General Description

The MAX20733 Evaluation Kit (EV kit) serves as a reference platform for evaluating the MAX20733 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 35A. Refer to the MAX20733 IC data sheet for more information.

The EV kit consists of a fully assembled and tested PCB implementation of the MAX20733. 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
- Proven PCB Layout
- Fully Assembled and Tested

Getting Started

Required Equipment

- MAX20733 EV kit
- 4.5V to 16V power supply
- 0A to 35A Load
- Oscillocope, 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.***

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Operation

The MAX20733 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 MAX20733 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 MAX20733 IC data sheet.

R_{GAIN} and C_{OUT} can also be changed to affect performance. Refer to the MAX20733 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 MAX20733 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

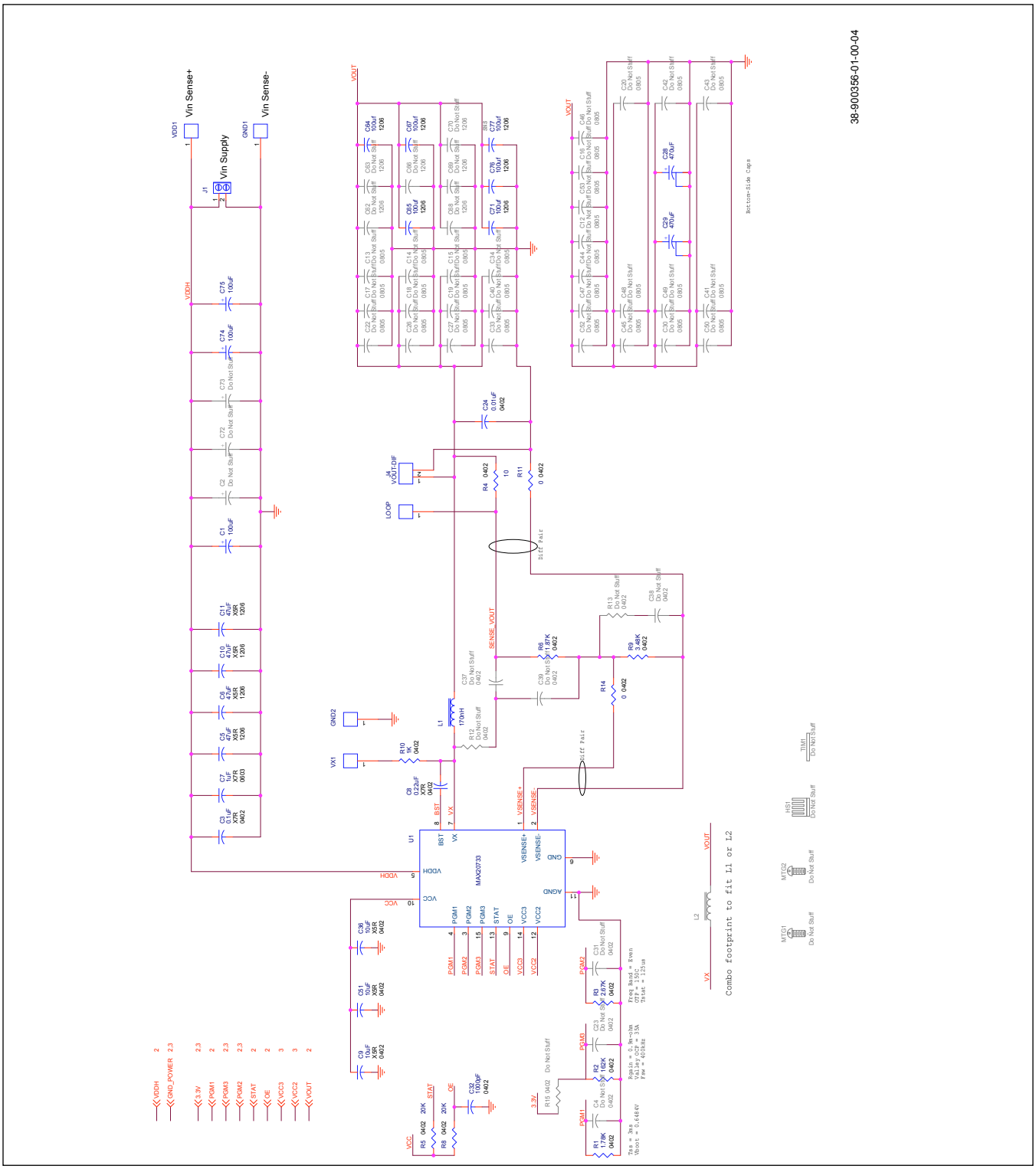
DEVICE TYPE	TYPE
MAX20733EVKIT#	EV Kit

#Denotes RoHS compliant.

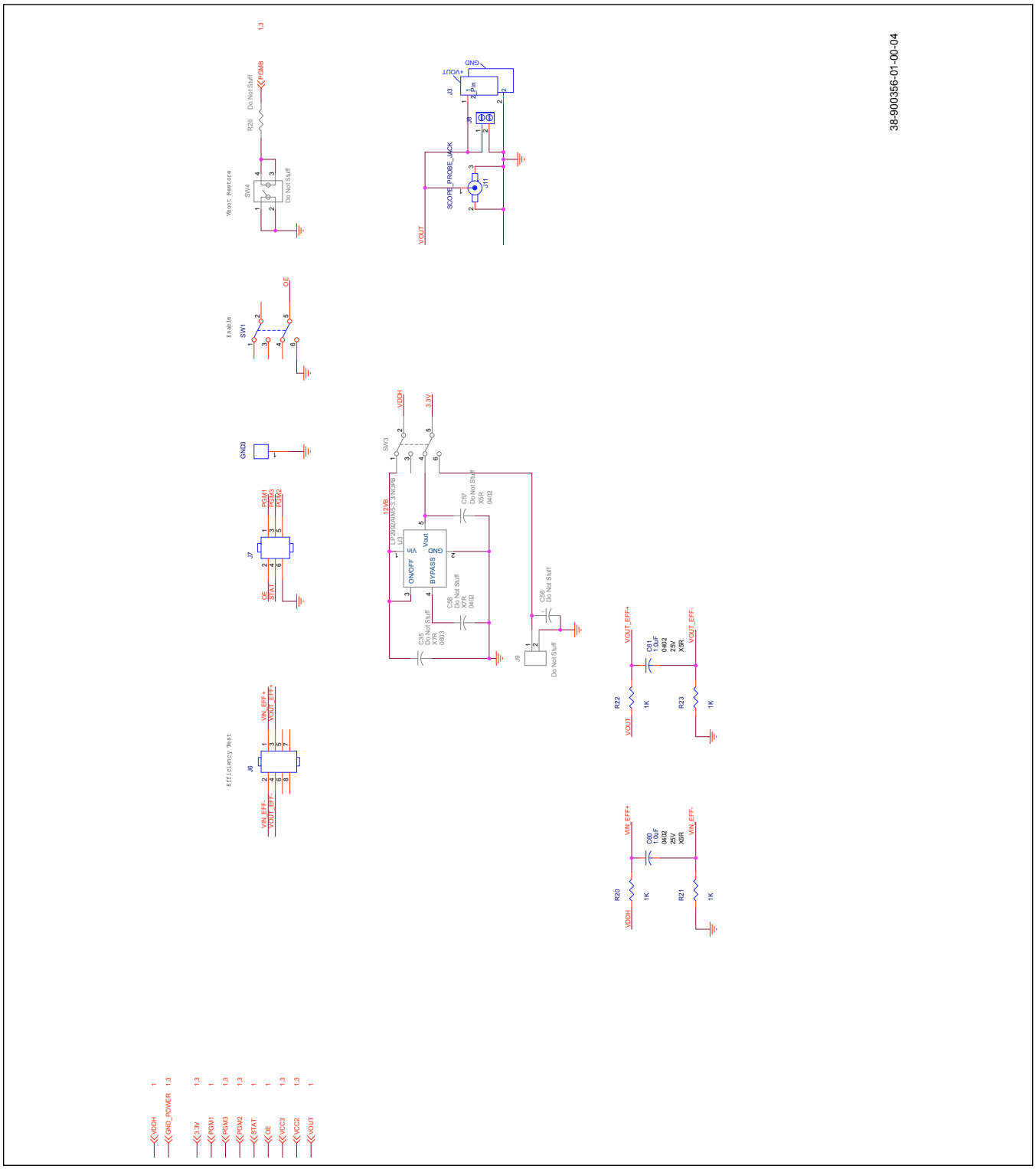
MAX20733 BOM

Part Reference	Quantity	Description
C1, C74, C75	3	100uF, 25V, 20%, TANTALUM
C24	1	0.01uF, 25V, 10%, X7R
C28, C29	2	470uF, 6.3, 20%, SP-CAP
C3	1	0.1uF, 25V, 10%, X7R
C32	1	1000pF, 50V, 10%, X7R
C5, C6, C10, C11	4	47uF, 25V, 20%, X5R
C60, C61	2	1.0uF, 25V, 20%, X5R
C64, C65, C67, C71, C76, C77	6	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	MAX20733
	1	PCB# 35-900356-01-00

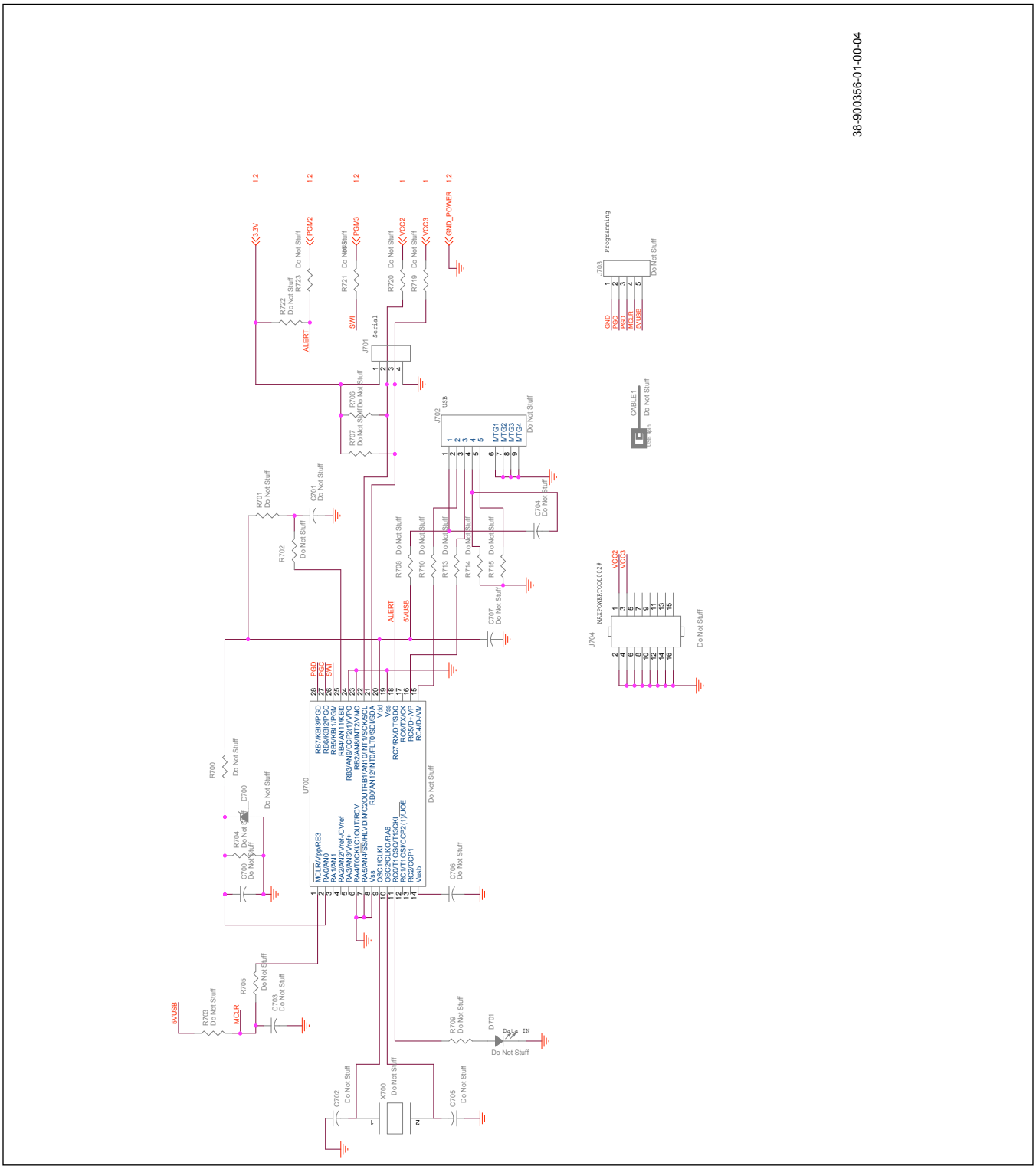
MAX20733 Schematics



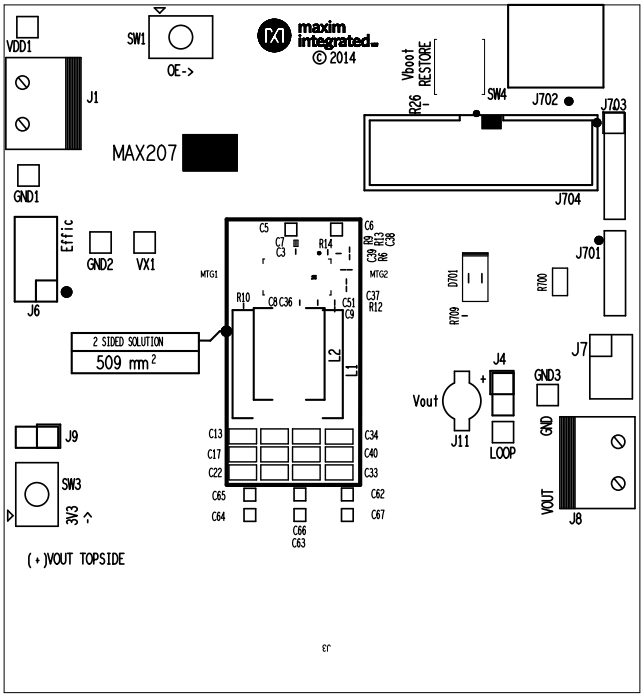
MAX20733 Schematics (continued)



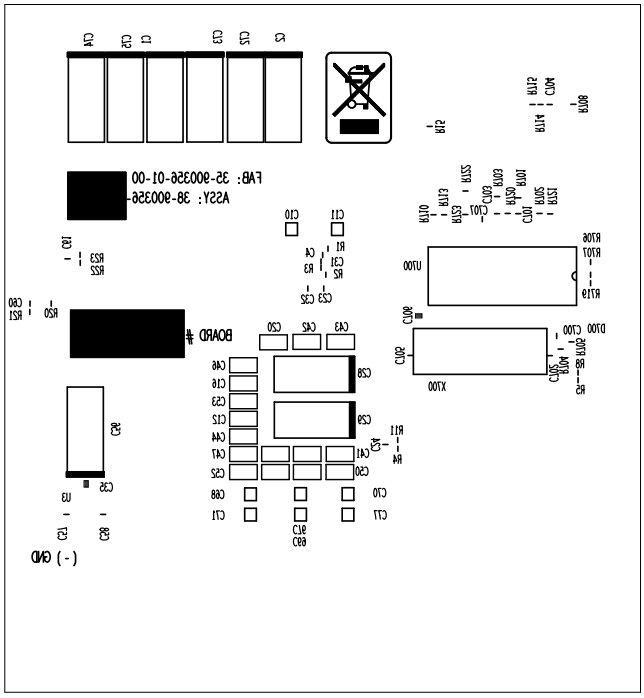
MAX20733 Schematics (continued)



MAX20733 PCB Layout

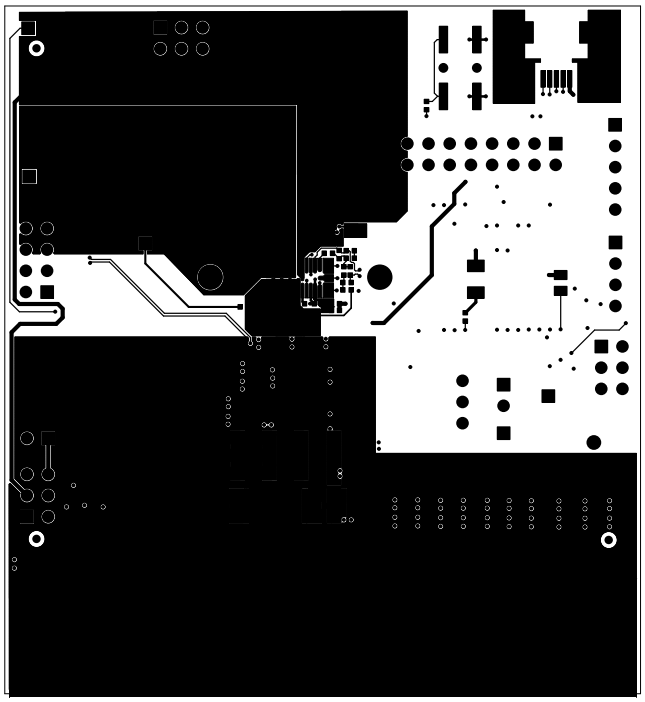


Top Silkscreen

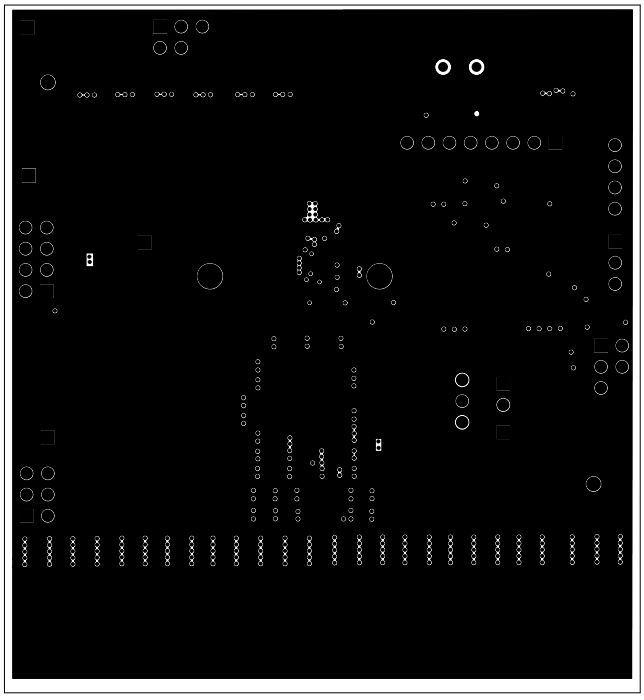


Bottom Silkscreen

MAX20733 PCB Layout (continued)

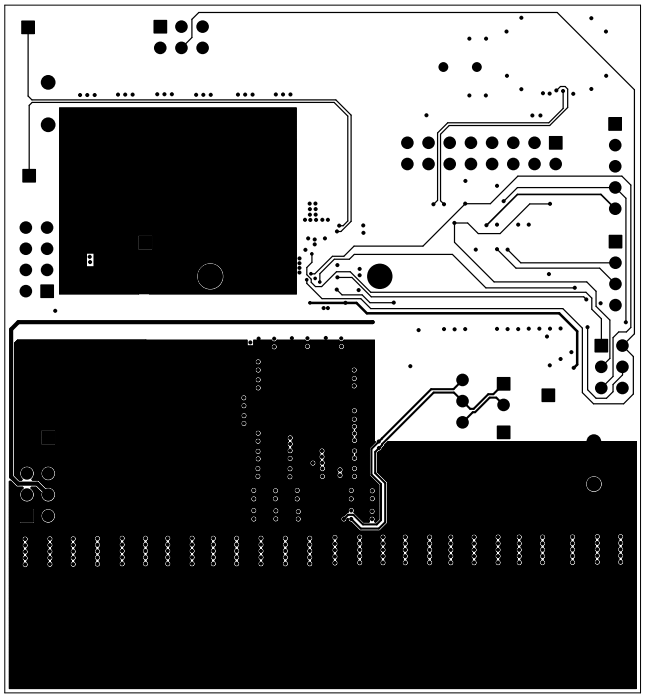


Layer 1

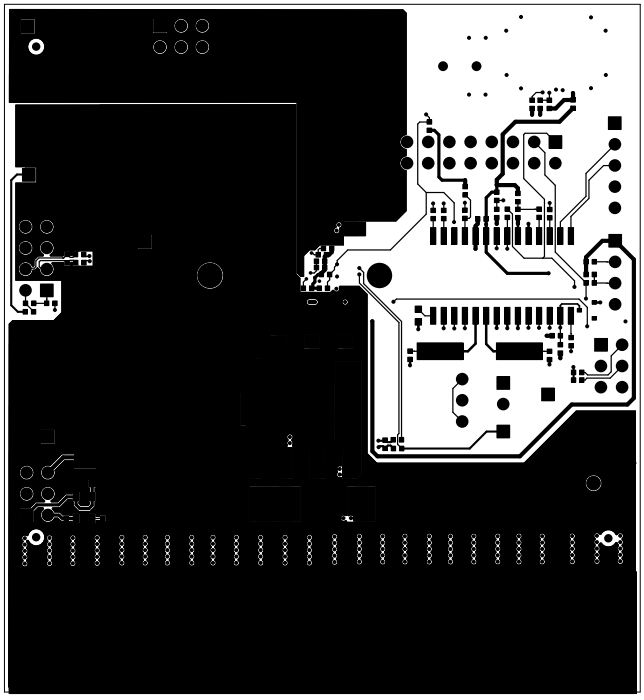


Layer 2

MAX20733 PCB Layout (continued)



Layer 3



Layer 4

Revision History

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