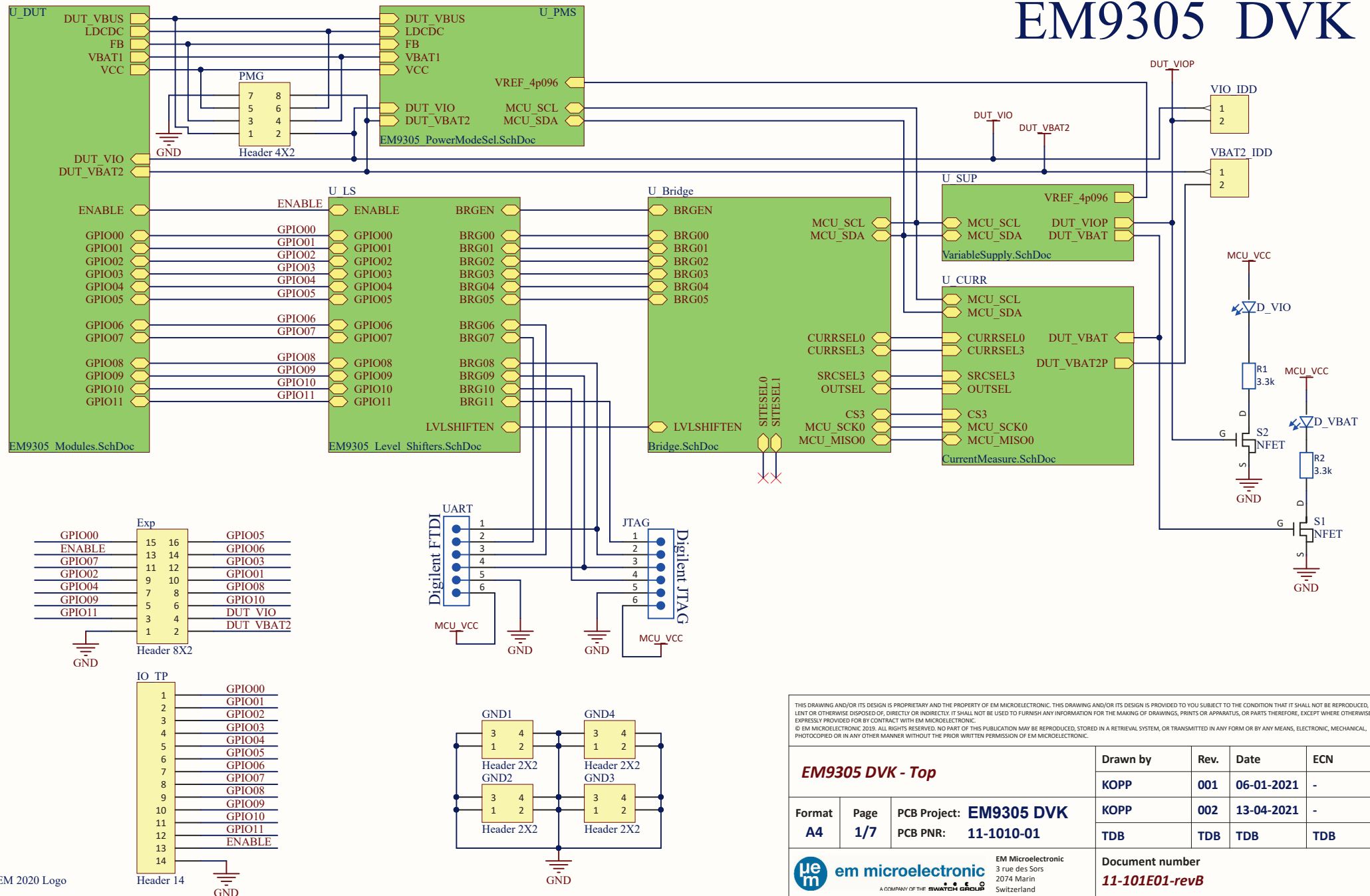



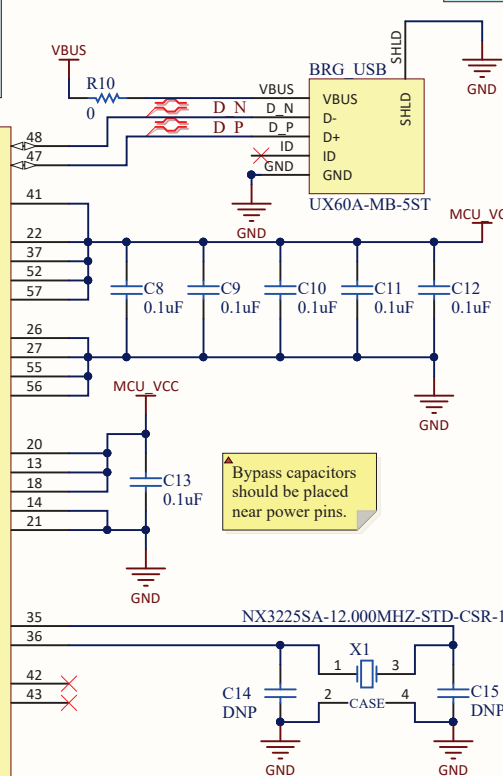
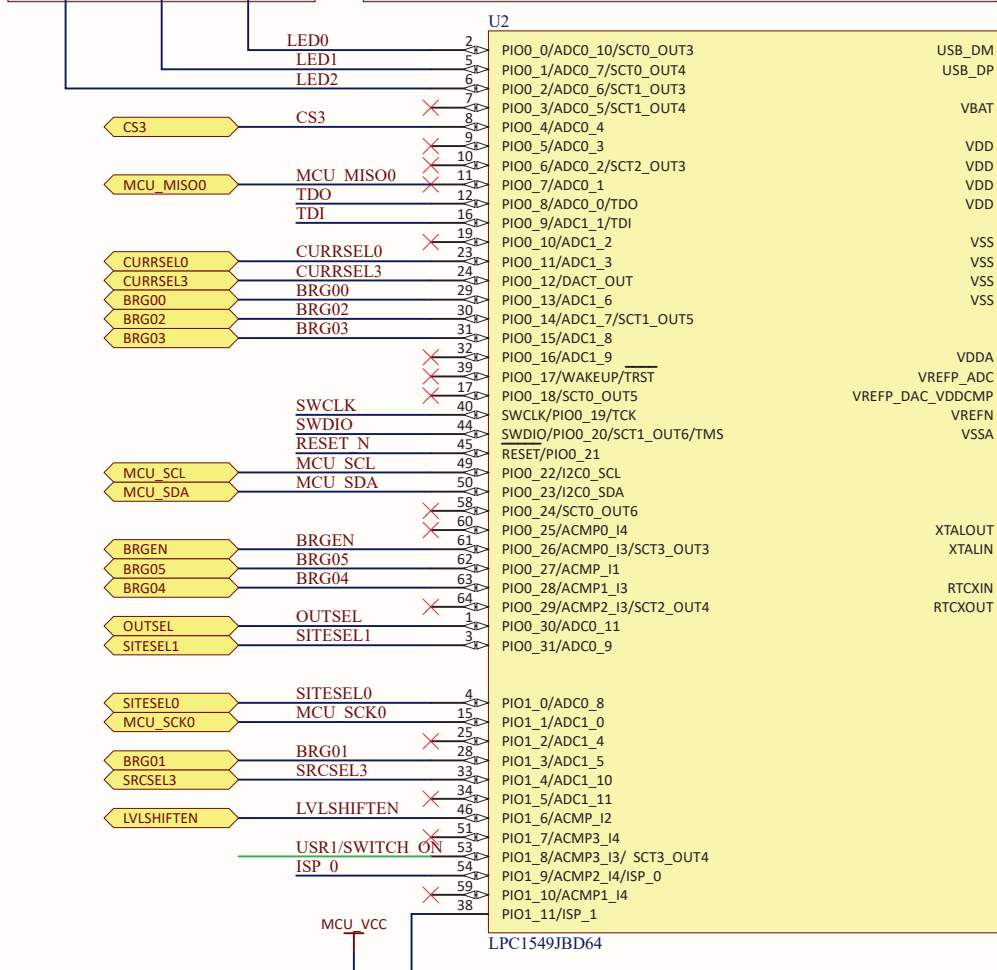
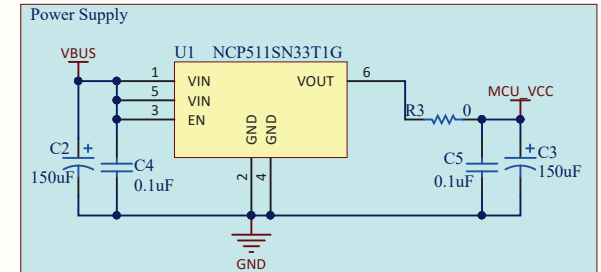
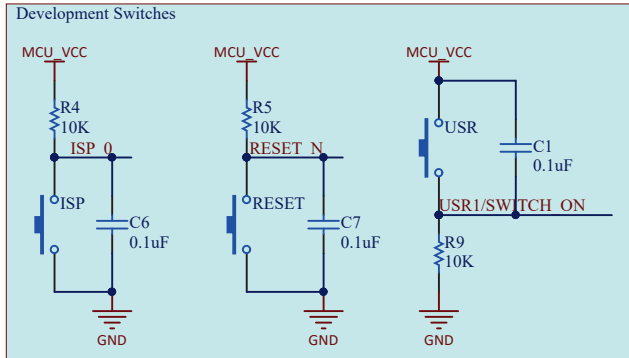
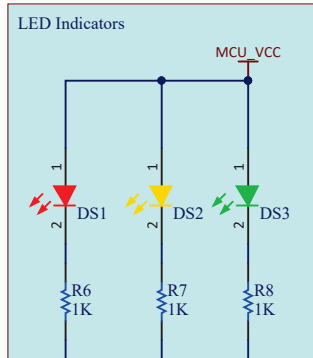
EM9305 DVK



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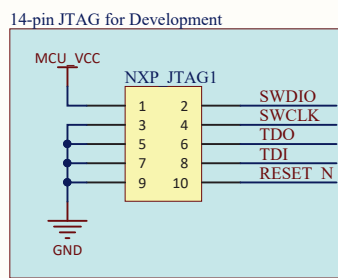
EM9305 DVK - Top			Drawn by	Rev.	Date	ECN
			KOPP	001	06-01-2021	-
Format A4	Page 1/7	PCB Project: EM9305 DVK PCB PNR: 11-1010-01	KOPP	002	13-04-2021	-
			TDB	TDB	TDB	TDB
 em microelectronic <small>A COMPANY OF THE RWATCH GROUP</small>			EM Microelectronic 3 rue des Sors 2074 Marin Switzerland			
			Document number 11-101E01-revB			



Bypass capacitors
should be placed
near power pins.

Component Selection

1. All resistors are 1%
2. All capacitors $\leq 1\mu\text{F}$ are NPO except $0.1\mu\text{F}$ are X7R
3. The $10\mu\text{F}$ capacitors on the power supply are tantalums (T491A106M016AS)

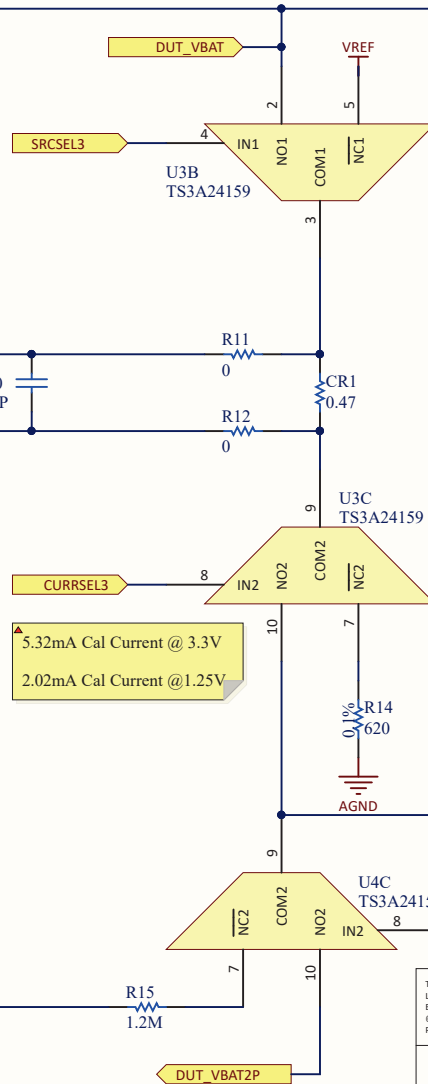
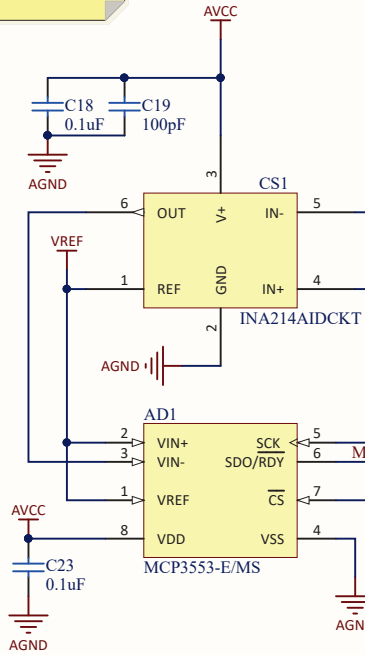


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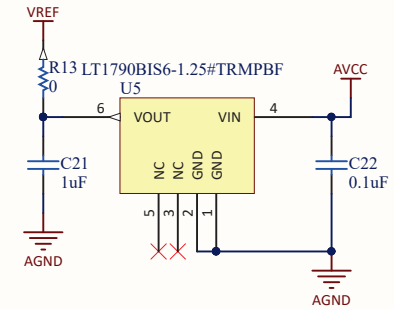
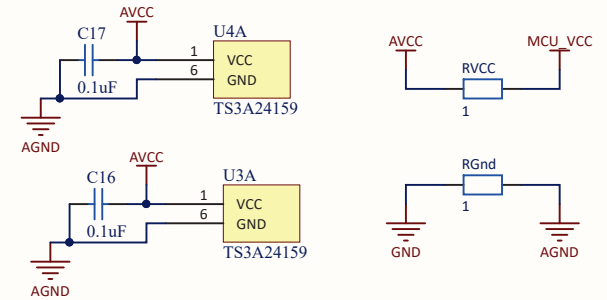
EM9305 DVK - Bridge				Drawn by	Rev.	Date	ECN
				KOPP	001	06-01-2021	-
				KOPP	002	13-04-2021	-
				TBD	TBD	TBD	TBD
				Document number 11-101E01-revB			



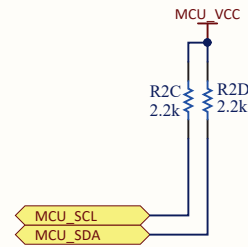
High Current Range
_read_ADC(3)
_set_current_range(3)



5.32mA Cal Current @ 3.3V
2.02mA Cal Current @ 1.25V



Bypass Current Range
_set_current_range(0)

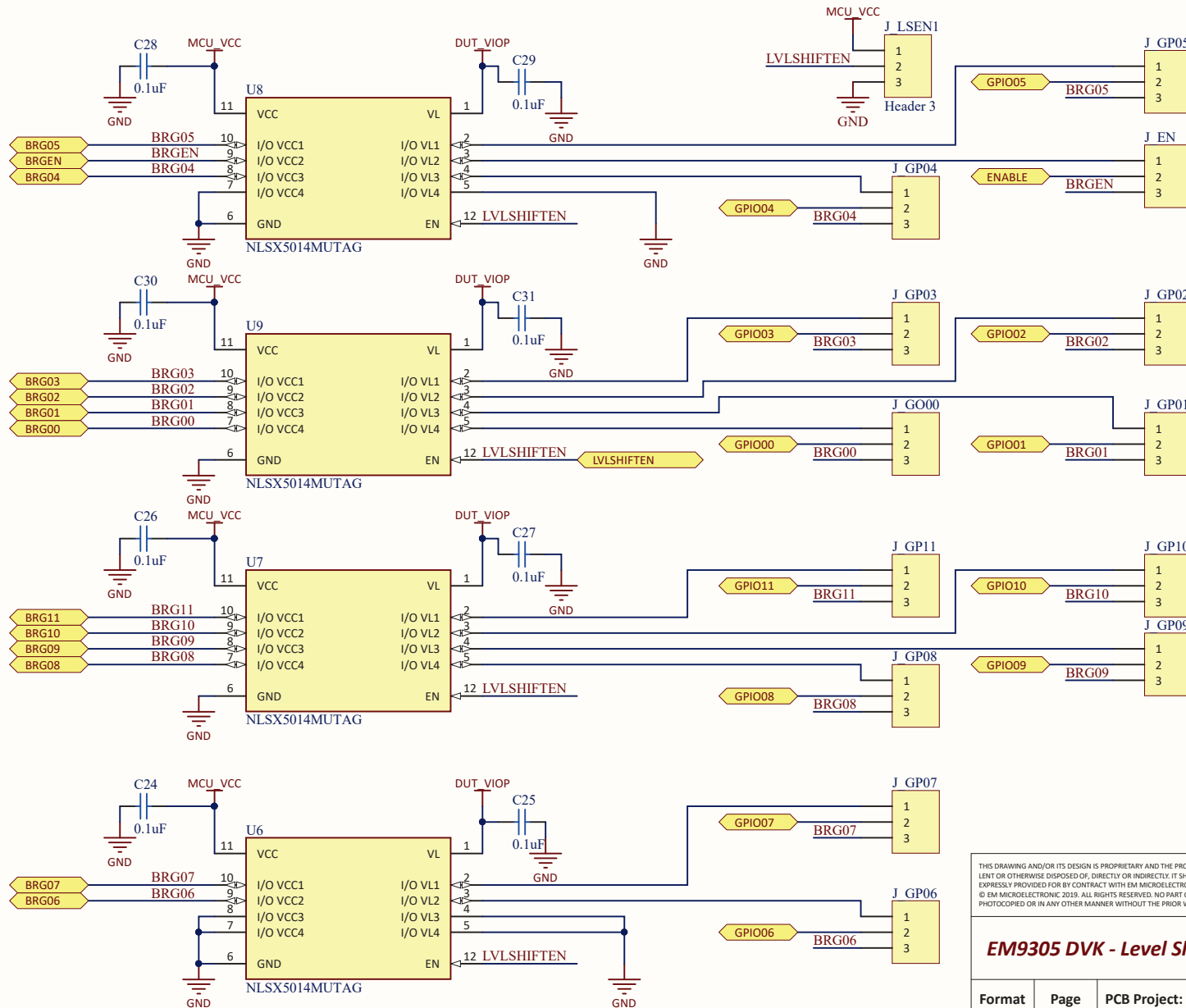


Depending on the shunt resistor used the gain is either:
• 0.50Ohm 1% 0805 for the INA210 giving a 1V/10mA output (200 V/V gain) with a 2.048V LT1790 reference giving you 2V/20mA max and a 5mV/10mA drop.
• 0.10Ohm 0.1% sense resistor for the INA212 giving 1V/10mA (1000 V/V gain) with a 2.048V LT1790 reference giving you 2V/20mA max and a 1mV/10mA drop.
To find the current: $I = ((V_{SEN+}) - (V_{SEN-})) / (R_{shunt} * Gain)$


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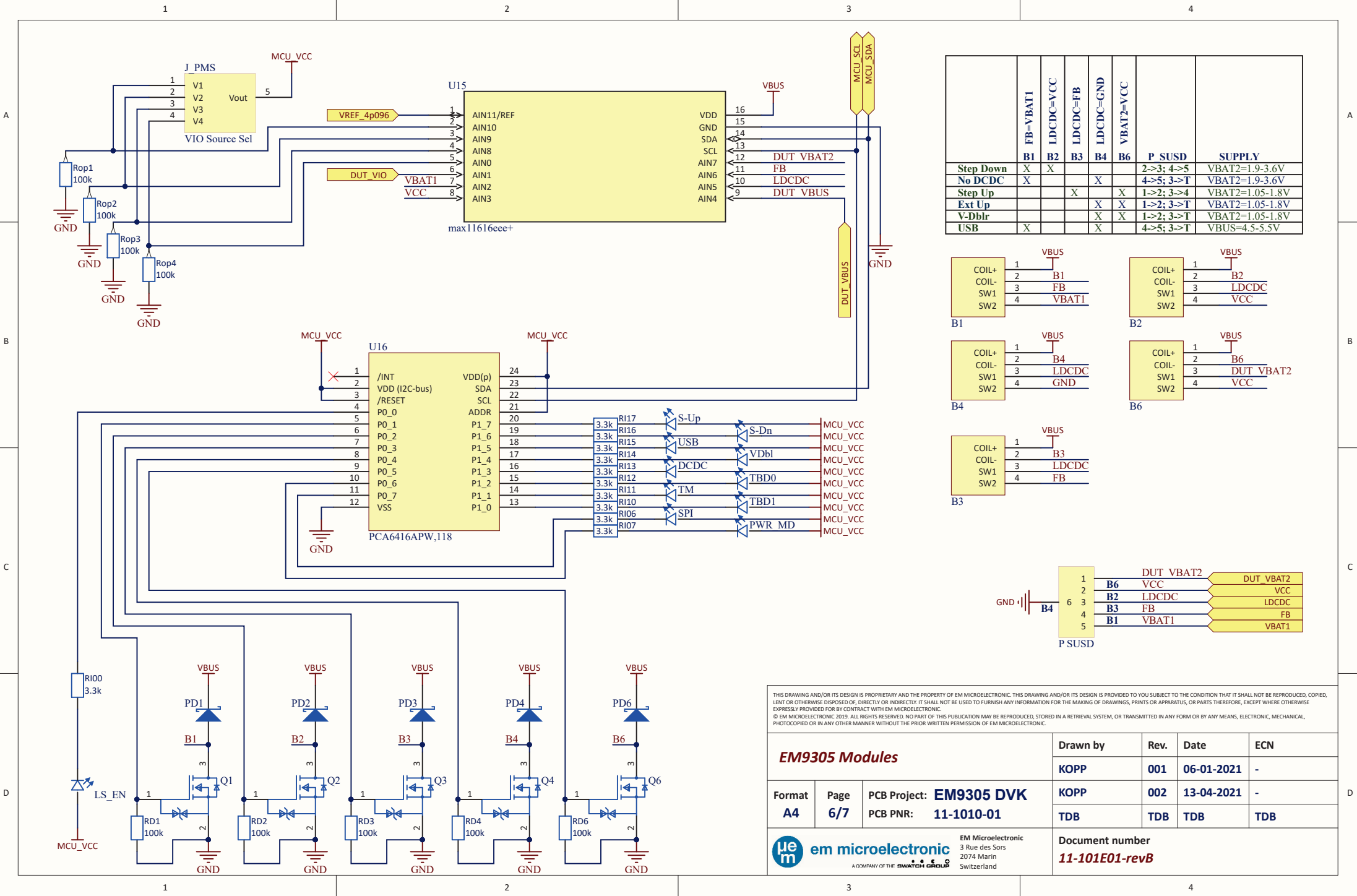
EM9305 - Current Sense				Drawn by	Rev.	Date	ECN
				KOPP	001	06-01-2021	-
				KOPP	002	13-04-2021	-
				TBD	TBD	TBD	TDB
				Document number 11-101E01-revB			





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EM9305 DVK - Level Shifter			Drawn by	Rev.	Date	ECN
			KOPP	001	21-01-2021	-
Format	Page	PCB Project: EM9305 DVK	KOPP	002	13-04-2021	-
A4	4/7	PCB PNR: 11-1010-01	TBD	TBD	TBD	TBD
<div><div><div>em microelectronic</div><div>A COMPANY OF THE SWATCH GROUP</div></div><div>EM Microelectronic 3 Rue des Sors 2074 Marin Switzerland</div></div>			Document number 11-101E01-revB			



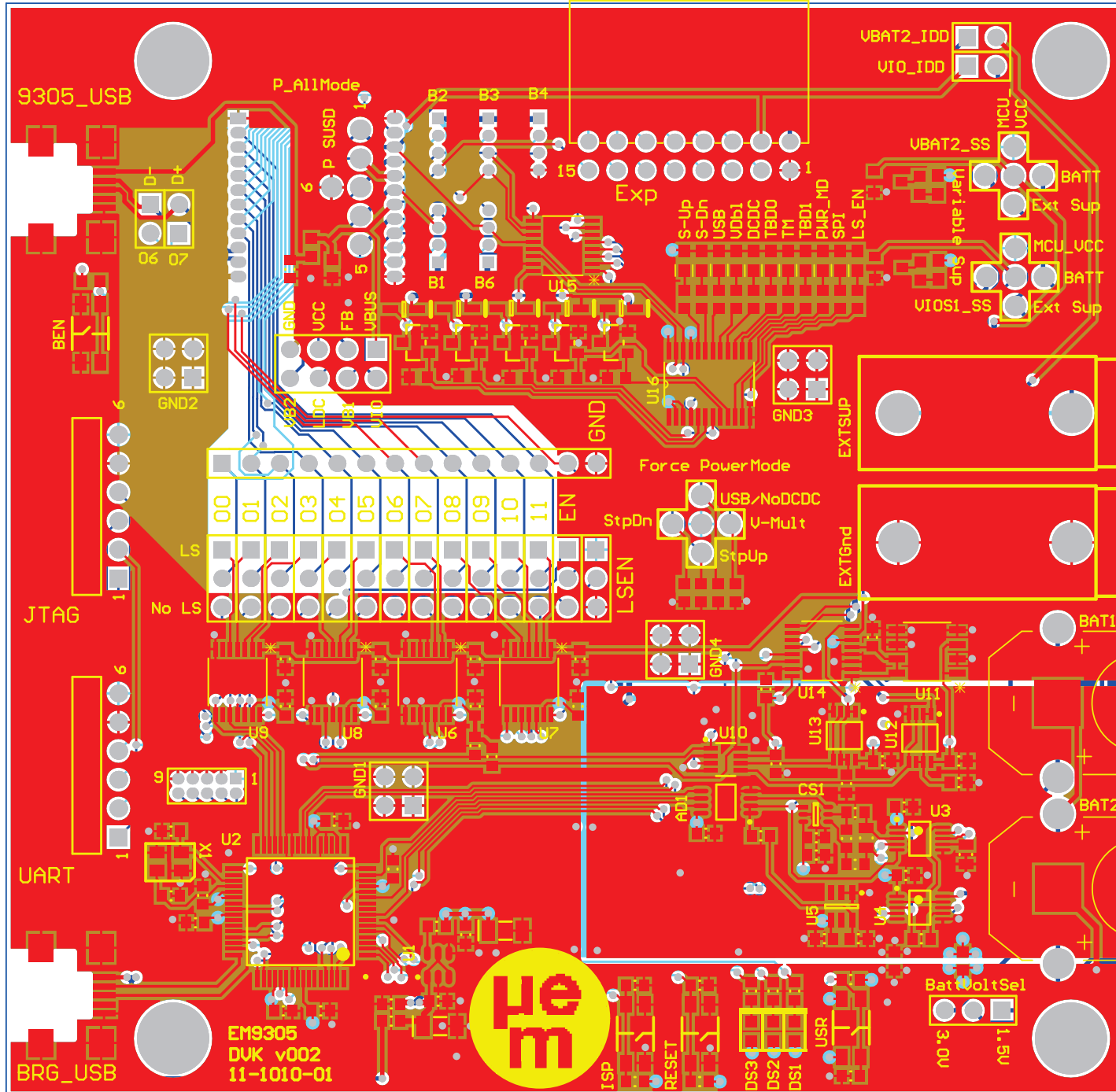
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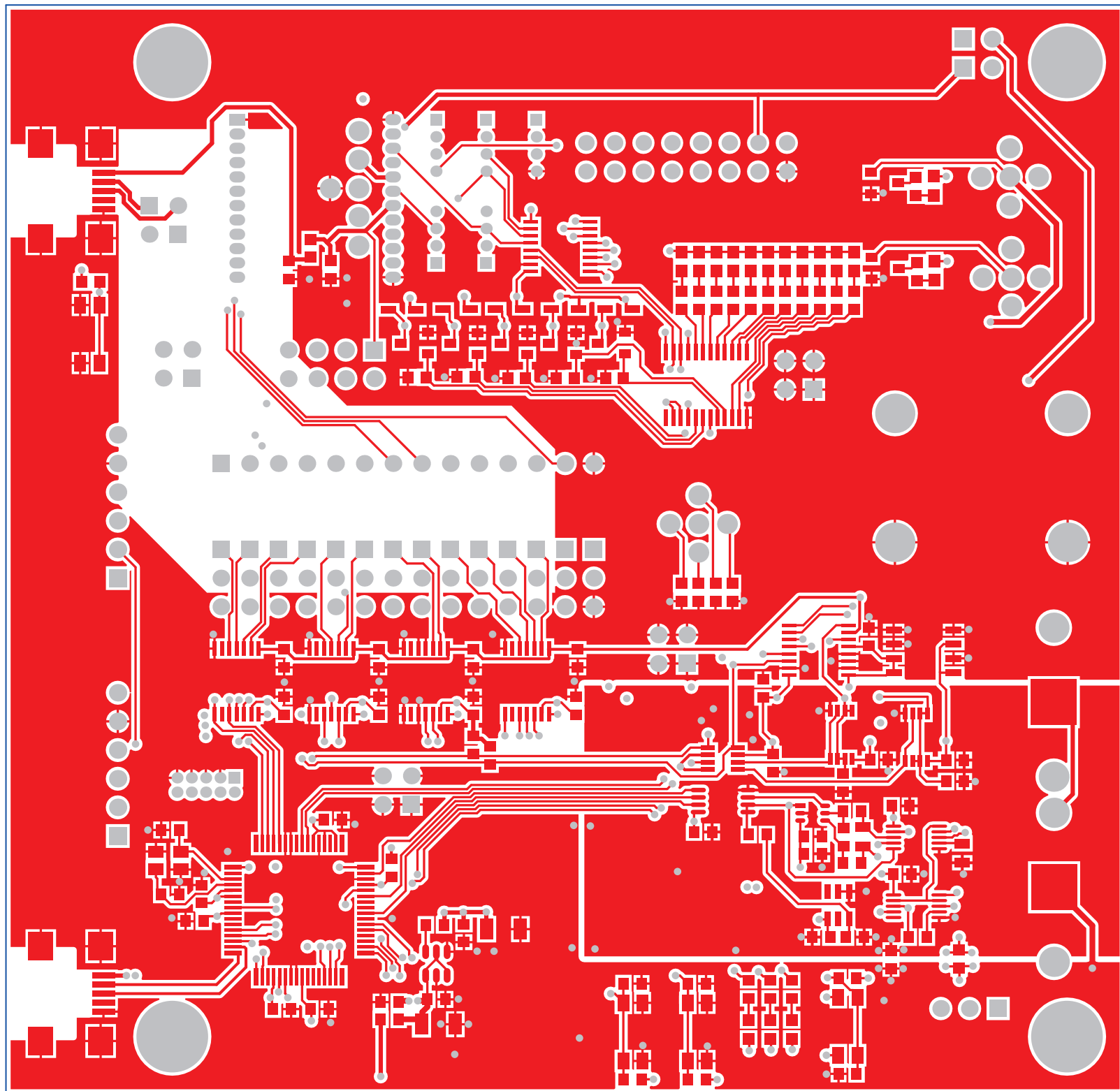
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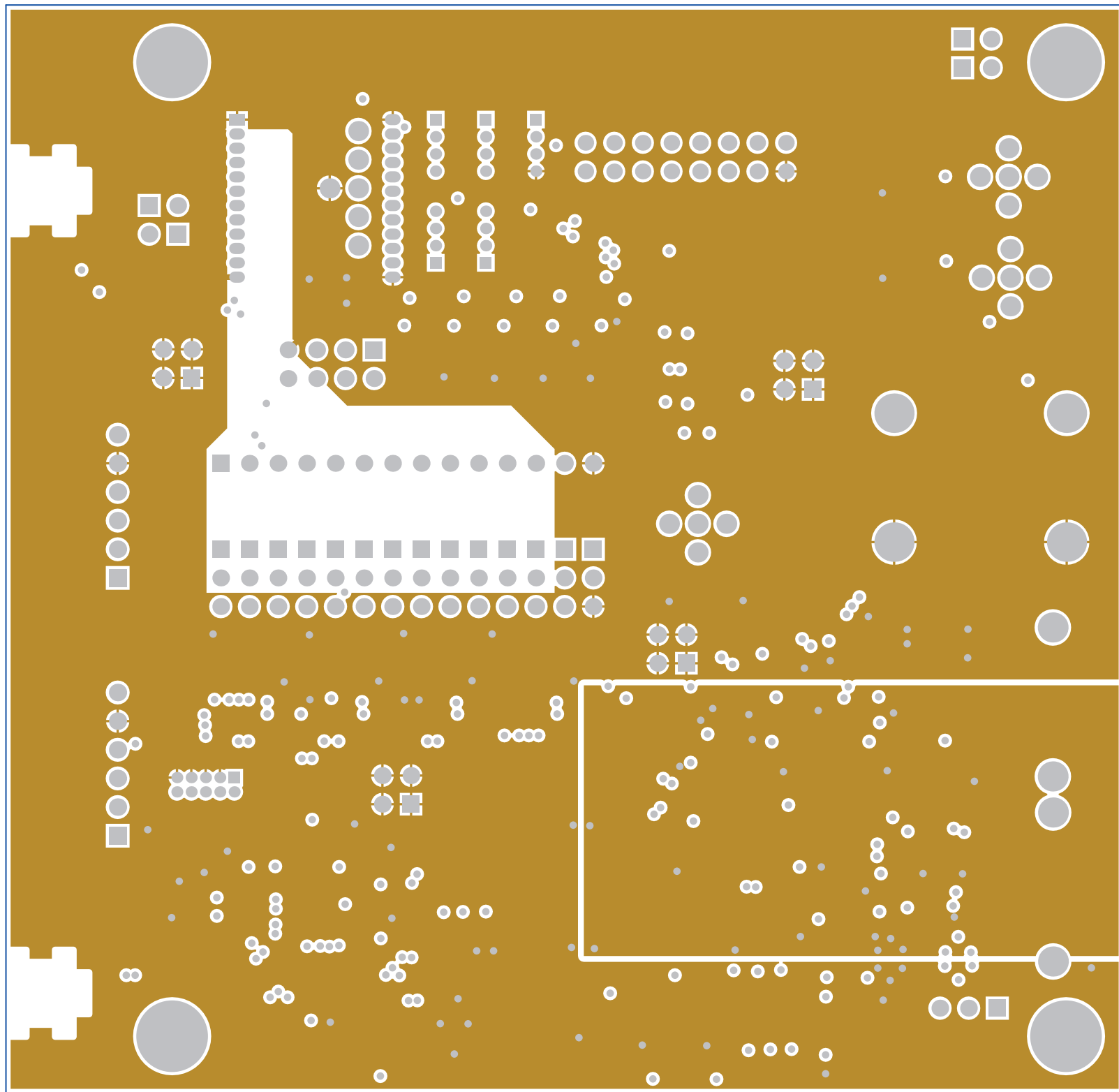
EM9305 Modules		Drawn by	Rev.	Date	ECN
Format	A4	KOPP	001	06-01-2021	-
Page	6/7	KOPP	002	13-04-2021	-
PCB Project:	EM9305 DVK	TDB	TDB	TDB	TDB
PCB PNR:	11-1010-01				

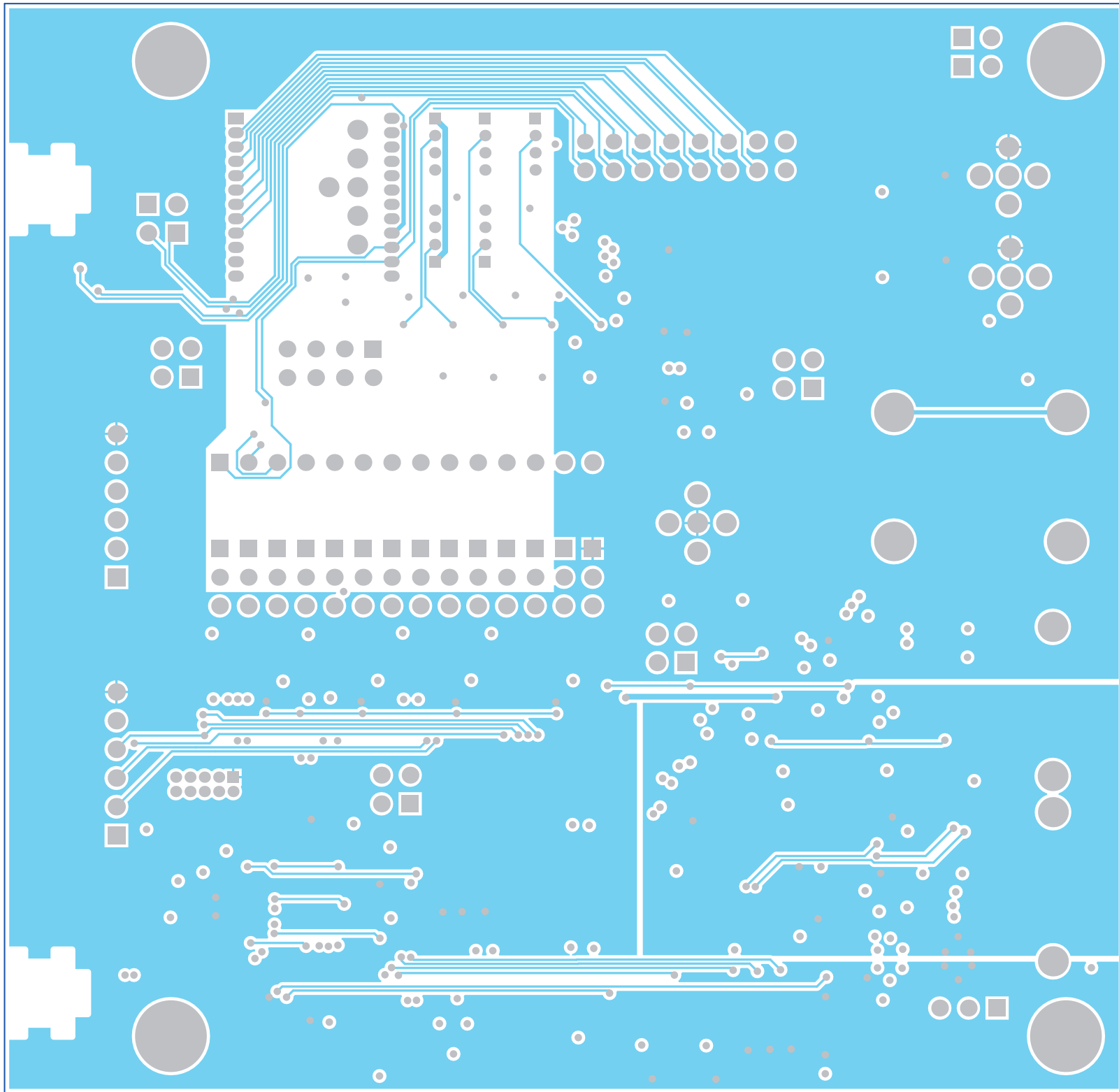
EM Microelectronic
3 Rue des Sors
2074 Marin
Switzerland

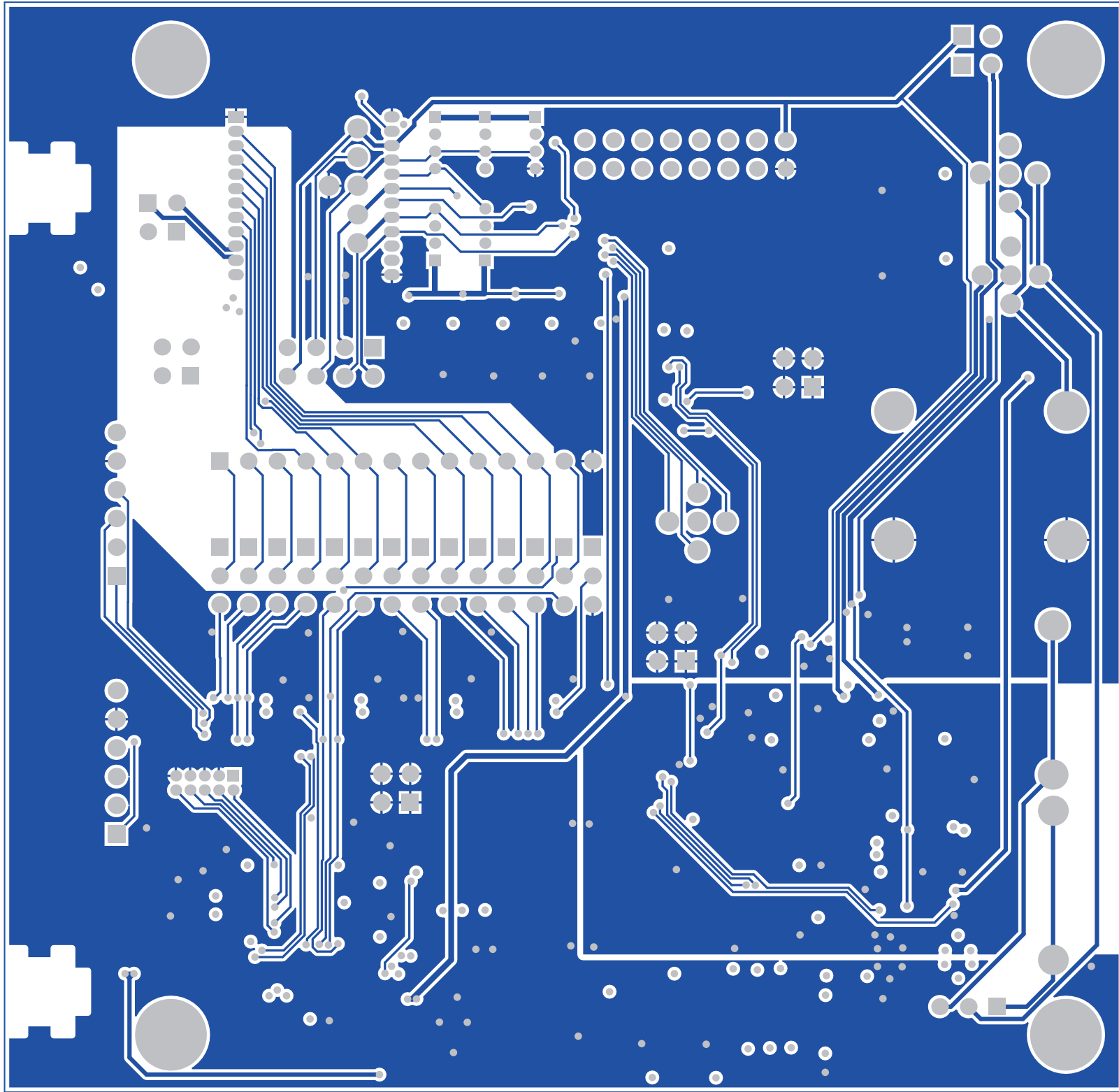
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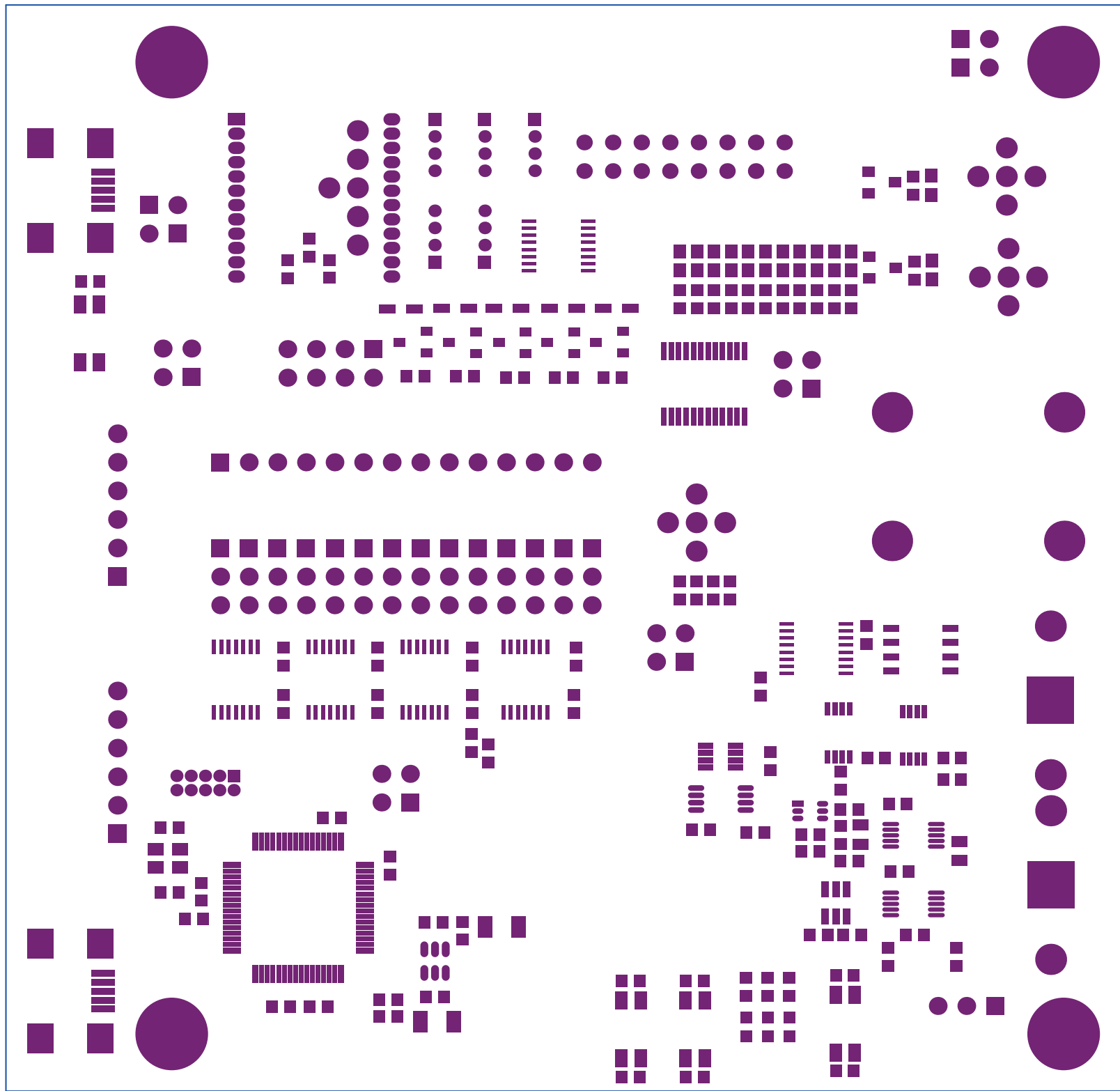


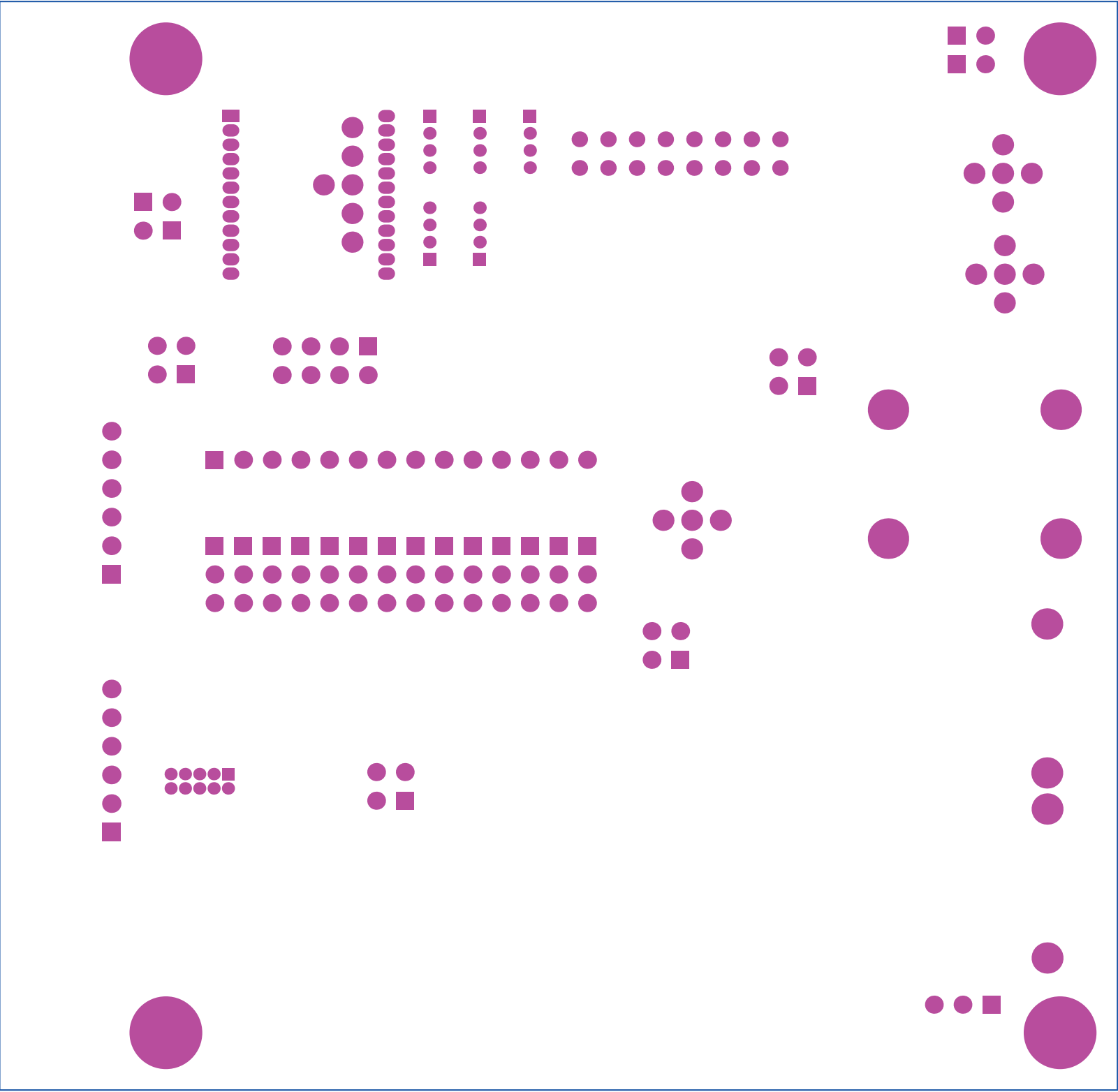


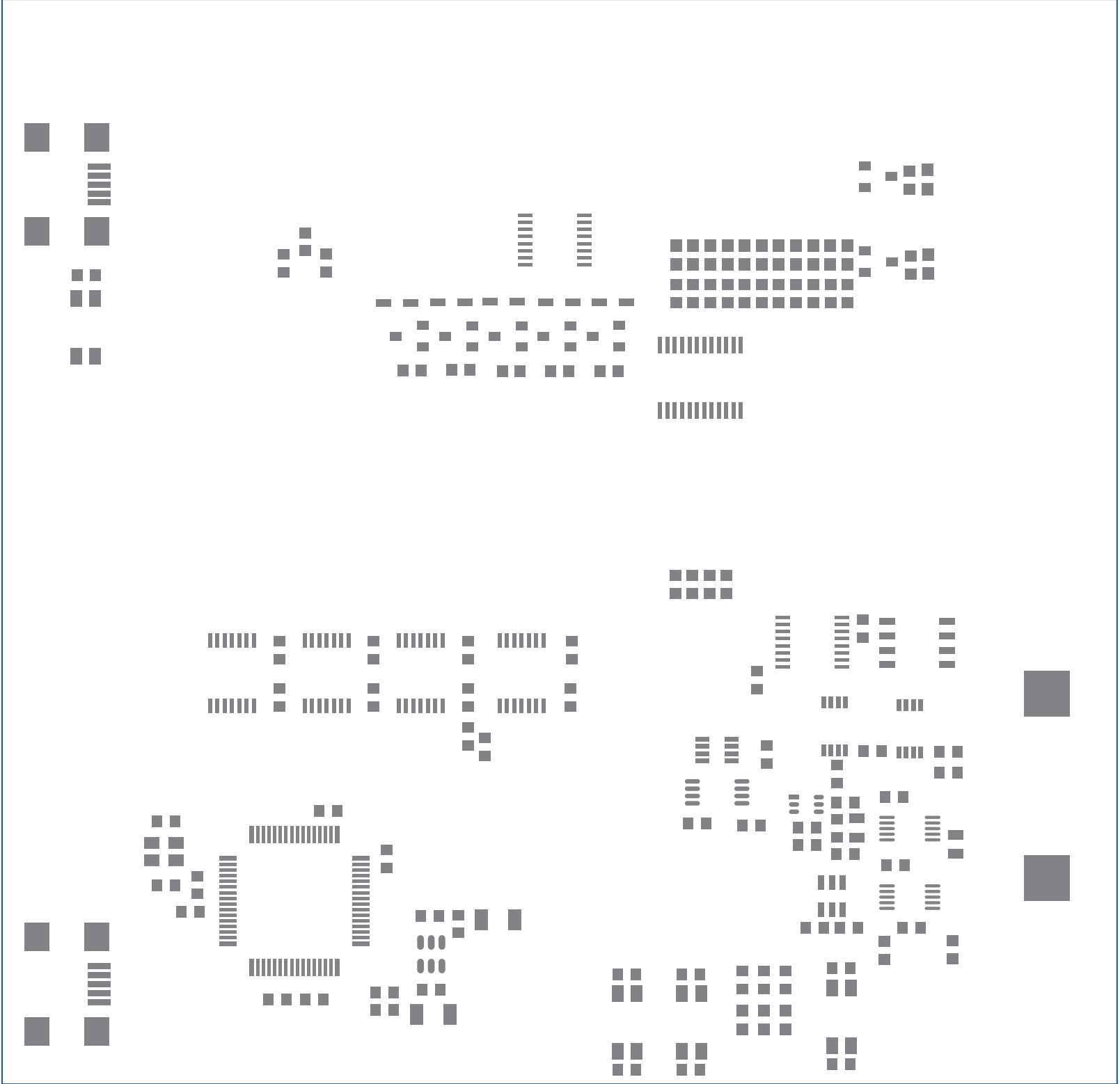










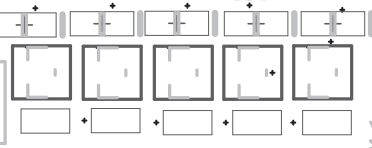


9305_USB

P_AllMode

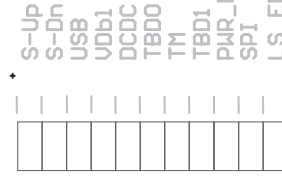
VBAT2_IDD

VIO_IDD



GND

Exp



EXTSUP



EXTGnd

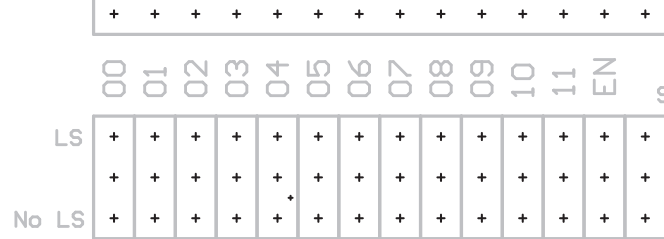
Force PowerMode

StpDn

USB/NoDCDC

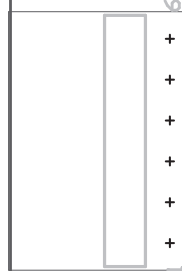
V-Mult

StpUp

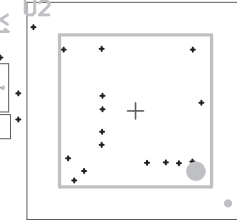
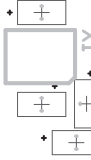


LSEN

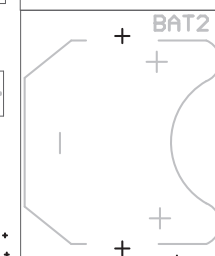
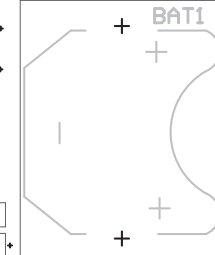
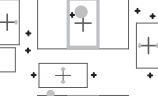
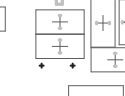
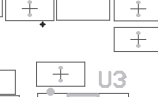
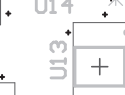
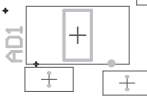
JTAG



UART



U10

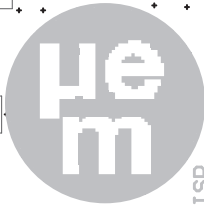


BattVoltSel



BRG_USB

EM9305
DVK v002
11-1010-01

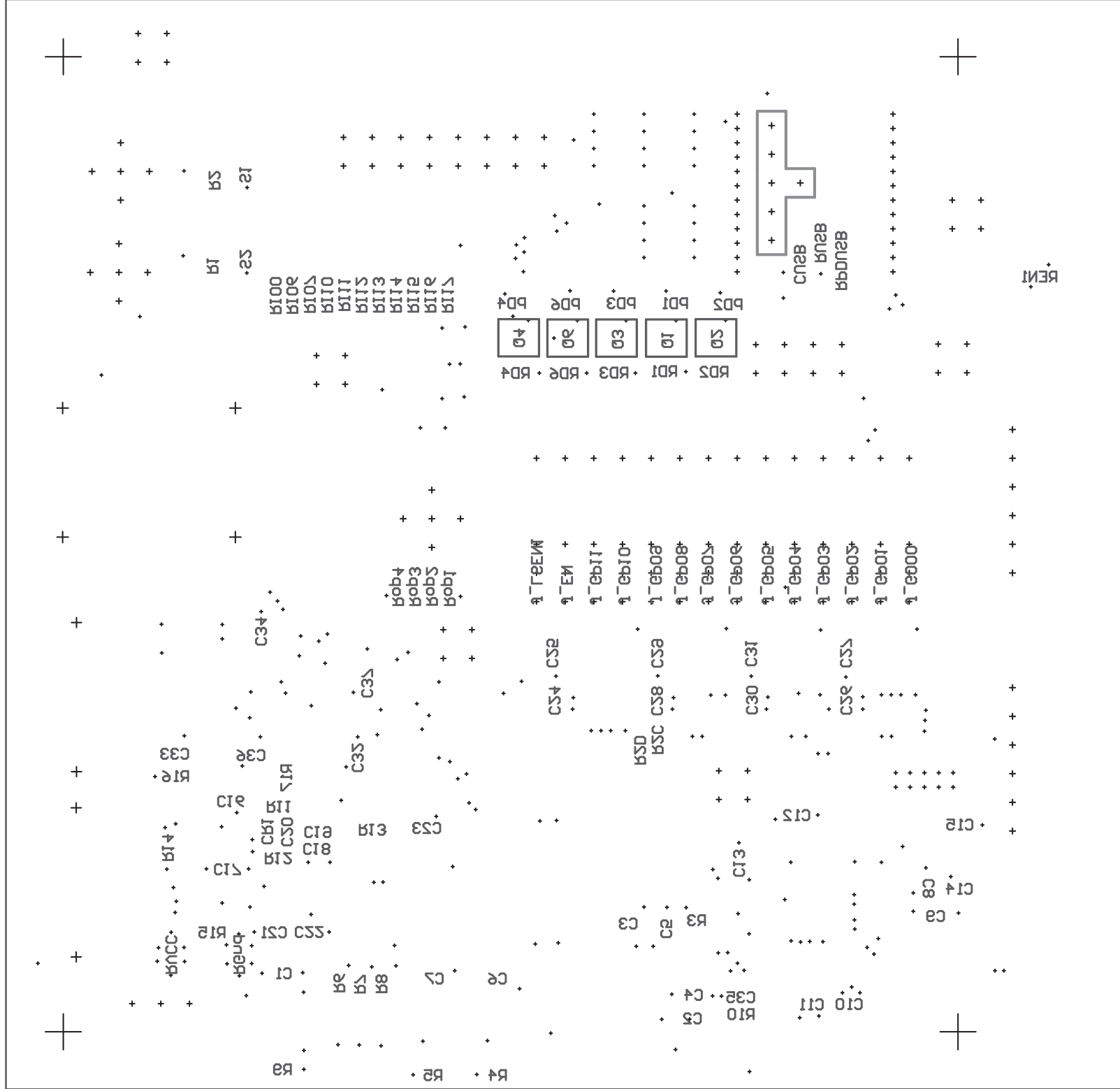


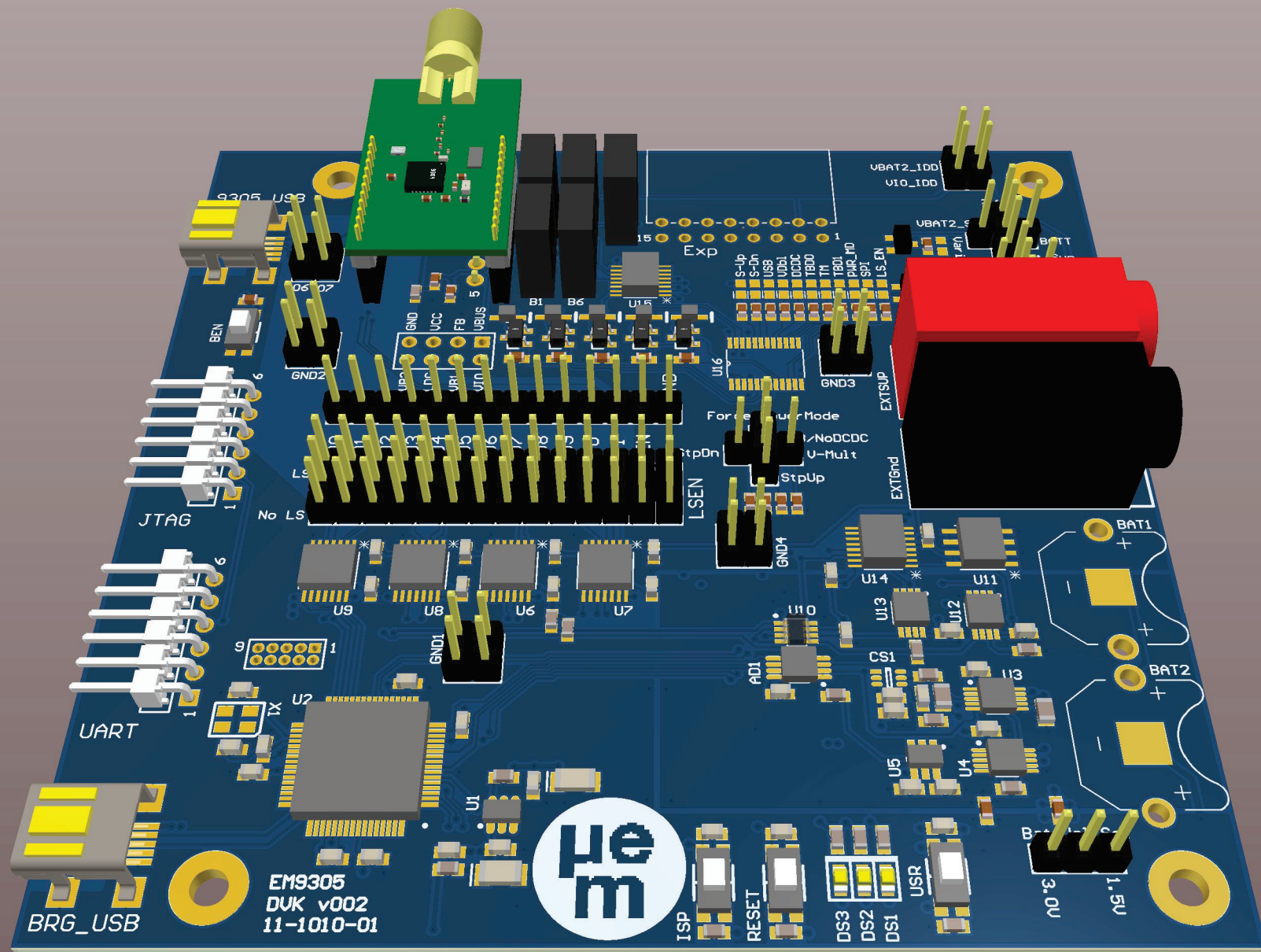
ISP

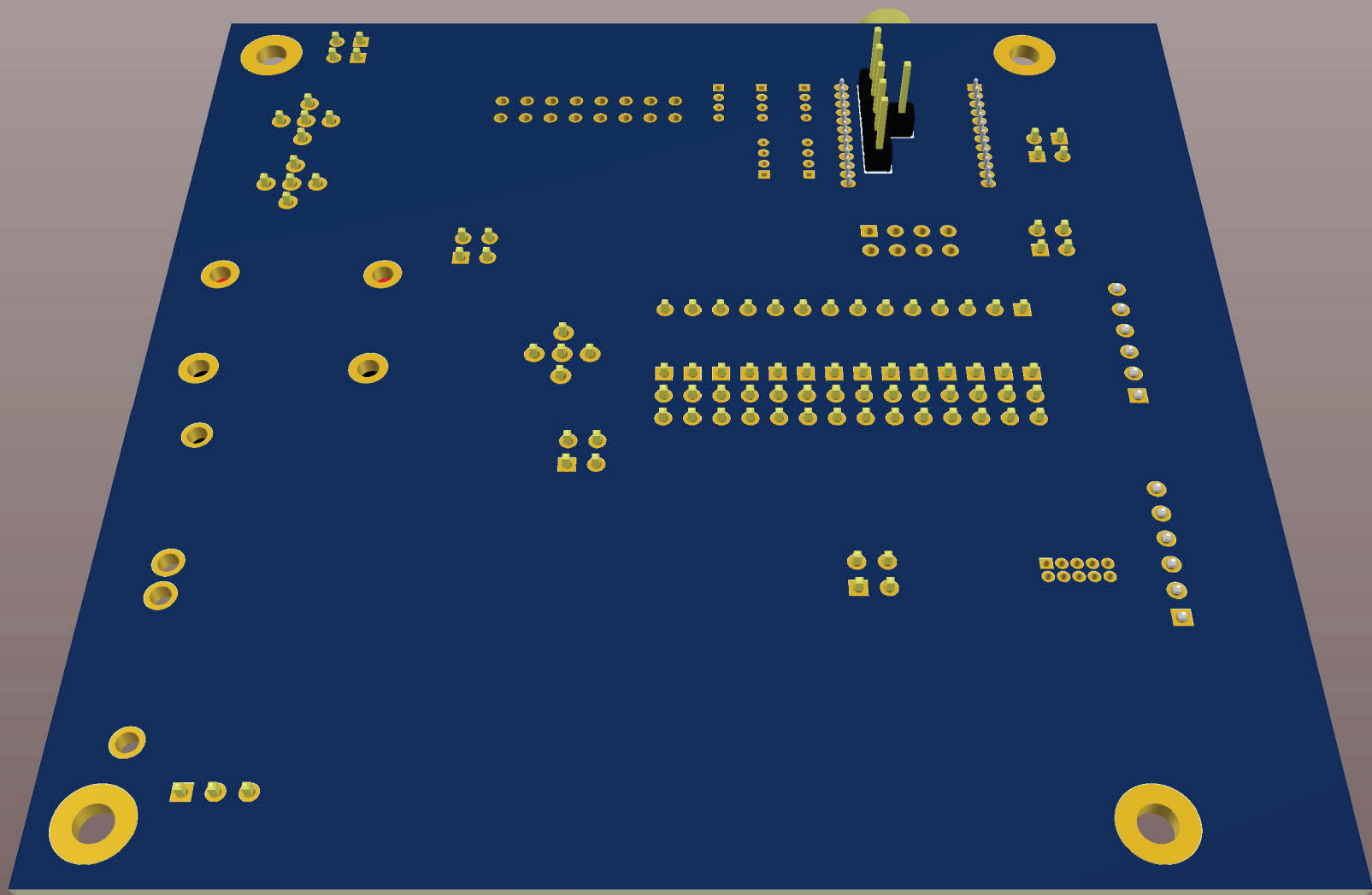
RESET



USR







Designator	Quantity	Comment	Description	Footprint	Manufacturer	Manufacturer Part Number	Value	Supplier 1	Supplier Part Number 1
9305_USB, BRG_USB	2	UX60A-MB-5ST	USB Mini-B Metal Shield SMT Type Without	UX60A-MB-5ST	Hirose Electric Co	UX60A-MB-5ST		Digikey	H2961CT-ND
U3, U4	2	TS3A24159	TS3A24159 300mOhm 2-Channel SPDT	SLAB-MSOP-10_L	Texas Instruments	TS3A24159DGSR		Digikey	296-219131-ND
BEN, ISP, RESET, USR	4	EVQ-P2402M	SMD Light Touch Switch, 4.7mm x 3.5mm	EVQ-P2402M	Panasonic Electronic	EVQ-P2402M		Digikey	P110805CT-ND
PD1, PD2, PD3, PD4, PD6	5	SD107WS-7F	Schottky Barrier Diode, 30V, -65 to 150	DIOD-SOD-323-2 V	Diodes Incorporated	SD107WS-7F		Digikey	SD107WS-FDICT-ND
R4, R5, R9, R16, R17, RPDUSB	6	RES0603	Resistor, SMD, 0603, 10k	RES0603(1608)_N	Vishay Beyschlag	MCT0603MD1002DP500	10K	Digikey	MCT0603-10K-MDCT-ND
R2C, R2D	2	RES0603	Resistor, SMD, 0603	RES0603(1608)_N	Stackpole Electronics	RMCF0603FT2K20	2.2k	Digikey	RMCF0603FT2K20CT-ND
R3, R10, R11, R12, R13	5	RES0603	Resistor, SMD, 0603	RES0603(1608)_N	Vishay Dale	WSL0603000000ZE9	0	Digikey	541-39271-ND
R6, R7, R8	3	RES0603	Resistor, SMD, 0603	RES0603(1608)_N	Vishay Beyschlag	MCT0603MC1001FP500	1K	Digikey	MCT0603-1.00K-MFCT-ND
R15	1	RES0603	Resistor, SMD, 0603	RES0603(1608)_N	Stackpole	RMCF0603FT1M20	1.2M	Digikey	RMCF0603FT1M20CT-ND
RD1, RD2, RD3, RD4, RD6, Rop1, Rop2, Rop3, Rop4	9	100k	RES SMD 100K OHM 5% 1/10W 0603	R0603	Yageo	RC0603JR-07100KL	100k	Digikey	311-100KGRCT-ND
B1, B2, B3, B4, B6	5	MS05-1A80-75	RELAY REED SPST 500MA 5V	MS05-1A80-75	Standex-Meder Electronics	UMS05-1A80-75L		Digikey	374-1253-ND
U11	1	MCP1501-25E/SN	No Description Available	SOIC8_NARROW_SN_MH	Microchip Technology	MCP1501-40E/SN		Digikey	MCP1501-40E/SN-ND
U14	1	max11614eee+	No Description Available	21-0055H_16_MXHL	Maxim Integrated	MAX11614EEE+		Digikey	MAX11614EEE+ND
U15	1	max11616eee+	No Description Available	21-0055H_16_MXHL	Maxim Integrated	max11616eee+		Digikey	MAX11616EEE+ND
S1, S2	2	NFET	N-Channel 20V 6.9A (Ta) 610mW (Ta) S	SC-99	Diodes Incorporated	DMN2020LSN-7	NFET	Digikey	DMN2020LSN-7DICT-ND
Q1, Q2, Q3, Q4, Q6	5	DMN2020LSN-7	MOSFET N-CH 20V 6.9ASCS9	FP-SC59-MFG	Diodes Incorporated	DMN2020LSN-7		Digikey	DMN2020LSN-7DICT-ND
AD1	1	MCP3553-E/MS	MCP3553-E/MS 22-bit ADC w/ SPI	MSOP-MS8_N	Microchip Technology	MCP3553-E/MS		Digikey	MCP3553-E/MS-ND
U10	1	LTC2633	LTC2633 Dual 12-/10-/8-Bit 12C VOUT D	LTC2633	Analog Devices Inc	LTC2633CTS8-LZ10#TRMPBF		Digikey	LTC2633CTS8-LZ10#TRMPBFCT-ND
U5	1	LT1790BS6-1.25#T	LT1790 Voltage Reference, 1.25V	LT-S6-6-TSOT-23_N	Analog Devices Inc	LT1790BS6-1.25#TRMPBF	2.048V	Digikey	LT1790BS6-1.25#TRMPBFCT-ND
U2	1	LPC1549JBD64	LPC1549JBD64	SOT314-2	NXP	LPC1549JBD64QL		Digikey	568-11350-ND
DS2	1	LTST-C191KSKT	LED YELLOW CLEAR SMD	KING-0603LED_V	Lite-On Inc.	LTST-C191KSKT		Digikey	160-1448-ND
DSL	1	LED RED CLEAR CHIP	LED RED CLEAR CHIP SMD	KING-0603LED_V	Lite-On Inc.	LTST-C190KRKT		Digikey	160-1436-ND
DS3	1	LED GREEN CLEAR CHIP	LED GREEN CLEAR CHIP SMD	KING-0603LED_V	Lite-On Inc.	LTST-C190GKT		Digikey	160-1183-ND
J_PMS, VBAT2_SS, VIOS1_SS	3	VIO Source Sel	Jumper block, cuta 5 pin header strip to r	Jumper Block	METZ CONNECT	PR20206VBNN		Digikey	1849-PR20206VBNN-ND
P_SUDO	1	Jumper Block	Jumper block 5-wide T	Jumper Block- TS	DNP	DNP		DNP	DNP
EXTSUP	1	571-0500	Insulated 4mm socket RED	BananaSocket4mm	Delttron	571-0500		Mouser	164-6219
EXTGrnd	1	571-0100	Insulated 4mm socket BLK	BananaSocket4mm	Delttron	571-0100		Mouser	164-6218
CS1	1	INA214IDDKT	INA210 Current-Sense Amplifier (200V)	SC-70	Texas Instruments	INA214IDDKT		Digikey	296-234221-ND
U6, U7, U8, U9	4	NLSX5014MUTAG	IC TRNSLTR BIDIRECTIONAL 12UQFN	TSSOP-14WB	ON Semiconductor	NLSX5014DTRG		Digikey	NLSX5014DTR2GOSCT-ND
U12, U13	2	LM358DGKR	IC OPAMP GP 2 CIRCUIT 8VSSOP	ONSC-MICRO-8-846A-Q2_H	ON Semiconductor	LM358DGKR		Digikey	296-184571-ND
U16	1	PCA6416APW, I18	IC I/O EXPANDER I2C/SMB 24TSSOP	SOP65P640X110-24N	NXP USA Inc.	PCA6416APW, I18	PCA6416APW, I18	Digikey	568-99111-ND
Exp	1	Header 8X2	Header, 8-Pin, Dual row	CON16_2X8_TR_TSW_SA		TSW-108-25-L-D-RA		Digikey	SAM15952-ND
NXP_JTAG1	1	MHDR2X5	Header, 5-Pin, Dual row	MHDR2X5	DNP	DNP		DNP	DNP
PMG	1	Header 4X2	Header, 4-Pin, Dual row	HDR2X4	DNP	DNP		DNP	DNP
BattVoltSel	1	Header 3	Header, 3-Pin	HDR1X3	METZ CONNECT	PR20203VBNN		Digikey	1849-1003-ND
J_EN, J_G000, J_GP01, J_GP02, J_GP03, J_GP04, J_GP05, J_GP06	14	Header 3	Header, 3-Pin	HDR1X3	Molex	0022284146		Digikey	WM24210-ND
GND1, GND2, GND3, GND4	4	Header 2X2	Header, 2-Pin, Dual row	HDR2X2	Molex	0010897040		Digikey	0010897040
J_D-, J_D+	2	Header 2	Header, 2-Pin	HDR1X2	Samtec Inc.	MTLW-102-07-L-S-250		Digikey	MTLW-102-07-L-S-250-ND
VBAT2_IDD, VIO_IDD	2	Header 2	Header, 2-Pin	HDR1X2	Molex	0010897040, WM22702-ND		Digikey	WM22702-ND, 0010897040
D_VBAT, D_VIO, DCD, LS_EN, PWR_MD, S-Dn, SPI, S-Up, TBD0, P_AllMode	13	LTST-C191KSKT	Green 571nm LED Indication - Discrete 2	D0603	Lite-On Inc.	LTST-C191KSKT		Digikey	160-14461-ND
X1	1	9305 Ref Design	Footprint for reference design. Part cons	9305 Ref Design	Samtec	2pcs of SMS-112-01-G-S		Digikey	2pcs of SAM9968-ND
IO_TP	1	NX3225SA-12.000MH	Crystal 12 MHz, 8pF, SMD	NX3225SA	NDK America, Inc	NX3225SA-12.000M-STD-CSR-1		Digikey	644-10471-ND
U1	1	Header 14	CONN HEADER VERT 14POS 2.54MM	HDR1X14	Molex	0022284146		Digikey	0022284146
C2, C3	1	NCP511SN33TIG	CMOS Low-Dropout Voltage Regulator, 3	NCP511SN33TIG_MC78LC3	ON Semiconductor	NCP511SN33TIG		Digikey	NCP511SN33TIGOSDKR-ND
C1, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C16, C17, C18, C14, C15, C20	28	CAP1206P	Capacitor, SMD, 1206, Polarized	PCAPC1206(3216)75_N	AVX Corporation	TLNK157M006R2500	150uF	Digikey	478-62501-ND
C19	1	CAP0603E	Capacitor, SMD, 0603, 0.1uF	CAPC0603(1608)100_N	Yageo	AC0603KRX7R9BB104	0.1uF	Digikey	311-30341-ND
C21	1	CAP0603E	Capacitor, SMD, 0603	CAPC0603(1608)100_N	DNP	DNP		DNP	DNP
C34	1	CAP0603E	Capacitor, SMD, 0603	CAPC0603(1608)100_N	AVX	06035C101JA2TA	100pF	Digikey	478-79251-ND
C35	1	CAP0603E	Capacitor, SMD, 0603	CAPC0603(1608)100_N	KEMET	C0603C105K9PAC7411	1uF	Digikey	399-C0603C105K9PAC7411CT-ND
BAT1, BAT2	2	BK-5091	Battery Retainer Coin, 11.6mm 1 Cell PCB	BAT_BK-5091	MPD (Memory Protection)	BK-5091		Digikey	BK-5091-ND
CR1	1	RES0805	0805 (2012 Metric) Chip Resistor	RES0805(2012)_L	Bourns Inc	CRL0805-FW-R470BIF	0.47	Digikey	118-CRL0805-FW-R470ELFCT-ND
R14	1	RES0805	0805 (2012 Metric) Chip Resistor	RES0805(2012)_L	Panasonic Electronic	ERA-6APB621V	620	Digikey	P620AZCT-ND
JTAG, UART	2	TSW-106-08-L-S-RA	0.025" SQ Post Header, Through-hole, R	TSW-106-08-L-S-RA	Samtec Inc.	TSW-106-08-L-S-RA		Digikey	SAM1043-06-ND
CUSB	1	10uF		C0603	Samsung Electro	CL10A106K08NNC	10uF	Digikey	1276-10381-ND
Logo	1	2020 version of the logo		EMLOGO 2020 12mm					
R1, R2, REN1, RI00, RI06, RI07, RI10, RI11, RI12, RI13, RI14, R	14	Resistor		R0603	Yageo	RMCF0603FT3K30	3.3k	Digikey	RMCF0603FT3K30CT-ND
Rgnd, RUSB, RVCC	3	Resistor		R0603	Stackpole Electron	RMCF0603JT1R00	1	Digikey	RMCF0603JT1R00CT-ND