



# SILICON TRANSISTOR

## NE68033 / 2SC3585 JEITA Part No.

### MICROWAVE LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISOR

#### DESCRIPTION

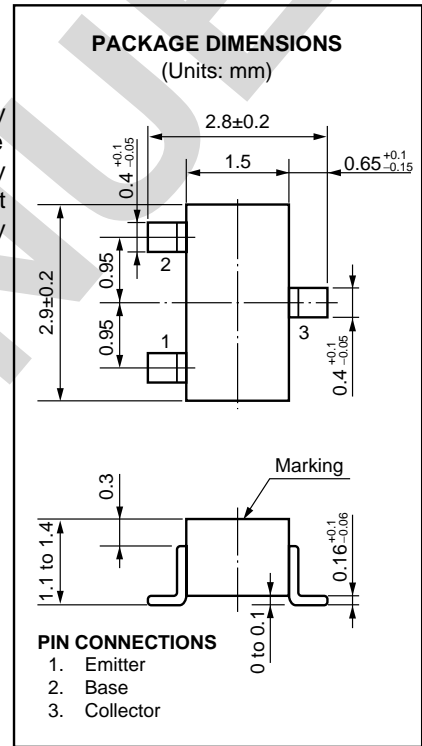
The NE68033 / 2SC3585 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. The NE68033 / 2SC3585 features excellent power gain with very low-noise figures. The NE68033 / 2SC3585 employs direct nitride passivated base surface process (DNP process) which is a proprietary new fabrication technique which provides excellent noise figures at high current values. This allows excellent associated gain and very wide dynamic range.

#### FEATURES

- NF 1.8 dB TYP. @f = 2.0 GHz
- Ga 9 dB TYP. @f = 2.0 GHz

#### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)

Collector to Base Voltage	V <sub>CBO</sub>	20	V
Collector to Emitter Voltage	V <sub>CEO</sub>	10	V
Emitter to Base Voltage	V <sub>EBO</sub>	1.5	V
Collector Current	I <sub>C</sub>	35	mA
Total Power Dissipation	P <sub>T</sub>	200	mW
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C



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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CBO</sub>			1.0	μA	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			1.0	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub> *	50	100	250		V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA
Gain Bandwidth Product	f <sub>T</sub>		10		GHz	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA
Feed-Back Capacitance	C <sub>re</sub> **		0.3	0.8	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>	6.0	8.0		dB	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA, f = 2.0 GHz
Maximum Available Gain	MAG		10		dB	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA, f = 2.0 GHz
Noise Figure	NF		1.8	3.0	dB	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz

\* Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

\*\* The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

#### h<sub>FE</sub> Classification

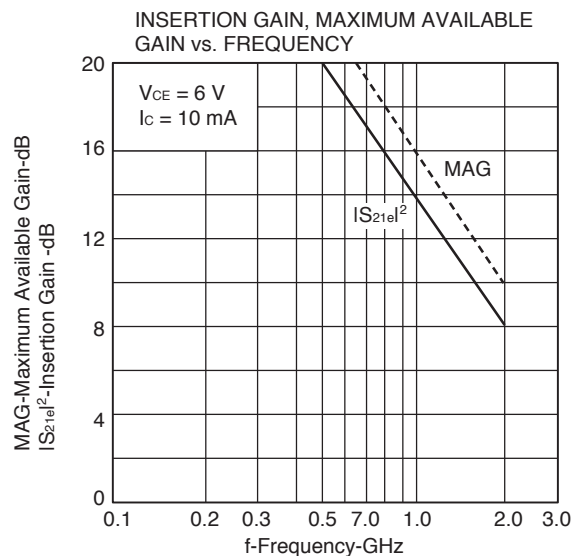
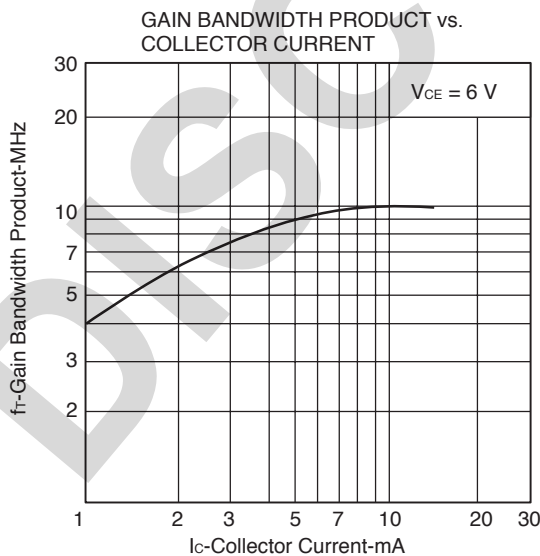
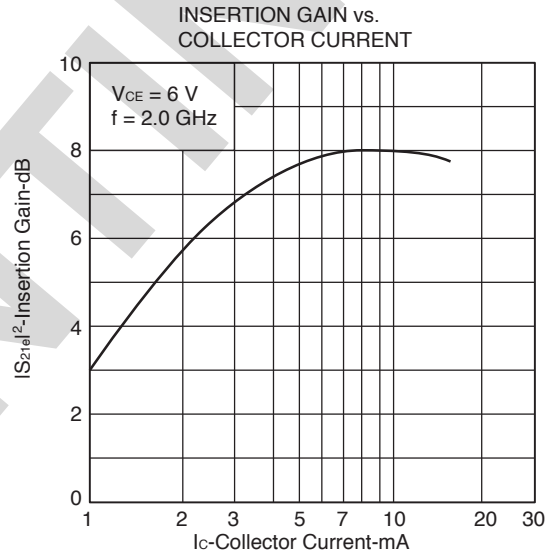
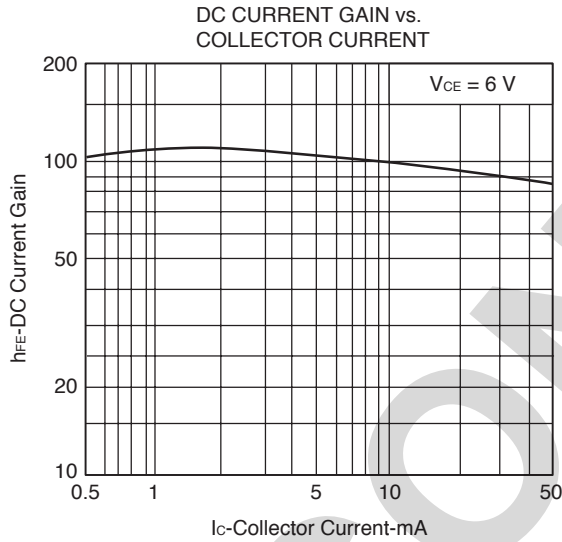
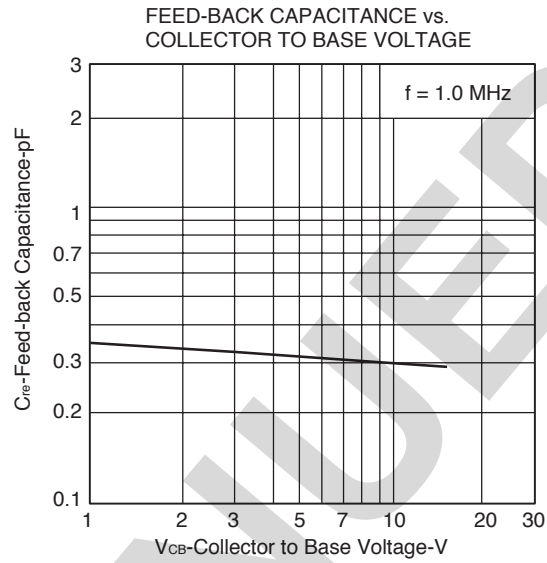
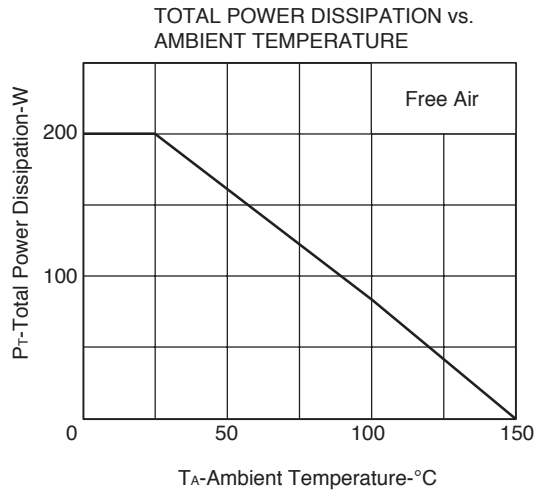
Class	R43/Q *	R44/R *	R45/S *
Marking	R43	R44	R45
h <sub>FE</sub>	50 to 100	80 to 160	125 to 250

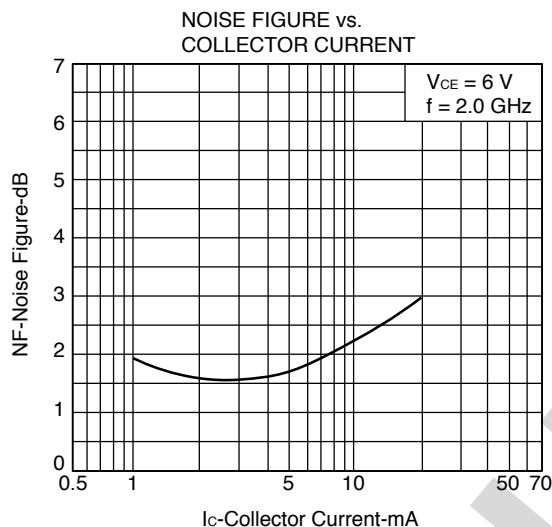
#### ORDERING INFORMATION

Part Number	Order Number	Quantity
NE68033-T1B	NE68033-T1B-A	3 kpcs/Reel
2SC3585-T1B	2SC3585-T1B-A	

\* Old Specification / New Specification

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





**S-PARAMETER**

V<sub>CE</sub> = 6.0 V, I<sub>C</sub> = 3.0 mA, Z<sub>O</sub> = 50 Ω

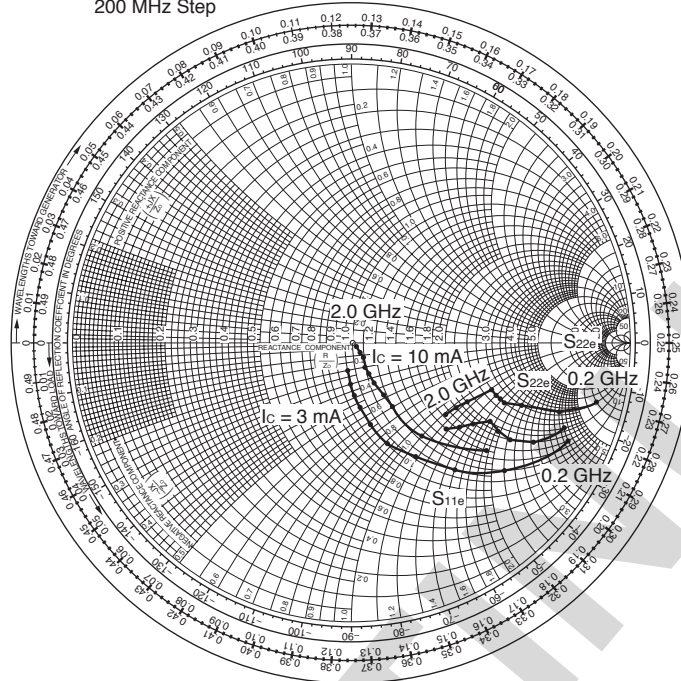
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.858	-23.1	8.499	153.3	0.030	46.5	0.905	-13.5
400	0.724	-40.6	6.923	131.6	0.060	58.7	0.826	-21.2
600	0.580	-51.1	5.951	118.4	0.080	60.3	0.749	-27.0
800	0.457	-58.9	4.615	104.9	0.099	60.2	0.666	-28.6
1000	0.362	-65.6	4.134	98.0	0.106	61.2	0.614	-30.1
1200	0.304	-73.1	3.412	88.9	0.129	61.1	0.574	-30.0
1400	0.232	-82.2	3.180	82.0	0.148	60.1	0.542	-31.7
1600	0.179	-84.9	2.763	75.7	0.154	59.5	0.514	-35.2
1800	0.147	-88.2	2.726	70.5	0.188	58.7	0.483	-40.1
2000	0.108	-104.1	2.378	64.9	0.197	56.8	0.455	-42.6

V<sub>CE</sub> = 6.0 V, I<sub>C</sub> = 10.0 mA, Z<sub>O</sub> = 50 Ω

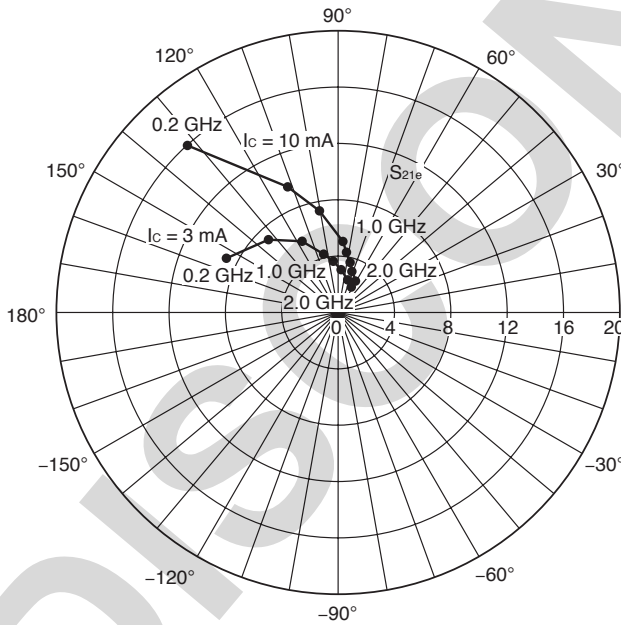
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.613	-37.0	16.141	133.9	0.021	52.5	0.781	-19.4
400	0.406	-53.6	10.096	111.5	0.053	70.6	0.651	-22.4
600	0.285	-56.0	7.640	101.4	0.064	73.0	0.590	-24.0
800	0.214	-57.6	5.564	90.7	0.089	71.7	0.548	-22.8
1000	0.156	-58.1	4.787	86.0	0.095	70.6	0.526	-23.3
1200	0.130	-54.2	3.876	79.3	0.119	70.3	0.506	-22.1
1400	0.105	-56.5	3.573	74.0	0.141	68.3	0.489	-24.8
1600	0.065	-55.0	3.058	69.4	0.158	68.9	0.470	-27.9
1800	0.042	-48.9	2.997	65.3	0.178	66.5	0.439	-31.4
2000	0.018	-65.6	2.590	60.7	0.202	66.2	0.426	-36.5

S-PARAMETER

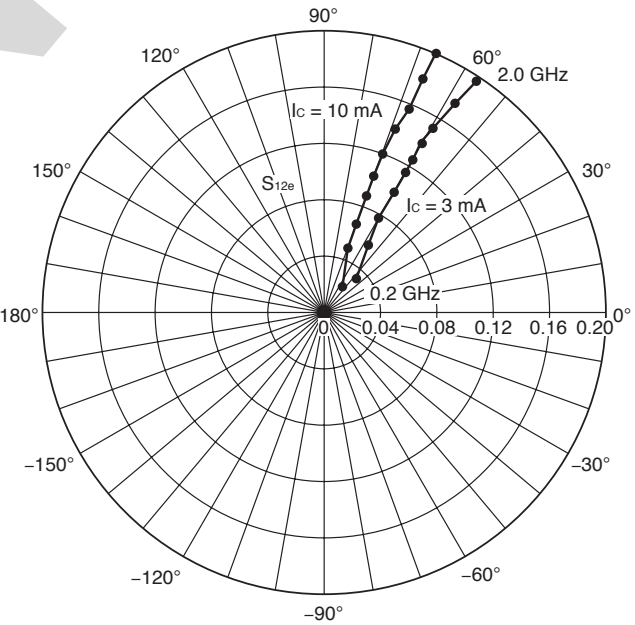
S<sub>11e</sub>, S<sub>22e</sub>-FREQUENCY CONDITION V<sub>CE</sub> = 6 V  
200 MHz Step



S<sub>21e</sub>-FREQUENCY CONDITION V<sub>CE</sub> = 6 V



S<sub>12e</sub>-FREQUENCY CONDITION V<sub>CE</sub> = 6 V



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