MAX20751S1VKIT# Evaluation Kit

Evaluates: MAX20751/VT1697SB

General Description

The MAX20751S1VKIT# evaluation kit (EV kit) is a proven application-circuit design for the MAX20751 DC-DC power-supply controller and the VT1697SB power train. The EV kit is a programmable-output, 4-phase switching regulator with a PMBus™ interface. The IC controls up to four power trains to generate a single output voltage. The EV kit can be used as a stand-alone board, if desired. However, to take full advantage of the IC's capabilities, the user must connect the EV kit to a PC using the MAXPOWERTOOL002 (PowerTool™), Maxim's USB-to-PMBus interface dongle for power products. The PowerTool is Windows XP-®, Windows Vista-®, and Windows 7-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the IC. The PowerTool GUI allows a PC to control the PMBus interface and to collect real-time data from the EV kit.

The EV kit contains a fully functional PCB assembly and is capable of delivering up to 100W of continuous 0.6V to 1.52V power output from a 7V to 14V input supply.

The PowerTool is sold separately and contains a USB cable (to connect PC to dongle) and a ribbon cable (to connect dongle to EV kit).

The EV kit also evaluates the VT1697SB smart slave IC with integrated current and temperature sensors. The VT1697SB is a features-rich smart slave IC designed to work with Maxim's master switch-mode power-supply controller to implement a high-density multiphase voltage regulator.

Features

- MAX20751 Master Switch-Mode Controller
- Up to Four Interleaved Power Stages
- Up to 100A Output Current
- PMBus Interface
- Digital Telemetry and Control
- Patented Synchronous Buck Topology Using Coupled Inductors
- Smaller Size
- Higher Efficiency
- Reduced Output Capacitance
- 300kHz to 800kHz Switching Frequency
- 7V to 14V Input Voltage Range
- All Ceramic Capacitor Output Capacitors
- Proven PCB Layout
- Fully Assembled and Tested

***Ordering Information** appears at end of data sheet.*

19-8336; Rev 1; 4/16

maxim integrated™

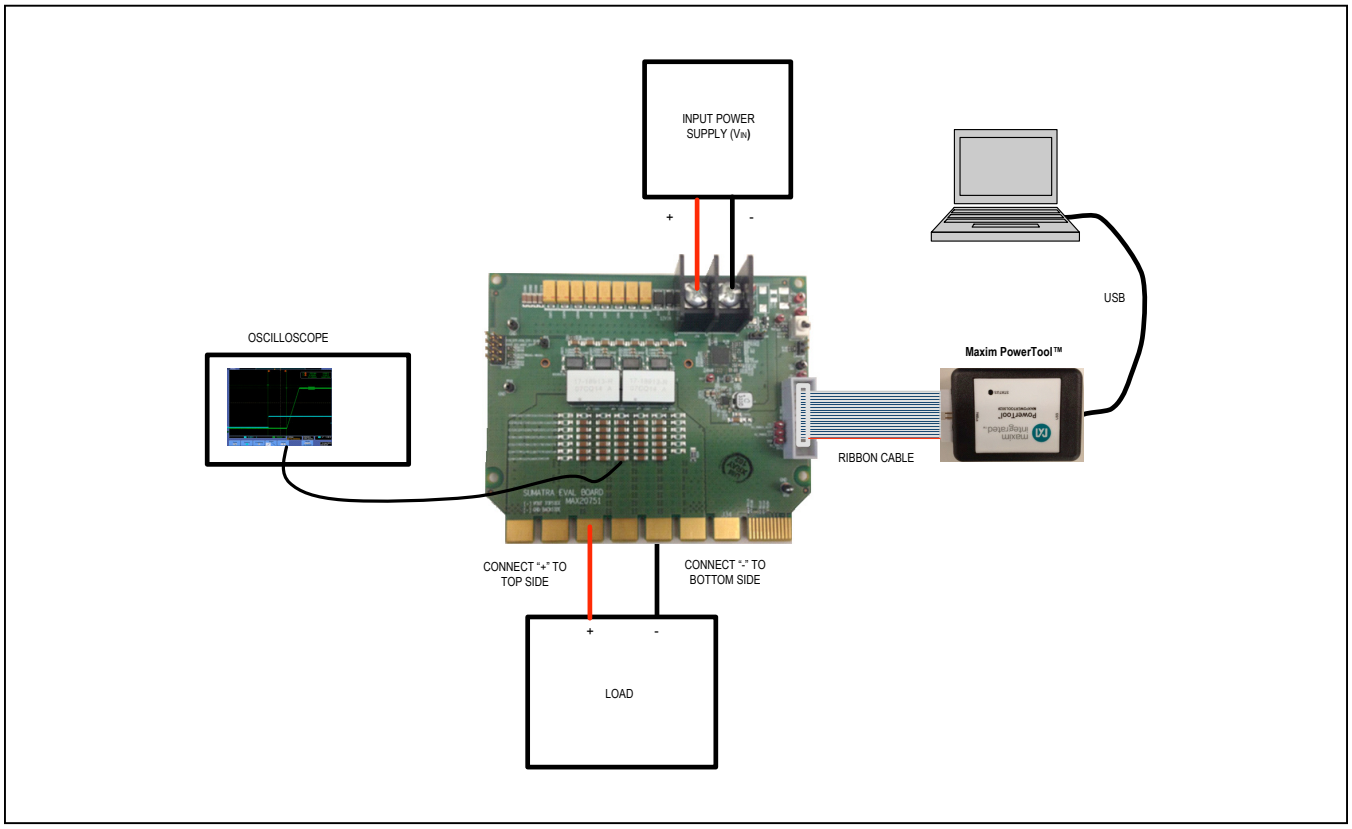


Figure 1. System Setup

Quick Start

Required Equipment

- MAX20751S1VKIT# EV kit
- MAXPOWERTOOL002
- 12V, 15A_{DC} supply
- 100MHz oscilloscope with two or more channels
- Electronic load capable of 100A (min)
- Digital multimeters (DMMs)
- PC with Windows XP, Windows Vista, or Windows 7 and available USB port
- Differential voltage probe for oscilloscope connection

Precautions

1) Before applying power, make sure the input power supply is set for a voltage within the EV kit's 7V to 14V operating limits.
2) Do not turn on any power supplies until all electrical connections are completed.
3) Do not exceed the current rating for the test leads used to connect V_{IN} and V_{OUT}. The EV kit is capable of supplying at least 150A output current.

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation and begin evaluation:

1) Visit **www.maximintegrated.com/en/design/tools/applications/evkit-software/index.mvp/id/1183** to download the latest version of the Digital PowerTool software and follow the automated installation procedures. Refer to the software's Help tab for detailed operating instructions.
2) Connect the PowerTool interface to the PC using the supplied USB cable.
3) After connecting the PowerTool to the PC, wait until the PC finishes installing the required USB-to-PM-Bus interface device driver.
4) Start the PowerTool software and verify that the GUI connects to the interface and that the interface device LED illuminates green.
5) Connect the input power source (V_{IN}), to the EV kit using wire capable of at least 15A_{DC}. It is best if the wires have crimped-on spade lugs to connect to the terminal blocks with ease. Be careful to observe correct polarity.

6) Connect the load to the EV kit output by soldering to the top of the output connector, as shown in Figure 1.
7) Connect the oscilloscope to V_{OUT} as desired. Measuring V_{OUT} with a differential voltage probe provides cleaner waveforms.
8) Connect the PowerTool (dongle) J80 with the supplied 16-pin ribbon cable.
9) Ensure that the EV kit enable switch (SW1) is in the OFF position. Note that the OFF position points away from the J80 ribbon-cable connector.
10) Turn on the input power supply.
11) The GUI should detect the EV kit and display PMBus information for the MAX20751.
12) Enable the EV kit output by placing SW1 in the ON position. Note that the ON position points toward the J80 ribbon-cable connector.

Detailed Description of Hardware

Setting Output Voltage

The default output voltage is pin strapped to 1.0V by resistors R1 and R21, connected to the R_SEL1 and R_SEL2 pins. The user can change this voltage through PMBus to a value between 0.6V and 1.52V. Refer to the MAX20751 IC data sheet for setting output voltages greater than 1.52V.

The IC reads the R_SELx resistor values one time, when input power is first applied to the EV kit. The output-voltage set point can be changed at any time by sending a new VOUT_COMMAND value from the GUI through the PMBus interface.

Setting PMBus Address

The EV kit slave address is configured to 0x70h by pin-strapped resistors R21 and R22, as shown in Table 7 in the MAX20751 IC data sheet. Additional slave addresses can be configured by changing R21 and R22 per the IC data sheet. These resistors also set the output voltage, so choose the appropriate values needed for both.

Note that these resistors are read only once when the IC is powered up. The slave address cannot be changed through the PMBus interface.

Input-Voltage Terminal Block (J78)

The positive input terminal block (J78) is located on the left side of the connector with the PCB oriented as shown in Figure 1. The negative side is located on the right side of the connector.

Output-Voltage Connector (J34)

Access the EV kit output voltage through the J34 connector. Note that J34 is an integral part of the board layout. Access the output voltage by connecting high-current wires to the top layer. Access the ground return by connecting high-current wires to the bottom layer.

PMBus Connector (J80)

Connect the 16-pin ribbon cable from the PowerTool to the J80 connector. J80 provides PMBus communication to and from the EV kit. The PMBus clock, data, and alert signals can be accessed with TP24, TP25, and TP23, respectively.

Enable Switch (SW1)

The EV kit includes enable switch SW1 to control the IC's VR_ON input. The ON position is up and the OFF position is down when the board is oriented per Figure 1.

LED Indicators (D5)

The EV kit features a "power-good" green LED (D5) that illuminates when the IC is asserting PWRGD.

3.3V External Bias Input (TP35)

The EV kit provides an input to apply 3.3V if the user wants to bypass the on-board 12V to 3.3V switching regulator. Apply the external 3.3V supply and ground return to TP35 and TP36, respectively. If an external 3.3V supply is used, install a 0Ω resistor in R160 and R5199 and remove the shorting jumper on J82.

3.3V Bias Jumper (J82)

Install the shorting jumper on J82 when using the on-board 12V to 3.3V bias circuitry. Remove J82 if supplying an external 3.3V bias supply.

Ground Jumper (J30)

J30 provides additional test points to the ground plane. Both J30 pins are connected to ground.

TS_FAULTB Test Point (TP17)

TP17 is connected to the IC's temperature sensor and slave fault flag pin, TS_FAULTB.

Bode Measurement Test Points (TP26 and TP27)

TP26 and TP27 provide a convenient connection to the 10Ω resistor used to take bode measurements of the EV kit. TP27 is connected to the output voltage and TP26 is connected to the IC's positive remote-voltage sense pin, SENSE_P.

Ground Jumper (J55)

J55 provides an additional ground-connection test point.

Input Current Shunt (J81)

J81 provides test points across the input current resistor shunts. These are two 5mΩ resistors in parallel (2.5mΩ) to provide easy measurement of the input current. The current scale factor is 0.4A/mV.

Efficiency-Measurement Connector (J8)

J8 provides Kelvin connections to the EV kit's proper efficiency-measurement points.

J8-1 and J8-2 are the input-voltage test points.

J8-3 and J8-4 are the output-voltage test points.

J8-5 and J8-6 are the bias-voltage test points.

Note that for a proper efficiency measurement, the user must disable the internal 3.3V bias supply and provide an external bias supply.

J8-7 and J8-8 provide jumpers to measure the bias current. It is recommended these pins not be used and the bias supply input current be measured prior to being connected to the EV kit.

Load Regulation Jumper (J27)

Use J27 to measure the EV kit's load regulation; it provides a convenient Kelvin connection to the power supply's output-voltage sensing location.

Performance Characteristics

Refer to the MAX20751 IC data sheet for the EV kit's performance characteristics.

Component List, Schematics, and PCB Layout Diagrams

Click on the links below for component information, schematics, and PCB layout diagrams:

- **MAX20751S1VKIT# BOM**
- **MAX20751S1VKIT# Schematic Diagrams**
- **MAX20751S1VKIT# PCB Layout Diagrams**

Ordering Information

PART	TYPE
MAX20751S1VKIT#	MAX20751 EV Kit
MAXPOWERTOOL002#	PowerTool USB-to-PMBus Interface Dongle for Power Products

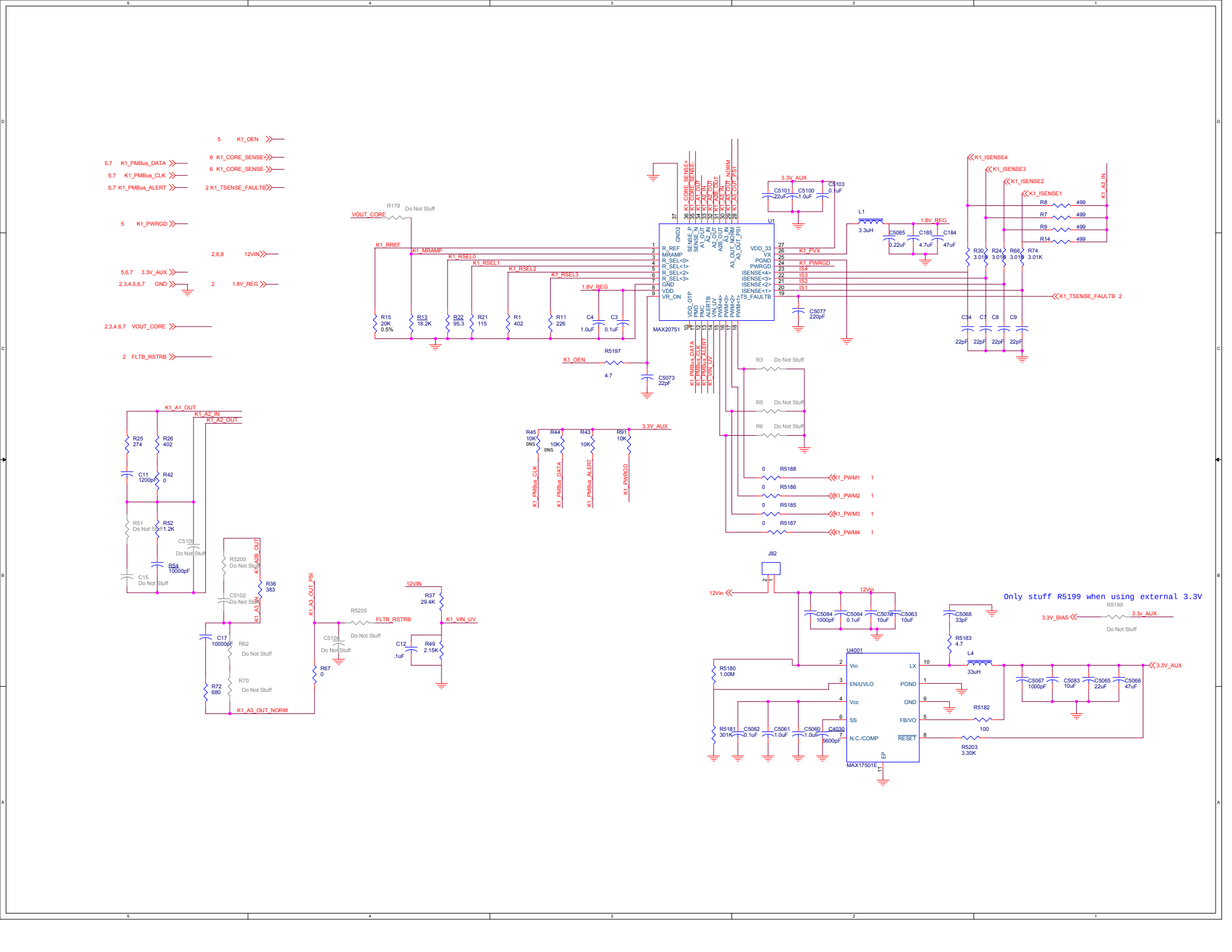
#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/15	Initial release	—
1	4/16	Updates to *General Description*, *Features*, and *Quick Start* sections; update to Billing of Materials	1–2, 6

MAX20751S1VKIT# BOM; Rev 1; 4/16

QTY	Reference Designators	Description	Case Size	Manufacturer Part Number	Manufacturer
13	C1000 C2000 C3000 C4000 C5066 C5079 C5080 C5081 C5082 C5089 C5093 C5094 C5106	47uF, 25V, 20%, X5R	1206	C3216X5R1E476M	TDK
6	C1001 C2001 C3001 C4001 C5067 C5084	1000pF, 50V, 10%, X7R	0402	04022R102K9B20D	Phycomp
7	C1002 C2002 C3002 C4002 C5062 C5064 C5103	0.1uF, 25V, 10%, X7R	0402	C1005X7R1E104K050BB	TDK
4	C1003 C2003 C3003 C4003	22000pF, 50V, 10%, X7R	0402	GRM155R71H223KA12D	Murata
8	C1004 C2004 C2005 C3004 C3005 C4004 C4005 C5088	1uF, 25V, 10%, X7R	0603	CGA3E1X7R1E105K	TDK
8	C1006 C1010 C2006 C2010 C3006 C3010 C4006 C4010	0.22uF, 16V, 10%, X7R	0402	GRM155R71C224KA12D	Murata
30	C106 C107 C117 C124 C125 C126 C127 C132 C133 C134 C135 C136 C137 C142 C143 C145 C151 C152 C154 C155 C161 C162 C163 C164 C165 C169 C170 C171 C172	100uf, 6.3V, 20%, X5R	1206	C3216X5R0J107M160AB	TDK
1	C11	1200pF, 25V, 10%, X7R	0402	GRM155R71H122KA01D	Murata
1	C12	0.1uF, 10V, 10%, X7R	0402	LMK105 BJ104KV	Taiyo Yuden
5	C14 C1011 C2011 C3011 C4011	2.2uF, 6.3V, 10%, X7S	0402	C1005X7S0J225K050BC	TDK
2	C17 R54	10000pF, 16V, 5%, X7R	0402	0402YC103JAT2A	AVX
4	C181 C292 C297 C5110	1.0uF, 6.3V, 10%, X5R	0402	C1005X5R0J105K	TDK
1	C184	47uF, 6.3V, 20%, X5R	0805	JMK212 BJ476MG	TaiyoYuden
1	C185	4.7uF, 6.3V, 20%, X5R	0402	GRM155R60J475ME47D	Murata
8	C289 C290 C293 C298 C299 C5069 C5070 C5071	100uF, 25V, 20%, TANTALUM	7343(D)	T521X107M025ATE060	Kemet
5	C3 C100 C101 C102 C103	0.1uF, 16V, 10%, X7R	0402	GRM155R71C104KA88D	Murata
5	C4 C291 C5060 C5061 C5100	1.0uF, 25V, 20%, X5R	0402	TMK105BJ105MV-F	Taiyo Yuden
1	C4030	5600pF, 25V, 5%, X7R	0402	04023C562JAT2A	AVX
7	C5063 C5086 C5087 C5092 C5095 C5104 C5105	10uF, 25V, 20%, X6S	0805	GRM21BC81E106ME11L	Murata
2	C5065 C5101	22uF, 16V, 10%, X5R	0805	C2012X5R1C226K	TDK
1	C5068	33pF, 50V, 5%, NPO	0603	GRM1555C1H330JA01D	Murata
1	C5077	220pF, 50V, 10%, X7R	0402	GRM155R71H221KA01D	Murata
3	C5078 C5090 C5107	10uF, 25V, 10%, X5R	0805	TMK212BBJ106KG-T	Taiyo Yuden
1	C5083	10uF, 16V, 20%, X5R	0603	EMK107BBJ106MA-T	Taiyo Yuden
1	C5085	0.22uF, 25V, 10%, X6S	0402	C1005X6S1E224K	TDK
4	C5096 C5097 C5098 C5099	56pF, 50V, 5%, NPO	0402	GRM1555C1H560JA01D	Murata
5	C7 C8 C9 C34 C5073	22pF, 50V, 5%, NPO	0402	GRM1555C1H220JA01D	Murata
1	D14	SMAJ20A Diode TVS, 400W, Vrc=32.4V, Ipp=12.3A	DO-214AC		Bourns
1	D15	MBRS130L, 40A, 30V	SMB		Fairchild Semiconductor
1	D5	GREEN LED	1206	LTST-C150GKT	Lite-On
4	J27 J30 J81 J82	2_PIN-1X2 Straight		TSW-101-07-L-D	Samtec
3	J34 MTG11 MTG12	FINGERS_MOLEX, 24 signal, 14 power. Edge Finger Connector			
1	J55	1_PIN-1X1 Straight		TSW-101-07-L-S	Samtec
1	J78	2_PIN-Single Row Terminal Block, 2 position		A382202	Cooper Bussmann
1	J8	8_PIN-2X4 Straight		87215-1	AMP
1	J80	16_PIN-BoxHeader 2x8		TSW-108-07-T-D	SamTec
1	L1	3.3uH, 1.23A, 167mOhm	2x2mm	EPL2014-332MLB	Coilcraft
2	L2 L3	100nH, +/-20%, 30A, 0.3mOhm, 2-phase	18x11x10mm	CTX17-18913-R	Cooper
1	L4	33uH, +/-20%, Low DCR	6x6x3.5mm	LPS6235-333MR	Coilcraft
4	MTG1 MTG2 MTG3 MTG4	Standoff-Hex Standoff, F/F, 4-40, 1"	4-40_Hex	2205	Keystone
1	Q3	BSS138-N-Channel Logic Level Enhancement	SOT-23	BSS138	Fairchild
1	R1	402Ω, 1%, 1/16W	402	CRCW0402402RFKED	Vishay
5	R1002 R2002 R3002 R4002 R5197	4.7Ω, 5%, 1/16W	0402	ERJ-2GEJ4R7X	Panasonic
1	R104	100Ω, 1%, 1/4W	1206	RCWP1206101F	Vishay Dale
1	R107	511KΩ, 1%, 1/16W	0402	ERJ-2RKF5113X	Panasonic
8	R109 R115 R139 R140 R157 R169 R5207 R5208	1KΩ, 1%, 1/16W	0402	ERJ-2RKF1001X	Panasonic
1	R11	226Ω, 1%, 1/16W	0402	ERJ-2RKF2260X	Panasonic
1	R13	18.2KΩ, 1%, 1/16W	0402	ERJ-2RKF1822X	Panasonic
1	R148	0Ω, 5%, 1/16W	0603	ERJ-3GEY0R00V	Panasonic
1	R15	20KΩ, 0.5%, 1/16W	0402	RR0510P-203-D	Susumu
1	R21	115Ω, .5%, 1/16W	0402	RR0510P-1150-D	Susumu
1	R22	95.3Ω, 1%, 1/10W	0402	ERJ-2RKF95R3X	Panasonic
4	R24 R30 R66 R74	3.01KΩ, 1%, 1/16W	0402	ERJ-2RKF3011X	Panasonic
1	R25	274Ω, 1%, 1/16W	0402	ERJ-2RKF2740X	Panasonic
1	R26	402Ω, 1%, 1/16W	0402	ERJ-2RKF4020X	Panasonic
1	R36	383Ω, 1%, 1/16W	0402	CRCW0402383RFKED	Vishay
1	R37	29.4KΩ, 1%, 1/16W	0402	CRCW040229K4FKED	Vishay
1	R40	10KΩ, 1%, 1/10W	0603	PTN0603E1002BST	Vishay
6	R41 R103 R1000 R2000 R3000 R4000	10Ω, 1%, 1/16W	0402	ERJ-2RKF10R0X	Panasonic
13	R42 R67 R100 R101 R102 R105 R106 R108 R5185 R5186 R5187 R5188 R5204	0Ω, 5%, 1/16W	0402	ERJ-2GE0R00X	Panasonic
4	R43 R44 R45 R91	10KΩ, 1%, 1/16W	0402	ERJ-2RKF1002X	Panasonic
2	R48 R50	1KΩ, 1%, 1/16W	0603	ERJ-3EKF1001V	Panasonic
1	R49	2.15KΩ, 1%, 1/16W	0402	ERJ-2RKF2151X	Panasonic
1	R5180	1.00MΩ, 1%, 1/16W	0402	ERJ2RKF1004X	Panasonic
1	R5181	301KΩ, 1%, 1/10W	0402	ERJ-2RKF3013X	Panasonic
1	R5182	100Ω, .5%, 1/16W	0402	RR0510P-101-D	Susumu
5	R5183 R5193 R5194 R5195 R5196	4.7Ω, 5%, 1/16W	0603	ERJ-3GSYJ4R7V	Panasonic
1	R52	1.2KΩ, 1%, 1/16W	0402	9C04021A1201FLHF3	Yageo
2	R5202 R5206	0.005Ω, 1%, 5W	2818	WSH28185L000FEK	Vishay
1	R5203	3.30KΩ, 1%, 1/16W	0402	ERJ-2RKF3301X	Panasonic
2	R68 R84	100Ω, 1%, 1/16W	0603	ERJ-3EKF1000V	Panasonic
4	R7 R8 R9 R14	499Ω, 1%, 1/16W	0402	ERJ-2RKF4990X	Panasonic
1	R72	680Ω, .5%, 1/16W	0402	RR0510P-681-D	Susumu
1	R77	10KΩ, 5%, 1/16W	0603	ERJ-3GSYJ103V	Panasonic
1	SW1	DPDT-DPDT, 6pins, 1switch		GT21MCBE	C&K
6	TP16 TP17 TP18 TP23 TP24 TP25	TP-Miniature Style Test Point Terminals		5000	Keystone
5	TP19 TP20 TP21 TP22 TP36	TP_Loop-BLACK-Large Test Point w/Loop, BLACK		5006	Keystone
3	TP26 TP27 TP35	TP_Loop-RED-Large Test Point w/Loop, RED		5005	Keystone
1	U1	MAX20751 Multiphase Master Controller with PMBus	QFN-36	MAX20751EKX+	Maxim Integrated
4	U1000 U2000 U3000 U4000	VT1697SB Slave Power Stage, 14V, 50A	QFN-16	VT1697SBFQX	Maxim Integrated
1	U4001	MAX17501E IC REG BUCK SYNC 3.3V 0.5A 10TDFN	10-TDFN(3x2)	MAX17501EATB+	Maxim Integrated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6 K1_CORE_SENSE+
6 K1_CORE_SENSE-
5,7 K1_PMBus_DATA
5,7 K1_PMBus_CLK
5,7 K1_PMBus_ALERT
2 K1_TSENSE_FAULTB
5 K1_PWRGD
2,6,8 12VIN
5,6,7 3.3V_AUX
2,3,4,5,6,7 GND
2 1.8V_REG
2,3,4,6,7 VOUT_CORE
2 FLTB_RSTRB
R178 Do Not Stuff
VOUT_CORE
K1_RREF
K1_MRAMP
K1_RSEL0
K1_RSEL1
K1_RSEL2
K1_RSEL3
R15 20K 0.5%
R13 18.2K
R22 95.3
R21 115
R1 402
R11 226
C4 1.0uF
C3 0.1uF
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IS4
IS3
IS2
IS1
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3.3V_AUX
C5101 22uF
C5100 1.0uF
C5103 0.1uF
C5077 220pF
L1
3.3uH
1.8V_REG
C5085 0.22uF
C185 4.7uF
C184 47uF
K1_ISENSE4
K1_ISENSE3
K1_ISENSE2
K1_ISENSE1
K1_A3_IN
R8 499
R7 499
R9 499
R14 499
R30 3.01K
R24 3.01K
R66 3.01K
R74 3.01K
C34 22pF
C7 22pF
C8 22pF
C9 22pF
K1_PMBus_DATA
K1_PMBus_CLK
K1_PMBus_ALERT
K1_VIN_UV
R3 Do Not Stuff
R5 Do Not Stuff
R6 Do Not Stuff
R5188 0
R5186 0
R5185 0
R5187 0
K1_PWM1 1
K1_PWM2 1
K1_PWM3 1
K1_PWM4 1
R45 10K DNS
R44 10K DNS
R43 10K
R91 10K
3.3V_AUX
K1_A1_OUT
K1_A2_IN
K1_A2_OUT
R25 274
R26 402
C11 1200pF
R42 0
R51 Do Not Stuff
R52 1.2K
C5109 Do Not Stuff
R54 10000pF
C15 Do Not Stuff
R5200 Do Not Stuff
K1_A2B_OUT
R36 383
K1_A3_IN
C5102 Do Not Stuff
C17 10000pF
R62 Do Not Stuff
R70 Do Not Stuff
R72 680
R67 0
K1_A3_OUT_NORM
K1_A3_OUT_PSI
R5205
FLTB_RSTRB
C5108 Do Not Stuff
12VIN
R37 29.4K
K1_VIN_UV
C12 .1uF
R49 2.15K
J82
12Vin
C5084 1000pF
C5064 0.1uF
C5078 10uF
C5063 10uF
U4001
MAX17501E
Vin
EN/UVLO
Vcc
SS
N.C./COMP
LX
PGND
GND
FB/VO
RESET
EP
R5180 1.00M
R5181 301K
C5062 0.1uF
C5061 1.0uF
C5060 1.0uF
C4030 5600pF
C5068 33pF
R5183 4.7
L4
33uH
R5182
100
R5203 3.30K
C5067 1000pF
C5083 10uF
C5065 22uF
C5066 47uF
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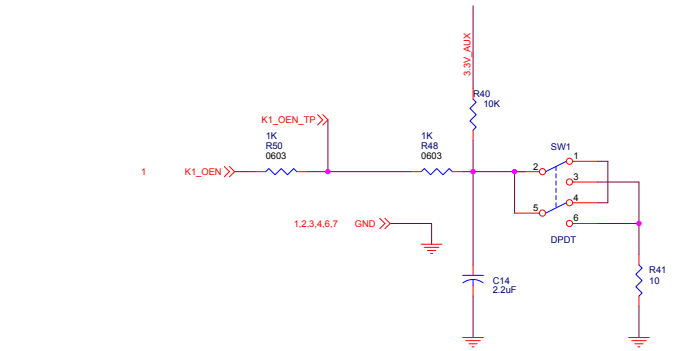
Only stuff R5199 when using external 3.3V
R5199
3.3V_BIAS
3.3v_AUX
Do Not Stuff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R50
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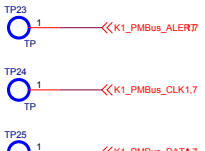
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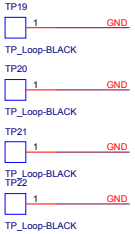
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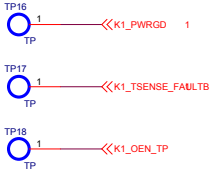
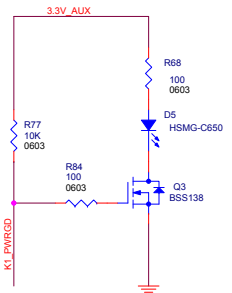
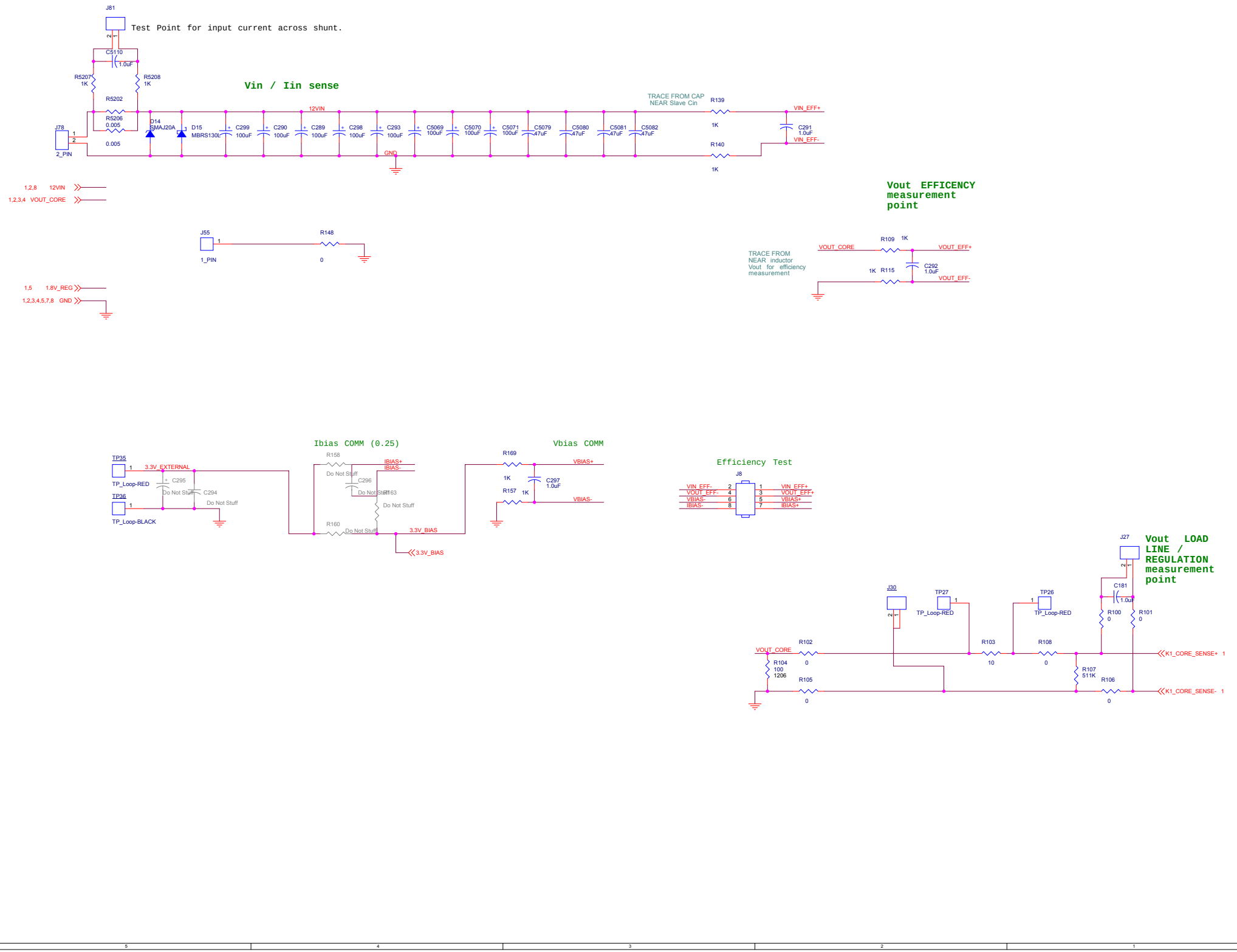
GND
TP_Loop-BLACK
TP20
1
GND
TP_Loop-BLACK
TP21
1
GND
TP_Loop-BLACK
TP22
1
GND
TP_Loop-BLACK

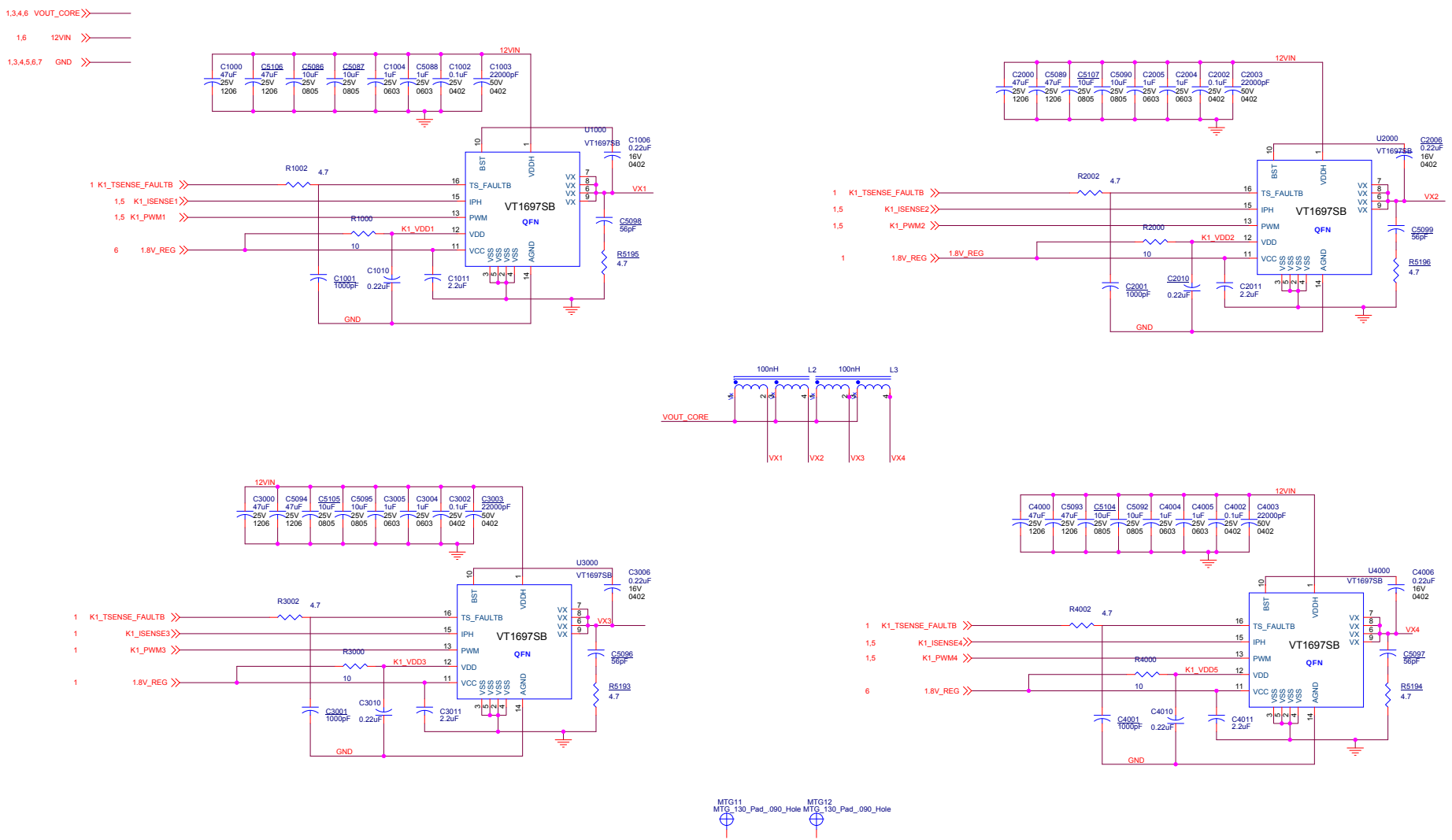

TP16
1
TP
K1_PWRGD
1
TP17
1
TP
K1_TSENSE_FAULTB
TP18
1
TP
K1_OEN_TP

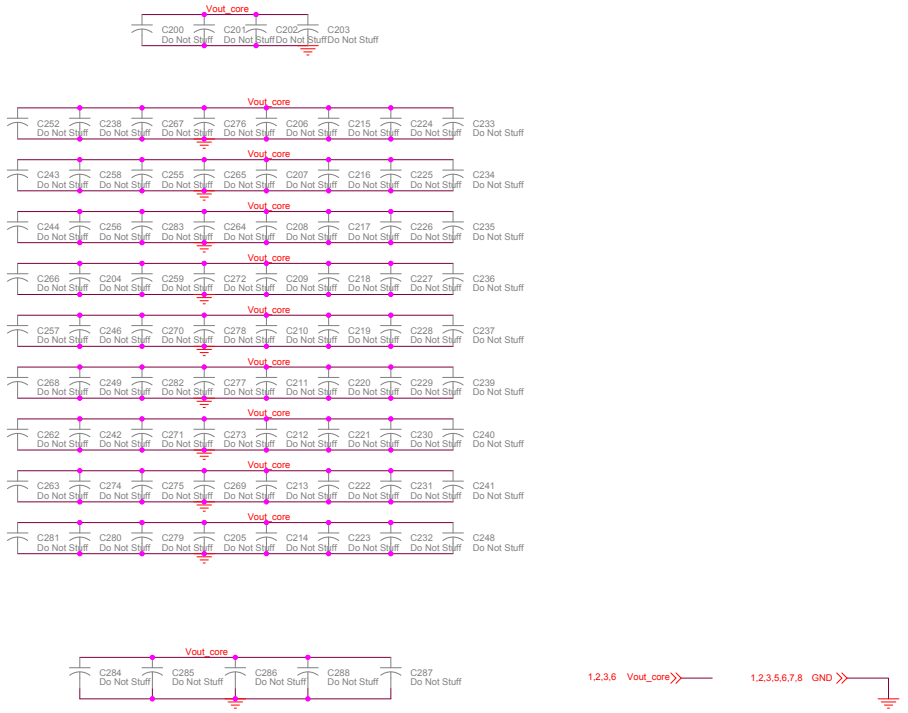
PWRGD

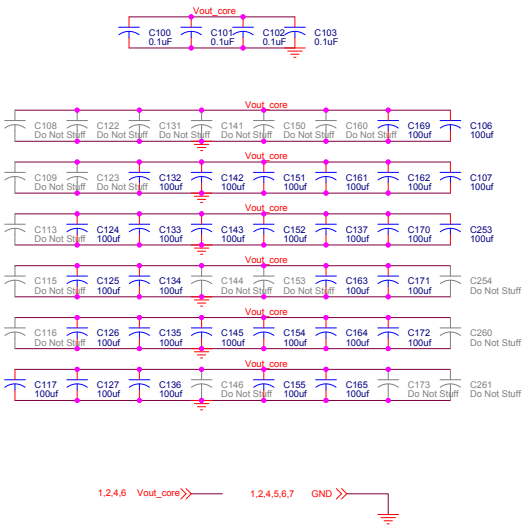

3.3V_AUX
R68
100
0603
D5
HSMG-C650
R77
10K
0603
R84
100
0603
Q3
BSS138
K1_PWRGD

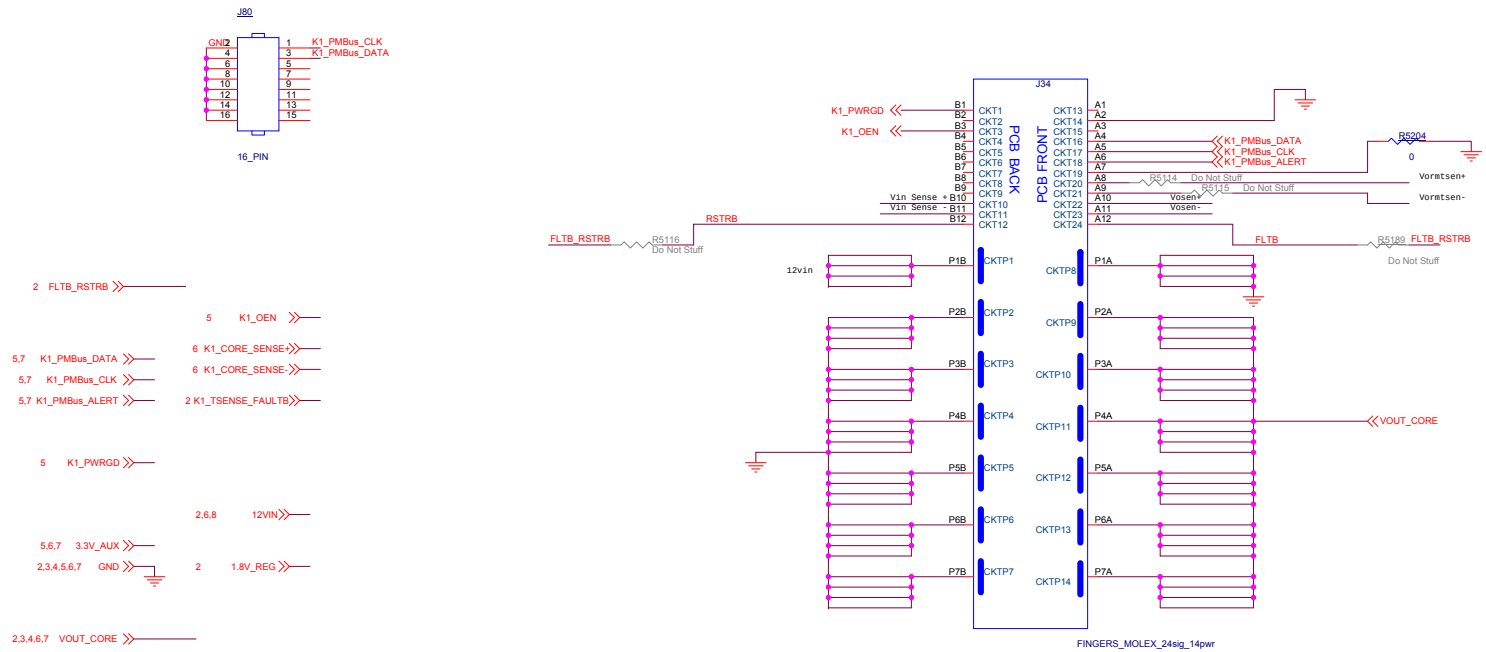

MTG1
Standoff
MTG2
Standoff
MTG3
Standoff
MTG4
Standoff

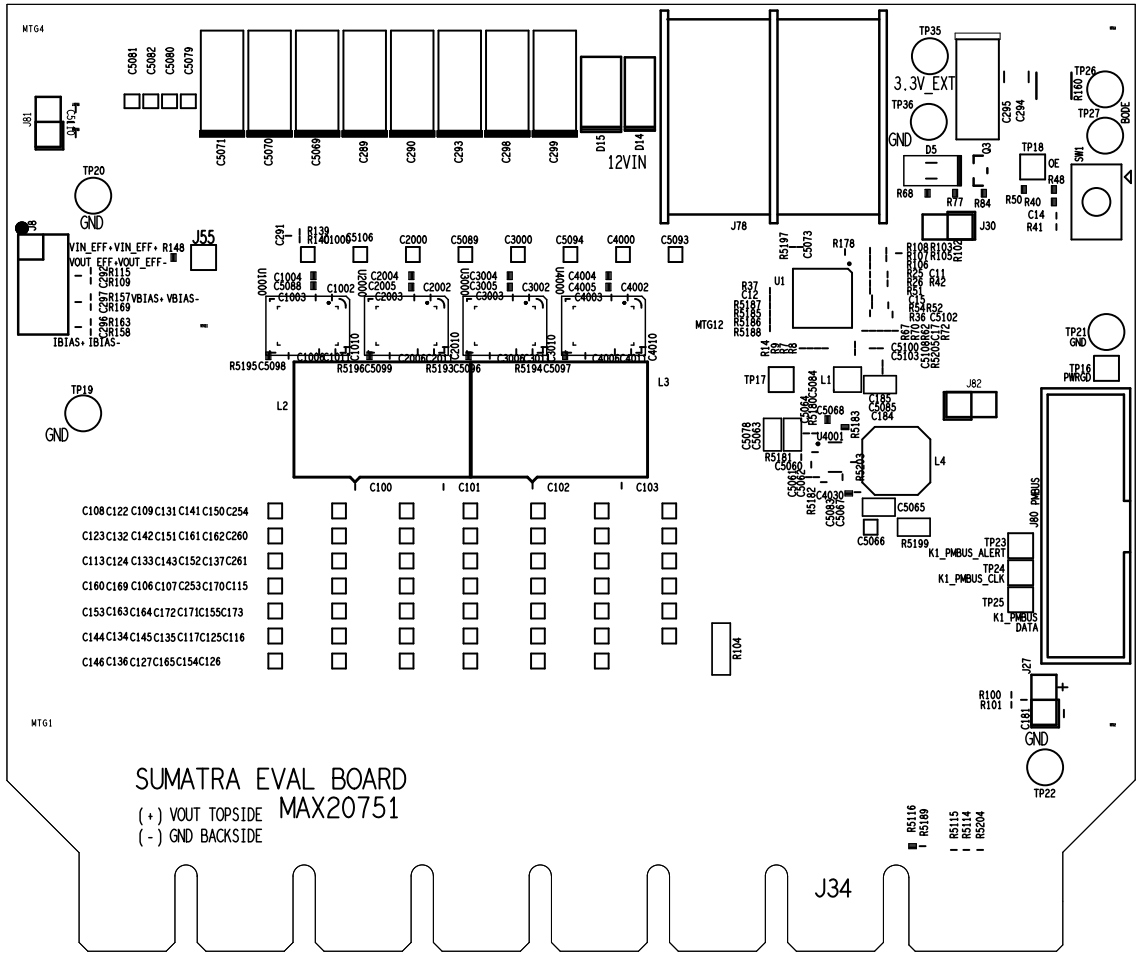

J81
Test Point for input current across shunt.
C5110
1.0uF
R5207
1K
R5208
1K
R5202
R5206
0.005
0.005
J78
2_PIN
Vin / Iin sense
D14
SMAJ20A
D15
MBRS130L
12VIN
C299 100uF
C290 100uF
C289 100uF
C298 100uF
C293 100uF
C5069 100uF
C5070 100uF
C5071 100uF
C5079 47uF
C5080 47uF
C5081 47uF
C5082 47uF
GND
TRACE FROM CAP
NEAR Slave Cin
R139
1K
R140
1K
VIN_EFF+
C291
1.0uF
VIN_EFF-
1,2,8 12VIN
1,2,3,4 VOUT_CORE
J55
1_PIN
R148
0
1,5 1.8V_REG
1,2,3,4,5,7,8 GND
Vout EFFICENCY
measurement
point
TRACE FROM
NEAR inductor
Vout for efficiency
measurement
VOUT_CORE
R109 1K
VOUT_EFF+
C292
1.0uF
1K R115
VOUT_EFF-
TP35
3.3V_EXTERNAL
TP_Loop-RED
C295
Do Not Stuff
C294
Do Not Stuff
TP36
TP_Loop-BLACK
Ibias COMM (0.25)
R158
Do Not Stuff
IBIAS+
IBIAS-
C296
Do Not Stuff
R163
Do Not Stuff
R160
Do Not Stuff
3.3V_BIAS
3.3V_BIAS
Vbias COMM
R169
1K
C297
1.0uF
R157 1K
VBIAS+
VBIAS-
Efficiency Test
J8
VIN_EFF-
VOUT_EFF-
VBIAS-
IBIAS-
VIN_EFF+
VOUT_EFF+
VBIAS+
IBIAS+
Vout LOAD
LINE /
REGULATION
measurement
point
J27
C181
1.0uF
J30
TP27
TP_Loop-RED
TP26
TP_Loop-RED
R100
0
R101
0
VOUT_CORE
R102
0
R103
10
R108
0
R104
100
1206
R105
0
R107
511K
R106
0
K1_CORE_SENSE+ 1
K1_CORE_SENSE- 1


1,3,4,6 VOUT_CORE
1,6 12VIN
1,3,4,5,6,7 GND
12VIN
C1000 47uF 25V 1206
C5106 47uF 25V 1206
C5086 10uF 25V 0805
C5087 10uF 25V 0805
C1004 1uF 25V 0603
C5088 1uF 25V 0603
C1002 0.1uF 25V 0402
C1003 22000pF 50V 0402
U1000
VT1697SB
C1006 0.22uF 16V 0402
R1002 4.7
1 K1_TSENSE_FAULTB
1,5 K1_ISENSE1
1,5 K1_PWM1
6 1.8V_REG
R1000
K1_VDD1
VT1697SB
QFN
BST
VDDH
TS_FAULTB
IPH
PWM
VDD
VCC
AGND
VSS
VX
VX1
C5098 56pF
R5195 4.7
C1001 1000pF
C1010 0.22uF
C1011 2.2uF
GND
12VIN
C2000 47uF 25V 1206
C5089 47uF 25V 1206
C5107 10uF 25V 0805
C5090 10uF 25V 0805
C2005 1uF 25V 0603
C2004 1uF 25V 0603
C2002 0.1uF 25V 0402
C2003 22000pF 50V 0402
U2000
VT1697SB
C2006 0.22uF 16V 0402
R2002 4.7
1 K1_TSENSE_FAULTB
1,5 K1_ISENSE2
1,5 K1_PWM2
1 1.8V_REG
R2000
K1_VDD2
VT1697SB
QFN
VX2
C5099 56pF
R5196 4.7
C2001 1000pF
C2010 0.22uF
C2011 2.2uF
GND
100nH L2 100nH L3
VOUT_CORE
VX1 VX2 VX3 VX4
12VIN
C3000 47uF 25V 1206
C5094 47uF 25V 1206
C5105 10uF 25V 0805
C5095 10uF 25V 0805
C3005 1uF 25V 0603
C3004 1uF 25V 0603
C3002 0.1uF 25V 0402
C3003 22000pF 50V 0402
U3000
VT1697SB
C3006 0.22uF 16V 0402
R3002 4.7
1 K1_TSENSE_FAULTB
1 K1_ISENSE3
1 K1_PWM3
1 1.8V_REG
R3000
K1_VDD3
VT1697SB
QFN
VX3
C5096 56pF
R5193 4.7
C3001 1000pF
C3010 0.22uF
C3011 2.2uF
GND
12VIN
C4000 47uF 25V 1206
C5093 47uF 25V 1206
C5104 10uF 25V 0805
C5092 10uF 25V 0805
C4004 1uF 25V 0603
C4005 1uF 25V 0603
C4002 0.1uF 25V 0402
C4003 22000pF 50V 0402
U4000
VT1697SB
C4006 0.22uF 16V 0402
R4002 4.7
1 K1_TSENSE_FAULTB
1,5 K1_ISENSE4
1,5 K1_PWM4
6 1.8V_REG
R4000
K1_VDD5
VT1697SB
QFN
VX4
C5097 56pF
R5194 4.7
C4001 1000pF
C4010 0.22uF
C4011 2.2uF
GND
MTG11
MTG_130_Pad_.090_Hole
MTG12
MTG_130_Pad_.090_Hole

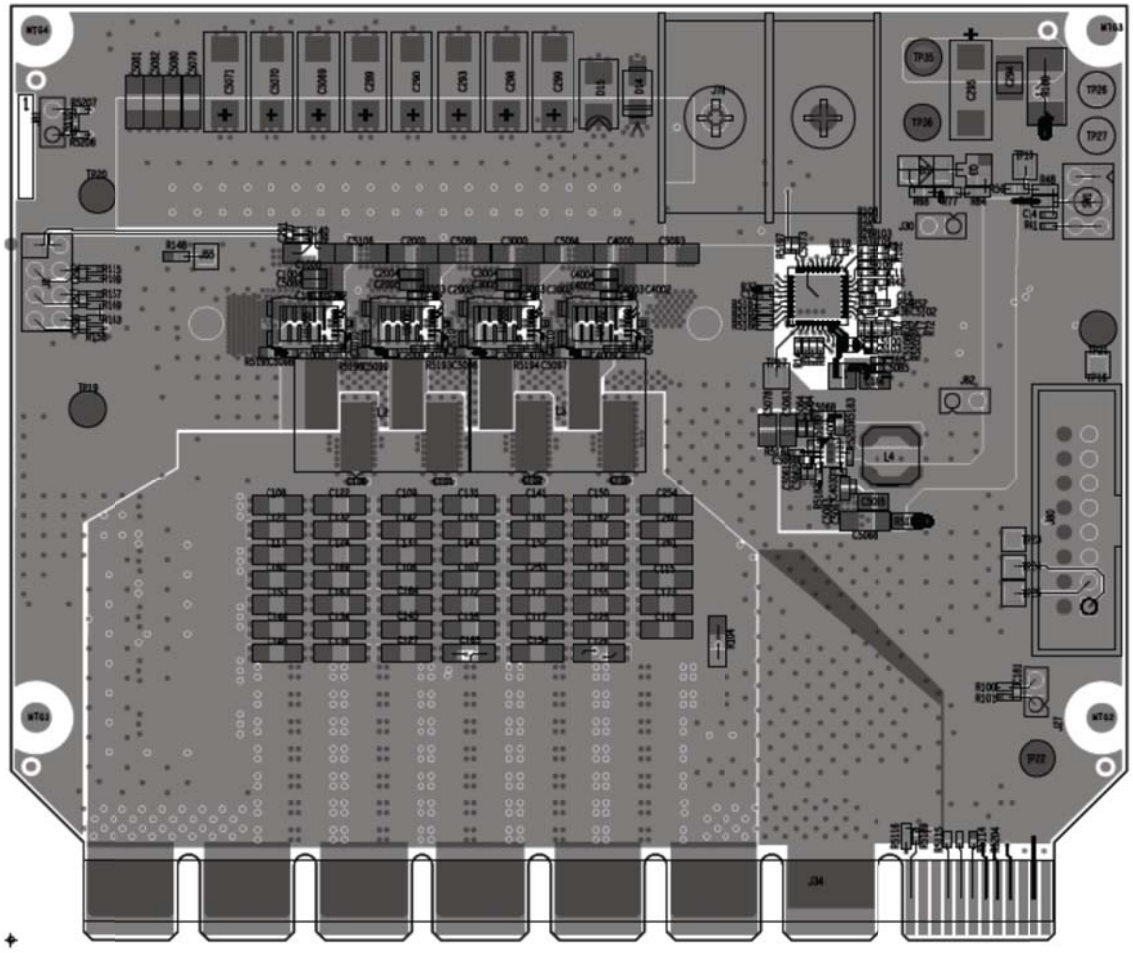

Vout_core
C200 Do Not Stuff
C201 Do Not Stuff
C202 Do Not Stuff
C203 Do Not Stuff
Vout_core
C252 Do Not Stuff
C238 Do Not Stuff
C267 Do Not Stuff
C276 Do Not Stuff
C206 Do Not Stuff
C215 Do Not Stuff
C224 Do Not Stuff
C233 Do Not Stuff
Vout_core
C243 Do Not Stuff
C258 Do Not Stuff
C255 Do Not Stuff
C265 Do Not Stuff
C207 Do Not Stuff
C216 Do Not Stuff
C225 Do Not Stuff
C234 Do Not Stuff
Vout_core
C244 Do Not Stuff
C256 Do Not Stuff
C283 Do Not Stuff
C264 Do Not Stuff
C208 Do Not Stuff
C217 Do Not Stuff
C226 Do Not Stuff
C235 Do Not Stuff
Vout_core
C266 Do Not Stuff
C204 Do Not Stuff
C259 Do Not Stuff
C272 Do Not Stuff
C209 Do Not Stuff
C218 Do Not Stuff
C227 Do Not Stuff
C236 Do Not Stuff
Vout_core
C257 Do Not Stuff
C246 Do Not Stuff
C270 Do Not Stuff
C278 Do Not Stuff
C210 Do Not Stuff
C219 Do Not Stuff
C228 Do Not Stuff
C237 Do Not Stuff
Vout_core
C268 Do Not Stuff
C249 Do Not Stuff
C282 Do Not Stuff
C277 Do Not Stuff
C211 Do Not Stuff
C220 Do Not Stuff
C229 Do Not Stuff
C239 Do Not Stuff
Vout_core
C262 Do Not Stuff
C242 Do Not Stuff
C271 Do Not Stuff
C273 Do Not Stuff
C212 Do Not Stuff
C221 Do Not Stuff
C230 Do Not Stuff
C240 Do Not Stuff
Vout_core
C263 Do Not Stuff
C274 Do Not Stuff
C275 Do Not Stuff
C269 Do Not Stuff
C213 Do Not Stuff
C222 Do Not Stuff
C231 Do Not Stuff
C241 Do Not Stuff
Vout_core
C281 Do Not Stuff
C280 Do Not Stuff
C279 Do Not Stuff
C205 Do Not Stuff
C214 Do Not Stuff
C223 Do Not Stuff
C232 Do Not Stuff
C248 Do Not Stuff
Vout_core
C284 Do Not Stuff
C285 Do Not Stuff
C286 Do Not Stuff
C288 Do Not Stuff
C287 Do Not Stuff
1,2,3,6 Vout_core
1,2,3,5,6,7,8 GND


Vout_core
C100 0.1uF
C101 0.1uF
C102 0.1uF
C103 0.1uF
Vout_core
C108 Do Not Stuff
C122 Do Not Stuff
C131 Do Not Stuff
C141 Do Not Stuff
C150 Do Not Stuff
C160 Do Not Stuff
C169 100uf
C106 100uf
Vout_core
C109 Do Not Stuff
C123 Do Not Stuff
C132 100uf
C142 100uf
C151 100uf
C161 100uf
C162 100uf
C107 100uf
Vout_core
C113 Do Not Stuff
C124 100uf
C133 100uf
C143 100uf
C152 100uf
C137 100uf
C170 100uf
C253 100uf
Vout_core
C115 Do Not Stuff
C125 100uf
C134 100uf
C144 Do Not Stuff
C153 Do Not Stuff
C163 100uf
C171 100uf
C254 Do Not Stuff
Vout_core
C116 Do Not Stuff
C126 100uf
C135 100uf
C145 100uf
C154 100uf
C164 100uf
C172 100uf
C260 Do Not Stuff
Vout_core
C117 100uf
C127 100uf
C136 100uf
C146 Do Not Stuff
C155 100uf
C165 100uf
C173 Do Not Stuff
C261 Do Not Stuff
1,2,4,6 Vout_core
1,2,4,5,6,7 GND

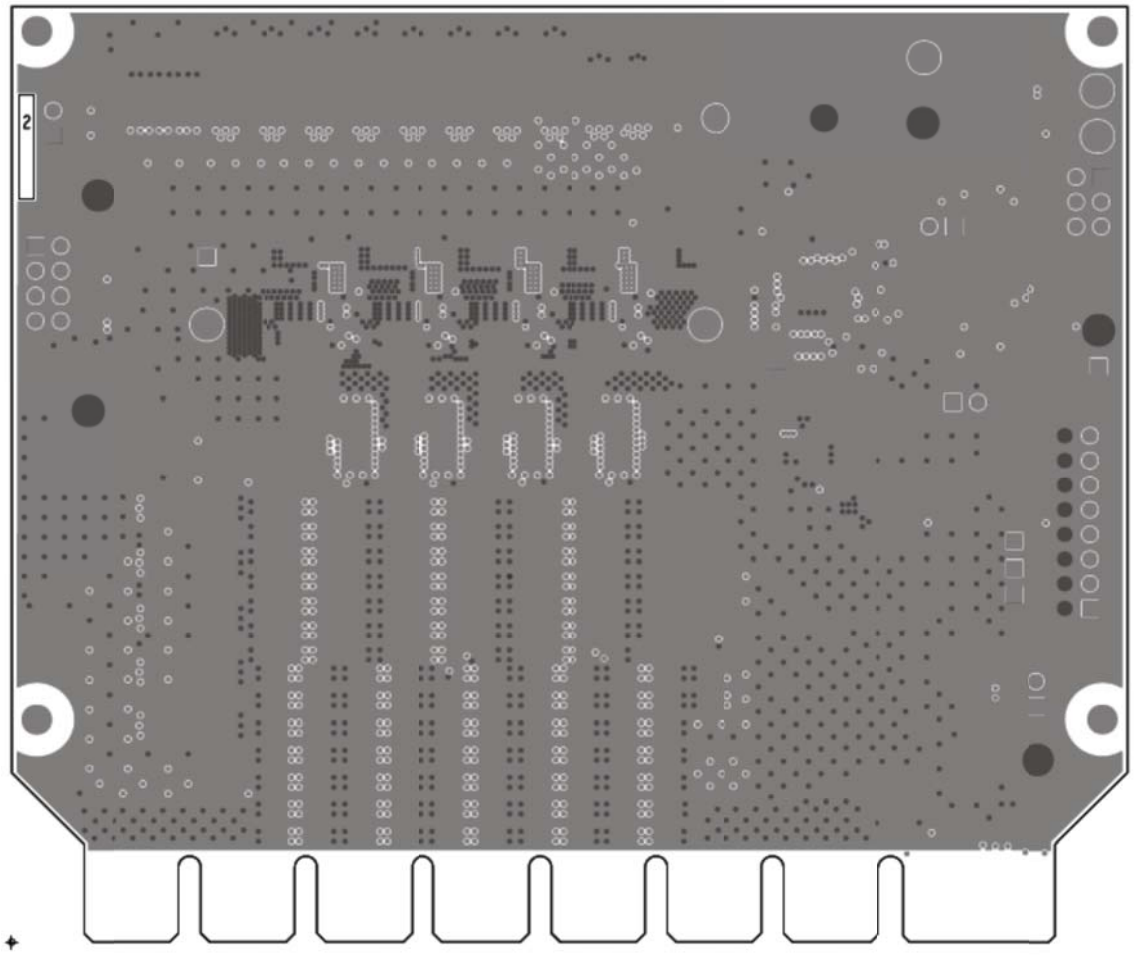

J80
GND
2
4
6
8
10
12
14
16
1
3
5
7
9
11
13
15
K1_PMBus_CLK
K1_PMBus_DATA
16_PIN
J34
PCB BACK
PCB FRONT
K1_PWRGD
K1_OEN
Vin Sense +
Vin Sense -
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
CKT1
CKT2
CKT3
CKT4
CKT5
CKT6
CKT7
CKT8
CKT9
CKT10
CKT11
CKT12
CKT13
CKT14
CKT15
CKT16
CKT17
CKT18
CKT19
CKT20
CKT21
CKT22
CKT23
CKT24
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
K1_PMBus_DATA
K1_PMBus_CLK
K1_PMBus_ALERT
R5204
0
Vormtsen+
Vormtsen-
R5114
Do Not Stuff
R5115
Do Not Stuff
Vosen+
Vosen-
RSTRB
FLTB_RSTRB
R5116
Do Not Stuff
FLTB
R5189
FLTB_RSTRB
Do Not Stuff
12vin
P1B
P2B
P3B
P4B
P5B
P6B
P7B
CKTP1
CKTP2
CKTP3
CKTP4
CKTP5
CKTP6
CKTP7
CKTP8
CKTP9
CKTP10
CKTP11
CKTP12
CKTP13
CKTP14
P1A
P2A
P3A
P4A
P5A
P6A
P7A
VOUT_CORE
FINGERS_MOLEX_24sig_14pwr
2 FLTB_RSTRB
5 K1_OEN
6 K1_CORE_SENSE+
6 K1_CORE_SENSE-
5,7 K1_PMBus_DATA
5,7 K1_PMBus_CLK
5,7 K1_PMBus_ALERT
2 K1_TSENSE_FAULTB
5 K1_PWRGD
2,6,8 12VIN
5,6,7 3.3V_AUX
2,3,4,5,6,7 GND
2 1.8V_REG
2,3,4,6,7 VOUT_CORE



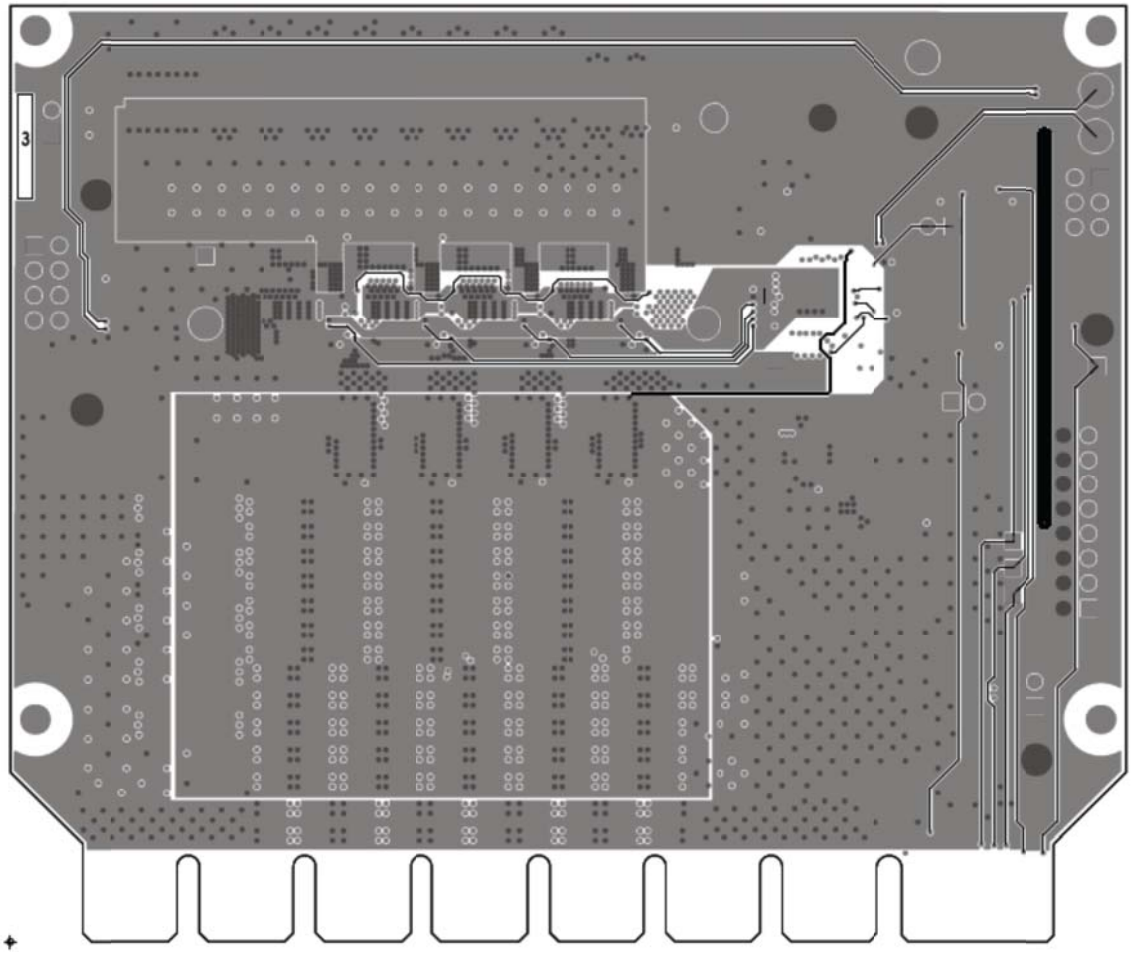
Top Assembly



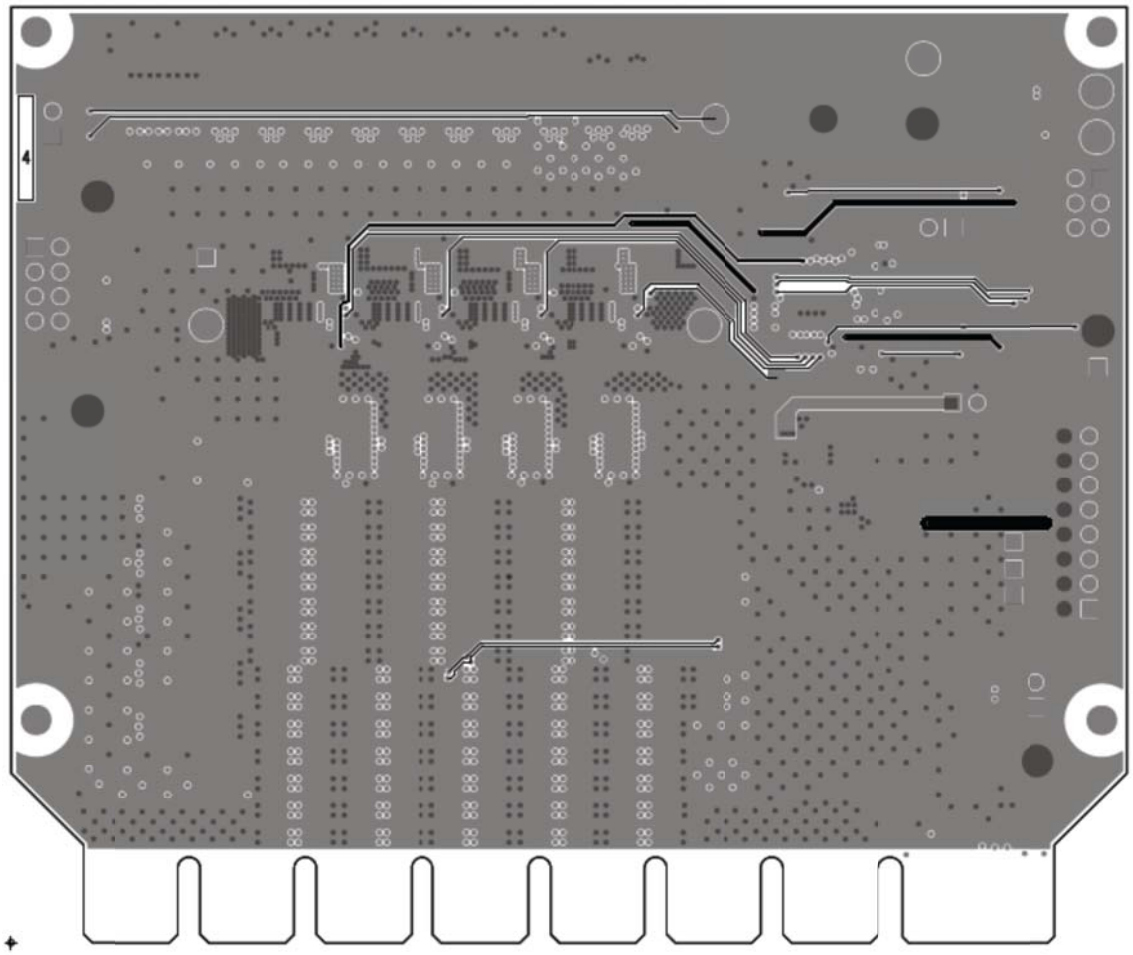
Top Layer



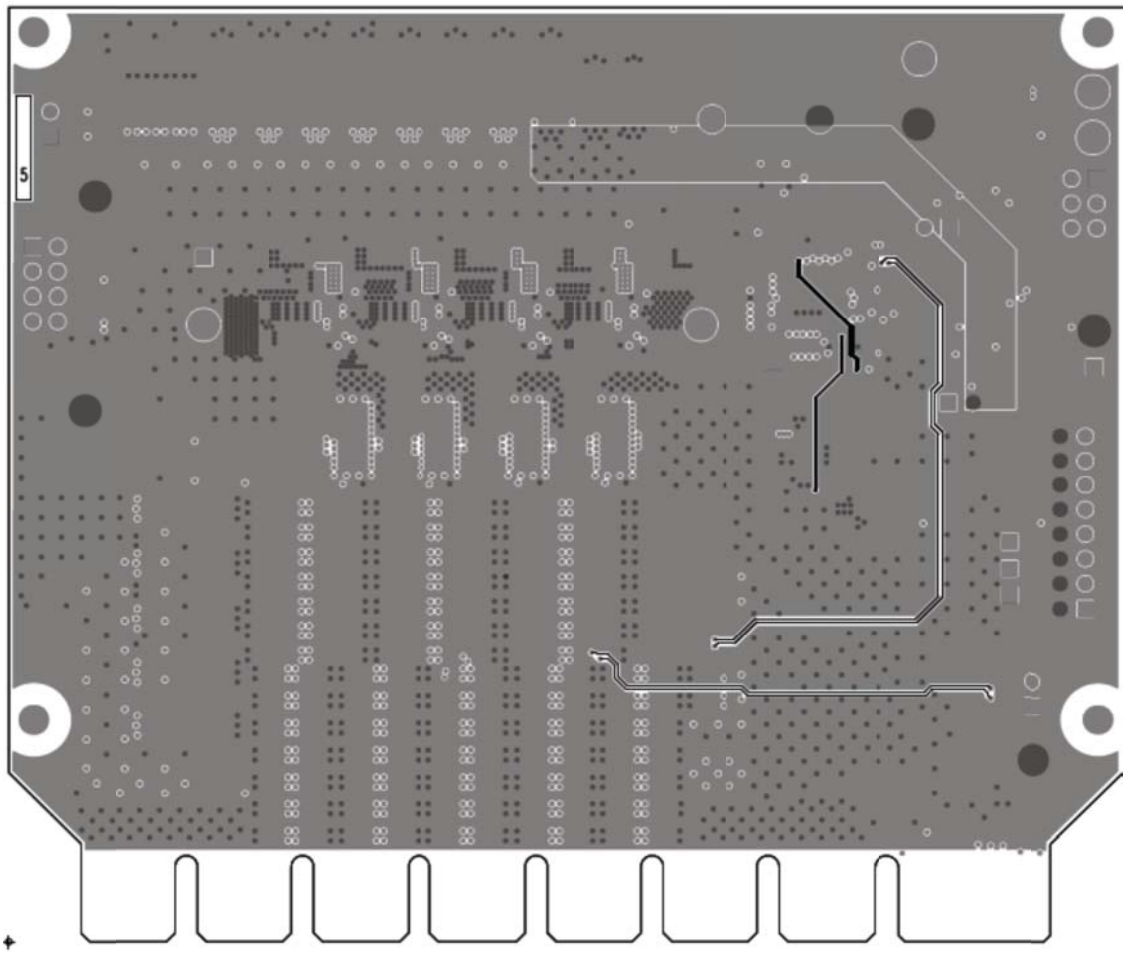
Layer 2



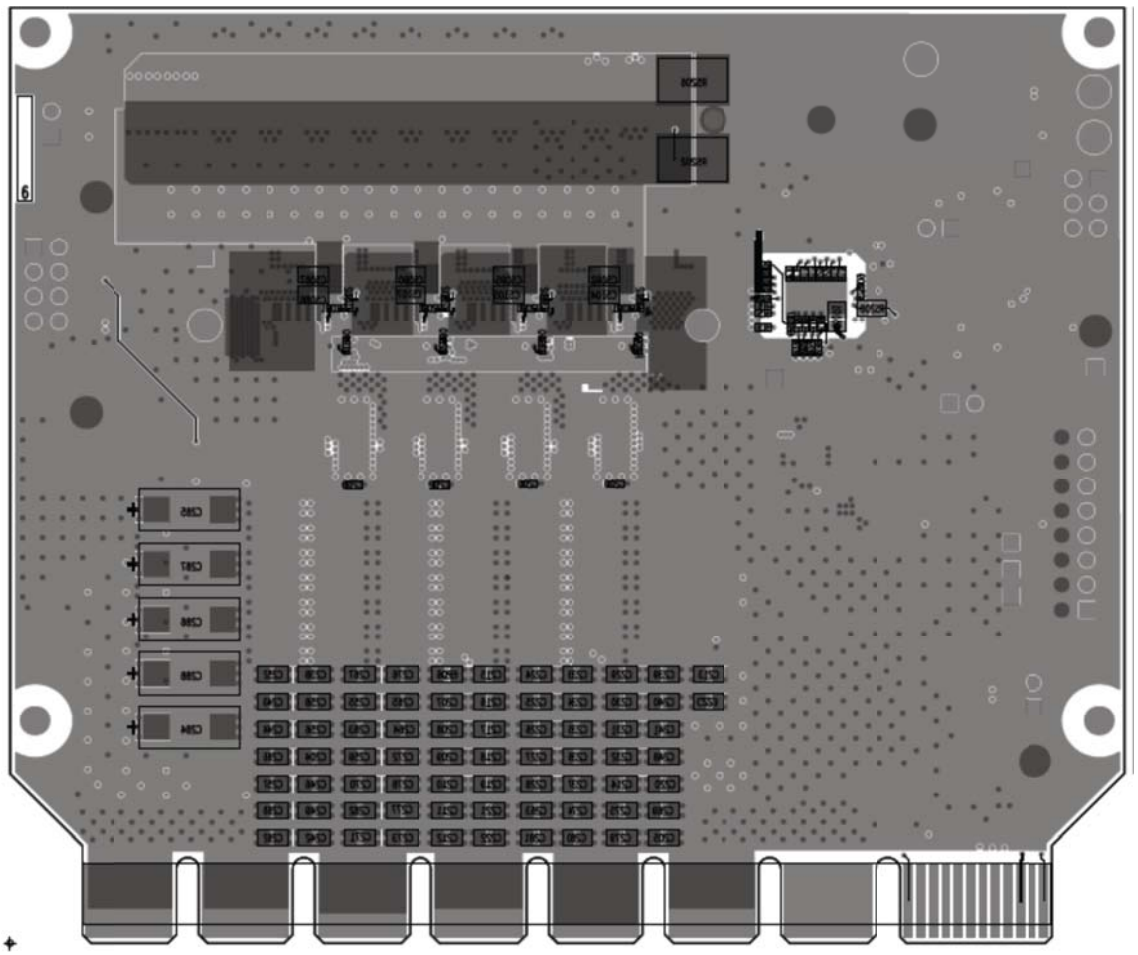
Layer 3



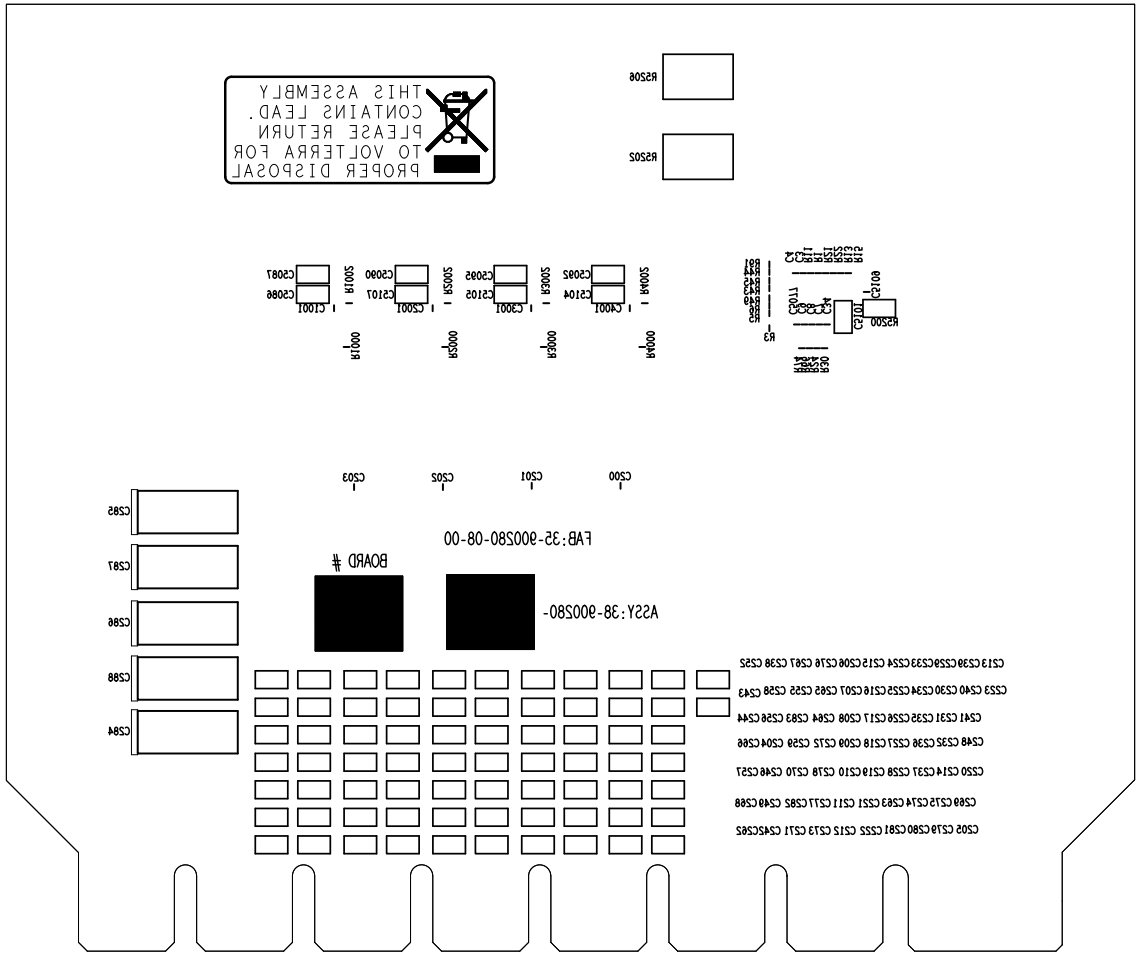
Layer 4



Layer 5



Layer 6



Bottom Assembly