FLUKE ®

39A

40 MS/s Waveform Generator

- *Arbitrary Waveforms up to 65,536 Points with 12-bit Resolution*
- *Waveform Sequencing*
- *Synthesized Function Generator including Square Waves to 16 MHz and Sine Waves to 16 MHz*
- *Pulse/Pulse-Train Generator*
- *Trigger Generator*
- *Sweep, am and Tone Modes*
- *Multi-unit Phase Locking*
- *GPIB and RS-232 Interfaces*

Fluke's Model 39A Universal Waveform Generator combines seven generators in one to provide extensive capabilities. For one low price, it is an arbitrary waveform generator (arb), function generator, pulse/pulse-train generator, sweep generator, trigger generator, tone generator and AM modulation source.

Arbitrary Waveform Generator. Model 39A is a powerful 12-bit arbitrary waveform generator with 65,536 points of waveform memory and clock speeds up to 40 MS/s. Up to 100 waveforms can be stored in non-volatile memory. Waveforms can be created and modified from the front panel or can be downloaded over the included RS-232 and GPIB interfaces with Fluke's WaveForm DSP2 software. For complex applications, multiple waveforms can linked together in a sequence.

Function Generator. With 12 standard functions built-in, Model 39A is an excellent function generator capable of generating square waves to 16 MHz and sine waves to 16 MHz.

Pulse and Pulse-Train Generator. Single pulses and complex pulse trains are generated with programmable period, width, delay and amplitude. Pulse trains containing up to 10 independently programmed pulses provide a powerful capability not found in standard pulse generators.

Versatile Operating Modes. Model 39A provides a wide range of operating modes including continuous, triggered burst, gated, frequency sweep, tone generation, external amplitude modulation and external signal summing modes.

Remote Operation. Model 39A comes standard with GPIB and RS-232 interfaces plus an RS-232 cable. All functions are programmable from the front panel or remotely.

Phase Locking. Multiple units may be phase locked for multi-channel applications. Phase angle is programmable between units.

Stored Settings. Up to 9 complete instrument set-ups can be stored in non-volatile memory and power-on settings are programmable.

Value. Model 39A provides tremendous functionality at a very affordable price. At one low price, the Model 39A combines the capabilities of seven generators in one.

Specifications

Specifications apply at 18°C-28°C after 30 minutes warm-up, at maximum output into 50Ω.

Waveforms

Standard Waveforms
Sine, square, triangle, DC, ramp, negative ramp, sin(x)/x, pulse, pulse train, cosine, haversine, havercosine

Sine, Cosine, Haversine, Havercosine

Range: 0.1 mHz to 16 MHz
Resolution: 0.1 mHz (7 digits)
Accuracy: 10 ppm for 1 year
Stability: < 1 ppm/°C
Harmonic Distortion:
< -60 dBc (0.1%) to 20 kHz
< -50 dBc to 1 MHz
< -35 dBc to 10 MHz
Non-harmonic spurii:
< -65 dBc to 1 MHz

Square

Range: 1 mHz to 16 MHz
Resolution: 1 mHz (4 digits)
Accuracy: ± 1 digit of setting
Rise and Fall Times: < 25 ns

Triangle, Ramps, Sin(x)/x

Range: 0.1 mHz to 100 kHz
Resolution: 0.1 mHz (7 digits)
Accuracy: 10 ppm for 1 year
Linearity Error: < 0.1% to 30 kHz

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Pulse and Pulse Train

Trains of up to 10 pulses may be specified, each having independently defined width, delay and amplitude level. Baseline voltage is separately defined and the pulse/pulse–train repetition rate is set by the pulse/pulse–train period.

Rise and Fall Times: < 25 ns
Period:
Range: 133.3 ns to 100s
Resolution: 4 digits
Accuracy: ± 1 digit of setting
Delay:
Range: –99.9s to +99.9s
Resolution:
0.002% of period or 33.33 ns
Width:
Range: –33.33 ns to 99.99s
Resolution:
0.002% of period or 33.33 ns

Arbitrary Waveforms

Up to 50 arbitrary (100 user defined) waveforms may be stored in RAM. Arbitrary waveforms can be defined from front panel editing controls or by downloading waveforms via RS–232 or GPIB. Front panel editing tools include insertion of stored waveforms, point editing and line draw. DSP2 is an optional software tool for creating and downloading waveforms over RS–232 or GPIB.

Memory Size: 65,536 points. Maximum waveform size is 65,536 points, minimum wave–form size is 4 points.

Vertical Resolution: 12 bits
Sample Clock Range:
100 mHz to 40 MHz
Resolution: 4 digits
Accuracy: ± 1 digit of setting

Waveform Sequencing: Up to 16 waveforms may be linked. Each waveform can have a loop count of up to 32,768. A sequence of waveforms can be looped up to 1,048,575 times or run continuously.

Amplitude

Output Impedance: 50Ω
Range: 2.5 mV p–p to 10V p–p (5 mV p–p to 20V p–p into open circuit). Amplitude can be specified open circuit (Hi Z) or into an assumed load of 50Ω or 600Ω inV p–p, V rms or dBm.
Accuracy:
< 2% ± 1 mV at 1 kHz into 50Ω
Amplitude Flatness: ± 0.2 dB to 200 kHz; ± 1 dB to 5 MHz; ± 2 dB to 10 MHz
Resolution: 3 digits or 1 mV

Offset

Range: ± 5 Vp. DC offset plus signal peak limited to ± 10V into 50Ω
Accuracy: Typically ± 3% plus 10 mV, unattenuated
Resolution: 3 digits or 1 mV

Output Filter

Selectable between 10 MHz Eliptic, 10 MHz Bessel or none.

Operating Modes

Continuous
The selected waveform is output continuously at the programmed frequency.

Triggered Burst
Each active edge of the trigger signal will produce one burst of the waveform, starting and stopping at the waveform position specified by the sync marker setting.

Waveforms: All standard and arbitrary
Burst Count: 1 to 1,048,575
Trigger Source: Manual trigger key, internal trigger generator, external trigger input or remote trigger command.
Trigger Rate: Internal Trigger Generator: DC to 100 kHz External Signal: DC to 1 MHz
Gated
The selected waveform is output continuously at the programmed frequency while the selected trigger signal is true.
Waveforms:
All standard and arbitrary waveforms.
Gate Trigger Source: Manual trigger key, internal trigger generator, external trigger input or remote trigger command.
Trigger Rate: Internal Trigger Generator: DC to 50 kHz
External Signal: DC to 1 MHz

Frequency Sweep

Both standard and arbitrary waveforms may be swept. Arbitrary waveforms are expanded or condensed to exactly 4,096 points and DDS techniques are used to perform the sweep.

Waveforms: All waveforms except pulse, pulse–train and sequence.
Sweep Modes: Manual, continuous, triggered; linear or logarithmic; up or down
Sweep Range: 1 mHz to 10 MHz in one range. Phase continuous. Independent setting of start and stop frequencies.
Sweep Time: 30 ms to 999s (3 digit resolution).
Marker: Programmable at any single frequency in the sweep range.
Sweep Trigger Source: Manually from keyboard, internal trigger generator, external trigger input or remote trigger command.
Sweep Hold: Sweep can be help and restarted by the HOLD key. Must be used in continuous sweep mode.

Tone

Allows standard or arbitrary waveform frequency switching up to 16 frequencies. Generating DTMF signals is possible by summing the outputs of two Model 39As.

Waveforms: All waveforms except pulse, pulse–train and sequence.
Frequency List: Up to 16 frequencies from 1 mHz to 10 MHz
Switching Sources: External trigger input.

External Amplitude Modulation

Carrier Frequency: Entire range for selected waveform.
Carrier Waveforms: All standard and arbitrary waveforms.
Modulation Source: VCA/SUM IN input.
Modulation Frequency Range:
DC–100 kHz
Modulation Signal Range:
Approximately 2.5V p–p for 100% level change at maximum output.

External Signal Summing

Carrier Frequency: Entire range for selected waveform.
Carrier Waveforms: All standard and arbitrary waveforms.
Sum Source: VCA/SUM IN input.
Frequency Range: DC–10 MHz
Signal Range: Approximately 2.5V p–p for 10V p–p output (50Ω).

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Remote Interfaces

RS-232
Variable baud rate, 9600 baud maximum. 9-pin D-connector.
GPIB
Conforms with IEEE-488.1and IEEE-488.2.
Drivers
LabVIEW™ driver available upon request.

Inputs

Trigger Input
Frequency Range: DC to 1 MHz
Level Range: ± 10V
Minimum Pulse Width: 50 ns for Trigger and Gated modes; 50µs for Sweep mode; 20 ms for Tone mode.
Input Impedance: 10 kΩ

VCA Input (for AM mode)

Frequency Range: DC to 100 kHz
Signal Range: 2.5V for 100% level change at maximum output.
Input Impedance: Typically 6 kΩ

Summing Input

Frequency Range: DC to >8 MHz
Signal Range: Approximately 2V p-p input for 20V p-p output.
Input Impedance: Typically 1KΩ

Hold Input

A TTL low switch closure causes an arbitrary waveform to hold at its current position (address). The hold function can be invoked by an input signal to the Hold Input, remotely or via the front panel hold key.
Input Impedance: 10KΩ

Reference Clock Input/Output

Set to Input: Input for an external 10 MHz reference clock. TTL/CMOS threshold level.
Set to Output: Buffered version of the internal 10 MHz reference clock. Outputs levels nominally 1V and 4V from 50Ω.
Set to Phase Lock: Used together with SYNC OUT on a master and TRIG IN on a slave to phase lock multiple Model 39s.

Outputs

Main Output
Outputs selected waveform at programmed frequency, amplitude and offset.
Output Impedance: 50Ω

Sync Output

Multifunction output that can be user definable or automatically selectable for any of the following:
Waveform Sync: Produces a square wave with 50% duty cycle at the waveform frequency for standard waveforms or a pulse coincident with the first few points of an arbitrary waveform.
Position Markers: May be used when generating arbitrary waveforms, any point(s) on the waveform may have associated marker bits set high or low.
Burst Done: Produces a pulse coincident with the last cycle of a burst.
Sequence Sync: Produces a pulse coincident with the end of a waveform sequence.
Trigger: Selects the current trigger signal. Useful for synchronizing gated or burst signals.
Phase Lock Out Used to phase lock two or more Model 39As. Produces a positive edge at the 0° phase point.

Cursor/Marker Output

Adjustable output pulse for use as a marker in sweep mode or to modulate the Z-axis input of an oscilloscope to provide a cursor for waveform editing.
Output Signal Level: Adjustable from 2V to 14V, normal or inverted; adjustable width as a cursor.
Output Impedance: Typically 600

General

Display: 20 character by 4 row alphanumeric LCD.
Stored Settings: Up to 9 complete instrument set-ups and up to 100 arbitrary waveforms can be stored in battery backed memory.
Dimensions: 130 mm (height), 212 mm (width), 330 mm (depth).
Weight: 4.1 kg (9 lb)
Power: 230V, 115V or 100V nominal 50/60 Hz, adjustable internally; operating range ± 14% of nominal; 100VA maximum.
Operating Range: 5°C to 40°C, 20% to 80% RH
Storage Range: -20°C to 60°C
Environmental: Indoor use at altitudes to 2 km, Pollution degree 2
Safety: Complies with EN61010-1
EMC: Complies with EN50081-1 and EN50082-1

Ordering Information

Model 39A: 30 MS/s Universal Waveform Generator
Option 001: Rack Mount Kit
WaveForm DSP2: Arbitrary Waveform Creation Software.