Time Electronics
8027 Function Generator with Frequency Counter

Description

A dual-channel arbitrary function generator that designed for both industrial and educational applications. Both channels are equipped with same characteristics to fit dual signal applications such as differential or IQ signaling.

The main features for both channels include 10 Vpp output amplitude; 25 MHz frequency bandwidth with 1 μHz resolution; built-in waveforms of Sine, Square, Ramp (Triangle) and Noise. The 1%~99% adjustable duty cycle of Square waveform can be used as pulse signal sources. For the arbitrary waveform, the user can edit the 66 built-in waveforms or create a new ones as required. The 8027 incorporates features of AM/FM/PM/FSK/SUM Modulation, Sweep, Burst and Frequency Counter. These make it a versatile module for signal generation applications in R&D and test environments.

In addition to the intuitive user interface, the 3.5-inch color LCD displays the comprehensive operation information including the true waveform presented at the output. The module is supplied with a software that is pre-loaded on the CalBench control centre (ordered separately).

Basic Specifications/Details

Channels: 2 independent output channels that can be used independently or correlated.

Display: 3.5" colour TFT LCD, shows waveform parameters, settings, real-time waveform display.

Interface: USB host and device ports for remote control and waveform editing via control centre.

Dimensions: 295mm, primary console fitting only.

Waveform basic specifications

Waveform types: Features standard waveforms including sine, square, ramp (triangle), noise, and arbitrary. It also includes 66 built-in arbitrary waveforms and supports user-customized signals.

Frequency range: From 1μHz to 25 MHz for sine and square waves.

Sampling rate: 120 MSa/s for arbitrary waveforms.

Vertical resolution: 10 bits.

Output amplitude: 10 Vpp (peak-to-peak) into a 50Ω load.

Frequency resolution: 1 μHz over the full range.

Functionality and modulation

Adjustable duty cycle: The square waveform has a 1% to 99% adjustable duty cycle.

Modulation: The generator can perform multiple modulation schemes, including amplitude (AM), frequency (FM), phase (PM), frequency shift keying (FSK), and summing (SUM).

Sweep and burst: It supports sweep and burst modes for generating signal sequences.

Frequency counter: A built-in frequency counter can measure frequencies up to 150 MHz.

Features

- 1 μHz to 25 MHz (sine/square wave)
- Frequency Resolution : 1 μHz in total range
- True dual-channel output, channel 2 provides the same characteristics as channel 1
- 120 MSa/s sampling, 10-bit, 4 k points arbitrary waveform for both channels
- Couple, tracking, phase operations of dual channel
- 1 to 99% Adjustable duty cycle for square waveform
- High resolution colour TFT LCD with friendly user interface
- Built-in standard AM/FM/PM/FSK/SUM/sweep/burst and frequency counter
- Multiple editing methods to edit arbitrary waveform easily
- Correlated functions of dual-channel outputs
- USB interface for remote control and waveform editing

Dual-channel capabilities

Correlation: Channels can be set to operate in a correlated manner, supporting coupling, tracking, and phase operations.

Equal capabilities: Both output channels are fully functional with the same features, which is beneficial for dual-signal applications like differential or IQ signaling.

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Technical Specifications

Specifications apply when unit is powered on for 30 mins under +20°C～+30°C.

Module 8027		**CH1**	**CH2**
Waveforms		Sine, Square, Ramp, Pulse, Noise, ARB	
Arbitrary Functions			
	Sample Rate	120 MSa/s	
	Repetition Rate	60 MHz	
	Waveform Length	4k points	
	Amplitude Resolution	10 bits	
	Non-Volatile Memory	4k points	
Frequency Characteristics			
Range	Sine, Square	1uHz~25MHz	
	Ramp	1MHz	
Resolution		1uHz	
Accuracy	Stability	±20 ppm	
	Aging	±1 ppm, per 1 year	
	Tolerance	≤1 mHz	
Output Characteristics			
Amplitude	Range	1mVpp to 10 Vpp (into 50Ω) 2mVpp to 20 Vpp (open-circuit) 1mVpp to 5 Vpp (into 50Ω) for 20MHz-25MHz 2mVpp to 10 Vpp (open-circuit) for 20MHz-25MHz	
	Accuracy	±2% of setting ±1 mVpp (at 1 kHz/into50Ω without DC offset)	
	Resolution	1mV or 3 digits	
	Flatness	±1% (0.1dB) ≤100kHz ±3% (0.3 dB) ≤5MHz ±5% (0.4 dB) ≤12MHz ±10%(0.9dB) ≤25MHz (sine wave relative to 1kHz/into 50Ω)	
	Units	Vpp, Vrms, dBm	
Offset	Range	±5 Vpk ac +dc (into 50Ω) ±10Vpk ac +dc (Open circuit) ±2.5 Vpk ac +dc (into 50Ω) for 20MHz-25MHz ±5Vpk ac +dc (Open circuit) for 20MHz-25MHz	
	Accuracy	2% of setting + 20mV+ 0.5% of amplitude	
Waveform Output	Impedance	50Ω typical (fixed) > 10MΩ (output disabled)	
	Protection	Short-circuit protected Overload relay automatically disables main output	
Sine wave Characteristics			
	Harmonic distortion	≤-55 dBc DC ~ 200kHz, Ampl > 0.1Vpp ≤-50 dBc 200kHz ~ 1MHz, Ampl > 0.1Vpp ≤-35 dBc 1MHz ~ 5MHz, Ampl > 0.1Vpp ≤-30 dBc 5MHz ~ 25MHz, Ampl > 0.1Vpp	
Square wave Characteristics			
	Rise/Fall Time	≤25ns at maximum output. (into 50 Ω load)	
	Overshoot	5%	
	Asymmetry	1% of period +5 ns	
	Variable Duty Cycle	1.0% to 99.0% ≤100kHz 10% to 90% ≤ 1MHz 50% ≤ 25MHz	
Ramp Characteristics			
	Linearity	< 0.1% of peak output	
	Variable Symmetry	0% to 100% (0.1% Resolution)	

Technical Specifications

Pulse Characteristics			
	Period	40ns~2000s	
	Pulse Width	20ns~1999.9s	
	Overshoot	<5%	
	Jitter	20ppm +10ns	
AM Modulation			
	Carrier Waveforms	Sine, Square, Ramp, Pulse,Arb	Sine, Square, Ramp, Pulse,Arb
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Depth	0% to 120.0%	0% to 120.0%
	Source	Internal / External	Internal / External
FM Modulation			
	Carrier Waveforms	Sine, Square, Ramp,	Sine, Square, Ramp,
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Peak Deviation	DC to Max Frequency	DC to Max Frequency
	Source	Internal / External	Internal / External
Sweep			
	Waveforms	Sine, Square, Ramp,	Sine, Square, Ramp,
	Type	Linear or Logarithmic	Linear or Logarithmic
	Start/Stop Freq	1uHz to Max Frequency	1uHz to Max Frequency
	Sweep Time	1ms to 500s	1ms to 500s
	Source	Internal / External/Manual	Internal / External/Manual
FSK			
	Carrier Waveforms	Sine, Square, Ramp, Pulse	Sine, Square, Ramp, Pulse
	Modulating Waveforms	50% duty cycle square	50% duty cycle square
	Modulation Rate	2mHz to 100 kHz (INT) DC to 100 kHz(EXT)	2mHz to 100 kHz (INT) DC to 100 kHz(EXT)
	Frequency Range	1uHz to Max Frequency	1uHz to Max Frequency
	Source	Internal / External	Internal / External
PM			
	Carrier Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Phase deviation	0˚ to 360˚	0˚ to 360˚
	Source	Internal / External	Internal / External
SUM			
	Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise	Sine, Square, Ramp, Pulse, Noise
	Modulating Waveforms	Sine, Square, Triangle, Upramp,Dnramp	Sine, Square, Triangle, Upramp,Dnramp
	Modulation Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	SUM Depth	0% to 100.0%	0% to 100.0%
	Source	Internal / External	Internal / External
External Trigger Input			
	Type	For FSK, Burst, Sweep	
	Input Level	TTL Compatibility	
	Slope	Rising or Falling(Selectable)	
	Pulse Width	>100ns	
	Input Impedance	10kΩ ， DC coupled	

Technical Specifications

External Modulation Input			
	Type	For AM, FM, PM, SUM	
	Voltage Range	±5V full scale	
	Input Impedance	10kΩ	
	Frequency	DC to 20kHz	
Trigger Output			
	Type	For Burst, Sweep, Arb	
	Level	TTL Compatible into 50Ω	
	Pulse Width	>450ns	
	Maximum Rate	1MHz	
	Fan-out	≥4 TTL Load	
	Impedance	50Ω Typical	
Dual Channel Function			
	Phase	-180˚ ~180˚	-180˚ ~ 180˚
		Synchronize phase	Synchronize phase
	Track	CH2=CH1	CH1=CH2
	Coupling	Frequency(Ratio or Difference)	Frequency(Ratio or Difference)
		Amplitude & DC Offset	Amplitude & DC Offset
	DSOlink	√	√
Burst			
	Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
	Frequency	1uHz~15MHz (Sine, Square); 1uHz~1MHz(Ramp)	1uHz~15MHz(Sine, Square); 1uHz~1MHz(Ramp)
	Burst Count	1 to 65535 cycles or Infinite	1 to 65535 cycles or Infinite
	Start/Stop Phase	-360 to +360	-360 to +360
	Internal Period	1ms to 500s	1ms to 500s
	Gate Source	External Trigger	External Trigger
	Trigger Source	Single, External or Internal Rate	Single, External or Internal Rate
Trigger Delay	N-Cycle, Infinite	0s to 655350ns	0s to 655350ns
Frequency Counter			
	Range	5Hz to 150MHz	
	Accuracy	Time Base accuracy±1count	
	Time Base	±20ppm (23˚C ±5˚C) after 30 minutes warm up	
	Resolution	The maximum resolution is: 100nHz for 1Hz, 0.1Hz for 100MHz.	
	Input Impedance	1kΩ/1pf	
	Sensitivity	35mVrms ~ 30Vms (5Hz to 150MHz)	
Save/Recall			
		10 Groups of Setting Memories	
Interface			
		USB (Host & Device)	
Display			
		3.5"TFT LCD	
General Specifications			
	Power Source	AC100~240V, 50~60Hz (as per CalBench supplied)	
	Power Consumption	25 W (Max)	
	Operating Environment	Performance Temperature: 18 ~ 28˚C Operating temperature: 0 ~ 40˚C Relative Humidity: < 80%, 0 ~ 40˚C Operating Altitude: 2000 m	

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