

MAX25612B Evaluation Kit

Evaluates: MAX25612B

General Description

The MAX25612B evaluation kit (EV kit) provides a proven design to evaluate the MAX25612B automotive high-voltage, high-brightness LED (HB LED) synchronous controller. The EV kit is set up for a SEPIC configuration and operates from a 6V to 18V DC supply voltage. The EV kit is configured to deliver up to 2A to one string of LEDs. The total voltage of the string can vary from 3V to 24V.

Features

- Configured for SEPIC Mode
- Synchronous Controller and Power Stage
- Analog Dimming Control
- Analog or Digital PWM Dimming

[Ordering Information](#) appears at end of data sheet.

Quick Start

Required Equipment

- MAX25612B EV kit
- 12V, 5A DC power supply
- A series-connected LED string rated at 2A
- Oscilloscope with a current probe

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are made.**

- 1) Verify that all jumpers (J1-J2) are in their default positions, as shown in [Table 1](#).
- 2) Connect the positive terminal of the 12V supply to the IN PCB pad or the red banana plug receptacle.
- 3) Connect the negative terminal of the 12V supply to the GND PCB pad or the black banana plug receptacle.
- 4) Connect the LED string across the LED+ and GND PCB pads on the EV kit for SEPIC configuration. The LED string voltage should be between the minimum and maximum input voltage in this configuration.
- 5) Clip the current probe on the wire connected to the LED string.
- 6) Turn on the DC power supply.
- 7) Verify that the LEDs turn on.
- 8) Verify that the oscilloscope displays approximately 2A.

Detailed Description

The MAX25612B EV kit provides a proven design to evaluate the MAX25612B synchronous high-voltage HB LED driver with integrated high-side current sense. The EV kit is set up for a SEPIC configuration and operates from a 6V to 18V DC supply voltage. The EV kit is configured to deliver up to 2A to a series LED string. The string forward voltage can vary from 3V to 24V.

Analog Dimming Control (ICTRL)

When a shunt is installed across pins 1-2 of J2, the LED current is set by the R1/R2 resistor-divider. The LED current is linearly proportional to the voltage on the ICTRL input. An ICTRL voltage of 200mV or less corresponds to $I_{LED} = 0A$. An ICTRL voltage of 1.3V or more corresponds to $I_{LED} = 2.2A$. Between 200mV and 1.3V, the LED current is linearly adjusted between 0A and 2.2A, respectively.

To set the LED current with an external reference, remove the shunt installed across J2, and apply a voltage across the ICTRL test point and the SGND pad.

Pulse-Dimming Input (PWMDIM)

When a shunt is installed across pins 1-2 of J1, the PWM duty cycle is set by the R13/R18 resistor-divider. In this mode of operation, an analog voltage between 0.2V and 3V generates an LED pulse duty cycle between 0% and 100%, respectively. The frequency of this LED pulse modulation is 200Hz, which is generated internally from the MAX25612B device. When a shunt is installed across pins 2-3 of J1, the PWMDIM input of the device is grounded and the LEDs are off.

Alternatively, an external signal (either analog or digital PWM) can be applied directly across the PWMDIM test point and the SGND pad to control the LEDs. The J1 jumper should be left open when using an external source attached to the PWMDIM test point.

Table 1. MAX25612B EV Kit Jumper Descriptions

JUMPER	SHUNT POSITION	DESCRIPTION
J1	1-2*	Analog voltage on the PWMDIM input of the device is controlled by the voltage divider of R13 and R18. Adjust R18 to vary the analog voltage on PWMDIM, which varies the LED pulse width using the internal 200Hz dimming signal.
	2-3	PWMDIM input of the device is connected to ground. LEDs are off.
	Open	PWMDIM input of the device is disconnected from the voltage divider. Apply a digital PWM signal across the PWMDIM test point and the SGND pad to control the LEDs.
J2	1-2*	ICTRL pin is now connected to a voltage-divider from V_{CC} to ground. Adjusting R2 allows programming the LED current from 0 to 2.2A.
	Open	Disconnects the ICTRL pin of the device from the external voltage divider on the V_{CC} pin. Allows the user to apply an external voltage across the ICTRL test point and the SGND pad to set the LED current level.

*Default position.

Ordering Information

PART	TYPE
MAX25612BEVKIT#	EV Kit

#Denotes RoHS compliant.

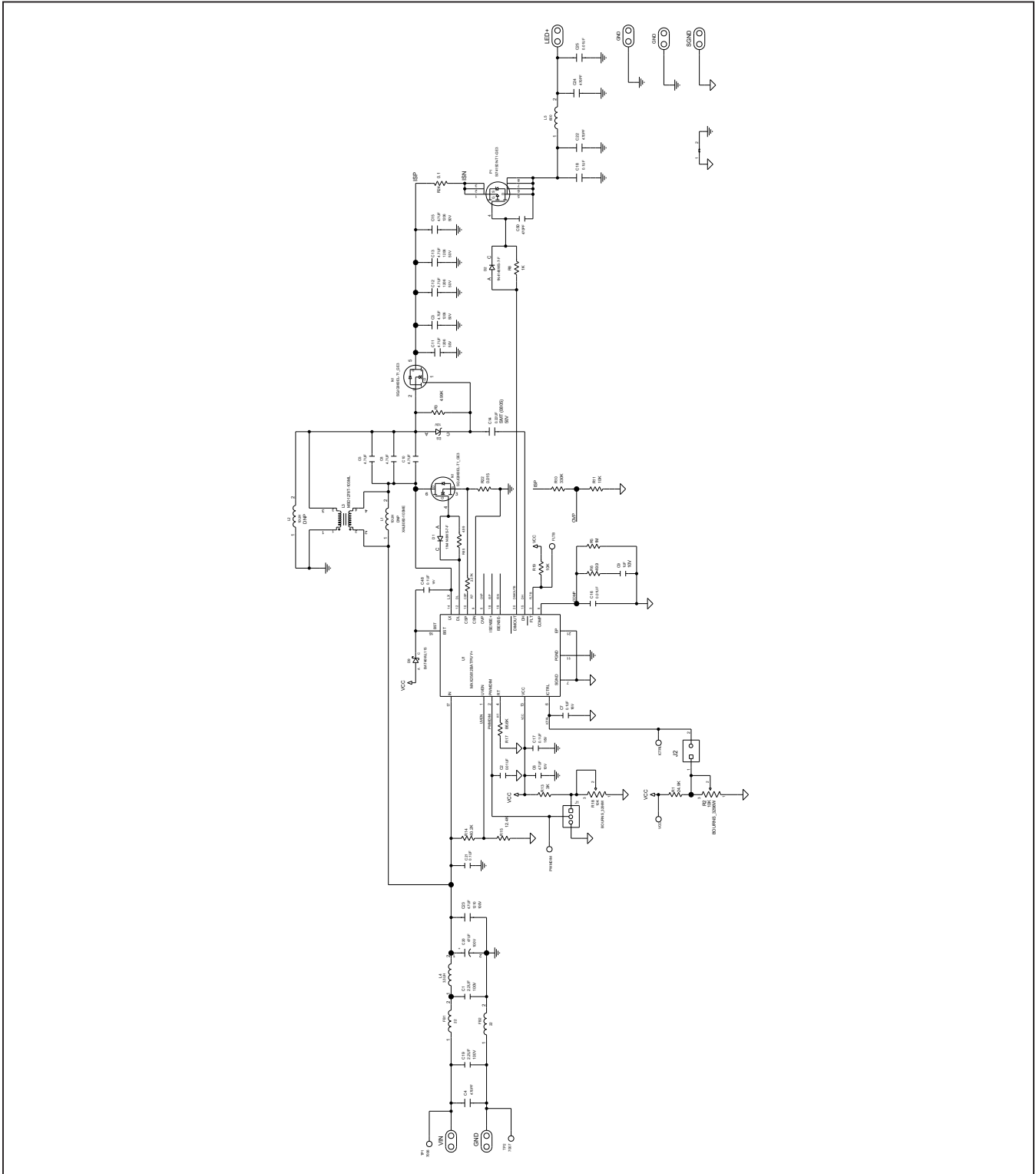
MAX25612B EV Kit Bill of Materials

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	C1, C19	2	GRM32ER72A225KA35; CGA6N3X7R2A225K230AB;CC1 210KKX7R0BB225; HMK325B7225KM	MURATA;TDK;YAGEO; TAIYO YUDEN	2.2UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 2.2UF; 100V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
2	C2, C16, C25	3	C0402C103K5RAC; GRM155R71H103KA88; C1005X7R1H103K050BE; CL05B103KB5NNN; UMK105B7103KV	KEMET;MURATA;TDK; SAMSUNG ELECTRONIC;TAIYO YUDEN	0.01UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
3	C3, C5, C8, C10-C13, C15	8	GRM31CR71H475KA12; GRJ31CR71H475KE11; GXM31CR71H475KA10	MURATA;MURATA; MURATA	4.7UF	CAPACITOR; SMT (1206); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
4	C4, C22, C24	3	C0603C471K1RAC; 06031C471KAT2A	KEMET;AVX	470PF	CAPACITOR; SMT; 0603; CERAMIC; 470pF; 100V; 10%; X7R; -55degC to + 125degC; +/-15% from -55degC to +125degC	
5	C6	1	C1005X5R1A475K050	TDK	4.7UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 4.7UF; 10V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
6	C7, C17, C48	3	C0402C104J4RAC; GCM155R71C104JA55	KEMET;MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=5%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
7	C9	1	C0402X5R100-105KNE; GRM155R61A105KE15	VENKEL LTD.;MURATA	1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 10V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R	
8	C14	1	C0805C224K5RAC; GRM21BR71H224KA01; CGJ4J2X7R1H224K125AA; UMK212B7224KG; C2012X7R1H224K125AA	KEMET;MURATA;TDK; TAIYO YUDEN;TDK	0.22UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 0.22UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
9	C18	1	CGA2B3X7R1H104K050BB; C1005X7R1H104K050BB; GRM155R71H104KE14; GCM155R71H104KE02; C1005X7R1H104K050BE; UMK105B7104KV-FR; CGA2B3X7R1H104K050BE	TDK;TDK;MURATA; MURATA;TDK;TAIYO YUDEN;TDK	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
10	C20	1	EKZE1011ELL470MJC5S	NIPPON CHEMI-CON	47UF	CAPACITOR; THROUGH HOLE-RADIAL LEAD; ALUMINUM-ELECTROLYTIC; 47UF; 100V; TOL=20%; MODEL=KZE SERIES	
11	C21	1	CGA3E3X7S2A104K080AB; C1608X7S2A104K080AB	TDK;TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
12	C23	1	CGA6M3X7S2A475K200AE; CGA6M3X7S2A475K200AB; GCM32DC72A475KE02	TDK;TDK;MURATA	4.7UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 4.7UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S; AUTO	
13	C50	1	C0402S471K5RAC; GRM155R71H471K; GRM155R71H471KA01; C1005X7R1H471K050BA	KEMET;MURATA; MURATA;TDK	470PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 470PF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
14	D1, D2	2	1N4148WS-7	DIODES INCORPORATED	1N4148WS-7-F	DIODE; SWT; SMT (SOD-323); PIV=75V; IF=0.3A	
15	D3	1	BZT52C10S-7-F	DIODES INCORPORATED	10V	DIODE; ZNR; SMT (SOD-323); VZ=10V; IZ=0.005A	
16	D9	1	BAT46WJ	NXP	BAT46WJ.115	DIODE; SCH; SMT (SOD-323F); PIV=100V; IF=0.25A	
17	FB1, FB2	2	BLM21PG220SN1	MURATA	22	INDUCTOR; SMT (0805); FERRITE-BEAD; 22; TOL=+/-25%; 6A; -55 DEGC TO +125 DEGC	
18	FLTB, ICTRL, PWMDIM, VCC	4	5007	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
19	GND, J3, J4, J6, LED+, VIN	6	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
20	J1	1	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 3PINS; -65 DEGC TO +125 DEGC	

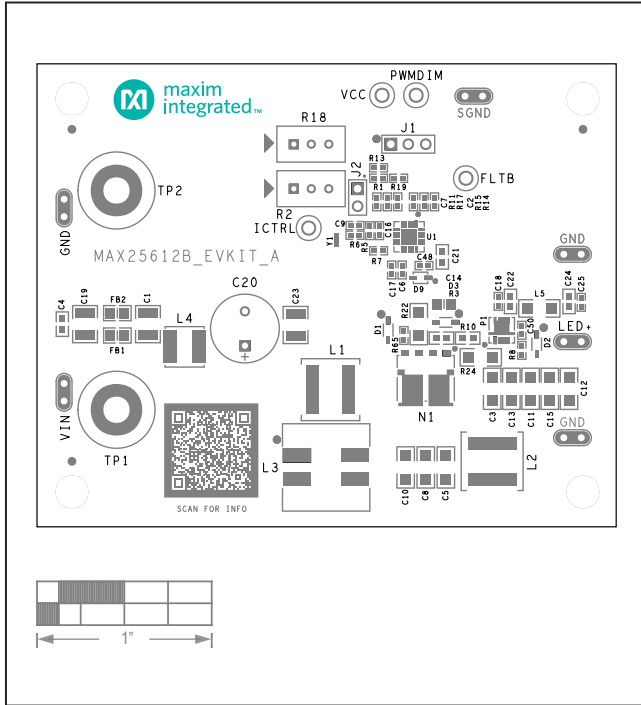
MAX25612B EV Kit Bill of Materials (continued)

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
21	J2	1	PCC02SAAN	SULLINS	PCC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC	
22	L1, L2	2	XAL8080-103ME	COILCRAFT	10UH	INDUCTOR; SMT; COMPOSITE CORE; 10UH; TOL=+/-20%; 8.7A	DNP
23	L3	1	MSD1278T-103ML	COILCRAFT	MSD1278T-103ML	INDUCTOR; SMT; FERRITE; MSD1278T-103ML; 20%; 3.62A	
24	L4	1	XAL5030-332ME	COILCRAFT	3.3UH	INDUCTOR; SMT; CORE MATERIAL= COMPOSITE; 3.3UH; TOL=+/-20%; 5.9A	
25	L5	1	BLM31KN601SH1	MURATA	600	INDUCTOR; SMT (1206); FERRITE-BEAD; 600; TOL=25%; 2.9A	
26	MH1-MH4	4	9032	KEystone	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON	
27	N1	1	SQJQ960EL-T1_GE3	VISHAY	SQJQ960EL-T1_GE3	TRAN; NCH; POWERPAK8X8L; PD-(71W); I-(63A); V-(60V)	
28	P1	1	SI7415DN-T1-GE3	VISHAY SILICONIX	SI7415DN-T1-GE3	TRAN; P-CHANNEL 60-V (D-S) MOSFET; PCH; POWERPAK1212-8; PD-(3.8W); I-(5.7A); V-(60V)	
29	R1	1	ERJ-2RKF2492	PANASONIC	24.9K	RESISTOR; 0402; 24.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
30	R2, R18	2	3296W-1-103LF	BOURNS	10K	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 3296 SERIES; 10K OHM; 10%; 100PPM; 0.5W; SQUARE TRIMMING POTENTIOMETER; 25 TURNS; MOLDER CERAMIC OVER METAL FILM	
31	R3	1	CRCW06034K99FK; ERJ-3EKF4991	VISHAY DALE; PANASONIC	4.99K	RESISTOR; 0603; 4.99K; 1%; 100PPM; 0.10W; THICK FILM	
32	R5	1	CRCW04021M00FK	VISHAY DALE	1M	RESISTOR; 0402; 1M; 1%; 100PPM; 0.0625W; THICK FILM	
33	R6	1	ERJ-2RKF49R9	PANASONIC	49.9	RESISTOR; 0402; 49.9 OHM; 1%; 100PPM; 0.1W; THICK FILM	
34	R7	1	ERJ-2RKF2371	PANASONIC	2.37K	RESISTOR; 0402; 2.37K OHM; 1%; 100PPM; 0.1W; THICK FILM	
35	R8	1	CRCW04021K00FK; RC0402FR-071KL; MCR01MZPF1001	VISHAY DALE; YAGEO PHICOMP; ROHM SEMI	1K	RESISTOR; 0402; 1K; 1%; 100PPM; 0.0625W; THICK FILM	
36	R10	1	CRCW0603330KFK	VISHAY DALE	330K	RESISTOR; 0603; 330K OHM; 1%; 100PPM; 0.10W; THICK FILM	
37	R11, R19	2	ERJ-2RKF1002	PANASONIC	10K	RESISTOR; 0402; 10K OHM; 1%; 100PPM; 0.10W; THICK FILM	
38	R13	1	CRCW04023K00FK	VISHAY DALE	3K	RESISTOR; 0402; 3K OHM; 1%; 100PPM; 0.0625W; THICK FILM	
39	R14	1	CRCW040240K2FK	VISHAY DALE	40.2K	RESISTOR; 0402; 40.2K OHM; 1%; 100PPM; 0.063W; THICK FILM	
40	R15	1	ERJ-2RKF1242	PANASONIC	12.4K	RESISTOR; 0402; 12.4K OHM; 1%; 100PPM; 0.1W; THICK FILM	
41	R17	1	CRCW040286K6FK	VISHAY DALE	86.6K	RESISTOR; 0402; 86.6K OHM; 1%; 100PPM; 0.063W; THICK FILM	
42	R22	1	ERJ-8CWFR015	PANASONIC	0.015	RESISTOR; 1206; 0.015 OHM; 1%; 75PPM; 1W; THICK FILM	
43	R24	1	ERJ-8BWFR100	PANASONIC	0.1	RESISTOR; 1206; 0.1 OHM; 1%; 100PPM; 1W; THICK FILM	
44	R65	1	CRCW04024R99FK; RK73H1ELTP4991F	VISHAY DALE; KOA SPEER ELECTRONICS	4.99	RESISTOR; 0402; 4.99 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
45	SU1, SU2	2	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	TEST POINT; SHUNT AND JUMPER; STR; TOTAL LENGTH=6.10MM; BLACK; INSULATION=GLASS FILLED POLYESTER; CONTACT=PHOSPHOR BRONZE	
46	TP1	1	7006	KEystone	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED	
47	TP2	1	7007	KEystone	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK	
48	U1	1	MAX25612BATP/VY+	MAXIM	MAX25612BATP/VY+	EVKIT PART - IC; MAX25612BATP/VY+; AUTOMOTIVE SYNCHRONOUS HIGH VOLTAGE LED CONTROLLER; TQFN20-EP; PACKAGE OUTLINE DRAWING: 21-100068; LAND PATTERN: 90-0037; PACKAGE CODE: T2044Y+3C	
49	PCB	1	MAX25612B	MAXIM	PCB	PCB:MAX25612B	-
TOTAL		80					

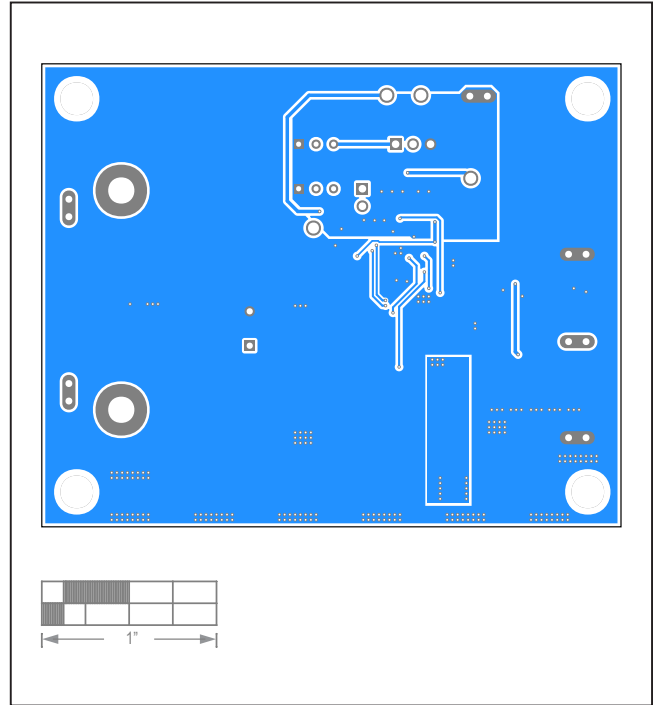
MAX25612B EV Kit Schematics



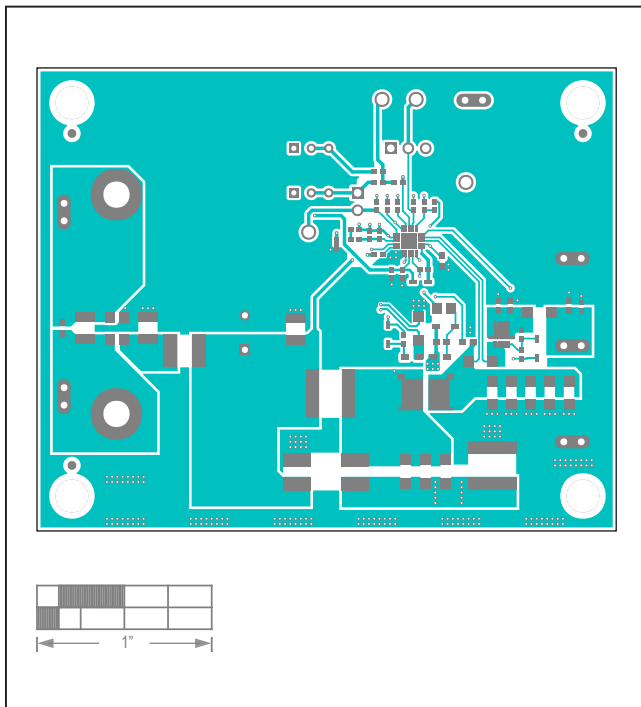
MAX25612B EV Kit PCB Layouts



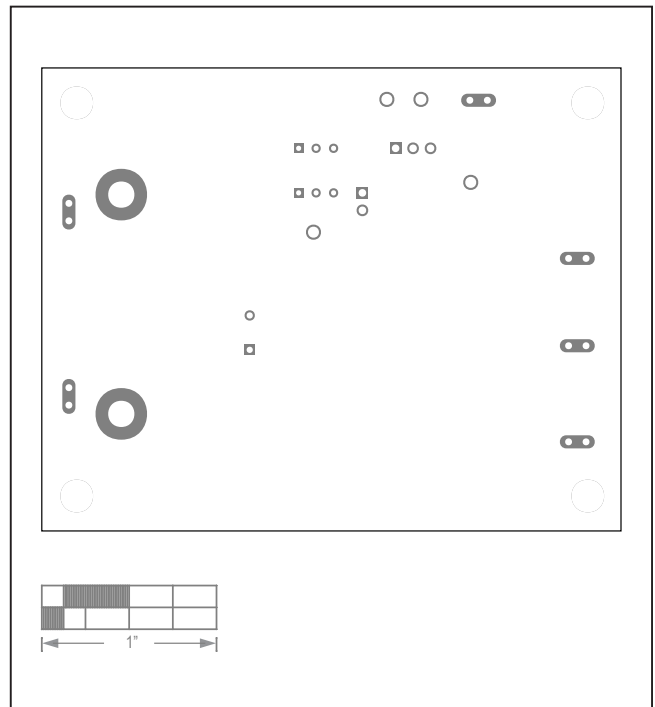
MAX25612B EV Kit PCB Layout—Silk Top



MAX25612B EV Kit PCB Layout—Bottom



MAX25612B EV Kit PCB Layout—Top



MAX25612B EV Kit PCB Layout—Silk Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/20	Initial release	—

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