TELEDYNE TEST TOOLS
Everywhereyoulook™

T3AWG6K Series Data Sheet

Arbitrary Waveform Generator
2, 4 and 8 Channel Configuration

Telemeter Electronic

Sample Rate up to 12.32 GS/s in RF mode

• 16 Bit Vertical Resolution	✔ Exceptional signal fidelity for developing quality products with a reduced design cycle.
• up to 5 V_{pp} Output Voltage and ±2.5 V HW Baseline Offset for a total output voltage window ±5 V or 10 V (50 Ohm)	✔ Unmatched wide output voltage window enables generating challenging in amplitude large-signal waveforms.
• 4 GPts Waveform Memory per Channel	✔ Unmatched deep memory depth allows to store and reproduce complex pseudo-random waveforms for long play time testing.
• Up to 32 Digital Channel in synchronous with Analog Generation	✔ Mixed Signal Generation for debugging and validating analog and digital design.
• Multifunctional solution instrument (AFG/AWG/DPG)	✔ Arbitrary Function Generator, Arbitrary Waveform Generation and Digital Pattern Generation functionalities into one instrument.

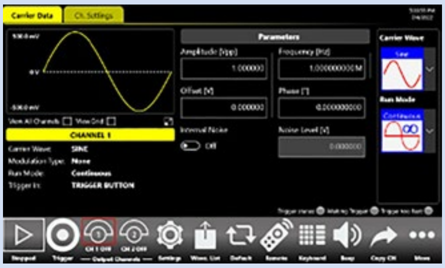
Standard warranty is one year.

Key Specifications

Model	T3AWG6062	T3AWG6064	T3AWG6068
Number of Analog Channels	2	4	8
Vertical Resolution	16 bits		
Output Voltage	up to 5 V_{pp} and ± 2.5 V Baseline Hardware offset (50 Ohm into 50 Ohm)		
Sampling Rate	up to 6.16 GS/s variable clock (12.32 GS/s in RF mode) for AWG and 6.16 GS/S fixed in AFG		
Waveform Memory	4 Gpts per channel		
Digital Pattern Generator (DPG)	up to 8 Digital Channels	up to 16 Digital Channels	up to 32 Digital Channels
Waveforms Sequencing	up to 16.384 waveforms, length granularity of 1 point (> 384 Pts.)		

AFG Operational Mode

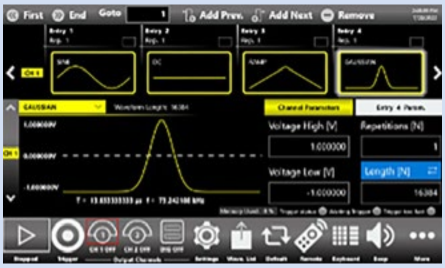
- Improved Direct Digital Synthesis (DDS) based technology
- Fixed Sampling Clock – 6.16 GS/s



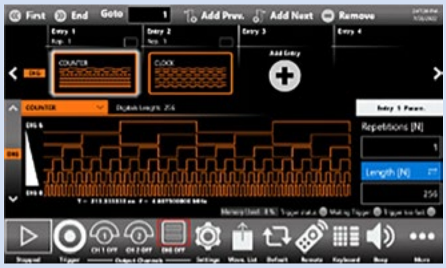
Arbitrary Function Generation (AFG functionality)

AWG Operational Mode

- Variable Clock True-Arbitrary Technology
- Variable Sampling Clock – from 1 S/s to 6.16 GS/s (12.32 GS/s in RF mode)
- Mixed Signal Generation: 2/4/8 Analog Channels and 8/16/32 synchronized Digital Channels[1)]



Arbitrary Waveform Generation (AWG functionality)



Digital Pattern Generation (DPG functionality)

[1)] See Digital Channel Selection Guide, page 16

Three different features on the same platform for a multifunctional generator

T3AWG6062, T3AWG6064 and T3AWG6068 are multi-functional generators that combines many functions in one instrument, i. e. Arbitrary Function Generator, Arbitrary Waveform Generator and Digital Pattern Generator.

These three-different functionalities are leveraging on the HW flexibility adopting two different technologies.

An improved Direct Digital Synthesis (DDS) based technology adopted when using the Function Generator (AFG) lets the user to change glitch free on-the-fly all the parameters preserving the waveform shape.

All control and setting are always one touch away: swipe gesture to change the channel, the carrier selection and have access to the modulation parameters, swipe into the waveform gallery to import a signal at a glance and use the touch-friendly virtual numeric keyboard to change parameters values.

The variable clock, true-arbitrary technology adopted when using the Arbitrary Waveform / Digital Pattern Generator lets the user to create complex waveforms of analog and digital pattern, insert them is a sequence, apply loops, jumps and conditional branches. Digital output combined and synchronized with analog output signals represents an ideal tool to troubleshoot and validate digital design.

The waveform memory length of 4 GPts on each channel combined with number of waveforms entries up to 16,384 and the waveform repeat count higher then $4\ 10^9$ or infinite make the T3AWG6062, T3AWG6064 and T3AWG6068 the best-in-class waveform generators for the most demanding technical applications.

This innovative and disruptive hardware architecture combined with 16-bit vertical resolution and 4 Gpts waveform memory depth, makes the T3AWG6062, T3AWG6064 and T3AWG6068 the ideal generators for today's and tomorrow's test challenges.

Applications and Key Industries at a glance

Multi-channel Stimulus-Response Testing

The T3AWG6K series arbitrary waveform generator delivers exceptional performance for creation of complex wideband waveforms. Up to 8 channels are available in a single instrument with 5 GHz bandwidth in @RF mode with 16-bit resolution and a sampling rate of 12.32 GS/s in @RF mode. Ideal for use in a Stimulus-Response measurement model with Digital Storage Oscilloscopes HD.

Different signal emulations

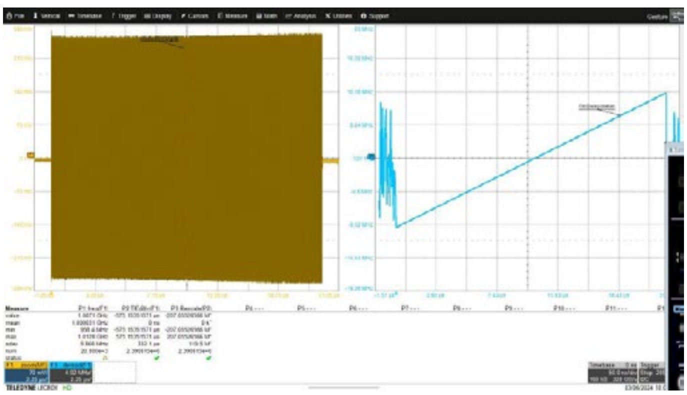
Emulation of	Stimulus-response testing case:
@perfect signal	DUT response behavior is not influenced by uncontrolled and unknown distortions
@real-world signal	DUT response behavior before any signal source can be available. (Playback of signals acquired using the oscilloscope and imported into the AWG)
@extreme condition signal	DUT response behavior in difficult conditions and corner cases (stress and margin tests)
@noise and interference signal	DUT response behavior with interference signals and noise added to the expected signal (noise and interference immunity)

Function/Arbitrary Waveform Generator (AWG), stimulus

Device Under Test (DUT)

Digital Storage Oscilloscope HD, Response

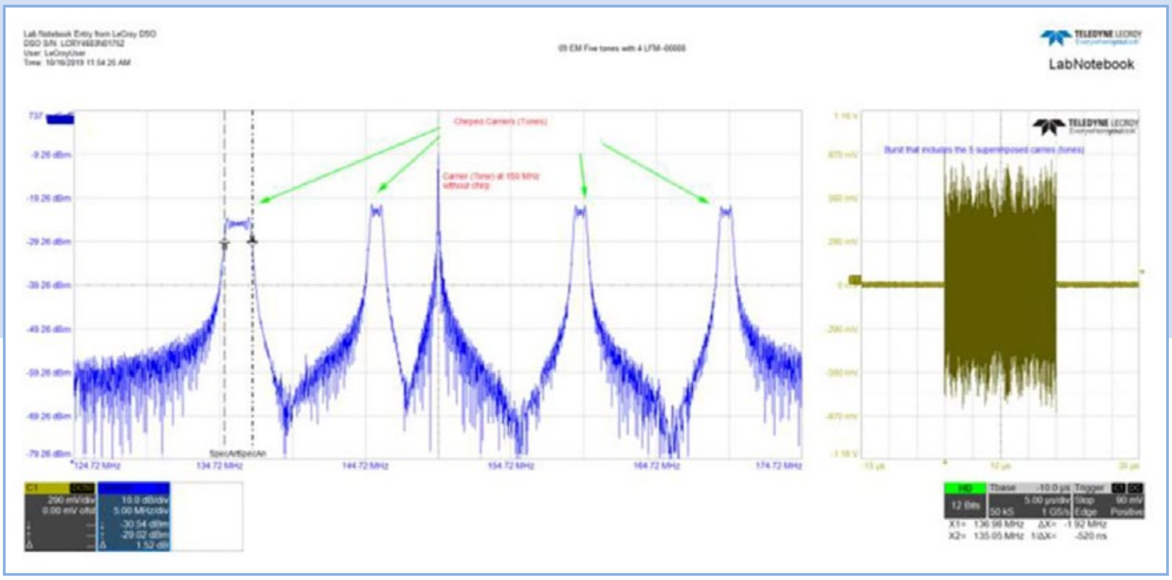
Phase Coherence Baseband, IF and I/Q signals emulation



The T3AWG6K series can produce a wide range of modulations and signal scenarios. In fact, you can rely on the function generation operating mode (AFG) using improved direct digital synthesis (DDS) technology and a powerful and flexible waveform sequence in the arbitrary waveform generation mode (AWG) using variable-clock true-arb technology. In addition, the ability to generate up to 32 digital channels synchronously with analog signals enables efficient and adaptive testing with complex signal emulation.

Complex Radio Frequency (RF) signal generation

Nowadays, RF engineers find it difficult to create the signals required for compliance and stress tests, simply because signals are becoming increasingly complex and require very precise phase related components. The T3AWG6K series arbitrary waveform generators can support all the today and tomorrow design and test challenges. This is also thanks to the SW Waveform Editor utility which allow to create new arbitrary and complex waveforms in a simple, flexible, and affordable way and the ability to capture real-life waveforms directly acquired by real-time oscilloscopes.

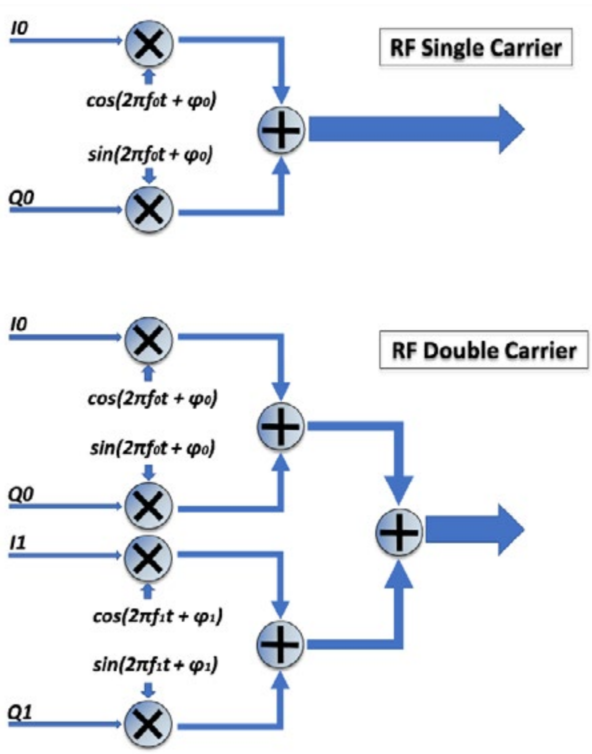


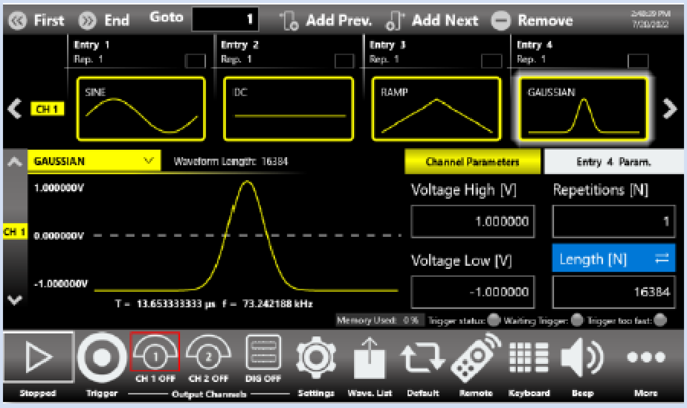
Digital IQ modulator with a single or double carrier (RF mode)

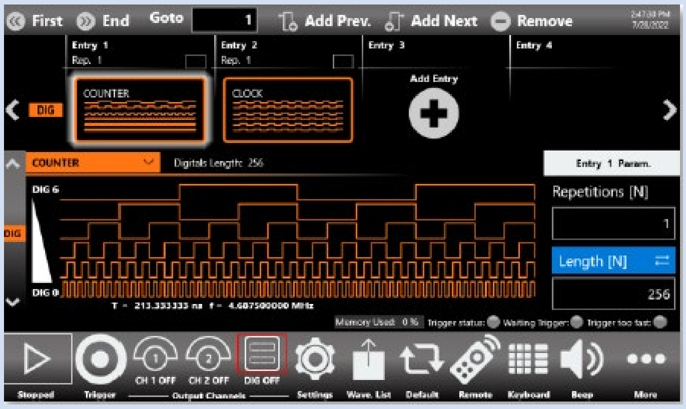
The RF mode gives a more advanced feature for creating and generating IQ modulated RF signals with a single or double carrier. This feature is available with all the T3AWG6K series platforms.

There are many applications where the RF mode is critical, starting from general applications, multi-channel arbitrary waveform generation, to satellite and radar testing, and ending with telecommunication I/Q communication signals.

With this internal IQ modulation feature, you do not need any more external modulators and mixers, so removing the cause of uncertainty for IQ mismatch, increasing the accuracy and the flexibility of the measurements. For every IQ component, it is possible select the shape of the waveform from the drop-down list, i.e waveform list, the amplitude, and the Voltage offset, while the Repetitions number and Length parameters will remain a specific setting of the entry. The sampling rate of the instrument for the RF mode pass from (up to) 6,16 GS/s of the Base Band mode, to (up to) 12,32 GS/s.







Waveform Sequencing with digital and analog synchronized signals

T3AWG6K can reproduce the signal in any case, whether you know how to define or can acquire the waveform.
If you know how to define the waveform you can use the SW Waveform Editor utility that allows you to create the waveform in a simple, flexible, and affordable way.

If, on the other hand, the signal is acquired using a digital storage real-time oscilloscope, the waveform can be imported with simple steps into T3AWG6K arbitrary waveform generator and then played back as is or modified. But there is more. These waveforms can be a simple waveform entry into a more complex and articulated signal using the waveform sequencing.

In fact, the user can have up to 16,384 waveform entries of analog waveforms and digital patterns, define their execution flow by means of loops, jumps and conditional branches. Digital output combined and synchronized with analog output signals represent a must-have tool to troubleshoot and validate the modern mixed signal design including analog and synchronous digital signals. The waveform memory length is 4 GSamples for each channel to fit the most challenging applications.

In conclusion we can say that T3AWG6K arbitrary waveform generator represents an easy way to a seamless transition from simulation to generation for your lab.

Key Industries

Today's cars are including highly sophisticated electronic with very sensitive electronic components.

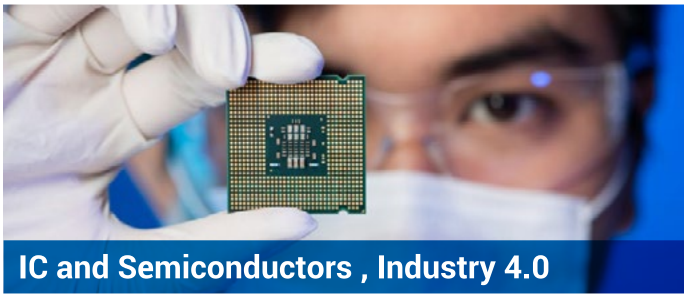
- 16-bit vertical voltage output resolution
- Waveform Sequencing adding noise and interference for EMI testing.
- Wide total output voltage window ±5 V or 10 V (into 50 Ohm)

Radar test and electronic warfare require to create specific complex true-to-life signals.

- Output RF signals directly up to 6 GHz (RF mode 12 GS/s)
- Built-in digital I/Q with a single or double carrier
- Wide output voltage ranges up to 5 V_{pp} and ±2.5 V HW Baseline Offset

Leading edge research in electronics physics, electronics, chemistry, mechanics, and other disciplines

- 4 GPts @Ch deep waveform memory
- Playback of signals acquired using the oscilloscope and imported into the T3AWG6K.
- Channel coupling for generating seamless phase related analog and digital signals.



Today's IC, components, and sensors are highly reliable extending the operating range in many variables.

- Separate or coupled per channel control of channel skew, frequency, gain, and offset.
- Signal BW up to 2.8 GHz BW per channel (6 GHz per channel in RF mode)
- Up to 32 digital channels synchronized with analog channels.

Automate your test and measurement requirements

Waveform generation for AFG and AWG operating modes and advanced remote instrument control

T3AWG6K series are easily added to your automated test environment. In addition to the programing manuals, which include the complete list of ASCII SCPI commands, programming examples are available for both the AFG (Function Generator) and AWG (Arbitrary Waveform Generator) operating modes. These programming examples make it easy to connect to a powerful graphical programming environment like LabView™, take full advantage of the visualization and programming capabilities found in MATLAB™, or use the flexibility offered by PYTHON or the .NET programming languages. Load waveforms, create sequences, change waveforms parameters, and enable signal generation directly from the PC.

MODEL SPECIFIC SPECIFICATIONS

General Specifications

	T3AWG6062	T3AWG6064	T3AWG6068
Number of Channels			
Analog	2	4	8
Digital	0, 8	0, 8, 16	0, 8, 16, 32
Markers	1	2	4
Operating Modes			
Function Generator	AFG, Improved Direct Digital Synthesizer (DDS) based Technology		
Arbitrary Waveform Generator	AWG, Variable Clock "True Arb" Technology		
Output Channels			
Output type	Single ended DC coupled		
Output impedance	Single ended: 50 Ω		
Connectors	SMA on front panel		
DC Amplitude			
Voltage Range	± 2.5 V (into 50 Ω)		
Resolution	100 µV (nom), 5 digits		
Amplitude Accuracy	± (1 % of |setting| + 5 mV)		
DC Baseline Hardware Offset			
Range (50 Ω into 50 Ω)	-2.5 V to +2.5 V		
Range (50 Ω into High Impedance)	-2.5 V to +2.5 V		
DC Baseline Accuracy (50 Ω into 50 Ω)	± (1 % of |setting| + 5 mV)		
AC Accuracy (1 kHz sine wave, 0 V offset, > 5 mV_{p-p} amplitude, 50 Ω load)	± (1 % of setting [V_{pp}] + 5 mV) [1)]		

[1)] Specifications is valid in the range 0 % to 90 % of full scale output

AFG mode Specifications

	T3AWG6062	T3AWG6064	T3AWG6068
General Specifications			
Operating Mode	Direct Digital Synthesizer (DDS)		
Sample Rate (SR)	6.16 GS/s (fixed)		
Amplitude Range	0 to 5 V_{pp} (into 50 Ω)		
Amplitude Resolution	100 µV (nom), 5 digits		
Run Modes	Continuous, modulation, sweep, burst		
Standard Waveforms	Sine, Square, Pulse, Ramp, more (Noise, DC, Sin(x)/x, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine		
Arbitrary Waveforms	Vertical resolution: 16-bit, Waveform length: 16,384 points		
Internal Trigger Timer			
Range	10.4 ns to 88 s		
Resolution	80 ps		
Accuracy	± (0.1 % setting + 5 ps)		

MODEL SPECIFIC SPECIFICATIONS

	T3AWG6062	T3AWG6064	T3AWG6068
Sine Waves			
Frequency Range Sine (50 Ω into 50 Ω) [1]	1 µHz to ≤ 1 GHz: 5 V_{pp}		
	1 GHz to ≤ 2 GHz: 4 V_{pp}		
Flatness	DC to 2 GHz: ± 0.5 dB (1 V_{pp}, relative to 1 kHz)		
Harmonic Distortion (1 $V_{p\text{-}p}$)	1 µHz to ≤ 20 kHz < -75 dBc		
	20 kHz to ≤ 400 MHz < -70 dBc		
	400 MHz to ≤ 1 GHz < -60 dBc		
	1 GHz to ≤ 2 GHz < -55 dBc		
Total Harmonic Distortion (1 $V_{p\text{-}p}$)	10 Hz to 20 kHz < 0.05 %		
Spurious (measured across DC to 3.08 Ghz) [2]	1 µHz to ≤ 500 MHz: < -75 dBc		
	500 MHz to ≤ 1.5 GHz: < -70 dBc		
	1.5 GHz to ≤ 2 GHz: < -55 dBc		
Phase Noise (1 $V_{p\text{-}p}$, 10 kHz offset)	20 MHz: < -127 dBc/Hz typ.		
	100 MHz: < -123 dBc/Hz typ.		
	1 GHz: < -105 dBc/Hz typ.		
Square Waves			
Frequency Range Sine (50 Ω into 50 Ω) [1]	1 µHz to ≤ 770 MHz		
Rise/fall time (10 % to 90 %)	400 ps		
Rise/fall time (20 % to 80 %)	300 ps		
Overshoot (1 $V_{p\text{-}p}$)	< 2 %		
Jitter (rms)	< 2 ps		
Pulse Waves			
Frequency Range	1 µHz to ≤ 770 MHz		
Pulse width [3]	500 ps to (Period – 500 ps)		
Pulse width Resolution	20 ps or 15 digits		
Pulse duty	0.1 % to 99.9 % (limitations of pulse width apply)		
Leading/trailing edge transition time (10 % to 90 %)	400 ps to 1,000 s		
Leading/trailing edge transition time (20 % to 80 %)	300 ps to 1,000 s		
Transition time Resolution	2 ps or 15 digits		
Overshoot (1 $V_{p\text{-}p}$)	< 2 %		
Jitter (rms, with rise and fall time ≥ 400 ps)	< 2 ps		
Double Pulse Waves			
Frequency Range	1 µHz to ≤ 385 MHz: 10 V_{pp} (V_{pp} = |V_{pp}1\| + \|V_{pp}2|)		
Other Pulse Parameters	See Pulse Waves		
Ramp Waves			
Frequency Range	1 µHz to 75 MHz		
Linearity (< 10 kHz, 1 $V_{p\text{-}p}$, 100 %)	≤ 0.1 %		
Symmetry	0 % to 100 %		

1) Amplitude doubles on High Impedance load
2) Spurious are evaluated @1 V_{pp} single ended nominal output amplitude
3) Below 500 ps width, the pulse amplitude will have some reduction respect to the set value

MODEL SPECIFIC SPECIFICATIONS

	T3AWG6062	T3AWG6064	T3AWG6068
Other Waves			
Frequency Range			
Exponential Rise, Exponential Decay	1 µHz to 75 MHz		
Sin(x)/x, Gaussian, Lorentz, Haversine	1 µHz to 150 MHz		
Additive Noise			
Bandwidth (-3 dB)	2 GHz		
Level	0 V to 2.5 V – abs (carrier max value [Vpk])		
Resolution	1 mV		
Frequency Resolution			
Sine, square, pulse, arbitrary, Sin(x)/X	1 µHz or 15 digits		
Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine	1 µHz or 14 digits		
Frequency Accuracy			
Non-ARB	± 2.0 ppm of setting | ± 500 ppb of setting (Opt.)		
ARB	± 2.0 ppm of setting ±1 µHz | ± 500 ppb of setting ±1 µHz (Opt.)		
Arbitrary			
Number of Samples	2 to 16,384		
Frequency range	1 µHz to ≤ 770 MHz		
Analog Bandwidth (-3 dB)	950 MHz		
Rise/fall time (10 % to 90 %)	400 ps		
Rise/fall time (20 % to 80 %)	300 ps		
Jitter (rms)	< 2 ps		

Modulations

Amplitude Modulation (AM)	
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB
Modulation source	Internal or external
Internal modulating waveforms	Sine, Square, Ramp, Noise, ARB
Modulating frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz max.
Depth	0.00 % to 120.00 %
Frequency Modulation (FM)	
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB
Modulation source	Internal or external
Internal modulating waveforms	Sine, Square, Ramp, Noise, ARB
Modulating frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz max.
Peak deviation	DC to 2 GHz
Phase Modulation (PM)	
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB
Modulation source	Internal or external
Internal modulating waveforms	Sine, Square, Ramp, Noise, ARB
Modulating frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz max.
Peak deviation range	0° to 360°

MODEL SPECIFIC SPECIFICATIONS

	T3AWG6062	T3AWG6064	T3AWG6068
Frequency Shift Keying (FSK)			
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB		
Modulation source	Internal or external		
Internal modulating waveforms	Square		
Key rate	Internal: 500 µHz to 61 MHz, External: 10 MHz max.		
Hop frequency	DC to 2 GHz		
Number of keys	2		
Phase Shift Keying (PSK)			
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB		
Modulation source	Internal or external		
Internal modulating waveforms	Square		
Key rate	Internal: 500 µHz to 61 MHz, External: 10 MHz max.		
Hop frequency	0° to +360°		
Number of keys	2		
Pulse Width Modulation (PWM)			
Carrier waveforms	Pulse		
Modulation source	Internal or external		
Internal modulating waveforms	Sine, Square, Ramp, Noise, ARB		
Modulating frequency	Internal: 500 µHz to 61 MHz, External: 10 MHz max.		
Deviation range	0 % to 50 % of pulse period		
Sweep			
Type	Linear, Logarithmic, staircase, and user defined		
Carrier waveforms	Standard waveforms (except Pulse, DC and Noise), ARB		
Sweep time	30 ns to 2,000 s		
Hold/return times	0 to (2000 s – 30 ns)		
Sweep/hold/return time resolution	15 ns or 12 digits		
Total sweep time accuracy	≤ 0.4 %		
Start/stop frequency range	Sine: 1 µHz to 2 GHz, Square: 1 µHz to 770 MHz		
Trigger source	Internal/External/Manual		
Burst			
Waveforms	Standard waveforms (except DC and Noise), ARB		
Type	Trigger or gated		
Burst count	1 to 4,294,967,295 cycles or Infinite		

True Arb – Baseband mode Specifications

	T3AWG6062	T3AWG6064	T3AWG6068
General Specifications			
Operating Mode	Variable clock (True Arbitrary) – Baseband mode		
Sample Rate (SR)	1 S/s to 6.16 GS/s		
Sin(x)/x -3 dB bandwidth	2.72 GHz @ 6.16 GS/S		
Run Modes	Continuous, Triggered Continuous, Single/Burst, Stepped, Advanced		
Vertical Resolution	16 bit		
Max Waveform Length	4 G samples @channel		
Waveform Granularity	1 if the entry length is > 416 samples,		
	32 if entry length is ≥ 128 and ≤ 416 samples		
Sequence Length	1 to 16,384		
Sequence Repeat Counter	1 to 4,294,967,294 or infinite		
Timer			
Range	20 ns to 1.39 seconds		
Resolution	± 1 sampling clock cycle		
Analog Channel to Channels skew			
Range	0 to 2.63 µs		
Resolution	100 fs		
Accuracy	± (1 % of setting + 20 ps)		
Initial Skew	< 20 ps		
Calculated bandwidth (0.35/rise time)	≥ 2 GHz		
SFDR @ 100 MHz [4]	< -80 dBc		
SFDR [4]	1 µHz to ≤ 600 MHz: < -80 dBc		
	600 MHz to ≤ 1.5 GHz: < -75 dBc		
	1.5 GHz to ≤ 2 GHz: < -65 dBc		
	2 GHz to ≤ 3 GHz: < -55 dBc		
Rise/fall time (1 V_{p-p} single-ended 10 % to 90 %)	≤ 175 ps		
Rise/fall time (1 V_{p-p} single-ended 20 % to 80 %)	≤ 110 ps		
Overshoot (1 V_{p-p} single-ended)	< 5 %		
Random jitter on clock pattern (rms, typical)	< 2 ps		
Timing and Clock			
Sampling Rate			
Range	1 S/s up to 6.16 GS/s		
Range in RF mode	1 S/s to 12.32 GS/S		
Resolution	32 Hz		
Accuracy	± 2.0 ppm		
Digital outputs (Optional)			
Output Channels			
Connectors	Mini-SAS HD connector on rear panel (custom pin-out)		
Number of connectors	1, 2, 4		
Number of outputs	8-bits, 16-bits, 32-bits		
Output impedance	100 Ω differential		
Output type	LVDS		
Rise/fall time (10 % to 90 %)	< 1 ns		
Jitter (rms)	20 ps		
Maximum update rate	1.54 Gbps per channel		
Memory depth	1 GSamples per digital channel		

[4] Measured across DC to Fs/2, excluding fsa – 2*fout and fsa – 3*fout and excluding harmonic where Fsa = 6.16 Gsa/s.

True Arb – RF mode Specifications

	T3AWG6062	T3AWG6064	T3AWG6068
General Specifications			
Operating Mode	Variable clock (True Arbitrary) – RF mode		
Output Sample Rate (SR)	8.5 GS/s to 12.32 GS/s		
Sin(x)/x -3 dB bandwidth	5.04 Ghz @ 12.32 GS/S		
RF Modulation	I/Q quadrature		
RF Carrier count per output channel	Single Carrier (2 components I0, Q0 for channel)		
	Double Carrier (4 components, I0, Q0 and I1, Q1 for channel)		
RF Carrier Frequency range	0 up to 6 GHz		
RF Carrier Frequency resolution	1 mHz		
RF Carrier Phase	Programmable		
I/Q Component Data Rate	1/8 of the Output Sample rate		
I/Q Component Prescaler	0 to 2^32		
Run Modes	Continuous, Triggered Continuous, Single/Burst, Stepped, Advanced		
I/Q Component Vertical Resolution	16 bit		
I/Q Component Waveform Length	32 M to 500 M samples for component (up to 1 G samples)		
I/Q Component Waveform Granularity	1 if the entry length is > 104 samples		
	8 if entry length is ≥ 32 and ≤ 104 samples		
Sequence Length	1 to 16,384		
Sequence Repeat Counter	1 to 4,294,967,294 or infinite		
Timer			
Range	20 ns to 1.39 seconds		
Resolution	± 1 Component sampling clock cycle		
I/Q Component to Component skew			
Range	0 to [16,200 * 8/Output Sampling Clock] s		
Resolution	[8/Output Sampling Clock] s		
Accuracy	± (1 % of setting + 20 ps)		
Initial Skew	< 20 ps		

Auxiliary input and output characteristics

	T3AWG6062	T3AWG6064	T3AWG6068
Sync in/out			
Connector type	Infiniband 4X connector on rear panel (custom pinout)		
Master to Slave delay (typ.)	TBD		
Marker Output			
Connector type	SMA on front panel		
Number of connectors	1/2/4		
Output impedance	50 Ω		
Output level (into 50 Ω)			
Voltage Window Amplitude	-0.5 V to 1.65 V		
Voltage Resolution	100 mV_{pp} to 2.15 V_{pp}		
Voltage Accuracy	1 mV ± (5 % setting + 25 mV)		
Switching characteristics			
Max Update Rate (True Arb Mode)	6.16 Gbps		
Max Frequency (AFG Mode)	96.5 MHz (continuous mode)		
Rise/Fall Time (10 % to 90 %, 2 V_{pp})	< 150 ps		
Jitter (rms)	< 10 ps		
Marker out to analog channel skew			
Range	True Arb Mode: 0 to 2.3 μs		
	AFG Mode: 0 to 11 sec. in Contin. Mode, 0 to 2.3 μs in Trig. Mode		
Resolution	True Arb Mode: 1/64 of DAC sampling period		
	AFG Mode: 5 ps		
Accuracy	± (1 % of setting + 5 ps)		
Initial skew	< 20 ps		
Trigger/Event Inputs			
Connector	SMA on the Front Panel		
Number of Trigger Inputs	2 (Trig.in 1, Trig.in 2)		
Input impedance	50 Ω / 1 kΩ		
Slope/Polarity	Positive or negative or both		
Input damage level	< -15 V or > +15 V		
Threshold control level	-10 V to 10 V		
Resolution	50 mV		
Threshold control accuracy	± (10 % of |setting| + 0.2 V)		
Input voltage swing	0.5 V_{p-p} minimum		
Minimum pulse width (1 V_{p-p})	3 ns		
Trigger/gate input to Analog Output delay			
Slow (synchronous) trigger	AFG mode: < 355 ns (< 405 ns in triggered sweep mode)		
	True Arb mode: < 1550 * DAC clock period(ns) + 10 ns		
Fast (asynchronous) trigger	AFG mode: < 335 ns (< 385 ns in triggered sweep mode)		
	True Arb mode: < 1,360 * DAC clock period(ns) + 27 ns		
Trigger In to output jitter (rms)	AFG mode: < 20 ps		
	True Arb mode: 0.29 * DAC clock period		
Trigger In programmable delay range	0 ps to 2,418 ps		
Trigger In programmable delay resolution	78 ps		
Maximum Frequency	AFG: 65 MTps on Rising/Falling Edge, 80 MTps on Both Edges		
	True Arb mode: 1 / (Period of the Analog Waveform + 48 DAC clock period)		
	MTps = Mega Transitions per second		

MODEL SPECIFIC SPECIFICATIONS

	T3AWG6062	T3AWG6064	T3AWG6068
Reference clock input			
Connector type	SMA on rear panel		
Input impedance	50 Ω, AC coupled		
Input voltage range	0.2 V_{pp} to 2 V_{pp}		
Damage level	Maximum Input voltage: -0.3 V to 3.6 V		
	Maximum input power: 30 dBm (50 Ω)		
Frequency range	5 MHz to 200 MHz		
Frequency Resolution	1 Hz		
Reference clock output			
Connector type	SMA on rear panel		
Output impedance	50 Ω, AC coupled		
Frequency	10 MHz TCXO | 100 MHz VCOCXO (Optional)		
Initial accuracy @ 25 °C	± 1.0 ppm		
Aging	± 1.0 ppm/year		
Stability vs. temperature	± 1 ppm		
Amplitude	1.65 V_{pp}		
Phase Noise @ 20 MHz carrier	-120 dBc/Hz at 100 Hz; -140 dBc/Hz at 1 KHz; -150 dBc/Hz at 10 KHz		
Phase Noise @ 100 MHz carrier	-120 dBc/Hz at 100 Hz; -145 dBc/Hz at 1 KHz; -150 dBc/Hz at 10 KHz		
External Clock Input			
Connector type	SMA on rear panel		
Input impedance	50 Ω, AC coupled		
Frequency[5)]	True Arb: SampleRate / N where: N = 4, 8, 16, 32 and SampleRate = 3.08 ÷ 6.16 GSps N = 2, 4, 8, 16, 32 and SampleRate = 3.08 ÷ 5.0 GSps		
	N = 2, 4, 8, 16 and SampleRate = 1.54 ÷ 3.08 GSps N = 1, 2, 4, 8, 16 and SampleRate = 1.54 ÷ 2.5 GSps		
	AFG: 192.5 MHz, 385 MHz, 770 MHz or 1,540 MHz (selectable)		
Input Power Range	+0 dBm to +10 dBm		
Damage Level	15 dBm		
Sync Clk Out			
Connector type	SMA on rear panel		
Output impedance	50 Ω, AC coupled		
Frequency	AFG Mode: 6.16 Ghz / N where N = 16, 32, 64, ..., 2,048		
	True Arb Mode: Sampling Rate / N, N = 16, 32, ..., 2,048		
Amplitude	1V_{pp} into 50 Ω		
External Modulation input			
Connector type	SMA on rear panel		
Input impedance	10 KΩ		
Number of inputs	1		
Bandwidth	10 MHz with 50 MS/s sampling rate		
Input voltage range	-1 V to +1 V (except FSK, PSK)		
	FSK, PSK: 0 V ÷ 3.3 V with 1.65 V fixed threshold		
Vertical resolution	12-bit		
Pattern Jump In (optional)			
Connector type	DSUB15		
Input signals	DATA [0..7] + Data_Select + Load		
Internal Data Width	14 bit, multiplexed using Data_Select		
Number of addressable entries	16,384		
Data Rate	DC to 1 MHz		
Input Range	VIL = 0 V to 0.8 V / VIH= 2 V to 3.3 V		
Impedance	Internal 1 kΩ pull-up resistor to Vcc (3.3 V)		

5) When using the External Clock Input the SampleRate must be in the range 3.08 ÷ 6.16 GHz

Power / Environmental characteristics / EMC and safety

	T3AWG6062	T3AWG6064	T3AWG6068
Power			
Source Voltage and Frequency	100 to 240 VAC ±10 % @ 45–66 Hz		
Max. power consumption	Max. 100 W (T3AWG6062)		
	Max. 200 W (T3AWG6064)		
	Max. 300 W (T3AWG6068)		
Environmental characteristics			
Temperature (operating)	+5 °C to +40 °C (+41 °F to 104 °F)		
Temperature (non-operating)	-20 °C to +60 °C (-4 °F to 140 °F)		
Humidity (operating)	5 % to 80 % relative humidity with a maximum wet bulb temperature of 29 °C at or below +40 °C, (upper limit de-rates to 20.6 % relative humidity at +40 °C).		
Humidity (non-operating)	5 % to 95 % relative humidity with a maximum wet bulb temperature of 40 °C at or below +60 °C, upper limit de-rates to 29.8 % relative humidity at +60 °C. Non-condensing.		
Altitude (operating)	3,000 meters (9,842 feet) maximum at or below 25 °C		
Altitude (non-operating)	12,000 meters (39,370 feet) maximum		
EMC and safety			
Safety	EN61010-1		
Main Standards	EN 61326-1:2013 – Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements		
Immunity	EN 61326-1:2013		

System specifications

	T3AWG6062	T3AWG6064	T3AWG6068
Display	7 inch, 1024 x 600, capacitive touch LCD		
Operative System	Windows 10		
External Dimensions	W 445 mm – H 135 mm – D 320 mm (3U 19" rackmount)		
Weight	Max. 26.45 lbs (12 Kg)		
Front panel connectors	CH N OUTPUT (SMA) where N = 2, 4,8 depending on the model		
	MARKER N OUT (SMA) where N = 1, 2,4 depending on the model		
	TRIGGER IN N (SMA) where N = 1,2		
	2 USB 3.0 ports		
Rear panel connectors	Ref. Clk. IN (SMA)		
	Ref. Clk. Out (SMA)		
	Ext. Mod. IN (SMA)		
	Sync Clk Out (SMA)		
	Ext Clk IN (SMA)		
	Sync IN (Infiniband 4X)		
	Sync OUT (Infiniband 4X)		
	POD X [7..0] where X = A, B, C, D depending on the model (Customized Mini SAS HD)		
	External Monitor ports (one or more)		
	2 USB 2.0 ports or more		
	4 USB 3.0 ports		
	Ethernet port (10/100/1000BaseT Ethernet, RJ45 port)		
	2 PS/2 keyboard and mouse ports		
	2 DPI ports		
	1 DVI port		
Hard Disk	1 TB SSD or better		
Processor	Intel® Pentium 3.7 GHz (or better)		
Processor Memory	32 GB or better		

T3AWG3-8DIG-TTL
LVDS to LVTTL adapter

Require T3AWG6-8DIG or T3AWG6-16DIG or T3AWG6K-32DIG and T3AWG3-8DIG-MSCAB (1x for -8DIG, 2x for -16DIG, 4x for -32DIG)

Output Connector	20 position 2.54 mm 2 Row IDC Header
Output Type	LVTTL
Output Impedance	50 Ω nominal
Output voltage	0.8 V to 3.8 V programmable in group og 8 bits
Maximum update rate	125 Mbps@0.8 V and 400 Mbps@3.6 V
Dimension	W 52 mm – H 22 mm – D 76 mm
Input connectors	proprietary standard
Cable length	1 meter
Cable type	proprietary standard

T3AWG3-8DIG-SMA
Mini-SAS HD to 16x SMA cable (8 LVDS outputs)

Require T3AWG6-8DIG or T3AWG6-16DIG or T3AWG6K-32DIG

Output Connector	SMA
Output Type	LVDS
Number of SMA	16 (8 bits)
Cable length	1 meter
Cable type	proprietary standard

Digital Channels Selection Guide

	8 Digital Channels	**16 Digital Channels**	**32 Digital Channels**
Digital Options	**T3AWG6-8DIG**	**T3AWG6-16DIG**	**T3AWG6-32DIG**
Product Mainframe			
T3AWG6062	Yes	No	No
T3AWG6064	Yes	Yes	No
T3AWG6068	Yes	Yes	Yes
Accessories required:			
Cable mini SAS HD 1 m	1 x T3AWG3-8DIG-MSCAB	2 x T3AWG3-8DIG-MSCAB	4 x T3AWG3-8DIG-MSCAB
LVTTL digital output [1)]	1 x T3AWG3-8DIG-TTL	2 x T3AWG3-8DIG-TTL	4 x T3AWG3-8DIG-TTL
mini SAS HD to x16 SMA Cable	1 x T3AWG3-8DIG-SMA	2 x T3AWG3-8DIG-SMA	4 x T3AWG3-8DIG-SMA

[1)] LVTTL digital output requires Cable mini SAS

Ordering information

T3AWG6062 Product Description (2 Channel platform)	Product Code
Arbitrary Waveform Generator, 2 CH, 6 GS/s, 4,096 Mpts/Ch, 5 V_{pp}, RF mode (12 GS/s), Wave Sequencing	**T3AWG6062**
8 Digital Output Channels for 2 CH, 4 CH and 8 CH T3AWG6K models (require 1 x Mini-SAS cable)	**T3AWG6-8DIG**
T3AWG6064 Product Description (4 Channel platform)	**Product Code**
Arbitrary Waveform Generator, 4 CH, 6 GS/s, 4,096 Mpts/Ch, 5 V_{pp}, RF mode (12 GS/s), Wave Sequencing	**T3AWG6064**
8 Digital Output Channels for 2 CH, 4 CH and 8 CH T3AWG6K models (require 1 x Mini-SAS cable)	**T3AWG6-8DIG**
16 Digital Output Channels for 4 CH and 8 CH T3AWG6K models (require 2 x Mini-SAS cable)	**T3AWG6-16DIG**
T3AWG6068 Product Description (8 Channel platform)	**Product Code**
Arbitrary Waveform Generator, 8 CH, 6 GS/s, 4,096 Mpts/Ch, 5 V_{pp}, RF mode (12 GS/s), Wave Sequencing	**T3AWG6068**
8 Digital Output Channels for 2 CH, 4 CH and 8 CH T3AWG6K models (require 1 x Mini-SAS cable)	**T3AWG6-8DIG**
16 Digital Output Channels for 4 CH and 8 CH T3AWG6K models (require 2 x Mini-SAS cable)	**T3AWG6-16DIG**
32 Digital Output Channels for 8 CH T3AWG6K models (require 4 x Mini-SAS cable)	**T3AWG6-32DIG**
Accessories for all platforms (2, 4 and 8 Channels)	**Product Code**
Cable Mini SAS HD 1 m for DIG options (1x for -8DIG, 2x for -16DIG, 4x for -32DIG)	**T3AWG3-8DIG-MSCAB**
LVDS to LVTTL adapter[1)]	**T3AWG3-8DIG-TTL**
Mini-SAS HD to 16 x SMA cable (8 LVDS output)[2)]	**T3AWG3-8DIG-SMA**
Additional SSD – 500 GB	**T3AWG3-SSD**
3U – 19" RACKMOUNT KIT for T3AWG6K	**T3AWG-RACKMOUNT-X**

[1)] require T3AWG6-8DIG or T3AWG6-16DIG or T3AWG6K-32DIG and T3AWG3-8DIG-MSCAB (1x for -8DIG, 2x for -16DIG, 4x for -32DIG)
[2)] require T3AWG6-8DIG or T3AWG6-16DIG or T3AWG6K-32DIG

Standard warranty is one year.

TELEDYNE TEST TOOLS
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Company Profile

Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively. Oscilloscopes are tools used by designers and engineers to measure and analyze complex electronic signals in order to develop high-performance systems and to validate electronic designs in order to improve time to market.

The Teledyne Test Tools brand extends the Teledyne LeCroy product portfolio with a comprehensive range of test equipment solutions. This new range of products delivers a broad range of quality test solutions that enable engineers to rapidly validate product and design and reduce time-to-market. Designers, engineers and educators rely on Teledyne Test Tools solutions to meet their most challenging needs for testing, education and electronics validation.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy has sales, service and development subsidiaries in the US and throughout Europe and Asia. Teledyne Test Tools and Teledyne LeCroy products are employed across a wide variety of industries, including semiconductor, computer, consumer electronics, education, military/aerospace, automotive/industrial, and telecommunications.

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