

Coaxial I&Q Modulator

NON-CATALOG

MIQC-88M+

50Ω

52 to 88 MHz

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
LO Power	50mW
I&Q Current	40mA

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

Pin Connections

LO (carrier)	13
RF (signal)	1
I (0°)(ref.)	8
Q (90°)*	5
GROUND	2,3,4,6,7,9,10,11,12,14,15,16
CASE GROUND	2,3,4,6,7,9,10,11,12,14,15,16

* Q = I + 90° for lower sideband suppression

Features

- hermetically sealed metal case
- excellent 3rd and 5th order harmonic suppressions
- good carrier and sideband rejection

Applications

- radar and communication system
- military, hi-rel applications



CASE STYLE: C07

+RoHS Compliant

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

Modulator Electrical Specifications

MODEL NO.	FREQUENCY (MHz)				CONVERSION LOSS (dB)			CARRIER REJECTION (-dBc)		SIDE BAND REJECTION (-dBc)		HARMONIC SUPPRESSION (-dBc)			
	RF (SIGNAL/ LO (CARRIER))		I&Q									3XI/Q		5XI/Q	
	fL	fU	Min.	Max.	$\bar{x}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
MIQC-88M+	52	88	DC	5	5.7	0.10	7.5	41	35	34	30	52	40	66	50

Operating LO power: 10±1dBm

1dB Compression: 0dBm typical

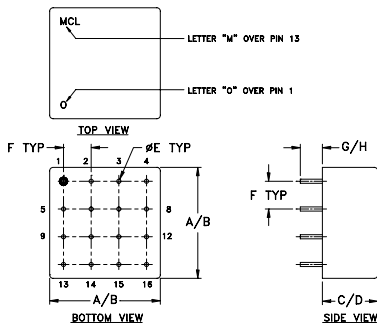
Conversion Loss: (I + Q) power, dBm - RF power, dBm

Carrier and sideband rejections measured at -5dBm I/Q power.

Typical Performance Data

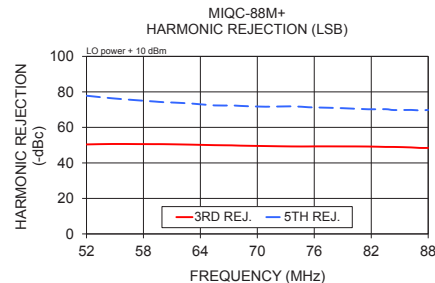
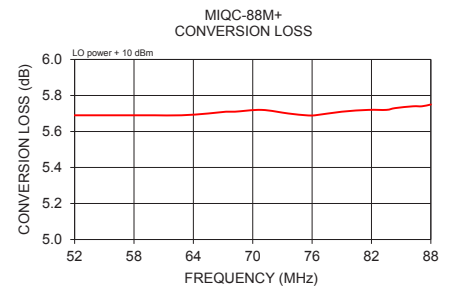
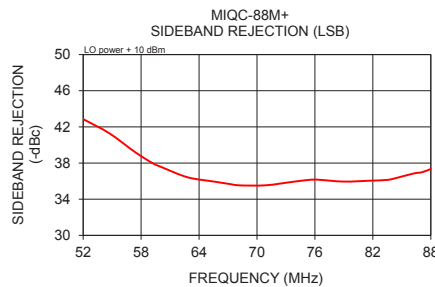
Carrier Freq. (MHz)	Conversion Loss		Sideband Rejection(x)		Carrier Rejection(x)		3rd. Harmonic Suppression (x)		5th. Harmonic Suppression (x)		DC Offset (x) (mV)
	$\bar{x}$ (dB)	σ (dB)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	
52.00	5.69	0.02	42.86	39.69	44.15	44.21	50.41	58.95	77.85	66.29	-0.10
54.70	5.69	0.03	41.30	38.12	43.80	43.74	50.66	59.53	76.40	65.83	-0.10
57.40	5.69	0.03	39.19	36.53	43.49	43.35	50.60	59.64	75.26	65.54	-0.09
59.20	5.69	0.03	37.98	35.67	43.26	43.28	50.57	59.53	74.57	65.23	-0.09
60.10	5.69	0.03	37.56	35.29	43.06	43.04	50.56	59.19	74.22	65.09	-0.09
62.80	5.69	0.03	36.43	34.51	42.85	42.71	50.32	59.20	73.56	64.62	-0.09
65.50	5.70	0.03	35.96	33.92	42.53	42.59	50.00	58.97	72.38	64.13	-0.09
67.30	5.71	0.03	35.66	33.67	42.39	42.38	49.89	58.76	72.39	64.00	-0.08
68.20	5.71	0.03	35.53	33.66	42.24	42.26	49.73	58.45	72.11	63.79	-0.08
70.90	5.72	0.03	35.54	33.66	41.98	42.01	49.49	57.70	71.65	63.68	-0.08
73.60	5.70	0.03	35.91	33.98	41.52	41.53	49.28	56.96	71.88	63.48	-0.07
75.40	5.69	0.03	36.14	34.00	41.37	41.34	49.27	56.68	71.35	63.24	-0.07
76.30	5.69	0.03	36.16	34.06	41.27	41.25	49.32	56.64	71.22	63.20	-0.07
79.00	5.71	0.03	35.95	34.02	41.12	41.10	49.29	56.42	70.83	62.88	-0.08
81.70	5.72	0.03	36.05	34.11	40.95	40.92	49.23	56.37	70.21	62.83	-0.08
83.50	5.72	0.03	36.14	34.25	40.81	40.82	49.00	56.26	70.28	62.68	-0.08
84.40	5.73	0.03	36.34	34.38	40.78	40.77	48.99	56.14	69.77	62.76	-0.08
86.20	5.74	0.03	36.84	34.71	40.75	40.69	48.73	55.97	69.85	62.71	-0.09
87.10	5.74	0.03	36.99	34.87	40.69	40.67	48.44	55.69	69.56	62.69	-0.09
88.00	5.75	0.03	37.34	35.01	40.64	40.65	48.44	55.49	69.84	62.83	-0.08

Outline Drawing

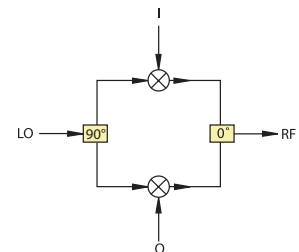


Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H	wt
.770	.810	.380	.410	.030	.200	.20	.14	grams
19.56	20.57	9.65	10.41	0.76	5.08	5.08	3.56	11.0



I&Q modulation block diagram



Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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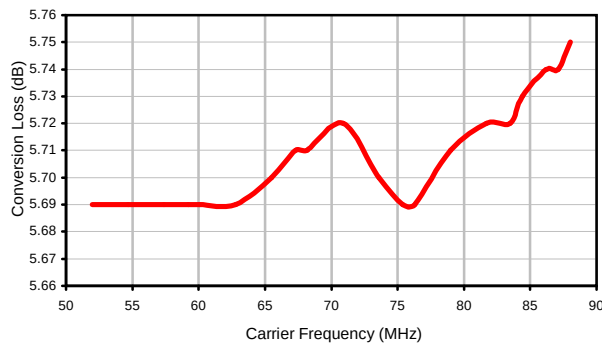
REV. E
M166133
MIQC-88M+
DJ/VV/CP/AM
180418

Typical Performance Data

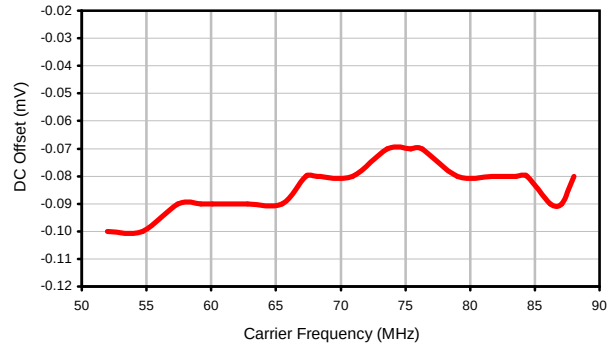
CARRIER FREQ.	CONVERSION LOSS	SIDE BAND REJECTION		CARRIER REJECTION		3rd HARMONIC SUPPRESSION		5th HARMONIC SUPPRESSION		DC OFFSET
		LSB	USB	LSB	USB	LSB	USB	LSB	USB	
(MHz)	(dB)	(-dBc)	(-dBc)	(-dBc)	(-dBc)	(-dBc)	(-dBc)	(-dBc)	(-dBc)	(mV)
52.0	5.69	42.86	39.69	44.15	44.21	50.41	58.95	77.85	66.29	-0.10
54.7	5.69	41.30	38.12	43.80	43.74	50.66	59.53	76.40	65.83	-0.10
57.4	5.69	39.19	36.53	43.49	43.35	50.60	59.64	75.26	65.54	-0.09
59.2	5.69	37.98	35.67	43.26	43.28	50.57	59.53	74.57	65.23	-0.09
60.1	5.69	37.56	35.29	43.06	43.04	50.56	59.19	74.22	65.09	-0.09
62.8	5.69	36.43	34.51	42.85	42.71	50.32	59.20	73.56	64.62	-0.09
65.5	5.70	35.96	33.92	42.53	42.59	50.00	58.97	72.38	64.13	-0.09
67.3	5.71	35.66	33.67	42.39	42.38	49.89	58.76	72.39	64.00	-0.08
68.2	5.71	35.53	33.66	42.24	42.26	49.73	58.45	72.11	63.79	-0.08
70.9	5.72	35.54	33.66	41.98	42.01	49.49	57.70	71.65	63.68	-0.08
73.6	5.70	35.91	33.98	41.52	41.53	49.28	56.96	71.88	63.48	-0.07
75.4	5.69	36.14	34.00	41.37	41.34	49.27	56.68	71.35	63.24	-0.07
76.3	5.69	36.16	34.06	41.27	41.25	49.32	56.64	71.22	63.20	-0.07
79.0	5.71	35.95	34.02	41.12	41.10	49.29	56.42	70.83	62.88	-0.08
81.7	5.72	36.05	34.11	40.95	40.92	49.23	56.37	70.21	62.83	-0.08
83.5	5.72	36.14	34.25	40.81	40.82	49.00	56.26	70.28	62.68	-0.08
84.4	5.73	36.34	34.38	40.78	40.77	48.99	56.14	69.77	62.76	-0.08
86.2	5.74	36.84	34.71	40.75	40.69	48.73	55.97	69.85	62.71	-0.09
87.1	5.74	36.99	34.87	40.69	40.67	48.44	55.69	69.56	62.69	-0.09
88.0	5.75	37.34	35.01	40.64	40.65	48.44	55.49	69.84	62.83	-0.08

Typical Performance Curves

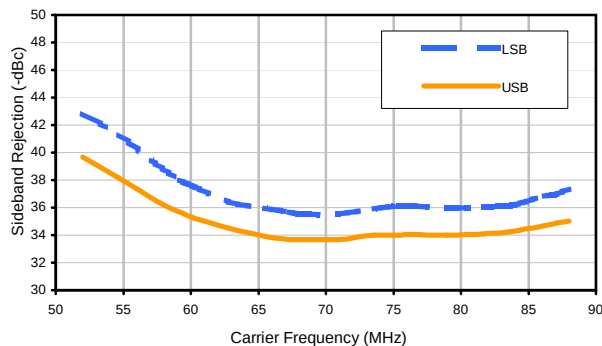
Conversion Loss



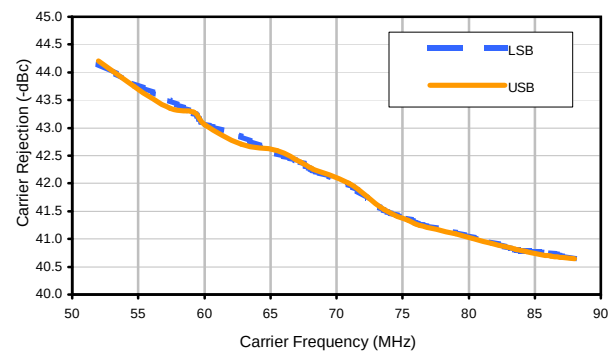
DC Offset



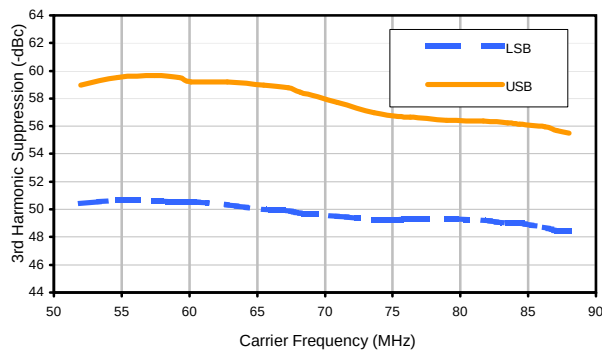
Sideband Rejection



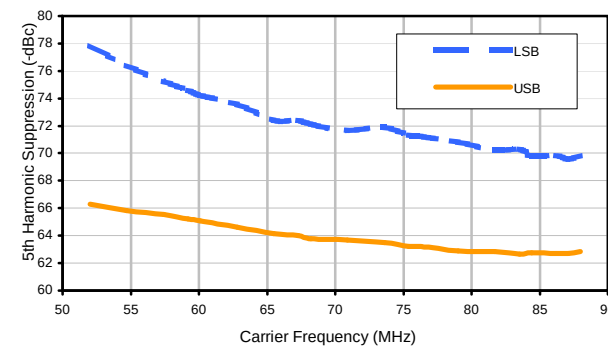
Carrier Rejection



3rd Harmonic Suppression

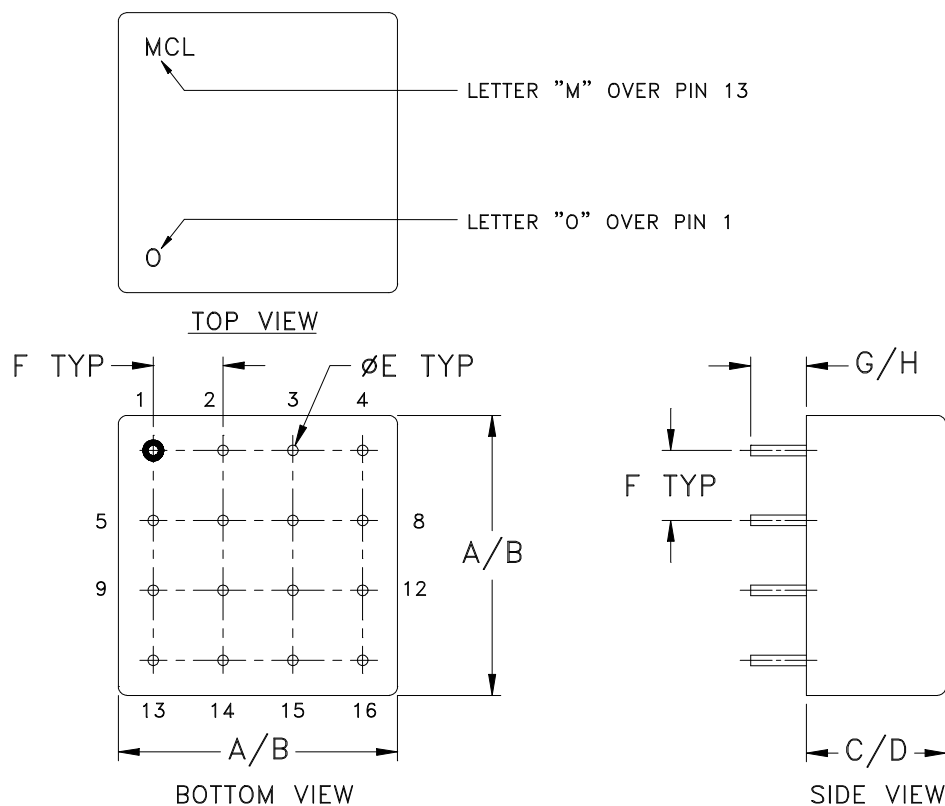


5th Harmonic Suppression



Outline Dimensions

C07



CASE#	A	B	C	D	E	F	G	H	WT. GRAM
C07	.770 (19.56)	.810 (20.57)	.380 (9.65)	.410 (10.41)	.030 (.76)	.200 (5.08)	.20 (5.08)	.14 (3.56)	11.0

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3 Pl. $\pm .015$

Notes:

- Header material: C.R.S.
Pin material: #52 alloy.
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver..
- Tolerance on pin diameter $\pm .005$ inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



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Mini-Circuits ISO 9001 & ISO 14001 Certified



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	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
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
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A



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
Gross Leak	125°C Bubble Test	MIL-STD-202, Method 112, Condition D
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D