TELEDYNE
MICROWAVE SOLUTIONS
Everywhereyoulook™

Rev. 5/10

IQM4221

1.9 TO 4.2 GHz IQ MIXER MODULATOR/DEMODULATOR

Typical Values	IQM4221
LO & RF	1.9 - 4.2 GHz
IF	DC - 1.1 GHz
Third Order I.P.	+13.0 dBm
Conversion Loss	-10.0 dB
LO Drive (nominal)	+10.0 dBm
High Isolation (LO to RF)	42.0 dB
Standard Mixer Carrier	

SPECIFICATIONS*

Parameter	Port	Frequency (GHz)	Typ. (dB)	Guaranteed -55 to +85 °C Max. (dB)
SSB Conversion Loss and SSB Noise Figure	f_R	2.1 to 4.1	9.0	10.0
	f_L	2.1 to 4.1	9.0	10.0
	f_I	DC to 0.5	9.0	10.0
	f_R	1.9 to 4.1	11.0	13.0
	f_L	1.9 to 4.1	11.0	13.0
	f_I	0.6 to 1.1	11.0	13.0
Conversion Comp.	f_R	Level = +3 dBm	–	1.0
Desenitization	f_{R2}	Level = +2 dBm	–	1.0
			Typ. (dB)	**Min. (dB)**
Isolation				
f_L at R	f_L	1.9 to 3.0	40	33
f_L at I	f_L	1.9 to 3.0	25	18
f_R at I	f_R	1.9 to 2.7	32	28
f_L at R	f_L	3.0 to 4.2	45	40
f_L at I	f_L	3.0 to 4.2	42	35
f_R at I	f_R	2.7 to 4.2	35	33
Third Order Intercept		LO = +10 dBm	+12 dBm	—
		LO = +13 dBm	+12 dBm	—
Image Rejection Side Band Suppression		RF = 1.9 to 4.2 GHz IF = 0.5 GHz	25 dB	20 dB
Amplitude Match		RF = 1.9 to 4.2 GHz	0.2 dB	0.3 dB
Phase Match (Demodulation)		RF = 1.9 to 4.2 GHz	2.0°	4.0°
Phase Match (Modulation)		RF = 2.5 to 3.5 GHz	±5.0°	±8.0°
		RF = 1.9 to 4.2 GHz	±10.0°	±15.0°
Conversion Loss (Modulation)		RF = 2.5 to 4.2 GHz	-7 dB	-8 dB
		RF = 1.9 to 4.2 GHz	-10 dB	-11.5 dB

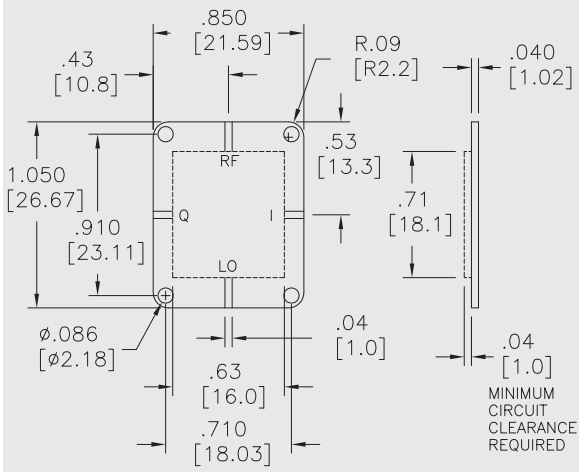
* Measured in a 50-ohm system with nominal LO drive of +10 dBm as a downconverter.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature . . . . . -65 to +150 °C
Peak RF Input Power All Ports . . . . . +22 dBm @ 25 °C
derate to +17 dBm @ 100 °C

IQM4221

Mixer Carrier MC4



DIMENSIONS ARE IN INCHES [MILLIMETERS]

Harmonic Intermodulation Products
(single tone)

HARMONICS OF f_R (rows 5 to 0) × HARMONICS OF f_L (columns 0 to 5)

	0	1	2	3	4	5
5	93	93	94	94	92	82
	93	93	94	95	91	78
4	93	94	94	73	77	78
	93	95	94	69	78	72
3	93	94	94	73	77	78
	65	90	67	47	73	93
2	76	37	50	40	71	66
	72	38	47	41	71	67
1	19	0	31	53	36	56
	19	0	31	56	41	55
0		-11	16	28	30	40
		-9	17	33	32	45

F_R = 2000 MHz @ -10 dBm
F_L @ +10 dBm
F_L = 2030 MHz
F_L @ +13 dBm

Harmonic Intermodulation Products
(single tone)

HARMONICS OF f_R (rows 5 to 0) × HARMONICS OF f_L (columns 0 to 5)

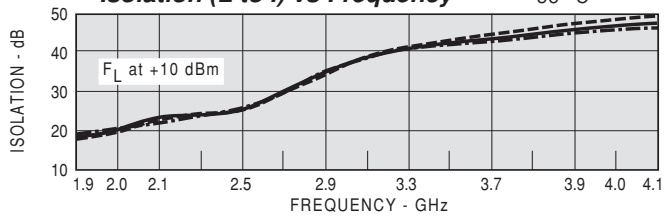
	0	1	2	3	4	5
5	90	92	93	93	96	96
	90	92	93	93	95	97
4	92	93	95	96	96	96
	91	92	94	95	92	96
3	91	94	93	61	94	95
	90	94	92	59	92	94
2	78	80	66	80	79	65
	76	78	65	79	75	69
1	26	0	48	49	61	50
	26	0	52	49	63	50
0		14	24	21	40	29
		18	27	19	45	33

F_R = 4000 MHz @ -10 dBm
F_L @ +10 dBm
F_L = 4030 MHz
F_L @ +13 dBm

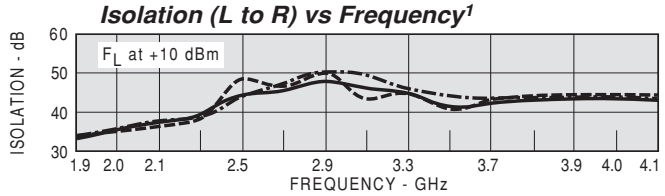
TYPICAL PERFORMANCE

KEY: +25 °C ——
+85 °C -·-·-
-55 °C - - -

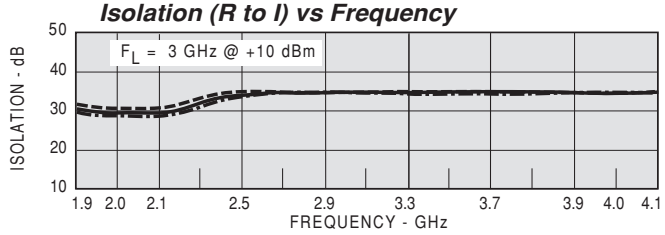
Isolation (L to I) vs Frequency[1]



Isolation (L to R) vs Frequency[1]

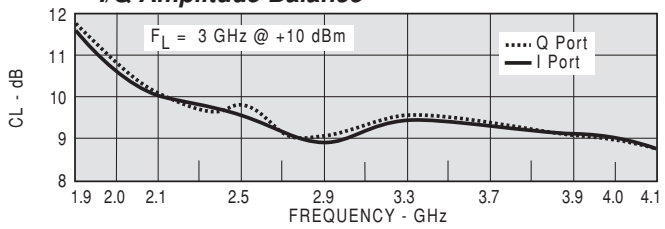


Isolation (R to I) vs Frequency



[1]Level of the f_L signal fed through to the R- and I-ports with respect to the level of the f_L signal at the L-port.

I/Q Amplitude Balance



I/Q Quadrative Phase Balance

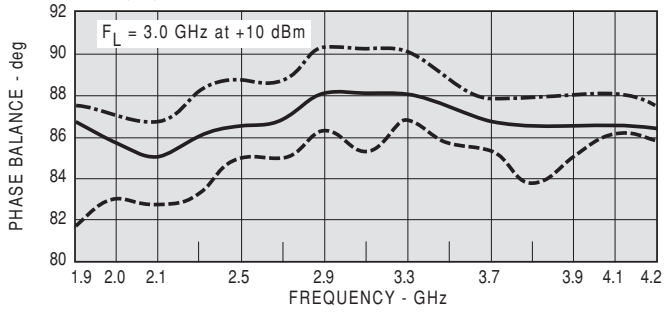
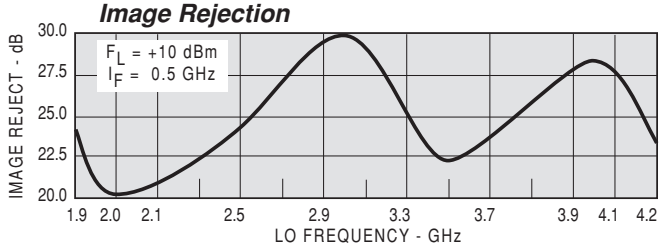
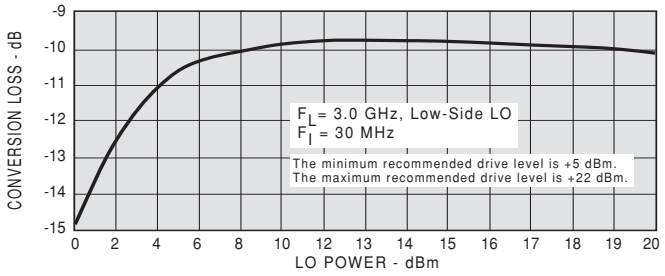


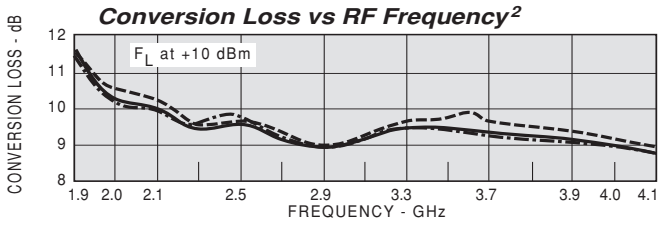
Image Rejection



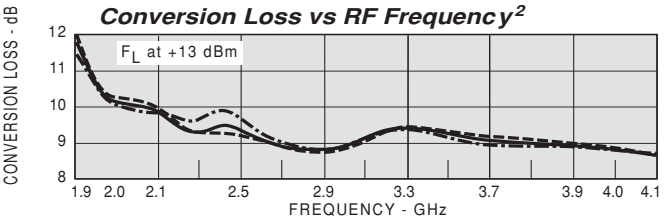
Conversion Loss vs LO Drive Level[2]



Conversion Loss vs RF Frequency[2]

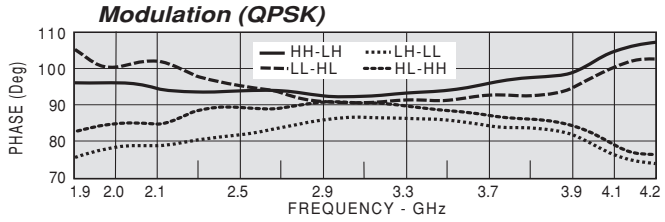


Conversion Loss vs RF Frequency[2]

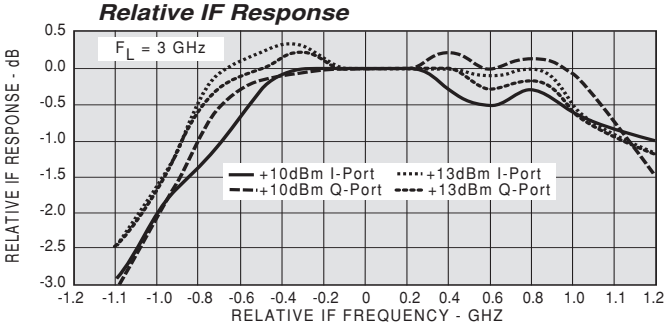
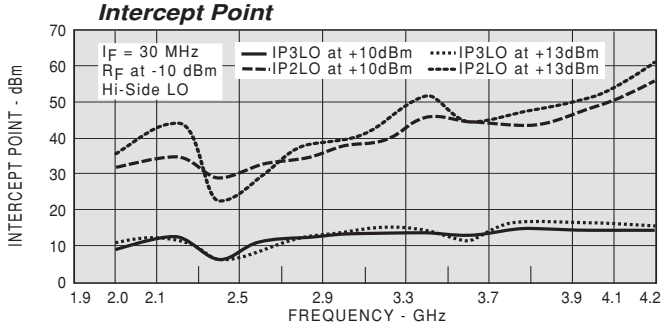


[2]Conversion loss of the mixer when used in an SSB system. The frequency ordinate refers to the R-port (f_R) with f_I at 30 MHz.

Modulation (QPSK)



Relative IF Response



Intercept Point