

TRINAMIC
MOTION CONTROL

TMC4671-EVAL

v1.1



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MOTION CONTROL

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TMC-Evaluation-Platform:

TMC4671-EVAL

Interfaces:

SPI, UART, S/D

v1.1



open source
hardware

GND
ADC_IQ_INN
ADC_I1_INN
AENC_WY_INN
AENC_UN_INN
DBG_SPI_MISO
DBG_SPI_TRG
DBG_SPI_SCK
GPI02
GPI01
GPI00
+3V3
+5V



MOTION CONTROL

 TMC-Evaluation-Plattform:

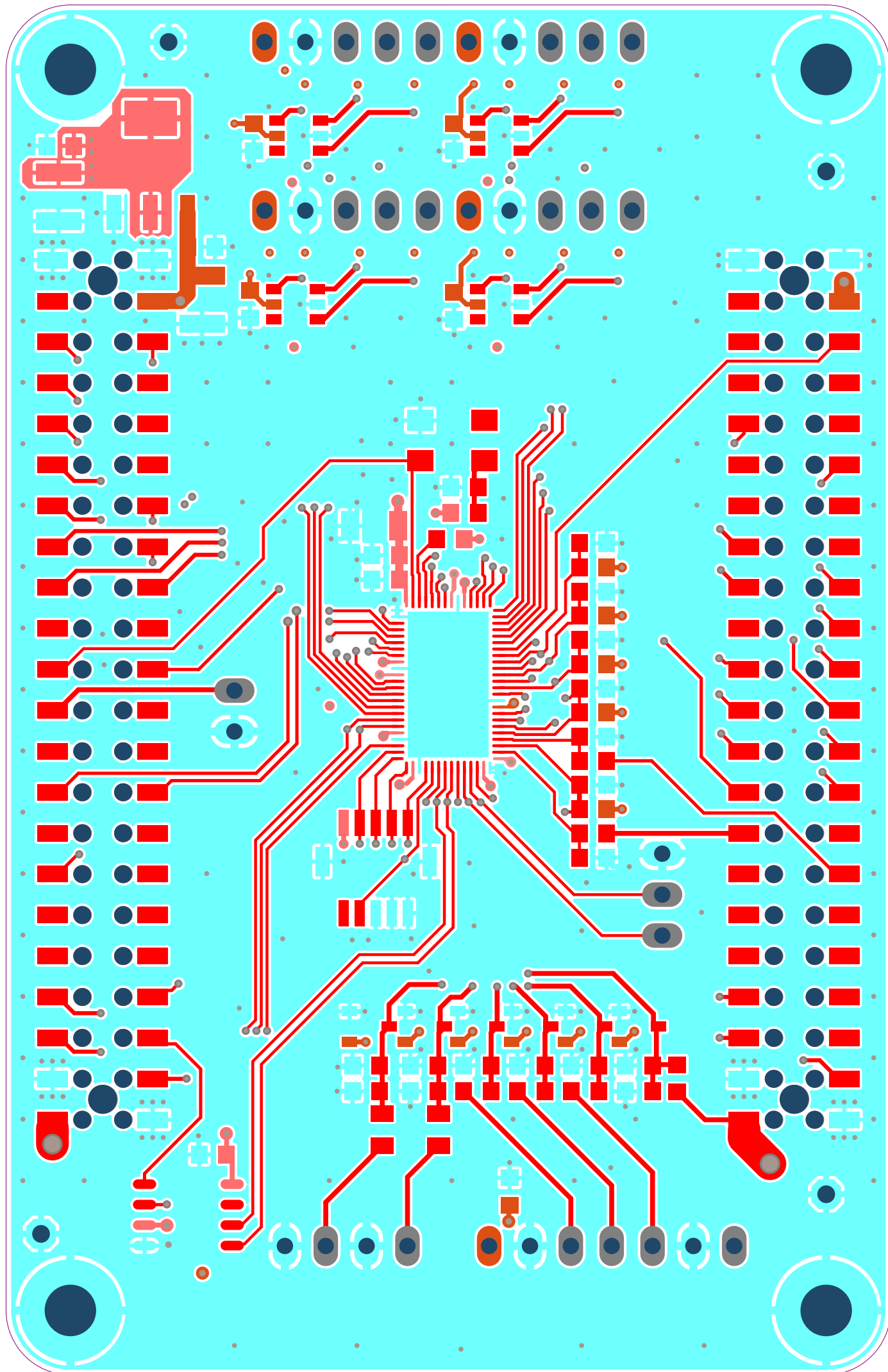
Interfaces:

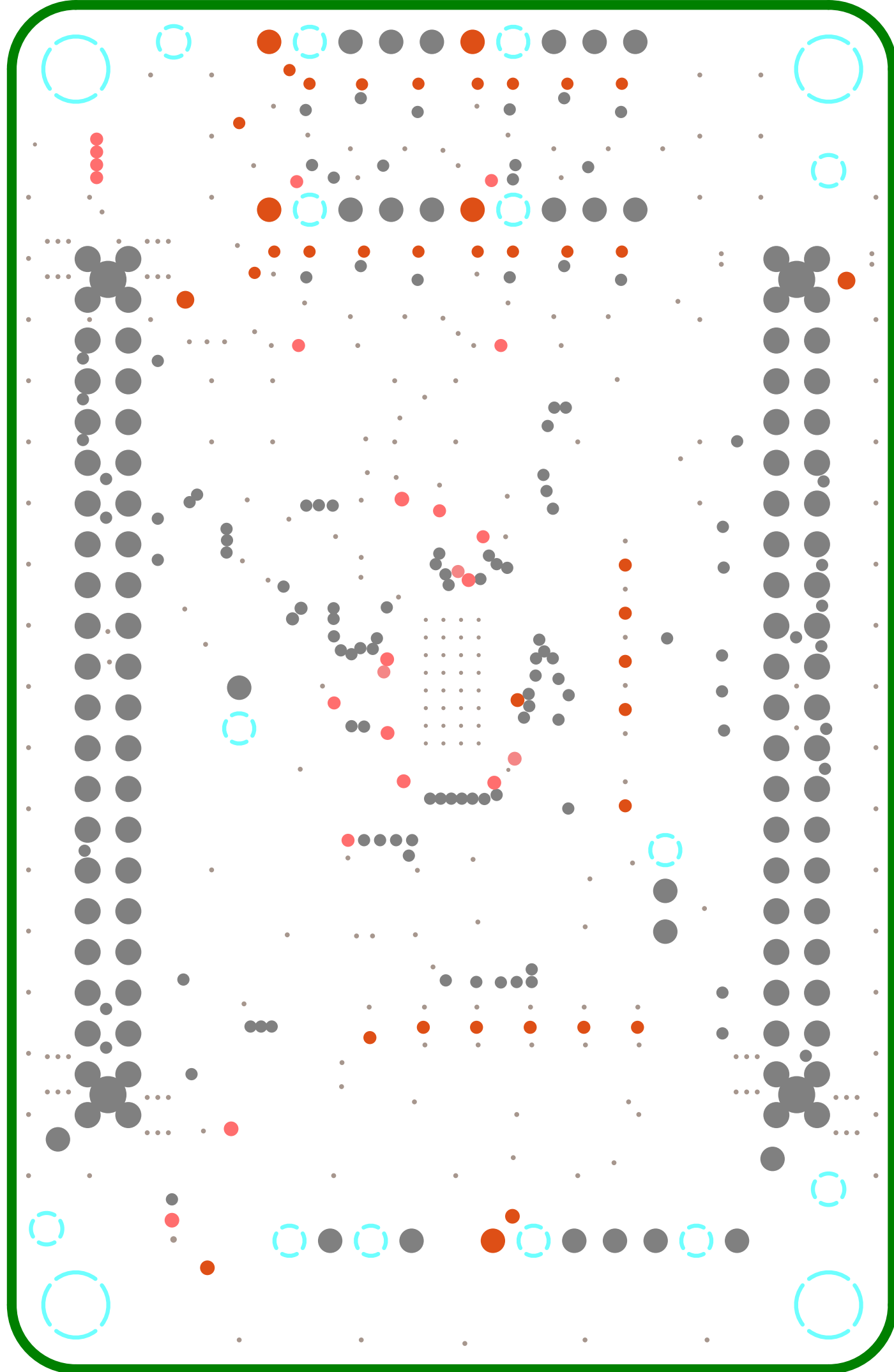
Interfaces:
SPI, UART, S/D

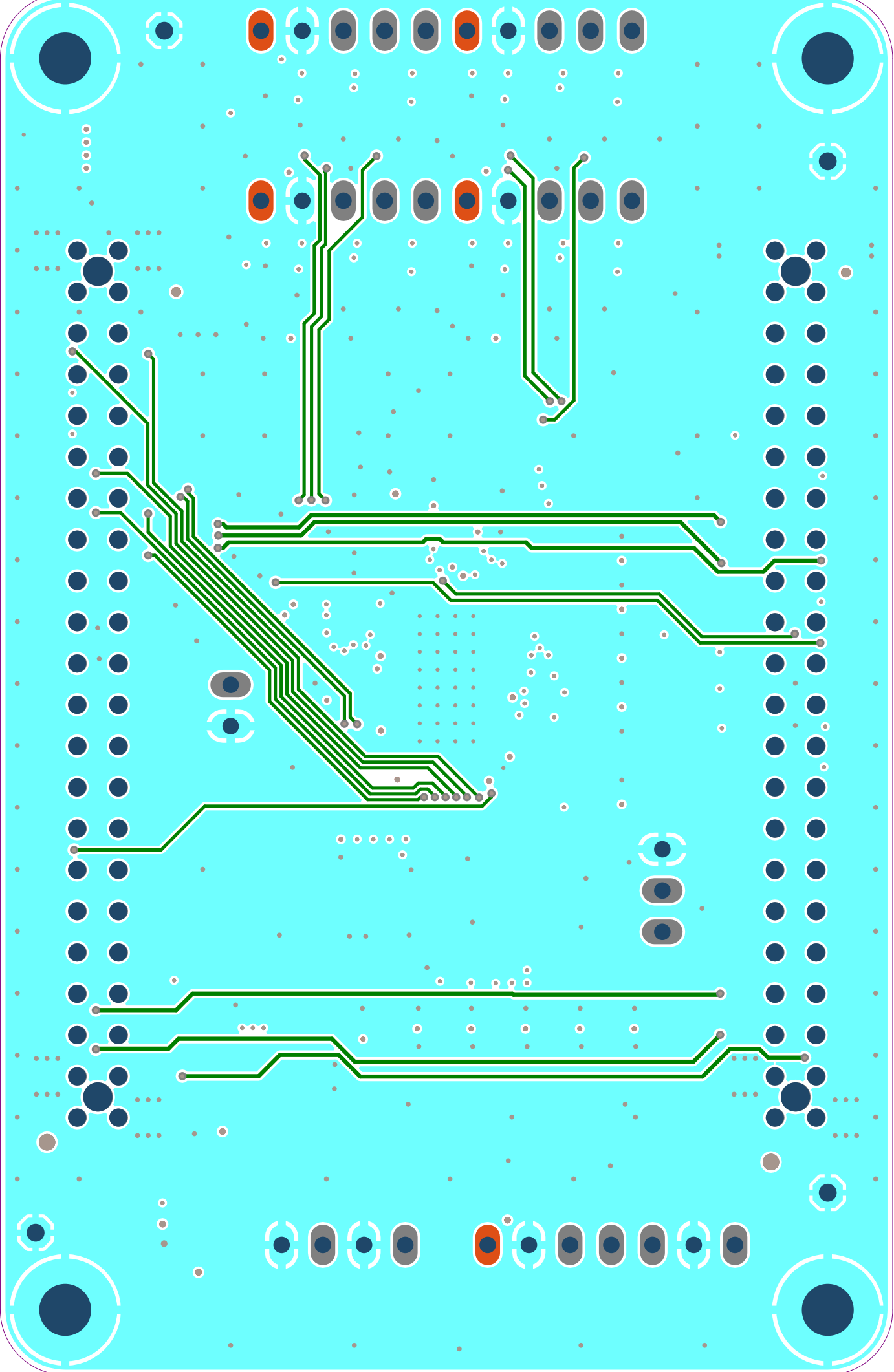
v1.1

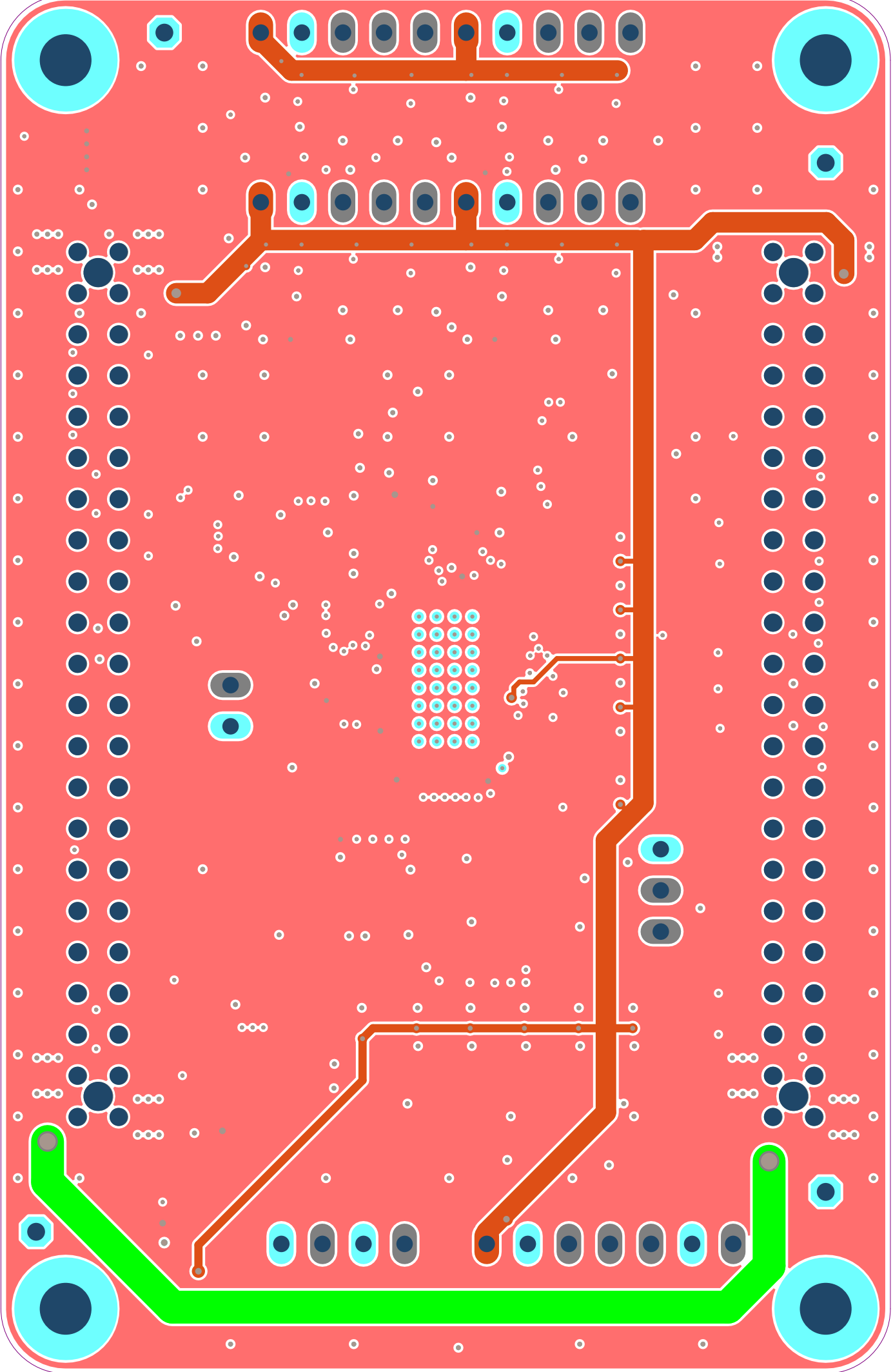


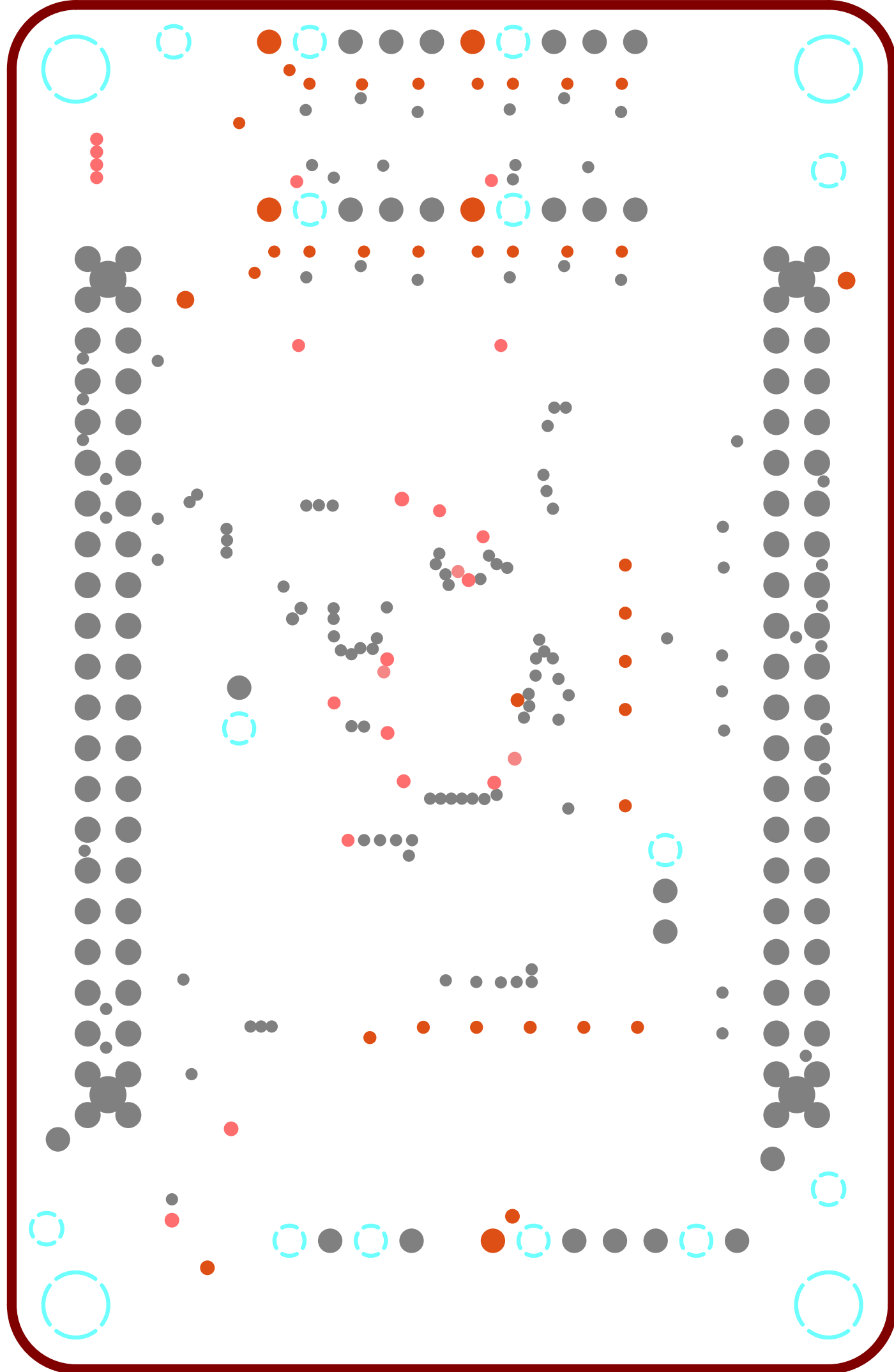
+5V
GPI00
GPI01
GPI02
DBG_SPI_nSCS
DBG_SPI_SCK
DBG_SPI_TRG
DBG_SPI_MISO
DBG_SPI_TRG
DBG_SPI_TRG
DBG_SPI_INN
AENC_UN_INN
AENC_WY_INN
AENC_I1_INN
ADC_I1_INN
ADC_I0_INN
GND

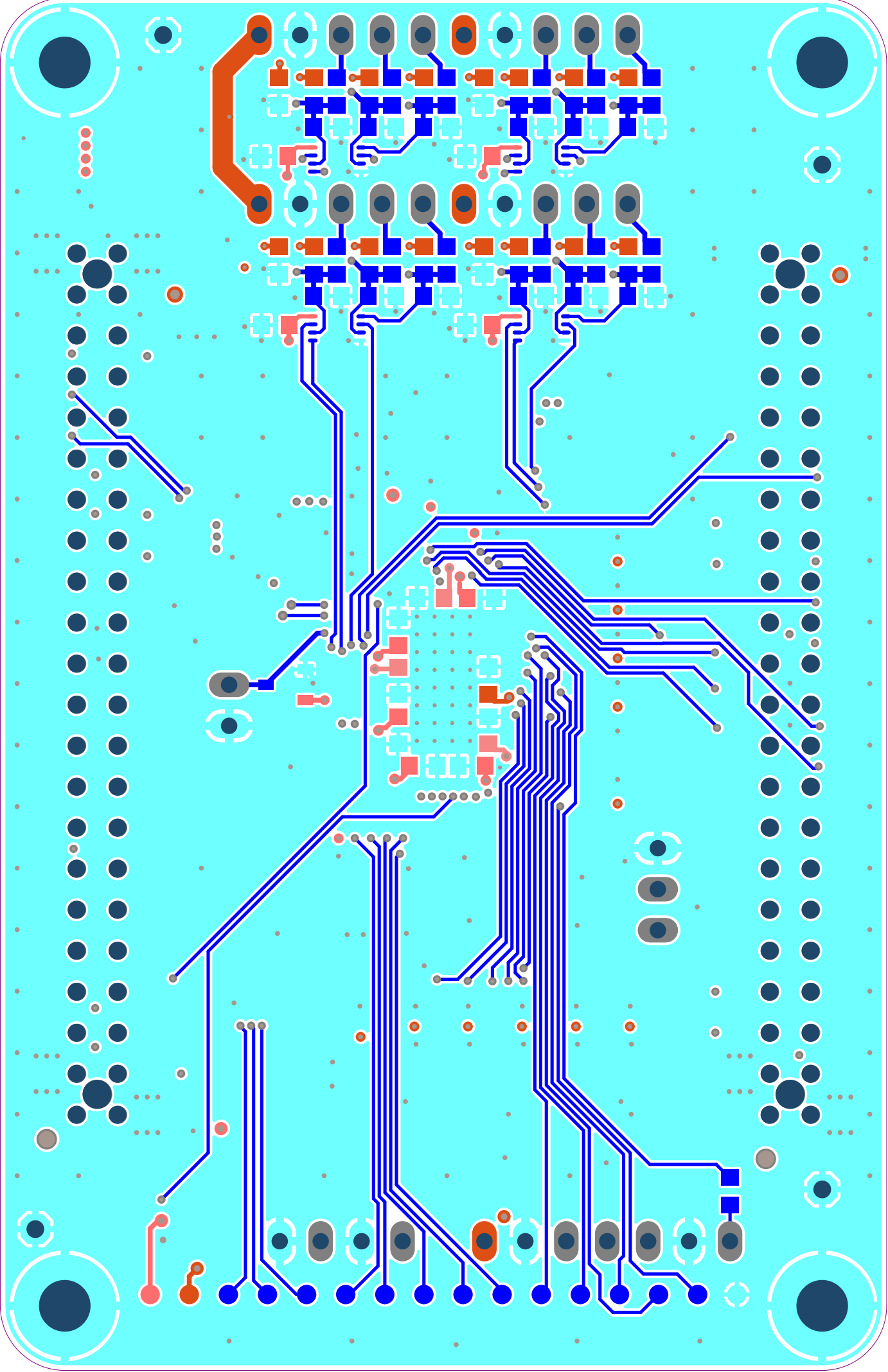


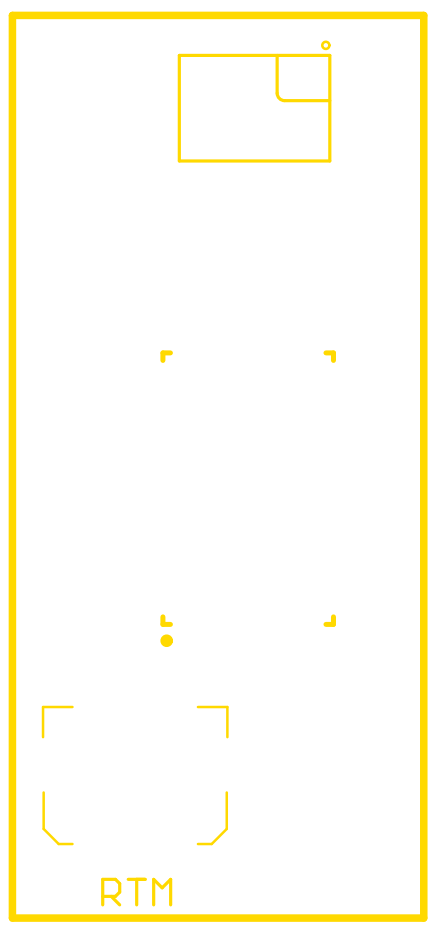














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TMC-Evaluation-Platform:

TMC4671-EVAL

Interfaces:

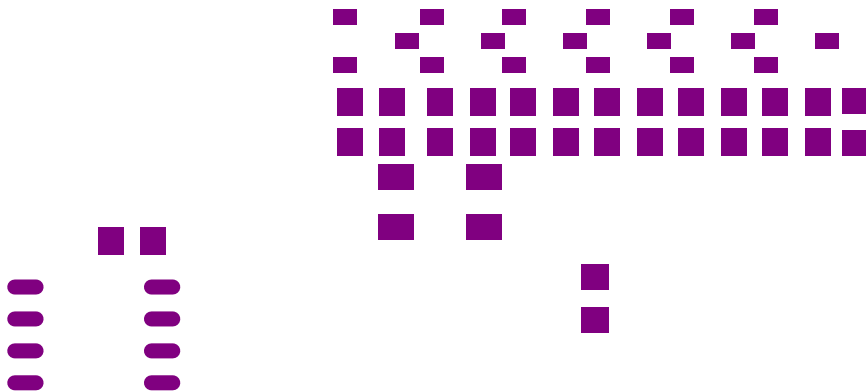
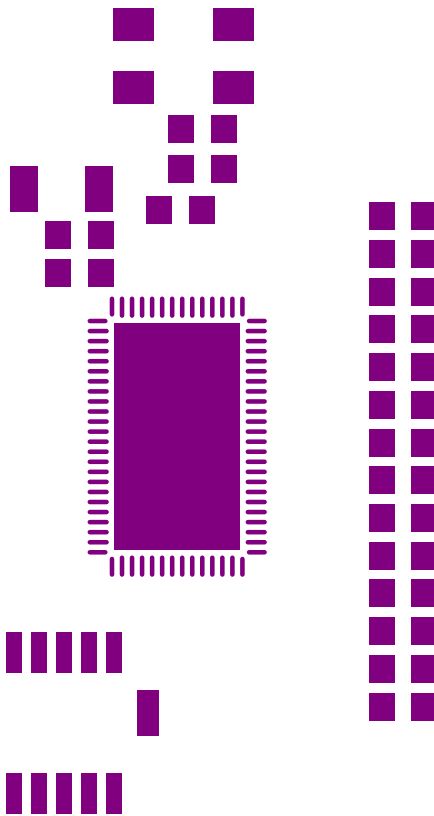
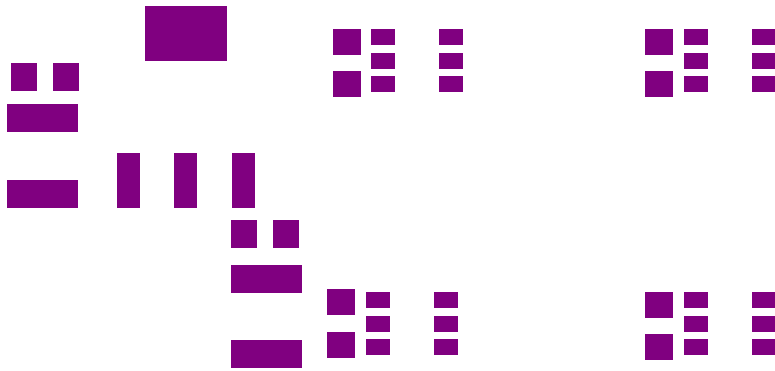
SPI, UART, S/D



open source
hardware

v1.1

+3V3
+5V
GPIO0
GPIO1
GPIO2
DBG_SPI_nSCS
DBG_SPI_TRG
DBG_SPI_MISO
DBG_SPI_TRG
AENC_UN_INN
AENC_UX_INN
AENC_WY_INN
AENC_IL_INN
ADC_I1_INN
ADC_IO_INN
GND



85,00

TRINAMIC

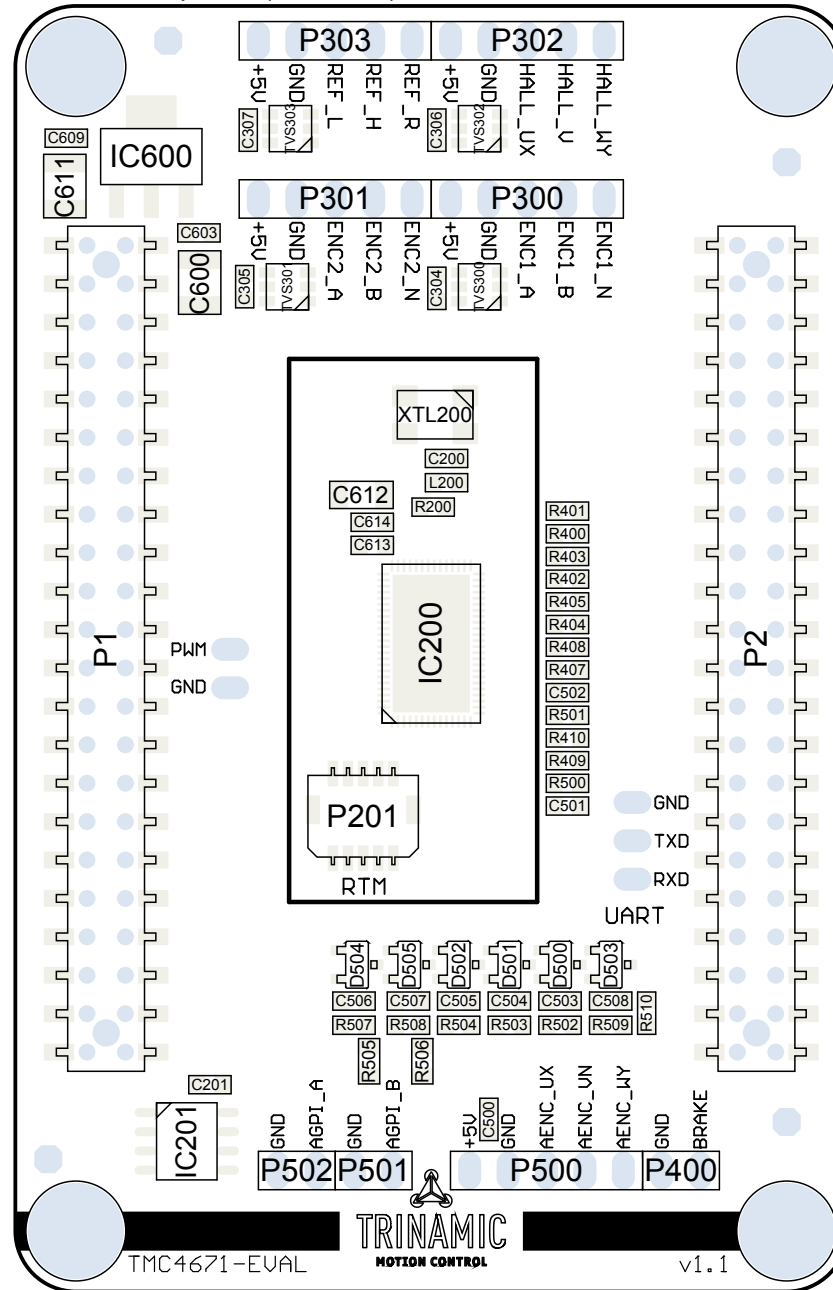
TMC4671-EVAL

MOTION CONTROL

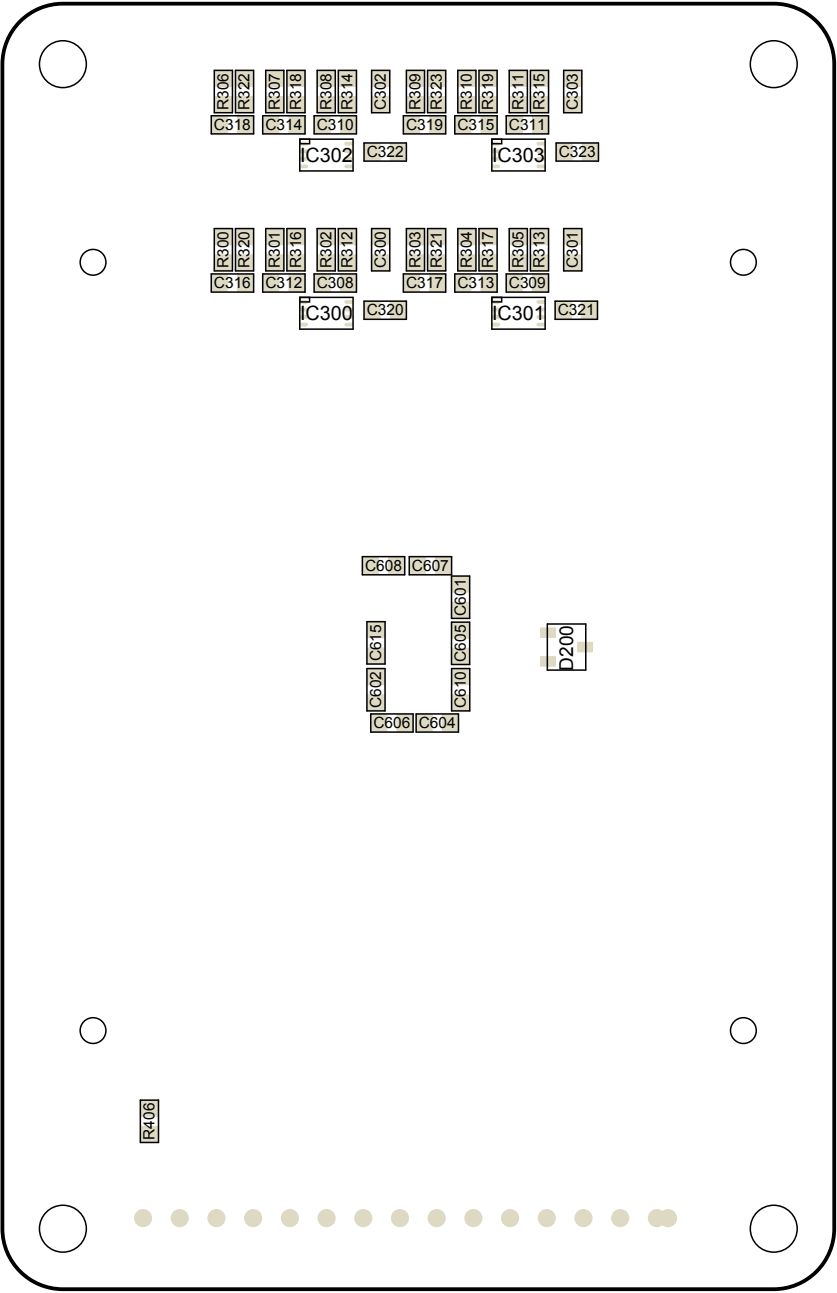
v1.1

55,00

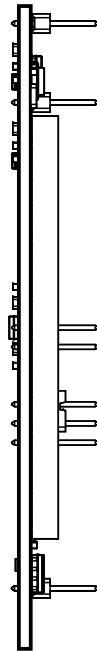
View from Top side (Scale 2:1)



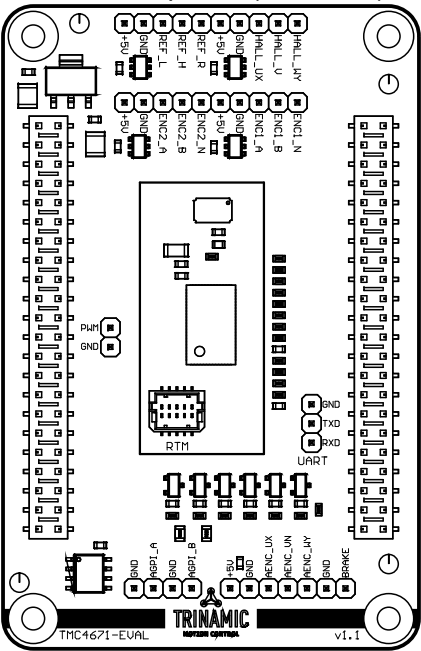
View from Bottom side (Scale 2:1)



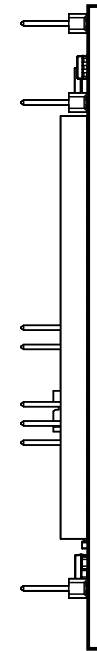
View from Left side (Scale 1:1)



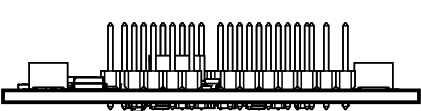
View from Top side (Scale 1:1)



View from Right side (Scale 1:1)



View from Front side (Scale 1:1)



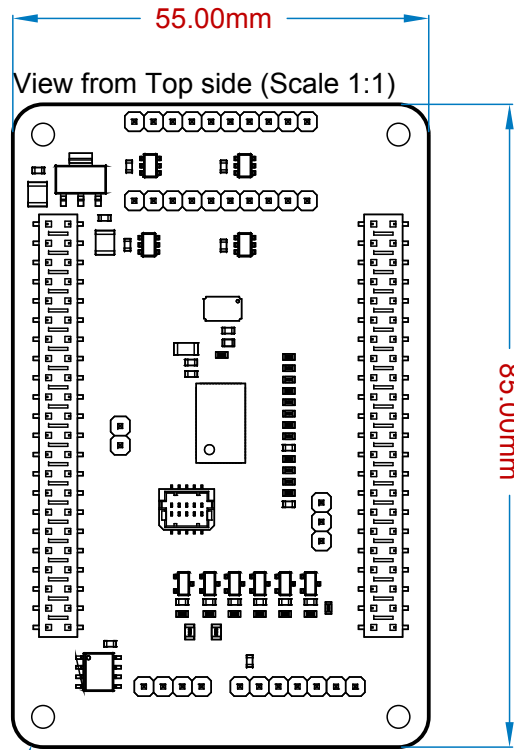
Layer Stack Legend

Material	Layer	Thickness	Dielectric Material	Type	Gerber
	Top Paste			Paste Mask	GTP
	Top Overlay			Legend	GTO
Surface Material	Top Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GTS
Copper	Top	0.035mm(1.378mil)		Signal	GTL
Core		0.127mm(5.000mil)	FR-4	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	
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
	Bottom Overlay			Legend	GBO
	Bottom Paste			Paste Mask	GBP

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: 1.1

Date: 4.05.2018 Time: 21:40 21:40



TMC4671_EVAL_V1.0

[1]_InterfaceConnectors
[1]_InterfaceConnectors.SchDoc



[2]_Communication_Inputs
[2]_Communication_Inputs.SchDoc



[3]_Output_Feedback
[3]_Output_Feedback.SchDoc



[4]_Output_Feedback_2
[4]_Output_Feedback_2.SchDoc



[5]_Analog_input_filters
[5]_Analog_input_filters.SchDoc



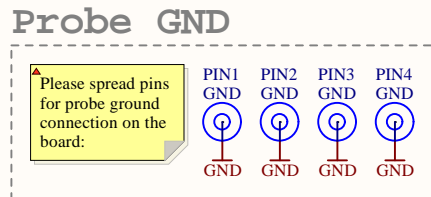
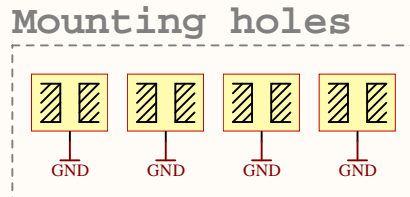
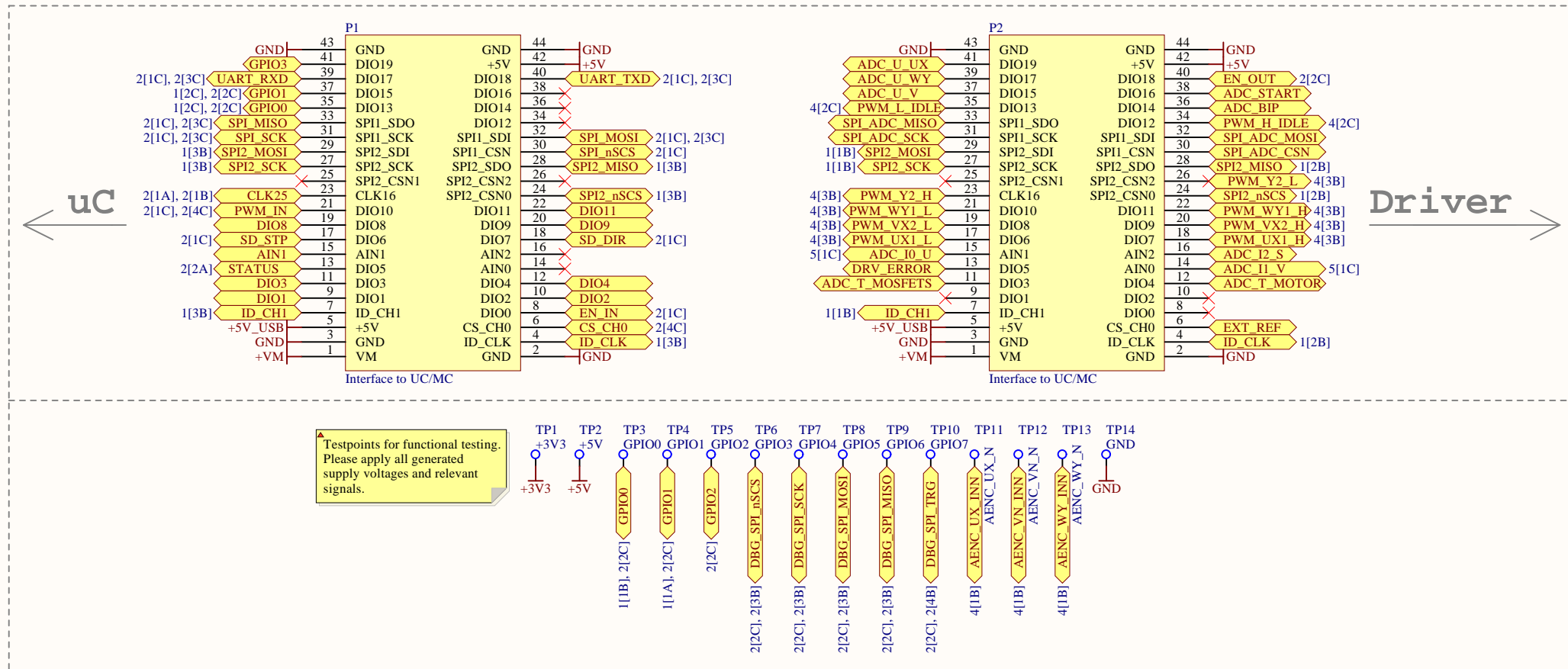
[6]_PSU
[6]_PSU.SchDoc



ChangeLog
ChangeLog.SchDoc



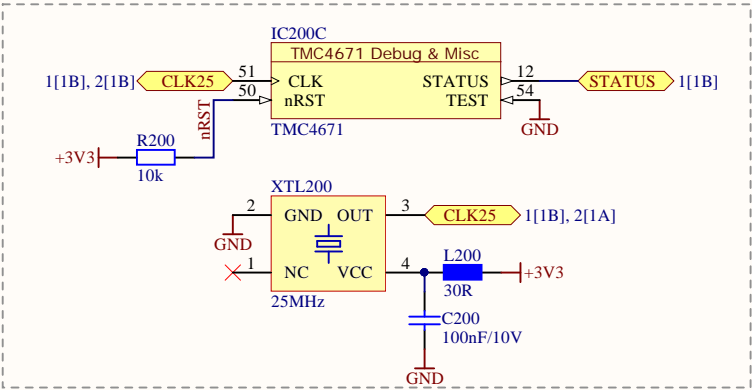
Interface connectors, mounting holes & testpads



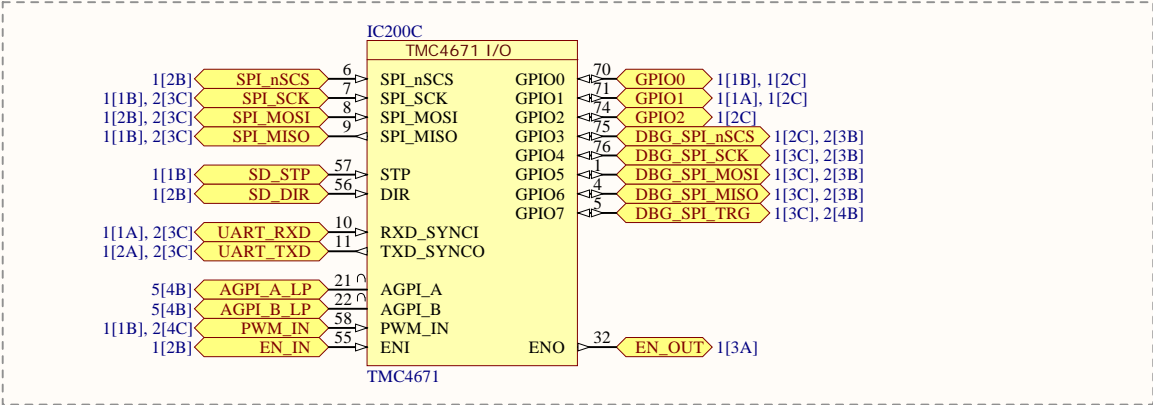
TMC4671-EVAL

Communication & Inputs

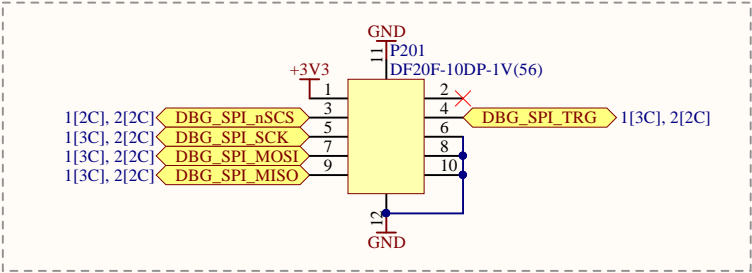
Clock & Misc



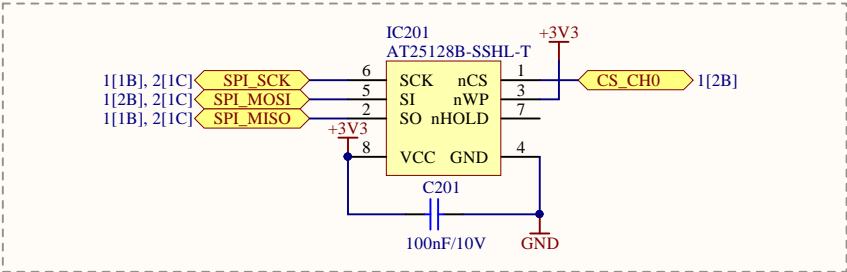
TMC4671 I/O



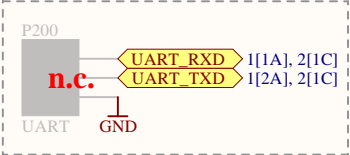
TMC Realtime Monitoring Interface



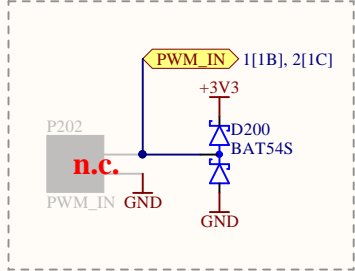
Module identification EEPROM



UART / Sync I/O



PWM Input



Title: Communication & Inputs

Size: A4 Project: TMC4671-EVAL Version: 1.1

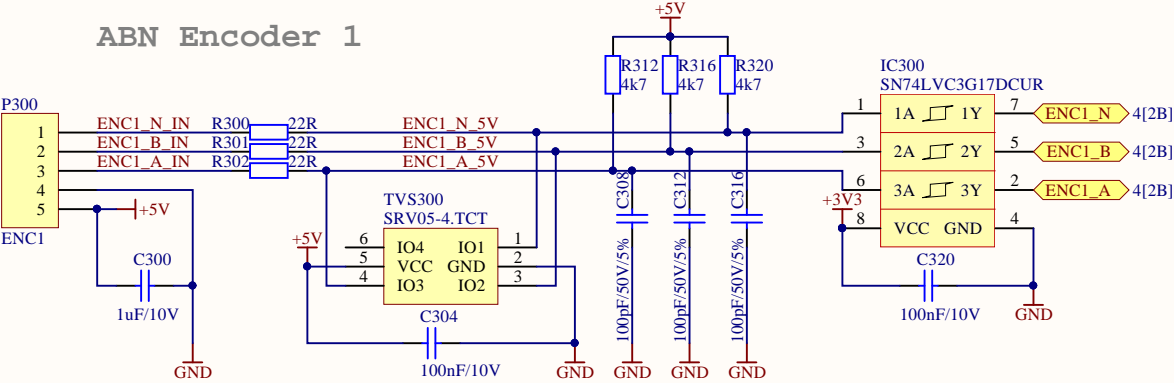
Date: 4.05.2018 Time: 21:40:38 Sheet 2 of 8

File: [2]_Communication_Inputs.SchDoc

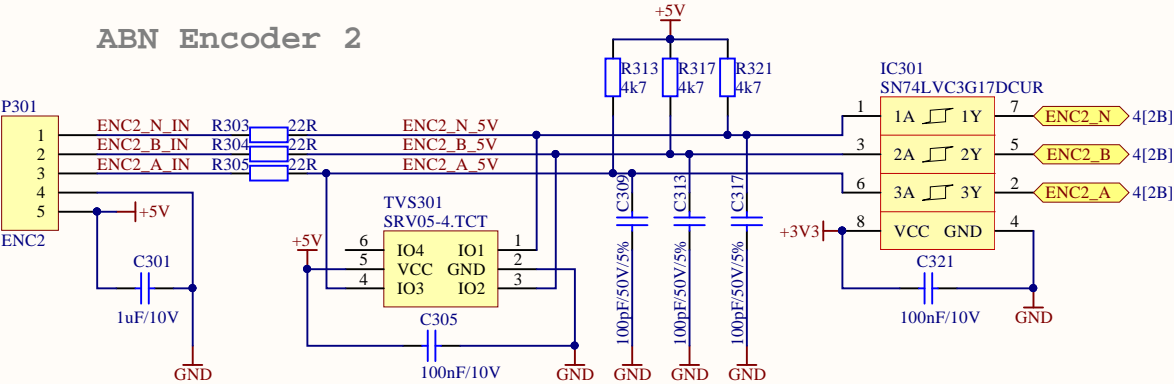


Output & Feedback

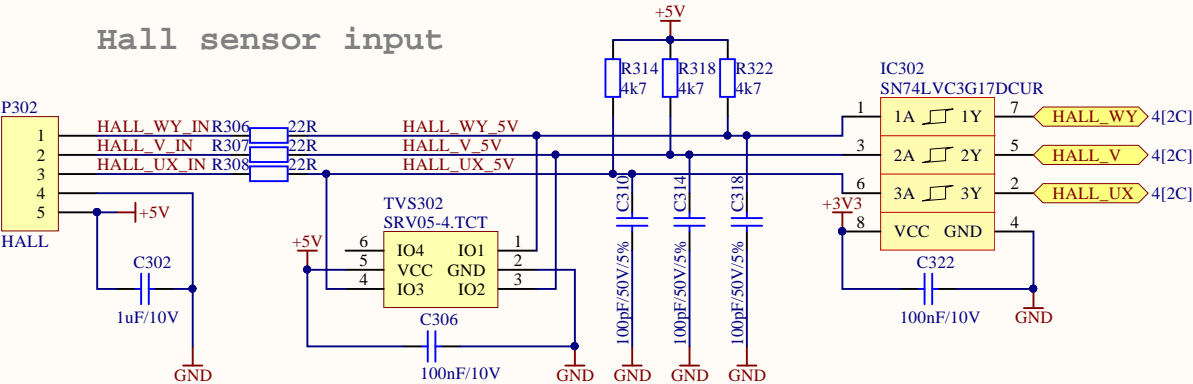
ABN Encoder 1



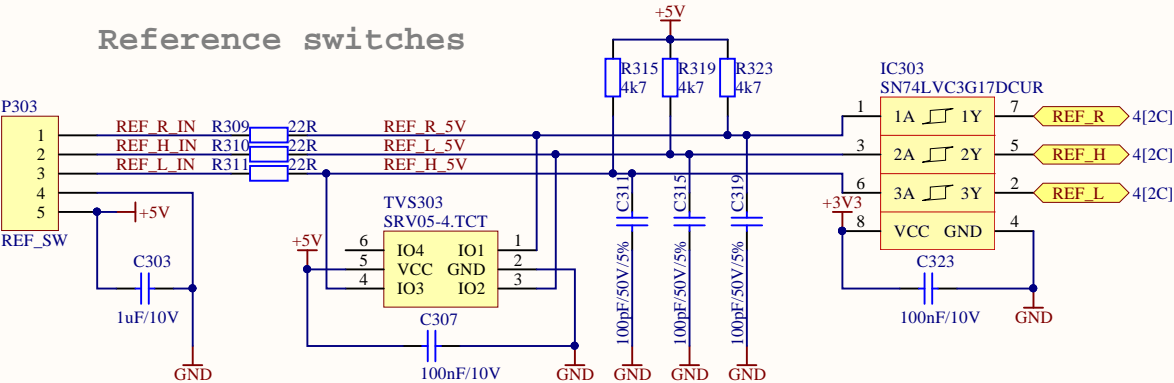
ABN Encoder 2



Hall sensor input



Reference switches



Title: Output & Feedback

Size: A4

Project: TMC4671-EVAL

Version: 1.1

Date: 4.05.2018

Time: 21:40:39

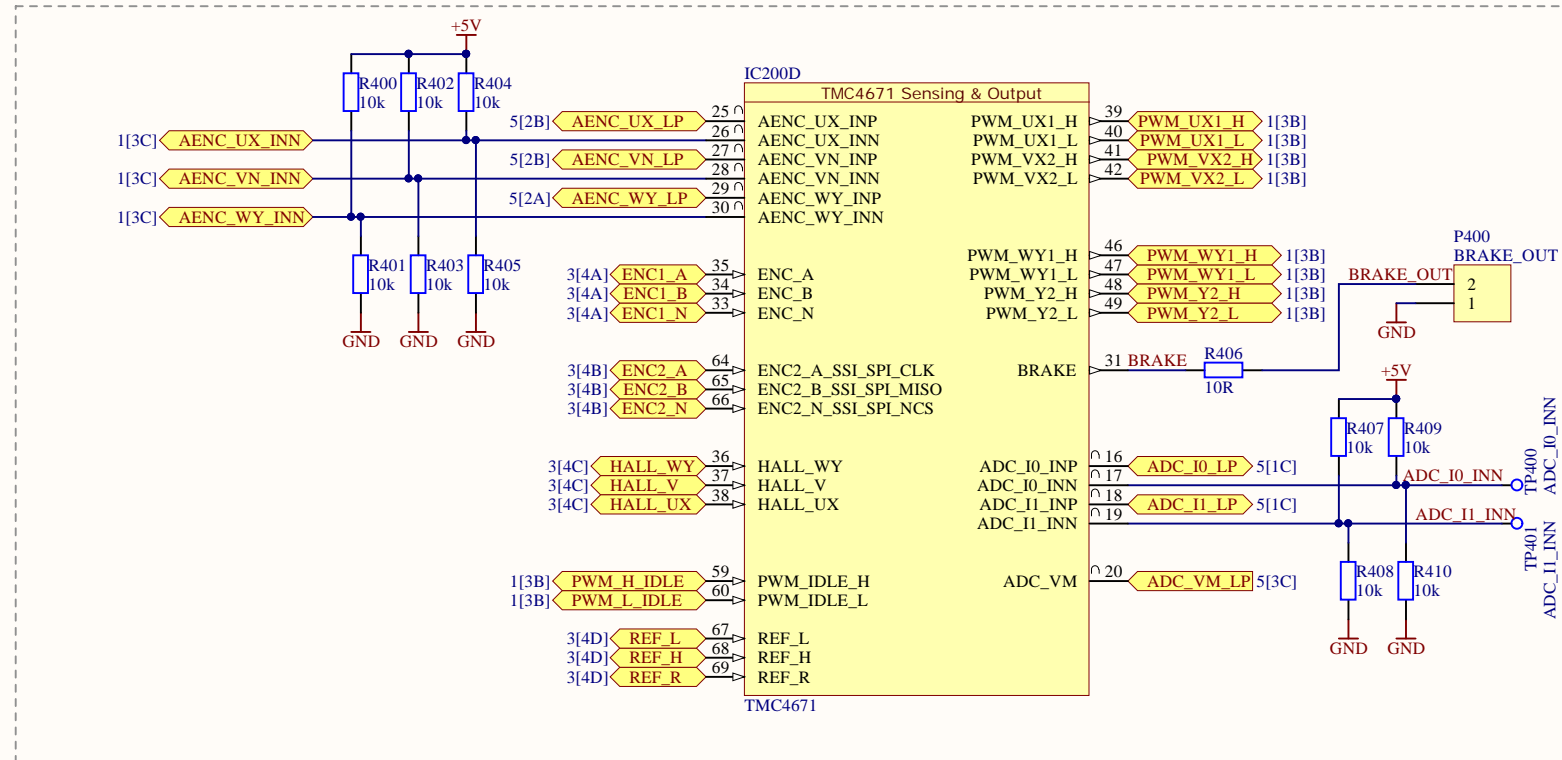
Sheet 3 of 8

File: [3]_Output_Feedback.SchDoc



Output & Feedback 2

TMC4671 Sensing & Output

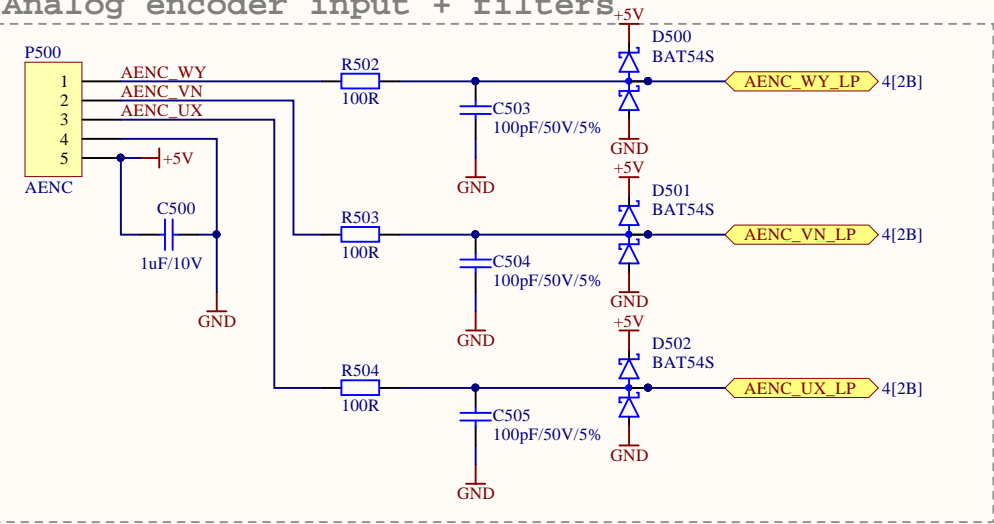


Title: Output & Feedback 2		
Size: A4	Project: TMC4671-EVAL	Version: 1.1
Date: 4.05.2018	Time: 21:40:41	Sheet 4 of 8
File: [4]_Output_Feedback_2.SchDoc		

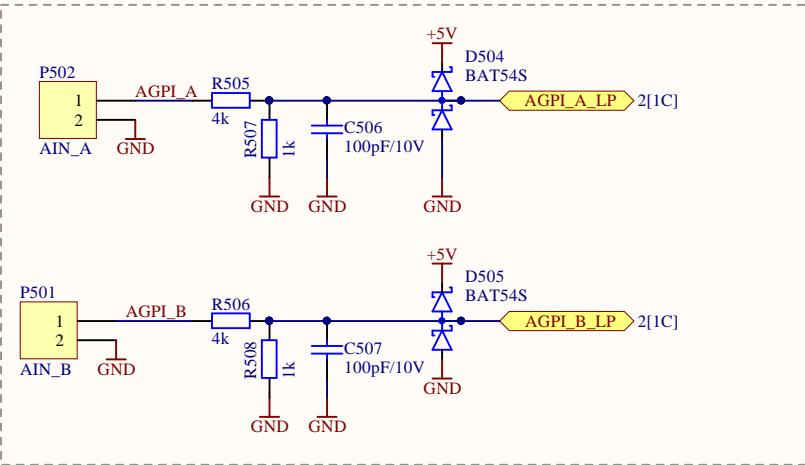


Analog inputs & filters

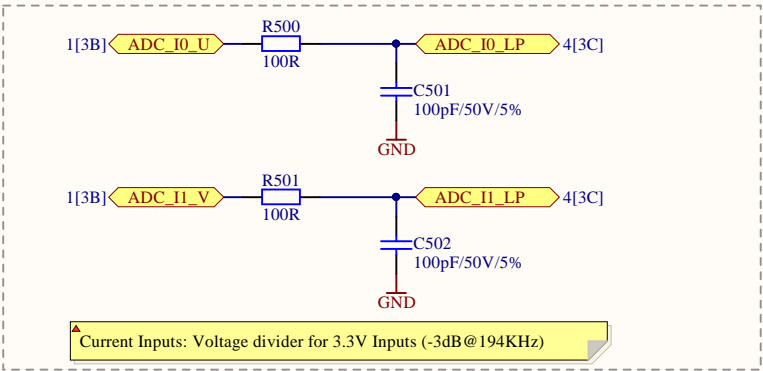
Analog encoder input + filters



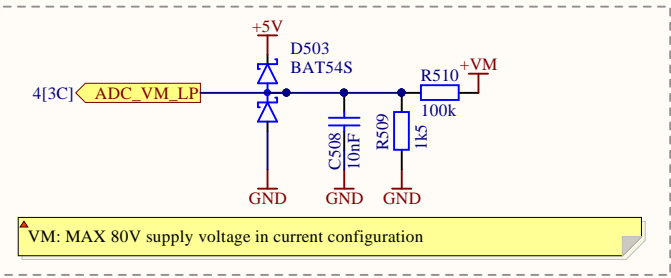
Analog inputs A & B with filters



ADC Filter

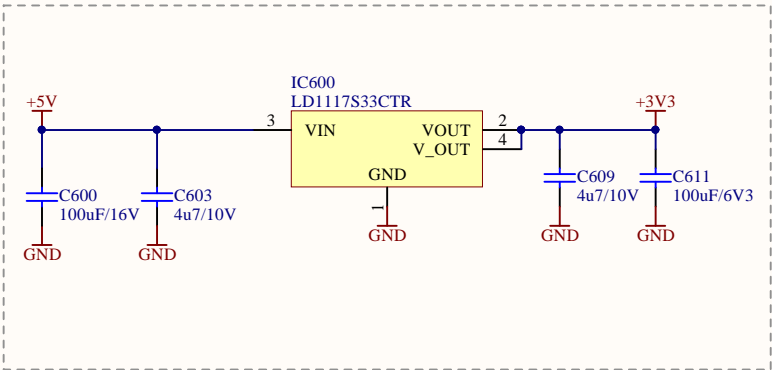


VM ADC Filter

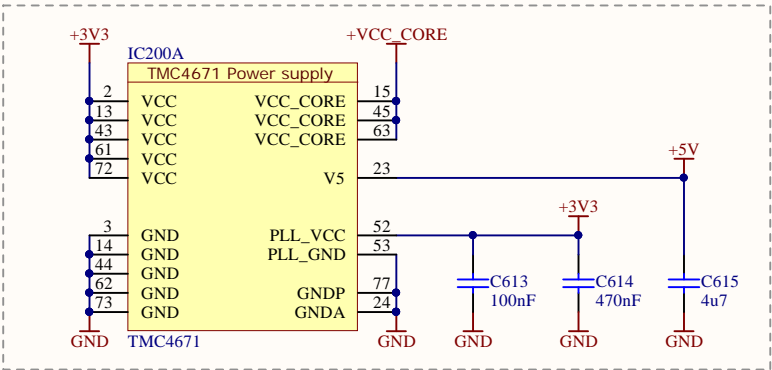


PSU

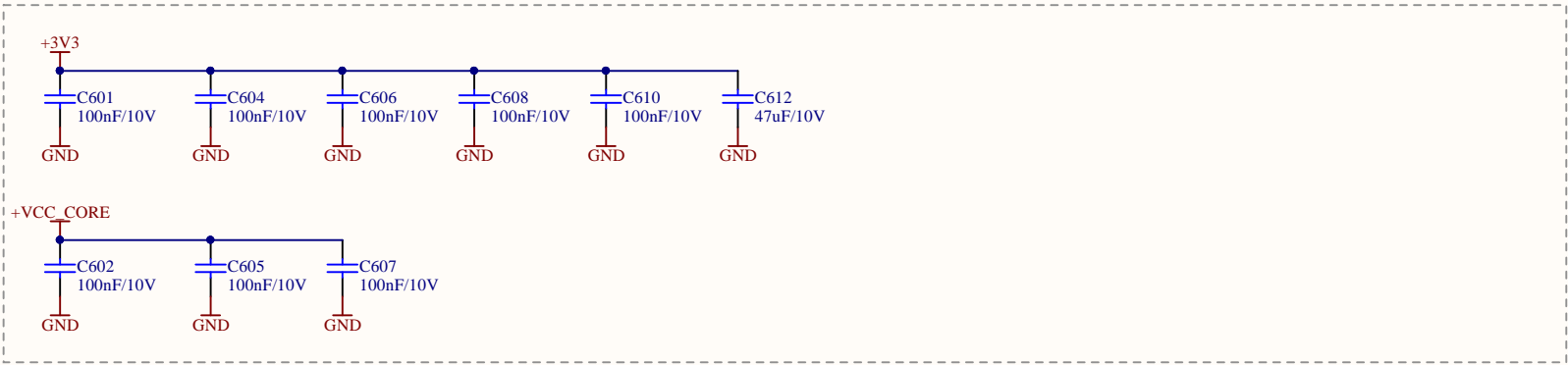
+3V3 LDO



TMC power



Bypass capacitors



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.

BOM

Project: TMC4671-EVAL

Version: 1.1

Date: 4.05.2018

#	Quantity	MPN	Comment	Designator	Footprint	Description	Note	MF
1	18	MC0603B104K100CT	100nF/10V	C200, C201, C304, C305, C306, C307, C320, C321, C322, C323, C601, C602, C604, C605, C606, C607, C608, C610	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.1 µF, 10 V, ± 10%, X7R, MC Series		Multicomp
2	5	MC0603X105K100CT	1µF/10V	C300, C301, C302, C303, C500	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 1 µF, 10 V, ± 10%, X5R, MC Series		MULTICOMP
3	17	MC0603N101J500CT	100pF/50V/5%	C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319, C501, C502, C503, C504, C505	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 100 pF, 50 V, ± 5%, CoG / NP0, MC Series		MULTICOMP
4	2	MCMT18N101F100CT	100pF/10V	C506, C507	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 100 pF, 10 V, ± 1%, CoG / NP0, MCMT Series		MULTICOMP
5	1	MCSH18B103K100CT	10nF	C508	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.01 µF, 10 V, ± 10%, X7R, MCSH Series		MULTICOMP
6	1	EMK325ABJ107MM-T	100uF/16V	C600	C1210	SMD Multilayer Ceramic Capacitor, 1210 [3225 Metric], 100 µF, 16 V, ± 20%, X5R, M Series		TAIYO YUDEN
7	2	MC0603X475K100CT	4u7/10V	C603, C609	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 4.7 µF, 10 V, ± 10%, X5R, MC Series		MULTICOMP
8	1	GRM31CR60J107ME39L	100uF/6V3	C611	C1210	SMD Multilayer Ceramic Capacitor, 1210 [3225 Metric], 100 µF, 6.3 V, ± 20%, X5R, GRM Series		MURATA
9	1	GRM31CR61A476ME15L	47uF/10V	C612	C1206	SMD Multilayer Ceramic Capacitor, 1206 [3216 Metric], 47 µF, 10 V, ± 20%, X5R, GRM Series		MURATA
10	1	MC0603B104K100CT	100nF	C613	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.1 µF, 10 V, ± 10%, X7R, MC Series		Multicomp
11	1	MC0603X474K160CT	470nF	C614	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.47 µF, 16 V, ± 10%, X5R, MC Series		Multicomp
12	1	MC0603X475K100CT	4u7	C615	C0603	SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 4.7 µF, 10 V, ± 10%, X5R, MC Series		MULTICOMP
13	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
14	1	TMC4671	TMC4671	IC200	QFN40P1050X650X90_HS-77N			TRINAMIC
15	1	AT25128B-SSHL-T	AT25128B-SSHL-T	IC201	SOP127P600X175-8N	EEPROM, SPI, 128 Kbit, 16K x 8bit, 20 MHz, SOIC, 8 Pins		MICROCHIP
16	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
17	1	LD1117S33CTR	LD1117S33CTR	IC600	SOT230P700X180-4N	Fixed LDO Voltage Regulator, 4.75V to 15V, 1.1V Dropout, 3.3Vout, 950mAout, SOT-223-4		STMICROELECTRONICS
18	1	MFB-160808-0030PO	30R	L200	L0603	Ferrite Bead, 30 ohm, 0603 [1608 Metric], MFB Series, 3 A, 0.04 ohm, ± 25%		MECAIRCOM
19	2	HLE-122-02-L-DV	Interface to UCMC	P1, P2	Interface_Connector	Board-To-Board Connector, 2.54 mm, 44 Contacts, Receptacle, HLE Series, Surface Mount, 2 Row s		SAMTEC
20	1	DF20F-10DP-1V(56)	DF20F-10DP-1V(56)	P201	CON, TMC Debug SPI	Wire-To-Board Connector, 1 mm, 10 Contacts, Header, DF20 Series, Surface Mount, 2 Row s		Hirose Electric Co Ltd
21	1		ENC1	P300	TH_HDR_1X5	Header, 5-Pin		
22	1		ENC2	P301	TH_HDR_1X5	Header, 5-Pin		
23	1		HALL	P302	TH_HDR_1X5	Header, 5-Pin		
24	1		REF_SW	P303	TH_HDR_1X5	Header, 5-Pin		
25	1		BRAKE_OUT	P400	TH_HDR_1X2	Header, 2-Pin		
26	1		AENC	P500	TH_HDR_1X5	Header, 5-Pin		
27	1		AIN_B	P501	TH_HDR_1X2	Header, 2-Pin		
28	1		AIN_A	P502	TH_HDR_1X2	Header, 2-Pin		
29	11	MC0603W0603110K	10k	R200, R400, R401, R402, R403, R404, R405, R407, R408, R409, R410	R0603	SMD Chip Resistor, Thick Film, 10 kohm, 50 V, 0603 [1608 Metric], 63 mW, ± 1%, MC Series		MULTICOMP
30	12	MCWR06X22R0FTL	22R	R300, R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311	R0603	SMD Chip Resistor, Thick Film, 22 ohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series		MULTICOMP
31	12	WR06X4701FTL	4k7	R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323	R0603	SMD Chip Resistor, 4.7 kohm, 75 V, 0603 [1608 Metric], 100 mW, ± 1%, WR06 Series		WALSIN
32	1	MC0603W0603110K	10R	R406	R0603	SMD Chip Resistor, Thick Film, 10 ohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series		MULTICOMP
33	5	MCWR06X1000FTL	100R	R500, R501, R502, R503, R504	R0603	SMD Chip Resistor, Thick Film, 100 ohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series		MULTICOMP
34	2	CRCW08054K00FKTA	4k	R505, R506	R0805	SMD Chip Resistor, Thick Film, 4 kohm, 150 V, 0805 [2012 Metric], 125 mW, ± 1%, CRCW Series		VISHAY
35	2	MC0603W060311K	1k	R507, R508	R0603	SMD Chip Resistor, Thick Film, 1 kohm, 50 V, 0603 [1608 Metric], 100 mW, ± 0.5%, RE Series		MULTICOMP
36	1	MCWR06X1501FTL	1k5	R509	R0603	SMD Chip Resistor, Thick Film, 1.5 kohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series		MULTICOMP
37	1	MCWR06X1003FTL	100k	R510	R0603	SMD Chip Resistor, Thick Film, 100 kohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series		MULTICOMP
38	4	SRV05-4-TCT	SRV05-4-TCT	TVS300, TVS301, TVS302, TVS303	SOT95P280X145-6N	ESD Protection Device, TVS, 17.5 V, SOT-23, 6 Pins, 5 V, 300 W		SEMTECH
39	1	FOX924B-25.000	25MHz	XTL200	FOX924B-25.000	TCXO, 25 MHz, 2.5 ppm, SMD, 5mm x 3.2mm, HCMOS, 3.3 V, FOX924 Series		FOX ELECTRONICS
Approved			Notes					

