NEC

GaAs FET

NES1823S-90

90 W L, S-BAND SINGLE-END POWER GaAs FET

DESCRIPTION

The NES1823S-90 is a 90 W single-end type GaAs FET designed for high power transmitter applications for IMT-2000 base station systems. It is capable of delivering 90 W of output power (CW) with high linear gain, high efficiency and excellent distortion under the condition of 12.0 V operation. Its primary band is 1.8 to 2.3 GHz. The device employs 0.7 μm Tungsten Silicide gates, via holes, plated heatsink, and silicon dioxide passivation for superior performance, thermal characteristics, and reliability.

FEATURES

- Single-end type GaAs FET
- V_{DS} = 12.0 V operation
- High output power: P_{out} = 90 W TYP.
- High linear gain : G_L = 13.0 dB TYP.
- High power added efficiency: η_{add} = 50% TYP. @ V_{DS} = 12.0 V, I_{Dset} = 1.5 A, f = 2.17 GHz
- Hollow plastic package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NES1823S-90	T-142M	ESD protective tray

Remark To order evaluation samples, contact your nearby sales office.

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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ABSOLUTE MAXIMUM RATINGS (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}	19	V
Gate to Source Voltage	V_{GSO}	–7	V
Gate to Drain Voltage	V_{GDO}	–26	V
Gate Current	I_G	450	mA
Total Power Dissipation	P_{tot}	125	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	–65 to +150	°C
Gain Compression (CW)	G_{comp}	3.0	dB

RECOMMENDED OPERATING RANGE

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V_{DS}		–	12.0	12.0	V
Channel Temperature	T_{ch}		–	–	+150	°C
Set Drain Current	I_{Dset}	V_{DS} = 12.0 V, RF OFF	–	1.5	3.0	A
Gate Resistance	R_g		–	1.2	2.4	Ω

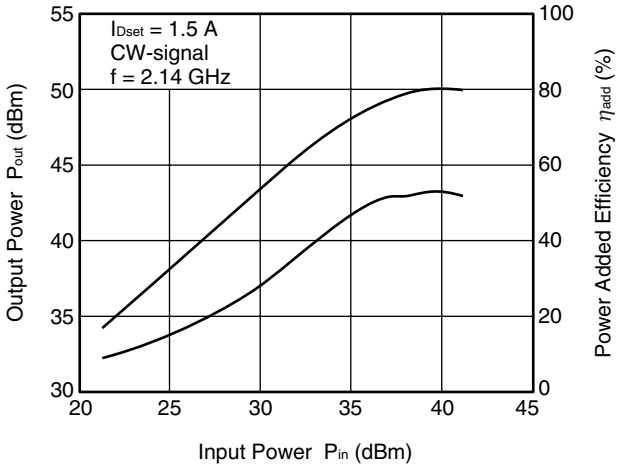
ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Pinch-off Voltage	V_p	V_{DS} = 2.5 V, I_D = 324 mA	–0.8	–0.5	–0.2	V
Thermal Resistance	R_{th}	Channel to Case	–	0.60	0.80	°C/W
Output Power	P_{out}	f = 2.17 GHz CW, V_{DS} = 12.0 V	48.5	49.5	–	dBm
Drain Current	I_D	P_{in} = 40.0 dBm, R_g = 1.2 Ω,	–	16	–	A
Power Added Efficiency	η_{add}	I_{Dset} = 1.5 A (RF OFF)	–	50	–	%
Linear Gain	G_L Note		12.0	13.0	–	dB

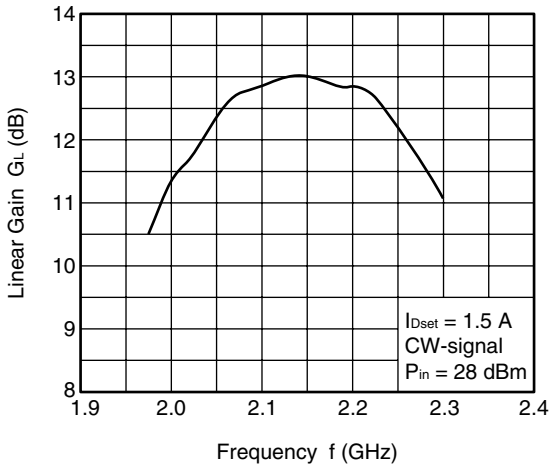
Note P_{in} = 28 dBm

TYPICAL CHARACTERISTICS (T_A = +25°C, V_{DS} = 12.0 V, R_g = 1.2 Ω)

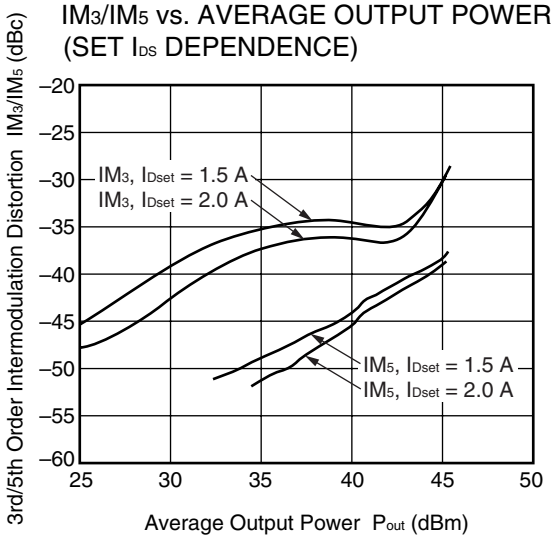
OUTPUT POWER, η_{add} vs. INPUT POWER



FREQUENCY RESPONCE

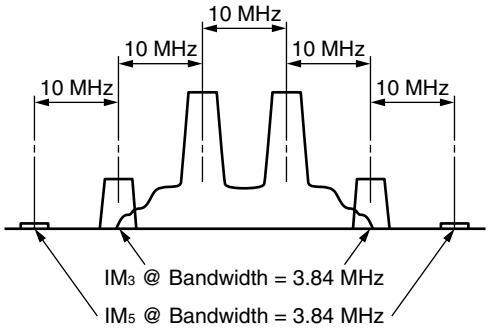


IM3/IM5 vs. AVERAGE OUTPUT POWER (SET I_{DS} DEPENDENCE)

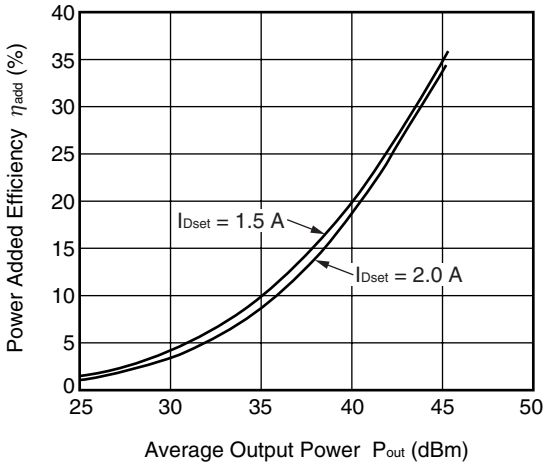


Test Conditions

W-CDMA, 3 GPP test model 1,
64 DPCH, 2 carrers, Clipping 100%,
f_1 = 2.135 GHz, f_2 = 2.145 GHz (Δf = 10 MHz)



η_{add} vs. AVERAGE OUTPUT POWER (SET I_{DS} DEPENDENCE)

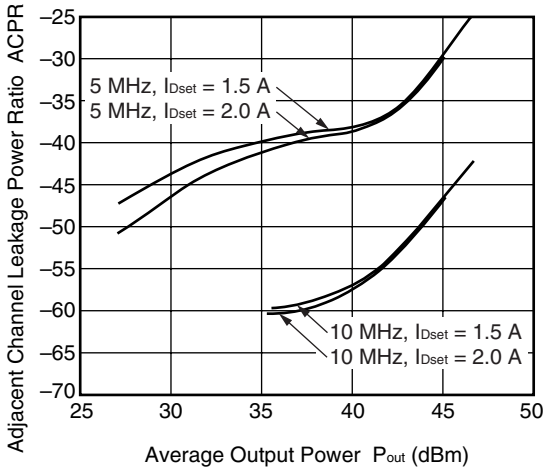


Test Conditions

W-CDMA, 3 GPP test model 1,
64 DPCH, 2 carrers, Clipping 100%,
f_1 = 2.135 GHz, f_2 = 2.145 GHz (Δf = 10 MHz)

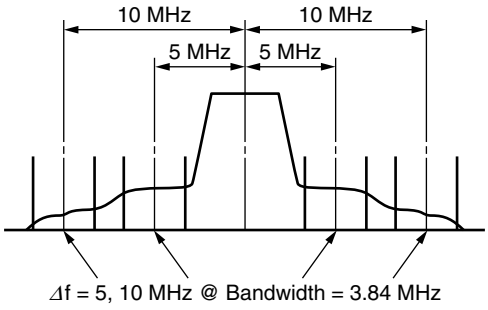
Remark The graphs indicate nominal characteristics.

ACPR vs. AVERAGE OUTPUT POWER
(SET I_{DS} DEPENDENCE)



Test Conditions

W-CDMA, 3 GPP test model 1,
64 DPCH, 2 carrers, Clipping 100%,
f = 2.140 GHz



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

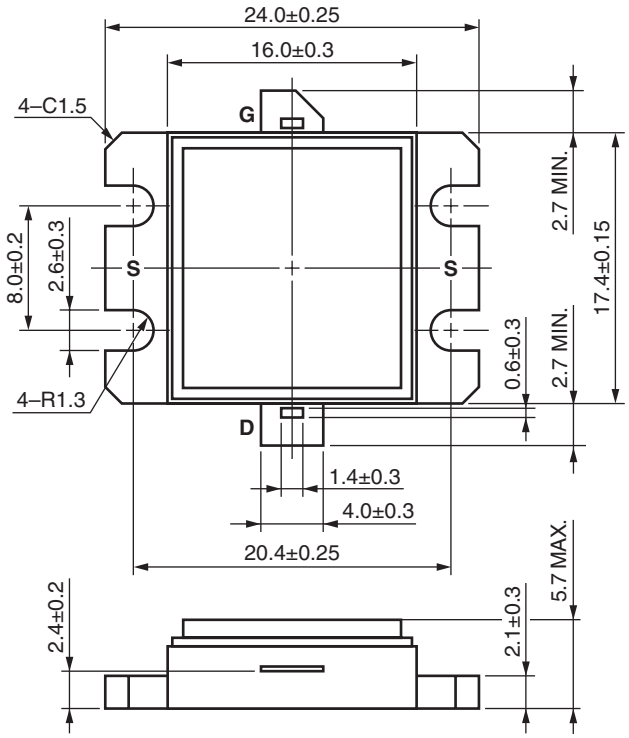
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL http://www.csd-nec.com/

PACKAGE DIMENSIONS

T-142M (UNIT: mm)



PIN CONNECTIONS

G : Gate
S : Source
D : Drain

NOTES ON CORRECT USE

(1) Fix to a heatsink or mount surface completely with screws at the four holes of the flange.

(2) The recommended torque strength of the screws is 29.4 N·cm typical using M2.3 type screws.

(3) The recommended flatness of the mount surface is less than ±10 μm (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 nearby sales office.

Soldering Method	Soldering Conditions		Condition Symbol
Partial Heating	Peak temperature (pin temperature)	: 350°C or below	HS350-P3
	Soldering time (per pin of device)	: 3 seconds or less	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	

Caution Do not use different soldering methods together (except for partial heating).

DEFINIITON OF THERMAL RESISTANCE

This thermal resistance (R_{th} : channel to case) guaranteed in the electrical characteristics shows the value between chip surface and the backside surface of the package.

The thermal resistance between chip surface and mount surface is 0.4 (MAX.) °C/W larger than the thermal resistance value guaranteed in the electrical characteristics, when the package is under the above-mentioned recommendation mounting condition screwed down.

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M8E 00.4-0110

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

▶**For further information, please contact**

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