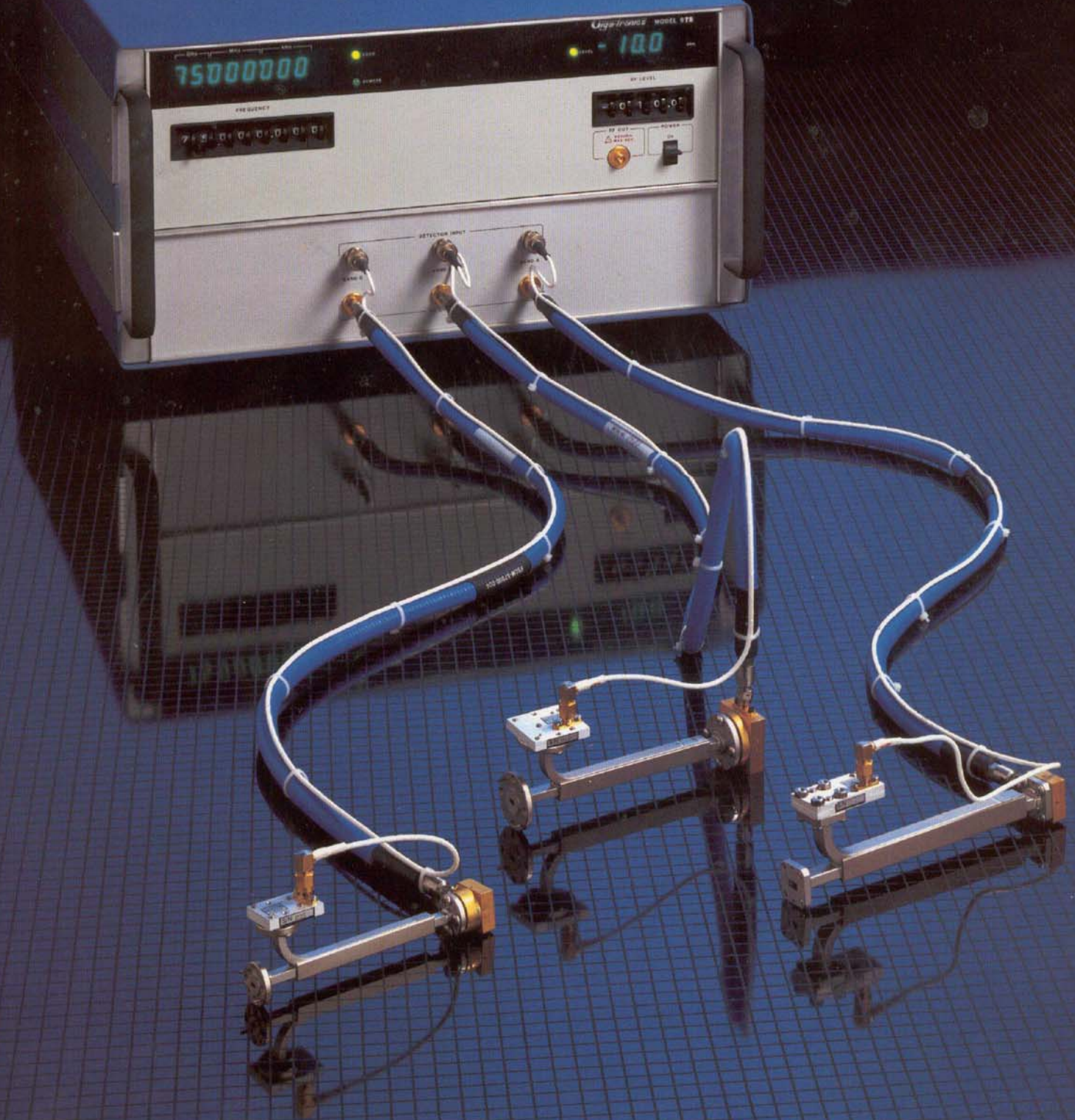


Indirect Synthesized Millimeter Products

# 10MHz-75GHz

Sources - Signal Generators - Sweepers



Giga-tronics Configured Millimeter Sources, Signal Generators and Sweepers are today's most complete, versatile and economical line of millimeter-wave stimulus instruments. They generate controlled, leveled signals from 10MHz through 75GHz in four bands.

## Series 905 Signal Sources

### Specifications:

#### Frequency Characteristics

Range:  $\geq 10\text{MHz}$  to  $\leq 75\text{GHz}$  in 4 bands; .01-26.5GHz (Band 1), 26.5-40GHz (Band 2), 40-60GHz or 33-50GHz (Band 3), 50-75GHz (Band 4)

Band 1: Select desired Series 905 Source from the Synthesizer Frequency Range Chart at left

Bands 2, 3, & 4: Select desired bands from the Millimeter Multiplier Chart at left

Resolution: 1kHz (Band 1), 2kHz (Band 2), 3kHz (Band 3), 4kHz (Band 4) or 1 to 4Hz (Option 16)

Accuracy & Stability: Same as Time Base

Time Base (Internal): 10MHz,  $<1 \times 10^{-9}$ /day rate

Time Base (External): 10MHz (5MHz with Option 11)  $\pm 1 \times 10^{-6}$  or better. 0.5 to 5V, p-p, overrides internal time base

Time Base Output: Buffered 10MHz, 2V, p-p, into 50 ohms, derived from internal or external time base

#### Spectral Purity

Harmonics:

Band 1:  $<-25\text{dBc}$ , 10-50MHz;  $<-55\text{dBc}$ , .05-26.5GHz

Band 2:  $<-20\text{dBc}$  (-25 typ), Fundamental;  $<-20\text{dBc}$  (-30 typ), 3rd Harmonic

Band 3:  $<-15\text{dBc}$  (-20 typ), 2nd & 4th Harmonic

Band 4:  $<-40\text{dBc}$ , 2nd Harmonic;  $<-12\text{dBc}$  (-20 typ), 3rd Harmonic;  $<-20\text{dBc}$  (-30 typ), 5th Harmonic

Spurious (Nonharmonics):  $<-55\text{dBc}$  (Band 1);  $<-49\text{dBc}$  (Band 2);  $<-45\text{dBc}$  (Band 3);  $<-43\text{dBc}$  (Band 4)

#### Output Characteristics

Leveled Output: +5 (+10 with Option 10) to -99dBm, Band 1; +5 (+8 typical) to -15dBm, Band 2; -3 (0 typical) to -15dBm, Band 3; -10 (-5 typical) to -15dBm, Band 4

Resolution: 0.1dBm

Accuracy:  $\pm 1\text{dB}$  (.01 to 18GHz),  $\pm 2\text{dB}$  (18 to 26.5GHz),  $\pm 2.5\text{dB}$  (Band 2);  $\pm 3\text{dB}$  (Band 3),  $\pm 3.5\text{dB}$  (Band 4)

### General Specifications

Output Connectors: Coaxial, SMA, .01 to 26.5GHz

WR-28WG Waveguide w/UG-599/U Flange, 26.5 to 40GHz

WR-22WG Waveguide w/UG-383/U Flange, 33 to 50GHz

WR-19WG Waveguide w/UG-383/U Flange, 40 to 60GHz

WR-15WG Waveguide w/UG-385/U Flange, 50 to 75GHz

Displays: Frequency, 8 digits (Series 905), 9 digits (Series 900/910); Power, 3 digits

Remote Interface: IEEE STD 488-1978

Operating Temperature Range: 0 to 50° C

Warm-up Time: 20 minutes, max

Environmental: Complies with MIL-T-28800C, Type III, Class 5, Style E.

Power: 110/120/220/240 VAC  $\pm 10\%$ , 50-400Hz, 270W

An indirectly synthesized generator covers RF and microwave frequencies to 26GHz and you may choose up to three millimeter bands for each instrument; Ka (26 to 40GHz), Q (33 to 50GHz), U (40 to 60GHz) or V (50 to 75GHz). High resolution frequencies and output power levels may be set by front panel control or

## Series 900 S

### Specifications:

#### Frequency Characteristics

Range:  $\geq 10\text{MHz}$  to  $\leq 75\text{GHz}$  in 4 bands; .01-26.5GHz (Band 1), 26.5-40GHz (Band 2), 40-60GHz or 33-50GHz (Band 3), 50-75GHz (Band 4)

Band 1: Select desired Series 900 Signal Generator or Series 910 Sweeper from the Synthesizer Frequency Range Chart at left

Bands 2, 3, & 4: Select desired bands from the Millimeter Multiplier Chart at left

Resolution: 1MHz (Band 1), 2MHz (Band 2), 3MHz (Band 3), 4MHz (Band 4) or 1 to 4kHz (Option 03) or 1 to 4Hz (Option 16)

Accuracy & Stability: Same as Time Base

Time Base (Internal): 10MHz,  $<1 \times 10^{-6}$ /year rate or  $<1 \times 10^{-9}$ /day (Option 06)

Time Base (External): 10MHz (5MHz with Option 11)  $\pm 1 \times 10^{-6}$  or better. 0.5V to 5V, p-p, overrides internal time base

Time Base Output: Buffered 10MHz, 2V, p-p, into 50 ohms, derived from internal or external time base

#### Spectral Purity

Harmonics:

Band 1:  $<-25\text{dBc}$ , 10-50MHz;  $<-55\text{dBc}$ , .05-26.5GHz

Band 2:  $<-20\text{dBc}$  (-25 typ), Fundamental;  $<-20\text{dBc}$  (-30 typ), 3rd Harmonic

Band 3:  $<-15\text{dBc}$  (-20 typ), 2nd & 4th Harmonic

Band 4:  $<-40\text{dBc}$ , 2nd Harmonic;  $<-12\text{dBc}$  (-20 typ), 3rd Harmonic;  $<-20\text{dBc}$  (-30 typ), 5th Harmonic

Spurious (Nonharmonics):  $<-55\text{dBc}$  (Band 1);  $<-49\text{dBc}$  (Band 2);  $<-45\text{dBc}$  (Band 3);  $<-43\text{dBc}$  (Band 4)

### Weight and Dimensions

	Net	Packed for air shipment
Width	16.75 in (42.5 cm)	24 in (60.9 cm)
Depth	24 in (60.9 cm)	31 in (78.7 cm)
Height	8.75 in (22.2 cm)	14.75 in (37.4 cm)
Volume	2.04 cu ft (.0577 cu m)	6.35 cu ft (.180 cu m)
Weight (nominal)	85 lbs (38.7 kg)	100 lbs (45.4 kg)

via the IEEE 488 bus. And, you may choose to include wide-band pulse and/or frequency modulation and digital or analog sweep capability.

Included with this brochure are several Millimeter Signal Generator Configuration Worksheets. They will aid you in selecting

the ideal instrument for your RF/microwave/millimeter-wave application. If your stock of them is depleted, please contact Giga-tronics or your local Giga-tronics Sales Representative for a new supply.

## Series 910 Sweepers

### Signal Generators

#### Output Characteristics

Leveled Output: 0 (+5 with Option 10) to -99dBm, Band 1; +5 (+8 typical) to -15dBm, Band 2; -3 (0 typical) to -15dBm, Band 3; -10 (-5 typical) to -15dBm, Band 4

Resolution: 0.1dBm

Accuracy:  $\pm 1$ dB (.01 to 18GHz),  $\pm 2$ dB (18 to 26.5GHz),  $\pm 2.5$ dB (Band 2),  $\pm 3$ dB (Band 3),  $\pm 3.5$ dB (Band 4)

#### Pulse and Square Wave Modulation

##### Internal

Repetition Rate: Variable from 100Hz to 50kHz with calibrated 1kHz point

Pulse Width: Variable from 0.1 to 10 $\mu$ sec with calibrated 1  $\mu$ sec point

On/Off Ratio: >80dB

Rise/Fall Times: <25nsec

Overshoot, Undershoot & Ringing:  $\pm 2$ dB

Settling Time:  $\pm 1$ dB within 100nsec

Sync Output: TTL level modulation waveform

External: TTL level signal, 10Hz to 1MHz rate, 0.1 $\mu$ sec min width,  $\pm 10$ V damage level

#### Digital Sweep

Method: Digitally controlled continuous or step and lock (Series 900), digitally controlled step and lock (Series 910)

Range: Entire frequency range of any band of the instrument

Function: Automatic recycle, single sweep and single step

Mode: Preset start, F1, to preset stop, F2

Increments: 1, 10 or 100MHz (.01 to 26.5GHz). Any increment within the instrument's resolution via the IEEE 488 bus

Sweep Time: Variable from 10msec to 100sec

Sweep Trigger Input: TTL low to initiate single sweep or single step

Ramp Output: 0 to 10V, proportional to frequency between preset limits

Pen Lift Output: TTL low during retrace

#### Analog Sweep (In addition to the foregoing specifications, Series 910 Sweepers include the following)

Range: Entire frequency range of any band of the instrument

Function: Automatic recycle or single sweep

Mode: Sweep (preset start, F1 to preset stop, F2), CF (symmetrical about preset center frequency) or  $\Delta M$  (between preset markers)

Settability: F1 and F2 settable in 1MHz increments (.01 to 26.5GHz).

Any increment within the instrument's resolution via the IEEE 488 bus

Sweep Length: 1MHz to full range

Accuracy (start):  $\pm 5$ MHz

Linearity:  $\pm 10$ MHz, worst case

Resolution: 2MHz for sweep widths  $\geq 300$ MHz; 75kHz for sweep widths <300MHz

Sweep Rate: Adjustable from 600MHz/msec to 1200MHz/sec by front panel control; 600MHz/msec to 18MHz/sec via the IEEE 488 bus

Minimum Sweep Time: 10msec/band, nominal (.01 to 26.5GHz)

Residual FM (Sweep Mode): <100kHz RMS

Markers: Five markers (M1 through M5) may be placed at any frequency between F1 and F2 by front panel control. Eight markers may be programmed via the IEEE 488 bus.  $\Delta M$  sweep mode is between M1 and M3. Remaining markers may be placed anywhere between M1 and M3.

Marker Resolution: 8MHz for sweep widths  $\geq 300$ MHz, 300kHz for sweep widths <300MHz

Sweep Sync Trigger Input: TTL low to initiate single sweep

Ramp Output: 0 to +10V, proportional to frequency between sweep limits, any sweep mode

Proportional Analog Output: 0.5V/GHz  $\pm 1\%$

Marker and Unblinking Output (Rear Panel): Composite signal for Z-axis modulation of oscilloscope. Levels are: Dark=+5V, Marker on=-5V and unblinking=0V

## Options and Accessories

### Frequency Options

Option 03 (Standard in Series 905): 1kHz resolution (Band 1), 2kHz (Band 2), 3kHz (Band 3), 4kHz (Band 4)

Option 06 (Standard in Series 905): High Stability Time Base.  $1 \times 10^{-9}$ /day rate

Option 11: 5MHz external time base in lieu of 10MHz

Option 16: 1Hz resolution (Band 1), 2Hz (Band 2), 3Hz (Band 3), 4Hz (Band 4)

### Output Power Options

Option 08 (Series 900/910): +5 to -99dBm (2 to 26.5GHz)

Option 10 (Series 905): +10 to -99dBm (2 to 26.5GHz)

### Modulation Option

Option 15 (Series 900/910): External Frequency Modulation.

Rate, 10Hz to 1MHz; Deviation, 20MHz, p-p (.01 to 26.5GHz), 40MHz, p-p (26.5 to 40GHz), 60MHz, p-p (33 to 60GHz), 80MHz, p-p (50 to 75GHz)

### Power Measurement Option

Option 09 (Series 900/910): External Power Measurement and Cable Cal feature, .01 to 26.5GHz (See Technical Bulletin 09)

### Accessories Included

- 1 ea. Operation and Maintenance Manual
- 1 ea. Extender Board Service Kit
- 1 ea. Power Cord

### Available Accessories

- Cable Kit Accessory, A001
- Rack Mount with Chassis Slides, A002
- Rack Mount with no Chassis Slides, A003

# Standard Millimeter Signal Sources

10MHz to 40, 50, 60, or 75GHz

## General Purpose Synthesized Signal Sources Model 940 • Model 950 • Model 960 • Model 975

Giga-tronics general purpose synthesized signal sources set the standard for multi-band millimeter-wave stimulus instruments. They provide accurate, stable, high resolution frequencies with controlled, spectrally pure output signals at very economical prices. For a reliable source of RF, microwave and millimeter-wave frequencies from 10MHz to 40, 50, 60, or 75GHz, choose the "A" version with panel mounted output ports or the "B" version with remote outputs.

If you require different frequency ranges or need modulation or sweep capability, open this page and study the wide selection offered by Giga-tronics' Configured Millimeter Products.

### Specifications:

#### Frequency Characteristics

Model No.	Frequency Bands (GHz)			
	1	2	3	4
975	.01-26.5	26.5-40	40-60 or 33-50	50-75
960	.01-26.5	26.5-40	40-60	—
950	.01-26.5	26.5-40	33-50	—
940	.01-26.5	26.5-40	—	—

Resolution: 1kHz (Band 1), 2kHz (Band 2), 3kHz (Band 3), 4kHz (Band 4) or 1 to 4Hz (Option 16)

Accuracy & Stability: Same as Time Base

Time Base (Internal): 10MHz,  $<1 \times 10^{-9}$ /day rate

Time Base (External): 10MHz (5MHz with Option 11)  $\pm 1 \times 10^{-6}$  or better, 0.5 to 5V, p-p, overrides internal time base

Time Base Output: Buffered 10MHz, 2V, p-p, into 50ohms, derived from internal or external time base

#### Spectral Purity

Harmonics:

Band 1:  $<-25$ dBc, 10-50MHz;  $<-55$ dBc, .05-26.5GHz

Band 2:  $<-20$ dBc (-25 typ), Fundamental;  $<-20$ dBc (-30 typ), 3rd Harmonic

Band 3:  $<-15$ dBc (-20 typ), 2nd & 4th Harmonic

Band 4:  $<-40$ dBc, 2nd Harmonic;  $<-12$ dBc (-20 typ), 3rd Harmonic;  $<-20$ dBc (-30 typ), 5th Harmonic

Spurious (Nonharmonics):  $<-55$ dBc (Band 1);  $<-49$ dBc (Band 2);  $<-45$ dBc (Band 3);  $<-43$ dBc (Band 4)

#### Output Characteristics

Leveled Output: +5 (+10 with Option 10) to -99dBm, Band 1; +5 (+8 typical) to -15dBm, Band 2; -3 (0 typical) to -15dBm, Band 3; -10 (-5 typical) to -15dBm, Band 4

Resolution: 0.1dBm

Accuracy: +1dB (.01 to 18GHz),  $\pm 2$ dB (18 to 26.5GHz), +2.5dB (Band 2),  $\pm 3$ dB (Band 3),  $\pm 3.5$ dB (Band 4)

Output Connectors: Coaxial, SMA (Band 1)

WR-28WG Waveguide w/UG-599/U Flange (Band 2)

WR-22WG Waveguide w/UG-383/U Flange (33 to 50GHz)

WR-19WG Waveguide w/UG-383/U Flange (40 to 60GHz)

WR-15WG Waveguide w/UG-385/U Flange (Band 4)



MODEL 975A

#### General Specifications

Display: Frequency, 8 digits; Power, 3 digits

Remote Interface: IEEE STD 488-1978

Operating Temperature Range: 0 to 50°C

Warm-up Time: 20 minutes, max

Environmental: Complies with MIL-T-28800C, Type III, Class 5; Style E

Power: 110/120/220/240 VAC  $\pm 10\%$ , 50-400Hz, 270W

#### Accessories Included

- 1 ea Operation & Maintenance Manual
- 1 ea Extender Board Service Kit
- 1 ea Power Cord

#### Available Accessories

- Cable Kit Accessory: A001
- Rack Mount with Chassis Slides: A002
- Rack Mount with no Chassis Slides: A003

#### Available Options

- 10: +10dBm Output, 2 to 26GHz (See Technical Bulletin 10)
- 11: 5MHz External Time Base
- 16: 1 to 4 Hz Frequency Resolution



MODEL 975B

## Standard Millimeter Frequency Extenders

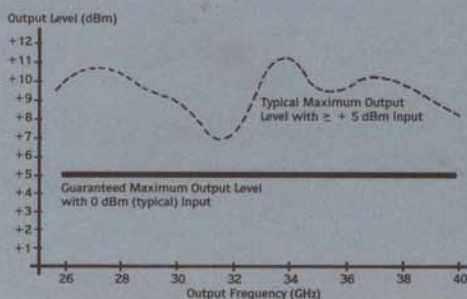
**Series 800:**

**Ka-band • Q-band • U-band • V-band**

### Features:

- Frequency Ranges to 40, 60 or 75GHz
- Leveled and calibrated variable output power
- Operates with any 0 dBm microwave source
- Remotely controllable

### Typical Model 840 Output Power Plot



### Standard Frequency Extenders

Model No	Frequency Range	Band(s)
840	26.5 to 40GHz	Ka
840-18	18 to 40GHz	K & Ka
850	26.5 to 50GHz	Ka & Q
850-33	33 to 50GHz	Q
860	26.5 to 60GHz	Ka & U
860-33	33 to 60GHz	Q & U
860-40	40 to 60GHz	U
875	26.5 to 75GHz	Ka, Q or U & V
875-33	33 to 75GHz	Q & V
875-40	40 to 75GHz	U & V
875-50	50 to 75GHz	V



MODEL 860



MODEL 875<sup>2</sup>

### Standard Millimeter Frequency Extenders

Giga-tronics Frequency Extenders increase the range of any 18 or 26GHz signal source into the millimeter wave region. The instruments use a power amplifier driven frequency doubler, tripler or quadrupler with a PIN diode attenuator, directional coupler, detector and amplifier to accomplish both leveling and calibrated amplitude control.

With controllable leveled outputs which can be swept or modulated by controlling the input source, Giga-tronics Frequency Extenders provide a flexible, economical means of testing, maintaining and calibrating sophisticated microwave systems to 40, 60 or 75GHz.

Spanning the frequency spectrum from 10MHz to 75GHz with single and multiband instruments, Giga-tronics provides the economical solution to the microwave test instrumentation requirements of EW, Radar and Telecommunications system applications.

### Frequency Extender Specifications

	K Band Doubler <sup>1</sup>	Ka Band Tripler <sup>1</sup>	Ka Band Doubler	Q Band Tripler	U Band Tripler	V Band Quadrupler
<b>Frequency Characteristics</b>						
Output Range (GHz)	18-26	26-40	26-40	33-50	40-60	50-75
Input Required (GHz)	9-13	8.6-13.3	13-20	11.16.7	13.3-20	12.5-18.8
Resolution, Accuracy and Stability	2X Input	3X Input	2X Input	3X Input	3X Input	4X Input
<b>Output Characteristics</b>						
Leveled Output (dBm)	>+5	>>3 (0typ)	>+5	>>3 (0typ)	>>3 (0typ)	>>10 (-5typ)
Input Required			0dBm, typ			
Level Control Range		-15 to +10dBm (Continuous via front panel, 0.1dB steps in remote)				
Accuracy & Flatness (dB)	± 3	± 2.5	± 2.5	± 3	± 3	± 3.5
Output Waveguide Type	WR-42WG	WR-28WG	WR-28WG	WR-22WG	WR-19WG	WR-15WG
Flange Type	UG-595/U	UG-599/U	UG-599/U	UG-383/U	UG-383/U	UG-385/U
Input Connector	Type WPM-3 female (SMA compatible)					
<b>Spectral Purity</b>						
Harmonics, Subharmonics	Doubblers: Fundamental <-20dBc (-25 typ), 3rd <-20dBc (-30 typ) Triplers: 2nd and 4th <-15dBc (-20 typ) Quadrupler: 2nd <-40dBc, 3rd <-12dBc (-20 typ), 5th <-20dBc (-30 typ)					
Spurious (Nonharmonics)	<-49dBc	<-45dBc	<-49dBc	<-45dBc	<-45dBc	<-43dBc
<b>Modulation Compliance</b> (follows input modulation)						
FM Deviation	2X Input	3X Input	2X Input	3X Input	3X Input	4X Input
Pulse/Square Wave	PRF of approx 100Hz to 1MHz; Width, 0.1µsec, min					
<b>Remote Control</b>						
Standard	Output frequency, power and leveling speed may be directly controlled by any Giga-tronics Synthesized Signal Generator with Option 14					
IEEE 488 Bus	Control of output power and leveling speed via IEEE 488 Bus requires option 01					
<b>General Specifications</b>						
Operating Temperature	0 to 50°C					
Environmental	Complies with MIL-T-28800C, Type III, Class S, Style E					
Power	100/120/220/240 VAC ± 10%, 50-400Hz, 15W (nominal)					
<b>Accessories Included</b>						
	1 ea. Operation and Maintenance Manual					
	1 ea. Parallel Interface Bus Cable, 2 ft., Pt. No. 203CA02200					
	1 ea. Power Cord, 6 ft., Pt. No. WMPO-033006					
	1 ea. Input Cable, 18 in., Pt. No. WCAO-26015					

<sup>1</sup>Used in Model 840-18 only.

<sup>2</sup>Model 875 is full-rack width. All other models are half-rack width.

## Giga-tronics

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