AFE7900 4T4R2F RF Sampling AFE with 12 GSPS DACs and 3 GSPS ADCs

1 Features

- Quad RF sampling 12-GSPS transmit DACs
- Quad RF sampling 3-GSPS receive ADCs
- Dual RF sampling 3-GSPS feedback ADCs
- Maximum RF signal bandwidth:
  - 4TX/2FB: 1200 MHz or 2TX: 2400 MHz
  - RX): 1200 MHz (no FB)/600 MHz (with FB)
- RF frequency range:
  - TX: 30 MHz - 12 GHz
  - RX/FB: 30 MHz - 12 GHz
- Digital step attenuators (DSA):
  - TX: 40 dB range, 0.125-dB steps
  - RX/FB: 25 dB range, 0.5-dB steps
- Single or dual-band DUC/DDCs for TX and RX
- 16x NCOs per TX/RX and FB
- Optional Internal PLL/VCO for DAC/ADC clocks or external clock at DAC or ADC sample rate
- Sysref Alignment Detector
- SerDes data interface:
  - JESD204B and JESD204C compatible
  - 8 SerDes transceivers up to 29.5 Gbps
  - Subclass 1 multi-device synchronization
- Package: 17-mm × 17-mm FCBGA, 0.8-mm pitch

2 Applications

- Radar
- Seeker Front End
- Defense Radio
- Tactical Communications Infrastructure
- Wireless Communications Test

3 Description

The AFE7900 is a high performance, wide bandwidth multi-channel transceiver, integrating four RF sampling transmitter chains, four RF sampling receiver chains and two RF sampling feedback chains (six RF sampling ADCs total). With operation up to 12 GHz, this device enables direct RF sampling in the L, S, C and X-band frequency ranges without the need for additional frequency conversions stages. This improvement in density and flexibility enables high-channel-count, multi-mission systems.

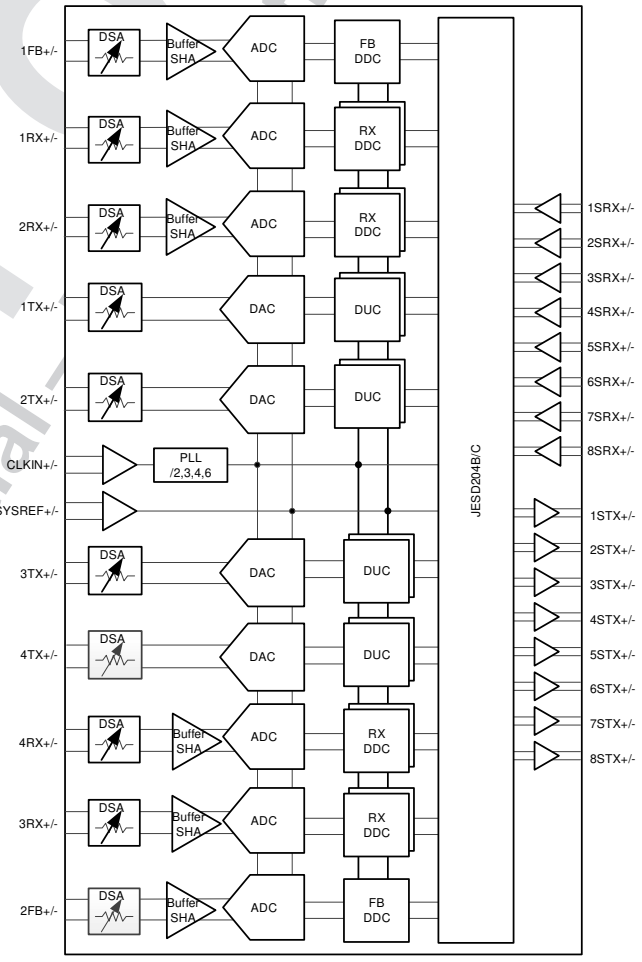
The TX signal paths support interpolation and digital up conversion options that deliver up to 1200 MHz of signal bandwidth for four TX or 2400 MHz for two TX. The output of the DUCs drives a 12-GSPS DAC (digital to analog converter) with a mixed mode output option to enhance 2nd or 3rd Nyquist operation. The DAC output includes a variable gain amplifier (TX DSA) with 40-dB range and 1-dB analog and 0.125-dB digital steps.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE
AFE7900	FC-BGA	17.00 mm × 17.00 mm

(1) For more information, see *Mechanical, Packaging, and Orderable Information*.

Functional Block Diagram



4 Description (continued)

Each receiver chain includes a 25-dB range DSA (Digital Step Attenuator), followed by a 3-GSPS ADC (analog-to-digital converter). Each receiver channel has an analog peak power detector and various digital power detectors to assist an external or internal autonomous automatic gain controller, and RF overload detectors for device reliability protection. Flexible decimation options provide optimization of data bandwidth up to 1200 MHz for four RX without FB paths or 600 MHz with two FB paths (1200 MHz BW each).

5 Device and Documentation Support

5.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

5.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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5.3 Trademarks

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5.4 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.

5.5 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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