12000A Microwave Synthesizer

The Giga-tronics 12000A Microwave Synthesizer is designed for those who demand the highest performance, even when it comes at the lowest price. The instrument delivers performance, accuracy and reliability better than that provided by synthesizers costing twice as much.

ADVANCED DIGITAL ARCHITECTURE

The heart of the 12000A is an advanced digital processing architecture driving a high-speed, ferrite-based YIG oscillator. The YIG oscillator is designed specifically for fast-tuning applications, and produces fast switching speeds while exhibiting low phase noise, high output power, and excellent frequency linearity.

The synthesis module in conjunction with the YIG oscillator form a phase locked loop (PLL) that produces a spectrally pure sine wave output from 4 to 8 GHz, with a tuning resolution of 0.1 Hz. The output is then divided or multiplied by other modules to produce a 0.01 to 20 GHz range of output frequencies.

FAST FREQUENCY SWITCHING

The synthesis module is designed to optimize the oscillator's fast switching speed while maintaining low phase noise. It is also used to produce frequency ramp sweep and modulation (FM).

The 12000A takes full advantage of complementary circuit design to further optimize the synthesizer's switching speed. Field programmable gate arrays (FPGA) perform logic operations quickly, while a digital signal processor (DSP) is employed as a secondary processor for dynamic control and fast frequency settings, without burdening the primary processor. The result is a switching time under 500 µs across the complete frequency range.

RAMP SWEEP

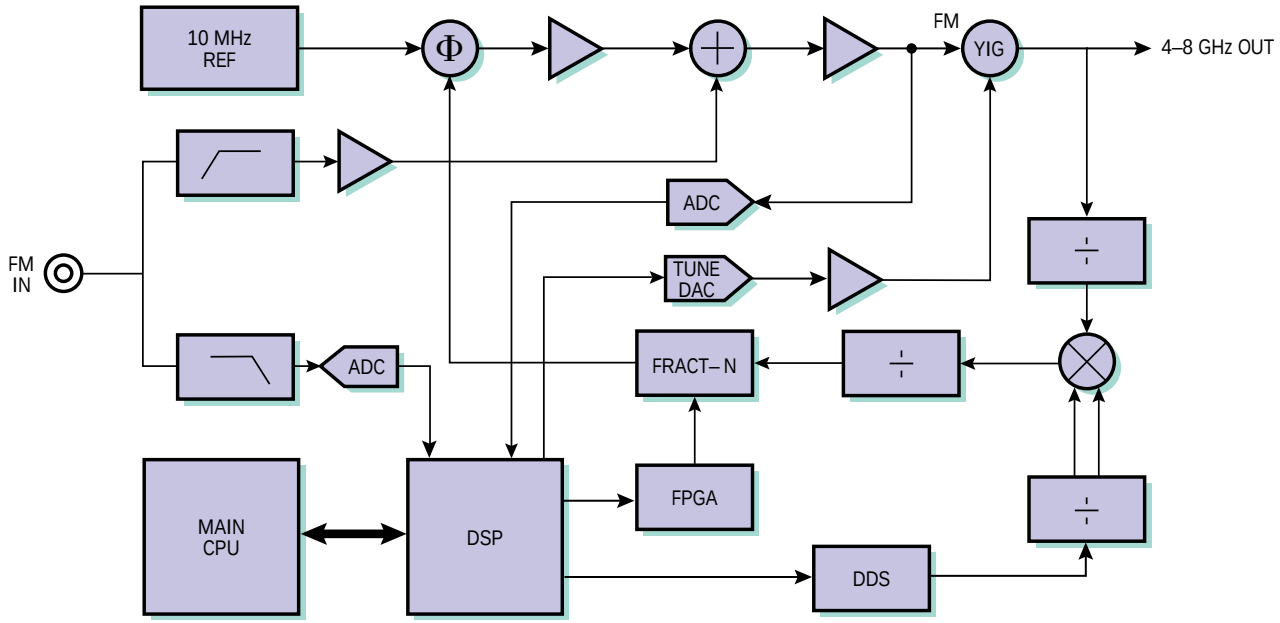
But fast switching speed is only the beginning. The frequency ramp sweep technique used in the 12000A provides an analog ramp sweep and a digital step sweep of the synthesizer from a predefined start frequency to a predefined stop frequency.

The analog ramp sweep feature of the 12000A is continuously controlled by the phase locked loop for optimum sweep accuracy.

Linearity errors are virtually eliminated because the frequency is stepped at a rate much faster than the phase locked loop bandwidth, essentially producing a swept phase locked loop. And 12 bit DAC resolution provides accuracy within a few Hertz, producing analog sweep linearity with unmeasurable error.

The result is a sweep mode with analog speed and digital accuracy. The benefit to the

The Giga-tronics 12000A Microwave Synthesizer delivers high performance, accuracy and reliability at a low price.



A simplified block diagram of the Giga-tronics 12000A synthesizer shows the extensive use of digital circuitry for greater accuracy and reliability.

user is apparent in both manual and automatic operation.

The manual two-step analog and digital tuning procedure typically used for filter tuning and component characterization can now be performed in a single sweep, reducing the time required for these operations from minutes to seconds. And the under 500 µs switching speed of the 12000A, versus the 25 to 100 ms switching speeds of other indirect synthesizers, allows you to perform list mode measurements for ATE applications 50 times faster, typically.

The synthesizer module DSP provides up to 12 sweep frequency markers, and three types of sweep markers may be selected — an RF amplitude marker (selectable from –10 dB to +10 dB), an intensity marker (sweep - pause a moment - sweep), or a video marker with TTL logic level output (polarity may be inverted).

MODULATION CAPABILITY

The FM circuitry of the 12000A applies an external FM source to the PLL in a way that results in low distortion, with wide bandwidth dc coupled frequency modulation in normal and wideband modes.

In addition to FM, the 12000A includes high-speed pulse/square wave modulation (PM) with on/off ratios greater than 80 dB and rise/fall times less than 10 ns. And you can obtain pulse widths as narrow as 25 ns.

Amplitude modulation (AM) and scan modulation (log AM) are standard features. Scan modulation can be operated simultaneously with FM and/or PM over a range of 0 to 60 dB from 10 MHz to 20 GHz.

PURE POWER

Leveled output power is +15 dBm from 10 MHz to 20 GHz with resolution of 0.01 dB.

Phase noise at 4 GHz is –88 dBc/Hz at 10 kHz offset for all power levels. Phase noise is equally impressive across the full range of the instrument, making the 12000A ideal for measuring critical narrow band characteristics.

Harmonics are less than –65 dBc at +6 dBm and less than –60 dBc at full power, so you can accurately test over a wide bandwidth with confidence.

PROVEN RELIABILITY

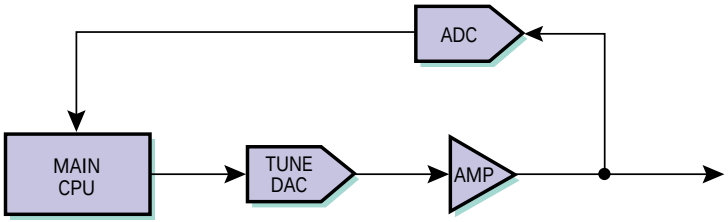
Performance is only one aspect of the 12000A synthesizer's extensive use of digital circuitry, reliability is another. In fact, the 12000A is the only microwave synthesizer that uses no potentiometers. The PLL is digitally controlled and will automatically self center to adjust for temperature drift. Calibration is recommended every two years; that's twice as long as the recommended cal cycle for conventional synthesizers. And the only instruments you'll need to calibrate a 12000A are a precision 10 MHz source, a 1 volt reference, and a Giga-tronics power meter.

The 12000A uses fewer circuit boards than most synthesizers and extensive use of surface mount components to ensure reliable operation under the most demanding conditions. Operational software is stored in flash memory, so future enhancements can be programmed from a PC.

EASY OPERATION

The 12000A incorporates a 3" high by 4" wide Liquid Crystal Display (LCD) with 320 x 240 line resolution, 0.30 mm dot pitch, and Cold Cathode Fluorescent Lamp (CCFL) back light for maximum detail and optimum viewing.

You can program up to nine stored setups. Custom setups such as list mode and level correction tables are stored in user-programmable non-volatile RAM. In addition to frequency, the list function allows the user to preprogram power, dwell time, and modulation modes (AM, FM, and pulse).



Digital circuits automatically self center to adjust for temperature drift, and the 12000A is the only microwave synthesizer with no potentiometers.

ORDERING INFORMATION

MODEL NUMBERS AND FREQUENCY RANGES:

CW & Step Sweep	CW, Step & Ramp Sweep	Frequency Range
12508A	12708A	10 MHz to 8 GHz
12528A	12728A	2 GHz to 8 GHz
12520A	12720A	10 MHz to 20 GHz
12522A	12722A	2 GHz to 20 GHz

AVAILABLE OPTIONS:

Option 20: Provides +20 dBm output power, .05 to 20 GHz.
Option 22: Moves the RF Output Connector from the instrument's front panel to its rear panel.
Option 23: Type N output connector.
Option 24: Provides built-in function generators for generating AM, FM, and pulse.
Option 26: Provides a built-in 110 dB attenuator (in 10 dB steps).
Option 28: Provides high stability time base: $<5 \times 10^{-10}$/day.
Option 36: Provides 1 kHz resolution throughout the frequency range.

AVAILABLE ACCESSORIES:

Accessory A001: Cable kit consisting of 2 low loss cables (18 and 72 inch lengths) and 2 output connector adaptors (F–F and M–F).
Accessory A002: Instrument configured for standard rack mounting with chassis slides.
Accessory A003: Instrument configured for standard rack mounting without chassis slides.
Accessory A010: Extra operation manuals (one furnished with each instrument).
Accessory A011: Service manual.

CW OPERATION

Range: 0.01 to 8 GHz, 2 to 8 GHz, .01 to 20 GHz, and 2 to 20 GHz
Resolution: 0.1 Hz (Standard), 1 kHz (Optional)
Accuracy and Stability: Identical to time base oscillator
Time Base (Internal): 10 MHz
Aging Rate: $<1 \times 10^{-9}$/day after 72 hours of continuous oven operation; $<5 \times 10^{-10}$/day (with Option 28)
Temperature Stability: $<\pm 2 \times 10^{-10}$/°C (0 to +55°C)
Time Base (External): 10 MHz ($\pm 1 \times 10^{-6}$ or better) 0.5 to 5 Vpp into 500 Ω (Nominal)
Switching Time: <500 µs for any frequency span

RF OUTPUT

Maximum Leveled Output:

Frequency (GHz)	Output Power (dBm)	Option 20 (dBm)	Option 26 (dBm)
0.1 to 8.0	+15	+20 (.05 – 8 GHz)	+15
8.0 to 15.0	+15	+20	+13
> 15.0 to 20.0	+15	+20	+12

Incremental Level Range: –20 to +20 dBm
Resolution: 0.01 dB, entry and display
Minimum Output Level: –120 dBm (with Option 26)
RF Off: Attenuates the output to <–140 dBm at the output connector
Combined Output Accuracy and Flatness (Internally Leveled, CW or frequency sweep mode): ±0.5 dB (0 dBm to maximum specified power). Add ±0.1 dB/10 dB(with Option 26)
Maximum Slope of Level Variation: <.5 dB/MHz
Output Switching Time: <500 µs; 20 ms with attenuator change – Option 26
Output Impedance: 50 Ω, nominal
Output SWR: <1.5:1
External Leveling: Output power may be externally leveled by positive or negative ZBS detectors or power meters
Level Drift: <0.05 dB/hour. Max 0.1 dB/24 hours.

SPECTRAL PURITY

Harmonics:

Frequency (GHz)	Harmonic (dBc)	Power (dBm)
0.01 to 2.0	–50	≤ +6
> 2.0 to 20.0	–65	≤ +6
0.01 to 2.0	–50	MAX
> 2.0 to 20.0	–60	MAX

Subharmonics: –60 dBc
Nonharmonics: <–50 dBc (0.01 to 2 GHz); <–60 dBc (>2 GHz)

SSB Phase Noise (dBc/Hz, CW Mode, All Power Levels):

Frequency (GHz)	Offset from Carrier				
	100 Hz	1 kHZ	10 kHz	100 kHz	1 MHz
0.25	–101	–101	–109	–127	–135
0.5	–95	–95	–103	–127	–135
2.0	–87	–92	–94	–125	–130
4.0	–81	–86	–88	–115	–130
6.0	–81	–84	–85	–115	–130
8.0	–75	–80	–82	–115	–130
10.0	–75	–80	–82	–110	–125
18.0	–69	–75	–75	–105	–120
20.0	–69	–75	–75	–105	–120

Residual FM (Hz, rms; CW Mode):

Frequency Range (GHz)	Post Detection Bandwidth	
	300 Hz to 3 kHz	50 Hz to 15 kHz
< 2	Decreases by 1/2 per oct	Decreases by 1/2 per oct
2 to 4	< 4	< 25
4 to 8	< 8	< 50
8 to 16	< 16	< 100
16 to 20	< 32	< 200

AM Noise: <–140 dBm/Hz (0.01 to 2 GHz); <–150 dBm/Hz (>2 GHz)

RAMP FREQUENCY SWEEP (12700A Series)

Continuous sweep, self-generated within the instrument. May be operated simultaneously with step power sweep.
Range: FA (minimum frequency of instrument) to FB (maximum frequency of instrument)
Sweep Time (any sweep mode): 1 ms to 200 s.
Resolution: 10 µs
Minimum sweep time is determined by the sweep width and the maximum sweep speed.
Minimum Sweep Width: 100 Hz (1 MHz, Option 36)
Maximum Sweep Speed: 1 octave/8 ms (general spec) determined by frequency band
Band Crossing Dead Time: <400 µs
Sweep Width Resolution: 0.1 Hz (1 kHz, Option 36)
Start, Stop, halted Frequency Accuracy: Phase locked to time base
Sweep Linearity (Relative to a linear RAMP OUT voltage, sweep time ≥100 ms, any sweep mode): < 0.1% of sweep width

Sweep Modes:

START/STOP (FA ≤ [F1 ≠ F2] ≤ FB): Sweeps up or down from a preset start frequency (F1) to a preset stop frequency (F2)

START/Δ (FA ≤ [F1 ± ΔF] ≤ FB): Sweeps up or down from a preset start frequency (F1) through a preset sweep width (ΔF)

CTR/Δ (FA ≤ [CF ± (ΔF/2)] ≤ FB): Sweeps up or down through a preset sweep width (ΔF) centered symmetrically about a preset center frequency (CF)

Δ MKR (FA ≤ [Mx ≠ My] ≤ FB): Sweeps up or down from any preset marker (Mx) to any other preset marker (My)

Sweep Functions:

AUTO: Continuous recycle of preset sweep

SINGLE: A single cycle of preset sweep initiated by manual operation of the front panel push-button or reception of the corresponding GBIP command

EXT: A single cycle of preset sweep initiated by each trigger from an external source

MANUAL: Stops the sweep when activated by the front panel push-button, the assertion of the Stop Sweep I/O BNC or the reception of the corresponding GPIB command to allow manual tuning of the frequency to any point in the sweep. Allows continuation from the current frequency.

Frequency Markers (Step and Ramp frequency sweep):

Twelve intensity, video, and/or amplitude markers, individually selected from either the front panel or via the GPIB

Resolution: Sweep width/4,000

Accuracy: Same as sweep linearity except the marker may vary ±25 mV relative to the linear 0 to +10 V RAMP OUT

Amplitude markers: A –10 to 10 dB change in RF output during analog frequency sweep

Video markers: TTL level output or ±5 V

Intensity markers: Provides a timed dwell of frequency sweep

STEP FREQUENCY SWEEP

Range: FA (minimum frequency of instrument) to FB (maximum frequency of instrument)

Step Size: Any increment within the instrument's frequency resolution

Dwell Time: May be set in 1 ms increments from approximately 1 ms to 200 s

Setup time/step: 200 µs typical

Accuracy and Stability: Same as in CW when locked at each step during dwell time

Modes:

START/STOP (FA ≤ [F1 ≠ F2] ≤ FB): Sweeps up or down from a preset start frequency (F1) to a preset stop frequency (F2)

START/Δ (FA ≤ [F1 ± ΔF] ≤ FB): Sweeps up or down from a preset start frequency (F1) through a preset sweep width (ΔF)

CTR/Δ (FA ≤ [CF ± (ΔF/2)] ≤ FB): Sweeps up or down through a preset sweep width (ΔF) centered symmetrically about a preset center frequency (CF)

START/STEPS (FA ≤ [F1 ± (Step Size X Number of Steps)] ≤ FB): Sweeps up or down from a preset start frequency (F1) through a preset number of frequency steps

Functions:

AUTO: Continuous recycle of preset sweep

SINGLE: A single cycle of preset sweep or (with stop activated) a single preset step, initiated by manual operation of the front panel push-button or reception of the corresponding GPIB command

EXT: A single cycle of preset sweep, initiated by each trigger from an external source

EXT STEP: A single sweep step of preset step sweep initiated by each trigger from an external source

MANUAL: Stops the sweep when activated by the front panel push-button, the assertion of the Stop Sweep I/O BNC or the reception of the corresponding GPIB command to allow manual tuning of the frequency to any point in the sweep. Allows continuation from the current frequency.

RAMP POWER SWEEP

Continuous sweep, self-generated within the instrument. May be operated simultaneously with step frequency sweep.

Range: 20 dB maximum, up or down, to maximum specified output power

Sweep Time (Any Sweep Mode): 2 ms to 200 s in five ranges. Minimum sweep time is determined by the sweep width and the maximum sweep speed.

Minimum Sweep Width: .01 dB

Maximum Sweep Speed: 1 dB/ms

Range	Resolution
2.0 to 20.0 ms	10.0 µs
20.0 to 200.0 ms	100.0 µs
200 ms to 2.0 s	1.0 ms
2.0 to 20.0 s	10.0 ms
20.0 to 200.0 s	100.0 ms

Sweep Level Resolution (any sweep mode): 0.01 dB

Start Level Accuracy (any sweep mode): ±0.5 dB (–10 to +11 dBm)

Sweep Level Linearity (any sweep mode): ±0.5% of sweep width

Sweep Modes:

START/STOP (LA ≤ [L1 ≠ L2] ≤ LB): Sweeps up or down from a preset start level (L1) to a preset stop level (L2)

START/Δ (LA ≤ [L1 ± ΔL] ≤ LB): Sweeps up or down from a preset start level (L1) through a preset sweep width (ΔL)

CTR/Δ (LA ≤ [CL ± (ΔL/2)] ≤ LB): Sweeps up or down from a preset sweep width (ΔL) centered symmetrically about a preset center level (CL)

Sweep Functions:

AUTO: Continuous recycle of preset sweep

SINGLE: A single cycle of preset sweep initiated by manual operation of the front panel push-button or reception of the corresponding GPIB command

EXT: A single cycle of preset sweep initiated by each trigger from an external source.

STOP/RESET: Stops the sweep when activated by the front panel push-button, the assertion of the Stop Sweep I/O BNC or the reception of the corresponding GPIB command to allow manual setting of the level to any point in the sweep. Allows continuation from the current level.

STEP POWER SWEEP

Range: LA (minimum level of instrument) to LB (maximum level of instrument)

Step Size: Any increment within the instrument's level resolution

Dwell Time: May be set in 1 ms increments from approximately 1 ms to 200 s

Setup time/step: 100 µs typical

Accuracy and Stability: Same as in CW when locked at each step during dwell time

Sweep Modes:

START/STOP (LA ≤ [L1 ≠ L2] ≤ LB): Sweeps up or down from a preset start level (L1) to a preset stop level (L2)

START/Δ (LA ≤ [L1 ± ΔL] ≤ LB): Sweeps up or down from a preset start level (L1) through a preset sweep width (ΔL)

CTR/Δ (LA ≤ [CL ± (ΔL/2)] ≤ LB): Sweeps up or down from a preset sweep width (ΔL) centered symmetrically about a preset center level (CL)

START/STEPS: (LA ≤ [L1 ± (Step Size X Number of Steps)] ≤ LB): Sweeps up or down from a preset start level (L1) through a preset number of level steps

Sweep Functions:

AUTO: Continuous recycle of preset sweep

SINGLE: A single cycle of preset sweep or (with stop activated) a single preset step, initiated by manual operation of the front panel push-button or the corresponding GPIB command

EXT: A single cycle of preset sweep or (with stop activated) a single preset step, initiated by each trigger from an external source

EXT STEP: A single step of preset sweep initiated by each trigger from an external source

STOP/RESET: Stops the sweep when activated by the front panel push-button, the assertion of the Stop Sweep I/O BNC or the reception of the corresponding GPIB command to allow manual setting of the level to any point in the sweep. Allows continuation from the current level

MODULATION PARAMETERS AND OPERATIONAL MODES

Option 24 provides two function generators for internally generating amplitude and frequency modulation envelope waveforms. A pulse generator is also provided. (Modes: free-run, triggered, gated, delayed, single, double, triple.)

PULSE/SQUARE WAVE MODULATION (PM)

Specifications apply with Scan/AM and FM off. PM may be operated with FM and/or Scan.

PM Envelope Parameters

On/Off Ratio: >80 dB

Rise/Fall Times:

Rise Time	Frequency Range
< 10 ns	> 500 MHz
< 50 ns	> 64 to 500 MHz
< 350 ns	25 to 64 MHz
< 500 ns	< 25 MHz

Overshoot, Undershoot and Ringing: <10%, >500 MHz

Settling Time (to within 1 dB): <75 ns

Leveled Pulsed Output Power (Referenced to CW output power): ± 0.5 dB, typical

≥100 ns pulse width, ±1 dB typical, <100 ns pulse width

Minimum Width	Frequency Range
25 ns	> 500 MHz
100 ns	64 to 500 MHz
1 µs	< 25 to 64 MHz

Internally Generated PM Envelope (Option 24)

Repetition Rate:

Range	Resolution
1 to 1 kHz	1 Hz
1 to 10 kHz	10 Hz
10 to 100 kHz	100 Hz
100 kHz to 1 MHz	1 kHz
1 to 3 MHz	10 kHz

Accuracy: ±0.02% of range maximum value

Pulse Delay (Referenced to sync output)

Range: 0 to 2 s

Resolution: 10 ns

Accuracy: ±1% of setting or ±20 ns, whichever is greater

Jitter: ±0.01% of setting or ±100 ps, whichever is greater

Pulse Width:

Range: 50 ns to 2 s

Resolution: 10 ns

Accuracy: ±1% of setting or ±20 ns, whichever is greater

Jitter: ±0.01% of setting or ±100 ps, whichever is greater

Externally Triggered PM Envelope

One PM envelope produced by each trigger

Repetition Rate: 5 Hz to 5 MHz

Pulse Delay: Set by internal delay control

Pulse Width: Set by internal width control

Input Trigger Required: Positive or negative-going TTL level trigger pulse, >25 ns wide

Externally Generated PM Envelope

One PM envelope produced by each pulse

Repetition Rate: 5 Hz to 5 MHz, leveled output; DC to 10 MHz, unleveled

Pulse Delay (Output envelope leading edge referenced to input pulse leading edge): 50 ns, typical

Input Pulse Required: Positive or negative-going TTL level trigger pulse, ≥50 ns wide (leveled output); ≥20 ns wide (unleveled output)

AMPLITUDE MODULATION

Specifications apply with FM off. AM may be operated simultaneously with FM.

AM Envelope Parameters

Modulation Depth: 0 to 90%, at 0 dBm output power

Modulation Resolution: 1%

Modulation Bandwidth: DC to 150 kHz, ±3 dB, at 0 dBm output

Modulation Accuracy: ±10% of depth setting

Externally Supplied AM Envelope

Waveform: Any waveform compatible with bandwidth considerations

Input Sensitivity (AM depth control set to 100%): 1 Vp-p, for 50% depth ± 10% depth, at 1 kHz modulation rate

Input Impedance: 600 Ω, nominal

Internally Generated AM Envelope (Option 24)

Waveform: Sine, square, sawtooth or triangle wave

Rate: 1 Hz to 100 kHz

Resolution: 1 Hz

Accuracy: ±0.01 Hz.

SCAN MODULATION

Specifications apply with FM and PM off. Scan may be operated simultaneously with FM and/or PM.

Envelope Parameters

Frequency of operation: 0.01 to 20 GHz

Scan Mode

Range: 0 to 60 dB

Resolution 0.1 dB

Sensitivity: –10 dB/V

Step Response: <1 µs for 50 dB change (less than 10 µs below 1 GHz)

Frequency Response: DC to 150 kHz sine wave

Linearity: ±0.6 dB (0 – 20 dB), ±1 dB (20 – 60 dB)

Input Impedance: 600 Ω, nominal

Internally Generated SCAN/AM Envelope (Option 24)

Waveform: Sine, square, sawtooth or triangle wave

Rate: 1 Hz to 100 kHz

Resolution: 1 Hz

Accuracy: ±0.01 Hz

FREQUENCY MODULATION (FM)

Specifications apply with SCAN/AM and PM off. FM may be operated simultaneously with SCAN/Linear AM and/or PM (PM and Linear AM not allowed simultaneously)

FM Envelope Parameters

Wide Mode

Max Deviation (See following table)

Minimum Deviation: 10 Hz, at 4 – 8 GHz (other ranges proportional)

Modulation Resolution: 1 kHz, (deviation <1 MHz); 10 kHz (deviation >1 MHz) (at 4 – 8 GHz, other ranges proportional)

Flatness: ±2 dB for rates from dc to 1 MHz; ±3 dB to 8 MHz

Residual FM: (See following table)

Normal Mode

Max Deviation (See following table)

Modulation Resolution: 10 Hz, (deviation <10 kHz); 1 kHz, (deviation >10 kHz) (at 4 – 8 GHz, other ranges proportional)

Flatness: ±2 dB for rates from dc to 1 MHz

Residual FM: Same as CW

Both Modes

Modulation Accuracy: ±5% at maximum deviation; 1 kHz modulation rate

Distortion: <5% (±1 MHz deviation); (4 – 8 GHz range)

Incidental AM: <±0.2%/MHz of deviation

Frequency (GHz)	Max Wide Deviation (Pk)	Max Normal Deviation (Pk)	Wide Mode Residual FM
.010 to .016	40 kHz	2 kHz	200 Hz
.016 to .032	80 kHz	4 kHz	200 Hz
.032 to .064	160 kHz	8 kHz	200 Hz
.064 to .125	320 kHz	16 kHz	200 Hz
.125 to .25	640 kHz	32 kHz	200 Hz
.25 to .5	1.25 MHz	64 kHz	200 Hz
.5 to 1	2.5 MHz	125 kHz	375 Hz
1 to 2	5 MHz	250 kHz	< 750 Hz
2 to 4	10 MHz	.5 MHz	< 1.5 kHz
4 to 8	20 MHz	1 MHz	< 3 kHz
8 to 16	40 MHz	2 MHz	< 6 kHz
16 to 20	80 MHz	4 MHz	< 12 kHz

Internally Generated FM Envelope (Option 24)

Waveform: Sine, square, sawtooth or triangle wave

Rate: 10 Hz to 1 MHz

Resolution: 1 Hz

Accuracy: ±0.01 Hz

Externally Supplied FM Envelope

Waveform: Any waveform compatible with bandwidth considerations

Rate: dc to 8 MHz

Input Sensitivity, Settable: 1 Vp for maximum peak deviation (FM deviation control set to maximum)

Input Impedance: 50 Ω, nominal

INPUTS/OUTPUTS

All connectors are type BNC unless otherwise stated

Front Panel

RF OUT: Generator's RF output signal on type SMA (f) connector

Option 22 moves the RF output connector to the rear panel

Option 23 for Type N connector (f)

AM IN: Input signal for external amplitude modulation

FM IN: Input signal for external frequency modulation

PM IN: Input signal for external pulse modulation

ALC IN: Signal input for remote leveling of output power by positive or negative polarity ZBS detectors or by applicable power meters

Range: 500 µV to 2 V

Loop bandwidth: 50 kHz, nominal (ZBS detector); 0.7 Hz, nominal (power meter)

Input Impedance: 10 kΩ, nominal

Rear Panel

REF IN: External time base input signal, 10 MHz ± 1 X 10^{-6} or better, 0.5 to 5 V, p-p, overrides internal time base

Input Impedance: 100 Ω, nominal

REF OUT: Buffered time base output, 2V, p-p, into 50 Ω, derived from internal or external time base

STOP SWEEP IN/OUT: TTL level signal, low input to stop frequency sweep or output to indicate that sweep has been stopped

LOCK/LEVEL OUT: TTL high, indicating that frequency is phase-locked and output power is leveled

PM VIDEO OUT: TTL level (approximately 1 V into 50 Ω) pulse modulation envelope waveform

PM SYNC OUT: TTL level (approximately 1 V into 50 Ω) 50 ns wide trigger pulse out coincident with leading edge of pulse modulation envelope waveform

AM SIG OUT: 2 V, p-p, into 1 mΩ, amplitude modulation waveform output

FM SIG OUT: 2 V, p-p, into 1 mΩ, frequency modulation waveform output

BLANK/MKR OUT: ±5 V during band changes, filter changes and retrace; 0 V during sweep, and ±5 V during markers. Signal polarity software selectable

0.5 V/GHz OUT: Signal directly proportional to the output frequency

SWEEP TRIGGER: TTL level, ≥50 ns wide trigger input to initiate sweep or step

RAMP OUT: 0 to +10 V ramp out, proportional to frequency between set sweep limits

SWP TRIG OUT: (To synchronize multiple signal generators)

AM IN: Input signal for external amplitude modulation

FM IN: Input signal for external frequency modulation

PM IN: Input signal for external pulse modulation

GENERAL SPECIFICATIONS

Remote Interface: IEEE STD 488.2 – All parameters except AC power on/off

Operating Temperature: 0 to 55°C

Environmental: Complies with MILPRF-28800F, Class 3, Type III, Class 5, Style E

Approvals: CE marked

Power: 90-253 VAC, 47-64 Hz (400 Hz optional), 250 Watts nominal

Fuse Rating: Internal to power supply

Weight: 13.6 kg (30 lb)

Dimensions: 133 mm H x 425 mm W x 533 mm D (5.25 in H x 16.75 in W x 21 in D)

Giga-tronics Incorporated
4650 Norris Canyon Road
San Ramon, California 94583
Telephone: 800 726 4442 or
925 328 4650
Telefax: 925 328 4700
Web Site: www.gigatronics.com