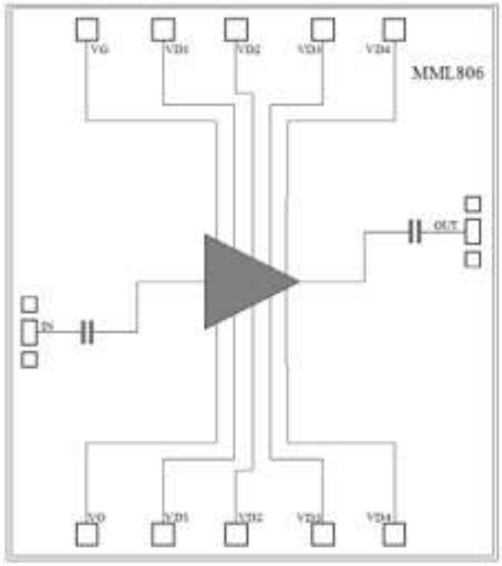
Featrues

- Frequency : 45-90GHz
- Small Signal Gain : 15dB Typical
- Gain Flatness : ±2.5dB Typical
- Noise Figure : 4.5dB Typical
- P1dB : 12dBm Typical
- Power Supply : VD=+4V@119mA ,VG=-0.4V
- Input/Output : 50Ω
- Chip Size : 1.766 x 2.0 x 0.05mm

Functional Block Diagram



Typical Applications

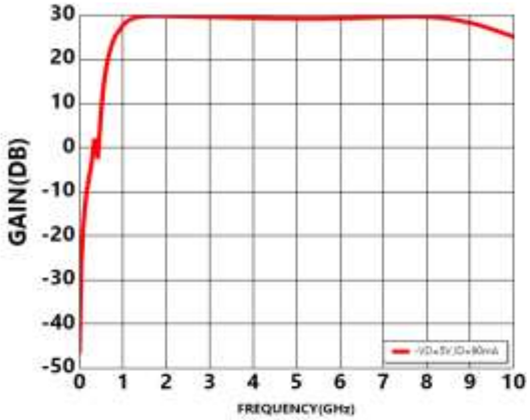
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

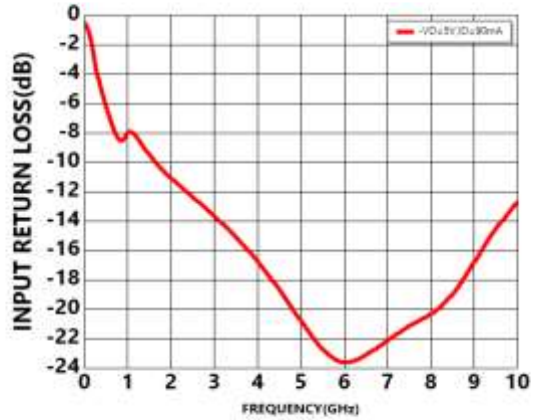
Electrical Specifications

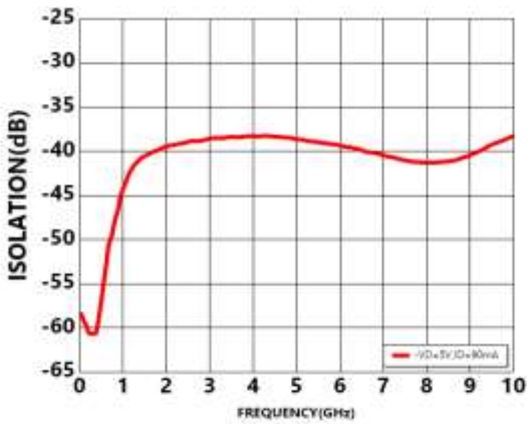
TA = +25℃, -VD=5V,ID=90mA

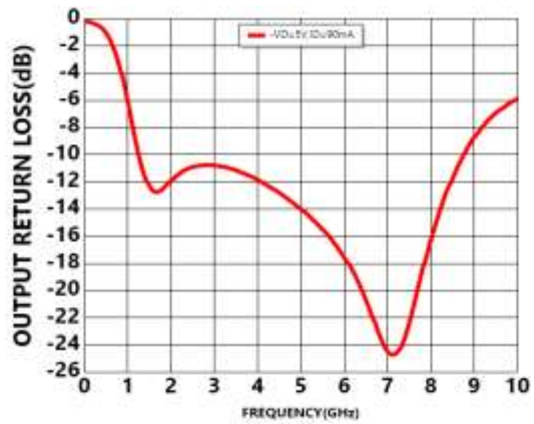
Parameter	Min	Type	Max	Min	Type	Max	Unit
Frequency		0 - 5			5 - 10		GHz
Small Signal Gain	-46.7	-8.4	29.8	25.2	27.4	29.7	dB
Gain Flatness		±42.5			±1.9		dB
Noise Figure	0.6	0.9	1.2	0.6	0.9	1.2	dB
P1dB - Output 1dB Compression	12.0	16.2	20.3	16.1	17.9	19.6	dBm
Psat - Saturated Output Power	18.3	19.4	20.5	20.4	21.0	21.5	dBm
OIP3 - Output Third Order Intercept	26.8	29.8	32.7	27.8	29.1	30.5	dBm
Input Return Loss	-20.7	-10.6	-0.5	-23.6	-18.2	-12.7	dB
Output Return Loss	-14.0	-7.1	-0.2	-24.7	-15.3	-5.9	dB

Measurement Plots: S-parameters
TA = +25℃

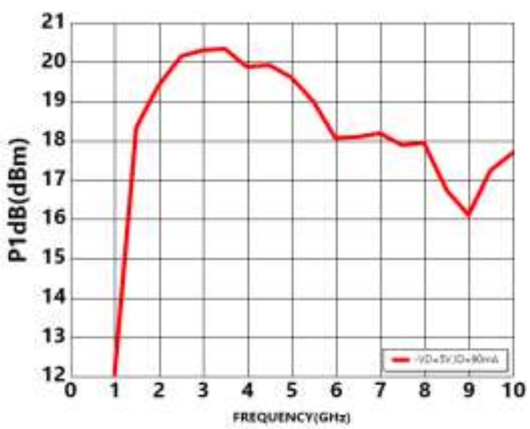




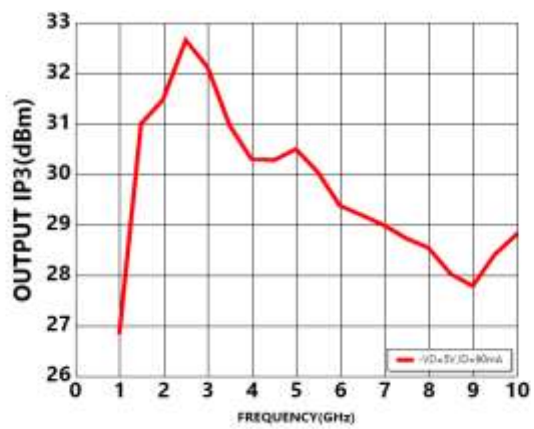




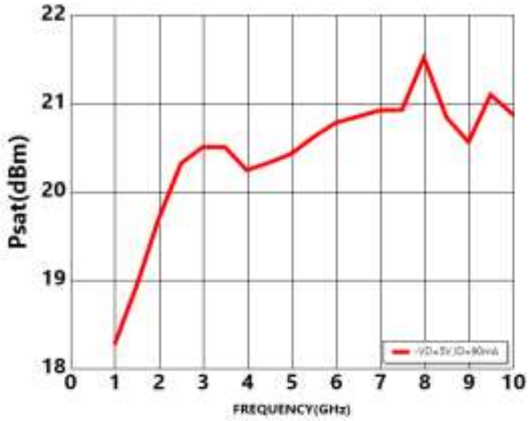
Measurement Plots: P1dB
TA = +25℃



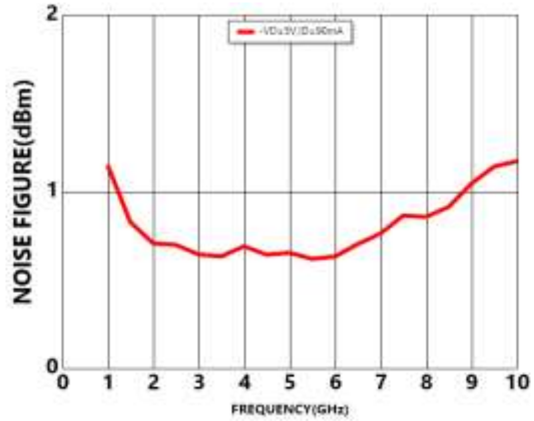
Measurement Plots: OIP3
TA = +25℃



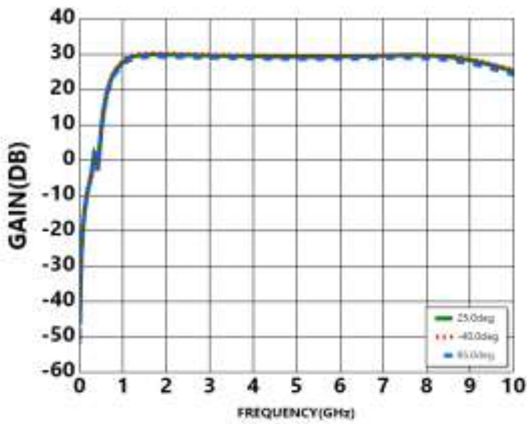
Measurement Plots: Psat
TA = +25℃

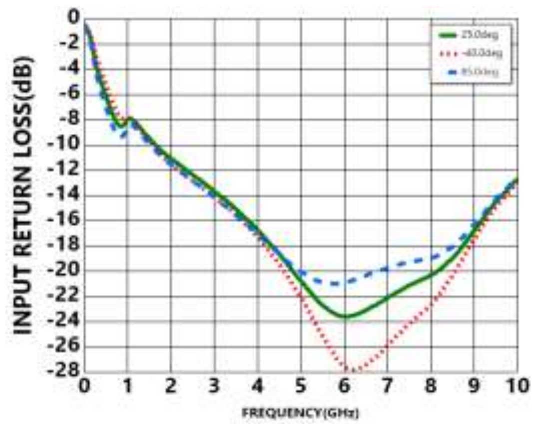


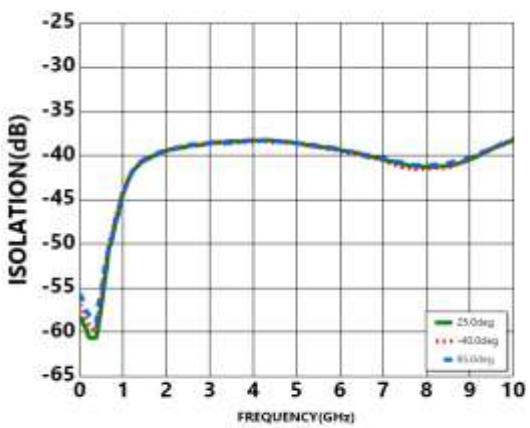
Measurement Plots: Noise Figure
TA = +25℃

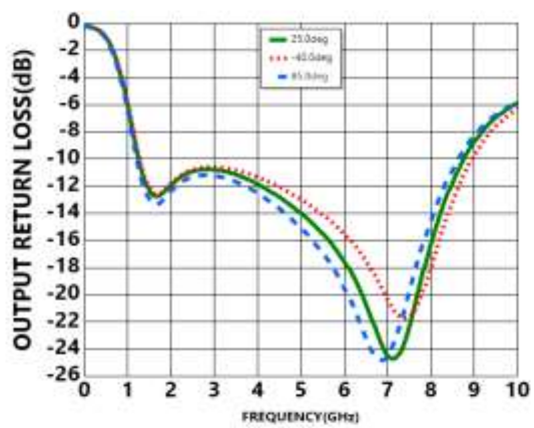


Measurement Plots: S-parameters
-VD=5V,ID=90mA

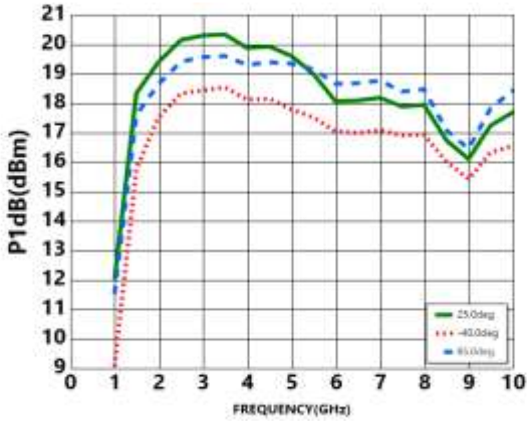




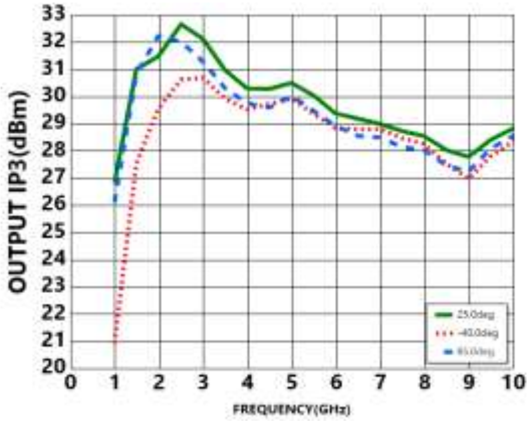




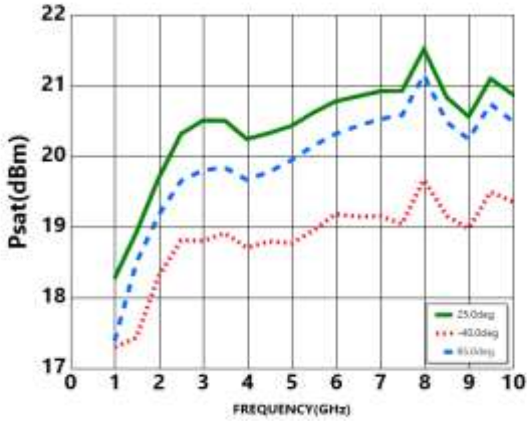
Measurement Plots: P1dB -VD=5V,ID=90mA



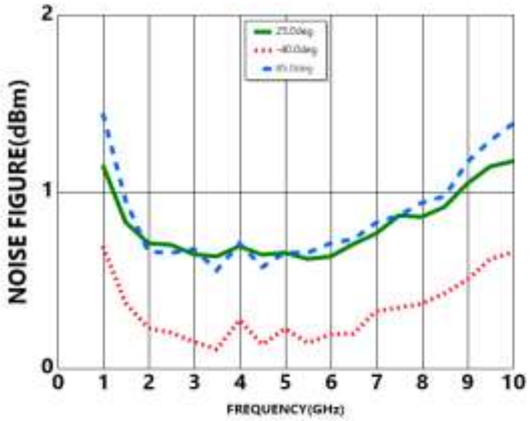
Measurement Plots: OIP3 -VD=5V,ID=90mA



Measurement Plots: Psat -VD=5V,ID=90mA



Measurement Plots: Noise Figure -VD=5V,ID=90mA



Absolute Maximum Ratings

Drain Bias Voltage (VD)	+4.5V
Gate Bias Voltage (VG)	-2V to 0V
RF Input Power (RFIN)	+15dBm
Continuous Pdiss (T = 85 °C) (derate 6.1mW/°C above 85 °C)	175°C
Thermal Resistance (channel to die bottom)	0.55W
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +150 °C

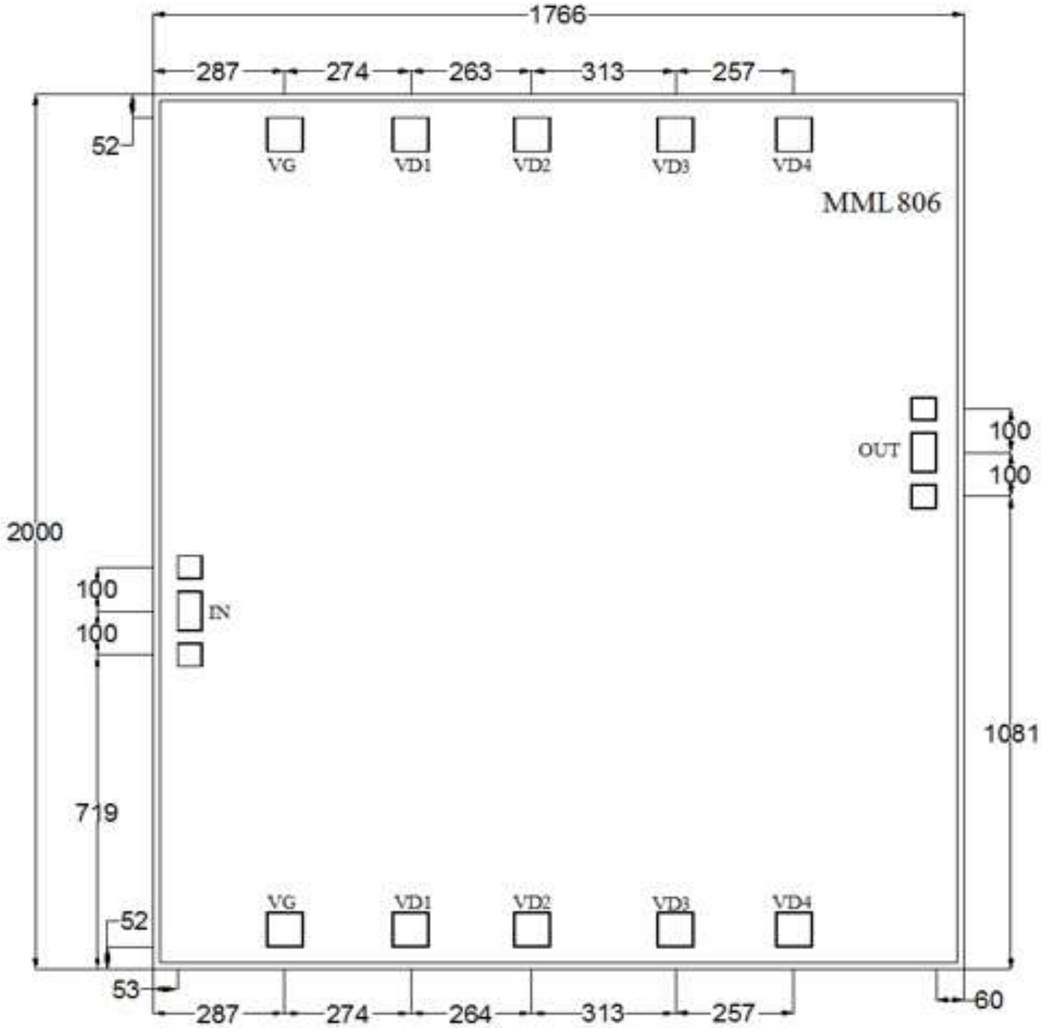
Typical Supply Current

VD(V)	VG(V)	IDQ(mA)
+3.5	-0.38	118
4.0	-0.40	119
4.0	-0.50	71

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing:

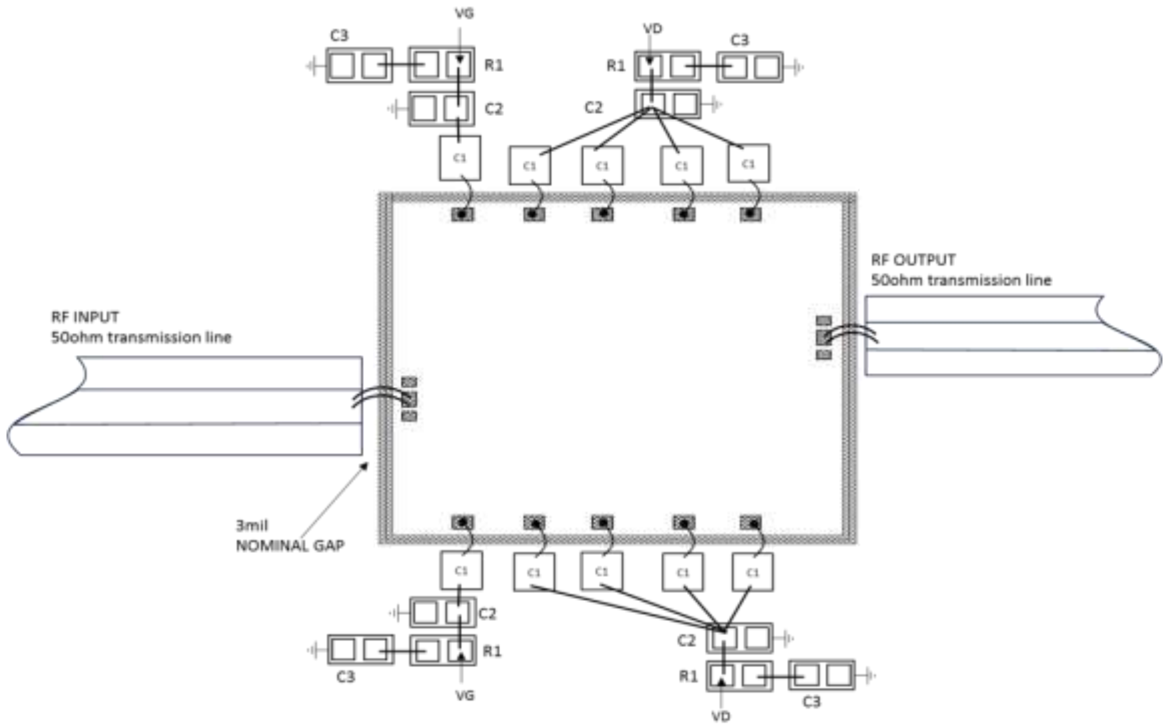
All Dimensions in µm



Notes:

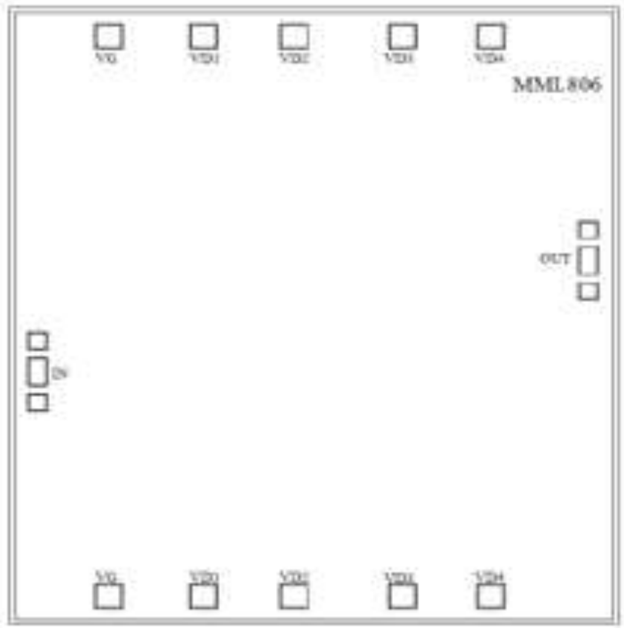
1. Die thickness: 50µm
2. VD bond pad is 75*75µm²
3. VG bond pad is 75*75µm²
4. RF IN/OUT bond pad is 50*86µm²
5. Bond pad metalization: Gold
6. Backside metalization: Gold

Assembly Drawing



Item	Description
C1	100pF Example: Skyworks Part: SC10002430
C2	0.01µF Example: TDK Part:C1005X7R1H103K050BB (0402)
C3	0.1µF Example: TDK Part:C1005X7R1H104K050BB (0402)
R1	100Ω Example: Yageo Part:SR0402FR-7T10RL

Item	Funciton	Description
1	RF IN	RF signal input terminal; no blocking capacitor required.
2	RF OUT	RF signal output terminal; no blocking capacitor required.
3	VD	Drain Biases for the Amplifier ; An external biasing circuit is required.
4	VG	Gate Biases for the Amplifier ; An external biasing circuit is required.
5	Die Bottom	Die bottom must be connected to RF and dc ground.

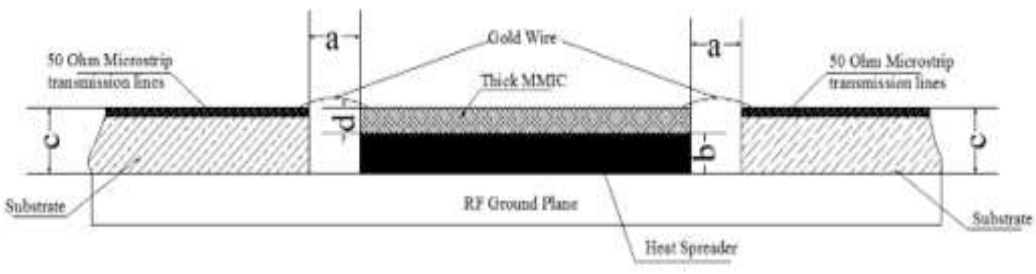


Biasing and Operation

Turn ON procedure:
1. Connect GND to RF and dc ground.
2. Set the gate bias voltages,VG to -2V.
3. Set the drain bias voltages VD to +4V.
4. Increase the gate bias voltages to achieve a quiescent supply current of 82 mA.
5. Apply RF signal.

Turn OFF procedure:
1. Turn off the RF signal.
2. Decrease the gate bias voltages, VG to -2V to achieve a IDQ = 0 mA (approximately).
3. Decrease the drain bias voltages to 0 V.
4. Increase the gate bias voltages to achieve a quiescent supply current of 82 mA.
5. Increase the all gate bias voltages to 0 V.

Mounting Bonding Techniques for MMICs



Direct Mounting

1.Typically, the die is mounted directly on the ground plane.
2.If the thickness difference between the substrate (thickness c) and the die (thickness d) exceeds 0.05 mm (i.e., c – d > 0.05 mm), it is recommended to first mount the die on a heat spreader, then attach the heat spreader to the ground plane.
3.Heat Spreader Material: Molybdenum-copper (MoCu) alloy is commonly used.
4.Heat Sink Thickness (b): Should be within the range of (c – d – 0.05 mm) to (c –d + 0.05 mm).
5.Spacing (a): The gap between the bare die and the 50Ω transmission line should typically be 0.05 mm to 0.1 mm. If the application frequency is higher than 40GHz, then this gap is recommended to be 0.05mm

Wire Bonding Interconnection

The connection between the die and the 50Ω transmission line is usually made using 25 µm diameter gold (Au) wires, bonded via wedge bonding or ball bonding processes.

Die Attachment Methods

1.Conductive Epoxy:
After adhesive application, cure according to the manufacturer's recommended temperature profile.

2.Au-Sn80/20 Eutectic Bonding:

Use preformed Au-Sn80/20 solder preforms.
Perform bonding in an inert atmosphere (N_2 or forming gas: 90% N_2 + 10% H_2).
Keep the time above 320℃ to less than 20 seconds to prevent excessive intermetallic formation.