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Evaluates: MAX78002

MAX78002 Evaluation Kit

General Description

The MAX78002 evaluation kit (EV kit) provides a platform and tools for leveraging device capabilities to build new generations of artificial intelligence (AI) products.

The kit provides optimal versatility with a modular peripheral architecture, allowing a variety of input and output devices to be remotely located. DVP and CSI cameras, I²S audio peripherals, digital microphones, and analog sensors are supported, while a pair of industry-standard QWIIC connectors supports a large and growing array of aftermarket development boards. An onboard stereo audio codec offers line-level audio input and output, and tactile input is provided by a touch-enabled 2.4in TFT display. The MAX78002 energy consumption is tracked by a power accumulator, with four channels of formatted results presented on a secondary TFT display. All device GPIOs are accessible on 0.1in pin headers. A standard coaxial power jack serves as power input, using the included 5V, 3A wall-mount adapter. Two USB connectors provide serial access to the MAX78002, one directly and the other through a USB to UART bridge. A third USB connector allows access to the MAX78002 energy consumption data. Rounding out the features, a microSD connector provides the capability for inexpensive high-density portable data storage.

EV Kit Contents

- EV Kit Board with Directly Soldered MAX78002
- MAX32625PICO Debugger with Cables
- Olimex ARM-USB-OCD-H
- Olimex ARM-JTAG 20-10 Adapter
- 5V, 3A Wall-Mount Power Adapter
- SPH0645-Based I²S Digital Microphone
- DVP and CSI Camera Modules
- 2 USB Standard-A to USB Micro-B Cables
- 1 USB Standard-A to USB Standard-B Cable
- Extra Shunts

Benefits and Features

- Power Accumulator with Dedicated Display to Track Device Energy Consumption
- Connectorized I²S Digital Microphone
- Stereo Audio Codec with 3.5mm Line-in and Line-out Jacks
- USB 2.0 High Speed
- SWD JTAG 10-Pin Header
- RISC-V Coprocessor JTAG 10-Pin Header
- 8MB QSPI SRAM
- microSD Flash Memory Card Connector
- 100% of Device GPIOs Accessible through 0.1in Headers
- Eight ADC Inputs
- Touch-Enabled, 2.4in, 320 x 240 Color TFT Display
- UART Access over USB Bridge
- Dual Industry-Standard QWIIC Connectors
- All IC Power Rails May Be Isolated for Individual Current Measurements
- Two General-Purpose LEDs and Two General-Purpose Pushbutton Switches

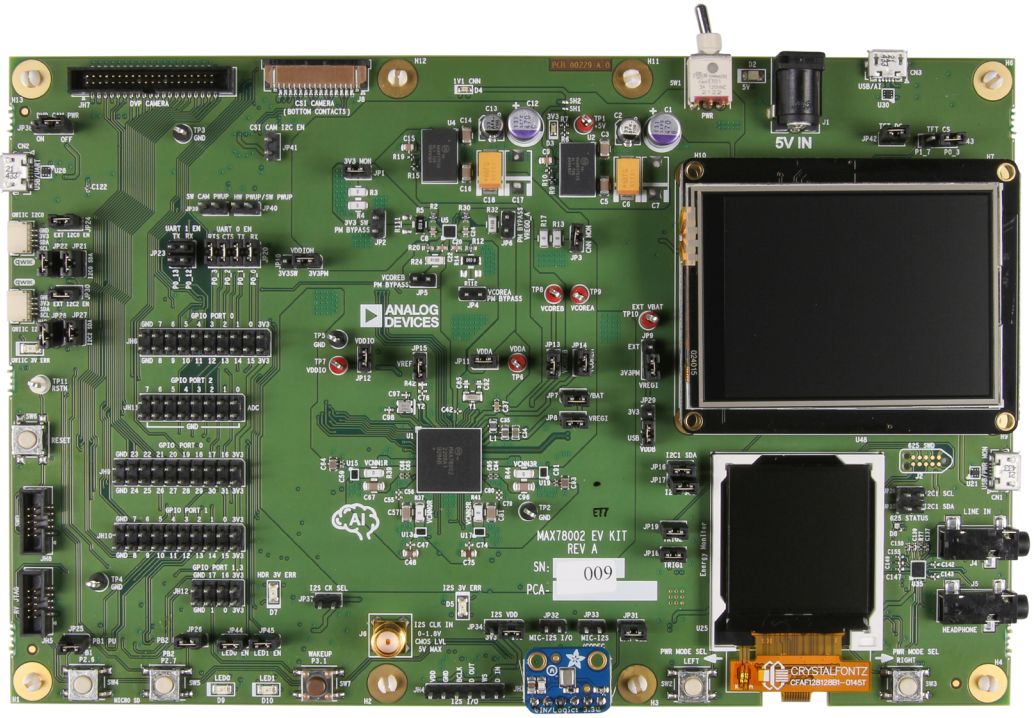
PRELIMINARY

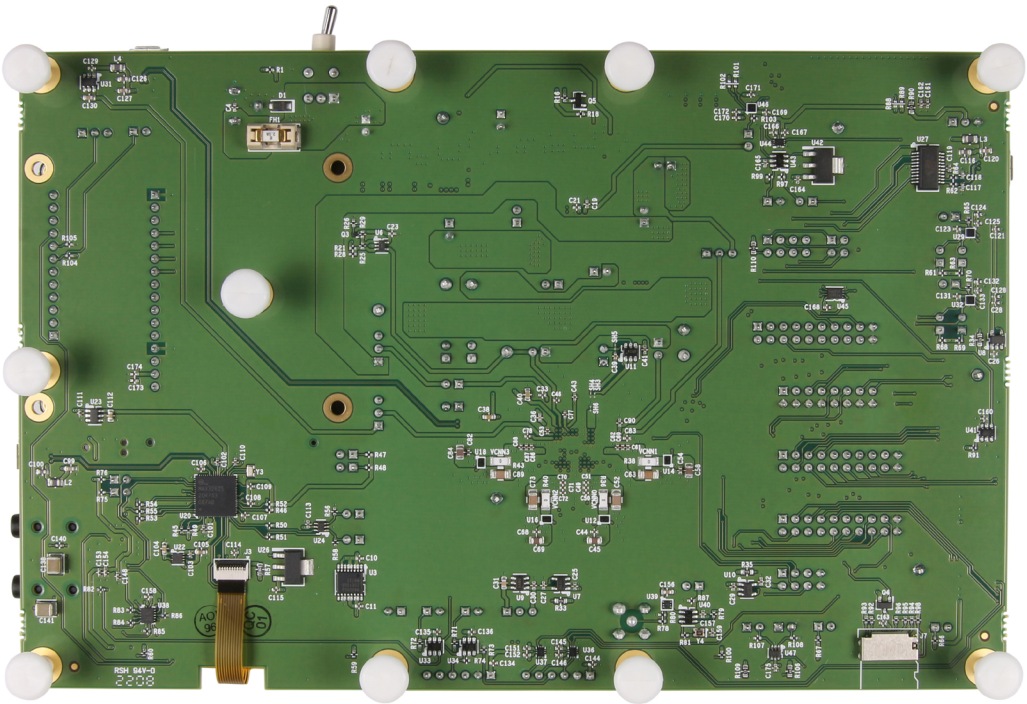
***Ordering Information* appears at end of data sheet.**

319-100919; Rev 0; 5/22

One Analog Way, Wilmington, MA 01887 U.S.A. | Tel: 781.329.4700 |

MAX78002 EV Kit Board Photos





PRELIMINARY

Quick Start

Required Equipment

- MAX78002 EV Kit
- One USB Standard-A to USB Micro-B Cable
- 5V, 3A Wall-Mount Power Adapter

Procedure

The MAX78002 EV kit is preprogrammed with a sample application to aid in verifying that the hardware is connected and functioning properly. Use the following steps to set up the board and run the sample application which displays messages on the primary TFT display and outputs messages on UART0 through USB Micro-B connector CN2:

1) While observing safe ESD practices, carefully remove the MAX78002 EV kit board out of its packaging. Inspect the board to ensure that no damage occurred during shipment. Jumpers/shunts are factory-installed to default locations prior to testing and packaging.
2) Verify that the UART0 EN jumpers are installed on JP20. These jumpers connect HW flow control, UART0 Rx, and UART0 Tx to the serial-to-USB bridge.
3) Connect a USB cable from the PC to the USB/UART connector (CN2) of the EV kit. This cable provides a virtual serial port connection to the MAX78002's UART0.
4) On your PC, open a serial terminal application (such as minicom or GTKTerm) and connect to the virtual serial port using a baud rate of 115200 and 8-N-1 settings.
5) Verify that the wall-mount power adapter is inserted into a valid AC power source and connect its coaxial plug to power jack 5V IN (J1).
6) Blue LED 5V (D2) will illuminate when power switch PWR (SW1) is in the ON position. After a brief delay, green LEDs 3V3 (D3) and 1V1 (D4) will also illuminate, verifying operation of the regulator modules and the presence of their respective voltage rails.
7) You will see a startup message from the MAX78002 appear in the terminal and on the primary TFT display. This verifies proper EV kit operation.

Detailed Description of Hardware

Power Management

The EV kit is powered by 5V sourced from coaxial power jack J1. A compatible wall-mount power adapter is included in the kit. Raw 5V is converted to 3.3V by the integrated regulator module U2, labeled "Peripheral and DUT Power." The regulated 3.3V is further divided between the peripherals and the MAX78002. The EV kit has provisions to monitor the total energy consumed by the MAX78002, as well as the energy consumed by specific internal functional blocks.

CNN Core Power Delivery

The MAX78002 contains an integrated single-inductor multiple-output (SIMO) switching power supply, offering high efficiency and multiple output voltages while requiring only a single inductor. It maintains excellent efficiency across all operating modes, but for peak performance the dynamic, pattern dependent load presented by the CNN core requires an external regulator optimized for higher power operation. Regulator module U4 meets this requirement, deriving a nominal 1.1V from the 3.3V net and supplementing the SIMO's output when peak CNN computing speed is required. Regulators U2 and U4 are cascaded, with U2 supplying 3.3V to both CNN core regulator U4 and SIMO input VREGI of the MAX78002. A shunt on this branch of the 3.3V line allows power accumulator U5 to accurately gauge total device energy consumption. As shown in the *MAX78002 EV Kit Schematic*, the default setting for jumper JP14 connects SIMO output VREGO_C and the output of U4 together through net VCOREA, placing the outputs of the two regulators in parallel. This simple connection works because the SIMO features reverse-current blocking on its outputs, and regulator U4 presents high impedance at its output when in shutdown. At system power-up, VREGO_C drives net VCOREA, and for extreme low-power applications, the SIMO alone can power core A. In higher power applications, such as this EV kit, U4 is typically programmed to output 1.1V, which is slightly more than the voltage setting of VREGO_C. As a result, once the MAX78002 startup sequence completes, regulator U4 is enabled and services the entire load on net VCOREA, ultimately powering both core A and the CNN core of the MAX78002.

External Peripheral Device Power Protection

The port headers, I²S headers, and QWIIC device connectors all incorporate power delivery pins. These pins are protected from accidental short circuits by the MAX4793 current limit switches. Trip current is nominally 300mA (500mA, max). When a fault occurs on a power delivery circuit, a corresponding error LED illuminates and power delivery to the faulting peripheral is halted. Should this occur, the user must find and correct the fault, then cycle board power to resume normal peripheral operation. Note that the I²S header supports both 1.8V and 3.3V peripherals, selectable by J34. I²S 1.8V power is derived from 3.3V I²S power, so a fault against a 1.8V peripheral illuminates the "I2S 3V ERR" LED. The recovery procedure is the same whether the I²S interface is set to run at 1.8V or 3.3V—locate the fault, correct it, and cycle board power to resume normal operation.

CNN Power Delivery Partitioning

To enhance MAX78002 efficiency, CNN core power delivery is partitioned into quadrants, with separate power pins at each quadrant for CNN core and RAM. The MAX78002 controls power delivery to core and RAM at each quadrant using a bank of eight load switches, each with its own enable control. Individual enable controls allow idle CNN quadrants to be powered off when not needed, while the option to leave RAM powered on preserves the state in idled CNN quadrants.

Power Accumulator

The specialized IC U5 provides cumulative energy consumption data on four power domains of the MAX78002. It functions by monitoring voltage at each of its 4 channels and calculating load currents by measuring voltage drops for each channel across appropriately sized shunts. Raw data is formatted by the power monitor processor U20, which drives the energy monitor TFT display. Operating mode options are selected with the LEFT and RIGHT PWR MODE SEL pushbuttons, which allow the operator to cycle through the presentation options.

Power Accumulator Channel Assignments

Channel 1 tracks total MAX78002 energy by monitoring the 3V3_PM net. This net drives the MAX78002 SIMO input VREGI and CNN core voltage regulator U4. Other 3V3 loads are connected prior to the channel 1 shunt, excluding them from MAX78002 energy measurements. Jumper JP2 serves as a test point to verify voltage drop across the channel 1 shunts (R5 and R111).

Channel 2 tracks energy on net VCOREB_PM, which drives the MAX78002 VCOREB. Its shunt is R24, with JP5 serving as a voltage drop test point.

Channel 3 tracks energy on net VCOREA_PM, which drives the CNN core. Its shunt is comprised of R14 and R112, with JP4 serving as a voltage drop test point. Note that SIMO tap VREGO_C is connected to the output of CNN core regulator U4 through jumper JP14. In practice, U4 is set to a slightly higher voltage than VREGO_C, allowing U4 to carry the load once the board power has stabilized. Jumper JP3 serves as a test point for verifying U4 current by replacing 0Ω jumpers R13 and R17 with an appropriately valued shunt. Conversely, VREGO_C current may be checked by removing jumper JP14 and connecting an appropriate current meter.

Channel 4 tracks energy on net VREGO_A_PM, which drives the MAX78002 VDDA and VDDIO through jumpers JP11 and JP12, respectively. Individual currents may be checked at these jumpers, while total current may be verified at jumper JP6, which is in parallel with shunt R32.

UART-to-USB Bridge

The EV kit provides a USB-to-serial bridge to the MAX78002 UART0 and UART1. UARTs are accessed through USB Micro-B connector CN2. Jumpers JP20 and JP23 select UART0 or UART1, respectively.

USB2 High Speed Interface

The MAX78002 USB High-Speed device interface is available at USB Micro-B connector CN3.

I²S

Header JH3 is provided for an included digital microphone. Other I²S peripherals may be connected by way of the I²S I/O header JH4. Opening JP32 selects the I²S mic input, and installing the shunt selects alternate I²S devices. JP31 selects which channel that microphone data appears upon; however, the operator should be aware that some I²S microphone modules pull the select line low. For those modules, JP31.1 may be wired to I²S_VDD to select the alternate channel. I²S clocking options include an onboard, low jitter, 12.288 MHz clock oscillator and provisions for external I²S clocking using SMA connector J6. The clock input expects a 1.8V CMOS level, but is 5V tolerant. JP37 is the clock-select jumper—remove the shunt for the internal oscillator, and install the shunt for external clocking.

Color TFT Display

The display provided is a 2.4in, 320 x 240 color TFT. It has three-wire serial control and a white LED backlight, and it uses a resistive touch-sensitive screen.

RV JTAG/Arm® SWD (Serial Wire Debug) Support

The RISC-V coprocessor JTAG is accessed through an Arm Cortex® standard 10-pin connector (JH5). Logic levels are set to VDDIO (1.8V). The Arm Cortex processor using SWD is accessed through an Arm Cortex standard 10-pin connector (JH8), also using VDDIO (1.8V) levels.

Reset Pushbutton

Pushbutton SW6 manually resets the MAX78002.

Auxiliary LEDs

The indicator LED0 (D9) is connected to GPIO P2.4. Indicator LED1 (D10) is connected to GPIO P2.5. These GPIOs must be configured for VDDIOH (3.3V) for proper operation. Buffer U2 prevents loading the ports, since these ports also may serve multiple functions. JP44 and JP45 serve to totally isolate the LED buffer from the ports.

Analog Inputs

A total of eight analog inputs are provided at JH11. Note that only the first two inputs do not have secondary functions tied to them in the EV kit. Secondary functions may be isolated by jumpers; see the *MAX78002 EV Kit Schematic* for details.

GPIO Pushbuttons

Pushbuttons PB1 and PB2 connect to P2.6 and P2.7, respectively. Depressing the button pulls the associated port low.

GPIO Headers

All GPIOs are accessible through 0.1in-spaced header pins. The IC provides support for both 1.8V and 3.3V peripherals through power rails VDDIO and VDDIOH. GPIO voltages can be programmed on a pin-by-pin basis. Refer to the MAX78002 User Guide for more detail.

Wakeup Input

The MAX78002 offers multiple low- and micro-power operating modes. WAKEUP pushbutton SW4 provides a signal to bring the IC back into normal operating mode.

QWIIC Connectors

Two industry-standard QWIIC compatible connectors, JH1 and JH2, support a large and growing array of after-market I2C development boards. See the *MAX78002 EV Kit Schematic* for details; in particular, I2C termination options are shown on individual schematic pages.

DVP Parallel Camera Module

The MAX78002 supports parallel camera interface devices. The included camera module plugs into the EV kit board and uses an OVM7692 integrated camera/lens device.

CSI Serial Camera Module

The MAX78002 supports serial camera interface devices. The included camera module plugs into the EV kit board and uses an OV5640 integrated camera/lens device.

8MB QSPI PSRAM

QSPI0 has 8MB of user PSRAM.

microSD Connector

A microSD connector provides inexpensive, high-density portable data storage.

PRELIMINARY

Table 1. MAX78002 EV Kit Jumper Settings

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP1	3V3 MON	1-2*	Normal operation in conjunction with JP3 jumpered 1-2
		Open	Test access point for current measurement
JP2	3V3 SW PM BYPASS	1-2	Power monitor shunts for main 3.3 V system power are bypassed
		Open*	Main 3.3V input routes through shunts for power accumulator measurements
JP3	CNN MON	1-2*	Normal operation in conjunction with JP6 jumpered 1-2
		Open	Test access point for current measurement of U4's share of VCOREA and CNN loads
JP4	VCOREA PM BYPASS	1-2	Power monitor shunts for U4's share of VCOREA + CNN loads are bypassed
		Open*	VCOREA + CNN loads route through shunts for power accumulator
JP5	VCOREB PM BYPASS	1-2	Power monitor shunts for VCOREB are bypassed
		Open*	VCOREB power routes through shunts for power accumulator
JP6	VREGO_A PM BYPASS	1-2	Power monitor shunts for VREGO_A are bypassed
		Open*	VREGO_A power routes through shunts for power accumulator
JP7	VBAT	1-2*	Enables 3V3 VBAT power
		Open	Disables 3V3 VBAT power
JP8	VREGI	1-2*	Enables 3V3 VREGI power
		Open	Disables 3V3 VREGI power
JP9	VREGI/VBAT (SELECT)	1-2*	Onboard 3V3_PM supplies VREGI/VBAT
		2-3	External source at TP10 supplies VREGI/VBAT
JP10	VDDIOH (SELECT)	1-2*	Onboard 3V3_PM supplies VDDIOH
		2-3	Onboard 3V3_SW supplies VDDIOH
JP11	VDDA (SELECT)	1-2*	VREGO_A_PM powers VDDA
		Open	VDDA may be powered using TP6
JP12	VDDIO (SELECT)	1-2*	VREGO_A_PM powers VDDIO
		Open	VDDIO may be powered using TP7
JP13	VCOREB (SELECT)	1-2*	VREGO_B powers VCOREB
		Open	VCOREB may be powered using TP8
JP14	VCOREA (SELECT)	1-2*	VREGO_C ties to net VCOREA
		Open	Net VCOREA may be powered using TP9; JP17 may also be used as a current test point
JP15	VREF	1-2*	DUT ADC VREF is supplied by precision external reference
		Open	External ADC VREF disabled; ref voltage may be injected at JP18.1
JP16	I2C1 SDA	1-2*	I2C1 DATA pullup
		Open	Close this jumper as needed to assure proper termination
JP17	I2C1 SCL	1-2*	I2C1 CLOCK pullup
		Open	Close this jumper as needed to assure proper termination

Table 1. MAX78002 EV Kit Jumper Settings (continued)

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP18	TRIG1	1-2*	PWR accumulator trigger signal 1 ties to port 1.6
		Open	TRIG1 is disabled, so DVP camera PCIF_D10 may be used instead
JP19	TRIG2	1-2*	PWR accumulator trigger signal 2 ties to port 1.7
		Open	TRIG2 is disabled, so DVP camera PCIF_D11 may be used instead
JP20	UART0 EN	Closed*	USB-UART bridge connected to DUT UART0 (RTS and CTS are supported)
		Open	USB-UART bridge disconnected from DUT UART0
JP21	I2C0 SDA	1-2*	I2C0 DATA pull-up
		Open	Close this jumper as needed to assure proper termination
JP22	I2C0 SCL	1-2*	I2C0 CLOCK pull-up
		Open	Close this jumper as needed to assure proper termination
JP23	UART1 EN	Closed	USB-UART bridge connected to DUT UART1 (no HW flow control)
		Open*	USB-UART bridge disconnected from DUT UART1
JP24	EXT I2C0 EN	1-2*	QWIIC interface for I2C0 enabled by default
		Open	Open this jumper to place the QWIIC level translator into a high-Z state
JP25	PB1 PU	1-2*	100kΩ pull-up enabled for pushbutton mode, port 2.6
		Open	Pull-up disabled, allowing port pin to be repurposed (this port shared with AIN6)
JP26	PB2 PU	1-2*	100kΩ pull-up enabled for pushbutton mode, port 2.7
		Open	Pull-up disabled, allowing port pin to be repurposed (this port shared with AIN7)
JP27	I2C2 SDA	1-2*	I2C2 DATA pull-up
		Open	Close this jumper as needed to assure proper termination
JP28	I2C2 SCL	1-2*	I2C2 CLOCK pull-up
		Open	Close this jumper as needed to assure proper termination
JP29	VDDB (SELECT)	1-2*	DUT USB XCVR VDDB powered from VBUS regulated with dedicated 3.3V LDO
		2-3	USB XCVR VDDB powered full time by system 3V3_PM
JP30	EXT I2C2 EN	1-2*	QWIIC interface for I2C2 enabled by default
		Open	Open this jumper to place the QWIIC level translator into a high-Z state
JP31	L/R SEL	1-2*	MIC ON R CH, I^2S microphone data stream
		Open	MIC ON L CH, I^2S microphone data stream
JP32	MIC-I2S I/O	1-2	External I^2S data from I^2S I/O header connected to I^2S SDI
		Open*	External MIC data from I^2S MIC header connected to I^2S SDI
JP33	MIC-I2S/CODEC	1-2	Onboard CODEC data connects to I^2S SDI
		Open*	External I^2S data (mic or slave I^2S) from header connects to I^2S SDI
JP34	I2S VDD (SELECT)	1-2*	External MIC and DATA I^2S interface headers run at 1.8V
		2-3	External MIC and DATA I^2S interface headers run at 3.3V

Table 1. MAX78002 EV Kit Jumper Settings (continued)

JUMPER	SIGNAL	SETTINGS	DESCRIPTION
JP35	I2C1 SDA	1-2	I2C1 DATA pull-up
		Open*	Close this jumper as needed to assure proper termination
JP36	I2C1 SCL	1-2	I2C1 CLOCK pull-up
		Open*	Close this jumper as needed to assure proper termination
JP37	I2S CK SEL	1-2	I^2S master clock sourced from SMA connector J6
		Open*	I^2S master clock sourced from onboard crystal oscillator
JP38	DVP CAM PWR (SELECT)	1-2*	Sets state of DVP camera PWDN input; default is OFF for OVM7692
		2-3	Sets state of DVP camera PWDN input; 2-3 will power up OVM7692
JP39	SW CAM PWUP	1-2	Camera reset and power up under port pin control
		Open*	Digilent P5C camera powered down, JP39 can over ride this condition
JP40	HW PWUP/SW PWUP	1-2	Camera will reset and power up as soon as 3.3V reaches a valid level
		Open*	Camera reset and power up under port pin control if JP39 is installed; else, camera off
JP41	CSI CAM I2C EN	1-2	CSI camera Digilent P5C I^2C connects to I2C1 for register setup
		Open*	Level translator and I^2C PU are in high-Z state; I2C1 disconnected from P5C registers
JP42	TFT_DC	1-2*	TFT data/command select connects to port 2.2
		Open	Pull jumper if using AIN2
JP43	TFT CS (SELECT)	1-2*	TFT CS driven by port 0.3, shared with UART0 RTS
		2-3	TFT CS driven by port 1.7, shared with DVP DATA 11 and TRIG2
JP44	LED0 EN	1-2*	LED0 illuminates when port 2.4 is high
		Open	Pull jumper if using AIN4
JP45	LED1 EN	1-2*	LED1 illuminates when port 2.5 is high
		Open	Pull jumper if using AIN5

**Indicates default jumper setting*

Ordering Information

PART	TYPE
MAX78002EVKIT#	EV Kit

#Denotes RoHS compliant.

MAX78002 EV Kit Bill of Materials

QUANTITY	PART REFERENCE	VALUE	BOM_DESCRIPTION	MANUFACTURER_PN	MANUFACTURER	ASSY_VARIANT
2	C1,C12	470uF	CAP ALUM POLY 470UF 20% 6.3V T/H	6SEPC470MW+TSS	Panasonic Electronic Components	
2	C2,C13	33uF	CAP ALUM 33UF 20% 10V SMD	EEE-FPA330UAR	Panasonic Electronic Components	
12	C3,C5,C14,C16,C52,C57, C63,C67,C73,C81,C89,C96	22uF	CAP CER 22UF 10V X7R 10% 1206	LMK316AB7226KL-TR	Taiyo Yuden	
72	C4,C10,C11,C30,C33,C42,C43,C44,C46,C47,C49,C50,C51, C53,C54,C55,C56,C59,C60, C61,C62,C65,C66,C68,C70, C71,C72,C74,C76,C77,C78, C79,C80,C82,C83,C86,C87, C88,C90,C91,C94,C95,C101, C102,C106,C107,C108,C109, C110,C111,C121,C124,C128, C129,C132,C137,C139,C140, C142,C143,C147,C148,C150, C153,C154,C155,C161,C162, C163,C170,C171,C173	1uF	CAP CER 1UF 16V 10% X5R 0402	GRT155R61C105KE01D	Murata Electronics North America	
2	C6,C18	680uF	CAP TANT POLY 680UF 2.5V 20% 2917	ETCF680M6L	Panasonic Electronic Components	
2	C7,C17	680uF	CAP TANT POLY 680UF 2.5V 20% 2917	ETCF680M6L	Panasonic Electronic Components	DNI
9	C8,C20,C22,C24,C31,C104, C105,C112,C130	4.7uF	CAP CER 4.7uF 10V 10% X5R 0603	C0603C475K8PACTU	Kemet	
2	C9,C15	1uF	CAP CER 1UF 16V 10% X8R 0805	CGA4J3X8R1C105K125AB	TDK Corporation	
41	C19,C21,C23,C25,C26,C27, C28,C29,C32,C39,C41,C113, C114,C115,C119,C122,C123, C125,C131,C133,C134,C135, C136,C144,C145,C146,C151, C152,C157,C158,C159,C160, C164,C165,C166,C167,C168, C169,C172,C174,C175	100nF	CAP CER 0.1UF 16V 10% X7R 0402	GRM155R71C104KA88D	Murata Electronics	
2	C34,C35	47uF	CAP CER 47UF 6.3V 20% X5R 0805	C2012X5R0J476M125AC	TDK Corporation	
1	C36	3.3nF	CAP CER 3300PF 16V 10% X7R 0402	GRM15XR71C332KA86D	Murata Electronics North America	
3	C37,C38,C40	22uF	CAP CER 22UF 6.3V 20% X5R 0603	C1608X5R0J226M080AC	TDK Corporation	
8	C45,C48,C58,C64,C69,C75, C84,C93	10uF	CAP CER 10UF 25V 10% X7S 0805	GRM21BC71E106KE11L	Murata Electronics	
2	C85,C92	DNI	DNI			DNI
2	C97,C98	10pF	CAP CER 10PF 50V 5% NP0 0402	C0402C100J5GACTU	Kemet	
4	C99,C120,C127,C156	100nF	CAP CER 0.1UF 50V 10% X7R 0603	C0603C104K5RACTU	Kemet	
3	C100,C116,C126	1uF	CAP CER 1UF 35V 10% X5R 0603	GMK107BJ105KA-T	Taiyo Yuden	
1	C103	10nF	CAP CER 10000PF 16V 10% X7R 0402	GRM155R71C103KA01D	Murata Electronics North America	
2	C117,C118	47pF	CAP CER 47PF 50V 1% NP0 0402	C1005C0G1H470F050BA	TDK Corporation	
2	C138,C141	220uF	CAP CER 220UF 4V 20% X5R 1210	AMK325ABJ227MM-T	Taiyo Yuden	
1	C149	2.2uF	CAP CER 2.2UF 25V 10% X5R 0402	ZRB157R61E225KE11D	Murata Electronics North America	
3	CN1,CN2,CN3	MICRO USB B R/A	CONN RCPT 5POS MICRO USB B R/A	47346-0001	Molex	
1	D1	SMF5.0A-TP	TVS 200W 5V UNIDIR SOD-123FL	SMF5.0A-TP	Micro Commercial Co	
1	D2	BLUE	LED 469NM BLUE DIFF 1206 SMD	HSMR-C150	Avago Technologies US Inc.	
2	D3,D4	GRN	LED SMARTLED GREEN 570NM 0603	LG L29K-G2J1-24-Z	OSRAM Opto Semiconductors Inc	
4	D5,D6,D7,D10	RED	LED 660NM RED WTR CLR 1206 SMD	SML-LX1206SRC-TR	Lumex Opto	
1	D8	SML-LX0404SIUPGUSB	LED RGB CLEAR 0404 SMD	SML-LX0404SIUPGUSB	Lumex Opto/Components Inc.	
1	D9	GRN	LED 565NM WTR CLR GREEN 1206 SMD	SML-LX1206GC-TR	Lumex Opto	
1	F1	2.5A	FUSE BRD MNT 2.5A 125VAC/VDC SMD	045102.5MRL	Littelfuse Inc	
1	FH1	01550900M	FUSE BLOK SMD	01550900M	Littelfuse Inc	
10	H1,H2,H3,H4,H5,H6,H11, H12,H13,H14	DNI	DNI MTG 125DRL 300PAD			
4	H7,H8,H9,H10	DNI	DNI MTG 110DRL 225PAD			
1	J1	PJ-102B	CONN POWER JACK 2.5MM PCB CIRC	PJ-102B	CUI Inc	
1	J2	MAXDAP	MAXDAP_POGO_PIN CBL PLUG-OF-NAILS 10-PIN	TC2050-IDC-NL	Tag-Connect LLC	DNI
1	J3	503480-1000	CONN FFC FPC 10POS 0.50MM R/A	503480-1000	Molex, LLC	
2	J4,J5	SJ-3523-SMT-TR	CONN JACK STEREO 3.5MM SMD R/A	SJ-3523-SMT-TR	CUI Inc	
1	J6	SMA	CONN SMA JACK STR 50 OHM PCB	901-10112	Amphenol RF	
1	J7	047571-0001	CONN MICRO SD CARD PUSH-PULL R/A	047571-0001	Molex	
1	J8	SFW15R-1STE1LF (15P)	CONN FFC BOTTOM 15POS 1.00MM R/A	SFW15R-1STE1LF	Amphenol ICC (FCI)	

PRELIMINARY

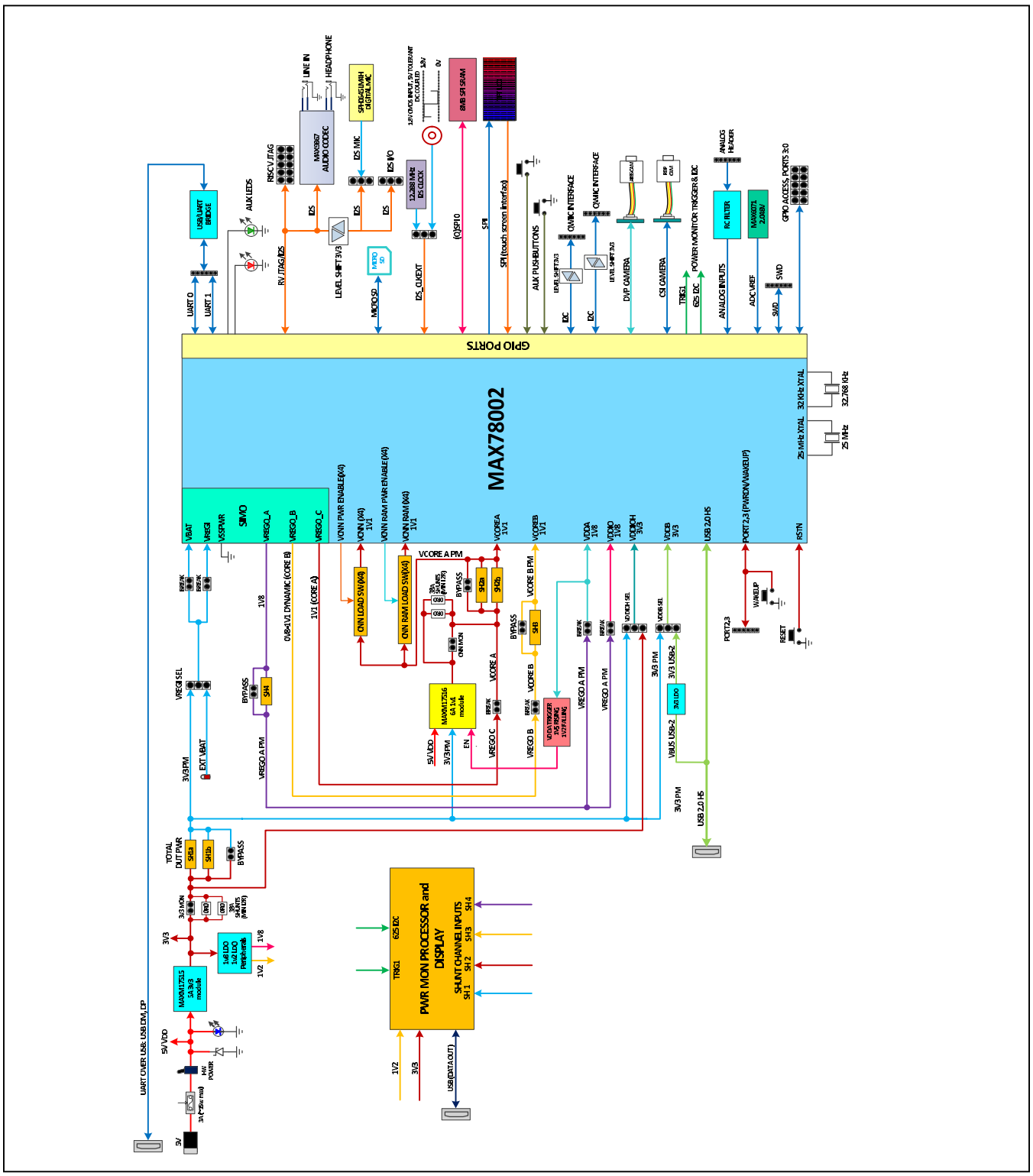
MAX78002 EV Kit Bill of Materials (continued)

QUANTITY	PART REFERENCE	VALUE	BOM_DESCRIPTION	MANUFACTURER_PN	MANUFACTURER	ASSY_VARIANT
2	JH1,JH2	SM04B-SRSS-TB(LF)(SN)	CONN HEADER SMD R/A 4POS 1MM	SM04B-SRSS-TB(LF)(SN)	JST Sales America Inc.	
2	JH3,JH4	6P 1x6	CONN HEADER .100 SINGL STR 6POS	PEC06SAAN	Sullins	
2	JH5,JH8	10P CORTEX DEBUG	IDC BOX HEADER 0.050 10 POS SMD	3220-10-0300-00	CNC Tech	
3	JH6,JH9,JH10	20P 2x10	CONN HEADER .100 DUAL STR 20POS	PEC10DAAN	Sullins	
1	JH7	40P 2x20 (1.27 PITCH)	CONN HEADER SMD 40POS 1.27MM	3220-40-0300-00-TR	CNC Tech	
1	JH11	16P 2x8	CONN HEADER .100 DUAL STR 16POS	PEC08DAAN	Sullins	
2	JH12,JP20	8P 2x4	CONN HEADER .100 DUAL STR 8POS	PEC04DAAN	Sullins	
1	JH13	16P 1x16	CONN HEADER .100 SINGL STR 16POS	PEC16SAAN	Sullins	
1	JH14	12P 1x12	CONN HEADER .100 SINGL STR 12POS	PEC12SAAN	Sullins	
37	JP1,JP2,JP3,JP4,JP5,JP6, JP7,JP8,JP11,JP12,JP13, JP14,JP15,JP16,JP17,JP18, JP19,JP21,JP22,JP24,JP25, JP26,JP27,JP28,JP30,JP31, JP32,JP33,JP35, JP36,JP37, JP39,JP40,JP41,JP42, JP44,JP45	JUMPER	CONN HEADER .100 SINGL STR 2POS (2x1)	PEC02SAAN	Sullins	
6	JP9,JP10,JP29,JP34, JP38,JP43	3P JUMPER	CONN HEADER .100 SINGL STR 3POS	PEC03SAAN	Sullins	
1	JP23	4P 2x2	CONN HEADER .100 DUAL STR 4POS	PEC02DAAN	Sullins	
1	L1	2.2uH	FIXED IND 2.2UH 1A 150 MOHM SMD 0805	MLP2012H2R2MT0S1	TDK Corporation	
3	L2,L3,L4	742792097	FERRITE BEAD 1.5 KOHM 0805 1LN	742792097	Wurth Elektronik	
1	PCB1	PCB				
1	Q3	DMP210DUFB4-7	MOSFET P-CH 20V 0.2A X2-DFN1006	DMP210DUFB4-7	Diodes Incorporated	
1	Q4	SI2301CDS-T1-BE3	MOSFET P-CHANNEL 20-V (D-S)	SI2301CDS-T1-BE3	Vishay	
1	Q5	BSS806N	MOSFET N-CH 20V 2.3A SOT23	BSS806N H6327	Infineon Technologies	
1	R1	4.7K	RES 4.7K OHM 1/10W 1% 0402 SMD	ERJ-2RKF4701X	Panasonic	
4	R2,R12,R20,R30	33.2	RES 33.2 OHM 1/10W 1% 0603 SMD	ERJ-3EKF33R2V	Panasonic	
12	R3,R4,R13,R17,R36,R37,R38, R39,R40,R41,R43,R44	0R JUMP	RES 0 OHM JUMPER 3/4W 1206	HCJ1206ZT0R00	Stackpole Electronics Inc	
2	R5,R14	10 mOhms	RES 0.01 OHM 1% 1W 1206	LVT12R0100FER	Ohmite	
16	R6,R18,R26,R29,R46,R52,R59,R6 0,R72,R91,R92,R93,R94, R95,R96,R98	10K	RES SMD 10K OHM 1% 1/16W 0402	RC0402FR-0710KL	Yageo	
2	R7,R16	1.5K	RES SMD 1.5K OHM 1% 1/10W 0402	ERJ-2RKF1501X	Panasonic	
1	R9	158K	RES SMD 158K OHM 1% 1/10W 0402	ERJ-2RKF1583X	Panasonic Electronic Components	
2	R10,R19	47.5K	RES 47.5K OHM 1% 1/16W 0402	RC0402FR-0747K5L	YAGEO	
1	R15	21K	RES 21K OHM 1% 1/16W 0402	RC0402FR-0721KL	YAGEO	
26	R21,R56,R58,R65,R66,R67, R70,R71,R73,R74,R77,R80, R82,R83,R84,R85,R86,R87, R97,R99,R100,R103,R104, R105,R107,R108	100K	RES SMD 100K OHM 1% 1/10W 0402	ERJ-2RKF1003X	Panasonic	
2	R24,R32	100 mOhms	RES 0.1 OHM 1% 3/4W 1206	KRL1632E-M-R100-F-T5	Susumu	
1	R25	383K	RES SMD 383K OHM 1% 1/10W 0402	ERJ-2RKF3833X	Panasonic Electronic Components	
1	R28	34K	RES SMD 34K OHM 1% 1/10W 0402	ERJ-2RKF3402X	Panasonic Electronic Components	
5	R33,R34,R35,R90,R109	470	RES 470 OHM 1/10W 1% 0603 SMD	ERJ-3EKF4700V	Panasonic	
1	R42	0	RES 0.0 OHM 1/10W JUMP 0402 SMD	ERJ-2GE0R00X	Panasonic	DNI
12	R45,R47,R48,R49,R50,R51, R61,R63,R68,R69,R75,R76	2.21K	RES SMD 2.21K OHM 1% 1/10W 0402	ERJ-2RKF2211X	Panasonic	
1	R53	2.7K	RES SMD 2.7K OHM 1% 1/10W 0402	ERJ-2RKF2701X	Panasonic	
1	R54	1.4K	RES SMD 1.4K OHM 1% 1/10W 0402	ERJ-2RKF1401X	Panasonic Electronic Components	
1	R55	1K	RES 1K OHM 1/10W 1% 0402 SMD	ERJ-2RKF1001X	Panasonic	
1	R57	100	RES SMD 100 OHM 1% 1/10W 0603	RC0603FR-07100RL	Yageo	
2	R62,R64	27	RES SMD 27 OHM 1% 1/10W 0402	ERJ-2RKF27R0X	Panasonic	
3	R78,R79,R81	33.2	RES SMD 33.2 OHM 1% 1/10W 0402	ERJ-2RKF33R2X	Panasonic	
4	R88,R89,R101,R102	2.21K	RES SMD 2.21K OHM 1% 1/10W 0402	ERJ-2RKF2211X	Panasonic	DNI
1	R106	332	RES 332 OHM 1/10W 1% 0603 SMD	ERJ-3EKF3320V	Panasonic	
1	R110	10K	RES 10K OHM 1/10W 1% 0603 SMD	ERJ-3EKF1002V	Panasonic	
2	R111,R112	100 mOhms	RES 0.1 OHM 1% 3/4W 1206	KRL1632E-M-R100-F-T5	Susumu	DNI
2	SH1,SH2	DNI	DNI 2 NET SHORT 25 MIL LINE			
4	SH3,SH4,SH5,SH6	DNI	DNI 2 NET SHORT			
1	SW1	SPDT 3A	SWITCH TOGGLE SPDT 3A 120V	ET01MD1AGE	C&K Components	
5	SW2,SW3,SW4,SW5,SW6	B3S-1000P	SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1000P	Omron Electronics	
1	SW7	B3S-1002 BY OMZ	SWITCH TACTILE SPST-NO 0.05A 24V	B3S-1002 BY OMZ	Omron Electronics	

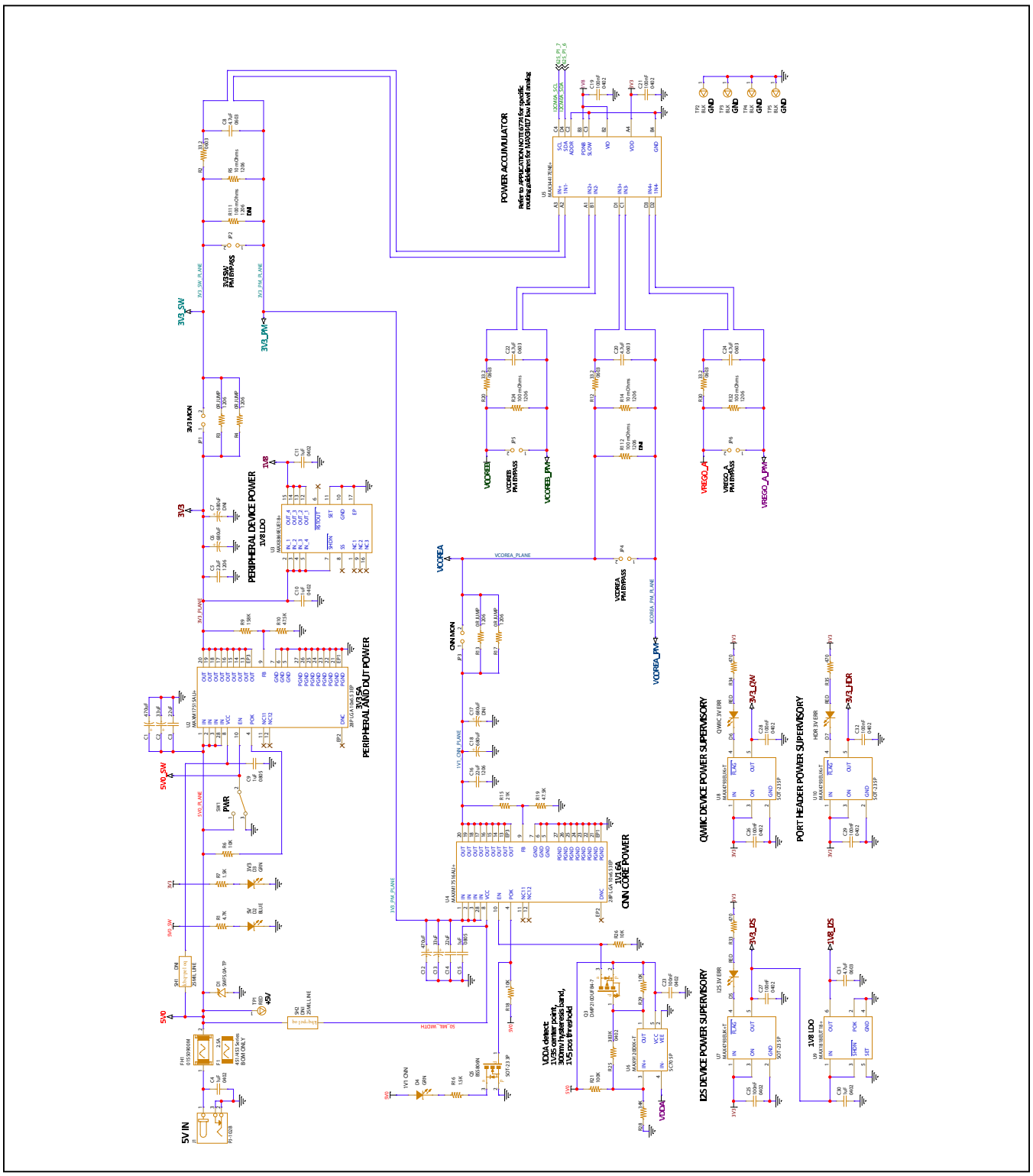
MAX78002 EV Kit Bill of Materials (continued)

QUANTITY	PART REFERENCE	VALUE	BOM_DESCRIPTION	MANUFACTURER_PN	MANUFACTURER	ASSY_VARIANT
6	TP1,TP6,TP7,TP8,TP9,TP10	RED	TEST POINT PC MULTI PURPOSE RED	5010	Keystone Electronics	
4	TP2,TP3,TP4,TP5	BLK	TEST POINT PC MULTI PURPOSE BLK	5011	Keystone Electronics	
1	TP11	WHT	TEST POINT PC MULTI PURPOSE WHT	5012	Keystone Electronics	
1	U1	MAX78002 144P BGA	MAX78002 144P BGA	MAX78002	Maxim Integrated	
1	U2	MAXM17515ALI+	Non-Isolated PoL Module DC DC Converter 1 Output 0.75 ~ 3.6V - - 5A 2.4V - 5.5V Input	MAXM17515ALI+	Maxim Integrated	
1	U3	MAX8869EUE18+	IC REG LDO 1.8V/ADJ 1A 16TSSOP-EP	MAX8869EUE18+	Maxim Integrated	
1	U4	MAXM17516ALI+	Non-Isolated PoL Module DC DC Converter Output 0.75 ~ 1.8V - - 6A 2.4V - 5.5V Input	MAXM17516ALI+	Maxim Integrated	
1	U5	MAX34417ENE+	IC 4CH SMBUS MONITOR 16TWLP	MAX34417ENE+	Maxim Integrated	
1	U6	MAX9120EXK+T	IC COMPARATOR BTR SC70-5	MAX9120EXK+T	Maxim Integrated	
3	U7,U8,U10	MAX4793EUK+T	IC CURRENT-LIMIT SWITCH 1X1 SOT23-5	MAX4793EUK+T	Maxim Integrated	
1	U9	MAX1818EUT18+	IC REG LDO 1.8V/ADJ 0.5A SOT23-6	MAX1818EUT18+	Maxim Integrated	
1	U11	MAX6071AAUT21+T	IC VREF SERIES 0.04% SOT23-6	MAX6071AAUT21+T	Maxim Integrated	
8	U12,U13,U14,U15,U16,U17, U18,U19	ADP1196ACBZ-02-R7	IC PWR SWITCH N-CHAN 1:1 6WLCSP	ADP1196ACBZ-02-R7	Analog Devices Inc.	
1	U20	MAX32625ITK+	MAX32625ITK+ 68P TQFN	MAX32625ITK+	Maxim Integrated	
4	U21,U28,U30,U39	MAX13202EALT+T	ESD PROTECT 2CH 6-UDFN	MAX13202EALT+	Maxim Integrated	
1	U22	MAX38902AATA+	IC REG LDO LINEAR ADJ .5A 8TDFN	MAX38902AATA+	Maxim Integrated	
2	U23,U31	MAX1818EUT33+T	IC REG LIN POS ADJ 500MA SOT23-6	MAX1818EUT33+T	Maxim Integrated	
2	U24,U47	74LVC2G06GW,125	IC INVERTER OD 2CH 2-INP 6TSSOP	74LVC2G06GW,125	Nexperia USA Inc.	
1	U25	CFAF128128B1-0145T	LCD TFT Full Color 1.45" 128x128	CFAF128128B1-0145T	Crystalfontz	
2	U26,U42	DS1233AZ-10+T&R	IC SUPERVISOR 1 CHANNEL SOT223-3	DS1233AZ-10+T&R	Maxim Integrate	
1	U27	FT231XS-R	IC USB SERIAL FULL UART 20SSOP	FT231XS-R	FTDI	
3	U29,U32,U46	MAX3373EEBL+T	IC TRNSLTR BIDIRECTIONAL 9UCSP	MAX3373EEBL+T	Analog Devices Inc.	
4	U33,U34,U40,U43	74LVC1G157GV,125	IC MULTIPLEXER 2INPUT 6TSOP	74LVC1G157GV,125	NXP Semiconductors	
1	U35	MAX9867EWV+T	IC STEREO AUD CODEC LP 30WLP	MAX9867EWV+T	Analog Devices Inc.	
3	U36,U37,U44	74AVC2T245GUX	IC TRNSLTR BIDIRECTIONAL 10XQFN	74AVC2T245GUX	Nexperia USA Inc.	
1	U38	74LVC125ABQ,115	IC BUF NON-INVERT 3.6V 14DHVQFN	74LVC125ABQ,115	Nexperia USA Inc.	
1	U41	74LVC2G07GV,125	IC BUFFER NON-INVERT 5.5V 6TSOP	74LVC2G07GV,125	Nexperia USA Inc.	
1	U45	APS6404L-3SQR-ZR	DRAM IoT RAM 64Mb QSPI (x1,x4) SDR 133/84MHz, RBX, 3V, USON8	APS6404L-3SQR-ZR	AP Memory	
1	U48	3315	FEATHERWING 2.4" 320X240 TFT LCD	3315	Adafruit Industries LLC	
1	Y1	32.768kHz	CRYSTAL 32.768KHZ 6.0PF SMD	ABS07-32.768KHZ-6-T	Abracon Corp	
1	Y2	25MHz	CRYSTAL 25.0000MHZ 10PF SMD	FA-20H 25.0000MF20X-K3	EPSON	
1	Y3	32.768KHz	CRYSTAL 32.7680KHZ 6PF SMD	ECS-.327-6-12-TR	ECS Inc.	
1	Y4	12.2880MHZ	XTAL OSC XO 12.2880MHZ CMOS SMD	ASCO2-12.288MHZ-EK-T3	Abracon LLC	

MAX78002 EV Kit Schematic

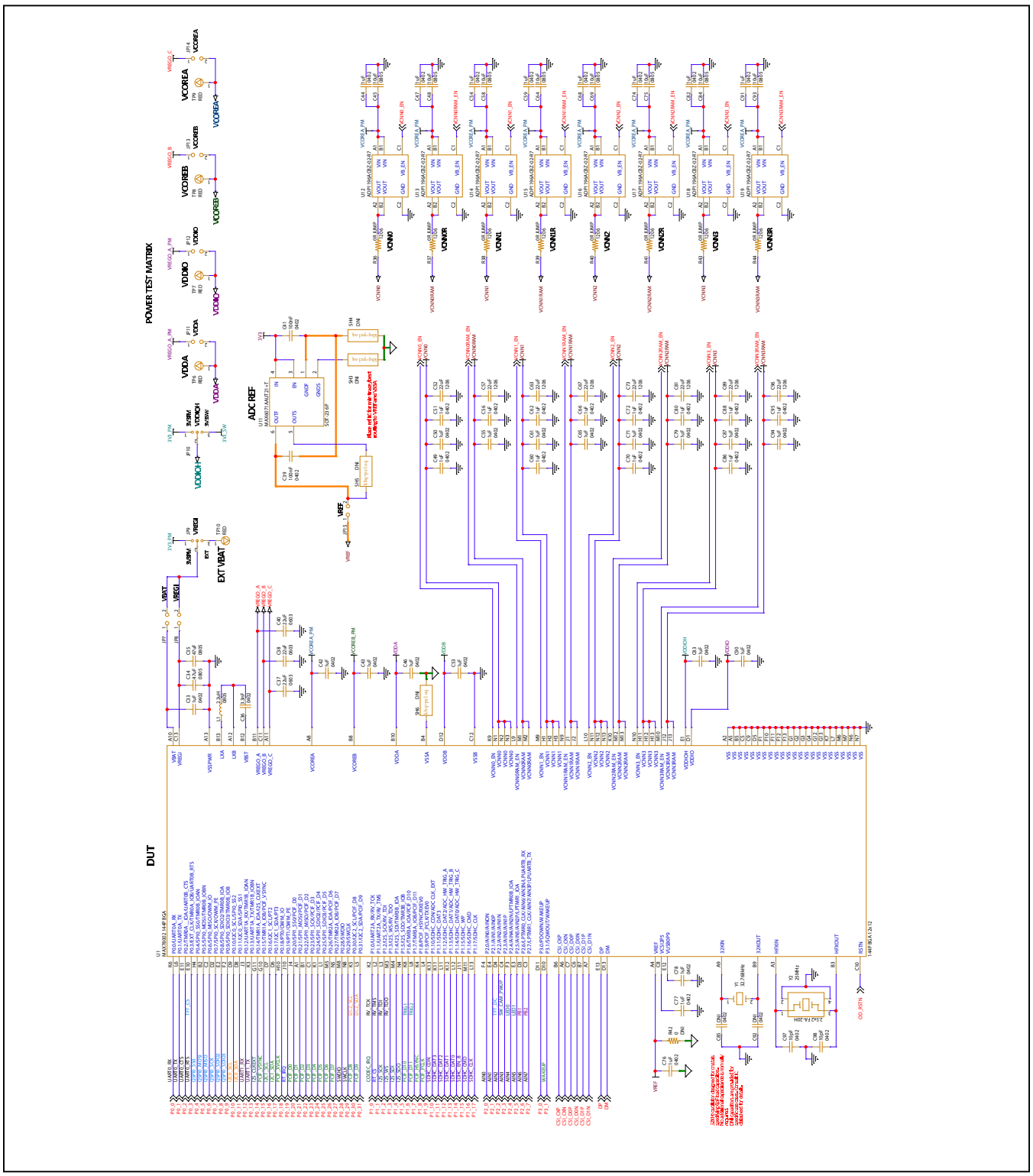


MAX78002 EV Kit Schematic (continued)



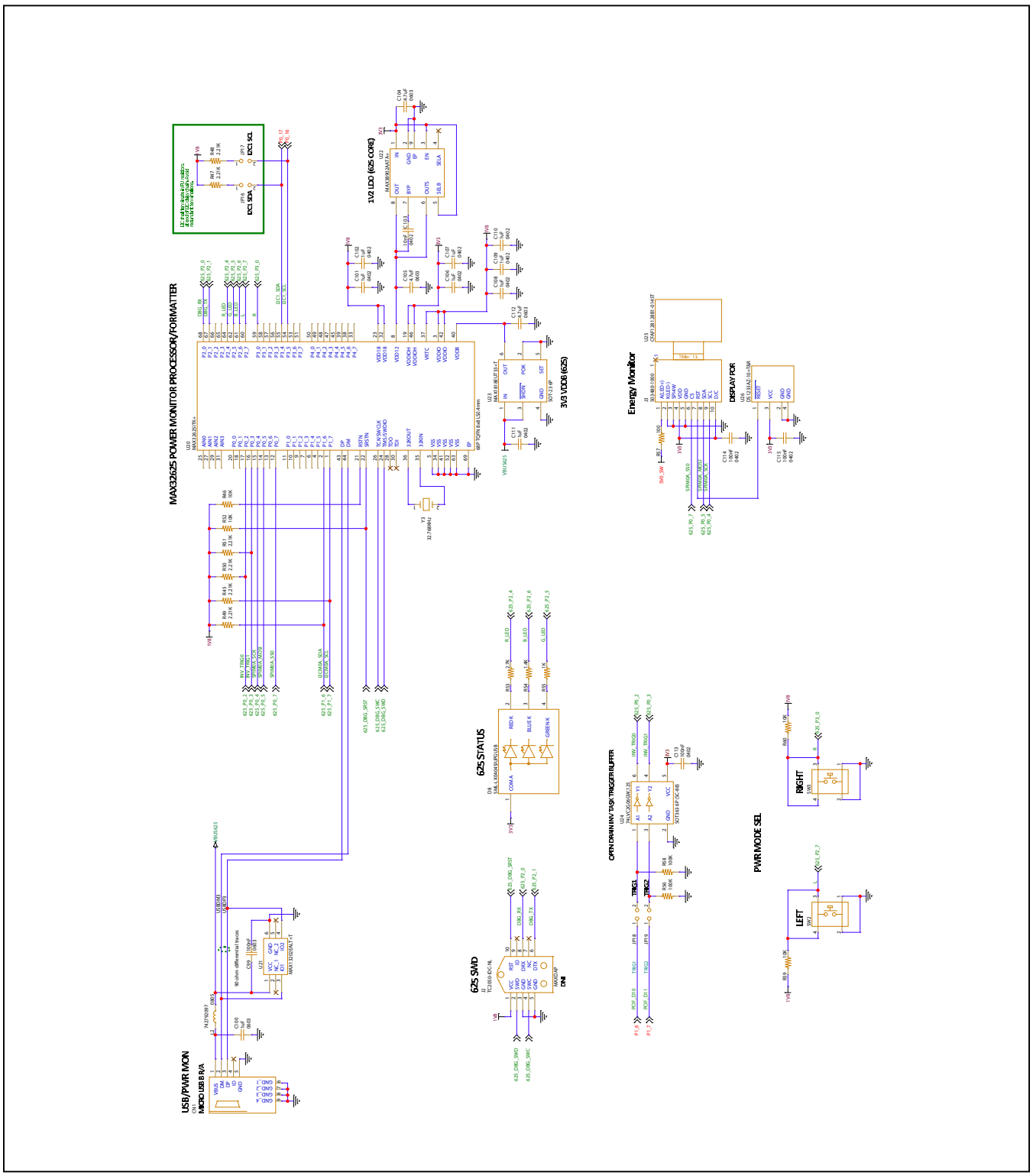
PRELIMINARY

MAX78002 EV Kit Schematic (continued)

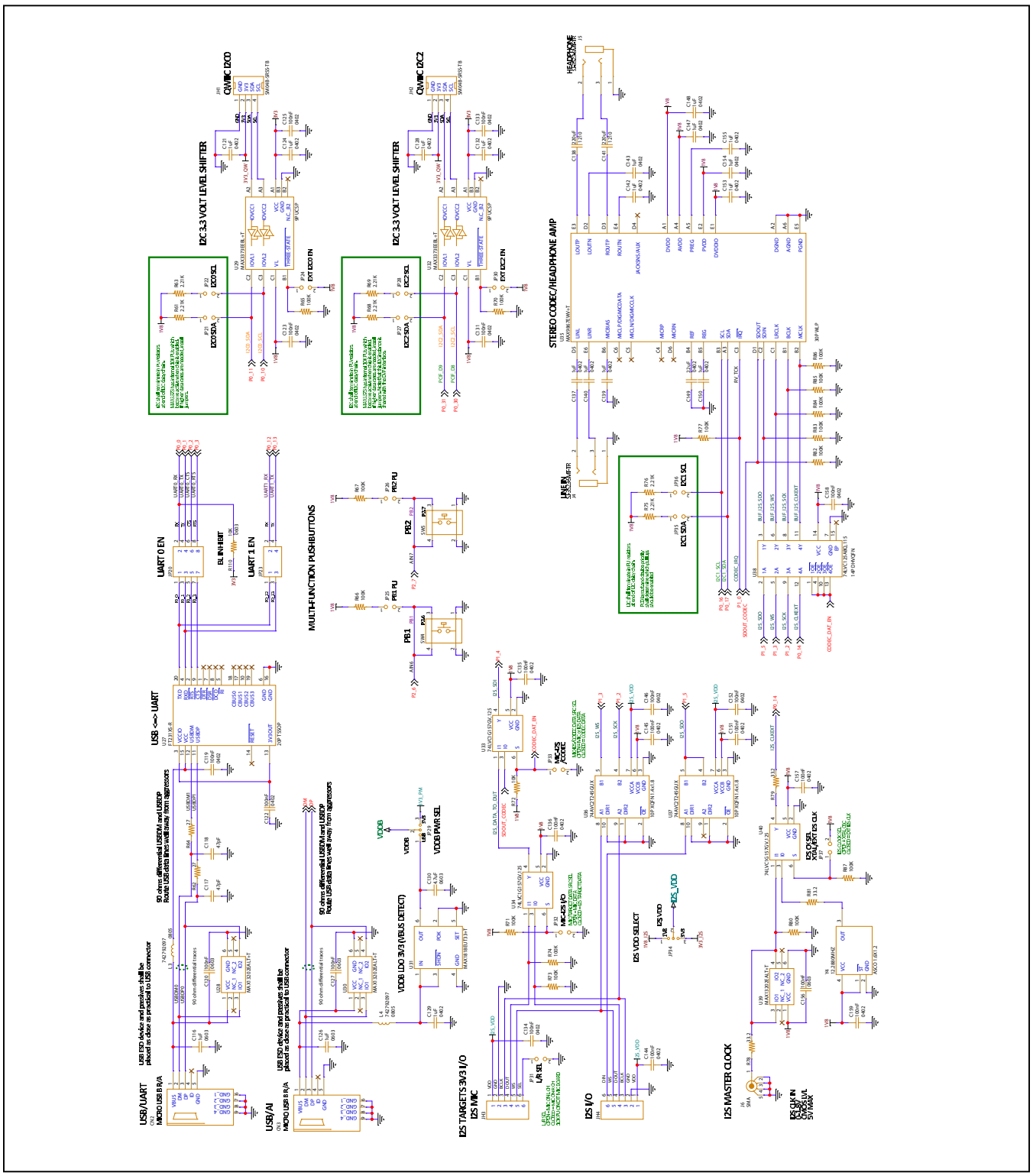


PRELIMINARY

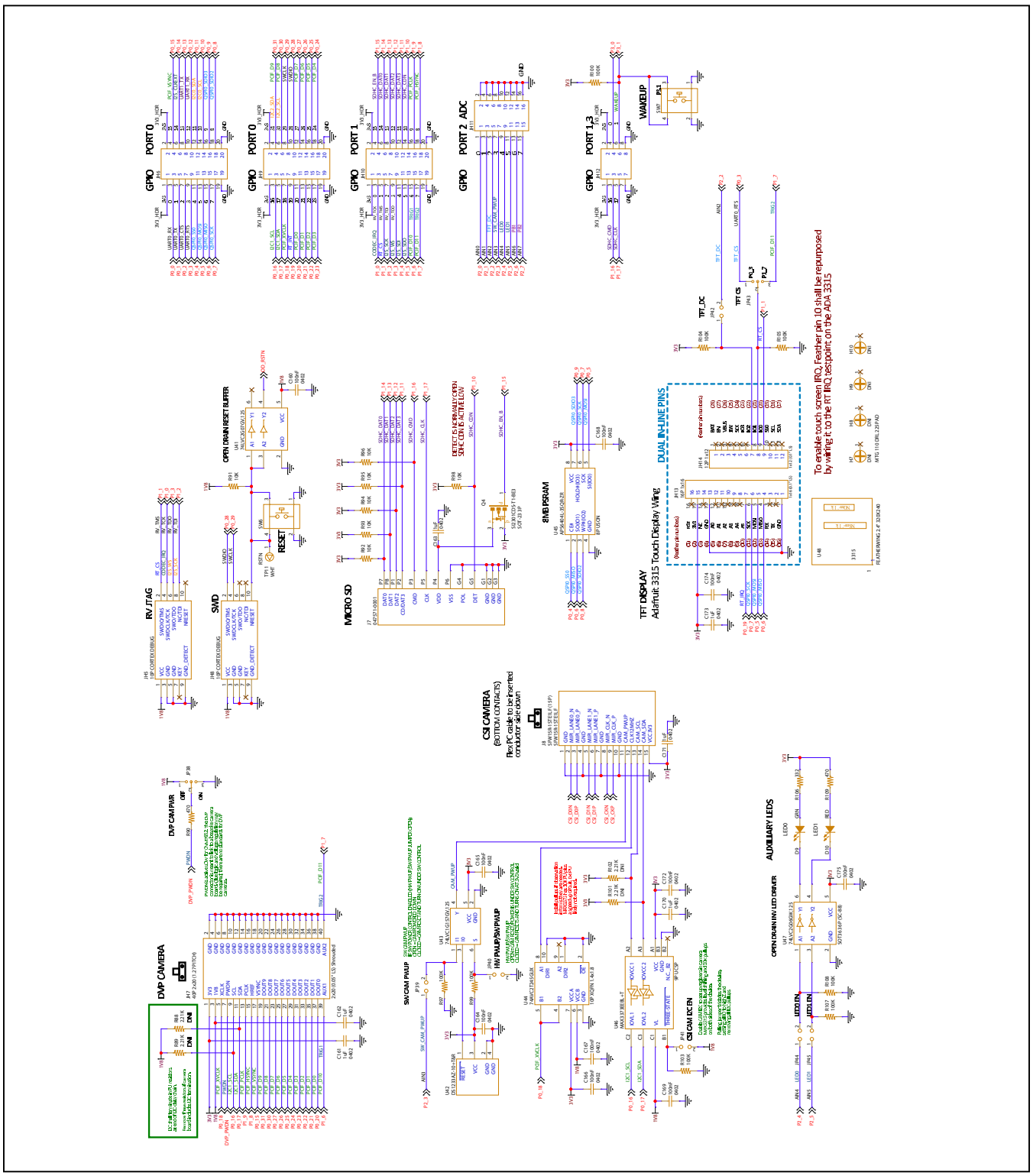
MAX78002 EV Kit Schematic (continued)



MAX78002 EV Kit Schematic (continued)



MAX78002 EV Kit Schematic (continued)



Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/22	Initial release	—

PRELIMINARY