

50 W L-BAND PUSH-PULL POWER GaAs MES FET

DESCRIPTION

The NES1823P-50 is a 50 W push-pull type GaAs MES FET designed for high power transmitter applications for PCS, DCS, PHS, and IMT2000 base station systems. It is capable of delivering 50 W of output power (CW) with high linear gain, high efficiency and excellent distortion. Its primary band is 1.8 to 2.3 GHz, however with different matching, 60 MHz or less of instantaneous bandwidth can be achieved anywhere from 0.8 to 2.3 GHz. The device employs 0.9 μm Tungsten Silicide gates, via holes, plated heat sink, and silicon dioxide passivation for superior performance, thermal characteristics, and reliability.

Reliability and performance uniformity are assured by NEC's stringent quality and control procedures.

FEATURES

- Push-pull type N-channel GaAs MES FET
- High output power: $P_{\text{out}} = 50 \text{ W TYP.}$
- High linear gain: $G_L = 10.5 \text{ dB TYP.}$
- High power added efficiency: $\eta_{\text{add}} = 40 \% \text{ TYP. @ } V_{\text{DS}} = 10.0 \text{ V, } I_{\text{Dset}} = 4.0 \text{ A (total), } f = 2.20 \text{ GHz}$

ORDERING INFORMATION (PLAN)

Part Number	Package	Supplying Form
NES1823P-50	T-86	ESD protective envelope

Remark To order evaluation samples, consult your NEC sales representative.

Caution Please handle this device at static-free workstation, because this is an electrostatic sensitive device.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (Unless otherwise specified, T_A = +25 °C)

Operation in excess of any one of these parameters may result in permanent damage.

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V _{DS}	15	V
Gate to Source Voltage	V _{GSO}	-7	V
Gate to Drain Voltage	V _{GDO}	-18	V
Drain Current	I _D	30	A
Gate Current	I _G	200	mA
Total Power Dissipation	P _{tot} ^{Note}	110	W
Channel Temperature	T _{ch}	175	°C
Storage Temperature	T _{stg}	-65 to +175	°C

Note T_C = +25 °C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V _{DS}		-	-	10.0	V
Gain Compression	G _{comp}		-	-	3.0	dB
Channel Temperature	T _{ch}		-	-	+150	°C
Set Drain Current	I _{Dset}	V _{DS} = 10.0 V, RF OFF	-	4.0	7.0	A
Gate Resistance	R _g ^{Note}		-	-	20	Ω

Note R_g is the series resistance between the gate supply and the FET gate.

ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

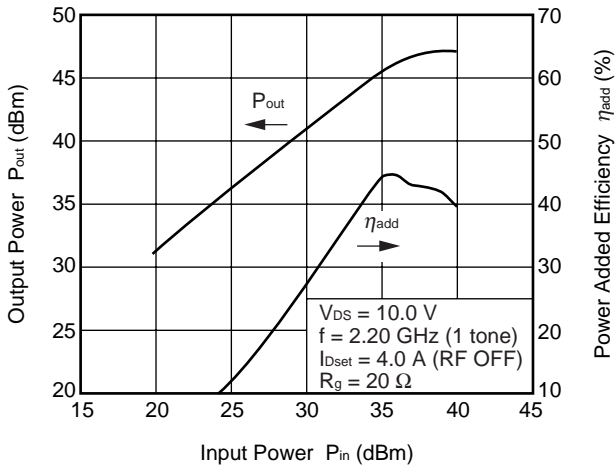
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Saturated Drain Current	I _{DSS}	V _{DS} = 2.5 V, V _{GS} = 0 V	-	30.0	-	A
Pinch-off Voltage	V _p	V _{DS} = 2.5 V, I _D = 130 mA	-4.0	-2.6	-	V
Thermal Resistance	R _{th}	Channel to Case	-	1.0	1.5	°C/W
Output Power	P _{out}	f = 2.20 GHz, V _{DS} = 10.0 V,	46.0	47.0	-	dBm
Drain Current	I _D	P _{in} = 39.5 dBm, R _g = 20 Ω,	-	12.5	16.0	A
Power Added Efficiency	η _{add}	I _{Dset} = 4.0 A Total (RF OFF) ^{Note 1}	-	40	-	%
Linear Gain	G _L ^{Note 2}		9.5	10.5	-	dB
3rd Order Intermodulation Distortion	IM ₃	Δf = 5 MHz, P _{out} = 39 dBm (2 tones total)	-	-36	-	dBc

Notes 1. I_{Dset} = 2.0 A each drain

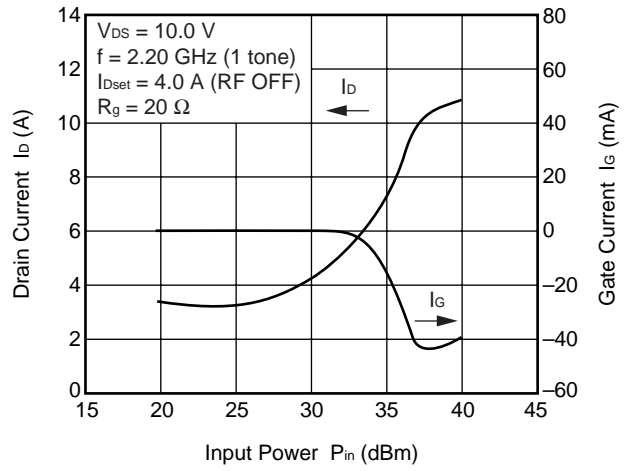
2. P_{in} = 22 dBm

TYPICAL CHARACTERISTICS (T_A = +25 °C)

OUTPUT POWER, POWER ADDED EFFICIENCY vs. INPUT POWER



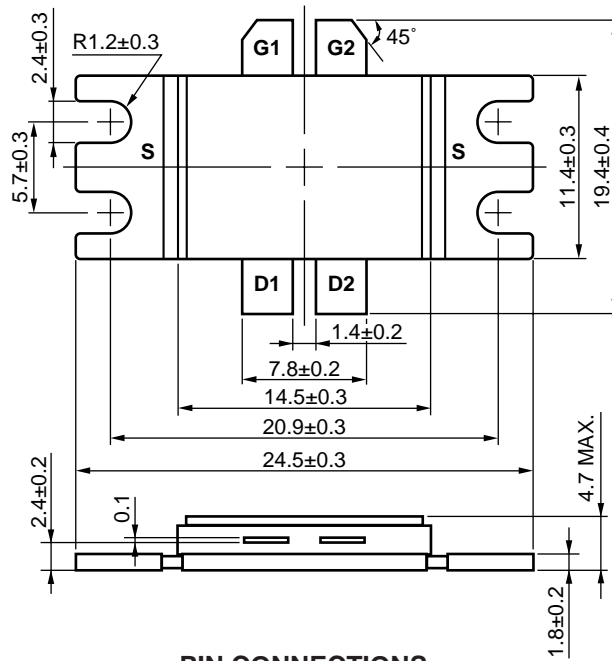
DRAIN CURRENT, GATE CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

T-86 (UNIT: mm)



PIN CONNECTIONS

- G1, G2 : Gate
- D1, D2 : Drain
- S : Source

RECOMMENDED MOUNTING CONDITIONS FOR CORRECT USE

- (1) Fix to heat sink or mount surface completely with screws at the four holes of the flange.
- (2) The recommended torque strength of the screws is 30 N typical using M2.3 type screws.
- (3) The recommended flatness of the mount surface is less than $\pm 10 \mu\text{m}$ (roughness of surface is $\nabla\nabla\nabla$).

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Partial Heating	Pin temperature: 260 °C or below, Time: 5 seconds or less (per pin row)	-

For details of recommended soldering conditions, please contact your local NEC sales office.

[MEMO]

[MEMO]

CAUTION

The great care must be taken in dealing with the devices in this guide.

The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.

Keep the law concerned and so on, especially in case of removal.

- **The information in this document is current as of July, 2000. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
 - No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
 - NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
 - Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
 - While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
 - NEC semiconductor products are classified into the following three quality grades:
"Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
- The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
- (Note)
- (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
(2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).