High IP3

Frequency Mixer

ADE-201FMH+

Level 13 (LO Power +13 dBm) 90 to 200 MHz

CASE STYLE: CD636

The Big Deal

- High IP3: +30 dBm
- Low conversion loss, 6.4 dB
- Excellent P1dB compression, +16 dBm at input
- High L-R isolation, 42 dB typ.
- High L-I isolation, 35 dB typ.

Product Overview

Mini-Circuits' ADE-201FMH+ is a surface mount frequency mixer providing high IP3 performance, ideal for minimizing 3rd order intermodulation distortion in multiple carrier environments and other systems where unwanted signals may be present. It also provides high isolation, high P1dB compression point, and low conversion loss. The mixer comes in a compact, six-lead plastic case measuring 0.27 x 0.31 x 0.22", saving space in dense board layouts.

Feature	Advantages
High IP3, +30 dBm	Minimizes third order intermodulation distortion and enables high-dynamic range.
Low conversion loss, 6.4 dB	Enables lower NF front ends, improving system sensitivity.
Excellent P1dB compression, +16 dBm at input	Provides linear performance for a wide range of RF input power levels.
High L-R isolation, • L-R, 42 dB • L-I, 35 dB	Preserves signal integrity from input to output and reduces undesired signal responses that can interfere with system performance.
Small size (0.27 x 0.31 x 0.22")	Saves board space and accommodates tight layouts

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Generic photo used for illustration purposes only

CASE STYLE: CD636

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200
13"	500,1000

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	20 dBm
LO Power	17 dBm

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

LO	6
RF	4
IF	3
GROUND	1,2,5

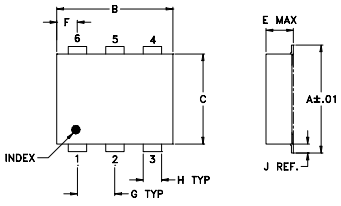
Features

- excellent IP3, 30 dBm typ.
- excellent P1dB compression,+16 dBm at input
- good L-R isolation, 42 dB typ.
- good L-I isolation, 35 dB typ.
- aqueous washable
- protected by U.S. patent 6,133,525

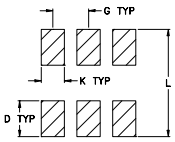
Applications

- amateur radio
- mobil radio
- radar
- vehicle recovery system
- locator transmitters

Outline Drawing



PCB Land Pattern



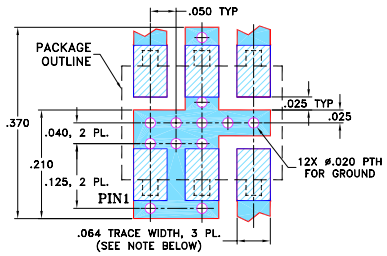
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.272	.310	.220	.100	.162	.055	.100
6.91	7.87	5.59	2.54	4.11	1.40	2.54

H	J	K	L	wt
.030	.026	.065	.300	grams
0.76	0.66	1.65	7.62	0.25

Demo Board MCL P/N: TB-02
Suggested PCB Layout (PL-051)



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

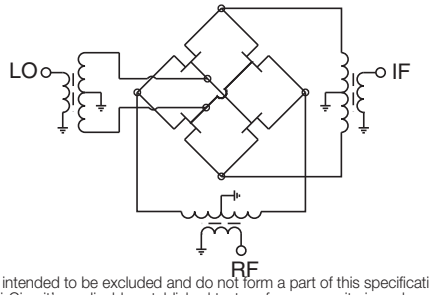
Electrical Specifications at 25°C

Parameter	Min.	Typ.	Max.	Unit
Frequency Range, RF	90	—	200	MHz
Frequency Range, LO	154	—	264	MHz
Frequency Range, IF	10	—	150	MHz
Conversion Loss	—	6.4	8.2	dB
LO to RF Isolation	34	42	—	dB
LO to IF Isolation	26	35	—	dB
IP3	—	30	—	dBm
RF Input Power at 1 dB Compression	—	+16	—	dBm

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)	IP3 (dBm)
RF	LO	LO +13 dBm	LO +13 dBm	LO +13 dBm	LO +13 dBm	LO +13 dBm	LO +13 dBm
90.10	154.10	6.87	52.67	42.88	1.88	5.24	28.50
100.10	164.10	6.79	50.96	40.90	1.92	5.03	29.99
106.10	170.10	6.67	49.81	39.71	1.96	4.86	30.79
110.10	174.10	6.57	48.93	38.94	1.98	4.70	31.12
112.10	176.10	6.46	48.50	38.56	1.96	4.63	31.01
114.10	178.10	6.41	48.14	38.20	1.96	4.55	31.67
116.10	180.10	6.41	47.76	37.83	1.95	4.46	32.52
118.10	182.10	6.39	47.29	37.44	1.94	4.35	32.32
120.10	184.10	6.36	46.83	37.08	1.94	4.23	32.40
130.10	194.10	6.23	45.00	35.42	1.97	3.55	33.15
136.10	200.10	6.29	44.04	34.47	1.95	3.06	33.70
138.10	202.10	6.26	43.81	34.16	1.94	2.89	32.69
140.10	204.10	6.24	43.55	33.85	1.93	2.72	33.30
142.10	206.10	6.26	43.25	33.58	1.92	2.56	32.81
150.10	214.10	6.20	42.42	32.67	1.98	1.98	33.46
160.10	224.10	6.28	41.79	32.22	1.94	1.61	34.49
170.10	234.10	6.33	42.09	32.64	1.81	1.77	34.58
180.10	244.10	6.43	43.19	33.44	1.82	2.17	34.26
190.10	254.10	6.52	44.37	34.27	1.82	2.58	29.36
200.10	264.10	6.55	45.33	35.02	1.69	2.94	27.92

Electrical Schematic



Notes

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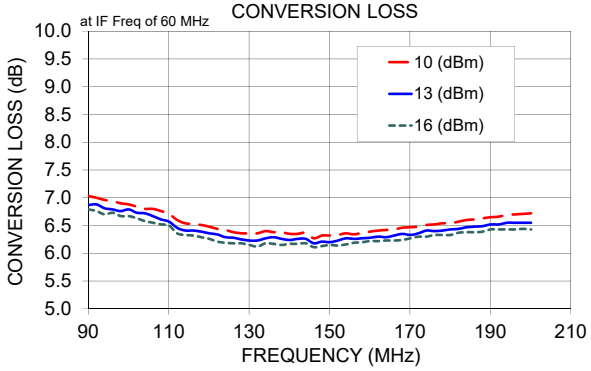
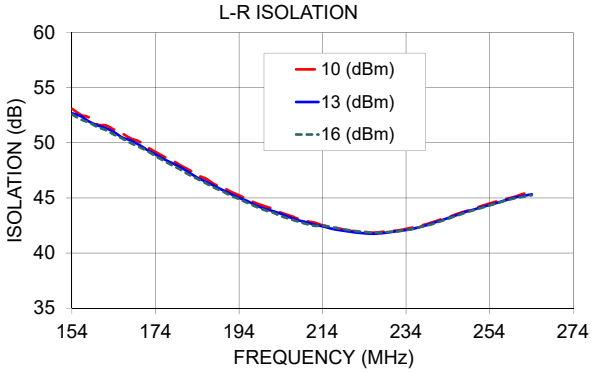
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

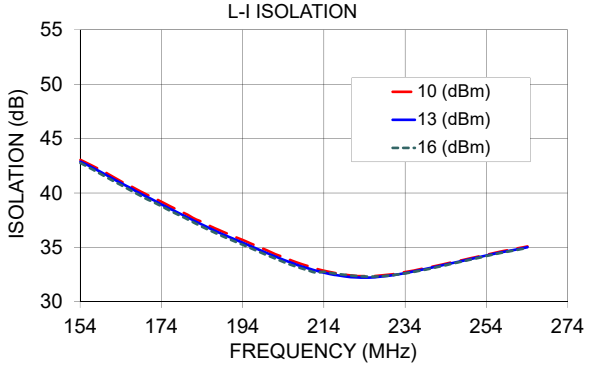
ADE-201FMH+
CONVERSION LOSS
at IF Freq of 60 MHz



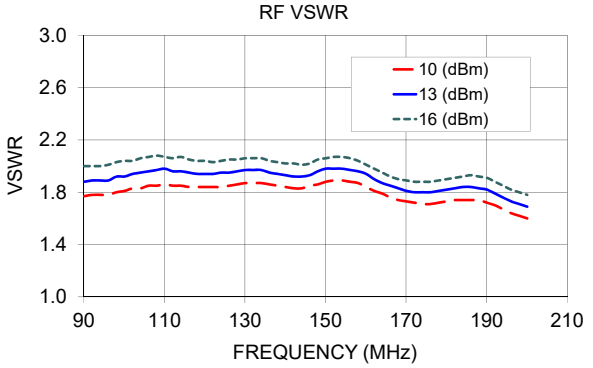
ADE-201FMH+
L-R ISOLATION



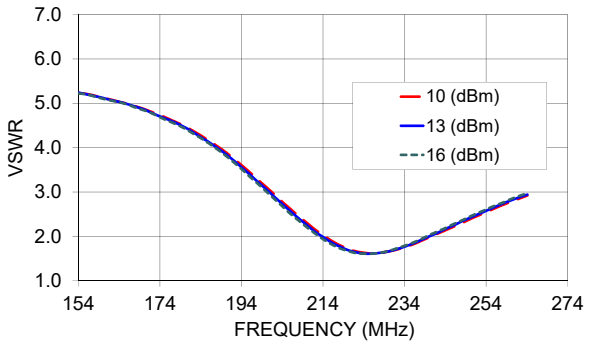
ADE-201FMH+
L-I ISOLATION



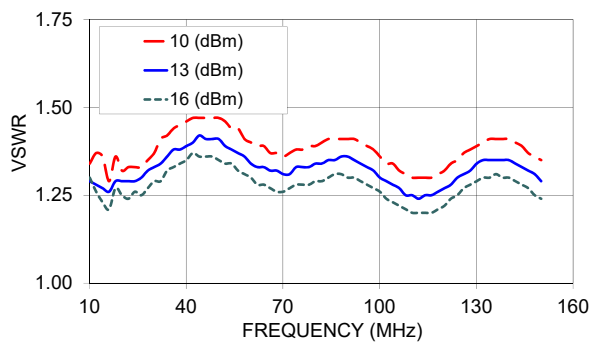
ADE-201FMH+
RF VSWR



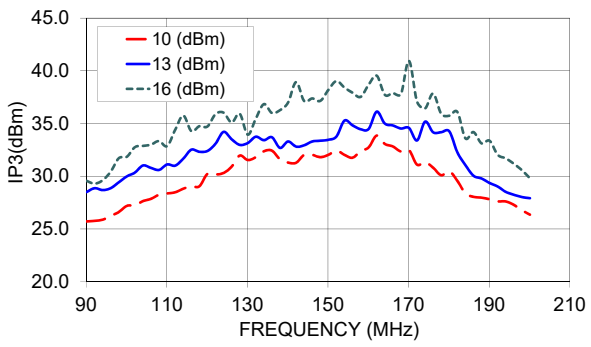
ADE-201FMH+
LO VSWR



ADE-20F1MH+
IF VSWR



ADE-201FMH+
IP3



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Frequency Mixer ADE-201FMH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=64MHz (dB)		
		@LO (dBm)		
		+10	+13	+16
40.1	104.1	7.29	7.10	6.94
50.1	114.1	7.25	6.98	6.87
60.1	124.1	7.18	6.95	6.83
72.1	136.1	7.21	7.01	6.88
82.1	146.1	7.10	6.96	6.83
92.1	156.1	7.00	6.88	6.76
106.1	170.1	6.80	6.67	6.55
114.1	178.1	6.54	6.41	6.33
126.1	190.1	6.38	6.28	6.18
136.1	200.1	6.38	6.29	6.17
146.1	210.1	6.27	6.18	6.11
158.1	222.1	6.37	6.27	6.20
168.1	232.1	6.46	6.35	6.24
180.1	244.1	6.54	6.43	6.33
190.1	254.1	6.65	6.52	6.43
200.1	264.1	6.72	6.55	6.43
212.1	276.1	6.80	6.61	6.45
222.1	286.1	6.84	6.62	6.44
232.1	296.1	6.91	6.66	6.45
244.1	308.1	7.13	6.84	6.61
254.1	318.1	7.31	6.99	6.76
266.1	330.1	7.49	7.15	6.88
276.1	340.1	7.64	7.25	6.98
286.1	350.1	7.86	7.44	7.15
298.1	362.1	8.03	7.59	7.25
308.1	372.1	8.17	7.68	7.32
320.1	384.1	8.30	7.77	7.37
330.1	394.1	8.48	7.90	7.47
340.1	404.1	8.69	8.06	7.60
352.1	416.1	8.91	8.25	7.76
362.1	426.1	9.12	8.42	7.92
372.1	436.1	9.32	8.58	8.08
384.1	448.1	9.52	8.77	8.23
394.1	458.1	9.67	8.89	8.35
406.1	470.1	9.83	9.00	8.42
416.1	480.1	9.97	9.10	8.51
426.1	490.1	10.13	9.22	8.59
438.1	502.1	10.37	9.41	8.75
448.1	512.1	10.53	9.54	8.85
460.1	524.1	10.73	9.70	8.97

RF (IN) (MHz)	LO (MHz)	IP-3 INPUT (dBm)		
		@LO (dBm)		
		+10	+13	+16
40.1	104.1	25.42	23.71	23.20
50.1	114.1	20.94	22.27	24.69
60.1	124.1	20.46	22.94	26.22
72.1	136.1	22.40	25.40	28.60
82.1	146.1	24.09	26.84	27.84
92.1	156.1	25.84	29.06	29.44
106.1	170.1	27.88	31.09	32.83
114.1	178.1	28.68	31.26	34.86
126.1	190.1	31.30	34.27	34.33
136.1	200.1	31.62	34.21	36.94
146.1	210.1	31.86	33.45	34.20
158.1	222.1	32.85	33.81	36.44
168.1	232.1	32.67	34.21	36.82
180.1	244.1	29.89	33.03	37.79
190.1	254.1	27.86	29.46	34.32
200.1	264.1	26.37	28.24	29.36
212.1	276.1	24.62	26.97	28.19
222.1	286.1	22.97	25.76	27.56
232.1	296.1	21.31	24.05	26.12
244.1	308.1	19.78	22.68	25.13
254.1	318.1	18.86	21.74	24.32
266.1	330.1	17.69	20.71	23.27
276.1	340.1	16.83	19.71	22.33
286.1	350.1	16.09	18.76	21.67
298.1	362.1	15.54	18.18	20.72
308.1	372.1	15.14	17.66	20.14
320.1	384.1	14.34	16.79	19.18
330.1	394.1	13.58	16.08	18.56
340.1	404.1	13.15	15.67	18.10
352.1	416.1	12.84	15.45	17.84
362.1	426.1	12.40	14.94	17.40
372.1	436.1	11.98	14.49	16.95
384.1	448.1	11.81	14.23	16.57
394.1	458.1	11.78	14.25	16.58
406.1	470.1	11.65	13.99	16.20
416.1	480.1	11.42	13.73	15.93
426.1	490.1	11.17	13.43	15.64
438.1	502.1	11.04	13.35	15.52
448.1	512.1	10.89	13.13	15.22
460.1	524.1	10.72	12.92	14.90

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+16dBm (dB)		
		@LO (dBm)		
		+10	+13	+16
40.1	104.1	1.77	0.85	0.39
50.1	114.1	1.85	1.03	0.55
60.1	124.1	1.82	1.03	0.62
72.1	136.1	1.48	0.83	0.50
82.1	146.1	1.22	0.69	0.43
92.1	156.1	0.99	0.56	0.35
106.1	170.1	0.69	0.39	0.28
114.1	178.1	0.60	0.37	0.26
126.1	190.1	0.46	0.28	0.23
136.1	200.1	0.40	0.23	0.23
146.1	210.1	0.36	0.27	0.21
158.1	222.1	0.33	0.25	0.19
168.1	232.1	0.38	0.24	0.22
180.1	244.1	0.57	0.34	0.26
190.1	254.1	0.78	0.42	0.27
200.1	264.1	1.10	0.57	0.35
212.1	276.1	1.63	0.75	0.42
222.1	286.1	2.26	1.05	0.55
232.1	296.1	2.93	1.47	0.71
244.1	308.1	3.75	1.98	0.94
254.1	318.1	4.33	2.46	1.15
266.1	330.1	4.97	3.01	1.47
276.1	340.1	5.31	3.36	1.72
286.1	350.1	5.58	3.65	2.00
298.1	362.1	5.91	3.99	2.28
308.1	372.1	6.21	4.31	2.55
320.1	384.1	6.74	4.83	2.99
330.1	394.1	7.16	5.28	3.40
340.1	404.1	7.52	5.63	3.73
352.1	416.1	7.94	6.08	4.14
362.1	426.1	8.22	6.33	4.41
372.1	436.1	8.35	6.52	4.59
384.1	448.1	8.41	6.60	4.66
394.1	458.1	8.50	6.72	4.80
406.1	470.1	8.72	6.94	5.04
416.1	480.1	8.88	7.17	5.27
426.1	490.1	9.09	7.41	5.49
438.1	502.1	9.31	7.64	5.76
448.1	512.1	9.49	7.84	5.95
460.1	524.1	9.57	7.92	6.08

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=146.1MHz (dB)
		@LO (dBm)
		+13
136.0	10.1	11.76
130.0	16.1	10.28
124.0	22.1	9.46
118.0	28.1	8.90
112.0	34.1	8.55
104.0	42.1	8.22
98.0	48.1	7.95
92.0	54.1	7.73
86.0	60.1	7.63
78.0	68.1	7.45
72.0	74.1	7.31
66.0	80.1	7.27
60.0	86.1	7.23
52.0	94.1	7.19
46.0	100.1	7.14
40.0	106.1	7.09
34.0	112.1	7.06
28.0	118.1	6.95
20.0	126.1	6.92
14.0	132.1	7.00
10.0	156.1	6.69
28.0	174.1	6.47
46.0	192.1	6.35
66.0	212.1	6.33
84.0	230.1	6.25
104.0	250.1	6.31
122.0	268.1	6.37
142.0	288.1	6.47
160.0	306.1	6.70
178.0	324.1	6.79
198.0	344.1	6.87
216.0	362.1	6.89
236.0	382.1	6.99
254.0	400.1	7.16
274.0	420.1	7.32
292.0	438.1	7.40
310.0	456.1	7.52
330.0	476.1	7.65
348.0	494.1	7.82
368.0	514.1	7.98

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=106.1MHz (dB)
		@LO (dBm)
		+13
10.0	116.1	7.77
20.0	126.1	7.54
30.0	136.1	7.38
40.0	146.1	7.14
50.0	156.1	7.06
62.0	168.1	6.94
72.0	178.1	6.83
82.0	188.1	6.76
92.0	198.1	6.72
104.0	210.1	6.59
114.0	220.1	6.73
124.0	230.1	6.73
134.0	240.1	6.72
146.0	252.1	6.76
156.0	262.1	6.79
166.0	272.1	6.83
176.0	282.1	6.93
186.0	292.1	7.01
198.0	304.1	7.10
208.0	314.1	7.21
218.0	324.1	7.30
228.0	334.1	7.44
240.0	346.1	7.58
250.0	356.1	7.68
260.0	366.1	7.74
270.0	376.1	7.87
282.0	388.1	7.97
292.0	398.1	8.10
302.0	408.1	8.12
312.0	418.1	8.27
322.0	428.1	8.42
334.0	440.1	8.52
344.0	450.1	8.62
354.0	460.1	8.71
364.0	470.1	8.83
376.0	482.1	8.96
386.0	492.1	9.09
396.0	502.1	9.21
406.0	512.1	9.37
418.0	524.1	9.50

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=186.1MHz (dB)
		@LO (dBm)
		+13
176.0	10.1	12.02
172.0	14.1	11.13
168.0	18.1	10.43
164.0	22.1	9.95
160.0	26.1	9.56
156.0	30.1	9.29
152.0	34.1	9.08
148.0	38.1	8.97
144.0	42.1	8.80
140.0	46.1	8.64
136.0	50.1	8.45
132.0	54.1	8.33
128.0	58.1	8.24
124.0	62.1	8.15
120.0	66.1	8.03
116.0	70.1	7.92
112.0	74.1	7.86
108.0	78.1	7.84
104.0	82.1	7.82
100.0	86.1	7.77
96.0	90.1	7.74
92.0	94.1	7.55
88.0	98.1	7.57
84.0	102.1	7.59
80.0	106.1	7.57
76.0	110.1	7.64
72.0	114.1	7.58
68.0	118.1	7.50
64.0	122.1	7.46
60.0	126.1	7.45
56.0	130.1	7.38
52.0	134.1	7.32
48.0	138.1	7.27
44.0	142.1	7.27
40.0	146.1	7.16
36.0	150.1	7.18
32.0	154.1	7.11
28.0	158.1	7.03
24.0	162.1	7.11
20.0	166.1	7.01

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+10	+13	+16	+10	+13	+16
104.1	59.34	59.12	59.35	49.17	49.03	48.98
114.1	57.58	57.59	57.74	48.21	48.04	47.93
124.1	56.61	56.82	56.96	47.32	47.13	47.00
136.1	55.39	55.36	55.19	45.90	45.81	45.67
146.1	54.04	53.80	53.70	44.43	44.28	44.15
156.1	52.54	52.42	52.12	42.67	42.52	42.36
170.1	50.12	49.81	49.62	39.91	39.71	39.50
178.1	48.39	48.14	47.93	38.42	38.20	38.01
190.1	45.95	45.71	45.58	36.29	36.05	35.86
200.1	44.26	44.04	43.90	34.71	34.47	34.27
210.1	42.90	42.80	42.64	33.28	33.08	32.89
222.1	41.97	41.86	41.99	32.37	32.24	32.37
232.1	42.06	42.00	41.99	32.60	32.51	32.51
244.1	43.25	43.19	43.12	33.51	33.44	33.37
254.1	44.51	44.37	44.34	34.33	34.27	34.22
264.1	45.50	45.33	45.25	35.09	35.02	34.96
276.1	46.12	45.87	45.74	35.91	35.83	35.77
286.1	46.69	46.43	46.24	36.57	36.47	36.40
296.1	47.85	47.59	47.34	37.25	37.16	37.09
308.1	49.58	49.22	49.01	38.03	37.96	37.89
318.1	50.56	50.06	49.72	38.60	38.51	38.46
330.1	51.43	50.86	50.49	39.04	38.99	38.93
340.1	52.41	51.86	51.35	39.26	39.20	39.16
350.1	53.39	52.80	52.30	39.37	39.35	39.32
362.1	53.99	53.24	52.74	39.45	39.44	39.42
372.1	54.30	53.63	52.98	39.58	39.58	39.59
384.1	55.17	54.23	53.50	39.69	39.73	39.76
394.1	56.07	55.23	54.46	39.96	40.04	40.08
404.1	56.83	55.80	54.93	40.16	40.24	40.30
416.1	58.21	56.98	56.00	40.39	40.50	40.59
426.1	59.99	58.58	57.45	40.38	40.50	40.60
436.1	61.33	60.02	58.70	40.39	40.54	40.67
448.1	61.00	60.05	58.93	40.30	40.43	40.57
458.1	60.72	59.72	58.58	40.21	40.36	40.53
470.1	61.17	60.72	59.72	40.07	40.22	40.37
480.1	62.33	62.80	61.90	40.24	40.41	40.55
490.1	62.08	63.09	63.17	40.34	40.52	40.73
502.1	59.55	60.84	61.21	40.56	40.74	40.98
512.1	60.05	61.16	60.77	40.57	40.79	41.02
524.1	59.75	62.58	64.88	40.42	40.65	40.87

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+10	+13	+16
40.1	104.1	22.32	21.53	20.61
50.1	114.1	21.17	20.61	20.11
60.1	124.1	24.33	23.84	23.52
72.1	136.1	27.85	27.27	26.94
82.1	146.1	30.37	29.99	29.90
92.1	156.1	33.69	33.38	33.46
106.1	170.1	35.95	35.82	35.80
114.1	178.1	38.53	38.24	38.15
126.1	190.1	40.42	40.53	40.89
136.1	200.1	42.57	42.70	42.77
146.1	210.1	42.15	42.16	42.16
158.1	222.1	41.05	40.96	41.17
168.1	232.1	38.65	38.90	39.25
180.1	244.1	37.46	37.74	37.80
190.1	254.1	35.86	35.97	36.14
200.1	264.1	35.55	35.43	35.63
212.1	276.1	33.92	33.55	33.39
222.1	286.1	33.78	33.54	33.09
232.1	296.1	33.56	33.20	32.91
244.1	308.1	33.24	33.24	32.79
254.1	318.1	32.71	32.75	32.27
266.1	330.1	31.73	31.63	31.33
276.1	340.1	32.13	31.92	31.74
286.1	350.1	31.08	30.89	30.57
298.1	362.1	31.96	31.51	31.04
308.1	372.1	30.86	30.32	29.78
320.1	384.1	31.79	31.30	30.83
330.1	394.1	31.22	30.31	29.84
340.1	404.1	32.54	31.65	30.91
352.1	416.1	32.40	31.22	30.54
362.1	426.1	33.38	31.83	31.11
372.1	436.1	33.93	31.97	31.15
384.1	448.1	34.83	32.46	31.44
394.1	458.1	36.10	33.29	32.10
406.1	470.1	36.80	33.34	31.96
416.1	480.1	38.64	34.25	32.50
426.1	490.1	39.87	34.25	32.05
438.1	502.1	45.69	36.81	33.86
448.1	512.1	48.76	36.97	33.49
460.1	524.1	49.76	40.36	35.20

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+10	+13	+16
40.1	104.1	1.65	1.76	1.85
50.1	114.1	1.68	1.78	1.88
60.1	124.1	1.74	1.85	1.95
72.1	136.1	1.74	1.85	1.95
82.1	146.1	1.76	1.87	1.99
92.1	156.1	1.78	1.89	2.00
106.1	170.1	1.85	1.96	2.07
114.1	178.1	1.85	1.96	2.07
126.1	190.1	1.85	1.95	2.05
136.1	200.1	1.86	1.95	2.04
146.1	210.1	1.85	1.93	2.02
158.1	222.1	1.87	1.96	2.04
168.1	232.1	1.74	1.83	1.90
180.1	244.1	1.73	1.82	1.90
190.1	254.1	1.72	1.82	1.91
200.1	264.1	1.60	1.69	1.78
212.1	276.1	1.59	1.67	1.76
222.1	286.1	1.58	1.66	1.75
232.1	296.1	1.56	1.63	1.71
244.1	308.1	1.52	1.58	1.65
254.1	318.1	1.54	1.60	1.66
266.1	330.1	1.55	1.61	1.67
276.1	340.1	1.54	1.59	1.65
286.1	350.1	1.58	1.63	1.68
298.1	362.1	1.63	1.68	1.73
308.1	372.1	1.66	1.70	1.76
320.1	384.1	1.67	1.71	1.76
330.1	394.1	1.75	1.79	1.84
340.1	404.1	1.77	1.82	1.87
352.1	416.1	1.78	1.82	1.87
362.1	426.1	1.82	1.87	1.91
372.1	436.1	1.86	1.91	1.96
384.1	448.1	1.89	1.95	2.00
394.1	458.1	1.91	1.96	2.01
406.1	470.1	1.97	2.02	2.07
416.1	480.1	2.00	2.07	2.13
426.1	490.1	1.99	2.05	2.11
438.1	502.1	2.03	2.09	2.15
448.1	512.1	2.04	2.10	2.16
460.1	524.1	2.06	2.12	2.18

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+10	+13	+16
104.1	5.55	5.55	5.54
114.1	5.57	5.57	5.56
124.1	5.50	5.49	5.49
136.1	5.42	5.42	5.42
146.1	5.35	5.35	5.35
156.1	5.21	5.20	5.20
170.1	4.87	4.86	4.84
178.1	4.57	4.55	4.52
190.1	3.90	3.86	3.82
200.1	3.11	3.06	3.01
210.1	2.30	2.25	2.20
222.1	1.66	1.64	1.62
232.1	1.70	1.71	1.73
244.1	2.14	2.17	2.19
254.1	2.55	2.58	2.61
264.1	2.92	2.94	2.97
276.1	3.29	3.30	3.33
286.1	3.53	3.54	3.56
296.1	3.72	3.73	3.74
308.1	3.92	3.92	3.93
318.1	4.04	4.04	4.05
330.1	4.15	4.16	4.17
340.1	4.24	4.25	4.26
350.1	4.32	4.33	4.33
362.1	4.39	4.40	4.40
372.1	4.44	4.45	4.45
384.1	4.50	4.51	4.51
394.1	4.55	4.55	4.55
404.1	4.57	4.58	4.58
416.1	4.60	4.60	4.61
426.1	4.62	4.63	4.63
436.1	4.64	4.65	4.64
448.1	4.69	4.69	4.69
458.1	4.71	4.71	4.71
470.1	4.74	4.74	4.74
480.1	4.76	4.76	4.77
490.1	4.77	4.77	4.77
502.1	4.80	4.80	4.80
512.1	4.80	4.81	4.81
524.1	4.83	4.83	4.83

IF (OUT) (MHz)	IF VSWR @LO=250.1MHz (:1) @LO (dBm)		
	+10	+13	+16
10.1	1.34	1.29	1.30
14.1	1.36	1.27	1.23
20.1	1.32	1.29	1.25
26.1	1.33	1.30	1.25
32.1	1.41	1.34	1.29
38.1	1.45	1.38	1.34
44.1	1.47	1.42	1.36
50.1	1.47	1.41	1.35
56.1	1.44	1.37	1.32
62.1	1.39	1.33	1.28
68.1	1.37	1.32	1.26
74.1	1.38	1.33	1.28
80.1	1.39	1.34	1.29
86.1	1.41	1.35	1.31
92.1	1.41	1.35	1.30
98.1	1.38	1.32	1.27
104.1	1.34	1.28	1.23
110.1	1.30	1.25	1.20
116.1	1.30	1.25	1.20
122.1	1.34	1.28	1.24
126.1	1.37	1.31	1.27
132.1	1.40	1.35	1.30
138.1	1.41	1.35	1.30
144.1	1.39	1.33	1.28
150.1	1.35	1.29	1.24
156.1	1.30	1.25	1.20
162.1	1.28	1.23	1.18
168.1	1.29	1.24	1.19
174.1	1.31	1.25	1.20
180.1	1.31	1.25	1.21
186.1	1.29	1.24	1.19
192.1	1.25	1.20	1.15
198.1	1.21	1.16	1.12
204.1	1.20	1.15	1.11
210.1	1.22	1.17	1.13
216.1	1.25	1.20	1.16
222.1	1.27	1.22	1.17
228.1	1.27	1.21	1.17
234.1	1.24	1.19	1.14
240.1	1.20	1.15	1.10

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-0.56	15.44	25.44	22.46	26.51	16.80	25.27	24.48	27.68	41.40
1	---	29.50	---	33.94	10.35	34.92	20.12	40.95	32.03	41.97	61.77	45.11
2	122.38	73.83	77.02	80.07	80.85	84.28	102.54	87.76	98.97	87.53	91.67	85.95
3	129.28	101.47	88.51	102.27	90.56	101.07	98.81	105.04	103.22	101.72	103.50	102.59
4	129.21	101.52	99.64	93.39	102.29	95.25	101.82	101.45	103.45	102.84	104.04	101.07
5	129.13	102.56	101.71	96.86	99.05	96.32	98.74	100.06	102.92	103.38	103.27	103.42
6	129.61	103.72	101.64	102.31	88.73	102.95	84.74	103.89	99.97	100.64	101.55	103.10
7	129.81	103.98	102.68	99.91	101.18	91.76	103.46	92.11	102.81	99.32	103.55	104.45
8	129.53	103.60	103.29	105.19	101.08	98.77	96.82	96.43	96.03	102.43	103.09	104.49
9	126.01	100.62	101.90	100.44	103.30	99.21	94.74	98.12	93.37	95.09	100.99	102.18
10	129.74	95.80	98.56	86.14	100.88	77.53	98.80	66.30	93.20	64.90	101.57	77.15
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 146 MHz; -15 dBm.**
LO IN: 210 MHz; +13.00 dBm
IF OUT: 64 MHz; -21.71 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	9.65	25.63	35.61	32.61	36.74	26.85	35.38	33.86	36.57	53.80
1	---	29.41	---	33.93	10.34	34.94	20.04	41.00	31.73	42.05	61.21	45.18
2	111.01	63.41	67.22	69.71	71.31	73.97	96.73	77.59	87.80	77.53	81.22	75.05
3	122.59	95.34	91.54	95.00	80.38	92.75	78.34	93.60	82.03	94.92	90.20	100.03
4	125.15	101.02	108.99	92.56	104.39	96.53	103.76	107.64	105.41	114.11	108.52	108.88
5	124.02	111.63	96.65	108.83	96.73	106.54	99.77	113.37	99.81	112.48	102.15	109.09
6	120.28	110.67	104.98	110.18	92.27	109.36	88.46	109.82	98.71	111.76	105.73	111.79
7	123.18	113.06	112.84	111.38	112.78	102.21	113.83	102.45	113.89	109.52	111.81	112.78
8	123.09	113.65	112.84	114.47	110.92	107.63	107.31	108.41	107.11	112.79	113.21	114.38
9	120.32	113.98	113.11	104.92	111.26	101.54	101.42	99.67	103.60	93.51	110.38	102.18
10	123.80	109.34	110.26	102.60	113.06	90.80	111.72	80.99	110.65	80.44	111.87	91.16
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

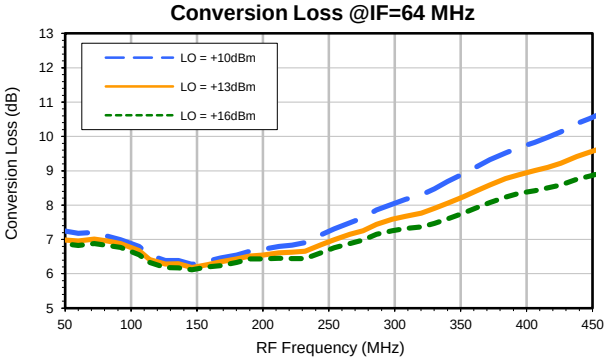
LO HARMONICS ORDER

Test conditions: **RF IN: 146 MHz; -5 dBm.**
LO IN: 210 MHz; +13.00 dBm
IF OUT: 64 MHz; -11.54 dBm

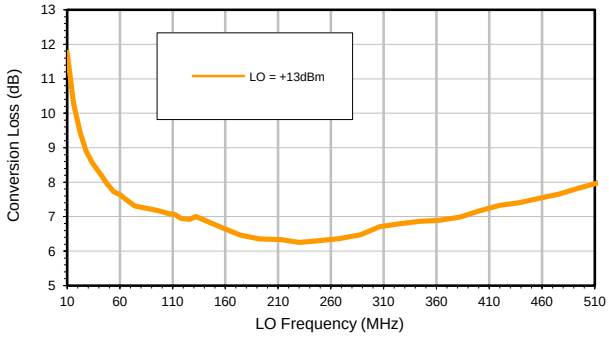
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT
2. + entry denotes harmonics are in (dBc) above IF OUTPUT
3. RF Cal represents the Harmonics level of the RF Input Signal to the mixer

Typical Performance Curves

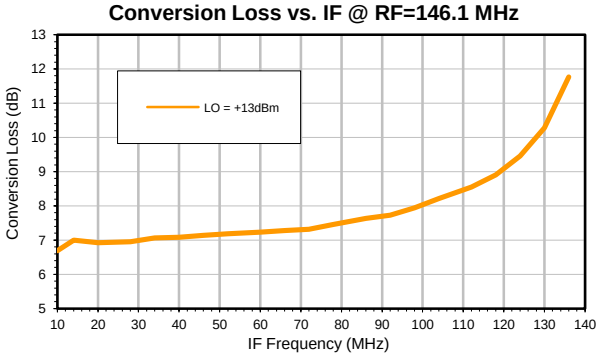
Conversion Loss @IF=64 MHz



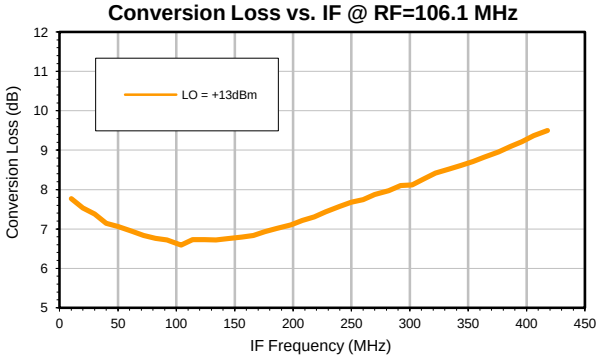
Conversion Loss vs. LO @ RF=146.1 MHz



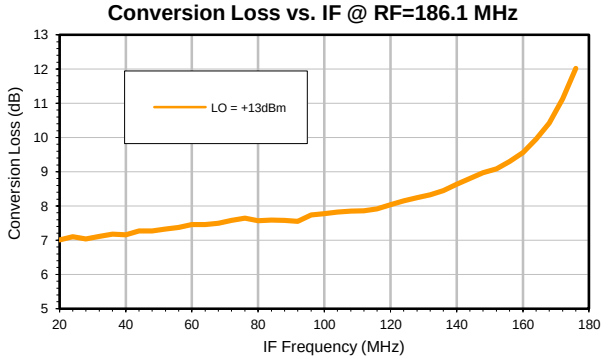
Conversion Loss vs. IF @ RF=146.1 MHz



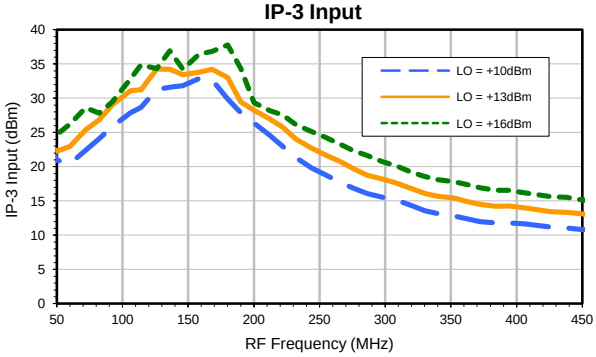
Conversion Loss vs. IF @ RF=106.1 MHz



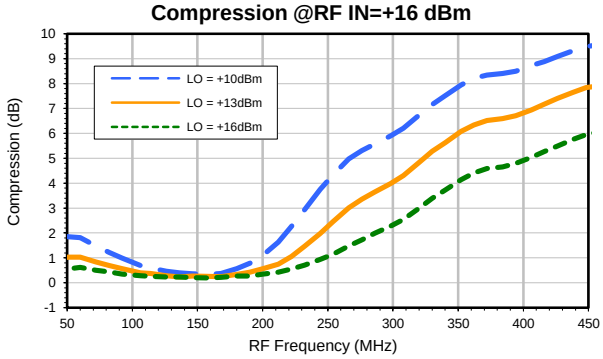
Conversion Loss vs. IF @ RF=186.1 MHz



IP-3 Input

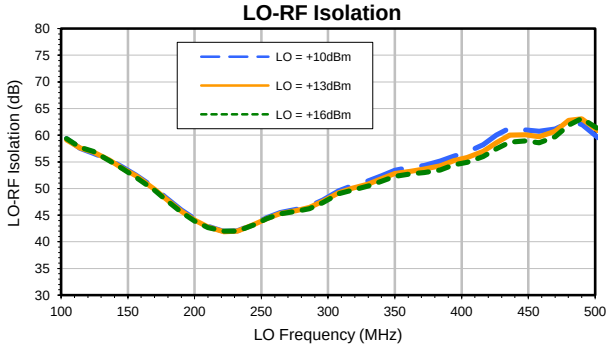


Compression @RF IN=+16 dBm

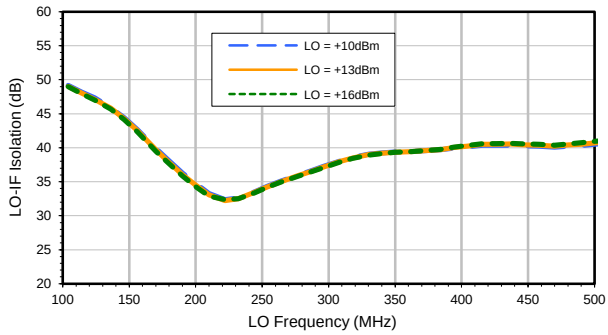


Typical Performance Curves

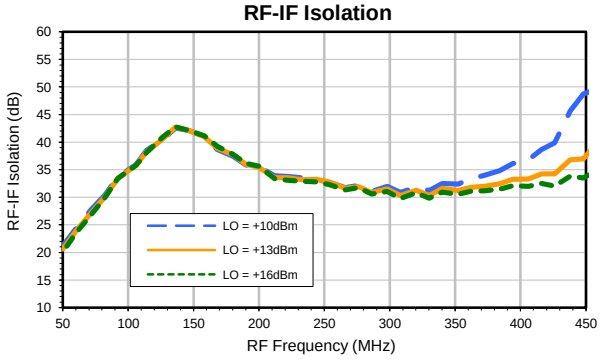
LO-RF Isolation



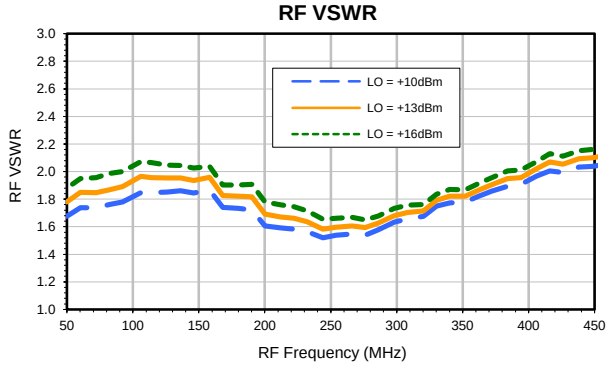
LO-IF Isolation



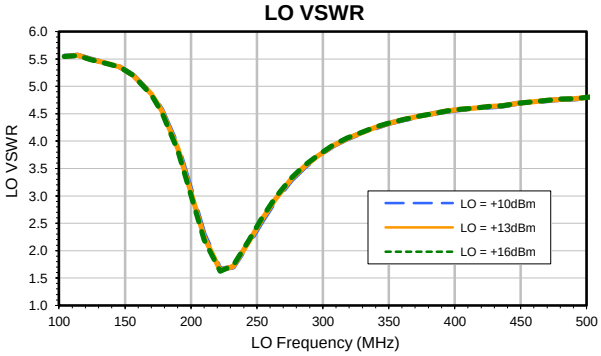
RF-IF Isolation



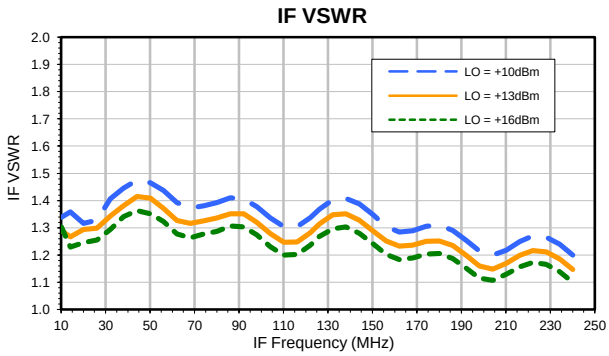
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-0.56	15.44	25.44	22.46	26.51	16.80	25.27	24.48	27.68	41.40
1	---	29.50	---	33.94	10.35	34.92	20.12	40.95	32.03	41.97	61.77	45.11
2	122.38	73.83	77.02	80.07	80.85	84.28	102.54	87.76	98.97	87.53	91.67	85.95
3	129.28	101.47	88.51	102.27	90.56	101.07	98.81	105.04	103.22	101.72	103.50	102.59
4	129.21	101.52	99.64	93.39	102.29	95.25	101.82	101.45	103.45	102.84	104.04	101.07
5	129.13	102.56	101.71	96.86	99.05	96.32	98.74	100.06	102.92	103.38	103.27	103.42
6	129.61	103.72	101.64	102.31	88.73	102.95	84.74	103.89	99.97	100.64	101.55	103.10
7	129.81	103.98	102.68	99.91	101.18	91.76	103.46	92.11	102.81	99.32	103.55	104.45
8	129.53	103.60	103.29	105.19	101.08	98.77	96.82	96.43	96.03	102.43	103.09	104.49
9	126.01	100.62	101.90	100.44	103.30	99.21	94.74	98.12	93.37	95.09	100.99	102.18
10	129.74	95.80	98.56	86.14	100.88	77.53	98.80	66.30	93.20	64.90	101.57	77.15
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 146 MHz; -15 dBm.**
LO IN: 210 MHz; +13.00 dBm
IF OUT: 64 MHz; -21.71 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	9.65	25.63	35.61	32.61	36.74	26.85	35.38	33.86	36.57	53.80
1	---	29.41	---	33.93	10.34	34.94	20.04	41.00	31.73	42.05	61.21	45.18
2	111.01	63.41	67.22	69.71	71.31	73.97	96.73	77.59	87.80	77.53	81.22	75.05
3	122.59	95.34	91.54	95.00	80.38	92.75	78.34	93.60	82.03	94.92	90.20	100.03
4	125.15	101.02	108.99	92.56	104.39	96.53	103.76	107.64	105.41	114.11	108.52	108.88
5	124.02	111.63	96.65	108.83	96.73	106.54	99.77	113.37	99.81	112.48	102.15	109.09
6	120.28	110.67	104.98	110.18	92.27	109.36	88.46	109.82	98.71	111.76	105.73	111.79
7	123.18	113.06	112.84	111.38	112.78	102.21	113.83	102.45	113.89	109.52	111.81	112.78
8	123.09	113.65	112.84	114.47	110.92	107.63	107.31	108.41	107.11	112.79	113.21	114.38
9	120.32	113.98	113.11	104.92	111.26	101.54	101.42	99.67	103.60	93.51	110.38	102.18
10	123.80	109.34	110.26	102.60	113.06	90.80	111.72	80.99	110.65	80.44	111.87	91.16
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

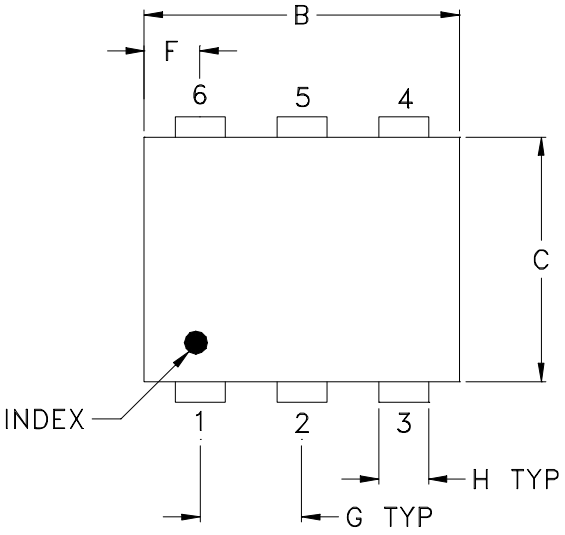
Test conditions: **RF IN: 146 MHz; -5 dBm.**
LO IN: 210 MHz; +13.00 dBm
IF OUT: 64 MHz; -11.54 dBm

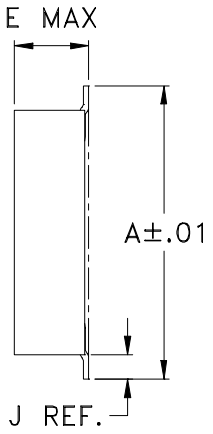
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT
2. + entry denotes harmonics are in (dBc) above IF OUTPUT
3. RF Cal represents the Harmonics level of the RF Input Signal to the mixer

Case Style CD

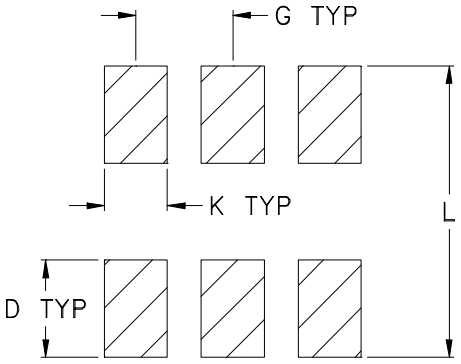
CD541
CD542
CD636
CD637

Outline Dimensions





PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
CD541	.272 (6.91)	.310 (7.87)	.220 (5.58)	.100 (2.54)	.082 (2.08)	.055 (1.40)	.100 (2.54)	.030 (0.76)	.026 (0.66)	.065 (1.65)	.300 (7.62)	.15
CD542					.112 (2.84)							.20
CD636					.162 (4.11)							.25
CD637					.206 (5.23)							.40

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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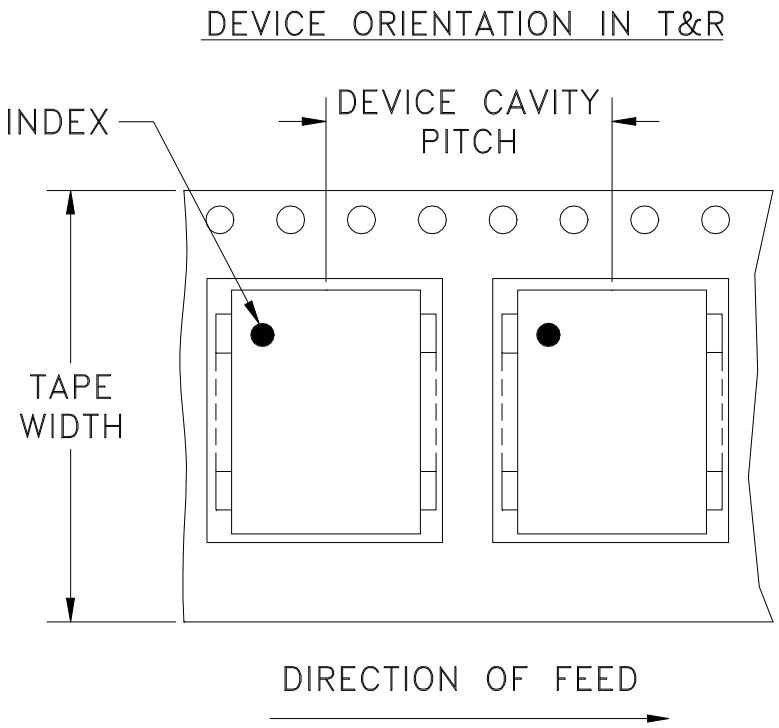
Tape & Reel Packaging TR-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
				100
				200
		13	Standard	500
				1000

Note: Availability of small reel quantity varies by model.
Refer to pricing and availability on individual model dashboard.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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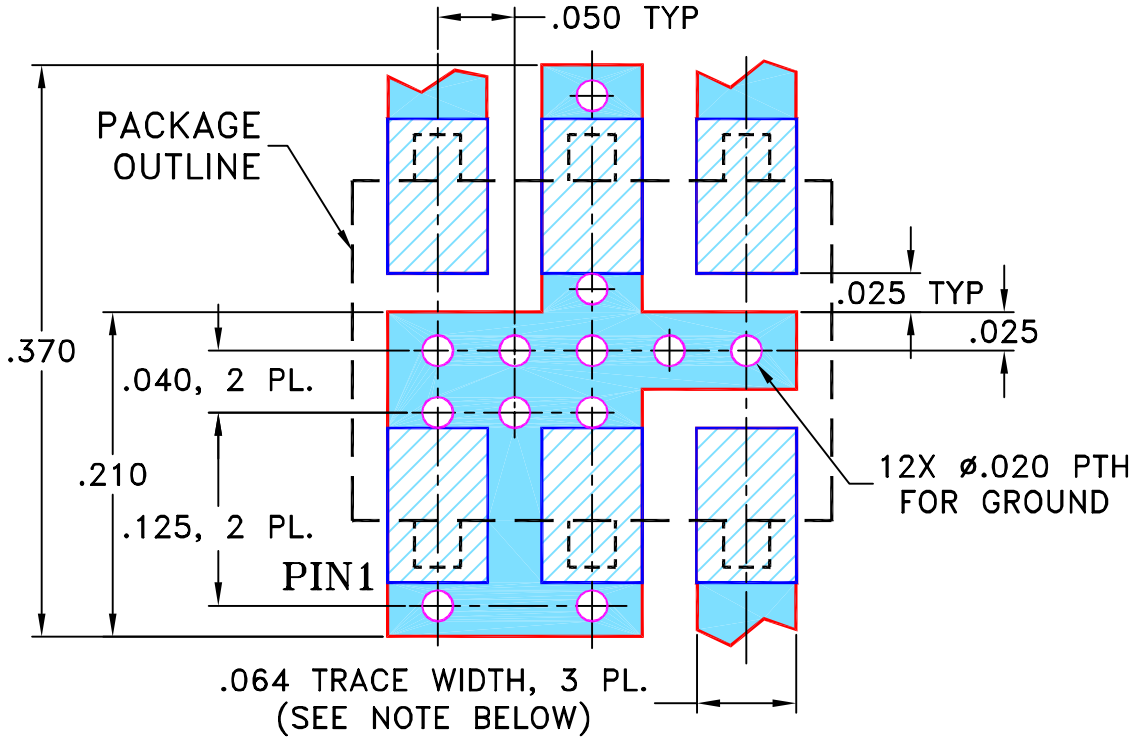
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/05/02	MMG	DJ
A	M102713	ADDED NOTE 2 & "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION FOR CD541/542/636/637 CASE STYLES, "jv", "ju", "jw" PIN CONNECTIONS



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	07/17/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/05/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

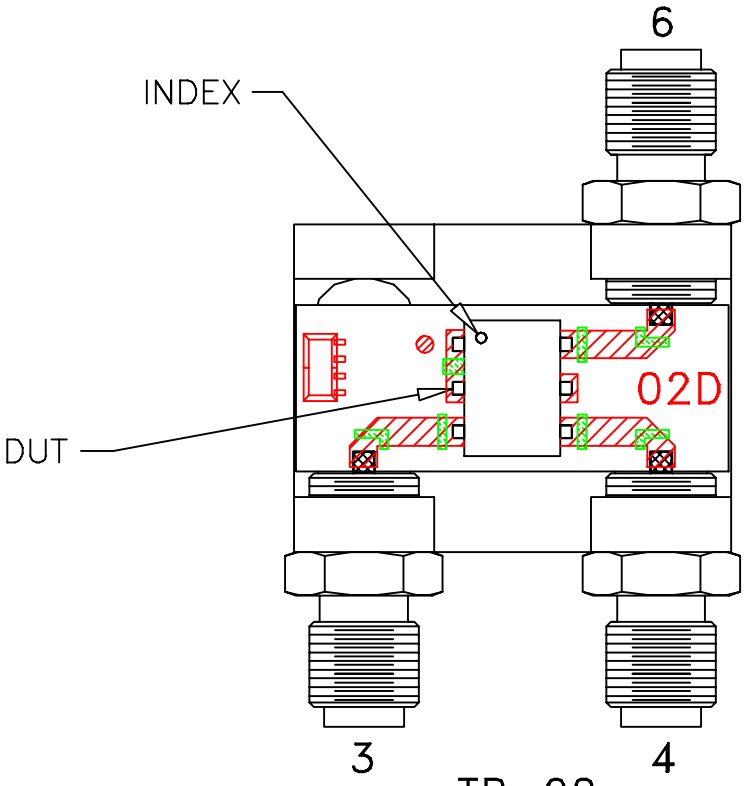
PL, jv/ju/jw, CD541/542/636/637, ADE, TB-02

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-051	A

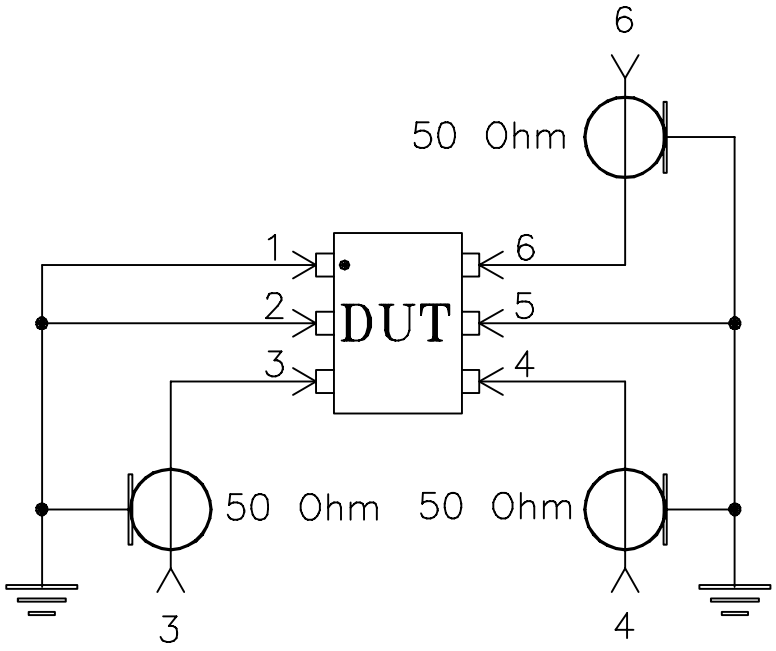
FILE:	SCALE:	SHEET:
98PL051	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-02



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV02T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215