12. Waveform Generators

Measurably better value

Product Range

Function, Arbitrary & Pulse generators

Aim-TTi is a world leader in waveform generation with products ranging from basic analog function generators through to advanced multi-channel arbitrary generators.

Waveform quality

The success of Aim-TTi function generators has always been based around waveform quality.

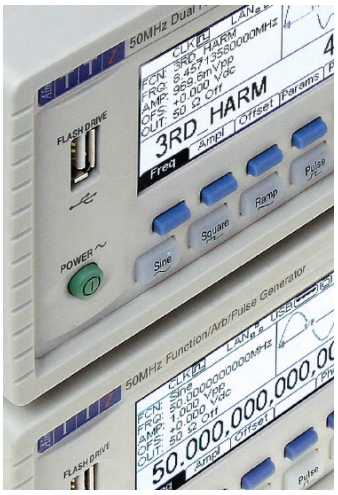
Aim-TTi generators offer waveform quality not just at high output levels, but at low levels as well - a much more difficult task.

Careful analog design yields excellent waveform purity at all frequencies and levels, unlike many competitive products.

Digital architectures

Aim-TTi has been at the forefront of digital generator design with products that combine both DDS (direct digital synthesis) and variable-clock architectures in order to offer optimum performance for specific applications.

Most recently an innovative architecture for pulse generation has been developed which eliminates the jitter created by other digital techniques.



TGP110 Pulse Generator

- 0.1Hz to 10MHz pulse generator
- Very wide pulse control range

The TGP110 is an analog pulse generator that offers a very wide control range.

Its dedicated architecture enables it to generate fast rise time flat top pulses over a very large duty cycle range.

The unit offers selectable delay between trigger and pulse, or between two pulses in double pulse mode. A sync output signal provides a pulse in synchronism with the trigger.

A low impedance output of fully variable level is provided together with a TTL/CMOS output and a level inversion switch.

- 0.1Hz to 10MHz frequency range
- Independent control of pulse frequency, width and delay
- 50ns minimum pulse width
- Squarewave, double pulse and delayed pulse modes
- Free-run, gated and triggered modes
- 50 Ohm output: 0.1V to 10V amplitude
- TTL/CMOS and Sync outputs

TGP3100 Series

- True pulse generators with universal waveform capabilities
- 50MHz or 25MHz, 1 or 2 channels
- Very high pulse resolution and very low jitter
- True asynchronous operation
- USB, GPIB & LAN (LXI) interfaces

True Pulse Generators with Universal Waveform capabilities

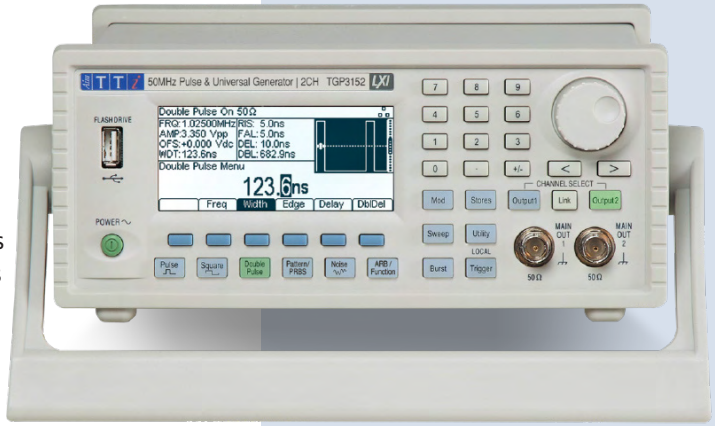
The TGP3100 Series are true pulse generators using all digital techniques. They can replicate the capabilities of traditional pulse generators whilst adding many additional facilities such as pulse modulations.

Unlike DDS based function generators the TGP3100 Series can generate pulses up to 50MHz with very low jitter and high resolution of width and delay (100ps). They can also operate in an asynchronously triggered mode with low jitter.

A high drive capability output stage enables up to 20 volts pk-pk to be driven into a 50 Ohm load.

As well as operating as pulse generators, the instruments can act as high performance noise generators and as function/arbitrary generators - making them truly universal waveform generators.

Full product details are available on the website.



- Pulse waveforms from 1mHz to 50MHz, minimum rise time 5ns
- Very low jitter synchronous and asynchronous operation
- Pulse, double pulse, pulse pattern and PRBS waveforms
- Pulse period, width and delay resolutions of 100ps or 11 digits
- Independently variable rise and fall times from 5ns to 800 seconds
- True low jitter asynchronous operation, externally triggered pulses or pulse reconstruction
- High drive capability output can provide 20V pk-pk into 50Ω
- Wide range of pulse modulations including AM, FM, PM, FSK, BPSK, SUM, PWM & PDM using internal or external modulation sources.
- Triggered (burst count) or gated operation using internal or external trigger sources
- Full Noise generator to 25MHz with selectable crest factor and user defined distribution
- Full Arbitrary/Function generator with 16 waveform types - sine waves up to 50MHz
- Arbitrary waveforms at 800MS/s sampling rate and 16-bit vertical resolution
- Internal channel coupling, tracking and modulations (2 channel models)
- Extensive internal/external modulation of all waveform types
- Linear and logarithmic sweeps of all waveform types
- Front panel mounted USB Flash drive interface
- GPIB, USB and LXI compliant LAN interfaces

GPIB IEEE-488 USB UNIVERSAL SERIAL BUS LAN ETHERNET LXI RS-232 RS-423

Model	Max Freq.	Channels
TGP3121	25MHz	One
TGP3151	50MHz	One
TGP3122	25MHz	Two
TGP3152	50MHz	Two

Pulse and Universal Generators

Although designed primarily as high performance pulse generators, the TGP3100 series can operate as function, arbitrary and noise generators making them a universal waveform generation tool.

Noise Generator

As a noise generator, the TGP3100 series offers fully variable noise bandwidth from 1mHz up to 25MHz. Noise amplitude distribution can be Gaussian (with variable crest factor) or fully user defined.

Function Generator

The TGP3100 Series can operate as a high performance function generator at up to 50MHz.

Sixteen standard waveforms include sine, square, triangle, ramps, sinc, cardiac, plus logarithmic, exponential and gaussian shapes.

Arbitrary Generator

With an 800MS/s sample clock, the TGP3100 series can perform as high speed arbitrary generators with 16-bit vertical resolution and up to 4096 waveform points.

14. Function Generators - waveform generation

Measurably better value

Function Generators

Function generators fall into two basic categories, analog and digital.

Analog generators use a voltage controlled oscillator to generate a triangular waveform of variable frequency. Sinusoids and square waves are generated from this.

Digital generators use a digital to analog converter (DAC) to generate a wave shape from values stored in memory. Normally such generators only offer sine and square waves up to the maximum generator frequency. Triangle waves and other waveforms are limited to a much lower frequency.

See page 16 onwards for arbitrary/function and true ARB generators.

The function generator is a particularly versatile instrument. It can generate a variety of precision wave shapes over a range of frequencies from mHz to MHz with a wide range of controlled amplitudes from a low-impedance source, and maintain constant amplitude as the frequency is varied.
Although digital function generators may offer more features, analog function generators have advantages that can make them more appropriate for certain applications.

Analog and Digital Function Generators - comparison table

	TG315	TG330	TG1006	TG1000/2000
Frequency Range (sine)	0.03Hz to 3MHz	0.03Hz to 3MHz	0.001Hz to 10MHz	0.001Hz to 10/20MHz
Frequency Resolution (sine)	up to 4 digits	up to 4 digits	6 digits or 1mHz	6 digits or 1mHz
Waveform Generation System	Analog	Analog	DDS	DDS
Frequency Accuracy	±1 digit 0.2Hz to 3MHz	±1 digit 0.2Hz to 3MHz	Better than ±10ppm	Better than ±10ppm
Waveform Functions	Sine, Square, Triangle	Sine, Square, Triangle	Sine, Square, Triangle	Sine, Square, Triangle, +ve/-ve Pulse
Variable Symmetry Range	10% to 90%	10% to 90%	20% to 80% square	20% to 80% square/pulse
Frequency Sweep (Rate/Mode)	N/A	20ms to 20s, lin or log	50ms to 999s, lin or log	50ms to 999s, lin or log
Internal/External Modulations	No	AM	FSK, AM	Tone, FSK, External AM
Internal Trigger Generator	No	No	0.001Hz to 10kHz	0.001Hz to 5kHz
Gated Operation	No	No	No	Yes
Amplitude Range (pk-pk EMF)	2mV - 20V from 50/600Ω	2mV - 20V from 50/600Ω	2mV - 20V from 50/600Ω	5mV - 20V from 50/600Ω
DC Offset Range	±10V EMF	±10V EMF	±10V EMF.	±10V EMF.
Sinewave Purity	<0.5% to 30kHz <-25dBc to 3MHz	<0.5% to 30kHz <-25dBc to 3MHz	Typically 0.1% to 20kHz <-30dBc at 10MHz	Typically 0.1% to 20kHz <-40dBc at 20MHz
Output Flatness	±0.2dB to 200kHz; ±2dB to 3MHz	±0.2dB to 200kHz; ±2dB to 3MHz	±0.5dB to 500kHz; ±2dB to 10MHz	±0.2dB to 500kHz; ±2dB to 20MHz
Auxiliary Output	Sync	Sync	Sync	Multi-function output for Waveform Sync, Trigger Out, Sweep Sync
Ext. Frequency Counter	No	5Hz to 120MHz	3Hz to 120MHz	No
Display	4 + 3 digit LCD	4 + 3 digit LCD	4 + 3 digit LCD	Dot-matrix backlit LCD
Digital Interfaces	No	No	No	RS232/USB (TG2000 only)
Power: 230V or 115V AC nominal 50/60Hz, Size & weight: 260 x 88 x 235 mm (WxHxD) 2.0 kg (4.4lb) .				

TG300 Series

- 3MHz function generator range
- Display of frequency and level
- 120MHz frequency counter (TG330)
- Sweep and AM modulation (TG330)

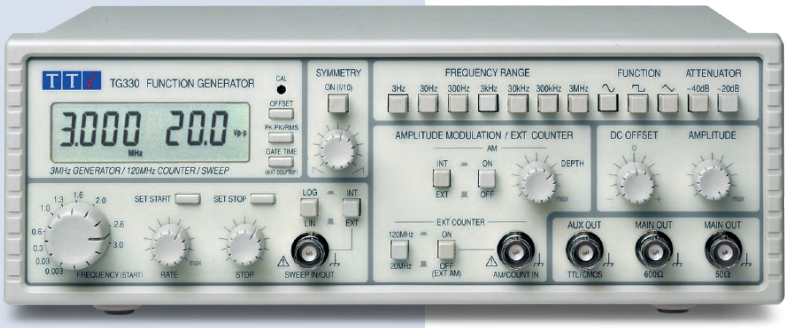
Further details are provided in the comparison table above Full details are available on the website.

The TG300 series are analog function generators with a digital display which provides simultaneous readout of frequency and level - amplitude pk-pk, amplitude rms or dc offset.

The TG330 includes an external counter with 7 digit resolution (using the full width of the display) at up to 120MHz.

The TG330 also includes a sweep generator and internal/external amplitude modulation.

- 0.03Hz to 3MHz frequency range
- Simultaneous display of frequency/amplitude
- High waveform quality at all frequencies & levels
- 2mV to 20V pk-pk from 50Ω or 600Ω
- Variable symmetry with constant frequency
- Auxiliary TTL/CMOS output
- 1000:1 freq. change by vernier or sweep voltage
- External seven digit 120MHz counter (TG330 only)
- Precision internal lin/log sweep (TG330 only)
- Internal/external AM up to 100% (TG330 only)



for more complete information:
www.aimtti.com/generator

TG1006

- 10MHz DDS function generator
- 120MHz frequency counter
- Sweep, AM and FSK

The TG1006 is a low cost function generator using DDS frequency generation and covering the range 1mHz to 10MHz. Up to ten frequencies can be stored in a list.

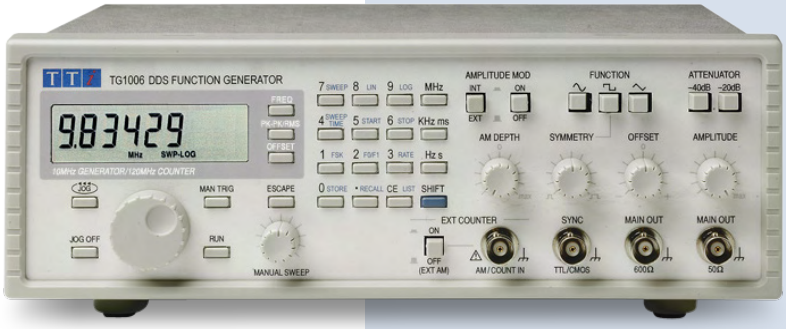
Despite its price, it includes a wide range of features including wide range phase continuous sweep, AM and FSK.

A seven digit frequency counter covering 3Hz to 120MHz is also incorporated.

A unique feature is manual sweep which enables any frequency range to be spanned by a quasi-analog control.

- 0.001Hz to 10MHz frequency range
- 6 digits or 1mHz resolution
- Simultaneous display of frequency and voltage amplitude or offset
- 1ppm stability and 10ppm one year accuracy
- Low distortion, high spectral purity sine waves
- Internal phase-continuous sweep, lin or log
- Unique manual sweep gives quasi-analog control
- AM and FSK modes, frequency list (10 steps)
- 2mV to 20V pk-pk from 50 or 600 Ohms
- Built-in seven digit 120MHz frequency counter

Further details are provided in the comparison table on p.14. Full details are available on the website.



TG1000 & TG2000

- 10/20MHz DDS function generator
- High stability and resolution
- USB & RS232 interfaces (TG2000)

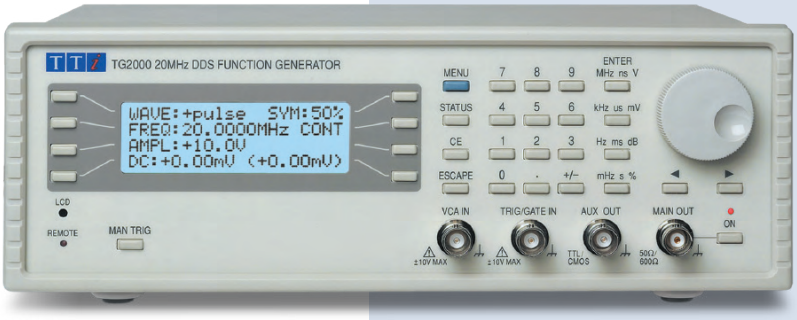
The TG2000 is a high performance DDS based function generator covering the range 1mHz to 20MHz.

It is ideal for engineers who require a high stability and high resolution function generator, but who do not require arbitrary waveforms.

The TG1000 has a lower maximum frequency of 10MHz and omits the RS232 and USB interfaces of the TG2000.

- 0.001Hz to 10MHz or 20MHz frequency range
- 6 digits or 1mHz resolution
- 1ppm stability and 10ppm one year accuracy
- Low distortion, high spectral purity sine waves
- Internal phase-continuous sweep, lin or log
- AM, FSK, gated and tone switching modes
- 5mV to 20V pk-pk from 50Ω or 600Ω
- Storage for multiple instrument set-ups
- USB and RS232 Interfaces (TG2000 only)

Further details are provided in the comparison table on p.14. Full details are available on the website.

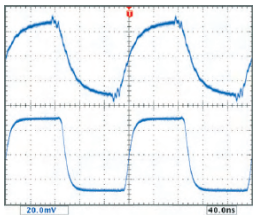


Waveform Quality

Ultimately what matters in a function generator is the quality of the output signal. The TG1000 and TG2000 maintains the Aim-TTi reputation for high signal quality at all frequencies and all levels.

The waveform capture opposite shows just how much difference that can make. The scope display opposite was captured from two 5MHz square wave signals each at 60mV pk-pk level into 50 Ω.

The upper waveform is from a widely available competitive DDS generator. The lower waveform is from a TG2000.



Unlike some other lower cost DDS based generators, the TG1000 and TG2000 provide digital control of all parameters and functions.

This allows for the complete instrument status to be stored in the set-up memories.

On the TG2000, it also enables complete control via the digital bus interfaces.

USB UNIVERSAL SERIAL BUS RS-232 RS-423

16. Function/Arbitrary Generators - waveform generation

Measurably better value

TGF4000 Series

- 40MHz / 80MHz / 160MHz/ 240MHz function generator
- High speed arbitrary waveforms
- Pulse, noise and harmonics generator modes
- Built-in frequency counter
- USB, LAN and optional GPIB

Model Comparison	TGF4042	TGF4082	TGF4162	TGF4242
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	50MHz		100MHz	

Full details are available on the website.

NEW

The TGF4000 series is the latest arbitrary function generator series from Aim-TTi.

With two channels and very high frequency capability, it offers exceptional value for money.

- 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
- Compact half-rack 2U casing with protective buffers and handle
- Programmable via USB and LAN (LXI) interfaces; GPIB optional

LAN LXI ETHERNET USB UNIVERSAL SERIAL BUS GPIB IEEE-488 OPTIONAL

TG5011A & TG2511A

- 50MHz/25MHz function generator
- High speed arbitrary waveforms
- Pulse generator mode with variable rise/fall times
- USB, LAN and optional GPIB

The TG5011A and TG2511A are high performance DDS arbitrary/function generators offering high quality sine and square waveforms at up to 50MHz.

The full graphics display is capable of showing representative waveform information simultaneously with a comprehensive status readout. The casing is highly compact being half rack width by 2U height.

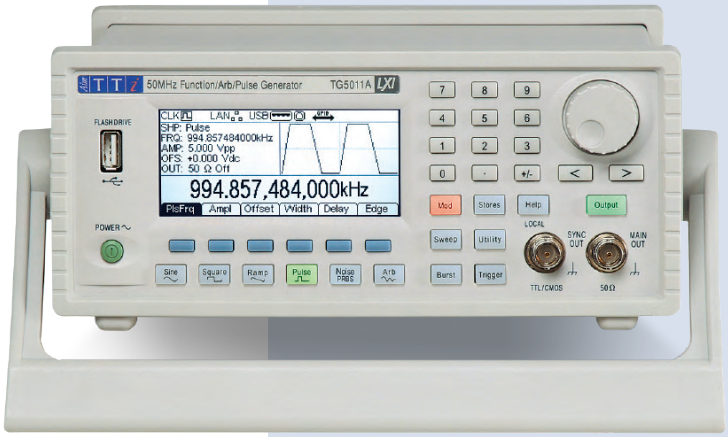
The wide range of standard waveforms is supplemented by full arbitrary waveform capability using a 125MS/s sampling rate and up to 128K word record length. Waveforms can be downloaded via the digital interfaces or loaded and saved via the front mounted USB flash drive interface.

Pulse waveforms are generated by a dedicated pulse generator system with independent setting of period, width and delay. Rise and fall times are independently variable over a wide range.

A comprehensive digital modulation system is incorporated covering AM, FM, PM, PWM, FSK and Noise. Modulations can be internal or external at frequencies from DC up to 20kHz external or 1MHz internal.

A comprehensive set of interfaces includes USB and LAN (conforming with LXI) as standard plus GPIB as an option.

Full details are available on the website.



- 1µHz to 50MHz or 25MHz range; 14 digits or 1µHz resolution.
- Standard waveforms include sine, square, ramp, pulse, PBRS, sin(x)/x, noise, exponential and logarithmic rise.
- True pulse generator with variable delay and variable rise/fall.
- Arbitrary waveforms of up to 128K points at up to 125MS/s.
- Waveform storage using USB flash drives
- Large graphic LCD with simultaneous text and waveform display.
- Comprehensive internal and external digital modulations including AM, FM, PM, PWM, SUM, FSK and BPSK.
- 20mV to 20V pk-pk output from 50Ω plus multi function aux. out.
- Storage for multiple instrument set-ups in non-volatile memory.
- Waveform Manager Plus for Windows software included.
- Programmable via USB and LAN (LXI) interfaces; GPIB optional.

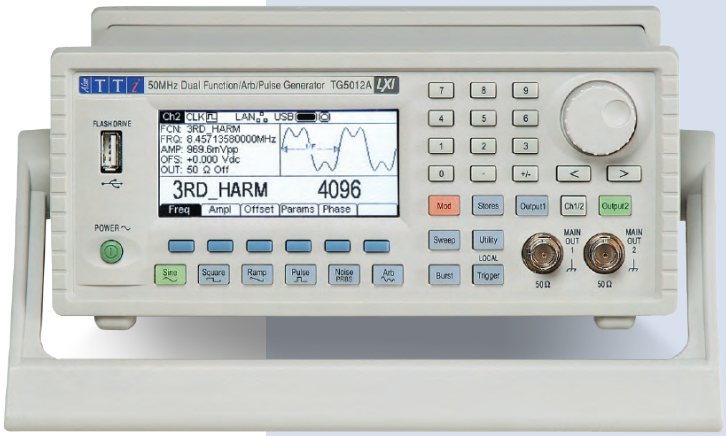
TG5012A & TG2512A

- Dual channel function generator
- 50MHz or 25MHz max. frequency
- Independent, coupled or tracking channel operation
- USB, LAN and optional GPIB

The TG5012A and TG2512A are two channel versions of the TG5011A/2511A, (detailed above) and have identical features augmented by multi-channel capabilities including coupling for frequency and/or level, full tracking, and defined phase offset.

The channels can also be used as completely independent generators and they represent excellent value for money when compared with buying two generators.

Full details are available on the website.



- Two channels - independent or linked with coupled/tracking modes.
- Selectable coupling of frequency (equal or offset), amplitude/dc offset.
- Inter-channel phase offset of -360° to +360° with 0.1° resolution.
- Individual channel features as TG5011A/TG2511A.

18. Arbitrary Generators - waveform generation

Measurably better value

ARB generator types

Arbitrary generator describes a class of digital generator potentially capable of reproducing any waveform shape. There are two distinctly different ways in which arbitrary waveforms can be produced - DDS and Variable Clock *.

Because each manufacturer may choose a different description for their product, it is not easy to know which underlying technology is being used.

There are three broad classes of arbitrary waveform generator:

1. Generators that use DDS (direct digital synthesis) for the production of both standard waveforms (function generator mode) and arbitrary waveforms.

These are most commonly described as either Function/Arbitrary Generators or Arbitrary/Function Generators (AFG).

2. Generators that use a variable clock architecture for the production of both standard waveforms and arbitrary waveforms. Within these generators a standard waveform is simply a specific instance of an arbitrary waveform.

These are most commonly described as Arbitrary Waveform Generators (AWG)

3. Generators that use DDS for the production of standard waveforms (function generator mode) and variable clock for generating arbitrary waveforms.

These may be described as Universal Arbitrary Waveform Generators or simply Arbitrary Waveform Generators (AWG) as in category 2.

* See the Aim-TTi website for more information about arbitrary generator architectures.

TGA overview

Aim-TTi generators with the TGA prefix are universal arbitrary waveform generators offering a choice of one, two or four channels.

Two series are available; the TGA1240 which has a maximum clock speed of 40MHz, and the TGA12100 which has a maximum clock speed of 100MHz, greater waveform memory length, and a number of additional features.

A key feature of both series is the universal architecture which combines the advantages of true variable clock arbitrary waveform generation with the benefits of DDS (direct digital synthesis) when acting as a function generator.

The two and four channel models offer exceptional flexibility with channels that can be fully independent or linked. In independent mode each channel is a completely separate generator offering not just differing frequency, amplitude and waveform but different operational modes.

For example one channels could be used as a function generator while another is used as an arbitrary generator and a third as a pulse generator.

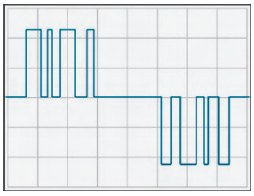
The channels can be set to provide inter-channel triggering, modulation or summing. Alternatively they can be linked to offer multi-channel phase controlled signals.

Universal Arbitrary Waveform Generators - comparison table (see also TG series - page 14)		
	TGA1240 series	**TGA12100 series**
Number of Channels	1, 2 or 4	1, 2 or 4
Arbitrary Waveforms		
Waveform Generation System	Variable Clock, 12 bit vertical resolution	
Clock Frequency Range	0.1Hz to 40MHz	0.1Hz to 100MHz
External ARB Clock	No	DC to 50MHz
Waveform Length	4 to 65,536 points	8 to 1,048,576 points
Internal Waveform Storage	Up to 100 waveforms	Up to 500 waveforms
Waveform Sequencing	Up to 16 waveforms	Up to 1024 waveforms
Arbitrary Waveform Editing	Internal or via Waveform Manager Plus software (supplied)	
Standard Waveforms (function generator mode)		
Waveform Generation System	DDS (Direct Digital Synthesis)	
Max. Frequency (sine/square)	16MHz/16MHz	40MHz/50MHz
Frequency Resolution (sine)	7 digits or 0.1mHz	10 digits or 0.1mHz
Minimum Frequency	0.0001Hz	0.0001Hz
Frequency Accuracy	Better than ±10ppm	
Waveform Functions	Sine, Square, Triangle, +ve/-ve Pulse, +ve/-ve Ramp, Pulse train, Cosine, Haversine, Havercosine, Noise (not 1240 series).	
Sinewave Purity	<0.1% to 100kHz <-35dBc at 10MHz	<0.15% to 100kHz, typically <-35dBc at 40MHz
Modulations		
Frequency Sweep (Range)	1mHz to 16MHz	1mHz to 40MHz
Frequency Sweep (Rate/Mode)	30ms to 999s, lin or log	1ms to 999s, lin or log
External AM/External Sum	Yes/Yes	Yes/Yes
Internal Trigger Generator	0.005 Hz to 100kHz	
Triggered Burst	1 to 1048575 cycles	
Variable Start-Stop Phase	0.1 degree resolution	
Other Modes	Gated, Tone Switching, FSK	
Inter-channel Modes (2 and 4 channel models)		
Channel Interactions	Inter-channel Modulation, Triggering, or Analog Summing for any number of channels	
Phase Locking	Any number of channels can be phase locked to 0.1 degree resolution plus 10ns uncertainty	
Output Characteristics		
Amplitude Range (pk-pk EMF)	5mV - 20V from 50Ω (display corrected for Hi-Z, 50Ω or 600Ω termination)	
DC Offset Range	±10V EMF	
Output Flatness	±0.2dB to 200kHz; ±1dB to 10MHz; ±2.5dB to 16MHz	±0.2dB to 1MHz; ±0.4dB to 40MHz
Other Features		
Auxiliary Output(s)	Multi-function output for Waveform Sync, Trigger Out, Sweep Sync., Marker	
Reference Clock In/Out	Input for external fixed reference clock or output of internal reference clock. Can be used to phase lock two or more generators	
Instrument Set-up Storage	9 stores	Up to 500 stores
Display	4 line backlit dot-matrix LCD	
Digital Interfaces	RS232/GPIB	RS232/USB/GPIB
Power: 230V or 115V AC nominal 50/60Hz, adjustable internally except for TGA12102/4 which are 100V to 230V, 50/60/400Hz. Size and weight: TGA1241 and TGA12101 are 3U half-rack: 212 x 130 x 335 mm (WxHxD). 4.1 kg (9 lb). TGA1242 and TGA1244 are 3U full (5/6) rack: 350 x 130 x 335 mm (WxHxD). 7.1 kg (15.6 lb) TGA12102 and TGA12104 are 3U full (5/6) rack: 350 x 130 x 335 mm (WxHxD). 6.0 kg (13.2 lb)		

Arbitrary, function and pulse

Each channel of a TGA series generator can be used as an arbitrary generator, function generator, or pulse pattern generator.

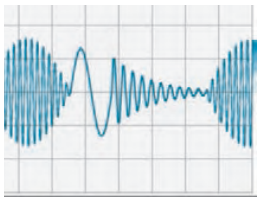
As a pulse generator a pattern of up to ten pulses can be defined with each pulse having its own amplitude, width and delay. The complete pattern can then be replayed at a user defined repetition rate.



Waveform sequencing

Sequencing enables complex waveforms to be constructed by sequencing simpler elements.

To understand the benefits of sequencing go to: www.aimtti.com/go/arb

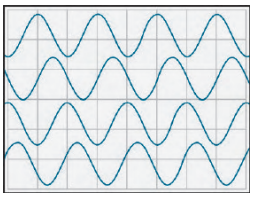


Multi-channel phase locking

Multi-channel TGA series generators can be used to generate multi-phase signals

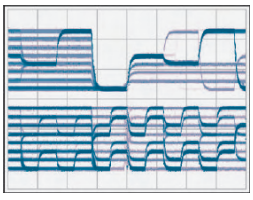
Any number of channels can be phase locked with offsets defined to a resolution of 0.1 degrees.

TGA12100 models can also be phase locked to an external clock and provide phase continuous frequency changes with a varying external signal.



Multi-channel modulation

Inter-channel modulation and summing allows the creation of complex modulation systems for simulation and testing.



TGA1240 Series

- 40MS/s universal arbitrary waveform generators
- One, two or four channels
- Variable clock ARB architecture
- DDS based function generator
- Independent or linked channels
- Pulse train generation
- RS-232 and GPIB interfaces

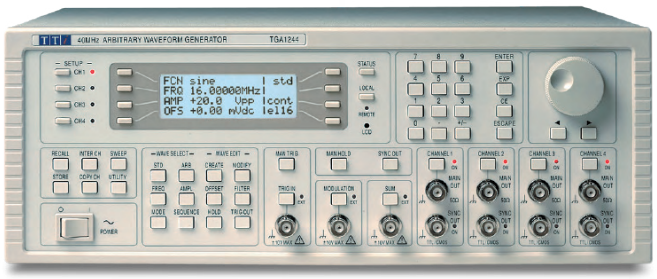
The TGA1240 series are universal arbitrary waveform generators that combine a high performance arbitrary waveform generator, pulse train generator and DDS function generator on each channel.

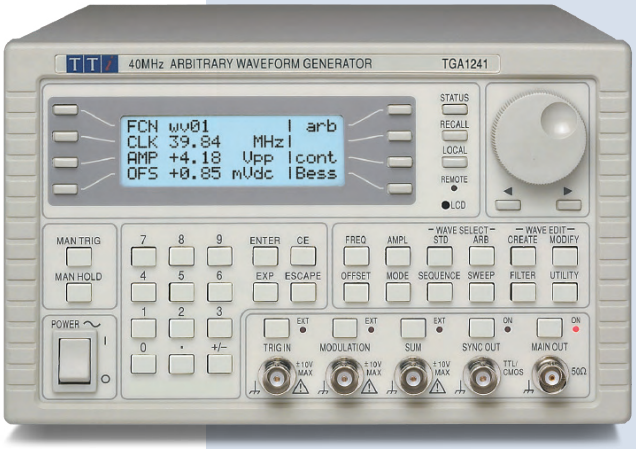
Variable clock architecture eliminates sampling jitter and enables complex waveforms to be created using waveform sequencing.

Multi-channel units can be operated as completely independent signal sources, phase locked sources, or interlinked sources using inter-channel triggering, modulation or summing.

- 1, 2 or 4 waveform channels, independent or linked.
- 40MS/s maximum sampling, (0.1Hz to 40MHz variable clock).
- 65,536 point waveform memory per channel.
- Non-volatile storage for up to 100 waveforms
- Complex waveform sequencing and looping capability.
- Inter-channel triggering, summing and phase control.
- 16MHz function generator capabilities using DDS.
- Multiple 'standard' waveforms including sine, square, triangle, haversine, ramp, pulse and sin(x)/x.
- Pulse train generation for up to 10 pulses.
- Wide range sweep, AM, tone switching, signal summing.
- Tone switching facilitates precision DTMF generation.
- Built-in trigger generator, gated & triggered burst modes.
- Fully interfaceable via RS-232 and GPIB (IEEE-488.2).

Further details are provided in the comparison table opposite. Full details are available on the website.





Model Range:

TGA1241 - single channel
TGA1242 - two channels
TGA1244 - four channels

RS-232 RS-423 GPIB IEEE-488

TGA12100 Series

- 100MS/s universal arbitrary waveform generators
- One, two or four channels
- 1M word waveform memory
- External ARB clock input
- Storage on CF memory cards
- RS-232, GPIB and USB interfaces

Model Range:

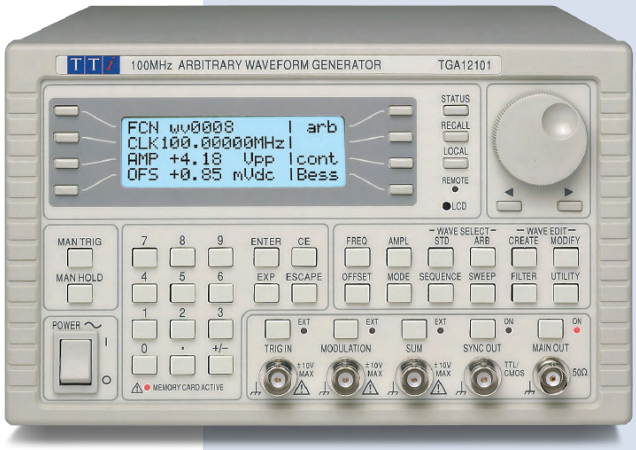
TGA12101 - single channel
TGA12102 - two channels
TGA12104 - four channels

RS-232 RS-423 GPIB IEEE-488

The TGA12100 series offers all of the features of the TGA1240 series with extended sampling speed and memory depth.

It also includes a number of additional features such as an external ARB clock input that extends the capabilities further.

- Features as per the TGA1240 series with the following additions:
- 100MS/s maximum sampling, (0.1Hz to 100MHz variable clock).
- 1,048,576 point waveform memory per channel.
- Waveform storage using removable CompactFlash memory cards.
- 40MHz function generator capabilities using DDS.
- External ARB clock input for synchronism with external signals.
- "System clock" architecture for reduced inter-channel skew.
- Auxiliary sinewave output (3rd or 5th output) on TGA12102/4.
- RS-232 and GPIB (IEEE-488.2) and USB interaces.



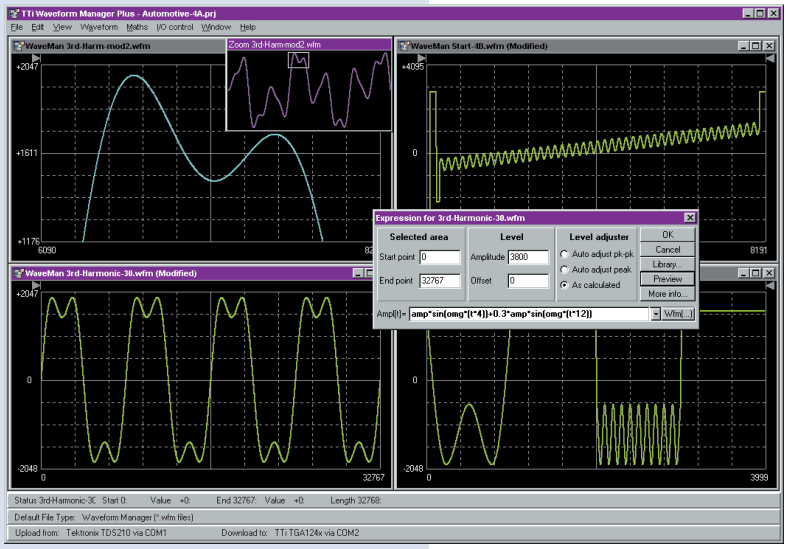
20. Waveform Software / Waveform Amplifier - waveform generation

Measurably better value

Waveform Manager Plus software

- Waveform creation, editing, import and management
- Full waveform building tools
- Pattern generation tools
- Interface via RS232, USB, LAN or GPIB

Waveform Manager Plus is supplied with all Aim-TTi generators that have arbitrary waveform capability.
Full details of the software capabilities are available on the website.



Aim-TTi arbitrary generators include a built-in waveform creation/editing facility that includes point-by-point value insertion, straight line interpolation between points and standard waveform insertion between points.

However, complex arbitrary waveforms will need to be generated using sophisticated software tools outside of the instrument and transferred using a digital interface.

Waveform Manager Plus is a Windows program that offers the most comprehensive range of waveform creation and editing tools available including a full mathematical expression generator and freehand drawing tools.

Waveform Manager Plus is supplied as standard with all TGA series generators, TG1010A, TGP3100 series, TG251xA and TG501xA generators and TGF series generators.

Waveform Manager Plus can also be used to import waveforms from other software programs or other hardware devices and to scale and crop these waveforms for compatibility with the target arbitrary generator.

- Full waveform building tools including standard waveforms, mathematical expressions, clipboard functions and freehand drawing.
- Compatible with Windows 2000 to Windows 10.
- Vertical resolutions up to 16 bits (65536 points).
- Horizontal resolutions to over one million points.
- Pattern generation tools for use with TGP31xx
- Waveform import/export via clipboard functions.
- Direct import from CSV files
- Download and upload via RS232, USB, GPIB, LAN.

WA301 Waveform Amplifier

- Up to 30 volts pk-pk output
- DC to 1 MHz bandwidth

The WA301 wide-band waveform amplifier is intended for extending the maximum output voltage swing of function and arbitrary generators for applications where an EMF of 20 volts pk-pk is insufficient.

- 30 V pk to pk output (15 V into terminating impedance)
- 50Ω and 600Ω outputs; full output protection
- Switchable 20dB output attenuator
- DC to 1MHz bandwidth
- High impedance input; 0dB to +20dB gain

30. Signal Generators - RF & EMC test equipment

Measurably better value

TGR1040

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

Note: Full technical details are available on the website.

- 10MHz to 1000MHz frequency range
- Accuracy better than 1ppm over 15°C to 30°C
- Ageing better than 1ppm over one year
- Low phase noise and low leakage
- -127dBm to +7dBm amplitude, 0.1dB steps
- Amplitude entry in dBm or µV / 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.

RS-232 / RS-423 GPIB IEEE-488 OPTIONAL

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 website.

- 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 1ppm over one year
- Low phase noise and low leakage
- -127dBm to +7dBm amplitude, 0.1dB steps
- Amplitude entry in dBm or µV / 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.

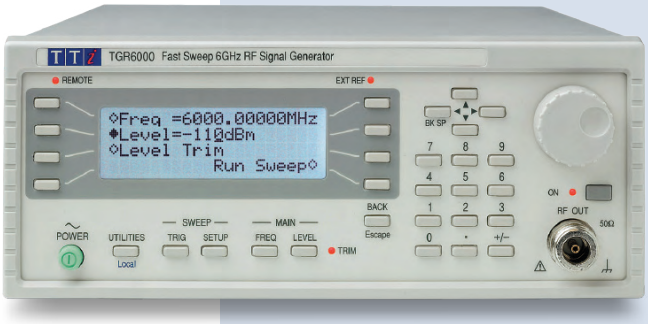
Remote control via RS232 and GPIB is included.

RS-232 / RS-423 GPIB IEEE-488

TGR6000

- 6 GHz signal generator
- -110dBm to +7dBm
- High speed sweep
- USB, RS-232, GPIB & LAN

Note: Full technical details are available on the website.



- 10MHz to 6000MHz frequency range
- Accuracy better than 1ppm over 15ºC to 30ºC
- Ageing better than 1ppm over one year
- Low phase noise and low leakage
- -110dBm to +7dBm amplitude, 0.1dB steps
- Amplitude entry in dBm, µV / mV, or dBµV
- User compensation tables for specific test set-ups
- Fast stepping sweep with dwell times down to 10ms
- Internal or externally triggered sweep, lin or log, up or down
- List sweep of up to 1000 points of amplitude versus frequency
- Non-volatile storage for 12 generator set-ups and 16 sweep lists
- Compact half-rack 2U casing uses minimum bench space
- Full remote control through RS232, USB, GPIB and LAN
- Significantly lower cost than other 6GHz generators

LAN ETHERNET · USB UNIVERSAL SERIAL BUS · RS-232 RS-423 · GPIB IEEE-488

The TGR6000 is a highly cost effective solution for engineers requiring a high quality generator operating up to 6GHz.

No modulations are incorporated, but rapid settling times enables a fast stepped sweep.

Level trim allows amplitude to be adjusted at various frequencies to match the requirements of specfic test set-ups. List sweep enables up to 1000 points of amplitude versus frequency to be defined.

TGR2051/2053

- 1.5GHz/3GHz signal generators
- -127dBm to +13dBm
- Extensive modulations set
- USB, RS-232, GPIB & LAN

Note: See website for more details following release.

NEW

- 100kHz to 1.5GHz or 3GHz frequency range with 10Hz setability
- -127dBm to +13dBm amplitude, 0.1dB steps
- Extensive modulation set including AM, OOK, ASK, FM, FSK, GFSK, MSK, GMSK, PM, PSK, GPSK
- High accuracy/stability internal timebase, or locking to external frequency standard
- Low phase noise and low leakage
- Amplitude entry in dBm or µV / mV
- FM, Phase and AM modulation, internal or external
- Advanced user interface with touch-screen offering numeric or rotary adjustments
- Step sweep and List sweep with level compensation tables
- USB, GPIB and LXI compliant LAN interfaces

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