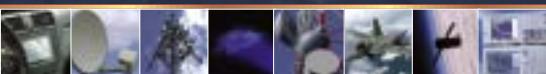
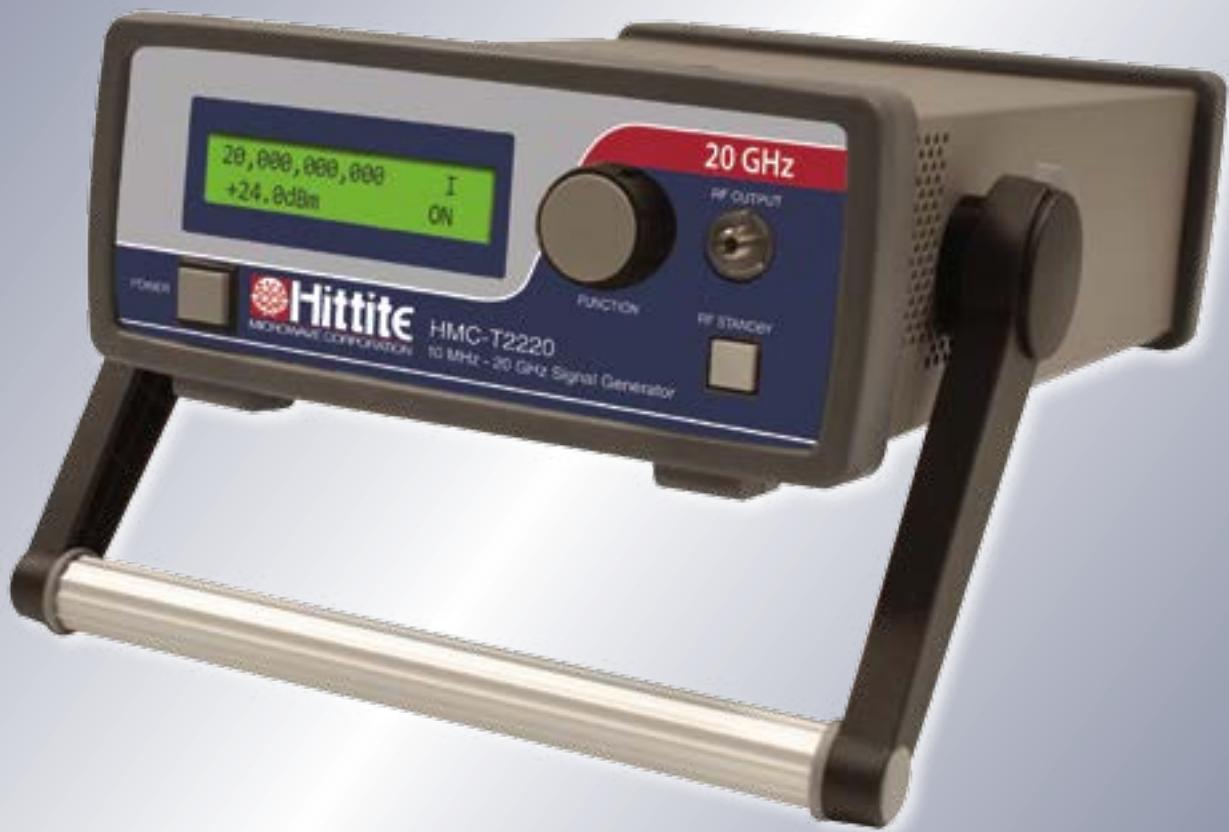


# HMC-T2220



Synthesized Signal Generator, 10 MHz to 20 GHz



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# HMC-T2220\* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

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## **COMPARABLE PARTS**

View a parametric search of comparable parts.

## **DOCUMENTATION**

### **Application Notes**

- Pulsed Modulation

### **Data Sheet**

- HMC-T2220: Synthesized Signal Generator, 10 MHz to 20 GHz Data Sheet

### **User Guides**

- Programmer's Manual Installation, Operation & Maintenance Guide for HMC-T2220, HMC-T2220B, HMC-T2240, and HMC-T2270
- User Manual - Synthesized Signal Generator Family - HMC-T2220/40/70, HMC-T2220B

## **DESIGN RESOURCES**

- HMC-T2220 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## **DISCUSSIONS**

View all HMC-T2220 EngineerZone Discussions.

## **SAMPLE AND BUY**

Visit the product page to see pricing options.

## **TECHNICAL SUPPORT**

Submit a technical question or find your regional support number.

## **DOCUMENT FEEDBACK**

Submit feedback for this data sheet.

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# HMC-T2220

## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

v07.0216

### Wide Frequency Range, 10 MHz to 20 GHz Signal Generator!

The HMC-T2220 is an easy to implement test equipment solution designed to fulfill your signal generation needs. Built on a foundation of high quality and market leading Hittite MMICs, the HMC-T2220 provides the highest output power, lowest harmonic levels and broadest frequency range amongst signal generators of its size and cost.

This compact and lightweight signal generator also features USB, GPIB and Ethernet interfaces ensuring carefree integration within various test environments while improving overall productivity and equipment utilization.

The HMC-T2220 incorporates several product upgrades: reduced spurious, wider dynamic range, higher frequency resolution, higher RF output power, reduced RF off leakage, quieter fan operation, improved front panel knob functions for display scrolling, a ruggedized handle that is customer removable, and an added TRIGGER OUT function.

#### Applications

- ◆ ATE
- ◆ Test & Measurement
- ◆ R&D Laboratories

#### Advantages

- ◆ Versatile: Higher Drive Simplifies Test Set-Ups
- ◆ Efficient: 300  $\mu$ s Frequency Switching
- ◆ Reliable: Incorporates Hittite MMICs
- ◆ Flexible: Manual or Software Control  
Via USB, GPIB or Ethernet



#### Performance

- ◆ High Output Power: +26 dBm @ 1 GHz
- ◆ Wide Frequency Range:  
10 MHz to 20 GHz
- ◆ Excellent Phase Noise Performance:  
-98 dBc/Hz @ 10 kHz Offset @ 10 GHz
- ◆ Spurious Rejection: -70 dBc @ 10 GHz
- ◆ Power Resolution: 0.1 dB
- ◆ Frequency Resolution: 1 Hz

# HMC-T2220

## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

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### Frequency

Accuracy: As Per Internal Ref.  $\pm 1.5$  ppm  
Resolution: 1 Hz  
Internal Reference: 10 MHz  
Aging Rate:  $< 1$  ppm/yr  
External Reference Input: 10 MHz (Sine)  
Internal Reference Output: 10 MHz (Square Wave)  
Frequency Switching Speed: 300  $\mu$ s

### Output Power (Maximum)

| Frequency (GHz) | Power Output (dBm) |
|-----------------|--------------------|
| 0.01            | 24                 |
| 0.05            | 26                 |
| 0.1             | 26                 |
| 0.5             | 26                 |
| 1               | 26                 |
| 2               | 25                 |
| 4               | 25                 |
| 10              | 25                 |
| 15              | 24                 |
| 20              | 21                 |

Minimum Settable: -35 dBm  
Dynamic Range: >60 dB  
Resolution: 0.1 dB  
Power Accuracy:  $\pm 1$  dB  $> 500$  MHz  
 $\pm 2$  dB  $\leq 500$  MHz  
 $\pm 2$  dB  $< -20$  dBm (All Frequencies)  
RF Off:  $< -80$  dBm

### Spurious @ 10 dBm Output

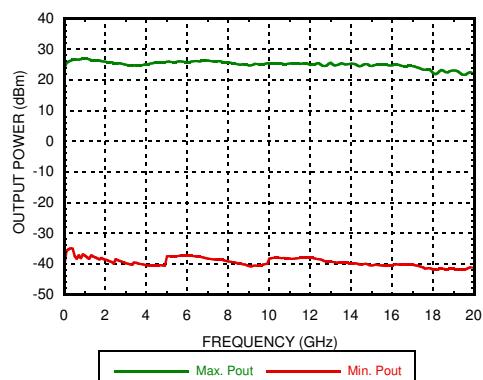
< -70 dBc @ Integer Frequencies  
< -65 dBc @ Fractional Frequencies  $< 10$  GHz  
< -57 dBc @ Fractional Frequencies  $> 10$  GHz

### Harmonics

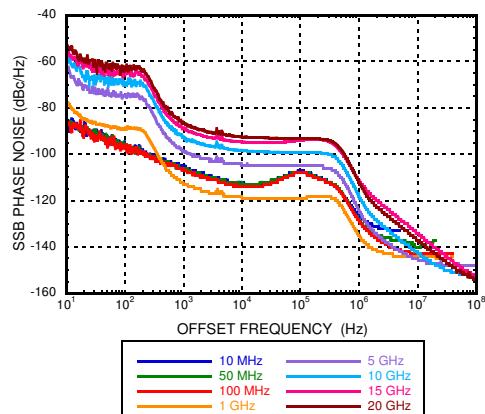
| Frequency (GHz) | 2nd Harmonics (dBc) | 3rd Harmonics (dBc) |
|-----------------|---------------------|---------------------|
| 0.01            | -34                 | -44                 |
| 0.05            | -30                 | -42                 |
| 0.1             | -31                 | -46                 |
| 0.5             | -34                 | -55                 |
| 1               | -33                 | -52                 |
| 2               | -43                 | -57                 |
| 5               | -32                 | -54                 |
| 10              | -34                 | -58                 |
| 15              | -39                 | -48                 |
| 20              | -55                 | -                   |

Output Power = +10 dBm

### Output Power Range @ 25°C



### SSB Phase Noise vs. Frequency



### RF Output Impedance

VSWR < 2.0:1

### SSB Phase Noise (dBc/Hz)

| Frequency (GHz) | Offset From Carrier |        |       |        |         |       |        |  |
|-----------------|---------------------|--------|-------|--------|---------|-------|--------|--|
|                 | 10 Hz               | 100 Hz | 1 kHz | 10 kHz | 100 kHz | 1 MHz | 10 MHz |  |
| 0.01            | -87                 | -97    | -106  | -113   | -107    | -126  | -140   |  |
| 0.05            | -86.4               | -96.2  | -106  | -112   | -108    | -128  | -140   |  |
| 0.10            | -86                 | -97    | -107  | -114   | -108    | -129  | -143   |  |
| 0.50            | -82                 | -95    | -119  | -125   | -125    | -139  | -143   |  |
| 1               | -77                 | -89    | -113  | -119   | -119    | -135  | -144   |  |
| 5               | -64                 | -75    | -99   | -105   | -105    | -124  | -145   |  |
| 10              | -58                 | -69    | -92   | -98    | -99     | -118  | -143   |  |
| 15              | -56                 | -66    | -89   | -95    | -94     | -111  | -134   |  |
| 20              | -51                 | -63    | -86   | -92    | -93     | -112  | -137   |  |

Output Noise: Floor  $< -155$  dBc/Hz

Above data is typical performance at  $+25^\circ\text{C}$  after 30 minutes of warm-up time unless otherwise stated.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106  
Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com)  
Application Support: Phone: 1-800-ANALOG-D

# HMC-T2220

## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

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### General Specifications

Frequency:

Accuracy:

For &lt; 2.5 GHz, Reference +0/-90 nHz

For &gt; 2.5 GHz, Reference +0/-2.88 uHz

Internal Reference:  $\pm 1.5$  ppm

Resolution: 1 Hz

Aging Rate: &lt;1 ppm/yr

External Reference Input: 10 MHz (Sine Wave)

Internal Reference Output: 10 MHz (Square Wave)

Frequency Switching Speed: 300  $\mu$ s

RF Output Power Change Versus Temperature:

10 MHz to 5 GHz 0.10 dB/ $^{\circ}$ C5 GHz to 15 GHz 0.125 dB/ $^{\circ}$ C15 GHz to 20 GHz 0.20 dB/ $^{\circ}$ C

Input / Output:

10 MHz REfout <sup>[1]</sup>10 MHz REfin <sup>[2]</sup>TRIGGER IN <sup>[3]</sup>: TTLTRIGGER OUT <sup>[3]</sup>: TTL

RS-232 (used for field upgrades)

Ethernet

GPIB

USB 2.0

RF Output SMA Female

Maximum DC voltage applied to RF Output: 8 Volts

Power - AC:

100 to 240 VAC @ 50 to 60 Hz

Operating Temperature (for indoor use only) <sup>[4]</sup>:0 to 55  $^{\circ}$ CStorage Temperature: -20 to 70  $^{\circ}$ C

Cooling: 2 Internal Fans

Fan Noise: &lt; 50 dBA

Mechanical Vibration &amp; Shock:

MIL PRF-288000 Class 4, non operating

Compliance:

CSA &amp; CE

ECCN:

EAR99

General Mechanical Characteristics

H: 76.2 mm (3 in)

W: 203 mm (8 in)

D: 305 mm (12 in)

Weight 3.2 kg (7.0 lbs)

Warranty: 1 Year Parts and Labor

[1] +10 dBm typ. into 50 Ohms; BNC Connector

[2] +5 dBm max. -5 dBm min., 50 Ohms; BNC Connector

[3] The trigger input can be driven from either 3.3V or 5V sources for direct interface with TTL signal levels; BNC Connector

[4] S/N 325 or higher

Above data is typical performance at +25 $^{\circ}$ C after 30 minutes of warm-up time unless otherwise stated.

# HMC-T2220

## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

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### HMC-T2220 Rear Panel I/O Connections



### Connectivity & Control

Its compact size, light weight, fast switching speed and USB, GPIB and Ethernet control interfaces support the standard SCPI command set ensuring smooth integration within all test environments, particularly those associated with automated test. An installation disk that accompanies each unit includes all the drivers required to remotely control the device as well as a user friendly GUI interface (right) compatible with a Windows XP®, Windows Vista® or Windows 7® operating system. User control is facilitated via pull down menus that allow programming of single or swept modes in frequency or power. Integration of multiple units within a production test environment is easy, and affordable.

#### Remote Interface

Hardware: USB (Windows XP®, Windows 7®, Windows Vista® Drivers Supplied), GPIB or Ethernet

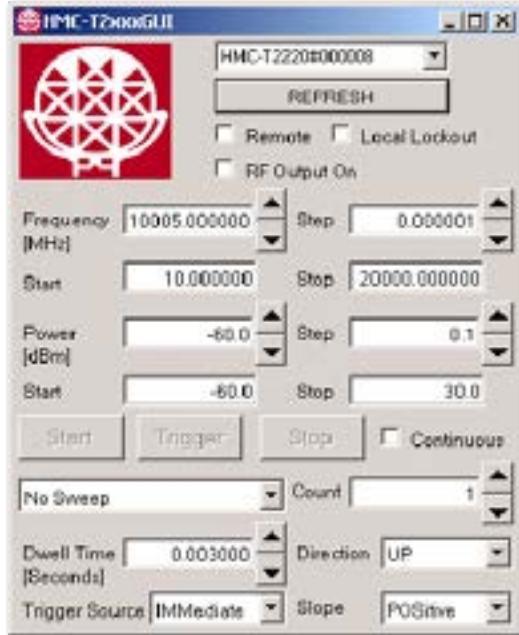
Software: LabVIEW 2009 Driver

Frequency Switching Speed:

300 us Typ.

#### Local Interface

Front Panel Rotary Knob & Display



### HMC-T2100 Compatibility

To facilitate integration into existing HMC-T2100 applications, the HMC-T2220 has a HMC-T2100 compatibility mode. In this mode, the HMC-T2220 identifies itself as a HMC-T2100 so that the HMC-T2100 USB drivers will work for a HMC-T2220, and programs which use the \*IDN? string will recognize a HMC-T2220 as a HMC-T2100. Frequency resolution, maximum and minimum values for power, and minimum sweep dwell time also change to match the HMC-T2100.

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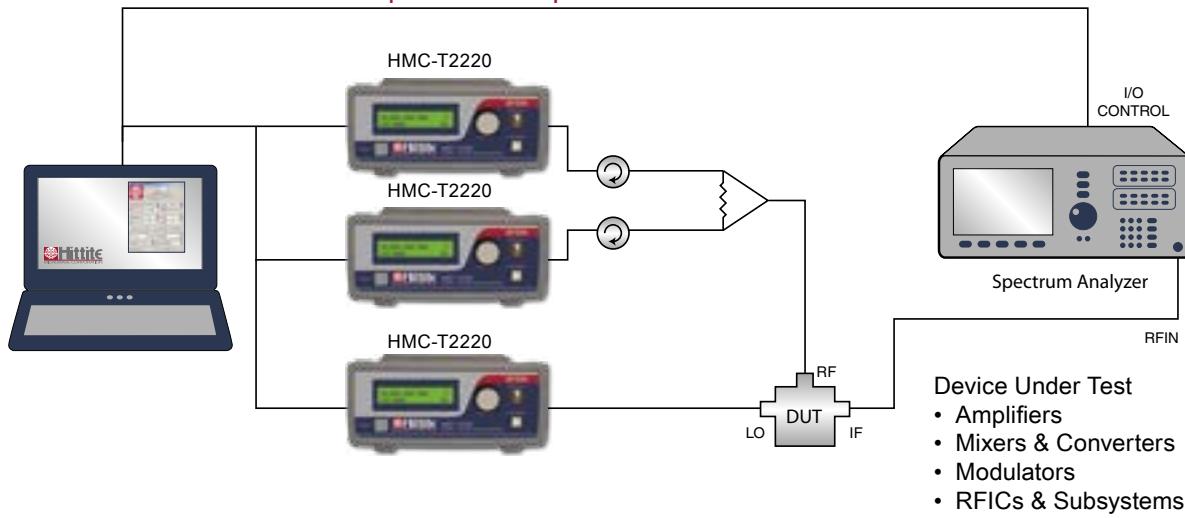
Application Support: Phone: 1-800-ANALOG-D

# HMC-T2220

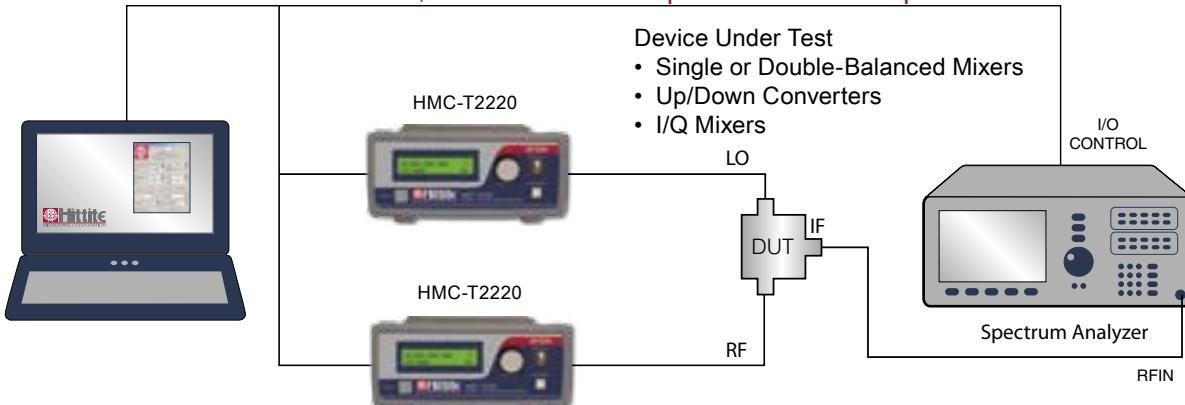
## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

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### Two Tone Third Order Intercept Test Set-up



### Efficient Mixer Conversion Loss, Isolation & MxN Spurious Test Set-up



# HMC-T2220

## SYNTHESIZED SIGNAL GENERATOR, 10 MHz to 20 GHz

v07.0216

### HMC-T2220



### Ordering Information

| Model Number | Description                                      | Price |
|--------------|--|-------|
| HMC-T2220    | Synthesized Signal Generator<br>10 MHz to 20 GHz |       |

Includes 100 - 240V AC Power Supply and one Power Cord at no cost.  
Please specify your preferred power cord part number at time of  
ordering. (see "Optional Power Cord" table)

### Test Rack Mount Kit

| Part Number | Description                                | Price |
|-------------|--|-------|
| HMC-RM02    | Dual Rack Mounting Plate<br>19" 2u Chassis |       |

### Power Cord

| Part Number | Region                 | Plug Type |
|-------------|------------------------|-----------|
| HMC-PC01    | Continental Europe     | ○○        |
| HMC-PC02    | United Kingdom         | □○        |
| HMC-PC03    | China                  | ○□        |
| HMC-PC04    | Australia, New Zealand | ○□        |
| HMC-PC05    | North America          | □□        |
| HMC-PC06    | South Africa / India   | ○○        |
| HMC-PC07    | Switzerland            | ○○○       |
| HMC-PC08    | Denmark                | ○○        |
| HMC-PC09    | Israel                 | ○○○       |
| HMC-PC10    | Italy                  | □○        |
| HMC-PC11    | Japan                  | ○□        |

All pricing is in U.S. Dollars and is subject to change without notice.