

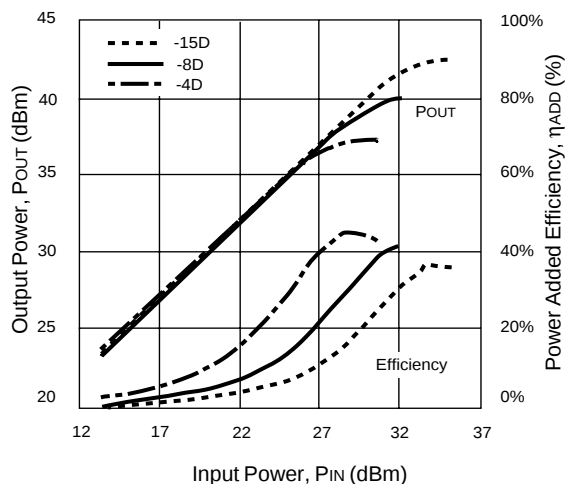
C-BAND INTERNALLY MATCHED POWER GaAs MESFET

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



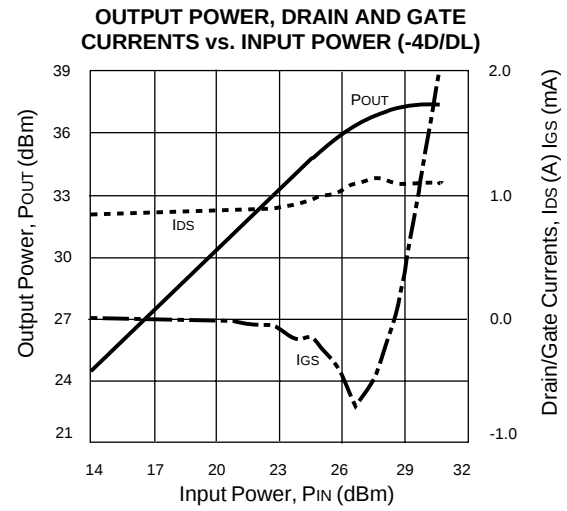
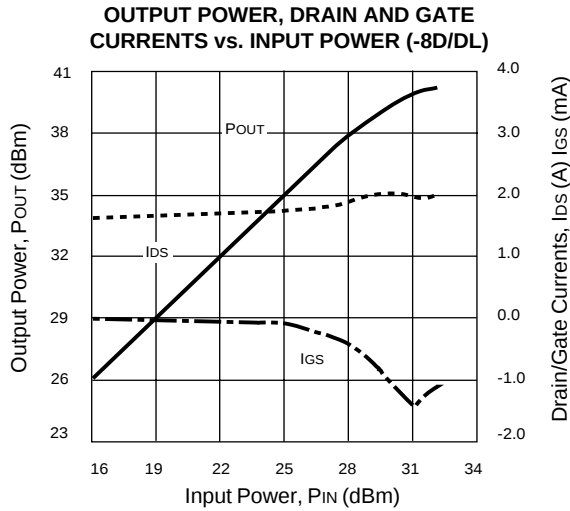
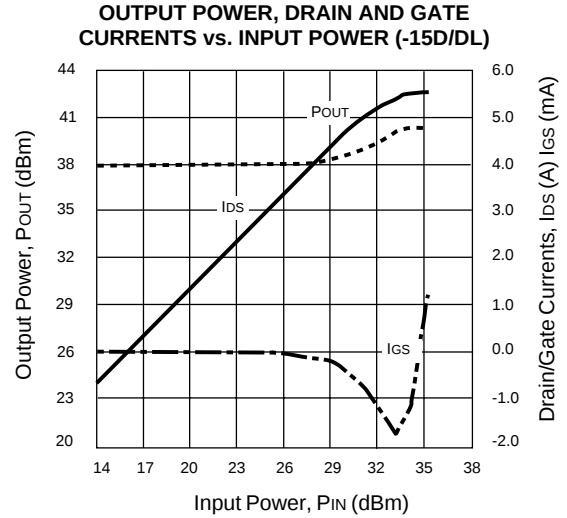
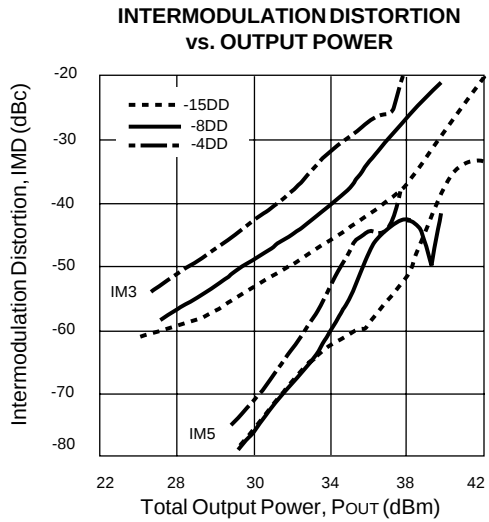
ELECTRICAL CHARACTERISTICS (T_C = 25°C)

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 _{DSQ} = 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.

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

TYPICAL PERFORMANCE CURVES (T_C = 25°C)



ABSOLUTE MAXIMUM RATINGS¹ (T_C = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS		
			NEZ4450-4D/4DL	NEZ-4450-8D/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.

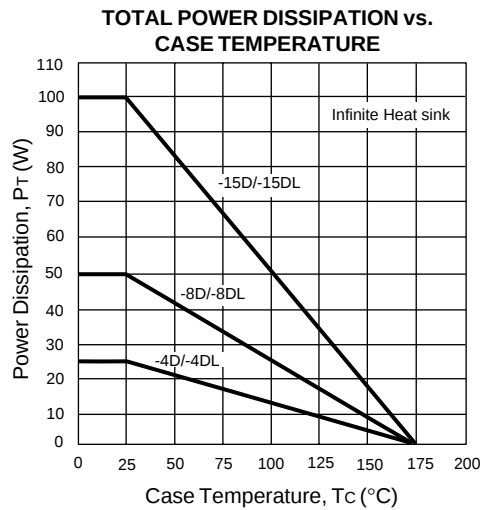
MAXIMUM OPERATING LIMITS

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:

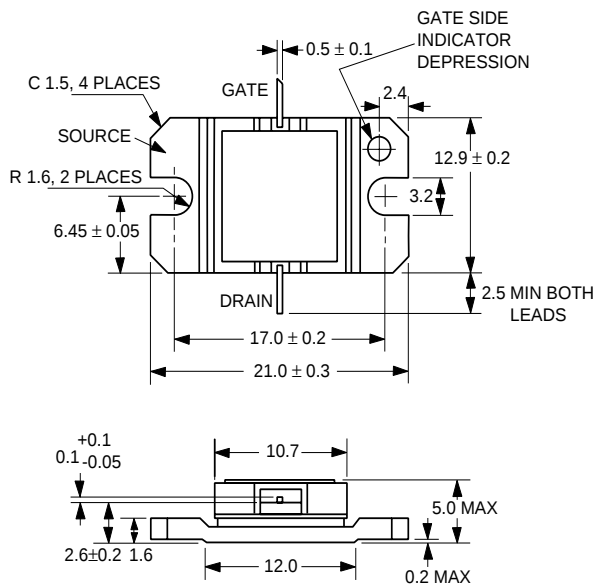
1. R_G MAX is the maximum recommended series resistance between the Gate Supply and the FET Gate.

TYPICAL PERFORMANCE CURVES (Tc = 25°C)

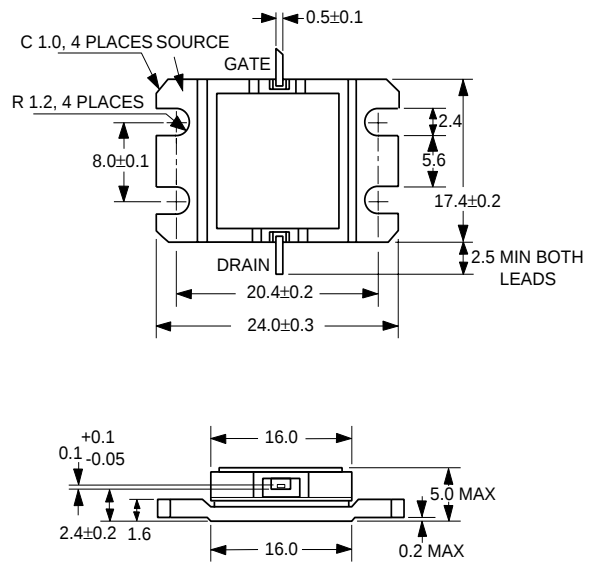


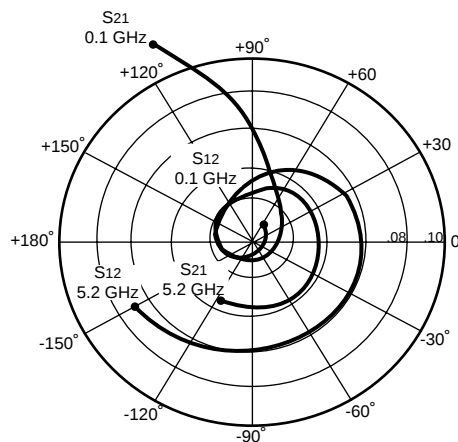
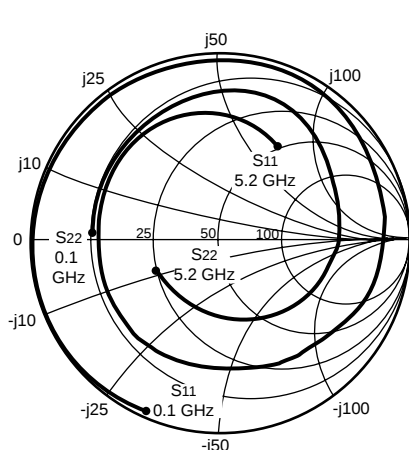
OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE T-61



PACKAGE OUTLINE T-65



TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (T_A = 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

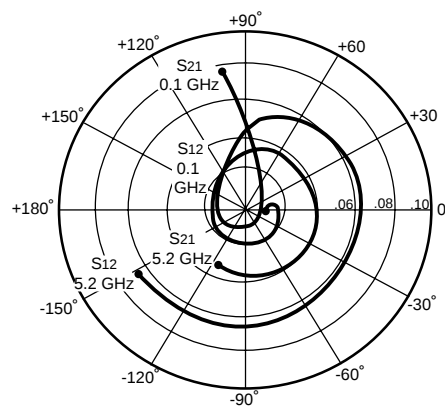
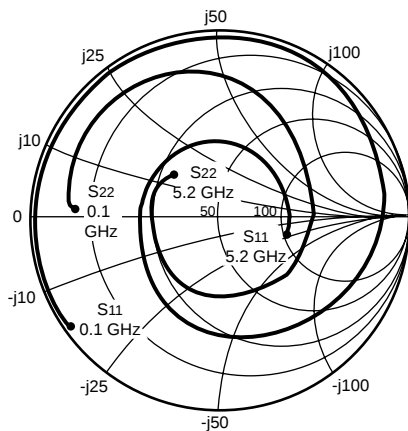
Note:

1. Gain Calculations:

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

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

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

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