Application Report
SLUA703–May 2014

SmartFlash OTP Programming

ABSTRACT

The SmartFlash OTP tool provides a means for the user to update the parameters of the OTP memory in the bq27411 devices. This document describes in detail how to use the SmartFlash tool to successfully update the OTP memory.

1 General Setup and Software Installation

1. Equipment needed:
   (a) Lab power supply configured for 7.4-V output. (Expect ~5-mA maximum current.)
   (b) Battery or second power supply with ≥ 3.0-V output. (Expect ~1-mA maximum current.)
   (c) EV2300 or EV2400 USB with I^2C interface adapter
   (d) Un-programmed bq27411-G1 device assembled in the battery pack or on the EVM.
   (e) Example .gg file provided by factory
   (f) GaugeStudio software installer
   (g) SmartFlash software executable
2. Install GaugeStudio software (Fuel Gauge evaluation software) (SLUC424).
3. Connect EV2300 or EV2400 to the unprogrammed device or EVM.
4. Connect battery to BAT(+) and V_{SS}(–) pins.
5. With output disabled, connect lab power supply to PROG(+) and V_{SS}(–) pins.

NOTE: Do not apply 7.4 V to the device until prompted by software.

Copyright © 2014, Texas Instruments Incorporated

2 Launch GaugeStudio Software

1. Launch GaugeStudio software.
2. Confirm ‘Gauge Dashboard’ panel detects EV2x00 adapter and bq27411-G1 device.
3. Click ‘DataMemory’ large icon to show OTP factory defaults reflected in DataMemory (RAM)
4. Click ‘Import’ icon to load DataMemory contents from provided sample .gg file.

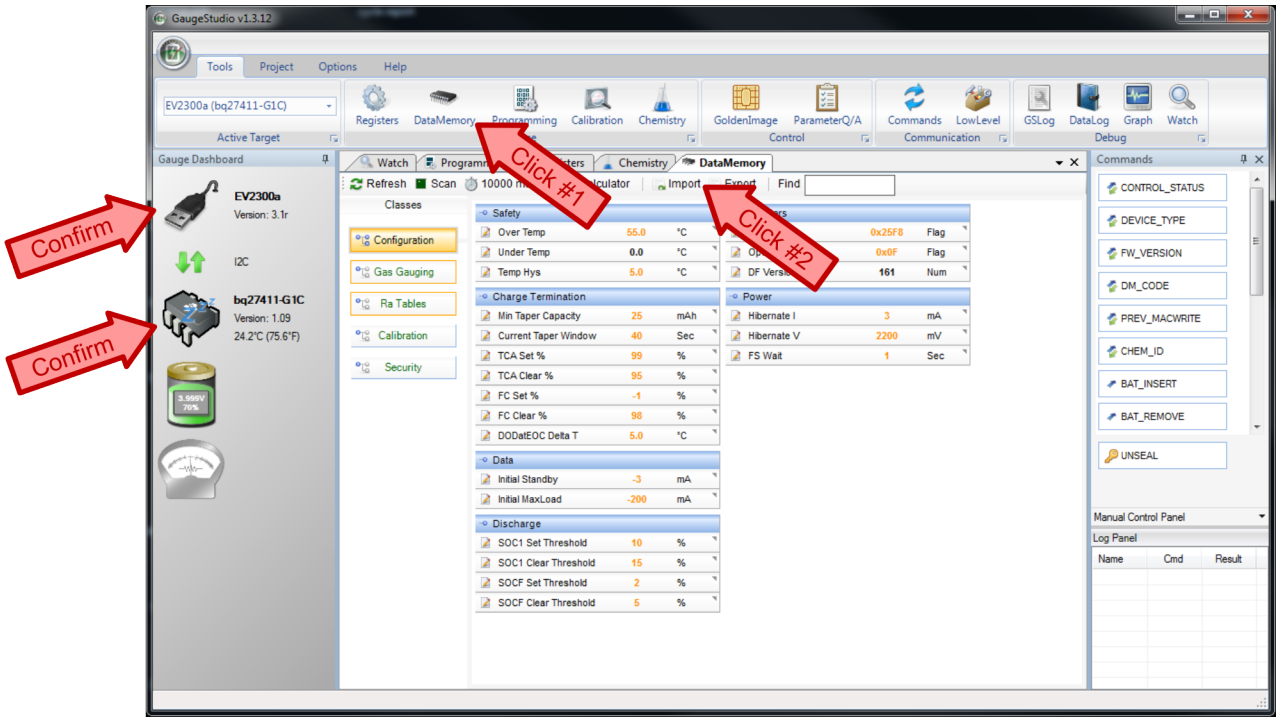

Figure 1. Launch GaugeStudio Software

Copyright © 2014, Texas Instruments Incorporated

3 Load .GG File

This procedure imports the gas gauge data or the data memory image to the device.

1. Browse to a click desired template or sample *.GG parameter file. (Example: bq27411-G1C_v109.gg shown in Figure 2.)
2. Click 'Open' button.

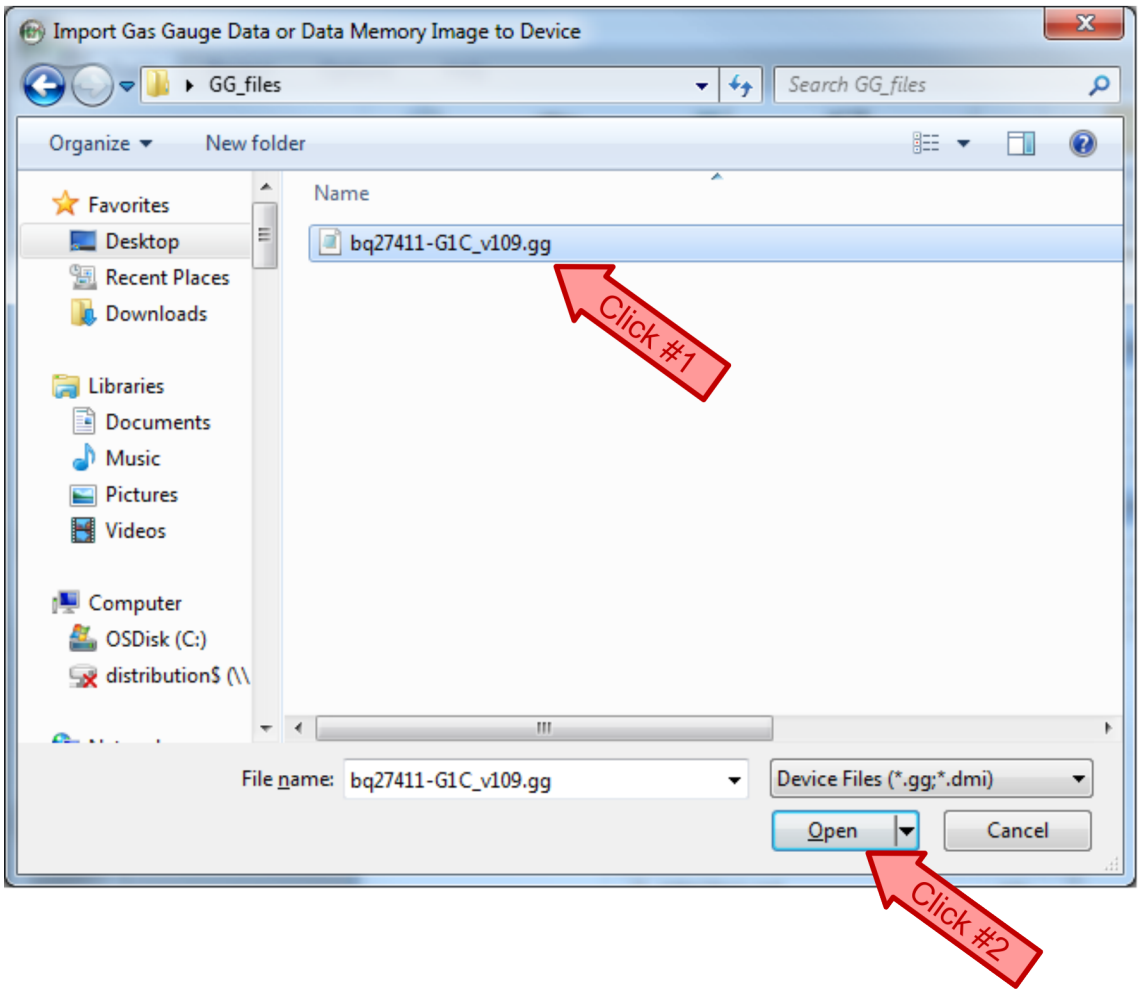

Figure 2. Load .GG File

Copyright © 2014, Texas Instruments Incorporated

4 Confirm or Update DataMemory Parameters

1. Imported DataMemory (RAM) parameters that differ from the factory defaults will appear in orange font.
2. Confirm or update DataMemory (RAM) parameters as required.
3. Save .GG file for future reference by clicking ‘Export’ button.

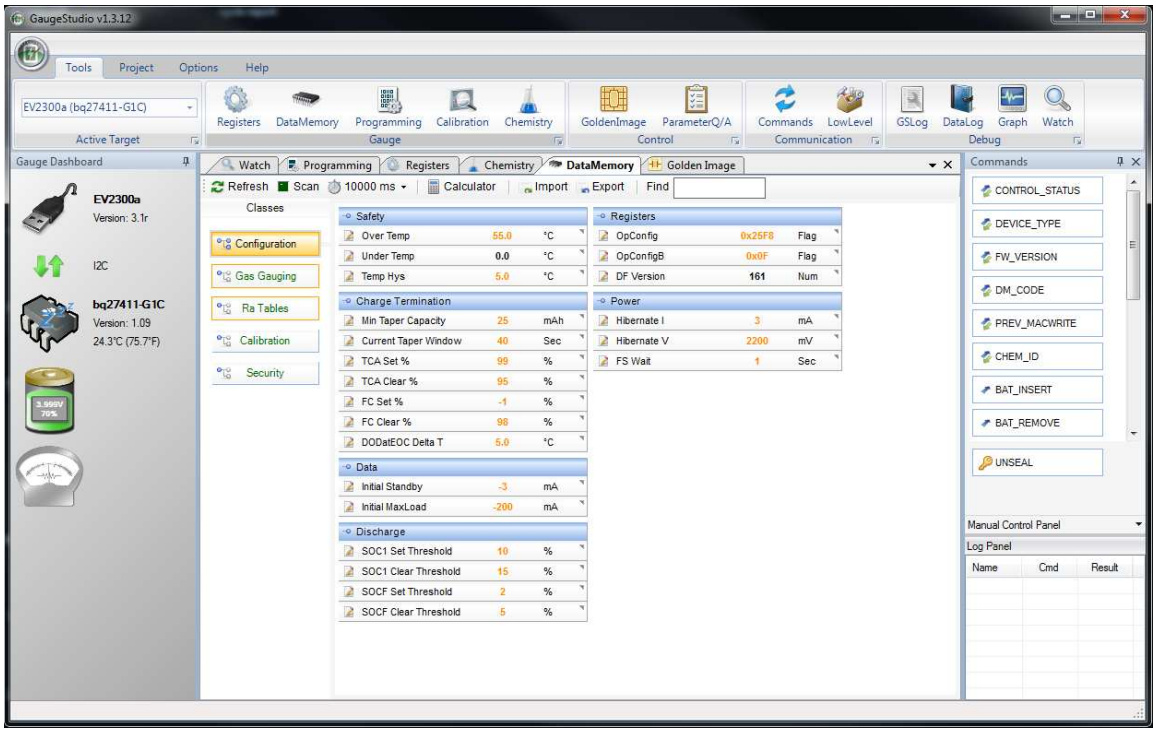

Figure 3. Confirm or Update DataMemory Parameters

Copyright © 2014, Texas Instruments Incorporated

5 Save .OTFS File

1. Click ‘GoldenImage’ icon.
2. From ‘GoldenImage’ panel, enter desired .OTFS base file name. Example: bq27411-G1C_v109

NOTE: No “Options” changes are required.

3. Click ‘Create Image File’ button.
4. Exit GaugeStudio software.

NOTE: Important because EV2x00 adapter must be freed for SmartFlash.

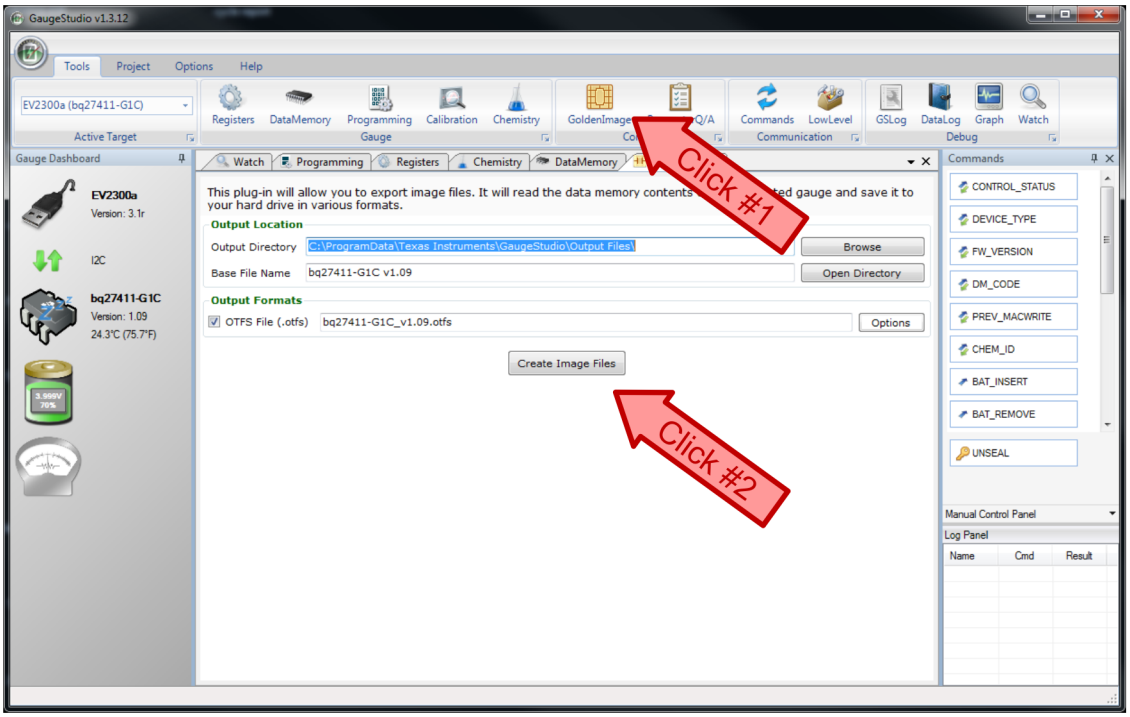

Figure 4. Save .OTFS File

Copyright © 2014, Texas Instruments Incorporated

6 Launch SmartFlash Software

1. Launch SmartFlash software.
2. Confirm auto-detection of EV2x00 adapter, Gauge = 421 and Version ≥ 109.
3. Click File > Open.

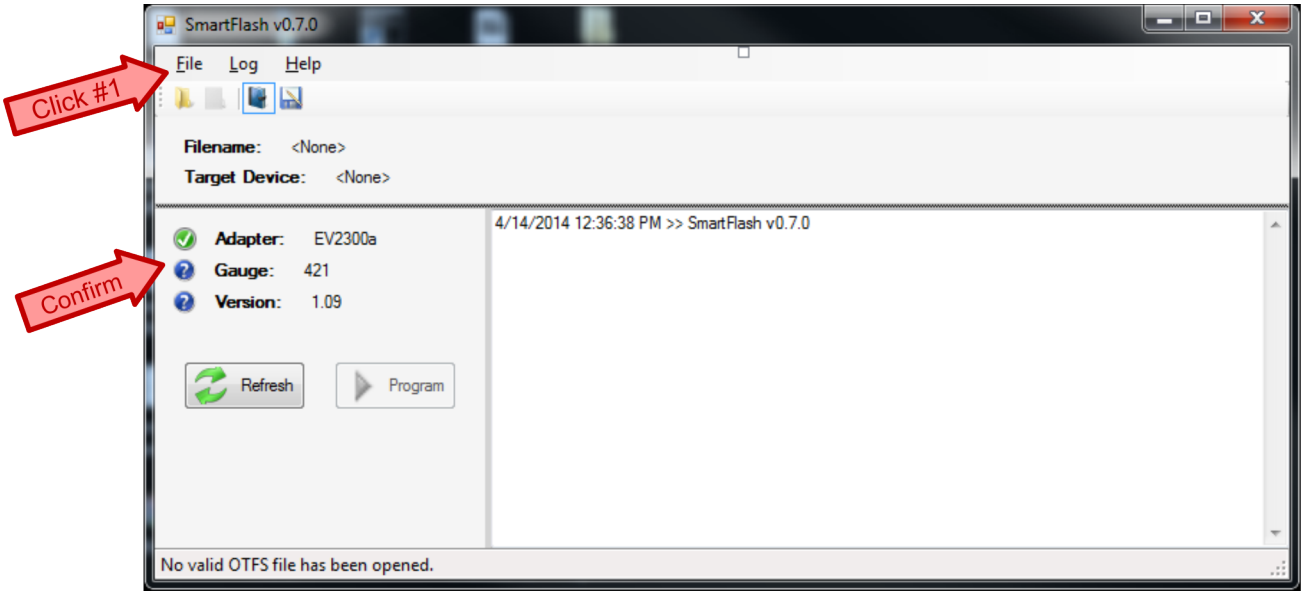

Figure 5. Launch SmartFlash Software

Copyright © 2014, Texas Instruments Incorporated

7 Open .OTFS File

1. From pop-up dialog box, click desired .OTFS file and click Open.
2. Confirm successful file load from log window.

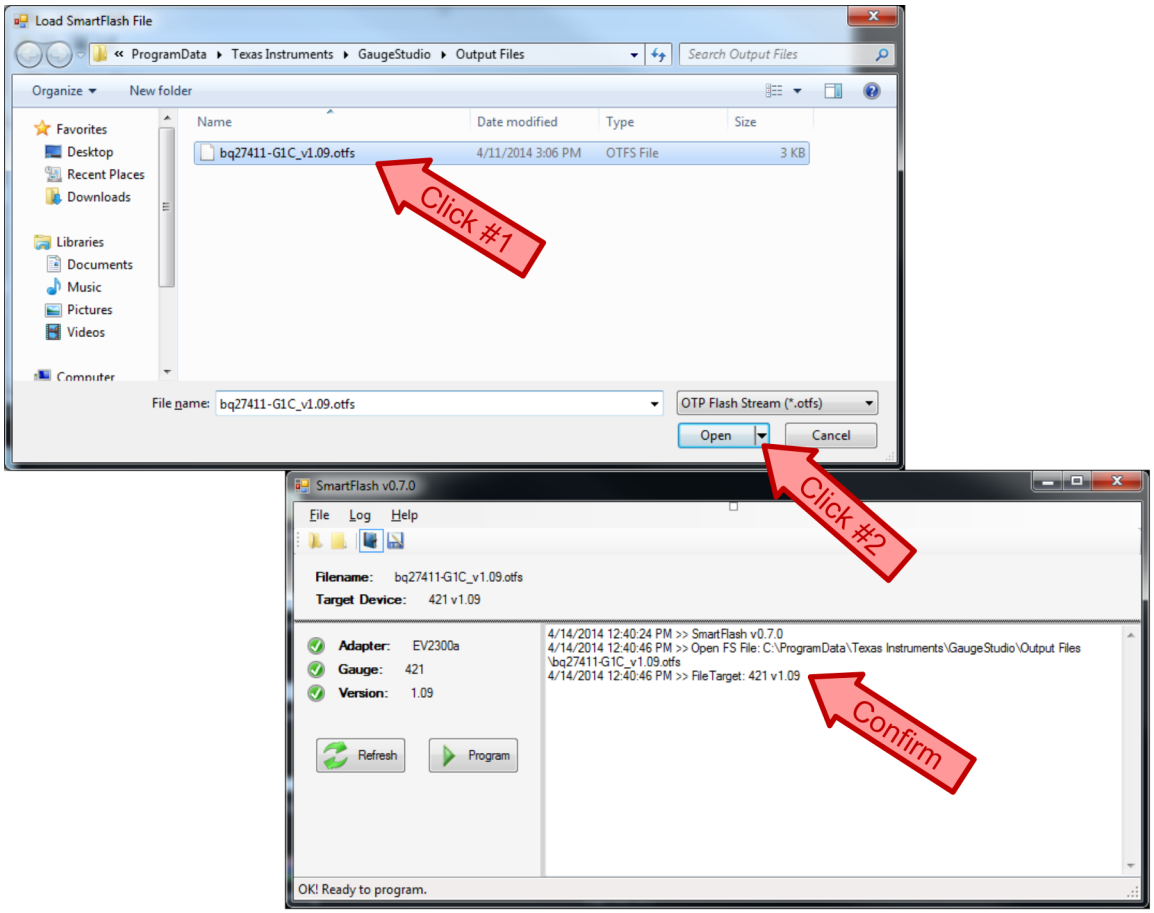

Figure 6. Open .OTFS File

Copyright © 2014, Texas Instruments Incorporated

8 Program OTP

1. Click ‘Program’ icon.
2. When ‘Apply Programming Voltage’ pop-up dialog box appears, enable 7.4-V power supply and click OK.
3. After a brief, approximately 1-second, delay for OTP programming and when ‘Remove Programming Voltage’ pop-up dialog box appears, disable the power supply and click OK.

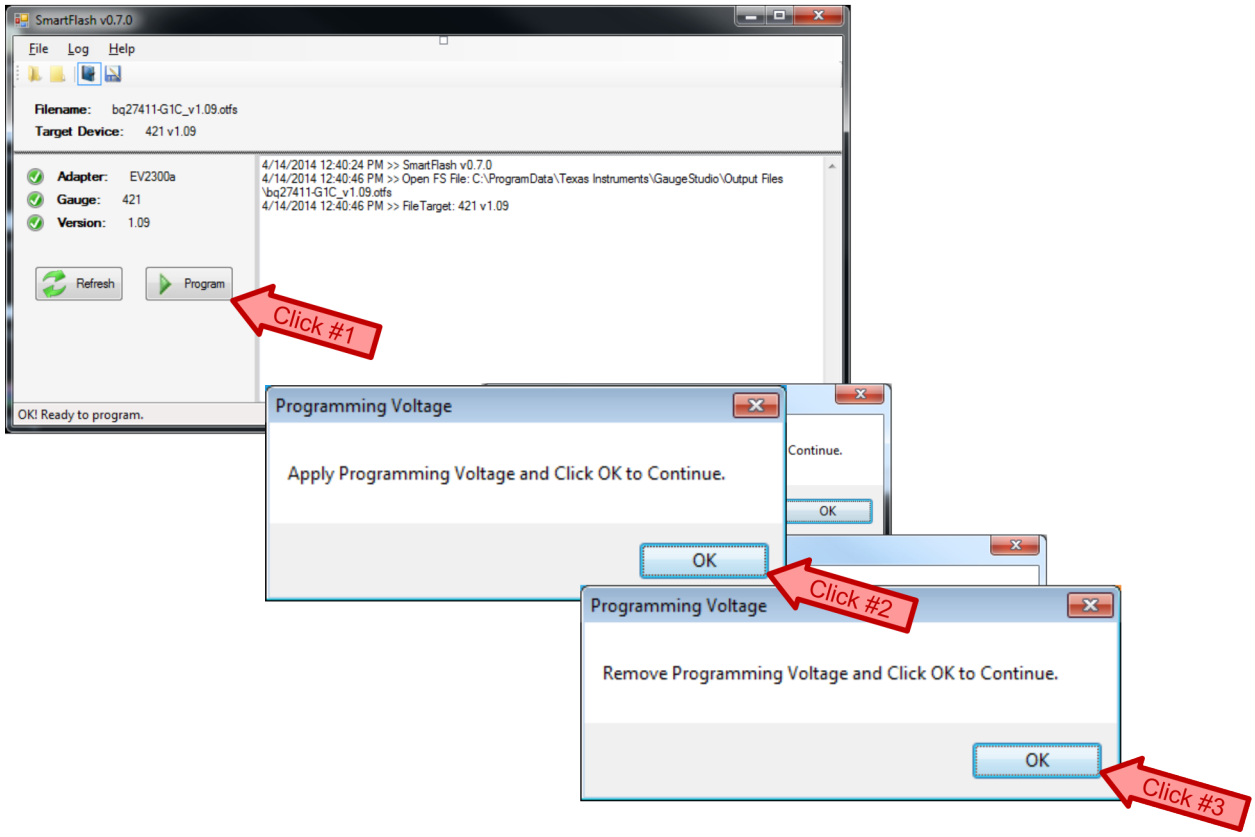

Figure 7. Program OTP

Copyright © 2014, Texas Instruments Incorporated

9 Confirm Success

1. Confirm message ‘Programming completed successfully!’ message from log window.
2. The device is now fully programmed.

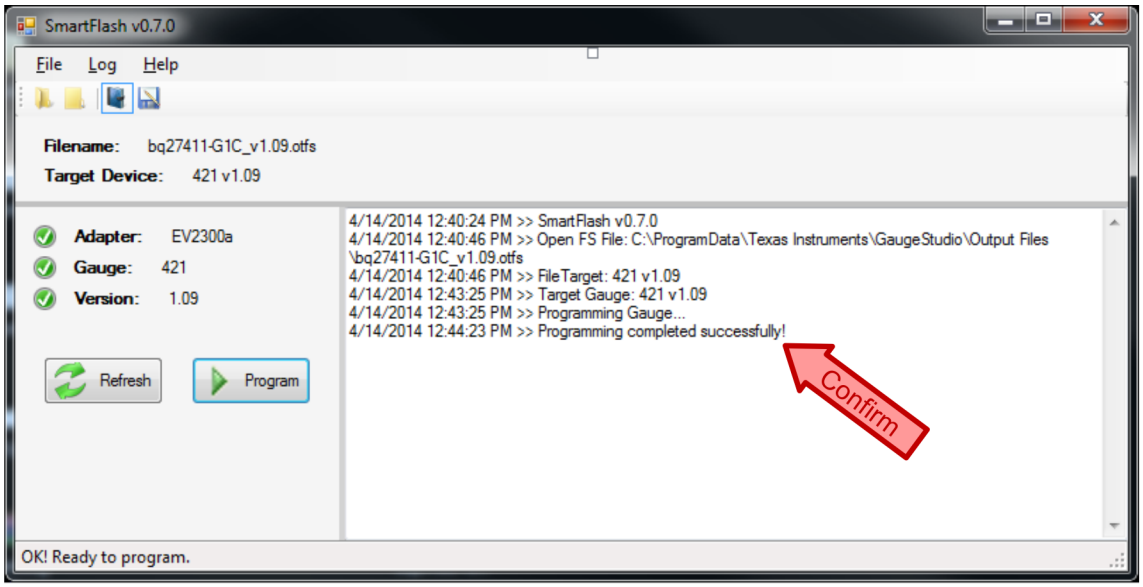

Figure 8. Confirm Success

Copyright © 2014, Texas Instruments Incorporated

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve 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 (also referred to herein as “components”) 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 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.

TI does not warrant or represent that any license, either express or implied, is granted under 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.

Reproduction of significant portions of TI information in TI data books or data sheets 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.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

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 which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm 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 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 a special agreement specifically governing such use.

Only those TI components which 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 which have ***not*** been so designated is solely at the Buyer's risk, and that 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.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2014, Texas Instruments Incorporated