

# DATA SHEET

# NEC

# SILICON TRANSISTOR 2SC3585

## MICROWAVE LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISTOR

### DESCRIPTION

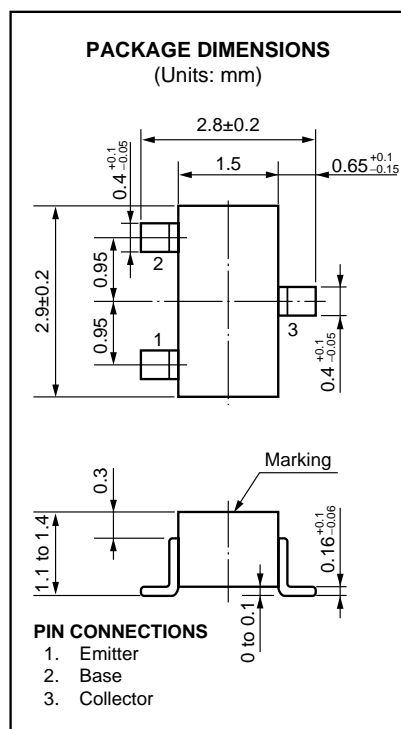
The 2SC3585 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. The 2SC3585 features excellent power gain with very low-noise figures. The 2SC3585 employs direct nitride passivated base surface process (DNP process) which is an NEC 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>CB0</sub>	20	V
Collector to Emitter Voltage	V <sub>CE0</sub>	10	V
Emitter to Base Voltage	V <sub>EB0</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>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> = 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 %

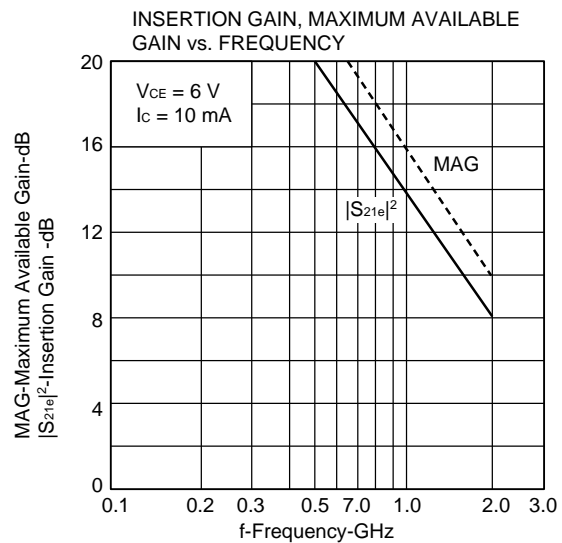
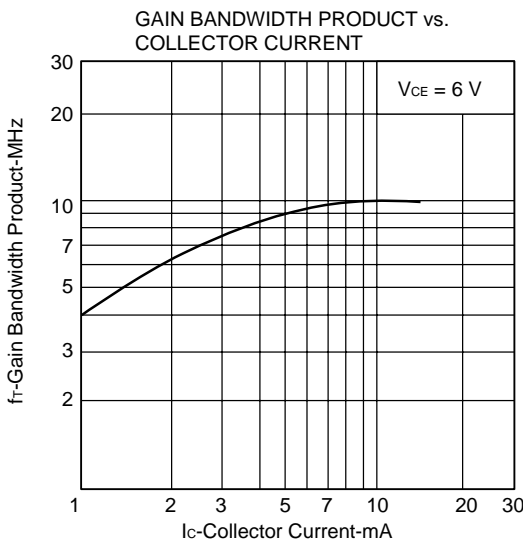
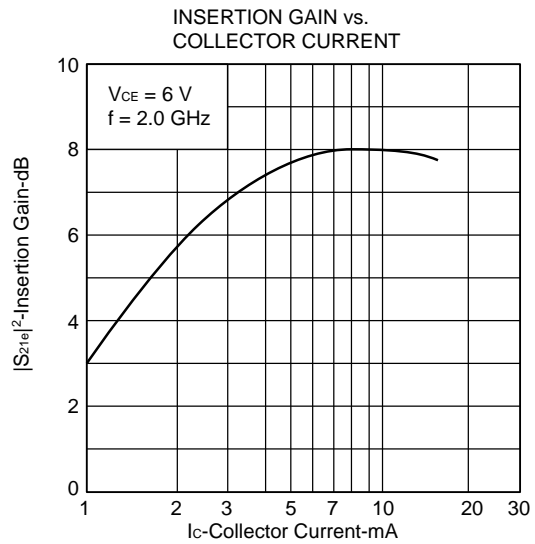
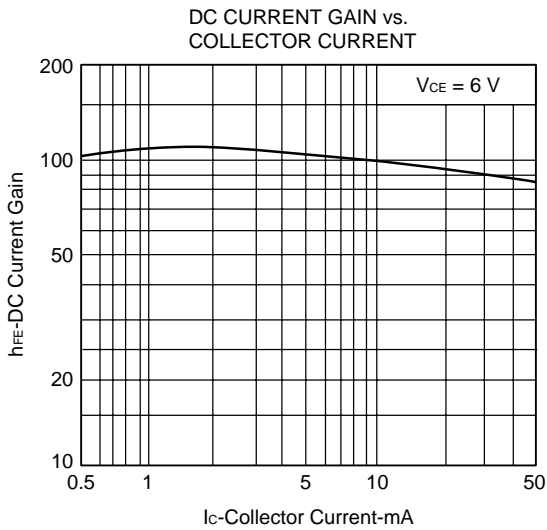
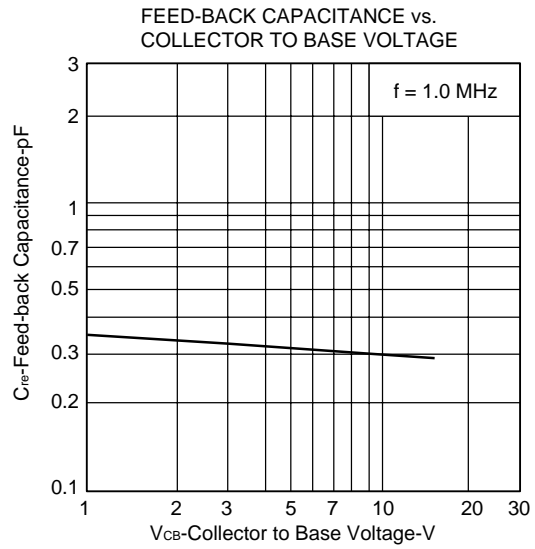
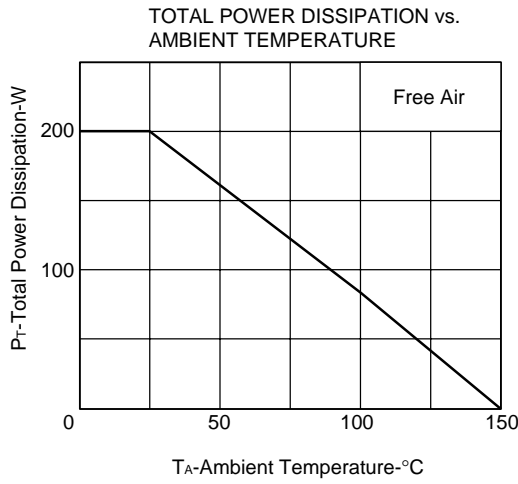
\*\* The emitter terminal and the case shall be connected to the ground terminal of the three-terminal capacitance bridge.

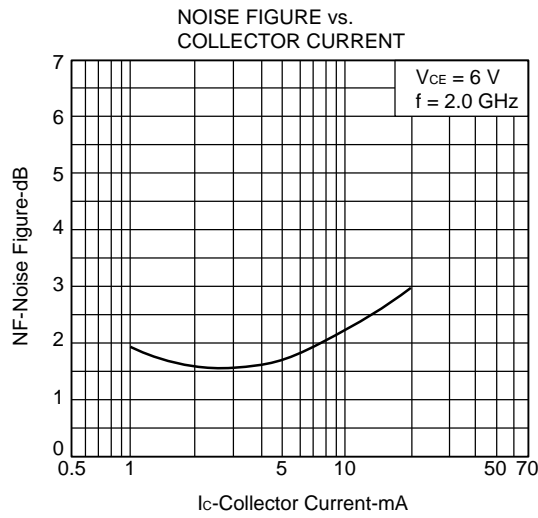
### h<sub>FE</sub> Classification

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

\* 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

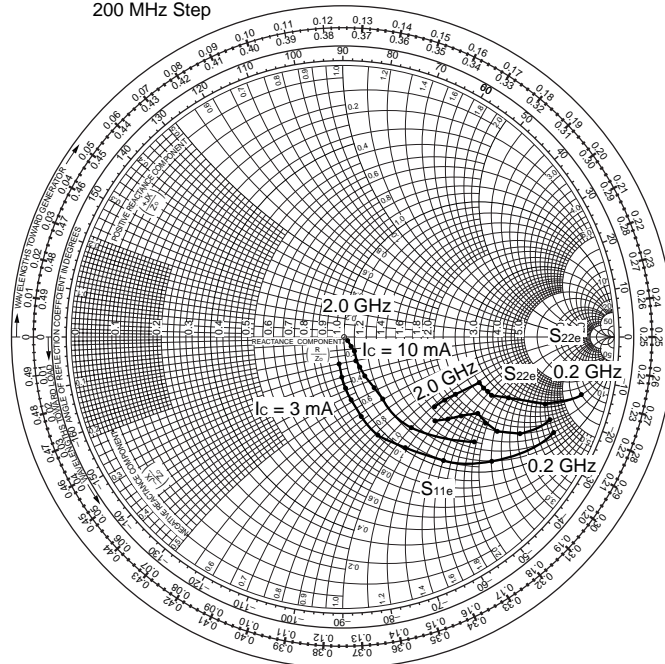
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.858	-23.1	8.499	153.3	0.030	46.5	0.905	-13.5
400	0.724	-40.6	6.923	131.6	0.060	58.7	0.826	-21.2
600	0.580	-51.1	5.951	118.4	0.080	60.3	0.749	-27.0
800	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

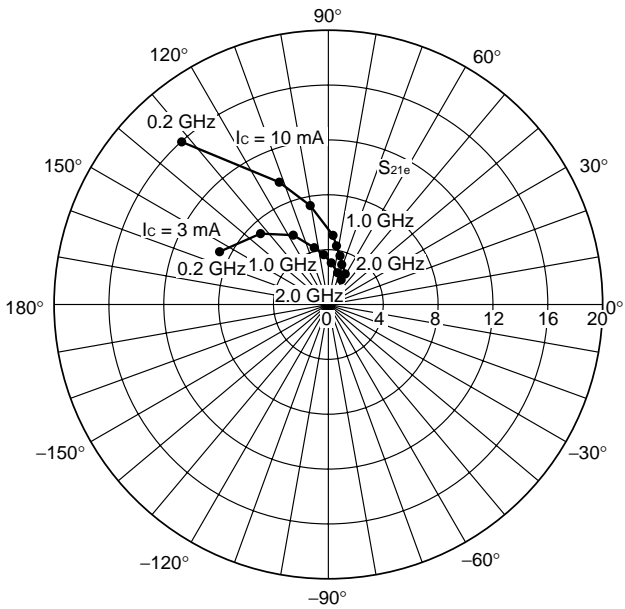
f (MHz)	S <sub>11</sub>	∠ S <sub>11</sub>	S <sub>21</sub>	∠ S <sub>21</sub>	S <sub>12</sub>	∠ S <sub>12</sub>	S <sub>22</sub>	∠ S <sub>22</sub>
200	0.613	-37.0	16.141	133.9	0.021	52.5	0.781	-19.4
400	0.406	-53.6	10.096	111.5	0.053	70.6	0.651	-22.4
600	0.285	-56.0	7.640	101.4	0.064	73.0	0.590	-24.0
800	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

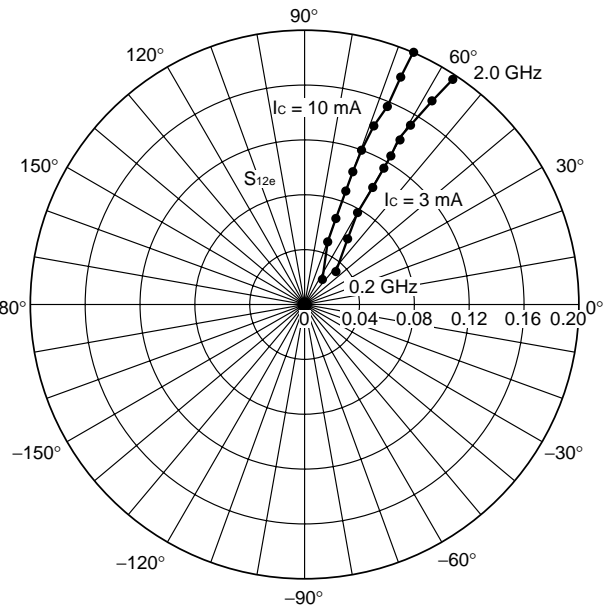
$S_{11e}$ ,  $S_{22e}$ -FREQUENCY CONDITION  $V_{CE} = 6 V$   
200 MHz Step



$S_{21e}$ -FREQUENCY CONDITION  $V_{CE} = 6 V$



$S_{12e}$ -FREQUENCY CONDITION  $V_{CE} = 6 V$



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Anti-radioactive design is not implemented in this product.