HYBRID ANTENNA SWITCH

MD004H

1200−1300MHz, 25W, ANTENNA SWITCH

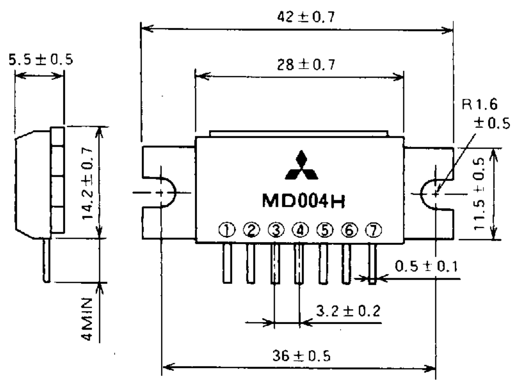
MINIATURE RF ANTENNA SWITCH

MD004H is designed to cover 1200 − 1300MHz, 25W, antenna switch module.

- Small, Easilly Mounted Package.
- High Isolation: 30dB Typ.
- Low Transmit Insertion Loss: TX-ANT 0.8dB Typ.
  ANT-RX 1.0dB Typ.
- Low Harmonic Output:
- Low Operating Current (TX-ANT ON): 50mA
- Off Through (ANT-RX ON): 0mA

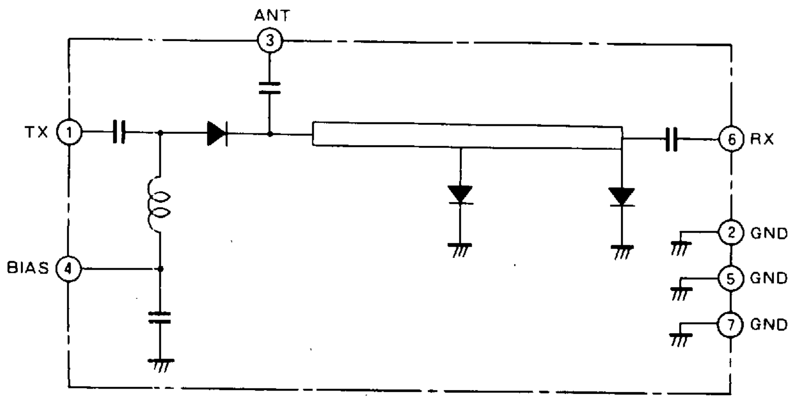
OUTLINE DRAWING

Dimensions in mm



① TX
② GND
③ ANT
④ BIAS
⑤ GND
⑥ RX
⑦ GND

EQUIVALENT CIRCUIT



OPERATING MATRIX

Bias condition	TX-ANT	ANT-RX
Ibias = 50mA	ON	OFF
Ibias = 0	OFF	ON

MITSUBISHI ELECTRIC

1200−1300MHz, 25W, ANTENNA SWITCH

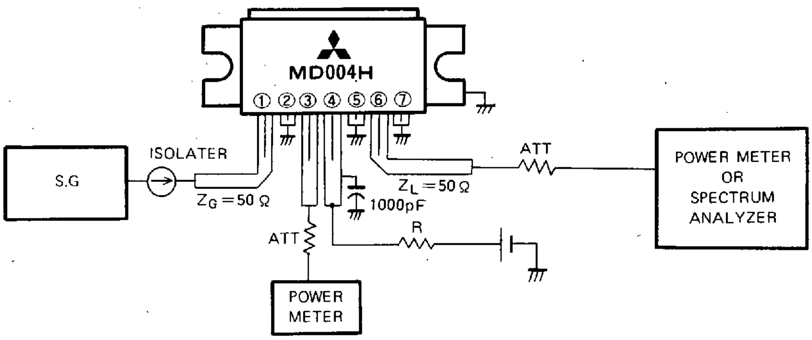
ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
Ibias	Bias current	100	mA
Pin	Input power	50 @Ta≦90°C	W
Tstg	Storage temperature	−30 to 110	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test condition	Limits			Unit
			Min	Typ	Max	
f	Frequency Range		1200		1300	MHz
ISO	Isolation (TX-RX)	Pin=20W, Ibias=50mA, ANT port terminated 50 Ω	25	30		dB
α_1	Insertion loss (TX-ANT)	Pin=20W, Ibias=50mA, RX port terminated 50 Ω		0.8	1.2	dB
α_2	Insertion loss (ANT-RX)	Pin=1mW, Ibias=0, TX port terminated 50 Ω		1.0	1.5	dB

TESTING CIRCUIT SCHEMATIC (ISO. α_1)



① TX
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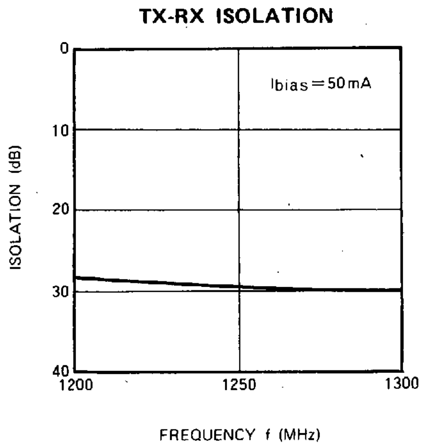
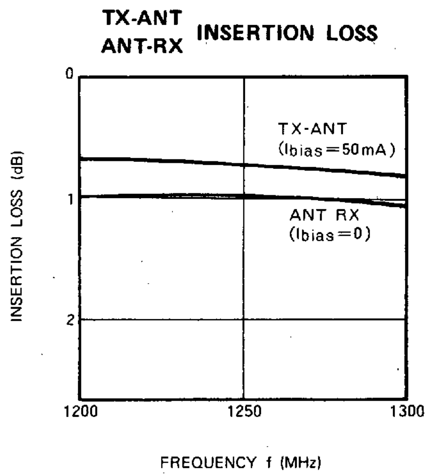
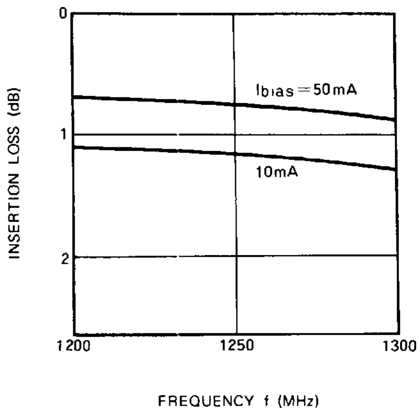
④ BIAS
⑤ GND
⑥ RX
⑦ GND

TYPICAL PERFORMANCE DATA

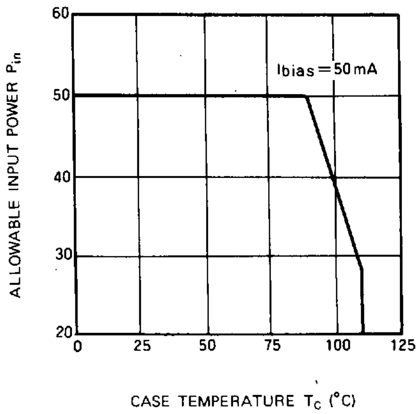




TX-ANT INSERTION LOSS VS. BIAS CURRENT



ALLOWABLE INPUT POWER



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated diodes at standard operation

(1) Thermal resistance between junction and package of incorporated diodes.

$R_{th(j-c)} = 70°C/W$ (Typ.)

(2) Junction temperature of incorporated diodes at standard operation. Conditions for standard operation.

$P_{in} = 33W$, $I_{bias} = 50mA$ (VF = 0.85V)(1), $r_{fs} = 0.8\Omega$(2), $Z_o = 50\Omega$(3)

Note 1: Forward Voltage of diodes.

Note 2: Series Resistance of diodes.

Note 3: Characteristic Impedance.

- Junction temperature of diodes

$T_j = [(P_{in}/Z_o) \times r_{fs} + I_{bias} \times VF] \times R_{th(j-c)} + T_C^{(4)}$

$= [(33/50) \times 0.7 + 0.05 \times 0.85] \times 70 + T_C$

$= 40.0 + T_C$ (°C)

Note 4: Package temperature of device

2. Heat sink design

In thermal design of heat sink, try to keep the package tempeatrure at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the input power of 33W below 90°C.

The thermal resistance $R_{th(c-a)}$(5) of the heat sink to realize this:

$R_{th(c-a)} = (T_C - T_a)/(P_{in} - P_{out}) = (90-60)/(33-27.5)^{(6)}$
$= 5.5$ (°C/W)

Note 5: Inclusive of the contact thermal resistance between device and heat sink.

Note 6: Insertion loss is 0.8dB

Mounting the heat sink of the above thermal resistance on the device,

$T_j = 130°C$, $T_C = 90°C$

In the annual average of ambient temperature is 30°C, $T_j = 100°C$

As the maximum junction temperature of these incorporated diodes T_{jmax} are 175°C, application under fully derated condition is ensured.