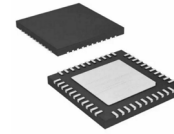
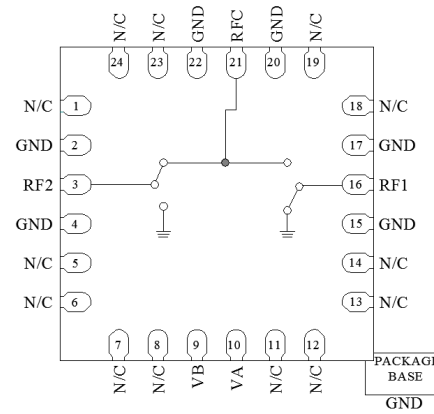


## Features

- SP2T Reflective design
- Frequency: 8-12GHz
- P0.3dB: 47dBm Typical
- Insertion Loss: 0.8dB Typical
- Control Voltage: 0/-40V
- Switching Speed: 20ns Typical
- Package Size : 4 x 4 x 0.75mm



## Functional Block Diagram



## Typical Applications

- Voltage control
- Fast Switching Speed
- Low Insertion Loss and High Isolation
- Customization available upon request

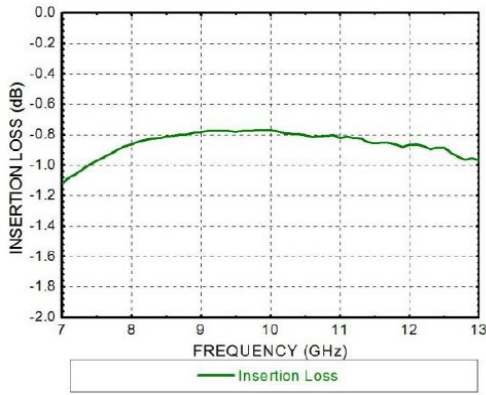
## Electrical Specifications

TA = +25°C, VCTL = 0/-40V

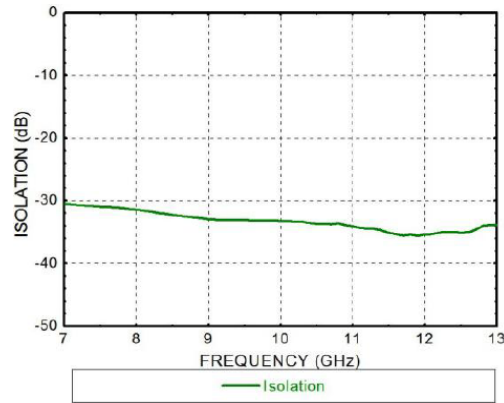
Parameters	Min.	Typ.	Max.	Units
Frequency	8		12	GHz
Insertion Loss		0.8		dB
Isolation		33		dB
Input Return Loss		-18		dB
Output Return Loss		-23		dB
P0.3dB - Output 0.3dB Compression		47		dBm
IIP3-Input Third Order Intercept		/		dBm
Switching Speed		20		ns



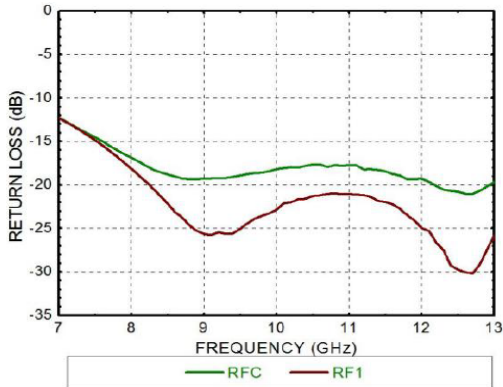
### Insertion Loss vs. Frequency



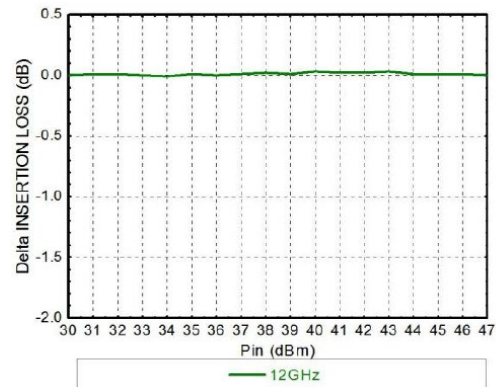
### Isolation vs. Frequency



### Return Loss vs. Frequency (ON State)

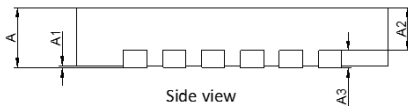
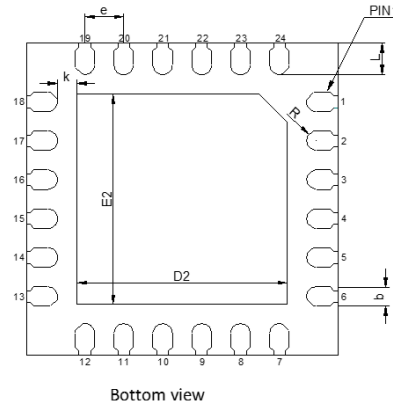
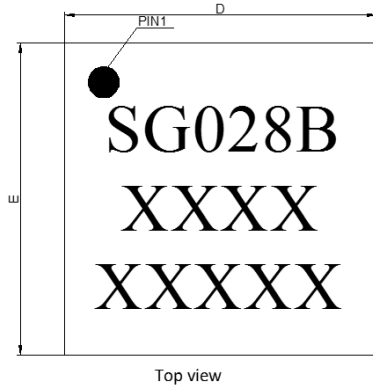


### Insertion Loss Compression vs Input Power (Normalized)





### Outline Drawing: All Dimensions in mm

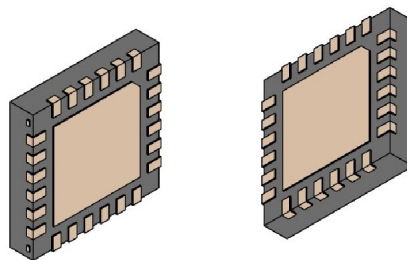
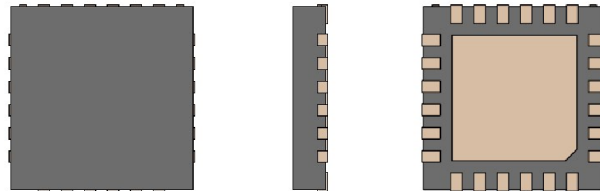


UNITS=MM

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.035	0.05
A2	--	0.55	--
A3	--	0.20	--
D	3.90	4.00	4.10
E	3.90	4.00	4.10
b	0.20	0.25	0.30
D2	2.60	2.70	2.80
E2	2.60	2.70	2.80
e		0.50	
K	0.20		
L	0.35	0.40	0.45
R	0.10		

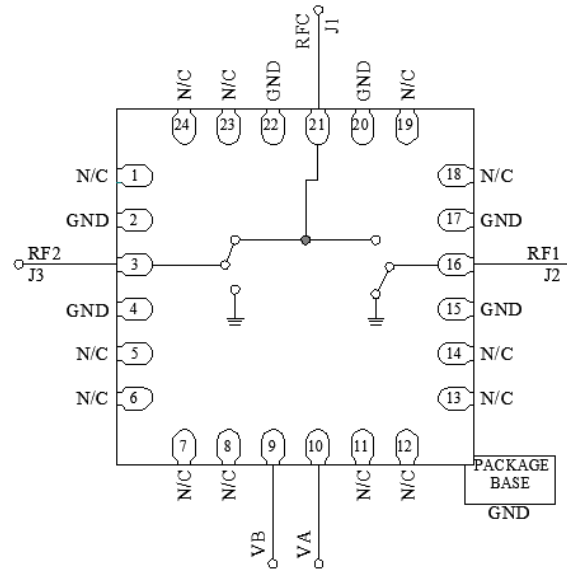
**Notes:**

1. Package model : 24-Lead Lead Frame Chip Scale Package .
2. Dimensions are in millimeters.
3. Lead spacing tolerance is non-cumulative.





### Assembly Drawing



### Pin Descriptions

No	Function	Description
1,5,6,7,8,11,12,13,14,18,19,23,24	NC	No connection. These pins may be connected to RF ground. Performance will not be affected.
2,4,15,17,20,22	GND	Connected to RF/DC ground.
21	RFC	Signal input terminal, connected to 50Ω circuit.
3,16	RF1,RF2	Signal output terminal, connected to 50Ω circuit.
9	VB	Control terminal, connected to 0 or -40V.
10	VA	Control terminal, connected to 0 or -40V.
25	GND	Package bottom must be connected to RF/DC ground.

### Truth Table

Function	A	B
RFC-RF1	-40V	0V
RFC-RF2	0V	-40V

### Absolute Maximum Ratings

RF Input Power (RFIN)	+48dBm
Control Voltage	-50V
Control Current	2mA
Channel Temperature, TCH	175°C
Thermal Resistance (Junction-to-Case (θJC) <sup>(1)</sup> )	5.5°C/W
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C



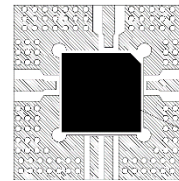
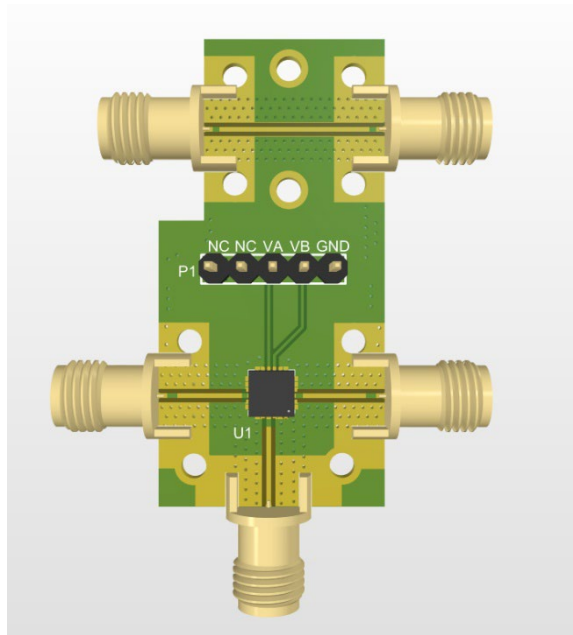
ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Notes:

1. Thermal resistance is referenced to the back of the package.



### Evaluation Board Layout Assembly and Mounting Pattern



Mounting Detail

Copper embedded design

Top dielectric material is ROGERS 4003C, 0.008 inch thickness with 0.5 oz copper.

The pad pattern shown above has been developed and tested for optimized assembly at Miller. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

Ground / thermal vias are critical for the proper performance of this device. Vias should use a 0.008~0.01 in. diameter drill, filled with copper plating.

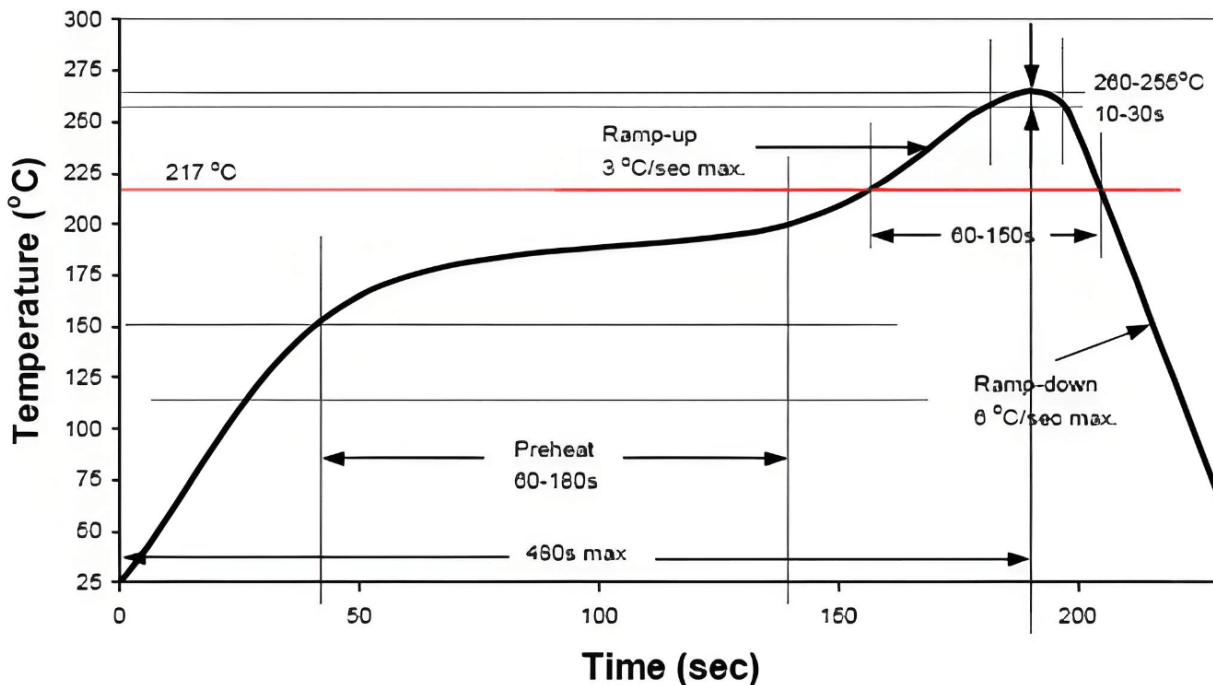
The bottom of the IC adopts a copper embedded design to ensure good heat transfer, and the copper surface maintains the same height as the PCB substrate.



### Solderability

1. Compatible with lead-free soldering process with 260 °C peak reflow temperature.
2. This package is non-hermetic, and therefore cannot be subjected to aqueous washing.  
The use of no-clean solder to avoid washing is highly recommended.

### Recommended Soldering Temperature Profile



### Pre-Assembly Handling and Baking Requirements

After opening the sealed tape-and-reel, components should be used within 168 hours.

- For standard packages: If the 168-hour limit is exceeded, bake at 125 °C for 2 hours before use.
- For vacuum tape-and-reel QFN packages: The tape material is not heat-resistant. If baking is required (i.e., after 168 hours), it must be performed at 85 °C for 360 hours. This special condition supersedes the standard baking procedure.

Note: Proper baking is critical to remove moisture and prevent damage during the subsequent reflow soldering process.



# MILLER MMIC

V1.0.0

## MMSG028Q4B

GaN Plastic QFN 4x4mm  
SP2T Reflective Switch  
8-12GHz

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MMSG028Q4B

GaN Plastic QFN 4x4mm SP2T Reflective Switch 8 – 12GHz