

# DGE3000 Series Single-Channel Arbitrary Waveform Generator

## Technical Specifications

All technical specifications are guaranteed when the following conditions are met, unless otherwise stated.

- The signal generator must be operated continuously for more than 30 minutes at the specified operating temperature (20°C to 30°C) to meet these specifications;
- The signal generator is in the calibration interval and has performed a self-calibration.

In addition to the specifications marked with the word "Typical", the specifications used are guaranteed.

## Waveforms

Waveforms		
Bandwidth	DGE3031	30 MHz
	DGE3061	60 MHz
Sample Rate	DGE3031	125 MSa/s
	DGE3061	300 MSa/s
Vertical Resolution	14 bits	
Channel	1	
Standard Waveforms	Sine wave, square wave, ramp wave, pulse wave, noise	
Arbitrary Waveforms	Sinc, exponential rise, exponential decline, electrocardiogram, Gaussian, semi-positive, Lorentz, dual audio, DC voltage totaling more than 160 kinds	

## Frequency Characteristics

Frequency Characteristics (Frequency resolution to 1 $\mu$ Hz)		
Sine wave	DGE3031	1 $\mu$ Hz ~ 30MHz
	DGE3061	1 $\mu$ Hz ~ 60MHz
Square wave	DGE3031	1 $\mu$ Hz ~ 15MHz
	DGE3061	1 $\mu$ Hz ~ 20MHz
Pulse wave	DGE3031	1 $\mu$ Hz ~ 15MHz
	DGE3061	1 $\mu$ Hz ~ 20MHz
Ramp wave	DGE3031	1 $\mu$ Hz ~ 1 MHz
	DGE3061	1 $\mu$ Hz ~ 2 MHz
Noise wave (-3 dB)	20 MHz BW(AWGN)	
Arbitrary wave	1 $\mu$ Hz - 10 MHz	
Frequency resolution	1 $\mu$ Hz or 7 significant figures	
Frequency stability	$\pm$ 30 ppm at 0 $\pm$ 40°C	

Frequency aging rate	±30 ppm per year
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## Amplitude Characteristics

Amplitude Characteristics (not specifically labeled, the load defaults to 50Ω)		
Output amplitude	DGE3031	2mVpp ~ 20Vpp(≤ 10MHz)High Z 2mVpp ~ 10Vpp(≤ 30MHz)High Z 1mVpp ~ 10Vpp(≤ 10MHz)50 Ω 1mVpp ~ 5Vpp(≤ 30MHz)50 Ω
	DGE3061	2mVpp ~ 20Vpp(≤ 10MHz)High Z 2mVpp ~ 10Vpp(≤ 60MHz)High Z 1mVpp ~ 10Vpp(≤ 10MHz)50 Ω 1mVpp ~ 5Vpp(≤ 60MHz)50 Ω
Amplitude accuracy	± (1% of setting + 1 mVpp) (Typical 1kHz sine, 0V offset)	
Amplitude resolution	1mVpp or 4 digits	
DC offset range (AC +DC)	DGE3031	±(10 Vpk–Amplitude Vpp/2) High Z(≤ 10MHz) ±(5Vpk - Amplitude Vpp/2) High Z(≤ 30MHz) ±(5 Vpk – Amplitude Vpp/2) 50Ω(≤ 10MHz) ±(2.5 Vpk – Amplitude Vpp/2) 50Ω(≤ 30MHz)
	DGE3061	±(10Vpk – Amplitude Vpp/2)High Z(≤ 10MHz) ±(5Vpk–Amplitude Vpp/2) High Z(≤ 60MHz) ±(5 Vpk - Amplitude Vpp/2) 50Ω(≤ 10MHz) ±(2.5 Vpk– Amplitude Vpp/2) 50Ω(≤ 60MHz)
DC offset accuracy	± (1 % of  setting  + 1 mV + amplitude Vpp * 0.5%)	
Offset resolution	1 mVpp or 4 digits	
Output Impedance	50Ω (Typical)	

## Signal Characteristics

Signal Characteristics		
Sine		
Bandwidth flatness (relative to 1 kHz Sine wave, 1 Vpp)	DGE3031	≤10MHz: ±0.3dB ≤30MHz: ±0.5dB
	DGE3061	≤10MHz: ±0.3dB ≤35MHz: ±0.5dB ≤60MHz: ±1dB
Harmonic distortion	DGE3031	Typical (0dBm) DC to 1MHz: <-65dBc 1MHz to 30MHz: <-60dBc
	DGE3061	Typical (0dBm) DC to 1MHz: <-65dBc 1MHz to 35MHz: <-60dBc 35MHz to 60MHz: <-50dBc
Total harmonic distortion	< 0.2 %, 10 Hz to 20 kHz, 1 Vpp	

Non-harmonic distortion	Typical (0dBm) ≤10MHz: <-70dBc >10MHz: <-70dBc + 6dB/ sound interval	
Phase noise	Typical (0dBm, 10kHz offset) 10MHz: ≤ -110dBc/Hz	
<b>Square</b>		
Rise/fall time	< 20ns	
Jitter (rms), typical (1Vpp, 50Ω)	200ps + 30ppm	
Overshoot	< 5%	
<b>Ramp</b>		
Linearity	< 1% of peak output (typical 1 kHz, 1 Vpp, symmetry 50%)	
Symmetry	0% to 100%	
<b>Pulse</b>		
Period	DGE3031	67 ns to 1 Ms
	DGE3061	50 ns to 1 Ms
Pulse Width	≥ 24ns	
Rise and fall time	≥ 15ns	
Overshoot	< 5%	
Jitter(rms), typical (1Vpp, 50Ω)	200ps + 30ppm	
<b>Noise</b>		
Types	Gaussian white noise	
Bandwidth (-3dB)	20 M	
<b>Arbitrary wave</b>		
Bandwidth	10M	
Waveform length	2 to 100K points	
Sampling rate	DGE3031	125 MSa/s
	DGE3061	300 MSa/s
Amplitude accuracy	14 bits	

## Modulation Characteristics

Modulation Characteristics	
Modulation Type	AM, DSB-AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK, PWM, SUM
<b>AM</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave (except DC)
Modulated signal source	Internal or external
Internal modulation waveform	Sine wave, square wave, ramp wave, noise
Internal amplitude	2 mHz to 100 kHz

modulation frequency	
Depth	0% to 100%
<b>DSBAM</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave (except DC)
Modulated signal source	Internal or external
Internal modulation waveform	Sine wave, square wave, ramp wave
Internal amplitude modulation frequency	2 mHz to 100 kHz
Depth	0% to 100%
<b>FM</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave (except DC)
Modulated signal source	Internal or external
Internal modulation waveform	Sine wave, square wave, ramp wave, noise
Internal modulation frequency	2 mHz to 100 kHz
Frequency offset	$1 \mu\text{Hz} \leq \text{offset} < \text{carrier frequency}$
<b>PM</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave (except DC)
Modulated signal source	Internal or external
Internal modulation waveform	Sine wave, square wave, ramp wave, noise
Internal phase modulation frequency	2 mHz to 100 kHz
Phase deviation range	0° to 180°
<b>PWM</b>	
Carrier	Pulse wave
Modulated signal source	Internal or external
Internal modulation waveform	Sine wave, square wave, ramp wave, noise
Internal phase modulation	2 mHz to 1 MHz

frequency	
Offset	0% to Carrier pulse duty cycle
<b>ASK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal source	Internal or external
Internal modulation waveform	50% square wave
Internal modulation amplitude	$0 \text{ mVpp} \leq \text{amplitude} < \text{carrier amplitude}$
ASK frequency	2 MHz to 1MHz
<b>PSK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal source	Internal or external
Internal modulation waveform	50% square wave
PSK frequency	2 MHz to 1MHz
Phase deviation range	$0^\circ$ to $360^\circ$
<b>FSK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal source	Internal or external
Internal modulation waveform	50% square wave
FSK rate	2 MHz to 1MHz
FSK hop frequency	$2\text{MHz} \leq \text{offset} < \text{maximum frequency of corresponding carrier}$
<b>3FSK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal source	Internal
Internal modulation waveform	50% square wave
FSK rate	2 MHz to 1MHz
<b>4FSK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal	Internal

source	
Internal modulation waveform	50% square wave
FSK rate	2 mHz to 1MHz
<b>BPSK</b>	
Carrier	Sine wave, square wave, ramp wave, arbitrary wave(except DC)
Modulated signal source	Internal
Internal modulation waveform	50% square wave
BPSK rate	2 mHz to 1MHz
Phase deviation range	0°~360°
Data source	01patt, 10patt, PN15,PN21
<b>QPSK</b>	
Carrier	Sine wave, square wave, ramp wave,arbitrary wave(except DC)
Modulated signal source	Internal
QPSK frequency	2 mHz to 1MHz
<b>OSK</b>	
Carrier	Sine wave
Modulated signal source	Internal
Internal modulation waveform	50% square wave
OSK frequency	2 mHz to 100 kHz
Oscillation time	8ns to 250s
<b>SUM</b>	
Carrier	Sine wave, square wave, ramp wave,arbitrary wave(except DC)
Modulated signal source	Internal or external
Internal amplitude modulation frequency	2 mHz to 100 kHz
Depth	0% to 100%

## Sweep Characteristics

Sweep Characteristics	
Carrier	Sine, square wave, ramp wave, arbitrary wave (Except DC)
Minimum/maximum	1 μHz(minimum)/

starting frequency	maximum frequency of corresponding carrier
Minimum/maximum termination frequency	1 $\mu$ Hz(minimum)/ maximum frequency of corresponding carrier
Types	Linear, logarithmic
Sweep time	1 ms to 500 s $\pm$ 0.1%
Trigger source	Internal, external, manual

## Burst Characteristics

Burst Characteristics	
Waveform	Sine wave, square wave, ramp wave, pulse wave and arbitrary wave (Except DC)
Types	N-cycle,Gated
N-cycle trigger source	Internal, external, manual
Carrier frequency	1 $\mu$ Hz $\leq$ Offset $\leq$ Maximum frequency of corresponding carrier/2
N-cycle trigger cycle	DGE3031   67 ns $\sim$ 1 Ms(Min = Cycles * Period)
	DGE3061   34 ns $\sim$ 1 Ms(Min = Cycles * Period)
periodicity	1 $\sim$ 60000(Max =Burst Period / Period)/infinite
Gated source	External trigger

## Counter Specifications

Counter Specifications	
Measurement function	Frequency, period
Frequency Range	Single channel :100 mHz - 200 MHz
Frequency resolution	6 digits
Input resistance	1 M $\Omega$

## Input/Output Characteristics

Input/Output Characteristics	
Communication Interface	USB Host, USB Device
<b>External modulation input</b>	
Input frequency range	DC - 20 kHz
Input level range	$\pm$ 1V full scale
Input impedance	10 k $\Omega$ (typical)
<b>External trigger input</b>	
Level	TTL-compatible
Slope	Rising or falling (selectable)
Pulse Width	>100ns
<b>Sync Output</b>	
Level	TTL-compatible
Maximum frequency	1MHz

## General Specifications

<b>Display</b>	
Display type	3.6-inch color LCD display
Display resolution	480 Horizontal ×272 Vertical pixels
Display color	65536 colors, 16 bits, TFT
<b>Power</b>	
Voltage	100- 240 VAC, 50/60 Hz, CAT II
Power consumption	Less than 15W
Fuse	250V, F1AL
<b>Environment</b>	
Temperature	Working temperature: 0 °C to 40 °C
	Storage temperature: -20 °C to 60 °C
Relative humidity	Less than 35°C: ≤ 90% relative humidity 35°C to 40°C: ≤ 60% relative humidity
Height	Operating 3,000 meters Non-operation 12,000 meters
<b>Mechanical Specification</b>	
Dimension	200mm (Length) × 92 mm (Height) × 145mm (Width)
Weight	Approx. 0.8 kg
<b>Others</b>	
Adjustment interval	The recommended calibration interval is one year



V1.0.0