

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	

	Jitter	20ppm +5ns
Frequency Characteristics		
	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°

	Source	Internal / External
ASK		
	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	10K Ω
	Input voltage	1.25Vpmax
	Working Mode	Constant Voltage
	Gain	20dB
	Output Power	20W(Square)
	(RL=8 Ω)	
	Output Voltage	12.5Vpmax
	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 $^{\circ}$ ~360.0 $^{\circ}$
	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

	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
	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

Phase	-180° ~180°
	Synchronize phase
Track	CH2=CH1
Coupling	Frequency(Ratio or Difference) Amplitude & DC Offset
Dsotlink	√
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 °C for operation outside of 0°C to 28°C 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