

# 0.5 TO 2.0 GHz TTL QPSK MODULATOR

## MODEL: SMT0502LC1MD (Modulation Driven)

### FEATURES

- RF/LO Coverage..... 0.5 to 2.0 GHz
- TTL-controlled I and Q inputs
- Amplitude accuracy.....  $\pm 0.5$  dB
- QPSK phase accuracy.....  $\pm 5^\circ$
- Switching speed..... 30 ns
- Rise time..... 10 ns



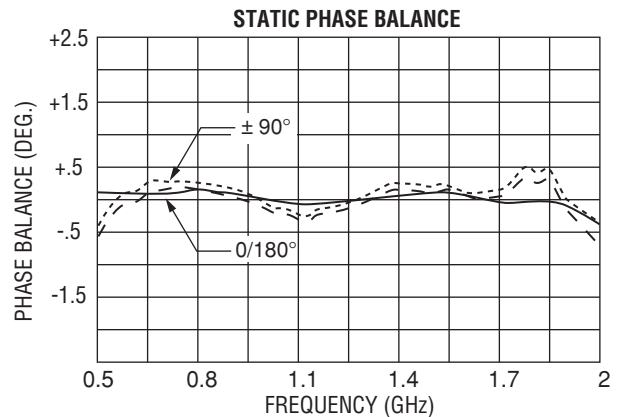
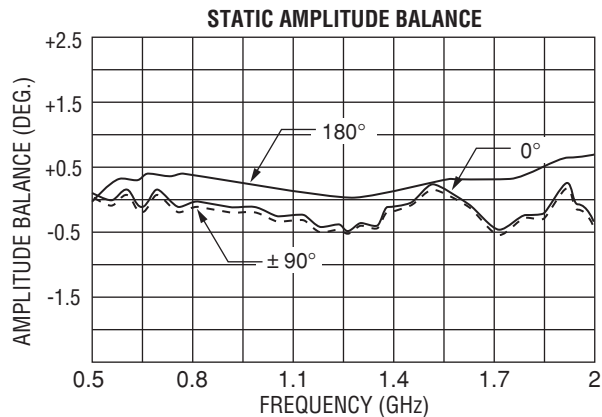
MITEQ's Model SMT0502LC1MD quadrature phase-shift keying (QPSK) modulator is designed for rapid digital TTL-control applications. For example, two channels (I/Q) of isolated digital modulation can be transmitted in the same bandwidth as required for one biphase modulator.

### ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF carrier		GHz	0.5		2
RF carrier level (maximum)		dBm		0	+3
RF VSWR	50 ohm reference	Ratio		2:1	2.5:1
IF modulation input	2 BITS			TTL	
DC power	+12 volts	mA			150
	-12 volts	mA			150
TRANSFER CHARACTERISTICS	CONDITION	UNITS	MIN.	TYP.	MAX.
Insertion loss		dB		7	10
Quadra-state phase balance		Degrees		$\pm 5$	$\pm 10$
Quadra-state amplitude balance		dB		$\pm 0.5$	$\pm 1.5$
Switching speed (50% TTL to 90% RF)		ns		10	30
Modulation to RF output isolation		dB	25		
Carrier suppression		dBc	18	25	
OUTPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	0.5		2
RF VSWR	50 ohm reference	Ratio		2.5:1	
Output phase matrix	<b>TTL LEVELS</b>				
	0	0	Ref.	Degrees	
	1	0	90	Degrees	
	1	1	180	Degrees	
	0	1	270	Degrees	

# SMT0502LC1MD MODULATION DRIVEN TYPICAL TEST DATA

RF = 0 dBm, I/Q = TTL



## SMT0502LC1MD MODULATION DRIVEN OUTPUT SPECTRUM TABLE

Frequency (GHz)	$f_0 + \text{IF}$ (I.L., dB) Note 1	$f_0 - \text{IF}$ (dBc)	$f_0$ (dBc)	$f_0 - 2 \text{ IF}$ (dBc)	$f_0 + 2 \text{ IF}$ (dBc)	$f_0 - 3 \text{ IF}$ (dBc)	$f_0 + 3 \text{ IF}$ (dBc)
0.5	-5.6	-25.9	-45.9	-37.9	-46.4	-12.4	-30.8
0.6	-5.9	-26.8	-34.3	-43.4	-47	-10.1	-37.9
0.7	-6.2	-28	-33.3	-45.9	-44.8	-9.9	-30.6
0.8	-6.1	-27.7	-35	-46	-45.9	-10.6	-33.5
0.9	-5.8	-28.4	-36.5	-46.4	-47.7	-11.1	-37.8
1	-5.7	-26.8	-38.3	-48.4	-49.7	-11	-31.8
1.1	-6	-26.4	-42.4	-47.1	-49.1	-10.8	-36.7
1.2	-5.9	-26.8	-45.2	-47.1	-47.6	-11.2	-40
1.3	-6.3	-26	-49.6	-46.1	-47.4	-10.5	-38.9
1.4	-6.6	-30.5	-48.4	-46.8	-47.2	-10.4	-35.4
1.5	-7	-31.5	-44.7	-46	-46.9	-10.3	-33
1.6	-7.4	-28.6	-41.5	-45.8	-47.1	-10.2	-35.3
1.7	-7.7	-25.6	-39.9	-46.7	-45.5	-10.3	-45.7
1.8	-7.7	-24.9	-36.2	-47.8	-43.7	-10.4	-30.4
1.9	-7.2	-26.8	-31.5	-46.9	-40.5	-11	-30.3
2	-6.5	-24	-28.1	-47.2	-37	-11.4	-41.5
Worst case	-7.7	-24	-28.1	-37.9	-37	-9.9	-30.3

OUTPUT SPECTRUM RELATIVE TO CARRIER +20 MHz OUTPUT

### MAXIMUM RATINGS

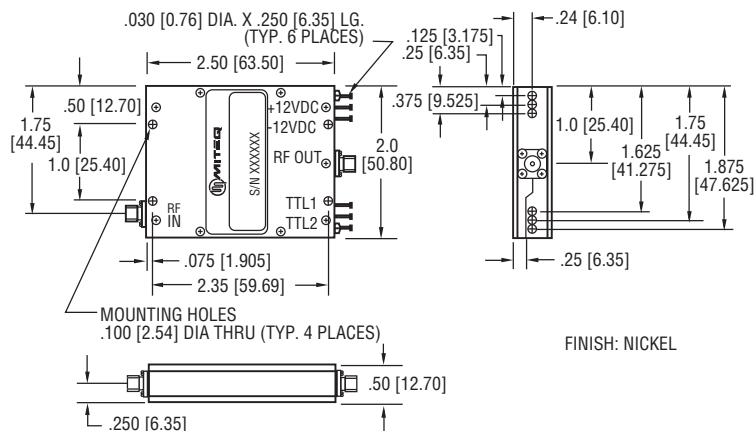
Specification temperature..... +25°C  
 Operating temperature ..... -54 to +85°C  
 Storage temperature ..... -65 to +125°C

### GENERAL NOTES

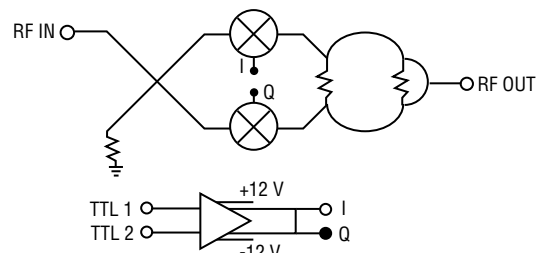
1. Conversion loss is relative to RF carrier input (0 dBm).
2. RF = 0 dBm, I/Q = TTL.
3. PIN diode for high level operation (RF = +20 dBm).

NOTE: Test data supplied at 25°C; insertion loss, phase and amplitude balance.

### OUTLINE DRAWING



### BLOCK DIAGRAM



NOTE: All dimensions shown in brackets [ ] are in millimeters.