High Speed

**Analog-to-Digital Converters**

and Track-and-Hold Amplifiers

**Communications & Microwave Infrastructure**

- Point-to-Point Backhauls
- Repeaters & Remote Radio Heads
- Direct Conversion & Diversity (MIMO) Receivers
- Macro BTS & Small Cells

**Test & Instrumentation**

- Digital Oscilloscopes
- Magnetic Resonance Imaging (MRI) & Ultrasound
- Spectrum Analyzers
- BER Testers

**Radar**

- Marine & Automotive Radar
- Pulse Detection Systems
- Phased Array Radar
- Radio Astronomy & Atmospheric LIDAR
Industry’s Best Performing Track-and-Hold Amplifiers

In addition to ADCs, Hittite offers a family of Track-and-Hold Amplifiers (T/H) that provides the capability of sampling ultra high-frequency microwave signals with excellent linearity and low noise. The T/H family is very well suited for use in front of high-speed ADCs and can support signal frequencies up to 18 GHz and sampling rates up to 4 GSPS. These devices have applications in wideband microwave A/D conversion typically employed in radar, communications, electronic surveillance and test & measurement equipment.

Standard Converter Products

Hittite offers a wide range of standard High Speed ADCs for Communication, Instrumentation, Industrial & Military applications. Low power consumption and high performance is combined with a high degree of flexibility.

- Sampling Rates: 3 to 1000 MSPS
- Resolution: 8 to 16 Bits
- CMOS & LVDS Interfaces
- Configuration of Power Consumption & Functionality with SPI Settings
- Integrated Instrumentation Functionality

Analog Made Easy™

With Hittite’s Analog Made Easy philosophy, we are committed to user friendly products. We have built multiple features and functionality into our ADCs that make our products easy to use, thus reducing overall cost for the system designer.

- EasySuite™: Evaluation & Prototyping Platform Environment
- EasyBoard™: Supplied Evaluation Board Connected to Xilinx Standard FMC Board
- EasyStack™: Firmware Code Stack Available for Xilinx©

Custom Signal Path Solutions

Hittite also offers signal path solutions for multiple applications.

- LNA, VGAs & Analog Multiplexers (Analog Front End)
- Analog-to-Digital Converters
- LVDS Interface
- MCMs Integrating RF & Microwave Functions with ADCs
- FPGA Code for Multiple Applications, such as: Digital Down Conversion, Image Rejection & Oscilloscope Triggers
## Data Converter Products

### Low Power Analog-to-Digital Converters

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<th>Sample Rate</th>
<th>Function/Mode</th>
<th>Resolution (bits)</th>
<th># of Channels</th>
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<th>SNR (dBFS)</th>
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Ultra High Speed Analog-to-Digital Converters

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<th>Sample Rate (GSPS)</th>
<th>Resolution (Bits)</th>
<th>ENOB</th>
<th>SFDR (dBFS)</th>
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Multi-GHz Quantizer

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<th>Content</th>
<th>Sampling Rate (MSPS)</th>
<th>SFDR @ 7 GHz</th>
<th>SNR @ 9 GHz</th>
<th>Input Signal Range (Vp - p)</th>
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<td>High Speed Data Acquisition</td>
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Track-and-Hold Amplifiers

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<th>Maximum Clock Rate (GSPS)</th>
<th>Output Noise (mV RMS)</th>
<th>Hold Mode Feed-through Rejection (dB)</th>
<th>Package</th>
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NEW!

HMCAD1063 – Dual 14-Bit Data Converter, 250 & 400 MSPS
HMCAD1073 – Dual 16-Bit Data Converter, 250 & 400 MSPS

- 14-Bit, 16-Bit Resolution
- 50 to 400 MSPS Sampling Rate Range
- 14-Bit: 85 dB SFDR & 72 dB SNR @ Fin = 125 MHz, FS = 400 MSPS
- 16-Bit: 90 dB SFDR & 76 dB SNR @ Fin = 125 MHz, FS = 400 MSPS
- Coarse & Fine Gain Control
- Dynamic Power Scaling vs. Sample Rate
- 2 & 4-Bit Fast Amplitude Detect (FAD) Outputs
NEW!

**HMC661LC4B – Ultra Wideband 4 GSPS Track-and-Hold Amplifier, DC - 18 GHz**

- 18 GHz Input Bandwidth (1 Vp-p Full Scale)
- 4 GSPS Maximum Sampling Rate
- 68 dB SFD (4 GHz/0.5 Vp-p Input, CLK = 1 GSPS)
- 57 dB SFD (4 GHz/1 Vp-p Input, CLK = 1 GSPS)
- Ultra-Clean Output Waveforms, Minimal Glitching
- >60 dB Hold Mode Feedthrough Rejection

**HMCAD1062 – Quad 14-Bit Data Converter, 80/105/125 MSPS**

**HMCAD1068 – Dual 14-Bit Data Converter, 80/105/125 MSPS**

- 1.8/1.8/1.9V Single Supply Operation @ 80/105/125 MSPS
- IF Sampling Up to 230 MHz
- SNR = 74 dBFS @ 125 MSPS & SFDR = 82 dBc @ 125 MSPS
- 2 Vp-p Differential Analog Input
- Coarse & Fine Gain Control
- Low Power Dissipation: HMCAD1062 - 760 mW @ 125 MSPS
  HMCAD1068 - 455 mW @ 125 MSPS

**Data Converter Solutions:** adcsupport@hittite.com

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**Performance vs. Fin @ 125 MSPS**

**HMC661LC4B**

**Sampling Transfer Function**
HMCAD5831L9BE — 3-Bit 26 GSPS A/D Converter with Overrange, Inhibit, & 1:2 DEMUX

- Full Flash Architecture
- Over/Under Range Bit
- Data Inhibit Function
- Data XOR Function
- 1:2 DEMUX
- CML Outputs with Programmable Voltage Swing

HMCAD1512 — 8-Bit, Dual-Channel 450 MSPS or Single-Channel 900 MSPS A/D Converter

- 8-Bit, Dual Channel 450 MSPS or 8-Bit, Single Channel 900 MSPS
- Internal 13-Bit Resolution Enables Full Scale Range Operation from 2 Vp-p down to 63 mVp-p
- Ultra Low Power Dissipation: 650 mW @ 900 MSPS, including I/O
- 1X Gain: 48.8 dB SNR, 10X Gain: 48.0 dB SNR 650 mW including I/O @ 900 MSPS
EKIT01-HMC9000 — Multi-GHz Quantizer for High Speed Data Acquisition

- Pulse Detection & Test Systems
- Direct Quantizer for Equivalent Time Sampling Systems including:
  - Pulse Radars
  - Bit Error Rate Testers (BERT)
  - Optical Time Domain Reflectometers (OTDR)
- Complete Multi-GHz Quantizer Board:
  - DC - 18 GHz Input Band Track-and-Hold
  - 8-Bit 1000 MSPS ADC
  - PLL + VCO
  - Clock Delay Controller
  - FGPA Board with EasyStack™ Firmware CodeStack
  - EasySuite™ GUI

Performance vs. Input Signal Amplitude,
Pin = 6 GHz, FS = 1000 MSPS

SNR vs. Input Frequency

Data Converter Solutions: adcsupport@hittite.com
IF Digital Pre-Distortion (DPD) Remote Radio Head

Baseband Digital Pre-Distortion (DPD) Remote Radio Head
Dual-Channel Receiver Remote Radio Head

- **HMC1030LP4E**
  - Power Detector
  - DC - 3.9 GHz

- **HMC1190LP4E**
  - Wideband Dual Downconverter
  - 0.7 - 3.5 GHz
  - 8 dB Conversion Gain
  - 25 dBm IP3
  - 9 dB Noise Floor

- **HMC1031MS8E**
  - Integer Mode PLL
  - Up to 500 MHz

- **HMC1035LP6GE**
  - Clock Generator
  - 25 - 2500 MHz
  - 97 fs RMS Jitter

- **HMC1033LP6GE**
  - Clock Generator
  - 25 - 550 MHz
  - 99 fs RMS Jitter

**NEW!**
- **HMC1034LP6GE**
  - Clock Generator
  - 25 - 2500 MHz
  - 78 fs RMS Jitter

- **HMC1032LP6GE**
  - Clock Generator
  - 125 - 3000 MHz
  - 75 fs RMS Jitter

**NEW!**
- **HMC1068**
  - 2-Channel, 14-Bit, 125 MSPS
- **HMC1063**
  - 2-Channel, 14-Bit, 400 MSPS

Single-Channel Repeater, Receiver Forward or Reverse

- **HMC1030LP4E**
  - Power Detector
  - DC - 3.9 GHz

- **HMC1090LP3E**
  - Broadband High IP3 Downconverter
  - 0.7 - 3.5 GHz
  - 7 dB Conversion Gain
  - 25 dBm High IP3

- **HMC1031MS8E**
  - Integer Mode PLL
  - Up to 500 MHz

- **HMC1035LP6GE**
  - Clock Generator
  - 25 - 2500 MHz
  - 97 fs RMS Jitter

- **HMC1033LP6GE**
  - Clock Generator
  - 25 - 550 MHz
  - 99 fs RMS Jitter

- **HMC1034LP6GE**
  - Clock Generator
  - 25 - 2500 MHz
  - 78 fs RMS Jitter

**NEW!**
- **HMC835LP6GE**
  - Wideband PLL + VCO
  - 32 - 4000 MHz
  - 4 Outputs

- **HMC835LP6GE**
  - Wideband PLL + VCO
  - 32 - 4000 MHz
  - 4 Outputs

**NEW!**
- **HMC1056**
  - 1-Channel, 2-Bit, 640 MSPS
- **HMC1068**
  - 2-Channel, 14-Bit, 125 MSPS
- **HMC1063**
  - 2-Channel, 14-Bit, 400 MSPS

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Data Converter Solutions

Direct Conversion Receiver (DCR) Remote Radio Head

- HMC1031MS8E Integer Mode PLL
  - Up to 500 MHz
- Demodulator
  - HMC597LP4E Wideband Demodulator
    - 100 - 4000 MHz
- Synthesizer
  - HMC1023LP5E Dual Programmable Low Pass Filter
    - 5 - 72 MHz
- PLL
  - HMC383LP6GE Wideband PLL + VCO
    - 33 - 4100 MHz
    - 4 Outputs

Spectrum Analyzers Featuring the HMCAD1062

- HMC1033LP6GE Clock Generator
  - 25 - 650 MHz, 3.3V
  - 99 fs RMS Jitter
- Power Divider
  - HMC680LP4E 5-Bit DVGA with Differential Outputs
    - 30 - 400 MHz
    - 4 - 79 dB Gain
    - 40 dBm OIP3
- Gain Ctrl
  - HMC1062 14-bit A/D Converter
    - 125 MSPS
    - 4 Channels
- ADC
  - Digital Gain
  - LVDS
- SPI
  - 1/2/4/8
- PLL
  - LVDS

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Digital Oscilloscopes Featuring the HMCAD1510 & HMCAD1511

HMC1035LP6GE
Clock Generator
• 25 - 2500 MHz, 3.3V
• 97 fs RMS Jitter

HMCAD1510
8-Bit A/D Converter
• 125/250/500 MSPS
• Quad/Dual/Single Channels

HMCAD1511
8-Bit A/D Converter
• 250/500/1000 MSPS
• Quad/Dual/Single Channels

Analog Front End

Vin Vin REF +3V

HMC860LP3E
High PSRR DC Regulator
• 3.35V - 5.6V

Medical & Industrial Imaging (Ultrasound) Featuring the HMCAD1100/1101/1102

HMC1035LP6GE
Clock Generator
• 25 - 2500 MHz, 3.3V
• 97 fs RMS Jitter

HMCAD1100/1101/1102
12-Bit A/D Converter
• 8 Channels
• 80 MSPS
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