

## MAX25206 Evaluation Kit

Evaluates: MAX25206/8

### General Description

The MAX25206 evaluation kit (EV kit) provides a proven design to evaluate the MAX25206/8 automotive 2.2MHz synchronous step-down controllers with 7 $\mu$ A I<sub>Q</sub>. The EV kit PCB comes with a MAX25206 IC installed, as well as various test points and jumpers for evaluation. The EV kit output voltage is fixed and is easily configured with minimum component changes. The default EV kit is designed to deliver up to 7A with input voltages from +3.5V to +60V (MAX25206) and +70V (MAX25208), but can be configured to deliver up to 20A. Output voltage quality can be monitored by observing the PGOOD signal.

### Benefits and Features

- +3.5V to +60V (MAX25206) and +70V (MAX25208) Input Supply Range
- Output Voltage: 5V or 3.3V Fixed or Adjustable between 0.7V to 20V
- Delivers up to 20A Output Current
- Frequency Synchronization Input
- Frequency Synchronization Output
- Spread-Spectrum Control
- Enable Input
- Voltage-Monitoring PGOOD Output
- Proven PCB Layout
- Fully Assembled and Tested

### Quick Start

#### Required Equipment

- MAX25206 EV Kit
- 3.5V to 60V, 7A power supply (power supply should be capable of providing 7A at 3.5V input)
- 1 Digital multimeter (DMM)
- 1 Oscilloscope
- Electronic load capable of sinking 7A

#### Procedure

The MAX25206 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Verify that all jumpers are in their default configurations according to [Table 1](#).
- 2) Connect the positive and negative terminals of the power supply to SUP and GND1 test pads, respectively.
- 3) Set the power-supply voltage to 14V and current limit to 10A.
- 4) Turn on the power supply.
- 5) Verify that OUT is approximately 5V using a digital multimeter.
- 6) Verify that the switching frequency is approximately 2.2MHz by monitoring inductor switching voltage with oscilloscope.

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

**Additional Evaluation**

- 7) Connect the positive and negative terminals of an electronic load to OUT and GND, respectively.
- 8) Set the electronic load to the desired current at or below 7A or use an equivalent resistive load with an appropriate power rating.
- 9) Turn on the electronic load.
- 10) Verify that the voltage across V<sub>OUT</sub> and GND pads is 5V ±1%.

**Detailed Description of Hardware**

**External Synchronization Input**

The device can operate in two modes: forced PWM or skip mode. Skip mode has better efficiency for light-load conditions. When SYNC is pulled low, the device operates in skip mode for light loads and PWM mode for larger loads. When SYNC is pulled high, the device is forced to operate in PWM across all load conditions. SYNC can be used to synchronize with other supplies if a clock source is present. The device is forced to operate in PWM when SYNC is connected to a clock source.

**Buck Output Monitoring (PGOOD)**

The EV Kit provides a power-good output test point (PGOOD) to monitor the status of the buck output (OUT). PGOOD is pulled low when the output voltage is out of regulation.

**Evaluating MAX25206/8**

The device is available in fixed +5V and +3.3V outputs. The EV kit comes installed with the +5V output version. To externally configure the output voltage, remove R1 and place appropriate resistors in positions R17 & R19. To optimize efficiency, refer to the MAX25206/7/8 IC datasheet.

**Table 1. Default Jumper Settings**

| JUMPER | DEFAULT SHUNT POSITION | FUNCTIONS          |
|--------|------------------------|--------------------|
| ENABLE | 1&2                    | Buck enabled       |
| SPS    | 2&3                    | No spread spectrum |
| SYNC   | 1&2                    | FPWM mode          |
| ENBK   | 2&3                    | Pulled to ground   |

**Ordering Information**

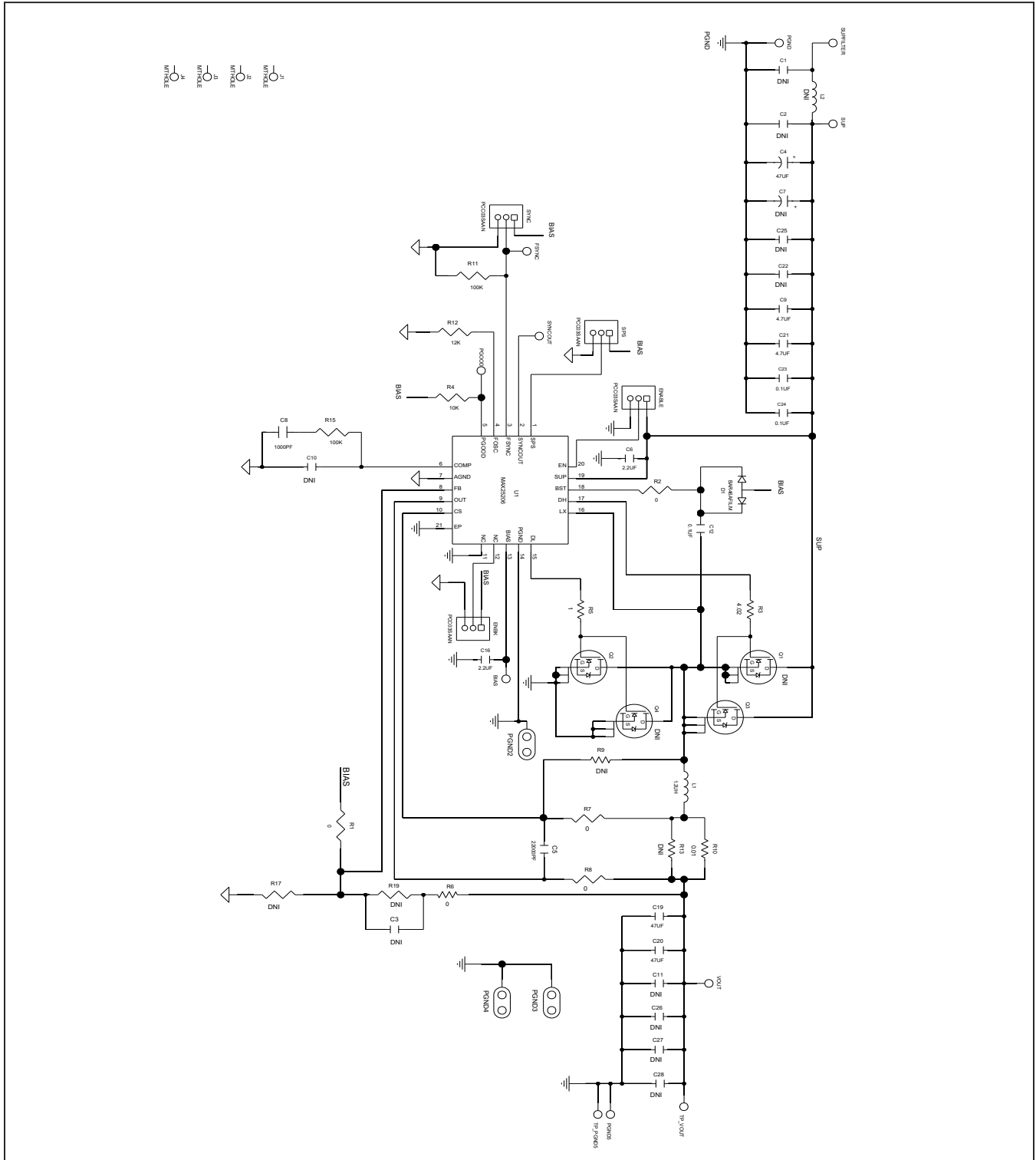
| PART           | TYPE   |
|----------------|--------|
| MAX25206EVKIT# | EV Kit |

#Denotes RoHS compliant.

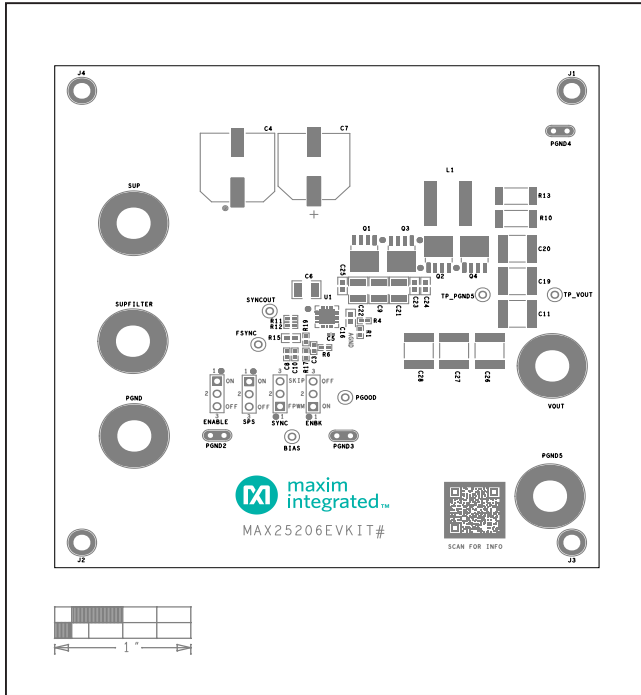
MAX25206 EV Kit Bill of Materials

| MAX25206EVKIT# Default: 5Vout, 2.2MHz, 7A       |     |   |   |
|---|-----|---|---|
| REFERENCE DESIGNATOR                            | QTY | DESCRIPTION   | MFG PART #  |
| C4  | 1   | 47µF ±20% 100V Aluminum-Electrolytic Capacitor (CASE H13) | EEV-TG2A470Q  |
| C5  | 1   | 22000PF ±5% 50V Ceramic Capacitor (0402)                  | GCM155R71H223JA55   |
| C6  | 1   | 2.2µF ±10% 100V X7R Ceramic Capacitor (1210)              | GRM32ER72A225KA35;CGA6N3X7R2A225K230AB;CC1210KX7R0BB225;HMK325B7225KM               |
| C8  | 1   | 1000pF ±10% 50V X7R Ceramic Capacitor (0402)              | GCM155R71H102KA37   |
| C9, C21   | 2   | 4.7µF ±10% 100V X7R Ceramic Capacitor (1210)              | CNA6P1X7R2A475K250AE  |
| C12, C23, C24                                   | 3   | 0.1µF ±10% 100V X7R Ceramic Capacitor (0603)              | CC0603KRX7R0BB104;GRM188R72A104KA35;GCJ188R72A104KA01;HMK107B7104KA;06031C104 KAT2A |
| C16   | 1   | 2.2µF ±10% 10V X7R Ceramic Capacitor (0603)               | GRM188R71A225KE15;CL10B225KP8N3N;C1608X7R1A225K080AC                                |
| C19, C20  | 2   | 47µF ±20% 25V X7R Ceramic Capacitor (2220)                | CGA9N3X7R1E476M230KB  |
| L1  | 1   | 1.2µH ±20% 26.3A Composite Inductor                       | XAL1060-122ME   |
| Q2, Q3  | 2   | N-Channel 80V Surface Mount SO-8L (6.15mmx5.13mm)         | SQJA84EP-T1 GE3   |
| R1, R2, R6-R8                                   | 5   | 0Ω Resistor (0402)  | CRCW04020000Z0EDHP; RCS04020000Z0   |
| R3  | 1   | 4.02Ω Resistor (0402)                                     | CRCW04024R02FKED  |
| R4  | 1   | 10kΩ Resistor (0402)                                      | CRCW040210K0FK;RC0402FR-0710KL  |
| R5  | 1   | 1Ω Resistor (0402)  | CRCW04021R00FK  |
| R10   | 1   | 0.01Ω Resistor (2512)                                     | PMR100HZPFU10L0   |
| R11   | 1   | 100kΩ Resistor (0402)                                     | TNPW0402100KBE  |
| R12   | 1   | 12kΩ Resistor (0402)                                      | ERJ-2RKF1202  |
| R15   | 1   | 100kΩ Resistor (0603)                                     | RCS0603100KFKEA   |
| U1  | 1   | VERSATILE AUTOMOTIVE 60V 2.2MHZ BUCK CONTROLLER           | MAX25206  |
| D1  | 1   | Schottky Diode SMT 100V (SOT23-3)                         | BAR46AFILM  |
| Alternate Configuration #1: 16Vout, 440kHz, 7A  |     |   |   |
| REFERENCE DESIGNATOR                            | QTY | DESCRIPTION   | MFG PART #  |
| C4  | 1   | 47µF ±20% 100V Aluminum-Electrolytic Capacitor (CASE H13) | EEV-TG2A470Q  |
| C5  | 1   | 22000PF ±5% 50V Ceramic Capacitor (0402)                  | GCM155R71H223JA55   |
| C6  | 1   | 2.2µF ±10% 100V X7R Ceramic Capacitor (1210)              | GRM32ER72A225KA35;CGA6N3X7R2A225K230AB;CC1210KX7R0BB225;HMK325B7225KM               |
| C8  | 1   | 1800pF ±5% 50V X7R Ceramic Capacitor (0402)               | GRM155R71H182JA01   |
| C9, C21   | 2   | 4.7µF ±10% 100V X7R Ceramic Capacitor (1210)              | CNA6P1X7R2A475K250AE  |
| C12, C23, C24                                   | 3   | 0.1µF ±10% 100V X7R Ceramic Capacitor (0603)              | CC0603KRX7R0BB104;GRM188R72A104KA35;GCJ188R72A104KA01;HMK107B7104KA;06031C104 KAT2A |
| C16   | 1   | 2.2µF ±10% 10V X7R Ceramic Capacitor (0603)               | GRM188R71A225KE15;CL10B225KP8N3N;C1608X7R1A225K080AC                                |
| C19, C20  | 2   | 47µF ±20% 25V X7R Ceramic Capacitor (2220)                | CGA9N3X7R1E476M230KB  |
| L1  | 1   | 10µH ±20% 15.5A Composite Inductor                        | XAL1010-103ME   |
| Q2, Q3  | 2   | N-Channel 80V Surface Mount SO-8L (6.15mmx5.13mm)         | SQJA84EP-T1 GE3   |
| R2, R6-R8                                       | 4   | 0Ω Resistor (0402)  | CRCW04020000Z0EDHP; RCS04020000Z0   |
| R3  | 1   | 4.02Ω Resistor (0402)                                     | CRCW04024R02FKED  |
| R4, R17   | 2   | 10kΩ Resistor (0402)                                      | CRCW040210K0FK;RC0402FR-0710KL  |
| R5  | 1   | 1Ω Resistor (0402)  | CRCW04021R00FK  |
| R10   | 1   | 0.01Ω Resistor (2512)                                     | PMR100HZPFU10L0   |
| R11   | 1   | 100kΩ Resistor (0402)                                     | TNPW0402100KBE  |
| R12   | 1   | 66.5kΩ Resistor (0402)                                    | ERJ-2RKF6652  |
| R15   | 1   | 120kΩ Resistor (0603)                                     | CRCW0603120KFKEA  |
| R19   | 1   | 220kΩ Resistor (0402)                                     | ERJ-2RKF2203  |
| U1  | 1   | VERSATILE AUTOMOTIVE 60V 2.2MHZ BUCK CONTROLLER           | MAX25206  |
| D1  | 1   |   | DO NOT INSTALL  |
| Alternate Configuration #2: 14Vout, 440kHz, 20A |     |   |   |
| REFERENCE DESIGNATOR                            | QTY | DESCRIPTION   | MFG PART #  |
| C4  | 1   | 47µF ±20% 100V Aluminum-Electrolytic Capacitor (CASE H13) | EEV-TG2A470Q  |
| C5  | 1   | 22000PF ±5% 50V Ceramic Capacitor (0402)                  | GCM155R71H223JA55   |
| C6  | 1   | 2.2µF ±10% 100V X7R Ceramic Capacitor (1210)              | GRM32ER72A225KA35;CGA6N3X7R2A225K230AB;CC1210KX7R0BB225;HMK325B7225KM               |
| C7  | 1   | 240µF ±20% 63V Aluminum-Electrolytic Capacitor (CASE KE0) | EMHS630ARA241MKE0S  |
| C8  | 1   | 1800pF ±5% 50V X7R Ceramic Capacitor (0402)               | GRM155R71H182JA01   |
| C9, C21   | 2   | 4.7µF ±10% 100V X7R Ceramic Capacitor (1210)              | CNA6P1X7R2A475K250AE  |
| C10   | 1   | 8.2pF ±0.25% 50V X7R Ceramic Capacitor (0402)             | GRM155R71H182JA01   |
| C11, C19, C20, C26-28                           | 6   | 47µF ±20% 25V X7R Ceramic Capacitor (2220)                | CGA9N3X7R1E476M230KB  |
| C12, C23, C24                                   | 3   | 0.1µF ±10% 100V X7R Ceramic Capacitor (0603)              | CC0603KRX7R0BB104;GRM188R72A104KA35;GCJ188R72A104KA01;HMK107B7104KA;06031C104 KAT2A |
| C16   | 1   | 2.2µF ±10% 10V X7R Ceramic Capacitor (0603)               | GRM188R71A225KE15;CL10B225KP8N3N;C1608X7R1A225K080AC                                |
| L1  | 1   | 2µH ±20% 26.3A Composite Inductor                         | XAL1580-202ME   |
| Q1-Q4   | 4   | N-Channel 80V Surface Mount SO-8L (6.15mmx5.13mm)         | SQJA84EP-T1 GE3   |
| R2, R6-R8                                       | 4   | 0Ω Resistor (0402)  | CRCW04020000Z0EDHP; RCS04020000Z0   |
| R3  | 1   | 2Ω Resistor (0402)  | CRCW04022R0FK;CRCW04022R00FK  |
| R4, R17   | 2   | 10kΩ Resistor (0402)                                      | CRCW040210K0FK;RC0402FR-0710KL  |
| R5  | 1   | 0.51Ω Resistor (0402)                                     | ERJ-2BQFR51   |
| R10, R13  | 2   | 0.006Ω Resistor (2512)                                    | PMR100HZPFU6L00   |
| R11   | 1   | 100kΩ Resistor (0402)                                     | TNPW0402100KBE  |
| R12   | 1   | 66.5kΩ Resistor (0402)                                    | ERJ-2RKF6652  |
| R15   | 1   | 113kΩ Resistor (0603)                                     | ERJ-3EKF1133  |
| R19   | 1   | 191kΩ Resistor (0402)                                     | CRCW0402191KFK  |
| U1  | 1   | VERSATILE AUTOMOTIVE 60V 2.2MHZ BUCK CONTROLLER           | MAX25206  |

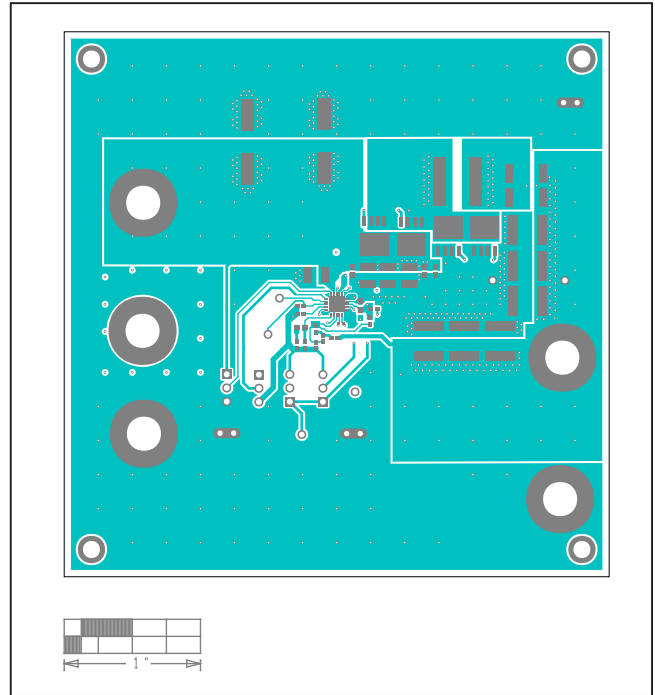
MAX25206 EV Kit Schematic



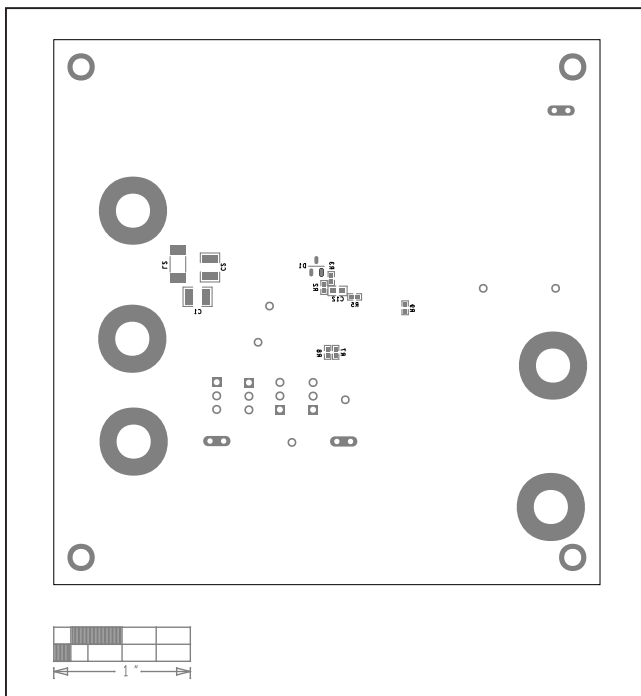
MAX25206 EV Kit PCB Layout



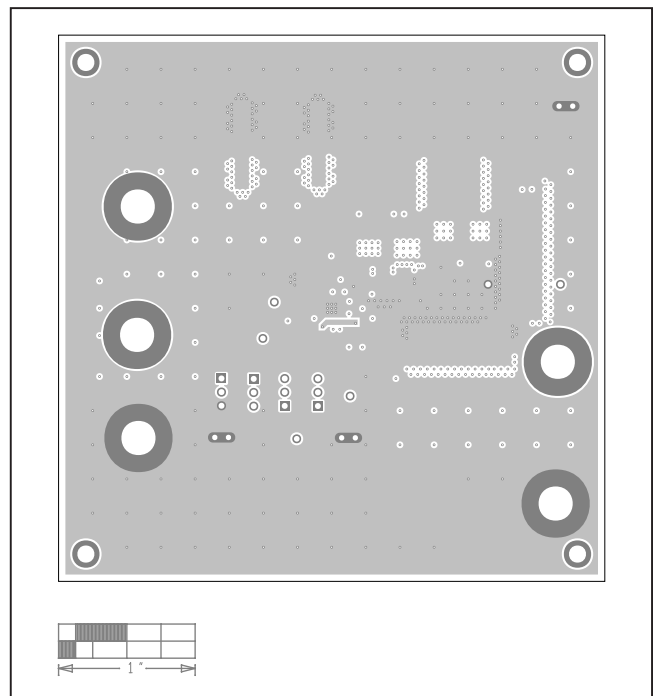
MAX25206/8 EVKit PCB Layout – Silkscreen Top



MAX25206/8 EVKit PCB Layout – Art Film – Top

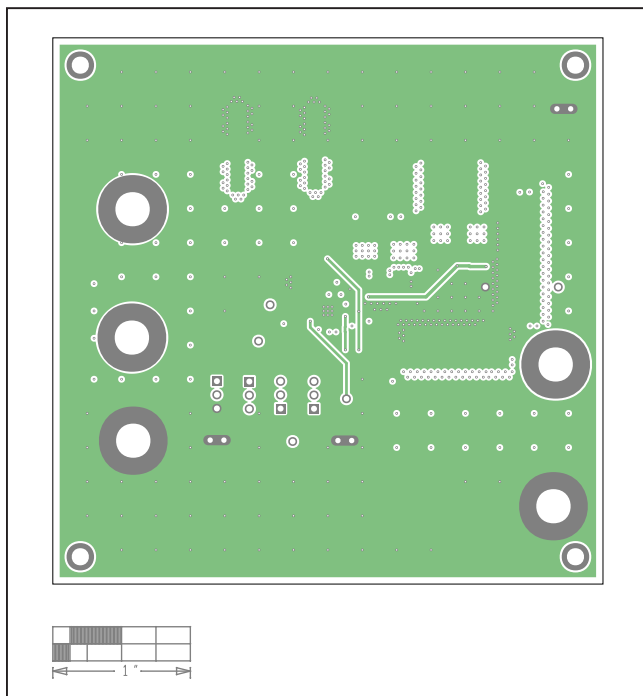


MAX25206/8 EVKit PCB Layout – Silkscreen Bottom

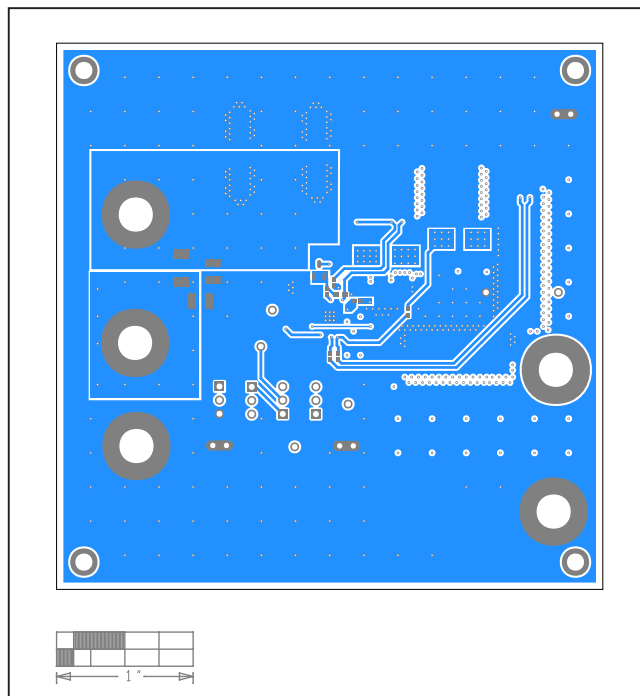


MAX25206/8 EVKit PCB Layout – Internal2

MAX25206 EV Kit PCB Layout (continued)



MAX25206/8 EVKit PCB Layout – Internal3



MAX25206/8 EVKit PCB Layout – Art Film – Bottom

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION                      | PAGES CHANGED |
|-----------------|---------------|----------------------------------|---------------|
| 0               | 12/19         | Initial release                  | —             |
| 1               | 6/20          | Removed references to MAX25207   | 1–7           |
| 2               | 1/21          | Updated <i>Bill of Materials</i> | 3             |

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

*Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.*