


Project: <b>BMS_Carrier_Board.PrjPcb</b>		
Title: <b>Controller Board Interface</b>		
Project Lead: Kevin Chen, Taiping Li		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 1.2	
Date: 7/18/2017	Sheet 1 of 4	
		Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>



Table 4. SPI Modes

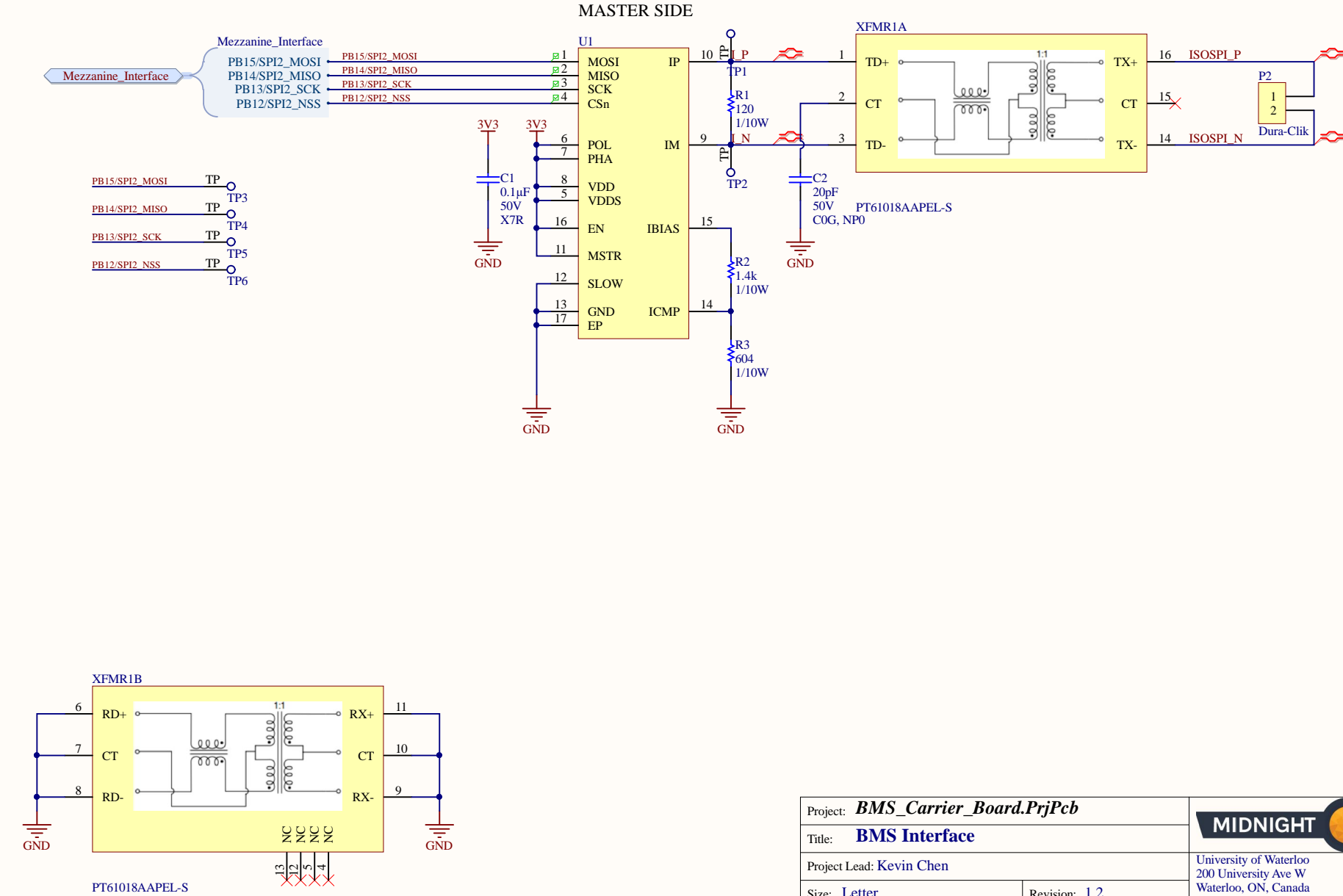
MODE	POL	PHA	DESCRIPTION
0	0	0	SCK Idles Low, Latches on Rising (1st) Edge
1	0	1	SCK Idles Low, Latches on Falling (2nd) Edge
2	1	0	SCK Idles High, Latches on Falling (1st) Edge
3	1	1	SCK Idles High, Latches on Rising (2nd) Edge


SCK idles high, latches on 2nd rising edge

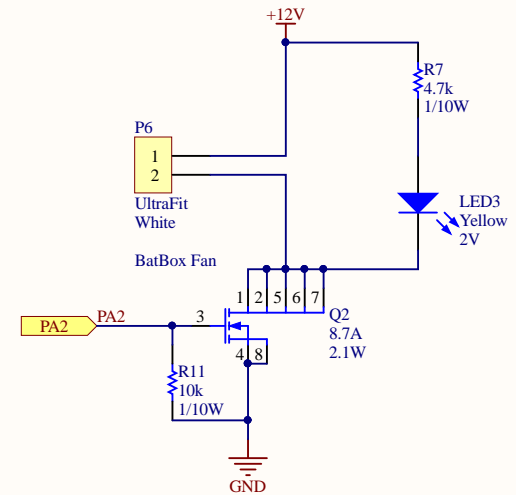
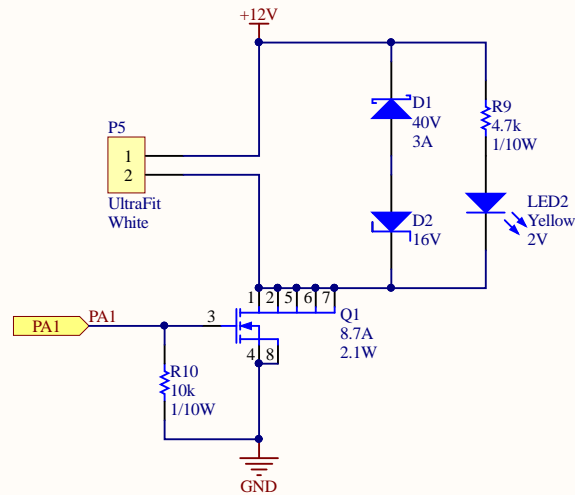
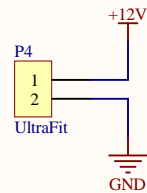
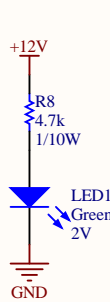
Pulse Drive Current  $I_{IP} = 20 \times I_{BIAS} = 20\text{mA}$


Transmitted Differential Signal Amplitude  $V_A = I_{IP} \times 120 / 2 = 1.2\text{V}$

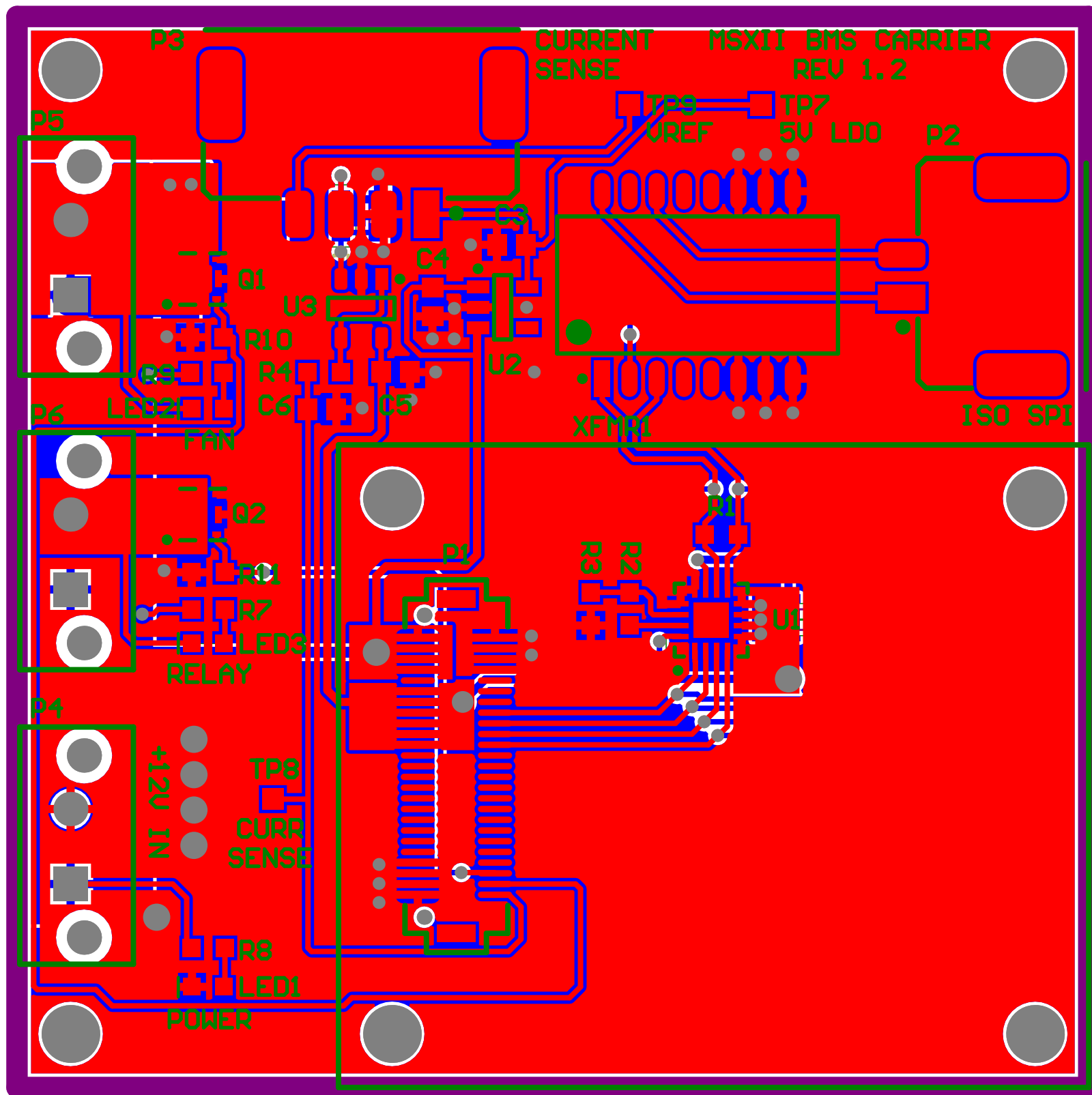
Bias Current  $I_{BIAS}$  can be adjusted from 0.1mA to 1mA  
Currently set to 1mA



Project: <b>BMS_Carrier_Board.PrjPcb</b>		
Title: <b>BMS Interface</b>		
Project Lead: <b>Kevin Chen</b>		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9 Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>
Size: <b>Letter</b>	Revision: <b>1.2</b>	
Date: <b>7/18/2017</b>	Sheet <b>3</b> of <b>4</b>	



Project: <i><b>BMS_Carrier_Board.PrjPcb</b></i>		
Title: <b>BMS Fan and Relay Control</b>		
Project Lead: Kevin Chen, Taiping Li		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 1.2	
Date: 7/18/2017	Sheet4 of 4	
		Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>



# Bill of Materials

Bill of Materials For Project [BMS\_Carrier\_Board.PrjPcb] (No PCB Document Selected)

Source Data From: BMS\_Carrier\_Board.PrjPcb  
 Project: BMS\_Carrier\_Board.PrjPcb  
 Variant: None

Creation Date: 7/18/2017 6:02:42 PM  
 Print Date: 18-Jul-17 6:02:47 PM  
 Production Quantity: 1  
 Currency: <none>

Footprint	Comment	LibRef	Designator	Description	Quantity	#Column Name	#Column Name Error: Su	#Column Name Error:3	#Column Name Error:4	#Column Name Error:5	#Column Name Error:6	#Column Name Error:Manufacturer Part Num
CAP, 0603	CAP CER 0.1UF 50V 10% X7R 0603	CAP CER 0.1UF 50V 10% X7R 0603	C1, C5	0.10uF ±10% 50V Ceramic Capacitor X7R 0603 (1608 Metric)	2							
CAP, 0603	CAP CER 20PF 50V ±5% COG/NP0 0603	CAP CER 20PF 50V ±5% COG/NP0 0603	C2	20pF ±5% 50V Ceramic Capacitor C0G, NP0 0603 (1608 Metric)	1							
CAP, 0603	CAP CER 2.2UF 25V 10% X5R 0603	CAP CER 2.2UF 25V 10% X5R 0603	C3	2.2uF ±10% 25V Ceramic Capacitor X5R 0603 (1608 Metric)	1							
CAP, 0603	CAP CER 1UF 50V 10% X7R 0603	CAP CER 1UF 50V 10% X7R 0603	C4	1uF ±10% 50V Ceramic Capacitor X7R 0603 (1608 Metric)	1							
CAP, 0603	CAP CER 10nF 50V 5% X7R 0603	CAP CER 10nF 50V 5% X7R 0603	C6	10000pF ±5% 50V Ceramic Capacitor U2J 0603 (1608 Metric)	1							
DO-214AA Diode	DIODE SCHOTTKY 40V 3A DO-214AA (SMB)	DIODE SCHOTTKY 40V 3A DO-214AA (SMB)	D1	Diode Schottky 40V 3A Surface Mount DO-214AA (SMB)	1							
DO-214AA Diode	DIODE ZENER 16V 5W DO- 214AA (SMB)	DIODE ZENER 16V 5W DO- 214AA (SMB)	D2	Zener Diode 16V 5W ±5% Surface Mount DO-214AA (SMB)	1							
LED_0603	LED GREEN CLEAR 2V 0603	LED GREEN CLEAR 2V 0603	LED1	Green 572nm LED Indication - Discrete 2V 0603 (1608 Metric)	1							
LED_0603	LED YELLOW CLEAR 2.1V 0603	LED YELLOW CLEAR 2.1V 0603	LED2, LED3	Yellow 590nm LED Indication - Discrete 2V 0603 (1608 Metric)	2							
CONN, Bergstak 50 Pos Plug	CONN 50POS Bergstak Plug 0.02"	CONN 50POS Bergstak Plug 0.02"	P1	50 Position Connector Plug, Outer Shroud Contacts Surface Mount Gold	1							
CONN, 2POS Dura-Click Vertical	Dura-Click	DURA-CLIK 0.079" VERT	P2	2 Positions Header, Shrouded Connector 0.079" (2.00mm) Surface Mount, Vertical Tin	1							
CONN, 4POS DURA-CLIK VERT	Dura-Click	CONN 4POS DURA-CLIK 0.079"	P3	4 Positions Header Connector 0.079" (2.00mm) Surface Mount Tin	1							
CONN, 2POS ULTRA-FIT	CONN 2POS ULTRA-FIT 0.138"	CONN 2POS ULTRA-FIT 0.138"	P4	2 Positions Header, Shrouded Connector 0.138" (3.50mm) Through Hole Gold	1							
CONN, 2POS ULTRA-FIT - NATURAL COLOR	CONN 2POS ULTRA-FIT NATURAL COLOR 0.138"	CONN 2POS ULTRA-FIT NATURAL COLOR 0.138"	P5, P6	2 Positions Header, Shrouded Connector 0.138" (3.50mm) Through Hole	2							
MOSFET N-CH 30V 12A 2mmx2mm PQFN	MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	Q1, Q2		2							
RES, 0603	RES 120 OHM 1% 1/10W 0603	RES 120 OHM 1% 1/10W 0603	R1	RES SMD 120 OHM 1% 1/10W 0603	1							
RES, 0603	RES 1.4k OHM 1% 1/10W 0603	RES 1.4k OHM 1% 1/10W 0603	R2	RES SMD 1.4K OHM 1% 1/10W 0603	1							
RES, 0603	RES 604 OHM 1% 1/10W 0603	RES 604 OHM 1% 1/10W 0603	R3	RES SMD 604 OHM 1% 1/10W 0603	1							
RES, 0603	RES 0.0 OHM 1/4W 0603	RES 0.0 OHM 1/4W 0603	R4	RES SMD 0.0 OHM JUMPER 1/4W 0603	1							
RES, 0603	RES 4.7K OHM 1% 1/10W 0603	RES 4.7K OHM 1% 1/10W 0603	R5, R7, R8, R9	4.7k Ohm ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	4							
RES, 0603	RES 6.8k OHM 1% 1/10W 0603	RES 6.8k OHM 1% 1/10W 0603	R6	RES SMD 6.8K OHM 1% 1/10W 0603	1							
RES, 0603	RES 10K OHM 1% 1/10W 0603	RES 10K OHM 1% 1/10W 0603	R10, R11	RES SMD 10K OHM 1% 1/10W 0603	2							
Test Point	Test Point	Test Point	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9		9							
IC COMM INTERFACE ISOSPI 16-QFN	IC ISOSPI COMM INTERFACE LTC6820IUD	IC ISOSPI COMM INTERFACE LTC6820IUD	U1	IC COMM INTERFACE ISOSP1 16-QFN	1							
SOT95P280X145- 5N	IC REG LDO 5V 0.1A SOT23-5	IC REG LDO 5V 0.1A SOT23-5	U2	Linear Voltage Regulator IC Positive Fixed Output 5V 100mA SOT-23-5	1							
IC OP AMP GP RR 10MHZ SOT- 23-5	IC OP AMP GEN PURPOSE RR 10MHZ SOT- 23-5	IC OP AMP GEN PURPOSE RR 10MHZ SOT- 23-5	U3	General Purpose Amplifier 1 Circuit Rail-to-Rail SOT-23-5	1							
IC_PULSE XFMR 1CT:1CT 350UH SMD	IC PULSE XFMR 1CT:1CT 350UH SMD	IC PULSE XFMR 1CT:1CT 350UH SMD	XFMR1	PULSE XFMR 1CT:1CT 350UH SMD	1							
					43					\$	-	

Approved	Notes