

# 1 TO 4 GHz SINGLE-SIDEBAND UPCONVERTER (OR I/Q) MODULATOR

## MODEL: SDM0104LC1MD\_\* (Modulation Driven)

### FEATURES

- RF output/carrier input ..... 1 to 4 GHz
- Modulation bandwidth ..... DC to 500 MHz (Q)
- Sideband suppression ..... 25 dB
- Carrier rejection ..... 35 dB
- Modulation options:
  - Single sideband ..... A, B and C  
(internal hybrid)
  - I/Q modulator ..... Q (separate inputs)



All modulators and SSB upconverters require that at least one of the input frequency bands (carrier or modulation) has sufficient power to turn on the semiconductors. This model employs modulation drive. All modulators yield a frequency spectrum that utilizes both sidebands on either side of the output suppressed carrier. SSB upconverters, however, employ an internal IF 90° hybrid to yield only one RF sideband output. This is offset above or below the input LO by the IF frequency (test data is recorded for the upper sideband only). Schottky diode (standard) modulators have the greatest speed and bandwidths, but yield RF output powers of typically less than 0 dBm. PIN diode (optional) designs can only be driven at modulation rates of less than 30 MHz, but will yield output RF powers exceeding +5 dBm. This modulation driven unit is used when the RF input has a wide dynamic range, such as for military and commercial Doppler frequency or phase-shift generation.

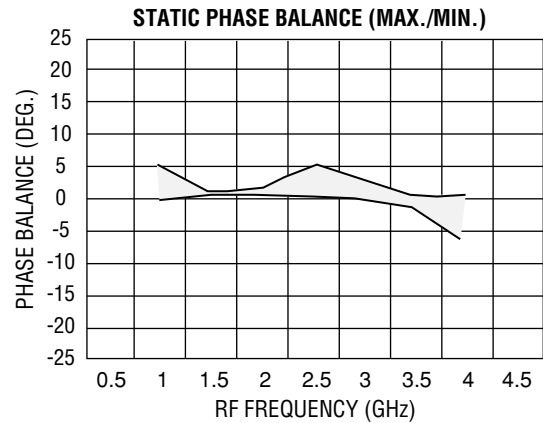
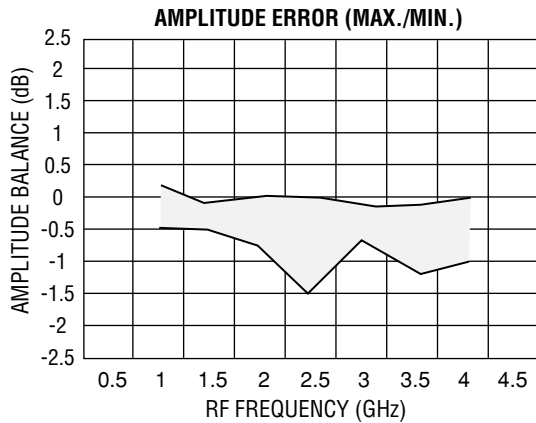
### ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	UNITS	MIN.	TYP.	MAX.
RF carrier	GHz	1		4
RF VSWR (RF = -10 dBm, IF modulation = +10 dBm)	Ratio		1.5:1	
RF power at 1 dB compression (IF = +10 dBm)	dBm		+5	
IF modulation frequency range (Note 3)	MHz	DC		500
IF modulation power range (50 ohm input)	dBm	+7	+10	+13
TRANSFER CHARACTERISTICS	UNITS	MIN.	TYP.	MAX.
Conversion loss (Note 1)	dB		7	10
Carrier suppression	dBc	30	40	
Sideband suppression upconverter mode (Note 2)				
Carrier – fundamental IF	dBc	17	27	
Carrier ±2 IF, 4 IF, etc.	dBc		45	
Carrier ±3 IF	dBc		10	
Quadrature phase accuracy, I/Q mode (see Graph Key)	Degrees		±7.5	±10
Quadrature amplitude accuracy	dB		±0.75	±1.5
OUTPUT PARAMETERS	UNITS	MIN.	TYP.	MAX.
RF frequency range	GHz	1		4
RF VSWR (RF = -10 dBm, IF modulation = +10 dBm)	Ratio		2.5:1	

# SDM0104LC1MDQ MODULATION DRIVEN TYPICAL TEST DATA

RF Phase (Deg.)	0	+90	-90	+180
I/Q	+/+	-/+	+/-	-/-

I/Q MODE (RF = 0 dBm, I/Q = +10 dBm or ±10 mA)



# SDM0104LC1MDC MODULATION DRIVEN OUTPUT SPECTRUM TABLE

SSB UPCONVERTER (RF = 0 dBm, IF = +10 dBm total, IF = 100 MHz)

Frequency (GHz)	$f_0 + IF$ (I.L., dB) Note 1	$f_0 - IF$ (dBc)	$f_0$ (dBc)	$f_0 - 2 IF$ (dBc)	$f_0 + 2 IF$ (dBc)	$f_0 - 3 IF$ (dBc)	$f_0 + 3 IF$ (dBc)
1	8.8	26	39	50	51	13	29
1.5	6	36	43	52	53	11	30
2	5.7	37	45	48	53	12	26
2.5	7.2	22	48	49	50	9.5	26
3	6.5	25	44	47	52	11	28
3.5	7.3	30	40	51	54	11.5	26
4	9.8	27	46	46	45	10	24

### MAXIMUM RATINGS

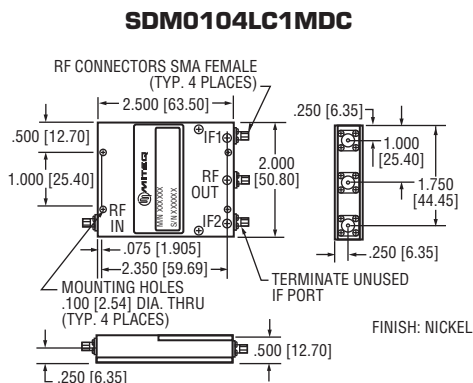
Specification temperature ..... +25°C  
 Operating temperature ..... -54 to +85°C  
 Storage temperature ..... -65 to +125°C

### GENERAL NOTES

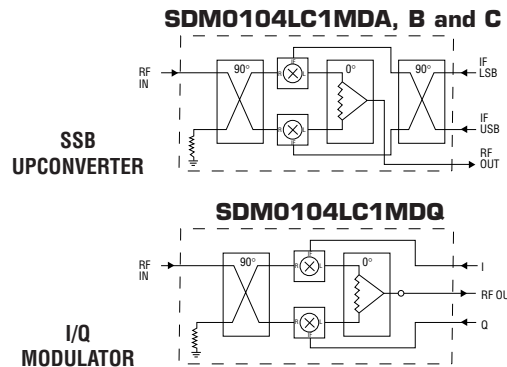
1. Insertion loss relative to +3 dBm input. All other outputs, including  $f_0$ , are relative to the desired upper ( $f_0 + f_m$ ) output.
2. Standard SSB units with IF hybrids are aligned for upper sideband operation. For lower sideband or selectable sideband, contact MITEQ.
- \*3. Available part numbers: SDM0104LC1MD\_ \*  
 A = 20–40 MHz  
 B = 40–80 MHz  
 C = 100–200 MHz  
 Q = DC–500 MHz

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

## OUTLINE DRAWING



## BLOCK DIAGRAMS



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