

OFF-THE-SHELF

New DC to Millimeterwave ICs & Modules from Hittite

MARCH
2008

Hittite Opens New Sales Office in Japan!

See Page 7

25 New Products Released!

Product Showcase

0.2 - 4 GHz High IP3 Amp



HMC636ST89E

- High Output IP3: +40 dBm
- Low Noise Figure: 2 dB
- AH1 Replacement

See Page 3

18 - 40 GHz Driver Amp



HMC635

- High Output P1dB: +23 dBm
- High Gain: 20 dB
- DC Supply: +5V

See Page 2

20 - 31 GHz I/Q Mixer Module



HMC-C046

- Wide IF BW: DC - 4.5 GHz
- Image Rejection: 24 dB
- High Input IP3: +22.5 dBm

See Page 5

HIGH SPEED DIGITAL LOGIC & LATCHED COMPARATORS RELEASED!

7 New High Speed Products Support Data Rates to 13 Gbps

Hittite Microwave is pleased to announce a new product line of High Speed Digital Logic devices operating at data rates up to 13 Gbps. These devices are designed for a wide range of applications requiring ultra low jitter and very low DC power consumption including high speed communications, optical systems, radar/sonar signal processing and broadband test and measurement equipment.



Four logic devices have been released including the HMC670LC3C 1:2 Fanout Buffer, the HMC671LC3C XOR/XNOR gate, HMC672LC3C AND/NAND/OR/NOR gate, and the HMC673LC3C D-Type flip flop. These devices will support serial data transmission up to 13 Gbps, and clock buffering applications up to 13 GHz. This series of logic devices provides propagation delays between 55 and 60 ps, while deterministic jitter is typically 1 ps. Rise and fall times are typically 24 and 22 ps, with power dissipation between 180 and 250 mW.

(Continued on page 6)

HITTITE EXPANDS SIGNAL GENERATOR PRODUCT OFFERING!

HMC-T2000 Low Cost & Compact Synthesizer Operates 700 to 8000 MHz



The second in our line of high quality Signal Generators, the HMC-T2000, with its broad frequency range, high power signal capability and affordability, is the ideal choice to fulfill your frequency generation needs. This light-weight compact unit has been carefully designed with mobility and functionality in mind and provides the user with the performance attributes required by today's test environment. The HMC-T2000 can easily be programmed for CW or swept frequency screening while the broad frequency range of 700 to 8000 MHz covers all major communication bands with a frequency resolution of 1 MHz and a fast switching speed of 200 us at 100 MHz steps. The high output power of +17 dBm, with 0.5 dB resolution, allows the user to simplify their test configurations in situations where driver amplifiers are typically required. The output power is leveled

(Continued on page 6)

HITTITE RELEASES 2008 DESIGNER'S GUIDE, 3 VOLUME SET

Hittite has released the 13th edition Designer's Guide catalog for 2008 which provides full specifications for 633 products. This popular three volume publication includes 152 new product data sheets, as well as quality/reliability, application and packaging/layout information.

Volume 1

Amplifiers, Power Detectors & Variable Gain Amplifiers

Volume 2

Attenuators, Data Converters, High Speed Digital Logic, Phase Shifters & Switches

Volume 3

Freq. Dividers & Detectors, Freq. Multipliers, Mixers, Mods. & Demodulators, Synthesizers, VCOs & PLOs.

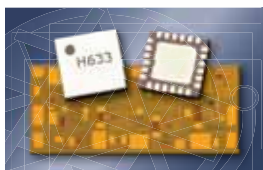


Each volume is conveniently organized into chip component, SMT, connectorized module and instrumentation sections. To request your 2008 catalog three volume set, please visit us on-line at www.hittite.com and select the "Submit Inquiry" button. Quantities are limited - order today!

Order On-line at: www.hittite.com

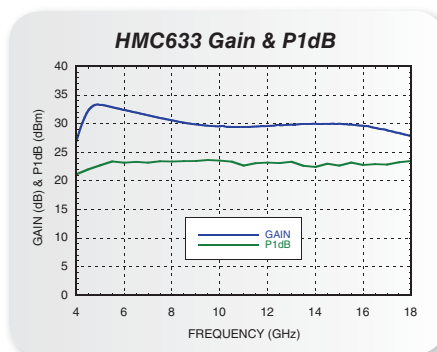
HMC633 & HMC633LC4

GaAs PHEMT MMIC Driver Amplifiers, 5 to 17 GHz



Features

- Gain to 30 dB
- P1dB: +23 dBm
- Saturated Power to +24 dBm
- DC Supply: +5V @ 180mA
- Chip & SMT Package Available

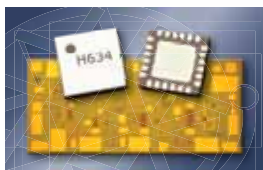


High Gain, Consistent Power

The HMC633 & HMC633LC4 are GaAs PHEMT MMIC Driver Amplifiers which operate between 5 and 17 GHz. The amplifiers provide up to 30 dB of gain, +30 dBm Output IP3, and +23 dBm of output power at 1 dB gain compression, while consuming 180 mA from a +5V supply. These MMICs are ideal for microwave radio applications and may be biased at +5V, 130 mA to provide 2 dB lower gain with improved PAE. The amplifier's I/Os are DC blocked and require no external matching.

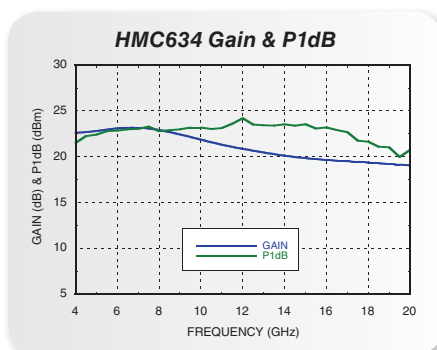
HMC634 & HMC634LC4

GaAs PHEMT MMIC Driver Amplifiers, 5 - 20 GHz



Features

- Gain to 22 dB
- P1dB to +23 dBm
- Saturated Power to +24 dBm
- DC Supply: +5V @ 180mA
- Chip & SMT Package Available

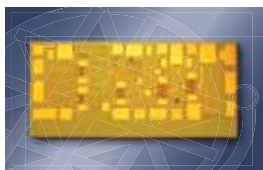


Versatile Driver Amplifier

The HMC634 & HMC634LC4 are GaAs PHEMT MMIC Driver Amplifiers which operate between 5 and 20 GHz. These amplifiers provide up to 21 dB of gain, +29 dBm Output IP3, and +22 dBm of output power at 1 dB gain compression, while consuming 180 mA from a +5V supply. These MMICs are ideal for microwave radio applications and may be biased at +5V, 130 mA to provide lower gain with optimized PAE. The amplifier's I/Os are DC blocked and require no external matching.

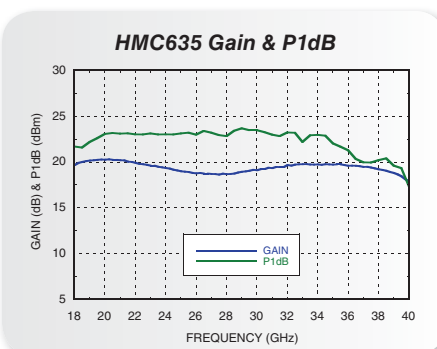
HMC635

GaAs PHEMT MMIC Driver Amplifier, 18 - 40 GHz



Features

- Gain: 20 dB
- P1dB: +23 dBm
- Saturated Power: +24 dBm
- DC Supply: +5V @ 280mA
- Chip & SMT Package Available

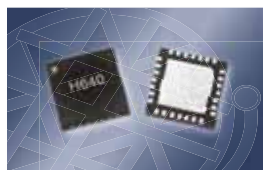


Ideal for Test Equipment & Military

The HMC635 is a GaAs PHEMT MMIC Driver Amplifier die which operates between 18 and 40 GHz. The amplifier provides 19.5 dB of gain, +29 dBm Output IP3, and +23 dBm of output power at 1 dB gain compression, while consuming 280 mA from a +5V supply. Ideal as a driver amplifier for microwave radio applications, the HMC635 is capable of providing up to +24 dBm of saturated output power at 15% PAE. The amplifier's I/Os are DC blocked and internally matched to 50 Ohms making it ideal for integration into Multi-Chip-Modules (MCMs).

HMC640LP5E

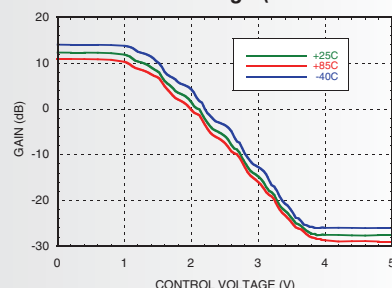
GaAs MMIC Analog Variable Gain Amplifier, 0.4 - 3.0 GHz



Features

- Wide Gain Control Range: up to 40 dB
- High Output IP3: +40 dBm
- Can Be Configured With 1 or 2 Attenuator Sections
- 5x5 mm SMT Package

Gain vs. Control Voltage (f = 2400 MHz)



Wide Gain Control Range

The HMC640LP5E is an analog controlled variable gain amplifier which operates from 0.4 to 3 GHz, and can be controlled to provide anywhere from 20 dB attenuation, to 25 dB of gain. The HMC640LP5E delivers output IP3 of up to +40 dBm in any state and can be configured with one attenuator for 20 dB of range, or with two attenuators for 40 dB of range. The HMC640LP5E is housed in a RoHS compliant 5x5 mm QFN leadless package, and covers all of the popular Cellular/3G/WiMAX bands.

HMC628LP4E

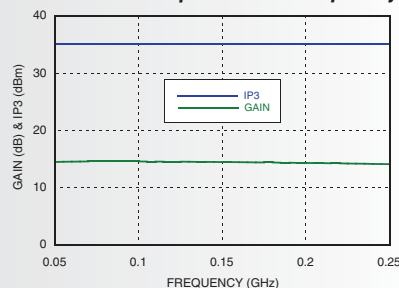
5-Bit Digital Variable Gain Amplifier, 50 - 800 MHz



Features

- TTL / CMOS Compatible Serial, Parallel or Latched Parallel Control
- High Output IP3: +35 dBm
- Wide Gain Control Range
- Power-Up State Selection
- 4x4 mm SMT Package

Max Gain & Output IP3 vs. Frequency



Ideal for IF & RF Applications

The HMC628LP4E is a digitally controlled variable gain amplifier which operates from 50 to 800 MHz, and can be programmed to provide anywhere from 8 dB attenuation, to 15 dB of gain, in 1 dB steps. The HMC628LP4E delivers noise figure of 5 dB in its maximum gain state, with output IP3 of up to +35 dBm in any state. The dual mode control interface is CMOS/TTL compatible, and accepts either a 3 wire serial input or a 5-bit parallel word and also features a user selectable power up state. The HMC628LP4E is available in three evaluation board configurations.

HMC636ST89E

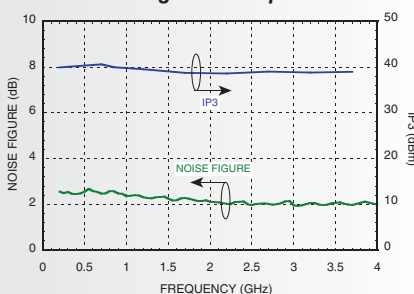
GaAs PHEMT High Linearity Gain Block, 0.2 - 4.0 GHz



Features

- Low Noise Figure: 2 dB
- High P1dB Output Power: +22 dBm
- High Output IP3: +40 dBm
- Gain: 13 dB
- 50 Ohm I/O's No External Matching
- Industry Standard SOT89 Package

Noise Figure & Output IP3

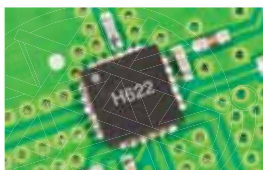


No External Matching

The HMC636ST89E is a GaAs PHEMT, High Linearity, Low Noise, Gain Block Amplifier covering 0.2 to 4 GHz. Packaged in an industry standard SOT89, the amplifier can be used as either a cascadable 50 Ohm gain stage, a PA Pre-Driver, a Low Noise Amplifier, or a Gain Block with up to +23 dBm output power. This versatile Gain Block Amplifier is powered from a single +5V supply and requires no external matching components. The internally matched topology makes this amplifier easily ported between different PCB materials and thicknesses.

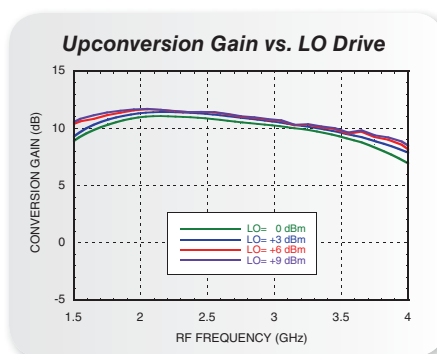
HMC622LP4E

GaAs MMIC Mixer w/ Integrated IF & LO Amplifiers, 1.8 - 3.9 GHz



Features

- High Input IP3: +23 dBm
- Low Input LO Drive: 0 to +6 dBm
- High LO to RF Isolation: 33 dB
- High Conversion Gain: 12 dB
- Upconversion & Downconversion

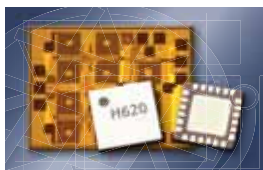


Ideal for WiMAX/LTE/4G

The HMC622LP4E is a highly integrated converter IC that operates from 1.8 to 3.9 GHz for both upconversion and downconversion applications. The HMC622LP4E incorporates a high dynamic range, double-balanced mixer core with integrated LO and IF amplifiers, making it ideal for compact transceiver applications in Cellular /3G and WiMAX/LTE/4G. This versatile converter RFIC operates with only +3 dBm LO drive, and provides up to 10 dB conversion gain in downconversion mode and up to 12 dB conversion gain in upconversion mode.

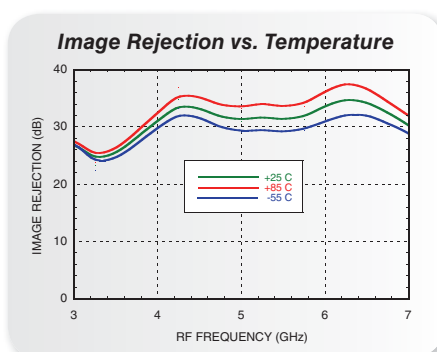
HMC620 & HMC620LC4

GaAs MMIC I/Q Mixer, 3 - 7 GHz



Features

- Wide IF Bandwidth: DC - 3.5 GHz
- High Image Rejection to 33 dB
- High LO to RF Isolation to 45 dB
- High Input IP3 to +23 dBm
- Chip & SMT Package Available



Excellent Image Rejection

The HMC620 & HMC620LC4 are compact I/Q MMIC mixers which can be used as either an Image Reject Mixer (IRM) or a Single Sideband Upconverter. The mixer utilizes two standard Hittite double balanced mixer cells and a 90 degree hybrid fabricated in a GaAs MESFET process. This product is a much smaller and more consistent alternative to hybrid style Image Reject Mixers and Single Sideband Upconverter assemblies. The HMC620LC4 is compatible with high volume surface mount manufacturing techniques.

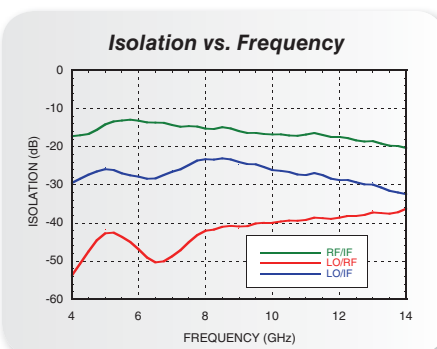
HMC558 & HMC558LC3B

GaAs MMIC Fundamental Mixer, 5.5 - 14 GHz



Features

- Passive Double-Balanced Topology
- High LO/RF Isolation: 45 dB
- Low Conversion Loss: 7 dB
- Wide IF Bandwidth: DC - 6 GHz
- Chip & SMT Packages Available

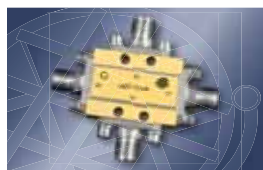


Double-Balanced Topology

The HMC558 & HMC558LC3B are general purpose double balanced mixers that can be used as upconverters or downconverters between 5.5 and 14 GHz. These mixers require no external components or matching circuitry. The HMC558LC3B provides excellent LO to RF and LO to IF isolation due to optimized balun structures and operates with LO drive levels as low as +9 dBm. The RoHS compliant HMC558LC3B eliminates the need for wire bonding, and is compatible with high volume surface mount manufacturing techniques.

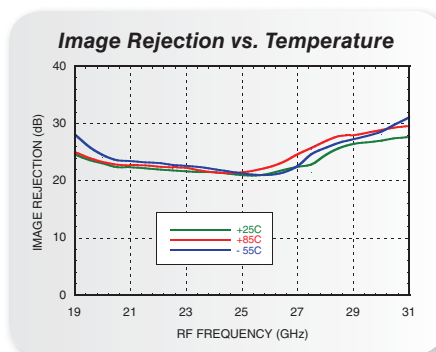
HMC-C046

GaAs MMIC I/Q Mixer Module, 20 - 31 GHz



Features

Wide IF Bandwidth: DC - 4.5 GHz
Image Rejection: 24 dB
LO to RF Isolation: 42 dB
High Input IP3: +22.5 dB
Hermetically Sealed Module

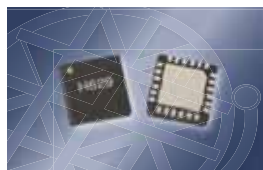


Ideal for Laboratory Use

The HMC-C046 is a passive I/Q MMIC mixer housed in a miniature hermetic module which can be used as either an Image Reject Mixer (IRM) or a Single Sideband Upconverter. The module utilizes two double balanced mixer cells and a 90 degree hybrid. This MMIC based module is a more reliable and consistent alternative to hybrid style I/Q Mixers and Single Sideband Converter assemblies. Removable SMA connectors can be detached to allow direct connection of the I/O pins to a microstrip or coplanar circuit.

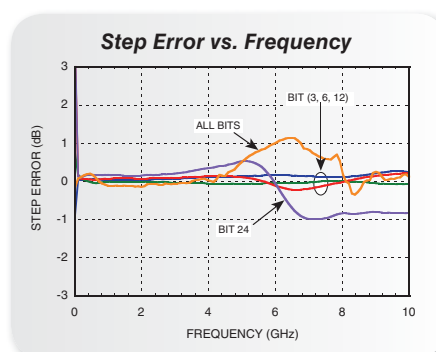
HMC629LP4E

GaAs MMIC 4-Bit Digital Attenuator, DC - 6 GHz



Features

TTL / CMOS Compatible Serial, Parallel or Latched Parallel Control
3 dB LSB Steps to 45 dB
Power-Up State Selection
Low Insertion Loss: 2.5 dB
±0.25 dB Typical Step Error
Single +3V to +5V Supply

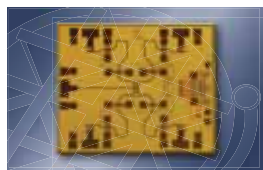


45 dB of Attenuation Range

The HMC629LP4E is a broadband 4-bit GaAs IC Digital Attenuator in a leadless SMT package which is ideal for a wide variety of RF and IF applications. The dual mode control interface is CMOS/TTL compatible, and accepts either a three wire serial input or a 4-bit parallel word. For applications which require only 33 dB of attenuation range, the HMC629LP4E provides excellent attenuation accuracy from DC to 10 GHz. The HMC629LP4E is housed in a RoHS compliant 4x4 mm QFN leadless package, and requires no external matching components.

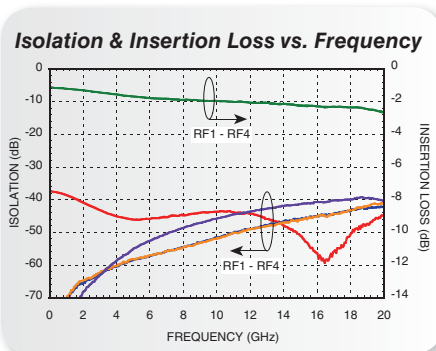
HMC641

GaAs MMIC SP4T Non-Reflective Switch, DC - 18 GHz



Features

Broadband Performance:
DC - 18 GHz
High Isolation: 42 dB @ 12 GHz
Low Insertion Loss:
2.1 dB @ 12 GHz
Integrated 2:4 TTL Decoder



High Isolation, Low Insertion Loss

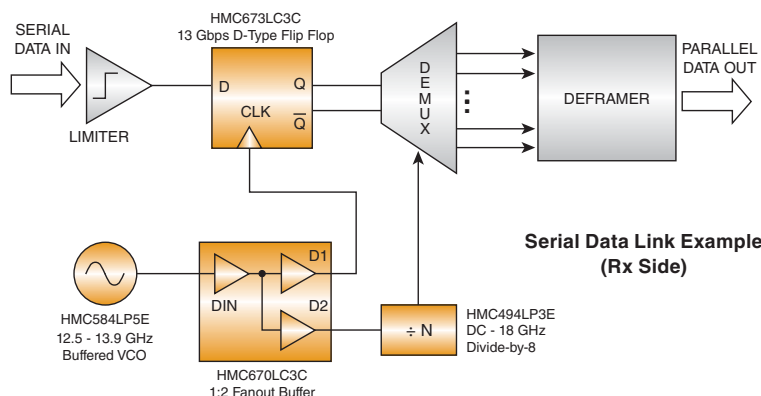
The HMC641 is a broadband non-reflective GaAs PHEMT SP4T switch chip. Covering DC to 18 GHz, this switch offers high isolation and low insertion loss and extends the frequency coverage of Hittite's SP4T switch product line. The switch includes an on board binary decoder circuit which reduces the number of required logic control lines to two. The switch operates using a negative control voltage of 0/-5V and exhibits +24 dBm P1dB and +40 dBm IP3.

HIGH SPEED DIGITAL LOGIC & LATCHED COMPARATORS RELEASED! ... (continued from page 1)

The HMC670LC3C, HMC671LC3C, HMC672LC3C and HMC673LC3C also feature an output level voltage swing control which allows for signal loss compensation or signal level optimization.

Also released is the HMC674LC3C, HMC675LC3C, and HMC676LC3C ultra fast Latched Comparator family of devices which feature reduced swing PECL, CML and ECL output drivers and latch inputs respectively. These comparators support 10 Gbps operation while providing 130 ps propagation delay and 60 ps minimum pulse width with 0.8 ps RMS random jitter, making them ideal for digital receivers, clock and data restoration circuits, pulse spectroscopy, ATE and high speed instrumentation.

These new High Speed Digital Logic and Latched Comparator products are specified for operation from -40°C to



+85°C, and are housed in ceramic RoHS compliant 3x3 mm SMT packages. Released data sheets are available on-line at www.hittite.com. Product and evaluation kits are also available from stock.

New High Speed Digital Logic Product Line

Part Number	Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Voltage Swing (Vpp)	DC Power Consumption (mW)	Vee Power Supply (Vdc)	Package
HMC670LC3C	13	1:2 Fanout Buffer	24 / 22	1	1.1	250	-3.3	LC3C
HMC671LC3C	13	XOR / XNOR	24 / 22	1	1.1	180	-3.3	LC3C
HMC672LC3C	13	AND / NAND / OR / NOR	24 / 22	1	1.1	180	-3.3	LC3C
HMC673LC3C	13	D-Flip-Flop	24 / 22	1	1.1	210	-3.3	LC3C

New High Speed Latched Comparators

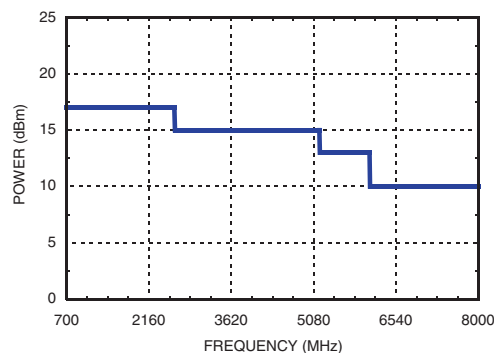
Part Number	Input Clock Rate (GHz)	Function	Deterministic Jitter (ps)	Propagation Delay (ps)	Output Voltage Swing (Vdc)	DC Power Consumption (mW)	Vcc, Vee Power Supply (Vdc)	Package
HMC674LC3C	9.7	Latched Comparator - RSPECL	10	130	0.4	180	+3.3, -3	LC3C
HMC675LC3C	9.7	Latched Comparator - RSCML	10	130	0.2	120	+3.3, -3	LC3C
HMC676LC3C	9.7	Latched Comparator - RSECL	10	130	0.4	120	+3.3, -3	LC3C

HITTITE EXPANDS SIGNAL GENERATOR PRODUCT OFFERING! ... (continued from page 1)

across certain frequency bands; however, the user may access the total maximum output of +21 dBm if desired. Harmonic rejection is an impressive 40 dBc and 33 dBc at 1 GHz and 8 GHz respectively, and the spurious products are less than 48 dBc across the entire band.

This versatile signal generator also features a USB interface and innovative control software ensuring carefree integration within multiple test environments. An installation disk accompanies each unit and includes all of the drivers required to remotely control the device, as well as a user friendly lab-windows based GUI interface compatible with a Windows XP operating system. Pull-down menus allow programming of single or swept modes in frequency and/or power. Integration of multiple units within a production test environment is easy, affordable and repeatable due to the incorporation of integer mode architecture and the ability to maintain phase coherence between frequency steps.

Built on a foundation of high quality and market leading Hittite MMICs and a scalable platform architecture, Hittite can offer new features, performance and bandwidth to suit



HMC-T2000 Levelled Output Power vs. Frequency

your measurement needs. Our expert hardware and software design teams are ready to discuss your requirements and to help you achieve your testing goals. Datasheets are available at www.hittite.com and units are available from stock.

75 dB LOGARITHMIC DETECTOR / CONTROLLER 50 Hz - 3000 MHz



The HMC612LP4E Logarithmic Detector / Controller is ideal for converting input signals with frequencies in the 50 Hz to 3 GHz range, to a proportional DC voltage at its output. The HMC612LP4E employs a successive compression technology which delivers extremely high dynamic range and conversion accuracy over a wide input frequency range. For detection mode, the LOGOUT pin is shorted to the VSET input and will provide a nominal logarithmic slope of 19 mV/dB and an intercept of -99 dBm. The HMC612LP4E can also be used in the controller mode where an external voltage is applied to the VSET pin, to create an Automatic Gain Control (AGC) or Automatic Power Control (APC) feedback loop.

HITTITE OPENS SALES OFFICE IN JAPAN!

Hittite is pleased announce the opening of a direct sales office in Tokyo, Japan. Mr. Tatsuyoshi Ueda will serve as Japan Country Manager. Ueda-san has over 26 years of component sales experience in Japan and has worked closely with various US based companies in the past, including Hittite. He will manage the overall sales channels in Japan to better serve the technical and commercial needs of our local customers. Ueda-san can be contacted at:

Hittite KK

Phone: +81-80-6791-4536

E-mail: japan@hittite.com

HITTITE ADDS NEW REPRESENTATIVE

IC Electronika to Cover Slovenia Region

With headquarters in Slovenia, IC Electronika offers full support to Hittite customers in Bulgaria, Bosnia Herzegovina, Croatia, Macedonia, Romania, Serbia Montenegro and Slovenia. IC Electronika may be contacted at:

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REPRESENTATIVE EXPANDS COVERAGE

Schillinger Assoc. to Cover Western Pennsylvania

Schillinger Associates has expanded their coverage and offers full support to Hittite customers in western Pennsylvania in addition to their Indiana, Kentucky, Michigan and Ohio territory. Schillinger Associates may be contacted at:

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Phone: 765-457-7241

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Connecting Our World Through Integrated Solutions

What We Do

Hittite Microwave Corporation is an innovative designer and manufacturer of analog and mixed-signal ICs, modules and subsystems for RF, microwave and millimeterwave applications covering DC to 110 GHz. Our 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. Our products include:

<i>Power Amplifiers</i>	<i>Attenuators</i>	<i>Mixers</i>	<i>VCOs</i>
<i>Gain Blocks & Driver Amps</i>	<i>Passives</i>	<i>Converters</i>	<i>Freq. Dividers</i>
<i>LNAs</i>	<i>Phase Shifters</i>	<i>IRMs</i>	<i>Freq. Detectors</i>
<i>Wideband Amplifiers</i>	<i>Switches</i>	<i>Modulators</i>	<i>Freq. Multipliers</i>
<i>Variable Gain Amplifiers</i>	<i>Transceivers</i>	<i>Demodulators</i>	<i>PLOs / PLLs</i>
<i>Track-and-Hold Amplifiers</i>	<i>Power Detectors</i>	<i>Sensors</i>	<i>Synthesizers</i>
	<i>High Speed Digital Logic</i>		

We also design and supply highly integrated custom ICs, modules and subsystems that combine multiple functions for specific requirements. We select the most appropriate semiconductor and package technologies, uniquely balancing digital and analog integration techniques.

Our custom and standard products support a wide range of wireless / wired communications and radar applications for the following markets:



Automotive Telematics & Sensors



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



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



Military C³I, ECM & EW



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



Space Payload Electronics



Fiber Optic OC-48 to OC-768



Test & Measurement Commercial / Industrial Sensors & Test Equipment

Every component is backed by Hittite Microwave's commitment to total quality. HMC is ISO 9001:2000 and ISO/TS 16949:2002 certified. Every Hittite employee and subcontractor is responsible for maintaining the highest level of quality. We are constantly working towards improvement of our procedures and processes, thus providing our customers with products that meet or exceed all requirements, are delivered on-time and function reliably throughout their useful life.

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