

**< S-band High Power GaN HEMT >**

# MGFS39G38L2-01

**2.5 – 3.8 GHz / 9W(P<sub>sat</sub>) x 2**
**DESCRIPTION**

The MGFS39G38L2, GaN HEMT with an N-channel schottky gate, is designed for S-band base transmitter station applications.

**FEATURES**

- High Voltage Operation : V<sub>DS</sub>=50V
- High Output Power : 39dBm (typ.) @ P<sub>sat</sub>, f=3.5GHz, Single Path
- High Efficiency : 60% (typ.) @ P<sub>sat</sub>, f=3.5GHz, Single Path
- High Gain : 18dB (typ.) @ f=3.5GHz, Single Path

**APPLICATION**

- Amplifier for S-band Base Transmitter Station

**RECOMMENDED BIAS CONDITIONS**

- V<sub>ds</sub>=50V • I<sub>ds</sub>=40mA

**Absolute Maximum Ratings** (Case Temperature T<sub>c</sub>=25°C)

Symbol	Parameter	Ratings	Unit
V <sub>DS</sub>	Operating Voltage	55	V
V <sub>BR</sub>	Drain-Source Voltage (V <sub>GS</sub> =-5V)	150	V
V <sub>GS</sub>	Gate-Source Voltage	-15	V
PT	Total Power Dissipation	15	W
P <sub>in</sub>	Maximum Input Power	27	dBm
T <sub>ch</sub>	Channel Temperature	200	°C
T <sub>stg</sub>	Storage Temperature	-55 to +150	°C

**Recommended Operating Conditions**

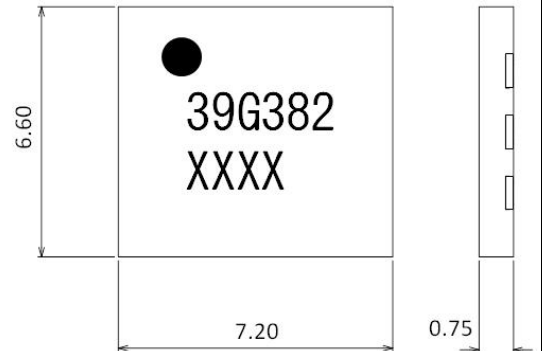
Symbol	Parameter	Limit	Unit
V <sub>DS</sub>	Operating Voltage	≤ 50	V
I <sub>GF</sub>	Forward Gate Current (R <sub>G</sub> =10Ω, Single Path)	≤ 8	mA
I <sub>GR</sub>	Reverse Gate Current (R <sub>G</sub> =10Ω, Single Path)	≤ 1	mA
T <sub>ch</sub>	Channel Temperature	≤ 185	°C
P <sub>ave</sub>	Average Output Power (Single Path)	31	dBm

**Electrical Characteristics** (Case Temperature T<sub>c</sub>=25°C)

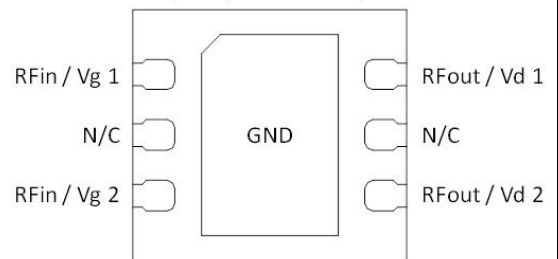
Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
V <sub>p</sub>	Pinch-Off Voltage	V <sub>DS</sub> = 50V, I <sub>D</sub> = 1.6mA	- 2.3	- 1.8	- 1.3	V
P <sub>sat</sub> *1	Saturated Output Power*1	V <sub>DS</sub> = 50V, I <sub>D</sub> (DC) = 40mA f=3.5GHz, Single Path, @ P <sub>sat</sub>	37.5	39.0	-	dBm
η <sub>dmax</sub> *1	Drain Efficiency*1		-	60	-	%
G <sub>p</sub>	Linear Power Gain	V <sub>DS</sub> = 50V, I <sub>D</sub> (DC) = 40mA f=3.5GHz, Single Path, @ P <sub>o</sub> = 31.0dBm	16.5	18	-	dB
η <sub>d</sub>	Drain Efficiency		20	25	-	%
ACLR*2	Adjacent Channel Leakage Ratio*2		-	-40	-	dBc
VSWR*1	Load Mismatch Tolerance*1	VSWR=10:1, All Phases,	No Device Degradation			
R <sub>th</sub>	Thermal Resistance	ΔVf Method, Single Path	-	6.2	-	°C/W
HBM	Human Body Model	JEDEC JESD22-A114	Class0 (< 250V)			
CDM	Charge Device Model	JEDEC JESD22-C101	Class C1 (250 to 500V)			
MSL	Moisture Sensitivity Level	JEDEC J-STD-020	3			

\*1 : 10%-duty RF Pulse

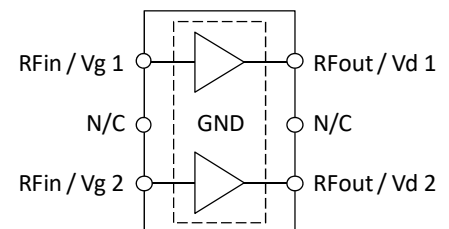
\*2 : Signal condition (W-CDMA, Test Model 1 64DPCH, PAPR=7.5dB @0.01% CCDF)

**Outline Drawing** [unit : mm]


## [ Perspective View ]

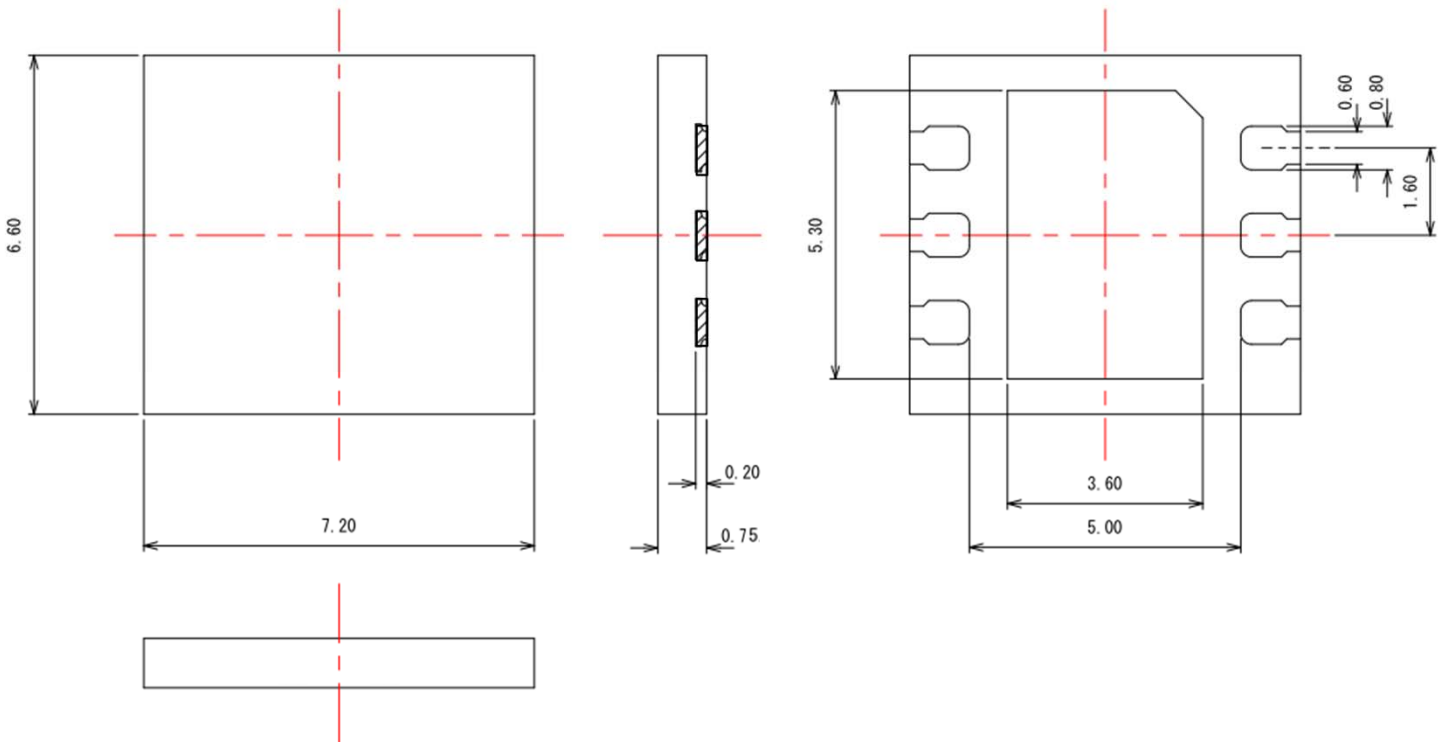


## [ Block Diagram ]

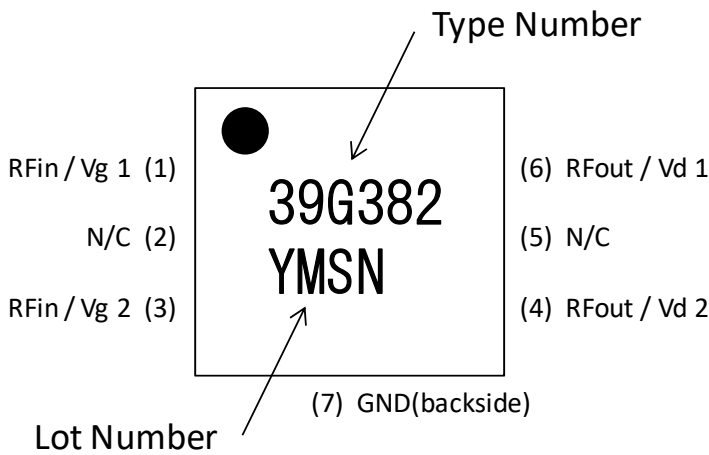


**PRODUCT DIMENSIONS**

**1. Package Drawing [ unit : mm ]**



**2. Pin Configuration and Marking**



**Pin Description**

Pin No.	Pin Name	Function
1	RFin / Vg 1	Path 1 RF Input & Gate Voltage
2	N / C	No Function
3	RFin / Vg 2	Path 2 RF Input & Gate Voltage
4	RFout / Vd 2	Path 2 RF Output & Drain Voltage
5	N / C	No Function
6	RFout / Vd 1	Path 1 RF Output & Drain Voltage
7	GND	Ground

Symbol	Content	Description
Y	Year	This single figure shows the year when the assembly of the lot is started. The period of the year is from April to March. (e.g.) 5 -- The lot was assembled in Apr./2015 to Mar./2016
M	Month	This single figure shows the month when the assembly of the lot is started. Apr.=1, May=2, ..... Nov.=8, Dec.=9, Jan.=X, Feb.=Y, Mar.=Z
SN	Serial Number	This combination of double alphabets (except I,O) shows the order when the assembly of the lot is started in the month.

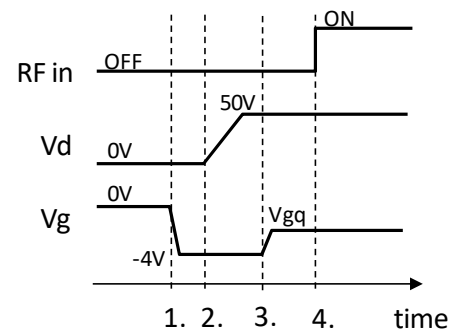
### Static Electric Safety Cautions

Compared to silicon products, GaN - and GaAs - based FETs are the products that are more sensitive to the electro-static discharge (ESD). Applying ESD may lead the product to fail. Please handle the product with careful taking ESD counter measures, such as the wrist band, grounding table/floor , ionizer, etc.

### Bias On/Off Sequence

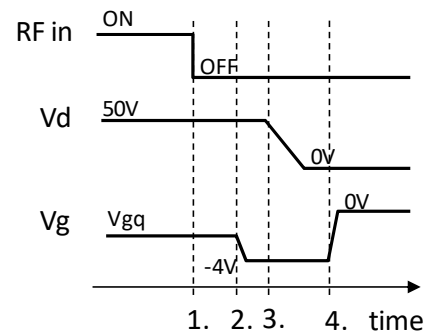
#### A. Bias sequence for turning on the device

1. Set gate voltage (V<sub>g</sub>) to -4V (typically pinch-off voltage).
2. Set drain voltage (V<sub>d</sub>) from 0V to 50V.
3. Set gate voltage (V<sub>g</sub>) to adjust a drain current (I<sub>dq</sub>).
4. RF on



#### B. Bias sequence for turning off the device

1. RF off
2. Set gate voltage to -4V for drain current (I<sub>dq</sub>) of 0A.
3. Set drain voltage to 0V.
4. Set gate voltage to 0V.



### Refer to the following Application Notes

- APN1111 Typical Characteristics of Single Path Power Amplifier
- APN2111 Typical Characteristics of Doherty Amplifier
- APN7111 Handling Precaution and Reflow Profile
- APN8111 Package Specification
- APN9111 Reliability Test Results

### **Keep safety first in your circuit designs!**

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