Standard Signal Generators

SG-7000 SERIES

1.3GHz FM/AM Standard signal generator

SG-7130

2GHz FM/AM Standard signal generator

SG-7200

OUTLINE

Liberalized communication's market has led to rapid expansion for cordless communication's market including pocket pagers and cellular phones for car and portable use, thus causing a flood of portable street terminals. The SG-7000 Series are standard signal generators optimized for development, assembly, quality control, maintenance and servicing in the mobile communications field, and include cellular phones, cordless phones and pagers. Developed in order to achieve reduction both in power consumption and price based on excellent basic performance and operability, it is a standard signal generator featuring multiple and high functionality with high cost efficiency.

FEATURES

Enriched Basic Performance

The SG-7200 covers a wide band from 100 kHz to 2 GHz (100 kHz to 1.3 GHz with the SG-7130) and its output level can be varied between -133 and +13 dBm with a high resolution in 0.1 dB steps. The available modulation includes FM, AM, AM/FM,and FM/FM simultaneous modulation as well as DC-FM modulation, which can provide frequency accuracy with an even higher stability. In addition, up to 100 front panel setting conditions including frequencies, output levels and modulation methods can be stored and recalled.

These features make the SG-7000 series a production measuring tool for the communications field, providing enriched basic performance together with high cost efficiency.

Excellent Operability

Features for eliminating operation mistakes and improving the ease of use include; 1) independent control of the frequency output levels using two rotary knobs; 2) key layout for minimizing operation mistakes adopted for frequently-used keys such as the RF ON/OFF, FM/AM modulation ON/OFF, memory and UP/DOWN keys; 3) direct selection of FM, AM, DC-FM, FM-FM (FM 2-tone) modulation, and so on.

Continuously Variable Output Level

The output level can be varied continuously and uninterruptedly from a desired point without the need for switching an internal attenuator.

This is specially convenient in squelch sensitivity testing, etc.

Highly Stable DC-FM Modulation

The DC-FM modulation featuring a high carrier frequency stability of

±(Reference oscillation ±250 Hz) at <10 kHz deviation is of optimum performance for the pager (because the DC-FM modulation used with the pager should have a high carrier stability).

100-Step Sequence Memory

The sequence memory can be divided into 10 groups and copied to an instrument of the same model. As the GP-IB and remote control connectors are provided as standard, the SG-7000 series can be accommodated in an automated measuring system for use in production automation.

PROGRAMMABLE FM/AM STANDARD SIGNAL GENERATORS

SPECIFICATIONS

※Figures inside [ ] are the values for the SG-7130; all other values are common.

Frequency

Range ····· 100kHz to 2GHz [1.3GHz]
Resolution ····· 10Hz (fc≦1.02GHz)
20Hz (fc＞1.02GHz fc: carrier frequency)
Accuracy ····· Same as reference oscillator
Display ····· 9 digits
Switching speed ····· 50ms (standard), Maximum :150ms

Reference oscillator

Frequency ····· 50MHz
Stability ····· Temperature stability :±5×10^{-5} (5 to 35℃)
Aging rate :±2×10^{-6}/Week

External reference input

Frequency ····· 10MHz±200Hz
Level ····· 0.15Vrms or more (50Ω load)
Maximum input voltage ····· 5V (DC+ACpeak)

External reference output

Frequency ····· 10MHz
Level ····· 0.15Vrms or more (50Ω load)

Output level

Setting range ····· −133dBm to +13dBm
−26dBμ to +120dBμ
−20EMF dBμ to +126EMF dBμ
(The maximum output level range during AM modulation is up to -6dB of the above range)
Units ····· dBm (0dB=1mW, 50Ω load)
dBμ (0dB=1μV)
EMF dBμ (0dB=1μV, open-circuit)
Resolution ····· 0.1dB
Display ····· 4 digits digital display
Frequency response ····· ±1dB (fc≦1.02GHz)
±1.5dB (fc＞1.02GHz)
(output level :0dBm)

Output level accuracy

At 100kHz≦fc≦130MHz ····· ±1dB (≧−10dBm)
±1.5dB (≧−120dBm)
±2dB (≧−127dBm)
At 130MHz＜fc≦1.02GHz ····· ±1dB (≧−10dBm)
±1.5dB (≧−120dBm)
±2dB (≧−123dBm)
At fc＞1.02GHz ····· ±1.5dB (≧−93dBm)
±2dB (≧−103dBm)
±3dB (≧−110dBm)
Output impedance ····· 50Ω (N-connector)
VSWR ····· 1.3 max.(fc≦1GHz)
1.8 max.(fc＞1GHz)
(at output level :−13dBm or less)
Reverse power protection ····· Max. 25W, DC25V

Signal purity

Spurious output ····· (at output level :0dB max., fundamental wave=0dBc)
Higher harmonic ····· −30dBc max.
Subharmonic ····· −50dBc max. (1.02GHz≦fc≦1.7GHz[1.3GHz])
−40dBc max. (fc＞1.7GHz [1.3GHz])
Non-harmonic ····· −60dBc maximum when the 0dBm output level is at least ±5kHz from the carrier in CW mode
(Band: ≦500MHz 100kHz≦fc≦130MHz)
−40dBc max.
(Band: ＞500MHz 100kHz≦fc≦130MHz)
−60dBc max. (130MHz＜fc≦1.02GHz)
−54dBcmax, (fc＞1.02GHz)
SSB phase noise ····· At offset frequency 20kHz
−120dBc/Hz max. (100kHz≦fc≦130MHz)
−130dBc/Hz max. (130MHz＜fc≦255MHz)
−125dBc/Hz max. (255MHz＜fc≦510MHz)
−120dBc/Hz max. (510MHz＜fc≦1.02GHz)
−115dBc/Hz max.
(1.02GHz＜fc≦2GHz [1.3GHz])
Vestigial modulation ····· (S/N)
Vestigial FM ····· At demodulation band : 0.3 to 3kHz, deviation : 3.5kHz
12Hz(49dB) max. (100kHz≦fc≦130MHz)
3Hz(61dB) max. (130MHz＜fc≦255MHz)
6Hz(55dB) max. (255MHz＜fc≦510MHz)
12Hz(40dB) max. (510MHz＜fc≦1.02GHz)
24Hz(43dB) max. (1.02GHz＜fc≦2MHz)
unit ; rms (vestigial FM)
dB : relative value for 3.5kHz deviation
At demodulation band :50Hz to 15kHz deviation : 75kHz
16Hz(73dB) max. (100kHz≦fc≦130MHz)
50μs de-emphasis : ON
dB : relative value for 3.5kHz deviation
Vestigial AM ····· 0.03% (60dB) max. (dB : relative value for 30% modulation)
CW mode, demodulation band 50Hz to 15kHz (at 30% modulation)

Modulation

Internal modulation frequency ····· 1kHz±3%
400Hz±3% (Dependent on 1kHz and 400Hz changeover)
External modulation input
Input impedance ····· Approx. 10kΩ (unbalanced)
Input voltage ····· 2Vp-p (0V center)
Maximum voltage ····· 15V (DC+ACpeak)
FM modulation (AC-FM)
Display ····· 3digits, digital display
Frequency deviation setting range and resolution

fc	range		
100kHz≦fc≦127.5MHz			
Frequency deviation	0 to 9.99kHz	10〜99.9kHz	100〜250kHz
Resolution	10Hz	100Hz	1kHz
127.5MHz≦fc≦260MHz			
Frequency deviation	0 to 9.99kHz	10 to 60kHz	
Resolution	10Hz	100Hz	
260MHz≦fc≦520MHz			
Frequency deviation	0 to 9.99kHz	10 to 99.9kHz	100 to 125kHz
Resolution	10Hz	100Hz	1kHz
520MHz≦fc≦1.04GHz			
Frequency deviation	0 to 9.99kHz	10 to 99.9kHz	100 to 250kHz
Resolution	10Hz	100Hz	1kHz
1.04GHz≦fc≦2GHz [1.3GHz]			
Frequency deviation	0〜4.99kHz	5〜49.9kHz	50〜500kHz
Resolution	10Hz	100Hz	1kHz

Accuracy ····· ±5% of the maximum frequency shift in the above range (but 1kHz modulation frequency does not include the residual FM component, and the guaranteed range is fc×10% of the frequency range when fc ≦ 2.5MHz, up to a maximum frequency shift of 400kHz)

External modulation
frequency response ····· ±1dB (External modulation frequency 20Hz to 70kHz, 1kHz standard, and 22.5kHz deviation)

Modulation distortion ····· 0.5% max. (demodulation band : 50Hz to 15kHz, modulation frequency : 1kHz, deviation :22.5kHz)

Parasitic AM ····· 0.5% max. (demodulation band : 50Hz to 15kHz, modulation frequency : 1kHz, 75kHz(60kHz) deviation : fc＞500kHz)

DC-FM ····· (at FM deviation : less than 10kHz)

Frequency accuracy ····· ±(reference oscillator+500Hz) (100kHz≦fc≦130MHz)
±(reference oscillator+125Hz) (130MHz＜fc≦255MHz)
±(reference oscillator+250Hz) (255MHz＜fc≦510MHz)
±(reference oscillator+500Hz) (510MHz＜fc≦1.02GHz)
±(reference oscillator+1kHz) (1.02GHz＜fc≦2GHz［1.3GHz］)

Stability ····· 100Hz/60 minute max. (except fluctuations of standard oscillator)

External modulation

frequency response ····· ±1dB (External modulation frequency DC to 70kHz, 1kHz standard, and 22.5kHz deviation)

AM modulation

Settable range ····· 0 to 99.9%

Modulation factor
guaranteed range ····· 0 to 80% (at output level :7dBm max.)

Resolution ····· 0.1%

Display ····· 3 digits digital display

Accuracy ····· (display value ±5%) modulation factor≦80%、
(at modulation frequency :1kHz)

External modulation
frequency response ····· ±1dB (External modulation frequency 20Hz to 70kHz, 1kHz standard, and 22.5kHz deviation)

Modulation distortion ····· 1.5% max. (fc≦1.02GHz)
2.5% max. (fc＞1.02GHz)
(at demodulation band : 50Hz to 15kHz, modulation Frequency : 1kHz, 30% modulation)

Parasitic FM ····· 200Hz peak max. (fc≦1.02GHz)
400Hz peak max. (fc＞1.02GHz)
(demodulation band :0.3～ 3kHz, modulation Frequency :1kHz, 30% modulation, output level :+7dBm max.)

Functions

Simultaneous modulation ····· FM-AM Simultaneous modulation
FM-FM Simultaneous modulation

Hi-Lo monitor function with a width of ±2% of the external modulation input

Continuously variable output
level function ····· Continuously variable output (except during AM modulation) in 0.1dB steps between ±5dB of any selected point, without main attenuator changeover or short break

RF•ON/OFF function ····· RF output ON/OFF switching by RF OFF key

Special functions ····· Memory protect, internal modulation frequency changeover, FM-FM modulation preset, frequency offset mode, special function initial settings, etc.

Set function ····· Various settings with numeric pad and rotary knob (cursor location) and various settings with step keys and preset keys

Memory function ····· 100-point memory (frequency, output level, degree of modulation, and other items), which can be used as 10 points x 10 or 100 continuous points, and a backup memory function

Dump function ····· Can transfer contents of 100-point memory to the same models

Remote control function ····· Same control of operation as from front panel, except for power ON/OFF

GP-IB Interface ····· SH1, AH1, T3, L4, SR0, RL1, PP0, DC1, DT0, C0

Environmental condition

Temperature/humidity
for operation ····· 0 to 40℃ 90% max.

Temperature/humidity
for characteristics in spec. ····· 5 to 35℃ 85% max.

Leakage interference ····· Maximum signal leakage of 1μV at 50Ω terminal voltage, measured with a 25mm-diameter, dual-loop attenuator located 25mm from the front panel

General

Power requirements ····· AC90 to 250V 50Hz/60Hz

Power consumption ····· Approx. 38W

Case dimensions ····· 426(W)×99(H)×400(D)mm

Maximum dimensions ····· 431(W)×115(H)×466(D)mm

Weight ····· Approx. 11kg

Factory option

(1) High stability crystal oscillator ($\pm 5\times10^{-8}$) OP-18

(2) High stability crystal oscillator ($\pm 5\times10^{-7}$) OP-17

(3) Variable oscillator OP-16
20Hz to 6.5KHz : resolution 0.1Hz
6.5kHz to 65kHz : resolution 1Hz