bq27z561EVM-011 EVM Single-Cell Impedance Track™ Technology

This evaluation module (EVM) is used with the bq27z561. The EVM includes one bq27z561 integrated circuit module with an external current-sense resistor, on board EV2400 communication module, bq2980 battery protector, and all other onboard components necessary to monitor and predict capacity for a pack-side fuel gauge solution. Through the use of battery management studio, via the on board EV2400 communication module, the user can:

- Read the bq27z561 data registers
- Update the RAM and Data Memory for different configurations
- Log cycling data for further evaluation
- Evaluate the functionality of the bq27z561 solution under different charge and discharge conditions

The latest Windows®-based PC software can be downloaded from the product folder on the Texas Instruments Web site.

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Trademarks

Impedance Track is a trademark of Texas Instruments.
Windows is a registered trademark of Microsoft Corporation.
I^2C is a trademark of NXP.

1 Features

- Complete evaluation system for the bq27z561 gas gauge with Impedance Track™ technology
- Populated circuit module for quick setup
- Personal computer (PC) software and interface board for easy evaluation
- Software that allows configuring and data logging for system analysis

1.1 Kit Contents

- bq27z561 circuit module (BMS011)

This EVM is used for the evaluation of bq27z561 and bq2980. Visit the product Web folder at *www.ti.com* to properly configure the bq27z561.

2 bq27z561-Based Circuit Module

The bq27z561 based circuit module is an example solution of a bq27z561 circuit for battery management. The circuit module incorporates a bq27z561 battery gas gauge integrated circuit (IC) with external sense resistor to accurately predict the capacity of a 1-series Li-ion cell. In addition, it includes a default high side battery protector the bq2980.

2.1 Circuit Module Connections

Contacts on the circuit module provide the following connections:

- Direct connection to the battery pack (J2): BAT+, BAT–
- Direct connection to the system connections for charging and discharging (J1): PACK+ / BAT+, PACK–
- I^2C™ communications via on board EV2400 through micro USB
- Access to various signal outputs: INT (TP11), PULS (TP12), CHG (TP5), and DSG (TP6)

2.2 Pin Description

Pin Name	Description
PACK+	Pack positive terminal
PACK–	Pack negative terminal
BAT+	Battery positive terminal and bq2980 bypass path
BAT–	Battery negative terminal
SDA	External I^2C communication data line
SCL	External I^2C communication clock line
VSS	Device ground
INT	General purpose output
PULS	General purpose output

3 Circuit Module Physical Layout, Bill of Materials and Schematic

This section contains the board layout, bill of materials, and schematic for the bq27z561 circuit module.

3.1 Board Layout

This section shows the printed-circuit board (PCB) layers (Figure 2 through Figure 6), and assembly drawing for the bq27z561 module.

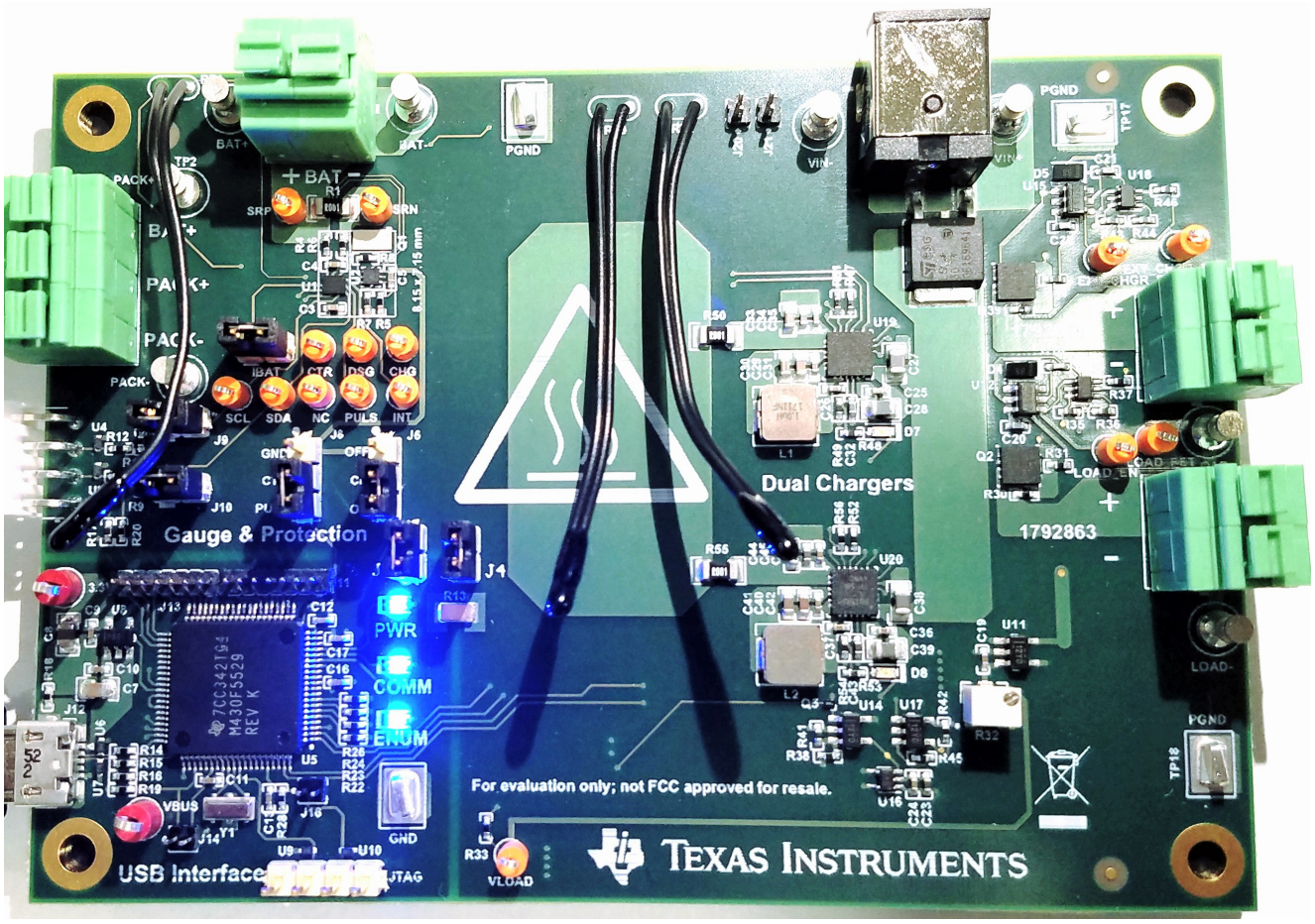

Figure 1. EVM Image

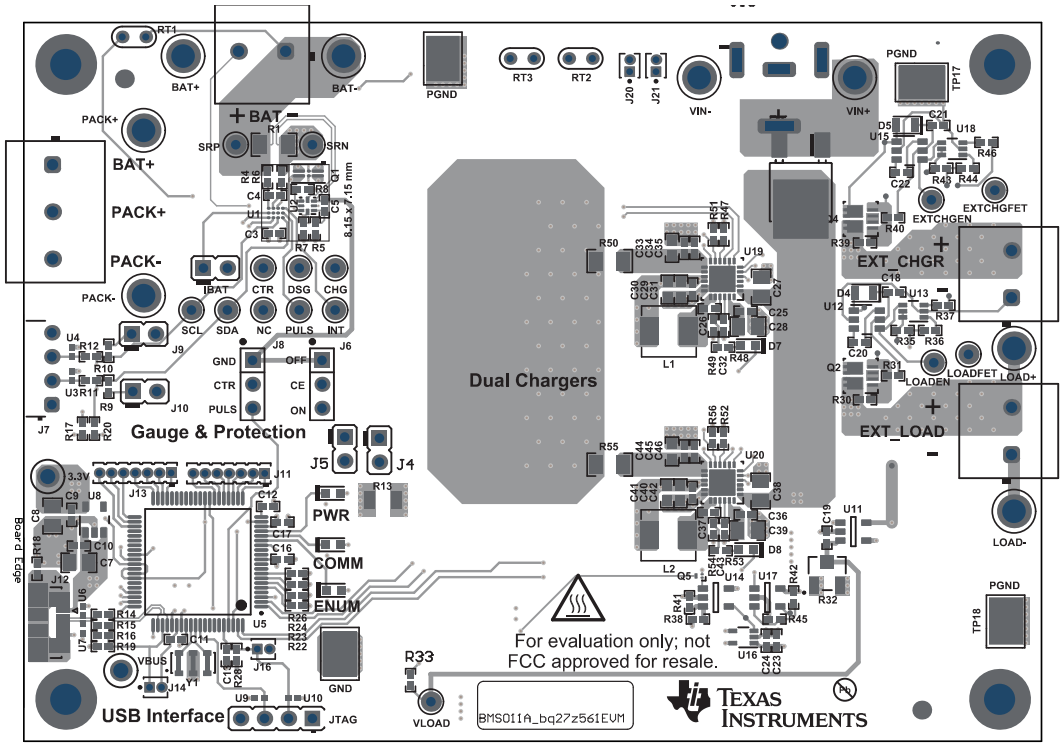

Figure 2. Top Layer Composite

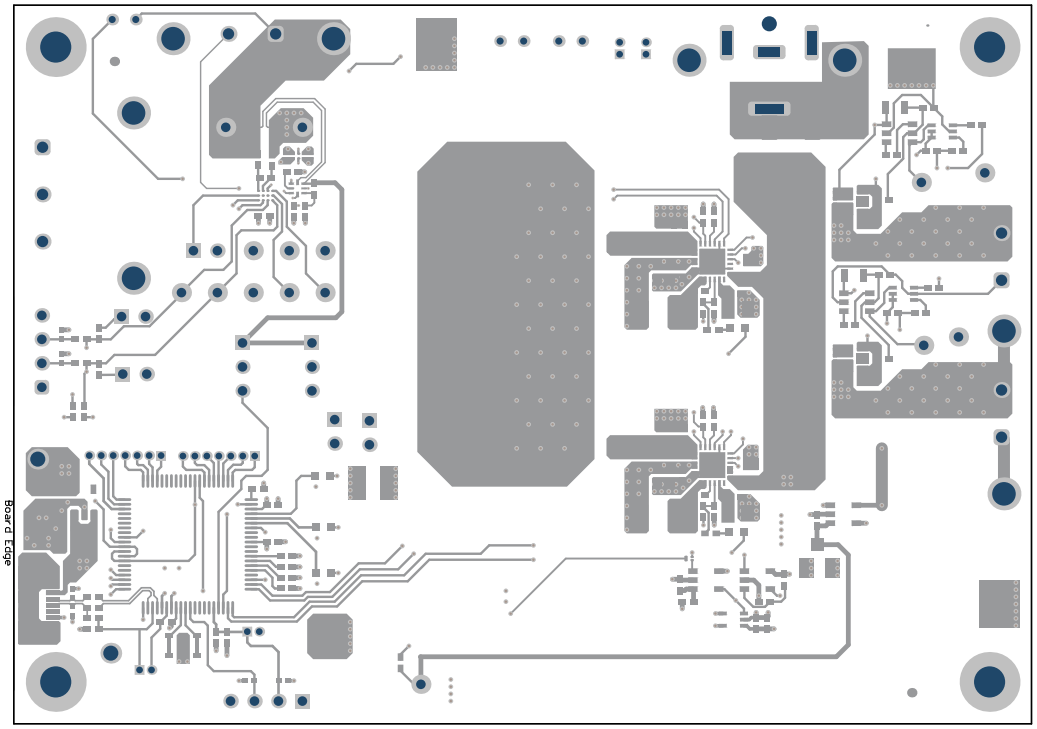

Figure 3. Top Layer

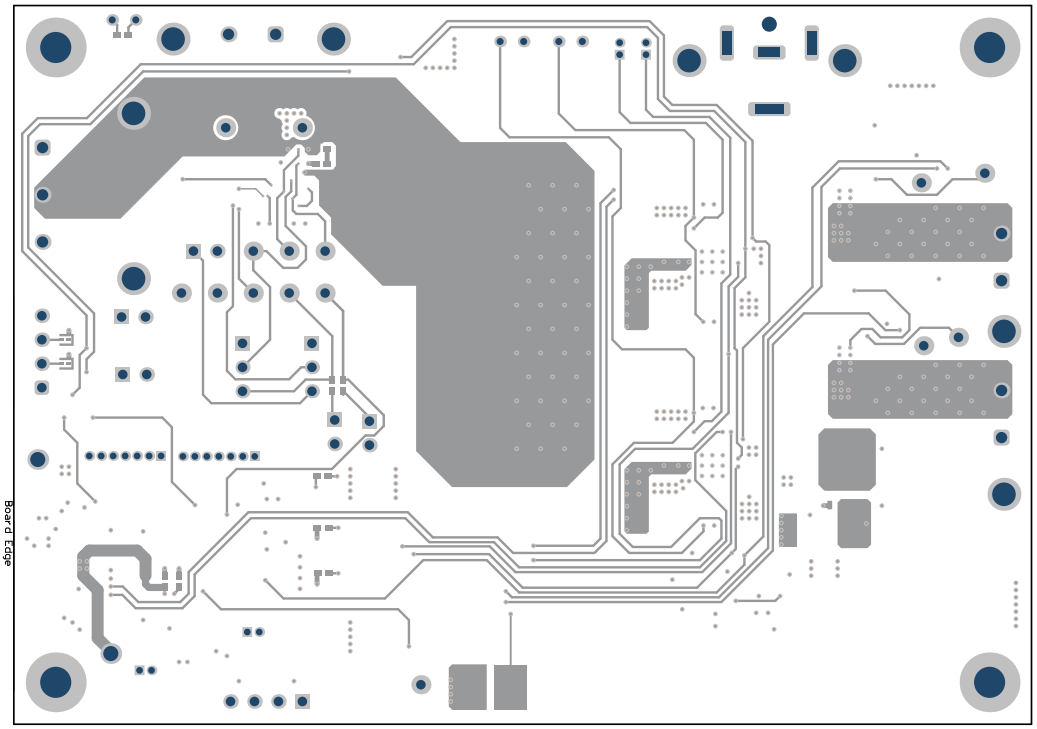

Figure 4. Bottom Layer

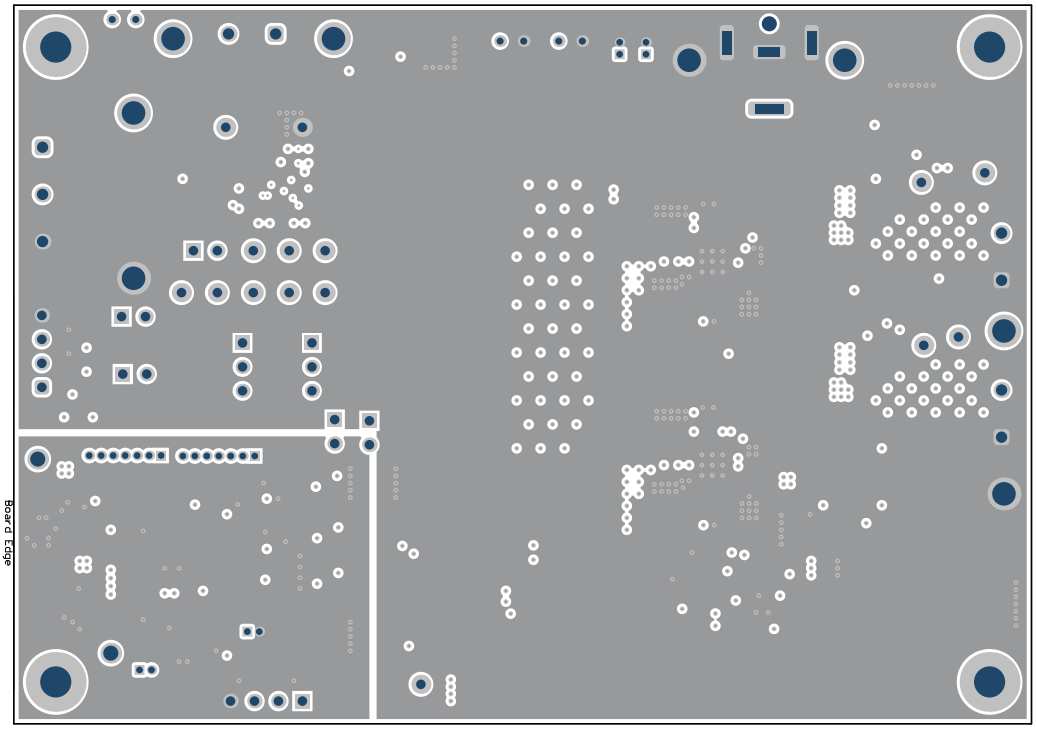

Figure 5. Ground Plane

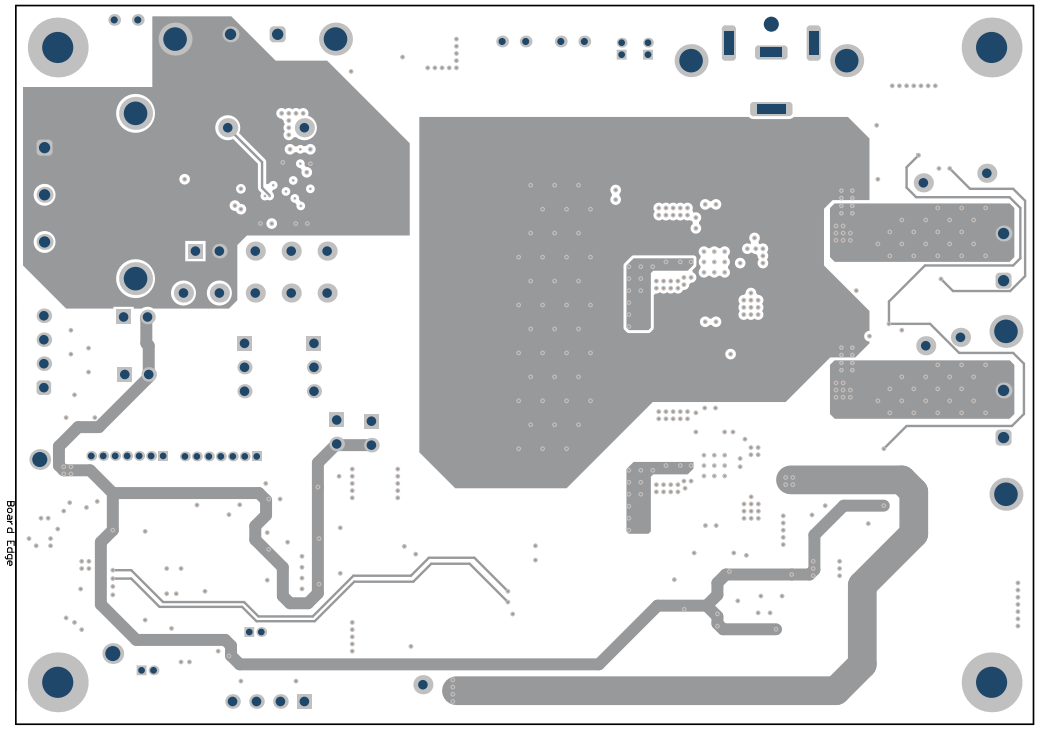

Figure 6. Power Path

3.2 Schematic

This section contains the schematics of the different (PCB) components.

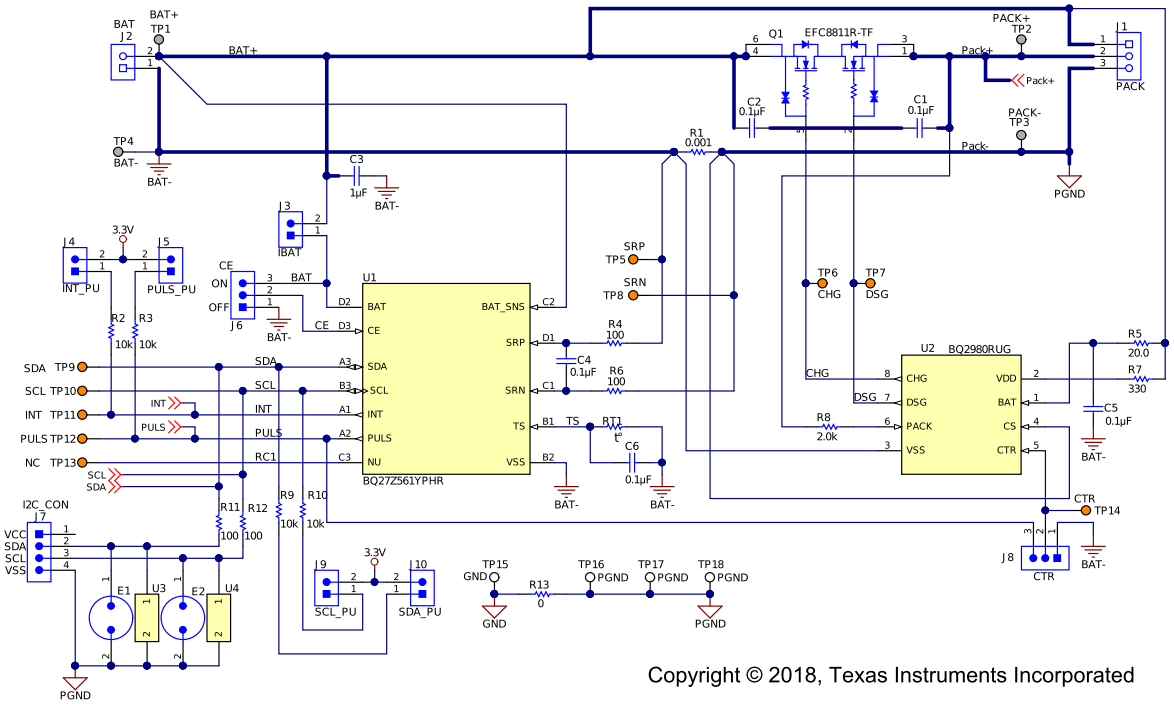

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Figure 7. bq27z561 and bq2980 Reference Schematic

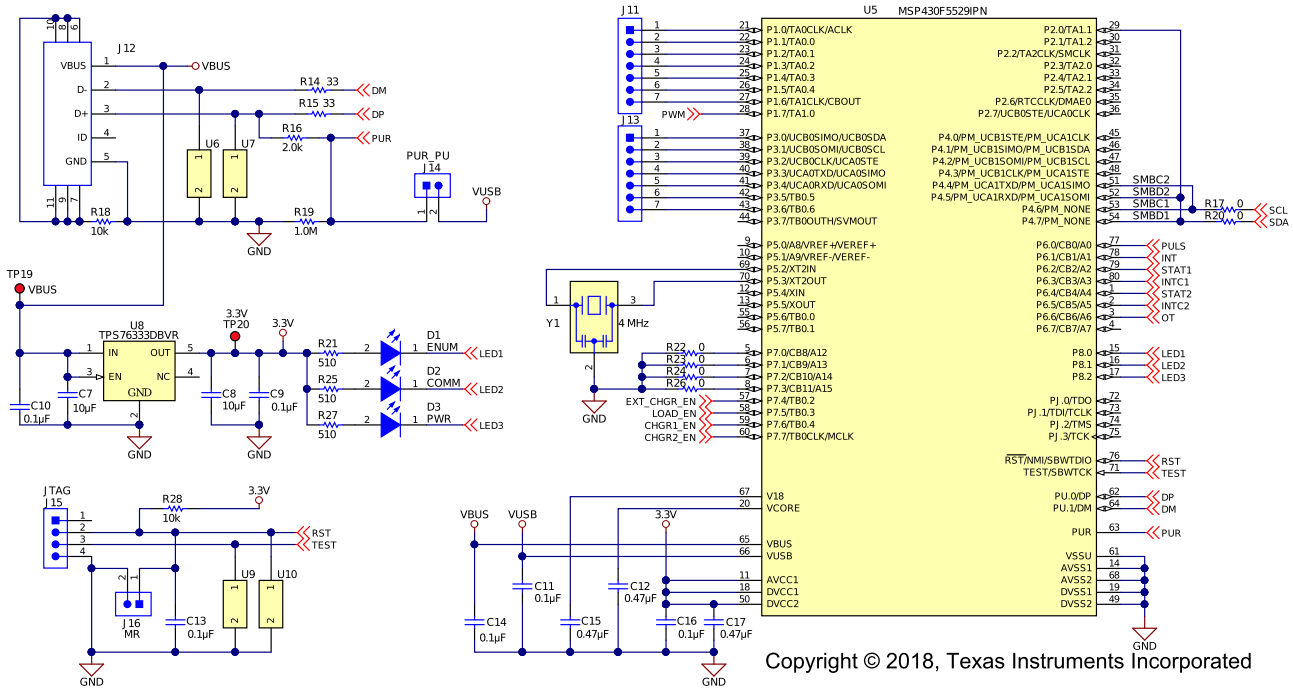

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Figure 8. On-Board EV2400 Reference Schematic

3.3 Bill of Material

Table 1. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
PCB	1		Printed Circuit Board		BMS011	Any
C1, C2	2	0.1uF	CAP, CERM, 0.1 uF, 25 V, +/- 10%, X7R, 0402	0402	GRM155R71E104KE14D	MuRata
C3	1	1uF	CAP, CERM, 1 uF, 6.3 V, +/- 10%, X5R, 0402	0402	GRM155R60J105KE19D	MuRata
C4, C5, C6, C9, C10, C11, C13, C14, C16, C19, C24, C25, C31, C35, C36, C42, C46	16	0.1uF	CAP, CERM, 0.1 uF, 10 V, +/- 10%, X5R, 0402	0402	GRM155R61A104KA01D	MuRata
C7, C8	2	10uF	CAP, CERM, 10 uF, 16 V, +/- 10%, X5R, 0805	0805	0805YD106KAT2A	AVX
C12, C15, C17	3	0.47uF	CAP, CERM, 0.47 uF, 6.3 V, +/- 10%, X5R, 0402	0402	04026D474KAT2A	AVX
C13	1	1000pF	CAP, CERM, 1000 pF, 10 V, +/- 10%, X5R, 0402	0402	GRM155R61A102KA01D	MuRata
C18, C20, C21, C22	4	3.3uF	CAP, CERM, 3.3 uF, 10 V, +/- 10%, X5R, 0402	0402	C1005X5R1A335K050BC	TDK
C23, C32, C34, C43, C45	5	4.7uF	CAP, CERM, 4.7 uF, 6.3 V, +/- 20%, X5R, 0402	0402	C1005X5R0J475M050BC	TDK
C26, C37	2	0.047uF	CAP, CERM, 0.047 uF, 25 V, +/- 10%, X7R, 0402	0402	GRM155R71E473KA88D	MuRata
C27, C28, C38, C39	4	22uF	CAP, CERM, 22 uF, 35 V, +/- 20%, JB, 0805	0805	C2012JB1V226M125AC	TDK
C29, C30, C33, C40, C41, C44	6	10uF	CAP, CERM, 10 uF, 10 V, +/- 20%, X5R, 0603	0603	C1608X5R1A106M080AC	TDK
D1, D2, D3	3	Blue	LED, Blue, SMD	LED_0603	150060BS75000	Wurth Elektronik
D4, D5	2	45V	Diode, Schottky, 45 V, 0.1 A, 1005 Diode	1005 Diode	CD1005-B0140L	Bourns
D6	1	30V	Diode, Schottky, 30 V, 8 A, DPAK	DPAK	STPS8L30B-TR	STMicroelectronics
D7, D8	2	Green	LED, Green, SMD	LED_0603	150060GS75000	Wurth Elektronik
H1, H2, H3, H4	4		Bumpon, Cylindrical, 0.312 X 0.200, Black	Black Bumpon	SJ61A1	3M
J1	1		Terminal Block, 5mm, 3x1, R/A, TH	Terminal Block, 5mm, 3x1, R/A, TH	1792876	Phoenix Contact
J2, J17, J18	3		Terminal Block, 5mm, 2x1, R/A, TH	Terminal Block, 5mm, 2x1, R/A, TH	1792863	Phoenix Contact
J3, J4, J5, J9, J10	5		Header, 2.54 mm, 2x1, Gold, TH	Header, 2.54 mm, 2x1, TH	GBC02SAAN	Sullins Connector Solutions
J6, J8	2		Header, 100mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
J7	1		Header, 2.54mm, 4x1, R/A, Tin, TH	Header, 2.54mm, 4x1, R/A, TH	640455-4	TE Connectivity
J11, J13	2		Header, 1.27mm, 7x1, Gold, TH	Header, 1.27 mm, 7x1, TH	FTS-107-01-F-S	Samtec
J12	1		Receptacle, Micro-USB Type B, 0.65 mm, 5x1, R/A, Bottom Mount SMT	Receptacle, 0.65mm, 5x1, R/A, SMT	47346-1001	Molex
J14, J16, J20, J21	4		Header, 50mil, 2x1, Gold, TH	2x1 Header	GRPB021VWVN-RC	Sullins Connector Solutions

Table 1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
J15	1		Header, 2.54mm, 4x1, Tin, TH	Header, 2.54mm, 4x1, TH	22284043	Molex
J19	1		DC POWER JACK, R/A, TH	DC POWER JACK, R/A, TH	PJ-063AH	CUI Inc.
L1, L2	2	1uH	Inductor, Shielded Drum Core, Powdered Iron, 1 uH, 7 A, 0.0189 ohm, SMD	5.49x2x5.18mm	IHLP2020BZER1R0M01	Vishay-Dale
Q1	1		Power MOSFET for 1 Cell Lithium-ion Battery Protection 12V, 3.2mOhm, 27A, Dual N-Channel, SMD	1.77x3.54mm	EFC8811R-TF	ON Semiconductor
Q2, Q4	2	V	MOSFET, 2-CH, N-CH, DMS0008A (WSON-CLIP-8)	DMS0008A	CSD87313DMS	Texas Instruments
Q3	1	30V	MOSFET, N-CH, 30 V, 25 A, DQJ0008A (VSONP-8)	DQJ0008A	CSD17579Q5A	Texas Instruments
Q5	1	30V	MOSFET, N-CH, 30 V, 3 A, YJJ0003A (PICOSTAR-3)	YJJ0003A	CSD17484F4T	Texas Instruments
R1, R29, R50, R55	4	.001	RES, 0.001, 1%, 1 W, AEC-Q200 Grade 0, 1206	1206	CSNL1206FT1L00	Stackpole Electronics Inc
R2, R3, R9, R10, R18, R28, R31, R35, R36, R37, R40, R41, R42, R43, R44, R45, R46, R57, R58	19	10k	RES, 10 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040210K0JNED	Vishay-Dale
R4, R6, R11, R12, R33	5	100	RES, 100, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100RFKED	Vishay-Dale
R5	1	20.0	RES, 20.0, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040220R0FKED	Vishay-Dale
R7	1	330	RES, 330, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2RKF3300X	Panasonic
R8, R16, R53	3	2.0k	RES, 2.0 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04022K00JNED	Vishay-Dale
R13	1	0	RES, 0, 1%, 0.5 W, 1206	1206	5108	Keystone
R14, R15	2	33	RES, 33, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040233R0JNED	Vishay-Dale
R17, R20, R22, R23, R24, R26	6	0	RES, 0, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R19, R30, R39	3	1.0Meg	RES, 1.0 M, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04021M00JNED	Vishay-Dale
R21, R25, R27	3	510	RES, 510, 1%, 0.1 W, 0402	0402	ERJ-2RKF5100X	Panasonic
R32	1	10k ohm	TRIMMER 10k OHM 0.125W SMD	3.52x4.16x3.94mm	3223W-1-103E	Bourns
R34	1	.5	RES, 0.5, 1%, 2 W, 2512	2512	CSR2512FGR500	Stackpole Electronics Inc
R38, R49, R54	3	5.23k	RES, 5.23 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04025K23FKED	Vishay-Dale
R47, R52	2	100	RES, 100, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100RJNED	Vishay-Dale
R48	1	909	RES, 909, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402909RFKED	Vishay-Dale
R51, R56	2	30.1k	RES, 30.1 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040230K1FKED	Vishay-Dale
RT1, RT2, RT3	3	10k	Thermistor NTC, 10.0k ohm, 1%, NTC Thermistor	NTC Thermistor	NTCLE413E2103F520L	Vishay-Bccomponents
SH-J3, SH-J4, SH-J5, SH-J6, SH-J8, SH-J9, SH-J10	7	1x2	Shunt, 100mil, Gold plated, Black	Shunt	SNT-100-BK-G	Samtec

Table 1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
TP1, TP2, TP3, TP4, TP21, TP22, TP30, TP31	8		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	KeyStone
TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP23, TP24, TP25, TP28, TP29	15		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	KeyStone
TP15, TP16, TP17, TP18, TP26, TP27	6		Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	KeyStone
TP19, TP20	2		Test Point, Compact, Red, TH	Red Compact Testpoint	5005	KeyStone
U1	1		Impedance Track Battery Gas Gauge Solution for 1-Series Cell Li-Ion Battery Packs, YPH0012ARAK (DSBGA-12)	YPH0012AUAM	BQ27Z561YPHR	Texas Instruments
U2	1		1S High Side Protector with External Shutdown Control, RUG0008A (X2QFN-8)	RUG0008A	BQ2980RUG	Texas Instruments
U3, U4, U6, U7, U9, U10	6		ESD in 0402 Package with 10 pF Capacitance and 6 V Breakdown, 1 Channel, -40 to +125 degC, 2-pin X2SON (DPY), Green (RoHS & no Sb/Br)	DPY0002A	TPD1E10B06DPYR	Texas Instruments
U5	1		25 MHz Mixed Signal Microcontroller with 128 KB Flash, 8192 B SRAM and 63 GPIOs, -40 to 85 degC, 80-pin QFP (PN), Green (RoHS & no Sb/Br)	PN0080A	MSP430F5529IPN	Texas Instruments
U8	1		Single Output LDO, 150 mA, Fixed 3.3 V Output, 2.7 to 10 V Input, with Low IQ, 5-pin SOT-23 (DBV), -40 to 125 degC, Green (RoHS & no Sb/Br)	DBV0005A	TPS76333DBVR	Texas Instruments
U11, U14, U17	3		350 kHz, Low-Noise, RRIO, CMOS Operational Amplifier for Cost-Sensitive Systems, DBV0005A (SOT-23-5)	DBV0005A	TLV333IDBVR	Texas Instruments
U12, U15	2		Switched Capacitor Voltage Converter, 6-pin SOT-23, Pb-Free	DBV0006A	LM2665M6/NOPB	Texas Instruments
U13, U18	2		Single 3-Input Positive OR-AND Gate, DCK0006A LARGE T&R	DCK0006A	SN74LVC1G3208DCKR	Texas Instruments
U16	1		Automotive Grade, 2.7V-Capable, 10 uA Analog Output Temperature Sensor, DCK0005A (SOT-SC70-5)	DCK0005A	LMT87QDCKRQ1	Texas Instruments
U19	1		1S 5A Fast Charger MaxCharge(TM) Technology for High Input Voltage and Adjustable USB OTG Boost, RTW0024H (WQFN-24)	RTW0024H	BQ25892RTWR	Texas Instruments
U20	1		1S 5A Fast Charger MaxCharge(TM) Technology for High Input Voltage and Adjustable USB OTG Boost, RTW0024H (WQFN-24)	RTW0024H	BQ25890RTWR	Texas Instruments
Y1	1		Resonator, 4 MHz, 1000 ppm, 39 pF, SMD	4.5x1.2x2 mm	CSTCR4M00G15L99-R0	MuRata
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A

3.4 bq27z561 Circuits Module Performance Specification Summary

This section summarizes the performance specifications of the bq27z561 circuit module.

Table 2. Performance Specification Summary

bq27z561 Specification	Min	Typ	Max	Units
Input voltage Pack+ to Pack–	-0.3	3.6	6	V
Input voltage Bat+ to Bat–	-0.3	3.6	6	V
bq2980 Specification				
Over Voltage Protection	4.465	4.475	4.485	V
Under Voltage Protection	2.580	2.600	2.620	V
Over Current in Charge	-9	-8	-7	mV(1)
Over Current in Discharge	7	8	9	mV(1)

(1) Based on 1 mΩ sense resistor

4 EVM Hardware and Software Setup

This section describes the installation of the bq27z561EVM PC software, and how to connect the different components of the EVM.

4.1 System Requirements

The bqStudio software requires Windows XP or later. Using earlier versions of Windows operating system may not work with the USB driver support.

4.2 Software Installation

Find the latest software version of bqStudio on http://www.ti.com/tool/bqstudio. Search for the bq27z561 part number to get to the tool folder for the device. Following these steps to install the bq27z561 bqStudio software.

1. Before starting this procedure, make sure the on-board EV2400 is not connected to the personal computer (PC) through the USB cable.
2. Open the archive containing the installation package, and copy its contents into a temporary directory.
3. Open the bqStudio installer file that was downloaded from the TI Web site.
4. Follow the instructions on screen until completing the software installation.
5. Before starting the evaluation software, connect the EV2400 to the computer using the micro USB (J12) port.
6. For the EV2400, the driver should be installed along with software installation.

5 Troubleshooting Unexpected Dialog Boxes

The user that is downloading the files must be logged in as the administrator. The driver is not signed, so the administrator must allow installation of unsigned drivers in the operating system. If using Windows 7, install the software with administrator privileges.

6 Hardware Connection

The bq27z561 evaluation system comprises of three hardware components: the bq27z561 circuit module, on board EV2400 PC interface board, and a bq2980 battery protector.

6.1 Connecting the bq27z561 Circuit Module to a Battery Pack

Figure 9 shows how to connect the bq27z561 circuit module to the battery and a system load/charger. It is important to note this EVM can be used with or without the bq2980 protector. To bypass the protector connect the positive terminal of system charger/load to the top (BAT+) pin on the J1 connector. To use the bq2980, connect the positive terminal of system charger/load to the Middle (PACK+) pin on the J1 connector.

NOTE: This board is equipt with dual chargers, and an external load. This allows this EVM to be a stand alone evaluation module capable of charging and discharging. These features are not yet active. Do not make the connections on the right side of the EVM shown by the "Future Improvement".

NOTE: Ensure the digital potentiometer R32 is in the full off state. This is done by turning the screw terminal on top all the way to the right. If not, the battery may see a load current even if no load is attached.

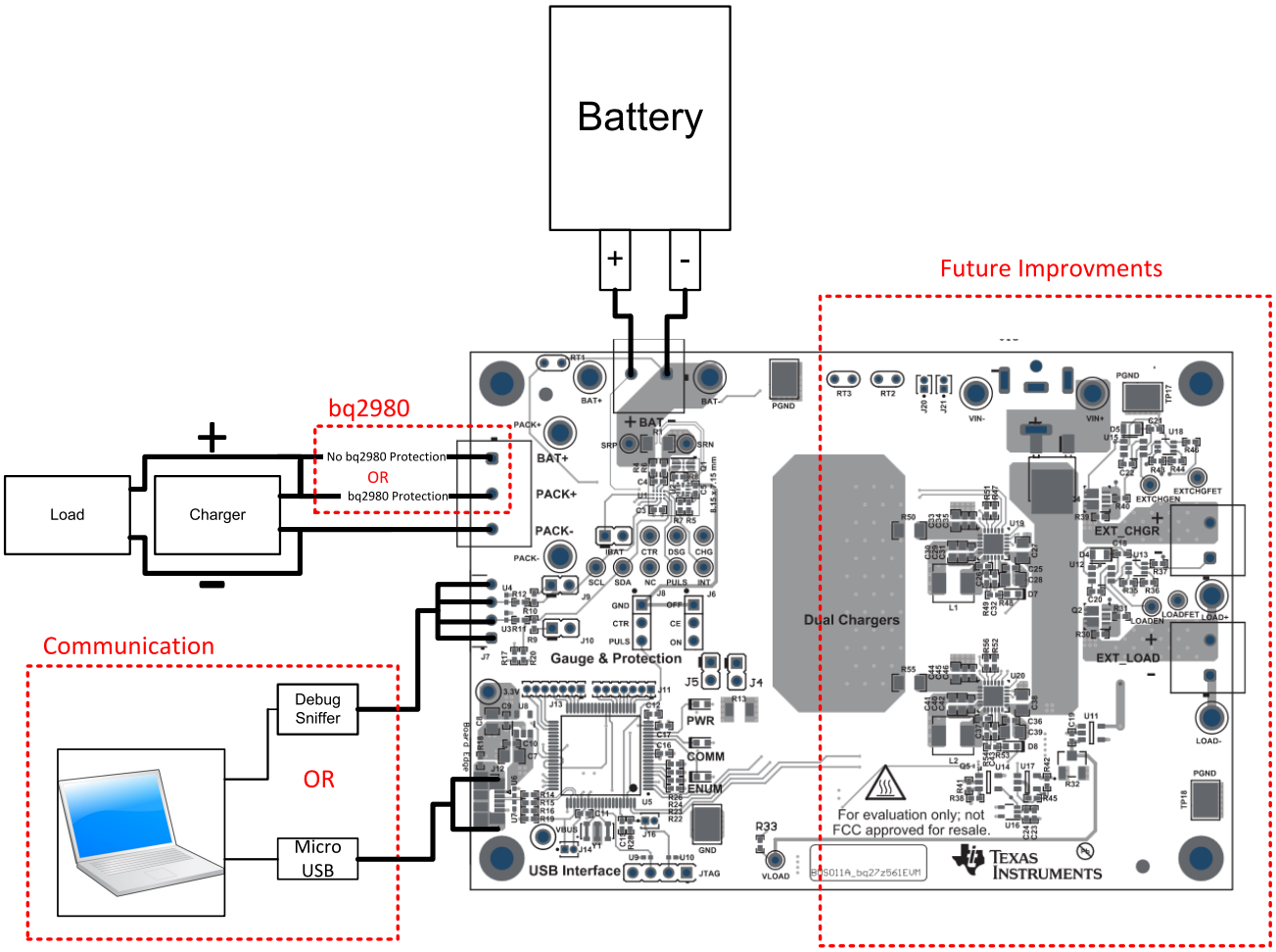

Figure 9. Connect the bq27z561 Circuit Module to a 1SxP

6.2 Description of EVM Jumpers

The following section describes the critical jumpers and their purpose on this board

1. **J6 - Chip Enable (CE):** This pin is used to put the bq27z561 into shutdown mode. It can be tied directly to a host system to be used for needed low power states. Removing power from this pin causes the bq27z561 to undergo a reset condition upon reassertion and is not intended to be used often. This jumper need to be placed in the "ON" position to communicate with the gauge.
2. **J9 - I2C Clock Pull-up (SCL):** This jumper applies a 10K pull-up on the I2C communication line. When using the on-board EV2400, this jumper should be present. If attaching a debug sniffer which contains unremovable pull-ups, these jumpers can be removed.
3. **J10 - I2C Data Pull-up (SDA):** This jumper applies a 10K pull-up on the I2C communication line. When using the on-board EV2400, this jumper should be present. If attaching a debug sniffer which contains unremovable pull-ups, these jumpers can be removed.
4. **J5 - bq27z561 Pulse Pull-up (PULS):** This jumper applies a 10K pull-up on the PULS pin of the bq27z561.
5. **J4 - bq27z561 Interrupt Pull-up (INT):** This jumper applies a 10K pull-up on the INT pin of the bq27z561.
6. **J8 - bq2980 Control (CTR):** This jumper ties the CTR pin of the bq2980 protector to either the PULS pin of the bq27z561 or to ground. The bq27z561 has a PULS feature designed to, on a specific command from the host. Assert the PULS pin which directs the bq2980 protector to open the FETS. When this jumper is tied to ground, the bq27z561 does not interface with the bq2980. They work independently. Alternatively the middle jumper can also be tied to a host and controlled by the host or external circuitry.
7. **J3 - bq27z561 Battery Connection (IBAT):** This jumper ties the bq27z561 BAT pin to the cell+. This jumper is intended to be able to install a shunt resistor to monitor device current consumption under various operating conditions.

7 Operation

This section details the operation of the bq27z561 bqStudio software.

7.1 Starting the Program

Run bqStudio from the desktop. The window consists of a tools panel at the top, and other child windows that can be hidden, docked in various positions or allowed to float as separate windows. When bqStudio first starts up the *Gauge Dashboard* window, the Registers window and *Data Memory* window should be seen in the main window. *Registers, Data Memory, Commands*, and other windows can be added to the main window by clicking on the corresponding icon in the tools panel at the top of the main window. Data should appear initially in the *Gauge Dashboard, Registers* and *Data Memory* sections. The **Refresh** (single time scan) or the **Scan** (continuous scan) buttons can be clicked in order to update the data in the *Registers* and *Data Memory* windows. The continuous scan is enabled when the *Scan* checkbox is highlighted green and disabled when the *Scan* checkbox is not highlighted. The continuous scanning interval can be set with the *stopwatch* icon next to the **Scan** button. When the *stopwatch* icon is clicked, a drop-down menu appears and the desired scanning interval can be selected. The scan interval value show up next to the *stopwatch* icon.

bqStudio provides a logging function which logs selected Data Registers last received from the bq27z561. To enable this function, click the **Start Log**. The default elapsed interval is 4000 milliseconds. To change this interval, go to Window, select Preferences, choose Registers, and change Scan/Log Interval from 4000 to 1000 milliseconds. There is no need to log faster than 1 second as the gas gauge does not update the registers faster than 1 second.

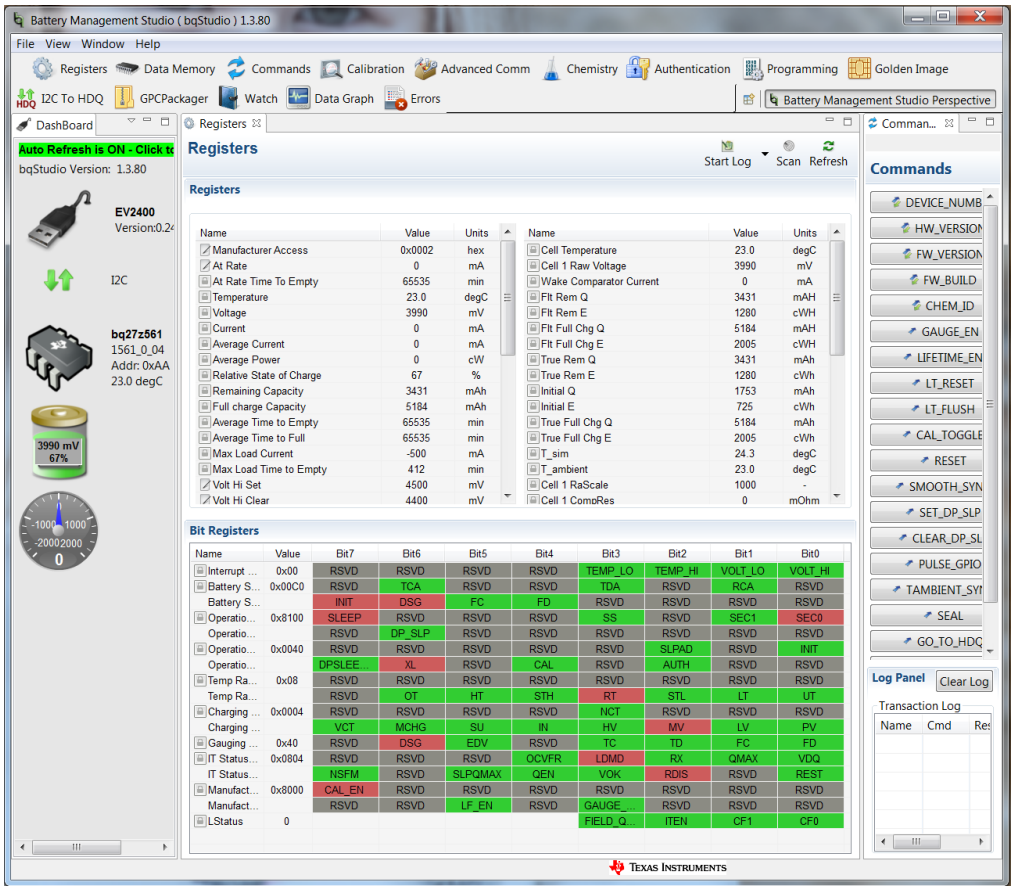

Figure 10. Registers Screen

Figure 10 shows the main bqStudio window. Additional Flag and Control Status data can be viewed at the bottom of the registers window.

7.2 Setting Programmable bq27z561 Options

The bq27z561 comes configured per the default settings detailed in the bq27z561 data sheet. Ensure that the settings are correctly changed to match the pack and application for the bq27z561 solution being evaluated.

IMPORTANT: The correct setting of these options is essential to get the best performance. The settings can be configured using the *Data Memory* window seen in the main *bqStudio* window (Figure 11).

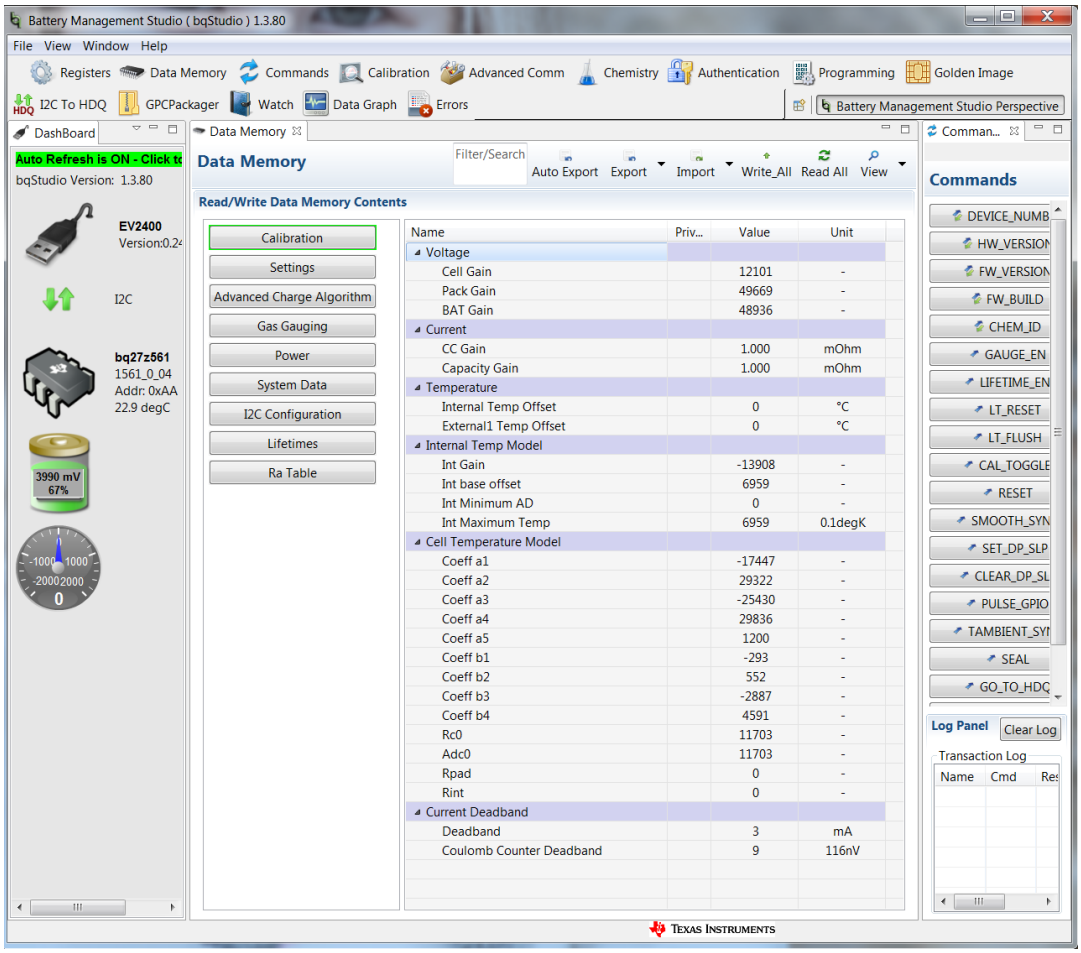

Figure 11. Data Memory Screen

To read all the data from the bq27z561, click on the **Read All** button in the *Data Memory* window. For ease of configuration, a text file with a .gg.csv extension can be extracted, modified, and imported back on the device. Use the export and import buttons as seen in Figure 11 to export and import .gg.csv files. The auto export button enabled gg files to be exported periodically at intervals. This is useful when debugging issues with the gauge. A write command is necessary if a gg.csv file is imported to ensure that all changes made on the gg.csv file are effected on the gauge. The read command is used to read back all of the data written to the gauge so that the changes made can be verified. The filter/search field enables the user to search for a particular parameter in the data memory content.

IMPORTANT: Do not make modifications to the gg.csv file using Microsoft Excel® as it makes changes to the file, which bqStudio rejects. Make sure to use a text editor like notepad or similar to edit a gg.csv file.

7.2.1 Important Data Memory Parameters to change

This section outlines the minimal critical setting that should be changed for even the basic evaluation. A short description is included which can be used as a recommendation how to set the parameter value. Additional updates are needed for a production setting.

1. ***[Gas Gauging][State][QMax]:*** This value should be updated to be the default design capacity of the battery being used. It represents the full unloaded chemical capacity of the cell. This value is updated by the gauge when proper learning is performed and in the field over the life of the battery.
2. ***[Gas Gauging][IT Cfg][Term Voltage]:*** This value should be set to the minimum value of the end system when absolute 0% state of charge should be reported. For normal Li-ion cells this value should range between 3.2 V to 2.75 V. It is recommended this value is not set to above 3.4 V.
3. ***[Gas Gauging][Advanced Charge Algorithm][Charge Term Taper Current]:*** This value should be set slightly above the capabilities of your charger to taper to. A recommended value is C/20 where C is the default capacity of the cell. For example a battery with 1000 mAh capacity should have a taper current of around 50mA.
4. ***[Gas Gauging][Advanced Charge Algorithm][Low/Standard/High/Rec Temp Charging][Voltage]:*** This parameter should be updated to the maximum charging voltage of the battery to be used. For a typical Li-Ion battery this value is between 4.4 V to 4.2 V.
5. **ChemID:** It is important that the correct ChemID is updated to give the best accuracy. Refer to Section 7.3 on how to update the chemistry in the device. If your cell is not included in the chemistry list, it is possible to run a match on the battery by following the steps here: http://www.ti.com/tool/gpcchem. For basic testing if the correct chemistry is unknown it is important to chose a chemistry ID with the same maximum charging voltage as the intended cell. Our recommended ID's for common charging voltages are as follows:
   - 4.2 V (ID 1202)
   - 4.35 V (ID 3230)
   - 4.4 V (ID 3142)

7.3 Setting the Chemistry

The chemistry file contains parameters that the simulations use to model the cell and its operating profile. It is critical to program a Chemistry ID that matches the cell into the device. Some of these parameters can be viewed in the Data Flash section of the Battery Management Studio.

Press the **Chemistry** button to select the **Chemistry** window.

- The table can be sorted by clicking the desired column. For example: Click the *Chemistry ID* column header.
- Select the ChemID that matches your cell from the table.
- Press **Program Selected Chemistry** to update the chemistry in the device.

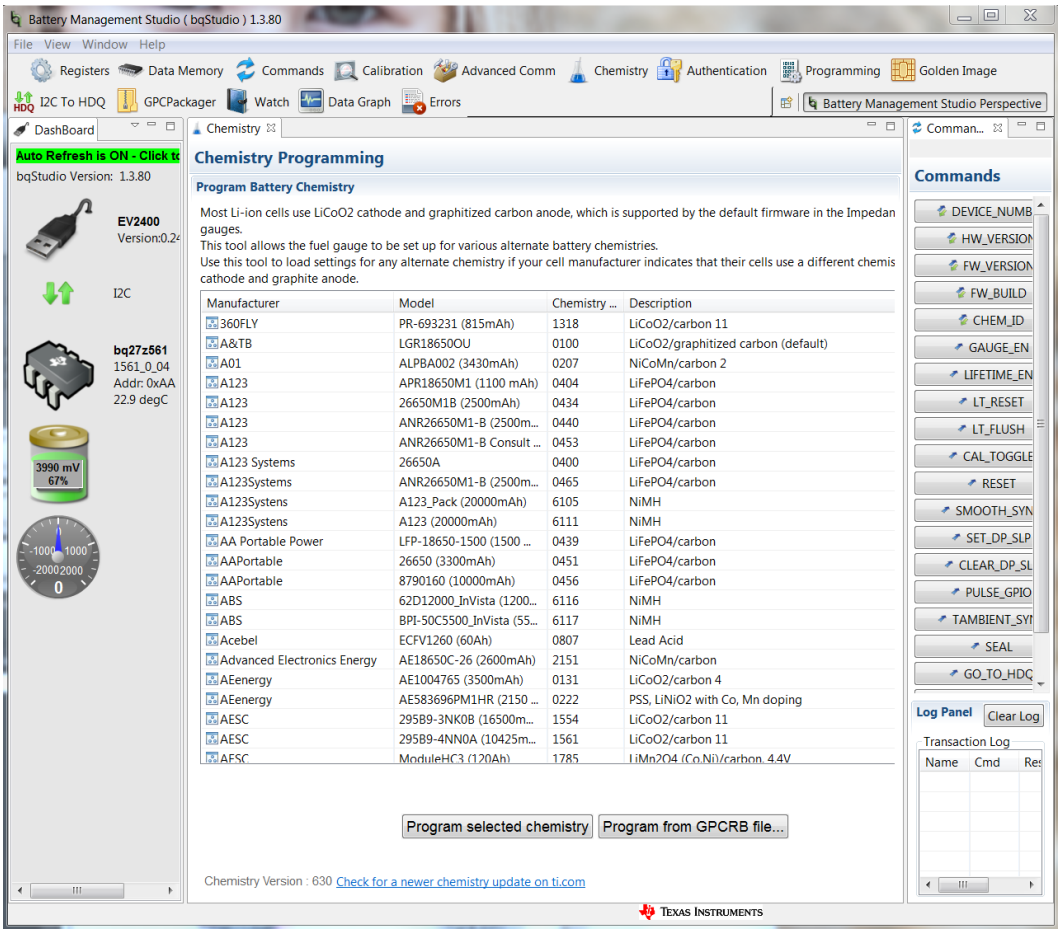

Figure 12. Chemistry Screen

8 Related Documentation from Texas Instruments

Updated documents also can be obtained through the TI Web site at www.ti.com .

1. Data sheet: *bq27z561 System-Side Impedance Track™ Fuel Gauge with Integrated Sense Resistor*, SLUSCY0
2. Technical Reference Manual: *bq27z561 Technical Reference Manual*, SLUUBO7

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