

DEVELOPMENT REFERENCE GUIDE

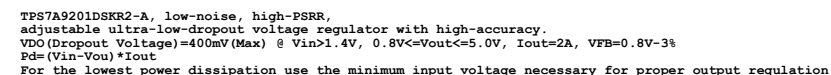
LDVFMA1+LDVMTRA1

DOCUMENT NO. : LDVFMA1MTRA1-A1

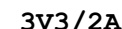
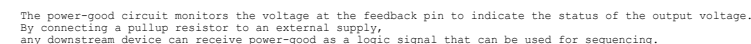
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Normal voltage: 3.7V, $3.7V \times 4S(\text{Serial}) = 14.8V$
Full-charge voltage: 4.2V, $4.2V \times 4S(\text{Serial}) = 16.8V$

YTELECTRICIAN
ALL-IN-ONE



$$\begin{aligned} V_{out} &= (R1/R2+1) * V_{ref} \\ &= (10.5K/2K+1) * 0.8V \\ &= 5V \end{aligned}$$



$$\begin{aligned} V_{out} &= (R_1/R_2 + 1) * V_{ref} \\ &= (3.57K/1.15K + 1) * 0.8V \\ &= 3.283V \end{aligned}$$

EQUATION/FORMULA
 $R1=R2*(V_{out}/V_{ref}-1)$, where $|V_{ref}(max)|/R2>5\mu A$
 $V_{ref}=0.8V$ (internal voltage reference)

$$V_{ou}/V_{ref}-1=R1/R2 \rightarrow V_{ou}/V_{ref}=R1/R2+1 \rightarrow V_{out}=(R1/R2+1) * V_{ref}$$



$$\begin{aligned} V_{out} &= (R_1/R_2+1) * V_{ref} \\ &= (2.43K/1.15K+1) * 0.8V \\ &= 2.490V \end{aligned}$$

Efficiency is defined by the ratio of output voltage to input voltage because the TPS7A92 is a linear voltage regulator. To achieve high efficiency, the dropout voltage ($V_{IN} - V_{OUT}$) must be as small as possible, thus requiring a very low dropout LDO.



$$\begin{aligned} V_{out} &= (R_1/R_2 + 1) * V_{ref} \\ &= (5.9K/11.8K + 1) * 0.8V \\ &= 1.2V \end{aligned}$$

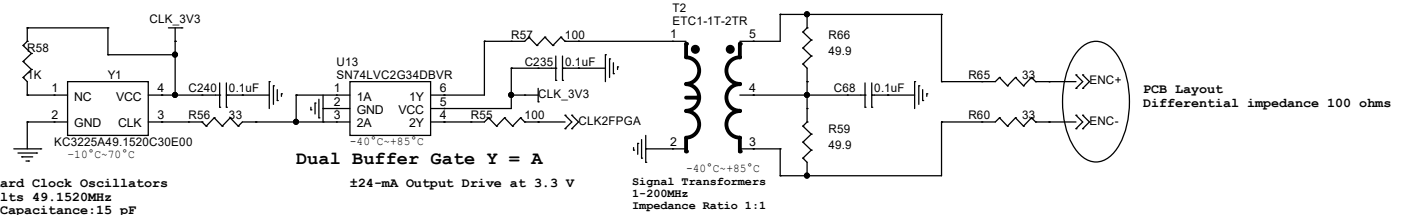
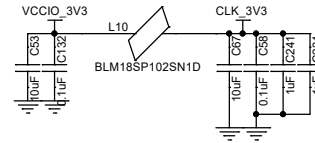
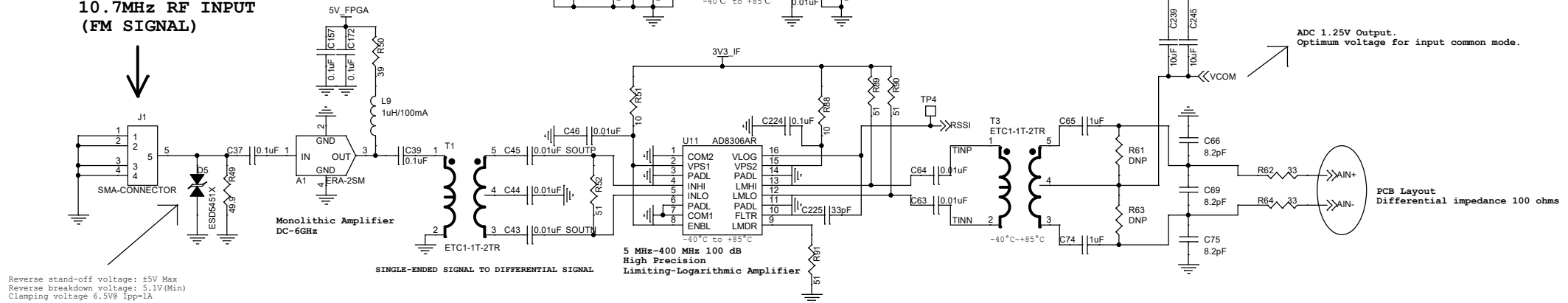
EN(9): Enable/Disable Control. EN = 1 to enable the MP2326.
For automatic start-up, connect EN to VIN with a pull-up resistor.

VCC(11): Internal Bias Supply. Internal 5V LDO output. Decouple with a 1 μ F ceramic capacitor as close to VCC as possible.

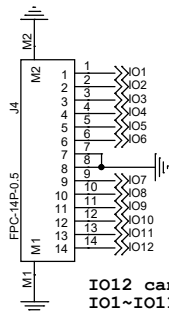
Title				
POWER SUPPLY RAILS				
Size	Document Number			Rev
A3	LDVFMA121DEC15			A1
ZHANGSHAoyan 13522296239				
Date:	Thursday, December 16, 2021	Sheet	1 of 1	

500mA, Ultra Low Dropout, Low Power, RF Linear Regulators
P=(5V-3.3V)*500mA=0.85W

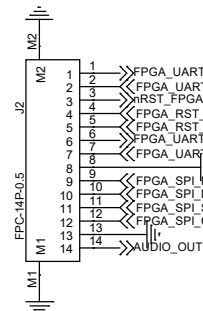
10.7MHz RF INPUT
(FM SIGNAL)



Incorrect footprint fixup in next release!!!



I012 can only be used as input (global clock input pin).
I01~I011 no direction limited.

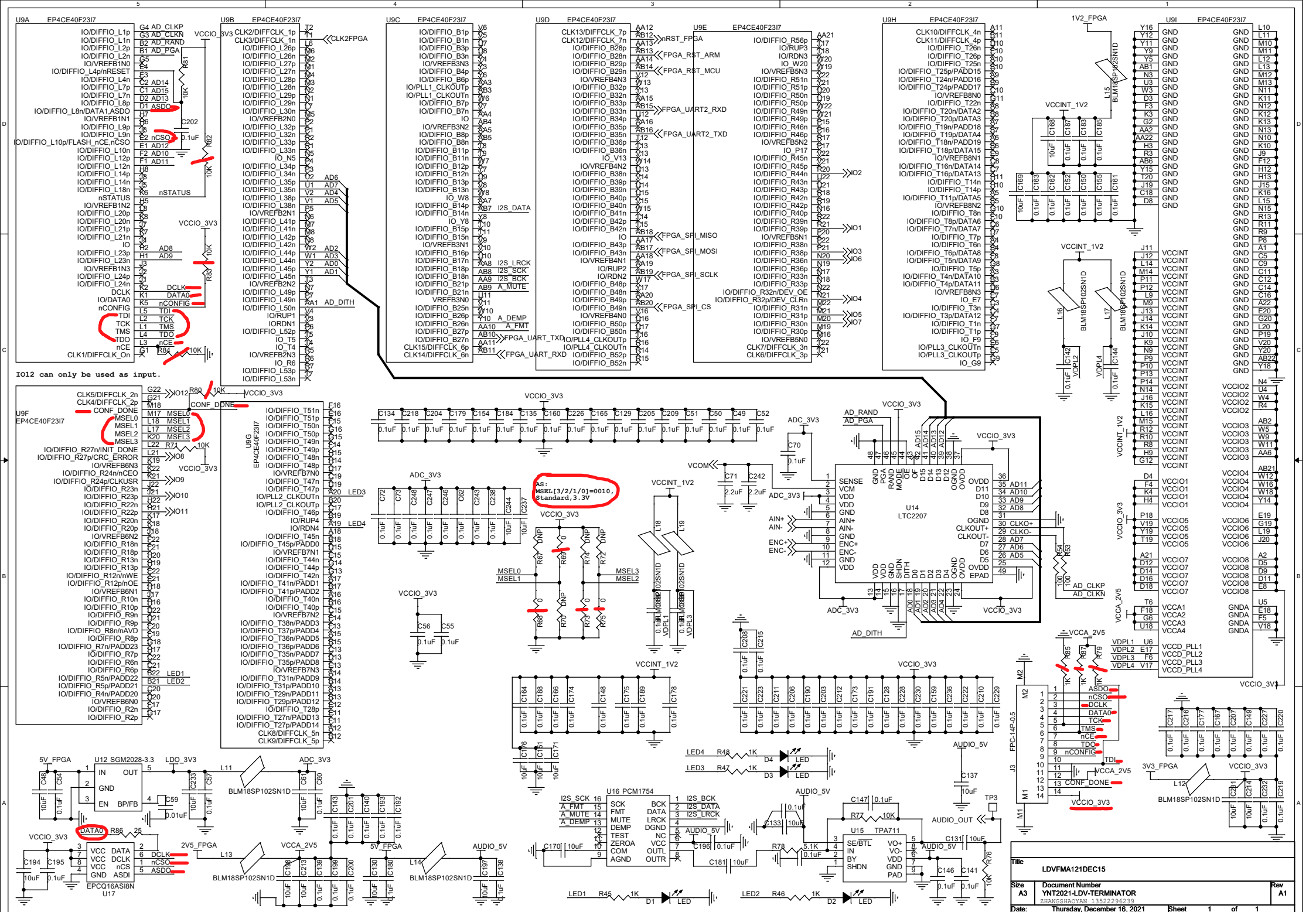


FPGA UART/FPGA UART2 can be used to communicate with MCU/MPU.
MCU/MPU pulls down nRST FPGA to reset entire FPGA logic.
FPGA pulls down FPGA RST MCU/ FPGA RST_ARM to launch MCU/MPU reset.
FPGA SPI offers SPI communication between MCU/MPU and FPGA.
AUDIO_OUT passes analog audio signal to MPU for back-end processing.

USE M3 SCREW TO FIXED BOARD.



Title		
FM INPUT		
Size	Document Number	Rev
A3	LDVFMIA12DEC15	A1
ZHANGSHAOYAN_13522296239		
Date:	Thursday, December 16, 2021	Sheet 1 of 1



Title		LDVFMA121DEC15	
Size		Document Number	
A3		WNT2021-LDV-TERMINATOR	
Date:		Thursday, December 16, 2021	
Sheet		1 of 1	
Rev		A1	

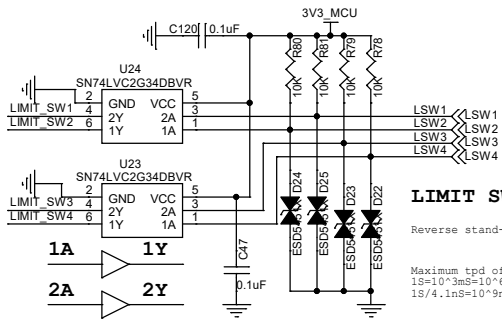
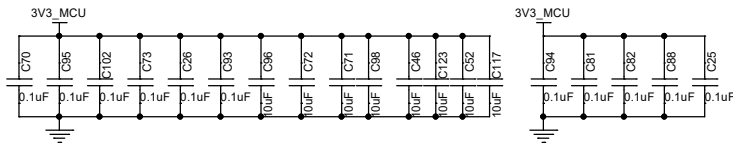
3V3_MCU
R62
560
2.5VRef
U20
TL431ADBZT
C85
0.1uF
U17 MCP6001T-IOT
Rail-to-Rail Input/Output
3V3_MCU
R21
560
U3
TL431ADBZT
C24
0.1uF
VREF 2V5

PT100, 100-OHMS@0°C
2.5V/(1K+0)=0.0025A
3-CH*0.0025A=0.0075A=7.5mA

LOW-TO-HIGH POR

BOOT1=X, BOOT0=0: boot from User Flash Memory
BOOT1=0, BOOT0=1: boot from System memory
BOOT1=1, BOOT0=1: boot from SRAM

DECOUPLING CAPACITORS

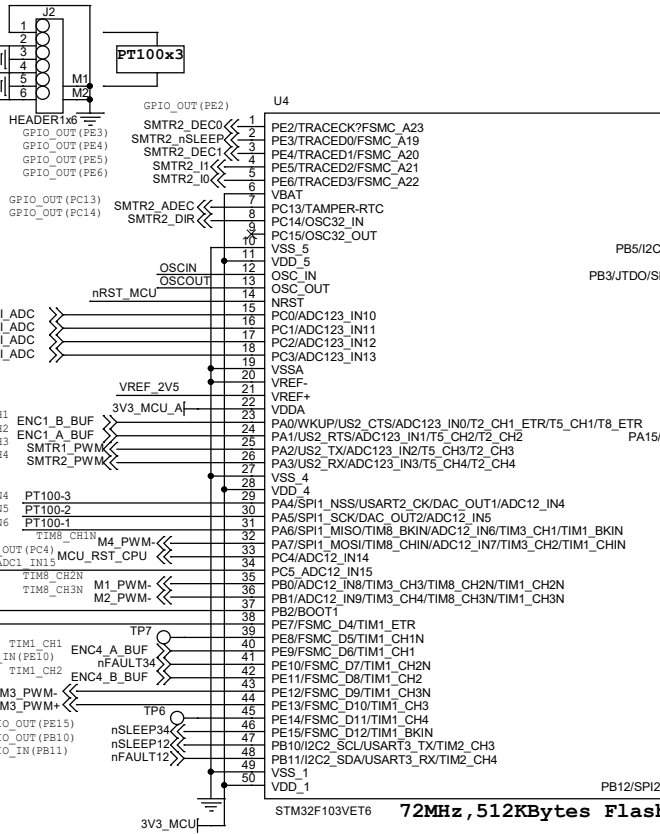


LIMIT SWITCH INPUT

Reverse stand-off voltage: ±5V Max

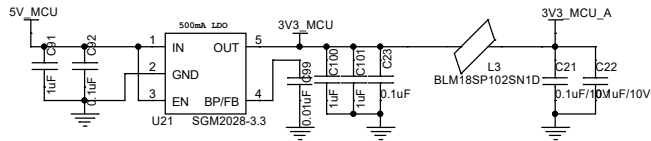
Maximum tpd of 4.1 ns at 3.3 V
1S/10°3ms=10°6us=10°9ns
1S/4.1ns=10°9ns/4.1ns=24392439Hz=243MHz

3-CH PT100 Temperature Sensor (ADC) 4-CH DC Motor Drivers with Encoder and Current(ADC) 2-CH Stepper Motor Driver

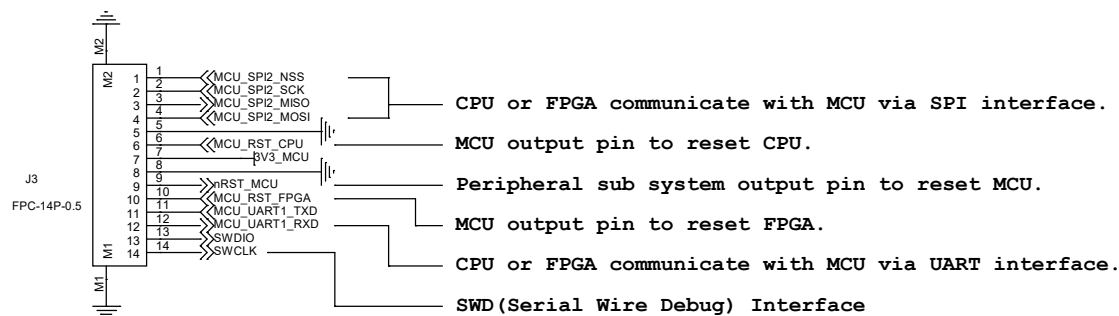
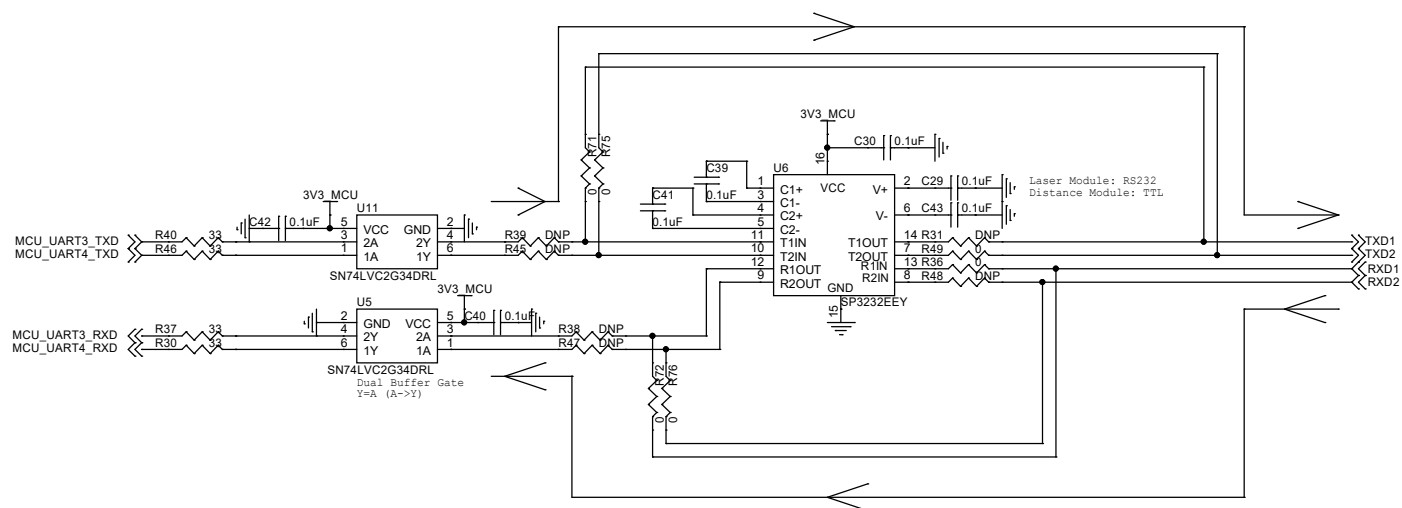


STM32F103VET6 72MHz, 512KBytes Flash, 64KBytes RAM, I/QFP100

5V-3.3V LDO



When use TTL bypass RS232

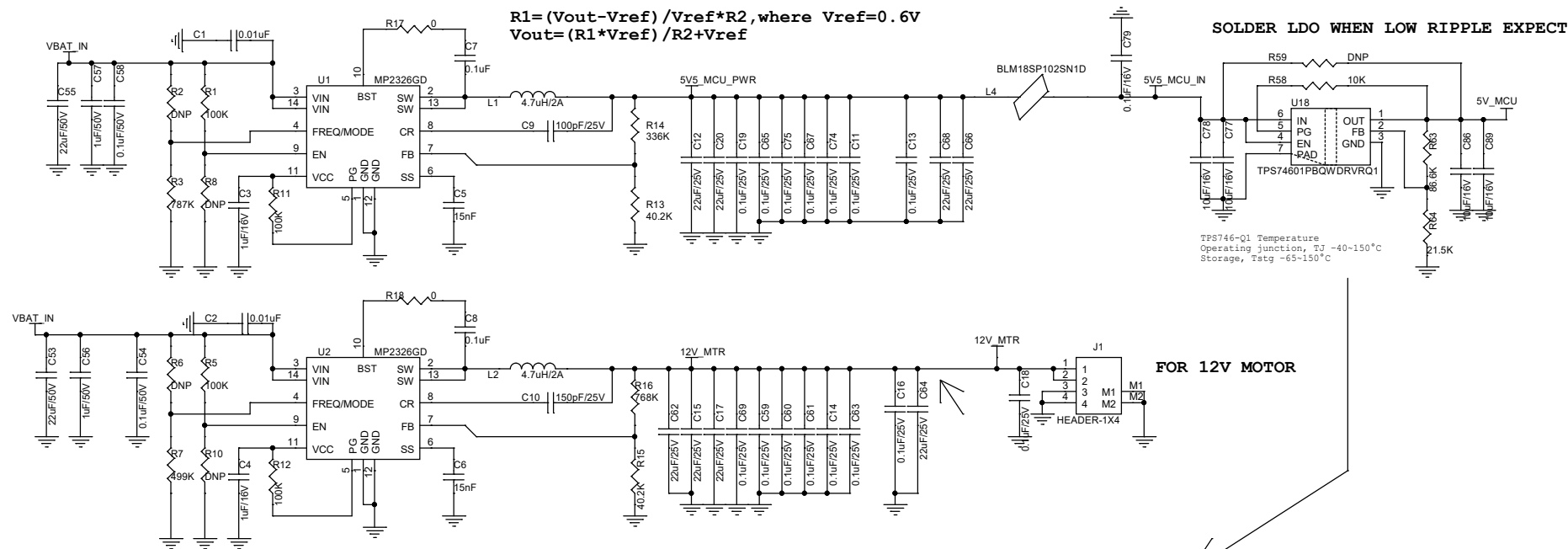


Lithium Battery Voltage:

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 Vout=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 Vout=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 x V_{OUT}(NOM) , 3.3 V ≤ V_{OUT} ≤ 5.5 V

VDO=160 (min)~265 (max) mV

According the datasheet, V_{FB}=-0.3V(min)~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

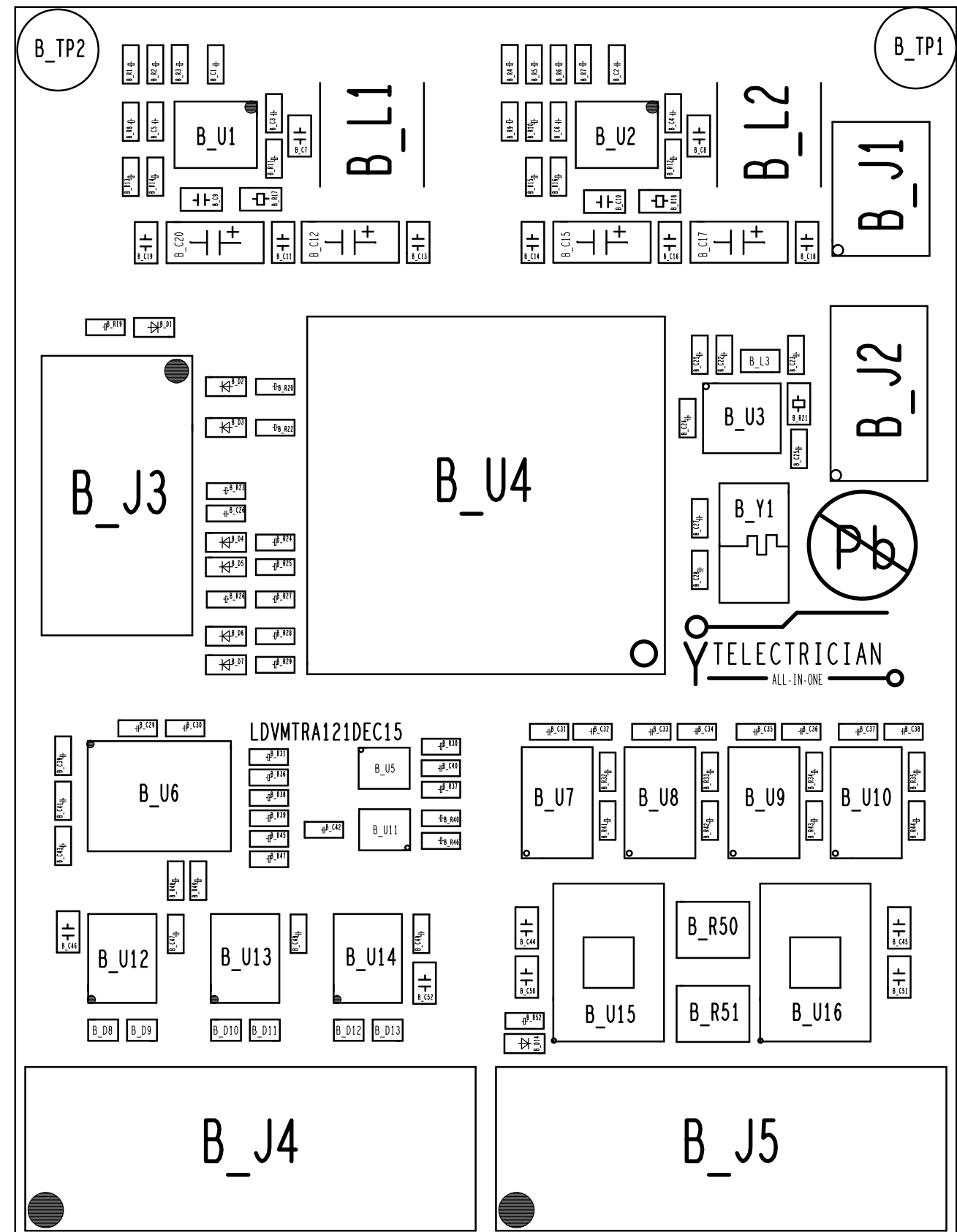
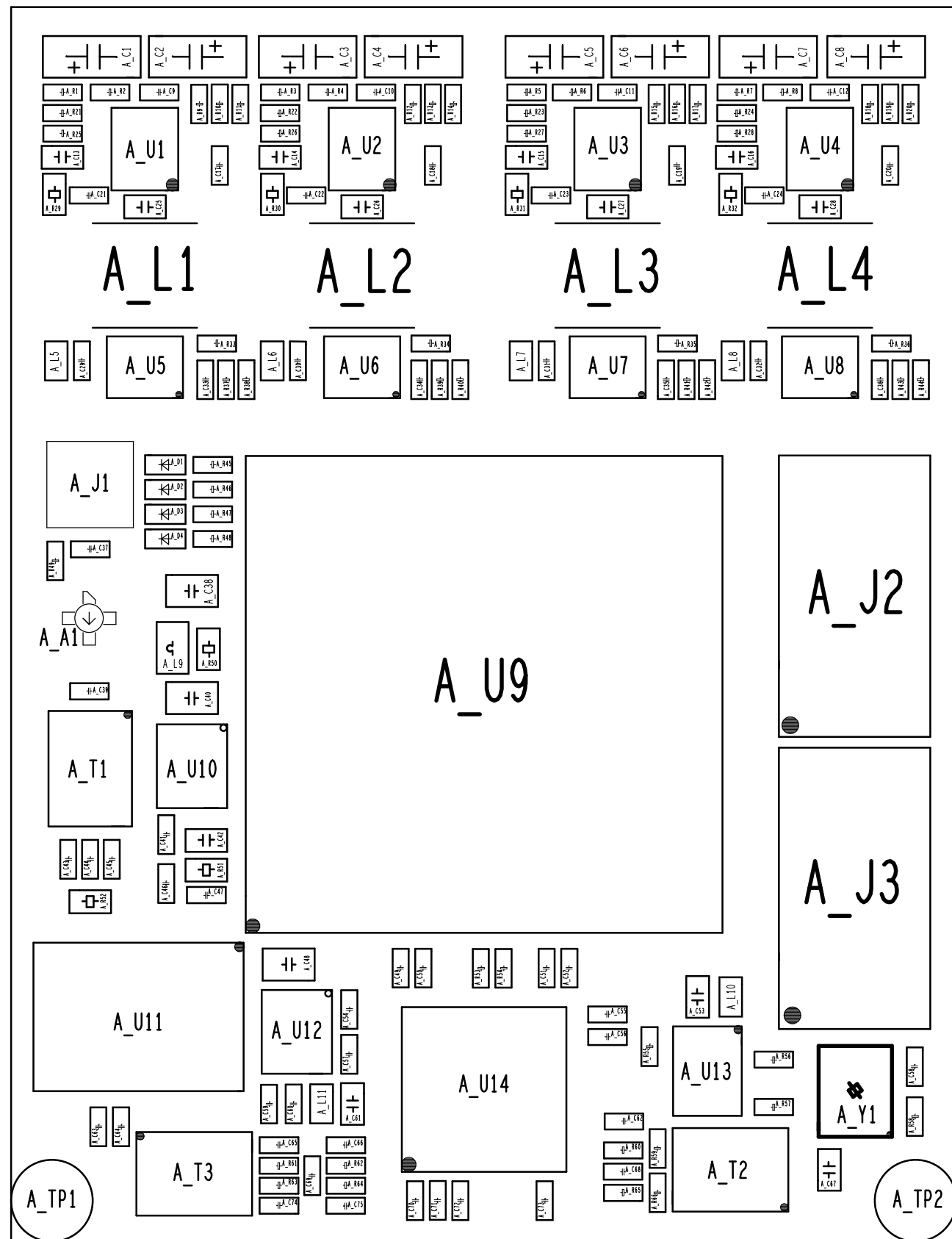
$$R2 = 86.6K / 4 = 21.65K$$

so the nearest value from table is 21.5K.

Verification

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

$$V_{out} = 1V * (1 + 86.6K / 21.5K) = 5.0279V$$



Bill Of Materials --- FM					
Item	Quantity	Reference	Part	PCBFootprint	Details
1	1	A1	ERA-2SM	ERA-2SM	Surface Mount Monolithic Amplifier DC-6GHz
2	8	C1, C2, C3, C4, C5, C6, C7, C8	22uF/50V	C1206	CAPACITOR SMD 1206 50V ±10%
3	4	C9, C10, C11, C12	15nF	C0402	CAPACITOR SMD 0402 16V ±10%
4	3	C13, C15, C16	100pF	C0603	CAPACITOR SMD 0603 25V ±10%
5	1	C14	150pF	C0603	CAPACITOR SMD 0603 25V ±10%
6	4	C17, C18, C19, C20	0. 1uF/50V	C0402	CAPACITOR SMD 0402 50V ±10%
7	6	C21, C22, C23, C24, C65, C74	1uF	C0402	CAPACITOR SMD 0402 16V ±10%
8	4	C25, C26, C27, C28	0. 1uF	C0603	CAPACITOR SMD 0603 25V ±10%
9	116	C29, C30, C31, C32, C37, C39, C47, C49, C50, C51, C52, C54, C55, C56, C57, C58, C60, C62, C68, C70, C72, C73, C128, C129, C132, C134, C135, C136, C138, C139, C140, C141, C142 , C143, C144, C146, C147, C148, C149, C150, C152, C153, C154, C155, C156, C157, C158, C159, C160, C161, C162, C163, C164, C165, C166, C167, C172, C173, C174, C175, C177, C178 , C179, C180, C182, C183, C184, C185, C186, C187, C188, C189, C190, C191, C192, C193, C195, C196, C199, C200, C201, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211 , C212, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C226, C227, C228, C229, C230, C232, C235, C236, C238, C240, C243, C246, C247, C248	0. 1uF	C0402	CAPACITOR SMD 0402 16V ±10%
10	4	C33, C34, C35, C36	10nF	C0402	CAPACITOR SMD 0402 16V ±10%
11	7	C38, C40, C48, C131, C137, C145, C181	10uF	C0805	CAPACITOR SMD 0805 16V ±10%
12	8	C41, C43, C44, C45, C46, C59, C63, C64	0. 01uF	C0402	CAPACITOR SMD 0402 16V ±10%
13	3	C42, C237, C244	10uF	C0603	CAPACITOR SMD 0603 10V ±10%
14	28	C53, C61, C67, C120, C121, C122, C123, C124, C125, C126, C127, C130 , C133, C151, C168, C169, C170, C171, C176, C194, C197, C198, C213, C214, C231, C233, C239, C245	10uF	C0603	CAPACITOR SMD 0603 16V ±10%
15	3	C66, C69, C75	8. 2pF	C0402	CAPACITOR SMD 0402 16V ±10%
16	2	C71, C242	2. 2uF	C0402	CAPACITOR SMD 0402 16V ±10%
17	18	C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93	0. 1uF/50V	C0603	CAPACITOR SMD 0603 50V ±10%
18	6	C94, C95, C96, C97, C98, C99	0. 1uF/25V	C0603	CAPACITOR SMD 0603 50V ±10%
19	4	C100, C101, C102, C103	0. 1uF	C0402	CAPACITOR SMD 0402 50V ±10%
20	12	C104, C105, C106, C107, C108, C109, C110, C111, C112, C113, C114, C115	22uF	C1206	CAPACITOR SMD 1206 16V ±10%

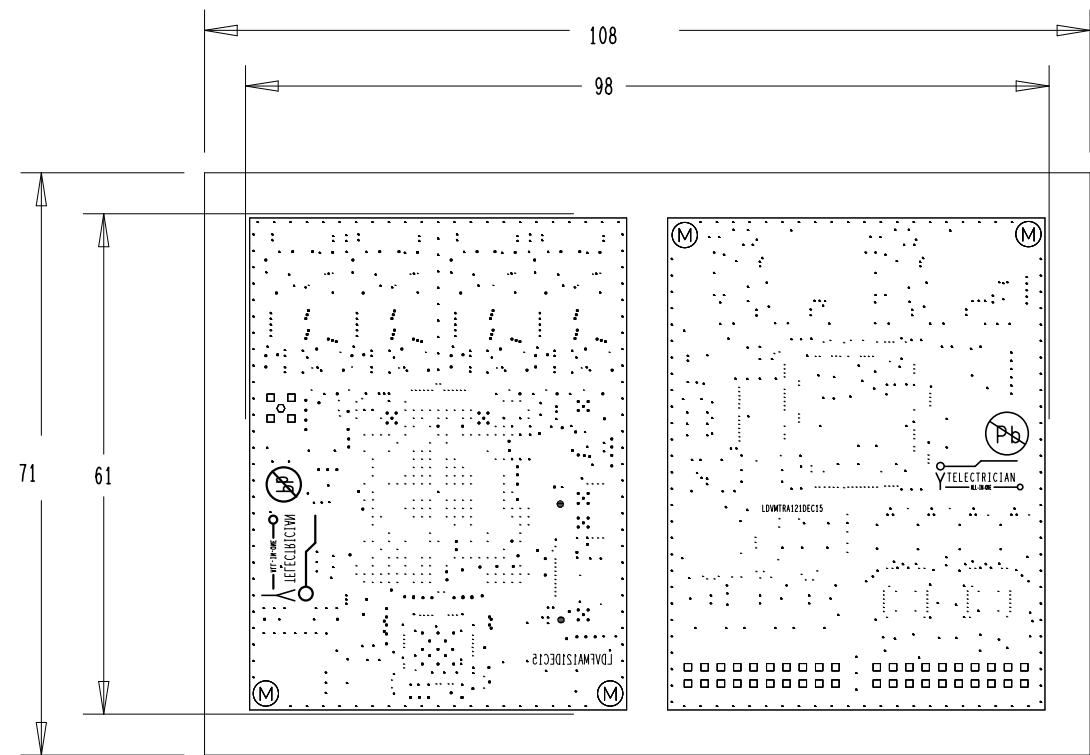
21	4	、	0. 1uF	C0603	CAPACITOR SMD 0402 16V ±10%
22	1	C225	33pF	C0402	CAPACITOR SMD 0402 16V ±10%
23	2	C234, C241	1uF	C0603	CAPACITOR SMD 0603 16V ±10%
24	4	D1, D2, D3, D4	LED	LED0402	LED SMD 0402 BLUE COLOR
25	1	J1	SMA-CONNECTOR	SMA	SMA FEMALE CONNECTOR
26	3	J2, J3, J4	FPC-14P-0. 5	FPC-14P-0D5	FPC 14PINS 0. 5MM HORIZONTAL CONNECTOR
27	2	L1, L2	4. 7uH/2A	CD54-IND-2P	INDUCTOR SMD CD54 SERIES 2A CURRENT
28	2	L3, L4	2. 2uH/2A	CD54-IND-2P	INDUCTOR SMD CD54 SERIES 2A CURRENT
29	14	L5, L6, L7, L8, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19	BLM18SP102SN1D	FB0603	Ferrite Beads 0603 1kOhms@100MHz 25% 1. 2A
30	1	L9	1uH/100mA	L0805	INDUCTOR SMD 0805
31	9	R1, R3, R5, R7, R9, R12, R15, R18, R28	100K	R0402	RESISTOR SMD 0402 ±1% 1/16W
32	14	R2, R4, R6, R8, R11, R14, R17, R20, R61, R63, R67, R70, R72, R74	DNP	R0402	DNP (DO NOT PLACE)
33	1	R10	787K	R0402	RESISTOR SMD 0402 ±1% 1/16W
34	1	R13	499K	R0402	RESISTOR SMD 0402 ±1% 1/16W
35	3	R16, R19, R27	180K	R0402	RESISTOR SMD 0402 ±1% 1/16W
36	4	R21, R22, R23, R24	40. 2K	R0402	RESISTOR SMD 0402 ±1% 1/16W
37	1	R25	328K	R0402	RESISTOR SMD 0402 ±1% 1/16W
38	1	R26	240K	R0402	RESISTOR SMD 0402 ±1% 1/16W
39	4	R29, R30, R31, R32	0	R0603	RESISTOR SMD 0603 ±5% 1/10W
40	4	R33, R34, R35, R36	20K	R0402	RESISTOR SMD 0402 ±1% 1/16W
41	1	R37	10. 5K	R0402	RESISTOR SMD 0402 ±1% 1/16W
42	1	R38	2K	R0402	RESISTOR SMD 0402 ±1% 1/16W
43	1	R39	3. 57K	R0402	RESISTOR SMD 0402 ±1% 1/16W
44	2	R40, R42	1. 15K	R0402	RESISTOR SMD 0402 ±1% 1/16W
45	1	R41	2. 43K	R0402	RESISTOR SMD 0402 ±1% 1/16W
46	1	R43	5. 9K	R0402	RESISTOR SMD 0402 ±1% 1/16W
47	1	R44	11. 8K	R0402	RESISTOR SMD 0402 ±1% 1/16W
48	8	R45, R46, R47, R48, R58, R79, R85, R87	1K	R0402	RESISTOR SMD 0402 ±1% 1/16W
49	3	R49, R59, R66	49. 9	R0402	RESISTOR SMD 0402 ±1% 1/16W
50	1	R50	39	R0603	RESISTOR SMD 0603 ±5% 1/10W
51	2	R51, R88	10	R0603	RESISTOR SMD 0603 ±5% 1/10W
52	1	R52	51	R0603	RESISTOR SMD 0603 ±5% 1/10W
53	4	R53, R54, R55, R57	100	R0402	RESISTOR SMD 0402 ±1% 1/16W
54	5	R56, R60, R62, R64, R65	33	R0402	RESISTOR SMD 0402 ±1% 1/16W
55	4	R68, R69, R73, R75	0	R0402	RESISTOR SMD 0402 ±1% 1/16W
56	7	R71, R77, R80, R81, R82, R83, R84	10K	R0402	RESISTOR SMD 0402 ±1% 1/16W
57	1	R76	10K	R0603	RESISTOR SMD 0603 ±5% 1/10W
58	1	R78	5. 1K	R0402	RESISTOR SMD 0402 ±1% 1/16W
59	1	R86	25	R0402	RESISTOR SMD 0402 ±1% 1/16W
60	3	R89, R90, R91	51	R0402	RESISTOR SMD 0402 ±1% 1/16W
61	2	TP1, TP2	T POINT R	SCREW-M3	M3 SCREW
62	2	TP3, TP4	T POINT S	TP SMD CIR 1D2	TEST POINT
63	3	T1, T2, T3	ETC1-1T-2TR	SM-22	Audio Transformers / Signal Transformers 1-200MHz IL 1. 5dB Impedance Ratio 1:1
64	4	U1, U2, U3, U4	MP2326GD	QFN-14	19V, 4A, 40 μ A IQ, Step-Down Converter
65	4	U5, U6, U7, U8	TPS7A9201DSKR	WS0N-10	2-A, low-noise, high-PSRR, adjustable ultra-low-dropout voltage regulator

66	1	U9	EP4CE40F23I7	FBGA-484	Altera FPGAs (Field Programmable Gate Array)
67	2	U10, U12	SGM2028-3.3	SOT-23-5	500mA, Ultra Low Dropout, Low Power, RF Linear Regulators
68	1	U11	AD8306AR	S0-16	Logarithmic Amplifiers 100 dB-range 10nA-1mA
69	1	U13	SN74LVC2G34DBVR	SOT-23-6	Dual Buffer Gate Y=A
70	1	U14	LTC2207	QFN-48	16-Bit, 105Msps ADC
71	1	U15	TPA711	MSOP-8-PAD	700-mW, mono, analog input, Class-AB audio amplifier
72	1	U16	PCM1754	SSOP-16	stereo audio digital-to-analog converter (DAC)
73	1	U17	EPCQ16ASI8N	S0-8	FPGA Configuration Flash Memory
74	1	Y1	KC3225A49.1520C30E00	TSX-3225-4P	Standard Clock Oscillators 3.3volts 49.1520MHz 3.2x2.5mm CMOS Output Format

Bill Of Materials --- MOTOR					
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 $\pm 5\%$ 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 $\pm 5\%$ 1/16W
43	1	R4	68K	R0402	RESISTOR SMD 0402 68K $\pm 1\%$ 1/16W
44	1	R7	499K	R0402	RESISTOR SMD 0402 499K $\pm 5\%$ 1/16W
45	1	R9	12K	R0402	RESISTOR SMD 0402 12K $\pm 1\%$ 1/16W
46	2	R13, R15	40.2K	R0402	RESISTOR SMD 0402 40.2K $\pm 5\%$ 1/16W
47	1	R14	336K	R0402	RESISTOR SMD 0402 294K $\pm 5\%$ 1/16W
48	1	R16	768K	R0402	RESISTOR SMD 0402 768K $\pm 5\%$ 1/16W
49	2	R17, R18	0	R0603	RESISTOR SMD 0603 0 $\pm 5\%$ 1/10W
50	1	R19	4.7K	R0402	RESISTOR SMD 0402 4K7 $\pm 5\%$ 1/16W
51	8	R20, R22, R24, R25, R28, R29, R67, R70	1K	R0402	RESISTOR SMD 0402 1K $\pm 5\%$ 1/16W
52	2	R21, R62	560	R0603	RESISTOR SMD 0603 560 $\pm 5\%$ 1/10W
53	10	R23, R26, R27, R58, R65, R66, R78, R79, R80, R81	10K	R0402	RESISTOR SMD 0402 10K $\pm 5\%$ 1/16W
54	4	R30, R37, R40, R46	33	R0402	RESISTOR SMD 0402 33 $\pm 5\%$ 1/16W
55	4	R32, R33, R34, R35	10	R0402	RESISTOR SMD 0402 10 $\pm 5\%$ 1/16W
56	14	R36, R49, R55, R68, R71, R72, R73, R74, R75, R76, R84, R85, R86, R87	0	R0402	RESISTOR SMD 0402 0 $\pm 5\%$ 1/16W
57	4	R41, R42, R43, R44	2.05K, 1%	R0402	RESISTOR SMD 0402 2.05K $\pm 1\%$ 1/16W
58	4	R50, R51, R77, R82	0.47	R3216	RESISTOR SMD 3216 0.47 $\pm 1\%$ 1/4W
59	2	R52, R83	6.8K	R0402	RESISTOR SMD 0402 6K8 $\pm 5\%$ 1/16W
60	3	R53, R54, R61	1K, 1%	R0603	RESISTOR SMD 0603 1K $\pm 1\%$ 1/10W
61	2	R56, R57	10K	R0402	RESISTOR SMD 0402 1K $\pm 5\%$ 1/16W
62	1	R63	86.6K	R0402	RESISTOR SMD 0402 86.6K $\pm 1\%$ 1/16W
63	1	R64	21.5K	R0402	RESISTOR SMD 0402 21.5K $\pm 1\%$ 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	WSO-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



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LDVFMA121DEC15=LDV+FM DEMODULATION+A1(REVISION)+21(YEAR)+DEC(DECEMBER)+15(DAY)

DRILL LEGEND TABLES

DRILL CHART: TOP to GND-L2			
ALL UNITS ARE IN MILLIMETERS			
FIGURE	FINISHED_SIZE	PLATED	QTY
.	0.2	PLATED	85

DRILL CHART: GND-L9 to BOTTOM			
ALL UNITS ARE IN MILLIMETERS			
FIGURE	FINISHED_SIZE	PLATED	QTY
.	0.15	PLATED	1
.	0.2	PLATED	132

DRILL CHART: TOP to BOTTOM			
ALL UNITS ARE IN MILLIMETERS			
FIGURE	FINISHED_SIZE	PLATED	QTY
.	0.15	PLATED	463
.	0.2	PLATED	725
□	0.9	PLATED	44
○	1.0	PLATED	1
Ⓜ	3.2	NON-PLATED	4

