Agilent
89431A
2 MHz to 2.65 GHz Downconverter

Technical Data

Introduction

Specifications describe warranted performance over the temperature range of 0° to 55°C (except where noted) and include a 30-minute warm-up from ambient conditions, unless noted otherwise. Supplemental characteristics identified as "typical" or "characteristic," provide useful information by giving non-warranted performance parameters. Typical performance is applicable from 20° to 30°C.

Definitions

dBc = dB relative to input signal level.

dBfs = dB relative to full scale amplitude range setting. Full scale corresponds to approximately –30 dB at the mixer.

FS or fs = Full scale; synonymous with amplitude range or input range.

TOI or Third-Order Intercept = The theoretical amplitude for a device at which the third-order intermodulation products would become equal in amplitude to one of the signals.

Frequency

Frequency tuning

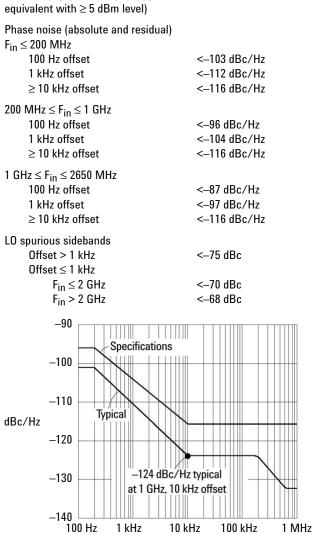|	
Frequency range	2 MHz to 2650 MHz
Center frequency tuning resolution	1.171875 MHz
Output characteristics	
IF bandwidth	8 MHz
Centered on	6 MHz

Note: Spectral information within the IF bandpass is "flipped" or "mirrored" relative to input signals within the tuned span.

Frequency accuracy (with standard high-precision frequency reference)

Frequency accuracy is the sum of initial accuracy, aging, and temperature drift.

Initial accuracy	± 0.1 ppm
Aging	± 0.015 ppm/month
Temperature drift	± 0.005 ppm (0° to 55°C)

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Stability (spectral purity) (with standard high-precision frequency reference or equivalent with ≥ 5 dBm level)

Phase noise (absolute and residual)

$F_{in} \le 200$ MHz

100 Hz offset	<–103 dBc/Hz
1 kHz offset	<–112 dBc/Hz
≥ 10 kHz offset	<–116 dBc/Hz

200 MHz ≤ F_{in} ≤ 1 GHz

100 Hz offset	<–96 dBc/Hz
1 kHz offset	<–104 dBc/Hz
≥ 10 kHz offset	<–116 dBc/Hz

1 GHz ≤ F_{in} ≤ 2650 MHz

100 Hz offset	<–87 dBc/Hz
1 kHz offset	<–97 dBc/Hz
≥ 10 kHz offset	<–116 dBc/Hz

LO spurious sidebands

Offset > 1 kHz	<–75 dBc
Offset ≤ 1 kHz	
F_{in} ≤ 2 GHz	<–70 dBc
F_{in} > 2 GHz	<–68 dBc

Spectral purity at 1 GHz

Amplitude

Input range	– 50 dBm to + 25 dBm (5 dB steps)
Maximum safe input power	
Average continuous power	+ 25 dBm (300 mW)
DC voltage	25 V

Input port

Input channels	1
VSWR	
Range ≥ –20 dBm	1.6:1 (12.7 dB return loss)
Range ≤ –25 dBm	1.8:1 (11 dB return loss)
Impedance	50 Ω
Connector	Type-N

IF output level accuracy

When tuned to a single full scale input signal, the output signal will be:

Nominal level	–13 dBm
Frequency	6 MHz

Amplitude accuracy is the sum of:

Conversion gain accuracy (at –20 dBm input range and 6 MHz input)	± 2 dB

Input range attenuation accuracy	
Range ≥ –20 dBm	± 2.5 dB
Range ≤ –25 dBm	± 4 dB

RF flatness (relative to 6 MHz)	
Range ≥ –20 dBm	+ 2 dB, –3.5 dB
Range ≤ –25 dBm	+ 3.5 dB, –5 dB

IF flatness (over ± 4 MHz span, relative to center frequency)	± 1.5 dB

The spectrum of the output signal will be "flipped" or "mirrored" about the 6 MHz center of the IF passband relative to the spectrum of the input signal. Therefore an input signal 10 kHz below the input tuned frequency will appear 10 kHz above 6 MHz at the output.

Dynamic range

Dynamic range indicates the amplitude range that is free of erroneous signals within the measurement bandwidth.

Harmonic distortion (with a single full scale signal at the input)

≥–25 dBm range	< –75 dBc
≤–30 dBm range	< –54 dBc

Third-order intermodulation distortion (with two input tones at 6 dB below full scale and ≥ 10 MHz)	< –8 dBc

Third-order intercept (TOI) (with two input tones at 6 dB below full scale and ≥ 10 MHz)	≥ 33 dB above range

General spurious (with input signal level equal to range and input frequency ≤ 2650 MHz)

For spans ≤ 1.5 MHz and for offset frequencies ≤ 1.5 MHz from input signal	<–75 dBc
For all spans and offsets	<–70 dBc

Residual responses (50 Ω input)	<–80 dBfs

Input noise density (50 Ω input, vector mode or scalar mode with sample detector)

	20° to 30° C	0° to 55° C
≥– 25 dBm range	<–115 dBfs/Hz	<–112 dBfs/Hz
≤– 30 dBm range	<– 110 dBfs/Hz	<–109 dBfs/Hz

Sensitivity

	20° to 30° C	0° to 55° C
– 50 dBm range	<–160 dBfs/Hz	<–159 dBfs/Hz

Safety and Environmental

Safety standards	CSA Certified for Electronic Test and Measurement Equipment per CSA C22.2, No. 231
This product is designed for compliance to	UL1244 and IEC348, 1978
Acoustics	LpA < 55 dB typical at 25 °C ambient
Temperature	
Operating	0° to 55°C
Storage	− 20° to 65°C
Humidity, non-condensing	
Operating`	10% to 90% at 40 °C
Storage	10% to 90% at 40 °C
Altitude	
Operating (above 2285 m (7,500 ft), derate operating temperature by − 3.6° C/1000 m (− 1.1° C/1000 ft))	4600 m (15,000 ft)
Storage	4600 m (15,000 ft)
Calibration interval	1 year
Warm-up time	30 minutes
Power requirements	
115 VAC operation	90 to 140 Vrms, 47 to 63 Hz
230 VAC operation	198 to 264 Vrms, 47 to 63 Hz
Maximum power dissipation	275 VA

IEC 801-3 (Radiated Immunity) Performance degradation may occur at Severity Level 2.

Physical

Weight	25 kg (55 lb)
Dimensions	
Height	173 mm (6.8 in)
Width	419 mm (16.5 in)
Depth	495 mm (19.5 in)

Interfaces (characteristics only)

External reference in/out	
External reference input	Locks to a 1, 2, 5, or 10 MHz (± 10 ppm) with a level > 0 dBm (use ≥ 5 dBm for optimum phase noise performance).
External reference output	Outputs 10 MHz at > 0 dBm (+6 dBm typical) into a 50 Ω load.
Serial communication port	
EIA 574	9-pin, RS-232 I/O port (to controller), nominally 9600 baud.

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