Evaluates: MAX32662

MAX32662 Evaluation Kit

General Description

The MAX32662 evaluation kit (EV kit) provides a platform for evaluating the capabilities of the MAX32662 microcontroller, which is a cost-effective, ultra-low power, highly integrated 32-bit microcontroller designed for battery-powered edge devices.

EV Kit Contents

- MAX32662 EV Kit Containing a MAX32662 with a Preprogrammed Demo
- MAX32625PICO2 Debugger with Cables
- One USB Standard-A to USB Micro-B Cable
- Extra Shunts

Features and Benefits

- 3-Pin Terminal Block for CAN Bus 2.0B
- 128 x 128 (1.45in) Color TFT Display with SPI Interface
- Selectable On-Board High-Precision Voltage Reference
- USB 2.0 Micro-B to Serial UART
- All GPIOs Signals Accessed through 0.1in Headers
- Four Analog Inputs Accessed through 0.1in Header
- SWD 10-Pin Header
- Board Power Provided by USB Port
- On-Board LDO Regulators
- Individual Power Measurement on All IC Rails through Jumpers
- One General-Purpose LED
- One General-Purpose Pushbutton Switch

Ordering Information *appears at end of data sheet.*

319-100969; Rev 0; 1/23

Quick Start

Required Equipment

- MAX32662 EV Kit Containing a MAX32662 with a Preprogrammed Demo
- One USB Standard-A to USB Micro-B Cable

Procedure

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

1. While observing safe ESD practices, carefully remove the EV kit board out of its packaging. Inspect the board to ensure that no damage occurred during shipment. Shunts are preinstalled prior to testing and packaging.
2. The target microcontroller is preprogrammed with the demo code. To run the demo, power up the board by plugging in the provided USB cable to connector CN1. Connect the other end of the USB cable to a computer or power adapter. Verify that the 5V blue LED (D1), and the 3V3 (D2), 1V8 (D3), and 1V1 (D4) green LEDs are illuminated, indicating that each of these voltage rails are powered on. If necessary, toggle power switch SW3.
3. Once power is applied to the board, the demo automatically starts and begins flashing LED0. This indicates that the microcontroller is executing code and that this simple demo is running as expected.

Now that the preprogrammed demo has run successfully, the next step is to install the Maxim Micros SDK in order to compile/build and run some of the provided examples.

Installing and Running the Maxim Micros SDK

Once the demo runs as expected, the next step is to download and run the Maxim Micros SDK installer for your desired operating system. The Maxim Micros SDK contains everything needed to evaluate and develop code for the supported microcontrollers including: the toolchain, tools, utilities, drivers, documentation, microcontroller firmware, and example code. The Maxim Micros SDK installer is located on the EV kit's product webpage. Once the installer runs, the user will be shown all the toolchain components and microcontroller firmware packages which will be installed, unless deselected by the user.

Note: When selecting the target microcontroller, be aware that only the first part number in the sequence is shown (see *Figure 1*).

For example, 'MAX32665 Resources' is the correct selection for either the MAX32665 or MAX32666. Likewise, 'MAX32650 Resources' is the correct selection for either the MAX32650, MAX32651, or MAX32652.

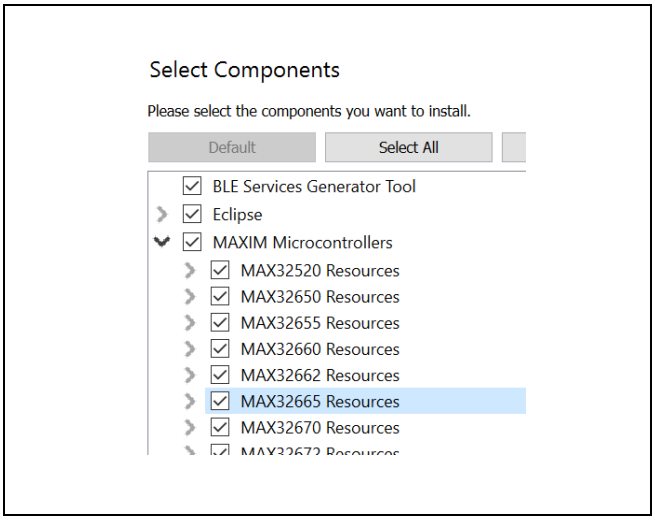


Figure 1. Select Components Window

Once the installation is complete, assuming that the default toolchain components were installed, the user can build and run the included examples to exercise various peripherals. Documentation for the SDK can be found in the **Documentation** folder located in the installation directory, as shown in *Figure 2*. Find and double-click **index.html** to proceed.

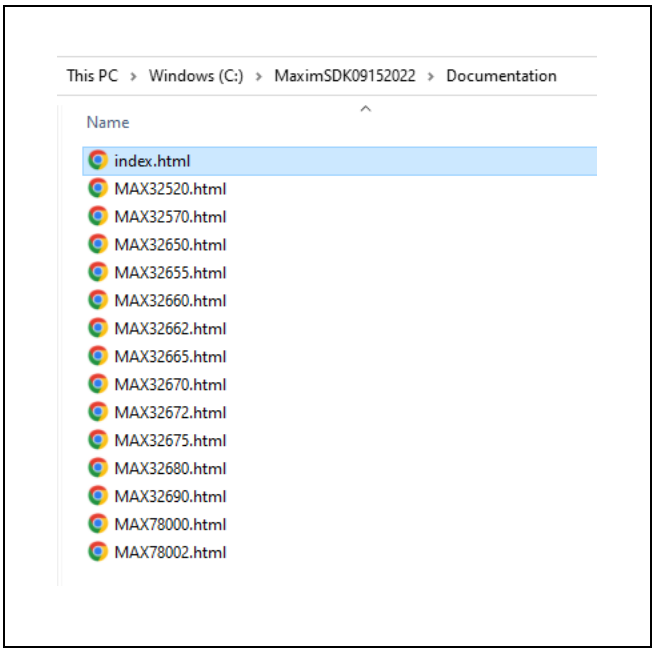


Figure 2. Documentation Folder

As shown in *Figure 3*, the Maxim Micros SDK documentation window then appears, which contains a list of the currently supported devices. Click on one of the devices to see the documentation for that microcontroller.

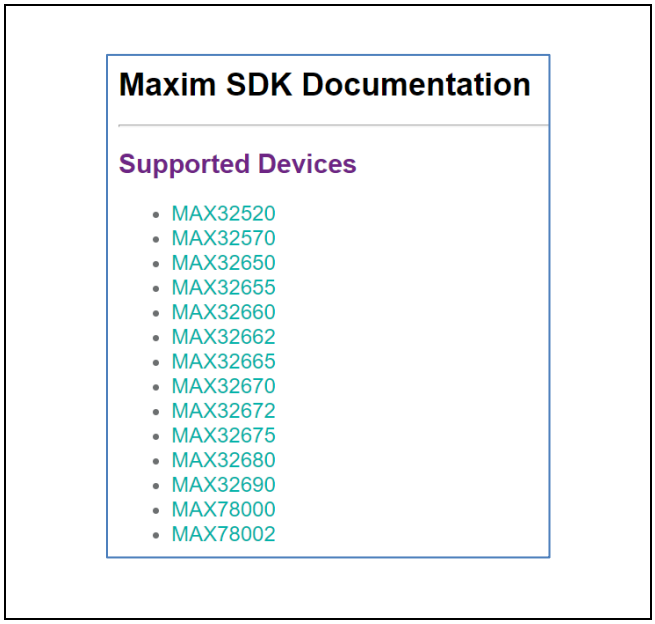


Figure 3. Maxim SDK Documentation Window

Each microcontroller selection contains toolchain documentation as well as documentation for each of the provided example programs as shown in *Figure 4.*

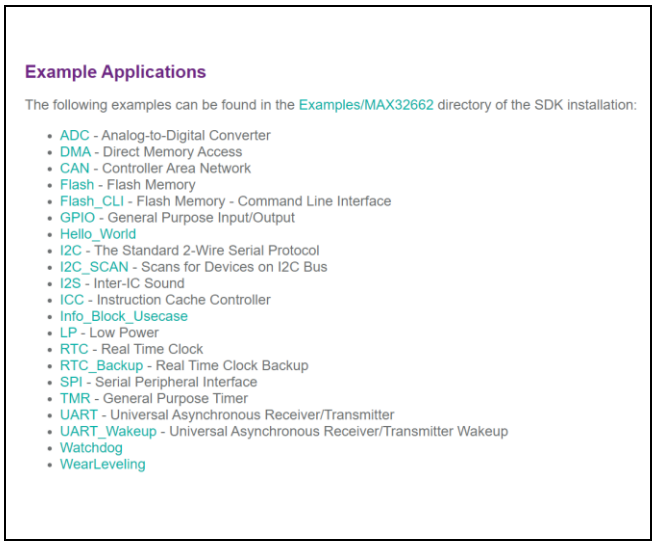


Figure 4. Examples Application Window

Launching Eclipse

When launching Eclipse, it is important to avoid browsing the installation folder and running the Eclipse executable directly. Instead, use eclipse.bat (Microsoft Windows), eclipse.sh (Linux), or run_eclipse.sh (MacOS) to launch Eclipse. These scripts properly configure the environment prior to launching Eclipse. For the Microsoft Windows version, use the “Eclipse MaximSDK” shortcut found in the Maxim Integrated SDK folder on the Windows Start menu.

MAX32625PICO2 Debugger

A MAX32625PICO2 debugger is provided for programming and debugging the target microcontroller through the SWD interface. Furthermore, the MAX32625PICO2 also serves as a UART bridge, providing serial terminal functionality without the need of an additional USB cable. See the UART Interfaces section for board configuration details.

This EV kit includes a USB cable for connecting the MAX32625PICO2 debugger to a PC (with Eclipse and the SDK installed) and a ribbon cable for connecting the MAX32625PICO2 debugger to J3 of the EV kit.

For more detailed information about the MAX32625PICO2, refer to the MAX32625PICO2 data sheet.

MAX32662 EV Kit Board

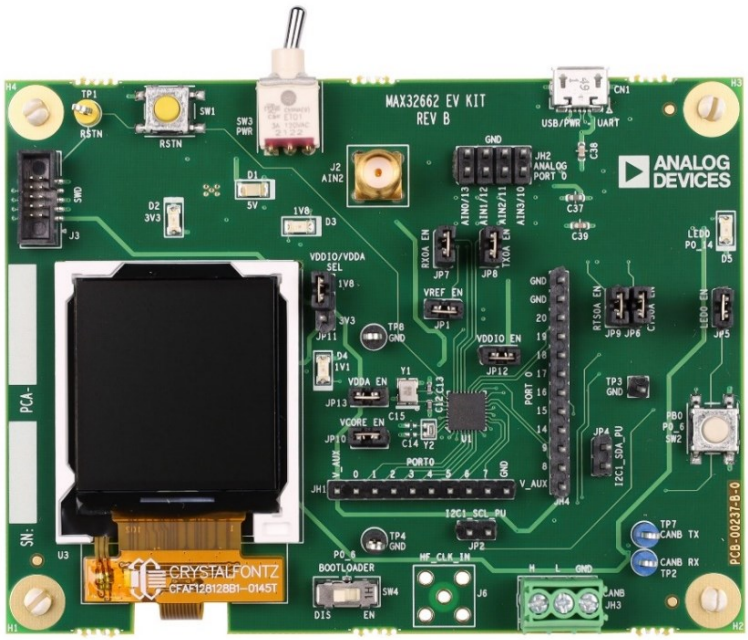


Figure 5. MAX32662 EV Kit Board—Top

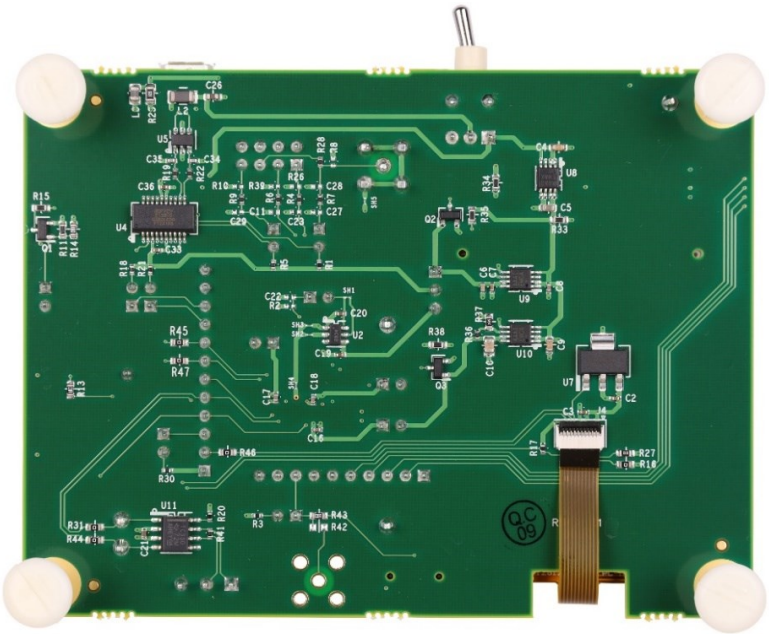


Figure 6. MAX32662 EV Kit Board—Bottom

Detailed Description of Hardware

Power Supply

The EV kit is powered by +5V through VBUS on the USB Micro-USB connector (CN1), which sources the on-board low-dropout (LDO) regulators. When the board is powered from the USB cable through CN1, blue LED 5V (D1), and green LEDs 3V3 (D2), 1V8 (D3), and 1V1 (D4) will illuminate. Power may be applied to the board with the switch (SW3) in either position.

Current Monitoring

Two pin jumpers are provided on all IC power rails for individual current measurements. The jumpers are VCORE EN (JP10), VDDIO EN (JP12), and VDDA EN (JP13).

Low-Power Current Measurements

To accurately achieve the low-power current values, the EV kit will need to be configured such that no outside influence (e.g., pull-ups, pull-downs, external clocks, debugger connector) causes a current source or sink on any GPIO.

For these measurements, the board needs to be configured as follows:

1. Remove the shunts at JP1, JP2, JP4, JP5, JP6, JP7, JP8, and JP9.
2. Set slide switch SW4 to the DIS (disable) position.
3. Unplug the debugger from the SWD connector.

Once the board is configured, look for the SDK low-power example (LP) to cycle through the low-power modes.

CAN Bus 2.0B

The three-screw lug terminal block (JH3) allows for connection to a CAN communications bus through the LTC2875HS8 transceiver (U11).

Color TFT LCD Display

The EV kit provides a color, 1.4in, 128 x 128-pixel TFT with an integrated TFT controller and an SPI interface. Current builds of the EV kit include the Crystalfontz® CFAF128128B1-0145T display (U3) connected through connector J4. Due to availability issues, future EV kit builds may include a different display model or vendor.

Clocking

The crystals provide a time base for the two internal oscillators. A 24.576MHz crystal (Y1) is the clock source for digital logic and peripherals, and a 32.768kHz crystal (Y2) is for RTC operations.

External Voltage Reference (VREF)

The microcontroller's ADC selects the internal reference by default. For critical applications, an external precision voltage reference can be connected to the VREF pin. To demonstrate this functionality, this EV kit includes a low-noise, high-precision, MAX6071 voltage reference (U2). Its output voltage connects to VREF through jumper JP1. When attempting to use this external reference, make sure JP1 has a shunt installed. Furthermore, user software must properly set the ADC External Reference Select bit. For additional information, refer to the ADC chapter in the device user guide.

Serial Wire Debug (SWD)

An Arm® debug access port (DAP) provides an external interface for debugging during application development. The DAP is a standard Arm CoreSight® serial wire debug port, uses a two-pin serial interface (SWDCLK and SWDIO), and is accessed through 10-pin header (J3). Logic levels are set to V_AUX (1V8 or 3V3), which is determined by the shunt placement on JP11. In addition, the UART1A port can also be accessed through J3.

UART Interfaces

An FTDI USB-to-UART bridge IC, the FT231x, allows for access to the IC's UART0A port through the USB Micro-B connector (CN1). The USB-to-UART bridge can be connected to the IC's UART0A with jumpers JP7 (RX0A EN), JP8 (TX0A EN), JP6 (CTS0A EN), and JP9 (RTS0A EN). Virtual COM port drivers and guides for installing Windows® drivers are available at the FTDI website.

The UART1A port can be accessed through the SWD 10-pin header (J3). This allows SWD/JTAG debuggers to use one USB cable to provide both a SWD/JTAG interface as well as a serial data interface to a host.

GPIO and Alternate Function Headers

GPIO and alternate function signals from the microcontroller can be accessed through headers JH1, JH2, and JH4. Analog inputs are accessible through header JH2. If accessing AIN0, the shunt on JP1 must be removed to prevent contention with the external reference voltage source. The IC provides support for both 1.8V and 3.3V peripherals through the power rail VDDIO.

I²C Access/Pull-ups

The I2C1A port is accessed through headers JH1 and JH4. Pull-up resistors are enabled through jumpers JP2 and JP4. Pull-up voltage levels are set to V_AUX (1V8 or 3V3), which is determined by the shunt placement on JP11.

The I2C0A port is accessed through header JH2. External pull-ups for the I2C0A bus are required, and the shunt on JP1 must be removed to prevent contention with the external reference voltage source.

Reset Pushbutton

Pushbutton SW1 momentarily pulls the RSTN pin low. RSTN is internally pulled up to VDDIO. Refer to the Electrical Characteristics table in the device data sheet for resistance value (R_{PU_VDDIO}).

Indicator LED

General-purpose indicator LED0 is driven by a buffer, which is connected to GPIO P0.14 and can be disabled by removing shunt JP5.

GPIO Pushbutton Switch

General-purpose pushbutton SW2 is connected to GPIO P0.6. If the pushbutton is pressed, the attached port pin is pulled low. It should be noted that P0.6 is also the secure bootloader default stimulus pin on secure bootloader-enabled devices. Set slide switch SW4 to the DIS (disable) position before attempting to operate SW2.

Secure Communications Protocol Bootloader (SCPBL)

The EV kit contains a version of the MAX32662 without the secure bootloader, meaning no SCPBL.

The secure bootloader provides a secure channel for device configuration and program loading. The EV kit hardware can be used to evaluate the secure bootloader-enabled versions of the MAX32662; however, these devices must be procured separately. Refer to the Ordering Information table in the MAX32662 data sheet for exact part numbers. To use this EV kit to evaluate the secure bootloader-enabled devices, replace the original MAX32662 with the new devices.

If using secure bootloader-enabled devices, the SCPBL is activated by asserting the default stimulus pin (P0.6) by setting the bootloader slide switch (SW4) to the EN (enable) position and momentarily pressing the RSTN pushbutton (SW1). The secure bootloader then monitors the UART0A for a connection request.

Note: To activate the bootloader, the following signals are required: the stimulus pin (P6.0), RSTN pin, and UART0A pins.

The stimulus pin is pulled high internally by a weak pull-up. If any additional connections are made to the stimulus pin, a stronger external pull-up may be required to keep the device out of bootloader mode when powering up or coming out of reset.

Note: The pull-up resistor enabled by installing the shunt on JP2 serves a dual-purpose—as a pull-up for I2C1A_SCL and to provide a strong pull-up to the P0.6 default stimulus pin.

Table 1. Jumper Connection Guide

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP1	VREF EN	1-2*	Connects the external voltage reference to the VREF pin; must be enabled in the software. See the External Voltage Reference (VREF) section for additional information.
		Open	Disconnects the external voltage reference.
JP2	I2C1_SCL_PU	1-2	Connects the pull-up to I2C1A_SCL (P0.6); sourced by V_AUX.
		Open*	Disconnects the pull-up from I2C1A_SCL (P0.6); sourced by V_AUX.
JP3	N/A	N/A	Does not exist.
JP4	I2C1_SDA_PU	1-2	Connects the pull-up to I2C1A_SDA (P0.9); sourced by V_AUX.
		Open*	Disconnects the pull-up from I2C1A_SDA (P0.9); sourced by V_AUX.
JP5	LED0 EN	1-2*	Enables LED0.
		Open	Disables LED0.
JP6	CTS0A EN	1-2*	Connects the USB-to-serial bridge to UART0A_CTS (P0.20).
		Open	Disconnects the USB-to-serial bridge from UART0A_CTS (P0.20).
JP7	RX0A EN	1-2*	Connects the USB-to-serial bridge to UART0A_RX (P0.11).
		Open	Disconnects the USB-to-serial bridge from UART0A_RX (P0.11).
JP8	TX0A EN	1-2*	Connects the USB-to-serial bridge to UART0A_TX (P0.10).
		Open	Disconnects the USB-to-serial bridge from UART0A_TX (P0.10).
JP9	RTS0A EN	1-2*	Connects the USB-to-serial bridge to UART0A_RTS (P0.19).
		Open	Disconnects the USB-to-serial bridge from UART0A_RTS (P0.19).
JP10	VCORE EN	1-2*	Connects 1V1 to VCORE.
		Open	Disconnects 1V1 from VCORE.
JP11	VDDIO/VDDA SEL (V_AUX)	2-1*	Connects 1V8 to V_AUX, VDDIO EN (JP12), and VDDA EN (JP13) jumpers.
		2-3	Connects 3V3 to V_AUX, VDDIO EN (JP12), and VDDA EN (JP13) jumpers.
JP12	VDDIO EN	1-2*	Connects the JP11 selected voltage to VDDIO.
		Open	Disconnects the voltage from VDDIO.

JP13	VDDA EN	1-2*	Connects the JP11 selected voltage to VDDA.
		Open	Disconnects the voltage from VDDA.
SW4	BOOTLOADER	2-1* (DIS)	Breaks the connection to P0.6.
		2-3 (EN)	Connects P0.6 to ground. See the Secure Communications Protocol Bootloader (SCPBL) section for additional information.

** Default shunt position*

Ordering Information

PART	TYPE
MAX32662EVKIT#	EV Kit

#Denotes RoHS-compliant.

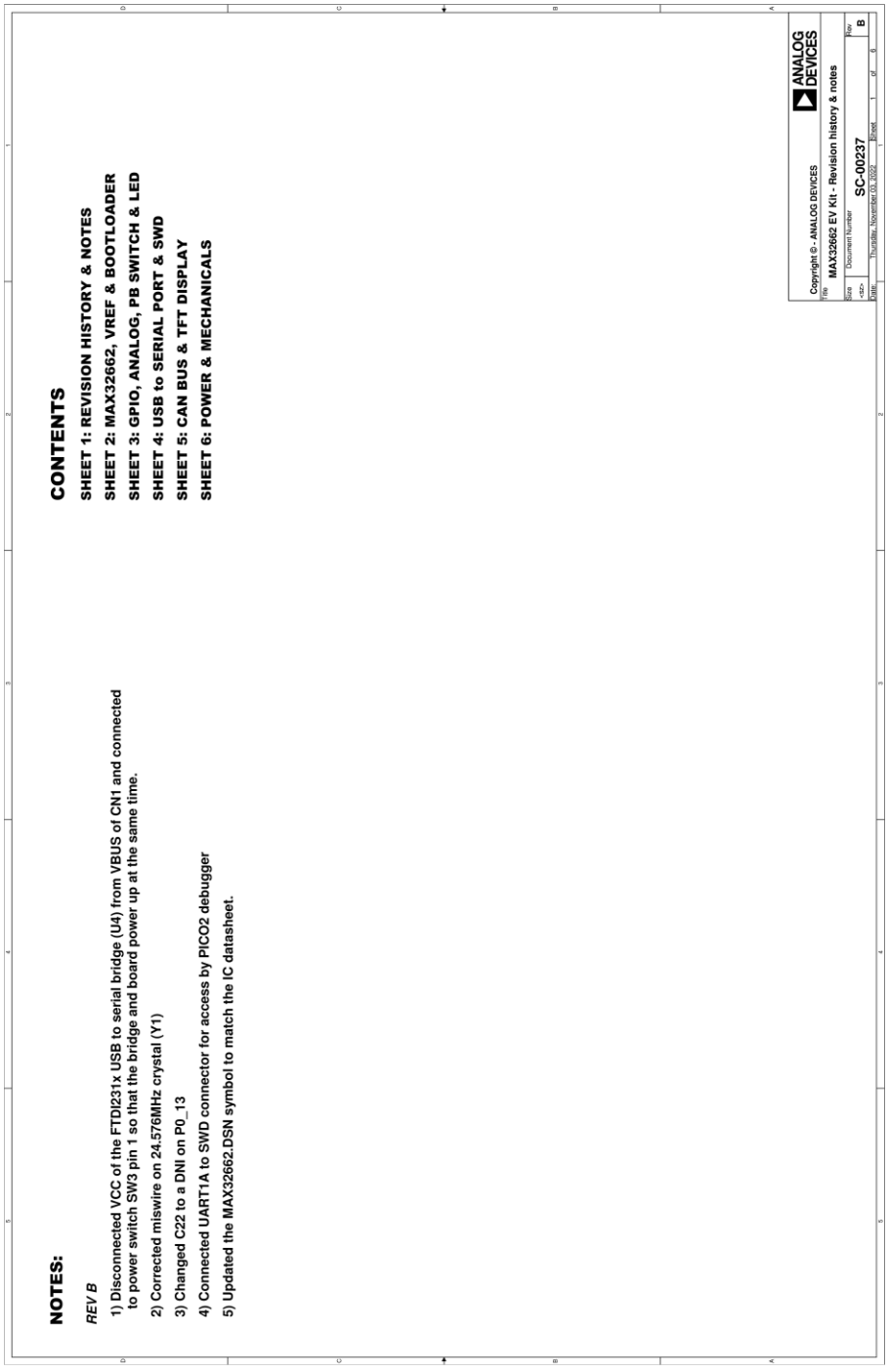
MAX32662 EV Kit Bill of Materials

QTY	PART REFERENCE	VALUE	DNI	BOM DESCRIPTION	MANUFACTURER PN	MANUFACTURER
4	C2 C3 C19 C20	100nF		CAP CER 0.1UF 16V 10% X7R 0402	GRM155R71C104KA88D	Murata Electronics
2	C4 C9	1uF		CAP CER 1uF 16V 10% X7R 0603	GCM188R71C105KA64D	Murata Electronics
1	C5	10uF		CAP CER 10UF 6.3V 20% X5R 0603	CL10A106MQ8NNNC	Samsung Electro-Mech
1	C6	10uF		CAP CER 10UF 6.3V 20% X5R 0402	GRJ155R60J106ME11D	Murata Electronics
3	C7 C33 C36	100nF		CAP CER 0.1UF 10V 10% X5R 0402	GRM155R61A104KA01D	Murata Electronics
4	C8 C16 C17 C18	1uF		CAP CER 1UF 16V 10% X5R 0402	GRT155R61C105KE01D	Murata Electronics
1	C10	10uF		CAP CER 10UF 10V 10% X7R 0805	CL21B106KPQNNNE	Samsung Electro-Mech
7	C11 C14 C15 C23 C27 C28 C29	DNI		DNI	—	—
2	C12 C13	12pF		CAP CER 12PF 50V 5% NP0 0402	CL05C120JB5NNNC	Samsung Electro-Mech
1	C21	2.2uF		CAP CER 2.2UF 25V 10% X5R 0402	ZRB157R61E225KE11D	Murata Electronics
1	C22	1uF	DNI	CAP CER 1UF 16V 10% X5R 0402	GRT155R61C105KE01D	Murata Electronics
1	C26	1uF		CAP CER 1UF 35V 10% X5R 0603	GMK107BJ105KA-T	Taiyo Yuden
2	C34 C35	47pF		CAP CER 47PF 50V 1% NP0 0402	C1005C0G1H470F050BA	TDK Corporation
1	C37	4.7uF		CAP CER 4.7uF 10V 10% X5R 0603	C0603C475K8PACTU	Kemet
1	C38	10nF		CAP CER 10000PF 25V 10% X7R 0603	CL10B103KA8NNNC	Samsung Electro-Mech
1	C39	100nF		CAP CER 0.1uF 16V 10% X7R 0603	C0603C104K4RACTU	Kemet
1	CN1	MICRO USB B R/A		CONN RCPT 5POS MICRO USB B R/A	47346-0001	Molex
1	D1	BLUE		LED 469NM BLUE DIFF 1206 SMD	HSMR-C150	Avago Technologies
4	D2 D3 D4 D5	GRN		LED 565NM WTR CLR GREEN 1206	SML-LX1206GC-TR	Lumex Opto
4	H1 H2 H3 H4	DNI		DNI MTG 125DRL 300PAD	—	—
1	J2	SMA		CONN SMA JACK STR 50 OHM PCB	901-10112	Amphenol RF
1	J3	10P CORTEX DEBUG		IDC BOX HEADER 0.050 10 POS SMD	3220-10-0300-00	CNC Tech
1	J4	503480-1000		CONN FFC FPC 10POS 0.50MM R/A	503480-1000	Molex, LLC
1	J6	SMA	DNI	CONN SMA JACK STR 50 OHM PCB	901-10112	Amphenol RF

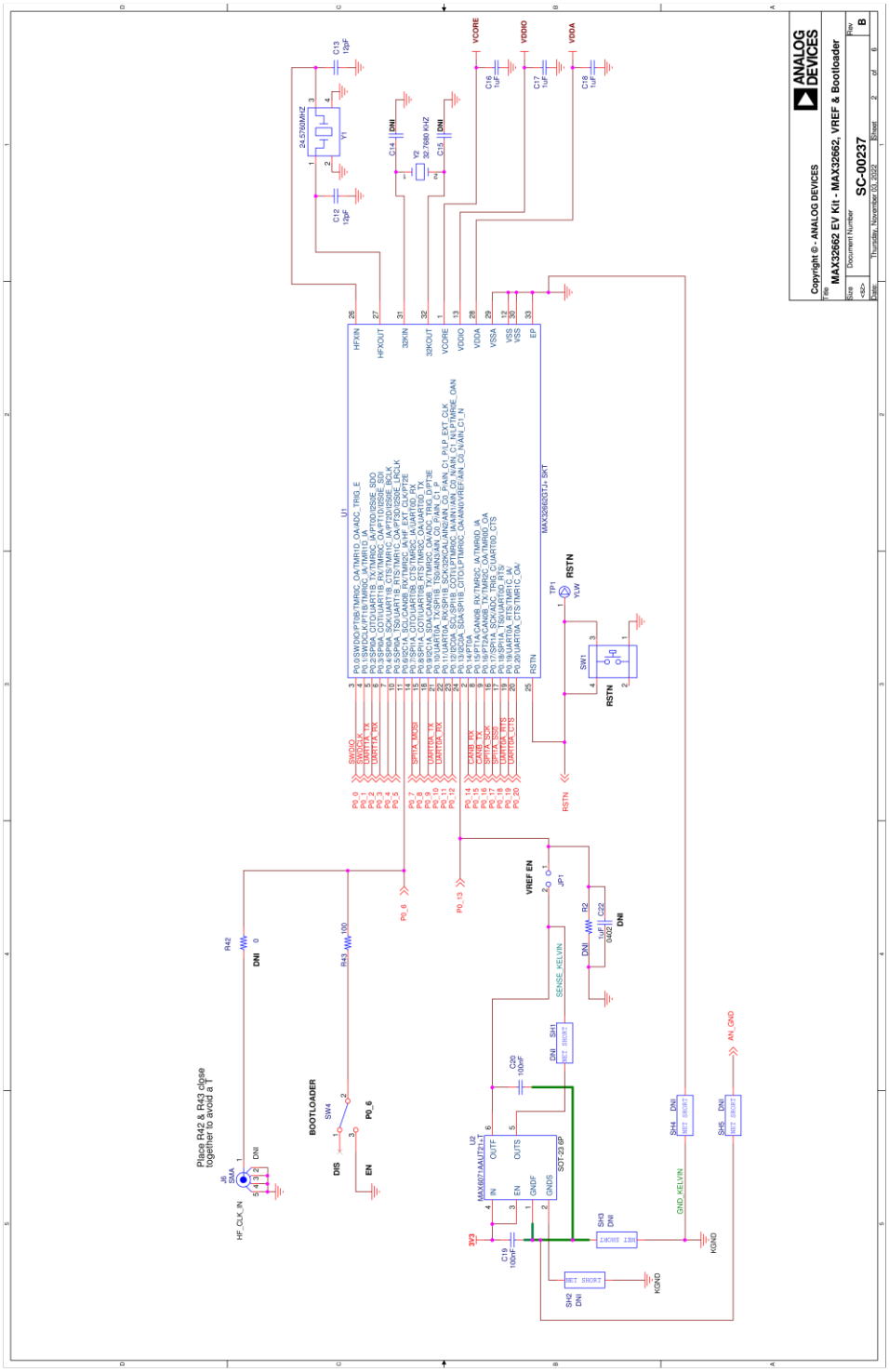
1	JH1	10P 1x10		CONN HEADER .100 SINGL STR 10POS	PEC10SAAN	Sullins
1	JH2	8P 2x4		CONN HEADER .100 DUAL STR 8POS	PEC04DAAN	Sullins
1	JH3	3P 3.5mm		TERM BLK 3POS SIDE ENT 3.5MM PCB	1984620	Phoenix Contact
1	JH4	12P 1x12		CONN HEADER .100 SINGL STR 12POS	PEC12SAAN	Sullins
11	JP1 JP2 JP4 JP5 JP6 JP7 JP8 JP9 JP10 JP12 JP13	JUMPER		CONN HEADER .100 SINGL STR 2POS	PEC02SAAN	Sullins
1	JP11	3P 3x1		CONN HEADER .100 SINGL STR 3POS	PEC03SAAN	Sullins
1	L2	HZ1206C202R-10		FERRITE CHIP SIGNAL 2000 OHM SMD	HZ1206C202R-10	Laird-Signal Integrity
1	L3	BLM21PG221SN1D		FERRITE CHIP 220 OHM 0805	BLM21PG221SN1D	Murata Electronics
1	PCB1	PCB		—	—	—
1	Q1	VP2110K1-G		MOSFET P-CH 100V 0.12A SOT23-3	VP2110K1-G	Microchip Technology
2	Q2 Q3	BSS806N		MOSFET N-CH 20V 2.3A SOT23	BSS806N H6327	Infineon Technologies
6	R1 R5 R17 R18 R20 R21	10K		RES SMD 10K OHM 1% 1/16W 0402	RC0402FR-0710KL	Yageo
1	R2	DNI		DNI 0402	—	—
2	R3 R30	2.21K		RES SMD 2.21K OHM 1% 1/10W 0402	ERJ-2RKF2211X	Panasonic Electronics
5	R4 R6 R7 R9 R28	0		RES 0.0 OHM 1/10W JUMP 0402 SMD	ERJ-2GE0R00X	Panasonic Electronics
1	R8	75	DNI	RES 75 OHM 1% 1/10W 0402 SMD	RK73H1ERTTP75R0F	KOA Speer Electronics
3	R10 R26 R39	49.9	DNI	RES SMD 49.9 OHM 1% 1/10W 0402	ERJ-2RKF49R9X	Panasonic Electronics
1	R11	1K		RES 1K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1001V	Panasonic Electronics
2	R13 R43	100		RES SMD 100 OHM 1% 1/10W 0603	RC0603FR-07100RL	Yageo
1	R14	150K		RES 150K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1503V	Panasonic Electronics
4	R15 R33 R35 R38	332		RES 332 OHM 1/10W 1% 0603 SMD	ERJ-3EKF3320V	Panasonic Electronics
6	R16 R31 R44 R45 R46 R47	0		RES SMD 0 OHM JUMPER 1/10W 0603	RC0603JR-070RL	Yageo
2	R19 R22	27		RES SMD 27 OHM 1% 1/10W 0402	ERJ-2RKF27R0X	Panasonic Electronics
1	R23	1M		RES SMD 1M OHM 5% 1/8W 0805	ERJ-6GEYJ105V	Panasonic Electronics
1	R27	10		RES 10 OHM 1/10W 1% 0603 SMD	ERJ-3EKF10R0V	Panasonic Electronics
1	R34	3.32K		RES 3.32K OHM 1/10W 1% 0603 SMD	ERJ-3EKF3321V	Panasonic Electronics
1	R36	18.7K		RES SMD 18.7K OHM 1% 1/10W 0402	ERJ-2RKF1872X	Panasonic Electronics

1	R37	49.9K		RES 49.9K OHM 1/10W 1% 0603 SMD	ERJ-3EKF4992V	Panasonic Electronics
1	R41	120		RES SMD 120 OHM 1% 1/10W 0402	ERJ-2RKF1200X	Panasonic Electronics
1	R42	0	DNI	RES SMD 0 OHM JUMPER 1/10W 0603	RC0603JR-070RL	Yageo
5	SH1 SH2 SH3 SH4 SH5	DNI		DNI 2 NET SHORT	—	—
1	SW1	B3S-1002 BY OMZ		SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1002 BY OMZ	Omron Electronics
1	SW2	B3S-1000P		SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1000P	Omron Electronics
1	SW3	SPDT 3A		SWITCH TOGGLE SPDT 3A 120V	ET01MD1AGE	C&K Components
1	SW4	CL-SB-12A-01T		SWITCH SLIDE SPDT 200MA 12V	CL-SB-12A-01T	Nidec Copal Electronics
1	TP1	YLW		TEST POINT PC MULTI PURPOSE YEL	5014	Keystone Electronics
2	TP2 TP7	BLUE		TEST POINT PC MULTI PURPOSE BLUE	5127	Keystone Electronics
1	TP3	1P		CONN HEADER .100 SINGL STR 1POS	PEC01SAAN	Sullins
2	TP4 TP8	BLK		TEST POINT PC MULTI PURPOSE BLK	5011	Keystone Electronics
1	U1	MAX32662GTJ+ SKT		MAX32662GTJ+ 32P QFN	MAX32662GTJ+	Analog Devices
1	U2	MAX6071AAUT21+T		IC VREF SERIES 0.04% SOT23-6	MAX6071AAUT21+T	Analog Devices
1	U3	CFAF128128B1-0145T		LCD TFT Full Color 1.45" 128x128	CFAF128128B1-0145T	Crystalfontz
1	U4	FT231XS-R		IC USB SERIAL FULL UART 20SSOP	FT231XS-R	FTDI
1	U5	MAX3207EAUT+T		ESD PROT DIFF SOT23-6	MAX3207EAUT+T	Analog Devices
1	U7	DS1233AZ-10+T&R		IC SUPERVISOR 1 CHANNEL SOT223-3	DS1233AZ-10+T&R	Analog Devices
1	U8	MAX1806EUA33+		IC REG LDO 3.3V/ADJ 0.5A 8UMAX	MAX1806EUA33+	Analog Devices
2	U9 U10	MAX1806EUA18+		Low Dropout Linear Regulator	MAX1806EUA18+	Analog Devices
1	U11	LTC2875HS8#PBF		IC TRANSCEIVER - CANbus 1/1 8SO	LTC2875HS8#PBF	Analog Devices
1	Y1	24.5760MHZ		CRYSTAL 24.5760MHZ 12PF SMD	ABM8AIG-24.576MHZ-12-2Z-T3	Abracon
1	Y2	32.7680 KHZ		CRYSTAL 32.7680KHZ 6PF SMD	ECS-.327-6-16R-TR	ECS

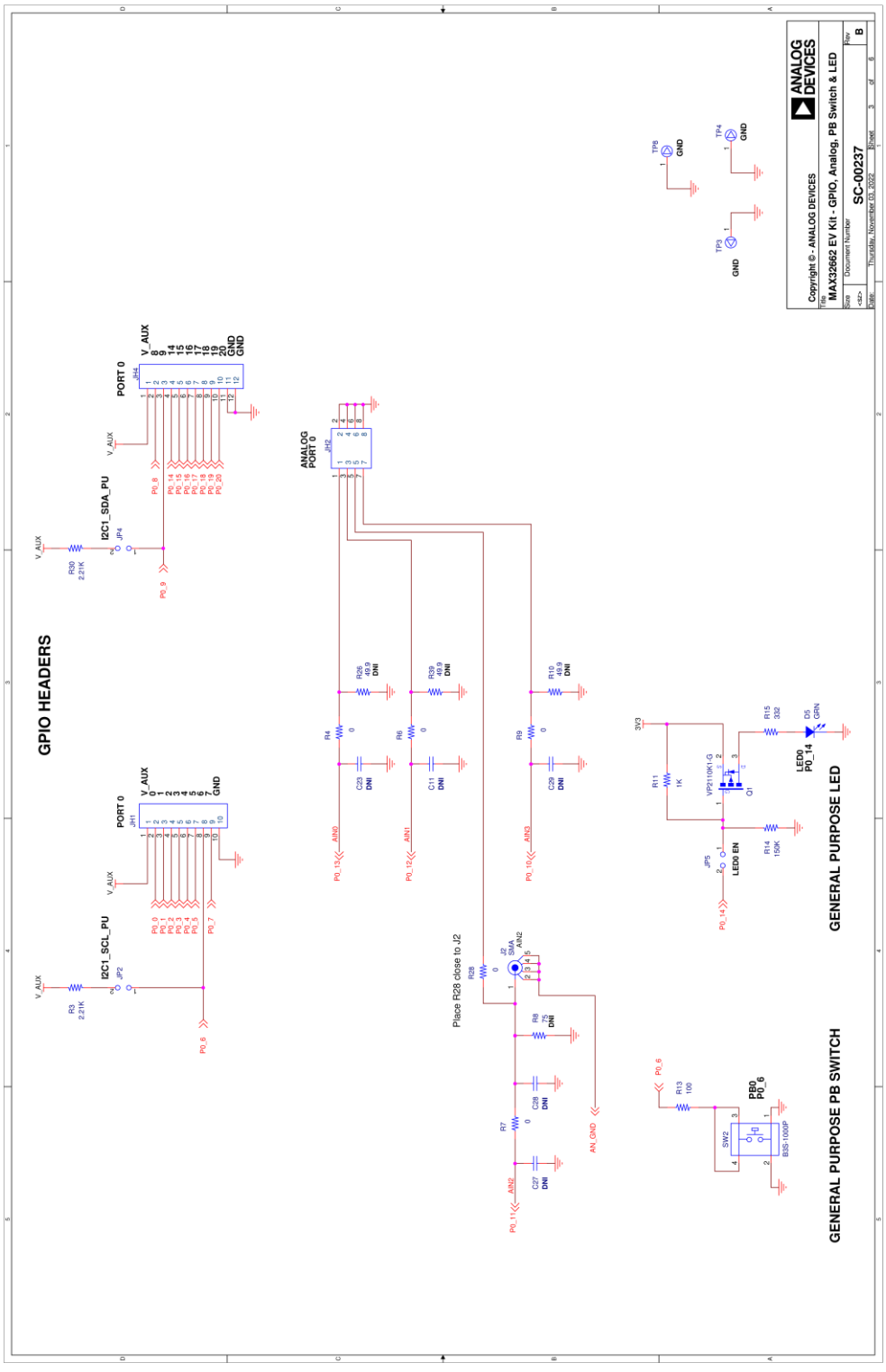
MAX32662 EV Kit Schematics



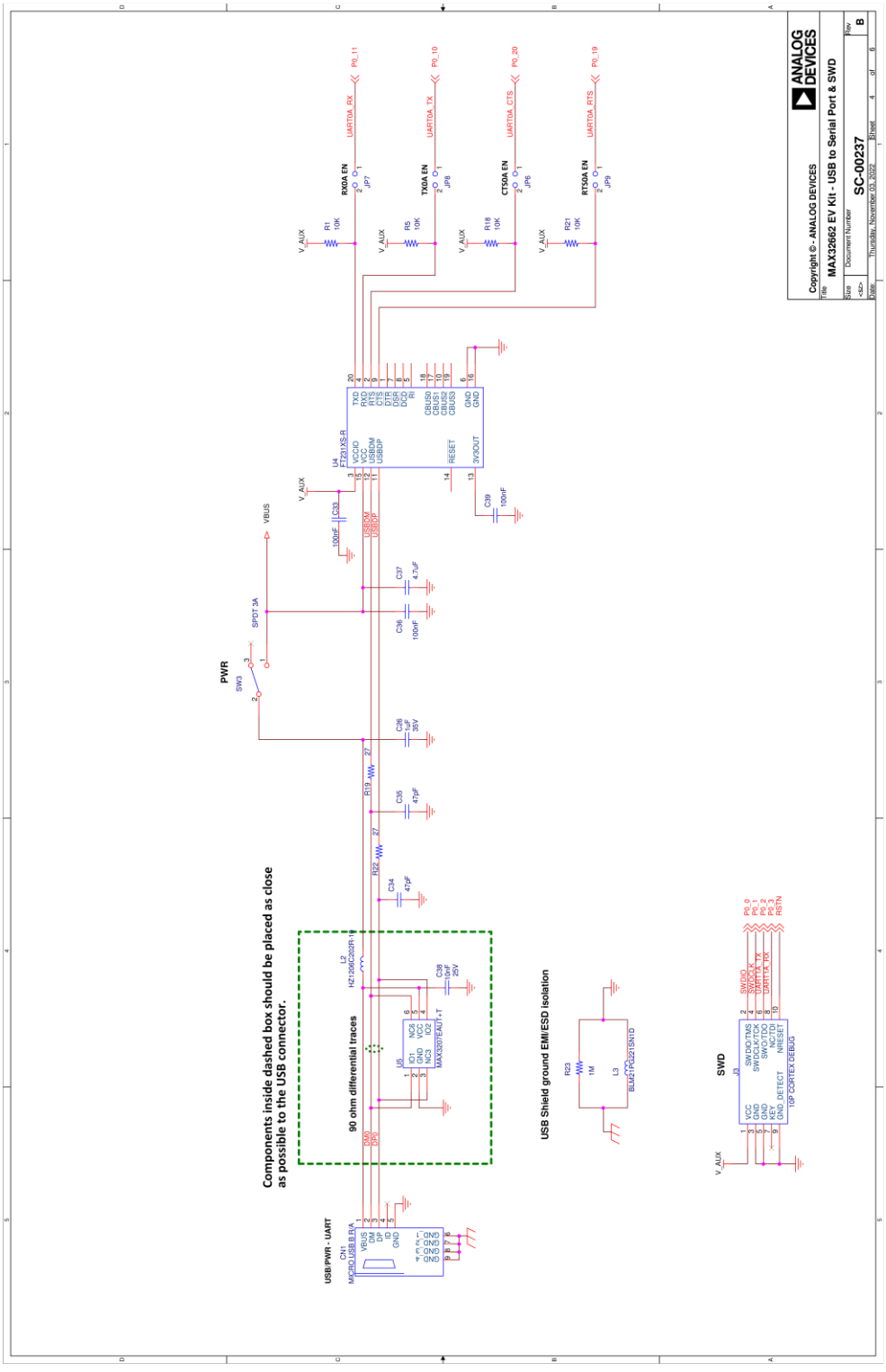
MAX32662 EV Kit Schematics (continued)



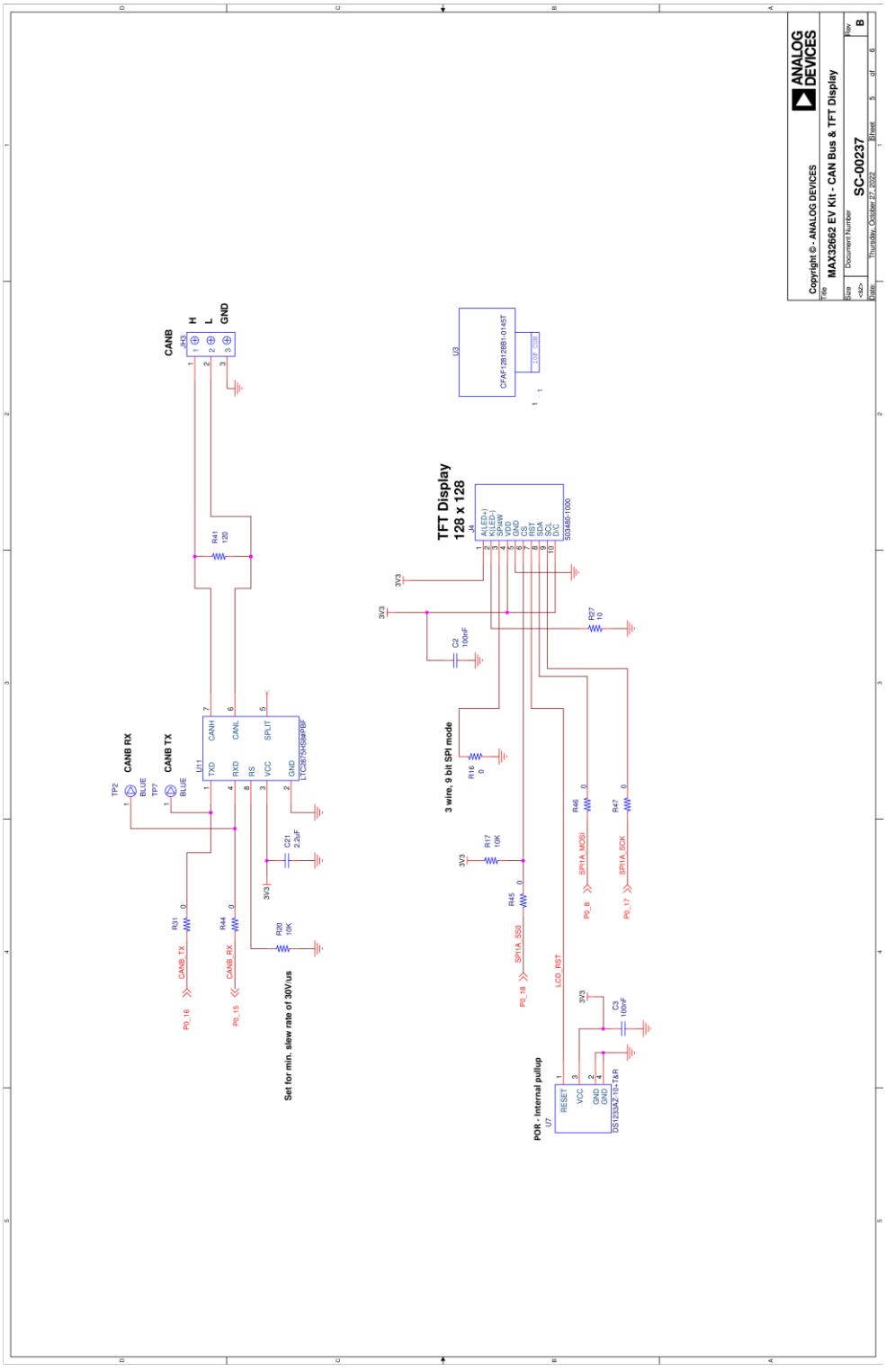
MAX32662 EV Kit Schematics (continued)



MAX32662 EV Kit Schematics (continued)



MAX32662 EV Kit Schematics (continued)



MAX32662 EV Kit Schematics (continued)