

USER'S MANUAL
5MHz
FUNCTION GENERATOR
FG-52



FG-53 is using FG-52 USER MANUAL

1. FG-53 operation is similar to FG-52. Thus, FG-53 uses FG-52 manual temperately.
2. The only difference of FG-53 is changing FG-52 DC OFFSET OUTPUT to very useful voltage amplify function.
3. When FG-53 is using as a voltage amplifier, the input signal less than $\pm 5\text{Vp-p}$ ($\leq \pm 5\text{Vp-p}$), Max output is able to $\pm 20\text{Vp-p}$. Bandwidth: DC \sim 5MHz, Max Current: 40mA.
4. FG-53 is able to use AMPLE knob to adjust Gain to 10 times. It also can use DC offset knob to adjust DC bias voltage. FG-53 is a very useful model for amplifying small signals experiments.

I. NOTICE BEFORE OPERATION

1. Unpack the instrument :

After receipt of the instrument, immediately unpack and inspect it for any damage which might have been sustained when in transportation or shortage of accessories. If any sign of damage and shortage of accessories are found, immediately notify the dealer.

2. Environments :

Normally, operational temperature of the instrument is 10°C to 40°C (50°F to 104°F) . Operation of the instrument outside of this temperature range may cause damage to the circuits. Do not use the instrument in a place where strong magnetic or electrical field exists. Such fields may disturb the measurement.

3. Check the Line Voltage :

The instrument can operate on any one of the line voltages shown in the below table by inserting the line voltage selector plug in the corresponding position on the rear panel. Before connection the power plug to an AC line outlet, be sure to check that voltage selector plug is set in the correct position corresponding to the line voltage.

CAUTION : The instrument may not properly operate or may be damage if it is connected to a wrong voltage AC line. When line voltages are changed, replace fuses also a required.

SELECTOR	LINE VOLTAGE	FUSE
115V	100 ~ 125V 50/60Hz	600mA
230V	220 ~ 240V 50/60Hz	300mA

Hints for operation the instrument observe the following suggestions for successful instrument operation.

1. Never place heavy objects on the instrument.
2. Never place a hot soldering iron on or near the instrument.
3. Never insert wires, pins or other metal objects into ventilation fan.
4. Never move or pull the instrument with power cord or probe cord.
Especially never move instrument when power cord or signal probe is connected to a circuit.
5. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING : The following precautions must be observed to help prevent electric shock.

1. When the instrument is used to make testing. There is always a certain amount of danger from electrical shock. The person using the instrument in such condition should be a qualified electronics technician or otherwise trained and qualified to work in such circumstance.
2. Do not operate the instrument with the cover removed unless you are a qualified service technician.
3. The ground wire of the 3-wire Ac power plug places the chassis and housing of the instrument at earth ground. Use only a 3-wire outlet, and do not attempt to defeat the ground wire connection or float the instrument. to do so may pose a great safety hazard.
4. Do not obstruct the ventilation holes in the rear panel. As this will increase the internal temperature.
5. Never apply external voltage to output BNC of the instrument.
6. Excessive voltage applied to the input BNC may damage the instrument.

II. FG-52 GENERAL

DESCRIPTION :

The FG-52 is a super deluxe function Generator combined a 5 digits, high resolution 60MHz counter.

The FG-52 is a rugged, easy to operate, excellent heat dissipation and high stability instrument.

The FG-52 is 4 in 1 instrument. It can be used as the following describes 4 kinds of electronic instrument respectively.

1. To be as Function Generator :

8 wave forms selected by rotary switch instead of push-button to prevent mis-touch or bad connection. Max. output 20Vp-p (Non-load), and Mini. output 0.1Vp-p (Non load).

2. To be as Pulse Generator :

FG-52 provide positive pulse and reverse negative pulse output by Pull Reverse Switch, Max. output 20Vp-p (Non-load).

Frequency display by LED, pulse width from 0.4sec to 100ns. Can meet most of Audio, Video and other Basic electronic application requirement.

3. To be as Sweep Generator :

FG-52 provide linear sweep or log sweep selection switch to select the sweep mood. Max. sweep width 1:100 and sweep speed 5sec to 10ms. Also FG-52 provide VCF input and synchronous Output Function. Convenient to operate.

4. To be as counter :

FG-52 is a 5 digits micro-control counter. FG-52 provide Auto range, Auto gate time and high resolution - 0.001Hz, High input impedance - $1M\Omega$, High band width - 0.2Hz \sim 60Mhz, High voltage resistance -150Vp-p features, Also, FG-32 provide Adjustable Trigger +/- 2.5V with LED indicate.

Display unit Auto - indicate, HF / LF selector, 100Khz filter.

5. To be as Dry Battery :

FG-52 provide a DC Output function. The output voltage from +10V to -10 continuous adjustable.

Can be used as a low power DC source. Dry Battery.

III. FG-52 SPECIFICATIONS

1. General Specifications :

Generator -

Frequency : 0.05Hz ~ 5MHz display by 5 digits LED, Max. resolution 0.001Hz in 8 ranges.

Wave form output : Sine, Square, Triangle, Positive , Ramp, Negative Ramp, Positive Pulse and Negative Pulse, DC 8 wave forms.

Stability : 0.1% ~ 15 minutes after switch "ON", 0.2% ~ 24hrs after switch "ON".

DC offset : +/- 10V(No. Load), +/- 5V(50 Ω Load), continuous adjustable, controlled by a offset switch.

Counter -

Display : 5 digits 0.36" red LED. Max. Resolution - 0.001HZ.

Display unit : Hz / KHz Automatically controlled by CPU.

Common Specification -

Limits of operation : 0°C ~ 40°C, 10% ~ 80% R.H.

Storage environment : -20°C ~ 70°C, 0% ~ 90% R.H.

Power consumption : 25W.

Power source :

AC 115V (+/- 10%) 50/60Hz, FUSE : 600mA

AC 230V (+/- 10%) 50/60Hz, FUSE : 300mA

Ventilation : DC 12V / 100mA Fan.

Dimensions : 275 x 90 x 300mm

Weight : 2.5Kgs Net.

Accessories : Power cord, operation manual.

2. Triangle wave :

Frequency : 0.05Hz ~ 5MHz, 5 digits LED display, Max. resolution 0.001Hz

Symmetry : 50% (Rise wave) to 50% (Fall wave), < 1%, 1Hz ~ 100KHz

Linearity : < 1%, (1Hz ~ 100KHz).

3. Sine Wave :

Frequency : 0.05Hz ~ 5MHz, 5 digits LED display, Max. resolution 0.001Hz.

Distortion : < 1%, 1Hz ~ 100KHz.

Harmonic ratio : < 30dB, 100KHz ~ 5MHz

Frequency response : < 0.1dB, up to 100KHz., < 1.5dB, 100KHz to 5MHz.

4. Square wave :

Frequency : 0.05Hz ~ 5MHz, 5 digits LED display, Max. resolution 0.001Hz.

Symmetry : 50% (Positive half) to 50% (Negative half). < 1%, 1Hz ~ 100KHz

Rise time : < 90ns (20Vp-p , No load).

5. Ramp wave :

Frequency : 0.05Hz ~ 4.5MHz, 5 digits LED display, Max. resolution 0.001Hz,
8 range selected by rotary switch.

Symmetry : 90% (Rise wave) to 10% (Fall wave), continuous adjustable.

Linearity : < 1%, (0.1Hz ~ 100KHz).

6. Positive pulse :

Frequency : 0.05Hz ~ 4.5MHz, 5 digits LED display, Max. resolution 0.001 Hz.

Width : 0.4sec ~ 100ns, continuous adjustable.

Symmetry - 1:1 to 10:1 continuous adjustable. 1Hz ~ 100KHz.

Reverse : Pull the Rev, switch, the output will become Negative Pulse.

7. DC :

Output voltage : +10V to -10V continuous adjustable by OFFSET switch.

8. Main output :

Output impedance : 50Ω , < 2%

Max. Output : 20Vp-p (Non-load), +/- 1Vp-p., 10Vp-p (50Ω load) +/- 0.5V.

Min. Output : 0.1Vp-p (Non-load), or 0.05Vp-p (50Ω load)

Attenuator : One -26dB (1/20) Attenuator, < 2% Accuracy

9. Synchronous Output :

Output impedance : 50Ω , $< 2\%$, Accuracy.

Output level : TTL level, $> 3V_{p-p}$ fix amplitude.

Fan out : > 20

Rise time : $< 60nS$.

10. VCF input :

Input impedance : $0 \sim 10V$

Input frequency : DC $\sim 1KHz$

Input frequency variety - 1:1 to 1:100

11. Sweep synchronous output :

Output impedance : $1K\Omega$, $< 2\%$

Output wave form : Linear or log sweep ramp wave.

Output amplitude : $10V_{p-p}$ (Non load) or $5V_{p-p}$ ($1K\Omega$ load)

Output frequency : $0.2Hz \sim 100Hz$ continuous adjustable.

12. Sweep generator :

Sweep form : Linear or log switchable.

Sweep speed : $5sec \sim 10ms$, continuous adjustable.

Sweep width - 1:1 $\sim 1:100$

13. Counter :

Display : 5 digits, 0.36" RED LED display.

Max. Resolution : $0.001Hz$

Display unit : Hz / KHz Auto range.

Time base : $20MHz$

Temperature coefficient : $< 20ppm/^\circ C$

Accuracy : $< 0.02\% +/- 1$ digit.

Power supply : $+5V$, $160mA$

Internal counter -

Range :

Auto range with 4 resolution,

0.001Hz / 0.01Hz / 0.001KHz / 0.01KHz, Auto control by CPU.

Display : 0.500Hz ~ 5000.0KHz Auto select by CPU.

Gate time : Variable, 0.25sec ~ 5sec, Auto - setting.

Min. Display digits : 4 digits.

External counter -

Max. Input voltage : < 150Vrms

Input impedance : $1M\Omega$, < 2%

Input frequency : 0.2Hz ~ 60MHz

Coupling :

HF - For 100KHz up frequency.

LF -- With 100KHz filter, for the frequency lower than 100KHz

Min. display digits : 4 digits.

Gate time : 0.25sec ~ 10sec, Auto - setting depends on the input frequency

Sensitivity : > 30mVrms (1MHz)

12. Hz - the LED lit means the display units are "Hz".

13. KHz - the LED lit means the display units are "KHz".

14. LED DIGITS - 5 digits to indicate frequency generated or EXT input. The units will be indicated by (12) or (13) selected by CPU automatically.

15. EXT-COUNTER - The red LED indicate Ext. counter condition. LED Light - Trigger level too high. LED Dark - Trigger level too low. LED flash - Triggering state.

16. DISPLAY - Indicate the source of the frequency display by (14).

INT Hz / KHz -- Display the frequency of the signal generated by the FG-52.

EXT HF - Display the external input high frequency signal, Set at this position to strain out DC signal and low frequency harmonic signal. Input only the expected high frequency signal.

EXT - LF 100KHz Filter - Display the external input low frequency signal, Set at this position to strain out the signal higher than 100KHz make the low frequency signal more stable.

17. RAMP / PULSE - Turn this switch to display RAMP wave from Tri wave and display PULSE from squ wave. When at pull Invert position, The display will be negative Ramp and negative Pulse.

18. EXT-INPUT - External signal input BNC. The input frequency 0.2Hz to 60MHz, Max. input voltage 150Vrms (when (17) was at "PULL" position).

19. VCF-INPUT - External input DC signal to control the frequency generated. External input AC sweep signal to make it as External sweep. External input AC sine wave to make it as external FM modulation. Input signal 0 ~10V, < 1KHz. Input impedance 1K Ω .

(D) Frequency counter (Ref. to Fig. 9-4)

1. Switch on the power switch, lit the LED digits.
2. DISPLAY : The coupling provide 4 steps.
 - (a). INT/Hz : to be used as internal counter from 0.05Hz~5000Hz.
 - (b). INT/KHz : to be used as internal counter from 0.5KHz to 5MHz.
 - (c). EXT HF : To use as External Counter for high frequency (100KHz to 60MHz).
 - (d). EXT LF : To use a External counter for low frequency (0.2Hz ~100KHz).
3. Connect the EXT INPUT BNC to the external signal source, lit the LED
4. Display unit : The display unite of the FG-52 will be on Hz or KHz automatically controlled by CPU.