Click here to ask an associate for production status of specific part numbers.

Evaluates: MAX20011G

MAX20011G Evaluation Kit

General Description

The MAX20011G EV kit is a fully assembled and tested PCB intended to demonstrate the capability of the MAX20011G step-down (buck) voltage regulator. The MAX20011G has an output current rating of 16A. The IC operates at 3V to 5.5V input supply voltage and can regulate to a voltage range of 0.5V to 1.275V.

The MAX20011G features a 2.2MHz fixed-frequency PWM mode for better noise immunity and load transient response. The 2.2MHz frequency operation allows for the use of all ceramic capacitors and minimizes external components. The spread-spectrum frequency modulation option minimizes radiated electromagnetic emissions. Integrated low $R_{DS(ON)}$ switches improve efficiency at heavy loads and simplifiy the layout.

The MAX20011G is offered with factory-preset output voltage. The I^2C interface supports dynamic voltage adjustment with programmable slew rates. Other features include programmable soft-start, over-current, and over-temperature protections.

Features

- High Efficiency DC-DC Converter
- Up to 16A Peak Output Current
- Differential Remote Voltage Sensing
- 3.0V to 5.5V Operating Supply Voltage
- I^2C Controlled Output Voltage:
  - 0.5V to 1.275V in 6.25mV Steps
- Excellent Load Transient Performance
- Programmable Compensation
- 2.2MHz or 1.1MHz Operation
- Loop Measurements Ready
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX20011G EV kit
- 8V, 20A power supply
- Appropriate resistive load, or an electronic load
- Voltmeters
- Ammeter

Procedure

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

1) Connect a 5V power supply to PV (TP1) and GND (TP2). Activate the supply.
2) Verify that $\overline{\text{RESET}}$ is at logic-low level (J8).
3) Populate jumper (J5) between EN and PV to activate the output.
4) Measure the output voltage at the sense point (J10).
5) Connect appropriate load between banana jacks TP3 (VOUT) and TP4 (GND).
6) Verify that the output voltage at the sense point (J10) remains within specification.
7) Verify that $\overline{\text{RESET}}$ is at logic-high level (J8).

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

319-100828; Rev 0; 9/21

One Analog Way, Wilmington, MA 01887 U.S.A. | Tel: 781.329.4700 |

Test setup

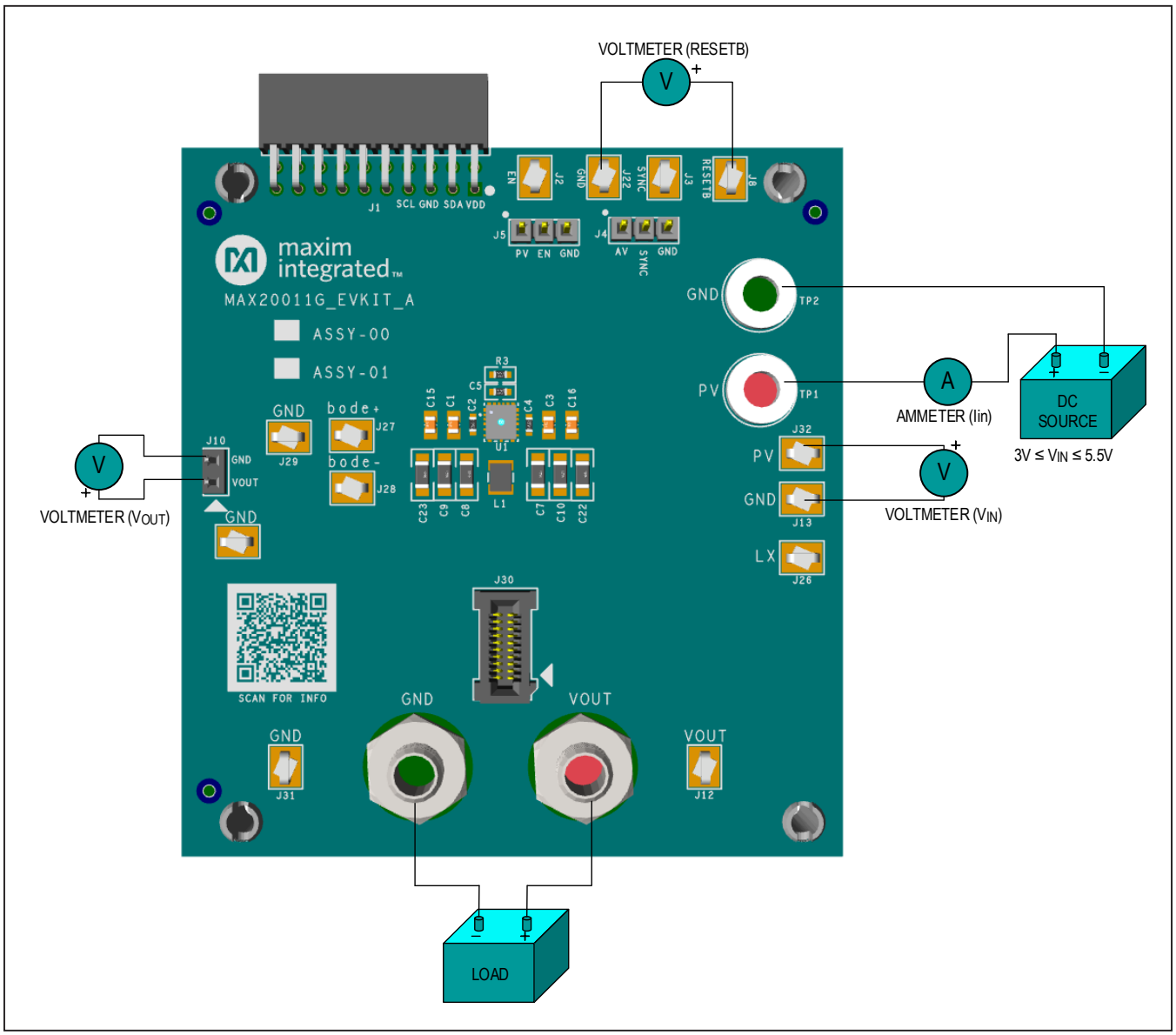


Figure 1. MAX20011G Evaluation Kit Configuration

Detailed Description of Hardware

EV Kit Interface

The banana jacks TP1 (PV) and TP2 (GND) are the main input power supply points on the board. Connect a 5V power supply across these connectors. Use J32 (PV) as a test point for monitoring the input power supply. The banana jacks TP3 (VOUT) and TP4 (GND) serve as outputs to an external load. The MAX20011G's enable signal (EN) is activated (pulled up) by a jumper placed across the EN and PV pins on jumper J5. The enable signal (EN) is monitored at test point J2, and the power-good signal (RESETB) is monitored at test point J8. Connector J1 provides I2C communication connectivity. Use test points J27 (Bode+), J28 (Bode-) for loop measurements, and J10 for measuring output voltage at the sense point. (Use a differential probe for ripple and transient measurements.) During efficiency measurement, use test points J32 (PV) and J13 (GND) for measuring input voltage. The output test point (J12) and GND test points (J22, J29, J31) provide additional flexibility in monitoring the evaluation environment. For explicit information on how these jumpers and test points interact with the EV kit circuitry, see the *MAX20011G EV Kit Schematic*.

I2C Communication and PEC

The MAX20011G EV kit is designed to be used with an I2C interface such as the MINIQUSB or MAXPICO2MINIQ board and a PC software that can read and write to the device like SimpleI2C. The IC has a packet error checking (PEC) feature. This option can be disabled through CONFIG register 0x05, bit 7 (PEC). In order to write to a register when the PEC is enabled, the I2C transaction must be followed by a PEC byte. The SimpleI2C software simplifies this process by providing a PEC enable setting.

Evaluating IC Capabilities

The default device on the board is the MAX20011G, a 16A device. Use the input and output connections described above to apply the input supply voltage and draw the appropriate current from the regulator while monitoring the output voltage at test point J10. The test point J10 provides a voltage readout at a remote sense point located at the output capacitor. This makes J10 suitable for taking output voltage ripple and transient measurements (using a differential probe) and for taking efficiency measurements (using a voltmeter). When measuring efficiency, connect a voltmeter to J32 for input voltage measurements. J4 allows an external synchronization pulse to be applied to the device's SYNC pin. Use the 50% duty cycle for the square wave. Loop measurements are made using J27 (bode+) and J28 (bode-). Inject the sinusoidal signal across the bode+ and bode- pins when measuring the gain and phase of the closed loop.

For I2C communication specifics, please refer to the MAX20011G data sheet.

MAX20011G EV Kit Jumpers, Test Points, and Connectors

JUMPER	SIGNAL	DEFAULT POSITION	FUNCTION
J1	NA	NA	I^2C communication connections
J2	EN	NA	Test point for monitoring the device enable (EN) signal
J3	SYNC	NA	Test point for monitoring the device sync (SYNC) signal
J4	SYNC	NA	Connection point for apply an external synchronization signal
J5	EN	OFF	Jumper for activating the device enable (EN) signal
J8	RESETB	NA	Test point for monitoring the device power-good ($\overline{RESET}$) signal
J10	RS+	NA	Test point for measuring output voltage at the sense point
J12	VOUT	NA	Test point for output voltage
J13	GND	NA	Ground test point (see *MAX20011G EV Kit Schematic*)
J22	GND	NA	Ground test point (see *MAX20011G EV Kit Schematic*)
GND	GND	NA	Ground test point (see *MAX20011G EV Kit Schematic*)
J26	LX	NA	Test point to measure LX signal
J27	bode+	NA	Test point for loop measurement
J28	bode-	NA	Test point for loop measurement
J29	GND	NA	Ground test point
J30	Plugin socket	NA	Connection for load transient board (MAXLDBD)
J31	GND	NA	Ground test point
J32	PV	NA	Test point for input voltage during efficiency measurement

Ordering Information

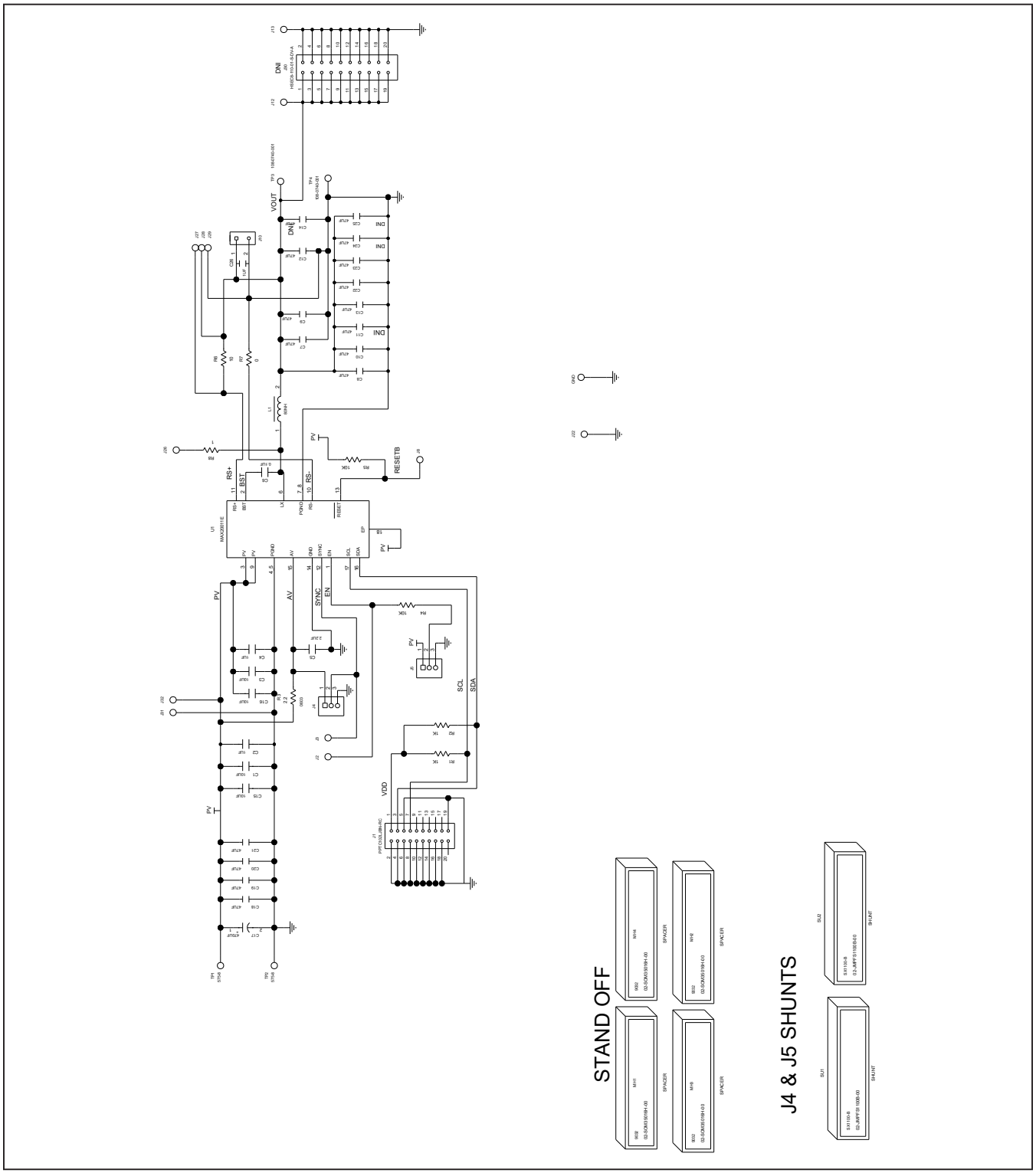
PART	TYPE
MAX20011GEVKIT#	EV Kit

#Denotes RoHS compliance.

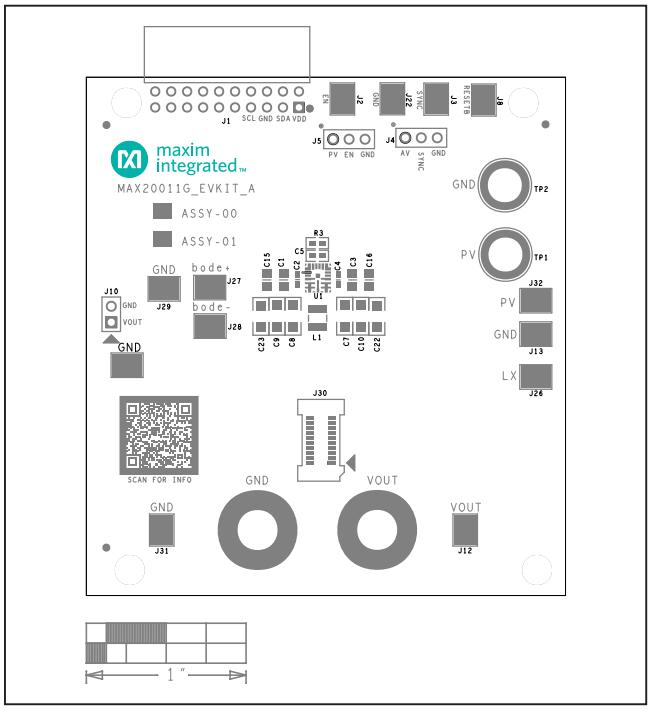
MAX20011G EV Kit Bill of Materials

REFERENCE	VALUE	DESCRIPTION	MANUFACTURER	MFG PART #
C1, C3, C15, C16	10UF	CAP; SMT (0805); 10UF; 20%; 10V; X7S; CERAMIC	TDK	CGA4J3X7S1A106M125AB
C2, C4	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	TDK	CGA3E1X7R1E105K
C5	2.2UF	CAP; SMT (0603); 2.2UF; 10%; 10V; X7S; CERAMIC	TDK	CGA3E3X7S1A225K080AE
C6	0.1UF	CAPACITOR, 0603, CERAMIC, 0.1UF, 25V, X7R	TDK	C1608X7R1E104K080AA
C7-C14, C22-C25	47UF	CAP; SMT (1206); 47UF; 20%; 4V; X7T; CERAMIC	TDK	CGA5L1X7T0G476M160AC
C17	470UF	CAPACITOR, 7343, TANTALUM POLYMER, 470UF, 6.3V	KEMET	T530X477M006ATE004
C18-C21	47UF	47µF ±20% 10V Ceramic Capacitor X7S 1210	TDK	CGA6P1X7S1A476M
C26	1UF	CAP; SMT (0402); 1UF; 10%; 6.3V; X7R; CERAMIC	MURATA	GRT155R70J105KE01
GND, J2, J3, J8, J12, J13, J22, J26-J29, J31, J32	N/A	TEST POINT; SMT; PIN LENGTH=0.185IN; PIN WIDTH=0.135IN; PIN HEIGHT=0.09IN; SILVER; PHOSPHOR BRONZE WITH SILVER PLATE CONTACT	KEYSTONE	USE FOR COLD TEST: 5016
J1	PPTC102LJBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; BREAKAWAY HEADER; RIGHT ANGLE; 20PINS	SULLINS ELECTRONICS CORP	PPTC102LJBN-RC
J4, J5	TSW-103-23-G-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS; -55 DEGC TO +125 DEGC	SAMTEC	TSW-103-23-G-S
J10	TSW-101-07-L-D	CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; DOUBLE ROW; STRAIGHT; 2PINS	SAMTEC	TSW-101-07-L-D
L1	80NH	EVKIT-PART - INDUCTOR; SMT; 80NH; 20%; 20A	TDK	CLT3225C80NMI3
MH1-MH4	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON	KEYSTONE	9032
R1, R2	1K	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM	PANASONIC	ERJ-3EKF1001
R3	2.2	RES; SMT (0603); 2.2; 1%; +/-100PPM/DEGC; 0.1000W	PANASONIC	ERJ-3RQF2R2
R4, R5	10K	RESISTOR; 0603; 10K; 1%, 100PPM, 0.10W, THICK FILM	PANASONIC	ERJ-3EKF1002
R6	10	RESISTOR; 0402; 10 OHM, 1%; 100PPM; 0.063W, THICK FILM	VISHAY DALE	CRCW040210R0FK
R7	0	RES; SMT (0402); 0; JUMPER; JUMPER; 0.1000W	PANASONIC	ERJ-2GE0R00
R8	1	RES; SMT (0603); 1; 1%; +/-100PPM/DEGC; 0.1000W	VISHAY	CRCW06031R00FN
SU1, SU2		JUMPER	KYCON;SULLINS ELECTRONICS CORP.	SX1100-B;STC02SYAN
TP1, TP2	575-8	RECEPTACLE; JACK; BANANA; 0.203IN [5.2MM] DIA X 0.350IN [8.9MM] L; 0.203D/0.350L; NICKEL PLATED BRASS	KEYSTONE	575-8
TP3, TP4	108-0740-001	CONNECTOR; MALE; PANELMOUNT; BANANA JACK; STRAIGHT; 1PIN	EMERSON NETWORK POWER	108-0740-001
U1	MAX20011G	IC; AUTOMOTIVE SINGLE 16A STEPDOWN CONVERTER FAMILY	MAXIM INTEGRATED	MAX20011GAFOA/VY+
J30	HSEC8-110-01-S-DV-A	CONNECTOR; FEMALE;	SAMTEC	HSEC8-110-01-S-DV-A

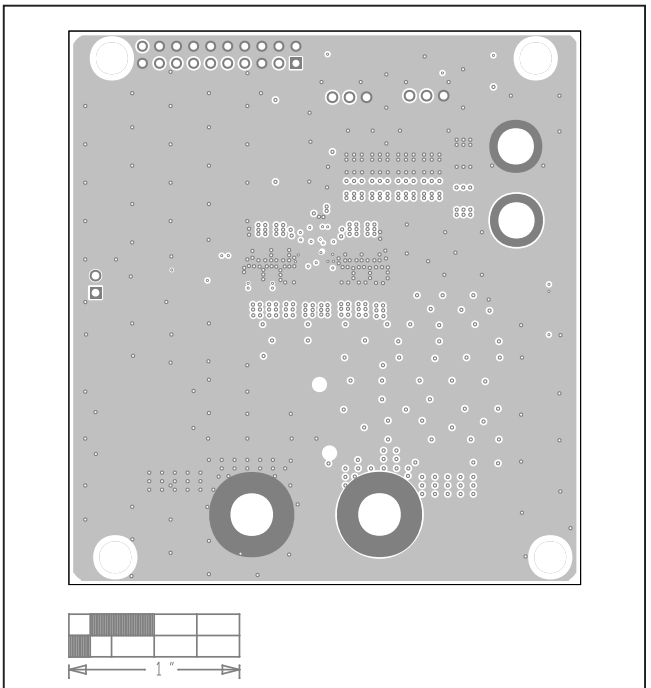
MAX20011G EV Kit Schematic



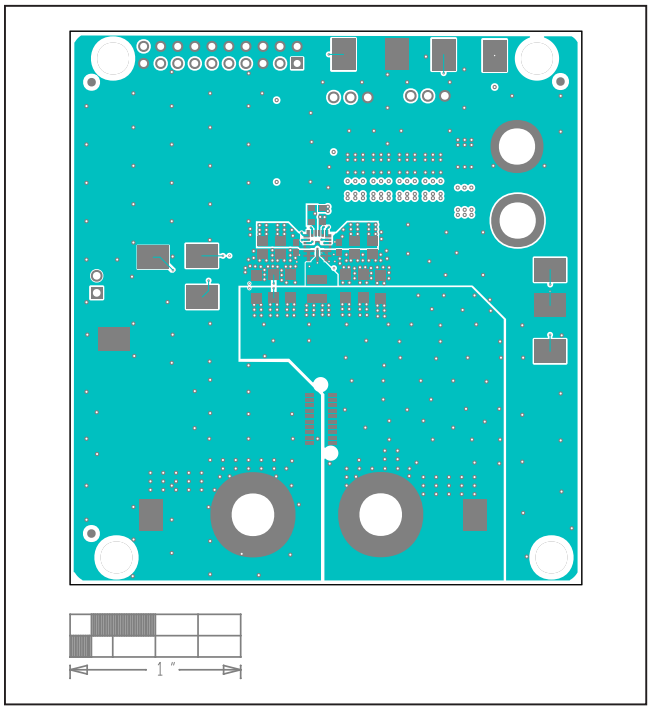
MAX20011G EV Kit PCB Layout Diagrams



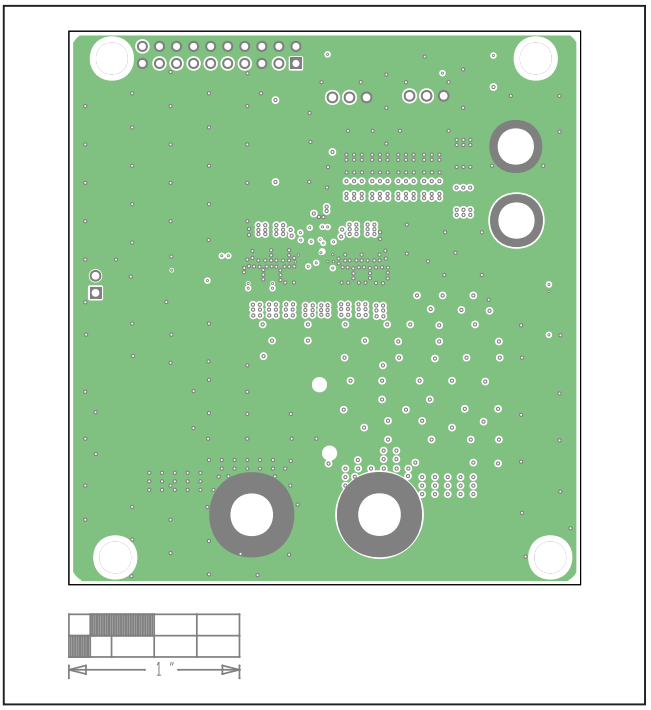
MAX20011G EV Kit PCB Layout—Silk Top



MAX20011G EV Kit PCB Layout—Layer2

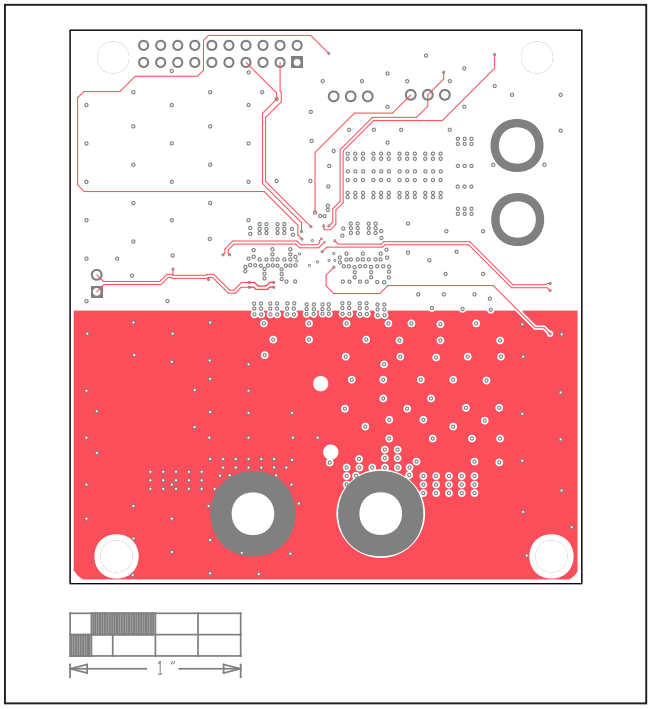


MAX20011G EV Kit PCB Layout—Top

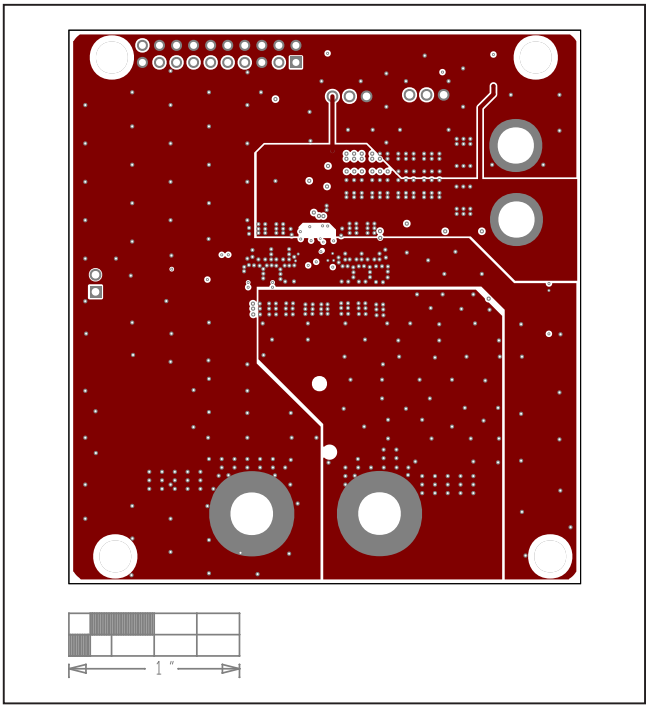


MAX20011G EV Kit PCB Layout—Layer3

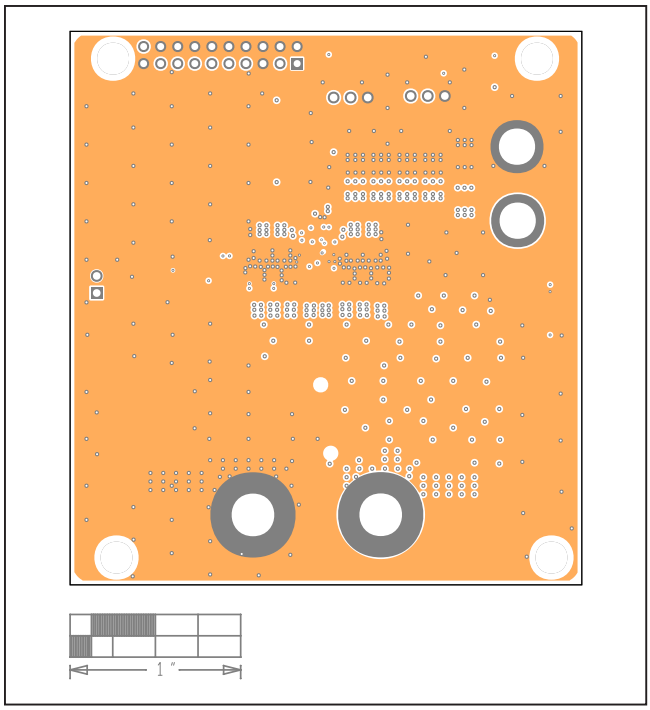
MAX20011G EV Kit PCB Layout Diagrams (continued)



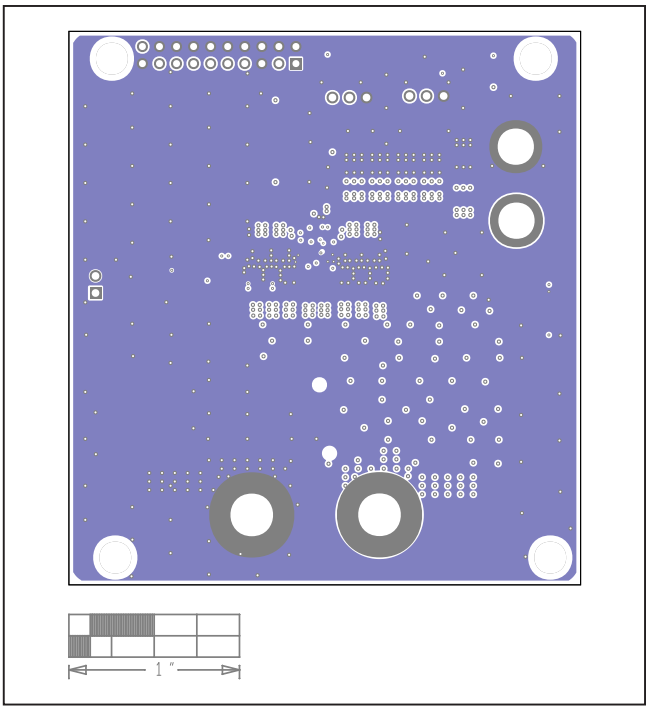
MAX20011G EV Kit PCB Layout—Layer4



MAX20011G EV Kit PCB Layout—Layer6

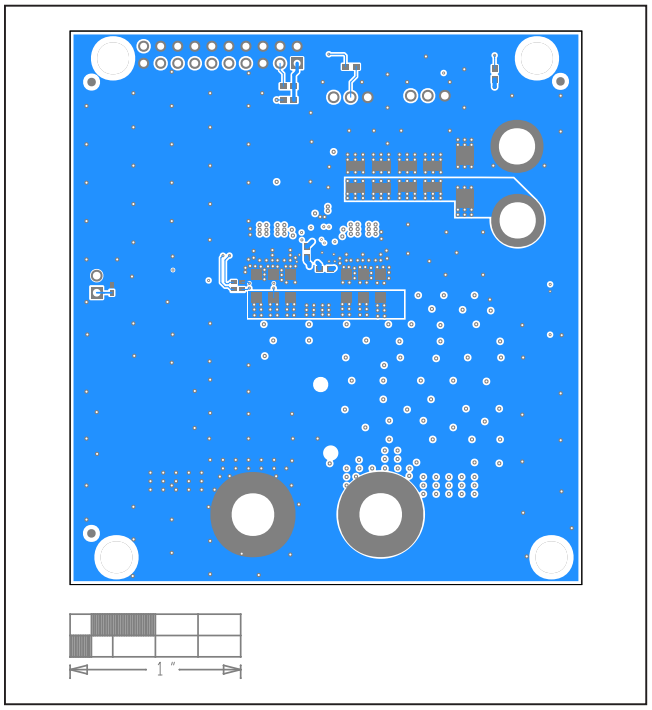


MAX20011G EV Kit PCB Layout—Layer5

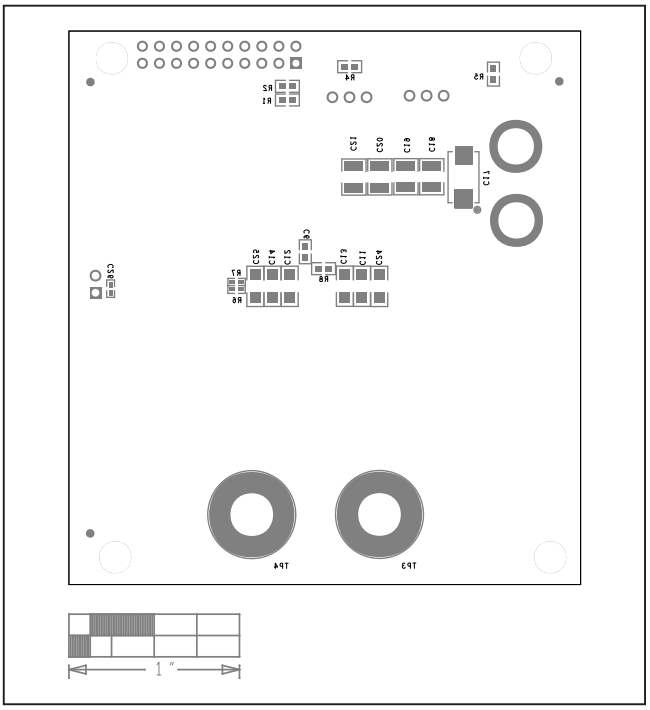


MAX20011G EV Kit PCB Layout—Layer7

MAX20011G EV Kit PCB Layout Diagrams (continued)



MAX20011G EV Kit PCB Layout—Bottom



MAX20011G EV Kit PCB Layout—Silk Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/21	Initial release	—