General Description

The MAX20710 Evaluation Kit (EV kit) serves as a reference platform for evaluating the MAX20710 voltage-regulator IC. This single-chip, integrated switching regulator provides an extremely compact, low-cost, highly efficient, fast, accurate, and reliable power-delivery solution for emerging low-output voltage applications up to 10A. Refer to the MAX20710 IC data sheet for more information.

The EV kit comprises a fully-assembled and tested PCB implementation of the MAX20710. Jumper pins, test points, and input/output connectors are included for flexibility and ease-of-use in a wide range of applications.

The evaluation board is configured with an edge strip to allow high di/dt loading when evaluating the system. The +VOUT connection is on the top side, while the return (or -VOUT) is on the bottom side, directly mirroring the top-side strip. Either solder the load devices directly to the output strip or use the J8 terminal block to interface to a load.

Features

- High Efficiency and Power Density
- Low Component Count
- Small Solution Size
  - 509mm^2 Including Inductor and Output Capacitors
- Optimized Performance
- Reduced Design-In Time
- Interfaces to Maxim PMBus™ Dongle and PowerTool™ GUI
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX20710EVKIT# EV kit
- 4.5V to 16V power supply
- 0A to 10A load
- Oscilloscope, probes, and voltmeter

Optional Equipment

- MAXPOWERTOOL002# USB-to-PMBus interface dongle
- Maxim PowerTool software

Procedure

The EV kit is fully assembled and tested. Verfiy board operation using these steps:

1) Connect a powered-off 4.5V to 16V input supply to J1.
   - Optionally, connect supply sense leads to VDD1 and GND1 for best accuracy.
2) Connect the load to J3 or J8.
3) If Maxim PowerTool software is used, connect the MAXPOWERTOOL002# USB-to-PMBus interface dongle to J704 and to the USB port on the PC.
4) Connect the VOUT scope probe/voltmeter to J4 or J11, as desired.
5) J4 and J11 are connected to the sense point for best accuracy.
   - Position the SW1 toggle switch, pointing away from J1 to enable the IC (if desired).
6) Turn on the input supply and observe that VOUT = 1V.
7) For efficiency measurements, J6 has the appropriate Kelvin sense points.

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

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Operation

Output Enable (OE)

OE is used to enable/disable the output voltage. The output voltage is enabled/disabled by SW1. Pointing SW1 in the direction of the silkscreened arrow enables the regulator.

Output-Voltage Selection

The MAX20710 EV kit is set up to initially boot up to an output voltage of 1V. This has been accomplished by setting the reference to come up to a V_{BOOT} of 0.65V and placing a voltage-divider in the feedback path with a divide ratio of 0.65. The reference voltage can be changed through PMBus, in which case the output voltage follows the reference voltage divided by the 0.65 divide ratio. To achieve higher output voltages, a higher divide ratio can be used. Note that the PMBus can command and report (write/read) VOUT as the voltage at the sense pins, so with the feedback-divider in place, the divide ratio must be taken into account.

R_{GAIN} of the IC and output capacitance of the EV kit can also be changed to affect performance. Refer to the MAX20710 IC data sheet for more details.

Soft-Start and Switching Frequency

These are programmable parameters. For the EV kit, soft-start is set to 3ms and switching frequency is set to 400kHz.

Monitoring

- **Status Monitoring:** Whenever the part is actively regulating, and the output voltage is within the power-good window, the STAT pin is high. In all other conditions, including enabled but in a fault state, the STAT pin is pulled low. Refer to the MAX20710 IC data sheet for more details.
- **Input-Voltage Monitoring:** The VDD1 and GND1 sense points monitor the input supply.
- **Switching-Voltage Monitoring:** The switching waveform can be monitored on VX1.
- **Output-Voltage Monitoring:** J4-1 and J4-2 monitor the output voltage of VOUT and GND, respectively. These test points should not be used for loading. Alternatively, scope jack J11 can be used to monitor the output voltage.

Efficiency Testing

J6 provides convenient access to the appropriate VIN and VOUT sense points.

- VIN_EFF± are on J6 pins 1-2.
- VOUT_EFF± are on J6 pins 3-4.
- Input and output currents should be measured with 0.1% lab shunts.
- For increased accuracy, shunt mismatch can be measured and calibrated out by doing a test running the same current through both shunts.

Ordering Information

PART	TYPE
MAX20710EVKIT#	EV Kit

#Denotes RoHS compliant.

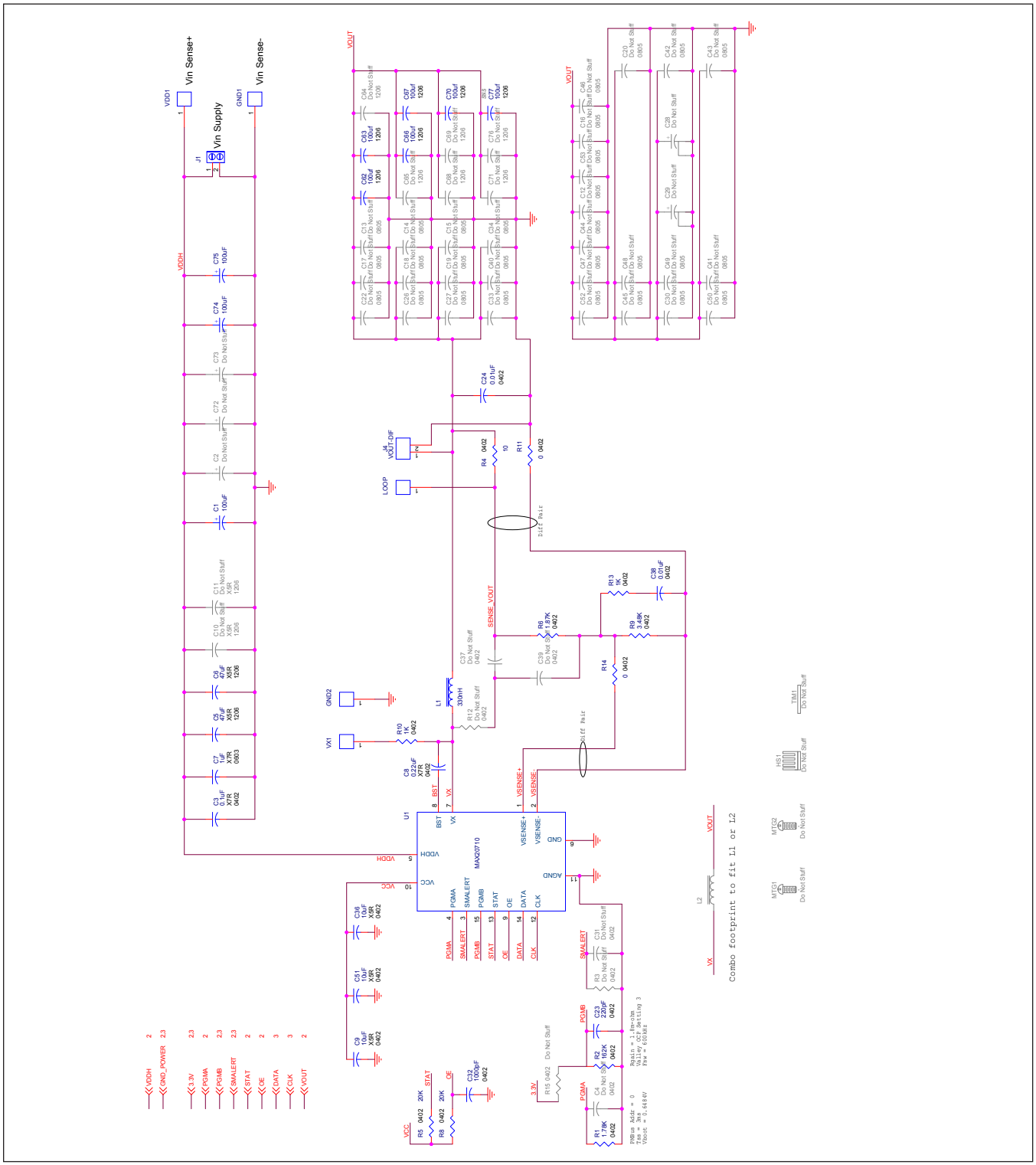
MAX20710 EV Bill of Materials

TITLE: Bill of Materials
DATE: 02/06/2018
DESIGN:

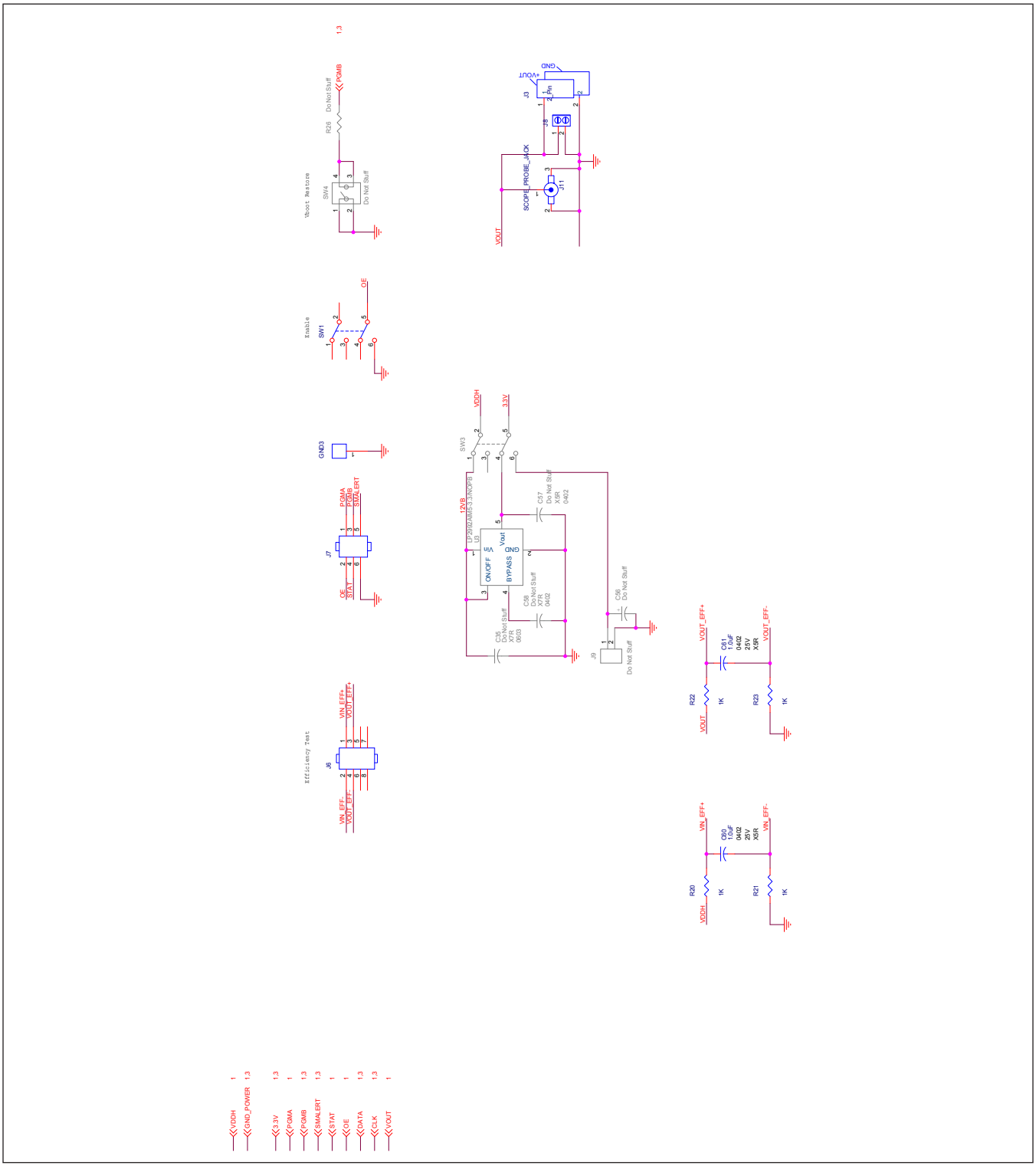
NOTE: DNI--> DO NOT INSTALL(PACKOUT) ; DNP--> DO NOT PROCURE

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C1, C74, C75	3	T521X107M025ATE060	Kemet	100uF	CAPACITOR; 7343(D); 100uF, 25V, 20%, TANTALUM
2	C23	1	GRM155R71H221KA01D	Murata	220pF	CAPACITOR; 0402; 220pF, 50V, 10%, X7R
3	C24	1	C1005X7R1E103K	TDK	0.01uF	CAPACITOR; 0402; 0.01uF, 25V, 10%, X7R
4	C3	1	C1005X7R1E104K050BB	TDK	0.1uF	CAPACITOR; 0402; 0.1uF, 25V, 10%, X7R
5	C32	1	04022R102K9B20D	Phycomp	1000pF	CAPACITOR; 0402; 1000pF, 50V, 10%, X7R
6	C38	1	C0402C103K5RAC	Kemet	0.01uF	CAPACITOR; 0402; 0.01uF, 50V, 10%, X7R
7	C5, C6	2	C3216X5R1E476M	TDK	47uF	CAPACITOR; 1206; 47uF, 25V, 20%, X5R
8	C60, C61	2	TMK105BJ105MV-F	Taiyo Yuden	1.0uF	CAPACITOR; 0402; 1.0uF, 25V, 20%, X5R
9	C62, C63, C66, C67, C70, C77	6	C3216X5R0J107M160AB	TDK	100uF	CAPACITOR; 1206; 100uF, 6.3V, 20%, X5R
10	C7	1	GRM188R71E105KA12D	Murata	1uF	CAPACITOR; 0603; 1uF, 25V, 10%, X7R
11	C8	1	GRM155R71C224KA12D	Murata	0.22uF	CAPACITOR; 0402; 0.22uF, 16V, 10%, X7R
12	C9, C36, C51	3	C1005X5R0J106M050BC	TDK	10uF	CAPACITOR; 0402; 10uF, 6.3V, 20%, X5R
13	GND1, GND2, GND3, LOOP, VDD1, VX1	6	TSW-101-07-L-S	Samtec		1 PIN-1X1 Straight
14	J1, J8	2	ED120/2DS	On Shore		2 PIN-2 Pin, Terminal Block w/Screws, Blue
15	J11	1	129-0701-202	Johnson		Shielded Scope Probe Jack, Vertical
17	J4	1	TSW-101-07-L-D	Samtec		VOUT-DIF-1X2 Straight
18	J6	1	87215-1	AMP		8 PIN-2X4 Straight
19	J7	1	TSW-103-07-L-D	Samtec		6 PIN-2X3 Straight
20	J704	1	AWHW16G-0202-T-R	Assman		16 PIN-BoxHeader 2x8
21	L1	1	FP1007R6-R33-R	Coiltronics	330nH	INDUCTOR; 330nH, 10%, Isat= 33A
22	R1	1	ERJ-2RKF1781X	Panasonic	1.78KΩ	RESISTOR; 0402; 1.78KΩ, 1%, 1/16W
23	R10, R20, R21, R22, R23	5	ERJ-2GEJ102X	Panasonic	1KΩ	RESISTOR; 0402; 1KΩ, 5%, 1/16W
24	R11, R14	2	ERJ-2GE0R00X	Panasonic	0Ω	RESISTOR; 0402; 0Ω, 5%, 1/16W
25	R13	1	ERJ-2RKF1001X	Panasonic	1KΩ	RESISTOR; 0402; 1KΩ, 1%, 1/16W
26	R2	1	ERJ-2RKF1623X	Panasonic	162KΩ	RESISTOR; 0402; 162KΩ, 1%, 1/16W
27	R4	1	ERJ-2RKF10R0X	Panasonic	10Ω	RESISTOR; 0402; 10Ω, 1%, 1/16W
28	R5, R8	2	ERJ-2GEJ203X	Panasonic	20KΩ	RESISTOR; 0402; 20KΩ, 5%, 1/16W
29	R6	1	ERJ-2RKF1871X	Panasonic	1.87KΩ	RESISTOR; 0402; 1.87KΩ, 1%, 1/16W
30	R9	1	ERJ-2RKF3481X	Panasonic	3.48KΩ	RESISTOR; 0402; 3.48KΩ, 1%, 1/16W
31	SW1	1	GT21MCKE	C&K		DPDT-DPDT, 6pins, 1switch
32	U1	1	MAX20710EPL+	Maxim Integrated		MAX20710-Maxim POL
TOTAL		54				

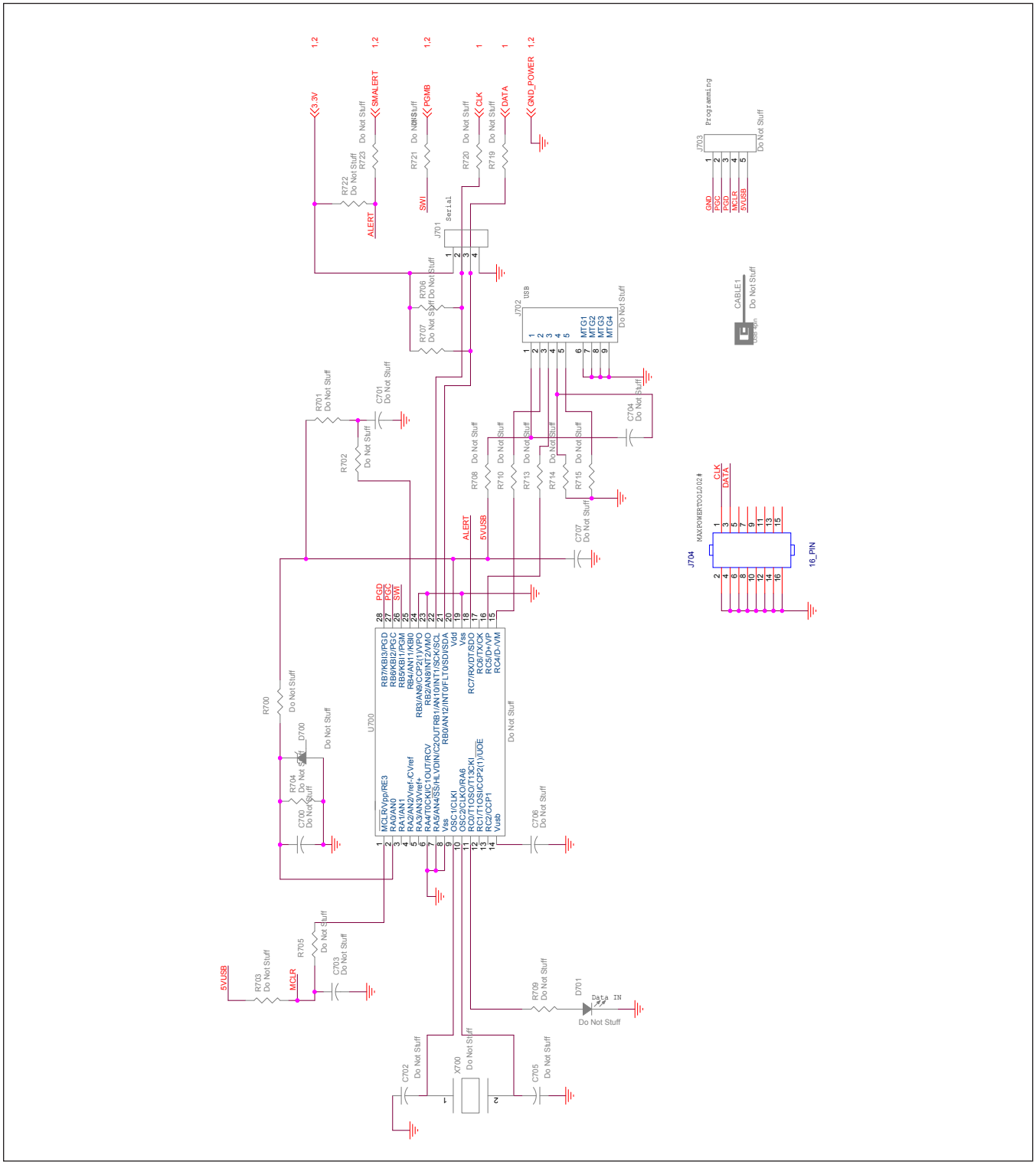
MAX20710 EV Schematics



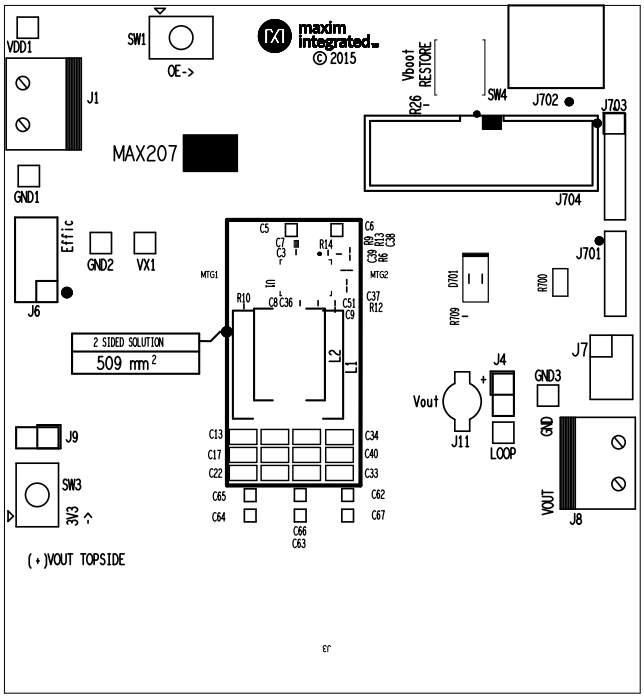
MAX20710 EV Schematics (continued)



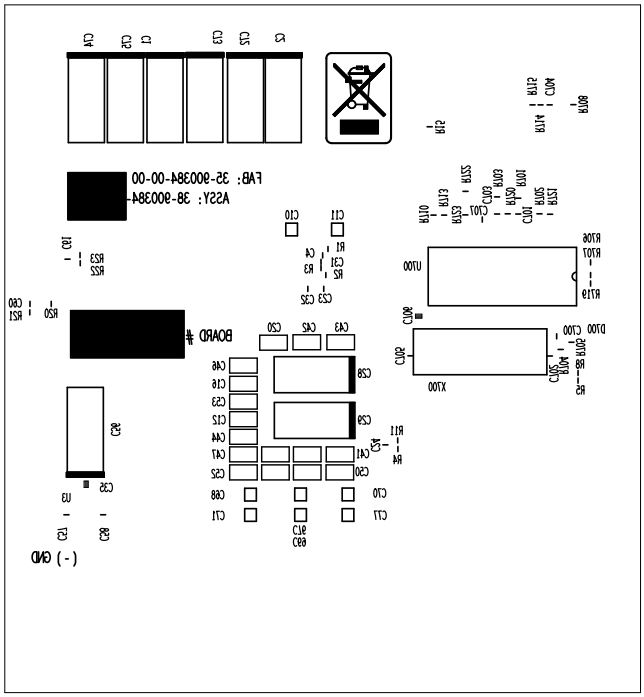
MAX20710 EV Schematics (continued)



MAX20710 EV PCB Layout

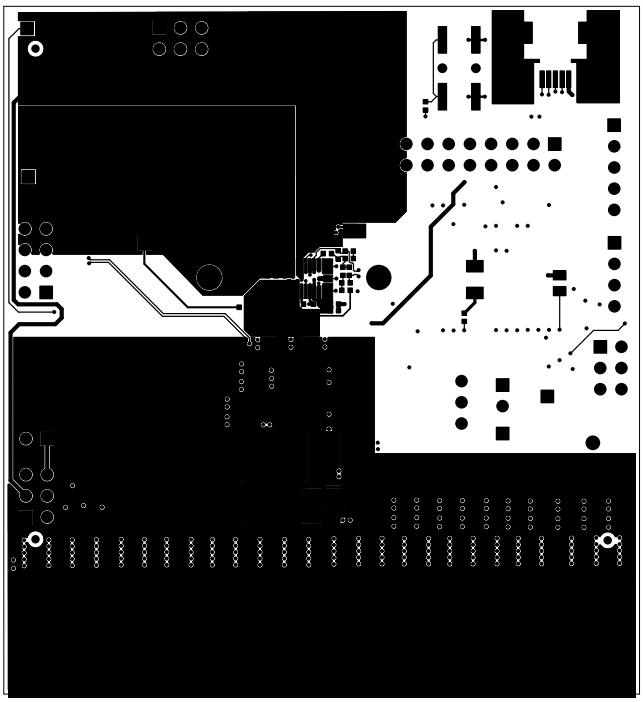


Top Silkscreen



Bottom Silkscreen

MAX20710 EV PCB Layout (continued)



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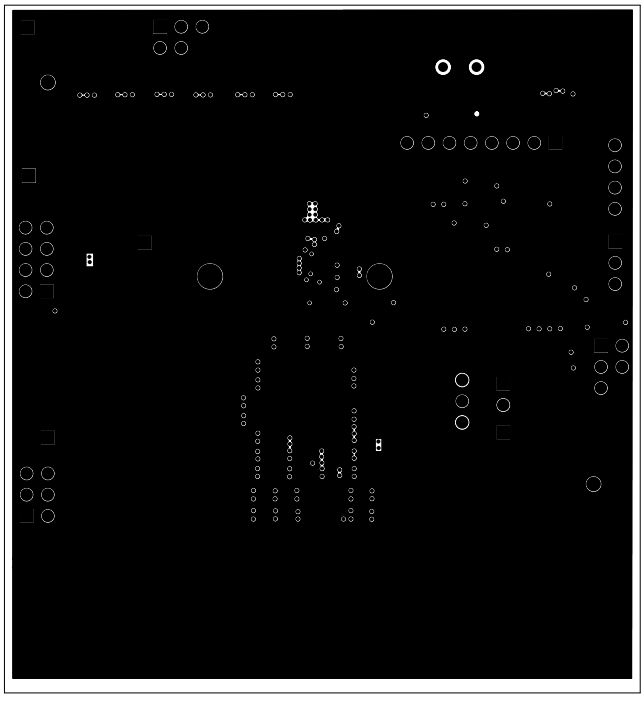
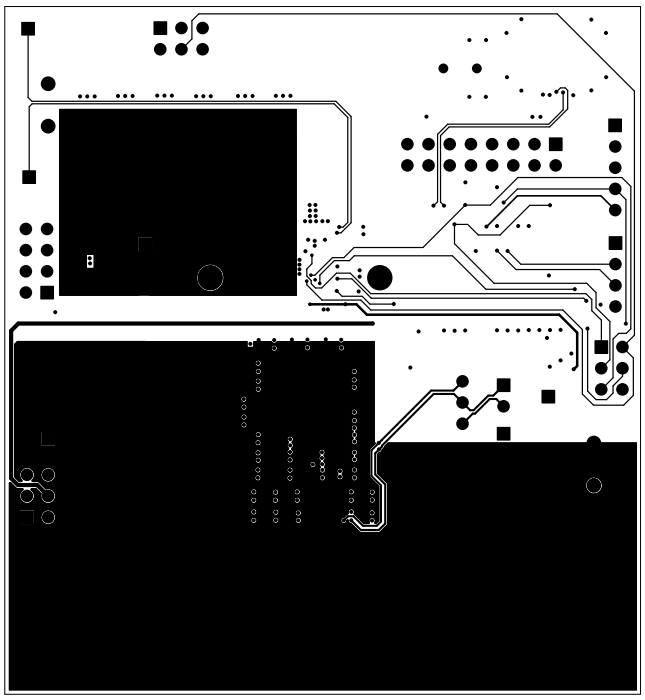


Layer 2

MAX20710 EV PCB Layout (continued)



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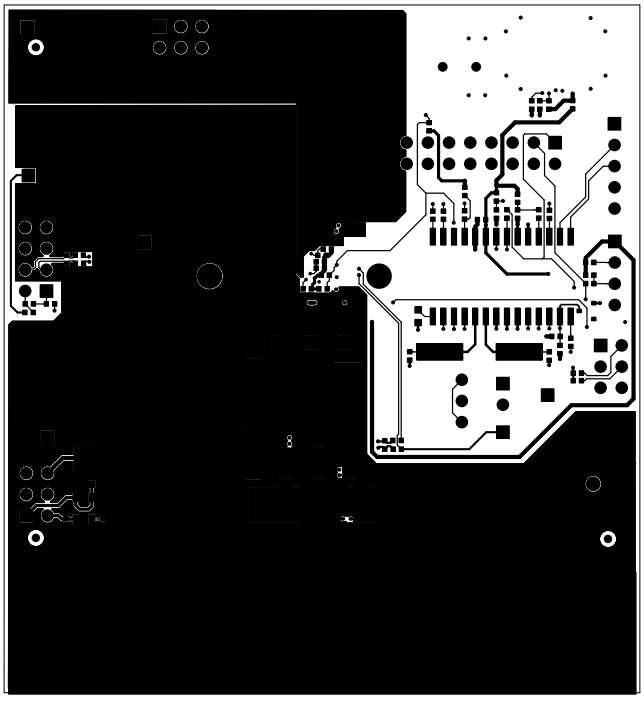

Layer 4

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/18	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.