

Texas Instruments
Analog EVM Test Procedure

TIDA-00589 (PWR664) Test Procedure

Rev. A

1 GENERAL

1.1 PURPOSE

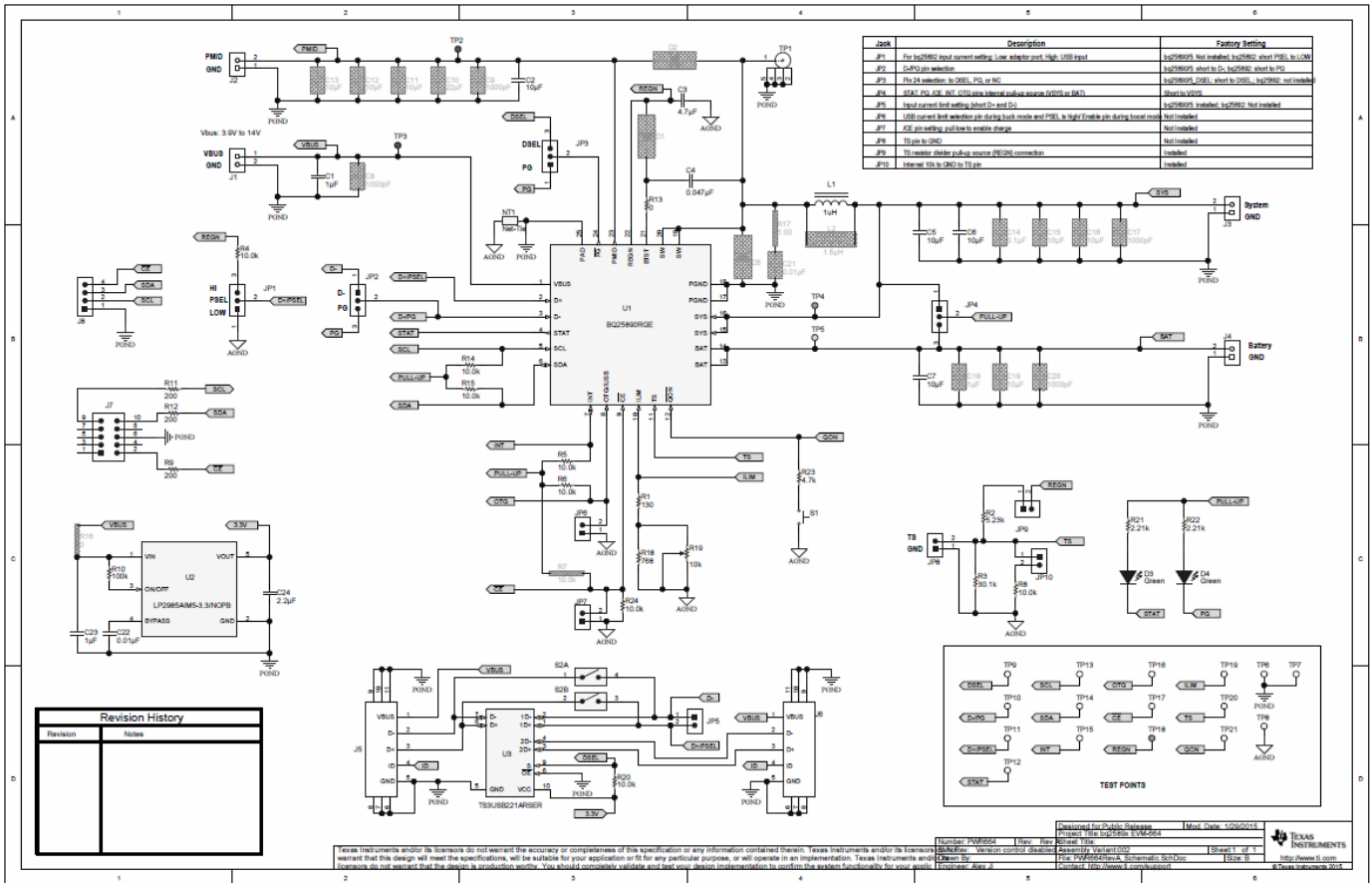
1.1.1 To provide detailed instructions for testing TIDA-00589 (PWR664 EVM) modules for the bq2589x device.

1.2 SCOPE

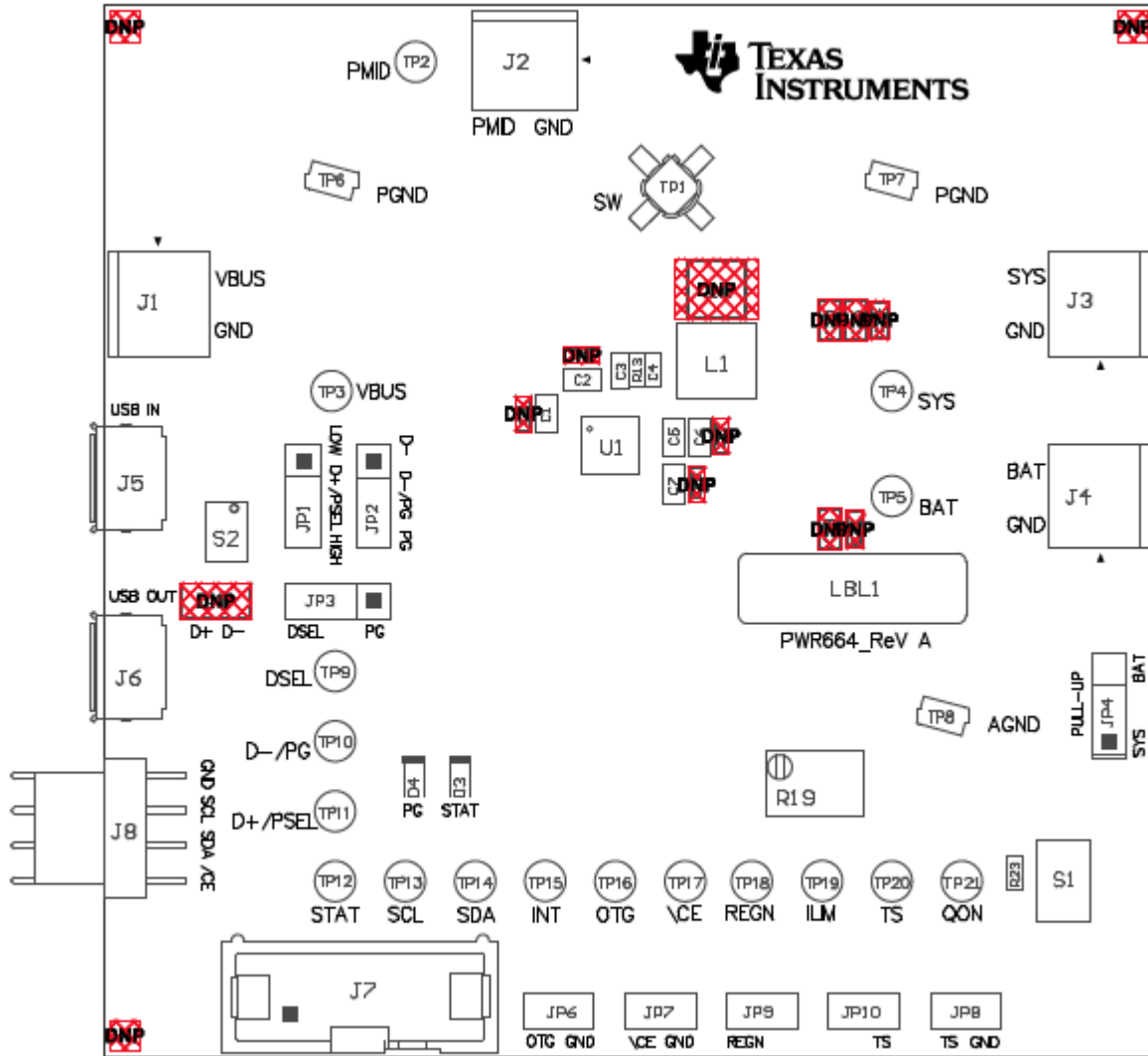
1.2.1 Covers complete instructions for testing TIDA-00589 (PWR664)

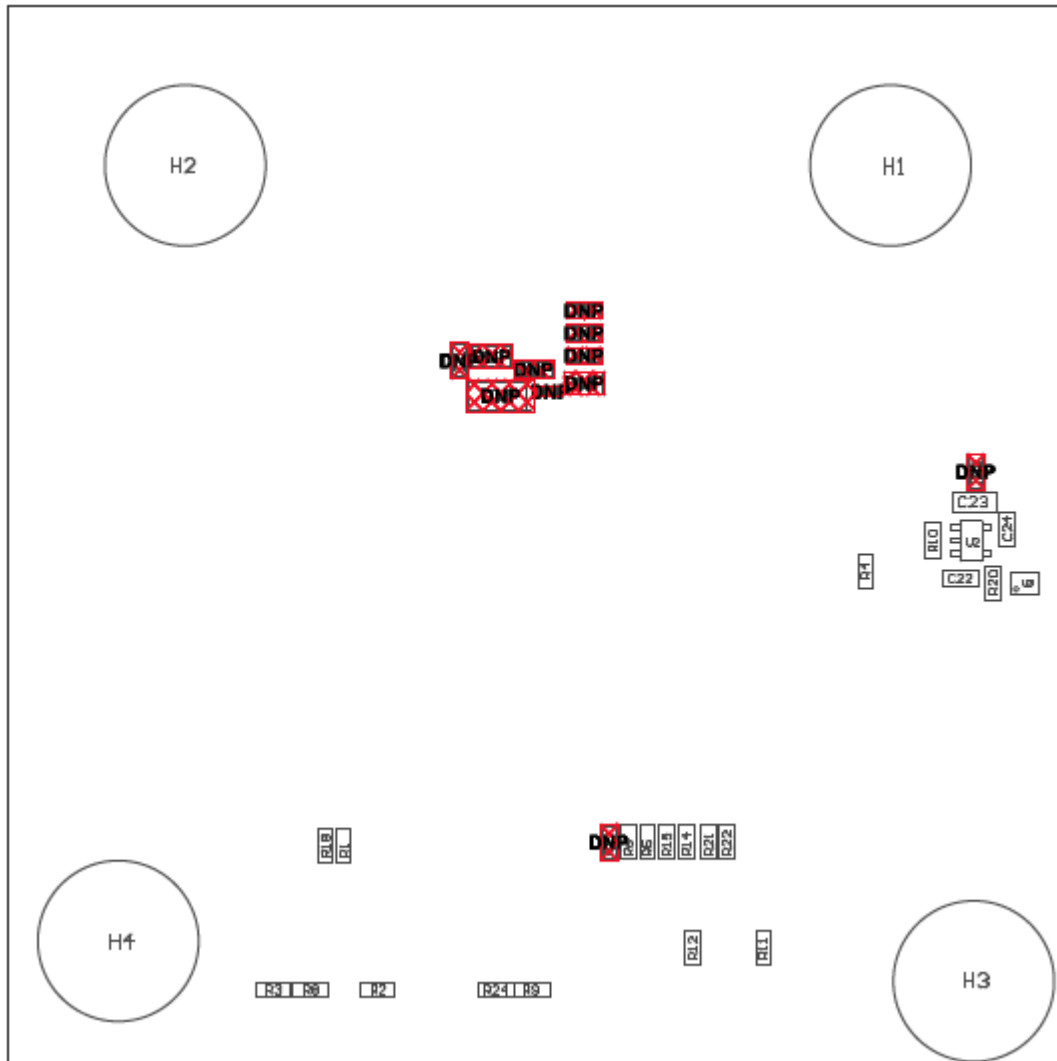
1.3 REFERENCE DOCUMENTATION

1.3.1 Schematic TIDA-00589 (PWR664)



1.3.2 Assembly DWG TIDA-00589 (PWR664)





2 SAFETY

- Safety Glasses are to be worn.
- This test must be performed by qualified personnel trained in electronics theory and understand the risks and hazards of the assembly to be tested.
- ESD precautions must be followed while handling electronic assemblies while performing this test.
- Precautions should be observed to avoid touching areas of the assembly that may get hot or present a shock hazard during testing.

3 QUALITY

- Test data or reports shall be made available upon request by Texas Instruments.

4 **APPAREL**

- Electrostatic smock
- Electrostatic Gloves or finger cots
- Safety Glasses
- Ground ESD wrist strap.

5 **EQUIPMENT**

5.1 **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.

5.2 **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:

Kepeco load: BOP 20–5M, DC 0 to ± 20 V, 0 to ± 5 A (or higher)

5.3 **Load#2 – Use with Boost Mode**

PMID to GND load, 10 Ω , 5 W or greater

5.4 **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.

5.5 **Computer**

A computer with at least one USB port and a USB cable. The bq2589xEVM evaluation software must be properly installed.

5.6 **USB-to-GPIO Communication Kit (EV2300/2400 USB-Based PC Interface Board)**

5.7 **Software**

Double click the “Battery Management Studio-1.3.20_Build2-Setup” installation file, follow the installation steps. The software supports the Windows™ XP and Windows 7 operating systems.

6 **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 2](#).

5. Connect a voltage meter across J4 (BAT+ and GND).
6. Connect the EV2300/2400 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 1](#).

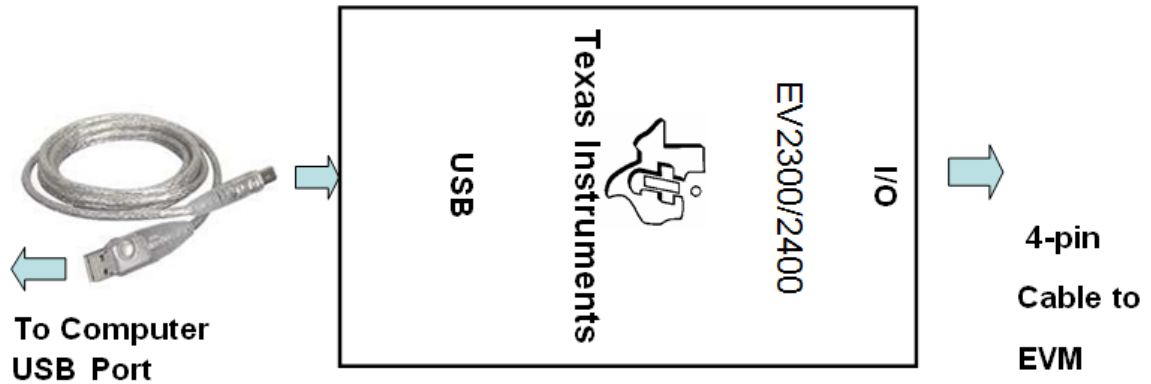


Figure 1. Connections of the EV2300/2400

7. Install shunts as shown in [Table 1](#).

Table 1. Jumper Connections

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

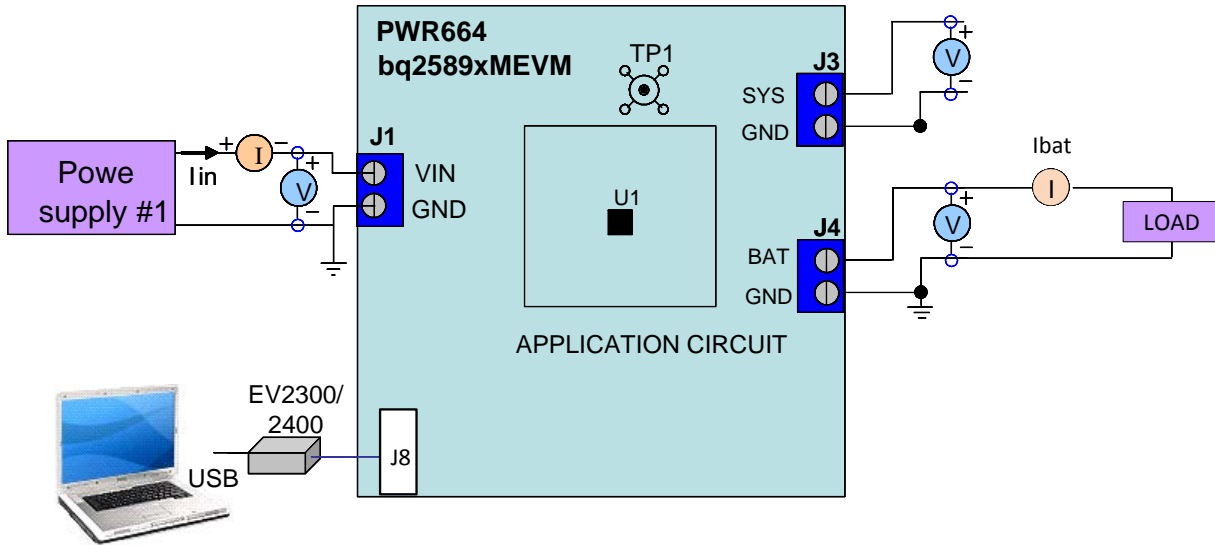


Figure 2. Original Test Setup for TIDA-00589 (PWR664 - bq2589x EVM)

- Turn on the computer. Launch the bq2589x evaluation software. The main window of the bq2589x software is shown in Figure 3.

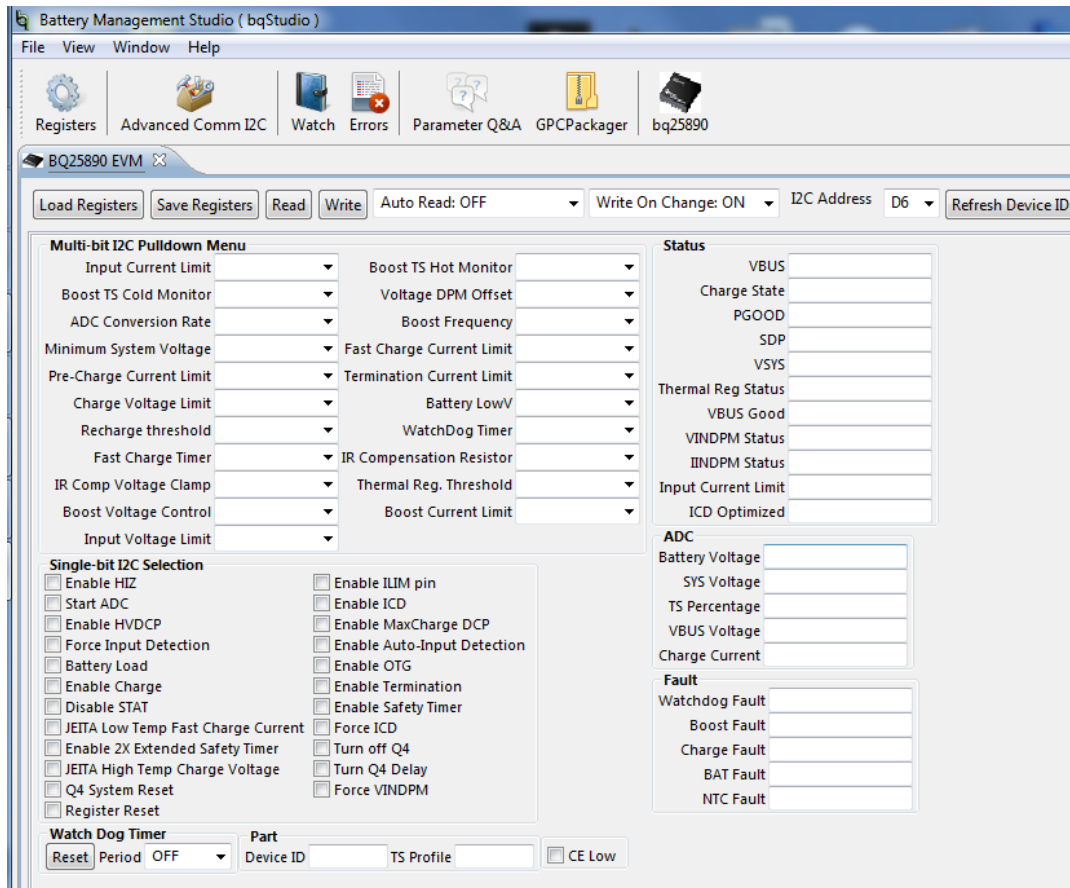
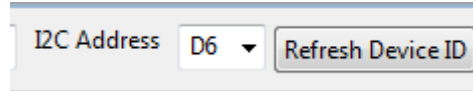


Figure 3. Main Window of the TIDA-00589 (bq2589x) Evaluation Software

7 PROCEDURE

7.1 Communication Verification

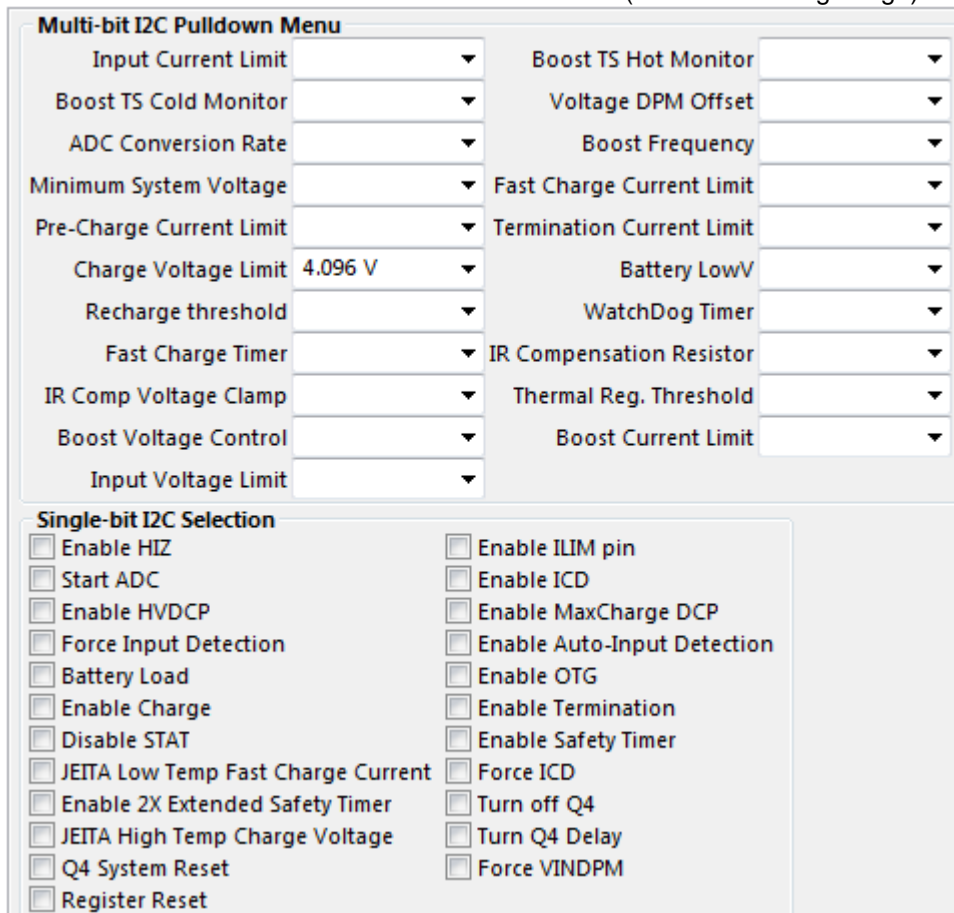
- 7.1.1 In the EVM software specify device "I2C Address" as D6 for bq25892, and D4 for bq24890/5



- 7.1.2 Click the **Read** button

- 7.1.3 In the EVM Software, make the following changes as necessary:

- Select "Disabled" for the "Watchdog Timer "
- 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 512 mA
- Set "Pre-Charge Current" to 256 mA
- Deselect "Enable Termination" (see the following image)



- 7.1.4 Click the Read button twice

- **Observe** → Everything 'normal' at *FAULT* box

Fault	
Watchdog Fault	
Boost Fault	
Charge Fault	
BAT Fault	
NTC Fault	

- **Observe** → D3 (STAT) is on
- **Observe** → D4 (/PG) is on

7.2 Charger Mode Verification

7.2.1 Enable Load#1 from Section 6 step 4. Measure the voltage across J3 and J4 as follows:

- **Measure** → V(J3(SYS), J3(GND)) = 3.65 V ±300 mV
- **Measure** → V(J4(BAT), J4(GND)) = 2.5 V ±200 mV
- Change load to 3.7V
- **Measure** → IBAT = 500 mA ±200 mA
- **Measure** → V(J4(BAT), J4(GND)) = 3.7 V ±200 mV

7.2.2 In the software, set “Fast Charge” to 1024 mA

- **Measure** → Iin = 500 mA ±200 mA

7.3 Boost Mode Verification

7.3.1 Turn off and disconnect PS#1

7.3.2 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

7.3.3 Apply 10 Ω (5 W or greater) across J2 (PMID(+)) to GND(-))

7.3.4 Check the “OTG” configurations option in the GUI

Enable OTG

Measure: V: (TP2 (PMID) and TP6 (GND)) = 5.1V +/- 200mV

7.4 Clean-up

7.4.1 If at any point in the test the unit fails, failed assemblies are to be marked with failure step and dispositioned according with section 9.0. Passing units should also be specified in section 9.0.

7.4.2 Verify the jumpers are installed as specified in Table 1.

7.4.3 Repeat starting at 7.1 and continue until all units have been tested.

8 EQUIPMENT SHUTDOWN

- Shut down and disconnect all loads

- Shutdown and disconnect all power supplies
- No additional special power down procedure needed.

9 MATERIAL DISPOSITION & TRANSFER

9.1 CONFORMING MATERIAL

Units that have passed this test procedure shall be packaged into anti-static ESD approved bags, labeled with two labels according to the table below, and shipped per the P.O.

Label 1 Assembly Number+Dash Number if Applicable	Label 2 IC Number
PWR664-001	bq25890TRW
PWR664-002	bq25892TRW
PWR664-003	bq25895TRW

9.2 NON-CONFORMING MATERIAL

If yield loss is 2% or less, scrap non-conforming units and adjust P.O. to reflect total amount shipped. If yield loss approaches or exceeds 5%, contact EVM coordinator for assistance.

IMPORTANT NOTICE FOR TI REFERENCE DESIGNS

Texas Instruments Incorporated ("TI") reference designs are solely intended to assist designers ("Buyers") who are developing systems that incorporate TI semiconductor products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products.

TI reference designs have been created using standard laboratory conditions and engineering practices. **TI has not conducted any testing other than that specifically described in the published documentation for a particular reference design.** TI may make corrections, enhancements, improvements and other changes to its reference designs.

Buyers are authorized to use TI reference designs with the TI component(s) identified in each particular reference design and to modify the reference design in the development of their end products. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI REFERENCE DESIGNS ARE PROVIDED "AS IS". TI MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. TI DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO TI REFERENCE DESIGNS OR USE THEREOF. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY BUYERS AGAINST ANY THIRD PARTY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON A COMBINATION OF COMPONENTS PROVIDED IN A TI REFERENCE DESIGN. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES, HOWEVER CAUSED, ON ANY THEORY OF LIABILITY AND WHETHER OR NOT TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, ARISING IN ANY WAY OUT OF TI REFERENCE DESIGNS OR BUYER'S USE OF TI REFERENCE DESIGNS.

TI reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques for TI components are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

Reproduction of significant portions of TI information in TI data books, data sheets or reference designs is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous failures, monitor failures and their consequences, lessen the likelihood of dangerous failures and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in Buyer's safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed an agreement specifically governing such use.

Only those TI components that TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components that have **not** been so designated is solely at Buyer's risk, and Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.