

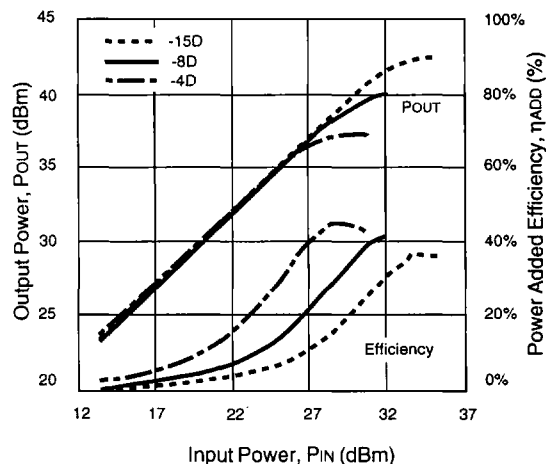
C-BAND INTERNALLY MATCHED POWER GaAs MESFET

NEZ4450-15D
NEZ4450-15DL
NEZ4450-8D
NEZ4450-8DL
NEZ4450-4D
NEZ4450-4DL

FEATURES

- **HIGH P_{OUT}**
18 W (42.5 dBm) TYP P_{1dB} for NEZ4450-15D/15DL
9 W (39.5 dBm) TYP P_{1dB} for NEZ4450-8D/8DL
4.5 W (36.5 dBm) TYP P_{1dB} for NEZ4450-4D/4DL
- **HIGH EFFICIENCY**
40% η_{add} for 4.5W Device
38% η_{add} for 9W Device
37% η_{add} for 18W Device
- **LOW IMD**
-45 dBc IM₃ @ 31.5 dBm P_{out} (S.C.L.) -15DL
-45 dBc IM₃ @ 29 dBm P_{out} (S.C.L.) -8DL
-45 dBc IM₃ @ 26 dBm P_{out} (S.C.L.) -4DL
- **SiO₂ PASSIVATED CHIP**
For Power/Gain Stability Under RF Overdrive
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY
vs. INPUT POWER

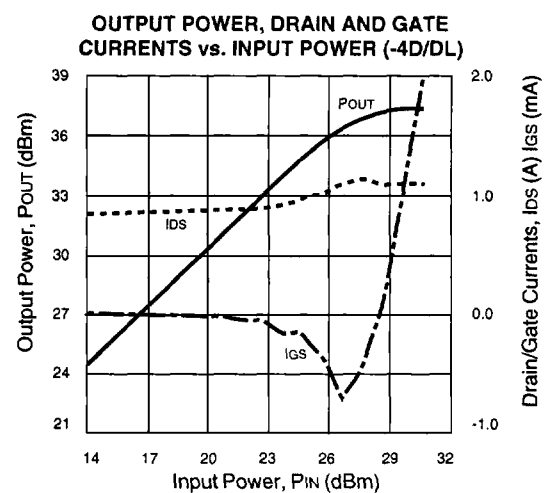
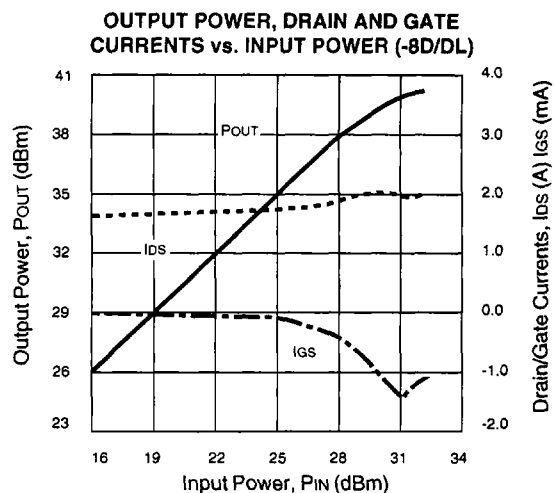
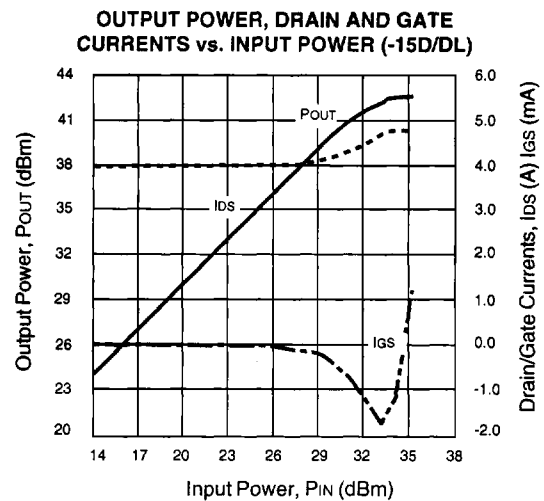
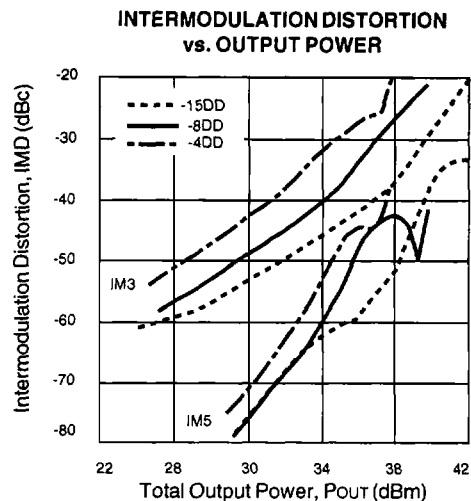


ELECTRICAL CHARACTERISTICS (T_c = 25°C)

PART NUMBER			NEZ4450-4D NEZ4450-4DL T-61			NEZ4450-8D NEZ4450-8DL T-61			NEZ4450-15D NEZ4450-15DL T-65			
PACKAGE OUTLINE												
SYMBOLS	CHARACTERISTICS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	TEST CONDITIONS
P _{1dB}	Output Power at P _{1dB} ¹ I _D = 0.8A, RF Off I _D = 1.6A, RF Off I _D = 4.0A, RF Off	dBm dBm dBm	35.5	36.5		38.5	39.5		41.5	42.5		V _{DS} = 10V f = 4.4 to 5.1 GHz Z _S = Z _L = 50 ohms
η _{ADD}	Power Added Efficiency @ P _{1dB}	%		40			38			37		
I _{DS}	Drain Current at P _{1dB}	A		1.1	1.5		2.2	3.0		4.4	6.0	
G _L	Linear Gain	dB	9.5	10.5		9.5	10.5		9.0	10.0		
IM ₃ -XDL Option Only	3rd Order Intermodulation ³ Distortion at P _{out} = 26 dBm SCL ² P _{out} = 29 dBm SCL ² P _{out} = 31.5 dBm SCL ²	dBc dBc dBc		-45	-42		-45	-42		-45	-42	I _{DQ} = 0.5 x I _{DSS} V _{DS} = 10V f ₁ = 4.99GHz f ₂ = 5.00 GHZ 2 Equal Tones
I _{DSS}	Saturated Drain Current V _{GS} = 0 V	A	1.0	2.3	3.5	2.0	4.5	7.0	4.0	9.2	14.0	V _{DS} = 2.5 V
V _P	Pinch Off Voltage I _{DS} = 15mA I _{DS} = 30mA I _{DS} = 60mA	V V V	-3.5	-2.0	-0.5	-4.0	-2.0	-0.5	-3.5	-2.2	-0.5	
BV _{DGO}	Drain-Gate Breakdown Voltage I _{DG} = 15 mA I _{DG} = 30 mA I _{DG} = 60 mA	V V V	20	22		20	22		20	22		
g _m	Transconductance I _{DS} = 1A I _{DS} = 2A I _{DS} = 4A	mS mS mS		1300			2600			5200		
R _{TH} (CH-C)	Thermal Resistance Channel to Case	°C/W		5.0	6.0		2.5	3.0		1.3	1.5	
ΔT (CH-C)	Channel Temperature Rise ⁴	°C			48			48			60	

Notes: 1. P_{1dB}: Output Power at the 1dB Gain Compression Point 2. S.C.L.: Single Carrier Level 3. Maximum Spec Applies to -XDL Option Only
4. ΔT (CH-C) = T_{CH} - T_C = 10 V x I_{DSQ} X R_{TH} (CH-C) MAX.

TYPICAL PERFORMANCE CURVES (T_C = 25°C)



ABSOLUTE MAXIMUM RATINGS¹ (T_C = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS		
			NEZ4450-4D/4DL	NEZ4450-8D/8DL	NE7-4450 -15D/15DL
V _{DS}	Drain to Source Voltage	V	15	15	15
V _{GSO}	Gate to Source Voltage	V	-7	-7	-7
V _{GDO}	Gate to Drain Voltage	V	-18	-18	-18
I _{DS}	Drain Current	A	I _{DSS}	I _{DSS}	I _{DSS}
I _{GRF}	Gate Current	mA	25	50	100
T _{ch}	Channel Temperature	°C	175	175	175
T _{stg}	Storage Temperature	°C	-65 to +175	-65 to +175	-65 to +175
P _T	Total Power Dissipation	W	2.5	50	100

Note:

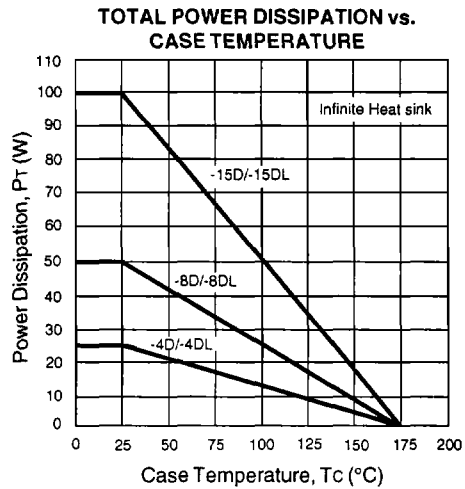
1. Operation in excess of any of these parameters may result in permanent damage.

MAXIMUM OPERATING LIMITS

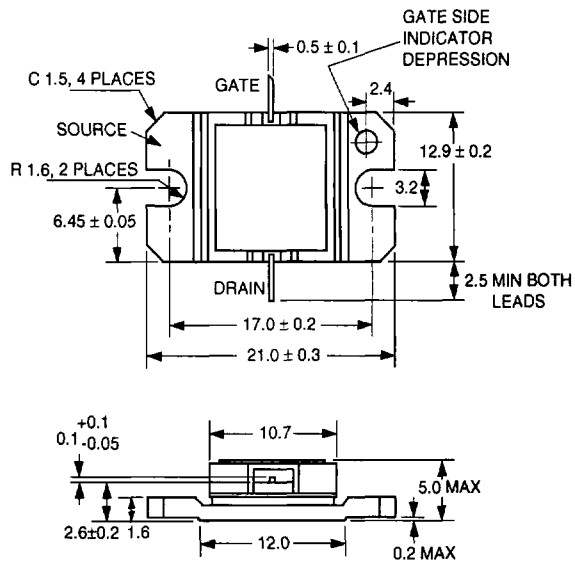
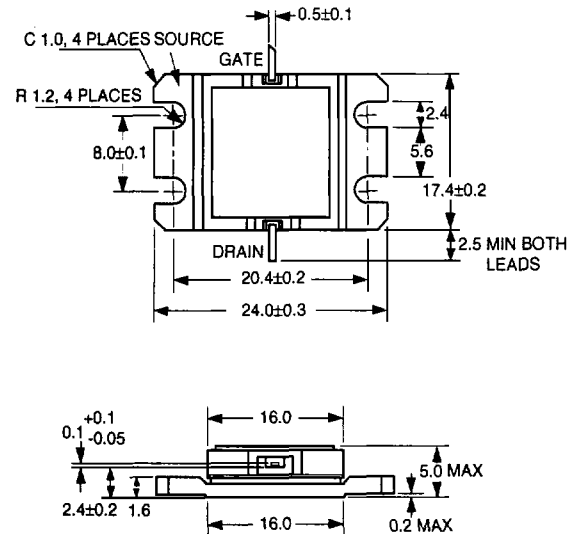
PART NUMBER	R _G MAX ¹ Ω	I _{GRF} MAX mA	V _{DS} MAX V
NEZ-4450-4D/4DD	200	5	10
NEZ-4450-8D/8DD	100	10	10
NEZ-4450-15D/15DD	50	20	10

Note:

1. R_G MAX is the maximum recommended series resistance between the Gate Supply and the FET Gate.

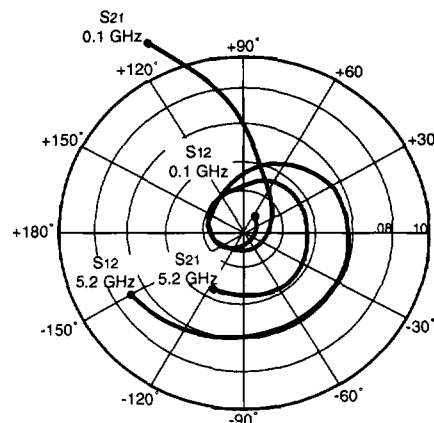
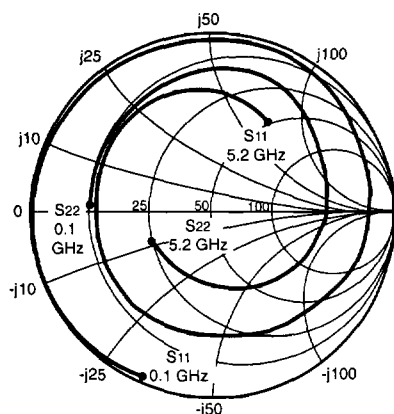
TYPICAL PERFORMANCE CURVES ($T_c = 25^\circ\text{C}$)

2

OUTLINE DIMENSIONS (Units in mm)**PACKAGE OUTLINE T-61****PACKAGE OUTLINE T-65**

NEZ4450-4D/DL, -8D/DL, -15D/DL

TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (TA = 25°C)



NEZ4450-4D/4DD

V_{DS} = 10.0 V, I_{DS} = 800 mA

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂		S ₂₁ (dB)	K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG			
0.1	.961	-116.2	11.641	114.8	.005	24.8	.627	179.2	0.29	21.3	33.7
0.2	.964	-149.8	6.618	94.4	.007	24.1	.654	175.7	0.49	16.4	29.8
0.5	.970	177.3	2.841	62.2	.008	5.1	.666	164.4	0.6	99.1	25.5
1.0	.971	150.5	1.555	22.4	.008	-6.1	.675	147.8	1.12	3.8	20.8
1.5	.961	125.8	1.187	-16.3	.010	-22.0	.682	128.3	1.48	1.5	16.6
2.0	.949	102.0	1.079	-55.1	.012	-52.2	.699	107.2	1.49	0.7	15.4
2.5	.929	74.2	1.138	-96.0	.013	-91.6	.698	83.6	1.75	1.1	14.4
3.0	.907	39.2	1.410	-142.0	.015	-139.5	.689	57.8	1.62	3.0	15.1
3.5	.830	-8.9	1.937	162.5	.019	144.3	.657	25.8	2.24	5.7	13.8
3.7	.773	-33.7	2.221	137.5	.020	122.0	.628	9.8	2.65	6.9	13.4
3.8	.742	-47.7	2.383	124.0	.023	103.5	.614	0.9	2.55	7.5	13.3
3.9	.711	-63.6	2.579	109.3	.025	92.0	.595	-9.3	2.48	8.2	13.4
4.0	.685	-81.3	2.684	92.6	.032	69.8	.574	-21.1	2.15	8.6	13.2
4.1	.680	-100.6	2.874	76.5	.042	61.1	.551	-34.2	1.60	9.2	13.8
4.2	.656	-122.2	3.000	59.7	.054	31.6	.499	-46.0	1.46	9.5	13.4
4.3	.632	-142.8	3.114	43.5	.057	5.1	.456	-57.1	1.53	9.9	13.1
4.4	.621	-162.6	3.252	27.4	.056	-14.4	.432	-67.1	1.59	10.2	13.1
4.5	.625	177.7	3.360	10.2	.055	-32.7	.417	-79.0	1.59	10.5	13.3
4.6	.626	158.7	3.452	-8.0	.056	-47.9	.400	-91.9	1.55	10.8	13.5
4.7	.632	140.2	3.484	-25.4	.057	-65.0	.389	-104.7	1.53	10.8	13.6
4.8	.629	122.5	3.471	-43.5	.059	-79.0	.375	-117.6	1.51	10.8	13.5
4.9	.626	105.6	3.493	-60.9	.063	-96.6	.368	-129.5	1.46	10.9	13.4
5.0	.619	88.9	3.482	-78.3	.064	-114.0	.363	-140.1	1.49	10.8	13.2
5.1	.606	72.2	3.458	-96.9	.068	-130.2	.359	-150.1	1.48	10.8	13.0
5.2	.591	54.0	3.463	-115.6	.070	-148.7	.357	-158.4	1.49	10.8	12.8

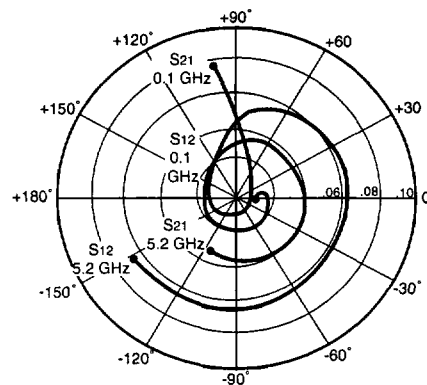
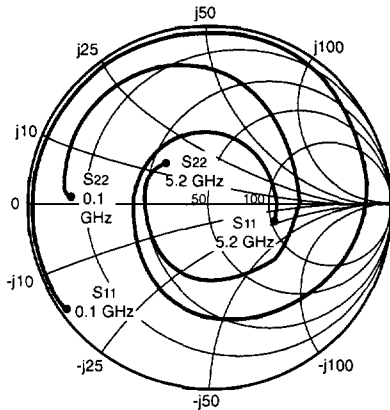
Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} \left(K \pm \sqrt{K^2 - 1} \right). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (T_A = 25°C)

2

NEZ4450-8D/8DD

V_{DS} = 10.0 V, I_{DS} = 1600 mA

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	S ₂₁ (dB)	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG			
0.1	.962	-147.3	7.146	101.1	.002	14.6	.776	176.8	0.10	17.1	35.5
0.2	.977	-167.8	3.743	87.9	.004	24.1	.802	173.6	0.77	11.5	29.7
0.5	.985	169.6	1.576	63.7	.005	25.3	.804	162.0	1.04	4.0	23.8
1.0	.984	146.7	0.894	30.4	.008	20.9	.793	144.4	1.22	-1.0	17.6
1.5	.978	122.9	0.715	-4.6	.011	1.7	.771	124.1	1.39	-3.0	14.4
2.0	.967	100.2	0.696	-40.2	.013	-25.8	.748	102.8	1.60	-3.1	12.7
2.5	.949	73.7	0.792	-78.7	.016	-55.9	.702	79.1	1.80	-2.0	11.8
3.0	.935	41.3	1.062	-123.3	.018	-101.6	.642	53.7	1.48	0.5	13.6
3.5	.865	-2.0	1.601	-178.3	.022	-161.5	.559	22.8	2.00	4.1	12.9
3.7	.799	-24.4	1.918	156.5	.022	169.5	.521	7.2	2.74	5.7	12.2
3.8	.761	-36.6	2.116	143.0	.025	150.0	.505	-1.5	2.65	6.5	12.2
3.9	.720	-50.9	2.349	128.0	.028	133.9	.487	-12.4	2.54	7.4	12.4
4.0	.668	-67.1	2.545	110.5	.035	107.0	.480	-25.4	2.23	8.1	12.4
4.1	.633	-86.2	2.824	93.5	.045	88.4	.474	-40.1	1.71	9.0	13.1
4.2	.572	-109.4	3.036	75.7	.050	51.6	.438	-56.5	1.77	9.6	12.7
4.3	.505	-133.6	3.239	57.6	.051	25.1	.406	-71.7	1.90	10.2	12.6
4.4	.454	-159.8	3.462	39.2	.051	4.9	.389	-87.5	1.93	10.8	12.8
4.5	.421	171.2	3.610	19.8	.052	-14.9	.380	-104.9	1.89	11.1	13.0
4.6	.393	140.4	3.719	-1.1	.054	-33.3	.371	-124.2	1.82	11.4	13.1
4.7	.381	110.2	3.731	-20.8	.056	-54.6	.365	-142.9	1.78	11.4	13.1
4.8	.373	80.4	3.637	-40.5	.059	-73.6	.356	-162.0	1.75	11.2	12.9
4.9	.371	52.8	3.561	-60.2	.062	-93.7	.348	-179.6	1.71	11.0	12.7
5.0	.374	26.4	3.438	-78.2	.063	-112.0	.337	163.3	1.75	10.7	12.3
5.1	.380	1.3	3.296	-96.7	.064	-130.0	.321	146.6	1.81	10.4	12.0
5.2	.396	-23.5	3.194	-115.0	.067	-149.2	.295	129.6	1.79	10.1	11.6

Note:

1. Gain Calculations:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} \left(K \pm \sqrt{K^2 - 1} \right). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12}| |S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain