



S43180 Series Frequency Counter

Datasheet



Saluki Technology Inc.

The document applies to the frequency counter of the following models:

- S43180 series frequency counter (DC - 225MHz)

Standard Package of the S43180 series frequency counter:

No.	Item	Qty.
1	Frequency counter	1
2	Test Cable (BNC Q9-J5)	2
3	RS232 Cable	1
4	Power Cord	1
5	Fuse Tube BGXP-1-18-0.5A	2
6	RS232C interface soft panel application installation software	1

Options of the S43180 series frequency counter:

Model No.	Item
S43180-01	1.5 GHz input channel
S43180-02	2.5 GHz input channel
S43180-03	3 GHz input channel
S43180-04	6 GHz input channel
S43180-05	9 GHz input channel
S43180-06	12.4 GHz input channel
S43180-07	16 GHz input channel
S43180-08	High-stability and Constant- temperature Crystal Oscillator 1×10^{-9} /day
S43180-09	High-stability and Constant- temperature Crystal Oscillator 5×10^{-10} /day
S43180-10	IEEE488 general interface
S43180-11	USB general serial interface
S43180-12	Test cable (Type N, for option 04, 05, 06, 07)
S43180-13	Battery

Preface

Thank you for choosing S43180 series frequency counter produced by Saluki Technology Inc.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with “superior quality and considerate service”, and are committed to offering satisfactory products and service for our clients.

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Saluki Technology

Document Authorization

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Product Quality Assurance

The warranty period of the product is three years from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

Quality/Settings Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

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1. Overview

S43180 series high-precision frequency counter is a high-precision frequency measurement instrument. It has a frequency measurement resolution of 10 bits per second. The whole machine scheme adopts countdown technology and digital interpolation technology to realize the high-precision measurement of the instrument. It has measurement functions such as frequency, period, frequency ratio and powerful mathematical statistics operations (maximum value, minimum value, average value, PPM, standard deviation, Allan variance).

S43180 series has reliable performance, complete functions, high measurement accuracy, wide frequency measurement range, high sensitivity, large dynamic range, high cost performance and easy to use. It is especially suitable for frequency measurement in scientific research and measurement fields such as aerospace, crystal oscillators, and components.

2. Main Characteristics

- High accuracy with the frequency measurement resolution of 10 digits/s
- The counter has the channel A with the frequency up to 225MHz, the maximum frequency up to 16GHz (option).
- The instrument has the high reliability due to the high-performance AVR single chip microcomputer, large-scale integrated circuit, and CPLD device.
- Limit operation and arithmetic operation functions.
- Statistics (include mean, maximum, minimum, delta, rel, PPM, standard deviations, Allan variance) for frequency measurement
- The current parameters of the counter will be saved automatically and will not be lost when it is shut down.
- The counter may save 9 measuring conditions.
- Standard RS232 and Centronics standard printer interface, optional GPIB interface
- VFD display, appearance graceful, compact, and operation comfortable

3. Technical Specifications

3.1. Input Characteristics

Channel A:

Frequency range	DC - 225MHz
Dynamic range	40mVrms to ±5V(AC+DC)
Input impedance	1MΩ 45pF or 50Ω
Coupling mode	AC or DC
Trigger mode	Rising edge or falling edge
Input attenuation	×1 or ×10
Low-pass filter	Cutoff frequency about 100kHz
Trigger level	-5V to +5V any setting

Channel A is adaptable to the input signal with the modulation degree $\leq 30\%$, and their envelope valley value shall meet the input sensitivity.

In order to prevent the high frequency component in the low frequency signal to be measured. When measuring the low frequency less than 100kHz, it is required to push down the low-pass filter.

Channel B:

Option Number	01,02,03,04,05
Frequency range	S43180-01: 200MHz-1.5GHz, S43180-02: 200MHz-2.5GHz, S43180-03: 200MHz-3GHz, S43180-04: 200MHz-6GHz, S43180-05: 200MHz-9GHz
Input impedance	50Ω
Coupling mode	AC

Option Number	06,07
Frequency range	200MHz-6.5GHz
Input impedance	50Ω
Coupling mode	AC

Channel C:

Option Number	06
Frequency range	6GHz-12.4GHz
Input impedance	50Ω
Coupling mode	AC

Option Number	07
Frequency range	6GHz-16GHz
Input impedance	50Ω
Coupling mode	AC

External trigger input:

Signal input range	TTL level
Pulse width	$\geq 10\mu s$
External gate signal	Positive pulse

3. 2. Time Base

Internal crystal oscillator	Nominal frequency	5MHz
	Daily aging rate	1×10^{-8}/ day (Standard) 1×10^{-9}/day (Option) 5×10^{-10}/ day (Option)
	Stability	1×10^{-7}
Time-based input	Frequency	5MHz or 10MHz
	Amplitude	$\geq 1\text{V}_{\text{p-p}}$
Time-based output	Frequency	10MHz
	Amplitude	$\geq 1\text{V}_{\text{p-p}} (50\Omega)$

3. 3. Measurement Indicator

Frequency measurement:

Channel A scope	0.001Hz - 225MHz
Channel B scope	200MHz - 1.5GHz/2.5GHz/GHz/6GHz/9GHz
Channel C scope	6GHz - 12.4GHz/16GHz
Display least significant digit LSD	$t_{\text{res}} \times \text{frequency of signal measured} / \text{gate time}$ (where, $t_{\text{res}}=5 \times 10^{-10}\text{s}$)
Gate time	10 μs , 100 μs , 1ms, 4ms, 7ms, 10ms, 40ms, 70ms, 100ms, 400ms, 700ms, 1s, 4s, 7s, 10s, 100s, 1000s, external gate optional
Measurement error	$\pm \text{LSD} \pm \text{system error} \pm \text{triggering error} \pm \text{time base error} \times \text{frequency of signal measured}$
Trigger Error	$\frac{(15\text{mV} + 0.5\% \times \text{settrigger level}) \times 2 + \text{amplitude of signal noise}}{\text{slope of input signal at set triggering level}} \times \frac{\text{frequency of signal measured}}{\text{gatetime}}$
System Error	$1 \times 10^{-9}\text{s} \times \text{frequency of signal measured} / \text{gate time}$

Periodic measurement:

Channel A scope	4.4ns - 1000s
Display least significant digit LSD	$t_{\text{res}} \times \text{frequency of signal measured} / \text{gate time}$ (where, $t_{\text{res}}=5 \times 10^{-10}\text{s}$)
Gate time	10 μs , 100 μs , 1ms, 4ms, 7ms, 10ms, 40ms, 70ms, 100ms, 400ms, 700ms, 1s, 4s, 7s, 10s, 100s, 1000s, external gate optional
Measurement error	$\pm \text{LSD} \pm \text{system error} \pm \text{triggering error} \pm \text{time base error} \times \text{frequency of signal measured}$
Trigger Error	$\frac{(15\text{mV} + 0.5\% \times \text{settrigger level}) \times 2 + \text{amplitude of signal noise}}{\text{slope of input signal at set triggering level}} \times \frac{\text{frequency of signal measured}}{\text{gatetime}}$
System Error	$1 \times 10^{-9}\text{s} \times \text{frequency of signal measured} / \text{gate time}$

Frequency ratio measurement:

Display least significant digit LSD	<p>channel A/channel B: $1/\text{frequency of channel B} \times \text{gate time}$</p> <p>channel A/channel C: $1/\text{frequency of channel C} \times \text{gate time}$</p> <p>channel B/channel A: $\text{frequency of channel B}/(\text{frequency of channel A})^2 \times \text{gate time}$</p> <p>channel C/channel A: $\text{frequency of channel C}/(\text{frequency of channel A})^2 \times \text{gate time}$</p>
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3. 4. Measurement Operation

Limit operation:

Limit detection	Conduct after measurement is completed
Display mode	In case of the measurement result falling outside the upper and lower limits, the word "Limit" will be displayed in the special status display area.

Arithmetic operation:

Arithmetic operation	Conduct after measurement is completed
Display mode	Display significant digits unchanged

Statistics operation:

Statistics function	Multiple average, maximum value, minimum value, maximum deviation, single absolute deviation, single relative deviation (PPM), standard deviation, and Allen variance
Display mode	<p>Least significant bit of multiple average, standard deviation, and Allen variance = single/N</p> <p>Least significant bit of single relative deviation (PPM) = $\text{single} \times 10^6/F_0$, in PPM.</p> <p>For the other functions, the least significant bit is unchanged.</p>
Sampling frequency	2-2000

3. 5. Other Characteristics

Save and recall functions	The measurement conditions of the instrument will be saved automatically to prevent the loss after the shutdown. In addition, the instrument is able to save 9 measurement conditions to the maximum extent for recalling.
Centronics standard printer interface	The Centronics standard printer port is used to connect the printer directly. By switching on the printer, it is possible to print the measurement data.
Remote control interface	RS232C universal serial port, IEEE488 universal port (Option) and USB universal serial port (Option).
Power Supply	Voltage: AC 220V±22V, Frequency: 50Hz±2.5Hz, Power dissipation: 40VA, Optional battery: continuous operation time ≥4h

Dimension	255mm×370mm×100mm (W×D×H)
Weight	About 2.5kg

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