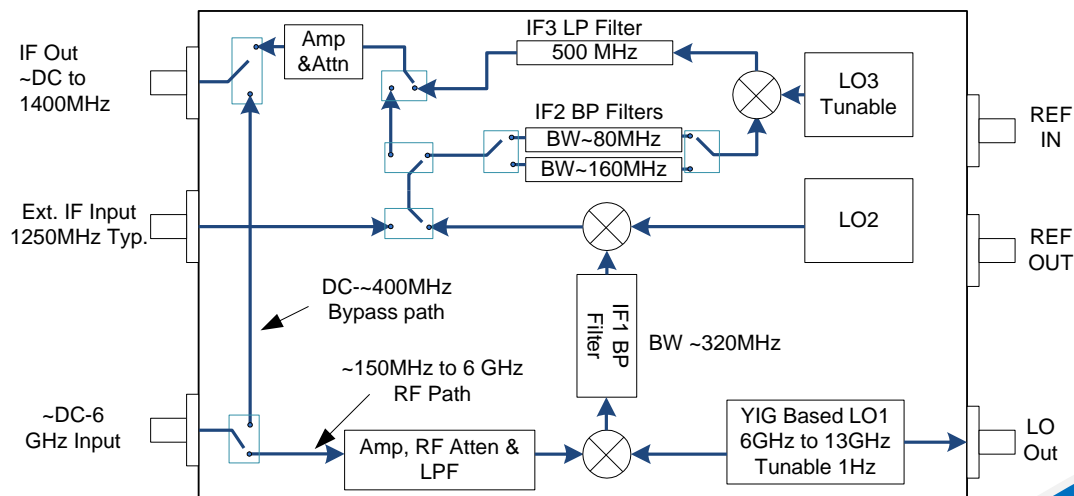


# SC5307A

## 6 GHz Triple Stage Downconverter

The SC5307A is a compact, high performance triple stage heterodyne downconverter with input RF frequency range from 100 kHz to 6 GHz in PXIe form factor. Its output IF frequency can also be tuned to center between 100 MHz and 500 MHz, and also selectable for 1250 MHz. Flexible IF bandwidths of 80 MHz, 160 MHz, and 320 MHz can be selected, depending on the selected IF BW. An optional IF2 input port is provided to down-convert external 1250 MHz signals, such as that coming from an external Ka-band block-converter, to a lower IF signal. The SC5307A IF output IP3 is typically better than 35 dBm, its gain range is over 60 dB, and its input noise floor is better than  $-160$  dBm/Hz when its RF preamplifier is turned on.

The module uses a YIG oscillator as its tunable RF LO, which provides excellent phase noise, thus contributing negligible noise to the down-converted RF signal. The LO signals are synthesized from an internal 10 MHz TCXO with stability of better than  $\pm 0.5$  ppm. For better stability the module can be programmed to phase lock to an external reference source such as a Rubidium or oven-controlled crystal oscillator. The SC5307A occupies two PXIe slots making it ideal for space constrained system integration. Driver and development software is provided, as well as a software GUI that allows the user to easily control the unit without having to write control software.



### Applications

- RF instrumentation
- Wireless communications
- Signal intelligence
- Satellite link
- Software-defined radio

## Technical Specifications

(At 25°C ambient, sine waveform)

### SPECTRAL SPECIFICATIONS

RF input frequency range ..... 100 kHz to 6 GHz

Flatness response<sup>1</sup> ..... 8 dB typical

Final IF output freq ..... 140 MHz

IF Bandwidth ..... 80, 160, 320 MHz

Amplitude flatness<sup>2</sup> ..... 3 dB peak

Internal reference

Stability<sup>3</sup> ..... ±0.5 ppm

Aging ..... < 1 ppm after 1 year

Phase locking range ..... ±2 ppm

Tuning

Resolution ..... 1 Hz

Speed (settled to .1 ppm)<sup>4</sup> ..... < 2 mS

Sideband phase noise<sup>5</sup> (typical, dBc/Hz)

Offset	RF Frequency			
	100 MHz	1 GHz	3 GHz	6 GHz
100 Hz	-80	-79	-77	-74
1 kHz	-95	-94	-92	-89
10 kHz	-105	-104	-102	-99
100 kHz	-117	-117	-116	-115
1 MHz	-141	-140	-138	-136
10 MHz	-148	-152	-151	-142

Sideband phase spurious signals

< 100 kHz ..... -65 dBc typical

> 100 kHz ..... -75 dBc typical

- (1) The raw RF amplitude response over the entire input frequency range. No RF attenuation applied.
- (2) The raw IF amplitude response over the bandwidth range.
- (3) Initial stability of the internal reference is a TCXO. For better accuracies and stability one should phase lock to an external source.
- (4) For step change of less than 50 MHz.

### AMPLITUDE SPECIFICATIONS

Input RF range ..... -164 dBm to 20 dBm

Max input (with 30 dB RF attenuation) . +20 dBm

Min detectable level (preamp on) ..... -160 dBm

RF attenuation ..... 0 to 30 dB

RF attenuation resolution ..... 1 dB

IF nominal output<sup>6</sup> ..... 0 dBm

IF attenuation ..... 0 to 60 dB

IF attenuation resolution ..... 1 dB

Accuracy (calibration applied)<sup>7</sup> ..... ±0.75 dB

Input P1dB compression (no RF atten) 0 dBm typ

IIP3 (2 tone at -20 dBm) ..... 17.5 dBm

@ 2 GHz typical

IMD3 (two -20 dBm tones, 1 MHz apart) .. < -75 dBc

@ 2 GHz typical

2<sup>nd</sup> order harmonics (-30 dBm tone)<sup>8</sup> .... < -80 dBc

Noise floor density at input

Set for best dynamic range (typical)

Freq	Level
100 MHz	-152 dBm/Hz
3 GHz	-150 dBm/Hz
6 GHz	-145 dBm/Hz

With preamplifier (typical)

Freq	Level
100 MHz	-163 dBm/Hz
3 GHz	-162 dBm/Hz
6 GHz	-160 dBm/Hz

VSWR (>3 dB RF Atten)

Freq	1GHz	3 GHz	6 GHz
VSWR	1.4	1.6	2.0

- (5) The phase noise specs are for the YIG based oscillator in normal tuning speed setting.
- (6) The nominal IF is set to 0 dBm, and the specs are based on 0 dBm output. However, the output P1dB is 19 dBm.
- (7) All units are factory calibrated and calibration is stored in onboard EEPROMs. The user must apply the calibration correction to the signal for accuracy specifications to be valid.
- (8) For RF > IF bandwidth.

# SC5307A SPECIFICATIONS

Image rejection .....	> 120 dB
Residual (system inherent) spurs .....	< -100 dBm
Input related spurs .....	< -80 dBc
LO leakage at RF terminal .....	-120 dBm
Gain (preamp disabled) .....	-55 dB to 30 dB typ
(preamp enabled) .....	-40 dB to 45 dB typ
Dynamic Range (DR) <sup>1</sup>	
Measurement DR .....	> 180 dB
Instantaneous DR .....	> 150 dB

## TERMINAL SPECIFICATIONS

RF input terminal	
Impedance .....	50 $\Omega$
Connector type .....	SMA female
Coupling .....	AC
IF output terminals	
Impedance (single ended) .....	50 $\Omega$
Connector type .....	SMA female
Coupling .....	AC
Reference input terminal	
Impedance (single ended) .....	50 $\Omega$
Connector type .....	SMA female
Coupling .....	AC
Frequency .....	10 MHz
Amplitude range .....	-3 dBm to 7 dBm
Lock range .....	$\pm 2$ ppm
Reference output terminal	
Impedance (single ended) .....	50 $\Omega$
Connector type .....	SMA female
Coupling .....	AC
Frequency <sup>2</sup> .....	10/100 MHz
Amplitude .....	3 dBm typ
PXI clock output terminal	
Impedance (single ended) .....	50 $\Omega$
Connector type .....	MCX Female

## POWER

Power Consumption .....	36 W typical
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## PHYSICAL

Weight .....	2.0 lbs
Dimensions .....	3U, 2 slots wide

## WARRANTY

1 year parts and labor on defects in materials or workmanship

## ORDER INFORMATION

7100071-01 .....	SC5307A, DC to 6.0 GHz PXIe RF Downconverter
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- (1) The dynamic range referred is the signal-to-noise dynamic range and is specified for 1 Hz RBW. The instantaneous dynamic range specifies the device's ability to make the measurement at a single device setting. The measurement dynamic range requires the device to change device settings.
- (2) User selectable