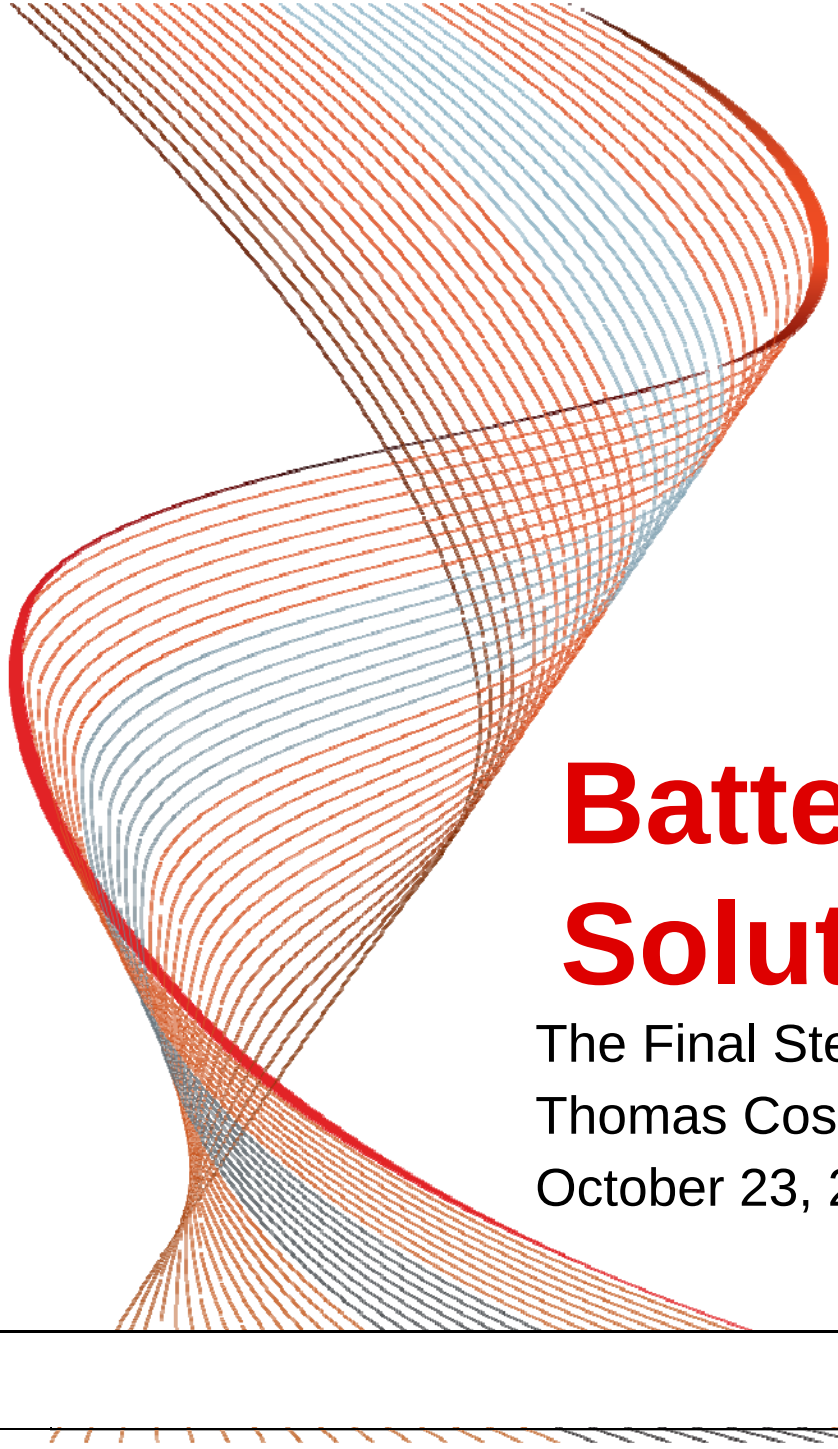


Battery Management Solutions

The Final Steps to Production

Thomas Cosby

October 23, 2014

bq40z50

Features

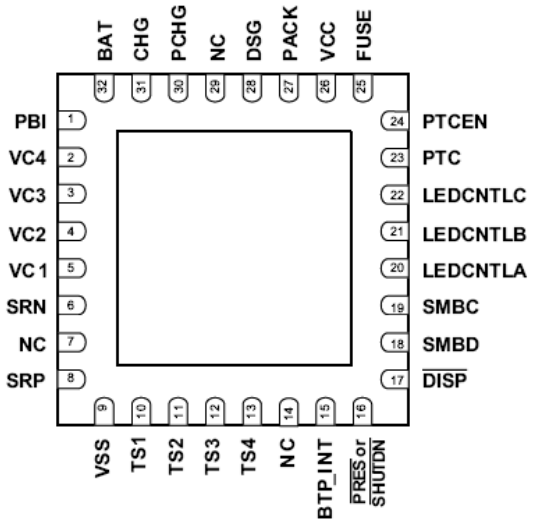
- Integrated AFE Safety Protector
  - Programmable
  - Voltage, Current, Temperature, Cell Imbalance
  - Charge, Impedance, Qmax
- N-channel FET drive
- Next Generation IT gauging
- Turbo Mode management
- Advanced Changing Algorithm
  - JEITA
  - Enhanced Charging
  - cell balancing at rest or while charging
- Diagnostic Lifetime Data
- Black box recorder
- SHA-1 Authentication
- LED (up to 5) support option
- 32-lead 4x4 QFN package

Applications

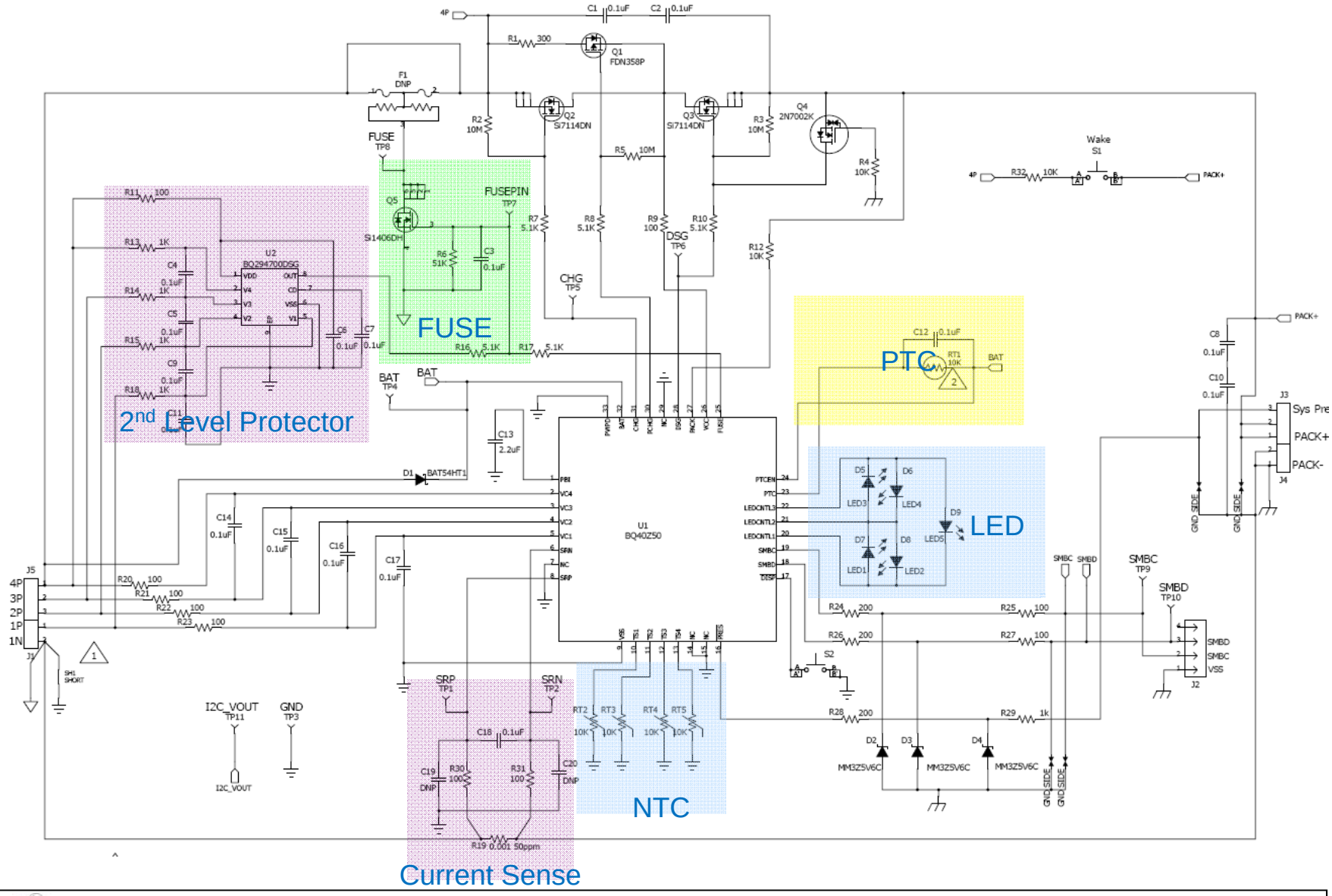
- Business Notebook PCs
- Medical and Test Equipment
- Portable Instruments

Benefits

- Reduce BOM count and PCB area with application flexibility and wide array of safety functions
- Ease of use, high gauging accuracy & complex charging profile support
- Analysis of returned battery packs
- Lower BOM cost
- Reduce BOM count
- Anti-counterfeiting
- For applications requiring LED drivers
- Compact footprint



bq40z50 Schematic

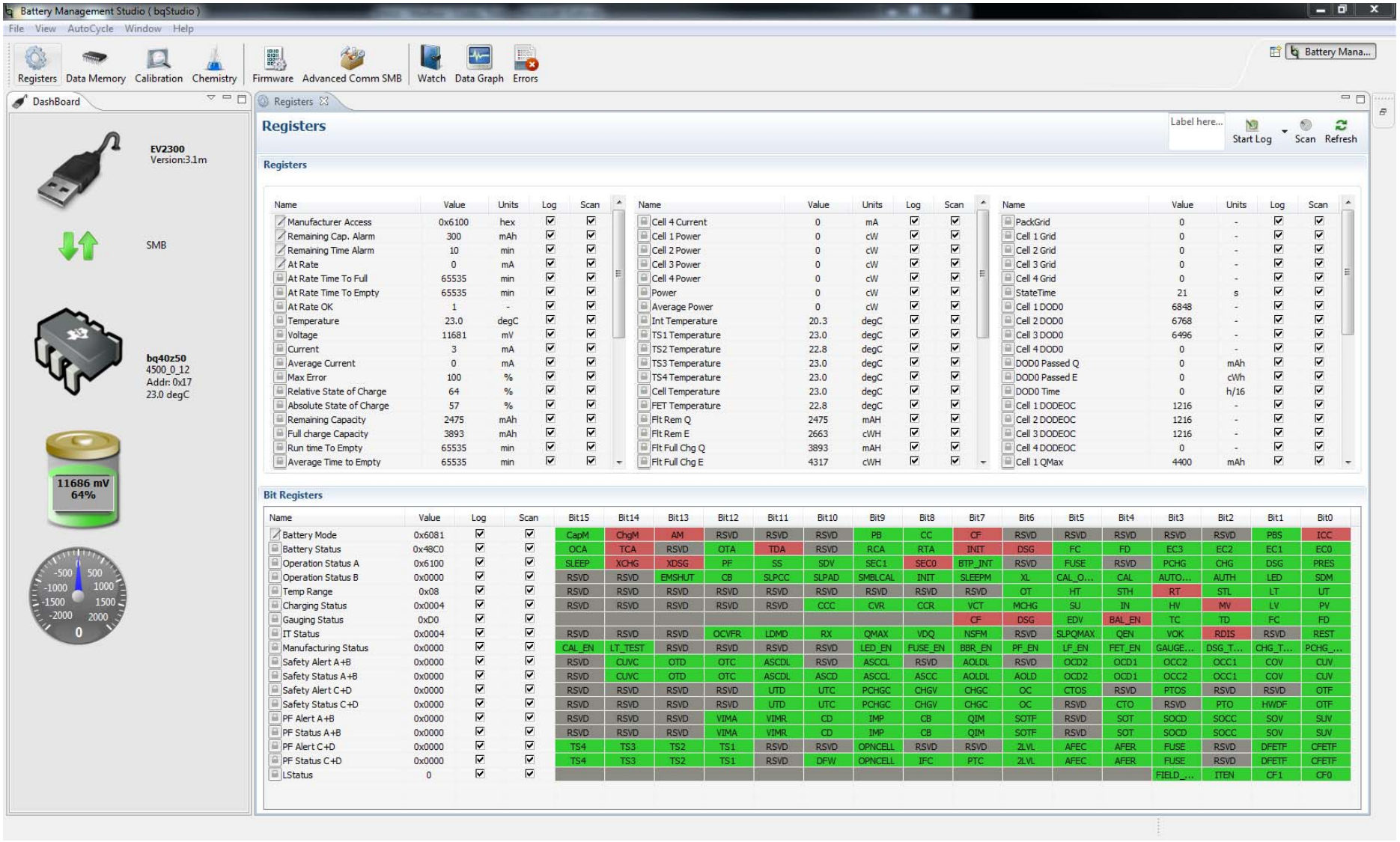


The New Tools

bqEvaluation		**bqStudio**
bqMTester		**bqProduction**

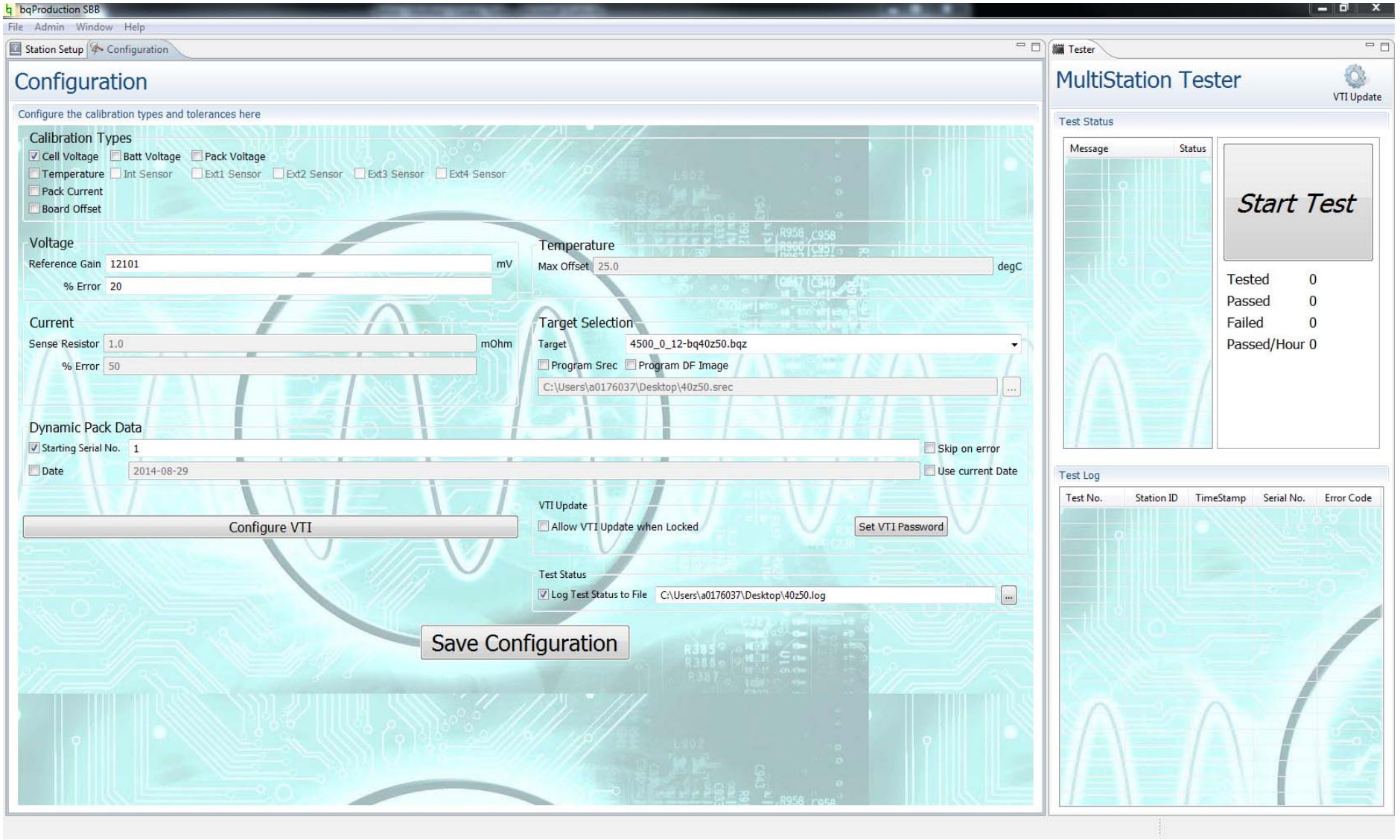
- **Consistent looks across device families.**
- **No longer required to run the full setup program for each device. Transfer a 50 kbyte file versus a 50 Mbyte setup program!!**
- **The tools use a standardized evaluation platform and it are customized for each device with a .bqz file.**
- **The chemistry files take much less disk space and are much faster to update.**

bqStudio



Texas Instruments

bqProduction



Texas Instruments

Design Process

Identify Product Requirements

- No. of series cells
- No. of parallel cells
- Protection required
- Special requirements
- Chemistry

Select Gauging Solution

- Gauging Algorithm
- Protection
- Cell balancing
- Select ChemID

Breadboard Concept

- TI EVMs
- ChemID Verification
- Preliminary Optimization Cycle
- Run test cycles
- Tweak parameters

Develop System Platform

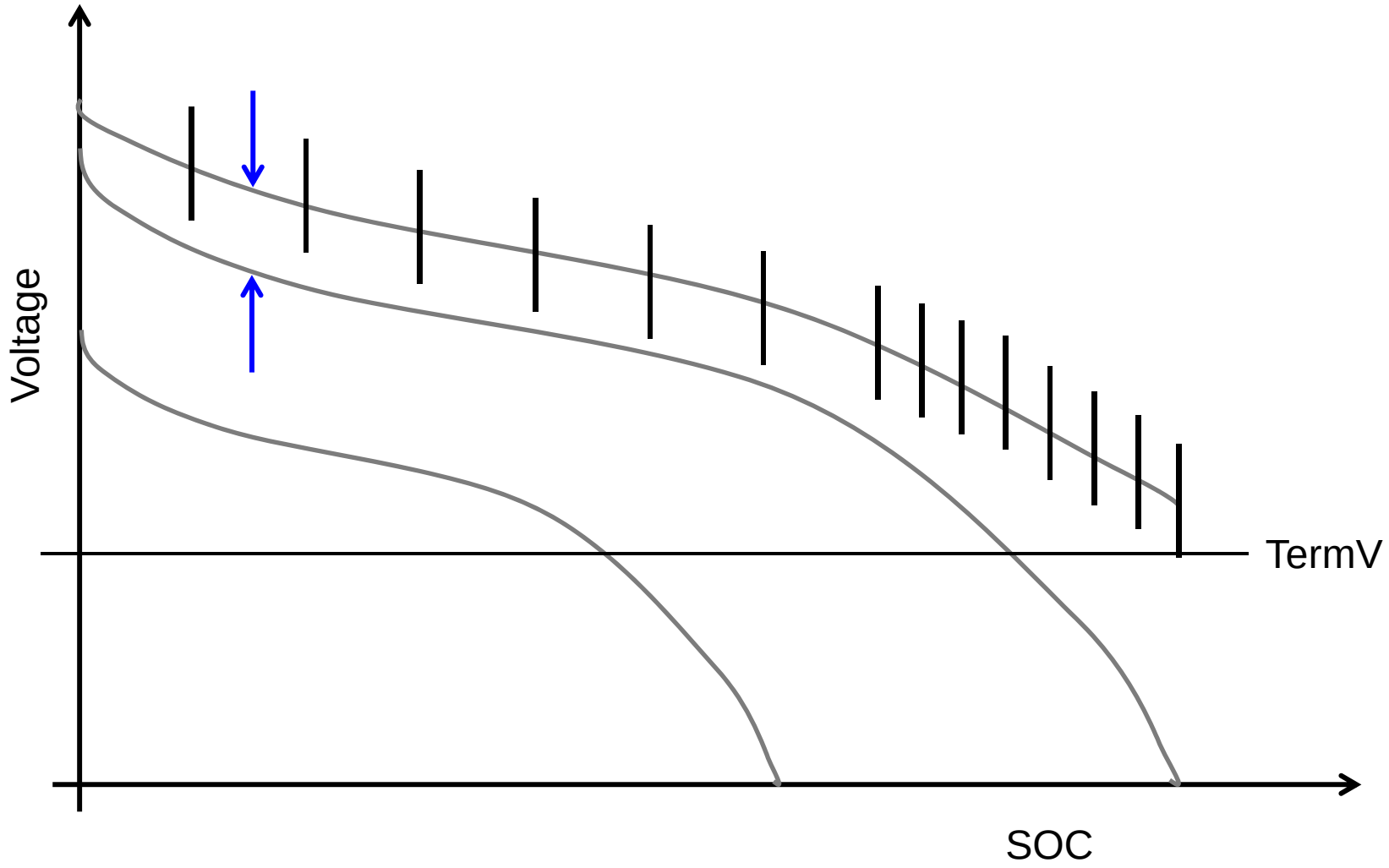
- Custom PCB
- Final Optimization Cycle
- Run test cycles
- Setup golden file

Develop Production Tools

- bqProduction
- bqMTester
- Custom tools

Production

Discharge Rate



SREC File

bqEvaluation Program

file types:

.senc:	Contains the full flash memory.
.dfi:	Contains the full data flash memory.
.rom:	Contains the full data flash memory and header information.
.gg	Contains the data flash parameters that the user can change.
.chem	Contains the chemistry data.

bqStudio Program

file types:

.srec:	Contains the full flash memory. Formatted in industry standard Motorola S-record format.
.gg.csv:	Contains the data flash parameters that the user can change. **Formatted in CSV, but edit with a text editor to import into the device.**

chemdat2: Contains the chemistry data.

chemdat4:

chemdat6:

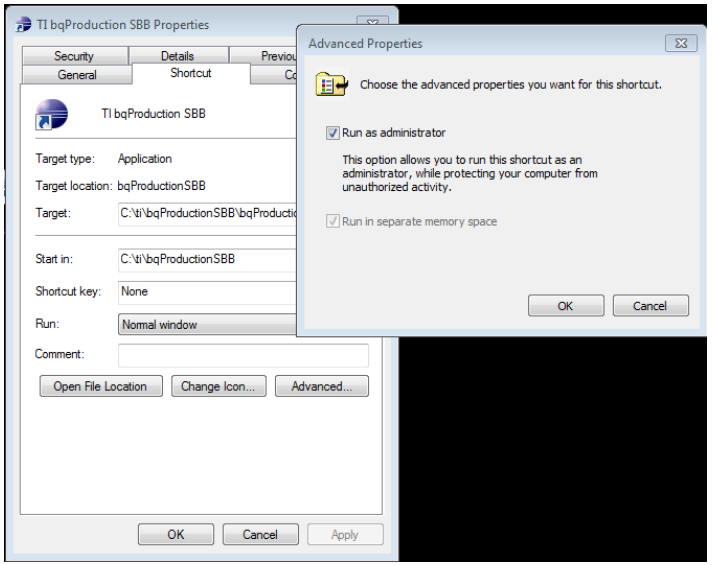
chemdat8:

Golden File

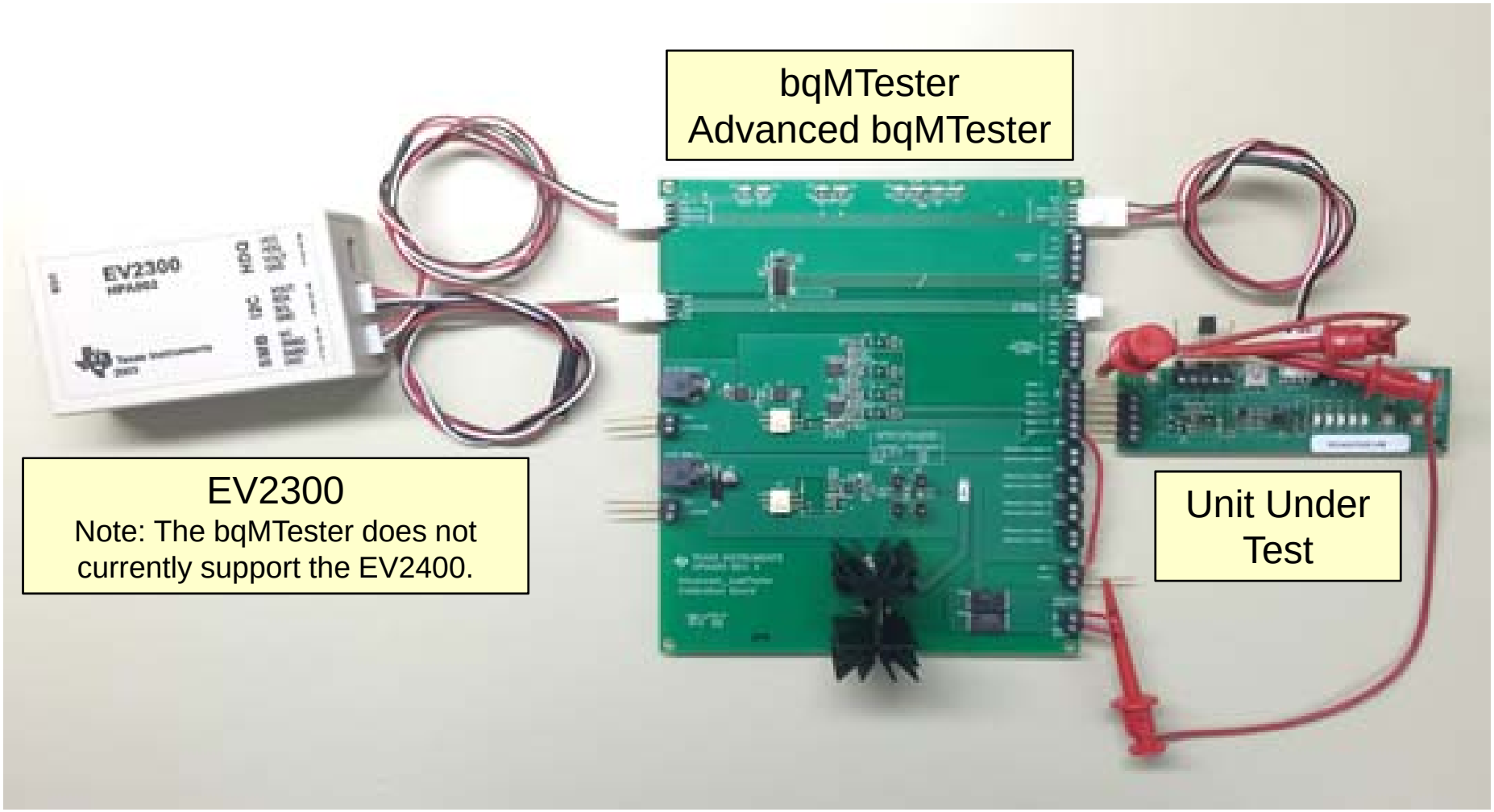
- Run the Optimization Cycle to update Qmax and the Ra-table.
- Go to the **Data Flash** window and press the **Read All** button.
- Export the gg.csv file
- Edit the gg.csv file using a text editor. e.g. Notepad. Do not use Excel.
- Set the Update Status to 02 and set the Cycle Count to 0.
- Load the default .srec file into the device.
- Load the ChemID into the device.
- Load your modified gg.csv file into the device and press the Write All button.
- Save the golden .srec file.

bqProduction

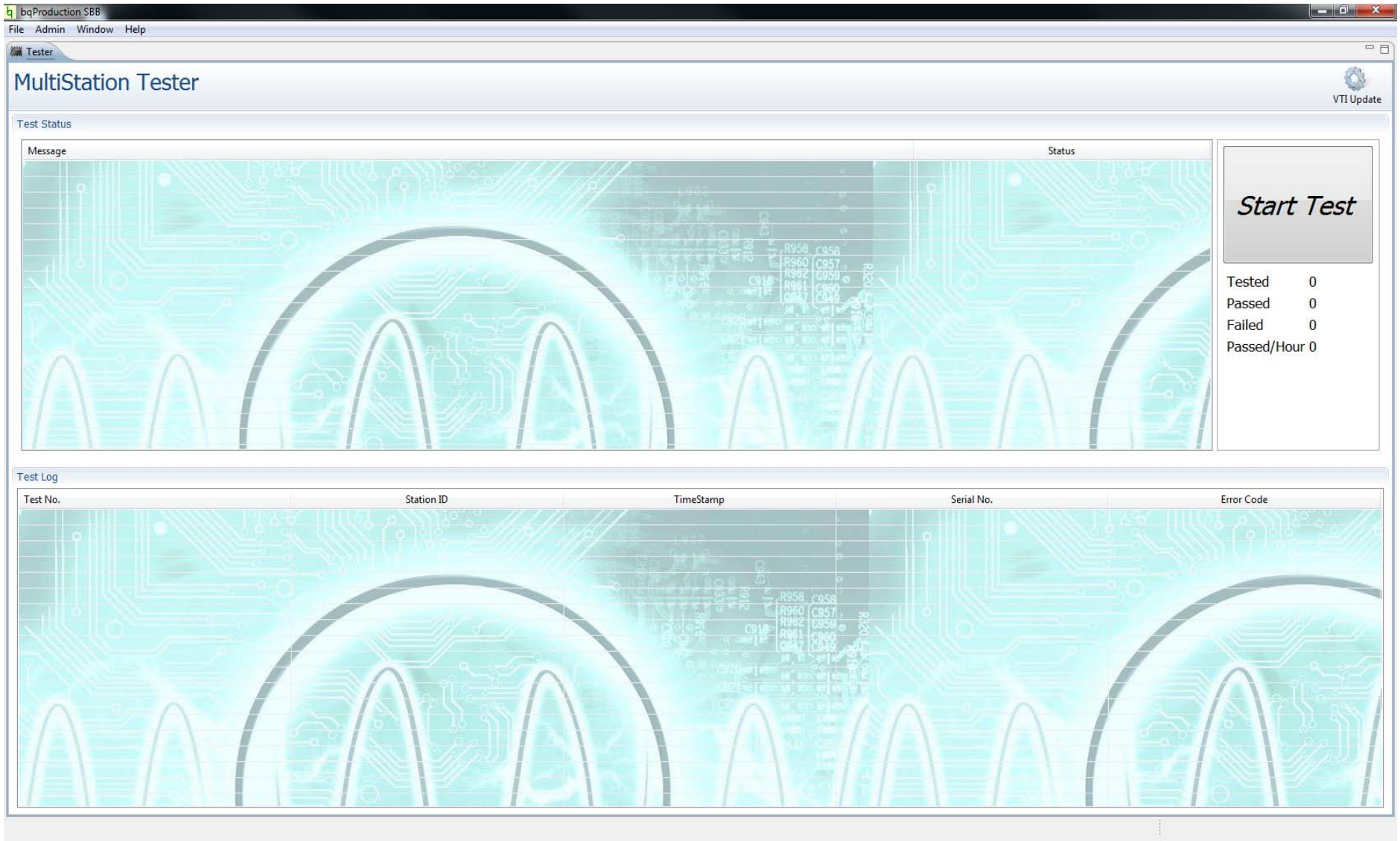
- The bqProduction setup program can be downloaded from the TI website. Search for bqProduction.
- Download and run the setup program.
- The files will be stored at C:\ti\bqProductionSBB.
- The shortcut should get placed on your desktop.
- Right click the icon and select Properties.
- Select Advanced and check the “Run as Administrator” box.
- Select OK to exit the configuration tool.



Items Needed

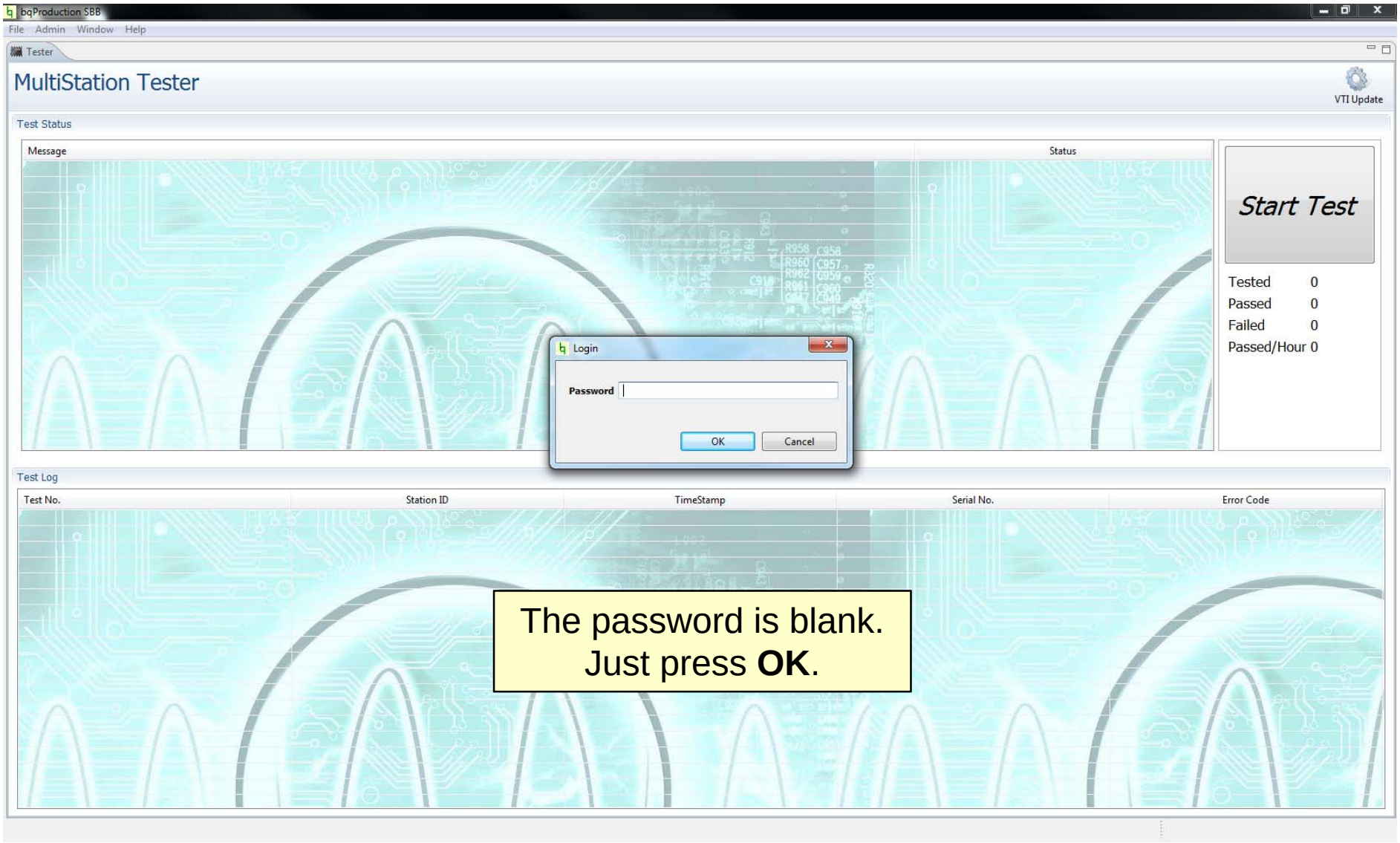


bqProduction

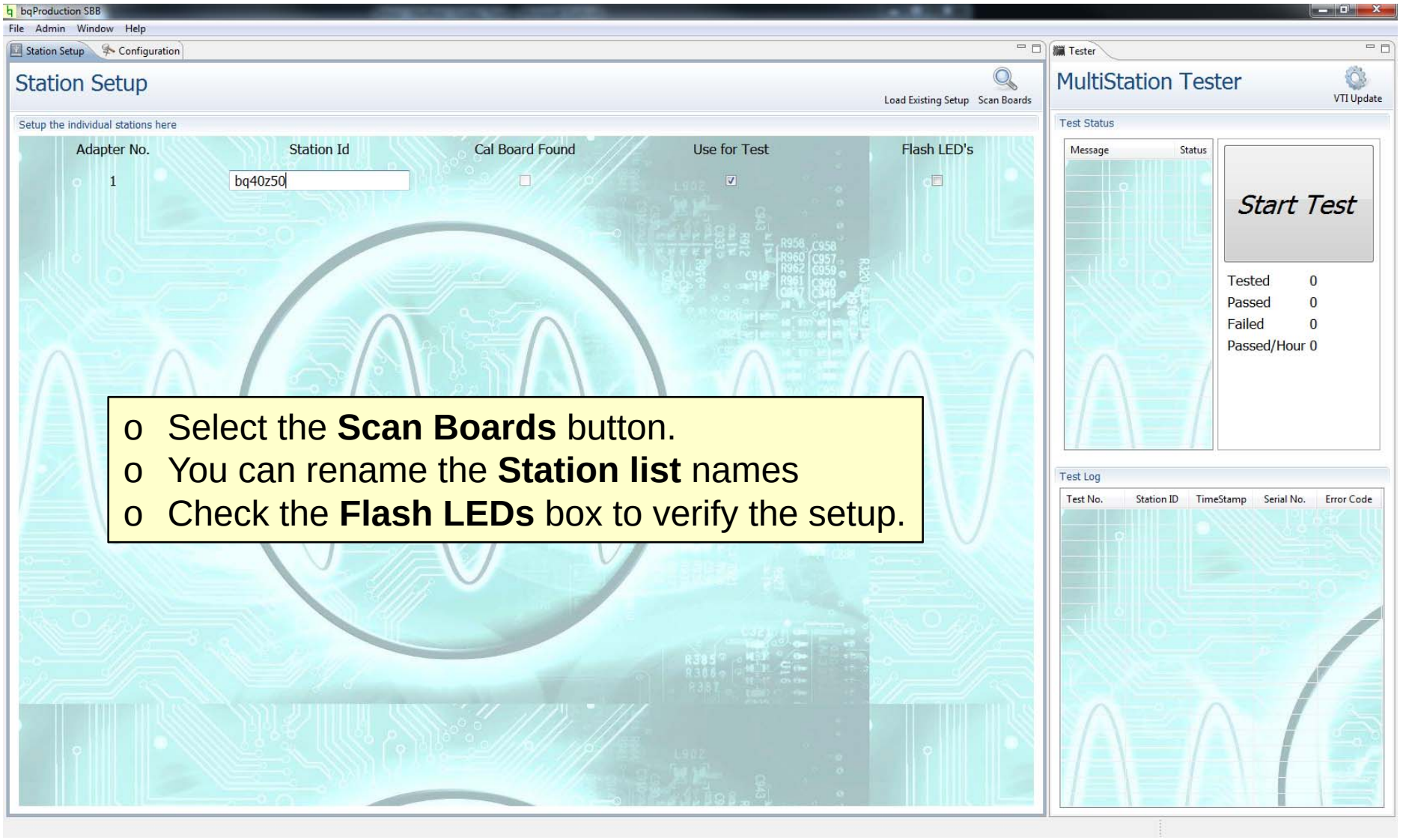


TEXAS INSTRUMENTS

bqProduction



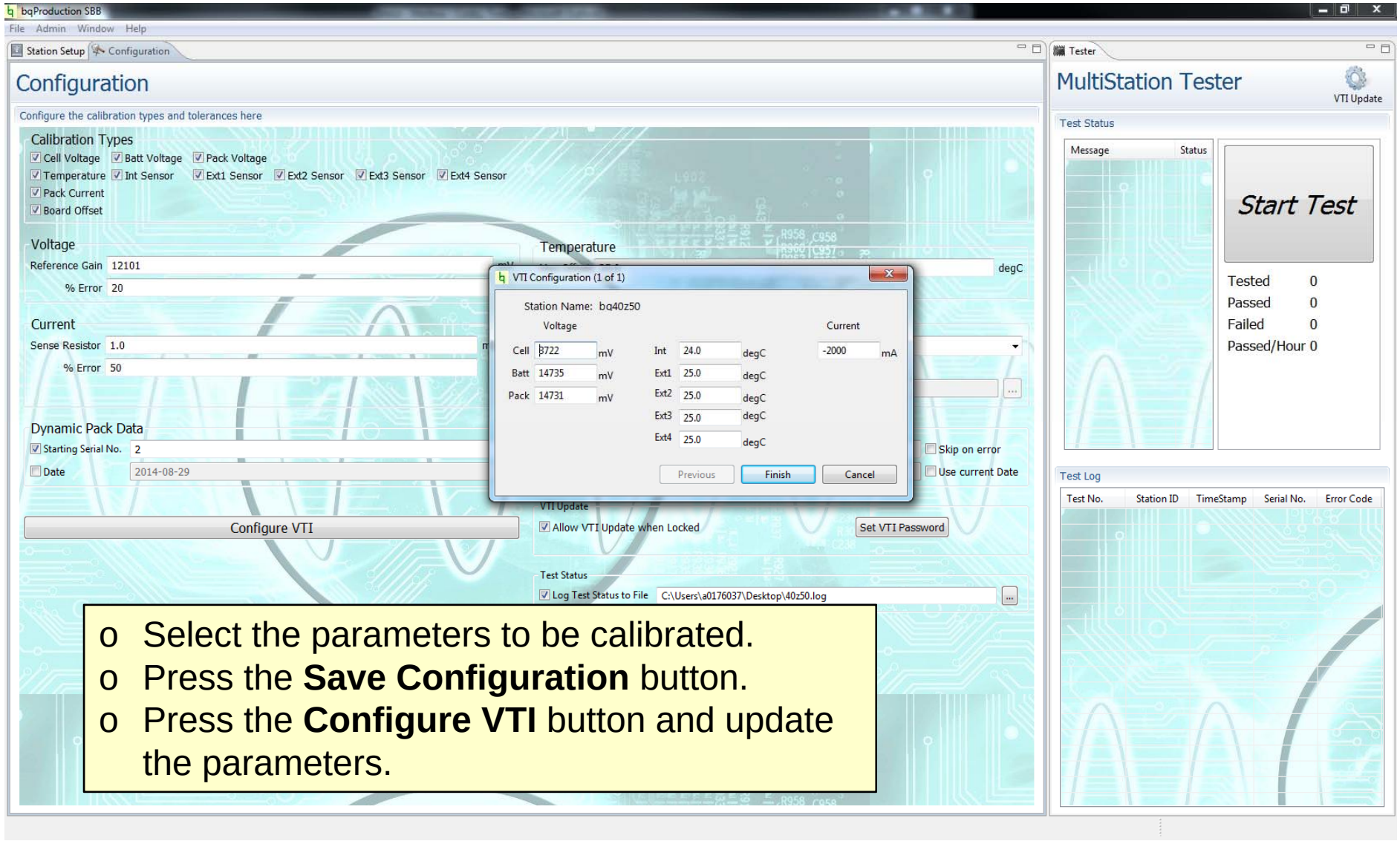
bqProduction



- Select the **Scan Boards** button.
- You can rename the **Station list** names
- Check the **Flash LEDs** box to verify the setup.

Texas Instruments

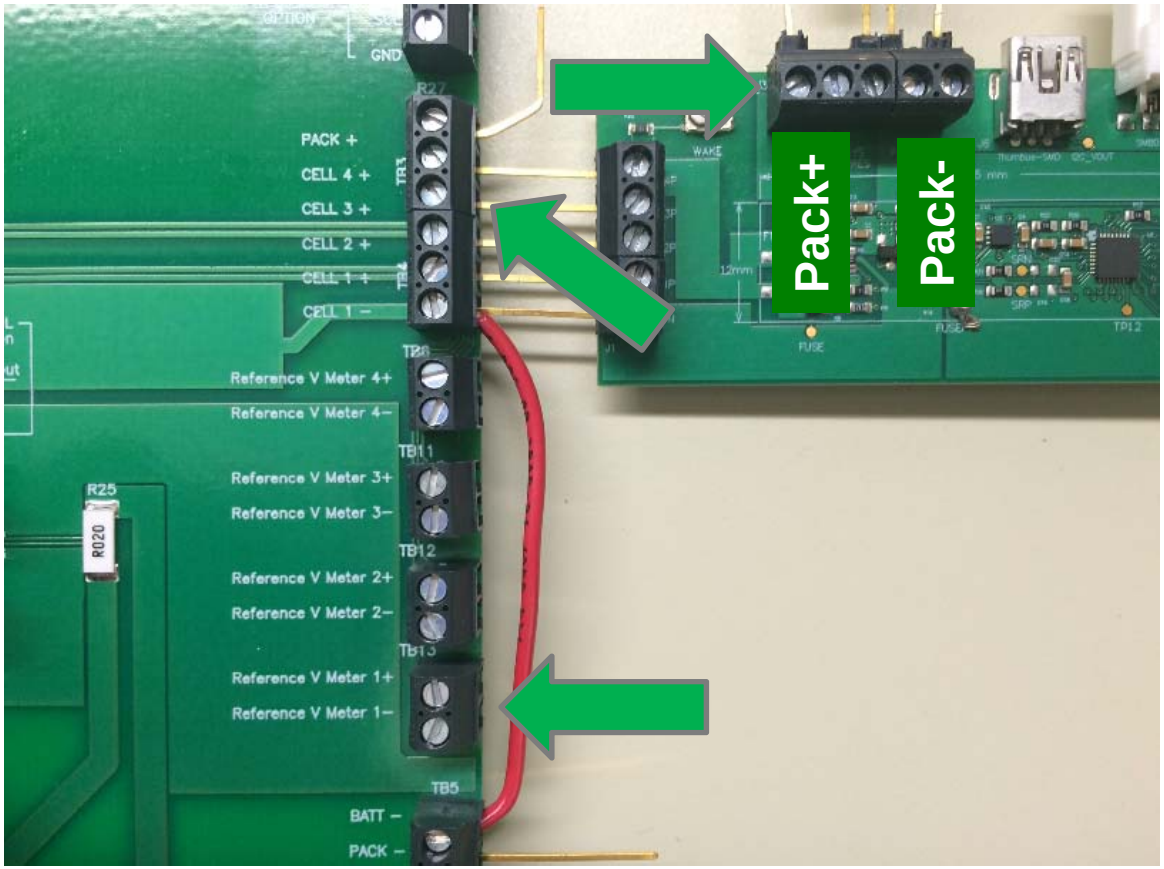
bqProduction



- Select the parameters to be calibrated.
- Press the **Save Configuration** button.
- Press the **Configure VTI** button and update the parameters.

Texas Instruments

bqProduction



Voltage Calibration:

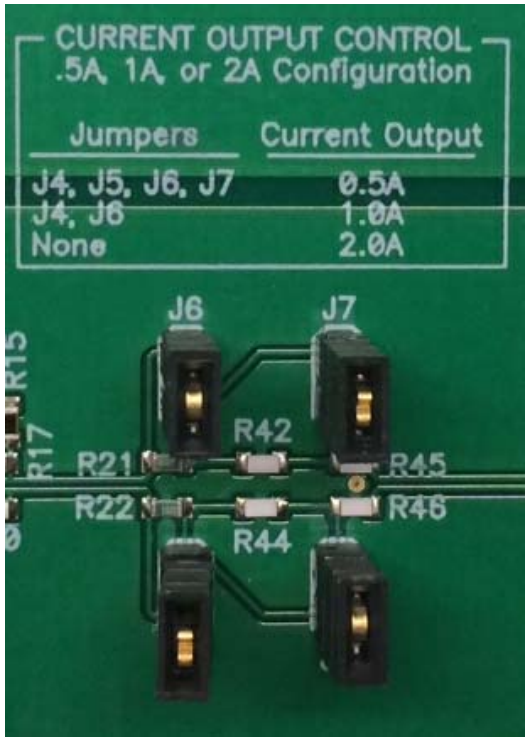
Measure the Cell Voltage from CELL1+ to CELL1- or the Cell1 Reference V meter port.

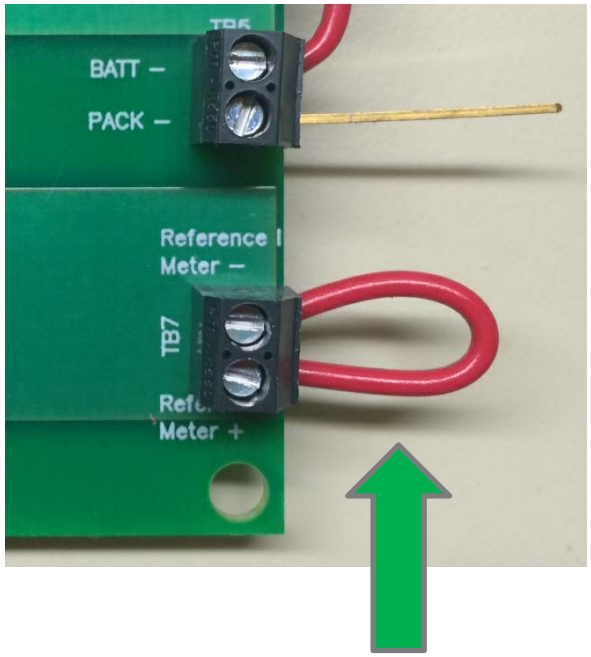
Measure the Battery Voltage from CELL1- to PACK+.

Measure the Pack Voltage from Pack+ to Pack-.

Enter the data into the **Configure VTI** screen.

bqProduction





Replace shunt with current meter.

Current Calibration:

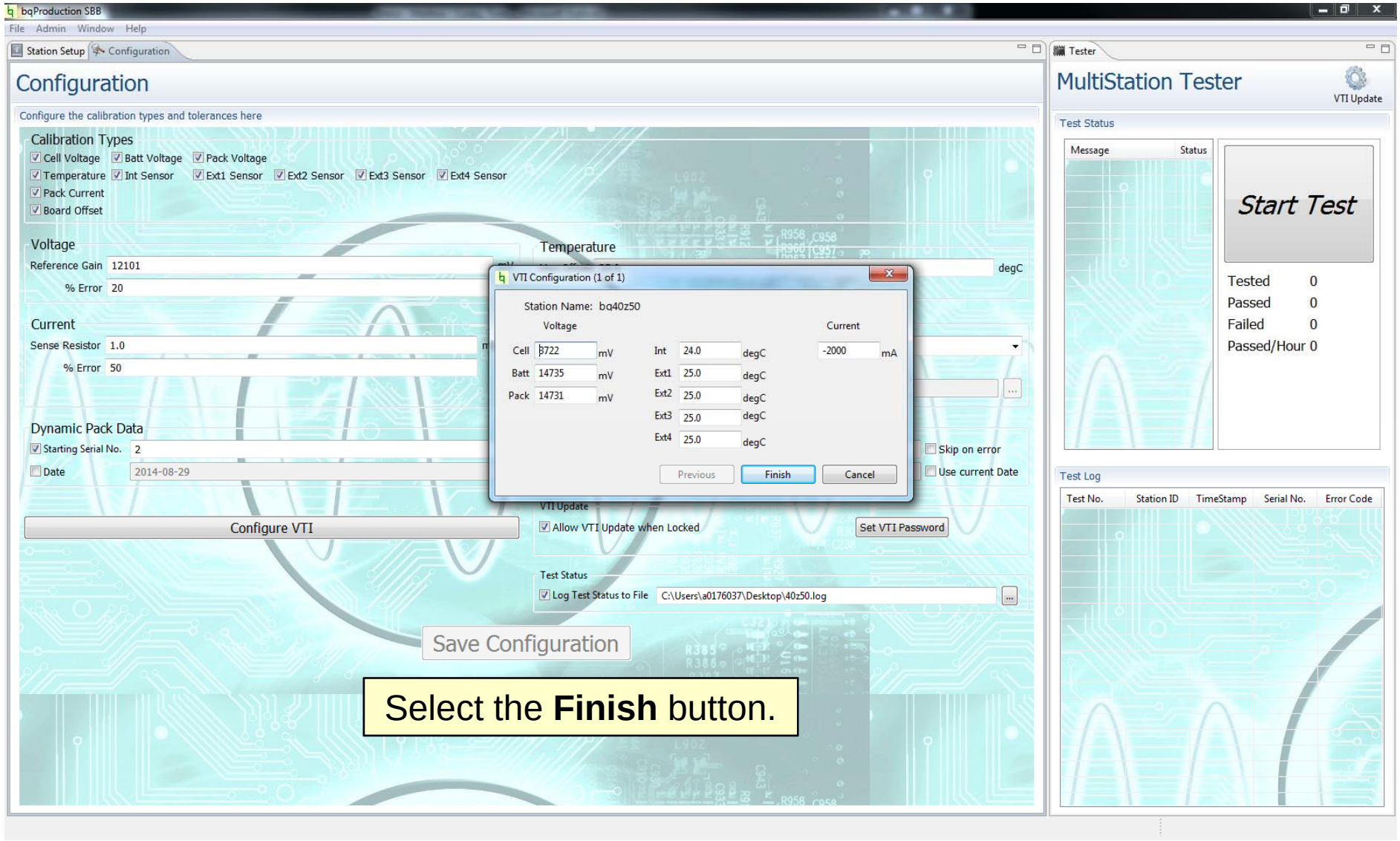
Set the CURRENT OUTPUT CONTROL jumpers to select the calibration current.

Replace the TB7 shunt with a current meter.

Measure the discharge current.

Enter the data into the **Configure VTI** screen.

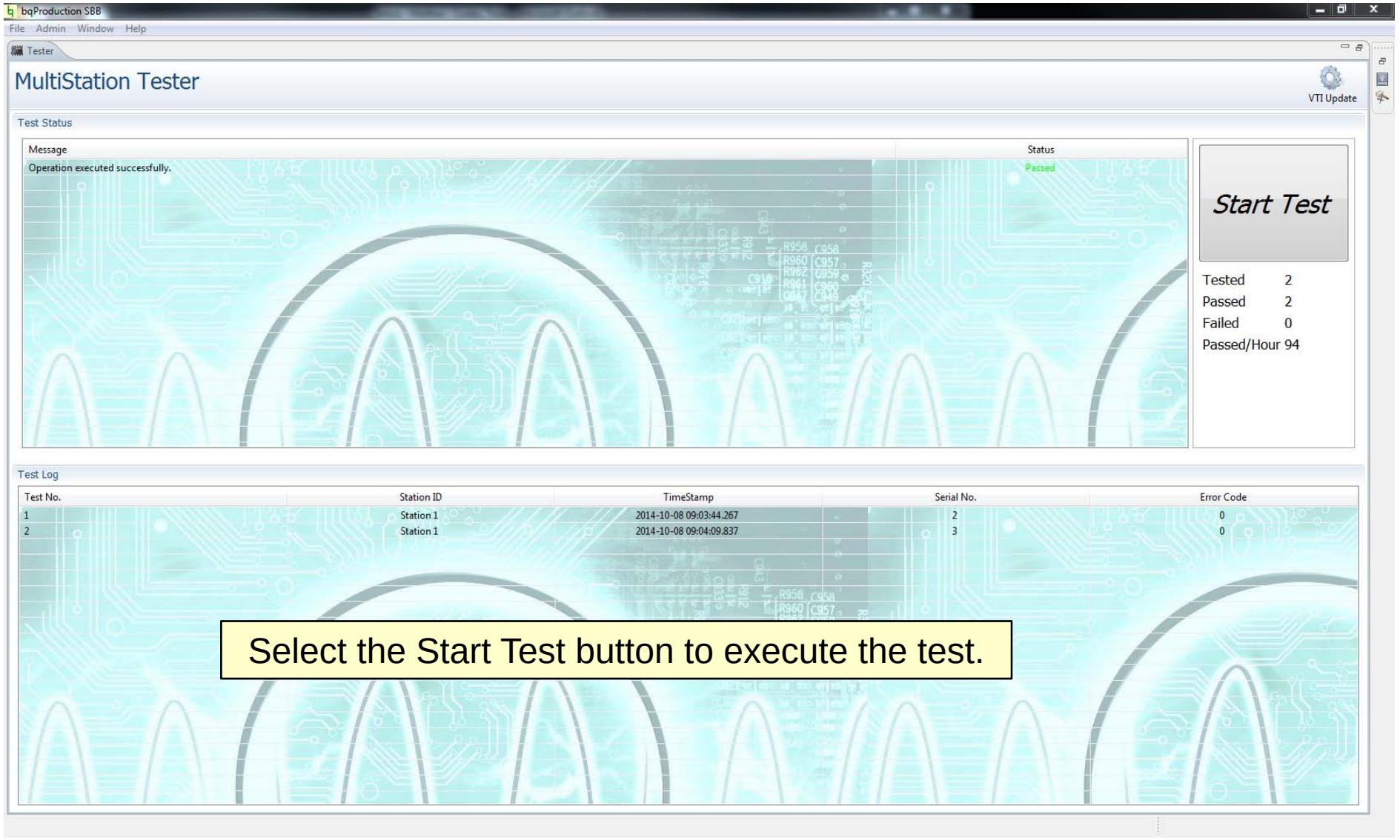
bqProduction



Select the **Finish** button.

TEXAS INSTRUMENTS

bqProduction



Texas Instruments

Demonstration

bqProduction

Questions