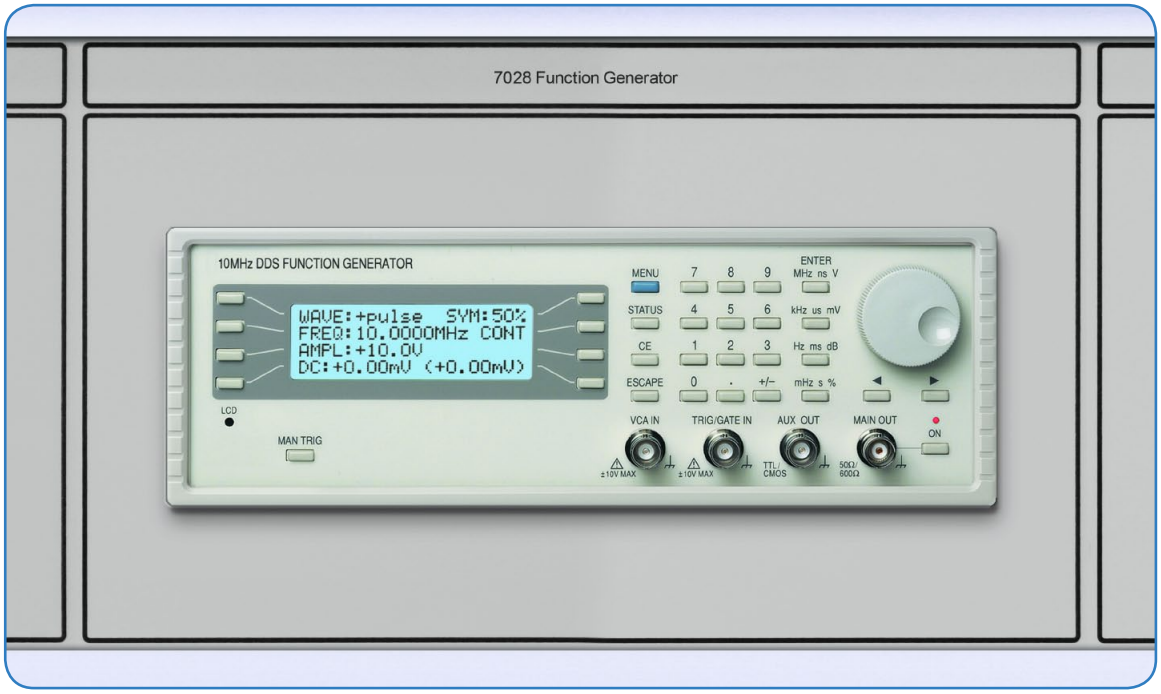
Time Electronics

7028 DDS Function Generator Module



- ***0.001Hz to 10MHz frequency range***
- ***6 digits or 1mHz resolution***
- ***1ppm stability & 10ppm one year accuracy***
- ***Storage for multiple instrument set-ups***
- ***Internal phase continuous sweep, lin or log***
- ***AM, FSK, gated and tone switching modes***
- ***5mV to 20V pk-pk from 50 or 600 Ohms***
- ***Low distortion, high spectral purity sine waves***

FEATURES

High measurement accuracy: DDS (direct digital synthesis) is a technique for generating waveforms digitally using a phase accumulator, a look-up table and a DAC. The accuracy and stability of the resulting waveforms is related to that of the crystal master clock. When correctly engineered, the DDS generator offers not only exceptional accuracy and stability but also high spectral purity, low phase noise and excellent frequency agility.

Wide frequency & amplitude range: The 7028 can generate waveforms between 0.001Hz and 10MHz with a resolution of six digits and a one year accuracy better than 10ppm. Amplitude is variable between 5mV and 20V pk-pk from a source impedance of 50 Ohm or 600 Ohm. Waveform quality remains excellent over the full amplitude range.

Easy and convenient to use: The 7028 is particularly easy to use. All of the main information is clearly displayed on a backlit LCD with 4 rows of 20 characters. Sub menus are used for the modulation modes and other complex functions. All parameters can be entered directly from the numeric keypad. Alternatively most parameters can be incremented or decremented using the rotary encoder for quasi-analogue control.

Sweep: All waveforms can be swept over their full frequency range (0.1Hz minimum) at a rate variable between 20 milliseconds and 15 minutes. The sweep is fully phase continuous. Sweep can be linear or logarithmic, single or continuous. Single sweeps can be triggered from the front panel, the trigger input, or the digital interfaces. A sweep marker is provided that is adjustable whilst sweep is running. The markers can provide a visual indication of frequency points on a 'scope or chart recorder.

Gated: The Gated mode turns the output signal On when the gating signal is high and Off when it is low. The gating source can be the front panel key, trigger input socket, or bus interface signal.

AM: External Amplitude Modulation is available for all waveforms via the VCA input.

FSK: Frequency Shift Keying provides phase coherent switching between two selected frequencies at a rate defined by the switching signal source. The switching source can be the front panel key, internal trigger generator or trigger input socket.

Tone Switching: The generator can be set to switch between a number of different frequencies in response to a trigger signal. Up to 16 frequencies can be defined. The tone is output while the trigger signal is true, and stops (after completion of a full cycle) when the trigger signal is false. The next tone is output when the trigger signal goes true again.

7028 Specifications

SPECIFICATIONS

Frequency

All waveforms are derived from a crystal clock using Direct Digital Synthesis

Frequency Range.....1mHz to 10MHz
Resolution .....6 digits or 1mHz
Accuracy .....<±10ppm for 1 year, 18°C to 28°C
Temp Coefficient .....Typically <1ppm/°C outside of 18°C to 28°C

Waveforms

Sinewave

Range.....1mHz to 10MHz
Resolution .....6 digits or 1mHz
Distortion .....<0.3% THD to 20kHz (typically 0.1%), <-45dBc to 300kHz, <-35dBc to 10MHz (typically <-40dBc)
Spurii .....Non harmonically related spurii <-55dBc to 1MHz, <(-55dBc + 6dB/octave) 1MHz to 10MHz
Output Level.....5mV to 20V pk-pk from 50 Ohms

Squarewave

Range.....1mHz to 10MHz
Resolution .....6 digits or 1mHz
Symmetry.....variable 20% to 80% in 1% steps
Aberrations.....<5% + 2mV
Rise & Fall Times.....<22ns
Output Level.....5mV to 20V pk-pk from 50 Ohms

Triangle

Range.....1mHz to 1MHz
Resolution .....6 digits or 1mHz
Linearity error .....<0.5% to 100kHz
Output Level.....5mV to 20V pk-pk from 50 Ohms

Positive and Negative Pulse

Range.....1mHz to 10MHz
Resolution .....6 digits or 1mHz
Symmetry.....variable 20% to 80% in 1% steps
Aberrations.....<5% + 2mV
Rise & Fall Times.....<22ns
Output Level.....2.5mV to 10V pk-pk from 50Ω pos or neg only pulses with respect to the DC Offset baseline

Modulation Modes

Continuous

Cycles of the selected waveform are output at the selected frequency

Gated

Non phase-coherent signal keying - output is On while Gate signal is high and Off while low.

Carrier frequency .....From 0.1Hz to 10MHz
Carrier waveforms.....All
Trigger rep. rate.....dc to 100kHz external, dc to 5kHz internal
Gate source.....Front panel MAN TRIG key, Internal Gate Generator, TRIG/GATE input

Sweep

Carrier waveforms.....All
Sweep Mode .....Linear or logarithmic, single or continuous
Sweep Width.....0.2Hz to 10MHz. Phase continuous. Independent setting of the start & stop frequency
Sweep Time .....50ms to 999s (3 digit resolution)
Markers .....Marker variable during sweep. Available at the AUX OUT socket
Sweep Trigger source...The sweep may be free run or triggered from: front panel MAN TRIG key, TRIG/GATE input

Modulation Modes Continued

Amplitude Modulation

Carrier frequency .....1mHz to 10MHz
Carrier waveforms.....All
Modulation source .....VCA IN socket

Frequency Shift Keying (FSK)

Phase coherent switching between two frequencies at a rate defined by the switching signal source.

Carrier frequency .....1Hz to 10MHz
Carrier waveforms.....All
Switch repetition rate ....dc to 5kHz (internal), dc to 1MHz (external)
Switching signal source..Front panel MAN TRIG key, Internal Trigger Generator, TRIG/GATE input

Tone

The tone is output while the trigger signal is true, and stops (after completion of a full cycle) when the trigger signal is false. The next tone is output when the trigger signal goes true again.

Carrier waveforms.....All
Frequency list.....Up to 16 frequencies between1Hz and 10MHz
Min. switching time .....1ms per tone
Switching source.....Front panel MAN TRIG key, Internal Trigger Generator, TRIG/GATE input.

Internal Trigger/Gate Generator

Period .....0.2ms to 999s (resolution 0.2 ms)
Waveform .....Square wave (1:1 duty cycle)

Main Output

Output Impedance.....50 Ohms or 600 Ohms switchable
Amplitude .....5mV-20V pk-pk open circuit (2.5mV-10V into 50Ω)

Output can be specified as V-HiZ (open circuit value) or V (potential difference) in pk-pk, RMS or dBm. Note that in positive or negative Pulse modes the amplitude range is 2.5mV to 10V pk-pk O/C.

Accuracy .....±3% ±1mV at 1kHz into 50 Ohms/600 Ohms
Flatness.....±0.2dB - 500kHz; ±1dB - 10MHz; ±2dB - 20MHz
DC Offset.....±10V from 50/600 Ohms. DC offset plus signal peak limited to ±10V. Accuracy ±3% ±10mV
Resolution .....3 digits for both amplitude and offset

Auxiliary Output

Multi-function output user definable to be any of the following:

Waveform Sync.....Outputs a 50% duty cycle squarewave at the main waveform frequency
Trigger Out .....Outputs the current trigger signal
Sweep Sync .....Output a trigger signal at the start of sweep (for synchronising an oscilloscope or chart recorder). Can additionally output a sweep marker.
Signal Levels.....Logic levels of <0.8V and >3V. Sweep Sync is a 3 level waveform, low at start of sweep, high at end of sweep, with a narrow 1V pulse at the marker point.

Inputs

Ext Trig/Gate

Frequency Range.....DC to 1MHz for FSK; DC to 100kHz for Gate; DC to 2.5kHz for Tone and Sweep
Signal Range.....Nominal TTL level threshold; max input ±10V
Min. Pulse Width .....100ns for Gate/FSK; 0.2ms for Sweep and Tone
Input Impedance.....Typically 10k Ohms

VCA In

Frequency Range.....DC - 100kHz
Signal Range.....2.5V for 100% level change at max output
Input Impedance.....Typically 6k Ohms

GENERAL SPECIFICATIONS and ORDERING INFORMATION

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.....295mm (primary console fitting only)

Ordering Information ..... **7028: 10MHz DDS Function Generator Module**

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