PRELIMINARY DATA SHEET

NEC

N-CHANNEL GaAs MES FET

NES1823P-45

45 W L, S-BAND PUSH-PULL POWER GaAs MES FET

DESCRIPTION

The NES1823P-45 is a 45 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 45 W of output power (CW) with high linear gain, high efficiency and excellent distortion under the condition of 12 V operation. 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
- V_{DS} = 12.0 V operation
- High output power: P_{out} = 45 W TYP.
- High linear gain: G_L = 12 dB TYP.
- High power added efficiency: η_{add} = 45 % TYP. @ V_{DS} = 12.0 V, I_{Dset} = 4.0 A (total), f = 2.20 GHz

ORDERING INFORMATION (PLAN)

Part Number	Package	Supplying Form
NES1823P-45	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.

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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}	19	V
Gate to Source Voltage	V_{GSO}	–7	V
Gate to Drain Voltage	V_{GDO}	–22	V
Drain Current	I_D	24	A
Gate Current	I_G	240	mA
Total Power Dissipation	P_{tot} Note	165	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}		–	–	12.0	V
Gain Compression	Gcomp		–	–	3.0	dB
Channel Temperature	T_{ch}		–	–	+150	°C
Set Drain Current	I_{Dset}	V_{DS} = 12.0 V, RF OFF	–	4.0	6.0	A
Gate Resistance	R_g Note		–	–	30	Ω

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

ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

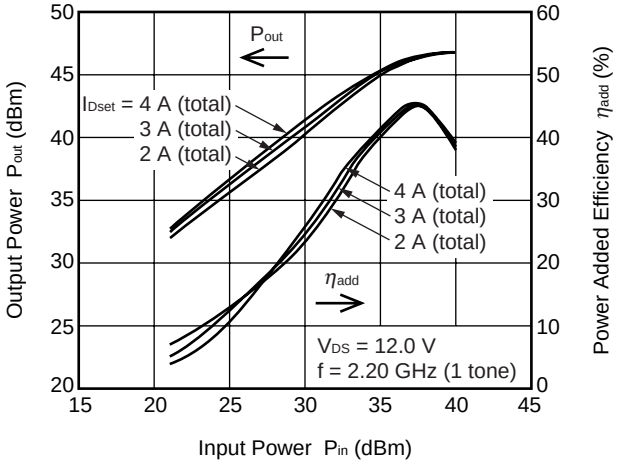
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Saturated Drain Current	I_{DSS}	V_{DS} = 2.5 V, V_{GS} = 0 V	–	24.0	–	A
Pinch-off Voltage	V_p	V_{DS} = 2.5 V, I_D = 110 mA	–4.0	–2.6	–	V
Thermal Resistance	R_{th}	Channel to Case	–	0.7	0.9	°C/W
Output Power	P_{out}	f = 2.20 GHz, V_{DS} = 12.0 V,	45.5	46.5	–	dBm
Drain Current	I_D	P_{in} = 37.5 dBm, R_g = 30 Ω,	–	7	–	A
Power Added Efficiency	η_{add}	I_{Dset} = 4.0 A Total (RF OFF) Note1	–	45	–	%
Linear Gain	G_L Note2		11	12	–	dB
3rd Order Intermodulation Distortion	IM_3	Δf = 5 MHz, P_{out} = 37 dBm (2 tones total)	–	–40	–	dBc

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

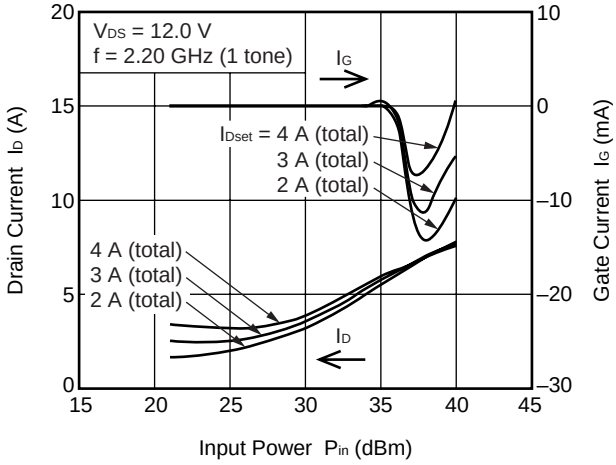
2. P_{in} = 21 dBm

TYPICAL CHARACTERISTICS (T_A = +25 °C)

OUTPUT POWER,
POWER ADDED EFFICIENCY vs.
INPUT POWER [Power Matched]



DRAIN CURRENT, GATE CURRENT
vs. INPUT POWER [Power Matched]



Remark The graphs indicate nominal characteristics.

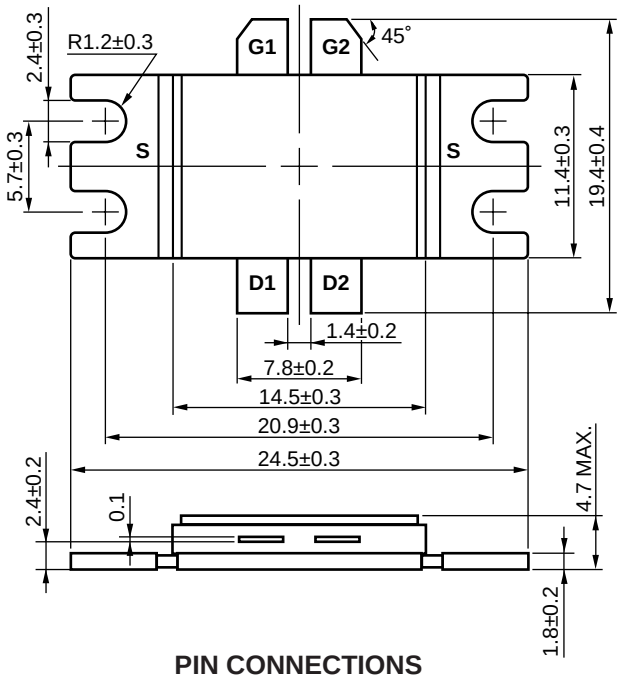
S-PARAMETERS

V_{DS} = 12.0 V, I_{Dset} = 2.0 A each drain

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
1.200	0.944	169.6	1.006	40.6	0.006	10.8	0.836	173.8
1.250	0.941	168.3	1.014	37.3	0.006	8.9	0.836	173.3
1.300	0.934	167.2	1.022	33.9	0.007	8.0	0.834	172.9
1.350	0.930	166.5	1.028	31.5	0.007	6.1	0.832	172.5
1.400	0.923	165.3	1.048	27.6	0.007	3.6	0.832	172.1
1.450	0.914	164.1	1.065	23.8	0.007	–0.1	0.829	171.6
1.500	0.904	162.8	1.088	19.6	0.008	–3.1	0.828	171.2
1.550	0.896	162.1	1.115	16.8	0.008	–5.3	0.827	171.0
1.600	0.882	160.8	1.146	12.0	0.008	–9.9	0.825	170.7
1.650	0.866	159.4	1.186	6.9	0.008	–14.8	0.827	170.4
1.700	0.846	158.1	1.241	1.4	0.009	–20.0	0.825	170.4
1.750	0.822	157.0	1.302	–5.3	0.009	–27.1	0.826	170.2
1.800	0.804	156.3	1.336	–9.5	0.009	–33.0	0.828	170.2
1.850	0.774	155.7	1.415	–17.4	0.009	–40.8	0.832	170.1
1.900	0.739	155.9	1.481	–26.2	0.009	–50.7	0.839	170.2
1.950	0.707	157.1	1.520	–36.7	0.009	–64.6	0.849	169.9
2.000	0.688	158.5	1.542	–43.6	0.009	–73.8	0.855	169.6
2.050	0.673	161.3	1.537	–55.3	0.009	–89.8	0.865	169.0
2.100	0.676	164.4	1.484	–66.9	0.008	–106.1	0.871	168.4
2.150	0.697	166.9	1.378	–78.3	0.007	–126.4	0.873	167.4
2.200	0.726	168.1	1.295	–88.0	0.006	–145.1	0.873	166.6
2.250	0.748	168.3	1.190	–95.4	0.006	–158.9	0.873	166.2
2.300	0.778	167.9	1.080	–102.9	0.005	–177.3	0.868	165.8
2.350	0.803	167.0	0.957	–109.2	0.005	161.8	0.863	165.4
2.400	0.826	165.7	0.880	–116.3	0.005	145.6	0.856	165.2
2.450	0.838	164.8	0.806	–120.3	0.006	134.5	0.853	165.2
2.500	0.854	163.3	0.739	–125.3	0.006	123.1	0.846	165.0
2.550	0.866	161.9	0.673	–128.9	0.006	108.6	0.841	165.0
2.600	0.878	160.4	0.615	–135.5	0.007	104.7	0.839	164.7
2.650	0.886	158.9	0.568	–137.4	0.007	96.4	0.838	165.0
2.700	0.893	157.9	0.533	–140.6	0.008	91.3	0.835	165.0
2.750	0.901	156.4	0.509	–143.9	0.008	85.7	0.835	165.1
2.800	0.909	154.8	0.458	–147.8	0.009	81.6	0.835	165.3
2.850	0.916	153.2	0.440	–150.4	0.010	74.9	0.834	165.4
2.900	0.922	152.0	0.424	–152.8	0.011	72.8	0.833	165.5
2.950	0.930	150.5	0.411	–156.8	0.011	69.3	0.833	165.2
3.000	0.940	148.7	0.375	–159.5	0.013	65.7	0.834	165.0

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 ±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 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.

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.

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