

# SME6004V GaN TRANSISTOR

Document Number: SME6004V  
Preliminary Datasheet V1

## Gallium Nitride 50V 40W, RF Power Transistor

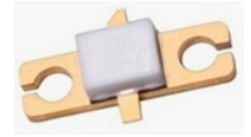
### Description

The SME6004V is a 40-watt, unmatched GaN HEMT, designed for multiple applications with frequencies up to 4000MHz.

It can support CW, pulsed and any modulation applications

There is no guarantee of performance when this part is used in applications designed outside of these frequencies.

**SME6004V**



• Typical performance (on fixture with device soldered):

$V_{DD}=50V$   $I_{DQ}=100mA$ , Pulse CW, Pulse Width=20 us, Duty cycle=10% ..

Freq(MHz)	P1dB(dBm)	P1dB Gain(dB)	P3dB(W)	EFF(%)@P3dB
3400	45.76	14.38	47.65	65.42
3500	45.43	14.73	45.45	63.70
3600	45.10	14.40	45.31	64.71

### 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	$I_{gf}$	5	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

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_C=85^{\circ}C$ , $T_J=200^{\circ}C$ , DC Power Dissipation, FEA	$R_{\theta JC}$	6.2	C/W

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

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## DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=-8V; I_{DS}=5mA$	$V_{DSS}$		200		V
Gate Threshold Voltage	$V_{DS} = 10V, I_D = 5mA$	$V_{GS(th)}$		-3.4		V
Gate Quiescent Voltage	$V_{DS} = 50V, I_{DS}=60mA,$ Measured in Functional Test	$V_{GS(Q)}$		-3		V

**Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) :**  $V_{DD} = 50 Vdc, I_{DQ} = 100 mA, f = 3500 MHz, CW$

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		12.5	13	dB
Drain Efficiency@P3dB <sub>t</sub>	Eff		65		%
3dB Compressed point	P3dB		45		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases(No device damage)	VSWR		10:1		Ψ

## Reference Circuit of Test Fixture Assembly Diagram

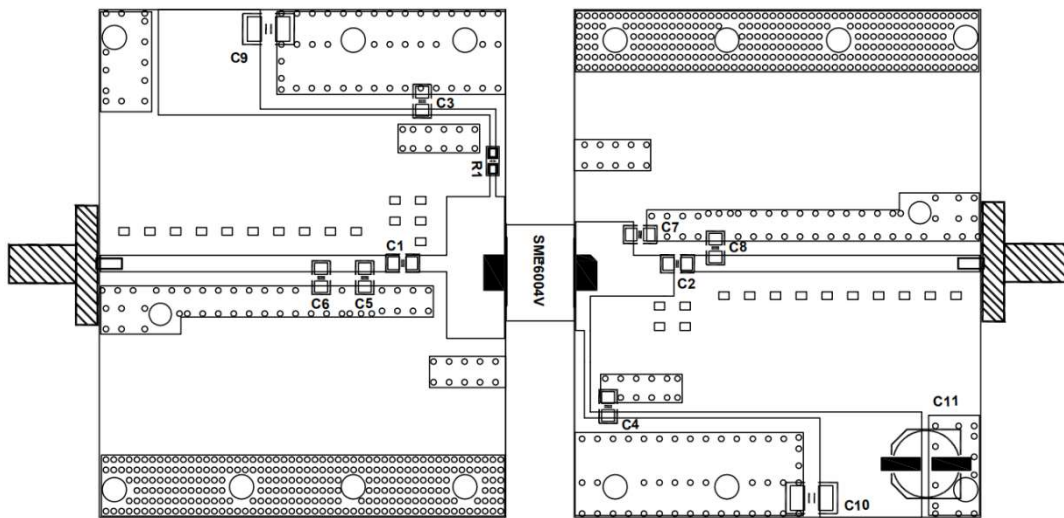


Figure 1. Test Circuit Component Layout (3400MHz~3600MHz)

Table 4. Test Circuit Component Designations and Values

BOM		
C1	3.3pF	ATC600F
C2,C3,C4	5.6pF	ATC600F
C5	1.0pF	ATC600F
C6,C7	0.5pF	ATC600F
C8	0.4pF	ATC600F
C9,C10	10uF/63V	
C11	470uF/63V	
R1	180 ohm	
PCB	30mils	RO4350B

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Figure 2. Pulse RF performance (3400MHz~3600MHz)  $V_{DD}=50V$   $I_{DQ}=60mA$ , Pulse CW, Pulse Width=20 us, Duty cycle=10%

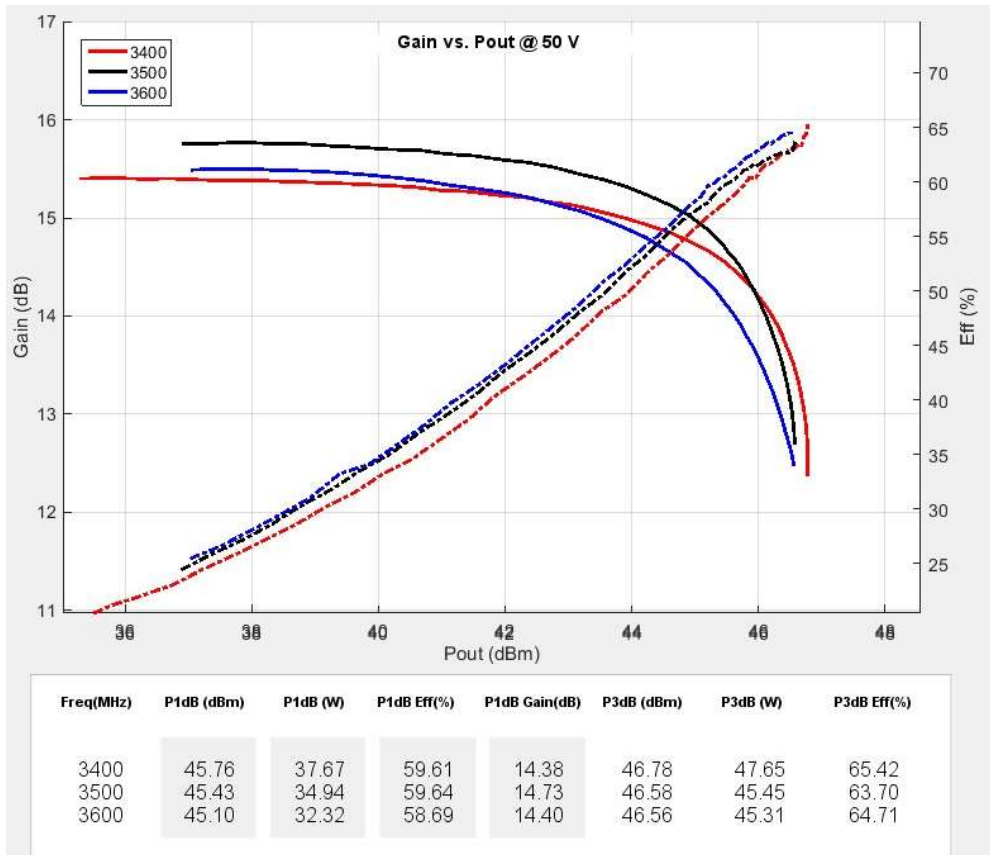
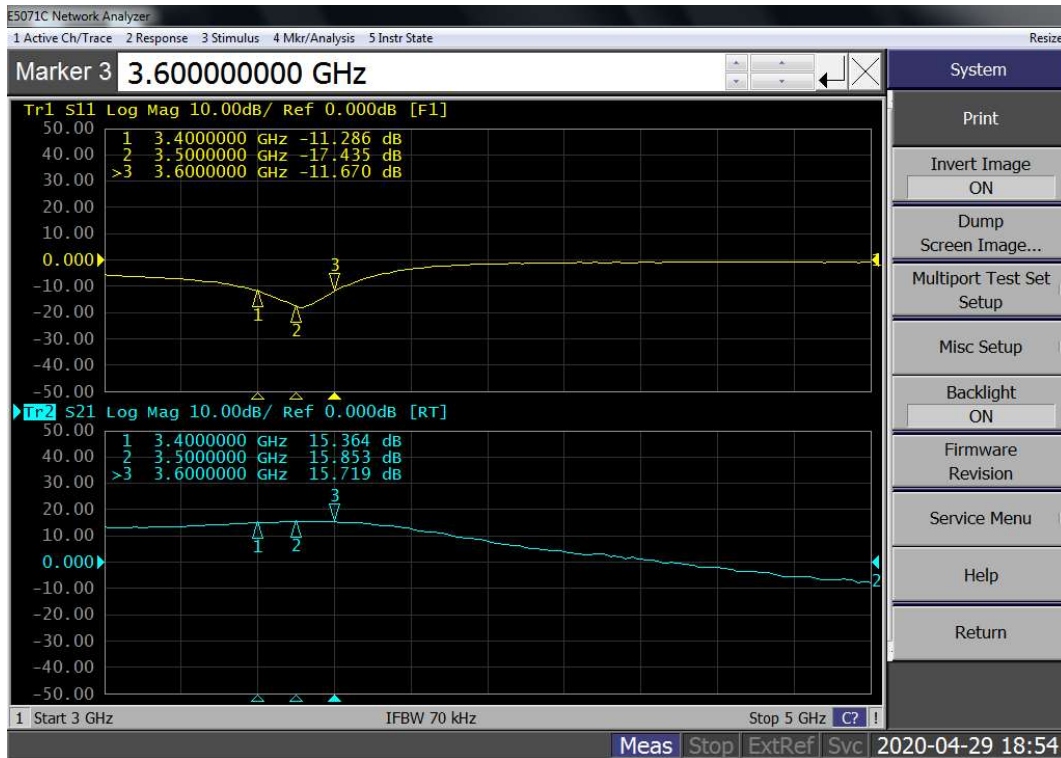


Figure 3. Network Analyzer result S11 and S21 (3400MHz~3600MHz)



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## Package Outline

Flanged ceramic package; 2 leads

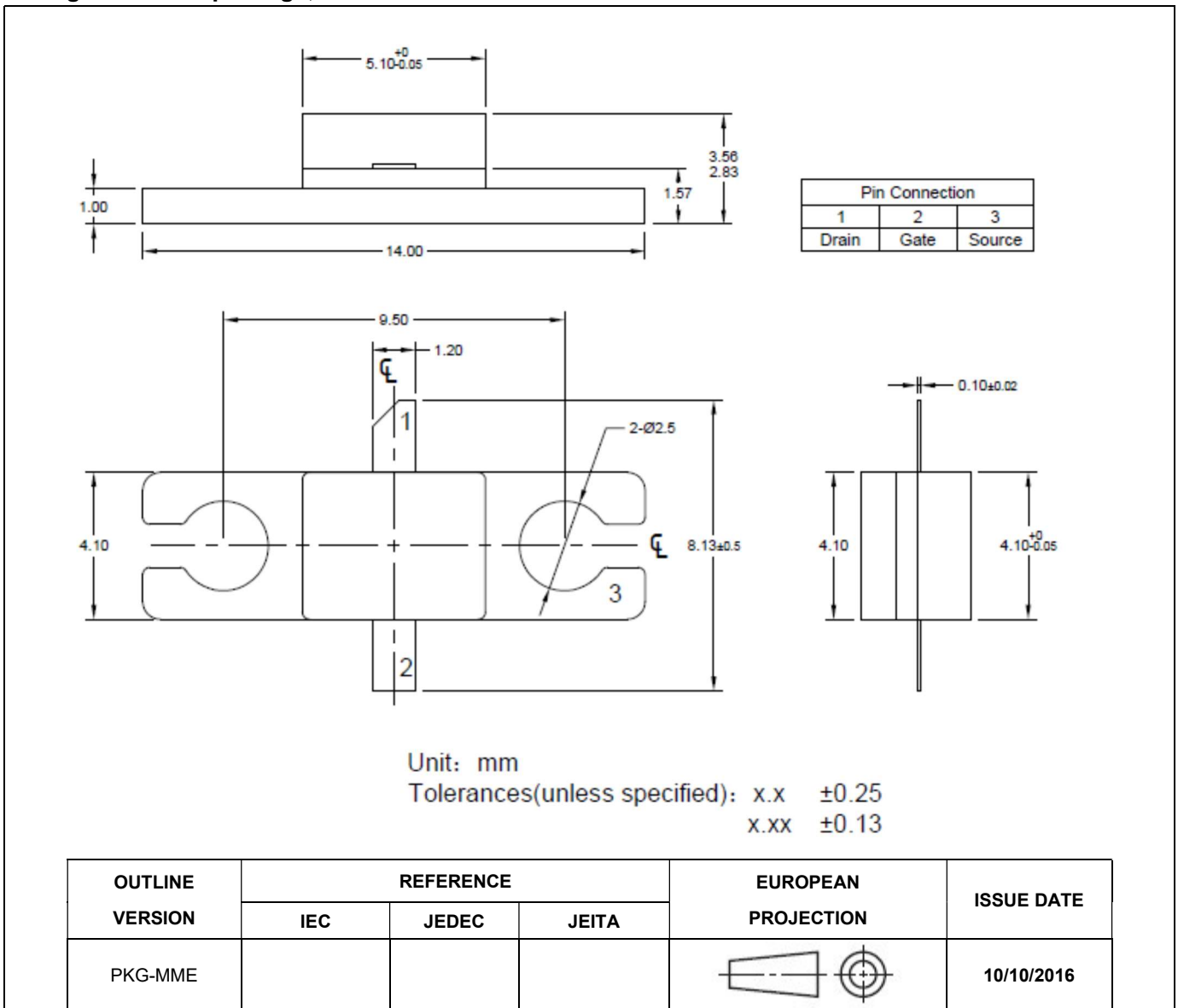


Figure 1. Package Outline PKG-MME

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## Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2020/5/6	V1.0	Preliminary Datasheet Creation

Application data based on ZBB-20-05

## Notice

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