

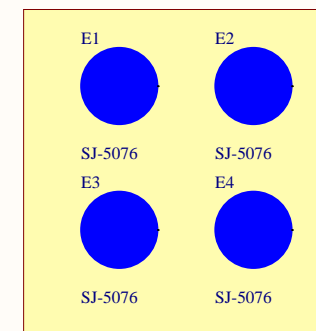
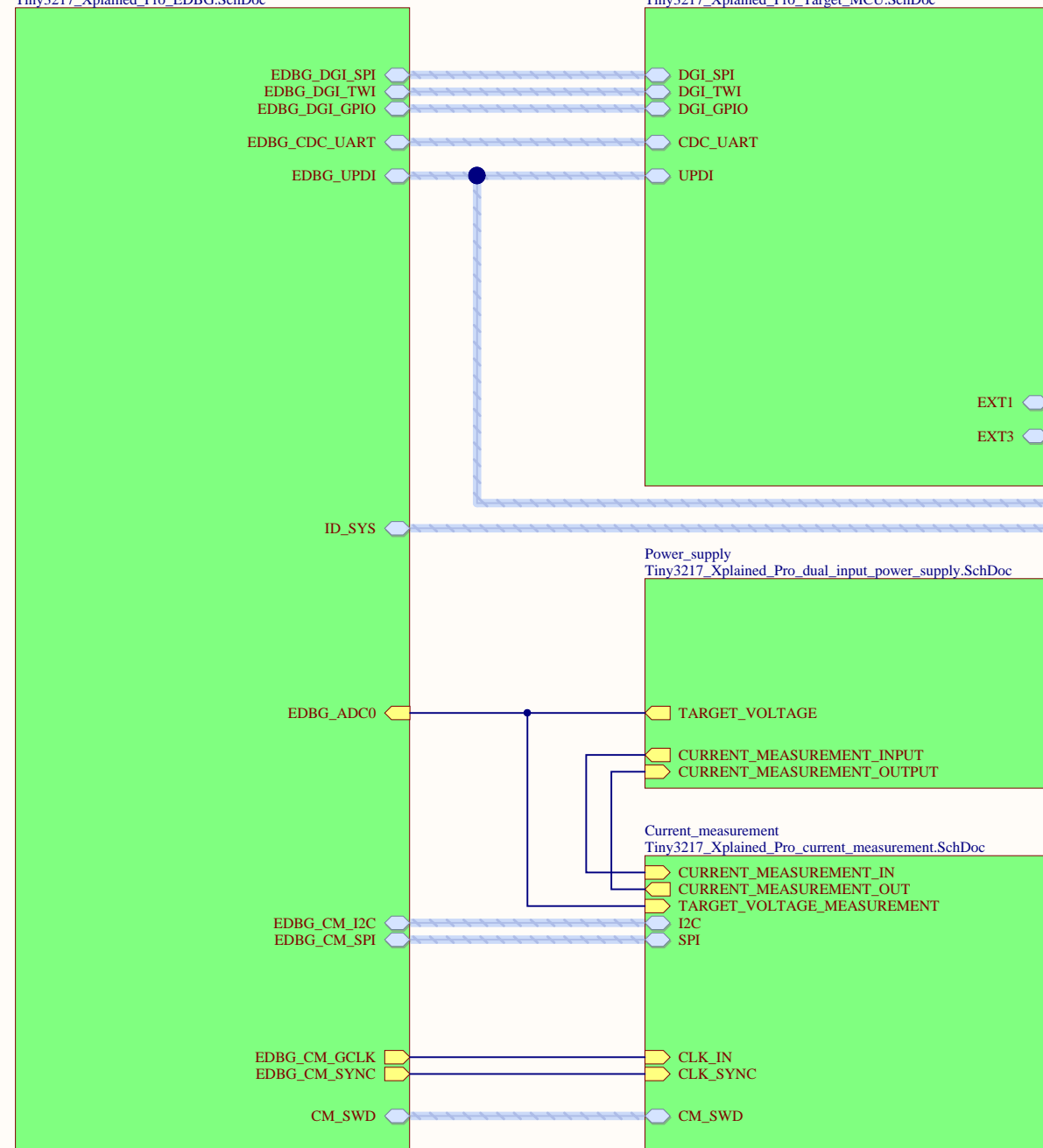
EDBG
Tiny3217_Xplained_Pro_EDBG.SchDoc

Target_MCU
Tiny3217_Xplained_Pro_Target_MCU.SchDoc

Connectors
Tiny3217_Xplained_Pro_Connectors.SchDoc

Power_supply
Tiny3217_Xplained_Pro_dual_input_power_supply.SchDoc

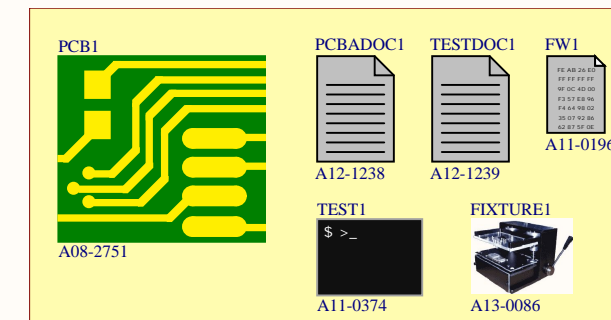
Current_measurement
Tiny3217_Xplained_Pro_current_measurement.SchDoc



LABEL1

Product number/revision
Serial number

Label PCBA



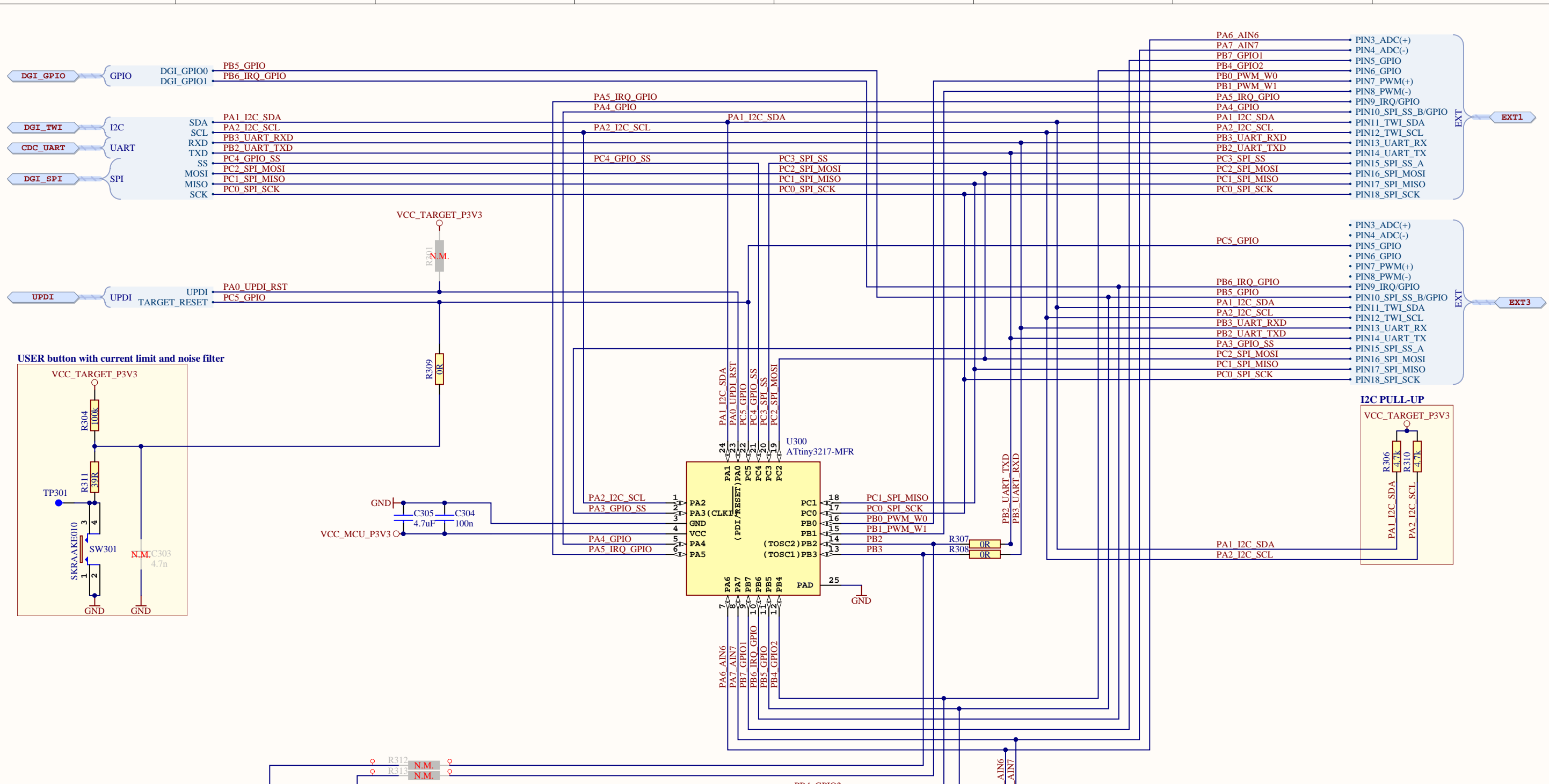
Drawn By:
Microchip Norway
Engineer:
AH



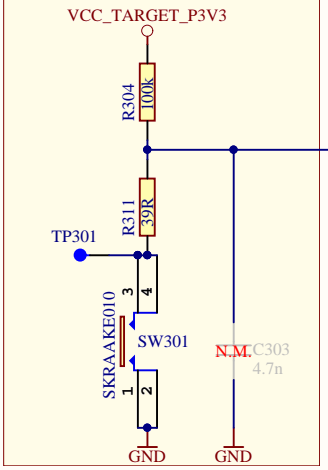
Project Title
ATtiny3217 Xplained Pro
Sheet Title
Top Level Schematics

Designed with
Altium
Altium.com

Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 3
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_TopLevel.SchDoc		Date: 12.02.2019
		Page: 1 of 9



USER button with current limit and noise filter



32 kHz CRYSTAL

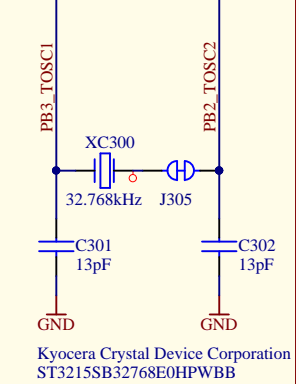
Crystal datasheet:
 Crystal = 9pF
 max ESR = 70kOhm
 Accuracy ±20ppm

ATtiny3217 datasheet:
 Cpara = ? (Typical)
 max ESR = ? kOhm

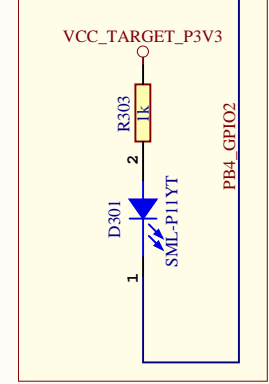
PCB capacitance: Cpcb = 0.5pF (estimated)

Estimated load:
 $C = 2x(\text{Crystal} - C_{\text{para}} - C_{\text{pcb}})$
 $C = 2x(9\text{pF} - 2.15\text{pF}(\text{estimated}) - 0.5\text{pF})$
 $C = 12.7\text{pF}$

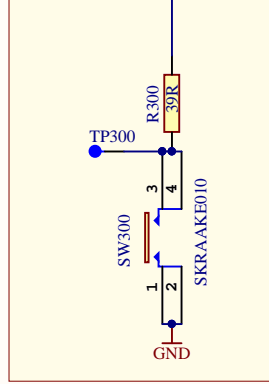
Selected in design: C = 13pF
 Verification showed: 13pF
 Accuracy: less than ±11.8ppm
 Startup time: 172ms to reach output
 with a 9.5pF probe connected to the crystal.
 Safety factor: Above 6



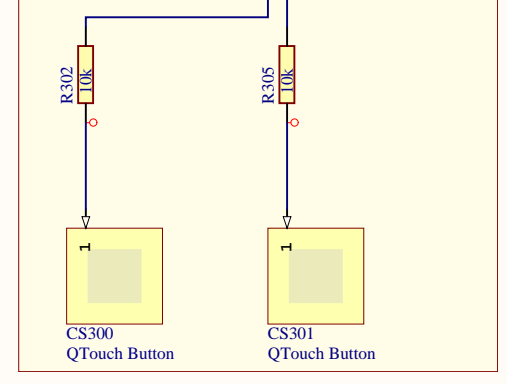
USER LED



USER BUTTON



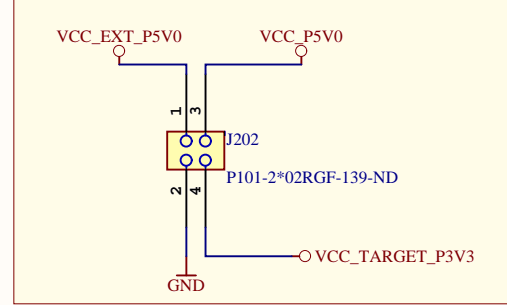
QTOUCH BUTTONS



Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Target MCU		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 3
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_Target_MCU.SchDoc		Page: 2 of 9



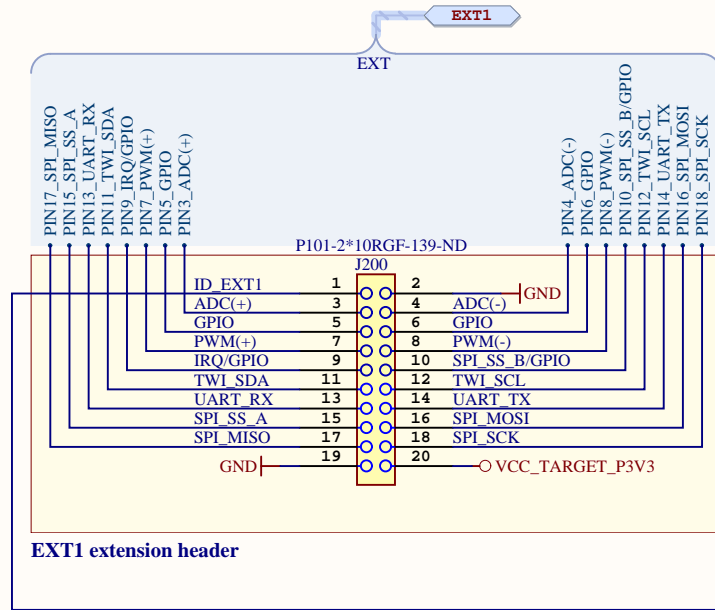
Power Connector



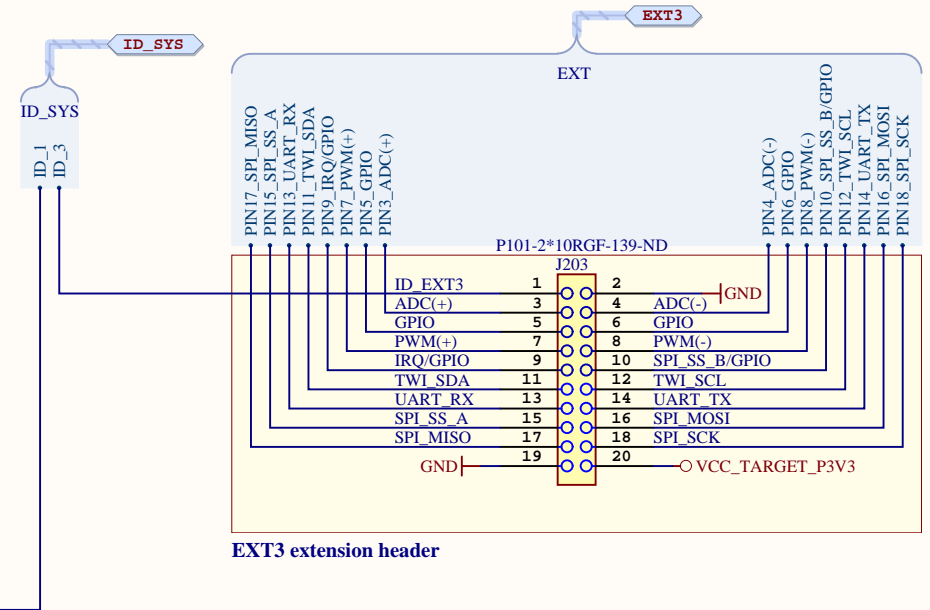
Power inputs/outputs to the Xplained PRO:
VCC_EXT_P5V0 (input)
 This power input can be used to power the whole board and it has a higher priority as the USB power input.

VCC_P5V0 (output)
 This supply is connected to either VCC_EXT_P5V0 or VCC_EDBG_USB_P5V0, based on the availability and priority of these supplies.

VCC_TARGET_P3V3 (output)
 Target supply voltage (target MCU and peripherals)

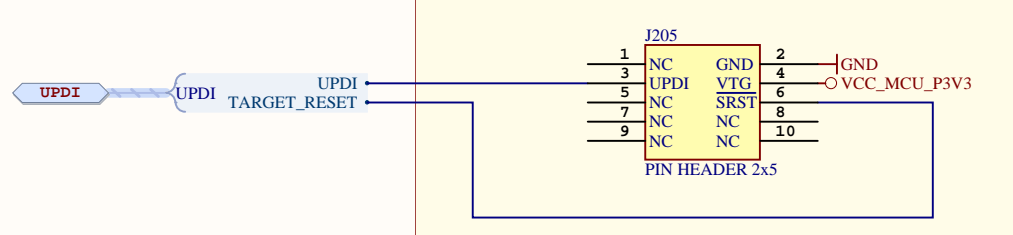


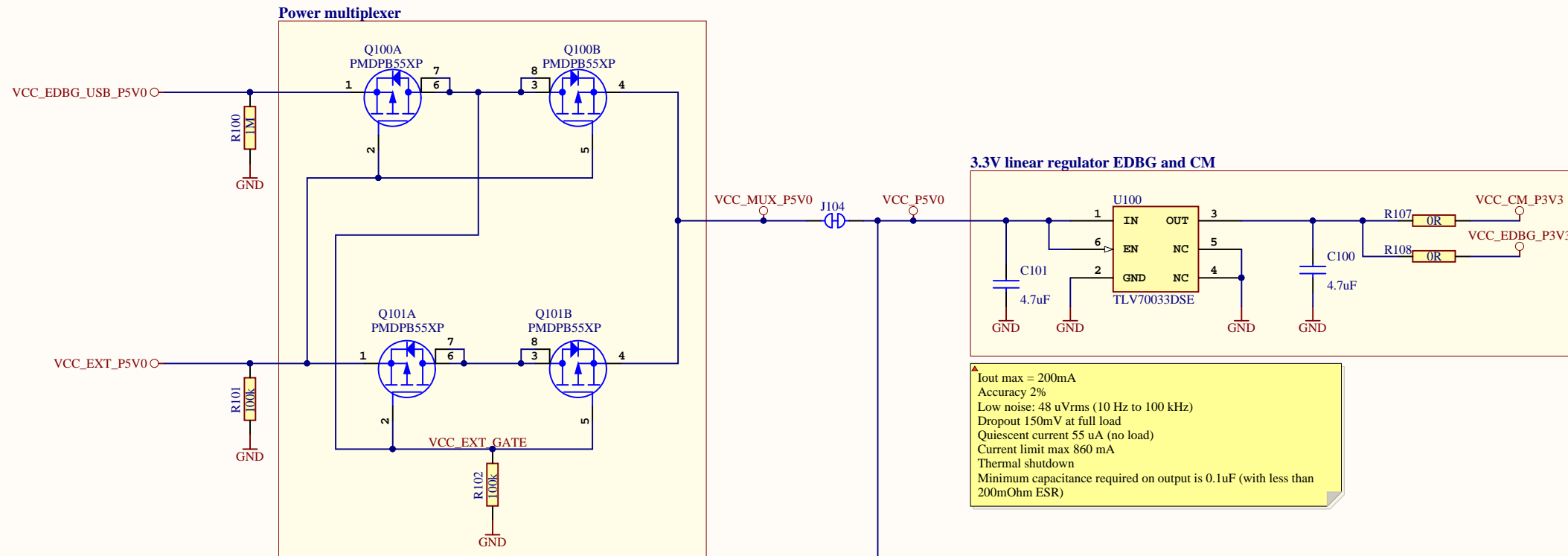
EXT1 extension header



EXT3 extension header

UPDI Debug Connector for connecting an external programmer/debugger

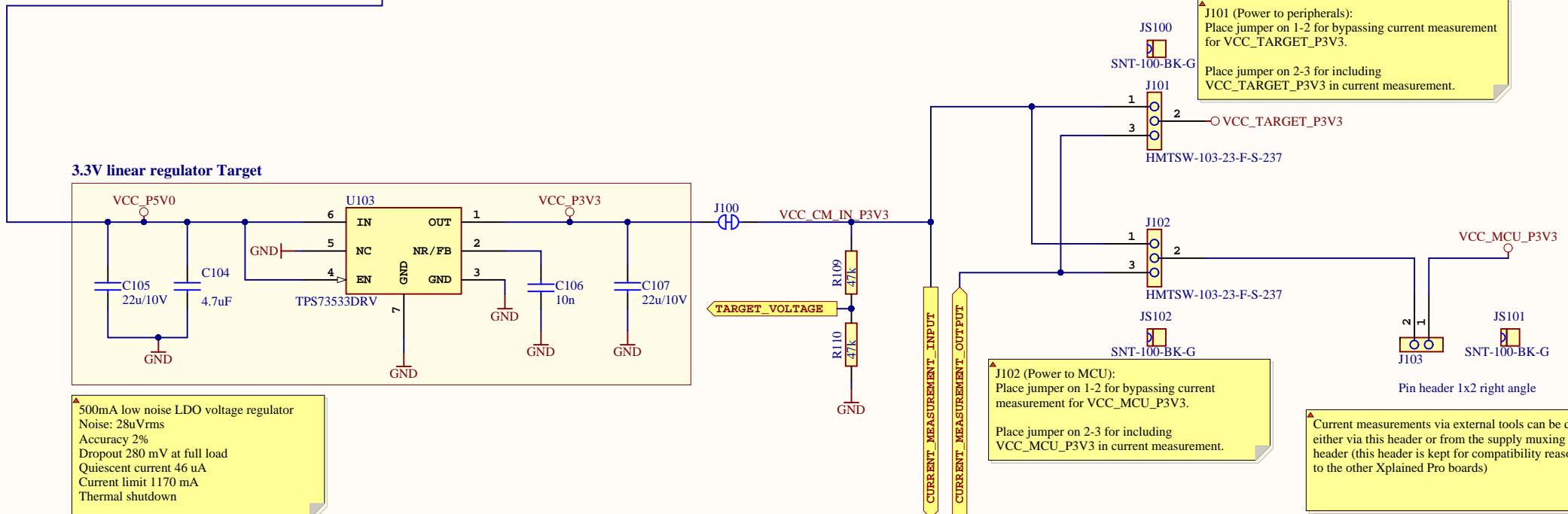




Iout max = 200mA
 Accuracy 2%
 Low noise: 48 uVrms (10 Hz to 100 kHz)
 Dropout 150mV at full load
 Quiescent current 55 uA (no load)
 Current limit max 860 mA
 Thermal shutdown
 Minimum capacitance required on output is 0.1uF (with less than 200mOhm ESR)

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.

J101 (Power to peripherals):
 Place jumper on 1-2 for bypassing current measurement for VCC_TARGET_P3V3.
 Place jumper on 2-3 for including VCC_TARGET_P3V3 in current measurement.



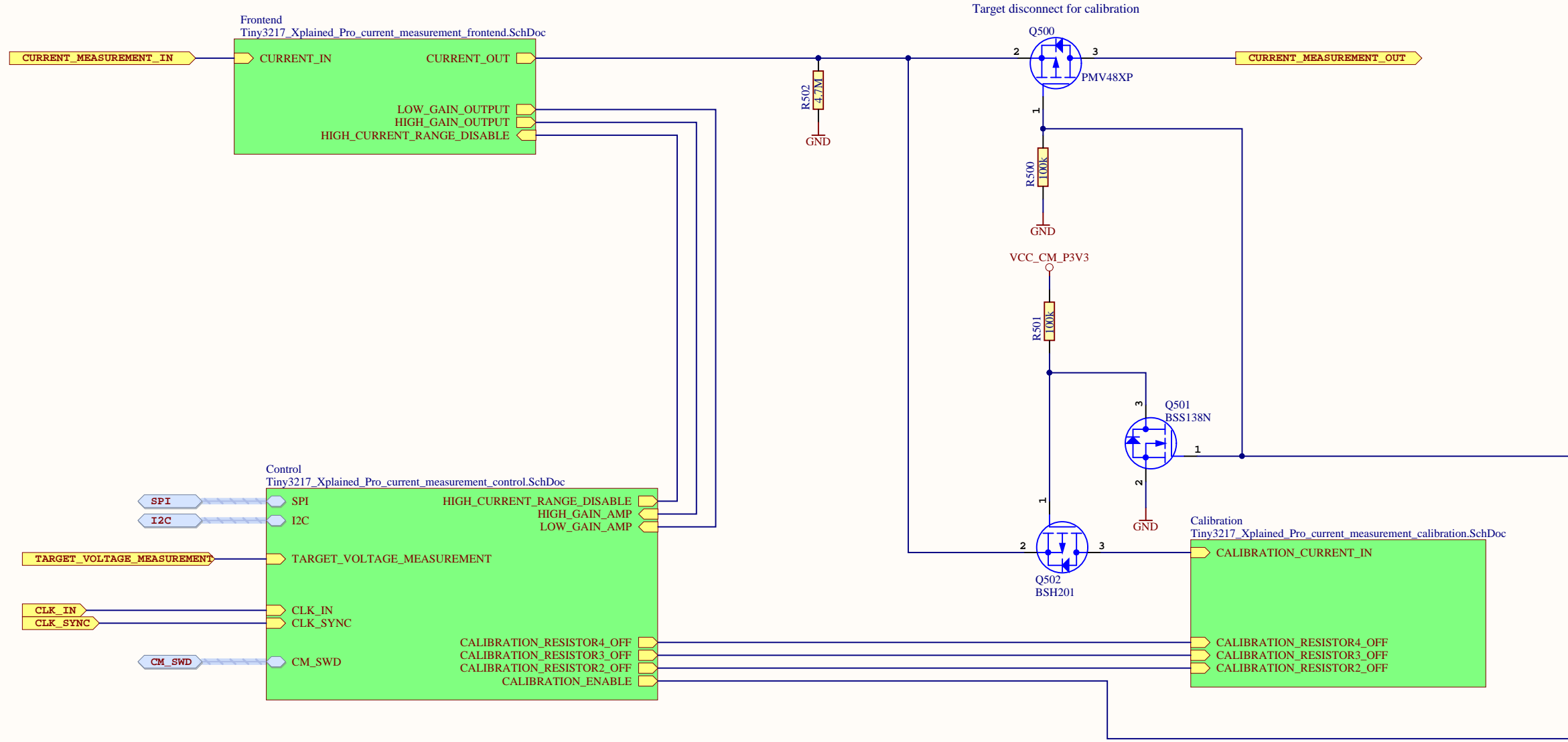
500mA low noise LDO voltage regulator
 Noise: 28uVrms
 Accuracy 2%
 Dropout 280 mV at full load
 Quiescent current 46 uA
 Current limit 1170 mA
 Thermal shutdown


J102 (Power to MCU):
 Place jumper on 1-2 for bypassing current measurement for VCC_MCU_P3V3.
 Place jumper on 2-3 for including VCC_MCU_P3V3 in current measurement.

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)

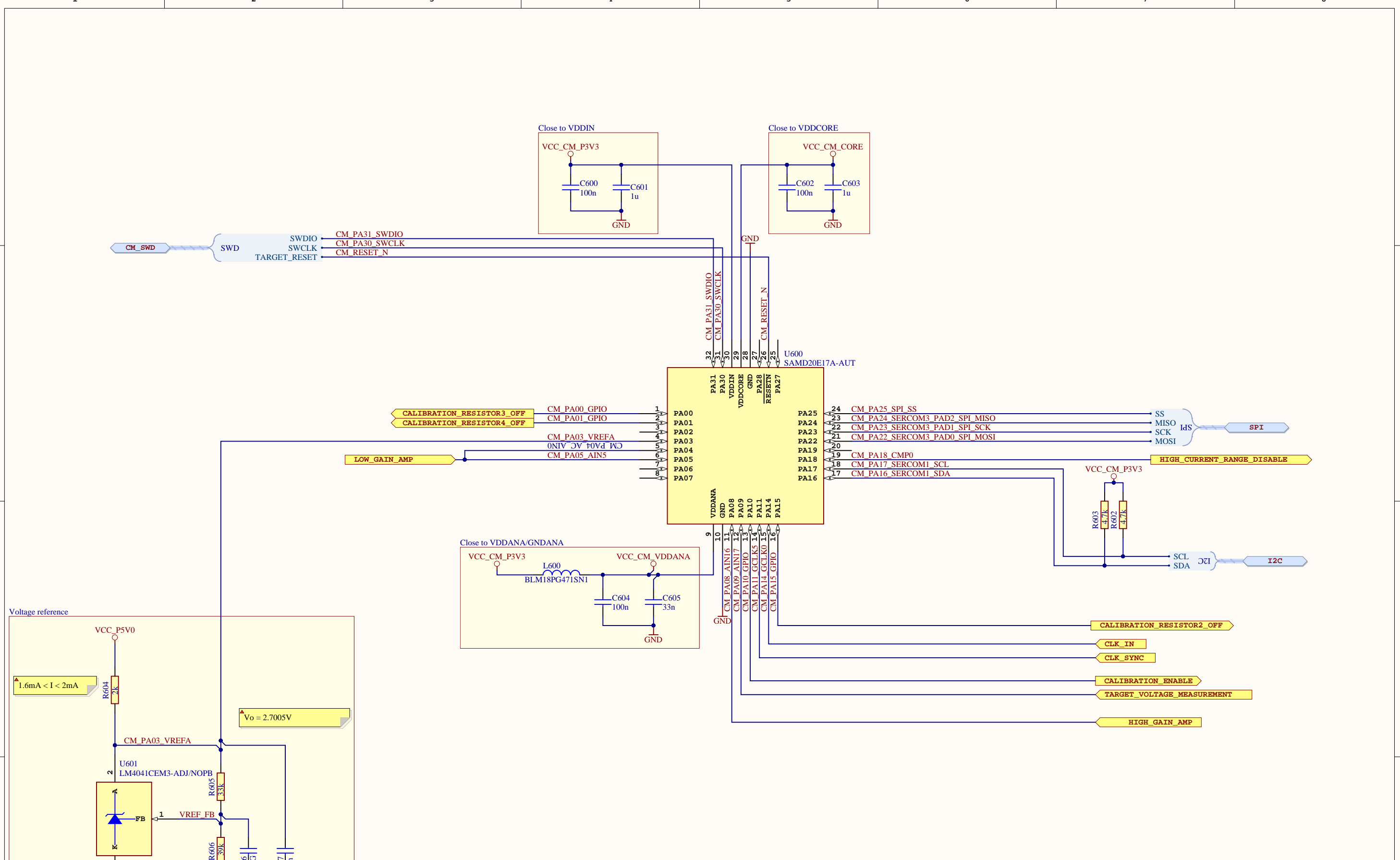
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Power supply		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 3
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_dual_input_power_supply.SchDoc		Page: 4 of 9





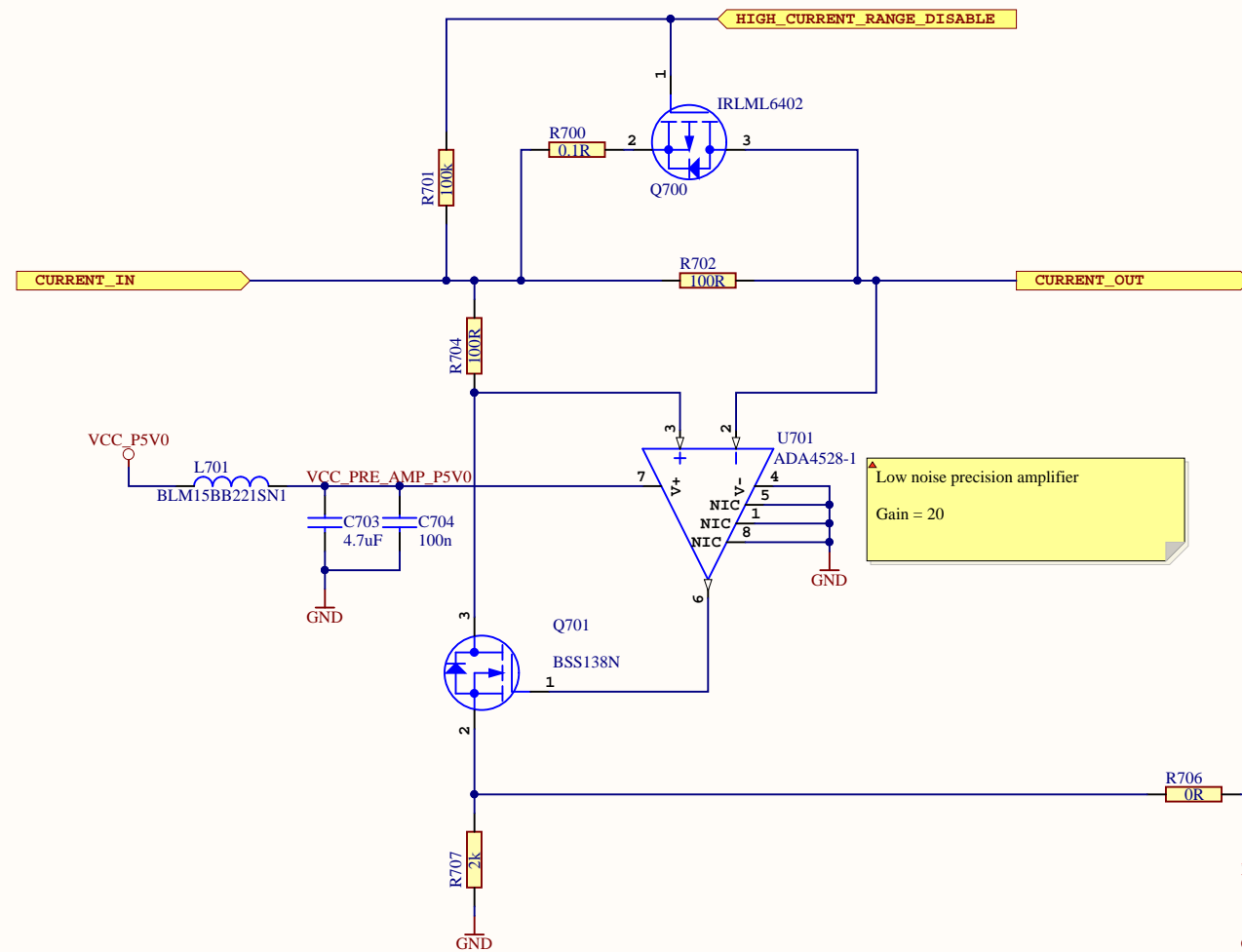
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Current measurement		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 3
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_current_measurement.SchDoc		Date: 12.02.2019
		Page: 5 of 9



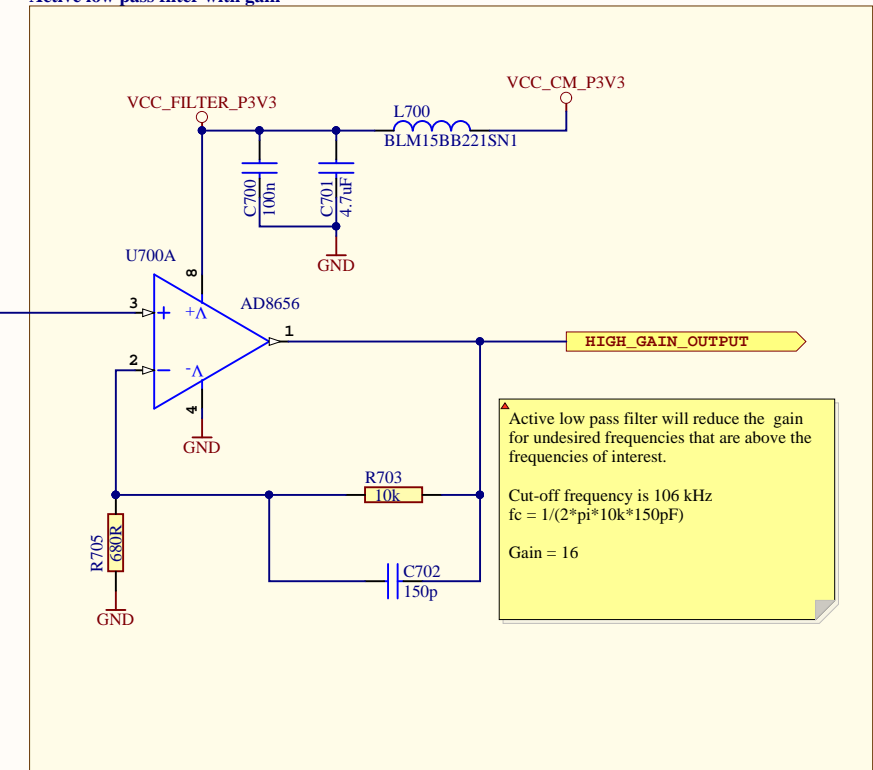


Drawn By: Microchip Norway Engineer: AH		
Project Title ATtiny3217 Xplained Pro Sheet Title Current measurement control		
Size A3	PCB Assembly Number: A09-2835 PCB Number: A08-2751	PCBA Revision: 3 PCB Revision: 1
File: Tiny3217_Xplained_Pro_current_measurement_control.SchDoc		Date: 12.02.2019 Page: 6 of 9

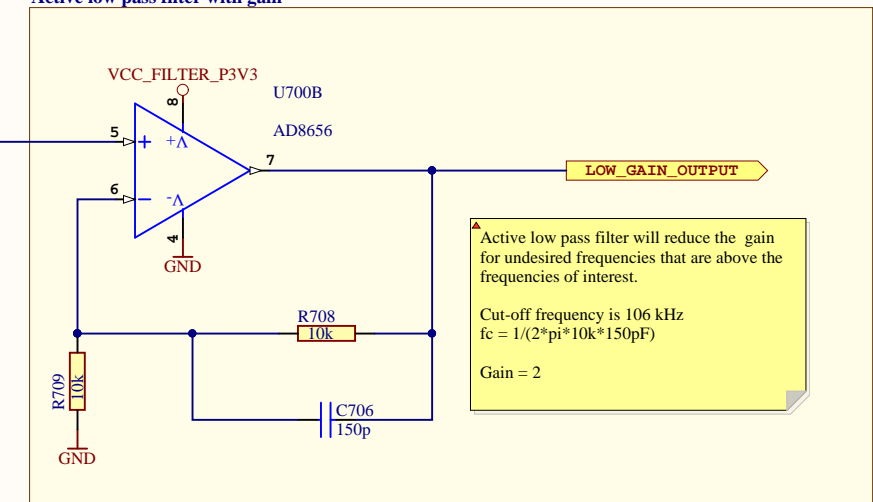




Active low pass filter with gain



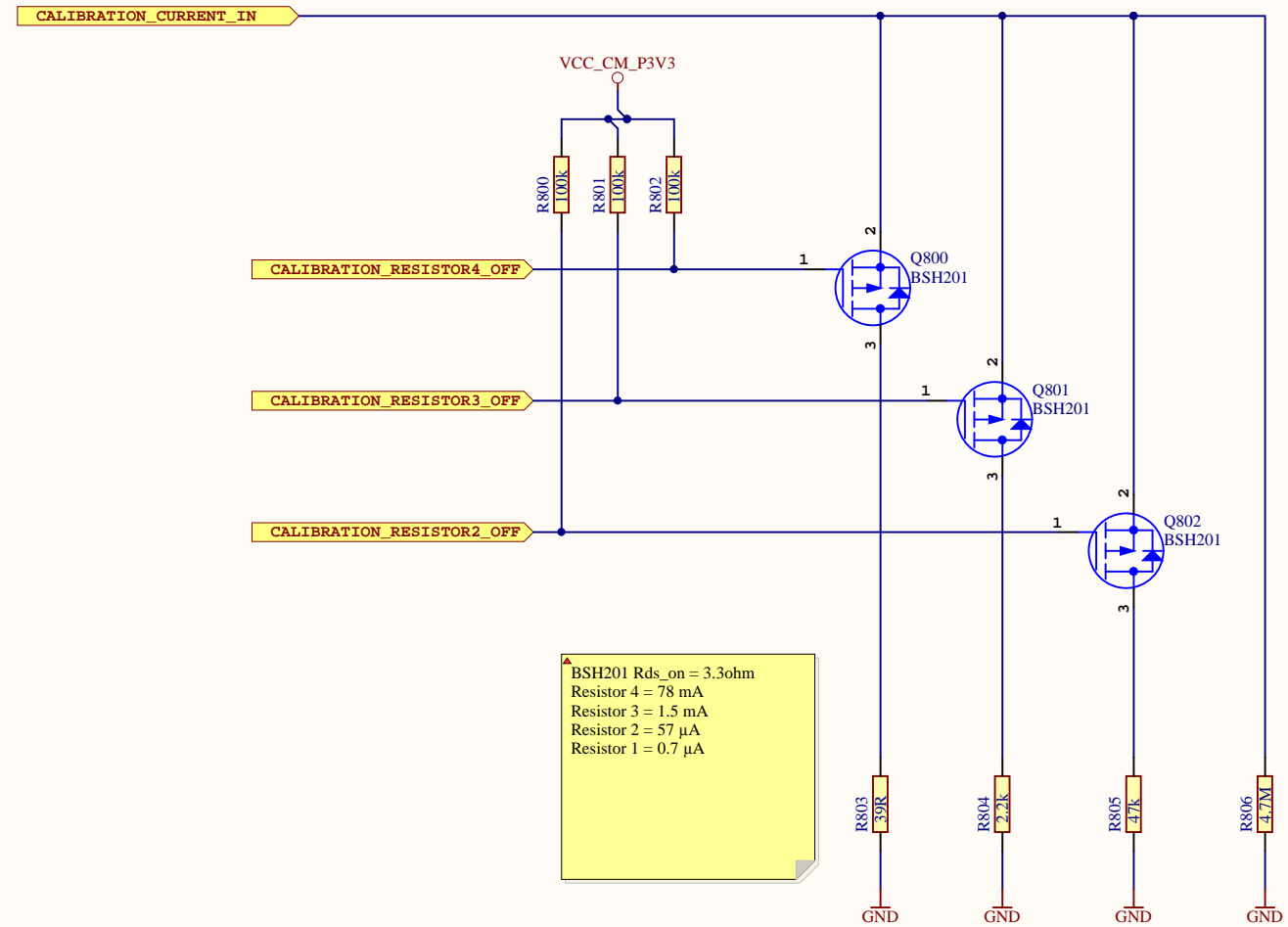
Active low pass filter with gain



Drawn By:
Microchip Norway
Engineer:
AH



Project Title ATtiny3217 Xplained Pro			Designed with Altium Altium.com
Sheet Title Current measurement frontend			
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 3	Date: 12.02.2019
	PCB Number: A08-2751	PCB Revision: 1	Page: 7 of 9
File: Tiny3217_Xplained_Pro_current_measurement_frontend.SchDoc			



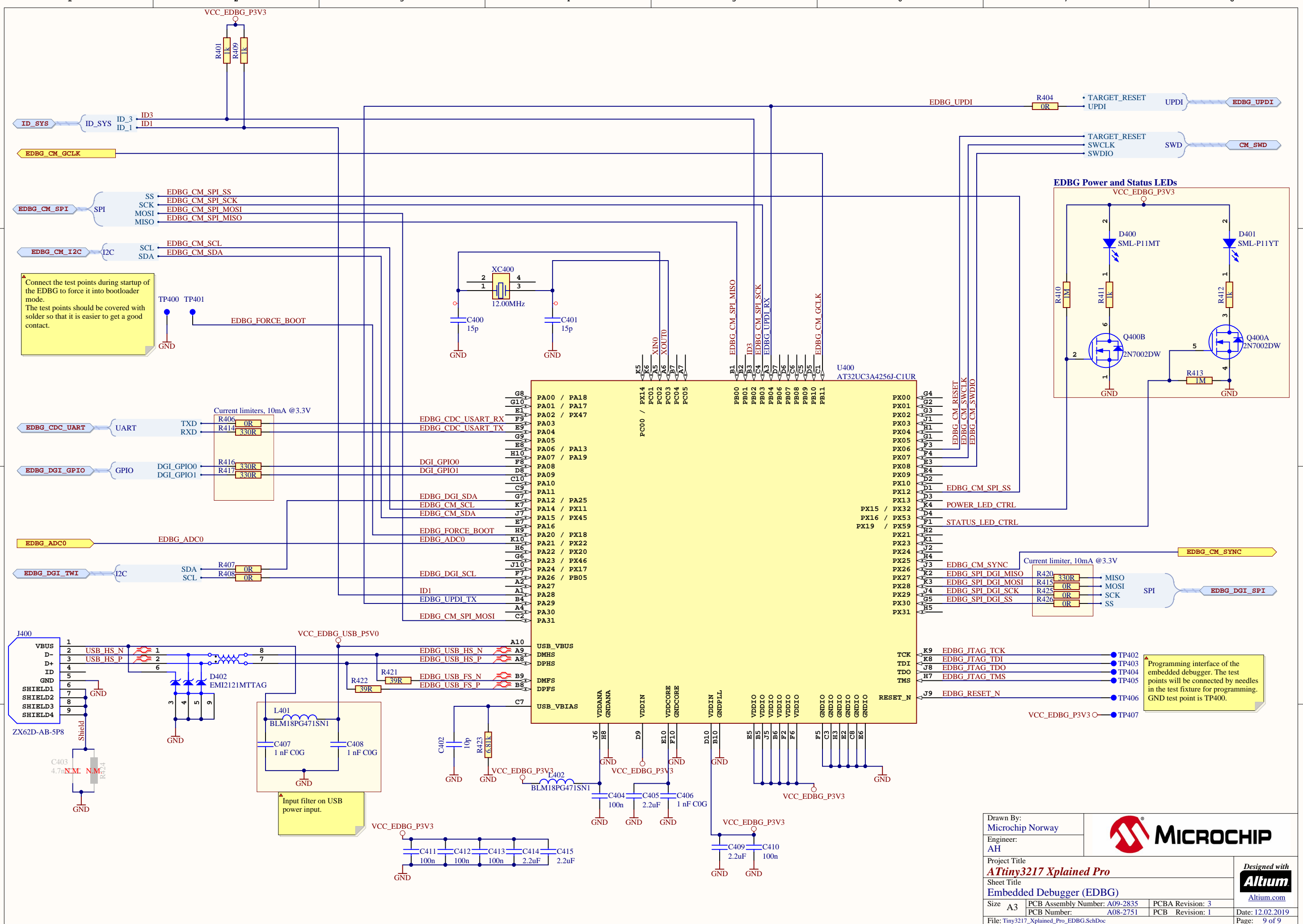
▲ BSH201 Rds_on = 3.3ohm
 Resistor 4 = 78 mA
 Resistor 3 = 1.5 mA
 Resistor 2 = 57 μ A
 Resistor 1 = 0.7 μ A

Drawn By:
 Microchip Norway
 Engineer:
 AH



Project Title
ATtiny3217 Xplained Pro
 Sheet Title
Current measurement calibration
 Size A3 PCB Assembly Number: A09-2835 PCBA Revision: 3
 PCB Number: A08-2751 PCB Revision: 1 Date: 12.02.2019
 File: Tiny3217_Xplained_Pro_current_measurement_calibration.SchDoc Page: 8 of 9





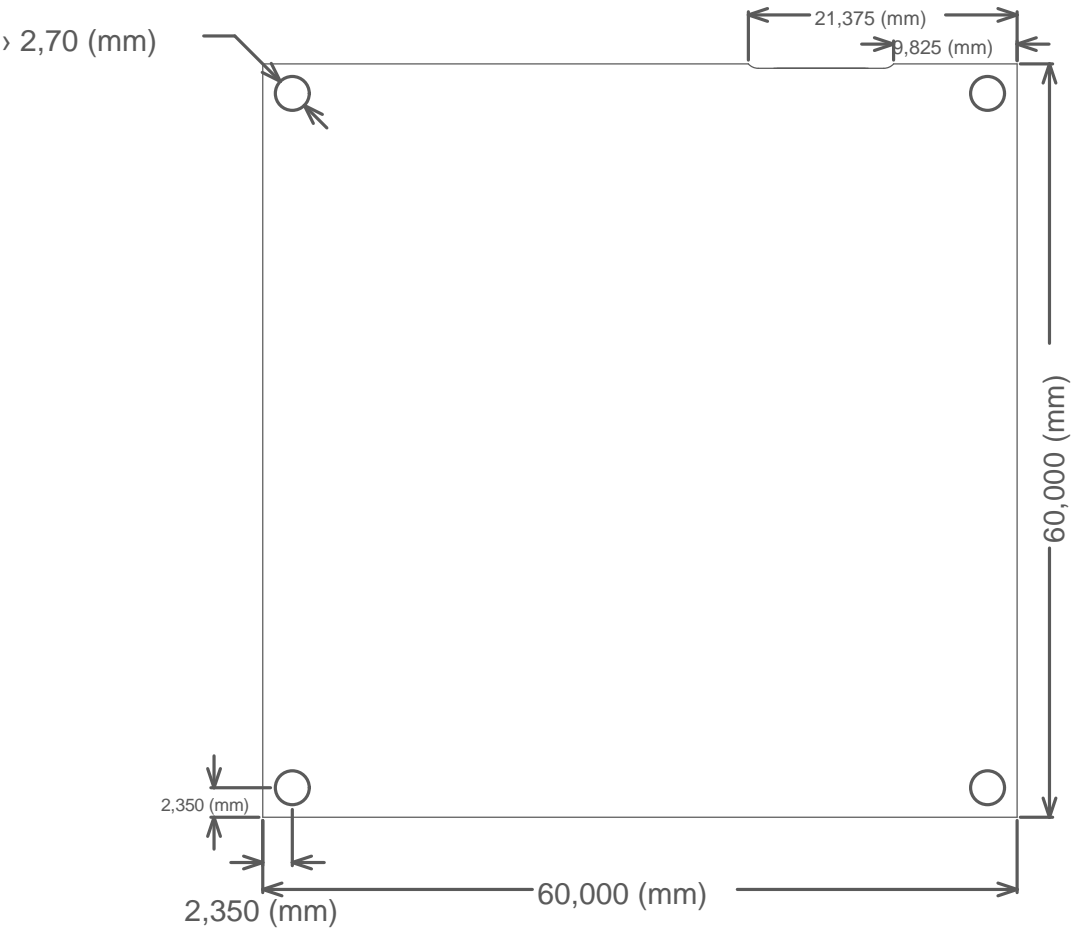
Connect the test points during startup of the EDBG to force it into bootloading mode. The test points should be covered with solder so that it is easier to get a good contact.

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.

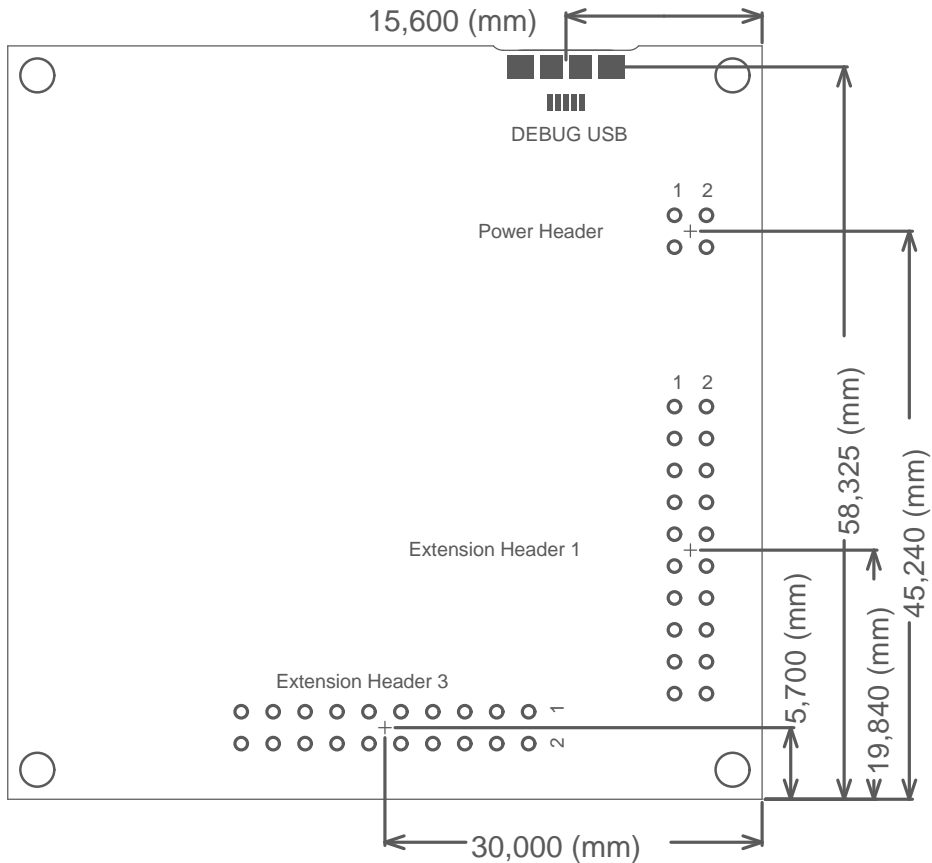
Drawn By: Microchip Norway Engineer: AH		
Project Title ATtiny3217 Xplained Pro Sheet Title Embedded Debugger (EDBG)		
Size A3	PCB Assembly Number: A09-2835 PCB Number: A08-2751	PCBA Revision: 3 PCB Revision: 1
File: Tiny3217_Xplained_Pro_EDBG.SchDoc		Date: 12.02.2019 Page: 9 of 9



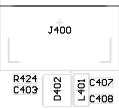
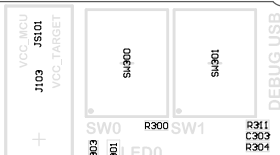
Mechanical Dimensions



Connector Placement



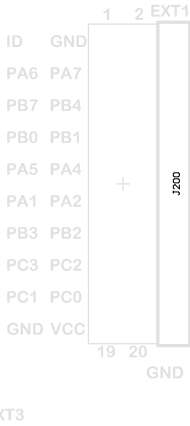
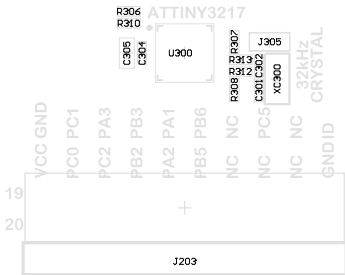
GND **AVR**



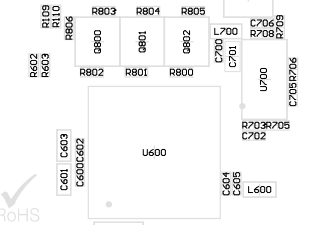
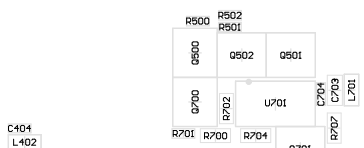
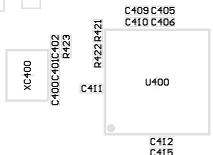
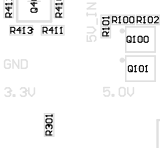
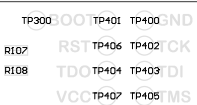
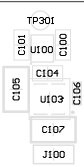
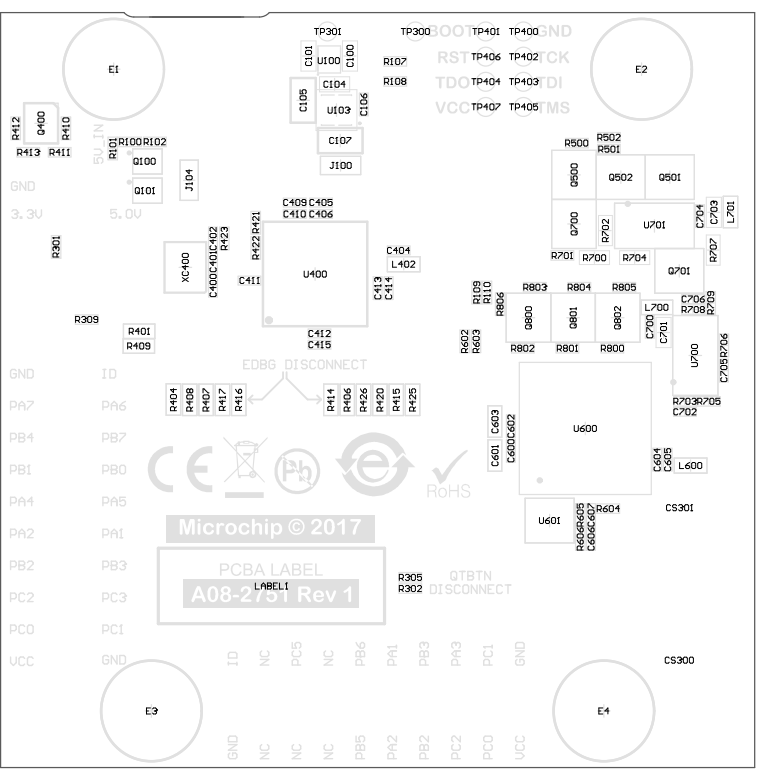
CURRENT MEASUREMENT



ATTINY3217 X PLAINED PRO



GND



Microchip © 2017

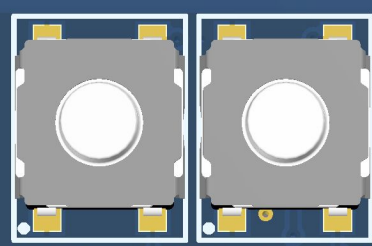
PCBA LABEL
A08-2751 Rev 1
LABEL1

R305 QTBTN
R302 DISCONNECT

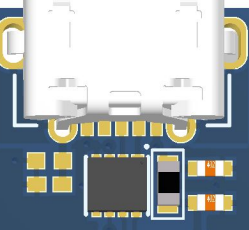


CS300

AVR
GND



DEBUG USB



POWER |
STATUS |
GND

MEASURE
BYPASS



MCU

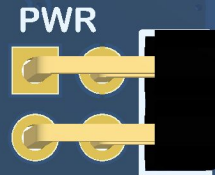
CURRENT
MEASUREMENT



I/O

MEASURE
BYPASS

5.0V_IN GND 1
5.0V VCC 3



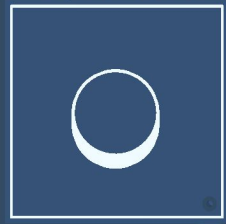
ATTINY3217
UPDI DEBUG



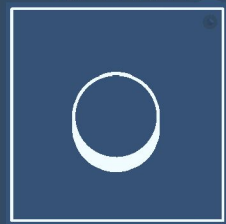
MICROCHIP

ATTINY3217 X PLAINED PRO

QT BTN 1

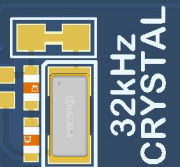
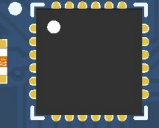


QT BTN 2



GND

ATTINY3217

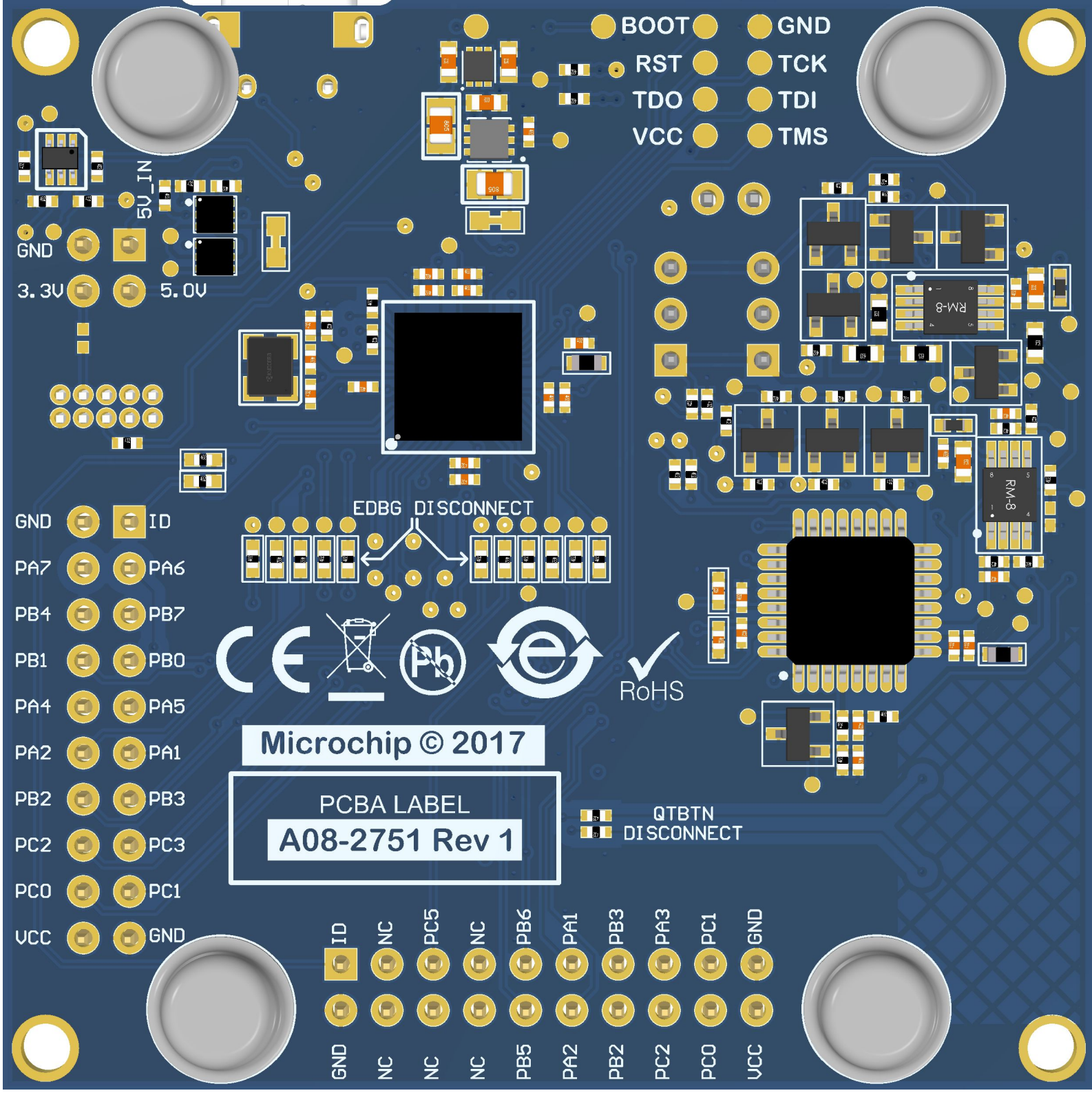


19 VCC GND
20 PC0 PC1
PC2 PA3
PB2 PB3
PA2 PA1
PB5 PB6
NC NC
NC PC5
NC NC
GND ID

1 2 EXT1
ID GND
PA6 PA7
PB7 PB4
PB0 PB1
PA5 PA4
PA1 PA2
PB3 PB2
PC3 PC2
PC1 PC0
GND VCC

EXT3

GND



● BOOT ● GND
● RST ● TCK
● TDO ● TDI
● VCC ● TMS

5V_IN
GND
3.3V
5.0V

GND ● ID
PA7 ● PA6
PB4 ● PB7
PB1 ● PB0
PA4 ● PA5
PA2 ● PA1
PB2 ● PB3
PC2 ● PC3
PC0 ● PC1
UCC ● GND

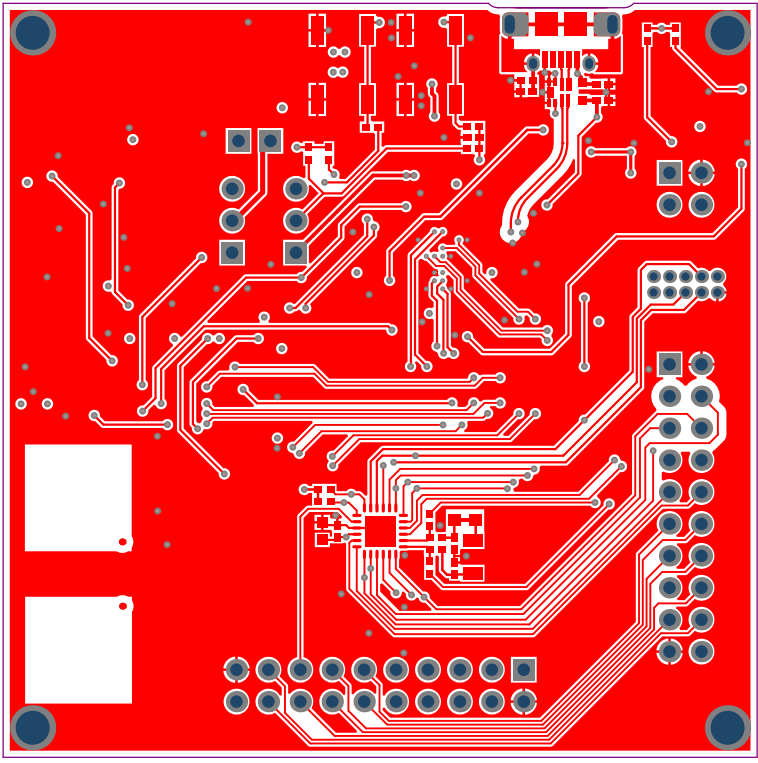
EDBG DISCONNECT

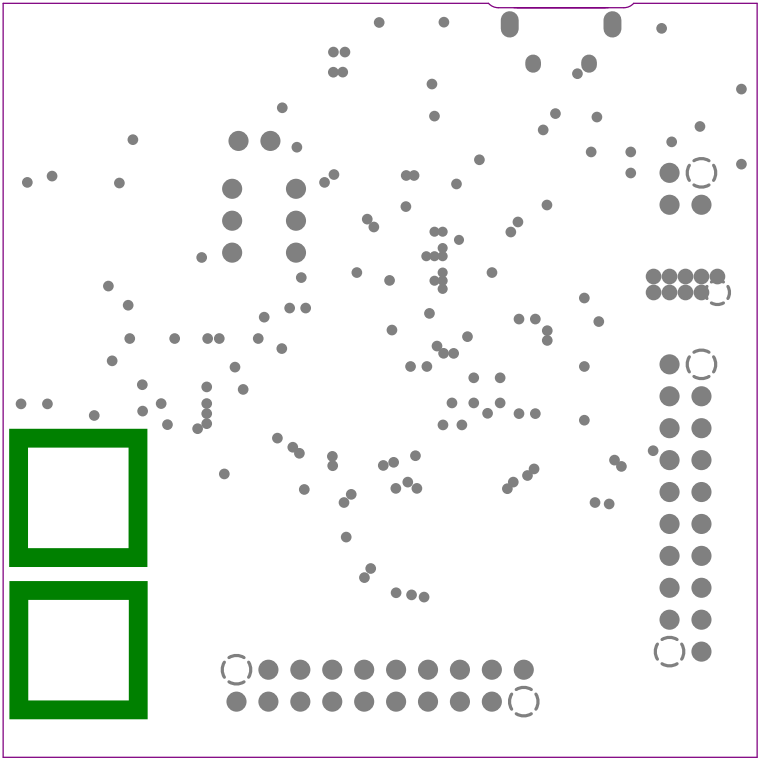


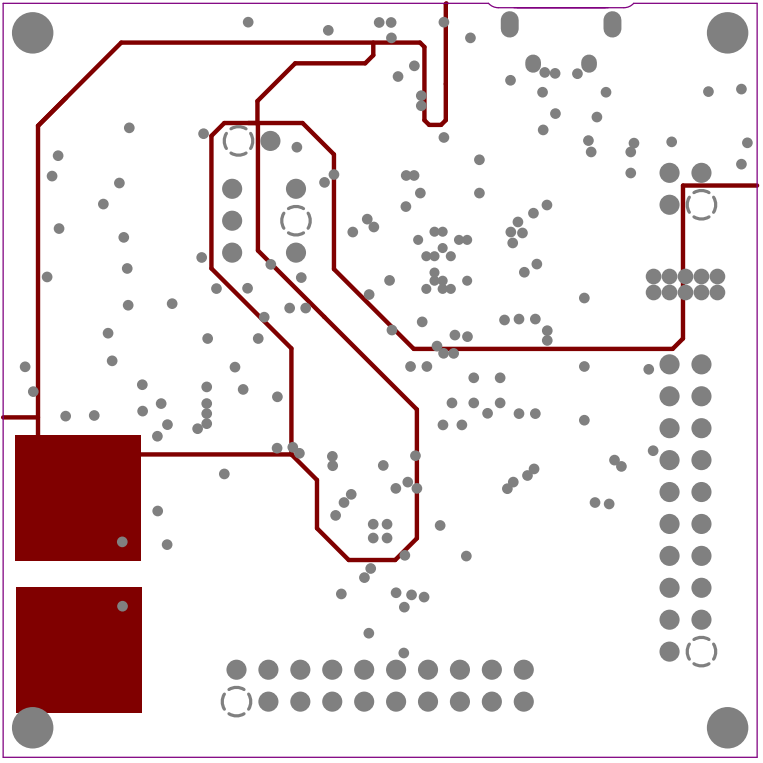
Microchip © 2017
PCBA LABEL
A08-2751 Rev 1

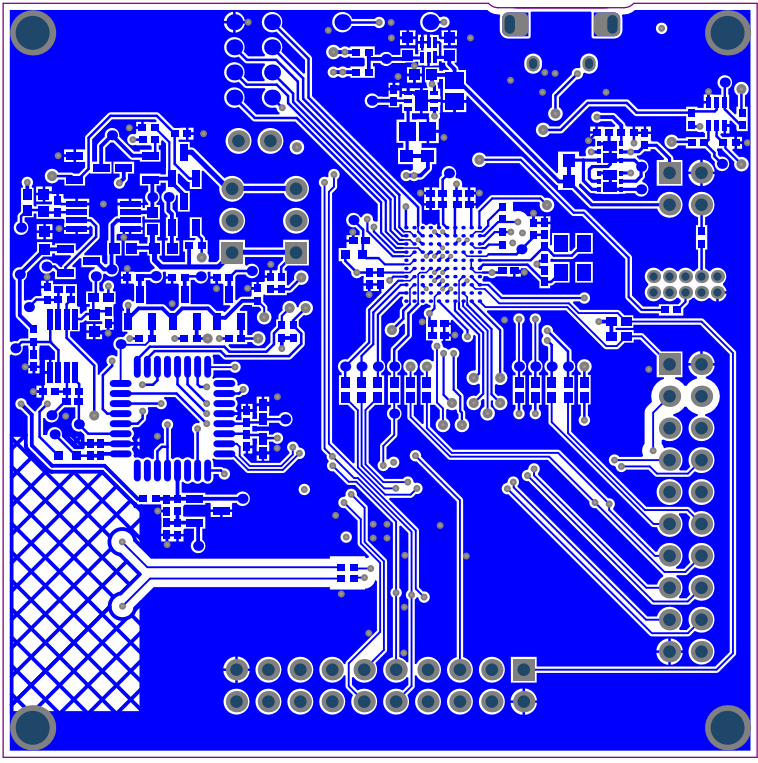
QTBTN DISCONNECT

ID ● NC ● PC5 ● NC ● PB6 ● PA1 ● PB3 ● PA3 ● PC1 ● GND
GND ● NC ● NC ● NC ● PB5 ● PA2 ● PB2 ● PC2 ● PC0 ● VCC









Component list

Bill of Materials Fitted For Variant [Default_assembly] of Project [Tiny3217_Xplained_Pro.PrjPCB] (No PCB Document Selected)

Source Data From: **Tiny3217_Xplained_Pro.PrjPCB**
 Project: **Tiny3217_Xplained_Pro.PrjPCB**
 Variant: **Default_assembly**



Report Date: 12.02.2019 13:39:26
 Print Date: 12.02.2019 13:36:51

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100, C101, C104, C305, C701, C703	6	4.7uF	WALSIN Technology Corporation	0603X475K100CT	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
Fitted	C105, C107	2	22u/10V	tdk	C2012X5R1A226M0.85	Ceramic capacitor, SMD 0805, X5R, 10V, A±20%
Fitted	C106	1	10n	YAGEO CORP	CC0402KRX7R8BB103	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Fitted	C301, C302	2	13pF	Murata	GRM1555C1H130JA01D	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C304, C404, C410, C411, C412, C413, C600, C602, C604, C607, C700, C704	12	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C400, C401	2	15p	AVX	04025A150JA2A	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C402	1	10p	AVX	04025A100JA2A	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C405, C409, C414, C415	4	2.2uF	Kemet	C0402C225M9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C406, C407, C408, C606	4	1 nF COG	Murata	GRM1555C1H102JA01D	Ceramic capacitor, SMD 0402, COG, 50V, +/-5%
Fitted	C601, C603	2	1u	Kemet	C0402C105K9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-10% (de26942)
Fitted	C605	1	33n	Murata	GRM155R71E333KA88D	Ceramic capacitor, SMD 0402, X7R, 25V, ±10%
Fitted	C702, C706	2	150p	YAGEO CORP	CC0402KRX7R8BB151	Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Fitted	D301, D401	2	SML-P11YT	ROHM	SML-P11YT-T86	LED, SMD 0402, Yellow, Wave length=586nm, 7.6mcd @ (11mA, 1.9Vf)
Fitted	D400	1	SML-P11MT	ROHM	SML-P11MT-T86	LED, SMD 0402, Green, Wave length=569nm, 2.1mcd @ (11mA, 1.9Vf)
Fitted	D402	1	EM2121MTTAG	ON Semiconductor	EM2121MTTAG	EM2121, SZEM2121 Single Pair Common Mode Filter with ESD Protection
Fitted	E1, E2, E3, E4	4	SJ-5076	3M	SJ-5076	2.8mm adhesive feet, diam 8.0mm
Fitted	FIXTURE1	1	Xplained PRO MCU board Jupiter Test Fixture	ESCA TEC	Xplained PRO MCU board Jupiter Test Fixture	Xplained PRO MCU board Jupiter Test Fixture
Fitted	FW1	1	EDBG secured firmw are	ATMEL		EDBG secured firmw are
Fitted	J101, J102	2	HMTSW-103-23-F-S-237	SAMTEC	HMTSW-103-23-F-S-237	1x3 pin header, 2.54mm pitch, Pin-in-Paste THM, 1mm hole
Fitted	J103	1	Pin header 1x2 right angle	Pro-data International Corp	2213R-2G	1x2 pin header, right angle, 2.54mm pitch, through-hole
Fitted	J200, J203	2	P101-2*10RGF-139-ND	Pro-data International Corp	P101-2*10RGF-139-ND	Pin header, 2x10, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J202	1	P101-2*02RGF-139-ND	Pro-data International Corp	P101-2*02RGF-139-ND	Pin header, 2x2, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J205	1	PIN HEADER 2x5	WOOD HARDWARE ELECTRONICS CO., LTD	1310-1205SNS073R1	2x5 pin header, 1.27mm pitch, THM
Fitted	J400	1	ZX62D-AB-5P8	HIROSE	ZX62D-AB-5P8(30)	Micro USB AB Connector, Standard SMT + DIP
Fitted	JS100, JS101, JS102	3	SMT-100-BK-G	SAMTEC	SMT-100-BK-G	Jumper cap for 2.54mm pinheader
Fitted	L401, L402, L600	3	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603, Z=4700Hm (@ 100MHz), Max R(dc)=0.65Ohm, Max current=1A
Fitted	L700, L701	2	BLM15BB221SN1	Murata	BLM15BB221SN1	SMD RF inductor 0402, Z=2200Hm (@ 100MHz), Max R(dc)=0.80Ohm, Max current=200mA
Fitted	LABEL1	1	Label PCB A	ACT Logmark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	A Tiny3217 Xplained Pro PCB documentation			A Tiny3217 Xplained Pro PCB documentation
Fitted	PCBADOC1	1	A09-2835 PCB A files			A Tiny3217 Xplained Pro PCB A documentation
Fitted	Q100, Q101	2	PMDP855XP	NXP	PMDP855XP	Dual P-Channel MOSFET, -20V, RDS(ON) < 55 mOhm @ -3.4A @ -4.5V
Fitted	Q400	1	ZN7002DW	Fairchild	ZN7002DW	Dual N-Channel MOSFET, 60V, 115mA cont.RDS(ON) < 7.5 Ohm @ 50mA @ 5V, SOT-363
Fitted	Q500	1	PMW48XP	NXP	PMW48XP215	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	BSS138N	Low leakage N-Channel MOSFET, 60V, 0.23A continuous, 0.92A Peak RDS(ON) = 3.50hm@VGS=4.5V, VGS(th)<1.4V
Fitted	Q502, Q800, Q801, Q802	4	BSH201	NXP	BSH201.215	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	Q700	1	IRLM6402	International Rectifier	IRLM6402PBF	P-ch. MOSFET, -30V, -3.7A continuous,RDS(ON)=0.05Ohm@VGS=4.5V, RDS(ON)=0.08Ohm@VGS=2.5V
Fitted	R100, R410, R413	3	1M	ASJ	CR10-1004-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R101, R102, R304, R500, R501, R701, R800, R801, R802	9	100k	ASJ	CR10-1003-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R108, R307, R308, R309, R706	6	0R	(n/a)	RMCF04022T0R00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	R109, R110, R805	3	47k	KOA	RK73H1ETT4702F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R300, R311, R421, R422, R803	5	39R	ASJ	CR10-39R-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R302, R305, R703, R708, R709	5	10k	vishay	CRW040210K0FKED	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R303, R411, R412	3	1k	ASJ	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R306, R310, R602, R603	4	4.7k	PHYCOMP	232270674702L	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	R404, R406, R407, R408, R415, R425, R426	7	0R	(n/a)	RMCF04022T0R00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	R414, R416, R417, R420	4	330R	ASJ	CR10-3300-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R423	1	6.81k	vishay	CRW04026K81FKED	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R502, R806	2	4.7M	YAGEO CORP	RC0402FR-074M7L	Thick film SMD 0402 1/16W 1%
Fitted	R604	1	2k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R605	1	33k	ASJ	CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R606	1	39k	ASJ	CR10-3902-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, TEMPO +/-75 ppm/A°C
Fitted	R702, R704	2	100R	Panasonic	ERA3YEB101V	ERA-3YEB101V, metal film, 100R ±0.1%, resistor in 0603 at 100mW, TEMPO ±25ppm/A°C, Max V=75V
Fitted	R705	1	680R	ASJ	CR10-6800-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R707	1	2k	YAGEO CORP	RC0603FR-072KL	Thick film resistor, SMD 0603, 1/10W, 1%
Fitted	R804	1	2.2k	ASJ	CR10-2201-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW300, SW301	2	SKRAAKE010	ALPS	SKRAAKE010	6.2x6.2 mm SMD tact swtch, same as A08-0091 but less force is needed
Fitted	TEST1	1	A Tiny3217 Xplained Pro test			Fixture test for A Tiny3217 Xplained Pro
Fitted	TESTDOC1	1	A Tiny3217 Xplained Pro Test Instructions			A Tiny3217 Xplained Pro Test Instructions
Fitted	U100	1	TLV7003DSE	Texas Instruments	TLV7003DSE	LDO, 200 mA, Iq=31µA, Vdo=250mV, Vout=3.3V, VIN= 2 V to 5.5V, SON-6 package
Fitted	U103	1	TPS73533DRV	Texas Instruments	TPS73533DRV	Low noise LDO, 500 mA, Vout=3.3V, 2% accuracy, IQ=46µA, noise=28µVrms, VIN= 2.7V to 6.5V, Vdo=280mV, stable with low ESR capacitor
Fitted	U300	1	A Tiny3217-MFR	Microchip	ATTINY3217-MFR	Atmel 8-bit RISC MCU
Fitted	U400	1	AT32UC3A4256J-C1UR	ATMEL	AT32UC3A4256J-C1UR	AVR 32-bit RISC MCU
Fitted	U600	1	SAMD20E17A-AUT	ATMEL	ATSAMD20E17A-AUT	Atmel 32bit RISC MCU 32 pin
Fitted	U601	1	LM4041CEB3-ADJNOPB	Texas Instruments	LM4041CEB3-ADJNOPB	Adjustable shunt voltage regulator, 1.24 to 10V out
Fitted	U700	1	AD8656	Analog Devices	AD8656ARMZ	AD8656, dual low noise precision OpAmp, rail-to-rail, low offset 250µV, GBP 28 MHz, 8MSOP
Fitted	U701	1	ADA4528-1	Analog Devices	ADA4528-1ARMZ	Precision OpAmp, Zero-Drift 0.015µV/K, ultra low noise 5.6nV/sqrt(Hz), Vo=2µV, GBW=4MHz, single supply 2.2V to 5.5V or dual supply +1V to +2.75V, rail to rail, unity gain stable
Fitted	XC300	1	32.768kHz	Kyocera Crystal Device Corporation	ST3215SB32768BHPWBB	Kyocera ST3215SB32768BHPWBB, 32.768kHz, 9pF, SMD tuning fork crystal
Fitted	XC400	1	12.00MHz	Kyocera Crystal Device Corporation	CX3225GB12000HKPSC1	Kyocera CX3225GB12000HKPSC1, 12MHz, 12pF, SMD crystal
Not Fitted	C303, C403	0	4.7n	PHYCOMP	223858715632	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10% (de35287), Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Not Fitted	C705	0	1n	YAGEO CORP	CC0402KRX7R9BB102	Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Not Fitted	R301	0	1k	ASJ	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Not Fitted	R312, R313	0	0R	(n/a)	RMCF04022T0R00	RES 0.0 OHM 1/16W 0402 SMD
Not Fitted	R424	0	1M	ASJ	CR10-1004-FK	Thick film resistor, SMD 0402, 1/16W, 1%

Approved

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