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General Description

The MAX20734 Evaluation Kit (EV kit) serves as a reference platform for evaluating the MAX20734 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 MAX20734 IC data sheet for more information.

The EV kit comprises a fully-assembled and tested PCB implementation of the MAX20734. 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
  - 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

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

Quick Start

Required Equipment

- MAX20734 EV kit
- 4.5V to 16V power supply
- 0A to 40A load
- Oscilloscope, probes, 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 V_{DD1} 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 V_{OUT} scope probe/voltmeter to J4 or J11, as desired.
   - J4 and J11 are connected to the sense point for best accuracy.
5) Position the SW1 toggle switch, pointing away from J1 to enable the IC (if desired).
6) Turn on the input supply and observe that V_{OUT} = 1V.
7) For efficiency measurements, J6 has the appropriate Kelvin sense points.

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maxim integrated™

Operation

The MAX20734 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 MAX20734 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 MAX20734 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 0.6484V and placing a voltage-divider in the feedback path with a divide ratio of 0.6484. The reference voltage can be changed through PMBus, in which case the output voltage follows the reference voltage divided by the 0.6484 divide ratio. To achieve higher output voltages, a higher divide ratio can be used. Note that the PMBus commanded and reported V_{OUT} is actually the voltage at the sense pins, so with the feedback-divider in place, the divide ratio must be taken into account.

R_{GAIN} and C_{OUT} can also be changed to affect performance. Refer to the MAX20734 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.

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 MAX20734 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.

- VIN_EFF± are on J6 pins 1 and 2.
- VOUT_EFF± 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.

Ordering Information

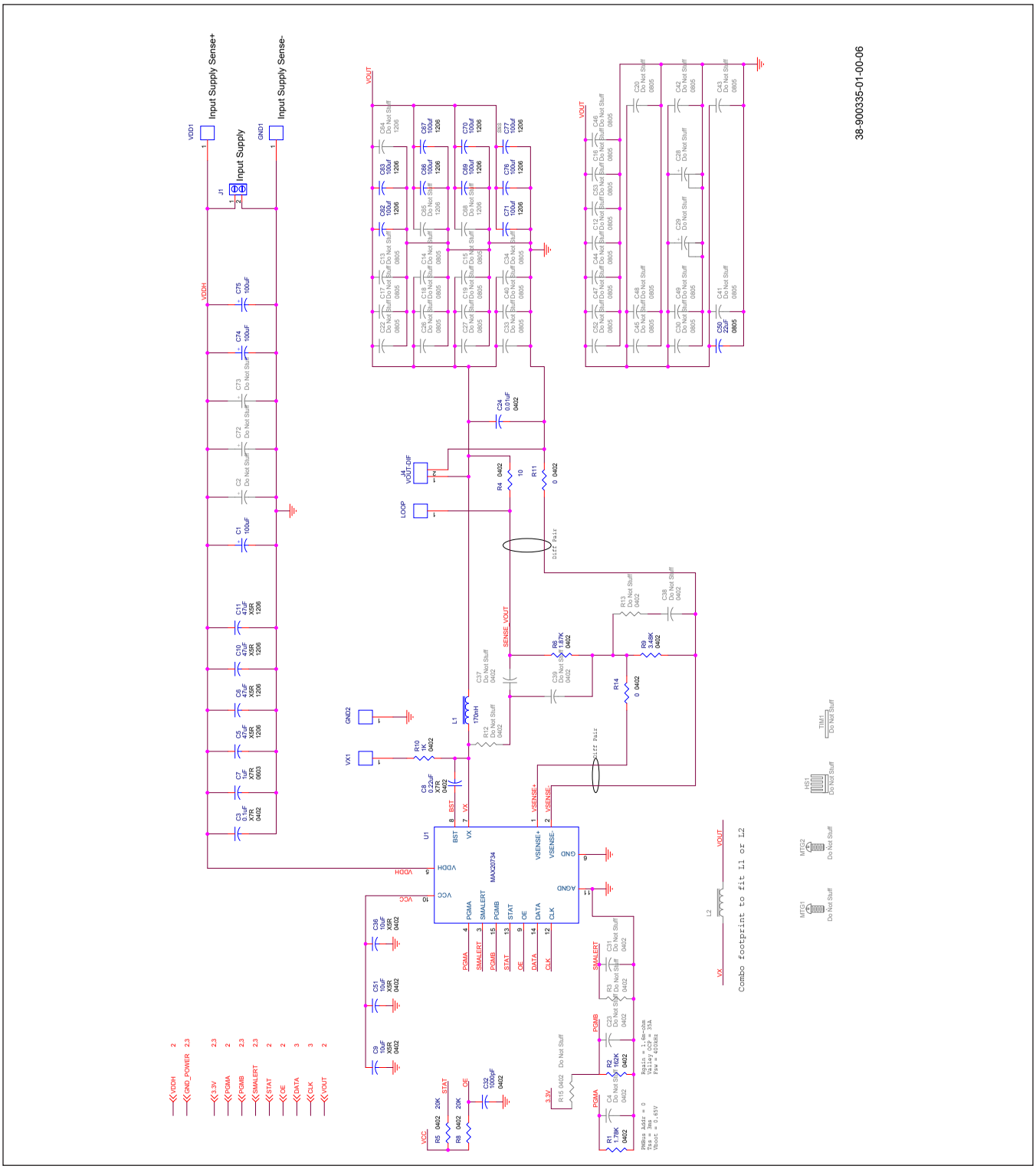
DEVICE TYPE	TYPE
MAX20734EVKIT#	EV Kit

#Denotes RoHS compliant.

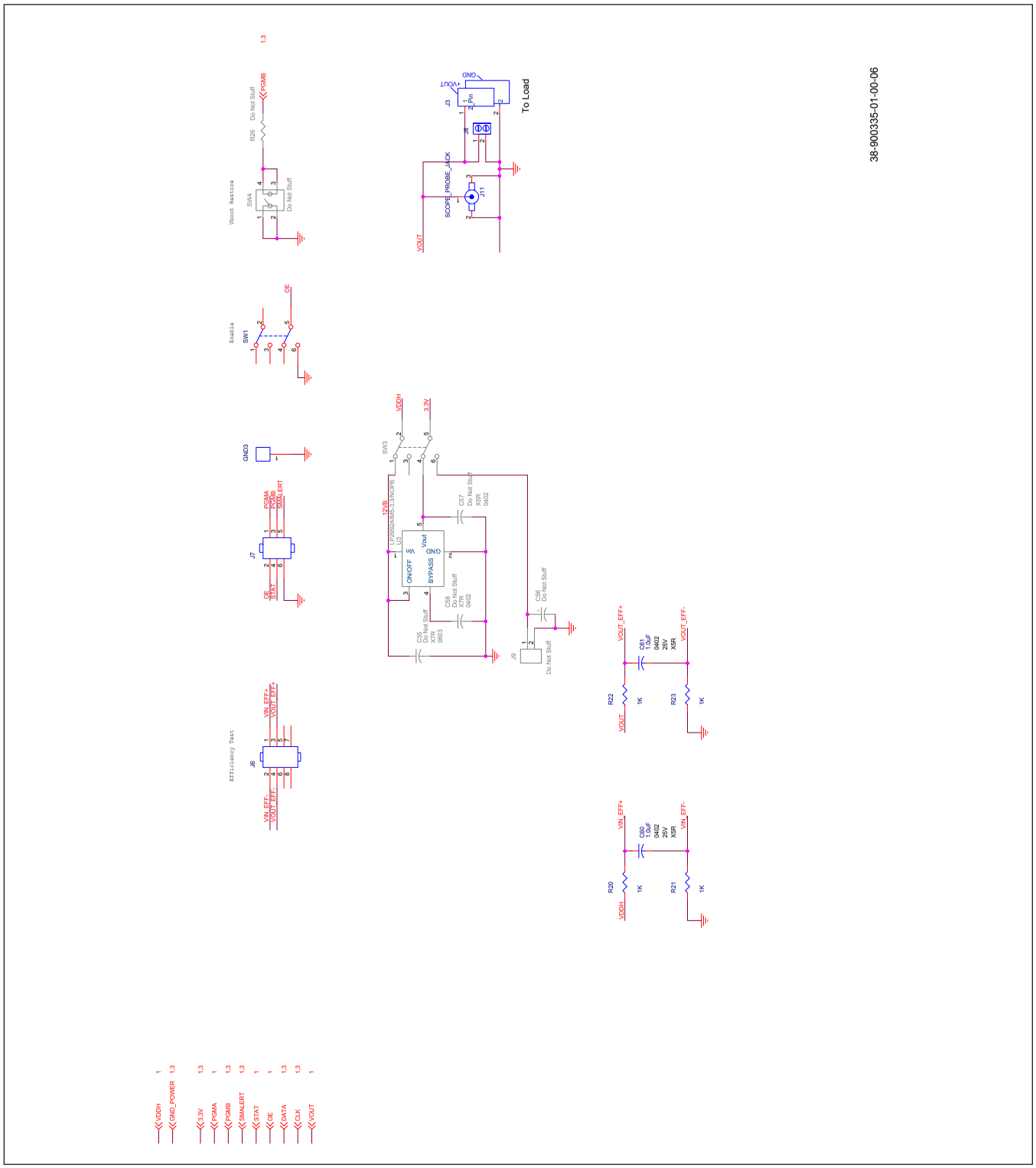
MAX20734 Bill of Materials

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
J704	1	16_PIN-BoxHeader 2x8
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
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	MAX20734
	1	PCB# 35-900335-01-00

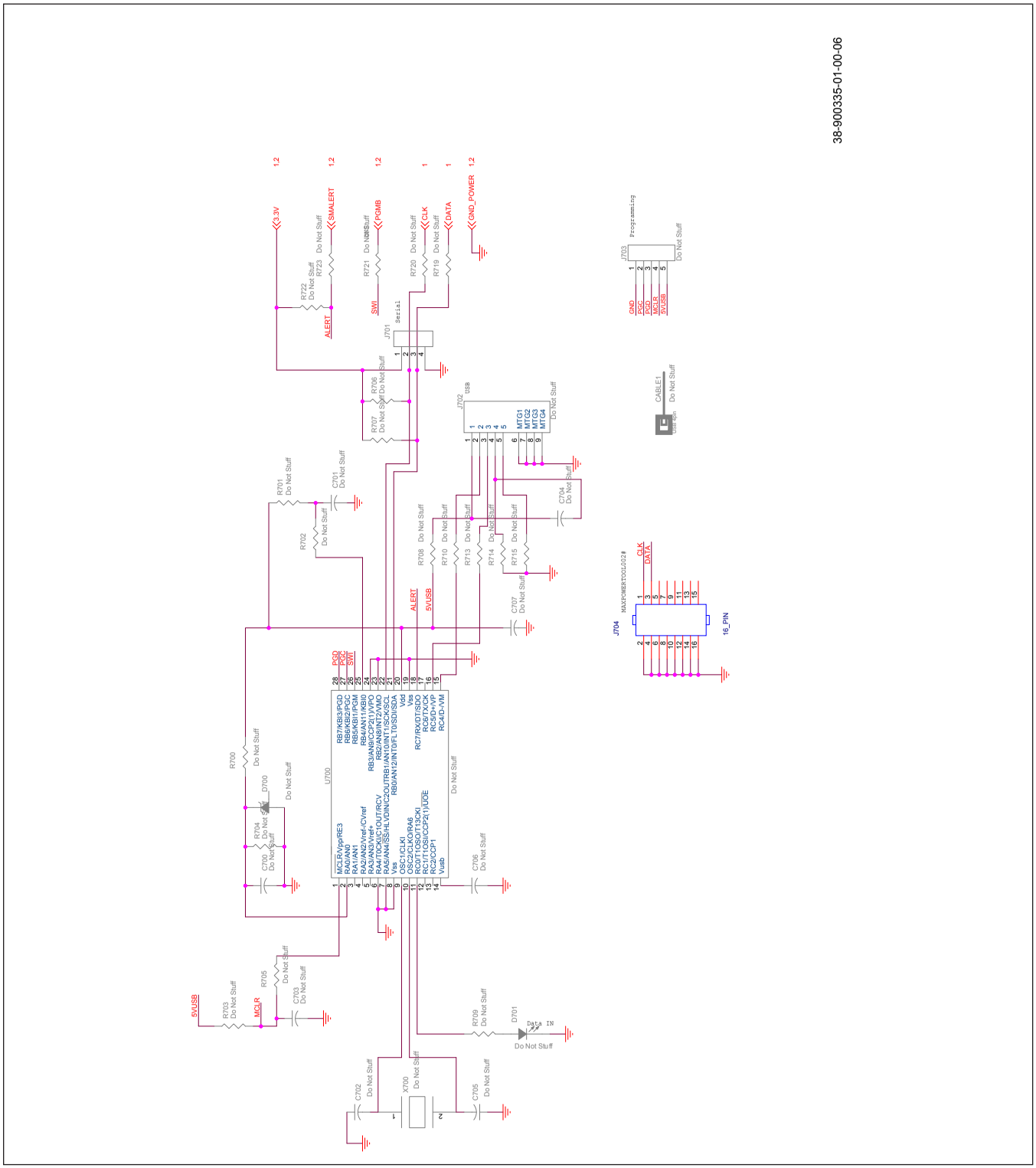
MAX20734 Schematics



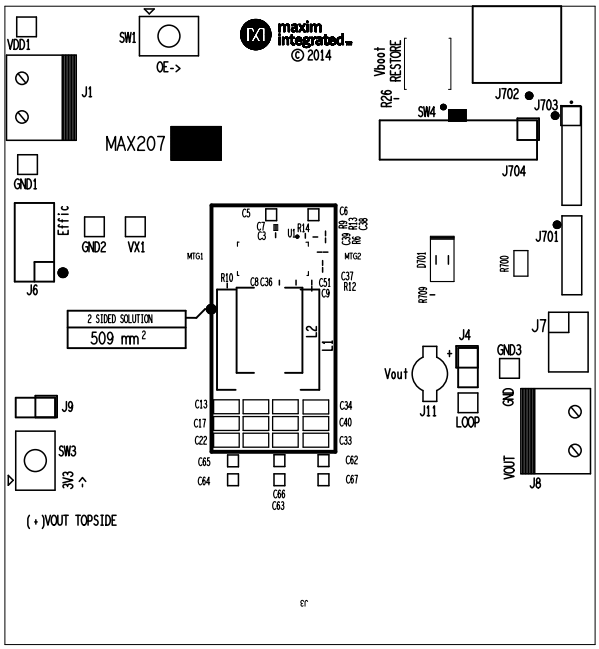
MAX20734 Schematics (continued)



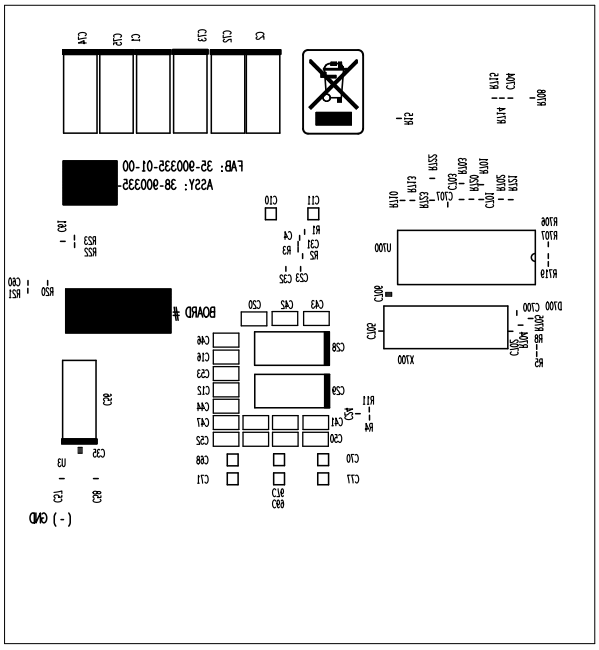
MAX20734 Schematics (continued)



MAX20734 PCB Layout

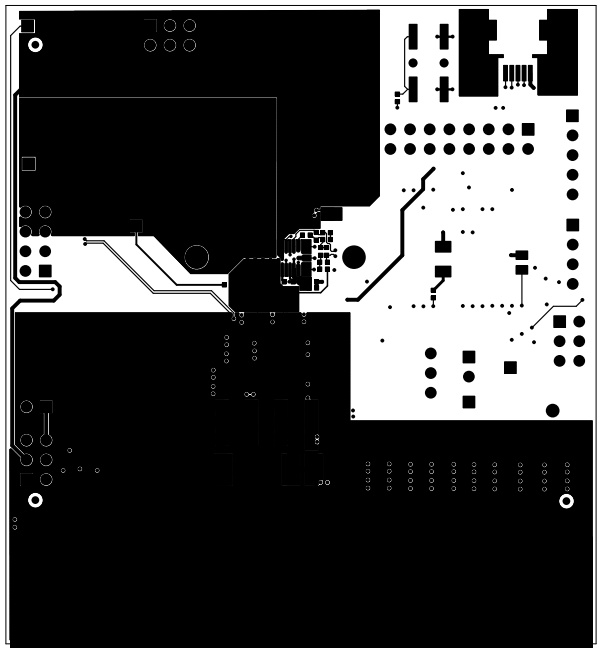


Top Silkscreen

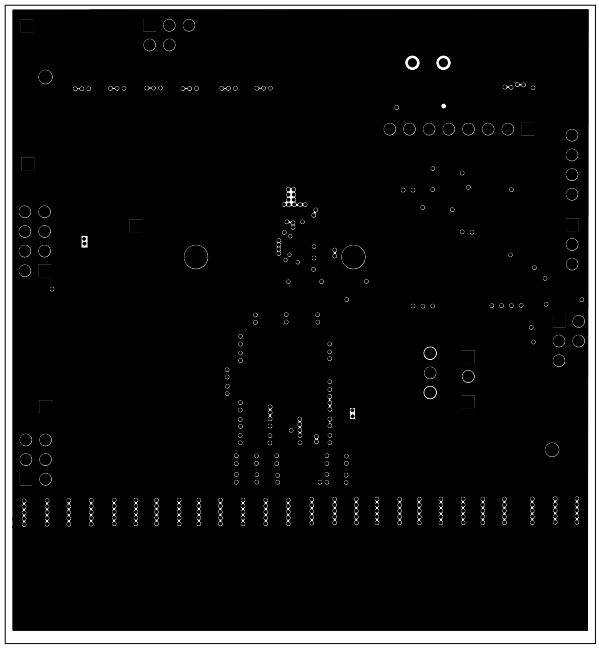


Bottom Silkscreen

MAX20734 PCB Layout (continued)

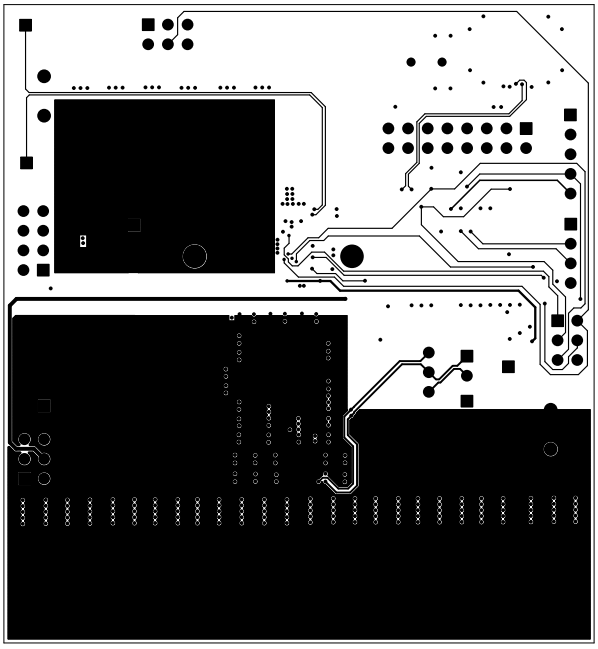


Layer 1

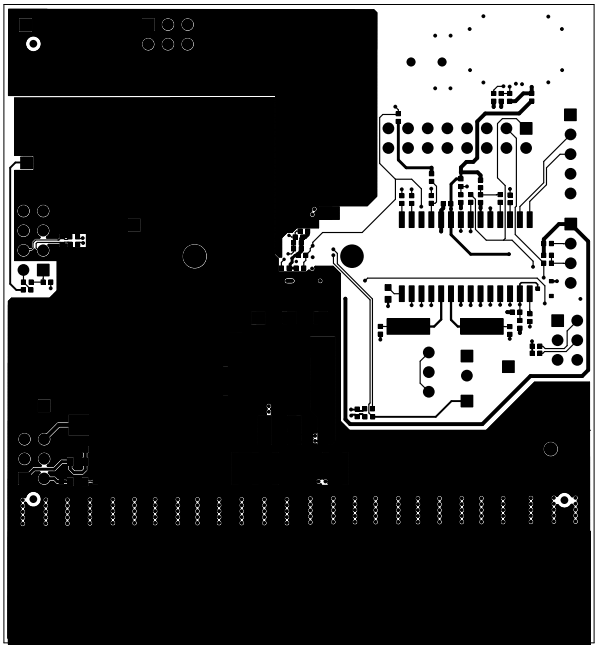


Layer 2

MAX20734 PCB Layout (continued)



Layer 3



Layer 4

Revision History

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

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