HITITITE INTRODUCES THREE NEW PRODUCT LINES!

New DC Power Management Product Line Introduced!

Industry’s First Complete Class-A Amplifier Biasing & Monitoring Solution

The HMC920LP5E, the first product in Hittite’s new DC Power Management product line is industry’s first complete Class-A amplifier biasing & monitoring solution. The HMC920LP5E is ideal for power management and control in automotive telematics, Cellular/3G, LTE/WiMAX/4G, broadband, fiber optic, military and test equipment applications.

The HMC920LP5E is an Active Bias Controller which can be used to bias depletion and enhancement mode amplifiers operating in Class-A regime. This unique IC houses an

(Continued on page 9)

New Broadband Time Delay Product Line Introduced!

Broadband Analog Time Delay is Ideal for Serial Data Transmission up to 32 Gbps

The first product within Hittite’s new Broadband Time Delay Product Line is now available. The HMC910LC4B is a DC to 24 GHz time delay product which provides a continuously variable time delay from 0 ps to 70 ps while maintaining a constant differential output voltage swing. The device accepts either single-ended or differential input data, while the differential output swing is programmable from 150 to 800 mVp-p.

Optimized for high speed operation, the HMC910LC4B provides fast rise and fall times of 14 ps, and less than 300 fs rms random jitter,

(Continued on page 9)

New Tunable MMIC Filter Product Line Introduced!

Band Pass and Low Pass Designs Ideal for Multi Channel Wideband Systems

Hittite Microwave has introduced the industry’s first tunable MMIC filters which are available in Low Pass and Band Pass configurations, operating between DC to 7.9 GHz. The HMC881LP5E and HMC882LP5E are tunable, Low Pass Filters (LPF), whereas the HMC890-LP5E and HMC891LP5E are tunable, Band Pass Filters (BPF) with two independent voltage controls for pass band frequency and bandwidth adjustments.

(Continued on page 10)

Two New Low Cost, Highly Flexible RMS Detectors!

Supports Cellular, LTE/ WiMAX/4G, Test Equip. & Military Applications to 5.8 GHz

Hittite has launched two new low cost, highly flexible RMS Power Detectors for RF power measurement/control in Cellular/3G, LTE/WiMAX/4G, broadband, test equipment and military applications between DC and 5.8 GHz. Ideal for the measurement of complex modulated waveforms with large, dynamically changing crest factors, the HMC1010LP4E RMS Power Detector pro-

(Continued on page 10)
Hittite Microwave offers over 825 products across 27 product lines. Our custom and standard products support a wide range of wireless/wired communications and radar applications for the following markets.

### Part Numbers by Market Applications

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<th>Part Number</th>
<th>Function</th>
<th>Frequency (GHz)</th>
<th>Page Number</th>
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<td>HMC797</td>
<td>Wideband Power Amp DC - 22</td>
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<tr>
<td>HMC907</td>
<td>Wideband Power Amp 0.2 - 22</td>
<td>4</td>
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<tr>
<td>HMC903</td>
<td>Low Noise 6 - 18</td>
<td>4</td>
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<td>HMC903LP3E</td>
<td>Low Noise 6 - 17</td>
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<tr>
<td><strong>Attenuators - Digital</strong></td>
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<tr>
<td>HMC800LP3E</td>
<td>1-Bit Digital DC - 10</td>
<td>4</td>
<td></td>
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<tr>
<td>HMC801LP3E</td>
<td>1-Bit Digital DC - 10</td>
<td>4</td>
<td></td>
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<tr>
<td>HMC802LP3E</td>
<td>1-Bit Digital DC - 10</td>
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<tr>
<td><strong>Broadband Time Delay - New Product Line!</strong></td>
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<td>HMC910LC4B</td>
<td>Analog 32 Gbps</td>
<td>1, 9</td>
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<td><strong>Comparators</strong></td>
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<tr>
<td>HMC974LC3C</td>
<td>Window Comparator</td>
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<td><strong>DC Power Management - New Product Line!</strong></td>
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<tr>
<td>HMC920LP5E</td>
<td>Active Bias Controller</td>
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<tr>
<td><strong>Filters - Tunable - New Product Line!</strong></td>
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<tr>
<td>HMC881LP5E</td>
<td>Low Pass DC - 4.0</td>
<td>1, 10</td>
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<tr>
<td>HMC882LP5E</td>
<td>Low Pass DC - 7.6</td>
<td>1, 10</td>
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<tr>
<td>HMC890LP5E</td>
<td>Band Pass 1 - 2</td>
<td>1, 10</td>
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<tr>
<td>HMC891LP5E</td>
<td>Band Pass 2 - 3.9</td>
<td>1, 10</td>
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<tr>
<td><strong>Frequency Dividers &amp; Detectors</strong></td>
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<tr>
<td>HMC794LP3E</td>
<td>Programmable Divider (N = 1 to 4) 0.2 - 2.0</td>
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<tr>
<td>HMC905LP3E</td>
<td>Programmable Divider (N = 1 to 4) 0.4 - 6.0</td>
<td>7</td>
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<tr>
<td><strong>Frequency Multipliers</strong></td>
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<tr>
<td>HMC814</td>
<td>x2 Active 6.5 - 12.3</td>
<td>5</td>
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</tr>
<tr>
<td>HMC814LC3B</td>
<td>x2 Active 6.5 - 12.3</td>
<td>5</td>
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<tr>
<td><strong>High Speed Digital Logic</strong></td>
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<tr>
<td>HMC720LP3E</td>
<td>1:2 Fanout Buffer 13 Gbps</td>
<td>8</td>
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<td>HMC721LP3E</td>
<td>XOR / XNOR 13 Gbps</td>
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<tr>
<td>HMC722LP3E</td>
<td>AND/NAND/OR/NOR 13 Gbps</td>
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<td>HMC723LP3E</td>
<td>D-Type Flip-Flop 13 Gbps</td>
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<td><strong>Mixers</strong></td>
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<td>HMC904LC5</td>
<td>I/Q Receiver 17 - 24</td>
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<tr>
<td>HMC908LC5</td>
<td>I/Q Receiver 9 - 12</td>
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<tr>
<td>HMC787LC3B</td>
<td>+17 LO, DBL-BAL 3 - 10</td>
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<td><strong>Modulators</strong></td>
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<td>HMC795LP5E</td>
<td>Direct Quadrature with VGA 0.05 - 2.8</td>
<td>11</td>
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</tr>
</tbody>
</table>

**HITTITE EXPANDS MODULATOR PRODUCT LINE!**

Hittite introduces a new high linearity direct modulator with integrated variable gain amplifier which is ideal for Cellular/3G and WiMAX/4G applications from 50 MHz to 2.8 GHz. See page 11.
New Products by Market Applications

<table>
<thead>
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<th>Part Number</th>
<th>Function</th>
<th>Frequency (GHz)</th>
<th>Page Number</th>
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<td><strong>Power Detectors</strong></td>
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<td>HMC909LP4E</td>
<td>RMS Detector</td>
<td>DC - 5.8</td>
<td>1, 10</td>
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<tr>
<td>HMC1010LP4E</td>
<td>RMS Detector</td>
<td>DC - 3.9</td>
<td>1, 10</td>
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<tr>
<td><strong>PLLs with Integrated VCOs</strong></td>
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<tr>
<td>HMC838LP6CE</td>
<td>Tri-Band VCO</td>
<td>0.795 - 3.780</td>
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<tr>
<td>HMC839LP6CE</td>
<td>Tri-Band VCO</td>
<td>1.050 - 4.820</td>
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<td><strong>Switches</strong></td>
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<tr>
<td>HMC641LC4</td>
<td>SP4T</td>
<td>DC - 20</td>
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<tr>
<td>HMC849LP4CE</td>
<td>SPDT, Hi Isolation</td>
<td>DC - 6</td>
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<td>HMC-T2100B</td>
<td>Portable Signal Generator</td>
<td>0.01 - 20</td>
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<td><strong>Variable Gain Amplifiers</strong></td>
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<tr>
<td>HMC742LP5E</td>
<td>6-Bit Digital, Serial &amp; Parallel Control</td>
<td>0.07 - 4.0</td>
<td>6</td>
</tr>
</tbody>
</table>

Industry’s First Portable, Battery Operated Signal Generator to 20 GHz!

Hittite’s HMC-T2100B is the industry’s first battery operated 10 MHz - 20 GHz Portable Synthesized Signal Generator. This signal generator is ideal for use in remote locations where main power is unavailable, such as military applications or wireless infrastructure field locations. The HMC-T2100B is also useful in automated test environments and research and development laboratories.

Applications for this high power output CW synthesized signal generator include amplifier testing, local oscillator (LO) sourcing, and uplink/downlink communications testing.

With a broad frequency range of 10 MHz to 20 GHz, the HMC-T2100B covers all major communication bands and provides frequency switching with a resolution of 10 kHz and a time of a 300 us. Further, the HMC-T2100B provides a high-power, +25 dBm RF signal with good output flatness over the RF and microwave frequency band. The output power of the synthesizer can be adjusted in 0.1 dB steps over a 40 dB dynamic range.

The system architecture designed into the HMC-T2100B provides for excellent Typical phase noise performances of -113 dBc/Hz at 100 kHz offset at 1 GHz and -90 dBc/Hz at 100 kHz offset at 10 GHz. This high phase noise performance is shown below, making the HMC-T2100B synthesizer ideal for receiver testing and RF sourcing for multiple applications.

The HMC-T2100B contains two removable batteries for use in locations where an AC source is not available, as well as a built-in battery charger that automatically recharges the batteries when the HMC-T2100B is powered from an AC source. This allows the synthesizer to operate continuously for 2 or 4 hours (with one or two batteries, respectively). The total recharge time with either one or two batteries is 6.5 hours during which time the unit can be operated concurrently.

Using advanced remote programming capabilities through a number of computer interfaces (GPIB, Ethernet, USB, and RS232) the HMC-T2100B can be programmed to accomplish automated testing in wireless/wired service installations, field testing, remote test site maintenance, as well as in lab applications.

![HMC-T2100B SSB Phase Noise vs. Frequency](image-url)

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Function</th>
<th>Frequency Resolution (MHz)</th>
<th>Maximum Power Output (dBm)</th>
<th>100 kHz SSB Phase Noise (dBc/Hz)</th>
<th>Spurious @ 1 GHz (dBc)</th>
<th>Switching Speed @ 100 MHz Steps (μs)</th>
<th>Part Number</th>
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<tr>
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<td>Portable, Battery Operated Signal Generator</td>
<td>0.01</td>
<td>+27 @ 2 GHz&lt;br&gt;+25 @ 10 GHz</td>
<td>-113 @ 1 GHz&lt;br&gt;-93 @ 10 GHz</td>
<td>-80</td>
<td>300</td>
<td>HMC-T2100B</td>
</tr>
</tbody>
</table>
HMC800 / 801 / 802LP3E

**1-Bit Digital Attenuators, DC - 10 GHz**

**Features**
- Only ±0.3 dB Typical Step Error
- Low Insertion Loss to 2 dB
- High IP3 to +55 dBm
- Single Control Line
- TTL/CMOS Compatible Control
- 3x3 mm SMT Packages

**High Linearity Attenuation**
The HMC800LP3E, HMC801LP3E, and HMC802LP3E are broadband bidirectional 1-Bit GaAs IC digital attenuators in low cost leadless surface mount packages. The single positive control line digital attenuators utilize off chip AC ground capacitors for near DC operation, making them suitable for a wide variety of RF and IF applications. Covering DC to 10 GHz, the insertion loss is 2 dB Typical and attenuation accuracy is excellent at ±0.3 dB Typical step error. The attenuators also feature excellent linearity with up to +55 dBm input IP3.

HMC903 & HMC903LP3E

**Low Noise Amplifiers, 6 to 18 GHz**

**Self Biased Ku-Band LNAs**
The HMC903 & HMC903LP3E are self-biased GaAs MMIC Low Noise Amplifiers which operate from 6 to 18 and 6 to 17 GHz respectively. These LNAs provide up to 19 dB of small signal gain, 1.6 dB noise figure, and output IP3 of +27 dBm, while requiring only 90 mA from a +3.5 V supply. The P1dB output power of up to 16 dBm enables the LNA to function as a LO driver for balanced, I/Q or image reject mixers. The HMC903 & HMC903LP3E also feature I/Os that are DC blocked and internally matched to 50 Ohms for ease of integration into multi-chip-modules (MCMs).

HMC797 & HMC907

**1/2 & 1 Watt Power Amplifier Chips, DC to 22 GHz**

**Positive Gain Slope**
The HMC797 & HMC907 are GaAs MMIC pHEMT Distributed Power Amplifiers which operate DC to 22 and 0.2 to 22 GHz respectively. These amplifiers provide up to 16 dB gain, 40 dBm output IP3 and +28 dBm of output power at 1 dB gain compression while requiring 400 mA from a +10 V supply. These PAs exhibit a slightly positive gain slope making them ideal for EW, ECM, Radar and test equipment applications. The HMC797 & HMC907 amplifier I/Os are internally matched to 50 Ohms facilitating integration into multi-chip-modules (MCMs).
HMC904 / 908LC5

Sub-Harmonic I/Q Downconverter / Receiver, 17 - 24 GHz

**Features**
- Conversion Gain: 12 dB
- Image Rejection: 30 dB
- 2 LO to RF Isolation: 45 dB
- Noise Figure: 3 dB
- 32 Lead 5x5 mm SMT Package: 25 mm²

**Sub-Harmonically Pumped**

The HMC904LC5 & HMC908LC5 are compact GaAs MMIC sub-harmonic I/Q downconverters in leadless 5x5 mm RoHS compliant SMT packages. These devices provide a small signal conversion gain of up to 12 dB with a noise figure as low as 3 dB and 30 dB of image rejection. The image reject mixer eliminates the need for a filter following the LNA, and removes thermal noise at the image frequency. I and Q mixer outputs are provided and an external 90° hybrid is used to select the required sideband.

HMC641LC4

SP4T Non-Reflective Switch SMT, DC - 20 GHz

**Features**
- High Isolation: 42 dB
- Low Insertion Loss: 2.1 dB
- Integrated 2:4 TTL Decoder
- 24 Lead 4x4 mm SMT Package: 16 mm²

**Ideal for Test Equipment**

The HMC641LC4 is a broadband non-reflective GaAs pHEMT SP4T switch in a compact 4x4 mm ceramic package. Covering DC to 20 GHz, this switch offers high isolation, low insertion loss and on-chip termination of isolated ports. This switch also includes an on-board binary decoder circuit which reduces the number of required logic control lines from four to two. The HMC641LC4 is controlled with 0/-5V logic, exhibits fast switching speed and consumes much less DC current than pin diode based solutions. The HMC641LC4 is also available in die form as the HMC641.

HMC814 & HMC814LC3B

x2 Active Multipliers, 13 - 24.6 GHz Fout

**Features**
- High Output Power: +17 dBm
- Low Input Power Drive: +4 dBm
- Fo Isolation: >20 dBc
  @ Fout = 19 GHz
- 100 kHz SSB Phase Noise: -136 dBc/Hz
- Single Supply: +5 V @ 88 mA
- Chip & SMT Package Available

**Low Drive, High Output Power**

The HMC814 & HMC814LC3B are x2 active broadband frequency multipliers utilizing GaAs pHEMT technology. When driven by a +4 dBm signal, the multiplier provides +17 dBm Typical output power from 13 to 24.6 GHz. The Fo, 3Fo and 4Fo isolations are >20 dBc at 19 GHz. These devices are 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 -136 dBc/Hz at 100 kHz offset helps maintain good system noise performance.
HMC787LC3B

**Double-Balanced Mixer SMT, 3 - 10 GHz**

**Features**
- High LO/RF Isolation: 55 dB
- Low Conversion Loss: 9 dB
- Wide IF Bandwidth: DC - 4 GHz
- No External Matching Required
- 12 Lead 3x3 mm SMT Package: 9 mm²

**Wideband, Passive Topology**
The HMC787LC3B is a general purpose double-balanced mixer in a leadless RoHS compliant SMT package that can be used as an upconverter or downconverter between 3 and 10 GHz. This mixer is fabricated in a GaAs MESFET process, and requires no external components or matching circuitry. The HMC787LC3B provides excellent LO to RF and LO to IF isolation due to optimized balun structures and operates with a LO drive level of +17 dBm. The 3x3 ceramic SMT package is compatible with high volume manufacturing techniques.

HMC849LP4CE

**High Isolation SPDT Non-Reflective Switch SMT, DC - 6 GHz**

**Features**
- High Isolation: up to 60 dB
- Single Positive Control: 0/+3 V to +5 V
- High Input IP3: +52 dBm
- Non-Reflective Design with “All Off” State
- 16 Lead 4x4 mm SMT Package: 16 mm²

**Ideal for WiMAX Tx/Rx**
The HMC849LP4CE is a high isolation non-reflective DC to 6 GHz GaAs pHEMT SPDT switch in a low cost leadless surface mount package. The switch is ideal for cellular/WiMAX/4G Infrastructure applications yielding up to 60 dB isolation, low 0.8 dB insertion loss and +52 dBm input IP3. Power handling is excellent up through the 5 - 6 GHz WiMAX band with the switch offering a P1dB compression point of +31 dBm. On-chip circuitry allows a single positive voltage control of 0/+3 V or 0/+5 V at very low DC currents. An enable input (EN) set to logic high will put the switch in an “all off” state.

HMC742LP5E

**6-Bit Digital Variable Gain Amplifier SMT, 0.07 - 4 GHz**

**Features**
- -19.5 to 12 dB Gain Control in 0.5 dB Steps
- Power-up State Selection
- High Output IP3: +39 dBm
- TTL/CMOS Compatible Serial, or Parallel Control
- ±0.25 dB Typical Gain Step Error

**Excellent Gain Accuracy**
The HMC742LP5E is a digitally controlled variable gain amplifier which operates from 70 MHz to 4 GHz, and can be programmed to provide from -19.5 dB attenuation, to 12 dB of gain, in 0.5 dB steps. The HMC742LP5E delivers noise figure of 4 dB in its maximum gain state, with output IP3 of up to +39 dBm in any state. The dual mode gain control interface accepts either a three-wire serial input or a 6 bit parallel word. The HMC742LP5E also features a user selectable power up state and requires minimal external components.
**NEW PRODUCTS FOR BROADBAND, CELLULAR, MILITARY & TEST**

**LOW NOISE PROGRAMMABLE DIVIDERS FOR MICROWAVE RADIO & SATCOM**

Supports Applications from 0.2 to 6 GHz

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

The HMC794LP3E and HMC905LP3E are SiGe BiCMOS low-noise programmable frequency dividers in 3x3 mm leadless SMT form. Both can be programmed to divide from N = 1 to N = 4 with very low SSB phase noise and 50% duty cycle, which make them ideal for low-noise clock generation, LO generation, and LO drive applications.

The HMC794LP3E has high level output power (up to 10 dBm) in the 200 MHz to 2 GHz input frequency range, whereas the HMC905LP3E has output power (up to 6 dBm single ended) in the 400 MHz to 6 GHz input frequency range. Configurable bias and output power controls allow current consumption and output power control. The HMC905LP3E further incorporates a power-down feature, and both devices benefit from good input to output isolation and fast start-up time.

**A Selection of Hittite’s Frequency Dividers - Typical Performance**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Input Freq. (GHz)</th>
<th>Input Power (dBm)</th>
<th>Output Power (dBm)</th>
<th>10 kHz SSB Phase Noise (dBc/Hz)</th>
<th>Bias Supply</th>
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</thead>
<tbody>
<tr>
<td>HMC794LP3E</td>
<td>Programmable Divider</td>
<td>0.2 - 2.0</td>
<td>-2 to +10</td>
<td>10</td>
<td>-160</td>
<td>+5V @ 135mA</td>
</tr>
<tr>
<td>HMC905LP3E</td>
<td>Programmable Divider</td>
<td>0.4 - 6.0</td>
<td>0 to +9</td>
<td>5</td>
<td>-158</td>
<td>+3.3V @ 100mA</td>
</tr>
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</table>

**Features**

- Low Noise Floor: as low as -164 dBc/Hz at 10 MHz Offset for N = 4
- Programmable Frequency Divider, N = 1, 2, 3 or 4
- Up to +10 dBm Output Power
- Sleep Mode: Consumes <1 μA
- 3x3 mm SMT Package: 9 mm²

**Applications**

- Military Applications
- Microwave Radio
- Test Equipment
- SATCOM

**Fractional-N Synthesizers with Integrated VCO Cover All Cellular/4G Bands**

Enables Compact LO Solutions from 0.66 to 13.4 GHz

The HMC838LP6CE and HMC839LP6CE are Fractional-N synthesizers, with integrated Voltage Controlled Oscillators (VCOs). Each of them provides ultra low noise behavior in a 6x6 mm QFN plastic packages while requiring a minimal number of external components.

These devices consist of an integrated low noise VCO with tri-band output, an auto-calibration subsystem for low voltage VCO tuning, a very low noise digital Phase Detector (PD), a precision controlled charge pump, a low noise reference path divider, and a fractional divider.

Both PLLs feature advanced delta-sigma modulator designs that allow both ultra-fine step sizes and low spurious products. The phase detector (PD) features cycle slip prevention (CSP) technology, reducing the frequency hoping times by 50%. Ultra low in-close phase noise and low spurious also allows wider loop bandwidths for faster frequency hopping and low micro-phonics. Spurious outputs are very low and eliminate the need for costly Direct Digital Synthesis (DDS) references in many applications.

**A Selection of Hittite’s PLL with Integrated VCOs - Typical Performance**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Freq. (GHz)</th>
<th>Closed Loop SSB Phase Noise @ 100 kHz Offset</th>
<th>Open Loop VCO Phase Noise @ 1 MHz Offset</th>
<th>Output Power (dBm)</th>
<th>RMS Jitter</th>
<th>Frac. Mode (fs)</th>
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</thead>
<tbody>
<tr>
<td>HMC838LP6CE</td>
<td>Tri-Band VCO</td>
<td>0.795 - 3.780</td>
<td>-108 dBc/Hz</td>
<td>-143 dBc/Hz</td>
<td>-157</td>
<td>17</td>
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<tr>
<td>HMC839LP6CE</td>
<td>Tri-Band VCO</td>
<td>1.05 - 4.82</td>
<td>-110 dBc/Hz</td>
<td>-140 dBc/Hz</td>
<td>-174</td>
<td>20</td>
<td></td>
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</tbody>
</table>

**Features**

- Fractional or Integer Modes
- 19-Bit Prescaler
- Ultra Low Phase Noise:
  - -112 dBc/Hz in Band Typ.
- Figure of Merit (FOM): -230 dBc Integer
- 24-Bit Step Size,
  - Resolution 3 Hz Typ.

**Applications**

- Cellular/4G Infrastructure
- Repeaters and Femtocells
- Communications Test Equipment
- CATV Equipment
- Phased Array Applications
- DDS Replacement

**Visits Us At:**

www.hittite.com

MAY 2010
New Window Comparator Features Low Jitter & Low Power Consumption

Hittite has launched the HMC974LC3C, the industry’s first 10 GHz Window Comparator in a space-saving 9 mm² SMT package. Based on the previously released HMC674LC3C comparator, the HMC974LC3C is an ultra-fast window comparator with level latched output driver with reduced output swings. The reduced swing output stages are designed to directly drive 400 mV into 50 Ohms terminated to a voltage Vterm = Vcco - 2 V.

This window comparator incorporates two matched comparators with additional output logic, to provide excellent DC and dynamic input matching with only 1 pF of input capacitance. Additionally, three output ports detect whether an analog input signal is above, below or between two reference levels supplied at its input. The HMC974LC3C features only 20 ps of overdrive and slew rate dispersion, a propagation delay of 88 ps, and less than 200 fs rms of random jitter. The HMC974LC3C can detect signal pulses as narrow as 60 ps, and includes a differential latch control which can either be enabled to latch the output data or disabled to implement a tracking window comparator.

The high performance of the HMC974LC3C window comparator makes it ideal for a wide range of applications including clock and data restoration, communications, ATE and semiconductor test systems, high speed triggering, and EW systems.

Ideal for Low Cost Applications in Microwave Radio & Test & Measurement

Hittite has launched four new high speed logic products speed logic product line that operate with clock rates up to 13 GHz, and are housed in plastic SMT packages. The HMC720LP3E, HMC721LP3E, HMC722LP3E and HMC723LP3E are ideal for deployment in high volume applications ranging from bench test equipment, ATE, optical communications, medical and industrial systems to networking and military communications 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.

The devices operate from a -3.3 V supply, are specified for operation from -40 °C to +85 °C and are housed in RoHS compliant 3x3 mm plastic SMT packages.
New DC Power Management Product Line Introduced! ... (continued from page 1)

integrated LDO to regulate the drain supply of the targeted amplifier and a negative voltage generator for depletion mode devices. The gate voltage of the targeted amplifier is automatically adjusted to keep the quiescent current of the amplifier constant over supply, temperature and threshold drifts. The HMC920LP5E is a system-on-chip solution which is equally ideal for biasing either microwave amplifiers, or fiber optic modulator drivers.

The control block in the HMC920LP5E manages the correct power-up and power-down sequence of the targeted amplifier to safely turn it on or off. It constantly monitors the quiescent current of the amplifier and generates an alarm if the current exceeds a higher or a lower threshold.

The HMC920LP5E features an Enable pin to quickly turn the targeted amplifier on or off. A Trigger-out signal is generated when the targeted amplifier achieves stable quiescent operation. Using Enable and Trigger-out signals, multiple HMC920LP5E devices can be daisy chained to bias a cascaded amplifier, which makes it possible to enable or disable the cascaded stages in a controlled and sequential manner.

The HMC920LP5E features many built-in safety features to protect both itself and the targeted amplifier from possible unintentional shorts to ground. The HMC920LP5E limits the power dissipation of the device with a power fold-back protection scheme. It constantly checks for failures and shorts to ground at Vdrain, Vnegative, and other important pins, disabling the system if a fault condition arises.

Housed in a compact and RoHS compliant, 5x5 mm QFN SMT package, the HMC920LP5E is specified for operation from -40°C to +85°C and is ideal for biasing Hittite’s broad line of amplifiers.

NEW BROADBAND TIME DELAY PRODUCT LINE INTRODUCED! ... (continued from page 1)

which supports serial data transmission up to 32 Gbps, or clock signal delay up to 24 GHz. The HMC910LC4B also exhibits a very high quality eye diagram at data rates up to 32 Gbps, which makes the device suitable for timing adjustment in complex digital applications including clock and data recovery, edge detection, NRZ-to-RZ conversion, data restoration and Mux/Demux applications. This time delay product also shows excellent stability over temperature, and can operate up to 24 GHz from a single +3.3 V DC supply, while consuming only 475 mA.

The HMC910LC4B provides a time delay which is linearly monotonic with respect to the delay control voltage, which may be varied from 1.1 V to 2.3 V. An integrated temperature compensation feature minimizes the delay variations over temperature. The delay control port provides a modulation bandwidth of 600 MHz.

All RF input and output signals of the HMC910LC4B are terminated with 50 Ohms to Vcc, and may be either AC or DC coupled. Outputs should be connected directly to a 50 Ohm to +3.3 V terminated system, while DC blocking capacitors should be used if the terminating system is 50 Ohms to an alternate DC voltage.

The HMC910LC4B complements many of Hittite’s previously released Fiber Optic and High Speed Logic products, and is the first of a series of time delay products.

The HMC910LC4B is housed in a ceramic, RoHS compliant 4 x 4 mm SMT package and is specified for operation from -40°C to +85°C. A released datasheet may be found at www.hittite.com. Samples and evaluation PC boards are available from stock and can be ordered via the company’s e-commerce site or via direct purchase order.
These filters are very well suited to programmable pre-selection in radio front-end designs where removal of unwanted mixer images and responses to local-oscillator harmonics are important. Furthermore, their compact 5x5 mm QFN SMT package footprint is well-suited for radio hardware where small size is important. Tunable LPF and BPF filter products from Hittite are highly versatile, robust, and easy-to-use solution for spectral selection in broadband, cellular infrastructure, microwave radio, military and test & measurement applications.

The HMC881LP5E and HMC882LP5E have adjustable LPF cut-off frequency from 2.2 to 4.0 GHz, and from 4.5 to 7.6 GHz, respectively. A 0 V to 14 V control signal allows the adjustment of pass-band cutoff from the lowest to the highest frequency allowable in only 150 ns. The LPFs maintain stop-band rejection of at least 35 dB to beyond 30 GHz.

The HMC890LP5E & HMC891LP5E benefit from two independent voltage controls for adjustment of pass-band frequency and bandwidth. Filter center frequency is adjustable from 1 to 2 GHz, and from 2.0 to 3.9 GHz, respectively. Pass-bandwidth is adjustable to ±3% of filter center frequency. Similarly to the low-pass filters, return loss is 10 dB and the BPFs maintain stop-band rejection of at least 30 dB to 9 GHz.

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tives 60 dB of dynamic range, a nominal logarithmic slope of 37 mV/dB and a nominal intercept of -68 dBm. The HMC1010LP4E exhibits superior detection accuracy of ±1 dB compared with any RMS detector in the market at its price point of $1.99 each at 10,000 pieces. It exhibits less than 0.1 dB modulation error at 900 MHz, 1900 MHz and 2200 MHz. The HMC909LP4E Single-Ended RMS Power Detector provides 40 dB of dynamic range, a nominal logarithmic slope of 37 mV/dB and a nominal intercept of -70 dBm over its entire DC to 5.8 GHz range. The HMC909LP4E combines superior detection accuracy and better modulation performance than the competition at its price point of $1.49 at 10,000 pieces. This versatile detector exhibits less than 0.1 dB modulation error at 900 MHz, 1900 MHz, 2200 MHz, and 3500 MHz and 0.4 dB at 5800 MHz.

Both products introduce a new digitally programmable integration bandwidth feature which permits the use of different integration bandwidth settings on the same system platform. The RF inputs of both the HMC1010LP4E and HMC909LP4E are externally matched to 50 Ohms. Both products operate from a +5 V single supply, are housed in 4x4 mm plastic leadless surface mount packages and have excellent temperature stability with less than ±1 dB total error from -40 °C to +85 °C maintained over the entire DC to 5.8 GHz frequency band.

Released data sheets for the HMC1010LP4E and HMC909LP4E RMS Power Detectors may be found at www.hittite.com. Samples and evaluation PC boards are available from stock and can be ordered via the company’s e-commerce site or via direct purchase order.
**What We Do**

Hittite Microwave is an innovative designer and manufacturer of analog, digital and mixed-signal ICs, Modules, Subsystems and Instrumentation for digital, RF, microwave and millimeterwave applications covering DC to 110 GHz. Our Digital/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 design and supply custom ICs, Modules, Subsystems and Instrumentation, combining multiple functions for specific requirements. We select the most appropriate semiconductor and package technologies, uniquely balancing digital and analog integration techniques.

Hittite Microwave is ISO 9001:2000 and AS9100 B certified. Every component is backed by every Hittite employee and subcontractor’s commitment to total 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 PRODUCTS & NEWS FROM HITTITE!**

**DIRECT QUADRATURE MODULATOR WITH INTEGRATED VGA, 50 - 2800 MHz**

The HMC795LP5E is a variable gain, direct quadrature modulator ideal for digital modulation applications from 50 - 2800 MHz including: Cellular/3G, Broadband Wireless Access and ISM circuits. The modulator offers a high level of integration with exceptionally low carrier feedthrough, and is a low cost alternative to more complicated double upconversion architectures.

The LO requires -9 to +3 dBm and can be driven in either differential or single-ended mode. The baseband inputs will support modulation inputs from DC - 440 MHz.

The differential RF output port is driven by a 6-Bit digital controlled variable gain amplifier to nominally provide up to 32 dB of very linear gain control in 0.5 dB steps. The low carrier suppression is maintained over the VGA dynamic range. The gain control interface accepts either three wire serial input or a 6-Bit parallel word. In addition, the gain control can be modified through the SPI to adjust a look up table to control the gain step to as low as 0.1 dB, with reduced range, or to adjust individual gain steps for system linearization.

**ENTER TO WIN A HMC-T2100!**

Hittite Microwave will be exhibiting at the 2010 IEEE MTT-S International Microwave Symposium and Exhibition to be held in Anaheim, California on May 25 - 27, 2010.

Hittite will feature over 35 new products and will conduct live demonstrations of new products from our Fractional-N PLL Synthesizer IC, Synthesized Signal Generator and Power Detector product lines throughout the exhibition.

Enter to win a HMC-T2100 Signal Generator. Drawing to be held in the Hittite booth #2105 on Wednesday, May 25, 2010 at 3:00 pm.

**EXPANDED REPRESENTATIVE COVERAGE!**

With headquarters in Dreux France, L-TEQ Microwave now offers full product support to Hittite customers and may be contacted at:

- **L-TEQ Microwave**
  - Phone: +33-1-30-07-77-80
  - E-mail: info@Lteq-Microwave.fr

With headquarters in Molndal Sweden, RF Partner now offers full product support to Hittite customers and may be contacted at:

- **RF Partner AB**
  - Phone: +46-31-475100
  - E-mail: info@rfpartner.se

**DIRECT QUADRATURE MODULATOR WITH INTEGRATED VGA, 50 - 2800 MHz**

**Output Power, Output IP3 & Sideband Suppression vs. Frequency**

**Offering over 825 standard products across 27 product lines**

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