



**TRINAMIC**  
MOTION CONTROL

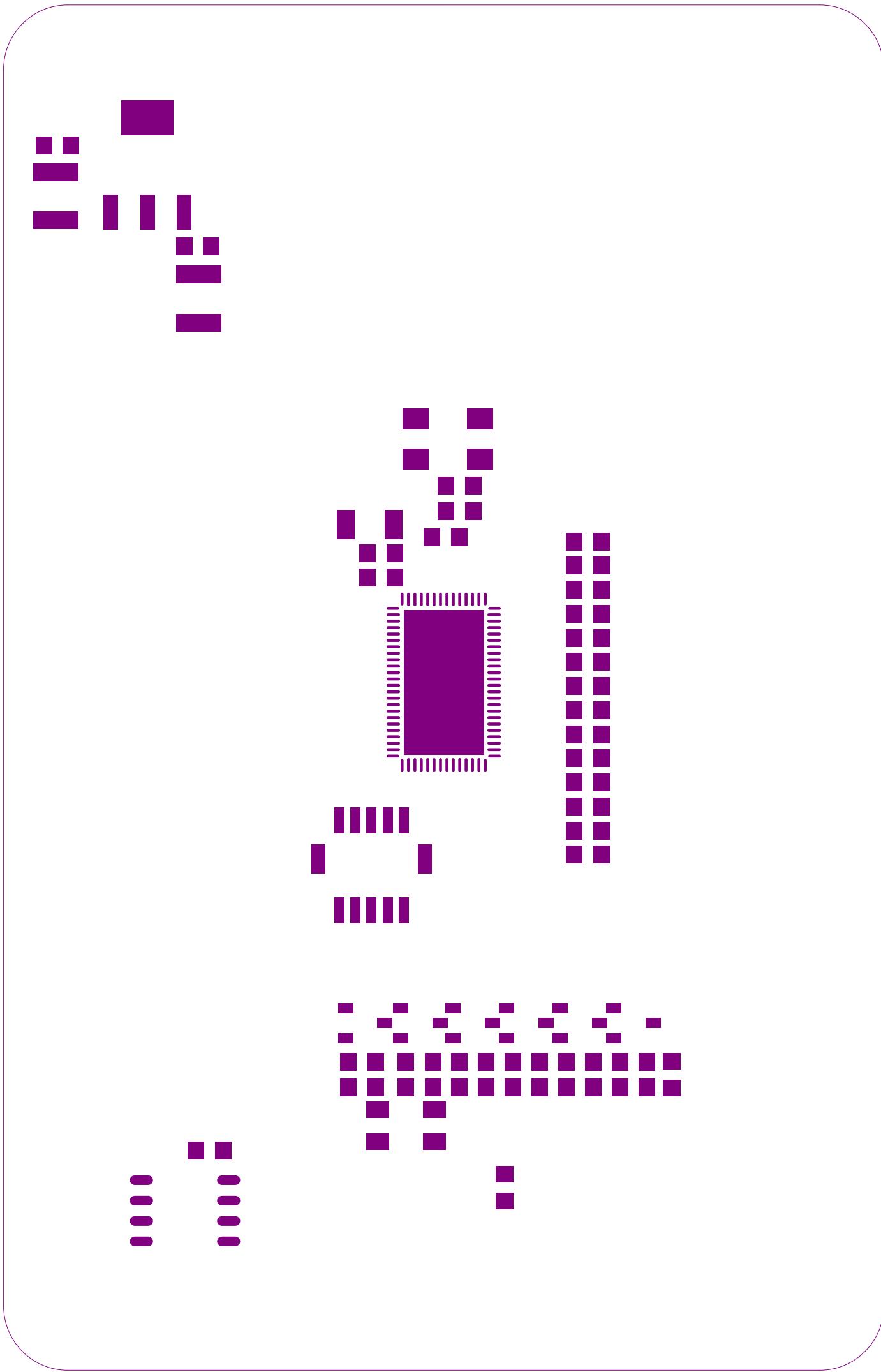
[www.TRINAMIC.com](http://www.TRINAMIC.com)  
TMC-Evaluation-Platform:  
**TMC4671-EVAL**  
Interfaces:  
**SPI, UART, S/D**

v1.2



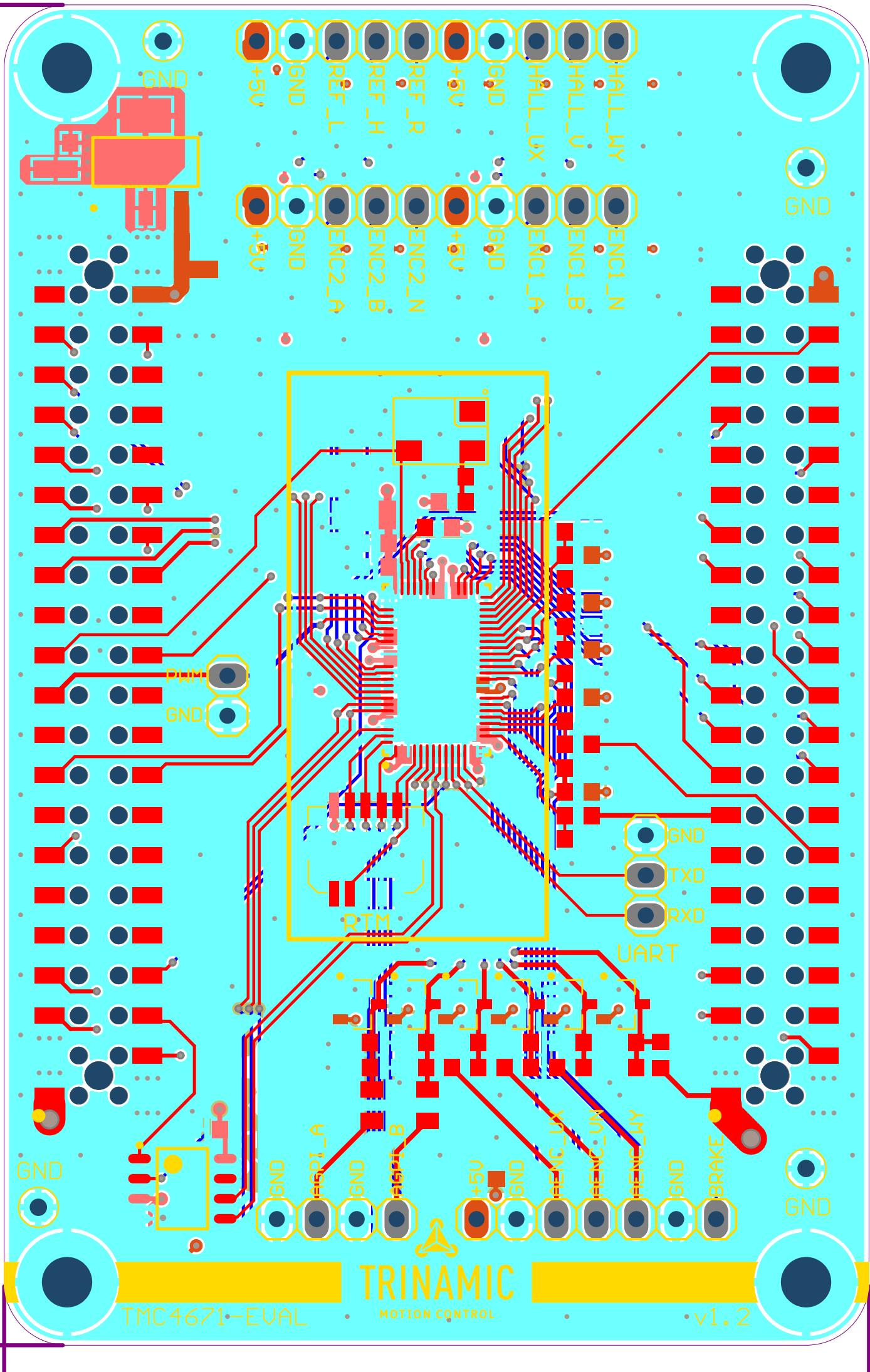
open source  
hardware

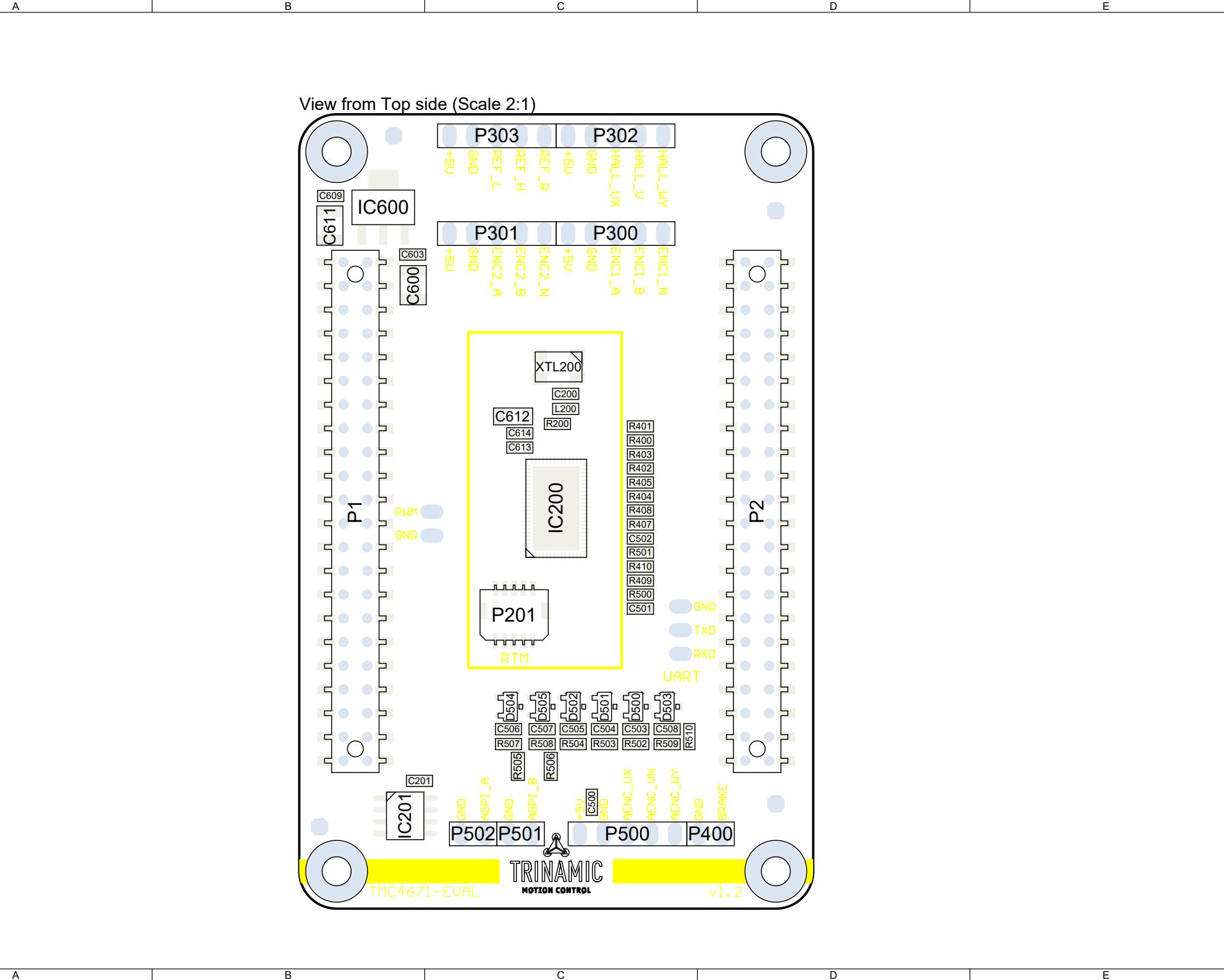
+5V  
+3V3  
GND  
ADC\_IO\_INN  
AENC\_IY\_INN  
AENC\_WY\_INN  
AENC\_UN\_INN  
DBG\_SPI\_MISO  
DBG\_SPI\_SCK  
DBG\_SPI\_TRG  
DBG\_UX\_INN  
GPIO01  
GPIO02  
GPIO100



85.00

55.00





A

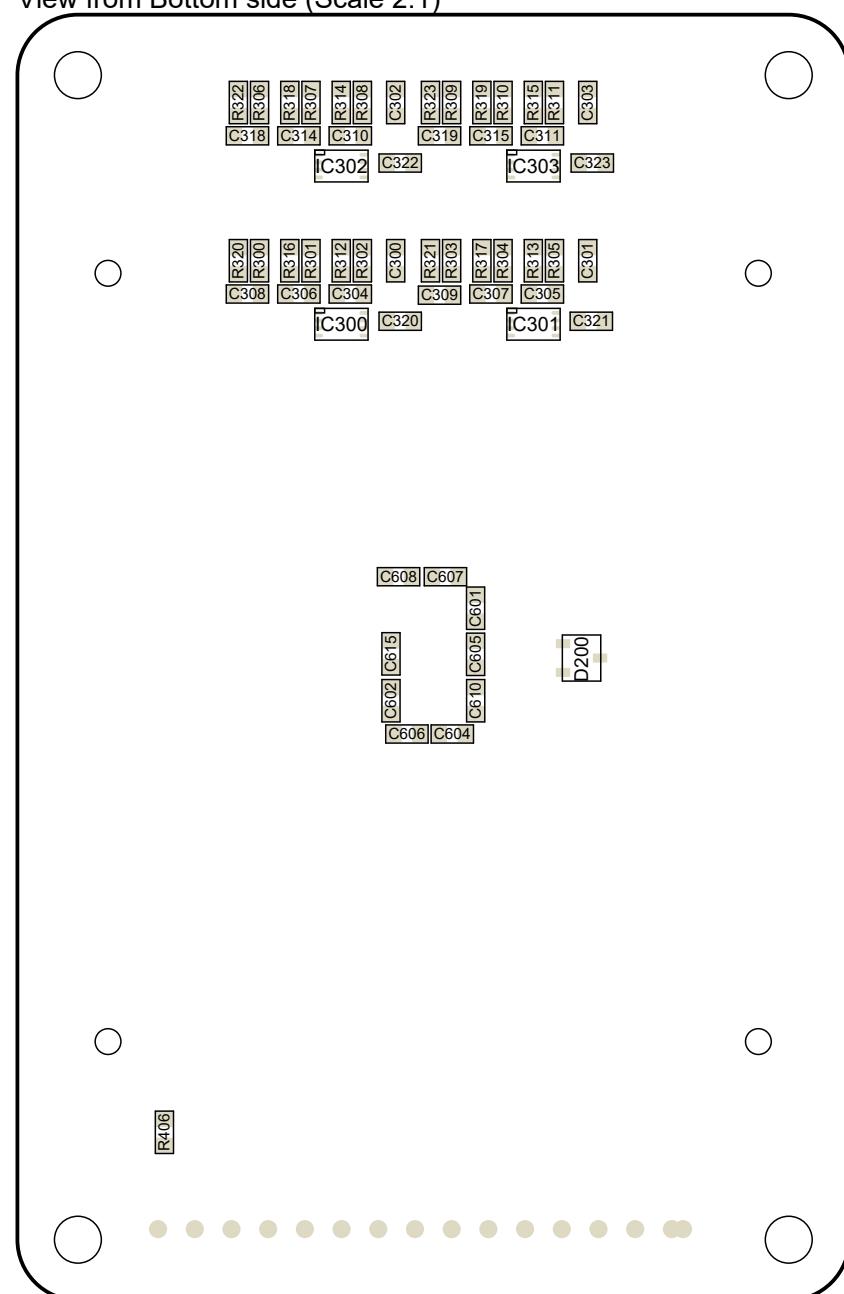
B

C

D

E

View from Bottom side (Scale 2:1)



A

B

C

D

E

A

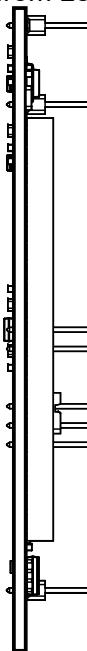
B

C

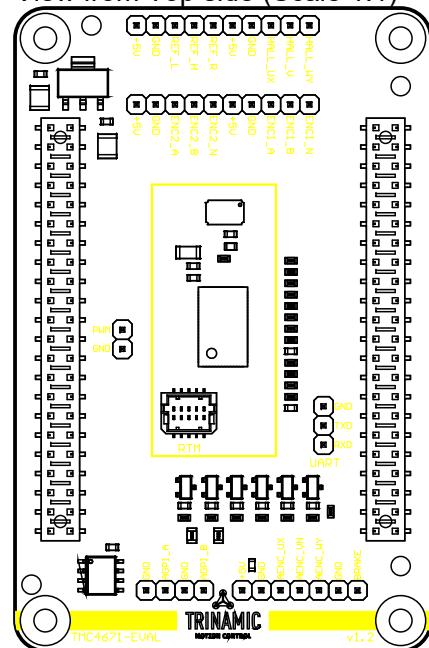
D

E

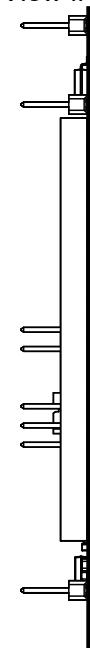
View from Left side (Scale 1:1)



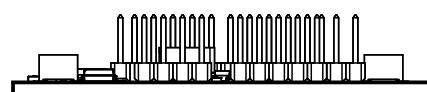
View from Top side (Scale 1:1)



View from Right side (Scale 1:1)



View from Front side (Scale 1:1)



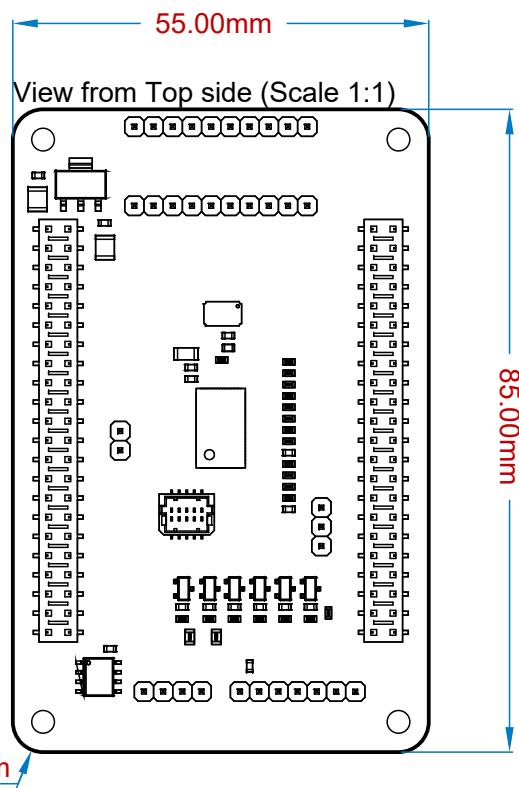
## Layer Stack Legend

	Material	Layer	Thickness	Dielectric Material	Type	Gerber
1	Surface Material	Top Overlay	0.010mm(0.400mil)	Solder Resist	Legend	GTO
	Copper	Top Solder	0.035mm(1.378mil)	Solder Resist	Solder Mask	GTS
	Copper	Top	0.127mm(5.000mil)	FR-4	Signal	GTL
	Core				Dielectric	
	Copper	GND1	0.035mm(1.378mil)		Internal Plane	GP1
	Prepreg		0.127mm(5.000mil)		Dielectric	
	Copper	MID	0.035mm(1.378mil)		Signal	G1
	Core		0.850mm(33.465mil)		Dielectric	
	Copper	VM	0.035mm(1.378mil)		Signal	G2
	Prepreg		0.127mm(5.000mil)		Dielectric	
2	Copper	GND2	0.035mm(1.378mil)		Internal Plane	GP2
	Core		0.127mm(5.000mil)		Dielectric	
	Copper	Bottom	0.035mm(1.378mil)		Signal	GBL
	Surface Material	Bottom Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GBS
					Legend	GBO

Total thickness: 1.588mm(62.533mil)

### Notes:

1. MATERIAL : FR-4-2 NATURAL EPOXY/FIBERGLASS
2. APPLY SOLDERMASK ON BOTH SIDES  
COLOR: WHITE  
FABRICATOR SHALL MAKE NECESSARY MODIFICATIONS TO SOLDERMASK PHOTOPLOT FILES FOR OPTIMAL SOLDERMASK COVERAGE BETWEEN FINE PITCH COMPONENT LEADS.
3. FINISH ALL EXPOSED COPPER SURFACES WITH IMMERSION GOLD.
4. HOLE SIZES APPLY AFTER PLATING.
5. APPLY SILKSCREEN TO BOTH SIDES  
COLOR: BLACK  
FABRICATOR SHALL MAKE NECESSARY MODIFICATIONS TO LEGEND PHOTOPLOT FILES TO ENSURE NO LEGEND INK COVERS ANY COMPONENT PAD OR VIA PAD.
6. MODIFIED PHOTOPLOT FILES ARE TO BE RETURNED BEFORE ORDER DELIVERED.
7. ALL PRINTED CIRCUITBOARD NETS SHALL BE ELECTRICALLY TESTED FOR OPENS AND SHORTS.
8. FABRICATION OF PCB TO COMPLY WITH IPC-A-600 CLASS II . CURRENT REVISION.



Title: TMC4671-EVAL

Version: 1.2

Date: 9/4/2019 Time: 3:43 PM 3:43 PM

# TMC4671\_EVAL\_V1.0

A  
[1]\_InterfaceConnectors  
[1]\_InterfaceConnectors.SchDoc

B  
[2]\_Communication\_Inputs  
[2]\_Communication\_Inputs.SchDoc

[3]\_Output\_Feedback  
[3]\_Output\_Feedback.SchDoc

[4]\_Output\_Feedback\_2  
[4]\_Output\_Feedback\_2.SchDoc

C  
[5]\_Analog\_input\_filters  
[5]\_Analog\_input\_filters.SchDoc

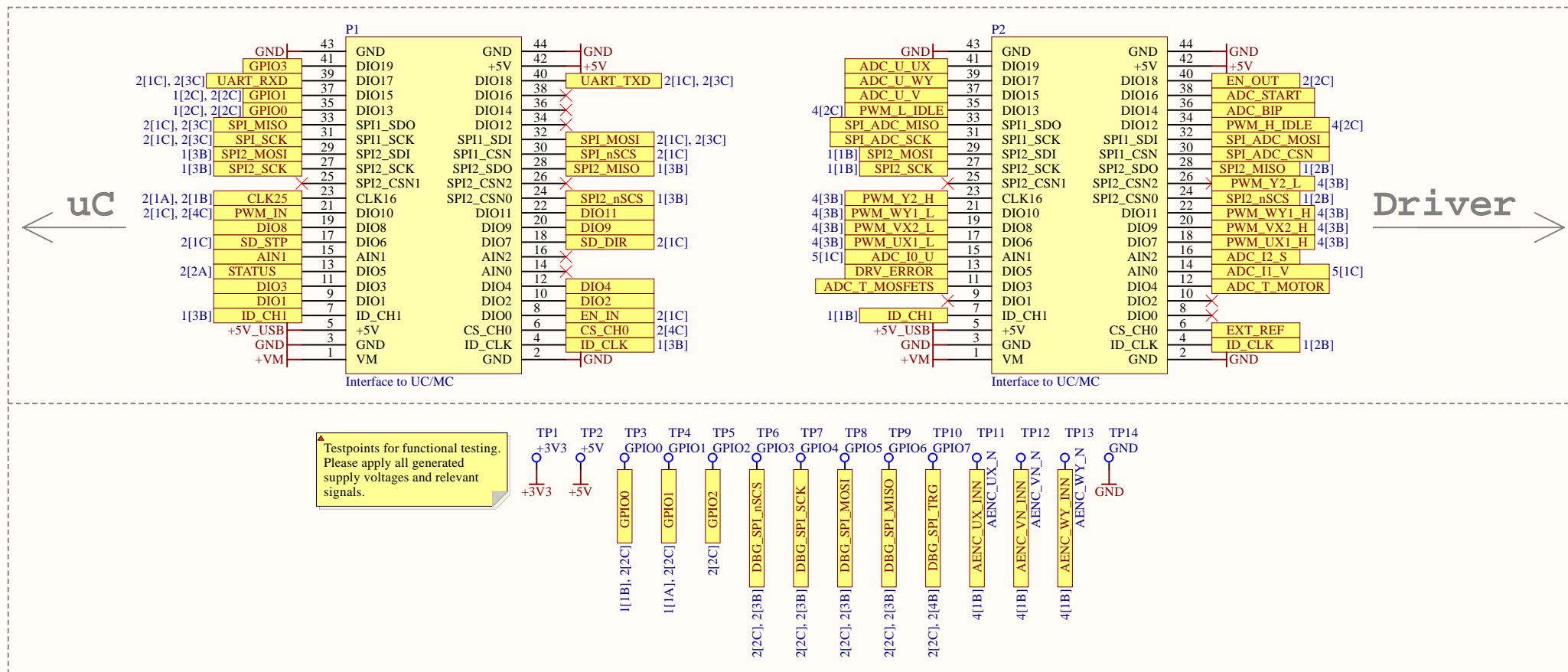
[6]\_PSU  
[6]\_PSU.SchDoc

D  
ChangeLog  
ChangeLog.SchDoc

Title: TMC4671_EVAL_V1.0		
Size: <b>A4</b>	Project: TMC4671-EVAL	Version: 1.2
Date: 9/4/2019	Time: 3:43:38 PM	Sheet 0 of 8
File: TMC4671-EVAL_V1.2.SchDoc		



# Interface connectors, mounting holes & testpads



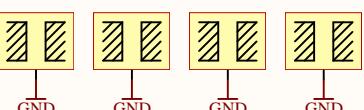
## SILK

## Mounting holes

## Probe GND

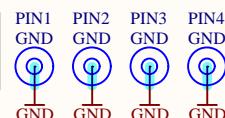
## TMC4671-EVAL

SILK1  
BACK SIDE GRAPHICS



SILK2  
TMC LOGO SMALL

Please spread pins for probe ground connection on the board:

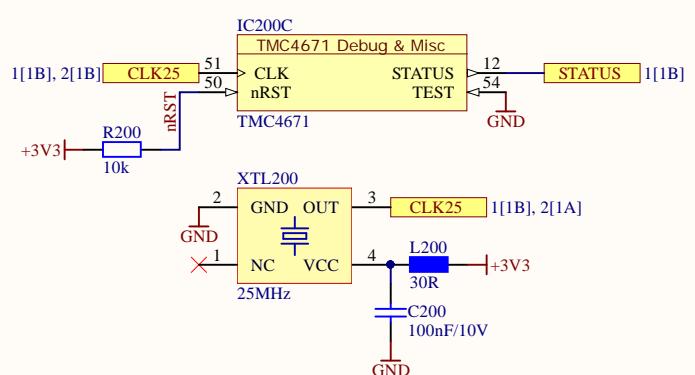


Title: Interface connectors, mounting holes & testpads	
Size: <b>A4</b>	Project: TMC4671-EVAL
Date: 9/4/2019	Time: 3:43:38 PM
File: [1]_InterfaceConnectors.SchDoc	Version: 1.2

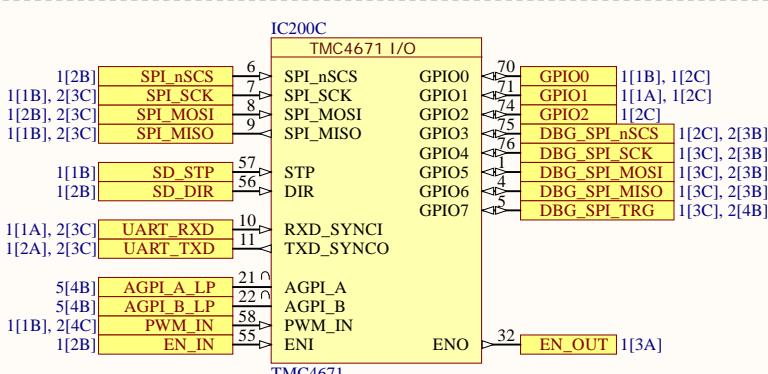
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# Communication & Inputs

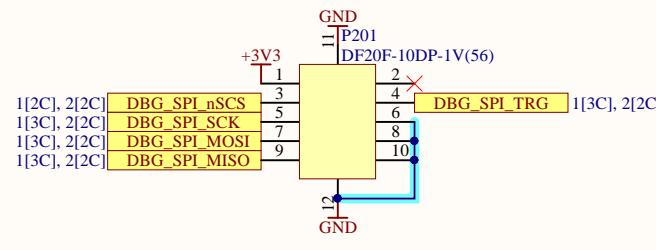
## Clock & Misc



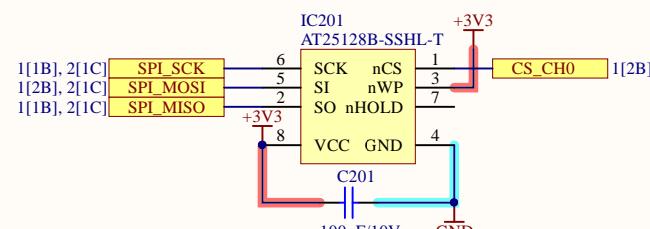
## TMC4671 I/O



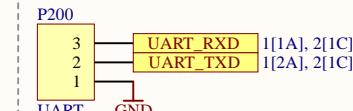
## TMC Realtime Monitoring Interface



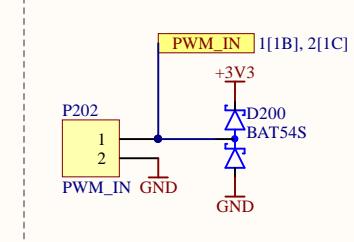
## Module identification EEPROM



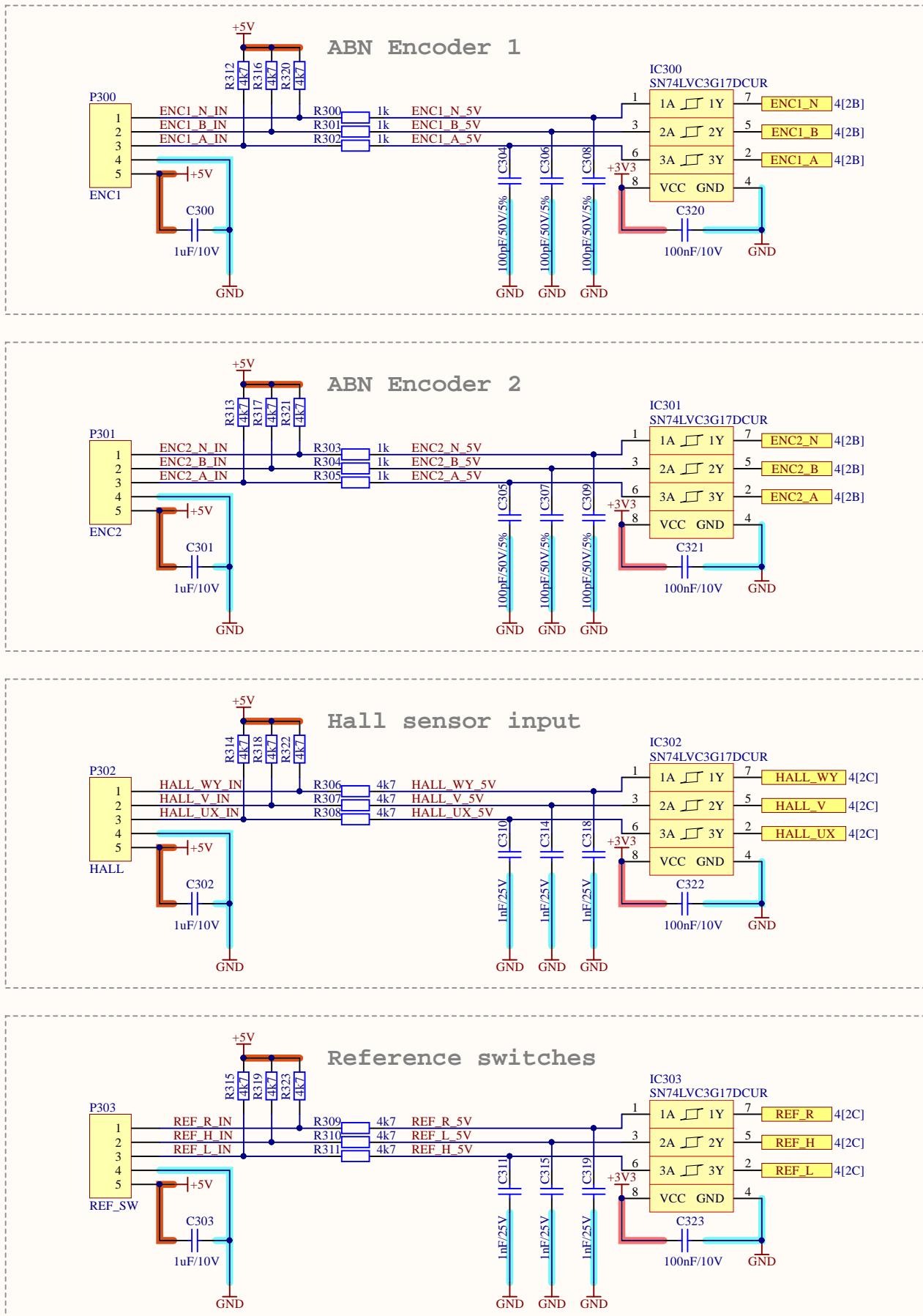
## UART / Sync I/O



## PWM Input



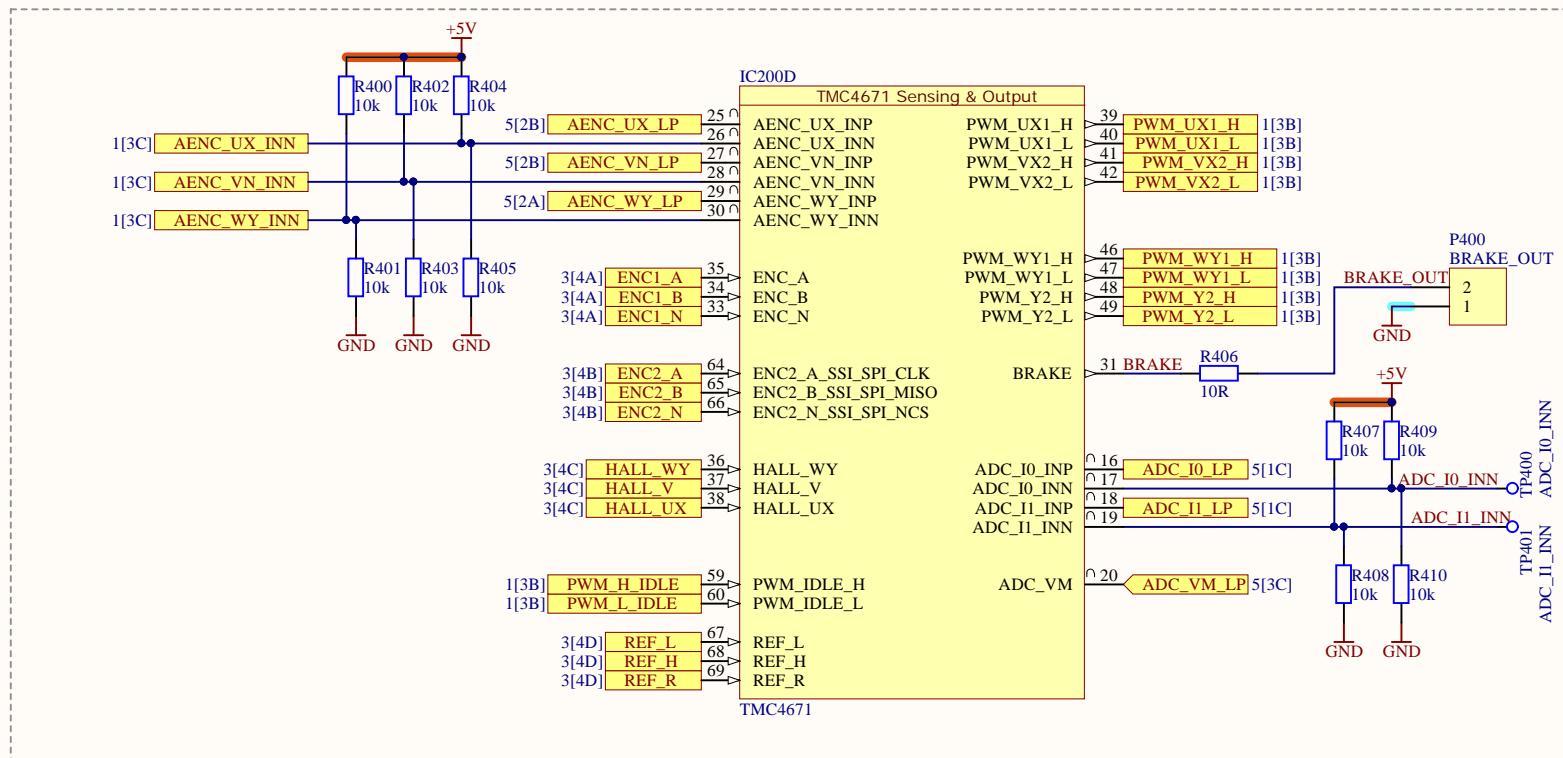
# Output & Feedback



Title: Output & Feedback		
Size: <b>A4</b>	Project: TMC4671-EVAL	Version: 1.2
Date: 9/4/2019	Time: 3:43:39 PM	Sheet 3 of 8
File: [3].Output_Feedback.SchDoc		

# Output & Feedback 2

## TMC4671 Sensing & Output

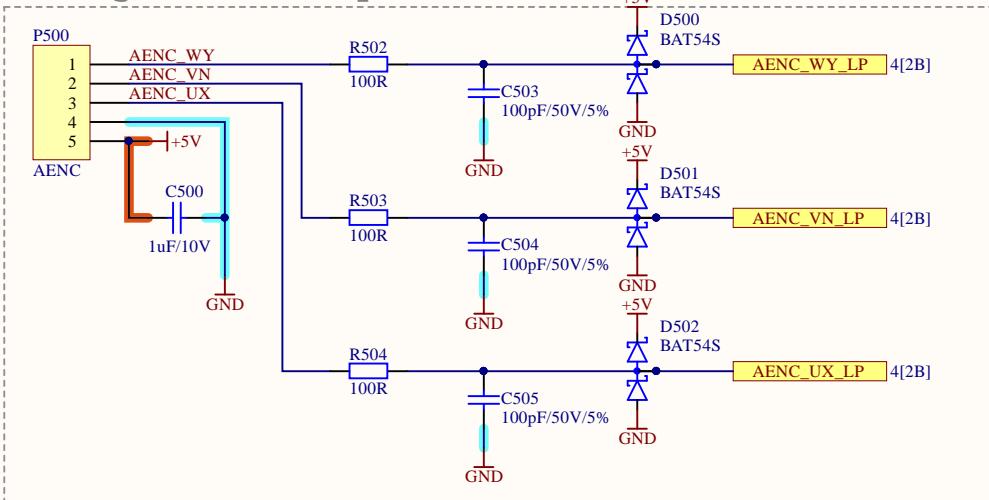


Title: Output & Feedback 2		
Size: A4	Project: TMC4671-EVAL	Version: 1.2
Date: 9/4/2019	Time: 3:43:40 PM	Sheet 4 of 8
File: [4]_Output_Feedback_2.SchDoc		

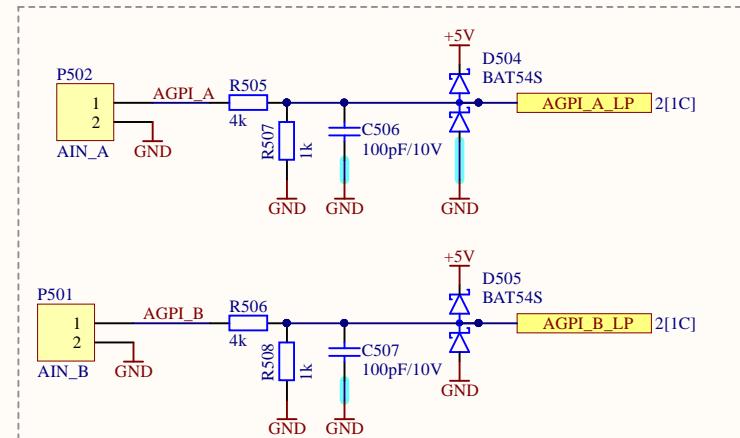


# Analog inputs & filters

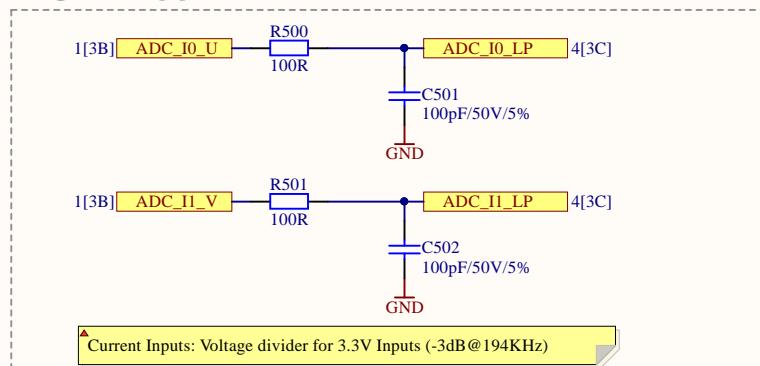
**Analog encoder input + filters**



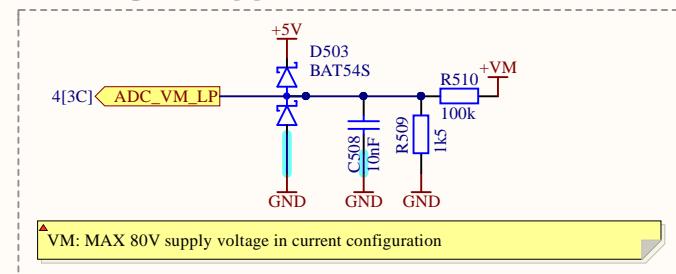
**Analog inputs A & B with filters**



**ADC Filter**



**VM ADC Filter**



Title: Analog inputs & filters

Size: A4 Project: TMC4671-EVAL Version: 1.2

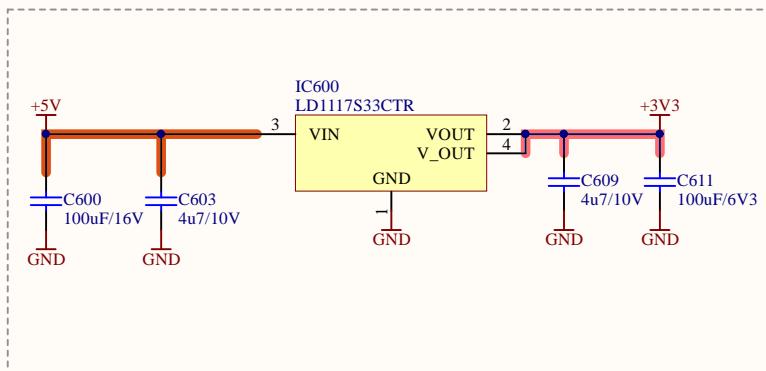
Date: 9/4/2019 Time: 3:43:40 PM Sheet 5 of 8

File: [5]\_Analog\_input\_filters.SchDoc

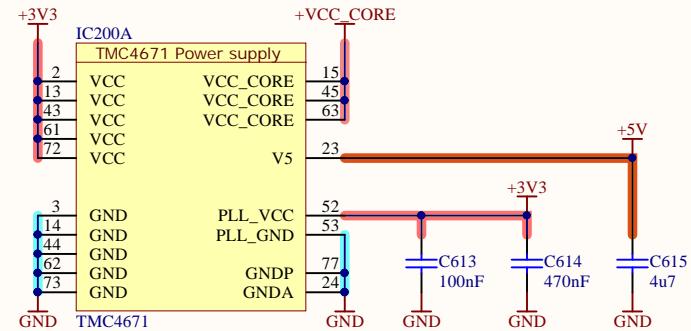
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# PSU

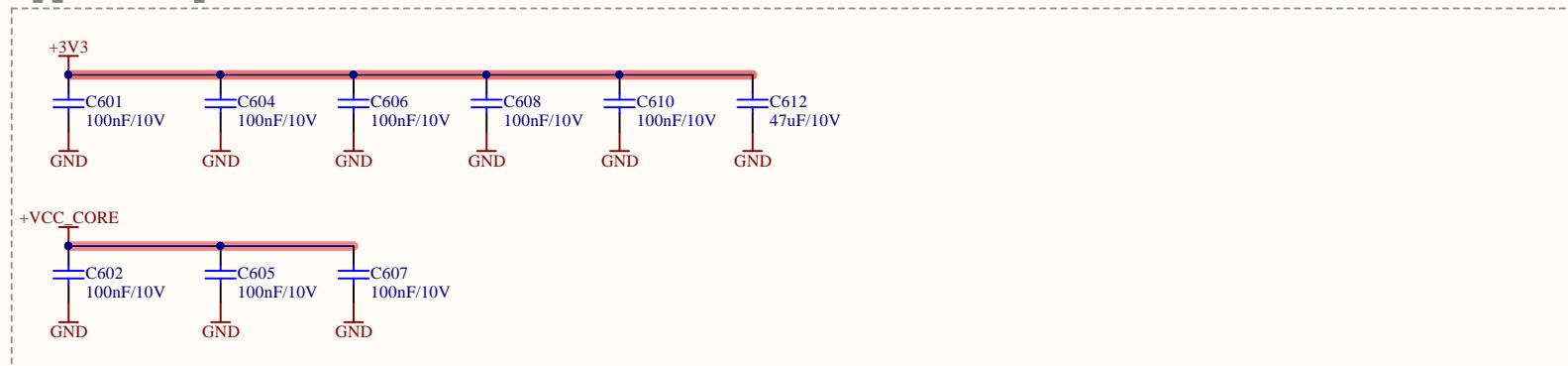
+3V3 LDO



TMC power



Bypass capacitors



Title: PSU		
Size: A4	Project: TMC4671-EVAL	Version: 1.2
Date: 9/4/2019	Time: 3:43:40 PM	Sheet 6 of 8
File: [6]_PSU.SchDoc		



# ChangeLog

## V1.0 - Initial design

# 25.09.2017

- Fixed XTL200 FOX924B pinout bug (swapped pins 3 & 4).

## V1.1 - Bug fixes

# 04.12.2017

- Fixed twisted AENC\_UX and AENC\_WY nets.
- Changed P200 pin order on PCB to [+5V, GND, AENC\_UX, AENC\_VN, AENC\_WY].
- Minor clean-ups.

# 22.12.2017

- Reduced TMC4671 footprint pad widths by 0.7mil.
- Increased TMC4671 pad clearances from 6mil to match pad spacing 8.5mil.

## V1.2 - Bug fixes

# 03.09.2019

- Removed SRV05-4 protection ICs.
- Moved all 4k7 pull-ups next to pinheaders on page 4.
- Changed encoder filter values to 1k/100pF.
- Changed hall sensor and reference input filter values to 4k7/1nF.

Title:	ChangeLog	
Size:	A4	Project: TMC4671-EVAL
Date:	9/4/2019	Time: 3:43:40 PM Sheet 7 of 8
File:	ChangeLog.SchDoc	



# BOM

Project: TMC4671-EVAL

Version: 1.2

Date: 9/4/2019

#	Quantity	MPN	Comment	Designator	FootPrint	Description	Note	MF
1	14	MC0603B104K100CT	100nF/10V	C200, C201, C320, C321, C322, C300, C301, C302, C303, C500	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 1.0μF 10V ±10% Y5P MC Series		Multicomp
2	5	MC0603X105K100CT	1uF/10V	C300, C301, C302, C303, C500	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 1.0μF 10V ±10% Y5P MC Series		MULTICOMP
3	11	MC0603N101J500CT	100pF/50V/5%	C304, C305, C306, C307, C308, C310, C311, C312, C313, C314, C315, C318, C319	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 0.1μF 50V ±10% Y5P MC Series		MULTICOMP
4	6	MC0603B102K250CT	1nF/25V	C310, C311, C314, C315, C318, C319	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 1.0nF 25V ±10% Y5P MC Series		MULTICOMP
5	2	MCMT18N101F100CT	100pF/10V	C506, C507	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 0.1μF 10V ±10% Y5P MC Series		MULTICOMP
6	1	MCSH18B103K100CT	10nF	C508	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 0.01μF 10V ±10% Y5P MC Series		MULTICOMP
7	1	EMK325ABJ107MM-T	100uF/16V	C600	C1210	SMD Multilayer Ceramic Capacitor, 1210 [3225 Metric] 100μF 16V ±10% Y5P M Series		TAIYO YUDEN
8	2	MC0603X475K100CT	4u7/10V	C603, C609	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 4.7μF 10V ±10% Y5P MC Series		MULTICOMP
9	1	GRM31CR60J107ME39L	100uF/6V3	C611	C1210	SMD Multilayer Ceramic Capacitor, 1210 [3225 Metric] 100μF 6V ±3% X5R M Series		MURATA
10	1	GRM31CR61A476ME15L	47uF/10V	C612	C1206	SMD Multilayer Ceramic Capacitor, 1206 [3216 Metric] 4.7μF 10V ±10% Y5P MC Series		MURATA
11	1	MC0603B104K100CT	100nF	C613	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 0.1μF 10V ±10% Y5P MC Series		Multicomp
12	1	MC0603X474K160CT	470nF	C614	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 0.47μF 16V ±10% X5R MC Series		Multicomp
13	1	MC0603X475K100CT	4u7	C615	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric] 4.7μF 10V ±10% Y5P MC Series		MULTICOMP
14	7	BAT54S	BAT54S	D200, D500, D501, D502, D503, D504, D505	SOT95P237X130-3N	Small Signal Schottky Diode, Dual Series, 30 V, 200 mA 1 V, 600 mA 125 °C		TAIWAN SEMICONDUCTOR
15	1	TMC4671	TMC4671	IC200	QFN40P1050X650X90_H5-77N			TRINAMIC
16	1	AT25128B-SHSL-T	AT25128B-SHSL-T	IC201	SOP127P600X175-8N	EEPROM, SPI, 128 Kbit, 16K x 8bit, 20 MHz, SOIC, 8 Pin		MICROCHIP
17	4	SN74LVC3G17DCUR	SN74LVC3G17DCUR	IC300, IC301, IC302, IC303	TSSOP50P310X90-8L	Triple Schmitt-Trigger Buffer, 74LVC3G17, 1.65 V to 5.5 V / VSSOP-8		TEXAS INSTRUMENTS
18	1	LD1117S33CTR	LD1117S33CTR	IC600	SOT230P700X180-4N	Fixed LDO Voltage Regulator, 4.75V to 15V, 1.1V Dropout, 3.3Vout, 0.5mAout, SOT-223-4		STMICROELECTRONICS
19	1	MFB-160808-0030PQ	30R	L200	L0603	Ferrite Bead, 30 ohm, 0603 [1608 Metric], MFB Series, 3.4 A, 0.04 ohm, ±25%		MEC MARCOM
20	2	HLE-122-02-L-DV	Interface to UC/MC	P1, P2	Interface_Connector	Board-To-Board Connector, 2.54 mm, 44 Contacts, Receptacle, HLE Series, Surface Mount, 2 Rows		SAMTEC
21	1		UART	P200	TH_HDR_1X3	Header, 3-Pin	Not fitted	
22	1	DF20F-10DP-1V(56)	DF20F-10DP-1V(56)	P201	CON, TMC Debug SPI	Wire-To-Board Connector, 1 mm, 10 Contacts, Header, DC-20 Series, Surface Mount, 2 Rows		Hirose Electric Co Ltd
23	1		PWM_IN	P202	TH_HDR_1X2	Header, 2-Pin	Not fitted	
24	1		ENC1	P300	TH_HDR_1X5	Header, 5-Pin		
25	1		ENC2	P301	TH_HDR_1X5	Header, 5-Pin		
26	1		HALL	P302	TH_HDR_1X5	Header, 5-Pin		
27	1		REF_SW	P303	TH_HDR_1X5	Header, 5-Pin		
28	1		BRAKE_OUT	P400	TH_HDR_1X2	Header, 2-Pin		
29	1		AENC	P500	TH_HDR_1X5	Header, 5-Pin		
30	1		AIN_B	P501	TH_HDR_1X2	Header, 2-Pin		
31	1		AIN_A	P502	TH_HDR_1X2	Header, 2-Pin		
32	11	MC0063W0603110K	10k	R200, R400, R401, R402, R403, R404, R405, R407, R408, R409	R0603	SMD Chip Resistor, Thick Film, 10 kohm, 50 V, 0603 [1608 Metric] 6.3 mW, ±1% MC Series		MULTICOMP
33	8	MCWR06X1001FTL	1k	R300, R301, R302, R303, R304, R305, R507, R509	R0603	SMD Chip Resistor, Thick Film, 1 kohm, 50 V, 0603 [1608 Metric] 100 mW, ±1% MCWB Series, SMD		MULTICOMP
34	18	WR06X4701FTL	4k7	R306, R307, R308, R309, R310, R311, R312, R313, R314, R315	R0603	SMD Chip Resistor, 4.7 kohm, 75 V, 0603 [1608 Metric] 100 mW, ±1% WPNP Series		WALSIN
35	1	MC0063W0603110K	10R	R406	R0603	SMD Chip Resistor, Thick Film, 10 ohm, 50 V, 0603 [1608 Metric] 100 mW, ±1% MCWD Series		MULTICOMP
36	5	MCWR06X1000FTL	100R	R500, R501, R502, R503, R504	R0603	SMD Chip Resistor, Thick Film, 100 ohm, 50 V, 0603 [1608 Metric] 100 mW, ±1% MCWD Series		MULTICOMP
37	2	CRCW08054K0FKTA	4k	R505, R506	R0805	SMD Chip Resistor, Thick Film, 4 kohm, 150 V, 0805 [0201 Metric] 125 mW, ±1% CPCW Series		VISHAY
38	1	MCWR06X1501FTL	1k5	R509	R0603	SMD Chip Resistor, Thick Film, 1.5 kohm, 50 V, 0603 [1608 Metric] 100 mW, ±1% MCWB Series		MULTICOMP
39	1	MCWR06X1003FTL	100k	R510	R0603	SMD Chip Resistor, Thick Film, 100 kohm, 50 V, 0603 [1608 Metric] 100 mW, ±1% MCWB Series		MULTICOMP
40	1	FOX924B-25.000	25MHz	XTL200	FOX924B-25.000	TCXO, 25 MHz, 2.5 ppm, SMD, 5mm x 3.2mm,		FOX ELECTRONICS

Approved

Notes

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