

Low-Additive Jitter, Four LVDS Outputs Clock Buffer Evaluation Board

This user's guide describes how to use the CDCLVD1204/CDCLVD2102 evaluation module (EVM) and provides users with guidelines to build their own systems. The EVM schematics and bill of materials are included.

1 Features

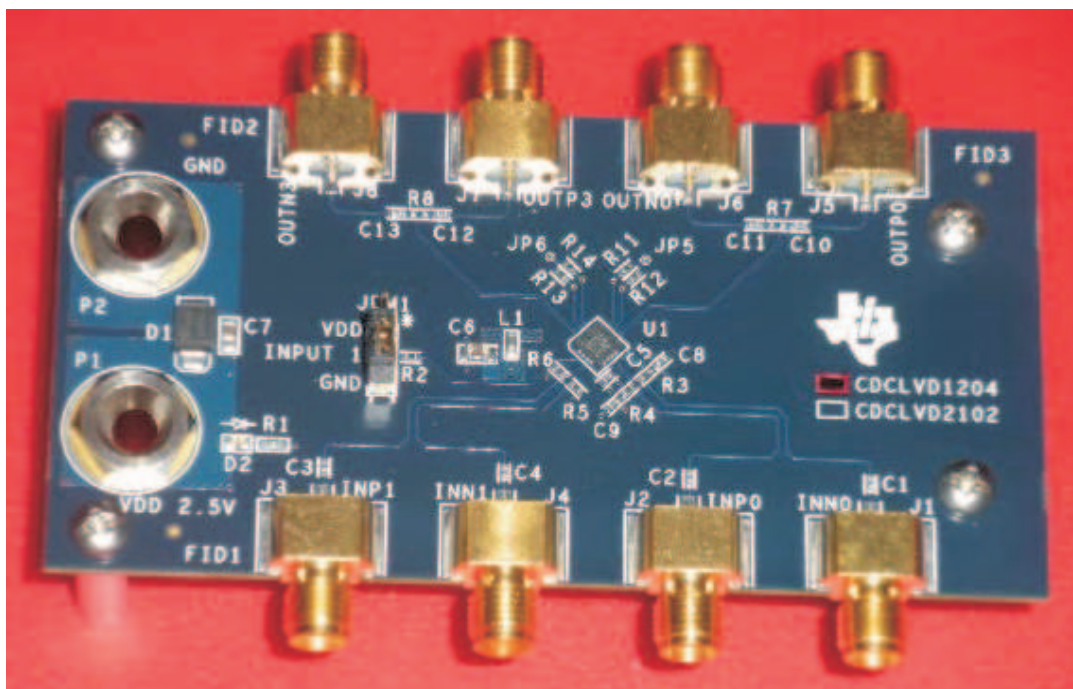


Figure 1. CDCLVD1204/CDCLVD2102 Evaluation Board

- Easy-to-use evaluation board to fan out low-phase noise clocks
- Easy device setup
- Fast configuration
- Control pins configurable through jumpers
- Board powered at 2.5 V
- Single-ended or differential input clocks
- Device supports four LVDS outputs, EVM supports two LVDS outputs

2 General Description

The CDCLVD1204/CDCLVD2102 are high-performance, low-additive jitter clock buffers. They have two universal input buffers that support single-ended or differential clock inputs and are selectable through a control pin (for CDCLVD1204 only). The devices also feature on-chip bias generators that can provide the LVDS common-mode voltage to the device inputs.

The evaluation module (EVM) is designed to demonstrate the electrical performance of the CDCLVD1204 or CDCLVD2102. 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.

3 Signal Path and Control Circuitry

The CDCLVD1204/CDCLVD2102 support single-ended inputs up to 200 MHz and differential inputs up to 800 MHz. Each device provides up to four LVDS outputs operating at the input frequency or frequencies.

For more information, see the CDCLVD1204 ([SCAS898](#)) or CDCLVD2102 ([SCAS904](#)) product data sheet for details.

4 Getting Started

The EVM has self-explanatory labeling and offers almost the same naming convention as used in the data sheets. The labeling words appearing in ***bold italic*** type in this document duplicate the same spelling as the actual labeling on the EVM board. The EVM can be used with single-ended or differential inputs.

5 Device Selection

The same EVM is used for both CDCLVD1204 (2:4 single buffer) and CDCLVD2102 (1:2 dual buffer). The selected box is highlighted in silkscreen for the particular device.

6 Power Supply Connection

Connect the power supply source to the banana plug labeled ***VDD (P1)*** and connect the ground of the power supply source to the ***GND (P2)***. The decoupling capacitors and ferrite bead isolate the EVM power from the device's power pins.

Supply voltage of 2.375 V to 2.625 V can be used for this EVM.

7 Input Clock Selection

The CDCLVD1204/CDCLVD2102EVM offers options of receiving either a differential or a single-ended clock as clock input. The default option is for the differential signal at both device inputs. The inputs can be applied through the SMAs, ***J1, J2*** and/or ***J3, J4***. These inputs are ac coupled to the device inputs and the common-mode voltage for these inputs after the ac-coupling capacitors are provided by 50 Ω (***R3, R4*** and ***R5, R6***) to the device on-chip bias generator (V_{AC_REF}) pins.

CDCLVD1204: Either of the two input clocks can be selected using the jumper ***JPM1***. When ***Input 1 of JPM1*** is connected to ***GND***, IN0 is selected. When Input 1 is connected to ***VDD***, IN1 is selected.

7.1 Configuring Single-Ended Input

For the single-ended clock applied to IN0, remove the capacitors ***C1*** and ***C2***, and replace them with 0-Ω resistors of the same footprint and also remove ***the biasing resistors R3 and R4***. The single-ended signal must be applied to ***INP0 (J2)***, and the DC bias voltage must be applied to ***INN0 (J1)***.

For the single-ended clock applied to IN1, remove the capacitors ***C3*** and ***C4***, replace them with 0-Ω resistors of the same footprint, and also remove ***the biasing resistors R5 and R6***. The single-ended signal must be applied to ***INP1 (J3)***, and the DC bias voltage must be applied to ***INN1 (J4)***.

8 Output Clock

The CDCLVD1204 generates up to four LVDS outputs, and two outputs are available on the EVM (OUT0 and OUT3) through the following SMAs: ***J5*** and ***J6*** for OUT0; ***J7*** and ***J8*** for OUT3. The LVDS outputs are ac coupled to the respective SMAs. Each output pair has an option of 100-Ω termination on the board (***R7*** and ***R8*** – not populated).

Test points are available for OUT1 and OUT2 outputs.

CDCLVD2102: Using the control pin EN (labeled as ***Input 1***), outputs can be disabled or enabled

Table 1. Output Control Table for CDCLVD2102

EN (Input 1)	Clock Outputs
0 (GND)	All outputs disabled (static "0")
OPEN	All outputs enabled
1 (VDD)	OUT0, OUT1 enabled and OUT2, OUT3 disabled (static "0")

9 The EVM Board Schematic

Figure 2 and Figure 3 show the printed circuit board (PCB) schematics .

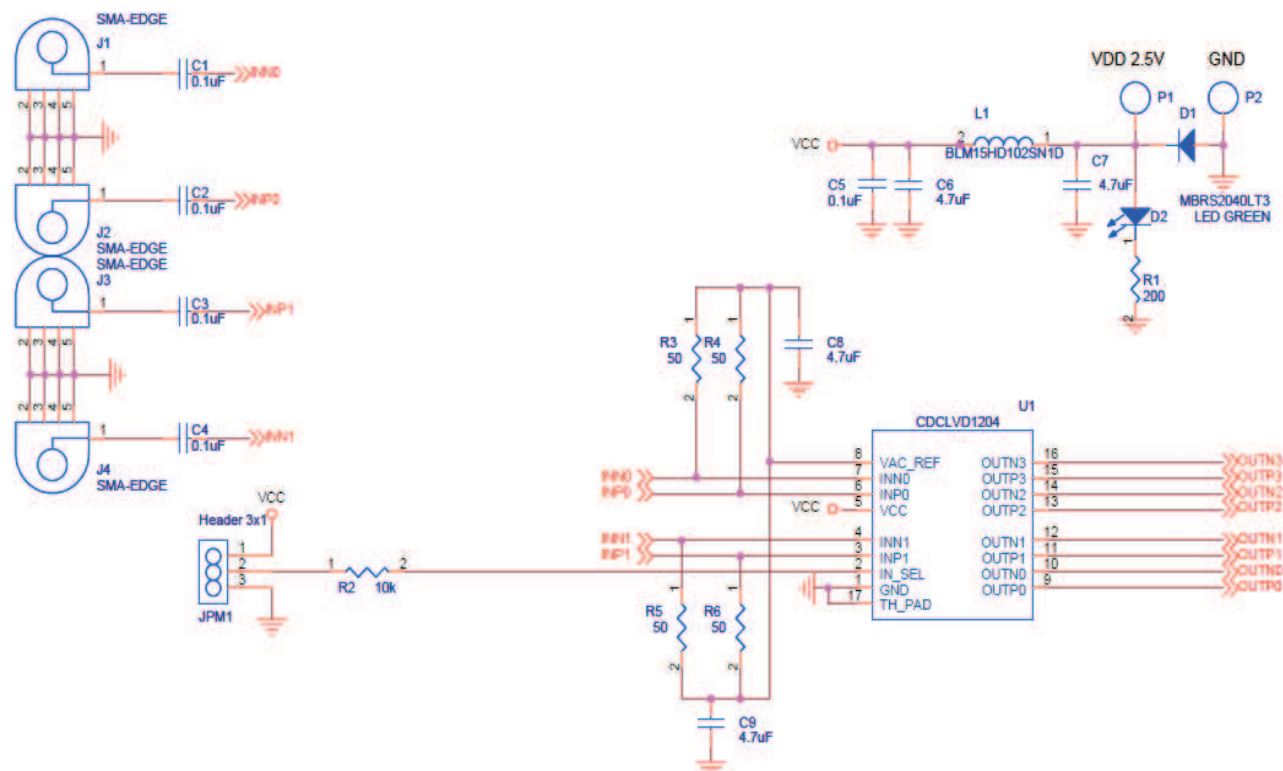


Figure 2. CDCLVD1204/CDCLVD2102EVM Schematic, Sheet 1 of 2

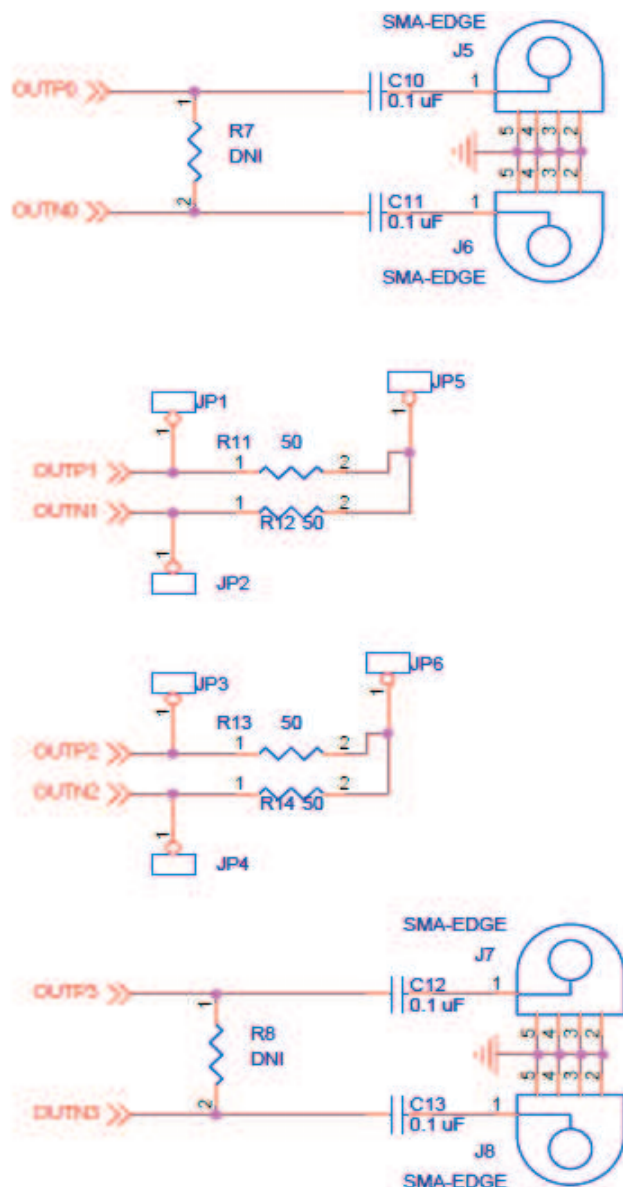


Figure 3. CDCLVD1204/CDCLVD2102EVM Schematic, Sheet 2 of 2

10 Bill of Materials

Table 2. Bill of Materials

Qty	Value	Ref Des	Footprint	Part Category	Manufacturer	Manufacturer Part No
5	0.1 μ F	C1–C5	0402	Capacitors	Venkel	C0402X7R160-104KNE
4	0.1 μ F	C10–C13	0402	Capacitors	Venkel	C0402X7R160-104KNE
2	4.7 μ F	C8, C9	0402	Capacitors	Taiyo Yuden	AMK105BJ475MV-F
2	4.7 μ F	C6, C7	0805	Capacitors	Murata Electronics North America	GRM21BR71C475KA73L
1	10.0K	R2	0402	Resistors	Rohm	MCR01MZPF1002
8	49.9	R3–,R6, R11–,R14	0402	Resistors	Venkel	CR0402-16W-49R9FT
1	200	R1	0603	Resistors	Venkel	CR0603-16W-2000FT
1	1000	L1	0603	Filters	Murata Electronics North America	BLM18HE102SN1D
1	MBRS240LT3G	D1	SMB	Discrete Semiconductor Products	ON Semiconductor	MBRS240LT3G
1	LED - Green	D2	0603	Optoelectronics	Lite-On	LTST-C190GKT
1	CDCLVD2102/ CDCLVD1204	U1	16-HQFN	Integrated Circuits	Texas Instruments	CDCLVD2102/ CDCLVD1204
2	Banana Plug - Metal	P1, P2	4mm	Connectors	Emerson Network Power Connectivity Solutions	108-0740-001
1	1 x 3	JPM1	0.1"	Connectors	Samtec	HTSW-150-07-G-S
8	142-0721-881	J1–J8	RF SMA Edge mount	Connectors	Emerson Network Power Connectivity Solutions	142-0721-881
4	0.75"	Standoffs	Round Threaded	Hardware	Keystone Electronics	2029
4	4-40/0.25"- Screws	Screws	Philips	Hardware	Building Fasteners	PMSSS 440 0025 PH
6	DNI	JP1–JP6				DNI
2	DNI	R7, R8				DNI

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 $V_{CC} + 0.2$ V and the output voltage range of -0.2 V to $V_{CC} + 0.2$ 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