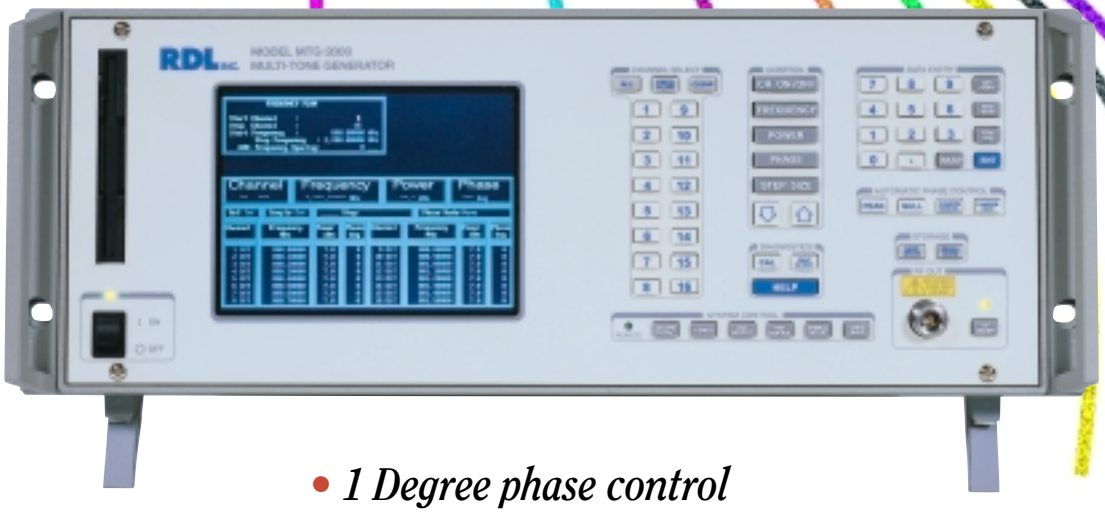
Model MTG-2000
Multi-Tone Signal Generator



- *1 Degree phase control*
- *Calibrated output power levels*
- *8 or 16 channels*
- *New, easy to use, operator interface*
- *Cellular and PCS Frequencies*
- *>85 dB SFDR*

AEROFLEX RDL

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MTG-2000
MULTI-TONE SIGNAL GENERATOR

What is the MTG

The MTG is a multi-tone signal generator where up to 16 CW signals are output simultaneously. These signals are internally combined so that the intermodulation products are controlled to be at very low levels. This output signal is primarily used to test the intermodulation performance of high power amplifiers (HPA).

Each tone is generated by a synthesizer that has 10 Hz frequency resolution and can be set to any frequency within the frequency range of that module. Any given MTG unit can be outfitted with up to 16 synthesizers. The typical configuration is either 8 or 16 tones. Both frequency range modules, Cellular and PCS, can be installed in a single MTG. The MTG represents a cost effective way to simulate the conditions presented by a base station to the output HPA.

Applications

Multi-channel amplifiers need to be tested with signals that represent the "real world". Any given base station can generate a set of carriers that might phase-align and increase the peak power to very high levels. The phase control capabilities of the MTG provide the means to simulate these signal conditions and verify that the HPA meets the intermodulation/linearity requirements of that particular communications system. Phase alignment (Phase Peaking), an automated sub-routine in the MTG, allows the user to make a signal that tests to controlled and repeatable peak-power conditions.

Random phase

This mode is provided in the MTG to verify that a feed-forward amplifier can properly respond to the varying peak power conditions presented in an actual base station. This mode, called "Continuous Random Phase", randomly moves the phase of each channel at a controlled rate and generates a signal that has a varying peak power similar to the conditions in an actual base station. It has been empirically determined that 16 tones, operated in a continuously changing phase condition, simulate the signal presented to the HPA in both Cellular and PCS systems. Most amplifiers are tested in both the "Phase Peaked" and "Continuous Random Phase" modes to verify that the amplifier can safely respond to the highest peak power condition (Peaked) and operate in a more "real world" condition (Random Phase) where the peak power is moving over a 6-10 dB range; a range that is caused by modulation and phase drift.

Calibrated outputs

The MTG has calibrated output levels with 0.1 dB resolution. The tone-to-tone variation can be as high a 10 dB to simulate tilt or to compensate for signal path variations.

Figure 1 The "Help" menu can be accessed at any time for information about any data entry and its format. This screen shows the display while the "Frequency" of Channel one is being changed.

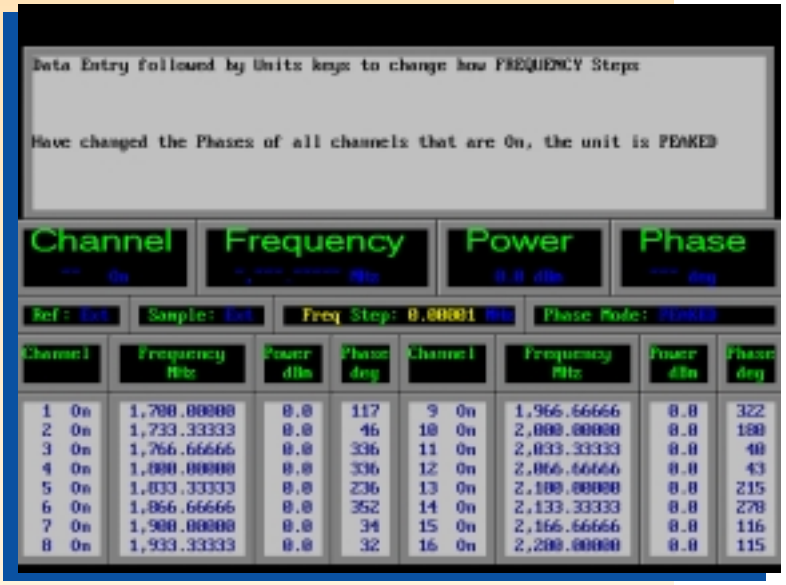

Figure 2 This screen shows that the 16 channels have been "Peaked" (phase aligned) and is being used to change the "Step Size" for later manipulation of the frequency of the individual channels.

Individual outputs

Each individual tone generated inside the MTG is output on the rear panel for use in testing devices that need power levels higher that those available at the combined output of the MTG.

Easy ATE

A "Lab View" driver is available for controlling the MTG which allows for easy incorporation in ATE applications. Those users of the Model IMD Multi-tone Generator can easily move to the MTG through the use of the "IMD emulation" IEEE bus command set.

About Digital modulation and 3G applications

The latest digital modulation techniques and the need for more capacity has made HPA (High Power Amplifier) testing much more demanding. These applications have signals where the peak-power can exceed the average power by many dB. These applications also require that the ACP (Adjacent Channel Power) be >65 dB down, sometimes > -75 dB as in the case of GSM/EDGE. This places unprecedented demands on the amplifier and the test equipment. The MTG-2000 has the dynamic range needed to generate a signal that can actually verify that the HPA or MCPA meets these requirements. The MTG-2000 can be used to create signals that closely simulate these signals without the dynamic range limitations of a digital modulator or the need for application-specific filtering.

Model MTG-2000 Multi-Tone Signal Generator

Specifications

MULTI-TONES

Number of Channels	8 & 16

FREQUENCY

Frequency Range	0.800-1.000 GHz 1.700-2.200 GHz
Minimum Frequency Step Size	10 Hz
Frequency Stability	± 0.1 ppm
Constant Ambient Temp.	
Frequency Stability over Temp.	± 0.1 ppm
(15 to 35 C)	

RF POWER

Programmable Output Range	
800 MHz to 1,000 MHz	+7 to −60 dBm
1,700 MHz to 2,200 MHz	+4 to −63 dBm
Output level accuracy (maximum to −10 dB)	± 0.5 dB
Output level accuracy (> 10 dB below maximum)	± 0.75 dB
Relative Power , tone to tone and total power, after manual leveling	0.2 dB
Minimum programmable Power Step Size	0.1 dB
Maximum Power Difference, tone to tone	10 dB
Rear Panel RF Power Output	19.5 dBm nom

PHASE CONTROL

Phase Control Range	0-359 deg.
Phase Increment	1 deg.
Phase Drift after 1 Hr. warm up	2 deg./Hour
Envelope Peak Factor, after peaking function (10log(n))	± 0.5 dB
Envelope Peak Factor, after nulling function	< 4 dB
Phase Peak / Null Time	<25 sec.
Random Phase Rate, typ.	150 msec. /channel

SPECTRAL PURITY

IMD Products, phase aligned	<-85 dBc
Spurious, offsets ≥12 kHz	<-85 dBc
Harmonics	<-85 dBc
Maximum Phase Noise (dBc / Hz)	dBc/Hz
Offset	
1 kHz	-50
10 kHz	-80
30 kHz	-95
100 kHz	-110

REFERENCE OUTPUT

Connector	Rear panel BNC
Power level	0 dBm ± 1.5 dB
Impedance	50 Ω output

REFERENCE INPUT

Connector	Rear panel BNC
Power level	-3 to +10 dBm
Impedance	50 Ω input

SAMPLE INPUT

RF Power	-10 to +10 dBm
Frequency Range	0.800-2.200 GHz

USER INTERFACE

Remote Control	IEEE Std. 488-1987

INSTRUMENT STATE STORAGE

Internal Storage	10 NVM states
3.5 inch floppy drive, IBM Formatted	

AC SUPPLY

Voltage (VAC)	90 to 130 Volts
Automatically adjusted	200 to 240 Volts
Frequency	47 to 63 Hz
Maximum AC Current	4 Amps

MECHANICAL

RF Output Connector	N-type, female, 50W
External Keyboard Connector	PS/2 Rear panel
Sample Input Connector (external phase alignment)	SMA-type, female, 50 Ω
Rear panel	
IEEE-488 Interface	IEEE-1284
A/C Connector	IEC Power Input Receptacle
Rack Mount	Conform to IEC-297-1 And DIN 41494, for part 1
Height	7.75 inches; (197 mm)
Width	17.5 inches; (445 mm)
Depth	22.0 inches; (559 mm)
Weight, net	80 lb.; (36 kg)
Weight, shipping	100 lb. (45 kg)

GENERAL

Safety & Electromagnetic Compatibility	CE 2001 Compliant
Operating Temperature Range (C)	15 to 35

Ordering Information

MTG-2000-01	8 Channels	1,700 MHz to 2,200 MHz	
MTG-2000-02	16 Channels	1,700 MHz to 2,200 MHz	
MTG-2000-03	8 Channels	800 MHz to 1,000 MHz	
MTG-2000-04	16 Channels	800 MHz to 1,000 MHz	
MTG-2000-05	16 Channels	8 with 800 MHz to 1,000 MHz	8 with 1,700 MHz to 2,200 MHz
MTG-2000-06	8 Channels	4 with 800 MHz to 1,000 MHz	4 with 1,700 MHz to 2,200 MHz

Specifications subject to change without notice

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