

PRELIMINARY DATA SHEET

NEC

N-CHANNEL GaAs MES FET NES1720P-140

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

DESCRIPTION

The NES1720P-140 is a 140 W push-pull type GaAs MES FET designed for high power transmitter applications for PCS, PDC and PHS 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 1.7 to 2.0 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: $G_L = 11.0$ dB TYP.
- High power added efficiency: $\eta_{add} = 43\%$ TYP. @ $V_{DS} = 12.0$ V, $I_{Dset} = 6.0$ A (total), $f = 1.96$ GHz

ORDERING INFORMATION

Part Number	Package	Supplying Form
NES1720P-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}		-	5	12.5	Ω

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

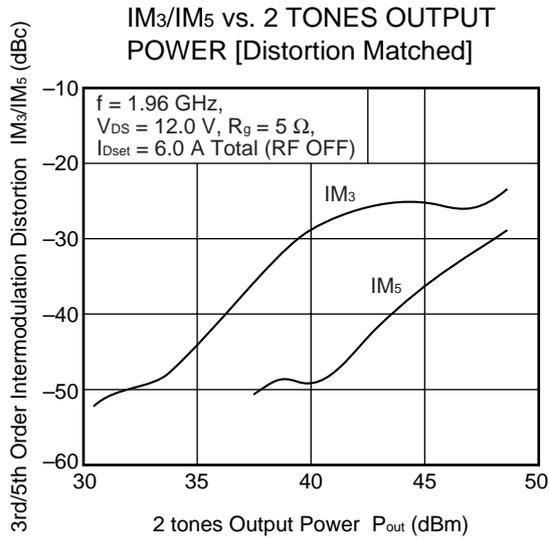
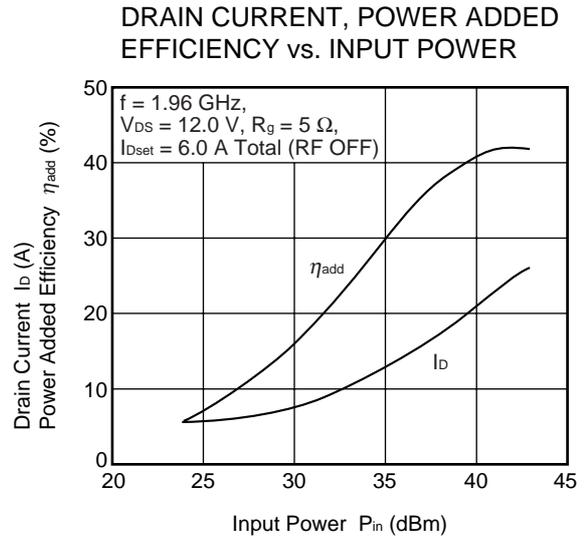
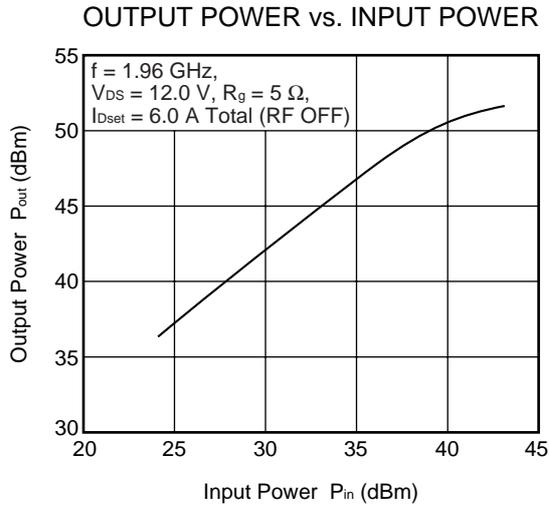
ELECTRICAL CHARACTERISTICS (T_A = +25°C)

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 = 1.96 GHz, V _{DS} = 12.0 V,	50.5	51.5	-	dBm
Drain Current	I _D	P _{in} = 43.0 dBm, R _g = 5 Ω,	-	24.0	-	A
Power Added Efficiency	η _{add}	I _{Dset} = 6.0 A Total (RF OFF) ^{Note1}	-	43	-	%
Linear Gain	G _L ^{Note2}		10.0	11.0	-	dB

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

2. P_{in} = 32 dBm

TYPICAL CHARACTERISTICS (T_A = +25°C)



Remark The graphs indicate nominal characteristics.

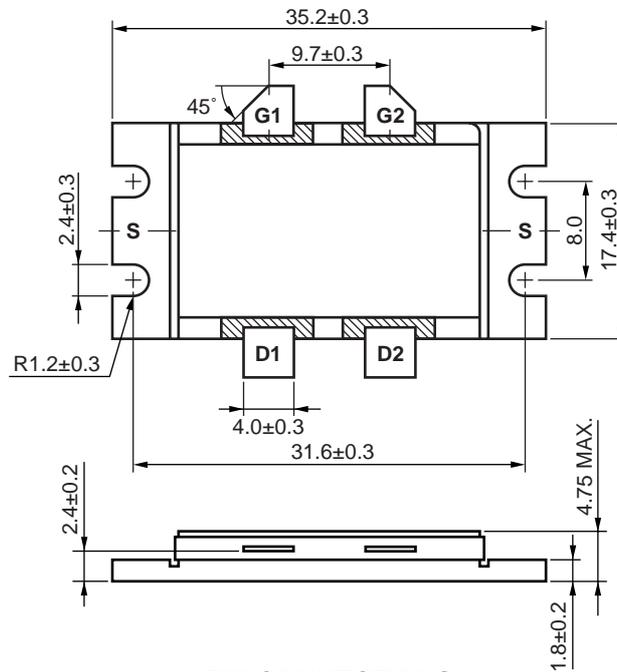
S-PARAMETERS

V_{DS} = 12.0 V, I_{Dset} = 3.0 A each drain

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
1.00	0.945	171.2	0.769	44.8	0.002	44.2	0.901	174.7
1.05	0.942	170.8	0.655	41.8	0.003	39.4	0.897	174.2
1.10	0.934	169.5	0.651	34.9	0.004	47.2	0.896	173.5
1.15	0.935	168.2	0.641	33.6	0.004	57.8	0.900	172.9
1.20	0.927	167.4	0.604	32.2	0.006	23.4	0.895	172.4
1.25	0.920	165.8	0.669	27.5	0.004	28.6	0.894	172.1
1.30	0.909	164.3	0.664	28.9	0.005	48.5	0.894	171.2
1.35	0.901	162.7	0.727	28.1	0.006	32.8	0.891	170.5
1.40	0.888	160.6	0.817	19.6	0.007	22.5	0.893	169.8
1.45	0.868	158.3	0.934	22.1	0.006	16.9	0.886	168.7
1.50	0.846	155.9	0.999	13.7	0.008	4.4	0.881	167.4
1.55	0.815	153.1	1.244	6.9	0.008	-10.7	0.877	166.0
1.60	0.773	149.6	1.344	1.7	0.006	-17.9	0.874	164.3
1.65	0.717	145.9	1.662	-8.7	0.007	-25.8	0.876	162.4
1.70	0.636	142.7	1.865	-22.3	0.012	-52.4	0.867	160.3
1.75	0.534	140.6	2.392	-33.7	0.012	-66.2	0.866	158.0
1.80	0.413	143.5	2.281	-50.0	0.014	-91.2	0.847	154.7
1.85	0.322	161.5	2.882	-69.7	0.018	-116.7	0.807	151.4
1.90	0.363	-174.2	2.802	-84.4	0.018	-138.0	0.751	149.3
1.95	0.494	-166.1	2.638	-102.2	0.019	-164.6	0.693	148.8
2.00	0.619	-168.5	2.789	-119.9	0.021	-178.2	0.647	149.8
2.05	0.714	-173.9	2.480	-131.1	0.020	160.7	0.617	151.5
2.10	0.776	-179.9	2.287	-146.1	0.020	143.7	0.599	153.5
2.15	0.815	174.0	2.272	-157.9	0.021	129.3	0.587	155.1
2.20	0.834	168.2	2.094	-166.1	0.021	128.3	0.588	156.1
2.25	0.845	162.7	1.895	-179.3	0.023	108.9	0.585	157.3
2.30	0.843	157.1	2.036	172.4	0.024	102.5	0.581	157.9
2.35	0.833	151.1	1.778	164.2	0.026	102.1	0.586	158.2
2.40	0.811	144.0	1.873	151.2	0.026	84.5	0.587	159.1
2.45	0.784	137.3	1.795	143.8	0.030	79.6	0.587	159.5
2.50	0.740	128.6	1.754	136.2	0.031	70.0	0.592	160.5
2.55	0.674	117.2	1.784	119.9	0.036	61.0	0.596	161.3
2.60	0.581	102.5	1.851	115.7	0.042	40.2	0.610	162.9
2.65	0.461	82.7	1.687	98.0	0.044	32.3	0.619	163.7
2.70	0.325	55.0	1.850	86.6	0.043	15.4	0.637	163.2
2.75	0.264	9.0	1.780	74.5	0.043	2.2	0.653	161.9
2.80	0.325	-44.6	1.621	56.4	0.041	-12.3	0.662	159.9
2.85	0.325	-78.8	1.680	39.9	0.041	-23.6	0.666	157.3
2.90	0.453	-100.9	1.375	27.6	0.036	-35.2	0.661	154.9
2.95	0.577	-116.2	1.189	12.0	0.033	-48.2	0.649	153.1
3.00	0.637	-127.6	1.104	-0.6	0.032	-60.6	0.631	152.0

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 a 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]

SAFETY INFORMATION ON THIS PRODUCT

<p>Caution</p>	<p>GaAs Products</p>	<p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
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