Hittite Launches First MicroSynth™ Integrated Synthesizer Module!
Extremely Compact Hermetic Module Features 24-Bit Step Size Resolution
The HMC-C070 MicroSynth™ combines high performance SiGe and GaAs technologies into a highly compact 1.41” x 0.75” hermetic package. The HMC-C070 delivers excellent phase noise performance of -117 dBc/Hz at 1 MHz, and features auto and manually triggered sweep functions, which make it a valuable building block for test and measurement applications. The output frequency range of 5.5 to 10.5 GHz, and average output power of +22 dBm, puts the power of a benchtop in the palm of your hand.

The HMC-C070 also features fully integrated low noise regulators and an output buffer amplifier which results in excellent ripple rejection and output power performance. In Fractional-N mode, the HMC-C070 can realize step sizes as low as 1.2 Hz, which is ideal for high performance frequency hopping communications systems. The HMC-C070 module is designed to withstand harsh environmental conditions, and may be upscreened to meet military requirements upon request.

New Comparator Product Line Introduced!
20 Gb/s Speed Ideal for Medical, Industrial & ATE Applications
Hittite has expanded its High Speed Comparator product line. Six high speed comparators deliver up to 20 Gb/s speed at 50% lower power consumption compared with traditional comparator solutions.

The HMC874LC3C, HMC875LC3C and the HMC876LC3C are monolithic, ultra-fast, clocked comparators which feature high speed latches with programmable hysteresis, and reduced swing PECL, CML and ECL output drivers respectively. These clocked comparators achieve 20 Gb/s operation at 150 mW power consumption while providing only 120 ps clock-to-data output delay. Minimum input detectable pulse width is typically 60 ps, and random jitter is specified at only 0.2 ps rms. Common mode input voltage range is specified at ±1.75 V, and typical overdrive and slew rate dispersion are less than 10 ps. Also available are the HMC674LC3C, HMC675LC3C and HMC676LC3C, 10 Gb/s level-latched comparators. With power consumption of less than 140 mW, they are ideal for Hittite Launches First MicroSynth™ Integrated Synthesizer Module!
Extremely Compact Hermetic Module Features 24-Bit Step Size Resolution
The HMC-C070 MicroSynth™ combines high performance SiGe and GaAs technologies into a highly compact 1.41” x 0.75” hermetic package. The HMC-C070 delivers excellent phase noise performance of -117 dBc/Hz at 1 MHz, and features auto and manually triggered sweep functions, which make it a valuable building block for test and measurement applications. The output frequency range of 5.5 to 10.5 GHz, and average output power of +22 dBm, puts the power of a benchtop in the palm of your hand.

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New Power Conditioning Product Line Introduced!
High PSRR Voltage Regulator is Ideal for Low Phase Noise Applications
Hittite has introduced a new, industry leading low noise voltage regulator which is ideal in automotive telematics, cellular/4G, medical, military and test equipment applications.

The HMC860LP3E is a Low Noise, High PSRR (Power Supply Rejection Ratio), Quad Output voltage regulator. It features a low noise band gap reference which is externally decoupled for best in-close noise performance. High PSRR in the 0.1 MHz to 10 MHz range provides excellent rejection of preceding switching noise.

New 2010 Designer’s Guide Catalog!
See Page 7

New 2010 Designer’s Guide Catalog!
See Page 7
Hittite Microwave offers over 800 products across 25 product lines. 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 & 4G/LTE

**Fiber Optic**
- OC-48 to 100G

**Microwave & mmWave Communications**
- Backhaul Radio Links
- Multi-Point Radios & VSAT

**Military**
- C4I, ECM & EW

**Space**
- Payload Electronics

**Test & Measurement**
- Commercial / Industrial
- Sensors & Test Equipment

## New Products by Market Applications

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<tr>
<th>Part Number</th>
<th>Function</th>
<th>Frequency (GHz)</th>
<th>Page Number</th>
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<th>Broadband</th>
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<td>Power Amplifier 1 Watt</td>
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<td>HMC863</td>
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<td>HMC864</td>
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<td>HMC870LC5</td>
<td>MZ Optical Modulator Driver</td>
<td>DC - 20</td>
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<td>Latched Comparator - RSPECL</td>
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<td>HMC915LP4E</td>
<td>High IP3, DBL-BAL, +2 LO</td>
<td>0.5 - 2.7</td>
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<td>3.35 - 5.6V</td>
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<td>HMC-C058</td>
<td>SPDT, Hi Isolation</td>
<td>DC - 18</td>
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<td>HMC-C071</td>
<td>SP4T, Hi Isolation</td>
<td>DC - 20</td>
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**Hittite Expands Limiting Amplifier Product Line!**

Hittite introduces two new 32 Gb/s Limiting Amplifiers ideal for 100 Gb/s Ethernet and 100 Gb/s Long Haul, and 40 Gb/s (D)QPSK Fiber Optic Communications. Please see page 6.
NEW PRODUCTS FOR MICROWAVE RADIO, MILITARY, SPACE & TEST

NEW DOUBLE-BALANCED MIXERS FOR MICROWAVE RADIO & SATCOM

Four New Mixers Support Applications from 6 to 43 GHz
The HMC773 & HMC774 are general purpose double-balanced mixer ICs that can be used in upconverter or downconverter applications from 6 to 43 GHz. These passive mixers require no external components or matching circuitry. The HMC773 & HMC774 provide excellent LO to RF and LO to IF isolations due to optimized balun structures, and operate with LO drive levels of only +13 dBm. The HMC773 & HMC774 wideband mixer chips exhibit consistent conversion gain and linearity performance across their rated bandwidth.

The HMC773 & HMC774 are also available in packaged form as the HMC773LC3B & HMC774LC3B. The HMC773LC3B & HMC774LC3B operate from 6 - 26 GHz and 7 - 34 GHz respectively, and are conveniently housed in 3x3mm leadless RoHS compliant ceramic SMT packages requiring no external components or matching circuitry. The HMC773LC3B & HMC774LC3B are compatible with SMT manufacturing techniques.

Applications
Microwave Radio & VSAT
Test Equipment & Sensors
Military & Space

LOW PHASE NOISE AMPLIFIER MODULES FOR MILITARY & TEST EQUIPMENT

Three New Low Phase Noise Modules Cover 1.5 to 12 GHz
The HMC-C072, HMC-C076 and HMC-C077 are GaAs HBT Ultra Low Phase Noise Amplifiers in miniature, hermetic modules designed to operate from 6 - 12 GHz, 7 - 11 GHz and 1.5 - 5 GHz respectively. These high dynamic range amplifier modules provide up to 14 dB of gain, and up to 22 dBm of output power with a single supply of +7V. SSB phase noise contribution as low as -180 dBc/Hz at 10 kHz offset, enables superior modulation accuracy within transceiver architectures and laboratory test equipment stands.

The wideband distributed amplifier I/Os are internally matched to 50 Ohms and DC blocked for robust performance. The modules feature removable SMA connectors which can be detached to allow direct connection of the I/O pins to a microstrip or coplanar circuit. The HMC-C072, HMC-C076 and HMC-C077 are available from stock, order today!

Applications
Microwave Radio
Military & Space
VSAT
Test Equipment & Sensors
Test Laboratories

A Selection of Hittite’s Low Phase Noise Amplifiers - Typical Performance

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Freq. (GHz)</th>
<th>Gain (dB)</th>
<th>IIP3 (dBm)</th>
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<th>P1dB (dBm)</th>
<th>DC Bias Supply</th>
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<td>14</td>
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<td>17</td>
<td>+7V @ 170mA</td>
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<td>HMC-C072</td>
<td>Low Phase Noise</td>
<td>6 - 12</td>
<td>11</td>
<td>34</td>
<td>-174</td>
<td>20</td>
<td>+7V @ 170mA</td>
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<tr>
<td>HMC-C076</td>
<td>Low Phase Noise</td>
<td>7 - 11</td>
<td>9</td>
<td>33</td>
<td>-180</td>
<td>22</td>
<td>+7V @ 300mA</td>
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</table>

Features
Ultra Low Phase Noise: as Low as -180 dBc/Hz @ 10 kHz
Gain up to 14 dB
Output Power: +22 dBm
Single DC Supply: +7V @ 170 to 300 mA
Hermetically Sealed Module
NEW PRODUCTS FOR MICROWAVE RADIO, MILITARY, SPACE & TEST

HMC863 & HMC864  ½ & 1 Watt Power Amplifier Chips, 24 to 29.5 GHz

**Features**
- Saturated Output Power up to: +31 dBm @ 18% PAE
- High Output IP3 up to +40 dBm
- High Gain: 27 dB
- DC Supply: +6 V @ 375mA to 750mA
- 50 Ohm Matched Input/Output

**High Gain & High Power**
The HMC863 & HMC864 are GaAs pHEMT MMIC ½ Watt and 1 Watt Power Amplifiers which operate between 24 and 29.5 GHz. Both Power Amplifiers provide 27 dB of gain, and operate from a +6 V supply. The HMC863 & HMC864 exhibit a typical P1dB of +27 dBm and +30 dBm respectively. The RF I/Os are DC blocked and matched to 50 Ohms for ease of integration into Multi-Chip Modules (MCMs).

HMC815LC5 / 819LC5  Sub-Harmonic I/Q Upconverters, 17.7 to 27 GHz

**Features**
- High Conversion Gain up to 15 dB
- Sideband Rejection to -35 dBc
- 2 LO to RF Isolation up to 12 dB
- Output IP3 up to +35 dBm
- 32 Lead 5x5 mm Ceramic SMT Package

**High Linearity Upconverters**
The HMC815LC5 & HMC819LC5 are GaAs MMIC I/Q upconverters covering 21 - 27 GHz and 17.7 - 23.6 GHz respectively. These compact converters provide small signal conversion gain up to 15 dB with -35 dBc of sideband rejection. The I/Q mixer topology reduces the need for filtering of the unwanted sideband. The HMC815LC5 and HMC819LC5 are much smaller alternatives to hybrid style single sideband upconverter assemblies and are compatible with surface mount manufacturing techniques.

HMC-C058 & HMC-C071  Non-Reflective Switch Modules, DC to 20 GHz

**Features**
- SPDT & SP4T Modules
- High Isolation up to 65 dB
- Low Insertion Loss: 2 dB
- Fast Switching Times: 3 ns
- Non-Reflective Design
- Hermetically Sealed Modules

**Robust Switch Modules**
The HMC-C058 & HMC-C071 are general purpose broadband high isolation non-reflective SPDT and SP4T switches housed in a miniature hermetic modules with field replaceable SMA connectors. The HMC-C058 & HMC-C071 cover DC - 18 and DC - 20 GHz respectively. These switches offer high isolation and low insertion loss with >65 dB isolation up to 6 GHz and >50 dB isolation up to 18 GHz. A CMOS interface allows a +5V bias voltage and 0/+5V control inputs, with very low DC current consumption.
HMC755LP4E

1 Watt Power Amplifier, 2.3 - 2.8 GHz

**Features**
- High Gain: 31 dB
- High PAE: 28% @ +33 dBm Pout
- Low EVM: 2.5% @ Pout = +25 dBm with 54 Mbps OFDM Signal
- Integrated Detector & Power Control
- 24 Lead 4x4 mm QFN Package

**Low EVM, High Efficiency**
The HMC755LP4E is a high gain, high linearity GaAs InGaP HBT MMIC Power amplifier covering 2.3 to 2.8 GHz. The amplifier provides 31 dB of gain and +33 dBm of saturated power from a single +5 V supply. The power control pins can be used to reduce the RF output power/quiescent current, or for full power down of the PA. The integrated power detector is internally coupled and requires no external components. With output power of +25 dBm at 2.5% EVM, the HMC755LP4E is ideal for WiMAX & LTE/4G Applications.

HMC759LP3E / 792LP4E

0.25 dB LSB Digital Attenuators, DC to 6 GHz

**Features**
- 0.25 dB LSB Steps to 15.75 or 31.75 dB
- Power-Up State Selection
- High Input IP3 up to +55 dBm
- Serial Control Interface
- 24 Lead 4x4 mm & 16 Lead 3x3 mm QFN Packages

**Excellent Attenuation Accuracy**
The HMC759LP3E is a 7-Bit BiCMOS Digital Attenuator covering 10 - 300 MHz while the HMC792LP4E is a 6-Bit GaAs MMIC Digital Attenuator covering DC - 6 GHz. These high accuracy, high resolution attenuators incorporate off-chip AC ground capacitors for near DC operation, making them suitable for a wide variety of RF and IF applications. The control interface is CMOS/TTL compatible and features user selectable power up states and a serial output port for cascading Hittite’s other serial controlled components.

HMC915LP4E

High IP3 Mixer w/Integrated LO Amp. 0.5 - 2.7 GHz

**Features**
- High Input IP3: +28 dBm
- Low Input LO Drive: +2 dBm
- High LO to RF Isolation: 28 dB
- Low Conversion Loss: 8 dB
- Single Supply: +5 V @ 88 mA
- 24 Lead 4x4 mm QFN Package

**Wideband, Low LO Drive**
The HMC915LP4E is a high linearity, double-balanced converter that operates from 0.5 to 2.7 GHz and delivers a +28 dBm input IP3. The LO amplifier output and high dynamic range mixer input are positioned so that an external LO filter can be placed in series between them if necessary. The converter provides 28 dB of LO to RF isolation and is ideal for upconverter and downconverter applications. The IC operates from a single +5 V supply consuming 88 mA and accepts LO drive levels of -2 to +4 dBm. The design requires no external baluns and supports IF frequencies between DC and 1 GHz.
The HMC865LC3C & HMC866LC3C are Limiting Amplifiers packaged in leadless 3x3 mm ceramic SMT packages which support up to 43 Gb/s operation. The amplifiers provide up to 30 dB of differential gain. Output voltage swing is adjustable up to 800 mVp-p differential by using the VAC analog control input and additive jitter is less than 300 fs rms for 32 Gb/s operation. The HMC865LC3C has internal DC offset correction circuitry while the HMC866LC3C allows for external offset correction to both inputs and outputs. All input / output RF signals of the HMC865LC3C & HMC866LC3C are terminated with 50 Ohms to +3.3 V on chip and may be either AC or DC coupled. The outputs of these devices can be operated either differentially or single-ended.

Both are ideal for 100 Gb/s Ethernet & 100 Gb/s Long Haul, and 40 Gb/s (D)QPSK applications. Samples and evaluation PC boards are available from stock. Released data sheets are available on-line at www.hittite.com.

The HMC866LC3C - 32 Gb/s Output Eye Diagram

The HMC870LC5 & HMC871LC5 are GaAs MMIC pHEMT Distributed Driver Amplifiers in leadless 5x5 mm SMT packages which operate between DC and 20 GHz. The amplifiers provide up to 18 dB of gain, 8 Vp-p saturated output swing and feature output swing cross point adjustment. Gain flatness is excellent at ±0.5 dB as well as very low additive jitter of 300 fs for 10 Gb/s operation.

The HMC870LC5 & HMC871LC5 provide metro and long haul designers with scalable power dissipation for varying output drive requirements as a result of their very wide supply (Vdd) operating range of +3.3 V to +7 V. The RF I/Os are internally matched to 50 Ohms and both devices are ideal as pre-drivers for 40 Gb/s DQSPK Modules, 10 GbE Transmitters and 10 Gb/s VSR Modules. Samples and evaluation PC boards are available from stock. Released data sheets are available on-line at www.hittite.com.

The HMC870LC5 - 22.5 Gb/s NRZ Output Eye Diagram

regulator noise. The HMC860LP3E provides four voltage outputs which are adjustable from 2.5 V to 5.2 V, and are ideal for conditioning the DC power supply to many low noise frequency generation sub-systems including Hittite’s broad line of VCOs, PLLs, Phase Frequency Detectors and PLLs w/Integrated VCOs. Each of the four voltage outputs can be adjusted higher or lower than the default value by using one external resistor, or each output can be set to +5 V by grounding the appropriate pin. The HMC860LP3E regulator can also be powered down via its TTL compatible enable input to consume <1 μA. The HMC860LP3E is housed in a compact and RoHS compliant 3x3 mm QFN SMT package. Samples and evaluation PC boards are available from stock. Released data sheets are available on-line at www.hittite.com.

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New Power Conditioning Product Line Introduced! … (continued from page 1)
**NEW COMPARATOR PRODUCT LINE INTRODUCED!** ... (continued from page 1)

digital receivers, clock and data restoration circuits, and pulse spectroscopy. These devices may be configured to operate in either latch mode, or as tracking comparators. This line of Comparators are housed in compact, pin-compatible ceramic 3x3 mm SMT packages (RoHS compliant) and are specified for operation from -40°C to +85°C. Samples and evaluation PC boards are available from stock. Released data sheets are available on-line at www.hittite.com.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Input Clock Rate (GHz)</th>
<th>Function</th>
<th>Deterministic Jitter (ps)</th>
<th>DC Power Consumption (mW)</th>
<th>VccI, Vcco, Vterm, Vee Power Supply (V)</th>
<th>Package</th>
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<tbody>
<tr>
<td>HMC874LC3C</td>
<td>20</td>
<td>Clocked Comparator-RSPECL</td>
<td>&lt;3</td>
<td>150</td>
<td>+3.3, +3.3, +1.3, -3</td>
<td>LC3C</td>
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<td>Clocked Comparator-RSCML</td>
<td>&lt;3</td>
<td>130</td>
<td>+3.3, 0, 0, -3</td>
<td>LC3C</td>
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<tr>
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<td>Clocked Comparator-RSECL</td>
<td>&lt;3</td>
<td>150</td>
<td>+3.3, 0, -2, -3</td>
<td>LC3C</td>
</tr>
</tbody>
</table>

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