RENESAS
BIG IDEAS FOR EVERY SPACE

RF PRODUCTS FAMILY

Renesas's RF products are best-in-class in dealing with unwanted interference from an increasingly crowded radio spectrum. Today's higher data rates drive the need for better radio signal-to-noise ratios, which translates to the need for our higher linearity RF components. Renesas's unique patented RF solutions enable green networks with minimal power consumption.

RF solutions from Renesas address the evolving needs of a wide range of applications, including cellular 4G and 5G base stations, Active Antenna Systems for both sub-6 GHz and mmWave frequencies, and Satcom phased array antennas.

Renesas's innovative silicon-based products utilize CMOS, SOI and SiGe processes. To continue advancing our portfolio, we include III-V technologies to enable further improvements in device performance as needed for next-generation designs.

With a combination of technologies and advanced IP, Renesas delivers unique solutions to the design challenges faced by designers.

Product categories

- Integrated Receive RF Front-ends
- Transmit Chains
- mmWave Beamformers
- Digital step attenuators (DSA)
- Variable voltage attenuators (VVA)
- RF switches
- Broadband mixers
- Variable gain amplifiers (VGA)
- Amplifiers
- Broadband modulators
- DPD Demodulators with integrated
- DSA, RF switch and LO switch

Features

- Highly differentiated RF products
- Smart Silicon™ enables unique technical innovations
  - Low noise
  - High linearity
  - Low power
  - Small form factors
- Scalable RF Solutions for increased integration

Applications

Wireless Infrastructure

- 4G / 5G macro base stations
- Active antenna systems (AAS)
- 5G mmWave
- Distributed antenna systems (DAS)
- Repeaters
- Microwave (RF/IF) point to point

Satcom

- Phased Array Antenna

Industrial

- Military/tactical communication systems
- FMCW Radar
- Public Safety
- Test and Measurement

Broadband CATV

- Headend (CMTS)
- Distribution nodes
- Fiber repeaters
- Cable modem, set-top box
- Satellite receivers and modems

RF PRODUCTS FAMILY

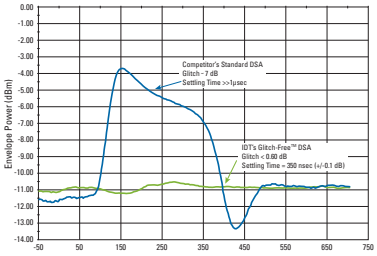
GLITCH-FREE™

Renesas RF Digital Step Attenuators and RF Variable Gain Amplifiers

Glitch-Free™

Renesas devices virtually eliminate transient overshoot that can occur during MSB attenuation state transitions of standard DSAs. Thus, amplifier damage and loss of information at the ADC are avoided.

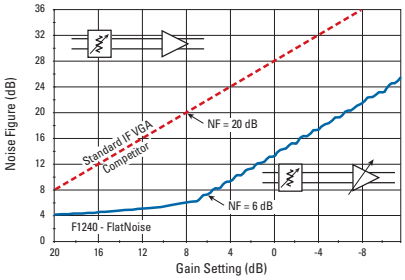
F1950 Glitch-Free™ DSA vs Competitor Standard DSA



FLATNOISE™

FlatNoise™

Noise Figure is kept virtually flat in the critical region while gain is reduced. Greatly eases design constraints for Radio Engineers by enhancing SNR.



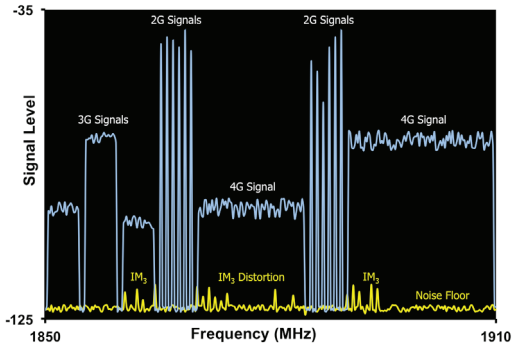
ZERO-DISTORTION™

Zero-Distortion™

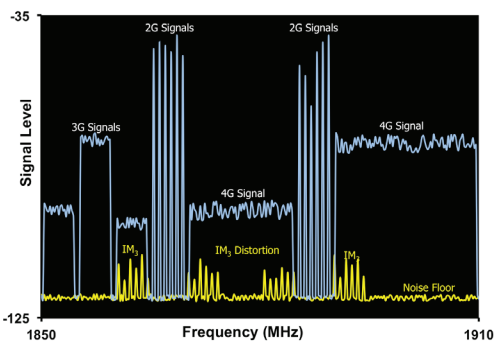
Renesas RF Mixers and IF Variable Gain Amplifiers

Renesas devices improve SNR by reducing the noise floor and IM3 intermodulation distortion, as shown below in yellow. This is key for crowded spectrum environments, as it enhances Quality of Service and frees up under-utilized spectrum.

Zero-Distortion IDT Rx



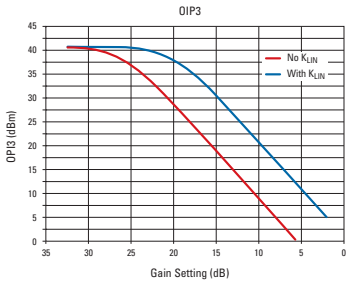
Standard Rx



K_{LIN} CONSTANT LINEARITY

Constant High Linearity

K_{LIN} maintains constant high linearity as gain is adjusted. As the gain is reduced, the linearity (OIP3) remains constant in the critical region (see graph). This prevents intermodulation distortion from degrading as the gain is reduced.



$K_{|Z|}$ CONSTANT IMPEDANCE

Constant Impedance

$K_{|Z|}$ maintains a near constant impedance when switching between RF ports preserving a higher RF port return loss. Standard switches without $K_{|Z|}$ create a large Voltage Standing Wave Ration, VSWR, transient when switching RF paths because the impedance of the switch is not well controlled during the switching event. By controlling the impedance during the switching process VSWR transients are minimized, improving switch reliability, reducing voltage stresses on downstream components and improving overall system performance.

To learn more about our industry-leading RF products, patented technologies, or request samples, visit: **idt.com/rf**

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