DC to 30GHz, RF Limiter

FEATURES

- Wideband frequency range: DC to 30GHz
- Insertion loss
  - 0.3dB typical from 0.01GHz to 20GHz
  - 0.7dB typical from 20GHz to 30GHz
- Power handling
  - 37dBm continuous wave typical to 6GHz
  - >44dBm pulsed typical to 2GHz
- Flat leakage
  - 17dBm typical from 0.01GHz to 20GHz
  - 15dBm typical from 20GHz to 30GHz
- Recovery time: <10ns
- Extended operating temperature range: −55°C to +125°C
- RoHS-compliant, 2mm × 2mm × 0.85mm, 8-lead LFCSP

APPLICATIONS

- RF transceivers
- Radar applications
- Test and measurement

FUNCTIONAL BLOCK DIAGRAM

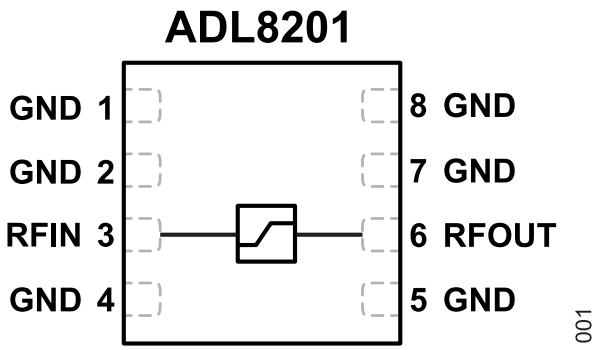

Figure 1. Functional Block Diagram

GENERAL DESCRIPTION

The ADL8201 is a DC to 30GHz, high power, reflective RF limiter ensuring protection of sensitive circuitry.

Typical insertion loss, input return loss (RFIN), and flat leakage are 0.7dB, 18dB, and 15dBm, respectively, from 20GHz to 30GHz. The ADL8201 can withstand 37dBm continuous wave at 6GHz and >44dBm pulsed RF input to 2GHz. The recovery time is less than 10ns. The ADL8201 is internally matched to 50Ω and does not require any external circuitry.

The ADL8201 is fabricated on a gallium arsenide (GaAs) and housed in an RoHS-compliant, 2mm × 2mm × 0.85mm, 8-lead LFCSP. The ADL8201 is specified for operation over an extended temperature range of −55°C to +125°C.

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REVISION HISTORY

1/2026—Revision 0: Initial Version

SPECIFICATIONS

0.01GHz TO 20GHz FREQUENCY RANGE

T_{CASE} = 25°C and the device has a 50Ω system, unless otherwise noted.

Table 1. 0.1GHz to 20GHz Frequency Range

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE (f)	0.01		20	GHz	
INSERTION LOSS		0.3		dB	
Variation over Temperature		0.0036		dB/°C	
RETURN LOSS					
RFIN		22.5		dB	
RFOUT		22		dB	
FLAT LEAKAGE		17		dBm	Input power (P_{IN}) = 30dBm
RECOVERY TIME		<10		ns	
RF INPUT					
Input Power for 1dB Compression (IP1dB)		16		dBm	
Input Power for 5dB Compression (IP5dB)		21		dBm	
Input Third-Order Intercept (IIP3)		38.5		dBm	Measurement taken at output power (P_{OUT}) per tone = 0dBm
Input Second-Order Intercept (IIP2)		81		dBm	Measurement taken at P_{OUT} per tone = 0dBm

20GHz TO 30GHz FREQUENCY RANGE

T_{CASE} = 25°C and the devices is a 50Ω system, unless otherwise noted.

Table 2. 20GHz to 30GHz Frequency Range

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE	20		30	GHz	
INSERTION LOSS		0.7		dB	
Variation over Temperature		0.01		dB/°C	
RETURN LOSS					
RFIN		18		dB	
RFOUT		17		dB	
FLAT LEAKAGE		15		dBm	P_{IN} = 30dBm
RECOVERY TIME		<10		ns	
RF INPUT					
IP1dB		15		dBm	
IP5dB		20.5		dBm	
IIP3		28		dBm	Measurement taken at P_{OUT} per tone = 0dBm
IIP2		48.5		dBm	Measurement taken at P_{OUT} per tone = 0dBm, f = 24GHz

SPECIFICATIONS

POWER HANDLING CAPABILITIES

Table 3. Power Survivability vs. Frequency, Pulse Width = 10µs, Duty Cycle = 1%, T_{CASE} = 85°C, Single Event (<10sec Operation)

Frequency	2GHz	4GHz	6GHz
Power Handling Rating	>44dBm	43.5dBm	43dBm

Table 4. Power Survivability vs. Pulse Width, f = 6GHz, Duty Cycle = 1%, T_{CASE} = 85°C, Single Event (<10sec Operation)

Pulse Width	1µs	10µs	100µs	500µs
Power Handling Rating	44.5dBm	43dBm	42dBm	41dBm

Table 5. Power Survivability vs. Duty Cycle, f = 6GHz, Pulse Width = 10µs, T_{CASE} = 85°C, Single Event (<10sec Operation)

Duty Cycle	1%	10%	20%	Continuous Wave
Power Handling Rating	43dBm	42.5dBm	41.5dBm	37dBm

ABSOLUTE MAXIMUM RATINGS

Table 6. Absolute Maximum Ratings

Parameter	Rating
Temperature	
Storage Range	−65°C to +150°C
Operating Range	−55°C to +125°C
Maximum Channel	175°C

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

ELECTROSTATIC DISCHARGE (ESD) RATINGS

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

Human body model (HBM) per ANSI/ESDA/JEDEC JS-001.

ESD Ratings for ADL8201

Table 7. ADL8201, 8-Lead LFCSP

ESD Model	Withstand Threshold (V)	Class
HBM	±1500	1C

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

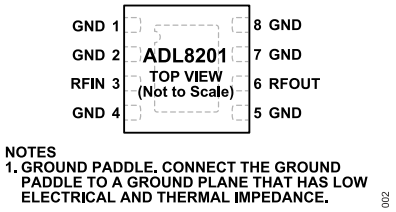

Figure 2. Pin Configuration

Table 8. Pin Function Descriptions

Pin No.	Mnemonic	Description
1, 2, 4, 5, 7, 8	GND	Ground. Connect the GND pins to a ground plane that has low electrical and thermal impedance. See Figure 3 for the interface schematic.
3	RFIN	RF Input. RFIN is DC-coupled and matched to 50Ω. See Figure 4 for the interface schematic.
6	RFOUT	RF Output. RFOUT is DC-coupled and matched to 50Ω. See Figure 4 for the interface schematic.
	GROUND PADDLE	Ground Paddle. Connect the ground paddle to a ground plane that has a low electrical and thermal impedance.

INTERFACE SCHEMATICS

Figure 3. GND Interface Schematic

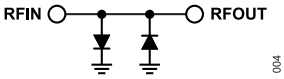

Figure 4. RFIN and RFOUT Interface Schematic

TYPICAL PERFORMANCE CHARACTERISTICS

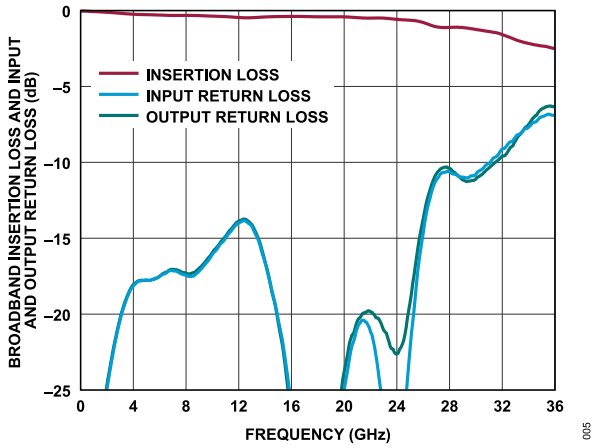

Figure 5. Broadband Insertion Loss and Input and Output Return Loss vs. Frequency

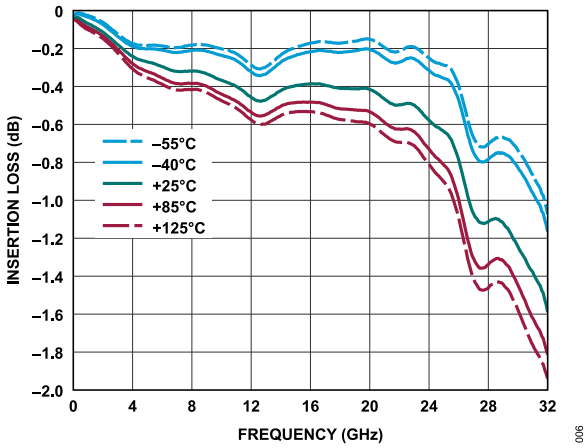

Figure 8. Insertion Loss vs. Frequency for Various Temperatures

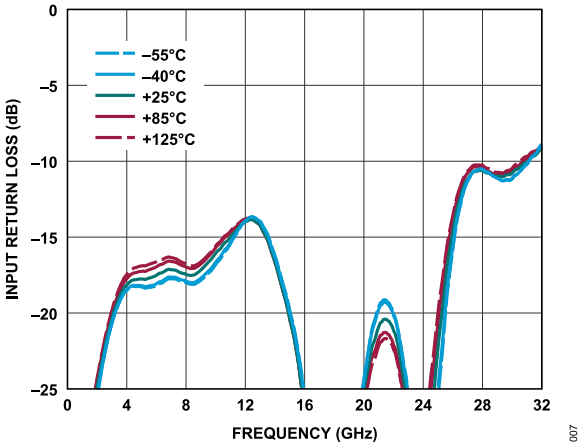

Figure 6. Input Return Loss vs. Frequency for Various Temperatures

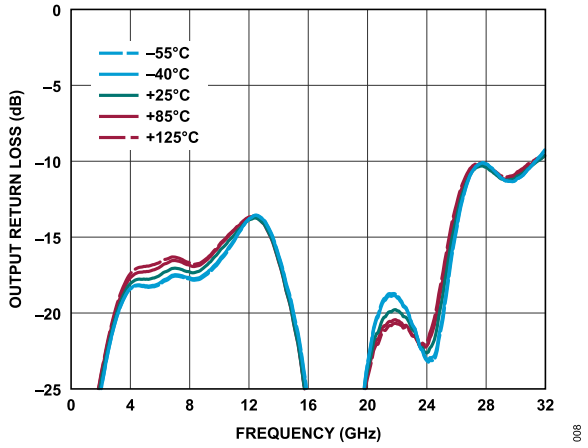

Figure 9. Output Return Loss vs. Frequency for Various Temperatures

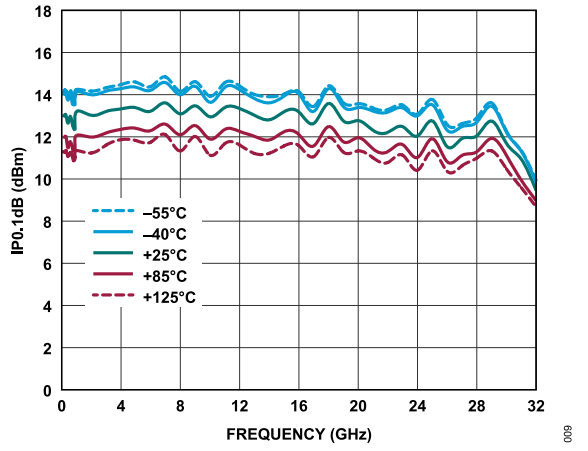

Figure 7. Input Power for 0.1dB Compression (IP0.1dB) vs. Frequency for Various Temperatures

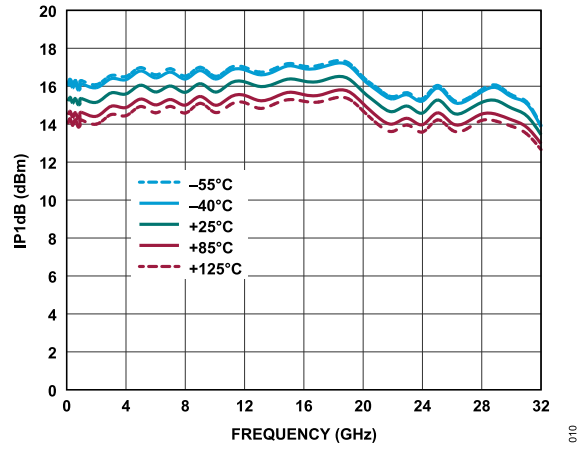

Figure 10. IP1dB vs. Frequency for Various Temperatures

TYPICAL PERFORMANCE CHARACTERISTICS

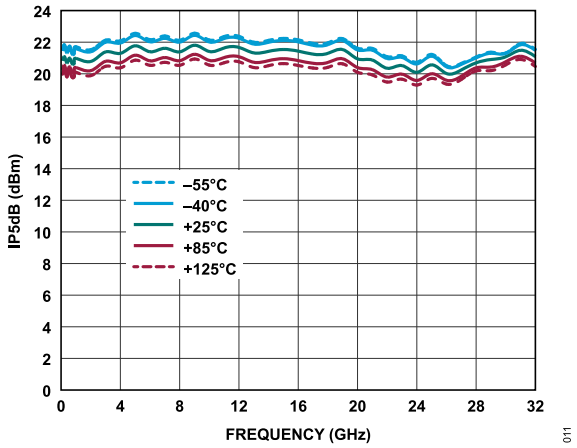

Figure 11. IP5dB vs. Frequency for Various Temperatures

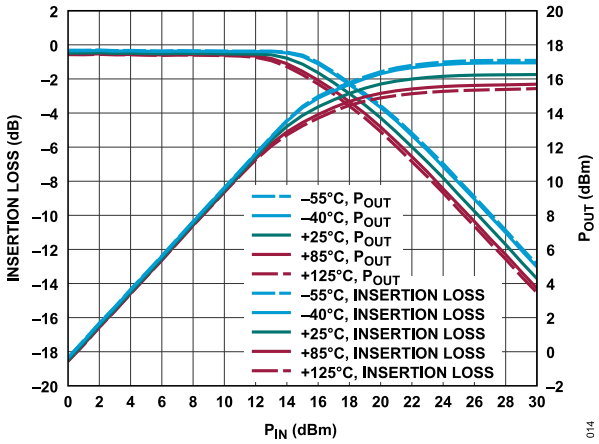

Figure 14. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 10GHz

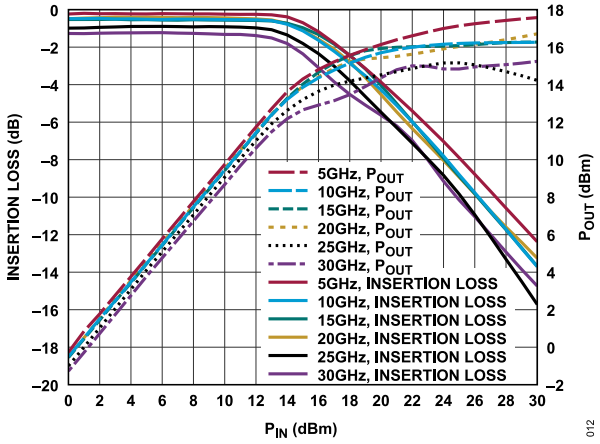

Figure 12. Insertion Loss and P_{OUT} vs. P_{IN} for Various Frequencies

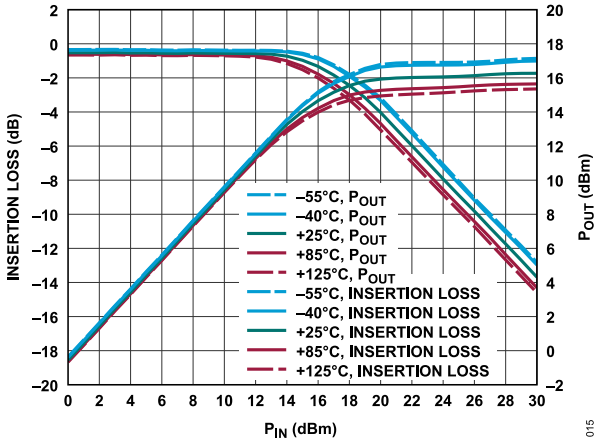

Figure 15. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 15GHz

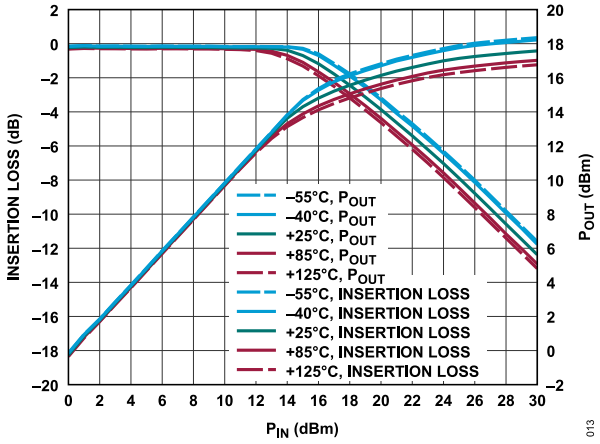

Figure 13. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 5GHz

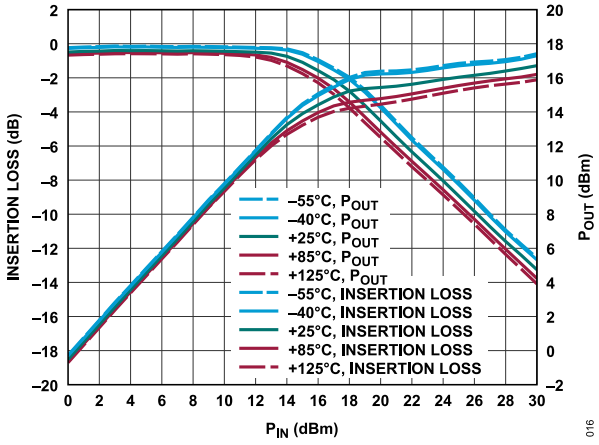

Figure 16. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 20GHz

TYPICAL PERFORMANCE CHARACTERISTICS

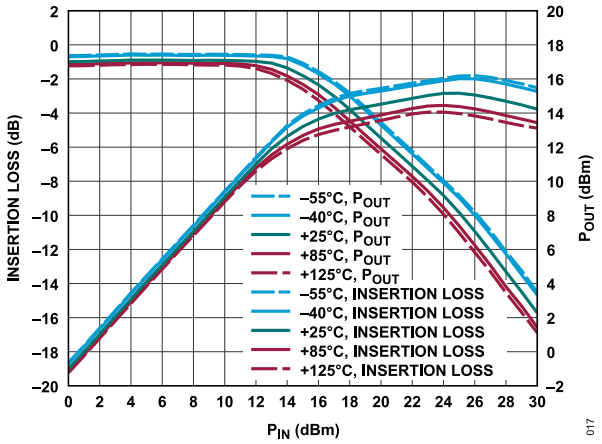

Figure 17. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 25GHz

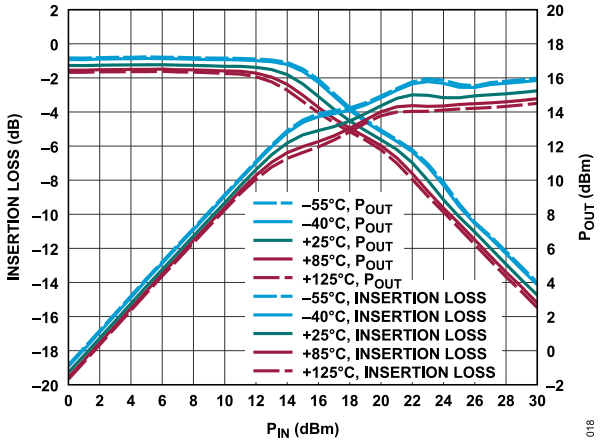

Figure 18. Insertion Loss and P_{OUT} vs. P_{IN} for Various Temperatures, 30GHz

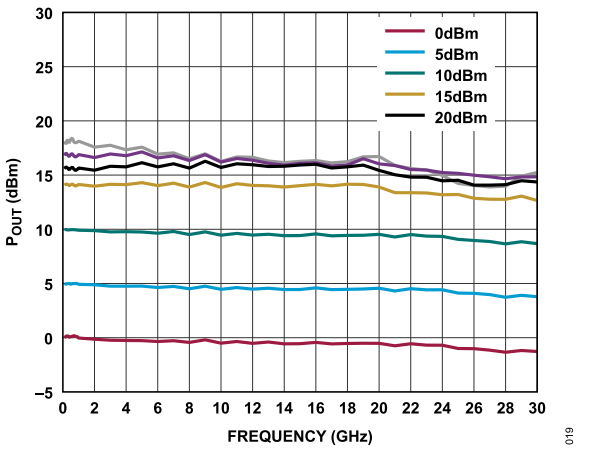

Figure 19. P_{OUT} vs. Frequency for Various P_{IN} Values

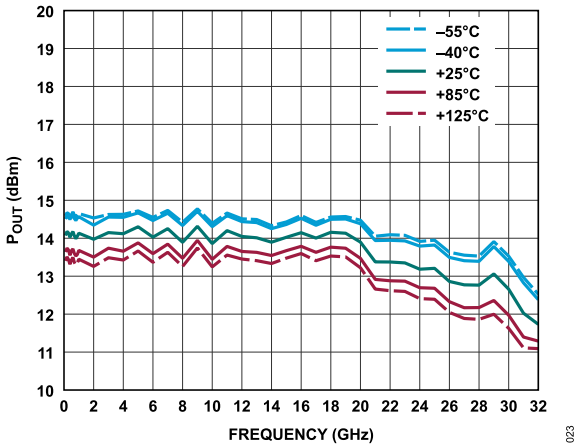

Figure 20. P_{OUT} vs. Frequency for Various Temperatures, 15dBm

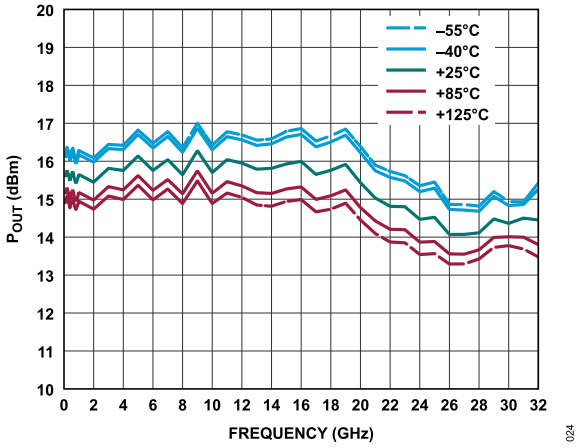

Figure 21. P_{OUT} vs. Frequency for Various Temperatures, 20dBm

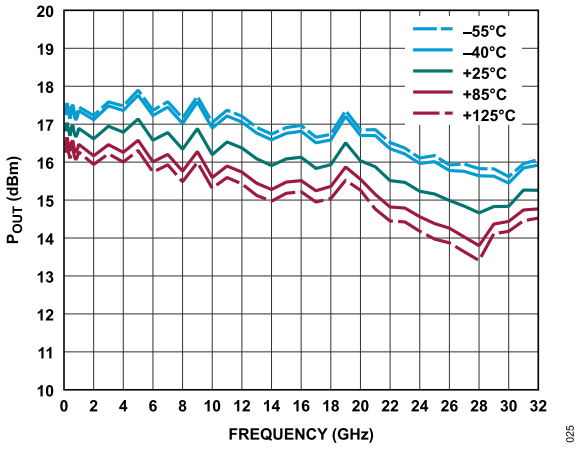

Figure 22. P_{OUT} vs. Frequency for Various Temperatures, 25dBm

TYPICAL PERFORMANCE CHARACTERISTICS

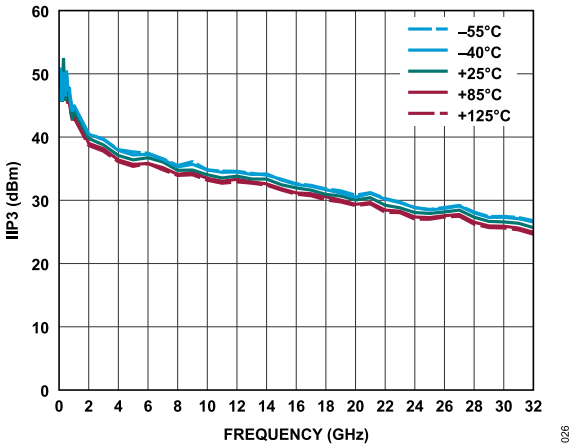

Figure 23. IIP3 vs. Frequency for Various Temperatures

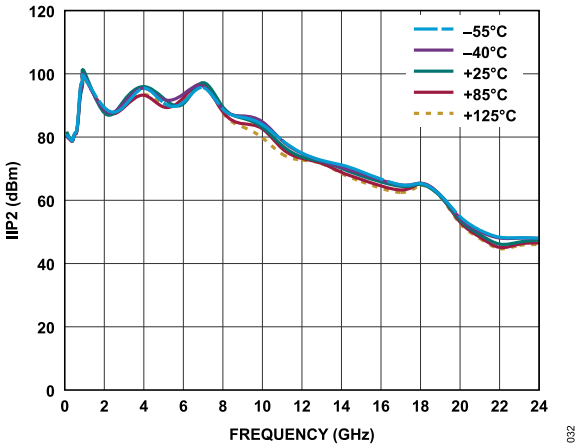

Figure 25. IIP2 vs. Frequency for Various Temperatures

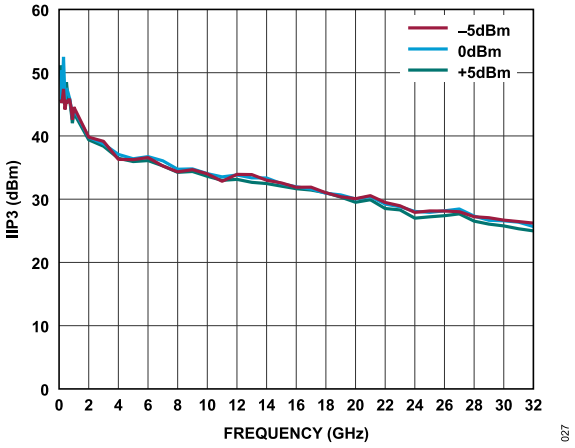

Figure 24. IIP3 vs. Frequency for Various P_{IN} Values per Tone

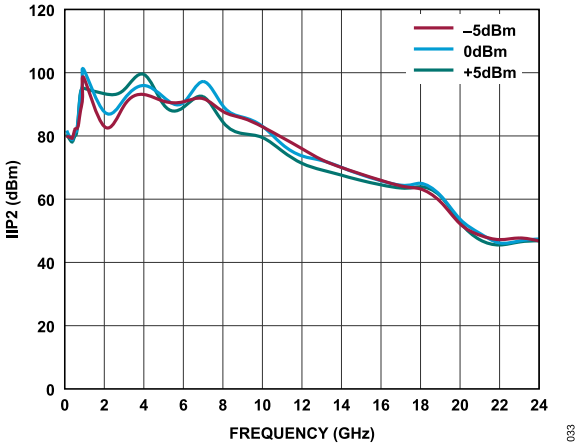

Figure 26. IIP2 vs. Frequency for Various P_{IN} Values per Tone

THEORY OF OPERATION

The ADL8201 is a reflective RF limiter. Figure 27 shows the simplified architecture of the ADL8201.

The ADL8201 has DC-coupled, single-ended input and output ports with impedance that is nominally equal to 50Ω up to 30GHz. No external matching components are required.

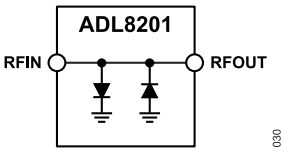

Figure 27. Simplified Architecture

APPLICATIONS INFORMATION

The basic connections for operating the ADL8201 over the specified frequency range are shown in Figure 28. No external biasing circuitry is required. Figure 28 represents the configuration used to characterize and qualify the ADL8201.

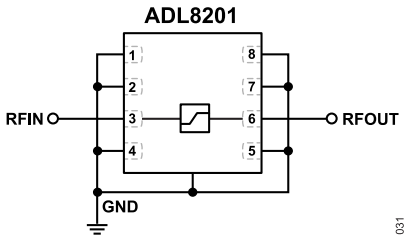

Figure 28. Typical Application Circuit

OUTLINE DIMENSIONS

Package Drawing Option	Package Type	Package Description
CP-8-30	LFCSP	8-Lead Lead Frame Chip Scale Package

For the latest package outline information and land patterns (footprints), go to Package Index.

ORDERING GUIDE

Model[1, 2]	Temperature Range	Package Description	Packing Quantity	Package Option
ADL8201ACPZN	−55°C to +125°C	8-Lead LFCSP, 2mm × 2mm × 0.85mm	Tape, 1	CP-8-30
ADL8201ACPZN-R7	−55°C to +125°C	8-Lead LFCSP, 2mm × 2mm × 0.85mm	Reel, 3000	CP-8-30

[1] Z = RoHS Compliant Part.

[2] The lead finish of the ADL8201ACPZN and ADL8201ACPZN-R7 is nickel palladium gold.