Measurably better value

DESIGNED IN THE UK · MANUFACTURED IN THE UK ·

Sine frequency up to 240MHz with 1µHz resolution

Up to 100MHz high resolution pulse generator

Arbitrary waveforms up to 16bits at 800MSa/s

Wideband noise generator

TGF4000 SERIES

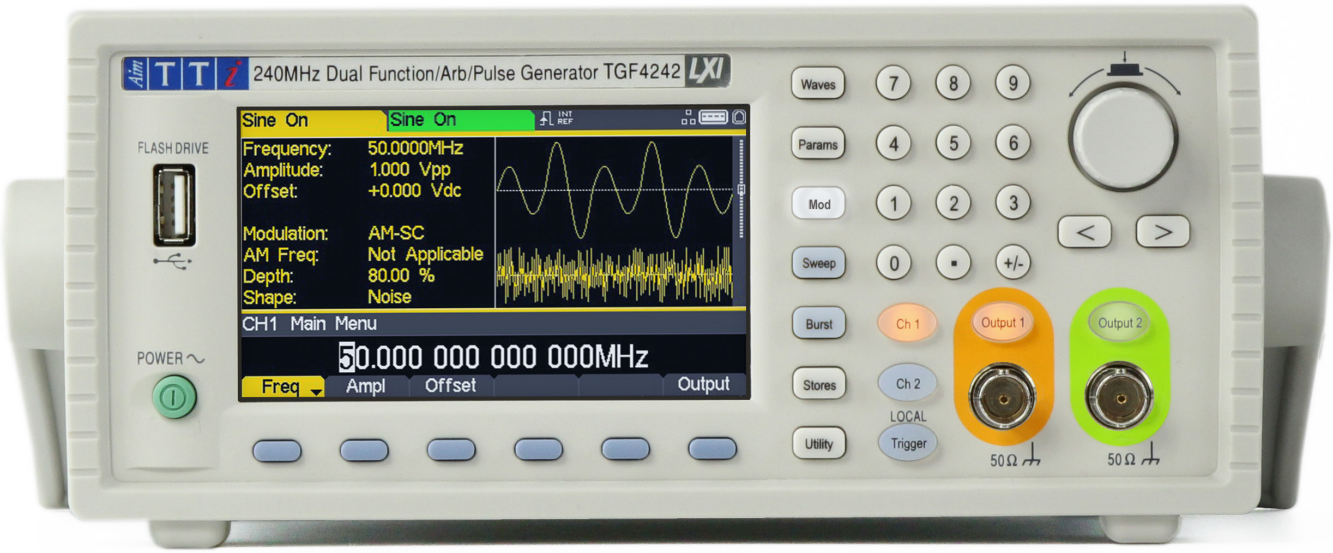
40MHz, 80MHz, 160MHz & 240MHz

Dual Channel Arbitrary Function Generators

aimtti.com | aimtti.us

EXTENSIVE FEATURES

- Sine frequency up to 240MHz high sine purity, THD <0.05%
- Full 10Vpp amplitude into 50Ω for sine waves up to 80MHz
- Arbitrary waveforms of 16 bits at up to 800MSa/s
- Class-leading modulation set including SUM* modulation
- Harmonics generation using up to 16 harmonics*
- Two identical channels with phase control, coupling and tracking
- Up to 100MHz high resolution pulse generator
- PRBS serial patterns with eight selectable sequence lengths*
- 125MHz frequency counter/timer with five measurement modes
- Wide bandwidth noise source



GPIB IEEE-488 USB UNIVERSAL SERIAL BUS LAN ETHERNET LXI

The TGF4000 series is the latest function/arbitrary generator series from Aim-TTi offering class-leading performance and unrivalled value for money.

A frequency capability of up to 240MHz is combined with two identical full performance channels that can operate as independent generators or in coupled or tracking modes. Precise channel to channel phase control with a resolution of 0.001° is provided.

A wide range of built-in waveforms is included and custom arbitrary waveforms can be used at sample speeds up to 800MSa/s and replay rates up to 80MHz. PC based arbitrary waveform generation and editing software is provided.

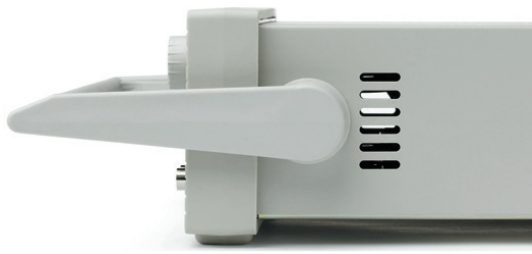
High resolution, low jitter pulses can be generated up to 100MHz as can wide bandwidth white noise.

An extensive array of modulations is provided using internal and external sources. Gated, burst and sweep modes can use internal or external trigger sources.

Remote control via USB and LXI compliant LAN (standard) can be supplemented by optional GPIB if required.

FEATURES SUMMARY

- 0.001mHz to 240MHz (TGF4242), 160MHz (TGF4162) , 80MHz (TGF4082) or 40MHz (TGF4042) sine frequency range
- High sine wave purity with low phase noise and jitter, audio band THD down to 0.05%
- Square waves up to 100MHz with variable duty cycle, edge speeds down to 3ns
- Resolution of up to 15 digits or 1µHz, high stability TCXO timebase
- Two identical channels - independent or linked with coupled and tracking modes
- Inter-channel phase offset of -360° to +360° with 0.001° resolution
- 1mHz to up to 100MHz Pulse generation with 100ps width resolution, <30ps jitter, and independently variable rise/fall times
- Wideband noise generator with up to 100MHz noise bandwidth
- PRBS pseudo-random bit sequence generation with 8 sequence lengths *
- Harmonics generation using up to 16 harmonics *
- Wide range of standard and arbitrary waveforms built-in
- Arbitrary waveforms of 14-bits / 400MSa/s (TGF4042 & TGF4082) or 16-bits / 800MSa/s (TGF4162 & TGF4242)
- Waveform Manager Plus for Windows, editing software included
- Front USB host socket for waveform storage and file transfers using Flash drives
- Comprehensive internal/external digital and analog modulation set including Sum* modulation
- Modulation frequencies up to 10MHz internal and 5MHz external
- Gate and Burst modes with internal and external triggering
- Bi-directional linear and logarithmic sweep using internal or external triggering
- 125MHz frequency counter/timer with five measurement modes
- Programmable via USB and LAN (LXI) interfaces; GPIB optional



Features marked * are only available on the TGF4162 & TGF4242

EXCEPTIONAL PERFORMANCE

MODEL COMPARISON	TGF4042	TGF4082	TGF4162	TGF4242
No. of channels	2	2	2	2
Max frequency (sine)	40MHz	80MHz	160MHz	240MHz
Max frequency (square/ pulse)	25MHz		100MHz	
Vertical bits / Sample rate	14 bits / 400Msa/s		16 bits / 800Msa/s	
Noise bandwidth	62.5MHz		100MHz	

HIGHER FREQUENCIES

The TGF4000 Series out-performs other generators in its price range by offering high purity sine waves up to 240MHz and square waves up to 100MHz, with low harmonic distortion and low phase noise, audio band THD is significantly better than similar generators at just 0.05%.

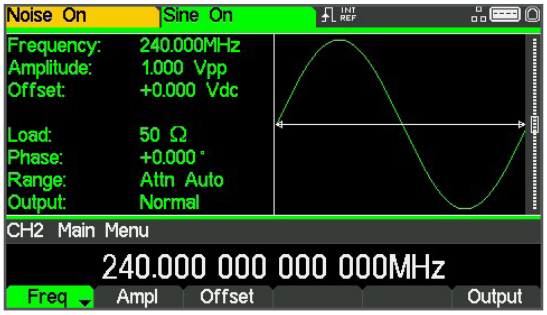
EXCEPTIONAL FREQUENCY PRECISION

The frequency of these waveforms can be set with up to 15 digits or one micro hertz of resolution.

The DDS based frequency generation system uses a high stability TCXO timebase oscillator.

HIGH FREQUENCY AND RESOLUTION PULSE

The pulse generator function offers an exceptionally high pulse width resolution of 100ps over a period range from 10ns to 1000s. The pulse edge speed is independently variable from 3ns to 800s. Pulse jitter is dramatically lower than any comparable generator at only 30ps.



PRBS GENERATOR *

PRBS (Pseudo-Random Bit Sequence) is a binary waveform type that is widely used within secure communications systems. PRBS is offered with a choice of 8 sequence lengths at rates between 1mbps and 100Mbps.

PRBS can be used as both a carrier waveform and a modulation.

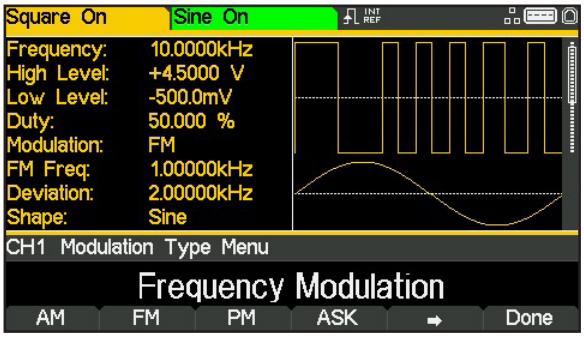
HARMONICS GENERATOR *

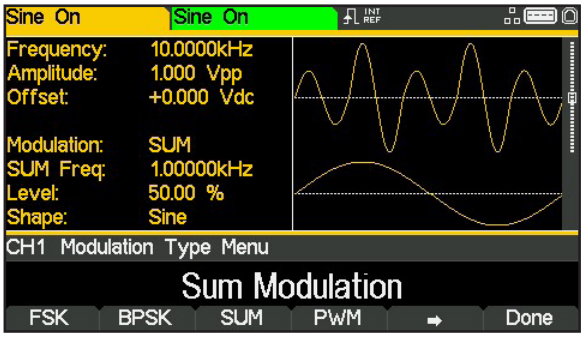
The harmonics generator function built into the TGF4000 series enables waveforms to be created by the addition of sine wave harmonics.

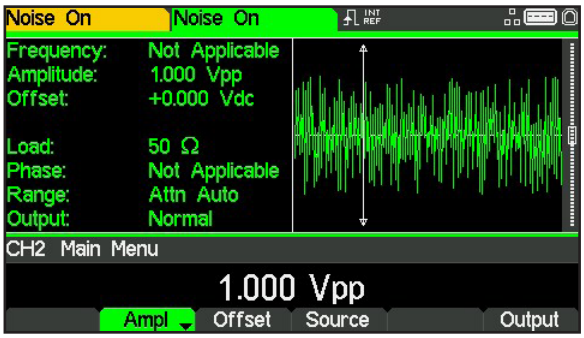
Up to 16 harmonics can be used, chosen from up to the 50th order. The amplitude and phase can be individually set for each harmonic.

FREQUENCY COUNTER/TIMER

The frequency counter function allows external signals to be measured in terms of frequency, period, pulse width or duty cycle. The frequency range is 0.1Hz to 125MHz with a measurement resolution of up to seven digits. Both generator channels remain operational when the counter is in use.







EXTENSIVE DIGITAL & ANALOG MODULATIONS

A large set of modulation types are built-in including AM, FM, PM, FSK, ASK, BPSK, PWM and SUM.

All standard and arbitrary waveforms can be modulated as the carrier, although Noise, Pulse and PRBS are limited to AM, ASK and SUM modulations plus PWM for Pulse.

INTERNAL DIGITAL MODULATIONS

AM, FM, PM, PWM and SUM modulations can use an internal modulation source based upon any standard or arbitrary waveform type or Noise. A very wide modulation frequency range of 1µHz to 10MHz can be used.

FSK, ASK, and BPSK use a square wave modulation signal adjustable between 2mHz and 10MHz.

EXTERNAL ANALOG MODULATION AND TRIGGERING

All modulation types can use an external modulation signal, either analog (AM, FM, PM, PWM and SUM) or digital triggering (FSK, ASK, and BPSK).

The analog modulation input bandwidth is DC to 5MHz.

SUM MODULATION *

SUM modulation, not offered by most other products, enables the modulation waveform to be added to the carrier at any percentage.

All waveform types including Pulse and PRBS can be SUM modulated. This is particularly useful using Noise as the modulator to test circuit resilience with noisy signals.

WIDEBAND NOISE GENERATOR

The Noise function provides wideband gaussian noise at bandwidths up to 100MHz and crest factor of more than five. Noise can be used both as a carrier waveform and as a modulating waveform for AM, FM, PM, PWM and SUM modulation types. As a carrier it can be AM, ASK or SUM modulated.

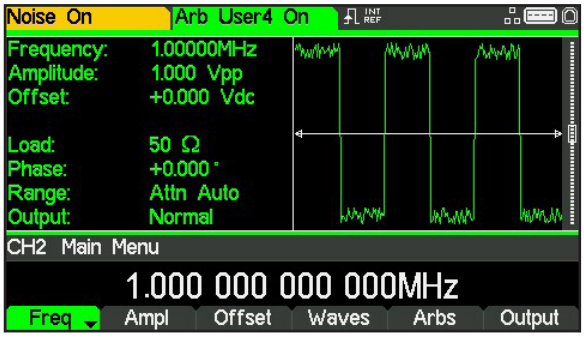
BUILT-IN WAVEFORMS

A large number of standard and pre-built arbitrary waveforms are built into the generator. These include triangles, ramps, sinc, logarithmics, exponentials, gaussians and cardiac (among others).

High sampling rate allows higher repetition rates than other generators.

CUSTOM ARBITRARY WAVEFORMS

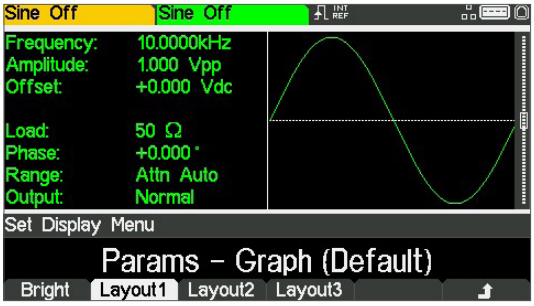
Custom arbitrary waveforms of 16 bit vertical resolution and up to 8192 points can be defined and replayed at sampling rates up to 800MS/s and repetition rates up to 80MHz.

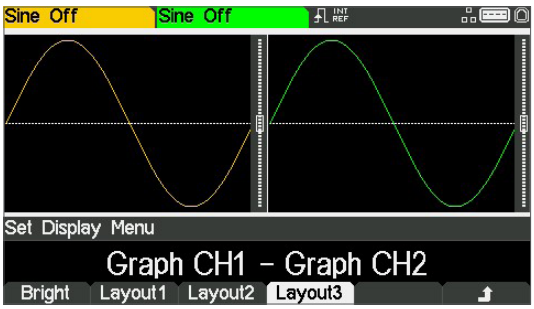


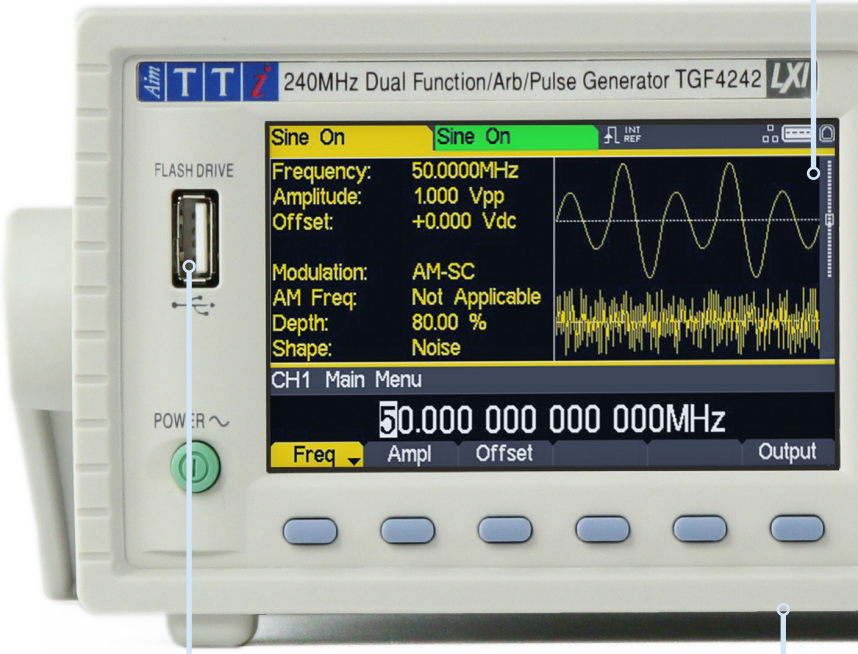
EFFICIENT WORKING

GRAPHIC USER INTERFACE (GUI)

The TGF4000 series is equipped with a 4.3 inch high resolution colour screen, providing added efficiency and clarity when carrying out complex testing. The graphic display demonstrates a quick visual insight into the waveform through the specifically colour coded graph, ensuring accurate and reliable results. Graphs for both channels can be displayed side by side for easy comparison or alongside a detailed description of the settings selected. Each channel has a unique set colour to provide instant recognition of the output channel selected when altering and updating settings or preferences.







FLASH DRIVE

A front mounted USB host socket enables the use of flash memory disk drives which can store up to 1,000 waveforms and 1,000 setups.

UNLIMITED WAVEFORM STORAGE

Flash drives can be used both to store waveforms permanently and to transfer waveforms from or to a PC.

The TGF4000 series is capable of storing up to four arbitrary waveforms internally, each flash drive can store up to 1000 waveforms which can be accessed using the instruments file handling facilities.

STORAGE OF INSTRUMENT SET-UPS

Up to nine complete set-ups of the instrument can be stored within its own non-volatile memory. Up to 1000 further set-ups can be stored on each flash drive.

TWO CHANNEL OPERATION

The two channels are identical with no performance limitations giving maximum flexibility and value for money.

▶ INDEPENDENT CHANNEL OPERATION

The two channels can be operated completely independently as if they were two separate generators. (Note that external trigger and external modulation inputs are shared).

▶ RELATIVE PHASE

The relative phase can be set from-360 degrees to +360 degrees with 0.001° resolution. Pressing the 'align' key phase synchronises the two channels with the specified phase offset.

▶ COUPLED OPERATION

The frequencies of the two channels can be coupled such that changes on one are applied to the other.

Amplitudes (and DC offsets) of the two channels can be coupled such that changes are applied to both simultaneously.

Outputs can be coupled such that the output on/off switches both channels simultaneously.

▶ TRACKING OPERATION

When in tracking mode both channels behave as one channel. If inverse tracking is selected, both channel still behave as one channel except that the output of channel 2 is inverted.

▶ SYNC OUTPUT

Channel 2 can be configured to be a Sync output for channel 1.

GATE, BURST & SWEEP

Comprehensive facilities for gating, burst triggering and frequency sweeping of signals are provided.

▶ TRIGGER SIGNAL

The trigger signal can be manual from the front panel key, internal from the internal trigger generator, external from the trigger-in socket, or remote via a bus command. It can be used for gating, triggered burst or triggered sweep. The internal trigger generator is adjustable between 2mHz and up to 50MHz.

▶ TRIGGERED BURST

In Burst mode, each active edge of the trigger will produce one burst of the waveform. The number of cycles in a burst can be set between 1 and 2,147,483,647 (or infinite). The burst start/end phase angle is settable between-360.0° to +360.0° to 0.001° resolution.

▶ SWEEP

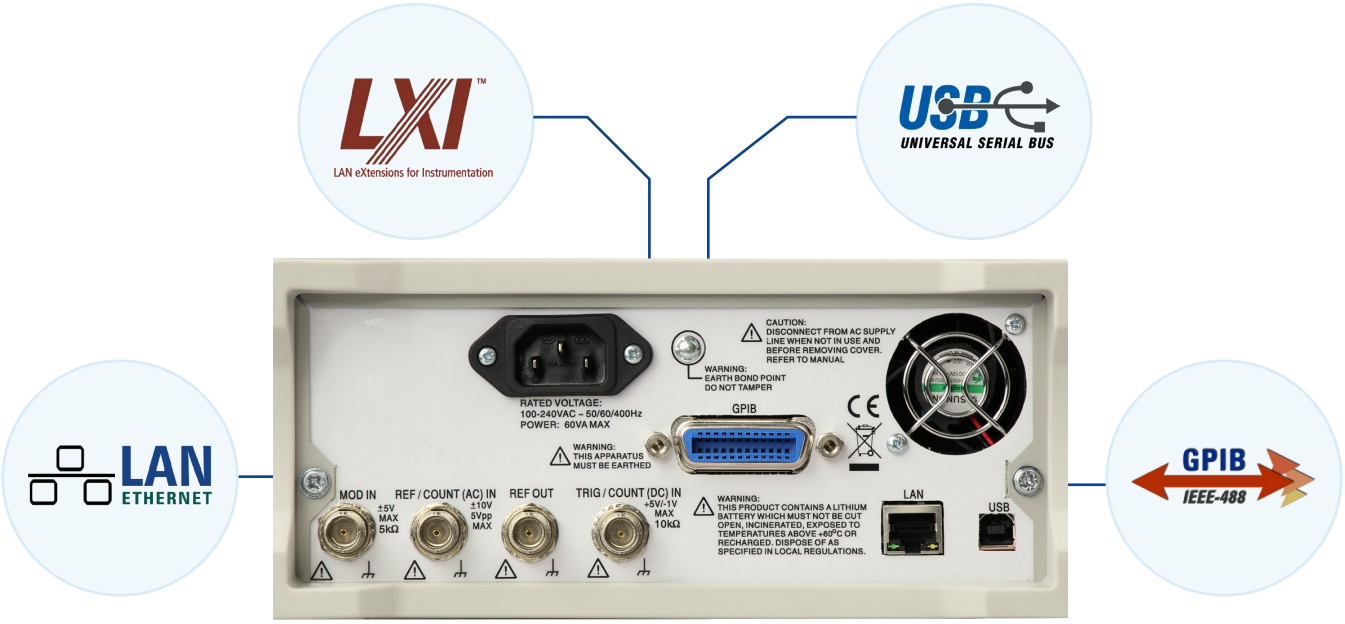
Phase continuous sweep is available for all standard and arbitrary waveforms except for Pulse, PRBS and Noise. The sweep range is from 1µHz through to the maximum for the chosen carrier waveform. Start and stop frequencies can be set independently. The sweep can be linear or logarithmic, triggered or continuous with a period between 1µs and 500s.

▶ GATING

In gated mode Waveform will run while the gate signal is true and stop while false. The start/stop phase is settable between -360.0° to +360.0° to 0.001° resolution.

*TGF4162 & TGF4242 only.

ENHANCED CONNECTIVITY



FULL REMOTE CONTROL

All functions of the generators can be controlled from the digital interfaces. Arbitrary waveform data can also be loaded using these interfaces.

LAN

The LAN interface uses a standard 10/100 base-T Ethernet hardware connection with ICMP and TCP/IP Protocol for connection to a Local Area Network or direct connection to a single PC. This interface supports LXI and is highly appropriate for system use because of its scalable nature and low cost interconnection.

LXI

The LAN interface is LXI compliant. LXI (LAN eXtensions for Instrumentation) is the next-generation, LAN-based modular architecture standard for automated test systems managed by the LXI Consortium, and is expected to become the successor to GPIB in many systems. For more information on LXI go to:

www.aimtti.com/go/lxi

GPIB (OPTIONAL)

The GPIB interface is compliant with IEEE-488.1 and IEEE-488.2. GPIB remains a widely used interface for system applications.

USB

USB provides a simple and convenient means of connection to a PC and is particularly appropriate for small system use. A USB driver is provided which supports Windows 2000 and above including Win 8 and 10.

LABVIEW & IVI DRIVER

An IVI driver for Windows is included. This provides support for common high-level applications such as LabView*, LabWindows*, and Keysight VEE*.

WEB INTERFACE

The TGF4000 has a built-in LXI compliant web server which provides information on the unit and allows it to be configured over the LAN, quickly allowing the unit to be controlled via PC or tablet at no extra cost. Simple command line control from the browser is also possible.

WAVEFORM SOFTWARE

Both generators are supplied with Waveform Manager Plus software for Windows.

This PC software enables complex arbitrary waveforms to be created and edited.

Waveforms can be built in any number of sections using any combination of standard waveforms, mathematical expressions, drawn waveforms, uploaded waveforms, imported waveforms and existing stored waveforms.

Waveforms can be transfered to the generator using either the Flash drive interface or the bus interfaces.

* LabView and LabWindows are trademarks of National InstrumentsKeysight VEE is a trademark of Keysight Technologies. Windows is a trademark of Microsoft.

FREQUENCY REFERENCE

The generators use a high quality TCXO crystal as the internal frequency reference providing 1ppm accuracy and stability.

If a higher accuracy or stability is required, an external 10MHz reference signal (from an off-air standard for example) can be applied to the Ref. Clock input.

The internal 10MHz clock is available as a rear panel output for synchronisation with external equipment.

OTHER INPUTS

In addition to the Reference Clock input and output sockets, rear panel inputs for Modulation and Trigger are provided.

These are used both for the modulation and triggering/gating functions and for the external frequency counter function.

SYNC OUTPUT

Channel 2 can be configured to be a Sync output for channel 1.

Sync can be chosen to perform a variety of tasks depending upon the waveform type and the application.

MAIN OUTPUTS

The main outputs can provide up to 10V pk-pk into 50Ω (20V pk-pk EMF) for frequencies up to 80MHz.

Maximum amplitude is reduced for higher frequencies.

High levels of DC offset can be set in conjunction with low signal levels, and the attenuator can be fixed to prevent glitches when changing levels.

Amplitudes can be entered as peak to peak voltage plus offset or in terms of high level and low level

The amplitudes are shown relative to a 50Ω load impedance or as the open circuit EMF values.

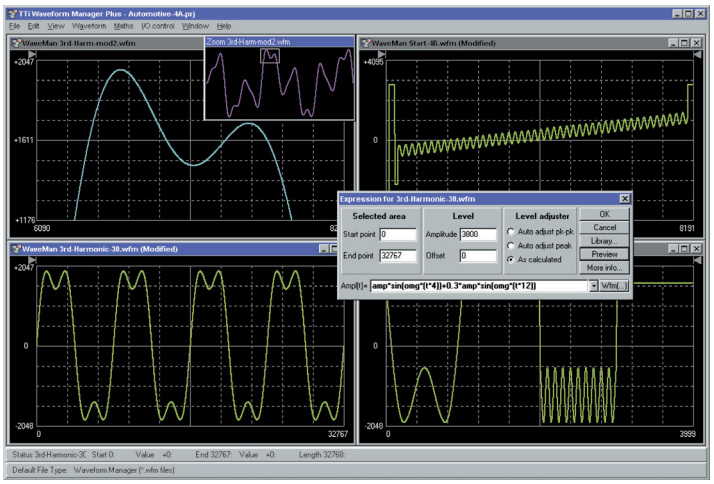
Alternatively the user can enter any load value between 1Ω to 10kΩ and the amplitude will be calculated accordingly.

WAVEFORM EDITING

Basic waveform creation and editing is built into the generator. However for complex waveforms Waveform Manager Plus software is included. This Windows based package enables almost any waveform shape to be created using mathematical expressions, freehand drawing, waveform libraries, and import of waveforms using the Clip Board.

WAVEFORM TRANSFER AND STORAGE

Waveforms can be stored on Flash drives using the front panel mounted USB host interface. Waveforms can be transferred from or to a PC either using a Flash drive, or via the digital interfaces (USB, LAN or GPIB).



ACCESSSORIES

Rack Mounting

For system applications the generators can be rack mounted.

With the protective moldings and handle removed the size is half rack width by 2U high.

A 2U rack mounting kit is available suitable for one or two instruments.

TECHNICAL SPECIFICATIONS

MODEL:		TGF4042	TGF4082	TGF4162	TGF4242
WAVEFORMS:					
Standard waveforms:		Sine, Square, Ramp (Variable Symmetry), Triangle (50% Ramp symmetry), Positive Ramp (100% Ramp symmetry), Negative Ramp (0% Ramp symmetry), Pulse, Noise (Gaussian), DC, Sin(x)/x, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Cardiac, Gaussian, Lorentz, D-Lorentz and 4 User Defined Arbitrary Waveforms. Dozens of useful pre-built arbitrary waveforms are also supplied on Website.			
		-		PRBS	
SINE :					
Frequency range:		1µHz to 40MHz	1µHz to 80MHz	1µHz to 160MHz	1µHz to 240MHz
Frequency resolution:		1µHz, 14 digits		1µHz, 15 digits	
Output level (into 50Ω) :		10mVp-p to 10Vp-p			
	≤50MHz		10mVp-p to 10Vp-p		
	≤80MHz		10mVp-p to 5Vp-p	10mVp-p to 10Vp-p	10mVp-p to 10Vp-p
	≤120MHz			10mVp-p to 5Vp-p	10mVp-p to 5Vp-p
	≤240MHz			10mVp-p to 2.5Vp-p	10mVp-p to 2.5Vp-p
Amplitude flatness (1Vp-p relative to 10 kHz):	≤10MHz	±0.1dB			
	≤100MHz	±0.2dB			
	≤160MHz	±0.6dB			
	≤240MHz	±1.0dB			
Harmonic distortion (1Vp-p)	≤10MHz	-65dBc			
	≤50MHz	-50dBc			
	≤80MHz	-40dBc			
	≤130MHz	-35dBc			
	≤240MHz	-28dBc			
Total harmonic distortion DC to 20kHz (typical):		0.05%			
Non-harmonic spurii:		-65dBc			
Phase noise (10MHz, 1Vp-p, 10kHz offset):		-113dBc/Hz			
SQUARE:					
Frequency range:		1µHz to 25MHz		1µHz to 100MHz	
Frequency resolution:		1µHz, 14 digits		1µHz, 15 digits	
Output level (into 50Ω) :	≤50MHz	10mVp-p to 10Vp-p		10mVp-p to 10Vp-p	
	≤ 100MHz			10mVp-p to 4Vp-p	
Duty cycle:		0.001% to 99.999%, 0.001% resolution			
Rise and fall times (typical) :	≤ 4Vp-p	10ns, fixed		3ns fixed	
	> 4Vp-p			5ns fixed	
Aberrations (typical) :		±5% of amplitude			
Jitter (RMS) :		<30ps (cycle to cycle)			
RAMP:					
Frequency range:		1µHz to 5MHz			
Frequency resolution:		1µHz, 13 digits			
Output level (into 50Ω) :		10mVp-p to 10Vp-p			
Linearity error:		<0.1% to 100kHz		<0.1% to 200kHz	
Variable symmetry:		0.00% to 100.00%, 0.01% resolution			

MODEL:		TGF4042	TGF4082	TGF4162	TGF4242
PULSE:					
Frequency range:		1mHz to 25MHz		1mHz to 100MHz	
Frequency resolution:		1mHz, 11 digits		1mHz, 12 digits	
Output level (into 50Ω) :	≤50MHz	10mVp-p to 10Vp-p		10mVp-p to 10Vp-p	
	≤ 100MHz			10mVp-p to 4Vp-p	
Aberrations (typical) :		±5% of amplitude (for transition time 10ns) ±3% of amplitude (for transition time 20ns) <±2% of amplitude (for transition time >40ns)		±5% of amplitude (for transition time 5ns) ±3% of amplitude (for transition time 10ns) <±2% of amplitude (for transition time >20ns)	
Jitter (RMS) :		<30ps (cycle to cycle)			
Rise and fall times:	Range: ≤ 4Vp-p	8ns to 799.999999984s (10% to 90%)		3ns to 799.999999989s (10% to 90%)	
	Range: > 4Vp-p			5ns to 799.999999989s (10% to 90%)	
	Resolution:	100ps			
	Accuracy:	±500ps ±0.01% of period			
	Rise and Fall times can be independently varied or can be varied together simultaneously.				
Width:	Range: ≤ 4Vp-p	20ns to 999.99999998s		5ns to 999.99999999s	
	Range: > 4Vp-p			10ns to 999.99999999s	
	Resolution:	100ps			
	Accuracy:	±200ps ±0.01% of period			
Duty:		0.001% to 99.999%, 0.01% of period			
Delay:	Range:	0ns to 999.99999996s		0ns to 999.99999998s	
	Resolution:	100ps			
	Accuracy:	±200ps ±0.01% of period			
	Delay can be entered as absolute delay or phase.				
ARBITRARY:					
In built arbitrary waveforms (Sin(x)/x, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Cardiac, Gaussian, Lorentz and D-Lorentz). Up to 4 user-defined waveforms may be stored in non-volatile memory. Waveforms can be defined by downloading of waveform data via remote interfaces or from the instrument's front panel.					
Waveform memory size:		8192 points			
Vertical resolution:		14 bits		16 bits	
Frequency range:	In built:	1μHz to 2MHz		1μHz to 4MHz	
	User defined:	1μHz to 40MHz		1μHz to 80MHz	
Frequency resolution:	In built:	1μHz, 13 digits			
	User defined:	1μHz, 14 digits			
Output level (into 50Ω) :		10mVp-p to 10Vp-p			
Sampling rate:		400Msa/s		800Msa/s	
Point to point jitter (typical) :		2.5ns		1.25ns	
Rise and fall times:		<8ns		<5ns for 100MHz filter	<8ns for 62.5MHz filter
Effective analog bandwith (-3bB):		50MHz		62.5MHZ, 100MHz, user selectable	
NOISE:					
Gaussian White Noise: Noise can also be used as modulating waveform.					
Bandwidth (-3dB):		50MHz		100MHz	
Noise crest factor (Vp/Vrms):		6.4		5.16	
Output level (into 50Ω) :		10mVp-p to 10Vp-p			

MODEL:	TGF4042	TGF4082	TGF4162	TGF4242
PBRS: (ONLY AVAILABLE IN TGF4162 & TGF4242)				
Bit rate:	-		1µbps to 100Mbps, 1µbps resolution	
Sequence lengh:	-		2^M- where M = 7, 9, 11, 15, 20, 23, 29 or 31	
Rise and fall times (typical):	5ns fixed			
Output level (into 50Ω) :	-		10mVp-p to 10Vp-p	
HARMONIC OUTPUT: (ONLY AVAILABLE IN TGF4162 & TGF4242)				
Harmonic waveforms can be defined and stored in user-defined arbitrary waveform locations.				
Frequency Range:	-		1µHz to 80MHz	
Frequency Resolution:	-		1µHz, 14 digits	
Harmonic Order:	-		1 to 50, Up to 16 different harmonics order can be defined	
Harmonic Amplitude:	-		0.0% to 100.0% of output amplitude, 0.1% resolution	
Harmonic Phase:	-		-360.0 to +360.0 degrees, 0.1 degree resolution	
Output level (into 50Ω) :	-		10mVp-p to 10Vp-p	
INTERNAL FREQUENCY REFERENCE:				
Initial Setting Error:	<± 1ppm			
Oscillator Aging Rate:	<± 1ppm first year			
Temperature Stability:	<1ppm over the specified temperature range			
MODULATION:				
AM (AMPLITUDE MODULATION) NORMAL & SUPPRESSED CARRIER:				
Carrier Waveforms:	Sine, Square, Ramp, Pulse, Noise, Arb			
	-		PRBS	
Maximum Carrier Frequency:	25MHz, subject to carrier waveform.		50MHz, subject to carrier waveform.	
Modulation Source:	Internal/External			
Internal Modulating Waveforms:	Sine, Square, Positive Ramp, Negative Ramp, Triangle, Gaussian Noise, DC, Sinc, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Gaussian, Lorentz, D-Lorentz, Cardiac and User Defined Arbs			
	-		PRBS-PN7, PN9, PN11, PN15, PN20, PN23, PN29, PN31	
Internal Modulating Frequency:	1µHz to 10MHz, 1µHz resolution			
Amplitude Depth:	0.00% to 100.00%, 0.01% resolution			
FM (FREQUENCY MODULATION):				
Carrier Waveforms:	Sine, Square, Ramp, Arb			
Modulation Source:	Internal/External			
Internal Modulating Waveforms:	Sine, Square, Positive Ramp, Negative Ramp, Triangle, Gaussian Noise, DC, Sinc, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Gaussian, Lorentz, D-Lorentz, Cardiac and User Defined Arbs.			
	-		PRBS-PN7, PN9, PN11, PN15, PN20, PN23, PN29, PN31	
Internal Modulating Frequency:	1µHz to 10MHz, 1µHz resolution			
Frequency Deviation:	DC to Fmax/2, 1µHz resolution			
PM (PHASE MODULATION):				
Carrier Waveforms:	Sine, Square, Ramp, Arb			
Modulation Source:	Internal/External			
Internal Modulating Waveforms:	Sine, Square, Positive Ramp, Negative Ramp, Triangle, Gaussian Noise, DC, Sinc, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Gaussian, Lorentz, D-Lorentz, Cardiac and User Defined Arbs.			
	-		PRBS-PN7, PN9, PN11, PN15, PN20, PN23, PN29, PN31	
Internal Modulating Frequency:	1µHz to 10MHz, 1µHz resolution			
Phase Deviation:	-360.000 to +360.000 degrees, 0.001 degree resolution			

MODEL:	TGF4042	TGF4082	TGF4162	TGF4242
ASK (AMPLITUDE SHIFT KEYING):				
Carrier Waveforms:	Sine, Square, Ramp, Pulse, Noise			
	-		PBRS	
Maximum Carrier Frequency:	25MHz, subject to carrier waveform.		50MHz, subject to carrier waveform.	
Source:	Internal/External (via TRIG IN)			
Internal Modulation:	2mHz to 10MHz (50% duty cycle square)			
FSK (FREQUENCY SHIFT KEYING):				
Carrier Waveforms:	Sine, Square, Ramp, Arb			
Source:	Internal/External (via TRIG IN)			
Internal Modulation:	2mHz to 10MHz (50% duty cycle square)			
BPSK (BINARY PHASE SHIFT KEYING):				
Carrier Waveforms:	Sine, Square, Ramp, Arb			
Modulation Source:	Internal/External (via TRIG IN)			
Internal Modulation:	2mHz to 10MHz (50% duty cycle square)			
PWM (PULSE WIDTH MODULATION):				
Carrier Waveforms:	Pulse			
Modulation Source:	Internal/External			
Internal Modulating Waveforms:	Sine, Square, Positive Ramp, Negative Ramp, Triangle, Gaussian Noise, DC, Sinc, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Gaussian, Lorentz, D-Lorentz, Cardiac, and User Defined Arbs (PRBS waveforms only available in TGF4162 and TGF4242).			
	-		PRBS-PN7, PN9, PN11, PN15, PN20, PN23, PN29, PN31	
Internal Modulating Frequency:	1µHz to 10MHz, 1µHz resolution			
Pulse Width Deviation:	0% to 100% of pulse width, 0.01% resolution			
SUM (ADDITIVE MODULATION): (ONLY AVAILABLE IN TGF4162 & TGF4242)				
Carrier Waveforms:	-		Sine, Square, Ramp, Pulse, Noise, PRBS, Arb	
Maximum Carrier Frequency:	-		50MHz, subject to carrier waveform.	
Modulation Source:	-		Internal/External	
Internal Modulating Waveforms:	-		Sine, Square, Positive Ramp, Negative Ramp, Triangle, Gaussian Noise, DC, Sinc, Exponential Rise, Exponential Fall, Logarithmic Rise, Logarithmic Fall, Haversine, Gaussian, Lorentz, D-Lorentz, Cardiac, PRBS-PN7, PN9, PN11, PN15, PN20, PN23, PN29, PN31 and User Defined Arbs.	
Internal Modulating Frequency:	-		1µHz to 10MHz, 1µHz resolution	
Ratio:	-		0% to 100%, 0.01% resolution	
TRIGGERED BURST:				
Each active edge of the trigger signal will produce one burst of the waveform.				
Carrier Waveforms:	Sine, Square, Ramp, Pulse, Arb: A fixed number of cycles, specified as number of cycles are generated at every trigger event. Noise: Noise is reset to its start condition at every trigger event. Allows generating same random noise sequence.			
	-		PRBS: A fixed number of bits, specified as number of cycles are generated at every trigger event	
Maximum Carrier Frequency:	25MHz (finite cycles), Fmax(infinite), subject to carrier waveform.		50MHz (finite cycles), Fmax(infinite), subject to carrier waveform.	
Number of Cycles:	1 to 2147483647 and infinite			
Trigger Repetition Rate: Internal	2mHz to 25MHz		2mHz to 50MHz	
Trigger Repetition Rate: External	DC to 1MHz			
Trigger Signal Source: Internal	From keyboard or trigger generator.			
Trigger Signal Source: External	From TRIG IN or remote interface.			
Trigger Start/Stop Phase:	-360.000 to +360.000 degrees, 0.001 degree resolution. Phase offset cannot be set for Noise and PRBS waveforms			

MODEL:		TGF4042	TGF4082	TGF4162	TGF4242
GATED:					
Waveform will run while the Gate signal is true and stop while false.					
Carrier Waveforms:		Sine, Square, Ramp, Pulse, Noise, Arb			
		-		PRBS	
Maximum Carrier Frequency:		25MHz, subject to carrier waveform.		50MHz, subject to carrier waveform.	
Trigger Repetition Rate:	Internal	2mHz to 25MHz		2mHz to 50MHz	
	External	DC to 1MHz			
Gate Signal Source:	Internal	From keyboard or trigger generator.			
	External.	From TRIG IN or remote interface			
Gate Start/Stop Phase:		-360.000 to +360.000 degrees, 0.001 degree resolution. Phase offset cannot be set for Noise and PRBS waveforms.			
SWEEP:					
Frequency sweep capability is provided for both standard and arbitrary waveforms.					
Carrier Waveforms:		Sine, Square, Ramp, Arb			
Sweep Mode:		Linear or logarithmic, triggered or continuous.			
Sweep Direction:		Up or Down			
Sweep Range:		From 1µHz to Fmax. Phase continuous. Independent setting of the start and stop frequency.			
Sweep Time:		1µs to 500s (9 digit resolution).			
Sweep Trigger Source:		The sweep may be free run or triggered from the following sources: Internal from keyboard or trigger generator. Externally from TRIG IN input or remote interface. External trigger repetition rate: DC to 1MHz			
TRIGGER GENERATOR:					
Internal Source Rate or Frequency		40ns to 500s or 2mHz to 25MHz square waves adjustable in 10ns steps.		20ns to 500s or 2mHz to 50MHz square waves adjustable in 10ns steps.	
Resolution		10ns, 11 digits			
Each channel has its own trigger generator. Channel 1 trigger is available for external use from the MAIN OUT 2 socket when Channel 2 is configured to output Channel 1 sync waveform and sync source is set to trigger.					
DUAL-CHANNEL OPERATIONS:					
TRACKING:					
Independent (Off):		The channels are independent of each other.			
Equal:		The two channels are identical and behave identically.			
COUPLING:					
Frequency coupling:		The frequencies of the two channels can be coupled. Changing the frequency of one channel changes the frequencies of both channels.			
Amplitude (and DC Offset) coupling:		Amplitude (and DC offset) of the two channels can be coupled. Changing the amplitude and offset on one channel changes the amplitude and offset of both channels.			
Output coupling:		Output On/Off can be coupled. Switching the output On/Off on one channel switches the output On/Off of both channels.			
CHARACTERISTICS:					
Relative phase:		-360.000 to 360.000 degrees, 0.001 degree resolution (Phase offset cannot be set for Noise)			
Channel to channel Skew (typical):		<1ns (when performing identical operations)			
Crosstalk (typical):		<-80db			

MODEL:		TGF4042	TGF4082	TGF4162	TGF4242
EXTERNAL FREQUENCY MEASUREMENT:					
Function:		Frequency, Period, Positive Width, Negative Width, Duty Cycle			
Frequency Range:	AC coupled	3Hz to >125MHz			
	DC coupled	100mHz to >125MHz			
Source:	AC coupled	REF / COUNT (AC) IN			
	DC coupled	TRIG / COUNT (DC) IN			
Frequency Resolution:		Up to 7 digits displayed.			
Measurement Time:		Automatic			
Input Range and Sensitivity:	AC coupled	≤50MHz- 100mVpp- 5Vpp >50MHz- 250mVpp- 5Vpp Maximum input ±10V			
	DC coupled	Threshold typically 1.2V; Sensitivity 100mVpp (≤50MHz), 250mVpp (<50MHz) Maximum input +5V,-1V			
Hysteresis:	Input hysteresis voltage	10mV			
Accuracy:		±1 digit ± timebase accuracy.			
Timebase Accuracy:		<± 1ppm initial settling error, <± 1ppm oscillator aging rate in the first year, <1ppm over the specified temperature range			
OUTPUTS:					
MAIN OUTPUTS:					
Output impedance:		50Ω			
Amplitude (sine):		20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω			
	≤50MHz		20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω		
	≤80MHz		20mVp-p to 10Vp-p open circuit, 10mVp-p to 5Vp-p into 50Ω	20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω	20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω
	≤120MHz			20mVp-p to 10Vp-p open circuit, 10mVp-p to 5Vp-p into 50Ω	20mVp-p to 10Vp-p open circuit, 10mVp-p to 5Vp-p into 50Ω
	≤240MHz			20mVp-p to 5Vp-p open circuit, 10mVp-p to 2.5Vp-p into 50Ω	20mVp-p to 5Vp-p open circuit, 10mVp-p to 2.5Vp-p into 50Ω
Amplitude (Pulse):		20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω			
	≤50MHz			20mVp-p to 20Vp-p open circuit, 10mVp-p to 10Vp-p into 50Ω	20mVp-p to 8Vp-p open circuit, 10mVp-p to 4Vp-p into 50Ω
	≤100MHz				
Amplitude can be specified open circuit (hi Z) or into an assumed load of 1Ω to 10kΩ in Vpp.					
Amplitude Accuracy:		1.5% ±5mV at 1kHz into 50Ω			
DC Offset Range:		±10V. DC offset plus signal peak limited to ±10V from 50Ω.			
DC Offset Accuracy:		Typically 1% ±50mV.			
Resolution:		3 digits or 1mV for both Amplitude and DC Offset.			

MODEL:		TGF4042	TGF4082	TGF4162	TGF4242
SYNC OUTPUT:					
Channel 2 can be configured to output Channel 1 sync from its MAIN OUT 2 socket. Sync is a multi function output which is automatically selected to be any of the following. Alternatively, the user can choose Sync to always be carrier referenced, to output the currently used trigger signal or turn it off.					
Carrier Waveform Sync:	Sine Square Ramp Pulse Arbs	≤ 28.125MHz- A square wave with 50% duty cycle at the waveform frequency. ≤ 80MHz- A sine wave at the waveform frequency.		≤ 62.5MHz- A square wave with 50% duty cycle at the waveform frequency. ≤ 240MHz- A sine wave at the waveform frequency.	
	Pattern	A positive pulse which is 1 bit rate wide at the beginning of the sequence			
	Noise	No sync associated with noise.			
Modualtion sync:	AM/FM/ PM/SUM/ PWM	A square wave with 50% duty cycle referenced to the internal modulation waveform when modulation source is internal, or a square wave referenced to the carrier waveform when modulation source is external. No sync is associated with Noise and DC waveforms as the modulation source .			
	ASK	A square wave referenced to the trigger rate. The sync is a TTL high when hop amplitude is the output amplitude and TTL low when carrier amplitude is the output amplitude for positive slope and vice versa for negative slope.			
	FSK	A square wave referenced to the trigger rate. The sync is a TTL high when hop frequency is the output frequency and TTL low when carrier frequency is the output frequency for positive slope and vice versa for negative slope.			
	BPSK	A square wave referenced to the trigger rate. The sync is a TTL high when the hop phase is the output phase and TTL low when carrier phase is the output phase for positive slope and vice versa for negative slope.			
Sweep Sync:		A square wave that is a TTL high from the beginning of the sweep and a TTL low from the midpoint of the sweep			
Burst Sync:	Internal Trigger	A square wave with 50% duty cycle at the trigger frequency.			
	External Trigger	A square wave with same duty cycle and frequency as the external source.			
	Manual Trigger	A positive pulse which is approximately 18us wide at the beginning of the event.			
Trigger:		Selects the current trigger signal.			
Output Signal Level:		Logic level nominally 3V			
Output Impedance:		50Ω			
REF CLOCK OUTPUT:					
Buffered version of the 10MHz clock currently in use (internal or external)					
Output Level:		Nominally 3V logic level from 50Ω			
INPUTS:					
TRIGGER / COUNT (DC) INPUT:					
For ASK, FSK, BPSK, triggered sweep, gated burst, triggered burst and DC coupled external frequency measurement.					
Frequency Range:	Trigger Input	DC – 1MHz			
	Counter Input	100mHz to >125MHz			
Signal Range:		Threshold typically 1.2V; Sensitivity 100mVpp (≤50MHz), 250mVpp (>50MHz) Maximum input +5V /-1V.			
Minimum Pulse Width (Trigger Input):		50ns			
Polarity (Trigger Inpput):		Selectable as high/rising edge or low/falling edge.			
Input Impedance:		10kΩ			
EXTERNAL MODULATION INPUT:					
For AM, FM, PM, SUM and PWM					
Voltage Range:		± 2.5V full scale			
Input Impedance:		5kΩ typical			
Bandwidth:		DC to 5MHz			

MODEL:	TGF4042	TGF4082	TGF4162	TGF4242
REF CLOCK / COUNT (AC) INPUT:				
Input for an external 10MHz reference clock and AC coupled external frequency measurement.				
Voltage Range:	≤50MHz - 100mVpp – 5Vpp >50MHz - 250mVpp – 5Vpp			
Maximum Voltage:	+10V			
Minimum Voltage:	-10V			
INTERFACES:				
Full digital remote control facilities are available through LAN, USB and optional GPIB interfaces.				
LAN Interface	Ethernet 100/10base – T hardware connection. 1.5 LXI Core 2016			
USB Interface	Standard USB 2.0 hardware connection. Implemented as virtual-COM port.			
USB Flash Drive	For waveform and set-up storage/recall.			
GPIB (optional)	Conforming with IEEE488.1 and IEEE488.2			
GENERAL:				
Display:	4.3 inch (10.9 cm) transflective backlit TFT LCD, 480 x 272 pixels, 262144 colours, adjustable brightness and contrast.			
Data Entry:	Keyboard selection of mode, waveform 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 internal memory.			
Size:	Bench Top: 97mm height; 250mm width; 295mm depth			
	Rack mount: 86.5mm (2U) height; 213.5mm (½”rack) width; 269mm depth			
Weight:	3.1kg			
Power:	100-240VAC ±10% 50/60Hz; 100-120VAC ±10% 400Hz; 60VA max. Installation Category II.			
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 2.			
Options:	19 inch rack mounting kit.			
Safety & EMC:	Complies with EN61010-1 & EN61326-1.			

For details, request the EU Declaration of Conformity for this instrument via http://www.aimtti.com/support (serial no. needed).

General specifications apply for the temperature range 5°C to 40°C.
Accuracy specifications apply for the temperature range 18°C to 28°C after 30 minutes warm-up, at maximum output into 50Ω.
Typical specifications are determined by design and are not guaranteed.

WAVEFORM GENERATOR RANGE

TG300 SERIES

3MHz
FUNCTION
ANALOG
1 CHANNEL
-

TG1006

10MHz
FUNCTION
DDS
1 CHANNEL
-

TG1000 & 2000 SERIES

10MHz / 20MHz
FUNCTION
DDS
1 CHANNEL
USB & RS232

TGXX11/12A

25MHz / 50MHz
FUNCTION / PULSE / ARB
DDS - 125MS/s FIXED
1 & 2 CHANNEL
USB, LAN & GPIB*

TGF3000 SERIES

80MHZ/160MHZ
FUNCTION/ PULSE/ ARB
DDS - 800MS/s FIXED
2 CHANNEL
USB, LAN & GPIB*

TGP110

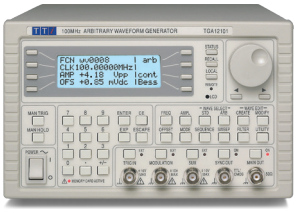
10MHz
PULSE
ANALOG
1 CHANNEL
-

TGP3100 SERIES

25MHz / 50MHz
PULSE/ FUNCTION/ ARB
DDS - 800MS/s FIXED
1 & 2 CHANNEL
USB, LAN & GPIB

TGA1240 SERIES

16MHz
TRUE ARB - 40MS/s MAX.
DDS - 40MS/s FIXED
1, 2 & 4 CHANNEL
RS232 & GPIB



TGA12100 SERIES

40MHz
TRUE ARB - 100MS/s MAX.
DDS - 100MS/s FIXED
1, 2 & 4 CHANNEL
USB, RS232 & GPIB

COMING SOON

TGA12200 SERIES

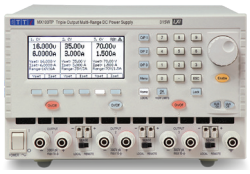
80MHz
TRUE ARB - 200MS/s MAX.
DDS - 500MS/s FIXED
2 & 4 CHANNEL
USB, LAN & GPIB*

* GPIB OPTIONAL

OTHER RANGES AVAILABLE

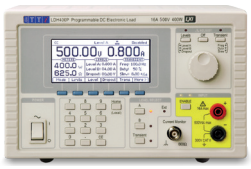
POWER SUPPLIES & LOADS

LINEAR POWER SUPPLIES



MIXED-MODE POWER SUPPLIES

POWERFLEX POWER SUPPLIES



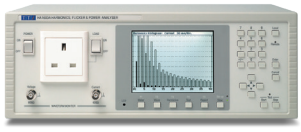
ELECTRONIC DC LOADS

- 30w to 1200w Single and Multi channel PSUs for bench-top or remote control and system use.
- Flexible electronic DC loads for general purpose applications.

RF & EMC TEST EQUIPMENT

SIGNAL GENERATORS

SPECTRUM ANALYSERS



HARMONICS ANALYSERS

LOW-DISTORTION SOURCE

- RF signal generators with frequency capability up to 6GHz.
- Handheld RF spectrum analyzers with frequency up to 6GHz.
- EMC analyzers for power Harmonics and Flicker.

PRECISION MEASUREMENT

MULTIMETERS

POSITIONAL CURRENT PROBES

FREQUENCY MEASUREMENT

COMPONENT MEASUREMENT

- Bench-top digital multimeters for dual display, system and logging.
- Innovative DC to 5MHz current probes for PCB tracks.
- Handheld and bench-top frequency counters up to 6GHz.
- Precision component measurements.

Visit www.aimtti.com for full ranges and further information.

EXCELLENCE THROUGH EXPERIENCE

Aim-TTi is the trading name of Thurlby Thandar Instruments Ltd. (TTi), 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 more than thirty years.

The company is based in the United Kingdom, and all products are built at the main 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.

bsi. ISO 9001 Quality Management

ISO9001:2015

Certificate number FM 20695

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

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

www.aimtti.com

www.aimtti.us

Designed and built in Europe by:

TTi ltd

Thurlby Thandar Instruments Ltd.
Glebe Road, Huntingdon, Cambridgeshire.
PE29 7DR United Kingdom
Tel: +44 (0)1480 412451 Fax: +44 (0)1480 450409
Email: sales@aimtti.com Web: www.aimtti.com

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