

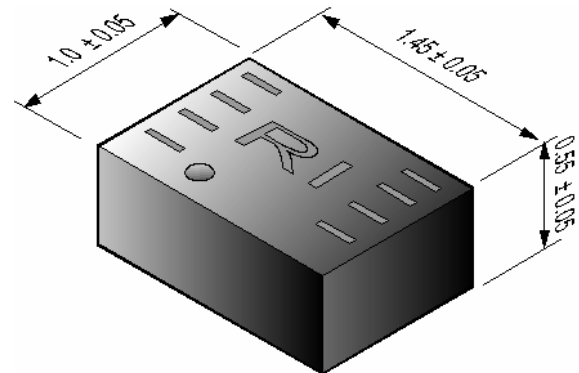
SMT EPC Gen2 IC

FEATURES

- Meets EPCglobal™ Gen2 (v1.0.9) and ISO/IEC 18000-6C
- Global Frequency Operability: 840 MHz to 960 MHz
- Supports Optional Gen2 Commands: Block Write and Block Erase
- 192-bit Memory: 96-bit Electronic Product Code™ (EPC), 32-bit Access Password, 32-bit KILL Password, 32-bit TID Memory
- Designed for High Performance and Low Power Consumption, Based on the Most Advanced Silicon Node for RFID (130 nm)
- Fast Tag Singulation Using Most Advanced Anticollision Scheme
- Green (RoHS and No Sb/Br) Compliant

APPLICATIONS

- PCB Tracking
- Specialized Tag Designs



Dimensions in mm

DESCRIPTION

Printed circuit board (PCB) manufacturers want to track products and component parts through their manufacturing and distribution systems. As space is at a premium, the typical requirement is for a robust method that can survive the manufacturing processes and yet has a footprint which takes up very little of the valuable board space. This UHF Gen2 packaged IC is designed for just that purpose – it can be placed across a typical dipole, near field loop, or a small etched slot to communicate specific information about that PCB when interrogated by fixed or hand held readers on a production line.

ORDERING INFORMATION

| DELIVERY ⁽¹⁾⁽²⁾ | PART NUMBER | QUANTITY |
|---|-----------------|----------|
| Texas Instruments UHF IC is packaged in a standard SMT (TLLGA) package and is delivered on 179-mm x 55-mm x 8-mm reels. | RI-UHF-IC116-00 | 5000 |

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
- (2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

ABSOLUTE MAXIMUM RATINGS

| | | MIN | MAX | UNIT |
|-----------|--|---|-----|--------|
| I_{IN} | Input current, from any active pin to any active pin | | 1.5 | mADC |
| V_{IN} | Input voltage to active pins (sustained) | | 1.5 | VDC |
| T_{stg} | Storage temperature range | -40 | 125 | °C |
| | Assembly survival temperature | Moisture Sensitivity Level 1 (MSL1) lead-free reflow (IPC/JEDEC J-STD-020C) | | 260 °C |
| ESD | Electrostatic discharge immunity | Charged-Device Model (CDM) | | 0.5 kV |
| | | Human-Body Model (HBM) | | 2 kV |

RECOMMENDED OPERATING CONDITIONS

| | | MIN | MAX | UNIT | |
|-----------|-----------------------|---------|-----|------|----|
| T_A | Operating temperature | Reading | -40 | 85 | °C |
| | | Writing | -25 | 65 | |
| f_{res} | Carrier frequency | 840 | 960 | MHz | |

ELECTRICAL CHARACTERISTICS

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|--|--------------------------|------------|---------|--------|
| Sensitivity (power level at the die terminals with a conjugate value) | Reading | -9 | -13 | | dBm |
| | Writing | -6 | -9 | | |
| $\Delta\Gamma$ | Change in modulator reflection coefficient | | ≥ 0.2 | | |
| T | Data retention time | $T_A = 25^\circ\text{C}$ | | 10 | Years |
| W&E | Write and erase endurance | $T_A = 25^\circ\text{C}$ | | 100 000 | Cycles |

RECOMMENDED ANTENNA SERIES IMPEDANCE

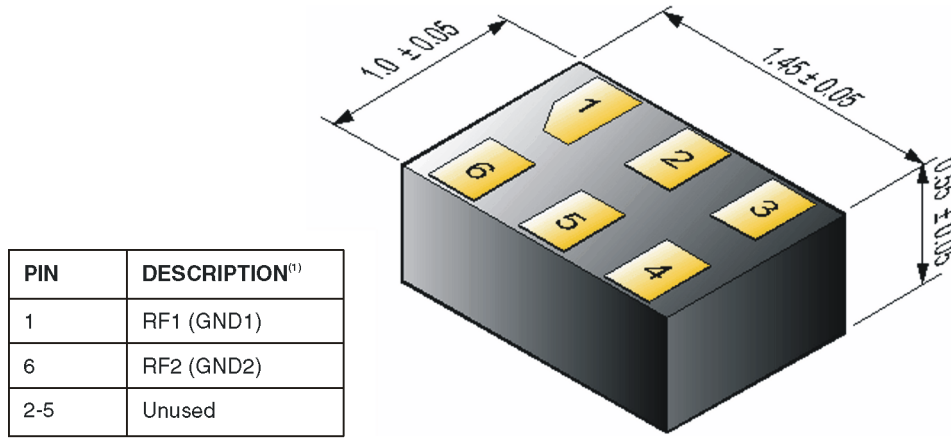
Use this data for the target impedance for antenna designs.

| | EUROPE 866.5 MHz | USA 915 MHz | JAPAN 953 MHz | UNIT |
|------------------|---------------------|----------------|------------------|----------|
| Series impedance | 9.8 + j73 | 8.2 + j61 | 7.2 + j53 | Ω |

DEVICE INFORMATION

IC Layout

The IC layout is shown in Figure 1 and Figure 2.



- (1) If using a discrete antenna type such as a dipole or loop, use pin names RF1 and RF2. If using a ground plane based antenna, use GND1 and GND2 for net list.

Figure 1. Overall Dimensions and Pin Layout

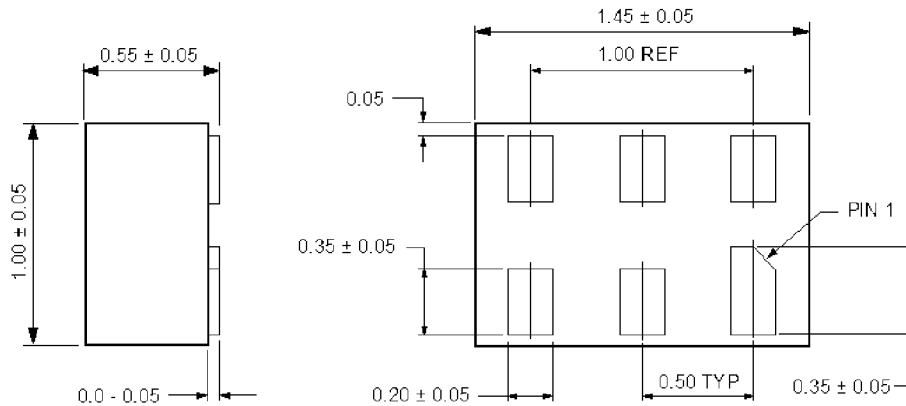


Figure 2. IC Dimensions (TI Package Designator DRY)

The land pattern for board layout is shown in [Figure 3](#).

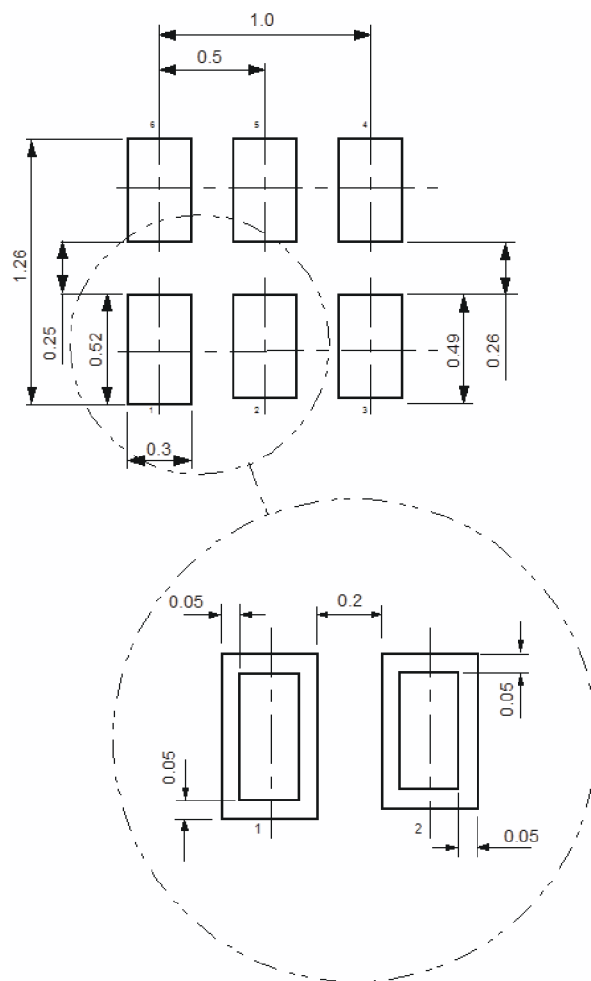


Figure 3. Board Layout With Solder Mask Clearance

Shipping, Packaging, and Further Handling

The packaged ICs are delivered in individual pockets on 179-mm (7-inch) reels. The overall dimensions of the reel are shown [Figure 4](#).

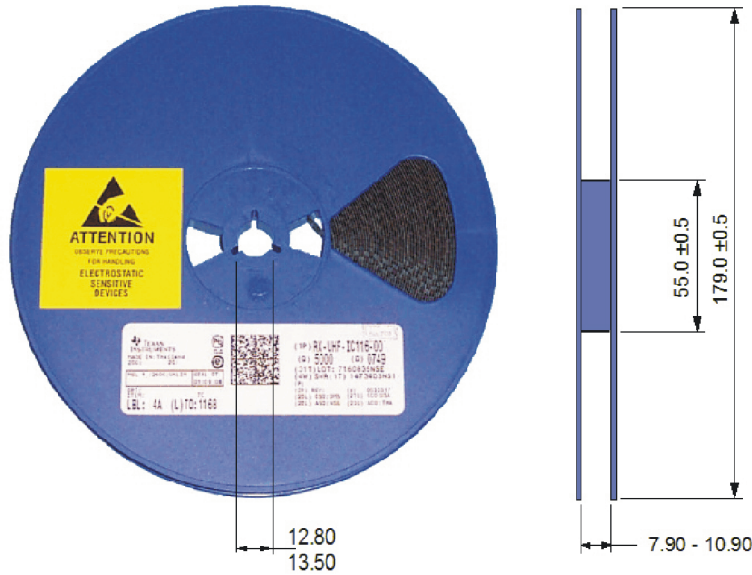


Figure 4. Reel Dimensions

The dimensions of the sprocket holes and IC pockets are shown in [Figure 5](#).

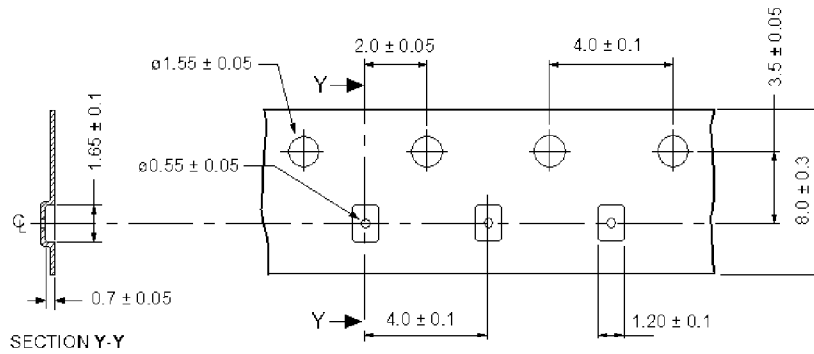


Figure 5. Tape Dimensions

The ICs are held in place by a continuous cover tape and are orientated in the pockets as shown in [Figure 6](#).

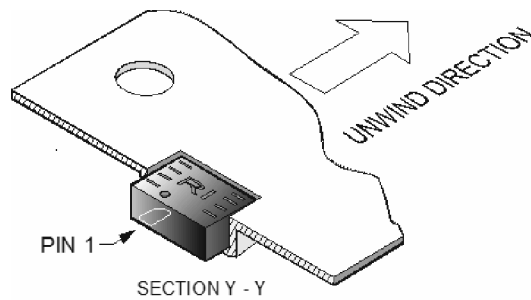


Figure 6. Die Orientation in Pocket

The packaged IC is delivered on reels of 5000. Each reel is packaged as shown in [Figure 7](#).

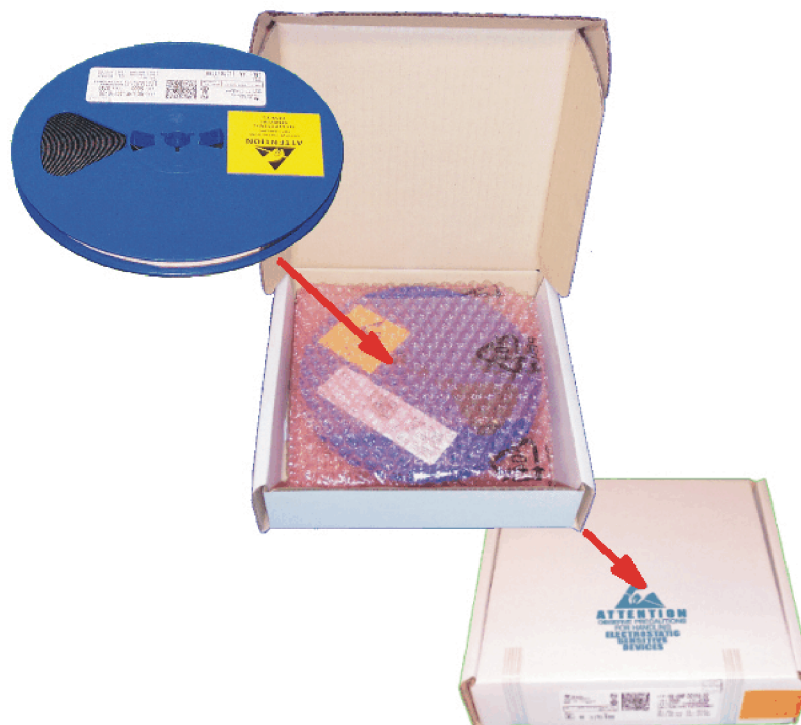


Figure 7. Single Reel Packaging

Terms and Abbreviations

A list of the terms and abbreviations used in the various TI manuals can be found in a separate document:

TI-RFID Product Manuals –Terms & Abbreviations ([SCBU014](#))

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| RI-UHF-IC116-00 | ACTIVE | SON | DRY | 6 | 5000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

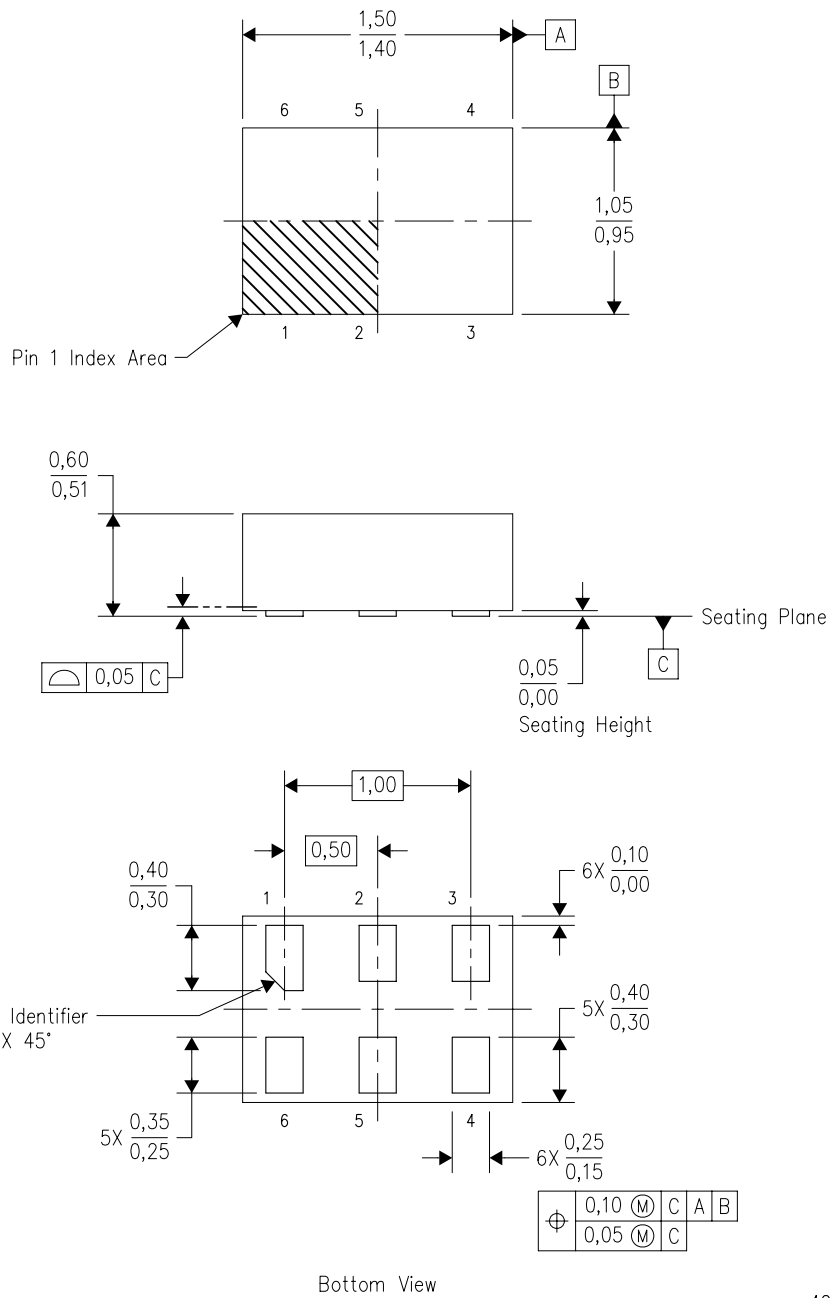
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

DRY (R-PDSO-N6)

PLASTIC SMALL OUTLINE



4207181/B 12/2007

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. SON (Small Outline No-Lead) package configuration.
 - D. This package complies to JEDEC MO-287 variation UFAD.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

| | |
|-----------------------------|--|
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DSP | dsp.ti.com |
| Clocks and Timers | www.ti.com/clocks |
| Interface | interface.ti.com |
| Logic | logic.ti.com |
| Power Mgmt | power.ti.com |
| Microcontrollers | microcontroller.ti.com |
| RFID | www.ti-rfid.com |
| RF/IF and ZigBee® Solutions | www.ti.com/lprf |

Applications

| | |
|--------------------|--|
| Audio | www.ti.com/audio |
| Automotive | www.ti.com/automotive |
| Broadband | www.ti.com/broadband |
| Digital Control | www.ti.com/digitalcontrol |
| Medical | www.ti.com/medical |
| Military | www.ti.com/military |
| Optical Networking | www.ti.com/opticalnetwork |
| Security | www.ti.com/security |
| Telephony | www.ti.com/telephony |
| Video & Imaging | www.ti.com/video |
| Wireless | www.ti.com/wireless |

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated