

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

DESCRIPTION

The NES2427P-140 is a 140 W push-pull type GaAs MES FET designed for high power transmitter applications for WLL 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 2.4 to 2.7 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: $G_L = 9.5$ dB TYP.
- High power added efficiency: $\eta_{add} = 38\%$ TYP. @ $V_{DS} = 12.0$ V, $I_{Dset} = 6.0$ A (total), $f = 2.40$ GHz

ORDERING INFORMATION

Part Number	Package	Supplying Form
NES2427P-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	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)

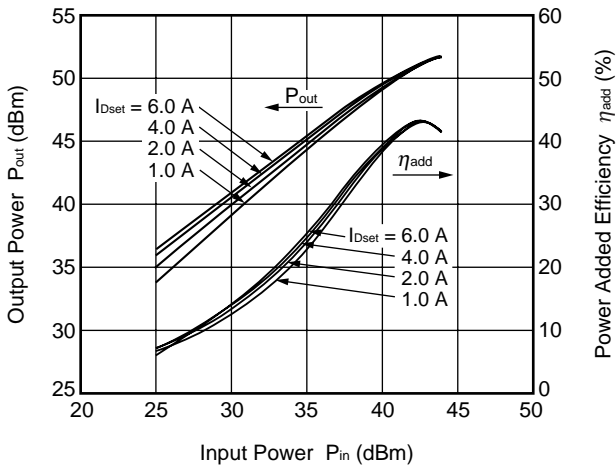
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Saturated Drain Current	I _{DSS}	V _{DS} = 2.5 V, V _{GS} = 0 V	-	76.0	-	A
Pinch-off Voltage	V _p	V _{DS} = 2.5 V, I _D = 330 mA	-4.0	-2.6	-	V
Thermal Resistance	R _{th}	Channel to Case	-	0.4	0.55	°C/W
Output Power	P _{out}	f = 2.40 GHz, V _{DS} = 12.0 V,	50.5	51.5	-	dBm
Drain Current	I _D	P _{in} = 44.5 dBm, R _g = 5 Ω,	-	23.0	-	A
Power Added Efficiency	η _{add}	I _{Dset} = 6.0 A Total (RF OFF) ^{Note1}	-	38	-	%
Linear Gain	G _L ^{Note2}		8.5	9.5	-	dB

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

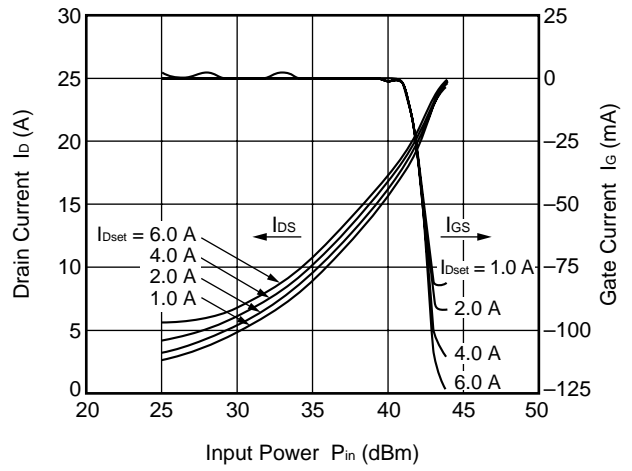
2. P_{in} = 32 dBm

TYPICAL CHARACTERISTICS (T_A = +25°C)

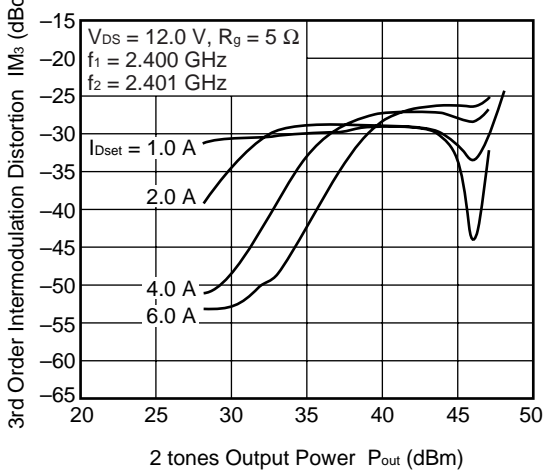
OUTPUT POWER, POWER ADDED EFFICIENCY vs. INPUT POWER



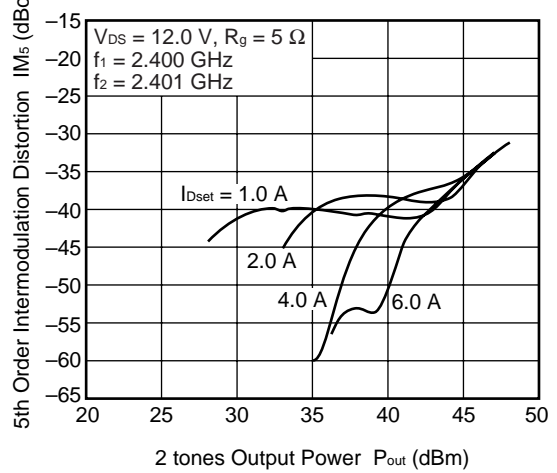
DRAIN CURRENT, GATE CURRENT vs. INPUT POWER



IM₃ vs. 2 TONES OUTPUT POWER



IM₅ vs. 2 TONES OUTPUT POWER



Remark The graphs indicate nominal characteristics.

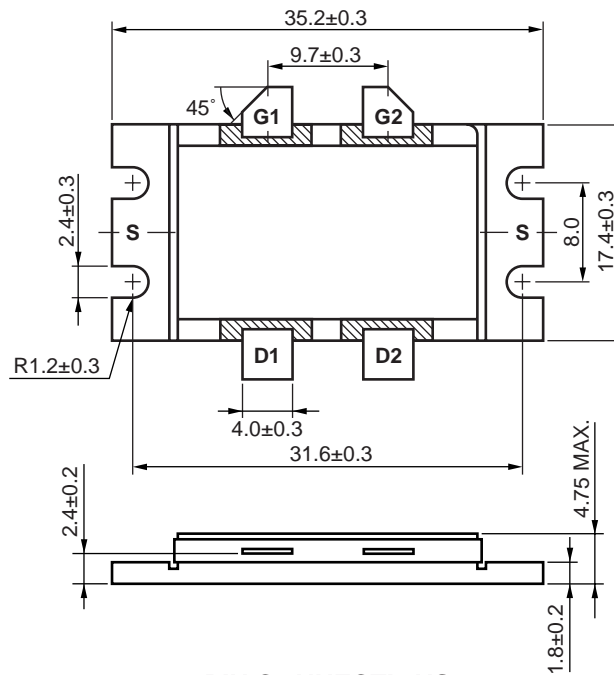
S-PARAMETERS

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
1.0	0.950	171.6	0.741	49.0	0.003	62.4	0.896	175.2
1.1	0.942	170.1	0.613	39.5	0.004	57.2	0.884	174.1
1.2	0.938	167.9	0.551	37.8	0.005	30.2	0.890	173.0
1.3	0.929	165.3	0.590	35.6	0.004	53.9	0.882	171.9
1.4	0.918	162.1	0.696	28.4	0.006	14.7	0.882	170.8
1.5	0.902	158.2	0.807	24.8	0.009	18.3	0.865	168.8
1.6	0.872	152.9	1.022	17.2	0.006	30.4	0.847	166.4
1.7	0.825	145.7	1.338	1.3	0.009	-3.3	0.844	164.1
1.8	0.735	135.0	1.661	-15.1	0.010	-31.7	0.841	161.2
1.9	0.552	119.9	2.418	-35.0	0.001	-56.8	0.815	156.6
2.0	0.196	99.7	3.484	-68.4	0.020	-106.0	0.733	150.8
2.1	0.310	-131.2	3.526	-108.5	0.024	-156.5	0.613	152.3
2.2	0.637	-156.0	3.133	-141.3	0.023	162.0	0.590	159.5
2.3	0.764	-174.4	2.742	-168.6	0.024	127.7	0.615	162.8
2.4	0.795	172.3	2.239	168.8	0.023	109.9	0.646	163.1
2.5	0.784	161.1	1.858	156.4	0.025	96.5	0.667	162.4
2.6	0.725	149.1	1.798	143.5	0.032	76.9	0.683	162.7
2.7	0.611	134.2	1.844	124.9	0.034	57.5	0.687	162.5
2.8	0.398	114.1	1.785	103.6	0.040	37.8	0.709	161.5
2.9	0.088	89.0	1.865	79.2	0.041	12.5	0.743	158.8
3.0	0.264	-100.2	1.876	46.2	0.041	-14.1	0.765	154.6

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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