6 GHz to 10 GHz, GaAs, MMIC, I/Q Mixer

Data Sheet

HMC520A

FEATURES

Radio frequency (RF) range: 6 GHz to 10 GHz
Local oscillator (LO) input frequency range: 6 GHz to 10 GHz
Conversion loss: 8 dB typical at 6 GHz to 10 GHz
Image rejection: 23 dBc typical at 6 GHz to 10 GHz
LO to RF isolation: 43 dB typical
LO to intermediate frequency (IF) isolation: 25 dB typical
Input third-order intercept (IP3): 19 dBm typical
Input power for 1 dB compression (P1dB): 10 dBm typical at 7.1 GHz to 8.5 GHz
Wide IF frequency range: DC to 3.5 GHz
24-terminal, 4 mm × 4 mm, ceramic leadless chip carrier

APPLICATIONS

Point to point microwave radios
Point to multipoint radios
Video satellites (VSATs)
Digital radios
Instrumentation
Automatic test equipment (ATE)

FUNCTIONAL BLOCK DIAGRAM

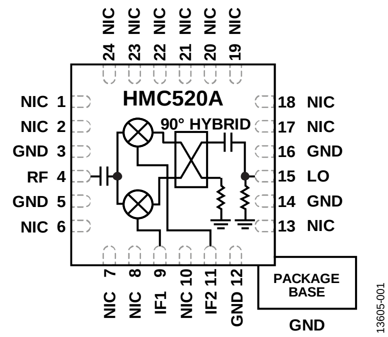

Figure 1.

GENERAL DESCRIPTION

The HMC520A is a compact gallium arsenide (GaAs), monolithic microwave integrated circuit (MMIC), in-phase quadrature (I/Q) mixer in a 24-terminal, RoHS compliant, ceramic leadless chip carrier (LCC) package. The device can be used as either an image reject mixer or a single sideband upconverter. The mixer uses two standard double balanced mixer cells and a 90° hybrid fabricated in a GaAs, metal semiconductor field effect transistor (MESFET) process. The HMC520A is a much smaller alternative to a hybrid style image reject mixer and a single sideband upconverter assembly. The HMC520A eliminates the need for wire bonding, allowing the use of surface-mount manufacturing techniques.

Rev. 0 Document Feedback

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REVISION HISTORY

1/2017—Revision 0: Initial Version

SPECIFICATIONS

LO = 15 dBm, IF = 100 MHz, RF = −10 dBm, T_A = 25°C, unless otherwise noted. All measurements were made as a downconverter with the lower sideband selected (high-side LO) and an external 90° IF hybrid at the IF ports, unless otherwise noted.

Table 1.

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RF RANGE		6		10	GHz
LO INPUT FREQUENCY RANGE		6		10	GHz
IF FREQUENCY RANGE		DC		3.5	GHz
LO AMPLITUDE			15		dBm
6 GHz to 10 GHz PERFORMANCE					
Conversion Loss			8	10	dB
Noise Figure			8.5		dB
Input Third-Order Intercept (IP3)			19		dBm
Input Power for 1dB Compression (P1dB)			10.5		dBm
Image Rejection		19	23		dBc
LO to RF Isolation	Taken without external 90° IF hybrid	38	43		dB
LO to IF Isolation	Taken without external 90° IF hybrid		25		dB
Phase Balance	Taken without external 90° IF hybrid		5		Degree
Amplitude Balance	Taken without external 90° IF hybrid		0.3		dB
7.1 GHz to 8.5 GHz PERFORMANCE					
Conversion Loss			7.7	9.5	dB
Noise Figure			8		dB
Input Third-Order Intercept (IP3)			19		dBm
Input Power for 1dB Compression (P1dB)			10		dBm
Image Rejection		21	25		dBc
LO to RF Isolation	Taken without external 90° IF hybrid	38	43		dB
LO to IF Isolation	Taken without external 90° IF hybrid		25		dB
Phase Balance	Taken without external 90° IF hybrid		4		Degree
Amplitude Balance	Taken without external 90° IF hybrid		0.3		dB

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
RF Input Power	20 dBm
LO Input Power	27 dBm
IF1 and IF2 Input Power	20 dBm
IF DC Current	12 mA
Maximum Peak Reflow Temperature[1]	260°C
Continuous Power Dissipation, P_{DISS} (T_A = 85°C, Derate 4.44 mW/°C Above 85°C)	400 mW
Operating Temperature Range	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature Range (Soldering 60 sec)	−65°C to +150°C
Electrostatic Discharge (ESD) Sensitivity	
Human Body Model (HBM)	750 V (Class 1B)
Field Induced Charged Device Model (FICDM)	1250 V (Class C3)

[1] See the Ordering Guide section.

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.

THERMAL RESISTANCE

Thermal performance is directly linked to printed circuit board (PCB) design and operating environment. Careful attention to PCB thermal design is required.

Table 3. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}[1]	Unit
E-24-1[2]	175°C	225	°C/W

[1] θ_{JC} is the thermal resistance, junction to case (°C/W).
[2] See JEDEC standard JESD51-2 for additional information on optimizing the thermal impedance (PCB with 3 × 3 vias).

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

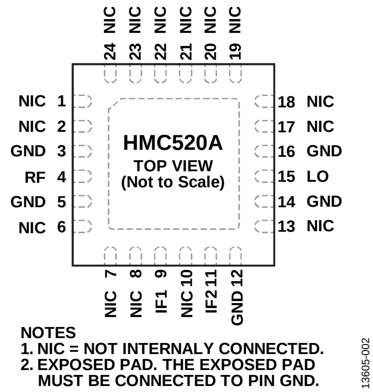

Figure 2. Pin Configuration

Table 4. Pin Function Descriptions

Pin No.	Mnemonic	Description
1, 2, 6 to 8, 10, 13, 17 to 24	NIC	Not Internally Connected.
3, 5, 12, 14, 16	GND	Ground. See Figure 7 for the GND interface schematic.
4	RF	RF Port. This pin is ac-coupled internally and matched to 50 Ω. See Figure 3 for the RF interface schematic.
9, 11	IF1, IF2	First and Second Quadrature Intermediate Frequency Input Pins. For applications that do not require operation to dc, use an off-chip dc blocking capacitor. For applications that require operation to dc, these pins must not source or sink more than 12 mA of current because the device may not function or possible device failure may result. See Figure 5 and Figure 6 for the IF1 and IF2 interface schematics.
15	LO	Local Oscillator Port. This pin is dc-coupled and matched to 50 Ω. See Figure 4 for the LO interface schematic.
	EPAD	Exposed Pad. The exposed pad must be connected to pin GND.

INTERFACE SCHEMATICS

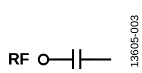

Figure 3. RF Interface Schematic

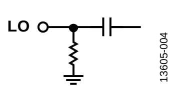

Figure 4. LO Interface Schematic

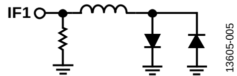

Figure 5. IF1 Interface Schematic

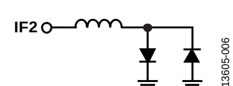

Figure 6. IF2 Interface Schematic

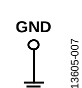

Figure 7. GND Interface Schematic

TYPICAL PERFORMANCE CHARACTERISTICS

DOWNCONVERTER PERFORMANCE: IF = 100 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

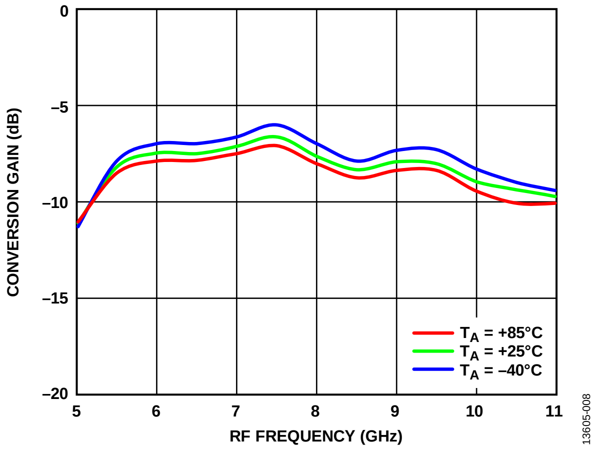

Figure 8. Conversion Gain vs. RF Frequency at Various Temperatures

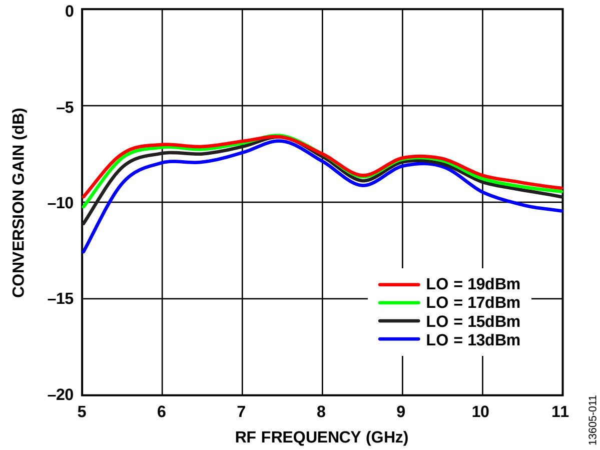

Figure 11. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

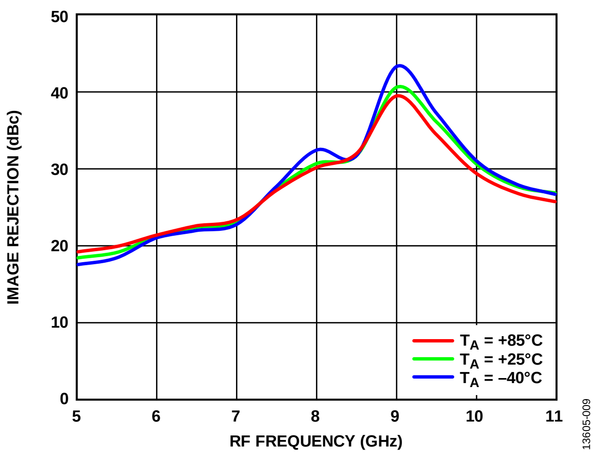

Figure 9. Image Rejection vs. RF Frequency at Various Temperatures

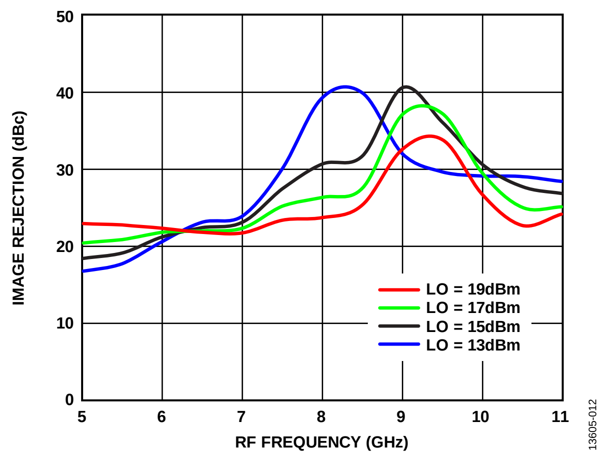

Figure 12. Image Rejection vs. RF Frequency at Various LO Powers, T_A = 25°C

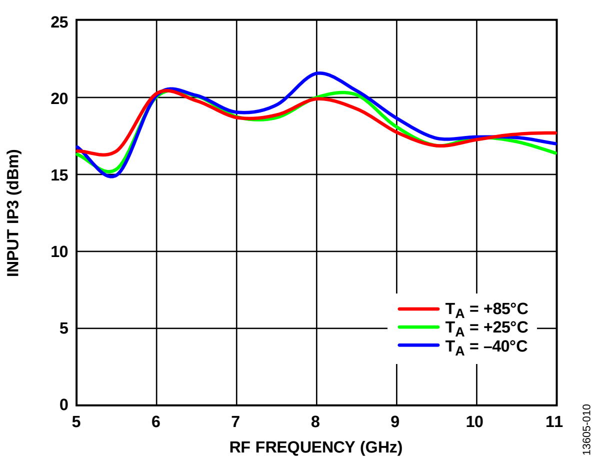

Figure 10. Input IP3 vs. RF Frequency at Various Temperatures

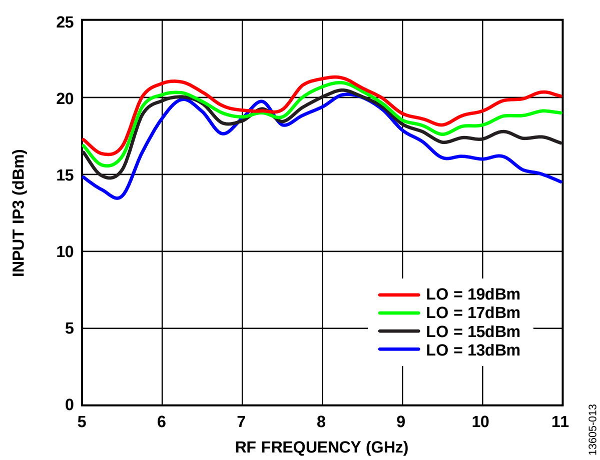

Figure 13. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

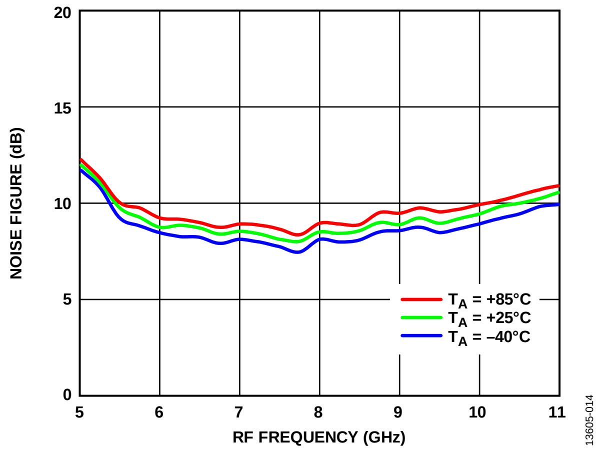

Figure 14. Noise Figure vs. RF Frequency at Various Temperatures

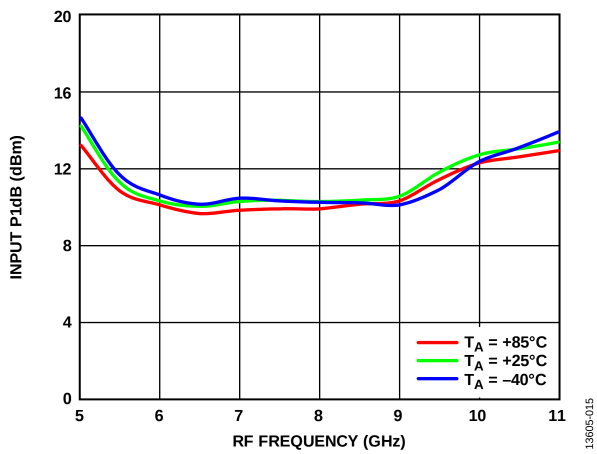

Figure 15. Input P1dB vs. RF Frequency at Various Temperatures

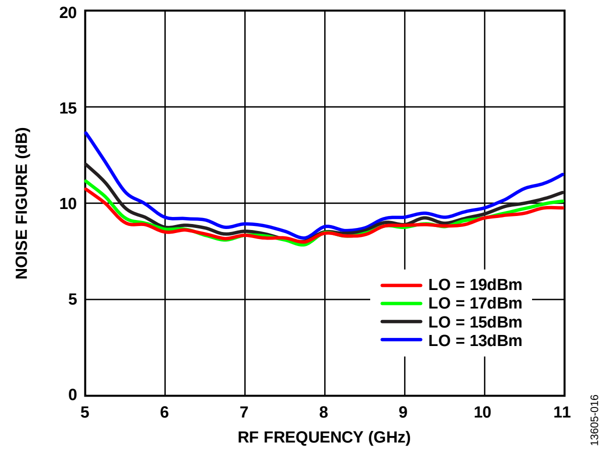

Figure 16. Noise Figure vs. RF Frequency at Various LO Powers, $T_A = 25°C$

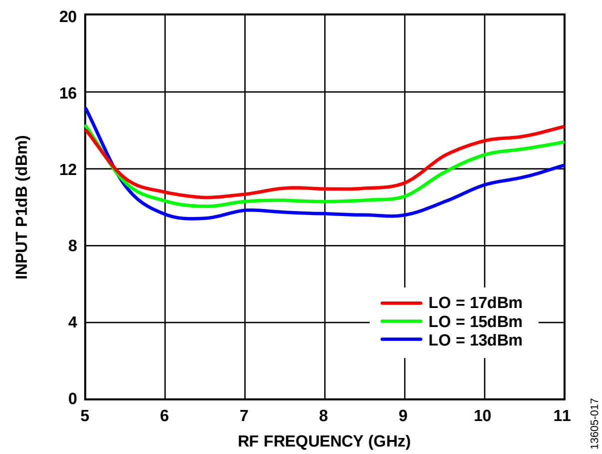

Figure 17. Input P1dB vs. RF Frequency at Various LO Powers, $T_A = 25°C$

DOWNCONVERTER PERFORMANCE: IF = 100 MHz, UPPER SIDEBAND (LOW-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

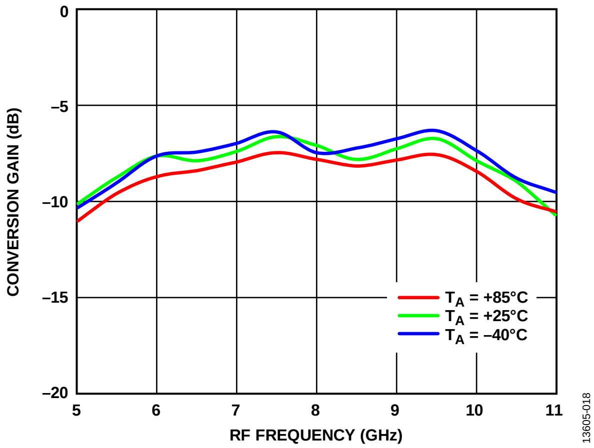

Figure 18. Conversion Gain vs. RF Frequency at Various Temperatures

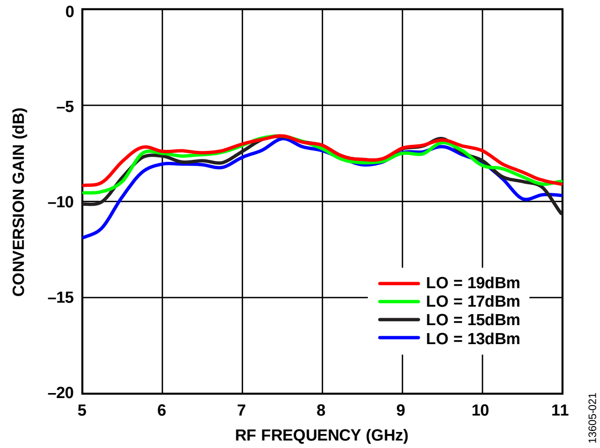

Figure 21. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

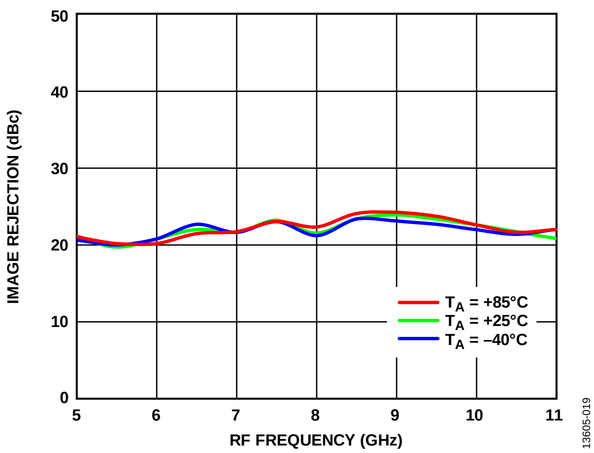

Figure 19. Image Rejection vs. RF Frequency at Various Temperatures

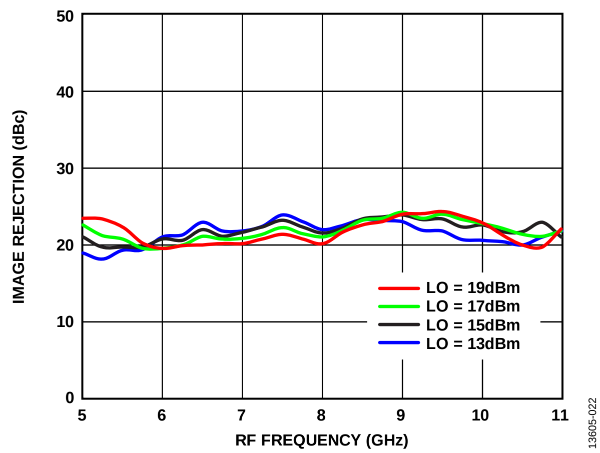

Figure 22. Image Rejection vs. RF Frequency at Various LO Powers, T_A = 25°C

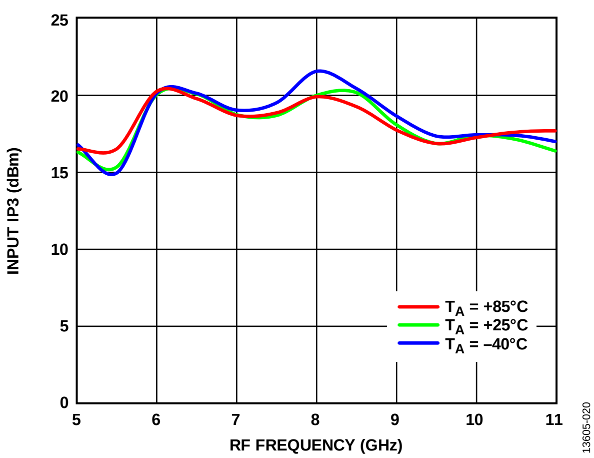

Figure 20. Input IP3 vs. RF Frequency at Various Temperatures

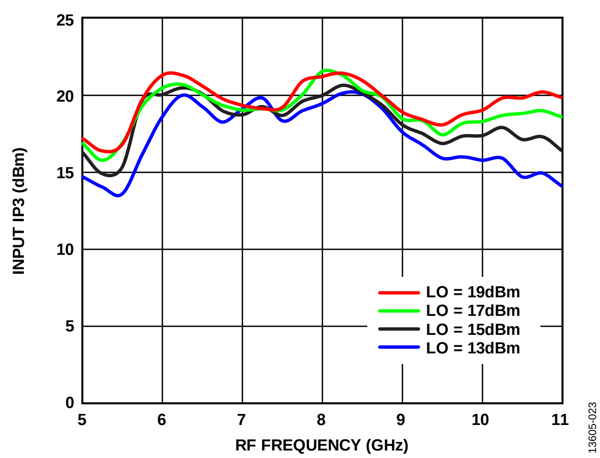

Figure 23. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

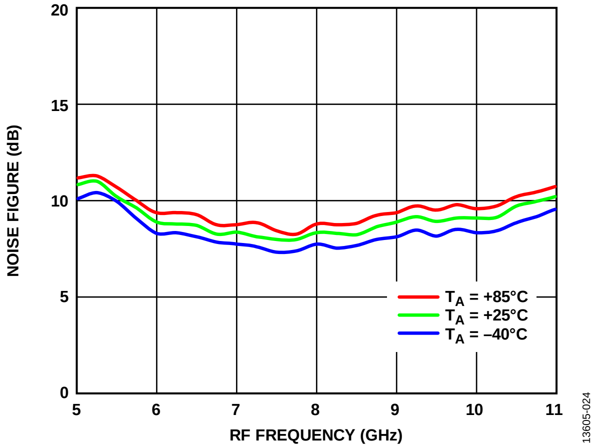

Figure 24. Noise Figure vs. RF Frequency at Various Temperatures

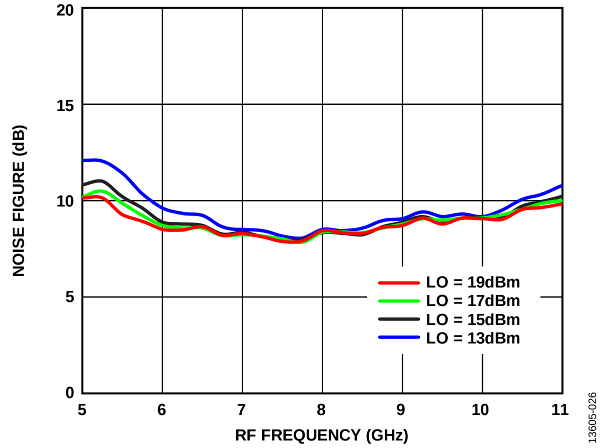

Figure 26. Noise Figure vs. RF Frequency at Various LO Powers, T_A = 25°C

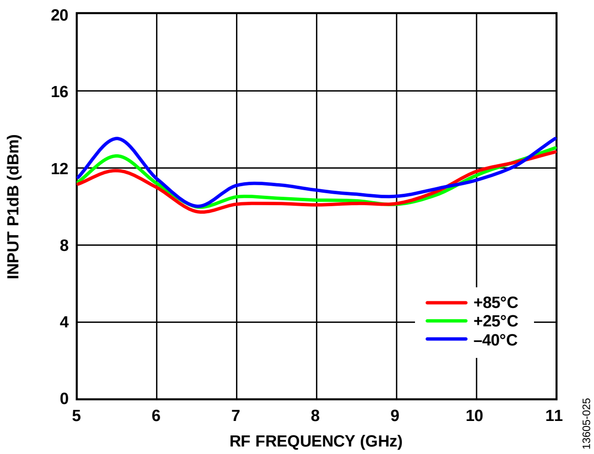

Figure 25. Input P1dB vs. RF Frequency at Various Temperatures

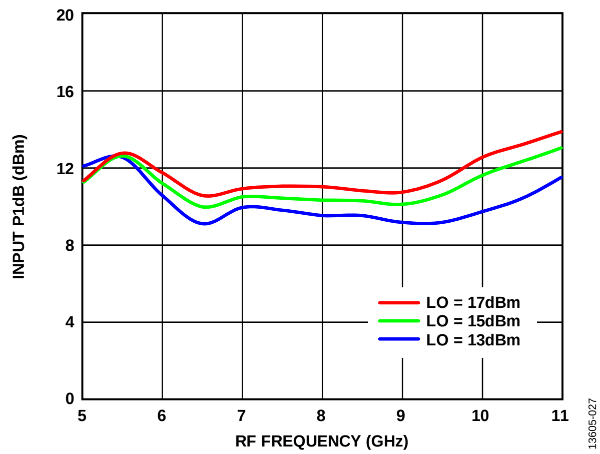

Figure 27. Input P1dB vs. RF Frequency at Various LO Powers, T_A = 25°C

DOWNCONVERTER PERFORMANCE: IF = 1500 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

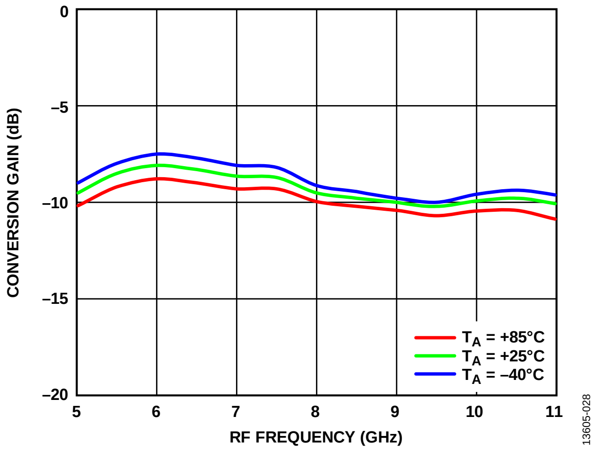

Figure 28. Conversion Gain vs. RF Frequency at Various Temperatures

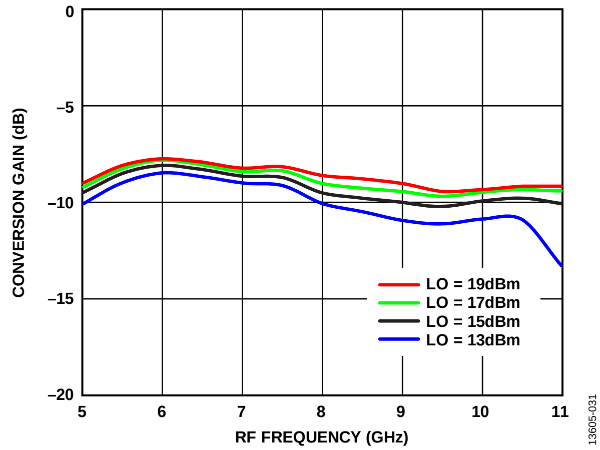

Figure 31. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

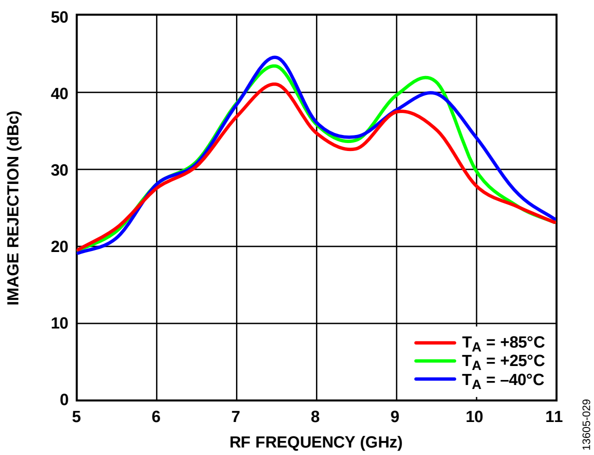

Figure 29. Image Rejection vs. RF Frequency at Various Temperatures

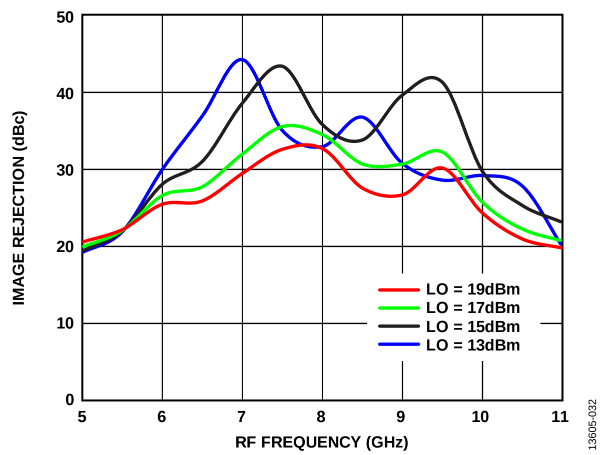

Figure 32. Image Rejection vs. RF Frequency at Various LO Powers, T_A = 25°C

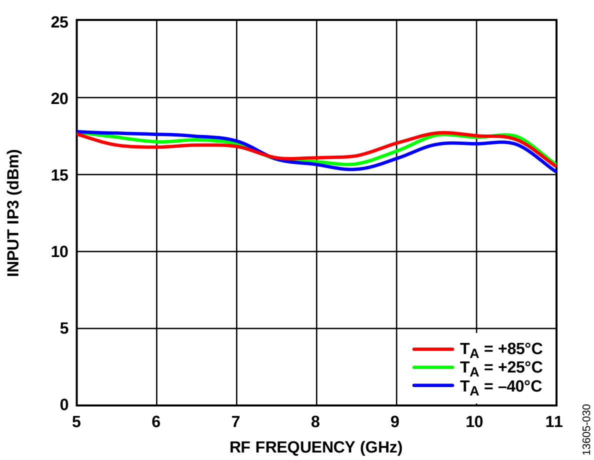

Figure 30. Input IP3 vs. RF Frequency at Various Temperatures

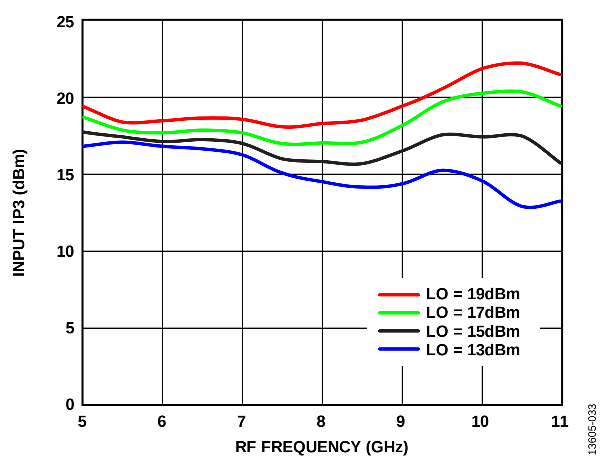

Figure 33. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

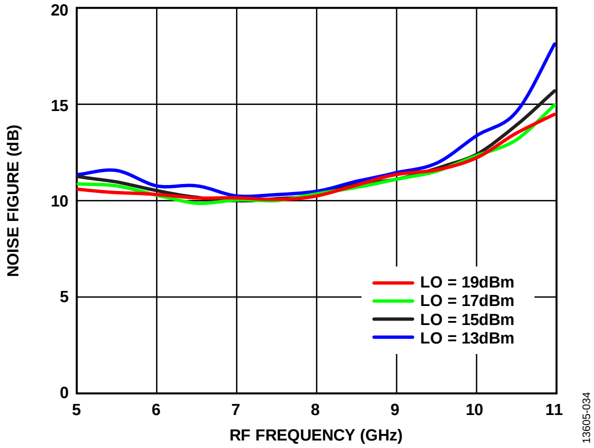

Figure 34. Noise Figure vs. RF Frequency at Various LO Powers, T_A = 25°C

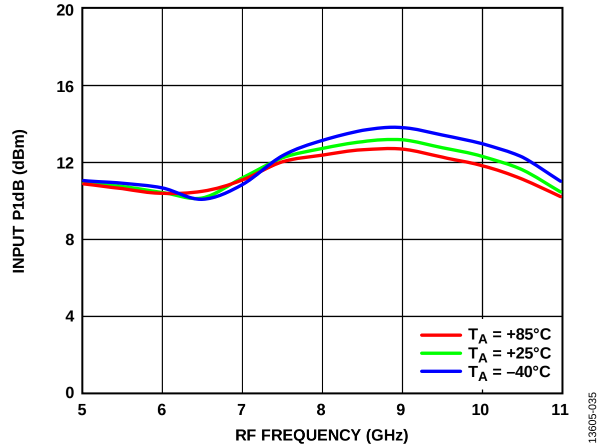

Figure 35. Input P1dB vs. RF Frequency at Various Temperatures

DOWNCONVERTER PERFORMANCE: IF = 1500 MHz, UPPER SIDEBAND (LOW-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

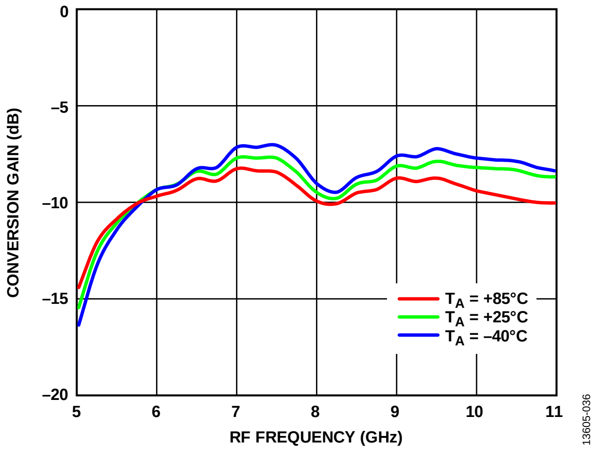

Figure 36. Conversion Gain vs. RF Frequency at Various Temperatures

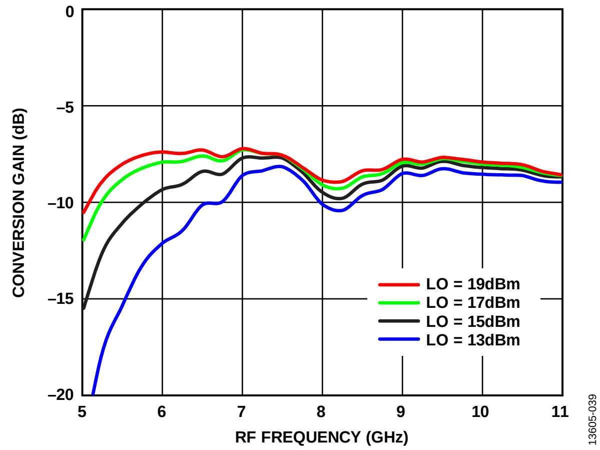

Figure 39. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

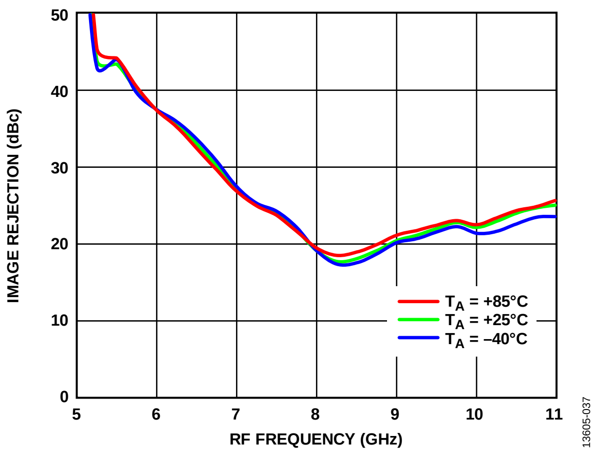

Figure 37. Image Rejection vs. RF Frequency at Various Temperatures

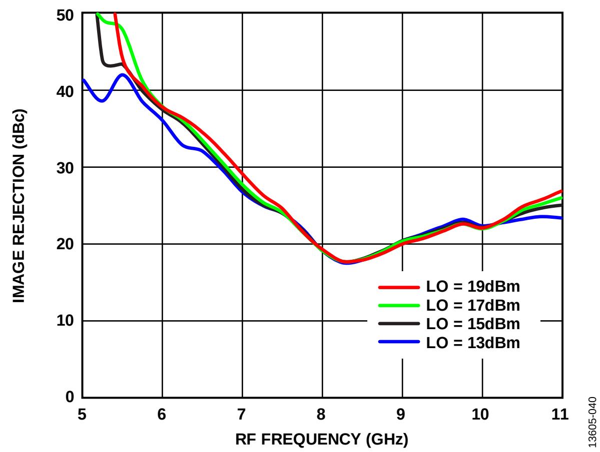

Figure 40. Image Rejection vs. RF Frequency at Various LO Powers

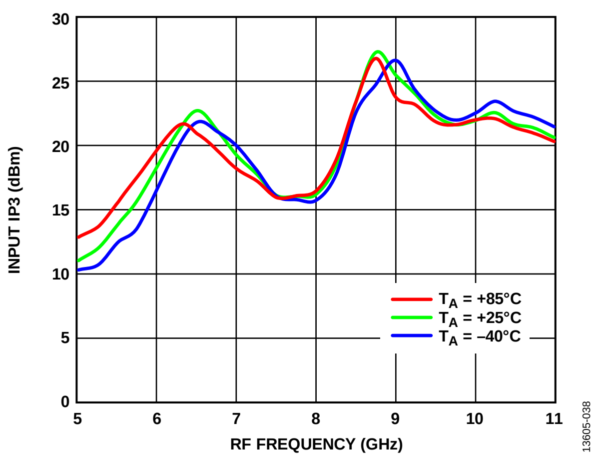

Figure 38. Input IP3 vs. RF Frequency at Various Temperatures

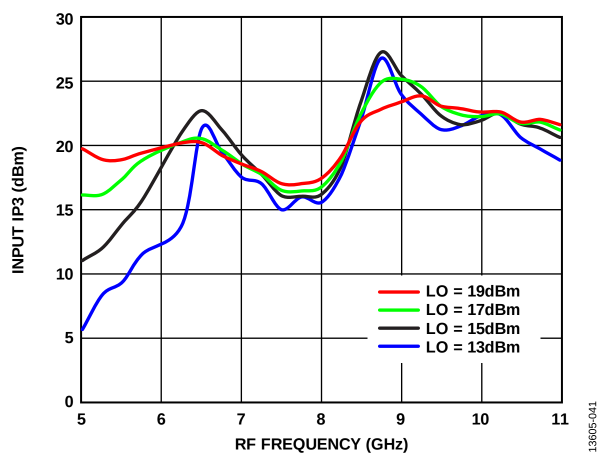

Figure 41. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

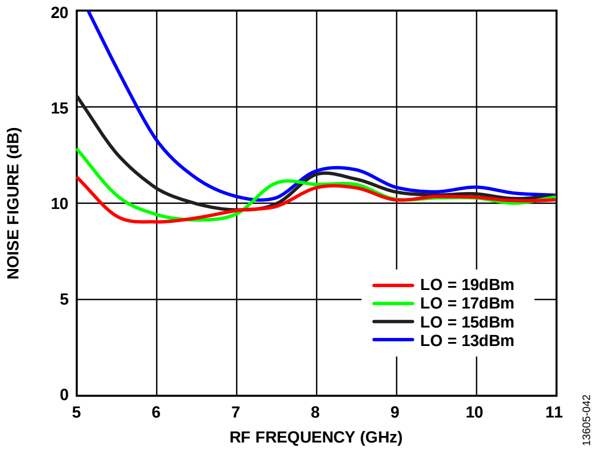

Figure 42. Noise Figure vs. RF Frequency at Various LO Powers, T_A = 25°C

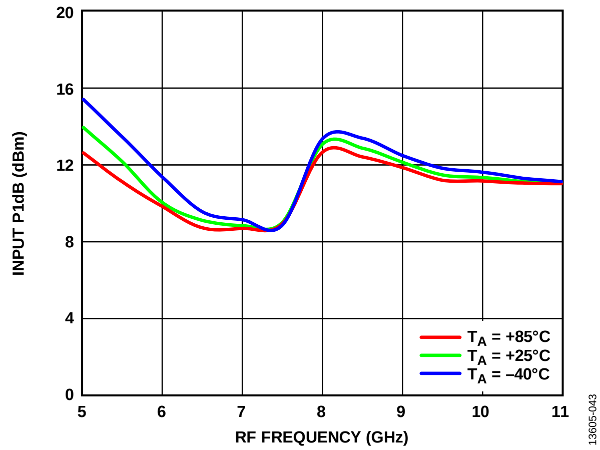

Figure 43. Input P1dB vs. RF Frequency at Various Temperatures

DOWNCONVERTER PERFORMANCE: IF = 3500 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

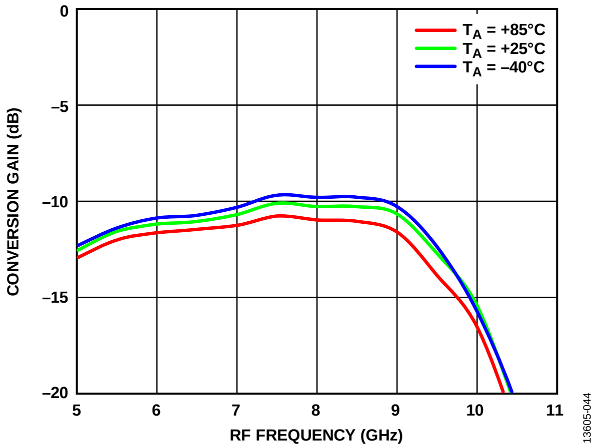

Figure 44. Conversion Gain vs. RF Frequency at Various Temperatures

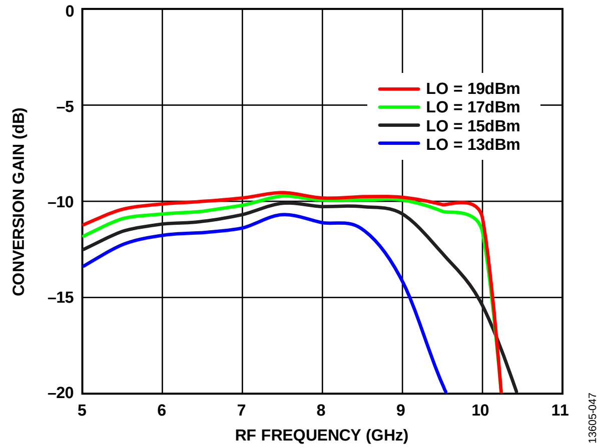

Figure 47. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

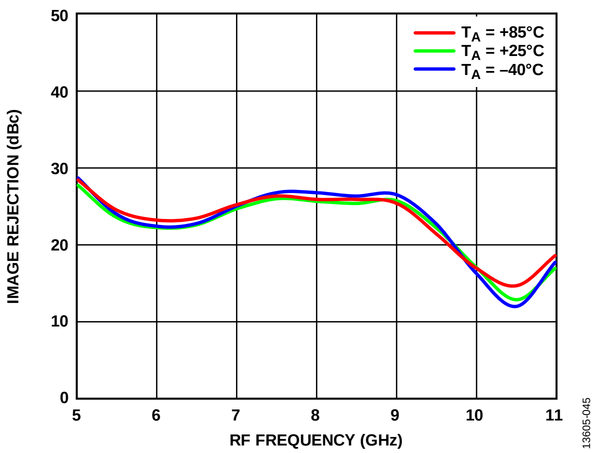

Figure 45. Image Rejection vs. RF Frequency at Various Temperatures

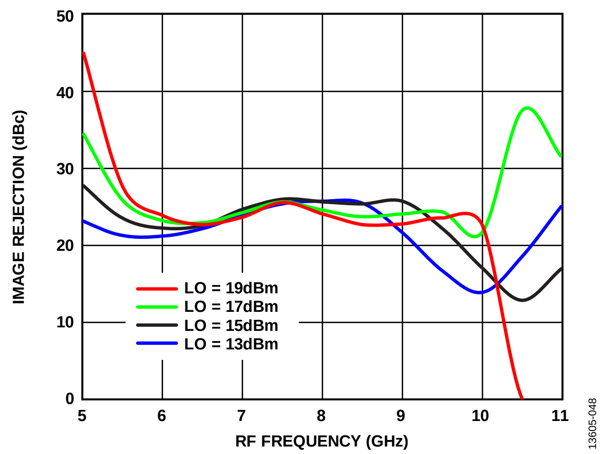

Figure 48. Image Rejection vs. RF Frequency at Various LO Powers, T_A = 25°C

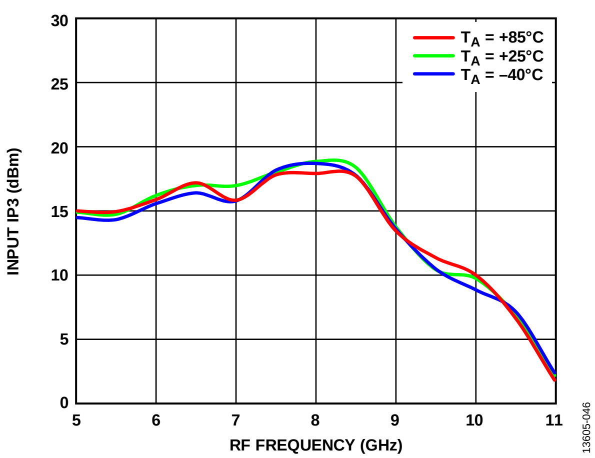

Figure 46. Input IP3 vs. RF Frequency at Various Temperatures

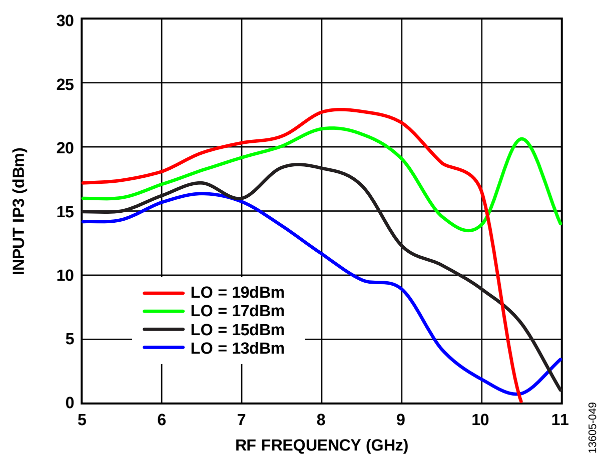

Figure 49. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

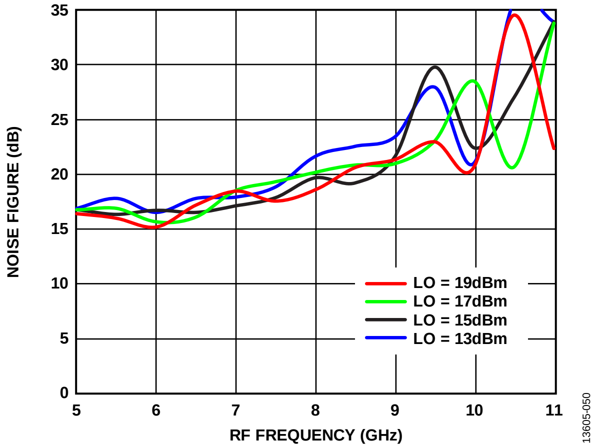

Figure 50. Noise Figure vs. RF Frequency at Various LO Powers, T_A = 25°C

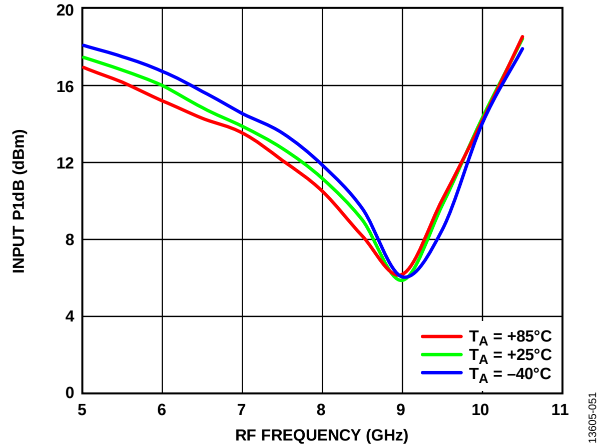

Figure 51. Input P1dB vs. RF Frequency at Various Temperatures

DOWNCONVERTER PERFORMANCE: IF = 3500 MHz, UPPER SIDEBAND (LOW-SIDE LO)

Data taken as an image reject mixer with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

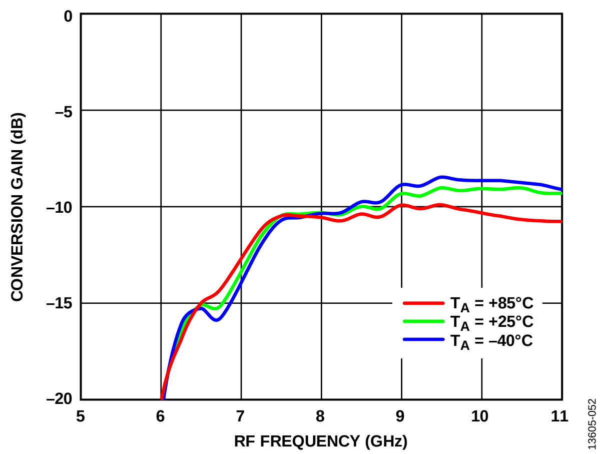

Figure 52. Conversion Gain vs. RF Frequency at Various Temperatures

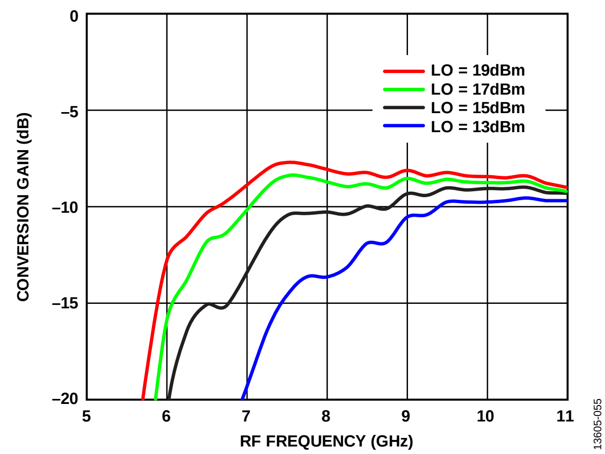

Figure 55. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

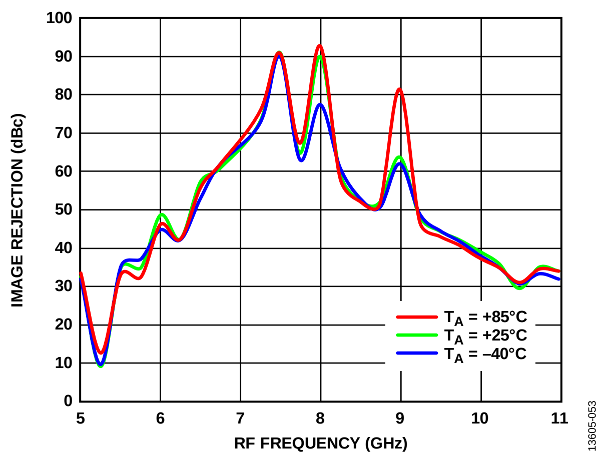

Figure 53. Image Rejection vs. RF Frequency at Various Temperatures

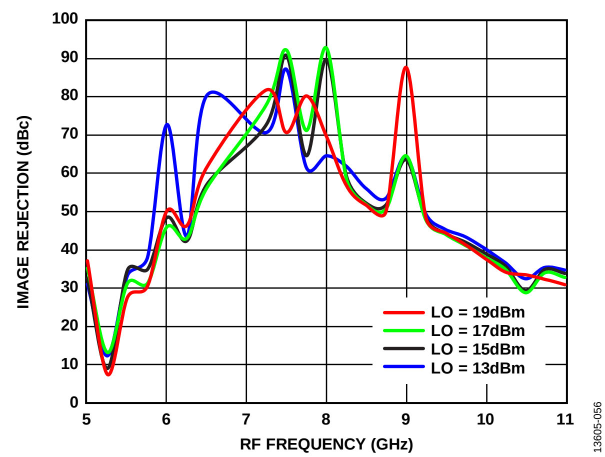

Figure 56. Image Rejection vs. RF Frequency at Various LO Powers

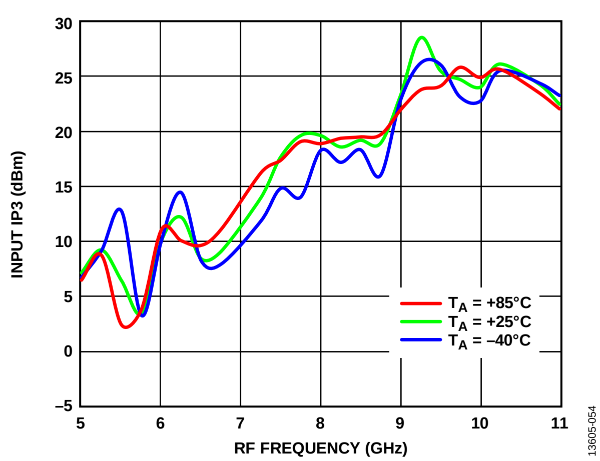

Figure 54. Input IP3 vs. RF Frequency at Various Temperatures

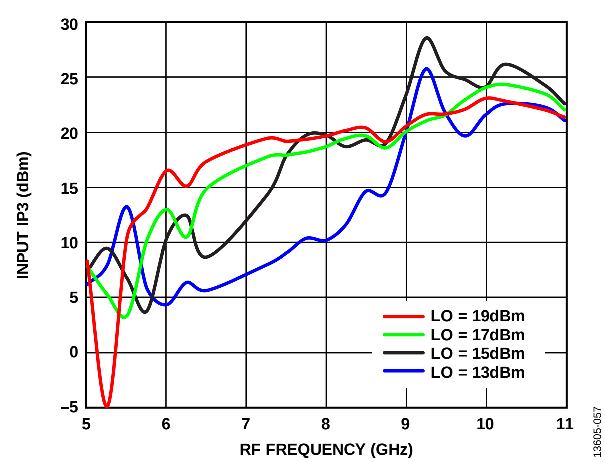

Figure 57. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

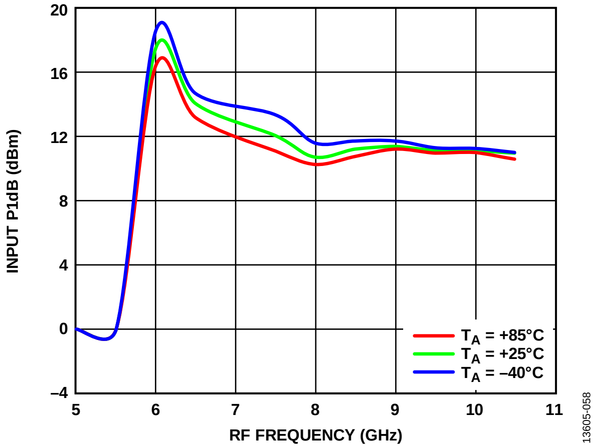

Figure 58. Input P1dB vs. RF Frequency at Various Temperatures

UPCONVERTER PERFORMANCE: IF_{IN} = 100 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken as single sideband upconverter with external 90° hybrid at the IF ports, LO = 15 dBm, unless otherwise noted.

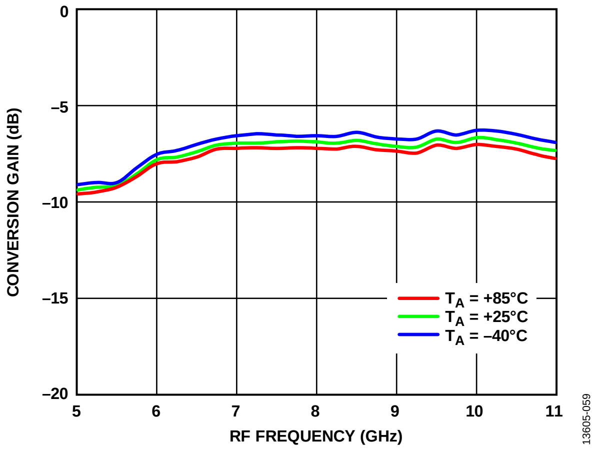

Figure 59. Conversion Gain vs. RF Frequency at Various Temperatures

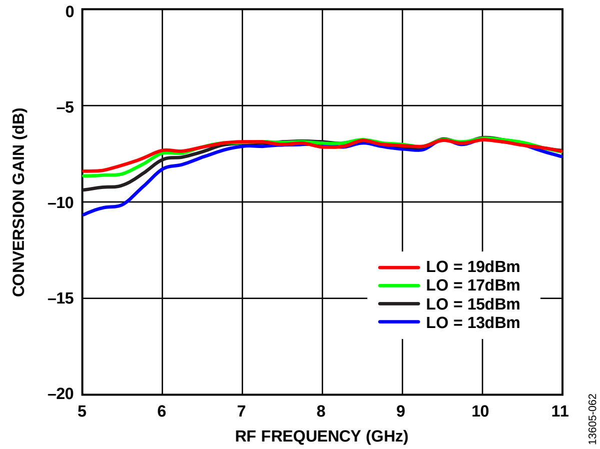

Figure 62. Conversion Gain vs. RF Frequency at Various LO Powers, T_A = 25°C

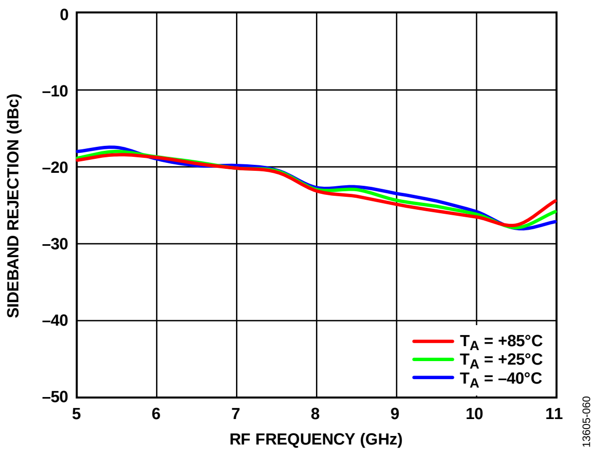

Figure 60. Sideband Rejection vs. RF Frequency at Various Temperatures

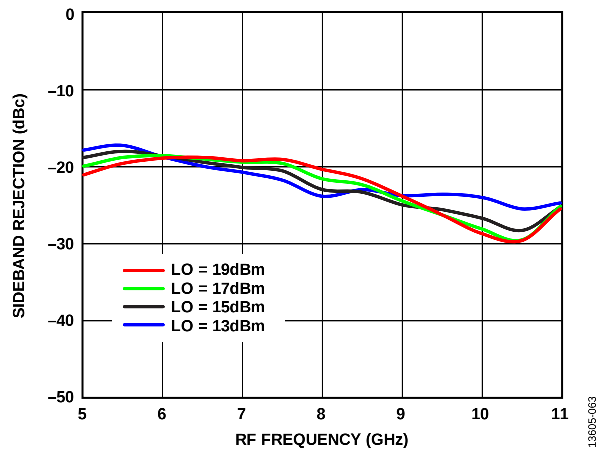

Figure 63. Sideband Rejection vs. RF Frequency at Various LO Powers, T_A = 25°C

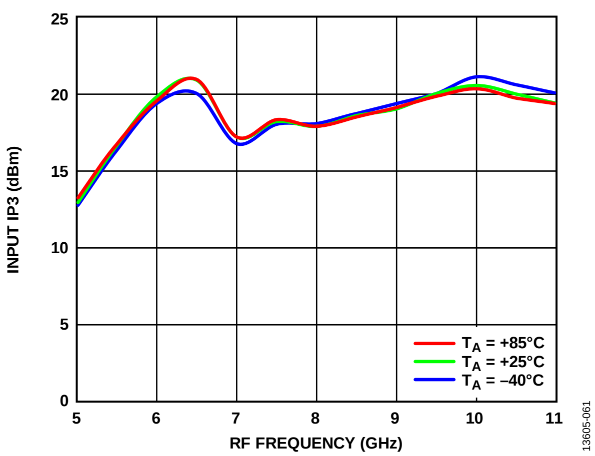

Figure 61. Input IP3 vs. RF Frequency at Various Temperature

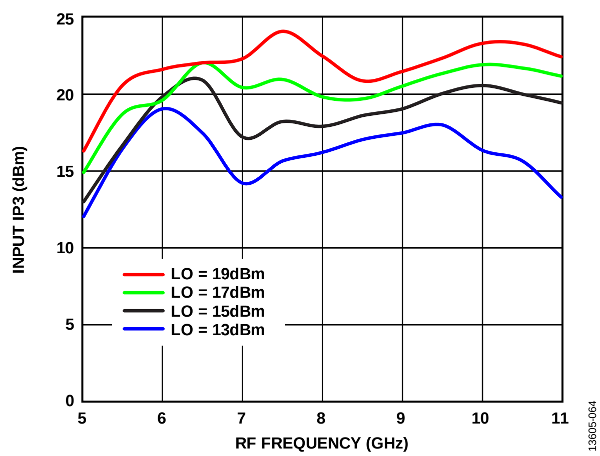

Figure 64. Input IP3 vs. RF Frequency at Various LO Powers, T_A = 25°C

AMPLITUDE/PHASE BALANCE DOWNCONVERTER: IF = 100 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken at LO = 15 dBm, unless otherwise noted.

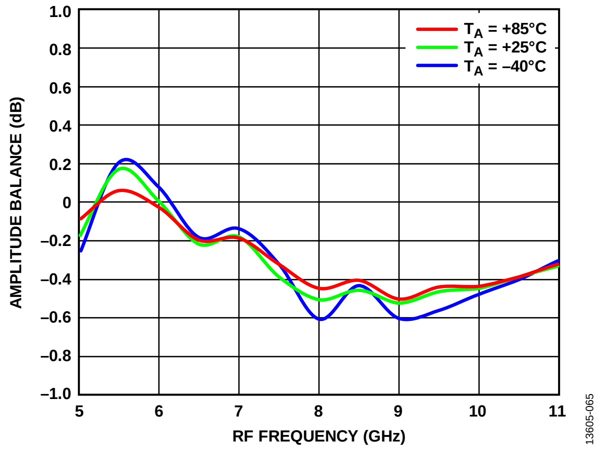

Figure 65. Amplitude Balance vs. RF Frequency at Various Temperatures

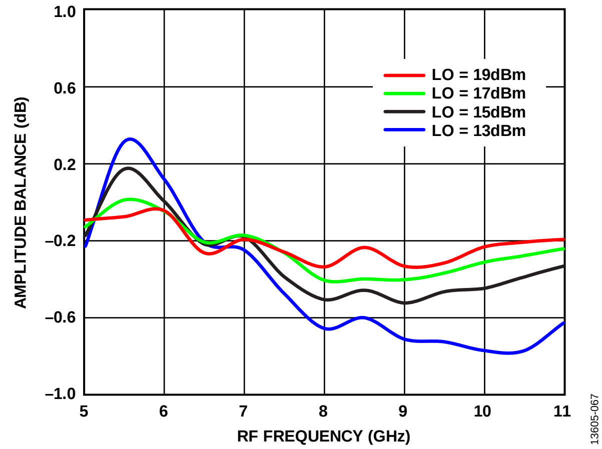

Figure 67. Amplitude Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

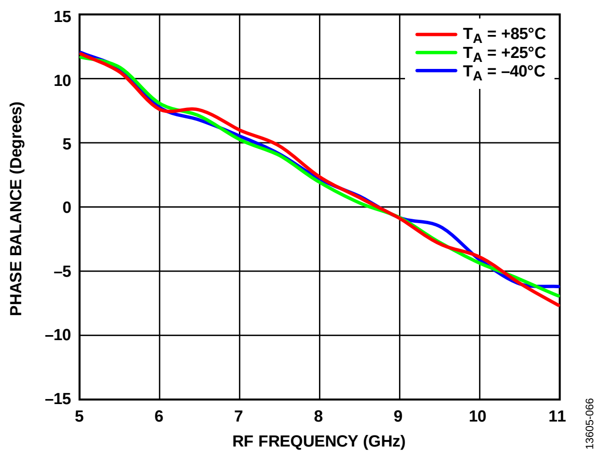

Figure 66. Phase Balance vs. RF Frequency at Various Temperatures

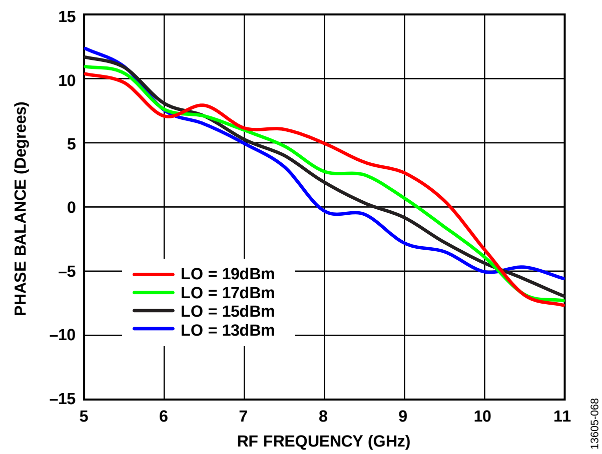

Figure 68. Phase Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

AMPLITUDE/PHASE BALANCE DOWNCONVERTER: IF = 1500 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken at LO = 15 dBm, unless otherwise noted.

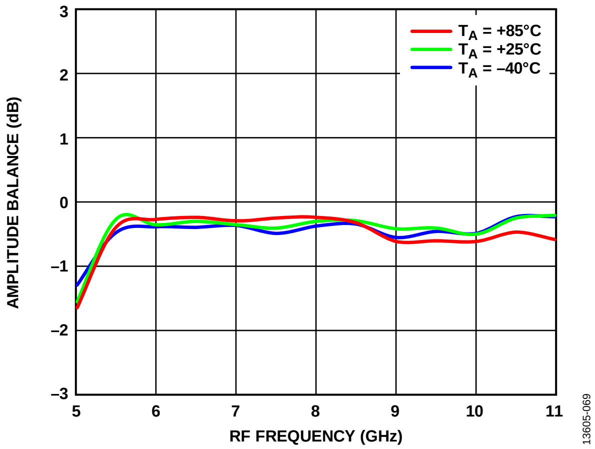

Figure 69. Amplitude Balance vs. RF Frequency at Various Temperatures

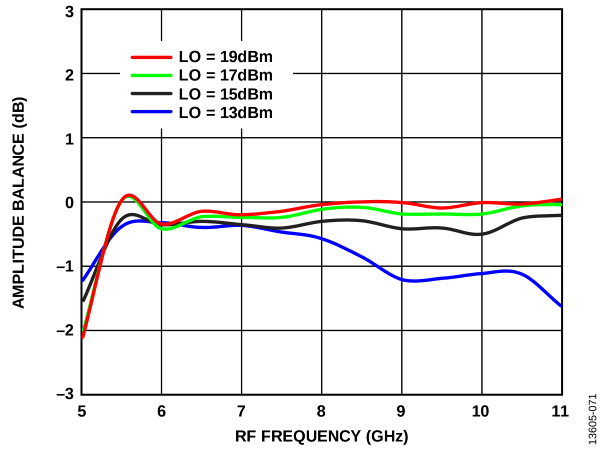

Figure 71. Amplitude Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

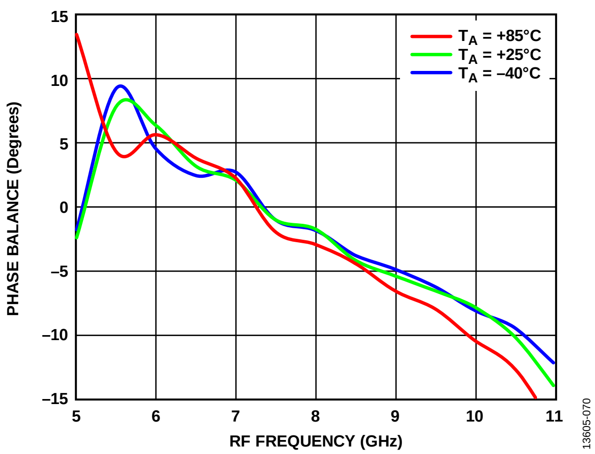

Figure 70. Phase Balance vs. RF Frequency at Various Temperatures

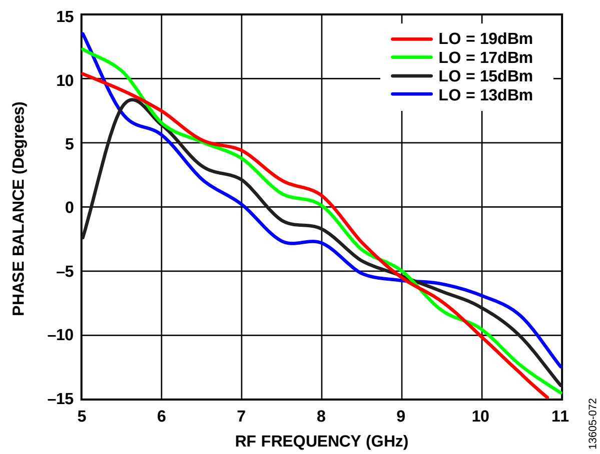

Figure 72. Phase Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

AMPLITUDE/PHASE BALANCE DOWNCONVERTER: IF = 3500 MHz, LOWER SIDEBAND (HIGH-SIDE LO)

Data taken at LO = 15 dBm, unless otherwise noted.

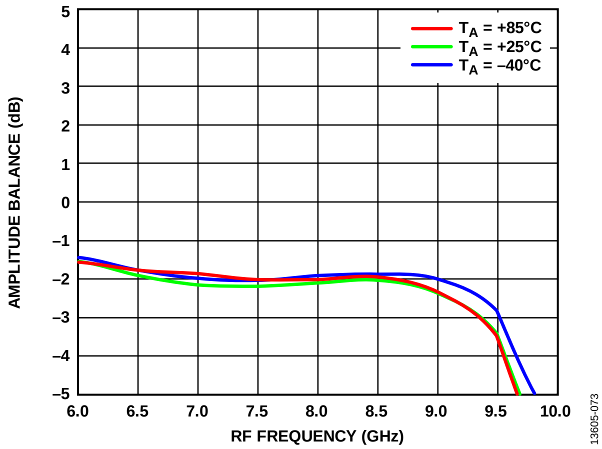

Figure 73. Amplitude Balance vs. RF Frequency at Various Temperatures

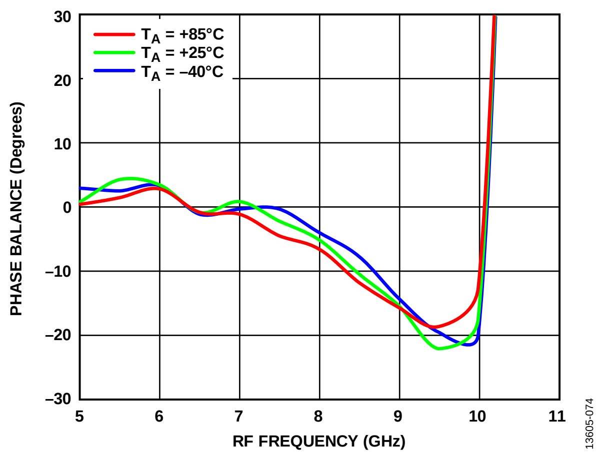

Figure 74. Phase Balance vs. RF Frequency at Various Temperatures

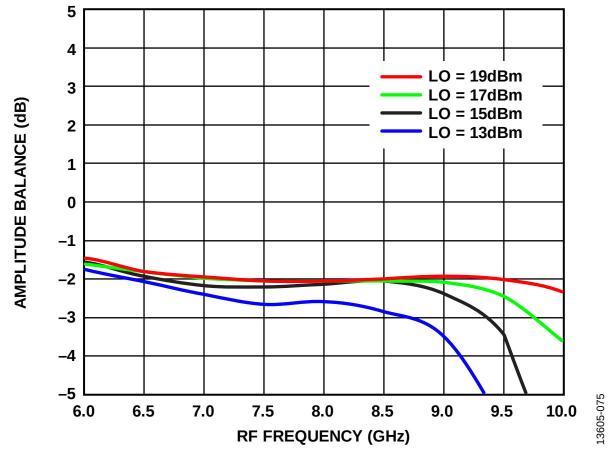

Figure 75. Amplitude Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

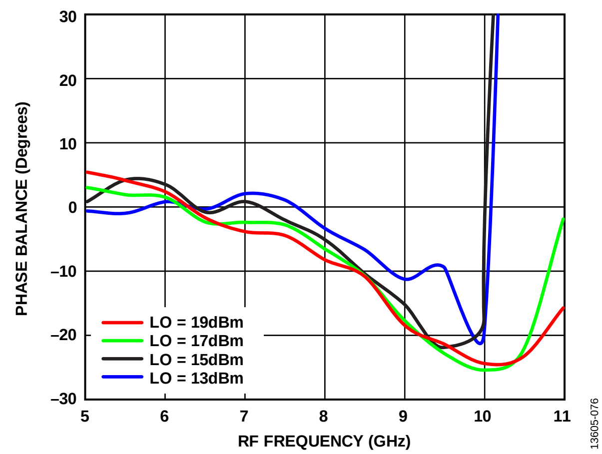

Figure 76. Phase Balance vs. RF Frequency at Various LO Powers, T_A = 25°C

IF BANDWIDTH, DOWNCONVERTER PERFORMANCE

Data taken as an image reject mixer with an external 90° hybrid, and LO = 15 dBm, unless otherwise noted.

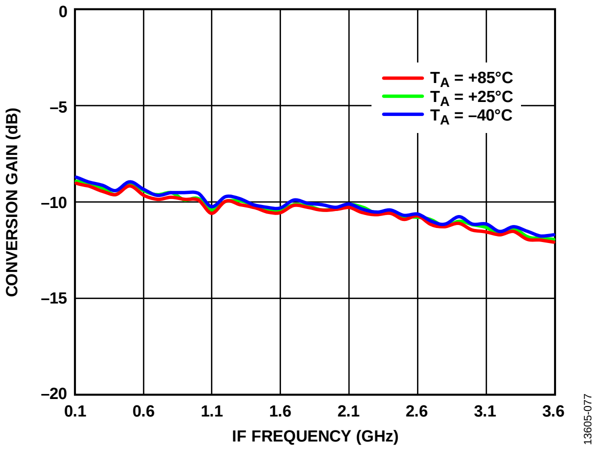

Figure 77. Conversion Gain vs. IF Frequency at Various Temperatures, Lower Sideband, LO = 10.5 GHz

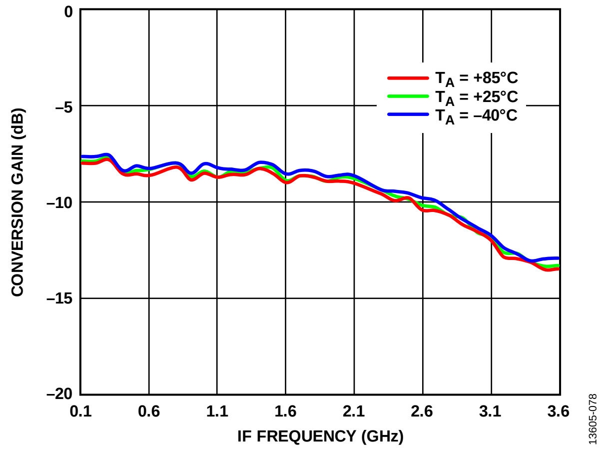

Figure 78. Conversion Gain vs. IF Frequency at Various Temperatures, Upper Sideband, LO = 8.5 GHz

ISOLATION AND RETURN LOSS

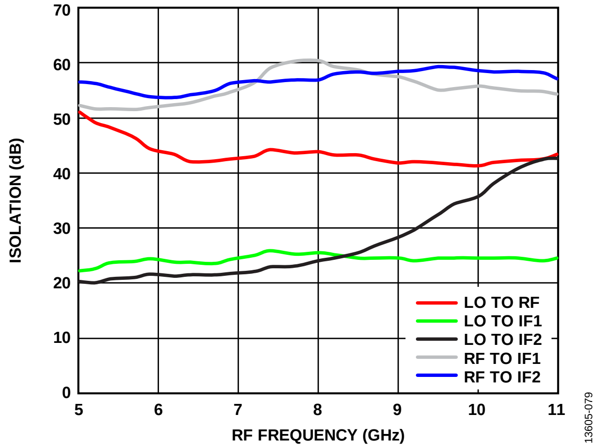

Figure 79. Isolation vs. RF Frequency at LO = 15 dBm, T_A = 25°C

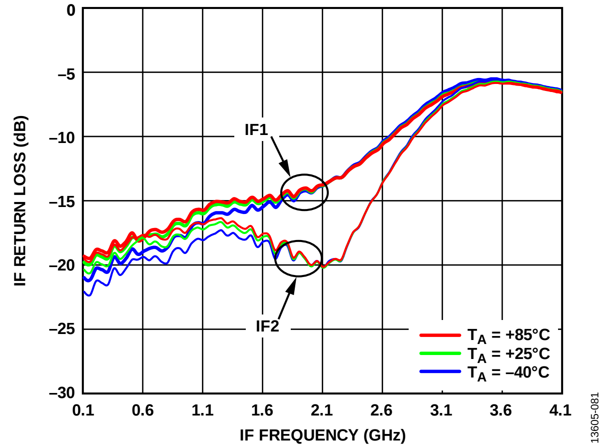

Figure 81. IF Return Loss vs. IF Frequency at Various Temperatures, LO = 8.5 GHz at 15 dBm

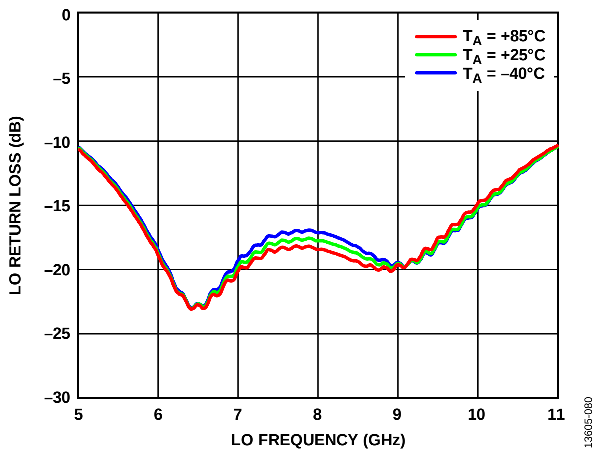

Figure 80. LO Return Loss vs. LO Frequency at Various Temperatures at LO = 15 dBm

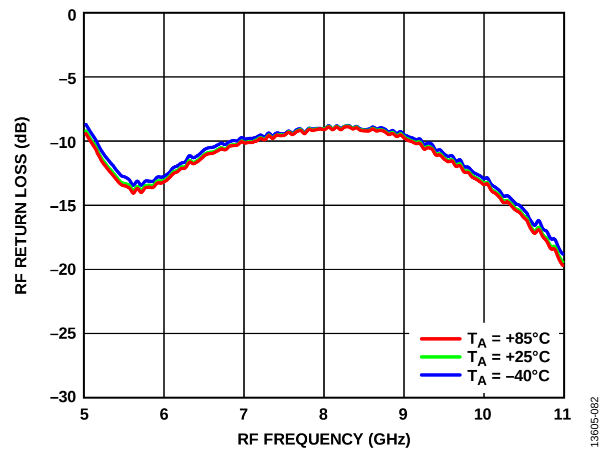

Figure 82. RF Return Loss vs. RF Frequency at Various Temperatures, LO = 8.5 GHz at 15 dBm

SPURIOUS AND HARMONICS PERFORMANCE

LO harmonic isolation, LO = 15 dBm, all values are in dBc below the input LO level at the RF port are positive, unless otherwise noted.

Table 5. N_{LO} Spur at RF Output (RF_{OUT})

	N × LO			
LO Frequency (GHz)	**1**	**2**	**3**	**4**
5.5	49	33	52	66
6.5	43	37	63	52
7	43	43	55	55
7.5	44	55	52	61
8.5	43	59	69	62
9.5	42	61	62	65
10.5	42	72	56	61

RF = 9400 MHz at −10 dBm, LO = 9500 MHz at 15 dBm, data taken without external hybrid, and all values are in dBc measured below the IF power level (M × RF) − (N × LO) are positive, unless otherwise noted.

Table 6. M × N Spurious Output Performance, Downconverter, Lower Sideband (High-Side LO), IF = 100 MHz, T_A = 25°C

		N × LO					
		0	**1**	**2**	**3**	**4**	**5**
M × RF	**0**	0	−13	+31	+12	+39	+56
	1	+31	0	+42	+60	+62	+50
	2	+71	+57	+66	+58	+70	+60
	3	+69	+70	+75	+67	+74	+71
	4	+62	+68	+71	+75	+85	+74
	5	+58	+61	+67	+71	+77	+85

RF = 7600 MHz at −10 dBm, LO = 7500 MHz at 15 dBm, data taken without external hybrid, and all values are in dBc measured below the IF power level (M × RF) − (N × LO) are positive, unless otherwise noted.

Table 7. M × N Spurious Output Performance, Downconverter, Upper Sideband (Low-Side LO), IF = 100 MHz, T_A = 25°C

		N × LO					
		0	**1**	**2**	**3**	**4**	**5**
M × RF	**0**	0	−10	+23	+29	+46	+35
	1	+31	0	+36	+49	+68	+53
	2	+73	+51	+76	+50	+75	+65
	3	+68	+74	+78	+72	+78	+73
	4	+68	+71	+71	+79	+87	+77
	5	+62	+68	+70	+73	+77	+86

RF_{OUT} = 7600 MHz, LO = 7500 MHz at 15 dBm, data taken without external hybrid, and all values are in dBc measured below the RF_{OUT} power level (M × IF_{IN}) − (N × LO) are positive, unless otherwise noted.

Table 8. M × N Spurious Output Performance, Upconverter, Upper Sideband (Low-Side LO), IF_{IN} = 100 MHz at −10 dBm, T_A = 25°C

		N × LO					
		0	**1**	**2**	**3**	**4**	**5**
M × IF	**0**	0	6	26	24	29	42
	1	78	0	24	30	56	42
	2	89	53	71	67	62	58
	3	88	65	73	67	64	60
	4	88	76	71	66	64	58
	5	86	77	72	68	63	59

RF_{OUT} = 9400 MHz, LO = 9500 MHz at 15 dBm, data taken without external hybrid, and all values are in dBc measured below the RF_{OUT} power level (M × IF_{IN}) − (N × LO) are positive, unless otherwise noted.

Table 9. M × N Spurious Output Performance, Upconverter, Lower Sideband (High-Side LO), IF_{IN} = 100 MHz at −10 dBm, T_A = 25°C

		N × LO					
		0	**1**	**2**	**3**	**4**	**5**
M × IF	**0**	0	8	21	17	26	35
	1	79	0	25	48	54	37
	2	87	55	47	57	56	59
	3	87	60	74	72	68	61
	4	86	77	73	72	66	61
	5	86	78	74	72	67	60

THEORY OF OPERATION

The HMC520A is a compact gallium arsenide (GaAs), monolithic microwave integrated circuit (MMIC), in-phase quadrature (I/Q) mixer in a 24-terminal, RoHS compliant, ceramic leadless chip carrier (LCC) package. The device can be used as either an image reject mixer or a single sideband upconverter. The mixer uses two standard double balanced mixer cells and a 90° hybrid fabricated in a GaAs, metal semiconductor field effect transistor (MESFET) process. This device is a much smaller alternative to a hybrid style image reject mixer and a single sideband upconverter assembly. The HMC520A eliminates the need for wire bonding, allowing the use of the surface-mount manufacturing techniques.

APPLICATIONS INFORMATION

Figure 83 shows the typical application circuit for the HMC520A. To select the appropriate sideband, an external 90° degree hybrid is needed. For applications not requiring operation to dc, use an off-chip dc blocking capacitor.

To select the upper sideband, connect IF1 to the 90° port of the hybrid and IF2 to the 0° port of the hybrid. To select the lower sideband, switch these connections.

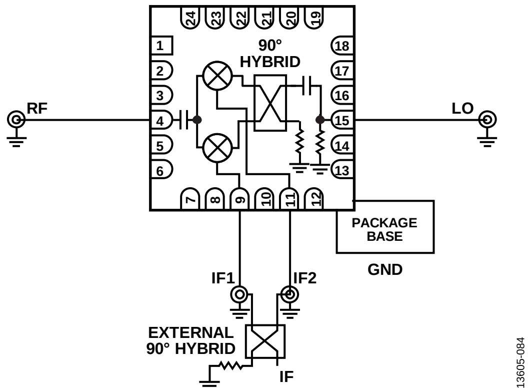

Figure 83. Typical Application Circuit

EVALUATION BOARD INFORMATION

The EV1HMC520ALC4 evaluation PCB used in the application must use RF circuit design techniques. Signal lines must have 50 Ω impedance and connect the package ground leads and exposed pad directly to the ground plane similarly to that shown in Figure 84. Use a sufficient number of via holes to connect the top and bottom ground planes. The evaluation circuit board shown in Figure 84 is available from Analog Devices, Inc., upon request

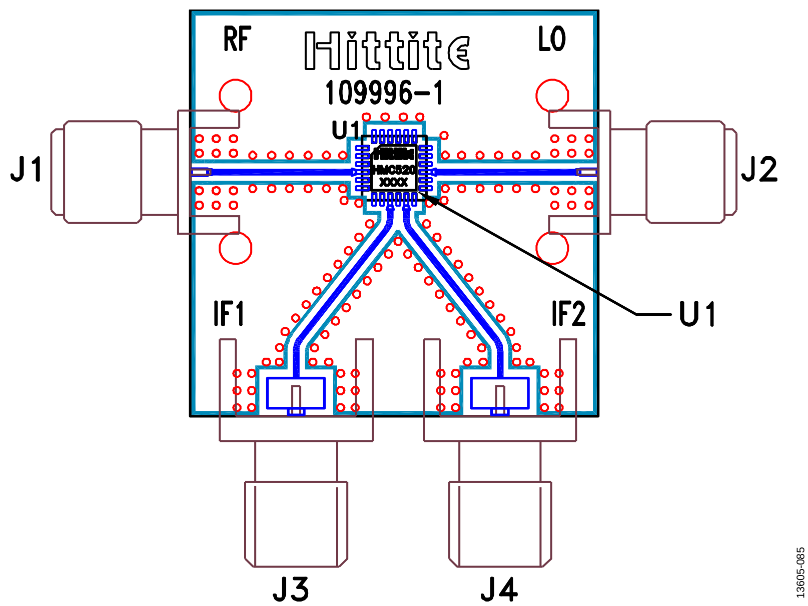

Figure 84. EV1HMC520ALC4 Evaluation PCB Top Layer

Table 10. Bill of Materials for the EV1HMC520ALC4 Evaluation PCB

Quantity	Reference Designator	Description	Part Number
1	109996-1	PCB, EV1HMC520ALC4	109996-1
2	J1, J2 (RF, LO)	2.92 mm SMA connectors, SRI Connector Gage	104935
2	J3, J4 (IF1, IF2)	Gold plated SMA, edge mount with 0.02 inch pin connectors, Johnson SMA connectors	105192
1	U1	Device under test, HMC520ALC4	HMC520ALC4

OUTLINE DIMENSIONS

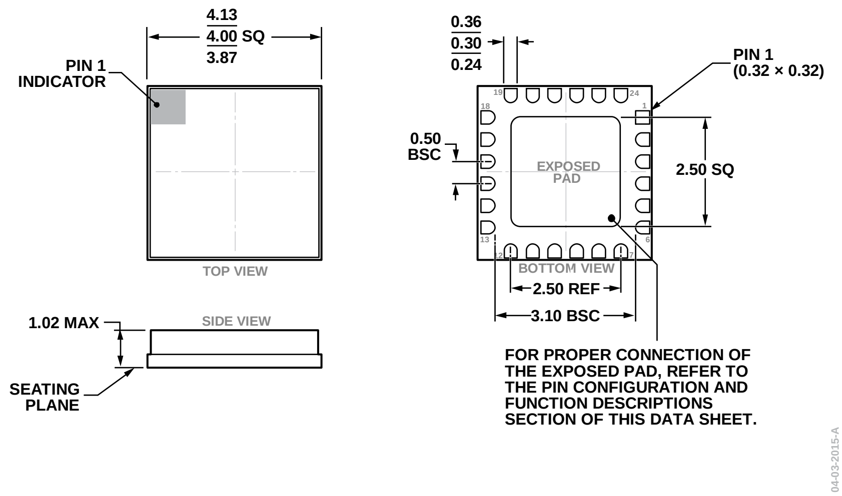

Figure 85. 24-Terminal Ceramic Leadless Chip Carrier [LCC]
(E-24-1)
Dimensions shown in millimeters

ORDERING GUIDE

Model[1]	Temperature Range	Package Body Material	Lead Finish	MSL Rating[2]	Package Description	Package Option	Branding[3]
HMC520ALC4	−40°C to +85°C	Alumina Ceramic	Gold over Nickel	MSL3	24-Terminal LCC	E-24-1	H520A XXXX
HMC520ALC4TR	−40°C to +85°C	Alumina Ceramic	Gold over Nickel	MLS3	24-Terminal LCC	E-24-1	H520A XXXX
HMC520ALC4TR-R5	−40°C to +85°C	Alumina Ceramic	Gold over Nickel	MLS3	24-Terminal LCC	E-24-1	H520A XXXX
EV1HMC520ALC4					Evaluation Board		

[1] The HMC520ALC4, the HMC520ALC4TR, and the HMC520ALC4TR-R5 are RoHS Compliant Parts.
[2] See the Absolute Maximum Ratings section.
[3] The four-digit lot number is XXXX.

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D13605-0-1/17(0)