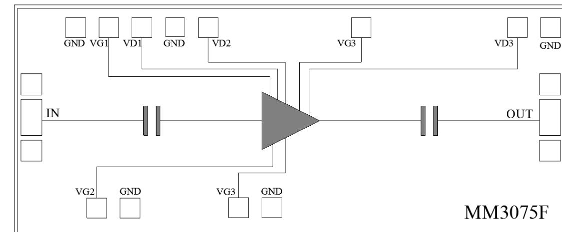
Features

- Frequency: 6-18GHz
- Small Signal Gain: 25dB Typical
- Gain Flatness: ±0.8dB Typical
- Psat: 28dBm Typical
- Supply Voltage:
  VD =+5V@450mA,VG=-0.276V Typical
- Input/Output: 50Ω
- Die Size: 2.5 x 1.05 x 0.1mm

Functional Block Diagram



Typical Applications

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

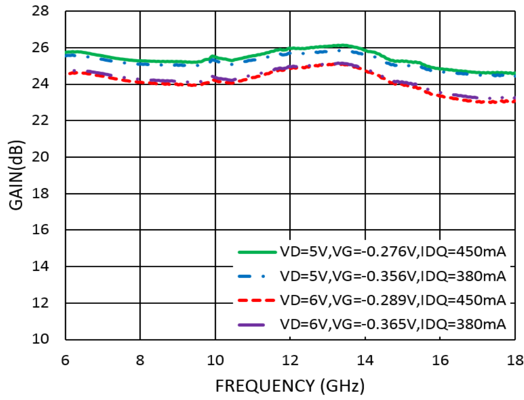
Electrical Specifications

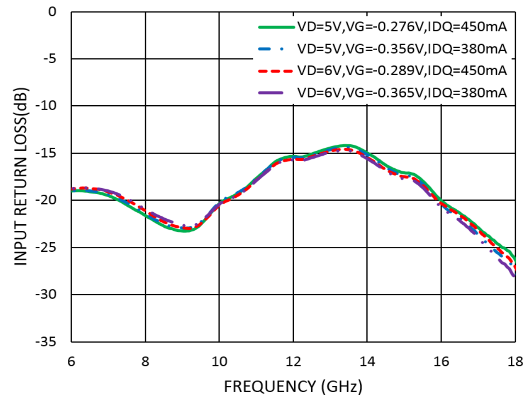
TA = +25°C, VD=+5V , VG= -0.276V , IDQ = 450mA Typical

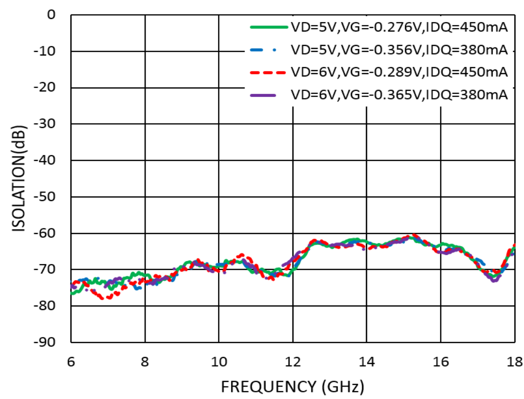
Parameters	Min.	Typ.	Max.	Units
Frequency	6		18	GHz
Small Signal Gain	23	25		dB
Gain Flatness		±0.8		dB
Noise Figure		/		dB
P1dB - Output 1dB Compression		28		dBm
Psat - Saturated Output Power		28.5		dBm
OIP3 - Output Third Order Intercept		/		dBm
Input Return Loss		-15		dB
Output Return Loss		-10		dB

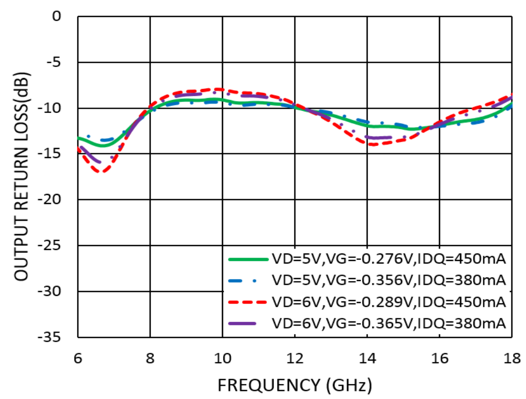
Measurement Plots: S-parameters

T_A = +25°C



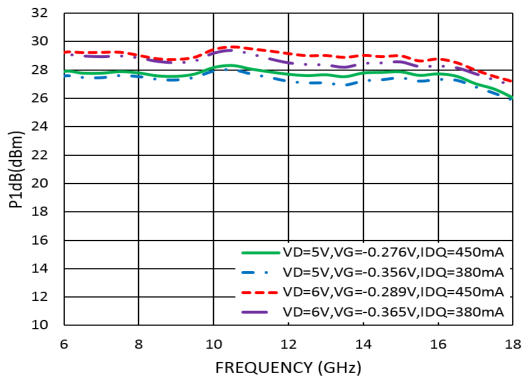






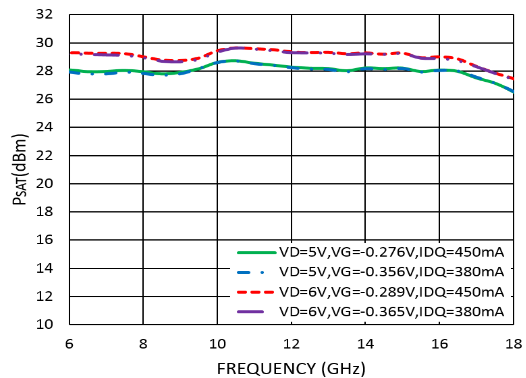
Measurement Plots: P1dB

T_A = +25°C



Measurement Plots: PSAT

T_A = +25°C

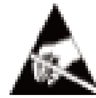


Absolute Maximum Ratings

Drain Bias Voltage (VD)	+6V
Gate Bias Voltages(VG)	–3V to 0V
RF Input Power (RFIN)	+20dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 32.3mW/°C above 85 °C)	2.1W
Thermal Resistance (channel to die bottom)	15°C/W
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +150 °C

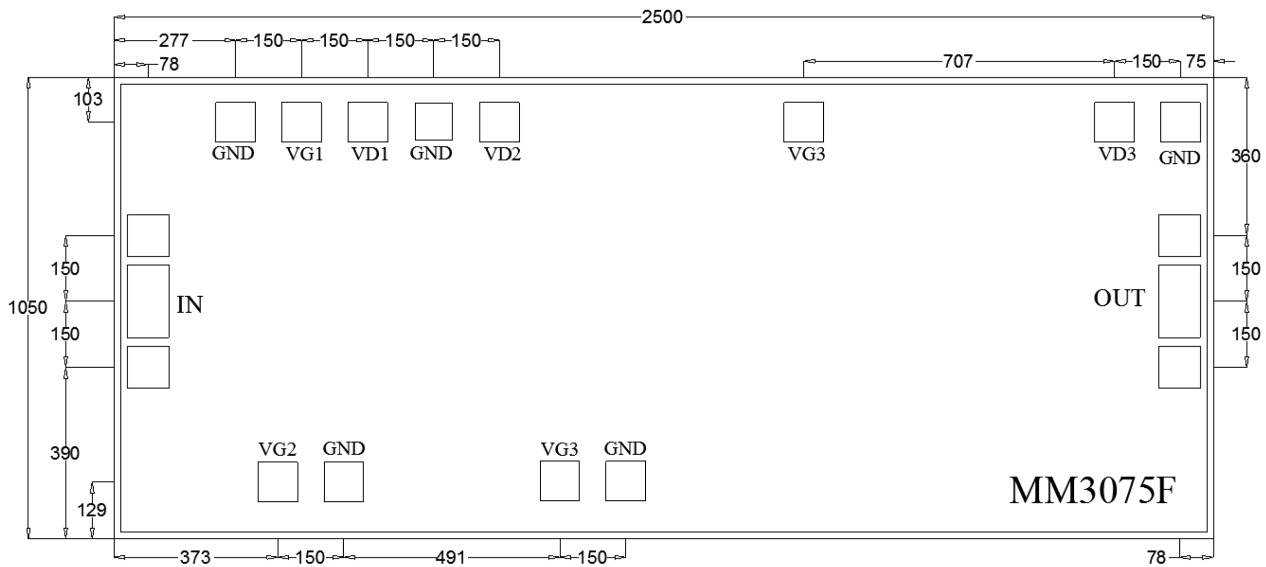
Typical Supply Current vs. VD,VG

VD (V)	VG (V)	IDQ (mA)
+5	-0.276	450
+5	0.356	380
+6	-0.289	450
+6	-0.365	380



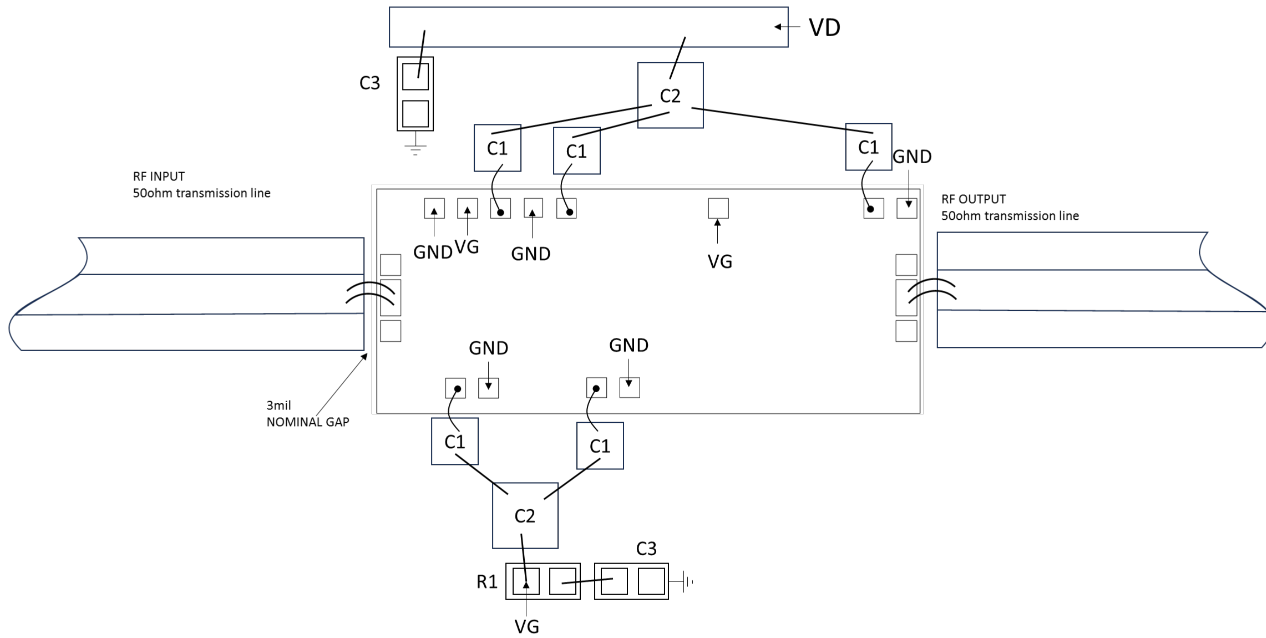
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing:
All Dimensions in µm



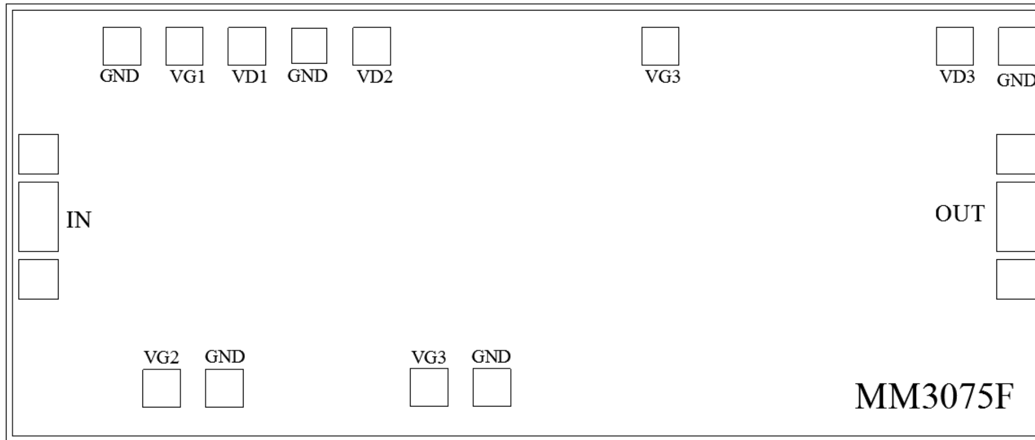
Notes:
1. Die thickness: 100µm
2. VD,VG bond pad is 90*90µm²
3. RF IN/OUT bond pad is 95*165µm²
4. Bond pad metalization: Gold
5. Backside metalization: Gold

Assembly Drawing



Item	Description	Item	Description
C1	100pF Example: Skyworks Part: SC10002430	C3	2.2μF Example : Murata Electronics Part:GRM155C71A225KE11J
C2	1000pF Example : Compexcorp Part : CSM-400-30X30X6-G-102-K	R1	10Ω Example: YAGEO Part: SR0402FR-7T10RL

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	VG	Gate Biases for the Amplifier ; An external biasing circuit is required.
5	GND	Ground pads
6	Die Bottom	Die bottom must be connected to RF and dc ground.



Biasing and Operation

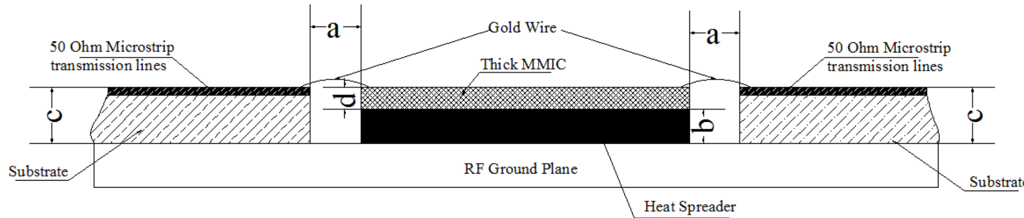
Turn ON procedure:

1. Connect GND to RF and dc ground.
2. Set the gate bias voltages VG to −3V.
3. Set the drain bias voltages VD to +5V .
4. Increase the gate bias voltages to achieve a quiescent supply current of 450 mA.
5. Apply RF signal.

Turn OFF procedure:

1. Turn off the RF signal.
2. Decrease the gate bias voltages, VG to −3V to achieve a I_{DQ} = 0 mA (approximately).
3. Decrease the drain bias voltages to 0 V.
4. 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°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.