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MAX14906 Evaluation Kit

Evaluates: MAX14906

General Description

The MAX14906 evaluation kit (EV kit) provides a proven design to evaluate the MAX14906, a four-channel industrial digital-output, digital-input device. The EV kit allows the MAX14906 to be configured on a per-channel basis as either a digital output (in High-Side switch or Push-Pull driver configuration) or a Type 1 and 3, or Type 2 digital input. The EV kit monitors the MAX14906 diagnostic information, including open-wire condition, state of the output channels, multiple undervoltage alarms, global and per-channel overtemperature alarms, and multiple fault alarms.

The EV kit must be powered from an external 24V DC power supply that can provide up to 6.4A (max), when all DOI_ output channels are fully loaded with the option of 2x load inrush current.

The MAX14906 EV kit communicates with a graphical user interface (GUI) on a PC through a USB port. The EV kit features an on-board FT2232 controller interfacing to the MAX14906 control signals. Alternatively, an external SPI interface from a microcontroller or FPGA can be used through the 20-pin header (J13).

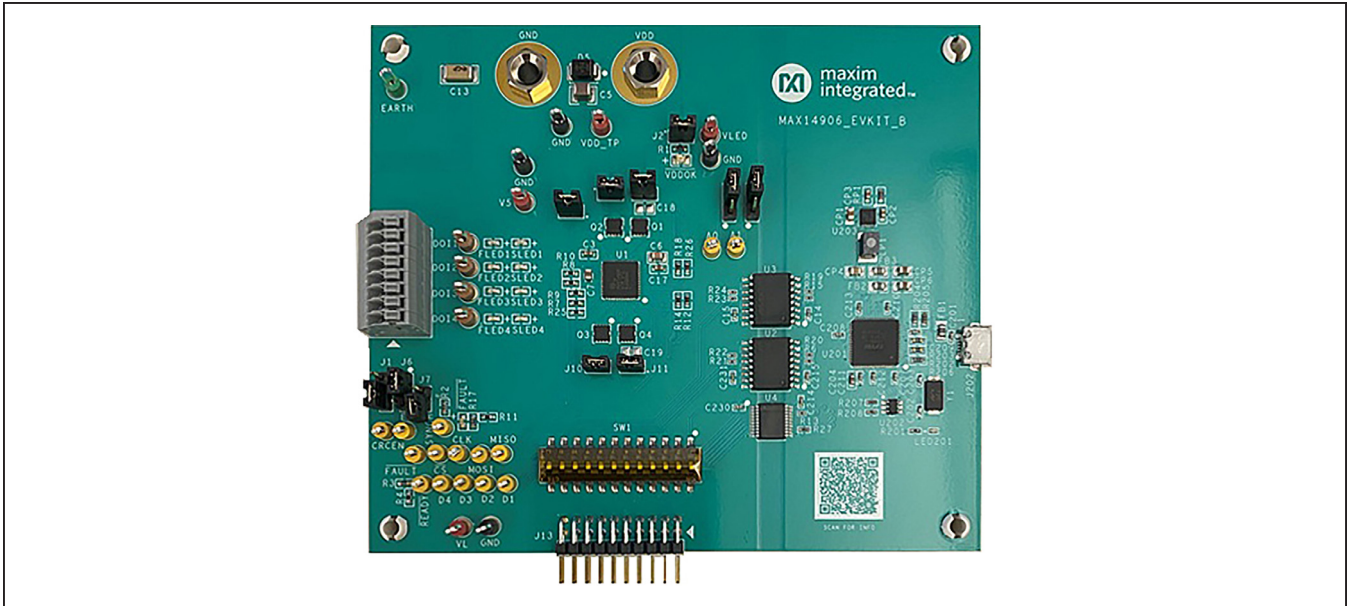
The MAX14906 EV kit comes with the MAX14906ATM+ installed in a 48-pin, 7mm x 7mm QFN package.

Features

- Easy Evaluation of the MAX14906 with Per-Channel Configuration
- SafeDemag™ for Safe Turn-Off of Unlimited Inductance in Digital Output Modes
- Configurable for IEC 61131-2 Type 1 and 3, or Type 2 Digital Input
- Support up to 3.75kV_{RMS} Galvanic Isolation with MAX14483 and MAX14937
- Support Communicating with External Microcontroller or FPGA
- Allow Output Switching with High-Speed Parallel Interface or SPI Serial Interface
- Windows® 10, Windows 8.1, and Windows 7 Compatible GUI Software
- Proven PCB Layout
- Fully Assembled and Tested
- RoHS Compliant

Ordering Information appears at end of data sheet.

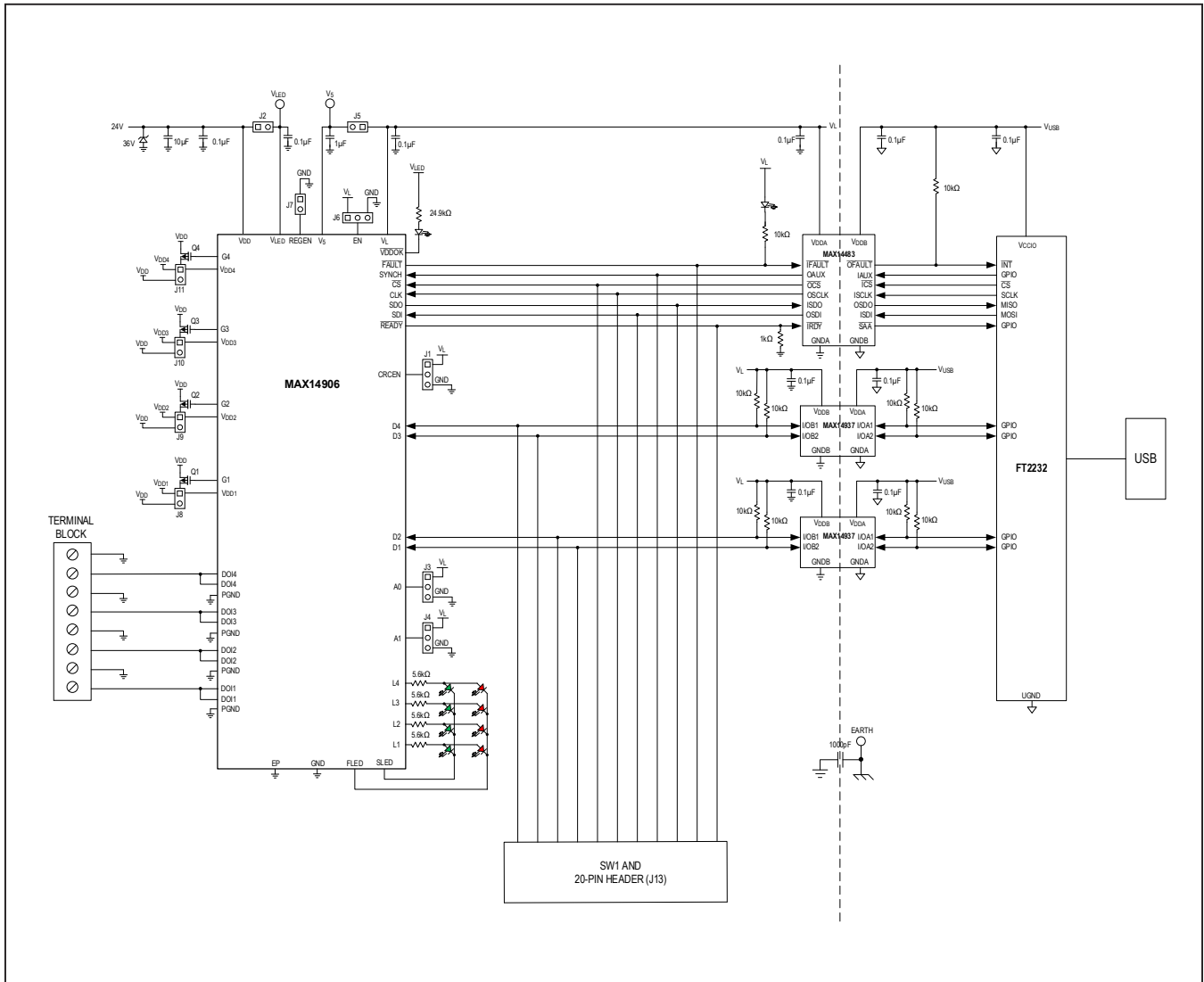
MAX14906 EV Kit Board Photo



SafeDemag™ is a trademark of Maxim Integrated Products, Inc.
Windows® is a registered trademark of Microsoft Corporation.



MAX14906 EV Kit Block Diagram



MAX14906 EV KIT Files

FILE	DESCRIPTION
MAX14906EVKitSetupV1.0.2.ZIP	Application Program (GUI)

Quick Start

Required Equipment

- MAX14906 EV kit
- 24V, 6.4A(max) DC power supply
- Windows 10, Windows 8,1, Windows 7 PC with a spare USB port
- USB A-to-micro-B cable

Procedure

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

Note: In the following section(s), 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.

- 1) Visit www.maximintegrated.com to download the latest version of the EV kit software, MAX14906EVKit-SetupV1.0.2.ZIP or newer.
- 2) Save the EV kit software to a temporary folder and uncompress the ZIP file.
- 3) Install the EV kit software and USB driver on your computer by running the MAX14906EVKitSetup-V1.0.2.EXE program inside the temporary folder.
- 4) The program files are copied to your PC and icons are created in the Windows **Start | Programs | Maxim Integrated** menu. During software installation, some versions of Windows might show a warning message indicating that this software is from an unknown publisher. This is not an error condition and it is safe to proceed with installation. Administrator privileges are required to install the USB device driver.
- 5) At the end of the installation process, the installer launches the installation for the FTDI Chip CDM drivers. Follow the instructions on the installer and once complete, click **Finish**. The default location of the software is in the program files directory.
- 6) Verify that all jumpers are in their default positions ([Table 1](#)).
- 7) Connect the DC power supply between the EV kit VDD banana jack and GND banana jack. Set the DC power supply output to +24V, and then enable the output. Observe that on the EV kit, the $\overline{\text{VDDOK}}$ and $\overline{\text{FAULT}}$ LEDs are on, indicating the EV kit is powered up.
- 8) Connect the USB A-to-micro-B cable from the PC to the EV kit board. A Windows message appears when connecting the EV kit board to the PC for the first time. Each version of Windows has a slightly different message. If you see a Windows message stating **ready to use**, then proceed to the next step.
- 9) Start the EV kit software by opening its icon in the Windows **Start | Programs | Maxim Integrated** menu. The EV kit software appears as shown in [Figure 1](#). Verify that the lower-right status bar indicates the EV kit hardware is **Connected**. The GUI automatically detects that the EV kit is connected to the PC and enables serial communication. Any configuration change can be made on the **Register Settings** tab.
- 10) By default, **SYNCH** is enabled as seen in the **Register Settings** tab.
- 11) Select the **GlobalErr** register (0x07) and press the **Read Selected** button once to read the default value of 0x1F. Press the **Read Selected** button for the second time to clear all initially detected undervoltage global conditions in the GUI.

Table 1. MAX14906 EV Kit Shunt Positions and Settings

HEADER	SHUNT POSITION	DESCRIPTION
J1	1–2	Connect CRCEN to the V_L supply to enable CRC on the SPI interface.
	2–3*	Connect CRCEN to GND to disable CRC on the SPI interface.
J2	1–2*	Connect the external V_{DD} supply to V_{LED} supply.
	Open	Use an external power supply for the V_{LED} supply between the V_{LED} test point and GND test point.
J3	1–2	Set chip LSB address bit A0 to 1 for the addressable SPI (needs to match the Address in the GUI).
	2–3*	Set chip LSB address bit A0 to 0 for the addressable SPI (needs to match the Address in the GUI).
J4	1–2	Set chip MSB address bit A1 to 1 for the addressable SPI (needs to match the Address in the GUI).
	2–3*	Set chip MSB address bit A1 to 0 for the addressable SPI (needs to match the Address in the GUI).
J5	1–2*	Connect V_L to V_5 5V LDO output when REGEN is unconnected. If REGEN = GND, connect a 5V external supply between the V_L test point and the GND test point to provide 5V to both V_L and V_5 .
	Open	Connect an external supply only on the V_L test point, when REGEN is unconnected and V_5 is enabled as the LDO output. If REGEN = GND, connect the external supplies to both the V_L test point and the V_5 test point, respectively.
J6	1–2*	Connect EN to the V_L supply to enable all DOI_ outputs.
	2–3	Connect EN to GND to disable/three-state all DOI_ outputs.

Table 1. MAX14906 Board Shunt Positions and Settings (continued)

HEADER	SHUNT POSITION	DESCRIPTION
J7	1–2	Connect REGEN to GND to disable the internal regulator. Connect an external 5V supply between the V ₅ test point and GND test point.
	Open*	Enable the internal 5V regulator (V ₅ is a 5V supply output).
J8	1–2	Connect V _{DD} to V _{DD1} . The external pMOS transistor Q1 is not used and G1 is turned off.
	Open*	V _{DD} is connected to V _{DD1} through the external pMOS transistor Q1 for reverse current protection and G1 is turned on.
J9	1–2	Connect V _{DD} to V _{DD2} . The external pMOS transistor Q2 is not used and G2 is turned off.
	Open*	V _{DD} is connected to V _{DD2} through the external pMOS transistor Q2 for reverse current protection and G2 is turned on.
J10	1–2	Connect V _{DD} to V _{DD3} . The external pMOS transistor Q3 is not used and G3 is turned off.
	Open*	V _{DD} is connected to V _{DD3} through the external pMOS transistor Q3 for reverse current protection and G3 is turned on.
J11	1–2	Connect V _{DD} to V _{DD4} . The external pMOS transistor Q4 is not used and G4 is turned off.
	Open*	V _{DD} is connected to V _{DD4} through the external pMOS transistor Q4 for reverse current protection and G4 is turned on.

*Default configuration

- 12) Select **Config1** register (0x0A) and set the SLEDSet bit to 0 in the **Setting** cell to autonomously control all four STATUS LEDs by the internal logic. The font color of the modified register is changed from black to red. Click the **Write Selected** button to write the new configuration into the register.
- 13) By default, the GUI is set for DO High-Side Mode. In the **System** tab of the GUI, select the desired output mode (High-side, High-side 2x Inrush Current, Active Clamp Push-pull or Simple Push-pull) and select **On** to set D₁ logic input high, thus the corresponding DOI₁ output is enabled/turned on. Notice that the corresponding status LED (SLED₁) lights up.
- 14) Select **Off** in the pulldown menu to set the D₁ logic input low to turn off the corresponding DOI₁ output. Verify that the SLED₁ is turned off, which indicates that the DOI₁ output is turned off.
- 15) Repeat steps 13 and 14 to verify other DOI₁ outputs and check that the status LED (SLED₁) follows the input setting.
- 16) In the **System** tab select **DI Mode** for all DOI₁ channels in the pulldown menu in the first column. This configures the DOI1 to DOI4 channels to Type 1 and 3 digital-input mode (DI mode) and sets D1 to D4 logic pins to logic outputs.
- 17) Connect the negative terminal of the 24V DC power supply to the GND test point. Connect the positive terminal of the 24V DC power supply to the DOI1 test point.
- 18) Using a voltmeter, verify D1 logic output is approximately 5V by probing the D1 test point.
- 19) Set the DC power supply output to be less than 6V.
- 20) Using a voltmeter, verify D1 logic output is approximately 0V by probing the D1 test point.
- 21) Repeat steps 17 to 20 to verify other DOI₁ input behavior.

Detailed Description of Hardware

The MAX14906 EV kit allows the user to evaluate all features and operational modes of the MAX14906, four-channel digital-output, digital-input device.

External Power Supplies

The EV kit is powered from a single power supply and accepts a wide range of supply voltages, from 10V to 40V DC. The power is applied through two banana jacks, VDD (+) and GND (-).

The MAX14906 requires a 5V DC power supply on V₅. It can be powered by the internal 5V linear regulator when the J7 header is left open. Alternatively, V₅ can be powered by an external 5V DC supply when J7 is in the 1–2 position. Refer to [Table 1](#) for details.

The logic supply V_L defines the levels on all I/O logic pins. It can be powered by the internal 5V linear regulator when the J7 header is left open and J5 is in the 1–2 position. If a different logic level other than 5V is desired, for example 3.3V, an external power supply is needed to power up the V_L pin through the V_L test point with a supply range of 2.5V to 5.5V. In this case, the J5 header should be left open.

Each DOI_ channel is powered by their respective field supply V_{DD1} to V_{DD4} . Each V_{DD} is connected directly to V_{DD} through jumpers J8 to J11 when all jumpers are closed. In this configuration, the external pMOS transistors Q1 to Q4 are not used and the gate driver outputs G1 to G4 are turned off. To protect the MAX14906 against high reverse-current flow into the DOI_ pins and allow the DOI_ input voltage to go above the V_{DD} supply voltage and not be clamped to one diode above the field supply, jumpers J8 to J11 are configured in open position, and the Q1 to Q4 pMOS transistors are turned on by enabling G1 to G4 gate driver outputs by setting the GDrvEn1 to GDrvEn4 bits to 1 in the **OpnWrEn** register (0x08).

Power-Up Sequencing

- 1) Enable the +24V DC power supply.
- 2) Connect the USB A-to-micro-B cable from a PC to the EV kit board.
- 3) Start the EV kit software.

When the GUI is not open, the DOI_ outputs are high due to the D_ inputs being high since the device is in high-side DO mode by default. When the GUI is open, the software pulls D_ inputs low and then DOI_ outputs are also low.

Digital Output Operation

In the Digital Output mode, the user can control the D_ logic inputs or HighO_ bits to enable or disable the DOI_ outputs. The specific DO mode, such as High-side, High-side 2x Inrush Current, Simple Push-pull, and Active Clamp Push-pull can be selected in the pulldown menu in the **System** tab, or by selecting the desired output mode by using DoMode_[1:0] bits in the **ConfigDO** register (0x0D). D_ logic inputs can be controlled either by the EV kit GUI or by an external source when D_ signals are disconnected from the on-board microcontroller using the corresponding switch (SW1) channels. The external D_ input signals can be applied to the D1 to D4 test points or to J13 connector.

Digital Input Operation

The user can configure the DOI_ channels as digital inputs by selecting **DI Mode** in the pulldown menu in the **System** tab, or by setting the SetDi1 to SetDi4 bits to 1 in

the **SetOUT** register (0x00). All the DOI_ channels can be configured as either Type 1 and 3 or Type 2 digital inputs. However, it is not possible to mix input types as the internal current sink is globally set to either 2.3mA (typ) for Type 1 and 3, or 7mA (typ) for Type 2 inputs. By default, the Typ2Di bit is set to 0, which is the Type 1 and 3 configuration. The DOI_ inputs support a minimum operating range of -3V to +30V which is compliant with IEC 61131-2 digital inputs standard. Input voltage can be applied to the J12 terminal block or the DOI_ test points.

LED Indicators

Field supply V_{DD} diagnostic faults are provided through the \overline{VDDOK} LED. Global diagnostic faults and per-channel diagnostic faults are provided through the \overline{FAULT} LED if the diagnostic features are enabled through the registers. By default, \overline{FAULT} LED is turned on at power-up due to undervoltage faults set by default in the **GlobalErr** register. Per-channel output state and per-channel fault conditions are visible through the LED matrix, SLED1 to SLED4, and FLED1 to FLED4, correspondingly. Other diagnostics are provided through the SPI interface by reading diagnostic registers 0x02 through 0x07.

Isolation Domains

The MAX14906 EV kit features galvanic isolation for the 4-wire SPI, SYNCH, \overline{FAULT} , and \overline{READY} signals using the MAX14483 and the D_ logic inputs/outputs (D1, D2, D3 and D4) using the MAX14937s, whose bidirectional channels allow the D_ signals to be transmitted in both directions on the same line. Refer to the [MAX14906 EV Kit Schematic](#). The isolated logic domain is powered exclusively from the USB connector J202. The digital isolators, MAX14483 (U4) and the MAX14937 (U2 and U3) keep the USB ground separate from the rest of the MAX14906 circuitry.

Protective Earth (PE) is provided on the upper-left corner of the EV kit with a safety rated Y capacitor (C13) between the field ground (GND) and PE.

External pMOS Transistors

The MAX14906 EV kit has an external pMOS transistor for each channel to protect the MAX14906 against high reverse current flow into the DOI_ pins in the DO modes and supports up to 30V input voltages in DI modes. When using the external pMOS transistors, ensure J8, J9, J10 and J11 headers are open, and gate drive pins G1 to G4 are enabled by setting the GDrvEn_ bits to 1 in the **OpnWrEn** register (0x08). The external pMOS transistors are always off and G1 to G4 pins are shorted to V_{DD1} to V_{DD4} in the DI modes and the high-impedance low-leakage mode.

Surge and ESD Protection

The MAX14906 EV kit is immune to $\pm 1\text{kV}$ surge pulses (1.2/50 μs , according to IEC 61000-4-5) applied between the DIO_ and field ground. Without external protection devices, the DOI_ channels of the MAX14906 are protected against negative 1kV surges per IEC 61000-4-5 (42 Ω /0.5 μF). To protect the MAX14906 from positive surge transients on the DOI_ pins, a suppressor/TVS diode (D5) is installed between V_{DD} and GND. Refer to the [MAX14906 EV Kit Schematic](#).

To protect the MAX14906 from electrostatic discharge (ESD) events per IEC 61000-4-2, an additional 470pF can be installed on C4, C8, C9, and C10 for each DOI_ pin. In addition, if the external pMOS transistors Q1 to Q4 are enabled (J8 to J11 open), install 1 μF bypass capacitors on C18 and C19 footprint. If the external pMOS transistors Q1 to Q4 are not used (J8 to J11 closed), install 1 μF bypass capacitors on C1, C2, C11, and C12 footprint for each V_{DD}_ pin.

Communicating with the MAX14906

The MAX14906 EV kit communicates to a PC through a USB port. The on-board FT2232 controller is communicating with all digital signals including SPI, D1 to D4, SYNCH, $\overline{\text{READY}}$ and $\overline{\text{FAULT}}$, and is managed by the EV kit GUI software on the PC. This is ideal for quick evaluation and to explore the features and functions of the MAX14906.

If the user prefers to use their own microcontroller or FPGA and their own software, all digital signals including SPI, D1 to D4 signals, SYNCH, $\overline{\text{READY}}$ and $\overline{\text{FAULT}}$ are available through J13. If J13 is used, disconnect the on-board FT2232 controller from the MAX14906 by opening all switches on SW1.

Detailed Description of Software

The MAX14906 GUI provides access to all registers and allows full configuration and control of the MAX14906. There are two tabs available to control the EV kit. The **System** tab provides quick and basic control of the DOI_ channels. The **Register Settings** tab provides per-channel and enhanced diagnostic configuration and allows full control of the device.

System Tab

The **System** tab allows the DOI_ pins to be configured in Digital Output mode by selecting the first pulldown menu to **DO Mode**. The type of digital output mode can be configured by selecting the second pulldown menu, including High-side mode, High-side with 2x Inrush Current mode, Active Clamp Push-pull mode and Simple Push-pull

mode, as shown in [Figure 2](#). The third pulldown menu allows the DOI_ outputs to be on, off, or driving a square-wave from the pulldown menu.

The EV kit drives outputs once **On** is selected in the pulldown menu. When driving a square wave, the user must click the **Drive Square** button on the lower right-side of the GUI to drive the outputs. The indicators connected to the OUT1 to OUT4 pins show the state of each output.

Connect the oscilloscope probe to DOI_ test points on the EV kit to see the output signal in real-time.

The user can set the MAX14906 in Digital Input mode by selecting **DI Mode** in the pulldown menu in the first column. In **DI Mode**, the pulldown menu in the second column allows the user to configure all digital inputs to either Type 1 and 3, or Type 2 inputs.

The user can also configure the MAX14906 to be in low-leakage high-impedance mode by selecting the **Low-Leakage Mode**, in the pulldown menu in the first column.

Register Settings Tab

The **Register Settings** tab allows full configuration of the device, as shown in [Figure 3](#). The full register map of the MAX14906 is located on the left-side of the tab, and the bit-by-bit control and description table is located on the right side. When the register is selected in the register table, the detailed description of each bit is shown in the bit description table. The bit value can be changed using pulldown menus in the **Setting** cell for each bit individually in the bit description table. Both tables are synchronized in that changes made in one table appear at both tables. There are several write and read options available through the corresponding control buttons located below the bit description table.

When the **Auto Write** button is selected, any data typed in, or selected through the **Setting** pulldown menu is automatically written into the corresponding writable register. The button renamed to **Stop Auto Write** and auto write function can be canceled by clicking on this button a second time.

The **Read All** button performs a read operation of all registers after each click.

When the fault conditions occur, they set the bit(s) in the corresponding read-only registers 0x02 to 0x07. The fault conditions should be carefully evaluated and removed externally (over-/undervoltage, thermal overload, open-wire, etc.). It is recommended to read the **Interrupt** (0x03) and **GlobalErr** (0x07) registers first to identify what kind of fault conditions are present, then read per-channel diagnostic registers 0x02, 0x04 to 0x06 twice to make sure that the condition is gone and to clear the interrupts.

The **Write Selected** button allows to write to the selected register only, while the **Write Modified** button performs a write operation to all modified registers after each click.

The **Burst Write** allows the GUI to write to registers 0x00 and 0x01 only in one SPI cycle, while the **Burst Read** allows the GUI to read multiple consecutive registers 0x02 through 0x07 (DoiLevel, Interrupt, OvrLdChF, OpnWirChF, ShtVDDChF, and GlobalErr registers) in one SPI cycle.

There are a **MAX14906 I/O Pins** box and a **SDO Diagnostic Result** box below the buttons. The SDO diagnostic faults are updated after each SPI read or write operation. To enable or disable the CRC function on the SPI interface, both software and hardware configurations

need to be matched. To enable the CRC, set the jumper J1 in the 1–2 position and put the **CRCEN** slider to the enabled position. To disable the CRC, set jumper J1 in the 2–3 position and set the **CRCEN** slider to disabled. The **SYNCH** slider allows manual synchronization of multiple devices.

The user must match A0 and A1 jumper position (2–3 position by default) on the EV kit with the SPI address selected from the **Address** pulldown menu, located below the register map table. The default address is 00.

Each SPI transaction is displayed in the **Device Mode Info** box for user convenience.

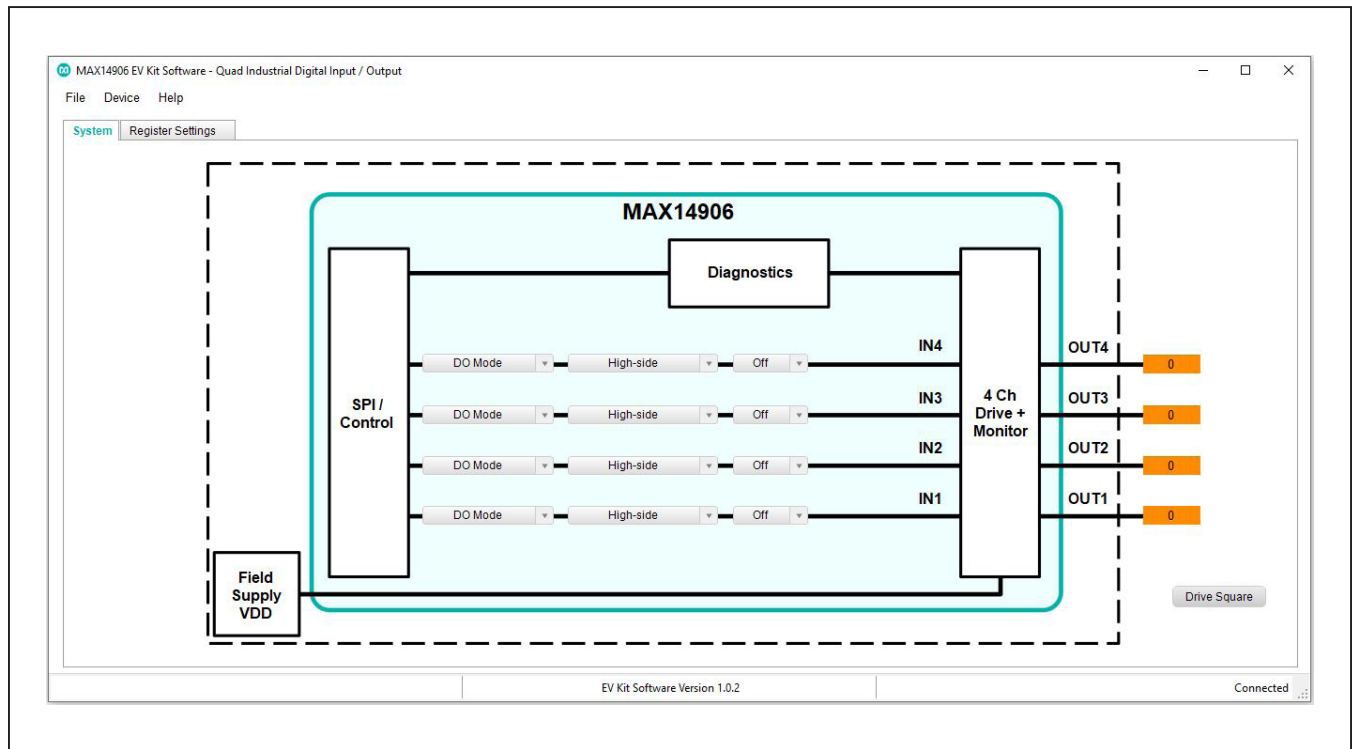


Figure 1. MAX14906 EV Kit GUI System Tab

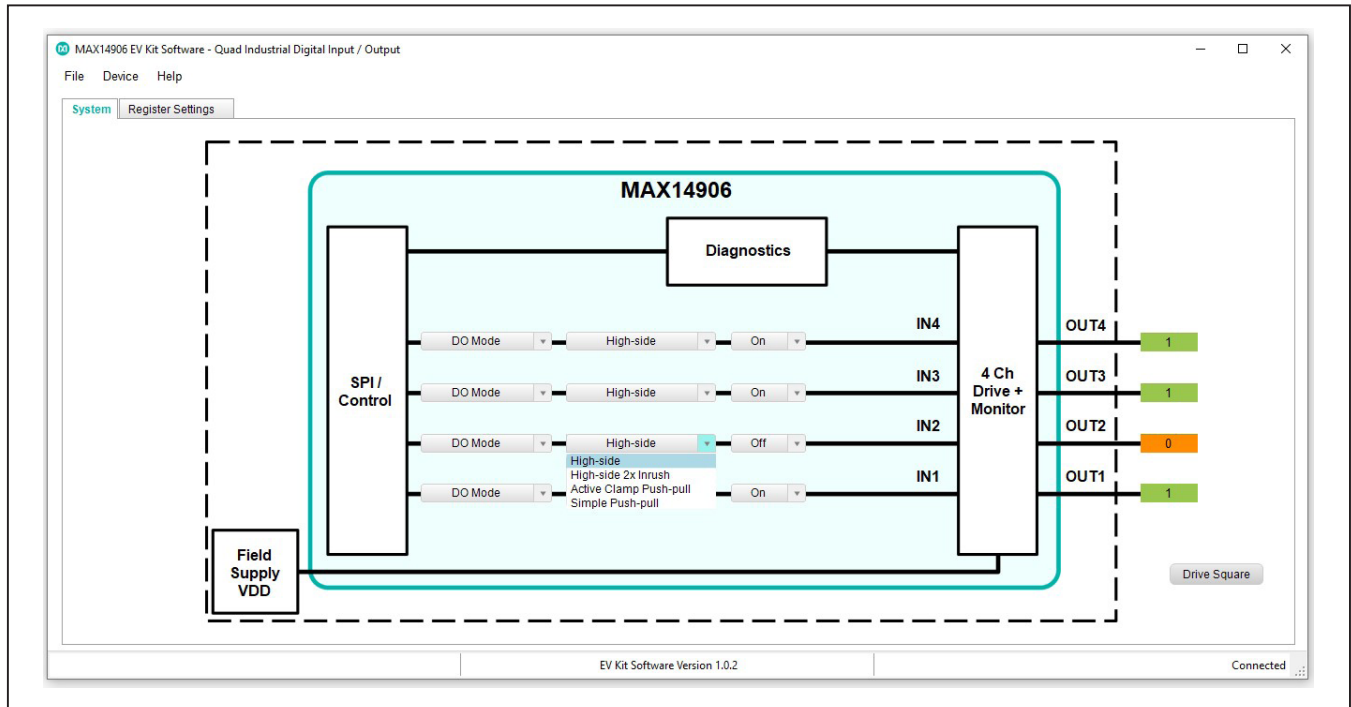


Figure 2. System Tab/Output Configuration

The screenshot shows the 'Register Settings' tab in the MAX14906 EV Kit Software. It contains a table of registers, a bit configuration table, and I/O pin status information.

Addr	R/W	Register	Value	Description
0x00	R/W	SetOUT	0b00000000	Set to Input or Output On / Off
0x01	R/W	SetLED	0b00000000	Set Status and Fault LEDs
0x02	R	DoLevel	0b00000000	Read DI or VDD and Safe Demag Faults
0x03	R	Interrupt	0b00000000	Provides IRQ Info
0x04	R	OvrLdChF	0b00000000	Current Limit and Thermal Overload Faults
0x05	R	OpnWirChF	0b00000000	Above VDD and Open Wire Off-State Faults
0x06	R	ShtVDDChF	0b00000000	VDD Overvoltage and Short to VDD Faults
0x07	R	GlobalErr	0b00000000	Global Errors
0x08	R/W	OpnWEn	0b00000000	Enable Open Wire Detection Off-State
0x09	R/W	ShtVDDEn	0b00000000	Enable VDD Overvoltage and Short to VDD
0x0A	R/W	Config1	0b01010011	Global Configuration 1
0x0B	R/W	Config2	0b00000000	Global Configuration 2
0x0C	R/W	ConfigDI	0b00001000	Digital Input Configuration
0x0D	R/W	ConfigDO	0b00000000	Digital Output Configuration
0x0E	R/W	CurrLim	0b00000000	Current Limit Faults
0x0F	R/W	Mask	0b10111110	Enable Global Error Detection

Bit	Name	Value	Setting	Description
B[7]	SetDI4	0b0	0: DO Mode	Program CH4 Mode of Operation
B[6]	SetDI3	0b0	0: DO Mode	Program CH3 Mode of Operation
B[5]	SetDI2	0b0	0: DO Mode	Program CH2 Mode of Operation
B[4]	SetDI1	0b0	0: DO Mode	Program CH1 Mode of Operation
B[3]	HighO4	0b0	0: Open(HS) / GND(PP)	Set CH4 Output
B[2]	HighO3	0b0	0: Open(HS) / GND(PP)	Set CH3 Output
B[1]	HighO2	0b0	0: Open(HS) / GND(PP)	Set CH2 Output
B[0]	HighO1	0b0	0: Open(HS) / GND(PP)	Set CH1 Output

Pin Name	Setting/Status	Read	Direction
SYNCH	Enabled	1	IN
READY#	Ready	0	OUT
FAULT#	No Fault	1	OUT
DIO1	Off	0	IN / OUT
DIO2	Off	0	IN / OUT
DIO3	Off	0	IN / OUT
DIO4	Off	0	IN / OUT

Pin Name	Value	Description
SHTVDD	0	Short to VDD Present
AbwVDD	0	Above VDD
OWOFF	0	Open Wire Switch Off
OvrCurr	0	Over Current
OvrId	0	Overload Fault
GLOBLF	0	Global Fault
Fault Bits	11110000	

The screenshot also shows 'Device Mode Info' (Chip Mode: SPI-Addressing, without CRC, Addr=0) and 'EV Kit' settings (Address: 00, CRCEN: Disabled). The software version is 1.0.2 and the device is connected.

Figure 3. Register Settings Tab

Ordering Information

PART	TYPE
MAX14906EVKIT#	EV Kit

#Denotes RoHS compliance.

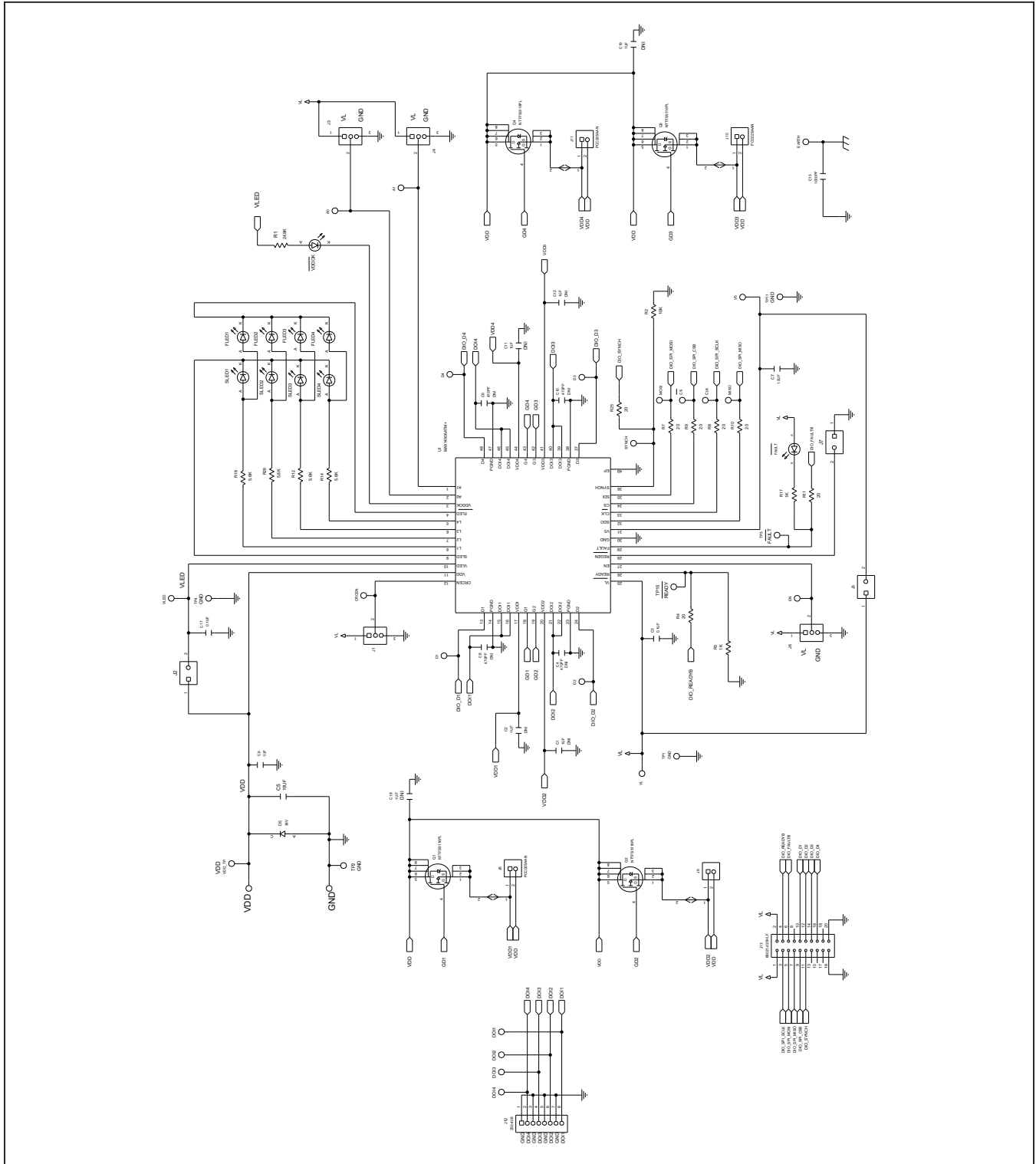
MAX14906 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	C3, C17	-	2	CC0603KR7R0BB104; GRM188R72A104KA35; GCJ188R72A104KA01;HMK107B7104KA; 06031C104KAT2A;GRM188R72A104K	YAGEO;MURATA;MURATA; TAIYO YUDEN;AVX;MURATA	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
2	C5	-	1	C3225X7S1H106K250AB; CGA6P3X7S1H106K250AB; GCM32EC71H106K	TDK;TDK;MURATA	10UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 10UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
3	C6	-	1	C2012X7S2A105K125AB; GRJ21BC72A105KE11; CGA4J3X7S2A105K125AB; GRM21BC72A105KE01	TDK;MURATA;TDK	1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
4	C7	-	1	GMK212B7105KG; GRM219R7YA105KA12	TAIYO YUDEN;MURATA	1.0UF	CAPACITOR; SMT (0805); CERAMIC; 1UF; 35V; TOL=10%; MODEL=GMK SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
5	C13	-	1	GA352QR7GF102KW01	MURATA	1000PF	CAP; SMT (2211); 1000PF; 10%; 250V; X7R; CERAMIC CHIP	
6	C14, C15, C205-C215, C230, C231	-	15	C0402C104J4RAC; GCM155R71C104JA55	KEMET;MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=5%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
7	C201	-	1	C1005X7R1V103K050BB	TDK	0.01UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 35V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
8	C202, C203	-	2	C0402C180J5GAC; GRM1555C1H180JA01; C1005C0G1H180J050BA	KEMET;MURATA;TDK	18PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 18PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=C0G	
9	C204	-	1	C0603C475K8PAC; LMK107BJ475KA;CGB3B1X5R1A475K; C1608X5R1A475K080AC; CL10A475KPBNNN	KEMET;TAIYO YUDEN;TDK; TDK;SAMSUNG ELECTRONICS	4.7UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7UF; 10V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
10	CP1	-	1	CL21A106K0QNNN; GRM21BR61C106KE15; EMK212ABJ106KD	SAMSUNG ELECTRONICS; MURATA;TAIYO YUDEN	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 16V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
11	CP2	-	1	UMK107BJ105KA; C1608X5R1H105K080AB; CL10A105KB9NNN; GRM188R81H105KAAL	TAIYO YUDEN;TDK; SAMSUNG;MURATA	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 50V; TOL=10%; MODEL=MK SERIES; TG=-55 DEGC TO +85 DEGC	
12	CP3	-	1	C0603C102K5RAC; GRM188R71H102KA01; C0603X7R500-102KNE	KEMET;MURATA;VENKEL	1000PF	CAPACITOR; SMT; 0603; CERAMIC; 1000PF; 50V; 10%; X7R; - 55degC to +125degC; +/-15% from - 55degC to +125degC	
13	CP4	-	1	C0805C226M9PAC; GRM21BR60J226ME39; LMK212BJ226MG; CL21A226MQLQCN	KEMET;MURATA;TAIYO YUDEN;SAMSUNG EL	22UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 22UF; 6.3V; TOL=20%; TG=-55 DEGC TO +125 DEGC; TC=X5R	
14	CP5, CP6	-	2	GRM21BR71C475KA73; 0605Y475KAT2A; GCM21BR71C475KA73; CGA4J3X7R1C475K125AE	MURATA;AVX;MURATA;TDK	4.7UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 4.7UF; 16V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
15	D5	-	1	SMBJ36A-E3	VISHAY GENERAL SEMICONDUCTOR	36V	DIODE; TVS; SMB (DO-214AA); VRM=36V; IPP=10.3A	
16	DOI1-DOI4	-	4	5125	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BROWN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
17	EARTH	-	1	5126	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; GREEN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
18	FAULT, FLED1-FLED4	-	5	LS L29K-G1J2-1-Z	OSRAM	LS L29K-G1J2-1-Z	DIODE; LED; SMART; RED; SMT (0603); PIV=1.8V; IF=0.02A; -40 DEGC TO +100 DEGC	
19	FB1	-	1	BLM21AG601SN1	MURATA	600	INDUCTOR; SMT (0805); FERRITE-BEAD; 600; TOL=+-25%; 0.2A	
20	FB2, FB3	-	2	BLM21PG331SN1	MURATA	330	INDUCTOR; SMT (0805); FERRITE-BEAD; 330; TOL=+-25%; 1.5A	
21	GND, VDD	-	2	3267	POMONA ELECTRONICS	3267	CONNECTOR; MALE; PANELMOUNT; STANDARD UNINSULATED BANANA JACK; STRAIGHT; 1PIN	
22	J1, J3, J4, J6	-	4	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 3PINS; -65 DEGC TO +125 DEGC	
23	J2, J5, J7-J11	-	7	PCC02SAAN	SULLINS	PCC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC	
24	J12	-	1	250-408	WAGO	250-408	CONNECTOR; FEMALE; THROUGH HOLE; COMPACT TERMINAL STRIP WITH PUSH BUTTON; STRAIGHT; 8PINS	
25	J13	-	1	68021-220HLF	AMPHENOL ICC	68021-220HLF	CONNECTOR; MALE; THROUGH HOLE; BERGSTIK II BREAKAWAY HEADER; RIGHT ANGLE; 20PINS	
26	J202	-	1	ZX62RD-AB-5P8(30)	HIROSE ELECTRIC CO LTD.	ZX62RD-AB-5P8(30)	CONNECTOR; MALE; THROUGH HOLE; MICRO-USB CONNECTOR MEETING REQUIREMENTS OF USB 2.0 STANDARD; RIGHT ANGLE; 5PINS	

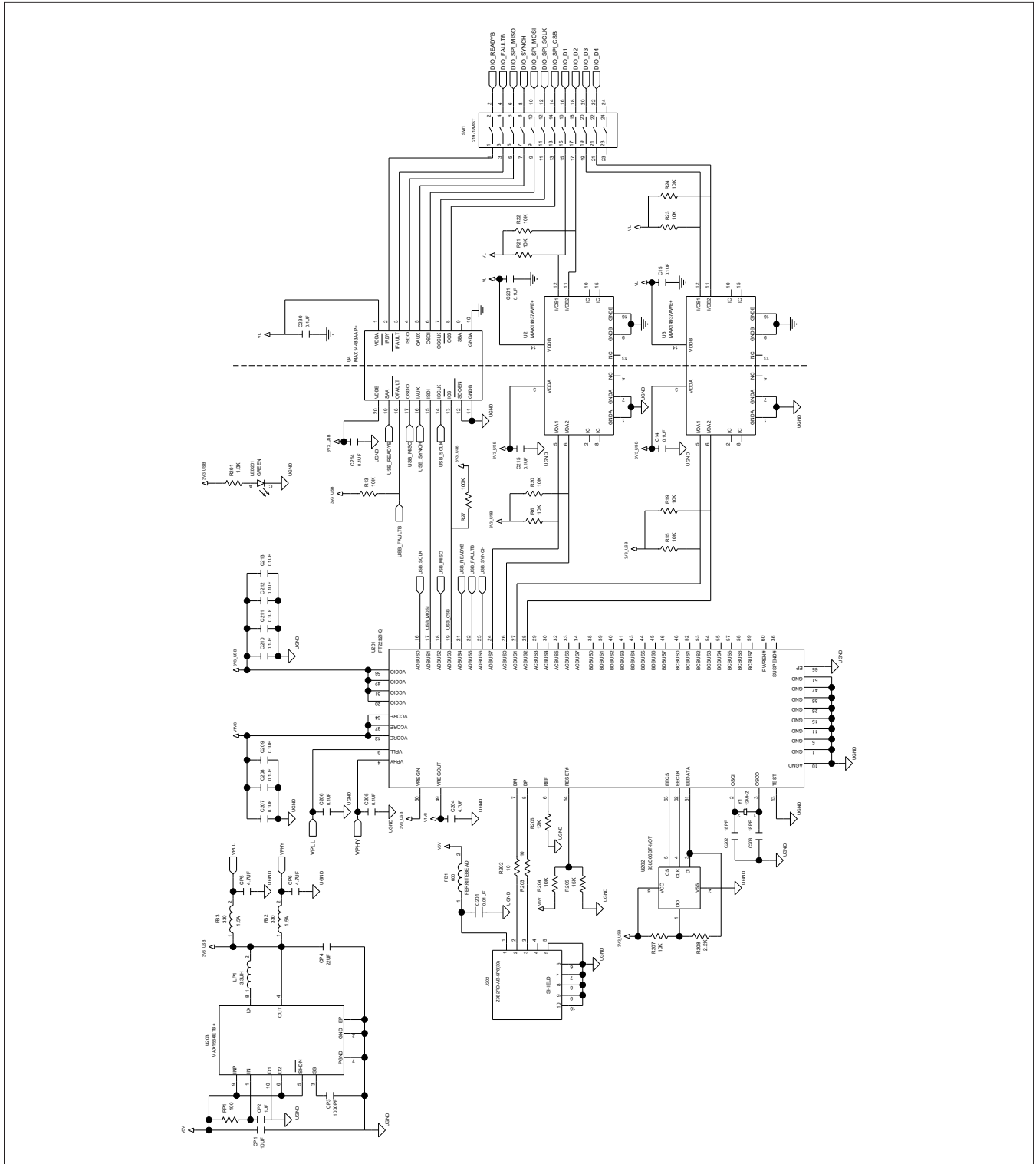
MAX14906 EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
27	LED201	-	1	SML-P12PT	ROHM	SML-P12PT	DIODE; LED; SML-P1 SERIES; ULTRA COMPACT HIGH BRIGHTNESS LED; GREEN; SMT (0402); VF=2.2V; IF=0.02A	
28	LP1	-	1	B82432T1332K000	TDK	3.3UH	INDUCTOR; SMT (1812); FERRITE CORE; 3.3UH; TOL=+/-10%; 0.9A	
29	Q1-Q4	-	4	NTTFS5116PLTAG	ON SEMICONDUCTOR	NTTFS5116PL	TRAN; POWER MOSFET; PCH; WDFNB; PD-(40W); I(-20A); V(-60V)	
30	R1	-	1	CRCW060324K9FK;ERJ-3EKF2492	VISHAY DALE;PANASONIC	24.9K	RESISTOR; 0603; 24.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
31	R2	-	1	CRCW060310K0JN;ERJ-3GEYJ103	VISHAY DALE;PANASONIC	10K	RESISTOR; 0603; 10K OHM; 5%; 200PPM; 0.10W; THICK FILM	
32	R3, R17	-	2	CRCW06031K00FK;ERJ-3EKF1001	VISHAY DALE;PANASONIC	1K	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM	
33	R4, R7-R11, R25	-	7	CRCW060320R0FK;ERJ-3EKF20R0	VISHAY DALE;PANASONIC	20	RESISTOR; 0603; 20 OHM; 1%; 100PPM; 0.10W; THICK FILM	
34	R6, R13, R15, R19-R24	-	9	CRCW020110K0FK	VISHAY DALE	10K	RESISTOR; 0201; 10K OHM; 1%; 100PPM; 0.05W; THICK FILM	
35	R12, R14, R18, R26	-	4	CRCW06035K60FK	VISHAY DALE	5.6K	RESISTOR; 0603; 5.6K OHM; 1%; 100PPM; 0.10W; THICK FILM	
36	R27	-	1	CRCW0402100KFK;RC0402FR-07100KL	VISHAY;YAGEO	100K	RESISTOR; 0402; 100K; 1%; 100PPM; 0.0625W; THICK FILM	
37	R201	-	1	ERJ-2RKF1301	PANASONIC	1.3K	RESISTOR; 0402; 1.3K OHM; 1%; 100PPM; 0.10W; THICK FILM	
38	R202, R203	-	2	CRCW060310R0FK;MCR03EZPFX10R0; ERJ-3EKF10R0	VISHAY DALE;ROHM	10	RESISTOR; 0603; 10 OHM; 1%; 100PPM; 0.10W; THICK FILM	
39	R204	-	1	CRCW060310K0FK;ERJ-3EKF1002	VISHAY DALE;PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM	
40	R205	-	1	CRCW060315K0FK	VISHAY DALE	15K	RESISTOR; 0603; 15K OHM; 1%; 100PPM; 0.10W; THICK FILM	
41	R206	-	1	CRCW060312K0FK	VISHAY DALE	12K	RESISTOR; 0603; 12K OHM; 1%; 100PPM; 0.10W; THICK FILM	
42	R207	-	1	CRCW040210K0FK;RC0402FR-0710KL	VISHAY DALE;YAGEO PHICOMP	10K	RESISTOR; 0402; 10K; 1%; 100PPM; 0.0625W; THICK FILM	
43	R208	-	1	CRCW04022K20FK;RC0402FR-072K2L	VISHAY DALE;YAGEO PHICOMP	2.2K	RESISTOR; 0402; 2.2K OHM; 1%; 100PPM; 0.0625W; THICK FILM	
44	RP1	-	1	CRCW0603100R0FK;ERJ-3EKF1000; RC0603FR-07100RL	VISHAY DALE;PANASONIC	100	RESISTOR; 0603; 100 OHM; 1%; 100PPM; 0.10W; THICK FILM	
45	SLED1-SLED4	-	4	LGL29K-G2J1-24-Z	OSRAM	LGL29K-G2J1-24-Z	DIODE; LED; SMARTLED; GREEN; SMT; PIV=1.7V; IF=0.02A	
46	SPACER1-SPACER4	-	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/BIN; NYLON	
47	SU1-SU11	-	11	S1100-B;SX1100-B;STC02SYAN	KYCON;KYCON;SULLINS ELECTRON	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED	
48	SW1	-	1	219-12MST	CTS	219-12MST	SWITCH; SPST; SMT; STRAIGHT; 20V; 0.1A; SURFACE MOUNT DIP SWITCH-AUTO PLACEABLE; RINSULATION=1000M OHM	
49	TP1, TP2, TP4, TP11	-	4	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	GND
50	A0, A1, CLK, CRCEN, CS, D1-D4, EN, MISO, MOSI, SYNCH, TP3, TP15	-	15	5009	KEYSTONE	N/A	TESTPOINT;PINDIA=0.125IN; TOTAL LENGTH=0.35IN;BOARDHOLE=0.063IN;YELLOW;PHOSPHORBRONZE WIRE SILVERPLATEFINISH;	(TP3:FAULT) (TP15:READY)
51	U1	-	1	MAX14906ATM+	MAXIM	MAX14906ATM+	EVKIT PART - IC; MAX14906ATM+; TOFN48-EP; PACKAGE CODE: T4866+6C; PACKAGE OUTLINE: 21-0144; PACKAGE LAND PATTERN: 90-0130	
52	U2, U3	-	2	MAX14937AWE+	MAXIM	MAX14937AWE+	IC; ISO; TWO CHANNEL; 5KVRMS I2C ISOLATOR; WSOIC16	
53	U4	-	1	MAX14483AAP+	MAXIM	MAX14483AAP+	IC; DISO; 6-CHANNEL; LOW-POWER; 3.75KVRMS SPI DIGITAL ISOLATOR; SSOP20	
54	U201	-	1	FT2232HQ	FUTURE TECHNOLOGY DEVICES IN	FT2232HQ	IC; MMRY; DUAL HIGH SPEED USB TO MULTIPURPOSE UART/FIFO; QFN64-EP	
55	U202	-	1	93LC66BT-I/IOT	MICROCHIP	93LC66BT-I/IOT	IC; EPROM; 4K MICROWIRE SERIAL EEPROM; SOT23-6	
56	U203	-	1	MAX1556ETB+	MAXIM	MAX1556ETB+	IC; CONV; PWM STEP-DOWN DC-DC CONVERTER; TDFN10-EP 3X3	
57	V5, VDD_TP, VL, VLED	-	4	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;	
58	VDDOK	-	1	LTST-C171GKT	LITE-ON ELECTRONICS INC.	LTST-C171GKT	DIODE; LED; STANDARD; GREEN; SMT (0805); PIV=5.0V; IF=0.12A; -55 DEGC TO +85 DEGC	
59	Y1	-	1	ABM7-12.000MHZ-D2Y-T	ABRACON	12MHZ	CRYSTAL; SMT; 18PF; 12MHZ; +/-20PPM; +/-30PPM	
60	PCB	-	1	MAX14906	MAXIM	PCB	PCB:MAX14906	-
61	C1, C2, C11, C12, C18, C19	DNP	0	C2012X7S2A105K125AB; GRJ21BC72A105KE11; CGA4J3X7S2A105K125AB; GRM21BC72A105KE01	TDK;MURATA;TDK	1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
62	C4, C8-C10	DNP	0	C0603C471K1GAC	KEMET	470PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 470PF; 100V; TOL=10%; MODEL=C03; TG=-55 DEGC TO +125 DEGC; TC=+	
TOTAL			154					

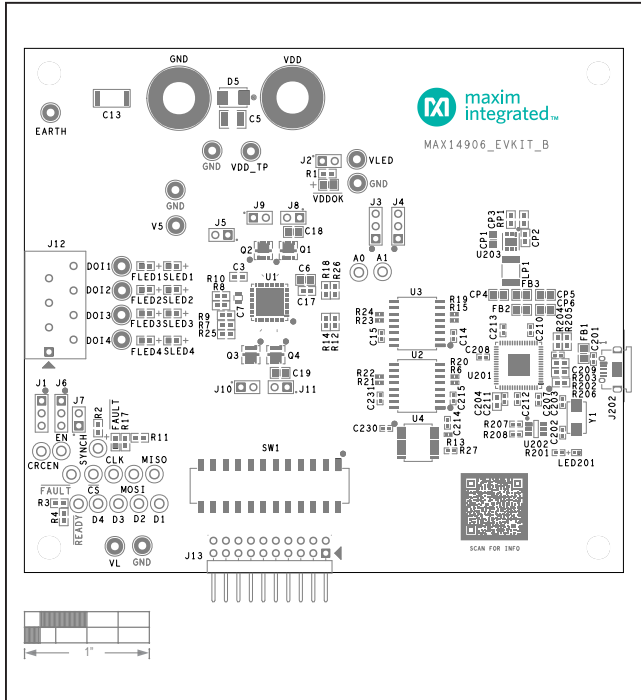
MAX14906 EV Kit Schematic



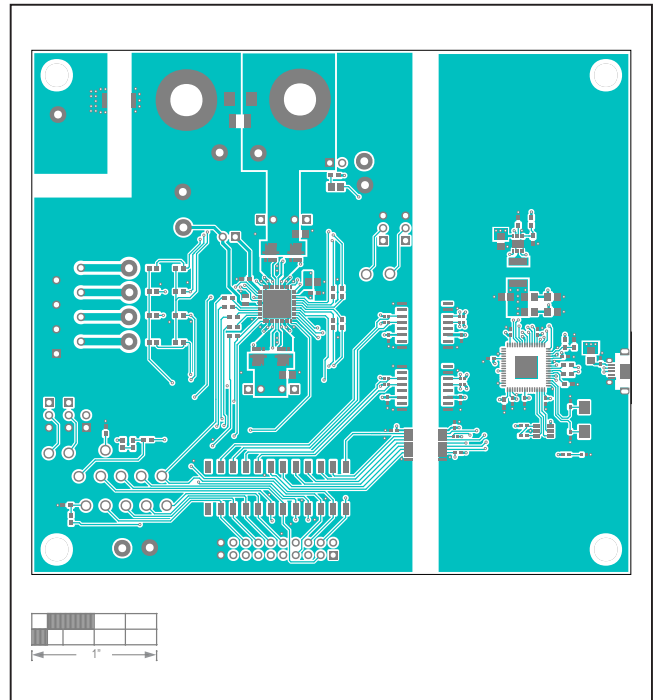
MAX14906 EV Kit Schematic (continued)



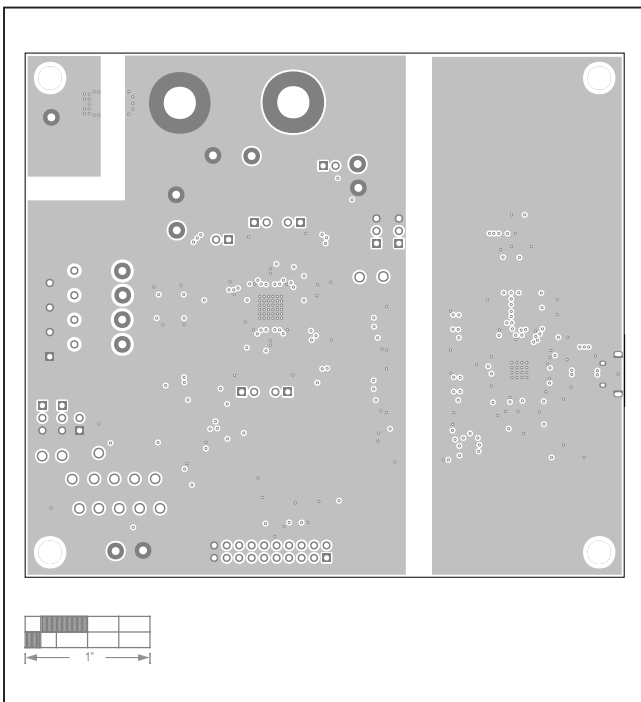
MAX14906 EV Kit PCB Layout Diagrams



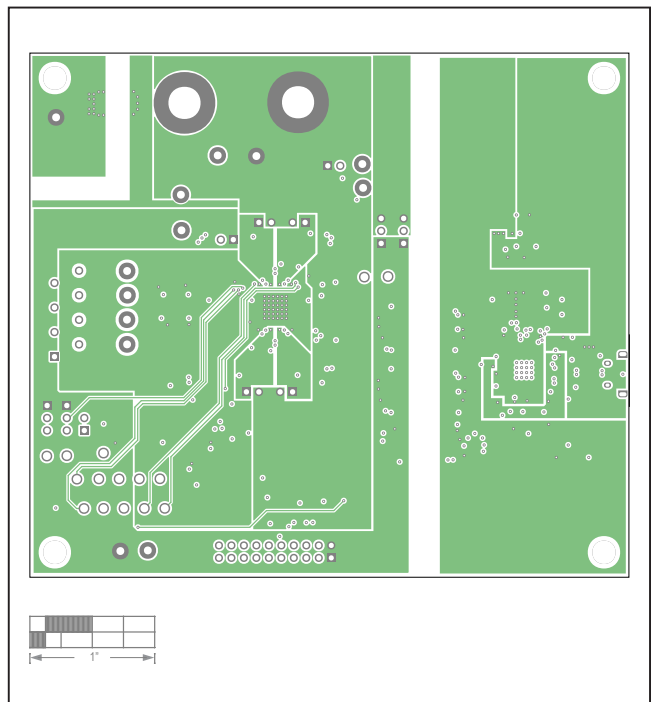
MAX14906 EV Kit—Top Silkscreen



MAX14906 EV Kit—Top Layer

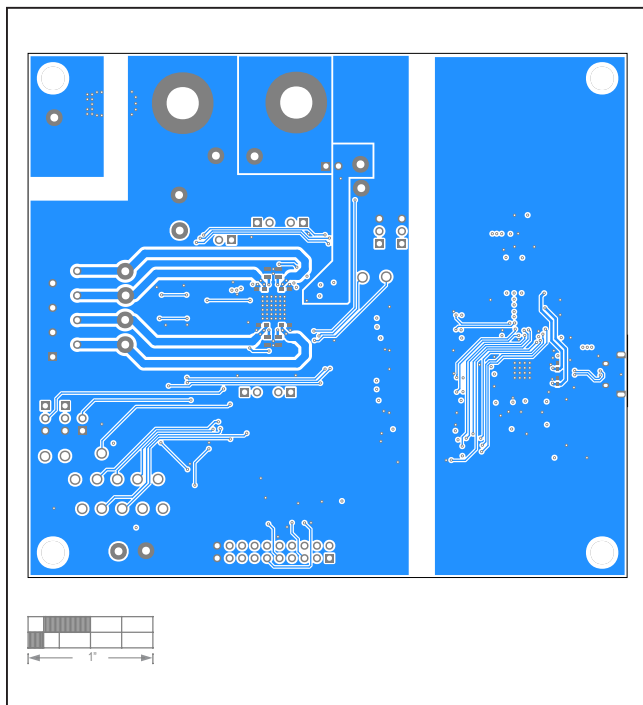


MAX14906 EV Kit—Layer 2 GND

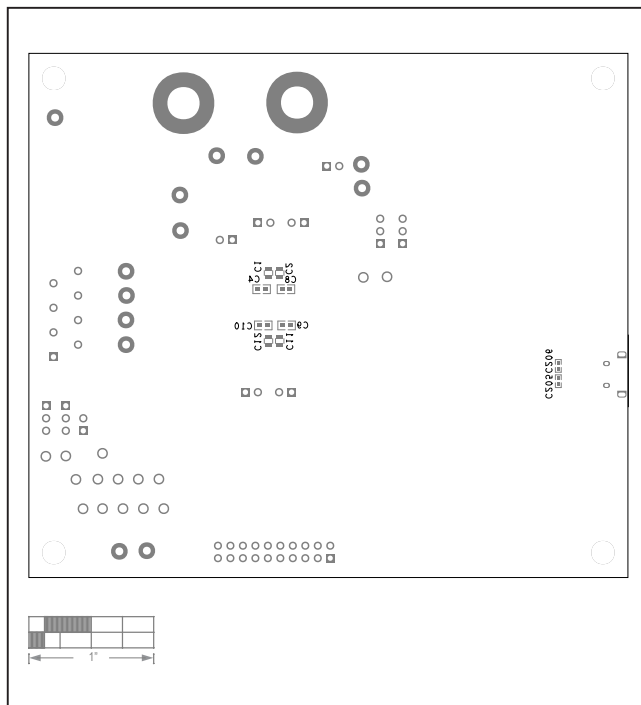


MAX14906 EV Kit—Layer 3 Power

MAX14906 EV Kit PCB Layout Diagrams (continued)



MAX14906 EV Kit—Bottom Layer



MAX14906 EV Kit—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/20	Initial release	—
1	3/21	Updated the <i>External Power Supplies</i> , <i>LED Indicators</i> , <i>Surge and ESD Protection</i> and <i>Registers Setting Tab</i> sections, and Table 1	4–7

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