TPS8269xEVM-207

User's Guide

Literature Number: SLVU802
October 2012

Contents

0.1 Introduction 4
0.1.1 Features 4
0.1.2 Applications 4
0.1.3 EVM Ordering Options 4
1 TPS8269xEVM Schematic 5
2 Connector and Test Point Descriptions 6
2.1 Input / Output Connectors: TPS8269xEVM 6
2.1.1 J1 V_{IN} 6
2.1.2 J2 S+ / S– 6
2.1.3 J3 GND 6
2.1.4 J4 V_{OUT} 6
2.1.5 J5 S+ / S– 6
2.1.6 J6 GND 6
2.2 Jumpers and Switches 6
2.2.1 JP1 ENABLE 6
2.2.2 JP2 MODE 6
3 Test Configuration 7
3.1 Hardware Setup 7
3.2 Procedure 7
4 TPS8269xEVM Test Data 8
4.1 Thermal Performance 8
4.1.1 Thermal Measurement TPS82693 , I_{OUT} = 400 mA 8
4.1.2 Thermal Measurement TPS82693 , I_{OUT} = 800 mA 8
5 TPS8269xEVM Assembly Drawings and Layout 9
A Appendix 11
A.1 Bill of Materials 11
A.2 Marking Information 11

Copyright © 2012, Texas Instruments Incorporated

List of Figures

1-1. TPS8269xEVM Schematic 5
3-1. Hardware Board Connection 7
4-1. V_{IN} = 3.6 V, V_{OUT} = 2.85 V, I_{OUT} = 400 mA 80-mW Power Dissipation at Room Temperature 8
4-2. V_{IN} = 3.6 V, V_{OUT} = 2.85 V, I_{OUT} = 800 mA 330-mW Power Dissipation at Room Temperature 8
5-1. TPS8269xEVM Component Placement 9
5-2. TPS8269xEVM Top Layer 9
5-3. TPS8269xEVM Internal Layer 1 10
5-4. TPS8269xEVM Internal Layer 2 10
5-5. TPS8269xEVM Bottom Layer 10

List of Tables

0-1. Ordering Information 4
A-1. TPS8269xEVM-207 Bill of Materials 11
A-2. Marking Information 11

Copyright © 2012, Texas Instruments Incorporated

This user's guide describes the characteristics, operation, and use of the TPS8269xEVM-207 evaluation module (EVM). The TPS8269xEVM-207 is a fully assembled and tested platform for evaluating the performance of the TPS8269xSIP high-frequency, synchronous, step-down DC-DC converters optimized for battery-powered portable applications. This document includes schematic diagrams, a printed circuit board (PCB) layout, bill of materials, and test data. Throughout this document, the abbreviations EVM and TPS8269xEVM and the term evaluation module are synonymous with the TPS8269xEVM-207 unless otherwise noted.

0.1 Introduction

The TPS8269xSIP device family is a high-frequency, synchronous, step-down DC-DC converters optimized for battery-powered portable applications. Intended for low-power applications, the TPS8269xSIP supports up to 500mA or 800mA and all TPS8269xSIP devices allow the use of low-cost chip inductors and capacitors. With a wide input voltage range of 2.3 V to 4.8 V, the devices support applications powered by lithium-ion (Li-Ion) batteries with extended voltage ranges. Different fixed voltage output versions of the TPS8269xSIP are available. These converters operate at a regulated 3-MHz switching frequency and enter a power-save mode operation under light load currents in order to maintain high efficiency over the entire load current range. A pulse frequency modulation (PFM) mode extends the battery life by reducing the quiescent current to 23 µA (typ) during light load operation.

0.1.1 Features

- Input Voltage Range: 2.3 V up to 4.8 V
- Fixed Output Voltages
- Up to 800-mA Output Current
- Sub 1-mm Profile Solution
- 3-MHz Regulated Frequency Operation
- Current Overload and Thermal Shutdown (Optional)
- Total Solution Size: < 6.7 mm^2
- Low Ripple Light-Load PFM Mode

0.1.2 Applications

- LDO Replacement
- Cell Phones, Smart-Phones
- PoL Applications

0.1.3 EVM Ordering Options

Table 0-1 provides the ordering information for the various EVM options.

Table 0-1. Ordering Information

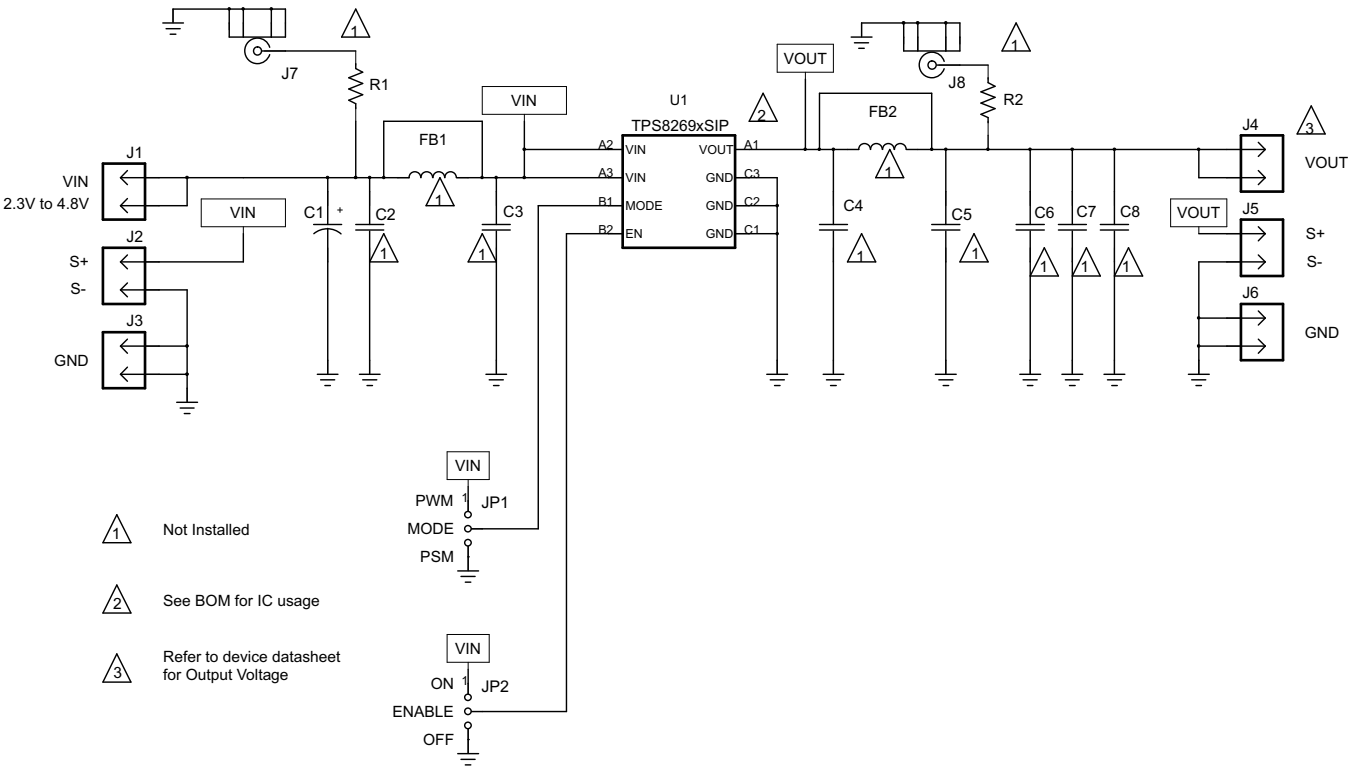
Orderable EVM Number	Device Part Number	Output Voltage	Maximum Output Current
TPS82693EVM-207	TPS82693	2.85 V	800 mA

All trademarks are the property of their respective owners.

Copyright © 2012, Texas Instruments Incorporated

TPS8269xEVM Schematic

Figure 1-1 illustrates the TPS8269xEVM-207 schematic.



NOTE: For reference only; see Table A-1 for specific values.

Figure 1-1. TPS8269xEVM Schematic

Copyright © 2012, Texas Instruments Incorporated

Connector and Test Point Descriptions

2.1 Input / Output Connectors: TPS8269xEVM

2.1.1 J1 V_{IN}

This header is the positive connection to the input power supply. The power supply must be connected between J1 and J3 (GND). The leads to the input supply should be twisted and kept as short as possible. The input voltage must be between 2.3 V and 4.8 V.

2.1.2 J2 S+ / S–

J2 S+ / S– are the sense connection for the input of the converter. Connect a voltmeter, sense connection of a power supply, or oscilloscope to this header.

2.1.3 J3 GND

This header is the return connection to the input power supply. Connect the power supply between J3 and J1 (V_{IN}). The leads to the input supply should be twisted and kept as short as possible. The input voltage must be between 2.3 V and 4.8 V.

Capacitor C1 compensates for parasitic inductance as a result of the wires from the DC power supply to the EVM. It is not required in an actual application circuit.

2.1.4 J4 V_{OUT}

This header is the positive output of the step-down converter. The TPS8269x has fixed output voltages; refer to the specific device data sheet for detailed information on the device output voltage.

2.1.5 J5 S+ / S–

J5 S+ / S– are the sense connection for the output of the converter. Connect a voltmeter, sense connection of an electronic load, or oscilloscope to this header.

2.1.6 J6 GND

J6 is the return connection of the converter. A load can be connected between J6 and J4 (V_{OUT}).

2.2 Jumpers and Switches

2.2.1 JP1 ENABLE

This jumper can enable or disable the converter on the EVM. Placing a shorting bar between ENABLE and ON turns on the converter. Placing a shorting bar between ENABLE and OFF disables the converter.

2.2.2 JP2 MODE

This jumper can enable or disable the power-saving mode (PSM) under light loads. Placing a shorting bar between MODE and pulse width modulation (PWM) disables the PSM. If the PSM is disabled, the converter operates in forced PWM mode over the entire load current range.

Placing a shorting bar between MODE and PSM enables the power-saving mode. The device operates in power-saving mode under light load conditions. See the specific device data sheet for detailed information.

Copyright © 2012, Texas Instruments Incorporated

Test Configuration

3.1 Hardware Setup

Figure 3-1 illustrates a typical hardware test configuration.

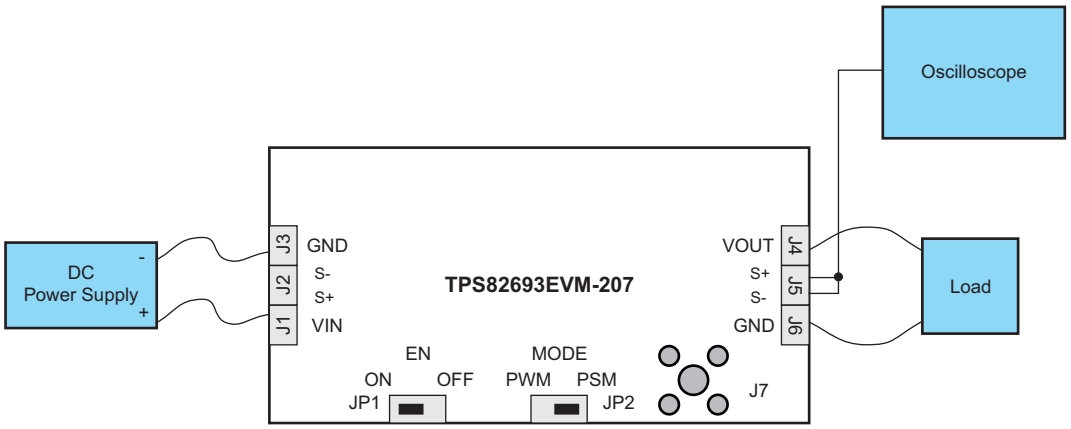


Figure 3-1. Hardware Board Connection

3.2 Procedure

Follow these procedures when configuring the EVM for testing.

CAUTION

Many of the components on the TPS8269xEVM-207 are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap, bootstraps, or mats at an approved ESD workstation. An electrostatic smock and safety glasses should also be worn.

- Work at an ESD workstation. Make sure that any wrist straps, bootstraps, or mats are connected and reference the user to earth ground before power is applied to the EVM. Electrostatic smocks and safety glasses should also be worn.
- Connect a DC power supply between J1 and J3 on the TPS8269xEVM. Note that the input voltage should range from 2.3 V to 4.8 V. Keep the wires from the input power supply to EVM as short as possible and twisted.
- Connect a DC voltmeter or oscilloscope to the output sense connection of the EVM.
- A load can be connected between J4 and J6 on the TPS8269xEVM.
- To enable the converter, connect the shorting bar on JP1 between ENABLE and ON on the TPS8269xEVM.
- The TPS8269xEVM has a feature that allows users to switch between PSM under light loads and forced PWM mode, with jumper JP2.

Copyright © 2012, Texas Instruments Incorporated

TPS8269xEVM Test Data

This section presents typical performance data for the TPS8269xEVM. Actual performance data can be affected by measurement techniques and environmental variables; therefore, these results are presented for reference and may differ from actual results obtained by some users.

4.1 Thermal Performance

Figure 4-1 and Figure 4-2 show the typical thermal performance for the TPS82693 for two load scenarios, respectively.

4.1.1 Thermal Measurement TPS82693 , I_{OUT} = 400 mA

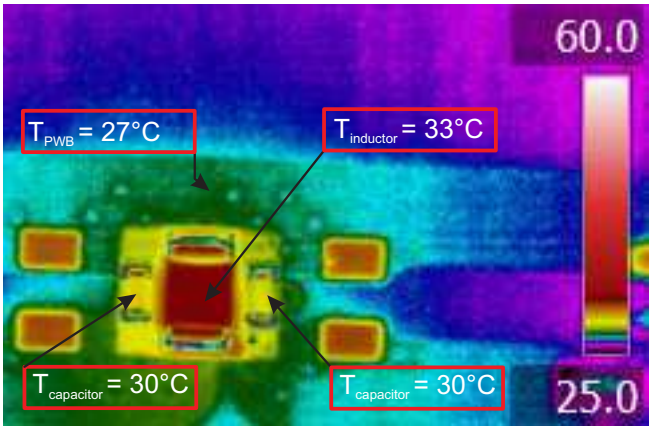


Figure 4-1. V_{IN} = 3.6 V, V_{OUT} = 2.85 V, I_{OUT} = 400 mA 80-mW Power Dissipation at Room Temperature

4.1.2 Thermal Measurement TPS82693 , I_{OUT} = 800 mA

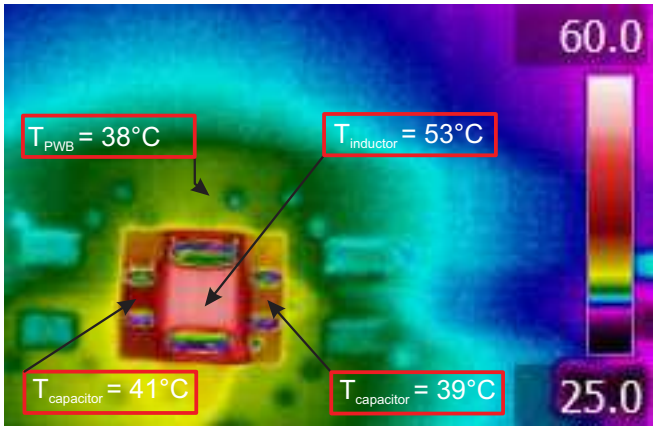


Figure 4-2. V_{IN} = 3.6 V, V_{OUT} = 2.85 V, I_{OUT} = 800 mA 330-mW Power Dissipation at Room Temperature

Copyright © 2012, Texas Instruments Incorporated

TPS8269xEVM Assembly Drawings and Layout

Figure 5-1 through Figure 5-5 show the design of the show the design of the TPS8269xEVM-207 printed circuit boards. The EVM was designed using a four-layer, 1-ounce copper-clad PCB with all components in an active area on the top side of the board. Moving components to both sides of the PCB or using additional internal layers can offer additional size reduction for space-constrained systems.

NOTE: Board layouts are not to scale. These figures are intended to show how the board is laid out; they are not intended to be used for manufacturing TPS8269xEVM-207 PCBs.

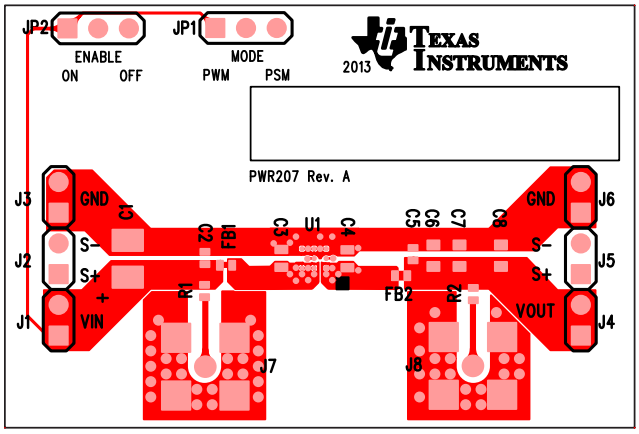


Figure 5-1. TPS8269xEVM Component Placement

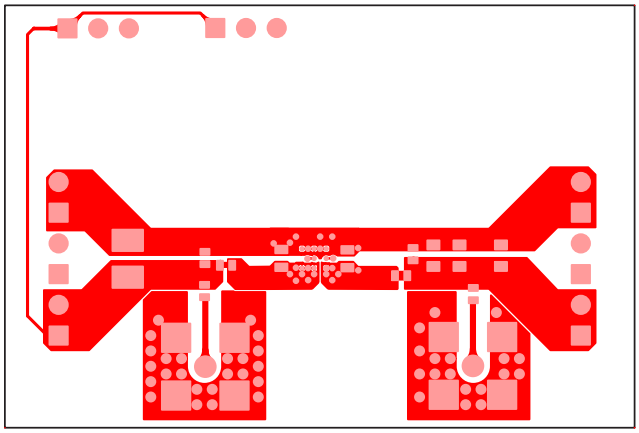


Figure 5-2. TPS8269xEVM Top Layer

Copyright © 2012, Texas Instruments Incorporated

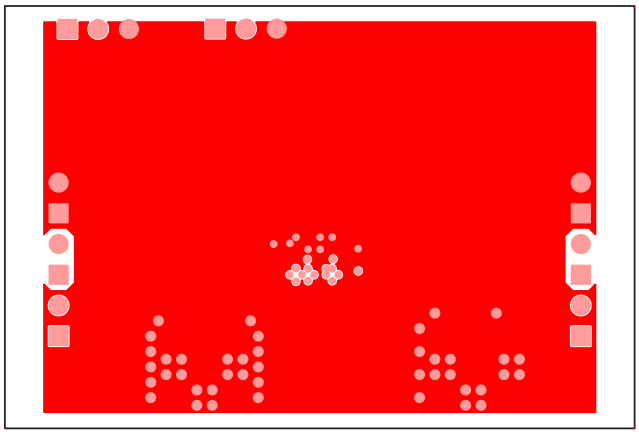


Figure 5-3. TPS8269xEVM Internal Layer 1

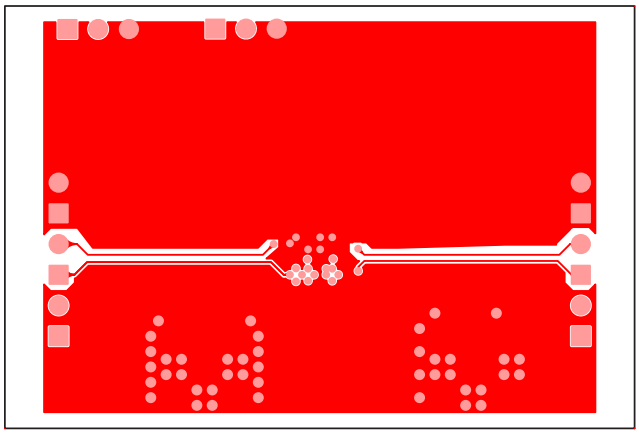


Figure 5-4. TPS8269xEVM Internal Layer 2

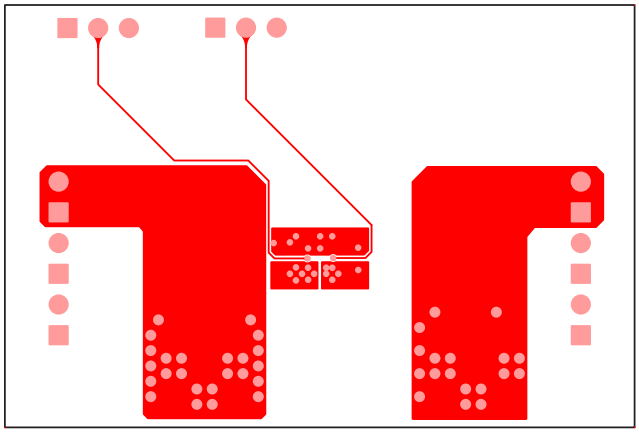


Figure 5-5. TPS8269xEVM Bottom Layer

Copyright © 2012, Texas Instruments Incorporated

Appendix

A.1 Bill of Materials

Table A-1 lists the bill of materials for the TPS8269xEVM.

Table A-1. TPS8269xEVM-207 Bill of Materials

EVM Device Option: Count		RefDes	Value	Description	Size	Part Number	Mfr
-001	-002						
0	0	C1	150 µF	Capacitor, Tantalum, 6.3 V, 25 mΩ, 20%	3528(B)	T520B157M006ATE025	Kemet
1	1	C2, C3, C4, C5, C6, C7, C8	Open	Capacitor, Ceramic	0603	Std	Std
6	6	J1, J2, J3, J4, J5, J6	PEC02SAAN	Header, Male 2-pin, 100 mil spacing	0.10 in x 2	PEC02SAAN	Sullins
0	0	J7, J8	Open	Connector, SMA , Straight, PC mount	0.210 in^2	901-144-8RFX	AMP
2	2	JP1, JP2	PEC03SAAN	Header, Male 3-pin, 100 mil spacing	0.10 in x 3	PEC03SAAN	Sullins
0	1	U1	TPS82693SIP	IC, 800-mA, High-Freq µModule Step-Down Converter	SIP-8	TPS82693	TI

A.2 Marking Information

Table A-2 provides the marking information for this EVM.

Table A-2. Marking Information

Assembly Number	Marking Text
PWR207-002	TPS82693EVM-207

Copyright © 2012, 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 © 2013, Texas Instruments Incorporated