3V3
GND
VCC_EDBG_P3V3
C409 2.2uF
C410 100n
GND
GND
VCC_EDBG_P3V3
C411 100n
C412 100n
C413 100n
C414 2.2uF
C415 2.2uF
GND
J400
MU-MB0142AB2-269
VBUS
D-
D+
ID
GND
SHIELD1
SHIELD2
SHIELD3
SHIELD4
EDBG_VBUS
EDBG_USB_N
EDBG_USB_P
Shield
D402
EMI2121MTTAG
C403 4.7n
R424 1M
GND
GND

Microchip Norway	*		MICROCHIP
Vestre Rosten 79	*		
N-7075 TILLER	*		
NORWAY			
Date:	9/15/2020	9:28:54 PM	PAGE: 7 of 11
Document number:			Revision 1
TITLE: Embedded_Debugger_Section			
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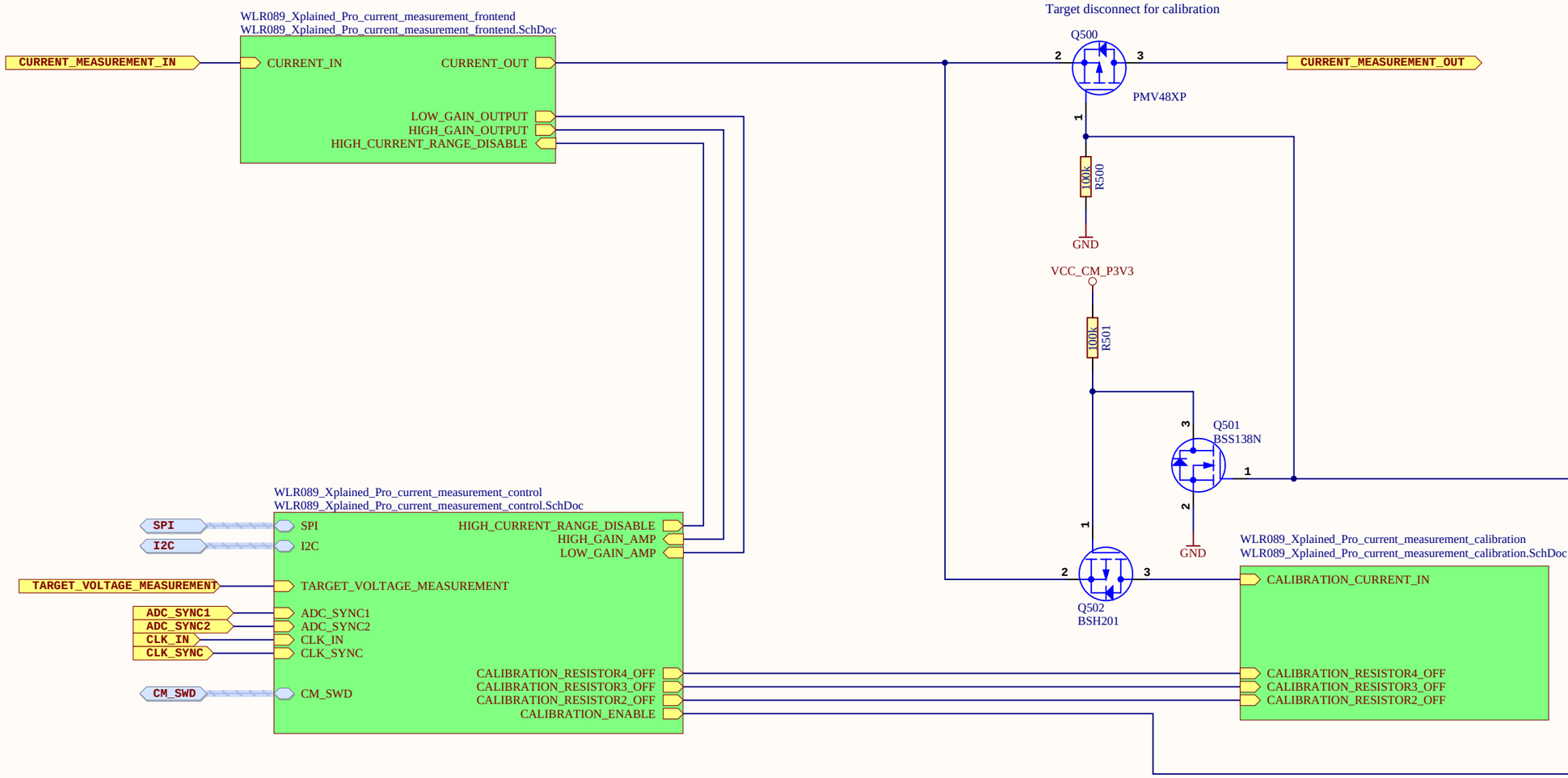
Current Measurement Section
Top Level View



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NORWAY			
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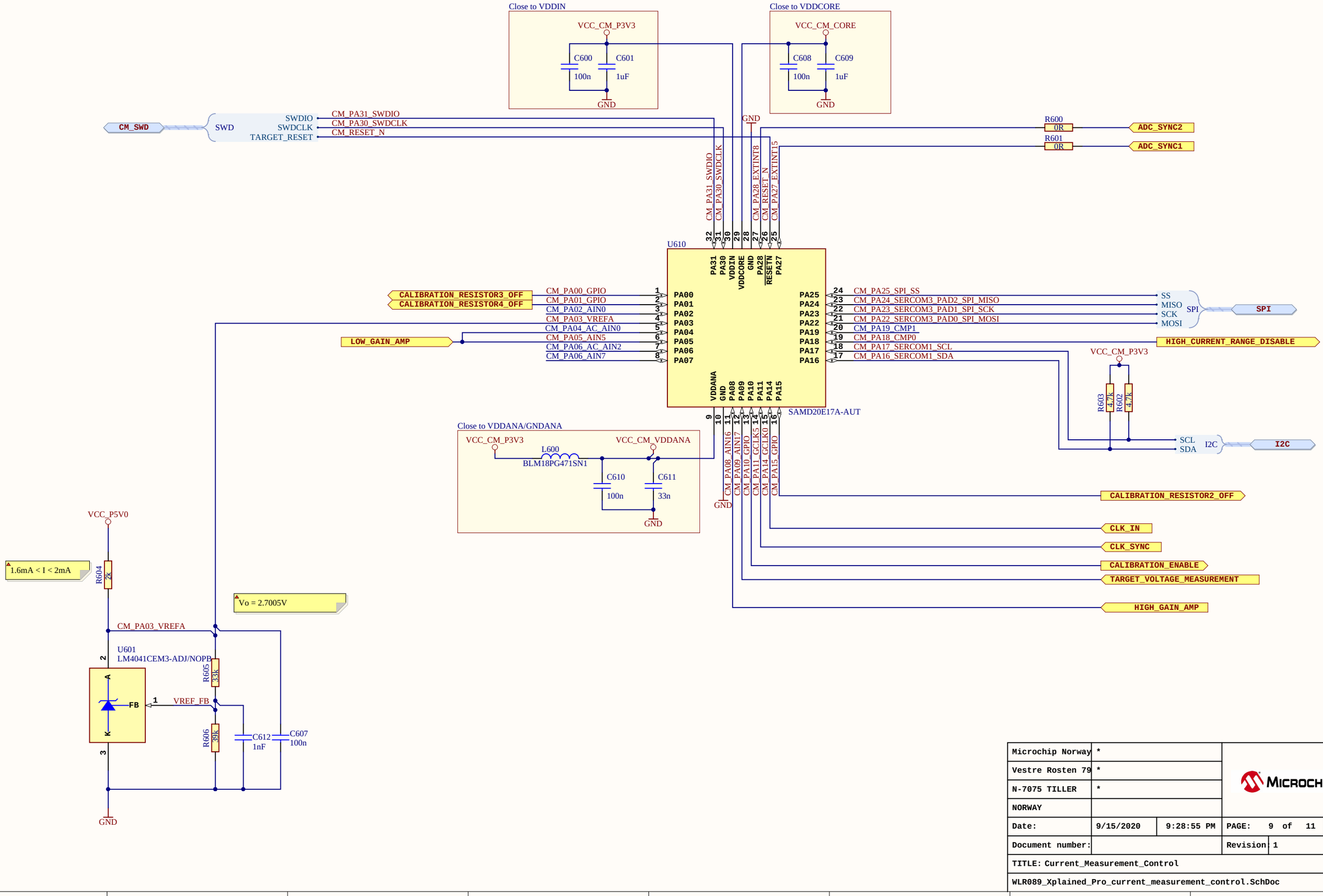
Current Measurement Control Section



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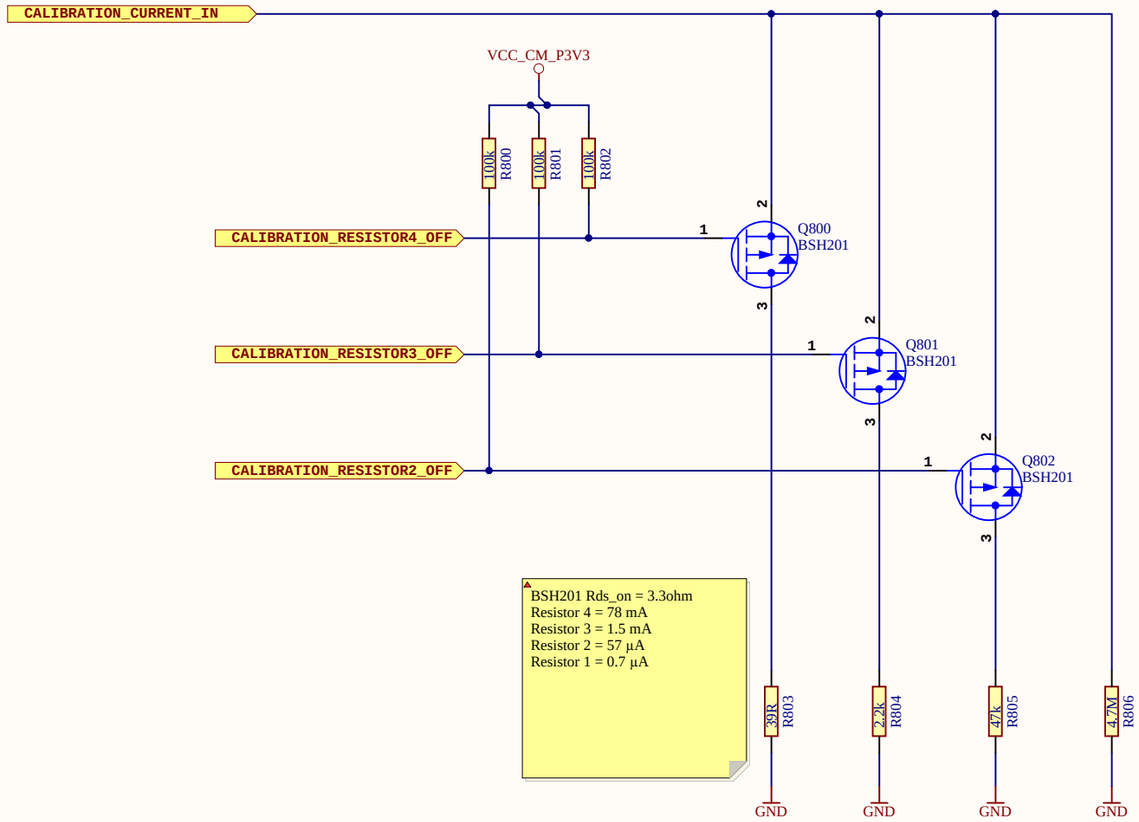
Document number:			Revision 1
TITLE: Current_Measurement_Control			
WLR089_Xplained_Pro_current_measurement_control.SchDoc			

Current Measurement Calibration Section



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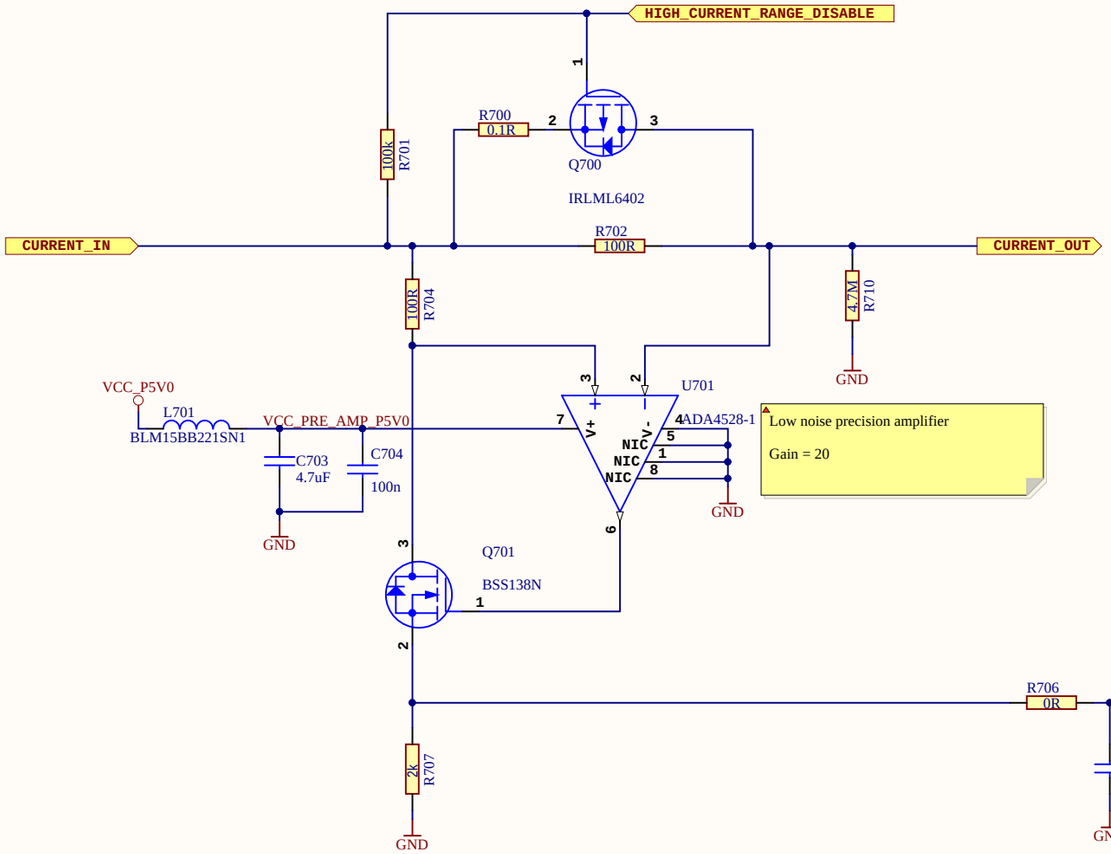
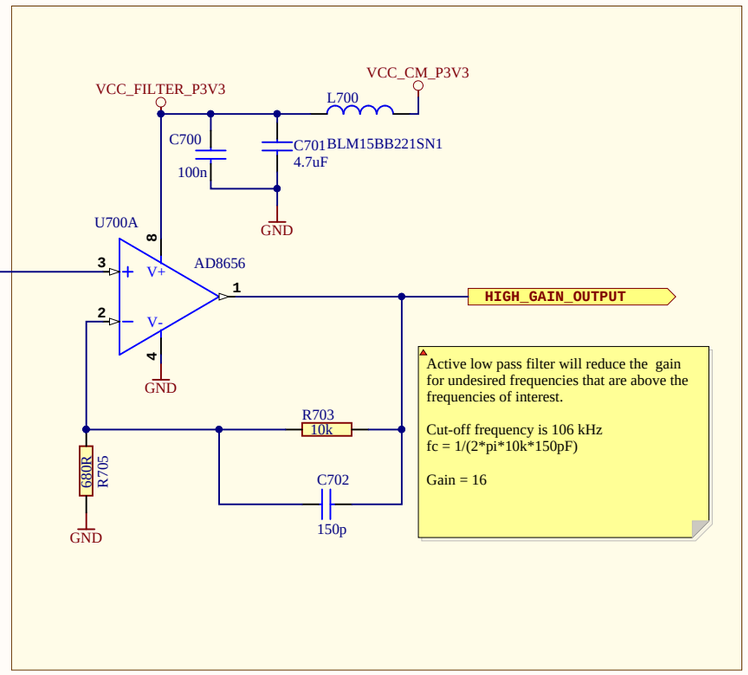
Document number:			Revision 1
TITLE: Current_Measurement_Calibration			
WLR089_Xplained_Pro_current_measurement_calibration.SchDoc			

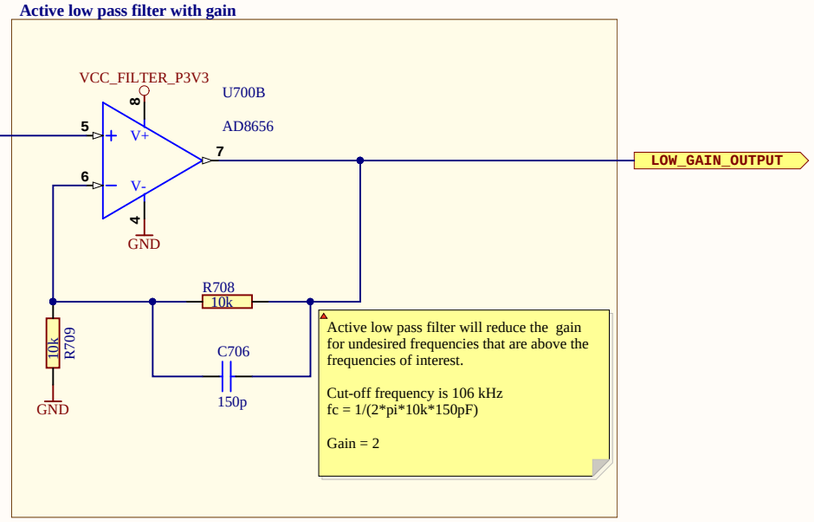
Current Measurement Frontend



Active low pass filter with gain



Active low pass filter with gain



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Document number:			Revision 1
TITLE: Current_Measurement_Frontend			
WLR089_Xplained_Pro_current_measurement_frontend.SchDoc			

Component list

Bill of Materials Fitted For Variant [WLR089_Xplained_Pro_with_WLR089U0] of Project [WLR089_Xplained_Pro.PrjPcb] (No PCB Document Selected)

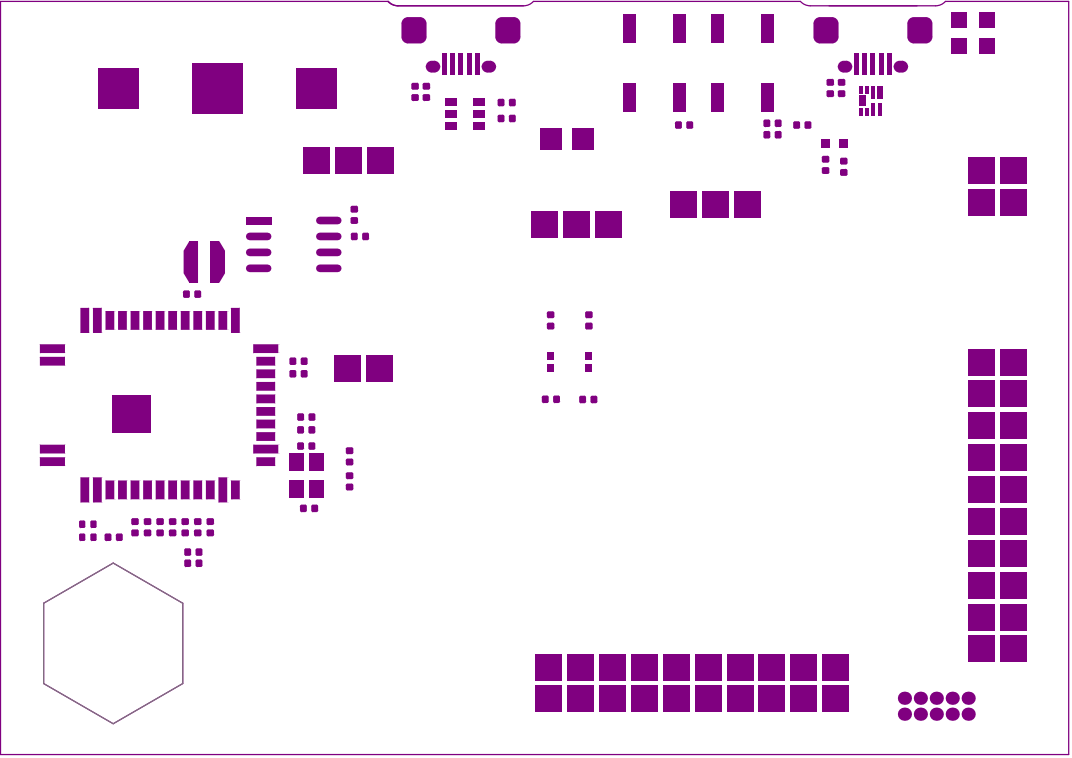
Source Data From: WLR089_Xplained_Pro.PrjPcb
Project: WLR089_Xplained_Pro.PrjPcb
Variant: WLR089_Xplained_Pro_with_WLR089U0

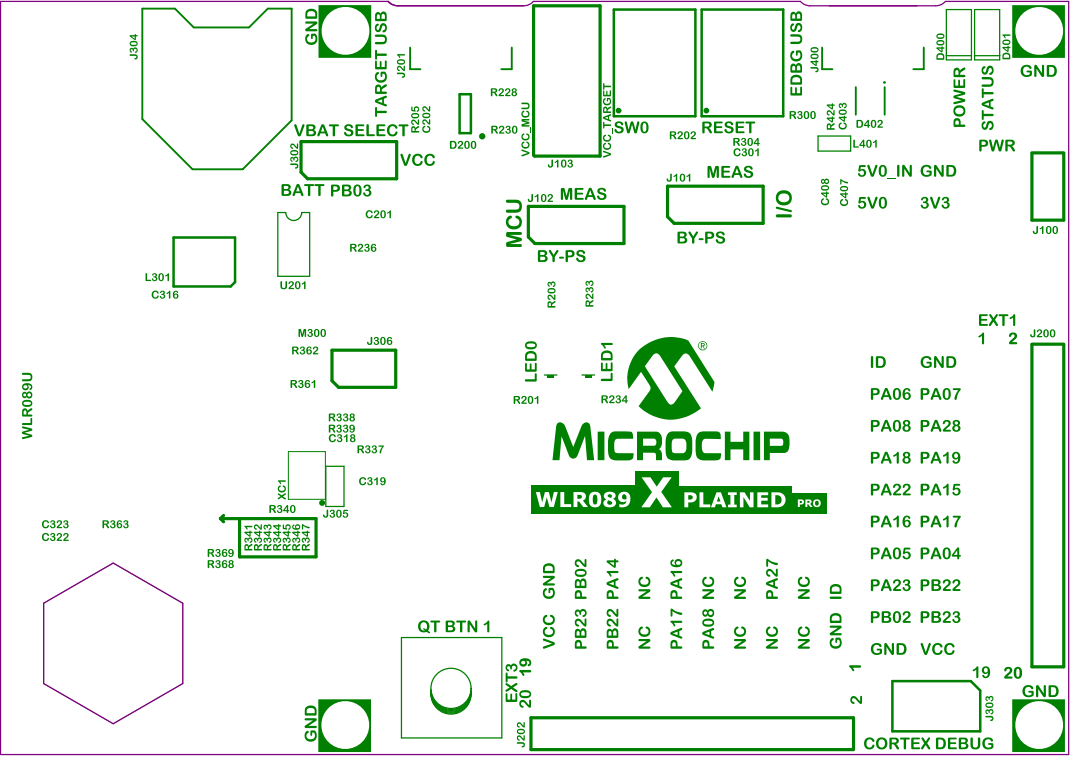
Report Date: 9/15/2020 9:29:17 PM
Print Date: 9/15/2020 9:20:48 PM

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C102, C103, C201, C301, C404, C410, C411, C412, C413, C600, C607, C608, C610, C700, C704	15	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C104, C110, C120, C701, C703	5	4.7uF	Walsin Technology Corporation	0603X475K100CT	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
Fitted	C105, C107	2	22u	TDK	C2012X5R1A226M/0.85	Ceramic capacitor, SMD 0805, X5R, 10V, Â±20%
Fitted	C106	1	10n	YAGEO CORP	CC0402KRX7R8BB103	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Fitted	C202, C403	2	4.7n	Yageo	CC0402KRX7R8BB472	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Fitted	C341	1	4.7p	Yageo	CC0402CRNPO9BN4R7	Ceramic capacitor, SMD 0402, NP0, 50V, +/-0.25pF
Fitted	C400, C401	2	22p	YAGEO CORP	CC0402JRNPO9BN220	Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C402	1	10p	Yageo	CC0402JRNPO9BN100	Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C405, C409, C414, C415	4	2.2uF	Kemet	C0402C225M9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C406, C407, C408, C612, C705	5	1nF	Murata	GRM1555C1H102JA01D	Ceramic capacitor, SMD 0402, C0G, 50V, +/-5%
Fitted	C601, C609	2	1uF	Murata	GRM188R61E105K	Ceramic capacitor, SMD 0603, X5R, 25V, ±10%
Fitted	C611	1	33n	Murata	GRM155R71E333KA88D	Ceramic capacitor, SMD 0402, X7R, 25V, ±10%
Fitted	C702, C706	2	150p	YAGEO CORP	CC0402KRX7R9BB151	Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Fitted	D200	1	NUP2114	ON Semiconductor	NUP2114UCMR6T1G	Transient Voltage Supressors, Low Capacitance ESD Protection for High Speed Data, 0.8pF, USB 2.0, pin-compatible with NUP4114 in TSOP-6
Fitted	D201	1	YELLOW LED	ROHM	SML-P12YTT86R	LED, SMD 0402, Yellow, Wave length=586nm, 7.6mcd @ (1mA, 1.9Vf)
Fitted	D202	1	GREEN LED	ROHM	SML-P12MTT86R	LED, SMD 0402, Green, Wave length=569nm, 2.1mcd @ (1mA, 1.9Vf)rohm
Fitted	D400	1	17-21SYGC/S530-E2/TR8	Everlight	17-21SYGC/S530-E2/TR8	LED, Green, Wave length=575nm, SMD 0805, ±70°
Fitted	D401	1	EL17-21UYC/A3	Everlight	17-21UYC/S530-A3/TR8	LED, Yellow , Wave length=591nm, SMD 0805, ±70°
Fitted	D402	1	EMI2121MTTAG	ON Semiconductor	EMI2121MTTAG	EMI2121, SZEMI2121 Single Pair Common Mode Filter with ESD Protection
Fitted	J100	1	1125-1202S0R138R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1202S0R138R1	Pin header, 2x2, Right Angle, 2.54mm, THT, Pin In Paste
Fitted	J101, J102, J302	3	1125-1103S0S113R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1103S0S113R1	1x3 pin header, 2.54mm pitch, Pin-in-Paste THM
Fitted	J103	1	Pin header 1x2 right angle	WCON HARDWARE ELECTRONICS CO., LTD	1125-1102S0R138R1	1x2 pin header, right angle, 2.54 mm pitch, through-hole
Fitted	J200, J202	2	1125-1210S0R138R1	WCON HARDWARE ELECTRONICS CO., LTD	1125-1210S0R138R1	Pin header, 2x10, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J201, J400	2	MU-MB0142AB2-269	Allen Creations Corp.	MU-MB0142AB2-269	USB micro AB, Surface mount signals and DIP shield
Fitted	J303	1	1310-1205SNS073R1	WCON HARDWARE ELECTRONICS CO., LTD	1310-1205SNS073R1	2x5 pin header, 1.27mm pitch, THM
Fitted	J304	1	3000TR	Keystone Corp.	3000TR	CR1220 Li-Ion coin-cell battery clip, SMD
Fitted	J306	1	1125-1102S0S113R1	WCON	1125-1102S0S113R1	1x2 pin header, 2.54mm pitch, Pin-in-Paste THM
Fitted	JS100, JS101, JS102, JS300, JS301	5	3710-6001OS0B01	WCON HARDWARE ELECTRONICS CO., LTD	3710-6001OS0B01	Jumper cap for 2.54mm pinheader
Fitted	L401, L402, L600	3	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603. Z=470Ohm (@100MHz), Max R(dc)=0.65Ohm, Max current=1A
Fitted	L700, L701	2	BLM15BB221SN1	Murata	BLM15BB221SN1	SMD RF inductor 0402. Z=220Ohm (@100MHz), Max R(dc)=0.80Ohm, Max current=200mA
Fitted	LABEL1	1	Label PCBA with Contains FCC&IC ID			Label for use on wireless PCBA that Contains unit with FCC & IC ID
Fitted	M300	1	WLR089U0 Module	Microchip Technology	WLR089U0	WLR089U Sub-1GHz U.FL variant LoRa Module without crypto device (ATECC608A)
Fitted	Q100, Q101, Q700	3	IRLML6402	International Rectifier	IRLML6402PBF	P-ch. MOSFET. -30V, -3.7A continuous,RDS(ON)=0.05Ohm@VGS=-4,5V, RDS(ON)=0.08Ohm@VGS=-2.5V
Fitted	Q102	1	2N7002,215	NXP	2N7002,215	N-Channel MOSFET. 60V, 0.300A continuous, 1.2A Peak. RDS(ON) = 3.8Ohm@VGS=4.5V, VGS(th)<2.5V
Fitted	Q400	1	2N7002DW	Fairchild	2N7002DW	Dual N-Channel MOSFET, 60V, 115mA cont,RDS(ON) < 7.5 Ohm @50mA@5V, SOT-363
Fitted	Q500	1	PMV48XP	NXP	PMV48XP	P-Channel Digital FET. -30V, -3.5A continuous, -14A Peak. RDS(ON)=48mOhm@VGS=-4.5V, RDS(ON)=71mOhm@VGS=-2.5V. VGS(th)<1.25V
Fitted	Q501, Q701	2	BSS138N	Infineon	BSS138NH6327XTSA2	Low leakage N-Channel MOSFET. 60V, 0.23A continuous, 0.92A Peak. RDS(ON) = 3.5Ohm@VGS=4.5V, VGS(th)<1.4V
Fitted	Q502, Q800, Q801, Q802	4	BSH201	NXP	BSH201	P-Channel Digital FET. -60V, -0.3A continuous, -1.2A Peak. RDS(ON)=2.5@VGS=-10V, RDS(ON)=<5 ohm @VGS=-2.5V. VGS(th)<1.9V
Fitted	R101, R104, R105, R205, R410, R413, R424	7	1M	Yageo	RC0402FR-071ML	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R102, R606	2	39k	ASJ, Yageo	CR10-3902-FK, RC0402FR-0739KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R103, R108, R131, R300, R500, R501, R701, R800, R801, R802	10	100k	ASJ	CR10-1003-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R106	1	390R	Yageo	RC0402FR-07390RL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R109, R110, R230, R805	5	47k	KOA	RK73H1ETTP4702F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R201, R229, R234, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R322, R323, R324, R325, R332, R336, R337, R338, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R600, R601, R706	52	0R	(n/a)	RMCF0402ZT0R00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	R202, R304, R331, R421, R422, R803	6	39R	ASJ	CR10-39R0-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R203, R231, R233, R411, R412, R414, R416, R417, R418, R420	10	330R	ASJ	CR10-3300-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R228	1	30k	Yageo	RC0402FR-0730KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R235, R703, R708, R709	4	10k	vishay	CRCW040210K0FKED	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R236, R368, R369, R602, R603	5	4.7k	Panasonic	ERJ2RKF4701X	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R401, R409	2	1k	ASJ	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R423	1	6.81k	Yageo	RC0402FR-076K81L	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R604, R707	2	2k	YAGEO CORP	RC0402FR-072KL	Thick film resistror, SMD 0402, 1/16W, 1%
Fitted	R605	1	33k	ASJ	CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R700	1	0.1R	vishay	WSL0603R1000FEA	WSL0603R1000FEA, metal strip resistor, 0.1 Ohm, +-1%, 0603 SMD, 1/10 W, TEMPCO +-75 ppmÂ°C
Fitted	R702, R704	2	100R	Panasonic	ERA3YEB101V	ERA-3YEB101V, metal film, 100R Â±0.1%, resistor in 0603 at 100mW, TEMPCO Â±25ppm/Â°C, Max V=75V
Fitted	R705	1	680R	Yageo	RC0402FR-07680RL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R710, R806	2	4.7M	YAGEO CORP	RC0402FR-074M7L	Thick film SMD 0402 1/16W 1%
Fitted	R804	1	2.2k	ASJ	CR10-2201-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW200, SW301	2	TS604VM1-035CR	Dailyw ell Electronics Co.LTD	TS604VM1-035CR-R	SWITCH, SMD, 260gf, 6.4mm X 6.2mm
Fitted	U101	1	TPS2113PWR	Texas Instruments	TPS2113PWR	Autosw itching 2:1 Pow er Mux
Fitted	U102	1	STMPS2161STR	ST	STMPS2161STR	Single channel pow er sw itch, 1A, reverse block, active low enabled.
Fitted	U103	1	TPS73533DRVT	Texas Instruments	TPS73533DRVT	Low noise LDO, 500 mA, Vout=3.3V, 2% accuracy, IQ=46uA, noise=28uVrms, VIN= 2.7V to 6.5V, Vdo=280mV,stable with low ESR capacitor
Fitted	U105	1	TLV70033DSET	Texas Instruments	TLV70033DSET	LDO, 200 mA, Iq=31 uA, Vdo=250mV, Vout=3.3V, VIN= 2 V to 5.5V, SON-6 package
Fitted	U201	1	AT25DF041B-SSHN-T	Adesto Technologies	AT25DF041B-SSHN-T	IC FLASH 4MBIT 85MHZ 8SOIC, 1.65 ~ 3.6V
Fitted	U400	1	AT32UC3A4256J-C1UR	Microchip Technology	AT32UC3A4256J-C1UR	AVR 32-bit RISC MCU
Fitted	U601	1	LM4041CEM3-ADJ/NOPB	Texas Instruments	LM4041CEM3-ADJ/NOPB	Adjustable shunt voltage regulator, 1.24 to 10V out
Fitted	U610	1	SAMD20E17A-AUT	Microchip Technology	SAMD20E17A-AUT	Atmel 32bit RISC MCU 32 pin
Fitted	U700	1	AD8656	Analog Devices	AD8656ARMZ	AD8656, dual low noise precision OpAmp, rail-to-rail, low offset 250uV, GBP 28 MHz, 8MSOP
Fitted	U701	1	ADA4528-1	Analog Devices	ADA4528-1ARMZ	Precision OpAmp, Zero-Drift 0.015uV/K, ultra low noise 5.6nV/sqrt(Hz), Vo=2uV, GBW=4MHz, single supply 2.2V to 5.5V or dual supply +-1V to +-2.75V, rail to rail, unity gain stable
Fitted	XC400	1	12.00MHz	Fox Electronics	FQ5032B-12.000	Fox FQ5032B 12.0MHz SMD crystal 738B-12
Not Fitted	C316	0	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Not Fitted	C318, C319	0	22p	YAGEO CORP	CC0402JRNPO9BN220	Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Not Fitted	C322, C323, C324, C325	0	DNP	Murata	GJM1555C1H1R3BB01	Ceramic capacitor, SMD 0402, C0G, 50V, +/-0.1pF
Not Fitted	C342, C343	0	4.7p	Yageo	CC0402CRNPO9BN4R7	Ceramic capacitor, SMD 0402, NP0, 50V, +/-0.25pF
Not Fitted	E1, E2, E3, E4	0	SJ-5076	3M	SJ-5076	2.8mm adhesive feet,diam 8.0mm
Not Fitted	L301	0	10uH	Murata	LQH3NPN100MJRL	10uH pow er inductor, Isat = 560mA , Itemp = 710mA, Rdc = 0.360ohm
Not Fitted	R321, R339, R340	0	0R	(n/a)	RMCF0402ZT0R00	RES 0.0 OHM 1/16W 0402 SMD
Not Fitted	R419	0	330R	ASJ	CR10-3300-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Not Fitted	XC1	0	12MHz	TST	TZ1712B	Crystal, 12.0000MHz, SMD LxWxH= 3.2x2.5x0.7mm, CL=12pF, ESR=100Ohm, 50ppm, -40C to 85C
		214				

Approved

Notes

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U201
R228
D200
R230
VCC_MCU
J103
VCC_TARGET
SW0
R202
RESET
EDBG USB
J400
R300
R304
C301
R424
C403
D402
L401
D400
D401
POWER
STATUS
PWR
GND
5V0_IN GND
5V0 3V3
J100
C408
C407
J101
MEAS
I/O
BY-PS
J102
MEAS
MCU
BY-PS
R203
R233
M300
J306
R362
R361
LED0
LED1
R201
R234
MICROCHIP
WLR089 XPLAINED PRO
EXT1
1 2
J200
ID GND
PA06 PA07
PA08 PA28
PA18 PA19
PA22 PA15
PA16 PA17
PA05 PA04
PA23 PB22
PB02 PB23
GND VCC
WLR089U
R338
R339
C318
R337
C319
XC1
J305
R340
C323
C322
R363
R341
R342
R343
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R346
R347
R369
R368
VCC GND
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PB22 PA14
NC NC
PA17 PA16
PA08 NC
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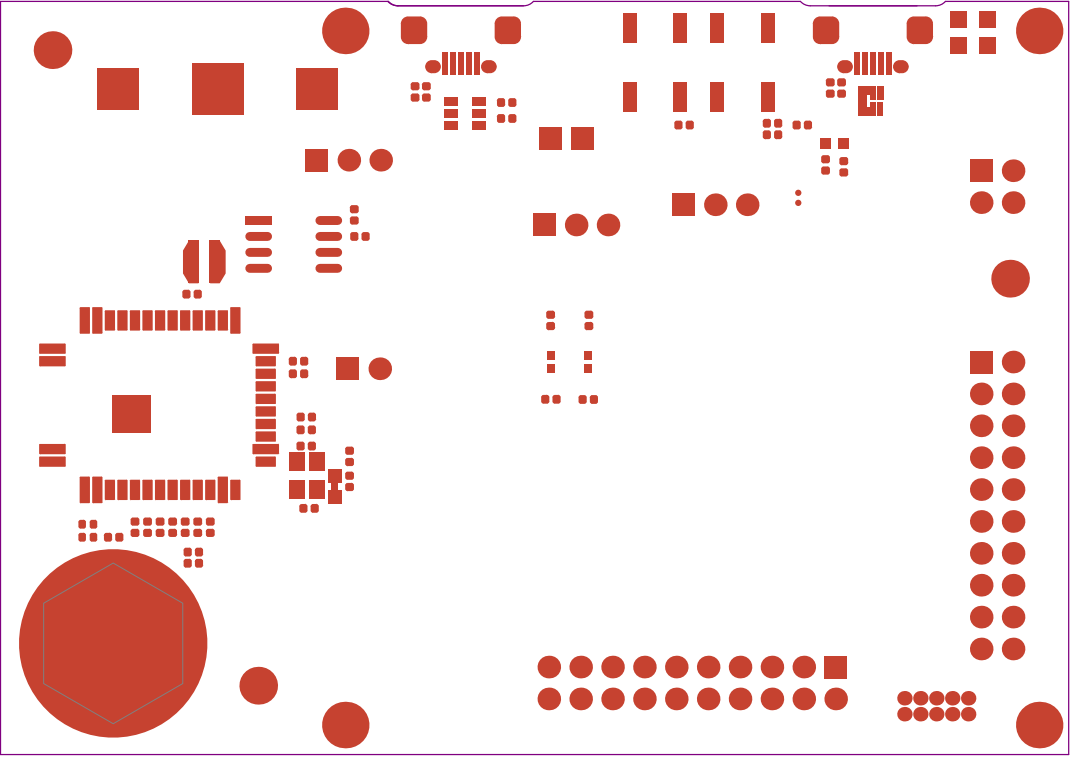

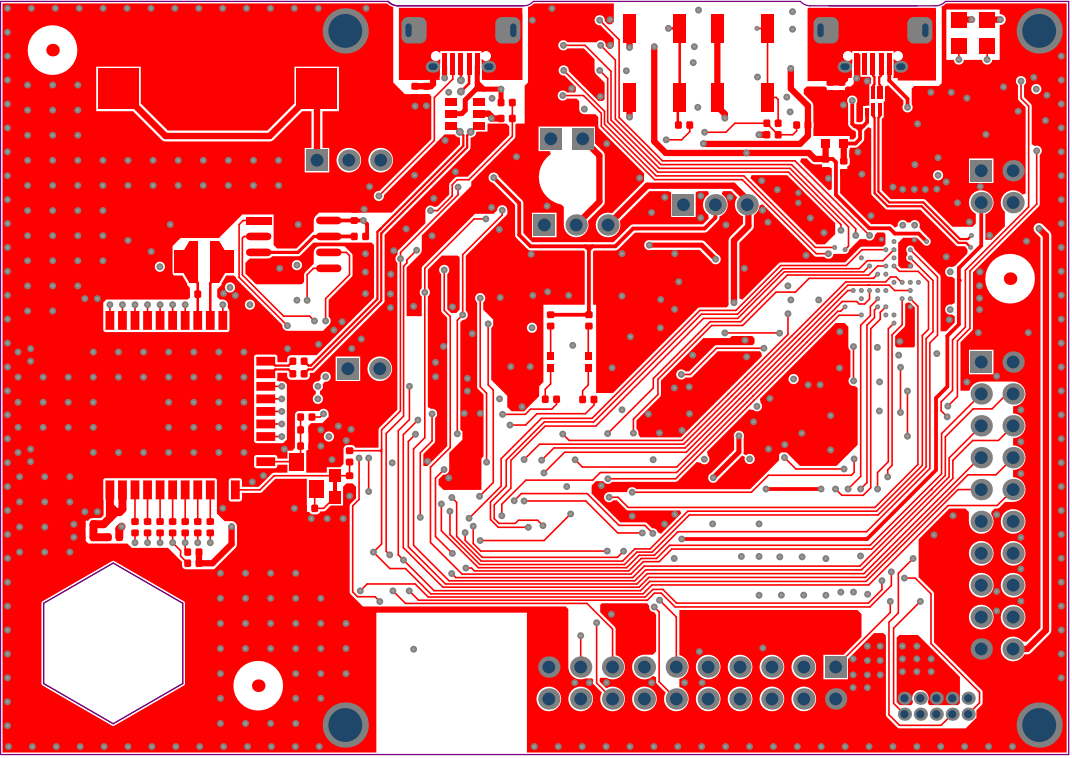

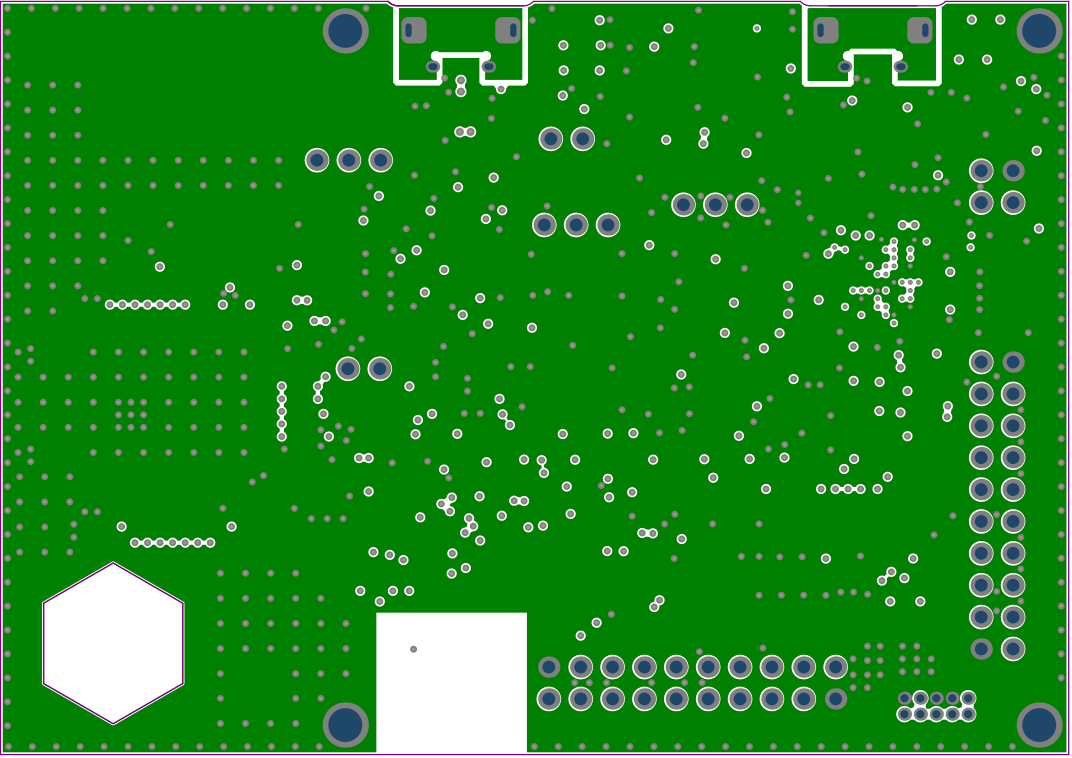

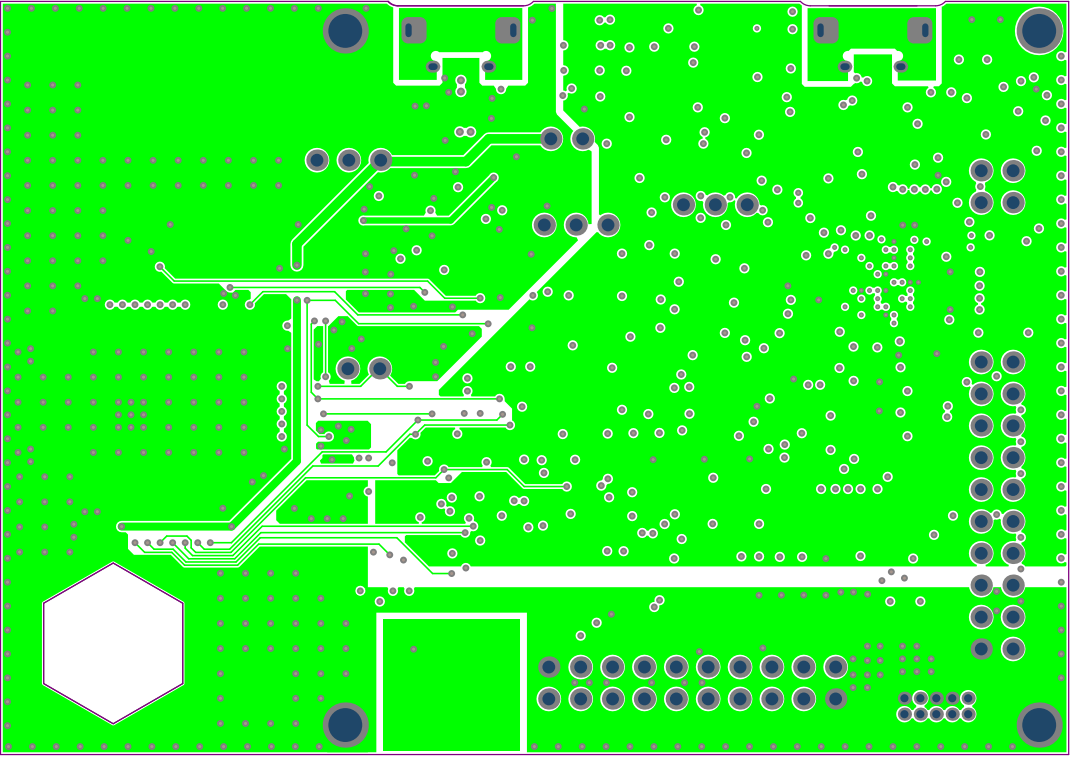

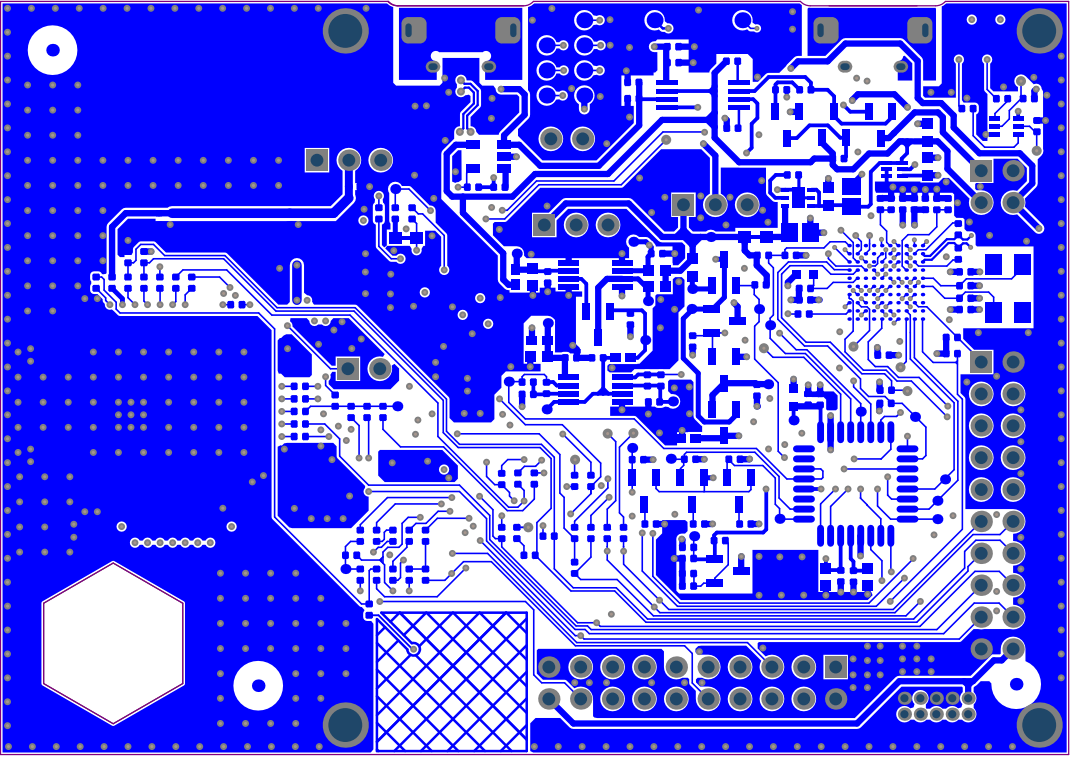

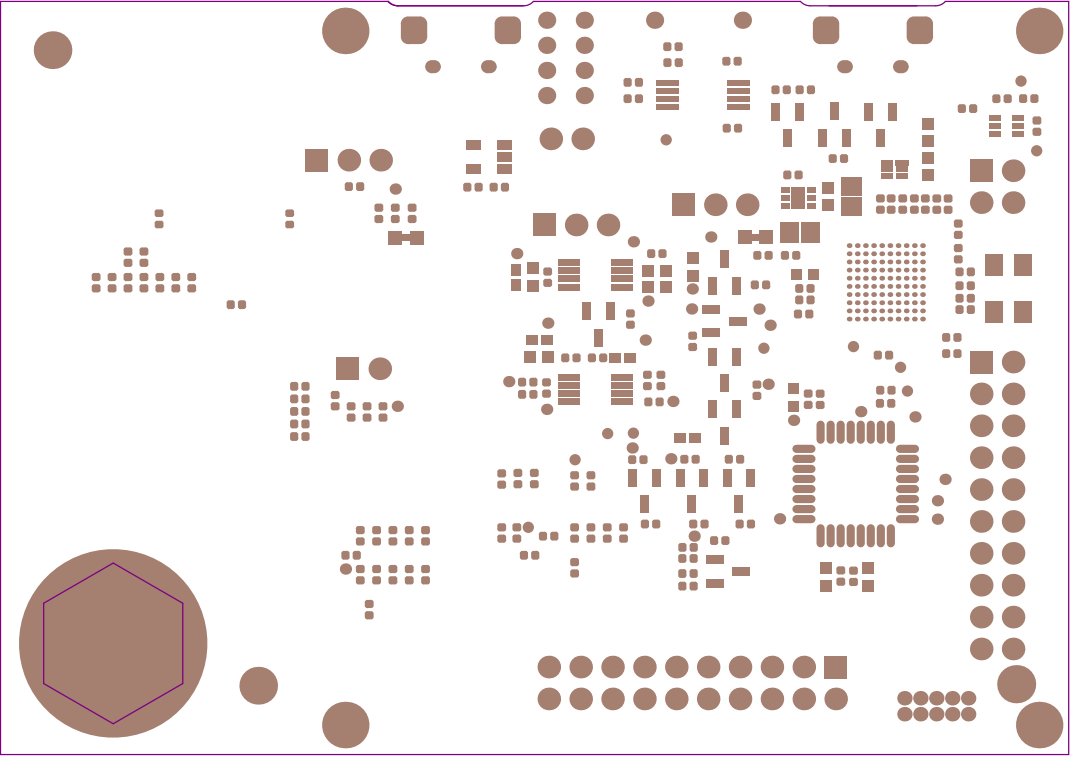

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Rev S
PCBA LABEL
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TMS
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RST
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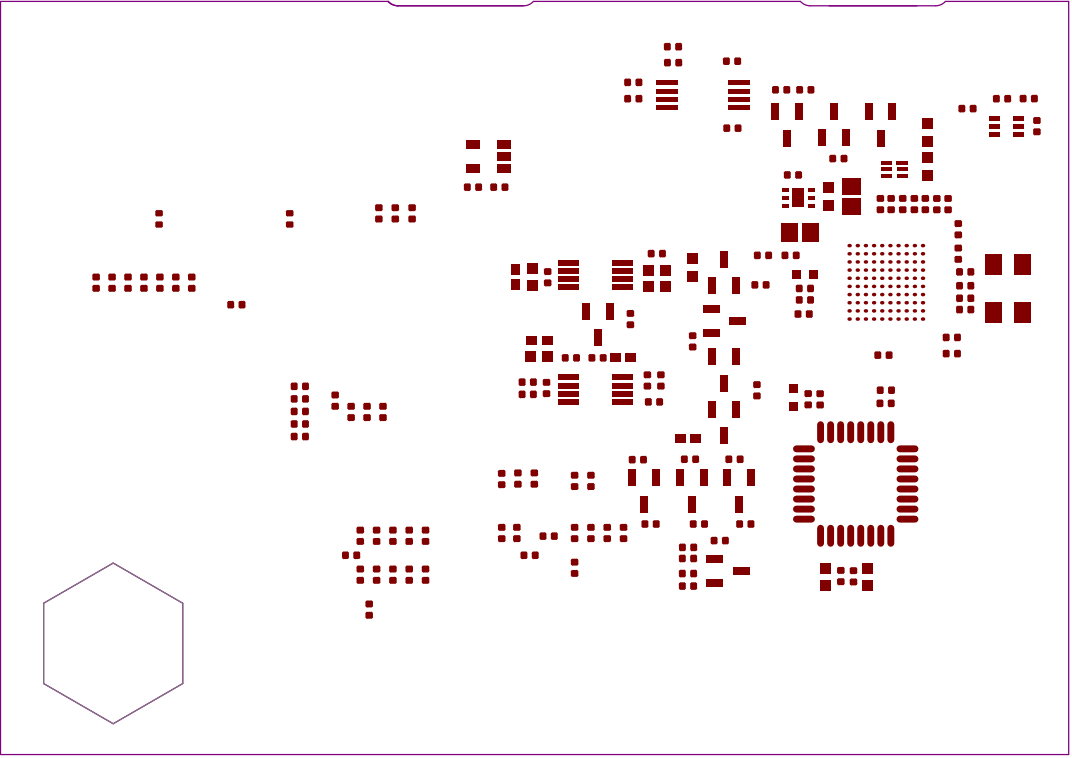

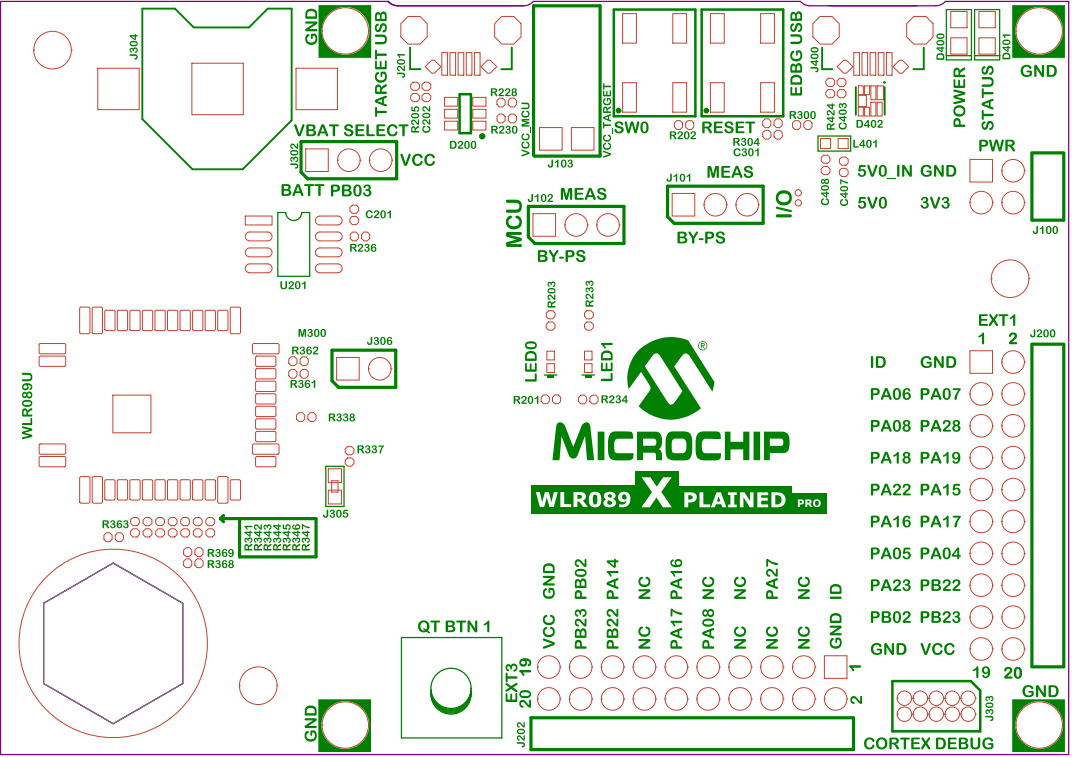
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5V0
3V3
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J302
VCC
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MEAS
I/O
BY-PS
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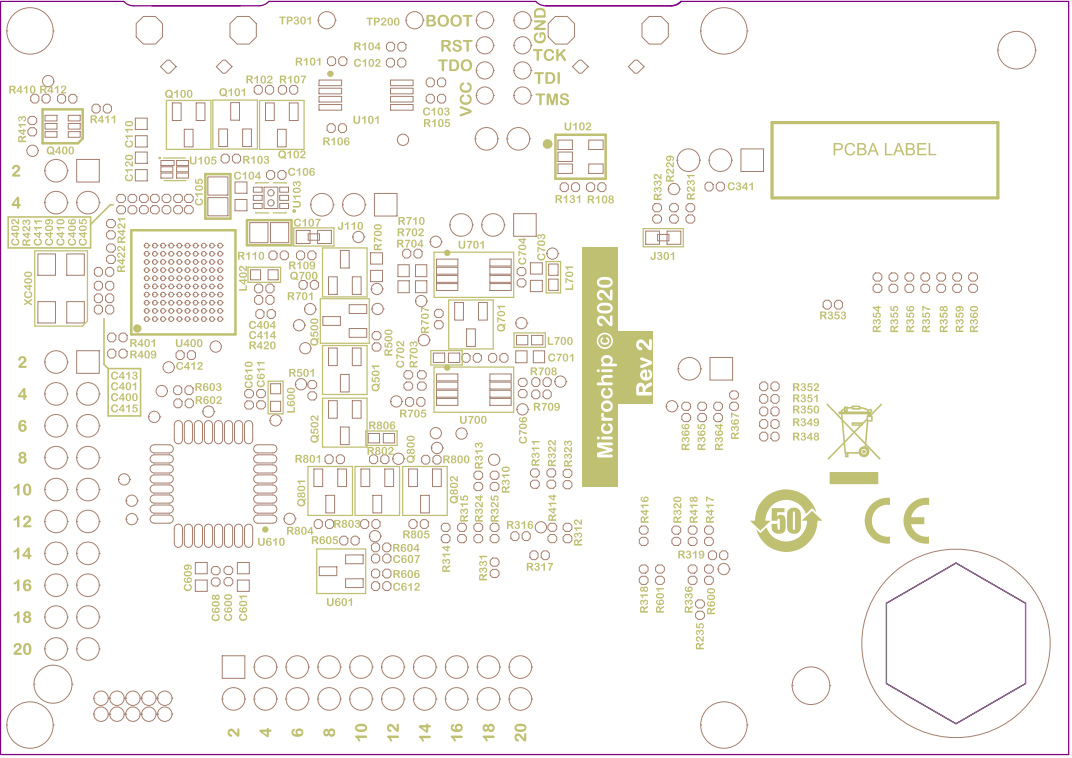
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Rev 2
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