Click here for production status of specific part numbers.

MAX25014 Evaluation Kit

Evaluates: MAX25014

General Description

The MAX25014 evaluation kit (EV kit) demonstrates the MAX25014, integrated 4-channel high-brightness LED driver with boost controller and I²C interface for automotive displays.

The EV kit operates from a DC supply voltage between 2.5V and 36V and the switching frequency can be either set at 2.2MHz or at 400kHz. The EV kit can only be configured to operate in I²C mode. Spread-Spectrum mode (SSM) is enabled by default for EMI improvement but it can be disabled by acting on a register bit. The EV kit demonstrates phase-shifted pulse-width modulation (PWM) dimming. Dimming can be performed either externally using a PWM signal applied to the DIM PCB pad or internally by programming the desired dimming frequency and individual duty cycle via I²C. The hybrid dimming feature can also be enabled through a register bit to reduce EMI. The EV kit also demonstrates short-LED, open-LED, Boost output Undervoltage and Overvoltage and overtemperature-fault protection. LED current measurement, and boost output voltage measurement are also demonstrated.

For operation at switching frequencies other than 2.2MHz or 400kHz, the external components should be chosen according to the calculations in the MAX25014 IC data sheet.

The EV kit provides an I²C interface that can operate in con¬junction with the MINIQUSB+ adapter board or a third-party I²C master. The EV kit also includes Windows®-compatible software that provides a simple graphical user interface (GUI) for exercis¬ing the features of the IC.

Benefits and Features

- Demonstrates Robustness of MAX25014
- Wide 2.5V to 36V Input Operating Range (Up to 40V Load Dump)
- Powers HB LEDs (Up to four strings) for Medium-to-Large-Sized LCD Displays in Automotive and Display Backlight Applications
- 400kHz to 2.2MHz Resistor-Programmable Switching Frequency with Spread-Spectrum option
- Phase-Shift Dimming option
- Demonstrates Cycle-by-cycle Current Limit and Thermal-Shutdown Features
- Demonstrates Wide Dimming Ratio
- Demonstrates Failsafe operation
- I²C Programmability
- Dedicated GUI
- Proven PCB and Thermal Design
- Fully Assembled and Tested

MAX25014 Ev Kit Files

FILE	DECRIPTION
MAX25014GUISetupV01.exe	Windows GUI Installer

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

PRELIMINARY

maxim integrated™

Quick Start

Required Equipment

- MAX25014 EV kit
- 2.5V to 36V, 16A DC power supply
- Two digital voltmeters (DVMs)
- Four series-connected HB LED strings (9 LEDs each) rated to no less than 150mA
- Current probe to measure the HB LED current
- MINIQUSB+ interface board with USB cable
- Windows®-compatible PC with a spare USB port

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 completed.

1) Download the latest version of the EV kit software, MAX25014GUISetupV01.exe, from the product's landing page at www.maximintegrated.com.
2) Install the EV kit software (GUI) on your PC by running the MAX25014GUISetupV01.exe program. The EV kit software application will be installed together with the required MINIQUSB+ drivers.
3) Verify that jumper J17 is closed and that jumper J22 is open (2.2MHz switching frequency selected).
4) Verify that jumper J1 is closed (DS1 green LED connected).
5) Verify that jumper J23 is closed (FSEN function disabled).
6) Verify that jumper J11 is closed (FAULT signaling through DS2 red LED enabled).
7) Verify that jumper J9 is closed and that jumper J7 is open (49.9kΩ IREF resistor selected).
8) Verify that a shunt is installed across pins 1-2 on jumper J2 (device enabled).
9) Verify that jumpers JMP3, JMP6-JMP7 and JMP9 have shunts installed across pins 1-2 (bleed resistors connected, all current sinks enabled).
10) Connect the MINIQUSB+ interface board's P3 header to the J24 header on the EV kit.
11) Connect the positive terminal of the power supply to the IN PCB pad. Connect the negative terminal of the power supply to a PGND PCB pad.
12) Connect a DVM across the OUT1 and GND PCB pads.
13) Connect the four LED strings from BOOST PCB pad to the OUT1, OUT2, OUT3 and OUT4 PCB pads.
14) Clip the current probe across the channel 1 HB LED+ wire to measure the LED current.
15) Turn on the power supply and set it to 12V. The green LED (DS1) should be on at this point.
16) Launch the EV kit software application.
17) From the EV kit software toolbar, select **Device → Scan for Address**. The GUI scans the I²C bus for available slave addresses on the bus and selects the first one (in this case, the MAX25014 I²C address). Press **OK** once the MAX25014 I²C address has been found.
18) Verify that the status bar in the bottom-right corner of the GUI displays **EV Kit: Connected**, as shown in Figure 1.
19) Uncheck the **Max ISET** box in the upper-left corner of the GUI window.
20) In the **0x02 ISET** register group box, select the desired OUT_ current value (45mA to 120mA in 5mA steps) by acting on the **ISET** slider bar, then click the **Refresh** button.
21) In the **0x02 ISET** register group box, check **ENA** to activate the driver.
22) Measure the voltage from each of the OUT_ PCB pads to PGND and verify the lowest voltage is approximately 1V.
23) Measure the LED current using the current probe and verify all channels.
24) For more details on how to use the GUI and all the features available, click on the GUI Help menu item.

PRELIMINARY

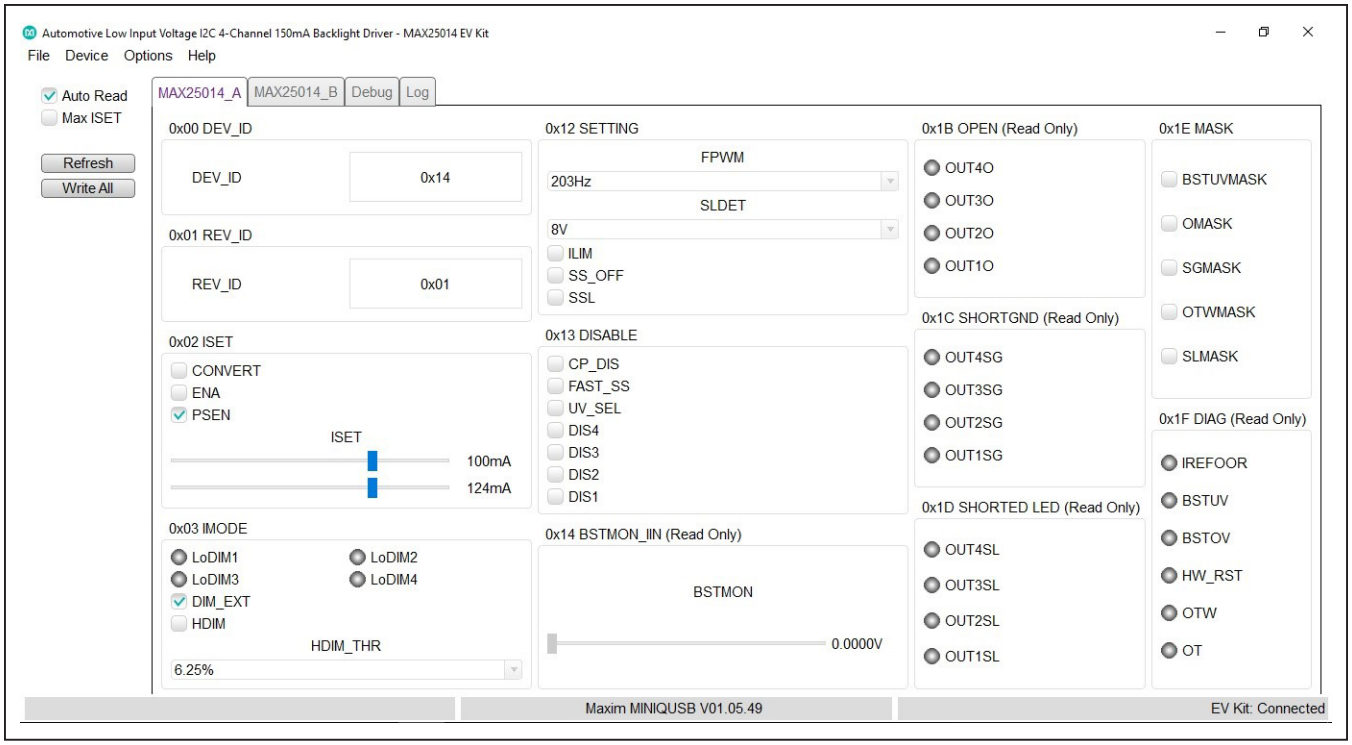

Figure 1. MAX25014 Evaluation Kit Software (GUI)

Detailed Description of Hardware

The MAX25014 EV kit demonstrates the MAX25014 HB LED driver with an integrated step-up DC-DC pre-regulator followed by four linear current sinks to drive up to four strings of LEDs. The pre-regulator switches at 2.2MHz (or at 400kHz) and oper¬ates as a current-mode-controlled regulator, providing up to 600mA for the linear current sinks as well as overvoltage protection. The cycle-by-cycle current limit is set by resistors R19, R24 and R25, while resistors R4 and R5 set the over-voltage protection voltage to 39V. The pre-regulator power section consists of inductor L2, power-current sense resistors R19, R24 and R25, Q3 MOSFET and switching diode D1. The EV kit circuit operates from a 2.5V DC supply voltage up to the HB LED forward string voltage. The circuit handles load-dump conditions up to 40V.

The EV kit circuit demonstrates ultra-low shutdown current when the EN pin of the device is pulled to ground by short¬ing the EN PCB pad to ground. Each of the four linear current sinks (OUT1–OUT4) is capable of operating up to 48V, sink¬ing up to 149mA per channel.

Each of the four channels' linear current sinks is I²C-configurable for 45mA to 120mA (56mA to 149mA if 40.2kΩ IREF resistor is selected), or can be disabled independently either by acting on **0x13 DISABLE** register group box or by acting on jumpers JMP3, JMP6-JMP7 and JMP9 which are used to disable outputs selectively when the HB LED string is not connected.

The measurements of LED currents through each channel and of the voltage on the BSTMON pin can be triggered by checking **CONVERT** in the same register group box and by clicking the **Refresh** button.

The results will be stored and shown on the **0x15** to **0x18 IOUT1-4** registers' slider bars (LED currents) and on the **0x14 BSTMON_IIN** register's slider bar.

The EV kit features PCB pads to facilitate connecting HB LED strings for evaluation. The BOOST PCB pads provide connections for connecting each HB LED string's anode to the DC-DC pre-regulator output. The OUT1–OUT4 PCB pads provide connections for connecting each HB LED string's cathode to the respective current sink. Capacitors C18, C23, C24 and C25 are included on the design to prevent oscillations and provide stability when using long, untwisted HB LED connecting cables during lab evaluation. These capacitors are not required if the connection between the LED driver and the HB LEDs is a low-inductance connection.

A DIM PCB pad is provided for using a digital PWM signal to control the brightness of the HB LEDs. Test points are also provided for easy access to the device's VCC regulator output as well as the COMP, IN, NGATE, BSTMON pins and the switching node of the pre-regulator (LX).

PRELIMINARY

SDA and SCL voltages (J18-J19, J21)

SDA and SCL voltage supplies can be selected between the VCC voltage and the fixed 3.3V provided by the MINIQUSB+. Alternatively, the User can force an external voltage as digital reference (see Table 1).

Caution: When using a supply higher than 3.3V for SDA and SCL pins, keep the EV kit disconnected from the MINIQUSB+ board to avoid any possible damage to the latter.

Power LED Enable (J1)

A green LED (DS1) is used to indicate that the EV kit is powered on. The LED can be disconnected from the power supply, allowing precise current-consumption evaluation. See Table 2 for shunt positions.

Enable (EN)

The EV kit features an enable input that can be used to enable/disable the device and place it in shutdown mode. To enable the EV kit whenever power is applied to IN, place the jumper across pins 1-2 on jumper J2. To enable the EV kit using an external enable signal, place the jumper across pins 2-3 on J2 and apply a logic signal on the EN PCB input pad on the EV kit. A 1MΩ pulldown resistor on the EV kit pulls the EN input to ground in the event that J2 is left open or the EN signal is high impedance. Refer to the Enable section in the MAX25014 IC data sheet for additional information. See Table 3 for J2 jumper settings.

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Table 1. SDA and SCL supply (J18-J19, J21)

SHUNT POSITION			SDA AND SCL SUPPLY
J18	J19	J21	
Open*	Open*	Open*	3.3V (with MINIQUSB+ connected)
Closed	Closed	Open	VCC
Open	Open	1-External SDA 2-External SCL 3-External GND	Externally provided

**Default position.*

Table 2. DS1 Enable (J1)

SHUNT POSITION	DS1 POWER LED
Closed*	Connected
Open	Disconnected

**Default position.*

Table 3. Enable (J2)

SHUNT POSITION	EN PIN	EVKIT OPERATION
1-2*	Connected to IN	Enabled when IN is powered.
2-3	Connected to EN PCB pad	Enabled/disabled by signal on EN PCB pad.

**Default position.*

Switching Frequency

Jumpers J17 and J22 (0-Ω resistors) are used to set the switching frequency of the MAX25014 to either 2.2MHz or 400kHz. When J17 is closed and J22 is open, the switching frequency is set to 2.2MHz. When J17 is open and J22 is closed, the switching frequency is nominally 400kHz. See Table 4 for jumper settings.

The EV kit is optimized for 2.2MHz switching operation by default. When selecting a switching frequency of 400kHz L2 should be changed to 10uH-22uH to maintain acceptable efficiency. Other component value adjustments may be needed.

The Spread-Spectrum feature can be enabled/disabled by checking/unchecking **SS_OFF** in the **0x12 SETTING** register group box. With Spread-Spectrum enabled, it is also possible to select the amount of spread by checking (±3%)/unchecking (±6%) **SSL** in the above register group box.

Refer to the Oscillator Frequency/External Synchronization and Spread-Spectrum Modulation sections in the MAX25014 IC data sheet for more information.

HB LED Current

Jumpers J7 and J9 (0-Ω resistors) are used to set the full-scale sink current for the outputs (OUT1-OUT4) to either 120mA or 149mA.

When J7 is closed and J9 is open, the full-scale sink current will be set to 149mA. When J7 is open and J9 is closed, the full-scale sink current will be set to 120mA. See Table 5 for jumper settings.

The device's current sinks' current on all four channels is then fully configurable via I²C (**ISET** slider bars in the **0x02 ISET** register group box). The upper slider bar is active when the full-scale sink current is set to 120mA (**Max ISET** unchecked) while the lower slider bar is active when the full-scale sink current is set to 149mA (**Max ISET** checked).

Refer to the LED Current Control section in the MAX25014 IC data sheet for more information.

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Table 4. Switching Frequency (J17 and J22)

SHUNT POSITION		RT PIN	EVKIT OPERATION
J17	J22		
Closed*	Open*	RT connected to GND via 13.3kΩ resistor	2.2MHz switching frequency
Open	Closed	RT connected to GND via 76.8kΩ resistor	400kHz switching frequency

**Default position.*

Table 5. LED Current full-scale (J7 and J9)

SHUNT POSITION		IREF PIN	EVKIT OPERATION
J7	J9		
Closed	Open	IREF connected to GND via 40.2kΩ resistor	149mA full-scale LED current
Open*	Closed*	IREF connected to GND via 49.9kΩ resistor	120mA full-scale LED current

**Default position.*

Channel 1–Channel 4 Current-Sink Disabling

The EV kit features jumpers JMP3, JMP6–JMP7 and JMP9 which are used to put each OUT_ current sink in one of three operating states:

1) Normal operation, i.e. OUT_ is connected to the corresponding PCB pad on the board edge and LEDs are connected from there to the pre-regulator output BOOST;
2) OUT_ connected through a 12kΩ resistor to GND and thus disabled;
3) OUT_ shorted to GND, used to test fault detection.

To disable a channel, install a jumper in the channel's respective jumper across pins 1-3, connecting the OUT_ to ground through a 12kΩ resistor. The dimming algorithm in the IC requires that higher numbered OUT_ current sinks be disabled first. For example, if only two strings are needed, OUT1–OUT2 should be used, with OUT3 and OUT4 disabled. See Table 6 for jumper settings. The 100kΩ bleed resistors are installed to prevent the OUT_ leakage current from dimly turning on large LED strings even when the DIM signal is low. Note that each channel can be alternatively disabled via I²C by acting on the **0x13 DISABLE** register group box.

Table 6. Selecting OUT_ Channels Operating State (JMP3, JMP6-JMP7 and JMP9)

OUT_	JUMPER	SHUNT POSITION	CHANNEL OPERATION
OUT1	JMP9	1-2*	Channel 1 operational; connect an HB LED string** between BOOST and OUT1. Bleed resistor connected.
		1-3	Channel 1 not used. OUT1 current sink disabled.
		1-4	Channel 1 shorted to GND to simulate a fault.
OUT2	JMP7	1-2*	Channel 2 operational; connect an HB LED string** between BOOST and OUT2. Bleed resistor connected.
		1-3	Channel 2 not used. OUT2 current sink disabled.
		1-4	Channel 2 shorted to GND to simulate a fault.
OUT3	JMP6	1-2*	Channel 3 operational; connect an HB LED string** between BOOST and OUT3. Bleed resistor connected.
		1-3	Channel 3 not used. OUT3 current sink disabled.
		1-4	Channel 3 shorted to GND to simulate a fault.
OUT4	JMP3	1-2*	Channel 4 operational; connect an HB LED string** between BOOST and OUT4. Bleed resistor connected.
		1-3	Channel 4 not used. OUT4 current sink disabled.
		1-4	Channel 4 shorted to GND to simulate a fault.

**Default position.*
***The series-connected HB LED string must be rated to no less than 150mA.*

HB LED Digital Dimming Control

The EV kit features a DIM PCB input pad for connecting an external digital PWM signal. Apply a digital PWM signal with a 0.8V logic-low level (or less) and 2.1V logic-high level (or greater). The DIM signal frequency should be at least 100Hz. If the DIM frequency is changed during operation the MAX25014 must be powered off and on again to register the change. To adjust the HB LED brightness, vary the signal duty cycle from 0% to 100% and maintain a mini¬mum pulse width of 500ns. Apply the digital PWM signal to the DIM PCB pad. The DIM input of the IC is pulled up internally with a 5µA (typ) current source.

Dimming can also be performed by programming the desired dimming level via I²C. External dimming is enabled by default at each device's power up. To disable it, first uncheck **DIM_EXT** in the **0x03 IMODE** register group box, then select one of the available dimming frequencies in the **FPWM** section contained in the **0x12 SETTING** register group box. Individual channel brightness levels can finally be selected by acting on the **TON1–TON4** slider bars.

Note: to ensure that correct brightness levels are selected in internal dimming mode, each **TON_** slider bar must be zeroed at each device's power up.

For additional information on the device's digital dimming feature, refer to the Dimming section in the MAX25014 IC data sheet.

Hybrid dimming Operation

The Hybrid dimming feature can be used both with external and internal dimming. The device will determine whether the LED current is to be dimmed by reducing the LED current or by chopping the LED current (depending on the hybrid dimming threshold set in the **HDIM_THR** section contained in the **0x03 IMODE** register group box). To enable the hybrid dimming feature, check **HDIM** in the **0x03 IMODE** register group box.

For additional information on the device's dimming feature, refer to the Hybrid Dimming section in the MAX25014 IC data sheet.

Phase-Shift Operation

The EV kit demonstrates the phase-shifting feature of the IC. Phase-shift is enabled by default at each device's power up. To disable it, uncheck **PSEN** in the **0x02 ISET** register group box. This operation must be always performed before enabling any LED string.

When phase shifting is enabled, each current sink's turn-on is separated by 360º/n, where n is the number of enabled strings. When phase shifting is disabled, the dimming of each string is controlled by the DIM input (or by the **FPWM** and **TON_** settings if internal dimming is enabled), and all current sinks turn on and off at the same time.

Failsafe Operation

The EV kit demonstrates the Failsafe feature of the IC. One of the jumpers J3-J6, J8, J10, J12, J14 can be closed before powering up the device to select, through a resistor to ground, the current level to which the current sinks will be enabled in case the FSEN PCB pad is forced high (even if **ENA** bit is not checked). If jumper J23 is closed, FSEN will be shorted to ground and its function will be disabled. Only one jumper at a time must be closed. See Table 7 for jumper settings.

For additional information on the device's Failsafe operation, refer to the FSEN pin function section in the MAX25014 IC data sheet.

PRELIMINARY

Table 7. Selecting FSEN resistor (J3-J6, J8, J10, J12, J14, J23)

FSEN RESISTOR VALUE (Ω)	JUMPER	SHUNT POSITION	OUT_CURRENT (MA)
0 (FSEN shorted to GND)*	J23	Closed	Failsafe disabled
3.48k	J14	Closed	25
7.15k	J12	Closed	25
12k	J10	Closed	50
18.7k	J8	Closed	50
27.4k	J6	Closed	75
39k	J5	Closed	75
59k	J4	Closed	100
84.5k	J3	Closed	100

**Default position.*

Fault-Indicator Output (FLTB)

The EV kit features the device's open-drain FLTB output. The FLTB sig¬nal on the PCB pad is pulled up to VCC by R48 resistor. FLTB goes low when an open-LED or shorted-LED string is detected, during thermal warning/shutdown events, during Boost Undervoltage events and in case of IREF out of range condition. Keep jumper J11 closed to allow DS2 red LED enabling in case FLTB goes low. If DS2 signaling function is not required, jumper J11 must be kept open and R62 resistor must be installed.

Refer to the Fault Protection section in the MAX25014 IC data sheet for additional information on the FLTB signal.

Shorted-LED Detection and Protection

The short-LED threshold is set via I2C in the **SLDET** section contained in the **0x12 SETTING** register group box. A shorted LED is detected when the following condition is satisfied:

VOUT_1-4 > VSLDET

When the short-LED threshold is reached, the affected current sink is disabled to reduce excess power dissipation and the FLTB indicator asserts low.

Overvoltage Detection and Protection

The resistors (R41 and R5) connected to BSTMON are configured for a VOUT_OVP of 39V. This sets the maximum converter output (BOOST) voltage at 39V. During an open-LED string condition, the converter output ramps up to the output overvoltage threshold. Capacitor C3 can be added to provide noise filtering to the overvoltage signal. To reconfigure the circuit for a different voltage, replace resistor R41 with a different value using the following equation:

R41 = [(VOUT_OVP/1.23) - 1] * R5

where R5 is 10kΩ, VOUT_OVP is the overvoltage-protection threshold desired, and R41 is the new resistor value for obtaining the desired overvoltage pro¬tection. MOSFET Q1 is an optional over-voltage protection resistor-divider disconnect switch for ultra-low shutdown current.

Refer to the Open-LED Management and Overvoltage Protection section in the MAX25014 IC data sheet for additional information.

Ordering Information

PART	TYPE
MAX25014EVKIT#	EVKIT

#Denotes RoHS compliant.

PRELIMINARY

MAX25014 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	BOOST, BOOST1-BOOST3, DIM, EN, FLTB, FSEN, GND, GND1, GND2, IN1, OUT1-OUT4, PGND, PGND1, PGND2, SCL, SDA, SYNC	-	22	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
2	BSTMON, COMP, LX, NGATE, TP1-TP3, VCC	-	8	5011	N/A	5011	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
3	C2, C6, C16	-	3	UMK107BJ105KA;C1608X5R1H105K080AB; CL10A105KB8NNN;GRM188R61H105KAAL	TAIYO YUDEN;TDK;SAMSUNG;MURATA	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 50V; TOL=10%; MODEL=_MK SERIES; TG=-55 DEGC TO +85 DEGC	
4	C4	-	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	
5	C5, C26	-	2	C1210C475K5RAC;GRM32ER71H475KA88; GCM32ER71H475KA55;CGA6P3X7R1H475K250AB; UMK325B7475KMHP;CNC6P1X7R1H475K250AE	KEMET;MURATA;MURATA;TDK;TAIYO YUDEN;TDK	4.7UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
6	C9	-	1	EEE-TG1H470UP	PANASONIC	47UF	CAPACITOR; SMT (CASE_F); ALUMINUM-ELECTROLYTIC; 47UF; 50V; TOL=20%; MODEL=TG SERIES; TG=-40 DEGC TO +125 DEGC	
7	C12, C226	-	2	C2012X7R1H225K125AC;CGA4J3X7R1H225K125AB; CGA4J3X7R1H225K125AE	TDK;TDK;TDK	2.2UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 2.2UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
8	C14	-	1	GRM32ER71H106KA12; CL32B106KBJNNN; UMJ325KB7106KMH; 12105C106K4Z2A	MURATA;SAMSUNG ELECTRONICS;TAIYO YU	10UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 10UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
9	C17	-	1	C1608C0G1H100D080AA	TDK	10PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 10PF; 50V; TOL=0.5PF; TG=-55 DEGC TO +125 DEGC; TC=C0G	
10	C18, C23-C25	-	4	GRM1885C1H102JA01;C1608C0G1H102J080AA; GCM1885C1H102JA16	MURATA;TDK;MURATA	1000PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1000PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC	
11	C20	-	1	GRM188R71A225KE15;CL10B225KP8NNN; C1608X7R1A225K080AC;C0603C225K8RAC	MURATA;SAMSUNG;TDK;KEMET	2.2UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 2.2UF; 10V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
12	C22	-	1	C0603C683J5RAC	KEMET	0.068UF	CAPACITOR; SMT; 0603; CERAMIC; 0.068uF; 50V; 5%; X7R; -55degC to + 125degC; 0 +/-15% degC MAX.	
13	C27	-	1	06035C101JAT	AVX	100PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 100PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
14	C28	-	1	06035C220JAT	AVX	22PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 22PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
15	C33	-	1	0603YC101KAT2A	AVX	100PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 100PF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
16	C35	-	1	50HVP56M	SUNCON	56UF	CAPACITOR; SMT; ALUMINUM-ELECTROLYTIC; 56UF; 50V; TOL=20%; TG=-55 DEGC TO +125 DEGC; SUPER LOW ESR	
17	D1	-	1	NRVBS260T3G	ON SEMICONDUCTOR	NRVBS260T3G	DIODE; SCH; SURFACE MOUNT SCHOTTKY POWER RECTIFIER; SMB; PIV=60V; IF=2A	
18	D2	-	1	BZG03C18	VISHAY SEMICONDUCTORS	18V	DIODE; ZNR; SMT (DO-214AC); VZ=18V; IZM=0.025A	
19	D3, D5	-	2	CMPD914E	CENTRAL SEMICONDUCTOR	CMPD914E	DIODE; SWT; SMT (SOT23-3); PIV=150V; IF=0.1A	
20	D4	-	1	B160B-13-F	DIODES INCORPORATED	B160B-13-F	DIODE; SCH; SMB (DO-214AA); PIV=60V; IF=1A	
21	DS1	-	1	LGL29K-F2J1-24-Z	OSRAM	LGL29K-F2J1-24-Z	DIODE; LED; SMARTLED; GREEN; SMT; PIV=1.7V; IF=0.02A	
22	DS2	-	1	LS L29K-G1J2-1-Z	OSRAM	LS L29K-G1J2-1-Z	DIODE; LED; SMART; RED; SMT (0603); PIV=1.8V; IF=0.02A; -40 DEGC TO +100 DEGC	
23	J1, J3-J6, J8, J10-J12, J14, J18, J19, J23	-	13	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	
24	J2, J21	-	2	PEC03SAAN	SULLINS ELECTRONICS CORP.	PEC03SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;	
25	J9	-	1	ANY	ANY	0	RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM; FORMFACTOR	
26	J17, R50, R53, R57, R59, R61	-	6	CRCW06030000Z0	VISHAY DALE	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.1W; THICK FILM	
27	J24	-	1	803-87-020-20-001101	PRECI-DIP SA	803-87-020-20-001101	EVKIT PART-CONNECTOR; FEMALE; TH; DOUBLE ROW; 2.54MM; RIGHT ANGLE SOLDER TAIL; MATING PIN DIA 0.76MM; RIGHT ANGLE; 20PINS;	
28	J25	-	1	HTSW-112-11-G-S-RA	SAMTEC	HTSW-112-11-G-S-RA	CONNECTOR; MALE; THROUGH HOLE; SQUARE POST HEADER; RIGHT ANGLE; 12PINS ;	
29	JMP3, JMP6, JMP7, JMP9	-	4	PEC04SAAN	SULLINS ELECTRONICS CORP.	PEC04SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS	
30	L1	-	1	SRP1238A-R60M	BOURNS	0.6UH	INDUCTOR; SMT; SHIELDED; 0.6UH; 20%; 29A	
31	L2	-	1	XAL1510-472ME	COILCRAFT	4.7UH	INDUCTOR; SMT; COMPOSITE; 4.7UH; 20%; 29A	
32	Q1	-	1	NDS351AN	FAIRCHILD SEMICONDUCTOR	NDS351AN	TRAN; N-CHANNEL LOGIC LEVEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR; NCH; SUPERSOT-3; PD-(0.5W); I-(1.4A); V-(30V)	
33	Q2	-	1	NVMFS5C677NLT1G	ON SEMICONDUCTOR	NVMFS5C677NLT1G	TRAN; NCH; POWER MOSFET; SO-8FL; PD-(3.5W); I-(36A); V-(60V)	
34	Q3	-	1	NTMFS5C673NLT1G	ON SEMICONDUCTOR	NTMFS5C673NLT1G	TRAN; NCH; MOSFET; SO-8FL; PD-(46W); I-(50A); V-(60V)	
35	Q5	-	1	SI1317DL-T1-GE3	VISHAY SILICONIX	SI1317DL-T1-GE3	TRAN; P-CHANNEL 20V (D-S) MOSFET; PCH; SOT-323; PD-(0.5W); I-(-1.4A); V-(-20V)	
36	R2	-	1	CRCW06033K00FK	VISHAY DALE	3K	RESISTOR; 0603; 3K OHM; 1%; 100PPM; 0.10W; THICK FILM	
37	R3, R7	-	2	CRCW08050000ZS;ERJ-6GEY0R00;RC2012J000; RMCF0805ZT0R00	DIGI-KEY	0	RESISTOR; 0805; 0 OHM; JUMPER; 0.125W; THICK FILM	
38	R4, R10	-	2	TNPW06031K50BE;ERA-3YEB152V	VISHAY DALE;PANASONIC	1.5K	RESISTOR; 0603; 1.5K OHM; 0.1%; 25PPM; 0.10W; THICK FILM	
39	R5	-	1	TNPW080510K0BE;ERA-6YEB103V	VISHAY DALE;PANASONIC	10K	RESISTOR; 0805; 10K OHM; 0.1%; 25PPM; 0.125W; THIN FILM	
40	R6	-	1	301-10K-RC	XICON	10K	RESISTOR, 0603, 10K OHM, 5%, 200PPM, 1/16W, THICK FILM	

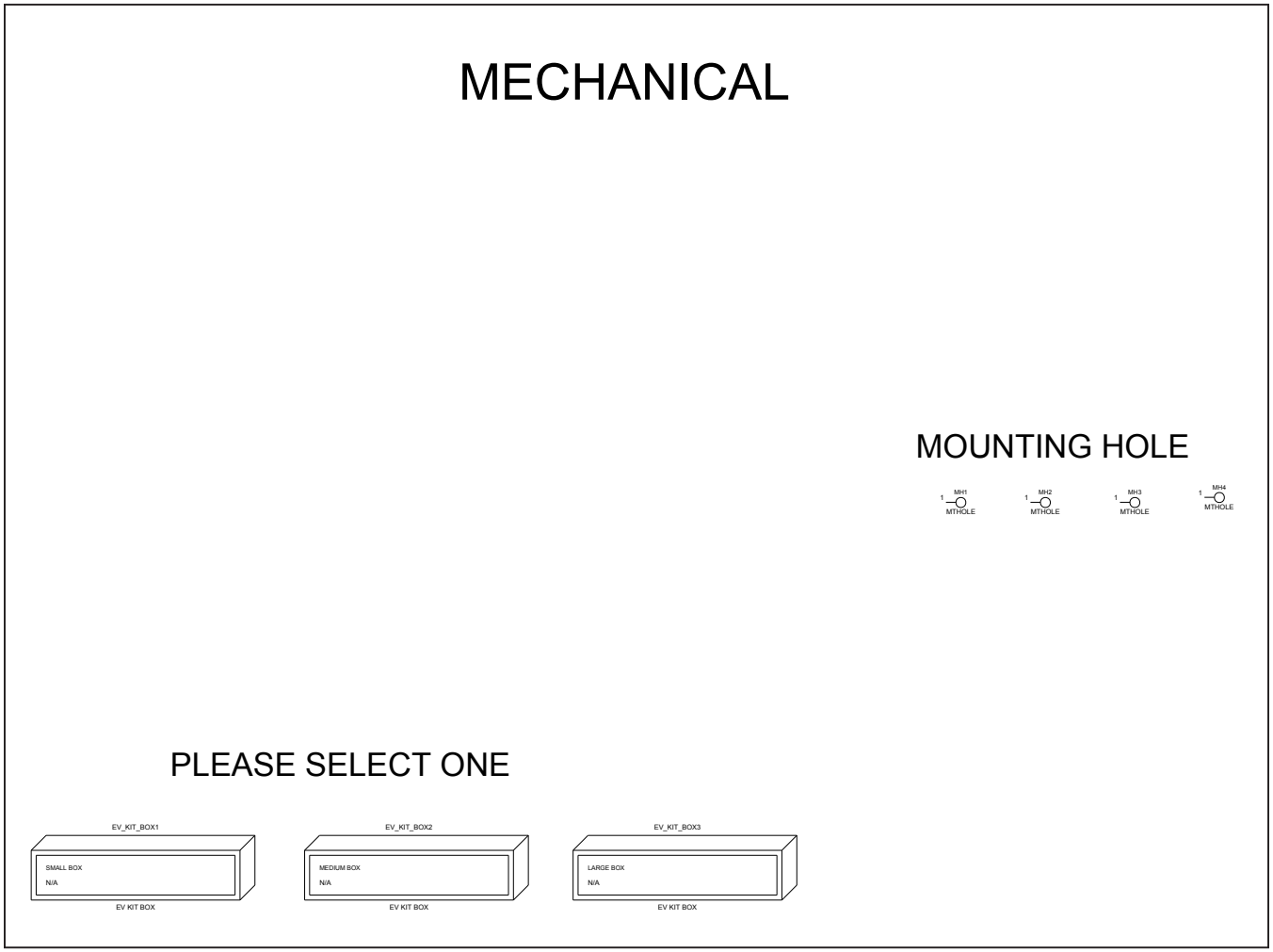
PRELIMINARY

MAX25014 EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
41	R8	-	1	LRC-LRZ2010LF-R000	TT ELECTRONICS	0	RES; SMT (2010); 0; JUMPER; CURRENT SENSE	
42	R9	-	1	CRCW06031M00FK; MCR03EZPFX1004	VISHAY DALE;ROHM	1M	RESISTOR, 0603, 1M OHM, 1%, 100PPM, 0.10W, THICK FILM	
43	R13	-	1	RC0603FR-0784K5L	YAGEO PHYCOMP	84.5K	RESISTOR; 0603; 84.5K OHM; 1%; 100PPM; 0.10W; THICK FILM	
44	R16	-	1	ERJ-3EKF5902	PANASONIC	59K	RESISTOR; 0603; 59K OHM; 1%; 100PPM; 0.1W; THICK FILM	
45	R17	-	1	TNPW060310K0BE; RN731JTTD1002B	VISHAY DALE;KOA SPEER ELECTRONICS	10K	RESISTOR; 0603; 10K OHM; 0.1%; 25PPM; 0.1W; THICK FILM	
46	R18	-	1	CRCW060327K4FK;ERJ-3EKF2742	VISHAY DALE;PANASONIC	27.4K	RESISTOR; 0603; 27.4K; 1%; 100PPM; 0.10W; THICK FILM	
47	R19, R24, R25	-	3	SLN5TTEDR120D	KOA SPEER ELECTRONICS INC.	0.12	RES; SMT (4527); 0.12; 0.5%; +/-75PPM/DEGC; 7W	
48	R20	-	1	ERJ-3EKF1872;CRCW060318K7FK	PANASONIC;VISHAY	18.7K	RESISTOR; 0603; 18.7K OHM; 1%; 100PPM; 0.10W; THICK FILM	
49	R21, R26	-	2	CRCW060310R0FK; MCR03EZPFX10R0;ERJ-3EKF10R0	VISHAY DALE;ROHM	10	RESISTOR; 0603; 10 OHM; 1%; 100PPM; 0.10W; THICK FILM	
50	R22, R29, R36, R38, R45	-	5	CRCW060312K0FK	VISHAY DALE	12K	RESISTOR, 0603, 12K OHM, 1%, 100PPM, 0.10W, THICK FILM	
51	R23, R34, R37, R43	-	4	CRCW0603100KFK;RC0603FR-07100KL;RC0603FR-13100KL;ERJ-3EKF1003;AC0603FR-07100KL	VISHAY DALE;YAGEO;YAGEO;PANASONIC	100K	RESISTOR; 0603; 100K; 1%; 100PPM; 0.10W; THICK FILM	
52	R28	-	1	ERJ-3EKF7151	PANASONIC	7.15K	RESISTOR; 0603; 7.15K OHM; 1%; 100PPM; 0.10W; THICK FILM	
53	R30	-	1	CRCW060340K2FK;RC0603FR-0740K2L;ERJ-3EKF4022	VISHAY DALE;YAGEO;PANASONIC	40.2K	RESISTOR; 0603; 40.2K; 1%; 100PPM; 0.10W; THICK FILM	
54	R32	-	1	CRCW060339K0FK	VISHAY DALE	39K	RESISTOR, 0603, 39K OHM, 1%, 100PPM, 0.10W, THICK FILM	
55	R35	-	1	CRCW12060000ZS;ERJ-8GEY0R00	VISHAY DALE;PANASONIC	0	RESISTOR; 1206; 0 OHM; 0%; JUMPER; 0.25W; THICK FILM	
56	R39	-	1	CRCW060376K8FK	VISHAY DALE	76.8K	RESISTOR; 0603; 76.8K OHM; 1%; 100PPM; 0.10W; THICK FILM	
57	R40	-	1	CRCW060349K9FK;ERJ-3EKF4992	VISHAY DALE;PANASONIC	49.9K	RESISTOR; 0603; 49.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
58	R41	-	1	TNPW0805309KBEEN	VISHAY	309K	RES; SMT (0805); 309K; 0.1%; +/-25PPM/DEGK; 0.2W	
59	R42, R48, R55	-	3	CHPHT0603K1002FGT	VISHAY SFERNICE	10K	RESISTOR; 0603; 10K OHM; 1%; 100PPM; 0.0125W; THICK FILM	
60	R47	-	1	CRCW06033K74FK	VISHAY DALE	3.74K	RESISTOR, 0603, 3.74KOHMS, 1%, 100PPM, 0.1W, THICK FILM	
61	R49	-	1	RG1608N-102-B-T1	SUSUMU CO LTD.	1K	RESISTOR; 0603; 1K OHM; 0.1%; 10PPM; 0.10W; THICK FILM	
62	R52	-	1	CRCW060313K3FK;ERJ-3EKF1332	VISHAY DALE;PANASONIC	13.3K	RESISTOR; 0603; 13.3K OHM; 1%; 100PPM; 0.1W; THICK FILM	
63	R54	-	1	ERJ-3EKF3481	PANASONIC	3.48K	RESISTOR; 0603; 3.48K OHM; 1%; 100PPM; 0.1W; THICK FILM	
64	U1	-	1	MAX25014ATG/V+	MAXIM	MAX25014ATG/V+	EVKIT PART-IC; AUTOMOTIVE LOW INPUT VOLTAGE I2C 4-CHANNEL 150 MILLIAMPERE BACKLIGHT DRIVER; PACKAGE OUTLINE DRAWING NUMBER: 21-0139; LAND PATTERN NUMBER: 90-0022; PACKAGE CODE: T2444+4C	
65	PCB	-	1	MAX25014	MAXIM	PCB	PCB:MAX25014	-
66	C1, C3, C19	DNP	0	N/A	N/A	OPEN	CAPACITOR; SMT (0603); OPEN; FORMFACTOR	
67	C7, C8	DNP	0	C1210C475K5RAC;GRM32ER71H475KA88; GCM32ER71H475KA55;CGA6P3X7R1H475K250AB; UMK325B7475KMHP;CNC6P1X7R1H475K250AE	KEMET;MURATA;MURATA;TDK;TAIYO YUDEN;TDK	4.7UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
68	C10, C13, C36-C39	DNP	0	GRM1885C1H102JA01;C1608C0G1H102J080AA; GCM1885C1H102JA16	MURATA;TDK;MURATA	1000PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1000PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC	
69	C15, C30, C32	DNP	0	C2012X7R1H225K125AC;CGA4J3X7R1H225K125AB; CGA4J3X7R1H225K125AE	TDK;TDK;TDK	2.2UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 2.2UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
70	C29	DNP	0	N/A	N/A	OPEN	EVKIT USE ONLY;DUAL PACKAGE OUTLINE 0603 AND 0805 NON-POLAR CAPACITOR	
71	L3	DNP	0	XAL5050-103ME	COILCRAFT	10UH	INDUCTOR; SMT; COMPOSITE CORE; 10UH; TOL=+/-20%; 4.9A	
72	R1, R33, J22	DNP	0	N/A	N/A	OPEN	RESISTOR; 0603; OPEN; FORMFACTOR	
73	R11	DNP	0	SLN5TTEDR120D	KOA SPEER ELECTRONICS INC.	0.12	RES; SMT (4527); 0.12; 0.5%; +/-75PPM/DEGC; 7W	
74	R27, R31	DNP	0	LRC-LRZ2010LF-R000	TT ELECTRONICS	0	RES; SMT (2010); 0; JUMPER; CURRENT SENSE	
75	R44	DNP	0	CRCW12060000ZS;ERJ-8GEY0R00	VISHAY DALE;PANASONIC	0	RESISTOR; 1206; 0 OHM; 0%; JUMPER; 0.25W; THICK FILM	
76	R51, R56, R58, R60	DNP	0	FC0603E50R0BTBS	VISHAY DALE	50	RESISTOR; 0603; 50 OHM; 0.1%; 25PPM; 0.125W; THIN FILM	
77	R62	DNP	0	CHPHT0603K1002FGT	VISHAY SFERNICE	10K	RESISTOR; 0603; 10K OHM; 1%; 100PPM; 0.0125W; THICK FILM	
78	J7	DNP	0	N/A	N/A	OPEN	RESISTOR; 0402; OPEN; FORMFACTOR	
TOTAL			136					

PRELIMINARY

MAX25014 EV Kit Schematics



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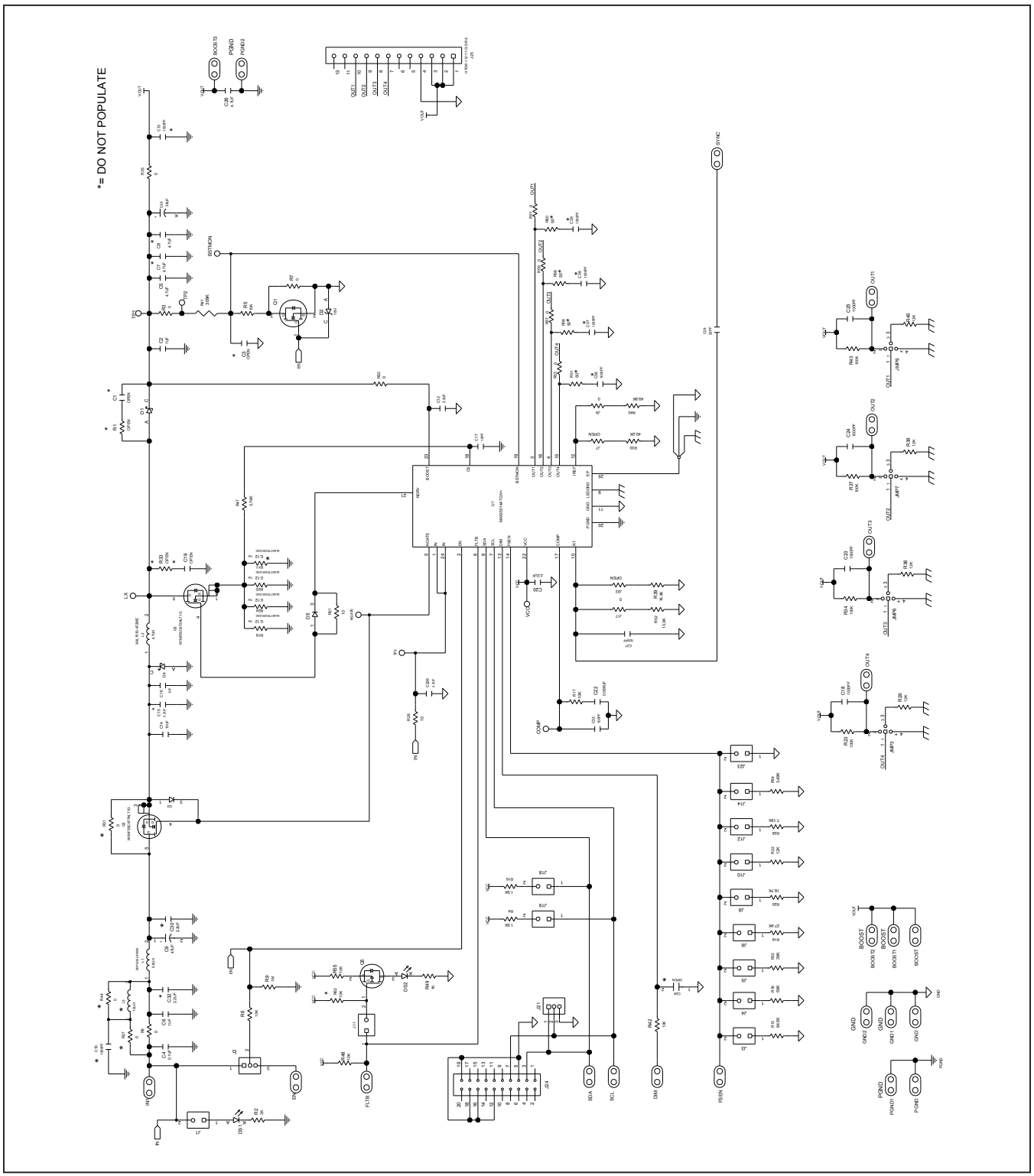
MAX25014 EV Kit Schematics (continued)



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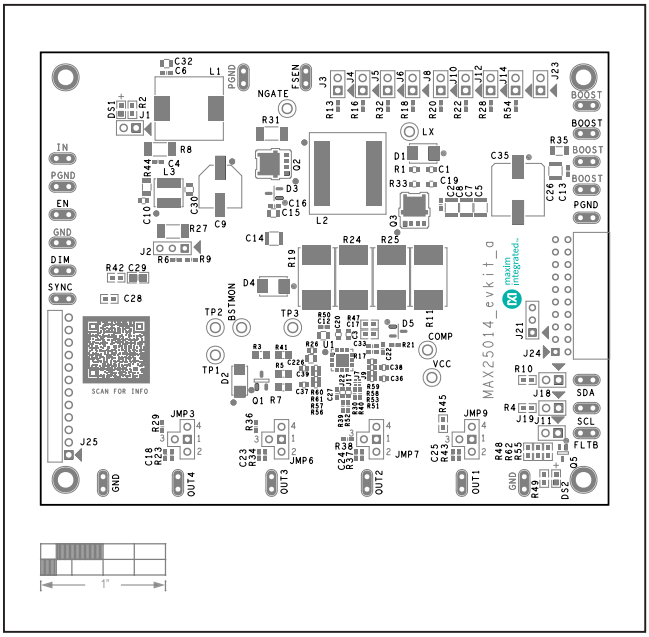
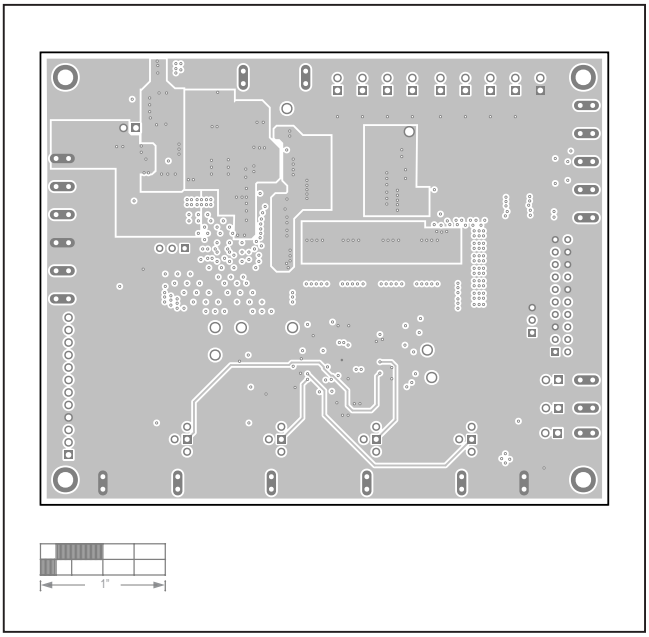
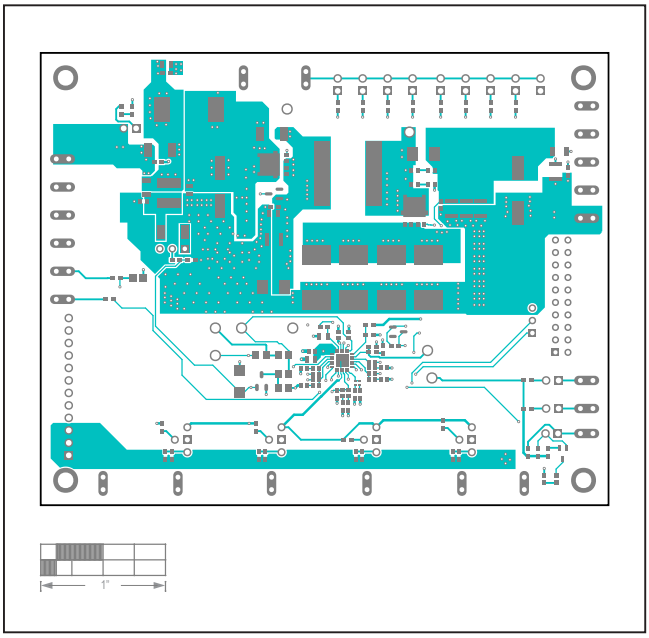
MAX25014 EV Kit PCB Layout Diagrams



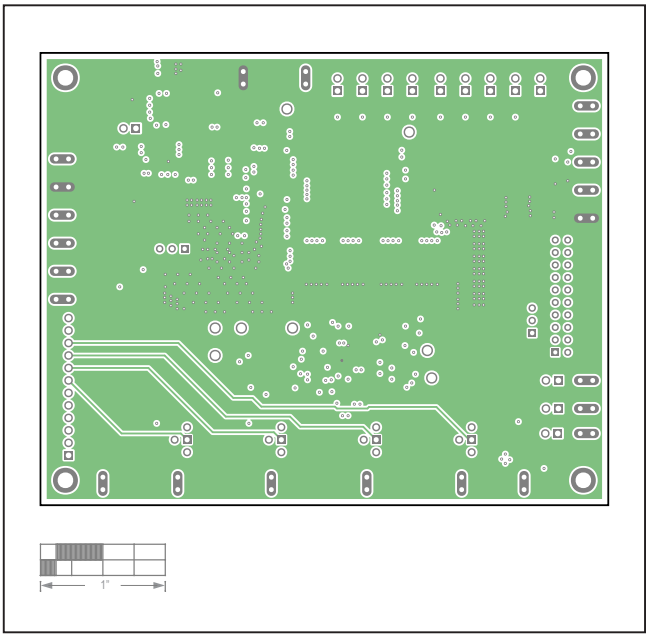
MAX25014 EV Kit Component Placement Guide—Top Silkscreen



MAX25014 EV Kit PCB Layout—Internal Layer 2



MAX25014 EV Kit PCB Layout—Top Layer



MAX25014 EV Kit PCB Layout—Internal Layer 3

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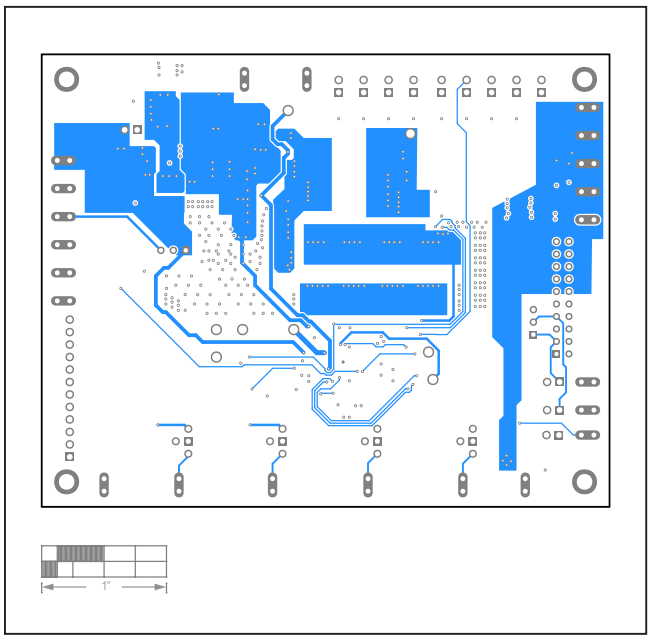
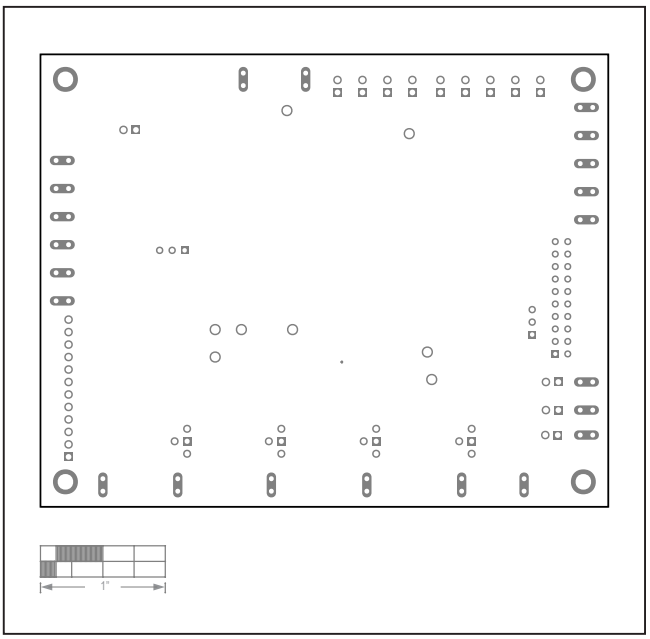
MAX25014 EV Kit PCB Layout Diagrams (continued)



MAX25014 EV Kit PCB Layout—Bottom Layer



MAX25014 EV Kit PCB Layout—Bottom Silkscreen

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/20	Initial release	—

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