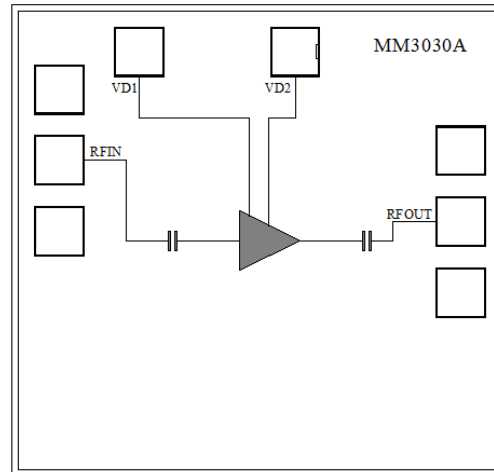


Features

- Frequency: 4-27GHz
- Small Signal Gain: 15dB Typical
- Gain Flatness: ± 0.3 dB Typical
- Psat: 22dBm Typical
- Supply voltage: +5V@126mA
- Input/Output: 50 Ω
- Die Size: 1.05 x 1.0 x 0.1mm

Typical Applications

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

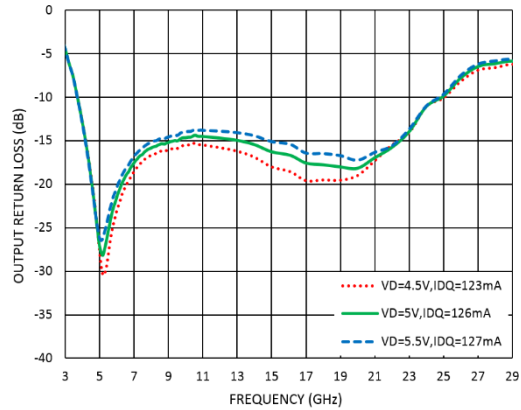
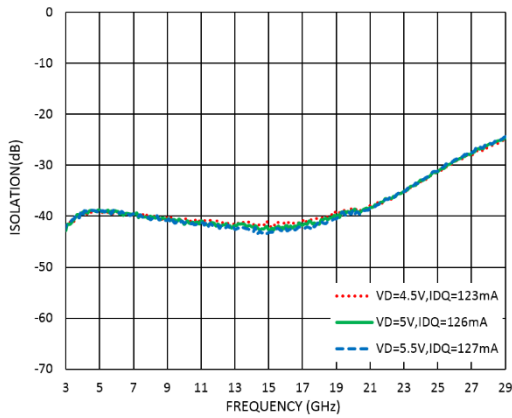
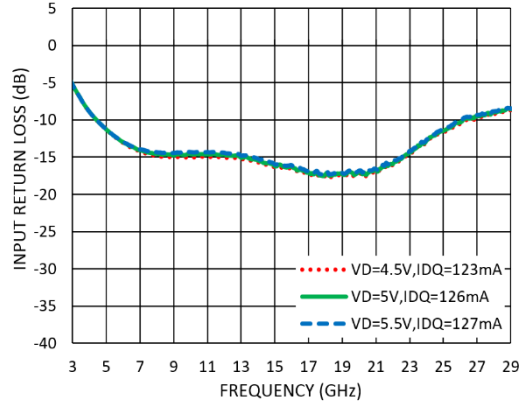
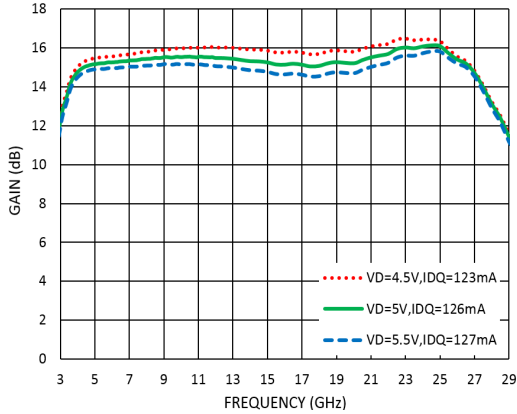
Functional Block Diagram

Electrical Specifications
TA = +25°C, VD=+5V, IDQ = 126mA Typical

Parameters	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency	4 - 8			8 - 20			20 - 27			GHz
Small Signal Gain	14	15		14.5	15		13.5	15.5		dB
Gain Flatness		± 0.5			± 0.3			± 1.0		dB
Noise Figure		6.5			6			5.5		dB
P1dB - Output 1dB Compression	18	20		19.5	21		15	18		dBm
Psat - Saturated Output Power		21			22			19		dBm
OIP3 - Output Third Order Intercept		30			31			28		dBm
Input Return Loss		-10			-15			-12		dB
Output Return Loss		-15			-15			-10		dB



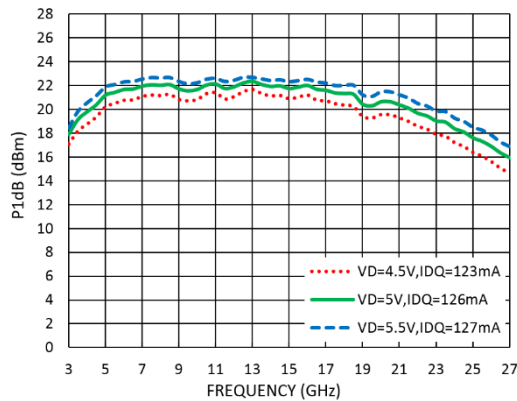
Measurement Plots: S-parameters

TA = +25°C



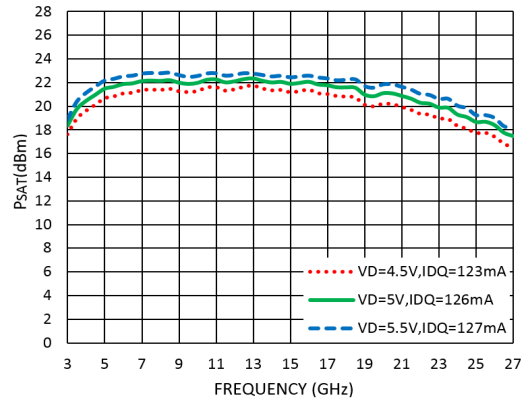
Measurement Plots: P1dB

TA = +25°C



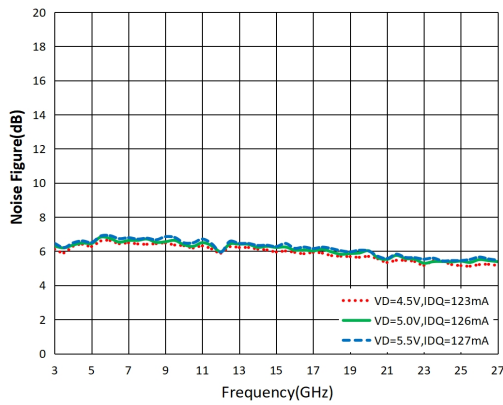
Measurement Plots: PSAT

TA = +25°C



Measurement Plots: Noise Figure

T_A = +25°C



Absolute Maximum Ratings

Drain Bias Voltage (VD)	+6V
RF Input Power (RFIN)	+15dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 10.9mW/°C above 85 °C)	0.71W
Thermal Resistance (channel to die bottom)	92.1°C/W
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +125 °C

Typical Supply Current vs. VD

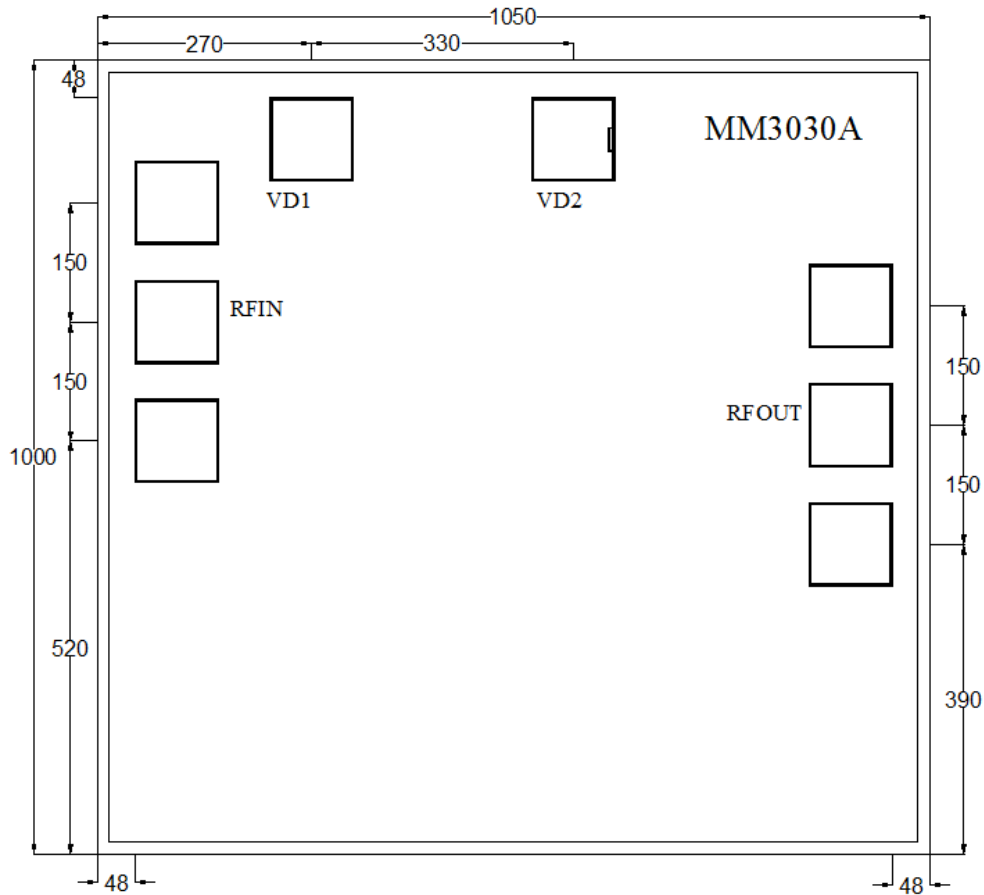
VD (V)	IDQ (mA)
+4.5	123
+5.0	126
+5.5	127



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS



Outline Drawing: All Dimensions in μm

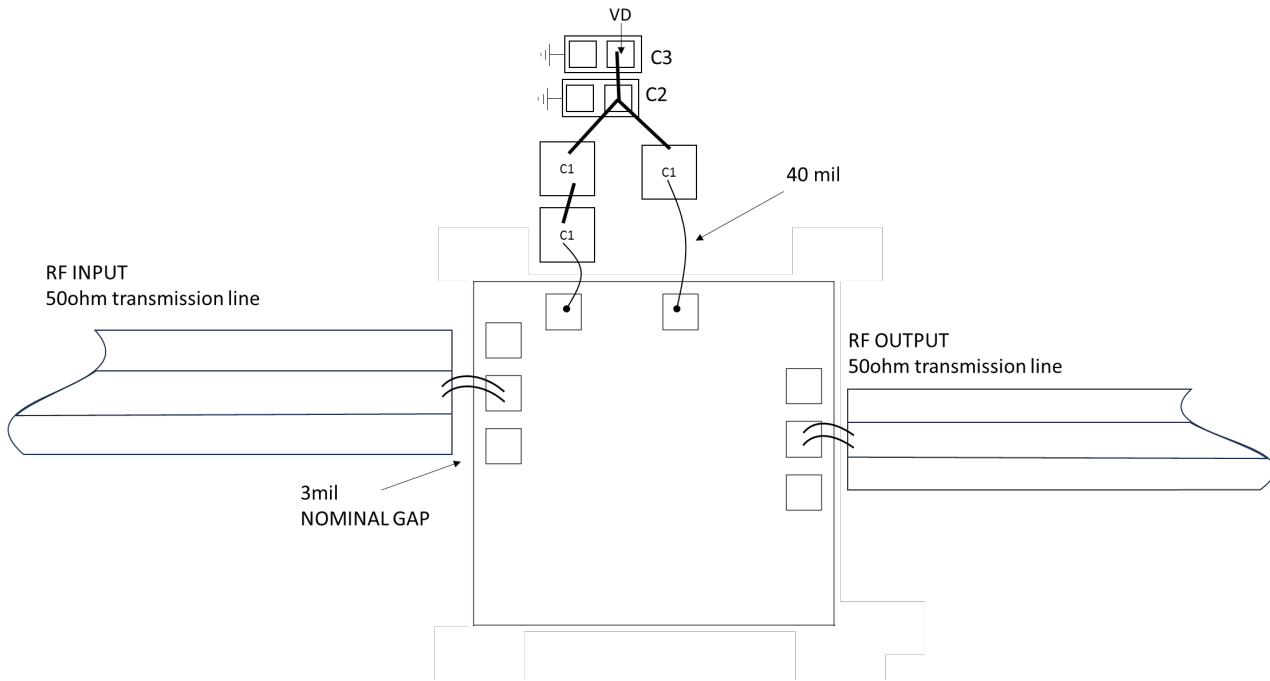


Notes:

1. Die thickness: $100\mu\text{m}$
2. DC bond pad is $98*98\mu\text{m}^2$
3. RF IN/OUT bond pad is $98*98\mu\text{m}^2$
4. Bond pad metalization: Gold
5. Backside metalization: Gold

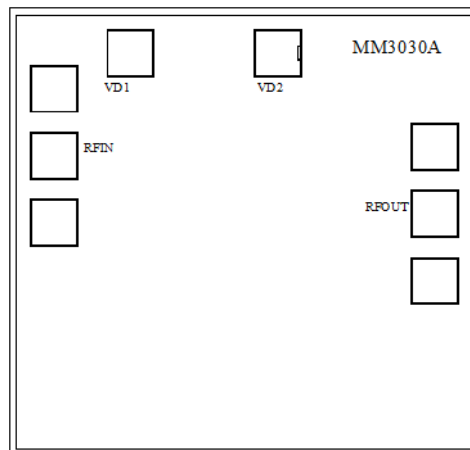


Assembly Drawing



Item	Description
C1	100 pF Example: Knowles Dielectric Labs Part: CSM-140-15X15X4-G-101-K
C2	0.01 μ F Example: Presidio Part: MBB0502X103MLT5C8C
C3	4.7 μ F Example: KYOCERA AVX Part: F951C475MPAAQ2

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.
4	Die Bottom	Die bottom must be connected to RF and dc ground.



Biasing and Operation

Turn ON procedure:

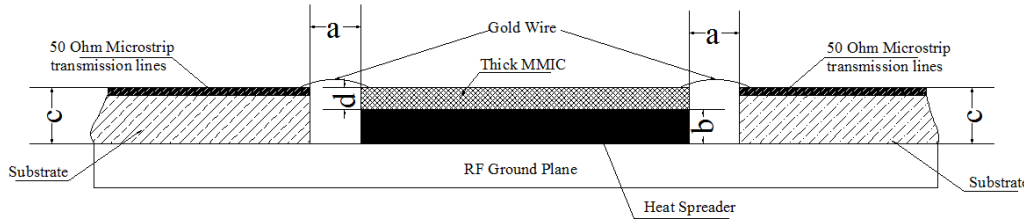
1. Connect GND to RF and dc ground.
2. Apply positive drain voltage VD and set to +5V .
3. Apply RF signal.

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.

Miller MMIC Inc. All rights reserved

Miller MMIC, Inc. holds exclusive rights to the information presented in its Data Sheet and any accompanying materials. As a premier supplier of cutting-edge RF solutions, Miller MMIC has made this information easily accessible to its clients.

Although Miller MMIC believes the information provided in its Data Sheet to be trustworthy, the company does not offer any guarantees as to its accuracy. Therefore, Miller MMIC bears no responsibility for the use of this information. It is worth mentioning that the information within the Data Sheet may be altered without prior notification.

Customers are encouraged to obtain and verify the most recent and pertinent information before placing any orders for Miller MMIC products. The information in the Data Sheet does not confer, either explicitly or implicitly, any rights or licenses with regards to patents or other forms of intellectual property to any third party.

The information provided in the Data Sheet, or its utilization, does not bestow any patent rights, licenses, or other forms of intellectual property rights to any individual or entity, whether in regards to the information itself or anything described by such information. Furthermore, Miller MMIC products are not intended for use as critical components in applications where failure could result in severe injury or death, such as medical or life-saving equipment, or life-sustaining applications, or in any situation where failure could cause serious personal injury or death.