



THURLBY THANDAR INSTRUMENTS

TG550



5MHz function generator with sweep

*simultaneous display of frequency & amplitude*

*crystal controlled digital frequency locking*

*seven digit external frequency counter*

# TG550 5MHz function generator with sweep

*digital frequency locking for exceptional accuracy and stability*

## *A state-of-the-art instrument*

The function generator is one of the most versatile pieces of test & measurement instrumentation available.

It can generate a variety of precision waveshapes over a range of frequencies from mHz to MHz. It can provide a wide range of controlled amplitudes from a low-impedance source, and maintain constant amplitude as the frequency is varied.

Voltage control of frequency enables a source of swept frequency to be generated for frequency response testing. AM and FM modulation can also be added.

The TG550 represent the state-of-the-art in 5MHz analogue function generators.

## *Exceptional waveform quality*

The TG550 provides very high waveform quality under all conditions.

That means low sinewave distortion, low aberration triangle waves and fast-edged square waves with low overshoot.

Unlike many competitive products good waveform quality is maintained throughout the frequency range and at low output levels.

## *Variable symmetry for pulse and ramp waveforms*

The TG550 series provides bi-directional variable symmetry from 1:9 to 9:1. Unlike some products, frequency is independent of symmetry setting.

## *Wide range level control*

The TG550 series provides a main output with a maximum emf of 20V pk-pk from a 50Ω or 600Ω source.

An amplitude vernier with a range of 20dB is combined with two switched attenuators of -20dB and -40dB to provide levels down to 2mV pk-pk unterminated.

Variable DC offset of ±10V is available via a center detent control. An auxiliary output provides a fixed 0V to +5V level suitable for driving both TTL and CMOS loads.

## *Wide sweep range*

Each range can be swept by at least 1000:1 either manually, via the external input, or using the built-in sweep generator.



## *Frequency locking for exceptional stability*

The TG550 includes a digital frequency locking system that gives it a level of frequency stability that cannot be matched by conventional analogue function generators.

Once the frequency has been set, pressing the Lock key engages a measure-and-correct circuit which compensates for the small thermal and mechanical drifts that inevitably occur in an analogue generator.

The frequency is compared to a crystal controlled reference and is maintained to within 0.01% of the set frequency.

- 0.005Hz to 5MHz frequency range
- Simultaneous display of frequency & amplitude
- Frequency locking for crystal controlled stability
- Precision internal linear or logarithmic sweep
- External frequency counter with 7 digit resolution
- Very high waveform quality at all frequencies & levels
- 20V pk-pk from 50 Ω or 600 Ω, plus TTL/CMOS output
- 1000:1 frequency change by vernier or sweep voltage
- Internal or external amplitude modulation up to 100%

# simultaneous display of frequency and level

## external frequency counter with seven digit resolution

### Dual digital displays for precision & convenience

The TG550 incorporates a large dual section digital display.

Unlike competitive products the display provides a readout not just of frequency, but of amplitude or offset simultaneously.

### Fast and accurate frequency measurement

Auto-ranging reciprocal measurement gives 4-digit resolution with rapid update right down to Hz levels. Accuracy is within  $\pm 1$  digit ( $\pm 0.02\%$  at full scale).

To maintain a fast update at sub-Hz frequencies, the measurement mode is changed resulting in 3-digit resolution and reduced accuracy.

However, when compared to the normal fixed gate-time meters used in other products the TG550 provides both higher accuracy and faster display update across the whole frequency range.



### RMS or peak to peak amplitude display

The output level display can be selected to show any of three values:

1. The peak to peak amplitude
2. The RMS amplitude
3. The DC offset

RMS values are calculated correctly for each waveform shape



The decimal point and units are changed automatically resulting in a display of the true amplitude regardless of the attenuator setting.

An display indicator warns against illegal combinations of offset and amplitude setting that would create clipping in the output stage.

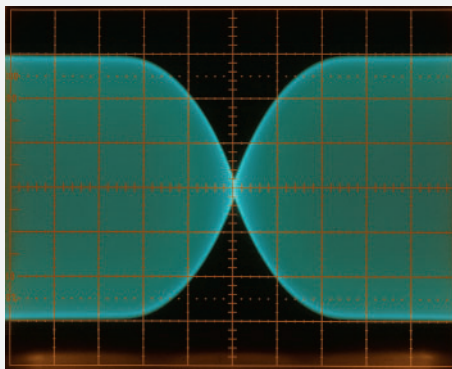
### Advanced internal sweep

The TG550 incorporates a versatile internal sweep generator capable of providing linear or logarithmic frequency sweeps.

Start and stop frequencies can be set with precision using the digital display. Sweep ranges of over 1000:1 are possible.

The sweep rate is adjustable over a wide range with good setability between limits of 20ms and 20s.

A sweep output socket is provided for use with an oscilloscope or an X-Y recorder. Unlike many other sweep generators, the sweep ramp is triangular which gives a superior display when using an oscilloscope to display swept frequencies.

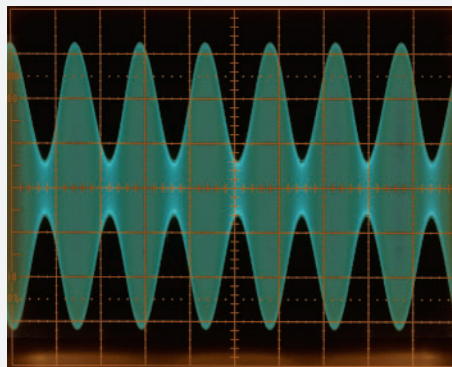


The display of a filter response using an oscilloscope in XY mode and a TG550 in swept frequency mode.

### Amplitude modulation for extra versatility

The TG550 also incorporates comprehensive AM facilities.

The modulation can be external or internal (via a 400Hz internal generator) with modulation levels fully variable between 0% and 100%.



### External counter with seven digit resolution

The TG550 has an external counter mode which utilises the full width of the display to provide up to seven digits of resolution.

The frequency range is from 5Hz up to 20MHz and the input sensitivity is better than 50mV rms.



A measurement period of 0.5 or 5 seconds can be selected. A reciprocal counting measurement system is used which ensures high resolution regardless of input frequency.

Thus, for example, mains frequency can be measured to a resolution of better than 1mHz.

Accuracy is better than 10ppm (0.001%) and an external adjustment point allows for closed case re-calibration.

### Part of an extensive range

TTi offers a wide choice of function generators both analogue and digital, from a simple 2MHz model up to a highly sophisticated 40MHz unit.

Contact TTi or visit the website for details of the full range.

# Technical Specifications

## FREQUENCY

Frequency Range: 0.005Hz to 5MHz in 7 overlapping decade ranges with fine adjustment by verniers.  
Vernier Range: 1000:1 on each range.

## FREQUENCY LOCKING

Operating Range: 0.5Hz to 5MHz with vernier setting within 10% to 100% of range maximum.  
Locking Accuracy: Better than 0.01% of displayed value.

## DISPLAY

LCD, 8 digits (11mm high) plus 14 annunciators

## METER FUNCTIONS (generator mode)

Frequency: Auto-ranging reciprocal measurement giving 4 digit resolution for frequencies down to 1Hz; maximum resolution is 0.001Hz. Accuracy  $\pm 1$  digit 0.2Hz to 5MHz; accuracy  $\pm 1\%$  of range full scale below 0.2Hz  
Amplitude: Display shows peak-to-peak amplitude or rms value. Display corrected for attenuator setting. 3-digit resolution, accuracy typically 5% of range  
DC Offset: 3-digit resolution; accuracy typically  $\pm 2\%$  of setting  $\pm 1$  digit. Display corrected for attenuator setting

## OUTPUTS

### MAIN - 50 Ohm

Amplitude 2mV to 20V peak-peak open circuit (1mV to 10V peak-peak into 50 $\Omega$ ) in four switch-selectable ranges with 20dB vernier control within each range  
Attenuator Ranges: 0dB, -20dB, -40dB, -60dB  
DC Offset Range:  $\pm 10$ V from 50 $\Omega$ . DC offset plus signal peak limited to  $\pm 10$ V ( $\pm 5$ V into 50 $\Omega$ ). DC offset plus waveform attenuated proportionally by the attenuator.

**MAIN - 600 Ohm** Alternative output socket offering the same facilities as the 50 $\Omega$  socket.

**AUX OUT** 0 to 5V TTL/CMOS logic levels capable of driving 2 standard TTL loads. Frequency, symmetry and phase as main outputs

**SWEEP OUT** 3V ramp from 600 $\Omega$

## EXTERNAL COUNTER

Frequency Range: 5Hz to 20MHz, fully autoranging  
Input Sensitivity: 50mV rms (sinewave)  
Input Impedance: 1M $\Omega$ /25pF  
Measurement Time: Selectable 0.5s or 5s  
Resolution: 6 digits in 0.5s; 7 digits in 5s  
Accuracy:  $\pm 1$  digit  $\pm$  timebase accuracy  
Timebase Accuracy:  $\pm 10$ ppm initial error;  $\pm 5$ ppm/year ageing rate; typically less than 0.5ppm/ $^{\circ}$ C. Adjustment point for closed-case recalibration

## OPERATING MODES

Specifications apply for the top decade of each frequency range and maximum output into 50 $\Omega$  termination.

### SINE

Distortion:  $< 0.5\%$  on 500, 5k and 50k ranges;  $< 1\%$  on 5, 50 and 500k ranges; all harmonics  $> 25$ dB below fundamental on 5M range.  
Amplitude Flatness:  $\pm 0.2$ dB to 200kHz;  $\pm 2$ dB to 5MHz.

### TRIANGLE

Linearity: Better than 99% to 200kHz

### SQUARE WAVE

Rise/Fall Times:  $< 45$ ns  
Mark - Space Ratio: 1:1  $\pm 1\%$  to 100kHz

### DC

Range:  $\pm 10$ V unterminated

### SYMMETRY

Symmetry Range: Variable typically 1:9 to 9:1 (on top decade of each range), frequency divided by 10.

## SWEEP MODES

### INTERNAL

Sweep Range:  $> 1000:1$  within each range.  
Sweep Rate: Adjustable, typically 20ms to 20 secs.  
Sweep Mode: Linear or logarithmic. Sweep start and stop frequencies displayed by button press.

### EXTERNAL

Input Impedance: 10k $\Omega$   
Input Sensitivity: 0 to 3V for 1000:1 sweep  
Max. Input Voltage:  $\pm 10$ V  
Sweep Linearity: Better than 1%  
Max. Voltage Rate: 0.1V/ $\mu$ s

## AMPLITUDE MODULATION

Depth: Variable 0 to 100%  
Frequency: 400Hz (internal). DC to 20kHz (external).  
External Sensitivity: Approx. 2V peak-to-peak for 50% modulation.

## GENERAL

### POWER REQUIREMENTS

AC Input: 220 to 240 volts  $\pm 10\%$  or 110 to 120 volts  $\pm 10\%$  50/60Hz, Installation Category II.  
Consumption: 25VA max.

### ENVIRONMENTAL & MECHANICAL

Operating Range:  $+5^{\circ}$ C to  $+40^{\circ}$ C, 20% to 80% RH.  
Storage Range:  $-10^{\circ}$ C to  $+65^{\circ}$ C  
Environmental: Indoor use at  $< 2000$ m, Pollution degree 2  
Safety: Complies with EN601010-1  
EMC: Complies with EN61326  
Size: 260(W) x 88(H) x 235(D)mm, excluding handle and feet.  
Weight: 1.9kg approx.

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

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