



**NEC's SUPER LOW NOISE
AMPLIFIER N-CHANNEL HJ-FET**

NE450184C

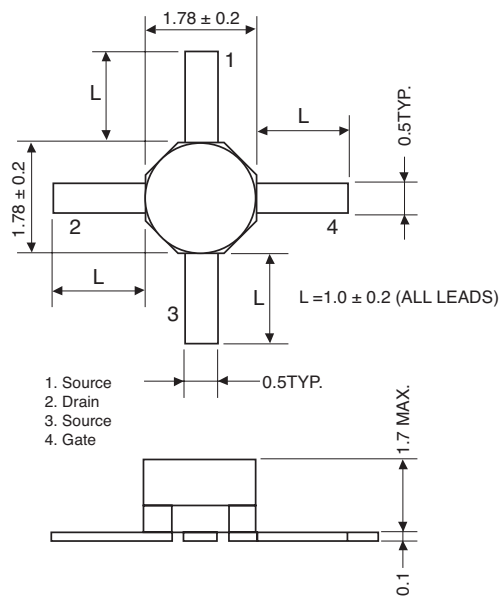
FEATURES

- **SUPER LOW NOISE FIGURE & HIGH ASSOCIATED GAIN:**
NF = 1.0 dB TYP., Ga = 10 dB TYP. @ f = 24 GHz
- **GATE LENGTH:**
Lg < 0.2 μm
- **GATE WIDTH:**
Wg = 160 μm

DESCRIPTION

NEC's NE450184C is a Hetero Junction FET that utilizes the hetero junction to create high mobility electrons. It's excellent low noise and high associated gain make it suitable for SSR Automobile, another K-band communication systems.

OUTLINE DIMENSIONS (Units in mm)



ELECTRICAL CHARACTERISTICS (TA = 25° C)

PART NUMBER PACKAGE OUTLINE		NE450184C			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
DC CHARACTERISTICS (TA = -40 +125° C)					
I _{GS}	Gate to Source Leak Current at V _{GS} = -3 V	μA			50
V _{GS(off)}	Gate to Source Cutoff Voltage at V _{DS} = 2 V, I _{DS} = 100 μA	V	-0.2		-2.0
I _{DSS}	Saturated Drain Current at V _{DS} = 2 V, V _{GS} = 0 V	mA	10		80
gm	Trans Conductance at V _{DS} = 2 V, I _{DS} = 10 mA	mS	40		
RF CHARACTERISTICS (TA = +25° C)					
NF	Noise Figure at V _{DS} = 2 V, I _{DS} = 10 mA, f = 24 GHz, NF Matching	dB		1.0	T.B.D.
G _a	Associated Gain at V _{DS} = 2 V, I _{DS} = 10 mA, f = 24 GHz, NF Matching	dB	T.B.D.	10	

RECOMMENDED OPERATING CONDITIONS (TA = 25°C)

PART NUMBER PACKAGE OUTLINE		NE450184C		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	MAX
V _{DS}	Drain to Source Voltage	V		3
I _{GS}	Gate Source Current	μA		8
I _{DS}	Drain Source Current	mA		15

TYPICAL NOISE PARAMETERS (TA = 25°C)

FREQ. (GHz)	F _{MIN} (dB)	R _{n/50} (Ω)	Γ _{OPT}	
			MAG	ANG
V _{DS} = 2 V, I _D = 10 mA				
10	0.33	0.042	0.64	113.8
11	0.35	0.045	0.61	122.8
12	0.38	0.044	0.57	132.1
13	0.41	0.040	0.52	144.9
14	0.45	0.037	0.44	159.8
15	0.49	0.037	0.38	171.4
16	0.53	0.044	0.34	-179.4
17	0.57	0.062	0.27	-154.0
18	0.62	0.087	0.20	-132.7
19	0.68	0.115	0.14	-90.9
20	0.74	0.141	0.12	-56.6
21	0.80	0.162	0.14	-5.4
22	0.87	0.174	0.19	28.9
23	0.94	0.177	0.25	46.4
24	1.02	0.172	0.31	65.7
25	1.11	0.167	0.36	79.0
26	1.21	0.175	0.41	98.9
V _{DS} = 2 V, I _D = 20 mA				
10	0.39	0.040	0.60	117.7
11	0.42	0.044	0.58	125.9
12	0.46	0.045	0.53	136.0
13	0.49	0.044	0.44	147.2
14	0.53	0.044	0.38	161.7
15	0.57	0.049	0.33	177.5
16	0.61	0.063	0.27	-168.4
17	0.66	0.085	0.19	-142.2
18	0.71	0.113	0.13	-112.6
19	0.77	0.144	0.10	-51.7
20	0.83	0.171	0.14	1.4
21	0.90	0.189	0.19	31.5
22	0.96	0.193	0.26	48.7
23	1.05	0.183	0.33	68.1
24	1.12	0.169	0.37	79.6
25	1.21	0.169	0.42	89.0
26	1.30	0.208	0.47	102.6
V _{DS} = 3 V, I _D = 10 mA				
10	0.35	0.046	0.68	115.4
11	0.38	0.047	0.67	125.0
12	0.42	0.045	0.57	135.1
13	0.46	0.040	0.55	147.4
14	0.50	0.036	0.42	161.6
15	0.54	0.037	0.41	173.5
16	0.58	0.046	0.36	-174.6
17	0.62	0.065	0.28	-148.1
18	0.68	0.093	0.23	-128.3
19	0.73	0.125	0.17	-95.6
20	0.79	0.154	0.14	-55.0
21	0.85	0.177	0.16	-3.6
22	0.92	0.191	0.21	25.0
23	1.00	0.195	0.26	42.4
24	1.08	0.189	0.36	68.4
25	1.16	0.180	0.39	79.3
26	1.25	0.182	0.46	94.1

ABSOLUTE MAXIMUM RATINGS¹ (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{DS}	Drain to Source Voltage	V	4
V _{GS}	Gate to Source Voltage	V	-3
I _{DS}	Drain Current	mA	I _{DSS}
I _{GS}	Gate Current	μA	80
P _{TOT}	Total Power Dissipation	mW	165
T _{CH}	Channel Temperature	°C	+150
T _{STG}	Storage Temperature	°C	-65 to +150

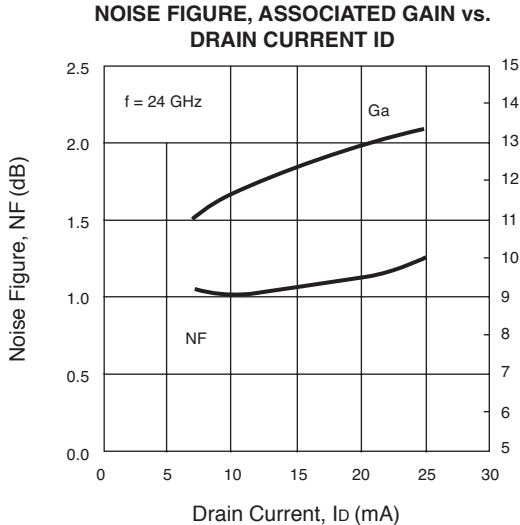
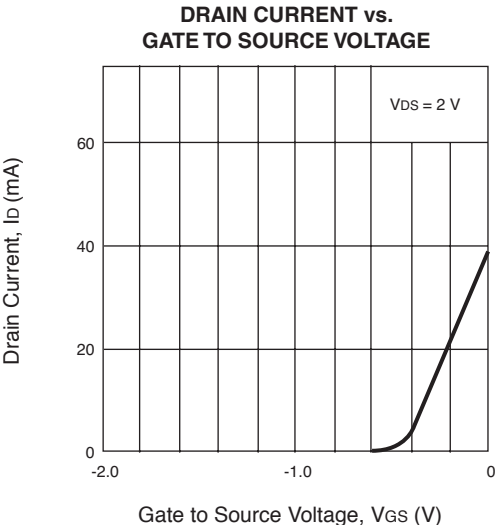
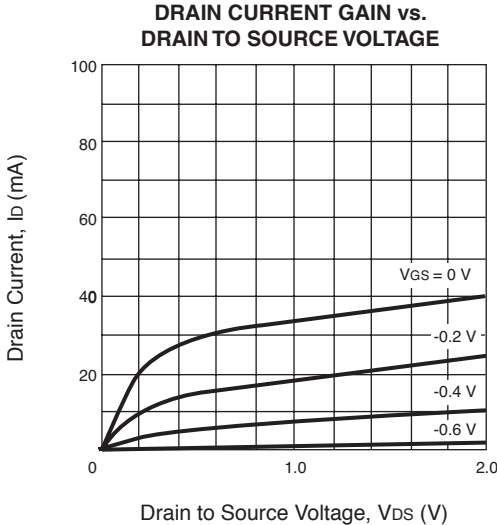
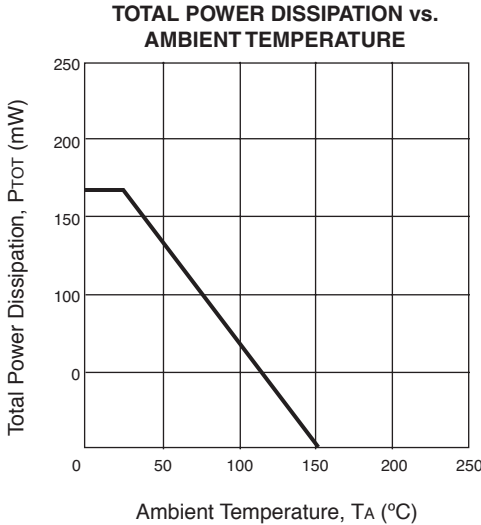
Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.

ORDERING INFORMATION

PART NUMBER	SUPPLYING FORM	MARKING
N450184C-T1	Tape & Reel 1000 pcs./reel	T.B.D.
N450184C-T1A	Tape & Reel 5000 pcs./reel	

TYPICAL PERFORMANCE CURVES (TA = 25°C)



NE450184C

TYPICAL NOISE PARAMETERS (T_A = 25°C)

NE450184C

V_{DS} = 2 V, I_D = 10 mA

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
10	0.641	-140.08	3.959	31.32	0.068	-0.46	0.487	-112.00
11	0.603	-152.28	3.890	18.59	0.070	-6.50	0.483	-120.40
12	0.568	-164.75	3.850	5.81	0.072	-12.39	0.480	-129.24
13	0.532	-178.10	3.842	-7.24	0.074	-18.65	0.477	-138.24
14	0.496	167.08	3.872	-20.78	0.076	-25.40	0.471	-147.37
15	0.463	150.29	3.922	-34.81	0.078	-32.94	0.461	-157.36
16	0.436	130.51	3.997	-49.66	0.079	-41.76	0.447	-168.01
17	0.420	107.17	4.090	-65.63	0.080	-52.22	0.424	179.79
18	0.425	80.47	4.170	-82.96	0.080	-65.29	0.389	165.54
19	0.456	51.90	4.218	-101.81	0.079	-81.36	0.339	148.45
20	0.510	23.51	4.176	-121.95	0.075	-100.75	0.273	127.17
21	0.573	-3.14	4.021	-143.19	0.070	-123.89	0.203	98.78
22	0.630	-27.18	3.746	-164.64	0.067	-150.76	0.149	57.83
23	0.663	-48.51	3.389	174.41	0.065	179.99	0.146	8.97
24	0.673	-67.15	3.013	154.33	0.069	152.15	0.177	-27.73
25	0.664	-83.71	2.665	135.33	0.080	128.49	0.214	-50.32
26	0.643	-98.27	2.353	117.08	0.097	109.14	0.240	-65.86

V_{DS} = 2 V, I_D = 20 mA

10	0.598	-139.23	4.482	29.60	0.066	6.08	0.455	-107.18
11	0.561	-150.81	4.378	17.11	0.069	0.24	0.456	-115.14
12	0.526	-162.41	4.312	4.62	0.072	-5.81	0.458	-123.67
13	0.491	-174.69	4.280	-8.12	0.074	-12.10	0.461	-132.40
14	0.455	171.32	4.297	-21.27	0.077	-19.03	0.463	-141.40
15	0.425	155.93	4.339	-34.78	0.079	-26.67	0.459	-150.99
16	0.399	136.85	4.415	-49.14	0.082	-35.42	0.451	-161.40
17	0.382	114.11	4.526	-64.55	0.083	-45.67	0.435	-173.22
18	0.384	87.31	4.640	-81.37	0.084	-58.13	0.406	173.09
19	0.410	58.38	4.736	-99.75	0.083	-73.10	0.362	156.68
20	0.467	28.17	4.736	-119.69	0.080	-91.47	0.298	136.61
21	0.536	0.81	4.623	-140.99	0.075	-113.52	0.221	111.49
22	0.605	-24.56	4.335	-162.85	0.069	-139.42	0.152	74.50
23	0.645	-47.28	3.944	175.62	0.066	-168.61	0.128	22.78
24	0.656	-66.76	3.501	155.09	0.068	162.35	0.150	-21.62
25	0.646	-84.22	3.086	135.56	0.078	136.03	0.183	-48.73
26	0.625	-99.23	2.706	117.10	0.095	114.39	0.210	-64.57

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

10	0.660	-140.85	3.685	31.64	0.065	1.61	0.505	-111.21
11	0.624	-153.43	3.632	18.77	0.066	-3.78	0.501	-119.70
12	0.587	-166.20	3.604	5.82	0.068	-9.12	0.498	-128.70
13	0.551	-179.77	3.600	-7.39	0.070	-14.42	0.497	-137.79
14	0.514	164.77	3.634	-21.14	0.073	-20.67	0.494	-146.92
15	0.482	148.14	3.686	-35.27	0.075	-27.22	0.486	-156.71
16	0.458	127.89	3.755	-50.31	0.078	-35.51	0.475	-167.54
17	0.444	104.72	3.846	-66.42	0.080	-45.77	0.457	-179.79
18	0.449	78.48	3.923	-83.90	0.082	-58.20	0.426	166.04
19	0.478	50.91	3.971	-102.83	0.081	-73.69	0.385	148.95
20	0.534	22.44	3.927	-123.13	0.078	-92.56	0.324	127.77
21	0.594	-3.23	3.791	-144.44	0.073	-115.29	0.257	101.30
22	0.656	-27.07	3.527	-166.06	0.066	-142.16	0.201	65.32
23	0.689	-48.63	3.201	172.80	0.063	-171.77	0.185	22.86
24	0.696	-67.07	2.842	152.51	0.066	158.67	0.205	-13.69
25	0.684	-83.82	2.516	133.36	0.075	132.08	0.238	-40.02
26	0.671	-98.74	2.219	115.12	0.090	111.37	0.270	-57.73

Note:

1. Gain Calculations:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} \left(K \pm \sqrt{K^2 - 1} \right). \text{ When } K \gg 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

CEL California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • www.cel.com

DATA SUBJECT TO CHANGE WITHOUT NOTICE

03/18/2003

NEC
A Business Partner of NEC Compound Semiconductor Devices, Ltd.