

12-Bit, 3.2/2.0 GSPS Ultra High-Speed ADC

1.0 General Description

The 12-bit 1.6/1.0 GSPS ADC12D1600/1000RF is an RF-sampling GSPS ADC that can directly sample input frequencies up to and above 2.7 GHz. The ADC12D1600/1000RF augments the very large Nyquist zone of National's GSPS ADCs with excellent noise and linearity performance at RF frequencies, extending its usable range beyond the 5th Nyquist zone

The ADC12D1600/1000RF provides a flexible LVDS interface which has multiple SPI programmable options to facilitate board design and FPGA/ASIC data capture. The LVDS outputs are compatible with IEEE 1596.3-1996 and supports programmable common mode voltage. The product is packaged in a lead-free 292-ball thermally enhanced BGA package over the rated industrial temperature range of -40°C to +85°C.

2.0 Features

- Excellent noise and linearity up to and above $f_{IN} = 2.7$ GHz
- Configurable to either 3.2/1.6 GSPS interleaved or 1600/1000 MSPS dual ADC
- New DESCLKIQ Mode for high bandwidth, high sampling rate apps
- Pin-compatible with ADC1xD1x00, ADC12Dx00RF
- AutoSync feature for multi-chip synchronization
- Internally terminated, buffered, differential analog inputs
- Interleaved timing automatic and manual skew adjust
- Test patterns at output for system debug
- Time Stamp feature to capture external trigger
- Programmable gain, offset, and t_{AD} adjust feature
- 1:1 non-demuxed or 1:2 demuxed LVDS outputs

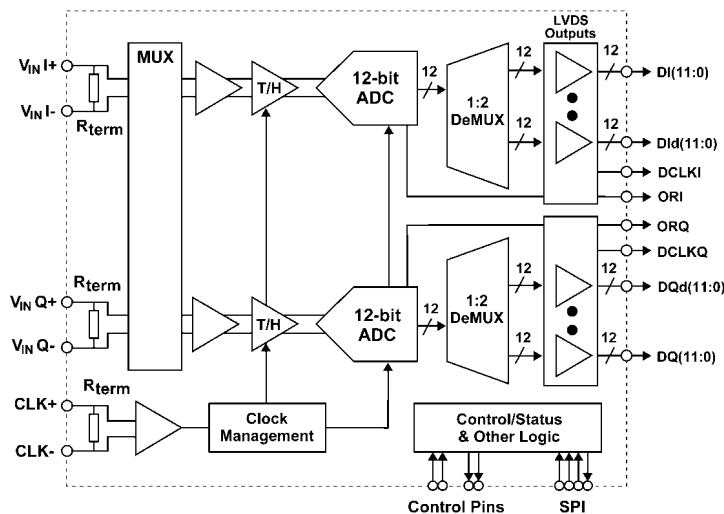
3.0 Applications

- 3G/4G Wireless Basestation
 - Receive Path
 - DPD Path
- Wideband Microwave Backhaul
- RF Sampling Software Defined Radio
- Military Communications
- SIGINT
- RADAR / LIDAR
- Wideband Communications
- Consumer RF
- Test and Measurement

4.0 Key Specifications

■ Resolution	12 Bits
Interleaved 3.2/2.0 GSPS ADC	
■ IMD_3 ($F_{in} = 2.7GHz @ -13dBFS$)	-63/-60 dBc (typ)
■ IMD_3 ($F_{in} = 2.7GHz @ -16dBFS$)	-70/-69 dBc (typ)
■ Noise Floor	-154.6/-154.0 dBm/Hz (typ)
■ Noise Power Ratio	TBD/TBD dB (typ)
■ Power	3.99/3.51W (typ)
Dual 1600/1000 MSPS ADC, $F_{in} = 498$ MHz	
■ ENOB	9.3/9.4 Bits (typ)
■ SNR	58.4/58.8 dB (typ)
■ SFDR	68.8/71.9 dBc (typ)
■ Power per Channel	1.99/1.75W (typ)

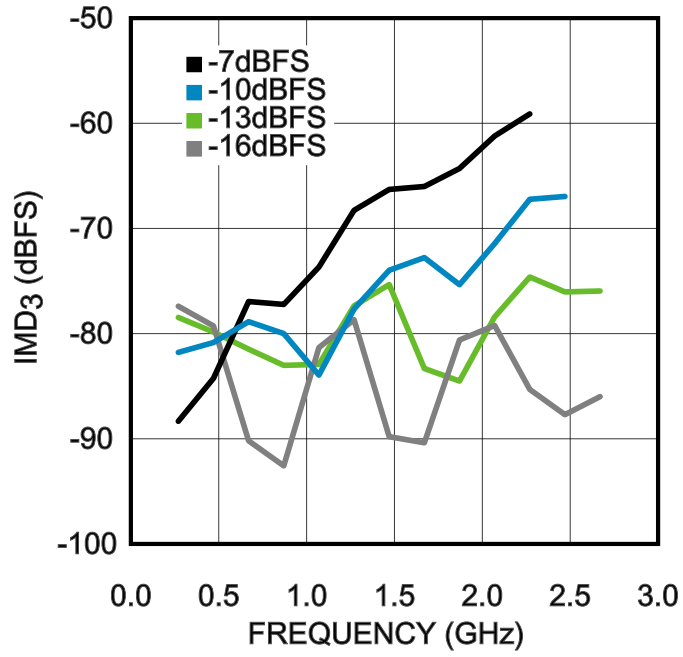
5.0 Block Diagram



Simplified Block Diagram

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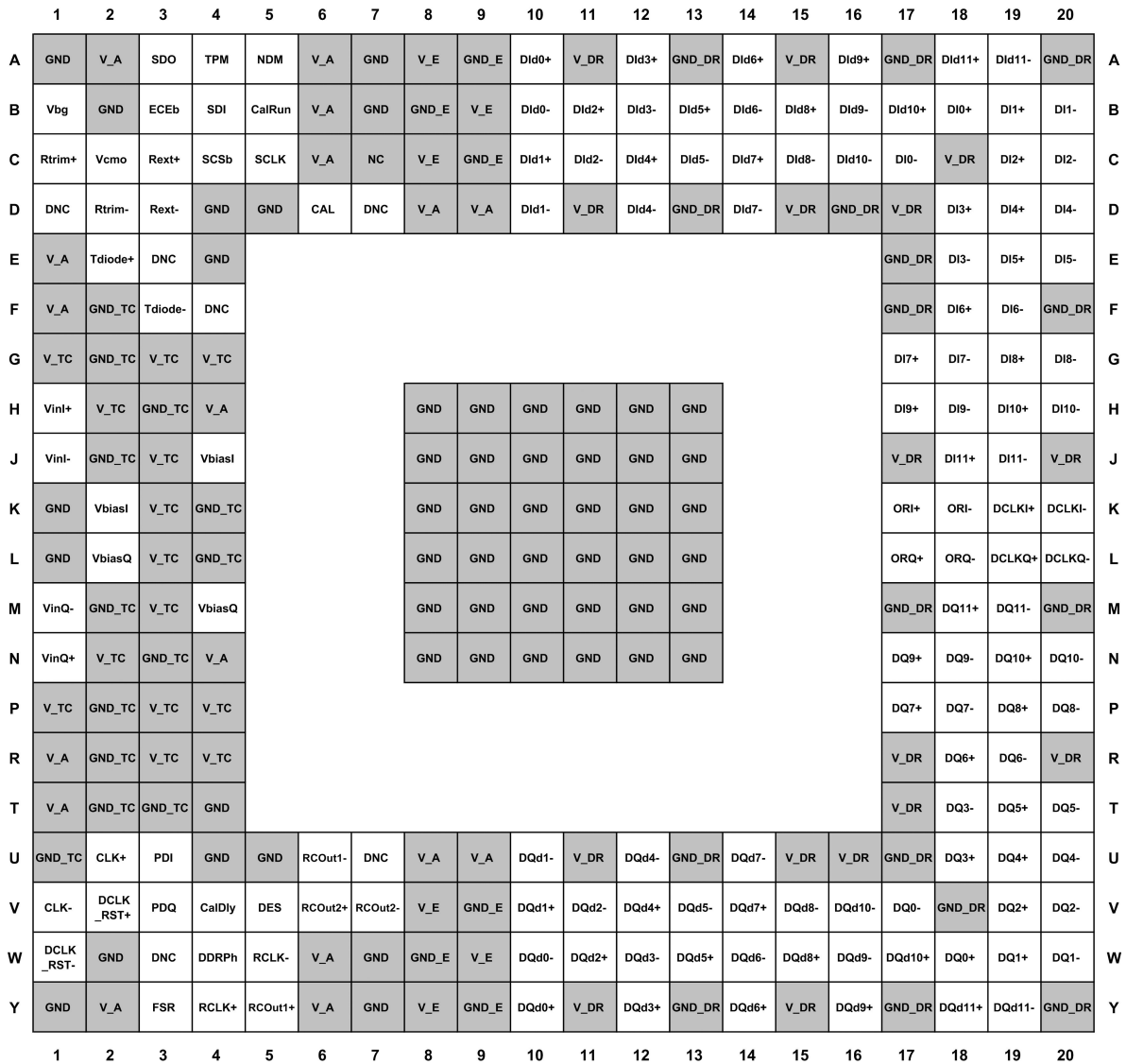
6.0 RF Performance



ADC12D1600RF DES Mode IMD_3

30164498

7.0 Connection Diagram



30164401

FIGURE 1. ADC12D1600/1000RF Connection Diagram

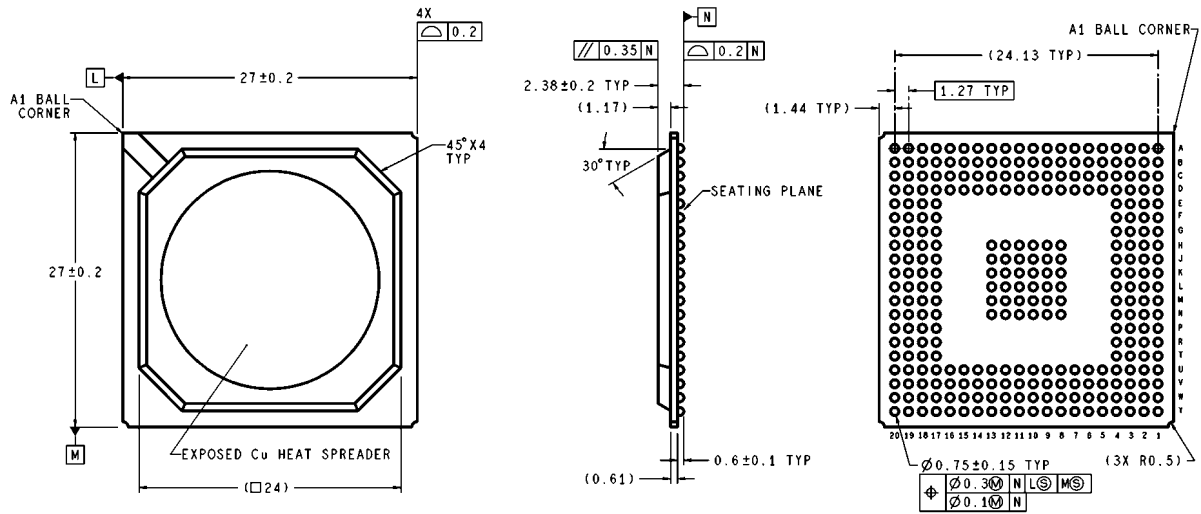
The center ground pins are for thermal dissipation and must be soldered to a ground plane to ensure rated performance.

8.0 Ordering Information

Industrial Temperature Range (-40°C < T_A < +85°C)	NS Package
ADC12D1600/1000RFIUT/NOPB	Lead-free 292-Ball BGA Thermally Enhanced Package
ADC12D1600RFRB	Reference Board

If Military/Aerospace specified devices are required, please contract the National Semiconductor Sales Office/Distributors for availability and specifications. IBIS models are available at: http://www.national.com/analog/adc/ibis_models.

9.0 Physical Dimensions inches (millimeters) unless otherwise noted



DIMENSIONS ARE IN MILLIMETERS

UFH292A (Rev A)

NOTES: UNLESS OTHERWISE SPECIFIED
 REFERENCE JEDEC REGISTRATION MS-034, VARIATION BAL-2.

292-Ball BGA Thermally Enhanced Package
Order Number ADC12D1600/1000RFUIT
NS Package Number UFH292A

Notes

ADC12D1600RF/ADC12D1000RF

Notes

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www.national.com

Products		Design Support	
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