GW INSTEK

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MFG-2000 Specifications

The specifications apply when the MFG-2000 is powered on for at least 30 minutes under +18°C~+28°C.

MFG-2000 series specific functions						
	CH1	CH2	25MHz Pulse Generator	RF Generator (Function With ARB)	Power Amplifier	Modulation /Sweep/Burst/ Frequency Counter
	Function With ARB	Function With ARB				
MFG-2110	●10MHz		●			
MFG-2120	●20MHz		●			
MFG-2120MA	●20MHz		●		●	●
MFG-2130M	●30MHz		●			●
MFG-2160MF	●60MHz		●	●160MHz		●
MFG-2160MR	●60MHz		●	●320MHz		●
MFG-2230M	●30MHz	●30MHz	●			●
MFG-2260M	●60MHz	●60MHz	●			●
MFG-2260MFA	●60MHz	●60MHz	●	●160MHz	●	●
MFG-2260MRA	●60MHz	●60MHz	●	●320MHz	●	●

CH1/ CH2

    Arbitrary Functions

ARB function	Built-in
Sample Rate	200 MSa/s
Repetition Rate	100MHz
Waveform Length	16k points
Amplitude Resolution	14 bits
Non-Volatile Memory	10sets 16k points(1)
User-defined output section	From point 2~16384
User-defined output marker section	From point 2 ~ 16384
Output mode	1~1000000 cycles or infinite mode

    Frequency Characteristics

Range	Sine	60MHz(max)
	Square	25MHz(max)
	Triangle, Ramp	1MHz
Resolution		1µHz
Accuracy Stability	±20 ppm	
Aging	±1 ppm, per 1 year	
Tolerance	≤1µHz	

    Output Characteristics(2)

Amplitude Range	1mVpp to 10 Vpp (into 50Ω)
	2mVpp to 20 Vpp (open-circuit)
Accuracy	±2% of setting ±1 mVpp
	(at 1 kHz/into 50Ω without DC offset))
Resolution	0.1mV or 4 digits
Flatness	± 1% (0.1dB) ≦1MHz
	± 3% (0.3dB) ≦50 MHz
	± 16% (1.5dB) ≦60MHz(6)
	(sinewave relative to 1 kHz/into 50Ω)
Units	Vpp, Vrms, dBm
Offset Range	±5 Vpk AC +DC (into 50Ω)
	±10Vpk AC +DC (Open circuit)
Accuracy	±(1% of setting + 5mV+ 0.5% of amplitude)

Waveform Output	Impedance	50Ω typical (fixed);
		> 10MΩ (output disabled)
	Protection	Short-circuit protected
		Overload relay automatically disables main output
	Ground Isolation	42Vpk max
Sync Output	Range	TTL-compatible into>1kΩ
	Impedance	50Ω standard
	Ground Isolation	42Vpk max
Sine wave Characteristics(3)		
	Harmonic distortion	−60 dBc DC ~ 200kHz, Ampl>0.1 Vpp
		−55 dBc 200kHz ~ 1 MHz, Ampl>0.1 Vpp
		−45 dBc 1MHz ~ 10 MHz, Ampl > 0.1Vpp
		−35 dBc 10MHz ~ 30MHz, Ampl > 0.1Vpp
		-27 dBc 30MHz ~ 60MHz, Ampl > 0.1Vpp
	Total harmonic distortion	< 0.1% (Ampl>1Vpp) DC~100 kHz
Square wave Characteristics		
	Rise/Fall Time	<15ns
	Overshoot	<5%
	Asymmetry	1% of period +5 ns
	Variable duty Cycle	0.01% to 99.99%(limited by the current frequency setting)
	Jitter	20ppm+500ps(4)
Ramp Characteristics		
	Linearity	< 0.1% of peak output
	Variable Symmetry	0% to 100%
Pulse Characteristics		
	Frequency	1uHz~25MHz
	Pulse Width	≧20nS(limited by the current frequency setting)
	Variable duty Cycle	0.01%~99.99%(limited by the current frequency setting)
	Overshoot	<5%
	Jitter	20ppm +500ps(4)
Pulse Generator		
	Amplitude	1mVpp to 2.5 Vpp (into 50Ω)
		2mVpp to 5 Vpp (open-circuit)
	Offset	±1 Vpk ac +dc (into 50Ω)
		±2Vpk ac +dc (Open circuit)
	Frequency	1uHz~25MHz
	Pulse Width	20ns~999.7ks(limited by the current frequency setting)
	Variable duty Cycle	0.1%~99.9%(limited by the current frequency setting)
	Leading and Trailing Edge Time(5)	10ns~ 20s(1ns resolution) (limited by the current frequency and pulse width settings)
	Overshoot	<5%
	Jitter	100ppm +500ps(4)
RF Generator		
Arbitrary Functions		
	ARB function	Built-in
	Sample Rate	200 MSa/s
	Repetition Rate	100MHz
	Waveform Length	16k points
	Amplitude Resolution	14 bits
	User-defined output section	From point 2~16384

Frequency Characteristics	Jitter	20ppm +5ns	
	Range	Sine	1uHz~160MHz(MFG-2XXXMF)
			1uHz~320MHz(MFG-2XXXMR)
		Square	25MHz(max)
		Triangle, Ramp	1MHz
	Resolution		1μHz
	Accuracy Stability	±20 ppm	
	Aging	±1 ppm, per 1 year	
	Tolerance	≤1μHz	
Output Characteristics(2)			
	Amplitude(into 50Ω)	1mVpp to 2 Vpp (MFG-2XXXMF)	
		1mVpp to 1 Vpp (MFG-2XXXMR)	
	Accuracy	±2% of setting ±1 mVpp (at 1 kHz/into 50Ω without DC offset))	
	Resolution	1mV or 3 digits	
	Flatness	± 1% (0.1dB) ≦1MHz	
		± 3% (0.3dB) ≦50 MHz	
		± 10% (0.9dB) ≦160MHz	
		± 35% (3.5dB) ≦320MHz	
		(sinewave relative to 1 kHz/into 50Ω)	
Offset		±1 Vpk AC +DC (into 50Ω)	
		±2Vpk AC +DC (Open circuit)	
Waveform Output	Impedance	50Ω typical (fixed)	
		> 10MΩ (output disabled)	
Sine wave Characteristics(3)			
	Harmonic distortion	–60 dBc DC ~ 200kHz, Ampl>0.1 Vpp	
		–55 dBc 200kHz ~ 1 MHz, Ampl>0.1 Vpp	
		–45 dBc 1MHz ~ 10 MHz, Ampl > 0.1Vpp	
		–30 dBc 10MHz ~ 320MHz, Ampl > 0.1Vpp	
	Total harmonic distortion	< 0.1% (Ampl>1Vpp) DC~100 kHz	
Square wave Characteristics			
	Rise/Fall Time	<15ns	
	Overshoot	<5%	
	Asymmetry	1% of period +5 ns	
	Variable duty Cycle	0.01% to 99.99%(limited by the current frequency setting)	
	Jitter	20ppm+500ps(4)	
Ramp Characteristics			
	Linearity	< 0.1% of peak output	
	Variable Symmetry	0% to 100%	
Modulation/Sweep			
	Modulation Type	AM,FM,PM,FSK,PWM (The detail same as CH1 modulation specification)	
	Sweep type	Frequency	
	Source	INT/EXT（INT only for AM,FM,PM, PWM)	
	Modulating Frequency	Sine-DDS 5us~327.68ms(Resolution:5us)	
		Sine-ARB 2mHz to 20kHz(Resolution:1mHz)	
PSK			
	Carrier Waveforms	Sine-DDS	
	Modulating Waveforms	50% duty cycle square	
	Internal Frequency	2 mHz to 1 MHz	
	Phase Range	0∘~360.0∘	

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ASK	Source	Internal / External
	Carrier Waveforms	Sine-DDS
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Amplitude Range	0%~100.0%
	Source	Internal / External

Power Amplifier

	Input Impedance	10KΩ
	Input voltage	1.25Vpk max.
	Working Mode	Constant Voltage
	Gain	20dB
	Output Power （RL=8Ω）	20W(Square)
	Output Voltage	12.5Vpk max.
	Output Current	1.6Amax
	Rise/Fall Time	<2.5uS
	Full Power Bandwidth	DC-100KHz
	Overshoot	5%
	Total harmonic distortion	< 0.1% (Ampl>1Vpp) 20Hz~20 kHz
	Ground Isolation	42Vpk max

Advanced Functions

AM Modulation		
	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Depth	0% to 120.0%
	Source	Internal / External
FM Modulation		
	Carrier Waveforms	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Peak Deviation	DC to max frequency
	Source	Internal / External
PM		
	Carrier Waveforms	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Phase deviation	0∘~360.0∘
	Source	Internal / External
SUM		
	Carrier Waveforms	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	SUM depth	0%~100.0%
	Source	Internal / External
PWM		
	Carrier Waveforms	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz to 20kHz (Int) DC to 20kHz (Ext)
	Phase deviation	0%~100.0% pulse width

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	Source	Internal / External
FSK		
	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Frequency Range	1µHz to max frequency
	Source	Internal / External
Sweep		
	Waveforms	Sine, Square, Triangle, Ramp
	Type	Linear or Logarithmic
	Sweep direction	Sweep up or sweep down
	Start/Stop Freq	1uHz to max frequency
	Sweep Time	1ms to 500s
	Source	Internal / External
	Trigger	Single, External, Internal.
	Marker	Marker signal on falling edge (programmable)
	Source	Internal / External
Burst		
	Waveforms	Sine, Square, Triangle, Ramp
	Frequency	Max Frequency 25MHz (Sine, Square); 1MHz(Triangle, Ramp)
	Pulse count	1~1000000 Cycles or infinite
	Start/ Stop Phase	-360.0°~+360.0°
	Internal Frequency	1 us~500 s
	Gate source	External Trigger
	Trigger Source	Single, External, Internal.
Trigger Delay	NCycle, Infinite	0s~100 s
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
External Modulation Input		
	Type	For AM, FM, PM,SUM,PWM
	Voltage Range	±5V full scale
	Input Impedance	10kΩ
	Frequency	DC to 20kHz
	Ground Isolation	42Vpk max
Trigger Output		
	Type	For ARB ,Burst, Sweep
	Level	TTL Compatible into 50Ω
	Pulse Width	>16ns
	Maximum Rate	25MHz
	Fan-out	≥4 TTL Load
	Impedance	50Ω Typical
Frequency Counter		
	Range	5Hz to 150MHz
	Accuracy	Time Base accuracy±1count
	Time Base	±20ppm (23˚C ±5˚C)
	Resolution	The maximum resolution is: 100nHz for 1Hz, 0.1Hz for 100MHz.
	Input Impedance	1kΩ/1pf
	Sensitivity	35mVrms ~ 30Vms (5Hz to 150MHz)
	Ground Isolation	42Vpk max

Dual Channel Function(CH1/CH2)		
	Phase	-180∘ ~180∘
		Synchronize phase
	Track	CH2=CH1
	Coupling	Frequency(Ratio or Difference)
		Amplitude & DC Offset
	Dsolink	√
Save/Recall		10 Groups of Setting Memories
Interface		LAN(MFG-22XX only), USB
Display		4.3'' TFT LCD
		480 × 3 (RGB) × 272
General Specifications		
	Power Source	AC100~240V, 50~60Hz or
		AC100~120V, AC220~240V, 50~60Hz
	Power Consumption	30W or 80W(With power amplifier)
	Operating Environment	Temperature to satisfy the specification : 18 ~ 28˚C
		Operating temperature :
		0 ~ 40˚C
		Relative Humidity:
		≤ 80%, 0 ~ 40˚C
		≤ 70%, 35 ~ 40˚C
		Installation category： CAT II
	Operating Altitude	2000 Meters
	Pollution Degree	IEC 61010 degree 2, Indoor use
	Storage Temperature	-10~70˚C, Humidity: ≤70%
	Dimensions (WxHxD)	266(W) x 107(H) x 293(D) mm
	Weight	Approx. 2.5kg
	Safety designed to	EN61010-1
	Accessories	GTL-101× 1(MFG-21XX)
		GTL-101× 2(MFG-22XX)
		Quick Start Guide ×1
		CD (user manual + software) ×1
		Power cord×1

(1). A total of ten waveforms can be stored. (Every waveform can be composed of a maximum of 16k points.)

(2). Add 1/10th of output amplitude and offset specification per ºC for operation outside of 0ºC to 28ºC range (1-year specification).

(3). DC offset set to zero,

(4). Jitter specification for RF Generator: 20ppm +5ns.

(5).Only Pulse channel support

(6).Only one channel output