TEXIO
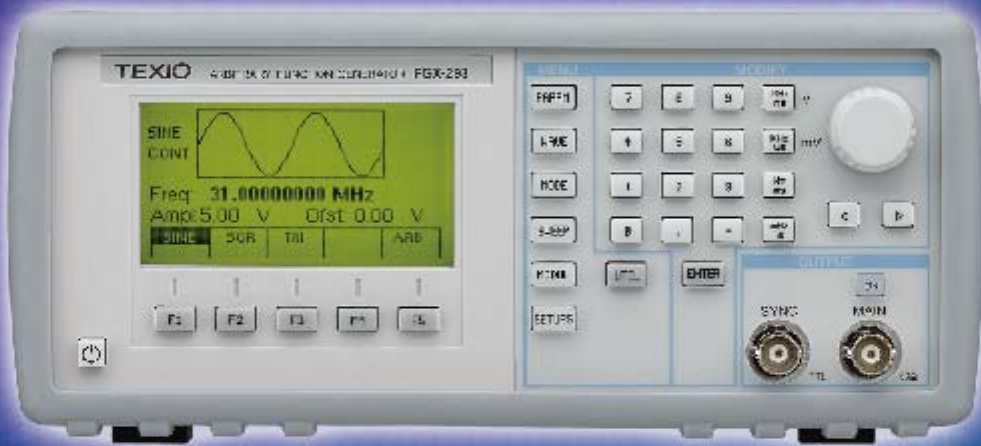
Arbitrary Function Generator

FGX-293

Generation of arbitrary waveform
with max. 500K point length
Wide range from 10µHz to 31MHz

FGX-293 SERIES

Arbitrary Function Generator

FGX-293

TEXIO is a new trademark for Kenwood TMI Corporation's test instruments

KENWOOD T M I CORPORATION

Outline

FGX-293 is a function generator incorporating arbitrary waveform capability.

It can generate arbitrary waveform with 12bit resolution, max. 500K point length, and max. 50MS/s sampling rate.

Waveform can be outputted by each mode of continuous, triggered, gate, or burst with internal or external reference.

It can match to wide variety of use with combining various seep functions, AM, FM, and FSK modulation. Owing to editing function for automatic increment, line draw, defined waveform, etc., easy generation of arbitrary waveform can be realized.

Also control by PC is possible by standard equipped RS-232C and GPIB.(SCPI compatible)

Features

Wide range of frequency generation up to 31MHz (for sine and square waveform)

It is possible to generate 10µHz ultra low frequency up to 31MHz high frequency.

DDS (Direct Digital Synthesizer) method

Standard waveform keeps high accuracy for frequency, ±25ppm by using DDS method.

Frequency setting can be made with 10digit or 1µHz high resolution.

Linear/Log Sweep function

Linear/Log sweep is possible for sweep sine, square, and triangle waveforms.

Duty variable, symmetry variable

Duty ratio for square wave is variable without changing frequency using duty variable function. Variable range is 20% to 80% at less than 5MHz, and 40% to 60% at less than 20MHz.

Symmetry of triangle waveform is variable within the range of 10% to 90%.

500K point long size memory for arbitrary waveform

Data length can be set freely within 500K points.

Setting start address and data length for arbitrary waveform output enables any separation in waveform memory. Sampling rate for arbitrary waveform is max. 50MS/s (20ns) with analog output.

Interface

GP-IB and RS-232C are equipped as standard.

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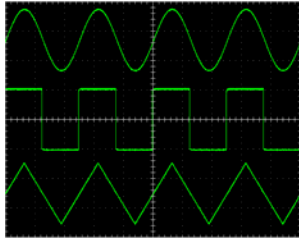
Function Generator function

Standard waveform
3 kinds of waveforms, sine, square, and triangle can be obtained. Max. Output is 10Vp-p(50 Ω termination), and offset can be effective until peak voltage becomes ±5V (50 Ω termination).
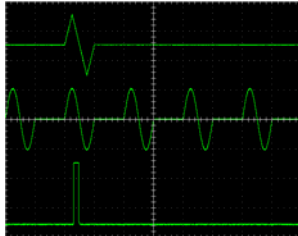

Phase setting function
Starting phase for non-continuous mode signal can be set. Setting range is within ± 360° with 0.1° resolution. Photo shows setting 0°、90°, 180°, and 270° from the top.
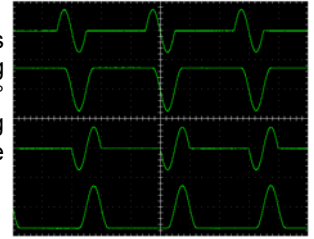

Trigger function
It outputs one cycle for the selected waveform. Manual, internal signal, or external signal can be selected as a trigger source.


AM/FM/FSK modulation
Modulation for internal and external signals can be made by built-in AM/FM modulator. FSK modulator to modulate sub carrier with digital signal is also built-in.
Photo shows AM modulation and FM modulation from the top.
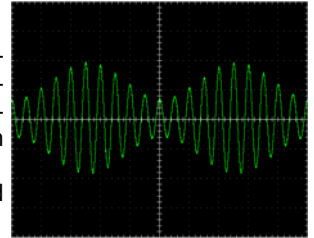
Burst function
Generation of burst waveform is possible for all waveforms.
Number of waveforms is from 2 to 99,999. Photo shows two numbers of triangle, 5 numbers of sine, and 10 numbers of square waveforms from the top.
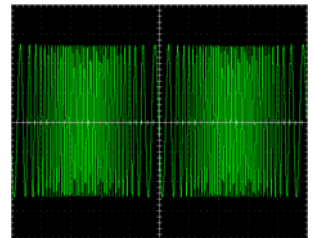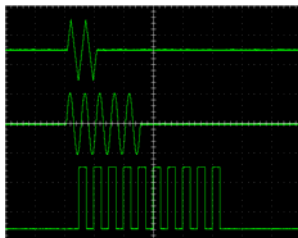
Arbitrary waveform function

Setting for arbitrary waveform
Generation of arbitrary waveform with front panel keys. Operations such as each data point input, drawing line between the points, inserting defined waveform, etc. from front panel keys are possible. Displaying menu and waveform on the 160x80 dot graphic LCD enables easy data input with confirmation of the process.


Generation of arbitrary waveform using application software
Using waveform editter Wave-X makes it easy.
It includes pencil function as well as variety of 9kinds of defined waveforms.
Reading waveform memory data from the unit, serving data, and printing data are possible.
Wave X can be downloaded from our home page.
http://www.kenwoodtmi.co.jp/download/

[Example 1 using front panel key
Process for generation of the waveform on the photo is as follows.
1. Download defined waveform.
2. Load enlarged/reduced sine waveforms onto the plus peak of the initial waveform.
3. Load line between two data points.
4. Add glitch waveform(data point input)
5. Add noise signal onto the minus peak of the initial waveform.
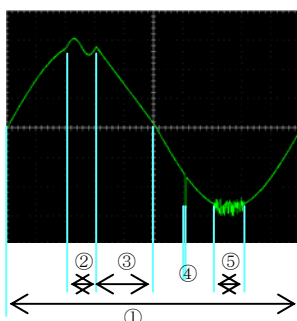
[Example 2 Application
Generation of waveform inserting Wave X defined waveform sequentially.
Photo shows Wave X edditer display and actual output waveform observed by oscilloscope from the top.
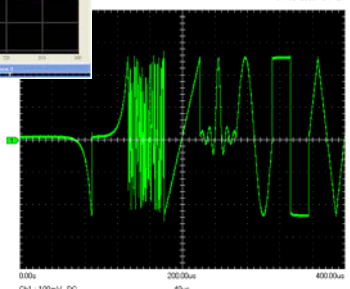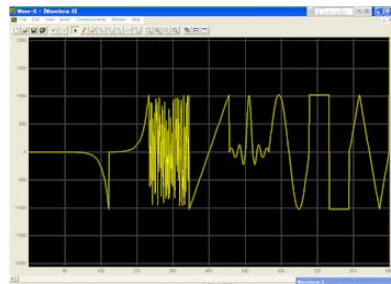
SPECIFICATIONS

FREQUENCY CHARACTERISTICS (STANDARD WAVEFORMS)	
Sine	10 µHz to 31 MHz
Square	10 µHz to 31 MHz
Triangle, Ramp	10 µHz to 500 kHz
Accuracy	0.0025 % (25 ppm)
Resolution	10 digits or 1µHz

ARBITRARY CHARACTERISTICS	
Waveform length	2 points to 500,000 points
Vertical resolution	12 bits
Sampling rate	20ns to 50s
Accuracy	0.0025 % (25ppm)
Resolution	4 digits or 10 ps

OUTPUT CHARACTERISTICS (into 50ohms)	
Amplitude Range	10mV to 10Vp-p
Resolution	3 digits (1000 counts)
Amplitude Accuracy	± 1.25% ± 20mV (Amplitude: 1V to 10V) ± 2.5% ± 10mV (Amplitude: 10mV to 999mV)
Flatness(Sine)	0.1 dB at 10MHz 1 dB at 20 MHz 2 dB at 31 MHz
Offset Range	± 4.5V into 50 ohms, depending on the Amplitude setting
Offset Resolution	10 mV (Amplitude >= 1V) 1 mV (Amplitude < 1V)
Offset Accuracy	± 1.25% ± 20mV (Amplitude: 1V to 10V) ± 2.5% ± 2mV (Amplitude: 10mV to 999mV)
Output Impedance	50 ohm
Output Protection	The main output is protected against short circuit.

WAVEFORM CHARACTERISTICS	
Harmonic Distortion	0 to 100 kHz: -55 dBc 100 kHz to 1 MHz: -45 dBc 1 MHz to 15 MHz: -35 dBc 15 MHz to 31 MHz: -25 dBc
Spurious	DC to 1MHz: <-65 dBc 1MHz to 31MHz＜-50dBc
Square Rise/Fall	< 12 ns (10% to 90%) at full amplitude into 50 ohms
Variable Duty Cycle	Square :20% to 80% to 5 MHz, 40% to 60% up to 20MHz Triangle: 10% to 90% to 500kHz
Symmetry at 50%	< 1 % (< 5MHz)

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 to programmed parameters. The trigger is a rising edge. Up to 10MHz trig rate for ARB waveforms and 5 MHz in DDS
Gate	Same as triggered mode, except waveform is executed for the duration of the gate signal. (The gate signal is high level.)
Burst	2 to 99,999 cycles
Phase	-360° to +360°, 0.1° resolution
Trigger Source	Trigger source may be internal, external or manual. Internal trigger rate 0.01Hz-1MHz

MODULATION CHARACTERISTICS		
Amplitude Modulation	Internal:	0.01Hz-20KHz sine, square or triangle waveform Variable modulation from 0% to 100%.
	External:	5 Vp-p for 100% modulation, 10 kohms input impedance.
Frequency Modulation	Internal:	0.01Hz-20KHz sine wave, square or triangle
	External:	5 Vp-p for 100% deviation, 10 kohms input impedance.
FSK	Internal rate	0.02Hz-1MHz
	External	1MHz max

SWEEP CHARACTERISTICS	
Sweep Shape	Linear and Logarithmic, up or down
Sweep Time	100 ms to 500 s.
Sweep trigger	internal, external, continuous or burst

VARIABLE PHASE	
Range	+360° to –360°
Resolution	0.1°

INPUTS AND OUTPUTS	
Trigger In	TTL compatible. Max. rate: 10MHz （Arb）, 5MHz(DDS). Minimum width: 50ns.
Sync Out	TTL pulse at programmed frequency, 50 ohms source impedance.
Modulation IN	5 Vp-p for 100% modulation. 10 kohms input impedance. DC to >20 KHz minimum bandwidth. **Note: When FSK modulation, the external input connector is "Trigger IN" connector.**
Reference IN-OUT	10 MHz, TTL compatible, input or output, for external unit synchronization.

GENERAL	
Store memory	50 full panel settings at power-off
Arbitrary memory	500K points in flash memory
Dimensions	W: 213 mm x H: 88 mm x D: 300 mm
Weight	Aprox 3 kg

Interface	
RS-232	A DB 9-pin male DTE RS-232 interface
GP-IB	Fully programmable with IEEE488.2 compliance

Power Source	
Line Voltage Range	100V to 240V／47Hz to 63Hz
Power Consumption	40 VA max
Fuse Rating	T1A, 250V

Atmospherics		
Ambient Temperature	Within Specifica-	10ºC to 35ºC
	Operating	0ºC to 50ºC
	Storage	-10ºC to 60ºC
Relative Humidity		90 % RH, 10ºC to 30ºC

Regulation(CE Labeled)	
SAFETY	EN61010
EMC	EN55011、 EN55082

Accessories	
Accessories	Instruction Manual (CD-R), AC cable

⚠ CAUTION
●For safe and correct use, please read the instruction manual and cautions on safe before using the product.
●Please do not install and use the product at the place where is near water, under high humidity, a lot of steam, dust, lamp soot, etc.
(Those may cause fire, electric shock, breakdown, etc.)

●Specifications and design are subject to change without notice.●The color of this catalog may differ from the original due to limitation of photo and printing technique.

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