

# SME6003V GaN TRANSISTOR

Document Number: SME6003V  
Preliminary Datasheet V1.1

## Gallium Nitride 50V 30W, RF Power Transistor

### Description

The SME6003V is a 30-watt, unmatched GaN HEMT, designed for multiple applications with frequencies up to 6000MHz.

The performance is guaranteed for applications operating in the mentioned frequencies. There is no guarantee of performance when this part is used in applications designed outside of these frequencies.

- Typical performance (on Innogration fixture with device soldered)

$V_{DD}=50V$ ,  $I_{DQ}=70mA$ , CW,

Frequency(MHz)	Gp (dB)	$P_{3dB}$ (W)	Efficiency (%)
2000	18	30	69



- Typical performance (on fixture with device soldered):  $V_{DD}=50V$   $I_{DQ}=70mA$ , Pulse CW, Pulse Width=20 us, Duty cycle=10% ..

Frequency (MHz)	Pulse CW					WCDMA Signal <sup>(1)</sup> : $P_{AVG}=36dBm$		
	Gp@ $P_{1dB}$ (dB)	$P_{1dB}$ (dBm)	$\eta_{D}$ (%)	$P_{3dB}$ (dBm)	$\eta_{D}$ (%)	Gp (dB)	$\eta_{D}$ (%)	ACPR <sub>5MHz</sub> (dBc)
3400	15.3	44.9	64.8	45.5	67.1	16.5	29.0	-40.5
3500	15.9	44.5	61.1	45.6	66.6	17.0	27.9	-39.1
3600	15.8	44.0	59.8	45.6	67.1	16.7	27.8	-38.6

Note:(1) WCDMA signal: 3GPP test model 1; 1 to 64 DPCH; Channel Bandwidth=3.84MHz,PAR =10.5 dB at 0.01 % probability on CCDF.

### Applications and Features

- Suitable for wireless communication infrastructure, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

### Important Note: Proper Biasing Sequence for GaN HEMT Transistors

#### Turning the device ON

1. Set VGS to the pinch-off (VP) voltage, typically -5 V
2. Turn on VDS to nominal supply voltage (50V)
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

#### Turning the device OFF

1. Turn RF power off
2. Reduce VGS down to VP, typically -5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	$V_{DSS}$	+200	Vdc
Gate--Source Voltage	$V_{GS}$	-8 to 0	Vdc
Operating Voltage	$V_{DD}$	0 to 55	Vdc
Maximum forward gate current	$I_{gf}$	3.6	mA
Storage Temperature Range	$T_{stg}$	-65 to +150	C
Case Operating Temperature	$T_C$	-55 to +150	C
Operating Junction Temperature	$T_J$	+225	C

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**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_C = 85^\circ\text{C}$ , $T_J = 200^\circ\text{C}$ , DC Power Dissipation, FEA	$R_{\theta JC}$	8.1	C/W

**Table 3. Electrical Characteristics** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

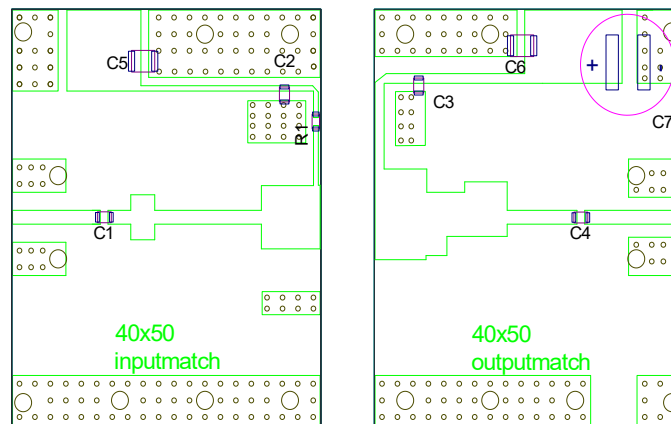
**DC Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$ ; $I_{DS} = 3.6\text{mA}$	$V_{DSS}$		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$ , $I_D = 3.6\text{mA}$	$V_{GS(th)}$		-3.3		V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$ , $I_{DS} = 70\text{mA}$ , Measured in Functional Test	$V_{GS(Q)}$		-3.0		V

**Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) :**  $V_{DD} = 50\text{Vdc}$ ,  $I_{DQ} = 70\text{mA}$ ,  $f = 2000\text{MHz}$ , CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		18		dB
Drain Efficiency@P3dB <sub>t</sub>	Eff		69		%
3dB Compressed point	P3dB		30		W
Input Return Loss	IRL		-10		dB
Mismatch stress at all phases(No device damage)	VSWR		10:1		$\Psi$

## Reference Circuit of Test Fixture Assembly Diagram



**Figure 1. Test Circuit Component Layout (3400MHz~3600MHz)**

**Table 4. Test Circuit Component Designations and Values**

Designator	Value	Package
C1, C2, C3, C4	6.8pF	0805
C5, C6	10uF	1210
R1	10 $\Omega$	0603
C7	100uF/63V	
PCB	0.762mm [0.030"] thick, $\epsilon_r = 3.48$ , Rogers RO4350B, 1 oz. copper	

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Figure 2. Pulse RF performance (3400MHz~3600MHz)

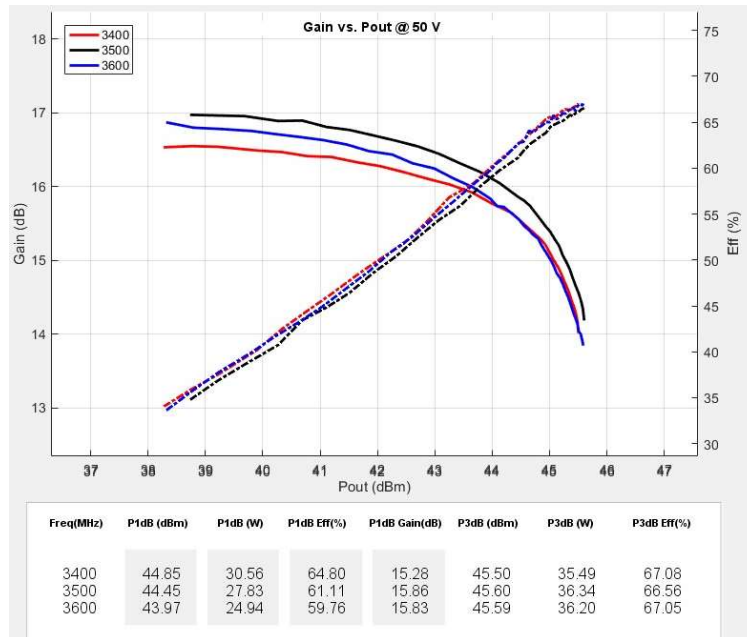
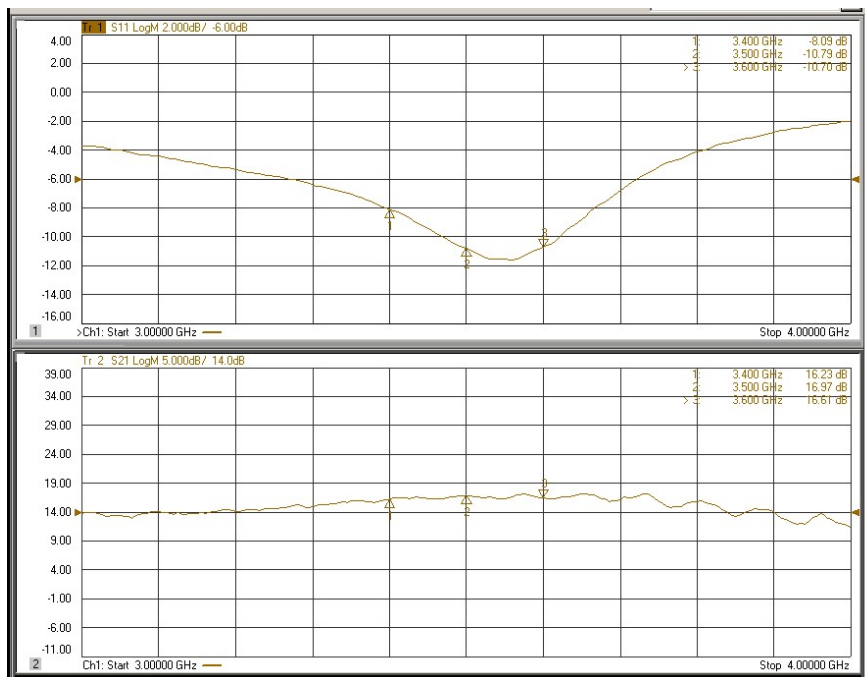


Figure 3. Network Analyzer result S11 and S21 (3400MHz~3600MHz)



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## Package Outline

Flanged ceramic package; 2 leads

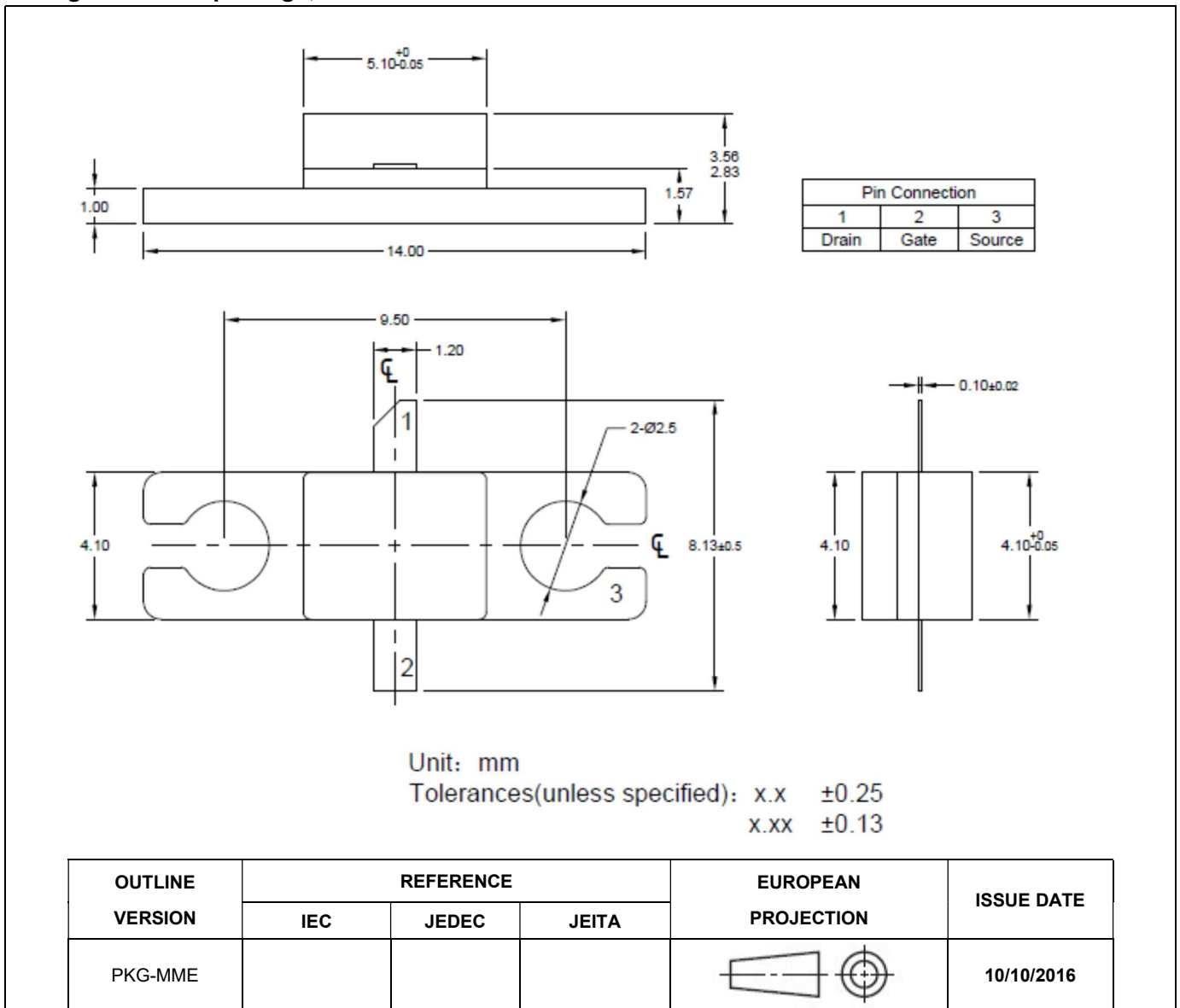


Figure 1. Package Outline PKG-MME

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## Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2019/08/22	V1.0	Preliminary Datasheet Creation
2020/1/2	V1.1	Modification on breakdown voltage rating

## Notice

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