

NEC[®]

LOW NOISE Ku-K BAND GaAs MESFET FOR HI REL APPLICATION ONLY

T-31-25
**NE67300
NE67383**

FEATURES

- **VERY HIGH f_{MAX} :** 100 GHz
- **LOW NOISE FIGURE**
0.4 dB at 4 GHz
0.8 dB at 8 GHz
1.4 dB at 12 GHz
1.9 dB at 18 GHz
3.3 dB at 26 GHz
- **0.3 MICRON RECESSED GATE**
- **N⁺ CONTACT LAYER**
(Triple Epitaxial Technology)
- **PROVEN RELIABILITY AND STABILITY**
- **SPACE QUALIFIED**

DESCRIPTION AND APPLICATIONS

The NE673 features a low noise figure and high associated gain thru K-band by employing a recessed 0.3 micron gate and triple epitaxial technology for industrial and space applications.

The device is available as a chip (NE67300). The chip's gate and channel are glassivated with a thin layer of Si₃N₄ for mechanical protection only. The NE673 is in a rugged hermetically sealed metal-ceramic stripline package selected for NFOPT performance at 12.0 GHz. The NE67383-4 is selected for NFOPT performance at 4.0 GHz.

PERFORMANCE SPECIFICATIONS (T_A = 25°C)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE			NE67300 00 (CHIP)			NE67383/ NE67383-4 ² 2SK407 83		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
f_{MAX}	Maximum Frequency of Oscillation at V _{DS} = 3 V, I _{DS} = 30 mA	GHz		100			100	
MAG	Maximum Available Gain ³ at V _{DS} = 3 V, I _{DS} = 30 mA f = 8 GHz f = 12 GHz f = 18 GHz	dB dB dB		15 12 8.5			15 12 8.5	
NFOPT	Optimum Noise Figure ⁴ at V _{DS} = 3 V, I _{DS} = 10 mA f = 4 GHz, Γ_{OPT} = .64∠69°, R _N = .38 f = 8 GHz, Γ_{OPT} = .55∠115°, R _N = .20 f = 12 GHz, Γ_{OPT} = .48∠-155°, R _N = .20 f = 18 GHz, Γ_{OPT} = .46∠-33°, R _N = .40 f = 26 GHz	dB dB dB dB		0.4 0.8 1.4 1.9 3.3	1.6		0.4 0.8 1.4	0.6 ² 1.6
GA	Associated Gain at Optimum Noise Figure at V _{DS} = 3 V, I _{DS} = 10 mA f = 4 GHz f = 8 GHz f = 12 GHz f = 18 GHz f = 26 GHz	dB dB dB dB dB	8.5	14.5 11.5 10 8 6		12 ² 8.5	14.5 11.5 10	
P _{1dB}	Output Power at 1 dB Compression Point at V _{DS} = 3 V, I _{DS} = 30 mA f = 12 GHz	dBm		14.5			14.5	

Notes:

- Electronic Industrial Association of Japan.
- NE67383-4 is tested for NFOPT at 4 GHz. The standard NE67383 is tested at 12 GHz.
- Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$, $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}||S_{21}|}$, $\Delta = S_{11}S_{22} - S_{21}S_{12}$
- Typical values of noise figures are those obtained when 50% of the devices from a large number of lots were individually measured in a circuit with the input individually tuned to obtain the minimum value. Maximum values are criteria established on the production line as a "go-no-go" screening test with the fixture tuned for the "generic" type but not for each specimen.

ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE			NE67300 00 (CHIP)			NE67383/ NE67383-4 2SK407 83		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
I _{DS}	Drain Current at V _{DS} = 3 V, V _{GS} = 0	mA	20	40	120	20	40	120
V _P	Pinch-off Voltage at V _{DS} = 3 V, I _{DS} = 0.1 mA	V	-0.5	-1.1	-3.5	-0.5	-1.1	-3.5
g _M	Transconductance at V _{DS} = 3 V, I _{DS} = 10 mA	mS	20	50	100	20	50	100
I _{GS}	Gate to Source Leakage Current at V _{GS} = -5 V	μA		1	10		1	10
R _{TH}	Thermal Resistance (Channel-to-Ambient)	°C/W			190 ²			450
P _T	Total Power Dissipation	mW			400 ^{2,3}			270 ⁴

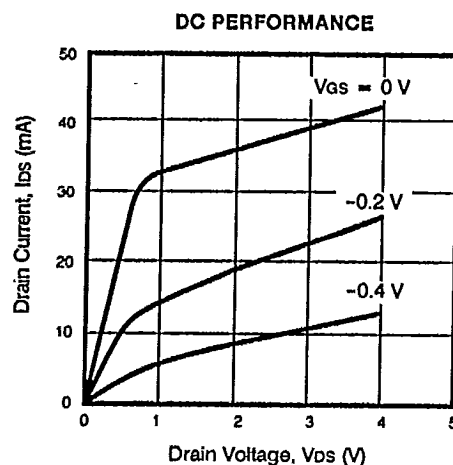
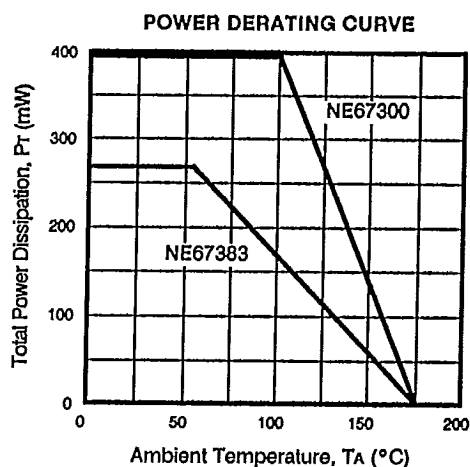
Notes:

1. Electronic Industrial Association of Japan.
2. R_{TH} (Channel-to-Case) for chips mounted on a copper heatsink.
3. TA = 100°C
4. TA = 55°C

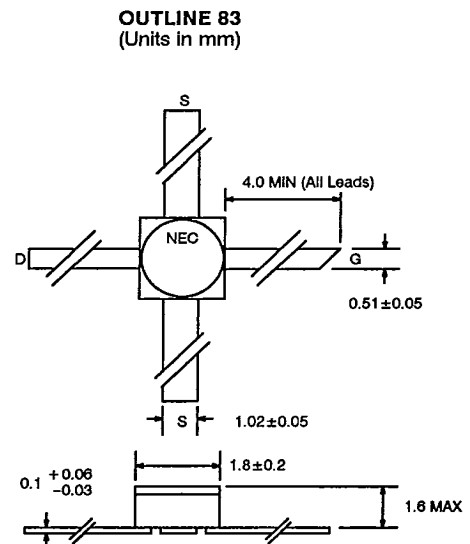
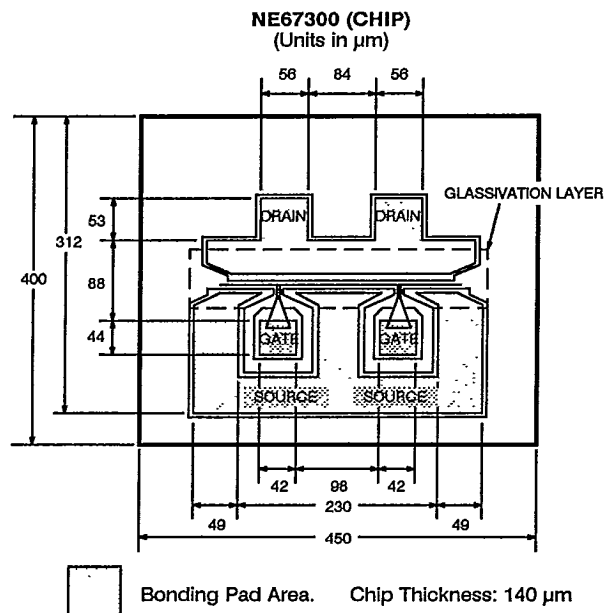
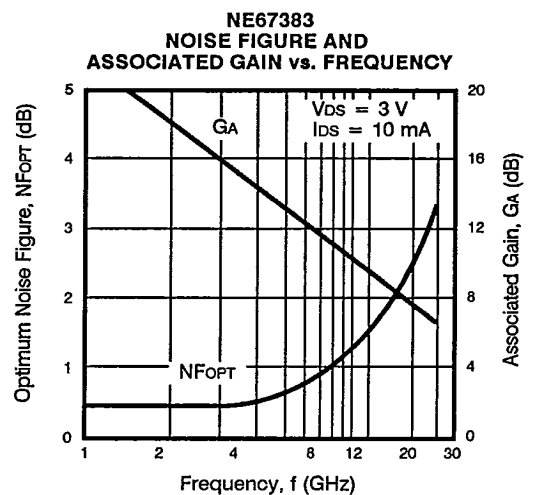
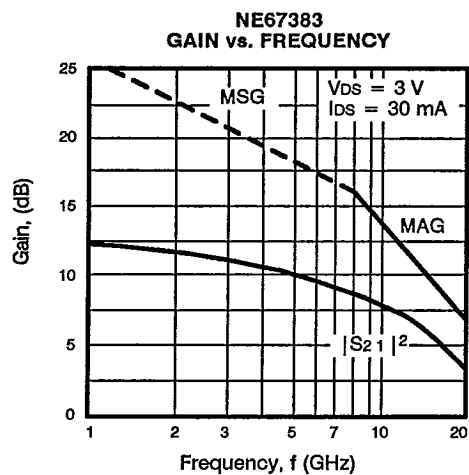
ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

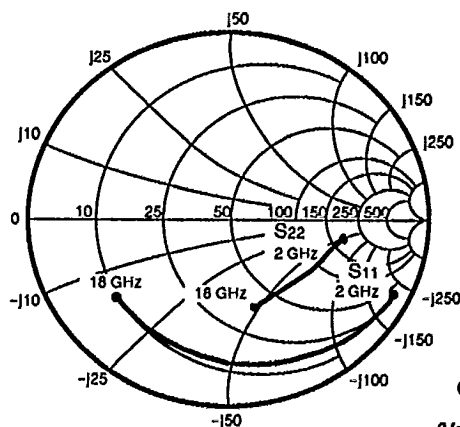
SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{DS}	Drain to Source Voltage	V	5
V _{GS}	Gate to Source Voltage	V	-6
I _{DS}	Drain Current	mA	120
P _{IN}	RF Input Power	mW	40
T _{CH}	Channel Temperature	°C	175
T _{STG}	Storage Temperature	°C	-65 to +175

TYPICAL DEVICE CHARACTERISTICS (TA = 25°C)

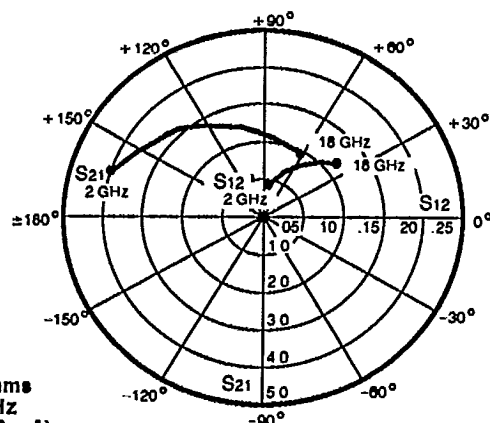


OUTLINE DIMENSIONS

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

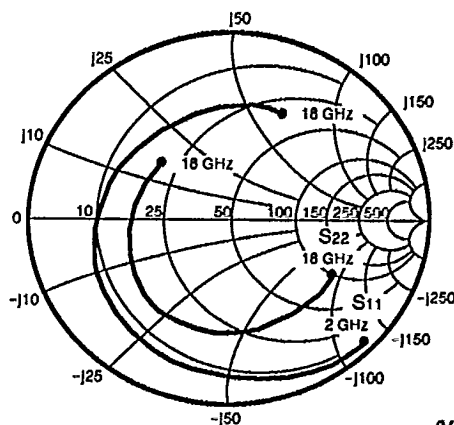
NE67300, NE67383**TYPICAL COMMON SOURCE SCATTERING PARAMETERS**

NE67300
Coordinates in Ohms
Frequency in GHz
($V_{DS} = 3\text{ V}$, $I_{DS} = 10\text{ mA}$)

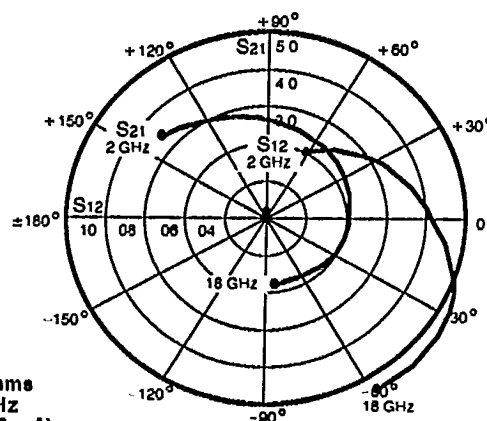
**S-MAGN AND ANGLES:** $V_{DS} = 3\text{ V}$, $I_{DS} = 10\text{ mA}$

FREQUENCY (MHz)

	S11		S21		S12		S22	
2000	.95	-26	3.79	161	.04	79	.59	-13
4000	.89	-50	3.26	141	.06	66	.58	-24
6000	.82	-70	2.83	126	.08	56	.54	-33
8000	.78	-88	2.55	114	.09	51	.50	-42
10000	.73	-102	2.21	104	.10	48	.47	-48
12000	.71	-114	2.16	93	.10	43	.45	-55
14000	.71	-122	2.11	90	.11	44	.47	-62
16000	.67	-128	1.92	76	.11	43	.49	-64
18000	.66	-140	1.81	63	.11	40	.52	-70



NE67383
Coordinates in Ohms
Frequency in GHz
($V_{DS} = 3\text{ V}$, $I_{DS} = 10\text{ mA}$)

**S-MAGN AND ANGLES:** $V_{DS} = 3\text{ V}$, $I_{DS} = 10\text{ mA}$

FREQUENCY (MHz)

	S11		S21		S12		S22	
2000	.97	-43	3.39	140	.04	61	.63	-32
4000	.88	-79	2.85	107	.06	35	.61	-58
6000	.84	-103	2.57	81	.07	20	.62	-77
8000	.78	-126	2.33	56	.07	12	.62	-94
10000	.71	-146	2.11	38	.07	4	.61	-107
12000	.64	-174	1.98	12	.08	-7	.60	-123
14000	.59	157	1.95	-11	.10	-15	.57	-139
16000	.57	111	1.83	-42	.11	-31	.47	-169
18000	.62	64	1.74	-84	.11	-58	.43	137