

## MAX32520 Evaluation Kit

Evaluates: MAX32520

### General Description

The MAX32520 evaluation kit (EV kit) provides a platform for evaluation capabilities of the MAX32520 for secure element IoT utilizing Maxim's proprietary PUF (physically unclonable function) technology.

The MAX32520 integrates an Arm® Cortex® M4 processor with FPU, 2MB of flash, 136KB of system RAM and 34KB ECC, 8KB of one-time-programmable (OTP) memory and 128KB of boot ROM. It provides a FIPS/ compliant TRNG, as well as environmental and tamper detection circuitry to facilitate system-level security. Multiple high speed interfaces are supported including SPI, UART, and an I<sup>2</sup>C. One of the SPI ports has a serial flash emulation mode allowing direct code fetching enabling secure boot from a host microcontroller.

### EV Kit Contents

- MAX32520 EV kit containing a MAX32520 with a preprogrammed demo
- MAX32625PICO# EV kit
- One standard A to Micro B USB cable

[Ordering Information](#) appears at end of data sheet.

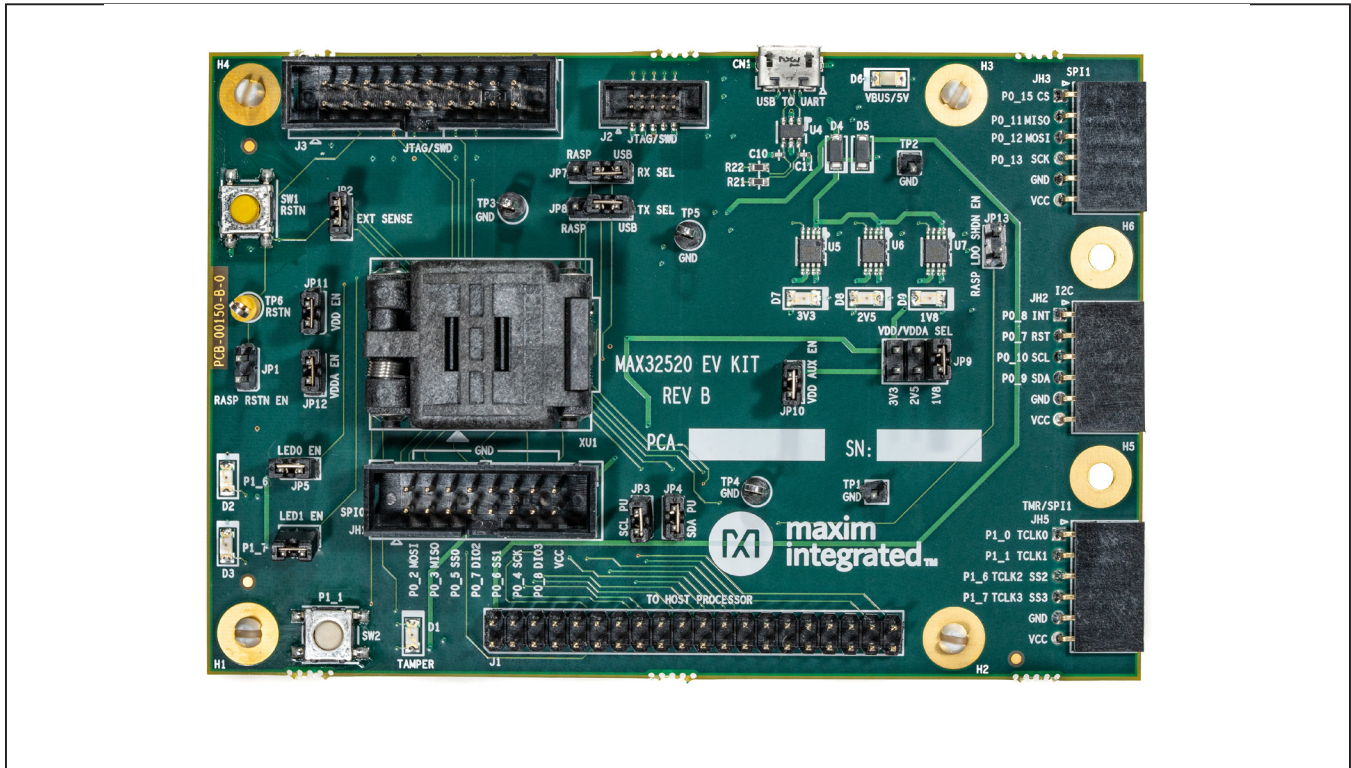
### Features

- Arm® Cortex® M4 Processor with FPU with ChipDNA™ PUF Technology
- USB 2.0 Micro B to Serial UART
- Serial UART Access Selectable Through a USB 2.0 Serial Bridge or from an Optional Host Processor
- Security Self-Destruct Jumper
- Arm® or SWD JTAG 20-Pin Header and Cortex 10-Pin Header
- 40-Pin Connector for Interfacing to a Host Processor
- 16-Pin Ribbon Cable Connector for Interfacing to QSPI
- Three PMOD Connectors for Interfacing to SPI, I<sup>2</sup>C, or Timer Modules
- Select GPIOs Accessed Through Shared 0.1in Headers
- Board Power Provided by Either USB Port or from a Host Processor
- Onboard 1.8V, 2.5V, and 3.3V Regulators for IC and Peripherals
- Individual Power Measurement on All IC Rails Through Jumpers
- Two General-Purpose LEDs and One General-Purpose Pushbutton Switch

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*ChipDNA is a trademark of Maxim Integrated Products, Inc.*

## MAX32520 EV Kit Board



## Quick Start

### Required Equipment

- MAX32520 EV kit
- One standard A to Micro B USB cable

### Procedure

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

- 1) While observing safe ESD practices, carefully remove the MAX32520 EV kit board out of its packaging. Inspect the board to ensure that no damage occurred during shipment. Jumpers/shunts are preinstalled prior to testing and packaging.
- 2) The MAX32520 is preprogrammed with a demo program. To run the demo, power up the board by plugging in the provided USB cable to connector CN1. Verify that the blue LED (D6) and the green LEDs (D7, D8, and D9) are illuminated.
- 3) Once power is applied, the demo initiates and flashes the green LED (D3) upon successful completion.

*Windows is a registered trademark and registered service mark of Microsoft Corporation.*

## Detailed Description of Hardware (or Software)

### Power Supply

The EV kit is powered by +5V, which is made available through VBUS on the Micro-USB type-B connector CN1 or from the host processor through a 40-pin connector (J1). The board is default jumpered for power provided by CN1.

### Current Monitoring

Two pin headers provide convenient current monitoring points for VDD (JP11) and VDDA (JP12).

### UART Interface

The EV kit provides a USB-to-UART bridge chip, FTDI FT230X. This bridge eliminates the requirement for a physical RS-232 COM port. Instead, the IC's UART access is through the Micro-USB type-B connector, CN1. The USB-to-UART bridge or the serial port of the host processor can be connected to the UART of the IC by configuring jumpers JP7 (RX SEL) and JP8 (TX SEL). Virtual COM port drivers and guides for installing Windows® drivers are available at the FTDI chip website.

### External Tamper Sensor

Jumper JP2 shorts the EXT\_SENSOR\_OUT to EXT\_SENSOR\_IN pin. When open, a tamper detection event occurs and illuminates the red tamper LED (D1).

### PMOD Connectors

Three 6-pin PMOD 0.1in spaced edge connectors are provided for interfacing to I<sup>2</sup>C (JH2), SPI (JH3), and timer (JH5) modules.

### Host Processor Connector

A 40-pin 0.1in spaced header is provided for interfacing to a host processor, such as Raspberry Pi™. It is used for SPI, I<sup>2</sup>C, and serial port communication to the IC. It also allows for sourcing power to the EV kit and control/status through shared GPIO.

### SPI Connector

A 9-pin 0.1 in spaced header allows for access to SPI port 0. The SPI port can also be routed to the 40-pin host connector by the population of 0Ω resistors. See the [MAX32520 EV Kit Schematic](#).

### JTAG/SWD (Serial Wire Debug) Support

JTAG or SWD debug can be accessed through an Arm standard 20-pin connector (J3) or an Arm Cortex 10-pin connector (J2). Logic levels are set to VDD\_AUX (1.8V, 2.5V or 3.3V) by configuring jumper JP9.

### Reset Pushbutton

The IC can be reset through the pushbutton SW1 or by the host processor populating jumper JP1.

### Indicator LEDs

The indicator LEDs D2 (red) and D3 (green) are connected to GPIO P1.6 and P1.7, respectively.

### GPIO Pushbutton Switch

Pushbutton SW2 is connected to GPIO P1.1. If the pushbutton is pressed, the attached port pin is pulled low.

### GPIO Header

Since the GPIOs are on multifunctional pins, they can be accessed through the various onboard headers and connectors.

**Table 1. MAX32520 EV Kit Jumper Settings**

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP1	RASP_RSTN	*Open	Disconnects Raspberry Pi reset from the DUT reset
		Close	Connects Raspberry Pi reset from the DUT reset
JP2	EXT SENSE	Open	Disconnects EXT_SENSE_IN to EXT_SENSE_OUT
		*Close	Connects EXT_SENSE_IN to EXT_SENSE_OUT
JP3	SCL	Open	Disconnects 4.7kΩ resistor from I <sup>2</sup> C SCL
		*Close	Connects 4.7kΩ resistor from I <sup>2</sup> C SCL
JP4	SDA	Open	Disconnects 4.7kΩ resistor from I <sup>2</sup> C SDA
		*Close	Connects 4.7kΩ resistor from I <sup>2</sup> C SDA
JP5	P1_6	Open	Disconnects red LED D2 from P1_6
		*Close	Connects red LED D2 from P1_6
JP6	P1_7	Open	Disconnects green LED D3 from P1_7
		*Close	Connects green LED D3 from P1_7
JP7	UART_RXD	*2-1	Connects the USB/serial bridge to DUT serial UART (P0.0)
		2-3	Connects the Raspberry Pi UART to DUT serial UART to (P0.0)
JP8	UART_TXD	*2-1	Connects the USB/serial bridge to DUT serial UART to (P0.1)
		2-3	Connects the Raspberry Pi UART to DUT serial UART to (P0.1)
JP9	VDD/VDDA/VDD AUX EN	*1-2	1V8 to VDD, VDDA and VDD AUX EN
		3-4	2V5 to VDD, VDDA and VDD AUX EN
		5-6	3V3 to VDD, VDDA and VDD AUX EN

*Raspberry Pi is a trademark of the Raspberry Pi Foundation.*

**Table 1. MAX32520 EV Kit Jumper Settings (continued)**

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP10	VDD_AUX	Open	Disconnects voltage from VDD_AUX
		*Close	Connects voltage to VDD_AUX
JP11	VDD	Open	Disconnects voltage from VDD
		*Close	Connects voltage to VDD
JP12	VDDA	Open	Disconnects voltage from VDDA
		*Close	Connects voltage to VDDA
JP13	LDO_SHDN_N	*Open	Disconnects the LDOs shutdown enable from the Raspberry Pi
		Close	Connects the LDOs shutdown enable to the Raspberry Pi

\*Default position.

## Ordering Information

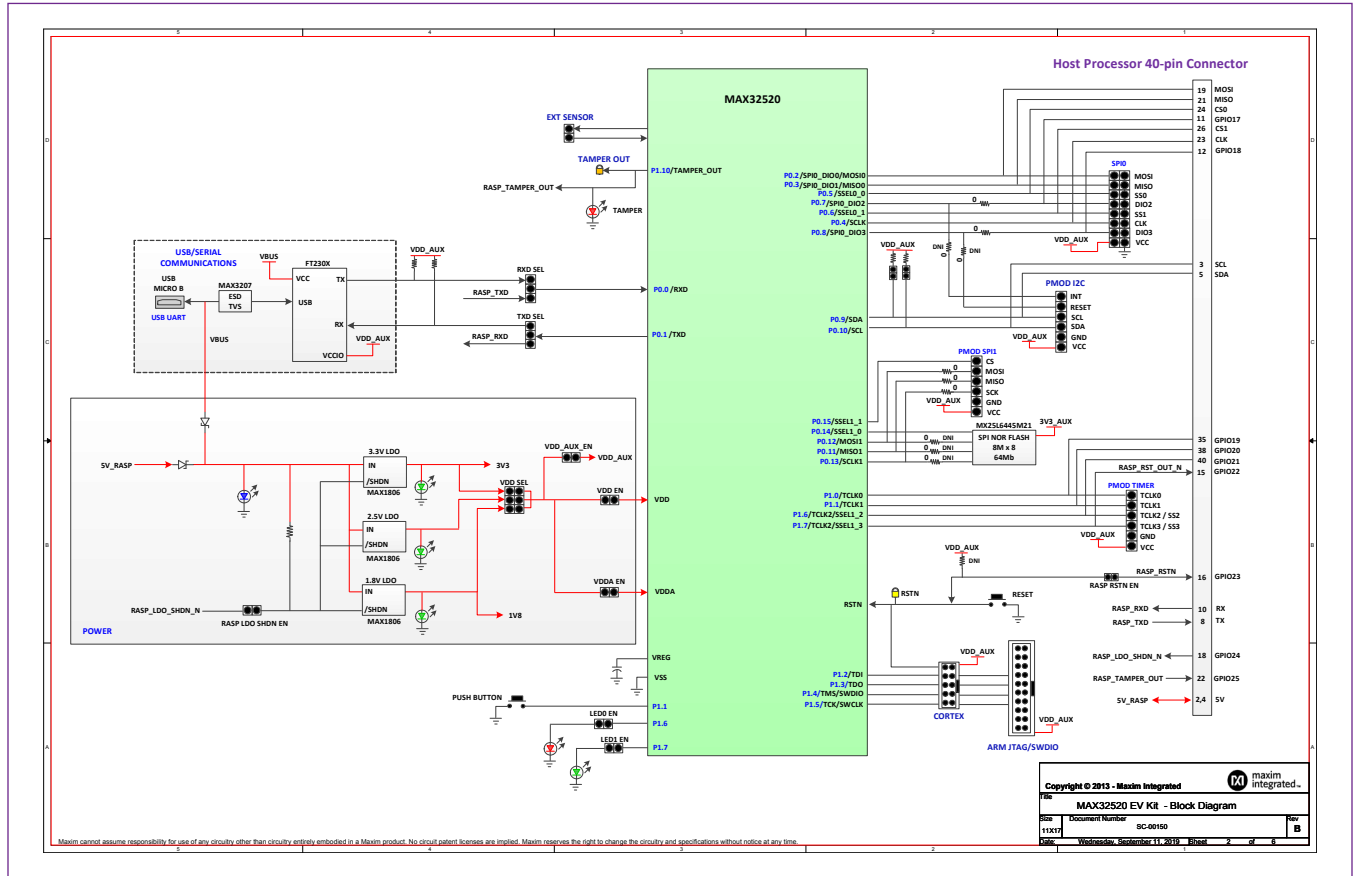
PART	TYPE
MAX32520-KIT#	EV Kit

#Denotes RoHS compliant.

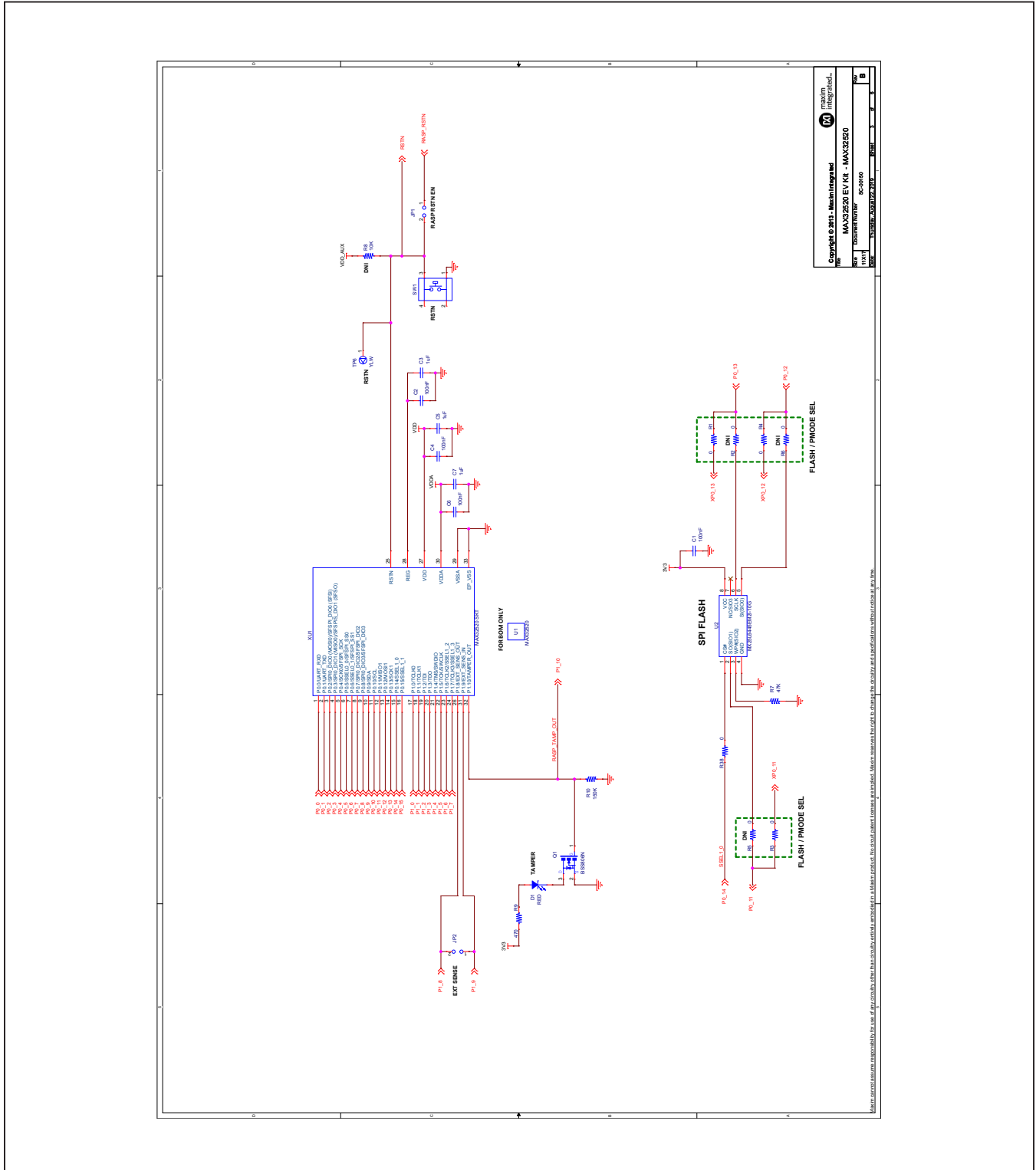
MAX32520 EV Kit Bill of Materials

QTY	PART REFERENCE	BOM DESCRIPTION	MANUFACTURER PN	MANUFACTURER
10	C1 C2 C4 C6 C8 C12 C15 C20 C23 C26	CAP CER 0.1UF 10V 10% X5R 0402	GRM155R61A104KA01D	Murata
3	C3 C5 C7	CAP CER 1uF 16V 10% X7R 0603	GCM188R71C105KA64D	Murata
1	C9	CAP CER 4.7uF 10V 10% X5R 0603	C0603C475K8PACTU	Kemet
2	C10 C11	CAP CER 47PF 50V 1% NPO 0402	C1005C0G1H470F050BA	TDK Corporation
1	C13	CAP CER 10000PF 25V 10% X7R 0603	CL10B103KA8NNNC	Samsung Electro
1	C14	CAP CER 0.1uF 16V 10% X7R 0603	C0603C104K4RACTU	Kemet
3	C18 C21 C24	CAP CER 1UF 35V 10% X5R 0603	GMK107BJ105KA-T	Taiyo Yuden
3	C19 C22 C25	CAP CER 10UF 6.3V 20% X5R 0402	GRJ155R60J106ME11D	Murata Electronics
1	CN1	CONN RCPT 5POS MICRO USB B R/A	47346-0001	Molex
2	D1 D2	LED 660NM RED WTR CLR 1206 SMD	SML-LX1206SRC-TR	Lumex Opto
4	D3 D7 D8 D9	LED 565NM WTR CLR GREEN 1206 SMD	SML-LX1206GC-TR	Lumex Opto
2	D4 D5	DIODE SCHOTTKY 30V 2A POWERDI123	DFLS230L-7	Diodes Inc
1	D6	LED 469NM BLUE DIFF 1206 SMD	HSMR-C150	Avago Technologies
6	H1 H2 H3 H4 H5 H6	DNI MTG 125DRL 300PAD		
1	J1	CONN HEADER VERT 40POS 2.54MM	PRPC020DAAN-RC	Sullins
1	J2	IDC BOX HEADER 0.050 10 POS SMD	3220-10-0300-00	CNC Tech
1	J3	CONN HEADER 2.54MM 20POS GOLD	SBH11-PBPC-D10-ST-BK	Sullins
1	JH1	CONN HEADER VERT 16POS 2.54MM	SBH11-PBPC-D08-ST-BK	Sullins
3	JH2 JH3 JH5	CONN HDR 6POS 0.1 GOLD PCB R/A	PPPC061LGBN-RC	Sullins
10	JP1 JP2 JP3 JP4 JP5 JP6 JP10 JP11 JP12 JP13	CONN HEADER .100 SINGL STR 2POS (2x1)	PEC025AAN	Sullins
2	JP7 JP8	CONN HEADER .100 SINGL STR 3POS	PEC035AAN	Sullins
1	JP9	CONN HEADER .100 DUAL STR 6POS	PEC03DAAN	Sullins
1	L1	FERRITE CHIP SIGNAL 2000 OHM SMD	HZ1206C202R-10	Laird-Signal Integrity
1	L2	FERRITE CHIP 220 OHM 0805	BLM21PG221SN1D	Murata Electronics
1	PCB1			
2	Q1 Q2	MOSFET N-CH 20V 2.3A SOT23	BSS806N H6327	Infineon Technologies
2	Q3 Q4	MOSFET P-CH 100V 0.12A SOT23-3	VP2110K1-G	Microchip Technology
6	R1 R3 R4 R38 R46 R47	RES SMD 0 OHM JUMPER 1/10W 0603	RC0603JR-070RL	Yageo
10	R2 R5 R6 R12 R14 R15 R16 R43 R44 R45	RES SMD 0 OHM JUMPER 1/10W 0603	RC0603JR-070RL	Yageo
1	R7	RES 47K OHM 1/10W 1% 0603 SMD	ERJ-3EKF4702V	Panasonic
1	R8	RES 10K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1002V	Panasonic
2	R9 R17	RES 470 OHM 1/10W 1% 0603 SMD	ERJ-3EKF4700V	Panasonic
4	R10 R37 R39 R40	RES 150K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1503V	Panasonic
2	R11 R13	RES 4.7K OHM 1/10W 1% 0402 SMD	ERJ-2RKF4701X	Panasonic
3	R18 R32 R36	RES 332 OHM 1/10W 1% 0603 SMD	ERJ-3EKF3320V	Panasonic
1	R19	RES SMD 100 OHM 1% 1/10W 0603	RC0603FR-07100RL	Yageo
5	R20 R23 R31 R34 R35	RES 10K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1002V	Panasonic
2	R21 R22	RES 27 OHM 1/10W 1% 0603 SMD	ERJ-3EKF27R0V	Panasonic
1	R24	RES SMD 1M OHM 5% 1/8W 0805	ERJ-6GEYJ105V	Panasonic
5	R25 R26 R27 R28 R29	DNI 0402		
1	R30	RES 2.7K OHM 1/10W 1% 0603 SMD	ERJ-3EKF2701V	Panasonic
1	R33	RES 267 OHM 1/10W 1% 0603 SMD	ERJ-3EKF2670V	Panasonic
2	R41 R42	RES 1K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1001V	Panasonic
1	SW1	SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1002 BY OMZ	Omron Electronics
1	SW2	SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1000P	Omron Electronics
2	TP1 TP2	CONN HEADER .100 SINGL STR 1POS	PEC01SAAN	Sullins
3	TP3 TP4 TP5	TEST POINT PC MULTI PURPOSE BLK	5011	Keystone Electronics
1	TP6	TEST POINT PC MULTI PURPOSE YEL	5014	Keystone Electronics
1	U1	MAX32520	MAX32520	Maxim Integrated
1	U2	IC FLASH 64MBIT 104MHZ 8SOP	MX25L6445EM2I-10G	Macronix
1	U3	IC USB SERIAL BASIC UART 16SSOP	FT230XS-R	FTDI
1	U4	ESD PROT DIFF SOT23-6	MAX3207EAUT+T	Maxim Integrated
1	U5	IC REG LDO 3.3V/ADJ 0.5A 8UMAX	MAX1806EUA33+	Maxim Integrated
1	U6	IC REG LDO 2.5V/ADJ 0.5A 8UMAX	MAX1806EUA25+	Maxim Integrated
1	U7	Low Dropout Linear Regulator	MAX1806EUA18+	Maxim Integrated
1	XU1	MAX32520 32P QFN SKT	32QN50S15050	Plastronics

MAX32520 EV Kit Schematic

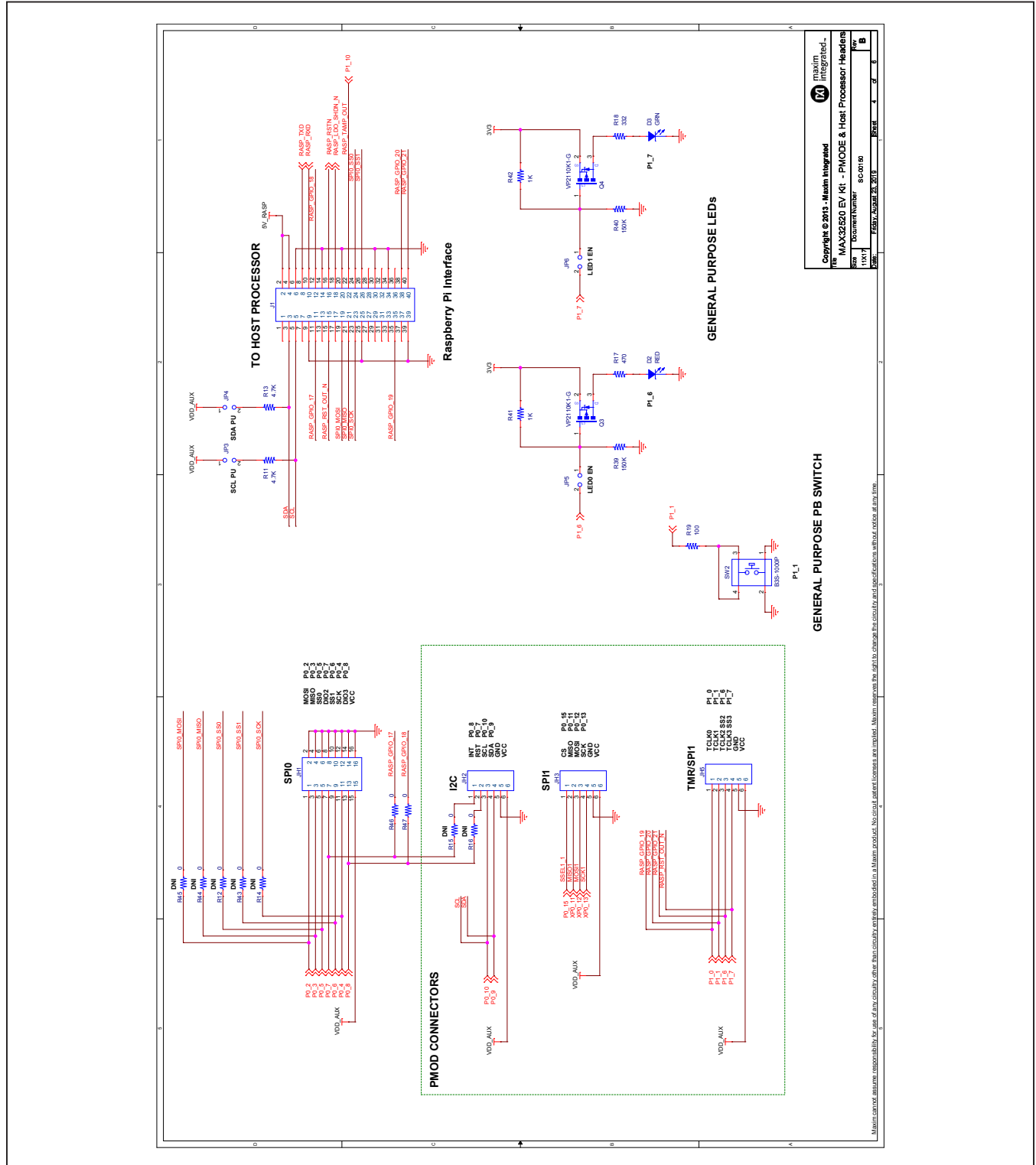


MAX32520 EV Kit Schematic (continued)



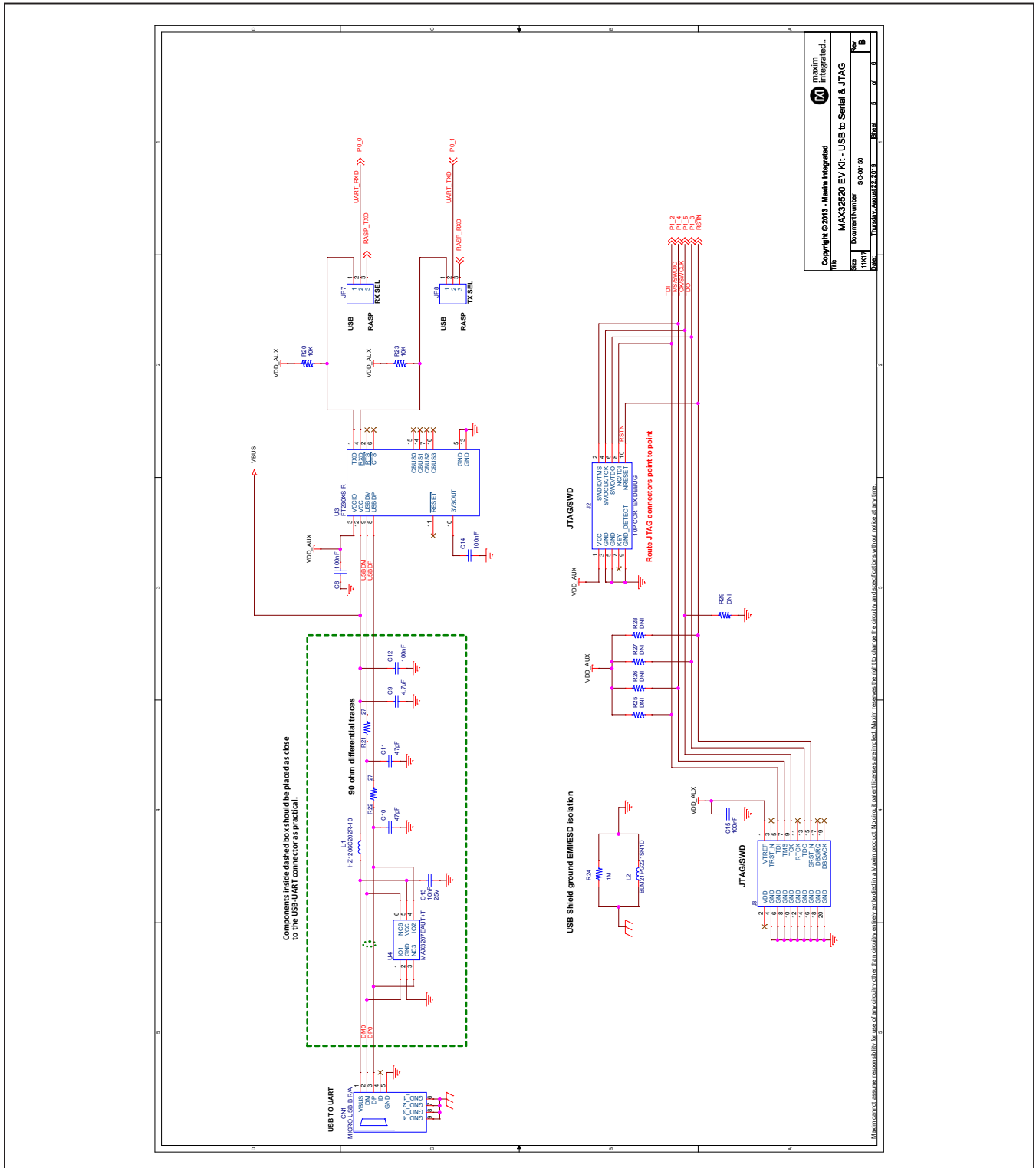


MAX32520 EV Kit Schematic (continued)

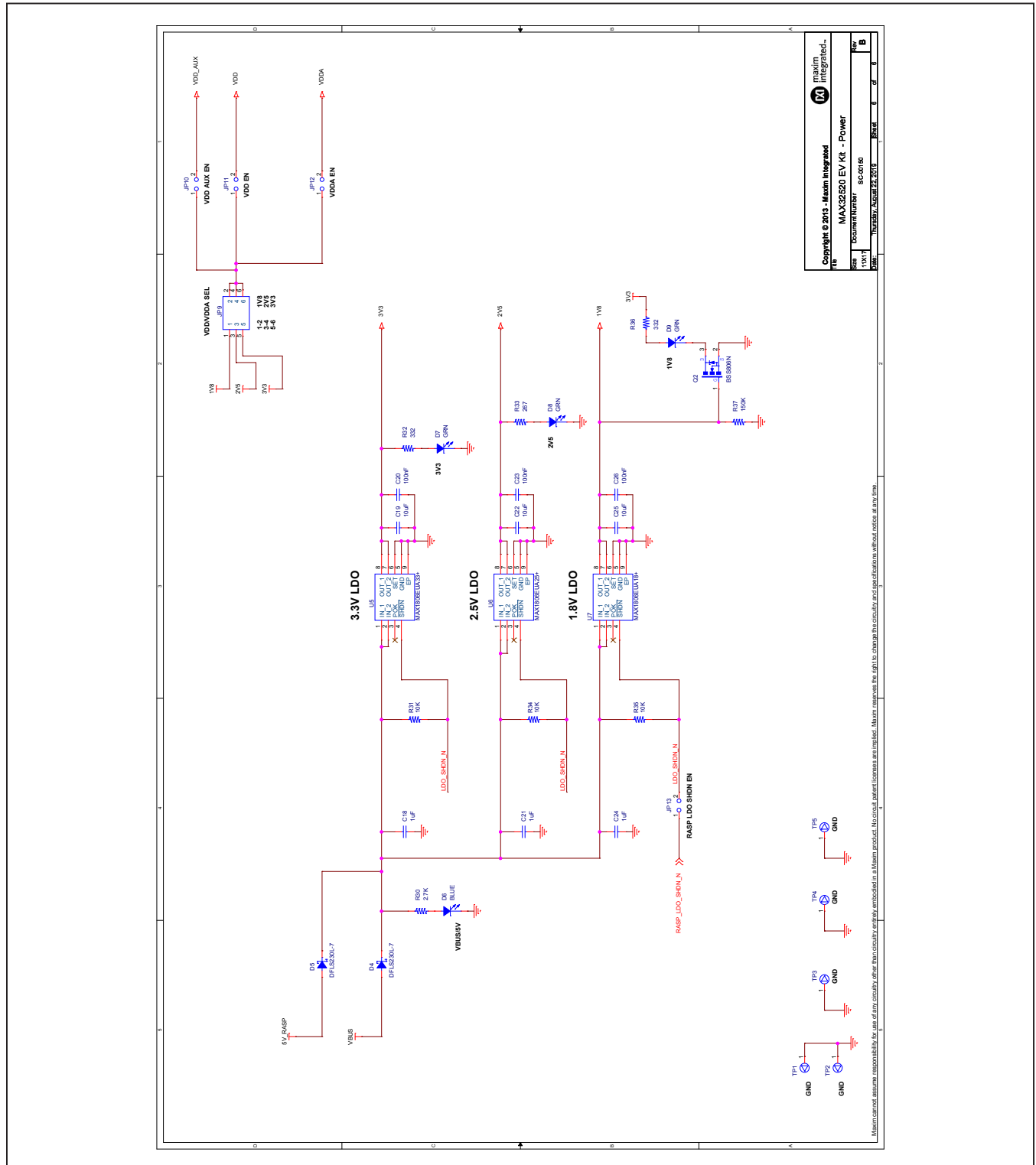




MAX32520 EV Kit Schematic (continued)



MAX32520 EV Kit Schematic (continued)



## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/19	Initial release	—
1	10/19	Updated <i>Features</i> section, <i>MAX32520 EV Kit Board</i> , <i>MAX32520 EV Kit Schematic</i> , and <i>MAX32520 EV Kit Bill of Materials</i>	1, 2, 5–10

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