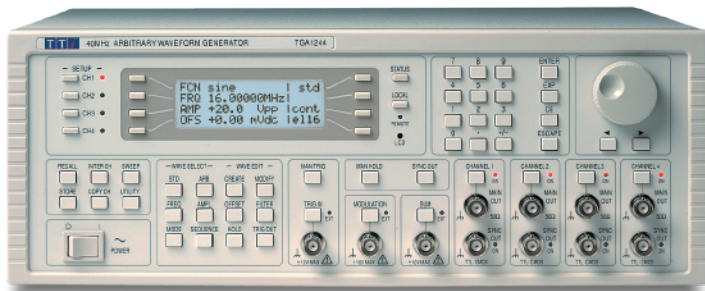The TGA1240 series are universal arbitrary waveform generators that combine a high performance arbitrary waveform generator, pulse train generator and DDS function generator on each channel.

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 over page. Full details are available on the web site.

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
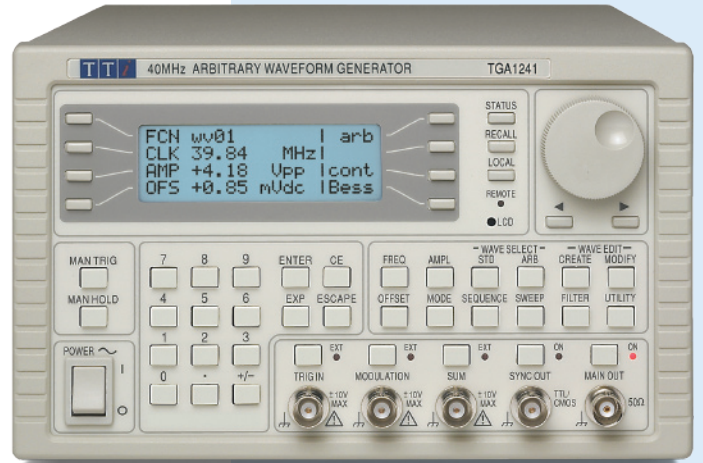
Model Range:
TGA1241 - single channel
TGA1242 - two channels
TGA1244 - four channels

◀

Model Range:
TGA12101 - single channel
TGA12102 - two channels
TGA12104 - four channels
▶

TGA12100 series

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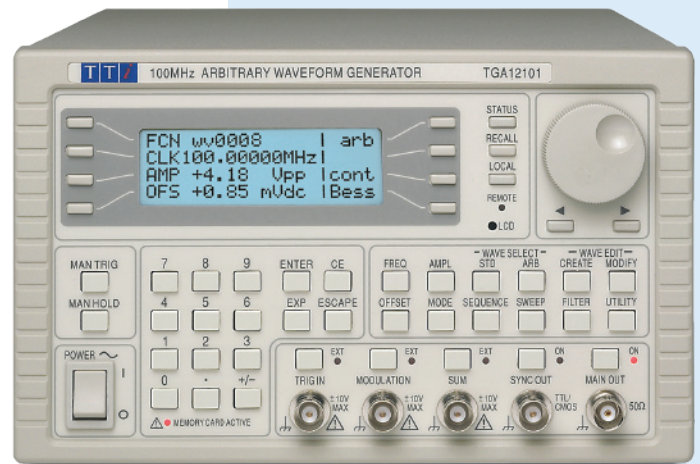- ▶ Storage on CF memory cards
- ▶ RS-232, GPIB and USB interfaces

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.

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 web site 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 Analogue 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, TGA12101 and TG4001 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.
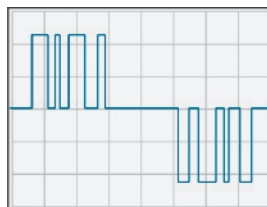
Waveform sequencing

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

To understand the benefits of sequencing go to: www.aimtti.com/go/arb
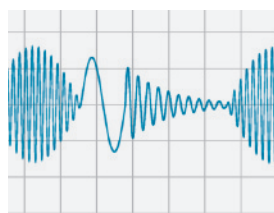
Multi-channel phase locking

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.
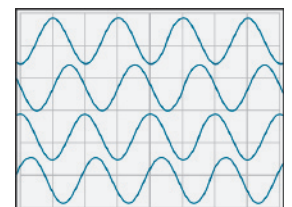
Multi-channel modulation

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