New Product Line: Clocks & Timing!

Two New Clock Generators Offer Best-In-Class Jitter, 78 fs RMS, & Industry-Leading Phase Noise Performance from 125 MHz to 3 GHz!

Hittite has announced the launch of two exciting new clock generators, the HMC1032LP6GE and the HMC1034LP6GE for high performance Clock and Timing applications.

The HMC1032LP6GE and HMC1034LP6GE offer programmable frequency synthesis from 125 MHz to 3 GHz in both integer and fractional-N relationships to their reference clocks. The HMC1032LP6GE is ideal for clocking DSP, FPGA and high performance processors, and operates from 125 MHz to 350 MHz, while the HMC1034LP6GE is designed to meet the stringent requirements of high speed data converters and Physical Layer Devices (PHY), and operates from 125 MHz to 3 GHz. The devices integrate high accuracy PLL and VCO circuits and an advanced Delta-Sigma Modulator with 24-bit step range that enables excellent frequency resolution of 3 Hz and below. The serial programming interface (SPI), and Hittite’s easy-to-use configuration software allows for programming frequencies rapidly.

Hittite Adds Three New Microwave PLLs with Integrated VCOs!

Hittite has extended the industry leading integrated Phase Locked Loop (PLL) and Microwave Voltage Controlled Oscillator (VCO) product line with the addition of three new devices. Hittite now offers seven PLL with Integrated Microwave VCO products in footprint compatible SMT packages with output frequency coverage from 7.3 to 13.4 GHz.

The HMC767LP6CE, HMC769LP6CE and HMC778LP6CE are full featured fractional-N PLL frequency synthesizers with integrated microwave VCOs. Each of these new products offers low open loop phase noise of -140 dBc/Hz at 1 MHz offset, a 350 MHz reference path input, with an integrated 14-bit reference divider. The advanced delta-sigma modulator design enables ultra-fine fractional step sizes while achieving industry leading phase noise and spurious emission performance. The highly integrated architecture provides market leading phase noise performance over temperature, shock and vibration.

New Low Noise, High Linearity Wideband Direct Quadrature Modulator!

Covers Cellular/4G/LTE, Broadband Wireless Access & ISM Applications to 6 GHz

The HMC1097LP4E is an advanced low noise, high linearity Direct Quadrature Modulator which is ideal for digital modulation applications from 0.1 to 6 GHz. The HMC1097LP4E meets all of the critical requirements of next generation BTS cellular, providing very high linearity of +30 dBm OIP3, and -160 dBm noise floor across all cellular bands. The HMC1097LP4E also exhibits a DC to 700 MHz modulation bandwidth, fast enable and disable features and high output power up to +11 dBm output P1dB. Housed in a compact 4 x 4 mm SMT QFN package, the HMC1097LP4E dissipates less than 850 mW from a +5V supply, and offers improved carrier feed through and sideband suppression characteristics.

Order On-line at: www.hittite.com
2 Elizabeth Drive • Chelmsford, MA 01824 • 978-250-3343 tel • 978-250-3373 fax
### New Products by Market Application

Hittite Microwave offers over 1,000 products across 34 product lines. Our custom and standard products support a wide range of wireless/wired communications and radar applications for the following markets.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Frequency (GHz)</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amplifiers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1016</td>
<td>Medium Power Amplifier</td>
<td>34 to 46.5</td>
<td>6</td>
</tr>
<tr>
<td>HMC1022</td>
<td>Wideband Power Amplifier</td>
<td>DC to 48</td>
<td>4</td>
</tr>
<tr>
<td>HMC1040LP3CE</td>
<td>Low Noise Amplifier</td>
<td>24 - 43.5</td>
<td>6</td>
</tr>
<tr>
<td><strong>Attenuators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1018LP4E</td>
<td>5-Bit Digital, Serial Control</td>
<td>0.1 to 30</td>
<td>4</td>
</tr>
<tr>
<td>HMC1019LP4E</td>
<td>5-Bit Digital, Serial Control</td>
<td>0.1 to 30</td>
<td>4</td>
</tr>
<tr>
<td><strong>Automatic Gain Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC993LP5E</td>
<td>RF Automatic Gain Controller</td>
<td>0.7 to 3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Broadband Time Delay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC856LC5</td>
<td>5-Bit Digital Time Delay</td>
<td>28</td>
<td>11</td>
</tr>
<tr>
<td>HMC877LC3</td>
<td>Analog Time Delay &amp; Phase Shifter</td>
<td>8 to 23</td>
<td>11</td>
</tr>
<tr>
<td>HMC910LC4B</td>
<td>Analog Time Delay</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>HMC911LC4B</td>
<td>Analog Time Delay</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td><strong>Clocks &amp; Timing - New Product Line!</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC987LP5E</td>
<td>1:9 Fanout Buffer</td>
<td>DC to 8</td>
<td>7</td>
</tr>
<tr>
<td>HMC1032LP6GE</td>
<td>Clock Generator with Fractional-N PLL+VCO</td>
<td>0.125 to 0.35</td>
<td>1</td>
</tr>
<tr>
<td>HMC1034LP6GE</td>
<td>Clock Generator with Fractional-N PLL+VCO</td>
<td>0.125 to 3</td>
<td>1</td>
</tr>
<tr>
<td><strong>DC Power Conditioning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1060LP3E</td>
<td>Low Noise Regulator</td>
<td>1.8 to 5.2V</td>
<td>5</td>
</tr>
<tr>
<td><strong>Frequency Dividers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC361G8</td>
<td>Divide-by-2</td>
<td>0.01 to 13</td>
<td>7</td>
</tr>
<tr>
<td>HMC861LP3E</td>
<td>Programmable Divider (N = 1,3)</td>
<td>0.1 to 13</td>
<td>7</td>
</tr>
<tr>
<td><strong>Mixers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1041LC4</td>
<td>I/Q Mixer / IRM</td>
<td>17 to 27</td>
<td>8</td>
</tr>
<tr>
<td>HMC1042LC4</td>
<td>I/Q Mixer / IRM</td>
<td>15 to 33.5</td>
<td>8</td>
</tr>
<tr>
<td>HMC1043LC4</td>
<td>+13 LO, TPL-BAL</td>
<td>26 to 32</td>
<td>6</td>
</tr>
<tr>
<td><strong>Modulators &amp; Demodulators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1097LP4E</td>
<td>Direct Quadrature</td>
<td>0.1 to 6.0</td>
<td>1</td>
</tr>
</tbody>
</table>
New Products by Market Application

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<table>
<thead>
<tr>
<th>Part Number</th>
<th>Function</th>
<th>Frequency (GHz)</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLLs with Integrated VCOs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC767LP6CE</td>
<td>Microwave VCO</td>
<td>8.450 to 9.550</td>
<td>1</td>
</tr>
<tr>
<td>HMC769LP6CE</td>
<td>Microwave VCO</td>
<td>9.050 to 10.150</td>
<td>1</td>
</tr>
<tr>
<td>HMC778LP6CE</td>
<td>Microwave VCO</td>
<td>9.600 to 10.800</td>
<td>1</td>
</tr>
<tr>
<td>HMC833LP6GE</td>
<td>Wideband RF VCO</td>
<td>0.025 to 6.0</td>
<td>5</td>
</tr>
<tr>
<td>HMC834LP6GE</td>
<td>Wideband RF VCO</td>
<td>0.045 to 8.4</td>
<td>5</td>
</tr>
<tr>
<td>PLL Chipset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC983LP5E</td>
<td>Fractional Divider with Sweeper</td>
<td>DC to 7</td>
<td>9</td>
</tr>
<tr>
<td>HMC984LP4E</td>
<td>Phase Frequency Detector</td>
<td>DC to 0.35</td>
<td>9</td>
</tr>
<tr>
<td>SDLVAs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC1013LP4E</td>
<td>SDLVA, Extended Range</td>
<td>0.5 to 18.5</td>
<td>4</td>
</tr>
<tr>
<td>Switches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMC547LC3</td>
<td>SPDT, High Isolation</td>
<td>DC to 28</td>
<td>8</td>
</tr>
<tr>
<td>HMC986</td>
<td>SPDT, Reflective</td>
<td>0.1 to 50</td>
<td>8</td>
</tr>
</tbody>
</table>

Hittite Expands Automatic Gain Control Product Line!

Complete 0.7 to 3 GHz RF-AGC Solution in 25 mm² SMT Package

Hittite has launched a new, complete RF Automatic Gain Control (RF-AGC) solution. The HMC993LP5E combines a high performance analog Variable Gain Amplifier (VGA) core with a high accuracy power detector in a RoHS compliant 5 x 5 mm QFN leadless package. HMC993LP5E is ideal for AGC implementation in the 0.7 to 3 GHz frequency range in LTE/WiMAX/4G, microwave radio, VSAT, test equipment and sensor applications.

The HMC993LP5E operates from 0.7 to 3.0 GHz and features a wide gain control range from -11 dB to +32 dB. The unique VGA core also provides a consistent gain slope vs. control voltage; a characteristic which enables easier implementation of AGC loops and provides a uniform transient response over the entire attenuation range.

Generally, analog VGAs exhibit large dips in their OIP3 performances at certain control voltages or degradation as the attenuation is increased. The HMC993LPSE differentiates itself from these traditional VGAs by providing a constant OIP3 of +40 dBm over the entire attenuation range. The integrated power detector features excellent temperature stability, and the HMC993LPSE provides highly accurate power control in AGC closed loop operation which is independent of part-to-part and temperature variations.

The HMC993LP5E provides a flexible architecture, and can be configured with one or two attenuators, depending upon the dynamic range requirements of the application. It can also be used as a standalone, high performance VGA in an open loop configuration or as a compact RF-AGC solution in closed loop operation.
New Power Amplifier, Control & SDLVA Products for Wideband Applications

**HMC1022**

**0.25 Watt Power Amplifier Chip, DC to 48 GHz**

**Features**
- High P1dB Output Power: +22 dBm
- High Psat Output Power: +24 dBm
- High Gain: 12 dB
- Supply Voltage: +10V @ 150 mA
- 50 Ohm Matched Input/Output

*Ideal for Test Equipment*

The HMC1022 is a GaAs pHEMT MMIC Distributed Power Amplifier which operates between DC and 48 GHz. The amplifier provides 12 dB of gain, 32 dBm output IP3 and +22 dBm of output power at 1 dB gain compression while requiring 150 mA from a +10V supply. The HMC1022 exhibits a slightly positive gain slope from 10 to 35 GHz, making it ideal for EW, ECM, Radar and Test Equipment applications. The HMC1022 amplifier I/Os are internally matched to 50 Ohms facilitating integration into Multi-Chip-Modules (MCMs).

**HMC1018LP4E / HMC1019LP4E**

**5-Bit Digital Attenuator SMTs, 0.1 to 30 GHz**

**Features**
- TTL/CMOS Compatible, Serial Control
- Unique Asynchronous Mode Control Allows Immediate Attenuation Changes
- 0.5 dB and 1.0 dB Resolution
- 4 x 4 mm SMT QFN Packages

*High Accuracy, High Linearity*

The HMC1018LP4E & HMC1019LP4E are broadband 5-bit GaAs IC digital attenuators in low cost leadless surface mount packages covering 0.1 to 30.0 GHz. The control interface is CMOS/TTL compatible and accepts a three wire serial input. The HMC1018LP4E and HMC1019LP4E feature a user selectable power up state and a serial output port. These digital attenuators are ideal for applications which require wide bandwidth and high linearity.

**HMC1013LP4E**

**67 dB SMT SDLVA, 0.5 to 18.5 GHz**

**Features**
- High Logging Range: 67 dB (-62 to +5 dBm)
- Output Frequency Flatness: ±2 dB
- Fast Rise/Fall Times: 5/15 ns
- Single Positive Supply: +3.3V
- ESD Sensitivity (HBM): Class 1A

*High Dynamic Range*

The HMC1013LP4E is a Successive Detection Log Video Amplifier which operates from 0.5 to 18.5 GHz. It provides a logging range of 67 dB. This device offers typical fast rise/fall times of 5/15 ns and a superior delay time of only 10 ns. The HMC1013LP4E log video output slope is typically 15 mV/dB. Maximum recovery times are less than 40 ns. The HMC1013LP4E is available in a highly compact 4 x 4 mm SMT plastic package and is ideal for high speed channelized receiver applications.
HMC1060LP3E

Quad Low Noise High PSRR Linear Voltage Regulator

Ultra Low Noise, High PSRR

The HMC1060LP3E is a BiCMOS ultra low noise quad-output linear voltage regulator targeted at high performance applications requiring superb power supply isolation. Maximum 500 mA of current, distributed between four independent outputs, enable the HMC1060LP3E to supply all of the power needs of Hittite’s Wideband PLL with Integrated VCO products, such as the HMC830LP6GE.

Features

- Ultra Low Noise: 3 nV/√Hz at 10 kHz, 7 nV/√Hz at 1 kHz
- High Power Supply Rejection Ratio (PSRR): 80 dB at 1 kHz, 60 dB at 1 MHz
- Four Adjustable Voltage Outputs: Vr1: 100 mA at 1.8 to 5.2V, Vr2 & Vr3: 50 mA at 1.8 to 5.2V, Vr4: 300 mA at 1.8 to 5.2V

HMC833LP6GE

Fractional-N PLL with Integrated VCO, 25 to 6000 MHz

Wideband Frequency Coverage

The HMC833LP6GE features industry leading phase noise and spurious performance, across all frequencies, that enable it to deliver excellent receiver sensitivity and transmitter spectral purity. The superior noise floor (< -170 dBc/Hz) makes it an ideal source for a variety of applications - such as; LO for RF mixers, a clock source for high-frequency data-converters, or a tunable reference source for ultra-low spurious applications. The device features a delta-sigma modulator Exact Frequency Mode that enables users to generate output frequencies with 0 Hz frequency error.

Features

- RF Bandwidth: 25 to 6000 MHz
- Maximum Phase Detector Rate 100 MHz
- Ultra Low Phase Noise -110 dBc/Hz in Band Typical
- Figure of Merit (FOM) -227 dBc/Hz

HMC834LP6GE

Fractional-N PLL with Integrated VCO, 45 to 8400 MHz

Excellent Spectral Performance

The HMC834LP6GE features industry leading phase noise and spurious performance, across all frequencies, that enable it to deliver excellent receiver sensitivity and transmitter spectral purity. The superior noise floor (< -170 dBc/Hz) makes it an ideal source for a variety of applications - such as; LO for RF mixers, a clock source for high-frequency data-converters, or a tunable reference source for ultra-low spurious applications. The device features a delta-sigma modulator Exact Frequency Mode that enables users to generate output frequencies with 0 Hz frequency error.

Features

- RF Bandwidth: 45 to 1050, 1400 to 2100, 2800 to 4200, 5600 to 8400 MHz
- Maximum Phase Detector Rate 100 MHz
- Figure of Merit (FOM) -227 dBc/Hz
New Amplifiers & Mixers for Microwave Radio, Military & Space Applications

HMC1040LP3CE

**GaAs pHEMT MMIC Low Noise Amplifier, 24 to 43.5 GHz**

**Features**
- Low Noise Figure: 2.2 dB
- High Gain: 23 dB
- High P1dB Output Power: +12 dBm
- High Output IP3: +14 dBm
- Single Supply Voltage: +2.5V @ 70 mA

**Wideband, Low Noise Figure**

The HMC1040LP3CE is a self-biased GaAs MMIC Low Noise Amplifier housed in a leadless 3 x 3 mm plastic surface mount package. The amplifier operates between 24 and 43.5 GHz, providing 23 dB of small signal gain, 2.2 dB noise figure, and output IP3 of +22 dBm, while requiring only 70 mA from a +2.5V supply. The P1dB output power of +12 dBm enables the LNA to function as a LO driver for many of Hittite’s balanced, I/Q and image reject mixers and receivers.

HMC1016

**Medium Power Amplifier Chip, 34 to 46.5 GHz**

**Features**
- P1dB Output Power: +24 dBm
- Psat Output Power: +26 dBm
- High Gain: 22 dB
- Output IP3: +34 dBm

**High Gain, High Output Power**

The HMC1016 is a four stage GaAs PHEMT MMIC Medium Power Amplifier die which operates between 34 and 46.5 GHz. The amplifier provides 22 dB of gain, +26 dBm of saturated output power, and 17% PAE from a +6V supply. With up to +37 dBm IP3 the HMC1016 is ideal for high linearity applications in military and space as well as point-to-point and point-to-multi-point radios. The HMC1016 amplifier I/Os are internally matched facilitating integration into multi-chip-modules (MCMs).

HMC1043LC3

**GaAs MMIC Triple Balanced Mixer, 26 to 32 GHz**

**Features**
- P1dB Output Power: +24 dBm
- High Input IP3: +23 dBm
- High LO/RF Isolation: 45 dB
- High 2LO/IF Isolation: 50 dB
- Upconversion & Downconversion Applications

**Excellent Isolation**

The HMC1043LC3 is a general purpose sub-harmonic triple balanced mixer that can be used as a frequency converter with 16 to 22 GHz at the IF port and 26 to 32 GHz at the RF port. This mixer requires no external components or matching circuitry. The HMC1043LC3 provides excellent port-to-port isolation and operates with LO drive levels from +9 dBm to +15 dBm. The HMC1043LC3 is housed in a convenient 3 x 3 mm package and is compatible with surface mount manufacturing techniques.
New Products for Clock Distribution & Signal Generation Applications

HMC987LP5E

**Features**
- Ultra Low Noise Floor: -166 dBc/Hz @ 2 GHz
- LVPECL, LVDS, CML & CMOS Compatible Inputs
- Power Down Current: <1µA

**Ideal Clock Distribution**
The HMC987LP5E 1-to-9 fanout buffer is designed for low noise clock distribution. It is intended to generate relatively square wave outputs with rise/ fall times < 100 ps. The low skew and jitter outputs of the HMC987LP5E, combined with its fast rise/ fall times, leads to controllable low-noise switching of downstream circuits such as mixers, ADCs/DACs or SERDES devices. The noise floor is particularly important in these applications, when the clock network bandwidth is wide enough to allow square wave switching.

HMC361G8

**Features**
- Ultra Low SSB Phase Noise: -148 dBc/Hz
- Wide Bandwidth
- Output Power: 3 dBm
- Single DC Supply: +5V
- 8 Lead Hermetic SMT Package

**Wideband Hermetic Divider**
The HMC361G8 is a low noise N = 2 static divider in an 8 lead glass/metal surface mount (hermetic) package. This device operates from 10 MHz (with a square wave input) to 13 GHz input frequency with a single +5V DC supply. The low additive SSB phase noise of -148 dBc/Hz at 100 kHz offset helps the user maintain good system noise performance. Hittite offers many hermetic packaged products for space and high reliability applications.

HMC861LP3E

**Features**
- Low Noise Floor: -152 dBc/Hz at 100 kHz Offset
- Programmable Frequency Divider, N = 1 or 3
- Wide Bandwidth 100 MHz to 13 GHz

**13 GHz Low Noise Programmable Divider (N = 1, 3) SMT**
The HMC861LP3E is a low noise programmable frequency divider in a 3 x 3 mm leadless surface mount package. The divider can be programmed to divide from N = 1, 3 in the 100 MHz to 13 GHz input frequency range. The low phase noise and wide frequency range make this device ideal for high performance and wide band communication systems.

VISIT US AT: www.hittite.com
New I/Q Mixers & SPDTs for Microwave Radio, Military and Test Equipment

New I/Q Mixers Are Ideal for Microwave Radio Transceivers

The HMC1041LC4 and the HMC1042LC4 are MMIC I/Q mixers which are housed in leadless RoHS compliant QFN SMT packages. These compact MMIC mixers employ a unique GaAs MESFET architecture which utilizes double balanced mixer cells and an on-chip 90 degree hybrid for nearly perfect amplitude and phase balance. As a result, the HMC1041LC4 and the HMC1042LC4 deliver low conversion loss, high port to port isolation and excellent image rejection. Due to their passive architecture, the HMC1041LC4 and HMC1042LC4 can be used as an image reject mixer (IrM) in a microwave receiver, or as a transmitter single sideband (SSB) upconverter. These SMT mixers occupy only 16 mm² of PC board area, require no external matching components, and represent a much smaller alternative to hybrid and microwave integrated circuit based image reject mixers and single sideband upconverter assemblies.

With the addition of these two new products, Hittite offers an I/Q mixer solution for virtually every microwave radioband in operation. Many of our I/Q mixer products are available in both bare die and in SMT QFN packages.

<table>
<thead>
<tr>
<th>RF / LO Frequency (GHz)</th>
<th>IF Frequency (GHz)</th>
<th>Conversion Gain (dB)</th>
<th>Image Rejection (dB)</th>
<th>IIP3 (dBm)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 - 27</td>
<td>DC - 3.5</td>
<td>-9</td>
<td>36</td>
<td>20</td>
<td>HMC1041LC4</td>
</tr>
<tr>
<td>15 - 33.5</td>
<td>DC - 3.5</td>
<td>-10</td>
<td>30</td>
<td>22</td>
<td>HMC1042LC4</td>
</tr>
<tr>
<td>3 - 7</td>
<td>DC - 3.5</td>
<td>-7.5</td>
<td>32</td>
<td>22</td>
<td>HMC620LC4</td>
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<tr>
<td>11 - 16</td>
<td>DC - 3.5</td>
<td>-8</td>
<td>35</td>
<td>26</td>
<td>HMC528LC4</td>
</tr>
</tbody>
</table>

Broadband SPDTs for Test Equipment and Military Applications

The HMC986 and the HMC547LC3 are wideband Single Pole Double Throw (SPDT) MMIC switches which are ideal for demanding applications which require low insertion loss, fast switching speed and wide bandwidth.

The HMC986 GaAs pHEMT SPDT Switch die is rated from 100 MHz to 50 GHz, and is controlled with two complementary inputs of 0/-3V. This tiny switch is less than 0.8 mm² and employs a low loss architecture. With an input signal at 40 GHz, the HMC986 exhibits 20 dB return loss, 31 dB isolation, and only 1.9 dB insertion loss.

The HMC547LC3 is a GaAs MESFET SPDT switch in a ceramic 3 x 3 mm leadless surface mount package which covers DC to 28.0 GHz. This high isolation, non-reflective switch offers over 40 dB isolation and less than 2 dB insertion loss at midband. This versatile switch operates using complementary negative control voltage logic lines of 0/-5V and requires no bias supply.

The HMC986 and the HMC547LC3 complement Hittite’s extensive line of single, double and multi-throw MMIC switches with frequency coverage from DC to 86 GHz.

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Insertion Loss (dB)</th>
<th>Isolation (dB)</th>
<th>Input P1dB (dBm)</th>
<th>Control Input (Vdc)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 - 50</td>
<td>1.9</td>
<td>31</td>
<td>25</td>
<td>0/-3V</td>
<td>HMC986</td>
</tr>
<tr>
<td>DC - 28</td>
<td>1.8</td>
<td>47</td>
<td>23</td>
<td>0/-5V</td>
<td>HMC547LC3</td>
</tr>
</tbody>
</table>
New PLL Chipset Solution for Test & Measurement and Military

PLL Chipset for Ultimate Spurious & Phase Noise Performance!

48-bit Delta-Sigma Modulator, Built-in Frequency Sweeper

Ideal for test & measurement and military applications, the HMC983LP5E DC to 7 GHz Fractional-N Divider and Frequency Sweeper and the HMC984LP4E Digital Phase-Frequency Detector and Charge Pump form a high performance PLL chipset solution targeted at PLL FMCW sweeper applications requiring ultimate performance.

The HMC983LP5E integrates the industry's largest programmable 48-bit Delta-Sigma Modulator enabling the combined PLL to achieve unparalleled fractional frequency resolution of 180 nHz. A built-in frequency sweeper enables the combined PLL to generate identical, coherent, FMCW frequency sweeps that can be linear, user-defined, automatic or triggered.

The HMC984LP4E provides an ultra low noise phase detector and charge pump capable of operating at high phase detector frequencies of 125 MHz in fractional mode, and 175 MHz in integer mode. This capability enables the PLL chipset to utilize wider loop bandwidths which result in better phase noise performance, faster PLL locking times and faster frequency sweeps. The PLL chipset phase noise Figure of Merit performance is -231 dBc/Hz in integer mode and -227 dBc/Hz in fractional mode.

Although the HMC983LP5E and the HMC984LP4E can be used separately in stand-alone applications, partitioning the PLL building blocks into two distinct devices achieves superb isolation and results in market leading spurious emissions performance exceeding -60 dBc/Hz inside-the-loop-bandwidth. Both the HMC983LP5E and the HMC984LP4E are housed in plastic leadless surface mount packages providing excellent temperature stability over the -40 °C to 85 °C operating range.

Samples and evaluation PC boards for all SMT packaged products are available from stock and can be ordered via the e-commerce site or via direct purchase order.
New Product Line: Clocks & Timing!... (continued from page 1)

A proprietary ‘Exact Frequency Mode’ of operation reduces frequency errors in fractional-N synthesis mode while maintaining the excellent noise and spur performance of the device.

The state-of-the-art HMC1034LP6GE clock generator achieves an industry leading phase jitter performance of 78 fs RMS typical (12 kHz to 20 MHz integration bandwidth) when operating at 800 MHz, and improves link level jitter performance, interface Bit-Error-Rates (BER) and Eye Diagram metrics. The device is ideal for low noise clock multiplication in Networking, Data Center and Storage applications.

The HMC1032LP6GE and HMC1034LP6GE may be used to generate the sample clocks for high speed data converters (ADC & DAC) in Cellular Infrastructure and Fiber Optics applications. With a phase noise floor of less than -165 dBc/Hz, the clock generators improve the SNR performance of data converters by providing very clean sample and device clocks.

Both devices provide an AC-coupled, differential clock pair with 2-bit adjustable output amplitude, which may be set via the SPI interface, and an output Mute function.

The HMC1032LP6GE and HMC1034LP6GE are each assembled in 6 x 6 mm plastic leadless surface mount packages, and support operation over the -40 °C to +85 °C temperature range. Evaluation Kits with easy-to-use USB programming capability and GUI-based programming software to set the desired register configuration are available from Hittite.

Hittite Adds Three New Microwave PLLs with Integrated VCOs!... (continued from page 1)

process, along with a rich integrated feature-set including: external triggering, double-buffering, exact frequency generation with 0 Hz frequency error, frequency modulation, phase modulation and more.

These new products offer the same exceptional microwave VCO performance for which Hittite is widely recognized, with the added functionality of an advanced, integrated, high performance fractional-N synthesizer. The HMC767LP6CE, HMC769LP6CE and HMC778LP6CE are housed in leadless QFN 6 x 6 mm surface mount packages and deliver high output power of up to +12 dBm, making them ideal for directly driving the LO port of many of Hittite’s high linearity, double balanced and I/Q mixer and receiver products.

To minimize design time and resources, Hittite offers an advanced Evaluation Kit to support each of the PLL with Integrated Microwave VCO products. The Evaluation Kit includes an Evaluation Board with a USB interface that contains an on-board reference oscillator and voltage regulators, and supports universal loop filter configurations. Included software allows the user to program, observe and test full performance and functionality of the PLL with Integrated Microwave VCO. Hittite’s proprietary PLL Design Software Suite enables users to simulate and predict the effect of any parameter on the performance of the PLL with Integrated Microwave VCO, and to design a loop filter targeted at a specific application.

Hittite’s line of PLL with Integrated Microwave VCO products uniquely combine the attributes of low phase noise, advanced features and compact size, making them ideal for numerous small form factor applications including microwave/millimeterwave radios, test equipment, fiber optic communications, and military communications and sensors.

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Closed Loop SSB PN @ 10 kHz Offset</th>
<th>Open Loop VCO PN @ 1 MHz Offset</th>
<th>Pout (dBm)</th>
<th>RMS Jitter Fractional Mode (fs)</th>
<th>Int. PN Fractional Mode (deg rms)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>7300 - 8200</td>
<td>-101 dBc / Hz</td>
<td>-140 dBc / Hz</td>
<td>15</td>
<td>196</td>
<td>0.58</td>
<td>HMC764LP6CE</td>
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<tr>
<td>7800 - 8800</td>
<td>-107 dBc / Hz</td>
<td>-140 dBc / Hz</td>
<td>13</td>
<td>193</td>
<td>0.61</td>
<td>HMC765LP6CE</td>
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<tr>
<td>NEW! 8450 - 9550</td>
<td>-107 dBc / Hz</td>
<td>-138 dBc / Hz</td>
<td>12</td>
<td>93</td>
<td>0.3</td>
<td>HMC767LP6CE</td>
</tr>
<tr>
<td>NEW! 9050 - 10150</td>
<td>-106 dBc / Hz</td>
<td>-140 dBc / Hz</td>
<td>12</td>
<td>82</td>
<td>0.28</td>
<td>HMC769LP6CE</td>
</tr>
<tr>
<td>NEW! 9600 - 10800</td>
<td>-106 dBc / Hz</td>
<td>-140 dBc / Hz</td>
<td>9</td>
<td>83</td>
<td>0.31</td>
<td>HMC778LP6CE</td>
</tr>
<tr>
<td>11500 - 12500</td>
<td>-99 dBc / Hz</td>
<td>-134 dBc / Hz</td>
<td>10</td>
<td>181</td>
<td>0.81</td>
<td>HMC783LP6CE</td>
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<tr>
<td>12400 - 13400</td>
<td>-98 dBc / Hz</td>
<td>-132 dBc / Hz</td>
<td>8</td>
<td>175</td>
<td>0.84</td>
<td>HMC807LP6CE</td>
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</tbody>
</table>
**Portfolio of Broadband Time Delays & Phase Shifters for Clock & Data Alignment!**

**Hittite Adds Two New Broadband Time Delay/Phase Shifter Products**

Hittite Microwave Corporation has recently expanded its Broadband Time Delay/Phase Shifter portfolio adding two exciting new products, the HMC911LC4B and the HMC877LC3.

The HMC911LC4B is a DC to 24 GHz Broadband Time Delay product that provides a continuously variable 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 adjustable from 150 mVp-p to 800 mVp-p. The modulation bandwidth is 1.6 GHz, which is the highest phase modulation bandwidth available in the market. Suitable for both clock and data lane alignment applications, the HMC911LC4B is ideal for 10G, 40G RZ-DQPSK, 100G DWDM RZ Carver clock chain and skew adjustments in the fiber optic domain.

The HMC911LC4B features internal temperature compensation and bias circuitry to minimize delay variations with temperature. The HMC911LC4B features internal temperature compensation and bias circuitry to minimize delay variations with temperature. The HMC877LC3 Broadband Time Delay/Phase Shifter is ideal for clock chain and skew adjustment in 10G-RZ, 40G/100G RZ-DQPSK fiber optic applications. The HMC877LC3 is the first Time Delay/Phase Shifter product in the market to provide 0 to 500° (1.4 Unit Interval) continuously adjustable delay over a wide 8 to 23 GHz frequency range. The device provides a differential output voltage with constant amplitude for single-ended or differential input voltages above the input sensitivity level. A control pin may be used to adjust the output voltage swing between 500 mVp-p and 900 mVp-p. This device provides a time delay/phase shift which is linearly monotonic with respect to the differential delay control voltage, over a ±0.6V tuning range. It also features internal temperature compensation and bias circuitry to minimize delay variation with temperature, ensuring an extremely stable programmable time delay over both frequency and temperature. A high delay control modulation bandwidth (3 dB rolloff point) of 2.5 GHz combined with single ±3.3V operation also make the HMC877LC3 an excellent choice for military, space, test & measurement and broadband applications.

The HMC911LC4B and HMC877LC3, along with previously released HMC856LC5 and HMC910LC4B time delays complement many of Hittite’s limiting amplifiers, modulator drivers and high speed logic products to provide a complete solution for fiber optic and test equipment applications.

**Hittite Complete Solutions for Fiber Optics & Networking and Test Equipment**

**HMC911LC4B Data Eye Diagram, 10 Gbps**

- **Time Scale:** 20 ps/div
- **Amplitude Scale:** 96.4 mV/div
- **Test Conditions:**
  - VCC = 3.3V
  - VAC = 2.6V
  - VDCP = 1200 mVp-p @ 1800 MHz
  - VDCN is 50 Ohms terminated
  - Input Data: Differential 400 mVp-p
  - 10 Gbps NRZ
  - PRBS 223-1 pattern
- **Measurement Result:**
  - Time Delay = 45.2 ps

**HMC877LC3 Eye Diagram, 15 GHz**

- **Time Scale:** 10 ps/div
- **Amplitude Scale:** 81.8 mV/div
- **Test Conditions:**
  - VCC=3.3 V, ODWN=0 V
  - VDCP = 300 mVpp @ 1 MHz
  - VDCN is 50 Ohms terminated
- **Measurement Result:**
  - 26.8 ps (0.4 UI)
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