SIGNAL GENERATORS

While signal generators traditionally produce sine waves with accurate frequencies and amplitudes, modern function generators provide capabilities such as pulses, square, triangle, and sawtooth waves. Added features include programmability, modulation, sweeping, gating, bursts, and a variety of triggering methods. Some generators provide specialty waves, such as simulated earthquake or ECG (electrocardiogram) signals. Arbitrary waveform generators (AWG) allow the creation of accurate and sophisticated stimulus signals that reflect real-world applications. For example, an automotive engineer can use an AWG to accurately simulate a fuel injector current signal in order to test some diagnostic electronics.

Modern circuits and systems can require a variety of signals for characterization and testing. B&K Precision offers 28 models of signal generators to meet these needs -- from sophisticated R&D lab work to price-conscious school budgets.

- 2 MHz – 120 MHz
- Analog and digital function generators
- True arbitrary waveform generators

There are two common architectures for signal generators today: DDS (direct digital synthesis) and analog.

DDS generators provide flexibility, digital precision, programmability, and sophisticated performance in small packages. Capable of generating sine and square waves up to 50 MHz and 14 bit arbitrary waveforms of up to 4 million points at up to 125 million samples per second, B&K Precision's 407x series of AWGs lead the field in price, flexibility, and performance. Additionally, this AWG family also provides full function generator capabilities.

While DDS generators are at the forefront of generator technology and features, analog generators are the time-tested workhorses of modern technology, troubleshooting/maintenance, and education. They provide excellent value with familiar controls and reliable operation, pleasing users and business managers alike.

Model 4040DDS

Model 4086

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SIGNAL GENERATORS
Selection Guide

Arbitrary/Function Generators
Primarily DDS function generators with limited Arb. capability in terms of memory space, vertical resolution and maximum output frequency.

Arbitrary Waveform Generator (AWG)
True AWG capable of generating almost any waveform combined with full function generator functionality (two in one).

Arbitrary Waveform and Function/Arbitrary Generators

	TYPE	MODEL	FREQUENCY RANGE	NUMBER OF CHANNELS	ARBITRARY			MODULATION		OUTPUT RANGE	INTERFACE	SPECIAL FEATURES	Page
					Waveform Length (points)	Sample Rate	Vertical resolution	AM / FM	Other				
Digital (DDS)	Arbitrary Waveform Generator	4079	1 uHz-50 MHz	2	4000000	125 MS/s	14 bit	int/ext	FSK	10 mV-10 Vpp	GPIB, RS232	marker, summing input	5
		4076	1 uHz-50 MHz	1	4000000	125 MS/s	14 bit	int/ext	FSK	10 mV-10 Vpp	GPIB, RS232	marker, summing input	5
		4078	1 uHz-25 MHz	2	400000	100 MS/s	14 bit	int/ext	FSK	10 mV-10 Vpp	RS232, GPIB option	marker	5
		4075	1 uHz-25 MHz	1	400000	100 MS/s	14 bit	int/ext	FSK	10 mV-10 Vpp	RS232, GPIB option	marker	5
	Function/ Arbitrary Generator	4086AWG	1 uHz-80 MHz	1	16000	200 MS/s	10 bit	int/ext	FSK, PSK	1 mV-10 Vpp	RS232	counter	8
		4084AWG	1 uHz-20 MHz	1	16000	200 MS/s	10 bit	int/ext	FSK, PSK	1 mV-10 Vpp	RS232	counter	8
		4045	0.1 Hz-20 MHz	1	1000	50 MS/s	12 bit	int/ext		10 mV-10 Vpp	RS232		8

Note: *) All generators provide basic function generator waveforms sine, square, triangle, TTL/CMOS and ramp/pulse and complex waveforms noise, sin(x)/x, exponential and Gaussian

Function Generator

	TYPE	MODEL	FREQUENCY RANGE	WAVEFORMS		MODULATION		SWEEP	BURST	OUTPUT RANGE	INTERFACE	SPECIAL FEATURES	Page
				Basic *)	Other	AM/FM	Other	lin/log		into 50 Ω			
Digital (DDS)	Function	4087	1 uHz-120 MHz	√	noise, complex	int/ext	FSK, PSK	√	√	1 mV-10 Vpp	RS232	counter	9
		4086	1 uHz-80 MHz	√	noise, complex	int/ext	FSK, PSK	√	√	1 mV-10 Vpp	RS232	counter	9
		4085	1 uHz-40 MHz	√	noise, complex	int/ext	FSK, PSK	√	√	1 mV-10 Vpp	RS232	counter	9
		4084	1 uHz-20 MHz	√	noise, complex	int/ext	FSK, PSK	√	√	1 mV-10 Vpp	RS232	counter	9
		4040DDS	0.1 Hz-20 MHz	√		int/ext		√		1 mV-10 Vpp		counter	7
		4013DDS	0.1 Hz-7 MHz	√				√		50 mV to 10 Vpp			7
		4007DDS	0.1 Hz-12 MHz	√				√		50 mV to 10 Vpp			7
Analog	Function	4040A	0.2 Hz-20 MHz	√		int/ext		√	√	100 mV-10 Vpp		counter	10
		4017A	0.1 Hz-10 MHz	√				√		100 mV-10 Vpp			10
		4012A	0.5 Hz-5 MHz	√				√		100 mV-10 Vpp			10
		4011A	0.5 Hz-5 MHz	√						100 mV-10 Vpp			10
		4003A	0.5 Hz-3 MHz	√				√		100 mV-10 Vpp		counter	10
		4001A	0.5 Hz-3 MHz	√				√		100 mV-10 Vpp			10
		4010A	0.2 Hz-2 MHz	√						100 mV-10 Vpp			10

Note: *) basic waveforms include sine, square, triangle, TTL/CMOS and ramp/pulse

	TYPE	Model	Frequency Range	Transistion Time	Width	Delay	Number of Outputs	Page
Pulse	Analog	4030	0.1 Hz - 10 MHz	12 ns	50 ns - 50 ms	0 - 2 us	1	11
	Digital	4033**	0.1 Hz - 50 MHz	5 ns - 100 ms	10 ns - 10 s	0 - 10 s	1	--
	Digital	4034**	0.1 Hz - 50 MHz	5 ns - 100 ms	10 ns - 10 s	0 - 10 s	2	--

** = Available Summer 2010

Other Signal Sources

	TYPE	MODEL	FREQUENCY RANGE	WAVEFORMS		MODULATION	OUTPUT RANGE	Page
				Sine	Square	AM/FM	into 50 Ω	
Analog	Signal	2005B	100 kHz-150 MHz	√		int/ext	100 mVrms max.	11
		3003	0.1 Hz-10 MHz	√	√		0-2.25 Vpp	11
	Audio	3001	20 Hz-150 kHz	√	√		0-2.5 Vpp	11

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SIGNAL GENERATORS
25 MHz & 50 MHz Arbitrary Waveform/ Function Generators

Model 4078

The 407x generators combine a full-featured DDS function generator with an arbitrary waveform generator (AWG). This gives the user uncommon flexibility to generate any waveform that can be described by a sampled set of data within the generator's capabilities. AWGs have revolutionized the generation of stimulus signals by greatly reducing the need to build special circuitry to generate custom signals. This reduces costs enormously because multiple design/build/debug steps are avoided. Now, a user can write software to generate the needed waveform shapes or use the simple tools to graphically construct special waveforms. With today's accelerated development schedules, can you afford not to take advantage of this powerful, enabling technology?

WAVEXPRESS™ Compatible

Common Features & Benefits

- High performance and cost effectiveness in a compact package
- Standard function generator capabilities (sine, square, triangle waves) with DDS accuracy and precision. Also included are noise, sync, and exponential waveforms
- Frequencies from 1 µHz (sine and square), and amplitudes from 10 mVpp to 10 Vpp into 50 Ω
- Up to four million points (4076, 4079) or four-hundred thousand points of AWG memory -- the largest waveform memories for instruments in their class. The memory is not partitioned -- use it all to store one waveform or many waveforms at different locations

Common Features & Benefits

- Sweep, gated, burst, and modulation (AM/FM/FSK) capabilities standard
- AWG provides built-in pulse, ramp, triangle, noise, sinc, exponential, and Gaussian noise waveforms. You can utilize these waveforms to build your own arbitrary waveform using the front panel controls
- Audio frequency sine waves have a very low distortion level of -65 dBc
- 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
- RS-232 and GPIB support
- The units are easily programmable with popular programming languages using a SCPI syntax

Features	4075	4078	4076	4079
Number of Channels	1	2	1	2
Frequency (sine)	1 uHz - 25 MHz		1 uHz - 50 MHz	
Flatness	±0.2 db @ 1 MHz, ±1 db @ 25 MHz		±0.1 db @ 10 MHz, ±1 db @ 50 MHz	
Sample rate	100 MS/s		125 MS/s	
Computer interface	RS232 standard, GBIP optional		RS232 and GPIB standard	
Weight	6.6 lbs (3 kg)		5.5 lbs (2.5 kg)	
Dimensions (W x H x D)	8.4" x 3.5" x 12" (213 x 88 x 300) mm		8.4" x 3.5" x 11.8" (213 x 88 x 300) mm	

Three year warranty 3

SIGNAL GENERATORS
25 MHz & 50 MHz Arbitrary Waveform/ Function Generators

Flexible interface

- The back panel has a 10 MHz reference signal output or it can be used to input a 10 MHz reference signal. This allows you to synchronize multiple generators to one generator or to a lab standard signal. Precisely adjust the output signal's phase with respect to this reference signal
- Marker pulses (50 Ω TTL output) can be output at any point on the waveform for user-defined durations. This lets you synchronize other equipment with your arbitrary waveforms. Trigger other generators phase-locked to the main generator to generate multiple waves with precise timing and phase relationships, or use the marker pulse to trigger a scope to let you view a system's response at a precise point
- Create and edit complex waveforms with WaveXpress™ software

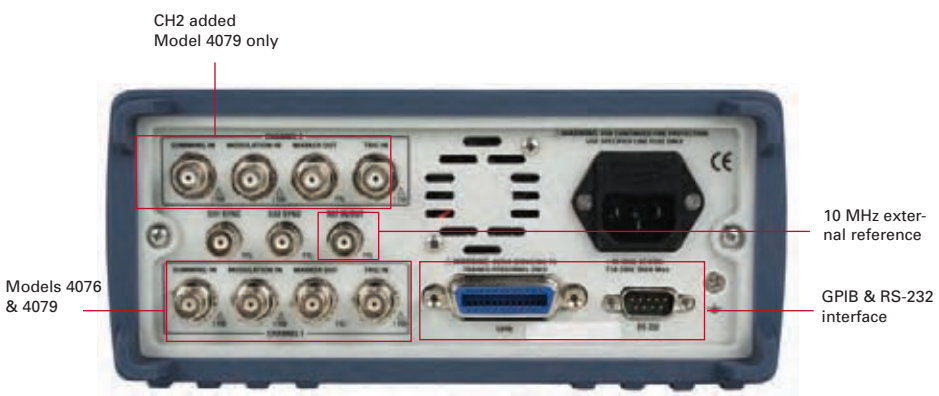
Intuitive user interface

- Back-lit LCD panels pack lots of information into a small space and can be easily read in a dark lab
- Intuitive layout of panel and screen menus
- Make parameter adjustments with an analog-style knob -- or enter numbers directly using the keypad. Enter frequency or period, whichever is most convenient. Use Vpp, Vrms, or dBm for amplitude (4076/4079). Left-right arrow keys let you choose which digit to adjust with the knob

Dual channel models (4078 & 4079)

Features & Benefits

- Both channels offer full functionality. All waveform 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 costs and bench space

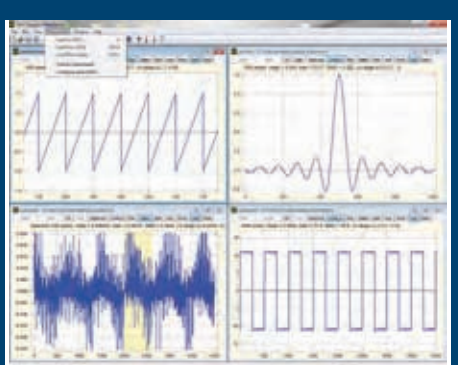


Model 4079 (rear view)

WaveXpress™

B&K Precision's WaveXpress™ software allows users to create and edit nearly any waveform imaginable, and integrates seamlessly with B&K Precision DSOs and AWGs.

- Seamless integration with B&K oscilloscopes 2534/2540/2542 and AWGs 4075 – 4079 & 4045
- Capture real-world waveforms with your DSO and play them back on a B&K AWG for testing
- Simple and intuitive interface
- Quickly create complex waveforms, and just as quickly edit them when requirements change
- Combine waveforms with addition, subtraction, multiplication and division



Waveform creation capabilities

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Model 4013DDS

Model 4040DDS

All three 40xx DDS models are versatile sweep function generators utilizing an advanced direct digital synthesis (DDS) design.

Common Features & Benefits

- Sine, square and triangle waveforms
- Lin or log sweep function
- Adjustable DC offset
- Adjustable duty cycle
- Bright, informative LCD

The 4007DDS and the 4013DDS are very similar in performance, only differing in maximum output frequency and slight differences in distortion levels and square wave rise/fall times. The 4007DDS can output triangle waves up to 100 kHz whereas the 4013DDS can output them up to 1 MHz. The symmetry of square waves can be adjusted from 15% to 85%. Users familiar with analog generators will appreciate the analog style controls.

The 4040DDS generator is a high-performance DDS generator with some features seen in only higher-end instruments, but at an attractive price.

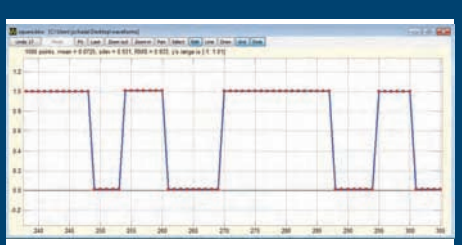
Features & Benefits

- Sine and square waves are available to 20 MHz with 0.01% frequency accuracy
- Amplitude flatness is ±1 dB over the full frequency range and ±0.5 dB up to 1 MHz
- Normal and triggered operation are available along with gated operation, sweeping, and internal or external AM/FM modulation. Internal modulation for both AM and FM is a 1 kHz sine wave
- Built-in counter

Features	4007DDS	4013DDS	4040DDS
Frequency (sine & square)	0.1 Hz - 7 MHz	0.1 Hz - 12 MHz	0.1 Hz - 20 MHz
Output range	1 mV - 10 Vpp		
Distortion	DC-20 kHz = -55 dBc (<0.25%)		DC-20 kHz = -50 dBc
Flatness	±1 dB to 7 MHz	±1 dB to 12 MHz	±0.5 dB @ 1 MHz ±1 dB to 20 MHz
Sweep time	100 ms - 30 s	100 ms - 30 s	10 ms - 50 s
Weight	4.4 lbs (2 kg)		5.5 lbs (2.5 kg)
Dimensions (W x H x D)	8.4" x 3.5" x 8.3" (213 x 88 x 210) mm		

Features & Benefits

- Import waveforms from B&K scopes, AWGs, or load them from CSV or text files
- Autoscan function automatically detects instruments connected via RS232, USB, or GPIB
- Create waveforms from scratch with drawing and editing tools. Insert commonly used waveforms and different types of noise
- Numerous transformations for changing a waveform. You can add user-defined transformations in the python programming language
- Multi-language support: additional languages can be added by the user
- Fast zooming and panning with mouse
- Dialog settings are remembered for faster repetitive work
- Undo/redo allow quick experimentation



Waveform editing capabilities

Free at www.bkprecision.com/wavexpress

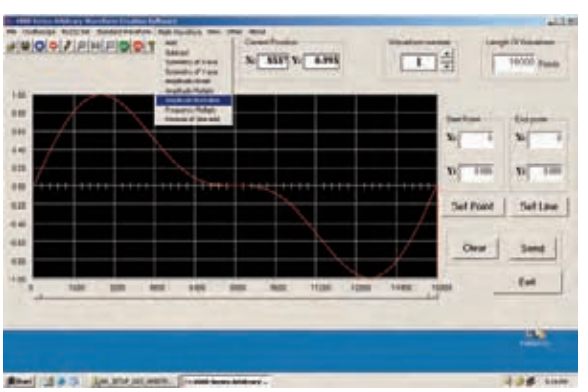
SIGNAL GENERATORS
DDS Arbitrary/ Function Generators

Model 4086AWG

Model 4045

The 4084AWG and 4086AWG are laboratory-grade DDS function generators with basic arbitrary waveform capability. They produce low distortion (0.1% THD) sine waves from 1 µHz and 26 other built-in waveforms. Pulses from 0.1% to 99.9% duty cycle can be produced. They can output 1 mVpp to 10 Vpp into 50 Ω. A 100 MHz counter/totalizer is supplied with 50 mVrms sensitivity. The 200 MSa/s arbitrary waveform generator can provide eight waveforms with up to 16,000 points each with 10 bit vertical resolution.

AM/FM/FSK/PSK modulation types are provided, along with linear/log sweep, burst (up to 10,000 cycles), and gate capabilities. Ten instrument setup states can be stored in non-volatile memory. Setup parameters can be entered with a keypad or knob. These generators can also output ±DC voltages from millivolt levels with 1 µV resolution up to 9.999 V with 1 mV resolution. A serial port provides programmability with SCPI-compatible syntax.



Arbitrary Waveform Generation Software (4084AWG & 4086AWG)

Features	4045	4084AWG	4086AWG
Sine	0.1 Hz - 20 MHz	1 uHz - 20 MHz	1 uHz - 80 mHz
Square	0.1 Hz - 20 MHz	1 uHz - 20 MHz	1 uHz - 40 mHz
Amplitude (into 50 Ω)	10 mV - 10 Vpp	1 mV - 10 Vpp	≤ 40 MHz: 1 mV ~ 10 Vpp ≥ 40 MHz: 1 mV ~ 2 Vpp
Frequency Accuracy	50 ppm	≤ ±5 x 10-6 (22ºC ±5ºC)	
Weight	5.5 lbs (2.5 kg)	6.6 lbs (3 kg)	
Dimensions (W x H x D)	8.4" x 3.5" x 8.3" (213 x 88 x 210) mm	10" x 3.93" x 14.56" (255 x 100 x 370) mm	

The 4045 is an entry-level arbitrary waveform generator with 1000 points of user-definable waveform memory. Output amplitudes can be from 10 mV to 10 Vpp into 50 Ω. It is also a full-featured function generator with sine, square, triangle, and ramp waveforms. AM and FM modulation are provided, along with linear/log sweep, burst, and gate capabilities. Triggering can be either internal, external, or manual. It is a cost-effective choice for educational environments and for budget-conscious engineering managers.

AVEXPRESS™ Compatible

4045 Features & Benefits

- 0.01 Hz to 20 MHz sine and square waves with 6 digit frequency resolution
- 0.01 Hz to 2 MHz triangle and ramp waveforms
- 12 bit arbitrary waveform vertical amplitude resolution
- Sampling rate per point from 20 ns to 50 s
- <18 ns square wave rise and fall time
- DC offsets ±4.5 V into 50 Ω
- Symmetry adjustment for square and triangle waves allows you to produce pulses and ramps
- Output and sync terminals on front panel
- Frequency accuracy is 50 ppm
- USB Interface (virtual COM)

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Model 4087

B&K Precision's 4080 series generators are laboratory-quality DDS function generators from 1 µHz output and amplitudes of 1 mVpp to 10 Vpp into 50 Ω (reduced output above 40 MHz). Besides providing sine, square, triangle, ramp, and pulse waveforms, there are 19 other built-in specialized waveforms.

Model 4087 (rear view)

Features & Benefits

- Low distortion sine waves (≤ 0.1% THD for 20 Hz to 100 kHz)
- AM/FM/FSK/PSK modulation
- Linear and logarithmic frequency sweeps. Sweep times from 1 ms to 800 s (linear). Sweep over the full frequency range if desired
- 100 MHz counter/totalizer with 50 mVrms sensitivity (input on rear panel)
- 0.1% to 99.9% duty cycle positive or negative pulses (below 10 kHz)
- Other waveforms provided: noise, ±DC, staircase, coded pulse, full wave rectified sine, half-wave rectified sine, sine transverse cut (i.e., the top of the sine wave is clipped), sine vertical cut (like an AC lamp dimmer), sine phase modulation (a phase-modulated square wave with sine amplitude modulation), logarithmic, exponential, half-round, sinc, square root, tangent, and combination (ramp, DC, and staircase)
- Frequency range for complex (arbitrary-style) waveforms is 1 µHz to 100 kHz
- Output ±DC voltages from millivolt levels with 1 µV resolution up to 9.999 V with 1 mV resolution
- A configuration setting lets you display the correct amplitude for either a high impedance load or a 50 Ω load
- Set amplitude in volts peak-to-peak, volts RMS, or dBm (1 mW into 50 Ω)
- RS-232 interface standard for controlling instrument state with SCPI-compatible syntax
- Easy-to-read VFD (vacuum fluorescent) display
- 10 instrument setup states can be stored in non-volatile memory
- Rear panel terminals: counter/totalize input, modulation out, modulation in, external trigger/FSK/burst
- 1 ppm frequency stability

Features	4084	4085	4086	4087
Sine	1 uHz - 20 MHz	1 uHz - 40 MHz	1 uHz - 80 MHz	1 uHz - 120 MHz
Square	1 uHz - 20 MHz	1 uHz - 40 MHz	1 uHz - 40 MHz	1 uHz - 40 MHz
Amplitude (into 50Ω)	1 mV ~ 10 Vpp	1 mV ~ 10 Vpp	≤40 MHz: 1 mV ~ 10 Vpp ≥40 MHz: 1 mV ~ 2 Vpp	≤40 MHz: 1 mV ~ 10 Vpp ≥40 MHz: 1 mV ~ 3 Vpp
Weight	6.6 lbs (3 kg)			
Dimensions (W x H x D)	10" x 3.93" x 14.56" (255 x 100 x 370) mm			

SIGNAL GENERATORS
Function Generators

These analog function generators offer familiar controls, stable output, and reliable operation at budget-saving price points. While DDS generators have eclipsed analog generators at the high end, these analog generators are the workhorses of industry, education, and hobbyists. They are widely used wherever repeatable signals are needed.

Common Features & Benefits

- Variable output: 10 Vpp into 50 Ω (includes a 20 dB attenuator)
- 50 Ω output impedance
- TTL/CMOS output
- Adjustable DC offset
- Sine/square/triangle/ramp/pulse outputs

Some models have digital counters for accurate frequency setting and measuring and some are capable of sweeping in frequency. Maximum frequency output ranges from 2 MHz to 20 MHz. Typical uses for these generators are:

- Signal injection into electrical circuits for characterization and troubleshooting
- Experimental setups in college science course laboratories
- Test signals for equipment used in scientific, engineering, and medical research

Note: While only the 4040A offers FM modulation, all units except the 4001A have a VCG (voltage controlled generator) input that can simulate FM modulation when driven by a modulating signal. In addition, providing a ramp signal to this input can effectively sweep the generator's output frequency. On generators with sweep, the VCG jack provides a DC signal proportional to the instantaneous frequency, which can be useful for driving XY plotters or scope displays.

The model 4040A is an analog generator with AM/FM modulation (internal or external), linear/log sweeping, and burst capability. Includes a 5 digit 30 MHz frequency counter with 30 mV sensitivity.

The model 4001A is an economy function generator with the ability to provide linear and logarithmic frequency sweeps -- a feature usually not seen at this price point. This feature is useful for the frequency characterization of system behavior or the discovery of resonances.

The model 4017A is a 10 MHz sweep function generator with a 5 digit LED display, linear/log sweep, variable duty cycle and DC offset.

Model 4003A is similar to the 4001A, but provides digital frequency setting and a 60 MHz frequency counter for external signals with 30 mV sensitivity, at a surprisingly low price.

Models 4011A and 4012A are popular 5 MHz generators for general bench and lab use with an ideal mixture of features at a compelling price. The 4012A is identical to the 4011A, but with a sweep function added.

The model 4010A is an entry level 2 MHz analog generator– perfect for school labs.

Features	4040A◊	4017A◊	4012A	4011A◊	4010A◊	4003A◊	4001A◊
Frequency Range (sine)	0.2 Hz - 20 MHz	0.1 Hz - 10 MHz	0.5 Hz - 5 MHz	0.5 Hz - 5 MHz	0.2 Hz - 2 MHz	0.5 Hz - 3 MHz	0.5 Hz - 3 MHz
Frequency Resolution	5 digits	5 digits	4 digits	4 digits	--	--	--
Distortion	≤3% typical at 1 kHz				4% typical at 1 kHz	<2%, 1 Hz - 100 kHz	
Rise time (square)	≤30 nS		≤30 nS	≤20 nS	≤120 nS	<90 nS	
Weight	4.5 lbs (2 kg)	4 lbs (1.8 kg)	4 lbs (1.8 kg)			5.5 lbs (2.5 kg)	
Dimensions (W x H x D)	11.75" x 5.5" x 10.57" (298 x 140 x 264) mm	11.75" x 4.5" x 10.57" (298 x 114 x 264) mm	11.75" x 4.5" x 10.37" (298 x 114 x 264) mm			10.83" x 3.6" x 11.8" (275 x 90 x 300) mm	

◊ = c UL us

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20 Hz-150 kHz sine/square wave audio generator

The model 3001 generates low-distortion sine waves at 46 discrete frequencies. Output impedance is 600 ohms at the dual banana jacks and the output voltage is continuously adjustable up to 1.2 V (RMS) into an open circuit. Output flatness is ±0.5 dB. A 5 Vpp square wave is provided at separate banana jacks for synchronization. Frequency accuracy is 3% from 20 Hz to 100 kHz. The unit is powered from a 9 V battery.

10 MHz pulse generator with 4-digit LED display

The model 4030 pulse generator supplies positive and negative 0.5-5 volt pulses into 50 Ω at up to 10 MHz pulse repetition frequency (pulse periods from 100 ns to 100 ms). Pulse widths are continuously variable between 50 ns and 50 ms and the pulses have rise and fall times of 12 ns. A 4-digit frequency counter and 8 crystal-controlled frequencies let you use the generator for accurate time-domain work. The generator can be triggered from external signals.

10 MHz handheld sine & square wave signal generator

The 3003 generates up to 10 MHz sine (adjustable amplitude from 0 to 4.5 Vpp no load) and TTL square waves using DDS technology in steps of 0.1 Hz. Output frequency accuracy is 0.02%. The sine and square waves are available simultaneously from separate BNC female connectors. A 9 V battery supplies power or an external 6-9 VDC adapter can be used. The output frequency is adjusted by push buttons that increment or decrement each digit. The unit is smaller than a typical paperback book and is about 2 inches (50 mm) thick, making it a small, portable package. Battery operation is useful to avoid ground loops and common mode voltages.

Example Uses

- Interfacing different logic families
- Providing clock signals for digital design tasks
- Measuring pulse response of circuits
- Providing digital delays of up to 2 µs
- Providing clean single pulses to trigger other events
- Converting a repetitive analog signal to clean digital pulses

150 MHz RF signal generator

The 2005B supplies sine wave outputs from 100 kHz to 150 MHz (harmonics usable to 450 MHz) at up to 100 mV (RMS). The output can be amplitude modulated with an internal 1 kHz signal or with an external audio signal up to 1 V (RMS). An external crystal can be plugged in for precise frequency control. The output is provided via a BNC female connector.

Features	3001	3003	2005B
Frequency Range	20 Hz - 150 kHz	0.1 Hz - 10 MHz	100 kHz - 150 MHz
Output Voltage	> 1.2 V rms at max setting(no load)	0 to 4.5 Vpp	up to 100 mVrms
Distortion (sine)	200 Hz - 15 kHz	--	--
Output Impedance	600 Ω	50 Ω	50 Ω - 200 Ω
Weight	7 oz (200 g)	2 lbs (0.9 kg)	5.5 lbs (2.5 kg)
Dimensions (W x H x D)	3.3" x 6" x 0.9" (82 x 150 x 21) mm	3.8" x 5.7" x 1.5" (97 x 145 x 38) mm	9.84" x 5.91" x 5.12" (250 x 150 x 130) mm