

MAX32655FTHR

Application Platform

Evaluates: MAX32655

General Description

The MAX32655FTHR is a rapid development platform to help engineers quickly implement ultra low-power wireless solutions using MAX32655 Arm® Cortex®-M4F and Bluetooth® 5.2 Low Energy (LE). The board also includes the MAX20303 PMIC for battery and power management. The form factor is a small 0.9in x 2.6in dual-row header footprint that is compatible with Adafruit Feather Wing peripheral expansion boards. The board includes a variety of peripherals, such as a digital microphone, low-power stereo audio CODEC, 128MB QSPI Flash, micro SD card connector, RGB indicator LED, and pushbutton. The MAX32655FTHR provides a power-optimized flexible platform for quick proof-of-concepts and early software development to enhance time to market.

Go to <https://www.maximintegrated.com/en/products/MAX32655FTHR> to get started developing with this board.

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

Features

- MAX32655 Microcontroller
 - Arm Cortex-M4F, 100MHz
 - 32-Bit RISC-V Coprocessor to Offload Timing-Critical Bluetooth Processing
 - 512KB Flash Memory
 - 128KB SRAM
 - 16KB Cache
 - Bluetooth 5.2 LE Radio
 - MAX20303 Wearable PMIC with Fuel Gauge
 - Charge from USB
 - On-Board DAPLink Debug and Programming Interface for Arm Cortex-M4F
 - Breadboard Compatible Headers
 - Micro USB Connector
 - Micro SD Card Connector
- Integrated Peripherals
 - RGB Indicator LED
 - User Pushbutton
 - Low-Power Stereo Audio CODEC
 - Digital Microphone
 - SWD Debugger
 - Virtual UART Console

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Quick Start

Apply power to the MAX32655FTHR using the USB cable. The pre-programmed 'BLE Connection' demo begins to execute.

The RGB LED starts to blink blue every second. Once a BLE connection is established, the RGB LED stops blinking and remains blue. A simple BLE connection can be established to the device using the LightBlue® mobile application. After the connection is complete, the connected device has control over LED states.

PMIC and Battery Charger

The MAX20303 wearable PMIC powers the MAX32655FTHR board and is also capable of charging a Li-Ion battery (not included). The MAX20303 has an internal MOSFET that connects the battery to system output when no voltage source is available on the charge input (USB). When an external source is detected at the charge input (USB), this switch opens and the system output is powered from the input source through the input current limiter. The system output to battery switch also prevents the system output voltage from falling below battery voltage when the system load exceeds the input current limit. The smart power selector unit inside the PMIC seamlessly distributes power from the charge input (USB) to the battery and system output. With both the USB and battery connected, the smart power switch's basic functions are as follows:

- When the system load requirements are less than the input current limit, the battery is charged with residual power from the input.
- When the system load requirements exceed the input current limit, the battery supplies supplemental current to the load.
- When the battery is connected, and there is no external power input (USB), the system is powered from the battery.
- When the MAX20303 thermal limits are reached, the charger does not shut down, but attempts to limit a temperature increase by reducing the input current from charge input. In this condition, the system load has priority over the charger current, so the input

current is first reduced by lowering the charge current. If the junction temperature continues to rise and reaches the maximum operating limit, no input current is drawn from the charge input and the battery powers the entire system load.

The USB charge current is set to 51mA. This allows charging from both powered and unpowered USB hubs with no port communication required. Refer to the MAX20303 data sheet and the data sheet for your battery to ensure compatibility.

Programming and Debugging

The MAX32625 microcontroller on the board is flashed with DAPLink firmware at the factory. It allows debugging and flashing the MAX32655 Arm Core over USB.

Pushbuttons

There are six pushbuttons on the MAX32655FTHR board:

SW1 PMIC Power Button

When the board is powered on state, pressing this button for 12 seconds performs a hard power-down.

When the board is in a powered-off state, pressing this button powers on the board.

This button can also be read by MAX32655 firmware, PMIC_PFN2 signal connected to Port 0.13 is a buffered input of the button status. When the button is pressed, this signal goes to a logic-low state.

SW2 User-programmable function button connected to MAX32655 Port 0.2 through a debouncer IC.

SW3 User-programmable function button connected to MAX32655 Port 0.3 through a debouncer IC.

SW4 Wake-up button connected to MAX32655 Port 3.1.

SW5 Resets the MAX32655 through RSTN input of the MAX32655.

SW6 DAPLink adapter button. Keep this button pressed while applying power to the board to put the MAX32625 DAPLink adapter on board to MAINTENANCE mode for DAPLink firmware updates.

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LEDs

There are three RGB LEDs on the MAX32655FTHR board:

- D1 Connected to the MAX32655FTHR GPIO ports. This LED can be controlled by user firmware.
 - Port 0.18: Red color
 - Port 0.19: Green color
 - Port 0.26: Blue color

- D2 Connected to MAX20303 PMIC LEDx outputs. These LEDs can be controlled through I²C commands. They also can be configured as charge status indicators by issuing I²C commands.
- D3 DAPLink adapter MAX32625 status LED. Controlled by the DAPLink adapter and cannot be used as a user LED.

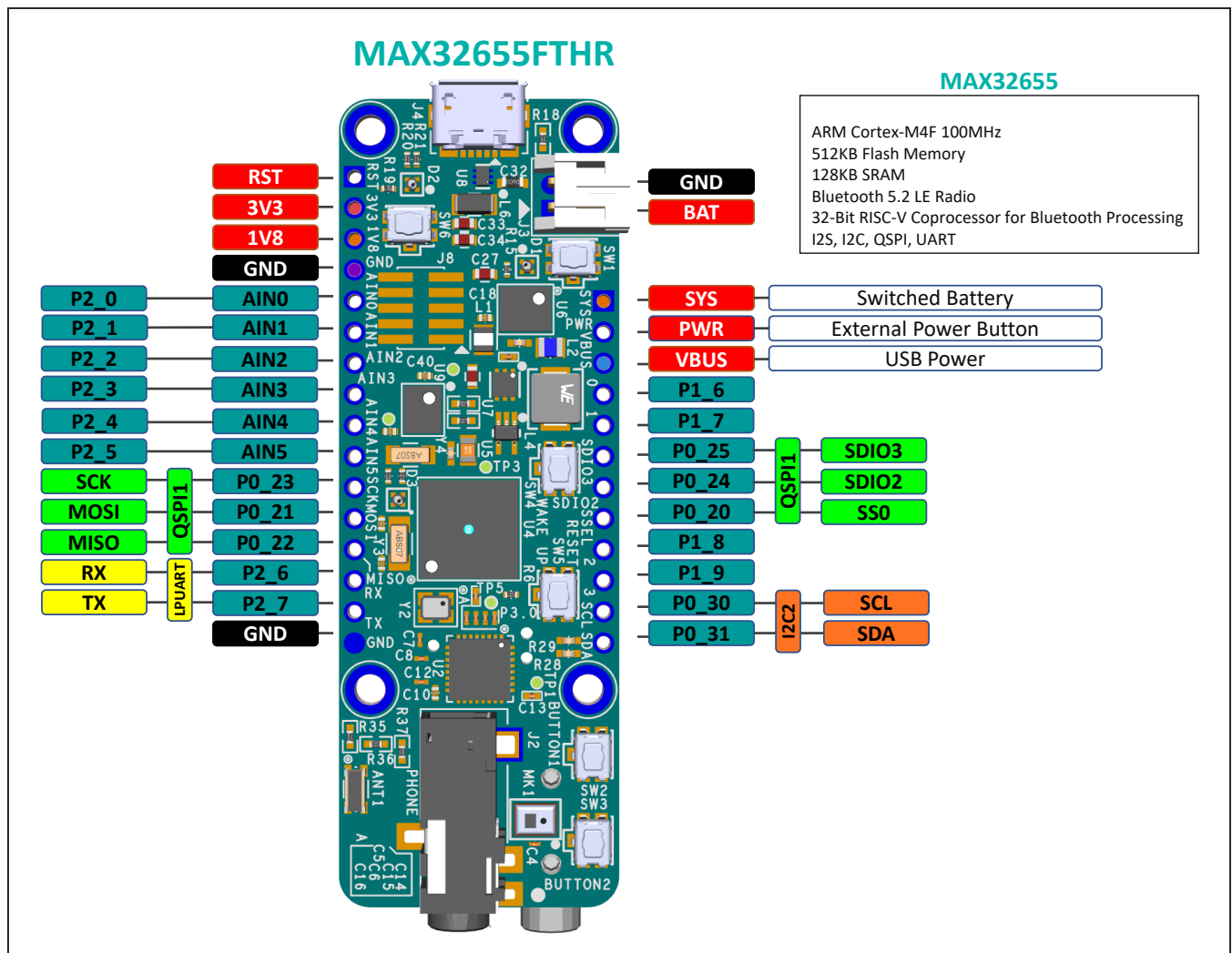


Figure 1. MAX32655FTHR Pinout Diagram

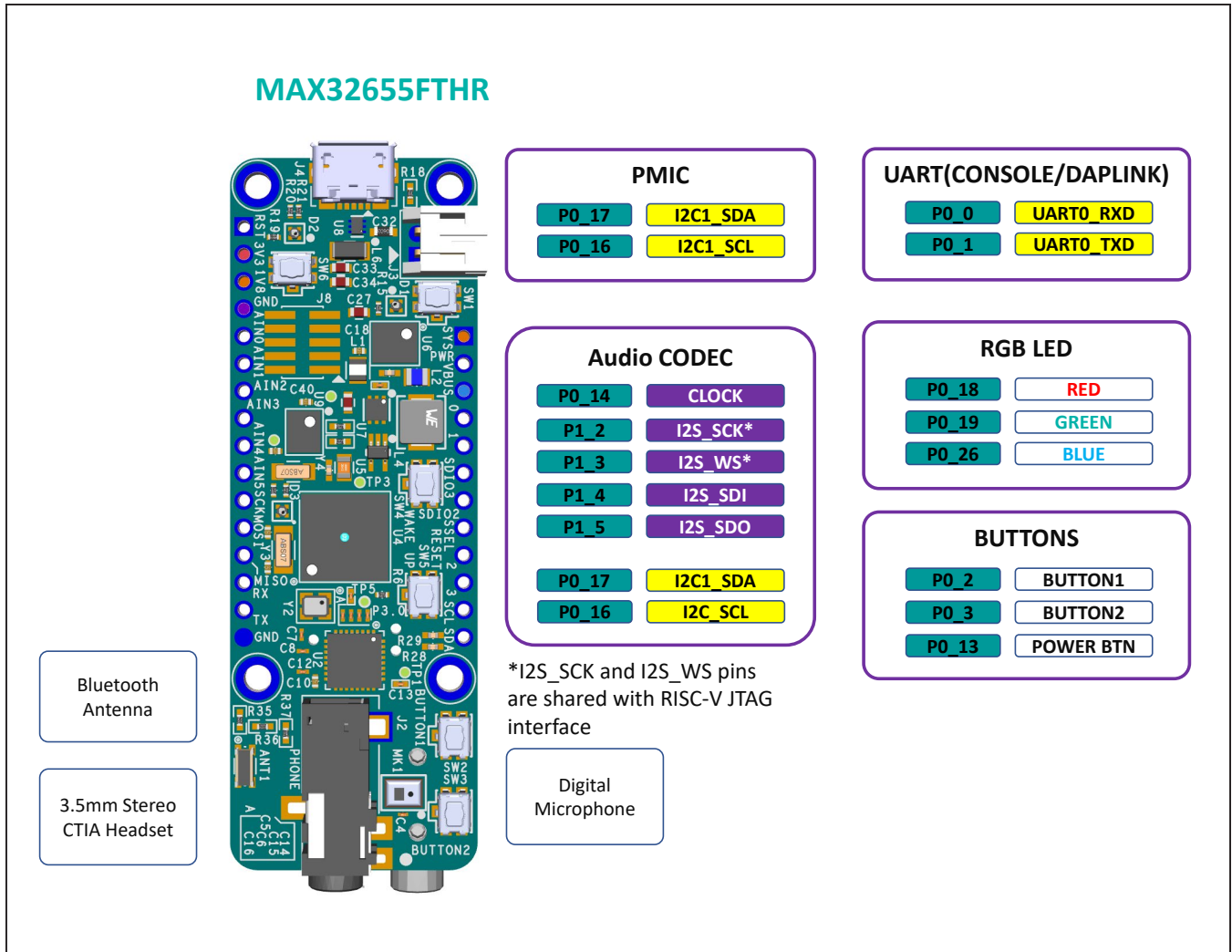


Figure 2. MAX32655FTHR Top Side Components

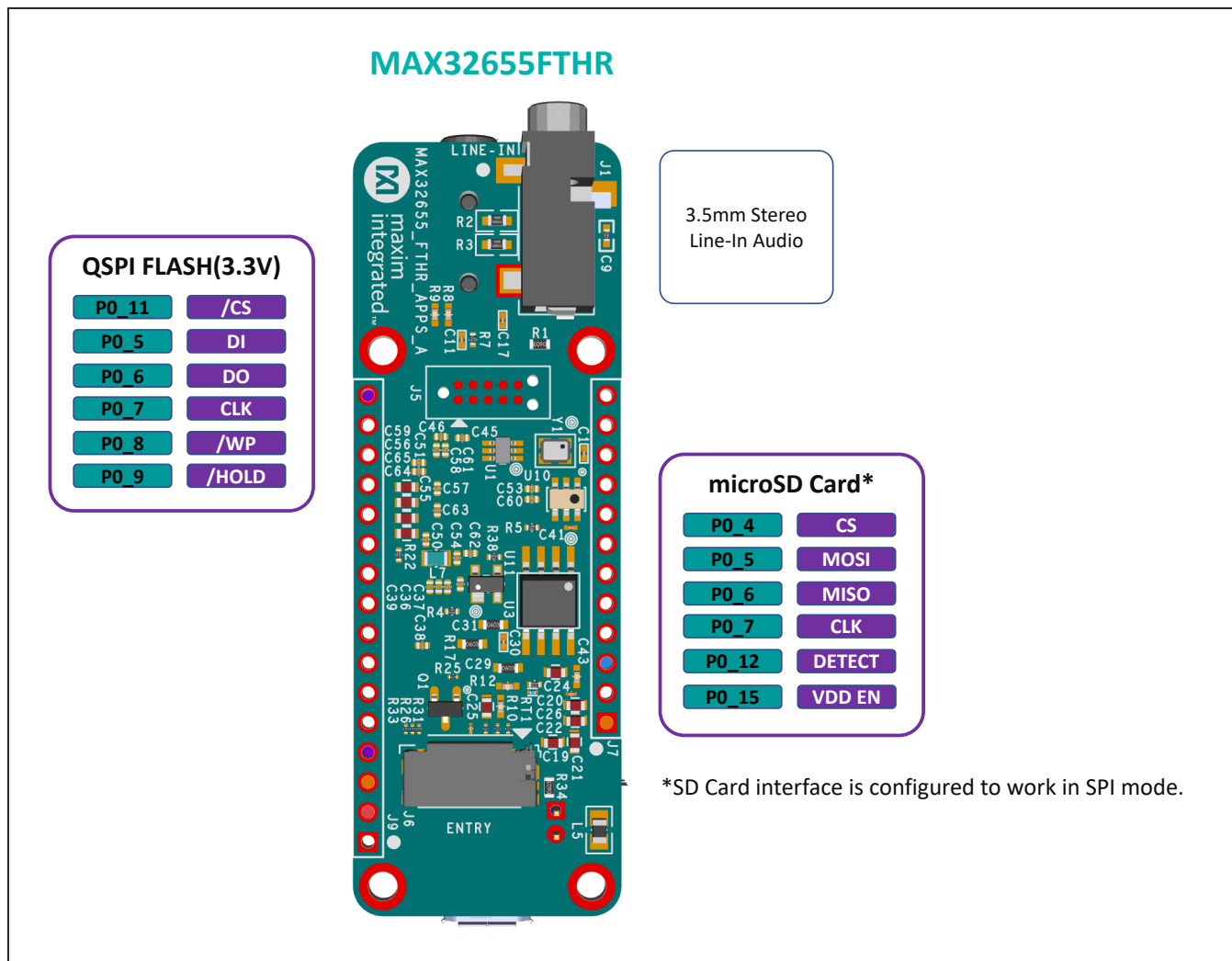


Figure 3. MAX32655FTHR Bottom Side Components

Expansion Headers

Table 1. J9 Pinout

PIN	NAME	DESCRIPTION
1	RST	Master Reset Signal
2	3V3	3.3V Output. Typically used to provide 3.3V to peripherals connected to the expansion headers.
3	1V8	1.8V Output. Typically used to provide 1.8V to peripherals connected to the expansion headers.
4	GND	Ground
5	P2_0	GPIO or Analog Input (AIN0 channel)
6	P2_1	GPIO or Analog Input (AIN1 channel)
7	P2_2	GPIO or Analog Input (AIN2 channel)
8	P2_3	GPIO or Analog Input (AIN3 channel)
9	P2_4	GPIO or Analog Input (AIN4 channel)
10	P2_5	GPIO or Analog Input (AIN5 channel)
11	P0_23	GPIO or QSPI1 clock signal.
12	P0_21	GPIO or QSPI1 MOSI signal.
13	P0_22	GPIO or QSPI1 MISO signal.
14	P2_6	GPIO or LPUART RX signal
15	P2_7	GPIO or LPUART TX signal
16	GND	Ground

Table 2. J7 Pinout

PIN	NAME	DESCRIPTION
1	SYS	SYS Switched Connection to the Battery. This is the primary system power supply and automatically switches between the battery voltage and the USB supply when available.
2	PWR	Turns of the PMIC if shorted to Ground for 13 seconds. Hard power-down button.
3	VBUS	USB VBUS Signal. This can be used as a 5V supply when connected to USB. This pin can also be used as an input to power the board, but this should only be done when not using the USB connector since there is no circuitry to prevent current from flowing back into the USB connector.
4	P1_6	GPIO
5	P1_7	GPIO
6	P0_25	GPIO or QSPI1 SDIO3 signal.
7	P0_24	GPIO or QSPI1 SDIO2 signal.
8	P0_20	GPIO or QSPI1 slave select signal.
9	P1_8	GPIO
10	P1_9	GPIO
11	P0_30	GPIO or I2C2 SCL signal.
12	P0_31	GPIO or I2C2 SDA signal.

Ordering Information

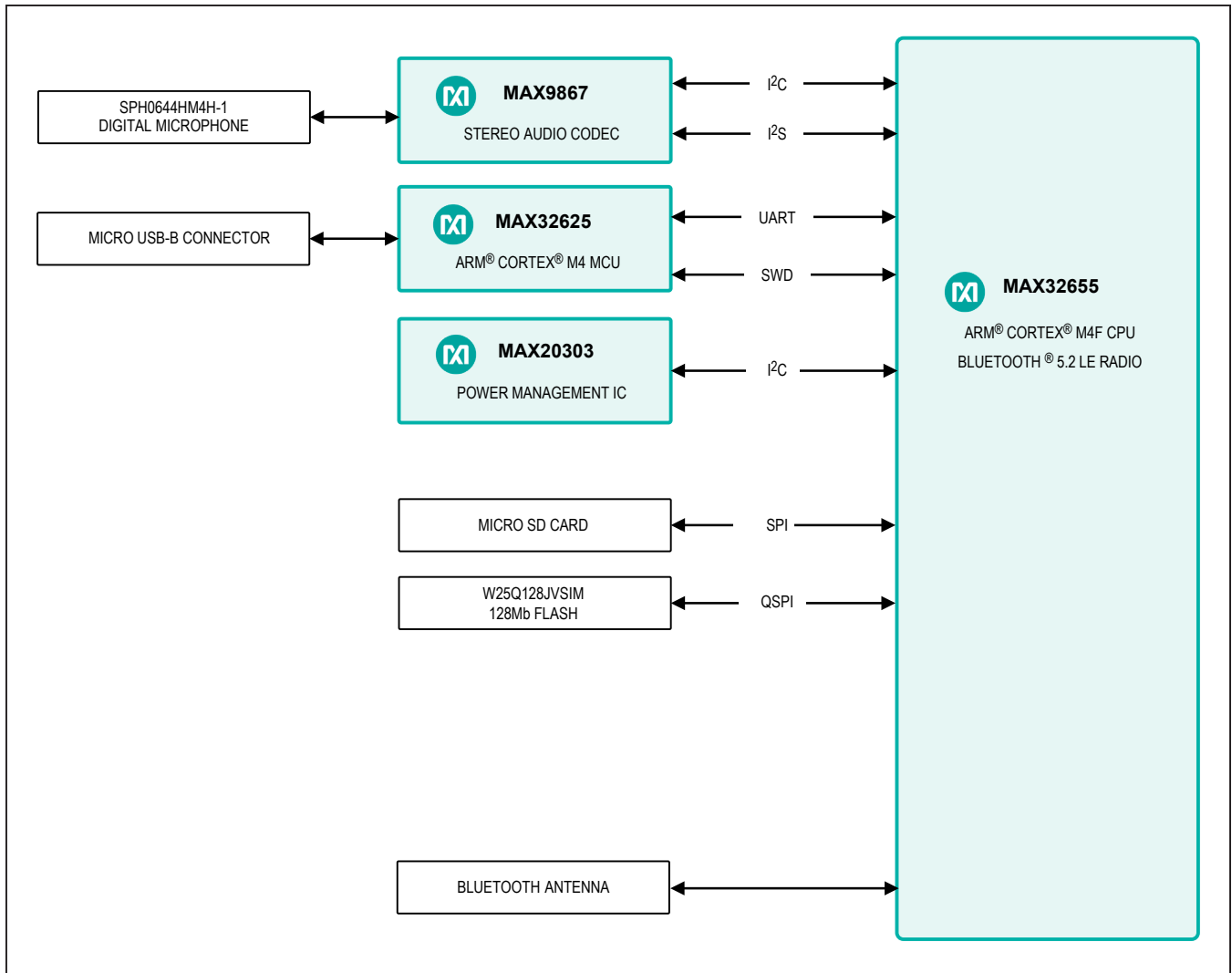
PART	TYPE
MAX32655FTHR#	Application Platform

#Denotes RoHS compliance.

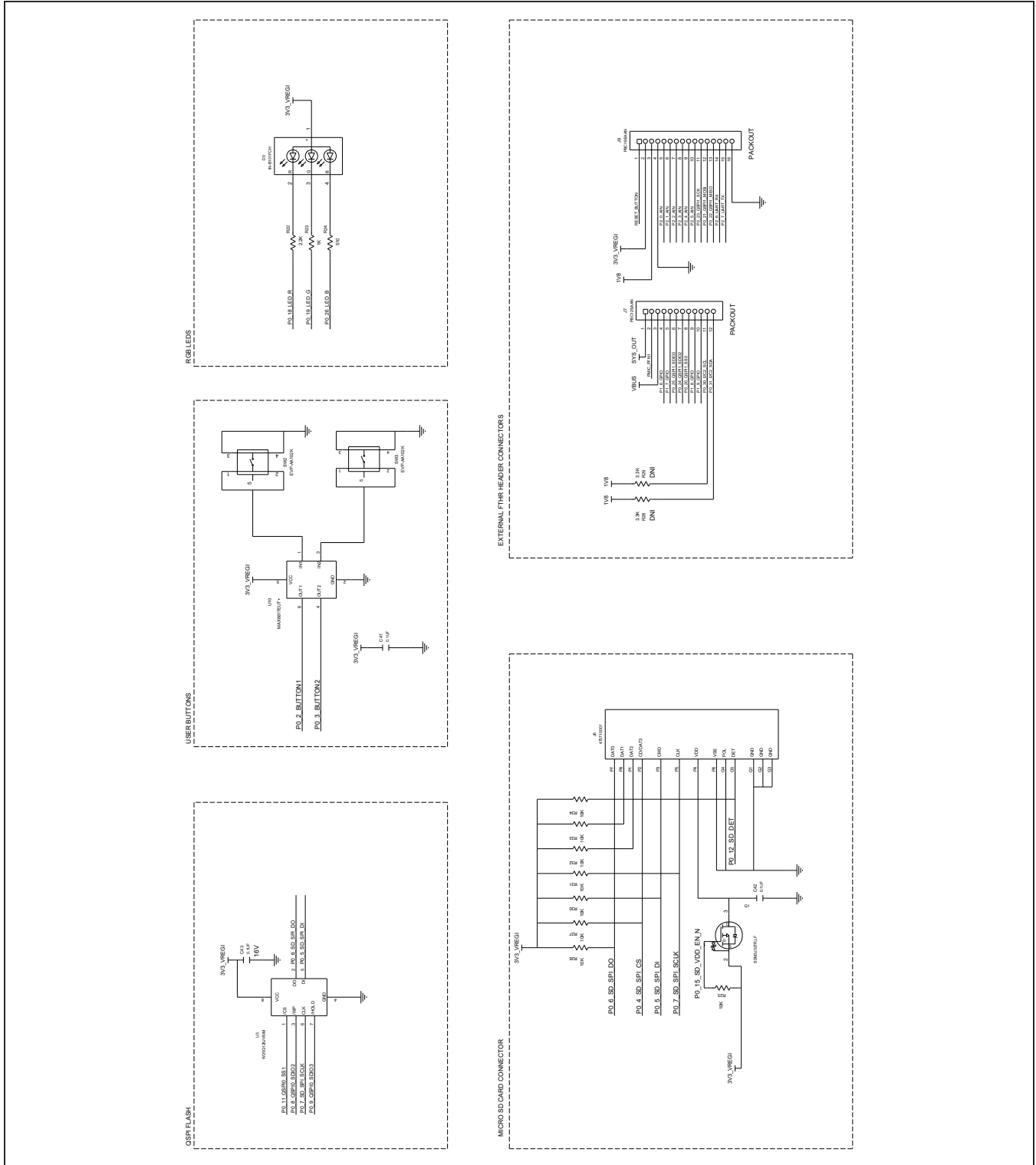
MAX32655FTHR EV Kit Bill of Materials

ITEM	REF_DES	DN/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	ANT1	-	1	2450AT18D0100	JOHANSON TECHNOLOGY	2.45GHZ	ANTENNA
2	C1, C4, C5, C20, C28, C30	-	6	GRM033R61C104K	MURATA	0.1UF	CAP SMT (0201) 0.1UF 10% 16V X5R CERAMIC
3	C6	-	1	GRM033R61A225KE47	MURATA	2.2UF	CAP SMT (0201) 2.2UF 10% 10V X5R CERAMIC
4	C7, C8, C11-C17	-	9	GRM033R61A105ME15	MURATA	1UF	CAP SMT (0201) 1UF 20% 10V X5R CERAMIC
5	C9, C10, C18, C35-C40	-	9	C0402C105K8PAC	KEMET	1UF	CAP SMT (0402) 1UF 10% 10V X5R CERAMIC
6	C19, C21-C24, C29, C31	-	7	C1608X5R1A226M080AC	MURATA	22UF	CAP SMT (0603) 22UF 20% 10V X5R CERAMIC
7	C25, C27	-	2	C1608X5R1E225K	TDK	2.2UF	CAP SMT (0603) 2.2UF 10% 25V X5R CERAMIC
8	C26	-	1	C1608X5R1E475K080AC	TDK	4.7UF	CAP SMT (0603) 4.7UF 10% 25V X5R CERAMIC
9	C32, C34	-	2	GMK107BJ105KA	TAIYO YUDEN	1.0UF	CAP SMT (0603) 1.0UF 10% 35V X5R CERAMIC
10	C33	-	1	C1608X8R1E104K080AA	TDK	0.1UF	CAP SMT (0603) 0.1UF 10% 25V X8R CERAMIC
11	C41, C42	-	2	C0603X5R1A104K030BC	TDK	0.1UF	CAP SMT (0201) 0.1UF 10% 10V X5R CERAMIC
12	C43, C44, C55, C61	-	4	C1005X7R1C104K050BC	TDK	0.1UF	CAP SMT (0402) 0.1UF 10% 16V X7R CERAMIC
13	C45, C46	-	2	GJM1555C1H160GB01	MURATA	16PF	CAP SMT (0402) 16PF 2% 50V C0G CERAMIC
14	C49, C51, C53, C54, C57, C58, C60, C62, C63	-	9	CL05A105K05N0N	SAMSUNG	1UF	CAP SMT (0402) 1UF 10% 16V X5R CERAMIC
15	C50	-	1	GRM15XR71C332KA86	MURATA	3300PF	CAP SMT (0402) 3300PF 10% 16V X7R CERAMIC
16	C52	-	1	CL21A476MQYNNN	SAMSUNG	47UF	CAP SMT (0805) 47UF 20% 6.3V X5R CERAMIC
17	C56, C59, C64, C65	-	4	C1608X5R0J226M080AC	TDK	22UF	CAP SMT (0603) 22UF 20% 6.3V X5R CERAMIC
18	D1-D3	-	3	IN-B101FCH	INOLUX		LED RGB SMD
19	J1	-	1	SJ-3523-SMT	CUI INC.		3.5MM AUDIO JACK
20	J2	-	1	SJ-43514-SMT	CUI INC.		3.5 MM AUDIO JACK
21	J3	-	1	S2B-PH-K-S(LF)(SN)	JST MANUFACTURING		DISCONNECTABLE CRIMP STYLE CONNECTOR
22	J4	-	1	47346-0001	MOLEX		MICRO USB B RECEPT BTM MOUNT ASSY
23	J6	-	1	475710001	MOLEX		MICRO-SD CARD HEADER WITH DETECT SWITCH
24	L1, L2	-	2	DFE201612E-2R2M	MURATA	2.2UH	INDUCTOR SMT (0806) WIREWOUND CHIP 2.2UH TOL=+/-20% 1.8A
25	L4	-	1	74437324022	WURTH ELECTRONICS INC	2.2UH	INDUCTOR SMT SHIELDED 2.2UH 20% 3.25A
26	L5	-	1	BLM21PG221SN1	MURATA	220	SMT (0805) FERRITE-BEAD 220 TOL=+/-25% 0.2A
27	L6	-	1	HZ1206C202R-10	LAIRD TECHNOLOGIES	2000	SMT (1206) FERRITE-BEAD 2000 TOL=+/-25% 0.3A
28	L7	-	1	MLP2012H2R2MT0S1	TDK	2.2UH	INDUCTOR SMT (0805) FERRITE 2.2UH 20% 1A
29	MK1	-	1	SPH0644HM4H-1	KNOWLES ACOUSTICS		MICROPHONE
30	Q1	-	1	SSM3J327R.LF	TOSHIBA		FIELD-EFFECT TRANSISTOR SILICON P-CHANNEL MOS TYPE (U-MOS VI)
31	R1	-	1	CRCW0201100KFK	VISHAY DALE	100K	RES SMT (0201) 100K 1% +/-100PPM/DEGC 0.0500W
32	R2	-	1	RK73Z1JT	KOA SPEER ELECTRONICS INC	0	SMT (0603) 0 JUMPER
33	R4, R10, R12, R14, R16	-	5	ERJ-2RKF1002	PANASONIC	10K	RES SMT (0402) 10K 1% +/-100PPM/DEGC 0.1000W
34	R5, R6, R8, R9	-	4	CRCW04023R2FK	VISHAY DALE	33.2	RES SMT (0402) 33.2 1% +/-100PPM/DEGC 0.0630W
35	R7, R19, R22	-	3	CRCW04022K20FK	YAGEO PHICOMP	2.2K	RES SMT (0402) 2.2K 1% +/-100PPM/DEGC 0.0630W
36	R11, R13	-	2	CRCW04023K30FK	VISHAY DALE	3.3K	RES SMT (0402) 3.3K 1% +/-100PPM/DEGC 0.0630W
37	R15	-	1	ERJ-2RKF3902X	PANASONIC	39K	RES SMT (0402) 39K 1% +/-100PPM/DEGC 0.0630W
38	R17	-	1	CRCW060356K2FK	VISHAY DALE	56.2K	RES SMT (0603) 56.2K 1% +/-100PPM/DEGC 0.1000W
39	R18	-	1	ERJ-2RKF1004	PANASONIC	1M	RES SMT (0402) 1M 1% +/-100PPM/DEGC 0.1000W
40	R20, R23	-	2	ERJ-2GEJ102	PANASONIC	1K	RES SMT (0402) 1K 5% +/-200PPM/DEGC 0.1000W
41	R21, R24	-	2	ERJ-2RKF5100	PANASONIC	510	RES SMT (0402) 1% 510 +/-100PPM/DEGC 0.1000W
42	R25-R27, R30-R34	-	8	CRCW020110K0FK	VISHAY DALE	10K	RES SMT (0201) 10K 1% +/-100PPM/DEGC 0.0500W
43	R36	-	1	ERJ-2GEOR00	PANASONIC	0	RES SMT (0402) 0 JUMPER 0.1000W
44	R38	-	1	RCC-0402PW1001F	INTERNATIONAL MANUFACTURING SERVICE	1K	RES SMT (0402) 1K 1% +/-
45	RT1	-	1	NCP03XH103J05	MURATA	10K	THERMISTOR SMT (0201) 10K OHM TOL=+/-5%
46	SW1-SW6	-	6	EVP-AA102K	PANASONIC		LIGHT TOUCH SWITCH
47	U1	-	1	NC7WZ17P6X	FAIRCHILD SEMICONDUCTOR		TINY LOGIC UHS DUAL BUFFER WITH SCHMITT TRIGGER INPUT
48	U2	-	1	MAX9867ETJ+	MAXIM		ULTRA-LOW POWER STEREO AUDIO CODEC
49	U3	-	1	W25Q128JVSIM	WINBOND ELECTRONICS		128-BIT SERIAL FLASH MEMORY WITH DUAL/QUAD SPI and QPI and DTR
50	U4	-	1	MAX32655GXG+	MAXIM		LOW-POWER ARM CORTEX-M4F MICROCONTROLLER WITH BLUETOOTH 5 FOR WEARABLES
51	U6	-	1	MAX20303BEWN+	MAXIM		WEARABLE POWER MANAGEMENT SOLUTION
52	U7	-	1	MAX38643AELT+	MAXIM		Buck Switching Regulator IC Positive Adjustable 0.7V 1 Output 700mA 6-WDFN
53	U8	-	1	MAX13202EALT+	MAXIM		2-CHANNEL +/-30KV ESD PROTECTOR
54	U9	-	1	MAX32625WY+	MAXIM		HIGH-PERFORMANCE CORTEX-M4F MICROCONTROLLER FOR WEARABLES
55	U10	-	1	MAX6817EUT+	MAXIM		+/-15KV ESD-PROTECTED DUAL CMOS SWITCH DEBOUNCERS
56	U11	-	1	MAX6816EUS+	MAXIM		Supervisory Circuits A +/- 15kV ESD-Protected, Single/Dual/Octal, CMOS Switch Debouncers
57	U5	-	1	SN74LVC1G07DCK	TEXAS INSTRUMENTS		SINGLE BUFFER/DRIVER WITH OPEN DRAIN OUTPUT
58	Y1	-	1	SG-210STF 12.2880ML	EPSON	12.2880MHZ	CRYSTAL SMT 2.5MMX2MM 15PF 12.2880MHZ +/-50PPM
59	Y2	-	1	FA-20H 32.0000MF12Y-W3	EPSON	32MHZ	CRYSTAL SMT 2.5MMX2MM 32MHZ +/-10PPM
60	Y3, Y4	-	2	ABS07-32.768KHZ-6-T	ABRACON	32.768KHZ	SMT 6PF 32.768KHZ +/-20PPM
61	PCB	-	1	MAX32655_FTHR_APPS_P1	MAXIM		PCB
62	C47, C48	DNP	2	GRM1555C1H6R0BA01	MURATA	6PF	CAP SMT (0402) 6PF +/-0.01PF 50V C0G CERAMIC
63	J5	DNP	1	TC2050-IDC-NL	TAG-CONNECT		10-PIN NO-LEGS CABLE WITH RIBBON CONNECTOR
64	J8	DNP	1	FTSH-105-01-L-DV-K	SAMTEC		0.05 (1.27MM) SMT MICRO HEADER
65	R3	DNP	1	RK73Z1JT	KOA SPEER ELECTRONICS INC	0	RES SMT (0603) 0 JUMPER
66	R28, R29	DNP	2	CRCW04023K30FK	VISHAY DALE	3.3K	SMT (0402) 3.3K 1% +/-100PPM/DEGC 0.0630W
67	R35, R37	DNP	2	ERJ-2GEOR00	PANASONIC	0	RES SMT (0402) 0 JUMPER 0.1000W
68	J7	DNI	1	PBC12SAAN	SULLINS ELECTRONICS CORP.		CONNECTOR MALE THROUGH HOLE BREAKAWAY STRAIGHT 12PINS
69	J9	DNI	1	PBC16SAAN	SULLINS ELECTRONICS CORP.		CONNECTOR MALE THROUGH HOLE BREAKAWAY STRAIGHT 16PINS

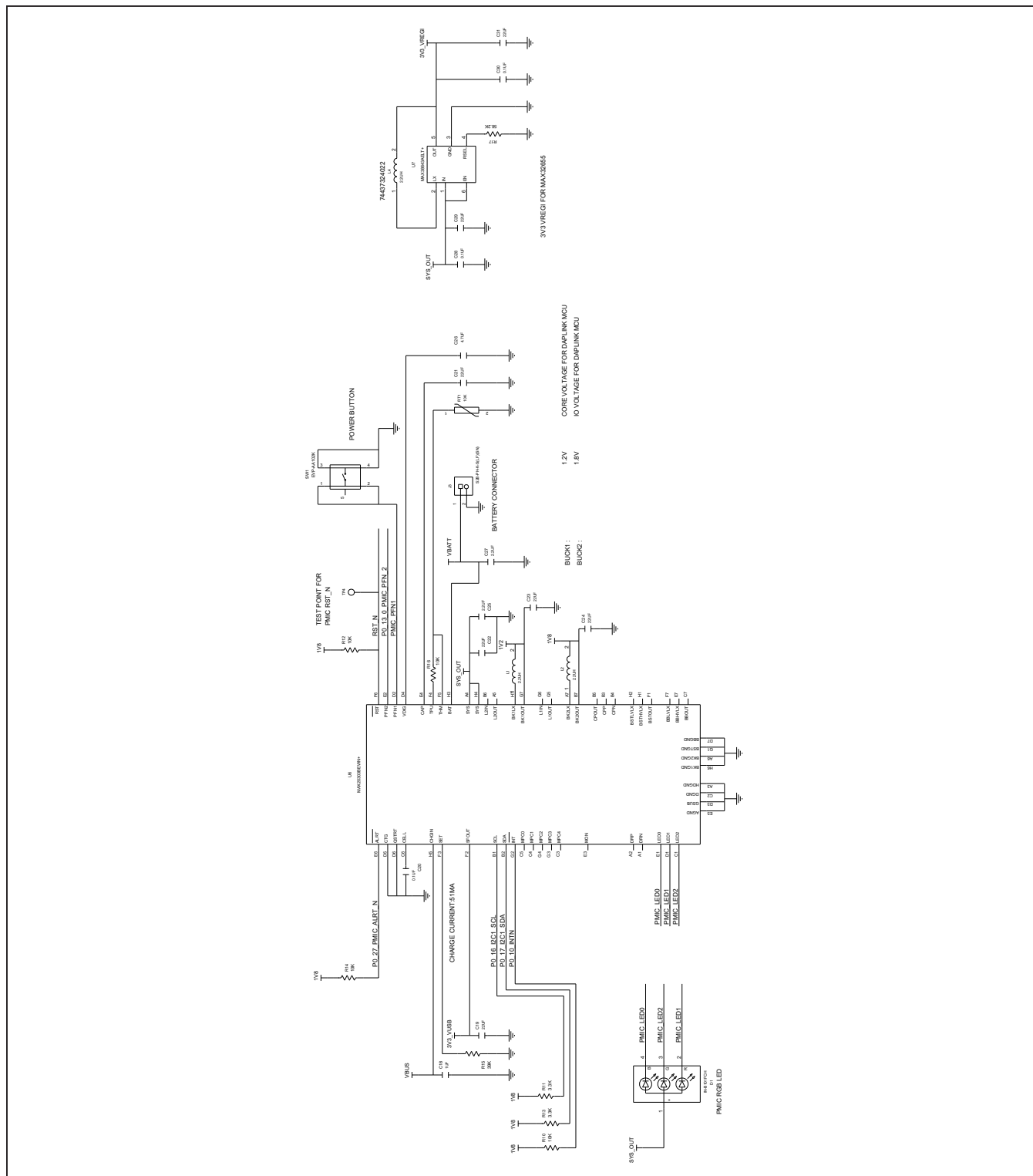
MAX32655FTHR Application Platform Diagram



MAX32655FTHR Application Platform Schematic (continued)



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