DS280BR810 Low Power 28 Gbps 8 Channel Linear Repeater

1 Features

- Octal-Channel Multi-Protocol Linear Equalizer Supporting up to 28 Gbps Interfaces
- Low Power Consumption: 93 mW / Channel (typical)
- No Heat Sink Required
- Linear Equalization for Seamless Support of CR4/KR4 Link Training
- Extends Channel Reach by 15dB+ Beyond Normal ASIC-to-ASIC Capability
- Ultra-Low Latency: 100 ps (typical)
- Low Additive Random Jitter
- Small 8 mm x 13 mm BGA Package with Integrated RX and TX AC Coupling Capacitors for Easy Flow-Through Routing
- Unique Pinout Allows Routing High-Speed Signals Underneath the Package
- Pin-Compatible Retimer Available
- Single 2.5 V ±5% Power Supply
- -40°C to +85°C Operating Temperature Range

2 Applications

- Backplane/Mid-Plane Reach Extension
- Front-Port Eye Opener for Optical and Passive Copper (100G-SR4/LR4/CR4)
- QSFP28, SFP28, CFP2, CFP4, CDFP

3 Description

The DS280BR810 is an extremely low-power, high-performance eight-channel linear equalizer supporting multi-rate, multi-protocol interfaces up to 28 Gbps. It is used to extend the reach and improve the robustness of high-speed serial links for front-port, backplane, and chip-to-chip applications.

The linear nature of the DS280BR810's equalization preserves the transmit signal characteristics, thereby allowing the host and link partner ASICs to freely negotiate transmit equalizer coefficients (100G-CR4/KR4). This transparency to the link training protocol facilitates system-level interoperability with minimal effect on the latency. Each channel operates independently, which allows the DS280BR810 to support individual lane Forward Error Correction (FEC) pass-through.

The DS280BR810's small package dimensions, optimized high-speed signal escape, and the pin-compatible retimer portfolio make the DS280BR810 ideal for high-density backplane applications. Simplified equalization control, low power consumption, and ultra-low additive jitter make it suitable for front-port interfaces such as 100G-SR4/LR4/CR4. The small 8 mm x 13 mm footprint easily fits behind numerous standard front-port connectors like QSFP28, SFP28, CFP2/CFP4, and CDFP without the need for a heat sink.

Integrated AC coupling capacitors (RX and TX) eliminate the need for external capacitors on the PCB. The DS280BR810 has a single power supply and minimal need for external components. These features reduce PCB routing complexity and bill of materials (BOM) cost.

A pin-compatible retimer device is available for longer reach applications.

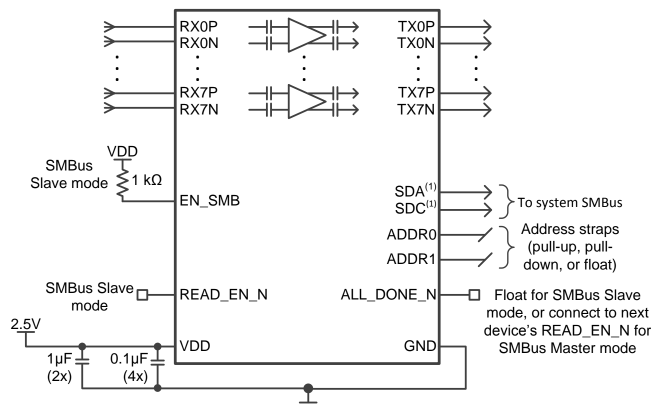
The DS280BR810 can be configured either via the SMBus or through an external EEPROM. Up to 16 devices can share a single EEPROM.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
DS280BR810	nFBGA(135)	8.0 mm x 13.0 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified Schematic



An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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4 Revision History

Changes from Original (September 2015) to Revision A	Page
• Deleted <	1

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5 Device and Documentation Support

5.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

5.2 Trademarks

E2E is a trademark of Texas Instruments.

5.3 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

5.4 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 designated 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.

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DS280BR810ZBFR	ACTIVE	NFBGA	ZBF	135	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	DS280BR8	Samples
DS280BR810ZBFT	ACTIVE	NFBGA	ZBF	135	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	DS280BR8	Samples

(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.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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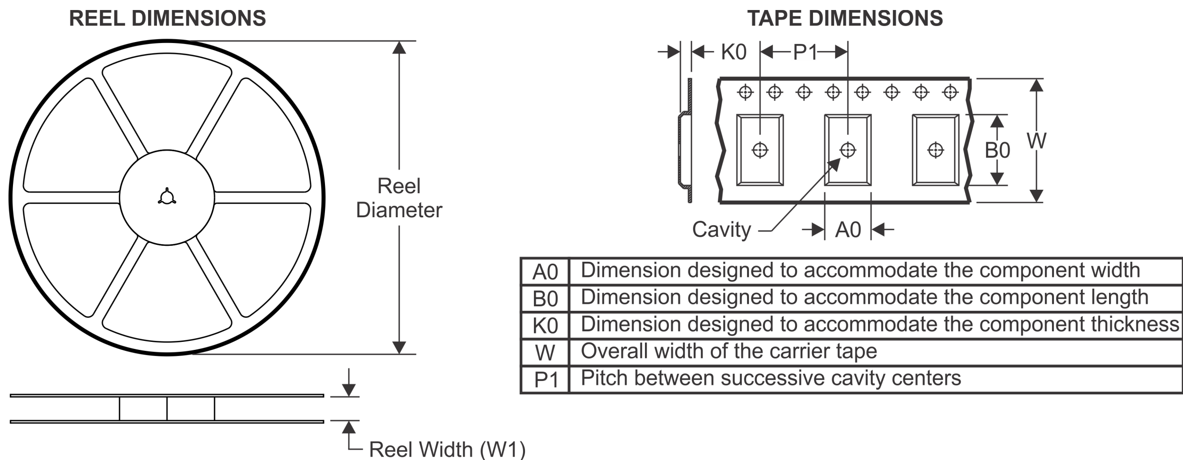
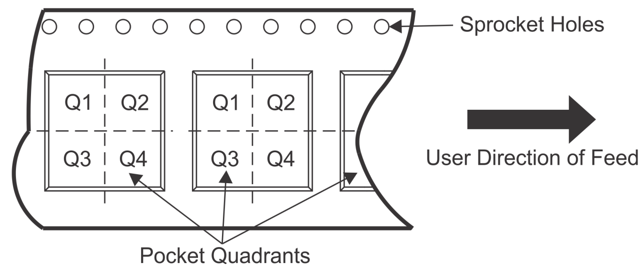
TAPE AND REEL INFORMATION

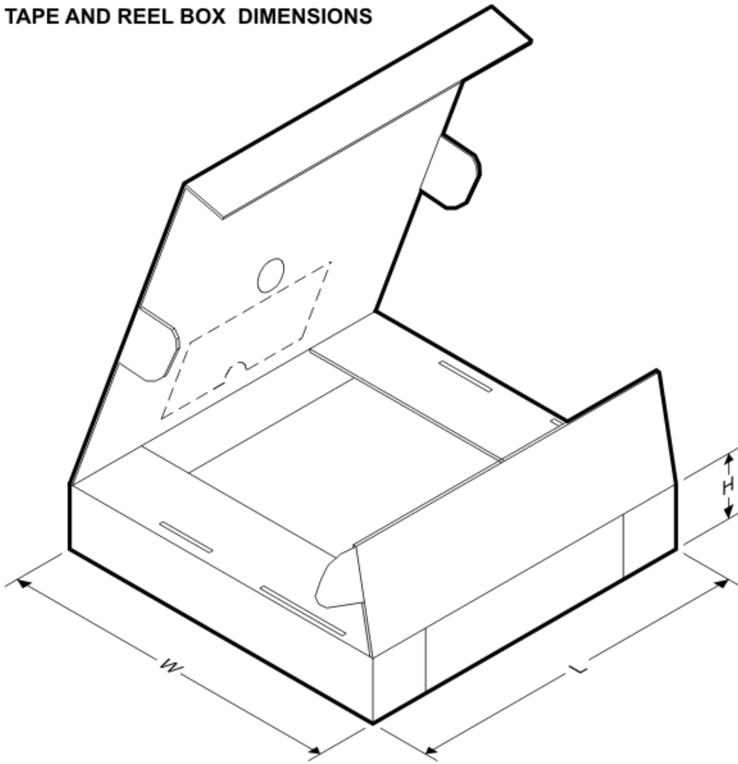




*All dimensions are nominal

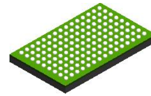
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
DS280BR810ZBFR	NFBGA	ZBF	135	1000	330.0	24.4	8.4	13.4	1.9	12.0	24.0	Q2
DS280BR810ZBFT	NFBGA	ZBF	135	250	178.0	24.4	8.4	13.4	1.9	12.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS280BR810ZBFR	NFBGA	ZBF	135	1000	367.0	367.0	45.0
DS280BR810ZBFT	NFBGA	ZBF	135	250	213.0	191.0	55.0



13.1
12.9

A

B

BALL A1 CORNER

8.1
7.9

1.35 MAX

C

SEATING PLANE

0.46
0.25 TYP

BALL TYP

0.2 C

11.2 TYP

SYMM

(0.9) TYP

(0.8) TYP

J H G F E D C B A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

6.4 TYP

SYMM

135X ∅ 0.51
0.41

∅0.15Ⓜ C AⓈ BⓈ
∅0.08Ⓜ C

0.8 TYP

BALL A1 CORNER

0.8 TYP

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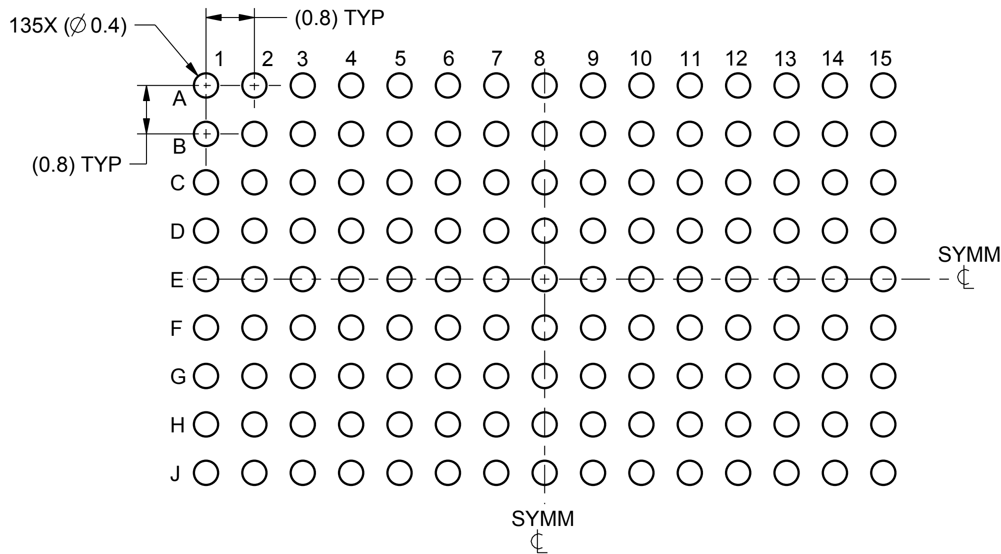
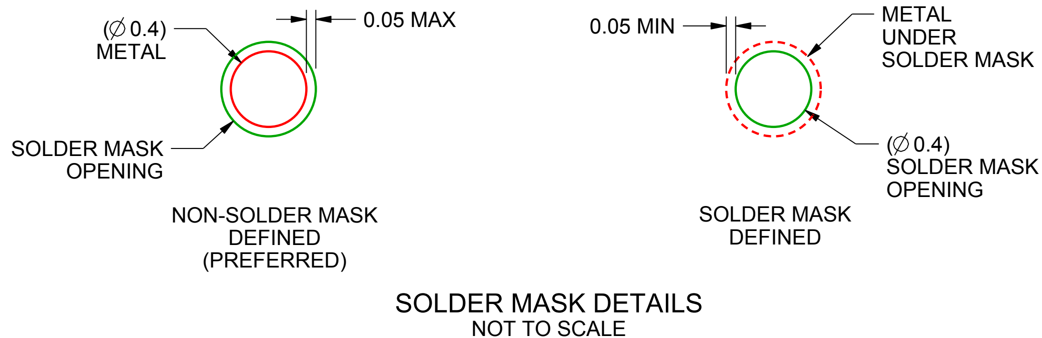
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS
NOT TO SCALE

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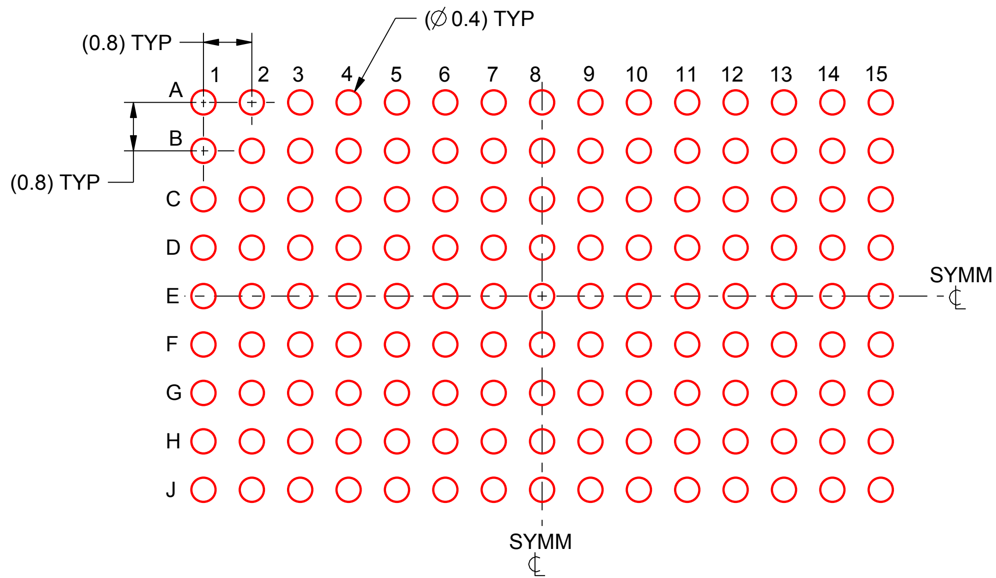
NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For information, see Texas Instruments literature number SPRAA99 (www.ti.com/lit/spraa99).



SOLDER PASTE EXAMPLE
BASED ON 0.15 mm THICK STENCIL
SCALE:8X

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NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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