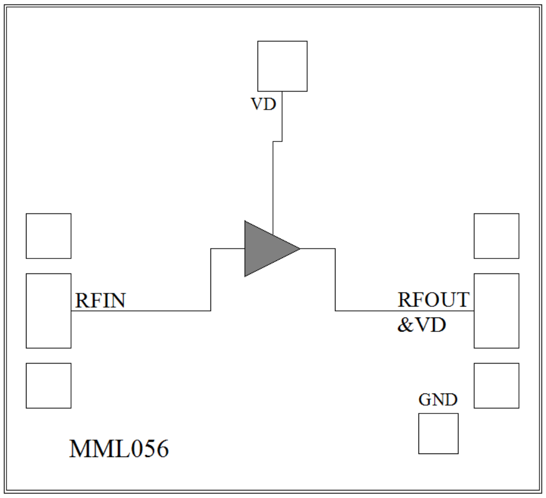
Features

- Frequency: 0.1-4.5GHz
- Small Signal Gain: 31dB Typical
- Gain Flatness: ±1.0dB Typical
- Noise Figure:0.6dB Typical
- P1dB: 19dBm Typical
- Power Supply: +5V@110mA
- Input/Output: 50Ω
- Chip Size: 1.08 x 0.98 x 0.1mm

Functional Block Diagram



Typical Applications

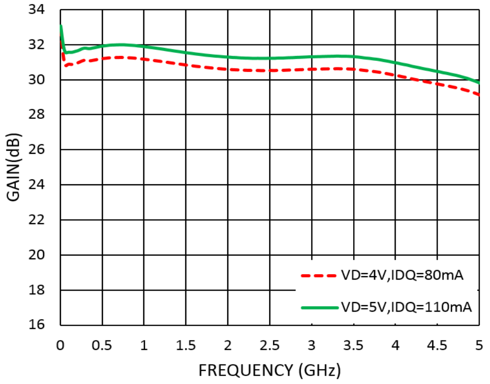
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

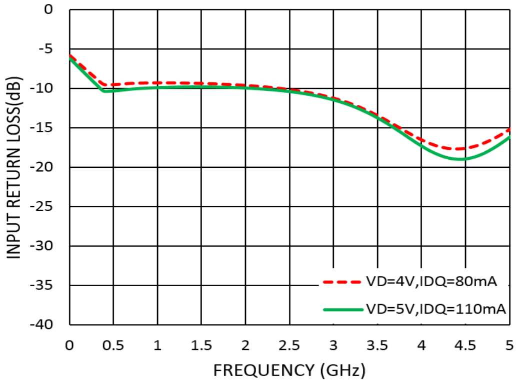
Electrical Specifications

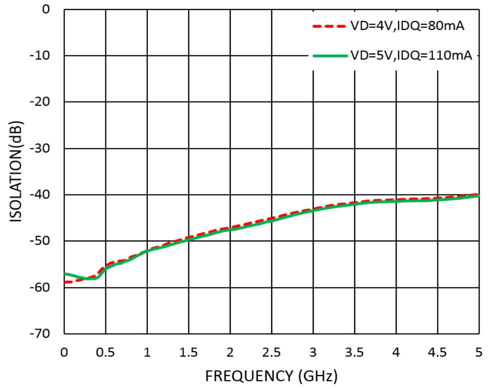
TA = +25°C, VD = +5V, IDQ = 110mA Typical

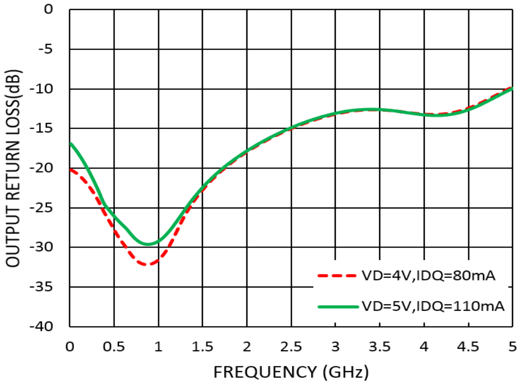
Parameters	Min.	Typ.	Max.	Units
Frequency	0.1		4.5	GHz
Small Signal Gain	30	31		dB
Gain Flatness		±1.0		dB
Noise Figure		0.6		dB
P1dB - Output 1dB Compression	18	19		dBm
Psat - Saturated Output Power		20		dBm
OIP3 - Output Third Order Intercept		26		dBm
Input Return Loss		-10		dB
Output Return Loss		-13		dB

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

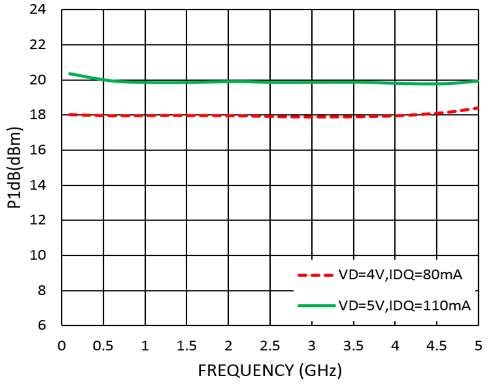




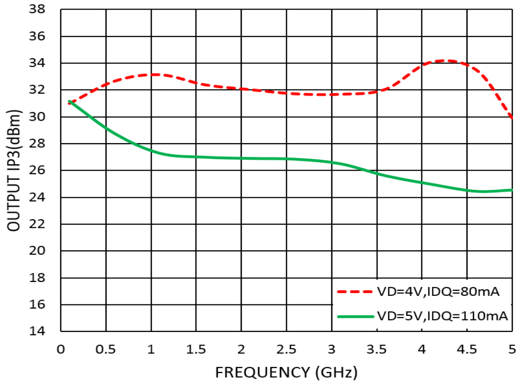




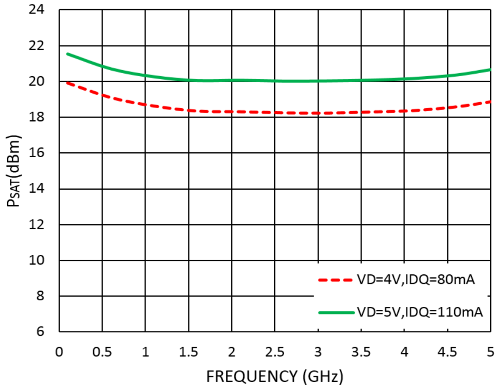
Measurement Plots: P1dB
T_A = +25°C



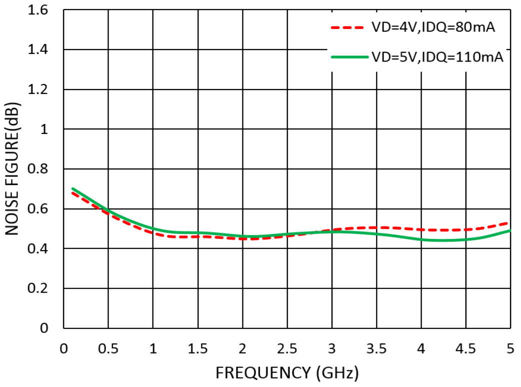
Measurement Plots: OIP3
T_A = +25°C



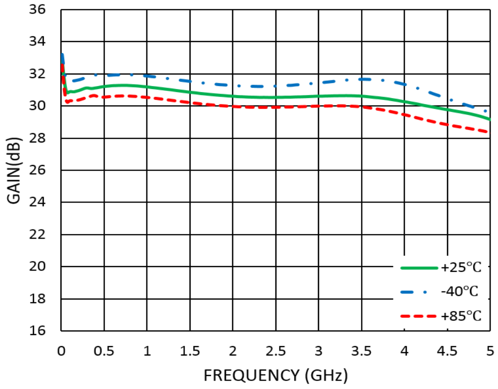
Measurement Plots: PSAT
T_A = +25°C

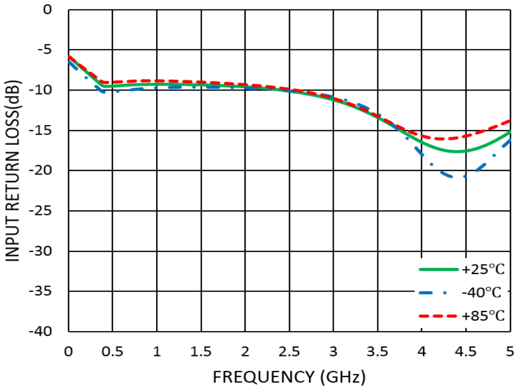


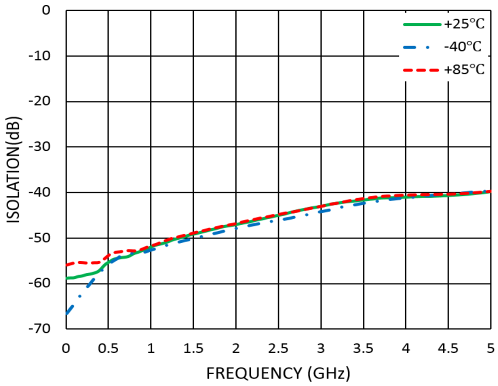
Measurement Plots: Noise Figure
T_A = +25°C

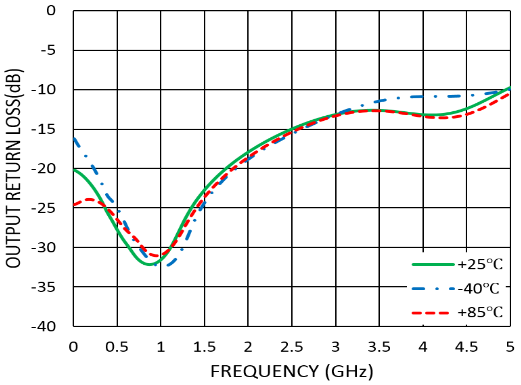


Measurement Plots: S-parameters
VD=4V

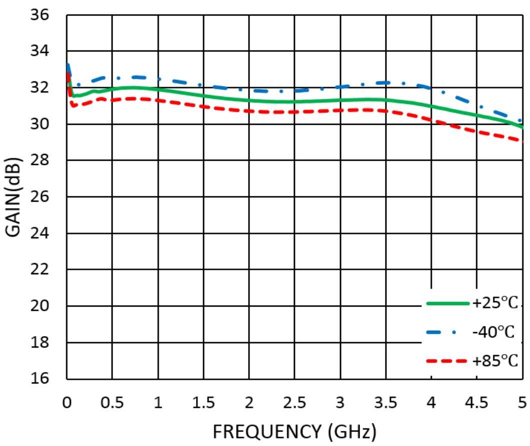


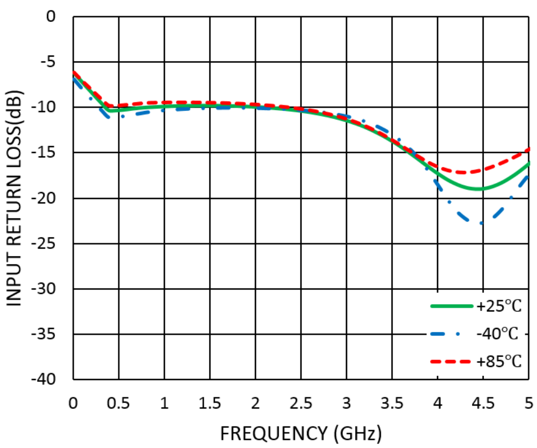


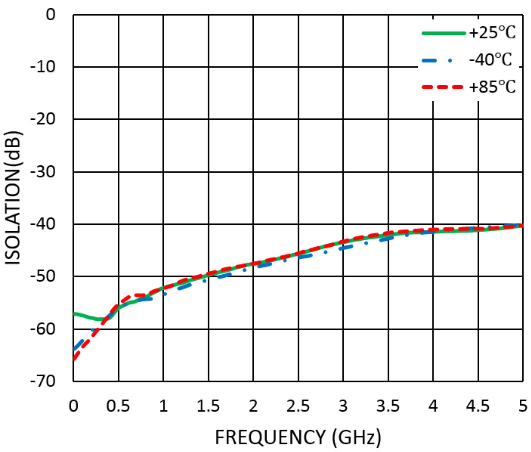


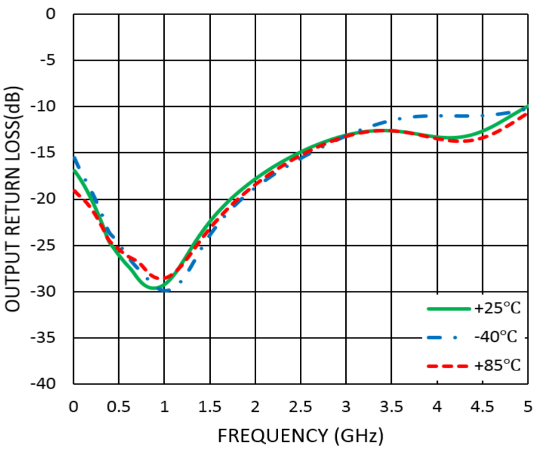


Measurement Plots: S-parameters
VD=5V

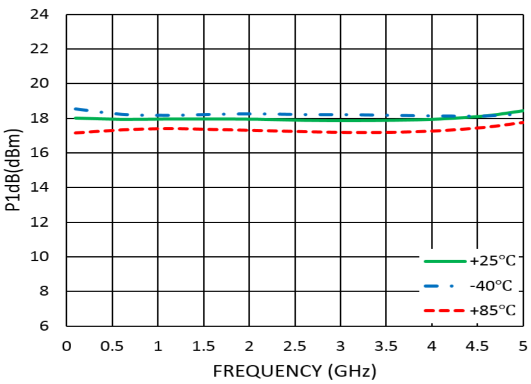




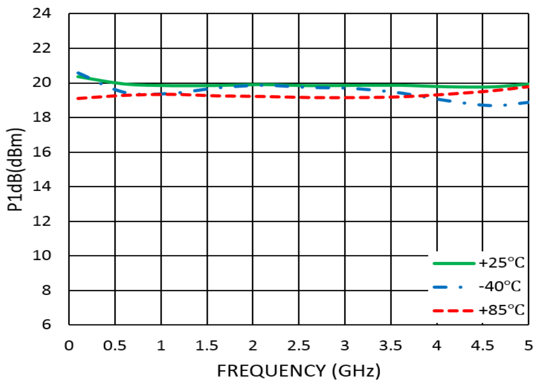




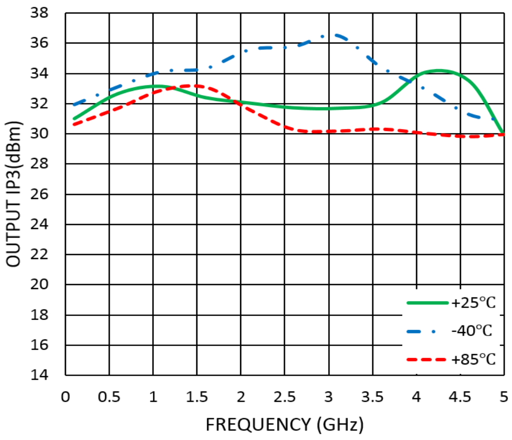
Measurement Plots: P1dB
VD=4V



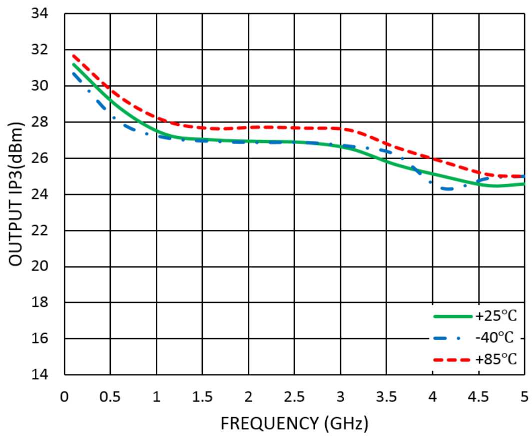
Measurement Plots: P1dB
VD=5V



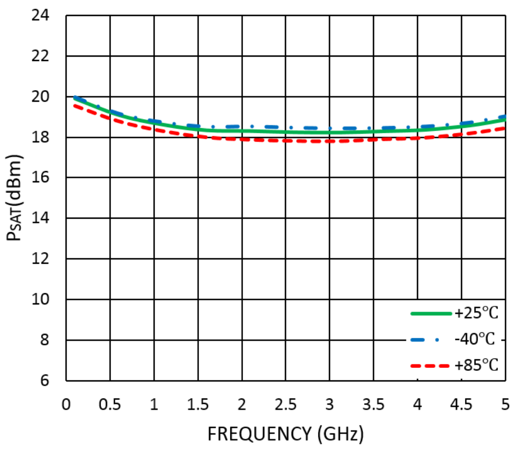
Measurement Plots: OIP3
VD=4V



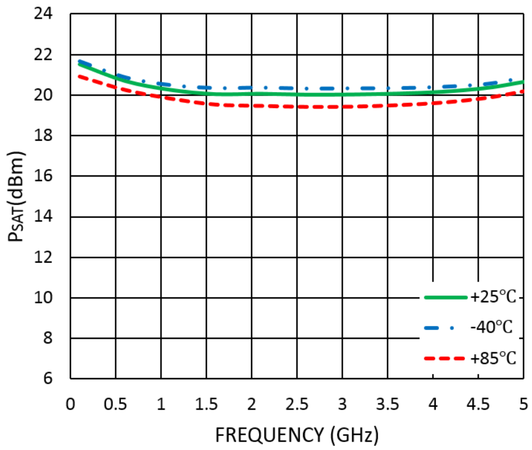
Measurement Plots: OIP3
VD=5V



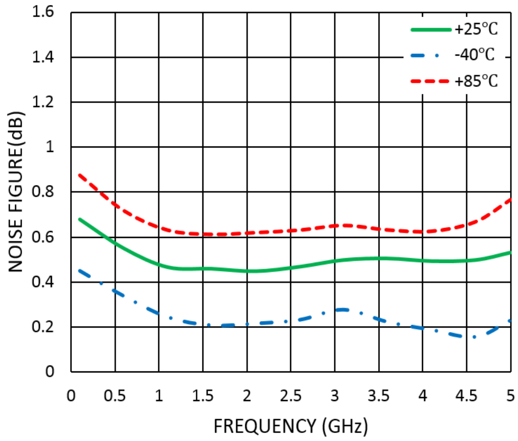
Measurement Plots: PSAT
VD=4V



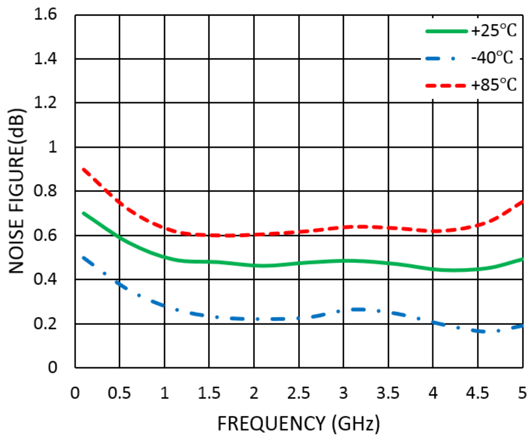
Measurement Plots: PSAT
VD=5V



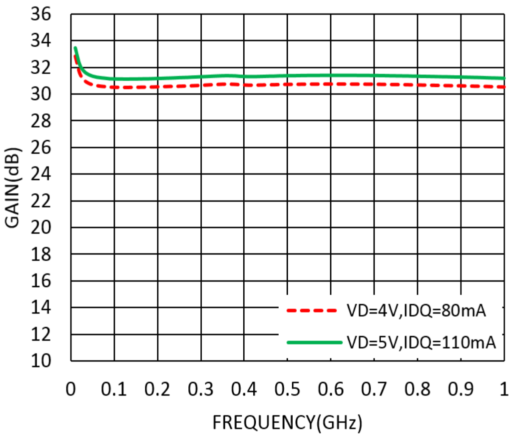
Measurement Plots: Noise Figure
VD=4V



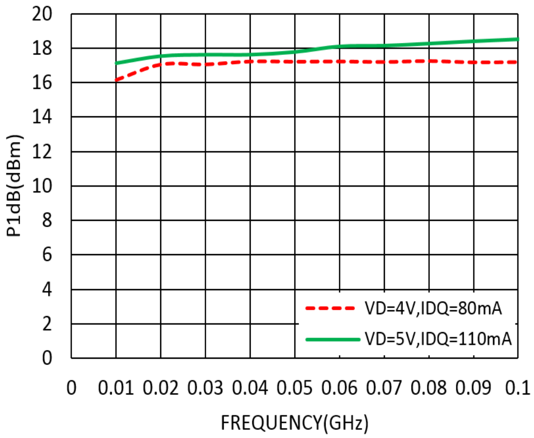
Measurement Plots: Noise Figure
VD=5V



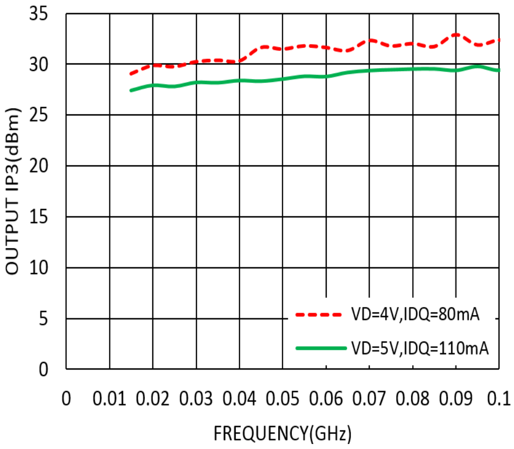
Measurement Plots: Gain
Freq:0.01-1GHz



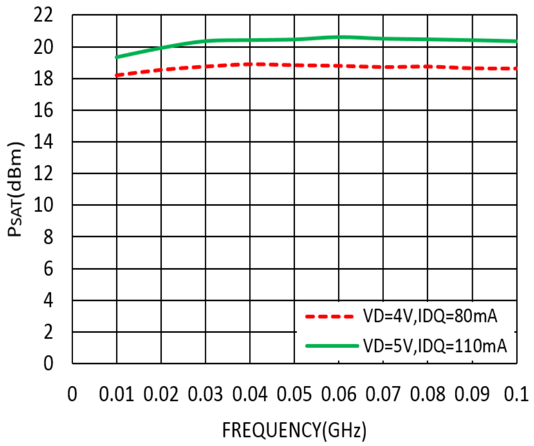
Measurement Plots: P1dB
Freq:0.01-0.1GHz



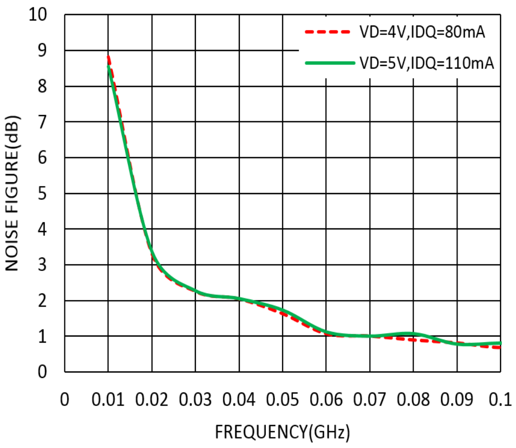
Measurement Plots: OIP3
Freq:0.01-0.1GHz



Measurement Plots: PSAT
Freq:0.01-0.1GHz



Measurement Plots: Noise Figure
Freq:0.01-0.1GHz



Absolute Maximum Ratings

Drain Bias Voltage (VD)	+7V
RF Input Power (RFIN)	+18dBm
Channel Temperature	165°C
Continuous Pdiss (T = 85 °C) (derate14.9mW/°C above 85 °C)	0.97W
Thermal Resistance (channel to die bottom)	73.3°C/W
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +150 °C

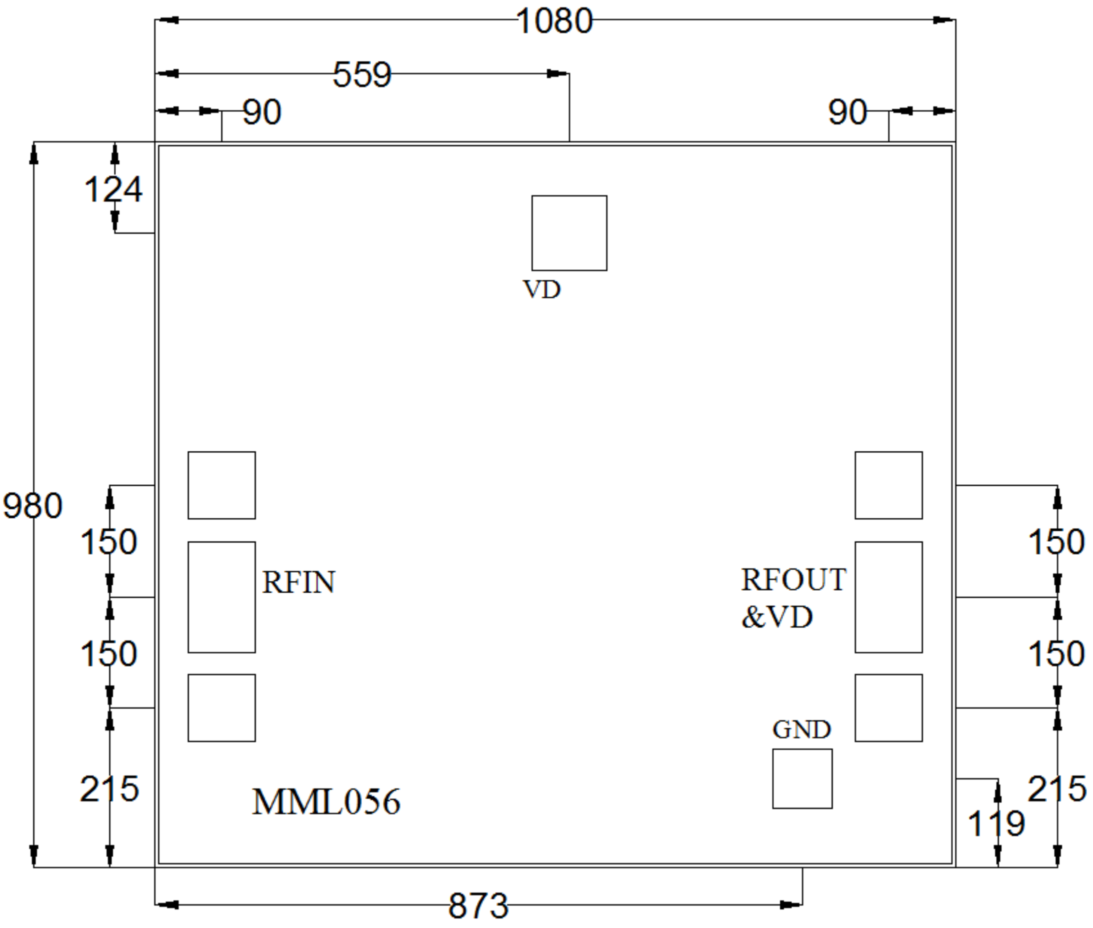
Typical Supply Current vs. VD

VD (V)	IDQ (mA)
+4	80
+5	110

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing:

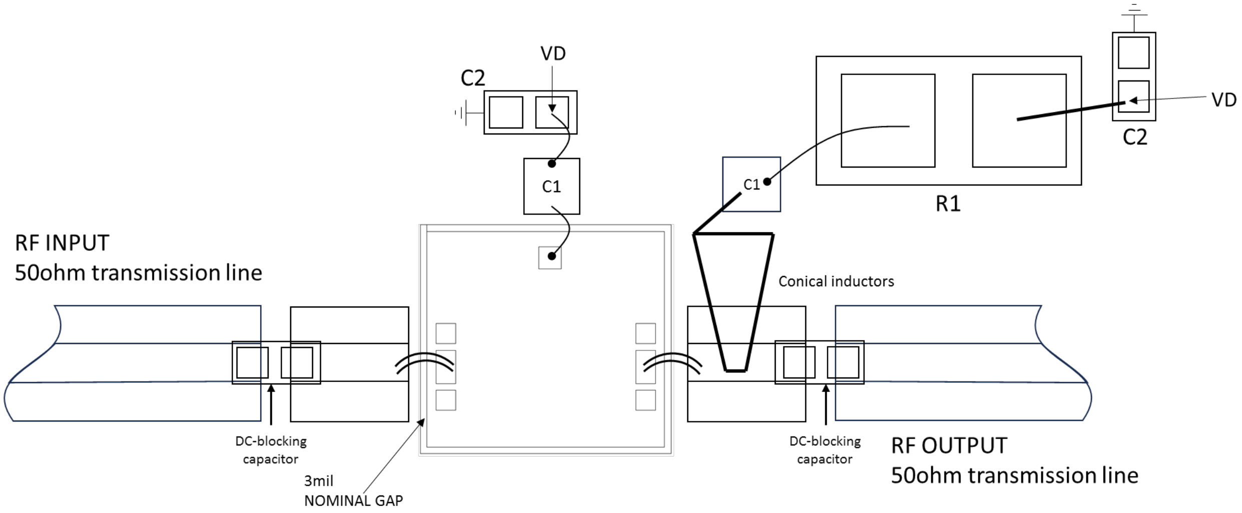
All Dimensions in µm



Notes:

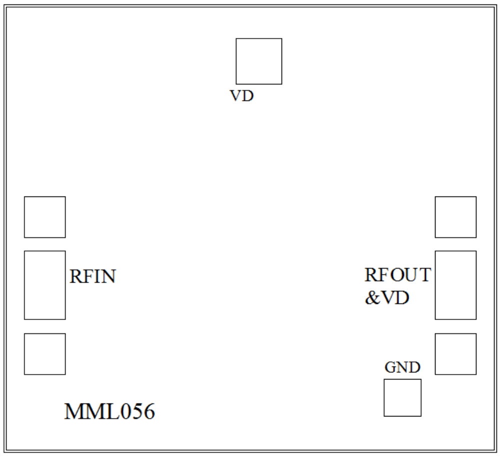
1. Die thickness: 100µm
2. DC bond pad is 100*100µm^2
3. RF IN/OUT bond pad is 90*150µm^2
4. Bond pad metalization: Gold
5. Backside metalization: Gold

Assembly Drawing



Item	Description	Item	Description
DC-blocking capacitor	0.1 µF Example: Passiveplus Part: 0402BB104KW500	C1	100pF Example: Presidio Part: SC10002430
Conical inductors	1.65 µH Example: Piconics Part: CC50T40K240G5	C2	1µF Example: TDK Part: C1005X7R1H103K050BB
		R1	10Ω Example: YAGEO Part: RC1206JR-0710RL

No	Function	Description
1	RF IN	Signal input terminal, connected to 50Ω circuit; blocking capacitor required.
2	RF OUT	Signal output terminal, connected to 50Ω circuit; blocking capacitor required; external DC biasing network required; drain current provided.
3	VD	Drain Biases for the Amplifier. External bypass capacitors of 100pF and 1µF are required for these pads.
4	Die Bottom	Die bottom must be connected to RF and dc ground.



Biasing and Operation

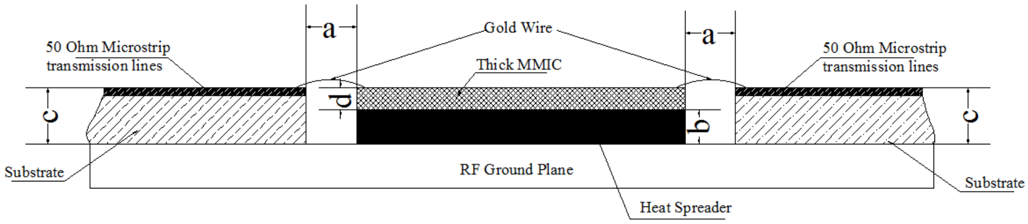
Turn ON procedure:

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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