NEC®

C-BAND MEDIUM POWER GaAs MESFET

NE8001 SERIES
NE8002 SERIES

FEATURES

- **NE800196**
  P_{1dB} = 26 dBm, G_{1dB} = 8.5 dB, V_{DS} = 9 V, f = 7.2 GHz
- **NE800296**
  P_{1dB} = 29 dBm, G_{1dB} = 8 dB, V_{DS} = 9 V, f = 7.2 GHz
- **BROADBAND CAPABILITY**
- **AVAILABILITY:**
  Hermetic Packages
  Chip
- **PROVEN RELIABILITY**

DESCRIPTION AND APPLICATIONS

The NE8001 and NE8002 are medium power GaAs FETs offering a unique recessed gate structure which provides high breakdown and operating voltages. These devices are operated with a drain voltage (V_{DS}) of 9 V for CW circuits and up to 13 V for pulsed circuits.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DS}	Drain to Source Voltage	V	20
V_{GS}	Gate to Source Voltage	V	-14
I_D	Drain Current NE800100, NE800196/99 NE800200, NE800296/99	 A A	 0.55 1.0
I_G	Gate Current NE800100, NE800196/99 NE800200, NE800296/99	 mA mA	 1.5 3
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-65 to +175

ELECTRICAL SPECIFICATIONS (T_A = 25°C)

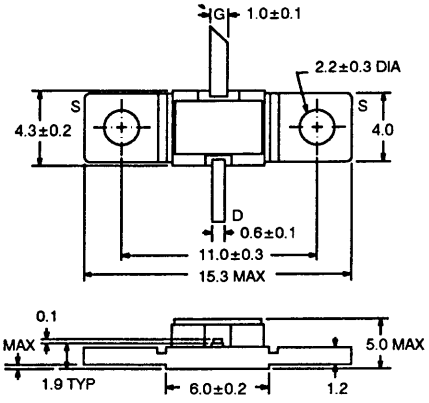
PART NUMBER / PACKAGE OUTLINE			NE800100[1] NE800196 00 (CHIP), 96			NE800199 99			NE800200[1] NE800296 00 (CHIP), 96			NE800299 99		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
I_{DSS}	Saturated Drain Current at V_{DS} = 2.5 V, V_{GS} = 0	mA	225	300	400	225	300	400	450	600	800	450	600	800
V_P	Pinch-off Voltage at V_{DS} = 2.5 V, I_D = 2 mA V_{DS} = 2.5 V, I_D = 4 mA	V V	-5	-3.5	-2.5	-5	-3.5	-2.5	-5	-3.5	-2.5	-5	-3.5	-2.5
g_m	Transconductance at V_{DS} = 3 V, I_D = 100 mA V_{DS} = 3 V, I_D = 250 mA	mS mS		60			60			120			120	
R_{TH}	Thermal Resistance (Channel-to-Case)	°C/W		60	64		60	64		30	32		30	32
P_T	Total Power Dissipation	W			2.5			2.5			5			5
P_{TEST}[2]	Power Output at Test Point V_{DS} = 9 V, $I_D \leq$ 150 mA, P_{IN} = 17.5 dBm, f = 7.2 GHz P_{IN} = 18.0 dBm, f = 8.4 GHz V_{DS} = 9 V, $I_D \leq$ 300 mA, P_{IN} = 21.0 dBm, f = 7.2 GHz P_{IN} = 21.5 dBm, f = 8.4 GHz	 dBm dBm dBm dBm	25	26		25	26		28	29		28	29	
P_{1dB}[3]	Output Power at 1 dB Compression Point V_{DS} = 9 V, $I_D \leq$ 125 mA, f = 7.2 GHz f = 8.4 GHz V_{DS} = 9 V, $I_D \leq$ 275 mA, f = 7.2 GHz f = 8.4 GHz	 dBm dBm dBm dBm		26			26			29			29	
G_{1dB}[3]	Gain at 1 dB Compression Point V_{DS} = 9 V, $I_D \leq$ 125 mA, f = 7.2 GHz f = 8.4 GHz V_{DS} = 9 V, $I_D \leq$ 275 mA, f = 7.2 GHz f = 8.4 GHz	 dB dB dB dB		8.5			8.5			8			8	
η_{ADD}[4]	Power Added Efficiency P_{OUT} = P_{1dB}	%		38			38			38			38	

Notes:

1. RF performance of the chip is determined by packaging and testing 10 chips per wafer. Wafer rejection criteria for standard devices is 2 rejects per 10 samples. See note 2.
2. This is a production test. Devices are measured in a tuned amplifier circuit. The drain current for the NE8001 is I_D = 100 to 150 mA; for the NE8002 I_D = 200 to 300 mA. The gate current is limited below the absolute maximum rating.
3. Amplifier performance in a circuit optimized at the test frequency.
4. $\eta_{ADD} = \frac{P_{1dB} - P_{IN}}{V_{DS} \times I_D} \times 100\%$

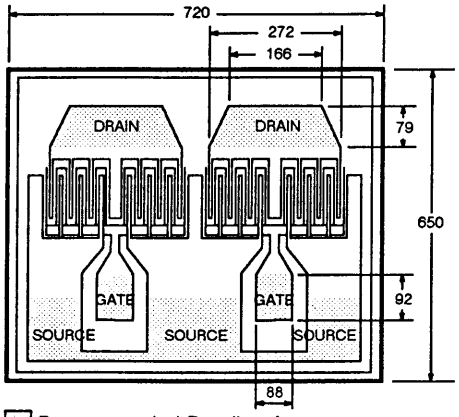
OUTLINE DIMENSIONS

OUTLINE 96/99
(Units in mm)



Flange Material: Copper
Flange Plating: Ni, Au
Lead Material: Kovar
Lead Plating: Ni, Au

NE800200 (CHIP)*
(Units in μm)



Recommended Bonding Area.
Die Thickness: 110 to 160 μm

*The NE800100 has one good cell on the two-cell chip. The waffle pack is marked with a circle to indicate which side of the chip has the good cell. Both cells are good for the NE800200.

HANDLING INFORMATION

DIE ATTACHMENT

Die attach can be accomplished with either Au-Ge (390 ± 10°C) or Au-Sn (290 ± 10°C) preforms in a forming gas environment. Epoxy die attach is not recommended.

BONDING

Gate and drain bonding wires should be minimum length, semi-hard gold wire (3 to 8% elongation) 30 microns or less in diameter. The source should be connected with gold ribbon or mesh.

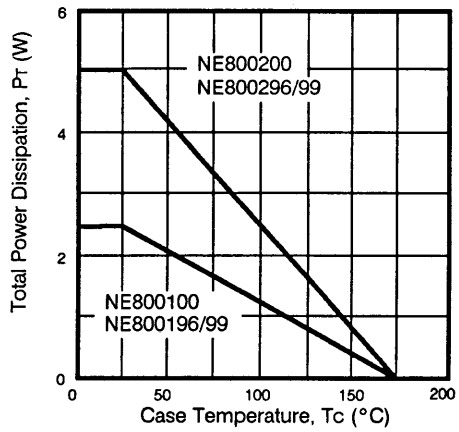
Bonding should be performed with a wedge tip that has a taper of approximately 15°. Die attach and bonding time should be kept to a minimum. As a general rule, the bonding operation should be kept within a 300°C to 10 minute curve. If longer periods are required, the temperature should be lowered.

PRECAUTIONS

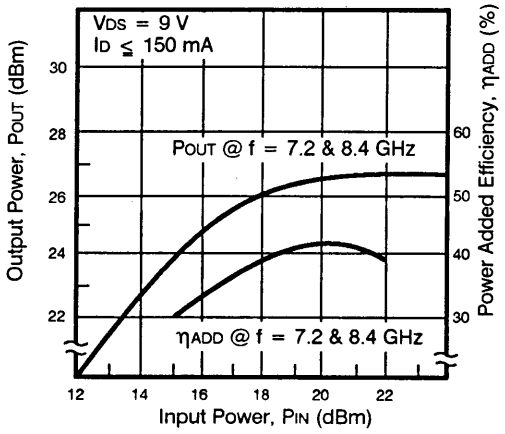
The user must operate in a clean, dry environment. The chip channel is glassivated for mechanical protection only and does not preclude the necessity of a clean environment.

TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

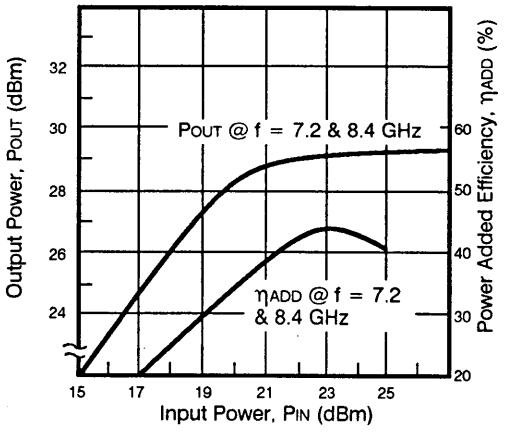
POWER DERATING CURVE



NE800196, NE800199
OUTPUT POWER AND POWER ADDED EFFICIENCY vs. INPUT POWER



NE800296, NE800299
OUTPUT POWER AND POWER ADDED EFFICIENCY vs. INPUT POWER



The bonding equipment should be periodically checked for sources of surge voltage and should be properly grounded at all times. In fact, all test and handling equipment should be grounded to minimize the possibilities of static discharge.

See AN-1001 (Recommended Handling Procedures for Microwave Transistor and MMIC Chips) for additional information.

NE800100 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 150 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
0.10	0.999	-7	6.07	175	0.006	84	0.57	-3	0.04	30.1
0.20	0.995	-14	5.96	170	0.012	81	0.56	-6	0.07	27.0
0.50	0.98	-35	5.76	156	0.028	71	0.54	-15	0.09	23.1
1.00	0.96	-66	5.25	135	0.052	52	0.51	-28	0.16	20.0
1.50	0.92	-92	4.55	116	0.067	38	0.46	-39	0.24	18.3
2.00	0.90	-115	3.98	100	0.076	24	0.41	-48	0.32	17.2
2.50	0.88	-133	3.53	87	0.080	17	0.38	-54	0.36	16.4
3.00	0.85	-149	3.20	74	0.083	9	0.36	-61	0.49	15.9
3.50	0.83	-162	2.68	63	0.084	2	0.34	-67	0.62	15.0
4.00	0.81	-173	2.38	53	0.084	-4	0.33	-74	0.74	14.5
4.50	0.81	176	2.08	43	0.083	-9	0.31	-81	0.89	14.0
5.00	0.80	167	1.91	34	0.081	-14	0.30	-88	1.03	12.7
5.50	0.79	159	1.75	25	0.074	-17	0.30	-94	1.27	10.6
6.00	0.79	152	1.66	17	0.078	-16	0.30	-102	1.25	10.3
6.50	0.79	146	1.53	10	0.079	-17	0.30	-110	1.32	9.5
7.00	0.81	140	1.40	2	0.086	-27	0.31	-119	1.21	9.4
7.50	0.81	134	1.30	-7	0.078	-32	0.31	-128	1.39	8.5
8.00	0.82	129	1.22	-14	0.075	-34	0.32	-137	1.43	8.2
8.50	0.83	124	1.13	-21	0.071	-35	0.33	-146	1.58	7.6
9.00	0.83	120	1.06	-29	0.071	-36	0.35	-155	1.63	7.1
9.50	0.84	116	1.01	-37	0.071	-37	0.37	-164	1.58	7.1
10.00	0.84	112	0.96	-43	0.073	-40	0.39	-172	1.50	7.0

NOTE: S-Parameters include bond wires.
GATE: Total 1 wire (s), 1 per bond pad, 0.0278″ (705 µm) long each wire.
DRAIN: Total 1 wire (s), 1 per bond pad, 0.0213″ (540 µm) long each wire.
SOURCE: Total 9 wire (s), 3 per source area, 0.0063″ (161 µm) long each wire.
WIRE: 0.0007″ (17.8 µm) dia., gold.

NE800200 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 150 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
0.10	0.999	-16	9.91	171	0.010	79	0.29	-13	0.04	30.1
0.20	0.995	-31	9.48	162	0.019	73	0.28	-24	0.07	27.0
0.50	0.96	-70	8.02	138	0.039	53	0.26	-57	0.09	23.1
1.00	0.92	-111	5.73	112	0.057	29	0.25	-90	0.16	20.0
1.50	0.90	-134	4.21	95	0.062	16	0.25	-107	0.24	18.3
2.00	0.89	-149	3.31	81	0.063	6	0.26	-116	0.32	17.2
2.50	0.90	-159	2.76	72	0.063	2	0.28	-121	0.36	16.4
3.00	0.88	-167	2.42	62	0.063	-3	0.30	-125	0.49	15.9
3.50	0.88	-173	1.98	54	0.062	-7	0.33	-129	0.62	15.0
4.00	0.87	-178	1.73	46	0.061	-11	0.36	-133	0.74	14.5
4.50	0.87	177	1.49	38	0.060	-14	0.39	-137	0.89	14.0
5.00	0.87	173	1.37	31	0.058	-17	0.41	-140	1.03	12.7
5.50	0.86	169	1.25	24	0.053	-18	0.43	-143	1.27	10.6
6.00	0.86	165	1.18	17	0.055	-16	0.46	-147	1.25	10.3
6.50	0.86	162	1.08	12	0.056	-16	0.48	-150	1.32	9.5
7.00	0.87	159	0.98	5	0.060	-24	0.51	-153	1.21	9.4
7.50	0.87	156	0.90	-2	0.054	-28	0.53	-157	1.39	8.5
8.00	0.88	153	0.85	-8	0.052	-28	0.55	-161	1.43	8.2
8.50	0.88	151	0.79	-13	0.049	-28	0.57	-165	1.58	7.6
9.00	0.88	148	0.73	-20	0.049	-27	0.60	-168	1.63	7.1
9.50	0.88	146	0.70	-26	0.049	-27	0.62	-172	1.58	7.1
10.00	0.88	143	0.67	-31	0.051	-28	0.63	-175	1.50	7.0

NOTE: S-Parameters include bond wires.
GATE: Total 2 wire (s), 1 per bond pad, 0.0278″ (705 µm) long each wire.
DRAIN: Total 2 wire (s), 1 per bond pad, 0.0213″ (540 µm) long each wire.
SOURCE: Total 9 wire (s), 3 per source area, 0.0063″ (161 µm) long each wire.
WIRE: 0.0007″ (17.8 µm) dia., gold.
A jumper wire was bonded from one drain pad to the other on the chip to prevent oscillations.

Note:

1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

$$MSG = \frac{|S_{21}|}{|S_{12}|}, \quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|}, \quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

NE800196 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 150 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
2.00	.90	-149	2.55	67	.04	11	.49	-67	.54	17.9
3.00	.87	-167	2.03	41	.04	8	.52	-93	.88	17.0
4.00	.82	177	1.97	12	.04	5	.57	-116	1.09	15.1
5.00	.61	152	2.25	-23	.05	-4	.66	-138	1.32	13.1
6.00	.18	-73	2.61	-89	.06	-53	.80	-164	1.26	13.5
7.00	.85	-131	1.36	-155	.02	-158	.71	170	1.98	12.6
8.00	.96	-153	.69	167	.04	104	.66	155	.94	12.7
9.00	.98	-165	.43	137	.07	78	.61	135	.64	8.2
10.00	1.0	-174	.33	106	.11	59	.62	112	.47	4.9

NE800296 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 300 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
2.00	.86	-159	2.71	66	.05	23	.26	-122	.77	17.6
3.00	.82	-172	2.05	44	.05	24	.33	-133	1.18	13.4
4.00	.80	177	1.85	21	.06	23	.39	-143	1.09	12.8
5.00	.68	162	1.95	-3	.09	20	.46	-148	1.04	12.4
6.00	.30	130	2.36	-43	.12	-6	.63	-158	.95	13.1
7.00	.52	-91	2.13	-108	.10	-62	.79	174	.94	13.7
8.00	.90	-128	1.19	-156	.02	-161	.66	145	2.00	12.6
9.00	.99	-147	.70	166	.06	88	.52	122	.17	10.9
10.00	.98	-157	.46	129	.12	62	.42	90	.47	5.9

NE800199 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 150 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
4.00	.84	-172	2.04	29	.04	5	.54	-114	.98	17.0
4.50	.82	180	1.90	16	.04	6	.57	-123	1.09	14.8
5.00	.81	171	1.83	6	.04	7	.60	-131	1.07	14.9
5.50	.78	162	1.81	-6	.04	9	.62	-139	1.11	14.2
6.00	.74	151	1.76	-17	.04	7	.64	-146	1.28	12.9
6.50	.69	140	1.81	-31	.05	4	.67	-153	1.21	12.9
7.00	.62	122	1.88	-44	.05	-7	.69	-160	1.34	12.2
7.50	.54	97	2.02	-62	.05	-20	.72	-167	1.29	12.6
8.00	.45	60	2.04	-83	.05	-45	.72	-175	1.68	11.4

NE800299 SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 9 V, ID = 300 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG (dB)[1]
4.00	.80	175	1.85	25	.06	23	.40	-151	1.06	13.2
5.00	.77	162	1.66	6	.08	25	.45	-162	1.06	11.9
6.00	.72	145	1.61	-16	.10	20	.50	-172	.91	12.2
7.00	.64	118	1.65	-42	.13	8	.56	178	.77	11.1
8.00	.54	69	1.73	-72	.16	-14	.64	163	.62	10.3
9.00	.58	0	1.61	-113	.16	-49	.66	138	.66	10.1
10.00	.75	-49	1.41	-153	.12	-85	.67	107	.58	10.8
11.00	.84	-83	1.03	167	.06	-141	.65	70	1.00	12.4
12.00	.84	-105	.74	128	.07	113	.67	33	1.35	7.1

Note:

1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

$$MSG = \frac{|S_{21}|}{|S_{12}|}, \quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|}, \quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

NEC®

Ku-BAND MEDIUM POWER GaAs MESFET

NE9000 SERIES
NE9001 SERIES
NE9002 SERIES

FEATURES

- **CLASS A OPERATION**
- **HIGH OUTPUT POWER**
  P_{OUT} = 26.5 dBm
  G_{1dB} = 7 dB
- **HIGH POWER ADDED EFFICIENCY**

DESCRIPTION AND APPLICATIONS

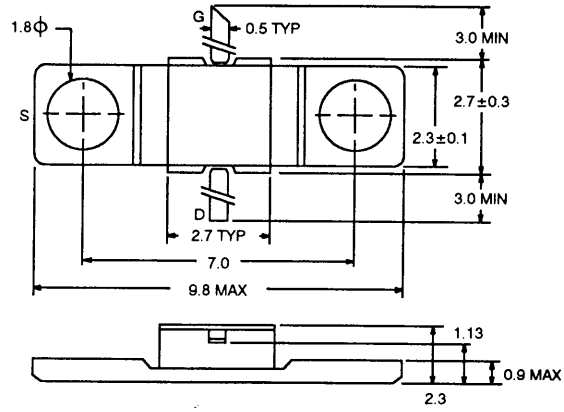
The NE9000, NE9001, and NE9002 are 0.5 micron recessed gate medium power GaAs FETs for commercial, military and space amplifier and oscillator applications to 20 GHz. The series incorporates silicon nitride passivation for suface stabilization, and silicon dioxide glassivation for superior scratch resistance and mechanical protection. Four chip configurations are available. The NE900000 is a one cell die of 400 µm gate width, the NE900100 is one cell of 750 µm gate width, the NE900200 is a two cell die of 1500 µm gate width and the NE900400 is a four cell of 3000 µm gate width. The NE9004 is covered in a separate data sheet. The series is available in chip form or a variety of hermetic ceramic packages. The NE900000, NE900100, and NE900200 are standard die without wraparound source metallization, while the NE900000G, NE900100G, and NE900200G have wraparound source metallization. The series conforms to MIL-S-19500 and is space qualified.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

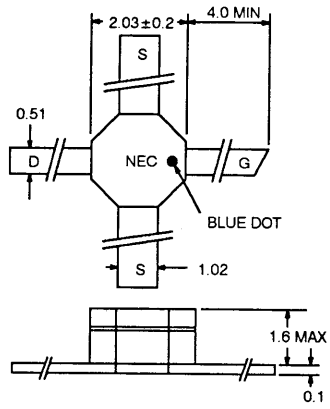
SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DS}	Drain to Source Voltage	V	20
V_{GS}	Gate to Source Voltage	V	-9
I_D	Drain Current NE900000, NE900075/89 NE900100, NE900175 NE900200, NE900275	 mA mA mA	 150 300 600
I_G	Gate Current NE900000, NE900075/89 NE900100, NE900175 NE900200, NE900275	 mA mA mA	 1.3 2.6 5

OUTLINE DIMENSIONS (Units in mm)

OUTLINE 75



OUTLINE 89A



PERFORMANCE SPECIFICATIONS (T_A = 25°C)

CHIP PART NUMBER PACKAGE PART NUMBER PACKAGE OUTLINE*			NE900089A 89A		NE900000 NE900000G NE900075 00 (CHIP), 75		NE900100 NE900100G NE900175 00 (CHIP), 75		NE900200 NE900200G NE900275 00 (CHIP), 75	
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MIN	TYP	MIN	TYP	MIN	TYP
P_{TEST}	Power Output at Test Point P_{IN} = 11 dBm, V_{DS} = 8 V, I_D = 50 mA, f = 8 GHz P_{IN} = 12 dBm, V_{DS} = 8 V, I_D = 50 mA, f = 14.5 GHz P_{IN} = 15 dBm, V_{DS} = 8 V, I_D = 90 mA, f = 14.5 GHz P_{IN} = 19 dBm, V_{DS} = 8 V, I_D = 180 mA, f = 14.5 GHz	 dBm dBm dBm dBm	19.5	20.5	19.5	20.5	22	23	25.5	26.5
P_{1dB}	Power Output at 1 dB Compression Point V_{DS} = 8 V, I_D = 50 mA, f = 8 Ghz V_{DS} = 8 V, I_D = 50 mA, f = 14.5 Ghz V_{DS} = 8 V, I_D = 90 mA, f = 14.5 Ghz V_{DS} = 8 V, I_D = 180 mA, f = 14.5 Ghz	 dBm dBm dBm dBm		20.5		20		23		25
G_{1dB}	Gain at 1 dB Compression Point V_{DS} = 8 V, I_D = 50 mA, f = 8 Ghz V_{DS} = 8 V, I_D = 50 mA, f = 14.5 Ghz V_{DS} = 8 V, I_D = 90 mA, f = 14.5 Ghz V_{DS} = 8 V, I_D = 180 mA, f = 14.5 Ghz	 dB dB dB dB		9		8		7		7
η_{ADD}	Power Added Efficiency V_{DS} = 8 V, at P_{1dB} Conditions	%		27		27		27		26

*Last two digits of the "NE" part number designates package code or chip (00).

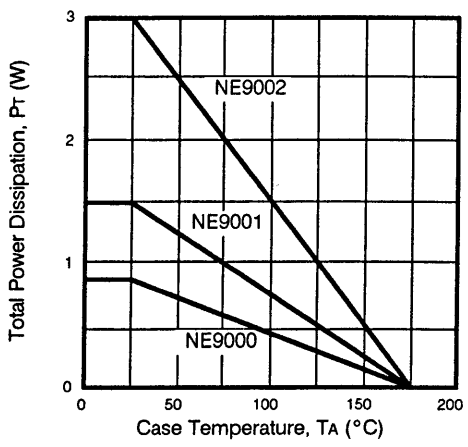
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER PACKAGE PART NUMBER PACKAGE OUTLINE*			NE900000 NE900000G NE900075 NE900089A 00 (CHIP), 75, 89A			NE900100 NE900100G NE900175 00 (CHIP), 75			NE900200 NE900200G NE900275 00 (CHIP), 75		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
I_{DSS}	Saturated Drain Current at V_{DS} = 2.5 V, V_{GS} = 0 V	mA	80	120	150	150	225	300	300	450	600
V_P	Pinch-off Voltage at V_{DS} = 2.5 V, I_{DS} = 2.5 mA I_{DS} = 5 mA I_{DS} = 10 mA	 V V V	-1.5	-3.5	-5	-2	-3.5	-5	-2	-3.5	-5
g_m	Transconductance at V_{DS} = 2.5 V, I_{DS} = 50 mA I_{DS} = 90 mA I_{DS} = 180 mA	 mS mS mS		25			50			100	
R_{TH} (c-c)	Thermal Resistance	°C/W			180			100			50
P_T	Total Power Dissipation	W			0.8			1.5			3

*Last two digits of the "NE" part number designates package code or chip (00).

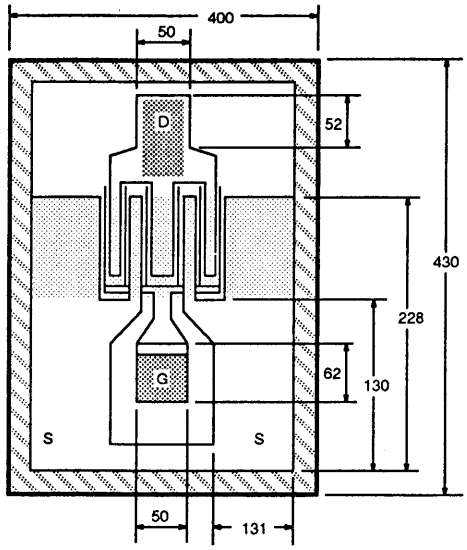
TYPICAL DEVICE CHARACTERISTICS (T_A = 25°C)

POWER DERATING CURVE

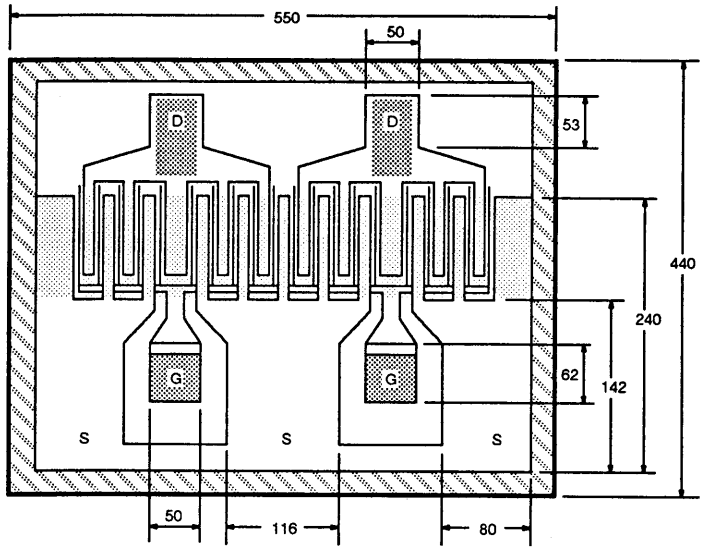


CHIP DIMENSIONS

NE900000 (CHIP)
(Units in μm)



NE900100/NE900200 (CHIP)*
(Units in μm)



Die Thickness: 110 to 160 μm

Recommended Bonding Area.

Glassivated Area

Plated Wraparound (Optional)

* The NE900100 has one good cell on the two-cell chip. The waffle pack is marked with a circle to indicate which side of the chip has the good cell. Both cells are good for the NE900200.

HANDLING PRECAUTIONS

DIE ATTACHMENT

Die attach can be accomplished with Au-Ge (390 ± 10°C) preforms in a forming gas environment. Epoxy die attach is not recommended.

BONDING

Gate and drain bonding wires should be semi-hard gold wire (3 to 8% elongation) 30 microns or less is diameter.

Bonding should be performed with a wedge tip that has a taper of approximately 15°. Die attach and bonding time should be kept to a minimum. As a general rule, the bonding operation should be kept within a 300°C to 10 minute curve. If longer periods are required, the temperature should be lowered.

PRECAUTIONS

The user must operate in a clean, dry environment. The chip channel is glassivated for mechanical protection only and does not preclude the necessity of a clean environment,

The bonding equipment should be periodically checked for sources of surge voltage and should be properly grounded at all times. In fact, all test and handling equipment should be grounded to minimize the possibilities of static discharge.

NE900000 TYPICAL SMALL SIGNAL SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 8 V, ID = 50 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
2000	.96	-42	3.00	148	.04	69	.80	-11
3000	.90	-59	2.71	136	.04	66	.78	-12
4000	.87	-73	2.48	125	.05	62	.76	-13
5000	.85	-85	2.28	114	.06	58	.74	-17
6000	.82	-94	2.10	105	.06	55	.72	-20
7000	.79	-103	1.94	96	.07	53	.71	-24
8000	.75	-112	1.79	88	.07	52	.70	-28
9000	.73	-120	1.64	80	.07	52	.70	-32
10000	.72	-128	1.51	73	.07	53	.70	-34
11000	.71	-134	1.38	67	.07	55	.71	-36
12000	.72	-140	1.27	62	.07	58	.71	-38
13000	.73	-144	1.17	58	.07	63	.71	-39
14000	.74	-147	1.09	54	.07	69	.71	-40
15000	.75	-149	1.04	51	.08	74	.71	-41
16000	.74	-151	1.01	48	.09	78	.70	-43
17000	.71	-152	1.03	45	.10	81	.69	-47
18000	.65	-155	1.10	40	.11	82	.68	-53

NE900100 TYPICAL SMALL SIGNAL SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 8 V, ID = 90 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
2000	.91	-63	4.54	137	.05	63	.47	-26
3000	.82	-81	3.70	124	.05	55	.46	-33
4000	.77	-97	3.14	111	.06	51	.44	-38
5000	.75	-110	2.75	100	.06	48	.43	-43
6000	.74	-120	2.44	91	.07	47	.41	-47
7000	.74	-129	2.17	83	.07	48	.40	-53
8000	.73	-135	1.93	77	.07	49	.39	-58
9000	.72	-141	1.70	71	.07	52	.39	-64
10000	.72	-145	1.50	67	.07	55	.40	-70
11000	.72	-148	1.34	62	.07	60	.41	-76
12000	.72	-150	1.21	58	.07	65	.43	-81
13000	.73	-152	1.13	55	.08	70	.46	-86
14000	.73	-153	1.08	51	.08	74	.47	-90
15000	.74	-155	1.05	48	.09	78	.49	-94
16000	.73	-157	1.03	44	.10	80	.49	-98
17000	.71	-161	1.00	41	.12	82	.46	-102
18000	.67	-167	.93	36	.13	82	.41	-109

NE900200 TYPICAL SMALL SIGNAL SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 8 V, ID = 180 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
2000	.92	-90	3.87	123	.06	46	.28	-74
3000	.84	-108	2.96	111	.06	36	.27	-86
4000	.84	-122	2.37	98	.07	29	.29	-96
5000	.85	-132	1.99	86	.07	24	.31	-103
6000	.86	-139	1.71	76	.07	20	.35	-108
7000	.87	-143	1.49	68	.07	18	.38	-113
8000	.87	-147	1.30	63	.07	16	.41	-116
9000	.86	-149	1.12	58	.07	15	.44	-119
10000	.86	-150	.98	54	.06	15	.47	-123
11000	.85	-152	.86	49	.06	14	.50	-126
12000	.85	-153	.77	44	.05	14	.52	-130
13000	.86	-154	.72	39	.06	15	.55	-134
14000	.87	-156	.69	33	.06	15	.57	-137
15000	.88	-156	.67	27	.06	16	.60	-140
16000	.89	-157	.64	2	.05	17	.63	-142
17000	.89	-157	.56	2	.05	19	.66	-143
18000	.87	-156	.38	2	.05	21	.70	-143

NE900175 TYPICAL SMALL SIGNAL SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 8 V, ID = 90 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
2000	.94	-88	2.71	112	.05	46	.50	-47
3000	.92	-115	2.14	90	.07	17	.50	-66
4000	.90	-134	1.76	69	.08	-3	.50	-83
5000	.89	-143	1.49	57	.06	-2	.54	-93
6000	.89	-154	1.31	42	.05	-7	.58	-108
7000	.88	-160	1.25	30	.05	-8	.61	-114
8000	.88	-166	1.25	20	.05	-11	.64	-121
9000	.85	-175	1.28	8	.06	-15	.65	-128
10000	.80	174	1.48	-5	.06	-24	.64	-135
11000	.73	156	1.81	-22	.06	-33	.65	-144
12000	.56	123	2.20	-48	.07	-60	.62	-158
13000	.41	47	2.65	-85	.08	-103	.52	179
14000	.58	-47	2.60	-128	.08	-157	.34	157
15000	.78	-93	1.95	-166	.08	150	.16	125
16000	.81	-119	1.54	163	.10	118	.10	64
17000	.86	-134	1.11	138	.10	96	.18	2
18000	.82	-149	.94	109	.10	71	.32	-21

NE900275 TYPICAL SMALL SIGNAL SCATTERING PARAMETERS

S-MAGN AND ANGLES:
VDS = 8 V, ID = 180 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
2000	.89	-118	3.64	96	.06	19	.29	-89
3000	.84	-139	2.62	78	.06	15	.32	-104
4000	.84	-151	2.09	64	.06	8	.36	-115
5000	.84	-161	1.74	44	.06	2	.41	-123
6000	.83	-168	1.56	35	.06	3	.45	-128
7000	.78	-174	1.42	18	.06	1	.48	-135
8000	.77	-178	1.40	11	.06	6	.49	-140
9000	.73	171	1.49	-9	.06	-1	.51	-146
10000	.67	156	1.69	-18	.08	-1	.51	-153
11000	.55	126	1.92	-45	.09	-15	.53	-164
12000	.42	77	1.96	-70	.09	-37	.49	180
13000	.49	7	2.00	-106	.08	-70	.41	151
14000	.70	-43	1.72	-143	.06	-115	.34	115
15000	.82	-73	1.35	-172	.04	-163	.33	66
16000	.84	-91	.96	161	.04	135	.41	28
17000	.86	-104	.71	140	.04	98	.49	-1
18000	.86	-117	.60	109	.06	62	.59	-17