

DEVELOPMENT REFERENCE GUIDE

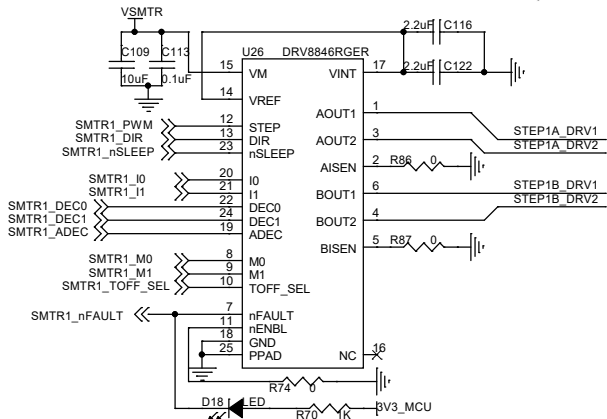
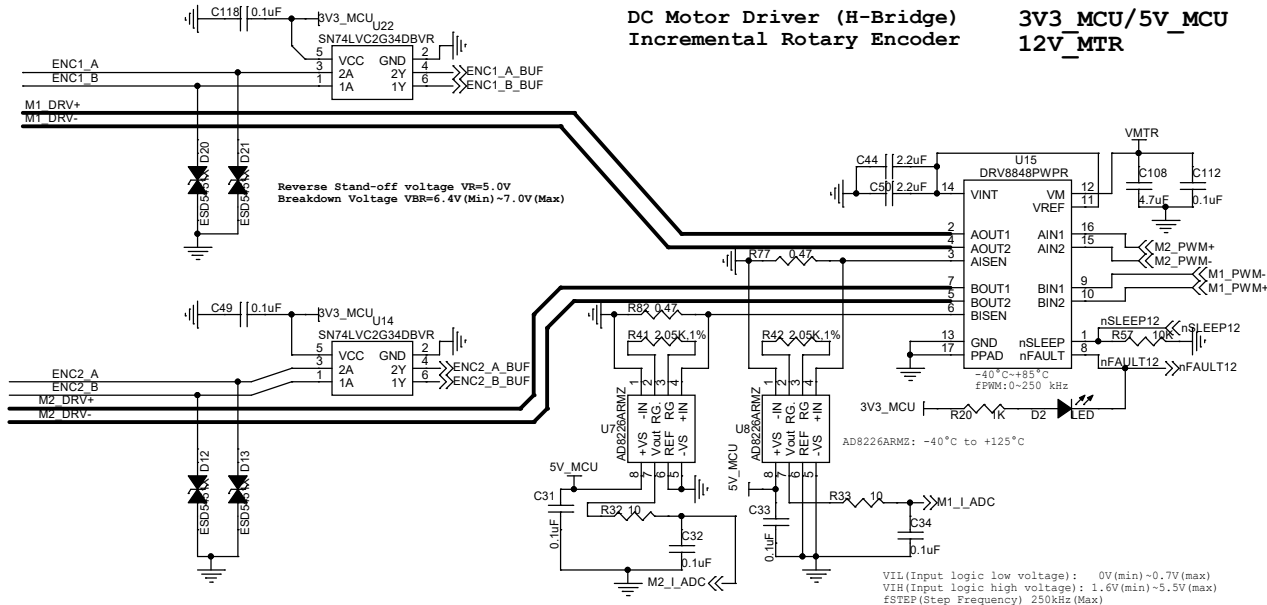
LDV-MTR-A1

DOCUMENT NO. : LDVMTRA121

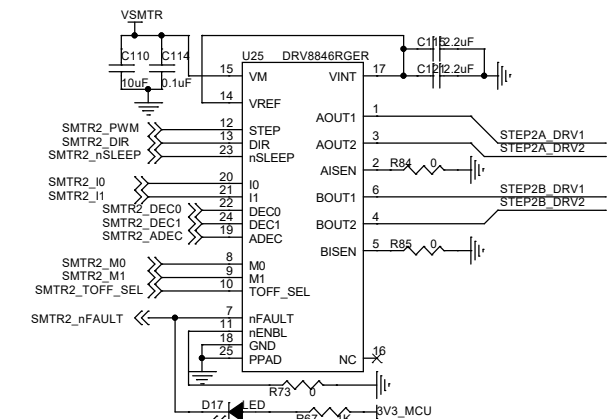
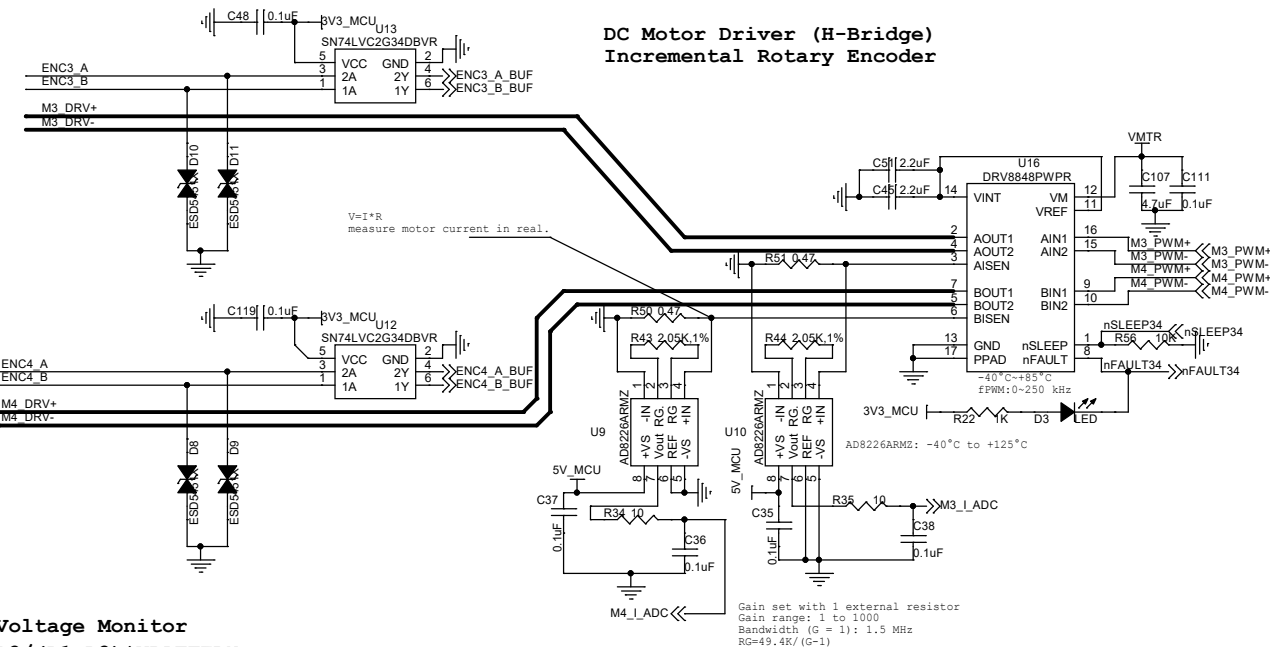
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DC Motor Driver (H-Bridge) Incremental Rotary Encoder

3V3_MCU/5V_MCU
12V_MTR

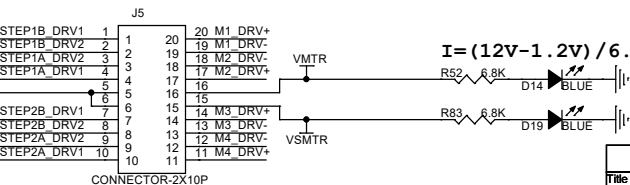
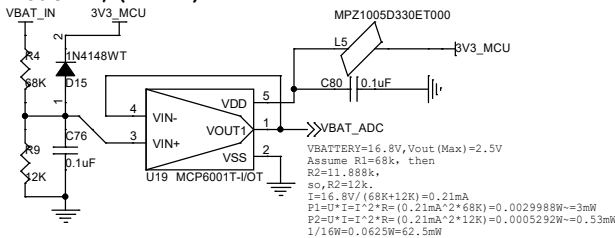


DC Motor Driver (H-Bridge) Incremental Rotary Encoder



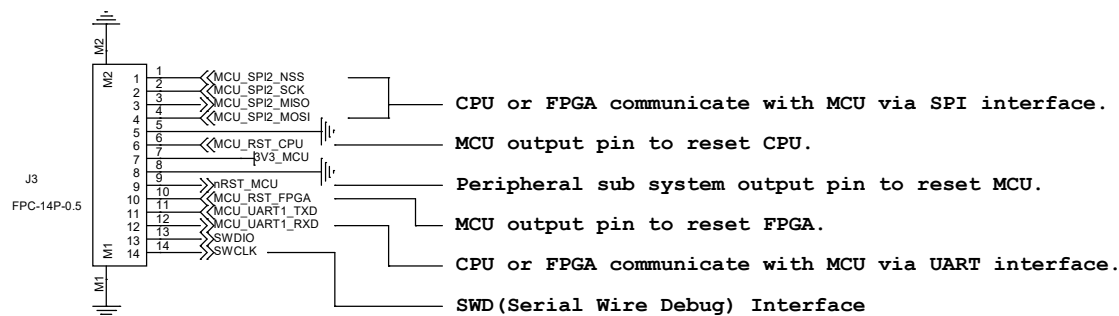
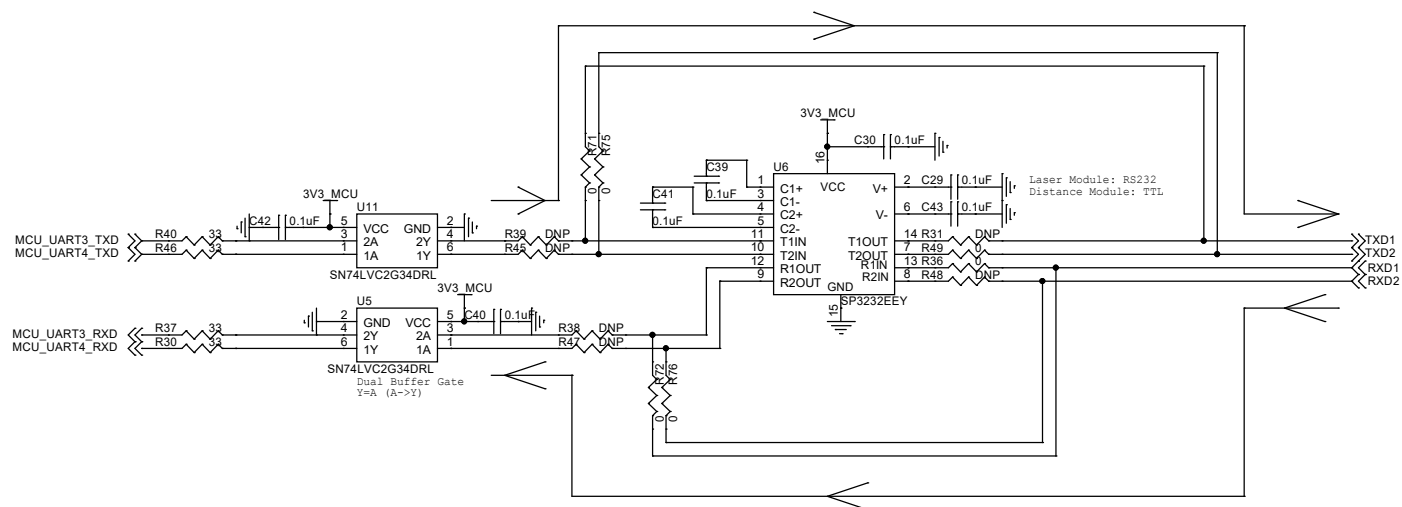
Main Voltage Monitor

Vout=R2/(R1+R2)*VBATTERY



Title			STM32_MOTOR
Size	Document Number	LDVMTA121	
A3	YTELETRICIAN	13522296239	
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When use TTL bypass RS232



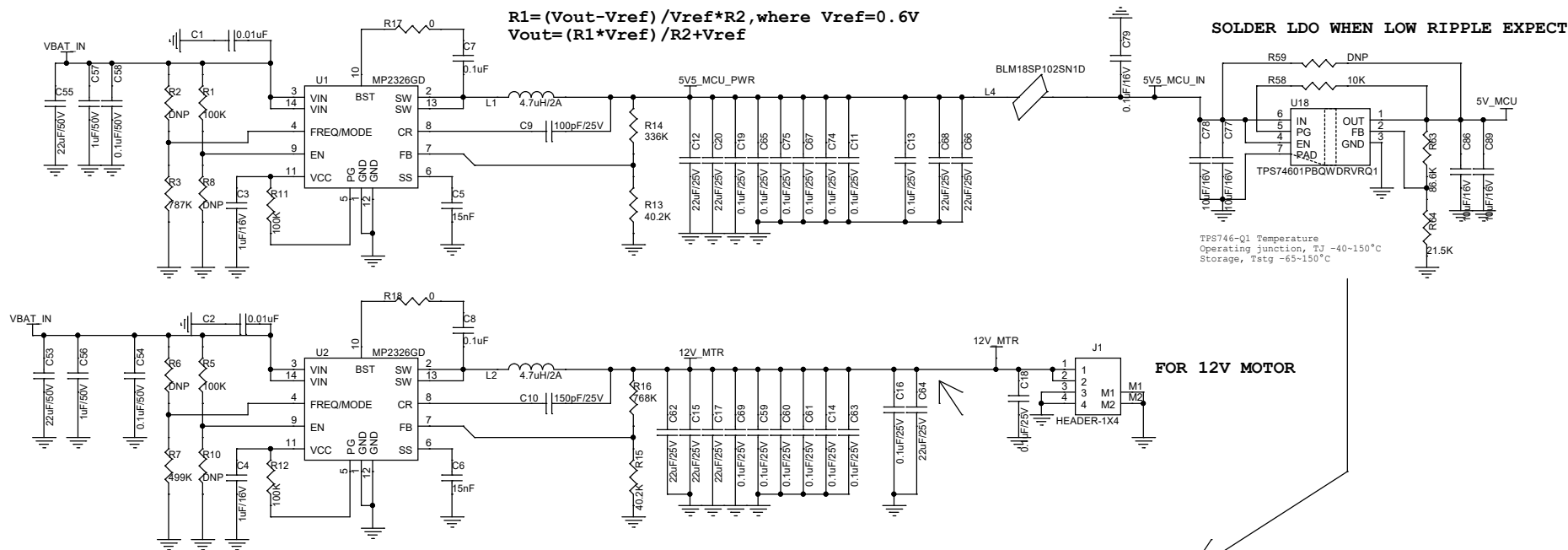
Title		TTL/RS232
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A3	LDVMTRA121	A1
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Lithium Battery Voltage:

Normal voltage: 3.7V, 3.7V*4S(Serial)=14.8V

Full-charge voltage: 4.2V, 4.2V*4S(Serial)=16.8V

The MP2326 is a fully integrated, high-efficiency, synchronous, step-down, switch-mode converter with only a 40µA quiescent current. 3.9V to 19V Operating Input Range ,4A Output Current



$$R1 = (V_{out} - V_{ref}) / V_{ref} * R2$$

It is recommended to choose a value within 5k to 100k for R2.

Where VREF is 0.6V, typically.

Without LDO
 $V_{out} = (294K * 0.6V) / 40.2K + 0.6V = 4.988V$

With LDO
 Expect $V_{out} = 5.6V$, let $R2 = 40.2K$, then
 $R1 = (5.6 - 0.6) / 0.6 * R2 = 335k$

No standard 335k values in EIA TABLES
 so fetch the nearest values 332k/336k

Verification
 $R1 = (v_{out} - V_{ref}) / V_{ref} * R2$
 $(V_{out} - V_{ref}) / v_{ref} = R1 / R2$
 $V_{out} = R1 / R2 * V_{ref} + V_{ref}$
 $V_{out} = 5.555 (332k)$
 $V_{out} = 5.6149 (336k)$

Expect $V_{out} = 12V$, let $R2 = 40.2K$, then
 $R1 = (12 - 0.6) / 0.6 * R2 = 763.8k$

No standard 763.8k values in EIA TABLES
 so fetch the nearest values 768k

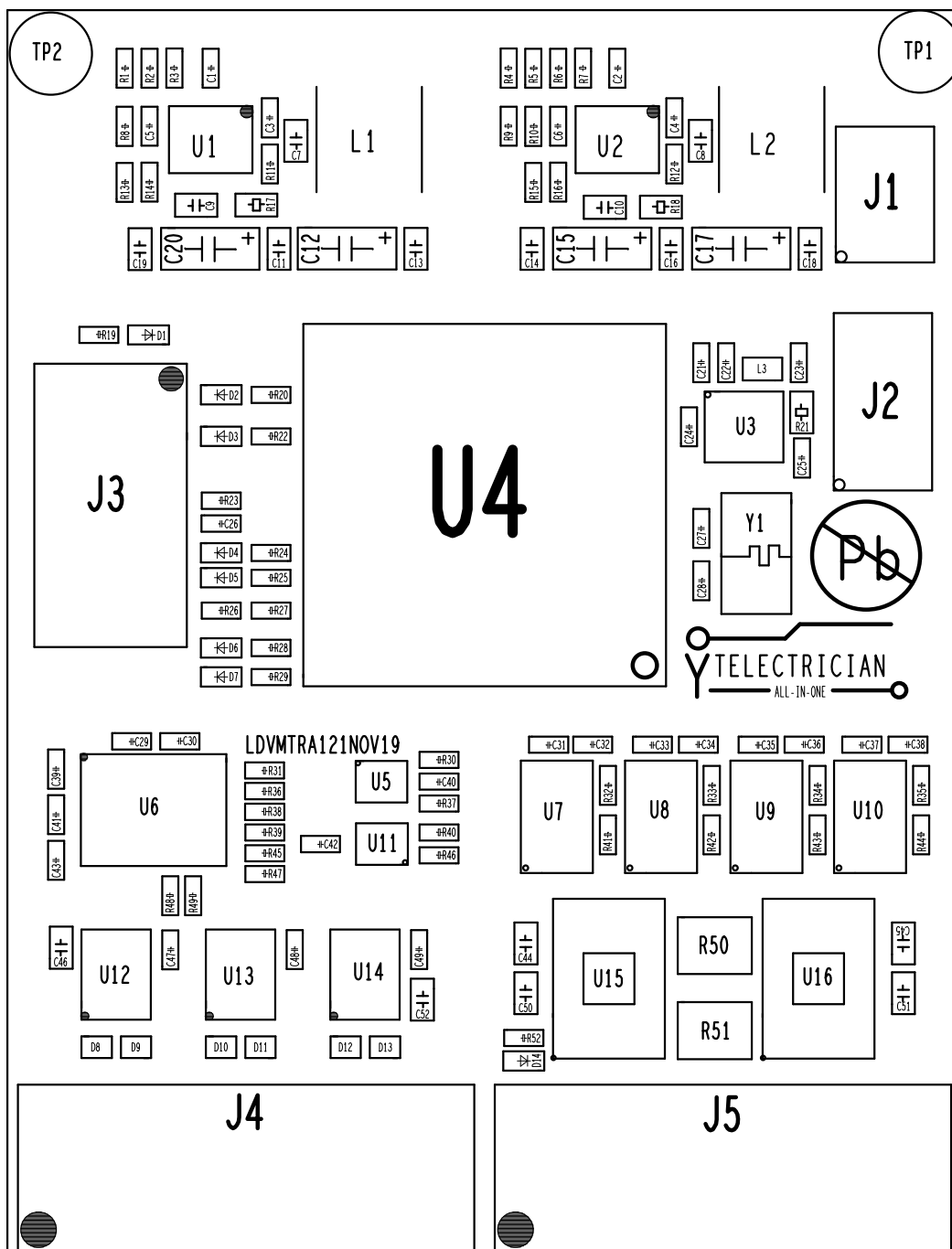
Verification
 $R1 = (v_{out} - V_{ref}) / V_{ref} * R2$
 $(V_{out} - V_{ref}) / v_{ref} = R1 / R2$
 $V_{out} = R1 / R2 * V_{ref} + V_{ref}$
 $V_{out} = 12.063V$

The TPS746-Q1 is a 1-A, ultra-low-dropout regulator (LDO) with power-good functionality.
 $V_{OUT} = V_{FB} \times (1 + R1 / R2)$
 VDO Dropout voltage
 TEST CONDITIONS: I_{OUT} = 1 A, $V_{OUT} = 0.95 \times V_{OUT} (NOM)$, $3.3V \leq V_{OUT} \leq 5.5V$
 VDO=160 (min)~265 (max) mV

According the datasheet, $V_{FB} = -0.3V (min) \sim 2.0V (max)$
 Here let $V_{FB} = 1V$, so we have
 $5V = 1V * (1 + R1 / R2)$
 calculate
 $R1 / R2 = 4$
 we check resistor values from Standard Electronic Decade Value Tables
 Assume $R1 = 86.6K$ then
 $R2 = 86.6K / 4 = 21.65K$
 so the nearest value from table is 21.5K.

Verification
 $V_{FB} = R2 / (R1 + R2) * V_{out} = 21.5K / (86.6K + 21.5K) * 5V = 0.1999 * 5V = 0.9995V \sim 1V$
 $V_{out} = 1V * (1 + 86.6K / 21.5K) = 5.0279V$

Title		
POWER SUPPLY		
Size	Document Number	Rev
A3	LDVMTA121	A1
Y TELETRICIAN 13522296239		
Date:	Monday, November 22, 2021	Sheet 1 of 1

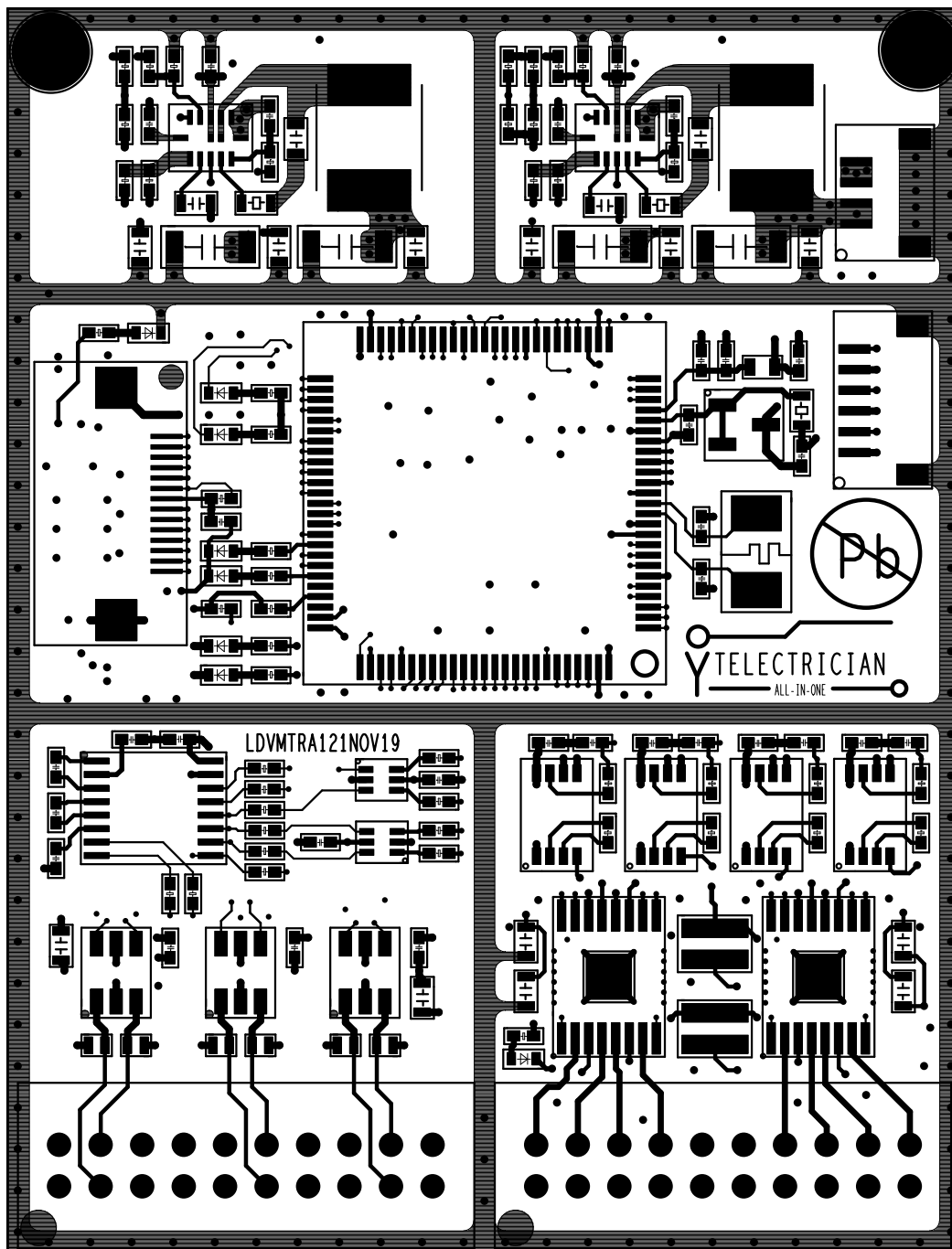


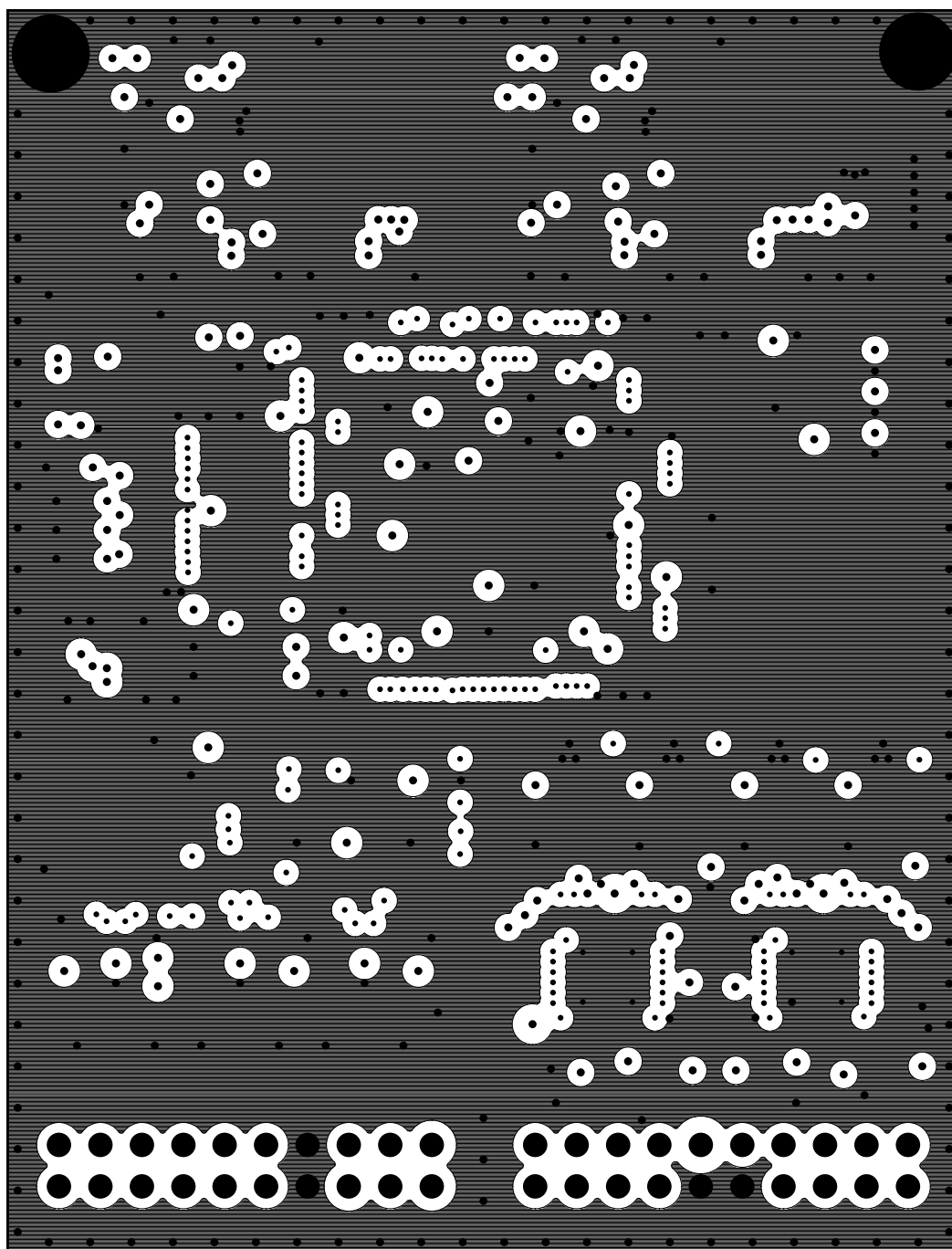
Bill Of Materials

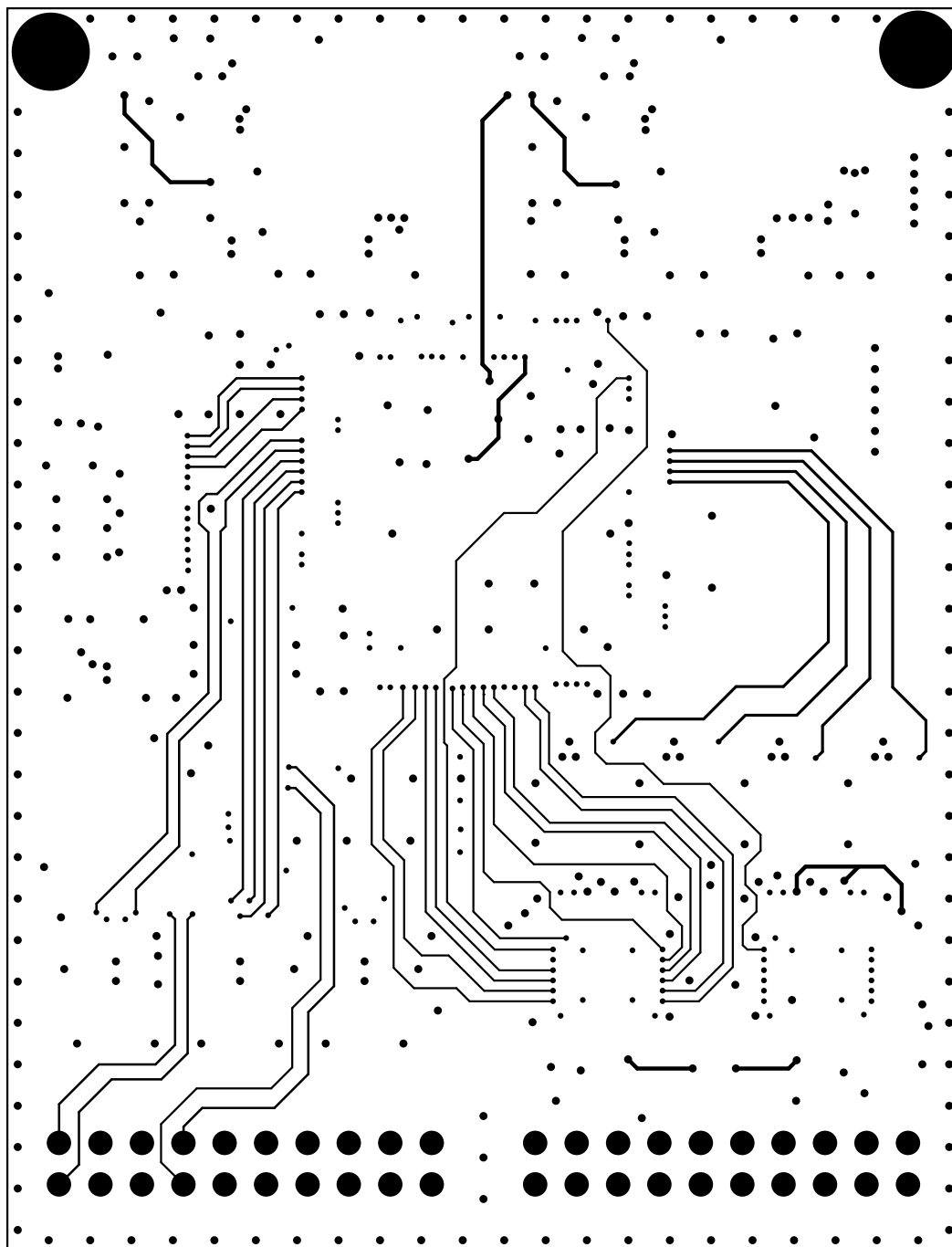
Item	Quantity	Reference	Part	PCBFootprint	Details
1	2	C1, C2	0. 01uF	C0402	CAPACITOR SMD 0402 0. 01uF 50V ±10%
2	2	C3, C4	1uF/16V	C0402	CAPACITOR SMD 0402 1uF 16V ±10%
3	2	C5, C6	15nF	C0402	CAPACITOR SMD 0402 15nF 25V ±10%
4	2	C7, C8	0. 1uF	C0603	CAPACITOR SMD 0603 0. 1uF 50V ±10%
5	1	C9	100pF/25V	C0603	CAPACITOR SMD 0603 100pF 25V ±10%
6	1	C10	150pF/25V	C0603	CAPACITOR SMD 0603 150pF 25V ±10%
7	15	C11, C13, C14, C16, C18, C19, C59, C60, C61, C63, C65, C67, C69, C74, C75	0. 1uF/25V	C0603	CAPACITOR SMD 0603 0. 1uF 25V ±10%
8	8	C12, C15, C17, C20, C62, C64, C66, C68	22uF/25V	C1206	CAPACITOR SMD 1206 22uF 25V ±10%
9	2	C21, C22	0. 1uF/10V	C0402	CAPACITOR SMD 0402 0. 1uF 10V ±10%
10	29	C23, C24, C25, C26, C30, C32, C34, C36, C38, C40, C42, C47, C48, C49, C70, C73, C81, C82, C84, C85, C88, C93, C94, C95, C97, C102, C118, C119, C120	0. 1uF	C0402	CAPACITOR SMD 0402 0. 1uF 10V ±10%
11	2	C27, C28	22pF/10V	C0402	CAPACITOR SMD 0402 22pF 10V ±10%
12	6	C29, C39, C41, C43, C111, C112	0. 1uF	C0402	CAPACITOR SMD 0402 0. 1uF 25V ±10%
13	7	C31, C33, C35, C37, C76, C80, C92	0. 1uF	C0402	CAPACITOR SMD 0402 0. 1uF 16V ±10%
14	8	C44, C45, C50, C51, C115, C116, C121, C122	2. 2uF	C0603	CAPACITOR SMD 0603 2. 2uF 25V ±10%
15	8	C46, C52, C71, C72, C96, C98, C117, C123	10uF	C0603	CAPACITOR SMD 0603 10uF 10V ±10%
16	2	C53, C55	22uF/50V	C1206	CAPACITOR SMD 1206 22uF 50V ±10%
17	2	C54, C58	0. 1uF/50V	C0603	CAPACITOR SMD 0603 0. 1uF 50V ±10%
18	2	C56, C57	1uF/50V	C0603	CAPACITOR SMD 0603 1uF 50V ±10%
19	4	C77, C78, C86, C89	10uF/16V	C0603	CAPACITOR SMD 0603 10uF 16V ±10%
20	1	C79	0. 1uF/16V	C0603	CAPACITOR SMD 0603 0. 1uF 16V ±10%
21	7	C83, C87, C90, C103, C104, C105, C106	10uF/16V	C0805	CAPACITOR SMD 0805 10uF 16V ±10%
22	1	C91	1uF	C0603	CAPACITOR SMD 0603 1uF 16V ±10%
23	1	C99	0. 01uF	C0402	CAPACITOR SMD 0402 0. 01uF 10V ±10%
24	2	C100, C101	1uF	C0603	CAPACITOR SMD 0603 1uF 10V ±10%
25	2	C107, C108	4. 7uF	C0603	CAPACITOR SMD 0603 4. 7uF 25V ±10%
26	2	C109, C110	10uF	C0603	CAPACITOR SMD 0603 10uF 25V ±10%
27	2	C113, C114	0. 1uF	C0402	CAPACITOR SMD 0603 0. 1uF 25V ±10%
28	3	D1, D14, D19	BLUE	LED0402	LED SMD 0402 GREEN COLOR
29	4	D2, D3, D17, D18	LED	LED0402	LED SMD 0402 RED COLOR
30	4	D4, D5, D6, D7	LED	LED0402	LED SMD 0402 BLUE COLOR

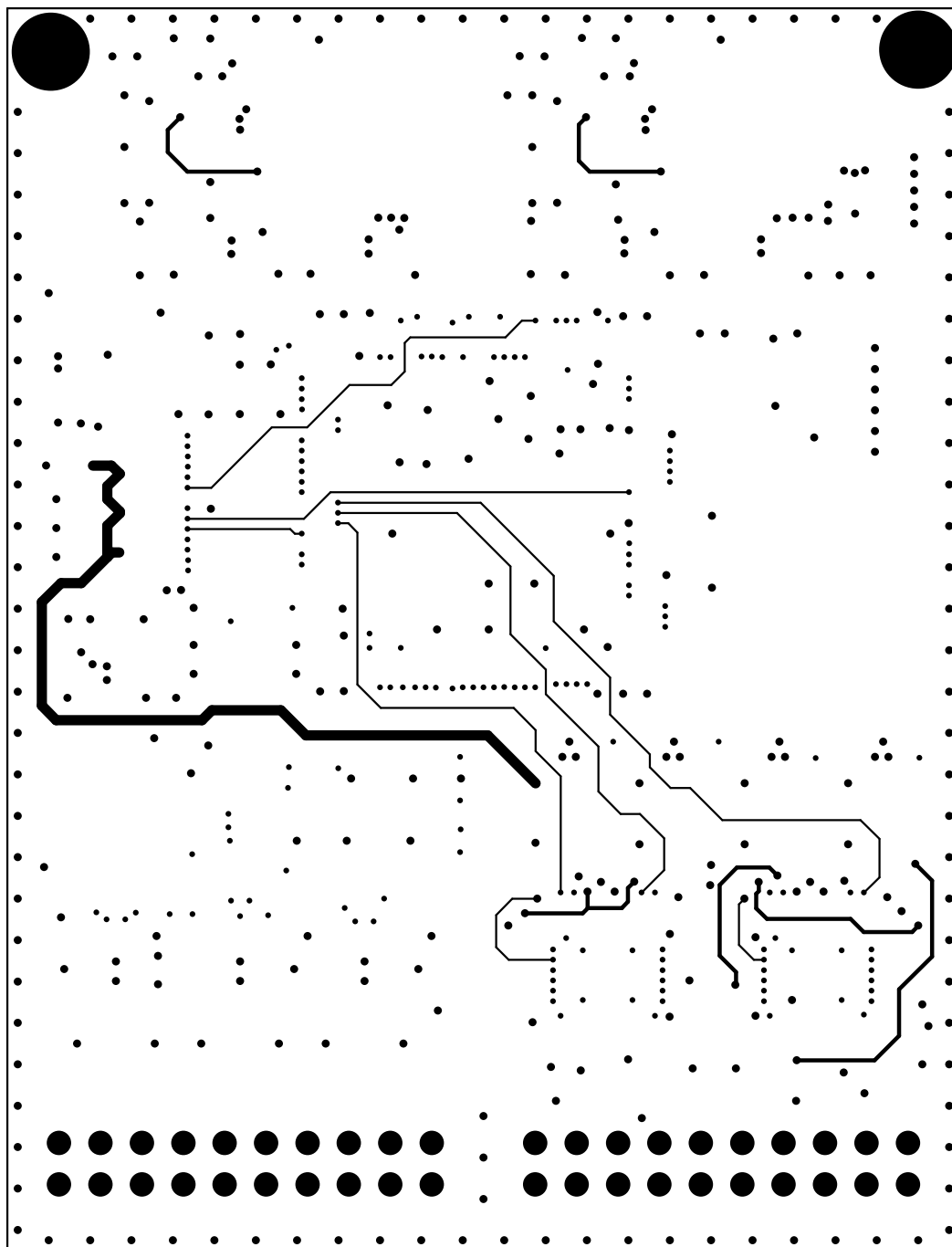
31	12	D8, D9, D10, D11, D12, D13, D20, D21, D22, D23, D24, D25	ESD5451X	DF1006	Bi-directional TVS Reverse stand-off voltage:±5V Max
32	2	D15, D16	1N4148WT	SOD-523F	HIGH SPEED SWITCHING DIODES
33	1	J1	HEADER-1X4	SH1D0-SMD-VER-4P	SH1.0MM SMD VERTICAL INSTALLATION 4PINS CONNECTOR
34	1	J2	HEADER1x6	SH1D0-SMD-VER-6P	SH1.0MM SMD VERTICAL INSTALLATION 6PINS CONNECTOR
35	1	J3	FPC-14P-0.5	FPC-14P-0D5	FPC 14PINS 0.5MM HORIZONTAL CONNECTOR
36	2	J4, J5	CONNECTOR-2X10P	PHB2DOMM-2X10P-VER	PHB2.0mm 2X10PINS VERTICAL INSTALLATION CONNECTOR
37	2	L1, L2	4.7uH/2A	CD54-IND-2P	INDUCTOR SMD CD54 SERIES 4.7uH 2A
38	2	L3, L4	BLM18SP102SN1D	FB0603	Ferrite Beads 0603 1000ohm 25% 1.2A
39	1	L5	MPZ1005D330ET000	FB0402	33 Ohms @ 100 MHz 1 Power Line Ferrite Bead 0402 (1005 Metric) 800mA 180mOhm
40	4	R1, R5, R11, R12	100K	R0402	RESISTOR SMD 0402 100K ±5% 1/16W
41	13	R2, R6, R8, R10, R31, R38, R39, R45, R47, R48, R59, R60, R69	DNP	R0402	DO NOT PLACE
42	1	R3	787K	R0402	RESISTOR SMD 0402 787K ±5% 1/16W
43	1	R4	68K	R0402	RESISTOR SMD 0402 68K ±1% 1/16W
44	1	R7	499K	R0402	RESISTOR SMD 0402 499K ±5% 1/16W
45	1	R9	12K	R0402	RESISTOR SMD 0402 12K ±1% 1/16W
46	2	R13, R15	40.2K	R0402	RESISTOR SMD 0402 40.2K ±5% 1/16W
47	1	R14	336K	R0402	RESISTOR SMD 0402 294K ±5% 1/16W
48	1	R16	768K	R0402	RESISTOR SMD 0402 768K ±5% 1/16W
49	2	R17, R18	0	R0603	RESISTOR SMD 0603 0 ±5% 1/10W
50	1	R19	4.7K	R0402	RESISTOR SMD 0402 4K7 ±5% 1/16W
51	8	R20, R22, R24, R25, R28, R29, R67, R70	1K	R0402	RESISTOR SMD 0402 1K ±5% 1/16W
52	2	R21, R62	560	R0603	RESISTOR SMD 0603 560 ±5% 1/10W
53	10	R23, R26, R27, R58, R65, R66, R78, R79, R80, R81	10K	R0402	RESISTOR SMD 0402 10K ±5% 1/16W
54	4	R30, R37, R40, R46	33	R0402	RESISTOR SMD 0402 33 ±5% 1/16W
55	4	R32, R33, R34, R35	10	R0402	RESISTOR SMD 0402 10 ±5% 1/16W
56	14	R36, R49, R55, R68, R71, R72, R73, R74, R75, R76, R84, R85, R86, R87	0	R0402	RESISTOR SMD 0402 0 ±5% 1/16W
57	4	R41, R42, R43, R44	2.05K, 1%	R0402	RESISTOR SMD 0402 2.05K ±1% 1/16W
58	4	R50, R51, R77, R82	0.47	R3216	RESISTOR SMD 3216 0.47 ±1% 1/4W
59	2	R52, R83	6.8K	R0402	RESISTOR SMD 0402 6K8 ±5% 1/16W
60	3	R53, R54, R61	1K, 1%	R0603	RESISTOR SMD 0603 1K ±1% 1/10W
61	2	R56, R57	10K	R0402	RESISTOR SMD 0402 1K ±5% 1/16W
62	1	R63	86.6K	R0402	RESISTOR SMD 0402 86.6K ±1% 1/16W
63	1	R64	21.5K	R0402	RESISTOR SMD 0402 21.5K ±1% 1/16W
64	2	TP1, TP2	T POINT R	SCREW-M3	M3 SCREW
65	3	TP5, TP6, TP7	T POINT R	TP SMD CIR 1D0	TEST POINT
66	2	U1, U2	MP2326GD	QFN-14	Buck Switching Regulator IC Positive Adjustable
67	2	U3, U20	TL431AIDBZT	SOT-23-3	Voltage References Adjustable Precision Shunt Regulator
68	1	U4	STM32F103VET6	LQFP-100	72MHz 512KBytes Flash 64kBytes RAM LQFP100 ARM CORTEX-M3
69	2	U5, U11	SN74LVC2G34DRL	SOT-6	Buffer, Non-Inverting 2 Element 1 Bit per Element Push-Pull Output
70	1	U6	SP3232EEY	TSSOP-16	RS-232 Transceivers
71	4	U7, U8, U9, U10	AD8226ARMZ	MSOP-8	Analog Devices Instrumentation Amplifiers
72	6	U12, U13, U14, U22, U23, U24	SN74LVC2G34DBVR	SOT-23-6	Buffer, Non-Inverting 2 Element 1 Bit per Element Push-Pull Output
73	2	U15, U16	DRV8848PWPR	HTSSOP-16	Bipolar Motor Driver Power MOSFET PWM 16-HTSSOP

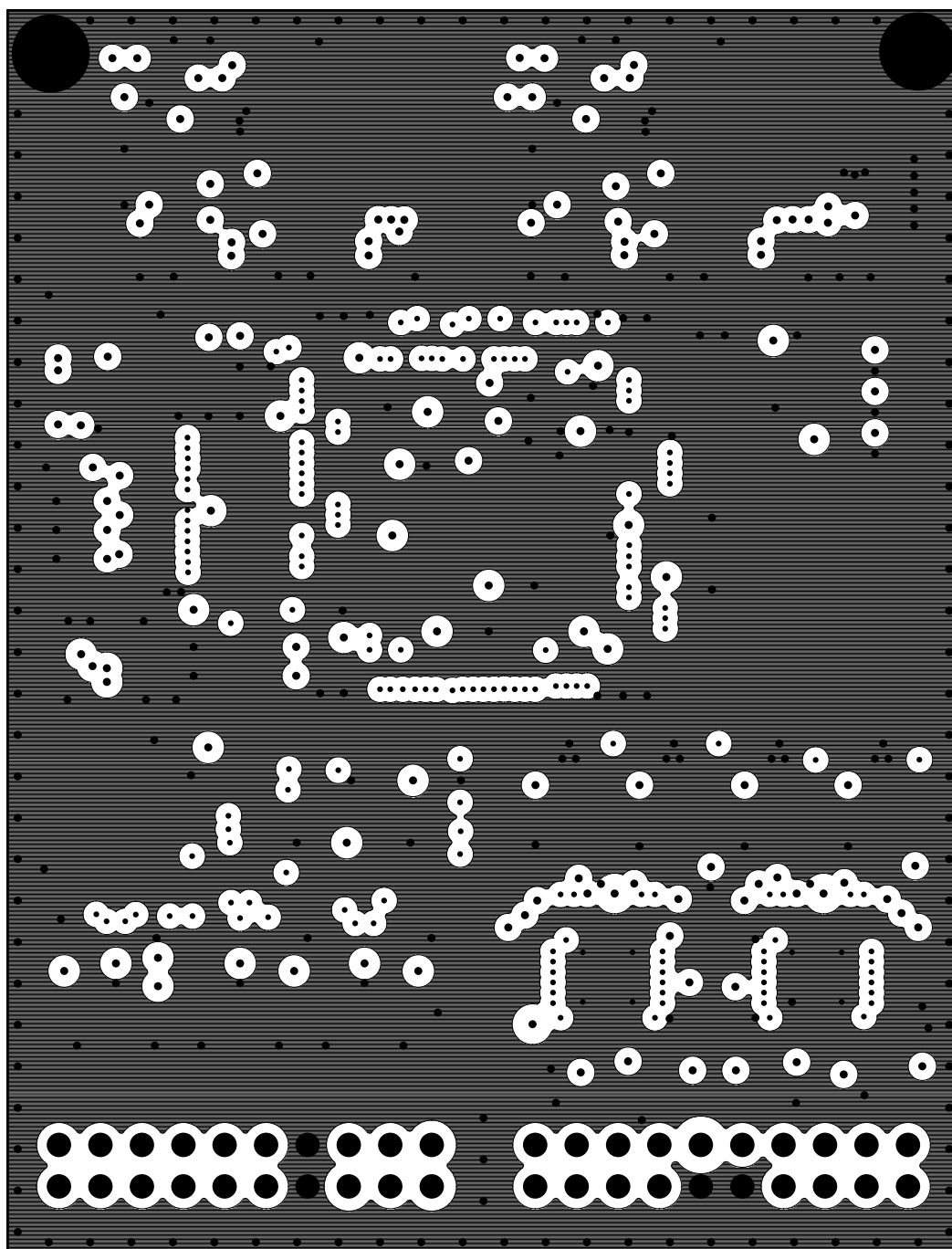
74	2	U17, U19	MCP6001T-I/OT	SOT-23-5	Microchip Technology Operational Amplifiers
75	1	U18	TPS74601PBQWDRVRQ1	WS0N-6	LDO Voltage Regulators Automotive 1-A, low-IQ, high-PSRR, low-dropout (LDO) voltage regulator with power good
76	1	U21	SGM2028-3.3	SOT-23-5	LDO Regulator Pos 3.3V 500mA 5-Pin SOT-23 T/R
77	2	U25, U26	DRV8846RGER	VQFN-24	highly-integrated stepper motor driver
78	1	Y1	8MHz	CRY5032	SMD CRYSTAL 8.0MHz 2PINS 5032

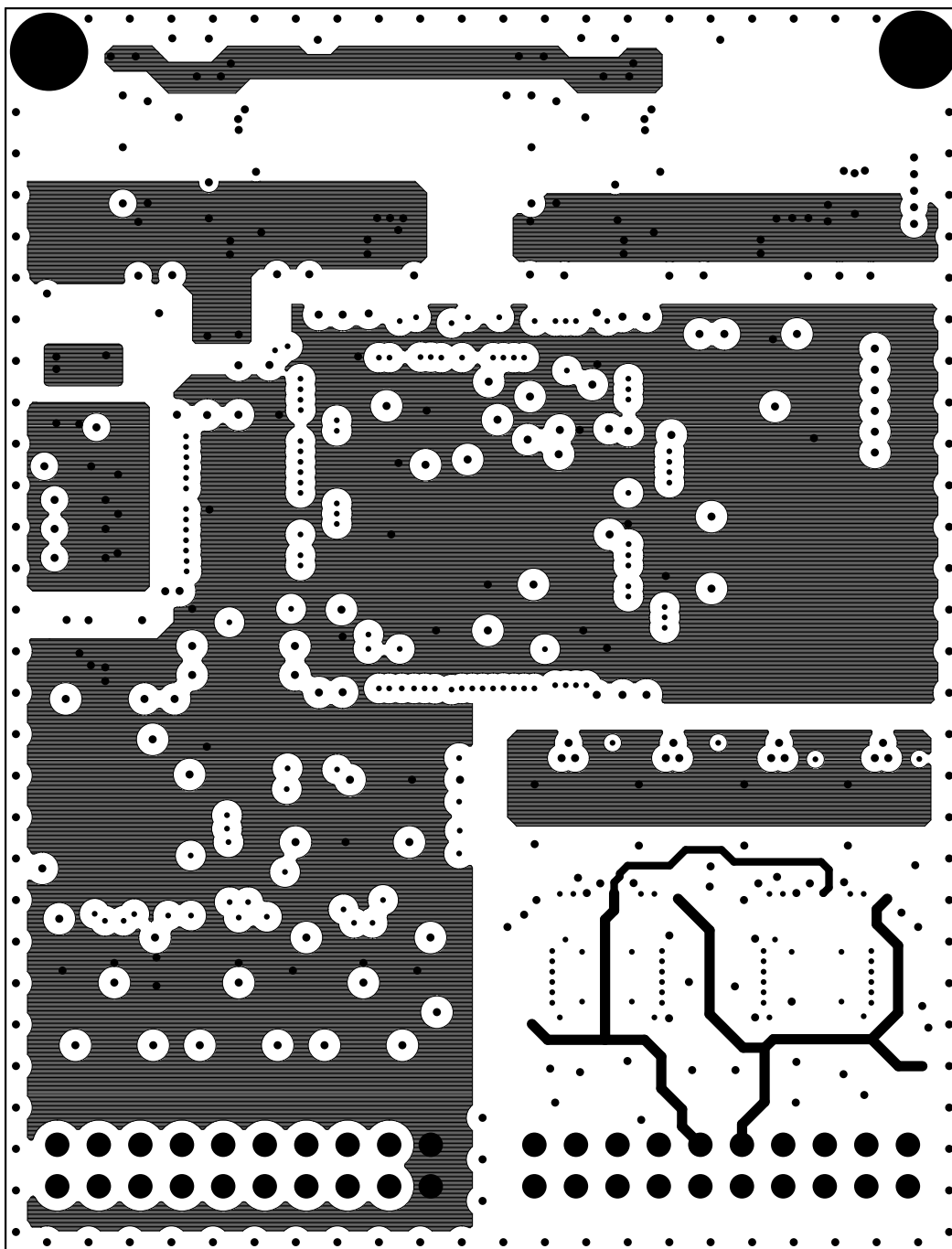


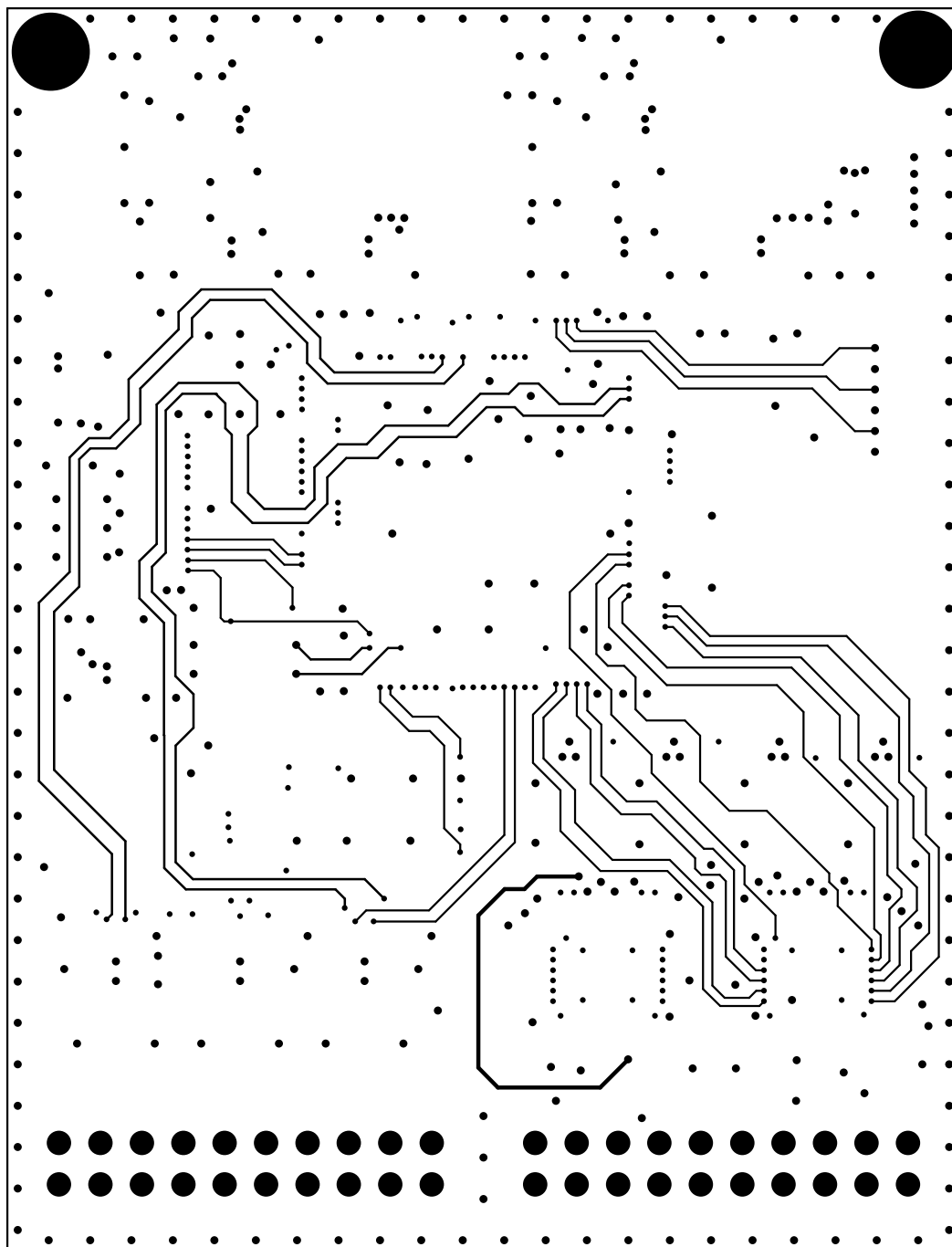


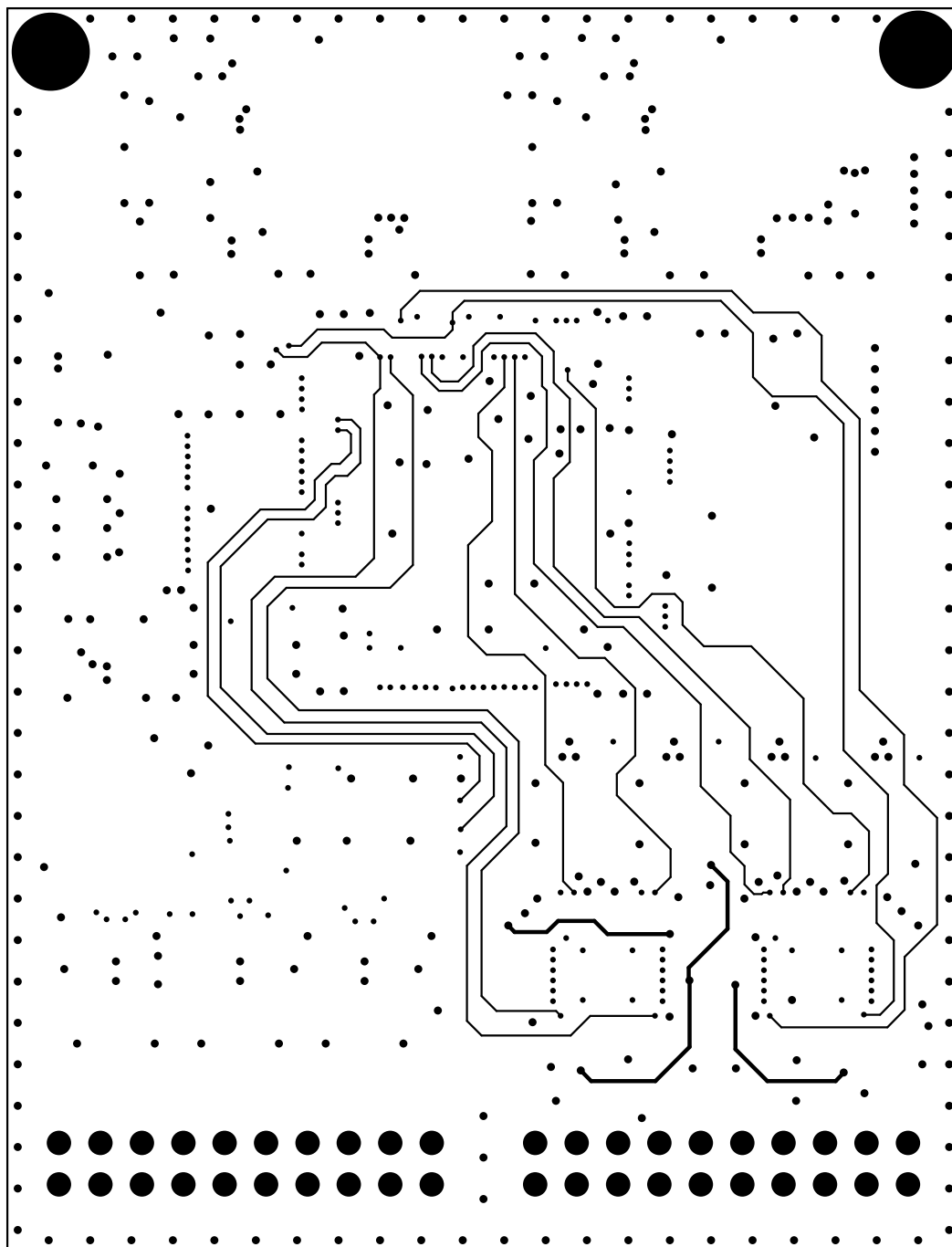


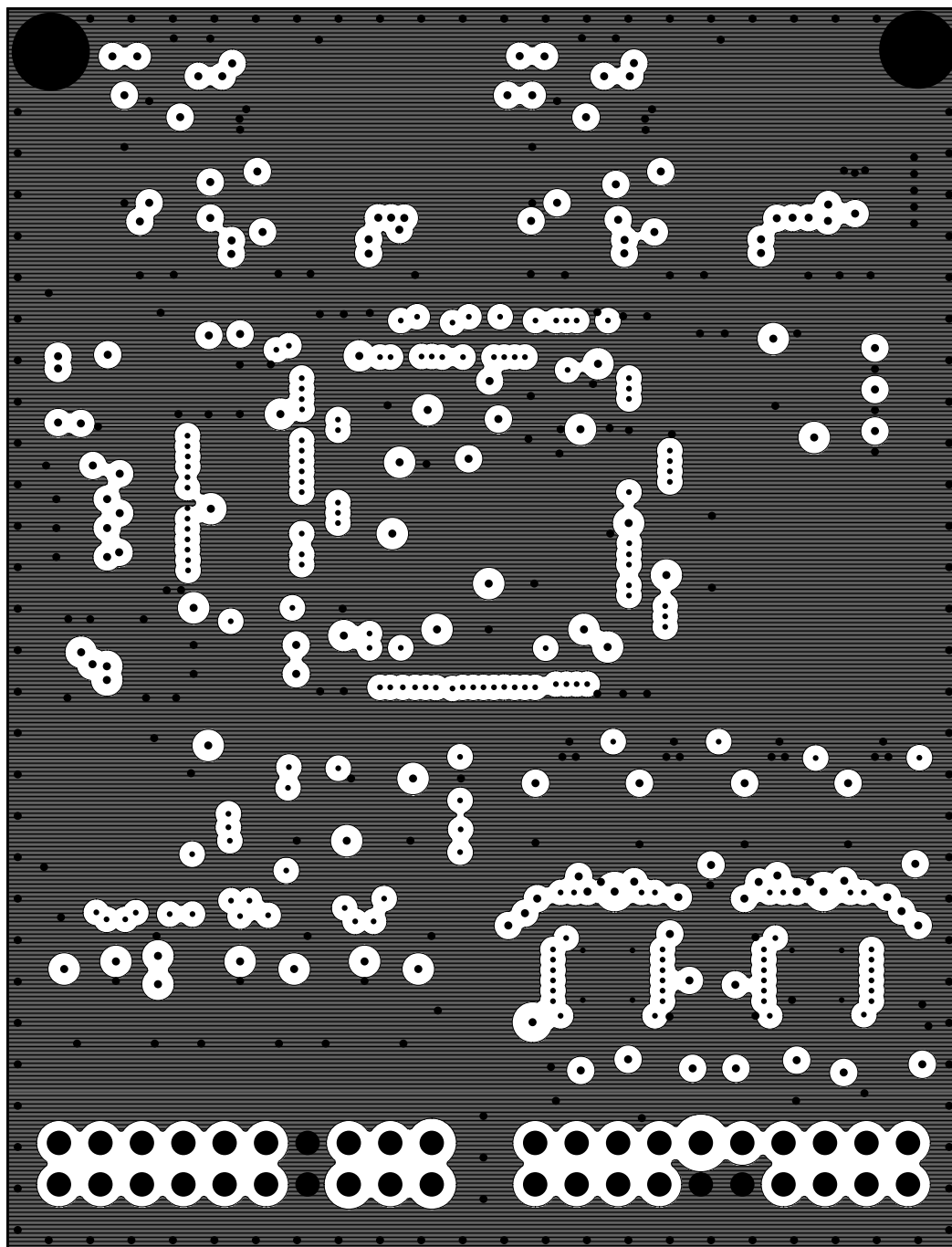


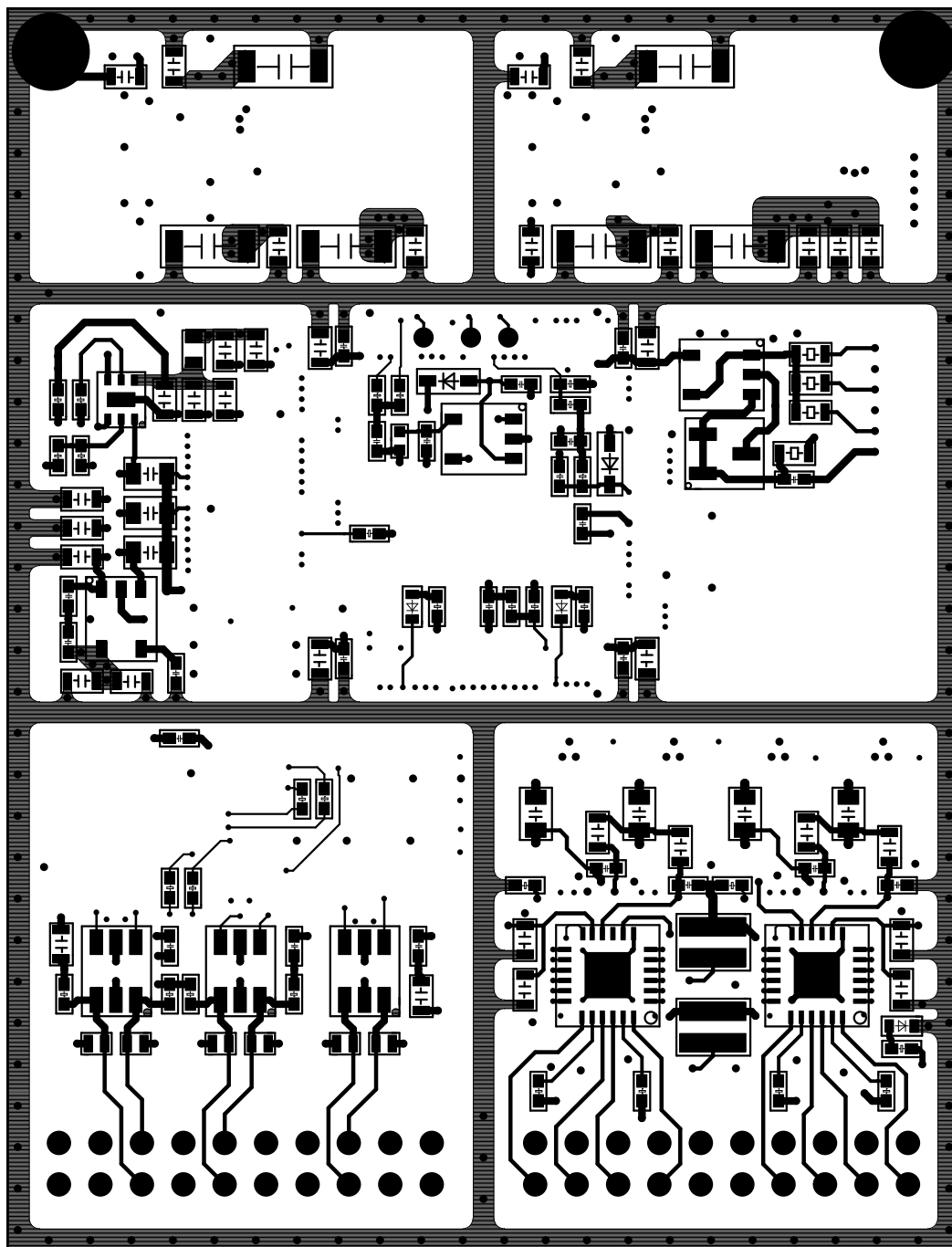


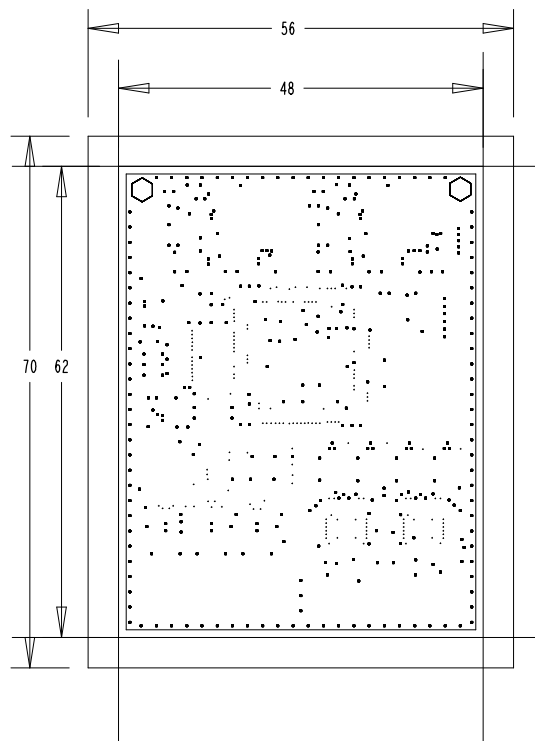








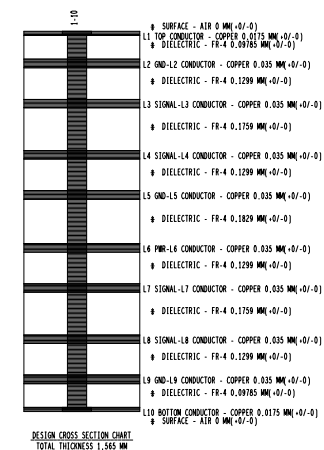




V-CUTx4 FOR BREAK

DRILL CHART: TOP to BOTTOM							
ALL UNITS ARE IN MILLIMETERS							
FIGURE	FINISHED_SIZE	TOOL_SIZE	ROTATION	TOLERANCE_DRILL	TOLERANCE_TRAVEL	PLATED	QTY
.	0.15	-	-	+0.0/-0.0	-	PLATED	170
•	0.2	-	-	+0.0/-0.0	-	PLATED	380
○	0.9	-	-	+0.0/-0.0	-	PLATED	40
⬡	3.2	-	-	+0.0/-0.0	-	NON-PLATED	2

TOTAL HOLES: 592



ANY QUESTIONS PLEASE CALL 13522296239 YANTAI ELECTRICIAN.
GOD BLESS US ALWAYS. November 19,2021