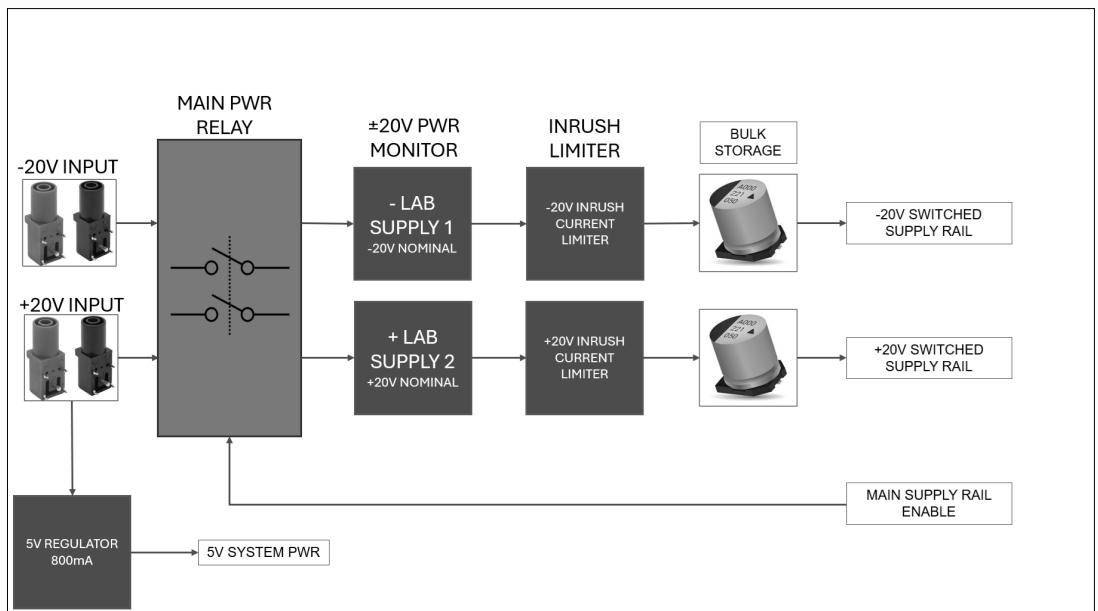
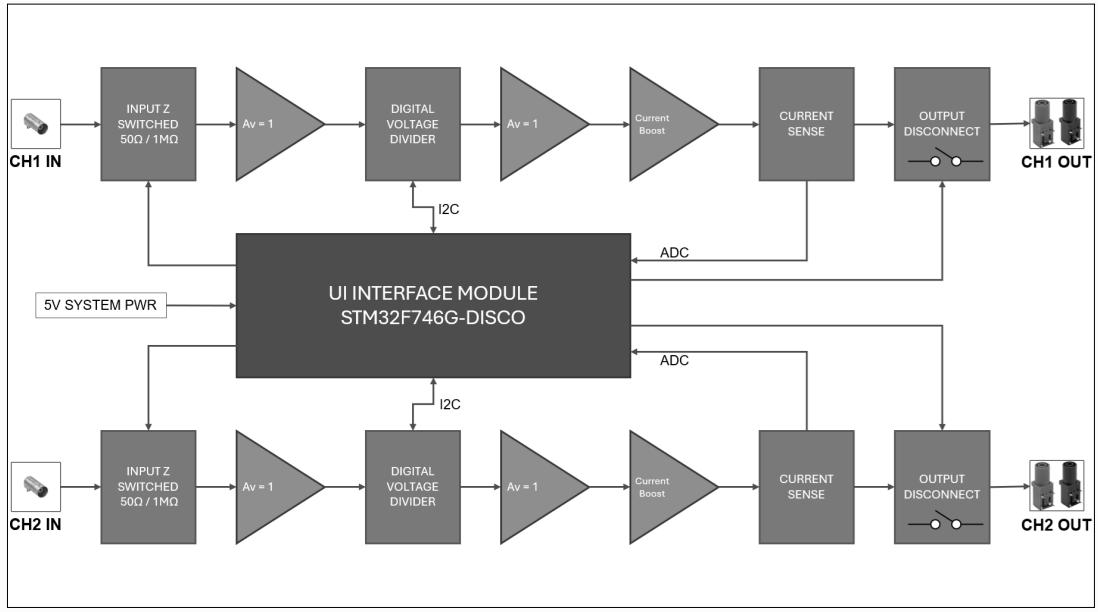


1 2 3 4 5 6

**REVISION HISTORY:**

REV	ECO	CHANGE DESCRIPTION
1	NA	Initial design

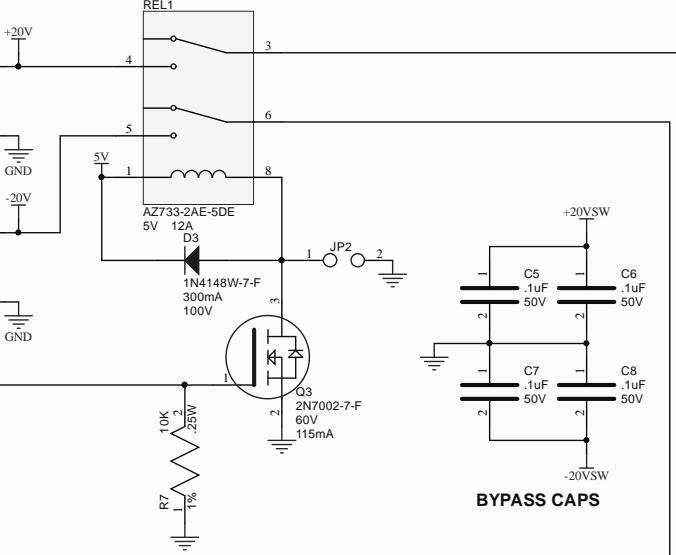


Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Sneville GA, 30039
Size: B	Number: IMR-005-SCH
Date: 02/25/25	Revision: 1
File: ArbPwrBoost_P1.SchDoc	Time: 08:00 Sheet 1 of 7 Engineer: Hab S Collector

1 2 3 4 5 6

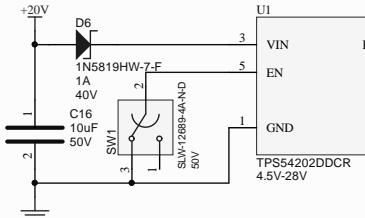
MAIN SWITCH

MAX INPUT +20V



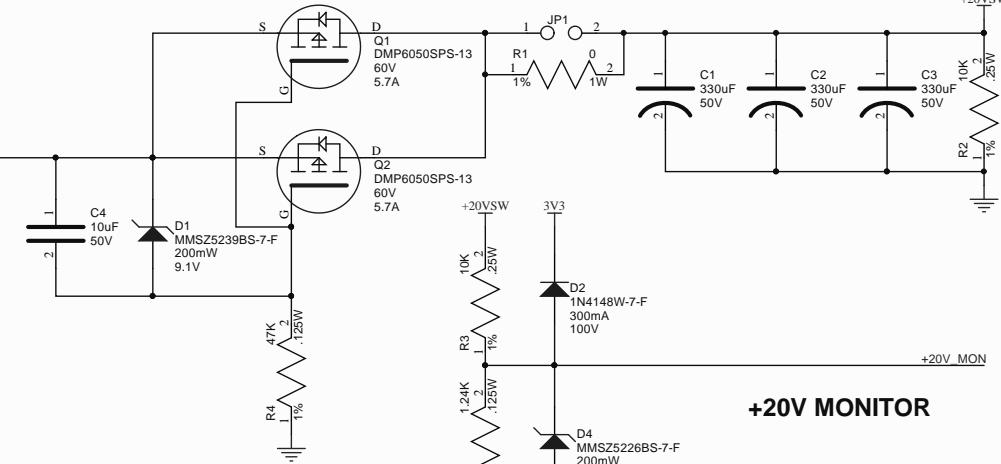
MAX INPUT -20V

MAIN PWR_EN

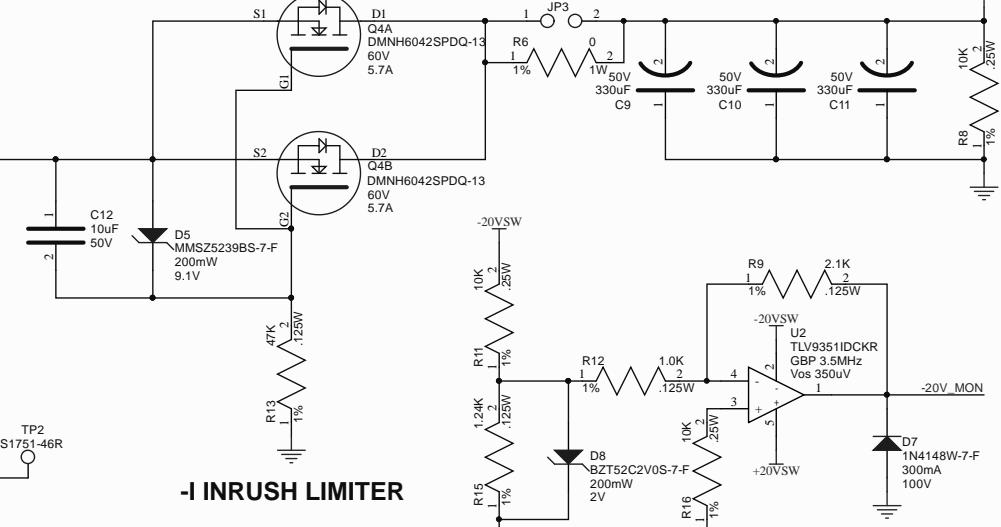


NOTES:

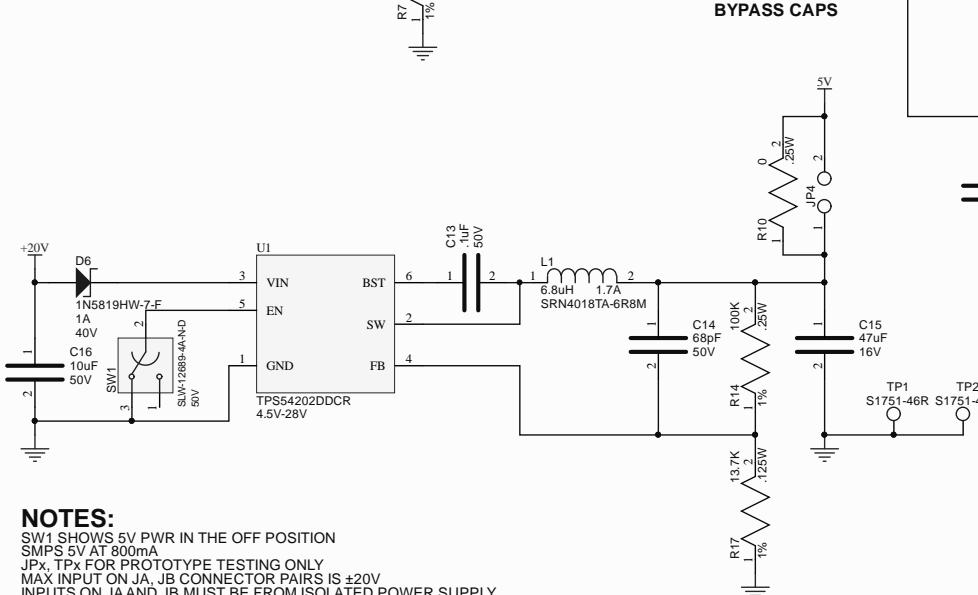
SW1 SHOWS 5V PWR IN THE OFF POSITION
SMPs 5V AT 80mA
JPF, TPx FOR PROTOTYPE TESTING ONLY
MAX INPUT ON JA, JB CONNECTOR PAIRS IS ±20V
INPUTS ON JA AND JB MUST BE FROM ISOLATED POWER SUPPLY
INPUT RATIO OF ±20V_MON IS 0.110V/V, MAX INPUT OF 30V



+I INRUSH LIMITER

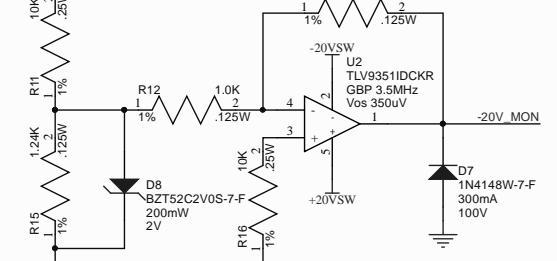


-I INRUSH LIMITER

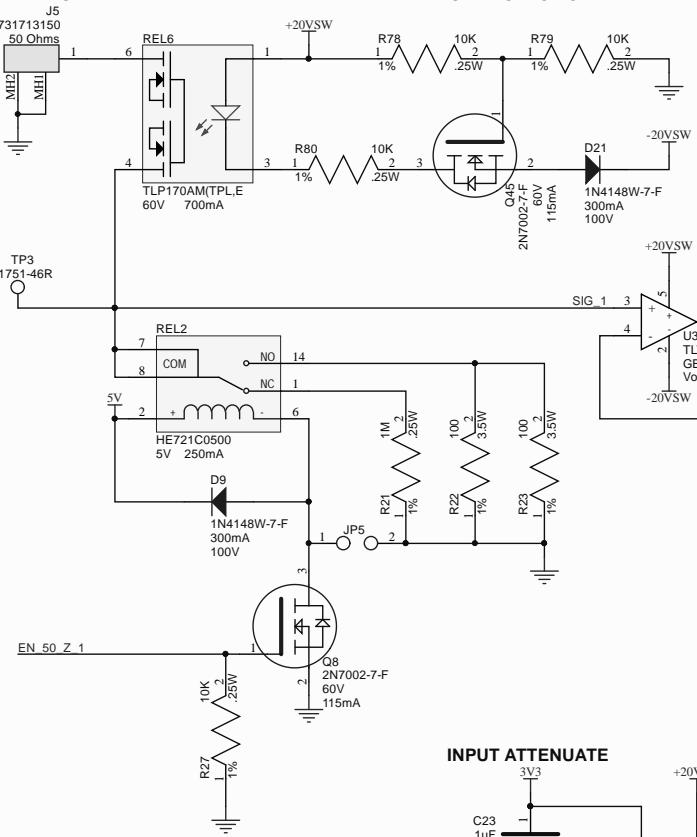
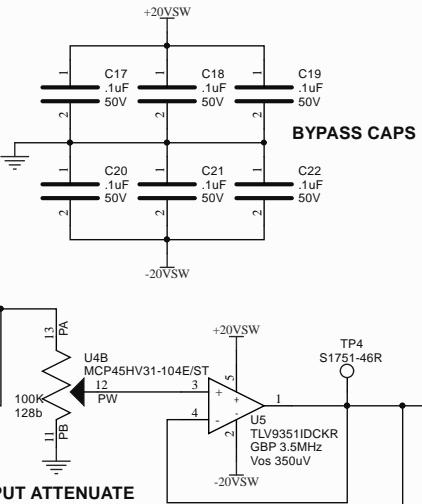
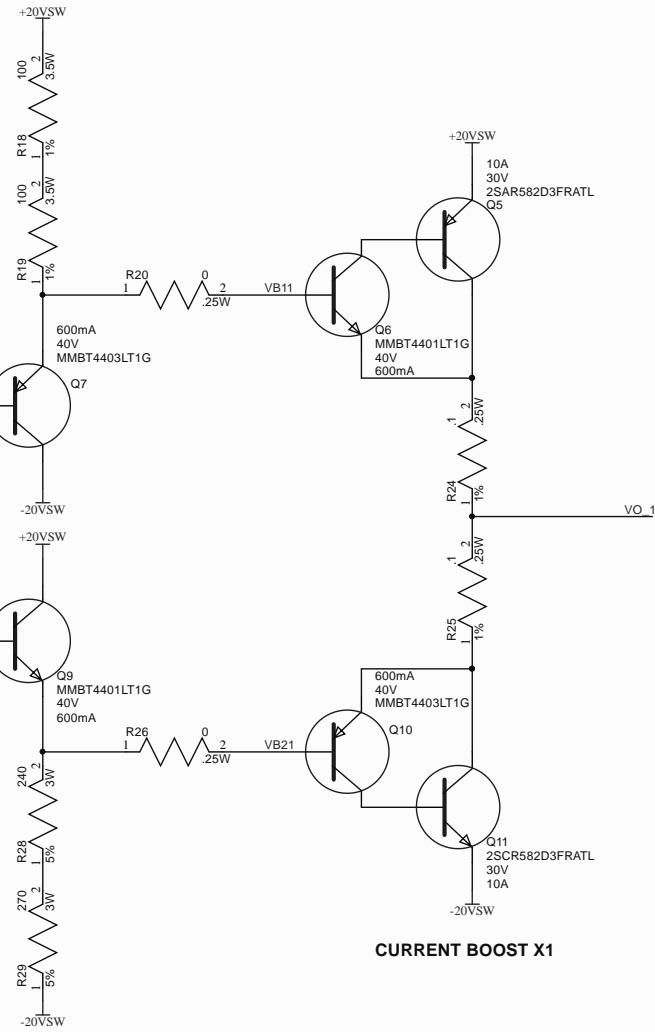


Title: Arbitrary Power Booster	IMR Engineering
Size: B	Number: IMR-005-SCH
Date: 02/25/25	Revision: 1
Time: 08:00	Sheet 2 of 7
File: ArbPwrBoost_P2.SchDoc	Engineer: Hab S Collector

-20V MONITOR

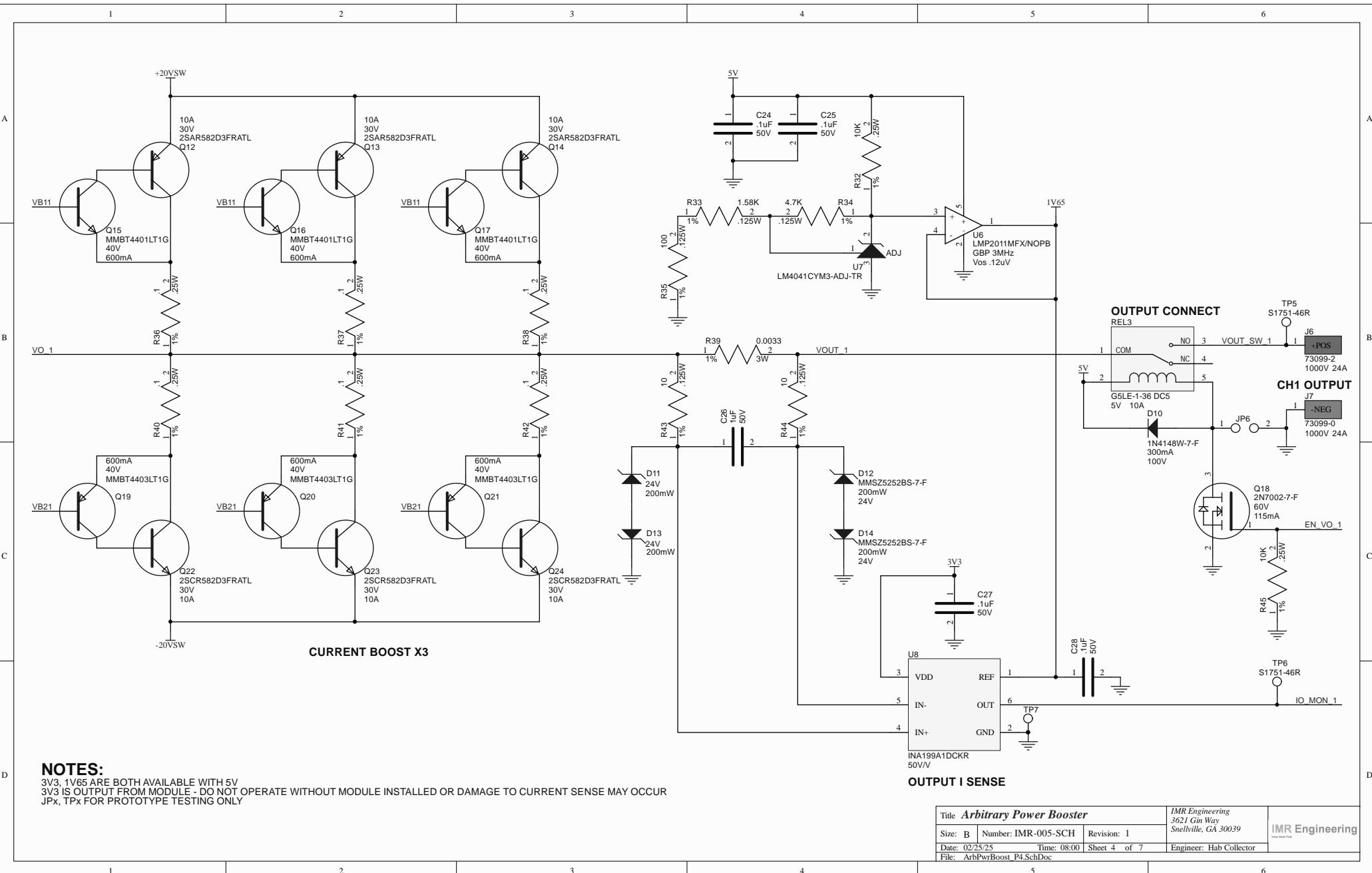


1 2 3 4 5 6

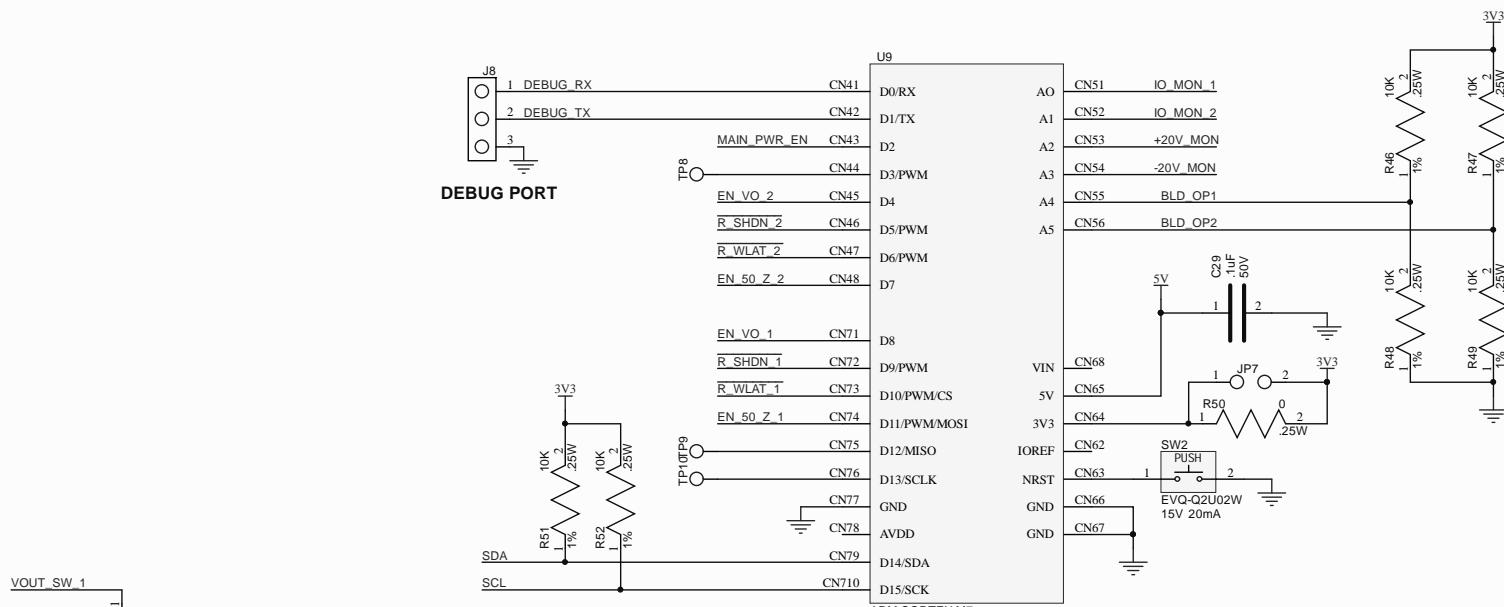
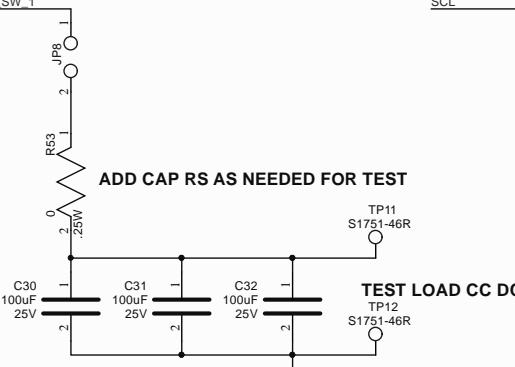
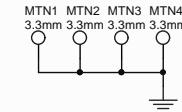
CH1 INPUT**INPUT PROTECTION****INPUT ATTENUATE****INPUT IMPEDANCE****NOTES:**

PULL DOWN U4.A0 FOR CH1 ADDRESS
 PULL UP U11.A0 FOR CH2 ADDRESS
 ± BYPASS CAPS FOR U3, U4, U5
 JPx, TPx FOR PROTOTYPE TESTING ONLY

Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Sneville, GA 30039	IMR Engineering
Size: B	Number: IMR-005-SCH	Revision: 1
Date: 02/25/25	Time: 08:00	Sheet 3 of 7
File: ArbPwrBoost_P3.SchDoc		Engineer: Hab Collector

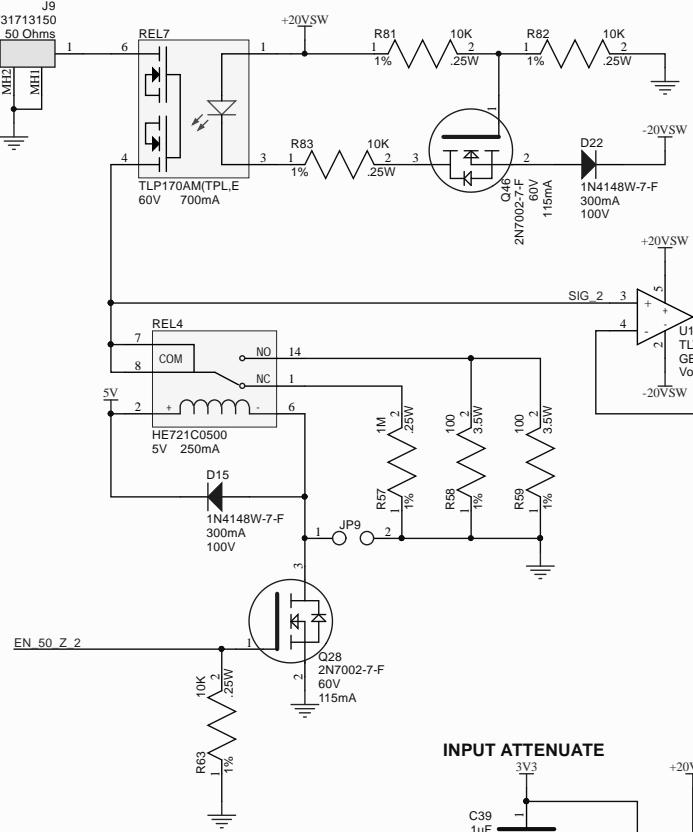
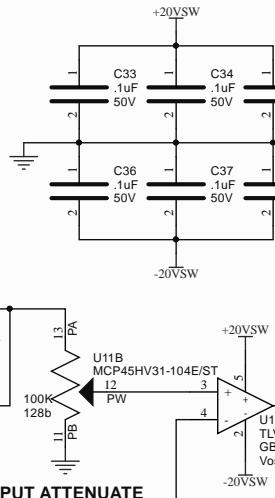
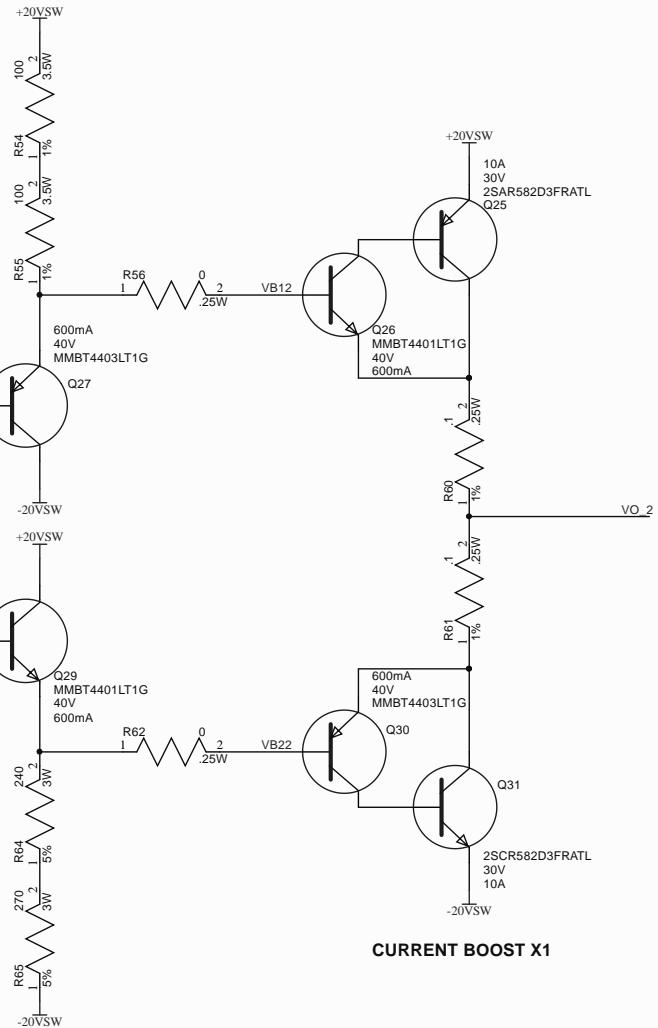
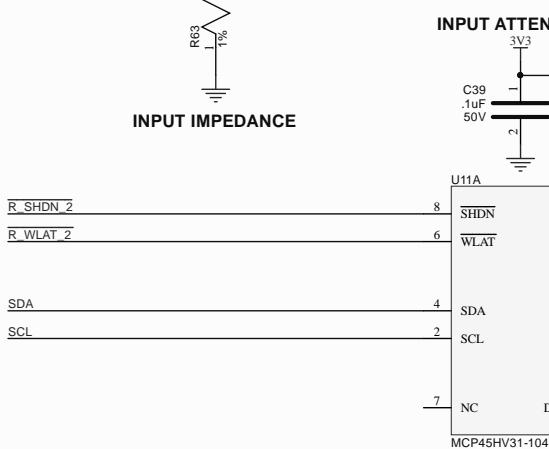


A

**MOUNTING HOLES****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
CHANNEL 1 IS MANDATORY, CHANNEL 2 IS A BUILD OPTION
BLD_OP1, 2 ARE HARDWARE FIRMWARE BUILD / CONFIG OPTIONS TBD

Title: Arbitrary Power Booster	IMR Engineering
Size: B	Number: IMR-005-SCH
Date: 02/25/25	Revision: 1
File: ArbPwrBoost_P5.SchDoc	Time: 08:00 Sheet 5 of 7 Engineer: Hab Collector

CH2 INPUT**INPUT PROTECTION****BYPASS CAPS****INPUT ATTENUATE**

3

4

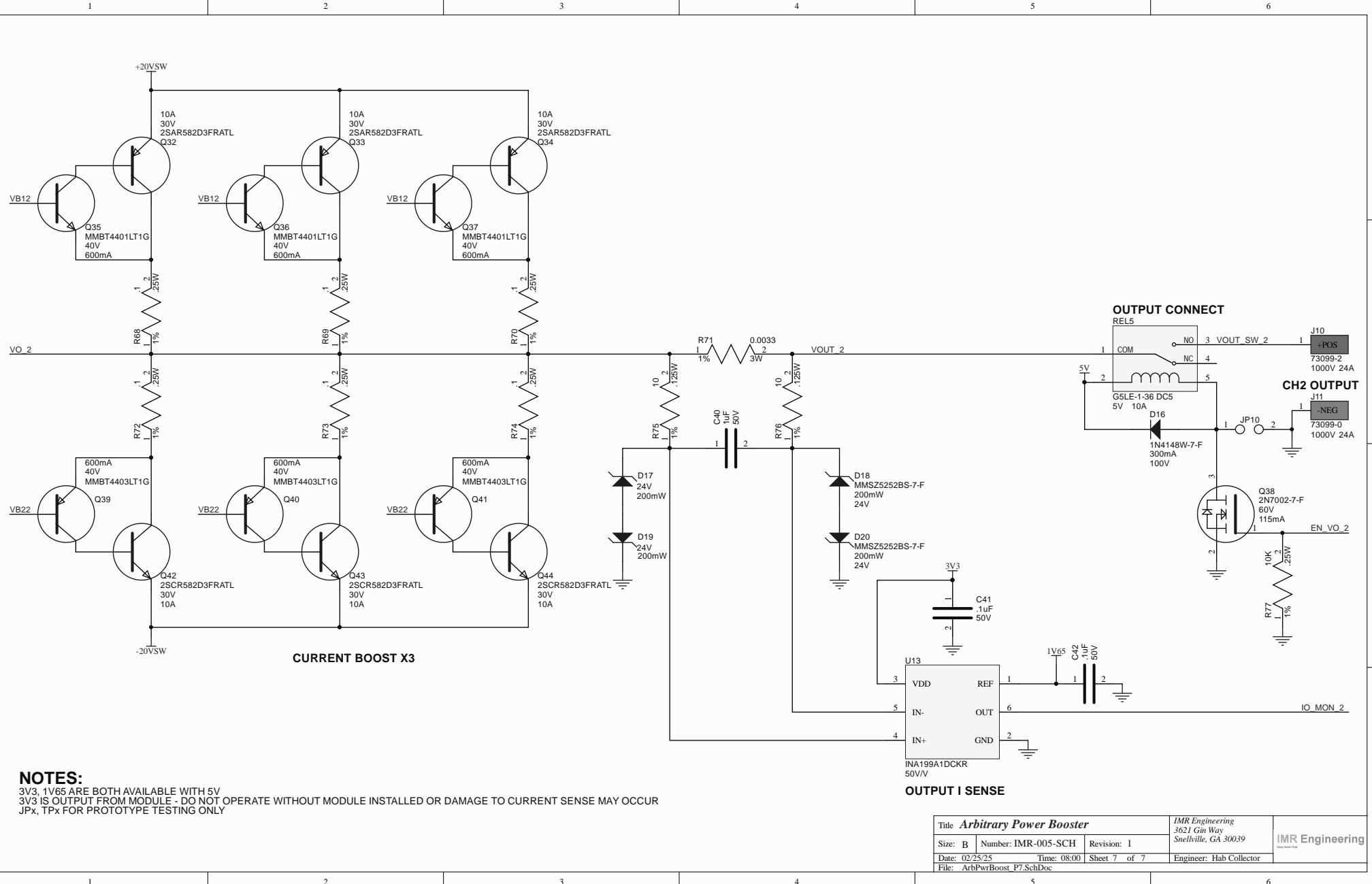
NOTES:

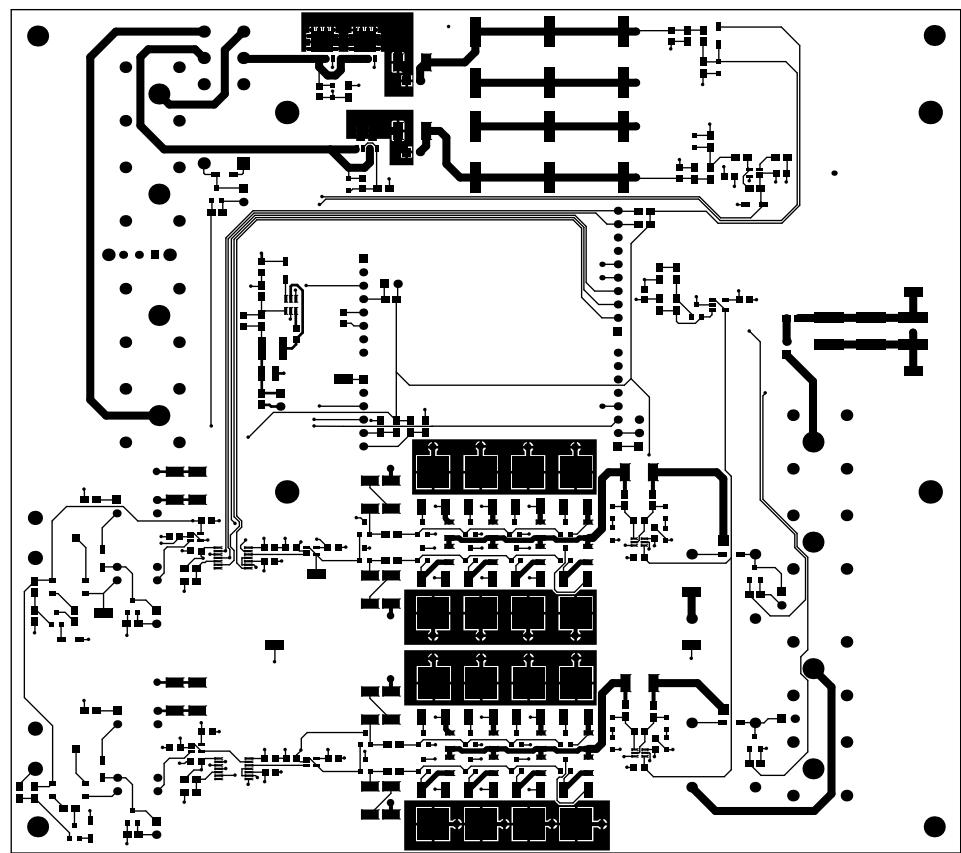
PULL DOWN U4.A0 FOR CH1 ADDRESS
 PULL UP U11.A0 FOR CH2 ADDRESS
 ± BYPASS CAPS FOR U10, U11, U12
 JPx, TPx FOR PROTOTYPE TESTING ONLY

Title: Arbitrary Power Booster	IMR Engineering 3621 Gin Way Sneville, GA 30039
Size: B	Number: IMR-005-SCH
Date: 02/25/25	Revision: 1
File: ArbPwrBoost_P6.SchDoc	Time: 08:00 Sheet 6 of 7 Engineer: Hab Collector

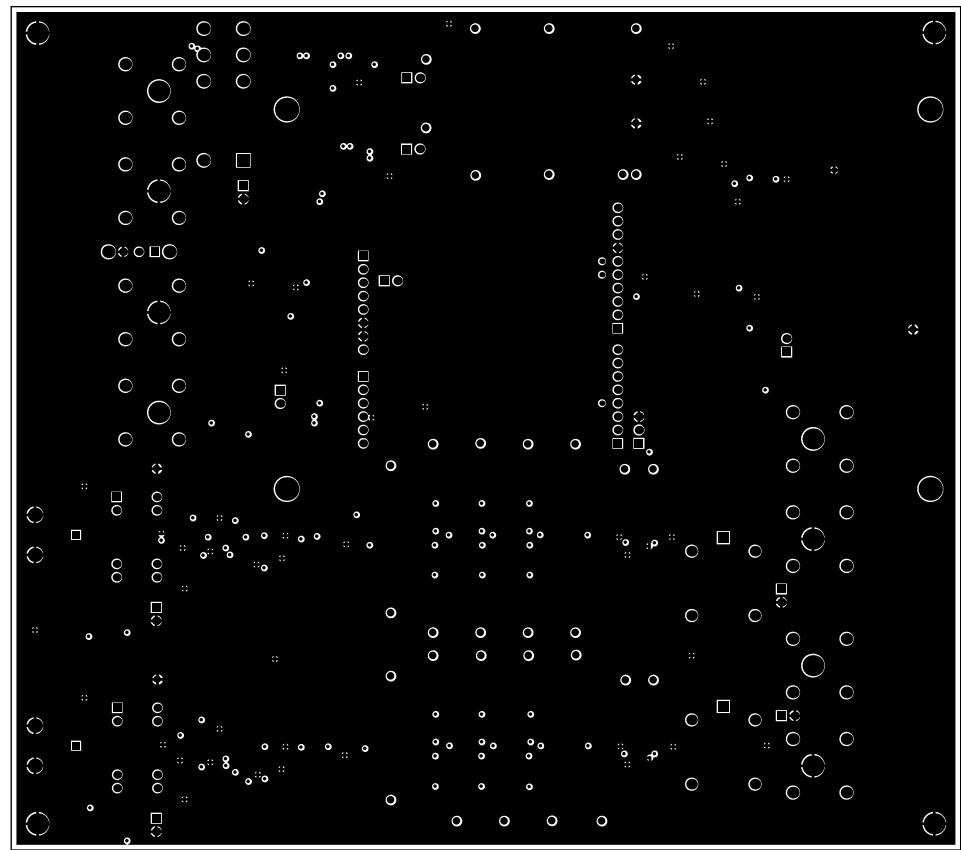
5

6

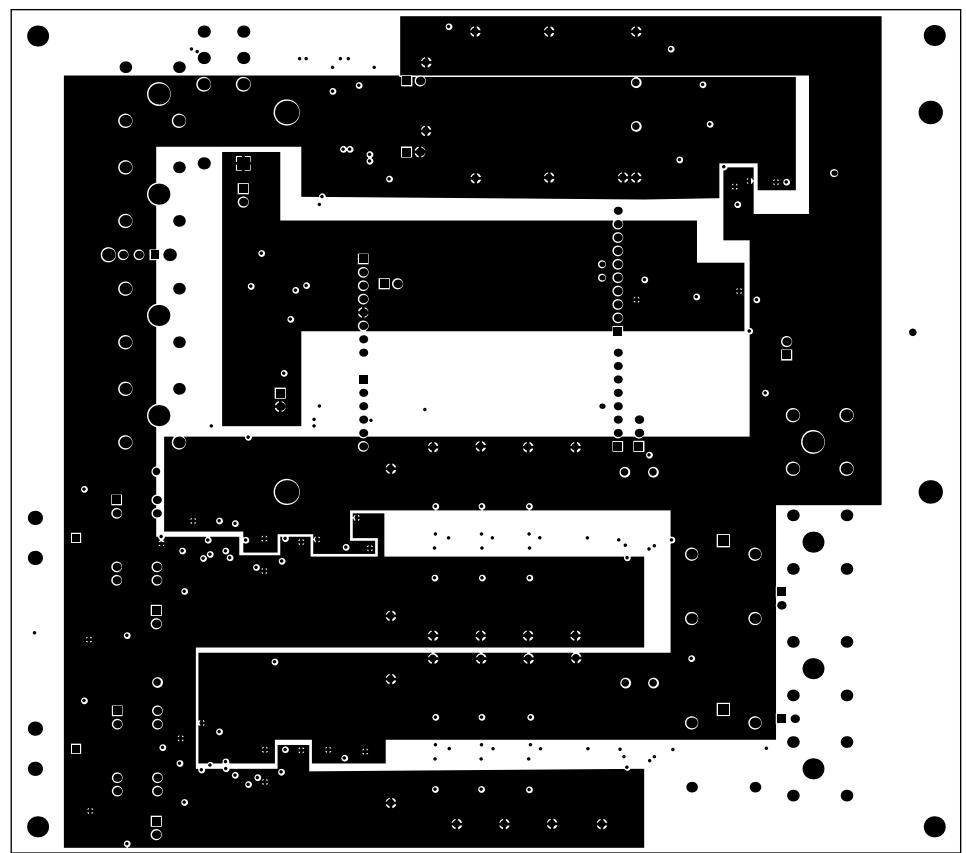




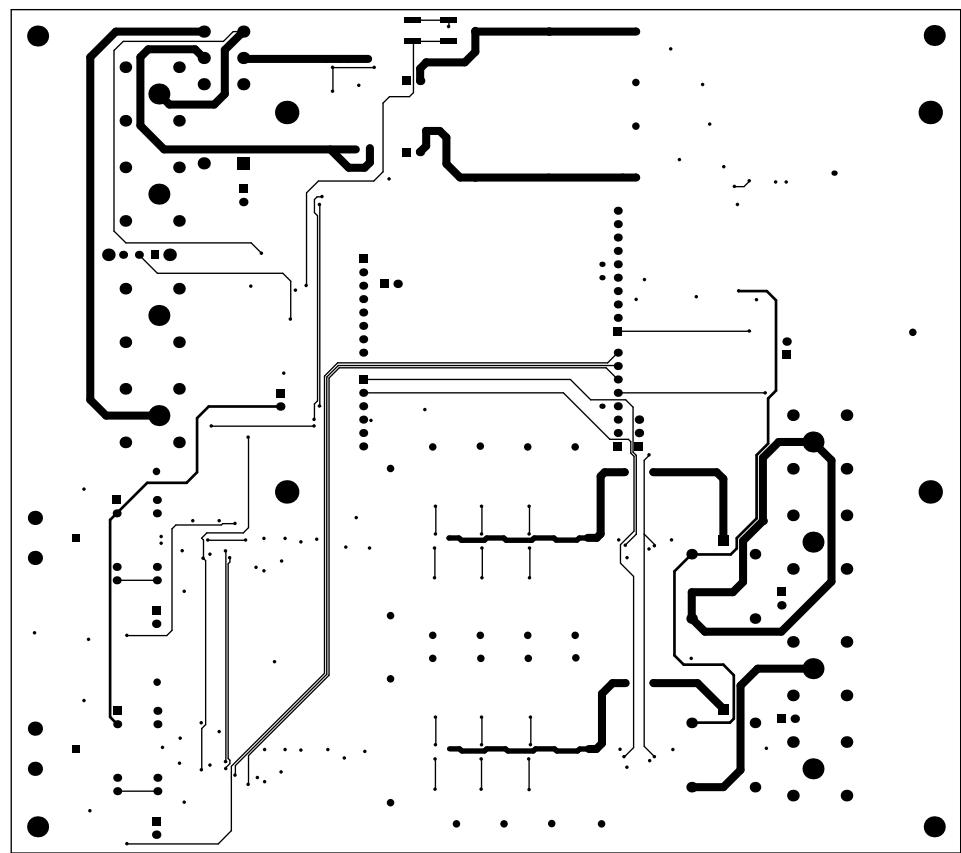
TOP



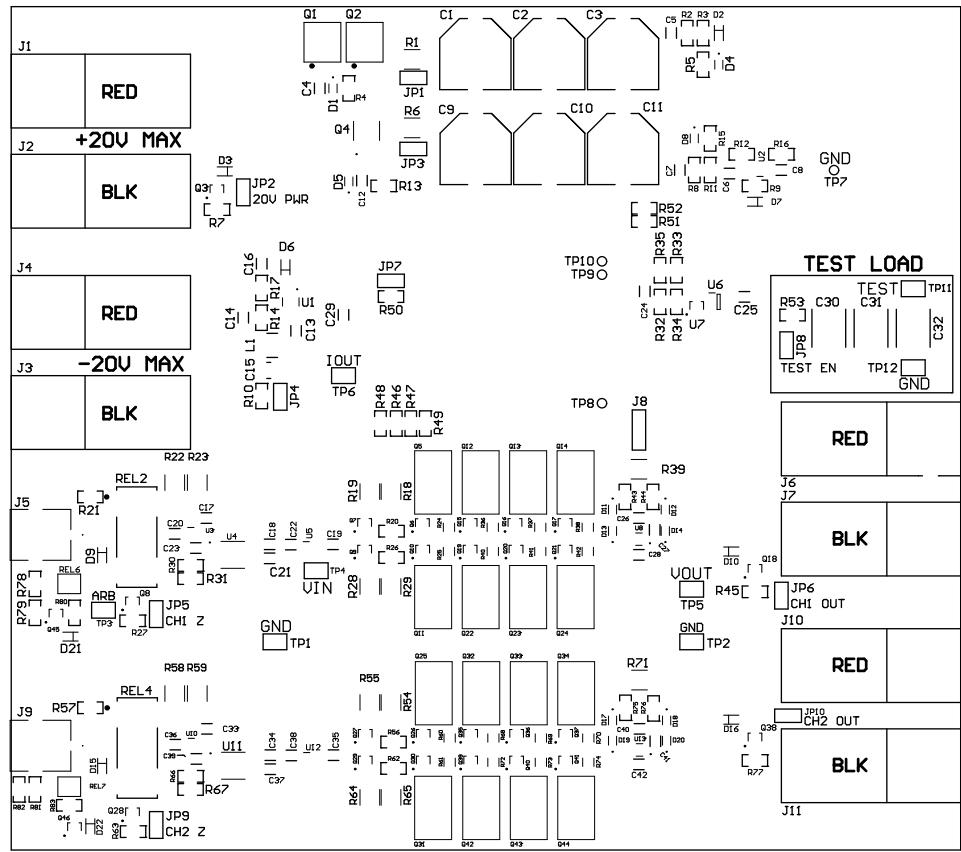
SIGNAL LAYER 1

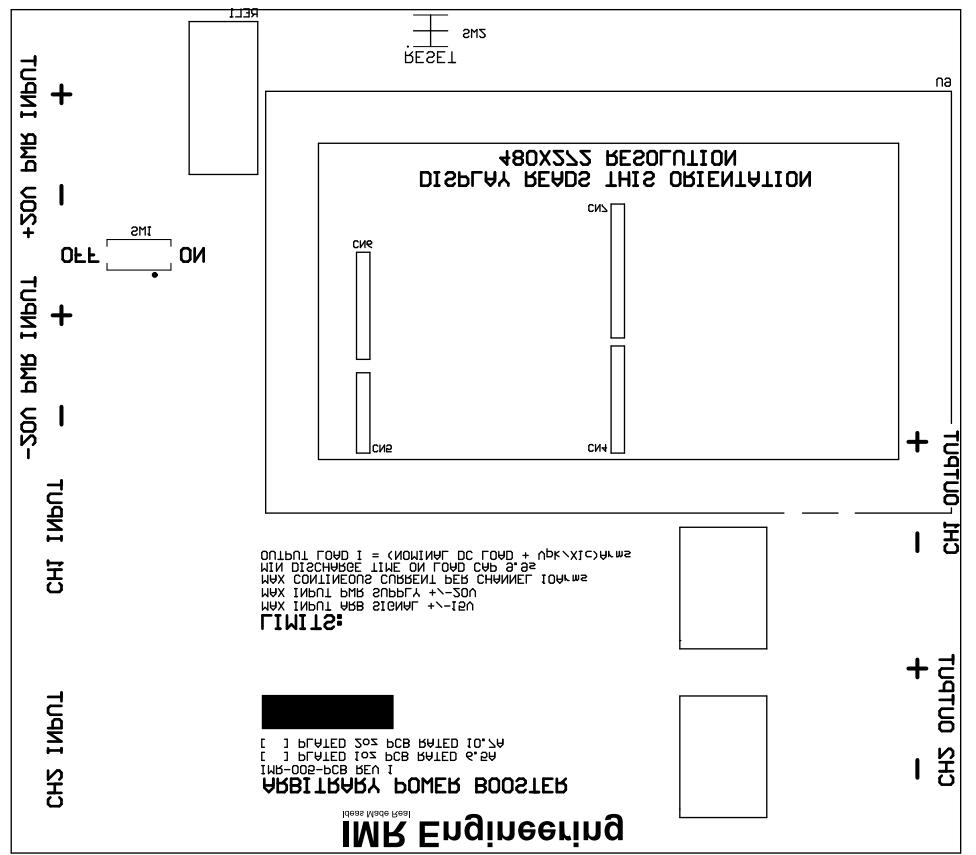


SIGNAL LAYER 2

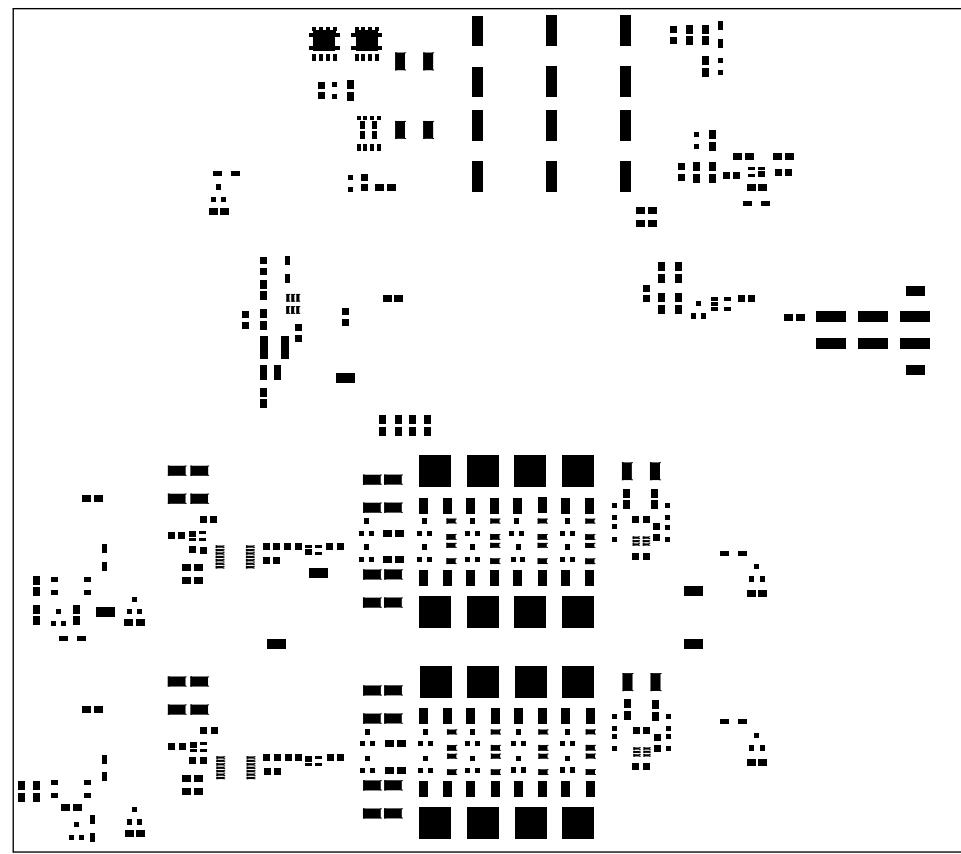


BOTTOM

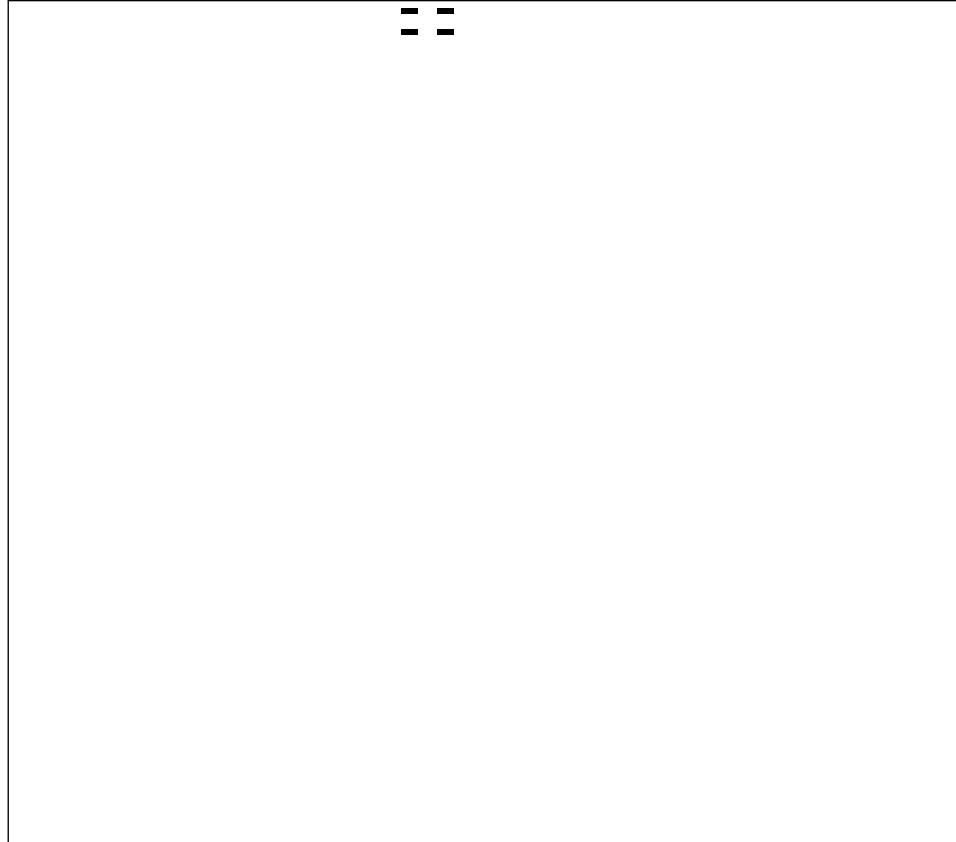




BOTTOM SILK

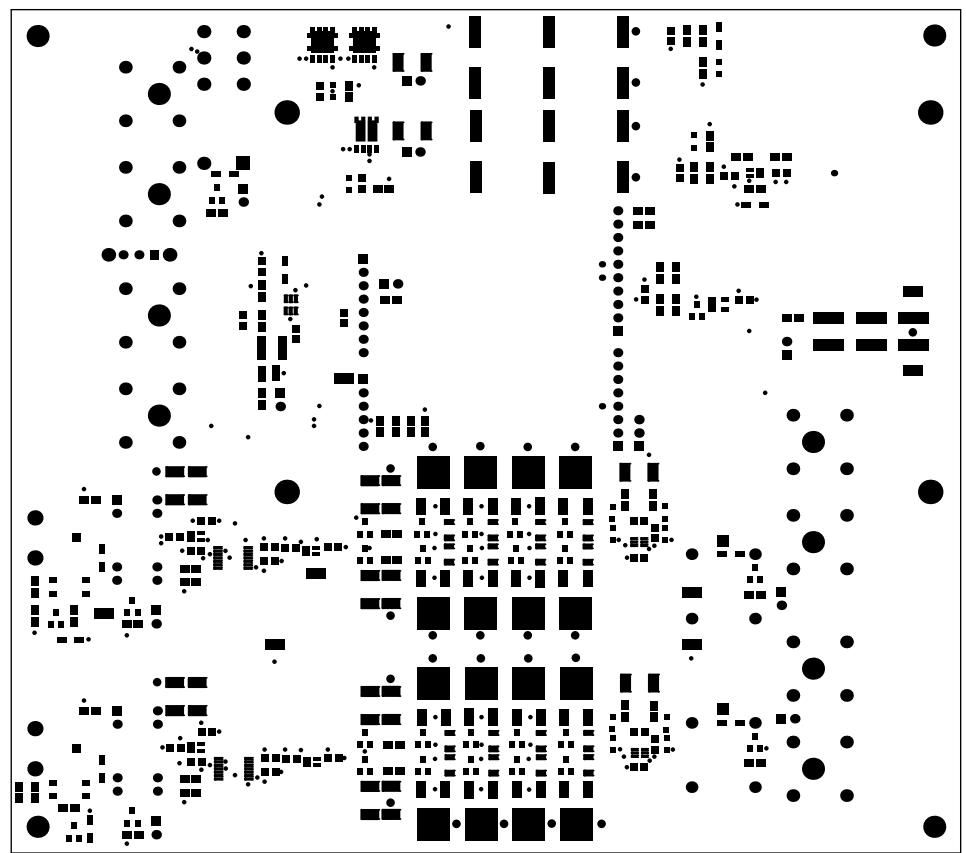


TOP PM

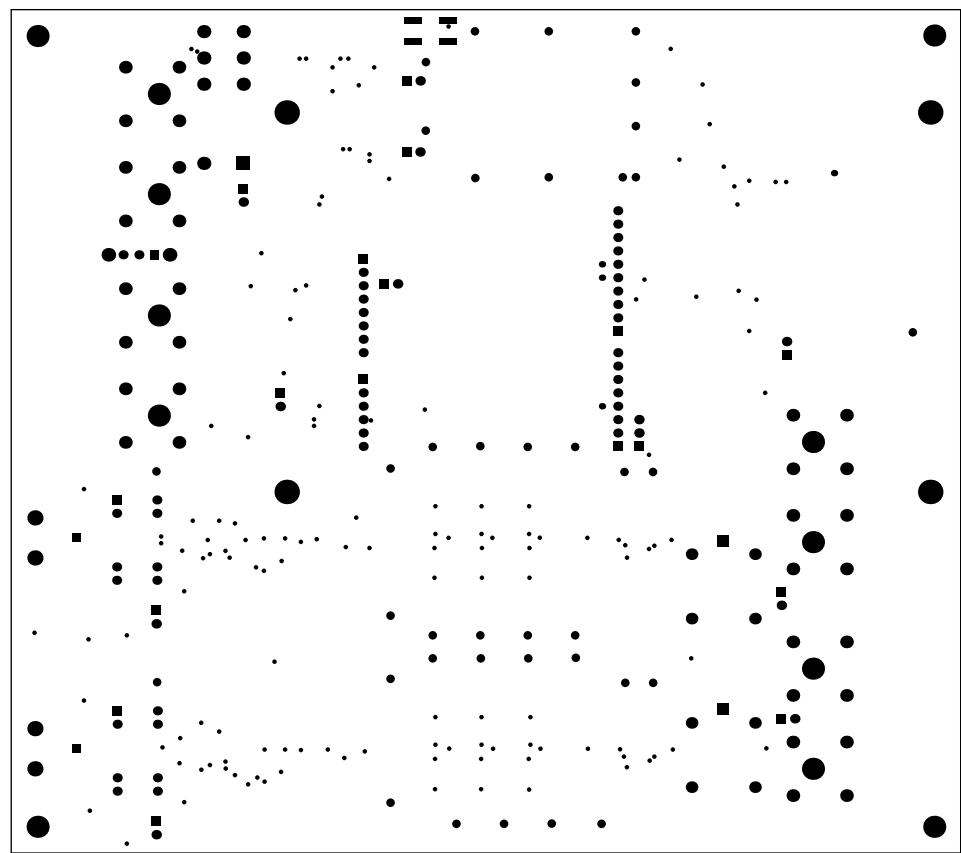


— —

BOTTOM PM



TOP SM

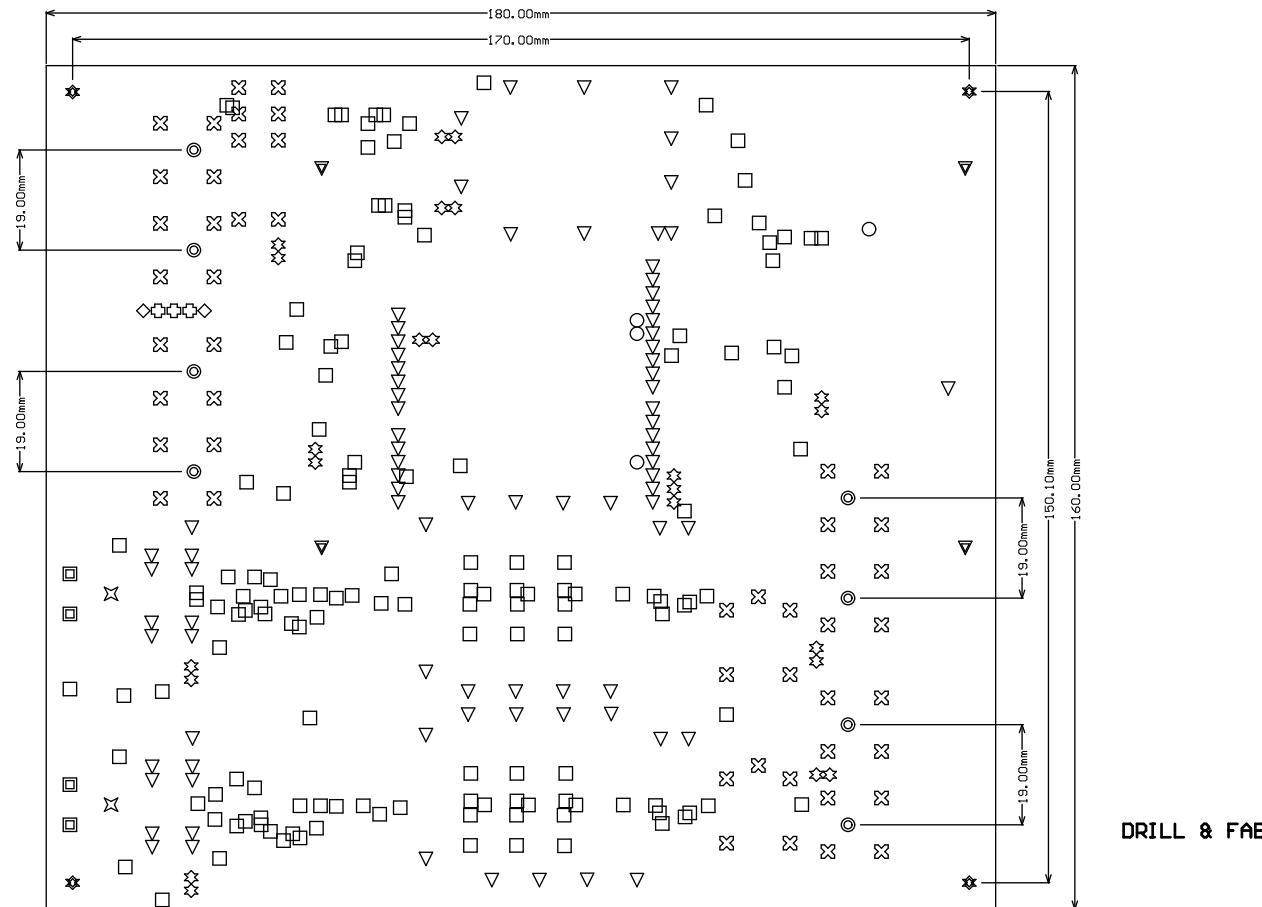


BOTTOM SM

Symbol	Hit Count	Finished Hole Size	Plated	Hole Type
x	2	0.920mm (.36.22mil)	PTH	Round
◊	2	1.590mm (.62.60mil)	PTH	Round
○	3	1.010mm (.39.76mil)	PTH	Round
○	4	0.508mm (.20.00mil)	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 (.86.61mil)	PTH	Round
◊	23	0.900mm (.35.43mil)	PTH	Round
☒	50	1.300mm (.51.18mil)	PTH	Round
▽	86	0.762mm (.30.00mil)	PTH	Round
□	147	0.381mm (.15.00mil)	PTH	Round
337 Total				

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

+/- 20V 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 94VO

Cu WEIGHT:
 OUTER LAYER: 1oz
 INNER LAYER: NA

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)

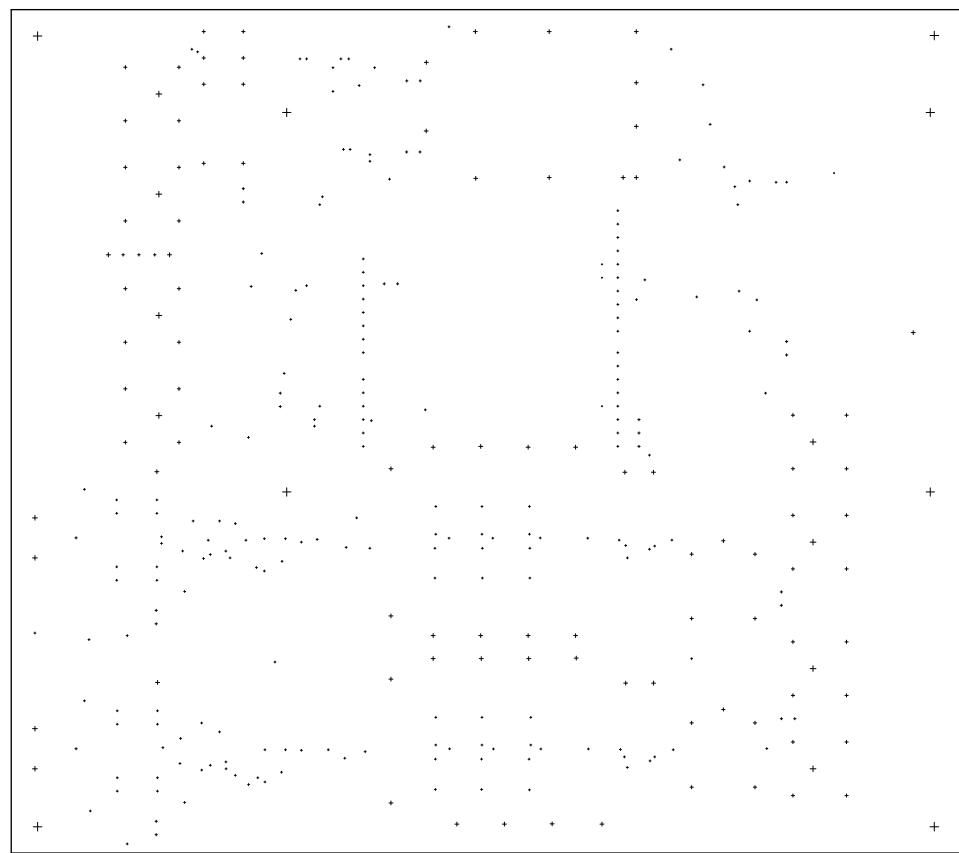
PCB ELECTRICAL TEST
 TESTED TO GERBER DATA
 PURCHASE ORDER TO OVERRIDE

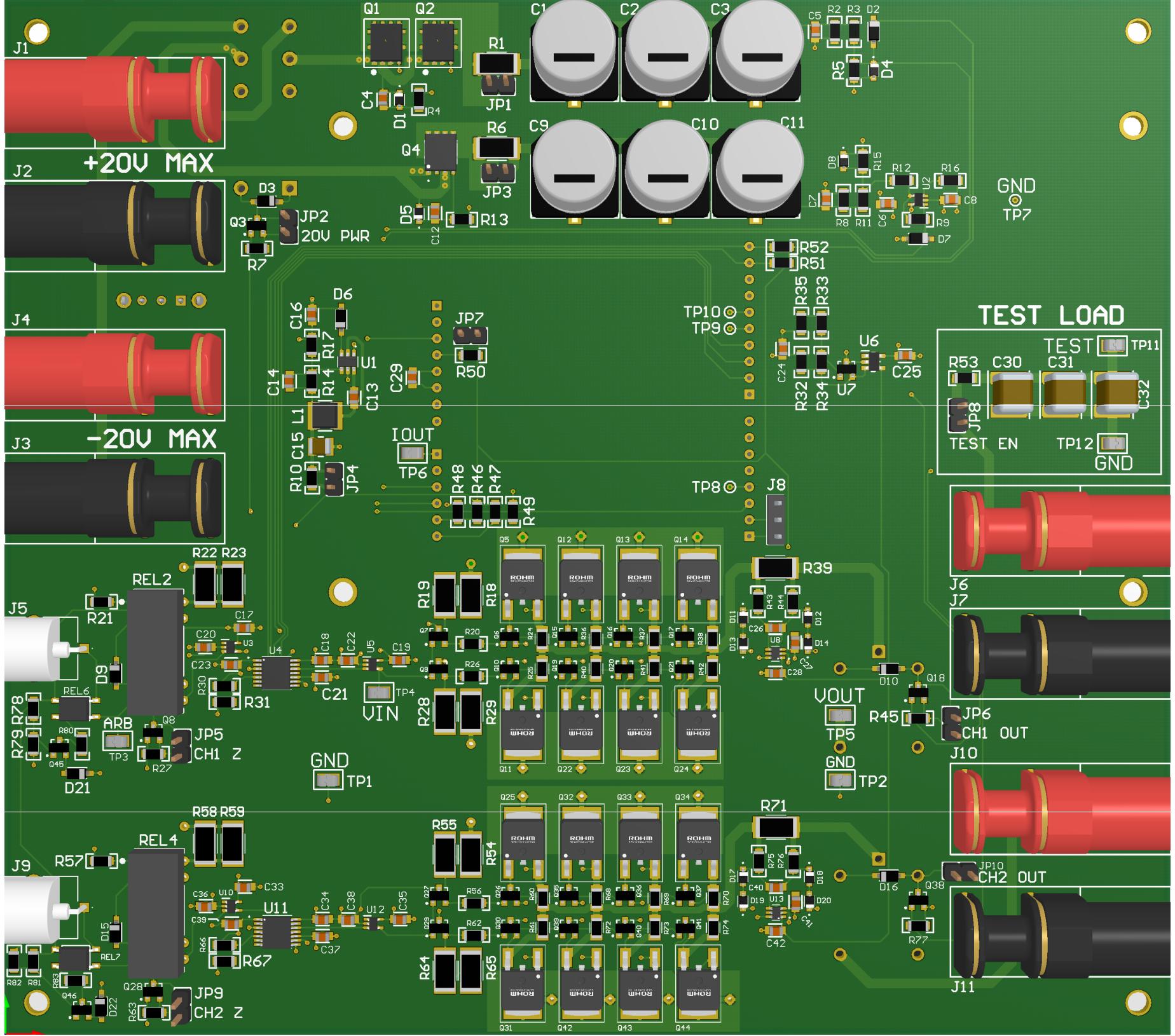
HOLE DIAMETER TOLERANCE:
 PLATED HOLE TOLERANCE: 0.076mm (.3MIL)
 NON PLATED HOLE TOLERANCE: 0.076mm (.3MIL)

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.PjrPcb
 Project: Arb_Power_Booster.PjrPcb
 Variant: None

Company Part Number: IMR-005-SCH
 PCB Revision: 1
 Engineer: Hab S Collector

Report Date: 3/1/2025
 Print Date: 01-Mar-25

7:31:07 AM
 7:31:28 AM

IMR Engineering
 Ideas Made Real

#	Quantity	LibRef	Description	Designator	MFG	MFG PN	Supplier 1	Supplier Part Number 1	Unit Price	TOTAL
1	6	CAP_SMD_330UF_50V_ALE	CAP ALE 330UF 20% 50V SMD	C1, C2, C3, C13, C10, C11	EV-FK1H31Q	Panasonic Electric	DigiKey	PCE3475CT-ND	.41	\$8.46
2	3	CAP_SMD_10UF_50V_0805	CAP CER 10UF 50V X5R 0805	C4, C12, C16	Murata Electronics	GRM21B61H106KE43L	DigiKey	490-18663-1-ND	.28	\$0.84
3	26	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, C27, C28, C29, C33, C34, C35, C36, C37, C38, C39, C41, C42	KYOCERA AVX	KGM21NR71H104KT	DigiKey	478-KGM21NR71H104KTCT-ND	.1	\$2.60
4	1	CAP_SMD_68PF_50V_0805	CAP CER 68PF 50V X7R 0805	C14	KEMET	O0805C68K05RACAUTO	DigiKey	399-C0805C68K05RACAUTOCT-ND	.24	\$0.24
5	1	CAP_SMD_47UF_16V_1210	CAP CER 47UF 50V X7R 1210	C15	Murata Electronics	GRM23ER047U6ME20L	DigiKey	490-18871-ND	.28	\$0.28
6	2	CAP_SMD_1.0UF_50V_0805	CAP CER 1UF 50V X7R 0805	C26, C40	KYOCERA AVX	06055C105K4T2A	DigiKey	478-KAM21KR71H105KUCLT-ND	.27	\$0.54
7	3	CAP_SMD_100UF_25V_SMD	CAP CER 100UF 25V X7S SMD	C30, C31, C32	Murata Electronics	KCM55WC71E107MH-113L	DigiKey	490-KCM55WC71E107MH13LCLT-ND	.568	\$17.04
8	2	DIODE_ZENER_MMSZ5239BS-7-F	DIODE ZENER 9.1V 200MW SO0323	D1, D5	Diods Inc	MMSZ5239BS-7-F	DigiKey	MMSZ5239BS-FDICT-ND	.18	\$0.36
9	9	DIODE_IN4148W-7-F	RELAY REED SPDT 250mA 5V	D2, D3, D7, D9, D10, D15, D16, D21, D22	Diods Inc	1N4148W-7-F	DigiKey	1N4148W-FDICT-ND	.16	\$1.44
10	1	DIODE_ZENER_MMSZ5226BS-7-F	DIODE ZENER 3.3V 200MW SO0323	D4	Diods Inc	MMSZ5226BS-7-F	DigiKey	MMSZ5226BS-FDICT-ND	.15	\$0.15
11	1	DIODE_SCHOTTKY_1N5819HW-7-F	DIODE SCHOTTKY 40V 1A SOD123	D6	Diods Inc	1N5819HW-7-F	DigiKey	1N5819HW-FDICT-ND	.25	\$0.25
12	1	DIODE_ZENER_BZT52C2V0S-7-F	DIODE ZENER 2V 200MW SO0323	D8	Diodes Inc	BZT52C2V0S-7-F	DigiKey	BZT52C2V0S-7FDICT-ND	.15	\$0.15
13	8	DIODE_ZENER_MMSZ5252BS-7-F	DIODE ZENER 24V 200MW SO0323	D11, D12, D13, D14, D17, D18, D19, D20	Diodes Inc	MMSZ5252BS-7-F	DigiKey	MMSZ5252BS-FDICT-ND	.12	\$0.96
14	4	CONN_PA_NOMA_73099-2	CONN 4mm Banana Socket Right Angle PCB RED	J1, J4, J6, J10	Promona	73099-2	DigiKey	501-73099-2-ND	10.39	\$41.56
15	4	CONN_PA_NOMA_73099-0	CONN 4mm Banana Socket Right Angle PCB BLK	J2, J3, J7, J11	Promona	73099-0	DigiKey	501-73099-0-ND	10.39	\$41.56
16	2	CONN_MOLEX_0731713150	CONN BNC 1.0H 50A OH MCPB	J5, J9	Molex	0731713150	DigiKey	WM20430-ND	1.40	\$2.80
17	1	CONN_HEADER_3P_100ML_VERT	CONN HEADER VERT 3POS 2.54MM	J8	Sullins Connector Solutions	PREC003SFAN-RC	Digi-Key	S1212EC-03-ND	.07	\$0.07
18	10	CONN_JUMPER_2P_100ML_VERT	CONN HEADER VERT 2POS 2.54MM	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10	Sullins Connector Solutions	PREC002SFAN-RC	Digi-Key	S1212EC-02-ND	.07	\$0.70
19	1	INDUCTOR_SR4018TA-6R8M	FIXED IND 6.8UH 1.7A 98 MOHM SMD	L1	Bourns Inc.	SRN4018TA-6R8M	DigiKey	SRN4018TA-6R8MCT-ND	.48	\$0.48
20	2	MOSFET_PCH_DM86050SPS-13	MOSFET P-CH 60V 5.7A PWRD860-8	Q1, Q2	Diods Inc	DM86050SPS-13	DigiKey	DM86050SPS-13DICT-ND	1.07	\$2.14
21	7	MOSFET_NCH_2N7002-7-F	MOSFET N-CH 60V 115mA SOT23-3	Q3, Q8, Q18, Q28, Q38, Q45, Q46	Diodes Inc	2N7002-7-F	DigiKey	2N7002-FDICT-ND	.20	\$1.40
22	1	MOSFET_NCH_DMNH6042SPDQ-13	MOSFET NCH 60V 5.7A POWERDI	Q4	Diods Inc	DMNH6042SPDQ-13	DigiKey	DMNH6042SPDQ-13DICT-ND	.36	\$1.36
23	8	BJT_PNP_2SA582DFRATL	TRANS PNP 30V 5.7A TO-252	Q5, Q12, Q13, Q14, Q25, Q32, Q33, Q34	Rohm Semiconductor	2SA582DFRATL	DigiKey	846-2SA582DFRATLCT-ND	.59	\$12.72
24	10	BJT_NPN_MMBT4401LT1G	TRANS NPN 40V 0.6A SOT23-3	Q6, Q8, Q15, Q16, Q17, Q26, Q29, Q35, Q36, Q37	On Semiconductor	MBBT4401LT1G	DigiKey	MBBT4401LT1GOSCT-ND	.13	\$1.30
25	10	BJT_PNP_MMBT4403LT1G	TRANS PNP 40V 0.6A SOT23-3	Q7, Q10, Q19, Q20, Q21, Q27, Q30, Q39, Q40, Q41	On Semiconductor	MBBT4403LT1G	DigiKey	MBBT4403LT1GOSCT-ND	.13	\$1.30
26	8	BJT_NPN_2SCR582D3FRATL	TRANS NPN 30V 10A TO-252	Q11, Q22, Q23, Q24, Q31, Q42, Q43, Q44	Rohm Semiconductor	2SCR582D3FRATL	DigiKey	846-2SCR582D3FRATLCT-ND	1.76	\$14.08
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	27	RES_SMD_10K_0805_1/4W_1%	RES SMD 10K OHM 1% 1/4W 0805	R2, R3, R7, R8, R11, R16, R27, R30, R31, R32, R45, R46, R47, R48, R49, R51, R52, R63, R66, R67, R77, R79, R80, R81, R82, R83	Yageo	RC0805FR-7W10KL	DigiKey	13-RC0805FR-7W10KLCT-ND	.10	\$2.70
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_18W_1%	RES SMD 2.1K OHM 1% 18W 0805	R9	Yageo	RC0805FR-072K1L	DigiKey	311-2.10KCRCT-ND	.1	\$0.10
32	7	RES_SMD_0_0805_1/8W_1%	RES SMD 0 OHM 1% 1/8W 0805	R10, R20, R26, R50, R53, R56, R62	Yageo	RC0805JR-070RL	DigiKey	311-0.0A0RCT-ND	.1	\$0.70
33	1	RES_SMD_1.0K_0805_18W_1%	RES SMD 1.0K OHM 1% 18W 0805	R12	Yageo	RC0805FR-071KL	DigiKey	311-1.00KCRCT-ND	.1	\$0.10
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	8	RES_SMD_100_0805_3.5W_1%	RES SMD 100 OHM 1% 3.5W 2512	R18, R19, R22, R23, R54, R55, R58, R59	Omnite	ALN2512F100RE-1	DigiKey	273-ALN2512F100RE-1CT-ND	1.50	\$12.00
37	2	RES_SMD_1M_0805_1/4W_1%	RES SMD 1K OHM 1% 1/4W 0805	R21, R67	Yageo	RC0805FR-7W11ML	DigiKey	13-RC0805FR-7W11MLCT-ND	.10	\$0.20
38	16	RES_SMD_0_1206_1/4W_1%	RES SMD 0 OHM 1% 1/4W 1206	R24, R25, R36, R37, R38, R40, R41, R42, R60, R61, R68, R69, R70, R72, R73, R74	Yageo	311-0.1LWCT-ND	DigiKey	311-100KCRCT-ND	.45	\$7.20
39	2	RES_SMD_240_2512_3W_5%	RES 240 OHM 5% 3W 2512	R28, R64	Yageo	RC2512JK-07240RL	DigiKey	13-RC2512JK-07240RLCT-ND	.28	\$0.56
40	2	RES_SMD_270_2512_3W_5%	RES 270 OHM 5% 1W 2512	R29, R65	Yageo	RC2512JK-07270RL	DigiKey	13-RC2512JK-07270RLCT-ND	.21	\$0.42
41	1	RES_SMD_1.58K_0805_1/8W_1%	RES 1.58K OHM 1% 1/8W 0805	R33	Yageo	RC0805FR-071K58L	DigiKey	311-1.58KCRCT-ND	.1	\$0.10
42	1	RES_SMD_4.7K_0805_18W_1%	RES 4.7K OHM 1% 18W 0805	R34	Yageo	RC0805FR-134K7L	DigiKey	13-RC0805FR-134K7LCT-ND	.1	\$0.10
43	1	RES_SMD_100_0805_0.1W_1%	RES 100 OHM 1% 0.1W 0805	R35	Yageo	RC0805FR-07100RL	DigiKey	311-100KCRCT-ND	.1	\$0.10
44	2	RES_SMD_0_0033_2512_3W_1%	RES SMD 0.0033 OHM 1% 3W 2512	R39, R71	Vishay Dale	WLSL2512L300PFA	DigiKey	541-10151-1-ND	1.23	\$2.46
45	4	RES_SMD_10_0805_1/8W_1%	RES 10 OHM 1% 1/8W 0805	R43, R44, R75, R76	Yageo	RC0805FR-1310RL	DigiKey	13-RC0805FR-1310RLCT-ND	.1	\$0.40
46	1	RELAY_AZ733-2A-E-SDE	RELAY REED SPDT 250mA 5V	REL1	American Zettler	AZ733-2A-E-SDE	DigiKey	3385-AZ733-2A-E-SDE-nd	2.18	\$2.18
47	2	RELAY_H721C0500	RELAY REED SPDT 250mA 5V	REL2, REL4	Littlefuse	H721C0500	DigiKey	HE112-ND	3.77	\$7.54
48	2	RELAY_GSLE-1-36DCS	RELAY GEN PURPOSE SPDT 10A 5V	REL3, REL5	Omron	GSLE-1-36DCS	DigiKey	G5LE-1-36DCS-ND	1.24	\$2.48
49	2	RELAY_TLP170AM/TPLE	SSR RELAY SPST-NO 700mA 6V	REL6, REL7	Toshiba	TLP170AM/TPLE	DigiKey	264-TLP170AM/TPLECT-ND	1.33	\$2.66
50	1	SWITCH_SWL-12689-4A-N-D	SWITCH SLIDE SPDT 300mA 50V	SW1	Same Sky	SLW-12689-4A-N-D	DigiKey	2223-SLW-12689-4A-N-D-ND	.48	\$0.48
51	1	SWITCH_EVQ-C2U02W	SWITCH TACTILE SPST-NO 0.02A 15V	SW2	American Zettler	EVQ-C2U02W	DigiKey	P12945CT-ND	.25	\$0.25
52	8	CONN_TEST_POINT_S1751-46R	PCB TEST POINT CONNECT	TP1, TP2, TP3, TP4, TP5, TP6, TP11, TP12	Harw In Inc	S1751-46R	Digi-Key	952-1478-1-ND	.28	\$2.24
53	1	IC_TPS54202DDC	IC REG BUCK ADJ DA2, SOT23	U1	Texas Instruments	TPS54202DDC	Digi-Key	296-TPS54202DDCRCT-ND	.97	\$0.97
54	5	OPAMP_TLV1935IDCRK	IC OPAMP/GP3.5MHZ 350uV/C70-5	U2, U3, U5, U10, U12	Texas Instruments	TLV1935IDCRK	DigiKey	296-TLV1935IDCRCT-ND	.49	\$2.45
55	2	IC_MCP16H/31-104EST	IC DGT POT 100KOHM#4128T#14TS50P	U4, U11	Microchip	MCP16H/31-104EST	DigiKey	MCP16H/31-104EST-ND	1.82	\$3.64
56	1	OPAMP_LMP2011MFANOPB	IC OPAMP/GP3MHZ 12uV CIRCUIT SOT23-5	U6	Texas Instruments	LMP2011MFANOPB	DigiKey	LMP2011MFANOPB-ND	2.33	\$2.33
57	1	IC_LM4041CYM-ADJ-TR	IC VREF SHUNT ADJ 0.5% SOT23-3	U7	Microchip	LM4041CYM-ADJ-TR	DigiKey	576-1049-1-ND	.39	\$0.39
58	2	IC_INA199A1DKR	IC CURRENT SENSE 1.5% 50V/V SOT70-6	U8, U13	Texas Instruments	INA199A1DKR	DigiKey	296-7329-1-ND	.45	\$0.90
59	1	MODULE_STM32F746G-DISCO	DISCOVERY STM32 F7 EVAL BRD	U9	ST Microelectronics	STM32F746G-DISCO	DigiKey	497-15680-5-ND	57.50	\$57.50

Approved

Notes

Bill of Cost (Unit Buy): \$268.96