KIKUSUI

LXI

50 MHz Arbitrary Waveform Generator
The LXI interface makes easier for the test system!

Function Generator

FGA5050

- **FGA5050**
- **FGA5050GC** (with GPIB)

The FGA5050 is a function generator that equips with the arbitrary waveform function. In addition to Sine waveform, Square waveform, Ramp waveform of those custom waveform generation function, the FGA5050 offers to realize high precision waveform with 1 µHz of resolution and 50 MHz of wideband frequency. The FGA5050 can be used in wide application such as "Voltage variation test for Automotive Electronic Components", "ECU false signal source", "Charge-Discharge test for the rechargeable battery", "Ripple super-impose test" and it can be used as the trigger signal for the various type of test system. Further more, three types of interface, LAN / USB / GPIB* are equipped with the FGA5050 as standard feature, it applies for automated test along with manual operation.

- Wide band frequency
  Sine waveform : 1 µHz to 50 MHz, Square waveform : 1 µHz to 25 MHz
- Sine waveform, Square waveform, Ramp waveform, Triangle waveform, Pulse waveform, Noise waveform, DC, Arbitrary waveform output
- Waveform editor application software "WAVEPATT" is included as standard
- Various modulation types
  AM, FM, PM, FSK, PWM, Frequency sweep, Burst, External Modulation Input
- 16 bits / up to 50 MHz pattern out
- 14 bits / 256 k-point, 125 MSs/s
- 10 MHz clock in and out
- Trigger Input and Trigger output (TTL compatible)
- Interface : LAN / USB / GPIB* standard

*Only available in Model FGA5050GC

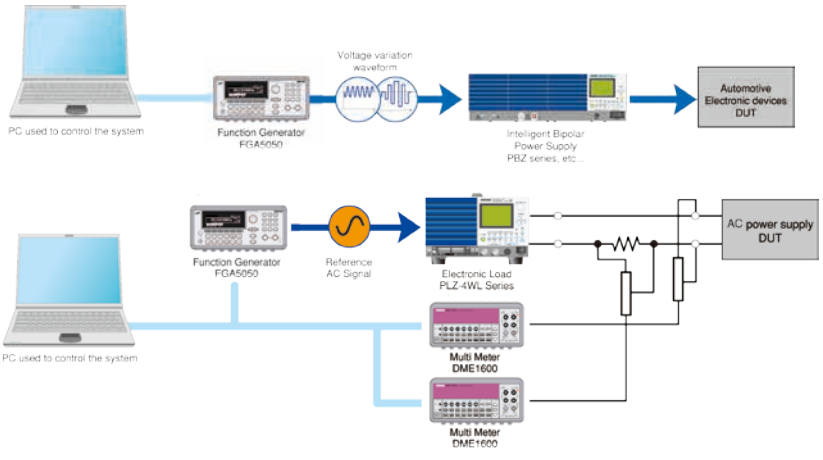
Application

Voltage variation test for Automotive Electronic devices

The system combined with the FGA5050 and the Bipolar power supply, it can be used as the "Signal Source" for the "Voltage variation test of the automotive electronic components" complied to the ISO standard and other manufacturer's standard.

Measurement of the output impedance of the power supply

The system combined with the FGA5050, electronic load, and multi-meter, it can be used as the "Reference AC Signal" for the "Impedance measurement of power supply output".



Specifications

Waveform characteristics				
Waveforms	Standard waveforms	Sine, square, ramp, triangle, pulse, noise, and DC		
	Arbitrary waveforms	Exponential rising wave, exponential falling wave, reverse ramp wave, sinc wave, and cardiac wave (cardiac electrogram wave)		
Sine waves	Frequency	1 µHz to 50 MHz		
	Amplitude flatness *1 *2 (relative to 1 kHz)	Less than 100 kHz		0.1 dB
		Less than 5 MHz		0.15 dB
		Less than 20 MHz		0.3 dB
		Less than 50 MHz		0.5 dB
	Harmonic distortion *2 *3	DC to 20 kHz	Less than 1 Vpp	-70 dBc
			1 Vpp or more	-70 dBc
		20 kHz to 100 kHz	Less than 1 Vpp	-65 dBc
			1 Vpp or more	-60 dBc
		100 kHz to 1 MHz	Less than 1 Vpp	-50 dBc
			1 Vpp or more	-45 dBc
		1 MHz to 20 MHz	Less than 1 Vpp	-40 dBc
			1 Vpp or more	-35 dBc
		20 MHz to 50 MHz	Less than 1 Vpp	-35 dBc
			1 Vpp or more	-30 dBc
	Total harmonic distortion	DC to 20 kHz	0.5 Vpp or more	0.06 % or less
	Spurious *2 *4 (non-harmonic)	DC to 1 MHz		-70 dBc
		1 MHz to 50 MHz		-70 dBc + 6 dB/octave
	Phase noise (10 kHz offset)	0.1 Vpp or more, 1 MHz or more		Typically -115 dBc/Hz
Square waves	Frequency	1 µHz to 25 MHz		
	Rising, falling time	Less than 10 ns		
	Overshoot	Less than 2 %		
	Variable duty cycle	Less than 10 MHz		20 % to 80 %
		Less than 25 MHz		40 % to 60 %
	Asymmetry	50 % duty cycle		1 % of period + 5 ns
	Jitter (RMS)	0.1 Vpp or more, 1 MHz or more		200 ps
Ramp and triangle waves	Frequency	1 µHz to 200 kHz		
	Linearity	Less than 0.1 % of the peak output		
	Symmetry	0.0 % to 100.0 %		
Pulse wave	Frequency	500 µHz to 10 MHz		
	Pulse width	20 ns minimum		
		Resolution (period ≤ 10 s)		10 ns
	Variable edge time	Less than 10 ns to 100 ns		
	Overshoot	Less than 2 %		
	Jitter (RMS)	0.1 Vpp or more, 50 kHz or more		200 ps
Noise waves	Bandwidth	Typically 20 MHz		
Arbitrary waveforms	Frequency	1 µHz to 10 MHz		
	Wavelength	2 to 256 K points		
	Resolution	14 bits (including the sign)		
	Sampling rate	125 megasamples per second		
	Minimum rising or falling time	Typically 30 ns		
	Linearity	Less than 0.1 % of the peak output		
	Settling time	Up to 0.5 % of the final value		Less than 250 ns
	Jitter (RMS)	6 ns + 30 ppm		
	Non-volatile memory	4 waveforms, 256 K points per waveform		
Common waveform characteristics				
Frequency	Resolution	1 µHz		
Amplitude	Range	50 Ω termination		10 mVpp to 10 Vpp
		No termination		20 mVpp to 20 Vpp
	Accuracy *2 *5	At 1 kHz		±1 % of setting ± 1 mVpp
	Units	Vpp, Vrms, and dBm		
	Resolution	4 digits		
DC offset	Range (peak AC + DC)	50 Ω termination		±5 V
		No termination		±10 V
	Accuracy *2 *5	±2 % of offset setting ±0.5 % of amplitude setting ±2 mV		
	Resolution	4 digits		
Main Output	Impedance	Typically 50 Ω		
	Isolation	From earth		Up to 42 Vpk
	Protection	Short-circuit protection, overload automatically stops output		
Internal frequency reference	Accuracy *5	90 days		±10 ppm
		1 year		±20 ppm
External frequency reference input	Lock range	10 MHz ± 500 Hz		
	Level	100 mVpp to 5 Vpp		
	Impedance	AC coupled		Typically 1 kΩ
	Lock time	Less than 2 s		
Frequency reference output	Lock range	10 MHz		
	Level	Typically 632 mVpp (0 dBm)		
	Impedance	AC coupled		Typically 50 Ω
Phase offset	Range	-360 ° to +360 °		
	Resolution	0.001 °		
	Accuracy	8 ns		

*1 Add 1/10th to the output amplitude and DC offset specifications per 1 °C for operations out-side the range of 18 °C to 28 °C.
*2 When autoranging is enabled
*3 DC offset set to 0 V
*4 Spurious output at low amplitudes is typically -75 dBm.
*5 Add 1 ppm/1 °C (average) for operations outside the range of 18 °C to 28 °C.
*6 FSK modulation uses the Trig In/Out, FSK/Burst connector (the maximum frequency is 1 MHz).
*7 Sine and square waveforms above 10 MHz are can only be used with an infinite burst count.

Modulation		
Modulation	AM, FM, PM, FSK, PWM, sweep, and burst	
AM	Carrier wave	Sine, square, ramp, or arbitrary
	Modulation signal	Internal or external
	Internal modulation signal	Sine, square, ramp, triangle, noise, or arbitrary
	Internal modulation signal frequency range	2 mHz to 20 kHz
	Modulation depth	0.0 % to 120.0 %
FM	Carrier wave	Sine, square, ramp, or arbitrary
	Modulation signal	Internal or external
	Internal modulation signal	Sine, square, ramp, triangle, noise, or arbitrary
	Internal modulation signal frequency range	2 mHz to 20 kHz
	Deviation	DC to 25 MHz
PM	Carrier wave	Sine, square, ramp, or arbitrary
	Modulation signal	Internal or external
	Internal modulation signal	Sine, square, ramp, triangle, noise, or arbitrary
	Internal modulation signal frequency range	2 mHz to 20 kHz
	Deviation	0.0 ° to 360 °
PWM	Carrier wave	Pulse wave
	Modulation signal	Internal or external
	Internal modulation signal	Sine, square, ramp, triangle, noise, or arbitrary
	Internal modulation signal frequency range	2 mHz to 20 kHz
	Deviation	0 % to 100 % of the pulse width
FSK	Carrier wave	Sine, square, ramp, or arbitrary
	Modulation signal	Internal or external
	Internal modulation signal	Square wave signal with a 50 % duty cycle
	Internal modulation signal frequency range	2 mHz to 100 kHz
External Modulation Input *6	Input voltage range	±5 V full scale
	Input resistance	Typically 8.7 kΩ
	Bandwidth	DC to 20 kHz
Sweep	Waveforms	Sine, square, ramp, or arbitrary
	Method	Linear and logarithmic
	Direction	Up, down
	Sweep time	1 ms to 500 s
	Trigger	Internal, external, or manual
	Marker	The falling edge of the sync output signal
Burst	Waveforms *7	Sine, square, ramp, triangle, noise, or arbitrary
	Method	Internal or external
	Starting and ending phases	-360 ° to +360 °
	Internal period	1 µs to 500 s
	Gate signal	External
	Trigger signal	Internal, external, or manual
Trigger input	Input level	TTL compatible
	Slope	Select rising or falling
	Pulse width	Greater than 100 ns
	Impedance	Greater than 10 kΩ (DC coupling)
	Latency	Less than 500 ns
Trigger output	Output Level	TTL equivalent (load of 1 kΩ or more)
	Pulse width	Greater than 400 ns
	Impedance	Typically 50 Ω
	Maximum speed	1 MHz
	Fan-out	Up to 4 FGA5050s
Pattern Mode Characteristic		
Output	Maximum clock speed	50 MHz
	Output Level	TTL equivalent (load of 2 kΩ or more)
	Output Impedance	Typically 110 Ω
	Pattern Length	2 to 256 K points

General	
Input voltage range	Single-phase 100 Vac to 240 Vac, 50 Hz to 60 Hz Single-phase 100 Vac to 120 Vac, 400 Hz
Input frequency range	50 Hz/60 Hz, 400 Hz
Power consumption	80 VA max
Operating temperature range	0 °C to 55 °C (80 %rh or less, no condensation)
Storage temperature range	-30 °C to 70 °C (80 %rh or less, no condensation)
Operating altitude	Up to 2000 m
Dimensions (mm)/ Weight	253W × 107H × 381D mm (9.96W × 4.21H × 15.0D inch)/ Approx. 4 kg(8.8 lb)
Interfaces	LAN, USB, GPIB (factory option)
Accessories	"Power cord" 1 pc. (with three-pronged plug), "Pattern generator cable" 1pc., "USB cable" 1pc., "CD-R"* 1pc., "Packing list,safety precautions" 1 English, 1 Japanese, "China RoHS disclosure report" 1pc.
Electromagnetic compatibility (EMC)	Complies with the requirements of the following directive and standard. EMC Directive 2014/30/EU, EN 61326-1(Class A), EN 55011(Class A, Group 1), EN 61000-3-2, EN 61000-3-3
Safety	Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU, EN 61010-1(Class I, Pollution degree 2)

*including the "Operation Manual" and "Communication Interface Manual".

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