Low-Additive Jitter, Four-LVDS-Outputs Clock Buffer With Divider EVM

This user's guide describes how to use the CDCLVD1213 evaluation module (EVM) and provides users with guidelines to build their own systems. The EVM schematics and bill of materials are included.

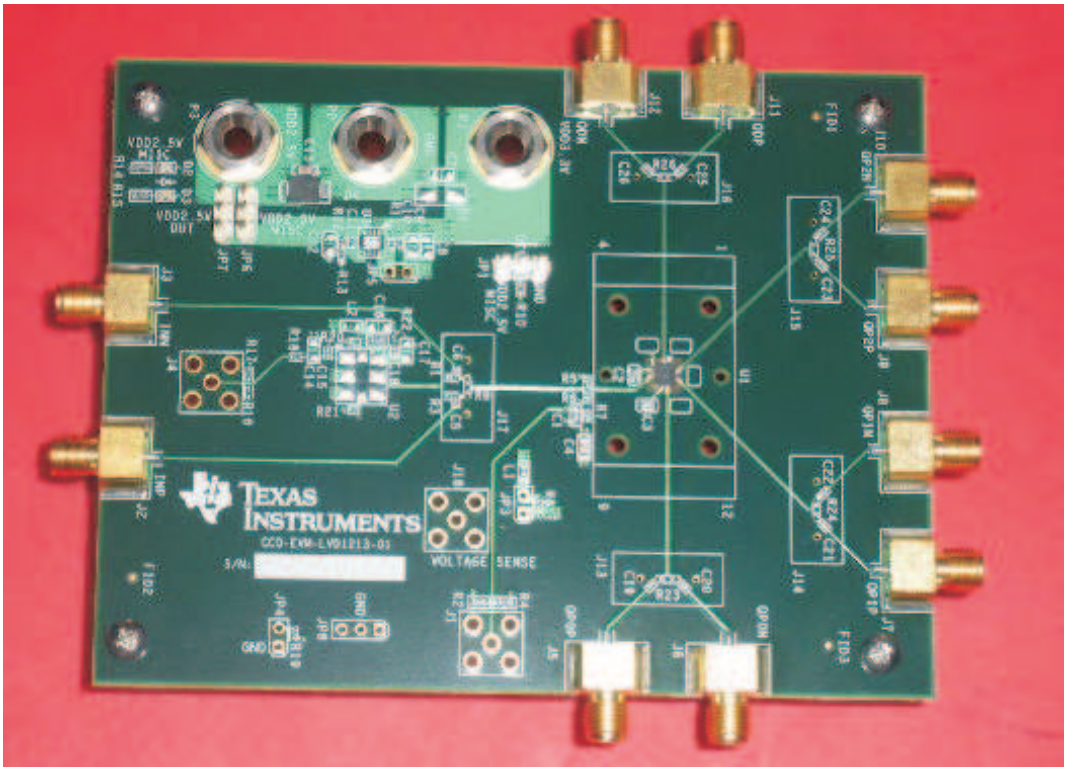


Figure 1. CDCLVD1213 Evaluation Board

1 Features

- Easy-to-use evaluation board to fan out low-phase noise clocks
- Easy device setup
- Fast configuration
- Control pin configurable through jumpers
- Board powered at 2.5 V
- Differential input clocks
- Device and EVM support four LVDS outputs

1.1 General Description

The CDCLVD1213 is a high-performance, low-additive jitter clock buffer with divider. The device has one differential input with internal 140-Ω differential input termination.

Copyright © 2010, Texas Instruments Incorporated

The evaluation module (EVM) is designed to demonstrate the electrical performance of the CDCLVD1213. This fully assembled and factory-tested evaluation board allows complete validation of device functionalities. For optimum performance, the board is equipped with SMA connectors and well-controlled 50-Ω impedance microstrip transmission lines.

1.2 Signal Path and Control Circuitry

The CDCLVD1213 supports differential input up to 800 MHz. Each device provides up to three LVDS outputs operating at the input frequency and one output with divide by /1, /2, or /4 frequency.

For more information, see the CDCLVD1213 product data sheet (SCAS897) for details.

2 Getting Started

The EVM has self-explanatory labeling and offers almost the same naming convention as used in the data sheet. All words appearing in ***bold italic*** print in this document are the actual labeling on the EVM.

3 Power Supply Connection

Connect the power supply source to the banana plug labeled ***VDD2.5V*** (***P3***), and connect the ground of the power supply source to the ***GND*** (***P2***). Place the jumpers between 2 and 3 for ***JP6*** and ***JP7***. Ensure that LED D2 and D3 are on.

Decoupling capacitors and ferrite beads isolate the EVM power from the device's power pins. Supply voltage of a 2.375-V to 2.625-V range can be used in this EVM.

The EVM has an option of providing 3.3 V (***P1***) and an LDO to convert 3.3 V to 2.5 V. The LDO (***U3***) is unpopulated on the EVM.

4 Input Clock Connection

The inputs can be applied through the SMAs, ***J2*** and ***J3***. These inputs are ac coupled to the device inputs and the common-mode voltage for these inputs after the ac-coupling capacitors are provided externally by ***R7*** (0 Ω) and ***R2*** and ***R4***.

The device input has an internal 140-Ω resistor. So, for 50-Ω characteristics impedance lines, an external 350 Ω is populated at ***R9***.

5 Output Clock

The CDCLVD1213 generates up to four LVDS outputs. Four outputs are available on the EVM through the following SMAs: ***J5*** and ***J6*** for QP0; ***J7*** and ***J8*** for QP1; ***J9*** and ***J10*** for QP2; and ***J11*** and ***J12*** for QD. The LVDS outputs are ac coupled to the respective SMAs. Each output pair has an option of 100-Ω termination on the board (***R23 - R26*** – unpopulated).

Table 1. Divider Selection Table for QD Output

DIV (JP1)	Divider Ratio
0 (GND)	/1
OPEN	/2
1 (VDD2.5VMISC)	/4

6 Onboard Oscillator/VCO

This EVM has an option of oscillator or VCO whose output is directly connected to the inputs of the CDCLVD12313 through ***R1*** and ***R3***. The oscillator (U2) and the associated components are unpopulated on the EVM.

7 The EVM Board Schematic

Figure 2 through Figure 4 show the printed-circuit board (PCB) schematics.

Copyright © 2010, Texas Instruments Incorporated

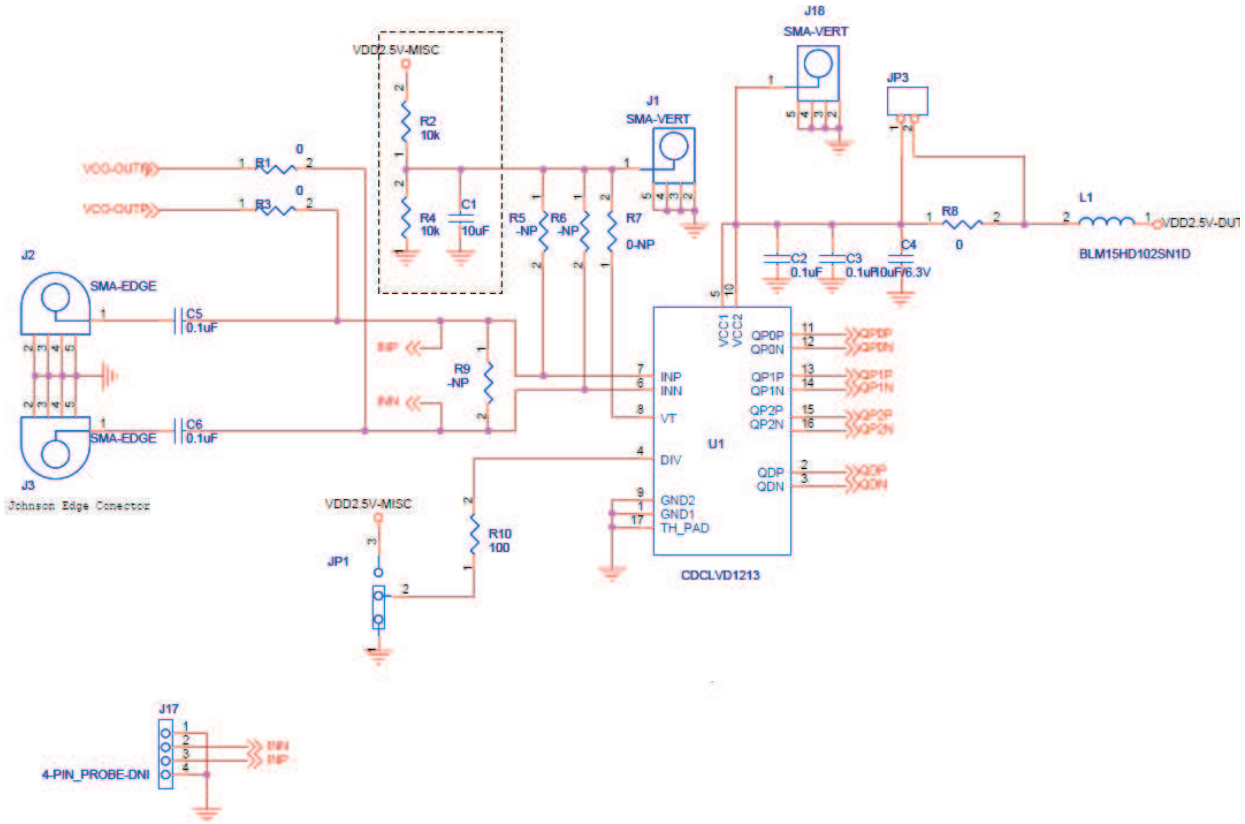


Figure 2. CDCLVD1213EVM – Schematic 1

Copyright © 2010, Texas Instruments Incorporated

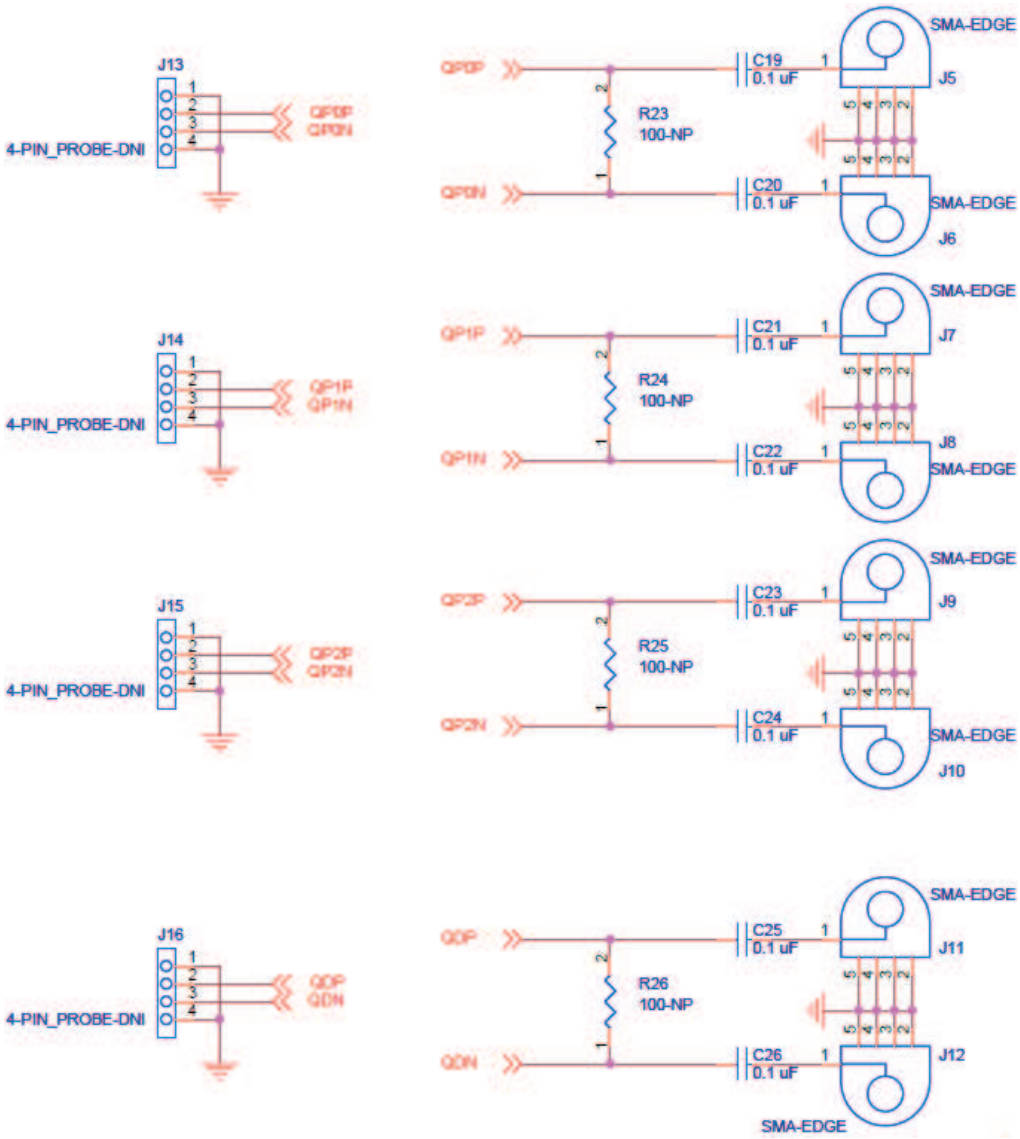


Figure 3. CDCLVD1213EVM – Schematic 2

Copyright © 2010, Texas Instruments Incorporated

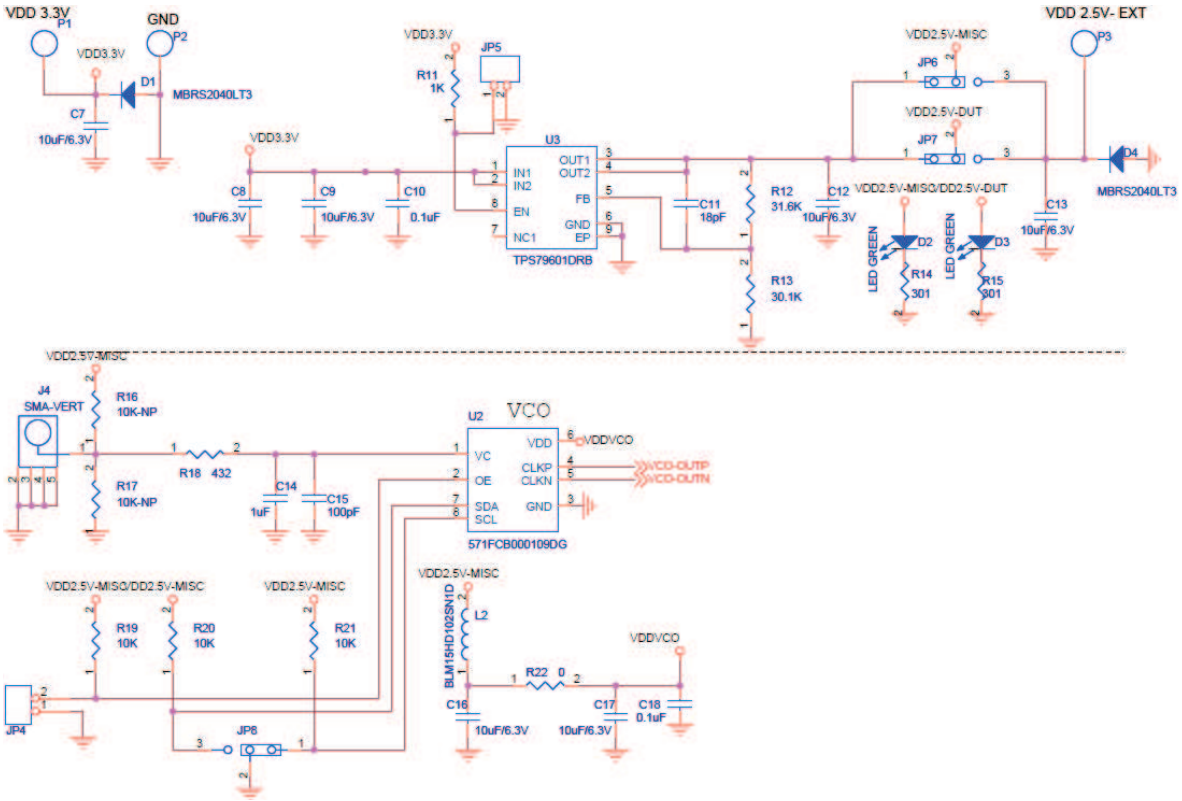


Figure 4. CDCLVD1213EVM – Schematic 3

Copyright © 2010, Texas Instruments Incorporated

8 Bill of Materials

Qty	Value	Ref Des	Footprint	Part Category	Manufacturer	Manufacturer Part #
12	0.1µF	C2, C3, C18–C26	0402	Capacitors	Venkel	C0402X7R160-104KNE
1	100pF	C15	0402	Capacitors	Venkel	C0402COG500-101JNE
1	18pF	C11	0402	Capacitors	Murata Electronics North America	GRM1555C1H180JZ01D
1	10µF	C1	0603	Capacitors	Panasonic	ECJ-1VB0J106M
1	1.0µF	C14	0805	Capacitors	Murata Electronics North America	GRM21BR71H105KA12L
8	10µF	C4, C13	0805	Capacitors	Murata Electronics North America	GRM21BR71A106KE51L
3	1 × 2	JP6, JP7	0.1"	Connectors	Samtec	HTSW-150-07-G-S
4	1 × 3	JP1	0.1"	Connectors	Samtec	HTSW-150-07-G-S
3	Banana Plug - Metal	P2, P3	4mm	Connectors	Emerson Network Power Connectivity Solutions	108-0740-001
3	142-0701-231		RF SMA	Connectors	Emerson Network Power Connectivity Solutions	142-0701-231
10	142-0721-881	J2, J3, J5–J12	RF SMA Edge mount	Connectors	Emerson Network Power Connectivity Solutions	142-0721-881
2	MBRS240LT3G	D4	SMB	Semiconductor Products	On Semiconductor	MBRS240LT3G
2	1000	L1	0603	Filters	Murata Electronics North America	BLM18HD102SN1D
1	TPS79601DRBR	U3	8-SON	Integrated Circuits	Texas Instruments	TPS79601DRBR
2	LED - Green	D2, D3	0603	Optoelectronics	Panasonic - Ssg	LNJ312G8LRA
3	0.0 (Zero Ohm)	R8	0402	Resistors	Panasonic - Ecg	ERJ-2GE0R00X
1	1.00K	R11	0402	Resistors	Venkel	CR0402-16W-1001FT
3	10.0K	R19, R20, R21	0402	Resistors	Rohm	MCR01MZPF1002
1	100	R10	0402	Resistors	Venkel	CR0402-16W-1000FT
1	30.1K	R13	0402	Resistors	Venkel	CR0402-16W-3012FT
1	30.9K	R12	0402	Resistors	Panasonic – Ecg	ERJ-2RKF3092X
1	453	R18	0402	Resistors	Panasonic – Ecg	ERJ-2RKF4530X
1	0.0 (Zero Ohm)	R22	0603	Resistors	Panasonic – Ecg	ERJ-3GEY0R00V
2	10.0K	R2, R4	0603	Resistors	Venkel	CR0603-10W-1002FT
2	301	R14, R15	0603	Resistors	Yageo America	RC0603FR-07301RL
1	CDCLVD1213	U1	16-QFN	Integrated Circuits	Texas Instruments	CDCLVD1213
1	571FCB000109DG	U2	8-SMT	Oscillator	Silicon Labs	571FCB000109DG
10	DNI	R16, R17, R5, R6, R9, R23–26, R7	0402	Resistors		
2	DNI	C5, C6	0402	Capacitors		
1	4-PIN_PROBE-DNI	J13–J17	4_17mil_100	Probe		

Copyright © 2010, Texas Instruments Incorporated

Evaluation Board/Kit Important Notice

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation board/kit is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by TI to be a finished end-product fit for general consumer use. Persons handling the product(s) must have electronics training and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards. This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and therefore may not meet the technical requirements of these directives or other related directives.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive.**

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.**

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please contact the TI application engineer or visit www.ti.com/esh.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

FCC Warning

This evaluation board/kit is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by TI to be a finished end-product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of -0.2 V to Vcc +0.2 V and the output voltage range of -0.2 V to Vcc +0.2 V .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 120° C. The EVM is designed to operate properly with certain components above 85° C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2010, Texas Instruments Incorporated

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		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Communications and Telecom	www.ti.com/communications
DSP	dsp.ti.com	Computers and Peripherals	www.ti.com/computers
Clocks and Timers	www.ti.com/clocks	Consumer Electronics	www.ti.com/consumer-apps
Interface	interface.ti.com	Energy	www.ti.com/energy
Logic	logic.ti.com	Industrial	www.ti.com/industrial
Power Mgmt	power.ti.com	Medical	www.ti.com/medical
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Space, Avionics & Defense	www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video and Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless-apps

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2010, Texas Instruments Incorporated