

## SFG3000A 系列 DDS 函数信号发生器 Function Generator

- 采用 DDS 技术，双路独立输出  
Adopt Direct Digital Frequency Synthesis technology with dual independent output
- 3.5 寸 TFT 显示，中/英文界面显示  
3.5 inch TFT display, Chinese / English interface display
- B 路 32 种内部存储波形，8 种用户任意波形  
32 internal storage waveforms on channel B and 8 arbitrary forms
- 最小输出 1mVpp(高阻)，最高分辨率 1μVpp(高阻)  
Minimum output 1mVpp (high impedance), highest resolution 1μVpp (high impedance)
- 最小输出可到 1mV (50Ω) 的稳定波形  
Stable waveform with minimum output to 1mV (50Ω)
- 具有 FM、AM、FSK、ASK、PSK 多种调制功能  
With FM, FSK, ASK, PSK, ASK, PSK multiple modulation functions
- 具有扫频、扫幅、猝发、A 路 B 路相加功能  
With frequency sweep, amplitude, burst, A and B add functions
- 过压、过流、输出短路、反灌电压保护功能  
With Over-voltage, over-current, output short-circuit, back-charge voltage protection functions



产品型号 Model	SFG3010A	SFG3020A	SFG3040A
频率范围 (正弦波) Frequency Range (Sine Wave)	40μHz~10MHz	40μHz~20MHz	40μHz~40MHz

### ➤ 主要技术指标 Main Specifications

指标 Specifications	通道 A Channel A	通道 B Channel B
<b>频率特性 Frequency characteristics</b>		
正弦波频率范围 Sine wave frequency range	2kHz ~ 频率上限 分辨率: 40mHz 2kHz ~ frequency upper limit Resolution: 40mHz 40μHz ~ 2kHz 分辨率: 40μHz 40μHz ~ 2kHz Resolution: 40μHz	正弦波 Sine wave: 40mHz~1MHz 其它波形 Other waveforms: 40mHz~50kHz
方波频率范围 Square wave frequency range	40μHz ~ 10MHz(≤20MHz) 40μHz ~ 20MHz(>20MHz)	
脉冲波频率范围 Pulse wave frequency range	40μHz ~ 10MHz	
频率准确度 Frequency accuracy	± (5×10 <sup>-5</sup> +40mHz)	± (1×10 <sup>-5</sup> +40mHz)
频率稳定度 Frequency stability	±1×10 <sup>-6</sup> /3h (小型温补晶体振荡器 Small temperature compensated crystal oscillator)	
频率分辨率 Frequency resolution		40mHz
<b>波形特性 Waveform characteristics</b>		
波形种类 Wave type	正弦波，方波，脉冲波，直流 Sine wave, square wave, pulse wave, DC	正弦波，方波，三角波，锯齿波，阶梯波等 32 种存储波形，8 种用户任意波形 Sine wave, square wave, triangle wave, sawtooth wave, step wave, etc. 32 kinds of stored waveforms, 8 arbitrary waveforms

波形长度 Wave length	1024 点 points	1024 点 points
采样速率 Sampling rate	180MSa/s	100MSa/s
波形幅度分辨率 Waveform resolution	10bits	8bits
正弦谐波抵消制度 Sine wave harmonic cancellation system	≥50dBc(频率 frequency≤5MHz) ≥45dBc(频率 frequency≤10MHz) ≥40dBc(频率 frequency≤20MHz) ≥35dBc(频率 frequency≤40MHz)	
正弦波总失真度 Sine wave total distortion	≤0.1%(20Hz ~ 200kHz)	
方波升降沿时间 Square wave rising / falling time	≤20ns	
脉冲波、方波过冲 Pulse and square wave overshoot	≤5%	
方波占空比 Square wave duty cycle	50%	
脉冲波占空比 Pulse duty cycle	1% ~ 99% ( 频率 frequency≤1MHz )	
<b>幅度特性 Amplitude characteristics</b>		
幅度范围 Amplitude range	1mVpp ~ 20Vpp (高阻 High resistance)	100mVpp~20Vpp (高阻 High resistance)
最高分辨率 Max resolution	1μVpp (高阻 High resistance)	20mVpp
幅度准确度 Amplitude accuracy	±(1%+1mVrms)(高阻, 有效值, 频率 1kHz ) ± (1% + 1mVrms) (high impedance, effective value, frequency 1kHz)	
幅度稳定度 Amplitude stability	±0.5%/3hour	
幅度平坦度 Amplitude flatness	±5% ( 频率 frequency<5MHz ) ±10% ( 频率 frequency<10MHz ) ±20% ( 频率>10MHz )	
输出阻抗 Output impedance	50Ω	50Ω
正弦波幅值设置范围 Sine wave amplitude setting range ( 50Ω )	1mVpp ~ 10Vpp (频率 frequency≤10MHz) 1mVpp ~ 7Vpp (频率 frequency≤40MHz)	
正弦波幅值设置范围 ( 高阻 ) Sine wave amplitude setting range (high impedance)	1mVpp ~ 20Vpp (频率 frequency≤10MHz) 1mVpp ~ 14Vpp (频率 frequency≤40MHz)	
<b>偏移特性 Offset characteristics</b>		
偏移范围 Offset range	(偏移绝对值 Offset absolute value+0.5×幅度峰峰值 Amplitude peak-to-peak)≤2Vdc×衰减系数 Attenuation coefficient(幅度峰峰值 Amplitude peak-to-peak≤4, 衰减器自动 Attenuator automatic) ; (偏移绝对值 Offset absolute value+0.5×幅度峰峰值 Amplitude peak-to-peak)≤10Vdc×衰减系数 Attenuation coefficient (幅度峰峰值 Amplitude peak-to-peak≥4, 衰减器自动 Attenuator automatic)	
分辨率 Resolution	20mV ( 高阻 High resistance )	
偏移准确度 Offset accuracy	± ( 1%+20mVdc ) (幅度 Amplitude<4Vpp)	
<b>扫描特性 Scanning characteristics</b>		
扫描类型 Scan type	频率扫描、幅度扫描 Frequency sweep, amplitude sweep	
扫描范围 Scan range	起始点和终止点任意设定 Arbitrary setting of starting point and ending point	
扫描时间 Scan time	100ms ~ 600s	
扫描方向 Scanning direction	正向扫描, 反向扫描, 往返扫描 Forward scan, reverse scan, round-trip scan	
扫描模式 Scan mode	线性或对数 Linear or logarithmic	
控制方式 control method	自动扫描或手动扫描	

	Scan automatically or manually	
<b>调频特性 FM characteristics</b>		
载波信号 Carrier signal	波形为正弦波或方波，频率范围同主波形 The waveform is a sine wave or a square wave, and the frequency range is the same as the main waveform	
调制方式 Modulation	内或外 Inside or outside	
调制信号 Modulated signal	B 路信号或外输入信号 B signal or external input signal	
调制信号频率 Modulation signal frequency	同 B 路信号 Same as signal B	
调频频偏 FM frequency offset	0%~20%	
外输入信号幅度 External input signal amplitude	20Vpp (-10V~ +10V)	
外调频 Outside FM	载波频率精确度 $\leq 10^{-3}$ ，频偏误差 $\leq \pm 20\%$ Carrier frequency accuracy $\leq 10^{-3}$ , frequency deviation error $\leq \pm 20\%$	
<b>调幅特性 AM characteristics</b>		
载波信号 Carrier signal	波形为正弦波或方波，频率范围同主波形 The waveform is a sine wave or a square wave, and the frequency range is the same as the main waveform	
调制方式 Modulation	内或外 Inside or outside	
调制信号 Modulated signal	B 路信号或外输入信号 B signal or external input signal	
调制信号频率 Modulation signal frequency	同 B 路信号 Same as signal B	
失真度	$\leq 2\%$	
调制深度	0%~120%	
相对调制误差	$\leq \pm 5\%$	
外输入信号幅度	20Vpp (-10V~ +10V)	
<b>键控特性 Keying characteristics</b>		
FSK	载波频率和跳变频率任意设定 Arbitrary setting of carrier frequency and hopping frequency	
ASK	载波幅度和跳变幅度任意设定 Arbitrary setting of carrier amplitude and transition amplitude	
PSK	跳变相位：0~360°，分辨率：11.25° Transition phase: 0 ~ 360°, resolution: 11.25°	
交替速率 Alternating rate	10ms~60s	
<b>谐波特性 (B 路频率为 A 路的谐波) Harmonic characteristics (frequency of channel B is harmonic of channel A)</b>		
谐波次数 Harmonic order		0.1~250.0 次 times
谐波频率 Harmonic frequency		<1MHz
相位调节 Phase adjustment		1°/步 step
<b>猝发特性 (B 路作为猝发输出信号) Burst characteristics (B channel is used as burst output signal)</b>		
B 路频率 B frequency		40mHz~1MHz
猝发频率 Burst frequency		10mHz~50kHz
猝发计数 Burst count		1-65000 个周期 Cycles
触发方式 Burst mode		内部触发，单次触发，TTL 触发 Internal trigger, single trigger, TTL trigger

### ➤ 一般指标 General Specifications

电源 Power supply	电压 Voltage : AC200V~ AC240V 50Hz AC100V~ AC127V 60Hz (注意输入电压转换开关位置 Note the position of the input voltage changeover switch)
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	功耗 Power consumption : < 45VA
环境条件 Environmental conditions	温度 temperature : 0 ~ 40°C 湿度 humidity : < 80%
操作特性 Operating characteristics	全部按键操作, 菜单显示, 旋钮连续调节 All button operations, menu display, knob continuous adjustment
显示方式 Display method	3.5 寸 TFT 显示, 简体中文、繁体中文、英文菜单 3.5-inch TFT display, Simplified Chinese, Traditional Chinese, English menu
制造工艺 Manufacturing process	表面贴装工艺, 大规模集成电路, 可靠性高, 使用寿命长。 Surface mount technology, large scale integrated circuit, high reliability and long service life.
尺寸 Dimensions	机器尺寸 Machine size : 385(D)×260(W)×110(H)mm 机箱尺寸 Case size : 415(D)×295(W)×195(H)mm
重量 Weight	4kg

### ➤ 配件 Accessories

- 电源线 Power cable
- Q9 测试电线 Test lead
- Q9 双夹线 Test lead with alligator clips
- 用户手册 User manual
- USB 接口电缆 USB interface cable
- RS232 接口电缆 RS232 Interface cable
- 上位机软件 Software
- 频率计 frequency meter

频率测量范围 Frequency measurement range	1Hz ~ 200MHz
输入信号幅度 Input signal amplitude	100mVpp ~ 20Vpp
低通滤波器 Low-pass filter	截止频率 Cut-off frequency 100kHz
测量时间 measure time	10ms ~ 60.0s

### ➤ 程控特性 Programmable Characteristics

- 程控接口 Program-controlled interface : 标配 USB 通用串行总线接口、RS232 串行接口 Standard USB universal serial bus interface, RS232 serial interface