



MAX1544/MAX1545 Evaluation Kits

General Description

The MAX1544/MAX1545 evaluation kits (EV kits) demonstrate the high-power, dynamically adjustable multiphase notebook CPU application circuit. This DC-DC converter steps down high-voltage batteries and/or AC adapters, generating a precision, low-voltage CPU core VCC rail. The MAX1544 EV kit meets the mobile and desktop AMD Hammer CPU transient voltage specification. The MAX1545 EV kit meets the desktop and mobile Pentium 4 (P4) CPUs transient voltage specification. The MAX1544/MAX1545 kits consist of the MAX1544 or MAX1545 Dual-Phase Quick-PWM™ step-down controller, two MAX1980 slave controllers and the MAX6590 temperature sensor. The MAX1544/MAX1545 kits include active voltage positioning with adjustable gain and offset, reducing power dissipation and bulk output capacitance requirements. The kit features independent four-level logic inputs for setting the suspend voltage (S0/S1).

The MAX1980 provides additional gate drive circuitry, phase synchronization, current limit, and current balancing. Precision slew-rate control provides “just-in-time” arrival at the new DAC setting, minimizing surge currents to and from the battery.

This fully assembled and tested circuit board provides a 5-bit digitally adjustable output voltage from a 7V to 24V battery input range. The EV kit operates at 300kHz switching frequency and has superior line- and load-transient response.

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Hammer is a trademark of Advanced Micro Devices, Inc.

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Features

- ◆ Quad-Phase Quick-PWM™ EV Kit
- ◆ Mobile and Desktop P4 or AMD Hammer Compatible
- ◆ Active Voltage Positioning with Adjustable Gain, Offset and Remote Sensing
- ◆ High Speed, Accuracy and Efficiency
- ◆ Low Bulk Output Capacitor Count
- ◆ Multiphase Fast-Response Quick-PWM Architecture
 - MAX1544/MAX1545 Dual-Phase Controller
 - Two MAX1980 Slave Controllers
- ◆ 7V to 24V Input Voltage Range
- ◆ 5-Bit On-Board DAC
 - Mobile P4: 0.60V to 1.75V Output Range
 - Desktop P4: 1.10V to 1.85V Output Range
 - AMD Hammer: 0.675V to 1.55V Output Range
- ◆ 68A Load-Current Capability (17A Each Phase)
- ◆ 300kHz Switching Frequency
- ◆ MAX6509 Temperature Sensor
- ◆ 40-Pin Thin QFN Package (MAX1544/MAX1545)
- ◆ 20-Pin Thin QFN Package (MAX1980)
- ◆ Fully Assembled and Tested

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1544EVKIT	0°C to +70°C	40 QFN (MAX154_)
MAX1545EVKIT		20 QFN (MAX1980)

Component List

DESIGNATION	QTY	DESCRIPTION
C1-C4, C7, C20, C25, C26, C33, C35, C62, C64	0	Not Installed (0603)
C5, C24, C36, C49	4	100pF 5% 50V C0G ceramic capacitor (0603) Murata GRM1885C1H101J
C6, C21, C23, C38, C39, C51, C60	7	0.22µF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ224KG

DESIGNATION	QTY	DESCRIPTION
C8-C12, C31, C32, C47	8	330µF, 2.5V 9mΩ Low-ESR polymer capacitor (D case) Sanyo 2R5TPE330M9
or	or	
C8-C12, C31, C32, C47	8	330µF, 2V 7mΩ Low-ESR specialty polymer capacitor (D case) Panasonic EEFS0D331XR
C13	0	Not installed (E case)
C14, C29, C58, C59	4	1000pF 10% 50V C0G ceramic capacitor (0603) Murata GRM188R71H102K



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Evaluates: MAX1544/MAX1545

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C15, C22, C34, C45	4	4700pF 10% 50V X7R ceramic capacitor (0603) Murata GRM188R71H472K (Not installed when using Si7442DP)
C16	1	2.2μF 10V X5R ceramic capacitor (0612) TDK C1632X5R1A225KTB09N
C17, C18, C19, C41, C42, C43, C53, C54, C65	9	15μF 20% 25V X5R ceramic capacitor (1812) TDK C4532X5R1E156M
C27, C40, C52	3	1μF 20% 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105KG or TDK C2012X7R1C105MKT
C28	1	47pF 5% 50V C0G ceramic capacitor (0603) Murata GRM1885C1H470J
C30, C37, C50, C56, C63	5	470pF 10% 50V X7R ceramic capacitor (0603) Murata GRM188R71H471K
C44, C48, C55, C57	4	1μF 10% 25V X7R ceramic capacitor (0805) TDK C2012X7R1E105K
C61	1	0.1μF 10% 50V X7R ceramic capacitor (0805) Murata GRM21BR71H104K
C67, C69, C70, C83, C84, C85, C87, C97-C101	12	10μF 20% 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J106M or Taiyo Yuden AMK212BJ106MG
C71-C78, C80-C82, C88-C92	16	22μF 6.3V X5R ceramic capacitor (1206) TDK C3216X5R0J226MT
D1	1	100mA, 30V Dual Schottky Diode Central Semiconductor CMPSH-3A
D2, D3, D4, D12	4	5A Schottky Diode Central Semiconductor CMSH5-40
D5, D13	2	100mA, 30V Schottky Diode Central Semiconductor CMPSH-3
D6, D11	2	200mA Switching Diode Central Semiconductor CMPD2838
D7, D10	0	Not Installed 100mA, 30V Dual Schottky Diode Central Semiconductor CMPSH-3C
J2	1	4-pin header Molex 39-29-3046
JUA0-JUA5	6	2-pin header
JU1, JU3, JU4	3	4-pin header
JU13	0	2-pin header

DESIGNATION	QTY	DESCRIPTION
JU2	1	3-pin header
L1-L4	4	0.6μH 26A 0.9mΩ Power Inductors Panasonic ETQP1H0R6BFA or Sumida CDEP134H-0R6
N1, N2, N5, N6, N7, N10, N15, N16 or N2, N7, N10, N16	8 or 4	N-channel MOSFET (SO-8) International Rectifier IRF7811W or Fairchild FDS6694 Vishay/Siliconix Si7886DP (Power PAK)
N3, N4, N8, N9, N11, N12, N13, N14	8	N-channel MOSFET (SO-8) International Rectifier IRF7822 or Fairchild FDS6688 or Vishay/Siliconix Si7442DP (Power PAK)
Q1, Q2	2	N-channel MOSFET Central Semiconductor 2N7002
R1, R8, R11, R14, R15, R17, R20, R37, R50, R52, R63, R64, R78, R98, R102	0	Not Installed, (short PC trace) (0603)
R2, R9, R39, R45	4	0.001Ω ±1% 1W resistor (2512) Panasonic ERJM1WTF1M0U
R3, R33-R35, R40, R44, R46, R48, R49, R107	10	100Ω ±5% resistor (0603)
R5, R6, R18, R24	4	1kΩ ±1% resistor (0603)
R7	1	60.4kΩ ±1% resistor (0603)
R10	1	100kΩ ±1% resistor (0603)
R12	1	20kΩ ±1% resistor (0603)
R16, R83, R84	3	10Ω ±5% resistor (0603)
R19, R21, R27, R30, R36, R51, R53, R61, R62, R65-R67, R74, R75, R81, R87, R92, R99-R101, R103-R106, R108, R109	0	Not Installed (0603)
R26, R28, R73, R76, R77, R79, R80	7	0Ω ±5% resistor (0603)
R29, R31	2	30.1kΩ ±1% resistor (0603)
R32, R42	2	150kΩ ±1% resistor (0603)
R41, R47	2	20Ω ±5% resistor (0603)
R43, R38	2	10kΩ ±5% resistor (0603)
R54-R59, R70, R95-R97, R110	11	100kΩ ±5% resistor (0603)
R60	1	11kΩ ±1% resistor (0603)
R82	1	1MΩ ±5% resistor (0603)
U2, U3	2	MAX1980ETP (20-TQFN)

MAX1544/MAX1545 Evaluation Kits

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U4	1	MAX6509HAUK-T (5-SOT23)
U5	0	MAX6509HAUK-T (5-SOT23)
None	10	Shunts
None	1	MAX1544/MAX1545 PC Board

DESIGNATION	QTY	DESCRIPTION
None	1	MAX1544/MAX1545 EV kit data sheet
None	1	MAX1544/MAX1545 data sheet
None	1	MAX1980 data sheet
None	1	MAX6509 data sheet

MAX1544 EV Kit

Additional Components

DESIGNATION	QTY	DESCRIPTION
R4, R23	2	2.61kΩ ±1% resistor (0603)
R22	1	24.9kΩ ±1% resistor (0603)
R25	1	100kΩ ±1% resistor (0603)
U1	1	MAX1544ETL (40-TQFN)
U8	1	Socket 754

MAX1545 EV Kit

Additional Components*

DESIGNATION	QTY	DESCRIPTION
R4, R23	2	3.01kΩ ±1% resistor (0603)
R22	1	182kΩ ±1% resistor (0603)
R25	1	20kΩ ±1% resistor (0603)
U1	1	MAX1545ETL (40-TQFN)
U8	1	None

*Contact Intel for the Mobile P4 specifications and contact Maxim for a reference schematic.

Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
Central Semiconductor	516-435-1110	516-435-1824	www.centalsemi.com
Fairchild Semiconductor	408-721-2181	408-721-1635	www.fairchildsemi.com
International Rectifier	310-322-3331	310-322-3332	www.irf.com
Panasonic	714-373-7939	714-373-7183	www.panasonic.com
Sumida	708-956-0666	708-956-0702	www.sumida.com
Taiyo Yuden	408-573-4150	408-573-4159	www.t-yuden.com
TDK	847-390-4373	847-390-4428	www.component.tdk.com
Vishay/Siliconix	203-268-6261	203-268-6296	www.vishay.com

Note: Please indicate that you are using the MAX1544 and MAX1545 when contacting these component suppliers.

Quick Start

Recommended Equipment

- 7V to 24V, >100W power supply, battery, or notebook AC adapter
- DC bias power supply, 5V at 1A
- One or more dummy loads capable of sinking 68A total
- Digital multimeter (DMM)
- 100MHz dual-trace oscilloscope

Procedure

- 1) Ensure that the circuit is connected correctly to the supplies and dummy load prior to applying any power.
- 2) Verify that the shunts are across JU1 pins 1 and 3 (S0) and JU3 pins 1 and 4 (S1), JU2 pins 1 and 2 (SHDN) and JU4 pins 1 and 3 (TON). The DAC code settings (D4–D0) are set for 1.50V output through installed jumpers JUA3 and JUA1. A fixed +50mV offset sets the final no load output voltage at 1.55V for the MAX1544 EV kit. A fixed -25mV offset sets the final no load output voltage at 1.45V for the MAX1545 EV kit.

- 3) Turn on the battery power before turning on the +5V bias power; otherwise, the output UVLO timer times out and the FAULT latch is set, disabling the regulator until +5V power is cycled or shutdown is toggled.
- 4) Observe the output voltage with the DMM and/or oscilloscope. Look at the LX switching nodes and MOSFET gate-drive signals while varying the load current.

Detailed Description

This 68A multiphase buck-regulator design is optimized for a 300kHz frequency and output voltage settings from 1.0V to 1.5V. At VOUT=1.5V and VIN=12V, the inductor ripple is approximately 30% (LIR=0.3). The MAX1544/MAX1545 controller shares the current between its two phases that operate 180° out-of-phase, supplying 17A per phase. Each MAX1980 slave is triggered by one side of the MAX1544/MAX1545 low-side gate driver, supplying another 17A per slave.

Evaluates: MAX1544/MAX1545

MAX1544/MAX1545 Evaluation Kits

Setting the Output Voltage

The MAX1544/MAX1545 has two unique internal VID input multiplexers that can select one of three different VID DAC code settings for different processor states. On startup, the controller selects the DAC code from the D0–D4 input decoder when SUS=GND. A second multiplexer selects the lower S0–S1 DAC code when SUS is high (SUS=3.3V or VCC), or the higher S0–S1 DAC code when SUS=REF. The output voltage can be digitally set by the D0–D4 pins (Table 1) or the S0–S1 pins (Table 2).

There are five different ways of setting the output voltage:

- 1) **Drive the external VID0–VID4 inputs (no jumpers installed):** The output voltage can be set by driving VID0–VID4 with open-drain drivers (pullup resistors are included on the board) or 3V/5V CMOS output logic levels (DPSPV = GND).
- 2) **Install jumpers JUA0–JUA4:** SUS=low. When JUA0–JUA4 are not installed, the MAX1544/MAX1545's D0–
- 3) **Drive DPSPV (suspend mode configuration):** As shipped, the EV kit is configured for operation in the suspend mode S0–S1 set for 1.000V output (Table 2).
- 4) **Drive DPSP:** DPSP can be driven by an external driver to introduce offsets to the output voltage (Table 2).
- 5) **Drive header J1 for full system control:** VID0–VID4, DPSP, DPSPV, VRON, and VROK are all available directly on header connections J1 (Figure 1c). Do not install jumper JU2 in this mode.

Table 1. MAX1544/MAX1545 Output Voltage Adjustment Settings (SUS=GND)

D4	D3	D2	D1	D0	MAX1544 VOUT (V)	MAX1545 CODE=VCC VOUT (V)	MAX1545 CODE=GND VOUT (V)
0	0	0	0	0	1.550	1.750	1.850
0	0	0	0	1	1.525	1.700	1.825
0	0	0	1	0	1.500	1.650	1.800
0	0	0	1	1	1.475	1.600	1.775
0	0	1	0	0	1.450	1.550	1.750
0	0	1	0	1	1.425	1.500	1.725
0	0	1	1	0	1.400	1.450	1.700
0	0	1	1	1	1.375	1.400	1.675
0	1	0	0	0	1.350	1.350	1.650
0	1	0	0	1	1.325	1.300	1.625
0	1	0	1	0	1.300	1.250	1.600
0	1	0	1	1	1.275	1.200	1.575
0	1	1	0	0	1.250	1.150	1.550
0	1	1	0	1	1.225	1.100	1.525
0	1	1	1	0	1.200	1.050	1.500
0	1	1	1	1	1.175	1.000	1.475

D4	D3	D2	D1	D0	MAX1544 VOUT (V)	MAX1545 CODE=VCC VOUT (V)	MAX1545 CODE=GND VOUT (V)
1	0	0	0	0	1.150	0.975	1.450
1	0	0	0	1	1.125	0.950	1.425
1	0	0	1	0	1.100	0.925	1.400
1	0	0	1	1	1.075	0.900	1.375
1	0	1	0	0	1.050	0.875	1.350
1	0	1	0	1	1.025	0.850	1.325
1	0	1	1	0	1.000	0.825	1.300
1	0	1	1	1	0.975	0.800	1.275
1	1	0	0	0	0.950	0.775	1.250
1	1	0	0	1	0.925	0.750	1.225
1	1	0	1	0	0.900	0.725	1.200
1	1	0	1	1	0.875	0.700	1.175
1	1	1	0	0	0.850	0.675	1.150
1	1	1	0	1	0.825	0.650	1.125
1	1	1	1	0	0.800	0.625	1.100
1	1	1	1	1	OFF	0.600	OFF

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

Table 2. MAX1544/MAX1545 Output Voltage Adjustment Settings (SUS=High or REF)

LOWER SUSPEND CODES				UPPER SUSPEND CODES			
SUS*	S1	S0	VOUT (V)	SUS*	S1	S0	VOUT (V)
High	GND	GND	0.675	REF	GND	GND	1.075
High	GND	REF	0.700	REF	GND	REF	1.100
High	GND	OPEN	0.725	REF	GND	OPEN	1.125
High	GND	VCC	0.750	REF	GND	VCC	1.150
High	REF	GND	0.775	REF	REF	GND	1.175
High	REF	REF	0.800	REF	REF	REF	1.200
High	REF	OPEN	0.825	REF	REF	OPEN	1.225
High	REF	VCC	0.850	REF	REF	VCC	1.250
High	OPEN	GND	0.875	REF	OPEN	GND	1.275
High	OPEN	REF	0.900	REF	OPEN	REF	1.300
High	OPEN	OPEN	0.925	REF	OPEN	OPEN	1.325
High	OPEN	VCC	0.950	REF	OPEN	VCC	1.350
High	VCC	GND	0.975	REF	VCC	GND	1.375
High	VCC	REF	1.000	REF	VCC	REF	1.400
High	VCC	OPEN	1.025	REF	VCC	OPEN	1.425
High	VCC	VCC	1.050	REF	VCC	VCC	1.450

*Note: Connect the 3-level SUS input to a 2.7V or greater supply (3.3V or V_{CC}) for an input logic level high.

Table 3. MAX1544/MAX1545 Operating Mode Truth Table

SHDN	SUS	SKIP	OFS	OUTPUT VOLTAGE	OPERATING MODE
GND	x	x	x	GND	Low-Power Shutdown Mode. DL ₋ is forced high, DH ₋ is forced low, and the PWM controller is disabled. The supply current drops to 1μA (typ).
V _{CC}	GND	V _{CC}	GND or REF	D0-D4 (No offset)	Normal Operation. The no load output voltage is determined by the selected VID DAC code (D0-D4, Table 1).
V _{CC}	x	REF	GND or REF	D0-D4 (No offset)	Dual-Phase Pulse Skipping Operation. When $\overline{\text{SKIP}}$ is set to 2V, the MAX1544/MAX1545 immediately enters dual-phase pulse skipping operation allowing automatic PWM/PFM switchover under light loads. Both MAX1980 slaves are disabled. The VROK upper threshold is blanked.
V _{CC}	x	GND	GND or REF	D0-D4 (No offset)	Single-Phase Pulse Skipping Operation. When $\overline{\text{SKIP}}$ is pulled to GND, the MAX1544/MAX1545 immediately enters single-phase pulse skipping operation allowing automatic PWM/PFM switchover under light loads. Both MAX1980 slaves are disabled. The VROK upper threshold is blanked.
V _{CC}	GND	x	0 to 0.8V or 1.2V to 2.0V	D0-D4 (Plus offset)	Deep Sleep Mode. The no load output voltage is determined by the selected VID DAC code (D0-D4, Table 1) plus the offset voltage set by OFS.
V _{CC}	REF or High	x	x	SUS, S0-S1 (Offset disabled)	Suspend Mode. The no load output voltage is determined by the selected suspend code (SUS, S0-S1, Table 2), overriding all other active modes of operation.
V _{CC}	x	x	x	GND	Fault Mode. The fault latch has been set by either UVP, OVP (if enabled), or thermal shutdown. The controller will remain in FAULT mode until V _{CC} power is cycled or SHDN toggled.

MAX1544/MAX1545 Evaluation Kits

Reduced Power Dissipation

Voltage Positioning

The MAX1544/MAX1545 EV kit uses voltage positioning to decrease the size of the output capacitor and to reduce power dissipation at heavy loads. Current-sense resistors (R2 and R9=1mΩ) are used to sense the inductor current and adjust the output voltage. The current-sense resistors dissipate some power but the net power savings are substantial. This EV kit further improves efficiency by using an internal op-amp gain stage to allow a reduction in the sense resistor value.

The MAX1544 op amp is configured for a gain of 2.5 (only 2 phases sensed) providing a -1.25mV/A voltage-positioning slope at the output when all four phases are active. The MAX1545 op amp is configured for a gain of 3 providing a slope of -1.5mV/A. Remote output and ground sensing eliminate any additional PC board voltage drops.

Dynamic Output Voltage Transition Experiment

Observe the output voltage transition between 1.00V and 1.50V by setting jumpers JUA0–JUA4 to 1.50V and toggling the SUS input between GND and VCC, respectively. This is the worst-case transition and should complete within 100μs.

This EV kit is set to transition the output voltage at 1-LSB per 2μs. The speed of the transition can be altered by changing resistor R7 (60.4kΩ).

During the voltage transition, watch the inductor current by looking across R2 and/or R9 with a differential scope probe or by inserting a current probe in series with the inductor. Observe the low, well-controlled inductor current that accompanies the voltage transition. The same slew rate and controlled inductor current are used during shutdown and startup, resulting in well-controlled currents into and out of the battery (input source).

There are two other methods to create an output voltage transition. Select D0–D4 (JUA0–JUA4). Then either manually change the JUA0–JUA4 jumpers to a new VID code setting (Table 1), or remove all jumpers and drive the VID0–VID4 PC board test points externally to the desired code settings.

Load-Transient Experiment

One interesting experiment is to subject the output to large, fast load transients and observe the output with an oscilloscope. This necessitates careful instrumentation of the output, using the supplied scope-probe jack. Accurate measurement of output ripple and load-transient response invariably requires that ground clip leads be completely avoided and that the probe must be removed to expose the GND shield, so the probe can be plugged directly into the jack. Otherwise, EMI and noise pickup corrupt the waveforms.

Most benchtop electronic loads intended for power supply testing lack the ability to subject the DC-DC converter to ultra-fast load transients. Emulating the supply current di/dt at the CPU VCORE pins requires at least 10A/μs load transients. One easy method for generating such an abusive load transient is to solder a power MOSFET directly across the scope-probe jack. Then drive its gate with a strong pulse generator at a low duty cycle (< 5%) to minimize heat stress in the MOSFET. Vary the high-level output voltage of the pulse generator to vary the load current.

To determine the load current, you might expect to insert a meter in the load path, but this method is prohibited here by the need for low resistance and inductance in the path of the dummy load MOSFET. There are two easy alternative methods of determining how much load current a particular pulse-generator amplitude is causing. The easiest method is to observe the currents through inductors L1 and L2 with a calibrated AC current probe, such as a Tektronix AM503, or by looking across R2 and R9 with a differential probe. In the buck topology, the load current is approximately equal to the average value of the inductor currents.

TON Settings

Jumper JU4 selects the MAX1544/MAX1545 switching frequency.

Note: Always set the MAX1980 slaves to the same switching frequency as the MAX1544/MAX1545.

Note: When changing the switching frequency, recalculate the inductor and output capacitor values using the equations in the MAX1544/MAX1545 and MAX1980 datasheets.

Table 4. Jumper JU4 Function (TON Setting)

SHUNT POSITION	TON PIN	MAX1544/MAX1545 SWITCHING FREQUENCY
1 and 2	Connected to GND	550kHz. Short R104 and R108 to set the MAX1980s to 550kHz.
1 and 3 (Default)	Connected to REF	300kHz.
1 and 4	Connected to V _{CC}	200kHz. Short R105 and R109 to set the MAX1980s to 200kHz.
Not installed	VR_ON driven by external signal	100kHz. Not supported by MAX1980. Disable MAX1980 when setting MAX1544/MAX1545 at 100kHz for highest suspend mode efficiency.

Table 5. PIN19 Function and Setting

PIN 19	MAX1544 (OVP PIN)	MAX1545 (CODE PIN)
High	Overvoltage Protection Enabled	Selects Mobile P4 VID code set
Low	Overvoltage Protection Disabled	Selects Desktop P4 VID code set

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

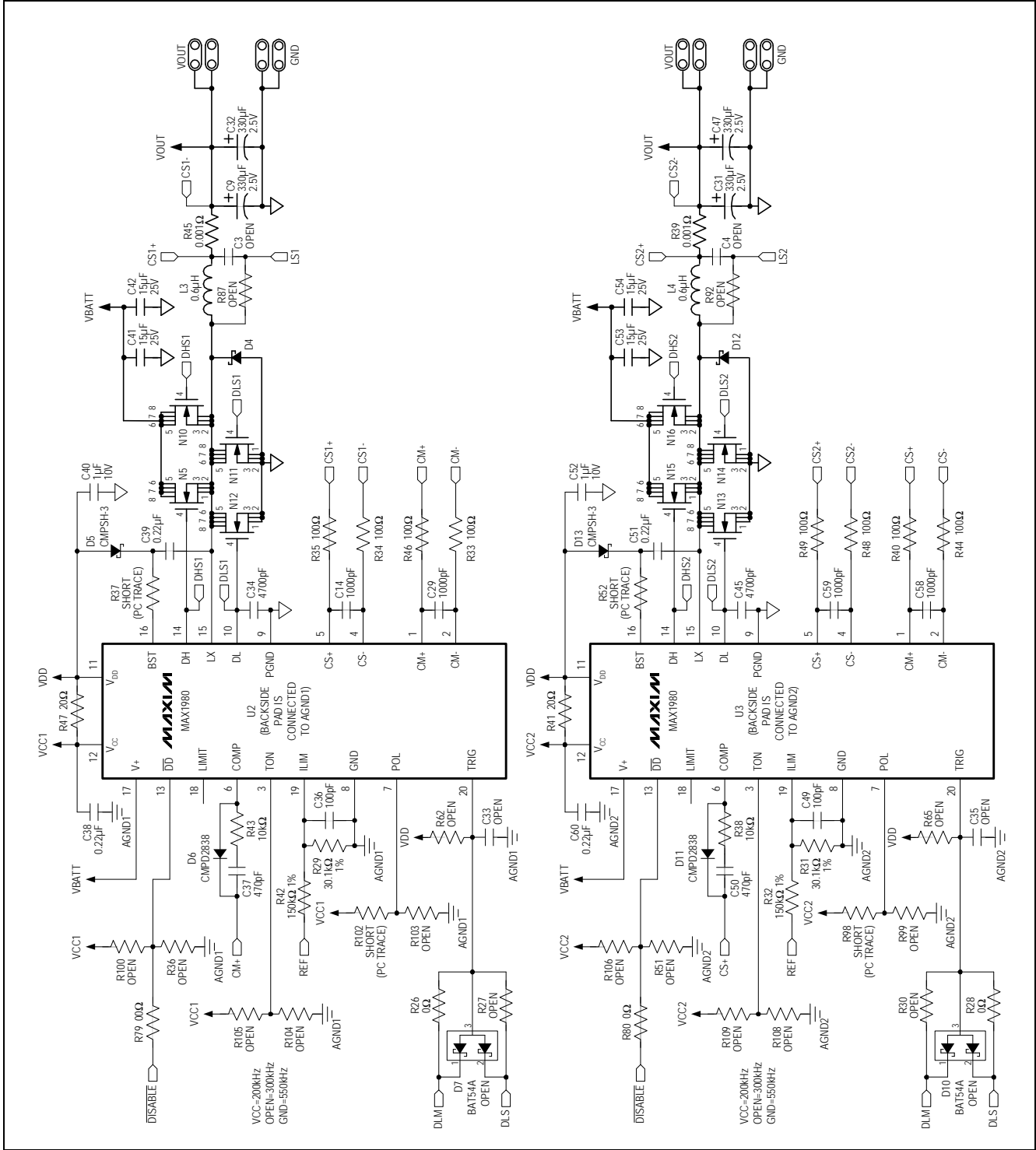


Figure 1b. MAX1544 EV Kit Schematic (Sheet 2 of 3)

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

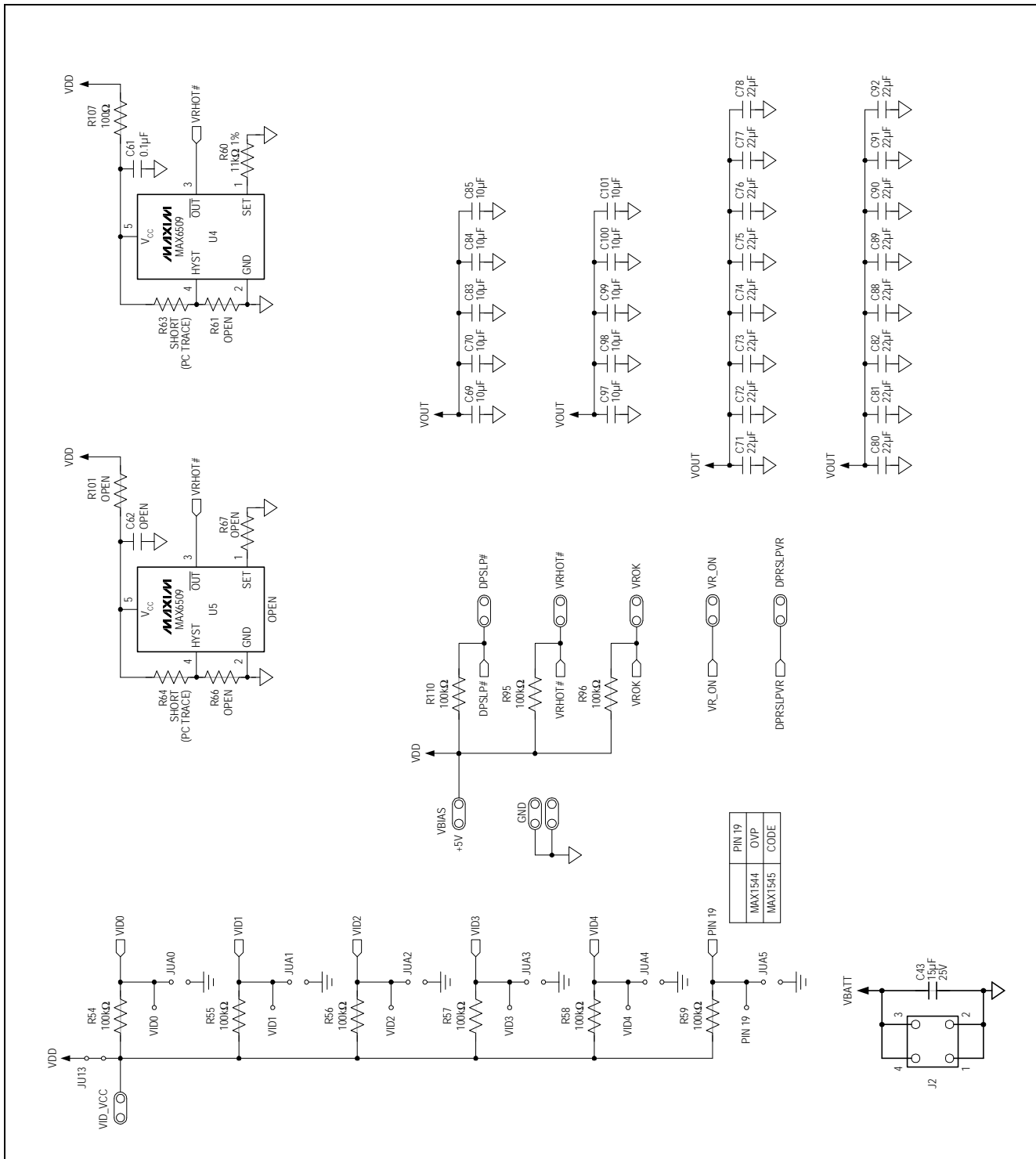


Figure 1c. MAX1544 EV Kit Schematic (Sheet 3 of 3)

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	A	
B	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	B	
C	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	C	
D	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	D	
E	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	E	
F	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	F	
G	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	G	
H	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	H	
J	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	J	
K	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	K	
L	291	292	293	294	295	296	297	298	299	300											301	302	303	304	305	306	307	308	309	310	L
M	311	312	313	314	315	316	317	318	319	320											321	322	323	324	325	326	327	328	329	330	M
N	331	332	333	334	335	336	337	338	339	340											341	342	343	344	345	346	347	348	349	350	N
P	351	352	353	354	355	356	357	358	359	360											361	362	363	364	365	366	367	368	369	370	P
R	371	372	373	374	375	376	377	378	379	380											381	382	383	384	385	386	387	388	389	390	R
T	391	392	393	394	395	396	397	398	399	400											401	402	403	404	405	406	407	408	409	410	T
U	411	412	413	414	415	416	417	418	419	420											421	422	423	424	425	426	427	428	429	430	U
V	431	432	433	434	435	436	437	438	439	440											441	442	443	444	445	446	447	448	449	450	V
W	451	452	453	454	455	456	457	458	459	460											461	462	463	464	465	466	467	468	469	470	W
Y	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	Y	
AA	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	AA	
AB	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	AB	
AC	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	AC	
AD	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	AD	
AE	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	AE	
AF	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	AF	
AG	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	AG	
AH	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	AH	
AJ	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	AJ	

	GND	A24	GND_SENSE	AE15	VID[0]
	VOUT	A23	VOUT_SENSE	AF15	VID[1]
				AG14	VID[2]
				AF14	VID[3]
				AG13	VID[4]

Figure 3. CPU Socket (U8) pinout

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

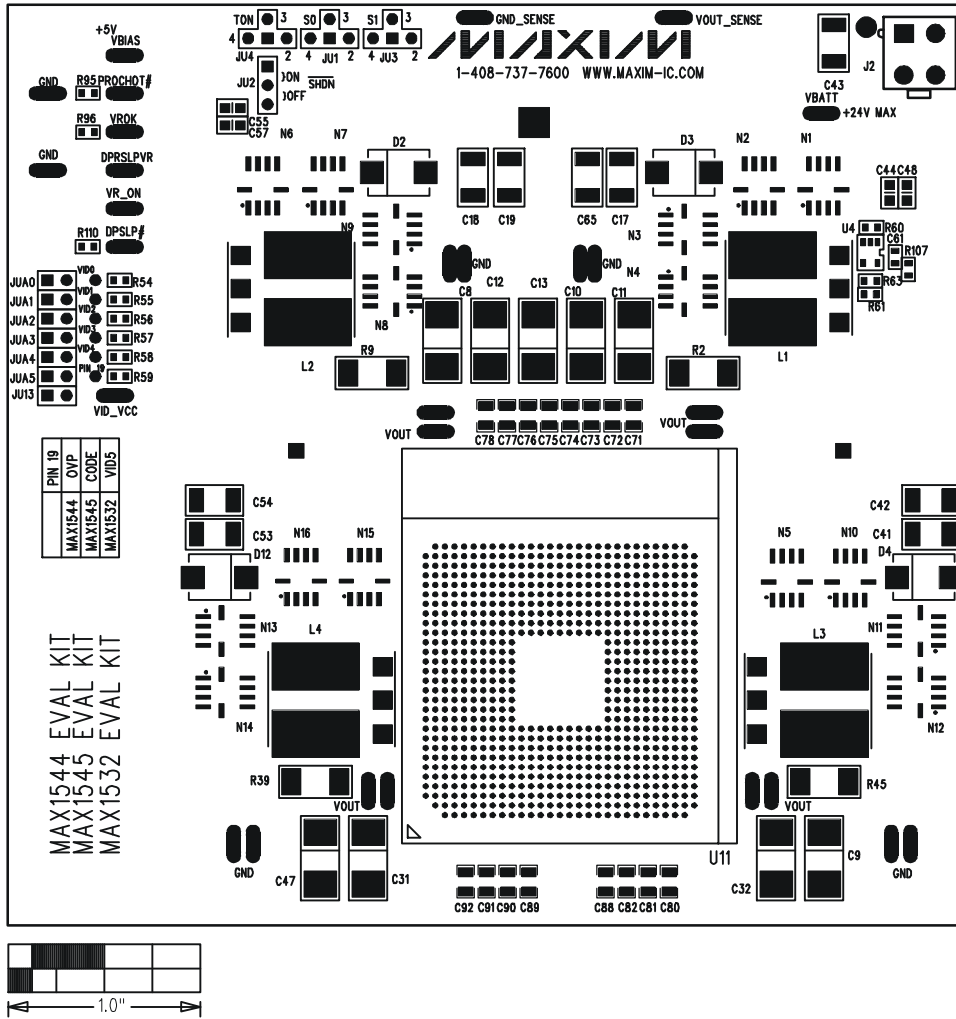


Figure 4. MAX1544/MAX1545 EV Component Placement Guide - Top Side

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

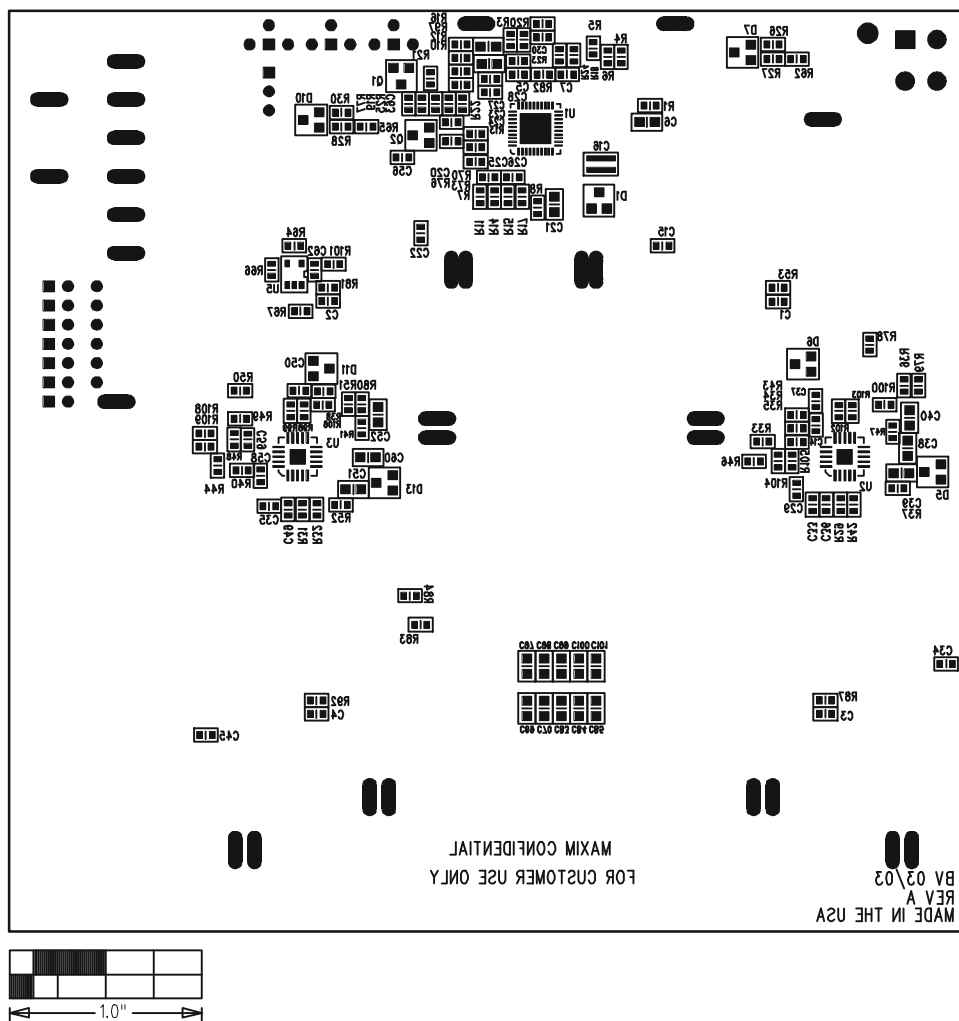


Figure 5. MAX1544/MAX1545 EV Kit Component Placement Guide - Bottom Side

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

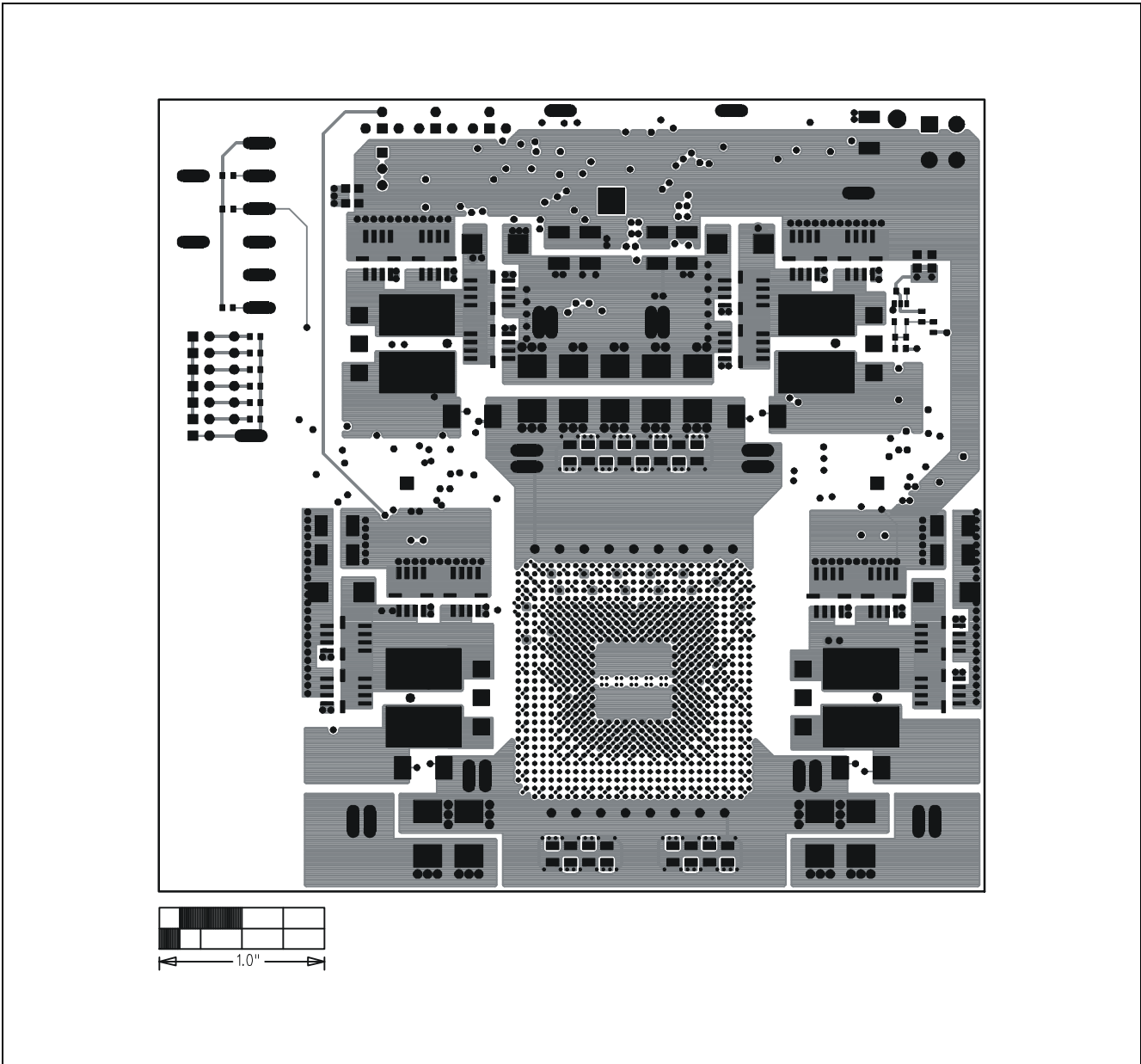


Figure 6. MAX1544/MAX1545 EV Kit PC Board Layout – Top Side

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

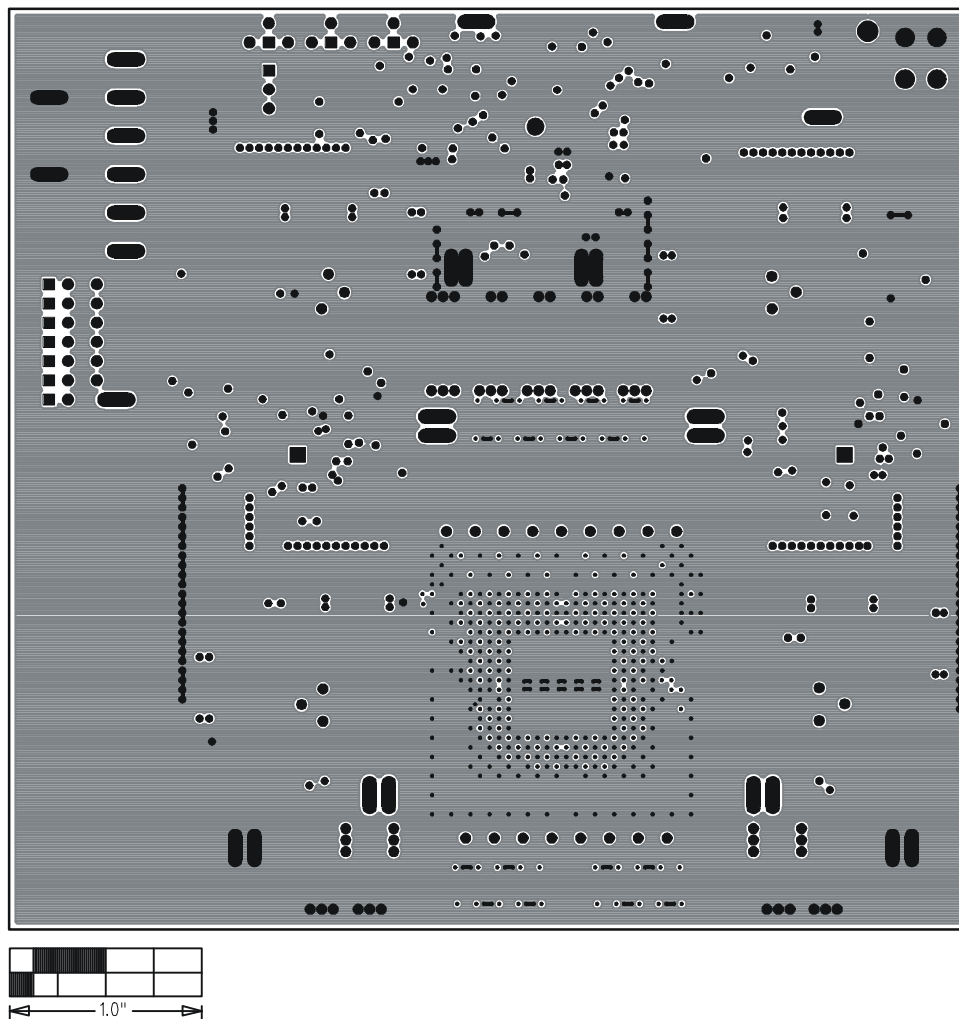


Figure 7. MAX1544/MAX1545 EV Kit PC Board Layout – GND Layer 2

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

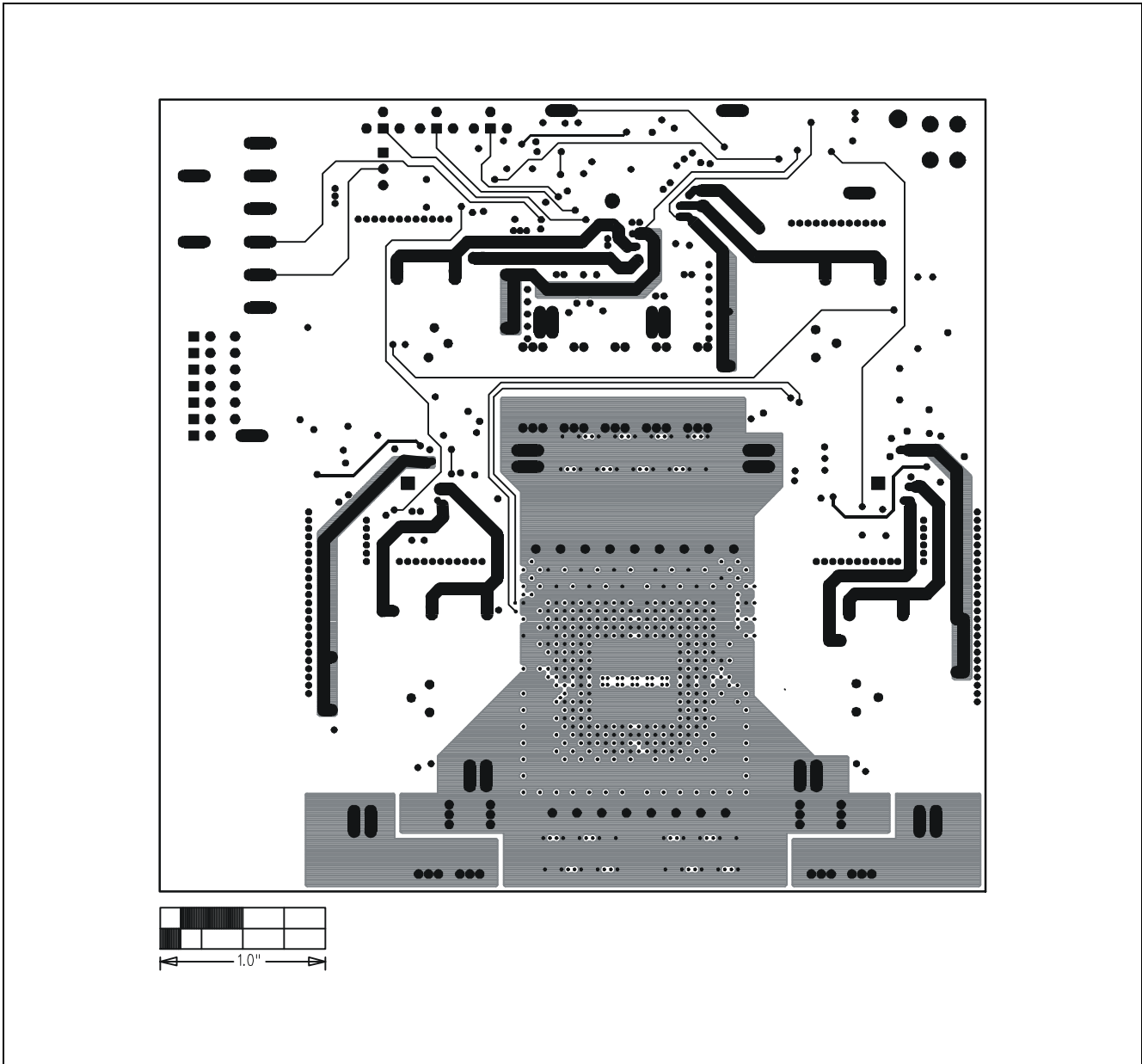


Figure 8. MAX1544/MAX1545 EV Kit PC Board Layout – Signal Layer 3

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

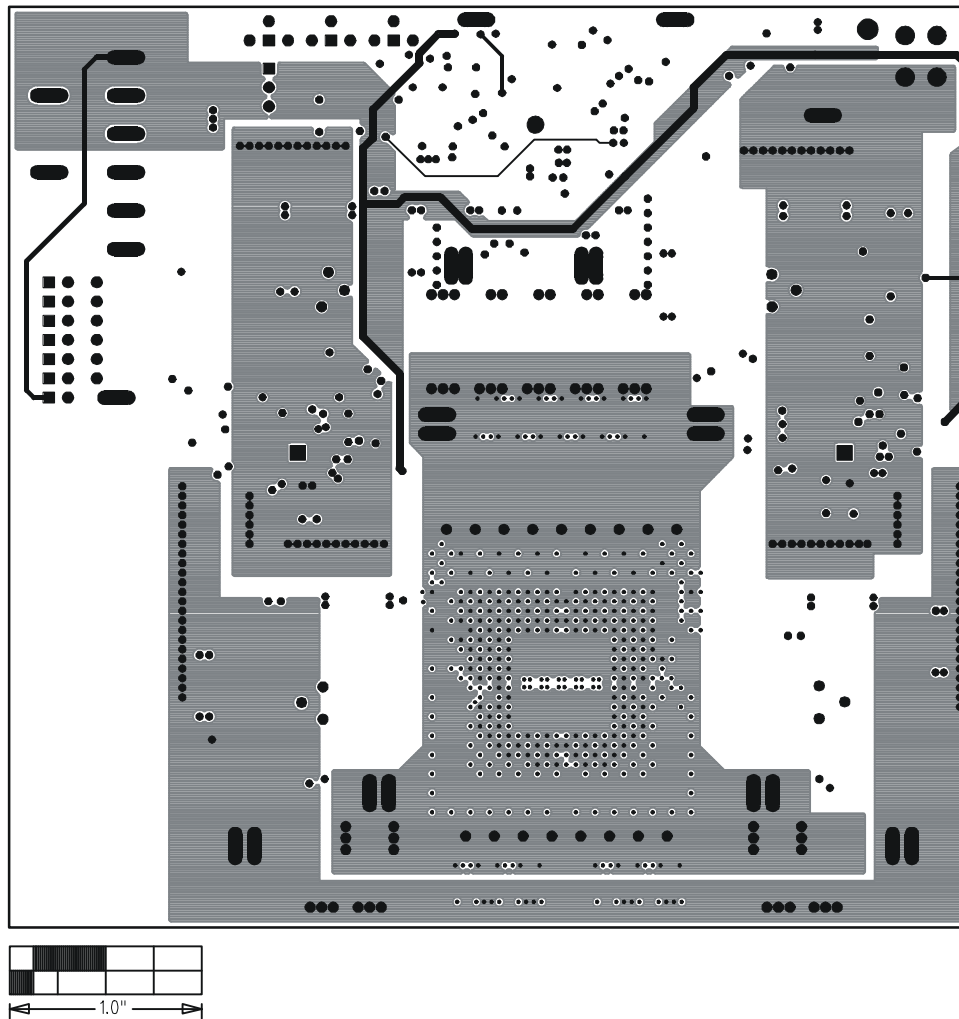


Figure 9. MAX1544/MAX1545 EV Kit PC Board Layout – Layer 4

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

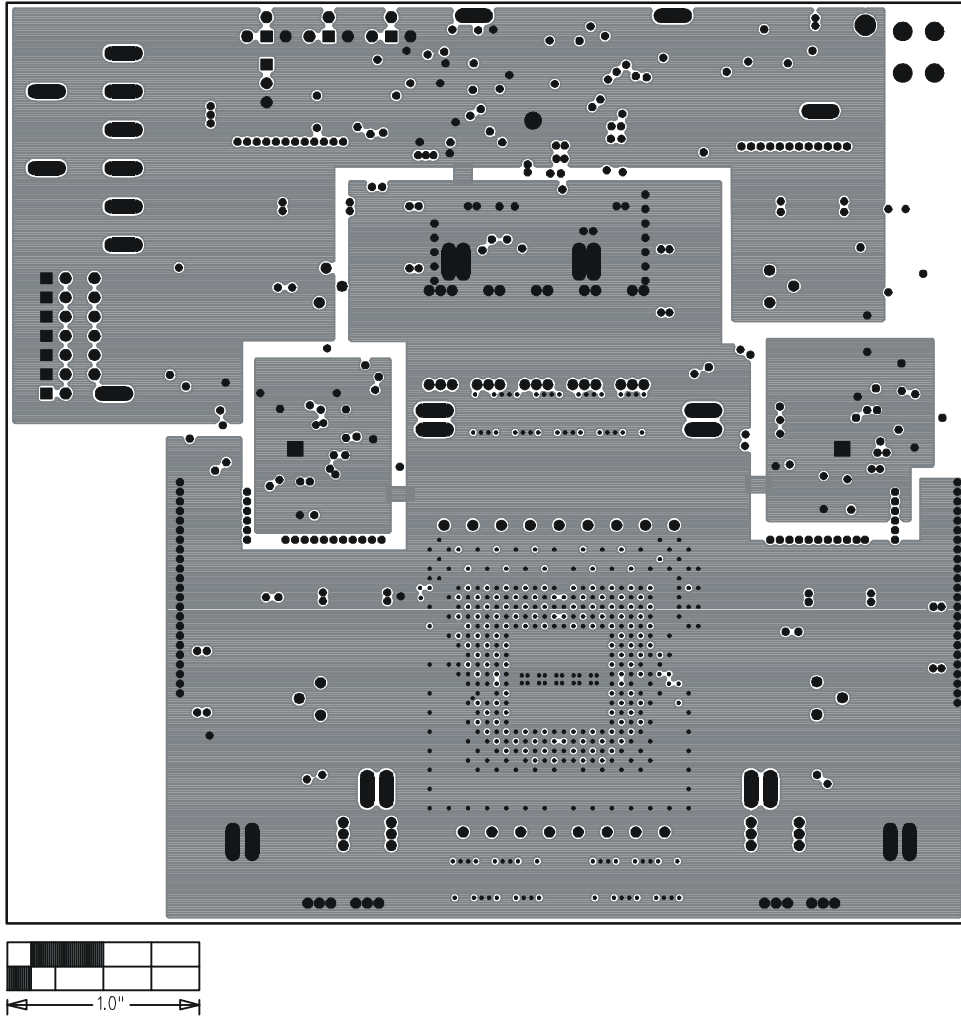


Figure 10. MAX1544/MAX1545 EV Kit PC Board Layout – Layer 5

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

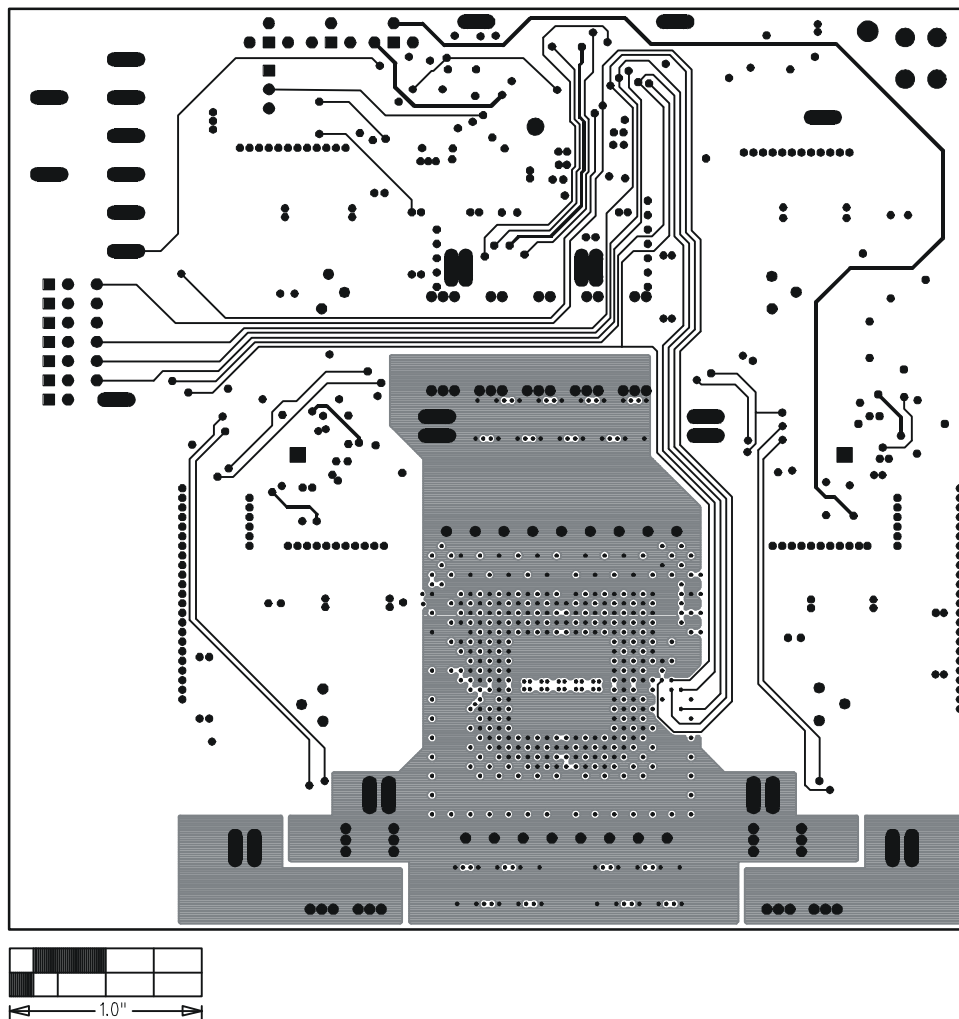


Figure 11. MAX1544/MAX1545 EV Kit PC Board Layout – Layer 6

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

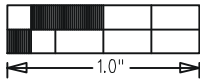
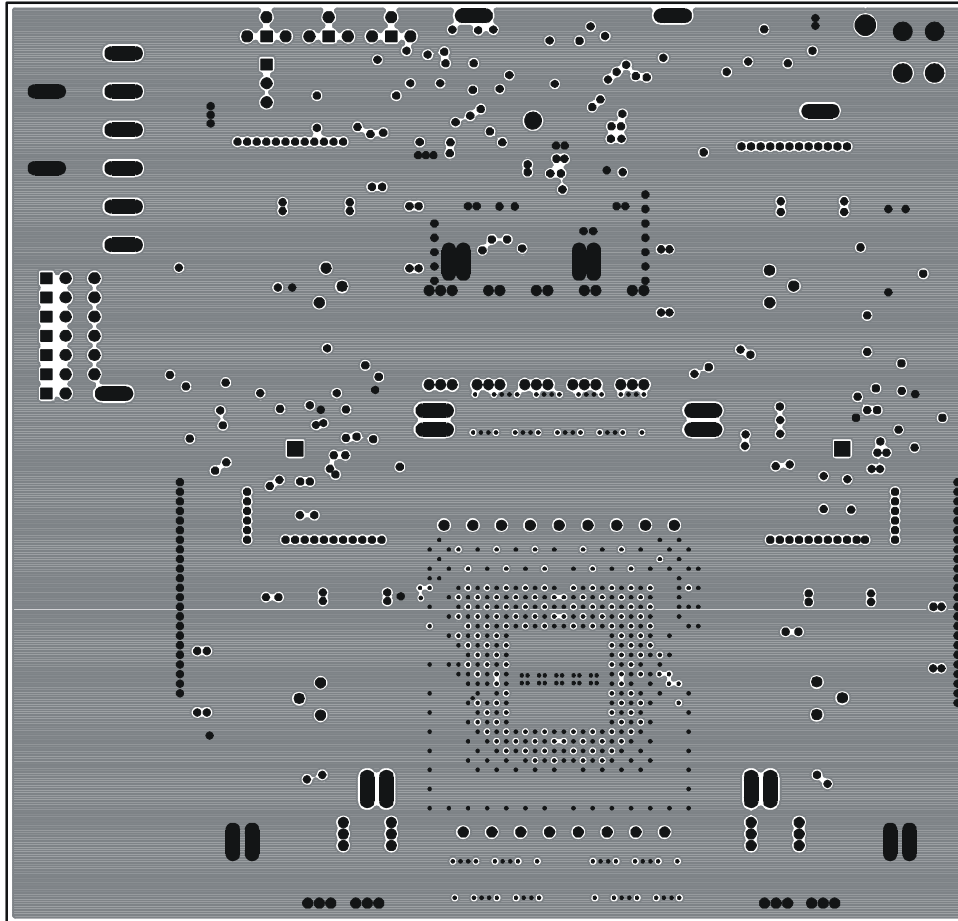


Figure 12. MAX1544/MAX1545 EV Kit PC Board Layout – Layer 7

MAX1544/MAX1545 Evaluation Kits

Evaluates: MAX1544/MAX1545

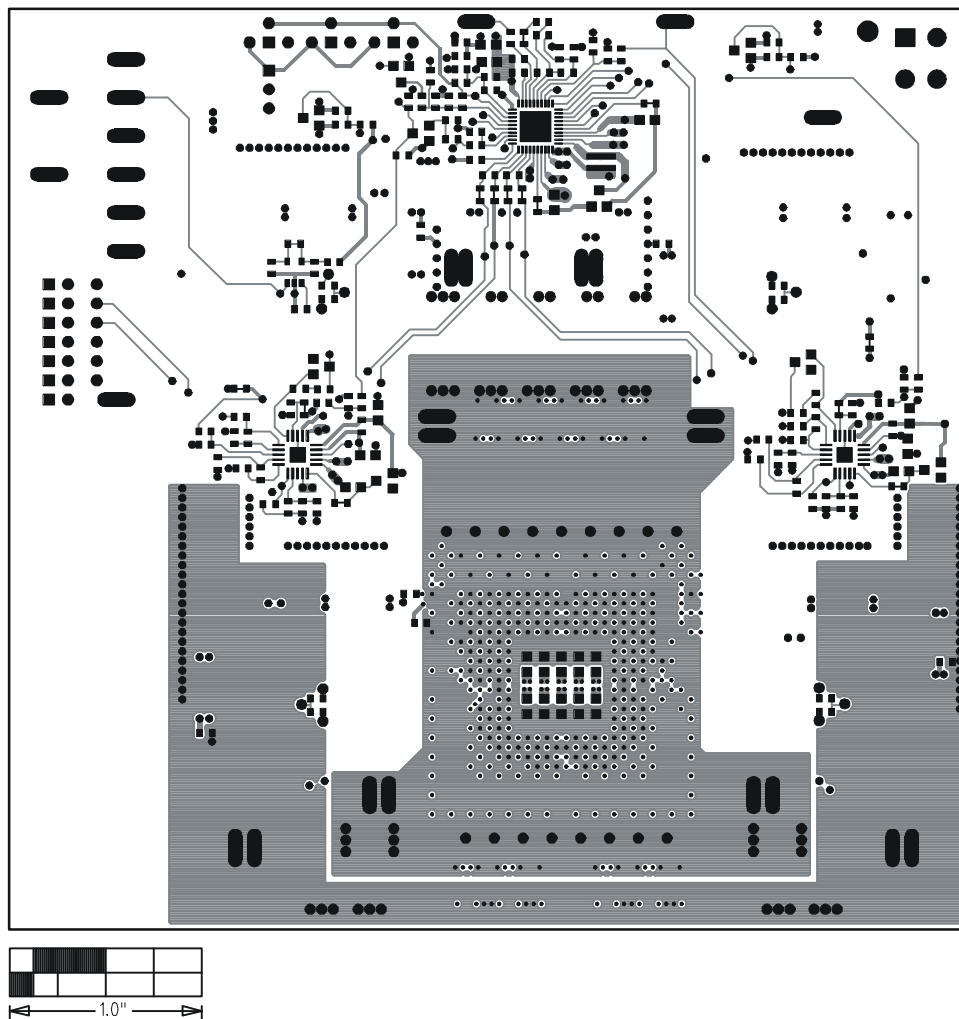


Figure 13. MAX1544/MAX1545 EV Kit PC Board Layout – Bottom Layer