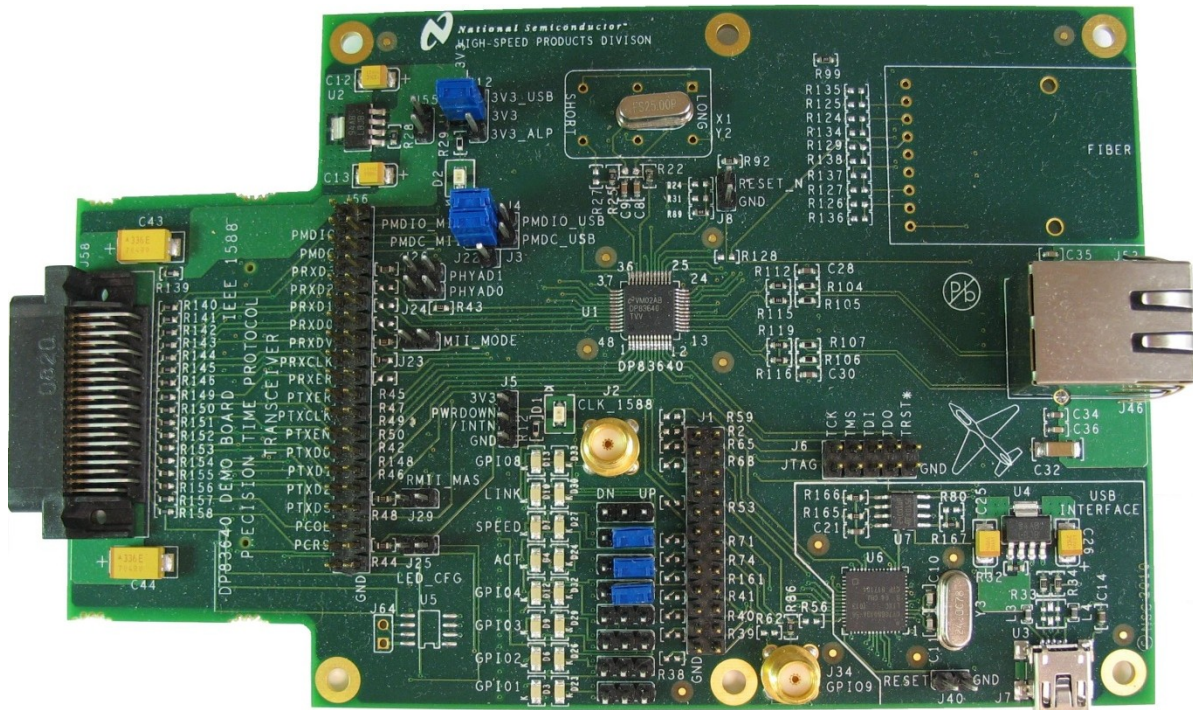


10/100 Mb/s Ethernet Products

DP83640 Precision PHYTER IEEE 1588 Precision Time Protocol Transceiver Demo Board User Guide



Interface Division
April 25, 2011
Document Revision C



Table of Contents

| | | |
|-------|--|----|
| 1 | General Description..... | 1 |
| 2 | Quick Start..... | 2 |
| 2.1 | Power Connection..... | 2 |
| 2.1.1 | MII Interface (Default) | 2 |
| 2.1.2 | USB Interface..... | 2 |
| 2.1.3 | External Supply | 2 |
| 2.2 | Address Setting..... | 3 |
| 2.3 | Device Register Access | 4 |
| 2.3.1 | Access MDIO Through MII | 4 |
| 2.3.2 | Access MDIO Through USB | 4 |
| 2.3.3 | Access MDIO Through Parallel Port..... | 4 |
| 2.4 | Clock Sources | 5 |
| 2.4.1 | Crystal (Default) | 5 |
| 2.4.2 | Oscillator | 5 |
| 2.5 | Straps..... | 6 |
| 2.6 | LEDs | 7 |
| 2.7 | SMA Connectors..... | 8 |
| 2.8 | Table of Jumpers | 9 |
| 2.9 | Modification for Fiber Operation | 10 |
| 2.10 | Register Access Software..... | 10 |
| 2.11 | Board Revision Differences | 11 |

1 General Description

The purpose of the DP83640 Demo Board is to provide National Semiconductor Corp.'s customers with a vehicle to quickly design and market systems containing the DP83640. Customers are encouraged to copy EVK components to expedite their design process.

The EVK contains:

- DP83640 Demo Board
- USB cable
- Cover letter
- DP83640 Demo licensing agreement

Links to the EVK design files and this User Guide can be found via the DP83640 product folder on the National Semiconductor website (www.national.com).

This document also highlights the differences between the different revisions of the DP83640 Demo Board.

2 Quick Start

The DP83640 Demo Board is fully assembled and factory tested. Follow the instructions below to set up the hardware platform for the measurement of interest.

2.1 Power Connection

The DP83640 Demo Board provides several options for supplying power to the board. Power can be supplied by way of the MII interface at 3.3 V or 5.0 V, USB interface, or directly from an external supply.

2.1.1 MII Interface (Default)

To allow the board to be supplied by the MII interface a 0 ohm resistor must be inserted at R139. Placing the jumper between J11 and pin 2 of J12 will connect the 3.3 V power plane to the MII 3.3V supply. In the case of an MII interface that supplies 5.0 V, an on board 3.3 V regulator is provided and no jumper should be placed on J55. For a 3.3 V MII supply, a jumper should be placed on J55 to bypass the regulator. In both cases, LED D2 will illuminate if a voltage is available at J11. The following image shows the default jumper configuration.

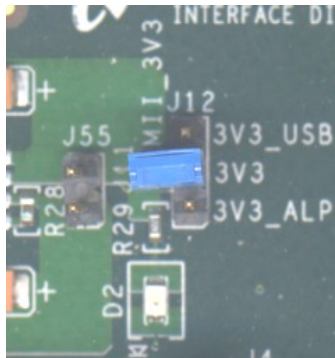


Figure 1. Default Power Supply Connection

2.1.2 USB Interface

To supply the device using the USB interface, a jumper should be placed between pins 2 and 3 of J12.

2.1.3 External Supply

The board can be supplied from an external supply by removing the jumper on J12 and connecting the external 3.3 V supply directly to pin 2 of J12. Ground can be connected to one of the GND pins on the board.

2.2 Address Setting

The PHY address can be set by placing jumpers in J24 and J26 as indicated in Table 1. Placing 2.2k ohm resistors in R47, R49, and R50 will pull PHYAD2, PHYAD3, and PHYAD4 high allowing for PHY addresses greater than 3. The default address is 1 (no jumpers or resistors placed).

Table 1. PHY Address Settings

| PHYAD1 (J26) | PHYAD0 (J24) | PHY Address |
|--------------|--------------|-------------|
| Open | Jumpered | 0 |
| Open | Open | 1 (Default) |
| Jumpered | Jumpered | 2 |
| Jumpered | Open | 3 |

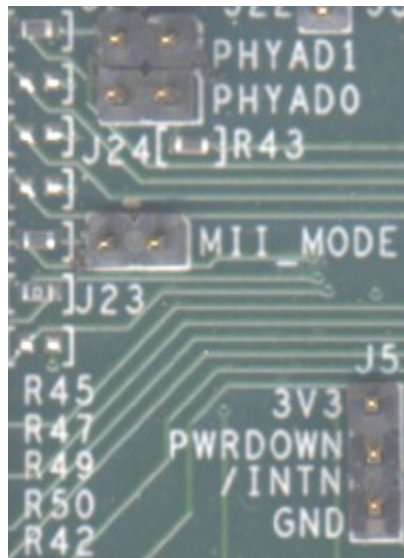


Figure 2. Default PHY Address Setting

2.3 Device Register Access

2.3.1 Access MDIO Through MII

To access the device registers through the MII interface jumpers should be placed between pins 1 and 2 of J3 and J4. Figure 3 shows the default jumper settings for the MDIO/MDC access via the MII interface.

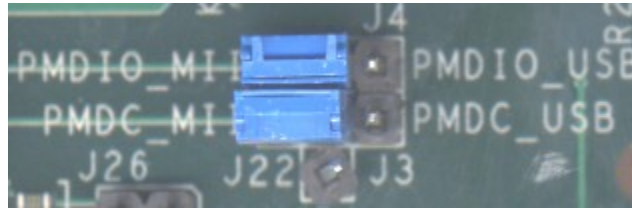


Figure 3. Default MDIO/MDC Connection

2.3.2 Access MDIO Through USB

To access the device registers through the USB interface jumpers should be placed between pins 2 and 3 of J3 and J4.

2.3.3 Access MDIO Through Parallel Port

To access the device registers through the parallel port of the PC, the jumpers on J3 and J4 must be removed. Figure 4 shows the connection between the parallel port and the device signals: MDIO (J4, 2), MDC (J3, 2), and GND (J22, 1).

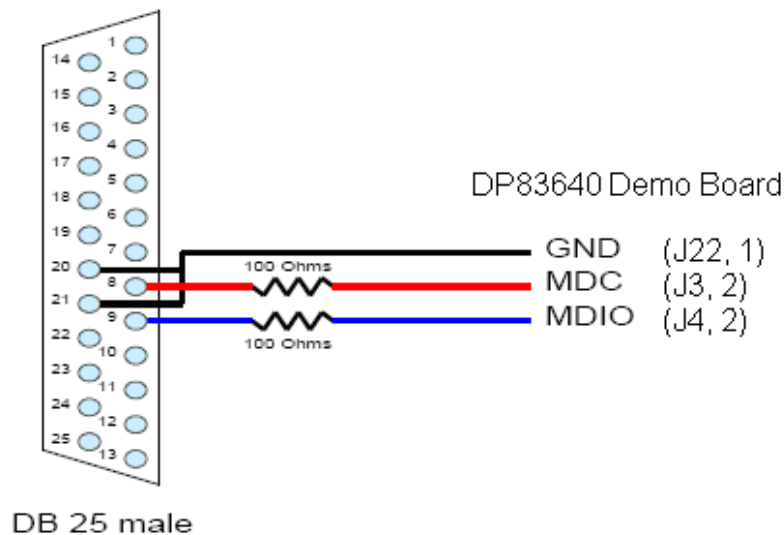


Figure 4. Direct Connect Cable with Line Resistors

2.4 Clock Sources

The board can be configured to operate with either a crystal or an external oscillator.

2.4.1 Crystal (Default)

The board comes with a 25 MHz crystal for use in the MII configuration. A surface mount device using the pads provided on the bottom side of the board can replace the through-hole part.

2.4.2 Oscillator

To use the board with a 25 MHz oscillator, remove the crystal (Y2) and resistors R22 and R25, populate the oscillator (X1) and R27 with a 0 ohm resistor. The board will accept oscillators in both full and half can package sizes.

For Reduced MII mode, two modes of operation are supported (RMII Master Mode and RMII Slave Mode). For RMII Master Mode, the DP83640 internally generates the 50 MHz RMII reference clock from the 25 MHz XTAL. For RMII Slave Mode operation, an external 50 MHz oscillator must provide the reference to the X1 input of the DP83640. Refer to the DP83640 datasheet for details on configuring the device for RMII Master and Slave Modes.

2.5 Straps

The DP83640 Demo Board provides a combination of jumpers and resistors to configure the strap options for the device. The following table summarizes the straps and the default settings.

Table 2. Strap Settings

| Jumper | Signal Name | IC Pin Name | Function | Default Setting |
|--------------------|-------------|-------------|-------------------------------|-----------------|
| J23 | MII_MODE | RX_DV | MII Mode Select | Open |
| J29 | RMII_MAS | TXD_3 | RMII Master Enable | Open |
| J25 | LED_CFG | CRS/CRS_DV | LED Configuration | Open |
| J32 | CLK_OUT_EN | GPIO1 | CLK_OUT Enable | Open |
| J35 | PCF_EN | GPIO2 | PHY Control Frame Enable | Open |
| J33 | ACT | LED_ACT | Sets Mode in Auto Negotiation | High |
| J36 | SPEED | LED_SPEED | Sets Mode in Auto Negotiation | High |
| J39 | LINK | LED_LINK | Auto-Negotiation Enable | High |
| R46 | FX_EN_Z | RX_ER | Fiber Mode Enable | Open |
| PHY Address | | | | |
| J24 | PHYAD0 | COL | PHY Address Bit 0 | Open |
| J26 | PHYAD1 | RXD_3 | PHY Address Bit 1 | Open |
| R47 | PHYAD2 | RXD_2 | PHY Address Bit 2 | Open |
| R49 | PHYAD3 | RXD_1 | PHY Address Bit 3 | Open |
| R50 | PHYAD4 | RXD_0 | PHY Address Bit 4 | Open |

Refer to the DP83640 datasheet for specific details related to each strap option. The position of the default strap settings are indicated below for each version of the board.

Table 3. Default Strap Locations and LED Differences per Board Revision

| | | |
|------------|------------|------------|
| | | |
| Revision 1 | Revision 2 | Revision 3 |

2.6 LEDs

Various LEDs are provided to assist the user in determining the state of operation of the board. Table 4 and Table 5 clarify the relationship between the LEDs and Jumpers.

Table 4. List of LEDs with Jumpers

| LED | | | Associated Jumper | Function |
|------------|------------|------------|-------------------|-----------------------------|
| Revision 1 | Revision 2 | Revision 3 | | |
| D1 | | | | Interrupt Indication |
| D2 | | | | MII Power Supply Indication |
| D13 | D13 / D21 | D13 / D33 | J42 | GPIO8 |
| D10 | D10 / D19 | D10 / D30 | J39 | Link (GPIO7) |
| D7 | D7 / D17 | D7 / D27 | J36 | Speed (GPIO6) |
| D4 | D4 / D15 | D4 / D24 | J33 | Activity (GPIO5) |
| D12 | D12 / D20 | D12 / D32 | J41 | GPIO4 |
| D9 | D9 / D18 | D9 / D29 | J38 | GPIO3 |
| D6 | D6 / D16 | D6 / D26 | J35 | GPIO2 |
| D3 | D3 / D14 | D3 / D23 | J32 | GPIO1 |

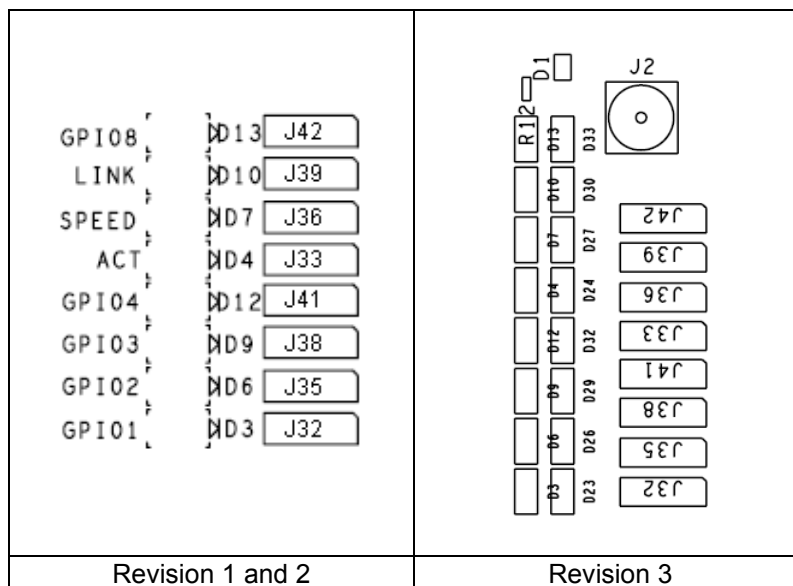


Table 5. LED/Jumper Order

LEDs can be used to indicate the state of GPIOs 1 through 8. When it is desired that the LED is "ON" when the GPIO is "LOW", the associated jumper should be set to the "UP" state. With this setting a GREEN LED will be illuminated. When it is desired that the LED is "ON" when the GPIO is "HIGH", the associated jumper should be set to the "DN" state. In this case, an AMBER LED has been incorporated in the circuit. **Care should be taken when selecting the LED polarity of the GPIO which also function as strap inputs.**

Refer to Table 3 for the “UP” and “DN” jumper position for each board revision. Note that on Revision 2 of the board, two separate LEDs have been used.

For additional information about the functionality of pins connected to the LEDs (with the exception of D2), refer to the DP83640 datasheet.

2.7 SMA Connectors

For convenience, two SMA connectors are provided (J2 and J34). J2 can be connected to the CLK_OUT pin by placing a 0 ohm resistor at R1. Similarly, J34 can be connected to GPIO9 by placing a 0 ohm resistor at R86. 50 ohm resistors can be placed at R2 and R62 to provide a terminating impedance for test equipment, if desired.

2.8 Table of Jumpers

Table 6. List of Jumpers

| Jumper | Name | Function | Default Setting |
|-------------------------|--------------|---|---------------------|
| Power | | | |
| J11/J12 | | Selects device 3.3 V source (Default MII_3V3) | |
| J55 | MII_5V/3V3 | Bypasses 3.3 V regulator for 3.3 V MII supply | Open |
| MDIO/MDC Access | | | |
| J3 | MDC_SEL | Allows selection between USB, MII or parallel port MDC source | Jumper to PMDC_MII |
| J4 | MDIO_SEL | Allows selection between USB, MII or parallel port MDIO source | Jumper to PMDIO_MII |
| J22 | GND | Ground for parallel port source | Open |
| Address | | | |
| J24 | PHYAD0 | PHY address strap pin | Open |
| J26 | PHYAD1 | PHY address strap pin | Open |
| Auto-Negotiation | | | |
| J33 | ACT | Force/Advertised operation mode in auto-negotiation | Pulled High |
| J36 | SPEED | Force/Advertised operation mode in auto-negotiation | Pulled High |
| J39 | LINK | Enable/Disable auto-negotiation | Pulled High |
| Reset | | | |
| J8 | RESET_N | Allows reset of DP83640 | Open |
| J40 | /RESET | Allows reset of USB interface device | Open |
| Function | | | |
| J5 | PWRDOWN/INTN | Allows for powerdown and interrupt modes | Open |
| J23 | MII_MODE | Allows for MII_MODE strap option. Placing the jumper forces the unit into RMII mode. | Open |
| J25 | LED_CFG | Allows for LED configuration strap option | Open |
| J29 | RMII_MAS | Allows for RMII_MAS strap option. Placing the jumper forces the unit into RMII Master mode when MII_MODE (J23) is strapped. | Open |
| J32 | GPIO1 | Allows GPIO1 LED connection and CLK_OUT_EN strap option | Open |
| J35 | GPIO2 | Allows GPIO2 LED connection and PCF_EN strap option | Open |
| J38 | GPIO3 | Allows GPIO3 LED connection | Open |
| J41 | GPIO4 | Allows GPIO4 LED connection | Open |
| J42 | GPIO8 | Allows GPIO8 LED connection | Open |
| J64 | | ALP EEPROM write control (Internal Use) | Open |

| Interface | | | |
|------------------|--------------------|---|--|
| J1 | GPIO Header | Allows access to GPIO pins | |
| J2 | CLK_1588 | Allows access to CLK_OUT signal | |
| J6 | JTAG | JTAG interface for DP83640 | |
| J7 | USB | USB Mini B connector | |
| J34 | GPIO9 | SMA Connector to GPIO9 | |
| J46 | Connector | RJ-45 connector | |
| J53 | FX Transceiver | HP FX transceiver (AFBR5803Z) - Not stuffed in copper configuration | |
| J56 | MII Header | Allow connection to MII pins | |
| J58 | MII Male Connector | Smartbits Interface | |
| J60 | ALP Connector | Internal Use – Not placed on Customer Demo Boards | |

2.9 Modification for Fiber Operation

Provisions have been made to allow for the evaluation board to be configured for fiber mode operation. To modify the board for fiber operation, the components on Sheet 7 of the schematic should be placed, with R113, R114, R117, R118, and R128 all 0 ohm resistors. A 2.2k ohm resistor should also be placed in R46 to strap the device into fiber mode. Resistors R112, R115, R116, and R119 should be removed.

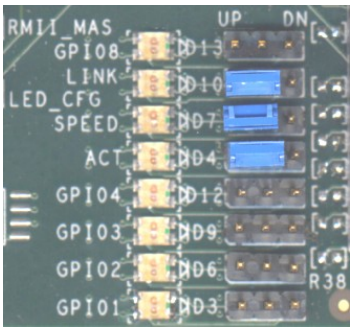
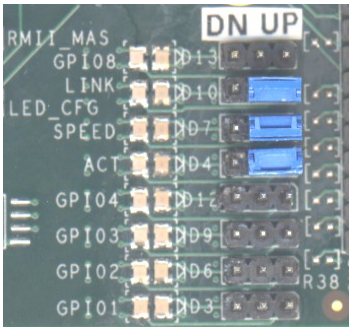
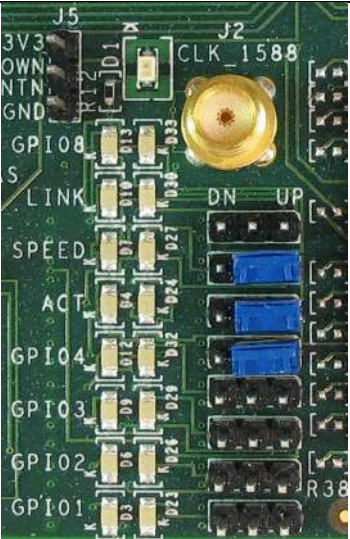

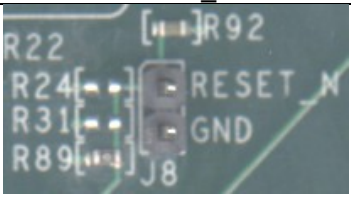
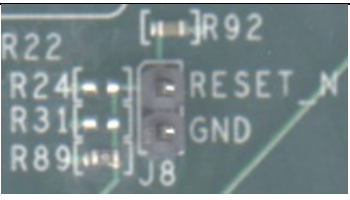
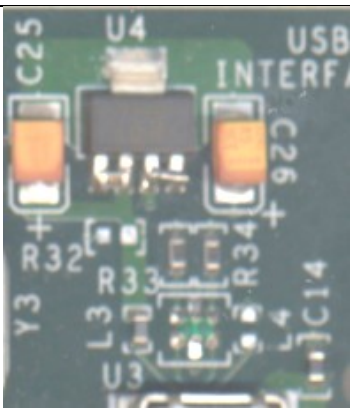
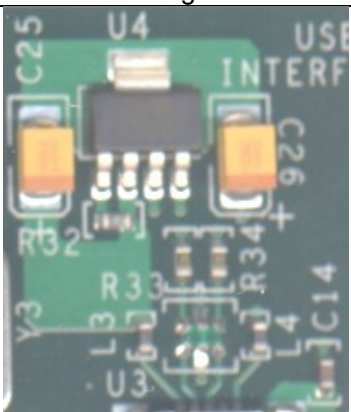
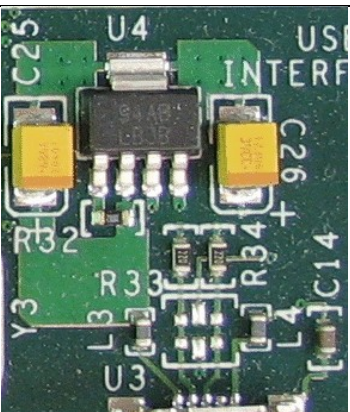
2.10 Register Access Software

Access to the device registers is available with the use of National's Analog LaunchPAD software. Refer to the DP83640 datasheet for detailed information on specific registers and to the National Semiconductor website (www.national.com) for the most recent version of the Analog LaunchPAD programming software.

2.11 Board Revision Differences

The following table highlights the differences between the board revisions.

Table 7. Board Revision Differences

| Revision 1 | Revision 2 | Revision 3 |
|---|---|---|
| Board Number: 551013211-001 Rev A | Board Number: 551013211-002 Rev A | Board Number: 551013211-003 Rev A |
| Strap Polarity and LEDs | | |
|  |  |  |
| RESET_N | | |
|  |  |  |
| USB Power Regulator Circuit | | |
|  |  |  |

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

| | |
|------------------------|--|
| Audio | www.ti.com/audio |
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DLP® Products | www.dlp.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 |
| OMAP Mobile Processors | www.ti.com/omap |
| Wireless Connectivity | www.ti.com/wirelessconnectivity |

Applications

| | |
|-------------------------------|--|
| Automotive and Transportation | www.ti.com/automotive |
| Communications and Telecom | www.ti.com/communications |
| Computers and Peripherals | www.ti.com/computers |
| Consumer Electronics | www.ti.com/consumer-apps |
| Energy and Lighting | www.ti.com/energy |
| Industrial | www.ti.com/industrial |
| Medical | www.ti.com/medical |
| Security | www.ti.com/security |
| Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Video and Imaging | www.ti.com/video |

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2012, Texas Instruments Incorporated