SECG 4.0

ECG Performance Tester

The ECG simulator designed for performance testing.
Suitable for compliance and production line testing.

- Single channel performance tester for diagnostic ECG, monitoring ECG and ambulatory ECG
- Built-in test circuits per defined in ECG standards
- Excellent shielding and grounding design makes amplitude and frequency accuracy < ±1%
- DC offset and pacemaker signal output can be adjustable
- Load ECG file function enables to load and replay recorded or programmed waveforms
- Offer alternative input of external generator for arbitrary waveforms
- Software Development Kit (SDK) assists user in developing customized or automated test software with less efforts
- Optional Standard Assistant software pack simplifies the medical standard with test sequences, options, parameters and pass criteria

Medical Standard Coverage

IEC 60601-2-25, IEC 60601-2-27, IEC 60601-2-47, AAMI EC11, AAMI EC13, GB9706.225, GB9706.227, YY9706.247, YY1079, YY1139, YY0782, YY0885, JJG 760, JJG 1041, and JJG 1042

Compliance

Production Line

• Technical Specifications

Parameters	Specifications
Main output voltage accuracy	±1% for amplitudes of 0.5mVpp or higher
Main output voltage resolution (DAC resolution)	2.5μV
Frequency / pulse repetition rate accuracy	±0.2%
Pulse duration / timing accuracy (excluding pacing)	±0.2ms
Pacing pulse width accuracy	±1μs
Pacing pulse amplitude accuracy, range	±2mV pulse: ±0.3% >2mV pulse: ±10% Range: ±2mV – ±700mV
Resistor tolerance	±0.5%
Capacitor tolerance	±5%
Precision 1000 : 1 divider (100kΩ : 100Ω)	±0.1%
Sample rate	5kHz ±0.05% (50ppm)
DC offset (fixed, noise free, sourced from internal supercapacitor)	300mV ±0.1%
DC offset (variable, may include up to 50μVpp noise)	Setting ±1% or ±3mV

• Signal Type

Parameters		Setting Range	Default Values	Minimum Step Size
Sine	Frequency (Hz)	0.05 – 500Hz	1Hz	0.01
	Frequency (BPM)	3 – 30000BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
Triangle	Frequency (Hz)	0.05 – 500Hz	1Hz	0.01
	Frequency (BPM)	3 – 30000BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
Square	Frequency (Hz)	0.05 – 500Hz	1Hz	0.01
	Frequency (BPM)	3 – 30000BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
Rectangle pulse	Frequency (Hz)	0.05 – 5Hz	1Hz	0.01
	Frequency (BPM)	3 – 300BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
	Pulse width	2 – 300ms	100ms	1
Triangle pulse	Frequency (Hz)	0.05 – 5Hz	1Hz	0.01
	Frequency (BPM)	3 – 300BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
	Pulse width	2 – 300ms	100ms	1
Exponential	Frequency (Hz)	0.05 – 3Hz	1Hz	0.01
	Frequency (BPM)	3 – 180BPM	60BPM	1
	Amplitude	(-10) – 10mV	1mV	0.01
ECG-2-27 waveform	QRS Amplitude	(-5.7) – 5.7mV	1mV	0.1
	QRS Duration	5 – 200ms	100ms	1
	T Amplitude	0 – 5mV	0.2mV	0.01
	Frequency (Hz)	0.05 – 6Hz	1Hz	0.01
	Frequency (BPM)	3 – 360BPM	60BPM	1
Special waveform	-	Load special waveforms from user's computer	-	-

• Signal Add-on

Parameters		Setting Range	Default Values	Minimum Step Size
DC offset		(-1000) – 1000mV	0mV	1
Pacing	Amplitude	(-700) – 700mV	0mV	1
	Duration	0.1 – 2ms	2ms	0.1
	Pacing rate	10 – 300BPM / Synchronization	60BPM	1
	Overshooting time constant	0 – 100ms	0ms	1
	Pulse type	Single pulse, Double pulse (150ms), Double pulse (250ms)	-	-
620kΩ / 4.7nF (Turn on for short circuit)		on / off	On	-
AAMI EC 13 Drift Test Triangle wave (0.1Hz, 4mV) add-on		on / off	Off	-
Noise	Main noise	50Hz, 60Hz, 80Hz, 100Hz (The 80Hz and 100Hz settings are for capacitance correction only, not for testing ECG.)	50Hz	-
	Amplitude	0.01 – 2mVp-p	0.1mV	0.01
Frequency scan (Sine)	Start frequency	0.67 – 500Hz	0.67Hz	0.01
	Stop frequency	0.67 – 500Hz	150Hz	0.01
	Duration	10 – 180s	30s	0.01
Frequency scan (ECG)	BPM	-	3 – 30BPM	-
	Duration	-	30s	-
Output lead electrode		RA (R), LA (L) , LL (F), V1, V2, V3, V4, V5, V6	RA (R)	-

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