Coaxial

Frequency Mixer

ZX05-1MHW+
ZX05-1MHW

Level 13 (LO Power +13 dBm) 0.5 to 600 MHz

CASE STYLE: FL905

Connectors	Model	Price	Qty.
SMA	ZX05-1MHW-S(+)	$39.95 ea.	(1-24)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

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

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA

Coaxial Connections

LO	1
RF	2
IF	3

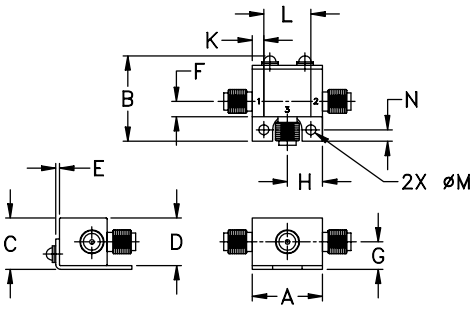
Features

- rugged construction
- small size
- low convesion loss
- high L-R isolation
- protected by US Patents 6,133,525 & 6,790,049

Applications

- cellular
- PCS
- instrumentation
- satellite communication

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.74	.90	.54	.50	.04	.16	.29
18.80	22.86	13.72	12.70	1.02	4.06	7.37

H	J	K	L	M	N	wt
.37	--	.122	.496	.106	.122	grams
9.40	--	3.10	12.60	2.69	3.10	20.0

Electrical Specifications (T_{AMB}=25°C)

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
		Mid-Band m			Total Range	L		M		U		L		M		U		
LO/RF f_L-f_U	IF	$\bar{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.
0.5-600	DC-600	5.2	0.1	6.9	8.0	63	50	53	32	43	20	56	40	44	25	30	20	17

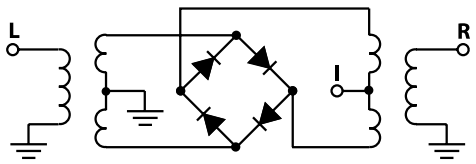
1 dB COMP.: +9 dBm typ.

L = low range [f_L to 10 f_L] M = mid range [10 f_L to f_U/2] U = upper range [f_U/2 to f_U]
m= mid band [2f_L to f_U/2]

Typical Performance Data

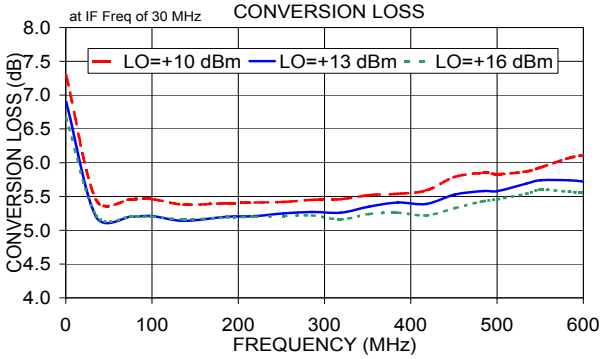
Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm
0.51	30.51	6.90	65.03	59.15	1.94	2.72
35.10	65.10	5.20	57.24	54.53	1.07	2.37
75.10	45.10	5.20	51.59	49.29	1.09	2.32
100.10	70.10	5.21	49.55	46.80	1.10	2.34
136.65	106.65	5.14	47.71	44.52	1.13	2.36
186.31	156.31	5.20	45.43	42.16	1.17	2.37
219.41	189.41	5.21	44.63	41.28	1.20	2.43
252.51	222.51	5.25	43.63	40.19	1.23	2.44
285.62	255.62	5.27	42.50	39.17	1.26	2.44
318.72	288.72	5.26	42.63	38.66	1.28	2.53
351.82	321.82	5.35	41.96	37.65	1.31	2.44
384.93	354.93	5.41	40.38	36.31	1.34	2.52
418.03	388.03	5.39	39.35	34.63	1.39	2.58
451.13	421.13	5.53	37.97	34.45	1.43	2.52
484.24	454.24	5.58	36.94	33.38	1.45	2.63
500.79	470.79	5.58	36.54	33.15	1.45	2.59
533.89	503.89	5.69	35.79	32.80	1.43	2.46
550.45	520.45	5.74	35.31	32.18	1.41	2.49
583.55	553.55	5.74	35.05	30.26	1.38	2.66
600.10	570.10	5.72	35.01	29.30	1.38	2.64

Electrical Schematic

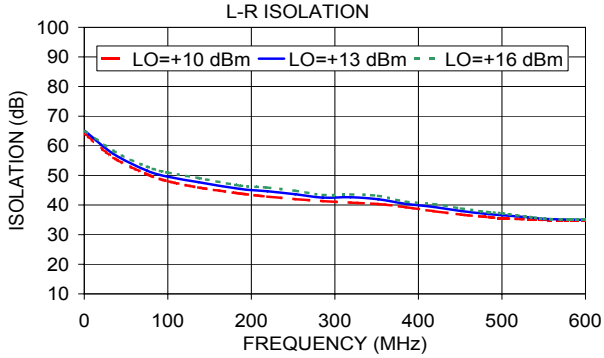


Performance Charts

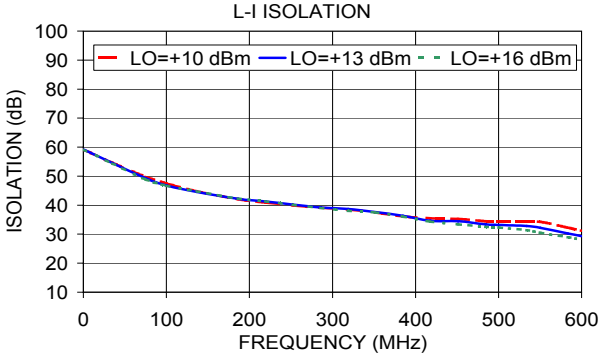
ZX05-1MHW
CONVERSION LOSS
at IF Freq of 30 MHz



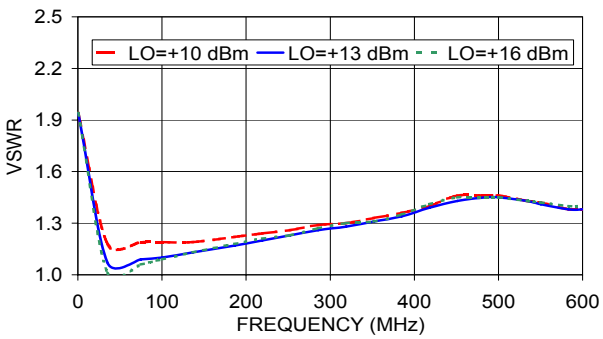
ZX05-1MHW
L-R ISOLATION



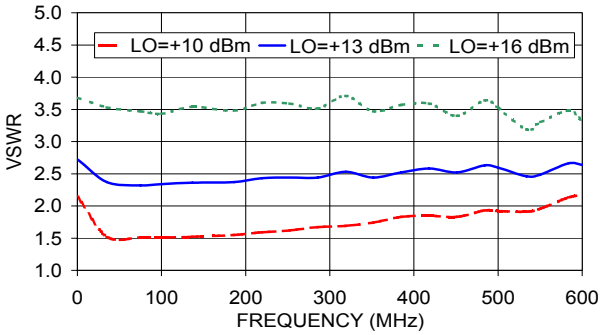
ZX05-1MHW
L-I ISOLATION



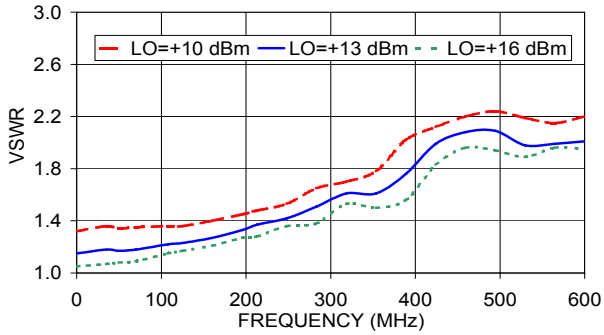
ZX05-1MHW
RF VSWR



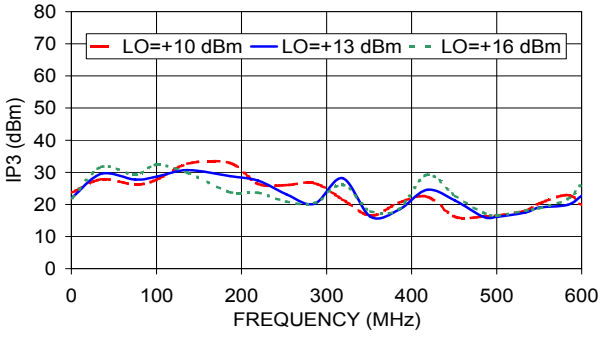
ZX05-1MHW
LO VSWR



ZX05-1MHW
IF VSWR



ZX05-1MHW
IP3



Frequency Mixer ZX05-1MHW

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB) @LO (dBm)		
		+10	+13	+16
0.5	30.5	7.29	6.90	6.66
0.8	30.8	6.83	6.46	6.24
1.0	31.0	6.63	6.25	6.05
5.1	35.1	5.74	5.41	5.32
10.1	40.1	5.53	5.20	5.28
20.1	50.1	5.45	5.11	5.20
35.1	65.1	5.45	5.20	5.22
50.1	80.1	5.46	5.19	5.23
75.1	105.1	5.46	5.20	5.20
100.1	130.1	5.46	5.21	5.20
120.1	150.1	5.42	5.17	5.15
136.7	166.7	5.38	5.14	5.16
153.2	183.2	5.41	5.18	5.18
169.8	199.8	5.38	5.17	5.15
186.3	216.3	5.40	5.20	5.19
202.9	232.9	5.36	5.18	5.20
219.4	249.4	5.41	5.21	5.20
236.0	266.0	5.39	5.21	5.21
252.5	282.5	5.42	5.25	5.21
269.1	299.1	5.43	5.25	5.20
285.6	315.6	5.45	5.27	5.22
300.1	330.1	5.42	5.25	5.19
318.7	348.7	5.46	5.26	5.16
335.3	365.3	5.47	5.31	5.16
351.8	381.8	5.52	5.35	5.24
368.4	398.4	5.56	5.41	5.28
384.9	414.9	5.54	5.41	5.26
401.5	431.5	5.55	5.39	5.25
418.0	448.0	5.59	5.39	5.22
434.6	464.6	5.65	5.43	5.27
451.1	481.1	5.79	5.53	5.33
467.7	497.7	5.84	5.57	5.41
484.2	514.2	5.85	5.58	5.43
500.8	530.8	5.83	5.58	5.46
517.3	547.3	5.82	5.62	5.49
533.9	563.9	5.87	5.69	5.54
550.5	580.5	5.93	5.74	5.60
567.0	597.0	5.97	5.74	5.59
583.6	613.6	6.07	5.74	5.57
600.1	630.1	6.11	5.72	5.56

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+10	+13	+16	+10	+13	+16
30.5	64.13	65.03	65.15	59.13	59.15	59.12
30.8	63.87	64.46	64.83	58.53	58.83	58.90
31.0	63.30	64.24	64.51	58.19	58.62	58.75
35.1	61.84	62.71	63.25	57.47	58.01	58.29
40.1	61.21	62.13	62.59	57.31	57.70	57.86
45.1	50.37	51.59	52.94	49.76	49.29	48.84
50.1	58.98	60.05	60.91	56.48	56.64	56.65
65.1	55.94	57.24	58.22	54.55	54.53	54.37
70.1	48.04	49.55	50.93	47.50	46.80	46.70
80.1	53.43	54.86	55.92	52.74	52.44	52.25
90.1	46.73	48.44	49.82	45.87	45.38	45.44
106.7	45.91	47.71	49.10	44.77	44.52	44.74
123.2	45.12	46.94	48.33	43.67	43.64	43.89
139.8	44.53	46.28	47.43	42.90	42.98	43.18
156.3	43.88	45.43	46.54	42.03	42.16	42.24
172.9	43.40	45.09	46.03	41.45	41.67	41.66
189.4	42.86	44.63	45.88	40.90	41.28	41.36
206.0	42.46	44.22	45.43	40.32	40.56	40.73
222.5	41.97	43.63	44.79	39.87	40.19	40.14
239.1	41.48	42.91	43.98	39.53	39.67	39.57
255.6	41.33	42.50	43.39	39.15	39.17	39.06
270.1	41.25	42.41	43.16	39.10	38.90	38.48
288.7	40.82	42.63	43.57	38.49	38.66	38.04
305.3	40.54	42.30	43.61	38.36	38.50	38.10
321.8	40.32	41.96	43.08	37.47	37.65	37.49
338.4	39.77	41.27	42.16	37.40	37.46	37.15
354.9	39.26	40.38	41.08	36.10	36.31	36.03
371.5	38.52	39.73	40.56	35.99	35.77	35.26
388.0	37.94	39.35	40.31	35.49	34.63	34.33
404.6	37.23	38.70	39.85	35.78	34.80	33.72
421.1	36.76	37.97	38.84	35.24	34.45	33.41
437.7	36.33	37.42	38.12	35.19	34.20	33.17
454.2	35.88	36.94	37.55	34.44	33.38	32.54
470.8	35.52	36.54	37.17	34.38	33.15	32.26
487.3	35.29	36.20	36.78	34.27	32.98	32.06
503.9	35.12	35.79	35.93	34.40	32.80	31.36
520.5	34.98	35.31	35.36	34.23	32.18	30.43
537.0	34.94	35.16	35.13	33.61	31.50	29.76
553.6	34.90	35.05	35.01	32.28	30.26	28.93
570.1	34.80	35.01	34.95	31.20	29.30	28.13

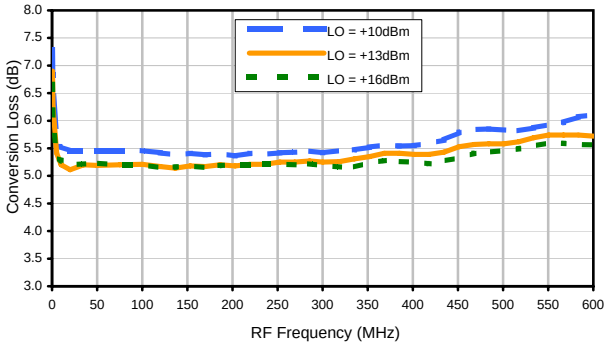
LO (MHz)	RF (MHz)	IP-3 Input (dBm) @LO (dBm)
		+13
30.5	0.5	22.10
30.8	0.8	30.60
31.0	1.0	26.40
35.1	5.1	27.90
40.1	10.1	28.10
50.1	20.1	33.30
65.1	35.1	29.50
80.1	50.1	31.00
105.1	75.1	27.70
130.1	100.1	28.60
150.1	120.1	30.80
166.7	136.7	30.70
183.2	153.2	33.90
199.8	169.8	31.00
216.3	186.3	28.80
232.9	202.9	25.30
249.4	219.4	27.40
266.0	236.0	21.70
282.5	252.5	23.20
299.1	269.1	25.20
315.6	285.6	20.20
330.1	300.1	22.70
348.7	318.7	28.20
365.3	335.3	20.90
381.8	351.8	16.20
398.4	368.4	16.60
414.9	384.9	18.30
431.5	401.5	22.30
448.0	418.0	24.50
464.6	434.6	20.20
481.1	451.1	21.20
497.7	467.7	16.70
514.2	484.2	16.10
530.8	500.8	16.20
547.3	517.3	16.40
563.9	533.9	17.50
580.5	550.5	19.00
597.0	567.0	19.60
613.6	583.6	19.80
630.1	600.1	22.70

Typical Performance Data

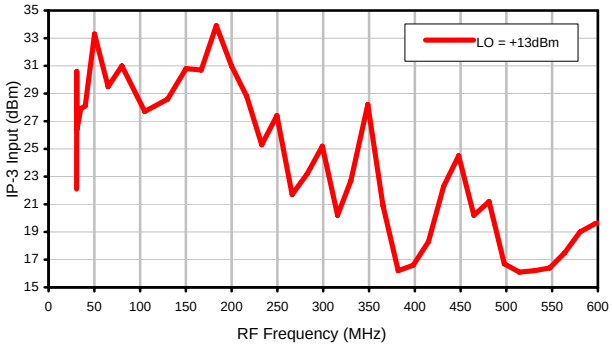
RF/LO (MHz)	RF VSWR (:1) @LO (dBm)			LO VSWR (:1) @LO (dBm)			IF (MHz)	IF VSWR (:1) @LO (dBm)		
	+10	+13	+16	+10	+13	+16		+10	+13	+16
30.5	1.94	1.94	1.94	2.14	2.72	3.68	0.1	1.32	1.15	1.05
30.8	1.66	1.66	1.66	1.90	2.56	3.55	0.3	1.34	1.16	1.05
31.0	1.55	1.55	1.56	1.79	2.50	3.48	0.5	1.36	1.18	1.07
35.1	1.22	1.15	1.14	1.53	2.37	3.41	1.0	1.38	1.19	1.08
40.1	1.19	1.10	1.07	1.53	2.40	3.55	5.0	1.38	1.20	1.08
45.1	1.19	1.09	1.06	1.51	2.32	3.47	10.0	1.38	1.19	1.07
50.1	1.18	1.07	1.02	1.50	2.38	3.49	20.0	1.35	1.18	1.07
65.1	1.18	1.07	1.01	1.52	2.37	3.53	35.0	1.36	1.18	1.07
70.1	1.19	1.10	1.09	1.51	2.34	3.43	50.0	1.34	1.17	1.08
80.1	1.17	1.07	1.03	1.49	2.36	3.53	70.0	1.35	1.18	1.09
90.1	1.19	1.12	1.11	1.50	2.35	3.49	90.0	1.34	1.19	1.12
106.7	1.19	1.13	1.13	1.52	2.36	3.54	107.6	1.36	1.22	1.15
123.2	1.21	1.15	1.14	1.53	2.38	3.58	125.2	1.36	1.23	1.17
139.8	1.21	1.16	1.16	1.54	2.39	3.54	142.8	1.37	1.25	1.19
156.3	1.22	1.17	1.18	1.55	2.37	3.48	160.4	1.40	1.27	1.21
172.9	1.23	1.19	1.19	1.55	2.39	3.52	177.9	1.41	1.31	1.24
189.4	1.24	1.20	1.21	1.59	2.43	3.60	195.5	1.45	1.33	1.27
206.0	1.24	1.22	1.22	1.61	2.46	3.65	213.1	1.48	1.37	1.28
222.5	1.26	1.23	1.23	1.62	2.44	3.59	230.7	1.50	1.41	1.34
239.1	1.28	1.25	1.26	1.64	2.42	3.49	248.3	1.53	1.42	1.36
255.6	1.29	1.26	1.27	1.67	2.44	3.51	265.9	1.59	1.44	1.35
270.1	1.29	1.27	1.28	1.69	2.51	3.62	283.5	1.65	1.51	1.38
288.7	1.30	1.28	1.30	1.69	2.53	3.71	301.0	1.66	1.57	1.48
305.3	1.32	1.29	1.32	1.72	2.48	3.64	318.6	1.70	1.61	1.53
321.8	1.33	1.31	1.31	1.74	2.44	3.47	336.2	1.73	1.62	1.53
338.4	1.34	1.32	1.33	1.78	2.46	3.45	353.8	1.78	1.61	1.50
354.9	1.36	1.34	1.35	1.83	2.52	3.57	371.4	1.87	1.62	1.49
371.5	1.38	1.36	1.37	1.86	2.60	3.67	389.0	2.02	1.76	1.56
388.0	1.40	1.39	1.41	1.85	2.58	3.59	406.6	2.09	1.92	1.70
404.6	1.43	1.41	1.43	1.82	2.53	3.42	424.1	2.12	1.99	1.83
421.1	1.46	1.43	1.45	1.83	2.52	3.40	441.7	2.17	2.05	1.92
437.7	1.47	1.44	1.45	1.88	2.58	3.51	459.3	2.20	2.08	1.96
454.2	1.46	1.45	1.45	1.93	2.63	3.64	476.9	2.22	2.09	1.98
470.8	1.46	1.45	1.45	1.92	2.59	3.52	494.5	2.24	2.09	1.94
487.3	1.45	1.44	1.44	1.90	2.47	3.24	512.1	2.22	2.03	1.90
503.9	1.43	1.43	1.43	1.91	2.46	3.19	529.7	2.19	1.98	1.89
520.5	1.42	1.41	1.42	1.96	2.49	3.30	547.2	2.14	1.97	1.91
537.0	1.40	1.39	1.41	2.05	2.61	3.47	564.8	2.15	1.99	1.96
553.6	1.38	1.38	1.40	2.13	2.66	3.48	582.4	2.26	2.04	1.94
570.1	1.38	1.38	1.40	2.17	2.64	3.32	600.0	2.20	2.01	1.95

Typical Performance Curves

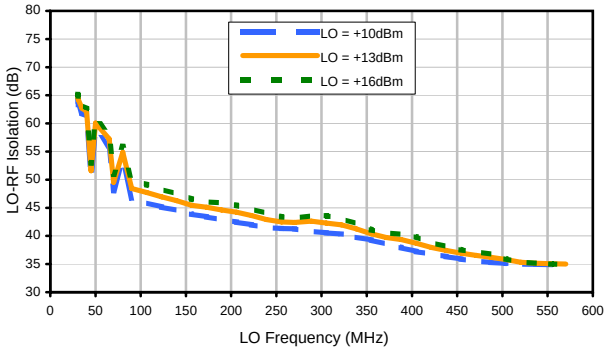
Conversion Loss



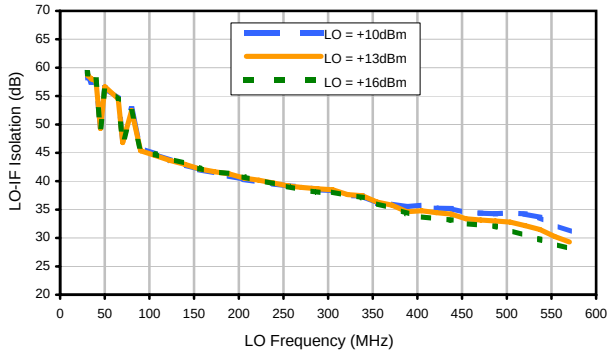
IP-3 Input



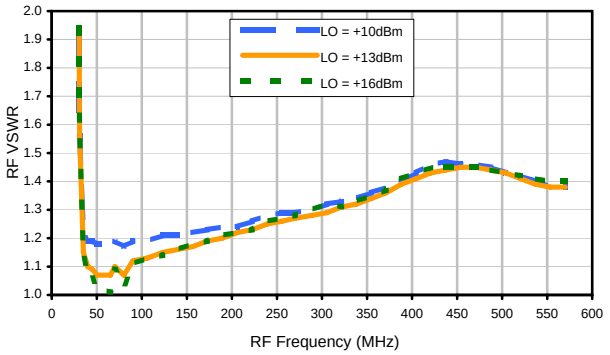
LO-RF Isolation



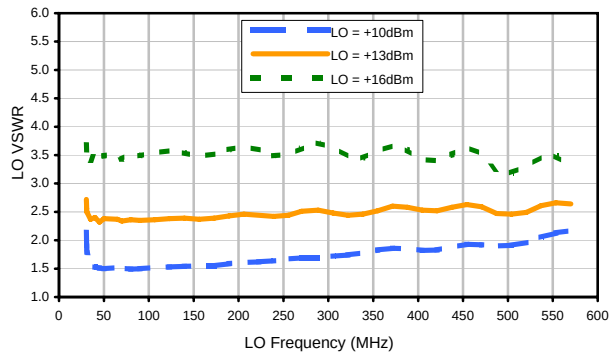
LO-IF Isolation



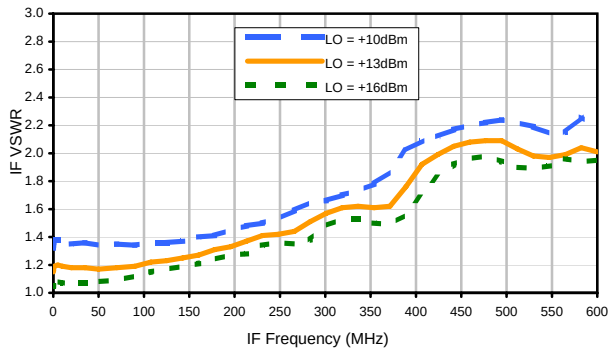
RF VSWR



LO VSWR



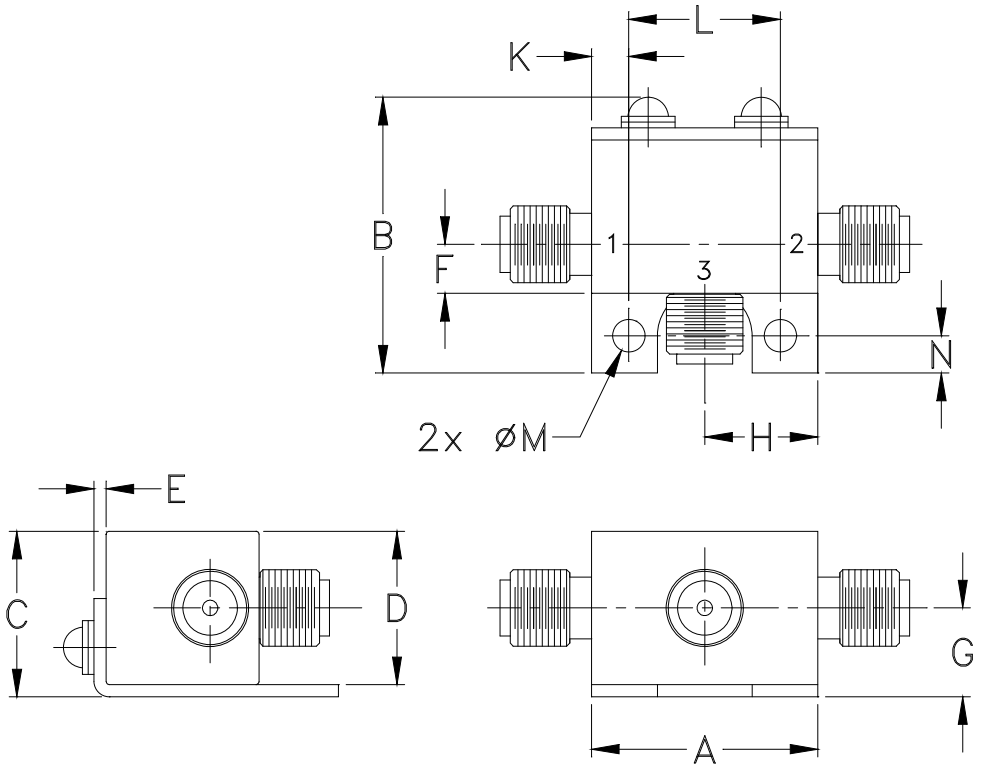
IF VSWR



Case Style FL

FL905

Outline Dimensions



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N	WT, GRAM
FL905	.74 (18.80)	.90 (22.86)	.54 (13.72)	.50 (12.70)	.04 (1.02)	.16 (4.06)	.29 (7.37)	.37 (9.40)	- -	.122 (3.10)	.496 (12.60)	.106 (2.69)	.122 (3.10)	20.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015.
Tolerance on hole size and interaxes dimensions to be ±.005.

Notes:

1. Case material: Brass.
2. Case finish: Nickel plate.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

This document and its contents are the property of Mini-Circuits.

Mini-Circuits

Environmental Specifications **ENV28T5**

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	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I

This document and its contents are the property of Mini-Circuits.