MAXQ1065 Evaluation Kit

General Description

The MAXQ1065 evaluation kit (EV kit) provides the hardware and software necessary to exercise the features of the MAXQ1065GTC+. The EV kit consists of five MAXQ1065GTC+ devices in a 12-pin TDFN package, and a MAXQ1065 evaluation 12-pin TDFN socket board.

The device makes it fast and easy to implement full security for embedded, connected products without requiring firmware development. The MAXQ1065 coprocessors can be designed-in from the start or added to an existing design to guarantee confidentiality, authenticity, and integrity of the device.

MAXQ1065 EV Kit Contents

| QTY	DESCRIPTION
5	MAXQ1065GTC+ Secure Coprocessor (12 TDFN)
1	MAXQ1065 Socket Board (12 TDFN)
1	USB Standard-A to Micro-B Cable
1	Raspberry Pi-Compatible Elevated Header

Ordering Information appears at end of data sheet.

Arduino is a registered trademark of Arduino, LLC.
Raspberry Pi is a registered trademark of the Raspberry Pi Foundation.

Features

- Demonstrates the Features of the MAXQ1065 Socket Board
- Compatible with Raspberry Pi® 3 Model B/B+ and Raspberry Pi 2 Model B
- Compatible with Arduino® UNO Motherboards
- Provides a USB Connector for USB 2.0-to-SPI Communication
- Convenient Connectors for Custom Wiring
- 1.8V and 3.3V Operating Voltage
- Software Development Kit (SDK) – Available by Request from the MAXQ1065 Webpage

MAXQ1065 EV Kit Socket Board
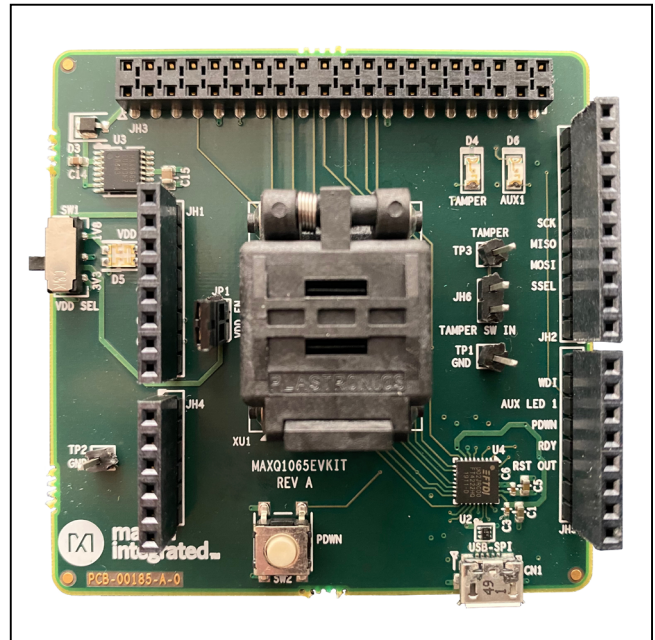
Quick Start

Required Equipment

- MAXQ1065 socket board (included)
- MAXQ1065 samples (included)
- USB Standard-A to Micro-B cable (included, needed only when evaluating from a personal computer)

Hardware Setup

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

1) Open the socket and insert a MAXQ1065 IC into the cavity.
   Note: The plus (+) on the package must be aligned with the white arrow on the PCB, as shown in Figure 1.

2) Install a jumper on VDD_EN (JP1), as shown in Figure 1.

3) Connect to one of the supported platforms, as seen in the *Detailed Hardware Description* section.
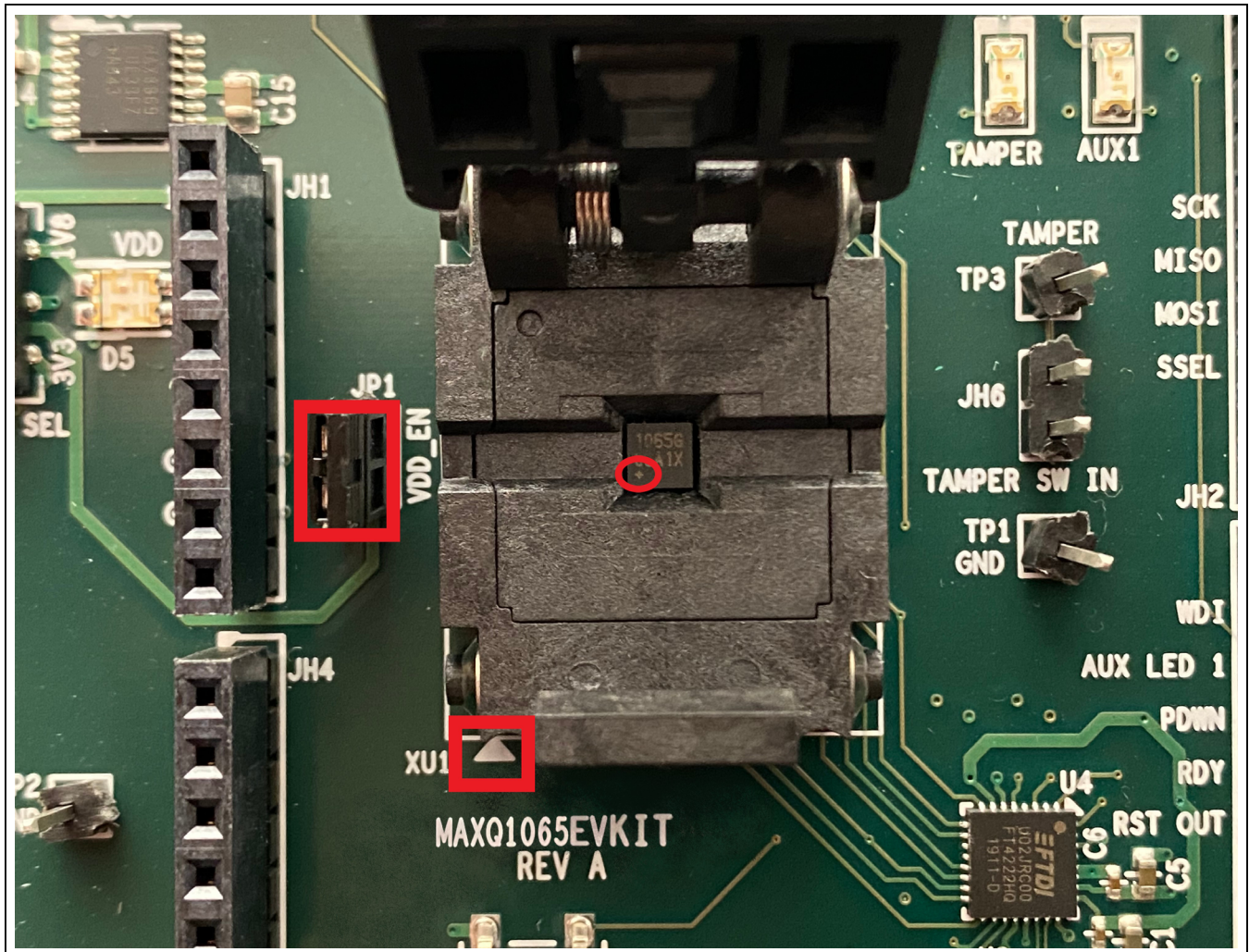

Figure 1. Proper Configuration of the MAXQ1065 Socket Board

Detailed Hardware Description

EV Kit Supported Platforms

The MAXQ1065 EV kit is designed to be compatible with a variety of platforms: PC, Raspberry Pi, Arduino Uno, and custom motherboards. All supported platforms must provide their own 5V power supply to the MAXQ1065 socket board to ensure proper operation.

PC

The MAXQ1065 socket board is compatible with multiple PC platforms, such as Linux® and Windows®. It includes an onboard USB connector and uses an FTDI bridge chip, the FT4222H, to enable a USB-to-SPI interface with the MAXQ1065 EV kit. A 5V power supply must be provided from the PC through the USB connector to ensure proper operation of the socket board. The following steps can be used to properly set up the MAXQ1065 socket board with a PC platform:

1) Adjust the VDD SEL switch (SW1) to the 3V3 position.
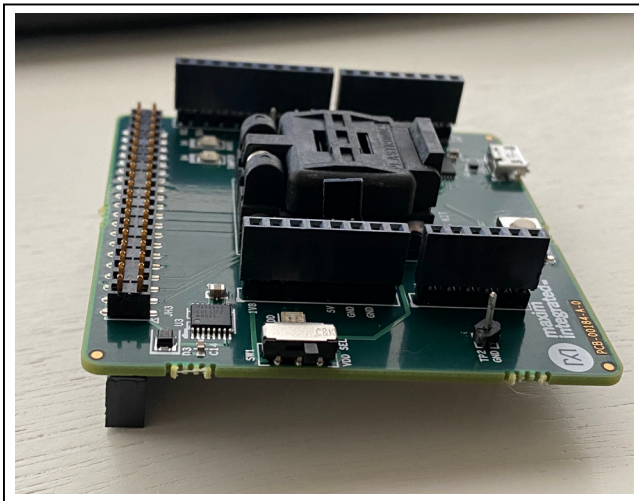2) Connect the MAXQ1065 socket board to the PC using the USB cable.

Raspberry Pi

The MAXQ1065 socket board is also compatible with Raspberry Pi 3 Model B/B+ and Raspberry Pi 2 Model B through the socket board's JH3 connector. In order to provide clearance between the socket board and the Raspberry Pi, the included Raspberry Pi-compatible elevated header must be installed before attempting to connect the two boards together. The following steps can be used to properly set up the MAXQ1065 socket board with a Raspberry Pi platform:

1) Ensure that the Raspberry Pi board is powered off.
2) Connect the elevated header onto the bottom side of the JH3 connector, as shown in Figure 2.
3) Adjust the VDD SEL switch (SW1) to the 3V3 position.
4) Connect the MAXQ1065 socket board on top of the Raspberry Pi, as shown in Figure 3.
5) Power on the Raspberry Pi board through its own USB connector, as shown in Figure 4.

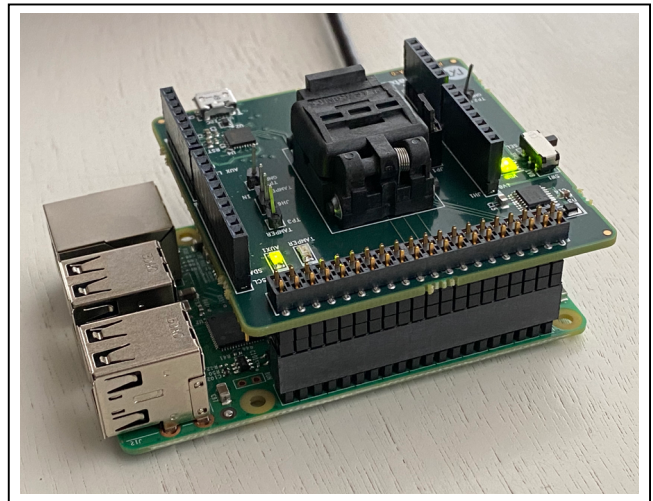*Figure 2. MAXQ1065 Socket Board with an Elevated Header Installed*

Figure 3. MAXQ1065 Socket Board Attached to a Raspberry Pi through an Elevated Header

Linux is a registered trademark of Linus Torvalds.
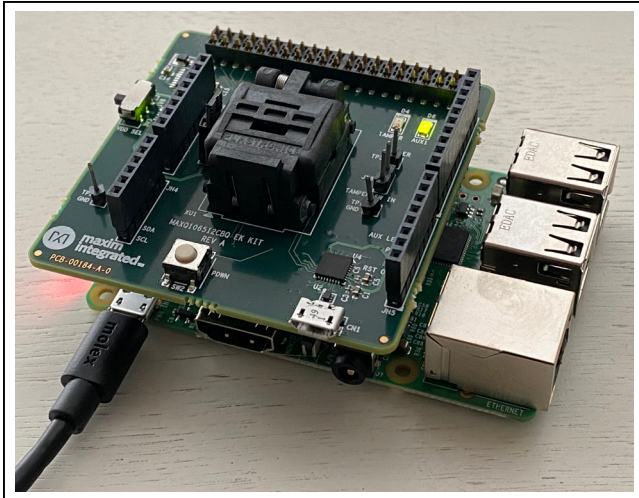*Windows is a registered trademark of Microsoft Corporation.*

Figure 4. Raspberry Pi Powered on through its Own USB Connector

Arduino Uno-Compatible Boards

The MAXQ1065 socket board also provides four Arduino-compatible connectors (JH1, JH2, JH4, and JH5) that can be used to install Arduino motherboards, such as the Maxim MAX3265MBED development platform, from the bottom side of the board. The following steps can be used to properly set up the MAXQ1065 socket board with an Arduino-compatible platform:

1) Ensure that the Arduino mother board is powered off.
2) Connect the MAXQ1065 socket board on top of the Arduino motherboard.
3) Adjust the VDD SEL switch (SW1) according to the Arduino motherboard's voltage requirements.
4) Power on the Arduino motherboard.
5) Do not use the USB cable.

Custom Motherboards

In the absence of an Arduino Uno board, the Arduino-compatible connectors (JH1, JH2, JH4, and JH5) can also be used for wiring up a custom motherboard to the MAXQ1065 socket board. Each connector has its pinout on the silkscreen for reference. The socket board supports custom motherboards operating in a 1.8V range through the JH1 connector's 1V8 pin (pin 1). The VDD SEL switch (SW1) must be configured to 1.8V when using a 1.8V motherboard to ensure proper operation of the socket board. Regardless of its operating voltage, a 5V power supply must be provided from the host motherboard through the JH1 connector's 5V pin (pin 5) to ensure proper operation of the socket board.

Hardware Settings

See Table 1, Table 2, and Table 3 for specific details on each of the MAXQ1065 socket board's hardware configuration settings.

Table 1. Jumper Settings

NAME	COMPONENT	SETTING	DESCRIPTION
VDD_EN	JP1	Open	Disconnects the MAXQ1065 from VDD power
		Closed	Connects the MAXQ1065 to VDD power
TAMPER SW IN	JH6	Open	No MAXQ1065 tamper event; turns off the TAMPER LED (D4)
		Closed	Triggers a MAXQ1065 tamper event; turns on the TAMPER LED (D4)

Table 2. Switch Settings

NAME	COMPONENT	SETTING	DESCRIPTION
VDD SEL	SW1	1V8*	Sets VDD power to 1.8V and sets LED (D5) red
		3V3	Sets VDD power to 3.3V and sets LED (D5) green
PDWN	SW2	Not pressed (Default)	Disable the MAXQ1065 power-down mode
		Pressed	Make the MAXQ1065 enter power-down mode

Only supported when a 1.8V power supply is present through connector JH1 (pin 1).

Table 3. LED Information

NAME	COMPONENT	STATE	DESCRIPTION
VDD	D5	Red	Indicates VDD power is at 1.8V*
		Green	Indicates VDD power is at 3.3V
TAMPER	D4	Off	No tamper condition enabled
		On	Tamper condition enabled
AUX1	D6	Off	LED driven high by one of the supported platforms**
		On	LED driven low by one of the supported platforms**

*Provided a 1.8V power supply is present through connector JH1 (pin 1).
**Not including the USB host.

Software Development Kit (SDK)

The software development kit (SDK) provides several tools for evaluating the MAXQ1065 socket board using one of the supported platforms. The SDK is available from the request link on the MAXQ1065 webpage. Open the README.html file situated at the root folder for more details on the SDK.

Ordering Information

PART	TYPE
MAXQ1065EVKIT#	EV Kit

#Denotes RoHS compliant.

MAXQ1065 EV Kit Bill of Materials

DESIGNATOR	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
C1, C2, C5, C18	4	CAP CER 4.7µF 10V 10% X5R 0603	Kemet	C0603C475K8PACTU
C3, C4, C6, C17	4	CAP CER 0.1µF 16V 10% X7R 0402	Murata	GRM155R71C104KA88D
C7	1	CAP CER 100pF 50V ±1% NP0 0402	AVX Corporation	04025A101FAT2A
C8, C12	2	CAP CER 27pF 50V 5% NP0 0402	Murata	GRM1555C1H270JA01D
C9, C10	2	CAP CER 1µF 35V 10% X5R 0603	Taiyo Yuden	GMK107BJ105KA-T
C11	1	CAP CER 0.1µF 50V 10% X7R 0603	Kemet	C0603C104K5RACTU
C13	1	CAP CER 0.47µF 10V 10% X5R 0402	Murata	GRM155R61A474KE15J
C14, C16	2	CAP CER 1µF 16V 10% X7R 0603	Murata	GCM188R71C105KA64D
C15	1	CAP CER 10µF 10V 10% X7R 0805	Samsung Electro-Mechanics	CL21B106KPQNNNE
CN1	1	CONN RCPT 5POS MICRO USB B R/A	Molex	47346-0001
D1, D2, D3	3	DIODE SCHOTTKY 20V 1A STMITE	STMicroelectronics	STPS120M
D4	1	LED 660nm RED WTR CLR 1206 SMD	Lumex Opto	SML-LX1206SRC-TR
D5	1	LED GREEN/RED CLEAR 1210	Lite-On Inc.	LTST-C155GEKT
D6	1	LED 565nm WTR CLR GREEN 1206 SMD	Lumex Opto	SML-LX1206GC-TR
JH1, JH5	2	CONN RCPT 8POS GOLD .100"	Samtec	ESQ-108-39-G-S
JH2	1	CONN RCPT 10POS GOLD .100"	Samtec	ESQ-110-39-G-S
JH3	1	CONN RCPT 40POS .100" SMD GLD	Samtec	HLE-120-02-G-DV-BE
JH4	1	CONN RCPT 6POS GOLD .100"	Samtec	ESQ-106-39-G-S
JH6, JP1	2	CONN HEADER .100 SINGL STR 2POS (2x1)	Sullins	PEC02SAAN
L1	1	FERRITE BEAD 120Ω 0805 1LN	Murata	BLM21AG121SN1D
PCB1	1	—	—	—
Q1, Q2	2	MOSFET P-CH 20V 600MA SOT23-3	Diodes Incorporated	DMP2004K-7
R1, R4, R6	3	RES 10kΩ 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF1002V
R2	1	RES SMD 12.1kΩ 1% 1/10W 0402	Panasonic	ERJ-2RKF1212X
R3	1	RES SMD 1MΩ 1% 1/10W 0402	Panasonic	ERJ-2RKF1004X
R5	1	RES 47kΩ 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF4702V
R7	1	RES 49.9kΩ 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF4992V
R8	1	RES 332Ω 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF3320V
R9	1	RES 120Ω 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF1200V
R10, R11	2	RES 150Ω 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF1500V
R12	1	RES 4.7kΩ 1/10W 1% 0402 SMD	Panasonic	ERJ-2RKF4701X
SW1	1	SWITCH SLIDE DPDT 300mA 6V RIGHT ANGLE	C&K	JS202011JAQN
SW2	1	SWITCH TACTILE SPST-NO 0.05A 24V	Omron Electronics	B3S-1000P

MAXQ1065 EV Kit Bill of Materials (continued)

DESIGNATOR	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
TP1, TP2, TP3	3	CONN HEADER .100 SINGL STR 1POS	Sullins	PEC01SAAN
U1	1	MAXQ1065GTC+ 12P TDFN	Maxim Integrated	MAXQ1065GTC+
U2	1	ESD PROTECT 2CH 6-UDFN	Maxim Integrated	MAX13202EALT+
U3	1	REG LDO 3.3V/ADJ 16TSSOP-EP	Maxim Integrated	MAX8869EUE33+
U4	1	IC BRIDGE USB TO I²C/SPI 32VQFN	FTDI	FT4222HQ-D-R
XU1	1	MAXQ1065GTC+ 12P TDFN SKT 12QN50S33030	Plastronics	12QN50S33030
Y1	1	CRYSTAL 12MHz 18pF SMD	Abracon Corp	ABM3-12.000MHZ-D2Y-T

MAXQ1065 EV Kit Schematic
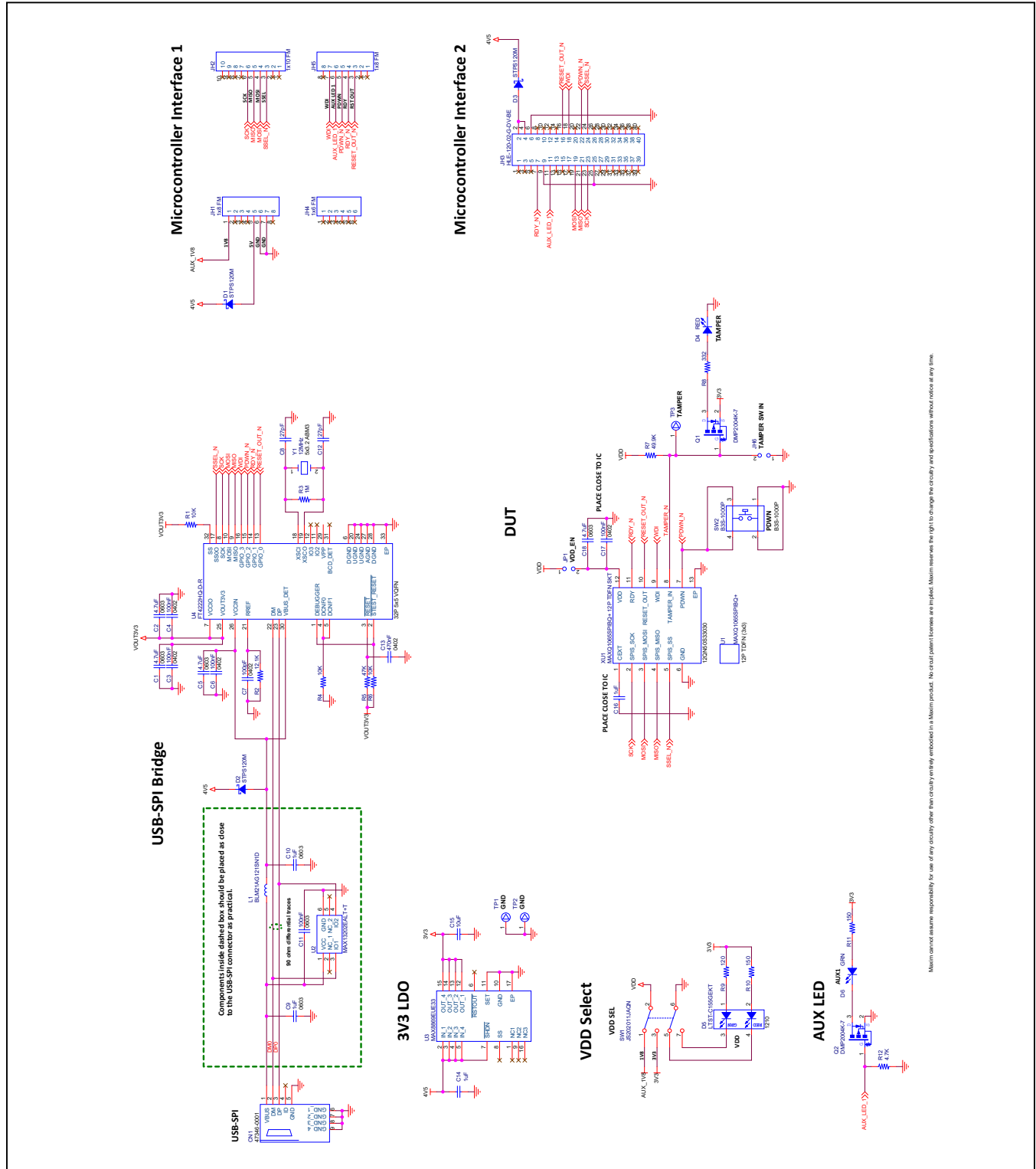
Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/21	Initial release	—
1	3/21	Updated *Features*, *Socket Board* photo, *Figure 1*, *Detailed Hardware Description* and *Software Development Kit (SDK)* sections, *Bill of Materials*, and *Schematic*	1–3, 5, 6–8