NME6003H GaN TRANSISTOR

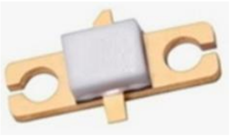
Gallium Nitride 28V 25W, RF Power Transistor

Description

The NME6003H is a 25W, unmatched GaN HEMT, designed for multiple applications with frequencies up to 6GHz.

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

NME6003H



•Typical performance (on Innogration fixture with device soldered)

V_{DD}=28V, I_{DQ}=150mA, CW,

Frequency(MHz)	Gp (dB)	P_{SAT}(W)	Efficiency (%)
2000	19	25	70

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 (28V)
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 (Not simultaneous, TC = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	40	Vdc
Maximum Forward Gate Current	Igmax	6	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+200	°C
Total Device Power Dissipation (Derated above 25°C,see note 2)	Pdiss	43	W

1. **Continuous operation at maximum junction temperature will affect MTTF**
2. **Bias Conditions should also satisfy the following expression: Pdiss < (Tj – Tc) / RJC and Tc = Tcase**

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, DC Power Dissipation(See note 1)	$R_{\theta JC\text{-}DC}$	4.6	C/W

1. **$R_{\theta JC\text{-}DC}$ is tested at only DC condition, it is related to the highest thermal resistance value among all test conditions. It might be differently lower in different RF operation conditions like CW signal ,pulsed RF signal etc.**

Table 3. Electrical Characteristics (T_C = 25℃ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=10mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D = 5 mA	V_{GS}(th)		-2.7		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=150mA, Measured in Functional Test	$V_{GS(Q)}$	——	-2.44	——	V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) :V_{DD} = 28 Vdc, I_{DQ} = 150 mA, f = 2000 MHz, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		19		dB
Drain Efficiency@Psat	Eff		70		%
Saturated Power	Psat		25		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases(No device damage)	VSWR		10:1		Ψ

Loadpull data:

Test condition: (100us, 20% duty cycle)

NME6003H 1GHz	Freq (MHz)	VDD (V)	Idq (mA)	Zsource (ohms)	Zload (ohms)	Pout (dBm)	Gain (dB)	Eff (%)
MXP	1000	28	65	5.1+j*11.0	8.0-j*0.4	45.91	21.87	63.02
MXE	1000	28	65	5.1+j*11.0	6.0+j*4.8	43.82	23.92	76.67
Trade Off	1000	28	65	5.1+j*11.0	10.9+j*0.8	45.71	22.43	64.78

NME6003H 2GHz	Freq (MHz)	VDD (V)	Idq (mA)	Zsource (ohms)	Zload (ohms)	Pout (dBm)	Gain (dB)	Eff (%)
MXP	2000	28	65	1.3+j*1.0	8.4-j*2.0	45.81	18.21	63.11
MXE	2000	28	65	1.3+j*1.0	5.4+j*4.3	44.02	22.47	76.40
Trade Off	2000	28	65	1.3+j*1.0	11.0-j*2.5	45.61	18.95	65.29

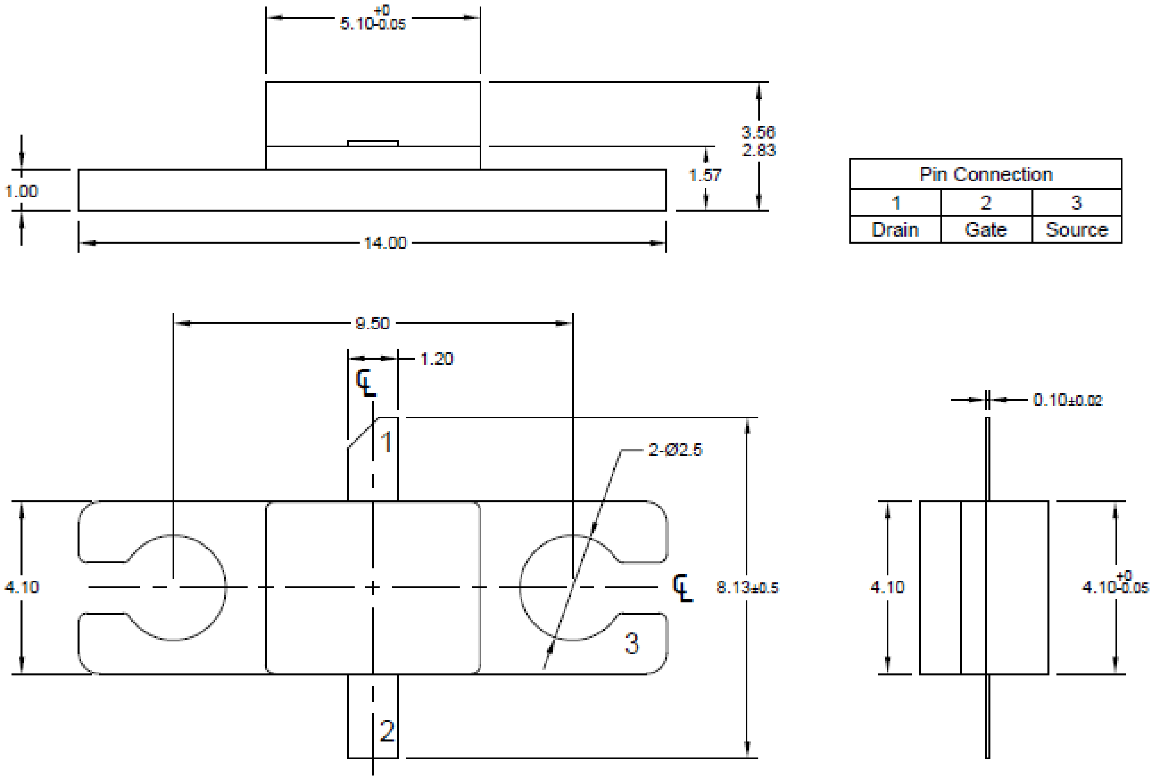
NME6003H 3GHz	Freq (MHz)	VDD (V)	Idq (mA)	Zsource (ohms)	Zload (ohms)	Pout (dBm)	Gain (dB)	Eff (%)
MXP	3000	28	65	1.9-j*4.5	6.6-j*3.9	45.82	14.37	68.54
MXE	3000	28	65	1.9-j*4.5	4.6+j*2.4	43.60	16.23	79.78
Trade Off	3000	28	65	1.9-j*4.5	6.6-j*1.6	45.62	15.15	72.34

NME6003H 4GHz	Freq (MHz)	VDD (V)	Idq (mA)	Zsource (ohms)	Zload (ohms)	Pout (dBm)	Gain (dB)	Eff (%)
MXP	4000	28	65	3.2-j*8.4	6.8-j*8.3	45.76	11.40	66.68
MXE	4000	28	65	3.2-j*8.4	3.5-j*3.6	43.41	12.47	78.60
Trade Off	4000	28	65	3.2-j*8.4	6.7-j*6.6	45.56	12.01	70.30

NME6003H 5GHz	Freq (MHz)	VDD (V)	Idq (mA)	Zsource (ohms)	Zload (ohms)	Pout (dBm)	Gain (dB)	Eff (%)
MXP	5000	28	65	8.5-j*18.9	6.4-j*14.8	45.68	9.42	62.80
MXE	5000	28	65	8.5-j*18.9	3.2-j*11.8	43.63	10.38	75.86
Trade Off	5000	28	65	8.5-j*18.9	5.3-j*13.7	45.48	9.81	66.23

Package Outline

Flanged ceramic package; 2 leads



Pin Connection		
1	2	3
Drain	Gate	Source

Unit: mm
Tolerances(unless specified): x.x ±0.25
x.xx ±0.13

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-MME					**10/10/2016**

Figure 1. Package Outline PKG-MME

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2017/4/25	V1.0	Objective Datasheet Creation
2017/6/19	V1.0	Preliminary datasheet creation
2018/3/7	V1.1	Add loadpull data and specified at Psat

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