

C to Ku BAND LOW NOISE AMPLIFIER  
N-CHANNEL GaAs MES FET

FEATURES

- Low noise figure  
NF = 1.6 dB TYP. at f = 12 GHz
- High associated gain  
Ga = 9.0 dB TYP. at f = 12 GHz
- Gate length:  $L_g = 0.3 \mu\text{m}$
- Gate width:  $W_g = 280 \mu\text{m}$

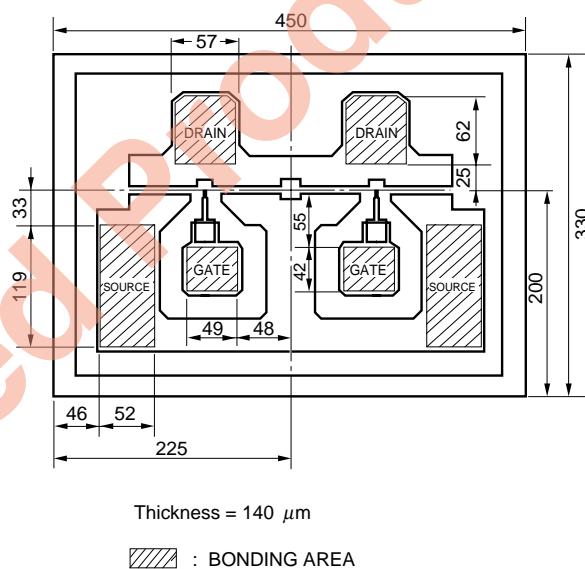
ABSOLUTE MAXIMUM RATINGS ( $T_A = 25 \text{ }^\circ\text{C}$ )

Drain to Source Voltage	$V_{DS}$	5.0	V
Gate to Source Voltage	$V_{GS}$	-3.0	V
Gate to Drain Voltage	$V_{GD}$	-5.0	V
Drain Current	$I_D$	$I_{DSS}$	mA
Total Power Dissipation	$P_{tot}$	500 <sup>*1</sup>	mW
Channel Temperature	$T_{ch}$	175	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Thermal Resistance	$R_{th(c-a)}$	190	$^\circ\text{C/W}$

\*1 :  $T_A = 100 \text{ }^\circ\text{C}$

$P_{tot}$  for chip mounted on a copper heat sink.

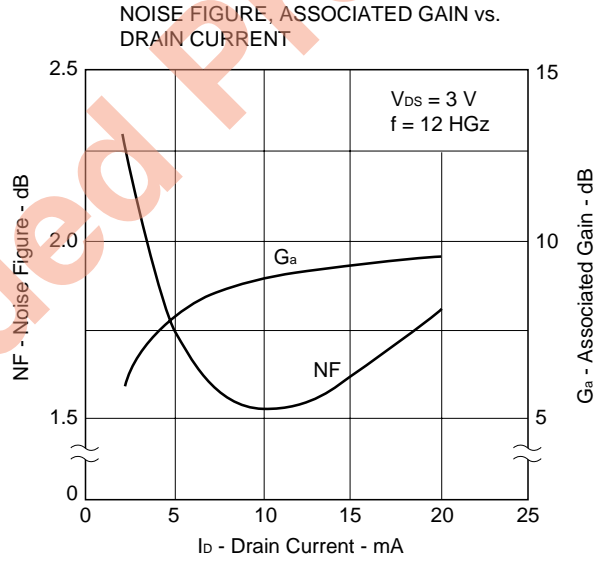
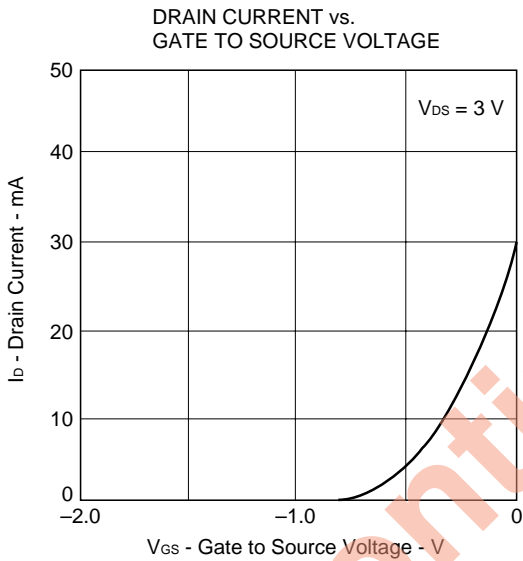
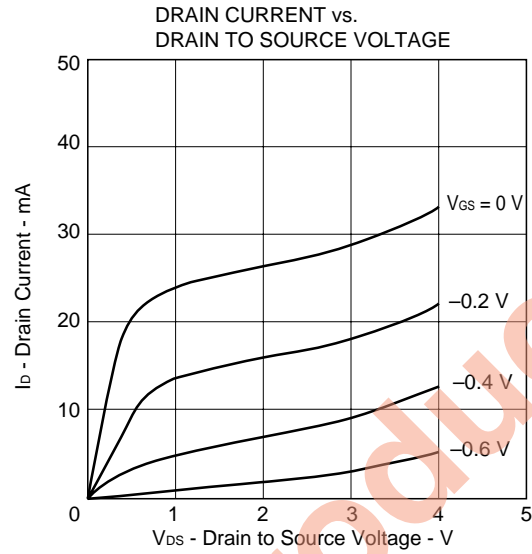
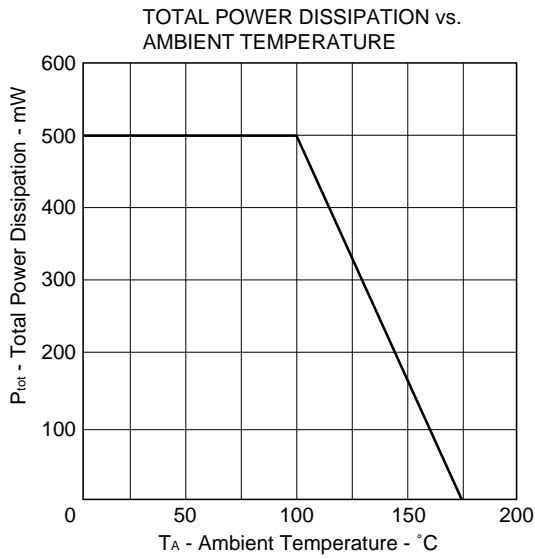
CHIP DIMENSIONS (Unit:  $\mu\text{m}$ )



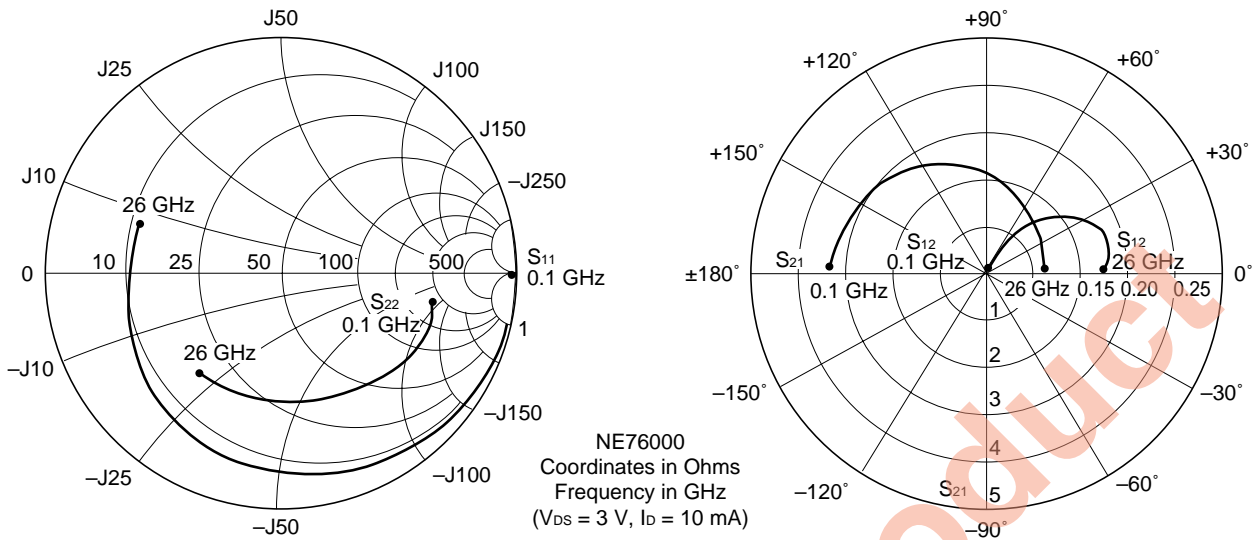
ELECTRICAL CHARACTERISTICS ( $T_A = 25 \text{ }^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Gate to Source Leak Current	$I_{GSO}$			10	$\mu\text{A}$	$V_{GS} = -4 \text{ V}$
Saturated Drain Current	$I_{DSS}$	15	30	50	mA	$V_{DS} = 3 \text{ V}, V_{GS} = 0 \text{ V}$
Gate to Source Cutoff Voltage	$V_{GS(off)}$	-0.5	-0.8	-3.0	V	$V_{DS} = 3 \text{ V}, I_D = 100 \mu\text{A}$
Transconductance	gm	30	40	70	mS	$V_{DS} = 3 \text{ V}, I_D = 10 \text{ mA}$
Noise Figure	NF		1.6	1.8	dB	$V_{DS} = 3 \text{ V}, I_D = 10 \text{ mA}$
Associated Gain	Ga	8.0	9.0		dB	f = 12 GHz

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



S-Parameters



**Note:** S-parameters include bond wires.

- Gate : Total 2 wire(s), 1 per bond pad, 0.0139" (354  $\mu$ m) long each wire.
- Drain : Total 2 wire(s), 1 per bond pad, 0.0115" (291  $\mu$ m) long each wire.
- Source : Total 4 wire(s), 2 per side, 0.0066" (168  $\mu$ m) long each wire.
- Wire : 0.0007" (17.8  $\mu$ m) Diameter, Gold.

MAG AND ANG

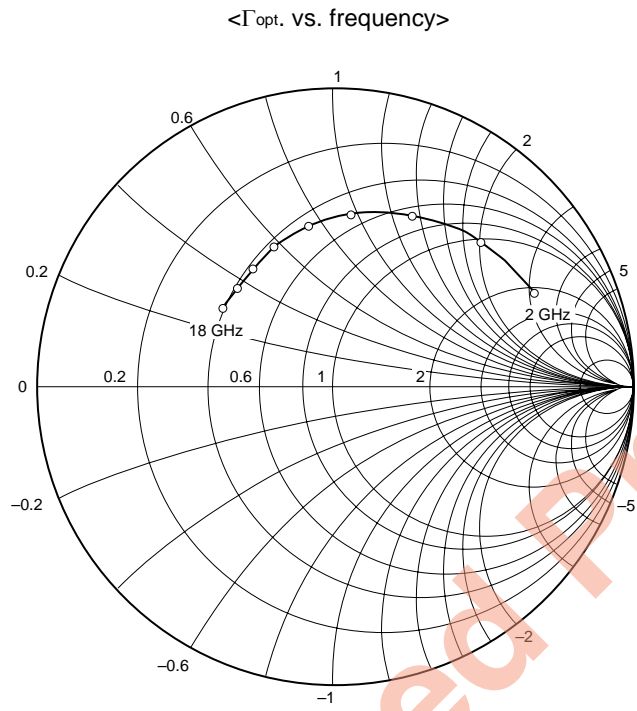
$V_{DS} = 3 V, I_D = 10 mA$

FREQUENCY(GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG
0.05	0.99	-1	3.32	180	0.001	89	0.68	-1	.15	35.2
0.10	0.99	-2	3.30	179	0.002	87	0.68	-1	.10	32.2
0.20	0.99	-3	3.29	178	0.004	86	0.68	-2	.10	29.2
0.50	0.99	-7	3.28	175	0.009	85	0.68	-3	.05	25.6
1.0	0.99	-14	3.27	169	0.02	81	0.67	-8	.05	21.9
2.0	0.99	-27	3.19	158	0.04	74	0.67	-16	.08	19.1
3.0	0.97	-39	3.08	148	0.06	66	0.66	-23	.13	17.3
4.0	0.95	-50	2.95	138	0.07	59	0.64	-30	.18	16.1
5.0	0.92	-61	2.81	129	0.09	51	0.62	-36	.24	15.2
6.0	0.89	-70	2.67	120	0.09	47	0.60	-42	.30	14.5
7.0	0.87	-78	2.55	113	0.10	41	0.59	-47	.34	13.9
8.0	0.86	-87	2.45	104	0.11	36	0.58	-53	.38	13.5
9.0	0.83	-96	2.33	97	0.11	30	0.57	-58	.45	13.1
10.0	0.81	-104	2.24	90	0.12	29	0.57	-63	.45	12.7
11.0	0.80	-112	2.16	83	0.13	23	0.56	-68	.48	12.3
12.0	0.77	-120	2.08	76	0.13	19	0.56	-73	.52	12.0
13.0	0.75	-128	2.00	70	0.13	16	0.55	-77	.56	11.9
14.0	0.74	-135	1.93	63	0.13	12	0.55	-81	.59	11.6
15.0	0.73	-141	1.85	58	0.13	9	0.55	-85	.62	11.4
16.0	0.72	-147	1.80	53	0.13	6	0.55	-88	.65	11.3
17.0	0.71	-152	1.73	47	0.13	5	0.55	-91	.72	11.3
18.0	0.70	-155	1.65	43	0.13	3	0.55	-94	.80	11.0
19.0	0.69	-159	1.57	38	0.12	2	0.55	-96	.97	11.1
20.0	0.68	-162	1.53	35	0.12	4	0.55	-99	.99	11.0
21.0	0.67	-166	1.49	30	0.12	5	0.55	-102	1.02	10.0
22.0	0.67	-171	1.46	26	0.12	4	0.55	-107	1.09	9.3
23.0	0.65	-176	1.41	21	0.12	5	0.55	-111	1.13	8.7
24.0	0.64	178	1.39	16	0.12	5	0.55	-116	1.08	8.9
25.0	0.63	171	1.32	11	0.12	5	0.55	-120	1.17	7.9
26.0	0.62	164	1.29	7	0.12	4	0.55	-123	1.18	7.6

NOISE PARAMETERS

$V_{DS} = 3.0\text{ V}$

$I_D = 10\text{ mA}$



START 2 GHz, STOP 18 GHz, STEP 2 GHz

<Noise Parameter>

Freq. (GHz)	NF <sub>min.</sub> (dB)	Gain (dB)	$\Gamma_{opt.}$		R <sub>n</sub> /50
			MAG.	ANG.(deg.)	
2.0	0.65	18.0	0.76	25	0.63
4.0	0.70	14.5	0.70	45	0.49
6.0	0.85	12.5	0.64	65	0.41
8.0	1.10	11.0	0.60	83	0.36
10.0	1.30	9.9	0.56	99	0.32
12.0	1.60	9.0	0.52	114	0.27
14.0	1.90	8.2	0.49	125	0.23
16.0	2.20	7.5	0.48	135	0.20
18.0	2.50	7.0	0.47	145	0.18

$\Gamma_{opt.}$  includes bond wired.

Bond wires used during testing. Wire: 0.0007" (17.8  $\mu\text{m}$ ) Diameter, Gold.

Gate: 2 wires total, 1 per bond pad, 0.0139" long each wire.

Drain: 2 wires total, 1 per bond pad, 0.0115" long each wire.

Source: 4 wires total, 2 per side, 0.0066" long each wire.

## CHIP HANDLING

### DIE ATTACHMENT

Die attach operation can be accomplished with Au-Sn (within a 300 °C –10 s) performs in a forming gas environment.

Epoxy die attach is not recommend.

### BONDING

Bonding wires should be minimum length, semi hard gold wire (3-8 % elongation) 20 microns in diameter.

Bonding should be performed with a wedge tip that has a taper of approximately 15 %. Bonding time should be kept to minimum.

As a general rule, the bonding operation should be kept within a 280 °C, 2 minutes for all bonding wires.

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.

Avoid high static voltage and electric fields, because this device is GaAs field effect transistor with shottky barrier gate.

### Caution

**The Great Care must be taken in dealing with the devices in this guide.**

**The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.**

**Keep the law concerned and so on, especially in case of removal.**

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Discontinued Product

[MEMO]

Discontinued Product

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Anti-radioactive design is not implemented in this product.