



SILICON TRANSISTOR

NE68139 / 2SC4094

JEITA
Part No.

MICROWAVE LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISTOR 4 PINS MINI MOLD

DESCRIPTION

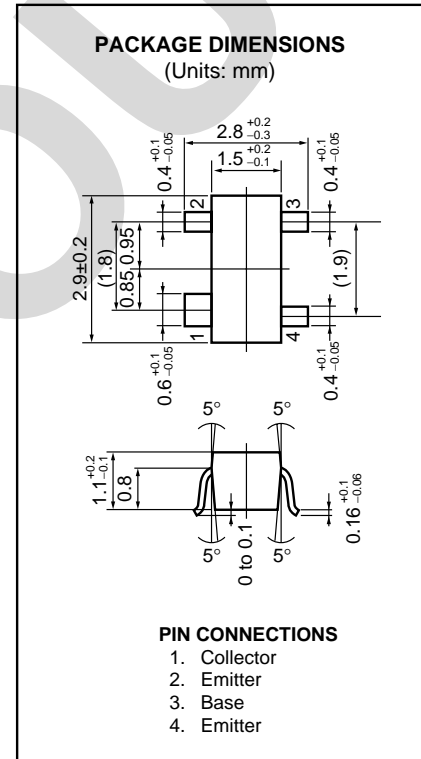
The NE68139 / 2SC4094 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. Low-noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This achieved by direct nitride passivated base surface process (DNP process) which is a proprietary new fabrication technique.

FEATURES

- NF = 1.2 dB TYP. @f = 1.0 GHz, $V_{CE} = 8$ V, $I_C = 7$ mA
- $|S_{21e}|^2 = 15$ dB TYP. @f = 1.0 GHz, $V_{CE} = 8$ V, $I_C = 20$ mA

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

Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	65	mA
Total Power Dissipation	P_T	200	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$



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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			1.0	μA	$V_{CB} = 10$ V, $I_E = 0$
Emitter Cutoff Current	I_{EBO}			1.0	μA	$V_{EB} = 1$ V, $I_C = 0$
DC Current Gain	h_{FE}	50		250		$V_{CE} = 8$ V, $I_C = 20$ mA
Gain Bandwidth Product	f_T		9		GHz	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Feed-Back Capacitance	C_{re}		0.25	0.8	pF	$V_{CB} = 10$ V, $I_E = 0$, $f = 1.0$ MHz
Insertion Power Gain	$ S_{21e} ^2$	13	15		dB	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Maximum Available Gain	MAG		17		dB	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Noise Figure	NF		1.2	2.0	dB	$V_{CE} = 8$ V, $I_C = 7$ mA, $f = 1.0$ GHz

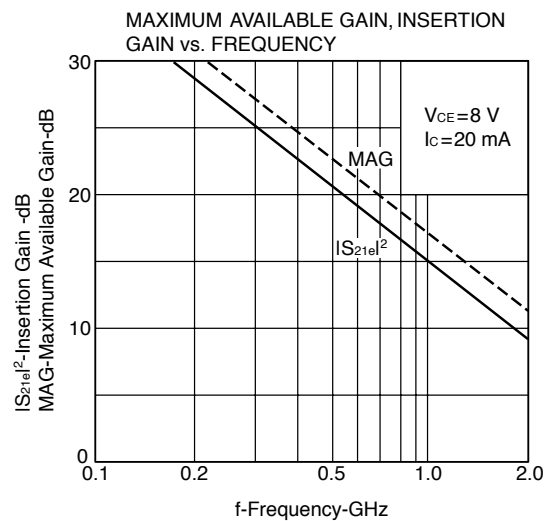
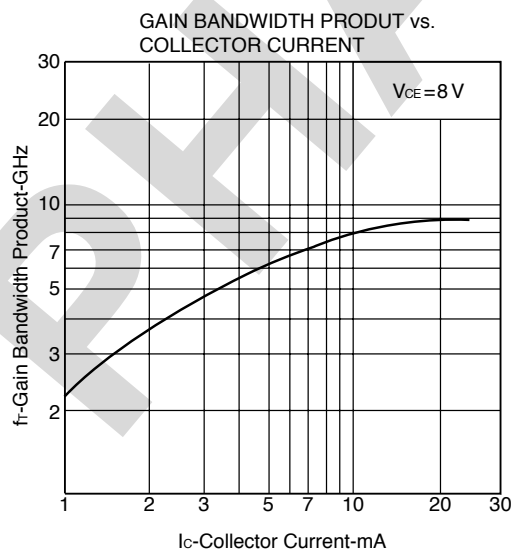
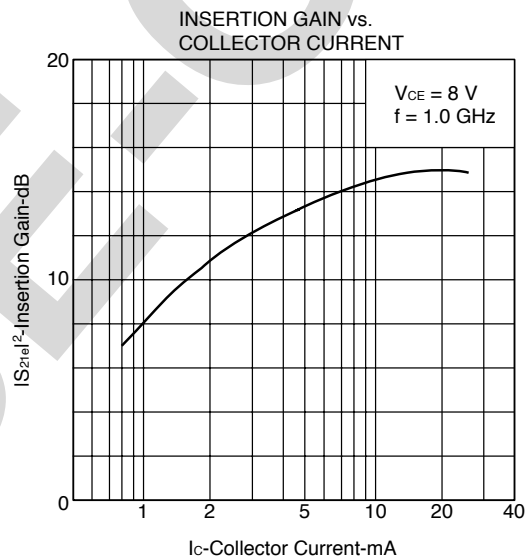
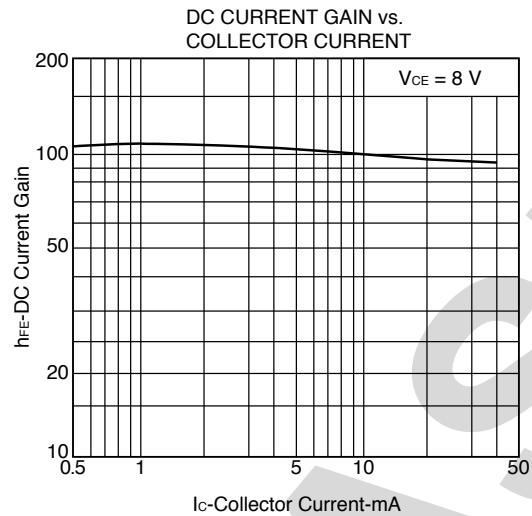
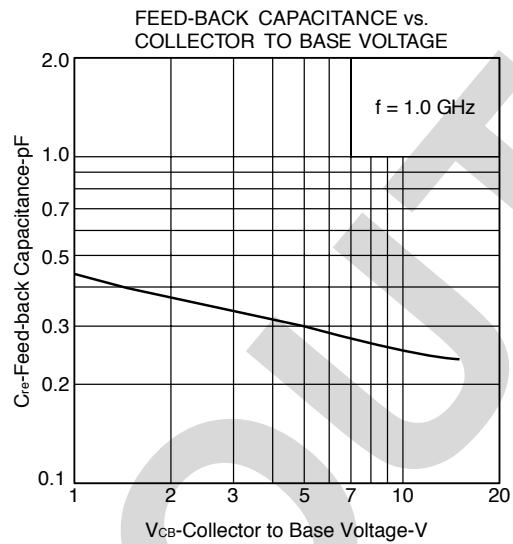
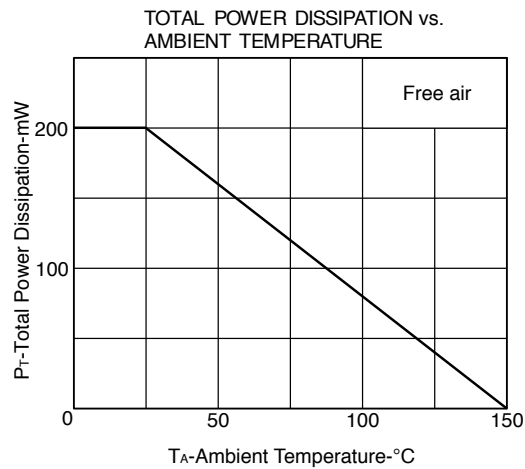
h_{FE} Classification

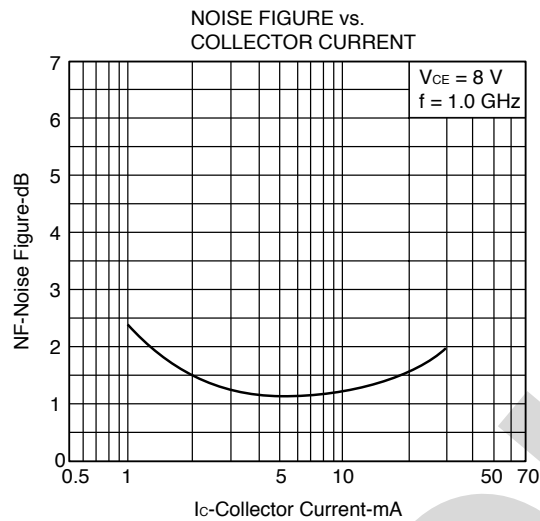
Class	R36/RCF *	R37/RCG *	R38/RCH *
Marking	R36	R37	R38
h_{FE}	50 to 100	80 to 160	125 to 250

* Old Specification / New Specification

ORDERING INFORMATION

Part Number	Order Number	Quantity
NE68139-T1 2SC4094-T1	NE68139-T1-A 2SC4094-T1-A	3 kpcs/Reel

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

**S-PARAMETER** $V_{CE} = 8.0\text{ V}$, $I_C = 5.0\text{ mA}$, $Z_O = 50\ \Omega$

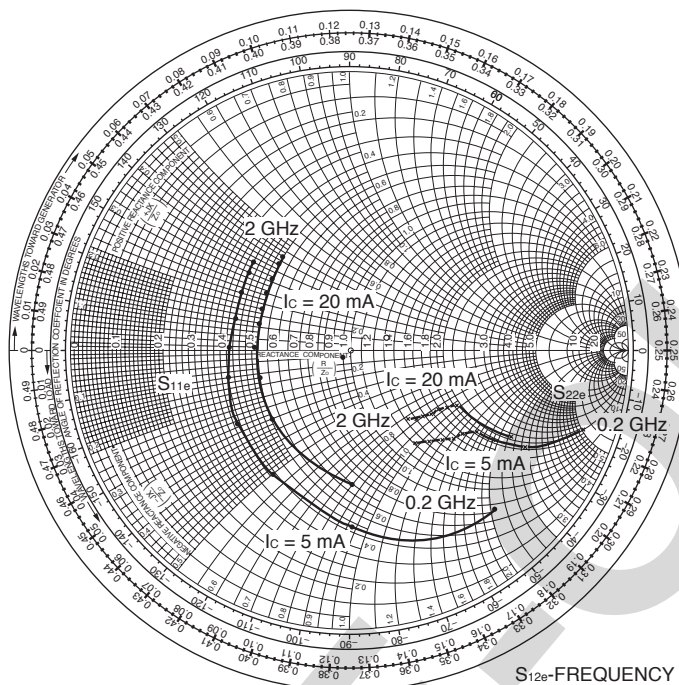
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.774	-47.8	12.689	146.5	0.031	65.4	0.882	-19.1
400	0.631	-88.8	9.952	119.4	0.048	53.4	0.723	-29.5
600	0.523	-120.9	7.813	100.9	0.058	46.2	0.611	-33.4
800	0.460	-145.1	5.966	87.6	0.067	43.9	0.564	-34.5
1000	0.426	-166.6	4.841	76.7	0.074	43.8	0.515	-37.6
1200	0.416	178.2	4.065	68.8	0.083	43.5	0.488	-39.6
1400	0.417	163.0	3.413	60.7	0.087	41.2	0.459	-44.1
1600	0.430	152.1	3.035	54.1	0.098	42.8	0.443	-45.9
1800	0.443	142.1	2.659	48.0	0.105	40.1	0.428	-51.1
2000	0.458	136.5	2.482	44.3	0.114	43.0	0.414	-53.5

 $V_{CE} = 8.0\text{ V}$, $I_C = 20.0\text{ mA}$, $Z_O = 50\ \Omega$

f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.461	-89.8	23.331	121.6	0.021	60.7	0.665	-27.7
400	0.364	-135.8	13.501	99.2	0.033	61.2	0.511	-30.5
600	0.338	-163.4	9.535	86.4	0.046	61.5	0.448	-29.5
800	0.330	177.9	7.083	77.5	0.056	62.1	0.430	-29.5
1000	0.334	163.2	5.604	69.3	0.070	60.0	0.402	-32.5
1200	0.344	153.9	4.722	63.5	0.084	60.4	0.385	-34.8
1400	0.359	143.1	3.982	56.8	0.091	54.9	0.362	-39.5
1600	0.383	136.1	3.517	51.1	0.104	54.5	0.350	-42.1
1800	0.401	128.3	3.094	45.6	0.116	49.9	0.337	-47.4
2000	0.419	124.7	2.882	42.7	0.127	50.8	0.323	-50.5

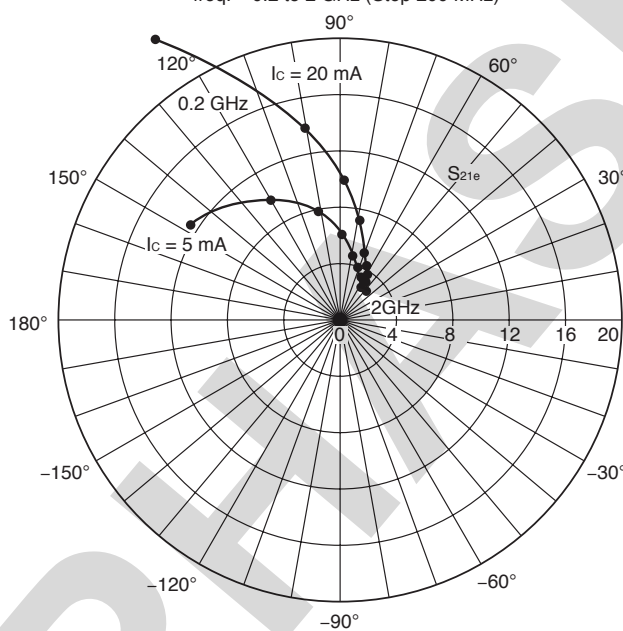
S-PARAMETER

S_{11e} , S_{22e} -FREQUENCY CONDITION $V_{CE} = 8\text{ V}$, $I_C = 20/5\text{ mA}$, freq. = 0.2 to 2 GHz (Step 200 MHz)



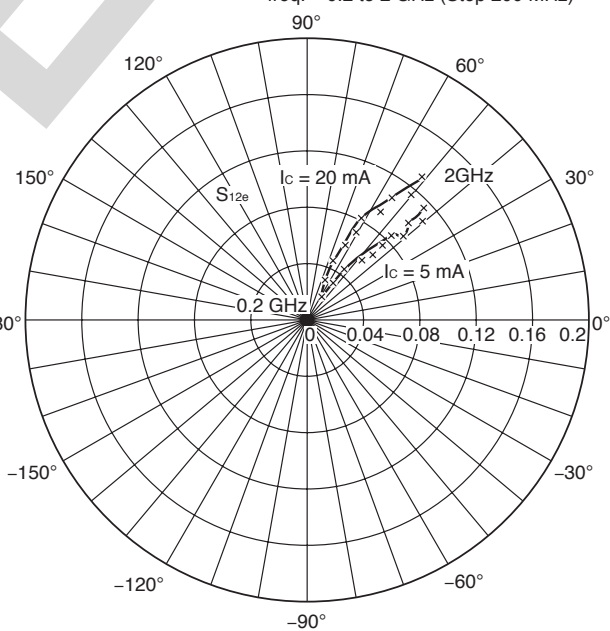
S_{21e} -FREQUENCY

CONDITION $V_{CE} = 8\text{ V}$
 $I_C = 20/5\text{ mA}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



S_{12e} -FREQUENCY

CONDITION $V_{CE} = 8\text{ V}$
 $I_C = 20/5\text{ mA}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



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