

Table 1-2. Specifications

### SPECIFICATIONS

(Specifications describe the instrument's warranted performance)

The following specifications apply with 50 Ohm load resistance in a temperature range of 0° to 55°C. Output levels double when driving into high impedance (up to 32 Vpp).

#### WAVEFORMS

Sine, Triangle, Ramp, Square, Pulse, Haversine, Havertriangle

#### TIMING CHARACTERISTICS

##### Frequency

Range: 1.00 Hz to 20.0 MHz  
 Resolution: 3 digits  
 Accuracy:  $\pm 5\%$  of setting (10.0 Hz to 20.0 MHz)  
 (50% duty cycle)  $\pm 10\%$  of setting (1.00 Hz to 9.99 Hz)  
 Repeatability: Factor 2.5 better than accuracy  
 Jitter:  $< 0.1\% + 50$  ps  
 Stability:  $\pm 0.2\%$  (1 hour)  
 $\pm 0.5\%$  (24 hours)

##### Duty Cycle (sine, triangle, square)

Range: 10% to 90% (1 Hz to 999 kHz)  
 50% fixed (1 Hz to 20 MHz)  
 Resolution: 1%  
 Accuracy (1 Hz to 999 kHz):  $\pm 1$  digit, 50% fixed  
 $\pm 3$  digits, 20% to 80%  
 $\pm 6$  digits, 10% to 20% and 80% to 90%

##### Pulse Width

Range: 25 ns to 100 ms  
 Resolution: 3 digits  
 Accuracy:  $\pm 5\%$  of setting  $\pm 2$  ns  
 Repeatability: Factor 2.5 better than accuracy  
 Jitter:  $< 0.1\% + 50$  ps  
 Max. duty cycle:  $> 75\%$  (1 Hz to 1 MHz), decreasing to  
 $> 50\%$  at 20 MHz

#### OUTPUT CHARACTERISTICS

**Output Impedance:** 50 Ohm  $\pm 5\%$ . Reflection  $< 10\%$

##### Amplitude/Offset

Amplitude and offset are independently variable within the following two level windows.

Level window	$\pm 80.0$ mV	$\pm 8.00$ V
Ampl. range	1.60 mVpp to 159.9 mVpp	16.00 Vpp to 160.0 Vpp
Ampl. resolution	3 1/2 digits	3 1/2 digits
Ampl. accuracy*	$\pm 5\%$ [0.45 dB]	$\pm 5\%$ [0.45 dB]
Ampl. repeatability	Factor 2.5 better than accuracy	
Offset range	0 to $\pm 80.0$ mV	0 to $\pm 8.00$ V
Offset resolution	3 digits (best case 10 $\mu$ V)	3 digits (best case 1 mV)
Offset accuracy	$\pm 5\%$ of setting $\pm 2\%$ of amplitude $\pm 1$ mV	$\pm 5\%$ of setting $\pm 2\%$ of amplitude $\pm 20$ mV
Offset repeatability	Factor 2.5 better than accuracy	

\*The amplitude accuracy for sine and triangle is specified at 1 kHz. For other frequencies see the following flatness specifications.

Amplitude Flatness (50% duty cycle)	Sine	Triangle
1.00 Hz to 999 kHz	$\pm 3\%$ [0.26 dB]	$\pm 3\%$
1.00 MHz to 20.0 MHz	$\pm 10\%$ [0.92 dB]	$\pm 10\%$ $- 15\%$

#### WAVEFORM CHARACTERISTICS

**Sine** (normal mode, 50% duty cycle, symmetrical mode)

Total Harmonic Distortion (THD):  
 $< 1\%$  [-40 dB], (10 Hz - 99.9 kHz)  
 $< 3\%$  [-30 dB], (100 kHz - 999 kHz)

Harmonic Signals: more than 26 dB below fundamental (1 MHz - 20 MHz) for amplitudes  $> 10$  mVpp

THD and Harmonic Signal Distorsion may increase by 3 dB below 10°C and above 45°C

#### Triangle, Ramp

Non-linearity:  $< \pm 1\%$  (10 Hz to 99.9 kHz)  
 $< \pm 3\%$  (1 Hz to 9.9 MHz and 100 kHz to 1 MHz)  
 (measured between 10% to 90% of amplitude)

#### Square, Pulse

Rise/Fall time:  $< 10$  ns (10% to 90% of amplitude)  
 Pulse Perturbations:  $< \pm 5\%$  of amplitude ( $\geq 0.16$  Vpp)  
 $< \pm 10\%$  of amplitude ( $< 0.16$  Vpp)

#### Output Modes

Switchselectable POSITIVE, NEGATIVE, SYMMETRICAL and NORMAL/COMPLEMENT output signal.

#### OPERATING MODES

**Normal:** Continuous waveform is generated  
**Trigger:** Each input cycle generates a single output cycle  
**Gate:** External signal enables oscillator. First output cycle synchronous with active trigger slope. Last cycle always completed.  
**VCO:** External voltage linearly sweeps 2 full frequency decades. The actual frequency is displayed.  
 Modulation range: 1:100 with 0.1V to 10V  
 Modulation bandwidth: dc to 1 kHz  
**Burst:** Each input cycle generates a preprogrammed number (1 to 999) of periods. Minimum time between bursts is 200 ns. (Option 001)

#### SUPPLEMENTARY PERFORMANCE CHARACTERISTICS

(Description of non-warranted typical performance parameters)

**Ext Input:** Threshold Level: 1.4V fixed  
 Max input voltage:  $\pm 20$  V  
 Sensitivity: 500 mVpp  
 Min pulse width: 25 ns  
 Input impedance: 10 kOhm  
 Trigger slope: positive

**Start Phase:** Adjustable from  $-90^\circ$  to  $+90^\circ$ .  
 Usable range may decrease to  $-90^\circ$  to  $0^\circ$  at 20 MHz.  
 Haversine and Havertriangle can be generated.

**Trigger Output:** TTL compatible output signal.

**Man:** Simulates external input.

**1 Cycle:** Provides a single output period in TRIG, GATE and BURST mode.

#### GENERAL

**Warm-up Time:** 15 min to meet all specifications.  
**Environmental:** Storage temperature:  $-40^\circ$  C to  $75^\circ$  C  
 Operating temperature:  $0^\circ$  C to  $55^\circ$  C  
 Humidity range: 95% R.H.,  
 $0^\circ$  C to  $40^\circ$  C

**Power:** 100/120/220/240 V rms  $\pm 5\%$ , -10%, 48-440 Hz;  
 70 VA max.

**Weight:** Net 4.6 kg (10 lbs), Shipping 6.6 kg (15 lbs)  
**Dimensions:** 89 mm high, 213 mm wide, 375 mm deep  
 (3.5 x 8.4 x 14.8 in)

**Options:** 001 Counted Burst  
 910 Additional Operating & Service Manual

Data subject to change