**INDUSTRY LEADING RMS DETECTOR RELEASED!**

Simultaneous RMS & Envelope Power Detection up to 3.9 GHz

Hittite Microwave has introduced the first integrated RMS power detector capable of simultaneously measuring the instantaneous (RF envelope) power and the true RMS power of any RF input signal from 100 MHz to 3.9 GHz.

The HMC614LP4E provides a “true RMS” representation of any RF/IF input signal and is ideally suited to wide bandwidth, wide dynamic range applications requiring repeatable power measurement over temperature; especially where RF/IF waveshape and crest factor change with time. The HMC614LP4E employs an innovative circuit architecture which enables simultaneous

**HITTITE EXPANDS HIGH SPEED DIGITAL LOGIC PRODUCT LINE!**

Ideal for Broadband Instrumentation, Radar, Frequency Synthesis and ATE

Hittite has released 12 new High Speed Digital Logic devices which support a wide range of applications requiring ultra low jitter and very low DC power consumption. These devices are ideal for optical systems, broadband instrumentation, military communications, radar, frequency synthesis and ATE applications with data / clock rates up to 26 Gbps / 26 GHz.

Rounding out the previously released HMC670LC3C through HMC673LC3C, are the HMC678LC3C 2:1 Selector and HMC679LC3C T-Flip Flop with reset, adding two new high speed logic building block functions to this family. The HMC678LC3C support data rates up to 13 Gbps, while the HMC679LC3C T-Flip Flop supports clock rates as high

**NEW TIA & NRZ-TO-RZ CONVERTER TARGET FIBER OPTICS!**

TIA is Ideal for OC-192 & SDM STM-64 Transponders

Hittite Microwave is pleased to announce the release of the HMC690, a 11.3 Gbps Transimpedance Amplifier (TIA) chip designed for optical links that require a linear receiver. Operating from a +3.3 V supply, from -40 to +85°C, the HMC690 features 11 pA/√Hz input referred noise density, 1.25 KΩ differential gain and 3 mA p-p overload capability. A SMT version will be available December 2008.

Also released is the HMC706LC3C, NRZ-to-RZ converter which is designed to support data/clock rates of up to 13 Gbps/13 GHz. The HMC706LC3C operates from a single +3.3V supply, and is available in a 3x3 mm ceramic SMT package. The HMC690 and HMC706LC3C are ideal for SONET OC-192 applications, SDH-64 transponders, 10 Gbps Ethernet and broadband instrumentation applications. Refer to table on page 6 for additional information.

Order On-line at: www.hittite.com

20 Alpha Road, Chelmsford, MA 01824  Phone: 978-250-3343  Fax: 978-250-3373
**HMC639ST89E**

**Features**
- Low Noise Figure: 2.3 dB
- High P1dB Output Power: +22 dBm
- High Output IP3: +38 dBm
- Gain: 13 dB
- 50 Ohm I/O’s, No External Matching

**Versatile, Cascadable!**
The HMC639ST89(E) is a GaAs PHEMT, High Linearity, Low Noise, Wideband Gain Block Amplifier covering 0.2 to 4.0 GHz. The amplifier can be used as either a LNA, Gain Block or PA Pre-Drive with up to +22 dBm output power. This versatile amplifier is powered from a single +5V supply and requires no external matching components. The internally matched topology permits this amplifier to be readily ported between virtually any printed circuit board material, regardless of its dielectric constant, thickness, or composition.

**HMC668 / 669LP3E**

**Features**
- Noise Figure to 1.4 dB
- Output IP3 to +33 dBm
- Gain to 17 dB
- Failsafe Operation: Bypass is enabled when LNA is unpowered
- Single Supply: +3V or +5V

**Failsafe; Operates Unpowered!**
The HMC668LP3E & HMC669LP3E are high dynamic range GaAs MMIC Low Noise Amplifiers that integrate a low loss LNA bypass mode on the IC, and operate at 900 & 1900 MHz respectively. The amplifiers are ideal for receivers and LNA modules and provide up to 17 dB of gain and +33 dBm IP3 from a single supply of +3V or +5V. A single control line is used to switch between LNA mode and a low loss bypass mode. The failsafe topology automatically enables the LNA bypass path, when no DC power is available.

**HMC665LP4E**

**Features**
- High Input IP3: +23 dBm
- Low Input LO Drive: -3 to +6 dBm
- High LO to RF Isolation: 36 dB
- High Conversion Gain: 10 dB
- Upconversion or Downconversion

**Downconversion or Upconversion!**
The HMC665LP4E is a highly integrated converter RFIC that operates from 0.7 to 1.2 GHz in both upconversion and downconversion modes. The HMC665LP4E incorporates a high dynamic range, passive double-balanced mixer core with integrated LO and IF amplifiers, making it ideal for compact cellular/3G transceiver applications. This versatile converter RFIC operates with a low LO input power level of only -3 dBm, provides up to 10 dB conversion gain, and exhibits +23 dBm input IP3 in downconversion mode.
High IP3, Low Noise Figure!
The HMC621LP4E & HMC623LP4E are highly integrated downconverter RFICs that operate from 0.9 to 1.6 GHz, and 1.8 to 2.7 GHz respectively. These downconverters incorporate a high dynamic range mixer core with integrated RF, LO and IF amplifiers. The HMC621LP4E & HMC623LP4E operate with a low LO input power level of only 0 dBm, provide 33 dB conversion gain, and exhibit up to +40 dBm output IP3. Integrated RF amplifiers provides for an overall noise figure as low as 4 dB.

Excellent 2x2 Suppression!
The HMC688LP4E & HMC689LP4E are high dynamic range passive MMIC mixers with integrated LO amplifiers in 4x4 SMT QFN packages covering 2.0 to 2.7 GHz. Excellent input IP3 performance up to +35 dBm for downconversion is provided for 3G & 4G GSM/CDMA applications at an LO drive of only 0 dBm. The HMC688LP4E & HMC689LP4E are optimized for high side and low side LO injection respectively. The DC to 700 MHz IF frequency response will satisfy virtually any transmit or receive frequency plan.

Ideal for WiMAX Transceivers!
The HMC666LP4E is a high dynamic range passive MMIC mixer with integrated LO amplifier in a 4x4 SMT QFN package covering 3.1 - 3.9 GHz. Excellent input IP3 performance of +31 dBm is provided for WiMAX and fixed wireless applications at an LO drive of only 0 dBm. The LO port is optimized for low side LO applications. With an input 1 dB compression points of +23 dBm, the RF port will accept a wide range of input signal levels. The DC to 800 MHz IF frequency response will satisfy WiMAX and fixed wireless transmit or receive frequency plans.
HMC-C050  
**Ultra Low Phase Noise Distributed Amplifier Module, 2 - 18 GHz**

**Features**
- Ultra Low Phase Noise: -165 dBC/Hz @ 1 MHz
- High Output IP3: +29 dBm
- Gain: 13.5 dB
- 50 Ohm Matched Input/Output

**Ideal for Test Equipment!**
The HMC-C050 is a GaAs HBT Distributed Amplifier in a miniature, hermetic module designed to operate between 2 and 18 GHz. This wideband amplifier module provides 13.5 dB of gain, 6 dB noise figure and up to +29 dBm of OIP3 with a supply of +5V. The ultra low phase noise contribution of -165 dBC/Hz, enables superior modulation accuracy within ATE and other high performance transceiver architectures. The RF I/O’s are internally matched to 50 Ohms and are DC blocked for robust performance.

HMC694 / HMC694LP4E  
**Analog Variable Gain Amplifiers, 6 to 17 GHz**

**Features**
- Wide Gain Control Range: 23 dB
- Single Control Voltage
- Output IP3 @ Max Gain: +30 dBm
- Output P1dB: +22 dBm
- No External Matching
- Chip & SMT Package Available

**Wide Gain Control Range!**
The HMC694 & HMC694LP4E are GaAs MMIC PHEMT analog variable gain amplifiers which operate from 6 to 20 GHz. Ideal for microwave radio applications, these amplifiers provide up to 24 dB of gain, output P1dB of up to +22 dBm, and up to +30 dBm of Output IP3 at maximum gain, while requiring only 170 mA from a +5V supply. A gate bias (Vctrl) is provided to allow variable gain control of up to 23 dB. Gain flatness is excellent from 6 to 17 GHz, making the HMC694 & HMC694LP4E also ideal for EW, ECM, radar and test equipment applications.

HMC-C053  
**Voltage Variable Attenuator Module, DC - 20 GHz**

**Features**
- Wide Bandwidth: DC - 20 GHz
- Low Phase Shift vs. Attenuation
- Up to 30 dB Attenuation Range
- Hermetically Sealed Module
- Field Replaceable SMA Connectors

**Excellent Linearity vs. Attenuation**
The HMC-C053 is an absorptive Voltage Variable Attenuator (VVA) module operating from DC to 20 GHz. The HMC-C053 features a single attenuator voltage control of 0 to -3V and can attenuate RF signal levels up to 30 dB. Its broad frequency range and high linearity at all attenuation levels, makes it attractive for many applications such as AGC and temperature compensation. Removable SMA connectors can be detached to allow direct connection of the module’s I/O pins to a microstrip or coplanar circuit.
**HMC663LC3**

**Double-Balanced High IP3 SMT Mixer, 6 - 12 GHz**

*Features*
- Low Conversion Loss: 8 dB
- High LO/RF Isolation: 40 dB
- High Input IP3 to +33 dBm
- No External Matching
- 3x3 mm SMT Package

Ideal for Digital Radios!
The HMC663LC3 is a high linearity double-balanced mixer in a leadless RoHS compliant ceramic SMT package that can be used as an upconverter or downconverter between 6 and 12 GHz. This passive mixer is fabricated in a GaAs MESFET process, requires no DC Bias and no external components and delivers excellent input IP3 of up to +33 dBm. The HMC663LC3 provides excellent LO to RF and LO to IF isolation, and the 3x3 mm QFN package is compatible with high volume SMT assembly.

**HMC-C055**

**4-Bit Digital Phase Shifter Module, 8 - 12 GHz**

*Features*
- Low RMS Phase Error: 6°
- Low Insertion Loss: 7 dB
- Excellent Flatness
- 360° Coverage, LSB = 22.5°
- Positive CMOS (0/+5V) Control

Excellent Accuracy!
The HMC-C055 is a 4-bit digital phase shifter module which is rated from 8 to 12 GHz, providing 360 degrees of monotonic, relative phase coverage, with a LSB of 22.5 degrees. The HMC-C055 features a very low RMS phase error of 6 degrees and a low insertion loss variation of ±1 dB across all phase states. This high accuracy phase shifter is controlled with CMOS logic levels (0/+5V), and is internally matched to 50 Ohms. The package is hermetically sealed and can also be used as a drop-in module.

**HMC698 / 699LP5E**

**7 GHz SMT Integer-N Synthesizer ICs**

*Features*
- Ultra Low SSB Phase Noise Floor: -153 dBc/Hz @ 10 kHz offset & 100 MHz Ref. Frequency
- Programmable Dividers
- Operate up to 7 GHz
- Reversible Polarity PFDs w/ Lock Detect Outputs

4/5 & 8/9 Based Freq. Division!
The HMC698LP5E & HMC699LP5E are synthesizer ICs with wideband reversible polarity digital PFDs and lock detect outputs. The HMC698LP5E & HMC699LP5E dividers operate up to 7000 MHz with continuous integer division ratios of 12 to 259 and 56 to 519 respectively. Their high frequency operation along with ultra low phase noise floor allow designers to realize frequency synthesizers with wide loop bandwidth and low N ratio, resulting in fast settling and very low phase noise characteristics.

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OCTOBER 2008
The HMC614LP4E provides a differential input sensing range of 72 dB, and ±1 dB detection accuracy up to 3.9 GHz with excellent crest factor immunity and temperature stability. The device also exhibits less than ±0.1 dB measurement deviation at 12 dB crest factor, and less than ±0.5 dB measurement deviation over the full operating temperature range.

Operating from a +5V supply, the HMC614LP4E is specified over the -40°C to +85°C temperature range, and is supplied in a compact 4x4 mm leadless SMT package.

The HMC720LC3C, HMC721LC3C, HMC722LC3C and HMC723LC3C have similar performance characteristics to the HMC670LC3C, HMC671LC3C, HMC672LC3C, HMC673LC3C series, but offers the advantage of faster rise/fall times to 15 ps.

The HMC724LC3C, HMC725LC3C, HMC726LC3C and HMC727LC3C provide similar performance to the HMC720LC3C through HMC723LC3C and are pinout/performance compatible with -3.3V devices from Inphi.

These new High Speed Logic products are specified for operation from -40°C to +85°C, and are housed in ceramic RoHS compliant 3x3 mm SMT packages. Samples and evaluation boards are available from stock and can be ordered on line. Released data sheets are available on-line at www.hittite.com.

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Hittite’s High Speed Digital Logic Product Line

<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>
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<td>300</td>
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<td>-</td>
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<td>HMC724LC3C</td>
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<td>-</td>
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<td>HMC726LC3C</td>
<td>13 / 13</td>
<td>2:1 Selector</td>
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<tr>
<td>HMC722LC3C</td>
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<td>17 / 16</td>
<td>2</td>
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<td>13 / 13</td>
<td>Fast Rise Time D Type Flip-Flop</td>
<td>19 / 17</td>
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<td>0.4 - 1.1</td>
<td>264</td>
<td>-3.3</td>
<td>-</td>
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<td>D Type Flip-Flop</td>
<td>19 / 17</td>
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<td>1.1</td>
<td>260</td>
<td>-3.3</td>
<td>13600DF</td>
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<td>NRZ to RZ Converter</td>
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<td>0.3 - 1.2</td>
<td>594</td>
<td>+3.3</td>
<td>13707RZ</td>
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<td>HMC679LC3C</td>
<td>26 / 26</td>
<td>T Flip-Flop w/Reset</td>
<td>20 / 19</td>
<td>2</td>
<td>0.4 - 1.1</td>
<td>270</td>
<td>-3.3</td>
<td>-</td>
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<td>HMC729LC3C</td>
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<td>Fast Rise Time XOR / NXOR</td>
<td>19 / 17</td>
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<td>-3.3</td>
<td>-</td>
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<td>HMC725LC3C</td>
<td>13 / 13</td>
<td>XOR / NXOR</td>
<td>19 / 18</td>
<td>2</td>
<td>1.1</td>
<td>230</td>
<td>-3.3</td>
<td>13610XR</td>
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</table>
HITTITE ADDS 3 NEW REPRESENTATIVES!
Coverage in Russia, Iowa, Kansas & W. Missouri

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NEW SELECTION GUIDE RELEASED!

Hittite is pleased to announce the release of the October 2008 Product Selection Guide which summarizes over 700 products. This popular publication is organized by product line as well as by market including: Automotive/Broadband, Cellular, Microwave & mmWave/Test & Measurement, Fiber Optic, Frequency Generation, Military & Space.

An updated version of the Designer’s Guide CD-ROM is also available. To request your copy of the October 2008 Selection Guide or CD-ROM, please visit www.hittite.com and select submit inquiry or contact your local Hittite sales representative.

HITTITE MICROWAVE TO ATTEND EUMW
Amsterdam, The Netherlands, October 27 - 31, 2008

Hittite Microwave is pleased to announce our attendance at the 2008 European Microwave Week to be held in Amsterdam, The Netherlands from October 27 - 31, 2008.

Hittite will feature over 30 new products including the HMC700LP4 Fractional-N Synthesizer IC, HMC672LC3C High Speed Digital Logic & HMC613LC4B Successive Detection Log Video Amplifier. The HMC-T2000 Synthesized Signal Generator will also be featured in our live product demonstrations to be held throughout the exhibition.

For more information about these products and more please visit us at Booth #515 or visit www.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, InGaN/GaAs, InP, SOI, SiGe, CMOS and BiCMOS semi-conductor processes utilizing MESFET, HEMT, pHEMT, mHEMT, HBT and PIN devices. Our broad product line portfolio includes:

Amplifiers
Attenuators
Data Converters
Freq. Dividers & Detectors
Freq. Multipliers
High Speed Digital Logic
Interface
Mixers
Mods. & Demodulators

Passives
Phase Shifters
PLLs
Power Detectors
Sensors
Switches
Synthesizers
VGA
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

Broadband
CATV, DBS, WiMAX, WLAN,
Fixed Wireless & UWB

Cellular Infrastructure
GSM, GPRS, CDMA, WCDMA,
UMTS & TD-SCDMA

Fiber Optic
OC-48 to 100G

Microwave & mmWave Communications
Backhaul Radio Links
Multi-PI Radios & VSAT

Military
C4I, ECM & EW

Space
Payload Electronics

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.
Connecting Our World Through Integrated Solutions

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