SignalCore™

PRESERVING SIGNAL INTEGRITY

Datasheet

SC5328A GREENJAY II

DC to 18 GHz RF Downconverter

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1. Definition of Terms

The following terms are used throughout this datasheet to define specific conditions:

Specification (spec)	Defines expected statistical performance within specified parameters which account for measurement uncertainties and changes in performance due to environmental conditions. Protected by warranty.
Typical Data (typ)	Defines the expected performance of an average unit without specified parameters. Not protected by warranty.
Nominal Values (nom)	Defines the average performance of a representative value for a given parameter. Not protected by warranty.
Measured Values (meas.)	Defines the expected product performance from the measured results of an individual sample or a batch of samples.

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

2. Description

The SC5328A, a member of the Greenjay family of modular super-heterodyne frequency converters, integrates a three-stage down-conversion chain designed for continuous broadband coverage, high image-rejection performance, and low spurious response. It accepts RF inputs from ~DC to 18 GHz, with 1.5 GHz to 18 GHz processed through the full conversion path and a dedicated ~DC to 3 GHz bypass routed directly to the second-stage IF output. This architecture supports both wideband pass-through operation and high-performance frequency translation within a single compact module.

The converter provides –20 dB to +35 dB of adjustable gain through integrated attenuators, extendable to +60 dB when the internal preamplifier is enabled. IF outputs are available after the second and third conversion stages, enabling either a high-IF output from 1.5 GHz to 3.25 GHz with more than 1 GHz instantaneous bandwidth or a baseband I/Q output from DC to 500 MHz with differential signaling and 1 GHz I/Q bandwidth. This flexibility allows the SC5328A to operate as a high-IF converter, a low-IF/baseband stage, or a wideband RF-to-IF bypass element depending on system requirements.

All LO signals are externally supplied to support coherent multi-channel architectures, with two LO sources required for operation through the second IF stage and three for full down-conversion to the DC–500 MHz I/Q output. External LO injection ensures deterministic phase alignment across multiple modules, enabling coherent receivers, phased arrays, and precision measurement systems.

The compact size of the SC5328A makes it well suited for dense system integration, particularly in multi-channel platforms or designs with limited real estate. Its broadband capability, configurable IF structure, large adjustment gain, and coherent LO architecture make it applicable to advanced communication transceivers, automotive radar and coherent receiver systems.

3. Block Diagram

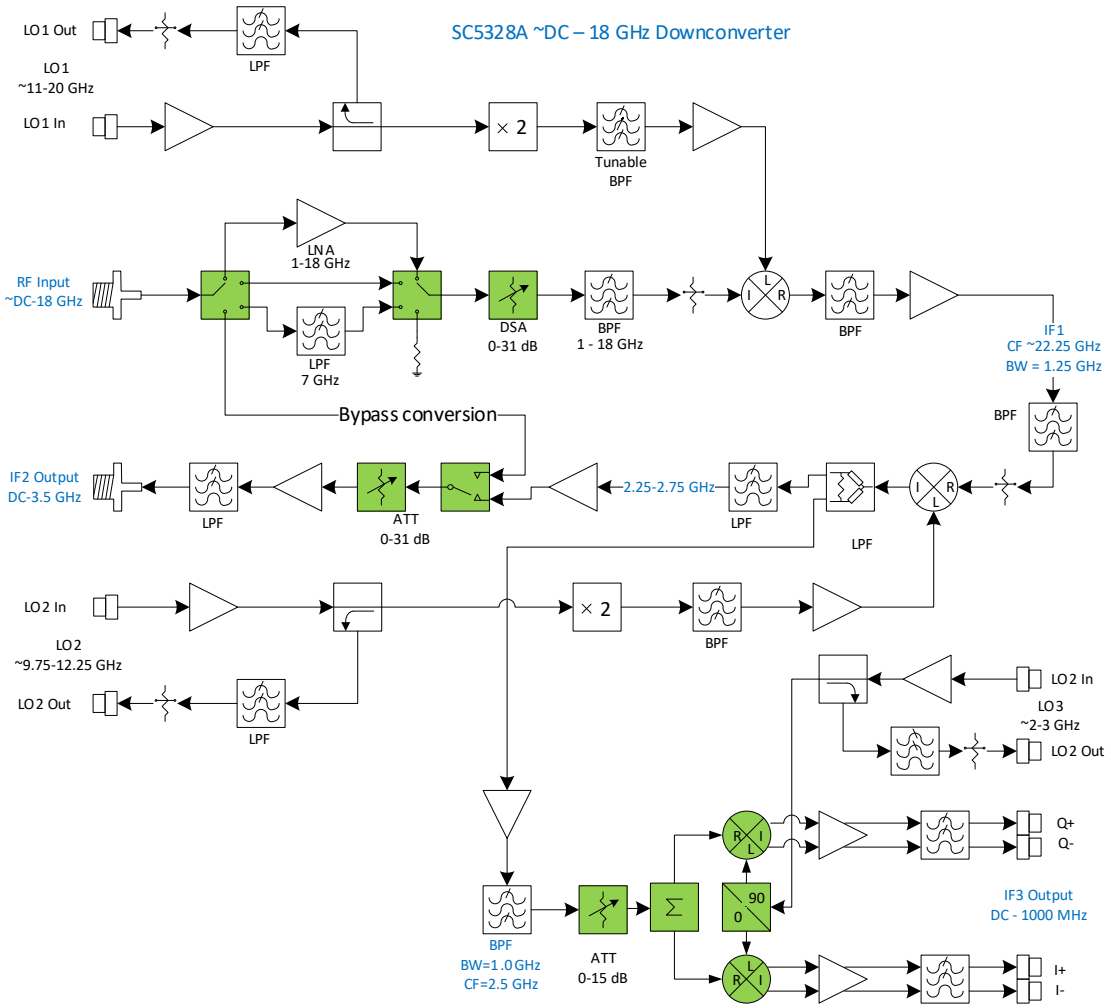

Figure 1 Block diagram of the downconverter, green blocks are user adjustable

4. Frequency Specifications

		Frequency Specifications
RF Input Range		
RF	Bypass	DC to 3.5 GHz
	Conversion	1.5 GHz to 18.0 GHz
IF Output Range		
IF2	Bypass	DC to 3.5 GHz
	Conversion	1.5 GHz to 3.25 GHz
IF3/IQ		DC to 500 MHz
IF Bandwidth		
IF2		1.25 GHz

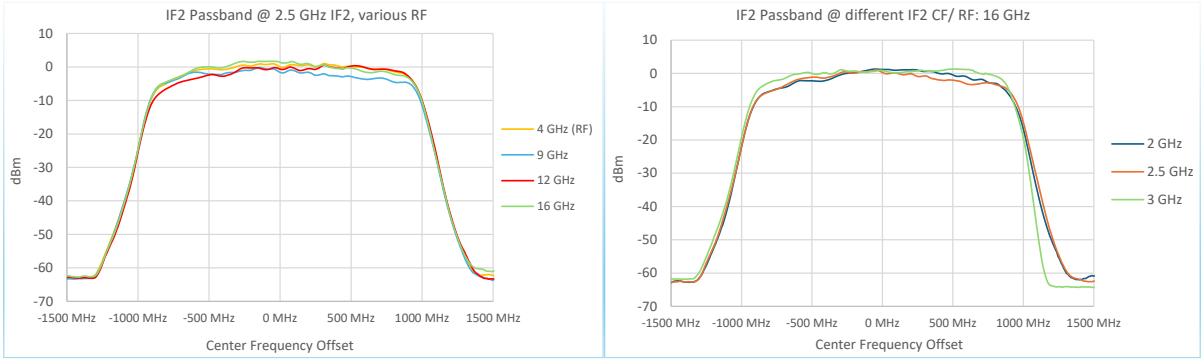

Figure 2 IF2 output bandwidth

IF3/IQ[1]		1000 MHz
IF Output Polarity		
IF2		Non-inverted/Inverted
IF3/IQ		Non-inverted/Inverted
LO Range[2]		
LO1		11 GHz to 20 GHz, typ
LO2		9.75 GHz to 12.25 GHz, typ
LO3		DC to 3.5 GHz, typ
Port VSWR		
RF Port VSWR		TBD
IF2 Port VSWR		TBD
IF3 Port VSWR		TBD

[1] Analog bandwidth = 500 MHz, I/Q bandwidth is 1 GHz
[2] Required LO frequency range for full conversion range

5. Amplitude Specifications

Amplitude Specifications		
Conversion Gain[3]		
RF to IF2[4]	Preamp off	+31 dB, typ
	Preamp on	+60 dB, typ

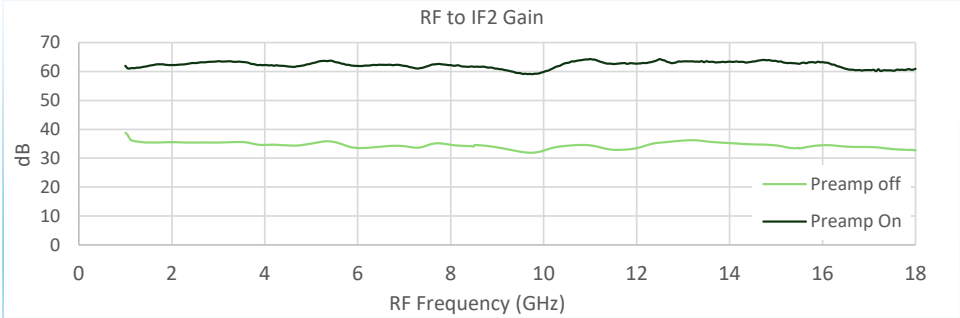

Figure 3 Conversion gain, IF2 =2.5 GHz

RF to IF3[5]	Preamp off	+14 dB, typ

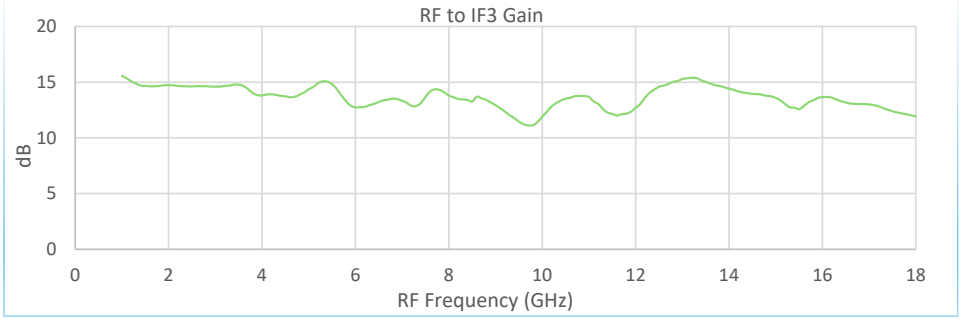

Figure 4 Conversion gain, IF3 = 250 MHz

Bypass Conversion Gain		
RF to IF2[6]	10 MHz to 3 GHz	+24 dB, typ

[3] IF2 @ 2.5 GHz and IF3 @ 250 MHz
[4] 0 dB RF attenuation, 0 dB IF2 attenuation
[5] 0 dB RF attenuation, 0 dB IF3/IQ attenuation
[6] 0 dB IF2 attenuation

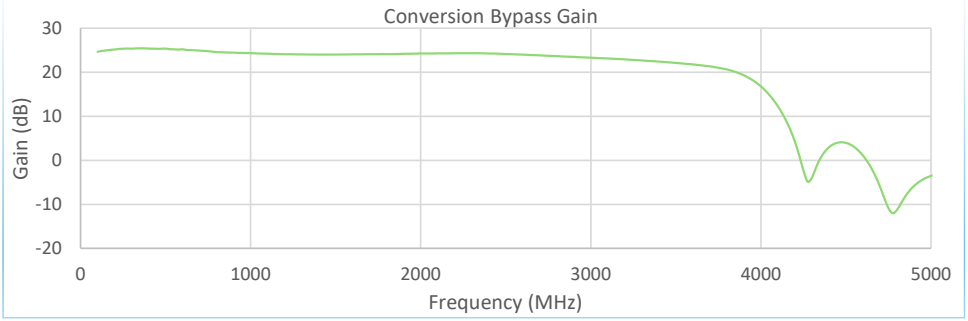

Figure 5 Pass-through gain, 0 dB attenuation

Gain Adjustment		
RF Attenuation	0.5 dB steps	0 dB to 31.5 dB
IF2 Attenuation	0.25 dB steps	0 dB to 31.75 dB
IF3/IQ Attenuation	1 dB steps	0 dB to 31 dB
IF Gain Flatness		
RF to IF2	1.5 GHz to 18 GHz	3 dB, typ
RF to IF3	1.5 GHz to 18 GHz	4 dB, typ
Over 1 GHz bandwidth		2 dB, typ
RF Input Level		
Preamp off		+25 dBm, max
Preamp on		0 dBm max
Bypass Conversion		+6 dBm max
IF3/IQ Output		
VCOM		0 V - 1 V
Differential		1 - 2 Vpp
LO Drive Level		
LO1, LO2, LO3	+7 dBm, max	+4 dBm, typ
LO Output Gain		
	LO1	+2 dB, typ
	LO2	+4 dB, typ
	LO3	+4 dB, typ

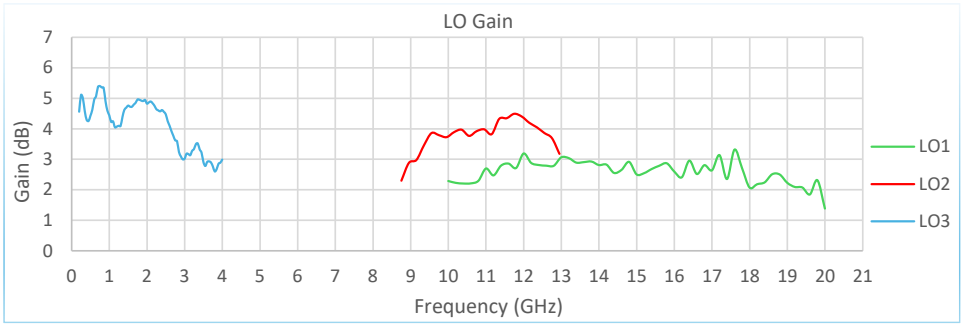

Figure 6 LO input to output gain

6. Spectral Specifications

Spectral Specifications		
RF Isolation[7]		
RF to IF2		<-90 dBc, typ

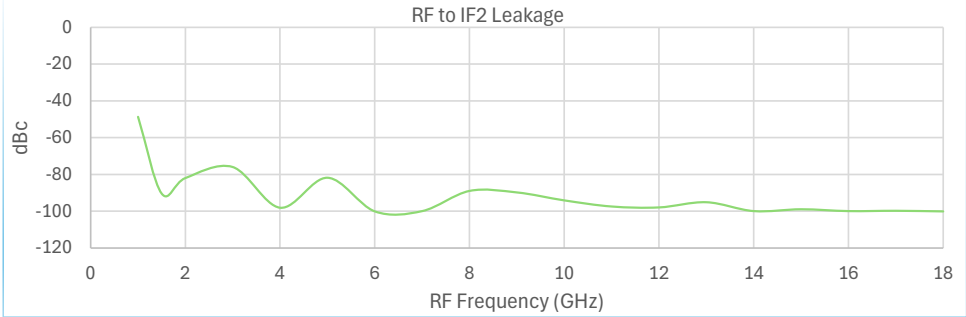

Figure 7 RF leakage at IF2 output

RF to IF3		< -90 dBc, typ

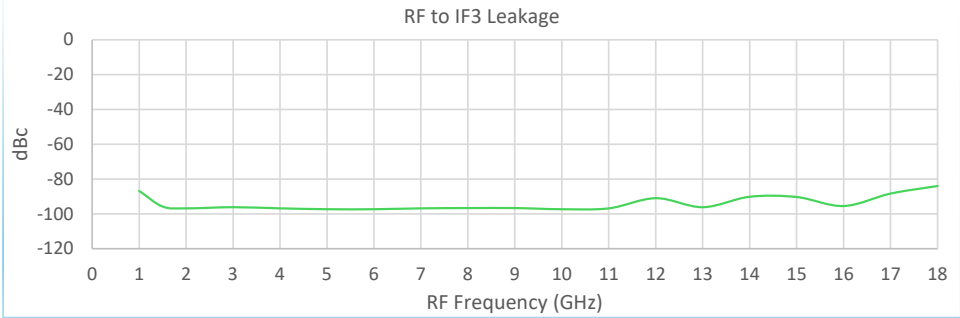

Figure 8 RF leakage at IF3 output

LO Leakage at IF2[7]		
2 GHz to 18 GHz	LO1	<-100 dBc, typ
	LO1 x 2	<-100 dBc, typ
	LO2	<-77 dBc, typ
	LO2 x 2	<-87 dBc, typ

[7] -20 dBm RF input, 0 dBm 2.5 GHz IF2 output

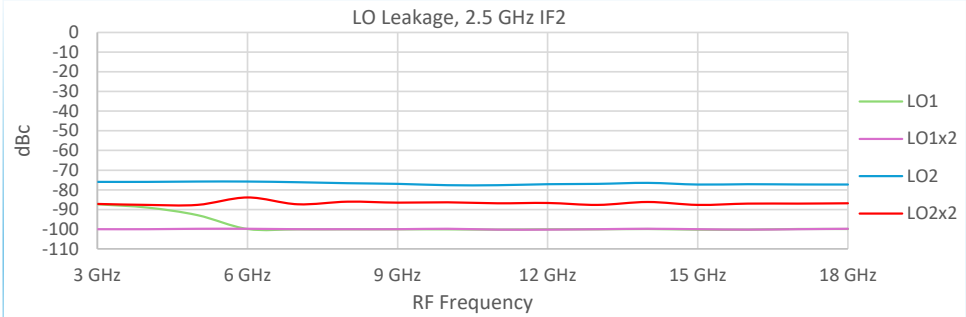

Figure 9 LO leakage at IF2 output

LO Leakage at RF[8]

+4 dBm LO input drive	LO1		<-75 dBc, typ
	LO1 x 2		<-75 dBc, typ

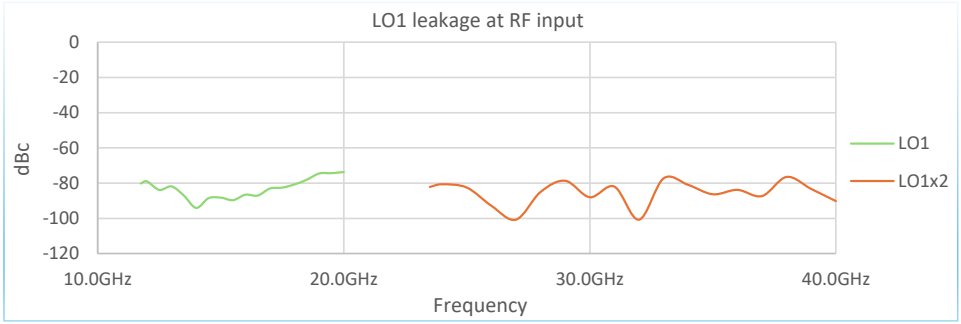

Figure 10 LO Leakage at RF input

Spurious Signals[9]

LO1xLO2 Intermodulation	In-band	<-55 dBm[10], max	<-90 dBm, typ
Higher LO Order Intermodulation	In-band	<-60 dBm[11], max	<-90 dBm, typ
RF Induced Spurs			
RF Frequency:			
1.5 GHz to 18 GHz	In-band		<-90 dBc, typ
~6.9 GHz to ~7.8 GHz	In-band	<-50 dBc, max	<-55 dBc, typ

[8] 0 dB attenuation, measured with respect to LO power
[9] -20 dBm RF input, 0 dBm 2.5 GHz IF2 output
[10] RF = ~4.25 GHz to ~5.75 GHz
[11] RF = ~13.2 GHz to ~13.9 GHz

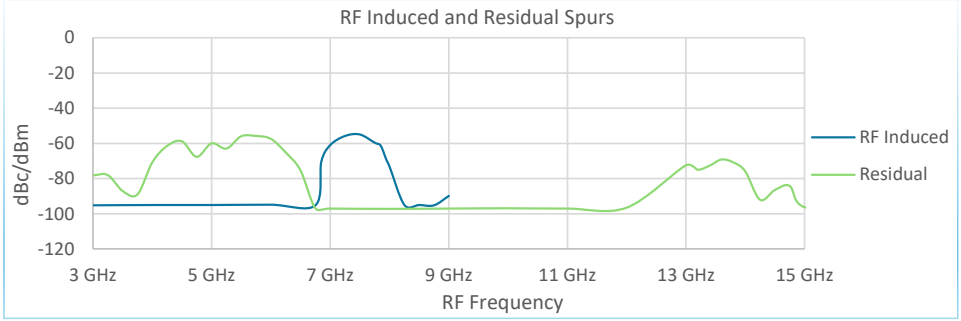

Figure 11 In-band spurs

2nd Harmonics (0 dBm)

500 MHz to 3.5 GHz[12] < -60 dBc, meas.

3rd Harmonics (0 dBm)

500 MHz to 3.5 GHz[12] < -80 dBc, meas.

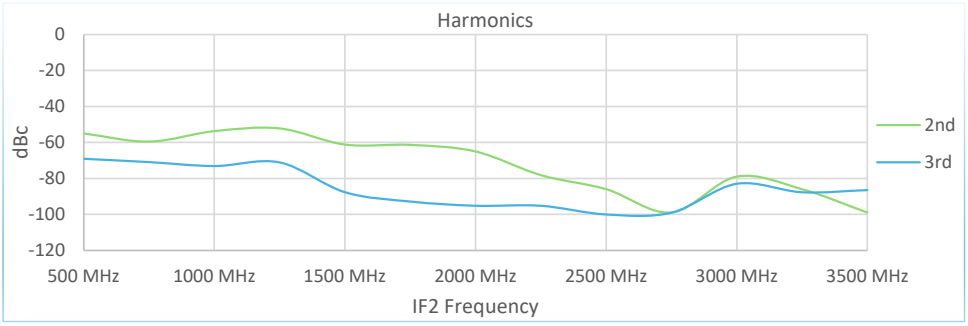

Figure 12 IF2 Harmonic levels at 0 dBm output level

7. Dynamic Range Specifications

Dynamic Range Specifications		
Noise Figure		
	Preamp off[13]	24 dB, typ
	Preamp on[14]	8 dB, typ
Input Noise Density		
	Preamp off[13]	-150 dBm/Hz, typ
	Preamp on[14]	-166 dBm/Hz, typ
Spurious Free Dynamic Range		
	Preamp off[13]	105 dB, typ
	Preamp on[14]	116 dB, typ

[12] IF2

[13] -20 dBm input, gain = +20 dB

[14] -40 dBm input, gain = +40 dB

Output third-order intermodulation OIP3[15] +30 dBm, typ

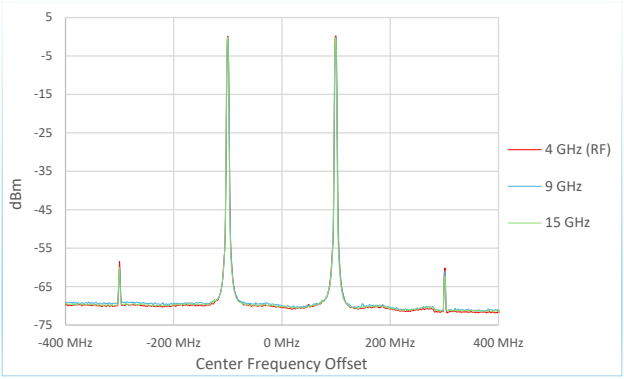

Figure 13 IMD performance, measured with -20 dBm input, 2.5 GHz IF2 output and +20 dB gain

Output compression OP1dB +18 dBm

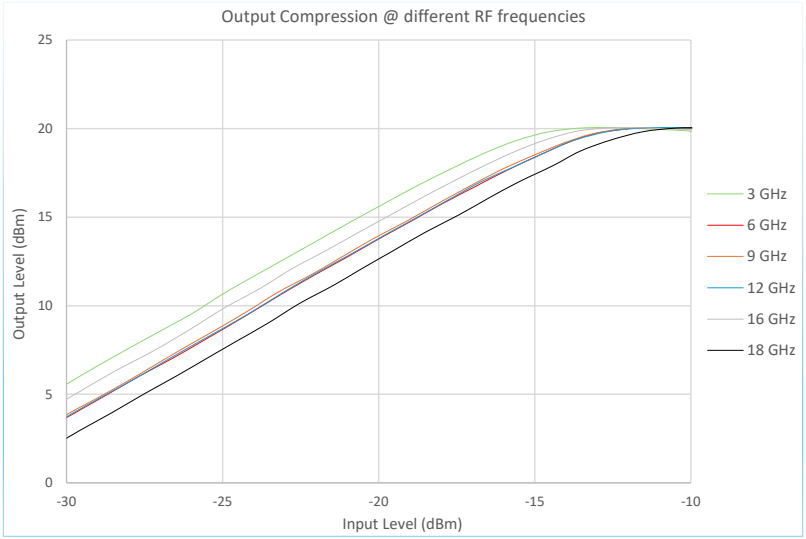

Figure 14 Output compression

[15] OIP3 measured with –20 dBm two-tone input (200 MHz spacing), 2.5 GHz IF2 output, and +20 dB gain

8. General Specifications

General Specifications		
Environmental		
Internal Device Operating Temperature[16]		-10°C to +70°C
Ambient Storage Temperature		-40°C to +90°C
Operating Relative Humidity		10% to 90%, non-condensing
Storage Relative Humidity		5% to 90%, non-condensing
Operating Shock		30 g, half-sine pulse, 11 ms duration
Storage Shock		50 g, half-sine pulse, 11 ms duration
Operating Vibration		5 Hz to 500 Hz, 0.31 g_{rms}
Storage Vibration		5 Hz to 500 Hz, 2.46 g_{rms}
Altitude		Up to 33,000 feet (de-rate max device temperature to 60°C)
Physical[17]		
Dimensions (W x H x D, max envelope)		3.7” x 0.75” x 6.00”
Weight		1.0 lb.
RF Input Connector		K-type, 2.92 mm
IF2 Output Connector		K-type, 2.92 mm
Connector Nominal Impedance		50 Ω
IF3/IQ Connectors		MMCX, female
LO Input and Output Connectors		SMPM, female
Digital Interface Connector[18]		M80-5401442
Communication Interface		USB, UART and SPI
UART, SPI and I/O Logic		3.3V LVCMOS, 5V Tolerant
Supply Connector		1.7mmx4.0mm Male Jack
Input Voltage		10 to 15 VDC
Current	Peak (initial)	2.4 A @ 12V, max
	Steady	2.2 A @ 12V, typ
Power Consumption	Steady	26 W, max

[16] Per read back from internal temperature sensor.
[17] See 3D and 2D mechanical files for more information on precise module dimensions and mounting hole positions.
[18] See hardware manual for more information on connectors and their pinouts.

Electromagnetic Compatibility (EMC)

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Basic immunity
- EN 55011 (CISPR 11): Class A Radiated emissions
- EN 55011 (CISPR 11): Class A Conducted emissions
- EN 61000-4-2: Electrostatic Discharge
- EN 61000-4-3: Radiated Immunity
- EN 61000-4-6: Conducted Immunity
- FCC 15.109: Radiated emissions
- ICES-003: Class A emissions

CE

This product meets the essential requirements of applicable European Directive:

- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Warranty

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

9. Revision Table

Revision	Revision Date	Description
0.1.0	05/27/2026	Preliminary

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