High Speed IC Solutions

High Speed Logic, TIAs, LIAs, Optical Driver Amps & Data Converters

100G Ethernet Solutions
OC-768 Solutions
OC-192 Solutions
Software Defined Radio
Digital Receivers
Radar, EW & ELINT Systems
Medical & Industrial Instrumentation
Broadband Test & Measurement

Hittite Microwave Corporation

JUNE 2009
**HMC690 - 10 Gbps Transimpedance Amplifier (TIA) Chip**

**Features**
- 1.25 k Ohm Differential Gain
- +3.3V Single Power Supply
- 11 pA/√Hz Input Referred Noise Density
- 3 mA p-p Overload
- Average Input Power Monitoring
- Output Offset Adjustment

**Applications**
- SONET OC-192 and SDH STM-64 Transponders
- 10 Gbps Ethernet
- Broadband Instrumentation
- Short, Intermediate and Long Reach Optical Receiver Modules

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Data Rate (Gbps)</th>
<th>Function</th>
<th>Transimpedance (k Ohm)</th>
<th>Input Overload (mApp)</th>
<th>Small Signal Bandwidth (GHz)</th>
<th>Deterministic Jitter (ps)</th>
<th>Noise (pA/√Hz)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMC690</td>
<td>1 - 10</td>
<td>10 Gbps Transimpedance Amplifier</td>
<td>1.25</td>
<td>3</td>
<td>7.5</td>
<td>&lt; 10</td>
<td>11</td>
<td>Chip</td>
</tr>
</tbody>
</table>

Full data specifications are available at www.hittite.com

**HMC750LP4E - 12.5 Gbps Limiting Amplifier (LIA) SMT - New Product line!**

**Features**
- Supports Data Rates up to 12.5 Gbps
- Integrated DC Offset Correction
- 2mV p-p input Sensitivity
- Very Low RMS Jitter Degradation
- Adjustable Differential Saturated O/P Voltage Swing up to 880 mVpp

**Applications**
- OC-192 Receivers
- 10 Gbps Ethernet Receivers
- 10 Gbps Fiber Channel Receivers
- Broadband Test & Measurement

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Data Rate (Gbps)</th>
<th>Function</th>
<th>Small Signal Bandwidth (GHz)</th>
<th>Differential Gain (dB)</th>
<th>Deterministic Jitter (ps p-p)</th>
<th>Additive Random Jitter (ps rms)</th>
<th>Supply Current</th>
<th>Package</th>
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<tbody>
<tr>
<td>HMC750LP4E</td>
<td>12.5</td>
<td>Limiting Amplifier</td>
<td>11</td>
<td>44</td>
<td>5</td>
<td>0.2</td>
<td>+5V @ 106mA</td>
<td>LP4</td>
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</tbody>
</table>

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**Generic Fiber Optic Transceiver**
**Optical Driver Amplifiers**

**HMC-AUH232 - Microwave & Optical Driver Amplifiers Operate to 65 GHz**

- **Features**
  - Small Signal Gain: 12 dB
  - Output Voltage up to 8 Vpp
  - Single-Ended I/Os
  - High Speed Performance: 46 GHz 3dB Bandwidth
  - Low Power Dissipation: 0.9W

- **Applications**
  - 40 Gbps Lithium Niobate / Mach-Zender Fiber Optic Modulations
  - Broadband Gain Block for Test & Measurement
  - Broadband Gain Block for RF Applications

**HMC-AUH232 Eye Diagram**

PRBS = 2^{31}-1, 7.3V Input, Data Rate = 40 Gbps

**Output Voltage Delta vs. Control Voltage**

**Optical Driver Amplifier Product Line**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (GHz)</th>
<th>Function</th>
<th>Gain (dB)</th>
<th>Group Delay Variation (ps)</th>
<th>Additive Jitter (ps)</th>
<th>P1dB (dBm)</th>
<th>Output Voltage Level (Vpp)</th>
<th>Package</th>
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<tbody>
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<td>HMC-AUH232</td>
<td>DC - 45</td>
<td>Wideband Optical Driver</td>
<td>14</td>
<td>± 10</td>
<td>0.4</td>
<td>16.5</td>
<td>8</td>
<td>Chip</td>
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<tr>
<td>HMC-AUH249</td>
<td>DC - 35</td>
<td>Wideband Optical Driver</td>
<td>15</td>
<td>± 10</td>
<td>-</td>
<td>21</td>
<td>8</td>
<td>Chip</td>
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<td>HMC-AUH312</td>
<td>0.5 - 65</td>
<td>Wideband Optical Driver</td>
<td>10</td>
<td>-</td>
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<td>-</td>
<td>2.5</td>
<td>Chip</td>
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</tbody>
</table>

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**Legend**

- Green: Current custom and standard Hittite Microwave products.
- Blue: Custom integration and development available. Contact FO@hittite.com for inquiries.

This Transceiver Chain is generic for 10 Gbps, 40 Gbps, 4 x 25 Gbps => 100 Gbps. Current Hittite products are targeting 10 Gbps, 40 Gbps and 100 G Ethernet operating at 28 Gbps.
HMC-C060 - 43 Gbps, D-Type Flip-Flop Module

**Features**
- Supports Data Rates up to 43 Gbps
- Less than 200 fs Additive RMS Jitter
- Hermetically Sealed Housing with 1.85 mm connectors
- -40 °C to +70°C Operating Temperature

**Applications**
- OC-768 & SDH STM-256 Equipment
- Serial Data Transmission up to 43 Gbps
- Digital Logic Systems up to 43 Gbps
- Broadband Test & Measurement

43 Gbps Hogge Phase Detector for Clock & Data Recovery

HMC-C060 Output Eye Diagram @ 43 Gbps

A Selection of In-Stock High Speed Digital Logic Including 11 New Products

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Data / Clock Rate (Gbps / GHz)</th>
<th>Function</th>
<th>Rise / Fall Time (ps)</th>
<th>Deterministic Jitter (ps)</th>
<th>Differential Output Voltage Swing (Vpp)</th>
<th>DC Power Consumption (mW)</th>
<th>DC Power Supply (Vdc)</th>
<th>Package</th>
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<tbody>
<tr>
<td>HMC724LC3C</td>
<td>13 / 13 Fast Rise Time 1:2 Fanout Buffer</td>
<td>19 / 18 2 1.1</td>
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<td>300</td>
<td>-3.3</td>
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<tr>
<td>HMC744LC3C</td>
<td>13 / 13 (1) Fast Rise Time 1:2 Fanout Buffer</td>
<td>22 / 20 2 0.6 - 1.1</td>
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<td>290</td>
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<td>HMC728LC3C</td>
<td>13 / 13 D-1 Selector</td>
<td>17 / 15 2 1.1</td>
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<td>HMC726LC3C</td>
<td>13 / 13 Fast Rise Time AND / NAND / OR / NOR</td>
<td>19 / 18 2 1</td>
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<td>13 / 13 (1) Fast Rise Time AND / NAND / OR / NOR</td>
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<td>13 / 13 Fast Rise Time AND / NAND / OR / NOR</td>
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<td>260</td>
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<tr>
<td>HMC727LD3C</td>
<td>13 / 13 Fast Rise Time D Type Flip-Flop</td>
<td>19 / 17 2 1</td>
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<td>260</td>
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<td>HMC747LD3C</td>
<td>13 / 13 (1) Fast Rise Time D Type Flip-Flop</td>
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<td>264</td>
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<td>HMC729LD3C</td>
<td>26 - 26 T Flip-Flop w/Reset</td>
<td>18 / 17 2 1.1</td>
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<td>LC3C</td>
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<td>HMC749LD3C</td>
<td>26 / 26 (1) T Flip-Flop w/Reset</td>
<td>18 / 17 2 0.6 - 1.1</td>
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<td>270</td>
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<tr>
<td>HMC706LD3C</td>
<td>13 / 13 (1) NRZ-to-RZ Converter</td>
<td>15 / 13 2 0.3 - 1.2</td>
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<td></td>
<td>594</td>
<td>+3.3</td>
<td>LC3C</td>
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<tr>
<td>HMC725LD3C</td>
<td>13 / 13 XOR / XNOR</td>
<td>19 / 18 2 1</td>
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<td>230</td>
<td>-3.3</td>
<td>LC3C</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC745LD3C</td>
<td>13 / 13 (1) Fast Rise Time XOR / XNOR</td>
<td>21 / 19 2 0.6 - 1.2</td>
<td></td>
<td></td>
<td></td>
<td>240</td>
<td>+3.3</td>
<td>LC3C</td>
</tr>
</tbody>
</table>

[1] These devices feature programmable output voltage. Full data specifications are available at www.hittite.com
**High Speed Comparators & Track-and-Hold Amplifier**

**Features**
- Low Jitter: <1ps rms
- Low Power Dissipation
- Resistor Programmable Hysteresis
- Supports 10 Gbps & 10 GHz Data Clock/Rates

**Applications**
- Broadband Test & Measurement
- ATE
- Digital Receiver Systems
- Clock & Data Restoration
- High Speed Trigger Circuits

### High Speed Comparator Product Line

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Input Clock Rate (GHz)</th>
<th>Deterministic Jitter (ps)</th>
<th>DC Power Consumption (mW)</th>
<th>Vcc, Vee Power Supply (Vdc)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMC674LC3C</td>
<td>Latched Comparator-RSPECL</td>
<td>9.3</td>
<td>2</td>
<td>140</td>
<td>+3.3, -3.0</td>
<td>LC3C</td>
</tr>
<tr>
<td>HMC675LC3C</td>
<td>Latched Comparator-RSCML</td>
<td>10</td>
<td>2</td>
<td>100</td>
<td>+3.3, -3.0</td>
<td>LC3C</td>
</tr>
<tr>
<td>HMC676LC3C</td>
<td>Latched Comparator-RSECL</td>
<td>10</td>
<td>2</td>
<td>120</td>
<td>+3.3, -3.0</td>
<td>LC3C</td>
</tr>
</tbody>
</table>

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**Wideband EW Receiver**

**Features**
- 4.5 GHz Input Bandwidth
- 9-Bit T/H Mode Linearity
- 3 GS/s Maximum Clock Rate
- Ultra Clean Waveforms, Minimal Glitching
- >60 dB Hold Mode Feedthrough Rejection

**Applications**
- RF ATE
- Digital Sampling Oscilloscopes
- RF Demodulation Systems
- Digital Receiver Systems
- Software Defined Radio

### High Linearity Track-and-Hold Amplifier

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Input Freq. (GHz)</th>
<th>Single Tone THD/SFDR (dB)</th>
<th>Max. Clock Rate (GS/s)</th>
<th>Output Noise (mV RMS)</th>
<th>Hold Mode Feedthrough Rejection (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMC660LC4B</td>
<td>Track-and-Hold Amplifier</td>
<td>0.02 - 4.5</td>
<td>-66 / 67</td>
<td>3</td>
<td>0.95</td>
<td>&gt;60</td>
<td>LC4B</td>
</tr>
</tbody>
</table>

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What We Do

Hittite Microwave Corporation is an innovative designer and manufacturer of analog and mixed-signal ICs, Modules, Subsystems and Instrumentation for RF, microwave and millimeterwave applications covering DC to 110 GHz. Our RFIC/MMIC products are developed using state-of-the-art GaAs, GaN, InGaP/GaAs, InP, SOI, SiGe, CMOS and BiCMOS semiconductor processes utilizing MESFET, HEMT, pHEMT, mHEMT, HBT and PIN devices. We offer over 750 products across 20 product lines:

- Amplifiers
- High Speed Digital Logic Interface
- Data Converters
- Limiting Amplifiers
- Freq. Dividers & Detectors Mixers
- Freq. Multipliers
- Mods. & Demodulators
- Passives PLLs
- Signal Generators
- Switches
- Transimpedance Amplifier
- VGAs
- VCOs & PLOs

We also design and supply highly integrated custom ICs, Modules, Subsystems and Instrumentation that combine multiple functions for specific requirements. We select the most appropriate semiconductor and package technologies, uniquely balancing digital and analog integration techniques.

Our custom and standard products support a wide range of wireless / wired communications and radar applications for the following markets:

- **Automotive**
  - Telematics & Sensors
- **Fiber Optic**
  - OC-48 to 100G
- **Space**
  - Payload Electronics
- **Test & Measurement**
  - Commercial / Industrial
  - Sensors & Test Equipment
- **Military**
  - C11, ECM & EW
- **Cellular Infrastructure**
  - GSM, GPRS, CDMA, WCDMA, UMTS, TD-SCDMA & 4G/LTE
- **Broadband**
  - CATV, DBS, WiMAX, WLAN, Fixed Wireless & UWB
- **Microwave & mmWave Communications**
  - Backhaul Radio Links
  - Multi-Pt Radios & VSAT
- **Test & Measurement**
  - Commercial / Industrial
  - Sensors & Test Equipment
- **Military**
  - C11, ECM & EW
- **Space**
  - Payload Electronics
- **Test & Measurement**
  - Commercial / Industrial
  - Sensors & Test Equipment
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  - Telematics & Sensors
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  - OC-48 to 100G
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  - Payload Electronics
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  - Sensors & Test Equipment
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  - C11, ECM & EW
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- **Broadband**
  - CATV, DBS, WiMAX, WLAN, Fixed Wireless & UWB
- **Microwave & mmWave Communications**
  - Backhaul Radio Links
  - Multi-Pt Radios & VSAT

Every component is backed by Hittite Microwave’s commitment to total quality. HMC is ISO 9001:2000 and ISO/TS 16949:2002 certified. Every Hittite employee and subcontractor is responsible for maintaining the highest level of quality. We are constantly working towards improvement of our procedures and processes, thus providing our customers with products that meet or exceed all requirements, are delivered on-time and function reliably throughout their useful life.