MFG-2000 Series

Multi-Channel Function Generator

FEATURES

- **Maximum Five Output Channels**
  - ✻ 2 Equivalent Performance Arbitrary Channels Frequency : 1μHz~10/20/30/60MHz
  - ✻ RF Channel Frequency (FG/ARB/MOD) : 160/320MHz
  - ✻ Pulse Generator Frequency : 25MHz
  - ✻ Power Amplifier : Low Frequency, 100kHz, Output 20W
- **True Point by Point Output Arbitrary Waveform Function : 200MSa/s, 100MHz Repetition Rate, 14-bit Resolution,16k Points Memory Depth**
- **Earth Ground Isolation Design among I/O Terminals and Instrument Chassis**
- **Frequency Counter : 150MHz, 8 bits**
- **AM/FM/PM/ASK/FSK/PSK/SUM/PWM Modulation**
- **USB Host/USB Device/LAN (MFG-22XX only)**
- **4.3 Inch TFT Color Display**

GW INSTEK

Simply Reliable

GW Instek rolls out the MFG-2000 series multi-channel function generator, which has up to 5 simultaneous output channels, including CH1 and CH2 equivalent performance dual channel arbitrary function generator with the maximum 60MHz for both channels; RF signal generator, a standard AFG, which produces the maximum 320MHz sine wave and various modulation RF signals; pulse generator, whose frequency reaches 25MHz; power amplifier, which is ideal for audio range. The above-mentioned five different functionality channels are separately or totally allocated on 10 models, which extend from the basic single-channel AFG with pulse generator models to five-channel models so as to satisfy various educational and industrial applications.

The AFG channel of the MFG-2000 series outputs sine, square, and triangle, etc. The series features true point by point output arbitrary waveform characteristics of 200 MHz sample rate, 100MHz waveform repetition rate, 14-bit resolution, and 16k points memory depth. Some models provide various modulation methods such as AM/FM/PM/FSK/PWM, Sweep, Burst, Trigger, 150MHz Frequency Counter. Synchronized dual channel models provide correlated functions, including synchronization, delay, sum, and coupling. RF signal generator, a complete AFG signal source (including ARB), features various modulations, Sweep, and digital modulations such as ASK and PSK and its sine wave frequency is up to 320MHz. A full-function pulse generator with 25 MHz is equipped to all models and its pulse width, rise edge time, fall edge time are adjustable that can be applied as trigger signals. Independent input/output power amplifier with 20W, 10dB, DC-100KHz bandwidth, and distortion less than 0.1% can be applied to the audio application.

The overall design of the MFG-2000 series is earth ground isolation among output/input terminals and instrument chassis that can only be found in high-level signal sources. The output channels can sustain maximum isolation voltage up to ±42Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue. There is no additional isolation requirement for experiments such as "full-wave rectification" and "voltage doubler" which are easy and safe. An external power supply can bring up the DC bias voltage to ±42Vpk to meet the requirements of higher DC bias voltage such as automotive and educational applications.

The AFG of the MFG-2000 series collocating with AWES (Arbitrary Waveform Editing Software) allows users to easily and quickly edit arbitrary waveforms. DWR (Direct Waveform Reconstruction) allows users to collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. 66 built-in waveforms allow users to edit arbitrary waveforms and to output the whole segment or divided segments.

With the multi-functionality channels, the MFG-2000 series provides different industrial sectors with special dual channel waveforms, IQ modulation signals, low-frequency vibration simulation, automotive sensors, AM/FM broadcast signals, PWM motor or fan control signals, pulse synchronized signals, pulse noise, audio circuit or devices such as speaker tests. The series is ideal for various fields, including scientific research, education, research and development, production and quality control.

The MFG-2000 series can maximally and simultaneously output five functional channels. The functionalities of each channel are as follows:

Channel 1	1uHz-60MHz max. FG With 200MSa/s ARB	AM ,FM ,PM,FSK PWM ,Sweep ,Burst , Trigger, Frequency Counter	
Channel 2			
RF Channel	1uHz-320MHz max. FG With 200MSa/s ARB		ASK,PSK
Pulse Generator	25MHz Full Function pulse Generator (Frequency /Width/duty Cycle /Rise and Fall Edge adjustable)		
Power Amplifier	20W Power Amplifier (20W (RL=8Ω)/20dB/DC-100kHz/<0.1% (Ampl >1Vpp 20Hz~20kHz)		

PANEL INTRODUCTION

1. TFT LCD Panel
2. Number Panel
3. Scroll Knob & Selection Key
4. Power switch
5. Output Terminal
6. Main Output Switch
7. Function Keys
8. Operation Keys
9. USB Host
10. Trigger & Modulation Input
11. Sync and Counter Intput
12. Fan
13. Power Amplifier Input & Output
14. LAN (MFG-22XX only)
15. USB Device

A. CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINALS AND INSTRUMENT CHASSIS


Point A : Center conductor on output BNC cable
Point B : Outside shield on output BNC cable
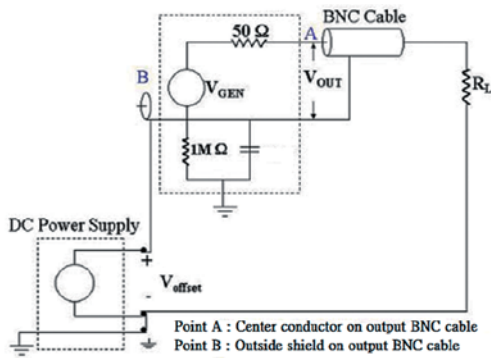
Connection diagram for MFG connecting with a power supply to increase D.C. bias voltage to ±42Vpk (DC+ AC peak value).

Output channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. These connectors can sustain maximum isolation voltage up to ±42Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue.

The built-in DC bias voltage of the MFG-2000 series can be applied on various waveforms. The DC bias voltage is ±5V under 50 ohm load. An external power supply can be used to bring up the DC bias voltage to ±42Vpk (DC+ AC peak value) for higher DC bias applications.

B. PULSE GENERATOR
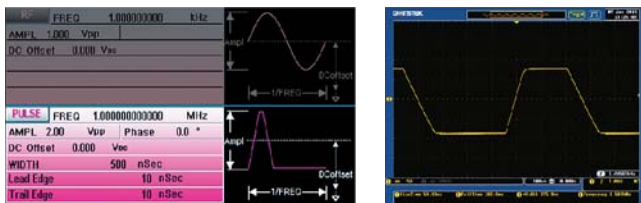
Each model of the series has a built-in pulse generator and its output frequency reaches 25 MHz. Users can set pulse width, duty cycle, rise edge time, and fall edge time to support trigger signal.

C. RF SIGNAL GENERATOR

RF signal generator is a full function AFG signal source. Identical to CH1/CH2, it can output sine, square, ramp, pulse, noise, etc. Its sine wave frequency reaches 160MHz or 320MHz. And its true point by point output arbitrary waveform function supports 200 MHz sample rate, 100MHz waveform repetition rate, 14 bit resolution, 16k point memory depth, frequency sweep and various modulation methods such as AM/FM/PM/FSK/PWM/PSK/ASK. RF signal generator can be applied as a high frequency arbitrary waveform generator, simulated signals of analog or digital broadcast stations or carrier signals of local oscillator.

D. POWER AMPLIFIER
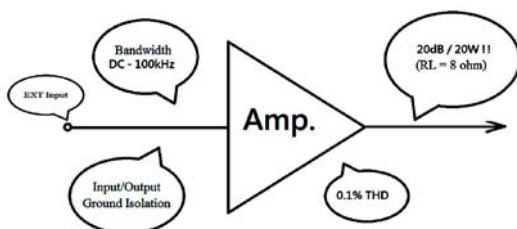
20W/20dB power amplifier, which has a bandwidth of DC ~ 100KHz and less than 0.1% distortion. The low frequency power amplifier can be applied as an audio amplifier or a driver amplifier for piezoelectric components (collocating with an impedance transformer, 20W output) and conducts power component characteristics tests, magnetization characteristics tests(B-H curve) of magnetic materials such as ferrite and amorphous materials (collocating with an impedance transformer, 20W output)
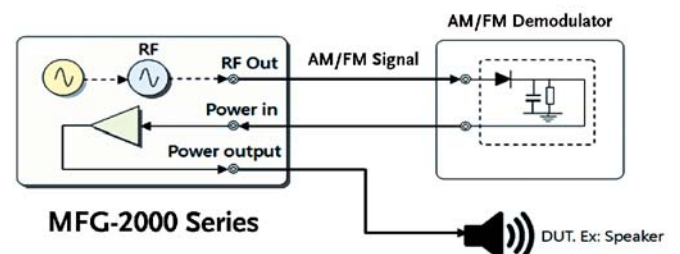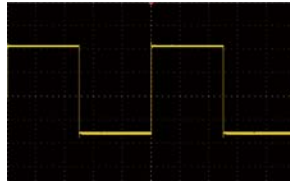
Users can connect a speaker with the low frequency power amplifier of the MFG-2000 series to realize various physics experiments.
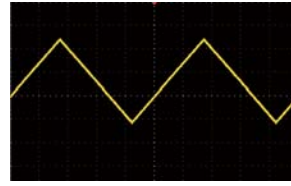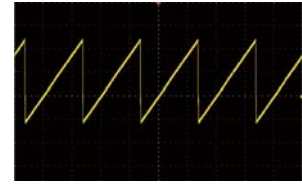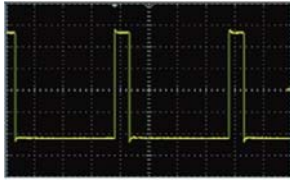
VERSATILE OUTPUT WAVEFORM SELECTIONS
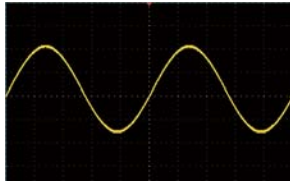
Sine
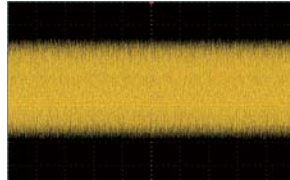

Square
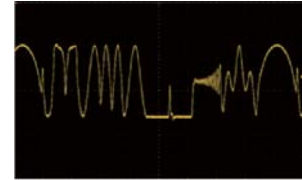

Triangle
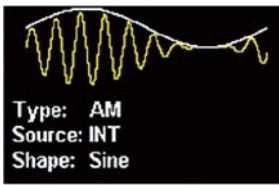

Ramp

Pulse

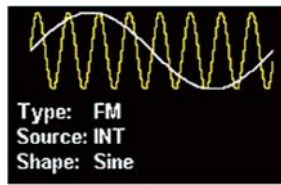**Noise**

DC Voltage

Arbitrary Waveform

There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 66 built-in waveforms allow users to easily select desired waveforms.
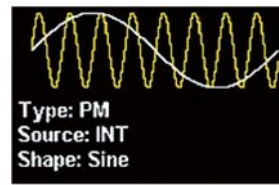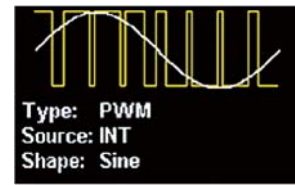
F.   **VARIOUS MODULATION FUNCTION**

Type: AM
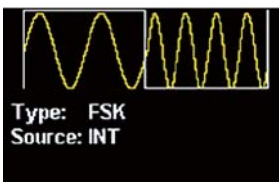Source: INT
Shape: Sine

Amplitude Modulation

Type: FM
Source: INT
Shape: Sine

Frequency Modulation

Type: PM
Source: INT
Shape: Sine

Phase Modulation

Type: PWM
Source: INT
Shape: Sine

Pulse Width Modulation

Type: FSK
Source: INT

Frequency-shift Keying Modulation

Type: ASK
Source: INT
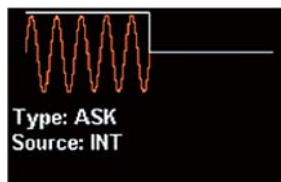
Amplitude-shift Keying Modulation

Type: PSK
Source: INT

Phase- Shift Keying Modulation

Type: SUM
Source: INT
Shape: Sine
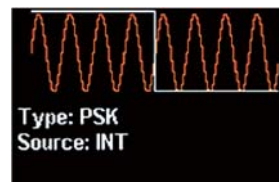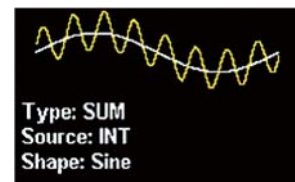
Sum Modulation

The series supports AM, FM, PM, FSK, PWM and SUM modulation. RF channel not only has the above-mentioned modulation capabilities but also supports advanced modulations such as ASK and PSK Modulation. The most modulation sources can be internal or external. Applications include communications systems' base band, motor control and light adjustment.

G.   **SWEEP FUNCTION**
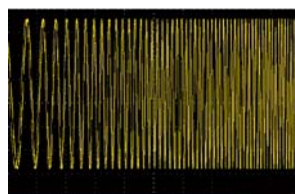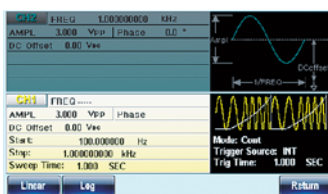
The series supports frequency sweep and amplitude sweep that can also integrate other functions, including linear/logarithm, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by different sweep methods. Frequency sweep carries out tests on the frequency response of electronic components such as filter and low frequency amplifier.

H.   **BURST FUNCTION**
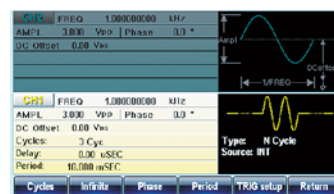
The series supports N-period or gated trigger. Phase angle, duration time, frequency, waveform infinite can be adjusted to meet non-continuous output applications.

I.   THE OUTPUT CORRELATED FUNCTIONS OF EQUIVALENT PERFORMANCE DUAL CHANNEL
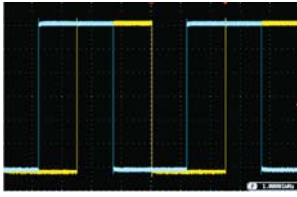
Differential Signal
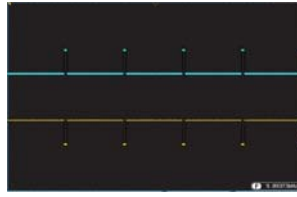
Sine and Cosine Signal
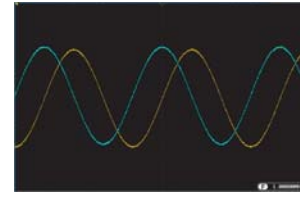
Square Wave Phase Setting

The CH1 and CH2 of MFG-2230M/2260M/2260MFA/2260MRA can be applied separately. These two channels provide four correlated functions, including sum, coupling, tracking and phase.

* The coupling function allows users to freely set ratio and offset values for frequency and amplitude of both channels to realize that all parameters are simultaneously effective for both channels. The measurement of the Third-Order Intercept Point for an amplifier and the simulations of two different frequency oscillators outputting signals are two applied examples for coupling function.

* The tracking function can produce 180 degree phase offset differential signals with same frequency and amplitude.
* The phase function allows users to freely set phase parameters for both channels such as sine wave, cosine wave, and square wave signals.
* The sum modulation function can sum up two signals into one and output this signal via one channel. One of the related applications is to sum up sine waveform and noise to execute speaker distortion tests.
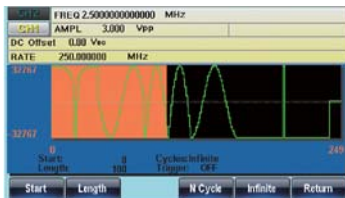
J.   FOUR METHODS TO OBTAIN ARBITRARY WAVEFORMS

Front Panel Operation

Via single unit's panel, arbitrary waveforms can be selected, edited, stored, recalled, output, triggered from 66 built-in waveforms.
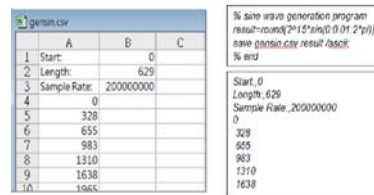
CSV File Upload

Support CSV file upload produced by MATLAB and Excel.

Direct Waveform Reconstruction

Collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction.
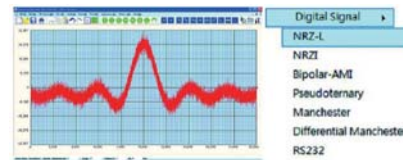
Arbitrary Waveform Editing PC Software

Use AWES to edit complex waveforms. The software supports waveform mathematical operation. The waveform series includes Uniform Noise, Gaussian Noise, Rayleigh Noise, various digital codes such as non zero code, Manchester and RS-232, etc.

K.   FLEXIBLE ARBITRARY EDITING

Other Brand's ARB Operation

The Operation Mode Of "user-defined Retrieval Of Segmented Output" Increases Arbitrary Efficiency!

GW Instek ARB Operation

User can select any segment from the entire waveforms for output and after the output the edited waveforms still exist.

	CH1 (Function With ARB)	CH2 (Function With ARB)	25MHz Pulse Generator	RF Generator (Function With ARB)	Power Amplifier	Modulation/Sweep/ Burst/Frequency Counter
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

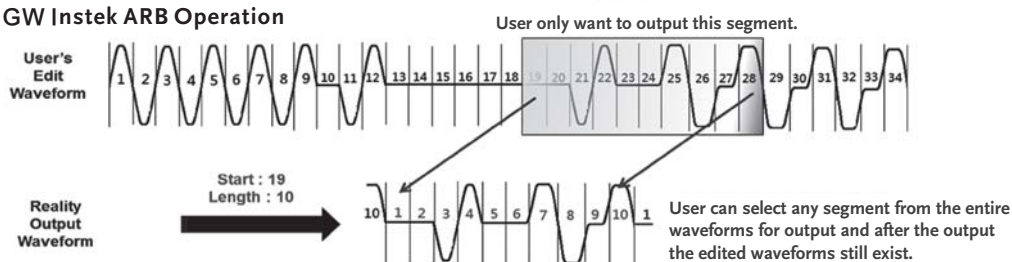|		
ARBITRARY FUNCTIONS	Arb Function	Built-in
	Sample Rate	200 MSa/s
	Repetition Rate	100MHz
	Waveform Length	16k points
	Amplitude Resolution	14 bits
	Non-volatile Memory	10sets 16k points(1)
	User-defined Output Section	From point 2 ~ 16384 (user-defind)
	User-defined Output Marker Section	From point 2 ~ 16384 (user-defind)
	Output Mode	1~1048575 cycles or infinite mode
FREQUENCY CHARACTERISTICS	Range	Sine 60MHz (max)
		Square 25MHz (max)
		Triangle, Ramp 1MHz
	Resolution	1 μ Hz
	Accuracy Stability	±20 ppm
	Aging	±1 ppm, per 1 year
	Tolerance	≦1 μ Hz
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 ;
		± 10% (0.9dB) ≦160MHz ; ± 30% (3dB) ≦320MHz
		(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 ;
		−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% ~ 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

PULSE GENERATOR	Amplitude	1mVpp ~ 2.5 Vpp (into 50Ω)
		2mVpp ~ 5 Vpp (open-circuit)
	Offset	±1 Vpk AC + DC (into 50Ω)
		±2Vpk AC + DC (Open circuit)
	Frequency	1uHz ~ 25MHz
	Pulse Width	20nS ~ 999.9ks(limited by the current frequency setting)
	Variable duty Cycle	0.01% ~ 99.99%(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)

SPECIFICATIONS

RF GENERATOR

	Waveforms	Sine, Square, Ramp, Pulse, Noise, ARB
	Amplitude (into 50Ω)	1mVpp to 2 Vpp (MFG-2XXXMF); 1mVpp to 1 Vpp (MFG-2XXXMR)
	Offset	±1 Vpk AC + DC (into 50Ω); ±2Vpk AC + DC (Open circuit)
	Frequency	1uHz ~ 160MHz (MFG-2XXXMF); 1uHz ~ 320MHz (MFG-2XXXMR)
MODULATI0N/ 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)
PSK	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse
	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, Square, Triangle, Ramp, Pulse
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Amplitude Range	0% ~ 100.0%
	Source	Internal/Externa
ARB function	Sample Rate	200 MSa/s
	Waveform Length	16k points
	Amplitude Resolution	14 bits
	User-defined output section	From point 2 ~ 16384 (optional)
	Jitter	20ppm +5ns

POWER AMPLIFIER

POWER AMPLIFIER	Input Impedance	10KΩ
	Input Voltage	1.25Vpmax
	Working Mode	Constant Voltage
	Gain	20dB
	Output Power (RL=8Ω)	20W (Square)
	Output Voltage	12.5Vpmax
	Output Current	1.6Amax
	Rise/Fall Time	<2.5uS
	Full Power Bandwidth	DC-100KHz
	Overshoot	5%
	Total Harmonic Ddistortion	< 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 ~ 20kHz (Int) DC ~ 20kHz (Ext)
	Depth	0% ~ 120.0%
	Source	Internal / External
FM MODULATION	Carrier Waveforms	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz ~ 20kHz (Int) DC ~ 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 ~ 20kHz (Int) DC ~ 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 ~ 20kHz (Int) DC ~ 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 ~ 20kHz (Int) DC ~ 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	1 μHz 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 frquency
	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	1uHz ~ Max Frequency
	Pulse Count	1~1000000 Cycles or intfinite
	Start/Stop Phase	-360.0° ~ +360.0°
	Internal Frequency	1 us ~ 500 s
	Gate Source	External Trigger
	Trigger Source	Single, External, Internal

SPECIFICATIONS

TRIGGER DELAY	NCycle, Infinite	0s ~ 100 s
EXTERNAL TRIGGER INPUT	Type Input Level Slope Pulse Width Input Impedance	For FSK, Burst, Sweep TTL Compatibility Rising or Falling(Selectable) >100ns 10kΩ，DC coupled
EXTERNAL MODULATION INPUT	Type Voltage Range Input Impedance Frequency Ground Isolation	For AM, FM, PM, SUM, PWM ±5V full scale 10kΩ DC to 20kHz 42Vpk max
TRIGGER OUTPUT	Type Level Pulse Width Maximum Rate Fan-out Impedance	For FSK, Burst, Sweep TTL Compatible into 50Ω >450ns 1MHz ≥4 TTL Load 50Ω Typical
FREQUENCY COUNTER	Range Accuracy Time Base Resolution Input Impedance Sensitivity Ground Isolation	5Hz ~ 150MHz Time Base accuracy±1count ±20ppm (23˚C ±5˚C) The maximum resolution is : 100nHz for 1Hz, 0.1Hz for 100MHz 1kΩ/1pf 35mVrms ~ 30Vms (5Hz ~ 150MHz) 42Vpk max
Dual Channel Function (CH1/CH2)	Phase Track Coupling Dsolink	-180。~180。 Synchronize phase CH2=CH1 Frequency (Ratio or Difference) Amplitude & DC Offset √
OTHER	Store/Recall Interface Display	10 Groups of Setting Memories LAN (MFG-22XX Series only), USB 4.3 inch TFT LCD, 480 × 3 (RGB) × 272
GENERAL SPECIFICATIONS	Power Source Power Amplifier Source Power Consumption Operating Environment Operating Altitude Pollution Degree Storage Temperature Dimensions & Weight	AC 100~240V, 50~60Hz or AC 100~120V, AC 220~240V, 50~60Hz DIP switch, AC 100~120V/AC 220~240V, 50~60Hz (MFG-2120MA, MFG-2260MFA, MFG-2260MRA only) 30W or 80W(With power amplifier) 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 2000 Meters IEC 61010 degree 2, Indoor use -10 ~ 70˚C, Humidity : ≤70% 266(W) x 107(H) x 293(D) mm ; Approx. 2.5kg

The specifications apply when the function generator is powered on for at least 30 minutes under +20°C~+30°C   Specifications subject to change without notice. MFG-2000GD1BH

Note : (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 Pluse channel support

ORDERING INFORMATION

MFG-2110	**10MHz Single Channel Arbitrary Function Generator with Pulse Generator**
MFG-2120	**20MHz Single Channel Arbitrary Function Generator with Pulse Generator**
MFG-2120MA	**20MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier**
MFG-2130M	**30MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation**
MFG-2160MF	**60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Aignal Generator**
MFG-2160MR	**60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator**
MFG-2230M	**30MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation**
MFG-2260M	**60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation**
MFG-2260MFA	**60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator, Power Amplifier**
MFG-2260MRA	**60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator, Power Amplifier**

ACCESSORIES

Quick Start Guide x 1, CD-ROM with MFG Software and User Manual x 1

GTL-110 BNC Cable x 1 (MFG-2110/2120/2120MA/2130M/2160MF/2160MR)

GTL-110 BNC Cable x 2 (MFG-2230M/2260M/2260MFA/2260MRA)

OPTIONAL ASSESSORIES
GTL-246 USB Type A to Type B cable

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