



DS150DF1610 12.5 to 15 Gbps 16-Channel Retimer

1 Features

- Pin-Compatible Family
 - DS150DF1610: 12.5 to 15G
 - DS125DF1610: 9.8 to 12.5G
 - DS110DF1610: 8.5 to 11.3G
- Fully Adaptive CTLE
- Self tuning DFE, with Optional Continuous Adaption
- Configurable VGA
- Adjustable Transmit V_{OD}
- Adjustable 3-tap Transmit FIR Filter
- On-chip AC Coupling on Receive Inputs
- Locks to Half/Quarter/Eighth Data Rates for Legacy Support
- On-chip Eye Monitor(EOM), PRBS Checker, Pattern Generator
- Supports JTAG Boundary Scan
- Programmable Output Polarity Inversion
- Input Signal Detection, CDR Lock Detection
- Single 2.5 V $\pm 5\%$ Power Supply
- SMBus Based Register Configuration
- Optional EEPROM Configuration
- 15 mm x 15 mm, 196-pin FCBGA Package
- Operating Temp Range : -10°C to $+85^{\circ}\text{C}$

2 Applications

- Backplane/Midplane reach extension

3 Description

The DS150DF1610 is a sixteen-channel multi-rate retimer with integrated signal conditioning features. The device includes a fully adaptive Continuous Time Linear Equalizer (CTLE), Decision Feedback Equalizer (DFE), clock and data recovery (CDR), and a transmit FIR filter to enhance the reach and robustness over long, lossy, crosstalk impaired high speed serial links to achieve $\text{BER} < 1 \times 10^{-15}$.

Each channel of the DS150DF1610 independently locks to serial data rates between 12.5 and 15 Gbps plus the divide by 2, 4 and 8 sub-multiples. A simple external oscillator ($\pm 100\text{ppm}$) that is synchronous or asynchronous with the incoming data stream is used as a calibration clock.

A programmable transmit Finite Impulse Response (FIR) filter offers control of the pre-cursor, main tap and post-cursor for transmit equalization. The fully adaptive receive equalization (CTLE and DFE) enables longer distance transmission in lossy copper interconnects and backplanes with multiple connectors.

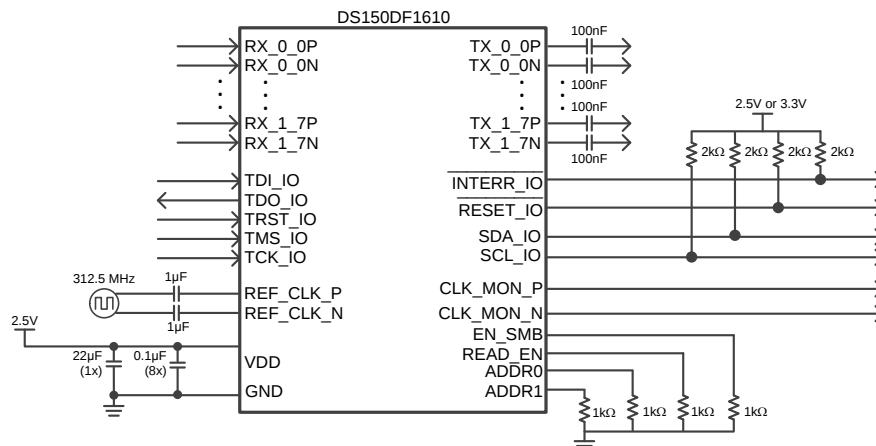
A non-disruptive mission mode eye-monitor feature allows link monitoring internal to the receiver. The built-in PRBS generator and checker compliment the internal diagnostic features to complete standalone BERT measurements. Built-in JTAG enables manufacturing tests.

To download the full datasheet, please send a request to: highspeed_datasheets@list.ti.com

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE NOM
DS150DF1610	FCBGA (196)	15.00 mm x 15.00 mm

(1) For all available packages, see the orderable addendum at the end of the datasheet



4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	COMMENTS
November 2014	*	Initial Release

5 Device and Documentation Support

5.1 Trademarks

All trademarks are the property of their respective owners.

5.2 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

5.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designed devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
DS150DF1610FB/NOPB	Active	Production	FCBGA (ABB) 196	126 JEDEC TRAY (5+1)	Yes	SNAGCU	Level-4-245C-72 HR	-10 to 85	DS150 DF1610
DS150DF1610FBE/NOPB	Active	Production	FCBGA (ABB) 196	126 JEDEC TRAY (5+1)	Yes	SNAGCU	Level-4-245C-72 HR	-10 to 85	DS150 DF1610

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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