

General Description

The MAX20735 Evaluation Kit (EV kit) serves as a reference platform for evaluating the MAX20735 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 40A. Refer to the MAX20735 IC data sheet for more information.

The EV kit consists of a fully assembled and tested PCB implementation of the MAX20735. 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 +V_{OUT} connection is on the top side, while the return (or -V_{OUT}) is on the bottom side, directly mirroring the top-side strip.

Either solder 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
 - 509mm² Including Inductor and Output Capacitors
- Optimized Performance
- Reduced Design-In Time
- Proven PCB Layout
- Fully Assembled and Tested

Getting Started

Required Equipment

- MAX20735 EV kit
- 4.5V to 16V power supply
- 0A to 40A Load
- Oscilloscope, probes, voltmeter

Procedure

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

- 1) Connect a powered-off 4.5V to 16V input supply to J1.
 - Optionally, connect supply sense leads to V_{DD1} and GND1 for best accuracy.
- 2) Connect the load to J3 or J8.
- 3) Connect the V_{OUT} scope probe/voltmeter to J4 or J11, as desired.
 - J4 and J11 are connected to the sense point for best accuracy.
- 4) Position the SW1 toggle switch, pointing away from J1 to enable the IC (if desired).
- 5) Turn on the power supply and observe that V_{OUT} = 1V.
- 6) For efficiency measurements, J6 has appropriate Kelvin sense points.

Ordering Information appears at end of data sheet.

Operation

The MAX20735 IC is a monolithic, high-frequency step-down switching regulator optimized for applications requiring small-size, high-efficiency, and low-output voltages. Detailed product and application information is provided in the MAX20735 IC data sheet.

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 EV kit is setup 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 0.6484V and placing a voltage-divider in the feedback path with a divide ratio of 0.6484. For different V_{OUT} values, the V_{BOOT} and feedback-divider ratio can be changed, as described in the MAX20735 IC data sheet.

R_{GAIN} and C_{OUT} can also be changed to affect performance. Refer to the MAX20735 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 to 400kHz.

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 MAX20735 IC data sheet for more details.

Input-Voltage Monitoring

The V_{DD1} 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 V_{OUT} and GND, respectively. These test points should not be used for loading. Alternatively, scopejack J11 can be used to monitor the output voltage.

Efficiency Testing

- J6 provides convenient access to the appropriate V_{IN} and V_{OUT} sense points.
- $V_{IN_EFF\pm}$ are on J6 pins 1 and 2.
- $V_{OUT_EFF\pm}$ are on J6 pins 3 and 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.
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Ordering Information

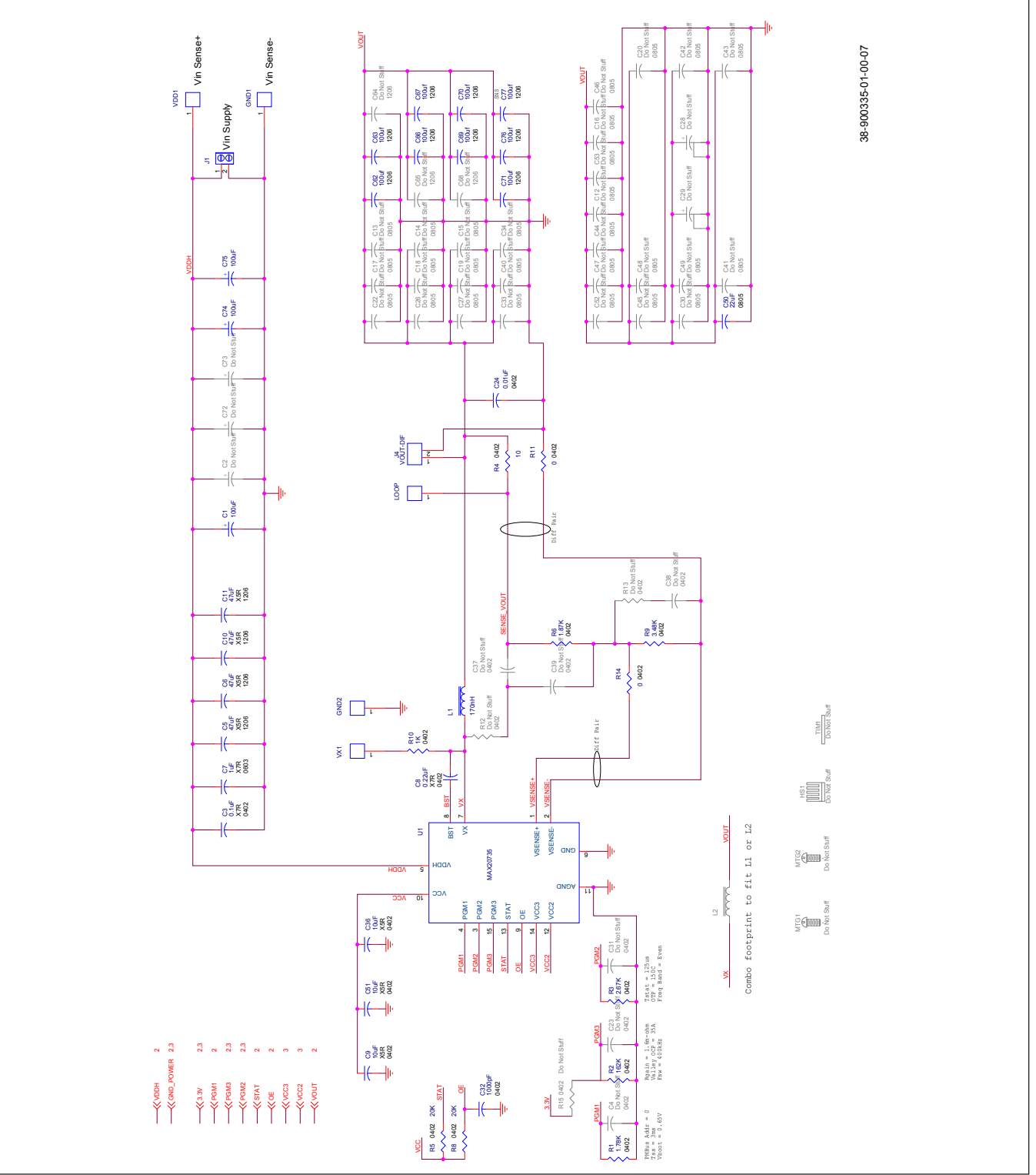
DEVICE TYPE	TYPE
MAX20735EVKIT#	EV Kit

#Denotes RoHS compliant.

MAX20735 Bill of Materials

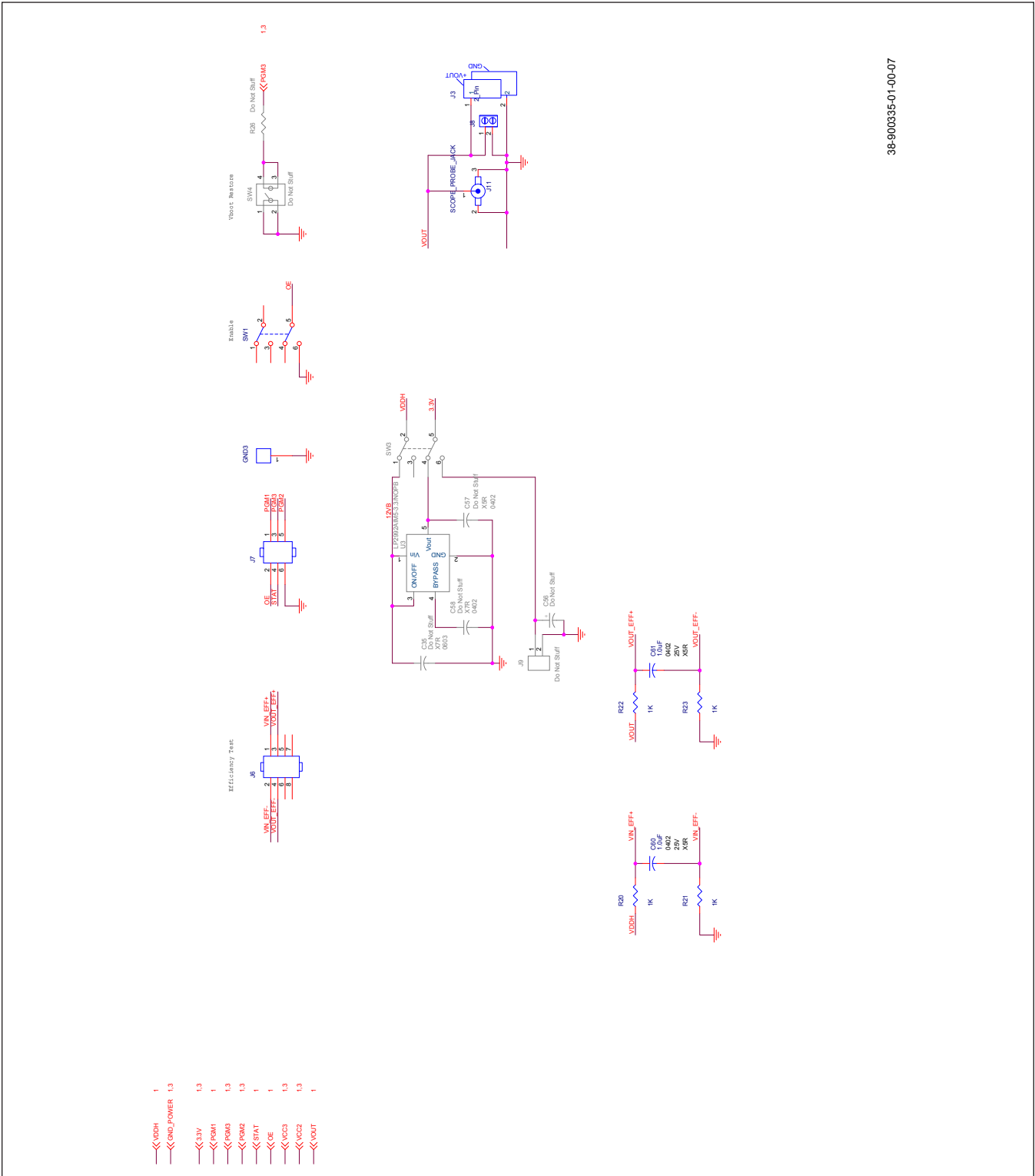
Part Reference	Quantity	Description
C1, C74, C75	3	100uF, 25V, 20%, TANTALUM
C24	1	0.01uF, 25V, 10%, X7R
C3	1	0.1uF, 25V, 10%, X7R
C32	1	1000pF, 50V, 10%, X7R
C5, C6, C10, C11	4	47uF, 25V, 20%, X5R
C50	1	22uF, 6.3V, 20%, X6S
C60, C61	2	1.0uF, 25V, 20%, X5R
C62, C63, C66, C67, C69, C70, C71, C76, C77	9	100uf, 6.3V, 20%, X5R
C7	1	1uF, 25V, 10%, X7R
C8	1	0.22uF, 16V, 10%, X7R
C9, C36, C51	3	10uF, 6.3V, 20%, X5R
GND1, GND2, GND3, LOOP, VDD1, VX1	6	1_PIN-1X1 Straight
J1, J8	2	2_PIN-2 Pin, Terminal Block w/Screws, Blue
J11	1	Shielded Scope Probe Jack, Vertical
J3	1	2_Pin-Edge Fingers
J4	1	VOUT-DIF-1X2 Straight
J6	1	8_PIN-2X4 Straight
J7	1	6_PIN-2X3 Straight
L1	1	170nH, 10%, Isat= 66A
R1	1	1.78KΩ, 1%, 1/16W
R10, R20, R21, R22, R23	5	1KΩ, 5%, 1/16W
R11, R14	2	0Ω, 5%, 1/16W
R2	1	162KΩ, 1%, 1/16W
R3	1	2.67KΩ, 1%, 1/16W
R4	1	10Ω, 1%, 1/16W
R5, R8	2	20KΩ, 5%, 1/16W
R6	1	1.87KΩ, 1%, 1/16W
R9	1	3.48KΩ, 1%, 1/16W
SW1	1	DPDT-DPDT, 6pins, 1switch
U1	1	MAX20735
	1	PCB# 35-900335-01-00

MAX20735 Schematics

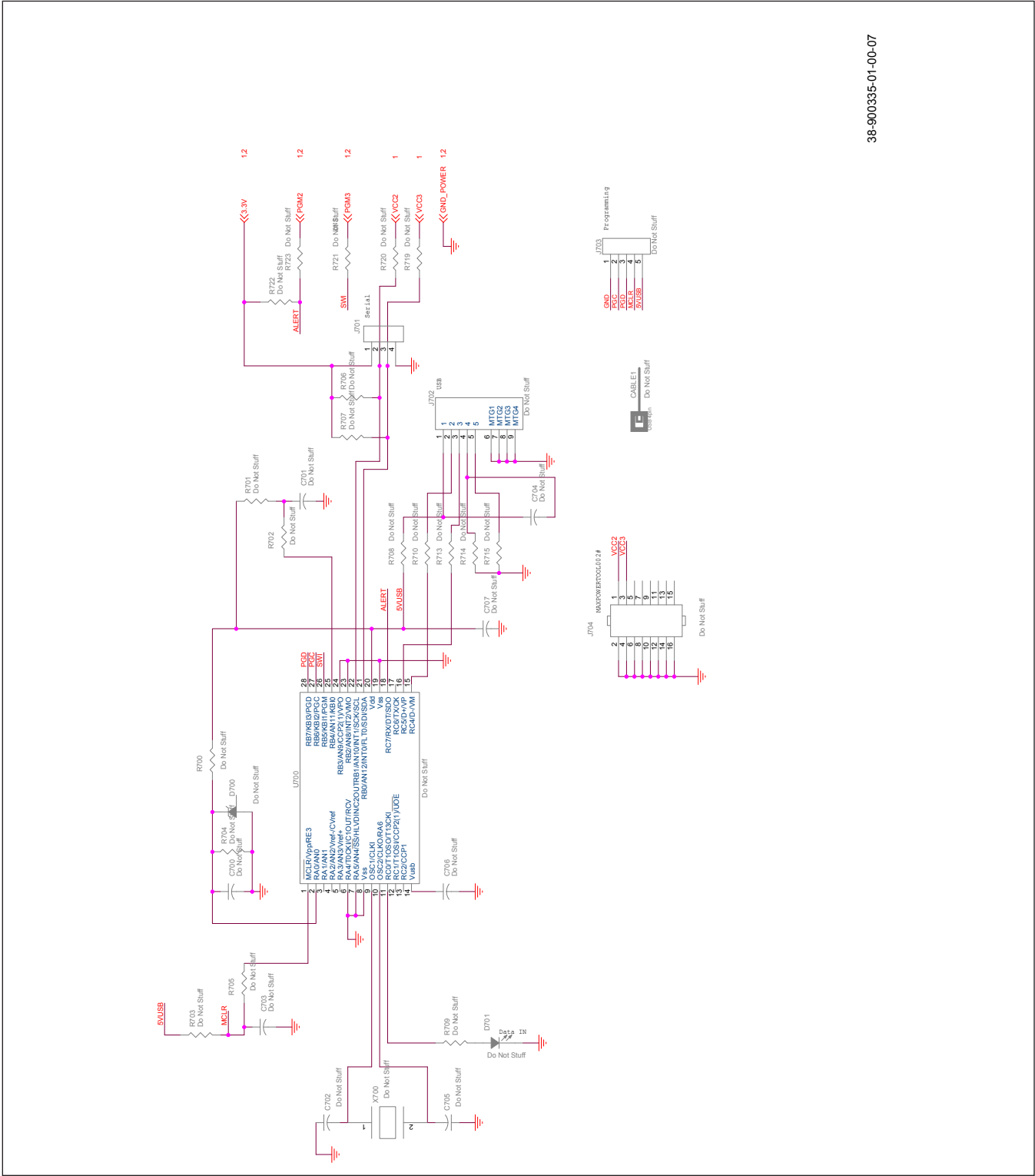


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MAX20735 Schematics (continued)

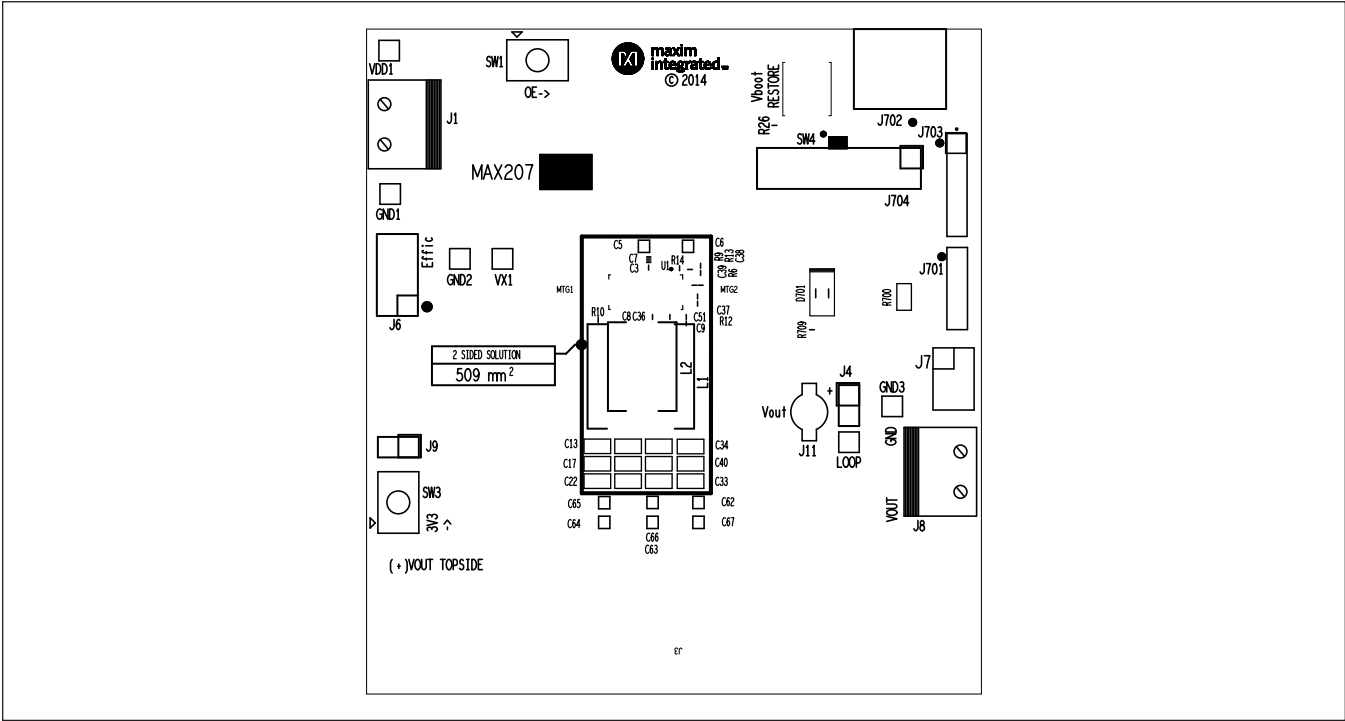


MAX20735 Schematics (continued)

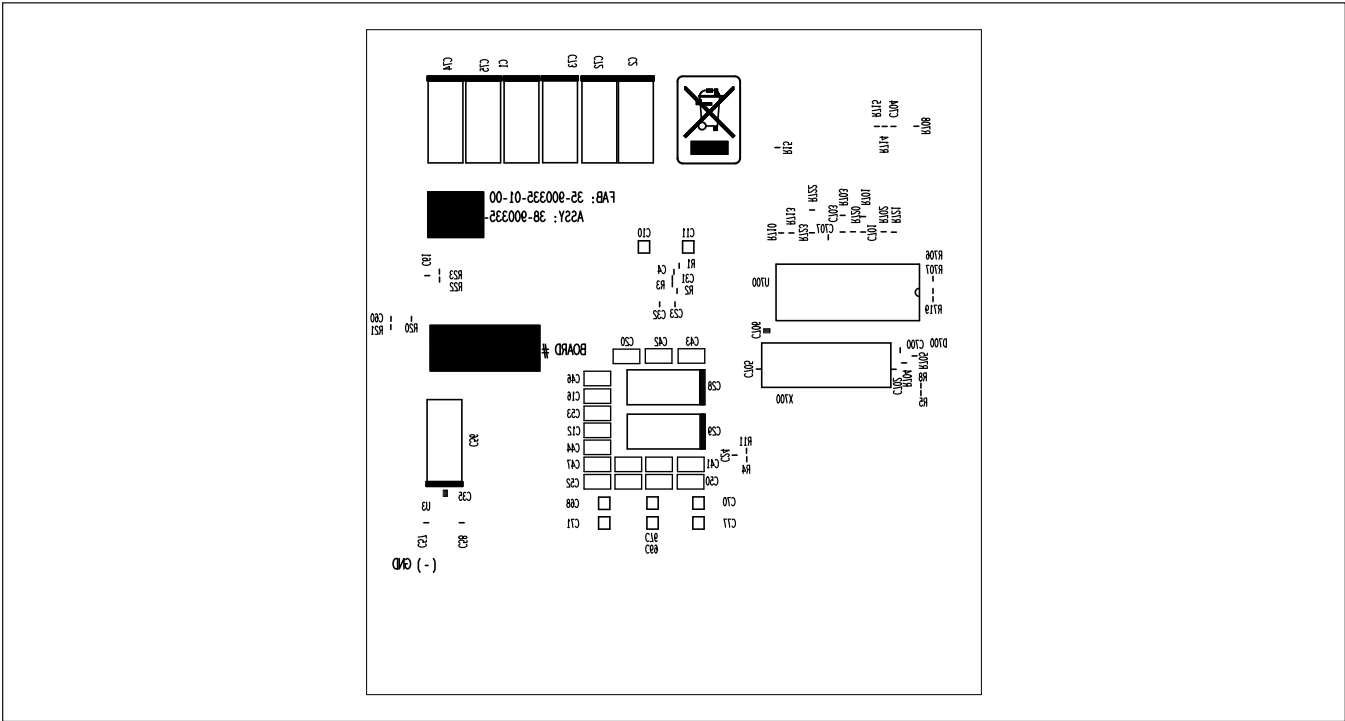


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MAX20735 PCB Layer

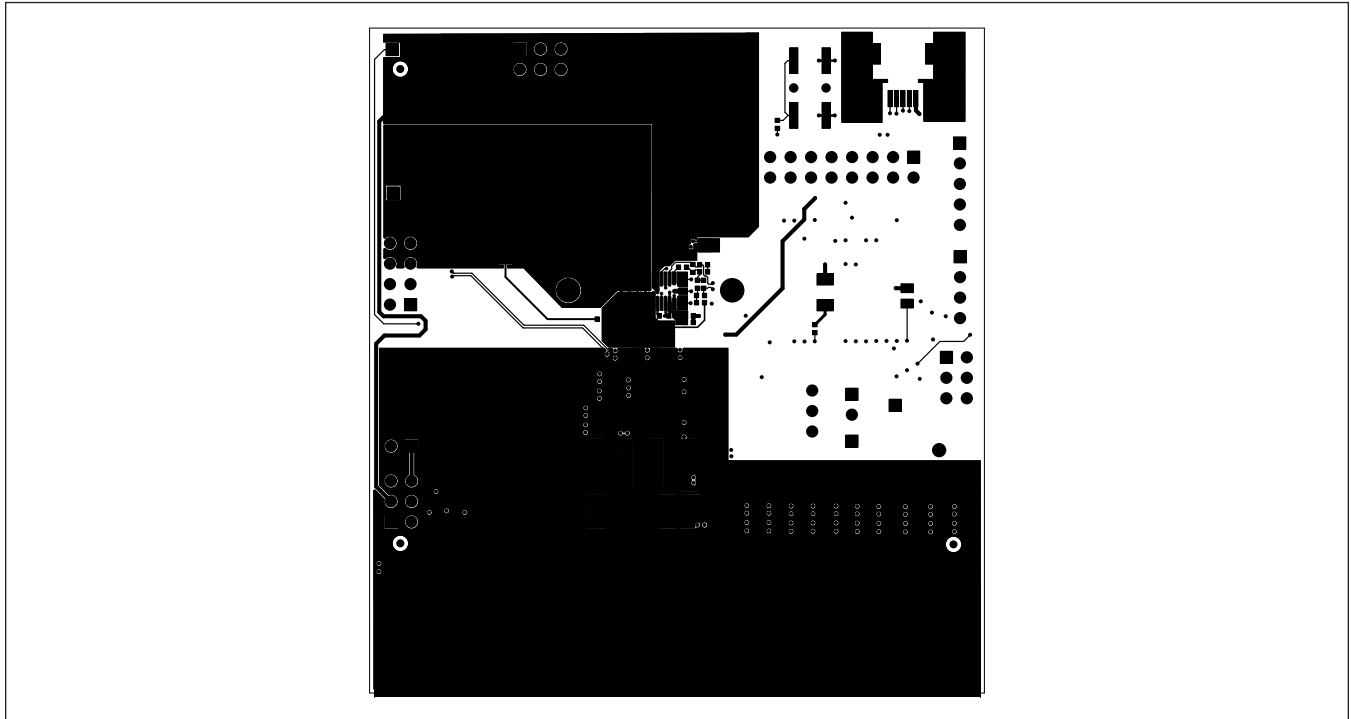


Top Silkscreen

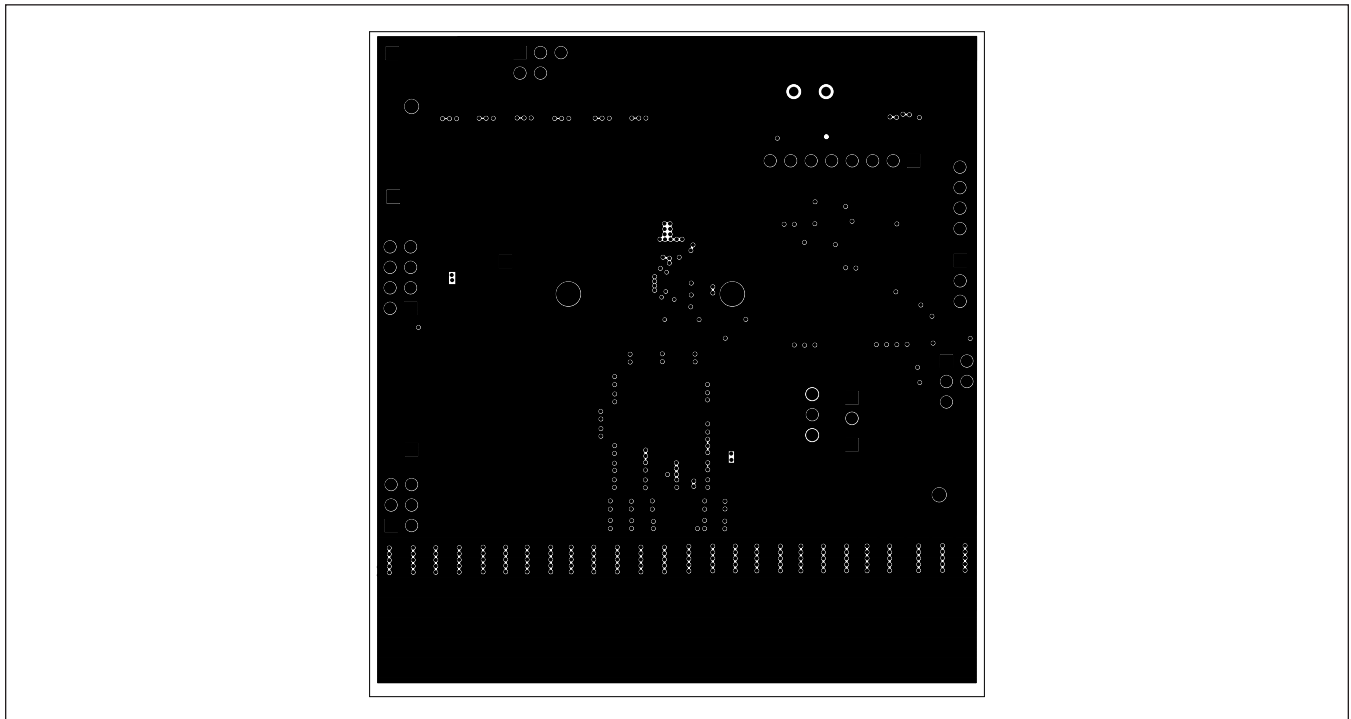


Bottom Silkscreen

MAX20735 PCB Layer (continued)

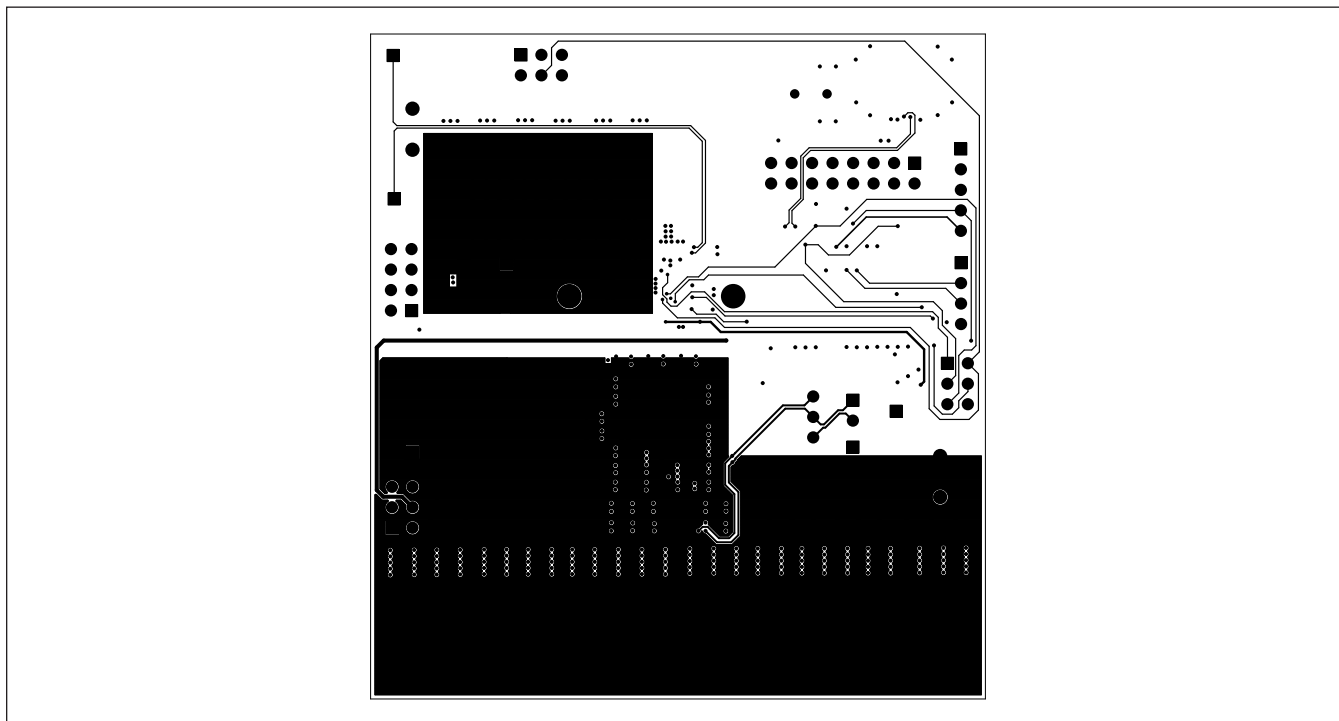


Layer 1

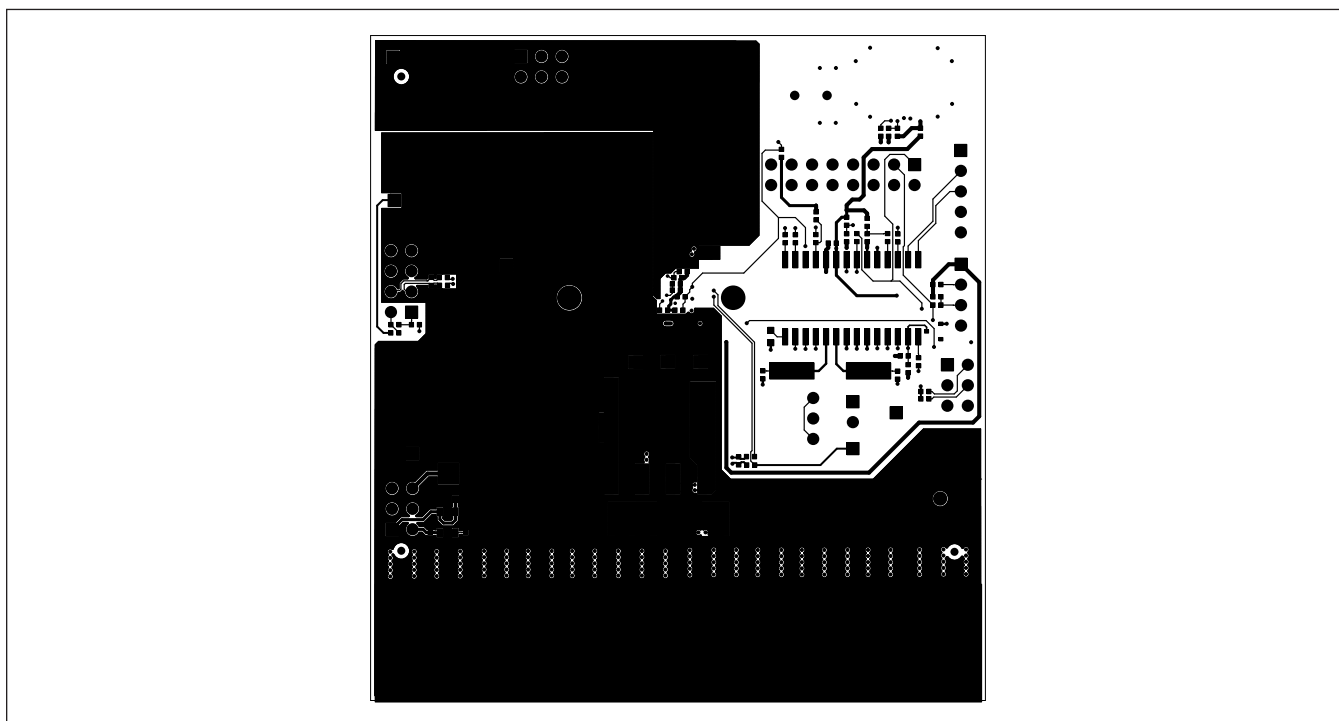


Layer 2

MAX20735 PCB Layer (continued)



Layer 3



Layer 4

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/16	Initial release	—

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