

# 4W/8W C-BAND POWER GaAs FET NEZ Series

## 4W/8W C-BAND POWER GaAs FET N-CANNEL GaAs MES FET

### DESCRIPTION

The NEZ Series of microwave power GaAs FETs offer high output power, high gain and high efficiency at C-band for microwave and satellite communications.

Internal input and output circuits matched to  $50\ \Omega$  are designed to provide good flatness of gain and output power in allocated band.

To reduce the thermal resistance, the device has a PHS (Plated Heat Sink) structure.

NEC's stringent quality assurance and test procedures guarantee the highest reliability and performance.

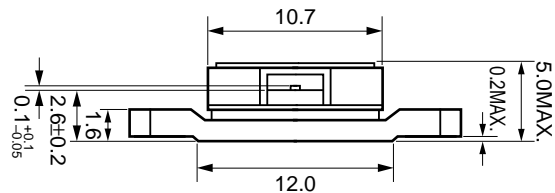
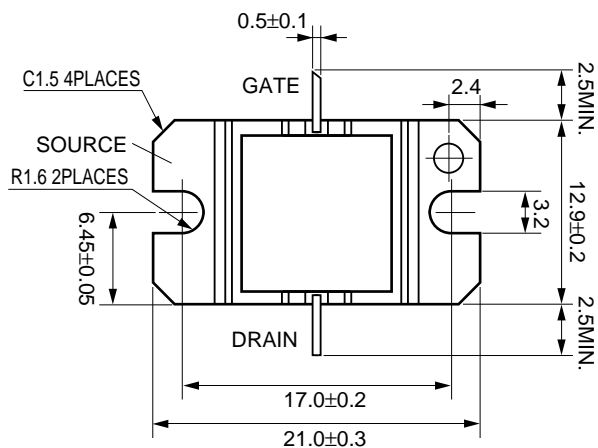
### SELECTION CHART

NEZ PART NUMBER	FREQUENCY BAND (GHz)
NEZ3642-4D, 8D, 8DD	3.6 to 4.2
NEZ4450-4D, 4DD/8D, 8DD	4.4 to 5.0
NEZ5964-4D, 4DD/8D, 8DD	5.9 to 6.45
NEZ6472-4D, 4DD/8D, 8DD	6.4 to 7.2
NEZ7177-4D, 4DD/8D, 8DD	7.1 to 7.7
NEZ7785-4D, 4DD/8D, 8DD	7.7 to 8.5

### FEATURES

- Internally matched to  $50\ \Omega$
- High power output
- High linear gain
- High reliability
- Low distortion

### PACKAGE DIMENSIONS (unit: mm)



**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	RATINGS		UNIT
		NEZ-4D, 4DD	NEZ-8D, 8DD	
Drain to Source Voltage	V <sub>DS</sub>	15	15	V
Gate to Source Voltage	V <sub>GS</sub>	- 12	-12	V
Gate to Drain Voltage	V <sub>GD</sub>	- 18	- 18	V
Drain Current	I <sub>D</sub>	4.5	9.0	A
Gate Current	I <sub>G</sub>	25	50	mA
Total Power Dissipation	P <sub>T</sub> *	25	50	W
Channel Temperature	T <sub>ch</sub>	175	175	°C
Storage Temperature	T <sub>stg</sub>	- 65 to + 175	- 65 to + 175	°C

\*T<sub>C</sub> = 25 °C

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	Part No.	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Saturated Drain Current	I <sub>DSS</sub>	NEZ-4D	1.0	2.3	3.5	A	V <sub>DS</sub> = 2.5 V, V <sub>GS</sub> = 0 V
		NEZ-8D, 8DD	2.0	4.5	7.0		
Pinch-off Voltage	V <sub>P</sub>	NEZ-4D, 4DD	- 3.5	- 2.0	- 0.5	V	V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 15 mA
		NEZ-8D, 8DD	- 3.5	- 2.0	- 0.5		V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 30 mA
Trans-Conductance	g <sub>m</sub>	NEZ-4D, 4DD	—	1300	—	mS	V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 1 A
		NEZ-8D, 8DD	—	2600	—		V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 2 A
Gate to Drain Voltage	B <sub>VGD0</sub>	NEZ-4D, 4DD	20	22	—	V	I <sub>GD</sub> = 15 mA
		NEZ-8D, 8DD	20	22	—		I <sub>GD</sub> = 30 mA
Thermal Resistance	R <sub>th</sub>	NEZ-4D, 4DD	—	5.0	6.0	°C/W	Channel to Case
		NEZ-8D, 8DD	—	2.5	3.0		

**4W PERFORMANCE SPECIFICATIONS (T<sub>A</sub> = 25 °C, Z<sub>s</sub> = Z<sub>L</sub> = 50 Ω)**

PART NUMBER	P1dB (dBm) *1		GL (dB)		IDS (A) *2		ΔGL (dB) *3, 4	IM <sub>3</sub> (dBc) *4		η <sub>add</sub> (%)	TEST CONDITIONS			
	MIN.	TYP.	MIN.	TYP.	TYP.	MAX.	MAX.	TYP.	MAX.	TYP.	V <sub>DS</sub>	I <sub>DS</sub>	FREQUENCY	IM <sub>3</sub> TEST
											(V)	(A)	BAND (GHz)	FREQ. (GHz) *5
NEZ3642-4D	35.5	36.5	10.0	11.0	1.2	1.5	1.0	-45	-42	43	10	0.8	3.6 to 4.2	4.2
NEZ4450-4D, 4DD	35.5	36.5	9.5	10.5	1.2	1.5	1.0	-45	-42	40	10	0.8	4.4 to 5.0	5.0
NEZ5964-4D, 4DD	35.5	36.5	9.0	10.0	1.2	1.5	1.0	-45	-42	37	10	0.8	5.9 to 6.45	6.45
NEZ6472-4D, 4DD	35.5	36.5	8.0	9.0	1.2	1.5	1.0	-45	-42	35	10	0.8	6.4 to 7.2	7.2
NEZ7177-4D, 4DD	35.5	36.5	7.5	8.5	1.2	1.5	1.0	-45	-42	33	10	0.8	7.1 to 7.7	7.7
NEZ7785-4D, 4DD	35.5	36.5	7.0	8.0	1.2	1.5	1.0	-45	-42	33	10	0.8	7.7 to 8.5	8.5

**Notes** \*1 Output power at 1dB gain compression point

\*2 IDS values are specified at P1dB point.

\*3 Gain flatness

\*4 Applies to - 4DD option only

\*5 IM<sub>3</sub> test conditions: Δf = 10 MHz, 2 tones test, P<sub>o</sub> = 26dBm (single carrier level)

**MAXIMUM OPERATING LIMITS**

R <sub>g</sub> max. (Ω)	V <sub>DS</sub> max. (V)
200	10

R<sub>g</sub> max is the maximum series resistance between the gate supply and the FET gate.

**8W PERFORMANCE SPECIFICATIONS (T<sub>A</sub> = 25 °C, Z<sub>s</sub> = Z<sub>L</sub> = 50 Ω)**

PART NUMBER	P1dB (dBm) *1		GL (dB)		IDS (A) *2		ΔGL (dB) *3, 4	IM <sub>3</sub> (dBc) *4		η <sub>add</sub> (%)	TEST CONDITIONS			
	MIN.	TYP.	MIN.	TYP.	TYP.	MAX.	MAX.	TYP.	MAX.	TYP.	V <sub>DS</sub> (V)	I <sub>DS</sub> (A) (RF OFF)	FREQUENCY	IM <sub>3</sub> TEST
													BAND (GHz)	FREQ. (GHz) *5
NEZ3642-8D, 8DD	38.5	39.5	10.0	11.0	2.4	3.0	1.0	- 45	- 42	40	10	1.6	3.6 to 4.2	4.2
NEZ4450-8D, 8DD	38.5	39.5	9.5	10.5	2.4	3.0	1.0	- 45	- 42	37	10	1.6	4.4 to 5.0	5.0
NEZ5964-8D, 8DD	38.5	39.5	8.5	9.5	2.4	3.0	1.0	- 45	- 42	35	10	1.6	5.9 to 6.45	6.45
NEZ6472-8D, 8DD	38.5	39.5	7.5	8.5	2.4	3.0	1.0	- 45	- 42	32	10	1.6	6.4 to 7.2	7.2
NEZ7177-8D, 8DD	38.5	39.5	7.0	8.0	2.4	3.0	1.0	- 45	- 42	30	10	1.6	7.1 to 7.7	7.7
NEZ7785-8D, 8DD	38.5	39.5	6.5	7.5	2.4	3.0	1.0	- 45	- 42	30	10	1.6	7.7 to 8.5	8.5

**Notes** \*1 Output power at 1dB gain compression point

\*2 IDS values are specified at P1dB point.

\*3 Gain flatness

\*4 Applies to – 8DD option only

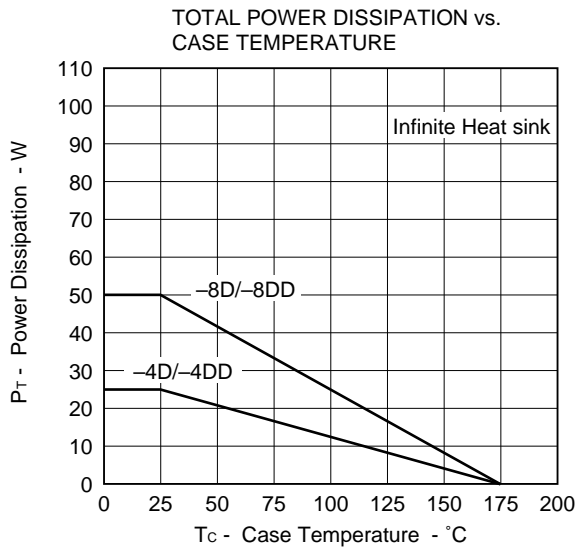
\*5 IM<sub>3</sub> test conditions: Δf = 10 MHz, 2 tones test, P<sub>o</sub> = 29dBm (single carrier level)

**MAXIMUM OPERATING LIMITS**

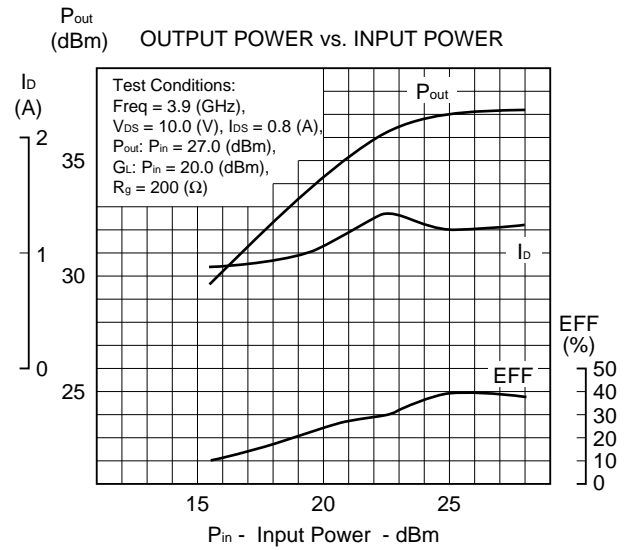
R <sub>g</sub> max. (Ω)	V <sub>DS</sub> max. (V)
100	10

R<sub>g</sub> max is the maximum series resistance between the gate supply and the FET gate.

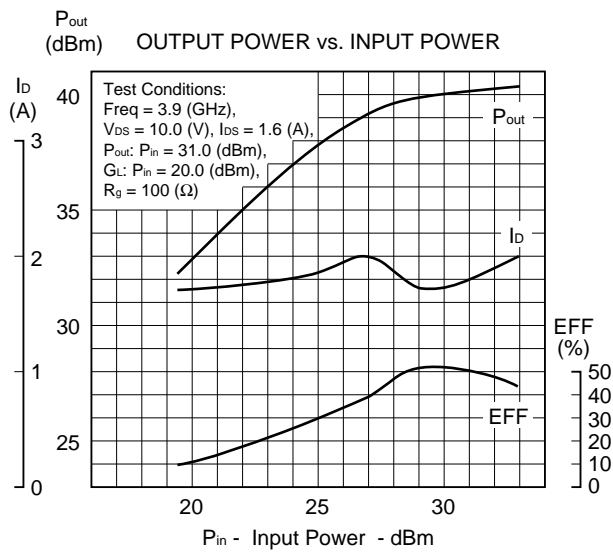
TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ )



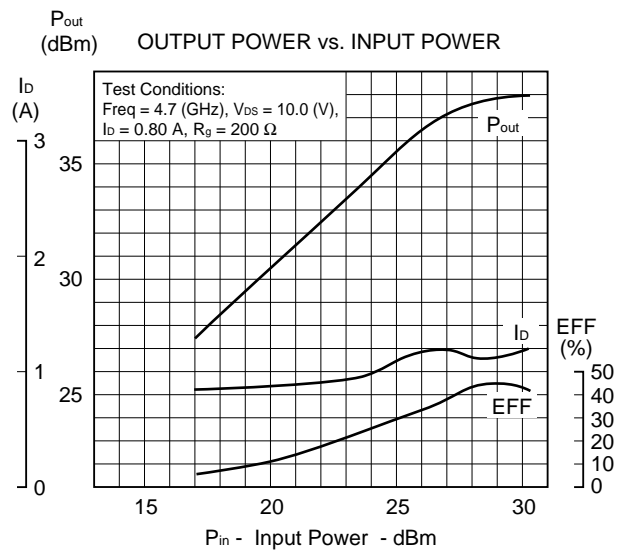
NEZ3642-4D



NEZ3642-8D/8DD

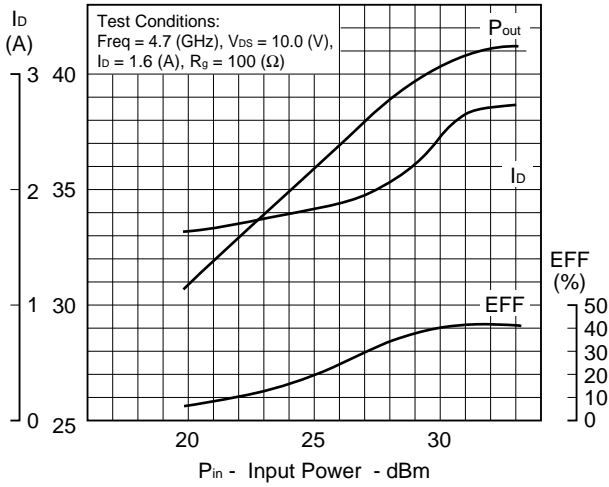


NEZ4450-4D/4DD



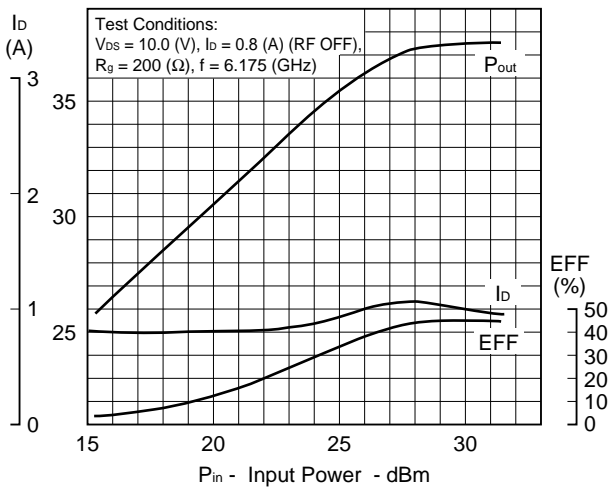
NEZ4450-8D/8DD

$P_{out}$  (dBm) OUTPUT POWER vs. INPUT POWER

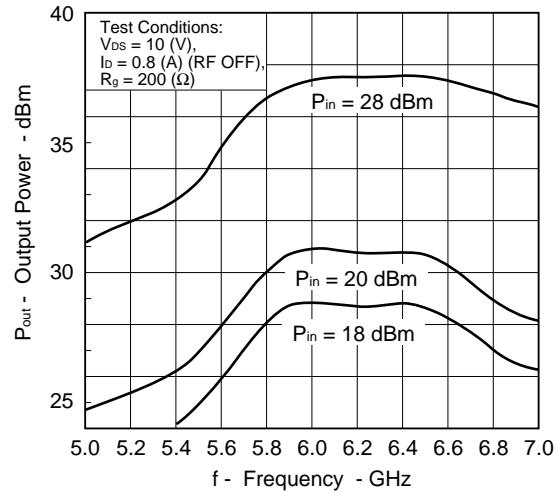


NEZ5964-4D, 4DD

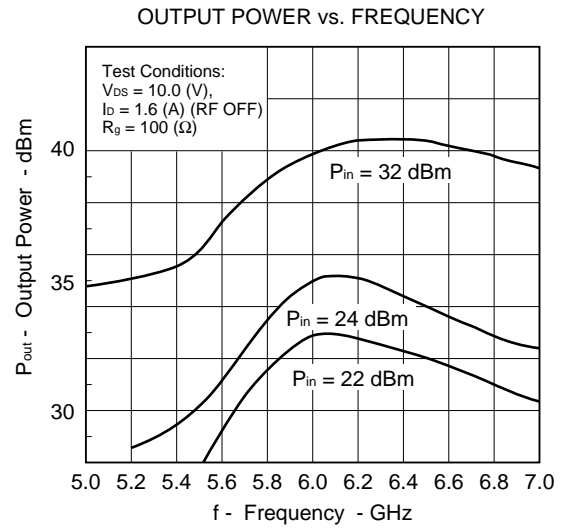
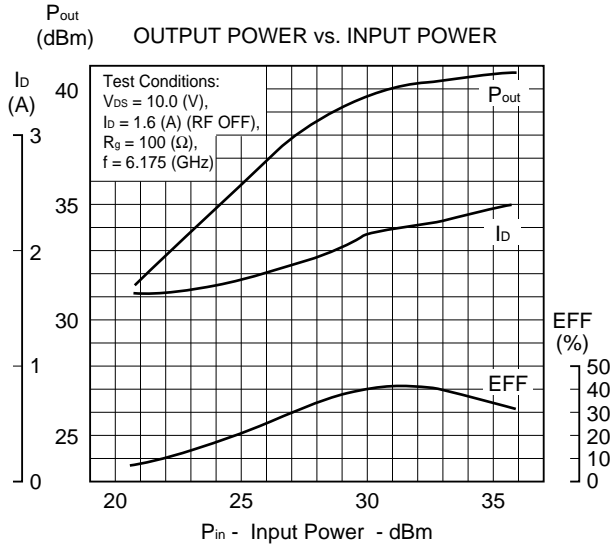
$P_{out}$  (dBm) OUTPUT POWER vs. INPUT POWER



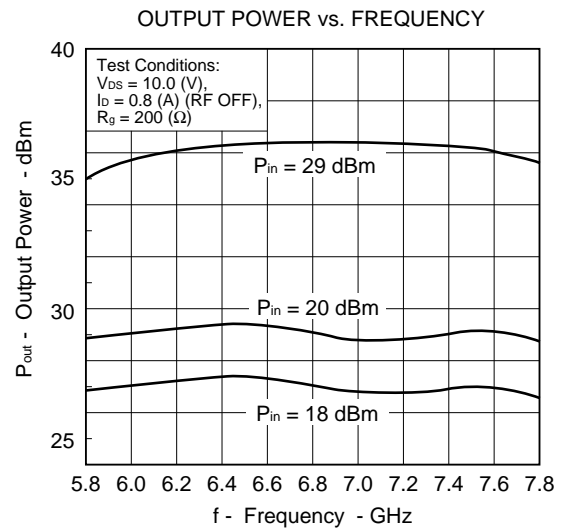
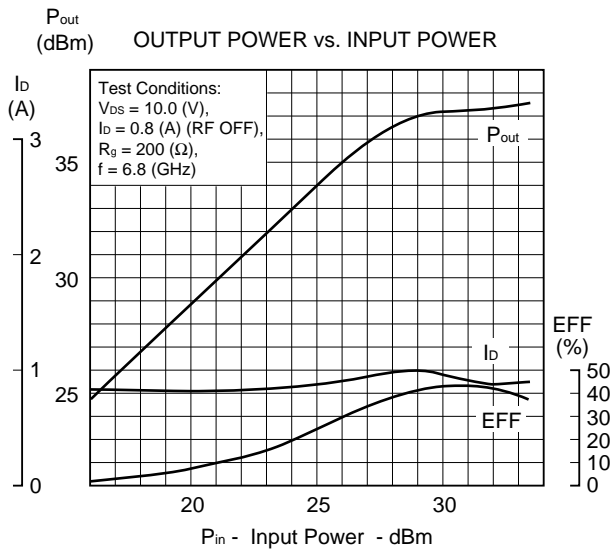
OUTPUT POWER vs. FREQUENCY



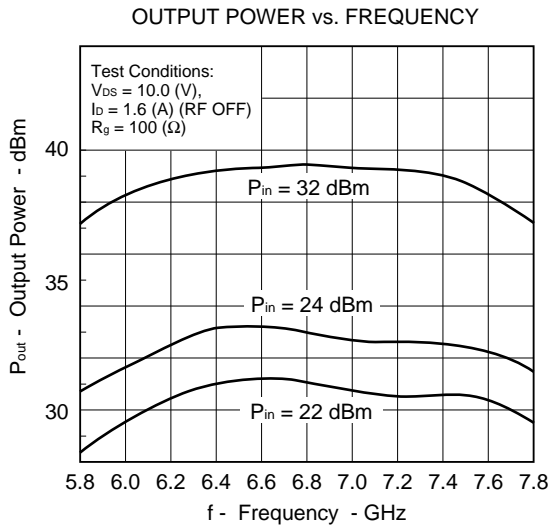
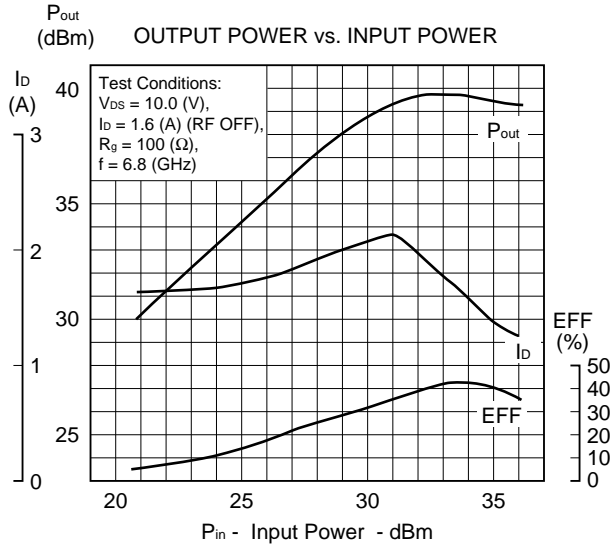
NEZ5964-8D, 8DD



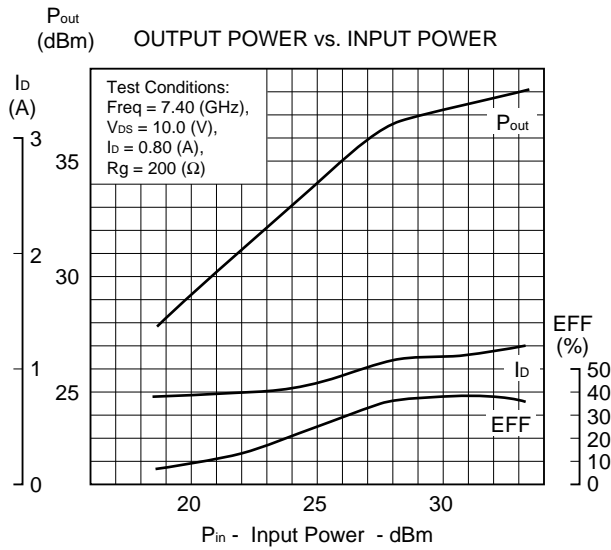
NEZ6472-4D, 4DD



NEZ6472-8D, 8DD

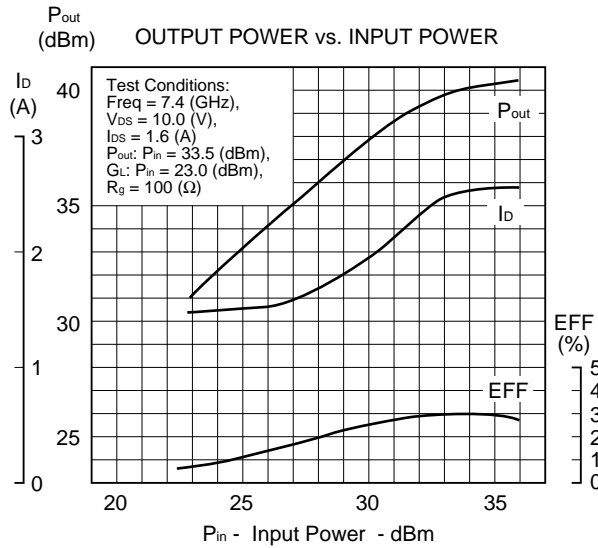


NEZ7177-4D/4DD

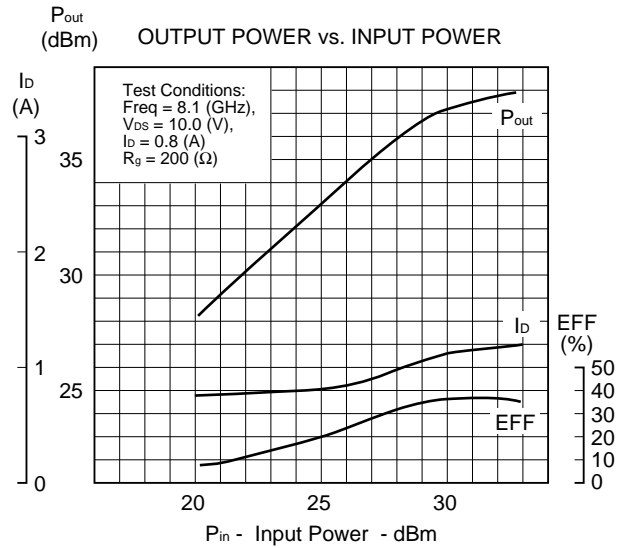




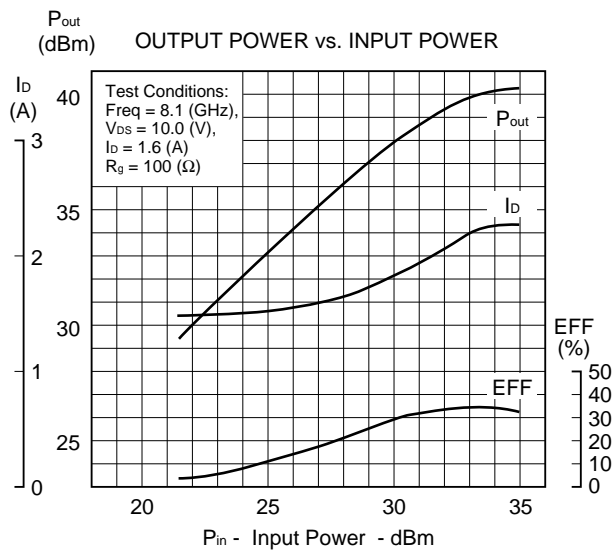
NEZ7177-8D/8DD



NEZ7785-4D/4DD



NEZ7785-8D/8DD



**S-PARAMETER**

NEZ3642-4D

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -1.486\text{ V}$ ,  $I_G = 0.0\text{ mA}$ ,  $R_G = 100\ \Omega$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.957	-129.5	11.354	104.3	0.005	11.4	0.587	180.0
0.200	0.957	-158.1	6.114	82.7	0.007	8.6	0.634	-179.7
0.500	0.960	171.4	2.444	43.0	0.006	12.8	0.700	173.2
1.000	0.968	142.4	1.231	-6.3	0.006	7.1	0.792	156.5
1.500	0.954	112.3	0.949	-50.2	0.009	-2.6	0.824	134.9
2.000	0.931	78.9	1.034	-93.9	0.012	-24.2	0.836	111.9
2.250	0.911	57.5	1.233	-119.1	0.012	-50.6	0.836	98.5
2.500	0.878	28.8	1.590	-148.5	0.012	-77.8	0.808	82.7
2.750	0.827	-10.4	2.182	174.7	0.008	-133.1	0.781	63.7
3.000	0.749	-64.1	2.985	130.2	0.006	109.4	0.704	39.3
3.200	0.699	-113.6	3.665	90.3	0.017	38.8	0.601	12.8
3.300	0.685	-138.9	4.020	69.3	0.023	18.4	0.535	-3.5
3.400	0.676	-163.7	4.356	47.7	0.029	-4.1	0.460	-23.8
3.500	0.664	172.3	4.682	25.3	0.036	-27.0	0.387	-50.4
3.600	0.638	149.2	4.967	2.0	0.044	-48.5	0.342	-83.8
3.700	0.594	126.6	5.181	-21.9	0.050	-71.4	0.337	-122.0
3.800	0.523	103.9	5.295	-46.3	0.058	-94.7	0.364	-157.7
3.900	0.427	80.7	5.316	-70.7	0.063	-119.1	0.401	171.9
4.000	0.315	54.5	5.211	-95.4	0.068	-145.8	0.422	145.3
4.100	0.194	15.8	5.015	-119.5	0.070	-173.0	0.401	122.0
4.200	0.162	-58.7	4.877	-143.0	0.072	158.6	0.329	101.3
4.300	0.295	-119.5	4.622	-168.2	0.069	129.5	0.209	85.3
4.400	0.455	-153.4	4.219	166.7	0.065	104.2	0.089	91.7
4.500	0.590	-176.1	3.774	144.1	0.061	80.8	0.082	172.8
4.600	0.697	165.3	3.344	122.1	0.057	57.5	0.185	-176.1
4.700	0.781	149.2	3.016	101.5	0.053	37.7	0.293	176.4
4.800	0.830	135.4	2.715	82.0	0.050	18.5	0.385	168.0
5.000	0.840	110.0	2.300	42.9	0.047	-16.7	0.525	151.1
6.000	0.980	95.5	0.316	165.9	0.007	158.6	0.982	83.9

NEZ4450-4DD

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -1.409\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.961	-116.2	11.641	114.8	0.005	24.8	0.627	179.2
0.200	0.964	-149.8	6.618	94.4	0.007	24.1	0.654	175.7
0.500	0.970	177.3	2.841	62.2	0.008	5.1	0.666	164.4
1.000	0.971	150.5	1.555	22.4	0.008	-6.1	0.675	147.8
1.500	0.961	125.8	1.187	-16.3	0.010	-22.0	0.682	128.3
2.000	0.949	102.0	1.079	-55.1	0.012	-52.2	0.699	107.2
2.500	0.929	74.2	1.138	-96.0	0.013	-91.6	0.698	83.6
3.000	0.907	39.2	1.410	-142.0	0.015	-139.5	0.689	57.8
3.500	0.830	-8.9	1.937	162.5	0.019	144.3	0.657	25.8
3.700	0.773	-33.7	2.221	137.5	0.020	122.0	0.628	9.8
3.800	0.742	-47.7	2.383	124.0	0.023	103.5	0.614	0.9
3.900	0.711	-63.6	2.579	109.3	0.025	92.0	0.595	-9.3
4.000	0.685	-81.3	2.684	92.6	0.032	69.8	0.574	-21.1
4.100	0.680	-100.6	2.874	76.5	0.042	61.1	0.551	-34.2
4.200	0.656	-122.2	3.000	59.7	0.054	31.6	0.499	-46.0
4.300	0.632	-142.8	3.114	43.5	0.057	5.1	0.456	-57.1
4.400	0.621	-162.6	3.252	27.4	0.056	-14.4	0.432	-67.1
4.500	0.625	177.7	3.360	10.2	0.055	-32.7	0.417	-79.0
4.600	0.626	158.7	3.452	-8.0	0.056	-47.9	0.400	-91.9
4.700	0.632	140.2	3.484	-25.4	0.057	-65.0	0.389	-104.7
4.800	0.629	122.5	3.471	-43.5	0.059	-79.0	0.375	-117.6
4.900	0.626	105.6	3.493	-60.9	0.063	-96.6	0.368	-129.5
5.000	0.619	88.9	3.482	-78.3	0.064	-114.0	0.363	-140.1
5.100	0.606	72.2	3.458	-96.9	0.068	-130.2	0.359	-150.1
5.200	0.591	54.0	3.463	-115.6	0.070	-148.7	0.357	-158.4

NEZ5964-4DD

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -1.327\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.947	-107.2	13.855	120.4	0.007	36.0	0.633	-177.3
0.200	0.958	-142.9	8.208	99.3	0.008	15.4	0.661	178.4
0.500	0.964	-177.3	3.525	69.5	0.009	3.2	0.674	167.7
1.000	0.968	158.0	1.854	35.9	0.009	-16.8	0.693	153.0
1.500	0.963	137.0	1.271	3.9	0.010	-25.6	0.708	137.0
2.000	0.961	119.1	1.008	-25.9	0.010	-41.1	0.734	120.4
2.500	0.951	101.9	0.873	-53.7	0.011	-57.7	0.750	103.1
3.000	0.960	83.2	0.837	-82.8	0.011	-79.9	0.761	84.9
3.500	0.975	63.3	0.864	-112.9	0.012	-104.1	0.763	65.7
4.000	0.967	42.9	0.942	-145.0	0.016	-128.7	0.752	45.3
4.200	0.958	34.7	0.997	-158.1	0.018	-159.6	0.750	36.4
4.400	0.939	25.6	1.060	-171.4	0.013	177.5	0.733	27.1
4.600	0.912	16.9	1.143	174.7	0.014	179.2	0.717	18.2
4.800	0.890	7.4	1.261	160.6	0.018	165.7	0.704	8.5
5.000	0.859	-3.7	1.404	144.8	0.023	148.4	0.684	-2.6
5.200	0.816	-14.2	1.621	125.9	0.029	126.1	0.632	-13.1
5.400	0.748	-27.7	1.836	108.2	0.034	100.3	0.590	-24.6
5.600	0.656	-45.2	2.135	89.5	0.043	75.5	0.541	-39.4
5.800	0.542	-69.5	2.483	67.7	0.055	49.0	0.466	-58.0
6.000	0.420	-104.4	2.878	43.5	0.064	19.8	0.377	-81.3
6.200	0.345	-156.5	3.201	16.7	0.077	-10.8	0.274	-115.9
6.400	0.377	146.0	3.370	-12.7	0.086	-44.0	0.200	-165.7
6.600	0.470	104.7	3.352	-41.9	0.090	-73.4	0.193	140.5
6.800	0.528	74.1	3.171	-68.6	0.091	-101.6	0.221	99.9
7.000	0.540	50.6	2.929	-92.7	0.088	-126.4	0.241	74.9

NEZ6472-4DD

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -1.458\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.942	-103.4	13.187	121.3	0.008	62.3	0.625	179.6
0.200	0.958	-141.0	7.998	100.9	0.008	16.7	0.677	177.2
0.500	0.963	-177.8	3.473	71.0	0.009	-0.6	0.691	166.6
1.000	0.968	155.5	1.846	37.5	0.010	-12.2	0.701	151.7
1.500	0.960	133.3	1.294	6.3	0.010	-25.4	0.709	134.5
2.000	0.955	113.5	1.050	-23.5	0.011	-41.3	0.726	118.8
3.000	0.949	71.5	0.914	-82.4	0.013	-85.6	0.748	84.7
4.000	0.930	23.9	1.047	-147.7	0.020	-148.4	0.756	48.6
4.500	0.872	-3.2	1.262	174.5	0.019	161.2	0.759	28.0
5.000	0.749	-35.9	1.547	134.8	0.024	127.1	0.728	5.8
5.500	0.590	-87.0	2.027	88.7	0.042	71.5	0.645	-21.3
6.000	0.528	-167.7	2.631	33.8	0.065	7.7	0.484	-59.5
6.200	0.562	158.3	2.849	9.7	0.072	-20.1	0.395	-78.7
6.300	0.580	141.4	2.907	-3.5	0.075	-32.9	0.345	-90.2
6.400	0.600	126.3	3.002	-16.1	0.080	-46.7	0.305	-102.6
6.500	0.613	112.6	3.061	-28.6	0.083	-59.1	0.265	-117.9
6.600	0.617	98.8	3.134	-41.7	0.087	-71.9	0.234	-135.4
6.700	0.604	86.3	3.189	-54.2	0.092	-83.9	0.218	-154.9
6.800	0.580	73.1	3.195	-67.9	0.095	-97.7	0.204	-178.2
6.900	0.552	60.7	3.245	-81.2	0.101	-110.3	0.211	159.7
7.000	0.506	49.0	3.167	-94.1	0.103	-123.7	0.224	139.5
7.100	0.470	33.6	3.236	-108.6	0.107	-138.5	0.240	117.8
7.200	0.404	19.3	3.152	-121.6	0.106	-150.7	0.244	102.2
7.300	0.342	2.3	3.164	-135.6	0.110	-163.6	0.254	88.0
7.400	0.271	-17.1	3.068	-147.9	0.110	-175.1	0.248	76.6

**NEZ7177-4DD**

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -2.002\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.964	-96.7	13.227	126.5	0.007	39.2	0.623	-178.2
0.200	0.961	-135.6	8.162	104.3	0.008	19.7	0.659	178.3
0.500	0.960	-173.9	3.583	73.2	0.009	10.4	0.680	168.7
1.000	0.959	162.3	2.441	41.5	0.011	1.0	0.694	154.4
1.500	0.959	138.5	1.299	9.9	0.013	-8.4	0.709	140.2
2.000	0.952	119.9	1.092	-18.4	0.014	-26.2	0.733	124.1
3.000	0.953	80.9	0.864	-74.8	0.016	-61.8	0.776	92.1
4.000	0.922	37.6	0.901	-134.7	0.015	-108.6	0.806	58.5
5.000	0.801	-19.0	1.230	157.3	0.021	176.3	0.803	19.8
5.500	0.717	-52.9	1.501	121.3	0.031	130.4	0.789	-1.2
6.000	0.581	-105.9	2.002	74.0	0.045	59.6	0.714	-28.3
6.300	0.508	-148.6	2.354	42.3	0.055	17.8	0.641	-45.5
6.500	0.478	178.0	2.596	19.0	0.058	-8.5	0.581	-58.0
6.700	0.465	141.6	2.807	-5.1	0.066	-31.7	0.520	-71.1
6.900	0.460	105.8	3.011	-31.2	0.072	-54.5	0.453	-85.9
7.000	0.455	88.2	3.038	-44.5	0.074	-68.5	0.419	-93.3
7.100	0.448	71.9	3.039	-57.8	0.079	-77.6	0.389	-101.2
7.200	0.431	55.8	3.040	-70.3	0.080	-91.1	0.352	-112.1
7.300	0.414	39.6	2.915	-82.9	0.088	-102.8	0.314	-122.4
7.400	0.395	23.3	2.902	-96.1	0.087	-116.3	0.268	-134.4
7.500	0.380	6.7	2.897	-106.9	0.098	-128.8	0.228	-148.4
7.600	0.358	-10.2	2.841	-120.1	0.098	-139.7	0.185	-164.4
7.700	0.332	-29.7	2.867	-132.6	0.104	-155.7	0.144	175.5
7.800	0.318	-49.5	2.819	-144.8	0.104	-168.2	0.116	150.4
7.900	0.307	-70.0	2.759	-158.7	0.108	178.2	0.091	117.1

**NEZ7785-4DD**

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 800\text{ mA}$ ,  $V_{GS} = -1.324\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.960	-96.7	14.856	126.3	0.007	40.9	0.630	-177.3
0.200	0.957	-135.4	9.147	104.7	0.009	19.9	0.671	179.0
0.500	0.956	-174.0	4.012	74.3	0.010	3.8	0.693	168.6
1.000	0.958	159.5	2.093	42.6	0.011	-5.6	0.707	155.4
1.500	0.957	137.4	1.435	13.2	0.013	-11.0	0.714	141.0
2.000	0.955	119.1	1.118	-14.5	0.014	-24.9	0.739	125.8
2.500	0.942	101.0	0.940	-41.3	0.015	-39.7	0.753	109.6
3.000	0.955	82.8	0.862	-67.2	0.017	-56.8	0.774	94.3
3.500	0.963	63.3	0.837	-93.8	0.017	-77.7	0.790	79.0
4.000	0.956	43.7	0.852	-121.5	0.021	-91.5	0.795	63.3
4.500	0.914	25.0	0.868	-151.3	0.015	-113.4	0.807	45.7
5.000	0.869	1.5	0.994	180.0	0.024	-144.1	0.793	27.8
5.500	0.801	-26.8	1.222	147.2	0.028	161.3	0.775	7.9
6.000	0.689	-62.7	1.567	108.7	0.037	105.5	0.727	-14.7
6.500	0.559	-114.9	2.070	64.4	0.046	47.6	0.641	-41.3
6.700	0.515	-143.2	2.306	44.4	0.052	24.8	0.591	-53.1
6.900	0.490	-176.0	2.566	21.8	0.057	4.1	0.527	-67.0
7.100	0.495	149.6	2.710	-1.8	0.061	-19.0	0.456	-80.1
7.300	0.510	115.1	2.728	-26.7	0.067	-40.7	0.380	-94.4
7.500	0.527	85.0	2.680	-48.8	0.071	-63.5	0.312	-110.4
7.700	0.547	58.0	2.665	-71.1	0.079	-84.4	0.243	-129.8
7.900	0.544	33.6	2.598	-93.3	0.087	-107.1	0.187	-156.4
8.100	0.526	10.9	2.557	-114.8	0.089	-130.0	0.157	168.7
8.300	0.496	-11.7	2.479	-137.8	0.094	-151.8	0.151	123.7
8.500	0.456	-34.2	2.343	-159.7	0.095	-174.5	0.166	84.0
8.700	0.419	-59.8	2.277	179.9	0.098	164.9	0.180	54.3

NEZ3642-8D

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 1\ 600\text{ mA}$ ,  $V_{GS} = -1.618\text{ V}$ ,  $I_G = 0.0\text{ mA}$ ,  $R_G = 100\ \Omega$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.960	-154.1	6.626	92.5	0.004	46.5	0.759	176.4
0.200	0.967	-171.7	3.388	76.5	0.006	16.8	0.790	176.1
0.500	0.974	166.7	1.332	41.8	0.004	31.5	0.821	167.3
1.000	0.980	142.0	0.671	-4.1	0.007	26.5	0.869	150.8
1.500	0.966	115.0	0.521	-45.2	0.008	7.8	0.883	130.4
2.000	0.949	85.3	0.566	-85.9	0.012	-14.4	0.886	108.6
2.250	0.935	67.0	0.676	-108.9	0.013	-37.9	0.884	95.8
2.500	0.910	43.1	0.881	-135.6	0.015	-57.5	0.854	80.8
2.750	0.877	10.9	1.244	-169.0	0.013	-88.3	0.827	63.0
3.000	0.808	-33.9	1.828	149.7	0.011	-133.2	0.765	40.7
3.200	0.741	-79.7	2.439	110.2	0.005	163.2	0.686	16.4
3.300	0.711	-105.5	2.782	88.6	0.005	96.7	0.634	1.7
3.400	0.691	-132.9	3.111	66.0	0.008	35.6	0.566	-16.0
3.500	0.678	-161.0	3.422	42.1	0.014	-0.1	0.498	-37.7
3.600	0.669	171.4	3.684	17.5	0.023	-32.0	0.440	-63.5
3.650	0.666	157.7	3.788	5.1	0.025	-44.4	0.415	-78.2
3.700	0.657	144.3	3.871	-7.4	0.030	-58.9	0.400	-93.2
3.750	0.644	131.2	3.920	-19.8	0.032	-70.1	0.390	-108.1
3.800	0.633	117.1	3.978	-32.6	0.037	-83.9	0.384	-123.1
3.850	0.619	103.5	3.987	-45.2	0.040	-97.1	0.381	-138.1
3.900	0.598	89.5	4.003	-57.5	0.043	-109.7	0.385	-150.8
3.950	0.578	75.0	3.984	-70.1	0.048	-123.2	0.386	-163.2
4.000	0.558	60.6	3.950	-82.3	0.050	-135.9	0.386	-174.2
4.050	0.535	45.5	3.907	-94.4	0.054	-150.1	0.383	176.3
4.100	0.519	28.9	3.855	-106.0	0.055	-163.2	0.366	168.9
4.150	0.512	10.7	3.864	-117.9	0.055	-176.0	0.354	164.6
4.200	0.512	-9.2	3.886	-130.5	0.056	172.8	0.350	161.2
4.250	0.509	-30.8	3.826	-144.1	0.056	161.0	0.347	158.6
4.300	0.521	-51.1	3.711	-157.1	0.056	149.7	0.341	157.0
4.350	0.536	-71.0	3.584	-170.4	0.057	139.1	0.343	155.7
4.400	0.561	-89.2	3.413	176.7	0.057	126.9	0.346	155.3
4.500	0.626	-119.5	3.071	152.7	0.055	105.5	0.364	155.4
4.600	0.692	-144.7	2.720	129.6	0.052	82.6	0.395	154.1
4.700	0.758	-165.3	2.446	107.7	0.049	63.8	0.447	151.5
4.800	0.803	178.1	2.181	86.8	0.044	46.1	0.495	148.8
4.900	0.830	163.6	1.955	65.8	0.041	28.0	0.543	144.9
5.000	0.837	151.5	1.759	44.9	0.038	9.7	0.591	141.1
5.100	0.835	141.6	1.593	24.0	0.035	-7.0	0.647	137.2
5.200	0.821	133.5	1.435	2.2	0.028	-28.5	0.707	133.7
5.300	0.812	127.3	1.278	-20.2	0.027	-42.1	0.781	129.3
5.400	0.806	123.5	1.111	-43.0	0.021	-64.0	0.849	124.5
5.500	0.828	120.1	0.969	-78.2	0.018	-95.8	0.864	118.9
6.000	0.972	98.7	0.263	-166.1	0.003	-13.5	1.045	82.8

**NEZ4450-8DD**

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 1\ 600\text{ mA}$ ,  $V_{GS} = -1.809\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.962	-147.3	7.146	101.1	0.002	14.6	0.776	176.8
0.200	0.977	-167.8	3.743	87.9	0.004	24.1	0.802	173.6
0.500	0.985	169.6	1.576	63.7	0.005	25.3	0.804	162.0
1.000	0.984	146.7	0.894	30.4	0.008	20.9	0.793	144.4
1.500	0.978	122.9	0.715	-4.6	0.011	1.7	0.771	124.1
2.000	0.967	100.2	0.696	-40.2	0.013	-25.8	0.748	102.8
2.500	0.949	73.7	0.792	-78.7	0.016	-55.9	0.702	79.1
3.000	0.935	41.3	1.062	-123.3	0.018	-101.6	0.642	53.7
3.500	0.865	-2.0	1.601	-178.3	0.022	-161.5	0.559	22.8
3.700	0.799	-24.4	1.918	156.5	0.022	169.5	0.521	7.2
3.800	0.761	-36.6	2.116	143.0	0.025	150.0	0.505	-1.5
3.900	0.720	-50.9	2.349	128.0	0.028	133.9	0.487	-12.4
4.000	0.668	-67.1	2.545	110.5	0.035	107.0	0.480	-25.4
4.100	0.633	-86.2	2.824	93.5	0.045	88.4	0.474	-40.1
4.200	0.572	-109.4	3.036	75.7	0.050	51.6	0.438	-56.5
4.300	0.505	-133.6	3.239	57.6	0.051	25.1	0.406	-71.7
4.400	0.454	-159.8	3.462	39.2	0.051	4.9	0.389	-87.5
4.500	0.421	171.2	3.610	19.8	0.052	-14.9	0.380	-104.9
4.600	0.393	140.4	3.719	-1.1	0.054	-33.3	0.371	-124.2
4.700	0.381	110.2	3.731	-20.8	0.056	-54.6	0.365	-142.9
4.800	0.373	80.4	3.637	-40.5	0.059	-73.6	0.356	-162.0
4.900	0.371	52.8	3.561	-60.2	0.062	-93.7	0.348	-179.6
5.000	0.374	26.4	3.438	-78.2	0.063	-112.0	0.337	163.3
5.100	0.380	1.3	3.296	-96.7	0.064	-130.0	0.321	146.6
5.200	0.396	-23.5	3.194	-115.0	0.067	-149.2	0.295	129.6

**NEZ5964-8DD**

$V_{DS} = 10\text{ V}$ ,  $I_{DS} = 1\ 600\text{ mA}$ ,  $V_{GS} = -1.644\text{ V}$ ,  $I_G = 0.0\text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.952	-140.0	8.776	105.5	0.005	34.1	0.799	179.0
0.200	0.975	-163.2	4.698	90.6	0.005	10.7	0.805	175.7
0.500	0.980	173.5	1.952	67.4	0.005	14.7	0.808	166.4
1.000	0.985	152.3	1.045	37.5	0.006	1.7	0.813	152.5
1.500	0.977	131.5	0.746	7.3	0.007	-4.4	0.811	138.4
2.000	0.972	113.2	0.625	-21.3	0.009	-16.9	0.823	123.6
2.500	0.962	95.1	0.580	-48.9	0.010	-35.9	0.821	108.2
3.000	0.967	74.7	0.604	-78.4	0.011	-60.7	0.821	91.8
3.500	0.974	52.0	0.684	-110.3	0.013	-87.0	0.814	74.5
4.000	0.944	27.4	0.838	-145.8	0.017	-117.8	0.799	55.8
4.200	0.923	17.1	0.934	-160.7	0.020	-152.6	0.796	47.5
4.400	0.892	4.8	1.051	-176.4	0.015	-178.1	0.778	38.5
4.600	0.853	-6.4	1.230	165.2	0.015	174.1	0.796	31.4
4.800	0.798	-20.7	1.433	146.9	0.022	160.8	0.779	21.2
5.000	0.718	-38.0	1.675	126.6	0.029	129.0	0.751	10.2
5.200	0.623	-60.7	1.996	103.8	0.036	95.2	0.705	-1.8
5.400	0.507	-92.1	2.362	79.0	0.047	62.1	0.628	-17.0
5.600	0.421	-136.0	2.777	51.2	0.056	26.9	0.519	-34.9
5.800	0.414	171.2	3.134	20.6	0.070	-7.9	0.367	-60.0
6.000	0.465	124.2	3.374	-11.8	0.081	-43.4	0.205	-97.7
6.200	0.481	86.7	3.426	-44.5	0.088	-77.6	0.132	-178.7
6.400	0.421	55.6	3.344	-76.4	0.092	-108.7	0.228	122.6
6.600	0.301	27.3	3.198	-107.4	0.095	-138.8	0.333	95.6
6.800	0.146	-7.6	3.000	-138.0	0.097	-167.8	0.394	75.3
7.000	0.083	-125.5	2.888	-168.8	0.100	164.6	0.412	57.6

NEZ6472-8DD

V<sub>DS</sub> = 10 V, I<sub>DS</sub> = 1 100 mA, V<sub>GS</sub> = -1.686 V, I<sub>G</sub> = 0.0 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.971	-136.9	8.298	106.7	0.004	-16.4	0.801	177.0
0.200	0.975	-161.5	4.465	92.4	0.005	18.2	0.830	175.1
0.500	0.981	174.4	1.859	69.8	0.005	9.8	0.834	165.6
1.000	0.985	153.4	0.991	41.4	0.007	8.5	0.835	151.2
1.500	0.978	133.4	0.703	13.5	0.008	0.8	0.833	136.2
2.000	0.973	115.9	0.579	-13.1	0.010	-13.9	0.838	121.7
2.500	0.962	98.3	0.520	-39.2	0.011	-33.9	0.833	106.5
3.000	0.972	79.4	0.516	-66.4	0.012	-50.9	0.837	90.6
3.500	0.984	59.3	0.547	-95.1	0.014	-72.0	0.837	74.6
4.000	0.973	38.6	0.615	-126.0	0.019	-104.8	0.828	58.0
4.500	0.955	16.7	0.764	-160.9	0.015	-144.0	0.846	39.9
5.000	0.862	-8.2	0.965	162.4	0.020	-175.3	0.819	20.8
5.500	0.720	-42.1	1.344	120.6	0.030	120.1	0.754	-0.4
5.800	0.606	-72.7	1.700	90.8	0.037	80.1	0.692	-17.2
6.000	0.532	-101.1	2.010	68.4	0.047	54.0	0.631	-31.4
6.200	0.477	-137.8	2.353	43.6	0.057	22.0	0.540	-48.7
6.400	0.464	177.9	2.702	15.3	0.070	-10.4	0.421	-71.0
6.500	0.472	156.9	2.837	0.8	0.076	-25.8	0.352	-85.5
6.600	0.486	136.3	2.988	-14.6	0.082	-43.1	0.287	-103.1
6.700	0.491	118.0	3.102	-29.8	0.088	-58.6	0.236	-125.7
6.800	0.488	99.4	3.150	-46.3	0.093	-76.0	0.196	-156.8
6.900	0.475	82.3	3.213	-62.6	0.100	-91.9	0.195	168.9
7.000	0.442	67.0	3.111	-78.6	0.103	-108.9	0.223	139.5
7.100	0.420	49.1	3.135	-95.5	0.105	-126.6	0.262	112.6
7.200	0.364	33.2	3.012	-110.8	0.104	-141.4	0.280	94.7
7.400	0.247	-5.5	2.834	-141.5	0.106	-171.1	0.294	70.1

NEZ7177-8D/8DD

V<sub>DS</sub> = 10 V, I<sub>DS</sub> = 1 600 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.100	0.965	-134.9	10.517	108.5	0.004	11.1	0.802	178.3
0.200	0.971	-160.1	5.614	94.0	0.006	18.7	0.823	176.2
0.500	0.976	175.6	2.333	72.4	0.007	19.2	0.832	167.3
1.000	0.978	155.2	1.222	46.4	0.009	18.7	0.833	154.9
1.500	0.974	136.0	0.861	20.4	0.012	12.3	0.830	141.2
2.000	0.970	119.2	0.692	-4.1	0.013	-2.3	0.841	127.0
2.500	0.958	102.0	0.604	-28.3	0.017	-18.9	0.843	112.5
3.000	0.966	83.9	0.576	-52.1	0.021	-30.6	0.847	98.9
3.500	0.979	64.2	0.580	-77.3	0.021	-47.0	0.858	85.3
4.000	0.949	45.6	0.590	-106.7	0.025	-64.9	0.872	72.6
4.500	0.927	24.2	0.642	-133.2	0.023	-82.0	0.866	57.2
5.000	0.865	-0.2	0.757	-161.6	0.034	-110.7	0.853	41.6
5.500	0.781	-28.9	0.955	165.9	0.040	-156.0	0.848	24.6
6.000	0.644	-65.4	1.256	127.0	0.041	147.0	0.824	5.9
6.500	0.456	-118.8	1.686	82.5	0.040	81.4	0.779	-16.8
6.700	0.382	-149.5	1.883	62.4	0.043	56.0	0.747	-26.7
6.900	0.335	171.1	2.103	40.0	0.046	32.0	0.698	-38.0
7.100	0.331	129.4	2.268	17.0	0.049	3.6	0.651	-48.8
7.300	0.370	90.1	2.368	-7.1	0.052	-22.0	0.586	-61.5
7.500	0.416	55.7	2.412	-31.4	0.058	-46.3	0.519	-75.3
7.700	0.452	27.0	2.440	-55.1	0.064	-69.1	0.440	-91.6
7.900	0.470	0.1	2.408	-79.4	0.072	-95.9	0.355	-112.1
8.100	0.469	-25.8	2.375	-103.0	0.077	-120.6	0.272	-138.9
8.300	0.451	-51.7	2.307	-127.7	0.082	-144.7	0.199	-177.0
8.500	0.431	-77.8	2.140	-152.2	0.084	-169.9	0.170	132.2
8.700	0.424	-103.6	2.003	-174.2	0.082	170.0	0.176	86.9

NEZ7785-8DD

$V_{DS} = 10 \text{ V}$ ,  $I_{DS} = 1 \text{ 600 mA}$ ,  $V_{GS} = -1.349 \text{ V}$ ,  $I_G = 0.0 \text{ mA}$

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.000	0.965	-134.9	10.517	108.5	0.004	11.1	0.802	178.3
2.000	0.971	-160.1	5.614	94.0	0.006	18.7	0.823	176.2
5.000	0.976	175.6	2.333	72.4	0.007	19.2	0.832	167.3
1.000	0.978	155.2	1.222	46.4	0.009	18.7	0.833	154.9
1.500	0.974	136.0	0.861	20.4	0.012	12.3	0.830	141.2
2.000	0.970	119.2	0.692	-4.1	0.013	-2.3	0.841	127.0
2.500	0.958	102.0	0.604	-28.3	0.017	-18.9	0.843	112.5
3.000	0.966	83.9	0.576	-52.1	0.021	-30.6	0.847	98.9
3.500	0.979	64.2	0.580	-77.3	0.021	-47.0	0.858	85.3
4.000	0.949	45.6	0.590	-106.7	0.025	-64.9	0.872	72.6
4.500	0.927	24.2	0.642	-133.2	0.023	-82.0	0.866	57.2
5.000	0.865	-0.2	0.757	-161.6	0.034	-110.7	0.853	41.6
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6.900	0.335	171.1	2.103	40.0	0.046	32.0	0.698	-38.0
7.100	0.331	129.4	2.268	17.0	0.049	3.6	0.651	-48.8
7.300	0.370	90.1	2.368	-7.1	0.052	-22.0	0.586	-61.5
7.500	0.416	55.7	2.412	-31.4	0.058	-46.3	0.519	-75.3
7.700	0.452	27.0	2.440	-55.1	0.064	-69.1	0.440	-91.6
7.900	0.470	0.1	2.408	-79.4	0.072	-95.9	0.355	-112.1
8.100	0.469	-25.8	2.375	-103.0	0.077	-120.6	0.272	-138.9
8.300	0.451	-51.7	2.307	-127.7	0.082	-144.7	0.199	-177.0
8.500	0.431	-77.8	2.140	-152.2	0.084	-169.9	0.170	132.2
8.700	0.424	-103.6	2.003	-174.2	0.082	170.0	0.176	86.9



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