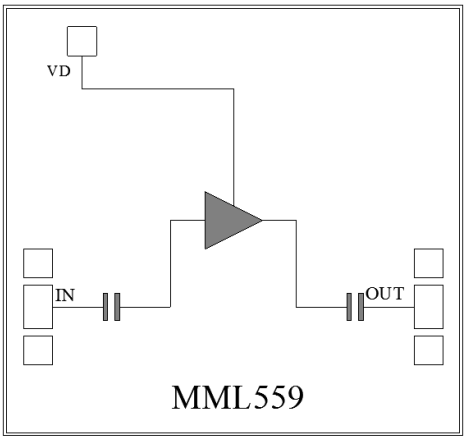
Features

- Single Biasing Voltage (Self Biased)
- Frequency: 1-12GHz
- Small Signal Gain: 19dB Typical
- Gain Flatness: ⊥1.5dB Typical
- Noise Figure: 1.4dB Typical
- P1dB: 20dBm Typical
- Power Supply: VD=5V,IDQ=60mA
- Input/Output: 50 Ω
- Chip Size: 1.59 x 1.49 x 0.1mm

Functional Block Diagram



Typical Applications

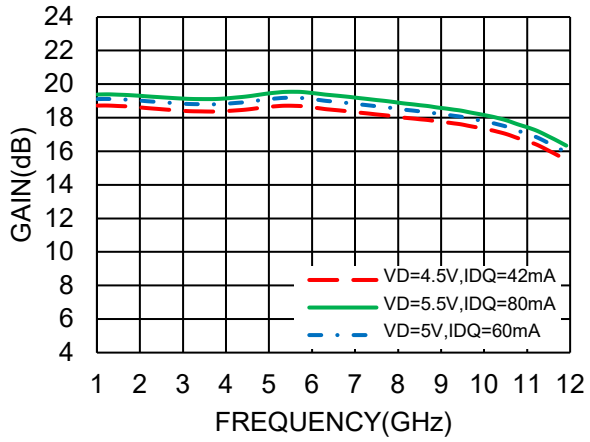
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

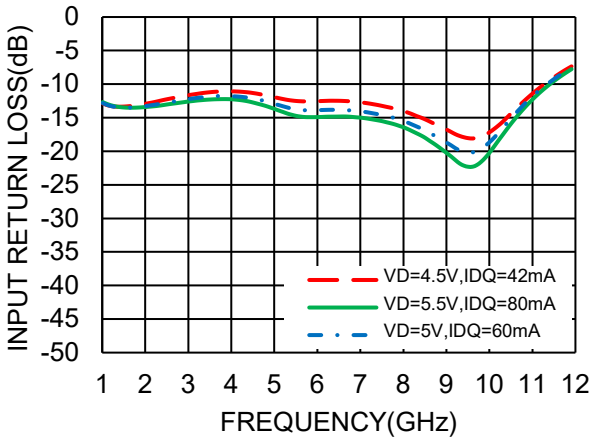
Electrical Specifications

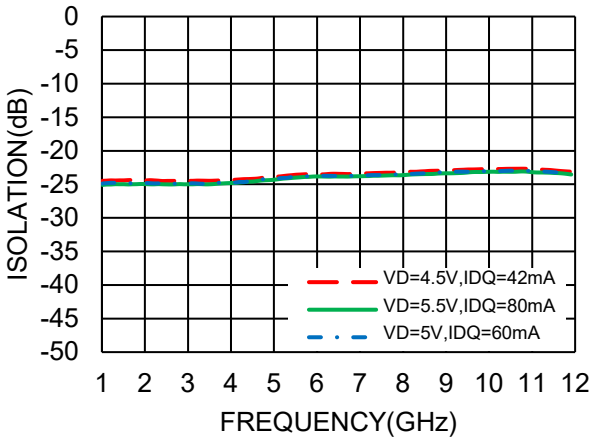
TA = +25°C, VD=5V,IDQ=60mA Typical

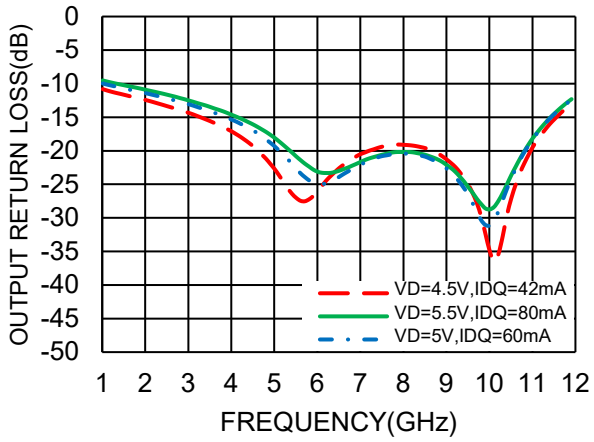
Parameters	Min.	Typ.	Max.	Units
Frequency	1		12	GHz
Small Signal Gain	15	19		dB
Gain Flatness		±1.5		dB
Noise Figure		1.5		dB
P1dB - Output 1dB Compression	19	20		dBm
Psat - Saturated Output Power		21		dBm
OIP3 - Output Third Order Intercept		30		dBm
Input Return Loss		-12		dB
Output Return Loss		-15		dB

Measurement Plots: S-parameters
TA = +25°C

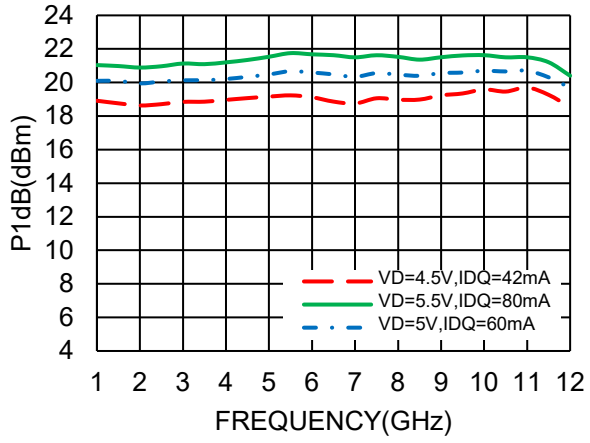




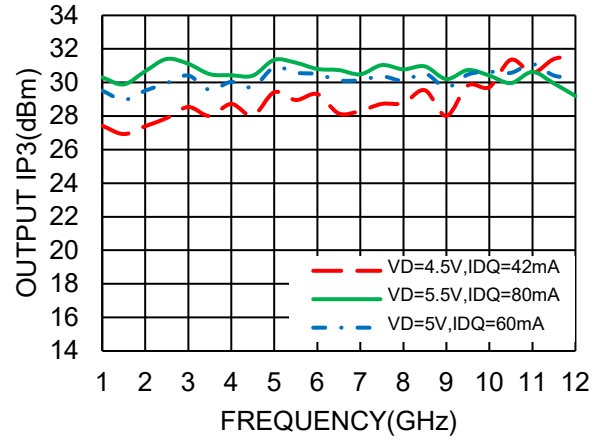




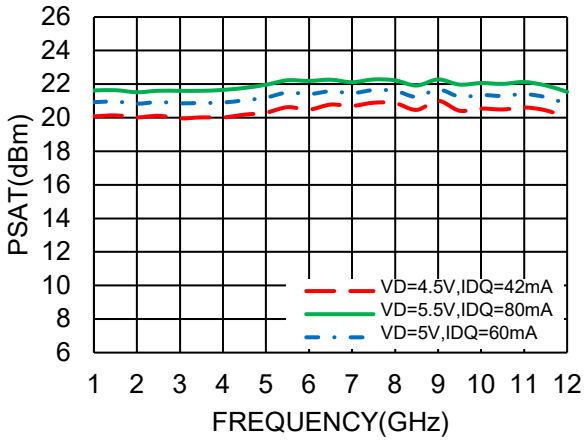
Measurement Plots: P1dB
TA = +25°C



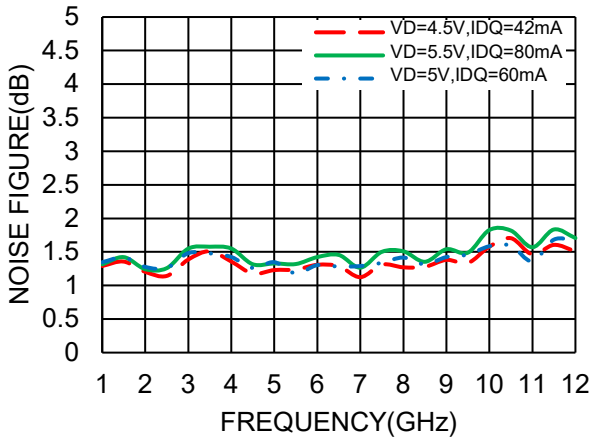
Measurement Plots: OIP3
TA = +25°C



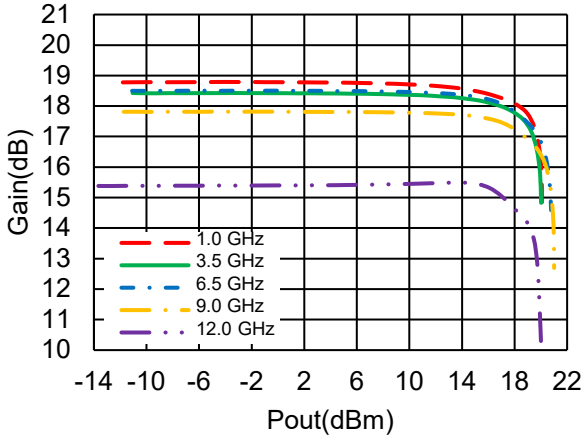
Measurement Plots: P_{SAT}
TA = +25°C



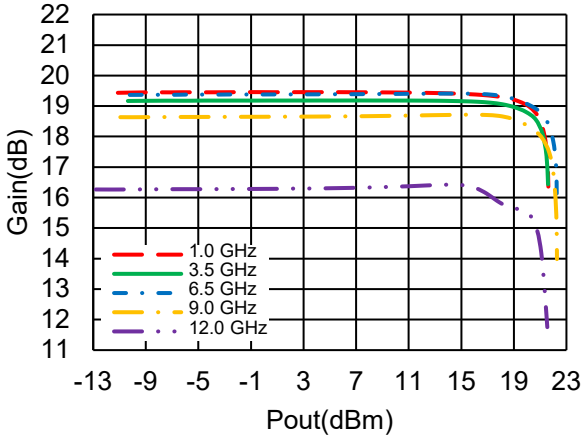
Measurement Plots: Noise Figure
TA = +25°C



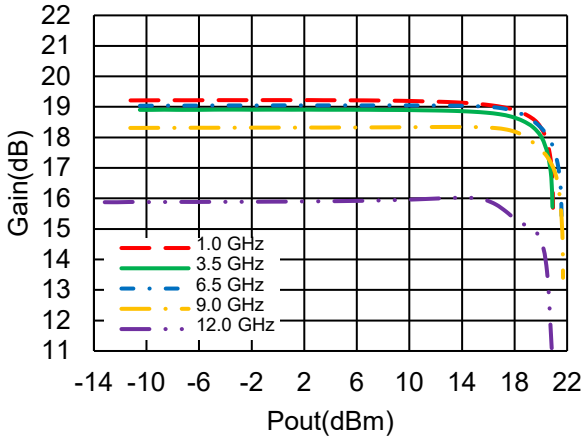
Measurement Plots: Gain vs. Pout
TA = +25°C, VD=4.5V, IDQ=42mA



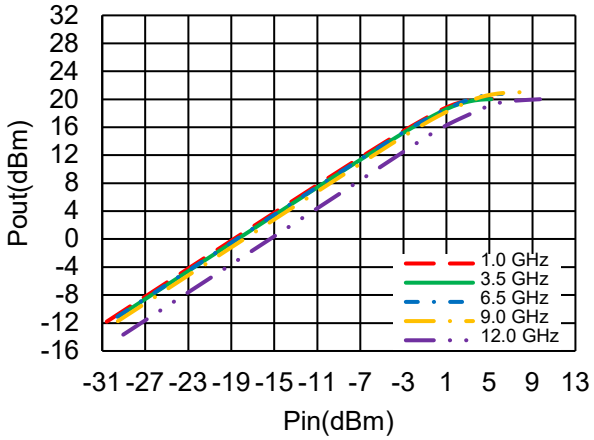
Measurement Plots: Gain vs. Pout
TA = +25°C, VD=5.5V, IDQ=80mA



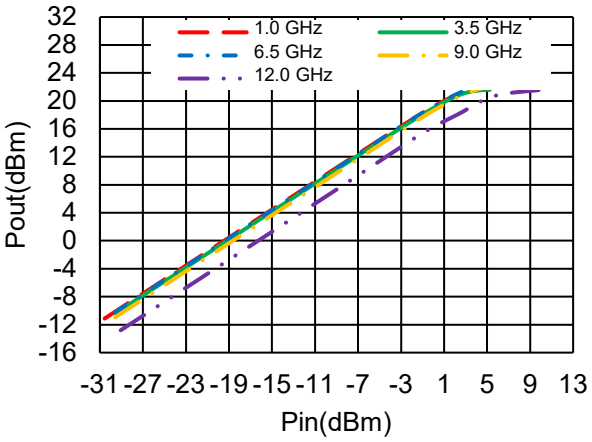
Measurement Plots: Gain vs. Pout
TA = +25°C, VD=5V, IDQ=60mA



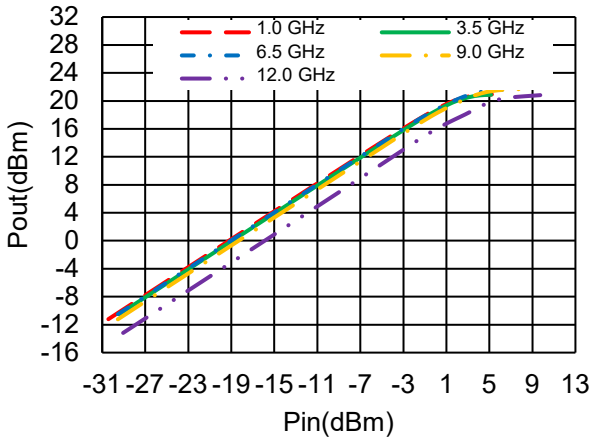
Measurement Plots: Pout vs. Pin
TA = +25°C, VD=4.5V, IDQ=42mA



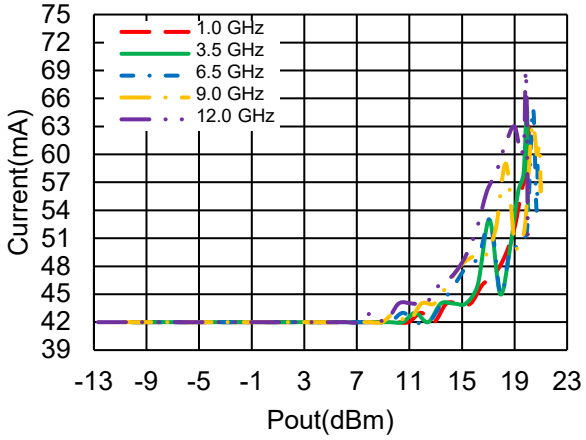
Measurement Plots: Pout vs. Pin
TA = +25°C, VD=5.5V, IDQ=80mA



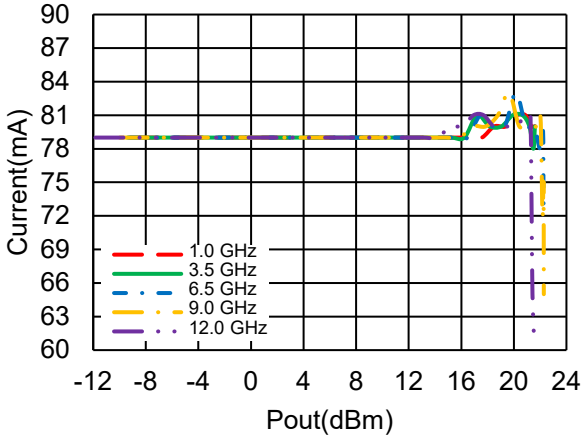
Measurement Plots: Pout vs. Pin
TA = +25°C, VD=5V, IDQ=60mA



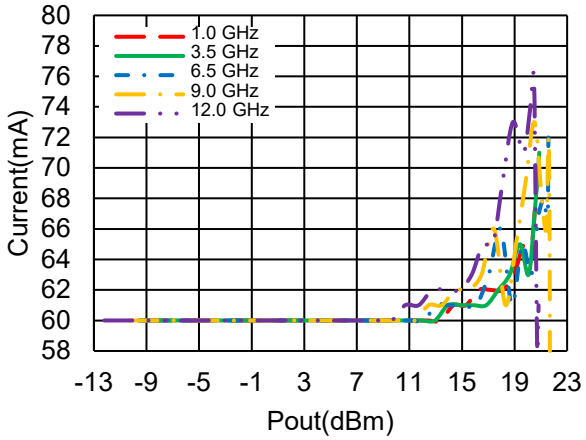
Measurement Plots: Current
TA = +25°C, VD=4.5V, IDQ=42mA



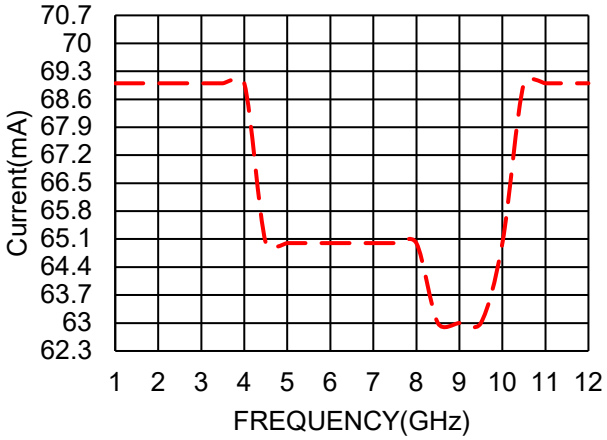
Measurement Plots: Current
TA = +25°C, VD=5.5V, IDQ=80mA



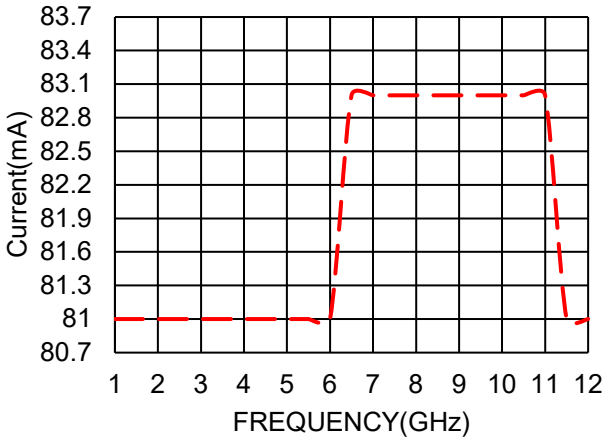
Measurement Plots: Current
TA = +25°C, VD=5V, IDQ=60mA



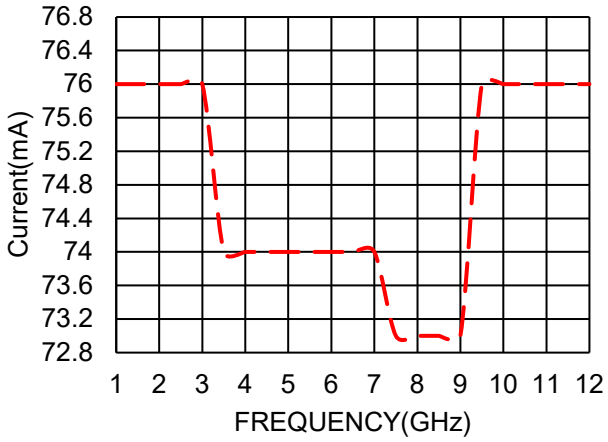
Measurement Plots: Max Current
TA = +25°C, VD=4.5V, IDQ=42mA



Measurement Plots: Max Current
TA = +25°C, VD=5.5V, IDQ=80mA



Measurement Plots: Max Current
TA = +25°C, VD=5V, IDQ=60mA



Absolute Maximum Ratings

Drain Bias Voltage (VD)	+7V
RF Input Power (RFIN)	+20dBm
Channel Temperature	175°C
Continuous Pdiss (T = 85 °C) (derate 9.6mW/°C above 85 °C)	0.87W
Thermal Resistance (channel to die bottom)	36.86°C/W
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C
Storage Humidity	Short-term Operation (< 1 week) ≤ 25% RH Long-term Storage (> 1 month) ≤ 5% RH or Nitrogen Cabinet

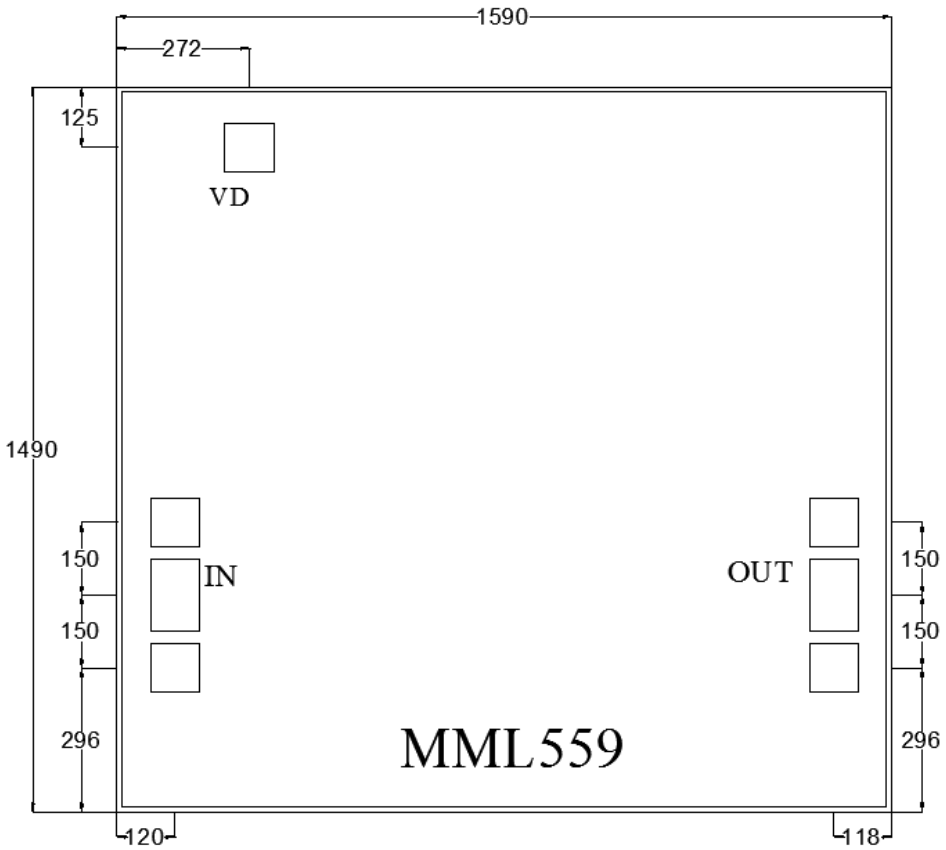
Typical Supply Current vs. VD

VD (V)	IDQ (mA)
4.5	42
5	60
5.5	80



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

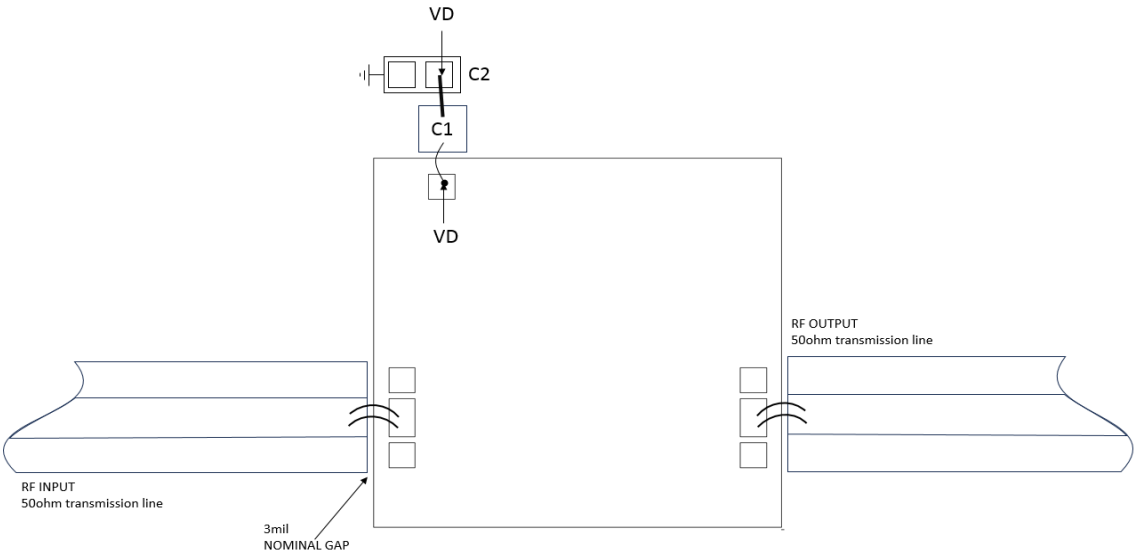
Outline Drawing:
All Dimensions in µm



Notes:

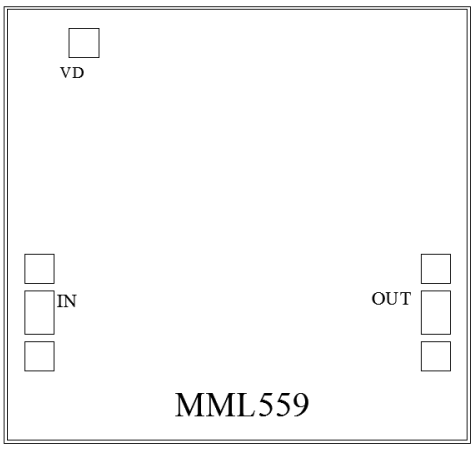
1. **Die thickness: 100µm**
2. **VD bond pad is 100*100µm²**
3. **RF IN/OUT bond pad is 100*150µm²**
4. **Bond pad metalization: Gold**
5. **Backside metalization: Gold**

Assembly Drawing



Item	Description	Item	Description
C1	100 pF Example: Knowles Dielectric Labs Part : CSM-140-15X15X4-G-101-K	C2	100 nF Example: TDK Part : C1005X7R1H104K050BB

No.	Function	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	Amplifier source bias ; An external biasing circuit is required.
4	Die Bottom	Die bottom must be connected to RF and dc ground.



Biasing and Operation

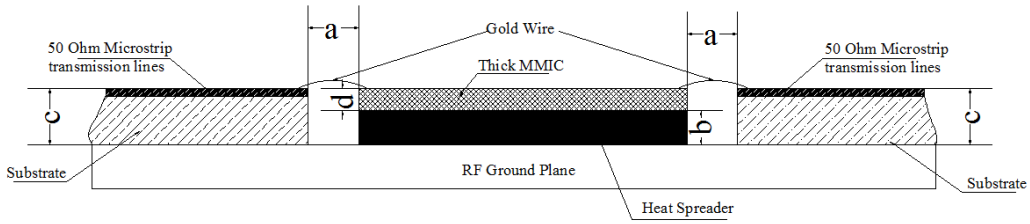
Turn ON procedure:

1. Connect GND to RF and dc ground.
2. Apply positive drain voltage VD and set to +5V.
3. Apply RF signal.

Turn OFF procedure:

1. Turn off the RF signal.
2. Turn off the positive drain voltage VD.

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°C to less than 20 seconds to prevent excessive intermetallic formation.

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