Advance Information

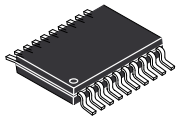
The MRFIC Line Quadrature Modulator

MRFIC0001

QUADRATURE MODULATOR INTEGRATED CIRCUIT

The MRFIC0001 is an integrated Quadrature Modulator designed for operation in the 50 to 260 MHz frequency range. The design utilizes Motorola's advanced MOSAIC 3 silicon bipolar RF process to yield superior performance in a cost effective monolithic device. Applications include DQPSK for PDC, NADC, and PHS; GMSK for GSM and DCS1800; and QPSK for CATV.

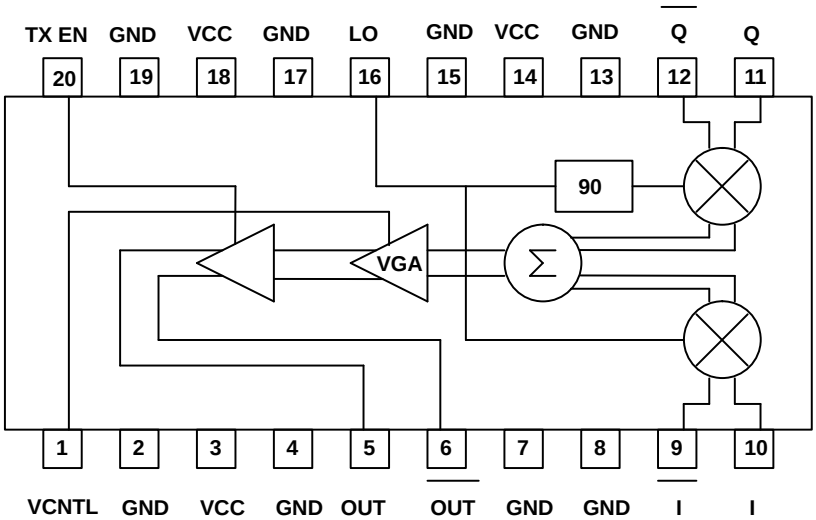
- Linear I/Q Ports
- On Chip LO Phase Shifter
- I/Q Phase Imbalance = 2 degrees (Typ)
- I/Q Amplitude Imbalance = 0.3 dB (Typ)
- Gain Control = 30 dB (Typ)
- Single Source Low Operating Supply Voltage
- Low Power Consumption
- Low–Cost, Low Profile Plastic TSSOP Package
- Available in Tape and Reel by Adding R2 Suffix to Part Number. R2 Suffix = 2,500 Units per 16 mm, 13 inch Reel.
- Device Marking = M001



CASE 948D–03 (TSSOP–20)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	6.5	Vdc
Control Voltages	TX EN, VCNTL	6.5	Vdc
LO Input Power	P_{LO}	0.0	dBm
Differential I/Q Input Voltage	V_D	2.0	V_{pp}
I, $\overline{I}$, Q, and $\overline{Q}$ DC Bias Voltage	V_B	2.0	Vdc
Ambient Operating Temperature	T_A	–30 to +85	°C
Storage Temperature	T_{stg}	–65 to +125	°C



Pin Connections and Functional Block Diagram

This document contains information on a new product. Specifications and information herein are subject to change without notice.

REV 2

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2.7 to 5.5	Vdc
LO Input Power	P_{LO}	–10	dBm
LO Frequency	f_{LO}	50 to 260	MHz
Differential I/Q Input Voltage	V_D	0 to 1.0	Vdc
I, $\overline{I}$, Q, and $\overline{Q}$ DC Bias Voltage	V_B	1.5 to 1.7	Vdc
Variable Gain Amplifier Control Voltage	CNTL	0 to V_{CC}	Vdc
Transmit Enable Low Voltage	TX EN	0 to 0.2	Vdc
Transmit Enable High Voltage	TX EN	V_{CC} – 0.2 to V_{CC}	Vdc

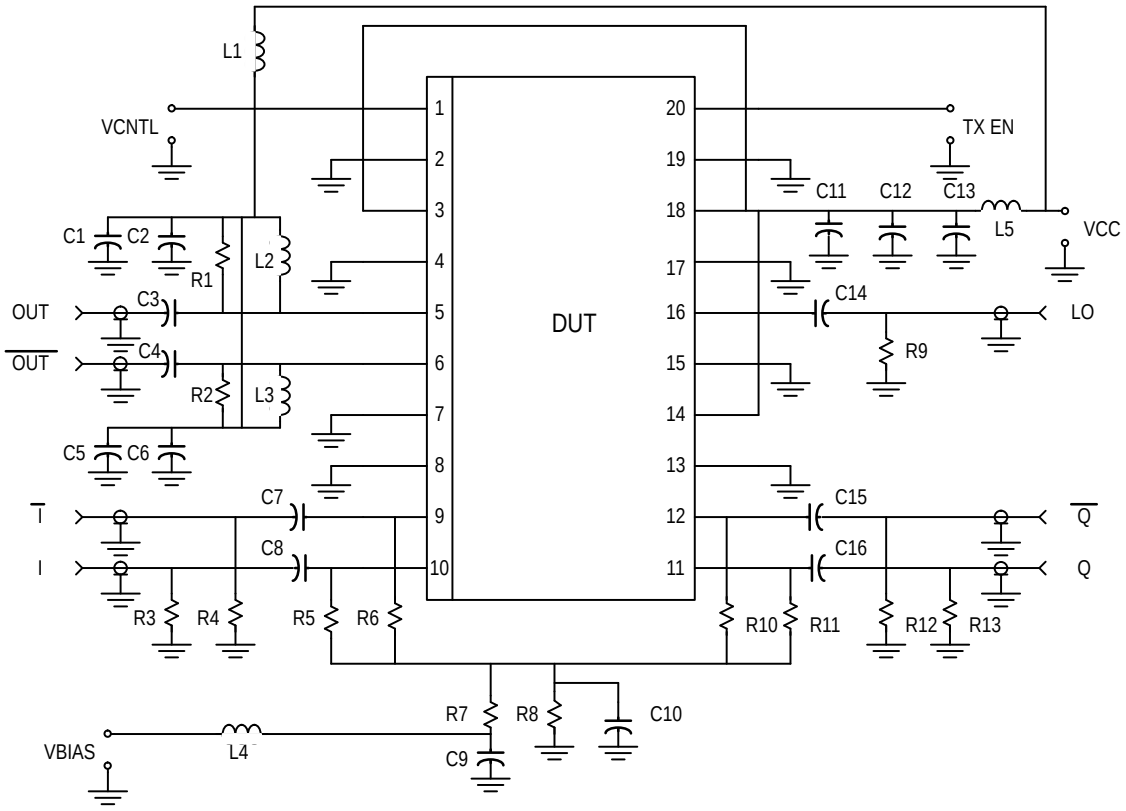
ELECTRICAL CHARACTERISTICS (V_{CC} = 3.0 V, TX EN = 3.0 V, VCNTL = 0.0 V, V_D = 0.8 V_{PP}, V_B = 1.6 V, P_{LO} = –10 dBm, f_{LO} = 248 MHz, f_D = 100 kHz, T_A = 25°C unless otherwise noted)

Characteristic	Min	Typ	Max	Unit
Supply Current	–	10	12	mA
Standby Current (TX EN = 0.0V)	–	40	100	μA
Single Sideband Output Power Level	–15	–13	–	dBm
Single Sideband Output Power 1dB Compression Point	–	–10	–	dBm
LO Leakage	–	–55	–45	dBm
Undesired Sideband Level	–	–35	–30	dBc
Output Level Dynamic Range (VCNTL = 0 to 2.2V)	–	30	–	dB
Turn–on/off time	–	2	–	μs
I/Q Data				
Input 3dB Bandwidth	–	5	–	MHz
Amplitude Imbalance	–	0.3	–	dB
Phase Imbalance	–	2	–	degree

* (1) All electrical characteristics measured in test circuit schematic shown in Figure 1.
V_B is the bias voltage on the input data ports.
V_D is the sinusoidal differential voltage on the input data ports when testing the part in a single sideband mode.
Above power levels are the single–ended output power.

EVALUATION BOARDS

Evaluation boards are available for RF Monolithic Integrated Circuits by adding a “TF” suffix to the device type. For a complete list of currently available boards and ones in development for newly introduced poduct, please contact your local Motorola Distributor or Sales Office.

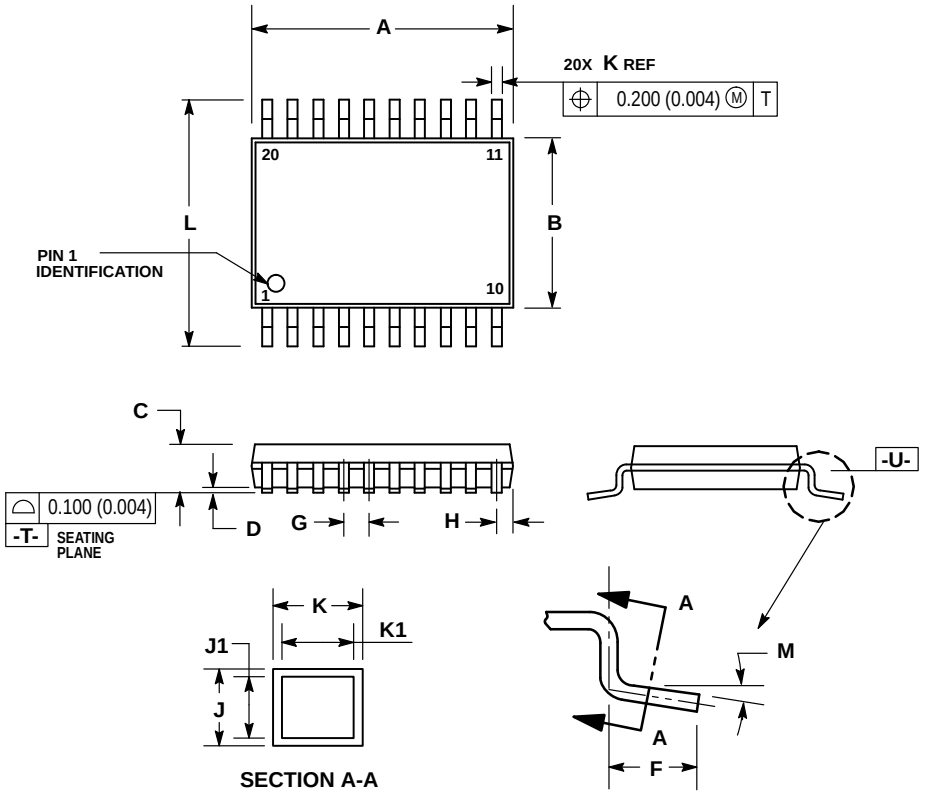


C1, C5, C9, C12 – 10000 pF, Chip Capacitor
C2, C6, C11 – 100 pF, Chip Capacitor
C3, C4 – 3.6 pF, Chip Capacitor
C7, C8, C10, C13, C15, C16 – 1 uF, Chip Capacitor
C14 – 10 pF, Chip Capacitor
L1, L4, L5 – 1.2 μH, Chip Inductor
L2, L3 – 68 nH, Chip Inductor

R1, R2 – 1000 Ω, Chip Resistor
R3, R4, R12, R13 – 510 Ω, Chip Resistor
R5, R6, R10, R11 – 2200 Ω, Chip Resistor
R7, R8, – 5100 Ω, Chip Resistor
R9 – 56 Ω, Chip Resistor

Figure 1. Typical Biasing Configuration

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSIONS A AND B ARE TO BE DETERMINED AT DATUM PLANE –U–.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	—	6.60	—	0.260
B	4.30	4.50	0.169	0.177
C	—	1.20	—	0.047
D	0.05	0.25	0.002	0.010
F	0.45	0.55	0.018	0.022
G	0.65 BSC		0.026 BSC	
H	0.275	0.375	0.011	0.015
J	0.09	0.24	0.004	0.009
J1	0.09	0.18	0.004	0.007
K	0.16	0.32	0.006	0.013
K1	0.16	0.26	0.006	0.010
L	6.30	6.50	0.248	0.256
M	0°	10°	0°	10°

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ISSUE B

How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298