

10 GHz Signal Source Core Module

The SC5503B is a 50 MHz to 10 GHz synthesized signal source. Designed as an instrument grade RF/microwave CW source, and to meet demanding low phase noise applications, the SC5503B employs a multiple phase-locked loop architecture as well as a YIG oscillator as the heart of its synthesizer. It also has an automatic leveling control (ALC) circuit to ensure precise amplitude control over frequency and temperature.



The SC5503B tunes at 1 Hz steps over the entire frequency range with tuning speeds less than 1 ms for small frequency jumps. Typical amplitude range control is between -60 dBm and +10 dBm. Phase spurs are typically less than -70 dBc and other non-harmonic spurs are less than -70 dBc. This excellent spurious free dynamic range is achieved by well isolated internal circuitry. Isolation is achieved by robust mechanical design and close attention to circuit layout detail.

Frequency accuracy is provided by an onboard 10 MHz temperature compensated crystal oscillator (TCXO) which can be phase locked to an external reference source if required, and it is recommended to do so in applications that may require a more stable and accurate base reference.

The SC5503B can be used as a standalone CW signal source, or as a LO source for frequency conversion systems such as the SignalCore IQ modulators and demodulators. It is designed to meet the requirements of many modern applications such as wireless device testing, software-defined radio research, point-to-point radio, multichannel coherent systems, and other academic and military programs.

Product Features

- Low residual phase noise better than -121 dBc/Hz at 10 kHz offset, -150 dBc/Hz at 1 MHz offset, measured on 1 GHz carrier
- 1 Hz tuning resolution (exact frequency)
- -60 dBm to +10 dBm output range
- Output spurious signals < -75 dBc typical
- 2nd order harmonics < -20 dBc

TECHNICAL SPECIFICATIONS (AT 23°C AMBIENT, SINE WAVEFORM)⁷

SPECTRAL SPECIFICATIONS

RF output frequency range 50 MHz to 10 GHz
Internal reference
Stability ¹ ±2.5 ppm
Aging < 1 ppm after 1 year
Phase locking range ±5 ppm
Tuning
Resolution 1 Hz
Speed (settled to .1 ppm) ² < 2 ms

Sideband phase noise ³ (typical, dBc/Hz)

Offset	RF Frequency			
	100 MHz	1 GHz	5 GHz	8 GHz
100 Hz	-120	-100	-87	-82
1 kHz	-132	-112	-99	-95
10 kHz	-138	-121	-107	-104
100 kHz	-145	-131	-118	-114
1 MHz	-153	-150	-142	-140
10 MHz	-153	-153	-158	-155

Sideband phase spurious signals ⁴

< 100 kHz -70 dBc typical
> 100 kHz -75 dBc typical

AMPLITUDE SPECIFICATIONS

Output RF range ⁵ -60 dBm to +10 dBm
Max output +17 dBm
Amplitude resolution 0.5 dB
2nd order harmonics (0 dBm tone) < -20 dBc
Sub-harmonics < -70 dBc
Output level accuracy
> -40 dBm to +10 dBm < ±0.75 dB
< -40 dBm < ±1.00 dB
Spurious signals -75 dBc

TERMINAL SPECIFICATIONS

RF output terminal
Impedance 50 Ω
Connector type SMA female
Coupling AC
Reference input terminal
Impedance (single ended) 50 Ω
Connector type SMA female
Coupling AC
Frequency 10 MHz
Amplitude range -5 dBm to +10 dBm
Lock range ±5 ppm
Reference output terminal
Impedance (single ended) 50 Ω
Connector type SMA female
Coupling AC
Frequency ⁶ 10 / 100 MHz
Amplitude +3 dBm

ENVIRONMENTAL

Device Operating temperature⁷ 0 °C to +75 °C
Operating relative humidity 10% to 90%, non-condensing
Operating shock 30g, half-sine pulse, 11 ms duration
Operating vibration 5 Hz to 500 Hz, 0.31 g_{rms}
Altitude 2000 m max (maintaining 25 °C ambient temperature)

General Specifications

Communication interface USB / RS-232 / SPI
Power consumption 24 W typical
Weight 2.6 lbs (1.2 kg)
Dimensions (W x H x D, max envelope) 3.7" x 1.4" x 6.1" (94 mm x 36 mm x 155 mm)

Warranty 3 years parts and labor on defects in materials or workmanship

ORDER INFORMATION

7100027-01 SC5503B,
Core Module – USB and SPI
Interfaces
7100027-02 SC5503B,
Core Module – USB and RS-
232 Interfaces

Specifications are subject to change without notice. For the most recent product specifications, please visit www.signalcore.com.

(1) Stability of the internal 10 MHz reference source
(2) Tuning step less than 50 MHz
(3) Measured sideband noise includes both AM and PM noise
(4) These are phase modulated spurs measured out to 1 MHz offset from the carrier

(5) >9 GHz output power is +7 dB
(6) Reference clock frequency is user selectable between 10 MHz and 100 MHz
(7) This temperature is the device temperature as measured by its internal temperature sensor. User is required to cool and maintain the device temperature to < 20°C above ambient temperature. Typical operating ambient temperature: -10°C to 55°C