NEC

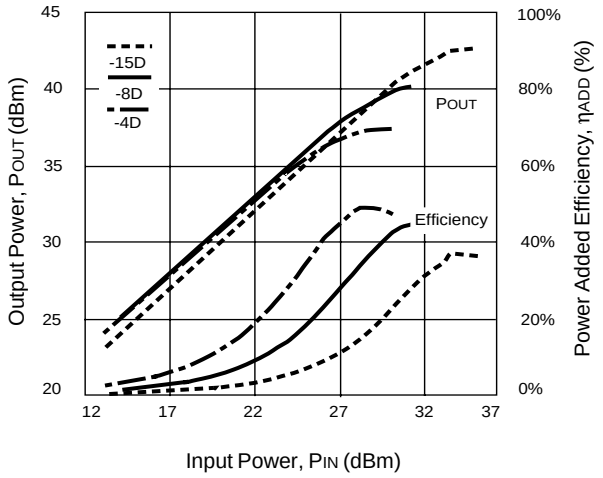
C-BAND INTERNALLY MATCHED POWER GaAs MESFET

NEZ3642-15D
NEZ3642-15DL
NEZ3642-8D
NEZ3642-8DL
NEZ3642-4D
NEZ3642-4DL

FEATURES

- **HIGH POUT**
  - 18 W (42.5 dBm) Typ P_{1dB} for NEZ3642-15D
  - 9 W (39.5 dBm) Typ P_{1dB} for NEZ3642-8D
  - 4.5 W (36.5 dbm) Typ P_{1dB} for NEZ3642-4D
- **HIGH EFFICIENCY**
  - 43% ηadd for 4.5W Device
  - 40% ηadd for 9W Device
  - 37% ηadd for 18W Device
- **LOW IMD**
  - -45 dBc IM_3 @ 31.5 dBm Pout (S.C.L.) -15DL
  - -45 dBc IM_3 @ 29 dBm Pout (S.C.L.) -8DL
  - -45 dBc IM_3 @ 26 dBm Pout (S.C.L.) -4DL
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY vs. INPUT POWER



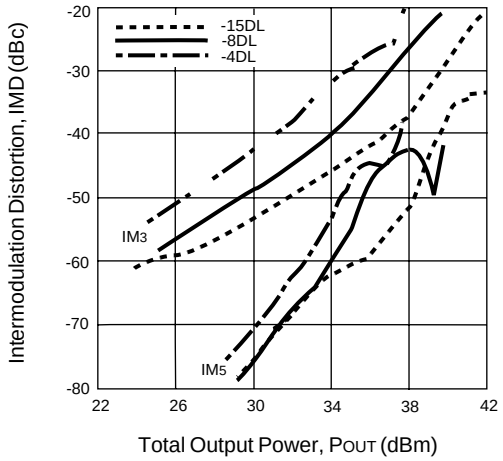
ELECTRICAL CHARACTERISTICS (T_C = 25°C)

PART NUMBER / PACKAGE OUTLINE			NEZ3642-4D NEZ3642-4DL T-61			NEZ3642-8D NEZ3642-8DL T-61			NEZ3642-15D NEZ3642-15DL 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= 3.6 to 4.2 GHz
η_{ADD}	Power Added Efficiency @ P_{1dB}	%		43			40			37		Zs = 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	10.0	11.5		10.0	11.0		9.0	10.0		
IM_3 -X DL Option Only	3rd Order Intermodulation Distortion at[3] 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	I_{DSQ} = 0.5 X I_{DSS} V_{DS} = I0V f_1 = 4.19 GHz f_2 = 4.20 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	
$\Delta T_{(CH-C)}$	Channel Temperature Rise[4]	°C			48			48			60	

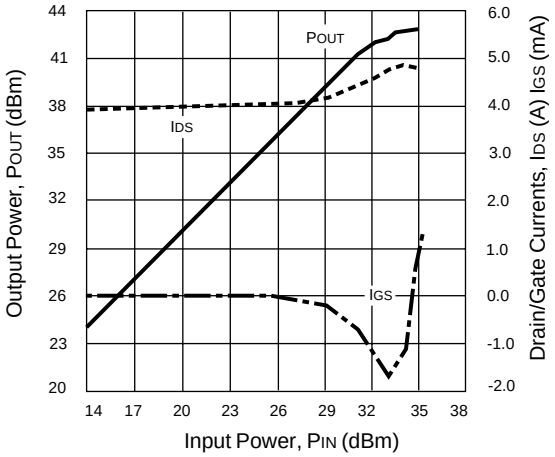
Notes:
1. P_{1dB}: Ouptut Power at the 1dB Gain Compression Point
2. S.C.L.: Single Carrier Level
3. Maximum Spec applies to -XDL only.
4. $\Delta T_{(CH-C)} = T_{CH} - T_C = 10\ V \times I_{DSQ} \times R_{TH\ (CH-C)\ MAX}$.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

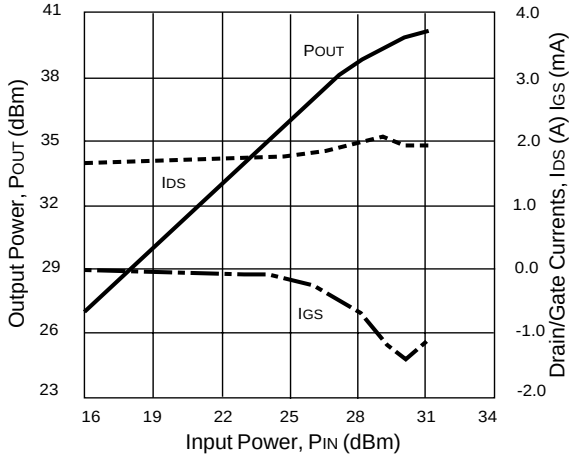
INTERMODULATION DISTORTION vs. OUTPUT POWER



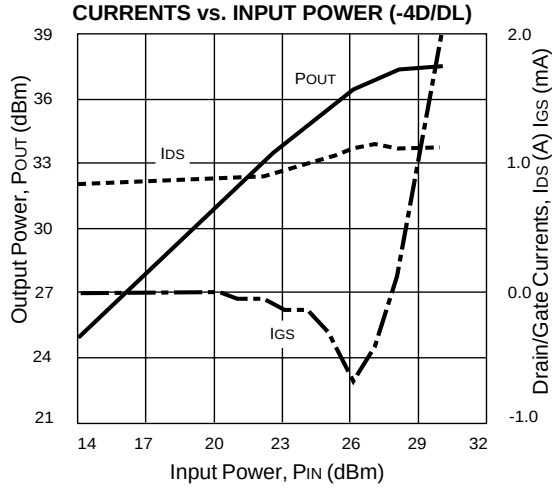
OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER (-15D/DL)



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



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



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS		
			NEZ3642-4D/4DL	NEZ3642-8D/8DL	NEZ3642-15D/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
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 used 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.).

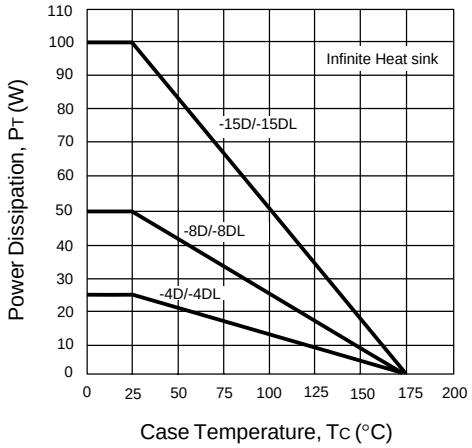
MAXIMUM OPERATING LIMITS

PART NUMBER	Rg MAX* Ω	I_{GRF} MAX mA	V_{DS} MAX V
NEZ-3642-4D/4DL	200	5	10
NEZ-3642-8D/8DL	100	10	10
NEZ-3642-15D/15DL	50	20	10

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

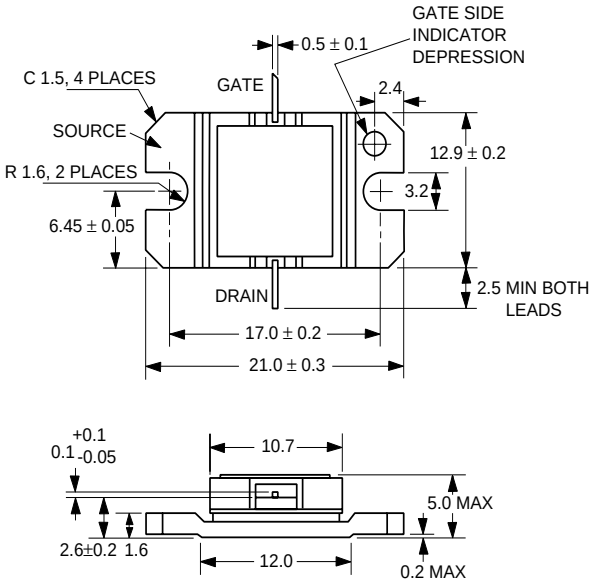
TYPICAL PERFORMANCE CURVES (T_A = 25°C)

TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

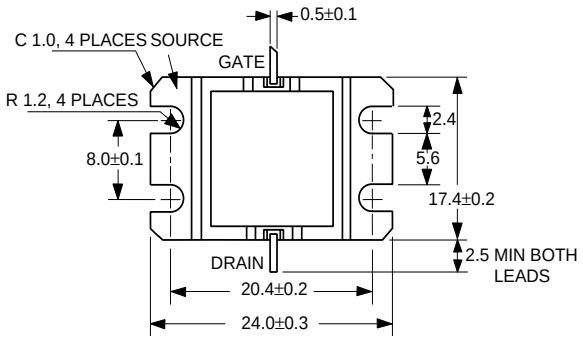


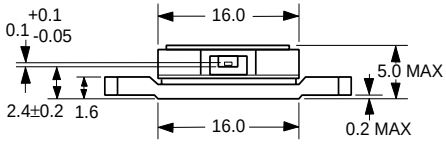
OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE T-61



PACKAGE OUTLINE T-65





NEZ3642-4D/4DL
V_{DS} = 10 V, I_{DS} = 800 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.10	0.957	-129.50	11.354	104.30	0.005	11.40	0.587	180.00	0.279	33.562
0.20	0.957	-158.10	6.114	82.70	0.007	8.60	0.634	-179.70	0.393	29.412
0.50	0.960	171.40	2.444	43.00	0.006	12.80	0.700	173.20	1.154	23.718
1.00	0.968	142.40	1.231	-6.30	0.006	7.10	0.792	156.50	1.232	20.219
1.50	0.954	112.30	0.949	-50.20	0.009	-2.60	0.824	134.90	1.300	16.943
2.00	0.931	78.90	1.034	-93.90	0.012	-24.20	0.836	111.90	1.134	17.129
2.25	0.911	57.50	1.233	-119.10	0.012	-50.60	0.836	98.50	1.109	18.110
2.50	0.878	28.80	1.590	-148.50	0.012	-77.80	0.808	82.70	1.437	17.297
2.75	0.827	-10.40	2.182	174.70	0.008	-133.10	0.781	63.70	2.907	16.847
3.00	0.749	-64.10	2.985	130.20	0.006	109.40	0.704	39.30	6.242	16.033
3.20	0.699	-113.60	3.665	90.30	0.017	38.80	0.601	12.80	2.923	15.800
3.30	0.685	-138.90	4.020	69.30	0.023	18.40	0.535	-3.50	2.330	15.956
3.40	0.676	-163.70	4.356	47.70	0.029	-4.10	0.460	-23.80	1.953	16.167
3.50	0.664	172.30	4.682	25.30	0.036	-27.00	0.387	-50.40	1.637	16.469
3.60	0.638	149.20	4.967	2.00	0.044	-48.50	0.342	-83.80	1.389	16.812
3.70	0.594	126.60	5.181	-21.90	0.050	-71.40	0.337	-122.00	1.264	17.063
3.80	0.523	103.90	5.295	-46.30	0.058	-94.70	0.364	-157.70	1.170	17.104
3.90	0.427	80.70	5.316	-70.70	0.063	-119.10	0.401	171.90	1.169	16.770
4.00	0.315	54.50	5.211	-95.40	0.068	-145.80	0.422	145.30	1.201	16.134
4.10	0.194	15.80	5.015	-119.50	0.070	-173.00	0.401	122.00	1.300	15.269
4.20	0.162	-58.70	4.877	-143.00	0.072	158.60	0.329	101.30	1.365	14.704
4.30	0.295	-119.50	4.622	-168.20	0.069	129.50	0.209	85.30	1.467	14.212
4.40	0.455	-153.40	4.219	166.70	0.065	104.20	0.089	91.70	1.536	13.808
4.50	0.590	-176.10	3.774	144.10	0.061	80.80	0.082	172.80	1.554	13.533
4.60	0.697	165.30	3.344	122.10	0.057	57.50	0.185	-176.10	1.525	13.409
4.70	0.781	149.20	3.016	101.50	0.053	37.70	0.293	176.40	1.423	13.687
4.80	0.830	135.40	2.715	82.00	0.050	18.50	0.385	168.00	1.338	13.870
5.00	0.840	110.00	2.300	42.90	0.047	-16.70	0.525	151.10	1.294	13.643
6.00	0.980	95.5	0.316	165.9	0.007	158.6	0.982	83.9	-8.118	8.470

NEZ3642-8D/8DL
V_{DS} = 10 V, I_{DS} = 1600 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.10	0.960	-154.10	6.626	92.50	0.004	6.50	0.759	176.40	0.968	32.192
0.20	0.967	-171.70	3.388	76.50	0.006	16.80	0.790	176.10	0.596	27.518
0.50	0.974	166.70	1.332	41.80	0.004	31.50	0.821	167.30	1.702	20.340
1.00	0.980	142.00	0.671	-4.10	0.007	26.50	0.869	150.80	1.029	18.782
1.50	0.966	115.00	0.521	-45.20	0.008	7.80	0.883	130.40	1.580	13.662
2.00	0.949	85.30	0.566	-85.90	0.012	-14.40	0.886	108.60	1.232	13.832
2.25	0.935	67.00	0.676	-108.90	0.013	-37.90	0.884	95.80	1.041	15.914
2.50	0.910	43.10	0.881	-135.60	0.015	-57.50	0.854	80.80	1.199	14.994
2.75	0.877	10.90	1.244	-169.00	0.013	-88.30	0.827	63.00	1.629	15.164
3.00	0.808	-33.90	1.828	149.70	0.011	-133.20	0.765	40.70	2.981	14.580
3.20	0.741	-79.70	2.439	110.20	0.005	163.20	0.686	16.40	9.327	14.187
3.30	0.711	-105.50	2.782	88.60	0.005	96.70	0.634	1.70	10.489	14.246
3.40	0.691	-132.90	3.111	66.00	0.008	35.60	0.566	-16.00	7.277	14.289
3.50	0.678	-161.00	3.422	42.10	0.014	-0.10	0.498	-37.70	4.430	14.464
3.60	0.669	171.40	3.684	17.50	0.023	-32.00	0.440	-63.50	2.829	14.662
3.70	0.657	144.30	3.871	-7.40	0.030	-58.90	0.400	-93.20	2.235	14.841
3.80	0.633	117.10	3.978	-32.60	0.037	-83.90	0.384	-123.10	1.894	14.870
3.90	0.598	89.50	4.003	-57.50	0.043	-109.70	0.385	-150.80	1.739	14.691
4.00	0.558	60.60	3.950	-82.30	0.050	-135.90	0.386	-174.20	1.637	14.304
4.10	0.519	28.90	3.855	-106.00	0.055	-163.20	0.366	168.90	1.654	13.728
4.20	0.512	-9.20	3.886	-130.50	0.056	172.80	0.350	161.20	1.657	13.674
4.30	0.521	-51.10	3.711	-157.10	0.056	149.70	0.341	157.00	1.723	13.262
4.40	0.561	-89.20	3.413	176.70	0.057	126.90	0.346	155.30	1.752	12.734
4.50	0.626	-119.50	3.071	152.70	0.055	105.50	0.364	155.40	1.815	12.246
4.60	0.692	-144.70	2.720	129.60	0.052	82.60	0.395	154.10	1.878	11.787
4.70	0.758	-165.30	2.446	107.70	0.049	63.80	0.447	151.50	1.817	11.751
4.80	0.803	178.10	2.181	86.80	0.044	46.10	0.495	148.80	1.831	11.683
4.90	0.830	163.60	1.955	65.80	0.041	28.00	0.543	144.90	1.779	11.664
5.00	0.837	151.50	1.759	44.90	0.038	9.70	0.591	141.10	1.753	11.613
6.00	0.972	98.7	0.263	-166.1	0.003	-13.5	1.045	82.8	8.303	7.175

NEZ3642-15D/15DL
VDS = 10 V, IDS = 4000 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
1.00	0.966	143.90	0.721	23.40	0.009	26.60	0.875	148.40	1.603	14.478
1.50	0.943	121.30	0.679	-20.00	0.013	-1.00	0.824	124.40	2.063	11.305
2.00	0.901	93.30	0.827	-66.50	0.020	-38.10	0.760	101.30	2.077	10.256
2.50	0.833	54.80	1.209	-123.80	0.029	-89.20	0.676	72.40	1.858	10.854
3.00	0.721	-5.30	2.071	162.80	0.038	-160.60	0.596	34.00	1.622	12.742
3.10	0.690	-21.90	2.351	145.40	0.039	-178.00	0.578	23.50	1.618	13.191
3.20	0.653	-41.00	2.639	126.80	0.042	162.50	0.551	10.80	1.584	13.492
3.30	0.614	-62.80	2.950	106.70	0.043	139.90	0.517	-5.00	1.641	13.678
3.40	0.575	-87.30	3.264	85.20	0.044	115.20	0.484	-24.20	1.670	13.919
3.50	0.537	-114.40	3.537	62.70	0.043	88.30	0.450	-46.10	1.782	14.025
3.60	0.503	-142.40	3.741	39.50	0.042	59.50	0.419	-71.70	1.894	14.053
3.70	0.472	-170.70	3.855	15.80	0.041	29.20	0.404	-99.20	2.002	14.008
3.80	0.444	162.40	3.913	-7.60	0.040	-0.40	0.414	-126.10	2.072	14.009
3.90	0.414	137.30	3.904	-29.40	0.040	-31.90	0.433	-148.60	2.118	13.889
4.00	0.381	113.50	3.839	-50.90	0.040	-60.50	0.447	-168.10	2.211	13.607
4.10	0.349	89.30	3.843	-72.00	0.040	-89.40	0.459	175.50	2.267	13.490
4.20	0.314	59.20	4.033	-93.80	0.043	-114.00	0.467	163.20	2.069	13.833
4.30	0.253	30.70	4.105	-117.30	0.051	-142.50	0.488	151.90	1.791	13.902
4.40	0.244	-12.20	4.236	-141.30	0.055	-169.70	0.449	142.80	1.712	13.950
4.50	0.283	-62.80	4.309	-168.40	0.059	160.80	0.384	137.70	1.655	13.901
4.60	0.377	-109.70	4.223	161.60	0.060	130.20	0.327	143.90	1.665	13.709
4.70	0.483	-149.40	3.910	131.30	0.060	100.30	0.363	159.40	1.667	13.367
4.80	0.557	176.10	3.382	102.50	0.055	72.40	0.474	164.40	1.786	12.748
4.90	0.585	145.10	2.809	75.40	0.048	45.50	0.577	159.60	2.031	11.876
5.00	0.571	115.50	2.332	49.60	0.042	19.00	0.666	150.40	2.327	10.984
6.00	0.810	171.80	0.158	-159.70	0.003	42.10	1.023	71.50	-17.707	17.215