SPECIFICATIONS

■ Output and Operation Modes

Number of channels	**FG110** : 1 channel **FG120** : 2 channels
Waveforms output	Sine, Square (fixed duty cycle of 50%), Triangle, Ramp, and Pulse (variable duty cycle from 5% to 95%), and their inverted forms
Operation modes	CONT (continuous oscillation mode) **FG120**: phase-continuous and switchable interchannel synchronization, **FG110**: phase-continuous; TRIG (trigger mode); GATE (gate mode); DC (DC mode), where a square wave cannot be selected in the TRIG and GATE modes

■ Frequency

Frequency range	Sine, square: 1 µHz to 2 MHz Triangle, ramp, pulse: 1 µHz to 100 kHz
Resolution	1 µHz or 10 digits
Accuracy	±20 ppm (±1 ppm with option code /XTAL)
Stability	±10 ppm (5 to 40°C) (±0.5 ppm [5 to 40°C] with option code /XTAL)

■ Output Characteristics

Voltage range	Switchable between 1-volt and 10-volt ranges
Maximum output voltage*1	1-volt range: ±1 V(maximum amplitude plus offset) 10-volt range: ±10 V (maximum amplitude plus offset)
Amplitude setting*1	1-volt range: 2 mVp-p to 2 Vp-p (with 0.01 mVp-p or 4-digit resolution) 10-volt range: 20 mVp-p to 20 Vp-p (with 0.1 mVp-p or 4-digit resolution)
Offset voltage setting*1	1-volt range: ±0.999 V (with 0.01 mV resolution) 10-volt range: ±9.99 V(with 0.1 mV resolution)
Output impedance	50Ω ±1% (open when output is off)
Amplitude accuracy*1	±(0.5% of setpoint plus 0.2% of range): 1kHz sine wave
Amplitude-frequency characteristics	Sine ≤ 10 kHz: ±0.1 dB Square ≤ 10 kHz: ±2% ≤ 100 kHz: ±0.2 dB Triangle ≤ 10 kHz: ±3% ≤ 1 MHz: ±0.5 dB Ramp ≤ 10 kHz: ±3% ≤ 2 MHz: ±1 dB (RMS values measured at an amplitude of 10 Vp-p, offset voltage of 0 V, 50Ω load, and scale factor of 0.5, based on a frequency of 1 kHz)
Offset voltage accuracy*1	±(0.3% of setpoint plus 0.2% of range plus 0.2% of amplitude setpoint)
DC mode*1	1-volt range: ±1 V(with 0.01 mV resolution) 10-volt range: ±10 V (with 0.1 mV resolution)
DC mode voltage accuracy*1	±(0.3% of setpoint plus 0.1% of range)
Interchannel crosstalk	–70 dB or less (FG120 only)*2

■ Sine-wave Purity (at an amplitude of 10 Vp-p, offset voltage of 0 V, 50Ω load and scale factor of 0.5)

Harmonics (maximum value in harmonic components from 2nd to 5th order)	10 kHz : –55 dBc or less (–70 dBc or less with option code /DIST1 or DIST2) 100 kHz : –50 dBc or less (–60 dBc or less with option code /DIST1 or DIST2) 2 MHz: –35 dBc or less (–40 dBc or less with option code /DIST1 or DIST2)
Harmonic distortion*3	10 kHz: 0.3% or less (0.05% or less with option code /DIST1 or DIST2)
Spurious responses*4	100 kHz: –55 dBc or less (–65 dBc or less with option code /DIST1 or DIST2)

■ Square- and Pulse-wave Characteristics (at an amplitude of 10 Vp-p, offset voltage of 0 V, 50Ω load and scale factor of 0.5)

Rise time	Square: 100 ns or less (10% to 90%) Pulse: 200 ns or less (10% to 90%)
Overshoot	Within ±5% of peak-to-peak output value
Duty cycle setting	5% to 95 % with 0.1% resolution (applicable only to pulse waves)
Duty-cycle time accuracy	≤10 kHz: ±0.2% of 1/frequency setpoint

■ Phase

Phase setting specifications	Setup of the starting-and-ending point of a phase in TRIG and GATE modes and interchannel phase difference
Phase setting range	–10000 to +10000 degrees
Phase resolution	0.01 degree
Interchannel offset-phase accuracy	≤ 1 kHz: ±0.02 degree ≤10 kHz: ±0.1 degree (Sine wave at an amplitude of 9.9 Vp-p, offset voltage of 0 V, 50Ω load and scale factor of 0.5)

■ TRIG, GATE, and Synchronization Outputs

Trigger sources	External trigger, MAN TRIG key, and GP-IB
External trigger input	TTL level with pulse width equal to or greater than 250 ns Switchable rise/fall time Triggering at an interval of 2µs or more after waveform generation
External gate input	TTL level with pulse width equal to or greater than 2ms Switchable high/low levels Shares the terminal for external trigger inputs
Synchronization output	TTL level (output impedance of 50Ω), synchronized with Channel 1

■ Other Functions

Setup memory	Capable of storing/recalling up to ten different panel setups using STORE/RECALL key (Non-volatile memory)
Scaling	Displayed by multiplying the voltage setpoint (amplitude, offset voltage, DC mode) by the scaling factor
Preset TTL level *1	Sets the amplitude at 5 V and offset voltage at 2.5 V
Copy function (FG120 only)	Copies setup parameters between the two channels (CH1 → CH2; CH2 → CH1)
Dual function (FG120 only)	Capable of changing setup parameters on the two channels at the same time
Output on/off	Allows both channels to be turned on or off separately

■ Communication Functions

Communication function	GP-IB interface (standard)
Electromechanical specifications	Complies with IEEE Standard 488–1978 (JISC1901–1987)
Subsets	SHI, AHI, T6, L4, SRI, RLI, PPO, DCI, DTI, CO

■ General Specifications

Signal grounding	All the grounds of the I/O connectors must be connected to the case grounding.
Operating temperature range	5 to 40°C (41 to 104°F)
Operating humidity range	20 to 80% RH (maximum wet-bulb temperature: 29°C)
Storage temperature range	–20 to 60°C (–4 to140°F)
Power	90 to 110 VAC or 108 to 132 VAC or 207 to 2 53 VAC, 48 to 63 Hz
Power consumption	60 VA maximum
Weight	Approx. 3.6 kg
Dimensions	Approx. 213(W) × 100(H) × 330(D)mm

Note: Allow the **FG110** and **FG120** to warm up for more than 30 minutes to obtain the performance specified above.

*1: with high-impedance load

*2: Crosstalk from CH1 to CH2 when 2-MHz sine wave is applied to CH1 and 1.5-MHz sine wave to CH2, respectively, at an amplitude of 10 Vp-p, offset voltage of 0 V, 50Ω load and scaling factor of 0.5.

*3: RMS value of harmonic components from 2nd to 5th order

*4: At a frequency range of 1 kHz to 20 MHz

Recommended operating conditions : Temperature: 23 ±2°C, Humidity: 50% ±10% RH, Power supply voltage: 100 V ±1%

AVAILABLE MODELS

Model	Suffix codes	Description
706011		FG110 (1-channel model)
706012		FG120 (2-channel model)
Power requirements	**-1**	90 to 110 VAC
	-4	108 to 132 VAC
	-7	207 to 253 VAC
Power Cord	**-D**	UL, CSA Standard
	-F	VDE Standard
	-R	SAA Standard
	-J	BS Standard
Optional features	**/XTAL**	High Stability Frequency Reference
	/DIST1	Low Distortion Output (for **FG110**)
	/DIST2	Low Distortion Outputs (for **FG120**)

■ Optional Accessories

Name	Code	Description	Order q'ty
BNC cable	**366924**	BNC-BNC, 1m	1
BNC cable	**366925**	BNC-BNC, 2m	1
BNC cable	**366926**	with alligator clip	1
Conversion adaptor	**366921**	BNC plug and banana jack	1
Conversion adaptor	**366927**	BNC plug and RCA jack	1
Conversion adaptor	**366928**	BNC jack and RCA plug	1
Rack mounting kit	**751501**	EIA single mounting	1
Rack mounting kit	**751502**	EIA double mounting	1
Rack mounting kit	**751503**	JIS single mounting	1
Rack mounting kit	**751504**	JIS double mounting	1

DIMENSIONS

• Common to both the **FG110** and **FG120**.

Unit: mm (inch)