MAX17625/MAX17626 Evaluation Kits

Evaluates: MAX17625/MAX17626 Converters in Application

General Description

The MAX17625/MAX17626 evaluation kits (EV kits) provide a proven design to evaluate the performance of the MAX17625/MAX17626 converters. Each of these devices operate over an input range from 2.7V to 5.5V and deliver up to 700mA output current. The devices are configured to demonstrate optimum performance and component sizes in the EV kits.

The MAX17625 converter delivers up to 700mA at a switching frequency of 2MHz. The converter is configured for a 1.2V output over a 2.7V to 5.5V input range.

The MAX17626 converter delivers up to 700mA at a switching frequency of 4MHz. The converter is configured for a 3.3V output over a 3.6V to 5.5V input range.

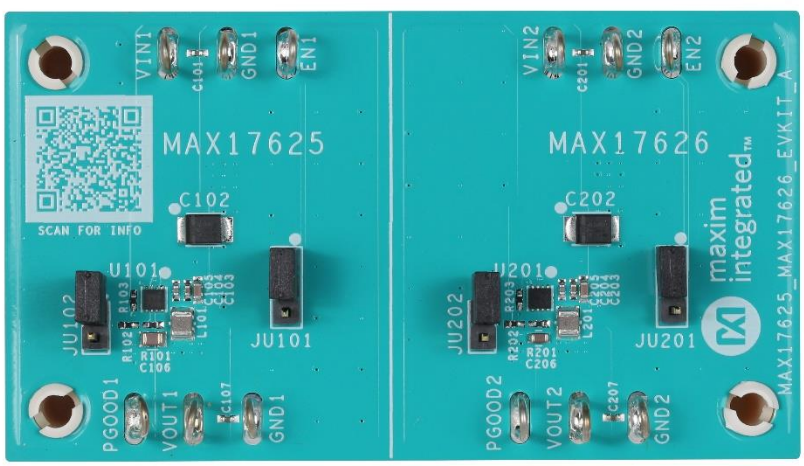
The EV kits feature provisions for selecting the Mode of operation (PWM/PFM), Enable input, and PGOOD signal. The MAX17625/MAX17626 converter data sheet provides a complete description of the parts that should be read in conjunction with this data sheet prior to operating the EV kits.

Features

- 2.7V to 5.5V Input-Voltage Range
- MAX17625 Offers High 90.6% Efficiency (V_{IN} = 3.3V, V_{OUT} = 1.2V, I_{OUT} = 400mA)
- MAX17626 Offers High 94.5% Efficiency (V_{IN} = 5V, V_{OUT} = 3.3V, I_{OUT} = 500mA)
- Up to 700mA Load Current
- 2MHz Fixed Switching Frequency for the MAX17625
- 4MHz Fixed Switching Frequency for the MAX17626
- Selectable Pulse-Width Modulation (PWM) and Pulse-Frequency Modulation (PFM) Modes of Operation
- Internal 1ms Soft-Start Time
- Power-Good (PGOOD) Output with Pullup Resistor to Respective Input Voltages
- Low-Profile, Surface-Mount Components
- Proven PCB Layout
- Fully Assembled and Tested

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

EV Kits Top View



Quick Start

Configuration Diagram

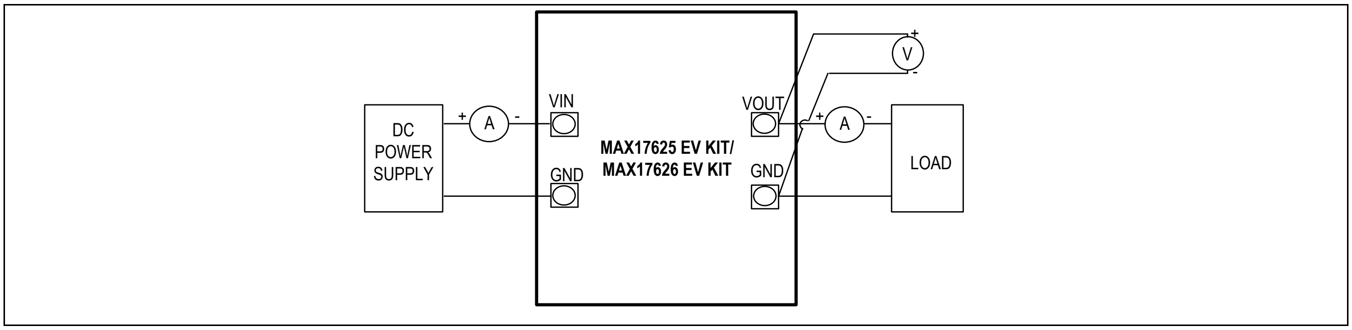


Figure 1. MAX17625/MAX17626 EV Kits Setup Diagram

Required Equipment

- One 2.7V to 5.5V DC, 700mA power supply
- Load resistors capable of sinking up to 700mA at 1.2V and 3.3V
- Digital multimeter (DMM)

Procedure

A typical bench setup for the MAX17625/MAX17626 EV kits is shown in *Figure 1*.

The EV kits are fully assembled and tested. Follow the steps to verify and test individual converters operation.

Caution: Do not turn on power supply until all connections are completed.

1. Disable the power supply and set the input power supply at a valid input voltage.
2. Connect the positive terminal and negative terminal of the power supply to the VIN pad and its adjacent GND pad of the converter under evaluation, respectively.
3. Connect a maximum 700mA resistive load across the VOUT pad and its nearest GND pad of the corresponding converter.
4. Verify that shunts are installed in the default position on jumpers (JU101 and JU201) (see *Table 1* for details).
5. Select the shunt position on jumpers (JU102, JU202) according to the required mode of operation (see *Table 2* for details).
6. Connect the digital multimeter (in voltage measurement mode) across the VOUT and its respective GND pad.
7. Turn on the input power supply.
8. Verify that the digital multimeter displays 1.2V for MAX17625 and 3.3V for MAX17626 output terminal voltages, respectively with respect to GND.

Detailed Description

The MAX17625/MAX17626 EV kits are designed to demonstrate the salient features of the MAX17625/MAX17626 power converters. The EV kits consist of typical application circuits of two different converters. Each of these circuits are electrically isolated from each other and hosted on the same printed circuit board (PCB). Each of these circuits can be evaluated for its performance under different operating conditions by powering them from their respective input pins.

MODE Selection

The MAX17625/MAX17626 supports PWM and PFM modes of operation. In the EV kits, leave the jumpers (JU102, JU202) open for operating the converters in PFM mode at light-load. Install shunts to configure the converters in PWM mode. See *Table 2* for jumpers (JU102 and JU202) settings. Refer to the *Mode Selection* section of the MAX17625/MAX17626 data sheet for more details.

Adjusting Output Voltage

The MAX17625 supports a 0.8V to 1.5V adjustable output voltage and the MAX17625 EV kit output voltage is preset to 1.2V.

The MAX17626 supports a 1.5V to 3.3V adjustable output voltage and the MAX17626 EV kit output voltage is preset to 3.3V. For the MAX17625, the output voltage is programmed using the resistor divider R101 and R102 and for the MAX17626, the output voltage is programmed using the resistor divider R201 and R202. Refer to the *Adjusting Output Voltage* section in the MAX17625/MAX17626 data sheet for more details.

Output Capacitor Selection

The X7R ceramic capacitors are preferred due to their stability over temperature in industrial applications. For the MAX17625, the required output capacitor (C106) is 22µF/6.3V and for the MAX17626, the required output capacitor (C206) is 10µF/10V. Refer to the *Output Capacitor Selection* section in the MAX17625/MAX17626 data sheet for more details.

Input Capacitor Selection

The input capacitors C103 for the MAX17625 and C203 for the MAX17626 serve to reduce the current peaks drawn from the input power supply and reduce switching frequency ripple at the input. Refer to the *Input Capacitor Selection* section in the MAX17625/MAX17626 data sheet to choose input capacitance. A 2.2µF/10V input capacitor is chosen for both the MAX17625 and MAX17626.

Hot Plug-In and Long cables

The MAX17625/MAX17626 EV kits PCB provides optional Tantalum capacitors (C102 for MAX17625 and C202 for MAX17626, 47µF/8V) to dampen input-voltage peaks and oscillations that can arise during hot plug-in and/or due to long input cables. These capacitors limit the peak voltage at the input of the device when the EV kits are powered directly from a precharged capacitive source or an industrial backplane PCB. Long input cables between the input power source and the EV kits circuit can cause input-voltage oscillations due to the inductance of the cables. The equivalent series resistance (ESR) of the Tantalum capacitor helps damp out the oscillations caused by long input cables. Further, capacitors (C101, C104, C105 for the MAX17625 and C201, C204, C205 for the MAX17626) placed near the input of the board and near the IN pin of the converter helps in attenuating high-frequency noise.

Table 1. EN Jumper Description (JU101, JU201)

SHUNT POSITION	EN PIN	OUTPUT
1–2*	Connected to V_{IN}	Enabled
2–3	Connected to GND	Disabled

**Default Position*

Table 2. MODE Jumper Description (JU102, JU202)

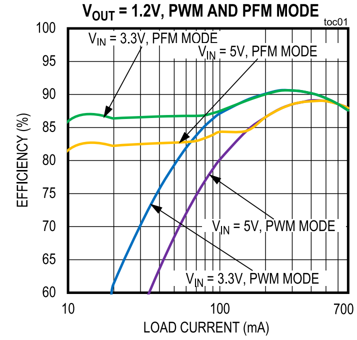
SHUNT POSITION	MODE PIN	MODE
1–2	Connected to GND	Operates in PWM Mode in all load conditions
Not Installed*	Unconnected	Operates in PFM Mode in light-load conditions

**Default Position*

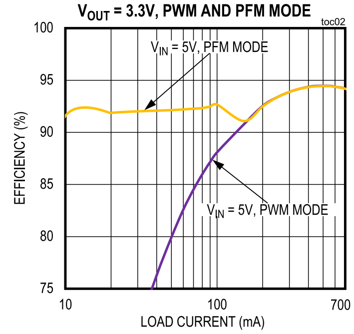
MAX17625/MAX17626 EV Kits Performance

(V_{IN} = V_{EN} = 5V, T_A = +25°C, unless otherwise noted.)

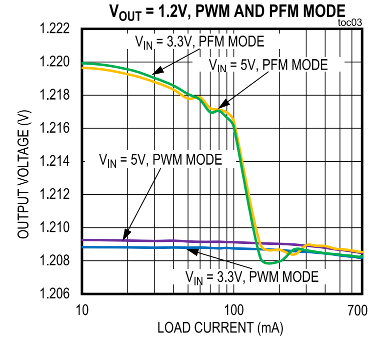
MAX17625
EFFICIENCY vs. LOAD CURRENT
V_{OUT} = 1.2V, PWM AND PFM MODE



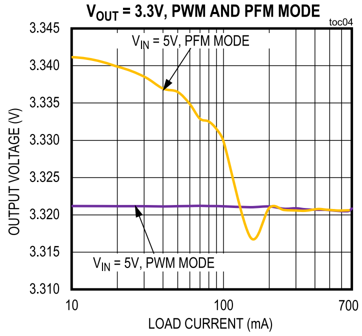
MAX17626
EFFICIENCY vs. LOAD CURRENT
V_{OUT} = 3.3V, PWM AND PFM MODE



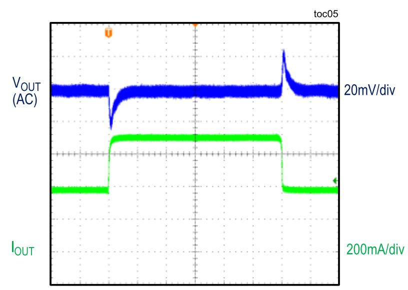
MAX17625
OUTPUT VOLTAGE vs. LOAD CURRENT
V_{OUT} = 1.2V, PWM AND PFM MODE



MAX17626
OUTPUT VOLTAGE vs. LOAD CURRENT
V_{OUT} = 3.3V, PWM AND PFM MODE

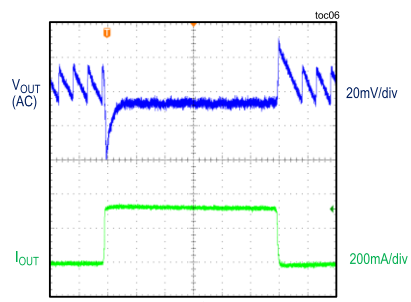


MAX17625 LOAD TRANSIENT RESPONSE
V_{IN} = 5V, V_{OUT} = 1.2V, PWM MODE



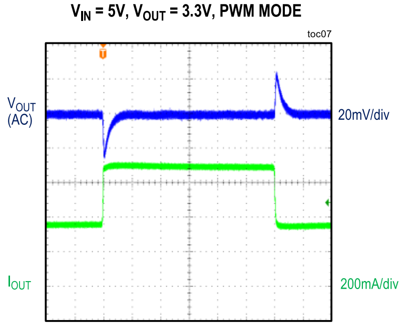
40µs/div
LOAD STEP BETWEEN 350mA TO 700mA

MAX17625 LOAD TRANSIENT RESPONSE
V_{IN} = 5V, V_{OUT} = 1.2V, PFM MODE



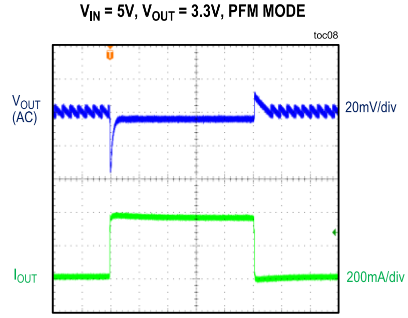
40µs/div
LOAD STEP BETWEEN 5mA TO 350mA

MAX17626 LOAD TRANSIENT RESPONSE
V_{IN} = 5V, V_{OUT} = 3.3V, PWM MODE



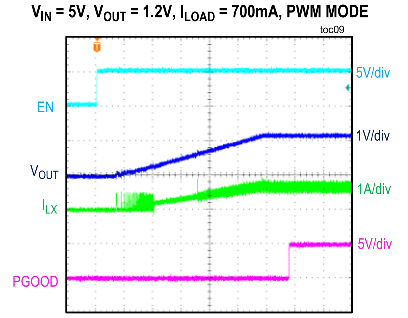
40µs/div
LOAD STEP BETWEEN 350mA TO 700mA

MAX17626 LOAD TRANSIENT RESPONSE
V_{IN} = 5V, V_{OUT} = 3.3V, PFM MODE



40µs/div
LOAD STEP BETWEEN 5mA TO 350mA

MAX17625 STARTUP THROUGH ENABLE
V_{IN} = 5V, V_{OUT} = 1.2V, I_{LOAD} = 700mA, PWM MODE

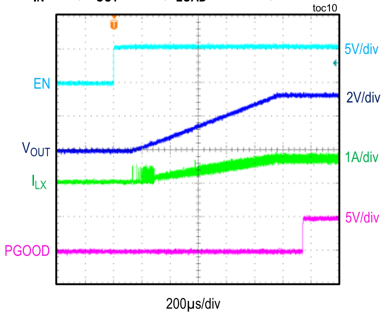


200µs/div

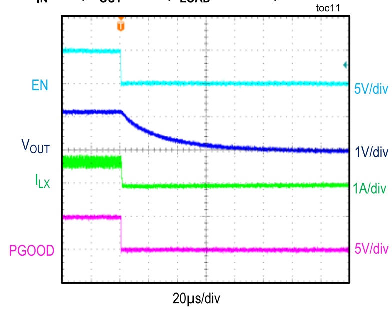
MAX17625/MAX17626 EV Kits Performance Report (Continued)

(V_{IN} = V_{EN} = 5V, T_A = +25°C, unless otherwise noted.)

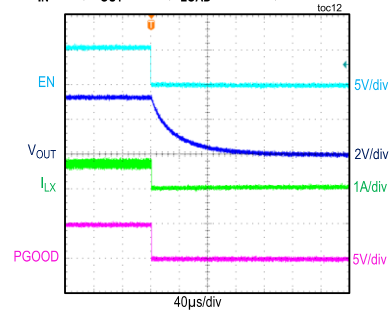
MAX17626 STARTUP THROUGH ENABLE
V_{IN} = 5V, V_{OUT} = 3.3V, I_{LOAD} = 700mA, PWM MODE



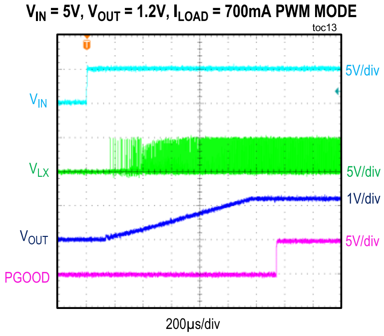
MAX17625 SHUTDOWN THROUGH ENABLE
V_{IN} = 5V, V_{OUT} = 1.2V, I_{LOAD} = 700mA, PWM MODE



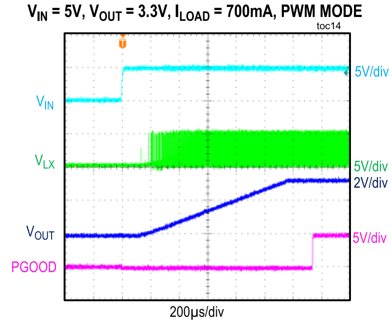
MAX17626 SHUTDOWN THROUGH ENABLE
V_{IN} = 5V, V_{OUT} = 3.3V, I_{LOAD} = 700mA, PWM MODE



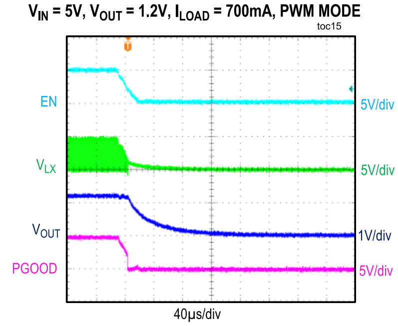
MAX17625 STARTUP THROUGH INPUT
V_{IN} = 5V, V_{OUT} = 1.2V, I_{LOAD} = 700mA PWM MODE



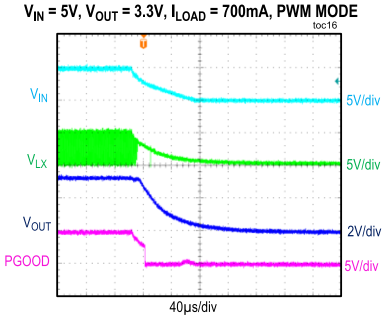
MAX17626 STARTUP THROUGH IN
V_{IN} = 5V, V_{OUT} = 3.3V, I_{LOAD} = 700mA, PWM MODE



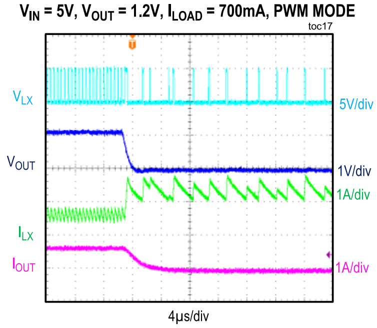
MAX17625 SHUTDOWN THROUGH INPUT
V_{IN} = 5V, V_{OUT} = 1.2V, I_{LOAD} = 700mA, PWM MODE



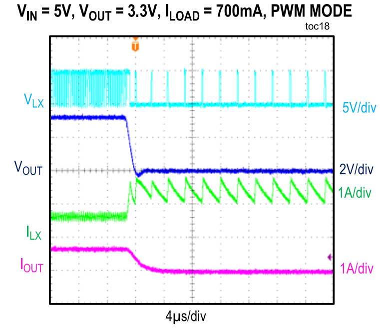
MAX17626 SHUTDOWN THROUGH IN
V_{IN} = 5V, V_{OUT} = 3.3V, I_{LOAD} = 700mA, PWM MODE



MAX17625 PERMANENT OUTPUT SHORT
V_{IN} = 5V, V_{OUT} = 1.2V, I_{LOAD} = 700mA, PWM MODE



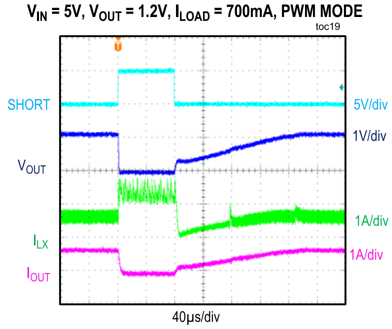
MAX17626 PERMANENT OUTPUT SHORT
V_{IN} = 5V, V_{OUT} = 3.3V, I_{LOAD} = 700mA, PWM MODE



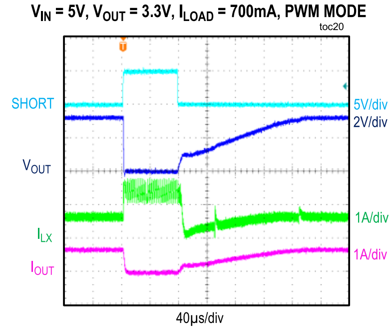
MAX17625/MAX17626 EV Kits Performance Report (Continued)

($V_{IN} = V_{EN} = 5V$, $T_A = +25°C$, unless otherwise noted.)

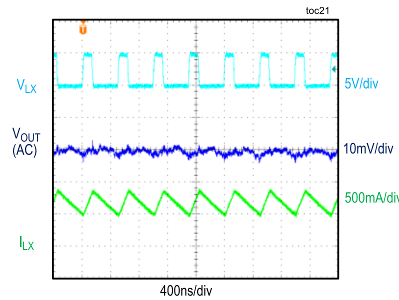
MAX17625 TEMPORARY OUTPUT SHORT
$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{LOAD} = 700mA$, PWM MODE



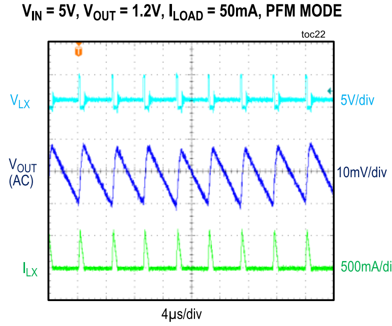
MAX17626 TEMPORARY OUTPUT SHORT
$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $I_{LOAD} = 700mA$, PWM MODE



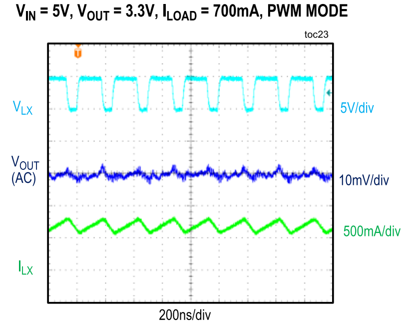
MAX17625 STEADY STATE
$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{LOAD} = 700mA$, PWM MODE



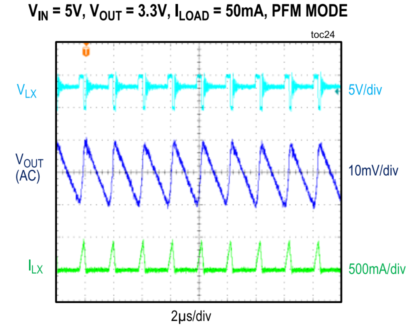
MAX17625 STEADY STATE
$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{LOAD} = 50mA$, PFM MODE



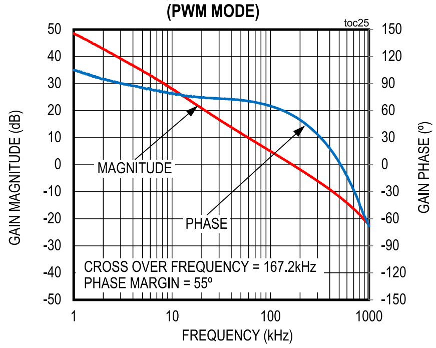
MAX17626 STEADY STATE
$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $I_{LOAD} = 700mA$, PWM MODE



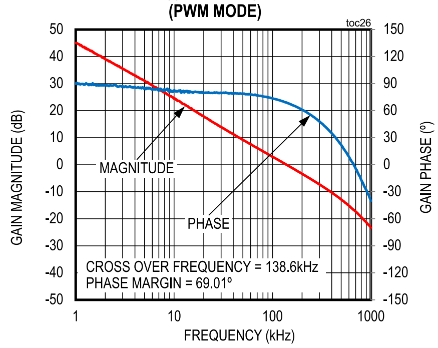
MAX17626 STEADY STATE
$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $I_{LOAD} = 50mA$, PFM MODE



MAX17625 BODE PLOT
$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{LOAD} = 700mA$
(PWM MODE)



MAX17626 BODE PLOT
$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $I_{LOAD} = 700mA$
(PWM MODE)



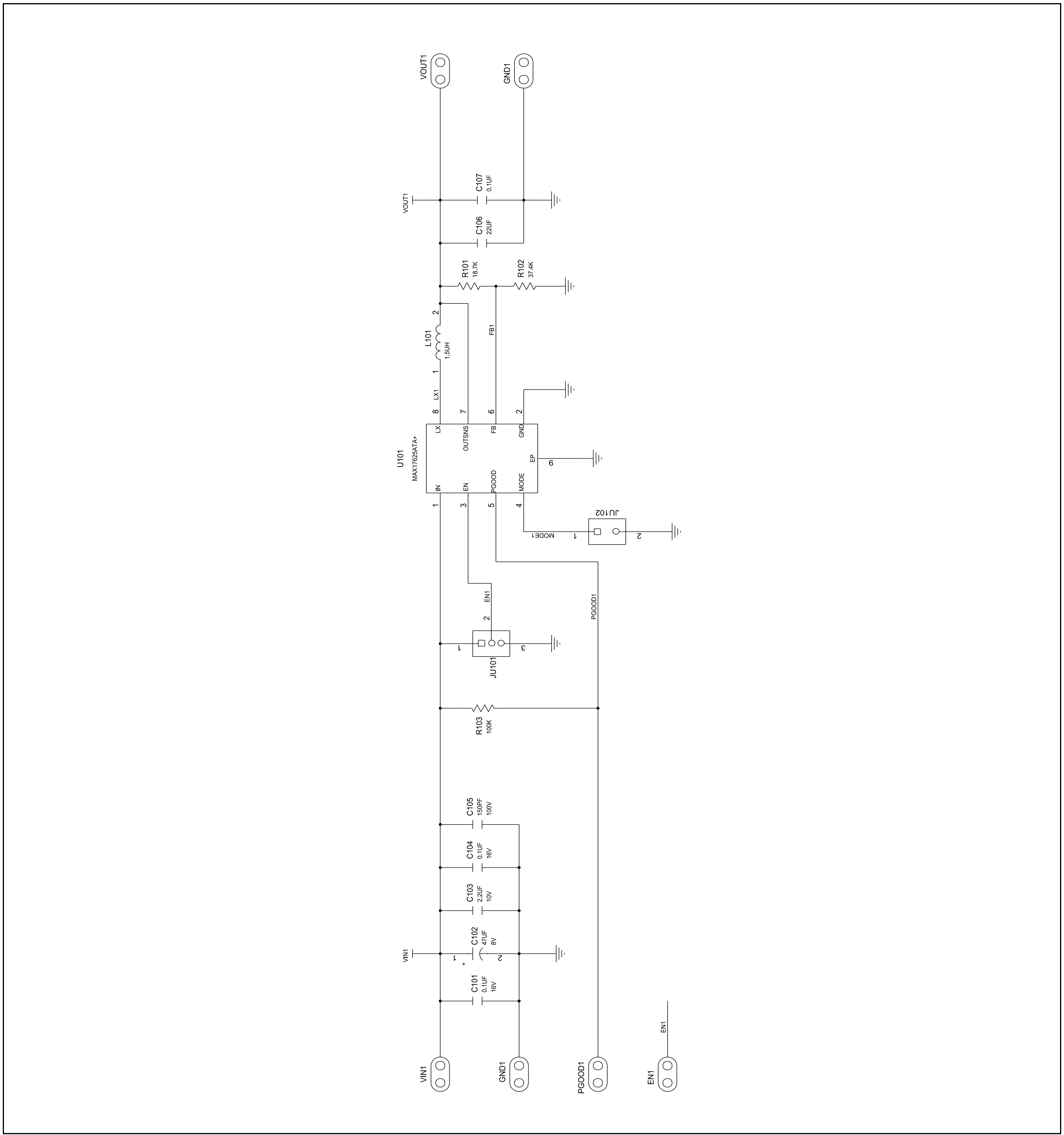
MAX17625 EV Kit Bill of Materials

ITEM	QTY	DESIGNATOR	DESCRIPTION	MANUFACTURER PART NUMBER
1	3	C101, C104, C107	0.1µF±10%, 10V, X7R, ceramic capacitor (0402)	TDK C1005X7R1C104K050BC
2	1	C102	47µF±20%, 8V, Tantalum capacitor (3528)	Kemet T520B476M008ATE035
3	1	C103	2.2µF±10%, 10V, X7R, ceramic capacitor (0603)	Murata GRM188R71A225KE15
4	1	C105	150pF±5%, 100V, COG, Ceramic capacitor (0402)	TDK C1005C0G2A151J050BA
5	1	C106	22µF±20%, 6.3V, X7R, ceramic capacitor (0805)	Murata GRM21BZ70J226ME44
6	1	L101	1.5µH±20%, 2.7A, Inductor (2520)	Murata DFE252012F-1R5M
7	1	R101	18.7kΩ±1% resistor (0402)	Vishay CRCW040218K7FK
8	1	R102	37.4kΩ±1% resistor (0402)	Vishay CRCW040237K4FK
9	1	R103	100kΩ±1% resistor (0402)	Panasonic ERJ-2RKF1003X
10	1	U101	MAX17625 TDFN8-EP	Maxim MAX17625ATA+

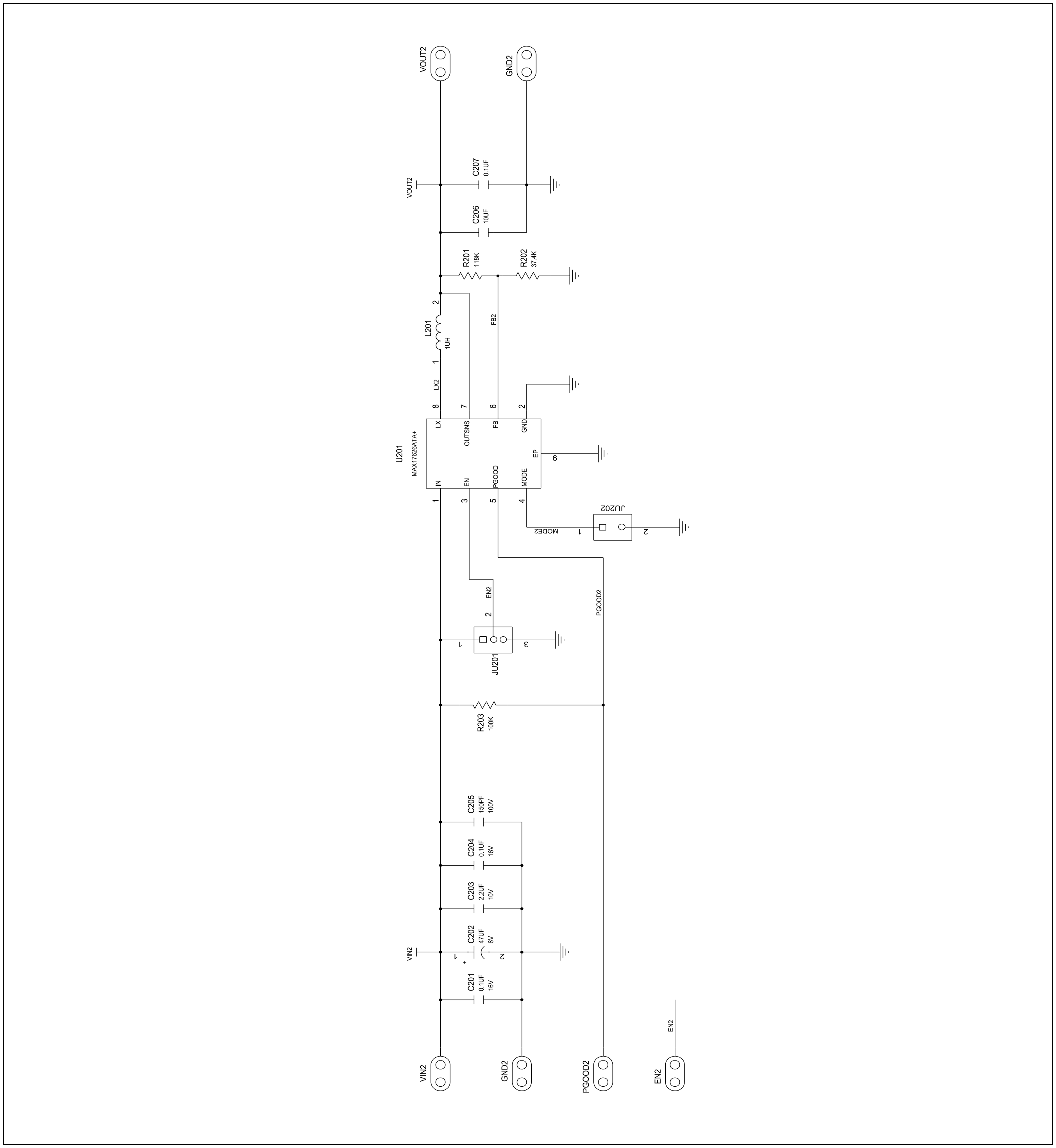
MAX17626 EV Kit Bill of Materials

ITEM	QTY	DESIGNATOR	DESCRIPTION	MANUFACTURER PART NUMBER
1	3	C201, C204, C207	0.1µF±10%, 10V, X7R, ceramic capacitor (0402)	TDK C1005X7R1C104K050BC
2	1	C202	47µF±20%, 8V, Tantalum capacitor (3528)	Kemet T520B476M008ATE035
3	1	C203	2.2µF±10%, 10V, X7R, ceramic capacitor (0603)	Murata GRM188R71A225KE15
4	1	C205	150pF±5%, 100V, COG, Ceramic capacitor (0402	TDK C1005C0G2A151J050BA
5	1	C206	10µF±10%, 10V, X7R, ceramic capacitor (0603)	Murata GRM188Z71A106KA73
6	1	L201	1µH±20%, 3.8A, Inductor (2520)	Murata DFE252012F-1R0M
7	1	R201	118kΩ±1% resistor (0402)	Vishay CRCW0402118KFK
8	1	R202	37.4kΩ±1% resistor (0402)	Vishay CRCW040237K4FK
9	1	R203	100kΩ±1% resistor (0402)	Panasonic ERJ-2RKF1003X
10	1	U201	MAX17626 TDFN8-EP	Maxim MAX17626ATA+

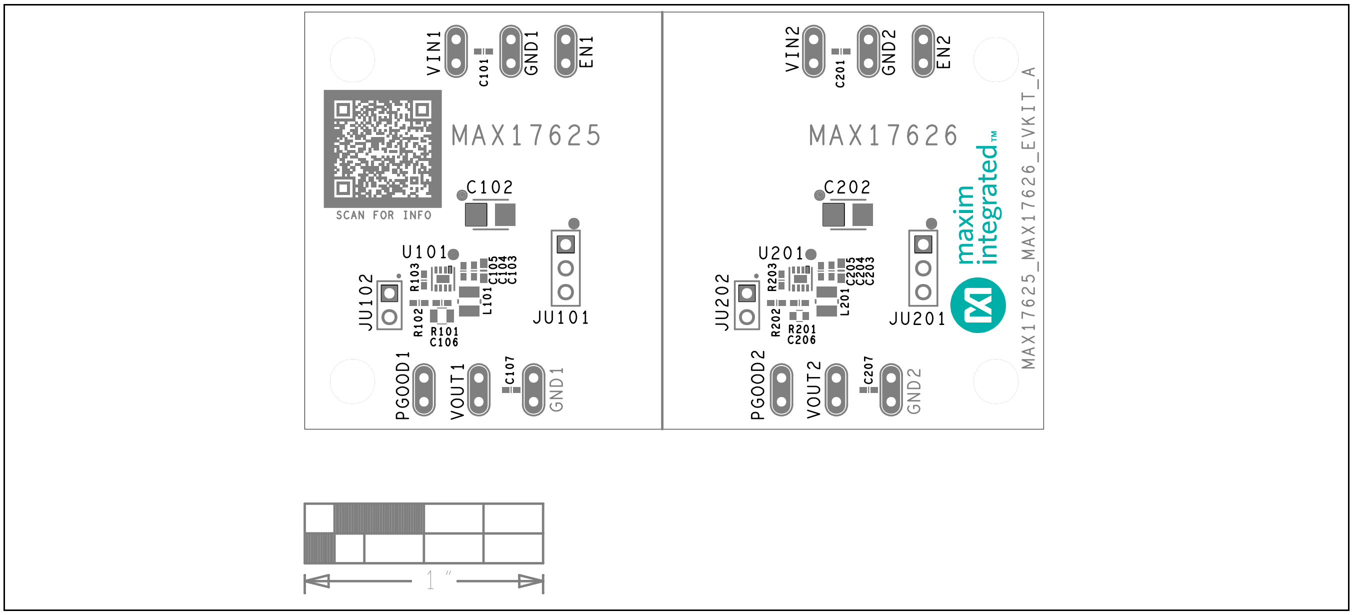
MAX17625 EV Kit Schematic Diagram



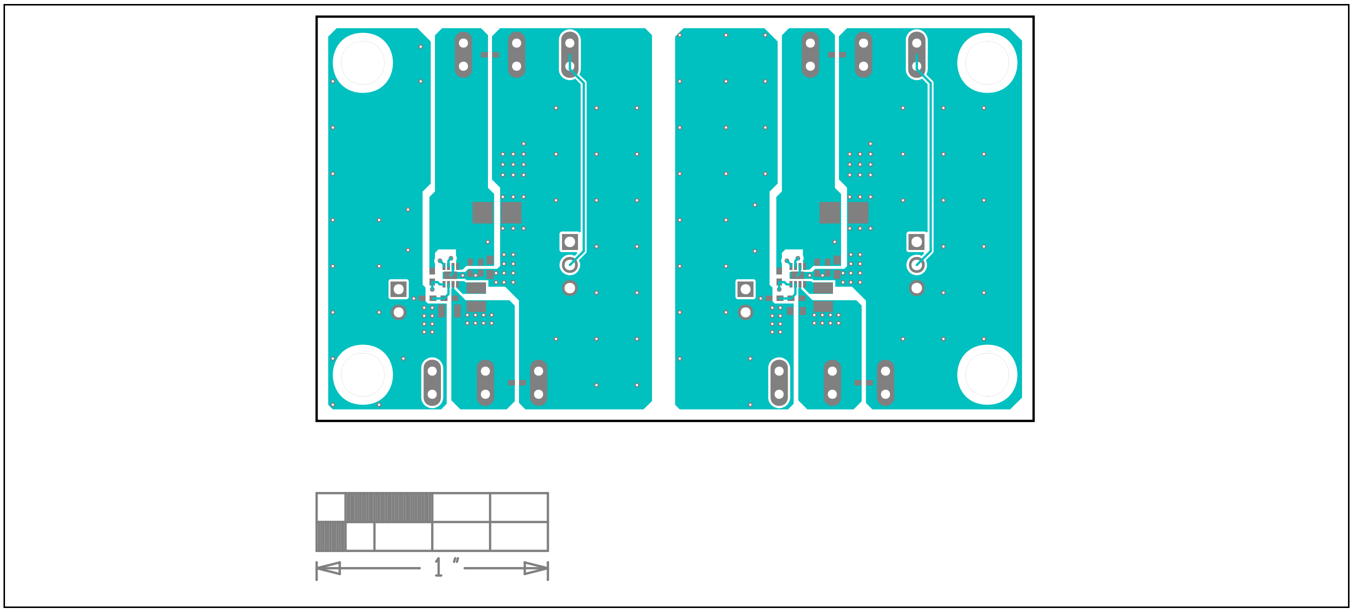
MAX17626 EV Kit Schematic Diagram



MAX17625/MAX17626 EV Kits PCB Layout Diagrams

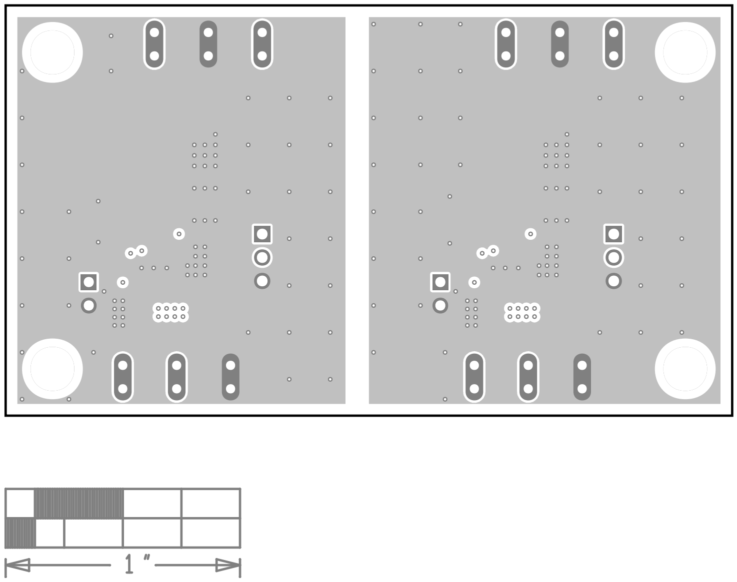


MAX17625/MAX17626 EV Kits PCB Layout—Top Silkscreen

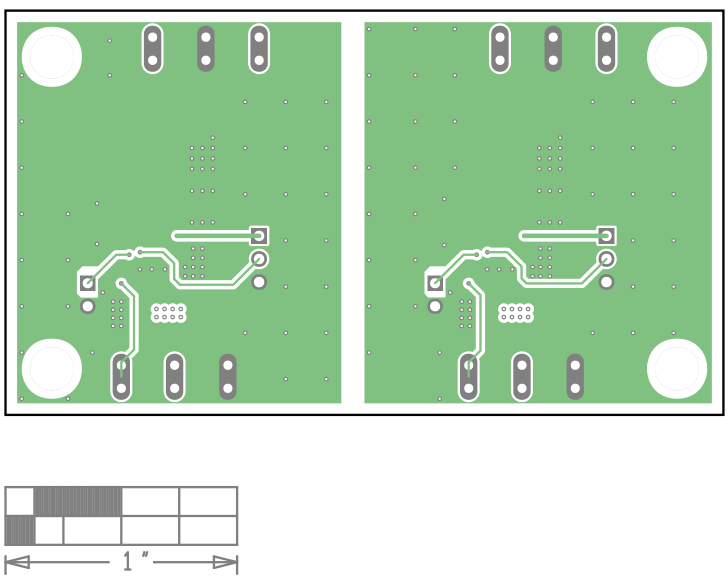


MAX17625/MAX17626 EV Kits PCB Layout—Top Layer

MAX17625/MAX17626 EV Kits PCB Layout Diagrams (continued)

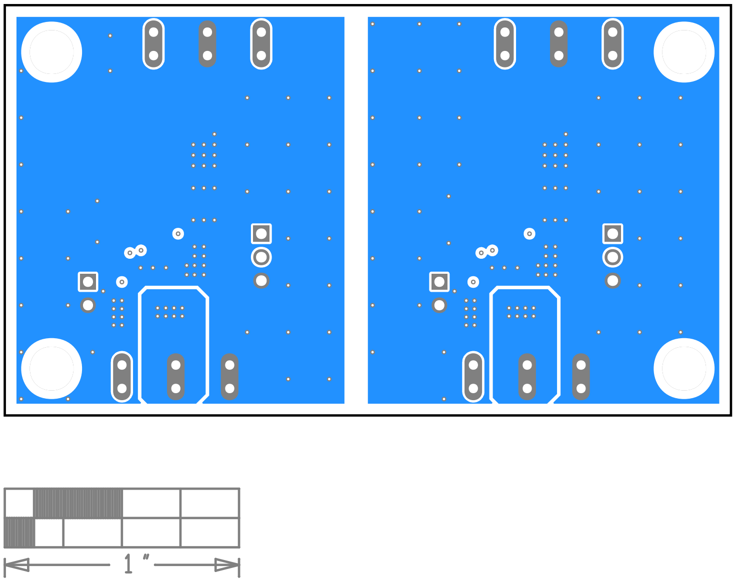


MAX17625/MAX17626 EV Kits PCB Layout—Layer 2



MAX17625/MAX17626 EV Kits PCB Layout—Layer 3

MAX17625/MAX17626 EV Kits PCB Layout Diagrams (continued)



MAX17625/MAX17626 EV Kits PCB Layout—Bottom Layer

Ordering Information

PART NUMBER	TYPE
MAX17625EVKIT#	EV Kit
MAX17626EVKIT#	EV Kit

# Denotes RoHS compliance.

Component Suppliers

SUPPLIER	WEBSITE
Murata Americas	www.murata.com
Vishay	www.vishay.com
Panasonic	www.panasonic.com
TDK Corp.	www.tdk.com
Kemet	www.kemet.com

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/21	Initial Release	—