

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

DESCRIPTION

The 2SC4093 is an NPN silicon epitaxial transistor designed for low noise amplifier at VHF, UHF and CATV band.

It has large dynamic range and good current characteristics, and is contained in a 4 pins mini-mold package which enables high-isolation gain.

FEATURES

- Low Noise  
NF = 1.1 dB TYP. @  $V_{CE} = 10\text{ V}$ ,  $I_c = 7\text{ mA}$ ,  $f = 1.0\text{ GHz}$
- High Power Gains  
 $|S_{21e}|^2 = 13\text{ dB TYP. @ } V_{CE} = 10\text{ V}$ ,  $I_c = 20\text{ mA}$ ,  $f = 1.0\text{ GHz}$

ORDERING INFORMATION

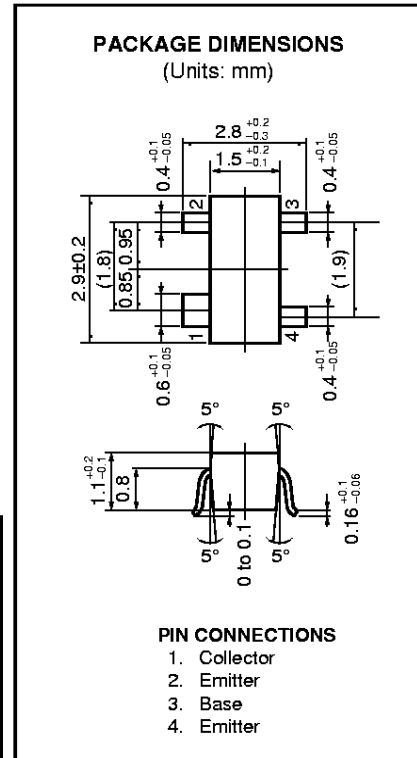
PART NUMBER	QUANTITY	PACKING STYLE
2SC4093-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC4093-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

\* Please contact with responsible NEC person, if you require evaluation sample.

Unit sample quantity shall be 50 pcs. (Part No.: 2SC4093)

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

Collector to Base Voltage	$V_{CBO}$	20	V
Collector to Emitter Voltage	$V_{CEO}$	12	V
Emitter to Base Voltage	$V_{EBO}$	3.0	V
Collector Current	$I_c$	100	mA
Total Power Dissipation	$P_T$	200	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{sig}$	-65 to +150	$^\circ\text{C}$



**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CB0</sub>			1.0	μA	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			1.0	μA	V <sub>EB</sub> = 10 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	50	120	250		V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA
Gain Bandwidth Product	f <sub>T</sub>		7.0		GHz	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA
Feed-Back Capacitance	C <sub>re</sub>		0.6	0.95	pF	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	11	13		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.1	2.0	dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 7 mA, f = 1.0 GHz

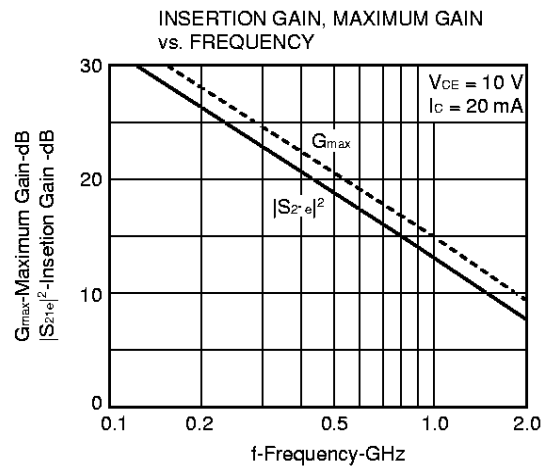
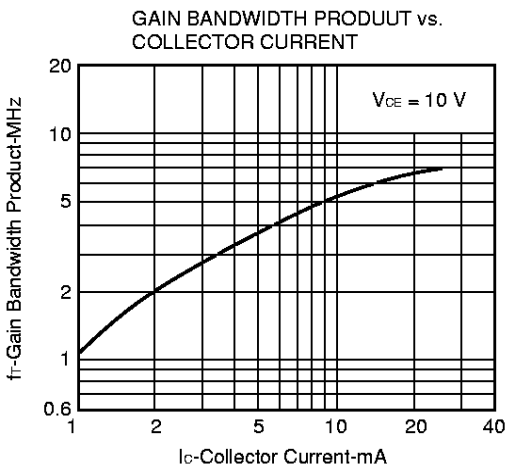
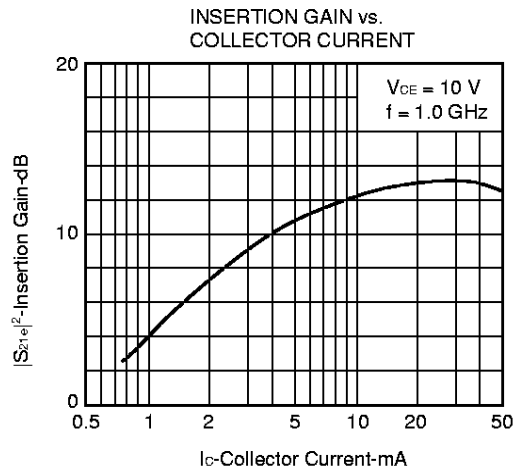
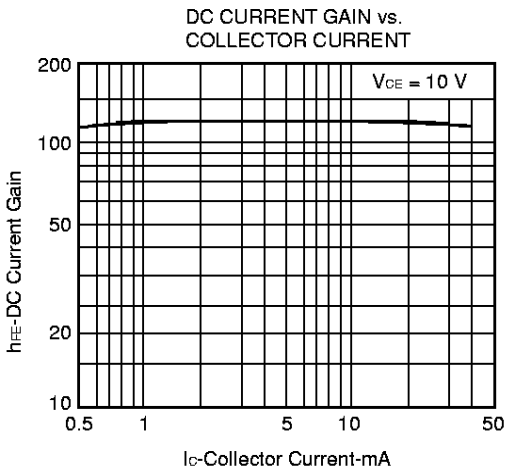
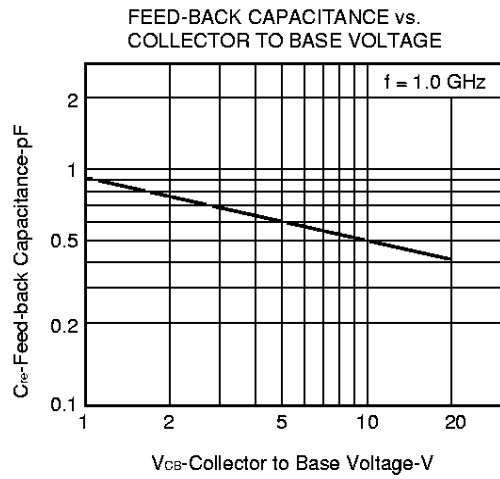
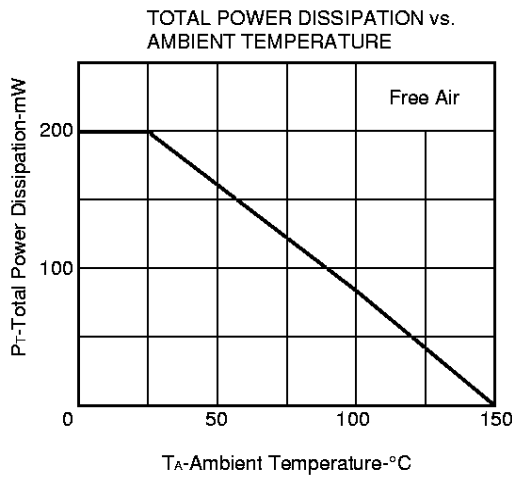
**Classification of h<sub>FE</sub>**

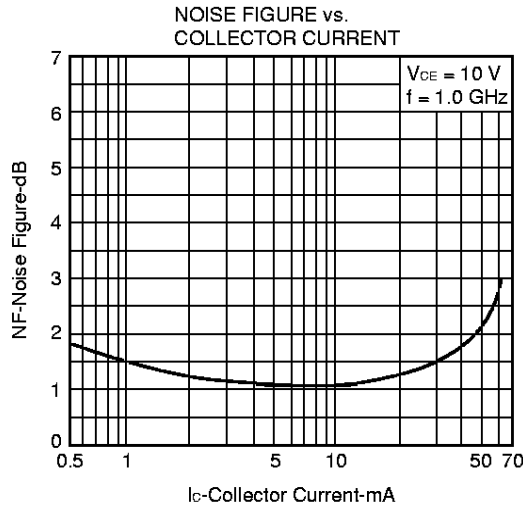
Rank	R26/RBF *	R27/RBG *	R28/RBH *
Marking	R26	R27	R28
Range	50 to 100	80 to 160	125 to 250

\* Old Specification / New Specification

h<sub>FE</sub> Test Conditions: V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA

TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)





**S-PARAMETER**

V<sub>CE</sub> = 10 V, I<sub>c</sub> = 5 mA, Z<sub>O</sub> = 50 Ω

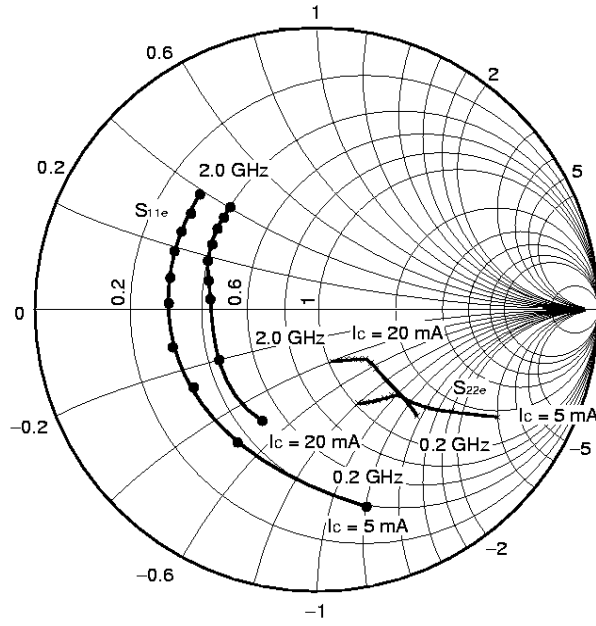
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.730	-76.5	11.712	129.6	0.048	47.2	0.772	-28.1
400	0.583	-118.8	7.379	105.6	0.056	43.2	0.600	-34.9
600	0.522	-146.2	5.551	92.2	0.072	38.6	0.526	-37.7
800	0.518	-166.5	4.026	80.8	0.072	40.5	0.471	-39.8
1000	0.519	178.3	3.406	71.9	0.088	40.5	0.441	-41.6
1200	0.539	166.6	2.744	63.1	0.089	44.3	0.428	-45.4
1400	0.552	157.4	2.512	55.2	0.106	45.6	0.406	-49.4
1600	0.555	149.0	2.122	48.5	0.111	44.8	0.388	-56.1
1800	0.570	140.9	2.028	41.9	0.134	49.3	0.380	-61.8
2000	0.582	134.0	1.740	36.4	0.135	47.3	0.367	-68.0

V<sub>CE</sub> = 10 V, I<sub>c</sub> = 20 mA, Z<sub>O</sub> = 50 Ω

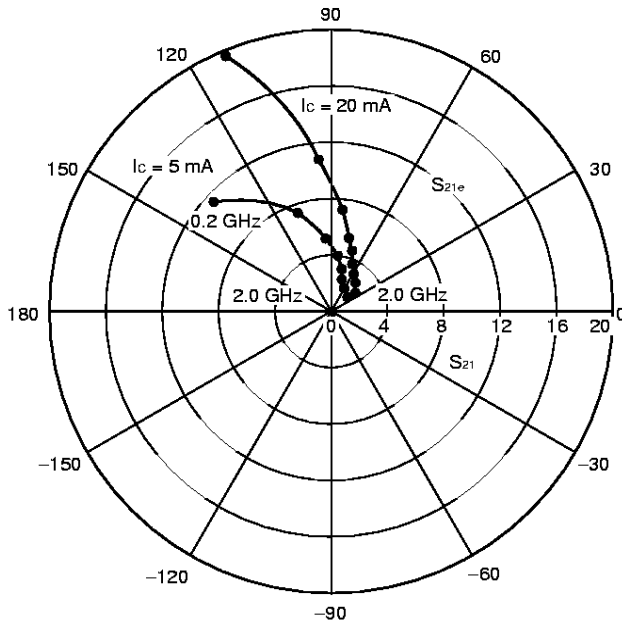
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.454	-114.9	19.635	111.0	0.033	46.1	0.497	-42.5
400	0.395	-153.0	10.412	93.3	0.041	58.1	0.359	-41.2
600	0.384	-172.8	7.454	84.4	0.060	55.6	0.315	-41.0
800	0.408	173.4	5.318	75.5	0.073	61.1	0.283	-42.5
1000	0.420	162.6	4.450	68.8	0.094	58.2	0.256	-43.2
1200	0.442	154.7	3.571	61.4	0.103	58.7	0.247	-47.8
1400	0.455	147.7	3.253	54.6	0.127	55.3	0.227	-53.0
1600	0.468	141.2	2.737	49.0	0.137	53.1	0.212	-62.2
1800	0.486	133.9	2.618	43.0	0.165	52.1	0.198	-67.4
2000	0.502	128.7	2.237	38.4	0.170	48.4	0.186	-75.5

S-PARAMETER

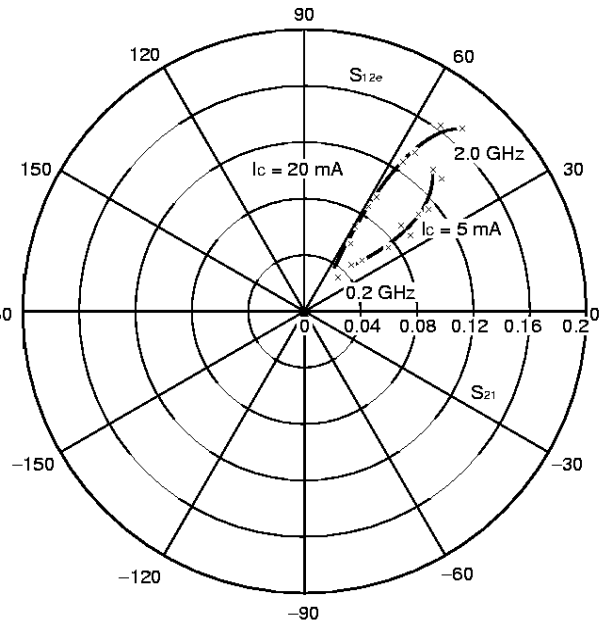
$S_{11e}, S_{22e}$ -FREQUENCY  
 $V_{CE} = 10\text{ V}$   
 freq. = 0.2 to 2 GHz (Step 200 MHz)



$S_{21e}$ -FREQUENCY  
 $V_{CE} = 10\text{ V}$   
 freq. = 0.2 to 2 GHz (Step 200 MHz)



$S_{12e}$ -FREQUENCY  
 $V_{CE} = 10\text{ V}$   
 freq. = 0.2 to 2 GHz (Step 200 MHz)



[MEMO]

[MEMO]

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Anti-radioactive design is not implemented in this product.