Data sheet

25 MHz Arbitrary / Function Generators
Models 4075 & 4078

4075

4078

Common Features & Benefits

- 14-bit, 100 MSa/s, 400 k point Arbitrary Waveform Generator
- 25 MHz Sine / 25 MHz Square waveforms
- Predefined Pulse, Ramp, Triangle, Noise, Sin (X)/X, Exponential and Gaussian waveforms
- AM, FM and FSK modulation
- 10 mVpp to 10 Vpp with 1 mVpp settable amplitude resolution
- Large graphical LCD shows a detailed output waveform representation
- Fully programmable markers
- Fully protected output
- Closed case calibration
- Arbitrary waveform editing software included
- SCPI compliant command set
- Optional GPIB versions available

Industry Leading Performance

Models 4075 and 4078 are versatile high performance function/arbitrary waveform generators with the largest arbitrary memory depth in their class. The generators combine the ability to produce nearly any conceivable arbitrary waveform with accuracy and precision and a DDS architecture offering easy to use conventional function generator capabilities. Arbitrary waveforms have 14 bit amplitude resolution, 100MSa/s sample rate and up to 400,000 points length. Waveforms can be output in continuous, triggered, gated or burst modes. Front panel operation is straightforward and user-friendly. The instruments can be remotely controlled using SCPI-compliant commands via RS232.

Extensive features such as internal or external AM, FM and FSK modulation along with versatile sweep capabilities and variable edge pulse generation make these generators suitable for a wide range of applications including electronic design, sensor simulation, functional test or generation of I/Q modulated signals.

Dual Channel Model 4078

- Both channels offer full functionality. All wave form parameters such as frequency, amplitude and offset can be set independently
- Synchronize both output signals to the same clock signal (external or internal) and precisely adjust the phase relationship between the two signals
- Economical baseband I/Q signal source
- Saves cost and bench space

Options

Model 4075 with GPIB interface: Order model number 4075GPIB
Model 4078 with GPIB interface: Order model number 4078GPIB

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▲ Front panel
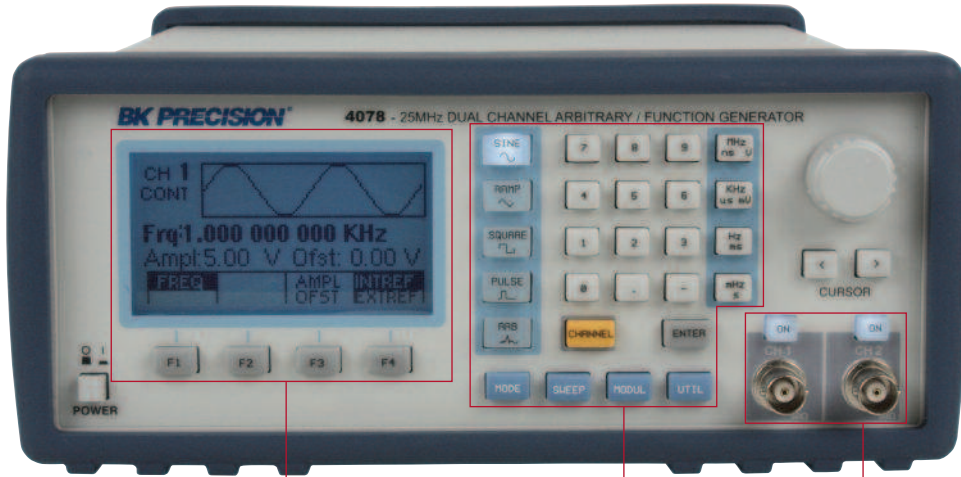
Informative
LCD with detailed display of
waveform parameters

Easy-to-use keypad
allows efficient parameter
configuration

Model 4078 allows for both
independent and phase synchro-
nized waveform generation

Intuitive user interface

These Waveform Generators use a menu-driven front panel keypad and control knob along with an easy-to-read graphical LCD to adjust all waveform parameters, which are visible at one glance. Arbitrary waveform editing and definition is flexible and easy: Waveforms can be defined from scratch by entering data point by point, by loading and modifying predefined built-in wave-forms or by downloading waveforms via the remote interface, using either the included arbi-trary waveform generation software Wave-X or a custom program. Standard function generator waveforms sine, square, ramp and pulse can be created by pressing a single button.

▲ Rear panel

4078 only

optional GPIB interface

4075 & 4078

10 MHz external reference
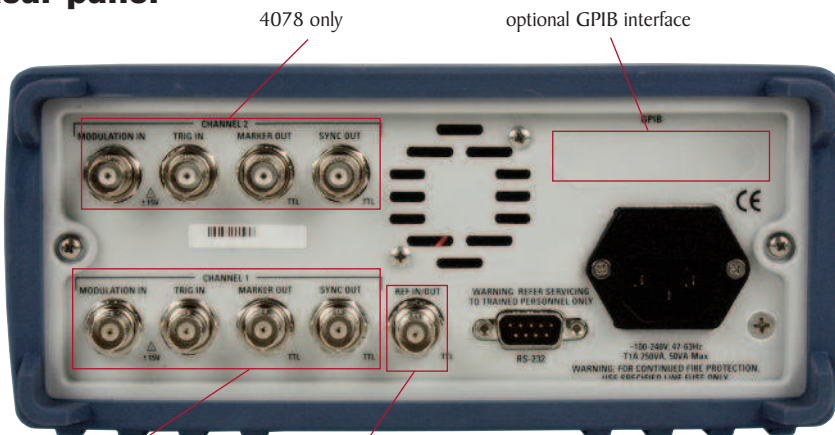
Flexible interface

Built-in 10 MHz external reference is included at no extra cost (both models).
This input/output let's you synchronize with another 4075/4078 generator or to an external 10 MHz Clock for precise phase adjustment.

Connect the programmable marker Output to the Trigger input of additional generators to create complex polyphase scenarios.

Flexible memory management

Unlike other comparable generators, which typically contain only a few fixed-size memory locations for waveform storage, the 4075 and 4078 gives users more freedom - the 400000 point flash memory can be allocated to one large waveform or up to 50 different waveforms, each with a customizable length.

Versatile noise generation

In Arb mode you can conveniently add noise to your waveform directly from the front panel and precisely adjust the scale of the noise amplitude. Unlike other generators that only produce a noise waveform, this feature allows you to choose between generating a noise waveform or adding noise to an existing waveform.
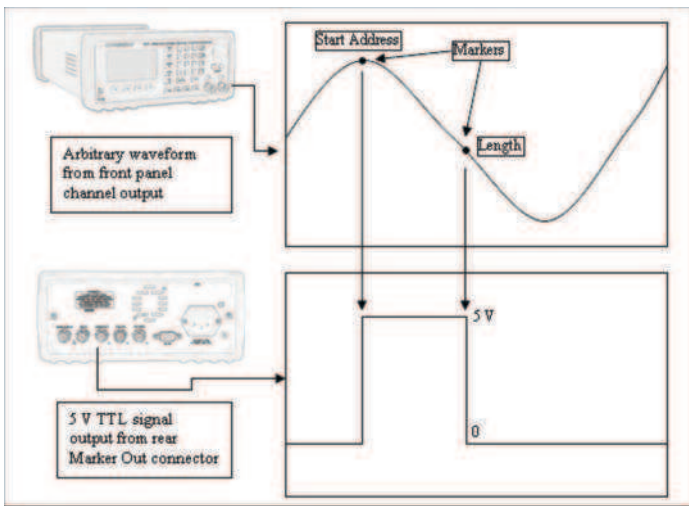
Programmable Markers

Models 4075 and 4078 provide fully programmable markers, allowing you to generate a positive TTL level output signal at the points specified by address and length up to 4000 points. This feature is available in Arbitrary mode and can not be found in other comparable waveform generators. It could be used for applications requiring polyphase signal generation, e.g. simulation of a real world 3 phase AC network where one of the phases is degraded with spikes or noise.
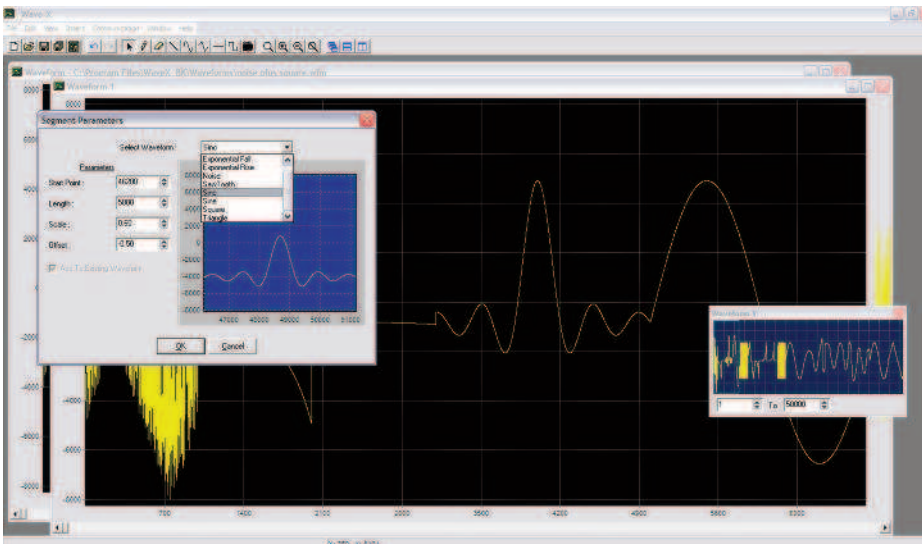
Generate waveforms with ease

The included PC Software allows you to easily generate, edit and download custom arbitrary waveforms.

Generate waveforms by importing a textfile, or define via freehand, point draw or waveform math. Waveforms can also be uploaded from the generator for documentation purposes.

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Specifications	models	
	4075	**4078**
Channels	1 Channel	2 Channels
Frequency Characteristics		
Sine	1 μHz to 25 MHz	
Square	1 μHz to 25 MHz	
Triangle, Ramp	1 μHz to 5 MHz	
Pulse	1 mHz to 10 MHz	
Accuracy	0.002 % (20 ppm)	
Resolution	12 digits or 1 μHz	
Arbitrary Characteristics		
Built-in Waveforms	Sine, Triangle, Square, Noise, Ramp Up, Ramp Down, Sine(X)/X, Exponential Up, Exponential Down, Gaussian	
Waveform Length	2 points to 400,000 points	
Vertical Resolution	14 bits (16,384 levels)	
Noise	Add 1% to 100% to output waveform	
Sampling Rate	100 MSa/s, Point execution rate adjustable from 10 ns-50 s	
Frequency	Accuracy: 0.002% (20 ppm) Resolution: 4 digits	
Output Characteristics		
Amplitude Range	10 mV to 10 Vp-p into 50 Ω	
Amplitude Resolution	3 digits (1000 counts)	
Amplitude Accuracy (1 kHz)	$\pm$ 1% $\pm$ 1 mV	
Flatness (relative to 1 kHz)	$\pm$ 0.2 dB to 1 MHz $\pm$ 1 dB to 25 MHz	
Offset Range	$\pm$ 5 V into 50 Ω, depending on the Amplitude setting	
Offset Resolution	10 mV with 3 digits resolution	
Offset Accuracy	$\pm$ 1% $\pm$ 10 mV into 50 Ω	
Output Impedance	50 Ω typical	
Output Protection	The instruments output is protected against short circuit or nominal accidental voltages applied to the main output connector	
Waveform Characteristics		
Harmonic Distortion (sine)	DC-20 kHz, -65 dBc 20 kHz-100 kHz, 60 dBc 100 kHz-5 MHz, -45 dBc 5 MHz-25 MHz, -30 dBc	
Spurious (sine)	DC-1 MHz < -60 dBc	
Rise/Fall Time (square, pulse)	< 12 ns (10% to 90%) at full amplitude into 50 Ω	
Variable Duty Cycle	20% to 80% to 5 MHz (square) 40% to 60% to 10 MHz (square) 50% >10 MHz (square)	
Variable Symmetry	10%-90% to 5 MHz (triangle)	
Symmetry at 50%	< 1 % + 5 ns	
Linearity (triangle, ramp)	<0.1% of peak output (1 μHz to 250 kHz)	
Pulse Width (period 10 μs - 0.1 μs)	20 ns to <(Period-20 ns) 10 ns resolution	
Variable Edge Time (period 100 μs - 0.16 μs)	100 ns to Width/0.625 (50 % duty cycle) 10 ns resolution	
Operating Modes		
Continuous	Output continuous at programmed parameters	
Triggered	Output quiescent until triggered by an internal or external trigger, then one waveform cycle is generated	

Triggered	to programmed parameters. Up to 10 MHz trigger rate for ARB waveforms and 5 MHz in DDS mode	
Gate	Same as triggered mode, except waveform is executed for the duration of the gate signal. The last cycle started is completed	
Burst	2-999,999 cycles	
Phase	-360.0 to +360 degrees with 0.1 degree resolution	
Trigger Source	Trigger source may be internal, external or manual. Internal trigger rate 0.01 Hz-1 MHz (1 μs – 10 s)	
Modulation Characteristics		
Amplitude Modulation		
Internal	0.1 Hz-20 kHz sine , square or triangle waveform variable modulation from 0% to 100%	
External	5 Vp-p for 100% modulation, 10 kΩ input impedance	
Frequency Modulation		
Internal	0.1 Hz-20 kHz sine wave, square or triangle	
External	5 Vp-p for 100% deviation, 10 kΩ input impedance	
Sweep Characteristics		
Sweep Shape	Linear and Logarithmic, up or down	
Sweep Time	20 ms to 500 s	
Sweep Trigger	internal, external, continuous or burst	
Inputs and Outputs		
Trigger IN	TTL Compatible Maximum rate 10 MHz Minimum width 50 ns	
Sync OUT	TTL pulse at programmed frequency, 50 Ω source impedance	
Modulation IN	5 Vp-p for 100% modulation 10 kΩ input impedance DC to >50 kHz minimum bandwidth	
Marker Out	Positive TTL pulse user programmable in Arbitrary waveform, 50 Ω source impedance	
Reference IN-OUT	10 MHz, TTL compatible, input or output, for external unit synchronization 50 Ω output impedance and 1 kΩ input	
Internal Trigger		
Repetition	1 μs to 100 s	
Resolution	4 digits	
Accuracy	+0.002%	
General		
Store Memory	50 full panel settings at power-off	
Arbitrary Memory	400,000 points in flash memory	
Dimensions	8.4(213) x 3.5(88) x 12(300) inches (mm) (WxHxD)	
Weight	Approx. 3 kg (6.6 lbs)	
Power	100 VAC-240 VAC $\pm$ 10%, 50 VA max.	
Temperature	Operating 0 ºC to + 50 ºC Non-operating -20 ºC to + 70 ºC	
Humidity	95 % RH , 0 ºC to 30 ºC	
EMC	According to EN55011 for radiated and conducted emissions	
Electrical Discharge Immunity	According to EN55082	
Safety Specifications	According to EN61010 , CE approved	
	Three Year Warranty	

Accessories

Supplied: CD containing user manual & Wave-X software, null modem serial interface cable, power cord