

L to X BAND SUPER LOW NOISE AMPLIFIER N-CHANNEL HJ-FET

DESCRIPTION

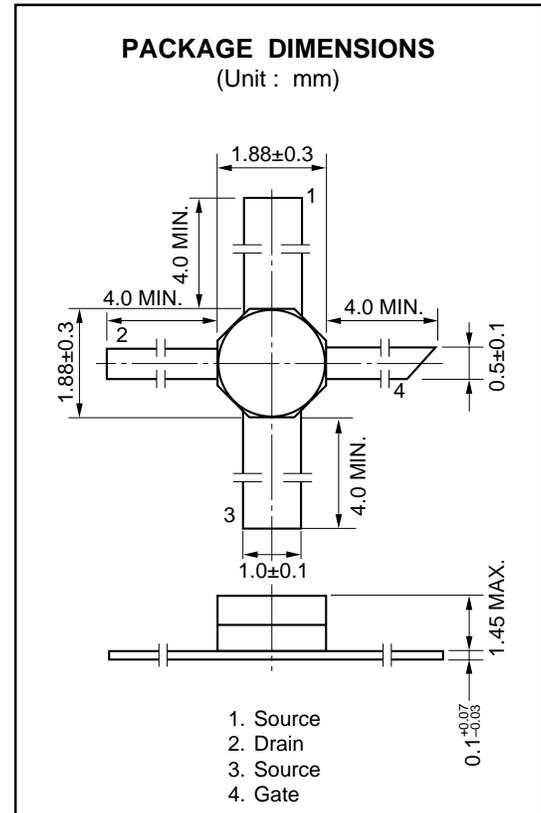
The NE23383B is a Hetero Junction FET that utilizes the hetero junction to create high mobility electrons.

FEATURES

- Super Low Noise Figure & High Associated Gain
NF = 0.35 dB TYP., $G_a = 15.0$ dB TYP. at $f = 4$ GHz
- Gate Width: $W_g = 280 \mu\text{m}$
- Hermetic sealed ceramic package
- High reliability

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

Drain to Source Voltage	V_{ds}	4.0	V
Gate to Source Voltage	V_{gs}	-3.0	V
Drain Current	I_d	I_{DSS}	mA
Total Power Dissipation	P_T	165	mW
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +175	$^\circ\text{C}$



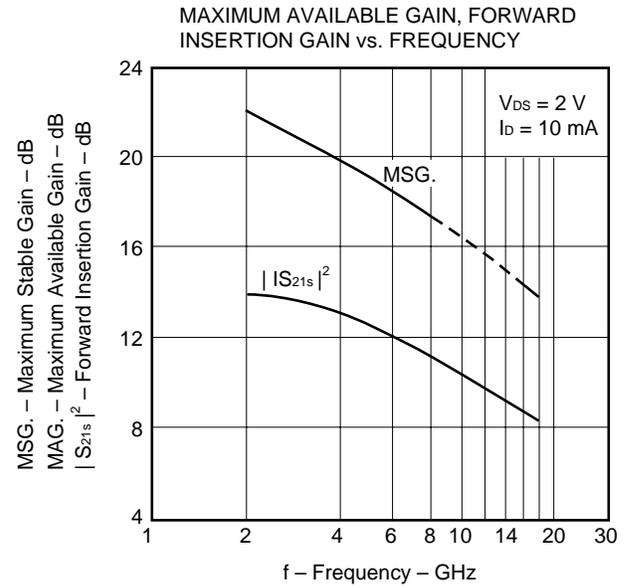
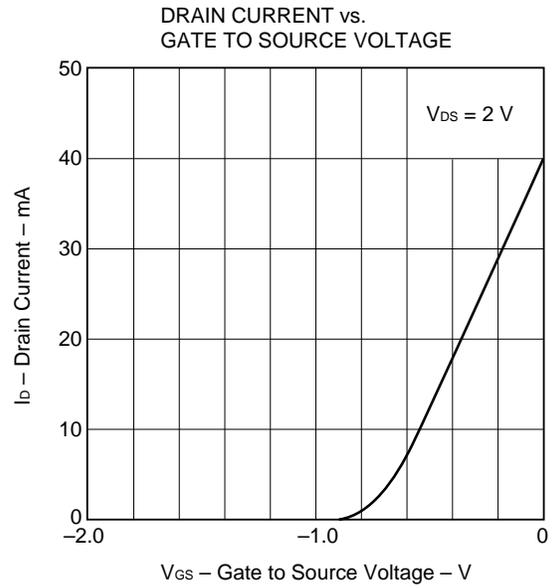
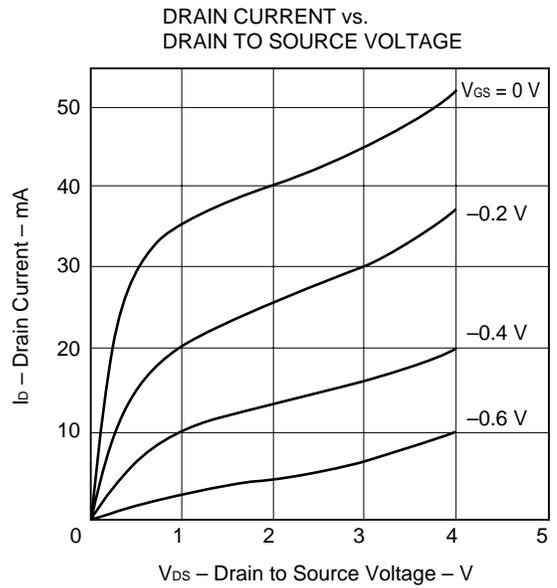
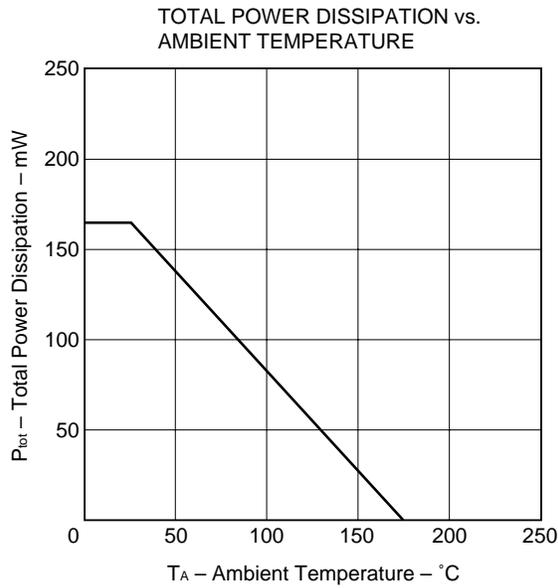
RECOMMENDED OPERATING CONDITION ($T_A = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V_{ds}		2	3	V
Drain Current	I_d		10	20	mA
Input Power	P_{in}			0	dBm

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Gate to Source Leak Current	I _{gso}		0.5	10	μA	V _{GS} = -3 V
Gate to Drain Leak Current	I _{gdo}		0.5	10	μA	V _{GD} = -3 V
Saturated Drain Current	I _{DSS}	15	40	80	mA	V _{DS} = 2 V, V _{GS} = 0 V
Gate to Source Cut off Voltage	V _{GS(off)}	-0.2	-0.8	-2.0	V	V _{DS} = 2 V, I _D = 100 μA
Transconductance	g _m	45	70		mS	V _{DS} = 2 V, I _D = 10 mA
Noise Figure	NF		0.35	0.45	dB	V _{DS} = 2 V, I _D = 10 mA
Associated Gain	G _a	13.0	15.0		dB	f = 4 GHz

TYPICAL CHARACTERISTICS (T_A = 25 °C)



Gain Calculations

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

$$MAG. = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}) \qquad \Delta = S_{11} \cdot S_{22} - S_{21} \cdot S_{12}$$

S-Parameter

MAG. AND ANG.

$V_{DS} = 2\text{ V}$, $I_D = 10\text{ mA}$

FREQUENCY GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	
2.0	.96	-39.94	5.00	141.49	.03	66.70	.52	-25.96	.22
3.0	.91	-53.81	4.54	125.98	.04	58.07	.54	-38.70	.36
4.0	.88	-64.11	4.07	113.15	.05	52.54	.54	-44.90	.46
5.0	.80	-74.58	3.85	100.67	.05	47.00	.57	-51.85	.67
6.0	.77	-85.67	3.73	88.48	.06	42.12	.51	-57.28	.76
7.0	.69	-98.42	3.71	75.46	.07	36.19	.46	-66.10	.90
8.0	.63	-115.67	3.64	60.60	.08	28.39	.41	-80.09	.98
9.0	.59	-132.86	3.44	46.21	.08	21.00	.40	-95.43	1.07
10.0	.57	-145.83	3.18	32.90	.08	13.97	.41	-109.27	1.12
11.0	.55	-154.21	2.97	22.06	.08	7.90	.43	-115.64	1.26
12.0	.54	-164.09	2.91	10.84	.08	6.58	.46	-120.71	1.24
13.0	.53	-179.26	2.88	-2.27	.08	3.61	.47	-131.41	1.15
14.0	.53	169.19	2.78	-16.05	.08	-4.59	.46	-146.02	1.20
15.0	.53	157.02	2.65	-29.31	.08	-9.21	.49	-156.04	1.18
16.0	.53	149.49	2.69	-41.55	.08	-10.08	.55	-166.37	.98
17.0	.52	136.67	2.69	-57.64	.09	-17.82	.58	177.96	.85
18.0	.50	117.26	2.59	-76.16	.09	-30.52	.61	159.46	.81

Noise Parameters

$V_{DS} = 2\text{ V}$, $I_D = 10\text{ mA}$

Freq (GHz)	NF _{min} (dB)	G _a (dB)	Γ _{opt.}		R _n /50
			MAG.	ANG. (deg.)	
2.0	0.32	16.0	0.90	26	0.35
4.0	0.35	15.0	0.80	51	0.29
6.0	0.41	13.7	0.70	75	0.22
8.0	0.50	12.6	0.61	101	0.15
10.0	0.62	11.5	0.53	127	0.09
12.0	0.75	10.5	0.48	154	0.05
14.0	0.88	9.6	0.45	-178	0.05
16.0	1.02	8.8	0.44	-147	0.07
18.0	1.15	8.0	0.48	-115	0.14

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" (C10535E)

Soldering process	Soldering conditions	Symbol
Partial heating method	Terminal temperature: 230 °C or below, Flow time: 10 seconds or below, Exposure limit ^{Note} : None	

Note: Exposure limit before soldering after dry-pack package is opened.

Storage conditions: 25 °C and relative humidity at 65 % or less.

Caution: 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 Hetero Junction 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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Anti-radioactive design is not implemented in this product.