MAXIM

MAXQ7665 Evaluation Kit

Evaluates: MAXQ7665

General Description

The MAXQ7665 evaluation kit (EV kit) is a convenient platform for evaluating the capabilities of the MAXQ7665 data-acquisition microcontroller (µC). The kit contains all the hardware needed to interface to a PC and run demo application software. The EV kit also includes external temperature sensors, along with the MAXQ7665 internal sensor, and a CAN transceiver for connecting to automotive networks.

EV Kit Contents

♦ **MAXQ7665 EV Kit PCB**

♦ **RS-232 Serial-Port Cable for Programming and Debugging**

♦ **12V, 1.5A DC Power Supply**

♦ **MAXQ7665 EV Kit Quick Start CD**

♦ **Additional Shunts for Jumper Configuration**

Windows is a registered trademark of Microsoft Corp.

Features

♦ **MAXQ7665 16-Bit RISC Data-Acquisition µC**
   64KB (32K x 16) Flash Memory
   512 Bytes (256 x 16) Data RAM

♦ **Magnetic Sensors**

♦ **UART/LIN Physical Interface**
   RS-232
   LIN

♦ **IIC EEPROM—2KBytes**

♦ **External 4.096V Voltage Reference**

♦ **Internal/External Temperature Sensors**
   MAXQ7665 Internal Temp Sensor
   External Transistor Temp Sensor
   External Linear Temp Sensor

♦ **Serial-to-JTAG Interface for Program/Debug**

♦ **External Power Supplies with Brownout**

♦ **CAN Interface**

Ordering Information

PART	PC INTERFACE	INTERFACE TYPE*
MAXQ7665EVKIT#	RS-232	Windows®

#Denotes an RoHS-compliant device.
*Tested under Windows XP.

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.001µF ±20% ceramic capacitor (0805) Kemet C0805C102M5RACTU
C2	1	4700pF ±10% ceramic capacitor (0805) Kemet C0805C472K5RACTU
C3, C5, C9, C14, C16–C19, C21, C24, C25, C26, C29, C31, C35, C36, C38, C39, C42, C45, C46, C47, C49, C51, C52, C55, C58, C61, C65, C70, C72	31	0.1µF +80%, -20% ceramic capacitors (0805) Kemet C0805C104Z5UACTU

DESIGNATION	QTY	DESCRIPTION
C4, C6, C12, C37, C41, C48, C60	7	0.01µF +80%, -20% ceramic capacitors (0805) Kemet C0805C103Z5UACTU
C8, C22, C44	3	1µF ±10% polarized capacitors (3216) Kemet T491A105K016AS
C10, C23	2	22µF ±20% polarized capacitors (3216) Kemet T491A226M010AS
C11, C30, C71	3	22pF ±5% ceramic capacitors (0805) Kemet C0805C220J5GACTU
C13, C20	2	10µF ±10% polarized capacitors (6032) Kemet T491C106K020AS

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MAXQ7665 Evaluation Kit

_____*Component List (continued)*

DESIGNATION	QTY	DESCRIPTION
C15	1	47pF ±5% ceramic capacitor (0805) Kemet C0805C470J5GACTU
C27	1	4.7µF ±10% polarized capacitor (3528) Kemet T494B475K010AS
C28	1	4.7µF ±10% polarized capacitor (3216) Kemet T491A475K010AS
C32	1	220pF ±5% ceramic capacitor (0805) Kemet C0805C221J5GACTU
C33, C34, C40, C43, C50, C53, C56, C57, C59, C62, C63, C64, C66–C69	16	2200pF ±10% ceramic capacitors (0805) Kemet C0805C222K5RACTU
C54	1	1.5µF ±10% polarized capacitor (3216) Kemet T491A155K016AS
D1, D2, D9	3	Green LEDs, surface mount (1206) Lite-On LTST-C150GKT
D3, D5, D10	3	Schottky diodes (DO-41) ON Semiconductor 1N5819RL
D6	1	Red LED, surface mount (1206) Lite-On LTST-C150CKT
D7	1	Amber LED, surface mount (1206) Lite-On LTST-C150AKT
D8	1	Transient voltage suppressor (41A-02) ON Semiconductor 1N6376
F1	1	Fuse, fast-acting SMD Littlefuse 0459004.UR
J1	1	4-pin, 0.1in header
J18	1	5 x 2, dual-row, 0.1in header
J21, J22, J23	3	DB-9 PC-mount connectors (DB9-HF) Jameco 104952

DESIGNATION	QTY	DESCRIPTION
J24	1	DC_POWER_CONN 2.5mm ID, 5.5mm OD power, 3-pin jack (PJ-102B) CUI, Inc. PJ-102B
JU1	1	3-pin, 0.1in header
JU2–JU5, JU8, JU13, JU16, JU17, JU18, JU22–JU26, JU28, JU29, JU30, JU32, JU33, JU36, JU37, JU39, JU40, JU41, JU44, JU46, JU47, JU51–JU56, JU58–JU69, JU71–JU80, JU83–JU86, JU103–JU108, JU172, JU174, JU177, JU222	69	2-pin, 0.1in headers
Q1	1	n-channel MOSFET, SOT23, 2N7002A Zetex 2N7002TA
Q2	1	npn transistor, SOT23, 2N3904 Diodes, Inc. MMBT3904-7
R1	1	24.9kΩ ±1% resistor (0805)
R3	1	169kΩ ±1% resistor (0805)
R4, R5, R9, R11, R23, R46, R47	7	10kΩ ±1% resistors (0805)
R6, R7	2	60.4Ω ±1% resistors (0805)
R8, R24, R38, R43	4	432Ω ±1% resistors (0805)
R10	1	143kΩ ±1% resistor (0805)
R12	1	4.7Ω ±1% resistor (0805)
R13	1	30.1kΩ ±1% resistor (0805)
R14	1	118kΩ ±1% resistor (0805)
R15	1	16.2kΩ ±1% resistor (0805)
R16	1	32.4kΩ ±1% resistor (0805)
R17	1	105kΩ ±1% resistor (0805)
R18	1	121kΩ ±1% resistor (0805)
R19	1	20kΩ ±1% resistor (0805)
R20	1	130kΩ ±1% resistor (0805)
R21	0	Not installed, resistor (0805)

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_____*Component List (continued)*

DESIGNATION	QTY	DESCRIPTION
R25	1	3.3kΩ ±1% resistor (0805)
R26, R33	2	47kΩ ±1% resistors (0805)
R28	1	1.05kΩ ±1% resistor (0805)
R29, R45	2	1kΩ ±1% resistors (0805)
R31	1	68kΩ ±1% resistor (0805)
R36	1	3.01kΩ ±1% resistor (0805)
SW1, SW2, SW4–SW11	10	Pushbutton switches, momentary PCB switches Omron B3S-1000
TP1–TP4, TP6, TP7, TP9–TP13	11	Test points Amp/Tyco 87220-1
U1	1	Low-dropout linear regulator (5 SOT23) Maxim MAX8863TEUK+
U2	1	CAN bus transceiver (8 SO) Maxim MAX13050ASA+
U3	1	RS-232 transceiver (16 SSOP) Maxim MAX3221CAE+
U4, U5, U10, U11	4	Magnetic sensors (8 SO) Honeywell HMC1501
U6	1	Precision-matched resistor-divider (3 SOT23) Maxim MAX5491TA05000+T
U7	1	IIC Serial EEPROM 2k x 8 (8 SO) Atmel AT24C16AN-10SI-2.7
U8	1	LIN transceiver (8 SO) Maxim MAX13020ASA+
U9, U25	2	Linear voltage regulators (8 SO-EP) Maxim MAX5024L+
U12, U14	2	Magnetic sensors (8 SO) Honeywell HMC1512
U13	1	Data-acquisition µC (48 TQFN) Maxim MAXQ7665BATM+
U15	1	Quad bus driver three-state (14 TSSOP) Fairchild 74VHC125MTC

DESIGNATION	QTY	DESCRIPTION
U16	1	Low-power temp sensor (5 SC70) Maxim MAX6605MXK+
U18	1	Flash µC (44 TQFP) Dallas DS89C430-ENL+
U19	1	Comparator (5 SOT23) Maxim MAX9140EUK+
U20	1	Analog switch (16 TSSOP) Maxim MAX4619CUE+
U22	1	RS-232 transceiver (20 SO) Maxim MAX203ECWP+
U24	1	4.096V voltage reference (8 SO) Maxim MAX6126BASA41+
U29	1	Three-state octal buffer (20 SOP) Texas Instruments SN74LV244ANSR
Y3	1	XTAL, 8MHz SMT crystal (CSM-7) ECS ECS-80-18-5PDN
Y5	1	XTAL, 7.3728MHz SMT crystal (CSM-4A) ECN ECN-73-20-28A
—	28	Shunts (see Table 1) Sullins STC02SYAN or equivalent

+Denotes a lead-free package.

MAXQ7665 Evaluation Kit

Detailed Description

MAXQ7665

The MAXQ7665 µC is a low-power, high-performance 16-bit RISC µC based on the MAXQ® architecture developed by Maxim. The MAXQ7665 has an analog front-end featuring a 12-bit ADC and a 12-bit DAC. The MAXQ7665 also has a UART and CAN controller for external interfacing. Refer to the MAXQ7665 data sheet, tools, application notes, and User's Guide available at **www.maxim-ic.com** for complete details.

Power Supply

The MAXQ7665 EV kit is powered by the external 12V DC power supply that is included with the kit. The external power supply provides power to the voltage regulators used for AVDD, DVDD, and VDDIO. Separate regulators are used to provide brownout voltages by pressing switches for each of the power supplies. The brownout switches verify the MAXQ7665 power-supply voltage monitor functionality when the monitors are enabled.

External Voltage References

The MAXQ7665 EV kit contains an external 4.096V voltage reference. The EV kit can use the AVDD supply (+5V) as the voltage reference for the ADC or DAC with jumpers.

Temperature Sensors

The MAXQ7665 contains an internal temperature sensor and the EV kit contains two external temperature sensors. One external temperature sensor is a common 2N3904 transistor connected as a pn junction. The application software sets two current sources and measures the voltage across the junction for each current. The junction temperature is then determined through a simple equation. The second external sensor is the MAX6605, which provides a linear voltage with temperature. The output voltage is measured using an ADC input and the temperature is calculated using the MAX6605 transfer function of 11.9mV/°C.

Utility LEDs

The EV kit contains three LEDs (red, amber, and green) that can be configured using general-purpose I/O bits.

UART Interface

The MAXQ7665 contains a UART that can be used to communicate over an RS-232 serial link. The EV kit has a transceiver that can be configured with jumpers to interface with the RS-232 physical layer.

LIN Interface

The MAXQ7665 UART can also be used as a LIN interface. The EV kit also has a LIN transceiver that can be configured with jumpers to interface to the LIN physical layer. A two-pin header is provided for the LIN interface.

CAN Interface

The MAXQ7665 has a CAN controller to interface with automotive networks. A CAN transceiver is included to interface to the CAN physical layer.

Serial-to-JTAG Interface

To program the MAXQ7665 over the JTAG interface, a separate Maxim µC and peripheral circuitry is included on the EV kit. The PC RS-232 JTAG serial port on the EV kit is used to communicate directly to the MAXQ7665 for erasing and programming of the flash memory. In addition, the interface is used to interface to the IAR Embedded Workbench® and other third-party tools for use during debugging.

Default Jumper Settings

The MAXQ7665 has a number of jumpers configured by default to quickly start using the EV kit. The default settings are shown in Table 1. For additional jumper settings, see the *MAXQ7665 EV kit schematic*.

Table 1. Factory Jumper Settings

DEFAULT JUMPER SETTING	SHUNT POSITION
JU1, JU2, JU3, JU5, JU18, JU22, JU23, JU29, JU37, JU38, JU39, JU58, JU64, JU65, JU66, JU69, JU85, JU103–JU108, JU177, JU222	1-2

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IAR Embedded Workbench is a registered trademark of IAR Systems AB.

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SHEET NUMBER	DESCRIPTION
1	MAXQ7665 EVALUATION KIT
2	MAXQ7665
3	MAXQ7665 POWER SUPPLY AND BROWNOUT MONITORS
4	SERIAL EEPROM AND CAN BUFFER
5	RS-232 INTERFACE AND LIN
6	JTAG INTERFACE
7	MAGNETIC DISPLACEMENT SENSORS
8	EXTERNAL VOLTAGE REFERENCE
9	POWER SUPPLY AND LEDs
10	PROTOTYPE AREA

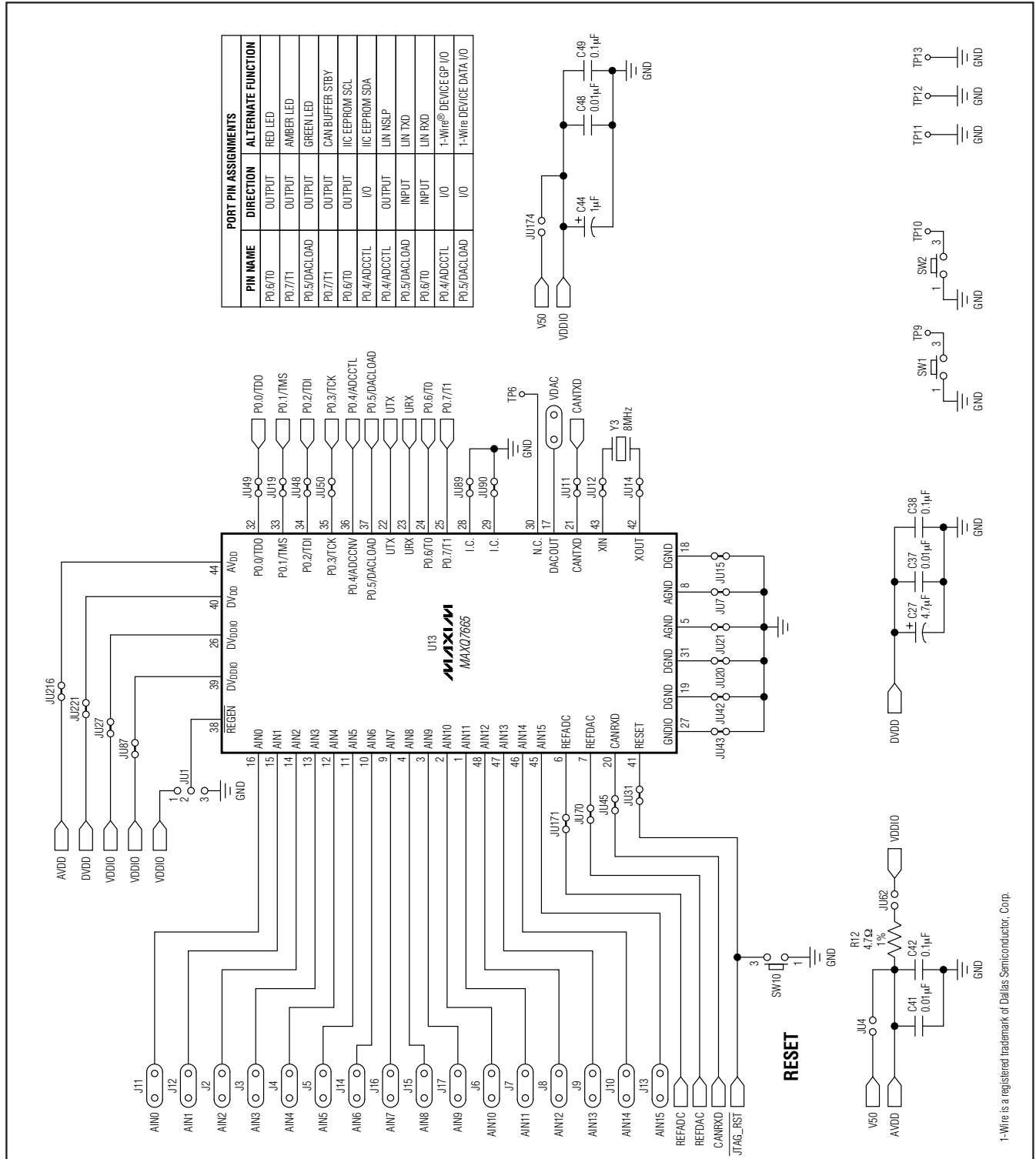*Figure 1. MAXQ7665 EV Kit Schematic Sheet 1*

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Figure 2. MAXQ7665 EV Kit Schematic Sheet 2

1-Wire is a registered trademark of Dallas Semiconductor, Corp.
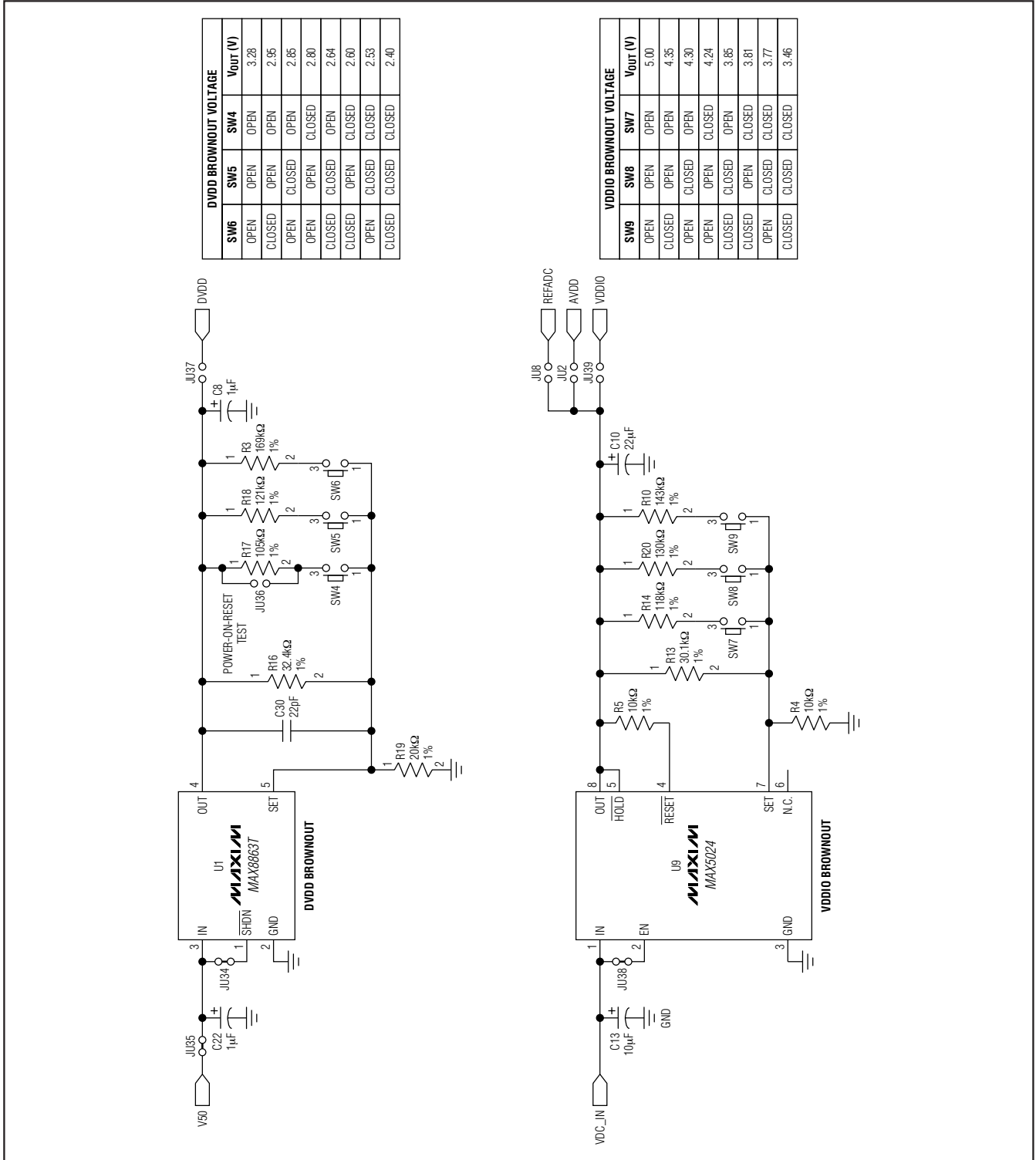
Figure 3. MAXQ7665 EV Kit Schematic Sheet 3

DVDD BROWNOUT VOLTAGE				
SW6	SW5	SW4		Vout (V)
OPEN	OPEN	OPEN		3.28
CLOSED	OPEN	OPEN		2.95
OPEN	CLOSED	OPEN		2.85
OPEN	OPEN	CLOSED		2.80
CLOSED	CLOSED	OPEN		2.64
CLOSED	OPEN	CLOSED		2.60
OPEN	CLOSED	CLOSED		2.53
CLOSED	CLOSED	CLOSED		2.40

VDDIO BROWNOUT VOLTAGE				
SW9	SW8	SW7		Vout (V)
OPEN	OPEN	OPEN		5.00
CLOSED	OPEN	OPEN		4.35
OPEN	CLOSED	OPEN		4.30
OPEN	OPEN	CLOSED		4.24
CLOSED	CLOSED	OPEN		3.85
CLOSED	OPEN	CLOSED		3.81
OPEN	CLOSED	CLOSED		3.77
CLOSED	CLOSED	CLOSED		3.46

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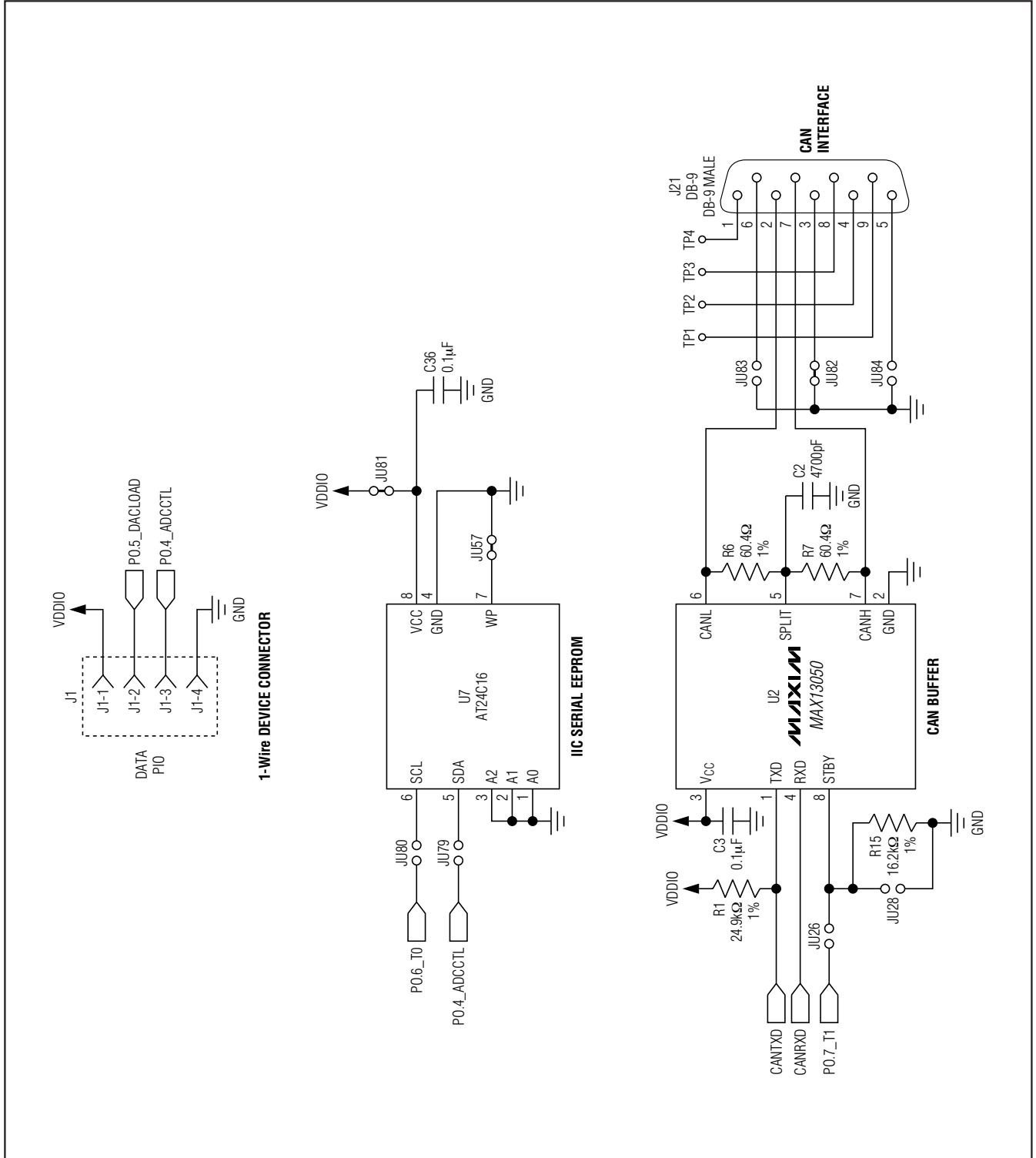
Figure 4. MAXQ7665 EV Kit Schematic Sheet 4

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MAXQ7665 Evaluation Kit
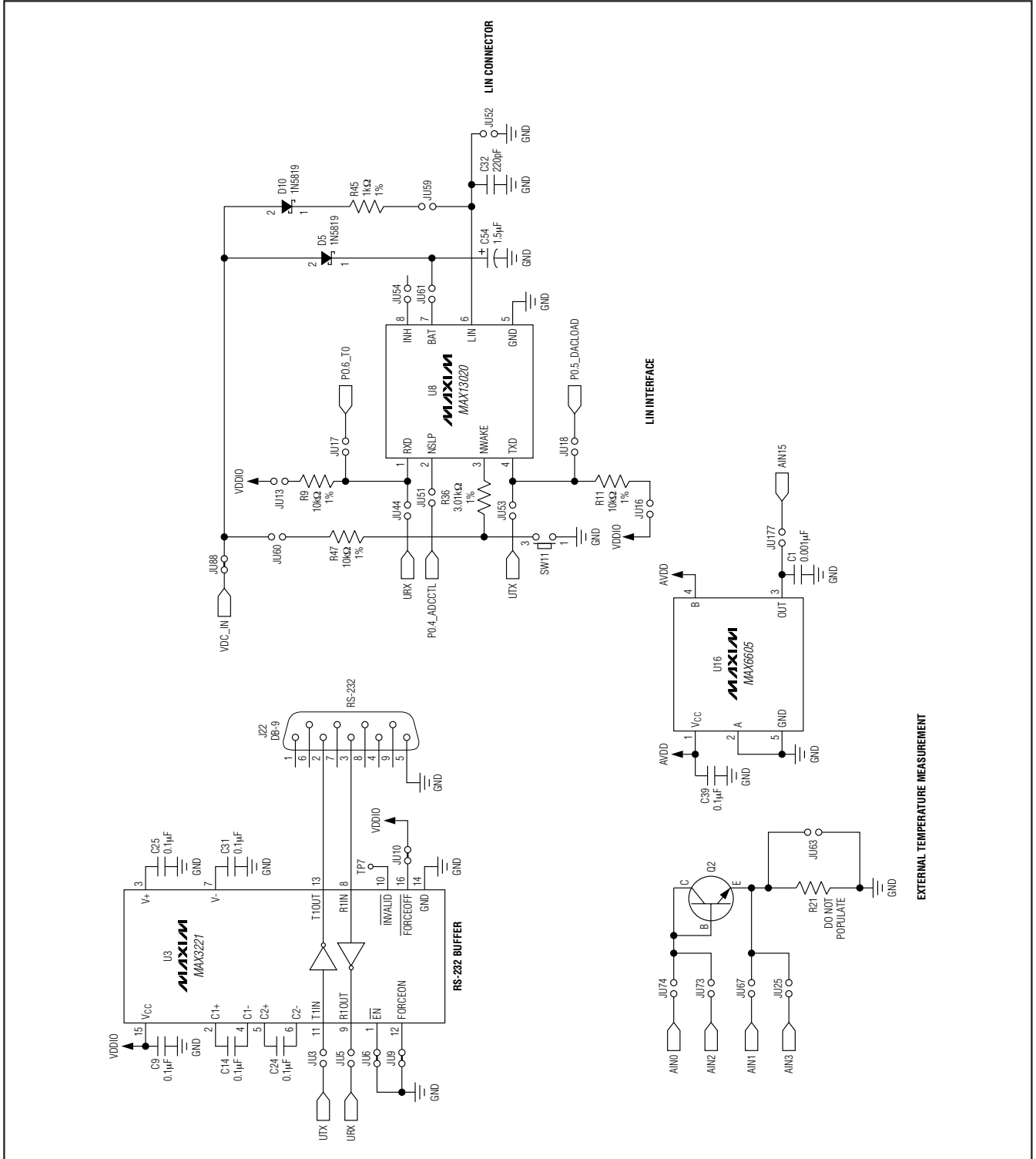
Figure 5. MAXQ7665 EV Kit Schematic Sheet 5
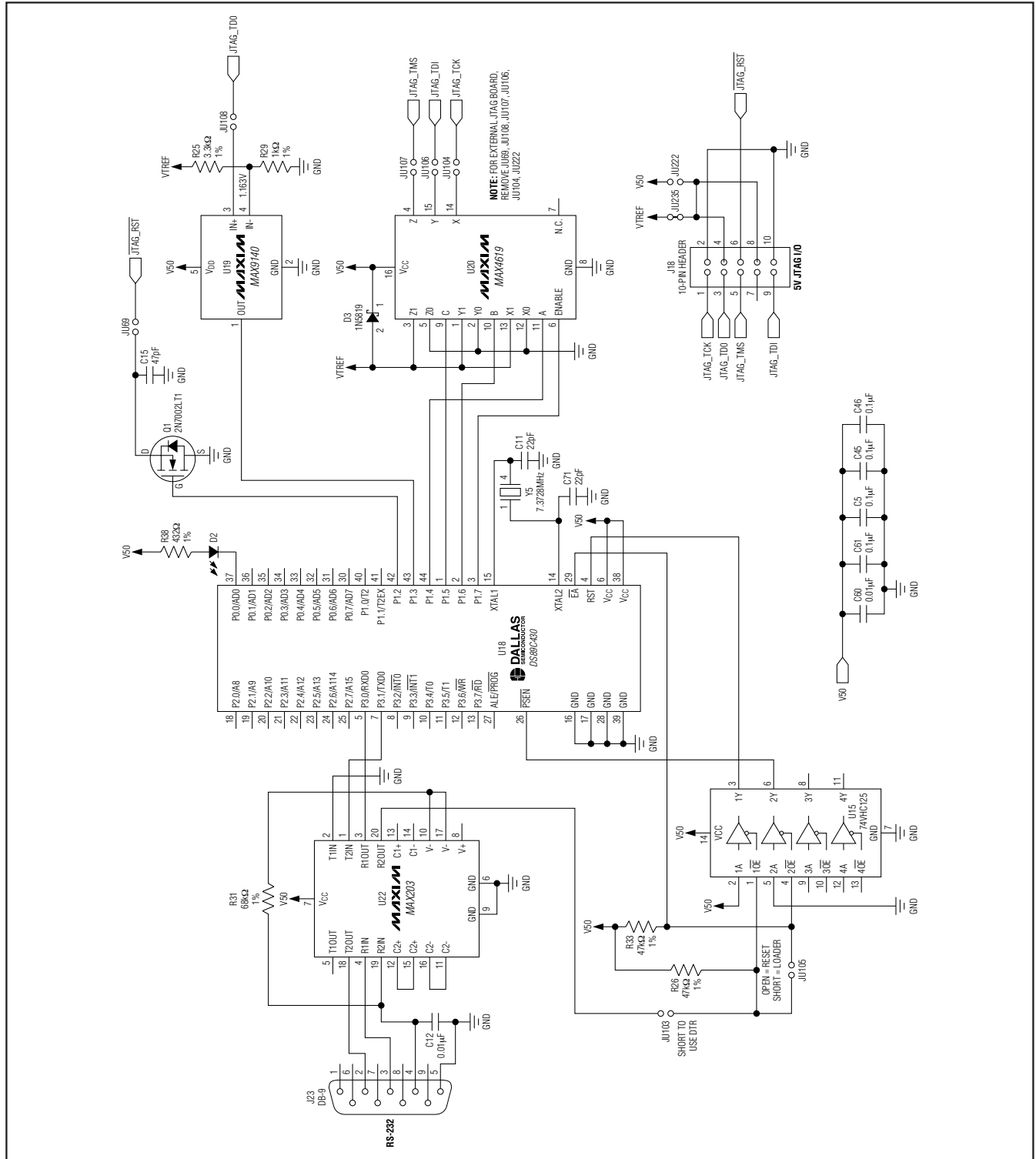
Figure 6. MAXQ7665 EV Kit Schematic Sheet 6

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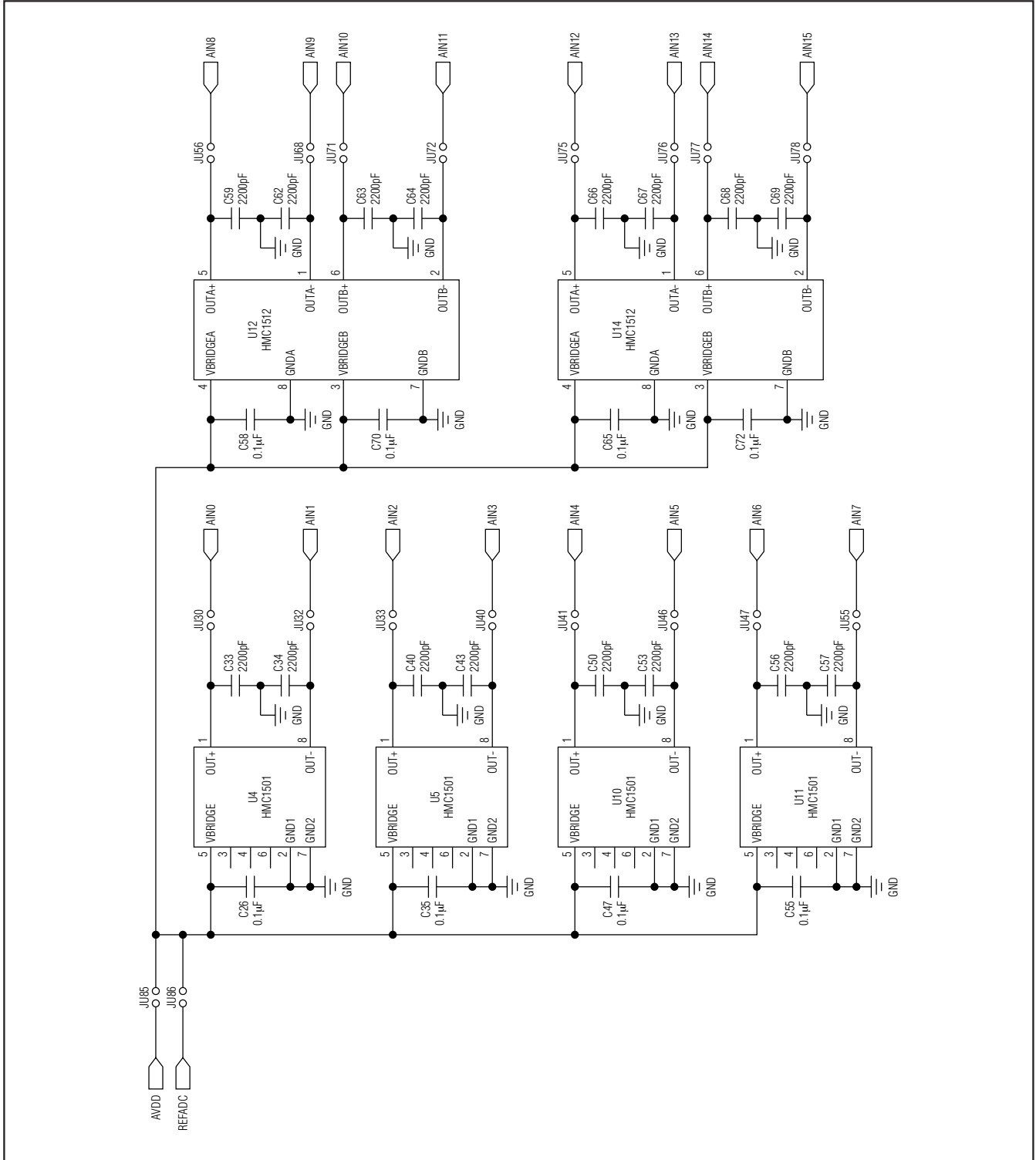
Figure 7. MAXQ7665 EV Kit Schematic Sheet 7

MAXQ7665 Evaluation Kit
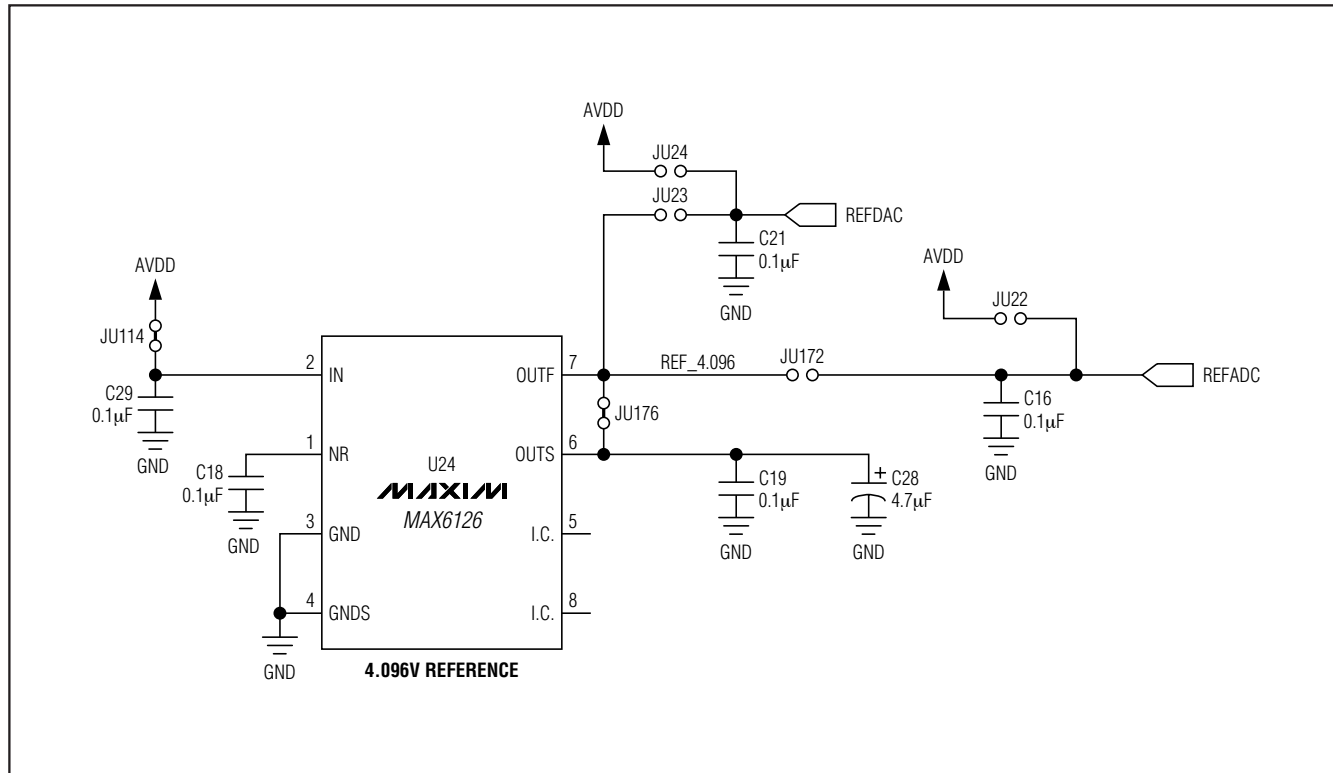
Figure 8. MAXQ7665 EV Kit Schematic Sheet 8

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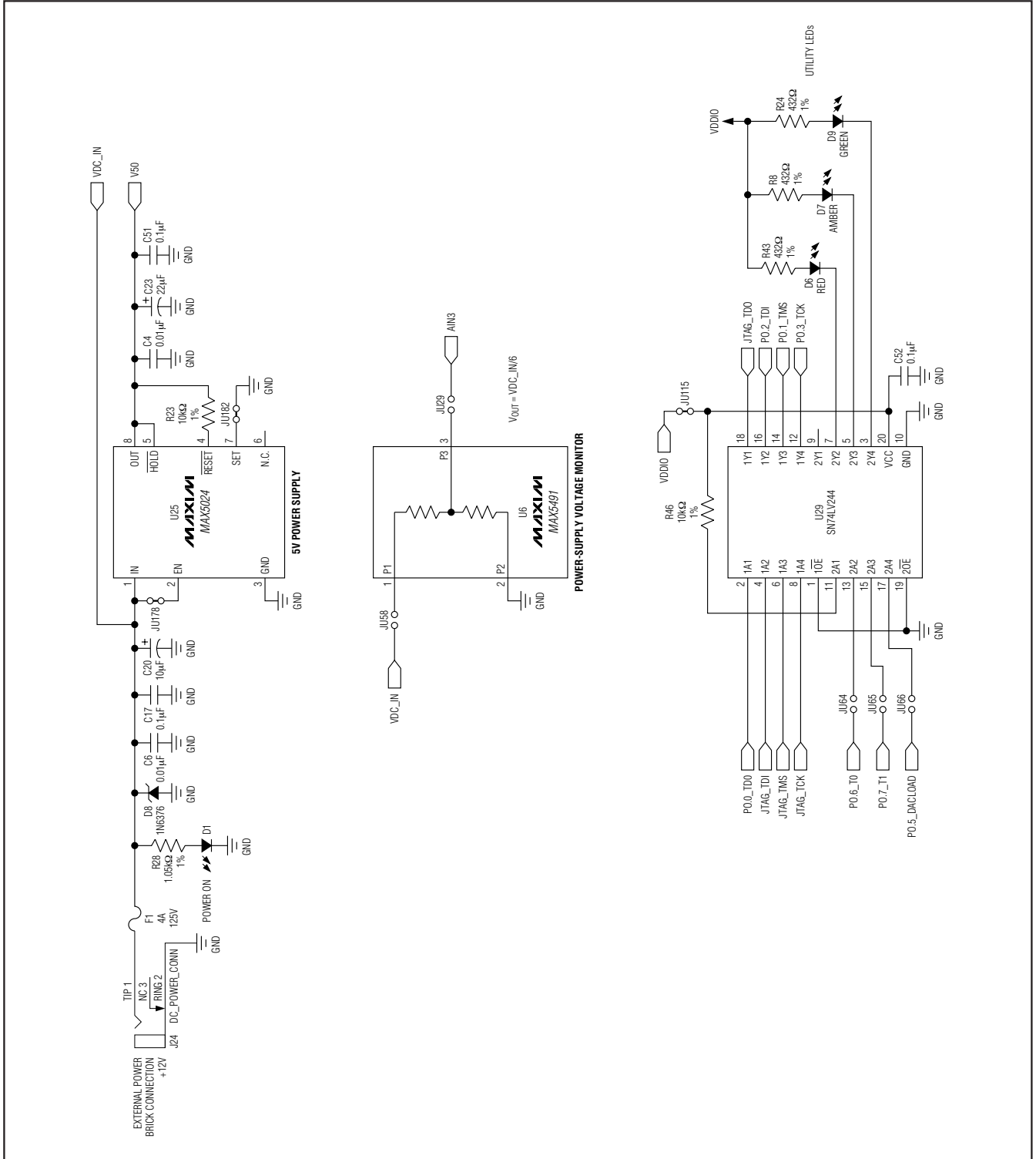
Figure 9. MAXQ7665 EV Kit Schematic Sheet 9
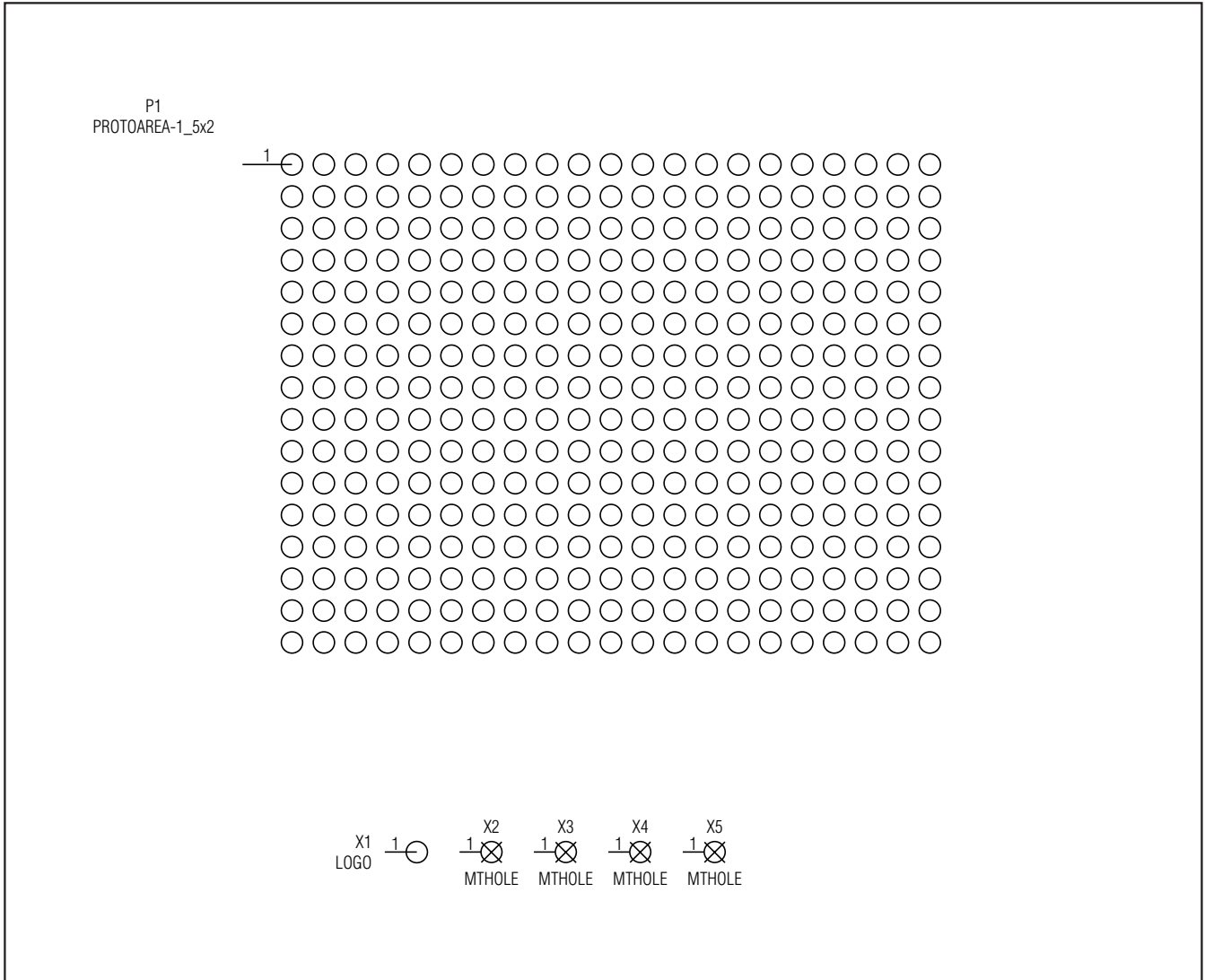
Figure 10. MAXQ7665 EV Kit Schematic Sheet 10

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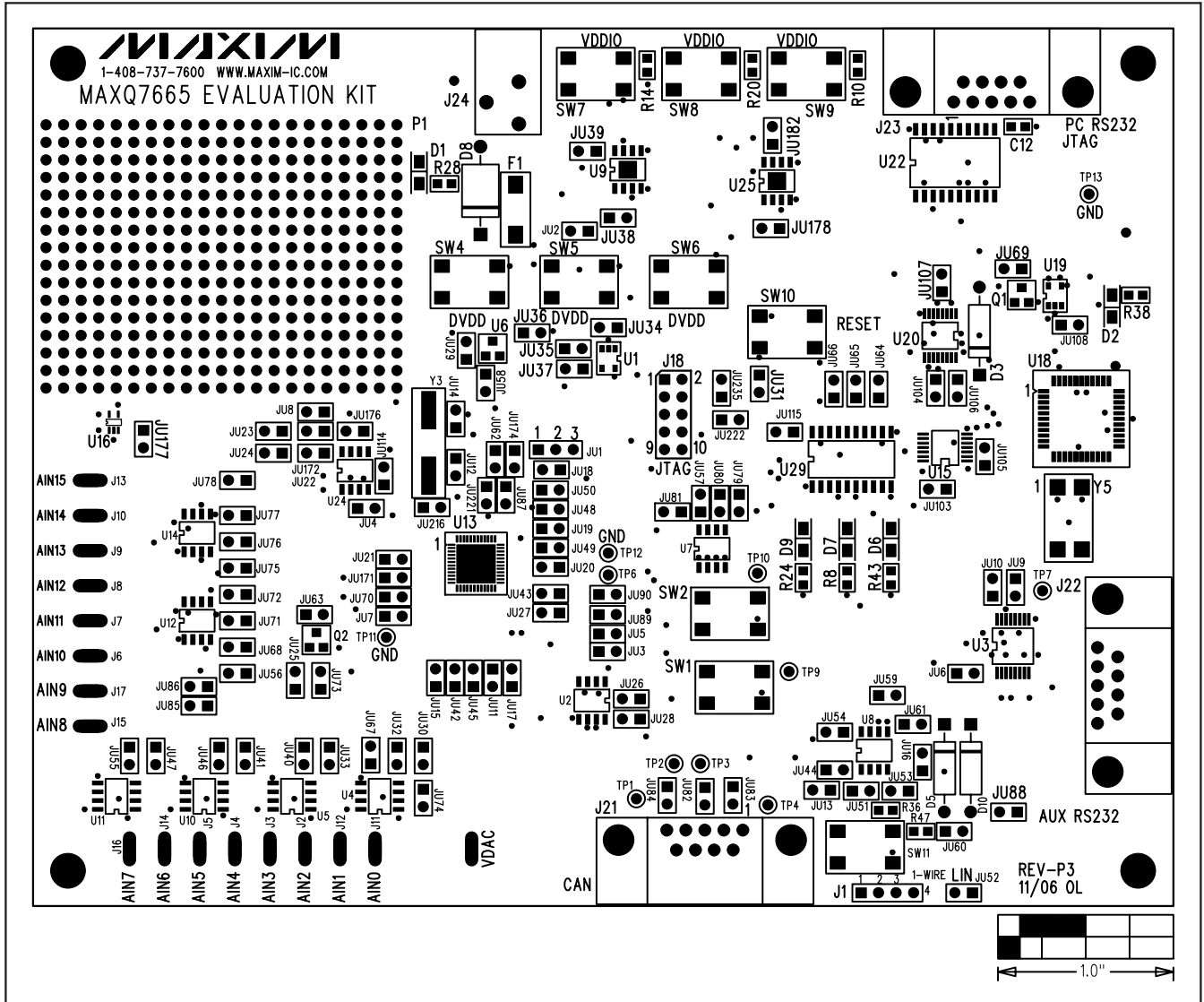
Figure 11. MAXQ7665 EV Kit PCB—Top Silkscreen
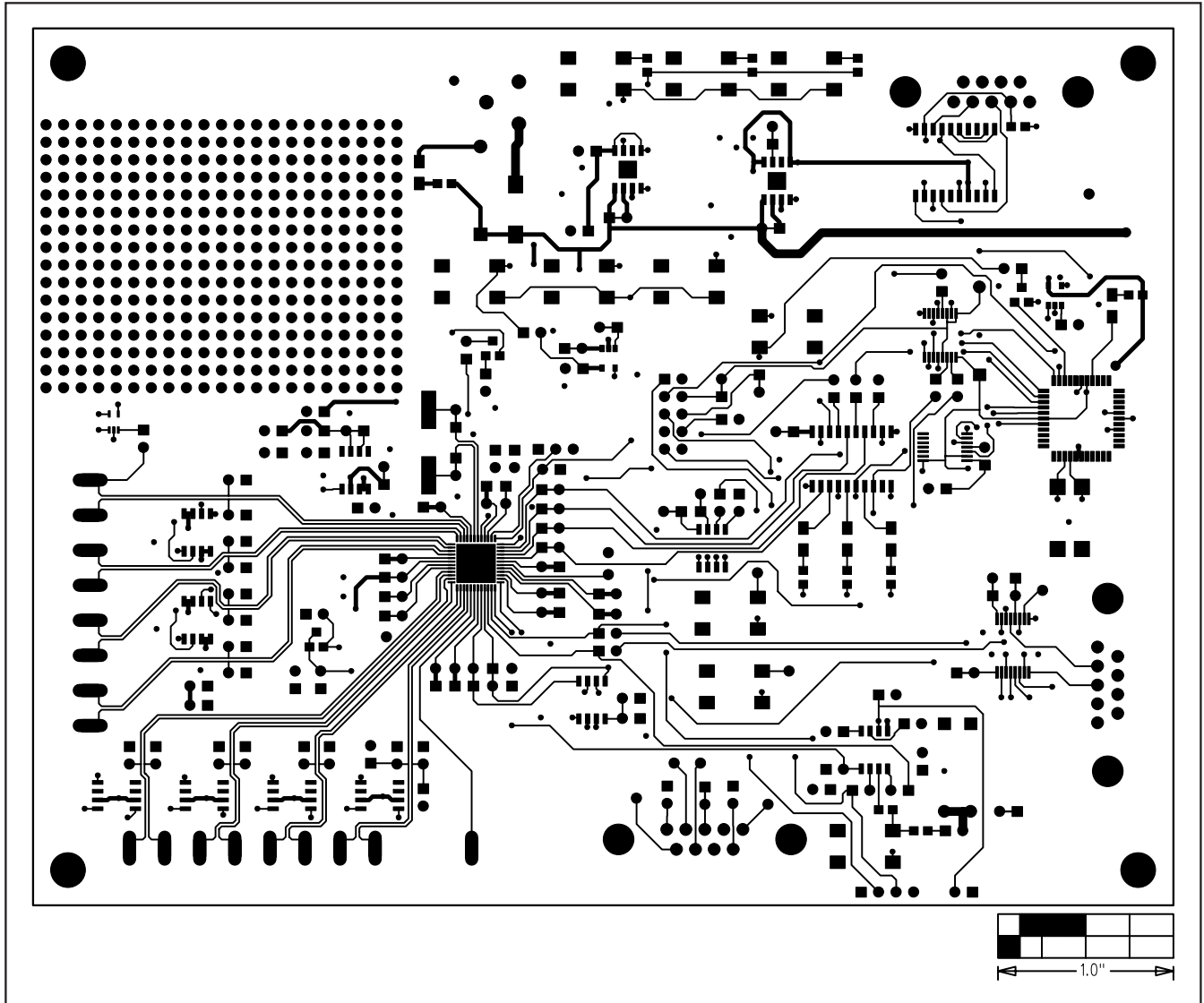
Figure 12. MAXQ7665 EV Kit PCB—Component Side
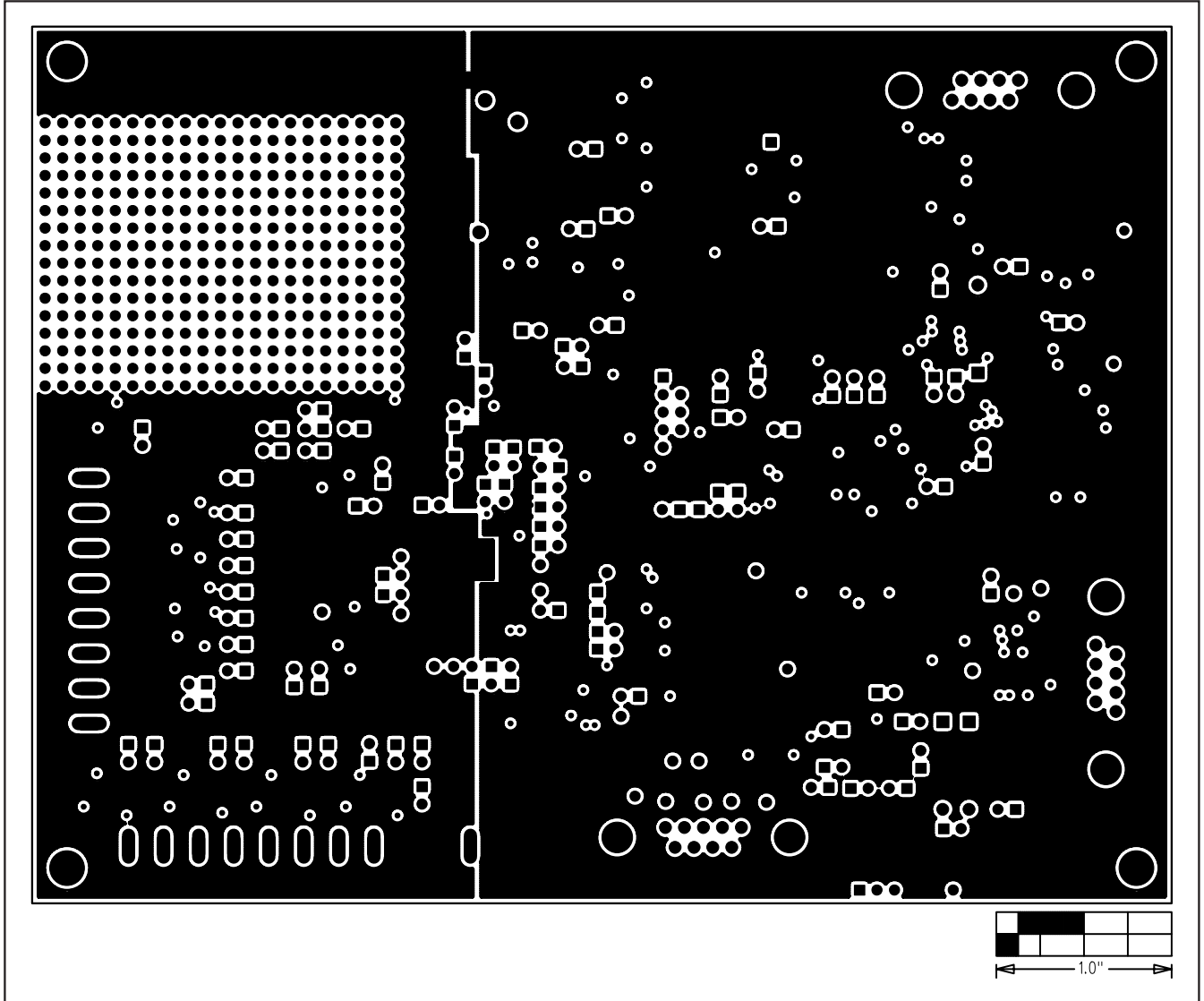
Figure 13. MAXQ7665 EV Kit PCB—Ground Layer 2
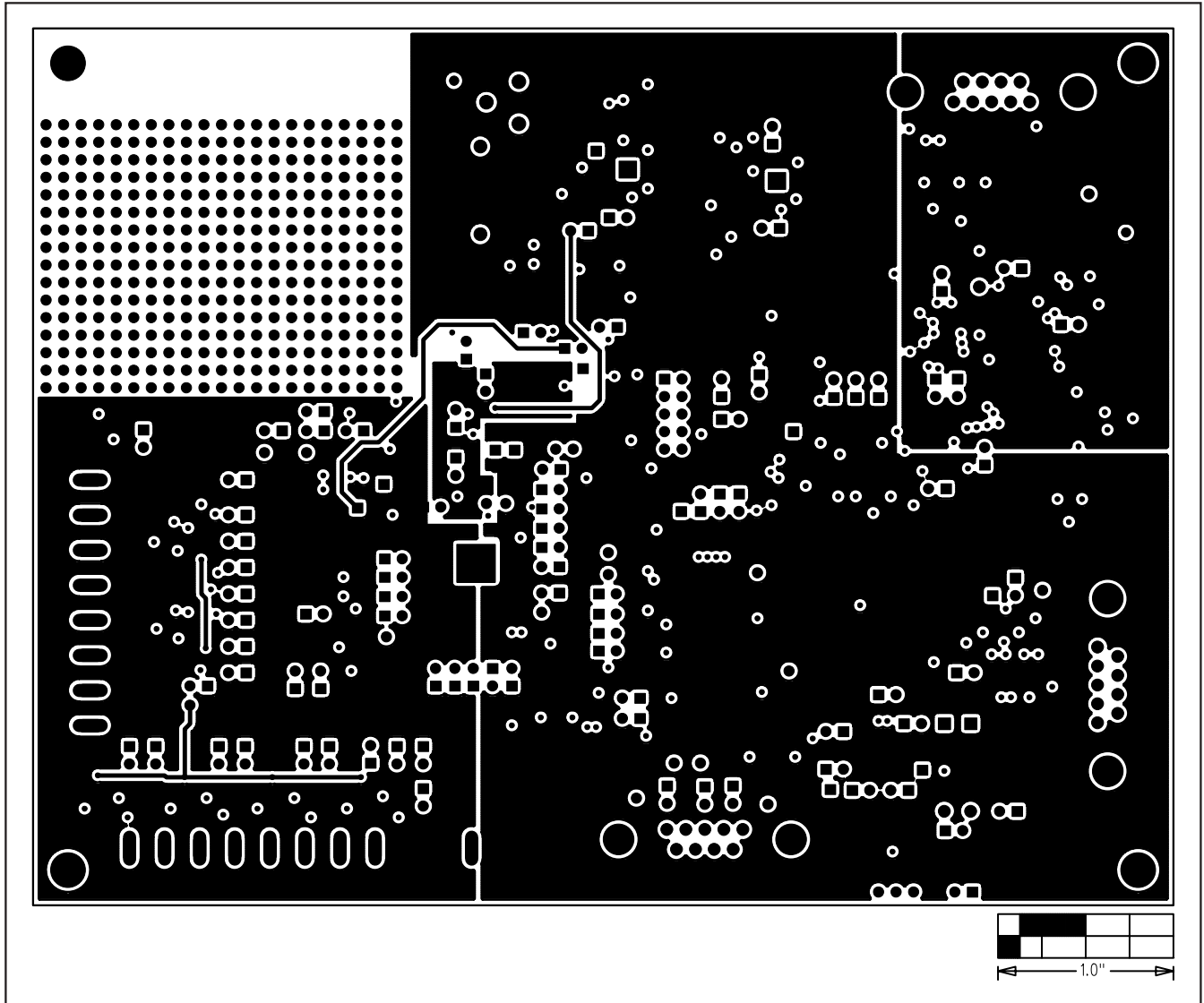
Figure 14. MAXQ7665 EV Kit PCB—V_{CC} Layer 3

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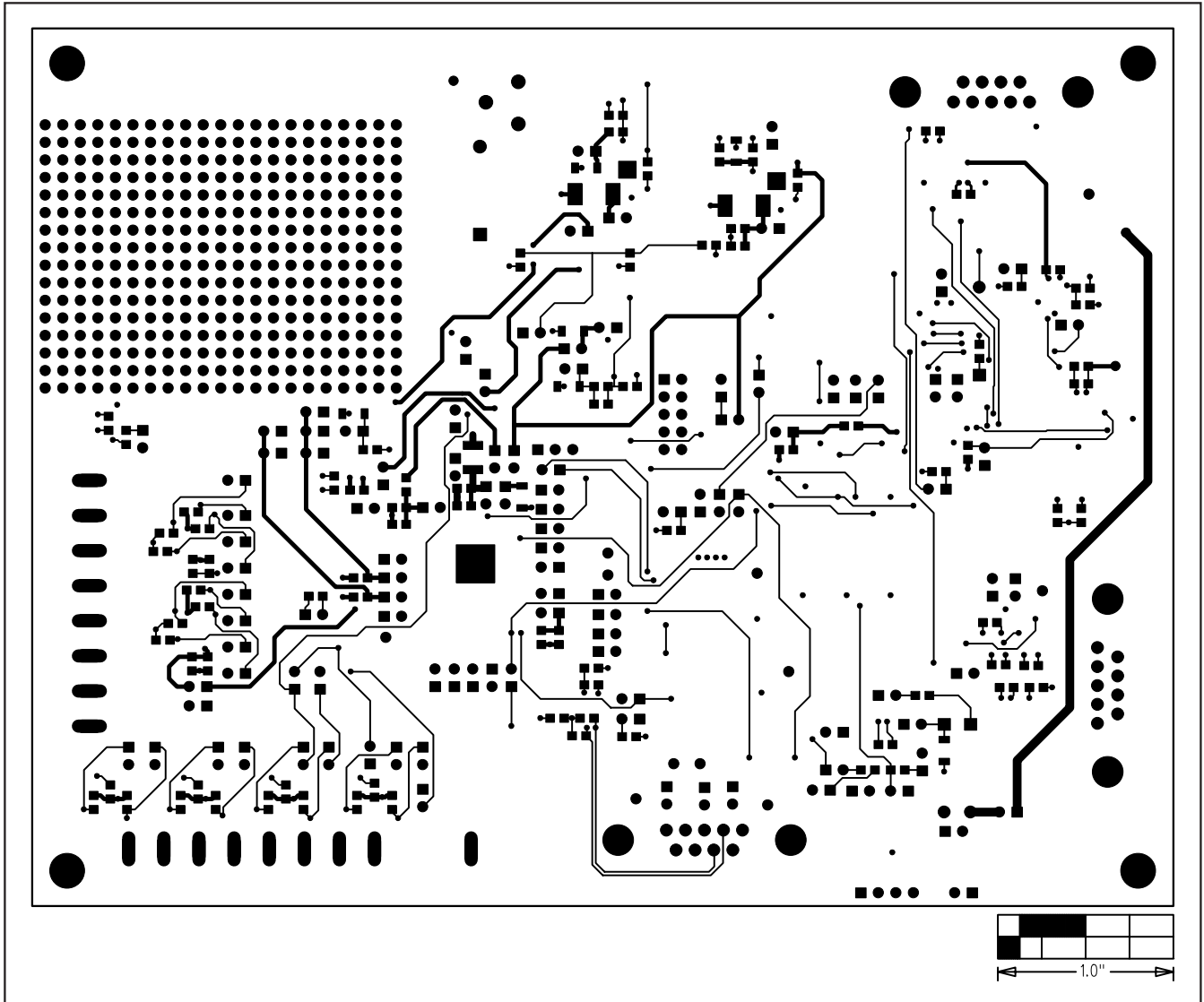
Figure 15. MAXQ7665 EV Kit PCB—Solder Side
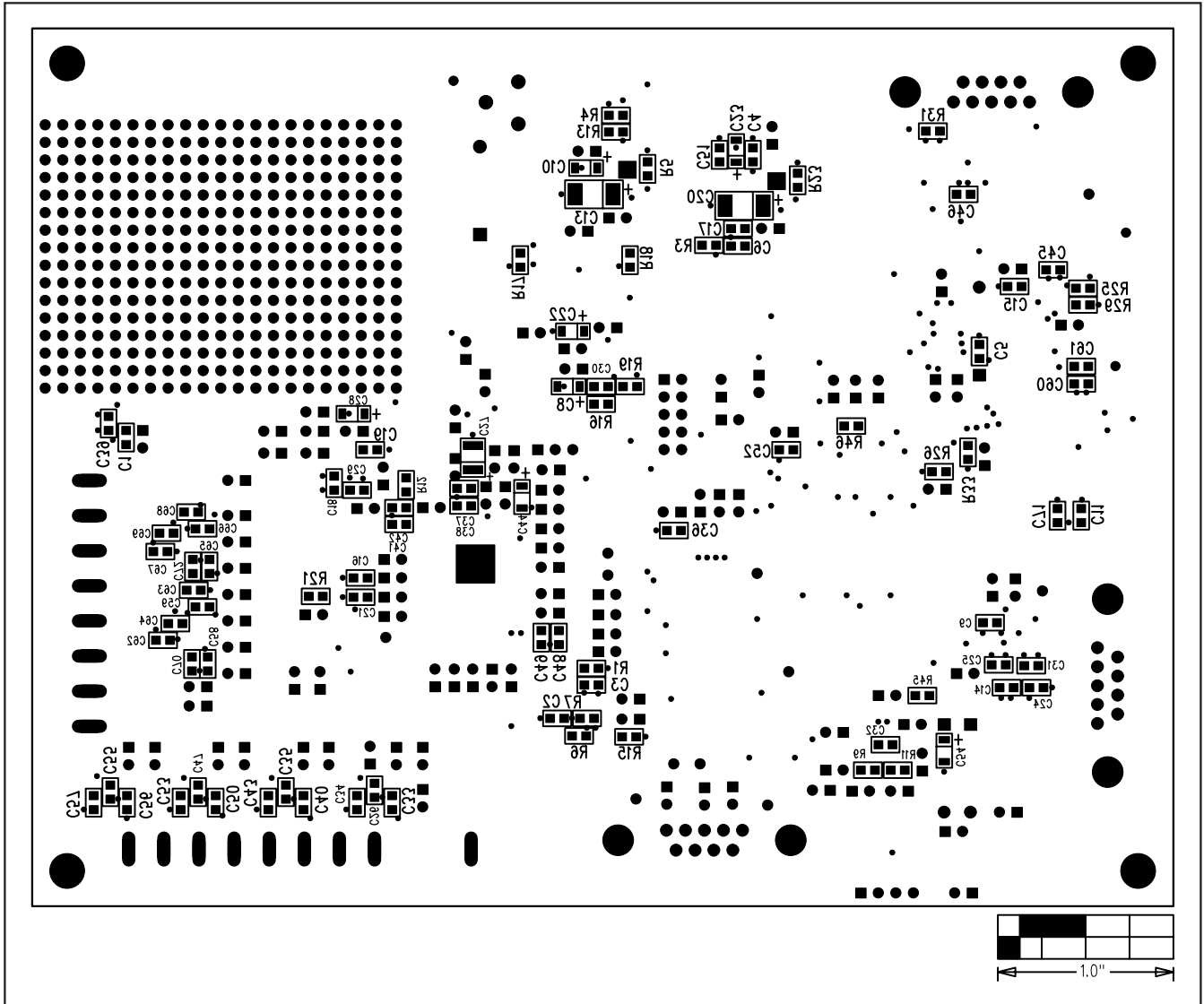
Figure 16. MAXQ7665 EV Kit PCB—Bottom Silkscreen

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