HITTITE LAUNCHES NEW LIMITING AMPLIFIER PRODUCT LINE!

Ideal for OC-192 & 10 Gbps Ethernet/Fiber Channel Receivers

The first product within Hittite’s new Limiting Amplifier (LIA) Product Line is now available. The HMC750LP4E Limiting Amplifier is designed to support data transmission rates up to 12.5 Gbps, offers a 3 dB bandwidth of 11 GHz, and can operate over a wide range of input voltage levels while providing a constant-level differential output voltage swing. The amplifier also features an output level control pin, which permits adjustments to compensate for cable losses or to optimize signal levels. Input signals greater than 3 mV pp may be amplified to the fully saturated 880 mV pp differential output signal level.

Ideal for use as a post amplifier in OC-192 and STM-64 optical receiver applications, the HMC750LP4E features very wide bandwidth, single and differential I/Os, serial/parallel control modes and an industry leading 63 dB gain control range. Hittite’s highly integrated DVGAs help designers achieve their goals for reduced parts count, consistent performance and reduced PC board area, and are targeted to IF and RF applications in Cellular/3G infrastructure, WiMAX/4G infrastructure and subscribers, as well as test equipment and microwave radio applications where precise gain control is required.

The HMC743LP6CE is an IF and RF DVGA which is rated from DC to 4 GHz, and provides microwave radio applications where precise gain control is required. The amplifier also features an output level control pin, which permits adjustments to compensate for cable losses or to optimize signal levels. Input signals greater than 3 mV pp may be amplified to the fully saturated 880 mV pp differential output signal level.

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HITTITE ADDS FIVE NEW DIGITAL VARIABLE GAIN AMPLIFIERS!

DVGAs Address IF & RF Applications with up to 63 dB Gain Control Range

Five new Digitally Controlled Variable Gain Amplifiers (DVGAs) are now available for high linearity applications from DC to 4 GHz. Hittite’s SMT DVG product line offers a combination of features such as low noise figure, wide bandwidth, single and differential I/Os, serial/parallel control modes and an industry leading 63 dB gain control range. Hittite’s highly integrated DVGAs help designers achieve their goals for reduced parts count, consistent performance and reduced PC board area, and are targeted to IF and RF applications in Cellular/3G infrastructure, WiMAX/4G infrastructure and subscribers, as well as test equipment and microwave radio applications where precise gain control is required.

The HMC743LP6CE is an IF and RF DVGA which is rated from DC to 4 GHz, and provides microwave radio applications where precise gain control is required.

PROGRAMMABLE DIVIDER ADVANCES SYNTHESIZER DESIGN!

Low Noise Integer-N Divider Accepts Input Frequencies to 6.5 GHz!

Hittite announces the release of an ultra low noise programmable frequency divider which supports advanced signal generation architectures found in test equipment, laboratory systems, microwave radio and various military applications.

The HMC705LP4E is a low noise GaAs HBT programmable divider that can divide input frequencies up to 6.5 GHz by any integer value from 1 to 17. The HMC705LP4E delivers high frequency operation along with a low noise floor, making it ideal in high performance, fast settling synthesizer architectures. The SSB phase noise for the divide-by-17 state is better than -153 dBc/Hz at offset frequencies greater than 100 kHz.

The HMC705LP4E is housed in a miniature 4x4 mm RoHS compliant QFN leadless SMT package and can be combined with many of Hittite’s standard MMIC VCO products to create state-of-the-art frequency synthesizers and phase locked oscillators (PLOs).
GaAs MMIC Amplifiers for 3G/4G Infrastructure,

HMC599ST89E

75Ω Low Noise Amplifier, 50 - 960 MHz

**Features**
- High P1dB Output Power: +19 dBm
- High Output IP3: +39 dBm
- Low Noise Figure: 2 dB
- Single Supply: +3V or +5V
- 75 Ohm Matched Input/Output

**Ideal for CATV Subscribers**
The HMC599ST89E is a GaAs pHEMT High Linearity, Low Noise Gain Block MMIC SMT Amplifier covering 50 to 960 MHz. The amplifier can be used as a cascadable 75 Ohm RF or IF gain stage as well as a PA or LO driver with up to +19 dBm output power. The HMC599ST89E offers 14 dB of gain with a +39 dBm output IP3 at 250 MHz, and can operate directly from a +3V or +5V supply. The HMC599ST89E exhibits excellent gain and output power stability over temperature, while requiring a minimal number of external bias components.

HMC718 / 719LP4E

Low Noise Amplifiers Cover 0.6 to 2.9 GHz

**Adjustable Supply Current**
The HMC718LP4E (0.6 to 1.4 GHz) & HMC719LP4E (1.3 to 2.9 GHz) are GaAs pHEMT MMIC Low Noise Amplifiers that are ideal for Cellular/3G and LTE/WiMAX/4G basestation front-end receivers operating between 600 to 2900 MHz. The amplifiers have been optimized to provide as low as 0.8 dB noise figure, 34 dB gain and +40 dBm output IP3 from a single supply of +5V. Input and output return losses are excellent and the LNAs require minimal external matching and bias decoupling components. The amplifiers can be biased with +3V to +5V and features an externally adjustable supply current.

HMC715 / 716 / 717LP3E

Low Noise Amplifiers Cover 2.1 to 6.0 GHz

**LNAs for WiMAX & 4G Bands**
The HMC715LP3E (2.1 to 2.9 GHz), HMC716LP3E (3.1 to 3.9 GHz) and HMC717LP3E (4.8 to 6.0 GHz) are GaAs pHEMT MMIC Low Noise Amplifiers that are ideal for Cellular/3G and LTE/WiMAX/4G basestation receivers. The amplifiers have been optimized to provide 0.9 dB noise figure, 19 dB gain and +33 dBm output IP3. Input and output return losses are excellent and the LNA requires minimal external components. The amplifiers can be biased with +3V to +5V and features an externally adjustable supply current which allows the designer to tailor the linearity performance of the LNA for each application.
HMC637

**Features**

- Psat Output Power: +30 dBm
- Gain: 14 dB
- Output IP3: +41 dBm
- Bias Supplies: +12V @ 400mA
- 50 Ohm Matched Input/Output

**Distributed Topology**

The HMC637 is a GaAs MMIC pHEMT Distributed Power Amplifier die which operates between DC and 6 GHz. The amplifier provides 14 dB of gain, +41 dBm output IP3 and +29 dBm of output power at 1 dB gain compression while requiring 400 mA from a +12V supply. Gain flatness is excellent at ±0.5 dB from DC to 6 GHz making the HMC637 ideal for EW, ECM, Radar and test equipment applications. The HMC637 amplifier I/Os are internally matched to 50 ohms facilitating integration into Multi-Chip-Modules (MCMs).

HMC693

**Features**

- Saturated Output Power: +30 dBm @ 23% PAE
- High Output IP3: +37 dBm
- High Gain: 18 dB
- DC Supply: +5V @ 800 mA
- 50 Ohm Matched Input/Output

**Consistent Gain & Power**

The HMC693 is a two stage GaAs pHEMT MMIC 1 Watt Power Amplifier which operates between 27 and 34 GHz. The HMC693 provides 18 dB of gain, and +30 dBm of saturated output power at 23% PAE from a +5V supply. The RF I/Os are DC blocked and matched to 50 Ohms with no external components for ease of integration into Multi-Chip-Modules (MCMs). All data is taken with the chip in a 50 Ohm test fixture connected via 0.025 mm (1 mil) diameter wire bonds of length 0.31 mm (12 mils).

HMC-ABH264

**Features**

- High Output IP3: +29 dBm
- High P1dB: +18 dBm
- High Gain: 18.5 dB
- Bias Supply: +5V
- 50 Ohm Matched Input/Output

**Ideal for Point-to-Point Radio**

The HMC-ABH264 is a high dynamic range GaAs pHEMT MMIC Medium Power Amplifier which operates between 33 and 42 GHz. The HMC-ABH264 provides 18.5 dB of gain, and an output power of +18 dBm at 1 dB compression from a +5V supply. This compact die delivers consistent output power and excellent gain flatness across its rated bandwidth. All data is measured with the chip in a 50 Ohm test fixture connected via 0.025mm (1 mil) diameter wire bonds of minimal length 0.31mm (12 mils).
HMC-C057

**Wideband Power Amplifier Module, 0.01 - 20 GHz**

**Features**
- Gain: 12 dB
- P1dB Output Power: +28 dBm
- Internally Regulated Supply & Bias Sequencing
- Hermetically Sealed Module

**Psat & Gain**

**Combine with HMC-T2000!**

The HMC-C057 is a GaAs pHEMT MMIC Power Amplifier module which is ideal for boosting the output power of the HMC-T2000 Synthesized Signal Generator to +28 dBm. The amplifier provides 12 dB of gain and up to +36 dBm output IP3. Gain flatness is excellent across the band making the HMC-C057 ideal for wideband test equipment applications. Integrated voltage regulators allow for flexible biasing of both the negative and positive supply pins, while internal bias sequencing circuitry assures trouble-free operation.

HMC-C049

**Double-Balanced Mixer Module, 7 - 14 GHz**

**Features**
- Passive DBL-BAL Topology
- High LO/RF Isolation: 48 dB
- Low Conversion Loss: 7 dB
- Wide IF Bandwidth: DC - 5 GHz
- Robust 1KV ESD, Class 1C
- Hermetically Sealed Module

**Conversion Gain & Isolation**

**Extends ATE Frequency Range**

The HMC-C049 is a 7 - 14 GHz double balanced mixer module which provides low conversion loss, high isolation, and wide IF bandwidth. This mixer does not require a DC bias and can operate with an LO power level of +9 dBm. The package is a hermetically sealed module that is assembled and tested to meet MIL-883-STD qualifications. This product comes standard with field replaceable SMA connectors that can also be interchanged with blind mate SMP connectors or detached to allow direct connection of the I/O pins to a microstrip or coplaner circuit.

HMC-C056

**x2 Active Frequency Multiplier Module, 8 - 21 GHz Output**

**Features**
- High Output Power: +14 dBm
- Input Power Drive: 0 to +10 dBm
- Low SSB Phase Noise: -142 dBc/Hz @ 100 kHz
- Fo Isolation 16 dBc @ 15 GHz
- Hermetically Sealed Module

**Conversion Gain & Isolation**

**Wideband, Low Phase Noise!**

The HMC-C056 is a x2 active broadband frequency multiplier module utilizing GaAs pHEMT technology in a miniature hermetic module. When driven by a +6 dBm signal, the multiplier provides +14 dBm typical output power from 8 - 21 GHz. The Fo isolation is 16 dBc @ 15 GHz with respect to output signal level. This frequency multiplier features DC blocked I/O’s, and is ideal for use in LO multiplier chains for Pt to Pt & VSAT radios yielding reduced parts count vs. traditional approaches. The low additive SSB Phase Noise of -142 dBc/Hz at 100 kHz offset helps maintain good system noise performance.
Hittite Launches +3.3V High Speed Logic Competitive Replacements!

Hittite has launched six new high speed logic products to complement our growing high speed logic product line. Operating with clock rates ranging from 13 GHz up to 26 GHz, these devices are pin-compatible industry replacements for a number of Inphi logic components, and are ideal for deployment in optical systems, ATE, broadband test and measurement equipment, frequency synthesis, and radar signal processing systems. These logic devices are also optimized for fast rise and fall times, low jitter and low DC power requirements, with an output level control pin feature which allows for signal loss compensation or signal level optimization. Typical deterministic jitter is 2 ps, while random jitter is 0.2 ps RMS.

The HMC744LC3C, HMC745LC3C, HMC746LC3C, HMC747LC3C, HMC748LC3C and HMC749LC3C operate from a +3.3V supply, are specified for operation from -40°C to +85°C and are housed in RoHS compliant 3x3 mm ceramic SMT packages.

Versatile InGaP HBT MMIC VCOs Feature Multiple Outputs!

Six new InGaP HBT MMIC VCOs have been added to our extensive VCO product line. These new VCOs are ideal for test equipment, industrial, VSAT, point-to-point radio, and military applications from 8.6 to 26.8 GHz. These low noise VCOs are housed in leadless QFN 4 x 4 and 5 x 5 mm surface mount packages, and can be combined with Hittite’s HMC700LP4E PLL IC to create state-of-the-art synthesizers and phase locked oscillators (PLOs).

The HMC734LP5E, HMC735LP5E, HMC736LP4E, HMC737LP4E, HMC738LP5E, and HMC739LP5E deliver SSB phase noise as low as -105 dBc/Hz, with output power up to +18 dBm. All six VCOs operate from a single positive supply, require no external matching components, and accept a tuning voltage from 1 to 13V. These fully integrated MMIC VCOs exhibit excellent phase noise performance over temperature and shock, due to the oscillator’s monolithic structure.

Each of these MMIC VCO and are ideal to for driving the LO port of many of Hittite’s Double-Balanced Mixers, Image Reject Mixers, and I/Q Receiver products.
**Hittite Launches New Limiting Amplifier Product Line!**  
(continued from page 1)

Low RMS jitter degradation of 0.2 ps and very fast rise and fall times of 23 and 21 ps respectively. The HMC750LP4E also features 2 mV pp of input sensitivity which enables the device to be used at the output of a transimpedance amplifier (TIA), such as Hittite’s recently released HMC690.

The HMC750LP4E also features an integrated DC offset cancellation loop which automatically adjusts the output offset of the device to 0V. This feature is a significant advantage compared with other limiting amplifiers, since these devices must accommodate offset cancellation with two additional external DC control points. The HMC750LP4E can also be used as a general purpose amplifier because it exhibits very flat broadband gain characteristics from DC to 10 GHz, and provides 44 dB of differential gain.

All single-ended input signals to the HMC750LP4E are terminated with 50 Ohms to +5V on-chip, and may be either AC or DC coupled. The outputs of the amplifier support single-ended or differential operation, and can be connected directly to a 50 Ohm terminated system referenced to +5V, while DC blocking capacitors may be used if the terminating system is 50 Ohms to a non +5V supply.

The HMC750LP4E is specified from -40°C to +85°C, operates from a single +5V supply, and is housed in a plastic RoHS compliant 4x4 mm SMT package. A released data sheet is available on-line at www.hittite.com.

**Hittite Adds Five New Digital Variable Gain Amplifiers**  
(continued from page 1)

The HMC680LP4E IF/RF DVGA is rated from 30 to 400 MHz, and features differential RF I/Os, which can be used to interface directly with SAW filters and digital-to-analog-converters in Tx and Rx chains.

The HMC681LP5E is an IF DVGA which is rated from DC to 1 GHz, and can provide up to 45 dB of gain in 0.5 dB steps. The HMC681LP5E delivers noise figure of 2.8 dB in its maximum gain state, with output IP3 of up to +36 dBm in any state.

The HMC707LP5E and HMC708LP5E are 6-Bit Digital VGAs which are rated from 700 - 1200 MHz, and 1700 - 2200 MHz respectively. These low noise VGAs deliver up to 29 dB gain and up to +38 dBm output IP3, with noise figure as low as 0.8 dB. Both the HMC707LP5E and HMC708LP5E feature a dual mode TTL/CMOS compatible control interface.

Released data sheets for each of these new VGAs are available on-line at www.hittite.com.

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**Hittite’s Digital Variable Gain Amplifier Product Line Cover DC to 6 GHz**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (GHz)</th>
<th>Function</th>
<th>Gain Control Range (dB)</th>
<th>NF (dB)</th>
<th>Output IP3 (dBm)</th>
<th>P1dB (dBm)</th>
<th>Bias Supply</th>
<th>Package</th>
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<tbody>
<tr>
<td>HMC628LP4E</td>
<td>0.05 - 0.8</td>
<td>5-Bit Digital</td>
<td>-8 to 15</td>
<td>5</td>
<td>35</td>
<td>18</td>
<td>+5V @ 65mA</td>
<td>LP4</td>
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<tr>
<td>HMC680LP4E</td>
<td>0.03 - 0.4</td>
<td>5-Bit Digital, Differential Outputs</td>
<td>-4 to 19</td>
<td>4.8</td>
<td>40</td>
<td>25</td>
<td>+5V @ 250mA</td>
<td>LP4</td>
</tr>
<tr>
<td>HMC626LP5E</td>
<td>DC - 1</td>
<td>6-Bit Digital, Parallel Control</td>
<td>8.5 to 40</td>
<td>4</td>
<td>36</td>
<td>20</td>
<td>+5V @ 176mA</td>
<td>LP5</td>
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<tr>
<td>HMC681LP5E</td>
<td>DC - 1</td>
<td>6-Bit Digital, Serial Control</td>
<td>13.5 to 45</td>
<td>2.7</td>
<td>36</td>
<td>20</td>
<td>+5V @ 176mA</td>
<td>LP5</td>
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<tr>
<td>HMC707LP5E</td>
<td>0.7 - 1.2</td>
<td>6-Bit Digital, Serial &amp; Parallel Control</td>
<td>-11.5 to 20</td>
<td>0.8</td>
<td>36</td>
<td>21</td>
<td>+5V @ 236mA</td>
<td>LP5</td>
</tr>
<tr>
<td>HMC708LP5E</td>
<td>1.7 - 2.2</td>
<td>6-Bit Digital, Serial &amp; Parallel Control</td>
<td>-11.5 to 20</td>
<td>1.0</td>
<td>36</td>
<td>21.5</td>
<td>+5V @ 252mA</td>
<td>LP5</td>
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<tr>
<td>HMC743LP6CE</td>
<td>DC - 4</td>
<td>12-Bit Digital, Serial &amp; Parallel Control</td>
<td>-45 to 18</td>
<td>6</td>
<td>33</td>
<td>18</td>
<td>+5V @ 95mA</td>
<td>LP6C</td>
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<tr>
<td>HMC627LP5E</td>
<td>DC - 1</td>
<td>6-Bit Digital, Serial &amp; Parallel Control</td>
<td>-11.5 to 20</td>
<td>4.3</td>
<td>36</td>
<td>20</td>
<td>+5V @ 65mA</td>
<td>LP5</td>
</tr>
<tr>
<td>HMC625LP5E</td>
<td>DC - 6</td>
<td>6-Bit Digital, Serial &amp; Parallel Control</td>
<td>-13.5 to 18</td>
<td>6</td>
<td>33</td>
<td>19</td>
<td>+5V @ 88mA</td>
<td>LP5</td>
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**2009 Designer’s Guide Released!**

Hittite has released our 14th edition Designer’s Guide catalog for 2009 which provides full specifications for over 730 products. This popular three volume publication includes over 100 new product data sheets, as well as quality/reliability, application and packaging/layout information.

**Volume 1**
Amplifiers, Limiting Amplifiers, Transimpedance Amplifiers, Power Detectors & Variable Gain Amplifiers

**Volume 2**
Attenuators, Data Converters, High Speed Digital Logic, Interface, Passives, Phase Shifters & Switches

**Volume 3**
Freq. Dividers & Detectors, Freq. Multipliers, Mixers & Converters, Modulators & Demodulators, Synthesizers, PLLs, VCOs / PLOs

Each volume is conveniently organized into chip component and SMT sections. To request your 2009 catalog three volume set, please visit us on-line at www.hittite.com and select the “Submit Inquiry” button. Quantities are limited - order today!

**HMC-T2000 Combination Pricing!**

Save 3% on Your Entire Purchase Order

Purchase a HMC-T2000 Synthesized Signal Generator and at least one of our Connectorized Module products and receive a 3% discount on your entire purchase order. Expand the capability of the HMC-T2000 with the addition of a connectorized module to:

- Increase Output Power to +28 dBm
- Extend the Frequency Range to 46 GHz
- Add Pulsed Testing Capability

\[ + \quad \text{3\%} \quad \text{OFF!} \]

To order please visit us on-line at www.hittite.com or contact us at sales@hittite.com!

**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 semi-conductor processes utilizing MESFET, HEMT, pHEMT, mHEMT, HBT and PIN devices. Our broad portfolio includes 20 Product Lines:

- Amplifiers
- Attenuators
- Data Converters
- Freq. Dividers & Detectors
- Freq. Multipliers
- High Speed Digital Logic
- Limiting Amplifiers
- Interface
- Mixers
- Mods. & Demodulators
- PLLs
- Phase Shifters
- Power Detectors
- Sensors
- Switches
- Synthesizers
- Transimpedance Amplifiers
- 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**
- **Broadband**
- **Cellular Infrastructure**
- **Fiber Optic**
- **Microwave & mmWave Communications**
- **Military**
- **Space**
- **Test & Measurement**
- **Commercial / Industrial**
- **Sensors & Test Equipment**

Every component is backed by Hittite Microwave’s commitment to total quality. HMC is ISO 9001:2000, AS9100 B and ISO/TS 16949:2002 certified. Every Hittite employee and subcontractor is responsible for maintaining the highest level of quality, thus providing our customers with products that meet or exceed all requirements, are delivered on-time and function reliably throughout their useful life.

**New Representatives For Instrumentation!**

Hittite has added new sales representatives specializing in Instrumentation products. They offer focused support and in-depth knowledge to our test engineering and R&D laboratory customers for our signal generator product line. For a complete listing of our worldwide Instrumentation sales representatives see page 8.
## Sales Contact Information:

### Hittite Microwave Worldwide Sales Offices

<table>
<thead>
<tr>
<th>Region</th>
<th>Contact Details</th>
</tr>
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<tr>
<td><strong>Americas</strong></td>
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</tr>
<tr>
<td>Brazil</td>
<td>Vermont Rep. Com. Ltda +55 11 3726-6655</td>
</tr>
<tr>
<td>Canada</td>
<td>Repwrex Calgary, Ottawa &amp; Montreal: +613-270-9811</td>
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<tr>
<td><strong>Europe</strong></td>
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### Sales Representatives

**AMERICAS**

- **Brazil**: Vermont Rep. Com. Ltda +55 11 3726-6655
- **Canada**: Repwrex Calgary, Ottawa & Montreal: +613-270-9811
- **USA North East & Mid-Atlantic**: Tokyo: +647-883-7360, Vancouver: +604-929-8541

**Europe**

- **US South West**: Texas: OK, LA & AR: NW Sales, LP, 817-483-5676, AZ & NM: Saguauno Technical Sales, Inc. 480-947-3724

**Instrumentation Sales Representatives**

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<td>TX: Testech</td>
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<td><strong>Asia &amp; South Pacific</strong></td>
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