**Industries Leading PLL + Wideband VCO Tunes Continuously from 25 to 3000 MHz!**

Excellent for Low Phase Noise, Spurious Free, High SNR Applications

Hittite has launched the HMC830LP6GE, an industry leading low noise, wide band, Fractional-N Phase-Locked-Loop (PLL) with integrated Voltage Controlled Oscillator (VCO). The HMC830LP6GE generates continuous frequencies from 25 MHz to 3000 MHz and features industry leading phase noise and spurious performance across all frequencies, making it the best choice for applications that require excellent signal quality performance and high SNR.

The HMC830LP6GE also features an integrated phase detector (PD) and delta-sigma modulator which are capable of operating at up to 100 MHz to permit wider loop-bandwidths with excellent spectral performance. With its superior performance, the HMC830LP6GE is the first high speed, low power 2 x 2 crosspoint to support rate doubling functionality of any input data rate up to 14.025 Gbps. A typical application could include 6.375 Gbps XAUI rate doubling for more efficient transmission over existing copper traces, which allows customers to field-upgrade equipment to handle greater bandwidth by upgrading line cards and switch cards in existing equipment.

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**New Battery Operated 20 GHz Signal Generator!**

10 MHz to 20 GHz Frequency Coverage with 4 Hours of Untethered Operation

Hittite Microwave Corporation expands its signal generator product line with the HMC-T2220B, a 10 MHz to 20 GHz Portable Signal Generator. Designed to fulfill signal generation needs in the field or on the bench, and priced at only $14,998, the HMC-T2220B provides the highest output power, lowest harmonic levels and broadest frequency range compared with portable signal generators of similar size and cost.

Ideal for use in automated test and measurement environments and in research and development laboratories, the HMC-T2220B is a compact and lightweight frequency generator that delivers up to +28 dBm of CW output power in 0.1 dB steps over a better than 60 dB dynamic range. Harmonic rejection is better than -43 dBc at 2 GHz and spurious products are better than -65 dBc below 10 GHz. Phase noise is -119 dBc/Hz @

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**Hittite Launches 14 Gbps 2 x 2 Crosspoint Switch!**

Ideal for 10 GbE, 16G Fibre Channel & Infiniband Networks

Hittite Microwave introduces the first product in its new Crosspoint Switch product line. The HMC857LC5 is easy to use, protocol agnostic, avoids complex programming and is ideal for driving and receiving high speed signals through backplanes up to 14.025 Gbps. The HMC857LC5 typically consumes less than 300 mW with all channels operational and is ideal for 10 GbE, 16G Fibre Channel, and Infiniband networks. The HMC857LC5 is the first high speed, low power 2 x 2 crosspoint to support rate doubling functionality of any input data rate up to 14.025 Gbps. A typical application could include 6.375 Gbps XAUI rate doubling for more efficient transmission over existing copper traces, which allows customers to field-upgrade equipment to handle greater bandwidth by upgrading line cards and switch cards in existing equipment.
Hittite Microwave offers over 925 products across 31 product lines. Our custom and standard products support a wide range of wireless / wired communications and radar applications for the following markets.

### New Products by Market Application

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<td>4:1 Selector*</td>
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<td>HMC859LC3</td>
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<td><strong>Mixers</strong></td>
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<td>HMC967LP4E</td>
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<td>HMC933LP4E</td>
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<td>HMC1030LP5E</td>
<td>Dual RMS Power Detector, Single-Ended</td>
<td>DC - 3.9</td>
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**Hittite Has Expanded Our Tunable Filter & Analog Phase Shifter Product Lines!**

See page 9 for more details about these exciting new frequency domain control products.

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**New Products by Market Application**

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<th>Function</th>
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<tr>
<td>HMC742HFLPSE</td>
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<td>6-Bit Digital, Serial &amp; Parallel Control</td>
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*These products feature programmable output voltage swing.

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**Enter To Win a HMC-T2220!**

Hittite Microwave will be exhibiting at the 2011 IEEE MTT-S International Microwave Symposium and Exhibition to be held in Baltimore, MD on June 7-9, 2011.

Hittite will feature over 30 new products and will conduct live demonstrations of new products from our ADC, Instrumentation, and PLL with Integrated VCO product lines throughout the exhibition.

Enter to win a HMC-T2220 Signal Generator. Drawing to be held in the Hittite booth #2009 on Wednesday, June 8th at 3:00 p.m.

**Industry Leading, Low Noise Voltage Regulator!**

Outstanding Low Noise 400 mA Linear Voltage Regulator with High PSRR

The HMC976LP3E is a BiCMOS linear voltage regulator which is ideal for high current and ultra low noise applications such as point-to-point microwave radio where a high data throughput demands very low power supply noise. The HMC976LP3E is also ideal for high precision, high quality test instrumentation, cellular base station infrastructure and radar or military applications.

Incorporating the HMC976LP3E regulator into VCO and PLL designs significantly improves phase noise performance and makes possible the high SNR needed for signals with dense constellations. The HMC976LP3E delivers up to 400 mA of current, a Power Supply Rejection Ratio (PSRR) of better than -60 dB at 1 kHz offset, and provides excellent rejection of any preceding switching regulator, power supply noise or any other externally generated noise.

The HMC976LP3E provides an output voltage in the 1.8 to 5V range at 400 mA and offers extremely low output noise spectral densities of 6 nV/√Hz at 1 kHz offset and 3 nV/√Hz at 10 kHz offset which largely surpasses the available linear voltage regulators on the market.

The HMC976LP3E is housed in 3 x 3 mm plastic leadless surface mount package and provides excellent temperature stability over the -40 °C to +85 °C temperature range. Samples and evaluation PC boards for all SMT packaged products are available from stock and can be ordered via the company’s e-commerce site or via direct purchase order. Released data sheets may be found at www.hittite.com.

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*Vout = 3.3V Output Noise Spectral Density*
New Low Noise and Power Amplifiers for Microwave Radio and Military

HMC962LC4 & HMC963LC4

Low Noise Amplifier SMTs, 6 to 26.5 GHz

Features

Low Noise Figure: 2.5 dB
High Gain to 22 dB
P1dB Output Power to 13 dBm
Single Supply Voltage: +3.5V @ 45 mA

Wideband Self-Biased LNAs

The HMC963LC4 & HMC962LC4 are self-biased GaAs MMIC Low Noise Amplifiers housed in leadless 4 x 4 mm ceramic surface mount packages. The amplifiers operate between 6 and 26.5 GHz, providing 13 dB or 22 dB of small signal gain, 2.5 dB noise figure, and output IP3 of +23 dBm or +18 dBm, while requiring as low as 45 mA from a +3.5V supply. The P1dB output power to +13 dBm enables the LNAs to function as LO drivers for Hittite’s balanced, I/Q or image reject mixers. The HMC962 / 963LC4 are DC blocked and internally matched to 50Ω, making them ideal for high capacity microwave radios and VSAT applications.

HMC968

1 Watt Power Amplifier Chip, 37 to 40 GHz

Features

Saturated Output Power:
+32 dBm @ 15% PAE
High Output IP3: +38 dBm
High Gain: 21 dB
DC Supply: +6V @ 900 mA
No External Matching Required

Ideal for Microwave Radio

The HMC968 is a 4 stage GaAs pHEMT MMIC 1 Watt Power Amplifier which operates between 37 and 40 GHz. The HMC968 provides 21 dB of gain, +32 dBm of saturated output power, and 15% PAE from a +6V supply. With a very good IP3 performance of +38 dBm, the HMC968 is ideal for linear applications including point-to-point and point-to-multi-point radios. All data is taken with the chip in a 50Ω test fixture connected via (2) 0.025 mm (1 mil) diameter wire bonds of 0.31 mm (12 mil) length.

HMC969

1 Watt Power Amplifier Chip, 40 to 43.5 GHz

Features

Saturated Output Power:
+31 dBm @ 15% PAE
Output IP3: +38 dBm
High Gain: 22 dB
DC Supply: +6V @ 900 mA
No External Matching Required

High Gain, High Power

The HMC969 is a 4 stage GaAs pHEMT MMIC 1 Watt Power Amplifier which operates between 40 and 43.5 GHz. The HMC969 provides 22 dB of gain, +31 dBm of saturated output power, and 15% PAE from a +6V supply. With a very good IP3 of 38 dBm, the HMC969 is ideal for linear applications including military and space as well as point-to-point and point-to-multi-point radios. All data is taken with the chip in a 50Ω test fixture connected via (2) 0.025 mm (1 mil) diameter wire bonds of 0.31 mm (12 mil) length.
NEW COMPACT DOWNCONVERTERS / RECEIVERS
FOR MICROWAVE RADIO AND MILITARY

HMC966LP4E & HMC967LP4E
I/Q Downconverter SMTs, 17 to 24 GHz

Features
Conversion Gain to 14 dB
Image Rejection to 40 dBc
2 LO to RF Isolation: 40 dB
Noise Figure: 2.5 dB
Input IP3 to 0 dBm

Integrated Low Noise Receiver
The HMC966LP4E & HMC967LP4E are compact GaAs MMIC I/Q subharmonic downconverters in leadless RoHS compliant SMT packages. These devices provide conversion gain of up to 14 dB with noise figure of 2.5 dB and up to 40 dBc of image rejection. The HMC966LP4E / 967LP4E utilize an LNA followed by an image reject mixer which is driven by an active x2 multiplier. 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.

HMC977LP4E
I/Q Downconverter SMT, 20 to 28 GHz

Features
Conversion Gain: 14 dB
Image Rejection: 21 dBc
2 LO to RF Isolation: 45 dB
Noise Figure: 2.5 dB
Input IP3: 1 dBm

Subharmonic LO Drive
The HMC977LP4E is a compact GaAs MMIC I/Q subharmonic downconverter in a leadless RoHS compliant SMT package. This device provides a conversion gain of 14 dB with a noise figure of 2.7 dB and 21 dBc of image rejection. The HMC977LP4E utilizes an LNA followed by an image reject mixer. The image reject mixer eliminates the need for a filter following the LNA and removes thermal noise at the image frequency. The HMC977LP4E is much smaller than discrete IRMs and is ideal for compact microwave radio applications.

HMC951LP4E
I/Q Downconverter SMT, 5.6 to 8.6 GHz

Features
Conversion Gain: 13 dB
Image Rejection: 20 dB
LO to RF Isolation: 48 dB
Noise Figure: 2.3 dB
Input IP3: 3 dBm

Excellent Image Rejection
The HMC951LP4E is a compact GaAs MMIC I/Q downconverter in a leadless RoHS compliant SMT package. This device provides a small signal conversion gain of 13 dB with a noise figure of 2 dB and 25 dB of image rejection. The HMC951LP4E utilizes an LNA followed by an image reject mixer which is driven by an LO buffer amplifier. 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 needed to select the required sideband.
**HMC985**

**Voltage Variable Attenuator, 20 to 50 GHz**

**Features**
- Wide Bandwidth: 20 to 50 GHz
- Excellent Linearity: +32 dB Input IP3
- Wide Attenuation Range: 35 dB
- Compact Die Size: 2.78 x 1.37 x 0.1 mm

**High Linearity Absorptive VVA**

The HMC985 is an absorptive Voltage Variable Attenuator (VVA) which operates from 20 to 50 GHz and is ideal in designs where an analog DC control signal must be used to control RF signal levels over a 35 dB dynamic range. It features two shunt-type attenuators which are controlled by two analog voltages. Optimum linearity performance of the attenuator is achieved by first varying Vctrl1 of the first attenuation stage from -3V to 0V with Vctrl2 fixed at -3V. The control voltage of the second attenuation stage, Vctrl2, should then be varied from -3V to 0V with Vctrl1 fixed at 0V.

**HMC742HFLP5E**

**0.5 dB LSB 6-Bit Digital Variable Gain Amplifier, 0.5 to 4 GHz**

**Features**
- -19 to +12.5 dB Gain Control in 0.5 dB Steps
- Power-up State Selection
- High Output IP3: +39 dBm
- TTL/CMOS Compatible: Serial, Parallel, or latched Parallel Control
- ±0.25 dB Typical Gain Step Error

**Covers All EUTRAN Bands**

The HMC742HFLPSE is a digitally controlled variable gain amplifier which operates from 0.5 GHz to 4 GHz, and can be programmed to provide from -19 dB attenuation, to 12.5 dB of gain, in 0.5 dB steps. The HMC742HFLPSE delivers noise figure of 4 dB in its maximum gain state, with OIP3 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 HMC742HFLP5E also features a user selectable power up state and a serial output for cascading other serially controlled Hittite components.

**HMC625HFLP5E**

**6-Bit Digital Variable Gain Amplifier SMT, 0.5 to 6 GHz**

**Features**
- -13.5 to +18 dB Gain Control in 0.5 dB Steps
- Power-up State Selection
- High Output IP3: +33 dBm
- TTL/CMOS Compatible: Serial, Parallel, or latched Parallel Control
- ±0.25 dB Typical Gain Step Error

**Excellent Gain Accuracy**

The HMC625HFLPSE is a digitally controlled variable gain amplifier which operates from 0.5 to 6 GHz, and can be programmed to provide anywhere from -13.5 dB attenuation, to +18 dB of gain, in 0.5 dB steps. The HMC625HFLPSE delivers noise figure of 6 dB in its maximum gain state, with OIP3 of up to +33 dBm in any state. The dual mode control interface is CMOS/TTL compatible, and accepts either a three wire serial input or a 6-bit parallel word. The HMC625HFLP5E also features a user selectable power up state and a serial output for cascading other serially controlled Hittite components.
New Power Detectors for Broadband, Cellular and Test Equipment

HMC1030LP5E

RMS Detector, Dual, DC to 3.9 GHz

Features

- Crest Factor (Peak-to-Average Power Ratio) Measurement
- ±1 dB Detection Accuracy to 3.9 GHz
- Input Dynamic Range:
  - -55 dBm to +15 dBm
  - +5V Operation from -40 °C to +85 °C

Single-Ended, 70 dB Dual RMS

The HMC1030LP5E is a dual-channel RMS power detector designed for high accuracy RF power signal measurement and control applications over the 0.1 to 3.9 GHz frequency range. The device can be used with input signals having RMS values from -60 dBm to +10 dBm referenced to 50Ω and large crest factors with no accuracy degradation. Each RMS detection channel is fully specified for operation up to 3.9 GHz, over a wide dynamic range of 70 dB.

The HMC1030LP5E operates over the -40 to +85 °C temperature range, and is housed in a 32-lead 5 x 5 mm leadless QFN package.

HMC1021LP4E

RMS Power Detector SMT with Envelope Tracker, DC to 3.9 GHz

Features

- Broadband Single-Ended RF Input
- ±1 dB Detection Accuracy to 3.9 GHz
- Input Dynamic Range:
  - -62 dBm to +8 dBm
  - ±1 dB Envelope Detection Accuracy over 20 dB Input Range
- Envelope Detection Bandwidth: >150 MHz

Fast Envelope Detector

The HMC1021LP4E is an RMS power detector with an integrated high bandwidth envelope detector. The RMS output is a temperature compensated, monotonic, linear-in-dB representation of real RF signal power, measured over an input sensing range of 72 dB. The envelope detector provides an accurate voltage output which is linearly proportional to the envelope amplitude of the RF input signal for modulation bandwidths up to 150 MHz. The high bandwidth envelope detection of the HMC1021LP4E makes it ideal for detecting broadband and high crest factor RF signals commonly used in CDMA2000, WCDMA, and LTE systems.

HMC1020LP4E

RMS Power Detector SMT, Single-Ended, DC to 3.9 GHz

Features

- Broadband Single-Ended RF Input
- ±1 dB Detection Accuracy to 3.9 GHz
- Input Dynamic Range:
  - -65 dBm to +7 dBm
  - Digitally Programmable Integration Bandwidth
  - Excellent Temperature Stability

Single-Ended, 72 dB RMS

The HMC1020LP4E Power Detector is designed for RF power measurement and control applications for frequencies up to 3.9 GHz. The detector provides an accurate RMS representation of any broadband, single-ended RF/IF input signal. The output is a temperature compensated, monotonic representation of real signal power, measured with an input sensing range of 72 dB.

The HMC1020LP4E is ideally suited to those wide bandwidth, wide dynamic range applications requiring repeatable measurement of real signal power.
Hittite has launched two new successive detection log video amplifiers (SDLVAs) with a limited RF output feature that operate over the 1 to 26 GHz and 1 to 20 GHz frequency ranges. The HMC813 and the HMC813LC4B are ideal for designers with space and power-constrained applications including EW and ELINT receivers, DF radar, ECM, IFM systems and missile guidance.

Available in die and ceramic 4 x 4 mm SMT formats, the HMC813 and the HMC813LC4B feature power limiter circuitry at their RF outputs and carry a class 1A ESD rating (250V HBM). Also ideal for high speed channelized systems that require improved ESD performance, these SDLVAs employ a successive compression topology, which delivers a high logging range of 55 dB and provides a nominal log video output slope of 15 mV/dB. The HMC813 and the HMC813LC4B are capable of processing RF pulses with amplitudes from -53 dBm to +7 dBm with less than 10 ns rise / fall times, and with recovery times of less than 20 ns. These SDLVAs exhibit frequency flatness of better than ±1.5 dB at -25 dBm input power, while logarithmic linearity is better than ±0.5 dB over the full -55 °C to +85 °C operating temperature range. The HMC813 and the HMC813LC4B consume less than 153 mA from a single +3.3V supply.

### Features

- **High Logging Range:** 55 dB
- **Frequency Flatness:** ±1.5 dB
- **Saturated Output Power:** -7 dBm
- **Fast Rise / Fall Times:** 4/10 ns
- **Single Positive Supply:** +3.3V

### Applications

- EW, ELINT & IFM Receivers
- DF Radar Systems
- ECM Systems
- Broadband Test & Measurement
- Power Measurement & Control Circuits

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<th>RSSI Slope (mV/dB)</th>
<th>RF Threshold Level (dBm)</th>
<th>Bias Supply (mA)</th>
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<td>-53</td>
<td>3.3V @ 150 mA</td>
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<td>15</td>
<td>-53</td>
<td>3.3V @ 153 mA</td>
<td>HMC813LC4B</td>
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</tbody>
</table>

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**New High Speed Digital Logic Products to 28 Gbps**

Hittite has launched six new high speed logic products to complement its growing high speed logic product line. Operating with clock rates ranging from 14 GHz up to 28 GHz, these devices are ideal for deployment in SONET OC-192 systems, 10/40/100 GbE, 16/32 G fiber channel equipment, broadband test and measurement equipment and clock synthesis and distribution applications. These logic devices are also optimized for fast rise and fall times, low jitter and low DC power requirements, with an output level control pin feature which allows for signal loss compensation or signal level optimization. Typical deterministic jitter is 2 ps, while random jitter is 0.2 ps RMS.

The devices operate from a ±3.3V supply, are specified for operation from -40 °C to +85 °C and are housed in RoHS compliant ceramic SMT packages.

### Features

- **Supports Data Rates to 28 Gbps**
- **Differential & Single-Ended Operation**
- **Fast Rise & Fall Times**
- **Excellent Jitter Performance**

### Applications

- Serial Data Transmission up to 28 Gbps
- 16G Fiber Channel
- Redundant Path Switching
- Clock Synthesis & Distribution
- Broadband Test & Measurement

### Table

<table>
<thead>
<tr>
<th>Data/Clock Rate (Gbps/GHz)</th>
<th>Function</th>
<th>Rise/Fall Time (ps)</th>
<th>Differential Output Swing (Vp-p)</th>
<th>DC Power Consumption (mW)</th>
<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>28 / 28</td>
<td>AND / NAND / OR / NOR</td>
<td>15 / 14</td>
<td>0.5 - 1.3</td>
<td>241</td>
<td>HMC852LC3C</td>
</tr>
<tr>
<td>14 / 14</td>
<td>2:1 Differential Selector</td>
<td>19 / 20</td>
<td>0.5 - 1.3</td>
<td>221</td>
<td>HMC858LC4B</td>
</tr>
<tr>
<td>- / 26</td>
<td>Clock Divide-by-8</td>
<td>19 / 17</td>
<td>0.8 - 1.8</td>
<td>320</td>
<td>HMC859LC3C</td>
</tr>
<tr>
<td>14 / 14</td>
<td>Dual D-Type Flip-Flop with Common Clock</td>
<td>22 / 20</td>
<td>0.6 - 1.3</td>
<td>442</td>
<td>HMC953LC4B</td>
</tr>
<tr>
<td>14 / 14</td>
<td>4:1 Selecter</td>
<td>17 / 17</td>
<td>0.5 - 1.3</td>
<td>294</td>
<td>HMC958LC5</td>
</tr>
<tr>
<td>- / 26</td>
<td>Clock Divide-by-4</td>
<td>19 / 19</td>
<td>0.8 - 1.8</td>
<td>281</td>
<td>HMC959LC3C</td>
</tr>
</tbody>
</table>
**New Tunable Filters and Analog Phase Shifters for Military, Microwave Radio & Test Equipment**

**Tunable Band Pass SMTs, 4 to 37 GHz**

The HMC892LP5E, HMC893LP5E, HMC894LP5E, and HMC897LP4E, and the HMC899LP4E are MMIC band pass filters which feature user selectable passband frequencies. Across the line, the center frequency of these tunable filters can be varied between 4 and 37 GHz by applying an analog tune voltage between 0 and 14V. These tunable filters provide 3 dB bandwidths which range from 6% to 18%, and can be used as much smaller alternatives to physically large switched filter banks and cavity tuned filters. Each of these products exhibit excellent microphonics due to the monolithic design and provides a dynamically adjustable solution in advanced communications applications. The HMC892LP5E, HMC893LP5E, HMC894LP5E, HMC897LP4E and the HMC899LP4E complement Hittite's broad line of low pass, band pass and band reject tunable MMIC filter products.

**Features**
- Fast Tuning Response
- Excellent Wideband Rejection
- Single Chip Replacement for Mechanically Tuned Designs
- Single Analog Tuning Voltage

**Applications**
- Test & Measurement Equipment
- Military RADAR & EW/ECM
- SATCOM & Space
- Industrial & Medical Equipment
- Frequency Agile Subsystems

**Analog Phase Shifter SMTs, 2 to 24 GHz**

The HMC935LP5E, HMC931LP4E, HMC932LP4E, and HMC933LP4E are Analog Phase Shifter MMICs which are controlled by an analog control voltage from 0.5 to +13V. Across the line, these versatile phase shifters provide a continuously variable phase shift of up to 495 degrees, and cover frequencies from 2 to 24 GHz with extremely consistent low insertion loss versus phase shift and frequency. These new analog phase shifters exhibit excellent phase flatness vs. frequency, and are fully monotonic with respect to control voltage. Each of these products are housed in RoHS compliant QFN leadless packages, require no external matching circuitry and are extremely easy to use.

**Features**
- Wide Bandwidth: 2 to 20 GHz
- 180° Phase Shift
- Low Insertion Loss: 4 dB
- Low Phase Error: +20/-8 deg Typ.
- Single Positive Voltage Control

**Applications**
- EW Receivers
- Military Radar
- Test Equipment
- Satellite Communications
- Beam Forming Modules
- Phase Cancellation Subsystems

---

**FREQ. RANGE**

<table>
<thead>
<tr>
<th>Freq. Range (GHz)</th>
<th>Return Loss (dB)</th>
<th>% Bandwidth (3 dB)</th>
<th>Low Side Rej. Freq. (Rej. &gt;20 dB)</th>
<th>High Side Rej. Freq. (Rej. &gt;20 dB)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 7.7</td>
<td>15</td>
<td>9</td>
<td>0.9 x Fcenter</td>
<td>1.13 x Fcenter</td>
<td>HMC892LP5E</td>
</tr>
<tr>
<td>4.8 - 9.5</td>
<td>7</td>
<td>6.5</td>
<td>0.9 x Fcenter</td>
<td>1.13 x Fcenter</td>
<td>HMC893LP5E</td>
</tr>
<tr>
<td>5.9 - 11.2</td>
<td>7.5</td>
<td>6</td>
<td>0.92 x Fcenter</td>
<td>1.08 x Fcenter</td>
<td>HMC894LP5E</td>
</tr>
<tr>
<td>9 - 19</td>
<td>9.5</td>
<td>18</td>
<td>0.81 x Fcenter</td>
<td>1.17 x Fcenter</td>
<td>HMC897LP4E</td>
</tr>
<tr>
<td>18.5 - 37.0</td>
<td>10</td>
<td>18</td>
<td>0.81 x Fcenter</td>
<td>1.20 x Fcenter</td>
<td>HMC899LP4E</td>
</tr>
</tbody>
</table>

---

**FREQ. RANGE**

<table>
<thead>
<tr>
<th>Freq. Range (GHz)</th>
<th>Insertion Loss (dB)</th>
<th>Phase Range (deg)</th>
<th>2nd Harmonic Pin = -10 dBm (dBc)</th>
<th>Control Voltage Range (Vdc)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 20</td>
<td>4</td>
<td>270° @ 2 GHz; 180° @ 20 GHz</td>
<td>-45</td>
<td>0.5 to +11V</td>
<td>HMC935LP5E</td>
</tr>
<tr>
<td>8 - 12</td>
<td>3.5</td>
<td>425° @ 8 GHz; 405° @ 12 GHz</td>
<td>-35</td>
<td>0 to +13V</td>
<td>HMC931LP4E</td>
</tr>
<tr>
<td>12 - 18</td>
<td>4</td>
<td>405° @ 12 GHz; 385° @ 18 GHz</td>
<td>-40</td>
<td>0 to +13V</td>
<td>HMC932LP4E</td>
</tr>
<tr>
<td>18 - 24</td>
<td>4.5</td>
<td>495° @ 18 GHz; 460° @ 24 GHz</td>
<td>-37</td>
<td>0 to +13V</td>
<td>HMC933LP4E</td>
</tr>
</tbody>
</table>
HMC830LP6GE is ideal for wideband multi-carrier and multi-standard cellular base stations as it can be used in up or down conversion, as a low jitter clock LO generator or as a tunable reference source for a spurious free performance. It is also ideal for high QAM microwave point-to-point links, software defined radios and communications test equipment.

The HMC830LP6GE PLL Figure of Merit is -230 / -227 in integer and fractional modes respectively. Double sideband RMS jitter is less than 180 fs and the noise floor is -171 dBc/Hz in fundamental mode at 2 GHz. The worst integer boundary spurious product is around -55 dBc when falling in-band. These specifications make the HMC830LP6GE the ultimate choice for designers looking for a single, superior performance, multi-purpose and multi-application device that can cover a wide frequency range.

The HMC830LP6GE is wideband 50Ω matched, includes RF output power control from 0 to 9 dB (3 dB steps) and an output mute function. An Exact Frequency Mode enables output frequencies with small channel step sizes, 0 Hz frequency error and zero spurious related to channel spacing.

The HMC830LP6GE is housed in a 6 x 6 mm plastic leadless surface mount packages and provides excellent temperature stability over the -40 °C to +85 °C temperature range.

This typical block diagram shows how the HMC830LP6GE can be used with other Hittite components to implement a wideband, multi-standard receiver solution.
**NEW BATTERY OPERATED 20 GHz SIGNAL GENERATOR!** … (continued from page 1)

100 kHz offset from 1 GHz with insignificant deviation over the temperature range of 0 °C to +35 °C. The broad frequency range of 10 MHz to 20 GHz covers all major communication bands with frequency resolution of 1 Hz, 0.1 dB power resolution and fast switching speed of 300 µs.

Internal rechargeable batteries allow for up to four hours of continuous operation, making the HMC-T2220B a portable and versatile instrument, which is particularly attractive for wireless/wired service installation, field testing or remote on-site maintenance applications.

Built on a foundation of Hittite’s high quality and market leading MMICs, this versatile portable signal generator features multiple interfaces (USB, GPIB and Ethernet) and innovative control software ensuring seamless integration within multiple test environments. To facilitate integration into existing HMC-T2100 and HMC-T2100B applications, the HMC-T2220B has a HMC-T2100 compatibility mode. In this mode, the HMC-T2220B identifies itself as a HMC-T2100 so that the HMC-T2100 USB drivers will work for a HMC-T2220B, and programs will recognize a HMC-T2220B as a HMC-T2100. Frequency resolution, maximum and minimum power values and minimum sweep dwell time also change to match the HMC-T2100.

**HITTITE LAUNCHES 14 GBPS 2 x 2 CROSSPOINT SWITCH!** … (continued from page 1)

The HMC857LC5 2 x 2 crosspoint switch also features selector port operation up to 14 GHz. The selector routes the differential inputs to either one or both of the desired outputs upon assertion of the appropriate selected port. The HMC857LC5 may be used as a dual 2:1 selector or in redundant switching applications and also features an output level control pin, VR, which may be programmed from 475 to 1200 mVp-p to allow for loss compensation or signal level optimization. The HMC857LC5 also features fast rise/fall times of 21 ps and a propagation delay of only 117 ps, making it beneficial for broadband test and measurement applications. Random and deterministic jitter is specified at 0.08 ps rms, and 2 ps p-p respectively.

The HMC857LC5 is specified over the full -40 °C to +85 °C temperature range, operates from a single -3.3V DC supply, and is available in a ceramic RoHS compliant 5 x 5 mm SMT package. A product datasheet may be requested at www.hittite.com.

**HITTITE ADDS 11 NEW REPRESENTATIVES!**

With headquarters located around the globe, these 11 new representatives provide support to Hittite customers for their superior performance MMIC, instrumentation, and connectorized module product lines.

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- **Caltest Oy**: Helsinki, Finland
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- **MCS Test Equipment LTD**: Wednesbury, West Midlands, U.K.,
  Tel: +08453 62 63 65
  Email: kevin.jones@mcs-testequipment.co.uk
- **PAT Associates**: Narragansett, RI, U.S.A.
  Tel: 401-783-9598 • Email: sales@patassociates.com

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**Tritek Solutions & Tritek Northwest**: CA, NV, OR & WA
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  Tel: 949-609-0560 • Email: sales-tritek@triteksolutions.com

**Test Conditions:**

Waveform generated with a differential 400 mV Agilent N4903A J-Bert with a 13 Gbps PN 2⁰⁻¹ signal.

Eye Diagram data presented on a Tektronix CSA 8000.
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