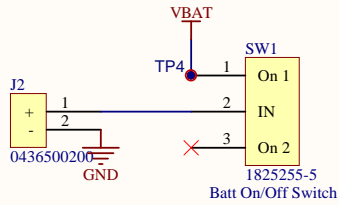


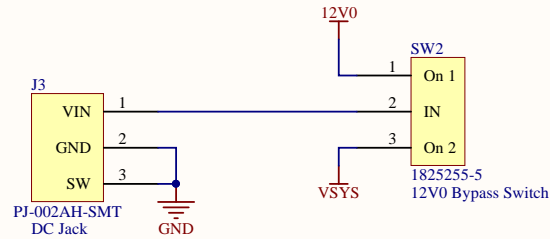
1 - Table of Contents
2 - Connectors
3 - Battery Manager
4 - Motor and MCU Power Supplies
5 - Motor Drivers

4/1/16	MV	A	Initial Full Design
4/2/16	MV	A.1	Fixed non-plated through hole footprints
4/2/16	MV	A.2	Fixed clearance violations on motor drivers
4/3/16	MV	A.3	Fixed title block/board info, aligned vias
4/3/16	MV	A.4	Final DRC, Added header pinout silk screen
4/3/16	MV	A.5	Added I sense wires and moved to 30 pin header
4/4/16	MV	A.6	Corrected DFM errors
4/4/16	MV	1.0	RELEASE VERSION
4/20/16	MV	1.1	Swapped 3.3V buck to 5V buck and adjusted passives Corrected missing power trace between 12V in and vsys. Flipped D2 to be in reverse bias

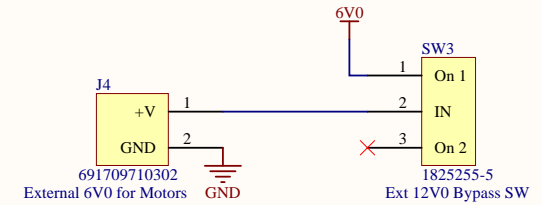
Battery Connection



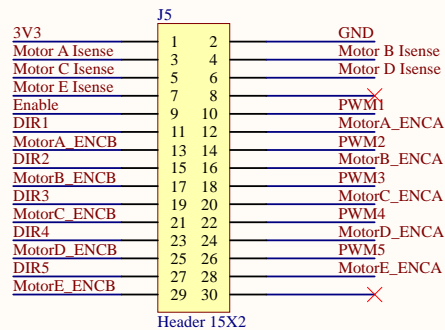
DC Input



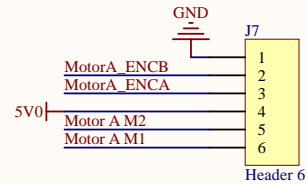
External 6V0 Motor Power



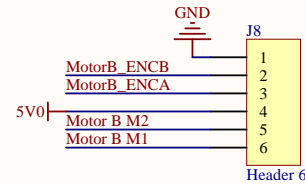
Main MCU Header



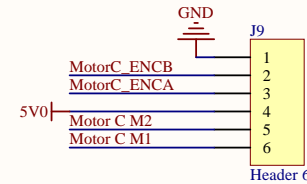
Motor A Header



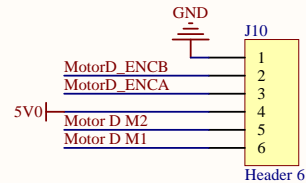
Motor B Header



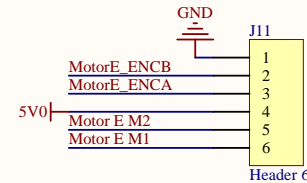
Motor C Header




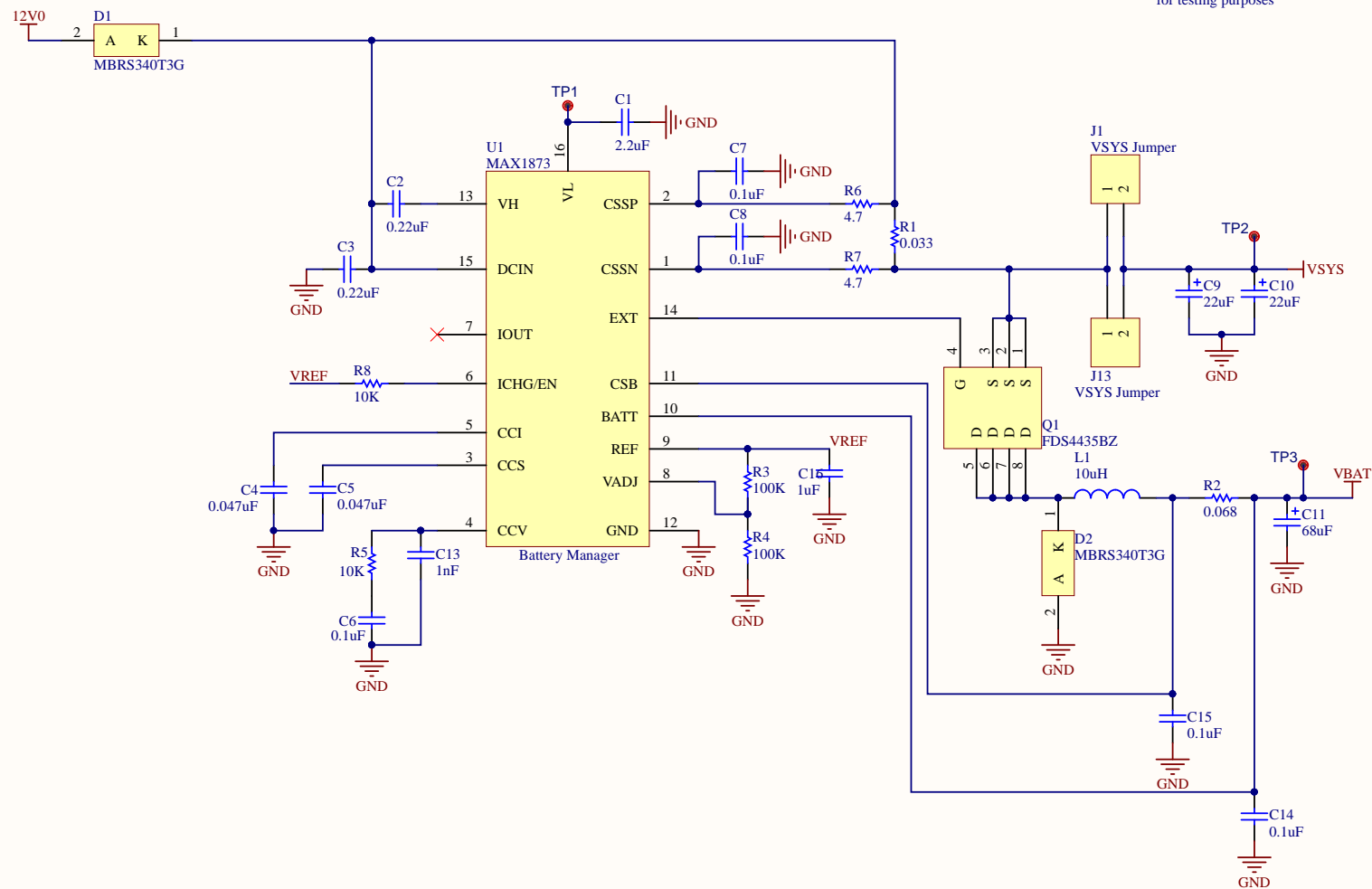
Motor D Header



Motor E Header




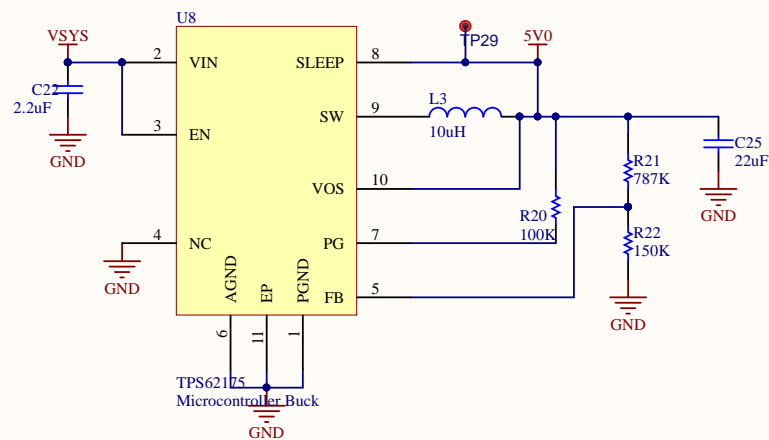
Title <i>Connectors</i>			Senior Design Project Prosthetic Hand Matthew Varas Rachel Mertz Donnell Jones	
Size: <i>A4</i>	Number: <i>2</i>	Revision: <i>1.1</i>		
Date: <i>5/6/2016</i>	Time: <i>3:30:44 PM</i>	Sheet <i>2</i> of <i>5</i>		
File: <i>E:\Dropbox\Senior Design Team Folder\PCB Projects\Hand Motor Driver Test Board\Connectors.SchDoc</i>				




Note: R1 currently set for 3A input limit. The following parts allow for alternate limits
 * 4A input limit: 0.025 ohm, 1W, Vishay WSLT2010R0250FEB18
 * 5A input limit: 0.02 ohm, 1W, Vishay WSLT2010R0200FEB18

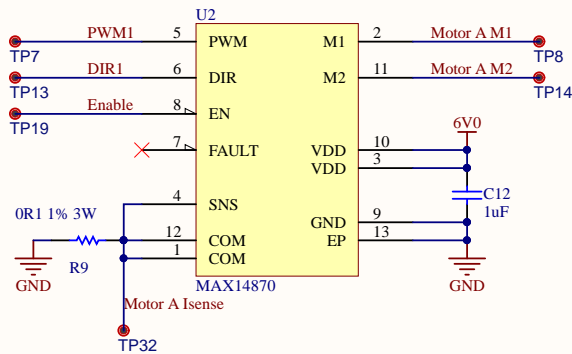
Note: R2 currently set for 3A charge limit. The following parts allow for alternate limits
 * 2A charge limit: 0.1 ohm, 2W, Vishay WSL2816R1000FEH
 * 1A charge limit: 0.02 ohm, 2W, Vishay WSH2818R0200FEA
 Note: This has incorrect package size for current design, but should fit for testing purposes

Title <i>Battery Manager</i>			Senior Design Project Prosthetic Hand Matthew Varas Rachel Mertz Donnell Jones	
Size: A4	Number:3	Revision:1.1		
Date: 5/6/2016	Time: 3:30:44 PM	Sheet 3 of 5		
File: E:\Dropbox\Senior Design Team Folder\PCB Projects\Hand Motor Driver Test Board\Battery Manager.SchDoc				

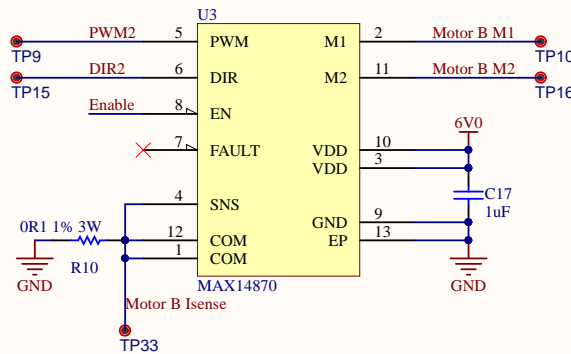


Title <i>Power Supply</i>			Senior Design Project Prosthetic Hand	
Size: A4	Number: 4	Revision: 1.1	Matthew Varas Rachel Mertz Donnell Jones	
Date: 5/6/2016	Time: 3:30:44 PM	Sheet 4 of 5		
File: E:\Dropbox\Senior Design Team Folder\PCB Projects\Hand			Motor Driver Test Board\Power_Supply_SchDoc	

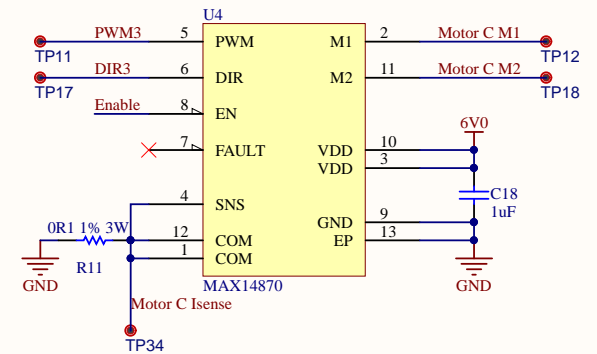
Motor Driver A



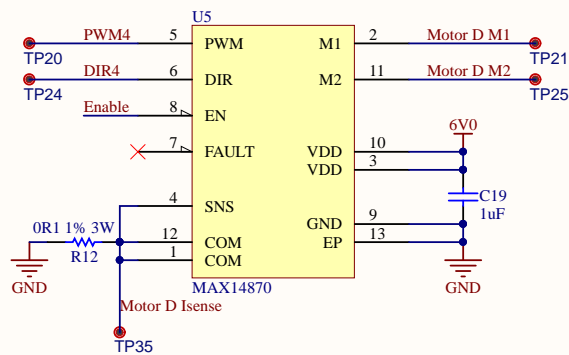
Motor Driver B



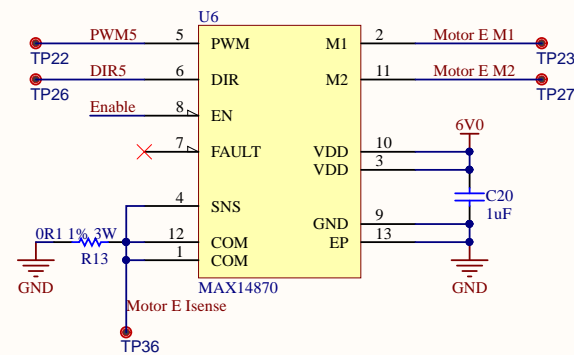
Motor Driver C




Motor Driver D



Motor Driver E



Title <i>Motor Drivers</i>			Senior Design Project Prosthetic Hand Matthew Varas Rachel Mertz Donnell Jones		
Size: A4	Number:5	Revision:1.1			
Date: 5/6/2016	Time: 3:30:44 PM	Sheet5 of 5			
File: E:\Dropbox\Senior Design Team Folder\PCB Projects\Hand Motor Driver Test Board\Motor Drivers.SchDoc					

Motor Driver and PSU Test Board
REV 1.1

2 Layer FR4

TOP LAYER COMPONENT

BOTTOM LAYER COMPONENT

All Layers 1oz Copper

Total Board thickness : .062

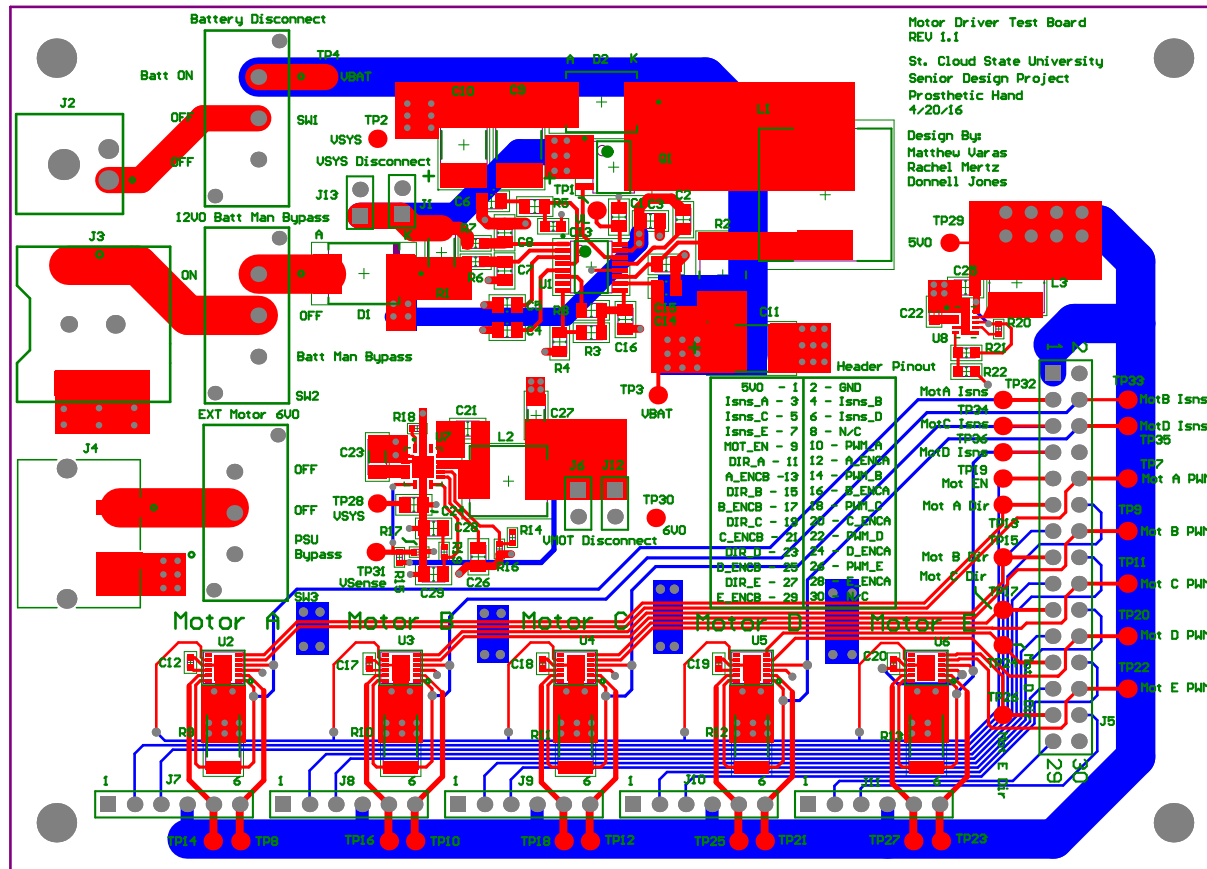
Top & Bottom Solder mask Green

Top Overlay White, No Bottom Overlay

Lead Free

Finish = ENIG

Layer	Name	Material	Thickness	Constant	Board Layer Stack
1	Top Overlay				
2	Top Solder	Solder Resist	0.40mil	3.5	
3	Top Layer	Copper	1.40mil		
4	Dielectric 1	FR-4	58.00mil	4.2	
5	Bottom Layer	Copper	1.40mil		
6	Bottom Solder	Solder Resist	0.40mil	3.5	
7	Bottom Overlay				



Bill of Materials

BOM Rev: 1.1

Project: Hand Motor Driver Test Board.PrjPcb
Source Data From: Hand Motor Driver Test Board.PrjPcb
Variant: None



Report Date: 5/6/2016 3:30:46 PM
Print Date: 06-May-16 3:31:00 PM

Matthew V. BOM Template Rev 2.0

#	Designator	MFG_NAME01	MFG_PN01	DIGI_PN01	Value	Case-EA	Description	Quantity
1	C1	TDK	C2012X5R1H225K085AB	445-14407-1-ND	2.2uF	0805	CAP CER 2.2UF 50V X5R 0805	1
2	C2, C3	Taiyo Yuden	GMK212B.J224KG	587-3366-1-ND	220nF	0805	CAP CER 0.22UF 35V X5R 0805	2
3	C4, C5	Murata	GCM21BR71H473KA37L	490-8050-1-ND	47nF	0805	CAP CER 0.047UF 50V X7R 0805	2
4	C6, C7, C8, C14, C15	TDK	C2012X7R1H104K125AM	445-6045-1-ND	100nF	0805	CAP CER 0.1UF 50V X7R 0805	5
5	C9, C10	AVX	TPSD226K035R0200	478-3356-1-ND	22uF	2917	CAP TANT 22UF 35V 10% 2917	2
6	C11	AVX	TPSE686M025R0125	478-4152-1-ND	68uF	2917	CAP TANT 68UF 25V 20% 2917	1
7	C12, C17, C18, C19, C20	Murata	GRT1155R61C105KE01D	490-12255-1-ND	1uF	0402	CAP CER 1UF 16V X5R 0402	5
8	C13	Murata	GRM188R71H102KA01D	490-1494-1-ND	1nF	0603	CAP CER 1000PF 50V X7R 0603	1
9	C16	TDK	C2012X7R1E105K125AB	445-1354-1-ND	1uF	0805	CAP CER 1UF 25V X7R 0805	1
10	C21	AVX	08053C104KAT2A	478-3755-1-ND	0.1uF	0805	CAP CER 0.1UF 25V X7R 0805	1
11	C22	Murata	GRM188R61C225KE15D	490-3296-2-ND	2.2uF	0603	CAP CER 2.2UF 16V X5R 0603	1
12	C23	Murata	GRM31CR61C226ME15L	490-4739-1-ND	22uF	1206	CAP CER 22UF 16V X5R 1206	1
13	C24	Murata	GRM21BR61E475KA12L	490-3335-1-ND	4.7uF	0805	CAP CER 4.7UF 25V X5R 0805	1
14	C25	Murata	GRM21BR60J226ME39L	490-1719-1-ND	22uF	0805	CAP CER 22UF 6.3V X5R 0805	1
15	C26	Yageo	CO0805KRX7R9BB272	311-1130-1-ND	2.7nF	0805	CAP CER 2700PF 50V X7R 0805	1
16	C27	Murata	GRM31CR61A226KE19L	490-6510-1-ND	22uF	1206	CAP CER 22UF 10V X5R 1206	1
17	C28	Yageo	CO0805KRX7R9BB183	311-1137-1-ND	18nF	0805	CAP CER 0.018UF 50V X7R 0805	1
18	C29	Yageo	CO0805JRNPO9BN390	311-1106-1-ND	39pF	0805	CAP CER 39PF 50V NPO 0805	1
19	D1, D2	ON Semiconductor	MBRS340T3G	MBRS340T3GOSCT-ND		DO-214AB SMC	DIODE SCHOTTKY 40V 4A SMC	2
20	J1, J13	Sullins Connector Solutions	PEC02SAAN	S1012E-02-ND			CONN HEADER .100 SINGL STR 2POS	2
21	J2	Molex	43650-0200	WM1860-ND			CONN HEADER 2POS 3MM RT ANG TIN	1
22	J3	CUI Inc.	PJ-002AH-SMT-TR	CP-002AHRJCT-ND			CONN POWER JACK 2.1X5.5MM HI CUR	1
23	J4	Würth Electronics Inc	691709710302	1297-1108-1-ND			CONN TERM BLOCK 2POS 5MM BLACK	1
24	J5	Samtec Inc	SSW-115-01-T-D	SAM1212-15-ND			30 Position Receptacle Connector 0.100" (2.54mm) Through Hole Tin	1
25	J6, J12	Sullins Connector Solutions	PEC02SAAN	S1012E-02-ND			PEC02SAAN	2
26	J7, J8, J9, J10, J11	TE Connectivity	3-644456-6	A31116-ND			CONN HEADER VERT 6POS .100 TIN	5
27	L1	Bourns	SRR1260A-100M	SRR1260A-100MCT-ND	10uH		FIXED IND 10UH 5.5A 20 MOHM SMD	1
28	L2	Bourns	SRP6540-3R3M	SRP6540-3R3MCT-ND	3.3uH		FIXED IND 3.3UH 6.5A 23 MOHM SMD	1
29	L3	Bourns	SDR0503-100ML	SDR0503-100MLCT-ND	10mH		FIXED IND 10UH 1.3A 130 MOHM SMD	1
30	Q1	Fairchild Semiconductor	FDS4435BZ	FDS4435BZCT-ND		8-SOIC	MOSFET P-CH 30V 8.8A 8-SOIC	1
31	R1	Murata	WSL2010R0330FEA18	WSLF-.033CT-ND	0.033	2010	RES SMD 0.033 OHM 1% 1W 2010	1
32	R2	Vishay Dale	WSL2816R0680FEH	WSLK-.068CT-ND	0.068	2816	RES SMD 0.068 OHM 1% 2W 2816	1
33	R3, R4	Yageo	RC0805FR-07100KL	311-100KCRCT-ND	100K	0805	RES SMD 100K OHM 1% 1/8W 0805	2
34	R5, R8	Yageo	RC0805FR-0710KL	311-10.0KCRCT-ND	10K	0805	RES SMD 10K OHM 1% 1/8W 0805	2
35	R6, R7	Samsung	RC1608F4R7CS	1276-4486-1-ND	4.70 Ohm	0603	RES SMD 4.7 OHM 1% 1/10W 0603	2
36	R9, R10, R11, R12, R13	Bourns	CRA2512-FZ-R100ELF	CRA2512-FZ-R100ELFCT-ND	0.1 Ohm	2512	RES SMD 0.1 OHM 1% 3W 2512	5
37	R14	Vishay Dale	CRCW0402105KFKE	541-105KLCT-ND	105k	0402	RES SMD 105K OHM 1% 1/16W 0402	1
38	R15	Vishay Dale	CRCW040290K9FKE	541-90.9KLCT-ND	90.9K	0402	RES SMD 90.9K OHM 1% 1/16W 0402	1
39	R16	Vishay Dale	CRCW040237K4FKE	541-37.4KLCT-ND	37.4K	0402	RES SMD 37.4K OHM 1% 1/16W 0402	1
40	R17	Vishay Dale	CRCW040210K0FKE	541-10.0KLCT-ND	10K	0402	RES SMD 10K OHM 1% 1/16W 0402	1
41	R18	Vishay Dale	CRCW040253K6FKE	541-53.6KLCT-ND	53.6K	0402	RES SMD 53.6K OHM 1% 1/16W 0402	1
42	R19	Vishay Dale	CRCW04023K57FKE	541-3.57KLCT-ND	3.57K	0402	RES SMD 3.57K OHM 1% 1/16W 0402	1
43	R20	Vishay Dale	CRCW040210K0FKE	541-100KLCT-ND	100k	0402	RES SMD 100K OHM 1% 1/16W 0402	1
44	R21	Yageo	RC0603FR-07787KL	311-787KHRCCT-ND	787K Ohm	0603	RES SMD 787K OHM 1% 1/10W 0603	1
45	R22	Yageo	RT0603BRD07150KL	YAG1532CT-ND	150K Ohm	0603	RES SMD 150K OHM 1% 1/10W 0603	1
46	SW1, SW2, SW3	TE Connectivity	1825255-5	450-1569-ND			SWITCH SLIDE SPDT 300MA 125V	3
47	TP1, TP2, TP3, TP4, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36	DNP	DNP				Test Pad	34
48	U1	Maxim Integrated	MAX1873REEE+T	MAX1873REEE+TCT-ND		16-SSOP	IC CNTRLR CHARGE LI+ 16-QSOP	1
49	U2, U3, U4, U5, U6	Maxim Integrated	MAX14870ETC+T	MAX14870ETC+CT-ND		12-WDFN	IC MOTOR DRV/DC FULL BR 12TDFN	5
50	U7	Texas Instruments	TPS54622RH-LR	296-29204-1-ND		14-VQFN	IC REG BUCK ADJ 6A SYNC 14QFN	1
51	U8	Texas Instruments	TPS62175DQCR	296-39451-1-ND		10-WDFN	IC REG BUCK BST 5V 0.8A 10WSON	1
Approved		Notes					Total Components:	115