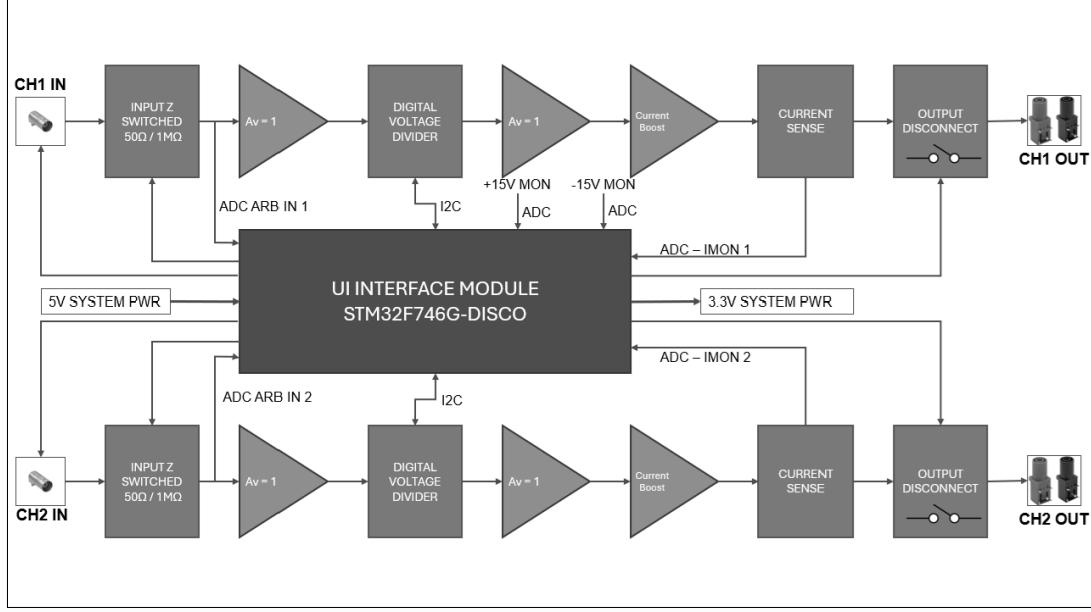
**REVISION HISTORY:**

REV	ECO	CHANGE DESCRIPTION
1	NA	Initial design
2	NA	Multiple changes to pin-out, circuit protection, Current Boost, and misc.
3	NA	Correction in ABS divider, change in Current Boost, Cooling and misc.



Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Sneville GA, 30039
Size: B	Number: IMR-005-SCH
Date: 05/12/25	Revision: 3
Time: 08:00	Sheet 1 of 8
File: ArbPwrBoost_P1.SchDoc	Engineer: Hab S Collector

MAIN SWITCH

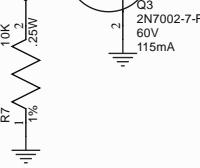
MAX INPUT +15V

J1 +POS 73099-2 1000V 2A
J2 -NEG 73099-0 1000V 2A GND

MAX INPUT -15V

J3 -NEG 73099-0 1000V 2A
J4 +POS 73099-2 1000V 2A GND

MAIN PWR EN

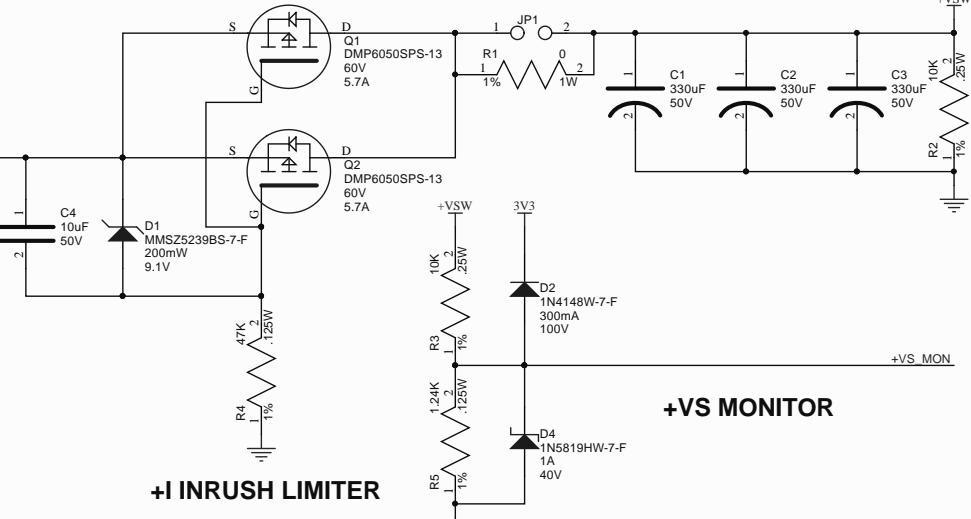


BYPASS CAPS

+VS TO 5V SMPS

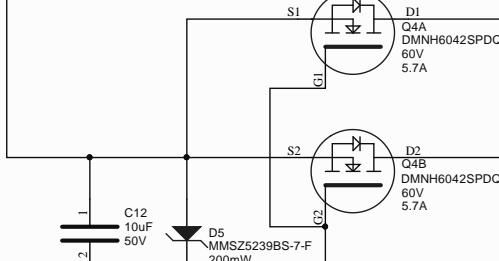
NOTES:
SW1 SHOWS 5V PWR IN THE OFF POSITION
SMPS 5V AT 1000mA ESTIMATED LOAD
JPF, TPX FOR PROTOTYPE TESTING ONLY
MAX INPUT ON POWER BANANA CONNECTOR PAIRS IS $\pm 15V$
INPUT POWER MUST BE FROM ISOLATED POWER SUPPLY
INPUT RATIO OF $\pm V_{MON}$ IS 0.110V, MAX INPUT OF 30V

MAIN SWITCH

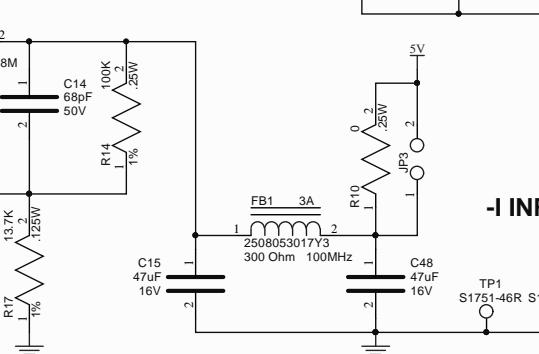


+VS MONITOR

+I INRUSH LIMITER

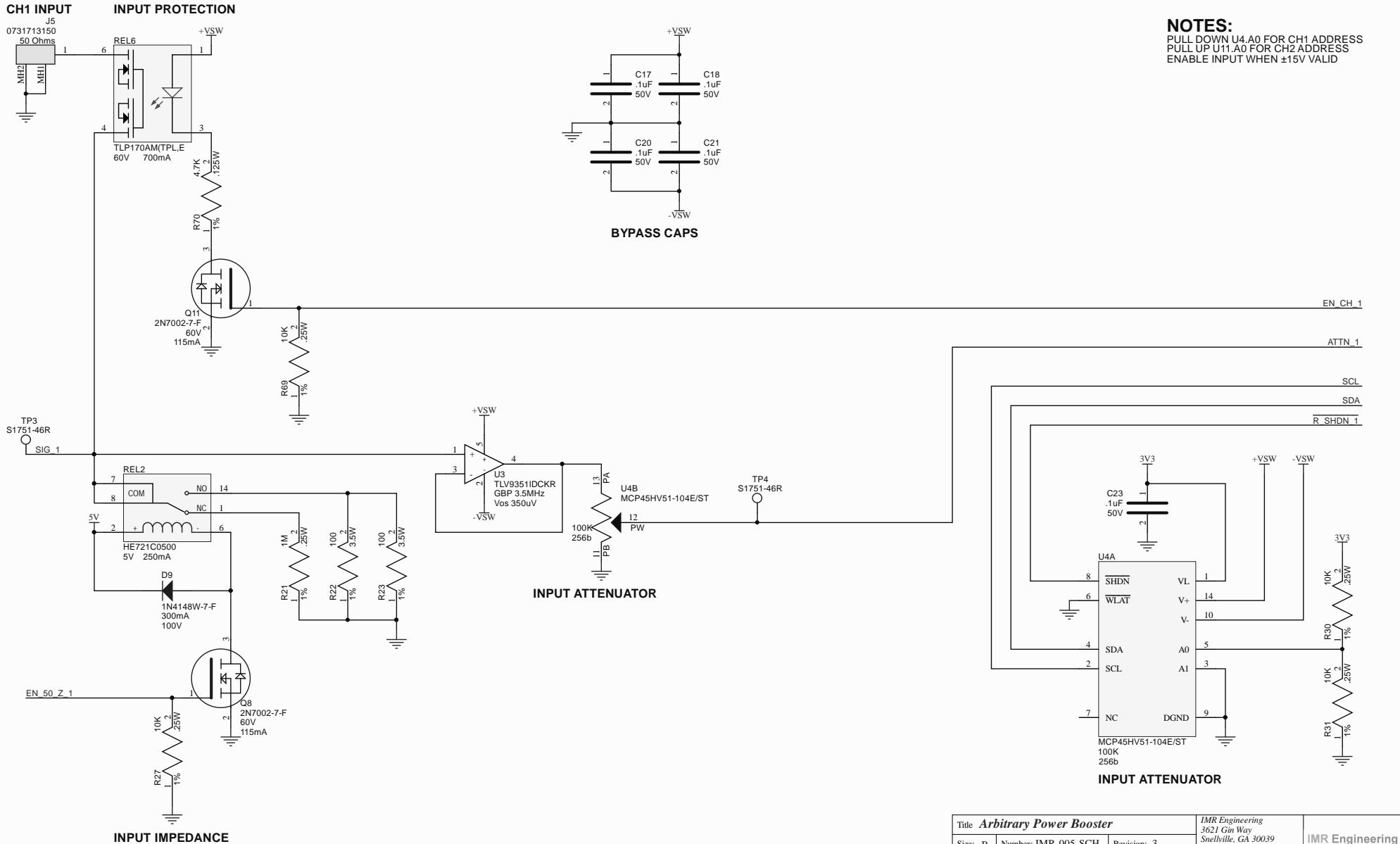


-I INRUSH LIMITER

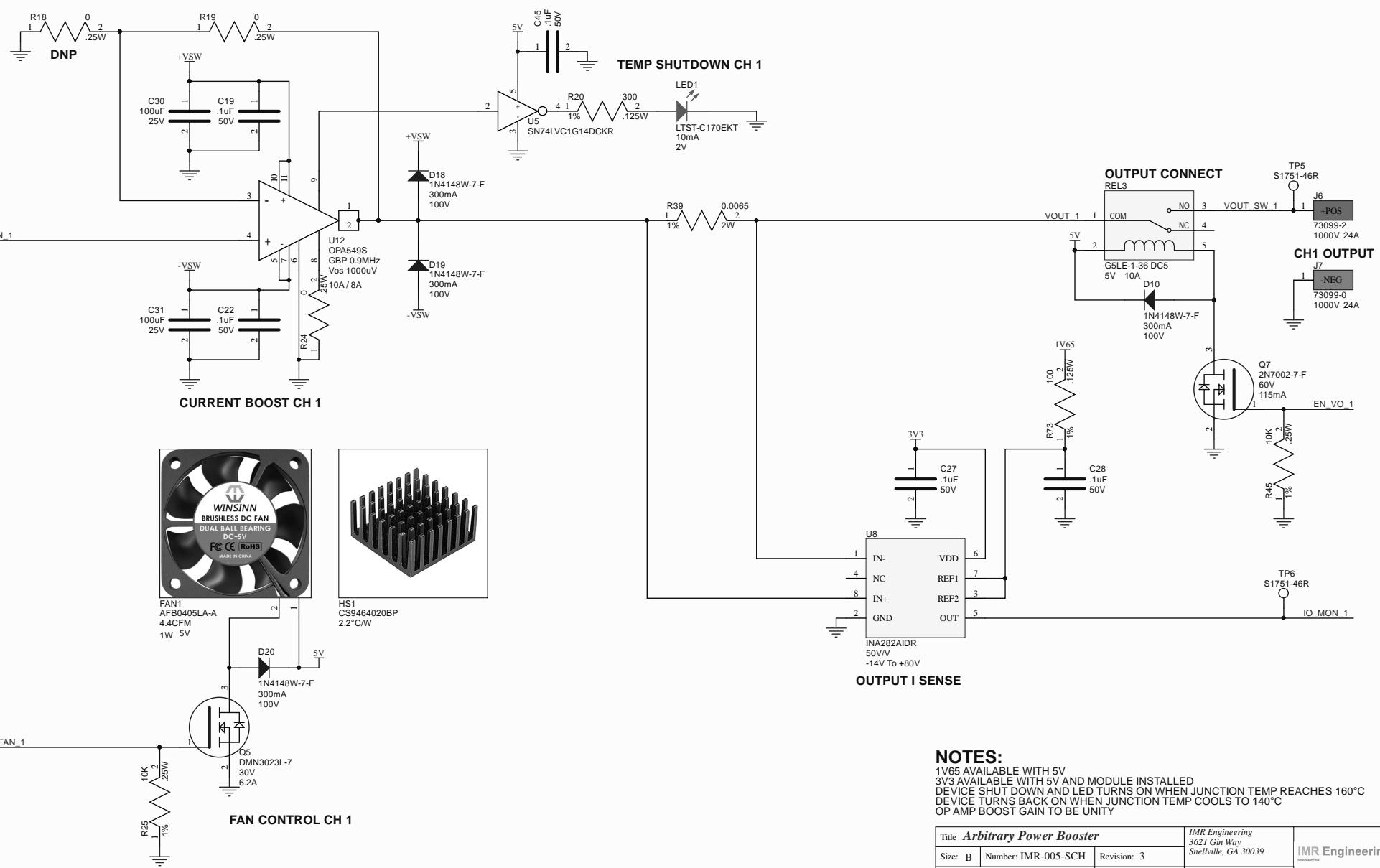


-VS MONITOR

Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Sneads GA, 30039
Size: B Number: IMR-005-SCH Revision: 3	
Date: 05/12/25 Time: 08:00 Sheet 2 of 8	Engineer: Hab S Collector
File: ArbPwrBoost_P2.SchDoc	IMR Engineering 3621 Gin Way Sneads GA, 30039



Title Arbitrary Power Booster			IMR Engineering
Size: B	Number: IMR-005-SCH	Revision: 3	3621 Gin Way Snellville, GA 30039
Date: 05/12/25	Time: 08:00	Sheet 3 of 8	Engineer: Hab Collector
File: ArbPwrBoost_P3.SchDoc			IMR Engineering



A

A

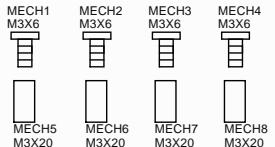
B

B

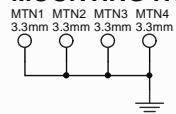
C

C

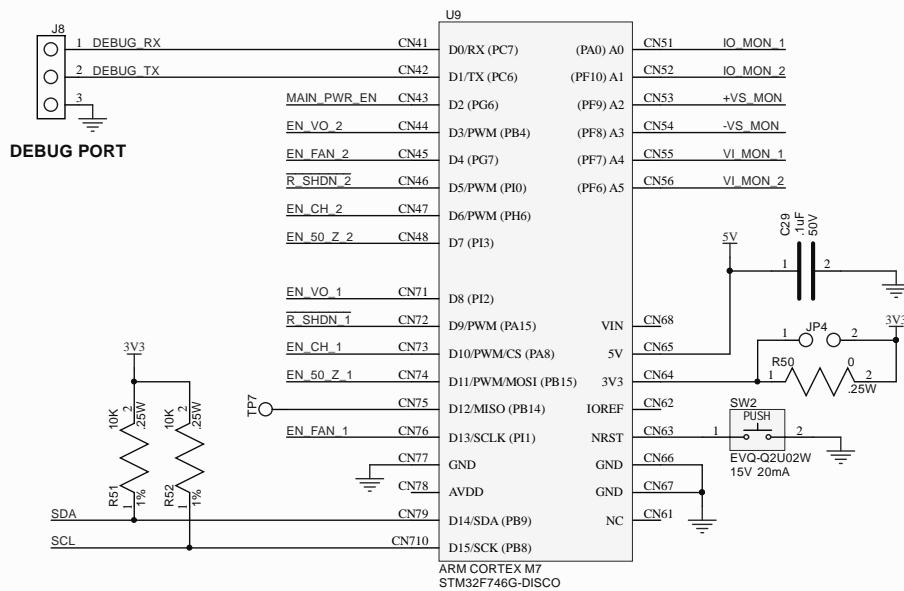
MOUNTING HARDWARE



MOUNTING HOLES



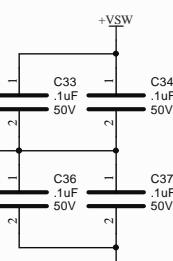
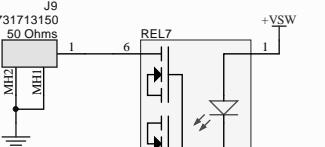
MODULE HARDWARE



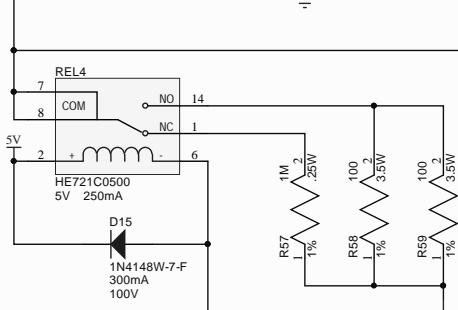
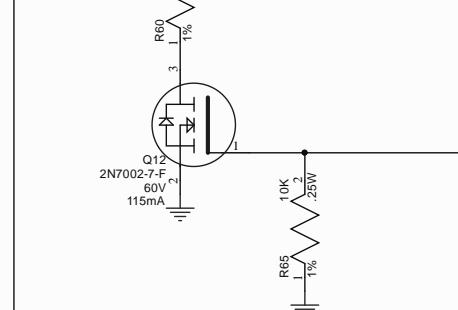
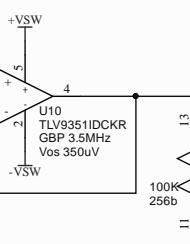
NOTES:

I2C PULL UP ON MODULE - ADDED HERE JUST IN CASE - DNP
5V IS POWER INPUT TO MODULE
3V3 IS REGULATED POWER OUTPUT FROM MODULE
JPx, TPx FOR PROTOTYPE TESTING ONLY
CHANNEL 1 AND CHANNEL 2 OPERATE INDEPENDENTLY OF EACH OTHER

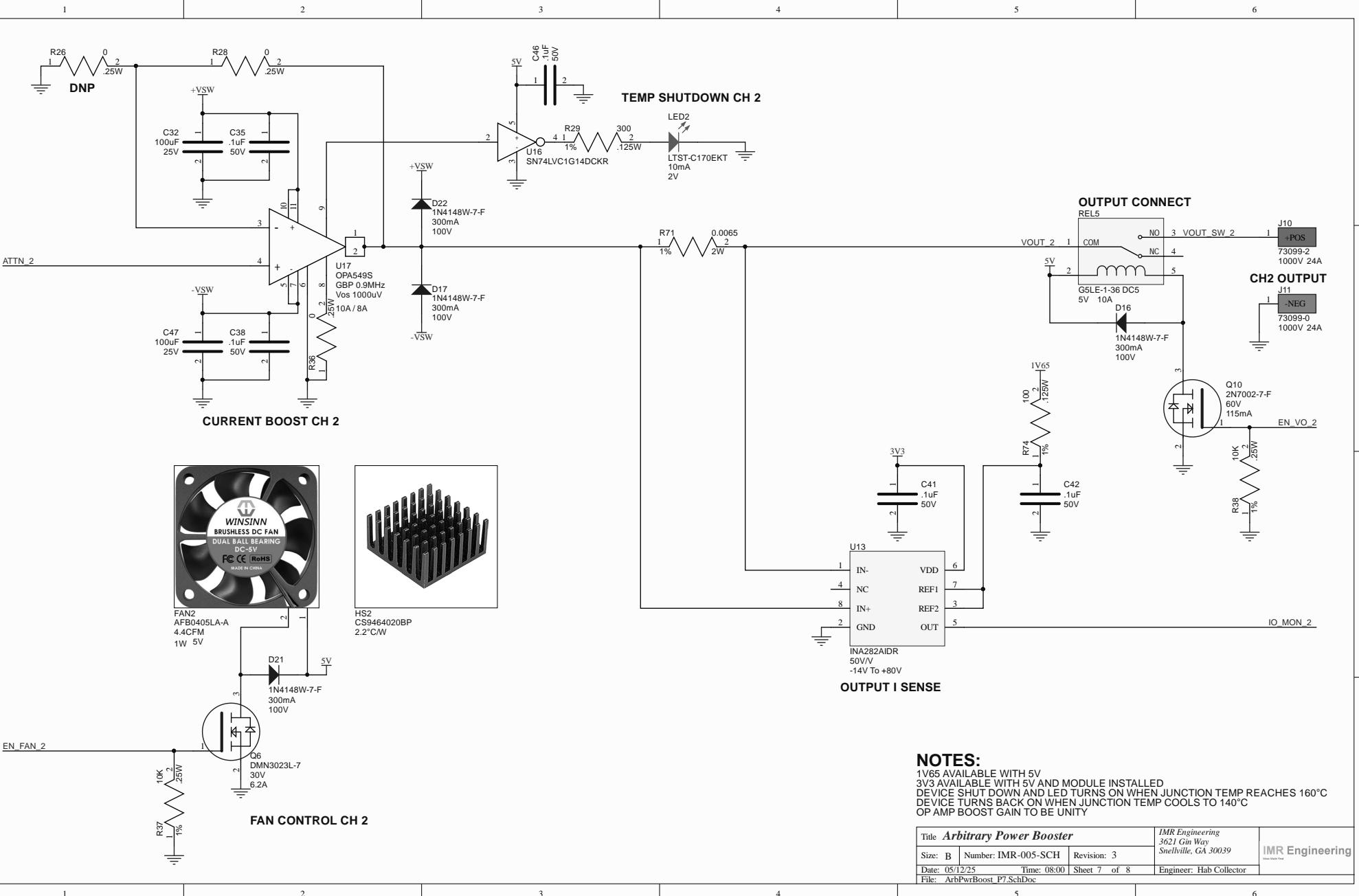
Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Snellville, GA 30039	IMR Engineering
Size: B	Number: IMR-005-SCH	Revision: 3
Date: 05/12/25	Time: 08:00	Sheet 5 of 8
File: ArbPwrBoost_P5.SchDoc		Engineer: Hab Collector

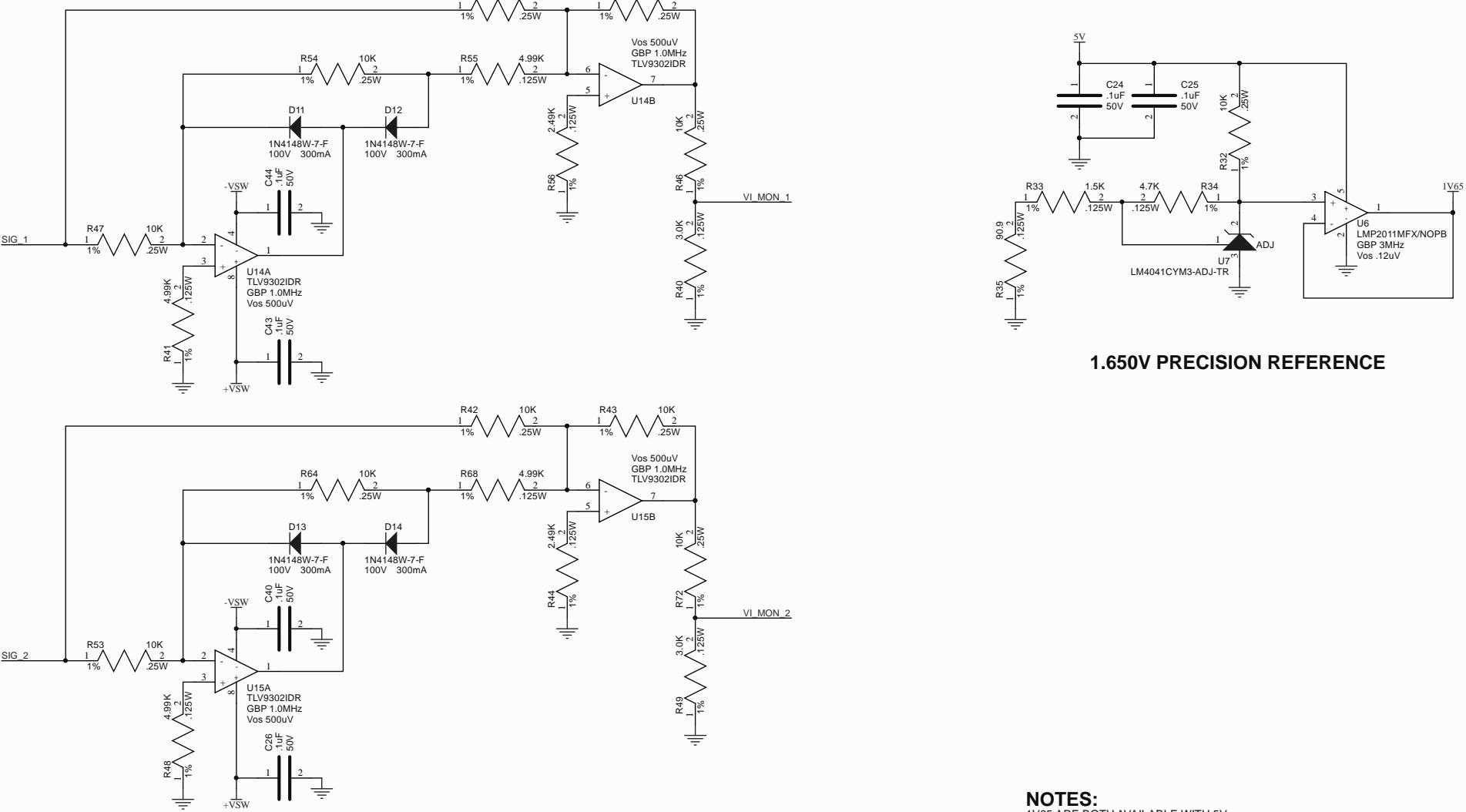
CH2 INPUT**INPUT PROTECTION****NOTES:**

PULL DOWN U4.A0 FOR CH1 ADDRESS
PULL UP U11.A0 FOR CH2 ADDRESS
ENABLE INPUT WHEN $\pm 15V$ VALID

**INPUT IMPEDANCE****INPUT ATTENUATOR**U11B
MCP45HV51-104E/ST

Title: Arbitrary Power Booster			IMR Engineering
Size: B	Number: IMR-005-SCH	Revision: 3	3621 Gin Way Snellville, GA 30039
Date: 05/12/25	Time: 08:00	Sheet 6 of 8	Engineer: Hab Collector
File: ArbPwrBoost_P6.SchDoc			IMR Engineering



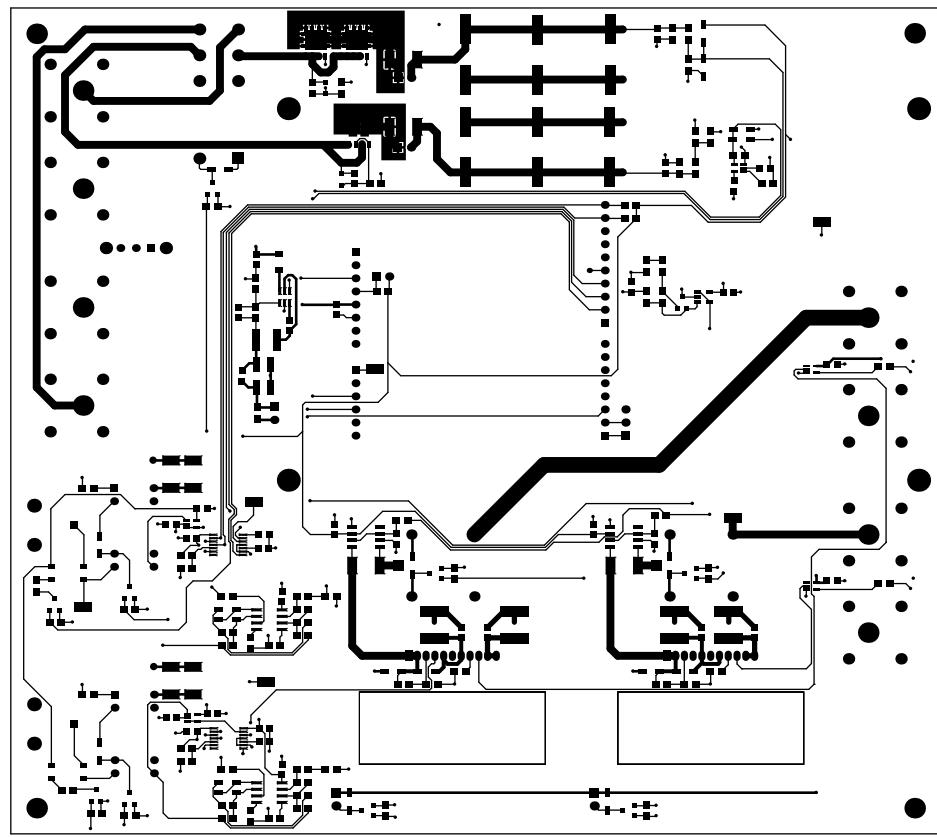


ABSOLUTE VALUE DIVIDER

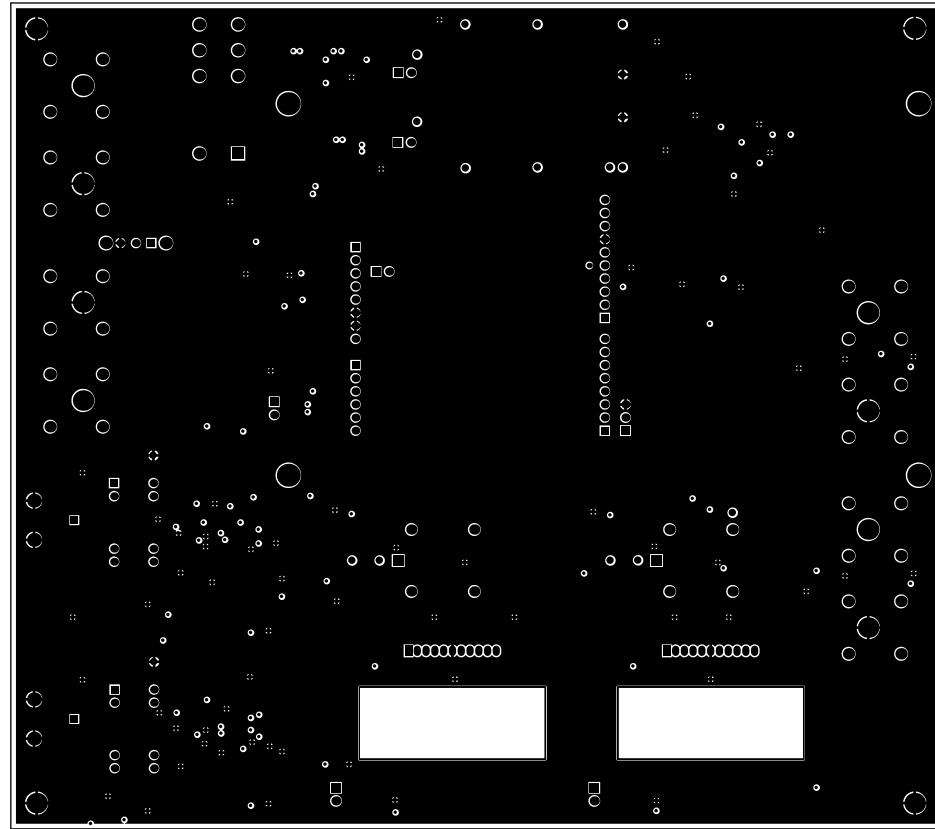
NOTES:

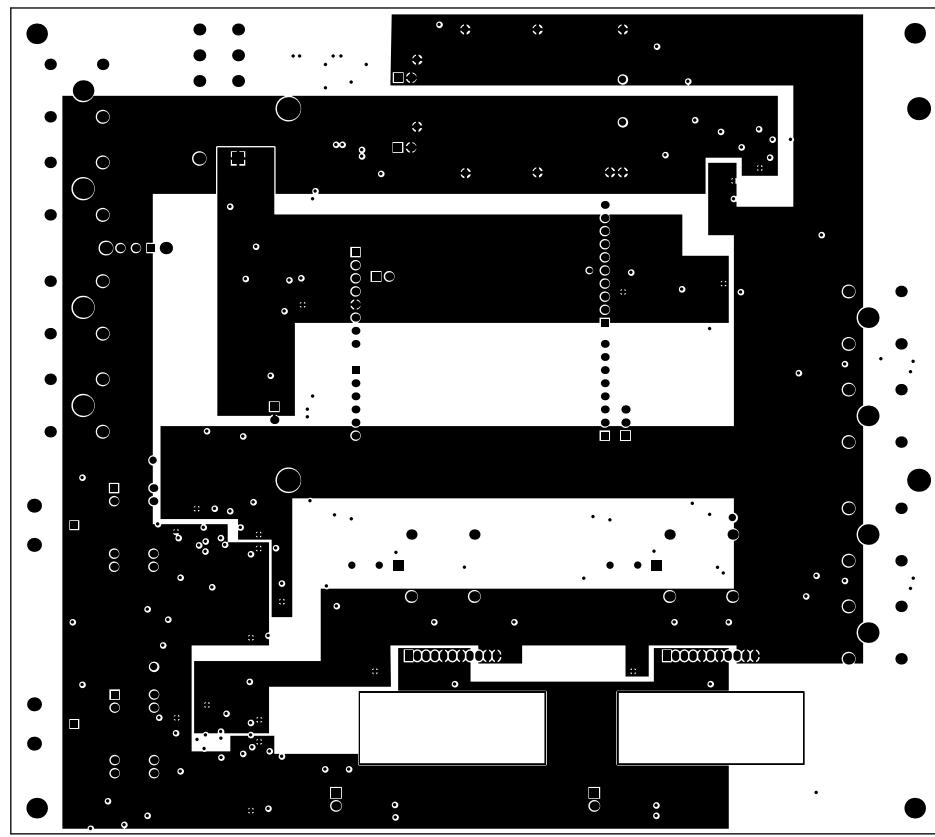
1V65 ARE BOTH AVAILABLE WITH 5V
3V3 REQUIRES MODULE TO BE INSERTED
ABSOLUTE VALUE DIVIDER RATIO 0.2308V/V

Title Arbitrary Power Booster			IMR Engineering
Size: B	Number: IMR-005-SCH	Revision: 3	3621 Gin Way Sneville, GA 30039
Date: 05/12/25	Time: 08:00	Sheet 8 of 8	Engineer: Hab Collector
File: ArbPwrBoost_P8.SchDoc			IMR Engineering

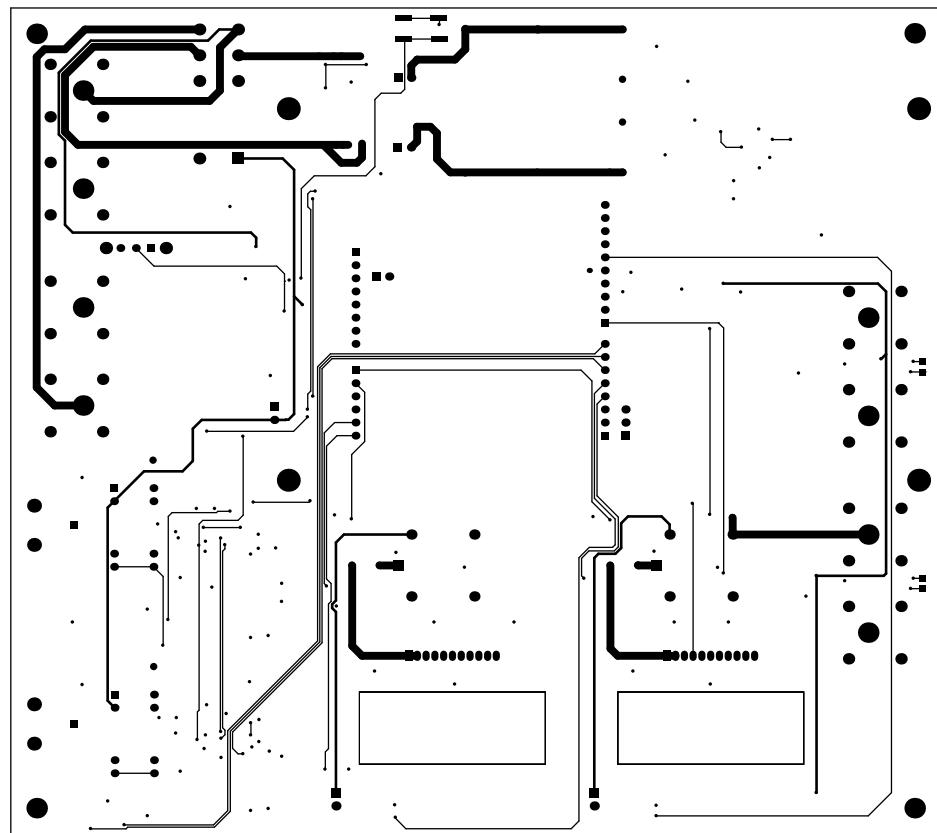


TOP

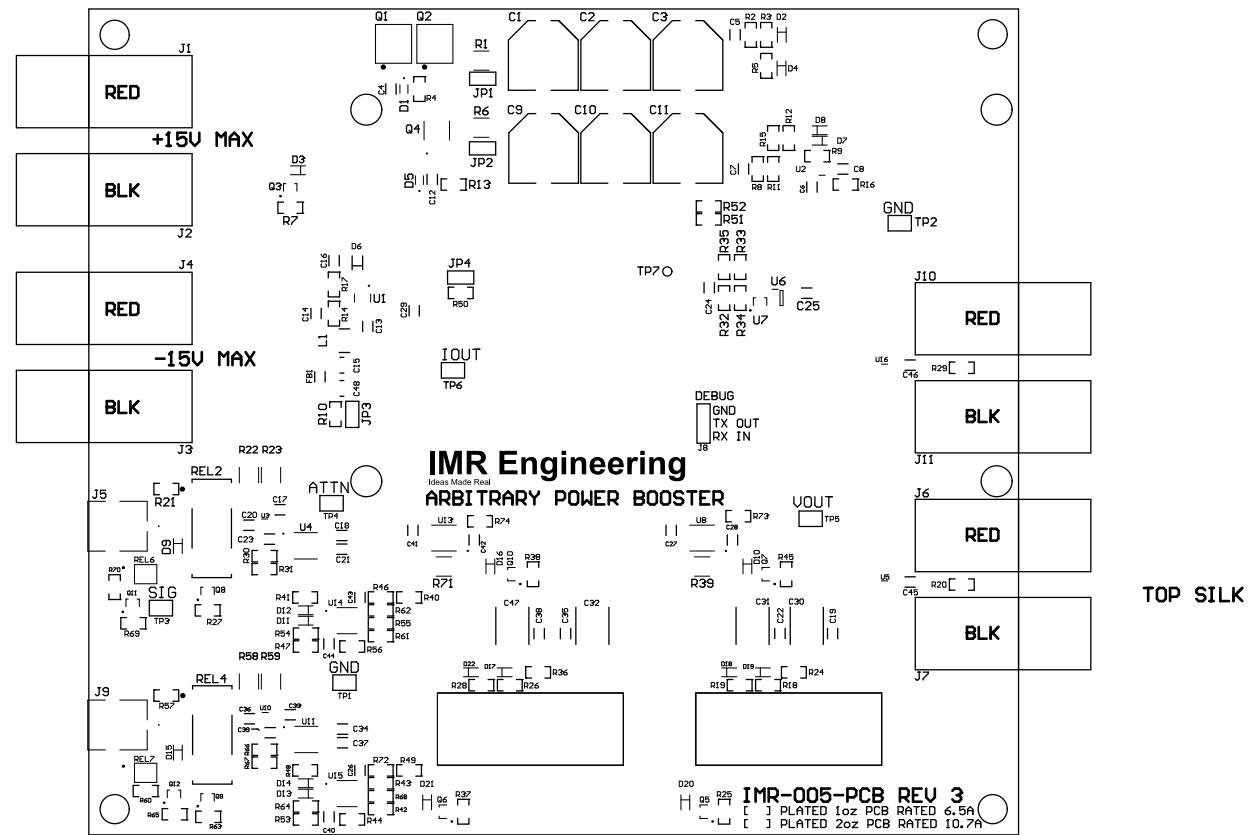


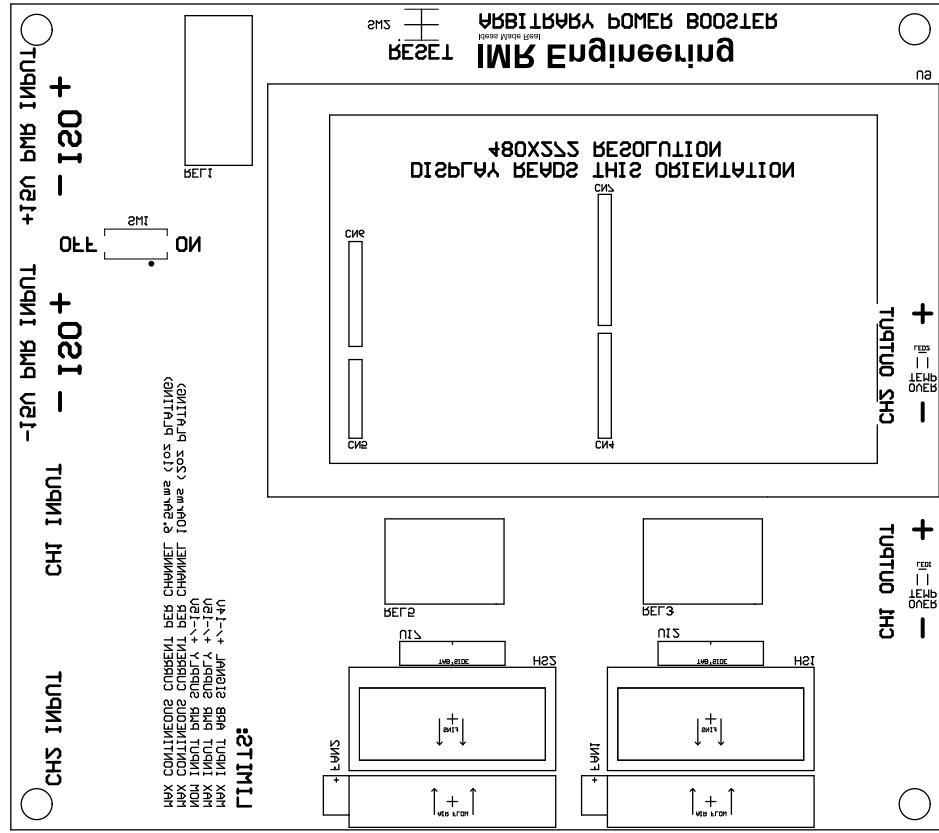


SIGNAL LAYER 2

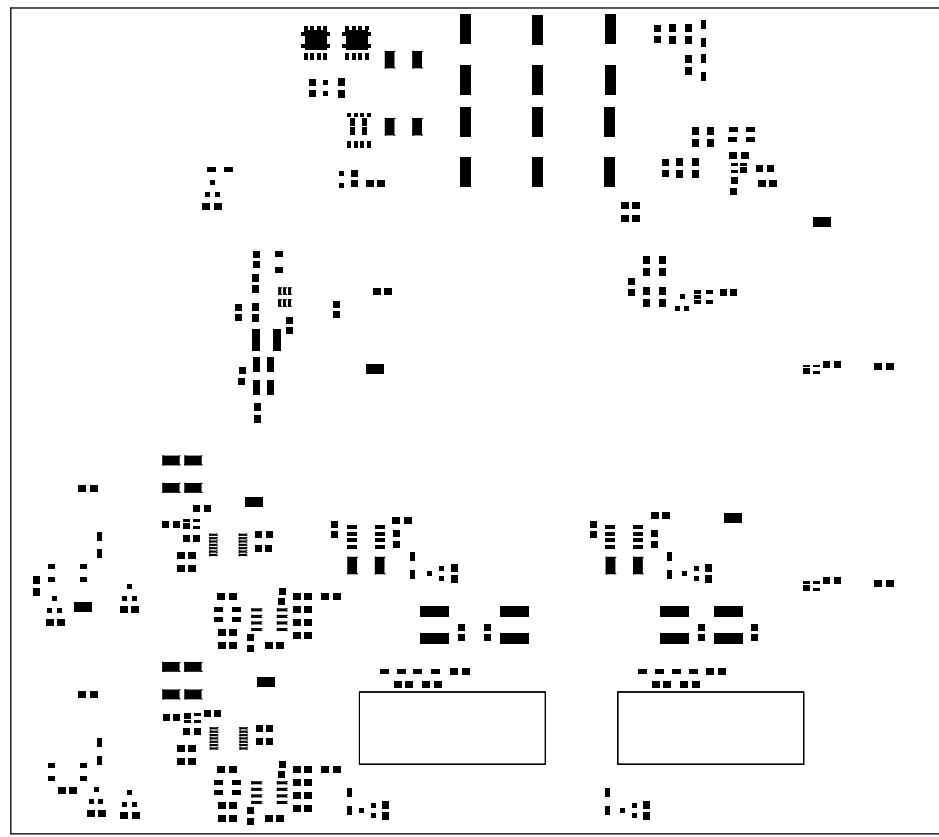


BOTTOM

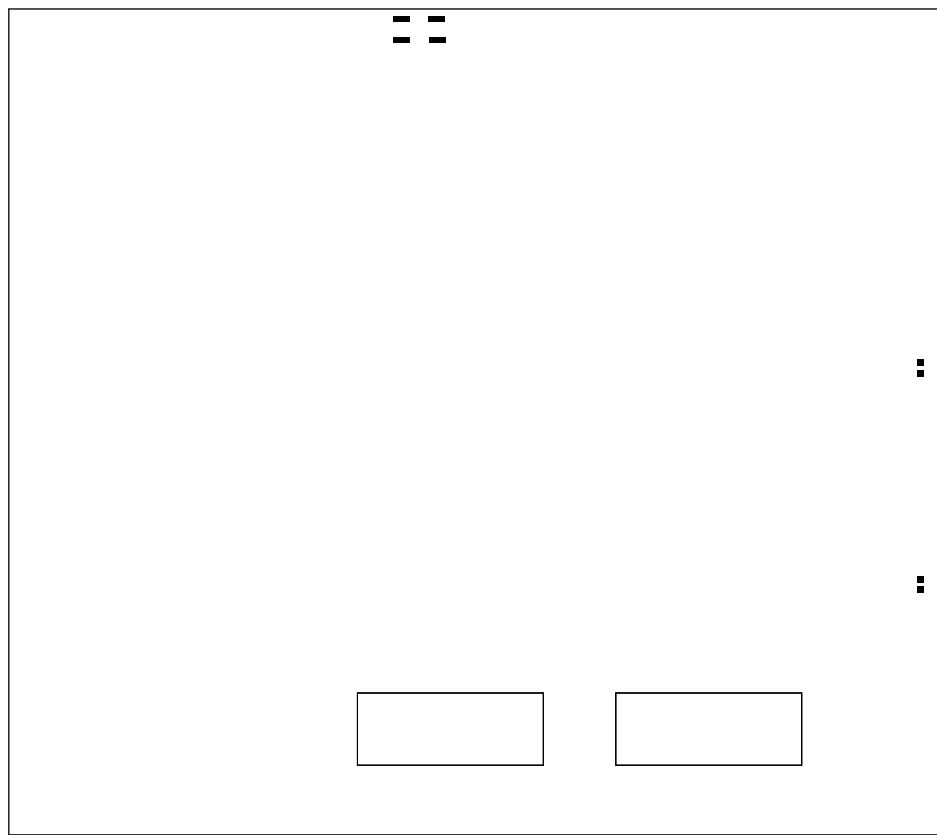




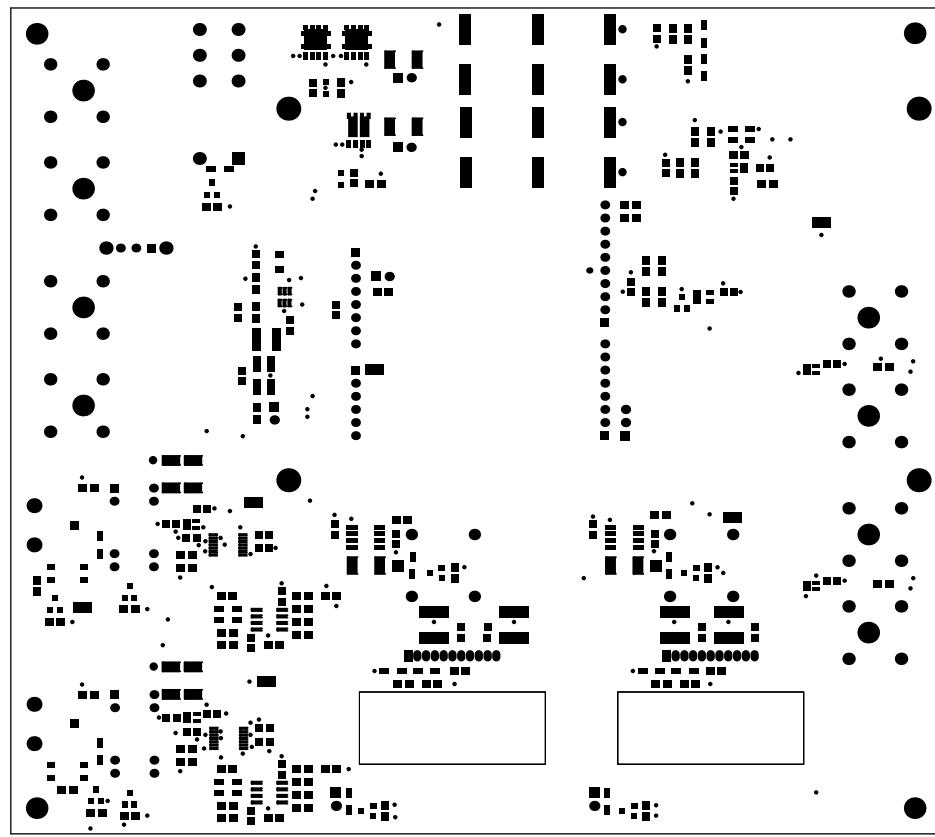
BOTTOM SILK



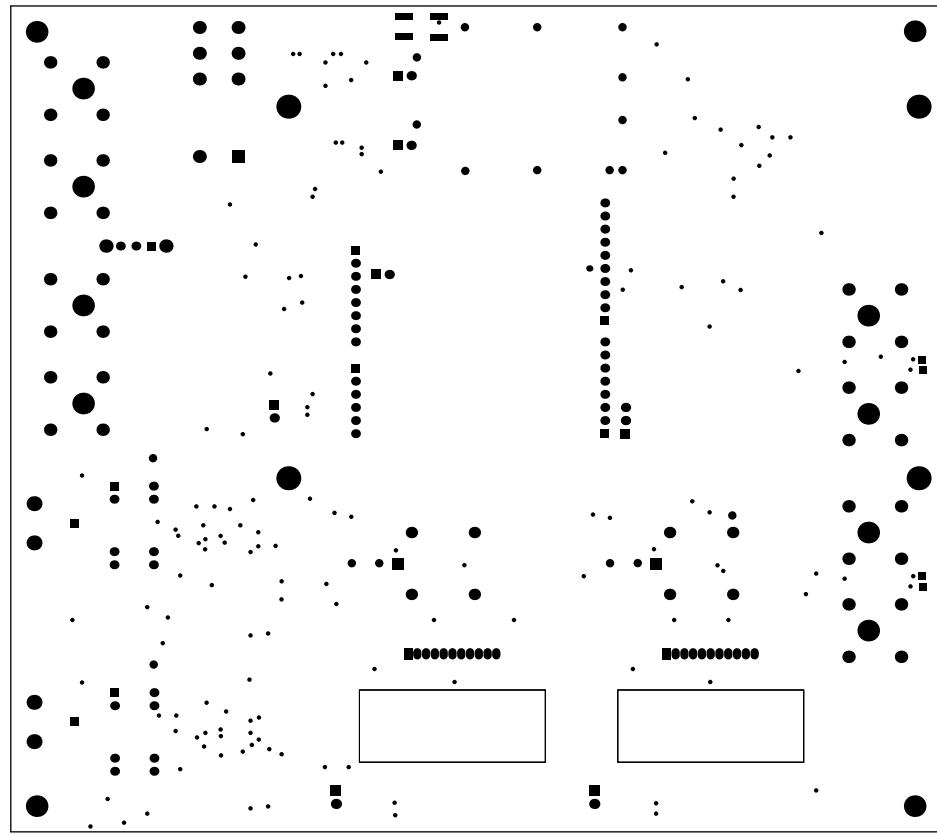
TOP PM



BOTTOM PM



TOP SM

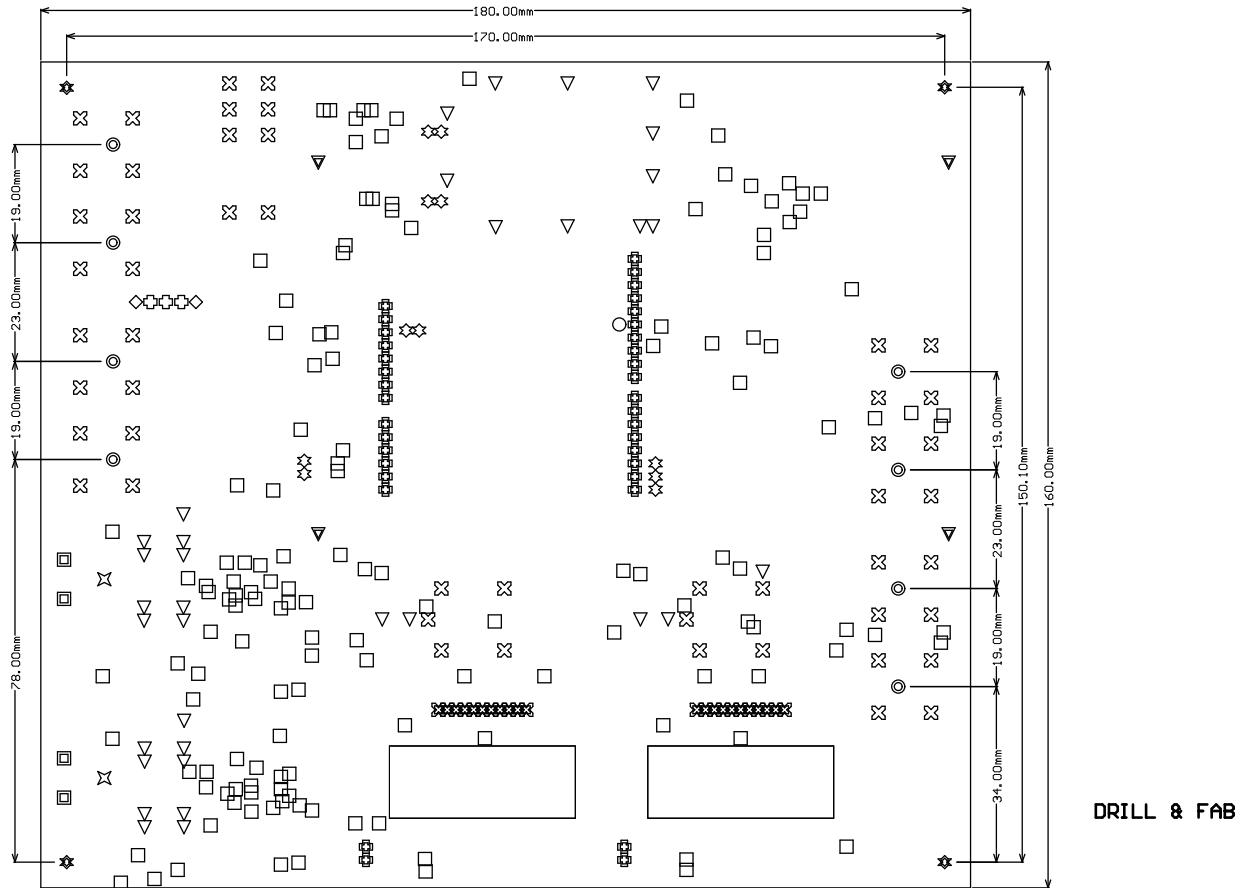


BOTTOM SM

Symbol	Hit Count	Finished Hole Size	Plated	Hole Type
○	1	0.508mm (20.00mil)	PTH	Round
×	2	0.920mm (36.22mil)	PTH	Round
◊	2	1.590mm (62.00mil)	PTH	Round
○	3	1.010mm (39.76mil)	PTH	Round
■	4	1.800mm (70.87mil)	PTH	Round
▼	4	3.175mm (125.00mil)	PTH	Round
*	4	3.300mm (129.92mil)	PTH	Round
●	8	2.200mm (86.41mil)	PTH	Round
◊	11	0.900mm (35.43mil)	PTH	Round
×	22	1.200mm (47.24mil)	PTH	Round
▼	34	0.762mm (30.00mil)	PTH	Round
●	36	0.889mm (35.00mil)	PTH	Round
■	50	1.300mm (51.18mil)	PTH	Round
□	146	0.381mm (15.00mil)	PTH	Round
		327 Total		

LAYER STACK:
 Top Layer
 Signal Layer 1
 Signal Layer 2
 Bottom Layer

+/- VS TRACE:
 MAX BOARD CURRENT 1oz PLATING: 6.50A RMS
 MAX BOARD CURRENT 2oz PLATING: 10.70A RMS



PCB FABRICATION NOTES:

MATERIAL:

FR4 (GF per MIL-P-13949) MIN UL 94V0

Cu WEIGHT:

OUTER LAYER: 1oz or 2oz PER (PO TO CLARIFY)
 INNER LAYER: 1oz

SOLDER MASK:

TYPE: LPI (LIQUID PHOTO-IMAGE)
 COVER: SMOBC (SOLDER MASK OVER BARE Cu)
 COLOR: RED (PROTOTYPE) OR GREEN (PRODUCTION) GLOSS

OVERALL PCB THICKNESS:

PCB: 1.6mm (63MIL)
 TOLERANCE: 0.178mm (7MIL)

PCB ELECTRICAL TEST

TESTED TO GERBER DATA
 PURCHASE ORDER TO OVERRIDE

HOLE DIAMETER TOLERANCE:

PLATED HOLE TOLERANCE: 0.076mm (3MIL)
 NON PLATED HOLE TOLERANCE: 0.076mm (3MIL)

SILK SCREEN

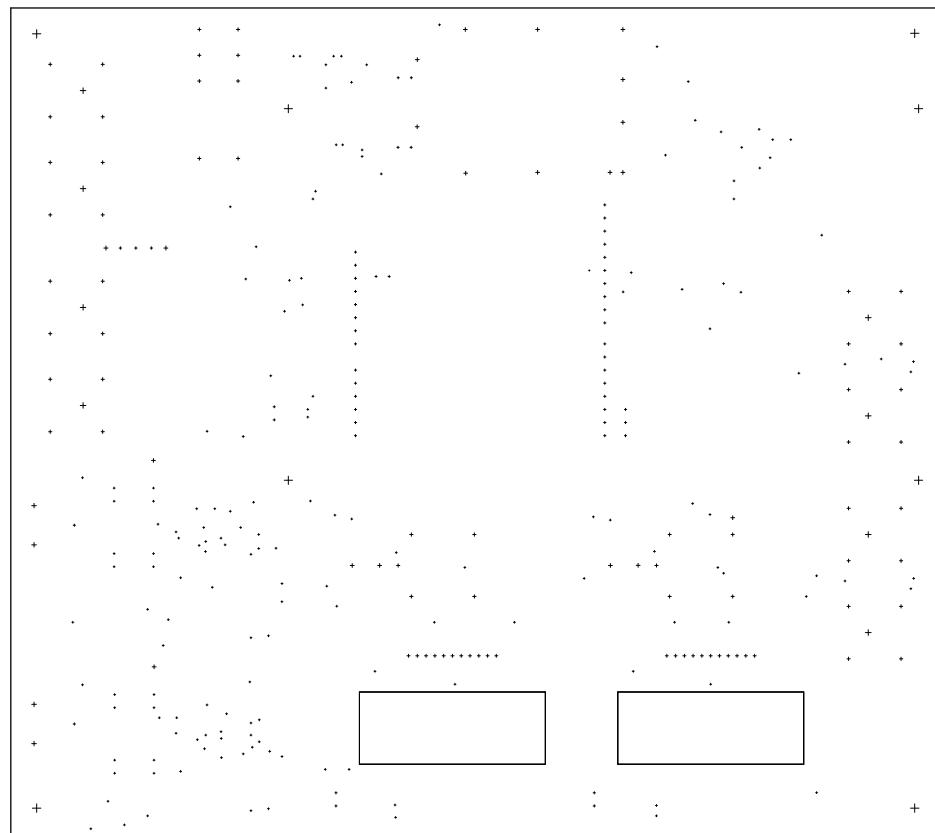
SIDES: TOP
 COLOR: WHITE
 TYPE: LPI (PREFERRED)

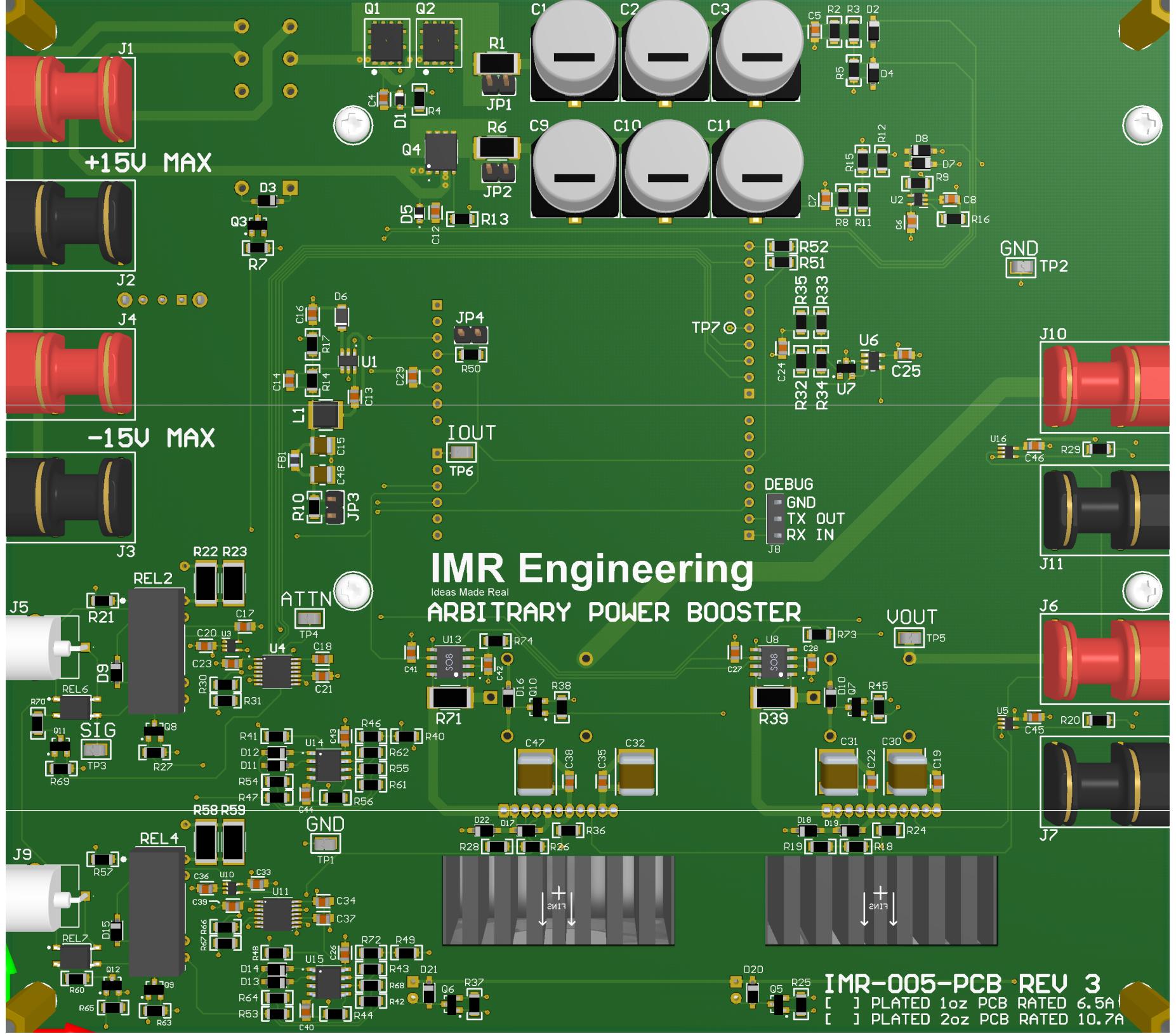
SURFACE FINISH:

PROTOTYPE: HASL OR ENIG
 PRODUCTION: ENIG (ONLY IF SPEC ON PURCHASE ORDER)

ACCEPTABILITY:

STANDARD: IPC-A-600 (LATEST REV)
 MFG TO ADD: DATE CODE, UL FLAME CODE





PROTOTYPE BOM

Arbitrary Power Booster

Source Data From: Arb_Power_Booster.PjPcb
 Project: Arb_Power_Booster.PjPcb
 Variant: None

Company Part Number: IMR-005-SCH
 PCB Revision: 3
 Engineer: Hab S Collector

IMR Engineering
 Ideas Made Real

#	Quantity	LibRef	Description	Designator	MFG	MFG PN	Supplier 1	Supplier Part Number 1	Unit Price	TOTAL
1	6	CAP_330UF_50V_ALE	CAP ALE 330UF 20% 50V SMD	C1, C2, C3, C9, C10, C11	EEV-FK1H31Q	Panasonic Electronic	DigiKey	PCE3475CT-ND	.41	\$8.46
2	3	CAP_SMD_10UF_50V_0805	CAP CER 10UF 50V X5R 0805	C4, C12, C16	Murata Electronics	GRM21BR61H106KE43L	DigiKey	490-18663-1-ND	.28	\$0.84
3	32	CAP_SMD_0.1UF_50V_0805	CAP CER 0.1UF 50V X7R 0805	C5, C6, C7, C8, C13, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46	KYOCERA AVX	KGM21NR71H104KT	DigiKey	478-KGM21NR71H104KTCT-ND	.1	\$3.20
4	1	CAP_SMD_68PF_50V_0805	CAP CER 68PF 50V X7R 0805	C14	KEMET	C0805C680K5RACAUTO	DigiKey	399-C0805C680K5RACAUTOCT-ND	.24	\$0.24
5	2	CAP_SMD_47UF_16V_1210	CAP CER 47UF 50V X5R 1210	C15, C48	Murata Electronics	GRM32ER60J476ME20L	DigiKey	490-1887-1-ND	.28	\$0.56
6	4	CAP_SMD_100UF_25V_SMD	CAP CER 100UF 25V XTS SMD	C30, C31, C32, C47	Murata Electronics	KCM55WC71E107MH13L	DigiKey	490-KCM55WC71E107MH13LCT-ND	5.68	\$22.72
7	2	DIODE_ZENER_MMSZ5239BS-7-F	DIODE ZENER 9.1V 200MW SOD323	D1, D5	Diods Inc	MMSZ5239BS-7-F	DigiKey	MMSZ5239BS-FDICT-ND	.18	\$0.36
8	17	DIODE_1N4148W-7-F	RELAY REED SPDT 250mA 5V	D2, D3, D7, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22	Diods Inc	1N4148W-7-F	DigiKey	1N4148W-FDICT-ND	.16	\$2.72
9	2	DIODE_SCHOTTKY_IN5819HW-7-F	DIODE SCHOTTKY 40V 1A SOD123	D4, D8	Diods Inc	1N5819HW-7-F	DigiKey	1N5819HW-FDICT-ND	.25	\$0.50
10	1	DIODE_SCHOTTKY_B240S1F-7	DIODE SCHOTTKY 40V 2A SOD123F	D6	Diods Inc	B240S1F-7	DigiKey	B240S1F-7DICT-ND	.25	\$0.25
11	2	FAN_AFB0405LA-A	FAN AXIAL 40X10MM BALL 5VDC WIRE	FAN1, FAN2	Delta Electronics	AFB0405LA-A	DigiKey	603-2014-ND	7.31	\$14.62
12	1	FERRITE_BEAD_2508053017Y3	FERRITE BEAD 300 OHM 0805 1LN	FB1	Fair-Field	2508053017Y3	DigiKey	1934-1474-1-ND	.10	\$0.10
13	2	HEATSINK_CS9464020BP	Heat Sink Aluminum Top Mount	HS1, HS2	Cooling Source	CS9464020BP	DigiKey	4165-CS9464020BP-ND	3.41	\$6.82
14	4	CONN_PANOMA_73099-2	CONN 4mm Banana Socket Right Angle PCB RED	J1, J4, J6, J10	Pomona	73099-2	DigiKey	501-73099-2-ND	10.39	\$41.56
15	4	CONN_PANOMA_73099-0	CONN 4mm Banana Socket Right Angle PCB BLK	J2, J3, J7, J11	Pomona	73099-0	DigiKey	501-73099-0-ND	10.39	\$41.56
16	2	CONN_MOLEX_071713150	CONN BNC RPCT/R/A 50 OHM PCB	J5, J9	Molex	071713150	DigiKey	VM20430-ND	1.40	\$2.80
17	1	CONN_HEADER_3P_100ML_VERT	CONN HEADER VERT 3POS 2.54MM	J8	Sullins Connector Solutions	PRECO03SFAN-RC	Digi-Key	S1212EC-03-ND	.07	\$0.07
18	4	CONN_JUMPER_2P_100ML_VERT	CONN HEADER VERT 2POS 2.54MM	JP1, JP2, JP3, JP4	Sullins Connector Solutions	PRECO02SFAN-RC	Digi-Key	S1212EC-02-ND	.07	\$0.28
19	1	INDUCTOR_SRN4018TA-6R8M	FIXED INDUCTION 6.8UH 1.7A 58 MOHM SMD	L1	Bourns Inc.	SRN4018TA-6R8M	DigiKey	SRN4018TA-6R8MCT-ND	.48	\$0.48
20	2	LED_RED_LTST-C170EKT	LED RED CLEAR SMD	LED1, LED2	Diods Inc	LSTST-C170EKT	DigiKey	160-1178-1-ND	.18	\$0.36
21	8	MECHANICAL_SCREW_M3X6_PAN_HEAD	SCREW M3X6 PAN HEAD SS	MECH1, MECH2, MECH3, MECH4, MECH5, MECH6, MECH7, MECH8	APM Hexseal	RMBX6MM2701	DigiKey	335-1156-ND	.58	\$4.64
22	4	MECHANICAL_STANDOFF_M3X20	HEX STANDOFF M3 BRASS 20MM	MECH9, MECH10, MECH11, MECH12	Keystone Electronics	24407	DigiKey	36-24407-ND	1.36	\$5.44
23	2	MOSFET_PCH_DM8605SPS-13	MOSFET P-CH 60V 5.7A PWRDE06-08	Q1, Q2	Diods Inc	DM8605SPS-13	DigiKey	DM8605SPS-13DICT-ND	1.07	\$2.14
24	7	MOSFET_NCH_2N7002-7-F	MOSFET N-CH 60V 115MA SOT23-3	Q3, Q7, Q8, Q9, Q10, Q11, Q12	Diods Inc	2N7002-7-F	DigiKey	2N7002-FDICT-ND	.20	\$1.40
25	1	MOSFET_NCH_DMNH6042SPDQ-13	MOSFET NCH 60V 5.7A POWERDI	Q4	Diods Inc	DMNH6042SPDQ-13	DigiKey	DMNH6042SPDQ-13DICT-ND	1.36	\$1.36
26	2	MOSFET_NCH_DMN3023L-7	MOSFET N-CH 30V 6.2A SOT23-3	Q5, Q6	Diods Inc	DMN3023L-7	DigiKey	DMN3023L-7DICT-ND	.48	\$0.96
27	2	RES_SMD_0.2512_1W_1%	RES SMD 0 OHM 1% 1W 2512	R1, R6	Yageo	RC2512JK-070RL	DigiKey	YAG1232CT-ND	.2	\$0.40
28	30	RES_SMD_10K_0805_1/4W_1%	RES SMD 10K OHM 1% 1/4W 0805	R2, R3, R7, R8, R11, R25, R27, R30, R31, R32, R37, R38, R42, R43, R45, R46, R47, R51, R52, R53, R54, R61, R62, R63, R64, R65, R66, R67, R69, R72	Yageo	RC0805FR-7W10KL	DigiKey	13-RC0805FR-7W10KLCT-ND	.10	\$3.00
29	2	RES_SMD_47K_0805_1/8W_1%	RES SMD 47K OHM 1% 1/8W 0805	R4, R13	Yageo	RC0805FR-1347KL	DigiKey	13-RC0805FR-1347KLCT-ND	.1	\$0.20
30	2	RES_SMD_1.24K_0805_1/8W_1%	RES SMD 1.24K OHM 1% 1/8W 0805	R5, R15	Yageo	RC0805FR-071K24L	DigiKey	311-1.24KCRCT-ND	.1	\$0.20
31	1	RES_SMD_2.1K_0805_1/8W_1%	RES SMD 2.1K OHM 1% 1/8W 0805	R9	Yageo	RC0805FR-072K1L	DigiKey	311-2.10KCRCT-ND	.1	\$0.10
32	8	RES_SMD_0.0805_1/8W_1%	RES SMD 0 OHM 1% 1/8W 0805	R10, R18, R19, R24, R26, R28, R36, R50	Yageo	RC0805JR-070RL	DigiKey	311-0.0ARCT-ND	.1	\$0.80
33	2	RES_SMD_1.0K_0805_1/8W_1%	RES SMD 1.0K OHM 1% 1/8W 0805	R12, R16	Yageo	RC0805FR-071KL	DigiKey	311-1.00KCRCT-ND	.1	\$0.20
34	1	RES_SMD_100K_0805_1/4W_1%	RES SMD 100K OHM 1% 1/4W 0805	R14	Yageo	RC0805FR-07100KL	DigiKey	311-100KCRCT-ND	.13	\$0.13
35	1	RES_SMD_13.7K_0805_1/8W_1%	RES SMD 13.7K OHM 1% 1/8W 0805	R17	Yageo	RC0805FR-0713K7L	DigiKey	311-13.7KCRCT-ND	.10	\$0.10
36	2	RES_SMD_300_0805_1/8W_1%	RES SMD 300 OHM 1% 1/8W 0805	R20, R29	Yageo	RC0805FR-07300RL	DigiKey	311-300CRCT-ND	.1	\$0.20
37	2	RES_SMD_1.0M_0805_1/8W_1%	RES SMD 1.0M OHM 1% 1/8W 0805	R21, R57	Yageo	RC0805FR-7W1ML	DigiKey	13-RC0805FR-7W1MLCT-ND	.10	\$0.20
38	4	RES_SMD_10_0805_3.5W_1%	RES SMD 100 OHM 1% 3.5W 2512	R22, R23, R58, R59	Omnite	ALN2512F100RE-1	DigiKey	273-ALN2512F100RE-1CT-ND	1.50	\$6.00
39	1	RES_SMD_1.5K_0805_1/8W_1%	RES SMD 1.5K OHM 1% 1/8W 0805	R33	Yageo	RC0805FR-071K5L	DigiKey	311-1.50KCRCT-ND	.1	\$0.10
40	3	RES_SMD_4.7K_0805_1/8W_1%	RES SMD 4.7K OHM 1% 1/8W 0805	R34, R60, R70	Yageo	RC0805FR-1347KL	DigiKey	13-RC0805FR-1347KLCT-ND	.1	\$0.30
41	1	RES_SMD_90.9_0805_1/8W_1%	RES SMD 90.9 OHM 1% 1/8W 0805	R35	Yageo	RC0805FR-0790R9L	DigiKey	311-90.9CRCT-ND	.1	\$0.10
42	2	RES_SMD_0.0065_2512_2W_1%	RES SMD 0.0065 OHM 1% 2W 2512	R39, R71	Vishay Dale	WLS2512BL2512600FEA18	DigiKey	541-WLS2512BL2512600FEA18CT-ND	1.76	\$3.52
43	2	RES_SMD_3.0K_0805_1/8W_1%	RES SMD 3.0K OHM 1% 1/8W 0805	R40, R49	Yageo	RC0805FR-133KL	DigiKey	13-RC0805FR-133KLCT-ND	.1	\$0.20
44	4	RES_SMD_4.99K_0805_1/8W_1%	RES SMD 4.99K OHM 1% 1/8W 0805	R41, R48, R55, R68	Yageo	RC0805FR-134K9L	DigiKey	13-RC0805FR-134K9LCT-ND	.1	\$0.40
45	2	RES_SMD_2.49K_0805_1/8W_1%	RES SMD 2.49K OHM 1% 1/8W 0805	R44, R56	Yageo	RC0805FR-132K49KL	DigiKey	13-RC0805FR-132K49LCT-ND	.1	\$0.20
46	2	RES_SMD_100_0805_1/8W_1%	RES SMD 100 OHM 1% 1/8W 0805	R73, R74	Yageo	RC0805FR-07100RL	DigiKey	311-100CRCT-ND	.1	\$0.20
47	1	RELAY_A7733-2A-E5DE	RELAY REED SPDT 250mA 5V	REL1	American Zettler	A7733-2A-E5DE	DigiKey	3385-AZ7733-2A-E5DE-nd	2.18	\$2.18
48	2	RELAY_HE7210500	RELAY REED SPDT 250mA 5V	REL2, REL4	Littleuse	HE7210500	DigiKey	HE7211ND	3.77	\$7.54
49	2	RELAY_G5LE-1-36DCS	RELAY GEN PURPOSE SPDT 10A 5V	REL3, REL5	Omron	G5LE-1-36 DC5	DigiKey	G5LE-1-36DCS-ND	1.24	\$2.48
50	2	RELAY_TLP170AM/TPLE	SSR RELAY SPST-NO 700mA 0-6V	REL6, REL7	Toshiba	TLP170AM/TPLE	DigiKey	264-TLP170AM/TPLECT-ND	1.33	\$2.66
51	1	SWITCH_SWL-12689-4A-N-D	SWITCH SLIDE SPDT 300mA 50V	SW1	Same Sky	SLW-12689-4A-N-D	DigiKey	2223-SWL-12689-4A-N-D-ND	.48	\$0.48
52	1	SWITCH_EVO-Q2U02W	SWITCH TACTILE SPST-NO 0.02A 15V	SW2	American Zettler	EVO-Q2U02W	DigiKey	P12954SCT-ND	.25	\$0.25
53	6	CONN_TEST_POINT_S1751-46R	PCB TEST POINT CONNECT	TP1, TP2, TP3, TP4, TP5, TP6	Harw in Inc	S1751-46R	Digi-Key	952-1478-1-ND	.28	\$1.68
54	1	IC_TPS4202DDCR	IC REG BUCK ADU 2A SOT23	U1	Texas Instruments	TPS4202DDCR	Digi-Key	296-TPS4202DDCRCT-ND	.97	\$0.97
55	3	OPAMP_TLV9351DCR	IC OPAMP 2.5MHz 350uV C70-5	U2, U3, U10	Texas Instruments	TLV9351DCR	Digi-Key	296-TLV9351DCRCT-ND	.49	\$1.47
56	2	IC_MCP45HV51-104EST	IC DGT-POT 100kOHM 256TP 147SSOP	U4, U11	Microchip	MCP45HV51-104EST	Digi-Key	MCP45HV51-104EST-ND	2.00	\$4.00
57	2	IC_SN74LVC1G14DKCR	IC INV-ERT SCHMITT 1CH 1IN SC70-5	U5, U16	Texas Instruments	SN74LVC1G14DKCR	Digi-Key	296-11608-1-ND	.10	\$0.20
58	1	OPAMP_LMP2011MFNP/OPB	IC OPAMP GP 3MHz -12uV CIRCUIT SOT23-5	U6	Texas Instruments	LMP2011MFNP/OPB	Digi-Key	LMP2011MFNP/OPBCT-ND	.23	\$2.33
59	1	IC_LM4041CYM5-ADJ-TR	IC VREF SHUNT ADJ 0.5% SOT23-3	U7	Microchip	LM4041CYM5-ADJ-TR	Digi-Key	576-1049-1-ND	.39	\$0.39
60	2	ICINA282AIDR	IC CURRENT SENSE 0.4% 50V/V SOIC-8	U8, U13	Texas Instruments	INA282AIDR	Digi-Key	296-27820-1-ND	4.13	\$8.26
61	1	MODULE_STM32F46G-DISCO	DISCOVERY STM32 F4 EVAL BRD	U9	ST Microelectronics	STM32F46G-DISCO	Digi-Key	497-15680-5-ND	57.50	\$57.50
62	2	OPAMP_OPA549S	IC OPAMP POWER 1 CIRC 11 PWRPACK	U12, U17	Texas Instruments	OPA549S	Digi-Key	OPA549S-ND	26.94	\$53.88
63	2	OPAMP_TLV9302IDR	IC OPAMP GP 2 CIRCUIT 8SOIC	U14, U15	Texas Instruments	TLV9302IDR	Digi-Key	296-53513-1-ND	.66	\$1.32

Approved

Notes

Bill of Cost (Unit Buy): \$328.58