



THURLBY THANDAR INSTRUMENTS

TGR1040



1GHz low-cost synthesised RF generator

high stability and low phase noise

wide amplitude range and low leakage

internal and external frequency modulation

TGR1040 low-cost synthesised RF generator



Overview

The TGR1040 is a low cost, synthesised RF signal generator which incorporates the essential features required for most development, test and service work - frequency accuracy and stability, wide dynamic range, low phase noise and low leakage.

The generator incorporates both internal and external FM. It is suitable for FM radio receiver sensitivity measurements, system gain measurements, receiver tuning & alignment, oscillator substitutions, EMC/antenna/field strength measurements and as a signal source for many other RF circuit and system development tasks.

The instrument can be operated manually via the front panel or can be remotely controlled via the RS-232 interface (standard) or GPIB interface (optional). Nine memories are provided for user set-ups.

In addition the generator's low cost, its ease of use and remote control capabilities make it eminently suitable for most production and development applications where a basic, stable signal source is required.

- 10MHz to 1000MHz frequency range
- 1kHz setability at any frequency
- ± 2 ppm accuracy over 5°C to 40°C
- -127dBm to +7dBm amplitude range
- Amplitude control in 0.1dB steps
- FM modulation, internal or external
- 80 character back-lit LCD display
- Keyboard and rotary encoder control
- Non-volatile storage for 9 user set-ups
- Full remote control via RS-232 or GPIB
- Outstanding price/performance ratio

10MHz to 1000MHz

high stability, wide amplitude range

Lower cost through innovative design

The TGR1040 sets a new price standard for a high performance RF generator. Costing little more than an analogue generator, it has the precision of a synthesised generator. Advanced design techniques utilising the latest component technologies have made this possible.

Now every engineer involved in RF design, manufacture or testing can have a generator of their own.

Precision and Stability

The TGR1040 uses a fully synthesised source locked to a temperature compensated crystal oscillator. This provides excellent signal frequency stability against temperature and ageing.

Careful low power oscillator design has yielded good phase noise characteristics.

The frequency can be set to a resolution of 1kHz across the whole frequency range, yielding a precision of 1ppm at 1GHz.

Frequency steps can be set from 1kHz up to 999-999MHz. The frequency stepping system makes operations such as precise amplitude response characterisation particularly easy.

Ease of use

Ease of use was a major consideration in the design of the TGR1040. A simple and straightforward user interface is combined with a comprehensive remote command set.

The clear four line display shows all the major signal parameters simultaneously. Data can be entered numerically using 0 - 9 keys or can be incremented/decremented using up/down keys or the rotary encoder. Both frequency and output level can be adjusted in steps of user programmed size.

There is no requirement to set both a level and an attenuator setting, the internal arrangements are transparent to the user, just set the level required and switch on the output. Output level can be set either in dBm or linear units of μV or mV. A single button press will translate from one to the other.

Wide amplitude range

The TGR1040 provides an amplitude range of -127dBm to $+7\text{dBm}$ ($0.1\mu\text{V}$ to 500mV into 50Ω). Setting resolution is 0.1dBm or $0.01\mu\text{V}$.

Output level steps can be set anywhere between 0.1dBm and 100dBm (or $0.01\mu\text{V}$ to 100mV depending on the entry mode). Stepping the level is useful for quick assessment of circuit linearity and dynamic range for instance.

The all-electronic attenuators provide highly repeatable output levels and are more reliable than mechanically switched systems.

Careful attention to screening requirements has given low output leakage so as not to affect low level measurements in sensitive circuits such as receivers.

FM Modulation

The TGR1040 provides both internal or external FM modulation using either the internally generated 1kHz modulator signal or an external signal in the range 300Hz to 50kHz.

This wide bandwidth allows for audio band demodulator testing as well as LF digital modulation.

Programmability for routine testing

The TGR1040 can store nine full instrument set-ups in non-volatile memory. This allows repetitive testing procedures to be undertaken quickly and accurately.

Full remote control

The TGR1040 provides full remote control facilities for all its functions. An RS-232 interface is provided as standard and a GPIB (IEEE-488.2) interface is available as an option.

Technical Specifications

Specifications apply after 30 minute warm-up, ambient 5°C to 40°C

FREQUENCY

Frequency Range:	10MHz to 1000MHz
Setting Resolution:	1kHz by direct keyboard entry, or in user-set increments of 1kHz to 999.999MHz by rotary control or increment-decrement keys.
Display Resolution:	1kHz
Accuracy:	± 2 ppm over temperature range 5°C to 40°C.
Stability:	<1ppm/year ageing.
Phase Noise:	-110dBc/Hz at 25kHz offset, 500MHz carrier.
Residual FM: (FM Off)	Equivalent peak deviation in a 300Hz to 3.4kHz bandwidth: 8Hz at 100MHz carrier 17Hz at 500MHz carrier 62Hz at 1000MHz carrier

OUTPUT LEVEL

Output Level Range:	-127dBm to +7dBm (0.1µV to 500mV into 50Ω).
Setting Resolution:	0.1dB (or 0.01µV to 1mV) by direct keyboard entry, or in user-set increments of 0.1dB to 100dB (or 0.01µV to 100mV) by rotary control or increment-decrement keys.
Accuracy:	Better than ± 2dBm, except for output levels <-70dBm at 500 -1000 MHz, ± 3dBm.
Harmonics:	Typically <-25dBc, maximum -20dBc, any carrier frequency, output level <0dBm.
Non-Harmonic Spurious:	≤-60dBc at ≥8kHz offset.
Carrier Leakage:	<0.5µV generated into a 50Ω load by a 2 turn 25mm loop, at a distance of 25mm from the generator with the output set to <-10dBm into a 50Ω sealed load.
Output Impedance:	50Ω
Output Connector:	TYPE N
Reverse Protection:	50V DC
Output Switch:	RF OUT on-off switch with LED showing ON status.

FM MODULATION

Peak Deviation:	0.5kHz to 100kHz.
Setting Resolution:	0.5kHz by direct keyboard entry, rotary control or increment-decrement keys.
Modulation Frequency:	Internal 1kHz; External 300Hz to 50kHz
Deviation Accuracy:	<±10% of setting ±0.5kHz, excluding residual FM, for 1kHz modulation, internal or 1Vrms external.
External Modulation Frequency Response:	± 1dB from 300Hz to 50kHz relative to 1kHz.
Distortion:	<2% total harmonic distortion at 1kHz modulating frequency, 100kHz deviation and 500MHz carrier.
Input Impedance:	100kΩ
Input Connector:	BNC

INTERFACES

Full remote control facilities are available through the RS232 (standard) or optional GPIB interfaces.

RS232:	Variable Baud rate, 19200 Baud maximum, 9-pin D-connector. Fully compatible with Thurlby Thandar ARC (Addressable RS232 Chain) system.
IEEE-488:	Conforming with IEEE488-1 and IEEE488-2.

GENERAL

Display:	20 character x 4 row backlit alphanumeric LCD
Data Entry:	Keyboard selection of frequency, amplitude, etc.; value entry direct by numeric keys or by rotary control.
Stored Settings:	Up to 9 complete instrument set-ups may be stored and recalled from battery-backed memory.
Size:	3U (130mm) height; half-rack (212mm) width; 330mm long.
Weight:	4.6 kg. (10 lb)
Power:	230V, 115V or 100V nominal 50/60Hz, adjustable internally; operating range ±14% of nominal; 30VA max. Installation Category II.
Options:	IEEE-488 interface; 19 inch rack mounting kit.

ENVIRONMENTAL & SAFETY

Operating Range:	+5°C to 40°C, 20-80% RH.
Storage Range:	-20°C to + 60°C.
Environmental:	Indoor use at altitudes up to 2000m, Pollution Degree 1.
Safety:	Complies with EN61010-1.
EMC:	Complies with EN55011 and EN50082-1.

Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice.

Designed and built in the U.K. by:



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