MAX20332 Evaluation Kit

Evaluates: MAX20332

General Description

The MAX20332 evaluation kit (EV kit) is a fully assembled and tested PCB that evaluates the MAX20332 USB charger detection with integrated overvoltage protector. The EV kit features a Pmod™ connector, allowing the USB2PMB2 adapter board to provide I²C interface.

The EV kit features an on-board LDO to generate a supply voltage from the USB +5V. The on-board LDO output is configurable for 4.2V, 3.3V, or 2.3V to power the IC.

The EV kit software controls the USB2PMB2 adapter board over the USB, which generates I²C commands.

Features

- USB-Powered Operation
- Proven High-Speed USB PCB Layout
- Pmod I²C Interface
- USB Connectors for Device Multiplexing
- Surface-Mount Components
- Fully Assembled and Tested

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

Quick Start

Recommended Equipment

***Note:** In the following sections, software-related items are identified by bold text. Text in **bold** refers to items directly from the install of EV kit software. Text which is **bold and underlined** refers to items from the Windows operating system.*

- MAX20332 EV kit (USB cables included)
- Two USB drives
- User-supplied Windows XP®, Windows Vista®, Windows® 7, and Windows 10 PC with two available USB ports

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

1) Visit **https://www.maximintegrated.com** to download the latest version of the EV kit software, **MAX20332EVKitSetupVxxx.ZIP** located on the MAX20332 EV kit web page. Download the EV kit software to a temporary folder and uncompress the ZIP file.
2) **Install the EV kit software on your computer by running the MAX20332EVKitSetupVxxx.EXE program inside the temporary folder.**
3) Verify that all jumpers are in their default positions, as shown in Table 1.
4) **Connect the USB2PMB2 adapter board to J1 PMOD connector on the EV Kit.**
5) **Connect a** USB A-to-micro-B cable **between the PC and the X1 port on the USB2PMB2. USB driver should be installed automatically.**
6) Connect the USB A-to-micro-B cable between the PC and the USB1 port on the EV kit.
7) Connect the USB A-to-micro-B cable between the PC and the USB4 port on the EV kit.

Pmod is a trademark of Digilent Inc.

Windows, Windows XP, and Windows Vista are registered trademarks and registered service marks of Microsoft Corporation.

maxim integrated™

8) Start the MAX20332 EV Kit tool. The EV kit software main window appears, as shown in Figure 2.
9) If connection is successfully established, the status bar at the bottom displays **Connected**.
10) Connect the two USB drives to the USB2 and USB3 ports on the EV Kit.
11) In the **Control Panel** tab, select **USB Switches connected to UT/UR** position from the drop-down list in the **USB Switch Control** group box.
12) Verify that the USB drive connected to the USB3 port is displayed in the computer windows, Devices with Removable Storage section.
13) Select **USB Switches connected to TD+/TD-** position from the drop-down list in the **USB Switch Control** group box.
14) Verify that the USB drive connected to the USB2 port is displayed in the computer windows, **Devices with Removable Storage** section.
15) The EV kit is now ready for additional evaluation.

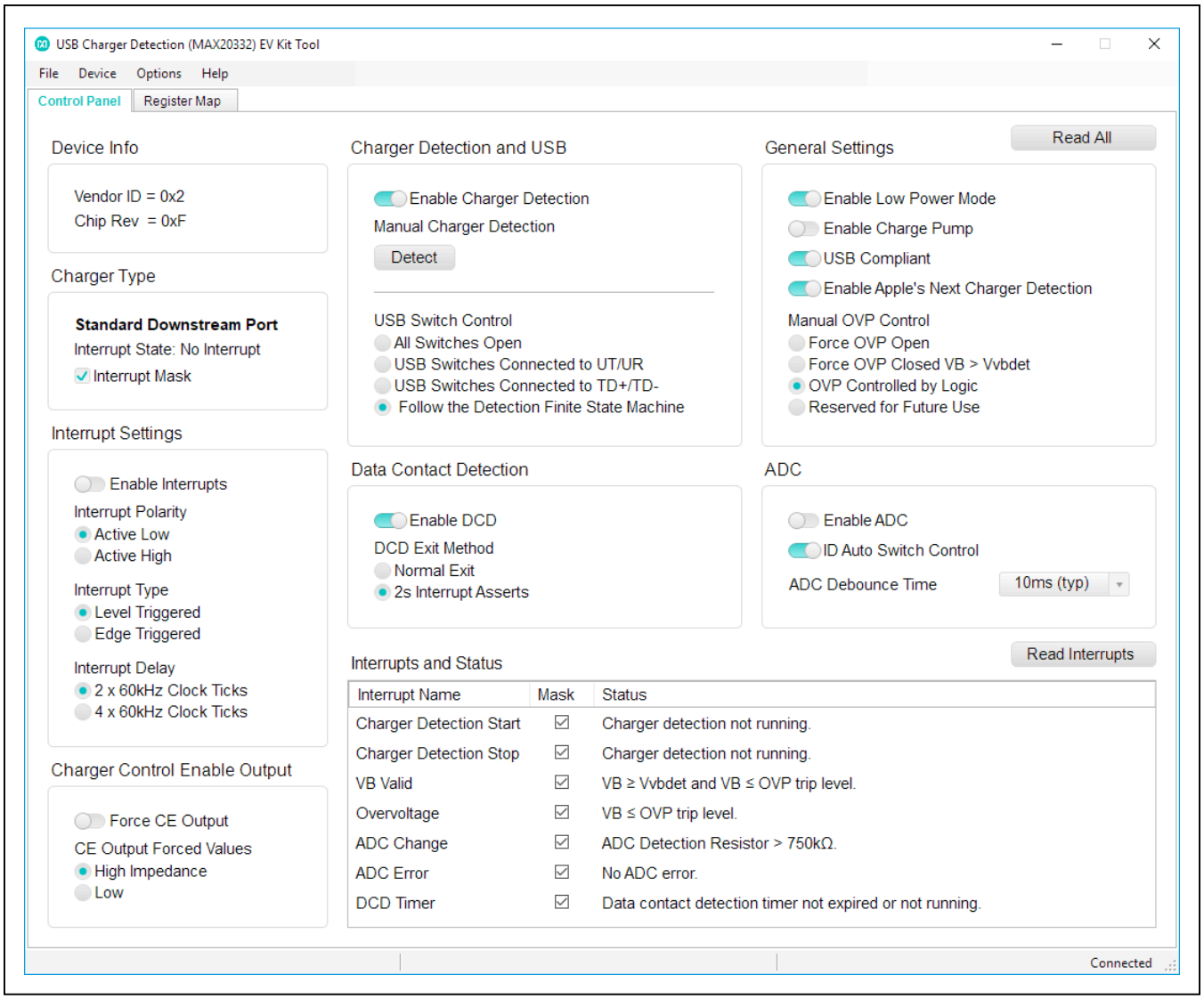


Figure 2. MAX20332 EV Kit Software Main Window (Control Panel Tab)

Detailed Description of Software

Graphic User Interface (GUI)

The MAX20332 EV kit software GUI provides a convenient way to test the features of the MAX20332. Figure 2 shows the EV kit software's **Control Panel** tab sheet, while Figure 3 shows the **Control Registers** tab sheet.

The EV kit software **Control Panel** tab sheet divides the EV kit functions into logical blocks. The EV kit software **Register Map** tab sheet allows configuration of all the I^2C registers of the MAX20332. The register to be read from or written to can be selected in the left table. The right table contains descriptions for each bit of the selected 8-bit register. At the bottom of the tab page, all bits are displayed along with their field names. To set a bit, click the bit label. Bold text represents logic 1 and regular text represents logic 0. To commit the changes to the device, click "Write" in the bottom right of the tab page.

Software Startup

Upon starting the program, the EV kit software automatically searches for the USB interface circuit and then for the IC device address. The EV kit enters the normal operating mode when the USB connection is detected and has found the device address. If the USB connection is not detected, the status bar displays **Not Connected**. If the USB connection is detected but the MAX20332 is not, the status bar displays **MAX20332 Not Detected**.

The **Read All** button reads all the registers visible on the current tab page. All statuses are polled continuously. The polling feature can be disabled in the **Options** section of the menu bar by selecting **Disable Polling**.

Device ID

The **Device Info** group box displays the IC's **Vendor ID**, **and Chip Rev**.

Interrupt Settings

The **Interrupt Settings** group box features an **Enable Interrupt** button to enable or disable the IC interrupt logic. This group box also features radio group boxes to configure the **Interrupt Polarity**, **Interrupt Type**, and **Interrupt Delay**.

Interrupts and Status

The **Interrupt and Status** group box shows the state of the status registers and their corresponding interrupts. By checking or unchecking the **Mask** option, the user can control which interrupts cause the INT output to be pulled low when asserted. Clicking the **Read Interrupts** button will read and clear the interrupts visible in the current tab. Asserted interrupts are denoted by bold text in the **Interrupt Name** field. All statuses are polled continuously. The polling feature can be disabled in the **Options** section of the menu bar by selecting **Disable Polling**.

Data Contact Detection

The **Data Contact Detection** (DCD) group box provides a **DCD Enabled** checkbox to enable or disable the DCD, and a **DCD Exit Method** radio group box to set the DCD exit method.

USB Switch Control

The **USB Switch Control** group box configures the IC's USB1 port. The USB1 port can be connected to USB2, USB3, or disconnected from both ports.

ADC

The **ADC** group box provides an **Enable ADC** button to enable or disable the ADC, an **ID Auto Switch Control** button to enable or disable the ID auto switch, and an **ADC Debounce Time** drop-down list to set the ADC debounce time.

Charger Detection

The **Charger Detection** group box provides **Enable Charger Detection button** to enable or disable the charger detection, a Manual Charger Detection button to force a charger detection manually.

Charger Type

The Charger Type group box displays the result of the charger detection and the status of the charger type interrupt. By checking or unchecking the **Interrupt Mask** checkbox, the user can also control if the interrupt causes the INT output to be pulled low when asserted.

USB Switch Control

The USB Switch Control group box configures the USB switches.

General Settings

The **General Settings** group box provides four buttons for general settings. The **Enable Low Power Mode** button enables or disables the low-power mode. The **Enable Charge Pump** button enables or disables the charge pump for the negative signals. The **USB Compliant** button sets the USB compatibility of the device. **The Enable Apple's Next Charger Detection** button enables or disables Apple's next (future) charger detection.

This group box also features a radio group box for configuring the Manual OVP Control.

Charger Control Enable Output

The **Charger Control Enable Output** group box features a **Force CE Output** button to force enable the IC CE output logic. When this button is toggled on, CE output logic value is set by the CE Output Forced Value.

Detailed Description of Hardware

The MAX20332 EV kit evaluates the MAX20332 USB charger detection with integrated overvoltage protector, which communicates over the I2C interface. The EV kit demonstrates the IC features such as charger detection, overvoltage protection, and USB switch control. The EV kit uses the IC in a 16-bump (1.6mm x 1.6mm) wafer-level package (WLP) on a proven, four-layer PCB design. The EV kit operates from the USB +5V DC and therefore does not require an external power supply.

USB Connectors

The EV kit provides USB connectors to accommodate the USB devices. Connect the output USB devices to the USB2 and USB3 connectors and connect the input device to the USB1 connector to evaluate the IC's USB switches.

Test Points

The EV kit provides test points to access the IC input/output signals. When charging a battery using a power-management integrated circuit (PMIC), connect the PMIC input to the OUT test point, connect the PMIC charger enable pin to the CE test point, and connect the PMIC charger output and ground to the VBAT and GND test points, respectively. Connect the battery positive terminal to the VBAT test point. Connect the battery negative terminal to the GND test point.

$\overline{DB}$ Circuit

The EV kit provides circuits to indicate the $\overline{DB}$ (U1-A3) output status. The circuits include U3, U4, N1, N2, D8, D9, D10, and their associated resistors and capacitors. The circuits are powered by OUT through jumper JU13. When $\overline{DB}$ outputs a logic-low, LED D9 illuminates. When $\overline{DB}$ outputs high impedance, LED D10 illuminates.

Table 1. Jumper Table (JU1–JU13)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	On-board VB supply. Connects VBUS (USB4-1) to VB.
	2-3	External VB supply. Externally supply VB with 3.5V to 36V.
JU2	1-2*	On-board VBAT supply. Connect INT_VBAT to VBAT.
	2-3	External VBAT supply. Externally supply VBAT with 2.8V to 5.5V.
JU3	Closed*	On-board I2C. Connects the on-board SCL signal to the SCL test point.
	Open	User-supplied I2C. Open the jumper and apply the SCL signal to the SCL test point.
JU4	Closed*	On-board I2C. Connects on-board SDA signal to the SDA test point.
	Open	User-supplied I2C. Open the jumper and apply the SDA signal to the SDA test point.
JU5	Closed*	Connects the $\overline{INT}$ test point to an LED indicator.
	Open	Disconnects the $\overline{INT}$ test point from an LED indicator.
JU6	Closed*	Connects the $\overline{CE}$ test point to an LED indicator.
	Open	Disconnects the $\overline{CE}$ test point from an LED indicator.
JU7	Closed*	Connects the VB test point to an LED indicator.
	Open	Disconnects the VB test point from an LED indicator.
JU8	Closed*	Connects the VBAT test point to an LED indicator.
	Open	Disconnects the VBAT test point from an LED indicator.
JU9	Closed*	Connects the OUT test point to an LED indicator.
	Open	Disconnects the OUT test point from an LED indicator.
JU10	1-2*	INT_VBAT = 2.3V.
	1-3	INT_VBAT = 3.3V.
	1-4	INT_VBAT = 4.2V.

Table 1. Jumper Table (JU1–JU13) (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
JU11	1-2	ADC detection resistor = 30.1kΩ.
	3-4	ADC detection resistor = 80.6kΩ.
	5-6	ADC detection resistor = 150kΩ.
	7-8	ADC detection resistor = 200kΩ.
	9-10	ADC detection resistor < 1.50kΩ.
	Open*	ADC detection resistor > 750kΩ.
JU12	Closed	USB1 shield connected to GND.
	Open*	USB1 shield not connected to GND.
JU13	Closed*	$\overline{DB}$ circuit powered by OUT.
	Open	$\overline{DB}$ circuit not used.
JU14	1-2	On-board 3.3V supply. Connect +3.3V to VIO.
	2-3*	External VIO supply. Externally supply VIO.
JU15	1-2	Connects VBUS2 to OUT.
	2-3*	Connects VBUS2 to +5V

**Default position.*

Component Suppliers

SUPPLIER	WEBSITE
Murata Americas	www.muratamericas.com
TDK Corp	www.component.tdk.com

Note: *Indicate that you are using the MAX20332 when contacting these component suppliers.*

Ordering Information

PART	TYPE
MAX20332EVKIT#	EV Kit

#Denotes RoHS compliant.

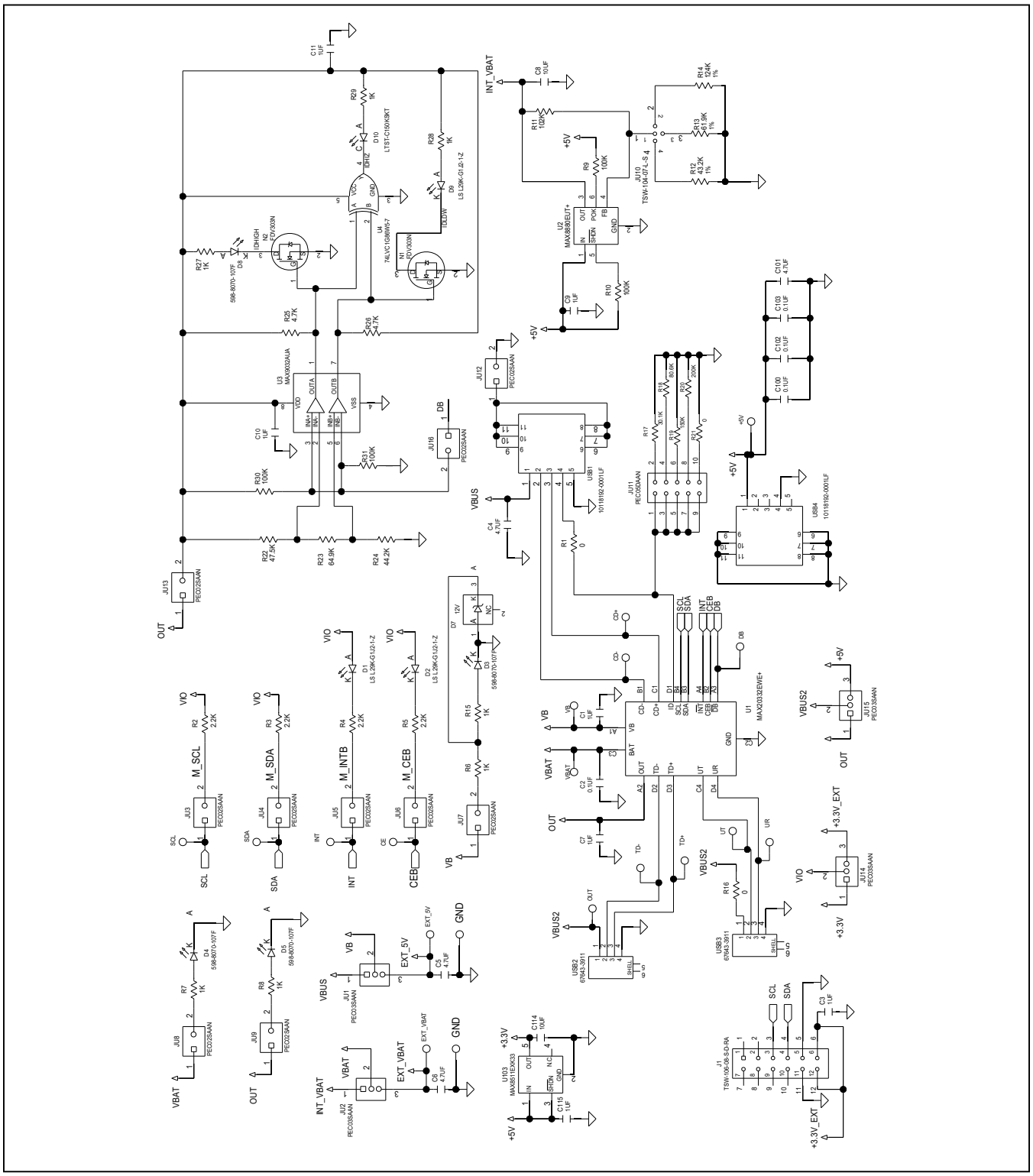
MAX20332 EV Kit Bill of Materials

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	UR, UT, VB, +5V, OUT, TD+, TD-, VBAT, EXT_5V, EXT_VBAT	10	5000	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
2	C1, C3, C7, C9-C11, C115	7	GRM21BR71H105KA12; CL21B105KBFNNNE; C2012X7R1H105K085AC; UMK212B7105KG	MURATA; SAMSUNG ELECTRONICS;TDK; TAIYO YUDEN	1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
3	C2, C100, C102, C103	4	C0603C104K5RAC; C1608X7R1H104K	KEMET;TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R;	
4	C4-C6, C101	4	GRM31CR71H475KA12	MURATA	4.7UF	CAPACITOR; SMT (1206); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
5	C8, C114	2	GRM21BR71A106KE51	MURATA	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 10V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
6	CE, DB, CD+, CD-, INT, SCL, SDA	7	5002	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;	
7	D1, D2, D9	3	LS L29K-G1J2-1-Z	OSRAM	LS L29K-G1J2-1-Z	DIODE; LED; SMART; RED; SMT (0603); PIV=1.8V; IF=0.02A; -40 DEGC TO +100 DEGC	
8	D3-D5, D8	4	598-8070-107F	DIALIGHT	598-8070-107F	DIODE; LED; STANDARD; GREEN; SMT (0603); PIV=3.2V; IF=0.02A	
9	D7	1	CMPZ5242B	CENTRAL SEMICONDUCTOR	12V	DIODE; ZNR; SMT (SOT-23); VZ=12V; IZ=0.02A	
10	D10	1	LTST-C150KSKT	LITE-ON ELECTRONICS INC.	LTST-C150KSKT	DIODE; LED; ULTRA BRIGHT CHIP LED; YELLOW; SMT (1206); PIV=2.1V; IF=0.02A	
11	J1	1	TSW-106-08-S-D-RA	SAMTEC	TSW-106-08-S-D-RA	CONNECTOR; THROUGH HOLE; DOUBLE ROW; RIGHT ANGLE; 12PINS;	
12	JU1, JU2, JU14, JU15	4	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	
13	JU3-JU9, JU12, JU13, JU16	10	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	
14	JU10	1	TSW-104-07-L-S	SAMTEC	TSW-104-07-L-S	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 4PINS	
15	JU11	1	PEC05DAAN	SULLINS ELECTRONICS CORP.	PEC05DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 10PINS; -65 DEGC TO +125 DEGC	
16	N1, N2	2	FDV303N	FAIRCHILD SEMICONDUCTOR	FDV303N	TRAN; DIGITAL FET; NCH; SOT-23; PD-(0.35W); IC-(0.68A); VCEO-(25V); -55 DEGC TO +150 DEGC	
17	R1, R16, R21	3	RC1608J000CS; CR0603-J/-000ELF;RC0603JR-070RL	SAMSUNG ELECTRONICS; BOURNS;YAGEO PH	0	RESISTOR; 0603; 0 OHM; 5%; JUMPER; 0.10W; THICK FILM	
18	R2-R5	4	CRCW06032K20JN; ERJ-3GEYJ222V	VISHAY DALE; PANASONIC	2.2K	RESISTOR; 0603; 2.2K OHM; 5%; 200PPM; 0.10W; THICK FILM	
19	R6-R8, R15, R27-R29	7	RR0816P-102-B-T5; PCF0603R-1K0B	SUSUMU CO LTD; TT ELECTRONICS	1K	RESISTOR; 0603; 1K OHM; 0.1%; 25PPM; 0.063W; METAL FILM	
20	R9, R10, R30, R31	4	ERJ-3GEYJ104V	PANASONIC	100K	RESISTOR; 0603; 100K OHM; 5%; 200PPM; 0.10W; THICK FILM	
21	R11	1	CRCW0603102KFK	VISHAY DALE	102K	RESISTOR; 0603; 102K OHM; 1%; 100PPM; 0.10W; THICK FILM	

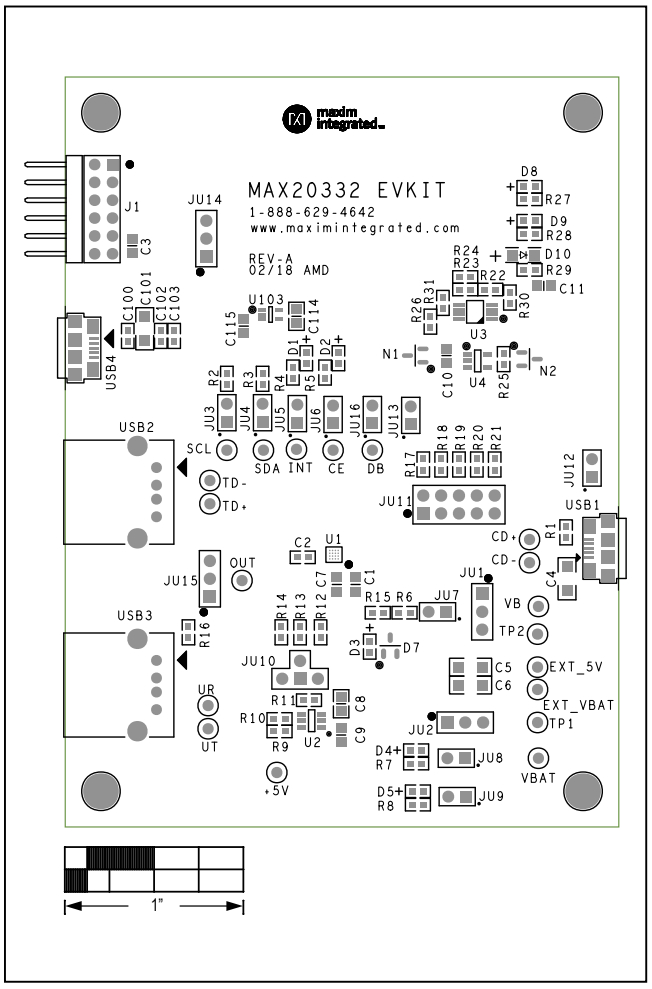
MAX20332 EV Kit Bill of Materials (continued)

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
22	R12	1	CRCW060343K2FK; ERJ-3EKF4322V	VISHAY DALE; PANASONIC	43.2K	RESISTOR; 0603; 43.2K OHM; 1%; 100PPM; 0.10W; THICK FILM	
23	R13	1	CRCW060361K9FK	VISHAY DALE	61.9K	RESISTOR; 0603; 61.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
24	R14	1	CRCW0603124KFK	VISHAY DALE	124K	RESISTOR; 0603; 124K OHM; 1%; 100PPM; 0.10W; THICK FILM	
25	R17	1	CRCW06033012FK	VISHAY DALE	30.1K	RESISTOR; 0603; 30.1K; 1%; 100PPM; 0.10W; THICK FILM	
26	R18	1	CRCW060380K6FK	VISHAY DALE	80.6K	RESISTOR; 0603; 80.6K OHM; 1%; 100PPM; 0.10W; METAL FILM	
27	R19	1	CRCW0603150KFK	VISHAY DALE	150K	RESISTOR, 0603, 150K OHM, 1%, 100PPM, 0.10W, THICK FILM	
28	R20	1	CRCW06032003FK	VISHAY DALE	200K	RESISTOR; 0603; 200K; 1%; 100PPM; 0.10W; THICK FILM	
29	R22	1	CRCW060347K5FK	VISHAY DALE	47.5K	RESISTOR; 0603; 47.5K; 1%; 100PPM; 0.1W; THICK FILM	
30	R23	1	RT0603BRD0764K9L	YAGEO PHYCOMP	64.9K	RESISTOR; 0603; 64.9K OHM; 0.1%; 25PPM; 0.1W; THIN FILM	
31	R24	1	ERJ-3EKF4422V	PANASONIC	44.2K	RESISTOR; 0603; 44.2K OHM; 1%; 100PPM; 0.1W ; THICK FILM	
32	R25, R26	2	CPF-A-0603B4K7E	TE CONNECTIVITY	4.7K	RESISTOR; 0603; 4.7K OHM; 0.1%; 25PPM; 0.063W; THIN FILM	
33	SU1-SU15	15	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PBT CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL	
34	TP1, TP2	2	5001	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	GND
35	U1	1	MAX20332EWE+	MAXIM	MAX20332EWE+	EVKIT PART - IC; DET; USB CHARGER DETECTION WITH INTEGRATED OVERVOLTAGE PROTECTOR; PACKAGE CODE: W161C1+2; PACKAGE OUTLINE: 21-100246	
36	U2	1	MAX8880EUT+	MAXIM	MAX8880EUT+	IC; VREG; ULTRA-LOW-IQ LOW-DROPOUT LINEAR REGULATOR WITH POK; SOT23-6	
37	U3	1	MAX9032AUA+	MAXIM	MAX9032AUA	IC; COMP; LOW-COST, ULTRA-SMALL, DUAL SINGLE-SUPPLY COMPARATOR; UMAX8	
38	U4	1	74LVC1G86W5	DIODES INCORPORATED	74LVC1G86W5-7	IC; OR; SINGLE 2 INPUT EXCLUSIVE OR GATE; SOT25	
39	U103	1	MAX8511EXK33+	MAXIM	MAX8511EXK33	IC; VREG; ULTRA-LOW-NOISE, HIGH PSRR, LOW-DROPOUT, LINEAR REGULATOR; SC70-5 ; -40 DEGC TO +85 DEGC	
40	USB1, USB4	2	10118192-0001LF	FCI CONNECT	10118192-0001LF	CONNECTOR; FEMALE; SMT; MICRO USB B TYPE RECEPTACLE; RIGHT ANGLE; 5PINS	
41	USB2, USB3	2	67643-3911	MOLEX	67643-3911	CONNECTOR; FEMALE; THROUGH HOLE; USB A-TYPE CONNECTOR; RIGHT ANGLE; 4PINS	
42	PCB	1	MAX	MAXIM	PCB	PCB:MAX	-
TOTAL		120					

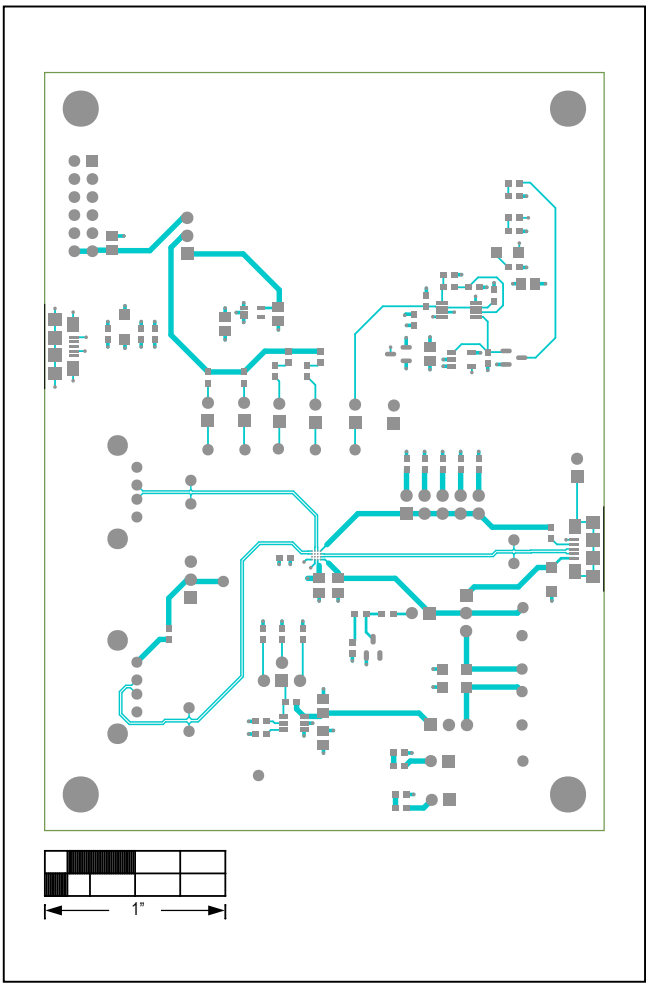
MAX20332 EV Kit Schematic



MAX20332 EV Kit PCB Layout Diagrams

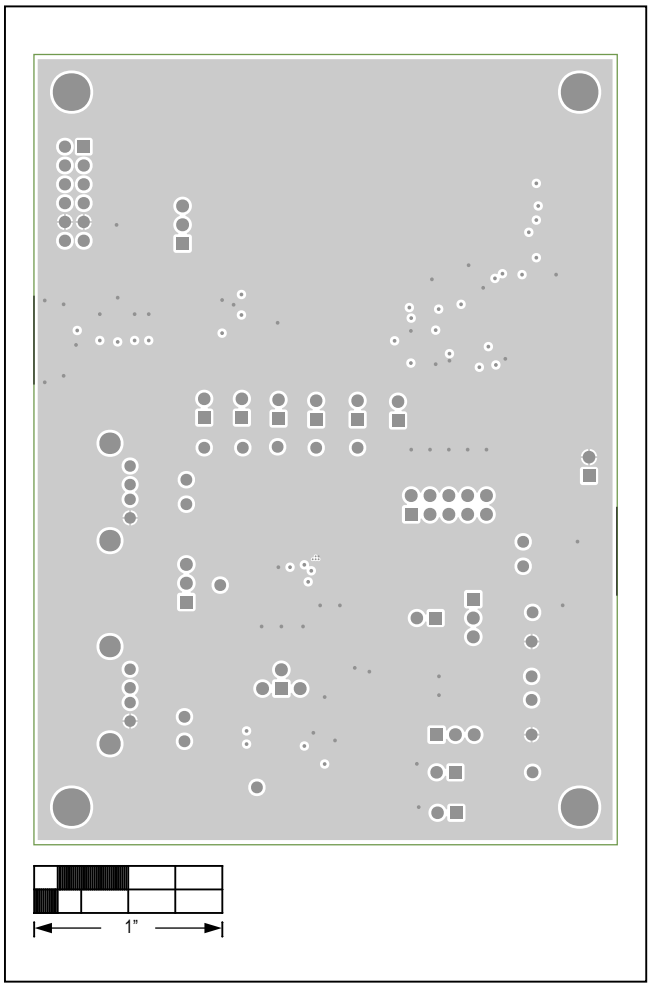


MAX20332 EV Kit—Top Silkscreen

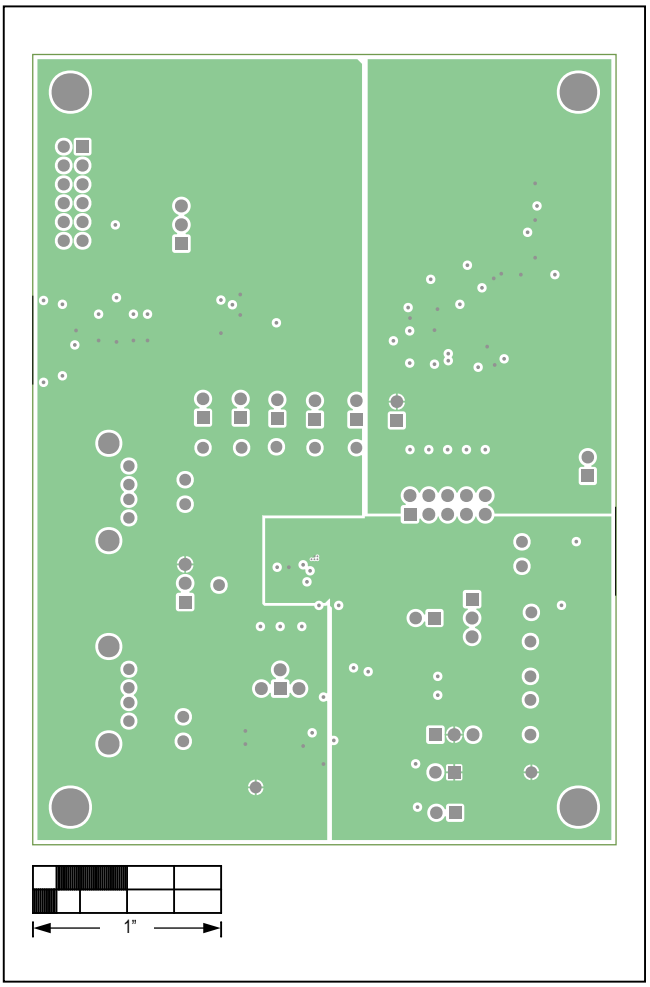


MAX20332 EV Kit—Top

MAX20332 EV Kit PCB Layout Diagrams (continued)

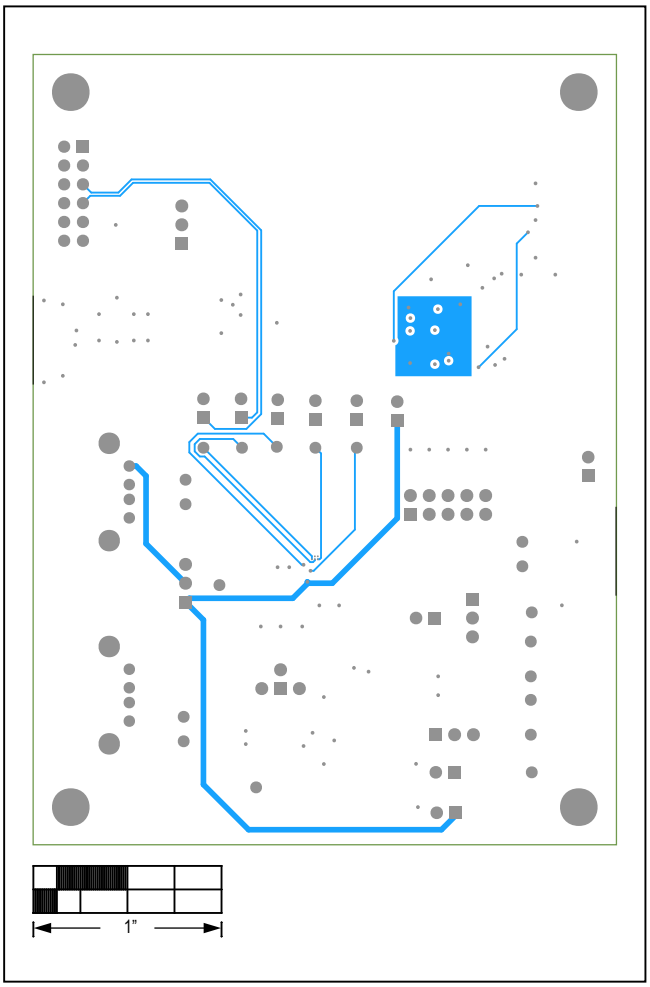


MAX20332 EV Kit—Internal 2



MAX20332 EV Kit—Internal 3

MAX20332 EV Kit PCB Layout Diagrams (continued)



MAX20332 EV Kit—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/18	Initial release	—

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