Performance data

Carrier frequency

Range:	9 kHz to 1.2 GHz (2023). 9 kHz to 2.4 GHz (2024).
Resolution:	1 Hz.
Accuracy:	Equal to the frequency standard accuracy.

RF output

Range:	-140 dBm to +13 dBm. When AM is selected the maximum RF output level decreases linearly with increasing AM depth to +7 dBm at 99.9% depth.
Resolution:	0.1 dB.
Accuracy:	For output levels above -127 dBm and over a temperature range of 17 to 27°C: ±0.8 dB to 1.2 GHz; ±1.6 dB to 2.4 GHz. Temperature coefficient <±0.02 dB/°C to 1.2 GHz, and <±0.04 dB/°C to 2.4 GHz.
Attenuator hold:	Selection of Attenuator Hold provides for uncalibrated level reduction of at least 10 dB without the mechanical attenuator operating.
RF output connector:	50 Ω, type-N connector to MIL 390123D.
VSWR:	For output levels less than -5 dBm output VSWR is less than 1.3:1 for carrier frequencies up to 1.2 GHz and less than 1.5:1 for carrier frequencies up to 2.4 GHz.
Output protection:	Protected against the application of reverse power to the output connector for levels up to 50 W from 50 Ω or 25 W from a source VSWR of 5:1. Protection circuit can be reset from the front panel or via the GPIB/RS-232 interfaces.
75 Ω calibration:	The output level can be entered as the value after a 50/75 Ω external adapter.

Spectral purity

Harmonics:	Typically better than -30 dBc for RF levels up to +7 dBm. Typically better than -25 dBc for RF levels up to +13 dBm.
Non-harmonics:	Better than -70 dBc for carrier frequencies up to 1 GHz. Better than -64 dBc for carrier frequencies above 1 GHz. Better than -60 dBc for carrier frequencies above 2 GHz.
Residual FM (FM off):	Less than 4.5 Hz RMS in a 300 Hz to 3.4 kHz unweighted bandwidth at a carrier frequency of 1 GHz. Residual FM (typical) <1 Hz at 249 MHz <2 Hz at 501 MHz <3 Hz at 1001 MHz <6 Hz at 2001 MHz
SSB phase noise:	Better than -124 dBc/Hz at 20 kHz offset from a 470 MHz carrier. Typically -121 dBc/Hz at 20 kHz offset from a 1 GHz carrier.
RF leakage:	Less than 0.5 µV at the carrier frequency into a two-turn 25 mm diameter loop 25 mm from the surface of the signal generator.

Modulation

FM, AM or phase modulation can be applied to the carrier from an internal or external modulation source. The internal modulation source is capable of generating two simultaneous signals into any one of the modulation channels. Internal and external modulation can be simultaneously enabled to produce combined amplitude and frequency (or phase) modulation. Pulse modulation can be applied to the carrier from an external pulse source. The pulse modulation can be used in combination with the other forms of modulation. 2 level or 4 level FSK modulation can be applied to the carrier using data from an external source.

Frequency modulation

Deviation range:	0 to 100 kHz.
Resolution:	3 digits or 1 Hz.
Bandwidth (1 dB):	DC to 100 kHz (DC coupled), 10 Hz to 100 kHz (AC coupled), 20 Hz to 100 kHz (AC coupled with ALC).
Accuracy:	±5% at 1 kHz modulation rate.
Carrier frequency	Less than 1% of the set frequency deviation.

offset (DC coupled):

Distortion:	Less than 1% at 1 kHz rate for deviations up to 100 kHz. Typically 0.3% at 1 kHz rate for deviations up to 10 kHz.
Group delay:	Less than 5 μs to 100 kHz.

FSK

Modes:	2 level or 4 level FSK.
Data source:	External data connected to 2FSK connector (2 level) or 2FSK and 4FSK connectors (4 level).
Frequency shift:	Settable up to ±100 kHz.
Accuracy:	As FM deviation accuracy.
Timing jitter:	±3.2 μs
Filter:	8^{th} order Bessel, –3 dB at 20 kHz.

Phase modulation

Range:	0 to 10 radians.
Resolution:	3 digits or 0.01 radians.
Bandwidth (3 dB):	100 Hz to 10 kHz.
Accuracy:	±5% at 1 kHz modulation rate.
Distortion:	Less than 3% at 10 radians at 1 kHz. Typically 0.5% for deviations up to 1 radian at 1 kHz.

Amplitude modulation (for carrier frequencies <500 MHz, usable to 1.5 GHz)

Range:	0 to 99.9%.
Bandwidth (1 dB):	DC to 30 kHz (DC coupled), 10 Hz to 30 kHz (AC coupled), 20 Hz to 30 kHz (AC coupled with ALC).
Resolution:	0.1%.
Accuracy:	±5% of set depth at 1 kHz rate at +17°C to 27°C ambient temperature. Temperature coefficient <0.02% per °C.
Distortion:	Less than 2.5% at 1 kHz rate for modulation depths up to 80%. Less than 1.5% at 1 kHz rate for modulation depths up to 30%.
ΦM on AM:	Typically 0.1 radians at 30% depth at 470 MHz.

Pulse modulation (for fast pulse see Options 7 or 11 when fitted)

Carrier frequency range:	32 MHz to 2.4 GHz, usable to 10 MHz.
RF level range:	Maximum guaranteed output is reduced to +8 dBm (+20 dBm or +14 dBm with high power option) when pulse modulation is selected.
RF level accuracy:	Maximum additional uncertainty is ±0.5 dB.
Input:	Rear panel BNC connector with an input impedance of 10 kΩ nominal. A logical '1' (5 V) turns the carrier on, a logical '0' (0 V) turns the carrier off. Maximum safe input is ±15 V.
On-off ratio:	Better than 40 dB, better than 45 dB below 1.2 GHz.
Rise and fall time:	Less than 10 μs.
Overshoot:	Less than 1 dB.

Modulation oscillator The internal modulation oscillator is capable of generating one or two modulation tones simultaneously in one modulation channel.

Frequency range:	0.01 Hz to 20 kHz.
Resolution:	0.01 Hz to 100 Hz, 0.1 Hz to 1 kHz, 1 Hz to 20 kHz.
Distortion:	Less than 0.1% at 1 kHz.
Sine wave frequency response:	Typically 1 dB DC to 20 kHz.

Waveforms: Sine (to 20 kHz), triangle or square wave (to 3 kHz). Square wave jitter <6.4 μs on any edge.

Output: The modulation oscillator signal is available on a front panel BNC connector at a nominal level of 2 V RMS EMF from a 600 Ω source impedance.

External modulation input A front panel external modulation input is provided.

Input level: 1 V RMS (1.414 V peak) sine wave for set deviation. Input sensitivity may be optionally specified for 1 V peak (Option 10). Maximum safe input is ±15 V.

Input impedance: 100 kΩ nominal.

Modulation ALC: Levels the applied external modulation over the range 0.75 to 1.25 V RMS. High and low indicators in display indicate when the input is outside levelling range.

Sweep mode A carrier frequency sweep mode is provided. The sweep is defined by entry of the start, stop and frequency step size. The sweep step size may be specified linearly or logarithmically. The step time can be set from 20 ms to 10 s per step. A trigger input on the rear panel may be used to trigger a step or the complete sweep. Sweep can be set to continuous.

Frequency standard The carrier frequency and internal modulation frequency are synthesized from either an internal reference oscillator or an external reference.

Internal standard: 10 MHz TCXO.

Aging rate: Less than ±1 in 10^6 per year.

Temperature stability: Better than ±5 in 10^7 over the temperature range 0 to 55°C.

External standard:

Input: Requires an input of 220 mV RMS to 1.8 V RMS into 1 kΩ on rear panel BNC connector. Input frequency can be 1 MHz or 10 MHz.

Output: Rear panel BNC socket provides an output of 10 MHz at a nominal level of 2 V pk-pk into 50 Ω.

Calibration interval Recommended 2 years. Realignment can be accomplished by GPIB control or from the front panel. There are no mechanical adjustments required for realignment.

Remote control

GPIB: All functions except the supply switch are remotely programmable.

Capabilities: Complies with the following subsets as defined in IEEE Std 488.1: SH1, AH1, T6, TE0, L4, LE0, SR1, PP0, DC1, DT1, C0, E2.

RS-232: All functions except the supply switch are remotely programmable.

Connector: 9-way male D-type.

Baud rate: 300 to 9600 bit/s.

Handshake: Hardware: DTR, RTS, CTS and DSR.
Software: XON and XOFF.

Electrical: Interface to EIA-232-D.

Electromagnetic compatibility Conforms to the protection requirements of Council Directive 89/336/EEC.
Complies with the limits specified in the following standards:

EN55011 Class B	CISPR 11
EN50082-1	IEC 1000-4-2,-3,-4
EN61000-3-2	IEC 1000-3-2

Safety This instrument is designed to comply with the requirements of EN61010-1/IEC1010-1, for Class 1 portable equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from an installation category 1 and 2 supply.

Rated range of use (over which full specification is met)

Temperature: 0 to +55°C.
Humidity: Up to 93% at 40°C.
Altitude: Up to 3050 m (10,000 ft).

Conditions of storage and transport

Temperature: -40°C to +71°C.
Humidity: Up to 95% at 40°C.
Altitude: Up to 4600 m (15,000 ft).

Power requirements 47 to 63 Hz at 90 to 132 V, or 188 to 264 V at 175 VA maximum.

Dimensions and weight

Height	Width	Depth	Weight
107 mm	419 mm	440 mm	<8 kg
4.2 in	16.5 in	17.3 in	<17.6 lb