IDT Products for Radio Applications

Highly-differentiated RF products from IDT offer significant improvements in RF reliability and data throughput and enable green networks with minimal power consumption. They scale easily from macros to small cells, and to industrial applications.

IDT best-in-class advanced timing products have very low phase-noise, low-spurious jitter attenuating frequency generators with support for one or multiple RF clock frequencies. They support input clock redundancy, mid to high clock fanout and optional synchronization signals, such as is used in JESD204B.

IDT is the industry leader in serial switching devices that include advanced PCI Express® and Serial RapidIO® switches optimized for the most demanding applications. IDT is the only “one stop” source with PCIe solutions for switches, bridges, signal integrity, and timing.

TYPICAL APPLICATIONS
- Industrial
- Test and Measurement
- Broadband CATV
- Microwave
- Wireless Infrastructure and DAS

RF Products
- Mixers | VGA | DSA | VVA | Switches

RF Timing
- Synthesizer-PLLs | RF PLLs | Buffers

Digital Timing
- Generators | UFT™ | PCle® Buffers | XO

Interconnect
- PCle® | RapidIO® | Signal Integrity
IDT Products for Radio Applications

Timing Products for Radio Cards

**RF SYNTHESIZER / PLL / LOCAL OSCILLATOR**

- Best-in-class combination of phase noise, spurious performance, frequency range and power
- Large tuning range to address a wide range of applications in Communications, Industrial, and Instrumentation
- Multiband local oscillator (LO) frequency synthesis in multi-mode base stations
- Eliminates the use of multiple narrow band RF Synthesizers
- Reduces BOM complexity and cost

**8V97051**
A high performance wideband RF synthesizer / PLL optimized for use as the local oscillator

**RF CONVERTER PLL**

**8V19N486I-02**
**8V19N476I-01**
**8V79S680**

Providing clock generation, frequency generation and jitter attenuation in JESD204B-compliant wireless base station radio clock equipment

**FEATURES**
- Pin-to-pin and register compatible with major competing solutions
- -143 dBc/Hz phase noise at 1MHz offset for a 1.1 GHz output, -147 dBc/Hz phase noise at 1MHz offset for a 700 MHz output
- Power consumption: 380 mW, typical (RF_OUTB disabled)
- Extended registers for enhanced features and resolution
- Full CMOS process

**BENEFITS**
- Facilitates evaluation
- Typical phase noise addresses blocker specs
- Allows high performance from the mixer or the modulator / demodulator
- Low power consumption: applications without air flow
- Flexible control of the local oscillator (LO) function
- Cost effective

**CHIP SET BENEFITS**
- Synchronization between clock and system reference signals
- Phase delay capabilities for alignment/delay of individual system reference signals
- Dedicated power-down features for reducing power consumption
- Input clock monitoring, manual and auto switch-over
- Holdover for temporary loss of input signal scenarios
- SPI controlled system reference signal (SYSREF) generation
- Status conditions with programmable functionality for loss-of-lock and loss of reference indication
- LVCMOS/LVTTL compatible SPI serial interface
IDT Products for Radio Applications

Timing Products for Radio Cards

HIGH PERFORMANCE CLOCK BUFFERS

Differential SiGe Buffer Families - All devices support a differential architecture and frequencies in the high-MHz and GHz range

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Part Number &gt;</th>
<th>8SLVP</th>
<th>8SLVD</th>
<th>8P34S</th>
<th>8T39S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple and low noise TI drop-in compatible</td>
<td>8V19N4xx RF PLL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low power TI pin-to-pin</td>
<td>8T49N285 UFT™, FemtoClock® Programmable Clock Generators</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible</td>
<td>5P49V5901 5P49V5935 VersaClock® 5 (Low Power) Programmable Clock Gen</td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I / O</th>
<th>LVPECL</th>
<th>LVDS</th>
<th>LVDS</th>
<th>Universal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Single and dual functions and matched pinout</td>
<td>S/E, OE, 2 banks, XTAL, I/F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$f_{\text{max}}$</td>
<td>2GHz</td>
<td>2GHz</td>
<td>1.2GHz</td>
<td>2GHz</td>
</tr>
<tr>
<td>Supply</td>
<td>2.5 - 3.3 V</td>
<td>2.5V</td>
<td>1.8V</td>
<td>2.5V, 3.3V, Mixed</td>
</tr>
</tbody>
</table>

BENEFITS

- Very low additive phase jitter
- Multiple low-skew outputs
- Optional frequency dividers

CLOCK GENERATION PRODUCT POSITIONING

These featured products are a select sample of the extensive IDT clock generation portfolio. For the complete product listing, please visit idt.com/go/clocks

- 8V19N4xx RF PLL
- 8T49N285 UFT™, FemtoClock® Programmable Clock Generators
- 5P49V5901 5P49V5935 VersaClock® 5 (Low Power) Programmable Clock Gen

- < 50fs Jitter*
  - WAN | Long Haul | JESD204B
- < 300fs*
  - MAN (40GigE, 100GbE) | Fibre Channel (32G)
  - SONET (OC-192) | Storage (12G) SAS/SATA | Small Cells
- < 700fs*
  - Fibre Channel (16G) | LAN (10GbE) | PCIe Gen 1/2/3
  - SONET (OC-48) | Storage (6G) SAS/SATA | Digital Front End
- > 1ps*
  - SONET (OC-12) | Fibre Channel (2G, 4G, 8G) | Medical
  - LAN (10/100, 1 GbE) | Storage (1.5G, 2G, 3G) SAS/SATA
  - Industrial | Military | Spread Spectrum | PCIe Gen 1/2
  - Hand-Held | Mobile | Gaming | Security | Multimedia
  - Computers | Peripherals | Consumer | POTS | USB | Audio

* RMS Phase Noise (12kHz to 20MHz)
IDT Products for Radio Applications

**RF Products for Radio Applications**

*Significant improvement in RF performance!*

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**RF TECHNICAL INNOVATIONS**

**IDT’s patented Glitch-Free™ technology** eliminates attenuation setting overshoot (“glitches”) from the transmit and or receive paths by reducing transient glitches by up to 95 percent during most significant bit (MSB) transitions.

**FlatNoise™ technology** is an innovative technology where noise does not degrade as gain is reduced. IDT’s low-noise devices improve quality-of-service (QoS) and ease the signal-to-noise ratio (SNR) requirements of the downstream data converter to reduce system cost.

**Zero-Distortion™ technology** offers the world’s lowest power consumption and world’s lowest IM3 distortion. IDT’s mixers reduce distortion for improved SNR while simultaneously reducing power consumption.

**Silicon Technology**

IDT silicon technology offers advantages over other technologies such as GaAs: manufacturing robustness in terms of higher electrostatic discharge (ESD) immunity and MSL1 moisture sensitivity-level performance. In addition, it enables excellent RF performance over temperature with low current drain, higher reliability versus GaAs, and higher levels of integration with simpler packaging assemblies that improve thermal performance and lower total cost.

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**RF TECHNICAL INNOVATIONS MAPPED TO TARGET MARKETS**

<table>
<thead>
<tr>
<th>Product Innovation</th>
<th>Industrial</th>
<th>Microwave</th>
<th>Broadband CATV</th>
<th>Test and Measurement</th>
<th>Wireless Infrastructure and DAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glitch-Free™</td>
<td>●</td>
<td></td>
<td>★</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>FlatNoise™</td>
<td>●</td>
<td></td>
<td>★</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Zero-Distortion™</td>
<td>●</td>
<td></td>
<td>★</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Silicon Technology</td>
<td>●</td>
<td></td>
<td>★</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Many IDT RF products are pin-to-pin compatible with existing products in the market. Check with your IDT contact to learn how to get the innovation of IDT in the footprint you already have.

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**DOWNCONVERTING MIXER PRODUCT FAMILY: F11xx**

Converts a high frequency RF input signal into a lower intermediate frequency (IF).

The IDT Advantage: Market-leading linearity, lowest power consumption and patented innovations such as Zero-Distortion™.

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**KEY BENEFITS**

- High linearity (IP3)
- Low noise figure
- Low power consumption
- Spur performance

**TYPICAL APPLICATIONS INCLUDE**

- Base stations
- DAS and repeaters
- Microwave backhaul
- Broadband (CATV)
- Industrial / military
IDT Products for Radio Applications

RF Products for Radio Cards

**RF VGA FAMILY – DIGITAL VARIABLE GAIN AMPLIFIERS AND ANALOG VARIABLE GAIN AMPLIFIER: F12xx**

*Significant improvement in RF performance!*

Provides amplification and level control of RF signals coming from the antenna. The IDT Advantage: Key innovations such as Glitch-Free™, Zero-Distortion and others that improve linearity over the control range.

**KEY BENEFITS**
- Insertion loss
- Attenuation range
- High linearity (IP3)
- Accuracy
- Overshoot

**TYPICAL APPLICATIONS**
- Base stations
- Repeaters and DAS
- Microwave backhaul
- Broadband (CATV)
- Industrial, military and public safety

**RF DSA FAMILY – DIGITAL STEP ATTENUATORS (DSA): F19xx**

*Significant improvement in RF performance!*

Reduces the power of a signal without appreciably distorting its waveform. The IDT Advantage: Silicon-based technology and patented innovations such as Glitch-Free™

**KEY BENEFITS**
- Insertion loss
- Attenuation range
- High linearity (IP3)
- Accuracy
- Overshoot

**TYPICAL APPLICATIONS**
- RF signal path level control
- Base stations
- Test and measurement
- DAS and repeaters
- CATV, SATCOM

**VVA FAMILY – VOLTAGE VARIABLE ATTENUATOR: F2250**

*Significant improvement in RF performance!*

Reduces the power of a signal without appreciably distorting its waveform. The IDT Advantage: Ultra-precision high linearity level control.

**KEY BENEFITS**
- Positive or negative slope
- 3 or 5 V supply
- Wide operating temperature range
  -40˚C to 105˚C
- Pin-compatible with competitors

**TYPICAL APPLICATIONS**
- RF signal path level control
- Base stations
- Test and measurement
- DAS and repeaters
- CATV, SATCOM

**RF SWITCH PRODUCT FAMILY : F29xx**

Routes high frequency signal through transmission paths. The IDT Advantage: Silicon technology and key innovations that improve dynamic switching performance.

**KEY BENEFITS**
- Insertion loss
- Isolation
- High linearity (IP3)
- Return loss
- Switching time

**OVERVIEW**
- Routes input signal to selected output
- Poles – Number of inputs
- Throws – Number of outputs
- SP2T = Single pole, double throw
IDT Products for Radio Applications

### Interconnect Solutions for Radio Applications

#### RapidIO PRODUCTS

**RapidIO® switches** are the backbone of 3G and 4G wireless base stations for chip-to-chip, board-to-board and chassis-to-chassis links including secure encryption/decryption of the S-RIO protocol for out-of-the-box cabling. This overall offering makes pervasive mobile broadband a reality. In military and embedded computing, the reliability and robustness of IDT RapidIO is battlefield proven, making missions safer and making it possible for OEMs to deploy complex multi-processor systems in everything from fighter aircraft to shipborne electronics.

**KEY BENEFITS**
- True real time switching, latency and QOS guaranteed by design
- Low power, low-latency
- Ideal for peer-to-peer multiprocessor embedded systems up to 6.25 Gbaud per serial link

#### PCI EXPRESS PRODUCTS

IDT offers the industry’s most comprehensive family of PCIe® switching solutions optimized for the most demanding applications - including server, embedded, networking, storage, and communications. IDT leads the industry in introducing advanced switch features such as multicast, multi-root partitioning, and multiple non-transparent bridges.

**KEY BENEFITS**
- First supplier of a standards-compatible PCIe Gen3 Retimer
- Signal integrity product portfolio for PCIe applications that enhance performance and reliability
- Product and technology leaders in PCIe switching
- Product and technology leaders in PCIe bridging
- Product and technology leaders in PCIe clocking solutions

#### SIGNAL INTEGRITY PRODUCTS

With the increase of signal speeds in computing, storage and communications applications, system designers face greater signal integrity challenges. The signal integrity product portfolio from IDT provides signal conditioning devices for popular multi-gigabit per second I/O protocols delivering signal quality over extended distances and offering simplified design by alleviating layout constraints.

**KEY BENEFITS**
- Extends maximum cable length to over 10 meters and trace length over 65 inches in cabled applications
- Speeds up system design time by allowing usage of longer trace and cable lengths
- Minimizes bit error rate (BER)
- Supports SAS, SATA, USB3, XAUI, sRIO, PCIe and Legacy Link

#### IQ DATA COMPRESSION TECHNOLOGY

Compression IP is used to put more data into a given fiber or microwave “link” in wireless systems. Using Compression IP, a higher data rate can be transmitted on lower speed links, which are generally cheaper. This is a goal across the industry, but few have achieved it. When compressing data, some signal quality is lost. Based on its patented technology, IDT has proven that it can do compression with very little loss of signal quality.

**KEY BENEFITS**
- IP can be deployed in ASIC or FPGA (Altera and Xilinx)
- Based on multiple protected patents worldwide
- GSM, WCDMA and LTE support
- Small FPGA footprint
- Compression ratios: 1.5:1 to 3:1 range
- EVM performance: 0.5% to 3% for typical 3G and 4G wireless signals
- Microsecond level latency at 307.2MHz
- High performance IP core supporting uncompressed data rate up to 9.8304Gbps
- Common clock rates of 61.44MHz and 153.6MHz for FPGA and 61.44MHz, 153.6MHz, and 307.2MHz for ASIC

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For more information about IDT Interconnect solutions, visit idt.com/products/interface-connectivity
Remote radio heads have become one of the most important subsystems of today's new distributed base stations — containing the base station's RF circuitry plus analog-to-digital/digital-to-analog converters and up/down converters. They have operation and management processing capabilities and a standardized optical interface to connect to the rest of the base station. Making MIMO operation easier, they increase a base station's efficiency and facilitate easier physical location for gap coverage problems.

**Highly-differentiated RF products** from IDT offer up to 10x improvement in RF performance and enable green networks with minimal power consumption. They scale easily from macros to small cells and improve reliability and data throughput.

**IDT best-in-class advanced timing products** have very low phase-noise, low-spurious jitter attenuating frequency generators with support for one or multiple RF clock frequencies. They support input clock redundancy, mid to high clock fanout and optional synchronization signals, such as is used in JESD204B.
Test and Measurement Market: The smart phone roadmap will drive the need for improved test hardware and better product performance – elimination of GaAs pHEMT semiconductors and mechanical switches is a priority. Every semiconductor shipped globally must be tested and the tester must be better than the device it is testing.

Industrial Radio Market: Radio replacement increase is driven by deployment of LTE data enabled radios using LTE modems. There is increasing need for first responder organizations to have a common communication platform. Military/tactical radios must support new and legacy frequency bands driving switch content up.

SYNERGY WITH IDT PRODUCTS

**TEST AND MEASUREMENT**

- Technology innovations by IDT add tremendous value
- This market demands high-performance products

*Product requirements:*
- Broadband - near DC to GHz
- RF power - 1 to 4 W
- High linearity

**INDUSTRIAL RADIO**

- Technology innovations by IDT are sought after in this market
- Mixers and switches cannot be integrated!

*Product requirements:*
- Broadband - 30M to 2.7GHz
- RF power - 1W/5W/10W
- High linearity

For more information about all IDT products for radio applications, please contact your local IDT representative or visit idt.com