NEC

GaAs MES FET

NE76184B

L to X BAND OSC
N-CHANNEL GaAs MES FET

DESCRIPTION

NE76184B is a N-channel GaAs MES FET housed in ceramic package. The device is fabricated by ion implantation for improved RF and DC performance reliability and uniformity.

FEATURES

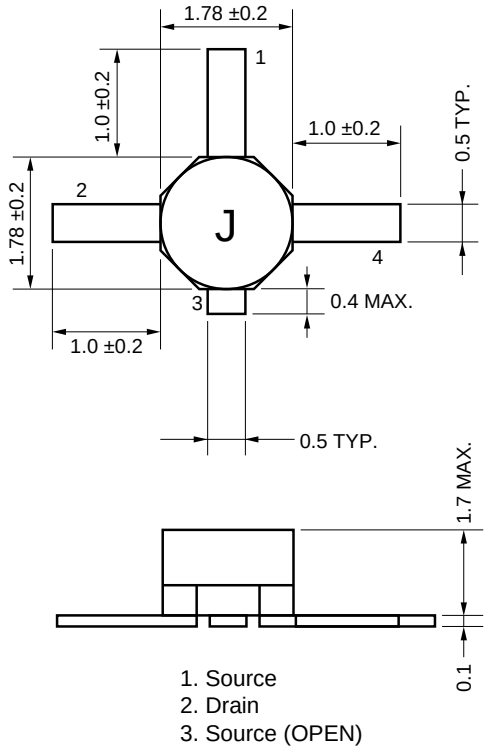
- Low noise figure & High associated gain
  NF = 0.8 dB TYP., G_a = 12 dB TYP. at f = 4 GHz

ORDERING INFORMATION

PART NUMBER	SUPPLYING FORM	MARKING
NE76184B-T1	Tape & reel 1000 pcs./reel	J
NE76184B-T1A	Tape & reel 5000 pcs./reel	

PACKAGE DIMENSIONS

(Unit: mm)



1. Source
2. Drain
3. Source (OPEN)
4. Gate

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ˚C)

Drain to Source Voltage	V_{DS}	5.0	V
Gate to Source Voltage	V_{GSO}	–5.0	V
Gate to Drain Voltage	V_{GDO}	–6.0	V
Drain Current	I_D	I_{DSS}	mA
Total Power Dissipation	P_{tot}	300	mW
Channel Temperature	T_{ch}	150	˚C
Storage Temperature	T_{stg}	–65 to +150	˚C

ELECTRICAL CHARACTERISTICS (T_A = 25 ˚C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS	
Gate to Source Leak Current	I_{GSO}	–	–	10	μA	V_{GS} = –5 V	
Saturated Drain Current	I_{DSS}	30	–	100	mA	V_{DS} = 3 V, V_{GS} = 0	
Gate to Source Cutoff Voltage	$V_{GS(off)}$	–0.5	–	–3.0	V	V_{DS} = 3 V, I_D = 100 μA	
Transconductance	g_m	20	45	–	mS	V_{DS} = 3 V, I_D = 10 mA	
Noise Figure	NF	–	0.8	1.4	dB	V_{DD} = 3 V, I_D = 10 mA	f = 4 GHz
Associated Gain	G_a	–	12	–	dB		
Power Gain	G_s	–	6	–	dB		f = 12 GHz

I_{DSS} rank is specified as follows. (K: 30 to 100 mA, N: 30 to 65 mA, M: 55 to 100 mA)

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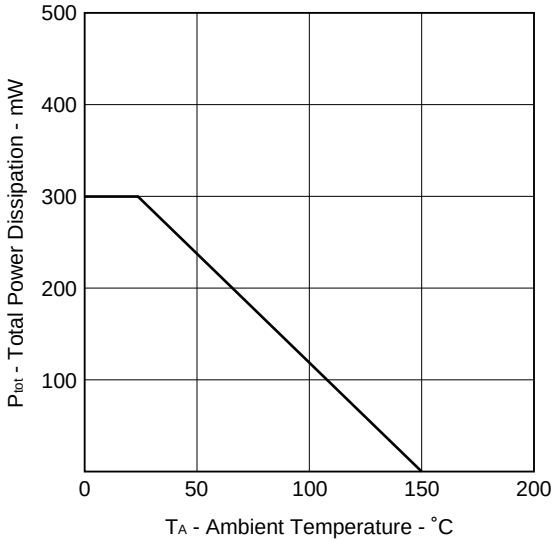
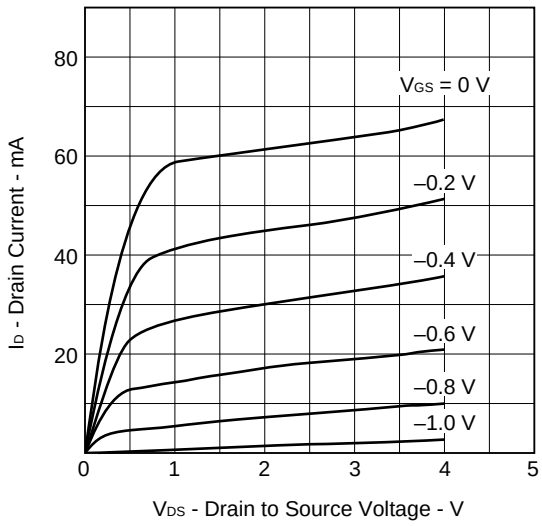
TYPICAL CHARACTERISTICS (T_A = 25 °C)

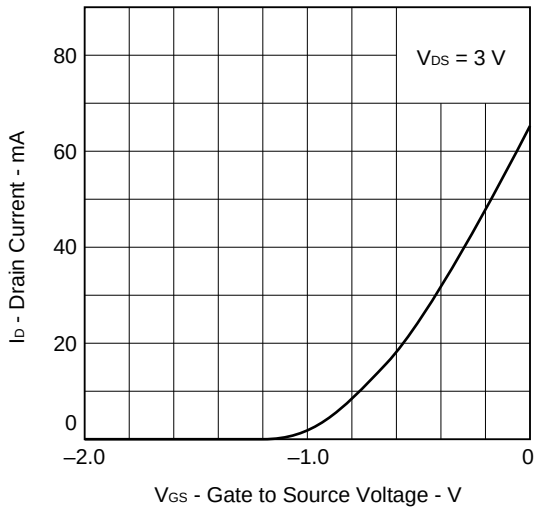
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE



S-PARAMETER

MAG. AND ANG.

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

FREQUENCY	S11		S21		S12		S22	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.920	–57.6	3.323	128.6	.074	52.8	.711	–33.6
3000	.834	–84.6	3.007	105.6	.097	36.6	.658	–48.2
4000	.741	–110.4	2.661	84.7	.110	23.8	.606	–61.7
5000	.680	–133.8	2.397	66.0	.116	13.2	.563	–74.7
6000	.637	–155.9	2.150	48.8	.117	4.7	.539	–87.6
7000	.612	–177.1	1.940	32.1	.117	–.3	.527	–98.9
8000	.591	164.0	1.743	17.2	.115	–4.1	.522	–109.8
9000	.585	146.0	1.597	3.2	.116	–6.9	.524	–121.5
10000	.589	128.3	1.491	–10.5	.121	–7.8	.525	–132.9
11000	.596	110.9	1.385	–23.7	.130	–10.0	.527	–145.2
12000	.606	94.9	1.283	–36.7	.140	–12.9	.532	–157.3
13000	.613	78.7	1.207	–49.5	.159	–16.6	.548	–169.4
14000	.630	63.2	1.137	–61.8	.175	–22.6	.559	178.8
15000	.649	48.1	1.074	–74.3	.196	–29.9	.566	166.8
16000	.664	31.9	1.021	–87.4	.220	–38.4	.576	154.4
17000	.671	16.5	.956	–100.4	.241	–47.2	.579	141.4
18000	.683	3.0	.914	–112.9	.266	–58.0	.581	127.9

V_{DS} = 3 V, I_D = 30 mA

FREQUENCY	S11		S21		S12		S22	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.886	–64.9	4.307	124.9	.061	52.7	.614	–34.1
3000	.783	–93.7	3.753	101.5	.076	38.5	.561	–47.9
4000	.691	–120.2	3.224	81.3	.087	29.2	.514	–60.7
5000	.637	–143.9	2.843	63.4	.094	21.3	.479	–73.4
6000	.603	–165.7	2.516	47.0	.098	16.6	.460	–86.3
7000	.584	173.9	2.242	31.1	.103	13.5	.455	–97.9
8000	.568	155.8	2.001	16.8	.110	11.0	.453	–109.2
9000	.567	138.5	1.827	3.4	.119	8.7	.461	–121.2
10000	.574	121.5	1.699	–9.9	.130	5.3	.467	–133.3
11000	.587	104.9	1.573	–22.9	.145	.8	.471	–146.2
12000	.597	89.1	1.456	–35.6	.162	–4.4	.479	–159.0
13000	.608	73.5	1.370	–48.1	.182	–11.0	.497	–171.3
14000	.624	58.3	1.292	–60.4	.200	–19.1	.513	176.5
15000	.644	43.3	1.215	–72.9	.223	–27.6	.524	164.4
16000	.662	28.1	1.150	–85.7	.248	–37.4	.539	151.9
17000	.671	12.8	1.081	–98.7	.262	–47.3	.546	138.7
18000	.682	–.4	1.030	–111.5	.285	–58.4	.545	125.3

AMP PARAMETERS

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

FREQUENCY MHz	$GU_{max.}$ dB	$GA_{max.}$ dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G_1 dB	G_2 dB
2000	21.63		10.43	–22.66	.25	.064	39.477	8.13	3.06
3000	17.18		9.56	–20.27	.40	.064	26.208	5.16	2.46
4000	13.94		8.50	–19.18	.55	.058	22.537	3.45	1.99
5000	11.95		7.59	–18.71	.68	.052	21.044	2.70	1.65
6000	10.41		6.65	–18.65	.81	.048	19.736	2.26	1.49
7000	9.21		5.76	–18.65	.91	.046	20.442	2.04	1.41
8000	8.08	10.48	4.83	–18.77	1.05	.041	17.635	1.87	1.38
9000	7.27	9.37	4.06	–18.68	1.11	.039	16.798	1.82	1.39
10000	6.72	8.98	3.47	–18.33	1.10	.038	17.123	1.85	1.40
11000	6.15	8.66	2.83	–17.74	1.07	.037	16.466	1.91	1.41
12000	5.59	8.41	2.16	–17.07	1.04	.036	14.768	1.99	1.44
13000	5.23		1.64	–15.95	.93	.035	15.412	2.04	1.55
14000	4.95		1.12	–15.12	.84	.034	15.646	2.20	1.63
15000	4.68		.62	–14.17	.76	.035	16.364	2.38	1.68
16000	4.45		.18	–13.15	.69	.036	17.442	2.52	1.75
17000	3.97		–.39	–12.35	.68	.036	12.559	2.59	1.77
18000	3.73		–.78	–11.51	.64	.035	12.969	2.72	1.79

V_{DS} = 3 V, I_D = 30 mA

FREQUENCY MHz	$GU_{max.}$ dB	$GA_{max.}$ dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G_1 dB	G_2 dB
2000	21.40		12.68	–24.28	.32	.065	32.910	6.67	2.05
3000	17.24		11.49	–22.34	.52	.065	25.779	4.12	1.64
4000	14.32		10.17	–21.21	.70	.056	23.415	2.82	1.33
5000	12.47		9.08	–20.54	.83	.050	22.253	2.26	1.13
6000	11.01		8.01	–20.16	.94	.046	21.938	1.97	1.03
7000	9.83	12.46	7.01	–19.76	1.02	.044	21.589	1.81	1.01
8000	8.72	10.78	6.03	–19.19	1.09	.040	19.318	1.69	1.00
9000	7.95	10.16	5.23	–18.49	1.08	.037	19.125	1.69	1.04
10000	7.41	10.11	4.61	–17.71	1.03	.037	19.388	1.74	1.07
11000	6.86		3.94	–16.76	.97	.036	19.244	1.83	1.09
12000	6.31		3.26	–15.81	.92	.035	17.502	1.92	1.13
13000	5.97		2.74	–14.82	.84	.035	18.209	2.00	1.23
14000	5.70		2.22	–13.98	.78	.034	20.157	2.15	1.33
15000	5.41		1.69	–13.05	.71	.035	24.264	2.33	1.39
16000	5.20		1.21	–12.11	.65	.035		2.50	1.49
17000	4.81		.68	–11.65	.65	.036	17.021	2.60	1.54
18000	4.50		.26	–10.91	.63	.035	16.200	2.71	1.53

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

<TYPES OF SURFACE MOUNT DEVICE>

For more details, refer to our document “SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL” (IEI-1207).

Soldering process	Soldering conditions	Symbol
Infrared ray reflow	Peak package’s surface temperature: 230 ˚C or below, Reflow time: 30 seconds or below (210 ˚C or higher), Number of reflow process: 1, Exposure limit*: None	IR30-00
Partial heating method	Terminal temperature: 230 ˚C or below, Flow time: 10 seconds or below, Exposure limit*: None	

***** Exposure limit before soldering after dry-pack package is opened.
Storage conditions: 25 ˚C and relative humidity at 65 % or less.

Note Do not apply more than a single process at once, except for “Partial heating method”.

PRECAUTION Avoid high static voltage and electric fields, because this device is MES FET with GaAs 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 Japanese law concerned.
Keep the Japanese law concerned and so on, especially in case of removal.

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