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HMC-T2000 SIGNAL GENERATOR

New Article Feature by Hittite Microwave Corporation

Hittite's Connectorized Modules Extend HMC-T2000 Synthesizer Performance



HMC-T2000

ENHANCE THE PERFORMANCE OF THE

Frequency synthesizers are the cornerstone of many RF/Microwave test and measurement applications ranging from R & D labs to production floor test racks, often dominating capital expenditure budgets. Through the application of our extensive connectorized module product line, Hittite Microwave can help customers extend the performance of our HMC-T2000 Synthesized Signal Generator.

Frequency synthesizers that provide 20, 40, or 50 GHz and/or $>+20$ dBm output power require expensive options and often require major purchasing decisions. Lead times for these expensive synthesizers can also extend for several months, in addition to the internal purchasing approval cycle.

Table 1a and 1b shows that the frequency range, output power and dynamic range of the HMC-T2000 can all be significantly enhanced with the right combination of connectorized modules. Our HMC-T2000 and module products are in stock and available for immediate purchase via e-commerce or direct purchase order.

HMC-T2000 Synthesized Signal Generator Overview

The HMC-T2000 Synthesized Signal Generator is the

second in Hittite's line of high quality signal generators. With its broad frequency range and high power signal capability it's the ideal choice for cost-constrained frequency generation applications. This light weight compact unit has been carefully designed with mobility and functionality in mind.

The HMC-T2000 can easily be programmed for CW or swept frequency screening while the broad frequency range of 700 MHz to 8 GHz covers many widely used communication bands with a frequency resolution of 1 MHz and a fast switching speed of 200 μ s. The high output power of +17 dBm, with 0.5 dB resolution, allows the user to simplify test configurations where driver amplifiers are typically required. The output power is leveled across certain frequency bands; however, the user may access the maximum output power of +21 dBm if desired. Harmonic rejection is an impressive 30 dBc and 26 dBc at 1 GHz and 8 GHz respectively, and the spurious products are less than 45 dBc across the 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 LabWindows™ based GUI interface compatible with Windows XP® or Windows

Extend Frequency Performance to 50 GHz

Increase Dynamic Range to 120 dB

Increase Output Power to +27 dBm

Add Pulse Capability

HMC-T2000

HMC-C019

HMC-C004

HMC-C057

HMC-C004

HMC-C018

HMC-C053

HMC-C025

HMC-C040

HMC-C056

HMC-C032

HMC-C034

HMC-T2000 WITH HITTITE MODULES

Table 1a: HMC-T2000 Range of Improved Performance

Parameter	HMC-T2000	HMC-T2000 + Hittite Connectorized Module
Frequency Range	0.7 to 8 GHz	0.07 to 50 GHz
Output Power Levelled/Max	+10 / +17 dBm	+23 / +27 dBm
Dynamic Range	32 dB	60, 90 or 120 dB

VISTA® operating systems. Pulldown 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.

Hittite's Connectorized Module Line Overview

Hittite offers a line of standard microwave module products that leverage its extensive portfolio of high performance monolithic microwave integrated circuits (MMICs). These robust, innovative products are ideal for use in laboratory, industrial and automated test equipment (ATE) applications as well as in custom military and commercial equipment. Currently, 62 module products are offered with functions that include amplifiers, mixers, dividers, multipliers, switches, attenuators, phase shifters, log detectors, high speed logic, and VCOs. In addition to standard product offerings, Hittite can integrate single or multiple functions into a single custom module tailored to specific customer requirements.

Extending Power Output Capability up to +27 dBm

The newly released HMC-C057 is a GaAs MMIC PHEMT Power Amplifier in a miniature, hermetic module with replaceable SMA connectors which operates between 0.1 GHz and 20 GHz. The amplifier provides 12 dB of gain, up to +36 dBm output IP3 and up to +28 dBm of output power at 1 dB gain compression. Gain flatness is excellent from 2 to 18 GHz making the HMC-C057 ideal for extending the HMC-T2000 output power. The wideband amplifier I/Os are internally matched to 50 Ohms and are DC blocked. Integrated voltage regulators allow for flexible biasing of both the negative and positive supply pins, while internal bias sequencing circuitry assures robust operation.

Figures 1 and 2 illustrate the end performance of this

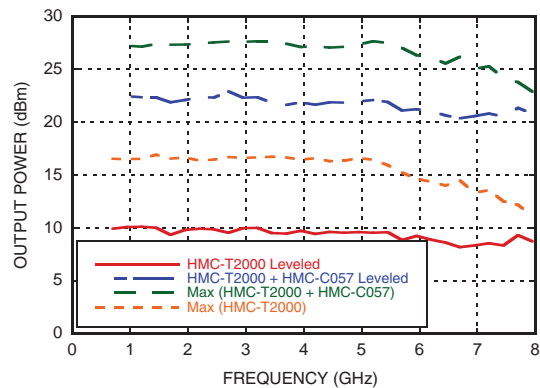


Figure 1: HMC-T2000 + HMC-C057 Output Power Extension

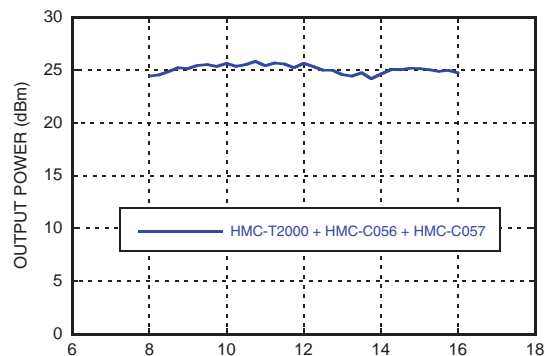


Figure 2: HMC-T2000 + HMC-C056 + HMC-C057 Output Power & Frequency Extension

Purchase a HMC-T2000 with at least one Hittite Connectorized Module product and receive a 3% discount on your purchase order!

IMPROVE DYNAMIC & FREQUENCY RANGE

combination compared with the HMC-T2000 alone as well as with the HMC-C056 Active Frequency Doubler. If less DC power consumption or a lower noise figure is desired, the HMC-C004 Wideband Driver Amplifier offers similar bandwidth with +24 dBm of output power.

Extending Dynamic Range Capability to 60+ dB

The HMC-C053 is an absorptive Voltage Variable Attenuator (VVA) operating from DC to 20 GHz. The HMC-C053 features a simple single voltage attenuation control from 0 to -3V. The device is ideal in designs where an analog DC control signal must control RF signal levels over a 30 dB amplitude range. Its broad frequency range makes it an attractive choice for many applications; particularly those involved with AGC or temperature compensation of multiple gain stages, and those typically found in microwave radio or test instrumentation architecture. By placing the HMC-C053 at the output of the HMC-T2000, the user can realize an analog power control range in excess of 60 dB. **Figure 3** displays the minimum and maximum attenuation characteristics of this combination at 4 GHz. If digital control is preferred, Hittite offers the HMC-C025 and the HMC-C018 31.5 dB, 6 bit, digital attenuator modules which utilize parallel and serial control respectively.

Extending Lower and Upper Operating Frequencies from 70 MHz to 50 GHz

The HMC-C040 is a low noise Divide-by-10 Static Divider utilizing InGaP GaAs HBT technology packaged in a

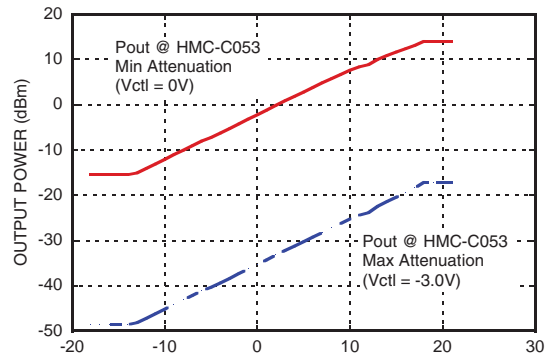


Figure 3: HMC-C053 Dynamic Range

miniature, hermetic module with replaceable SMA connectors. This device operates from 0.5 to 17 GHz input frequency from a single +5V DC supply. The low additive SSB phase noise of -155 dBc/ Hz at 100 kHz offset helps the user maintain excellent system noise performance. Combining the HMC-C040 divide-by-10 module with the HMC-T2000 provides an output frequency range of 70 MHz to 800 MHz; ideal for IF applications.

The HMC-C056 is a x2 Active Frequency Multiplier utilizing GaAs PHEMT technology in a miniature hermetic module. When driven by a +6 dBm signal, the multiplier provides +14 dBm typical output power from 8 to 21 GHz, and the Fo isolation is 16 dBc at 15 GHz with respect to output signal level. The HMC-T2000 coupled with the HMC-C056 will provide a frequency range of 8 to 16 GHz. This key combination can also be augmented by the HMC-C057 Power

Table 1b: HMC-T2000 / Connectorized Module Performance Summary

Combination	Benefit
HMC-T2000 + HMC-C057	Extend leveled power to +23 dBm, max power to +27 dBm
HMC-T2000 + HMC-C056 + HMC-C057	Frequency Range 8-16 GHz, leveled +25 dBm of output power
HMC-T2000 + HMC-C040	Extend Frequency Range to 70 - 800 MHz
HMC-T2000 + HMC-C056	Extend Frequency Range to 8 - 16 GHz
HMC-T2000 + HMC-C056 + HMC-C032	Extend Frequency Range to 17 - 31 GHz
HMC-T2000 + HMC-C056 + HMC-C032 + HMC-C034	Extend Frequency Range to 37 - 50 GHz
HMC-T2000 + HMC-C053	Extend Dynamic Range to 60 dB
HMC-T2000 + HMC-C019	Add Pulse Capability

ADD PULSE MEASUREMENT CAPABILITY

Amplifier and the HMC-C053 Analog VVA to provide a comprehensive X-band synthesizer solution.

With the HMC-T2000 and HMC-C056 pair, the frequency range can be extended further by adding other frequency doublers to this combination. The HMC-C032, HMC-C033, and HMC-C034 can be used in this fashion to extend the frequency range from 16 to 50 GHz. **Figure 4** shows some examples of the HMC-T2000 driving these module combinations.

Adding Pulse Measurement Capability

The HMC-C019 is a high speed, High Isolation GaAs MESFET SPST switch housed in a miniature hermetic module with field replaceable SMA connectors. Covering DC to 20 GHz, the switch features 100 dB isolation up to 4 GHz and 65 dB isolation up to 20 GHz. A CMOS interface allows a +5V bias voltage at very low DC currents. This non-reflective switch exhibits very fast switching speeds, with very low switching transients making it ideal for high speed RF pulse modulation applications. With a rise time of 6.5 ns, the HMC-C019 can be used to modulate the HMC-T2000 output signal into pulses with user defined duty cycle. X and Ku band pulsed applications are also possible when combined with the HMC-C056 x2 Active Multiplier.

Summary

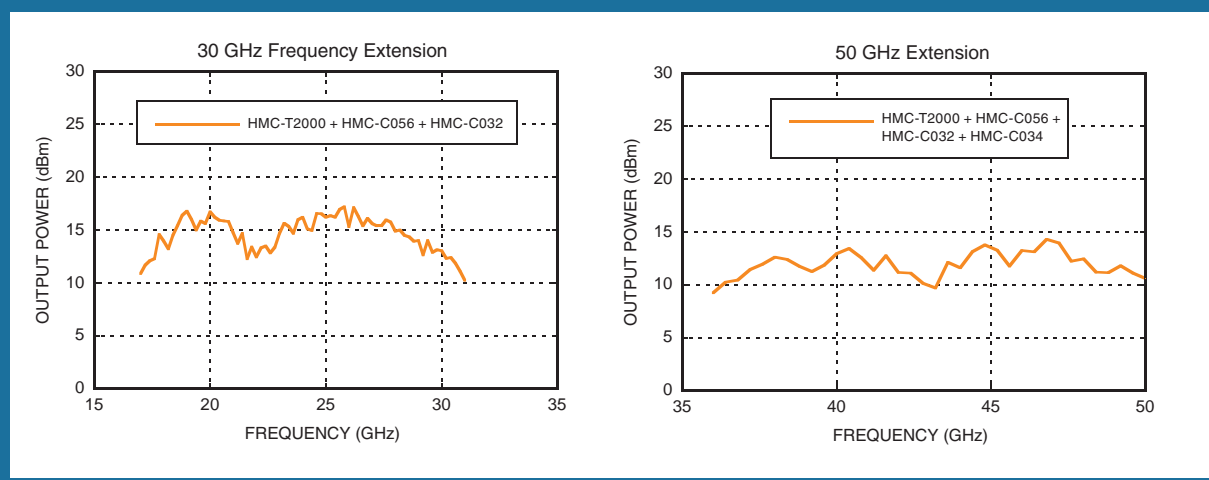
Hittite Microwave's HMC-T2000 Synthesized Signal Generator in combination with our line of connectorized modules can provide test equipment customers with an affordable and scalable test solution. Expand the capability of the HMC-T2000 with the addition of a connectorized module to:

- Increase Output Power to +28 dBm
- Extend the Frequency Range to 50 GHz
- Extend the Dynamic Range to 60+ dB
- Add Pulsed Testing Capability

For a limited time Hittite is offering HMC-T2000 and Connectorized Module combination pricing to help customers stretch their R&D and production test budgets. Purchase a HMC-T2000 Synthesized Signal Generator and at least one of our Connectorized Module products and receive a 3% discount on your entire purchase order.

The HMC-T2000 Synthesized Signal Generator and all of our connectorized module products are available from stock. Released datasheets can be found at www.hittite.com. To order please visit us on-line at www.hittite.com or contact us at sales@hittite.com.

Figure 4: Frequency Extension



Contact us Today with Your Custom Test Instrumentation Requirements at TE@hittite.com



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SIGNAL GENERATOR

PRECISE & AFFORDABLE RF SIGNAL GENERATION FOR ATE & LAB ENVIRONMENTS!

Analog & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

\$3,998.00



HMC-T2000 Performance

- ◆ High Output Power: +20 dBm
- ◆ Wide Frequency Range: 700 MHz to 8 GHz
- ◆ Spurious Rejection: < -45 dBc
- ◆ Phase Continuity Capability; Integer Mode Architecture

HMC-T2000 Advantages

- ◆ Versatile: Higher Drive Simplifies Test Set-ups
- ◆ Efficient: Fast Frequency Switching, 200 μ s
- ◆ Accurate: Incorporates Hittite MMICs
- ◆ Flexible: Manual or Software Control via USB

USE THESE MODULES TO EXPAND THE CAPABILITY OF THE HMC-T2000

Part Number	Function	Application
Increase Output Power		
HMC-C004	0.01 - 20 GHz Wideband Driver Amplifier	Increase HMC-T2000 Pout to +23 dBm
NEW! HMC-C057	0.1 - 20 GHz, Power Amplifier	Increase HMC-T2000 Pout to +28 dBm
HMC-C013	1.8 - 2.2 GHz, Power Amplifier, 10 Watt	Increase HMC-T2000 Pout to +40 dBm for Cellular / 3G
Extend Frequency Range		
HMC-C005	0.5 - 18 GHz, Divide-by-2 Prescaler	Extend HMC-T2000 Lower Frequency Limit to 400 MHz
HMC-C056	4 - 10.5 GHz, x2 Active Frequency Multiplier	Extend HMC-T2000 Upper Frequency Limit to 16 GHz
HMC-C032	9 - 14.5 GHz, x2 Active Frequency Multiplier	Extend HMC-T2000 Upper Frequency Limit to 29 GHz ^[1]
HMC-C033	12 - 16.5 GHz, x2 Active Frequency Multiplier	Extend HMC-T2000 Upper Frequency Limit to 32 GHz ^[1]
HMC-C034	16 - 23 GHz, x2 Active Frequency Multiplier	Extend HMC-T2000 Upper Frequency Limit to 46 GHz ^[2]
Extend Dynamic Range		
HMC-C018	DC - 13 GHz, 6-Bit Digital Attenuator	Extend HMC-T2000 Dynamic Range by 31.5 dB
HMC-C025	DC - 20 GHz, 6-Bit Digital Attenuator	Extend HMC-T2000 Dynamic Range by 31.5 dB
HMC-C053	DC - 20 GHz, Voltage Variable Attenuator	Extend HMC-T2000 Dynamic Range by 31.5 dB
Add Pulsed & Multi-Port Capability		
HMC-C019	DC - 20 GHz, SPST Hi Isolation Switch	Add Pulsed Testing Capability, 8.5 ns Switching
HMC-C011	DC - 20 GHz, SPDT Hi Isolation Switch	Add Multi-port Capability, 40 dB Isolation

[1] with the HMC-C056 [2] with the HMC-C056 & HMC-C032



Purchase the HMC-T2000 Signal Generator With Any Connectorized Module & Save 3% On Your Entire Purchase Order!



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