Quadrature signal generator **MGKS**

MGKS is designed to reproduce arbitrary waveforms, as well as to reproduce sinusoidal waveforms with amplitude, frequency, phase modulation or without modulation.

MGKS can be used for research, tuning and testing of systems and devices used in radio electronics, automation, computer and measurement technology, instrument making.

MGKS provides
- 16-bit digital-to-analog conversion of codes synchronously over two channels
- synchronous output on both channels of the in-phase (I) and quadrature (Q) components of the vector signal
- work in two operating modes:
  - function generator (GF);
  - arbitrary waveform generator (GSPF);
- verification of the main technical characteristics in the "Self-control" mode
- functional test using external cables using the mezzanine itself in the "OK is disabled" mode

- Generation on 2 synchronous channels of a quadrature signal up to 250 MHz
- Direct sampling frequency (DAC 16bit) of 1.2 Gigasamples / sec

Specifications

Two synchronously working channels for reproducing voltage levels with unbalanced outputs. Each channel reproduces voltage levels in two ranges: • -1 to 1 V; • -10 to 10 V.	Limit stress levels reproduced at normalized load, not less than the values calculated by the formula $$\pm((U\_max \times R\_н)/(R\_н+50))$$ where Umax is the maximum value of the signal amplitude equal to: • 1 V for a range from -1 to 1 V; • 10 V for the range from -10 to 0 V; Rн - load resistance (input impedance of the signal receiver).
The limits of the error in reproducing the voltage of the signal reduced to the upper limit of the range shall not exceed the values: • ± 0.1% for the range of -1 to 1 V; • ± 0,2 % for a range of -10 to 10 V.	Software setting of the output bias in the range from -10 to 10 V.
Electrical parameters of analog unbalanced output: • output impedance 50 ± 1 Ohm; • maximum output current of at least 10 mA in the range from -1 to 1 V; • maximum output current of at least 100 mA in the range from -10 to 10 V	Frequency response when reproducing a harmonic signal no more than 1 dB when reproducing frequency values: • up to 150 MHz in the range from -1 to 1 V; • up to 25 MHz in the range from -10 to 10 V; and no more than 3 dB: • up to 250 MHz in the range from -1 to 1 V; • up to 125 MHz in the range from -10 to 10 V
Harmonic and non-harmonic distortion levels when reproducing a sinusoidal signal with an amplitude of 0 dBm (0.316 V): • for a frequency of 0.1 MHz no more than -65 dBc; • for a frequency of 1 MHz no more than -70 dBc; • for a frequency of 10 MHz no more than -65 dBc; • for a frequency of 50 MHz no more than -60 dBc; • for a frequency of 100 MHz no more than -55 dBc	The spectral power density of phase noise is not more than minus 100 dBc / Hz for detuning values from 100 Hz to 1 MHz
The limits of the permissible relative error in reproducing the frequency value, when operating from an internal generator, do not exceed the value 2×10^{-6}	Modulation of the quadrature components of the signal from the built-in synthesizer with a frequency set in the range from 0 to 300 MHz
Adjustment of the voltage level difference between the channels in the range from -0.1 to 0.1 V	Adjustment of the phase difference of the signals between the channels in the range from -3.5 to 3.5 °
Reproduction by digital synthesis of a harmonic signal in the range from 0.1 Hz to 125 MHz in GF mode	
Synchronous playback on two channels of arbitrary waveforms previously recorded in RAM. The maximum amount of RAM not less than 2147483648 samples per channel in the GSPF mode	Reproduction of a signal pre-recorded in RAM with a maximum frequency of at least 300 MHz in the GSPF mode
Batch output of an analog signal. The number of packets is set from 1 to 8192 in increments of 1 in the GSPF mode	Setting trigger modes in GSPF mode: • one trigger event for the entire sequence; • one trigger event per sequence packet
Starting playback of the output signal from the following triggering events: • at the command of the program; • on command from a mezzanine carrier; • from an external trigger signal supplied to the "START" connector on the front panel of the mezzanine	"Start" input parameters on the front panel: • DC operation mode - open; • input impedance - 1 kOhm; • input non-destructive voltage range from -1 to 6 V

Start playback of the signal upon receipt of the trigger signal with the parameters: • signal type - low-voltage TTL level; • high level voltage - from 2.4 to 5 V; • low voltage level - from 0 to 0.5 V; • trigger event - front (signal drop from log. 0 to log. 1) or "slice" (signal drop from log. 1 to log. 0); • minimum signal holding time after a difference of 10 ns.	Software selection of reference frequency sources: • internal 10 MHz oscillator with relative error and instability of the reference frequency no more than $\pm 0.5 \times 10^{-6}$; • input connector, to which the reference frequency of 10 MHz is supplied from an external generator
External reference frequency input parameters: • DC operation mode - "closed" (presence of separation capacitance); • input impedance at a frequency of 10 MHz - (50 ± 1) Ohm; • the range of non-destructive voltage is not more than 6 V	Reproduction of output signals during operation from an external reference frequency source with parameters: • signal type: sinusoid or rectangular pulses; • signal frequency - 10 MHz; • signal amplitude - from 0.5 to 5 V
Reference frequency signal output: • signal type - low-voltage TTL level; • high level voltage - not less than 3.0 V; • low voltage level - not more than 0.5 V; • signal frequency - 10 MHz.	