

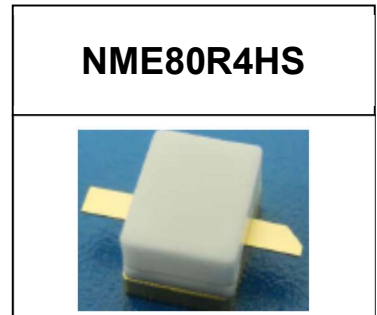
NME80R4HS GaN TRANSISTOR

Document Number: NME80R4HS
Preliminary Datasheet V1.1

Gallium Nitride 28V 4W, RF Power Transistor

Description

The NME80R4HS is a 4W, unmatched GaN HEMT, designed for multiple applications with frequencies up to 8GHz, packaged by thermally enhanced tiny MMS package(5*4mm)
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)

$V_{DD}=28V$, $I_{DQ}=20mA$, CW,

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)
6900	26.3	36.2	4.2	0.237	9.9	62.8
7000	25.8	36	4	0.226	10.2	62.9
7100	25.8	36	4	0.221	10.1	62.8
7200	26.5	35.7	3.8	0.223	9.2	60

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	I_{gmax}	1	mA
Storage Temperature Range	T_{stg}	-65 to +150	°C
Case Operating Temperature	T_c	+150	°C
Operating Junction Temperature(See note 1)	T_j	+225	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	P_{diss}	12	W

1. Continuous operation at maximum junction temperature will affect MTTF
2. Bias Conditions should also satisfy the following expression: $P_{diss} < (T_j - T_c) / R_{JC}$ and $T_c = T_{case}$

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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 (See note 1)	$R_{\theta\text{JC-DC}}$	16	C/W

1. $R_{\theta\text{JC-DC}}$ is tested at only DC condition, it is related to the highest thermal resistor 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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 1\text{mA}$	V_{DSS}		150		V
Gate Threshold Voltage	$V_{DS} = 28\text{V}$, $I_D = 1\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$, $I_{DS} = 20\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$	---	-2.46	---	V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) : $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 20\text{mA}$, $f = 2000\text{MHz}$, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain @Psat	Gp		20		dB
Drain Efficiency @Psat	Eff		70		%
Saturated Power	Psat		4		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

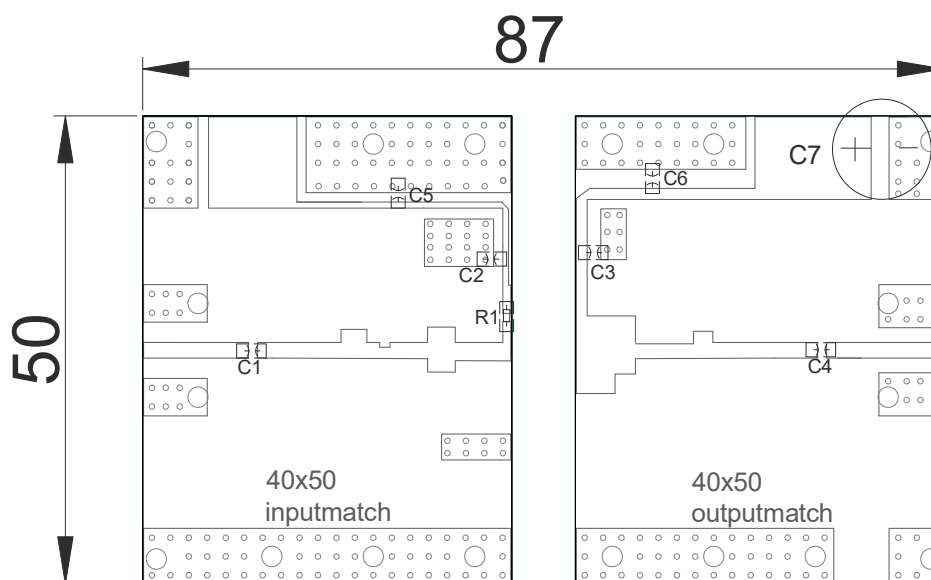


Figure 1. Test Circuit Component Layout (6900-7200MHz)

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Table 4. Test Circuit Component Designations and Values

Component	Description	Remark
C1,C2,C3,C4	2.4pF	DLC75D
C5,C6	Ceramic multilayer capacitor, 10uF, 50V	10uF/50V
C7	470uF	470uF/63V
R1	Metal Film Resistor, 12 Ω	0603
PCB	0.762mm [0.030"] thick, $\epsilon_r=3.48$, Rogers RO4350B, 1 oz. copper	

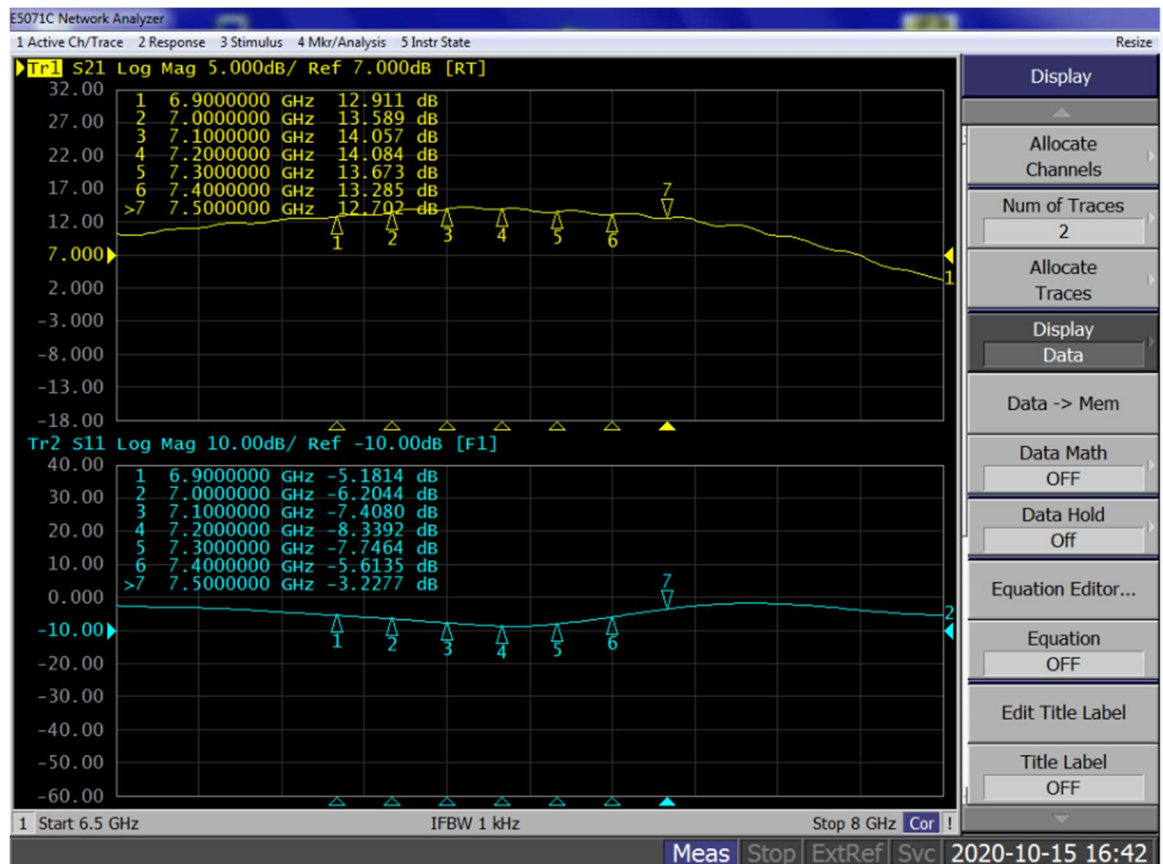


Figure 2. Network Analyzer S11/S21 output (Vds=28V, Vgs=-2.46V, Idq=20mA, Input Power =0dBm)

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Package Outline

Earless ceramic package; 2 leads

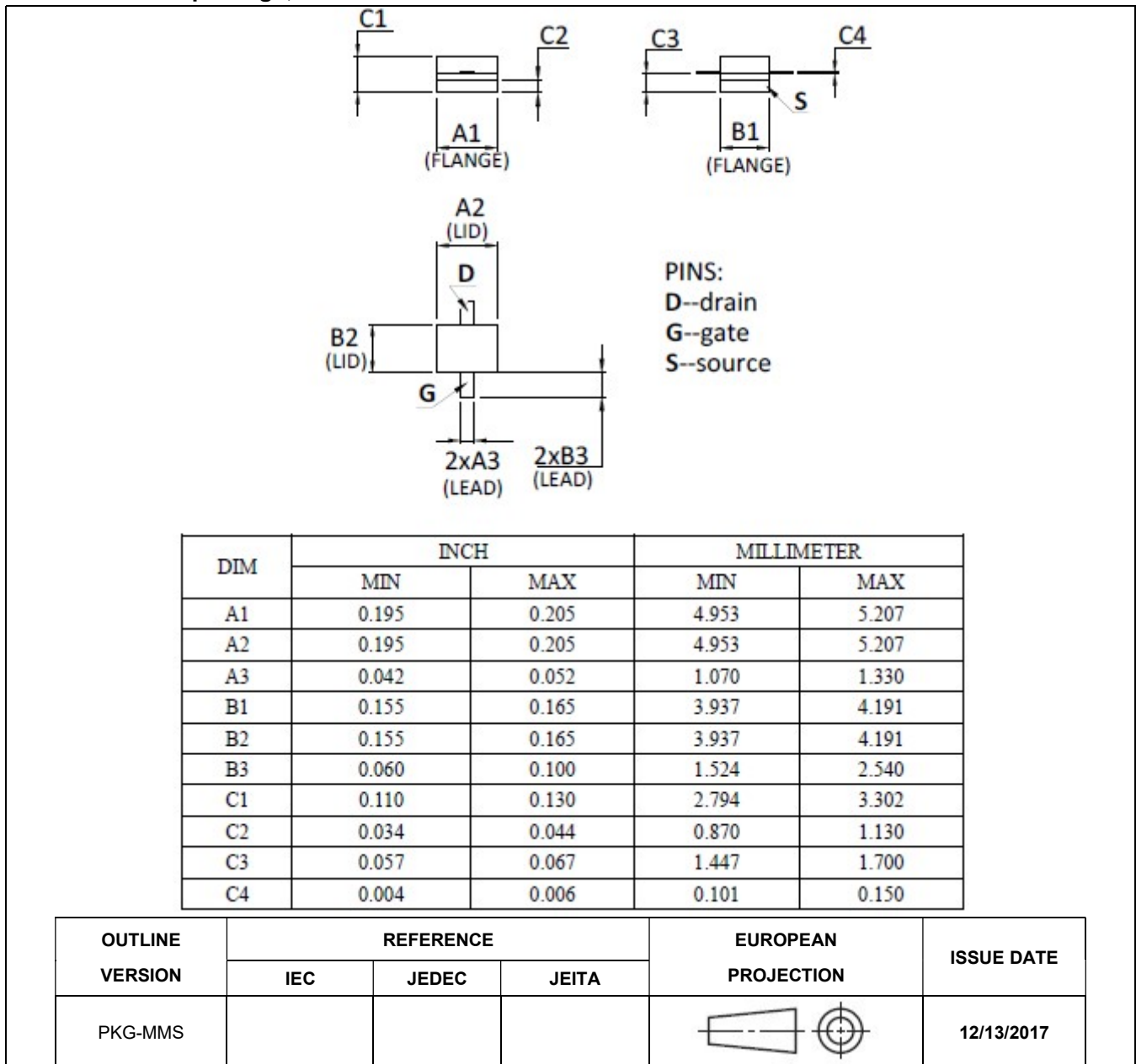


Figure 1. Package Outline PKG-MMS

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Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2017/12/13	V1.0	Preliminary Datasheet Creation
2020/10/16	V1.1	Add more application result

Application data based on YHG-20-27

Notice

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