MAX25561 Evaluation Kit

General Description

The MAX25561 evaluation kit (EV kit) demonstrates the MAX25561 integrated 6-channel high-brightness LED driver with boost controller and I2C interface for automotive displays supporting ASIL B.

The EV kit operates from a DC supply voltage between 7V (4.5V if the LED current per string is set to 150mA or less) 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 through I2C. When the dimming signal is applied through the DIM PCB pad, readback of measured dimming duty cycle and frequency will be made available on dedicated I2C registers.

The hybrid dimming feature can also be enabled through a register bit to reduce EMI.

The EV kit features a LED current foldback option as a function of the temperature by means of an on-board NTC sensor. I2C-programmable automatic fading functionality is also available.

Finally, the EV kit demonstrates short-LED, open-LED, boost output undervoltage and overvoltage, boost input overcurrent, LED current/duty cycle mismatch, and overtemperature-fault protection. Additional ASIL B features like LED current measurement, boost input 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 MAX25561 IC data sheet.

The EV kit provides an I2C interface that can operate in conjunction with the MAX32625PICO adapter or a third-party I2C controller. Windows®-based graphical-user interface (GUI) software is available for use with the EV kit and can be downloaded on the MAX25561 product page (under the Evaluation Kits tab). A Windows 7 or newer Windows operating system is required to use the EV kit software.

Features and Benefits

- Demonstrates Robustness of MAX25561
- 7V (4.5V if LED Current per String Is Set to 150mA or Less) to 36V Input Operating Range (up to 42V Load Dump)
- Powers HB LEDs (up to Six 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 Hybrid Dimming for Better EMI and Acoustic Performance and Higher Dimming Ratio
- Demonstrates Fade in/out for Smooth Brightness Transition
- Designed to Show Thermal Foldback Function
- I2C Programmability
- Dedicated GUI
- Proven PCB and Thermal Design
- Fully Assembled and Tested

MAX25561 EV Kit Files

FILE	DESCRIPTION
MAX25561SetupV1_0_0000.exe	Installs EV kit files onto computer

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

319-101042; Rev 0; 12/23

Quick Start

Required Equipment

- MAX25561 EV kit
- 7V (4.5V if the LED current per string is set to 150mA or less) to 36V, 10A DC power supply
- One digital voltmeter (DVM)
- Six series-connected HB LED strings (8 LEDs per string, max) rated to no less than 225mA
- Current probe to measure the HB LED current
- Standard-A to Micro-B USB cable
- Windows-compatible PC with a spare USB port

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system.

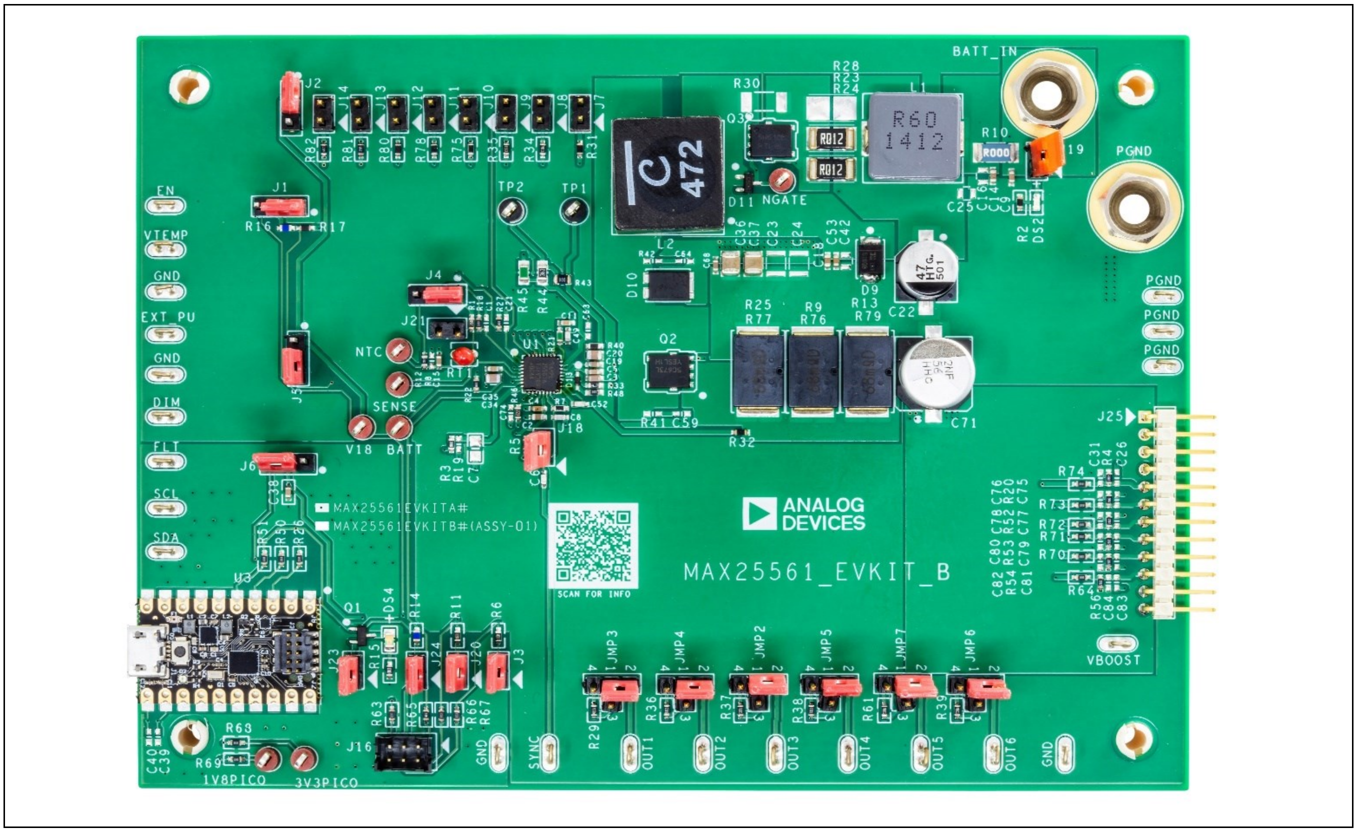
Procedure

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. Install the EV kit software (GUI) on your PC by running the MAX25561SetupV1_0_0000.exe program. The EV kit software application will be installed together with the required PICO drivers.
2. Verify that jumper J18 is closed (2.2MHz switching frequency selected).
3. Verify that jumper J19 is closed (DS2 green LED connected).
4. Verify that a shunt is installed across pins 2-3 on jumper J5 (ADD pin connected to GND). This will set the IC's I^{2}C address to 0x4E.
5. Verify that jumpers J2 and J4 have shunts installed across pins 1-2 (ISET and TEMP IC's pins both connected to V18).
6. Verify that jumpers J3, J20, and J24 are closed (pull-up resistors for SDA, SCL, and FLTB respectively connected).
7. Verify that a shunt is installed across pins 2-3 on jumper J6 (pull-up voltage set to 3.3V).
8. Verify that jumper J23 is closed (FAULT signaling through DS4 red LED enabled).
9. Verify that a shunt is installed across pins 1-2 on jumper J1 (device enabled).
10. Verify that jumpers JMP2-JMP7 have shunts installed across pins 1-2 (bleed resistors connected, all current sinks enabled).
11. Connect the positive terminal of the power supply to the BATT_IN PCB socket. Connect the negative terminal of the power supply to the PGND PCB socket.
12. Connect the DVM across the OUT1 and GND PCB pads.
13. Connect the 6 LED strings (8 LEDs per string, max) from the VBOOST PCB pad to the OUT1-OUT6 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 (DS2) 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 I^{2}C bus for available target addresses on the bus and selects the first one (in this case, the MAX25561 I^{2}C address). Press **OK** once the MAX25561 I^{2}C 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. From the EV kit software toolbar, select **Options → Set I2C Frequency → 100kHz**.
20. Select the desired OUT_ current value (34.5mA to 225mA in 1.5mA steps) by acting on the **ISET** slider bar.
21. Check **Boost Converter Enable** to activate the driver.
22. Measure the voltage from each of the OUT_ PCB pads to GND and verify that the lowest voltage is approximately 0.7V.
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.

MAX25561 EV Kit Photo



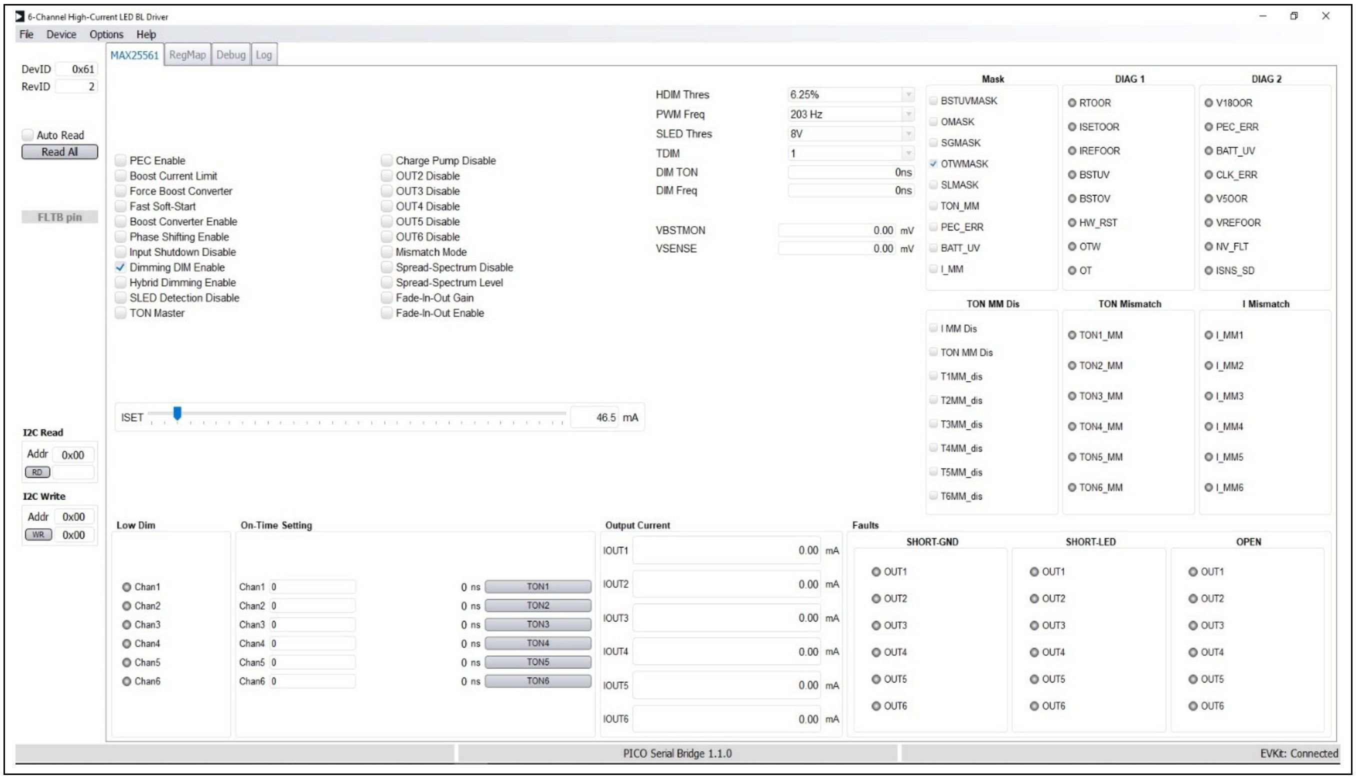


Figure 1. MAX25561 EV Kit Software (GUI) Main Window

Detailed Description of Hardware

The MAX25561 EV kit demonstrates the MAX25561 HB LED driver with an integrated step-up DC-DC preregulator followed by six linear current sinks to drive up to six strings of LEDs. The preregulator switches at 2.2MHz (or at 400kHz) and operates as a current-mode-controlled regulator, providing up to 1.35A for the linear current sinks as well as overvoltage protection. The cycle-by-cycle current limit is set by resistors R32, R76, R77, and R79, while resistors R44 and R45 set the overvoltage protection voltage to 35V. The preregulator power section consists of inductor L2, power-current-sense resistors R23 and R24, power current-sense resistors R76, R77, and R79, Q2 and Q3 MOSFETs, and switching diode D10. The EV kit circuit operates from a 7V DC supply voltage up to the HB LED forward string voltage. The circuit handles load-dump conditions up to 42V.

The EV kit circuit demonstrates ultra-low shutdown current when the EN pin of the device is pulled to ground by shorting the EN PCB pad to ground. Each of the six linear current sinks (OUT1-OUT6) is capable of operating up to 42V, sinking up to 225mA per channel.

Each of the six channels' linear current sinks is I^{2}C-configurable for 34.5mA to 225mA. Channels from 2 to 6 can be disabled independently either by acting on the **OUT2-OUT6 Disable** checkboxes or by acting on jumpers JMP2 and JMP4-JMP7, which are used to disable outputs selectively when the HB LED string is not connected.

The internal ADC measurements of LED currents through each channel of the boost converter input current (indirectly provided as a voltage drop between the BATT and SENSE pins) and of the voltage on the BSTMON pin are continuously refreshed and are shown in the **IOUT1-IOUT6**, **VBSTMON**, and **VSENSE** boxes.

External dimming signal's frequency and on-time measurements are also shown in the **DIM Freq** and **DIM TON** boxes, respectively.

The EV kit features PCB pads to facilitate connecting HB LED strings for evaluation. The VBOOST PCB pads provide connections for connecting each HB LED string's anode to the DC-DC preregulator output. The OUT1-OUT6 PCB pads provide connections for connecting each HB LED string's cathode to the respective current sink. Capacitors C31, C76, C78, C80, C82, and C84 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 V18 regulator output as well as the BATT, SENSE, and NGATE pins and the NTC sensor non-grounded terminal.

SDA and SCL Supply Voltages

SDA and SCL voltage supplies can be selected between an externally applied voltage and the fixed 3.3V provided by the PICO board (see Table 1).

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

Table 1. SDA and SCL Supply (J3, J6, J20)

SHUNT POSITION			SDA AND SCL SUPPLY
J3	J6	J20	—
Closed*	2-3*	Closed*	3.3V (PICO connected)
Closed	1-2	Closed	External

Default position.

Power LED Enable

A green LED (DS2) 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.

Table 2. DS1 Enable (J19)

SHUNT POSITION	DS2 POWER LED
Closed*	Connected
Open	Disconnected

Default position.

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 BATT_IN, place a jumper across pins 1-2 on jumper J1. To enable the EV kit using an external enable signal, place a jumper across pins 2-3 on jumper J1 and apply a logic signal on the EN PCB input pad on the EV kit. A 1MΩ pull-down resistor on the EV kit (R17) pulls the EN input to ground in the event that J1 is left open or the EN signal is high impedance. See Table 3 for J1 jumper settings.

Table 3. Enable (J1)

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

Default position.

Switching Frequency

Jumper J18 is used to set the switching frequency of the MAX25561 to either 2.2MHz or 400kHz. When J18 is closed, the switching frequency is set to 2.2MHz. When J18 is open, 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 10μH to 22μH to maintain acceptable efficiency. Other component value adjustments may be needed.

The spread-spectrum feature can be disabled/enabled by checking/unchecking **Spread-Spectrum Disable**. With spread spectrum enabled, it is also possible to select the amount of spread by checking (±4%)/unchecking (±6%) **Spread-Spectrum Level** in the register group box.

Refer to the *Oscillator Frequency/External Synchronization* section in the MAX25561 IC data sheet for more information.

Table 4. Switching Frequency (J18)

SHUNT POSITION	EN PIN	EV KIT OPERATION
Closed*	RT connected to GND through 15kΩ/64.9kΩ	2.2MHz switching frequency
Open	RT connected to GND through 64.9kΩ	400kHz switching frequency

**Default position.*

HB LED Current

The device's current sinks' current on all six channels is fully configurable through I2C (**ISET** slider bar) between 34.5mA and 225mA. Alternatively, the initial LED current can be set by connecting a resistor from the ISET pin to GND; in this way the device will start up immediately when the EN pin is taken high without the need for checking **Boost Converter Enable** in the GUI window. It will still be possible to act on the **ISET** slider bar to adjust the LED current value at a later stage.

One of the jumpers J7-J14 can be closed before powering up the device to select, through a resistor to ground, the initial current level to which the current sinks will be enabled. If a shunt is placed across pins 1-2 on jumper J2, the ISET pin will be shorted to V18, and its function will be disabled. Only one of the above listed jumpers at a time must be closed. See *Table 5* for jumper settings.

Refer to the *LED Current Control* section in the MAX25561 IC data sheet for more information.

Table 5. LED Current Initial Setting through ISET Resistor (J2 and J7-J14)

ISET RESISTOR VALUE (kΩ)	JUMPER	SHUNT POSITION	OUT_CURRENT (mA)
ISET shorted to V18*	J2	1-2	ISET function disabled
ISET shorted to GND	J2	2-3	Test ISETOOR fault detection
4.3kΩ	J7	Closed	96
9.1kΩ	J8	Closed	106.5
15kΩ	J9	Closed	118.5
24kΩ	J10	Closed	130.5
33kΩ	J11	Closed	145.5
43kΩ	J12	Closed	162
56kΩ	J13	Closed	180
68kΩ	J14	Closed	199.5

**Default position.*

Channel 1–Channel 6 Current-Sink Disabling

The EV kit features jumpers JMP2-JMP7, which are used to put each OUT_ current sink in one of three operating states:

- Normal operation (i.e., OUT_) connected to the corresponding PCB pad on the board edge; LEDs are connected from there to the preregulator output VBOOST
- OUT_ connected through a 9.1kΩ resistor to GND, and thus disabled
- 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 9.1kΩ 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-OUT6 disabled. See *Table 6* for jumper settings. The 20kΩ 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 OUT2-OUT6 channels can be alternatively disabled through I²C by acting on the **OUT2-OUT6 Disable** check boxes.

Table 6. Selecting OUT_ Channels Operating State (JMP2-JMP7)

OUT_	JUMPER	SHUNT POSITION	CHANNEL OPERATION
OUT1	JMP3	1-2*	Channel 1 operational; connect an HB LED string** between VOUT 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	JMP4	1-2*	Channel 2 operational; connect an HB LED string** between VOUT 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	JMP2	1-2*	Channel 3 operational; connect an HB LED string** between VOUT 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	JMP5	1-2*	Channel 4 operational; connect an HB LED string** between VOUT 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.
OUT5	JMP7	1-2*	Channel 5 operational; connect an HB LED string** between VOUT and OUT5. Bleed resistor connected.
		1-3	Channel 5 not used. OUT5 current sink disabled.
		1-4	Channel 5 shorted to GND to simulate a fault.
OUT6	JMP6	1-2*	Channel 6 operational; connect an HB LED string** between VOUT and OUT6. Bleed resistor connected.
		1-3	Channel 6 not used. OUT6 current sink disabled.
		1-4	Channel 6 shorted to GND to simulate a fault.

**Default position. **The series-connected HB LED string must be rated to no less than 225mA.*

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 0.6V logic-low level (or less) and 1.22V logic-high level (or greater). The DIM signal frequency should be at least 90Hz. To adjust the HB LED brightness, vary the signal duty cycle from 0% to 100% and maintain a minimum pulse width of 300ns. Apply the digital PWM signal to the DIM PCB pad. The DIM input of the IC is pulled up internally with a 2μA (typ) current source.

Dimming can also be performed by programming the desired dimming level through I²C. External dimming is enabled by default at each device's power up. To disable it, first uncheck **Dimming DIM Enable**, then select one of the available dimming frequencies in the **PWM Freq** dropdown menu. Individual channel brightness levels can finally be selected by writing a multiple of 50ns in the **TON1-TON6** windows and pressing the relevant button to confirm the selection.

Note: By checking **TON Master**, it is possible to set the same on time for all the channels.

For additional information on the device's digital dimming feature, refer to the *Dimming* section in the MAX25561 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 Thres** dropdown menu). To enable the hybrid dimming feature, check **Hybrid Dimming Enable**.

For additional information on the device's dimming feature, refer to the *Hybrid Dimming* section in the MAX25561 IC data sheet.

Phase-Shift Operation

The EV kit demonstrates the phase-shifting feature of the IC. Phase shift is disabled by default at each device's power up. To enable it, check **Phase Shifting Enable.** 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 **PWM Freq** and **TON1-TON6** settings if internal dimming is enabled), and all current sinks turn on and off at the same time.

LED Current Foldback Option

The EV kit demonstrates the temperature foldback feature of the IC. A shunt on jumper J4 allow connection of the device's TEMP pin to an NTC sensor (NTCLE100E3103G or a similar NTC device) through resistor R12 according to *Table 7*. A different NTC sensor can be installed on the EV kit using the J21 pins after removing RT1.

When the NTC senses a temperature higher than a limit value (set by R1), the LED current will be linearly reduced with increasing temperature down to 20% of its initial value. Temperature values which would result in a LED current lower than 20% of its initial value will cause the complete turning off of the current sinks.

For additional information on the device's temperature foldback operation, refer to the *Temperature Foldback* section in the MAX25561 IC data sheet.

Table 7. TEMP Pin Connection (J4)

SHUNT POSITION	TEMP PIN	EV KIT OPERATION
1-2*	TEMP connected to V18	Temperature foldback disabled
2-3	TEMP connected to NTC through 2kΩ resistor	Temperature foldback enabled

**Default position.*

Fault-Indicator Output (FLT)

The EV kit features the device's open-drain FLTB output. The FLTB signal on the PCB pad is pulled up to the PU_V voltage by resistor R14 with jumper J24 closed. FLTB goes low when an open-LED or shorted-LED string is detected, during thermal warning/shutdown events, during boost undervoltage/input overcurrent events, and in case of IREF/ISET/RT out-of-range, LED current/dimming TON mismatch conditions. Keep jumper J23 closed to allow red LED DS4 enabling in case FLTB goes low. If DS4 signaling function is not required, jumper J23 must be kept open. PU_V logic voltage source must be provided externally (see *Table 8*).

Refer to the *Diagnostic and FLTB Output* section in the MAX25561 IC data sheet for additional information on the FLTB signal.

Table 8. FLTB Pull-up Voltage Selection (J6, J23, J24)

SHUNT POSITION			FLTB PULL-UP VOLTAGE
J6	J23	J24	
1-2	Closed	Closed	External, DS4 signaling enabled
1-2	Open	Closed	External, DS4 signaling disabled

**Default position.*

Shorted-LED Detection and Protection

The short-LED threshold is set through I^{2}C in the **SLED Thres** dropdown menu. A shorted LED is detected when the following condition is satisfied:

VOUT_1-6 > SLED Thres

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

LED short detection can be disabled by checking **SLED Detection Disable**.

Overvoltage Detection and Protection

The resistors R44 and R45 connected to BSTMON are configured for a VOUT_OVP of 35V which then equals the maximum converter output (VOUT) voltage. During an open-LED string condition, the converter output ramps up to the output overvoltage threshold. Capacitor C63 can be added to provide noise filtering to the overvoltage signal. To reconfigure the circuit for a different voltage, replace resistor R44 with a different value using the following equation:

R44 = [(VOUT_OVP/0.95) - 1] x R45

where R45 is 1kΩ, VOUT_OVP is the overvoltage-protection threshold desired, and R44 is the new resistor value for obtaining the desired overvoltage protection.

Refer to the *Open-LED Management and Overvoltage Protection* section in the MAX25561 IC data sheet for additional information.

Fading Function

The fading option feature can be enabled for all dimming conditions (external or internal, with or without hybrid dimming) by checking **Fade-In-Out Enable**. With fading enabled, any dimming duty cycle change will be applied incrementally following an exponential increase/decrease with a gain of 6.25% per dimming cycle sequence (or 12.5% if **Fade-In-Out Gain** is checked).

Depending on the value set in the **TDIM** dropdown menu, the user is also able to set a delay after which each duty cycle update will be carried out. The fading duty cycle update will occur every 2^{TDIM} dimming cycles, where 2^{TDIM} can be equal to one of the following values: 1, 2, 4, 8, 16, or 32.

Refer to the *Automatic Fade-In/Fade-Out During Dimming* section in the MAX25561 IC data sheet for additional information.

Ordering Information

PART	TYPE
MAX25561EVKITA#	EV Kit

#Denotes RoHS-compliant.

MAX25561 EV Kit Bill of Materials

PART	DNI	MFG PART #	QTY	DESCRIPTION
1V8PICO, 3V3PICO, BATT, NGATE, NTC, SENSE, V18	—	5005	7	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
BATT_IN, PGND	—	6095	2	CONNECTOR; FEMALE; PANELMOUNT; NON-INSULATED RECESSED HEAD BANANA JACK; STRAIGHT THROUGH; 1PIN
C2, C14, C18	—	UMK107AB7105KA; CC0603KRX7R9BB105	3	CAP; SMT (0603); 1UF; 10%; 50V; X7R; CERAMIC
C3	—	GRM188C71E225KE11	1	CAP; SMT (0603); 2.2UF; 10%; 25V; X7S; CERAMIC
C4, C5	—	C0603C223K5RAC; GRM188R71H223K;	2	CAP; SMT (0603); 0.022UF; 10%; 50V; X7R; CERAMIC

		C1608X7R1H223K080AA; GCJ188R71H223KA01		
C6, C52	—	C0603C100K1GAC	2	CAP; SMT (0603); 10PF; 10%; 100V; C0G; CERAMIC
C8	—	C0603H101J5GAC	1	CAP; SMT (0603); 100PF; 5%; 50V; C0G; CERAMIC
C9, C15, C19, C35, C38, C53, C68	—	CC0603KRX7R0BB104; GRM188R72A104KA35; HMK107B7104KA; 06031C104KAT2A; GRM188R72A104K	7	CAP; SMT (0603); 0.1UF; 10%; 100V; X7R; CERAMIC
C11	—	C0603C683J5RAC; C0603X683J5RAC	1	CAP; SMT (0603); 0.068UF; 5%; 50V; X7R; CERAMIC
C20, C34	—	C2012X7R1H225K125AC	2	CAP; SMT (0805); 2.2UF; 10%; 50V; X7R; CERAMIC
C22	—	EEE-TG1H470UP	1	CAP; SMT (CASE_F); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
C36, C37	—	GRM32ER71H106KA12; CL32B106KBJNNN; UMJ325KB7106KMH; 12105C106K4Z2A	2	CAP; SMT (1210); 10UF; 10%; 50V; X7R; CERAMIC
C49	—	06035C101JAT	1	CAP; SMT (0603); 100PF; 5%; 50V; X7R; CERAMIC
C71	—	50HVP56M	1	CAP; SMT; 56UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
D9	—	B160B-13-F	1	DIODE; SCH; SMB (DO-214AA); PIV=60V; IF=1A
D10	—	PMEG100T050ELPE-Q	1	DIODE; SCH; SMT (SOT-1289); PIV=100V; IF=5A
D11	—	CMPD914E	1	DIODE; SWT; SMT (SOT23-3); PIV=150V; IF=0.1A
D13	—	1N4148WT	1	DIODE; SWT; SMT (SOD-523); PIV=75V; IF=0.25A
DIM, EN, EXT_PU, FLT, GND7-GND9, GND11-GND14, OUT1-OUT6, SCL, SDA, SYNC, VBOOST1, VTEMP	—	9020 BUSS	22	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
DS2	—	LGL29K-F2J1-24-Z	1	DIODE; LED; SMARTLED; GREEN; SMT; PIV=1.7V; IF=0.02A
DS4	—	LTST-C170EKT	1	DIODE; LED; STANDARD; RED; SMT (0805); PIV=2.0V; IF=0.02A;
J1, J2, J4-J6	—	PEC03SAAN	5	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
J3, J7-J14, J18-J21, J23, J24	—	PBC02SAAN	15	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
J16	—	DF11-6DP-2DSA(24)	1	CONNECTOR; MALE; THROUGH HOLE; DF11 SERIES; DOUBLE-ROW CONNECTOR; STRAIGHT; 6PINS;
J25	—	HTSW-112-11-G-S-RA	1	CONNECTOR; MALE; THROUGH HOLE; SQUARE POST HEADER; RIGHT ANGLE; 12PINS ;

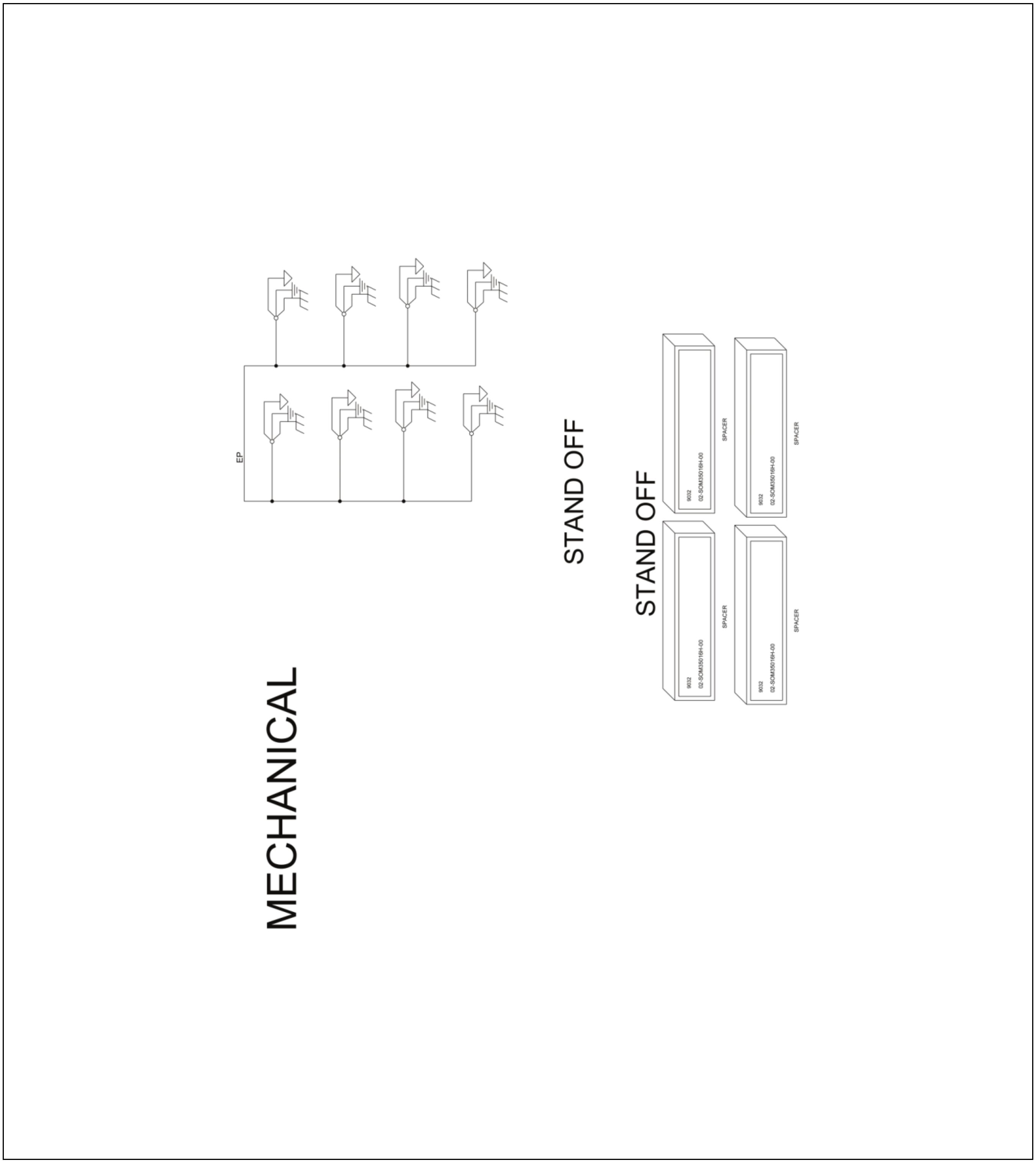
JMP2-JMP7	—	22-28-4043	6	CONNECTOR; MALE; THROUGH HOLE; FLAT VERTICAL BREAKAWAY; STRAIGHT; 4PINS
L1	—	SRP1238A-R60M	1	INDUCTOR; SMT; SHIELDED; 0.6UH; 20%; 29A
L2	—	XAL1510-472ME	1	INDUCTOR; SMT; COMPOSITE; 4.7UH; 20%; 29A
Q1	—	BSS84	1	ENHANCEMENT MODE FIELD EFFECT TRANSISTOR, P-CHANNEL, SOT-23, PD=0.36W, ID=-0.13A, VDSS=-50V, -55degC TO +150degC
Q2	—	NTMFS5C673NLT1G	1	TRAN; NCH; MOSFET; SO-8FL; PD-(46W); I-(50A); V-(60V)
Q3	—	NVMFS5C677NLT1G	1	TRAN; NCH; POWER MOSFET; SO-8FL; PD-(3.5W); I-(36A); V-(60V)
R1	—	CRCW06036K04FK	1	RES; SMT (0603); 6.04K; 1%; +/-100PPM/DEGC; 0.1000W
R2	—	CRCW06033K00FK	1	RES; SMT (0603); 3K; 1%; +/-100PPM/DEGC; 0.1000W
R3	—	CRCW06030000Z0	1	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W
R4, R20, R52-R54, R56	—	MCR03EZPFX2002; ERJ-3EKF2002; CR0603-FX-2002ELF; CRCW060320K0FK; RMCF0603FT20K0	6	RES; SMT (0603); 20K; 1%; +/-100PPM/DEGC; 0.1000W
R5, R35	—	CRCW060315K0FK	2	RES; SMT (0603); 15K; 1%; +/-100PPM/DEGC; 0.1000W
R6, R11	—	CRCW06031K50FK	2	RES; SMT (0603); 1.5K; 1%; +/-100PPM/DEGC; 0.1000W
R7	—	ERJ-3EKF6492	1	RES; SMT (0603); 64.9K; 1%; +/-100PPM/DEGC; 0.1000W
R10	—	LRC-LRZ2010LF-R000	1	RES; SMT (2010); 0; JUMPER; CURRENT SENSE
R12	—	CRCW06032K00FKEAHP	1	RES; SMT (0603); 2K; 1%; +/-100PPM/DEGK; 0.2500W
R14, R16	—	CHPHT0603K1002FGT	2	RES; SMT (0603); 10K; 1%; +/-100PPM/DEGC; 0.0125W
R15	—	CR0603-FX-1001ELF;RC0603FR-071KL	1	RES; SMT (0603); 1K; 1%; +/-100PPM/DEGC; 0.1000W
R17	—	CRCW06031M00FK; MCR03EZPFX1004	1	RES; SMT (0603); 1M; 1%; +/-100PPM/DEGC; 0.1000W
R18, R22, R26, R27, R48, R50, R51, R63-R74	—	CRCW06030000ZS; MCR03EZPJ000; ERJ-3GEY0R00; CR0603AJ/-000ELF	19	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W
R21	—	TNPW060310K0BE; RN731JTTD1002B	1	RES; SMT (0603); 10K; 0.10%; +/-25PPM/DEGK; 0.1000W
R23, R24	—	TLRP3A30DR012F	2	RES; SMT (2512); 0.012; 1%; +/-50PPM/DEGC; 3W;
R29, R34, R36-R39, R61	—	CRCW06039K10FKEAC	7	RES; SMT (0603); 9.1K; 1%; +/-100PPM/DEGK; 0.1000W

R31	—	CRCW06034K30FK	1	RES; SMT (0603); 4.3K; 1%; +/-100PPM/DEGK; 0.1000W
R32	—	CRCW06031K80FK	1	RES; SMT (0603); 1.8K; 1%; +/-100PPM/DEGC; 0.1000W
R33	—	ERJ-3RQF4R7	1	RES; SMT (0603); 4.7; 1%; +/-100PPM/DEGC; 0.1000W
R40	—	CRCW060310R0FK; MCR03EZPFX10R0; ERJ-3EKF10R0	1	RES; SMT (0603); 10; 1%; +/-100PPM/DEGC; 0.1000W
R43	—	CRCW08050000ZS; RC2012J000	1	RES; SMT (0805); 0; JUMPER; JUMPER; 0.1250W
R44	—	RT0805BRD0736KL	1	RES; SMT (0805); 36K; 0.10%; +/-25PPM/DEGC; 0.1250W;
R45	—	TNPW08051K00BE; RN732ATTD1001B	1	RES; SMT (0805); 1K; 0.10%; +/-25PPM/DEGK; 0.1250W
R46	—	CPF0603B22KE	1	RES; SMT (0603); 22K; 0.10%; +/-25PPM/DEGC; 0.0630W
R75	—	ERJ-3EKF2402	1	RES; SMT (0603); 24K; 1%; +/-100PPM/DEGC; 0.1000W
R76, R77, R79	—	WSR5R0660D	3	RES; SMT (4527); 0.066; 0.5%; +/-75PPM/DEGC; 5W;
R78	—	CRCW060333K0FK	1	RES; SMT (0603); 33K; 1%; +/-100PPM/DEGC; 0.1000W
R80	—	CRCW060343K0FK	1	RES; SMT (0603); 43K; 1%; +/-100PPM/DEGC; 0.1000W
R81	—	CRCW060356K0FK	1	RES; SMT (0603); 56K; 1%; +/-100PPM/DEGC; 0.1000W
R82	—	CRCW060368K0FK	1	RES; SMT (0603); 68K; 1%; +/-100PPM/DEGC; 0.1000W
RT1	—	NTCLE100E3103G	1	THERMISTOR; THROUGH HOLE-RADIAL LEAD; 10K OHM; TOL=+/-2%
SPACER1-SPACER4	—	9032	4	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
TP1, TP2	—	5011	2	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
U1	—	MAX25561ATJ/V+	1	EVKIT PART - IC; 6-CHANNEL HIGH-CURRENT WHITE LED BACKLIGHT DRIVER WITH BOOST CONTROLLER; PACKAGE OUTLINE DRAWING 21-0140; LAND PATTERN DRAWING: 90-0603; PACKAGE CODE: T3255-6C; TQFN32-EP
U3	—	MAX32625PICO	1	MODULE; BOARD; MAX32625PICO BOARD DESIGN FOR MAX32625 ARM CORTEX-M4F; BOARD; LAMINATED PLASTIC WITH COPPER CLAD;
PCB	—	MAX25561	1	PCB:MAX25561
C16, C25, C42	DNI	C2012X7R1H225K125AC	0	CAP; SMT (0805); 2.2UF; 10%; 50V; X7R; CERAMIC
C21, C74	DNI	CGA3EANP02A103J080AC	0	CAP; SMT (0603); 0.01UF; 5%; 100V; C0G; CERAMIC

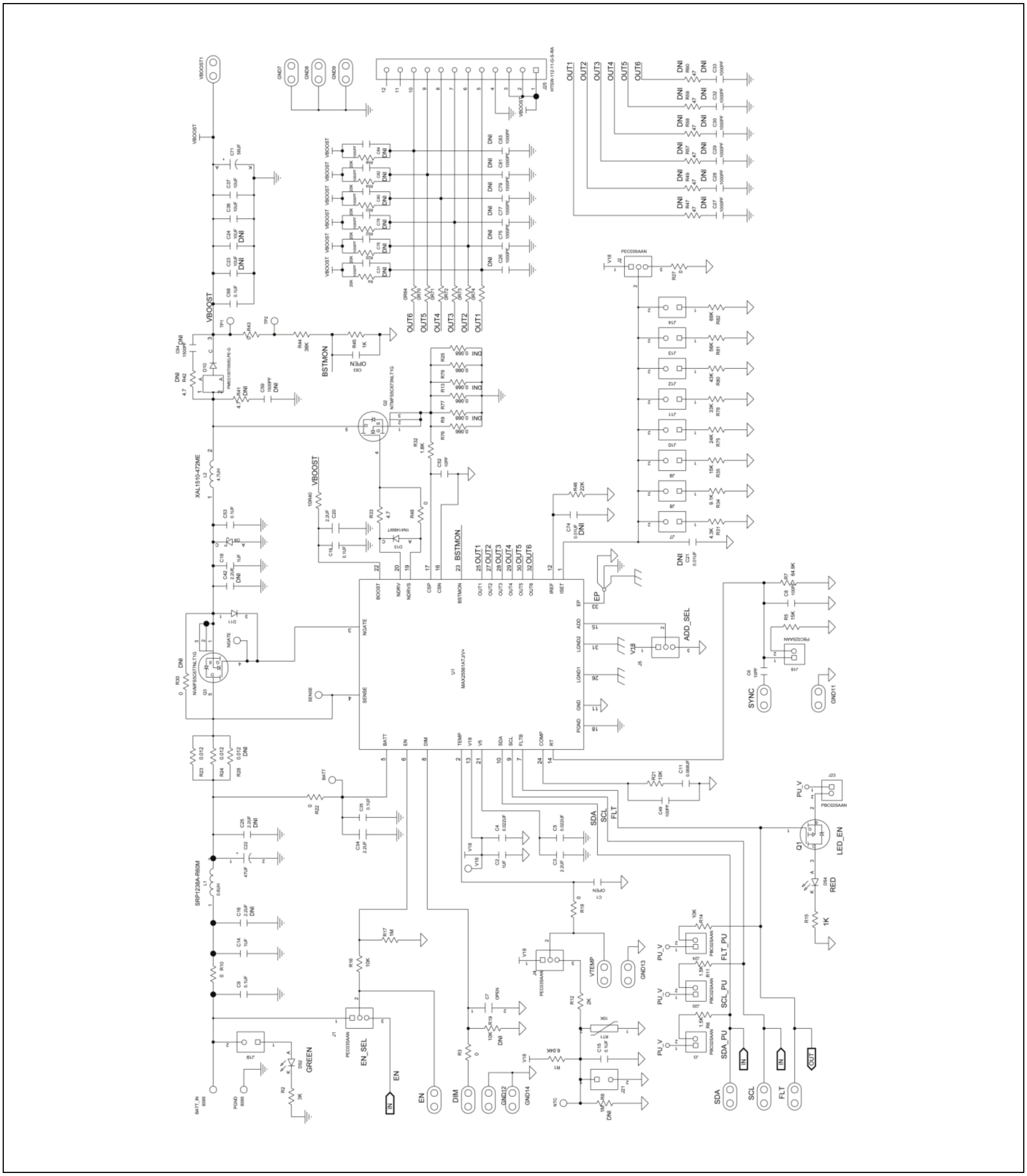
C23, C24	DNI	GRM32ER71H106KA12; CL32B106KBJNNN; UMJ325KB7106KMH; 12105C106K4Z2A	0	CAP; SMT (1210); 10UF; 10%; 50V; X7R; CERAMIC
C26-C30, C32, C33, C75, C77, C79, C81, C83	DNI	GRM1885C1H102FA01	0	CAP; SMT (0603); 1000PF; 1%; 50V; C0G; CERAMIC
C31, C76, C78, C80, C82, C84	DNI	GRM1885C1H102JA01; C1608C0G1H102J080AA; GCM1885C1H102JA16	0	CAP; SMT (0603); 1000PF; 5%; 50V; C0G; CERAMIC
C39, C40	DNI	CC0603KRX7R0BB104; GRM188R72A104KA35; HMK107B7104KA; 06031C104KAT2A; GRM188R72A104K	0	CAP; SMT (0603); 0.1UF; 10%; 100V; X7R; CERAMIC
C59, C64	DNI	C1608X8R1H152K080; GCM188R91H152KA01	0	CAP; SMT (0603); 1500PF; 10%; 50V; X8R; CERAMIC
R8	DNI	CRCW06031M00FK; MCR03EZPFX1004	0	RES; SMT (0603); 1M; 1%; +/-100PPM/DEGC; 0.1000W
R9, R13, R25	DNI	SLN5TTED68L0D	0	RES; SMT (4527); 0.068; 0.5%; +/-75PPM/DEGC; 7W
R19	DNI	CHPHT0603K1002FGT	0	RES; SMT (0603); 10K; 1%; +/-100PPM/DEGC; 0.0125W
R28	DNI	TLRP3A30DR012F	0	RES; SMT (2512); 0.012; 1%; +/-50PPM/DEGC; 3W;
R30	DNI	LRC-LRZ2010LF-R000	0	RES; SMT (2010); 0; JUMPER; CURRENT SENSE
R41, R42	DNI	ERJ-3RQF4R7	0	RES; SMT (0603); 4.7; 1%; +/-100PPM/DEGC; 0.1000W
R47, R49, R57-R60	DNI	CRCW060347R0FK	0	RES; SMT (0603); 47; 1%; +/-100PPM/DEGC; 0.1000W
C1	DNI	N/A	0	CAPACITOR; SMT (0603); OPEN; FORMFACTOR
C7	DNI	N/A	0	EVKIT USE ONLY;DUAL PACKAGE OUTLINE 0603 AND 0805 NON-POLAR CAPACITOR
C63	DNI	N/A	0	PACKAGE OUTLINE 0603 NON-POLAR CAPACITOR

DNI → Do Not Install

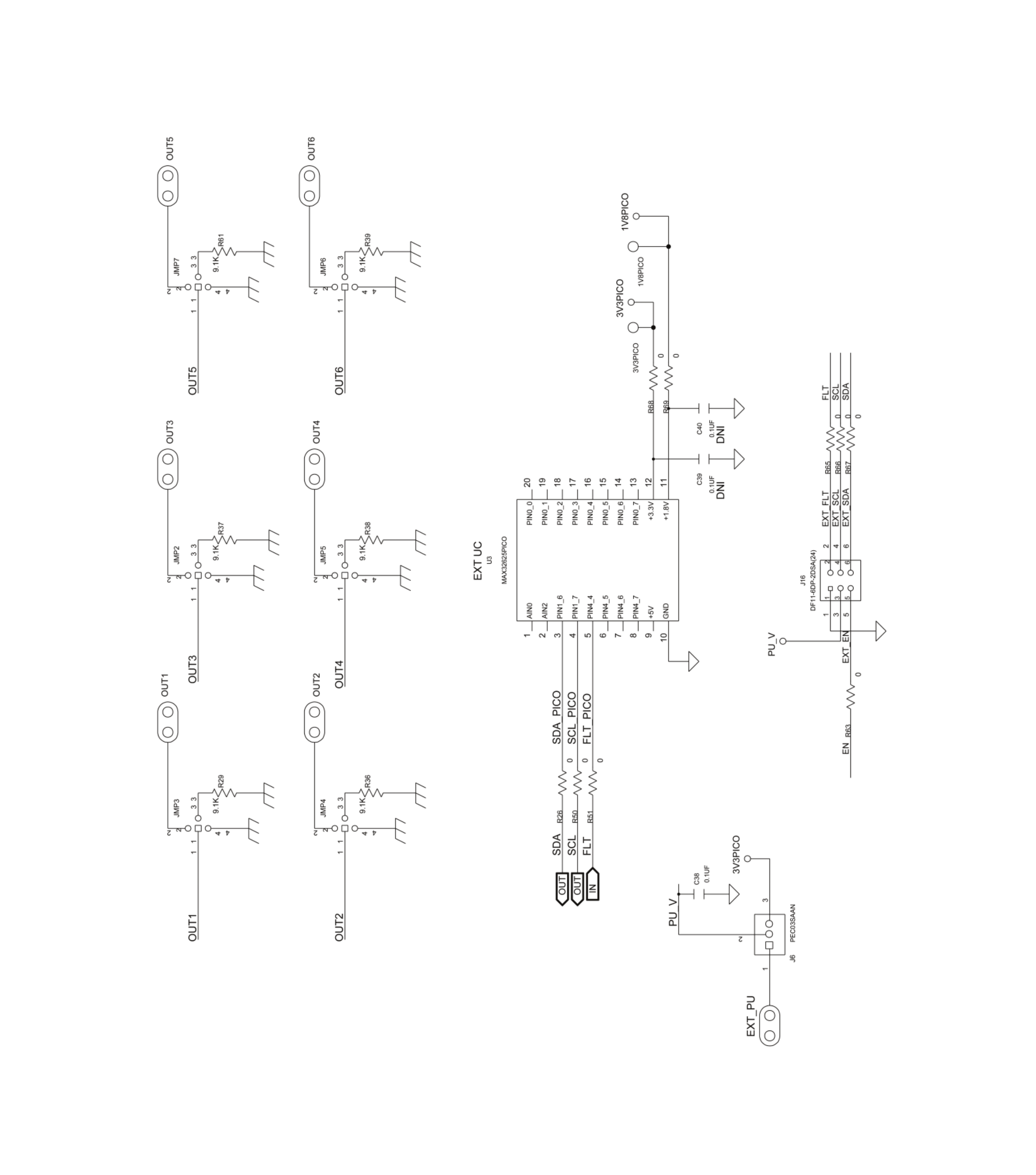
MAX25561 EV Kit Schematics



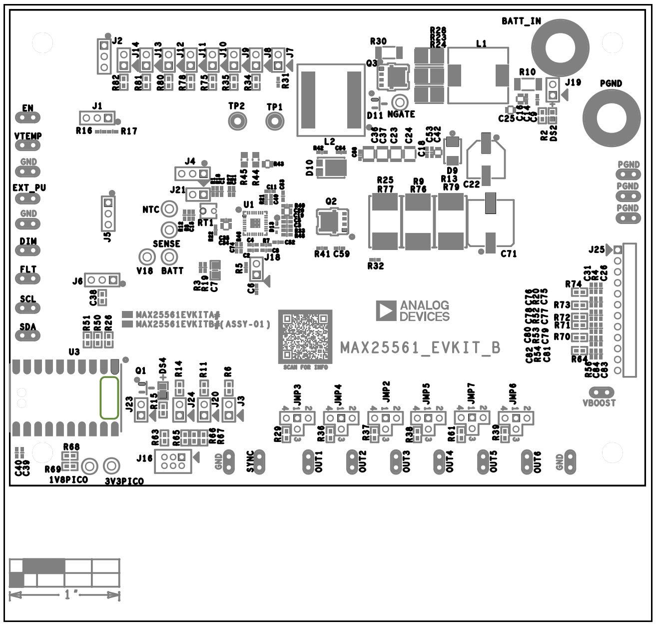
MAX25561 EV Kit Schematics (continued)



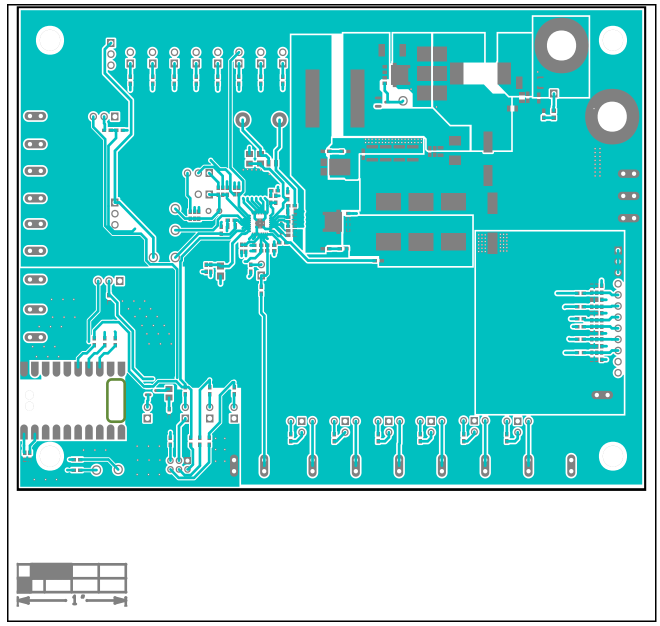
MAX25561 EV Kit Schematics (continued)



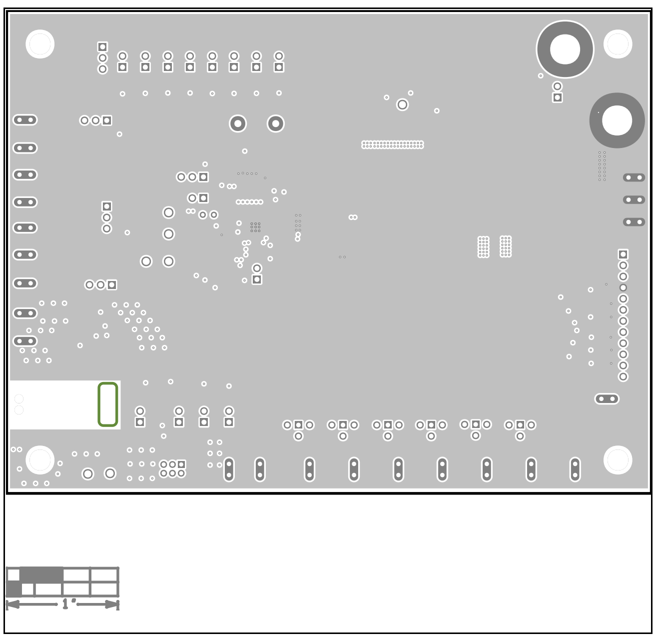
MAX25561 EV Kit PCB Layouts



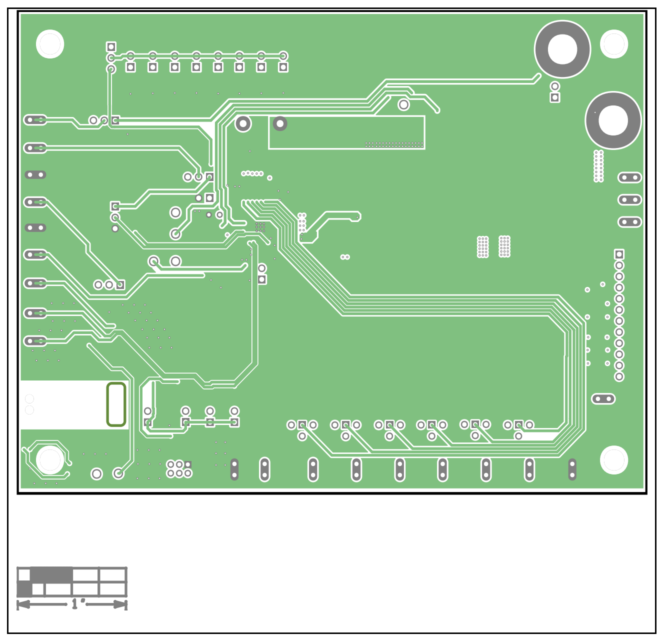
MAX25561 EV Kit Component Placement Guide—Top Silkscreen



MAX25561 EV Kit PCB Layout—Top Layer

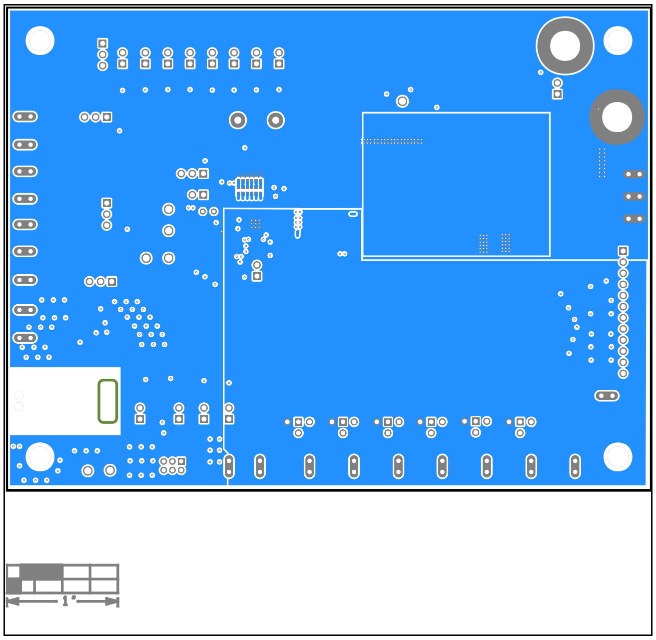


MAX25561 EV Kit PCB Layout—Internal Layer 2

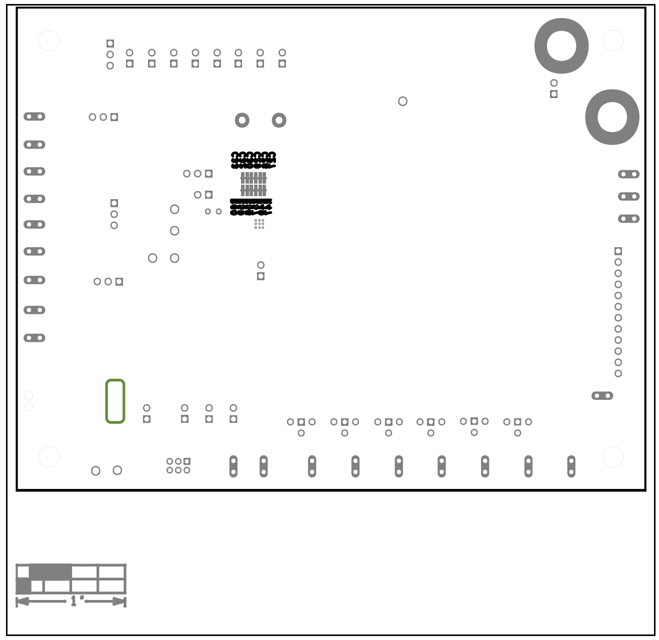


MAX25561 EV Kit PCB Layout—Internal Layer 3

MAX25561 EV Kit PCB Layouts (continued)



MAX25561 EV Kit PCB Layout—Bottom Layer



MAX25561 EV Kit Component Placement Guide—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/23	Initial release	—