



THURLBY THANDAR INSTRUMENTS

SHORTFORM CATALOGUE

Precision Measurement & RF Test Equipment



- Digital Multimeters • Component Meters •
- Current Measurement • Power Source Testing •
- Frequency Measurement • RF Spectrum Analysis •
- RF Signal Generation • Power & EMC Harmonics Analysis •

Product Range

Digital Multimeters - page 1

Bench-top multimeters with from 4¼ to 5½ digit resolution, all with true rms ac and digital control interfaces.

Component Measurement - page 3

Precision LCR bridge, micro-ohm meter.

I-Prober Current Probe - page 4

Innovative probe for applications that include non-contact measurement of currents in PCB tracks.

Power Source Testing - page 5

Electronic DC Load for power supply and battery testing. Proving unit for volt-sticks.

Frequency Measurement - page 6

Bench-top universal counter and handheld frequency meter.

RF and EMC Test Equipment

page 7 onwards

Precision measurement instruments

TTi has been designing and manufacturing precision measurement instruments for nearly thirty years.

Expertise in precision analog design has enabled the company to offer high performance products with advanced features at attractive prices.

TTi offers instruments for the precision measurement of all of the fundamental electronic parameters including voltage, current, resistance, capacitance, inductance, power and frequency.

The new I-Prober open field current probe will enable the measurement of current in situations where it was previously not possible.



Digital Multimeters

Bench-top DMMs versus hand-held

Low cost hand-held DMMs have replaced bench-top DMMs in many applications. Although the performance of these meters may be sufficient for some tasks, it is likely that most engineers will regularly encounter measurement problems that are beyond the capability of a hand-held unit.

An instrument intended for serious use

A TTi bench-top DMM is a substantial instrument. It stays where you put it even with heavy test leads connected. The tilt stand ensures that the large display is always readable. The functions buttons are large and the front panel is clearly marked.

Sensitivity, Resolution and Accuracy

Compare the performance of any TTi bench-top DMM with a good quality 4000 count hand-held DMM of 0.3% basic dcV accuracy.

Longer scale length, greater sensitivity and higher accuracy ensure that measurement uncertainty is a full order of magnitude better.

TTi bench-top DMMs maintain good accuracy on all functions including ac voltage, resistance and current. For most hand-helds, the accuracies for functions other than dc voltage are dramatically poorer.

Wideband ac measurement and true RMS

Most hand-held DMMs have an ac frequency response specified to below 1kHz. All TTi bench-top DMMs provide excellent accuracy on all ranges throughout the audio band (40Hz to 20kHz) with a 3dB bandwidth extending well above this.

Most ac signals are not sinusoidal. However, most hand-held DMMs incorporate a mean sensing ac converter which only gives useful results on sinusoids, those that do have a True RMS converter often have insufficient bandwidth to cope with complex waveshapes. All TTi bench-top DMMs combine True RMS ac with sufficient bandwidth to ensure accurate results.

Digital Multimeters - Comparison Table			
	1604	1705 & 1705-GP	1906 & 1906-GP
Display Type	LED	Dual LCD	LED
Scale Length (Counts)	40,000	12,000	210,000
Dual Measurement	No	Yes	No
DC Voltage: Ranges	(5) 400mV to 1000V	(5) 120mV to 1000V	(5) 200mV to 1000V
Best Resolution	10µV	10µV	1µV
Basic Accuracy	0.08%	0.04%	0.012%
AC Voltage: Ranges	(5) 400mV to 750V	(5) 120mV to 750V	(5) 200mV to 750V
True RMS conversion	Yes	Yes	Yes
Frequency Response	0.08%	0.04%	0.012%
DC/AC Current: Ranges	(3) 4mA to 10A	(3) 1.2mA to 10A	(6) 200µA to 10A
Best Resolution	100nA	100nA	1nA
Resistance: Ranges	(6) 400Ω - 40MΩ	(7) 120Ω - 20MΩ	(6) 200Ω - 20MΩ
Best Resolution	10µΩ	10µΩ	1µΩ
Frequency	Yes	Yes	No
Capacitance	No	Yes	No
Smart Functions	3	12	9
Interfaces: RS-232	Yes *	Yes	Yes
GPIB (IEEE-488)	No	Yes (GP version)	Yes (GP version)
Power Source	AC Line	AC Line or Battery	AC Line

PC and System connectivity

At some point most engineers are going to want to connect their DMM to their personal computer to provide automatic measurement control or importing of data into a computer programme. Unlike a hand-held DMM, all TTi bench-top DMMs include a fully isolated RS-232 interface.

For full system applications, the 1705-GP and 1906-GP also have a GPIB (IEEE-488) interface.

Functions & features of real value

Hand-held DMMs may offer a few "smart" features but these are rarely well enough implemented to be of real use.

TTi bench-top DMMs offer features which are of real use and not just "gimmicks". Features such as dual Measurement & display, precision frequency measurement, dBm, data logging, power and VA, to mention just a few.

* RS232 interface on 1604 is only for use with the optional PC-1604 control and data logging software.

Full technical details for all three multimeters is available on the web site.

Function	Ranges	Best Resolution	Best Accuracy
DC V	(5) 400mV - 1000V	10 μ V	0.08% \pm 4 digits
AC V	(5) 400mV - 750V	100 μ V	0.5% \pm 4 digits
Resistance	(6) 400 Ω - 40M Ω	10 μ Ω	0.1% \pm 4 digits
DC I	(3) 4mA - 10A	0.1 μ A	0.1% \pm 4 digits
AC I	(3) 1mA - 10A	1 μ A	0.1% \pm 4 digits
Frequency	(2) 4kHz to 40kHz	0.1Hz	0.01% \pm 1 digit

Further measurement functions: Continuity, Diode Test.
 Smart functions: Null (Relative), Hold, T-Hold, Min/Max.
 Interface: opto-isolated bi-directional RS-232 interface. 9600 baud.
 Power: 230V or 115V AC nominal 50/60Hz, adjustable internally.
 Size & weight: 260 x 88 x 235 mm (WxHxD). 2.0 kg (4.4 lb)

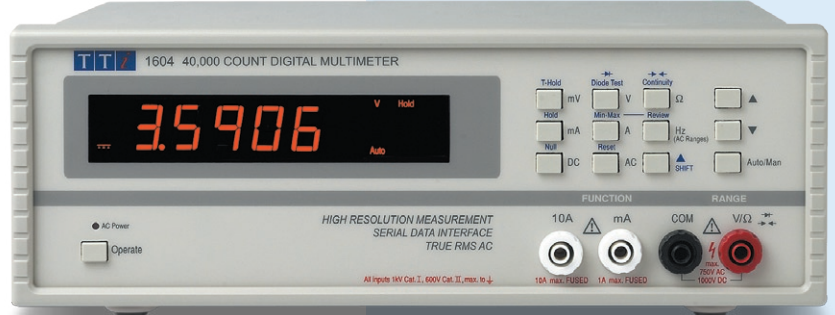
- ▶ 40,000 counts, auto or manual ranging
- ▶ Accuracy and resolution, 0.08%, 10 μ V, 10m Ω
- ▶ Large and bright LED display (14mm/0.56")
- ▶ True RMS ac functions, wide ac bandwidth
- ▶ Relative, T-Hold and Min-Max functions included
- ▶ Optional PC control and logging software

The 1604 is a high quality 40,000 count bench-top multimeter with a wide range of features.

It offers automatic or manual ranging, high resolution (10 μ V, 10m Ω) together with current measurement up to 10A.

1604 DMM

- ▶ 4 $\frac{3}{4}$ digit bench-top multimeter
- ▶ 0.08% basic dc-v accuracy
- ▶ True RMS ac functions
- ▶ Isolated RS-232 interface*



Function	Ranges	Best Resolution	Best Accuracy
DC V	(5) 120mV - 1000V	10 μ V	0.04% \pm 2 digits
AC V	(5) 120mV - 750V	100 μ V	0.2% \pm 20 digits
Resistance	(6) 120 Ω - 20M Ω	10 μ Ω	0.08% \pm 2 digits
DC I	(3) 1mA - 10A	0.1 μ A	0.1% \pm 3 digits
AC I	(3) 1mA - 10A	0.1 μ A	0.3% \pm 20 digits
Capacitance	(5) 10nF to 100nF	10pF	2% \pm 5 digit

Further measurement functions: Continuity, Diode Test, Frequency
 Smart functions: Null (Relative), Hold, T-Hold, Min/Max, dB, Ax+B, % deviation, VA.
 Logger: 100 readings. Interfaces: RS-232 standard. GPIB (IEEE-488) optional.
 Power: 230V or 115V AC 50/60Hz, or 6 x C cells disposable or rechargeable.
 Size & weight: 260 x 88 x 235 mm (WxHxD). 2.0 kg (4.4 lb)

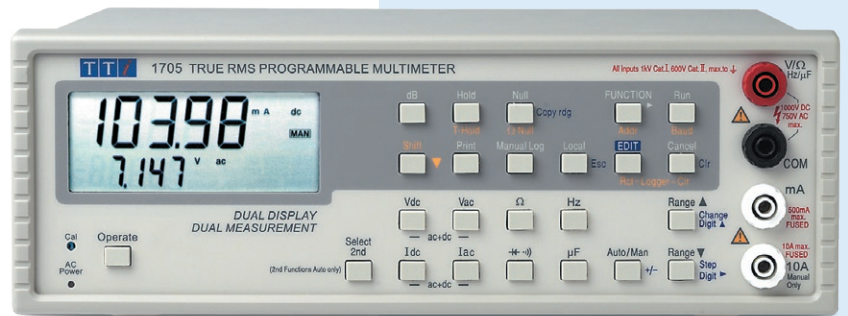
- ▶ Dual 12,000 count LCD, auto/manual ranging
- ▶ Accuracy and resolution: 0.04%, 10 μ V, 10m Ω
- ▶ Dual displays & 'dual measurement' technology
- ▶ True RMS ac functions, Frequency, Capacitance
- ▶ Wide range of computing functions e.g. Ax + B
- ▶ Model with GPIB (IEEE-488) interface available
- ▶ Mains and battery operation as standard

The 1705 is a precision 4 $\frac{1}{4}$ digit bench multimeter incorporating dual displays and dual measurement technology.

The dual displays can be used either to display one measurement in two units (e.g. mV and dB) or to measure two parameters simultaneously (e.g. dc-V and ac-V).

1705 DMM

- ▶ Dual measurement multimeter
- ▶ 0.04% basic dc-v accuracy
- ▶ Built-in data logger
- ▶ Isolated RS-232 or GPIB
- ▶ AC line or battery operation



Function	Ranges	Best Resolution	Best Accuracy
DC V	(6) 210mV - 1000V	1 μ V	0.012% \pm 3 digits
AC V	(6) 400mV - 750V	10 μ V	0.2% \pm 25 digits
Resistance	(6) 400 Ω - 40M Ω	1 μ Ω	0.019% \pm 3 digits
DC I	(3) 4mA - 10A	1nA	0.08% \pm 12 digits
AC I	(3) 1mA - 10A	10nA	0.37% \pm 25 digits

Further measurement functions: Continuity, Diode Test.
 Smart functions: Null (Relative), Hold, T-Hold, Min/Max, Ax + B, % deviation, dB, Digital filtering. Logger: 100 readings, manual or automatic.
 Interfaces: RS-232 standard. GPIB (IEEE-488) optional.
 Power: 230V or 115V AC nominal 50/60Hz, adjustable internally.
 Size & weight: 260 x 88 x 235 mm (WxHxD). 2.2 kg (4.8 lb)

- ▶ 210,000 counts, auto or manual ranging
- ▶ Accuracy and resolution: 0.012%, 1 μ V, 1m Ω
- ▶ Four terminal resistance measurement
- ▶ True RMS ac functions, wide ac bandwidth
- ▶ Wide range of computing functions included
- ▶ Automatic data logging functions include
- ▶ Digital filtering for improved noise rejection
- ▶ Model with GPIB (IEEE-488) interface available

The 1906 is a precision bench-top multimeter offering both high resolution and high accuracy.

The precision is matched by a four terminal ohms measurement.

It's wide range of facilities include many 'smart' calculation functions and a data logger.

1906 DMM

- ▶ 5 $\frac{1}{2}$ digit bench-top multimeter
- ▶ 0.012% basic dc-v accuracy
- ▶ 1 μ V, 1nA, 1m Ω resolution
- ▶ True RMS ac functions
- ▶ Isolated RS-232 or GPIB



LCR400 LCR bridge

- ▶ 0.1% basic accuracy
- ▶ Built-in component fixture
- ▶ Built-in limits comparator
- ▶ RS-232 interface

Note: Full technical details are available on the web site.



- ▶ 0.1% basic measurement accuracy
- ▶ Three test frequencies of 100Hz, 1kHz and 10kHz
- ▶ Automatic component recognition
- ▶ Built-in 4 terminal component fixture
- ▶ Dual 5 digit high brightness displays
- ▶ Limits comparator with multiple pass and fail bins
- ▶ RS-232 interface for PC connectivity
- ▶ Optional SMD tweezers, Kelvin Clip leads, Windows logging software



Note: accessories not to same scale as LCR400



The LCR400 is a high performance LCR meter that offers an alternative to low-cost handheld units or expensive system units.

Dual displays, automatic component recognition and auto-ranging make it easy to use, while its built-in test fixture and limits comparator make it suitable for applications within the laboratory, production or inspection areas.

Range and resolution limits:

Resistance: 0.1mΩ to 990MΩ
Inductance: 0.001μH to 9900H
Capacitance: 0.001pF to 99000μF

BS407 low Ohmmeter

- ▶ 0.1% basic accuracy
- ▶ 1μΩ to 20kΩ range
- ▶ Kelvin clip connection leads
- ▶ Rechargeable battery operation

Note: Full technical details are available on the web site.



- ▶ High basic accuracy of 0.1%
- ▶ Wide measurement range of 1μΩ to 20kΩ
- ▶ Current reversal switch for detecting thermal emf
- ▶ Current diversion switch for easy zero setting
- ▶ Four terminal measurement using Kelvin clip leads
- ▶ Battery operation with built-in charger
- ▶ Switchable 20mV clamp for 'dry circuit' testing

The BS407 is fully optimised for the task of accurate measurement of low resistances with a best resolution of 1μΩ.

It uses a Direct Current technique to measure true resistance, rather than the resistive component of impedance which is shown by AC excited LCR bridges. The test current for each range has been chosen to minimise heating of the sample under test while being sufficient to minimise the effects of thermal emf and noise.

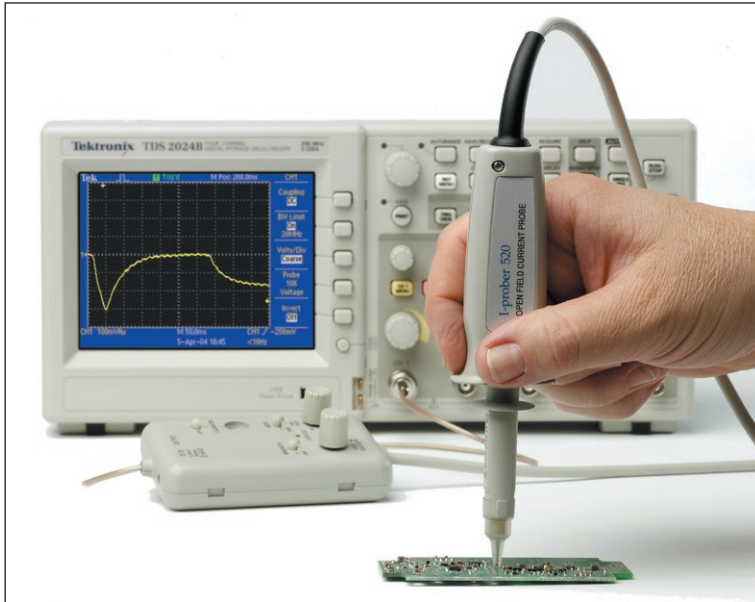
This gives much greater accuracy at low resistances than can be obtained from the very low test currents used by general purpose high resolution multimeters.



New Product

The I-Prober 520 is available mid 2008

for more information on this innovative product, go to the TTI web site: tti-test.com/go/iprober



- ▶ Current measurement from non-contact probing of conductor
- ▶ Wide dynamic range of 5mA to 20A peak to peak
- ▶ Wide bandwidth of DC to 5MHz
- ▶ Low noise equivalent to <math><5\text{mA rms}</math>
- ▶ Designed to meet safety requirements to 600V Cat II
- ▶ Suitable for connection to any oscilloscope
- ▶ High accuracy general purpose H-field probe
- ▶ Convertible into standard 'closed magnetic circuit' current probe

The I-Prober 520 is supplied with a clip-on toroid assembly which converts it into a closed magnetic circuit probe for measuring current in a wire.

The toroid is open until the probe is attached, allowing insertion of the wire without disconnection.

The wide bandwidth, dynamic range and low noise of the probe are retained.



I-Prober 520

- ▶ Current measurement by simple non-contact probing of PCB track
- ▶ DC to 5MHz bandwidth
- ▶ 5mA to 20A dynamic range
- ▶ Low noise figure



The I-Prober 520 open field current probe is unlike any other current measurement device available.

Calibrated measurement of current normally requires the current to be passed through a closed magnetic loop. Typically this is done using some form of split clamp device. Whereas this is suitable for individual wires, it is of no use for measuring current in PCB tracks.

The I-Prober 520 is a compact hand-held probe which is used with an oscilloscope. By placing the insulated tip of the probe onto a PCB track, the current flowing in the track can be observed and measured.

LD300 dc load

- ▶ 300 watt dc electronic load
- ▶ Up to 80 volts or 80 amps
- ▶ CI, CR, CV and CP modes
- ▶ Built-in transient generator

Note: Full technical details are available on the web site.



- ▶ Versatile solution for testing dc power sources
- ▶ Constant current, constant resistance, constant conductance, constant voltage and constant power modes
- ▶ Wide voltage and current range, 0 to 80 volts and 0 to 80 amps.
- ▶ 300 watts continuous dissipation at 40°C
- ▶ Low minimum operating voltage of <1V at 40A
- ▶ Ten turn controls for level setting
- ▶ Built-in transient generator with variable slew
- ▶ Current monitor output for waveform viewing
- ▶ Variable drop-out voltage for battery testing
- ▶ Analog remote control capability

The LD300 is an inexpensive electronic load which is suitable for testing and characterising a wide variety of dc power sources.

It can be used to investigate the behaviour of many different types of power source such as batteries, solar cells, fuel cells or wind generators, as well as electronic power supply units.

Its wide voltage/current range, multiple operating modes and built-in transient generator give it the versatility to offer test solutions from the design laboratory through to the component test area.

P240 proving unit

- ▶ Essential equipment for safety compliance
- ▶ Long-life battery operation
- ▶ Belt-clip mountable



The P240 is a hand-held battery powered proving unit that provides a nominal 240V dc, 2mA source intended for proving the integrity of neon type test voltage indicators.

For safety compliance, voltage indicators should be checked for correct operation from this known voltage source before and after every use.

Testing is performed by inserting the test probes of the neon tester into two recessed "touch proof" terminals on the proving unit. Insertion of the probes automatically turns the proving unit on thus eliminating the need for an on-off switch.

- ▶ 5Hz to 1300MHz frequency range
- ▶ 0.001mHz max. frequency resolution
- ▶ High sensitivity across the whole frequency range
- ▶ Frequency, period, pulse width, frequency ratio & event counter modes
- ▶ Reciprocal counting for higher accuracy & resolution
- ▶ AC or battery operation, 200 hours battery life
- ▶ Optional RS-232 interface for remote operation & read-back

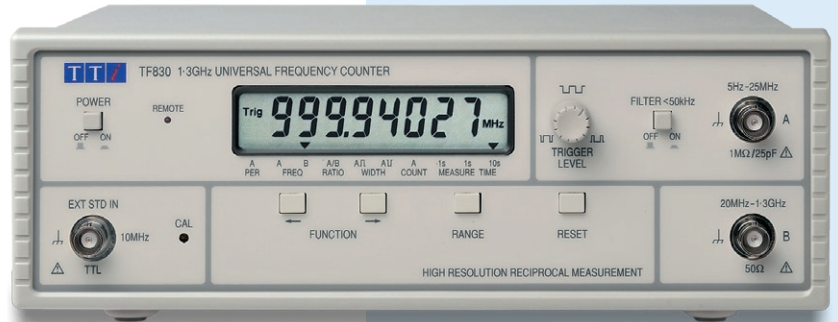
The TF830 is a high quality bench/portable universal frequency counter which offers period measurement, frequency ratio, pulse width and event counting. Pulse width measurements can be made from rising to falling or falling to rising edge.

It uses the reciprocal frequency counting technique to achieve high resolution at all frequencies. Reciprocal counting involves synchronized multiple period measurements followed by computation of the reciprocal value.

This results in high resolution measurements regardless of the signal frequency and eliminates the +/-1 input cycle errors of a conventional frequency counter.

The system yields at least 7 digits of resolution per second of measurement time and can measure low frequencies to a resolution of 0.001mHz.

Note: Full technical details are available on the web site.



TF830

- ▶ 5Hz to 1300MHz range
- ▶ Frequency, period, pulse width, ratio and event counter modes
- ▶ Battery and AC line operation
- ▶ RS-232 interfaced version

The TF830-RS232 includes an addressable RS-232 interface that can be used for full remote control and readback.

- ▶ 5Hz to 1300MHz frequency range
- ▶ Frequency and period measurement
- ▶ High sensitivity at all frequencies
- ▶ Switchable low pass filter
- ▶ Reciprocal counting technique gives superior accuracy
- ▶ 0.001mHz low frequency resolution
- ▶ Push-to-measure function with auto power-down
- ▶ Large 8 digit display with full range of annunciators

The PFM1300 is a handheld frequency counter with a wide range of features.

It can measure both frequency and period and uses a reciprocal frequency counting technique which involves multiple period measurements followed by computation of the reciprocal.

The system yields at least 7 digits of resolution per second of measurement time and can measure low frequencies to a resolution of 0.001mHz.

Despite its wide frequency range the PFM1300 has a low power consumption enabling it to operate for many hours from a PP3 size battery.

A push-to-measure capability gives a virtually instantaneous reading followed by an automatic power down after 15 seconds.

This provides greatly extended battery life where continuous monitoring of the signal is not required.

Note: Full technical details are available on the web site.

See also

PFM3000 3GHz frequency counter

available from mid 2008
see page 24

PFM1300

- ▶ 5Hz to 1300MHz range
- ▶ Frequency & period measurement
- ▶ Handheld format
- ▶ Long battery life



Product Range

Spectrum Analyzers - page 8

PSA-T series low-cost handheld spectrum analyzers, 1.3GHz and 2.7GHz.

Signal Generators - page 9

Synthesised RF signal sources offering exceptional value for money, 1GHz and 2GHz.

Harmonics & Flicker Measurement - page 10

Compliance quality power and harmonics analyzer and source for measurements to EN61000-3-2 and EN61000-3-3.

Frequency Measurement - page 7

See also Precision Measurement section (page 6).

RF and EMC Test Equipment

RF Test

The rapid growth in the use of wireless communications and the inclusion of RF elements into many electronic designs has increased the need for RF test equipment.

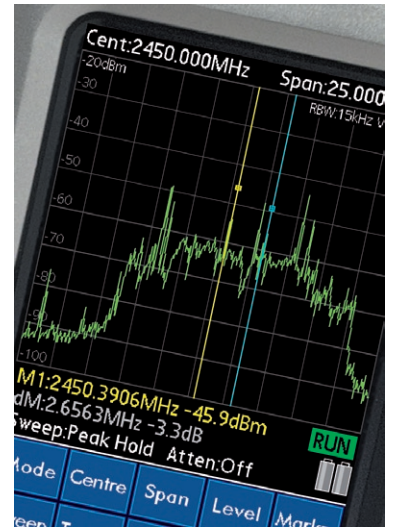
The high cost of products from the major producers in this area has led TTI to develop lower cost alternatives for the essential RF tools such as signal generators and spectrum analyzers.

RF products from TTI are designed to offer the essential elements required by engineers at significantly lower costs.

EMC Test

Most countries have now implemented legislation requiring products to comply with standards for radiated and conducted emissions.

TTI has produced equipment capable of compliance quality measurements, enabling users to self-certify for current harmonics and flicker.



PFM3000 counter

- ▶ 5Hz to 3GHz frequency range
- ▶ Frequency or period display
- ▶ Continuous reciprocal measurement
- ▶ Handheld format
- ▶ Long battery life



New Product

The PFM3000 is available mid 2008

for other frequency counter products
see Precision Measurement section - page 23

The PFM3000 is the latest handheld frequency counter from TTI offering measurement up to 3GHz.

It provides high impedance measurement up to 100MHz and 50Ω measurement up to 3000MHz, with excellent sensitivity across all frequencies.

It can measure both frequency and period and uses a continuous reciprocal frequency counting technique which gives high resolution and accuracy at all frequencies.

Despite its wide frequency range the PFM3000 has a low power consumption enabling it to operate for many hours from a disposable battery.

A push-to-measure capability is provided to extend battery life when continuous signal monitoring is not required.

- ▶ 5Hz to 3000MHz frequency range
- ▶ Frequency and period measurement
- ▶ High sensitivity at all frequencies
- ▶ Switchable low pass filter
- ▶ Continuous reciprocal counting measurement
- ▶ 0.001mHz low frequency resolution
- ▶ Push-to-measure function with auto power-down
- ▶ Large 8 digit display with full range of annunciators

Model	Frequency Range
PSA1301T	150 kHz to 1300 MHz
PSA2701T	1 MHz to 2700 MHz
Size and weight: 170mm high x 97mm wide x 47mm deep 495 grams total	

The PSA1301T and PSA2701T are low-cost, highly portable RF spectrum analyzers.

They incorporate the features most needed in a portable spectrum analyzer, together with many additional functions provided within the handheld computer.

- ▶ 150kHz to 1300MHz frequency range (PSA1301T)
- ▶ 1MHz to 2700MHz frequency range (PSA2701T)
- ▶ Resolution bandwidths of 280kHz or 15kHz (PSA1301T)
- ▶ 1MHz, 280kHz or 15kHz (PSA2701T)
- ▶ High resolution (480 x 320 pixel) TFT colour screen
- ▶ -96dBm typical noise floor at -20dBm reference level
- ▶ Measurement in dBm or dB μ V
- ▶ Fully adjustable centre frequency and span in 1kHz steps
- ▶ Choice of centre/span or start/stop setting
- ▶ Zero span mode with AM and FM audio demodulation
- ▶ Sweep modes of normal, single, peak hold and average
- ▶ Reference waveforms displayed in contrasting colour
- ▶ Twin markers with readout of absolute & difference values
- ▶ Smart marker movement with selectable peak tracking
- ▶ Amplitude limit lines with editor and store/recall
- ▶ Unlimited storage for waveforms, set-ups and screens
- ▶ Data transfer to PC for analysis, documentation & printing
- ▶ More than 4 hours continuous operation from a charge
- ▶ Smaller and lighter than any other spectrum analyzer (weight less than 0.5kg)

plus:

- ▶ Handheld computer based facilities including word processing, spreadsheets, appointments, picture/video viewing, MP3, Web and Email via Bluetooth and WiFi
- ▶ Large range of third party programs available including many for engineering, science and mathematics



PSA-T series

- ▶ True handheld spectrum analyzers
- ▶ 1.3 GHz and 2.7 GHz models
- ▶ Half VGA colour screen
- ▶ Built-in handheld computer



to see a full product
information tour:
www.tti-test.com/psa

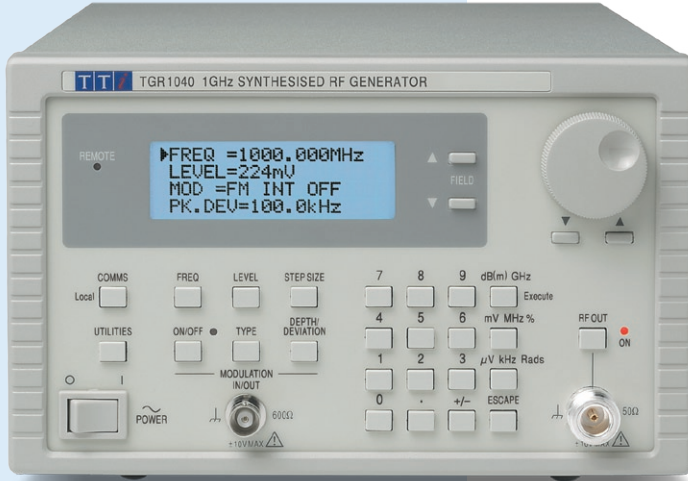
The small size, low weight and long battery life of the PSA-T Series make it the ideal tool for RF field measurements.

However, its surprisingly low cost provides every engineer with the potential to own a spectrum analyzer, whether they work in the RF field or not. The PSA-T Series will find applications within development, servicing and production as well as field use.

TGR1040

- ▶ 1 GHz signal generator
- ▶ -127dBm to +7dBm
- ▶ RS-232, optional GPIB
- ▶ Low cost

Note: Full technical details are available on the web site.



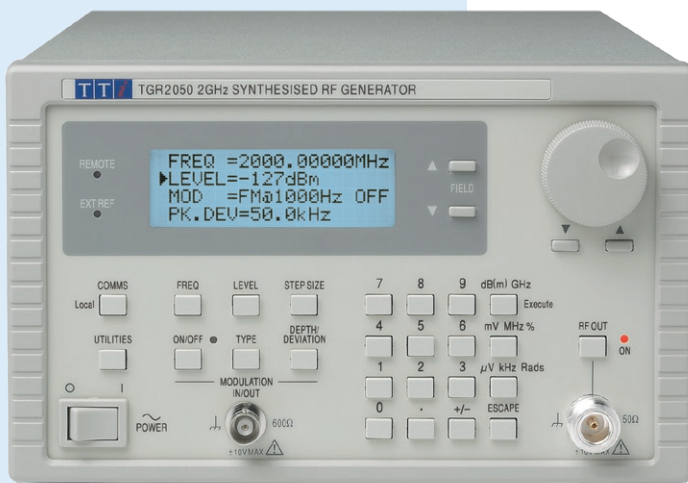
- ▶ 10MHz to 1000MHz frequency range
- ▶ Accuracy better than 1ppm over 15°C to 30°C
- ▶ Ageing better than 1 ppm over one year
- ▶ Low phase noise and low leakage
- ▶ -127dBm to +7dBm amplitude, 0.1dB steps
- ▶ Amplitude entry in dBm or μ V / mV
- ▶ FM modulation, internal or external
- ▶ Four line back-lit dot matrix LCD display
- ▶ Keyboard and rotary encoder control
- ▶ Non-volatile storage for 9 generator set-ups
- ▶ Full remote control through RS232 or optional GPIB
- ▶ Significantly lower cost than other synthesized RF generators

The TGR1040 is the low cost solution for RF engineers who require a basic RF generator of high stability and wide amplitude range. It has good phase noise and low leakage and offers FM modulation, internal or external.

TGR2050

- ▶ 2 GHz signal generator
- ▶ -127dBm to +7dBm
- ▶ AM, FM & phase modulation
- ▶ RS-232 and GPIB standard

Note: Full technical details are available on the web site.



- ▶ 150kHz to 2000MHz frequency range
- ▶ 10Hz frequency setability
- ▶ Locking to external frequency standard
- ▶ Accuracy better than 1ppm over 15°C to 30°C
- ▶ Ageing better than 1 ppm over one year
- ▶ Low phase noise and low leakage
- ▶ -127dBm to +7dBm amplitude, 0.1dB steps
- ▶ Amplitude entry in dBm or μ V / mV
- ▶ FM, Phase and AM modulation, internal or external
- ▶ Keyboard and rotary encoder control
- ▶ Non-volatile storage for 9 generator set-ups
- ▶ Full remote control through RS232 and GPIB
- ▶ Exceptional price/performance ratio

The TGR2050 offers a wide frequency range with a setability of 10Hz. It has 1ppm internal stability and can be locked to an external standard.

Modulation facilities of FM, Phase and AM are included.

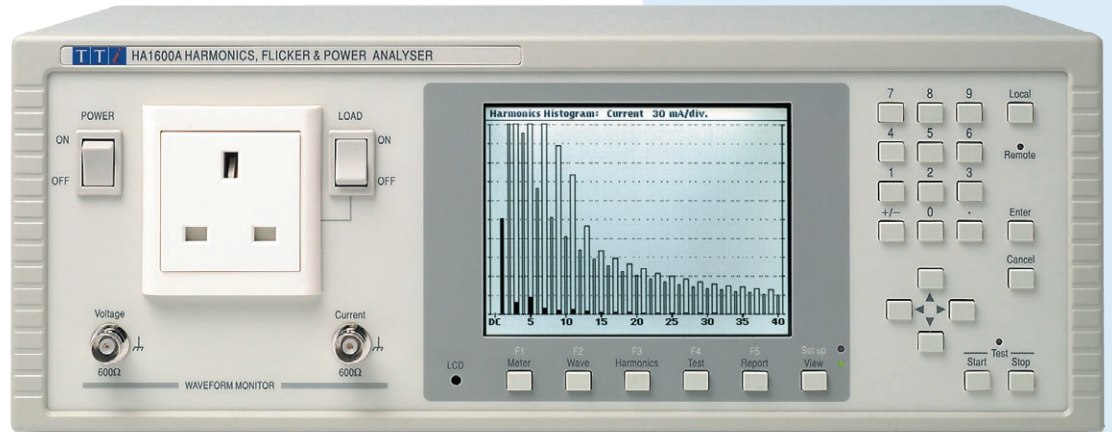
Remote control via RS232 and GPIB is included.

HA1600A

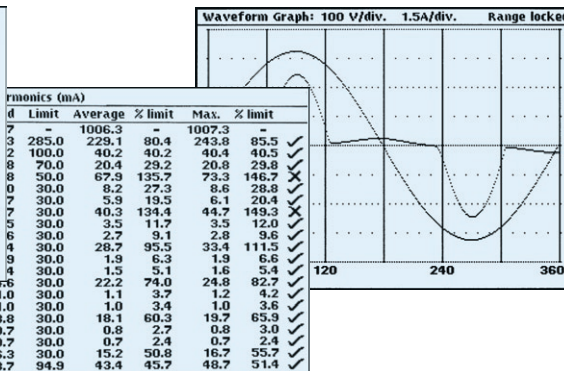
- ▶ Compliance quality current harmonics measurements to EN61000-3-2 when using compliant source (such as AC1000A)
- ▶ Tabular and histogram display of harmonics
- ▶ Continuous analysis with real-time graphical update
- ▶ Compliance quality fluctuations and flicker measurements to EN61000-3-3
- ▶ Full power analyzer measuring Watts, VA, Vrms, Vpk, Arms, Apk, A-inrush, CF, THD, PF, Hz
- ▶ Real-time voltage and current waveform displays
- ▶ Wide range of national power connectors available
- ▶ Parallel printer port plus RS232 and USB interfaces
- ▶ Windows PC control and documentation software supplied

- ▶ Compliance measurements to EN61000-3-2 & EN61000-3-3
- ▶ Tabular and histogram display of harmonics
- ▶ Continuous analysis with real-time graphical update
- ▶ Full power analyzer features
- ▶ PC software supplied

Note: Full technical details are available on the web site.



Power Meter			Hold
Supply Voltage			
229.8 V _{rms}	0.1% THD	Frequency 50.04 Hz	
325.1 V _{pk}	at 89.4°	Crest Factor 1.414	
Load Power			
47.64 w	64.03 VA	Power Factor 0.744	
Load Current			
278.6 mA _{rms}	49.9% THD	90.7% under Class D mask	
586.0 mA _{pk}	Phase 12.5°	Crest Factor 2.103	
Harmonic Summary			
Load detected Class A by waveform.			
Load passes Harmonic levels.			
Supply meets IEC requirements.			



The HA1600A is a fast, easy to use power and harmonics analyzer with a large and high resolution graphical display, capable of continuous real-time analysis.

The HA1600A is intended primarily as a dedicated harmonics and flicker analyzer for compliance quality measurements, but it can also be used as a general purpose power analyzer.

The unit is available with range of power connectors to suit different national standards.

A printer interface is included along with RS-232 and USB interfaces for PC connectivity.

It is suitable for both the product development environment, and for production line test verification.

AC1000A

- ▶ 1 kW low-distortion source
- ▶ Suitable for EN61000-3-2

Note: Full technical details are available on the web site.

The AC1000A is an innovative, low cost, pure power source designed specifically for use with a harmonics analyser such as the TTI HA1600A.

It permits compliance quality measurements to EN61000-3-2 in situations where the quality of the AC supply is poor or variable.

The AC1000A has a power rating of 1000 watts at 230 volts. Maximum continuous rms current is 4.4A with a peak current capability of 10A.





Measurably better value

Other TTI product groups

In addition to precision measurement, RF and EMC test equipment, TTI also manufactures a wide range of test and measurement instruments including laboratory power supplies and waveform generators.

Please visit the web site for full information.

Where to buy TTI products

TTi products are widely available from a network of distributors and agents in more than fifty countries across the world.

To find your local distributor, please visit our web site which provides full contact details.

tti-test.com

tti.eu

Thurlby Thandar Instruments Limited

Glebe Road, Huntingdon, Cambridgeshire
PE29 7DR England (United Kingdom)

Contact for international customers:

Web: www.tti-test.com
Telephone: +44 (0)1480 412451
Faximile: +44 (0)1480 450409
Email: sales@tti-test.com

Contact for UK customers:

Web: www.tti.co.uk
Telephone: 01480 412451
Faximile: 01480 450409
Email: sales@tti.co.uk

Designed and built in Europe

About this Short Form Catalogue

Products included

This Precision Measurement & RF Test Equipment catalogue is an extract from the main TTI short form catalogue which covers all TTI product groups and can be downloaded from the web site.

New product introductions and changes

TTi regularly introduces new products and some may have been added since this catalogue was printed. For the latest information please visit our web site.

Products are subject to continuous development and changes to some detailed specifications or to cosmetic appearance may have taken place since the catalogue was printed.

Detailed product information

This catalogue contains only limited product information.

Fully detailed information for each product is available from the web site. Alternatively contact TTI or the local distributor in your country to request detailed information.

Product illustrations

The illustrations within this catalogue are representative of the products at the time of printing. The main illustration for each product is at approximately 42% (linear) of actual size in order to enable size comparisons.

Further illustrations within the product description area are at a variable scaling to fit the available space.

About TTI

Excellence through experience

Thurlby Thandar Instruments is one of Europe's leading manufacturers of test and measurement instruments.

The company has wide experience in the design and manufacture of advanced test instruments and power supplies built up over nearly thirty years

TTi is based in the United Kingdom, and all products are built at the company's facility in Huntingdon, close to the famous university city of Cambridge.

Traceable quality systems



TTi is an ISO9001 registered company operating fully traceable quality systems for all processes from design through to final calibration.
BS EN ISO9001:2000
Certificate number FM 20695

THURLBY THANDAR INSTRUMENTS