

SME6002V GaN TRANSISTOR

Document Number: SME6002V
Preliminary Datasheet V1.2

Gallium Nitride 50V 18W, RF Power Transistor

Description

The SME6002V is a 20-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	20	70

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

Frequency (MHz)	Pulse CW				
	Gp@ P_{1dB} (dB)	P_{1dB} (dBm)	η_D (%)	P_{3dB} (W)	η_D (%)
3400	17.6	42	57.5	21.4	62.1
3500	18.3	42	54.5	22.7	61.3
3600	18.3	41.9	53.8	24.3	61.5

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	Igf	2.4	mA
Storage Temperature Range	Tstg	-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	$R_{\theta JC}$	10.9	C/W

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

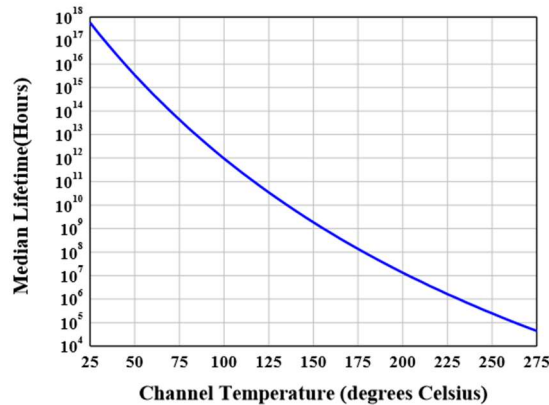
DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 2.4\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 2.4\text{mA}$	$V_{GS(th)}$		-3.4		V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 20\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.1		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 _t	Eff		70		%
3dB Compressed point	P3dB		20		W
Input Return Loss	IRL		-10		dB
Mismatch stress at all phases(No device damage)	VSWR		10:1		Ψ

Figure 1: Median Lifetime vs. Channel Temperature



Reference Circuit of Test Fixture Assembly Diagram

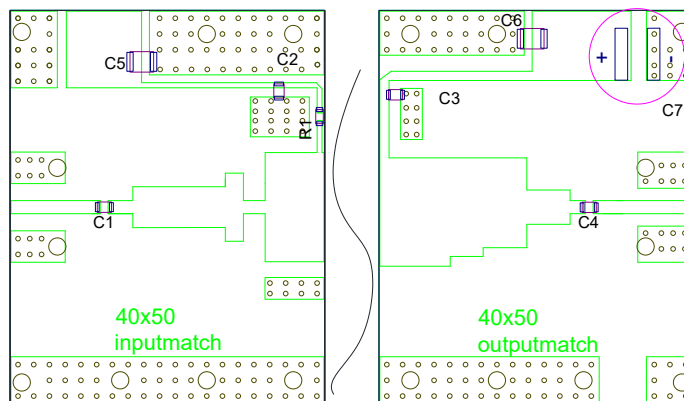


Figure 2. Test Circuit Component Layout (3400MHz~3600MHz)

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Table 4. Test Circuit Component Designations and Values

Designator	Value	Package	Quantity
C1, C2, C3, C4	6.8pF	0805	4
C5, C6	10uF	1210	2
R1	10 Ω	0603	1
C7	100uF/63V		1

Figure 3. Pulse RF performance (3400MHz~3600MHz)

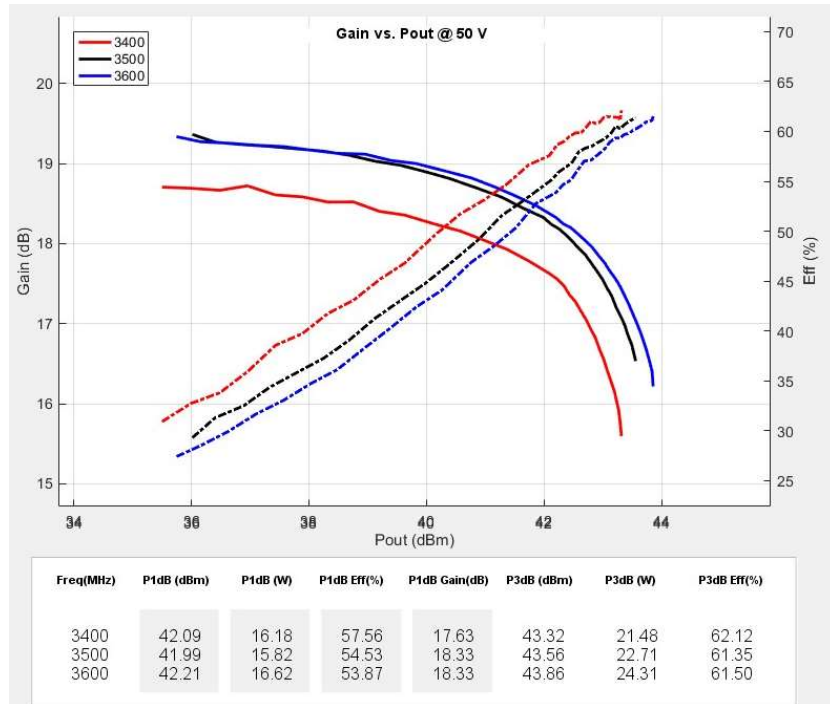
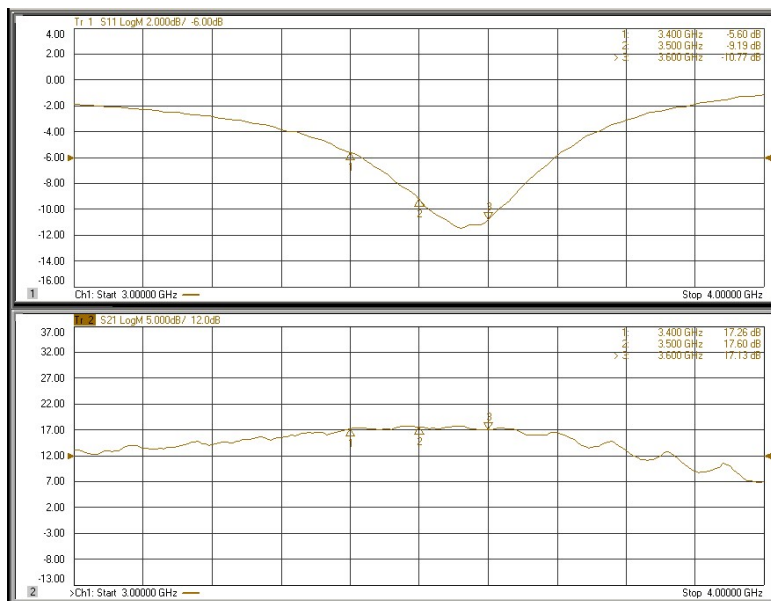


Figure 4. Network Analyzer result S11 and S21 (3400MHz~3600MHz)



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Package Outline

Flanged ceramic package; 2 leads

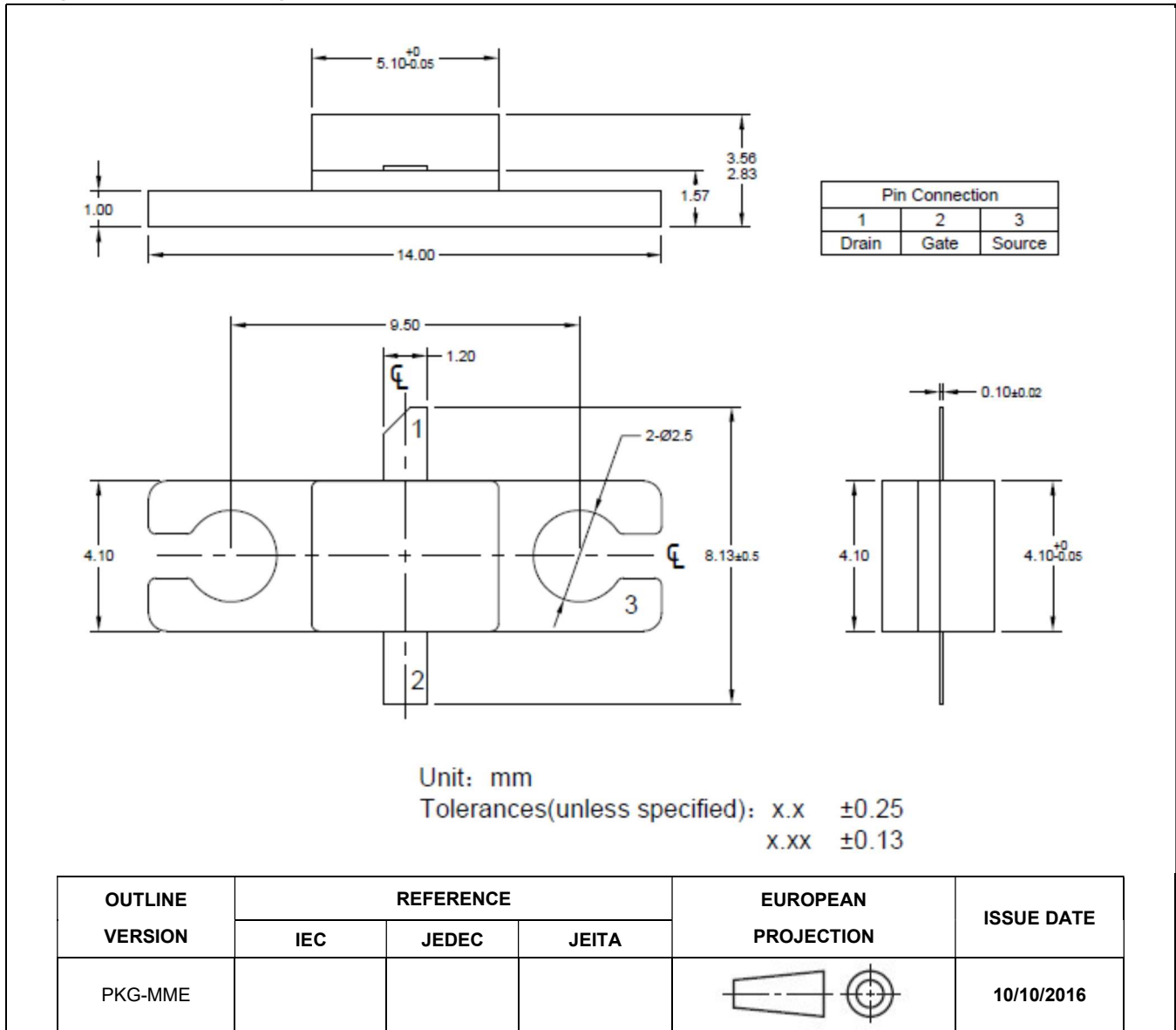


Figure 1. Package Outline PKG-MME

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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
2020/11/2	V1.2	Add MTTF data

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