NEC

GaAs MES FET
NES1821B-30

30W L-BAND POWER GaAs FET
N-CHANNEL GaAs MES FET

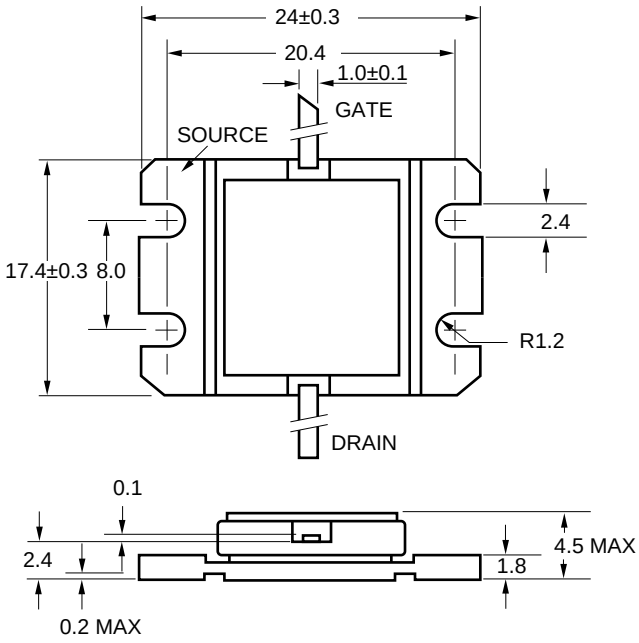
DESCRIPTION

The NES1821B-30 is power GaAs FET which provides high output power and high gain in the 1.8-2.1 GHz band.

Internal input matching circuits are designed to optimize performance. The device has a 0.8 μm gate length for increased linear gain. To reduce thermal resistance, the device uses PHS (Plated Heat Sink) technology.

The device incorporates WSi (tungsten silicide) gate for high reliability and SiO_2 glassivation for surface stability.

PACKAGE DIMENSIONS (UNIT: mm)



FEATURES

- High output power
- High gain
- High power added efficiency
- Internally matched input
- High reliability

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage	V_{DS}	15	V
Gate to Source Voltage	V_{GS}	–7	V
Gate to Drain Voltage	V_{GD}	–18	V
Drain Current	I_D	27	A
Gate Current	I_G	180	mA
Total Power Dissipation	$P_{T(*)}$	110	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	–65 to +175	°C

*T_C = 25 °C

Caution Please handle this device at static-free workstation, because this is an electrostatic sensitive device.

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Saturated Drain Current	I_{DSS}	––	18.0	––	A	V_{DS} = 2.5 V, V_{GS} = 0 V
Pinch-off Voltage	V_P	−4.0	−2.6	––	V	V_{DS} = 2.5 V, I_{DS} = 80 mA
Thermal Resistance	R_{th}	––	1.4	1.7	°C/W	Channel to Case
Output Power	P_O ***1**	44.5	45.0	––	dBm	freq. = 1.96 GHz V_{DS} = 10 V I_{DS} = 1.0 A set Rg = 30 Ω ***3**
Linear Gain	GL	11.0	13.0	––	dB	
Drain Current	I_D ***2**	––	2.5	––	A	

***1** PIN = 35.5 dBm ***2** P_O = 37 dBm

RECOMMENDING OPERATING LIMITS

Rg ***3** (Ω)	V_{DS} (V)	T_{ch} (°C)	G.C.P ***4**
30	to 10	to 125	to 3 dB comp

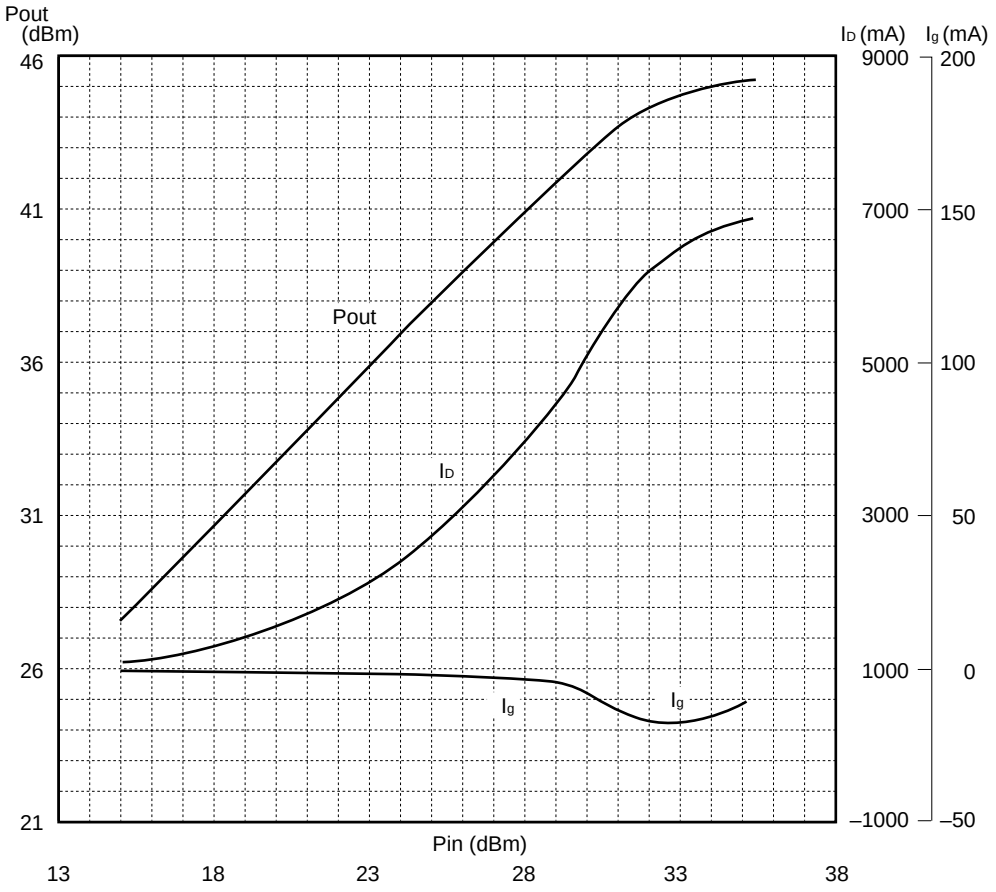
Note

***3** Rg is the series resistance between the gate supply and the FET gate.

***4** G.C.P: Gain Compression Point

TYPICAL RF PERFORMANCE

f = 1.96 GHz, Vd = 10 V, Id = 1 A set, Rg = 30 Ω



S-PARAMETER

V_{DS} = 10 V, Ids = 1 A set

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
1 600.000	0.793	114.8	1.210	−18.4	0.027	−92.7	0.903	144.0
1 610.000	0.786	113.9	1.235	−20.1	0.028	−94.2	0.904	143.5
1 620.000	0.779	113.0	1.256	−21.2	0.029	−95.7	0.908	143
1 630.000	0.774	112.2	1.286	−21.8	0.030	−97.7	0.909	142.5
1 640.000	0.766	111.3	1.337	−22.3	0.032	−100.4	0.912	141.8
1 650.000	0.758	110.4	1.412	−23	0.033	−103.3	0.914	141.3
1 660.000	0.752	109.4	1.511	−24.7	0.034	−106.6	0.919	140.7
1 670.000	0.744	108.5	1.616	−27.7	0.035	−109.7	0.920	140.0
1 680.000	0.736	107.4	1.711	−32.0	0.036	−112.6	0.924	139.3
1 690.000	0.728	106.4	1.768	−36.8	0.036	−114.6	0.927	138.5
1 700.000	0.720	105.3	1.791	−41.4	0.036	−116.1	0.929	137.6
1 710.000	0.710	104.2	1.783	−45.5	0.037	−116.8	0.931	136.9
1 720.000	0.698	103.0	1.758	−48.3	0.039	−117.4	0.934	136.0
1 730.000	0.688	101.9	1.748	−49.8	0.041	−118.1	0.936	134.9
1 740.000	0.675	100.6	1.763	−50.2	0.045	−119.6	0.938	133.8
1 750.000	0.662	99.3	1.822	−49.9	0.049	−122.5	0.940	132.7
1 760.000	0.646	98.0	1.947	−50.1	0.052	−126.5	0.940	131.4
1 770.000	0.631	96.5	2.136	−51.7	0.055	−131.1	0.939	130.2
1 780.000	0.614	94.9	2.350	−55.6	0.057	−136.0	0.937	128.6
1 790.000	0.593	93.3	2.547	−61.2	0.059	−140.2	0.934	127.0
1 800.000	0.571	91.6	2.682	−67.6	0.060	−143.8	0.929	125.2
1 810.000	0.546	89.8	2.742	−73.9	0.062	−146.4	0.923	123.4
1 820.000	0.519	87.9	2.749	−79.0	0.065	−148.6	0.916	121.3
1 830.000	0.488	85.9	2.748	−83.0	0.068	−151.0	0.907	119.1
1 840.000	0.453	83.9	2.771	−86.0	0.073	−154.1	0.891	116.5
1 850.000	0.411	81.9	2.846	−88.3	0.080	−158.1	0.870	113.6
1 860.000	0.362	80.3	3.006	−90.9	0.086	−163.4	0.845	110.5
1 870.000	0.307	79.5	3.249	−94.8	0.093	−169.5	0.814	107.1
1 880.000	0.243	80.9	3.544	−100.6	0.098	−175.9	0.774	103.2
1 890.000	0.176	88.9	3.819	−108.4	0.104	177.3	0.721	99.1
1 900.000	0.124	113.0	4.028	−117.1	0.109	170.1	0.651	94.9
1 910.000	0.134	152.3	4.143	−125.9	0.113	162.4	0.569	90.6
1 920.000	0.208	172.6	4.189	−134.3	0.117	154.1	0.470	87.5
1 930.000	0.307	177.0	4.201	−142.6	0.118	145.0	0.360	86.5
1 940.000	0.410	175.3	4.179	−151.0	0.117	135.9	0.253	91.9
1 950.000	0.511	170.6	4.110	−159.7	0.115	127.2	0.174	112.1
1 960.000	0.602	164.9	3.967	−168.2	0.111	118.9	0.168	147.0
1 970.000	0.678	158.9	3.762	−176.3	0.107	111.1	0.230	168.2
1 980.000	0.739	152.9	3.531	176.3	0.101	103.6	0.312	175.3
1 990.000	0.787	147.3	3.299	169.6	0.094	96.5	0.391	176.5
2 000.000	0.822	142.2	3.081	163.3	0.088	90.5	0.462	175.3
2 010.000	0.848	137.5	2.850	157.0	0.081	85.3	0.524	173.4
2 020.000	0.865	133.2	2.607	151.2	0.076	81.0	0.576	171.2
2 030.000	0.880	129.2	2.363	146.2	0.071	77.2	0.623	168.9
2 040.000	0.887	125.7	2.129	142.6	0.068	73.5	0.661	166.6
2 050.000	0.892	122.5	1.927	140.2	0.065	69.3	0.695	164.6
2 060.000	0.895	119.4	1.772	138.9	0.062	64.3	0.724	162.6
2 070.000	0.898	116.5	1.670	138.0	0.059	58.7	0.747	160.7
2 080.000	0.897	113.8	1.613	136.6	0.054	53.5	0.768	158.7
2 090.000	0.896	111.1	1.583	134.1	0.050	49.2	0.788	157.1
2 100.000	0.894	108.7	1.546	130.3	0.045	45.9	0.804	155.5
2 110.000	0.891	106.3	1.485	125.4	0.041	44.6	0.819	154.0
2 120.000	0.887	103.9	1.386	120.2	0.038	43.6	0.831	152.7
2 130.000	0.884	101.7	1.265	116.0	0.036	43.7	0.842	151.3
2 140.000	0.879	99.5	1.141	113.2	0.035	43.5	0.851	150
2 150.000	0.875	97.2	1.031	112.1	0.035	42.4	0.860	148.7
2 160.000	0.871	95.1	0.949	112.6	0.035	39.7	0.871	147.5
2 170.000	0.865	93.0	0.897	114	0.034	35.5	0.879	146.4
2 180.000	0.861	90.9	0.880	115.0	0.033	30.5	0.885	145.4
2 190.000	0.856	88.6	0.888	114.7	0.030	26.0	0.892	144.2

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