



Description

A combined module including a precision DDS function generator that can generate waveforms between 0.001 Hz and 10 MHz, with a resolution of six digits and a one year accuracy better than 10 ppm. Amplitude is variable between 2 mV and 20 V pk-pk from a source impedance of 50 Ω or 600 Ω . Frequencies can be entered directly from the numeric keypad in units of Hz, kHz or MHz. Alternatively any digit can be incremented or decremented using the spin wheel. All waveforms can be swept over almost the full frequency range (0.1 Hz to 10 MHz) at a rate variable between 100 milliseconds and more than 15 minutes. The sweep is fully phase continuous and can be linear or logarithmic, single or continuous.

Frequency Counter

In external counter mode the full width of the display is used to provide up to seven digits of resolution. The frequency range is from 3 Hz up to more than 120 MHz, and the input sensitivity is better than 50 mV rms. A reciprocal counting measurement system is used which ensures high resolution regardless of input frequency.



Features

- 0.001 Hz to 10 MHz frequency range using DDS
- 6 digits or 1 mHz setting resolution
- 1 ppm stability and < 10 ppm absolute accuracy for 1 year
- Sine, square and triangle waveforms
- Low distortion, high spectral purity sine waves
- Simultaneous display of frequency and amplitude/offset
- External seven digit 120 MHz frequency counter
- Internal full range phase continuous sweep, linear or log
- Unique manual sweep mode for quasi-analog control
- Modulations modes of AM, FSK and frequency list
- 2 mV to 20 V pk-pk output from 50 Ω or 600 Ω
- Storage for up to ten frequencies in non-volatile memory



Technical Specifications

Waveforms

Sine

Range.....	1 MHz to 10 MHz
Resolution	1 MHz or 6 digits
Accuracy	10 ppm for 1 year; ± 1 MHz below 0.2 Hz
Temperature Stability	Typically < 1 ppm/ $^{\circ}$ C outside 18 $^{\circ}$ to 28 $^{\circ}$ C
Output Level.....	1 mV to 10 Vp-p into 50 Ω
Harmonic Distortion.....	< 0.3 % THD to 20 kHz (typically 0.1 %), < -45 dBc to 300 kHz; < -30 dBc to 10 MHz (typically < -35 dBc)
Non-harmonic Spuri.....	< -55 dBc to 1 MHz, < -55 dBc + 6 dB/octave 1 MHz to 10 MHz

Square

Range.....	1 MHz to 10 MHz
Resolution	1 MHz or 6 digits
Symmetry Control.....	20 % to 80 % 1 MHz to 10 MHz
Accuracy	10 ppm for 1 year; ± 1 MHz below 0.2 Hz
Output Level.....	1 mV to 10 Vp-p into 50 Ω
Rise and Fall Times	< 25 ns
Aberrations.....	< 5 % + 2 mV

Triangle

Range.....	1 MHz to 1 MHz
Resolution	1 MHz or 6 digits
Accuracy	10 ppm for 1 year; ± 1 MHz below 0.2 Hz
Output Level.....	1 mV to 10 Vp-p into 50 Ω
Linearity Error.....	< 0.5 % to 100 kHz

Operating modes

Continuous

Continuous cycles of the selected waveform are output at the programmed frequency.

Sweep

Carrier waveforms	All
Sweep mode	Manual, linear or logarithmic, single or continuous.
Sweep width.....	From 0.1 Hz to 10 MHz in one range. Phase continuous. Independent setting of the start and stop frequency.
Sweep time.....	100 ms to 999 s (10 ms resolution).
Sweep SYNC.....	Start of sweep trigger available from SYNC output.
Trigger source.....	The sweep may be free run or triggered from front panel MAN TRIG key.
Manual sweep mode	An analogue control can be used to set any between the sweep start and sweep stop frequencies.

Amplitude Modulation

Carrier Frequency.....	From 1 MHz to 10 MHz.
Carrier Waveforms.....	All
Modulation Frequency	400 Hz internal. DC to 20 kHz external
External Modulation.....	AM/COUNT IN socket

Frequency Shift Keying (FSK)

Phase coherent switching between two selected frequencies at a rate defined by the switching signal source.	
Carrier frequency.....	From 0.1 Hz to 10 MHz.
Carrier waveforms	All
Switch repetition rate.....	DC to 10 kHz (internal trigger).
Switching signal source.....	Manual (front panel MAN TRIG key) or internal trigger generator

Frequency List

Carrier Waveforms.....	All
Frequency List.....	Up to 10 frequencies from 1 MHz to 10 MHz
Switching Source.....	Manual from front panel MAN TRIG key

General Specifications

Display	20 character x 4 row alphanumeric LCD.
Data Entry	Keyboard selection of mode, waveform etc.; value entry direct by numeric keys or by rotary control
Stored Settings	Up to 9 complete instrument set-ups may be stored in battery-backed memory.
Module Width.....	295 mm (primary console fitting only).

Outputs

Main Outputs

Output Impedance	50 Ω and 600 Ω (not independent)
Amplitude	2 mV to 20 V pk-pk open circuit, (1 mV to 10 V pk-pk into 50 Ω /600 Ω) in four switch selectable ranges with 20 dB vernier control within each range. (Amplitude can be displayed in pk-pk or r.m.s.)
Attenuator.....	0, -20 dB, -40 dB, or -60 dB.
Amplitude Flatness.....	± 0.2 dB to 500 kHz; ± 2 dB to 10 MHz.
DC Offset Range.....	± 10 V. DC offset plus signal peak limited to ± 10 V from 50 Ω /600 Ω ; CLIP shows in display when offset plus signal peak exceeds ± 10 V. DC offset plus waveform attenuated proportionally by the attenuator.
Resolution	3 digits for both Amplitude and DC Offset.

SYNC Out

Automatically selected to be either Waveform Sync or Sweep Sync:	
Waveform Sync	A square wave at the main waveform frequency. Symmetry is 50 % for sine and triangle waves at MAIN OUT; for square waves symmetry is the same as that of the waveform at MAIN OUT.
Sweep Sync	Outputs a trigger signal at the start of sweep to synchronize an oscilloscope.
Output Signal Level.....	Output impedance 50 Ω nominal. Logic levels of < 0.8 V & > 3 V.

Inputs

AM In

The AM/COUNT IN socket is set to AM input when External AM is selected.	
Input Impedance	40 k Ω
Input Sensitivity	Approximately 2 V peak-peak for 100 % modulation.
Max. Allowable Input	± 10 V

Count In

The AM/COUNT IN socket is set to external frequency measurement when EXT COUNT is selected.	
Input Impedance	1 M Ω /20 pF
Input Sensitivity	50 mVrms (sinewave)
Max. Allowable Input	0 Vdc/30 Vrms to 50 Hz/60 Hz with respect to ground, reducing to 1 Vrms above 1 MHz.

Display functions

The LCD shows generator frequency at a resolution of 4 digits simultaneously with output amplitude/offset, together with various status annunciators. Alternatively, the generator frequency can be displayed without the amplitude/offset to a resolution of 6 digits. The LCD also functions as the external frequency measurement display with up to 7 digits of resolution.

Internal Measurement Accuracy

Amplitude	Display shows peak-to-peak amplitude or rms value. Display corrected for attenuator setting. 3-digit resolution, accuracy typically ± 5 % of full scale.
DC Offset: 3-digit resolution; accuracy typically ± 2 % setting ± 1 digit. Display corrected for attenuator setting.	
Frequency Setting	Resolution up to 6 digits, see Waveforms section for setting accuracy.

External frequency measurement

Frequency Range.....	3 Hz to > 120 MHz.
Resolution	Up to 7 digits
Input Sensitivity	better than 50 mVrms (sinewave).
Measurement time	Automatic.
Accuracy	± 1 digit \pm timebase accuracy.
Timebase Accuracy.....	± 5 ppm initial error; ± 5 ppm/year ageing rate; typically < 0.1 ppm/ $^{\circ}$ C.

Ordering Information

8023

10 MHz DDS Function Generator with 120 MHz Frequency Counter Module.

Options: Traceable (factory) and accredited (ISO 17025) calibration certificates.

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.