Fast track your design with NXP's high-speed converters

JESD204A CGV
Fast track your design

www.nxp.com

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A tradition of innovation

With billions of high-performance RF, analog, power and digital processing ICs shipping annually, NXP is a worldwide leader in mixed-signal and standard product solutions. And although you may not realize it, we're a leader in data converters as well. Since 1952 when the paper, "Delta Modulation, a Method of PCM Transmission using the One Unit Code," appeared in the *Philips Research Report*, we have consistently innovated in the field of data acquisition. For decades we have been embedding our high-speed converters into some of the most performance-intensive ASICs and SOCs under the NXP and Philips' brand names.

Today we are NXP, an independent company building upon this strong foundation to deliver the most innovative merchant-market solutions in analog mixed-signal semiconductors. Our new portfolio of high-speed converters, which includes the first instantiation of the JESD204A serial interface, reflects our deep commitment to offering solutions for today's performance-critical signal processing systems.

Six Decades of Data Converter Innovations

1952
Delta Modulation, a Method of PCM Transmission using the One Unit Code, *Philips Research Report*

1976
Dynamic Element Matching for High-Accuracy Monolithic D/A converters, *IEEE Journal of Solid-State Circuits*

1987
An 8-bit Video ADC Incorporating Folding and Interpolation Techniques, *IEEE Journal of Solid-State Circuits*

1990
A 10-bit 50MHz CMOS D/A Converter with 75Ω buffer, *IEEE Journal of Solid-State Circuits*

1994
A 25-Msps 8-bit CMOS A/D Converter for Embedded Application, *IEEE Journal of Solid-State Circuits*

1997
A 12-bit, 60-Msample/s Cascaded Folding and Interpolating ADC, *IEEE Journal of Solid-State Circuits*

2001
A 2.5-V 12-bit 54-MSample/s 0.25-µm CMOS ADC in 1-mm2 with Mixed-Signal Chopping and Calibration, *IEEE Journal of Solid-State Circuits*

2004
An 8-bit 600MS/s 200mW CMOS Folding A/D Converter using an Amplifier Preset Technique, *International Solid-State Circuits Conference*

2006
A 90nm CMOS 1.2V 10-bit Power and Speed Programmable Pipelined ADC with 0.5pJ/Conversion-Step, *IEEE International Solid-State Circuits Conference*

2008
A 1.35 GS/s, 10-bit, 175 mW Time-Interleaved A/D Converter in 0.13 µm CMOS, *IEEE Journal of Solid-State Circuits*

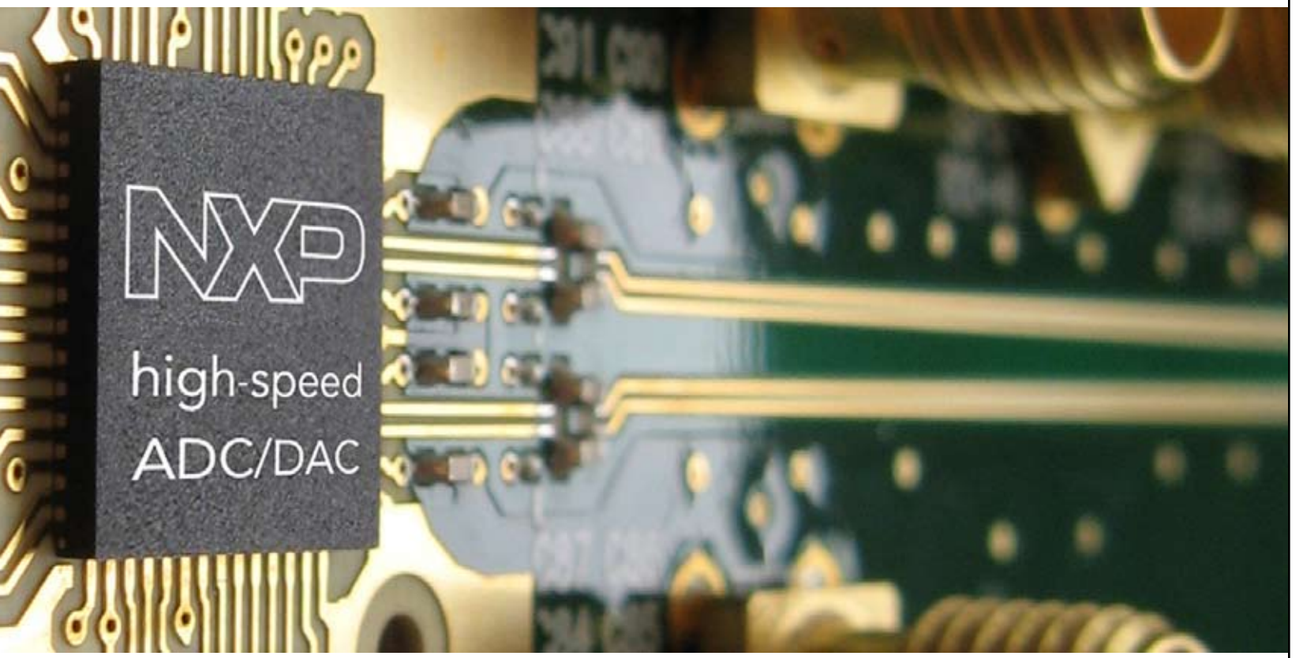
2009
A 1.2-V 250-mW 14-bit 100-MS/s Digitally Calibrated Pipeline ADC in 90-nm CMOS, *IEEE Journal of Solid-State Circuits*

The leader in high-speed interface technology and products

NXP's CGV™ transforming high-speed data conversion

- NXP is leading the way for the next generation of high-speed converters. With NXP's CGV (Convertisseur Grand Vitesse) technology—the industry's first implementation of the JESD204A serial interface—we are transforming high-speed data conversion, delivering an industry standard-compliant JESD204A product with key enhancements.
- The transition to JESD204A—an optimized interface between high-speed data converters and digital VLSI—is inevitable. It's similar to earlier transitions to SATA, USB and PCI Express, each of which represented a huge advancement in higher bandwidth communications in its day.
- Indeed, OEMs cannot afford NOT to adopt JESD204A because the BOM cost savings will rapidly pay for the NRE cost of system redesign.
- CGV radically simplifies PCB layout and channel synchronization, setting an entirely new standard for data converter ease-of-use.
- With enhanced reach, rate and features, CGV dramatically improves system performance over conventional parallel interfaces.

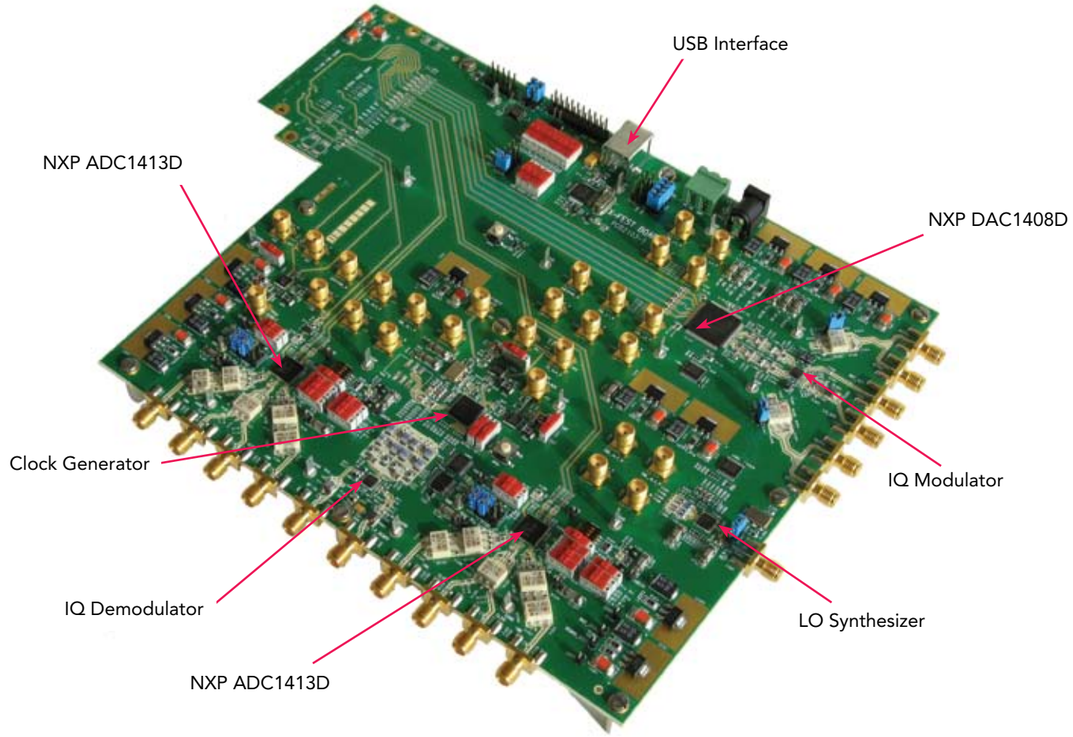
Like TGV—one of the world's fastest, most reliable train systems—CGV provides the world's fastest sampled data transport for signal-processing systems



CGV is a 100% JEDEC-compliant interface which NXP has enhanced for even greater ease-of-use and improved performance:

- Enhanced rate (up to 4.0 Gbps) — a 28% increase over the JEDEC standard 3.125 Gbps.
- Enhanced reach (up to 100 cm) — a 400% increase over the JEDEC standard 20 cm.
- Enhanced features (multiple DAC synchronization) — enables up to sixteen DACs' data streams to be sample-synchronized and phase-coherent.
- Comprehensive interoperability with SERDES-based FPGAs — eliminates the risk and cost associated with project schedules.
- NXP CGV ADCs and DACs interwork with FPGAs from Altera, Lattice and Xilinx — giving you plug-and-play interop!

Reference designs to fast-forward your development cycle



NXP provides comprehensive worldwide technical support to customers in all application segments

NXP offers numerous reference designs, including this radio reference design complete with receiver RF demodulation, transmitter RF modulation, transmitter DPD feedback ADC, and SMA, FMC and HSMC connections to FPGA baseboards.

Other reference designs include stand-alone ADC and DAC performance evaluation boards, interoperability demonstration boards with Altera, Lattice and Xilinx FPGAs, and a universal data acquisition and generation card with USB connectivity. These boards are available to qualified customers without charge.

NXP has dedicated data converter field application engineers across the world. They are backed up with regional application engineering centers staffed by NXP high-speed data converter experts supported with high quality lab test equipment.

CGV reduces Total Cost of Ownership (TCO) by up to 40% over traditional parallel interfaces

Saves board space

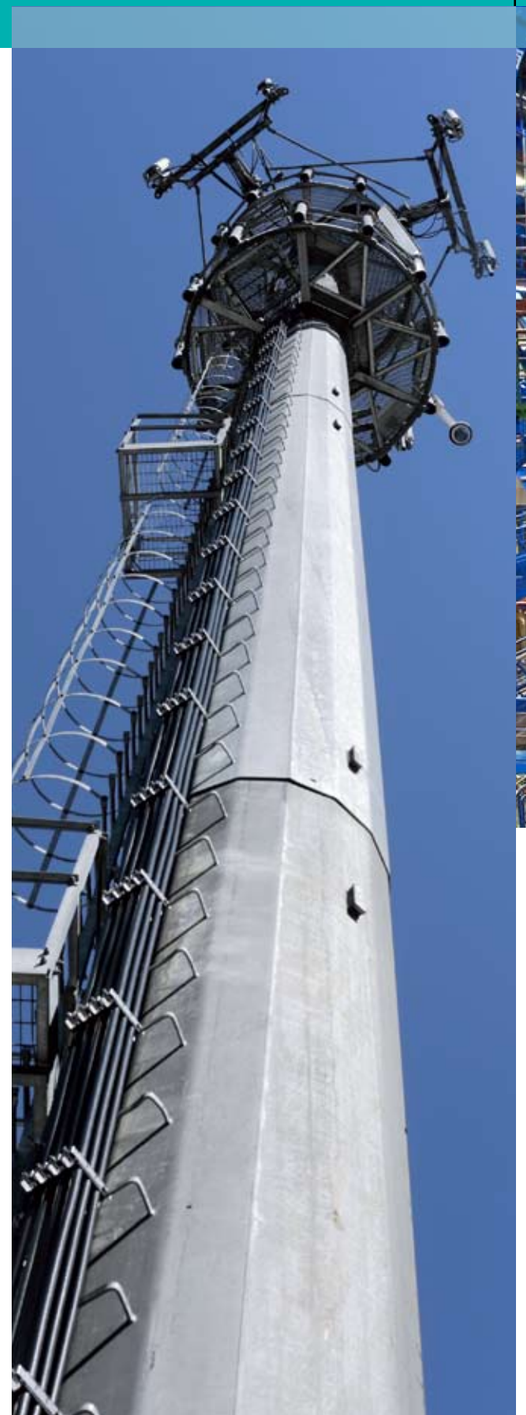
- Up to 25% PC board cost reduction through the elimination of routing layers.
- Up to 80% fewer interconnect signal traces and simplified trace routing constraints.
- Take the case of a 14-bit dual-channel converter. CGV reduces the 28 wires needed for the conventional parallel digital interface to just 2 differential data lanes!
- Up to 20% reduction in data conversion subsystem PCB design effort and cost.
- Up to 10% BOM cost reduction based on the elimination of external channel synchronization logic devices.
- Up to 10% PC board size reduction due to reduced pin count and minimized package outline size.
- A leading basestation OEM has used CGV converters to reduce its PCB board layers from 16 to 12. This 25% savings in PCB layer count significantly reduced BOM costs in volume production.

Improves reliability

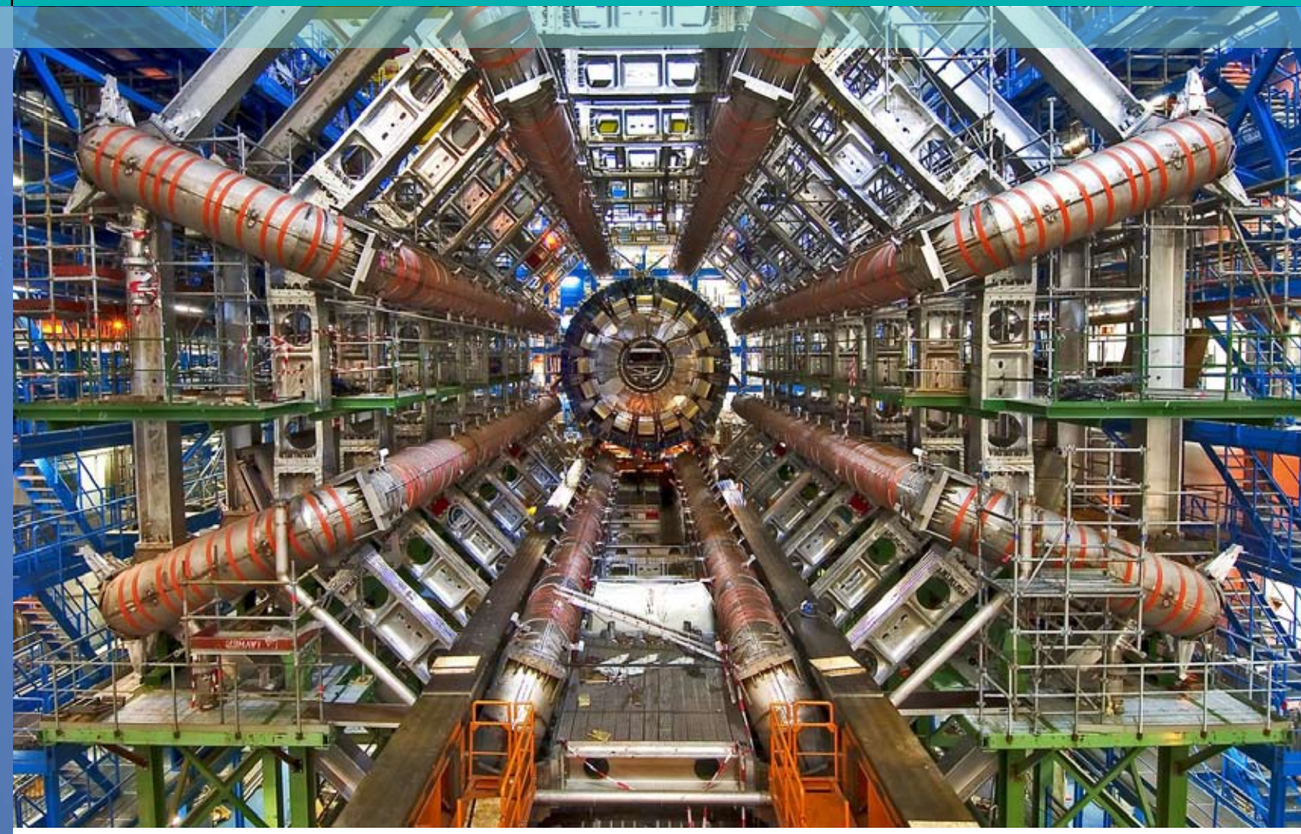
- Fewer interconnects means fewer points of failure. Improves system reliability by up to 10%.

Saves power

- Up to 10% reduced power consumption.
- Very low voltage signaling on the data interface reduces power supply costs at the BOM level.



Fast track your applications with NXP



Wireless basestations

NXP data converters promote the optimal balance between linearity and power dissipation. They meet and exceed the dynamic performance requirements for all air interfaces including multi-carrier (MC) GSM and LTE at minimum power dissipation so you don't have to choose between performance and low power.

Aerospace and defense

NXP CGV data converters improve data acquisition while keeping RF and digital circuitry securely isolated via optional data scrambling. This feature contributes to overall ease-of-use.

Industrial

NXP data converters deliver maximized dynamic range across a broad operating temperature range, especially important for industrial applications operating in harsh environments.

Medical imaging

In medical imaging applications, such as ultrasound scanners, noise degrades image quality. NXP data converters feature outstanding SFDR and SNR specifications, so you can achieve your desired image quality while enhancing your cost-competitiveness.

A complete high-speed converter portfolio to meet all system interface requirements

As a leader in digital interface technology, NXP offers an extensive selection of high-speed data converters, spanning JESD204A with our CGV products and a full range of high-speed products with CMOS LVCMOS and LVDS DDR interfaces.

Across all interfaces, our high-speed DACs and ADCs deliver best-in-class converter core performance and ultra-stable dynamic performance across a broad temperature range. We're also the only semiconductor vendor to support true system-level integration across the RF front-end. Imagine the rewards of being able to utilize data converters, small-signal RF building blocks and RF power amplifiers from a single supplier.

High-Speed ADC Selection Table

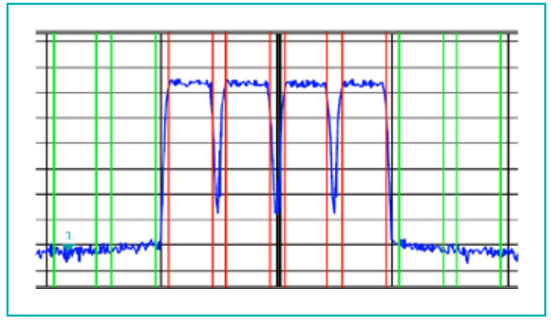
Type	Description	SFDR (dBc)	SNR (dBFS)	Digital Interface
ADC1613D series	Dual 16-bit ADC up to 65/80/105/125Msps with serial interface	93	73.2	JESD204A
ADC1610S series	Single 16-bit ADC up to 65/80/105/125Msps	93	73.2	LVCMOS and LVDS/DRR
ADC1415S series	Single 14-bit ADC up to 65/80/105/125Msps with input buffer	91	73.2	LVCMOS and LVDS/DRR
ADC1413D series	Dual 14-bit ADC up to 65/80/105/125Msps with serial interface	91	73.2	JESD204A
ADC1412D series	Dual 14-bit ADC up to 65/80/105/125Msps	91	73.2	LVCMOS and LVDS/DRR
ADC1410S series	Single 14-bit ADC up to 65/80/105/125Msps	91	73.2	LVCMOS and LVDS/DRR
ADC1215S series	Single 12-bit ADC up to 65/80/105/125Msps with input buffer	91	70.7	LVCMOS and LVDS/DRR
ADC1213D series	Dual 12-bit ADC up to 65/80/105/125Msps with serial interface	91	70.7	JESD204A
ADC1212D series	Dual 12-bit ADC up to 65/80/105/125Msps	91	70.7	LVCMOS and LVDS/DRR
ADC1210S series	Single 12-bit ADC up to 65/80/105/125Msps	91	70.7	LVCOS and LVDS/DRR
ADC1207S080	Single 12-bit ADC 80 Msps	90	71	parallel LVCMOS
ADC1206S series	Single 12-bit ADC 40/50/70 Msps	72	64	parallel CMOS and TTL
ADC1115S125	Single 11-bit ADC up to 125Msps with input buffer	90	66.7	LVCMOS and LVDS/DRR
ADC1113D125	Dual 11-bit ADC up to 125Msps with serial interface	90	66.7	JESD204A
ADC1015S series	Single 10-bit ADC up to 65/80/105/125Msps with input buffer	91	61.7	LVCMOS and LVDS/DRR
ADC1010S series	Single 10-bit ADC up to 125Msps	91	61.7	LVCMOS and LVDS/DRR
ADC1006S series	Single 10-bit ADC 50/70 Msps	71	59	parallel CMOS and TTL
ADC1005S060	Single 10-bit ADC 60 Msps	72	58	parallel CMOS and TTL
ADC1004S series	Single 10-bit ADC 30/40/50 Msps	72	58	parallel CMOS and TTL
ADC1003S series	Single 10-bit ADC 30/4050 Msps with internal Vref	70	58	parallel CMOS and TTL
ADC1002S020	Single 10-bit ADC 20 Msps	72	60	parallel CMOS and TTL
ADC0808S series	Single 8-bit ADC 125/250 Msps	57	50	parallel CMOS/ LVDS clk
ADC0804S series	Single 8-bit ADC 30/40/50 Msps	72	49	parallel CMOS and TTL
ADC0801S040	Single 8-bit ADC 40 Msps	59	47	parallel CMOS and TTL

High-Speed DAC Selection Table

Type	Description	SFDR (dBc)	Interpolation	Digital Interface
DAC1408D series	Dual 14-bit DAC upto 650/750 Msps	77	2x, 4x, 8x	JESD204A
DAC1405D series	Dual 14-bit DAC upto 650/750 Msps	77	2x, 4x, 8x	LVCMOS and LVDS/DRR
DAC1403D160	Dual 14-bit DAC 160 Msps	80	2x	parallel LVCMOS
DAC1401D125	Dual 14-bit DAC 125 Msps	88	–	parallel LVCMOS
DAC1208D series	Dual 12-bit DAC upto 650/750 Msps	77	2x, 4x, 8x	JESD204A
DAC1205D series	Dual 12-bit DAC upto 650/750 Msps	80	2x, 4x, 8x	LVCMOS and LVDS/DRR
DAC1203D160	Dual 12-bit DAC 160 Msps	77	2x	parallel LVCMOS
DAC1201D125	Dual 12-bit DAC 125 Msps	65	–	parallel LVCMOS
DAC1008D series	Dual 10-bit DAC upto 650/750 Msps	77	2x, 4x, 8x	JESD204A
DAC1005D series	Dual 10-bit DAC upto 650/750 Msps	77	2x, 4x, 8x	LVCMOS and LVDS/DRR
DAC1003D160	Dual 10-bit DAC 160 Msps	80	2x	parallel LVCMOS
DAC1001D125	Dual 10-bit DAC 125 Msps	65	–	parallel LVCMOS

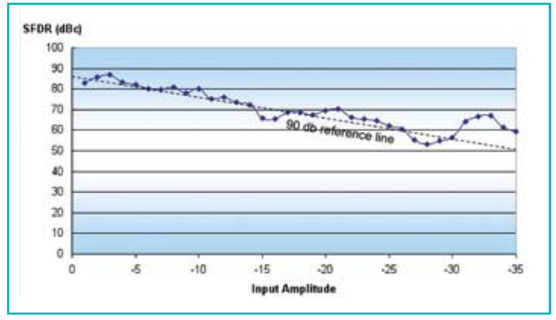
NXP uniquely supplies the complete radio signal chain—small signal RF ICs, data converters, and power RF devices

DAC1405D750 from NXP



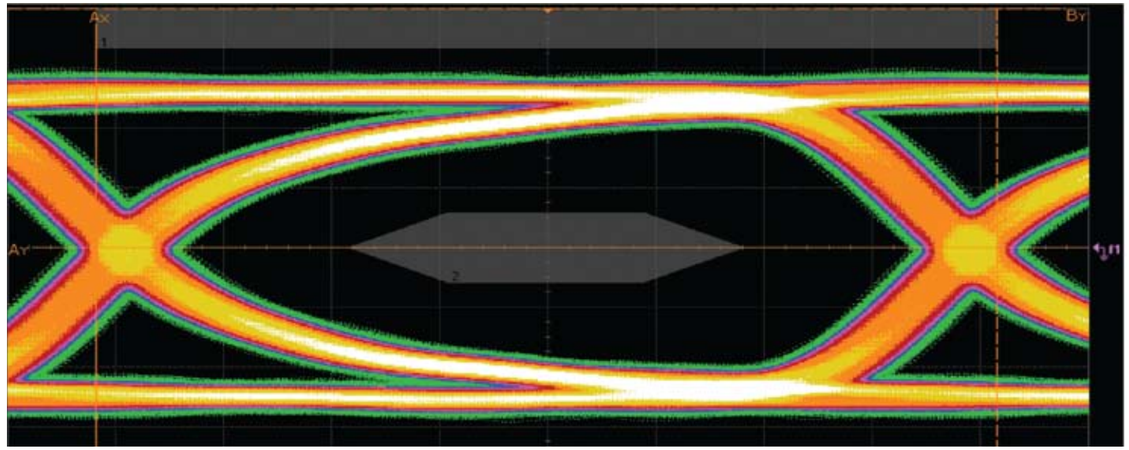
NXP's DACs outperform competitors by up to 6dB

ADC1610S from NXP



NXP's ADCs offer as much as 5dB of increased linearity versus alternative solutions

Eye diagram for 100cm long signal @ 3.125Gbps



As clearly shown in this time domain eye diagram, NXP's robust PLL design provides significant design margin versus the JESD204A jitter mask specifications, helping to enable the extended rate and reach capabilities of the CGV implementation of this standard.

The enhanced rate capability of NXP's CVG implementation of the JESD204A standard interface (up to 4 Gbps) allows higher bandwidth ADC data acquisition and DAC data rendering using fewer differential data lanes. The longer reach capability of NXP's CGV implementation (up to 100 cm between converter and FPGA/ASIC) enables more flexible and cost effective distributed signal processing system architectures, particularly in systems with numerous sensors or transducers.

The customer experience

NXP is the industry's *only* vendor to provide the entire RF signal chain—high-speed converters, small-signal RF AND power RF ICs—delivering unmatched built-in compatibility in signal-processing systems. This high level of signal chain coverage frees designers from the headaches associated with multi-vendor solutions, speeding design-to-delivery times and driving down BOM costs.

Whatever your demand, NXP can meet it. Producing over 65 million units per day, we control our front- and back-end manufacturing quality and cost structures. With 11 manufacturing sites worldwide, including internal 8-inch IC fabs in the Netherlands and Singapore; assembly plants in China, Hong Kong and Thailand; and SSMC, a joint venture with the world's largest foundry, TSMC—NXP has the manufacturing scale to support even the highest demand.

Our processes are all AEC100-certified for supply into the most quality-conscious customers and applications. All our manufacturing sites are ISO 9001 and, where automotive products are manufactured, ISO/TS16949-certified. We also work closely with our major customers to continuously advance quality.

Controlling the cost structure and end-to-end quality of our manufacturing base empowers us to follow our customers and their applications through all phases of market evolution—from inception through market maturity.

We also provide unparalleled sales and support. Strategically partnered with the world's global distribution leaders—Arrow, Avnet, Future Electronics and World Peace, we can supply product quickly and cost effectively through any direct or indirect channel.

NXP's world-class high-speed converter engineering team is based in Caen, France and in Eindhoven, The Netherlands

About NXP

Our History, People and Culture

You may know NXP from our roots. Founded by Royal Philips Electronics more than 50 years ago, NXP Semiconductors became an independent company in 2006. Headquartered in Europe, the company has 27,000 employees working in more than 30 countries and posted Q4 2009 sales of +$1.1B. This makes us one of top 5 semiconductor companies in analog and mixed-signal worldwide and one of the top 10 semiconductor vendors overall.

Experience NXP.

We are customer-focused with a passion to win.