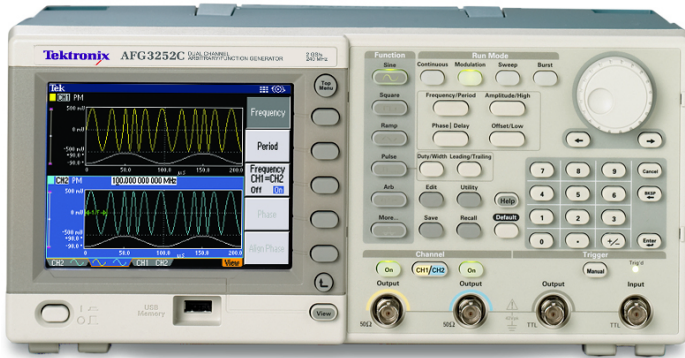


# Arbitrary/Function Generators

## AFG3000C Series Datasheet



Unmatched performance, versatility, intuitive operation, and affordability make the AFG3000C Series of Function, Arbitrary Waveform, and Pulse Generators the most useful instruments in the industry.

### Key performance specifications

- 10 MHz, 25 MHz, 100 MHz, or 240 MHz sine waveforms
- 14 bits, 250 MS/s, 1 GS/s, or 2 GS/s arbitrary waveforms
- Amplitude up to 20 V<sub>p-p</sub> into 50 Ω loads

### Key features

- 5.6 in. display for full confidence in settings and waveform shape
- Multi-language and intuitive operation saves setup time
- Pulse waveform with variable edge times
- AM, FM, PM, FSK, PWM
- Sweep and burst
- Dual-channel models save cost and bench space
- USB connector on front panel for waveform storage on memory device
- USB, GPIB, and LAN
- LabVIEW and LabWindows/IVI-C drivers

### Applications

- Electronic test and design
- Sensor simulation
- Functional test
- Education and training

### Superior performance and versatility

Users can choose from 12 different standard waveforms. Arbitrary waveforms can be generated up to 128 K in length at high sampling rates. On pulse waveforms, leading and trailing edge time can be set independently. External signals can be connected and added to the output signal. Dual-channel models can generate two identical or completely different signals. All instruments feature a highly stable time base with only ±1 ppm drift per year.

### Intuitive user interface shows more information at a single glance

Color TFT LCD screen on all models shows all relevant waveform parameters and graphical wave shape at a single glance. This gives full confidence in the signal settings and lets you focus on the task at hand. Shortcut keys provide direct access to frequently used functions and parameters. Others can be selected conveniently through clearly structured menus. This reduces the time needed for learning and relearning how to use the instrument. Look and feel are identical to the world's most popular TDS3000 Oscilloscopes.

### ArbExpress™ software included for creating waveforms with ease

With this PC software waveforms can be seamlessly imported from any Tektronix oscilloscope, or defined by standard functions, equation editor, and waveform math.

# Specifications <sup>1</sup>

All specifications apply to all models unless noted otherwise.

## Model overview

	AFG3011C	AFG3021C, AFG3022C	AFG3051C, AFG3052C	AFG3101C, AFG3102C	AFG3251C, AFG3252C
Channels	1	1 / 2	1 / 2	1 / 2	1 / 2
Waveforms	Sine, Square, Pulse, Ramp, Triangle, Sin(x)/x, Exponential Rise and Decay, Gaussian, Lorentz, Haversine, DC, Noise				

## General characteristics

### Sine waves

	AFG3011C	AFG3021C, AFG3022C	AFG3051C, AFG3052C	AFG3101C, AFG3102C	AFG3251C, AFG3252C
<b>Frequency range</b>	1 $\mu$ Hz to 10 MHz	1 $\mu$ Hz to 25 MHz	1 $\mu$ Hz to 50 MHz	1 $\mu$ Hz to 100 MHz	1 $\mu$ Hz to 240 MHz
<b>Sine wave in Burst Mode</b>	1 $\mu$ Hz to 5 MHz	1 $\mu$ Hz to 12.5 MHz	1 $\mu$ Hz to 25 MHz	1 $\mu$ Hz to 50 MHz	1 $\mu$ Hz to 120 MHz
<b>Effective maximum frequency out</b>	10 MHz	25 MHz	50 MHz	100 MHz	240 MHz
<b>Amplitude flatness (1 V<sub>p-p</sub>)</b>	<5 MHz: $\pm 0.15$ dB $\geq 5$ MHz to 10 MHz: $\pm 0.3$ dB	<5 MHz: $\pm 0.15$ dB $\geq 5$ MHz to 20 MHz: $\pm 0.3$ dB $\geq 20$ MHz to 25 MHz: $\pm 0.5$ dB	<5 MHz: $\pm 0.15$ dB $\geq 5$ MHz to 45 MHz: $\pm 0.3$ dB $\geq 45$ MHz to 50 MHz: $\pm 0.5$ dB	<5 MHz: $\pm 0.15$ dB $\geq 5$ MHz to 25 MHz: $\pm 0.3$ dB $\geq 25$ MHz to 100 MHz: $\pm 0.5$ dB	<5 MHz: $\pm 0.15$ dB $\geq 5$ MHz to 25 MHz: $\pm 0.3$ dB $\geq 25$ MHz to 100 MHz: $\pm 0.5$ dB $\geq 100$ MHz to 200 MHz: $\pm 1.0$ dB $\geq 200$ MHz to 240 MHz: $\pm 2.0$ dB
<b>Amplitude flatness (1 V<sub>p-p</sub>), typical</b>	<5 MHz: $\pm 0.11$ dB $\geq 5$ MHz to 10 MHz: $\pm 0.2$ dB	<5 MHz: $\pm 0.06$ dB $\geq 5$ MHz to 25 MHz: $\pm 0.02$ dB	<5 MHz: $\pm 0.06$ dB $\geq 5$ MHz to 50 MHz: $\pm 0.02$ dB	<5 MHz: $\pm 0.03$ dB $\geq 5$ MHz to 50 MHz: $\pm 0.02$ dB $\geq 50$ MHz to 100 MHz: $\pm 0.03$ dB	<5 MHz: $\pm 0.03$ dB $\geq 5$ MHz to 50 MHz: $\pm 0.02$ dB $\geq 50$ MHz to 100 MHz: $\pm 0.02$ dB $\geq 100$ MHz to 200 MHz: $\pm 0.03$ dB $\geq 200$ MHz to 240 MHz: $\pm 0.04$ dB
<b>Harmonic distortion (1 V<sub>p-p</sub>)</b>	10 Hz to 20 kHz: < -60 dBc $\geq 20$ kHz to 1 MHz: < -55 dBc $\geq 1$ MHz to 5 MHz: < -45 dBc $\geq 5$ MHz to 10 MHz: < -45 dBc	10 Hz to 20 kHz: < -70 dBc $\geq 20$ kHz to 1 MHz: < -60 dBc $\geq 1$ MHz to 10 MHz: < -50 dBc $\geq 10$ MHz to 25 MHz: < -40 dBc	10 Hz to 20 kHz: < -70 dBc $\geq 20$ kHz to 1 MHz: < -60 dBc $\geq 1$ MHz to 5 MHz: < -50 dBc $\geq 5$ MHz to 50 MHz: < -40 dBc	10 Hz to 1 MHz: < -60 dBc $\geq 1$ MHz to 5 MHz: < -50 dBc $\geq 5$ MHz to 100 MHz: < -37 dBc	10 Hz to 1 MHz: < -60 dBc $\geq 1$ MHz to 5 MHz: < -50 dBc $\geq 5$ MHz to 25 MHz: < -37 dBc $\geq 25$ MHz to 240 MHz: < -30 dBc
<b>Harmonic distortion (1 V<sub>p-p</sub>), typical</b>	10 Hz to 20 kHz: < -73 dBc $\geq 20$ kHz to 1 MHz: < -72 dBc $\geq 1$ MHz to 5 MHz: < -65 dBc $\geq 5$ MHz to 10 MHz: < -56 dBc	10 Hz to 20 kHz: < -77 dBc $\geq 20$ kHz to 1 MHz: < -72 dBc $\geq 1$ MHz to 25 MHz: < -55 dBc	10 Hz to 20 kHz: < -75 dBc $\geq 20$ kHz to 1 MHz: < -72 dBc $\geq 1$ MHz to 5 MHz: < -65 dBc $\geq 5$ MHz to 50 MHz: < -56 dBc	10 Hz to 1 MHz: < -72 dBc $\geq 1$ MHz to 5 MHz: < -66 dBc $\geq 5$ MHz to 100 MHz: < -43 dBc	10 Hz to 1 MHz: < -67 dBc $\geq 1$ MHz to 5 MHz: < -74 dBc $\geq 5$ MHz to 25 MHz: < -57 dBc $\geq 25$ MHz to 240 MHz: < -43 dBc

<sup>1</sup> The given typical values are not warranted. But 80% or more manufactured units will perform to the level indicated at room temperature (approximately 25 °C).

**General characteristics**

<b>Spurious(1 V<sub>p-p</sub>)</b>	10 Hz to 1 MHz: < -60 dBc ≥1 MHz to 10 MHz: < -50 dBc	10 Hz to 1 MHz: < -60 dBc ≥1 MHz to 25 MHz: < -50 dBc	10 Hz to 1 MHz: < -60 dBc ≥1 MHz to 50 MHz: < -50 dBc	10 Hz to 1 MHz: < -60 dBc ≥1 MHz to 25 MHz: < -50 dBc ≥25 MHz to 100 MHz: < -50 dBc + 6 dBc/octave	10 Hz to 1 MHz: < -50 dBc ≥1 MHz to 25 MHz: < -47 dBc ≥25 MHz to 240 MHz: < -47 dBc + 6 dBc/octave
<b>Spurious(1 V<sub>p-p</sub>), typical</b>	10 Hz to 1 MHz: < -61 dBc ≥1 MHz to 10 MHz: < -68 dBc	10 Hz to 1 MHz: < -71 dBc ≥1 MHz to 25 MHz: < -68 dBc	10 Hz to 1 MHz: < -71 dBc ≥1 MHz to 50 MHz: < -69 dBc	10 Hz to 1 MHz: < -71 dBc ≥1 MHz to 25 MHz: < -63 dBc ≥25 MHz to 50 MHz: < -87 dBc ≥50 MHz to 100 MHz: < -52 dBc	10 Hz to 1 MHz: < -63 dBc ≥1 MHz to 25 MHz: < -57 dBc ≥25 MHz to 50 MHz: < -51 dBc ≥50 MHz to 100 MHz: < -69 dBc ≥100 MHz to 240 MHz: < -55 dBc
<b>Phase noise, typical</b>	< -110 dBc/Hz at 10 MHz, 10 kHz offset, 1 V <sub>p-p</sub>				
<b>Residual clock noise</b>	-63 dBm	-63 dBm	-63 dBm	-57 dBm	-57 dBm

**Square waves**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Frequency range</b>	1 μHz to 5 MHz	1 μHz to 25 MHz	1 μHz to 40 MHz	1 μHz to 50 MHz	1 μHz to 120 MHz
<b>Rise/fall time</b>	≤50 ns	≤9 ns	≤7 ns	≤5 ns	≤2.5 ns
<b>Jitter (RMS)</b>	500 ps	500 ps	300 ps	200 ps	100 ps
<b>Jitter (RMS), typical</b>	<210 ps	<60 ps	<60 ps	<35 ps	<35 ps

**Ramp waves**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Frequency range</b>	1 μHz to 100 kHz	1 μHz to 500 kHz	1 μHz to 800 kHz	1 μHz to 1 MHz	1 μHz to 2.4 MHz
<b>Linearity, typical</b>	≤0.2% of peak output	≤0.1% of peak output	≤0.1% of peak output	≤0.15% of peak output	≤0.2% of peak output
<b>Symmetry</b>	0% to 100.0%				

**Pulse waves**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Frequency range</b>	1 mHz to 5 MHz	1 mHz to 25 MHz	1 mHz to 40 MHz	1 mHz to 50 MHz	1 mHz to 120 MHz
<b>Pulse width</b>	80.00 ns to 999.99 s	16 ns to 999.99 s	12 ns to 999.99 s	8.00 ns to 999.99 s	4.00 ns to 999.99 s
<b>Resolution</b>	10 ps or 5 digits				
<b>Pulse duty</b>	0.001% to 99.999% (Limitations of pulse width apply)				
<b>Edge transition time</b>	50 ns to 625 s	9 ns to 625 s	7 ns to 625 s	5 ns to 625 s	2.5 ns to 625 s
<b>Resolution</b>	10 ps or 4 digits				
<b>Lead delay: range</b>	(Continuous Mode): 0 ps to Period (Triggered/Gated Burst Mode): 0 ps to Period - [Pulse Width + 0.8 * (Leading Edge Time + Trailing Edge Time)]				
<b>Lead delay: resolution</b>	10 ps or 8 digits				

General characteristics

Overshoot, typical	<5%				
Jitter (RMS)	500 ps	500 ps	300 ps	200 ps	100 ps
Jitter (RMS), typical	<210 ps	<60 ps	<60 ps	<35 ps	<35 ps

Other waveforms

	AFG3011C	AFG3021C, AFG3022C	AFG3051C, AFG3052C	AFG3101C, AFG3102C	AFG3251C, AFG3252C
Frequency range	1 $\mu$ Hz to 100 kHz	1 $\mu$ Hz to 500 kHz	1 $\mu$ Hz to 800 kHz	1 $\mu$ Hz to 1 MHz	1 $\mu$ Hz to 2.4 MHz
Noise bandwidth (-3 dB)	10 MHz	25 MHz	50 MHz	100 MHz	240 MHz
Noise type:	White Gaussian				
Internal noise add	When activated, output signal amplitude is reduced to 50%				
Level	0.0% to 50% of amplitude ( $V_{p-p}$ ) setting				
Resolution	1%				
DC (into 50 $\Omega$ )	-10 V to +10 V	-5 V to +5 V	-5 V to +5 V	-5 V to +5 V	-2.5 V to +2.5 V

Arbitrary waveforms

	AFG3011C	AFG3021C, AFG3022C	AFG3051C, AFG3052C	AFG3101C, AFG3102C	AFG3251C, AFG3252C
Frequency range	1 mHz to 5 MHz	1 mHz to 12.5 MHz	1 mHz to 25 MHz	1 mHz to 50 MHz	1 mHz to 120 MHz
Arbitrary waveforms in Burst Mode	1 mHz to 2.5 MHz	1 mHz to 6.25 MHz	1 mHz to 12.5 MHz	1 mHz to 25 MHz	1 mHz to 60 MHz
Effective analog bandwidth (-3 dB)	8 MHz	70 MHz		100 MHz	225 MHz
Nonvolatile memory	4 waveforms				
Memory: Sample rate (1K=1024 points)	2 to 128 K: 250 MS/s	2 to 128 K: 250 MS/s	2 to 16 K: 1 GS/s >16 K to 128 K: 250 MS/s	2 to 16 K: 1 GS/s >16 K to 128 K: 250 MS/s	2 to 16 K: 2 GS/s >16 K to 128 K: 250 MS/s
Vertical resolution	14 bits				
Rise/fall time	$\leq$ 80 ns	$\leq$ 14 ns	$\leq$ 10 ns	$\leq$ 8 ns	$\leq$ 3 ns
Jitter (RMS)	4 ns	4 ns	1 ns at 1 GS/s 4 ns at 250 MS/s	1 ns at 1 GS/s 4 ns at 250 MS/s	500 ps at 2 GS/s 4 ns at 250 MS/s

Amplitude

	AFG3011C	AFG3021C, AFG3022C	AFG3051C, AFG3052C	AFG3101C, AFG3102C	AFG3251C, AFG3252C
Range, 50 $\Omega$ Load	20 mV <sub>p-p</sub> to 20 V <sub>p-p</sub>	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>	20 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>	$\leq$ 200 MHz: 50 mV <sub>p-p</sub> to 5 V <sub>p-p</sub> >200 MHz: 50 mV <sub>p-p</sub> to 4 V <sub>p-p</sub>
Range (open circuit or High Z)	40 mV <sub>p-p</sub> to 40 V <sub>p-p</sub>	20 mV <sub>p-p</sub> to 20 V <sub>p-p</sub>	20 mV <sub>p-p</sub> to 20 V <sub>p-p</sub>	40 mV <sub>p-p</sub> to 20 V <sub>p-p</sub>	$\leq$ 200 MHz: 100 mV <sub>p-p</sub> to 10 V <sub>p-p</sub> >200 MHz: 100 mV <sub>p-p</sub> to 8 V <sub>p-p</sub>
Accuracy	$\pm$ (2% of setting +2 mV) (1 kHz sine wave, 0 V offset, >20 mV <sub>p-p</sub> amplitude)	$\pm$ (1% of setting +1 mV) (1 kHz sine wave, 0 V offset, >10 mV <sub>p-p</sub> amplitude)			

**General characteristics**

<b>Accuracy, typical</b>	$\pm(1\% \text{ of setting} + 5 \text{ mV})$ (1 kHz sine wave, 0 V offset, $>20 \text{ mV}_{p-p}$ amplitude)	$\pm(0.5\% \text{ of setting} + 0.5 \text{ mV})$ (1 kHz sine wave, 0 V offset, $>10 \text{ mV}_{p-p}$ amplitude)
<b>Resolution</b>	0.1 mV <sub>p-p</sub> , 0.1 mV <sub>RMS</sub> , 1 mV, 0.1 dBm or 4 digits	
<b>Units</b>	V <sub>p-p</sub> , V <sub>RMS</sub> , dBm (sine wave only) and Volt (high/low setting)	
<b>Output impedance</b>	50 Ω	
<b>Load impedance setting</b>	Selectable: 50 Ω, 1 Ω to 10.0 kΩ, High Z (Adjusts displayed amplitude according to selected load impedance)	
<b>Isolation</b>	42 V <sub>pk</sub> maximum to earth	
<b>Short-circuit protection</b>	Signal outputs are robust against permanent shorts against floating ground	
<b>External voltage protection</b>	To protect signal outputs against external voltages use fuse adapter 013-0345-xx	

**DC offset**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Range (50 Ω load)</b>	$\pm(10 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm(5 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm(5 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm 5 \text{ V}_{pk} \text{ DC}$	$\pm 2.5 \text{ V}_{pk} \text{ DC}$
<b>Range (open circuit or High Z)</b>	$\pm(20 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm(10 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm(10 \text{ V}_{pk} - \text{Amplitude}_{p-p} \div 2)$	$\pm 10 \text{ V}_{pk} \text{ DC}$	$\pm 5 \text{ V}_{pk} \text{ DC}$
<b>Accuracy</b>	$\pm(2\% \text{ of }  \text{setting}  + 10 \text{ mV} + 1\% \text{ of amplitude } (V_{p-p}))$	$\pm(1\% \text{ of }  \text{setting}  + 5 \text{ mV} + 0.5\% \text{ of amplitude } (V_{p-p}))$			
<b>Resolution</b>	1 mV				

**System characteristics**

<b>Frequency resolution</b>	1 μHz or 12 digits
<b>Internal frequency reference</b>	
<b>Stability</b>	All except ARB: $\pm 1 \text{ ppm}$ , 0 °C to 50 °C ARB: $\pm 1 \text{ ppm} \pm 1 \text{ μHz}$ , 0 °C to 50 °C
<b>Aging</b>	$\pm 1 \text{ ppm per year}$
<b>Phase (except DC, noise, pulse)</b>	
<b>Range</b>	-180° to +180°
<b>Resolution</b>	0.01° (sine), 0.1° (other waveforms)
<b>Internal noise add</b>	When activated, output signal amplitude is reduced to 50%
<b>Level</b>	0.0% to 50% of amplitude (V <sub>p-p</sub> ) setting
<b>Resolution</b>	1%
<b>Main output</b>	50 Ω

## System characteristics

Remote programming: GPIB, LAN 10BASE-T / 100BASE-TX, USB 1.1  
 configuration times, max, typical  
 Compatible with SCPI-1999.0 and IEEE 488-2 standards

	USB	LAN	GPIB
Function change	81 ms	81 ms	81 ms
Frequency change (except Pulse)	2.5 ms	6 ms	3.2 ms
Frequency change (Pulse)	40 ms	37 ms	32 ms
Amplitude change	90 ms	97 ms	90 ms
Select user ARB (4k points from USB Memory)	48 ms	50 ms	49 ms
Select user ARB (128k points from USB Memory)	260 ms	266 ms	240 ms

Remote programming: data download time for 4000 point waveform data, typical	USB	LAN	GPIB
	47 ms	78 ms	320 ms

Power source 100-240 V, 47-63 Hz, or 115 V, 360-440 Hz

Power consumption Less than 120 W

Warm up time, typical 20 minutes

Power on self-diagnosis, typical <10 s

Acoustic noise, typical <50 dBA

Display 5.6 in. Color TFT LCD

User interface and Help languages English, French, German, Japanese, Korean, Portuguese, Simplified and Traditional Chinese, Russian (user selectable)

## Modulation characteristics

### AM, FM, PM

Carrier waveforms All except Pulse, Noise, and DC

Source Internal/external

Internal modulating waveform Sine, square, ramp, noise, ARB  
 (AM: maximum waveform length 4,096;  
 FM/PM: maximum waveform length 2,048)

Internal modulating frequency 2 mHz to 50.00 kHz

AM modulation depth 0.0% to +120.0%

Min FM peak deviation DC

Max FM peak deviation See following table,

PM phase deviation -360.0° to +360.0°

### Pulse width modulation

Carrier waveform Pulse

Source Internal/external

**Modulation characteristics**

<b>Internal modulating waveform</b>	Sine, square, ramp, noise, ARB (maximum waveform length 2,048)
<b>Internal modulating frequency</b>	2 mHz to 50.00 kHz
<b>Deviation</b>	0% to 50.0% of pulse period

**Max FM peak deviation**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Sine</b>	5 MHz	12.5 MHz	25 MHz	50 MHz	120 MHz
<b>Square</b>	2.5 MHz	12.5 MHz	20 MHz	25 MHz	60 MHz
<b>ARB</b>	2.5 MHz	6.25 MHz	12.5 MHz	25 MHz	60 MHz
<b>Others</b>	50 kHz	250 kHz	400 kHz	500 kHz	1.2 MHz

**Frequency shift keying**

<b>Carrier waveforms</b>	All, except Pulse, Noise, and DC
<b>Source</b>	Internal/external
<b>Internal modulating frequency</b>	2 mHz to 1,000 MHz
<b>Number of keys</b>	2

**Sweep**

<b>Waveforms</b>	All, except Pulse, Noise, and DC
<b>Type</b>	Linear, logarithmic
<b>Sweep time</b>	1 ms to 300 s
<b>Hold/return time</b>	0 ms to 300 s
<b>Max total sweep time</b>	300 s
<b>Resolution</b>	1 ms or 4 digits
<b>Total sweep time accuracy, typical</b>	≤0.4%
<b>Min start/stop frequency</b>	All except ARB: 1 μHz ARB: 1 mHz
<b>Max start/stop frequency</b>	See chart, below

**Sweep: max start/stop frequency**

	<b>AFG3011C</b>	<b>AFG3021C, AFG3022C</b>	<b>AFG3051C, AFG3052C</b>	<b>AFG3101C, AFG3102C</b>	<b>AFG3251C, AFG3252C</b>
<b>Sine</b>	10 MHz	25 MHz	50 MHz	100 MHz	240 MHz
<b>Square</b>	5 MHz	25 MHz	40 MHz	50 MHz	120 MHz
<b>ARB</b>	5 MHz	12.5 MHz	25 MHz	50 MHz	120 MHz
<b>Others</b>	100 kHz	500 kHz	800 kHz	1 MHz	2.4 MHz

**Burst**

<b>Waveforms</b>	All, except Noise and DC
<b>Type</b>	Triggered, gated (1 to 1,000,000 cycles or Infinite)
<b>Internal trigger rate</b>	1 μs to 500.0 s
<b>Gate and trigger sources</b>	Internal, external, remote interface

## Auxiliary input characteristics

<b>Modulation inputs</b>	Channel 1, Channel 2
<b>Input range</b>	All except FSK: $\pm 1$ V FSK: 3.3 V logic level
<b>Impedance</b>	10 k $\Omega$
<b>Frequency range</b>	DC to 25 kHz (122 kS/s)

### External Triggered/Gated Burst input

<b>Level</b>	TTL compatible
<b>Impedance</b>	10 k $\Omega$
<b>Pulse width</b>	100 ns minimum
<b>Slope</b>	Positive/negative, selectable
<b>Trigger delay</b>	0.0 ns to 85.000 s
<b>Trigger delay resolution</b>	100 ps or 5 digits
<b>Jitter (RMS), typical</b>	Burst: <500 ps (trigger input to signal output)

### 10 MHz reference input

<b>Impedance</b>	1 k $\Omega$ , AC coupled
<b>Required input voltage swing</b>	100 mV <sub>p-p</sub> to 5 V <sub>p-p</sub>
<b>Lock range</b>	10 MHz $\pm$ 35 kHz

### External channel 1 add input

	AFG3101C, AFG3102C, AFG3251C, AFG3252C only
<b>Impedance</b>	50 $\Omega$
<b>Input range</b>	-1 V to +1 V (DC + peak AC)
<b>Bandwidth</b>	DC to 10 MHz (-3 dB) at 1 V <sub>p-p</sub>

## Auxiliary output characteristics

### Trigger output (Channel 1)

<b>Level</b>	Positive TTL level pulse into 1 k $\Omega$
<b>Impedance</b>	50 $\Omega$
<b>Jitter (RMS), typical</b>	AFG3011C/21C/22C: 500 ps AFG3051C/52C: 300 ps AFG3101C/02C: 200 ps AFG3251C/52C: 100 ps
<b>Max frequency</b>	4.9 MHz (4.9 MHz to 50 MHz: A fraction of the frequency is output; >50 MHz: no signal is output)

### Clock reference out (10 MHz)

	AFG3101C, AFG3102C, AFG3251C, AFG3252C only
<b>Impedance</b>	50 $\Omega$ , AC coupled
<b>Amplitude</b>	1.2 V <sub>p-p</sub> into 50 $\Omega$ load



## Physical characteristics

Benchtop configuration

### Dimensions

Height	156 mm (6.2 in.)
Width	329.6 mm (13.0 in.)
Depth	168.0 mm (6.6 in.)

### Weight

Net	4.5 kg (9.9 lb.)
Shipping	5.9 kg (12.9 lb.)

## EMC environmental and safety characteristics

### Temperature

Operating	0 °C to +50 °C
Non-operating	-30 °C to +70 °C

### Humidity

Operating	≤ +40 °C: ≤80%
	> +40 °C to 50 °C: ≤60%

### Altitude

Up to 3,000 m (10,000 ft.)

### EMC compliance

European Union	EU Council Directive 2004/108/EC
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### Safety

UL 61010-1:2004  
CAN/CSA C22.2 No. 61010-1:2004  
IEC 61010-1:2001

## Ordering information

### Arbitrary function generators

AFG3011C	1 µHz to 10 MHz sine wave, 1-channel arbitrary function generator
AFG3021C	1 µHz to 25 MHz sine wave, 1-channel arbitrary function generator
AFG3022C	1 µHz to 25 MHz sine wave, 2-channel arbitrary function generator
AFG3051C	1 µHz to 50 MHz sine wave, 1-channel arbitrary function generator
AFG3052C	1 µHz to 50 MHz sine wave, 2-channel arbitrary function generator
AFG3101C	1 µHz to 100 MHz sine wave, 1-channel arbitrary function generator
AFG3102C	1 µHz to 100 MHz sine wave, 2-channel arbitrary function generator
AFG3251C	1 µHz to 240 MHz sine wave, 1-channel arbitrary function generator
AFG3252C	1 µHz to 240 MHz sine wave, 2-channel arbitrary function generator

## Instrument options

### Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

### Manual options

Opt. L0	English (071-1631-xx)
Opt. L1	French (071-1632-xx)
Opt. L2	Italian (071-1669-xx)
Opt. L3	German (071-1633-xx)
Opt. L4	Spanish (071-1670-xx)
Opt. L5	Japanese (071-1634-xx)
Opt. L6	Portuguese (071-3042-xx)
Opt. L7	Simple Chinese (071-1635-xx)
Opt. L8	Traditional Chinese (071-1636-xx)
Opt. L9	Korean (071-1637-xx)
Opt. L10	Russian (071-1638-xx)
Opt. L99	No manual

### Service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R5	Repair Service 5 Years (including warranty)
Opt. R5DW	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase
Opt. SILV400	Standard warranty extended to 5 years

## Standard accessories

### Accessories

- Quick-start user manual
- Power cord
- USB cable
- CD-ROM with specifications and performance verification manual,
- Programmer manual
- Service manual
- LabView and IVI drivers
- CD-ROM with ArbExpress™ software
- NIST-traceable calibration certificate.
- 3-year warranty on parts and labor

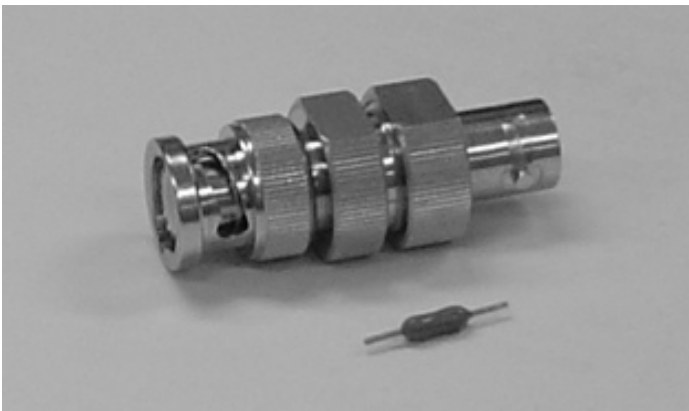
### Warranty

Three-year warranty on parts and labor.

## Recommended accessories

### Accessories

Rackmount kit	RM3100
Fuse adapter, BNC-P to BNC-R	013-0345-xx
Fuse set, 3 pcs, 0.125 A.	159-0454-xx
BNC cable shielded, 3 ft.	012-0482-xx
BNC cable shielded, 9 ft.	012-1256-xx
GPIB cable, double shielded	012-0991-xx
50 $\Omega$ BNC terminator	011-0049-02



# Datasheet



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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\* European toll-free number. If not accessible, call: +41 52 675 3777

**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com).

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## Данный компонент на территории Российской Федерации

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Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

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Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

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