

Description

This user's guide provides detailed testing instructions for the BQ25190 evaluation module (EVM). Also included are descriptions of the necessary equipment, equipment setup, procedures, the printed-circuit board layouts, schematics, and the bill of materials (BOM).

Throughout this user's guide, the abbreviation *EVM*, *BQ25190EVM*, and the term evaluation module are synonymous with the BQ25190 evaluation module, unless otherwise noted.

Get Started

- 1. Order the BQ25190EVM
- 2. Order the USB2ANY
- 3. Follow this step-by-step guide.

1 Features

This EVM has the following features:

- 1-A Linear battery charger
- I2C Configurable Battery Regulation voltage with 0.5% Accuracy
- Configurable Termination Current down to 0.5 mA
- Programmable thermal charging profile with configurable Hot, Warm, Cool, and Cold thresholds
- Power Path Management for powering the system and charging the battery
 - 15-nA shutdown mode for longest shelf life
- 12-bit, 7-Channel ADC
- Integrated Buck converter with DVS output
- Integrated Buck-Boost converter with DVS output
- Power Sequencing
- Two integrated I2C programmable LDOs
- One Button Wake-up and Reset Input with Adjustable Timers
- I2C Communication control
- Four GPIO lines with LED PWM driver

See the device datasheet for detailed features and operation of the integrated IC

Applications

- Smartwatches and other wearable devices
- Portable Medical Equipment
- Smart Trackers
- · Retail automation and payment



BQ25190EVM Hardware Board

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WARNING

Hot surface! Contact may cause burns. Do not touch!

Some components may reach high temperatures >55°C when the board is powered on. The user must not touch the board at any point during operation or immediately after operating, as high temperatures may be present.

2 Introduction

The BQ25190EVM is an evaluation kit for the BQ25190 integrated battery charge management IC. The BQ25190 is an integrated battery charge management IC that integrates the most common functions for wearable devices: linear charger, regulated output, manual reset with timer, and ship mode function.

3 EVM Setup

Table 3-1 lists the jumper connections and the jumper description. Table 3-2 lists the recommended operating conditions.

Jumper Name	Description
J1	VIN and GND Connector. Input voltage from external power supply. Recommended voltage is 3V - 18V
J2	VBAT and GND connector.
J3	External LDO Power Selection. The source for this external LDO can be configured to VIN, VBAT, or connected directly
	to another source
J4	USB-C Connection. Configured for 5V and 1A Source.
J5	SYS Rail and GND Connection.
J6	LSLDO1 Rail and GND Connection
J7	VINLS1 connection. Populate to connect VINSL1 to SYS.
J8	BUCK Rail and GND Connection
J9	/CE Pull-up to VIO. Populate to pull /CE high, leave floating to pull /CE low.
J11	BUCK-BOOST Rail and GND Connection
J12	LSLDO2 Rail and GND Connection
J13	Sense Line headers for voltage reading.
J14	VIO / VPU Rail Selector. Select between BUCK, SYS, or BUCK-Boost Rails to power VIO or VPU. Short R7 to select the External LDO.
J15	Battery Pack Connector. Battery connection using JST header
J16	VINLS2 connection. Populate to connect VINLS2 to SYS
J22	TS Potentiometer Connection
J23	ADC Input Connection. Select between a potentiometer input or Buck-Boost Rail input
J24,J25,J26,J27	GPIO Pull up connections. Populate to pull up GPIO voltages, leave floating to pull GPIOs low
J28	SYS Indicator LED.
J29	I2C Pull up Rail. Populate to pull up the I2C lines to VIO
J30	USB2ANY Connector

Table 3-1. Jumper Descriptions





Table 3-2. Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
V _{BAT}	Battery Voltage Range			4.65	V
I _{IN}	Input Current Range (IN to SYS)			1.05	A
I _{BAT}	Fast Charge Current			1	A
	RMS Discharge Current (continuously)			1.5	A
	Peak Discharge Current (Up to 50ms)			2.5	A
V _{INLS1} /V _{INLS2}	LDO1/LDO2 Input Voltage Range	1.5		6	V
I _{OUT_BUCK}	Buck Output Current			600	mA
I _{OUT_BUBO}	Buck-boost Output Current ($V_{SYS} \ge 3.0V$, $V_{BBOUT} = 3.3V$)			600	mA
I _{OUT_LDO1} / I _{OUT_LDO2}	LDO1/LDO2 Output Current			200	mA
ТА	Operating Ambient Temperature Range	-40		85	°C
TJ	Operating Junction Temperature Range	-40		125	°C

GPIO Resistor Configuration

The GPIO Resistor configuration is populated for default device configuration but designed for flexibility. All GPIO signals have a 0 Ohm 0402 resistors that connect the GPIO signal to a Jumper-configurable resistor network. GPIO3 and GPIO4 additionally can be pulled up to VIO or SYS through J34. GPIO4 additionally can be used to exhibit PWM functionality through D1 diode, where pull up voltage can be attached at J35 and requires a resistor placed at R21.

VIO Selection

VIO serves as the digital pull-up rail for the EVM. Various rails can be selected as the rail intended for as the supply for this rail. J14 allows simple changing between Buck, Buck-Boost, or the SYS rail. An external LDO can



be used by populating R7, though J14 should be disconnected at this point. This external LDO input rail can be selected via the J3 header.

4 EVM Connectors and Test Points

Table 4-1 shows the default configuration for connectors.

Iabi	e 4-1. Factory Jumper Sett	ings
Jumper Name	Description	Setting
J1	VIN and GND	NA
J2	VBAT and GND	NA
J3	VIN, EXT LDO IN, and VBAT	NA
J4	USB-C Port	NA
J5	SYS and GND	NA
J6	LSLDO1 and GND	NA
J7	VINLS1 and SYS	Connected
J8	BUCK and GND	NA
J9	/CE and Pull-Up Res	Connected
J11	BUCK-BOOST and GND	NA
J12	LSLDO2 and GND	NA
J13	Sense Lines	NA
J14	VIO / VPU Selector	Connect to BBOUT
J15	Battery Pack	NA
J16	VINLS2 and SYS	Connected
J22	TS Potentiometer	Connected
J23	ADC Input	NA
J24,J25,J26,J27	GPIO Pull Up	NA
J28	SYS LED Indicator	NA
J29	I2C Pull-Up	NA
J30	USB2ANY	NA
J34	GPIO3 and GPIO 4 Pull up	Connected to VIO

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Note

Connecting the SYS LED, I2C Pull-Up, External LDO, and other hardware will increment current consumption readings.

4.1 USB2ANY Debug

USB2ANY Debug

USB2ANY under some circumstances may not respond to the GUI. To resolve this you can proceed with resetting the USB2ANY device. This is done by first installing and opening the USB2ANY Explorer Software. With the software open, press and hold the S1 switch and connect the USB2ANY via USB cable. The software should provide procedure to re-flash the device. More information about the USB2ANY is available.

5 Testing Procedures

5.1 Equipment

This section includes a list of supplies required to perform tests on this EVM

- 1. Two Power Supplies: Keithley 2400 Powersupply or equivalent
 - a. Power Supply #1 (PS #1) will be used as input voltage
 - b. Power Supply #2 (PS #2) will be used as battery voltage
- 2. 4 Channel Oscilloscope: To monitor voltages at VIN, VBAT, VSYS and BUCK
 - a. Channel 1 (SC #1) will be used to probe VIN
 - b. Channel 2 (SC #2) will be used to probe VBAT
 - c. Channel 3 (SC #3) will be used to probe VSYS
 - d. Channel 4 (SC #4) will be used to probe BUCK
- 3. Computer: A computer with at least one USB port and a USB cable
- 4. PC communication interface: USB2ANY with the latest firmware
- 5. Software: Download the TI Charger GUI from Texas Instruments.

5.2 Charge Mode

Connect the equipment as the following:

- Power Supply PS#1: VIN of the BQ25190 at 5V
- Power supply PS#2: VBAT of the BQ25190 at 3.7V
- Scope Channel SC#1: VIN
- Scope Channel SC#2: VSYS
- Scope Channel SC#3: VBAT
- Scope Channel SC#4: BUCK

Depopulate the /CE Pull-up jumper and ensure the TS jumper is placed for fixed TS resistor. Turn ON the supply PS#2, then turn ON the supply PS#1. The VSYS will rise to the level of 4.5V. BUCK should rise to the level of





1.85V. The device will begin to charge as long as the TS is left at default configuration and there are no other faults.



Figure 5-1. BQ25190 EVM Connections

To adjust the charge current or change other parameters, connect the USB2ANY to the EVM and then startup TI Charger GUI.

Note

If the supplies (VIN and VBAT) are turned off, you will need to restart the TI Charger GUI for correct I²C transactions to be reflected in the TI Charger GUI

7



Yease choose your device	Q. Search	Device	
vailable Devices			
BQ25181 The BQ25181 is a 1A 1-cell Li-ion linear charger with regulated power path management in a small 10-pin QFN package. Highly configurable via 12C with ultra low IQ modes for optim	BQ2519x The B02519x is a highly integrated battery management unit that integrates a linear charger with PowerPath, a Buck converter, a buck-boost converter, and two LDOs, manual res	BQ25720 (SMBus interface) The BQ25720 buck-boost charge controller supports 1-4 cell battery charging with NVDC from a wide range of input sources and voltages.	BQ25180 The BQ25180 is a 1A, 1-cell fully programmable Linear Batte Charger IC focusing on ultra small solution size and low quiescent current for optimal battery life.
Power Path Low IDDQ 12C Protections	Integration Efficiency ADC	Power Path Efficiency SELECTDEVICE 0 KNOW MORE 0	Power Path Low IDDQ Programability
BQ25790	BQ25792	BQ25798	BQ25672
The BQ25790 is a fully integrated, switch-mode, buck-boost charger for 1-4 cell Li-ion batteries and Li-polymer batteries.	The BQ25792 is a fully integrated, switch-mode, buck-boost charger for 1-4 cell Li-ion batteries and Li-polymer batteries.	The BQ25798 is a fully integrated, switch-mode, buck-boost charger for 1-4 cell LHon batteries and Li-polymer batteries.	The BQ25672 is a fully integrated, switch-mode, buck charge for 1-4 cell LHon batteries and LHpolymer batteries.
Integration Efficiency ADC	Integration Efficiency ADC	Integration Efficiency MPPT	Integration Efficiency ADC
BQ24725A	BQ2416x	BQ2425x	BQ24190 BQ24192 BQ241921
The BQ24725A is a switch-mode, buck charge controller for 1- 4 cell LHon batteries.	The BQ2416x is a highly integrated single-cell Li-ion battery charger and system power path management devices targeted for space-limited, portable applications with high	The BQ2425x is a highly integrated single-cell Li-ion battery chargers and system power-path management devices targeted for space-limited, portable applications with high	The bq24190/bq24192/bq241921 is a highly-integrated switch-mode battery charge management and system powe path management devices for single cell Li-lon and Li-polym
Efficiency Programmability	Integration Efficiency Power Path	Integration Efficiency	Integration Efficiency Power Path
SELECT DEVICE O KNOW MORE O			
			B005790 B005791

Figure 5-2. TI Charger GUI Device Selection



Select the BQ2518X from the charger selection. Click Quick Start or Register Map.

Analo	g EVM File Options Tools Zoom Help	_ @ ×
= "	enu	
• • •	BQ2519x Not Connected and an Description of a start of the start of	CUICK LINKS Register Conferences NOMELOGE BASE
*		El CS Des Sees. See Sees. ESE Frank
		QUECTIP Averys are electrical givens and make save your convection is grounded. Everare of electrical circuit damages.
R co	Hardware nat Connected Please nam your Taront Device into your computer's USB nort and cick the Connect icon at left	Forward By SUI Comments

Figure 5-3. BQ25190EVM Connected

The Quick Start is shown in Figure 5-4

4	Quick Start									Auto Read Off	 ✓ REA 	AD ALL REG	Write P	Mode Immediate V	WHITE REGISTE
Quic	ck Start														
١	TS_STAT	Normal		CHG_STAT	Not Charging	VBATREG	3500 \$	mV	CHG_DIS	ICHG	5 mA	*	ITERM	Disabled ~	
4	SEQUENCE_DELAY	1 ms	~	WATCHDOG_SEL	160s SW Rei 🗸 🗸	HOST_HW_RESET_			REG_RST	EN_RST_SHIP	No Effect	~	SYS_REG_CTRL	VBAT + 225+ 🐦	
5	SYS_MODE	VIN or VBJ	a ~	DEVICE_ID	0.000	DEV_REV	0.000								

Figure 5-4. Quick Start



The register map is shown in Figure 5-5.

Register Man										A	do Road	or		v	READ RE	ISISTER .	READ A	L REGISTERS	MYTE REGISTER		antes In	mediate Write
Rearch Dealsters for earns or address (fix)															e e e e e e e e e e e e e e e e e e e	and shake		how RPc				
										E	10] 04400				FIELD VIEW	N		
Register Name	Address	Value	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	VBAT			
STAT2	0x02	0x00000									0	0	0	0	0	0	0	0		TURATECOL	ei.	
STATE	0x03	0x0000									0	0	0	0	0	0	0	0	10022310X7 100	1 / Yahina aga		
FLADS	0x04	0x0000									0	0	0	0	0	0	0	0	VBATREG			4100 Φ
FLAG1	0x05	0x0000									0	0	0	0	0	0	0	0				
FLAG2	0x05	0x0000									0	0	0	0	0	0	0	0				
FLAGI	0x07	0x0000									0	0	0	0	0	0	0	0				
MASKD	0x08	0x0000									0	0	0	0	0	0	0	0				
MASK1	0x09	0x0000									0	0	0	0	0	0	0	0				
MASK2	0x0A	0x000x0									0	0	0	0	0	0	0	0				
MASK3	0x08	0x0000									0	0	0	0	0	0	0	0				
VEAT	9 0x0C	0x003C									0	0	1	1	1	1	0	0				
ICHG_CTRL	0x0D	0x000x0									0	0	0	0	0	0	0	0				
CHARGECTRLD	0x0E	0x00000									0	0	0	0	0	0	0	0				
CHARGECTRL1	0x0F	0x0000									0	0	0	0	0	0	0	0				
IC_CTRL	0x10	0x0000									0	0	0	0	0	0	0	0				
TMR_JUM	Coc11	0x00000									0	0	0	0	0	0	0	0				
SHIP_RST	0x12	0x0000									0	0	0	0	0	0	0	0				
SYS_REG	Ox13	0x0000									0	0	0	0	0	0	0	0				
TS_COLD	0x14	0x00000									0	0	0	0	0	0	0	0				
TS_COOL	0x15	0x00000									0	0	0	0	0	0	0	0				
TS_WARM	0x16	0x0000									0	0	0	0	0	0	0	0				
TS_HOT	0x17	0x0000									0	0	0	0	0	0	0	0				
ADCCTRL0	Ox18	0x00000									0	0	0	0	0	0	0	0				
ADCCTRL1	0x19	0x0000									0	0	0	0	0	0	0	0				
ADCCTRL2	0x1A	0x0000									0	0	0	0	0	0	0	0				
ADC_DATA_VBAT	0x1B	0x0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Figure 5-5. Register Map

The Charger page provides charging, TS, and MR related configurations.

rger Controls									
VBATREG	4100 \$	mV	CHG_DIS			ICHG	5 mA	~	
VDPPM_DIS			IPRECHG	Precharge -	~	ITERM	Disabled	~	
VINDPM	4.2 V	~	THERM_REG	100 °C	~	IBAT_OCP	500 mA	*	
BAT_DEPL	2.0	v	IBATSC	8 mA	~	VLOWV_SEL	3 V	~	
VRECHG	100 mV	~	ILIM	25 mA	~	VIN_OVP	5.7 V	~	
Controls TS_COLD	0 ¢	mV	TS_COOL	0 ¢	mV	TS_WARM	0 0	mV	
TS_HOT	0 0	mV	TS_ACTION_EN			TS_FAULT_BAT_EN			
TS_FAULT_VIN_EN			TS_ICHG	0.5 x ICHG	~	TS_VREG	VREG - 100	~	
Controls									
	5	s	PB_LPRESS_ACTION	No Effect	~	WAKE1_TMR	125 mS	~	
MR_LPRESS									

Figure 5-6. Charger Page

The Status page provides the status bit indicators, flags, and masks.



Status					
TS,OPEN,STAT	TS_STAT Normal	ILIM, ACTIVE, STAT 🌒 INACTIVE	VDPPM, ACTIVE, ST 🌒 INACTIVE	VINDPM_ACTIVE_S. 🔵 INACTIVE	
THERMREG, ACTIV INACTIVE	ADC_DONE_STAT . NACTIVE	COMPLALARMUST . NACTIVE	COMP2_ALARM_ST . INACTIVE	COMPS_ALARM_ST 🔵 INACTIVE	
CHG_STAT Not Charging	SEQUENCE_PG_STA O NACTIVE	VIN_PODOD_STAT . NACTIVE	VIN_OVP_STAT	GPIO1_STAT . INACTIVE	
GPIO2_STAT . INACTIVE	GPICQ_STAT . NACTIVE	GPIO4_STAT	BATDEPL_FAULT_S.	TSHUT_STAT . INACTIVE	
Tiaga					
TSLOPENLFLAG . INACTIVE	TS_FLAG INACTIVE	IUM_ACTIVE_FLAG 🌒 INACTIVE	VOPPILACTIVE_R INACTIVE	VINDPM_ACTIVE_F. O INACTIVE	
THERWREG, ACTIV. O INACTIVE	WAKELFLAG . NACTIVE	WAKEZ, FLAG • NACTIVE	ADC,DONE,FLAG 🌒 INACTIVE	COMPLIALARMUR. O INACTIVE	
COMP2_ALARM_FL 🕚 INACTIVE	COMPLIALARM, FL 🕚 INACTIVE	SAFETY_TIMER_FA. 🔵 INACTIVE	CHG_FLAG INMETINE	SEQUENCE_PG_FL. 🔵 INACTIVE	
BUCK_DOP_FAULT INACTIVE	BUBO_CCP_FAULT_ O NACTIVE	LDO1_DCP_FAULT_ • NACTOR	LDD2_DCP_FAULT_ O INNETTIE	VIN, PODOD, FLAG 🕚 INACTIVE	
VIN,OVP,FAULT,FL 💿 INACTIVE	OPI01,FLAG	0PI02_FLAG INACTIVE	0PI03,FLA0 . INACTIVE	OPID4, PLAG	
SYS,SHORT,FAULT. INACTIVE	BATDEPL, FAULT, F. 🜒 NACTIVE	BAT, OCP, FAULT, F. 💿 INACTIVE			
Vasks					
TS,OPEN,MASK	TS,MASK	IJM, ACTIVE, MASK	VEPPM, ACTIVE, M.	VINDPM_ACTIVE	
TEGO INT MARY				100 0000 MINT 0	

Figure 5-7. Status Page

The Power rails page provides configurations related to the Buck, Buck-boost, and LDO rails.

দ Rails			Aut	o Read O	ff	READ ALL RE	EGISTERS	Write Mod	le Immediate	• Wi	ITE REGISTERS
Buck											
BUCK_VOUT_SET	0.0000 🗢	v	BUCK_VOUT1_SET	0.0000 \$	v	BUCK_VOUT2_SET	0.0000 😫	v	BUCK_VOUT3_SET	0.0000 🗢	v
BUCK_VOUT4_SET	0.0000 ¢	v	BUCK_HI_RANGE			BUCK_VRAMP_SPE.	. Instant	*	BUCK_EN_SET	A Sequencer	~
BUCK_PG_EN			BUCK_PG	INACTIVE							
Buck-Boost											
BUBO_VOUT_SET	1700 🗢	mV	BUBO_EN_SET	A Sequences	~	BUBO_PG_EN			BUBO_PG	INACTIVE	
BUBO_ILIMIT	Unlimited	~									
LD01											
LD01_LD0_SWITCH.	LDO Mode	~	LD01_V0UT_SET	800 \$	mV	LD01_EN_SET	A Sequencer	~	LD01_PG_EN		
LDO1_PG			LD01_SHIP_A0	Off in Shipm	~						
LD02											
LD02_LD0_SWITCH	LDO Mode	~	LD02_VOUT_SET	800 \$	mV	LD02_EN_SET	A Sequences	~	LD02_EN_PG	0	
LD02_PG	INACTIVE										

Figure 5-8. Power Rails Page

The Peripherals page provides configurations for timers and GPIO.



Peripherals	Auto Read Off	✓ READ A	LL REGISTERS	Write Mode	Immediate 🗸
ers					
TMR2X_EN		SAFETY_TIMER	3 Hours	÷	
WATCHDOG_SEL	160s SW Re: 🗸	AUTOWAKE	0.5 s	~	
WAKE1_TMR	125 mS 🗸 🗸	WAKE2_TMR	1 s	~	
WATCHDOG_15S_E	🖸				
0					
GPI01_CONFIG	Open-Drain I 🗸 🗸	GPI02_CONFIG	Open-Drain I	×	

Figure 5-9. Peripherals Page

The ADC page provides configurations and readings for the ADC and ADC Channels.

ADC Auto	reau Off	* READ ALL RE	Write M	immediate V	
DC_EN		ADC_RATE	Continuous 🗸	ADC_SAMPLE	11 bit Effecti 🗸
DC_AVG	Single Value 🗸	ADC_AVG_INIT	Existing Valu 🗸 🗸	ADC_COMP1_EN	
DC_COMP2_EN		ADC_COMP3_EN		ADC_COMP1	TDIE 🗸
DCIN_MODE	General Pur; 🗸	EN_CRIT_MON		ADC_COMP2	TDIE 👻
DC_COMP3	TDIE V	ADCALARM1	0 ¢	ADCALARM1_ABO	/E
DCALARM2	0 0	ADCALARM2_ABO	VE	ADCALARM3	0 10
DCALARM3_ABOV	re 🗆	IIN_ADC_DIS		VSYS_ADC_DIS	
BAT_ADC_DIS		VIN_ADC_DIS		VBAT_ADC_DIS	
S_ADC_DIS		ADCIN_ADC_DIS		TDIE_ADC_DIS	
Data					
DC_DATA_VBAT	0.00 mV	ADC_DATA_TS	0.00 mV	ADC_DATA_IBAT	0 mA
DC_DATA_ADCIN	0.00 mV	ADC_DATA_VIN	0.0 mV	ADC_DATA_VSYS	0.00 mV
DC_DATA_IIN	0.0 mA	ADC_DATA_TDIE	0.010		

Figure 5-10. ADC Page

5.3 Ship Mode

To go to Ship Mode, enable ship mode through an I²C transaction to set EN_SHIP_RST bits or the PB_LPRESS_ACTION bits as shown in Figure 5-11:

- EN_RST_SHIP = 2b01 (Enable shipmode with wake on button press or adapter insert)
- PB_PRESS_ACTION = 2b10 (Enable shipmode)

Enter ship mode by removing VIN if setting EN_RST_SHIP to 2b01. If setting PB_LPRESS_ACTION to 2b10 to enable shipmode, hold the TS/MR button for the configured t_{LPRESS} then remove VIN.

You will know you are in Ship Mode as the voltage on the SYS (SC#2) will fall to 0 V.

BQ2519x / SHIP_RST / EN_RST_SHIP[6:5]	0
EN_RST_SHIP	
Enable Shipmode	~

Figure 5-11. SHIP_RST Register



6 PCB Layouts

The images below show the EVM PCB layout.



Figure 6-1. TopLayer



Figure 6-3. Third Layer



Figure 6-2. Second Layer



Figure 6-4. Bottom Layer

7 Schematic

Figure 7-1 illustrates the EVM schematic.















Figure 7-3. BQ25190EVM Peripheral Circuits



Figure 7-4. BQ25190EVM Digital Connections





Figure 7-5. LDO for Other Peripherals



8 Bill of Materials

The table below lists the EVM bill of materials (BO

Table 8-1. Bill of Material

Designator	Quantity	Description	PartNumber	Manufacturer
!PCB1	1	Printed Circuit Board	BMS-067	Any
C1	1	Capacitor, Ceramic, 10µF, 35V, +/- 20%, X5R, 0603	GRM188R6YA106MA73D	Murata
C2, C8	2	Capacitor, Ceramic, 1µF, 35V, +/- 10%, X5R, 0402	GRM155R6YA105KE11D	MuRata
C3, C4	2	Capacitor, Ceramic, 10µF, 10V, +/- 20%, X5R, 0402	GRM155R61A106ME11	MuRata
C5	1	Capacitor, Ceramic, 4.7µF, 6.3V, +/- 20%, X5R, 0402	GRM155R60J475ME47D	MuRata
C6	1	Capacitor, Ceramic, 3300pF, 50V, +/- 10%, X7R, 0603	C0603C332K5RACTU	Kemet
C7	1	Capacitor, Ceramic, 1µF, 16V, +/- 10%, X5R, 0402	EMK105BJ105KVHF	Taiyo Yuden
C9	1	Capacitor, Ceramic, 2.2µF, 25V, +/- 10%, X5R, 0402	GRM155R61E225KE11D	MuRata
C10	1	Capacitor, Ceramic, 10µF, 6.3V, +/- 20%, X5R, 0402	GRM155R60J106ME15D	MuRata
C11	1	Capacitor, Ceramic, 22µF, 6.3V, +/- 20%, X5R, 0603	GRM188R60J226MEA0D	MuRata
C12, C14	2	Capacitor, Ceramic, 2.2µF, 6.3V, +/- 20%, X5R, 0402	GRM155R60J225ME15D	MuRata
C13, C15	2	Capacitor, Ceramic, 1µF, 16V,+/- 20%, X5R, 0402	GRM155R61C105MA12D	MuRata
D1, D2	2	LED, Green, SMD	LTST-C190KGKT	Lite-On
J1, J2, J5, J8, J11	5	Terminal Block, 3.5mm Pitch, 2x1, TH	ED555/2DS	On-Shore Technology
J3, J22, J23, J34	4	Header, 100mil, 3x1, Gold, TH	TSW-103-07-G-S	Samtec
J4	1	Receptacle, 0.5mm, USB TYPE C, R/A, SMT	12401610E4#2A	Amphenol Canada
J6, J7, J9, J12, J16, J24, J25, J26, J27, J28, J29	11	Header, 100mil, 2x1, Tin, TH	PEC02SAAN	Sullins Connector Solutions
J10, J32	2	Connector, Receptacle, 100mil, 2x1, Gold plated, TH	5-534206-1	TE Connectivity
J13	1	Header, 100mil, 10x1, Gold, TH	TSW-110-07-G-S	Samtec
J14	1	Header, 100mil, 3x2, Gold, TH	TSW-103-07-G-D	Samtec
J15	1	Header (shrouded), 2mm, 2x1, R/A, SMT	S2B-PH-SM4-TB(LF)(SN)	JST Manufacturing
J20, J21	2	Connector, Receptacle, 100mil, 10x1, Gold plated, TH	SSW-110-23-F-S	Samtec
J30	1	Header (shrouded), 100mil, 5x2, Gold, TH	5103308-1	TE Connectivity
J35	1	Header, 2.54mm, 1x1, Gold, TH	HTSW-101-07-G-S	Samtec



Table 8-1. Bill of Materials (continued)

L1	1	Inductor, Shielded, Metal Composite, 2.2 μ H, 1.7A, 0.14 Ω , SMD	DFE201610E-2R2M=P2	MuRata
L2	1	Inductor, Shielded, Metal Composite, 1 μ H, 2.7A, 0.057 Ω , SMD	DFE201610E-1R0M=P2	MuRata
LBL1	1	Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	THT-14-423-10	Brady
R2, R3, R23, R24, R25, R26	6	Resistor, 5.1kΩ, 5%, 0.063W, AEC-Q200 Grade 0, 0402	CRCW04025K10JNED	Vishay-Dale
R4, R5	2	Resistor, 100kΩ, 1%, 0.0625 W, AEC-Q200 Grade 0, 0402	AC0402FR-07100KL	Yageo America
R8, R19, R20, R22, R27	5	Resistor, 0, 5%, 0.1W, AEC-Q200 Grade 0, 0402	ERJ-2GE0R00X	Panasonic
R9	1	Resistor, 4.99kΩ, 1%, 0.063W, AEC-Q200 Grade 0, 0402	CRCW04024K99FKED	Vishay-Dale
R12, R13, R14, R15	4	Resistor, 1.00kΩ, 0.1%, 0.063 W, 0402	ERA-2AEB102X	Panasonic
R28, R30, R33, R34	4	Resistor, 10.0kΩ, 1%, 0.063W, 0402	RC0402FR-0710KL	Yageo America
R29, R31	2	TRIMMER, 50kΩ, 0.5W, TH	3296Y-1-503LF	Bourns
R32	1	Resistor, 1.00kΩ, 1%, 0.063W, 0402	MCR01MZPF1001	Rohm
SH-JP1, SH-JP2, SH-JP4, SH-JP5, SH-JP6, SH-JP7, SH-JP8, SH-JP9, SH-JP11, SH-JP12, SH-JP13, SH-JP14	12	Shunt, 100mil, Gold plated, Black	SNT-100-BK-G	Samtec
SW1	1	Tactile Switch SPST-NO Top Actuated Surface Mount	4.30152E+11	Wurth Electronics
TP1, TP2, TP6, TP7, TP12, TP18, TP21, TP22, TP26	9	Test Point, Multipurpose, Red, TH	5010	Keystone Electronics
TP3, TP4, TP19, TP24, TP25, TP27, TP28, TP29	8	Test Point, Multipurpose, Black, TH	5011	Keystone Electronics
TP5, TP9, TP11, TP13, TP20, TP23	6	Test Point, Multipurpose, Yellow, TH	5014	Keystone Electronics
TP8, TP10	2	Test Point, Multipurpose, Orange, TH	5013	Keystone Electronics
TP14, TP15, TP16, TP17	4	Test Point, Multipurpose, Green, TH	5126	Keystone Electronics



Table 8-1. Bill of Materials (continued)

U1	1	Ultra-low IQ BMU with 1A Linear Charger, Voltage Regulators, 12-bit ADC, and GPIOs	BQ25190YBGR	Texas Instruments
U2	1	150mA, 30V, Ultra-Low IQ, Wide Input Low-Dropout Regulator with Reverse Current Protection, DBV0005A (SOT-23-5)	TPS70933DBVR	Texas Instruments
C16, C18, C20, C22, C24, C26, C28	0	Capacitor, Ceramic, 0.01µF, 10V, +/- 10%, X7R, 0402	0402ZC103KAT2A	AVX
C17, C19, C21, C23, C25, C27, C29	0	Capacitor, Ceramic, 10µF, 10V, +/- 10%, X6S, 0603	C1608X6S1A106M080AC	ток
FID1, FID2, FID3	0	Fiducial mark. There is nothing to buy or mount.	N/A	N/A
R1	0	Resistor, 1.0M, 5%, 0.063W, AEC-Q200 Grade 0, 0402	CRCW04021M00JNED	Vishay-Dale
R6, R7, R17, R18	0	Resistor, 0Ω, 5%, 0.1W, AEC-Q200 Grade 0, 0402	ERJ-2GE0R00X	Panasonic
R11	0	Resistor, 0Ω, 5%, 0.063W, 0402	RC0402JR-070RL	Yageo America
R16	0	Resistor, 10.0kΩ, 1%, 0.063W, AEC-Q200 Grade 0, 0402	AC0402FR-0710KL	Yageo America
R21	0	Resistor, 1.00kΩ, 1%, 0.063W, 0402	MCR01MZPF1001	Rohm
RT1, RT2		103AT Thermistor		

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9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
October 2024	*	Initial release

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