bq25890EVM, bq25892EVM, bq25895EVM, bq25896EVM and bq25895MEVM(PWR664)

This user's guide provides detailed testing instructions for the PWR664 evaluation modules (EVM) using the bq25890, bq25892, bq25895, bq25896 or bq25895M (bq2589x) devices. Also included are descriptions of the necessary equipment, equipment setup, and procedures. The reference documentation contains the printed-circuit board layouts, schematics, and the bill of materials (BOM).

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1 Introduction

1.1 EVM Features

For detailed features and operation, refer to Table 1 for a list of devices and their data sheets.

Table 1. Device Data Sheets

Device	Document
bq25890/bq25892	SLUSBU7
bq25895	SLUSC74
bq25895M	SLUSCB5
bq25896	SLUSCF7

The bq2589x evaluation module (EVM) is a complete charger modules for evaluating an I^2C-controlled single NVDC-1 charge using the bq2589x device.

This EVM doesn't include the USB-to-GPIO interface board. To evaluate the EVM, a USB-to-GPIO interface board must be ordered separately.

1.2 I/O Descriptions

Table 2 lists the jumper connections available on this EVM.

Table 2. EVM Connections

Jack	Description
J1–VBUS	Input: positive terminal
J1–GND	Input: negative terminal (ground terminal)
J2–PMID	PMID pin connection/Power bank output
J2–GND	Ground/Power bank output negative terminal
J3–SYS	Connected to system
J3–GND	Ground
J4–BAT+	Connected to battery pack
J4–GND	Ground
J5	Input mini-USB port
J6	Output mini-USB port
J7	USB-to-GPIO connector
J8	I2C 4-pin connector

Table 3 lists the EVM jumper connections.

Table 3. Jumper Connections

Jack	Description	Factory Setting
JP1	For bq25892/6 input current setting: Low: adaptor port; High: USB input	bq25890/5/5M: Not installed; bq25892/6: short PSEL to LOW
JP2	D–/PG pin selection	bq25890/5/5M: short to D–; bq25892/6: short to PG
JP3	Pin 24 selection: to DSEL, PG, or NC	bq25890/5/5M_DSEL: short to DSEL; bq25892/6: not installed
JP4	STAT, PG, $\overline{CE}$, INT, OTG pins internal pullup source (VSYS or BAT)	Short to VSYS
JP5	D+/D– connections for input current limit setting	bq25890/5/5M: installed; bq25892/6: Not installed
JP6	USB current limit selection pin during buck mode and PSEL is high/ Enable pin during boost mode	Not installed
JP7	$\overline{CE}$ pin setting: pull low to enable the charge	Not Installed
JP8	TS pin to GND	Not Installed
JP9	TS resistor divider pullup source (REGN) connection	Installed
JP10	Internal 10 k to GND to TS pin	Installed

Table 4 lists the recommended operating conditions for this EVM.

Table 4. Recommended Operating Conditions

Symbol	Description	MIN	TYP	MAX	Unit
Supply voltage, V_{IN} bq25890/2/5/5M/6	Input voltage from AC adapter	3.9		14	V
Battery voltage, V_{BAT} 0 3.7 4.4 V	Voltage applied at V_{BAT} terminal	0		4.5	V
I_{BAT}	Fast charging current			5	A
	Discharging current through internal MOSFET	9			A
Supply current, I_{IN}	Maximum input current from AC adapter input	0		3.25	A

2 Test Summary

2.1 Equipment

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

1. **Power Supplies**
   Power supply #1 (PS#1): a power supply capable of supplying 5 V at 1 A is required. While this part can handle larger voltage and current, it is not necessary for this procedure.
2. **Load #1** (4-Quadrant Supply, Constant Voltage < 4.5 V)
   A 0–20 V/0–5 A, > 30-W system, DC electronic load and setting as constant voltage load mode.
   Or:
   Kepco load: BOP 20–5M, DC 0 to ±20 V, 0 to ±5 A (or higher).
3. **Load #2** – Use with Boost Mode
   PMID to GND load, 10 Ω, 5 W or greater.
4. **Meters**
   Six Fluke 75 multimeters, (equivalent or better).
   Or:
   Four equivalent voltage meters and two equivalent current meters. The current meters must be capable of measuring 5 A+ current.
5. **Computer**
   A computer with at least one USB port and a USB cable. The bq2589xEVM evaluation software must be properly installed.
6. **USB-to-GPIO Communication Kit** (EV2300 USB-Based PC Interface Board)
7. **Software**
   Double click the “BatteryManagementStudio-1.3.35_Build2-windows-installer” installation file, follow the installation steps. The software supports the Microsoft® Windows® XP and Windows 7 operating systems.

   Install EV2300 Software

   For Windows 7 64-bit users:
   http://e2e.ti.com/support/power_management/battery_management/m/videos__files/458983.aspx.
   Verify the computer Windows 7 settings by right clicking on computer and selecting properties:

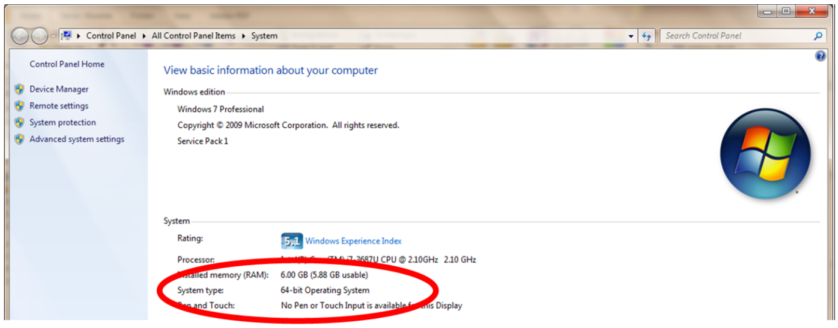


Figure 1. Verify Windows 7 Properties

Windows XP or Windows 7 32-bit users must access the following: http://www.ti.com/litv/zip/slec003a.

2.2 Equipment Setup

1. Set PS#1 for 5-V DC, 1-A current limit and then turn off the supply.
2. Connect the output of PS#1 in series with a current meter (multimeter) to J1 (VBUS and GND).
3. Connect a voltage meter across TP3 (VBUS) and TP6 (PGND).
4. Turn on the Load, set to constant voltage mode and output to 2.5 V. Turn off (disable) Load. Connect Load in series with a current meter (multimeter), ground side, to J4 (BAT+ and GND) as shown in Figure 3.
5. Connect a voltage meter across J4 (BAT+ and GND).
6. Connect the EV2300 USB interface board to the computer with a USB cable and from I2C port to J8 with the 4-pin cable. The connections are shown in Figure 2.
7. Remove jumper (if installed) from JP5.

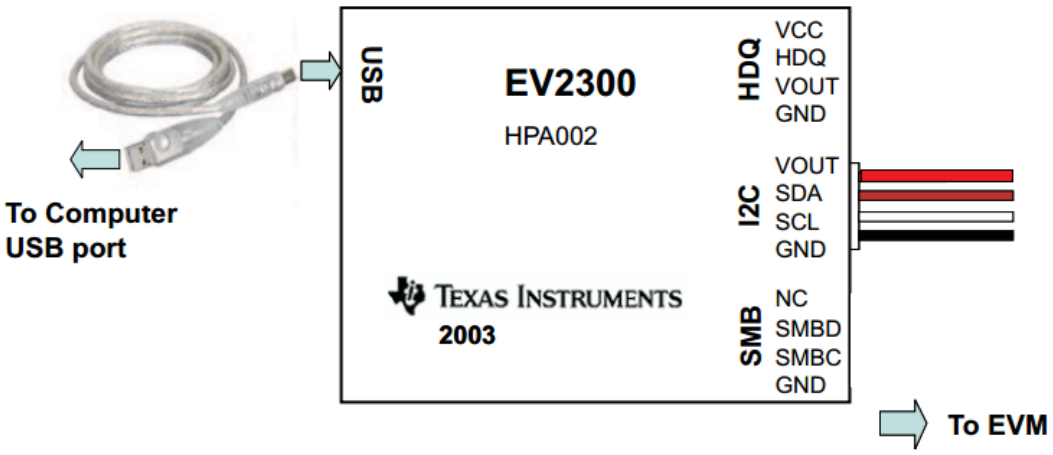


Figure 2. Connections of the EV2300

8. Install shunts as shown in Table 3.

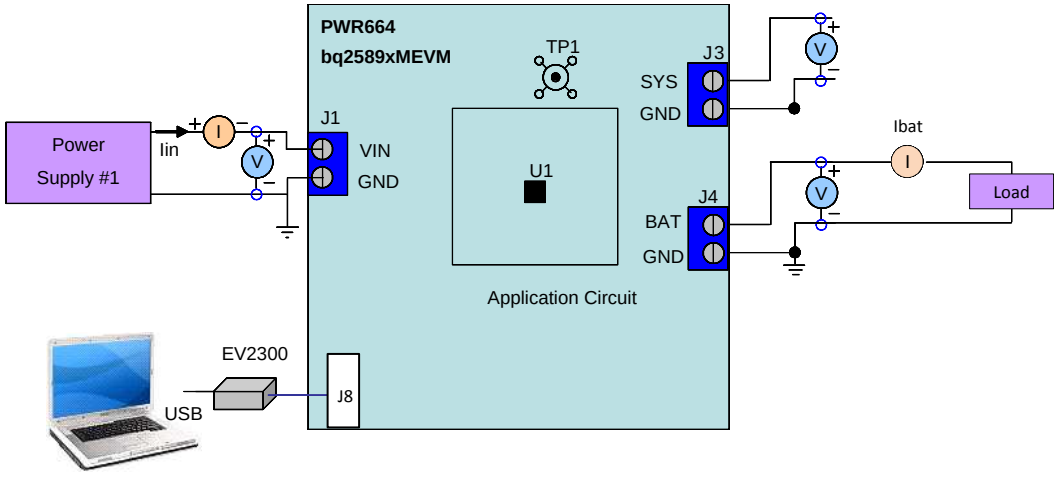


Figure 3. Original Test Setup for PWR664 (bq2589x EVM)

9. Turn on the computer. Launch the bq2589x evaluation software, choose *Charger* as shown in Figure 4, then choose the appropriate .bqz file as shown in Figure 5.

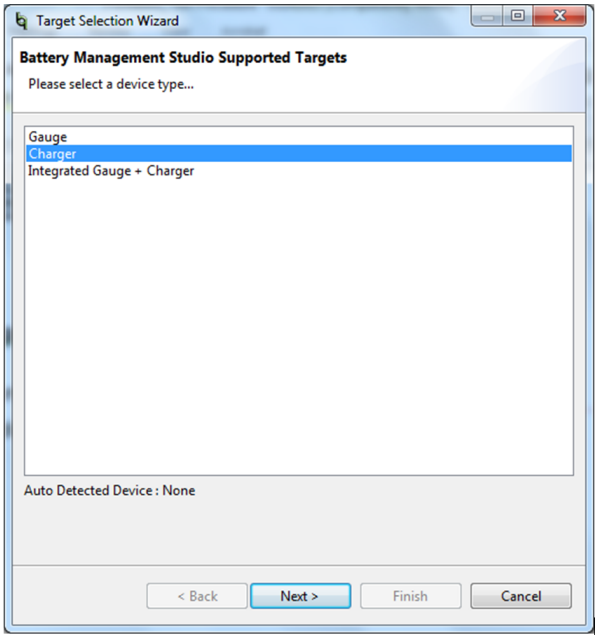


Figure 4. Start Window of the bq2589x Evaluation Software

Figure 5 illustrates the following part selection options:

- Select the Charger_1_00-bq25890-895.bqz file, if evaluating the bq25890 or bq25895
- Select Charger_1_00-bq25892-896.bqz, if evaluating the bq25892

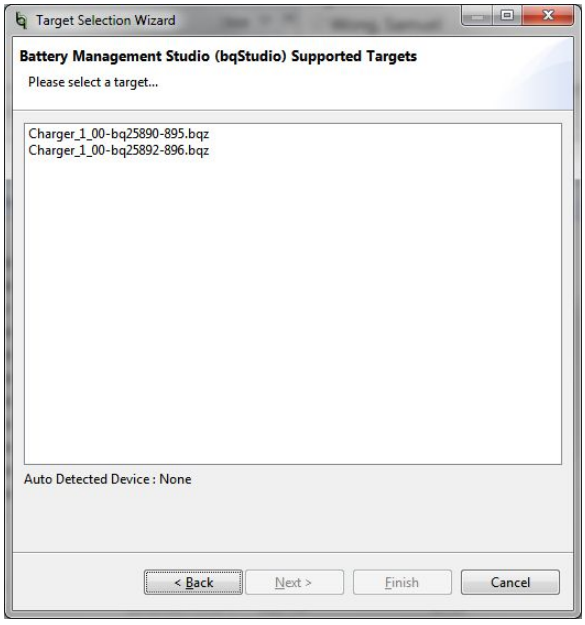


Figure 5. Part Select Window of the bq2589x Evaluation Software

10. If an error pops up stating the communications adapter was not found (Figure 6), click OK to proceed. Next, unplug and re-plug the adapter.

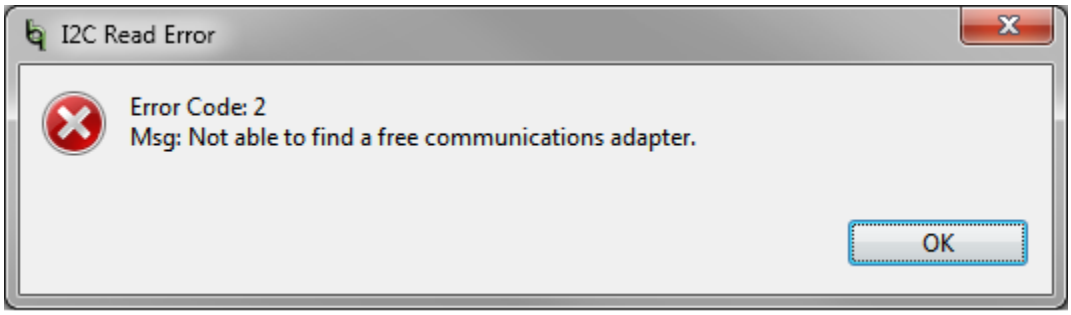


Figure 6. Communications Adapter Error

If an error pops up stating there is no acknowledge from the device (Figure 7), click OK to proceed and then pick the appropirate I2C address from the drop-down menu in the GUI (see the Procedure section).

Figure 7. Acknowledge Error

Check the connection status of the EV2300 in bqStudio by going to *View* → *DashBoard*. A panel on the left-hand side should appear, with the status of the EV2300 at the top (Figure 8).

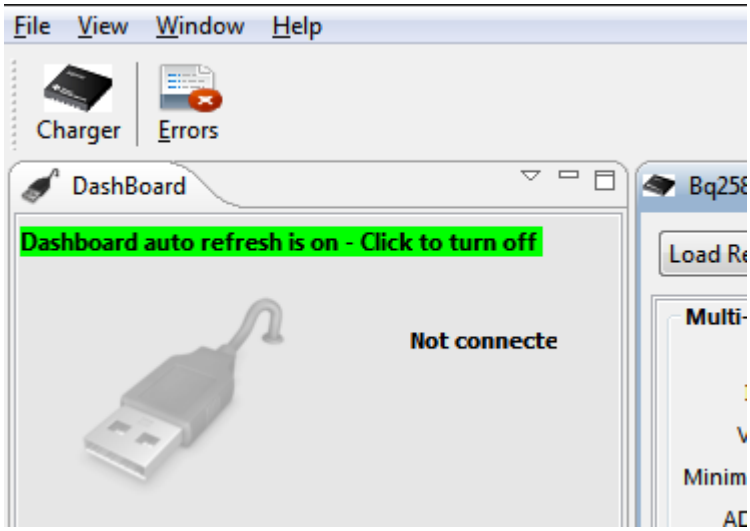


Figure 8. DashBoard Status Tab

11. Choose *Field View*, as shown in Figure 9. The main window of the bq2589x software is shown in Figure 10.

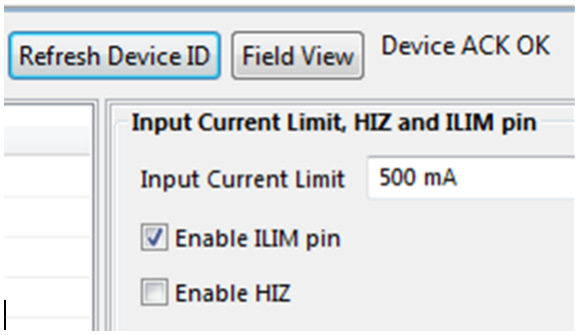


Figure 9. Select Field View

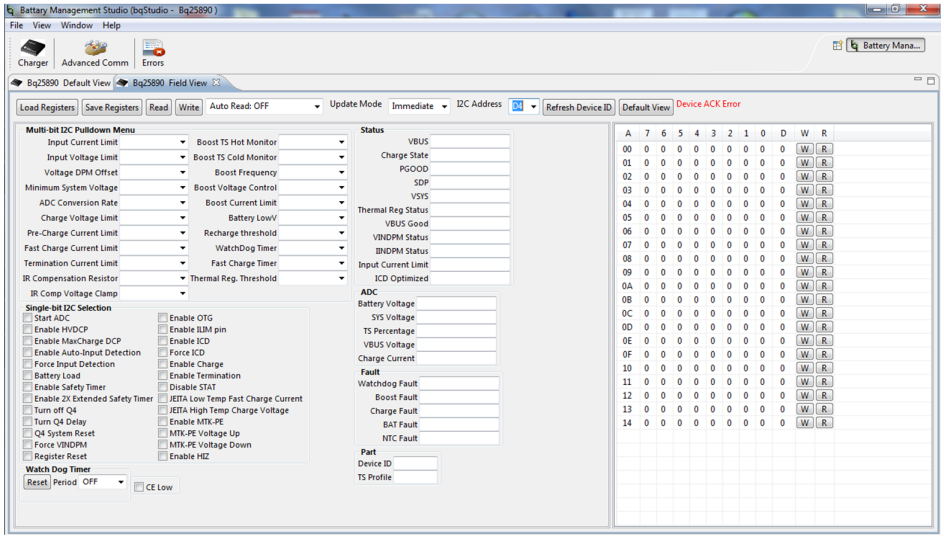
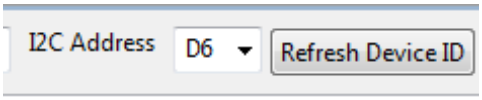


Figure 10. Main Window of the bq2589x Evaluation Software

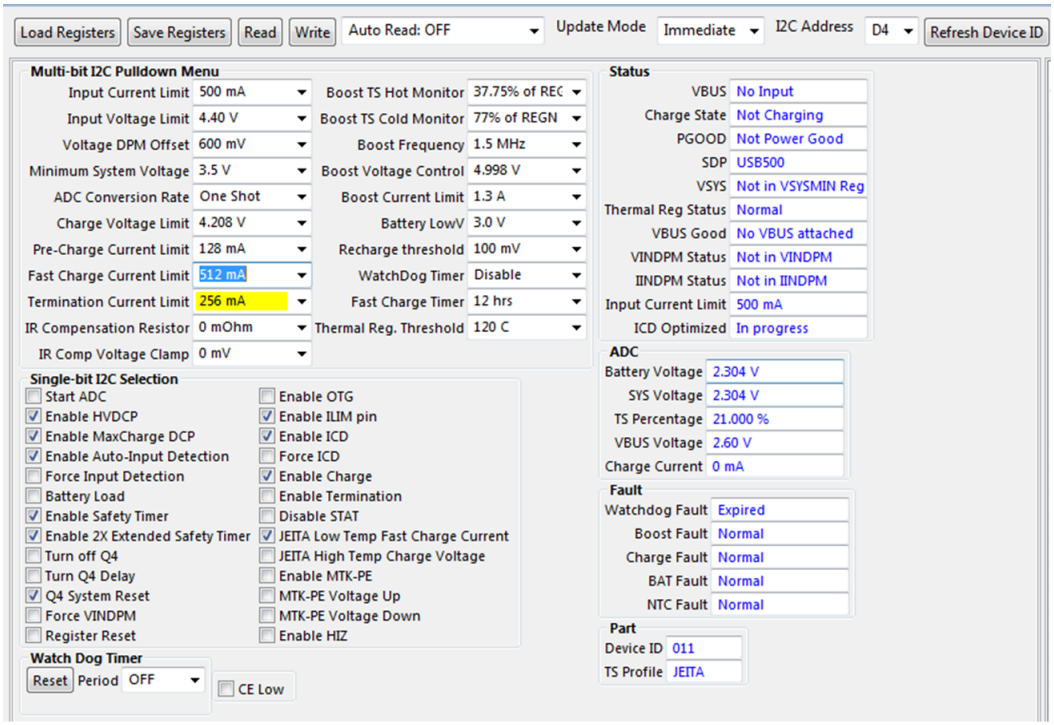
2.3 Procedure

2.3.1 Communication Verification

1. In the EVM software, specify device “I2C Address” as D6 for bq25892/6, and D4 for bq25890/5.

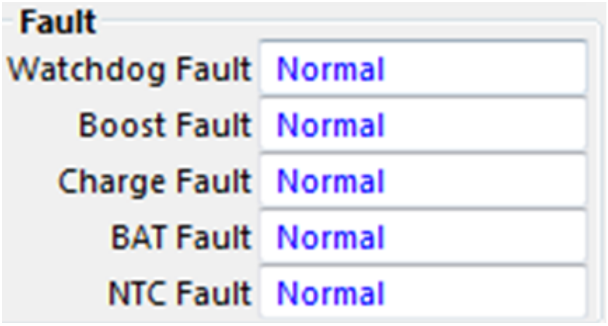


2. Enable Load#1 from Section 2.2, step 4. Click the **Read** button
3. In the EVM GUI software (see example screen shot below) , make the following changes as necessary:
   - Select “Disabled” for the “Watchdog Timer”
   - Select "Force VINDPM"
   - Set “Input Voltage Limit” to 4.2
   - Set “Input Current Limit” to 500 mA
   - Set “Charge Voltage Limit” to 4.208 V
   - Set “Fast Charge Current” ICHG to 960 mA
   - Set "Minimum System Voltage" to 3.5V
   - Set “Pre-Charge Current” to 256 mA
   - Select "Charge Enable"
   - Deselect "Enable ILIM pin"
   - Deselect "Enable ICD"
   - Deselect “Enable Termination”



2.3.2 Charger Mode Verification

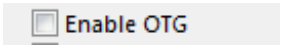
1. Turn on PS#1, click the ***Read*** button twice:
   - **Observe** → Everything *Normal* at *Fault* box



   - **Observe** → D3 (STAT) is on
   - **Observe** → D4 ($\overline{PG}$) is on (bq25892/6)
2. Measure the voltage across J3 and J4 as follows:
   - **Measure** → V(TP4(SYS), TP7(GND)) = 3.65 V ±300 mV
   - **Measure** → V(TP5(BAT), TP7(GND)) = 2.5 V ±200 mV
3. Change load to 3.7 V
   - **Measure** → I(BAT) = 625 mA ± 100 mA
   - **Measure** → V(TP5(BAT), TP7(GND)) = 3.7 V ±200 mV
   - **Measure** → I(VBUS) = 500 mA ± 200mA

2.3.3 Boost Mode Verification

1. Turn off and disconnect PS#1
2. If the constant voltage load connected from BAT+ to GND is not a four-quadrant supply (sources current), remove the load and use the power source disconnected in step one, set to 3.7-V and 2-A current limit and connect between BAT+ and GND
3. Check the *OTG* configurations option in the GUI



4. Apply 10 Ω (5 W or greater) across J2 (PMID(+) to GND(–))
   - **Measure: V:** (TP2 (PMID) and TP6 (GND)) = 5.0 V ±200 mV

2.3.4 Helpful Hints

1. The leads/cables to the various power supplies, batteries and loads have resistance. The current meters also have series resistance. The charger dynamically reduces charge current depending on the voltage sensed at its VBUS pin (using the VINDPM feature), BAT pin (as part of normal termination) and TS pin (through its battery temperature monitoring feature via battery thermistor). Therefore, you must use voltmeters to measure the voltage as close to the IC pins as possible instead of relying on the power supply's digital readouts. If a battery thermistor is not available, either disable the TS function or replace with an appropriately sized (typically) 10 kΩ resistor.
2. When using a sourcemeter that can source and sink current as your battery simulator, it is highly recommended to add a large (1000 µF+) capacitor at the EVM BAT and GND connectors in order to prevent oscillations at the BAT pin due to mismatched impedances of the charger output and sourcemeter input within their respective regulation loop bandwidths. Configuring the sourcemeter for 4-wire sensing eliminates the need for a separate voltmeter to measure the voltage at the BAT pin. When using 4-wire sensing, always ensure that the sensing leads are connected in order to prevent accidental overvoltage by the power leads.
3. For precise measurements of charge current and battery regulation near termination, the current meter

in series with the battery or battery simulator should not be set to auto-range and may need be removed entirely. An alternate method for measuring charge current is to either use an oscilloscope with hall effect current probe or place a 1% or better, thermally capable (for example, 0.010 Ω in 1210 or larger footprint) resistor in series between the BAT pin and battery and measure the voltage across that resistor.

3 PCB Layout Guideline

Minimize the switching node rise and fall times for minimum switching loss. Proper layout of the components minimizing high-frequency current path loop is important to prevent electrical and magnetic field radiation and high-frequency resonant problems. This PCB layout priority list must be followed in the order presented for proper layout:

1. Place the input capacitor as close as possible to the PMID and GND pin connections and use the shortest possible copper trace connection or GND plane.
2. Place the inductor input terminal as close to the SW pin as possible. Minimize the copper area of this trace to lower electrical and magnetic field radiation but make the trace wide enough to carry the charging current. Do not use multiple layers in parallel for this connection. Minimize parasitic capacitance from this area to any other trace or plane.
3. Put an output capacitor near to the inductor and the IC. Tie ground connections to the IC ground with a short copper trace connection or GND plane.
4. Route analog ground separately from power ground. Connect analog ground and connect power ground separately. Connect analog ground and power ground together using power pad as the single ground connection point or use a 0-Ω resistor to tie analog ground to power ground.
5. Use a single ground connection to tie the charger power ground to the charger analog ground just beneath the IC. Use ground copper pour but avoid power pins to reduce inductive and capacitive noise coupling.
6. Place decoupling capacitors next to the IC pins and make the trace connection as short as possible.
7. It is critical that the exposed power pad on the backside of the IC package be soldered to the PCB ground. Ensure that there are sufficient thermal vias directly under the IC, connecting to the ground plane on the other layers.
8. The via size and number should be enough for a given current path.

See the EVM design for the recommended component placement with trace and via locations. For the QFN information, refer to *Quad Flatpack No-Lead Logic Packages* (SCBA017) and *QFN/SON PCB Attachment* (SLUA271).

4 Board Layout, Schematic, and Bill of Materials

This section contains the board layouts, schematics, and BOM.

4.1 PWR664 PCB Layouts

Figure 11 through Figure 17 show the PCB layouts for the PWR664 EVM.

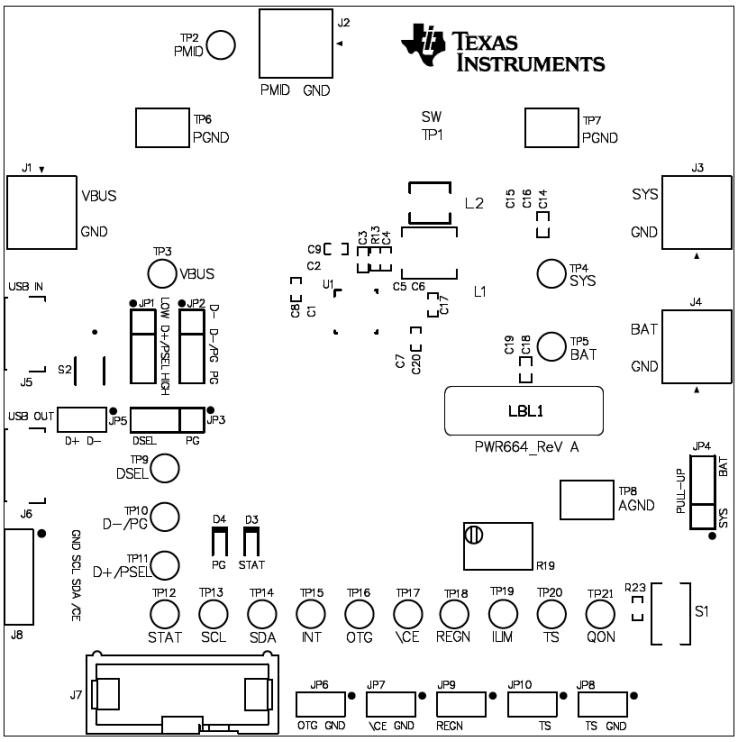


Figure 11. Top Assembly

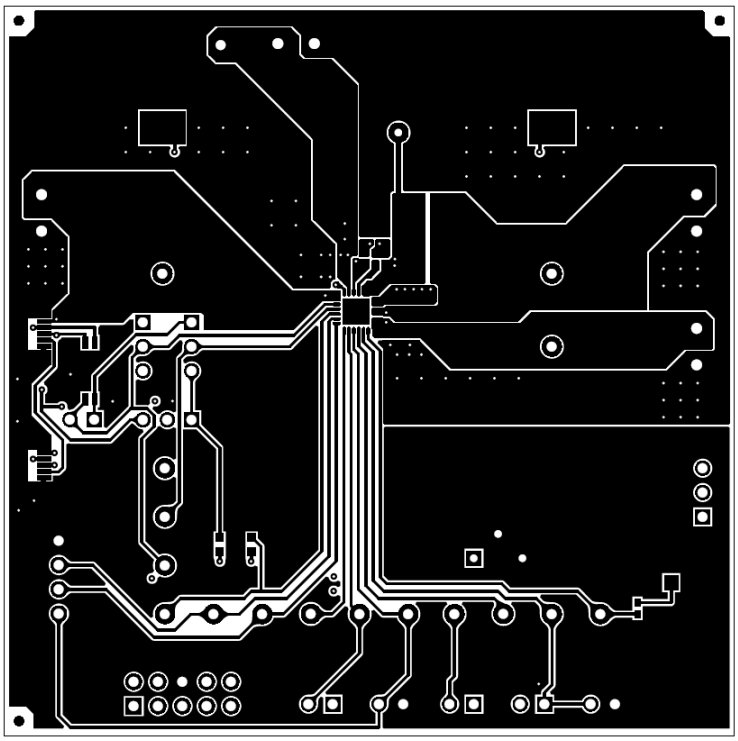


Figure 12. Top Layer

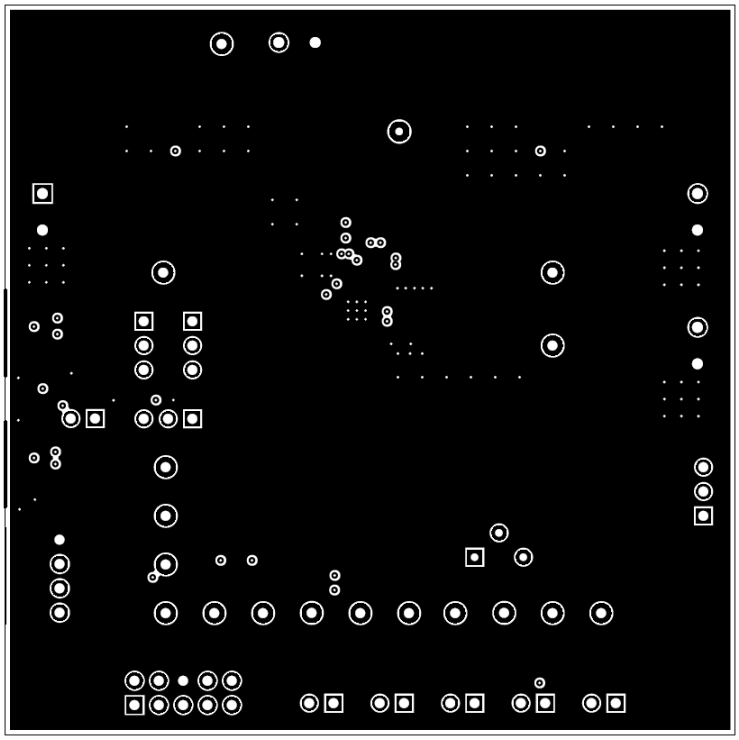


Figure 13. Mid-Layer 1

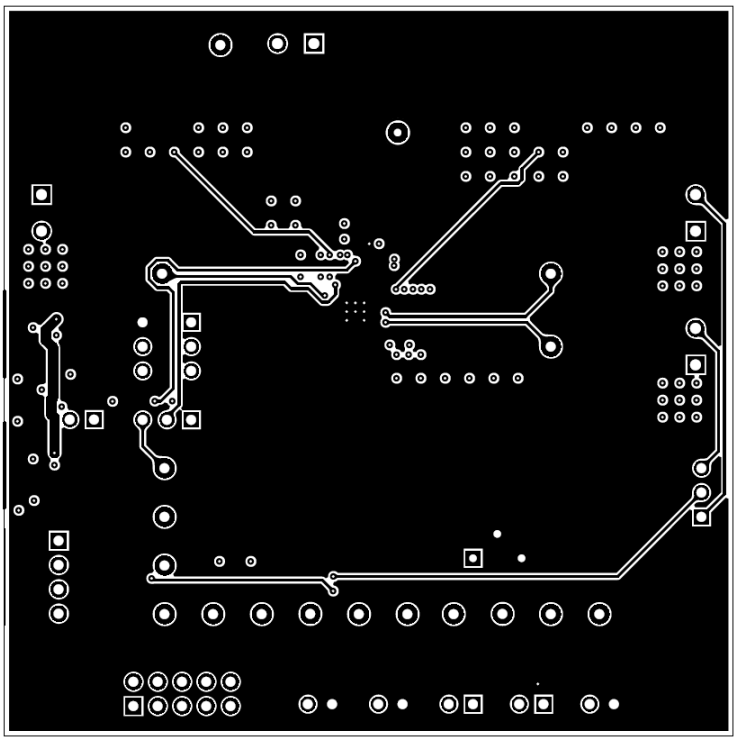


Figure 14. Mid-Layer 2

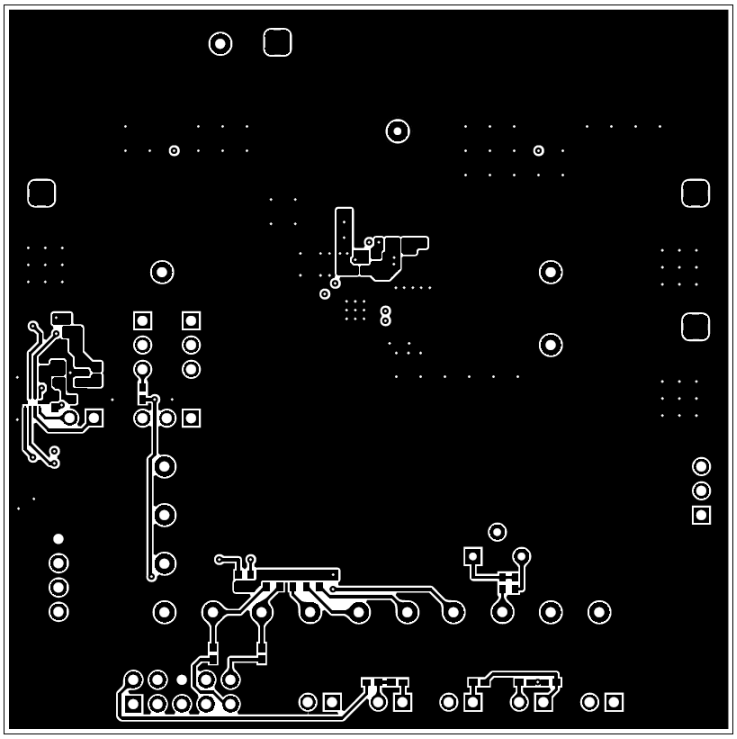


Figure 15. Bottom Layer

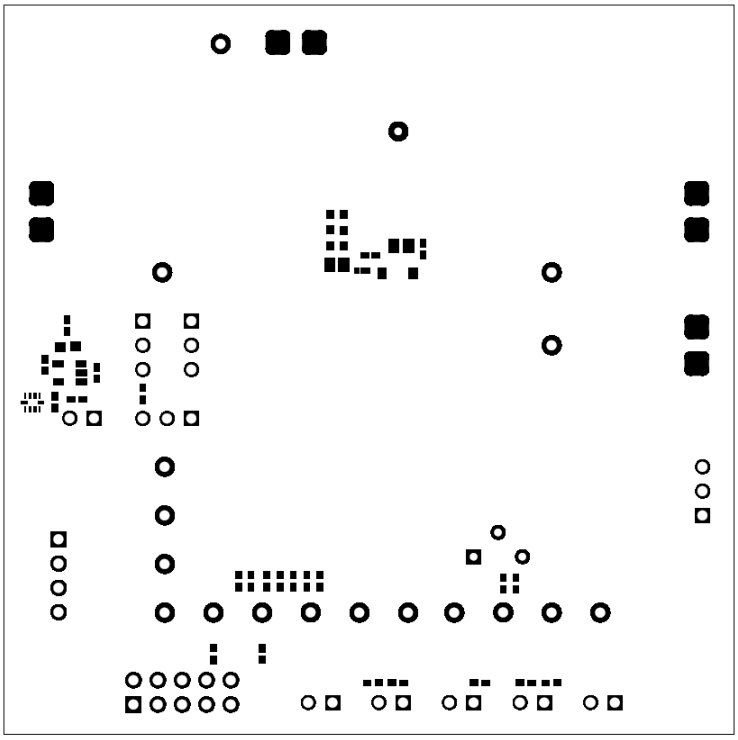


Figure 16. Bottom Solder

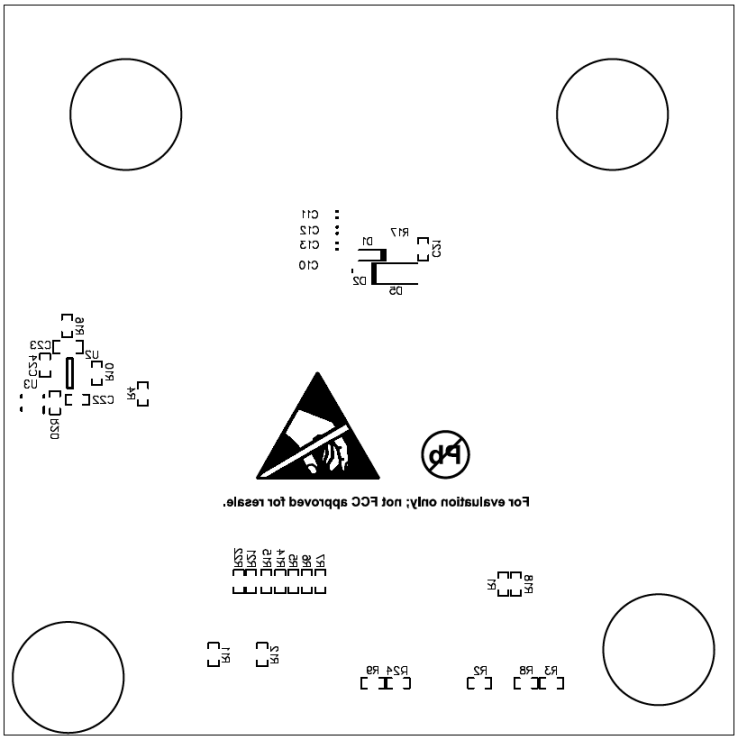


Figure 17. Bottom Assembly

4.2 Schematics

The bq25890EVM (Figure 18), bq25892EVM (Figure 19), bq25895EVM (Figure 21), bq25896EVM (Figure 22) and bq25895MEVM (Figure 21) schematics are provided for reference.

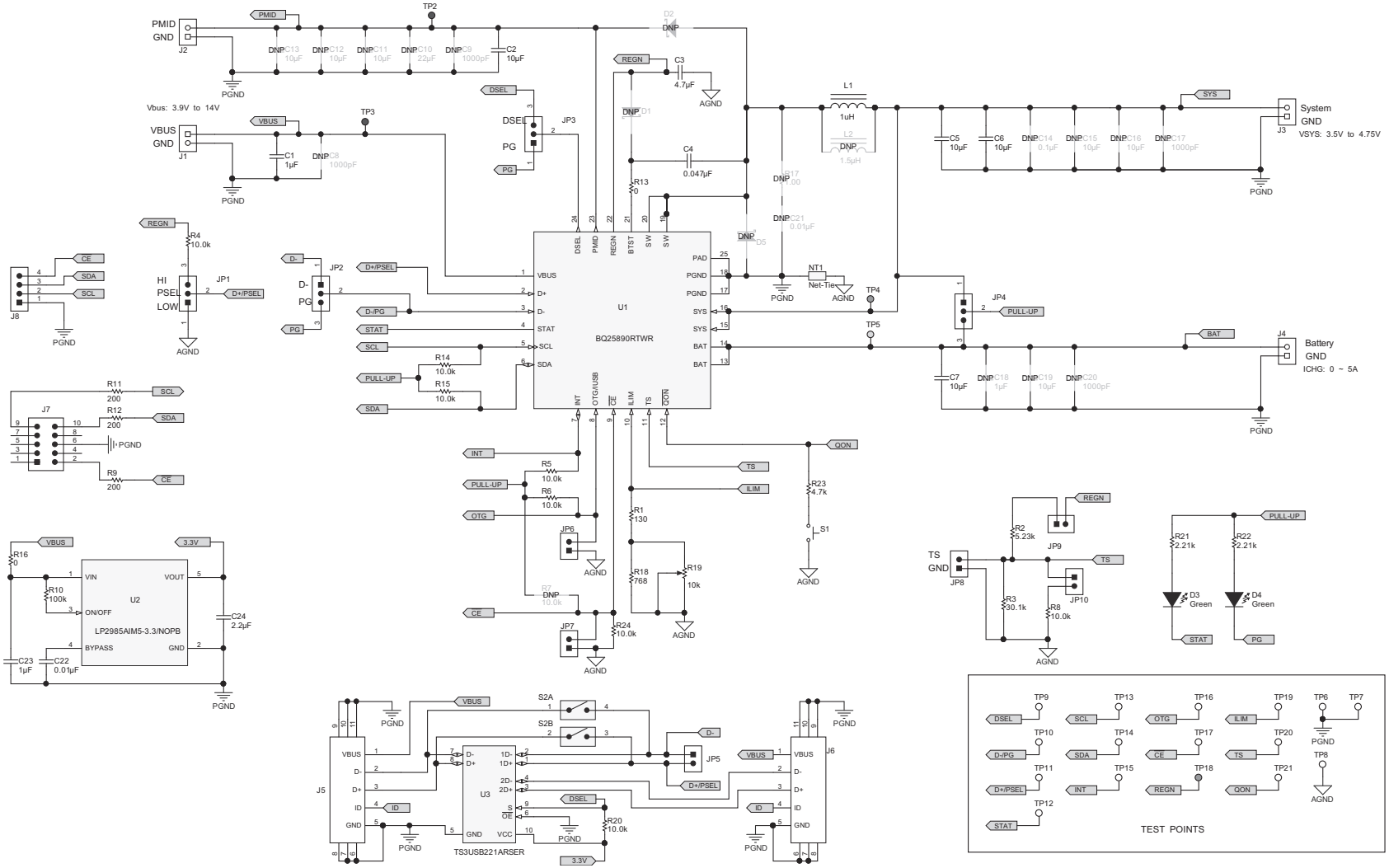


Figure 18. bq25890 EVM Schematic

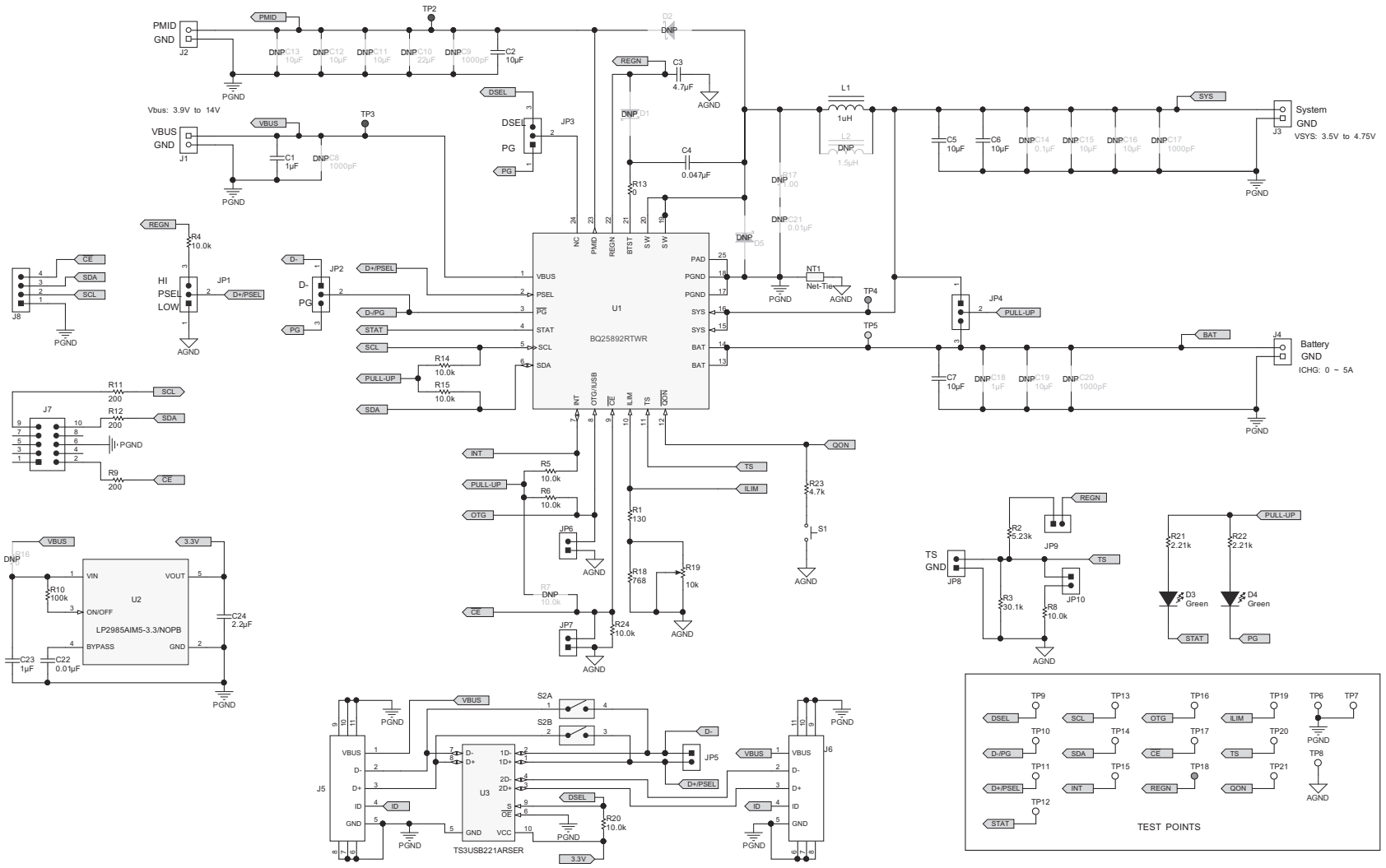


Figure 19. bq25892 EVM Schematic

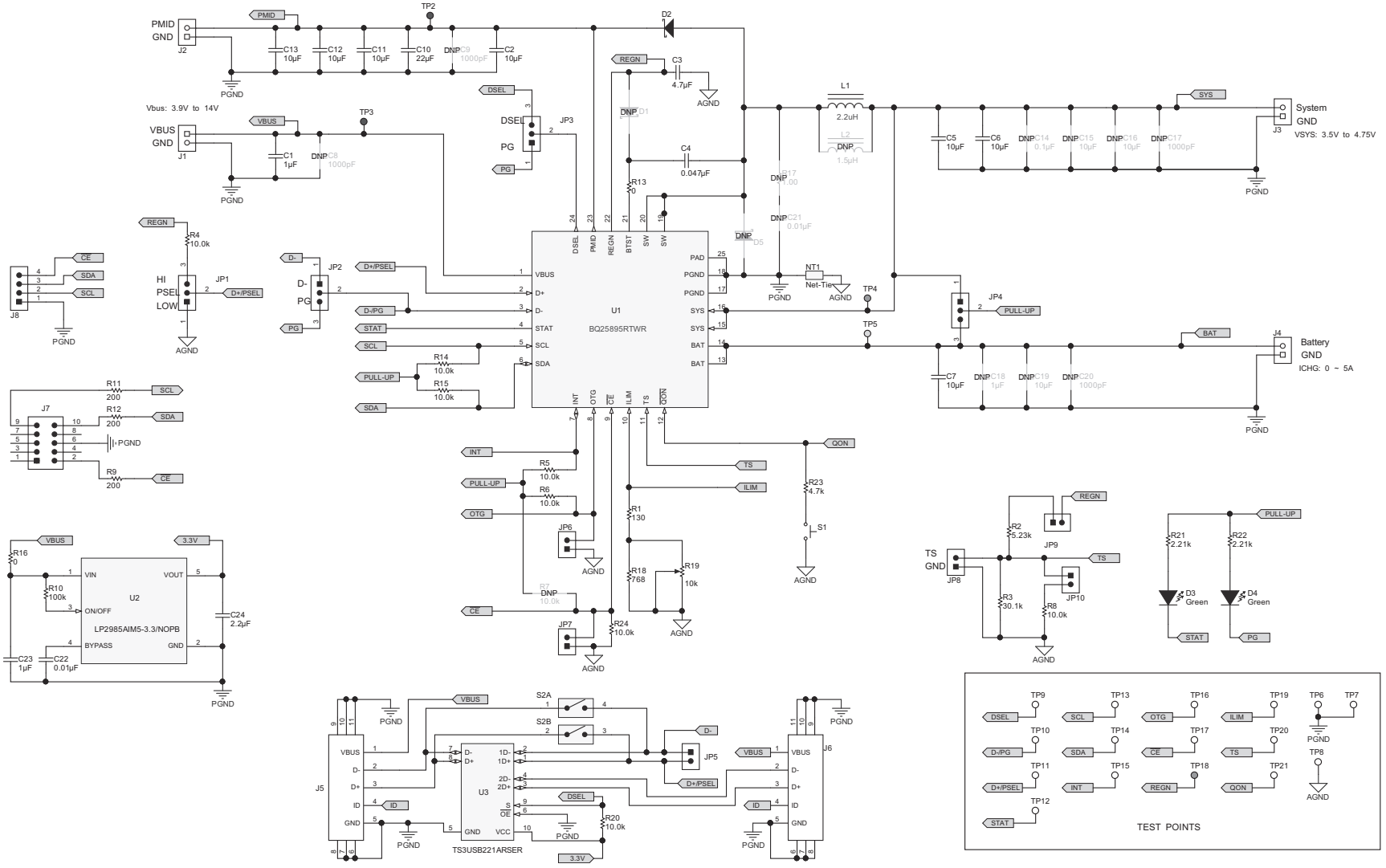


Figure 20. bq25895 EVM Schematic

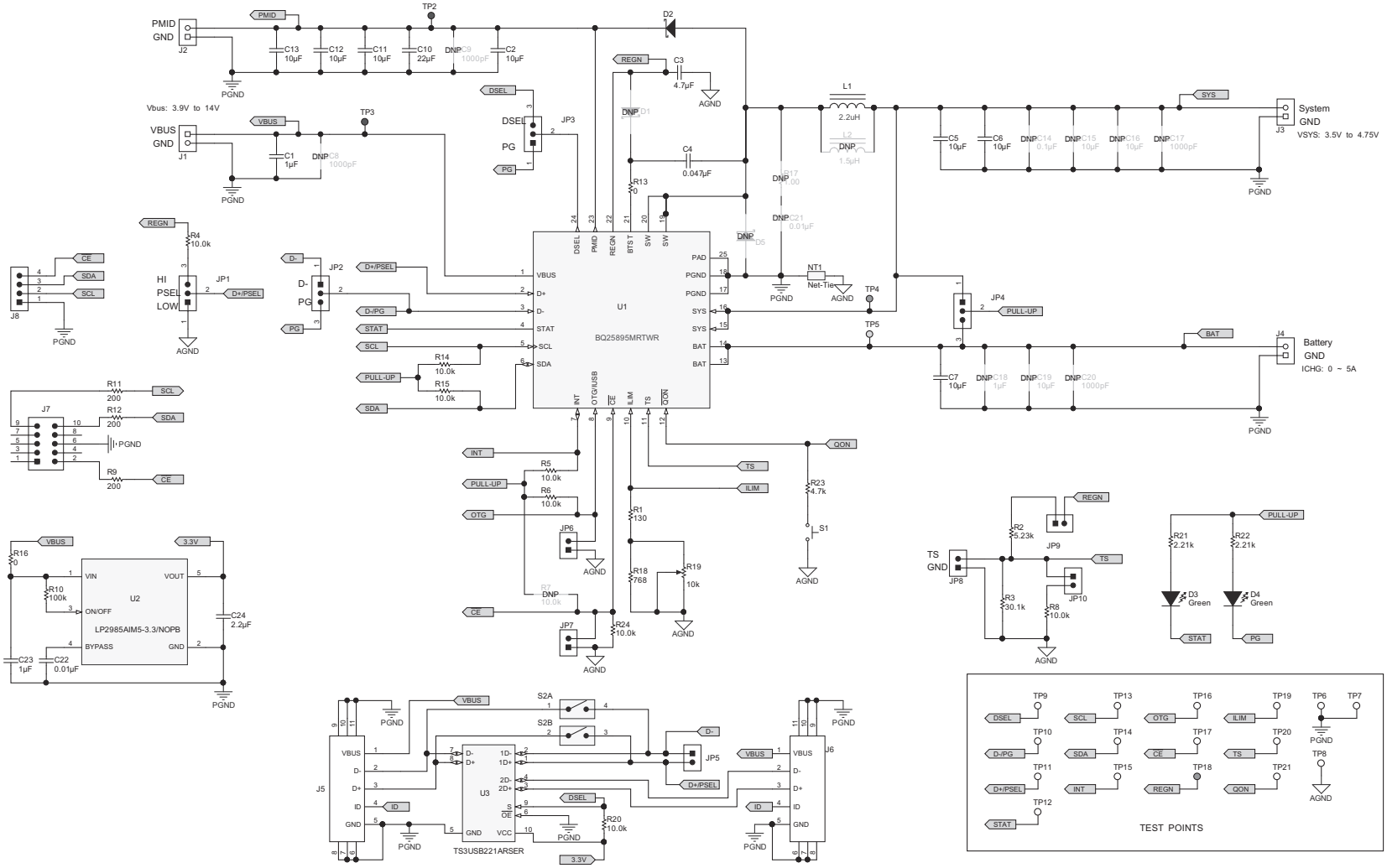


Figure 21. bq25895M EVM Schematic

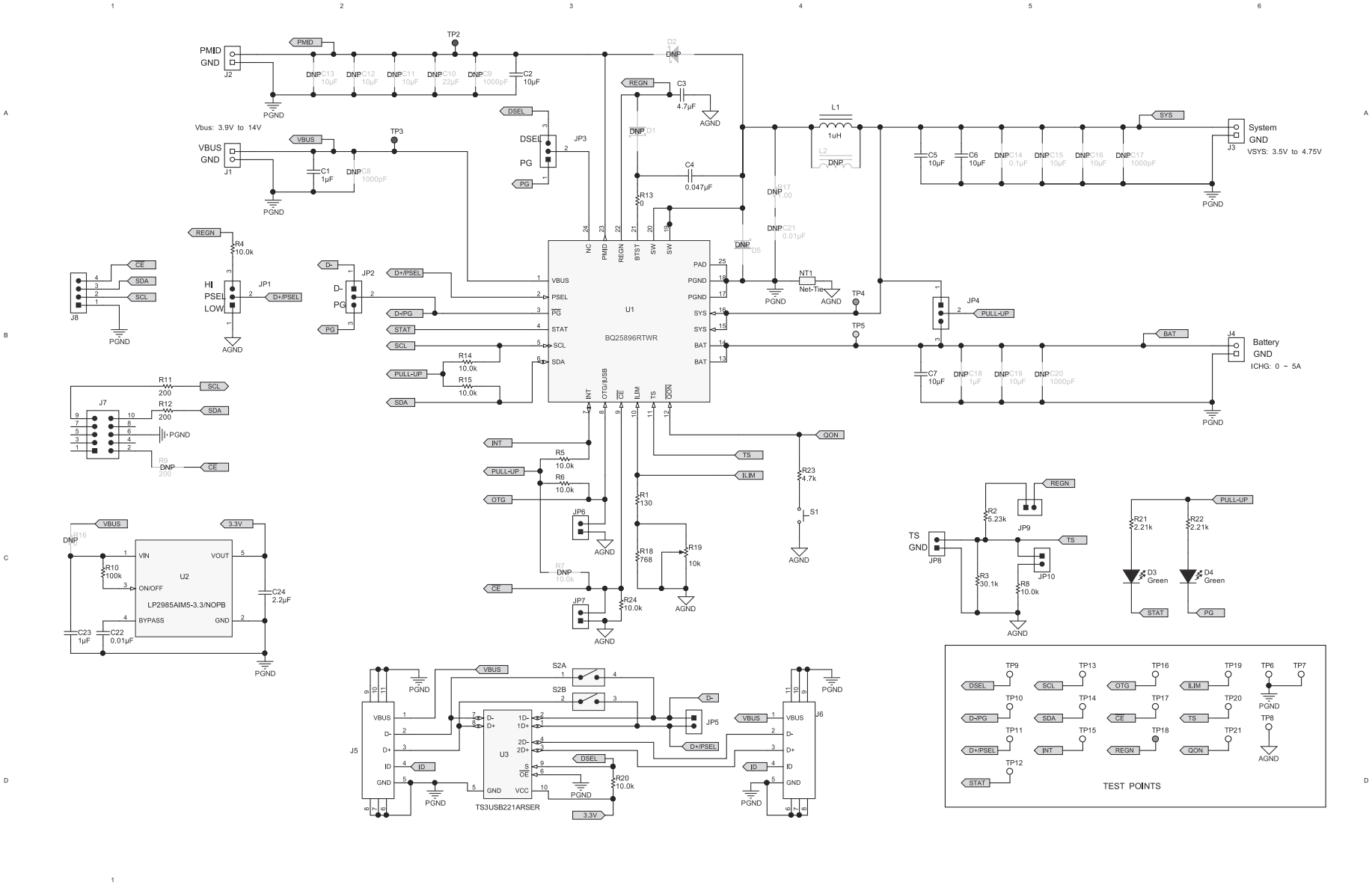


Figure 22. bq25896 EVM Schematic

4.3 Bill of Materials

Table 5 lists the bq25890EVM-664 BOM, Table 6 lists the bq25892EVM-664 BOM, Table 7 lists the bq25895EVM-664 BOM, Table 8 lists the bq25895MEVM-664 BOM and Table 9 lists the bq25896EVM-664 BOM.

Table 5. bq25890EVM-664 Bill of Materials

Designator	Qty.	Value	Description	Package Reference	Part Number	Manufacturer
C1	1	1µF	CAP, CERM, 1 µF, 25 V, ±10%, X7R, 0805	0805	GRM219R71E105KA88D	Murata
C2	1	10µF	CAP, CERM, 10uF, 25V, ±10%, X5R, 0805	0805	C2012X5R1E106K125AB	TDK
C3	1	4.7µF	CAP, CERM, 4.7uF, 16V, ±10%, X5R, 0603	0603	GRM188R61C475KAAJ	Murata
C4	1	0.047µF	CAP, CERM, 0.047uF, 25V, ±10%, X7R, 0402	0402	GRM155R71E473KA88D	Murata
C5, C6, C7	3	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C22	1	0.01µF	CAP, CERM, 0.01uF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
C23	1	1µF	CAP, CERM, 1uF, 25V,±10%, X7R, 0603	0603	C1608X7R1E105K080AB	TDK
C24	1	2.2µF	CAP, CERM, 2.2uF, 10V, ±10%, X5R, 0402	0402	C1005X5R1A225K050BC	TDK
D3, D4	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 × 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3, J4	4	2x1	Conn Term Block, 2POS, 3.81mm, TH	2POS Terminal Block	1727010	Phoenix Contact
J5, J6	2		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	0473460001	Molex
J7	1		Header (shrouded), 100mil, 5x2, High-Temperature, Gold, TH	5x2 Shrouded header	N2510-6002-RB	3M
J8	1		Header, 100mil, 4x1, R/A, TH	4x1 R/A Header	22-05-3041	Molex
JP1–JP4	4		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
JP5–JP10	6		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
L1	1	1µH	Inductor, Shielded Drum Core, Powdered Iron, 1µH, 7A, 0.0181 Ω, SMD	5.49x2x5.18mm	IHLP2020BZER1R0M11	Vishay-Dale
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1	1	130	RES, 130 Ω, 1%, 0.063W, 0402	0402	CRCW0402130RFKED	Vishay-Dale
R2	1	5.23k	RES, 5.23kΩ, 1%, 0.063W, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R3	1	30.1k	RES, 30.1kΩ, 1%, 0.063W, 0402	0402	CRCW040230K1FKED	Vishay-Dale
R4–R6, R8, R14, R15, R20, R24	8	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R9, R11, R12	3	200	RES, 200 Ω, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R10	1	100k	RES, 100kΩ, 1%, 0.063W, 0402	0402	CRCW0402100KFKED	Vishay-Dale
R13, R16	2	0	RES, 0 Ω, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R18	1	768	RES, 768 Ω, 1%, 0.063W, 0402	0402	CRCW0402768RFKED	Vishay-Dale
R19	1	10k	Trimmer, 10kΩ, 0.25W, TH	4.5x8x6.7mm	3266W-1-103LF	Bourns
R21, R22	2	2.21k	RES, 2.21kΩ, 1%, 0.063W, 0402	0402	CRCW04022K21FKED	Vishay-Dale
R23	1	4.7k	RES, 4.7kΩ, 5%, 0.063W, 0402	0402	CRCW04024K70JNED	Vishay-Dale
S1	1		Switch, Normally open, 2.3N force, 200k operations, SMD	KSR	KSR221GLFS	C and K Components
S2	1		DIP Switch, SPST, 2Pos, Slide, SMT	SW, 4.7x1.45x3mm	CVS-02TB	Copal Electronics
SH-JP2—SH-JP5, SH-JP9, SH-JP10	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Table 5. bq25890EVM-664 Bill of Materials (continued)

Designator	Qty.	Value	Description	Package Reference	Part Number	Manufacturer
TP2, TP3	2	Red	Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone
TP4, TP18	2	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone
TP5	1	Yellow	Test Point, Miniature, Yellow, TH	Yellow Miniature Testpoint	5004	Keystone
TP6, TP7, TP8	3	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone
TP9–TP17, TP19–TP21	12	White	Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
U1	1		I2C Controlled 5A Single Cell Charger with NVDC Power Path Management and MaxChargeTM High Voltage Adapter Support, RTW0024H	RTW0024H	BQ25890RTWR	Texas Instruments
U2	1		Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator in SOT-23 Package, DBV0005A	DBV0005A	LP2985AIM5-3.3/NOPB	Texas Instruments
U3	1		ESD Protected,High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer / Demultiplexer Switch, 1:2 Mux / Demux, 6 Ω RON, 2.5 to 3.3V, –40 to 85°C, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ARSER	Texas Instruments
C8, C9, C17, C20	0	1000pF	CAP, CERM, 1000pF, 25V, ±5%, C0G/NP0, 0402	0402	C1005C0G1E102J	TDK
C10	0	22µF	CAP, CERM, 22 µF, 25 V, ±20%, X5R, 0805	0805	GRM21BR61E226ME44	Murata
C11, C12, C13	0	10µF	CAP, CERM, 10uF, 25V, ±20%, X5R, 0603	0603	GRM188R61E106MA73	Murata
C14	0	0.1µF	CAP, CERM, 0.1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C104K	TDK
C15, C16, C19	0	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C18	0	1µF	CAP, CERM, 1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C105K	TDK
C21	0	0.01µF	CAP, CERM, 0.01uF, 25V,±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
D1	0	40V	Diode, Schottky, 40V, 0.38A, SOD-523	SOD-523	ZLLS350TA	Diodes Inc.
D2	0	20V	Diode, Schottky, 20 V, 1 A, 1.4x0.6x0.31mm	1.4x0.6x0.31mm	NSR10F20NXT5G	ON Semiconductor
D5	0	30V	Diode, Schottky, 30 V, 1 A, SOD-123	SOD-123	B130LAW-7-F	Diodes Inc.
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
L2	0	1.5µH	Inductor, Flat Wire, Powdered Iron, 1.5 µH, 3 A, 0.05 Ω, SMD	4.7x1.2x4.0mm	SRP4012-1R5M	Bourns
R7	0	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R17	0	1.00	RES, 1.00 Ω, 1%, 0.125W, 0805	0805	CRCW08051R00FKEA	Vishay-Dale
SH-JP1	0	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Table 6. bq25892EVM-664 Bill of Materials

Designator	Qty.	Value	Description	Package Reference	PartNumber	Manufacturer
C1	1	1µF	CAP, CERM, 1 µF, 25 V, ±10%, X7R, 0805	0805	GRM219R71E105KA88D	MuRata
C2	1	10µF	CAP, CERM, 10uF, 25V, ±10%, X5R, 0805	0805	C2012X5R1E106K125AB	TDK
C3	1	4.7µF	CAP, CERM, 4.7uF, 16V, ±10%, X5R, 0603	0603	GRM188R61C475KAAJ	MuRata
C4	1	0.047µF	CAP, CERM, 0.047uF, 25V, ±10%, X7R, 0402	0402	GRM155R71E473KA88D	MuRata
C5, C6, C7	3	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	MuRata
C22	1	0.01µF	CAP, CERM, 0.01uF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
C23	1	1µF	CAP, CERM, 1uF, 25V, ±10%, X7R, 0603	0603	C1608X7R1E105K080AB	TDK
C24	1	2.2µF	CAP, CERM, 2.2uF, 10V, ±10%, X5R, 0402	0402	C1005X5R1A225K050BC	TDK
D3, D4	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 × 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3, J4	4	2x1	Conn Term Block, 2POS, 3.81mm, TH	2POS Terminal Block	1727010	Phoenix Contact
J5, J6	2		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	0473460001	Molex
J7	1		Header (shrouded), 100mil, 5x2, High-Temperature, Gold, TH	5x2 Shrouded header	N2510-6002-RB	3M
J8	1		Header, 100mil, 4x1, R/A, TH	4x1 R/A Header	22-05-3041	Molex
JP1, JP2, JP3, JP4	4		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
JP5, JP6, JP7, JP8, JP9, JP10	6		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
L1	1	1uH	Inductor, Shielded Drum Core, Powdered Iron, 1µH, 7A, 0.0181 Ω, SMD	5.49x2x5.18mm	IHLP2020BZER1R0M11	Vishay-Dale
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1	1	130	RES, 130 Ω, 1%, 0.063W, 0402	0402	CRCW0402130RFKED	Vishay-Dale
R2	1	5.23k	RES, 5.23kΩ, 1%, 0.063W, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R3	1	30.1k	RES, 30.1kΩ, 1%, 0.063W, 0402	0402	CRCW040230K1FKED	Vishay-Dale
R4–R6, R8, R14, R15, R20, R24	8	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R9, R11, R12	3	200	RES, 200 Ω, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R10	1	100k	RES, 100kΩ, 1%, 0.063W, 0402	0402	CRCW0402100KFKED	Vishay-Dale
R13	1	0	RES, 0 Ω, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R18	1	768	RES, 768 Ω, 1%, 0.063W, 0402	0402	CRCW0402768RFKED	Vishay-Dale
R19	1	10k	Trimmer, 10kΩ, 0.25W, TH	4.5x8x6.7mm	3266W-1-103LF	Bourns
R21, R22	2	2.21k	RES, 2.21kΩ, 1%, 0.063W, 0402	0402	CRCW04022K21FKED	Vishay-Dale
R23	1	4.7k	RES, 4.7kΩ, 5%, 0.063W, 0402	0402	CRCW04024K70JNED	Vishay-Dale
S1	1		Switch, Normally open, 2.3N force, 200k operations, SMD	KSR	KSR221GLFS	C and K Components
S2	1		DIP Switch, SPST, 2Pos, Slide, SMT	SW, 4.7x1.45x3mm	CVS-02TB	Copal Electronics
SH-JP1—SH-JP4, SH-JP9, SH-JP10	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
TP2, TP3	2	Red	Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone
TP4, TP18	2	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone
TP5	1	Yellow	Test Point, Miniature, Yellow, TH	Yellow Miniature Testpoint	5004	Keystone
TP6, TP7, TP8	3	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone

Table 6. bq25892EVM-664 Bill of Materials (continued)

Designator	Qty.	Value	Description	Package Reference	PartNumber	Manufacturer
TP9–TP17, TP19–TP21	12	White	Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
U1	1		I2C Controlled 5A Single Cell Charger with NVDC Power Path Management and MaxCharge™ High Voltage Adapter Support, RTW0024H	RTW0024H	BQ25892RTWR	Texas Instruments
U2	1		Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator in SOT-23 Package, DBV0005A	DBV0005A	LP2985AIM5-3.3/NOPB	Texas Instruments
U3	1		ESD Protected,High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer / Demultiplexer Switch, 1:2 Mux / Demux, 6 Ω RON, 2.5 to 3.3V, -40 to 85°C, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ARSER	Texas Instruments
C8, C9, C17, C20	0	1000pF	CAP, CERM, 1000pF, 25V, ±5%, C0G/NP0, 0402	0402	C1005C0G1E102J	TDK
C10	0	22µF	CAP, CERM, 22 µF, 25 V, ±20%, X5R, 0805	0805	GRM21BR61E226ME44	Murata
C11, C12, C13	0	10µF	CAP, CERM, 10uF, 25V, ±20%, X5R, 0603	0603	GRM188R61E106MA73	Murata
C14	0	0.1µF	CAP, CERM, 0.1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C104K	TDK
C15, C16, C19	0	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C18	0	1µF	CAP, CERM, 1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C105K	TDK
C21	0	0.01µF	CAP, CERM, 0.01uF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
D1	0	40V	Diode, Schottky, 40V, 0.38A, SOD-523	SOD-523	ZLLS350TA	Diodes Inc.
D2	0	20V	Diode, Schottky, 20 V, 1 A, 1.4x0.6x0.31mm	1.4x0.6x0.31mm	NSR10F20NXT5G	ON Semiconductor
D5	0	30V	Diode, Schottky, 30 V, 1 A, SOD-123	SOD-123	B130LAW-7-F	Diodes Inc.
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
L2	0	1.5µH	Inductor, Flat Wire, Powdered Iron, 1.5 µH, 3 A, 0.05 Ω, SMD	4.7x1.2x4.0mm	SRP4012-1R5M	Bourns
R7	0	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R16	0	0	RES, 0 Ω 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R17	0	1.00	RES, 1.00 Ω, 1%, 0.125W, 0805	0805	CRCW08051R00FKEA	Vishay-Dale
SH-JP5	0	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Table 7. bq25895EVM-664 Bill of Materials

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
C1	1	1µF	CAP, CERM, 1 µF, 25 V, ±10%, X7R, 0805	0805	GRM219R71E105KA88D	Murata
C2	1	10µF	CAP, CERM, 10µF, 25V, ±10%, X5R, 0805	0805	C2012X5R1E106K125AB	TDK
C3	1	4.7µF	CAP, CERM, 4.7µF, 16V, ±10%, X5R, 0603	0603	GRM188R61C475KAAJ	Murata
C4	1	0.047µF	CAP, CERM, 0.047µF, 25V, ±10%, X7R, 0402	0402	GRM155R71E473KA88D	Murata
C5, C6, C7	3	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C10	1	22µF	CAP, CERM, 22 µF, 25 V, ±20%, X5R, 0805	0805	GRM21BR61E226ME44	Murata
C11, C12, C13	3	10µF	CAP, CERM, 10µF, 25V, ±20%, X5R, 0603	0603	GRM188R61E106MA73	Murata
C22	1	0.01µF	CAP, CERM, 0.01µF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
C23	1	1µF	CAP, CERM, 1µF, 25V, ±10%, X7R, 0603	0603	C1608X7R1E105K080AB	TDK
C24	1	2.2µF	CAP, CERM, 2.2µF, 10V, ±10%, X5R, 0402	0402	C1005X5R1A225K050BC	TDK
D2	1	20V	Diode, Schottky, 20 V, 1 A, 1.4x0.6x0.31mm	1.4x0.6x0.31mm	NSR10F20NXT5G	ON Semiconductor
D3, D4	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 x 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3, J4	4	2x1	Conn Term Block, 2POS, 3.81mm, TH	2POS Terminal Block	1727010	Phoenix Contact
J5, J6	2		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	0473460001	Molex
J7	1		Header (shrouded), 100mil, 5x2, High-Temperature, Gold, TH	5x2 Shrouded header	N2510-6002-RB	3M
J8	1		Header, 100mil, 4x1, R/A, TH	4x1 R/A Header	22-05-3041	Molex
JP1, JP2, JP3, JP4	4		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
JP5–JP10	6		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
L1	1	2.2µH	Inductor, Shielded Drum Core, Powdered Iron, 2.2 µH, 8 A, 0.018 ohm, SMD	IHLP-2525CZ	IHLP2525CZER2R2M01	Vishay-Dale
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1	1	130	RES, 130 Ω, 1%, 0.063W, 0402	0402	CRCW0402130RFKED	Vishay-Dale
R2	1	5.23k	RES, 5.23kΩ, 1%, 0.063W, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R3	1	30.1k	RES, 30.1kΩ, 1%, 0.063W, 0402	0402	CRCW040230K1FKED	Vishay-Dale
R4–R6, R8, R14, R15, R20, R24	8	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R9, R11, R12	3	200	RES, 200 Ω, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R10	1	100k	RES, 100k Ω, 1%, 0.063W, 0402	0402	CRCW0402100KFKED	Vishay-Dale
R13, R16	2	0	RES, 0 Ω, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R18	1	768	RES, 768 Ω, 1%, 0.063W, 0402	0402	CRCW0402768RFKED	Vishay-Dale
R19	1	10k	Trimmer, 10kΩ, 0.25W, TH	4.5x8x6.7mm	3266W-1-103LF	Bourns
R21, R22	2	2.21k	RES, 2.21k Ω, 1%, 0.063W, 0402	0402	CRCW04022K21FKED	Vishay-Dale
R23	1	4.7k	RES, 4.7kΩ 5%, 0.063W, 0402	0402	CRCW04024K70JNED	Vishay-Dale
S1	1		Switch, Normally open, 2.3N force, 200k operations, SMD	KSR	KSR221GLFS	C and K Components
S2	1		DIP Switch, SPST, 2Pos, Slide, SMT	SW, 4.7x1.45x3mm	CVS-02TB	Copal Electronics
SH-JP2, SH-JP3, SH-JP4, SH-JP5, SH-JP9, SH-JP10	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
TP2, TP3	2	Red	Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone
TP4, TP18	2	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone

Table 7. bq25895EVM-664 Bill of Materials (continued)

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
TP5	1	Yellow	Test Point, Miniature, Yellow, TH	Yellow Miniature Testpoint	5004	Keystone
TP6, TP7, TP8	3	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone
TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP19, TP20, TP21	12	White	Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
U1	1		I2C Controlled 5A Single Cell Charger with NVDC Power Path Management and MaxCharge™ High Voltage Adapter Support, RTW0024H	RTW0024H	BQ25895RTWR	Texas Instruments
U2	1		Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator in SOT-23 Package, DBV0005A	DBV0005A	LP2985AIM5-3.3/NOPB	Texas Instruments
U3	1		ESD Protected, High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer / Demultiplexer Switch, 1:2 Mux / Demux, 6 Ω RON, 2.5 to 3.3V, -40 to 85°C, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ARSER	Texas Instruments
C8, C9, C17, C20	0	1000pF	CAP, CERM, 1000pF, 25V, ±5%, C0G/NP0, 0402	0402	C1005C0G1E102J	TDK
C14	0	0.1µF	CAP, CERM, 0.1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C104K	TDK
C15, C16, C19	0	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C18	0	1µF	CAP, CERM, 1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C105K	TDK
C21	0	0.01µF	CAP, CERM, 0.01uF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
D1	0	40V	Diode, Schottky, 40V, 0.38A, SOD-523	SOD-523	ZLLS350TA	Diodes Inc.
D5	0	30V	Diode, Schottky, 30 V, 1 A, SOD-123	SOD-123	B130LAW-7-F	Diodes Inc.
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
L2	0	1.5µH	Inductor, Flat Wire, Powdered Iron, 1.5 µH, 3 A, 0.05 Ω, SMD	4.7x1.2x4.0mm	SRP4012-1R5M	Bourns
R7	0	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R17	0	1.00	RES, 1.00 Ω, 1%, 0.125W, 0805	0805	CRCW08051R00FKEA	Vishay-Dale
SH-JP1	0	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Table 8. bq25895MEVM-664 Bill of Materials

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
C1	1	1µF	CAP, CERM, 1 µF, 25 V, ±10%, X7R, 0805	0805	GRM219R71E105KA88D	Murata
C2	1	10µF	CAP, CERM, 10µF, 25V, ±10%, X5R, 0805	0805	C2012X5R1E106K125AB	TDK
C3	1	4.7µF	CAP, CERM, 4.7µF, 16V, ±10%, X5R, 0603	0603	GRM188R61C475KAAJ	Murata
C4	1	0.047µF	CAP, CERM, 0.047µF, 25V, ±10%, X7R, 0402	0402	GRM155R71E473KA88D	Murata
C5, C6, C7	3	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C10	1	22µF	CAP, CERM, 22 µF, 25 V, ±20%, X5R, 0805	0805	GRM21BR61E226ME44	Murata
C11, C12, C13	3	10µF	CAP, CERM, 10µF, 25V, ±20%, X5R, 0603	0603	GRM188R61E106MA73	Murata
C22	1	0.01µF	CAP, CERM, 0.01µF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
C23	1	1µF	CAP, CERM, 1µF, 25V, ±10%, X7R, 0603	0603	C1608X7R1E105K080AB	TDK
C24	1	2.2µF	CAP, CERM, 2.2µF, 10V, ±10%, X5R, 0402	0402	C1005X5R1A225K050BC	TDK
D2	1	20V	Diode, Schottky, 20 V, 1 A, 1.4x0.6x0.31mm	1.4x0.6x0.31mm	NSR10F20NXT5G	ON Semiconductor
D3, D4	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 x 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3, J4	4	2x1	Conn Term Block, 2POS, 3.81mm, TH	2POS Terminal Block	1727010	Phoenix Contact
J5, J6	2		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	0473460001	Molex
J7	1		Header (shrouded), 100mil, 5x2, High-Temperature, Gold, TH	5x2 Shrouded header	N2510-6002-RB	3M
J8	1		Header, 100mil, 4x1, R/A, TH	4x1 R/A Header	22-05-3041	Molex
JP1, JP2, JP3, JP4	4		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
JP5–JP10	6		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
L1	1	2.2µH	Inductor, Shielded Drum Core, Powdered Iron, 2.2 µH, 8 A, 0.018 ohm, SMD	IHLP-2525CZ	IHLP2525CZER2R2M01	Vishay-Dale
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1	1	130	RES, 130 Ω, 1%, 0.063W, 0402	0402	CRCW0402130RFKED	Vishay-Dale
R2	1	5.23k	RES, 5.23kΩ, 1%, 0.063W, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R3	1	30.1k	RES, 30.1kΩ, 1%, 0.063W, 0402	0402	CRCW040230K1FKED	Vishay-Dale
R4–R6, R8, R14, R15, R20, R24	8	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R9, R11, R12	3	200	RES, 200 Ω, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R10	1	100k	RES, 100k Ω, 1%, 0.063W, 0402	0402	CRCW0402100KFKED	Vishay-Dale
R13, R16	2	0	RES, 0 Ω, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R18	1	768	RES, 768 Ω, 1%, 0.063W, 0402	0402	CRCW0402768RFKED	Vishay-Dale
R19	1	10k	Trimmer, 10kΩ, 0.25W, TH	4.5x8x6.7mm	3266W-1-103LF	Bourns
R21, R22	2	2.21k	RES, 2.21k Ω, 1%, 0.063W, 0402	0402	CRCW04022K21FKED	Vishay-Dale
R23	1	4.7k	RES, 4.7kΩ 5%, 0.063W, 0402	0402	CRCW04024K70JNED	Vishay-Dale
S1	1		Switch, Normally open, 2.3N force, 200k operations, SMD	KSR	KSR221GLFS	C and K Components
S2	1		DIP Switch, SPST, 2Pos, Slide, SMT	SW, 4.7x1.45x3mm	CVS-02TB	Copal Electronics
SH-JP2, SH-JP3, SH-JP4, SH-JP5, SH-JP9, SH-JP10	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
TP2, TP3	2	Red	Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone
TP4, TP18	2	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone

Table 8. bq25895MEVM-664 Bill of Materials (continued)

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
TP5	1	Yellow	Test Point, Miniature, Yellow, TH	Yellow Miniature Testpoint	5004	Keystone
TP6, TP7, TP8	3	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone
TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP19, TP20, TP21	12	White	Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
U1	1		I2C Controlled 5A Single Cell Charger with NVDC Power Path Management and MaxCharge™ High Voltage Adapter Support, RTW0024H	RTW0024H	BQ25895MRTWR	Texas Instruments
U2	1		Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator in SOT-23 Package, DBV0005A	DBV0005A	LP2985AIM5-3.3/NOPB	Texas Instruments
U3	1		ESD Protected, High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer / Demultiplexer Switch, 1:2 Mux / Demux, 6 Ω RON, 2.5 to 3.3V, -40 to 85°C, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ARSER	Texas Instruments
C8, C9, C17, C20	0	1000pF	CAP, CERM, 1000pF, 25V, ±5%, C0G/NP0, 0402	0402	C1005C0G1E102J	TDK
C14	0	0.1µF	CAP, CERM, 0.1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C104K	TDK
C15, C16, C19	0	10µF	CAP, CERM, 10 µF, 10 V, ±10%, X7R, 0805	0805	GRM21BR71A106KE51L	Murata
C18	0	1µF	CAP, CERM, 1uF, 16V, ±10%, X7R, 0603	0603	C1608X7R1C105K	TDK
C21	0	0.01µF	CAP, CERM, 0.01uF, 25V, ±10%, X7R, 0402	0402	C1005X7R1E103K	TDK
D1	0	40V	Diode, Schottky, 40V, 0.38A, SOD-523	SOD-523	ZLLS350TA	Diodes Inc.
D5	0	30V	Diode, Schottky, 30 V, 1 A, SOD-123	SOD-123	B130LAW-7-F	Diodes Inc.
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
L2	0	1.5µH	Inductor, Flat Wire, Powdered Iron, 1.5 µH, 3 A, 0.05 Ω, SMD	4.7x1.2x4.0mm	SRP4012-1R5M	Bourns
R7	0	10.0k	RES, 10.0kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R17	0	1.00	RES, 1.00 Ω, 1%, 0.125W, 0805	0805	CRCW08051R00FKEA	Vishay-Dale
SH-JP1	0	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Table 9. bq25896EVM-664 Bill of Materials

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
C1	1	1uF	CAP, CERM, 1 µF, 25 V, +/- 10%, X7R, 0805	0805	GRM219R71E105KA88D	MuRata
C2	1	10uF	CAP, CERM, 10uF, 25V, +/-10%, X5R, 0805	0805	C2012X5R1E106K125AB	TDK
C3	1	4.7uF	CAP, CERM, 4.7uF, 16V, +/-10%, X5R, 0603	0603	GRM188R61C475KAAJ	MuRata
C4	1	0.047uF	CAP, CERM, 0.047uF, 25V, +/-10%, X7R, 0402	0402	GRM155R71E473KA88D	MuRata
C5, C6, C7	3	10uF	CAP, CERM, 10 µF, 10 V, +/- 10%, X7R, 0805	0805	GRM21BR71A106KE51L	MuRata
C22	1	0.01uF	CAP, CERM, 0.01uF, 25V, +/-10%, X7R, 0402	0402	C1005X7R1E103K	TDK
C23	1	1uF	CAP, CERM, 1uF, 25V, +/-10%, X7R, 0603	0603	C1608X7R1E105K080AB	TDK
C24	1	2.2uF	CAP, CERM, 2.2uF, 10V, +/-10%, X5R, 0402	0402	C1005X5R1A225K050BC	TDK
D3, D4	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 X 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3, J4	4	2x1	Conn Term Block, 2POS, 3.81mm, TH	2POS Terminal Block	1727010	Phoenix Contact
J5, J6	2		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	0473460001	Molex
J7	1		Header (shrouded), 100mil, 5x2, High-Temperature, Gold, TH	5x2 Shrouded header	N2510-6002-RB	3M
J8	1		Header, 100mil, 4x1, R/A, TH	4x1 R/A Header	22-05-3041	Molex
JP1, JP2, JP3, JP4	4		Header, 100mil, 3x1, Tin plated, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
JP5, JP6, JP7, JP8, JP9, JP10	6		Header, 100mil, 2x1, Tin plated, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
L1	1	1uH	Inductor, Shielded Drum Core, Powdered Iron, 1uH, 7A, 0.0181 ohm, SMD	5.49x2x5.18mm	IHLP2020BZER1R0M11	Vishay-Dale
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650"H x 0.200"W	THT-14-423-10	Brady
R1	1	130	RES, 130 ohm, 1%, 0.063W, 0402	0402	CRCW0402130RFKED	Vishay-Dale
R2	1	5.23k	RES, 5.23k ohm, 1%, 0.063W, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R3	1	30.1k	RES, 30.1k ohm, 1%, 0.063W, 0402	0402	CRCW040230K1FKED	Vishay-Dale
R4, R5, R6, R8, R14, R15, R20, R24	8	10.0k	RES, 10.0k ohm, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R10	1	100k	RES, 100k ohm, 1%, 0.063W, 0402	0402	CRCW0402100KFKED	Vishay-Dale
R11, R12	2	200	RES, 200 ohm, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R13	1	0	RES, 0 ohm, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R18	1	768	RES, 768 ohm, 1%, 0.063W, 0402	0402	CRCW0402768RFKED	Vishay-Dale
R19	1	10k	Trimmer, 10k ohm, 0.25W, TH	4.5x8x6.7mm	3266W-1-103LF	Bourns
R21, R22	2	2.21k	RES, 2.21k ohm, 1%, 0.063W, 0402	0402	CRCW04022K21FKED	Vishay-Dale
R23	1	4.7k	RES, 4.7k ohm, 5%, 0.063W, 0402	0402	CRCW04024K70JNED	Vishay-Dale
S1	1		Switch, Normally open, 2.3N force, 200k operations, SMD	KSR	KSR221GLFS	C and K Components
S2	1		DIP Switch, SPST, 2Pos, Slide, SMT	SW, 4.7x1.45x3mm	CVS-02TB	Copal Electronics
SH-JP1, SH-JP2, SH-JP3, SH-JP4, SH-JP9, SH-JP10	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
TP2, TP3	2	Red	Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone
TP4, TP18	2	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone
TP5	1	Yellow	Test Point, Miniature, Yellow, TH	Yellow Miniature Testpoint	5004	Keystone
TP6, TP7, TP8	3	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone

Table 9. bq25896EVM-664 Bill of Materials (continued)

Designator	Qty.	Value	Description	PackageReference	Part Number	Manufacturer
TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP19, TP20, TP21	12	White	Test Point, Miniature, White, TH	White Miniature Testpoint	5002	Keystone
U1	1		I2C Controlled 3A Single Cell Charger with NVDC Power Path Management and MaxCharge High Voltage Adapter Support, RTW0024H	RTW0024H	BQ25896RTWR	Texas Instruments
U2	1		Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator in SOT-23 Package, DBV0005A	DBV0005A	LP2985AIM5-3.3/NOPB	Texas Instruments
U3	1		ESD Protected,High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer / Demultiplexer Switch, 1:2 Mux / Demux, 6 ohm RON, 2.5 to 3.3V, -40 to 85 degC, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ARSER	Texas Instruments
C8, C9, C17, C20	0	1000pF	CAP, CERM, 1000pF, 25V, +/-5%, C0G/NP0, 0402	0402	C1005C0G1E102J	TDK
C10	0	22uF	CAP, CERM, 22 µF, 25 V, +/- 20%, X5R, 0805	0805	GRM21BR61E226ME44	MuRata
C11, C12, C13	0	10uF	CAP, CERM, 10uF, 25V, +/-20%, X5R, 0603	0603	GRM188R61E106MA73	MuRata
C14	0	0.1uF	CAP, CERM, 0.1uF, 16V, +/-10%, X7R, 0603	0603	C1608X7R1C104K	TDK
C15, C16, C19	0	10uF	CAP, CERM, 10 µF, 10 V, +/- 10%, X7R, 0805	0805	GRM21BR71A106KE51L	MuRata
C18	0	1uF	CAP, CERM, 1uF, 16V, +/-10%, X7R, 0603	0603	C1608X7R1C105K	TDK
C21	0	0.01uF	CAP, CERM, 0.01uF, 25V, +/-10%, X7R, 0402	0402	C1005X7R1E103K	TDK
D1	0	40V	Diode, Schottky, 40V, 0.38A, SOD-523	SOD-523	ZLLS350TA	Diodes Inc.
D2	0	20V	Diode, Schottky, 20 V, 1 A, 1.4x0.6x0.31mm	1.4x0.6x0.31mm	NSR10F20NXT5G	ON Semiconductor
D5	0	30V	Diode, Schottky, 30 V, 1 A, SOD-123	SOD-123	B130LAW-7-F	Diodes Inc.
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
L2	0	2.2uH	Inductor, Shielded Drum Core, Powdered Iron, 2.2 µH, 8 A, 0.018 ohm, SMD	IHLP-2525CZ	IHLP2525CZER2R2M01	Vishay-Dale
R7	0	10.0k	RES, 10.0k ohm, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale
R9	0	200	RES, 200 ohm, 1%, 0.063W, 0402	0402	CRCW0402200RFKED	Vishay-Dale
R16	0	0	RES, 0 ohm, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R17	0	1.00	RES, 1.00 ohm, 1%, 0.125W, 0805	0805	CRCW08051R00FKEA	Vishay-Dale
SH-JP5	0	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M

Revision History

Changes from A Revision (July 2015) to B Revision **Page**

- Added *bq25896 EVM Schematic* Figure 22 20
- Added *bq25896 EVM* BOM Table 9. 29

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

Revision History

Changes from Original (March 2015) to A Revision **Page**

- Added bq25895M EVM to document. 1
- Changed version number on BatteryManagementStudio-1.3.35. 4
- Changed *Install EV2300 Software* section. 4
- Changed *Connections of the EV2300* image. 5
- Deleted EV2400 reference in *Original Test Setup for PWR664 (bq2589x EVM)* image. 5
- Changed steps 8 and 9 in the *Equipment Setup* section. 6
- Changed image in the *Communication Verification* section, step 3. 9
- Added *Clean-Up* section. 10
- Added *bq25895M EVM Schematic* image. 19
- Added *bq25895M EVM* BOM Table 8 27

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

STANDARD TERMS AND CONDITIONS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, or documentation (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms and conditions set forth herein. Acceptance of the EVM is expressly subject to the following terms and conditions.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms and conditions that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.

   2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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2. 実験局の免許を取得後ご使用いただく。
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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

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