User's Guide BQ25181 EVM User's Guide

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ABSTRACT

This user's guide provides detailed testing instructions for the BQ25181 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*, *BQ25181EVM*, and the term evaluation module are synonymous with the BQ25181 evaluation module, unless otherwise noted.



Table of Contents

1 Introduction	3
1.1 Features	3
1.2 EVM Setup	3
2 EVM Connectors and Test Points	5
3 Testing Procedures	6
3.1 Equipment	6
3.2 Charge Mode	6
3.3 Ship Mode	9
3.4 Shutdown Mode	10
4 Lavout	13
5 Schematics	14
6 Bill of Materials	17

List of Figures

Figure 3-1. BQ25181EVM Connections.6Figure 3-2. TI Charger GUI Device Selection.7Figure 3-3. BQ25181EVM Connected.7Figure 3-4. BQ25181EVM GUI Quick Start.8Figure 3-5. BQ25181 Register Map.8Figure 3-6. SHIP_RST Register: Enabling Ship Mode.9Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode.10Figure 3-9. SHIP_RST Register: Enabling Shutdown Mode.11Figure 4-1. Top Overlay.13Figure 4-2. Top Solder.13Figure 4-3. Top Layer.13Figure 4-4. Bottom Layer.13Figure 4-5. Bottom Solder.13	Figure 1-1. EVM Connections	4
Figure 3-2. TI Charger GUI Device Selection. 7 Figure 3-3. BQ25181EVM Connected. 7 Figure 3-4. BQ25181EVM GUI Quick Start. 8 Figure 3-5. BQ25181 Register Map. 8 Figure 3-6. SHIP_RST Register: Enabling Ship Mode. 9 Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-9. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-1. BQ25181EVM Connections	6
Figure 3-3. BQ25181EVM Connected. 7 Figure 3-4. BQ25181EVM GUI Quick Start. 8 Figure 3-5. BQ25181 Register Map. 8 Figure 3-6. SHIP_RST Register: Enabling Ship Mode. 9 Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-2. TI Charger GUI Device Selection	7
Figure 3-4. BQ25181EVM GUI Quick Start. 8 Figure 3-5. BQ25181 Register Map. 8 Figure 3-6. SHIP_RST Register: Enabling Ship Mode. 9 Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-3. BQ25181EVM Connected	7
Figure 3-5. BQ25181 Register Map. 8 Figure 3-6. SHIP_RST Register: Enabling Ship Mode. 9 Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-4. BQ25181EVM GUI Quick Start	<mark>8</mark>
Figure 3-6. SHIP_RST Register: Enabling Ship Mode. 9 Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-5. BQ25181 Register Map	<mark>8</mark>
Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode. 10 Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-6. SHIP_RST Register: Enabling Ship Mode	9
Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode. 11 Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode	. 10
Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode. 11 Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode	11
Figure 4-1. Top Overlay. 13 Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode	. 11
Figure 4-2. Top Solder. 13 Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 4-1. Top Overlay	. 13
Figure 4-3. Top Layer. 13 Figure 4-4. Bottom Layer. 13 Figure 4-5. Bottom Solder. 13	Figure 4-2. Top Solder	. 13
Figure 4-4. Bottom Layer	Figure 4-3. Top Layer	13
Figure 4-5. Bottom Solder	Figure 4-4. Bottom Layer	. 13
	Figure 4-5. Bottom Solder	13

1

Figure 4-6. Bottom Overlay	13
Figure 5-1. BQ25181EVM Schematic	14
Figure 5-2. BQ25181EVM Jumper Connectors	15
Figure 5-3. LDO for Other Peripherals	16

List of Tables

Table 1-1. Jumper Descriptions	3
Table 1-2. Recommended Operating Conditions	4
Table 2-1. Jumper Default Configuration	. 5
Table 2-2. Test Point Descriptions	5
Table 6-1. Bill of Materials	.17

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1 Introduction

The BQ25181EVM is an evaluation kit for the BQ25181 battery charge management IC. The BQ25181 is an I²C controlled, 1-A linear battery charger with Power Path in a small QFN package with a thermal pad. The BQ25181 integrates the most common functions for industrial and personal electronics applications and provides ultra-low IQ, integrated protections, programmability, TS monitoring, and best thermal performance in a small solution size.

1.1 Features

This EVM has the following features:

- 1-A linear battery charger
- I²C configurable battery regulation voltage with 0.5% accuracy
- Configurable termination ucrrent 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
- · One button wake-up and reset input with adjustable timers
- I²C communication control
- · Dedicated VIN Power Good (PG) and Charge Enable (CE) pins

1.2 EVM Setup

Table 1-1 lists the jumper connections and the jumper description.

Jumper Name	Description
J1	Provide the I ² C pull-up to 3p3 V. Note: The USB2ANY will provide this pull-up when using the TI Charger GUI
J2	VIN and GND connector. Input voltage from external power supply. Recommended voltage is 5 V and OVP is 5.7 V. Max input voltage is 25 V while in OVP.
J3	VBAT and GND connector. Battery connection using jumper for easy access.
J4	Battery pack connector. Battery connection using JST header.
J5	TS potentiometer connector. Connects TS potentiometer to TS pin. Leaving this jumper will leave the TS pin open.
J6	USB2ANY connector. For connecting the device to the USB2ANY evaluation board to allow computer to interface with the EVM.
J7	VIO connector to 3p3 V. This is supplied by an external on-board LDO. Will pull the /PG and /INT high when populated.
J8, J9	Board connector to the other module.
J10	Power Good (PG) LED jumper
J11	VSYS and GND connector.
J13	/CE connector. Connects /CE pin to high or low setting.
J14	Micro USB connector (optional for VIN)

Table 1-1. Jumper Descriptions

Figure 1-1 shows the various connections and features on the device.





Figure 1-1. EVM Connections

Table 1-2 lists the recommended operating conditions.

Table 1-2	. Recommended	Operating	Conditions
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		MIN	NOM	MAX	UNIT
VBAT	Battery voltage range	2.2		4.6	V
VIN	Input voltage range	2.7		5.5	V
IIN	Input current range (IN to SYS)			1.1	А
IBAT	Battery discharge current (BAT to SYS)			1.5	А
T _A	Operating ambient temperature range	-40		85	°C
TJ	Operating junction temperature range	-40		125	°C



2 EVM Connectors and Test Points

Table 2-1 shows the default configuration for connectors.

Table 2-1. Jumper Default Configur	ation
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Jumper Name	Description	Setting
J1	l ² C Pullup	NA
J2	VIN and GND connector	NA
J3	VBAT and GND connector	NA
J4	Battery pack connector	NA
J5	TS potentiometer connector	Connected
J6	USB2ANY connector	NA
J7	VIO connector to 3p3V	Connected
J8, J9	Board connector to other modules	NA
J10	LED jumper	Connected
J11	VSYS and GND connector	NA
J13	Charge enable jumper control	Low
J14	Micro USB connector (optional for VIN)	NA

Table 2-2 describes the test points available on the board for easy access measurement.

Table 2-2. Test Point Descriptions

Test Point	Description
TP1, TP2, TP3	IC GND test point
TP4	IC /CE test point
TP5	IC VIN test point
TP6	IC VSYS test point
TP7	IC SCL test point
TP8	IC VBAT test point
TP9	IC SDA test point
TP10	IC /PG or GPO test point
TP11	IC TS/MR test point
TP12	IC /INT test point

3 Testing Procedures

3.1 Equipment

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

- 1. Two Power Supplies: Keithley 2400 Power Supply 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. Four Channel Oscilloscope: To monitor voltages at VIN, VBAT, and VSYS
 - 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
- 3. Computer: A computer with a 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

3.2 Charge Mode

Connect the equipment as follows:

- Power Supply PS #1: VIN of the BQ25181EVM at 5 V
- Power Supply PS #2: VBAT of the BQ25181EVM at 3.7 V
- Scope Channel SC#1: VIN at TP5
- Scope Channel SC#2: VBAT at TP8
- Scope Channel SC#3: VSYS at TP6

Turn ON power supply PS #2, then turn ON supply PS #1. With PS #1 enabled, VSYS will rise to the level of 4.5 V and the /PG LED will turn on to indicate Power Good. The device will begin to charge as long as TS is left at default configuration, J13 connects the /CE pin to low, and there are no other faults.



Figure 3-1. BQ25181EVM Connections

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

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Figure 3-2. TI Charger GUI Device Selection

Select BQ25181 from the charger selection. Click Quick Start or Register Map.

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Analo	g EVM File Options Tools Help	
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0		
	BQ25181	QUICK LINKS
7	• Connected 0x6A ~	
ý	The BQ25181 is a 1A 1-cell Li-ion linear charger with regulated power path management in a small 10-bin OEN package. Device is biobly configurable via	Register Configuration
	I2C with ultra low IQ modes for optimal battery life, NTC monitoring, multiple reset mechanisms, and integrated fault protections.	KNOWLEDGE BASE
	QUICK START > REGISTER MAP >	User Guide Data Sheet EEE Forum
/	and a second sec	
€		QUICK TIP
		Always use electrical gloves and make sure your connection is grounded. Beware of electrical circuit damages.
		Caution hot surface on EVM, some components can reach 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.
		Falseted By diff Composed
a 🗐	USB2ANY/OneDemo device Hardware Connected.	🜵 Texas Instruments



The Quick Start is shown in Figure 3-4. Disabling the charge through I²C will override the charge disable pin.

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Analo		e Options Too	ols Help						• • *	
≡ м	enu									
†	🜱 🛛 Quick Star	rt		Auto Read	Off ~	READ ALL REGISTERS	Write Mode Im	mediate 🗸		ISTERS
0	Quick Start									
*	CHG_DIS		VBATREG	4.20 V 🗸	SYS_REG_CTRL	4.5V ~	ICHG	10 mA 🗸		
	ILIM	500mA 🗸	IPRECHG	2x Term 🗸 🗸	ITERM	10% of ICHG 🗸 🗸	WATCHDOG_SEL	160s 🗸		
	PG_GP0	VIN Status 🗸 🗸	PG_GP0	Hi-Z 🗸						
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The register map is shown in Figure 3-5.

log EVM File Options	Tools H	Help										
✓ Register Map			Auto Read Ever	ry 1 sec		•	READ R	EGISTE	R	AD ALL	REGISTERS	WRITE REGISTER WRITE ALL REGISTERS Immediate Write
Q Search Registers by name or address (0x)						Search	n Bitfie	lds	✓ Sho	w Bits	E
Register Name		Address	Value	7	6	5	B 4	its 3	2	1	0	FIELD VIEW STATO
▼ BQ25181						5	-	5	-		v	0025101 / CTATA / TO ODEN CTAT[7]
STAT0	0	0x00	0x00	0	0	0	0	0	0	0	0	A TS OPEN STAT
STAT1		0x01	0x00	0	0	0	0	0	0	0	0	TSMR nin is not Open
FLAG0		0x02	0x30	0	0	1	1	0	0	0	0	
VBAT_CTRL		0x03	0x46	0	1	0	0	0	1	1	0	BQ25181 / STAT0 / CHG_STAT[6:5]
ICHG_CTRL		0x04	0x05	0	0	0	0	0	1	0	1	CHG_STAT
CHARGECTRL0		0x05	0x24	-	0	1	0	0	1	0	0	Not Charging while charging is enabled.
CHARGECTRL1		0x06	0x56	0	1	0	1	0	1	1	0	
IC_CTRL		0x07	0x84	1	0	0	0	0	1	0	0	BQ251817 STATU7 ILIM_ACTIVE_STAT[4]
TMR_ILIM		0x08	0x4D	0	1	0	0	1	1	0	1	Not Active
SHIP_RST		0x09	0x11	0	0	0	1	0	0	0	1	NotActive
SYS_REG		0x0A	0x40	0	1	0	0	0	0	0	0	BQ25181 / STAT0 / VDPPM_ACTIVE_STAT[3]
TS_CONTROL		0x0B	0x00	0	0	0	0	0	0	0	0	VDPPM_ACTIVE_STAT
MASK_ID		0x0C	0xC1	1	1	0	0	0	0	0	1	Not Active 🗸
												BQ25181 / STAT0 / VINDPM_ACTIVE_STAT[2]
												VINDPM_ACTIVE_STAT
												Not Activo



3.3 Ship Mode

To enter the Ship Mode state, connect the equipment as follows:

- Power Supply PS #1: VIN of the BQ25181EVM at 0 V, OFF, or disconnected
- Power Supply PS #2: VBAT of the BQ25181EVM at 3.7 V
- Scope Channel SC #1: VIN at TP5
- Scope Channel SC #2: VBAT at TP8
- Scope Channel SC #3: VSYS at TP6
- Scope Channel SC #4: TS/MR at TP11

Turn ON power supply #2. Enter Ship Mode by setting the EN_RST_SHIP bits in the SHIP_RST register (0x09) to 2b10. You will know you are in Ship Mode as the voltage on SYS (SC #3) will fall to 0 V and the voltage on TS/MR (SC #4) will still periodically pulse to monitor button press.

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Anal	og EVM File Options Too	ls I	Help										
≡	Menu												
ŧ	Register Map			Auto Read Ever	y 1 sec		•	READ P	REGISTE	R RE	AD ALLI	REGISTERS	WRITE REGISTER WRITE ALL REGISTERS Immediate Write 🗸
	Q Search Registers by name or address (0x)							Searc	h Bitfie	lds 📘	Shows the second sec	ow Bits	
4	Register Name		Address	Value	7	6	5	8 4	Bits 3	2	1	0	FIELD VIEW SHIP_RST
ý	▼ BQ25181					Ŭ	, in the second s		Ŭ	-		÷	BQ25181 / SHIP_RST / REG_RST[7]
	STAT0		0x00	0x00	0	0	0	0	0	0	0	0	REG_RST
L.	STAT1		0x01	0x00	0	0	0	0	0	0	0	0	Do nothing 🗸
	FLAG0		0x02	0x30	0	0	1	1	0	0	0	0	
Ħ	VBAT_CTRL		0x03	0x46	0	1	0	0	0	1	1	0	BQ25181 / SHIP_RST / EN_RST_SHIP[6:5]
_	ICHG_CTRL		0x04	0x05	0	0	0	0	0	1	0	1	EN_RST_SHIP
	CHARGECTRL0		0x05	0x24	-	0	1	0	0	1	0	0	Enable ship with button press (relaxed)
	CHARGECTRL1		0x06	0x56	0	1	0	1	0	1	1	0	BQ25181 / SHIP_RST / PB_LPRESS_ACTION[4:3]
_	IC_CTRL		0x07	0x84	1	0	0	0	0	1	0	0	PB_LPRESS_ACTION
≥	TMR_ILIM		0x08	0x4D	0	1	0	0	1	1	0	1	Enable shipmode 🗸
	SHIP_RST	0	0x09	0x51	0	1	0	1	0	0	0	1	
	SYS_REG		0x0A	0x40	0	1	0	0	0	0	0	0	BQ25181 / SHIP_RST / WAKE1_TMR[2]
	TS_CONTROL		0x0B	0x00	0	0	0	0	0	0	0	0	WAKE1_TMR
	MASK_ID		0x0C	0xC1	1	1	0	0	0	0	0	1	300ms 🗸
													BQ25181 / SHIP_RST / WAKE2_TMR[1]
													WAKE2_TMR
													2s 🗸
													Powered By GUI Composer*
<i>e</i> c	Hardware not Connected. Please plug yo	our Targel	t Device into yo	ur computer's USE	3 port, a	nd clic	k the C	onnec	t icon a	ıt left.			Texas Instruments

Figure 3-6. SHIP_RST Register: Enabling Ship Mode

Alternatively, Ship Mode can be entered through a long button press. Turn ON power supply #2. With VSYS active (not in Ship Mode or Shutdown Mode), ensure that the PB_LPRESS_ACTION bits are set to 2b10: Enable shipmode. After holding the button SW1 for longer than MR_LPRESS (default: 2b01 (10s), the voltage on SYS (SC #3) will fall to 0 V.

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Ana	og EVM File Options Tools	Help										
=	E Menu											
_												
Ħ	 Register Map 		Auto Read Off			~	READ R	IEGISTEI	RRE	AD ALL	REGISTERS	WRITE REGISTER WRITE ALL REGISTERS Immediate Write 🗸
	Q Search Registers by name or address (0x)						Search	h Bitfie	lds N	Sho	ow Bits	F
*	Register Name	Address	Value				В	its				
				7	6	5	4	3	2	1	0	SHIF_RST
×	▼ BQ25181	0×00	0v21	0	0	1	0	0	0	0	1	BQ25181 / SHIP_RST / REG_RST[7]
-	STAT1	0x00	0x40	0	1	0	0	0	0	0	0	REG_RST
Ľ	FLAGO	0x02	0x40	0	0	0	1	0	0	1	0	Do nothing 🗸 🗸
	VBAT_CTRI	0x02	0x46	0	1	0	0	0	1	1	0	BQ25181 / SHIP_RST / EN_RST_SHIP[6:5]
Ħ		0x04	0x05	0	0	0	0	0	1	0	1	EN_RST_SHIP
	CHARGECTRI 0	0x05	0x24	ž	0	1	0	0	1	0	0	Do nothing 🗸
	CHARGECTRL1	0x06	0x56	0	1	0	1	0	1	1	0	
	IC CTRL	0x07	0x84	1	0	0	0	0	1	0	0	BQ25181 / SHIP_RST / PB_LPRESS_ACTION[4:3]
€	TMR ILIM	0x08	0x4D	0	1	0	0	1	1	0	1	PB_LPRESS_ACTION
	SHIP_RST 0	0x09	0x11	0	0	0	1	0	0	0	1	
	SYS_REG	0x0A	0x40	0	1	0	0	0	0	0	0	BQ25181 / SHIP_RST / WAKE1_TMR[2]
	TS_CONTROL	0x0B	0x00	0	0	0	0	0	0	0	0	WAKE1_TMR
	MASK_ID	0x0C	0xC1	1	1	0	0	0	0	0	1	300ms 🗸
												B025181 / SHIP_RST / WAKE2_TMR[1]
												WAKE2_TMR
												2s ×
-												Powered By GUI Composer™
<i>∎</i>	D USB2ANY/OneDemo device Hardware Connec	ted.										TEXAS INSTRUMENTS

Figure 3-7. SHIP_RST Register: Long Press Action to Enable Ship Mode

To exit Ship Mode, simply hold the TS/MR button SW1 until VSYS enables. Turning on VIN at 5 V will also exit Ship Mode.

3.4 Shutdown Mode

To enter the Shutdown Mode state, connect the equipment as follows:

- Power Supply PS #1: VIN of the BQ25181EVM at 0 V or disconnected
- Power Supply PS #2: VBAT of the BQ25181EVM at 3.7 V
- Scope Channel SC #1: VIN at TP5
- Scope Channel SC #2: VBAT at TP8
- Scope Channel SC #3: VSYS at TP6
- Scope Channel SC #4: TS/MR at TP11

Turn ON power supply #2. Enter Shutdown Mode by setting the EN_RST_SHIP bits in the SHIP_RST register (0x09) to 2b01. You will know you are in Shutdown Mode as the voltage on the SYS pin (SC #2) will fall to 0 V and the voltage on the TS/MR pin falls to 0 V.

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= 1	/lenu											
ŧ.	✓ Register Map		Auto Read Even	/ 1 sec		•	READ R	EGISTER	R RE	AD ALL	REGISTERS	warre begister 🛛 Warre ALL REGISTERS Immediate Write 🗸
	Q Search Registers by name or address (0x)						Search	n Bitfiel	lds 📘	Sho	w Bits	
4	Register Name	Address	Value	7	6	5	B 4	its 3	2	1	0	FIELD VIEW SHIP_RST
ý	▼ BQ25181 STAT0	0x00	0x00	0	0	0	0	0	0	0	0	BQ25181 / SHIP_RST / REG_RST[7] REG_RST
	STAT1 FLAGD	0x01 0x02	0x00	0	0	0	0	0	0	0	0	Do nothing V
₽	VBAT_CTRL	0x03	0x46	0	1	0	0	0	1	1	0	BQ25181 / SHIP_RST / EN_RST_SHIP[6:5]
	ICHG_CTRL CHARGECTRL0	0x04 0x05	0x05 0x24	0	0	0	0	0 0	1	0 0	1 0	Enable shutdown with wake on adapter insert only
0	CHARGECTRL1	0x06	0x56	0	1	0	1	0	1	1	0	BQ25181 / SHIP_RST / PB_LPRESS_ACTION[4:3]
∢	TMR_ILIM	0x07 0x08	0x84 0x4D	0	1	0	0	1	1	0	1	PB_LPRESS_ACTION Enable shipmode
	SHIP_RST Ø	0x09	0x31	0	0	1	1	0	0	0	1	BQ25181 / SHIP_RST / WAKE1_TMR[2]
	TS_CONTROL	0x0B	0x00	0	0	0	0	0	0	0	0	WAKE1_TMR
	MASK_ID	0x0C	0xC1	1	1	0	0	0	0	0	1	
												WAKE2_TMR
												2s 🗸
												Powered By GUI Compos

Figure 3-8. SHIP_RST Register: Enabling Shutdown Mode

Alternatively, Ship Mode can be entered through a long button press. Turn ON power supply #2. With VSYS active (not in Ship Mode or Shutdown Mode), ensure that the PB_LPRESS_ACTION bits are set to 2b11: Enable Shutdown Mode. After holding the button SW1 for longer than MR_LPRESS (default: 2b01 (10s), the voltage on SYS (SC #3) will fall to 0 V.

O 1	I Charger GUI × +											∨ - □ X
\leftarrow	C S https://dev.ti.com/gallery/view/BCl	PLC/ticharger_gui/										💴 🗢 💙 🇯 🖬 🏩 🗄
Ana	log EVM File Options Tools	Help										
=	Menu											
_						_						
Π	 Register Map 		Auto Read Off			~	READ R	EGISTE	RRE	AD ALL	REGISTERS	Immediate Write 🗸
A	Q Search Registers by name or address (0x)						Searc	h Bitfie	lds	✓ Sho	w Bits	
7	Register Name	Address	Value	7	6	5	8 4	its 3	2	1	0	SHIP_RST
ș,	▼ BQ25181											0025101 (SHIP DET / DEG DET[7]
	STAT0	0x00	0x21	0	0	1	0	0	0	0	1	REG RST
Ŀ	STAT1	0x01	0x40	0	1	0	0	0	0	0	0	Do nothing V
_	FLAG0	0x02	0x12	0	0	0	1	0	0	1	0	-
—	VBAT_CTRL	0x03	0x46	0	1	0	0	0	1	1	0	BQ25181 / SHIP_RST / EN_RST_SHIP[6:5]
	ICHG_CTRL	0x04	0x05	0	0	0	0	0	1	0	1	EN_RST_SHIP
	CHARGECTRL0	0x05	0x24	-	0	1	0	0	1	0	0	Do nothing 🗸
Ø	CHARGECTRL1	0x06	0x56	0	1	0	1	0	1	1	0	B025181 / SHIP RST / PB LPRESS ACTION[4:3]
	IC_CTRL	0x07	0x84	1	0	0	0	0	1	0	0	PB LPRESS ACTION
€	TMR_ILIM	0x08	0x4D	0	1	0	0	1	1	0	1	Enable shutdown mode
	SHIP_RST	Ø 0x09	0x19	0	0	0	1	1	0	0	1	
	SYS_REG	0x0A	0x40	0	1	0	0	0	0	0	0	BQ25181 / SHIP_RST / WAKE1_TMR[2]
	TS_CONTROL	0x0B	0x00	0	0	0	0	0	0	0	0	WAKE1_TMR
	MASK_ID	0x0C	0xC1	1	1	0	0	0	0	0	1	300ms 🗸
												BQ25181 / SHIP_RST / WAKE2_TMR[1]
												WAKE2_TMR
												2s 🗸
												Powered By GUI Composer™
₽ c	Hardware not Connected.											TEXAS INSTRUMENTS

Figure 3-9. SHIP_RST Register: Long Press Action to Enable Shutdown Mode

Testing Procedures



To exit Ship Mode, simply turn on VIN at 5 V. Exiting Shutdown Mode will enable the VSYS output.



4 Layout

Figure 4-1 through Figure 4-6 show the EVM PCB layout images.



Figure 4-5. Bottom Solder

Figure 4-6. Bottom Overlay



5 Schematics

Figure 5-1 through Figure 5-3 illustrate the EVM schematics.



Figure 5-1. BQ25181EVM Schematic





Figure 5-2. BQ25181EVM Jumper Connectors





Figure 5-3. LDO for Other Peripherals



6 Bill of Materials

The Bill of Materials is shown in the following table.

	Table 6-1. Bill of Materials											
Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer						
C1, C5	2	2.2uF	CAP, CERM, 2.2 uF, 25 V, +/- 10%, X5R, 0402	0402	GRM155R61E225KE11D	MuRata						
C2	1	0.1uF	CAP, CERM, 0.1 uF, 25 V, +/- 10%, X5R, 0402	0402	GRM155R61E104KA87D	MuRata						
C3	1	10uF	CAP, CERM, 10 μF, 10 V,+/- 20%, X5R, 0402	0402	CL05A106MP8NUB8	Samsung Electro- Mechanics						
C4	1	1uF	CAP, CERM, 1 uF, 35 V, +/- 10%, JB, 0402	0402	C1005JB1V105K050BC	TDK						
C6	1	1uF	CAP, CERM, 1 uF, 10 V, +/- 10%, X5R, 0402	0402	GRM155R61A105KE15D	MuRata						
D1	1	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On						
J1, J2, J3, J5, J7, J10, J11	7		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions						
J4	1		Header (shrouded), 2mm, 2x1, R/A, SMT	Header, 2x1, 2mm, R/A	S2B-PH-SM4-TB(LF)(SN)	JST Manufacturing						
J6	1		Header(Shrouded), 2.54mm, 5x2, Gold, TH	Header, 2.54mm, 5x2, TH	AWHW-10G-0202-T	Assman WSW						
J8, J9	2		Connector, Receptacle, 100mil, 10x1, Gold plated, TH	10x1 Receptacle	SSW-110-23-F-S	Samtec						
J13	1		Header, 100mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions						
J14	1		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	Micro USB receptacle	105017-0001	Molex						
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650 x 0.200 inch	THT-14-423-10	Brady						
R1, R2, R11, R14	4	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	RC0402FR-0710KL	Yageo America						



Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	
R6	1	100k	RES, 100 k, 1%, 0.0625 W, AEC-Q200 Grade 0, 0402	0402	AC0402FR-07100KL	Yageo America	
R4, R5	2	0	RES, 0, 5%, 0.1 W, AEC- Q200 Grade 0, 0402	0402	ERJ-2GE0R00X	Panasonic	
R7	1	100kΩ	12-Turn Through Hole Trimmer Resistor with Pin Terminations, 10% 1/4W 150ppm/C	PTH_POT_6MM4_4MM0	PV37W104C01B00	Murata	
R8	1	1.5k	RES, 1.5 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04021K50JNED	Vishay-Dale	
SW1	1		Tactile Switch SPST-NO Top Actuated Surface Mount	SMT_TACT	430152070826	Wurth Electronics	
TP1, TP2, TP3	3		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone	
TP4, TP7, TP9, TP10, TP11, TP12	6		Test Point, Multipurpose, Yellow, TH	Yellow Multipurpose Testpoint	5014	Keystone	
TP5, TP6, TP8	3		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone	
U1	1		Power Path Linear Battery Charger with ShipMode in ultra small package	WSON10	BQ25181DLHT	Texas Instruments	
U2	1		1-uA IQ, 200-mA, Ultralow IQ Low-Dropout Regulator, DBV0005A (SOT-23-5)	DBV0005A	TPS7A0233PDBVR	Texas Instruments	
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A	
R9	0	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	RC0402FR-0710KL	Yageo America	



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