Click here to ask an associate for production status of specific part numbers.

Evaluates: MAX25254, MAX25255

MAX25255 Dual Phase Evaluation Kit

General Description

The MAX25255 dual phase evaluation kit (EV kit) provides a proven design to evaluate the MAX25254/MAX25255 automotive 2MHz synchronous buck converter dual phase operation. The EV kit comes with a MAX25255DAFDA/VY+ (3.3V/2MHz) installed, as well as various test points and jumpers for evaluation.

The EV kit is designed to deliver up to 12A with input voltage 3V to 36V. The output voltage quality can be monitored by observing the PGOOD1 signal. The EV kit can also be used to evaluate other MAX25254/MAX25255 variants with minimal component changes.

Features

- Input Supply Range from 3V to 36V
- Buck Provides 3.3V Fixed Output and Adjustable from 0.8V to 14V
- Delivers up to 12A/16A Output Current
- Selectable BIAS LDO Input Source
- Frequency-Synchronization Input
- Independent Enable Inputs
- Spread-Spectrum Available
- Voltage Monitoring PGOOD Output Available
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Required Equipment

- MAX25255 dual phase EV kit
- 36V, 16A DC power supply (PS)
- Appropriate resistive loads, or electronic loads that can sink 16A (EL)
- Digital multimeter (DMM)

Procedure

The EV kit comes fully assembled and tested. Use the following steps to verify board operation:

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

1) Verify that all jumpers are in their default positions, as shown in Table 1.
2) Connect the positive and negative terminals of the power supply to the VSUPF and GND test pads, respectively.
3) Set the power supply voltage to 14V.
4) Connect the positive terminal of electronic load EL to the VOUT PCB pad; connect the negative lead to the GND1 pad.
5) Set the electronic load to the desired current at or below 12A or use an equivalent resistive load with an appropriate power rating.
6) Adjust current limit on the power supply as necessary.
7) Turn on the power supply.
8) Verify the voltage across the VOUTS and GND2 is 3.3V ±2%.
9) Turn on the electronic load.
10) Verify the voltage across the VOUTS and GND2 is 3.3V ±2%.
11) Turn off the electronic load.
12) Turn off the power supply.

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Detailed Description of Hardware

The MAX25255 dual phase EV kit provides a proven layout for the MAX25255 synchronous buck regulator IC. The IC accepts input voltages as high as 36V and delivers up to 12A. The EV kit can handle an input supply transient up to 42V. Various test points are included for evaluation.

External Synchronization

The IC can operate in two modes: forced-PWM (FPWM) or skip mode. Skip mode has better efficiency for light-load conditions. When SYNC is pulled low, the IC operates in skip mode for light loads and PWM mode for larger loads. When SYNC is pulled high, the IC is forced to operate in PWM mode across all load conditions.

SYNC can be used to synchronize with an external clock signal. The IC is forced to operate in FPWM mode when SYNC is connected to a clock source.

Buck Output Monitoring (PGOOD_)

The EV kit provides two power-good output test points (PGOOD1 and PGOOD2) to monitor the status of the buck output voltage VOUT and master status. The PGOODs are pulled to high impedance when the output voltage is in regulation. PGOODs pulled to ground when the output voltage drops below 95% (typ) of its nominal regulated voltage.

Programming Buck Output Voltage

The EV kit comes installed with MAX25255DAFDA/VY+, which provides fixed 3.3V voltage regulation on VOUT. To externally adjust the voltage at VOUT from 0.8V to 14V, remove U1 MAX25255DAFDA/VY+ and replace with adjustable version IC, remove R5 and install a 0Ω resistor on R7, place appropriate resistors in the positions R8 and R9 according to the following equation:

$$R8 = R9\left[\left(\frac{VOUT}{VFB}\right) - 1\right]$$

Where typically VFB = 0.8V(typ) and R9 = 10kΩ.

Selecting EXTVCC

The MAX25255 IC provides an internal 1.8V BIAS LDO that supplies the IC internal circuitry. To reduce the IC internal power dissipation, the input of the internal BIAS LDO can be switched from VSUPF to an external supply or one of the buck converter outputs by applying the voltage to EXTVCC. The EV kit provides jumper JU_EXTVCC, which allows shunts to be installed connecting EXTVCC to VOUT. If the buck converter output is connected to EXTVCC, light-load efficiency is improved as the supply current to BIAS LDO is scaled down proportionally to the duty cycle of the buck converter.

If the EXTVCC voltage drops below 2.40V (typ), the input supply of the BIAS LDO is automatically switched back to VSUPF.

Evaluating Other Variants

The EV kit comes installed with the 3.3V/2MHz/12A variant (MAX25255DAFDA/VY+). The other variants can be installed with minimal component changes.

Analog Devices offers additional variations, including the ICs that operate at the lower switching frequency of 400kHz for increased efficiency. See the *MAX25255 Dual Phase EV Kit Bill of Materials* to select components for evaluating 400kHz variants. Refer to the MAX25254/MAX25255 IC data sheet for part variant details and contact the factory for additional variants of MAX25254/MAX25255.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTIONS
JU_EN1	1-2	BUCK1 ENABLED
JU_EN2	1-2	BUCK2 ENABLED
JU_SYNC	1-2	SYNC is pulled to BIAS to enable FPWM mode
JU_EXTVCC	Installed	EXTVCC is connected to VOUT
JU_PGOOD1	Installed	PGOOD1 is pulled up to BIAS when VOUT is in regulation
JU_PGOOD2	Installed	PGOOD2 is pulled up to BIAS when VOUT is in regulation

Ordering Information

PART	TYPE
MAX25255DUALEVKIT#	3.3V/2MHz Dual Phase EV Kit

#Denotes RoHS compliance.

MAX25255 Dual Phase EV Kit Bill of Materials

MAX25255 Dual Phase EV Kit BOM–400kHz

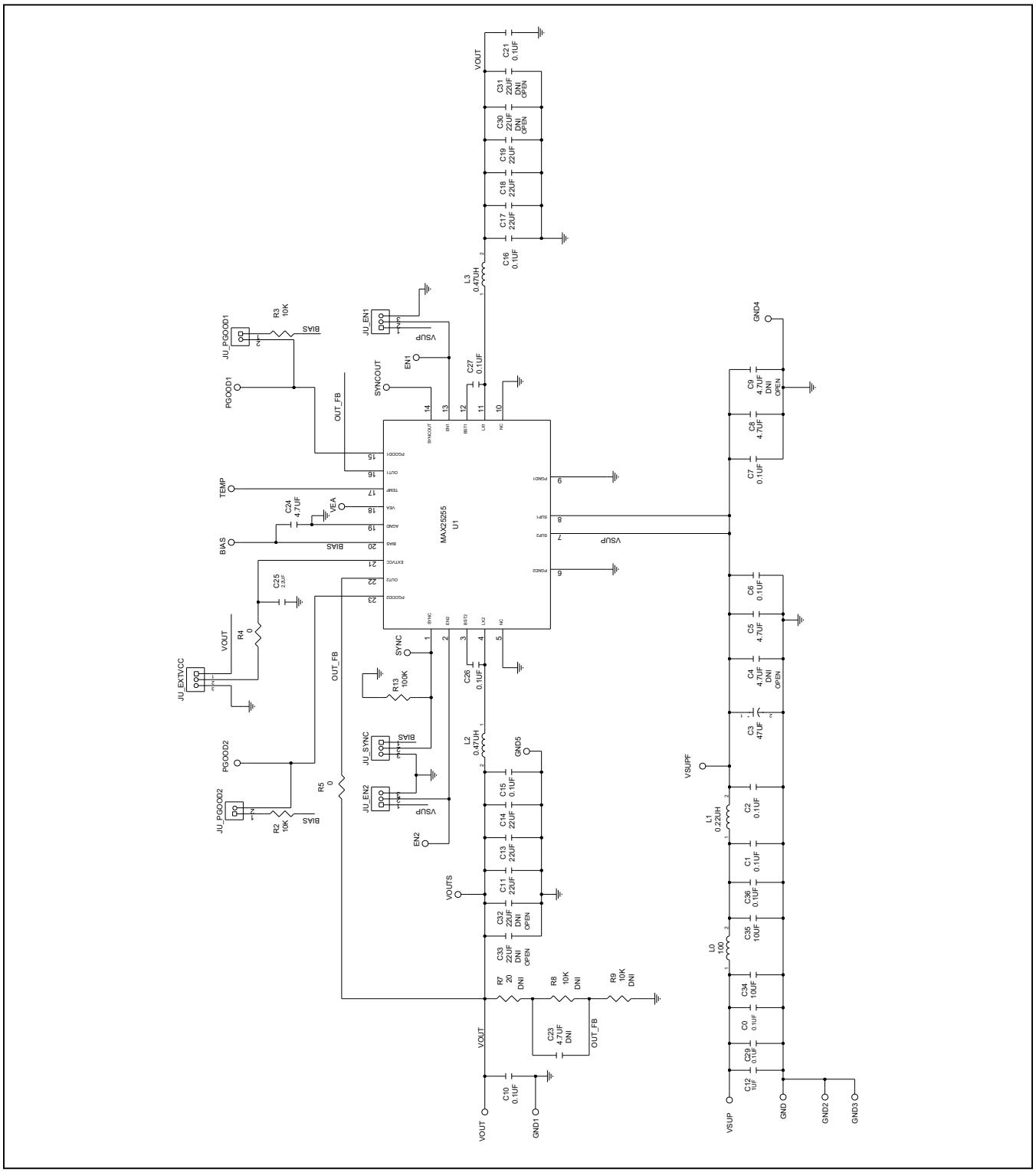
REFERENCE	QTY	PART DESCRIPTION	MANUFACTURER/PART NUMBER
U1	1	Analog Devices Dual Buck Converters, F2CQFN23	Analog Devices, MAX25255DAFDA/VY+
C0-C2, C29, C32	5	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC	TDK, CGA2B3X7R1H104K050BE
C3	1	CAP; SMT (CASE_D); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC	PANASONIC, EEE-FT1H470AP
C5, C8	2	CAP; SMT (0805); 4.7UF; 10%; 50V; X7R; CERAMIC	TDK, CGA4J1X7R1H475K125AE
C6, C7, C10, C15, C16, C21	6	CAP; SMT (0603); 0.1UF; 10%; 50V; X7R; CERAMIC	TDK, CGA3E2X7R1H104K080AA
C11, C13, C14, C17-C19	6	CAP; SMT (1210); 47UF; 10%; 10V; X7R; CERAMIC	AVX, 1210ZC476KAT2A
C12	1	CAP; SMT (0603); 1UF; 20%; 50V; X7R; CERAMIC	TAIYO YUDEN, UMK107AB7105MA
C24	1	CAP; SMT (0603); 4.7UF; 10%; 6.3V; X7R; CERAMIC	TAIYO YUDEN, JMK107BB7475KA
C25	1	CAP; SMT (0603); 2.2UF; 20%; 6.3V; X7R; CERAMIC	TDK, CGA3E1X7R0J225M080AC
C26, C27	2	CAP; SMT (0402); 0.1UF; 20%; 50V; X7R; CERAMIC	TDK, CGA2B3X7R1H104M050BB
C34, C35	2	CAP; SMT (1210); 10UF; 10%; 50V; X7S; CERAMIC	TDK, CGA6P3X7S1H106K250AB
C4, C9	0	CAP; SMT (0805); 4.7UF; 10%; 50V; X7R; CERAMIC ; DNI	TDK, CGA4J1X7R1H475K125AE
C23	0	CAP; SMT (0603); 4.7UF; 10%; 16V; X7R; CERAMIC,DNI	MURATA, GRM188Z71C475KE21
L0	1	INDUCTOR; SMT (1812); FERRITE-BEAD; 100; TOL=+/-25%; 8A	WURTH ELECTRONICS INC, 74279226101
L1	1	INDUCTOR; SMT; SHIELDED; 0.22UH; 30%; 9.5A	WURTH ELECTRONICS INC, 744373000000
L2, L3	2	INDUCTOR; SMT; COMPOSITE; 2.2UH; 20%; 18.1A	COILCRAFT, XEL6060-222ME
R2, R3	2	RES; SMT (0402); 10K; 0.10%; +/-25PPM/DEGK; 0.0630W	VISHAY DALE, TNPW040210K0BE
R4, R5	2	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W	VISHAY DALE, CRCW06030000Z0
R13	1	RES; SMT (0402); 100K; 1%; +/-100PPM/DEGC; 0.0630W	VISHAY, CRCW0402100KFK
R7	0	RES; SMT (0603)	
R8, R9	0	RES; SMT (0603)	
SU1	1	TEST POINT; SHUNT AND JUMPER; STR; TOTAL LENGTH=6.10MM; BLACK	SAMTEC, SNT-100-BK-G
JU_EN1, JU_EN2, JU_SYNC,JU_EXTVCC	4	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	SULLINS, PEC03SAAN
JU_PGOOD1, JU_PGOOD2	2	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	SULLINS, PEC02SAAN
GND, GND1, VOUT, VSUP, VSUPF	5	JACK; BANANA; 0.203IN [5.2MM] DIA X 0.218IN [5.5MM] L; 0.203D/0.218L	KEYSTONE, 575-4
BIAS, EN1, EN2, GND2-GND5, PGOOD1, PGOOD2, SYNC, VOUTS	11	TEST POINT; PIN DIA=0.125IN	KEYSTONE, 5125

MAX25255 Dual Phase EV Kit Bill of Materials (continued)

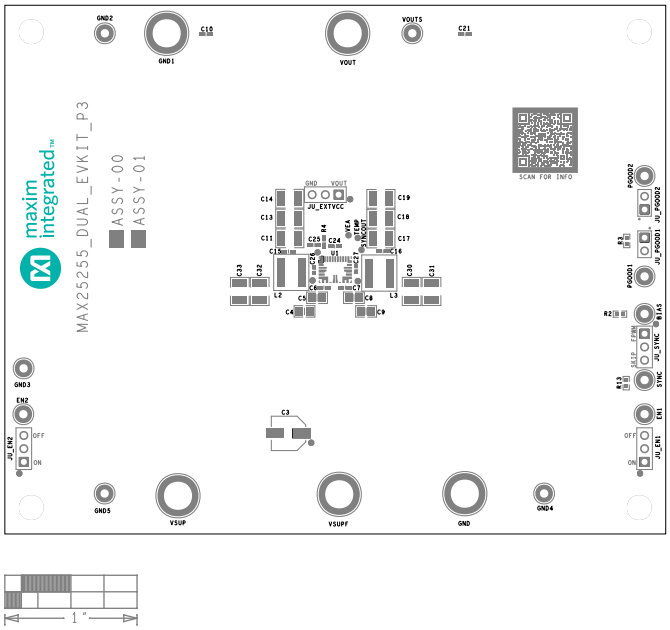
MAX25255 Dual Phase EV Kit BOM–2MHz

REFERENCE	QTY	PART DESCRIPTION	MANUFACTURER/PART NUMBER
U1	1	Analog Devices Dual Buck Converters, F2CQFN23	Analog Devices, MAX25255DAFDA/VY+
C0-C2, C29, C32	5	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC	TDK, CGA2B3X7R1H104K050BE
C3	1	CAP; SMT (CASE_D); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC	PANASONIC, EEE-FT1H470AP
C5, C8	2	CAP; SMT (0805); 4.7UF; 10%; 50V; X7R; CERAMIC	TDK, CGA4J1X7R1H475K125AE
C6, C7, C10, C15, C16, C21	6	CAP; SMT (0603); 0.1UF; 10%; 50V; X7R; CERAMIC	TDK, CGA3E2X7R1H104K080AA
C11, C13, C14, C17-C19	6	CAP; SMT (1210); 22UF; 20%; 16V; X7R; CERAMIC	TDK, CGA6P1X7R1C226M250AC
C12	1	CAP; SMT (0603); 1UF; 20%; 50V; X7R; CERAMIC	TAIYO YUDEN, UMK107AB7105MA
C24	1	CAP; SMT (0603); 4.7UF; 10%; 6.3V; X7R; CERAMIC	TAIYO YUDEN, JMK107BB7475KA
C25	1	CAP; SMT (0603); 2.2UF; 20%; 6.3V; X7R; CERAMIC	TDK, CGA3E1X7R0J225M080AC
C26, C27	2	CAP; SMT (0402); 0.1UF; 20%; 50V; X7R; CERAMIC	TDK, CGA2B3X7R1H104M050BB
C34, C35	2	CAP; SMT (1210); 10UF; 10%; 50V; X7S; CERAMIC	TDK, CGA6P3X7S1H106K250AB
C4, C9	0	CAP; SMT (0805); 4.7UF; 10%; 50V; X7R; CERAMIC ; DNI	TDK, CGA4J1X7R1H475K125AE
C23	0	CAP; SMT (0603); 4.7UF; 10%; 16V; X7R; CERAMIC,DNI	MURATA, GRM188Z71C475KE21
L0	1	INDUCTOR; SMT (1812); FERRITE-BEAD; 100; TOL=+/-25%; 8A	WURTH ELECTRONICS INC, 74279226101
L1	1	INDUCTOR; SMT; SHIELDED; 0.22UH; 30%; 9.5A	WURTH ELECTRONICS INC, 744373000000
L2, L3	2	INDUCTOR; SMT; COMPOSITE;0.47UH; 20%; 22.3A	COILCRAFT, XEL6030-4171ME
R2, R3	2	RES; SMT (0402); 10K; 0.10%; +/-25PPM/DEGK; 0.0630W	VISHAY DALE, TNPW040210K0BE
R4, R5	2	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W	VISHAY DALE, CRCW06030000Z0
R13	1	RES; SMT (0402); 100K; 1%; +/-100PPM/DEGC; 0.0630W	VISHAY, CRCW0402100KFK
R7	0	RES; SMT (0603)	
R8, R9	0	RES; SMT (0603)	
SU1	1	TEST POINT; SHUNT AND JUMPER; STR; TOTAL LENGTH=6.10MM; BLACK	SAMTEC, SNT-100-BK-G
JU_EN1, JU_EN2, JU_SYNC,JU_EXTVCC	4	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	SULLINS, PEC03SAAN
JU_PGOOD1, JU_PGOOD2	2	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	SULLINS, PEC02SAAN
GND, GND1, VOUT, VSUP, VSUPF	5	JACK; BANANA; 0.203IN [5.2MM] DIA X 0.218IN [5.5MM] L; 0.203D/0.218L	KEYSTONE, 575-4
BIAS, EN1, EN2, GND2-GND5, PGOOD1, PGOOD2, SYNC, VOUTS	11	TEST POINT; PIN DIA=0.125IN	KEYSTONE, 5125

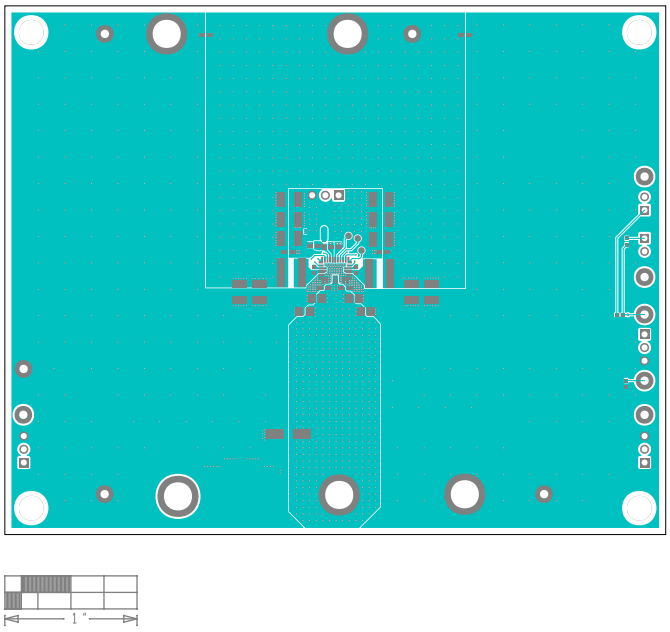
MAX25255 Dual Phase EV Kit Schematic



MAX25255 Dual Phase EV Kit PCB Layouts

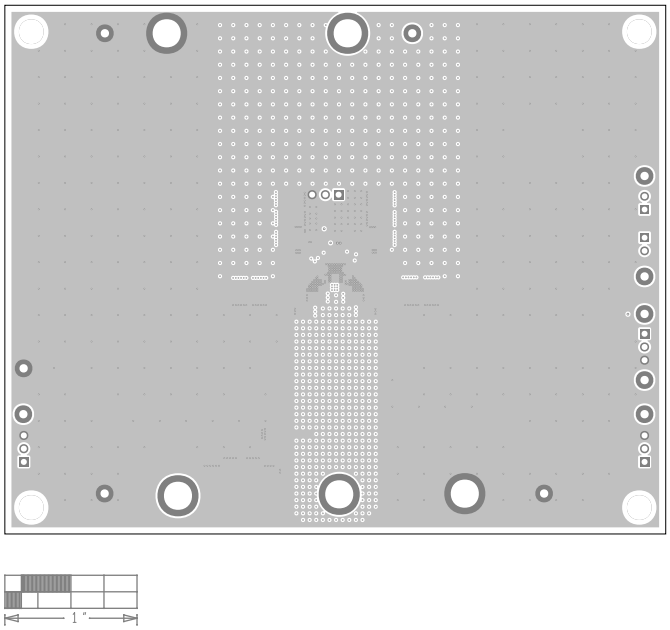


MAX25255 Dual Phase EV Kit PCB Layout—Top Silkscreen

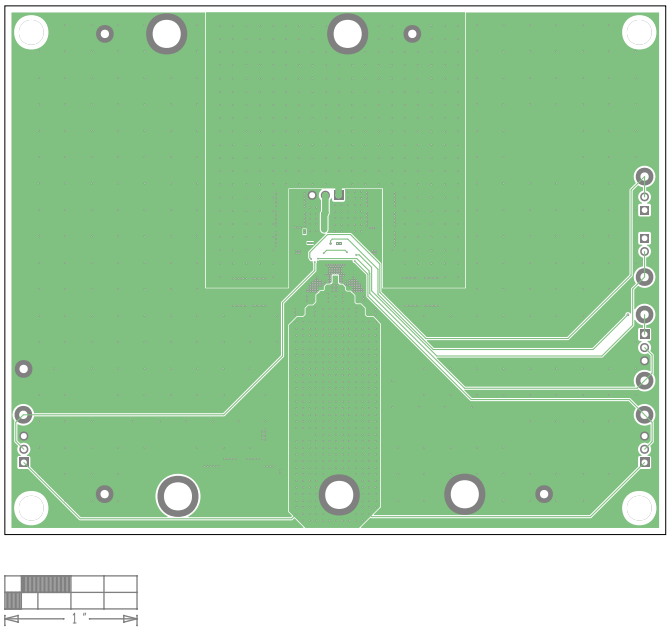


MAX25255 Dual Phase EV Kit PCB Layout—Top Layer

MAX25255 Dual Phase EV Kit PCB Layouts (continued)

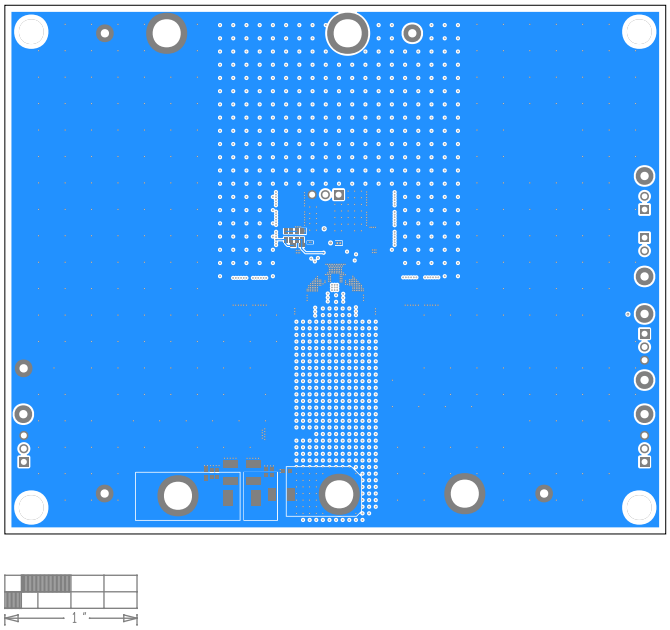


MAX25255 Dual Phase EV Kit PCB Layout—Inner Layer 2

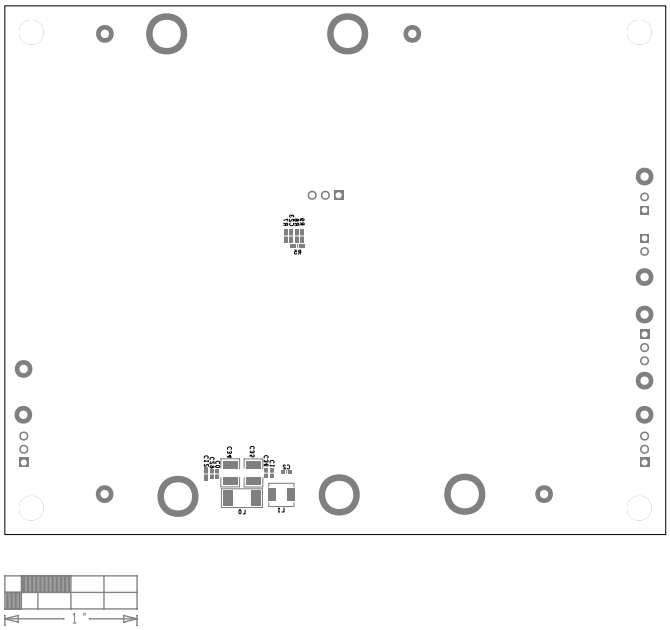


MAX25255 Dual Phase EV Kit PCB Layout—Inner Layer 3

MAX25255 Dual Phase EV Kit PCB Layouts (continued)



MAX25255 Dual Phase EV Kit PCB Layout—Bottom Layer



MAX25255 Dual Phase EV Kit PCB Layout—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/21	Initial release	—
1	8/22	Updated header, *General Description*, *Detailed Description of Hardware*, and *Bill of Materials*	All