
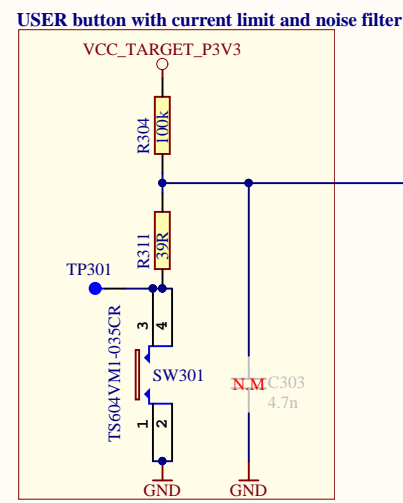
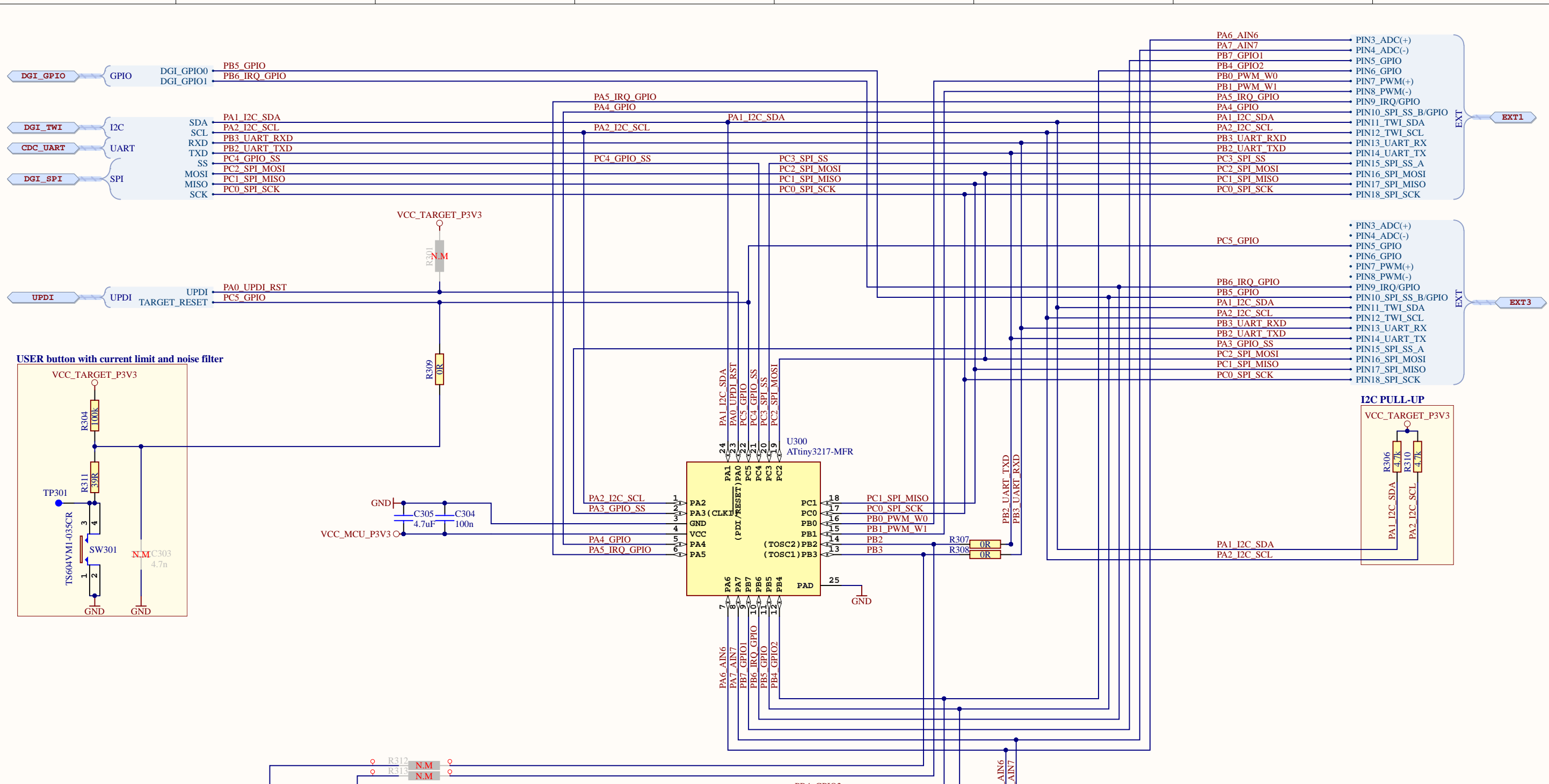


Drawn By: Microchip Norway			
Engineer: AH			
Project Title ATtiny3217 Xplained Pro			
Sheet Title Top Level Schematics			
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4	
	PCB Number: A08-2751	PCB Revision: 1	Date: 11/22/2019
File: Tiny3217_Xplained_Pro_TopLevel.SchDoc			Page: 1 of 9





32 kHz CRYSTAL

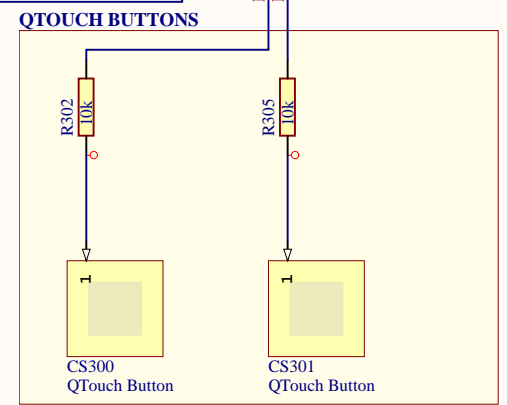
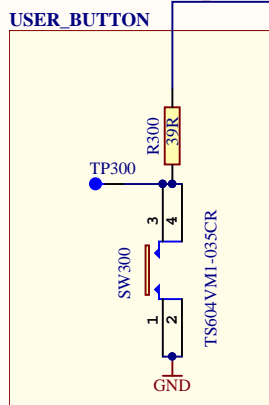
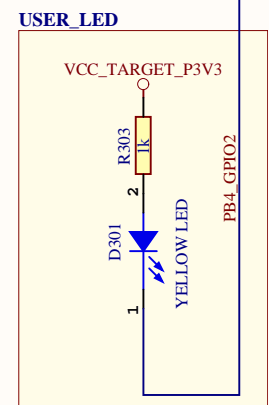
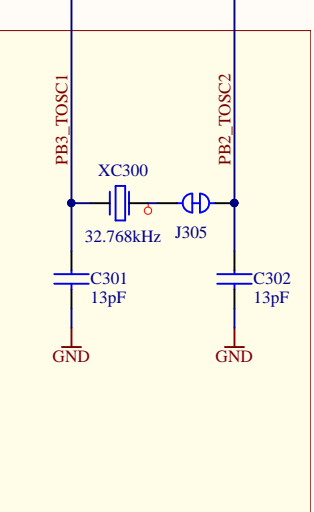
Crystal datasheet:
 Crystal = 9pF
 max ESR = 70kOhm
 Accuracy ±20ppm

ATtiny3217 datasheet:
 Cpara = 2.75 (Typical)
 max ESR = 80 kOhm

PCB capacitance: Cpcb = 0.5pF (estimated)

Estimated load:
 $C = 2x(\text{Crystal} - C_{\text{para}} - C_{\text{pcb}})$
 $C = 2x(9\text{pF} - 2.75\text{pF}(\text{estimated}) - 0.5\text{pF})$
 $C = 11.5\text{pF}$

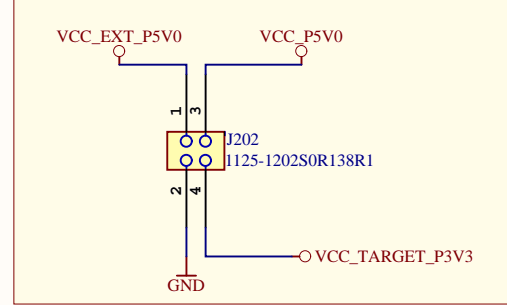
Selected in design: C= 13pF
 Verification showed: 13pF
 Accuracy: less than ±11.8ppm
 Startup time: 172ms to reach output
 with a 9.5pF probe connected to the crystal.
 Safety factor: Above 6



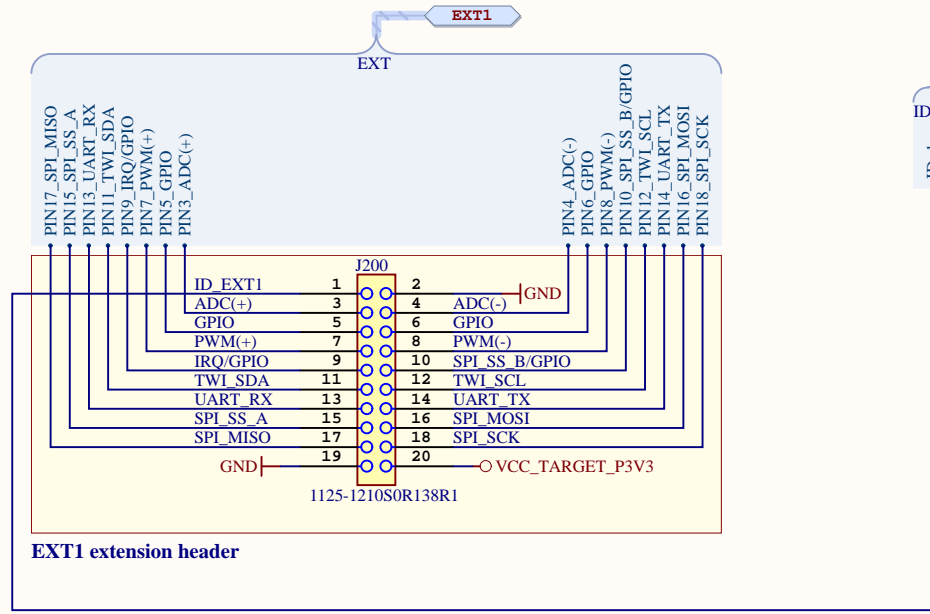
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Target MCU		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_Target_MCU.SchDoc		Page: 2 of 9

Designed with
Altium
Altium.com

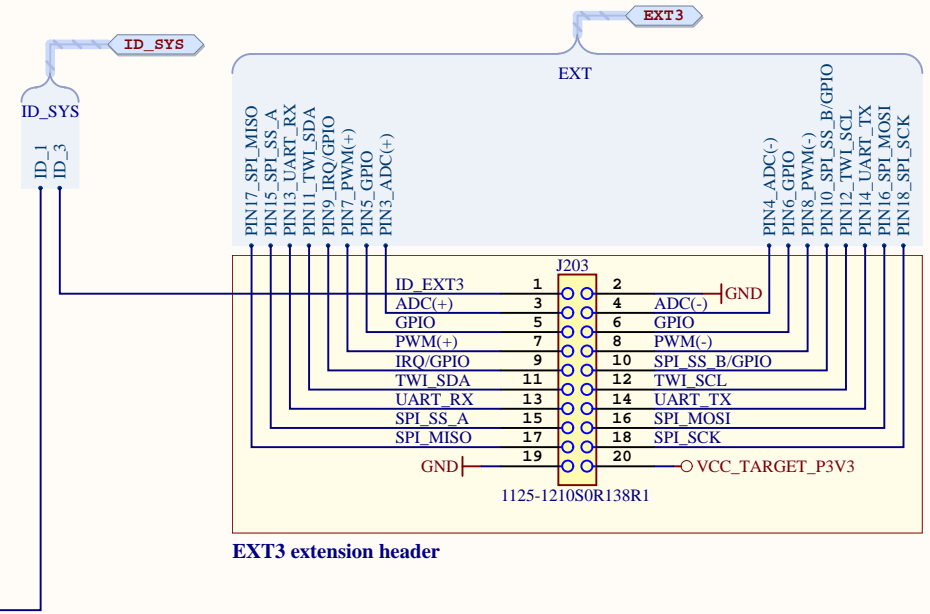
Power Connector



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)

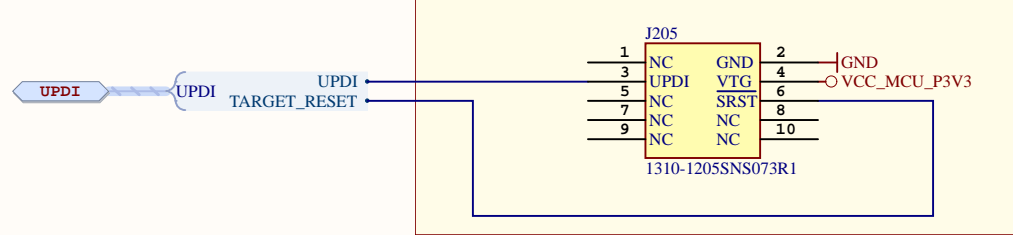


EXT1 extension header

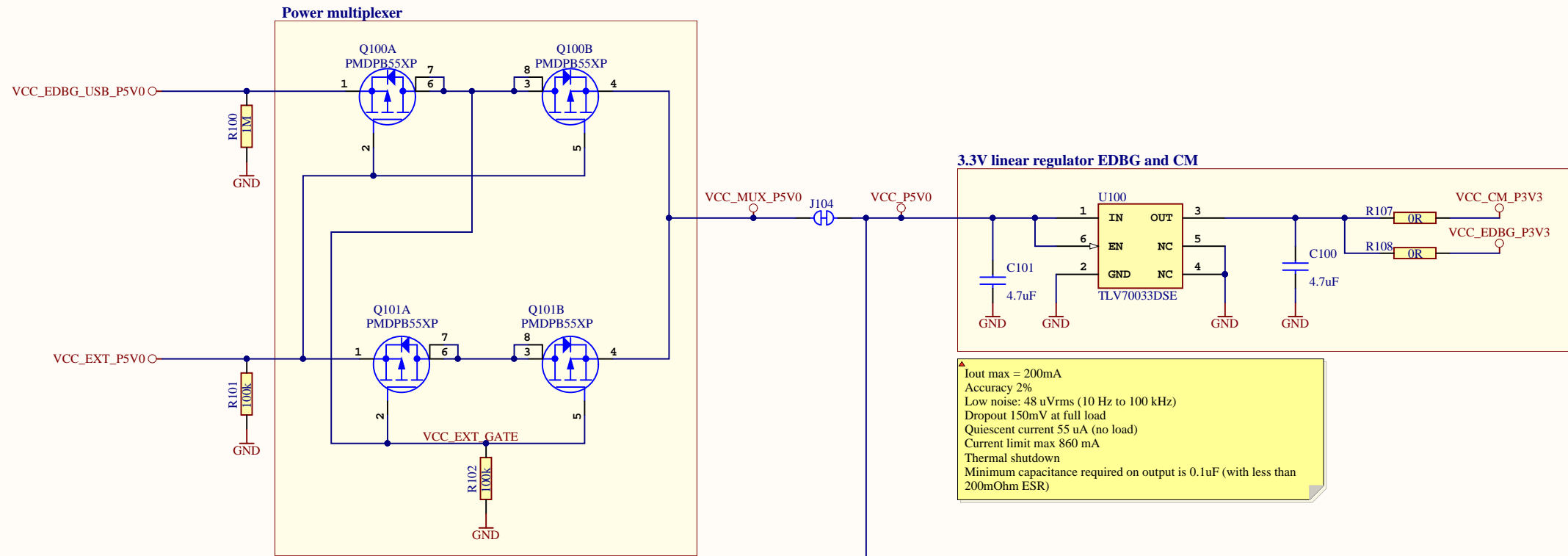


EXT3 extension header

UPDI Debug Connector for connecting an external programmer/debugger



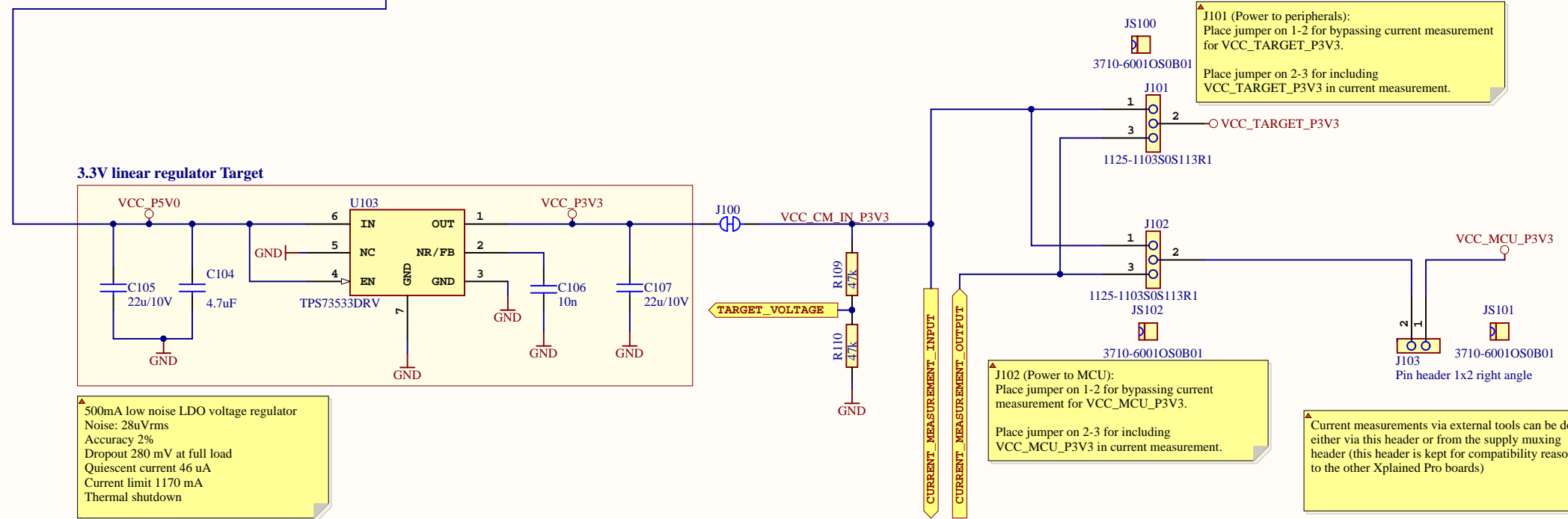
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro	Designed with 	
Sheet Title Extension connectors		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_Connectors.SchDoc		Date: 11/22/2019
		Page: 3 of 9



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.



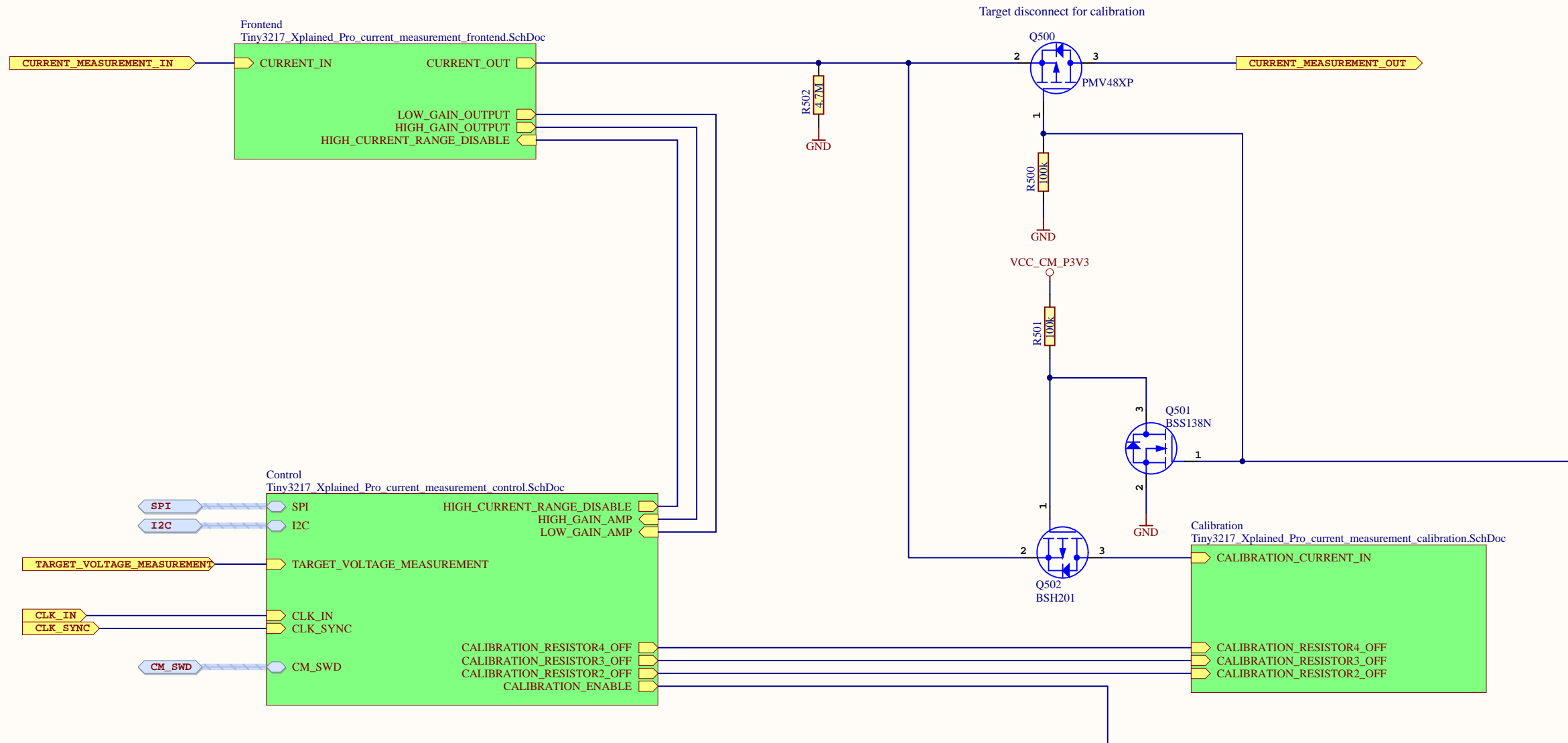
500mA low noise LDO voltage regulator
 Noise: 28uVrms
 Accuracy 2%
 Dropout 280 mV at full load
 Quiescent current 46 uA
 Current limit 1170 mA
 Thermal shutdown


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)

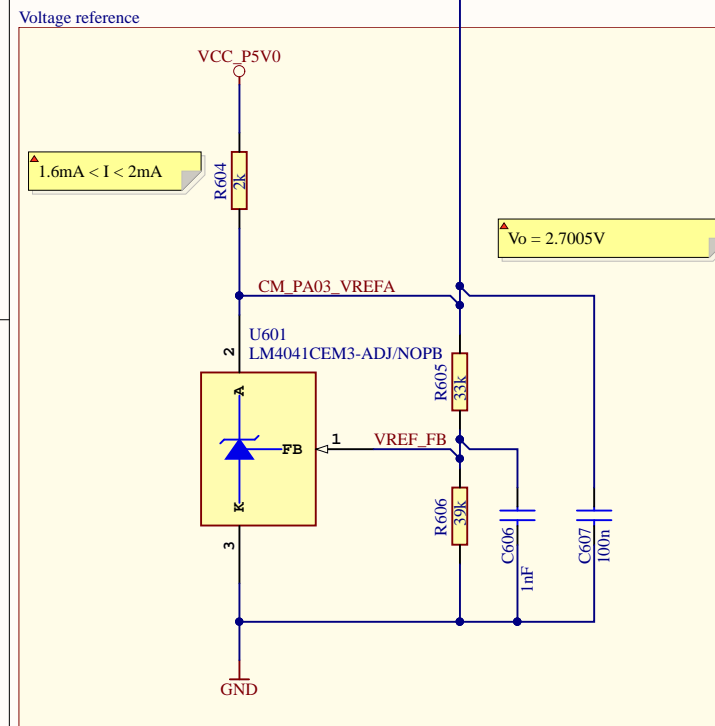
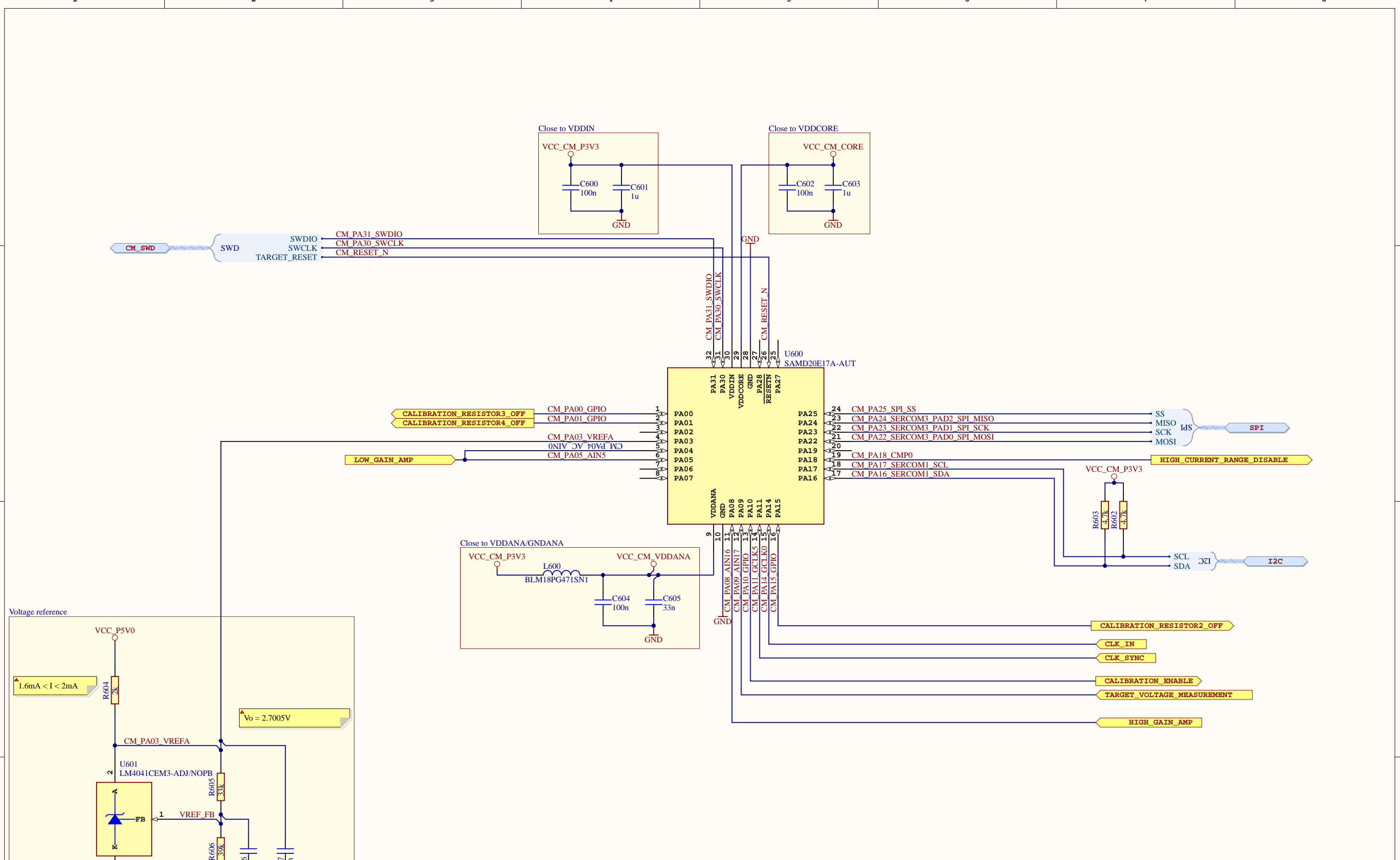
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Power supply		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_dual_input_power_supply.SchDoc		Date: 11/22/2019
		Page: 4 of 9





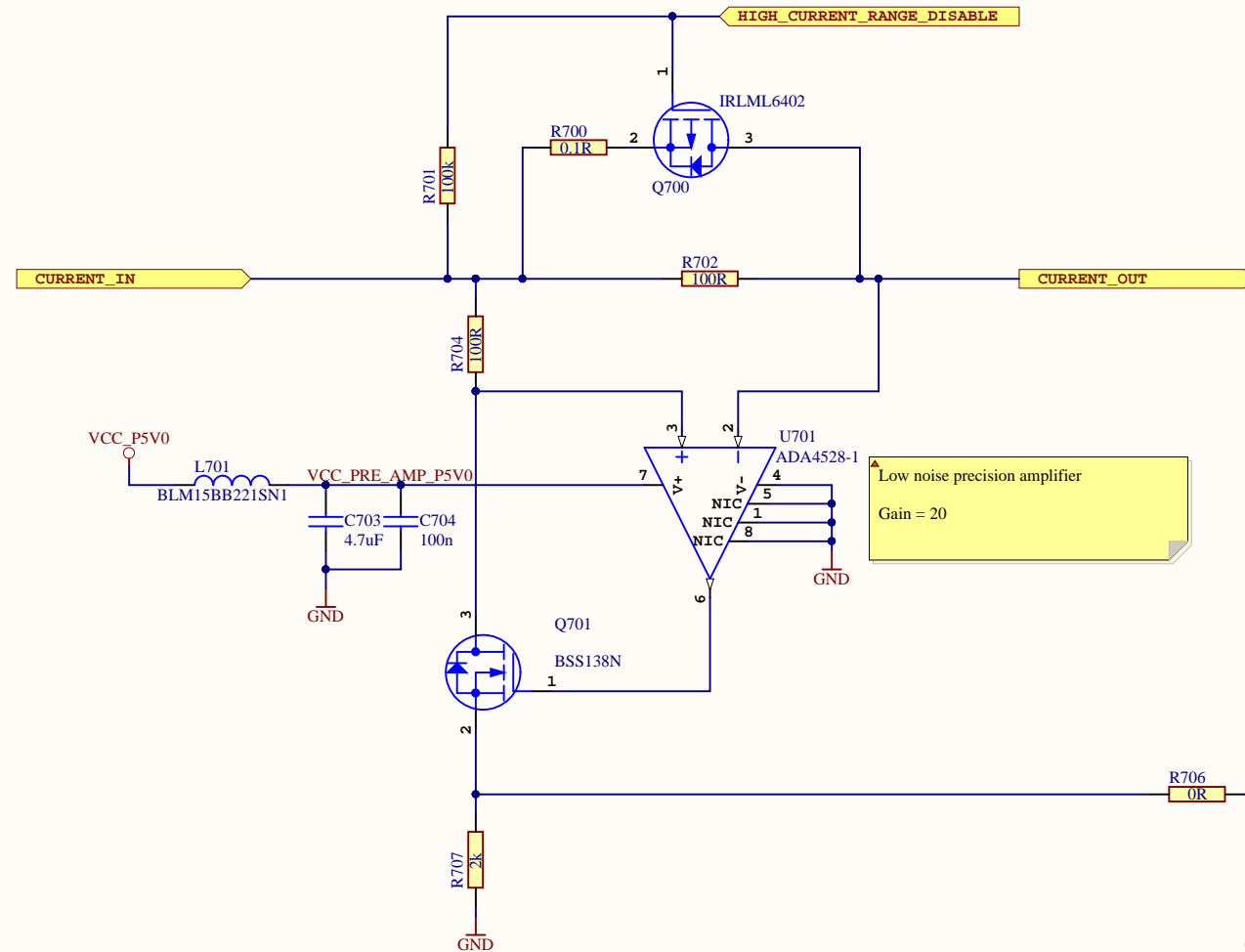
Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Current measurement		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_current_measurement.SchDoc		Date: 11/22/2019
		Page: 5 of 9



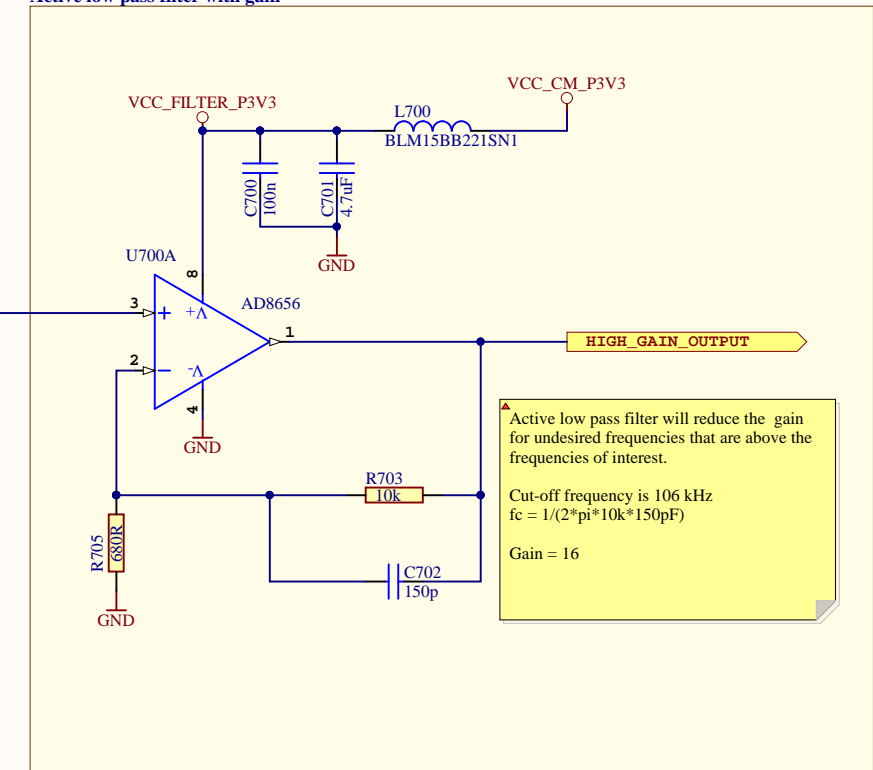


Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Current measurement control		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_current_measurement_control.SchDoc		Date: 11/22/2019
		Page: 6 of 9

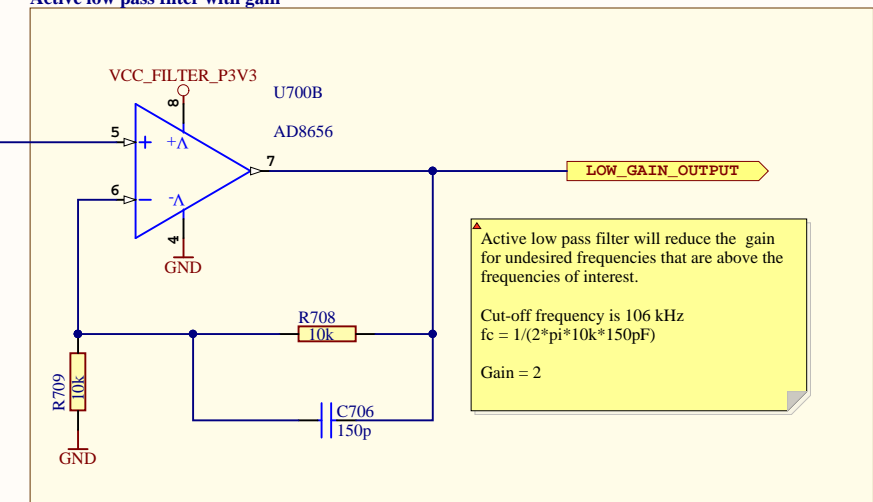




Active low pass filter with gain



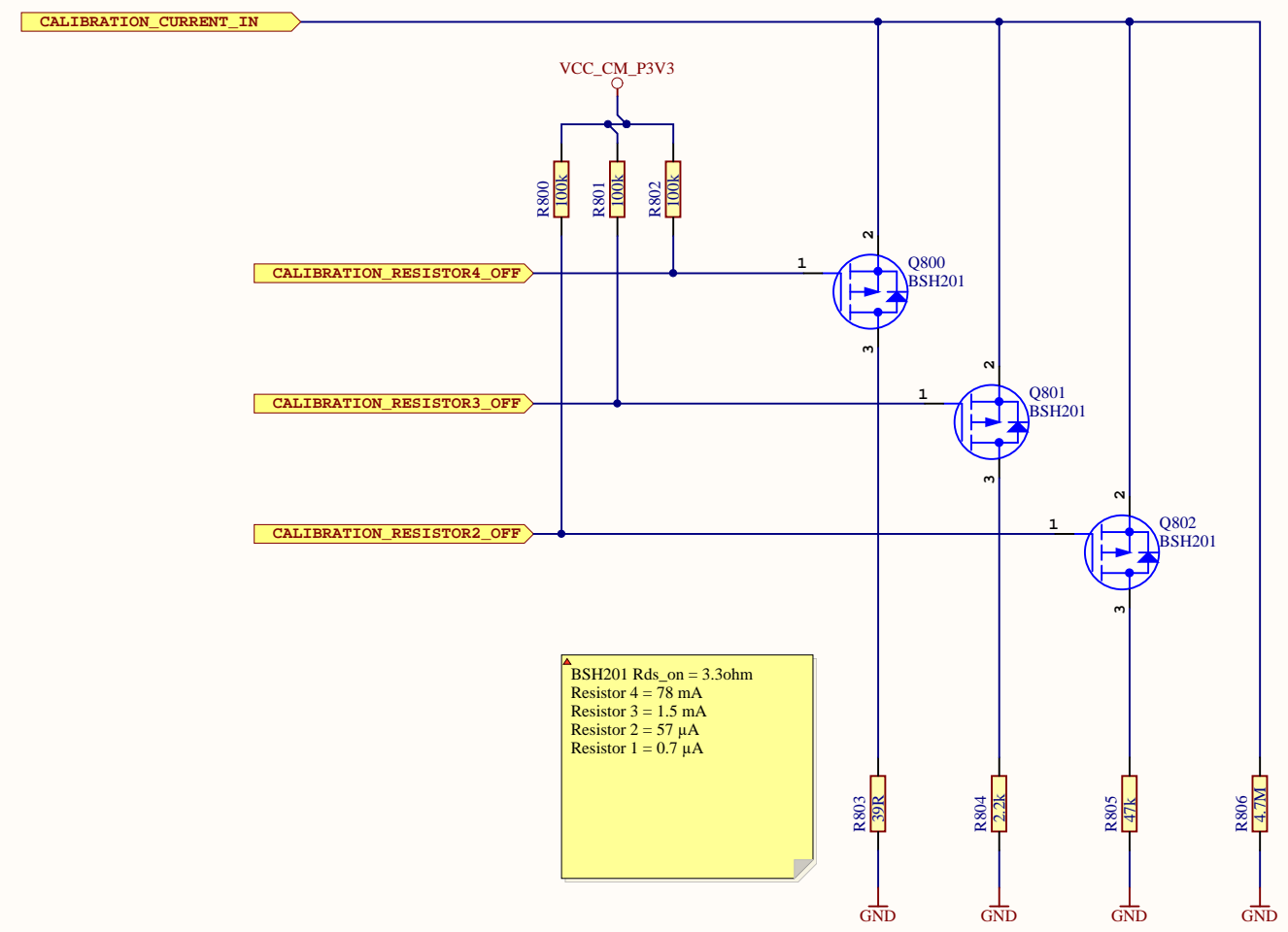
Active low pass filter with gain




Drawn By:
Microchip Norway
Engineer:
AH

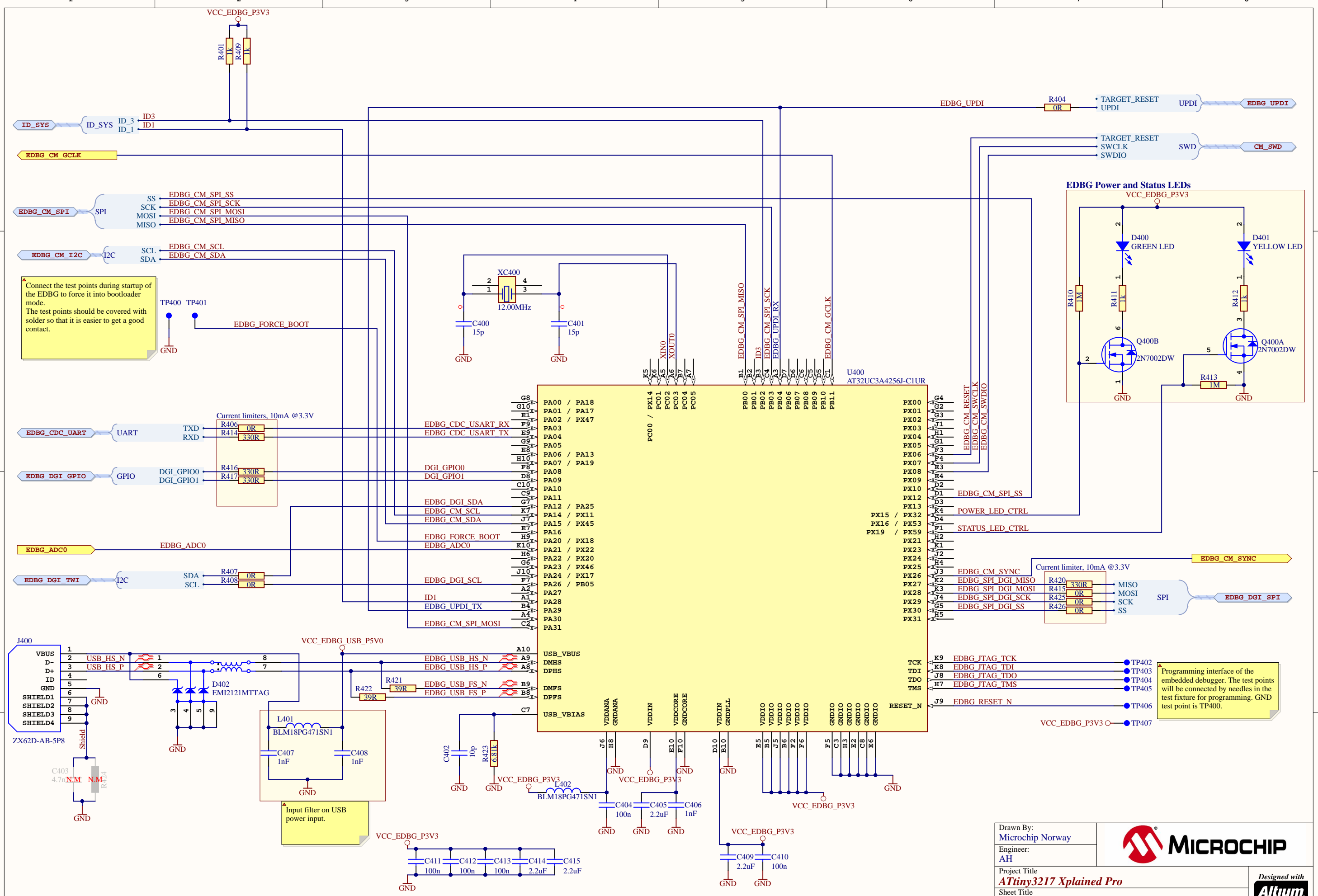


Project Title ATtiny3217 Xplained Pro			Designed with Altium Altium.com
Sheet Title Current measurement frontend			
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4	Date: 11/22/2019
	PCB Number: A08-2751	PCB Revision: 1	Page: 7 of 9
File: Tiny3217_Xplained_Pro_current_measurement_frontend.SchDoc			



▲ 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: 4
	PCB Number: A08-2751	PCB Revision: 1
File: Tiny3217_Xplained_Pro_current_measurement_calibration.SchDoc		Date: 11/22/2019
		Page: 8 of 9



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.

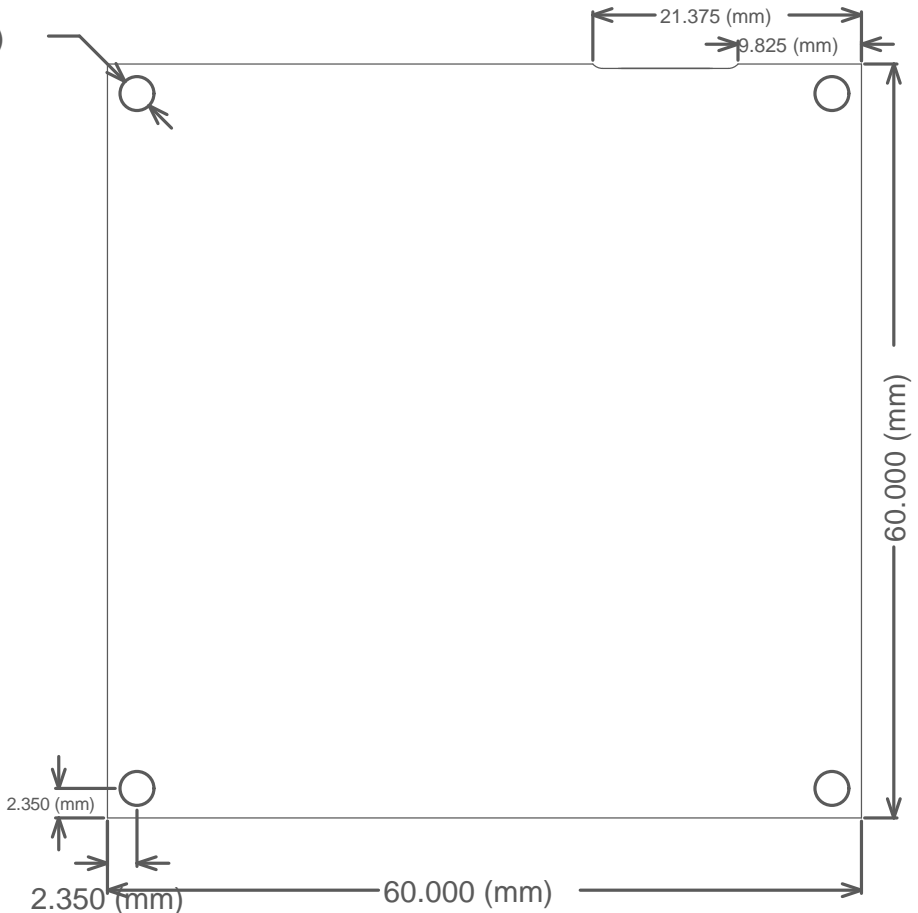
Programming interface of the embedded debugger. The test points will be connected by needles in the test fixture for programming. GND test point is TP400.

Drawn By: Microchip Norway		
Engineer: AH		
Project Title ATtiny3217 Xplained Pro		
Sheet Title Embedded Debugger (EDBG)		
Size A3	PCB Assembly Number: A09-2835	PCBA Revision: 4
PCB Number: A08-2751		PCB Revision: 1
File: Tiny3217_Xplained_Pro_EDBG.SchDoc		Date: 11/22/2019
		Page: 9 of 9

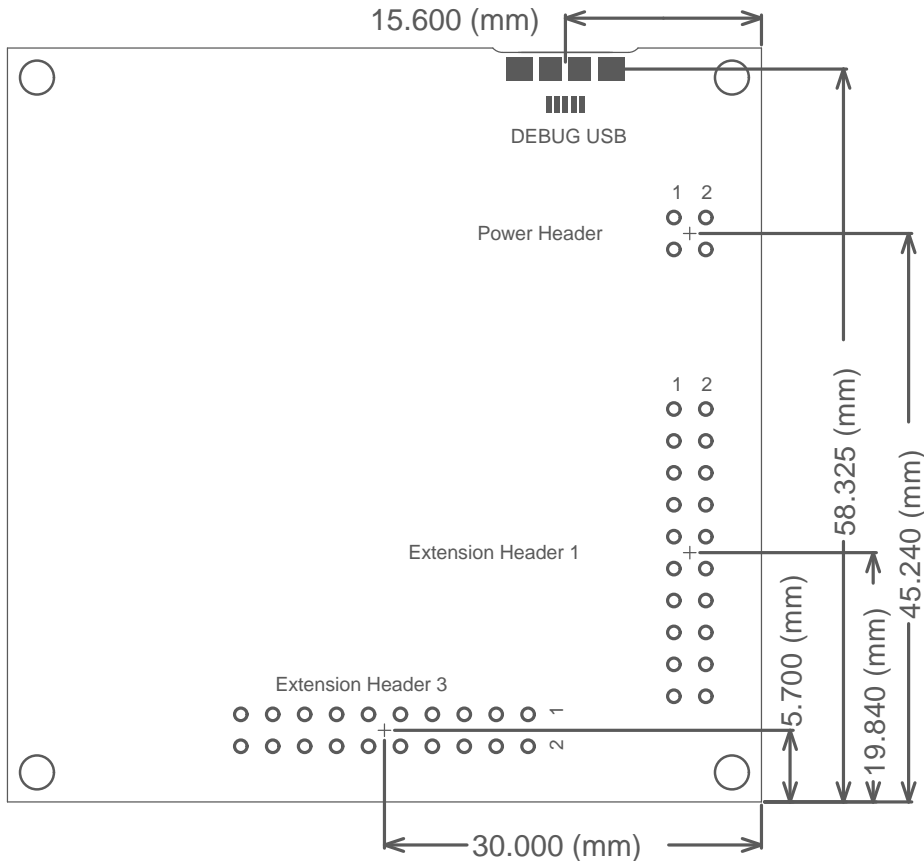


Mechanical Dimensions

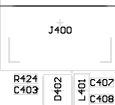
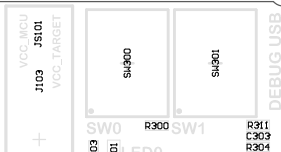
2.70 (mm)



Connector Placement



GND **AVR**



MEASURE
 BYPASS



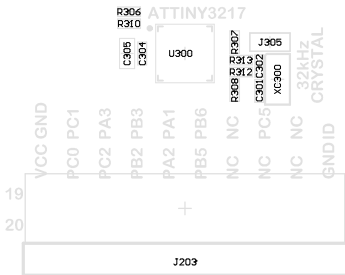
MEASURE
 BYPASS

CURRENT MEASUREMENT

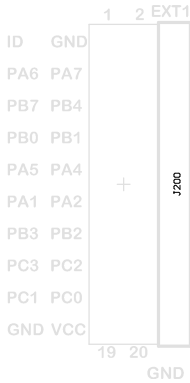
MICROCHIP
ATTINY3217 X PLAINED PRO

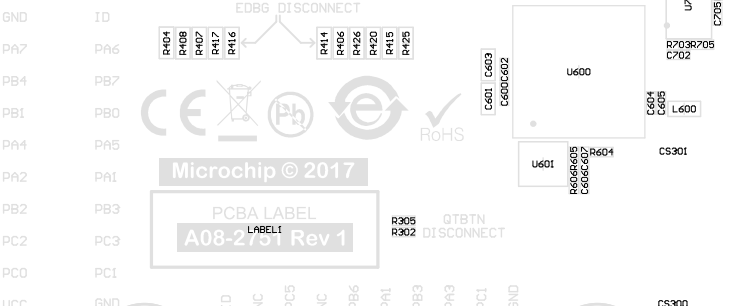
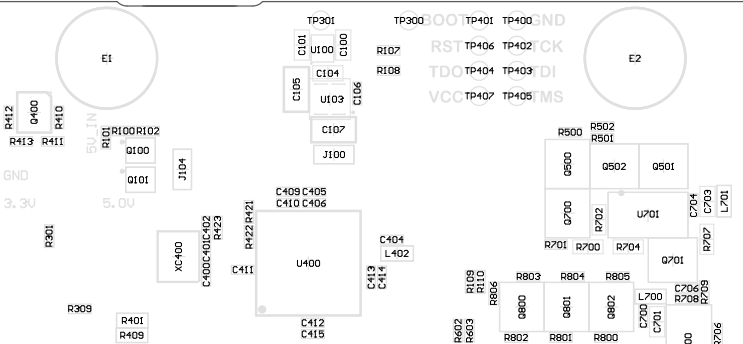


GND



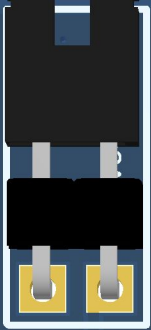
5.0V_IN GND 1
 5.0V VCC 3



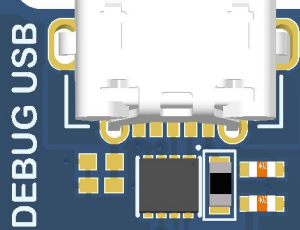


Microchip © 2017
 PCBA LABEL
 A08-2751 Rev 1
 LABEL1

EDBG DISCONNECT
 R305 QTBTN
 R302 DISCONNECT



SW0 SW1



DEBUG USB



POWER STATUS

MEASURE BYPASS



MCU

CURRENT MEASUREMENT



I/O

MEASURE BYPASS

5.0V_IN GND 1
5.0V VCC 3



PWR

ATTINY3217 UPDI DEBUG



ATTINY3217 X PLAINED PRO

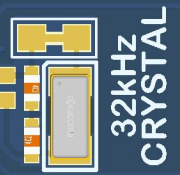
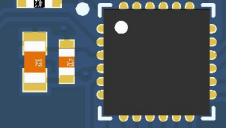


QT BTN 1



QT BTN 2

ATTINY3217



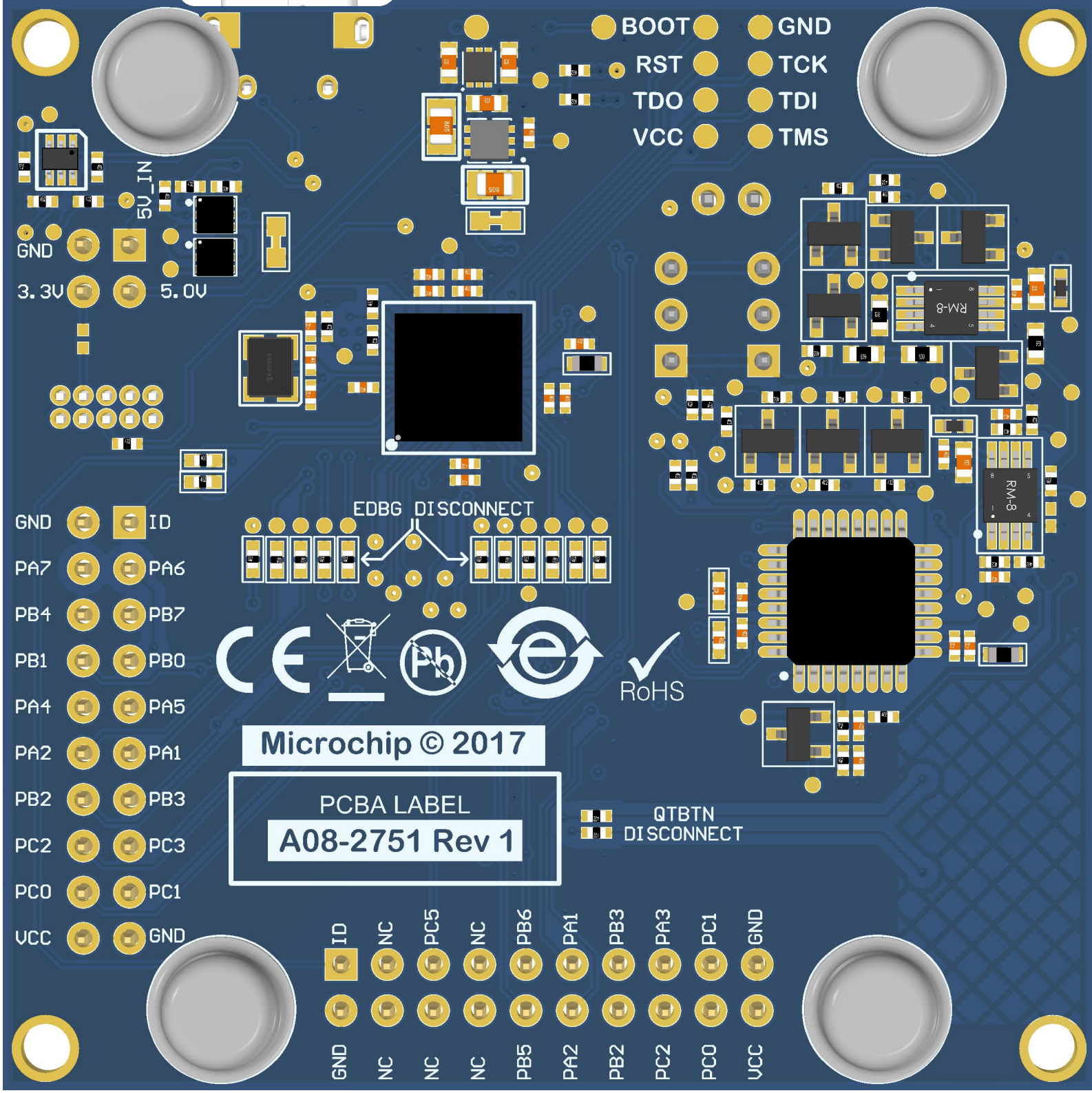
32kHz CRYSTAL

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



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

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



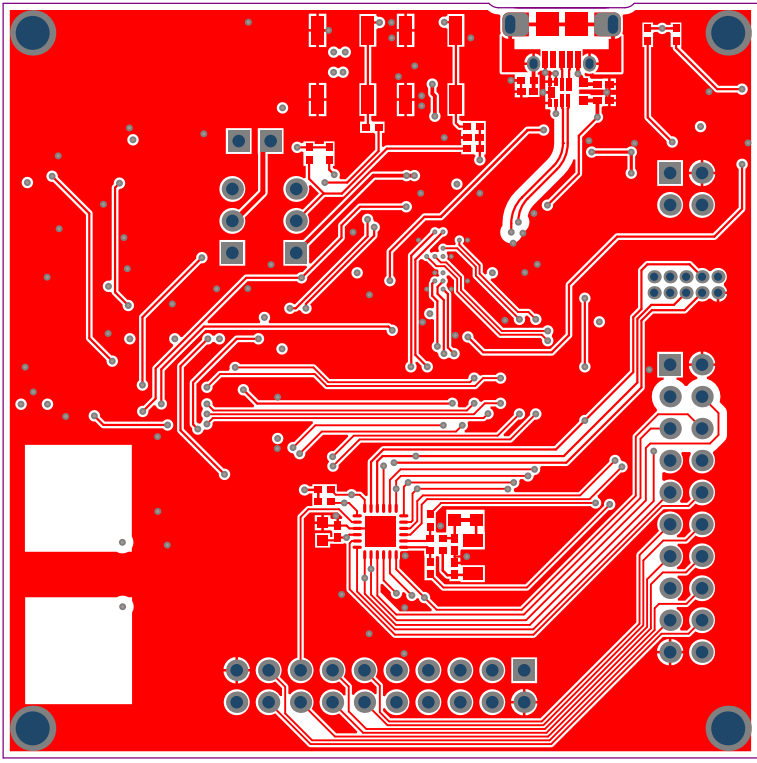
RoHS

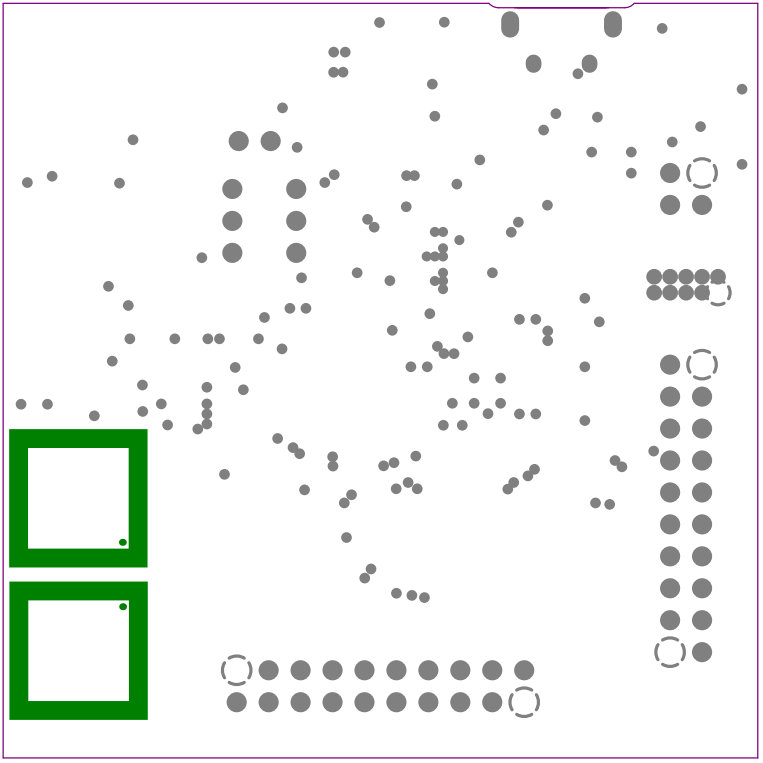
Microchip © 2017

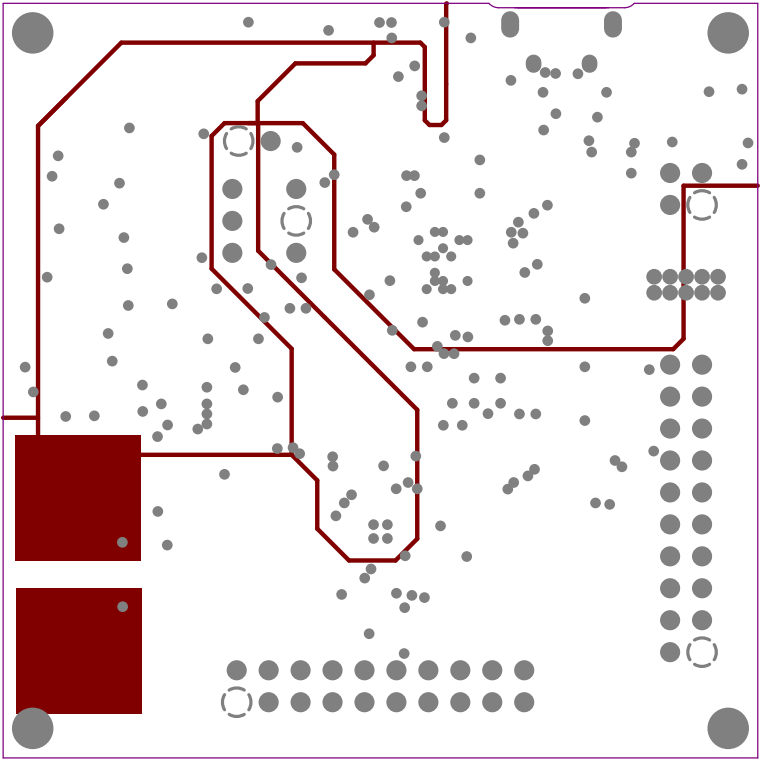
PCBA LABEL
A08-2751 Rev 1

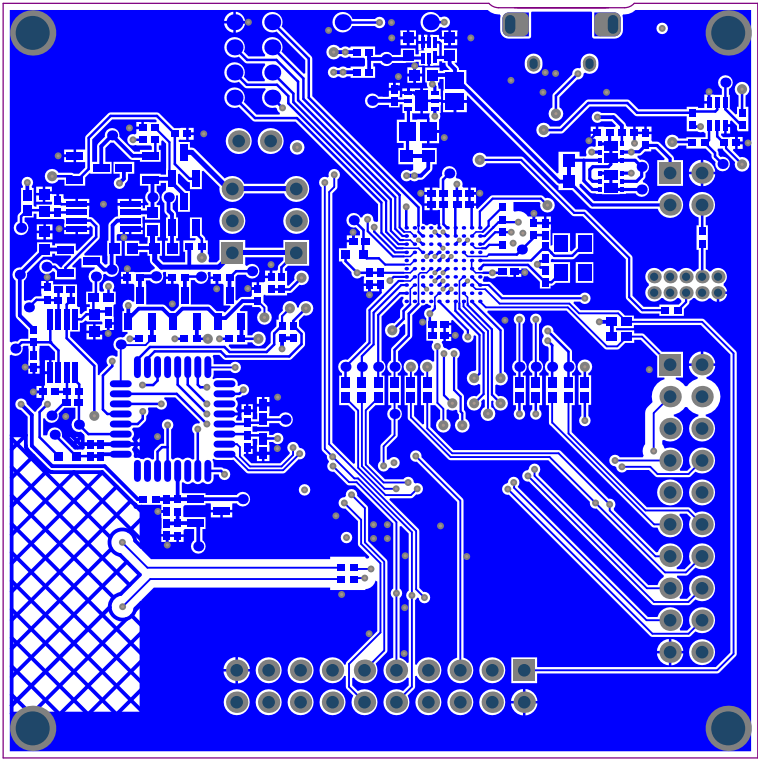
QTBTN
DISCONNECT

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









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: 11/22/2019 3:05 PM
 Print Date: 11/22/2019 3:03:53 PM

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100, C101, C104, C305, C701, C703	6	4.7uF	WALSIN Technology Corporation	0603X475K100CT	Ceramic capacitor, SMD 0805, X5R, 10V, 10% (d631036)
Fitted	C105, C107	2	22u/10V	TDK	C2012X5R1A226M0.05	Ceramic capacitor, SMD 0805, X5R, 10V, A±20%
Fitted	C106	1	10n	Yageo	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	C0402C104KRACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C400, C401	2	15p	AVX	04025A150JAT2A	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C402	1	10p	AVX	04025A100JAT2A	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	1uF	Murata	GRM1555C1H102JA01D	Ceramic capacitor, SMD 0402, C0G, 30V, +/-5%
Fitted	C601, C603	2	1u	Kemet	C0402C105K9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-10% (d626942)
Fitted	C605	1	33n	Murata	GRM15R71E333KA88D	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Fitted	C702, C706	2	150p	Yageo	CC0402KRX7R9BB151	Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Fitted	D301, D401	2	YELLOW LED	ROHM	SML-P12YT786R	LED, SMD 0402, Yellow, Wave length=586nm, 7.6mcd @ (1mA, 1.9Vfwhm)
Fitted	D400	1	GREEN LED	ROHM	SML-P12MT786R	LED, SMD 0402, Green, Wave length=569nm, 2.1mcd @ (1mA, 1.9Vfwhm)
Fitted	D402	1	EM2121MFTAG	ON Semiconductor	EM2121MFTAG	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	ESCATREC	Xplained PRO MCU board Jupiter Test Fixture	Xplained PRO MCU board Jupiter Test Fixture
Fitted	FW1	1	EDBG secured firmware	Microchip		EDBG secured firmware
Fitted	J101, J102	2	1125-1103S0S113R1	WCOON	1125-1103S0S113R1	1x3 pin header, 2.54mm pitch, Pin-in-Paste THM
Fitted	J103	1	Pin header 1x2 right angle	WCOON	1125-1202SOR138R1	1x2 pin header, right angle, 2.54 mm pitch, through-hole
Fitted	J200, J203	2	1125-1210SOR138R1	WCOON	1125-1210SOR138R1	Pin header, 2x10, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J202	1	1125-1202SOR138R1	WCOON	1125-1202SOR138R1	Pin header, 2x2, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J205	1	1310-1206SNS073R1	WCOON	1310-1206SNS073R1	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	3710-6001C50S01	WCOON	3710-6001C50S01	Jumpers cap for 2.54mm pinheader
Fitted	L401, L402, L600	3	BLM18P241F1SN1	Murata	BLM18P241F1SN1	SMD RF inductor 0603, 2-470Ohm (@100MHz), Max R(d.c)=0.20Ohm, Max current=1A
Fitted	L700, L701	2	BLM115B821SN1	Murata	BLM115B821SN1	SMD RF inductor 0402, 2-220Ohm (@100MHz), Max R(d.c)=0.80Ohm, Max current=200mA
Fitted	LABEL1	1	Label PCB	ACT Logmark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	ATtiny3217_Xplained Pro PCB documentation			ATtiny3217_Xplained Pro PCB documentation
Fitted	PCBADC01	1	A09-2835 PCB			ATtiny3217_Xplained Pro PCB documentation
Fitted	Q100, Q101	2	PMDP855XP	NXP	PMDP855XP	Dual P-Channel MOSFET, -20V, RDS(ON) < 55 mOhm @ -3.4A @ -4.5V
Fitted	Q400	1	2N7002DW	Fairchild	2N7002DW	Dual N-Channel MOSFET, 80V, 115mA cont, RDS(ON) < 7.5 Ohm @ 50mA @ 5V, SOT-363
Fitted	Q500	1	PMV48XP,215	NXP	PMV48XP,215	P-Channel Digital FET, -30V, -3.5A continuous, -14A Peak, RDS(ON)=46mOhm @ 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) = 3.5Ohm @ 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	IRLML6402	International Rectifier	IRLML6402PBF	P-ch. MOSFET, -30V, -3.7A continuous, RDS(ON)=0.050Ohm @ VGS=-4.5V, RDS(ON)=0.080Ohm @ VGS=-2.5V
Fitted	R100, R410, R413	3	1M	ASJ Holdings	CR10-1004-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R101, R102, R304, R500, R501, R701, R800, R801, R802	9	100k	ASJ Holdings	CR10-1003-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R108, R307, R308, R309, R705	6	0R	(n/a)	RMCF0402ZT0R00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	R109, R110, R805	3	47k	KOA	RK73H1ETP4702F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R300, R311, R421, R422, R803	5	39R	ASJ Holdings	CR10-39R0-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 Holdings	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R306, R310, R602, R603	4	4.7k	Panasonic	ERJ2RFK4701X	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R401, R409	2	1k	ASJ Holdings	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R404, R406, R407, R408, R415, R425, R426	7	0R	(n/a)	RMCF0402ZT0R00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	R414, R416, R417, R420	4	330R	ASJ Holdings	CR10-3300-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R423	1	6.81k	Vishay	CRW0402681FKED	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R502, R806	2	4.7M	Yageo	RC0402FR-074M7L	Thick film SMD 0402 1/16W 1%
Fitted	R604	1	2k		CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R605	1	33k	ASJ Holdings	CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R606	1	39k	ASJ Holdings	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, TEMP CO +/-75 ppm/A°C
Fitted	R702, R704	2	100R	Panasonic	ERA-3YEB101V	ERA-3YEB101V, metal film, 100R, +/-1%, resistor in 0603 at 100mV, TEMP CO +/-25ppm/A°C, Max V=75V
Fitted	R705	1	680R	ASJ Holdings	CR10-6800-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R707	1	2k	Yageo	RC0603FR-072KL	Thick film resistor, SMD 0603, 1/10W, 1%
Fitted	R804	1	2.2k	ASJ Holdings	CR10-2201-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW300, SW301	2	TS604VM1-035CR	Dailywell Electronics Co.LTD	TS604VM1-035CR-R	SWITCH, SMD, 26gft, 6.4mm X 6.2mm
Fitted	TEST1	1	ATtiny3217_Xplained Pro test			Fixture test for ATtiny3217_Xplained Pro
Fitted	TESTDOC1	1	ATtiny3217_Xplained Pro Test instructions			ATtiny3217_Xplained Pro Test Instructions
Fitted	U100	1	TLV7003DSE	Texas Instruments	TLV7003DSE	LDO, 200 mA, Iq=31 uA, 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=46uA, noise=28uVrms, VIN= 2.7V to 6.5V, Vdo=280mV, stable with low ESR capacitor
Fitted	U300	1	ATtiny3217-MFR	Microchip	ATTINY3217-MFR	8-bit RISC MCU
Fitted	U400	1	AT32UC3A426J-C1UR	Microchip	AT32UC3A426J-C1UR	EDBG controller
Fitted	U600	1	SAM028E17A-AUT	Microchip	ATSAMD28E17A-AUT	Armal 32bit RISC MCU 32 pin
Fitted	U801	1	LM4041CEM3-ADJ/NOPB	Texas Instruments	LM4041CEM3-ADJ/NOPB	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 250uV, GBP 28 MHz, 8MSOP
Fitted	U701	1	ADA4528-1ARMZ	Analog Devices	ADA4528-1ARMZ	Precision OpAmp, Zero-Drift 0.015uV/K, ultra low noise 5.6nV/sqrt(Hz), Vos=2uV, 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	Abracon	ABS07-32.768Hz-9-T	Crystal, 32.768kHz, CL=9.0pF, ESR=70kOhm, SMD LxW=3.2 x 1.5mm, 20ppm
Fitted	XC400	1	12.00MHz	Kyocera Crystal Device Corporation	CX3225G812000HKPSC1	Kyocera CX3225G812000HKPSC1, 12MHz, 12pF, SMD crystal
Not Fitted	C303, C403	0	4.7n	PHYCOMP	2238 567 15632	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10% (d636287)
Not Fitted	C705	0	1n	Yageo	CC0402KRX7R9BB102	Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Not Fitted	R301	0	1k	ASJ Holdings	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Not Fitted	R312, R313	0	0R	(n/a)	RMCF0402ZT0R00	RES 0.0 OHM 1/16W 0402 SMD
Not Fitted	R424	0	1M	ASJ Holdings	CR10-1004-FK	Thick film resistor, SMD 0402, 1/16W, 1%

Approved	156	Notes
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