

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

DESCRIPTION

The NES1823P-140 is a 140 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 140 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: $P_{out} = 140$ W TYP.
- High linear gain: $G_L = 11$ dB TYP.
- High power added efficiency: $\eta_{add} = 43$ % TYP. @ $V_{DS} = 12.0$ V, $I_{Dset} = 6.0$ A (total), $f = 2.20$ GHz

ORDERING INFORMATION (PLAN)

Part Number	Package	Supplying Form
NES1823P-140	T-92	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}	19	V
Gate to Source Voltage	V _{GSO}	-7	V
Gate to Drain Voltage	V _{GDO}	-22	V
Drain Current	I _D	76	A
Gate Current	I _G	440	mA
Total Power Dissipation	P _{tot} ^{Note}	270	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	G _{comp}		-	-	3.0	dB
Channel Temperature	T _{ch}		-	-	+150	°C
Set Drain Current	I _{Dset}	V _{DS} = 12.0 V, RF OFF	-	6.0	6.0	A
Gate Resistance	R _g ^{Note}		-	-	12.5	Ω

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

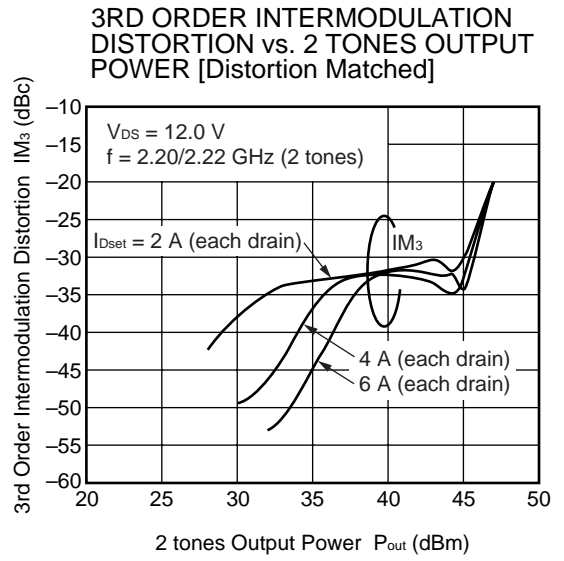
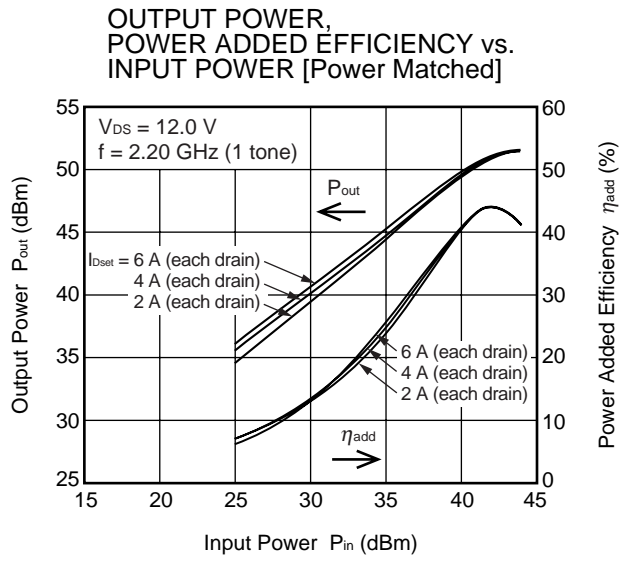
ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Saturated Drain Current	I _{DSS}	V _{DS} = 2.5 V, V _{GS} = 0 V	-	76.0	-	A
Pinch-off Voltage	V _p	V _{DS} = 2.5 V, I _D = 330 mA	-4.0	-2.6	-	V
Thermal Resistance	R _{th}	Channel to Case	-	0.4	0.55	°C/W
Output Power	P _{out}	f = 2.20 GHz, V _{DS} = 12.0 V,	50.5	51.5	-	dBm
Drain Current	I _D	P _{in} = 43.5 dBm, R _g = 12.5 Ω,	-	22.0	-	A
Power Added Efficiency	η _{add}	I _{Dset} = 6.0 A Total (RF OFF) ^{Note1}	-	43	-	%
Linear Gain	G _L ^{Note2}		9	11	-	dB

Notes 1. I_{Dset} = 3.0 A each drain

2. P_{in} = 25 dBm

TYPICAL CHARACTERISTICS (T_A = +25 °C)



Remark The graphs indicate nominal characteristics.

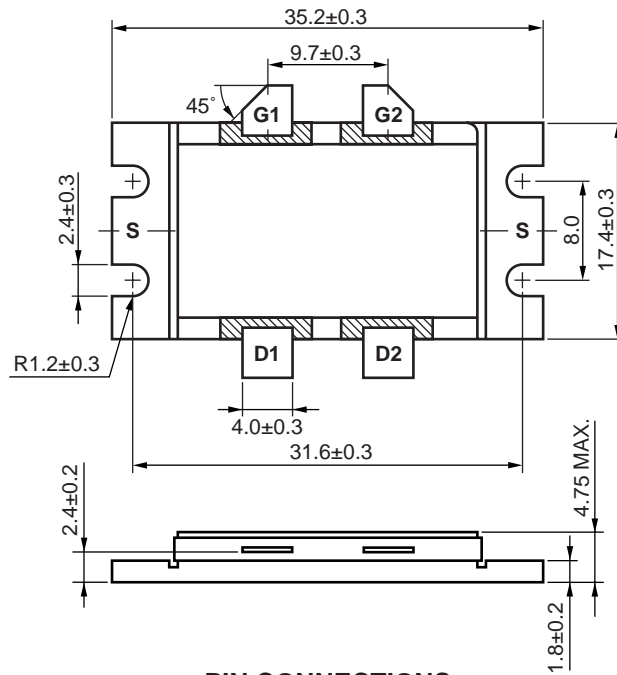
S-PARAMETERS

V_{DS} = 12.0 V, I_{Dset} = 3.0 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.)	
1.000	0.954	168.3	0.440	91.8	0.005	63.9	0.901	162.2	
1.050	0.953	167.5	0.461	90.7	0.004	86.8	0.898	161.7	
1.100	0.958	166.2	0.481	85.7	0.006	64.3	0.884	160.2	
1.150	0.954	165.2	0.498	84.1	0.005	49.6	0.881	158.2	
1.200	0.947	164.0	0.545	80.3	0.006	51.6	0.866	156.7	
1.250	0.948	163.0	0.569	77.3	0.005	42.8	0.856	155.3	
1.300	0.943	161.4	0.592	74.9	0.006	79.6	0.849	153.9	
1.350	0.939	159.6	0.634	72.3	0.005	46.6	0.838	152.2	
1.400	0.936	158.1	0.704	66.9	0.009	49.0	0.831	150.7	
1.450	0.926	155.8	0.755	61.9	0.009	43.1	0.804	148.3	
1.500	0.921	153.6	0.855	58.5	0.007	28.4	0.793	146.5	
1.550	0.916	151.8	0.922	53.0	0.011	38.9	0.776	144.9	
1.600	0.902	149.0	0.988	48.5	0.009	39.4	0.761	143.2	
1.650	0.885	146.8	1.113	42.6	0.012	39.1	0.738	141.3	
1.700	0.860	142.6	1.324	34.0	0.012	14.5	0.707	138.6	
1.750	0.835	139.1	1.476	27.0	0.013	16.5	0.682	136.5	
1.800	0.806	136.2	1.641	20.2	0.014	6.8	0.657	134.3	
1.850	0.776	132.6	1.879	11.9	0.019	-9.9	0.628	131.9	
1.900	0.746	129.0	2.145	1.3	0.022	-15.5	0.609	129.0	
1.950	0.698	125.2	2.399	-9.1	0.023	-30.1	0.572	124.5	
2.000	0.609	119.2	2.897	-26.3	0.028	-54.7	0.522	115.2	
2.050	0.531	115.8	3.271	-39.5	0.028	-70.2	0.478	105.7	
2.100	0.446	113.6	3.596	-55.8	0.033	-89.0	0.407	89.4	
2.150	0.353	117.4	3.911	-72.3	0.035	-115.4	0.323	64.8	
2.200	0.290	131.5	4.080	-91.6	0.037	-128.6	0.254	21.9	
2.250	0.310	150.5	3.996	-111.3	0.035	-157.9	0.277	-31.8	
2.300	0.427	156.0	3.544	-138.4	0.030	169.9	0.439	-82.7	
2.350	0.499	150.9	3.117	-154.6	0.029	147.2	0.550	-101.3	
2.400	0.549	144.8	2.790	-166.4	0.028	126.2	0.631	-114.5	
2.450	0.572	138.0	2.411	-179.1	0.020	122.6	0.694	-124.1	
2.500	0.584	130.0	2.074	171.3	0.023	92.8	0.743	-131.6	
2.550	0.580	121.2	1.920	160.8	0.025	80.7	0.779	-137.9	
2.600	0.559	106.7	1.608	147.7	0.022	62.5	0.824	-144.4	
2.650	0.526	95.2	1.480	139.9	0.016	51.4	0.848	-148.3	
2.700	0.498	81.5	1.374	132.3	0.020	32.1	0.860	-151.0	
2.750	0.457	66.8	1.242	120.6	0.020	9.6	0.871	-154.0	
2.800	0.414	47.6	1.071	112.7	0.020	-5.5	0.883	-156.4	
2.850	0.381	24.7	1.000	101.2	0.020	-2.8	0.894	-158.9	
2.900	0.418	3.4	0.901	92.4	0.020	-16.7	0.905	-160.6	
2.950	0.475	-20.5	0.816	86.3	0.017	-27.5	0.903	-162.6	
3.000	0.530	-41.0	0.753	75.8	0.023	-40.7	0.908	-163.8	

PACKAGE DIMENSIONS

T-92 (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.

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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