MAX20430 Evaluation Kit

Evaluates: MAX20430

General Description

The MAX20430 evaluation kit (EV Kit) is a fully assembled and tested application circuit for the MAX20430 high-efficiency four-output PMIC. The EV kit can test all outputs to full load within the normal operating input range of 3.5V to 36V. The IC features two modes of watchdog operation, challenge/response and simple windowed mode, which can also be disabled for simplified evaluation. I²C communication must be used to configure the MAX20430 and monitor errors. A PC-to-I²C I²C interface (such as the MINIQUSB or MAX32625PICO) and software for reading and writing to I²C registers (such as SimpleI2C) may simplify testing.

Benefits and Features

- Integrated IC Minimizes Board Area and Layout
- Input Voltage Range from 3.5V to 36V
- User-Programmable Settings through I²C
- Challenge/Response or Simple Windowed Watchdog
- 2.1MHz Fixed-Frequency Switching with Spread-Spectrum Option
- Status Monitoring through $\overline{\text{RESET}}$ Pin and I²C Status Registers
- Fully Assembled and Tested
- Proven PCB Layout with Automotive-Grade Components

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

Quick Start

Required Equipment

- MAX20430 EV Kit
- I²C read/write software such as SimpleI2C
- I²C interface such as MINIQUSB or MAX32625PICO (PICO board)
- DC power supply (capable of 0-36V output)
- Digital multimeters (DMM)
- Electronic load

Procedure

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

The MAX20430 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Verify that all jumpers are in their default configuration according to Table 2.
2) If using the MINIQUSB, connect the USB cable from the PC to the MINIQUSB board and then plug it into J1 on the EV kit. If using the PICO board, separate cables must be used to connect the SDA, SCL, GND, and V_{DD} pins to the EV kit.
3) Connect the positive and negative terminals of the power supply to V_{SUP} and PGND test pads, respectively.
4) Set the power-supply voltage to 13.5V and then turn on the power supply.
5) If using SimpleI2C, open the software and load in the register map for MAX20430 by selecting **Regmap** in the menu bar, then **Load Regmap**. Check and enable **Auto Read** on the left menu bar.
6) To establish connection to the EV kit, select **Device** in the menu bar, then **Scan for Address**. The software should find the default address (0x70). Click **OK**.

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7) The default operation of MAX20430 has Packet Error Checking (PEC) enabled. To send I²C command with PEC, select **Settings** in the menu bar, then **PEC**, then the **CRC-8, $X^8 + X^2 + X + 1$** option.
8) The default MAX20430 has the watchdog disabled. If watchdog time is enabled in the part, it can be disabled by setting WDCFG2 (0x14) register bit 3 (WD_EN) to 0.
9) Connect the electronic load across OUT1 and PGND1.
10) Enable the load to output and increase the current to 500mA. Verify that OUT1 is still approximately 3.3V.
11) Repeat for other channels with load current of interest.

Detailed Description of Hardware (or Software)

Detailed Description

The MAX20430 EV kit provides a proven layout for evaluating the MAX20430 small, high-efficiency, four-output PMIC. The input-output range is shown in Table 1.

Table 1. Default Jumper Settings

CHANNEL	INPUT	OUTPUT
OUT1	3.5V-36V	3.3V/2.5A
OUT2	OUT1	1.2V/3A (default)
OUT3	OUT1	5V/500mA
OUT4	OUT1	1.0V/3A (default)

I²C Communication and PEC

The MAX20430 EV kit is designed to be used with an I²C interface such as the MINIQUSB or MAX32625PICO board and PC software that can read and write to the device (such as SimpleI2C). The IC has a packet-error checking (PEC) feature that is enabled by default. This option can be disabled through CONFIG1 register 0x01, bit 0 (PECE). In order to write to a register when the PEC is enabled, the I²C transaction must be followed by a PEC byte. The SimpleI2C software simplifies this process by providing a PEC enable setting.

Saving and Loading Temporary Configuration

With SimpleI2C, the register settings can be exported under **File > Export Script**. This file can be loaded back to the software at any time by selecting **File > Run Script**. During an evaluation, the IC can be restarted with a temporary register configuration by using the 0x06 PORRST register, which removes the need to fully cycle the power. This way, start-up features such as sequencing and watchdog timings can be evaluated without switching the IC to a different variant.

Workflow for I²C Configuration

To effectively set up the device, it is recommended that watchdog and PEC are initially disabled while other settings are evaluated. The first item to consider is the output voltages of each channel and the power-up sequencing (FPS).

For detailed information on each register, please refer to the MAX20430 IC datasheet.

Table 2. Default Jumper Settings

JUMPER	DEFAULT SHUNT POSITION	FUNCTIONS
EN - J3	Short	IC enable
VDD - J4	Open	Onboard 3.3V SCL/SDA pullup
MD1 - J7	Short to GND	Mount ID detection (optional)
MD2 - J8	Short to GND	Mount ID detection (optional)
SYNC - J2	Short	Short to BIAS for 2.1MHz switching frequency. Connect to external clock input for different switching frequency.
IN5 - J5	Short to GND	IN5 comparator input
IN6 - J6	Short to GND	IN6 comparator input

Ordering Information

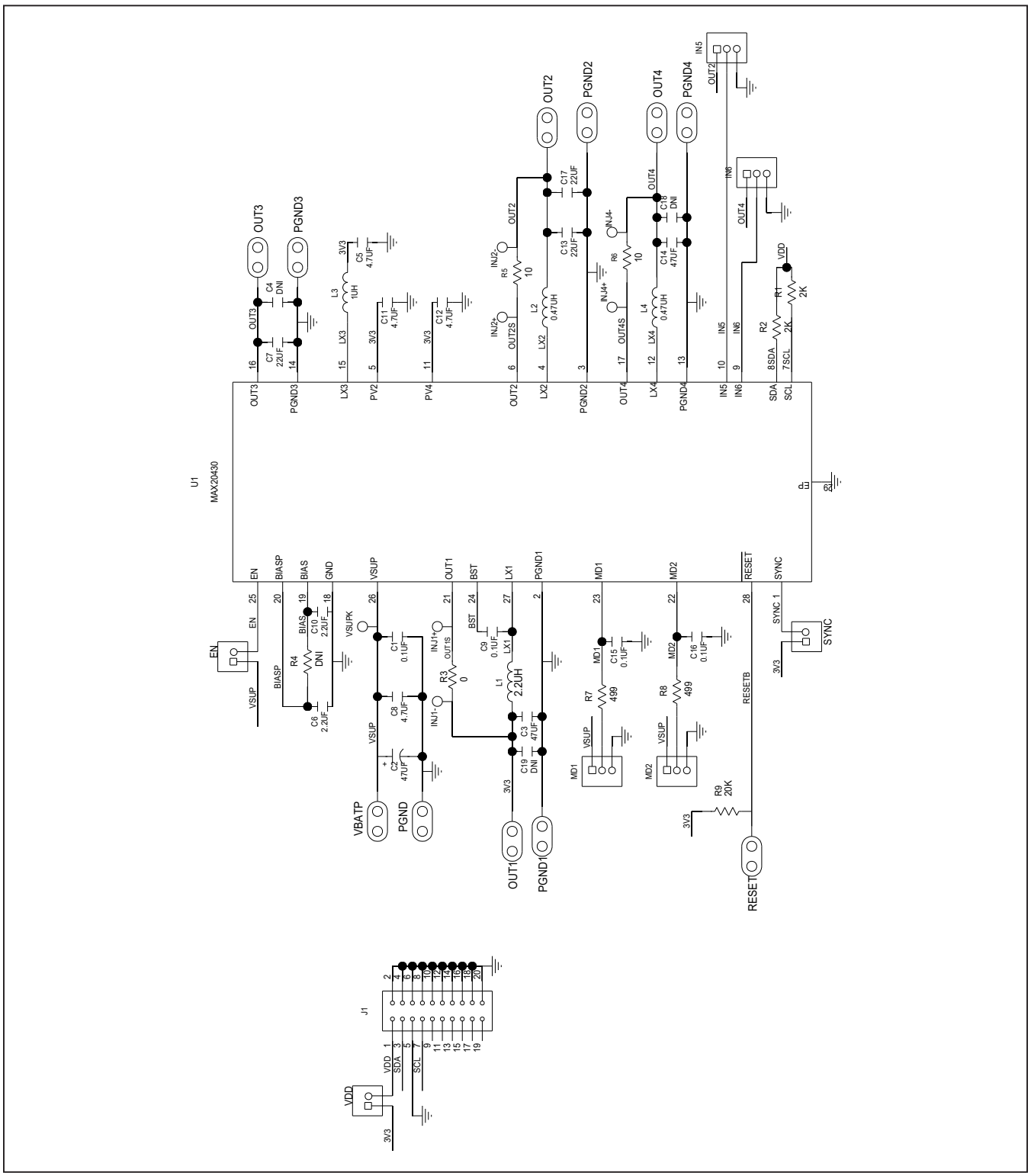
PART	TYPE
MAX20430EVKIT#	EV Kit
MAX20430EVKITSYS#	EV Kit and MAX32625PICO

#Denotes RoHS compliant.

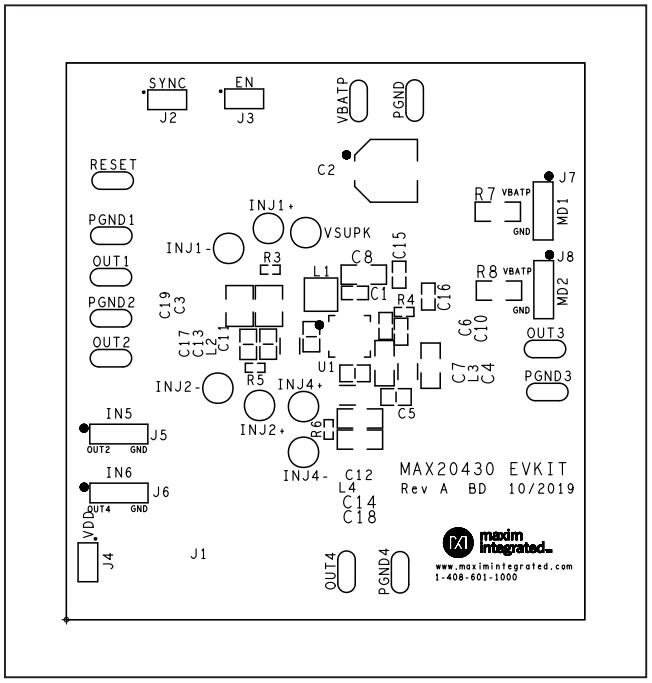
MAX20430 EV Kit Bill of Materials

REF DES	QTY	VALUE	MANUFACTURER	P/N	DESCRIPTION
C1, C15, C16	3	0.1 UF	TDK	CGA3E2X7R1H104K080AA	0.1uF ±10%, 50V X7R ceramic capacitor (0603) AEC-Q200
C2	1	47 UF	Cornell Dubilier	AFK476M50E16T-F	47uF ±20%, 50V aluminum electrolytic capacitor AEC-Q200
C3	1	47 UF	Taiyo Yuden	JMK325B7476KMHPR	47uF ±10%, 6.3V X7R ceramic capacitor (1210) AEC-Q200
C5, C11, C12	3	4.7 UF	TDK	CGA4J3X7R1A475K125AB	4.7uF ±10%, 10V X7R ceramic capacitor (0805) AEC-Q200
C6, C10	2	2.2 UF	TDK	CGA3E1X7S1C225M080AE	2.2µF ±20%, 16V X7S ceramic capacitors (0603) AEC-Q200
C7	1	22 UF	TDK	CGA5L1X7S1A226M160AC	22µF ±20%, 10V X7S ceramic capacitors (1206) AEC-Q200
C8	1	4.7 UF	TDK	CNA5L1X7R1H475K160AE	4.7uF ±10%, 50V X7R ceramic capacitor (1206) AEC-Q200
C9	1	0.1 UF	TDK	CGA2B3X7R1H104K050BB	0.1uF ±10%, 50V X7R ceramic capacitor (0402) AEC-Q200
C13, C17	2	22 UF	TDK	C2012X7S1A226M125AC	22uF ±20%, 10V X7S ceramic capacitor (0805)
			Murata	GRT21BC81A226ME13L	22uF ±20%, 10V X6S ceramic capacitor (0805) AEC-Q200
C14	1	47 UF	TDK	C3216X7S0J476M160AC	47uF ±20%, 6.3V X7S ceramic capacitor (1206)
			Murata	GRT31CC80J476KE13L	47uF ±10%, 6.3V X6S ceramic capacitor (1206) AEC-Q200
J1	1	-	Samtec	SSQ-110-02-T-D-RA	20-pin right angle receptacle
J2-J4	3	-	Sullins	PCC02SAAN	2-pin headers
J5-J8	4	-	Sullins	PCC03SAAN	3-pin headers
L1	1	2.2 UH	Coilcraft	XEL4030-222MEB	2.2uH 7.8A, 22.1mOhm Inductor (4mm x 4mm x 3.1mm)
L2, L4	2	0.47 UH	TDK	TFM252012ALMAR47MTAA	0.47uH 4.9A, 24mOhm Inductor (2.5mm x 2mm x 1.2mm)
L3	1	1 UH	TDK	TFM252012ALMA1R0MTAA	1uH 4.7A,42mOhm Inductor (2.5mm x 2mm x 1.2mm)
R1, R2	2	2k	Vishay	CRCW04022K00FKED	2kOhm ±1%, resistor (0402)
R3	1	0	Vishay	CRCW04020000Z0ED	0Ohm ±1%, resistor (0402)
R5, R6	2	100	Vishay	CRCW040210R0FKED	10Ohm ±1%, resistors (0402)
R7, R8	2	499	Vishay	CRCW0402499RFKED	499Ohm ±1%, resistors (1206)
R9	1	20k	Vishay	CRCW040220K0FKTD	20kOhm ±1%, resistors (0402)
INJ1+	1	-	Keystone	5010	Test Point (Red)
INJ3+	1	-	Keystone	5014	Test Point (Yellow)
INJ2+	1	-	Keystone	5013	Test Point (Orange)
INJ1-, INJ2-, INJ3-	3	-	Keystone	5011	Test Point (Black)
VSUP	1	-	Keystone	5126	Test Point (Green)
U1	1	-	Maxim Integrated	MAX20430ATIA/VY+	4 Output Mini PMIC (28 TQFN-EP)
Maxim I/O Loops: VBATP, PGND, OUT1, PGND1, OUT2, PGND2, OUT3, PGND3, OUT4, PGND4, RESET	11	-	Keystone	5020	Test Point - No Base
See Jumper Table	7	-	Kycon	SX1100-B	Jumper Shunt - 2 Position

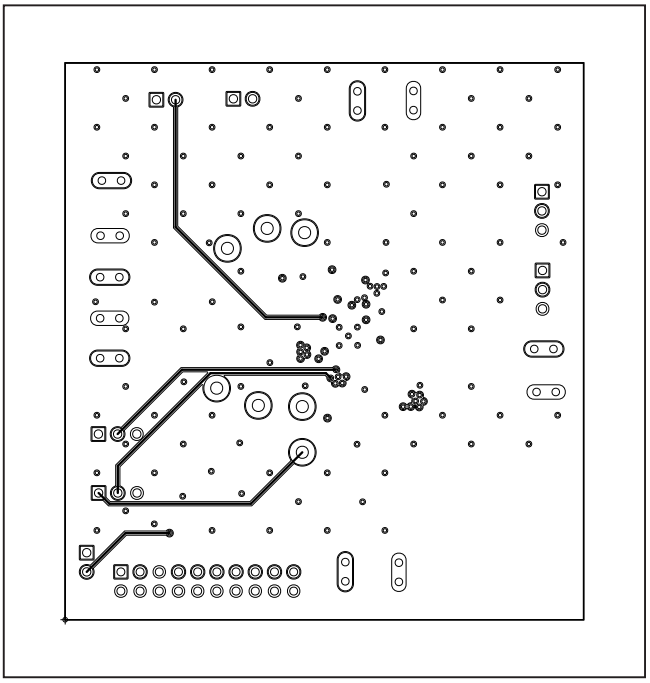
MAX20430 EV Kit Schematic



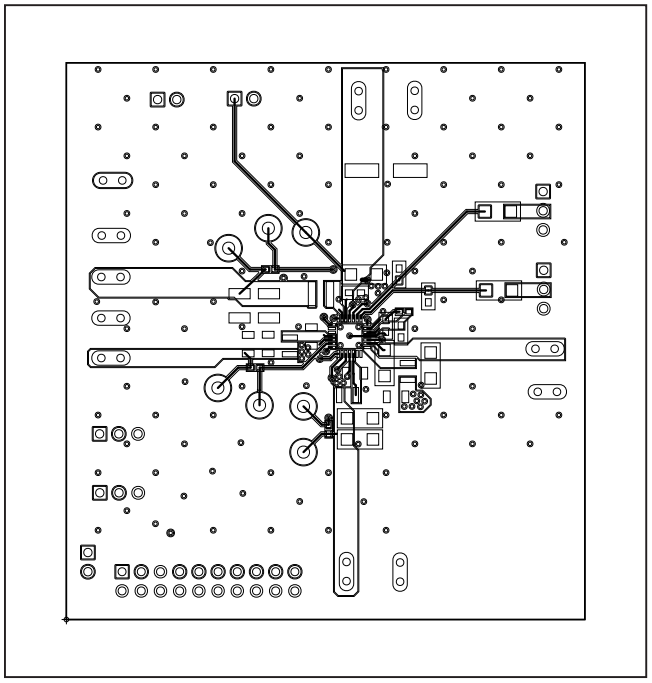
MAX20430 EV Kit PCB Layouts



Silk Top



Layer1



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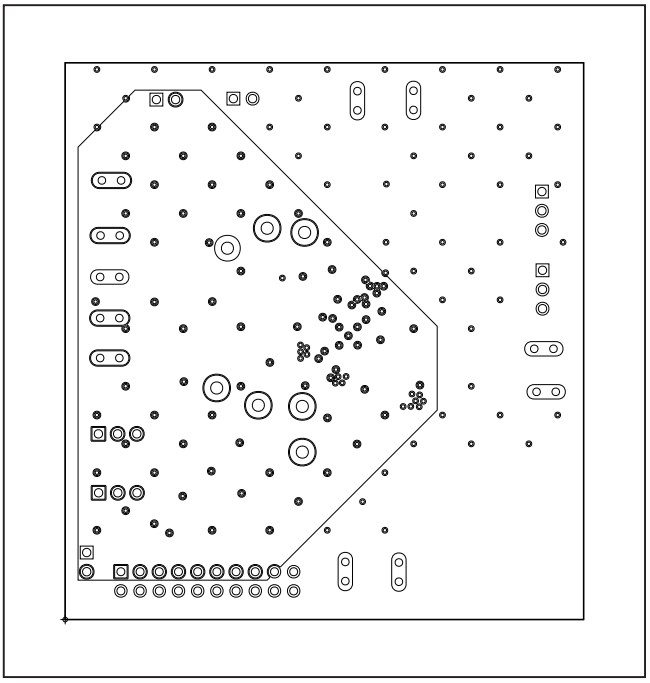
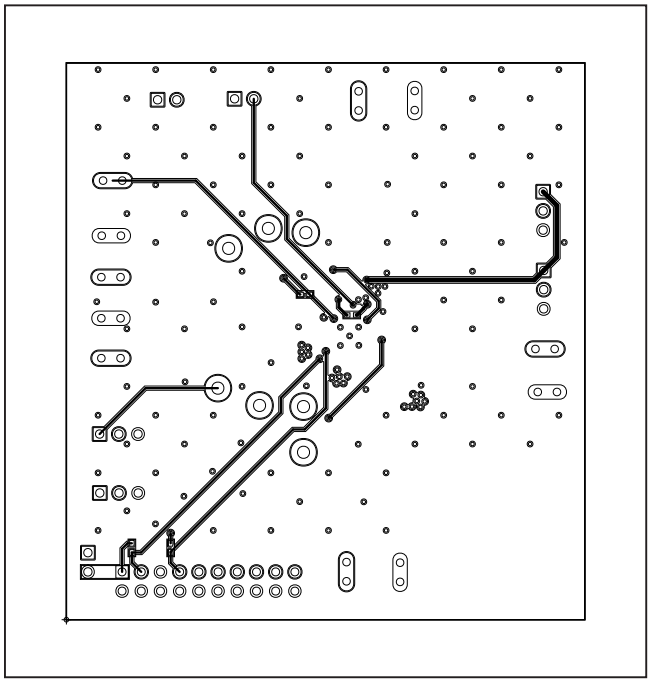


Layer2

MAX20430 EV Kit PCB Layouts (continued)



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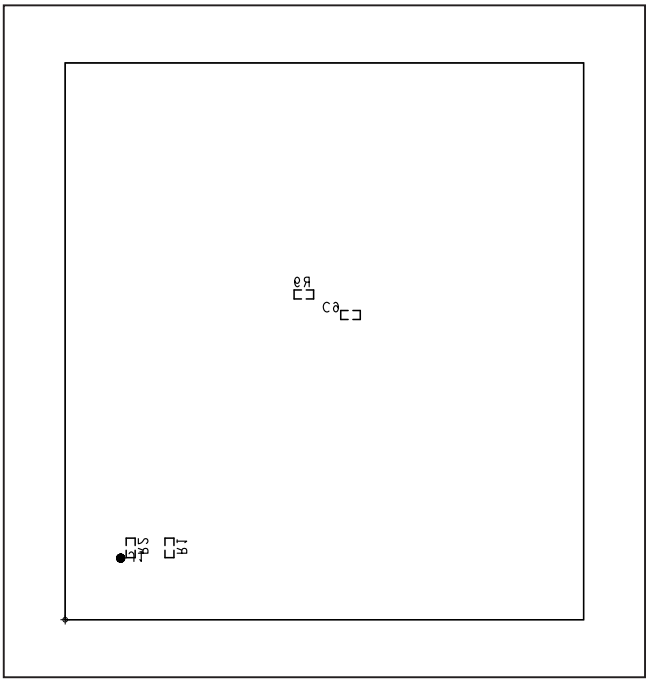

Silk Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/20	Initial release	—

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