NEC

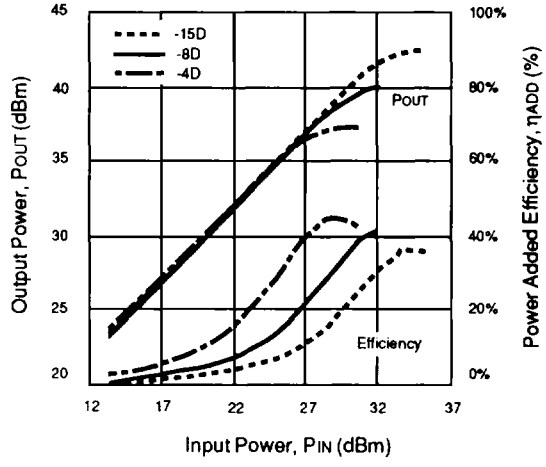
C-BAND POWER GaAs MESFET

NEZ4450-15D
NEZ4450-15DD
NEZ4450-8D
NEZ4450-8DD
NEZ4450-4D
NEZ4450-4DD

FEATURES

- **HIGH POUT**
  - 18 W (42.5 dBm) Typ P_{1dB} for NEZ4450-15D/15DD
  - 9 W (39.5 dBm) Typ P_{1dB} for NEZ4450-8D/8DD
  - 4.5 W (36.5 dbm) Typ P_{1dB} for NEZ4450-4D/4DD
- **HIGH EFFICIENCY**
  - 40% ηadd for 4.5W Device
  - 38% ηadd for 9W Device
  - 37% ηadd for 18W Device
- **LOW IMD**
  - -45 dBc IM_3 @ 31.5 dBm Pout (S.C.L.) -15DD
  - -45 dBc IM_3 @ 29 dBm Pout (S.C.L.) -8DD
  - -45 dBc IM_3 @ 26 dBm Pout (S.C.L.) -4DD
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY vs. INPUT POWER



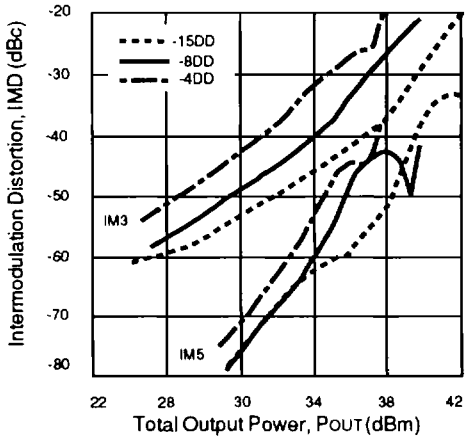
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER / PACKAGE OUTLINE			NEZ4450-4D NEZ4450-4DD T-61			NEZ4450-8D NEZ4450-8DD T-61			NEZ4450-15D NEZ4450-15DD T-65			
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
η_{ADD}	Power Added Efficiency @ P_{1dB}	%		40			38			37		$Z_S = Z_L =$
I_{DS}	Drain Current at P_{1dB}	A		1.1	1.5		2.2	3.0		4.4	6.0	50 ohms
G_L	Linear Gain	dB	9.5	10.5		9.5	10.5		9.0	10.0		
IM_3	3rd Order Intermodulation[3] Distortion at Pout = 26 dBm SCL[2] Pout = 29 dBm SCL[2] Pout = 31.5 dBm SCL[2]	 dBc dBc dBc		-45	-42		-45	-42		-45	-42	V_{DS} = I0V 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_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	V_{DS} = 2.5 V
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} = IA 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	

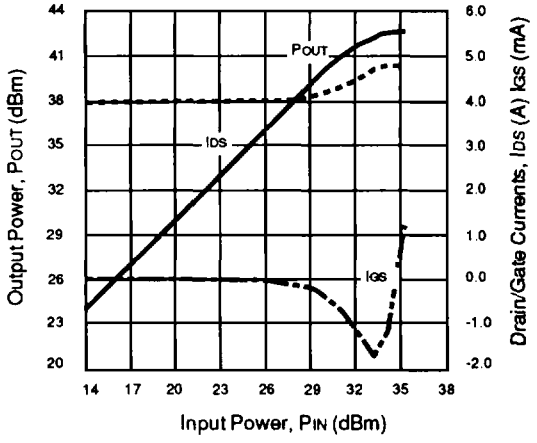
Notes:
1. P_{1dB}: Ouptut Power at the 1dB Gain Compression Point
2. S.C.L.: Single Carrier Level
3. Minimum Spec Applies to -XDD Option Only

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

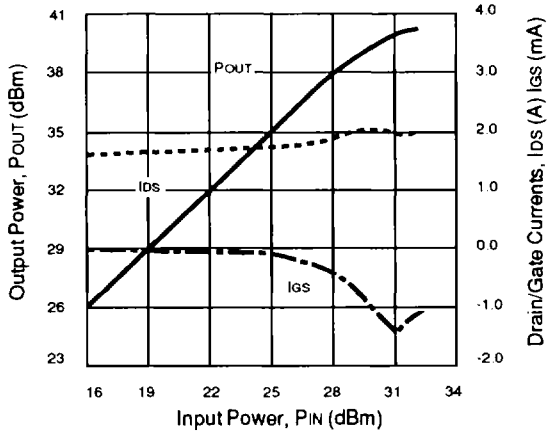
INTERMODULATION DISTORTION vs. OUTPUT POWER



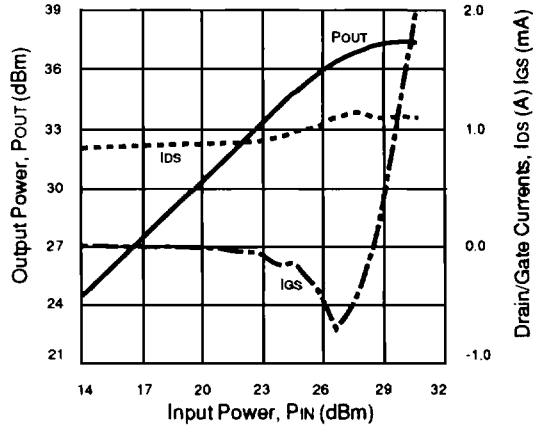
OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER (-15D/DD)



OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER (-8D/DD)



OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER (-4D/DD)



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS		
			NEZ4450-4D/4DD	NEZ-4450-8D/8DD	NE7-4450-15D/15DD
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
Tch	Channel Temperature	°C	175	175	175
Tstg	Storage Temperature	°C	-65 to +175	-65 to +175	-65 to +175
P_T	Total Power Dissipation	W	2.5	50	100

Note:
1. A Thermal Interface Medium must be dused between the bottom of the package and its mating surface to ensure optimum heat transfer. Each customer must choose the most appropriate method for his particular application (i.e. thermal grease, solder, etc.).

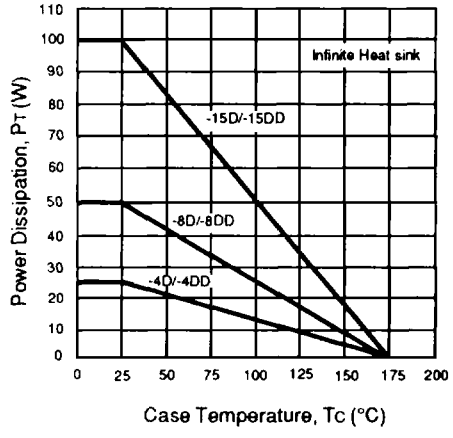
MAXIMUM OPERATING LIMITS

PART NUMBER	RG MAX* 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

* RG MAX is the maximum series resistance between the Gate Supply and the FET Gate.

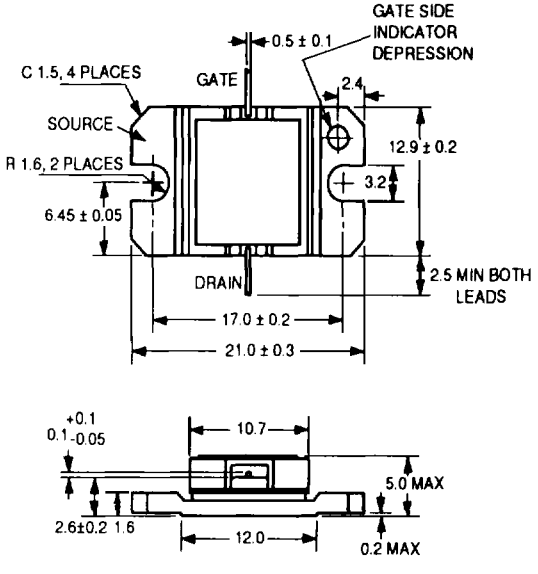
TYPICAL PERFORMANCE CURVES (TA = 25°C)

TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

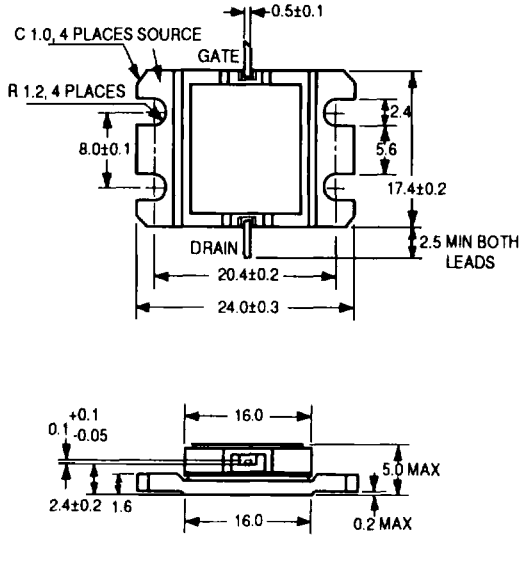


OUTLINE DIMENSIONS (Units in mm)

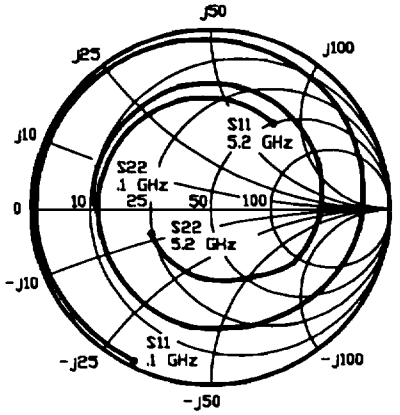
PACKAGE OUTLINE T-61

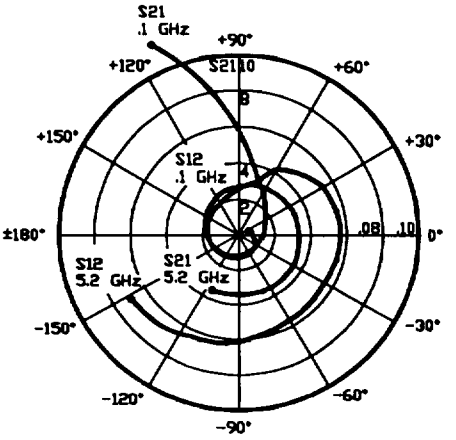


PACKAGE OUTLINE T-65



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





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NEZ4450-4D/4DD

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

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		S_{21}	K	MAG[1]
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(dB)		(dB)
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

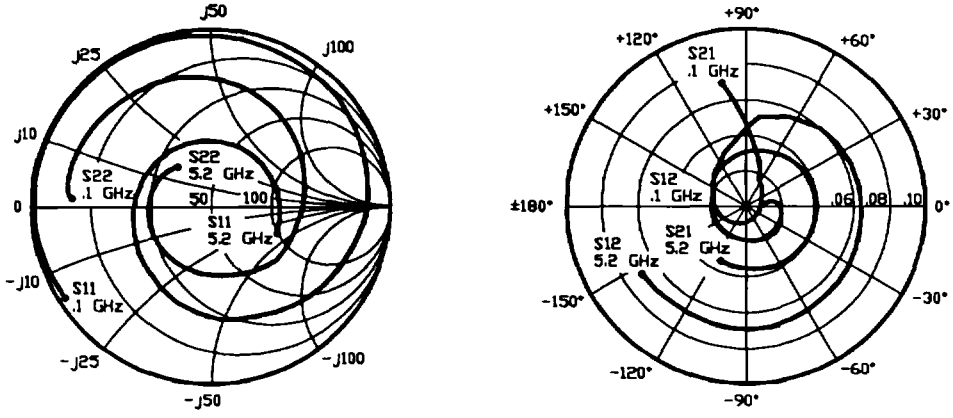
Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$$. When K ≤ 1, 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)



NEZ4450-8D/8DD

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

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	S_{21}	MAG[1]
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)	(dB)
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:

$$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$$. When $K \le 1$, 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