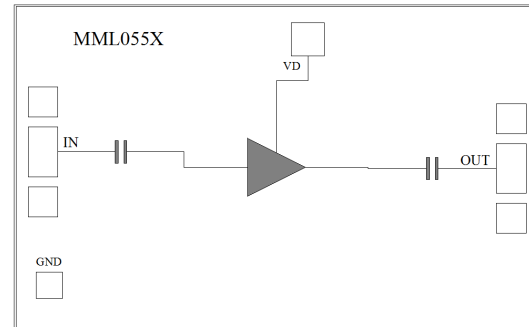


Features

- Single Biasing Voltage (Self Biased)
- Frequency: 1-14GHz
- Small Signal Gain: 18.5dB Typical
- Gain Flatness: ± 0.3 dB Typical
- Noise Figure: 1.2dB Typical
- P1dB: 19dBm Typical
- Power Supply: +5V@65mA
- Input/Output: 50 Ω
- Chip Size: 1.58 x 0.98 x 0.1mm

Typical Applications

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

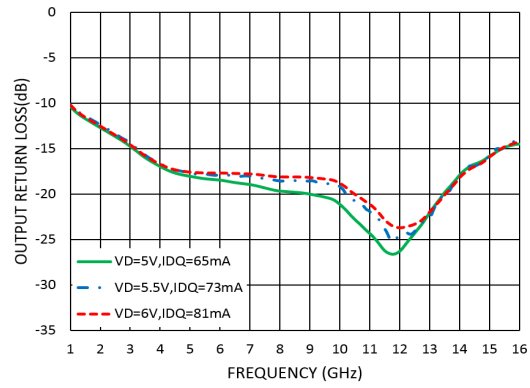
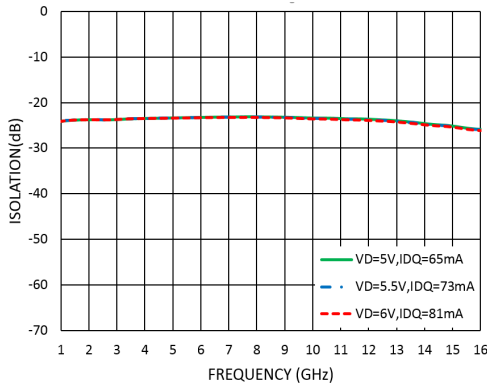
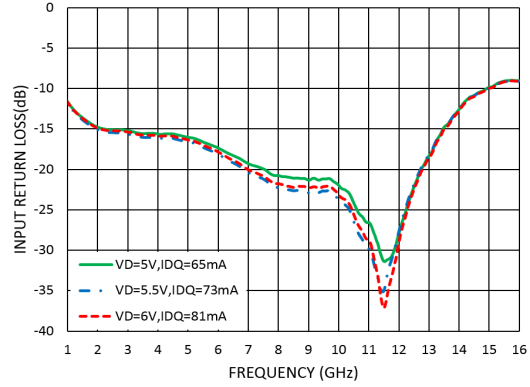
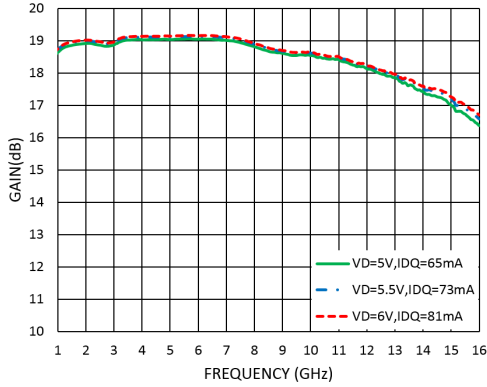
Functional Block Diagram

Electrical Specifications
TA = +25°C, VD = +5V, IDQ = 65mA Typical

Parameters	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency	1		8	8		14	GHz
Small Signal Gain	18	19		17	18		dB
Gain Flatness		± 0.3			± 0.75		dB
Noise Figure		1.2	1.4		1.2	1.5	dB
P1dB - Output 1dB Compression	17.5	19		17	18.5		dBm
Psat - Saturated Output Power		20			20		dBm
OIP3 - Output Third Order Intercept		29			26		dBm
Input Return Loss		-15			-15		dB
Output Return Loss		-15			-17		dB



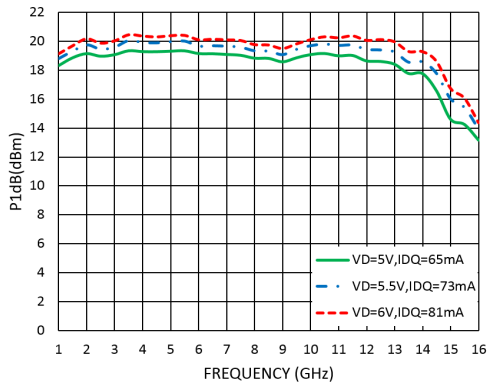
Measurement Plots: S-parameters

TA = +25°C



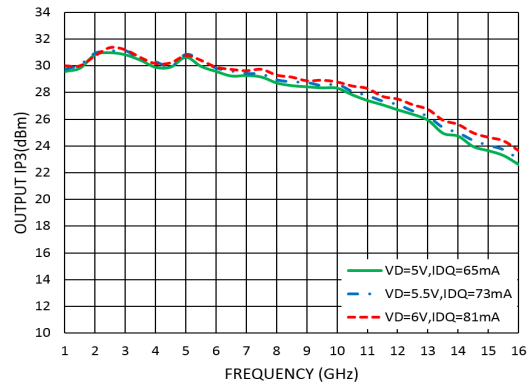
Measurement Plots: P1dB

TA = +25°C



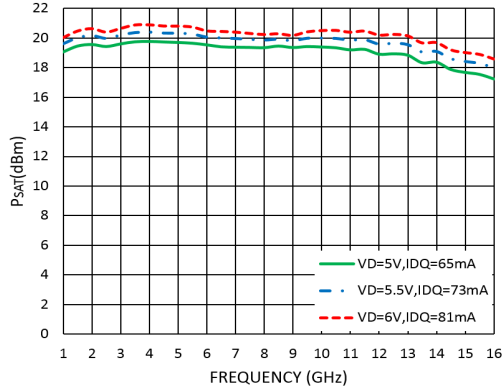
Measurement Plots: OIP3

TA = +25°C

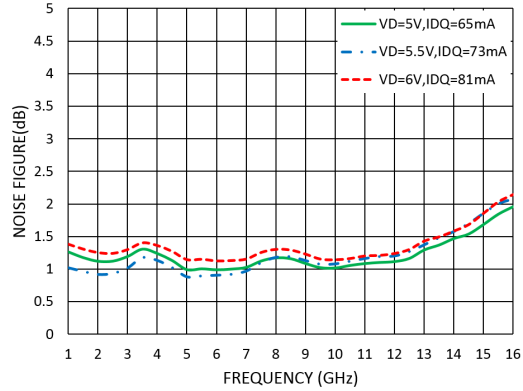




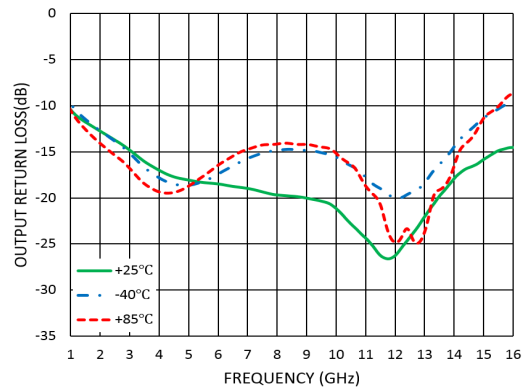
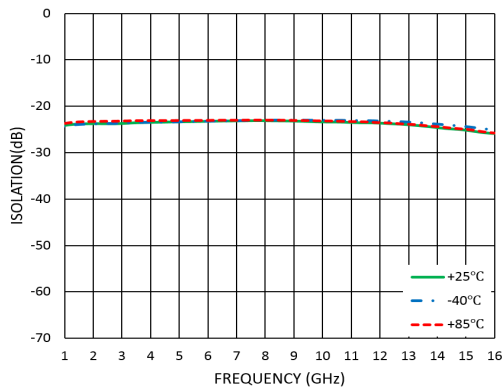
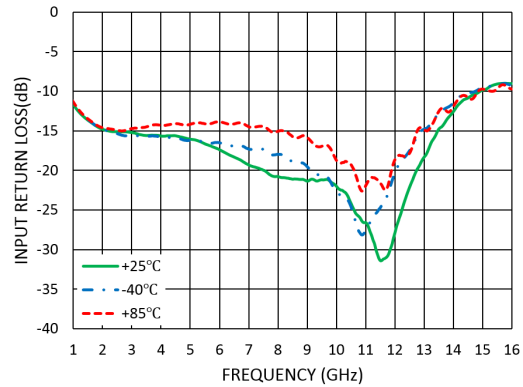
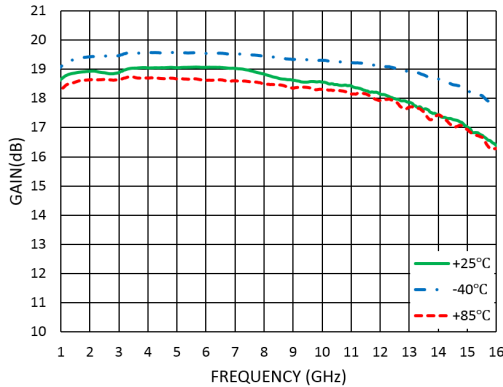
Measurement Plots: P_{SAT}
TA = +25°C



Measurement Plots: Noise Figure
TA = +25°C



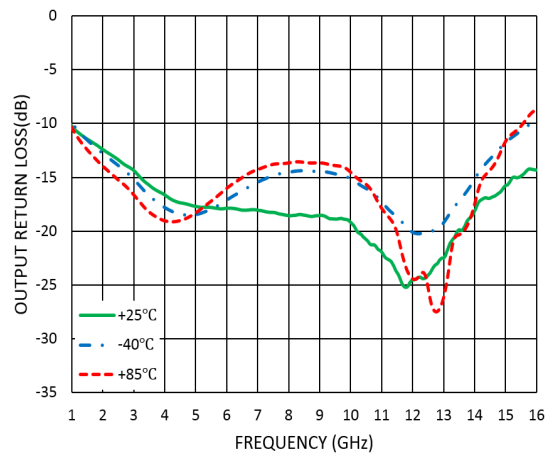
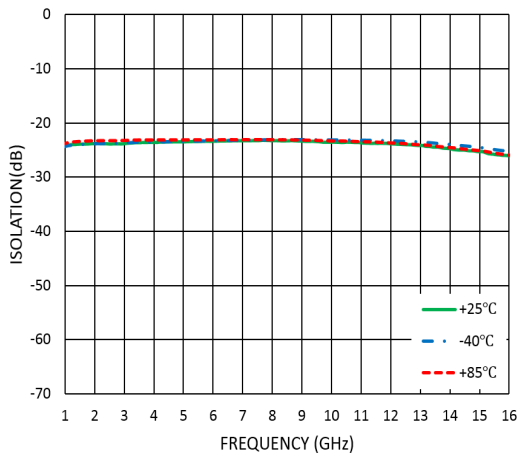
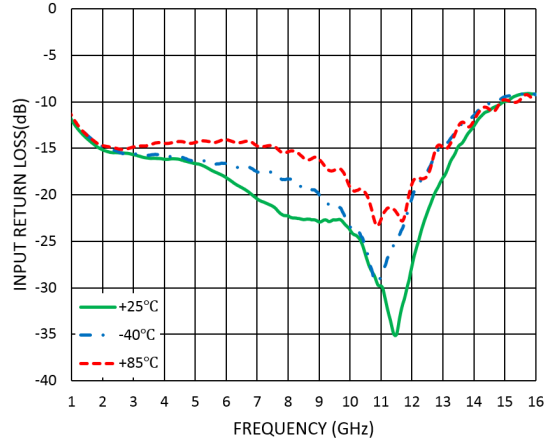
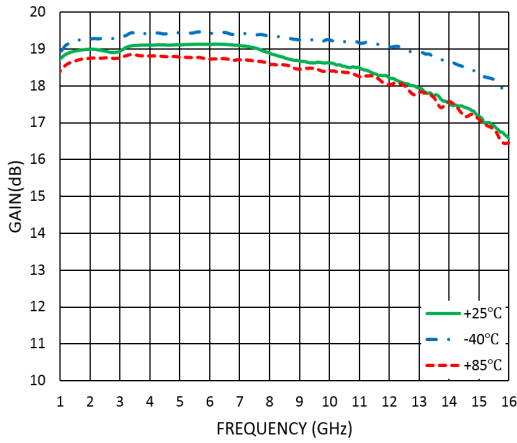
Measurement Plots: S-parameters
VD=5V





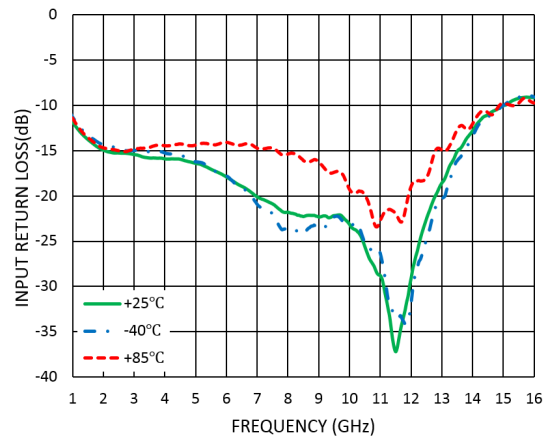
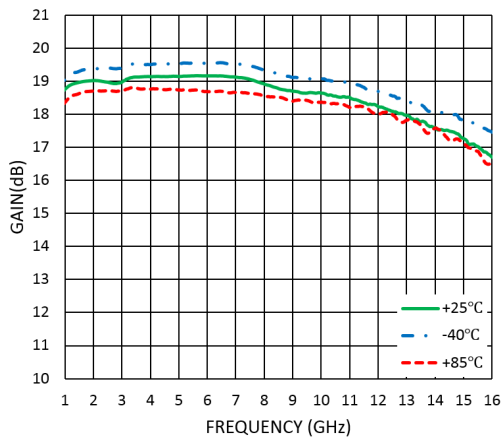
Measurement Plots: S-parameters

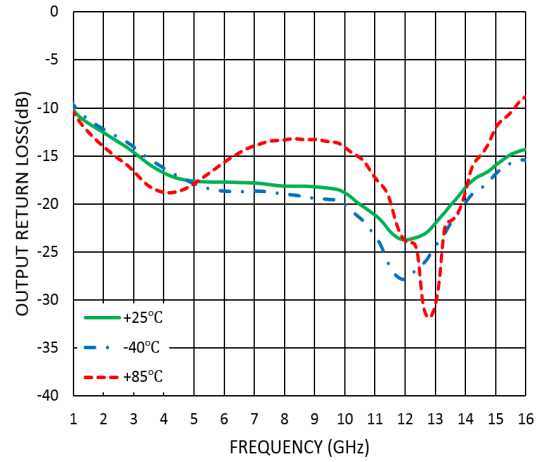
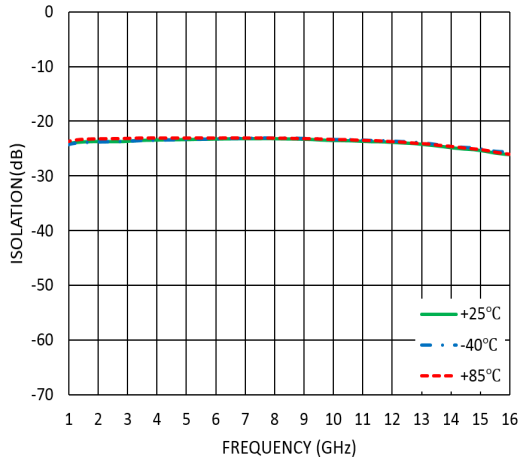
VD=5.5V



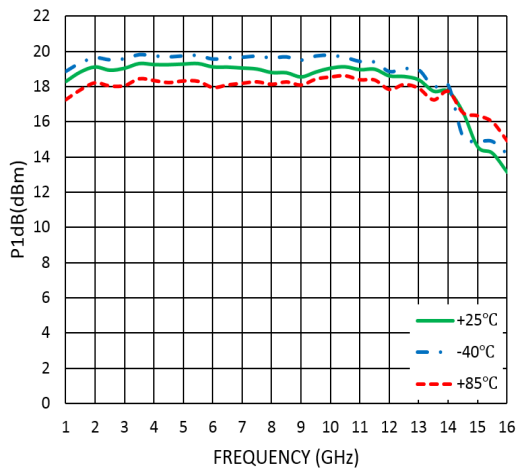
Measurement Plots: S-parameters

VD=6V

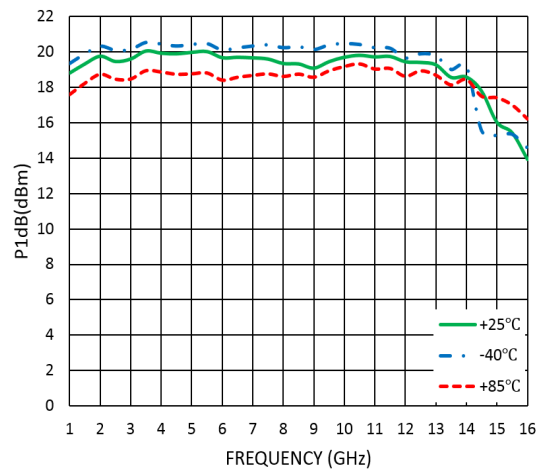




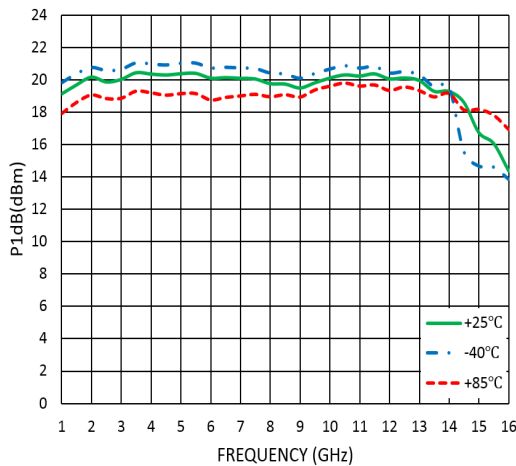
Measurement Plots: P1dB
VD=5V



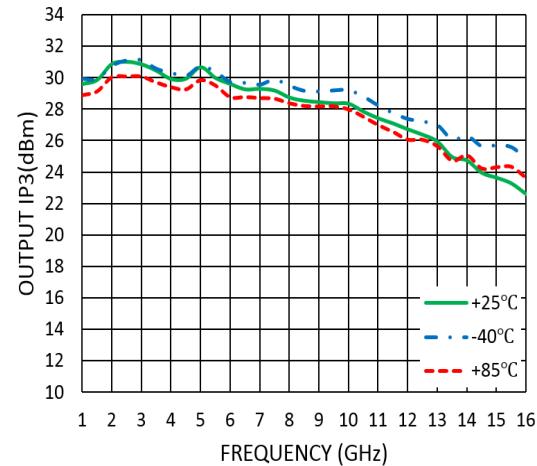
Measurement Plots: P1dB
VD=5.5V



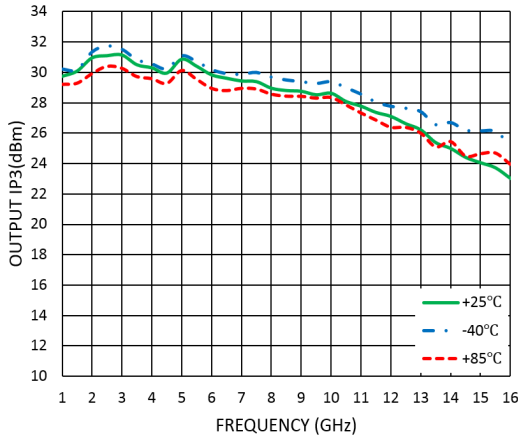
Measurement Plots: P1dB
VD=6V



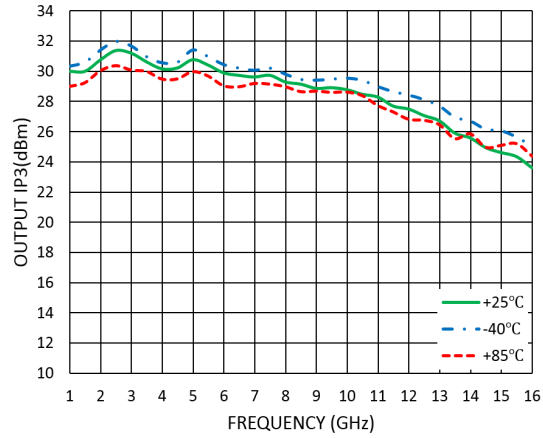
Measurement Plots: OIP3
VD=5V



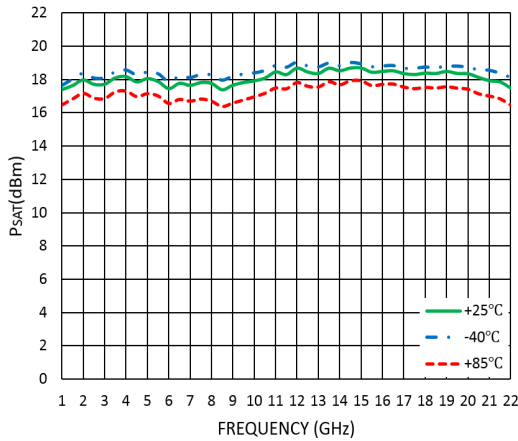
Measurement Plots: OIP3
VD=5.5V



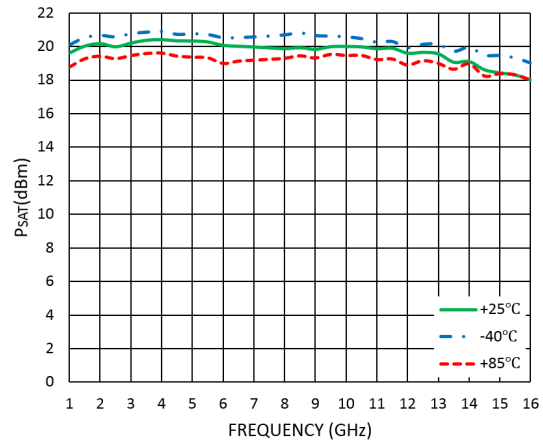
Measurement Plots: OIP3
VD=6V



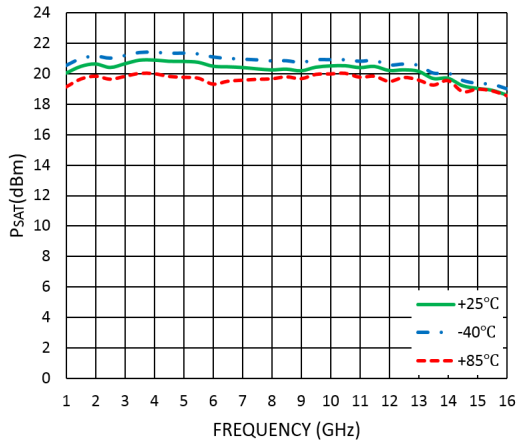
Measurement Plots: PSAT
VD=5V



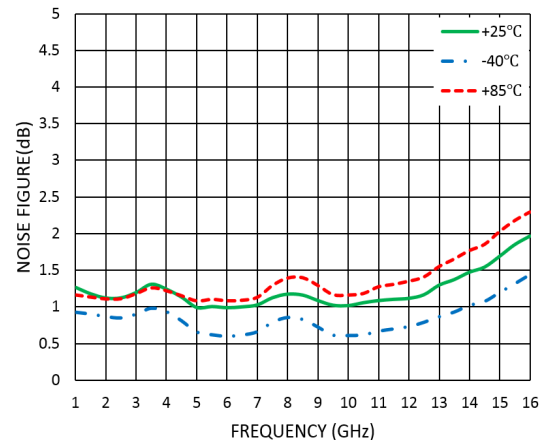
Measurement Plots: PSAT
VD=5.5V



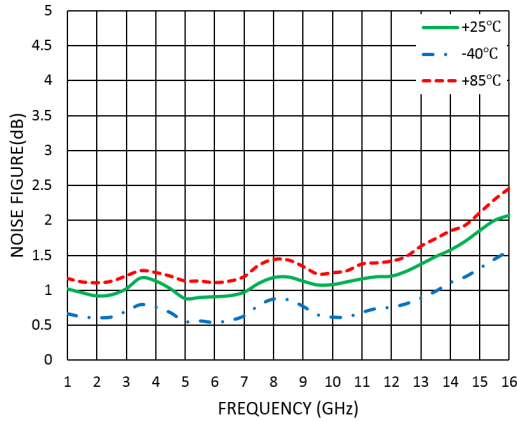
Measurement Plots: PSAT
VD=6V



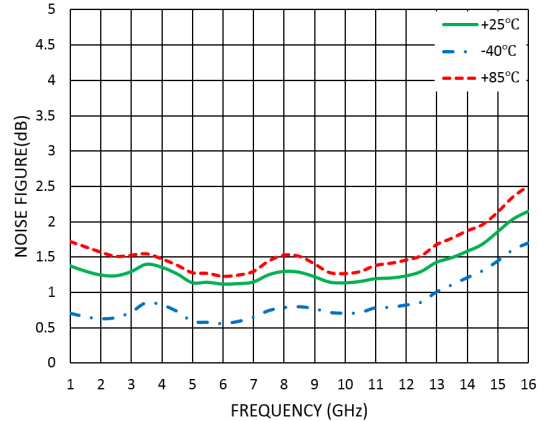
Measurement Plots: Noise Figure
VD=5V



Measurement Plots: Noise Figure
VD=5.5V



Measurement Plots: Noise Figure
VD=6V



Absolute Maximum Ratings

Drain Bias Voltage (VD)	+7V
RF Input Power (RFIN)	+18dBm
Channel Temperature	175°C
Continuous Pdiss (T = 85 °C) (derate 6.7mW/°C above 85 °C)	0.6W
Thermal Resistance (channel to die bottom)	79.5°C/W
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

Typical Supply Current vs. VD

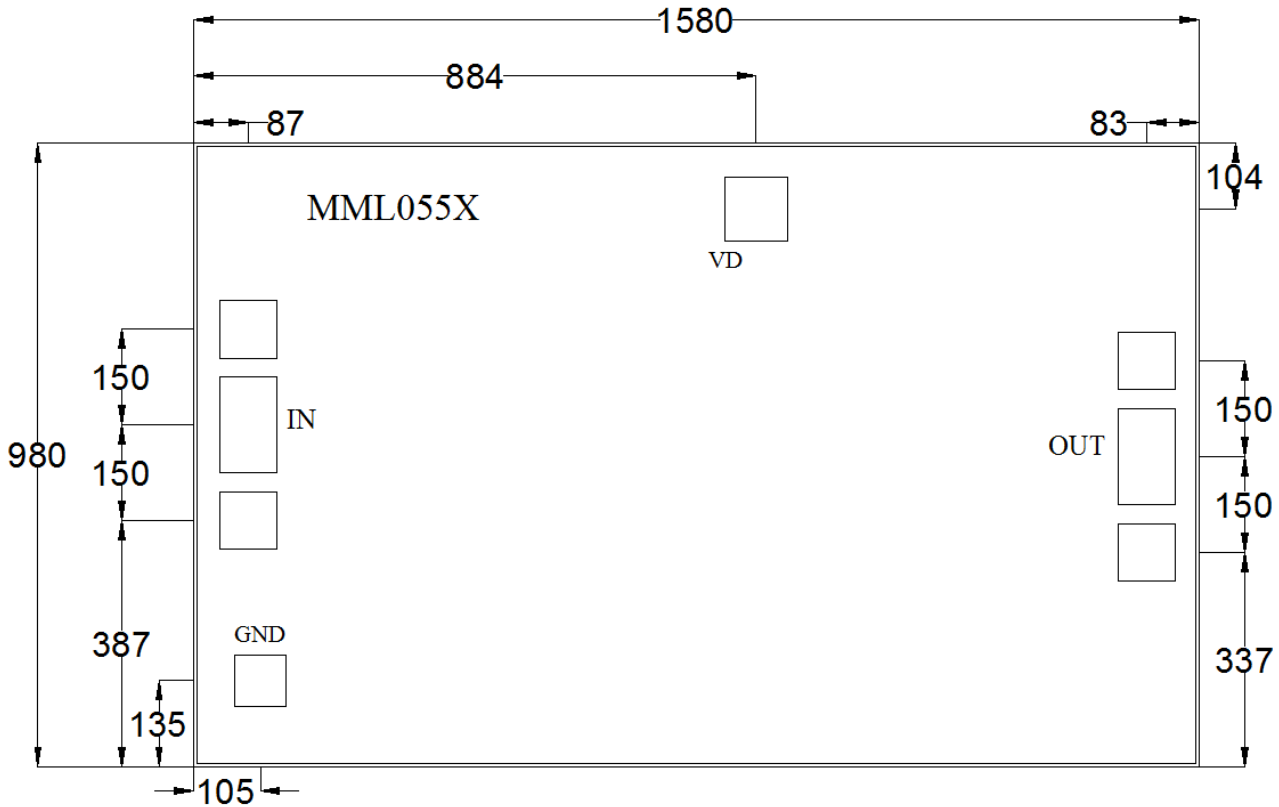
VD (V)	IDQ (mA)
+5.0	65
+5.5	73
+6.0	81



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS



Outline Drawing: All Dimensions in μm

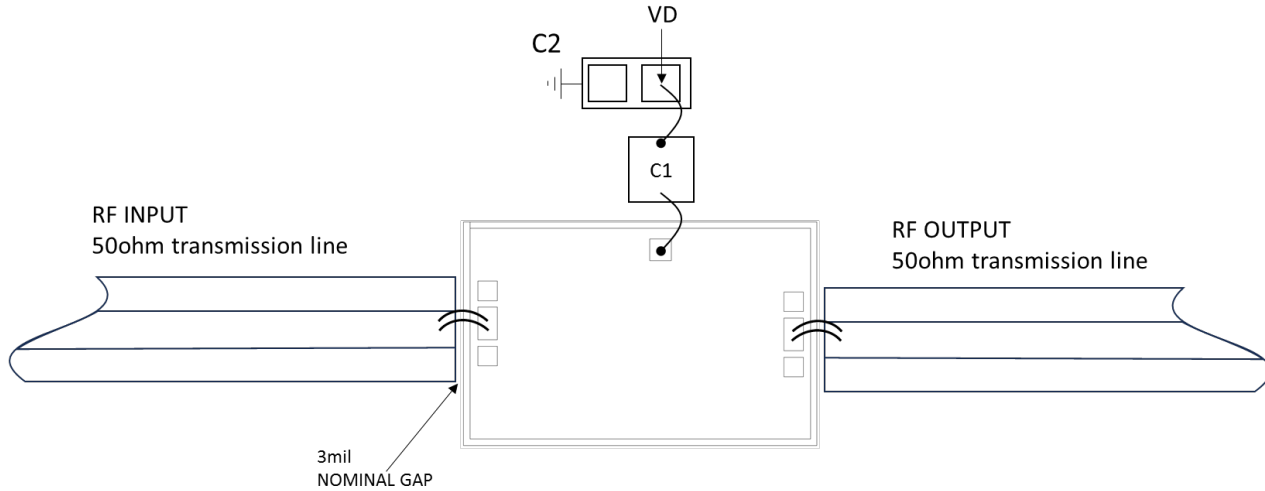


Notes:

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

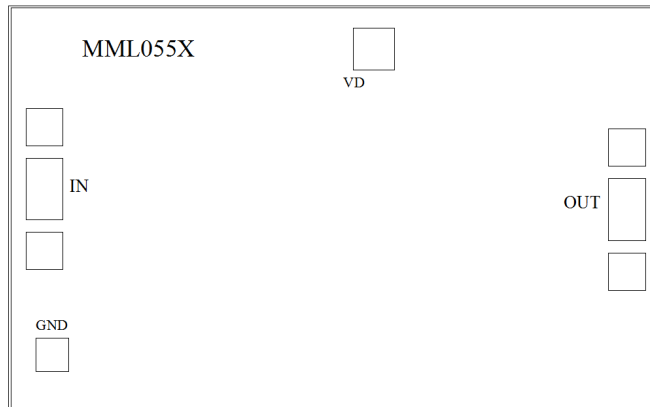


Assembly Drawing



Item	Description
C1	100pF Example: Knowles Dielectric Labs Part: CSM-140-15X15X4-G-101-K
C2	1μF Example: TDK Part: C1005X7S1A105K050BC (0402)

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	Drain Biases for the Amplifier ; 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:

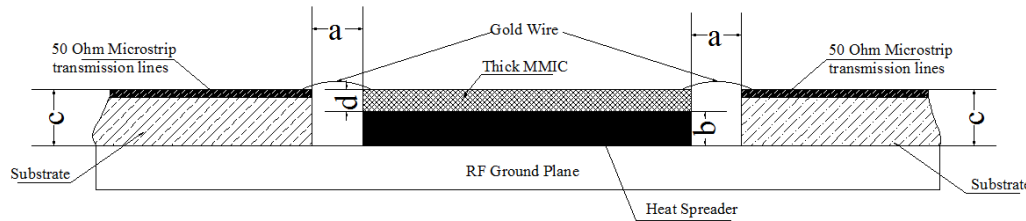
1. Connect GND to RF and dc ground.
2. Apply positive drain voltage VD and set to +5V .
3. Apply RF signal.

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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