TELEDYNE TEST TOOLS
Everywhereyoulook™

T3AWG3x54 / T3AWG3x58 Data Sheet

High Definition Arbitrary Waveform Generator
4 and 8 Channels

Accurate and Versatile Waveforms Generation

• 16 Bit Vertical Resolution	✓ Exceptional signal fidelity for developing quality products with a reduced design cycle.
• up to 24 V_{pp} Output Voltage and ±12 V HW Baseline Offset for a total output voltage window ±24 V or 48 V (50 Ohm into High Impedance)	✓ Unmatched wide output voltage window enables generating challenging in amplitude large-signal waveforms.
• Waveform memory up to 1 Gpoint @Ch	✓ Unmatched deep memory depth allows to store and reproduce complex pseudo-random waveforms for long play time testing.
• Mixed Signal Generation	✓ combining the 4/8 analog channels with up to 16/32 synchronized Digital Channels for debugging and validating 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	T3AWG3254	T3AWG3354	T3AWG3258	T3AWG3358
Number of Analog Channels	4		8	
Frequency Range (Sinewave AFG mode)	1 µHz to 250 MHz	1 µHz to 350 MHz	1 µHz to 250 MHz	1 µHz to 350 MHz
Vertical Resolution	16 Bits			
Waveform Memory	up to 1 Gpoint/Ch.			
Output Voltage V_{pp} (peak to peak)	up to 12 V_{pp} (50 Ohm into 50 Ohm), up to 24 V_{pp} (50 Ohm into High-Impedance)			
Digital Pattern Generator (DPG)	up to 16 Channels @ 1.0 Gbps	up to 16 Channels @ 1.2 Gbps	up to 32 Channels @ 1.0 Gbps	up to 32 Channels @ 1.2 Gbps
Waveforms Sequencing	up to 16.384 waveforms, length granularity of 1 point (> 384 Pts.)			

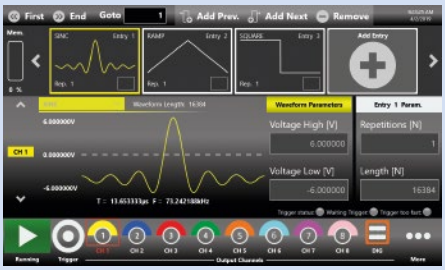
AFG Operational Mode

- Improved Direct Digital Synthesis (DDS) based technology
- Fixed sampling clock

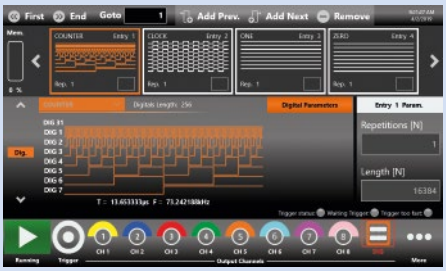
Arbitrary Function Generation (AFG functionality)

AWG Operational Mode

- Variable Clock True-Arbitrary Technology
- Variable Sampling Clock
- Mixed Signal Generation: 4/8 Analog Channels and 16/32 Digital Channels



Arbitrary Waveform Generation (AWG functionality)



Digital Pattern Generation (DPG functionality)

A multifunctional generator with an innovative architecture

T3AWG3x54 and T3AWG3x58 are multifunctional generators that combines many functions in one instrument, including 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.

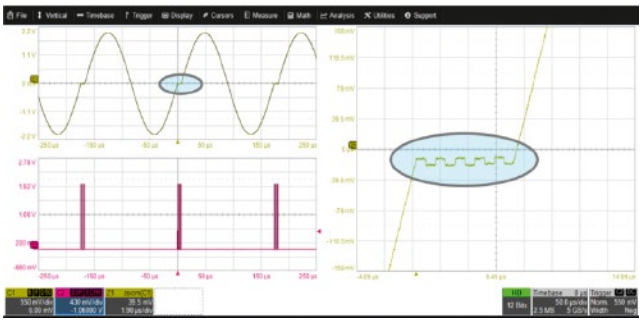
All control and setting are always one touch away: swipe gesture to change the channel, the carrier selection and have access to the modulation parameters, swipe into the waveform gallery to import a signal at a glance and use the touch-friendly virtual numeric keyboard to change parameters values.

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 128 Mpoints (up to 1 Gpoints optional) 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 T3AWG3x54 and T3AWG3x58 the best-in-class waveform generators for the most demanding technical applications.

This disruptive and innovative hardware architecture provides the possibility to generate unmatched performances, versatile functionality, outstanding usability, making the T3AWG3x54 and T3AWG3x58 the ideal generator for today's and tomorrows test challenges.

Exceptional Signal Fidelity with 16-bit Vertical Resolution



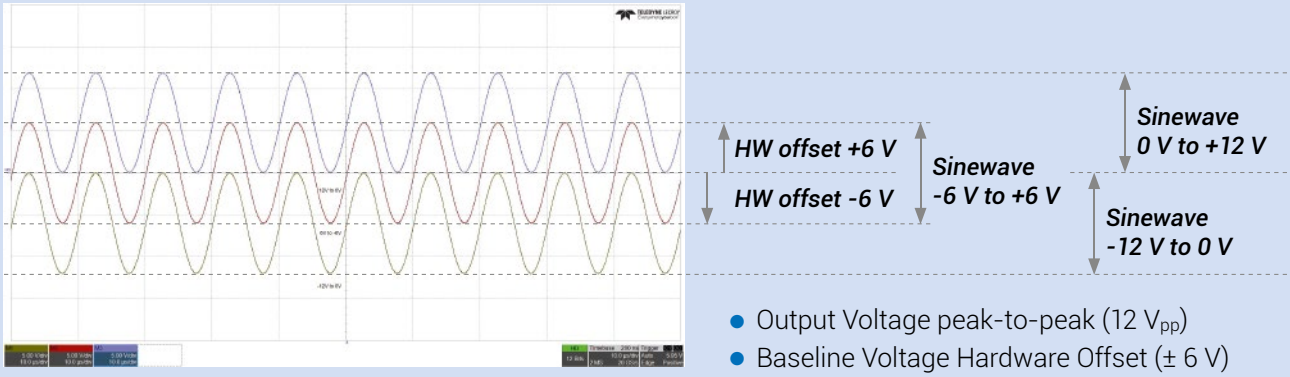
4V_{pp} Sine Wave and 5 x 10 mV_{pp} Square Wave Sequencing

Highest signal accuracy and precise waveform details generation are key contributors for developing quality products with a reduced design time. Indeed, the pressure is to get products to market faster with a shortest design cycle and with the increase of the quality goals. The exceptional Signal Fidelity of the T3AWG3x54 and T3AWG3x58 with the 16-bit Vertical Resolution give the capability to emulate the thinnest details of your waveform making your testing highly efficient and increasing the confidence in your results as more stable and reliable.

Max Output Voltage Window ± 12 V (50 Ω into 50 Ω) or ± 24 V (50 Ω into High Impedance)

Output voltage swing is a compulsory requirement for key applications for the IC and Semiconductor Test or Defense marker segment. The T3AWG3x54 and T3AWG3x58 generators have unmatched outstanding voltage swing capability leveraging on two different combined features. The 12 V_{pp} (50 Ω into 50 Ω) amplitude range and the ±6 V (50 Ω into 50 Ω) hardware offset voltage. The following images show a 12 V_{pp} sinewave (50 Ω into 50 Ω) shifted from -12 V to 0 V to 0 V to +12 V using the hardware base voltage offset setting and a 24 V_{pp} pulse from 0 V to 24 V (50 Ω into high Impedance).

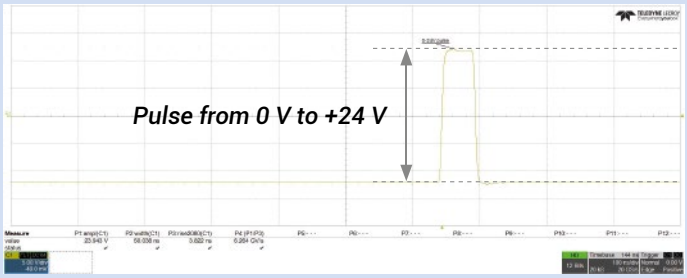
Max Output Voltage Window: ± 12 V (50 Ω into 50 Ω)



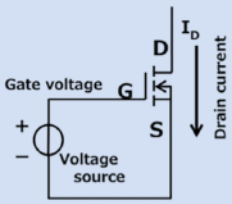
- Output Voltage peak-to-peak (12 V_{pp})
- Baseline Voltage Hardware Offset (± 6 V)

12 V_{pp} waveform can be shifed of ±6 V from -12 V to 0 V to 0 V to +12 V

Max Output Voltage Window: ± 24 V (50 Ω into High Impedance)



- Output Voltage peak-to-peak (24 V_{pp})
- Baseline Voltage Hardware Offset (± 12 V)



Pulse from 0 V to 24 V

MOSFET gate voltage-driven

8 Channel High Definition Stimulus-Response model:

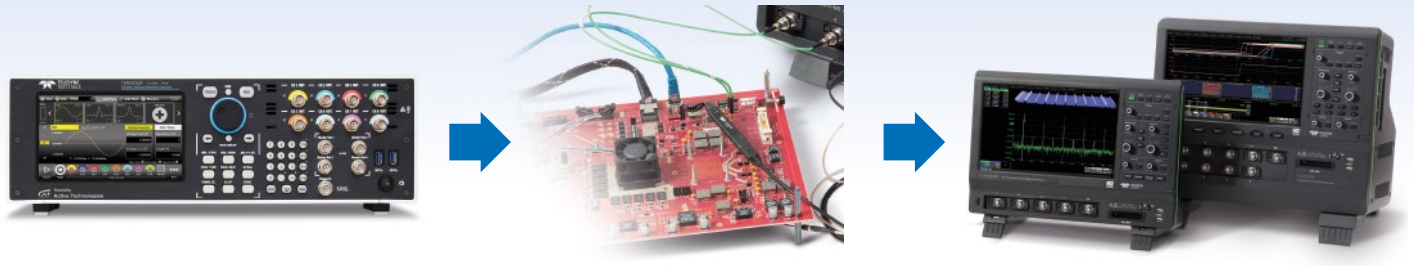
Applying an HD Stimulus with the T3AWG generator to the DUT and analysing the Response using an HD Oscilloscope Different measurements scenarios:

a. Emulation of clean and **"perfect signal"**, so that uncontrolled and unknown distortions are not influencing the DUT response behavior.

b. Emulation of **"real-world signal"** including distortions to test the DUT response behavior before any signal source is available. Playback of signals previously acquired using the oscilloscope and imported into the AWG.

c. Emulation of extreme signal condition **"stress test"**, we can emulate difficult conditions and corner case signals that can be statistically infrequent to test the DUT response behavior.

d. Emulation of noise or interference signal **"noise and interference immunity"**, so we can generate expected interference signal to add to expected signal and test the DUT response behavior.



8 Channel HD AWG (stimulus) *Device Under Test (DUT)* *4 and 8 Channel HD scope (stimulus)*

Accurately emulate the thinnest waveform details at largest output voltage swings

8 Channel High Definition T3AWG3258-3358 generators are ideal tools for powerful stimulus-response testing scenario when in combination with 8 Channel Oscilloscopes.

There are situations when you want to generate an **"ideal signal"** to test your device when uncontrolled and unknown distortions are not influencing the behavior of your device.

Alternatively, you may want to test your device with a **"real-world signal"** previously acquired with the oscilloscope, imported into the HD arbitrary waveform generator and then played-back for all the time needed comfortably testing your device in the lab. Often real-world signals can be accessible to be acquired with an HD oscilloscope only for very short time or in difficult environmental situation like for high energy physics or aero-space applications. This makes impossible to do any design of your device at the place where the real-world signal can be sourced, then the HD arbitrary waveform generator provides an essential indispensable solution.

All the new emerging technologies and applications are requiring verifying the operating margin of your device emulating worst-case and infrequent corner-case conditions.

Your device needs to be tested to its performance limit and **"stress test"** during the product development is vital to avoid the risk of any device malfunction your customer ends up finding.

The High Definition 8 Channel T3AWG3258-3358 generators are ideal for precisely generating degraded or stressed signals thanks to the capability to emulate accurately any waveform details because of the 16-bit vertical resolution and in addition to emulate large voltage swings because of the 12 V_{pp} combined with the ± 6 V HW Voltage baseline.

High Definition 8 Channel T3AWG3258-3358 have unmatched output voltage window ±24 V, 48 V in case of 50 Ω into High Impedance or ±12 V, 24 V in case of 50 Ω into 50 Ω.

Definitively you want your device properly working when in the presence of signals or noise interfering.

Today's technology density, co-existing of many communications systems, highest standard in product reliability make a must to go for **"noise and interference immunity"** testing.

The High Definition 8 Channel T3AWG3258-3358 generators are the perfect arbitrary generator for product noise susceptibility, interference immunity and EMI applications because of the excellent output signal spectral purity, the unmatched deep waveform memory enabling long play-time testing combined with versatile waveforms creation thanks to the intuitive and easy waveform sequencer user interface.

Easily automate your test and measurement requirements by using the programming examples

Examples are available for both the Arbitrary Function Generator and Arbitrary Waveform Generator operating modes

T3AWG3x54 and T3AWG3x58 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.

The programming examples can be directly downloaded from the T3AWG product page of the Teledyne LeCroy website.

High Definition Generator: Key Applications at a glance

Automotive

Today's cars are including lots of highly sophisticated electronic control units (ECU) with very sensitive electronic components. The 16-bits vertical resolution combined with the 1.2 GS/s fast sampling rate make the High Definition T3AWG Arbitrary Generators indispensable tools for successfully and efficiency addressing the new testing challenges in automotive.

- CAN, CAN-FD, LIN, Flexray, SENT emulation and trouble-shooting
- 100BASE-T1, 1000BASE-T1, BroadR-Reach emulation and immunity from interference signal and noise
- EMI debugging, troubleshooting and testing
- Electrical standards emulation up to 24 V
- Power MOSFET circuitry in automotive electronics optimization and characterization

Aerospace and Defense

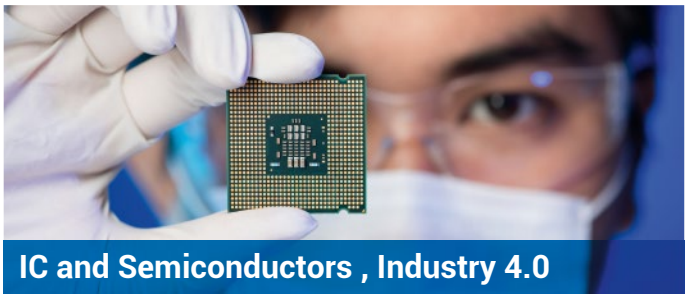
Radar test and electronic warfare require to create specific complex true-to-life signals. The spectral purity, the wide voltage swing and the long waveform play-time make the High Definition T3AWG Arbitrary Generators the ideal tools for the military research and development sector.

- Frequency response, intermodulation distortion and noise-figure measurements characterization of components, subsystems and systems
- Phase Locked Loop (PLL) pull-in and hold range characterization
- RF I/Q modulators emulation and characterization
- RADAR base-band signals emulation to improve target resolution and detection and decrease false target return (noise immunity)
- MIL-1553 , ARINC 429 and PRBS long-play time emulation

Research Centers, Universities

Researches and Scientists require to emulate pulses adding amplitude and timing variation imperfections in an accurate, detailed and repeatable controlled manner. Physics, electronics, chemistry, mechanics and other disciplines can benefit from the user interface versatility combined with the fast edge generation, the excellent dynamic range and the unmatched accuracy of the High Definition T3 AWG generators.

- Emulation of signal sources adding noise and known modulation distortion
- Modulating and driving laser diode with detailed waveform generation
- Generation/playback of real-world signals previously acquired using an High Definition Oscilloscope and imported into the High Definition T3 AWG generator.
- Emulation of long PRBS sequences with the 8 digital output channels synchronous with analog waveforms
- Generation of multi-level and multi-edge pulses long waveforms with the 1 GSample @Ch memory



IC and Semiconductors , Industry 4.0

Today's IC, components, electronic circuits and sensors are required to be highly reliable extending the operating range in many variables. Stress test need to be performed to confirm the mathematical model used for predicting breaking points or safe usage limits. The output voltage resolution combined with large voltage swing and the mixed mode operation make the High Definition T3AWG the best tool for developing quality components with a reduced design time.

- Clock generation for component overclock behavior and operating range limit and stress test
- Power Integrity testing of electric and electronic components for use in motor vehicles at low voltage
- Sensors signals generation: emulation of ideal signals or generation of real world signals after acquisition with an High Definition Oscilloscope .
- MOSFET gate drive amplitude signal emulation for MOSFET characterization and optimization
- Power up sequences of IC using the low impedance feature (5 Ω output impedance).

T3AWG3x54 and T3AWG3x58
High Definition 4 and 8 channels Arbitrary Waveform Generator

General Specifications

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Number of Channels				
Analog	4	8	4	8
Digital	0-16	0-16-32	0-16	0-16-32
Markers	2	4	2	4
Operating Modes				
AFG	Improved Direct Digital Synthesizer (DDS) based Technology			
AWG	Variable Clock "True Arb" Technology			
Amplitude peak-to-peak				
Voltage Range peak-to-peak	0 to 6 V_{pp} (12 V_{pp} opt.)			
Accuracy[1)]	±(1 % of setting (V_{pp}) + 5 mV)			
Resolution	< 0.5 mV_{pp} or 5 digits			
Output Impedance	Single-ended: 50 Ω and 5 Ω (Low Impedance)			
Amplitude HW Baseline Offset				
Range (50 Ω into 50 Ω)	-3 V to +3 V (-6 V to +6 V opt.)			
Range (50 Ω into High Impedance)	-6 V to +6 V (-12 V to +12 V opt.)			
Accuracy (50 Ω into 50 Ω)	±(1.0 % | setting | ± 5 mV)			
Resolution	< 4 mV or 4 digits			
Amplitude DC				
Amplitude Range (50 Ω into 50 Ω)	-3 V to +3 V (-6 V to +6 V opt.)			
Amplitude Accuracy	±(1.0 % | setting | ± 10 mV)			

[1)] 1 KHz Sine, 0 V offset, > 5 mVpp amplitude , 50 Ω load

AFG Specifications
Arbitrary Function Generator Operating Mode

Waveform Types

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Ouput Channels				
Connectors	BNC on front panel			
Output Type	Single-ended			
Output Impedance	50 Ω or 5 Ω (Low Impedance) selectable			
General Specifications				
Technology	Direct Digital Synthesizer (DDS)			
Standard Waveforms	Sine, Square, Pulse, Ramp, Noise, DC, Sin(x)/x, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine			
Run Modes	Continuous, Modulation, Sweep, Burst			
Arbitrary Waveforms				
Vertical Resolution	16 bits			
Waveform Length	16.384 Points			
Internal Trigger Timer				
Range	13.3 ns to 100 s			
Resolution	104 ps			
Accuracy	±(1.1 % setting + 5 ps)			

MODEL SPECIFIC SPECIFICATIONS

	T3AWG3254		T3AWG3354	
Sine Wave Characteristics				
Frequency Range	1 µHz to 250 MHz		1 µHz to 350 MHz	
Frequency Resolution	1 µHz or 15 digits		1 µHz or 15 digits	
Output Amplitude (50 Ω into 50 Ω)[2]	0 to ≤ 70 MHz	12 V	0 to ≤ 70 MHz	12 V
	> 70 MHz to ≤ 120 MHz	9 V	> 70 MHz to ≤ 120 MHz	9 V
	> 120 MHz to ≤ 180 MHz	6 V	> 120 MHz to ≤ 180 MHz	6 V
	> 180 MHz to ≤ 250 MHz	2.5 V	> 180 MHz to ≤ 250 MHz	2.5 V
Flatness (1 V_{p-p} , relative to 1 KHz)	DC to 250 MHz	±0.5 dB	DC to 350 MHz	±0.5 dB
Harmonic Distortion (1 V_{p-p}) typ.	1 µHz to ≤ 10 MHz	< -65 dBc	1 µHz to ≤ 10 MHz	< -65 dBc
	> 10 MHz to ≤ 50 MHz	< -55 dBc	> 10 MHz to ≤ 50 MHz	< -55 dBc
	> 50 MHz to ≤ 100 MHz	< -45 dBc	> 50 MHz to ≤ 100 MHz	< -45 dBc
	> 100 MHz to ≤ 125 MHz	< -40 dBc	> 100 MHz to ≤ 125 MHz	< -40 dBc
	> 125 MHz to ≤ 250 MHz	< -30 dBc	> 125 MHz to ≤ 350 MHz	< -30 dBc
Total Harmonic Distorsion (1 V_{p-p})	10 kHz to 20 KHz	< 0.1 %	10 kHz to 20 KHz	< 0.1 %
Spurious (1 V_{p-p})[3]	1 µHz to ≤ 10 MHz	< -60 dBc	1 µHz to ≤ 10 MHz	< -60 dBc
	> 10 MHz to ≤ 250 MHz	< -55 dBc	> 10 MHz to ≤ 350 MHz	< -55 dBc
Phase Noise (1 V_{p-p}, 10 KHz offset)	10 MHZ	< -120 dBc/Hz typ.	10 MHZ	< -120 dBc/Hz typ.
	100 MHZ	< -115 dBc/Hz typ.	100 MHZ	< -115 dBc/Hz typ.
Square Wave Characteristics				
Frequency Range	1 µHz to 120 MHz		1 µHz to 150 MHz	
Output Amplitude (50 Ω into 50 Ω)[2]	1 µHz to ≤ 40 MHz	12 V	1 µHz to ≤ 40 MHz	12 V
	> 40 MHz to ≤ 80 MHz	10 V	> 40 MHz to ≤ 80 MHz	10 V
	> 80 MHz to ≤ 120 MHz	7 V	> 80 MHz to ≤ 150 MHz	7 V
Frequency Resolution	1 µHz or 15 digits		1 µHz or 15 digits	
Rise/Fall time (10 % to 90 %)	2.0 ns		2.0 ns	
Overshoot (1 V_{p-p})	< 2 %		< 2 %	
Jitter (rms)	< 20 ps		< 20 ps	
Pulse Wave Characteristics				
Frequency Range	1 µHz to 120 MHz		1 µHz to 150 MHz	
Frequency Resolution	1 µHz or 15 digits		1 µHz or 15 digits	
Output Amplitude (50 Ω into 50 Ω)[2]	1 µHz to ≤ 5 MHz	12 V	1 µHz to ≤ 5 MHz	12 V
	> 5 MHz to ≤ 60 MHz	10 V	> 5 MHz to ≤ 60 MHz	10 V
	> 60 MHz to ≤ 120 MHz	7 V	> 60 MHz to ≤ 150 MHz	7 V
Pulse width	3 ns to (Period-3.0 ns)		2.5 ns to (Period-2.5 ns)	
Resolution	20 ps or 15 digits		20 ps or 15 digits	
Pulse duty cycle	0.1 % o 99.9 % (limitation of pulse width apply)		0.1 % o 99.9 % (limitation of pulse width apply)	
Leading/trailing edge transition time	2.5 ns to 1000 ns		2.0 ns to 1000 ns	
Resolution	2 ps or 15 digits		2 ps or 15 digits	
Overshoot (1 V_{p-p})	< 2 %		< 2 %	
Jitter (rms, with rise time and fall time >2 ns)	< 20 ps		< 20 ps	
Ramp Wave Characteristics				
Frequency Range	1 µHz to 10 MHz		1 µHz to 15 MHz	
Linearity (<10 KHz, 1 V_{p-p}, 100 %)	≤ 0.1 %		≤ 0.1 %	
Symmetry	0 % to 100 %		0 % to 100 %	

[2] Amplitudes double on HiZ load and one channel running at the time
[3] excluding f_{Sa}-F_{out}, f_{Sa}-2*f_{out}

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Other Waves Characteristics				
Frequency Range				
Exponential Rise, Exponential Decay	1 µHz to 10 MHz		1 µHz to 15 MHz	
Sin(x)/x, Gaussian, Lorentz, Haversine	1 µHz to 20 MHz		1 µHz to 30 MHz	
Frequency Resolution				
Sin(x)/x	1 µHz or 15 digits		1 µHz or 15 digits	
Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine	1 µHz or 14 digits		1 µHz or 14 digits	
Additive Noise				
Bandwitdh (-3 dB)	> 200 MHz		> 200 MHz	
Level	0 V to 6 V- | carrier max value(V_{pk}) |		0 V to 6 V- | carrier max value(V_{pk}) |	
Resolution	1 mV		1 mV	
Arbitrary				
Number of Samples	2 to 16.384		2 to 16.384	
Rise/Fall Time	2.0 ns		2.0 ns	
Jitter (rms)	< 20 ps		< 20 ps	
Frequency Range	1 µHz to ≤ 125 MHz		1 µHz to ≤ 150 MHz	
Frequency Resolution	1 µH or 15 digits		1 µH or 15 digits	
Frequency Accuracy				
Non-Arbitrary	± 2 % x 10^{-6} of setting			
Arbitrary	± 2 % x 10^{-6} of setting ± 1 µHz			

Modulations

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
AM (Ampitlude Modulation)				
Carrier Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, Arbitrary			
Modulating Frequency				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Depth	0.00 % to 120.00 %			
FM (Frequency Modulation)				
Carrier Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, Arbitrary			
Modulating Frequency				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Depth	0.00 % to 120.00 %			
Peak Deviation	DC to 250 MHz		DC to 350 MHz	

MODEL SPECIFIC SPECIFICATIONS

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
PM (Pulse Modulation)				
Carrier Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, Arbitrary			
Modulating Frequency				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Peak Deviation Range	0° to 360°			
FSK (Frequency Shift Keying)				
Carrier Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Square			
FSK Key Rate				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Depth	0.00 % to 120.00 %			
Hop Frequency	1 µHz to 250 MHz		1 µHz to 350 MHz	
Number of keys	2			
PSK (Phase Shift Keying)				
Carrier Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Square			
PSK Key Rate				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Depth	0.00 % to 120.00 %			
Hop Phase	0° to +360°			
Number of keys	2			
PWM (Pulse Width Modulation)				
Carrier Waveforms	Pulse			
Modulation Source	Internal or External			
Internal Modulating Waveforms	Sine, Square, Ramp, Noise, Arbitrary			
PSK Key Rate				
Internal	500 µHz to 48 MHz			
External	max 8 MHz			
Deviation Range	0 % to 50 % of pulse period			

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Sweep				
Type	Linear, Logarithmic, Staircase and user defined			
Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Sweep Time	40 ns to 2000 s			
Hold/Return Times	0 to (2000 s-40 ns)			
Sweep/Hold/Return Time Resolution	20 ns or 12 digits			
Total sweep time accuracy	≤ 0.4 %			
Start/Stop Frequency Range				
Sine	1 µHz to 250 MHz		1 µHz to 350 MHz	
Square	1 µHz to 120 MHz		1 µHz to 150 MHz	
Trigger Source	Internal/External/Manual			
Burst				
Type	Trigger and Gated			
Waveforms	Standard Waveforms (except Pulse, DC and Noise) and Arbitrary			
Burst Count	1 to 4,294,967,295 cycles or infinite			

AWG Specifications
Variable Clock (True Arbitrary) Operating Mode

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Output Channels				
Connectors	BNC on front panel			
Output Type	Single-ended DC coupled			
Output Impedance	50 Ω or 5 Ω (Low Impedance) selectable			
General Specifications				
Technology	Variable Clock (True Arbitrary)			
Run Modes	Continuous, Triggered Continuous, Single/Burst, Stepped			
Vertical Resolution	16 bits			
Waveform Length	16 to 128 MSamples @Channel (up to 1 GSample @Channel)			
Waveform Granularity	1 (length > 384), 16 (16 ≤ length ≤ 384)			
Sequence Length	1 to 16384			
Sequence Repeat Counter	1 to 4,294,967,294 or infinite			
Timer				
Range	23.52 ns to 7 s			
Resolution	± 1 sampling clock cycle			
Analog Channel to Channel Skew				
Range	0 to 3.4 µs			
Resolution	≤ 5 ps			
Accuracy	±(1 % | setting | ± 20 ps)			
Initial Skew	< 200 ps			
Bandwidth calculated: (0.35 / rise or fall time)	318 MHz			

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Harmonic Distorsion Sine Wave 32 points, 1 V_{pp}	< -60 dBc @(1 GS/s and 31.25 MHz)		< -60 dBc @(1.2 GS/s and 37.5 MHz)	
Spurious Sine Wave 32 points, 1 V_{pp}	< -60 dBc @(1 GS/s and 31.25 MHz)		< -60 dBc @(1.2 GS/s and 37.5 MHz)	
SFDR (Spuriuos Free Dynamic Range) Sine Wave 32 points, 1 V_{pp}	< -60 dBc @(1 GS/s and 31.25 MHz)		< -60 dBc @(1.2 GS/s and 37.5 MHz)	
Rise/Fall Time 1 V_{pp}, single-ended 10 % to 90 %	≤ 1.1 ns		≤ 1.1 ns	
Overshoot 1 V_{pp}, single-ended	< 2 %			

Time Base and Clock

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Sampling Rate				
Range	1 S/s to 1 GS/s		1 S/s to 1.2 GS/s	
Resolution	16 Hz			
Accuracy	± 2.0 x 10^{-6}		± 2.0 x 10^{-6}	
R_j on clock patter (rms)	< 10 ps		< 10 ps	

Digital Outputs

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Output Channels				
Connectors	mini-SAS HD connector on rear panel (not standard pin-out)			
Number of connectors	2	4	2	4
Number of Outputs	16 Channels	32 Channels	16 Channels	32 Channels
Output Impedance	100 Ω Differential			
Output type	LVDS			
Rise/Fall time (10 % to 90 %)	< 1 ns			
Jitter (rms)	20 ps			
Maximum Update Rate	1 GS/s		1.2 GS/s	
Memory Depth	128 MSample @ Ch (up to 1 GSample)			

Auxiliary input and output characteristics

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Sync in/out (T3AWG3258/3358 only)				
connector type	Proprietary connector on rear panel			
Master to Slave delay (typ.)	< 20 ns			
Marker Output				
connector type	SMA on Front panel			
Number of connectors	2	4	2	4
Output impedance	50 Ω			
Output level (into 50 Ω)				
Amplitude	1 V to 2.5 V			
Resolution	10 mV			
Accuracy	± (2 % setting + 10 mV)			
Rise/Fall Ttime (10 % to 90 %, 2.5 V_{pp})	< 700 ps			
Jitter (rms)	20 ps			
Marker out to analog channel skew				
Range	Variable Clock Mode: 0 to 3 µs AFG Mode: 0 to 14 s in continuos mode, 0 to 3 µs in Trig. Mode			
Resolution	Variable Clock Mode: 78 ps, AFG Mode: 39 ps			
Accuracy	± (1 % setting + 140 ps)			
Initial skew	< 1 ns			
Trigger / Gate Input				
Connector type	SMA on the Front Panel			
Input impedance	50 Ω / 1 KΩ			
Slope / Polarity	Positive or Negative or both			
Input damage level	< -15 V or > +15 V			
Threeshold control level	- 10 V to 10 V			
Resolution	50 mV			
Threshold control accuracy	± (10 % | setting | + 0.2 V)			
Input voltage swing	0.5 V_{p-p} minimum			
Minimum pulse width (1 V_{pp})	3 ns			
Initial trigger/gate delay to Analog Output	Variable Clock Mode: < 240 * DAC clock period +32 ns AFG Mode: < 360 ns (< 420 ns in troggeed sweep mode)			
Trigger in to output jitter	AFG Mode: < 40 ps Variable Clock Mode: 0.29 * DAC clock period			
Maximum frequency	AFG: 65 Mpts on Rising/Falling Edge, 80 MTps on both edges Variable Clock Mode: 42.5 MTps MTps = Mega Transition per second			
Reference clock input				
Connector type	SMA on rear panel			
Input impedance	50 Ω AC coupled			
Input Voltage range	-4 dBm to 11 dBm sine or square wave (rise time T10-90 <1 ns and duty cycle from 40 % to 60 %)			
Damage level	+14 dBm			
Frequency range	5 MHz to 100 MHz			
Reference clock output				
Connector type	SMA on rear panel			
Output impedance	50 Ω AC coupled			
Frequency range	10 MHz			
Accuracy	± 2.0 x 10^{-6}			
Aging	± 1.0 x 10^{-6}/year			
Amplitude	1.65 V			
Jitter (rms)	< 20 ps			

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
External modulation Input				
Connector type	SMA on rear panel			
Input impedance	> 2 MΩ			
Number of inputs	One			
Bandwidth	8 MHz with 40 MS/s sampling rate			
Vertical resolution	8 bits			
Power				
Source Voltage and Frequency	100 to 240 VAC ±10 % @ 45–66 Hz			
Max Power Consumption	150 W			
Enviromental 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 . Non-condensing.			
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

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
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 10" rackmount)			
Weight	10.8 kg			
Front panel connectors	CH N OUTPUT (SMA) where N = 4,8 depending on the model			
	MARKER N OUT (SMA) where N = 2,4 depending on the model			
	TRIGGER IN (SMA)			
	2 USB 3.0 ports			
Rear panel connectors	Ref. Clk. IN (SMA)			
	Ref. Clk. Out (SMA)			
	Ext. Mod. IN (SMA)			
	Sync IN (proprietary connector) for 8 Channel model only			
	Sync OUT (proprietary connector) for 8 Channel model only			
	External Monitor ports (one or more)			
	DIGITAL POD X [7..0] where X = A, B, C, D depending on the model			
	1 USB 2.0 ports or more			
	Ethernet port (10/100/1000BaseT Ethernet, RJ45 port)			
	2 PS/2 keyboard and mouse ports			
Hard Disk	32 GB SSD or better			
Processor	Intel® Celeron J1900, 2 GHz (or better)			
Processor Memory	4 GB or better			

T3AWG3-8DIG-TTL
LVDS to LVTTL adapter
(Requires T3AWG3-8 DIG)

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
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)
(Requires T3AWG3-8 DIG)

	T3AWG3254	T3AWG3258	T3AWG3354	T3AWG3358
Output Connector	SMA			
Output Type	LVDS			
Number of SMA	16 (8 bits)			
Cable length	1 meter			
Cable type	proprietary standard			

Ordering information

T3AWG3254 and T3AWG3354 Product Description (4 Channels)	Product Code
Arbitrary Waveform Generator, 4 Ch, 250 MHz, 16 bit, 128 Mpts/Ch, 6 V_{pp} output, AFG/AWG, Wave Sequencing	T3AWG3254
Arbitrary Waveform Generator, 4 Ch, 350 MHz,16 bit, 128 Mpts/Ch, 6 V_{pp} output, AFG/AWG, Wave Sequencing	T3AWG3354
1024 Mpts/Ch Memory Option for 4 Ch mainframe	T3AWG3-XL-4CH
High Voltage (12 V_{pp} on 50 Ohm) for 4 Ch mainframe	T3AWG3-HV-4CH
Digital 16 Ch. Output (require 2 x Mini-SAS cables)	T3AWG3-16DIG-4CH
warranty extended to 3 years	T3AWG3-W3-4CH
T3AWG3258 and T3AWG3358 Product Description (8 Channels)	**Product Code**
Arbitrary Waveform Generator, 8 Ch, 250 MHz, 16 bit, 128 Mpts/Ch, 6 V_{pp} output, AFG/AWG, Wave Sequencing	T3AWG3258
Arbitrary Waveform Generator, 8 Ch, 350 MHz,16 bit, 128 Mpts/Ch, 6 V_{pp} output, AFG/AWG, Wave Sequencing	T3AWG3358
1024 Mpts/Ch Memory Option for 8 Ch mainframe	T3AWG3-XL-8CH
High Voltage (12 V_{pp} on 50 Ohm) for 8 Ch mainframe	T3AWG3-HV-8CH
Digital 16 Ch. Output (require 2 x Mini-SAS cables)	T3AWG3-16DIG-8CH
Digital 32 Ch. Output (require 4 x Mini-SAS cables)	T3AWG3-32DIG-8CH
Sync cable (for 8 Ch. only)	T3AWG3-SYNC
warranty extended to 3 years	T3AWG3-W3-8CH
Upgrades and Accessories for 4 Channel and 8 Channel platform	**Product Code**
Upgrade to 16 Ch. Digital Output (require 2 x Mini-SAS cables) for 4 Ch. platform	T3AWG3-16DIG-UPGRADE-4CH
Upgrade to 1024 Mpts/Ch Memory for 4 Ch. platform	T3AWG3-XL-UPGRADE-4CH
Upgrade to High Voltage (12 V_{pp} on 50 Ohm) for 4 Ch. platform	T3AWG3-HV-UPGRADE-4CH
Upgrade to 16 Ch. Digital Output (require 4 x Mini-SAS cables) for 8 Ch. platform	T3AWG3-16DIG-UPGRADE-8CH
Upgrade to 32 Ch. Digital Output (require 8 x Mini-SAS cables) for 8 Ch. platform	T3AWG3-32DIG-UPGRADE-8CH
Upgrade to 1024 Mpts/Ch Memory for 8 Ch. platform	T3AWG3-XL-UPGRADE-8CH
Upgrade to High Voltage (12 V_{pp} on 50 Ohm) for 4 Ch. platform	T3AWG3-HV-UPGRADE-8CH
LVDS to LVTTL adapter[4)]	T3AWG3-8DIG-TTL
Mini-SAS HD to 16 x SMA cable (8 LVDS output)[4)]	T3AWG3-8DIG-SMA
Cable Mini SAS HD 1 m for 8 DIG	T3AWG3-8DIG-MSCAB
Additional SSD – 500GB	T3AWG3-SSD

[4)] require T3AWG3-16DIG-4CH or T3AWG3-16DIG-8CH or T3AWG3-32DIG-16CH and T3AWG3-8DIG-MSCAB

Standard warranty is one year.

ABOUT TELEDYNE TEST TOOLS

TELEDYNE TEST TOOLS
Everywhereyoulook™

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.

Distributed by:

Teledyne LeCroy (US Headquarters)

700 Chestnut Ridge Road
Chestnut Ridge, NY. USA 10977-6499

Phone:	800-553-2769 or 845-425-2000
Fax Sales:	845-578-5985
Phone Support:	1-800-553-2769
Email Sales:	contact.corp@teledynelecroy.com
Email Support:	support@teledynelecroy.com
Web Site:	http://teledynelecroy.com/

Teledyne LeCroy (European Headquarters)

Teledyne LeCroy GmbH
Im Breitspiel 11c
D-69126 Heidelberg, Germany

Phone:	+49 6221 82700
Fax:	+49 6221 834655
Phone Service:	+49 6221 8270 85
Phone Support:	+49 6221 8270 28
Email Sales:	contact.gmbh@teledynelecroy.com
Email Service:	service.gmbh@teledynelecroy.com
Email Support:	tlc.t3.appsupport.eu@teledyne.com
Web Site:	http://teledynelecroy.com/germany

World wide support contacts can be found at:
https://teledynelecroy.com/support/contact/#

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T3 stands for Teledyne Test Tools.

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