

NPN EPITAXIAL SILICON TRANSISTOR  
FOR MICROWAVE LOW-NOISE AMPLIFICATION

The 2SC3603 is an NPN epitaxial transistor designed for low-noise amplification at 0.5 to 4.0 GHz. This transistor has low-noise and high-gain characteristics in a wide collector current region, and has a wide dynamic range.

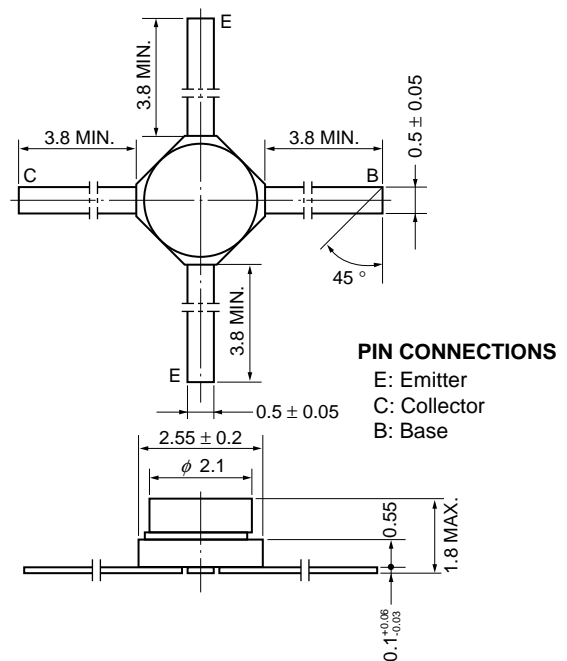
FEATURES

- Low noise : NF = 2.1 dB TYP. @ f = 2.0 GHz
- High power gain :  $G_A = 10$  dB TYP. @ f = 2.0 GHz

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

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V <sub>CB0</sub>	20	V
Collector to Emitter Voltage	V <sub>CEO</sub>	12	V
Emitter to Base Voltage	V <sub>EBO</sub>	3	V
Collector Current	I <sub>c</sub>	100	mA
Total Power Dissipation	P <sub>T</sub> (T <sub>C</sub> = 25 °C)	580	mW
Junction Temperature	T <sub>j</sub>	200	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

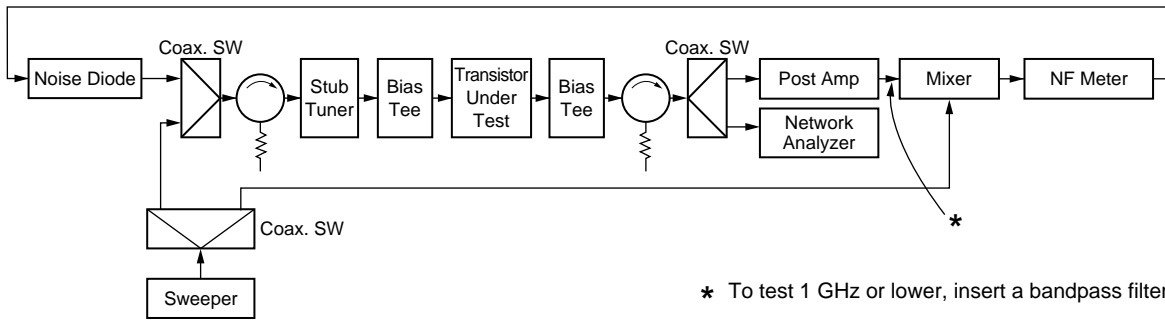
PACKAGE DIMENSIONS (in mm)



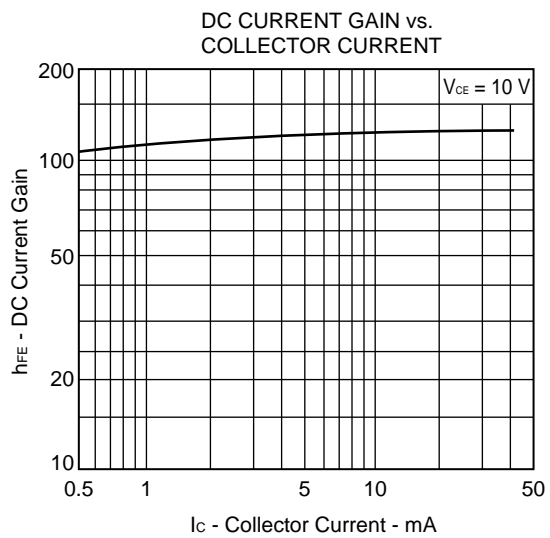
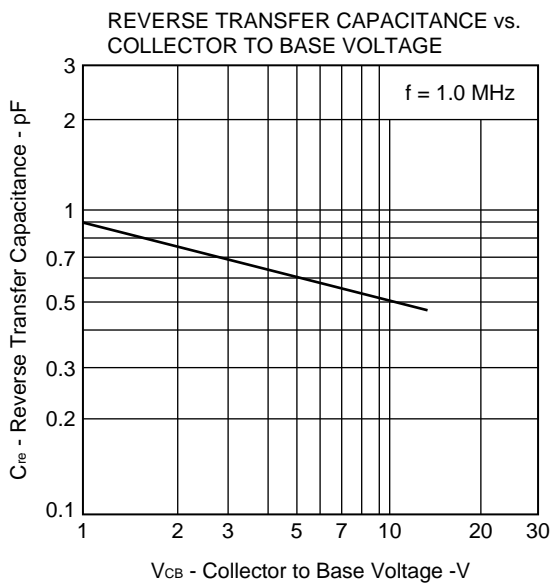
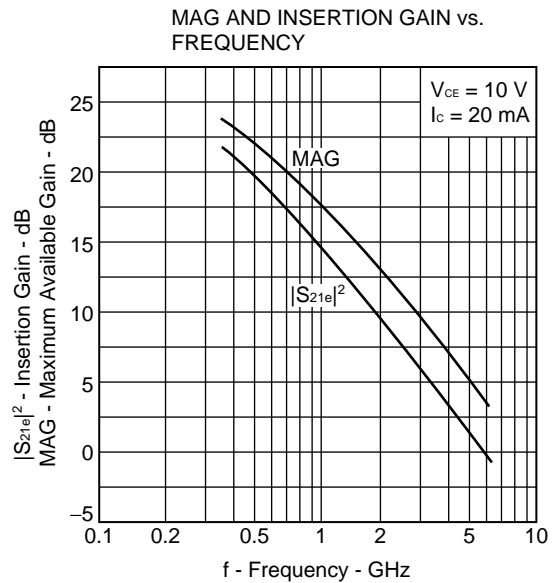
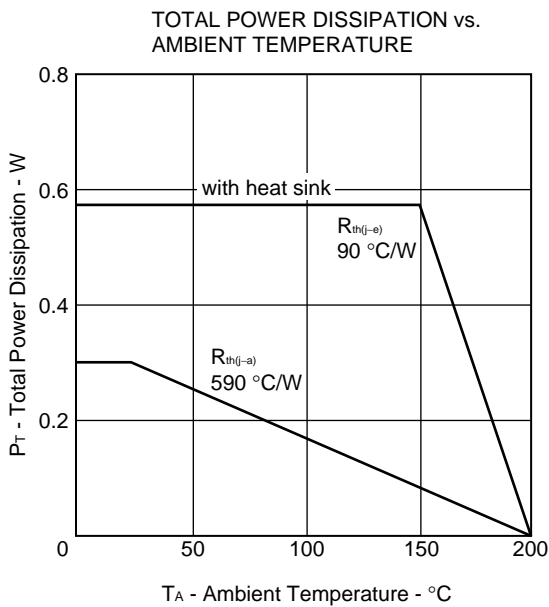
ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

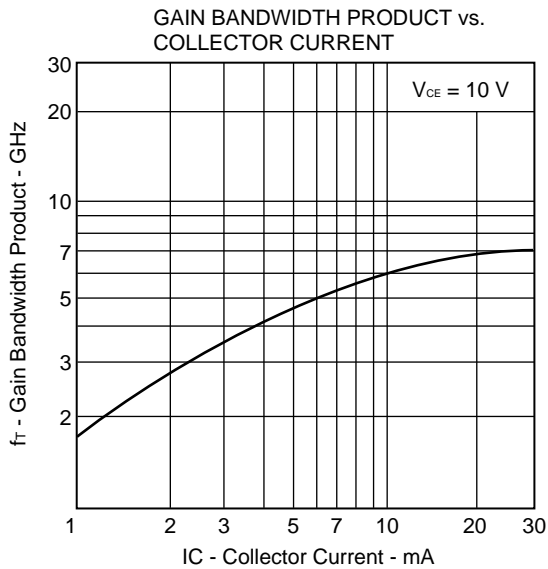
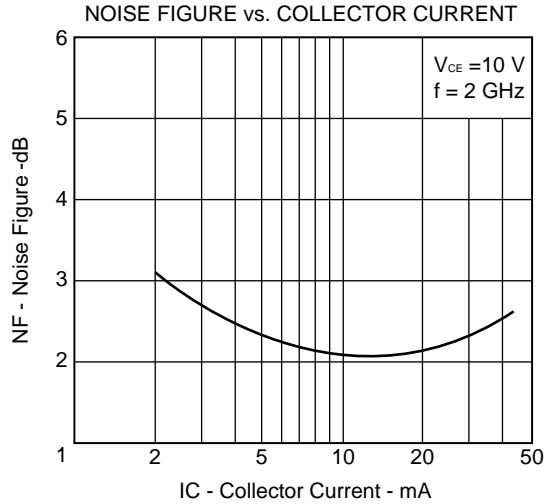
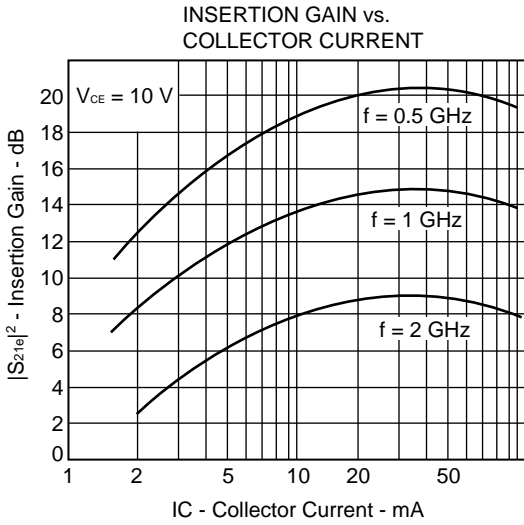
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0			1.0	μA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0			1.0	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 20 mA Pulse	50	120	300	
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 20 mA		7		GHz
Reverse Transfer Capacitance	C <sub>re</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz		0.5	1.0	pF
Noise Figure	NF <sup>Note</sup>	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 7 mA, f = 2 GHz		2.1	3.4	dB
Insertion Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 20 mA, f = 2 GHz	7.0	9.0		dB
Maximum Available Gain	MAG	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 20 mA, f = 2 GHz	10.0	12.0		dB
Power Gain	G <sub>A</sub>	V <sub>CE</sub> = 10 V, I <sub>c</sub> = 7 mA, f = 2 GHz		10		dB

Note Test block diagram



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





**S PARAMETER**

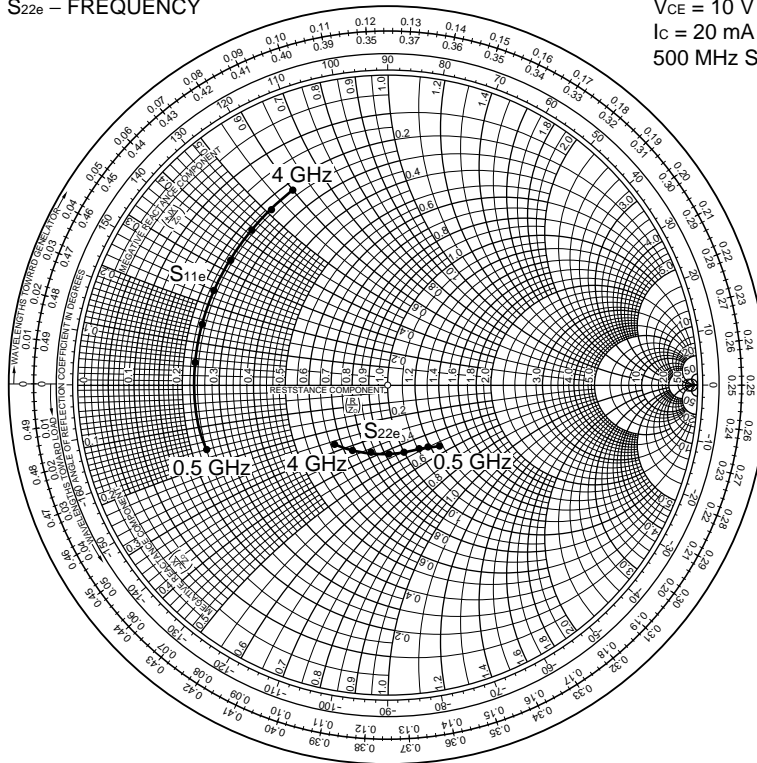
$V_{CE} = 10\text{ V}$ ,  $I_C = 20\text{ mA}$ ,  $Z_O = 50\ \Omega$

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>
500	.629	-160.8	10.100	92.6	.040	41.5	.256	-49.0
1000	.631	175.8	5.411	75.1	.048	51.4	.244	-57.2
1500	.628	162.5	3.565	60.6	.070	59.2	.232	-66.8
2000	.646	152.2	2.720	48.4	.086	56.0	.22	-77.4
2500	.659	142.1	2.161	38.8	.105	52.2	.213	-89.1
3000	.677	132.0	1.916	25.7	.127	45.1	.217	-103.1
3500	.695	123.8	1.585	14.3	.151	39.7	.232	-119.5
4000	.713	116.5	1.392	5.3	.168	34.8	.254	-134.0

S PARAMETER

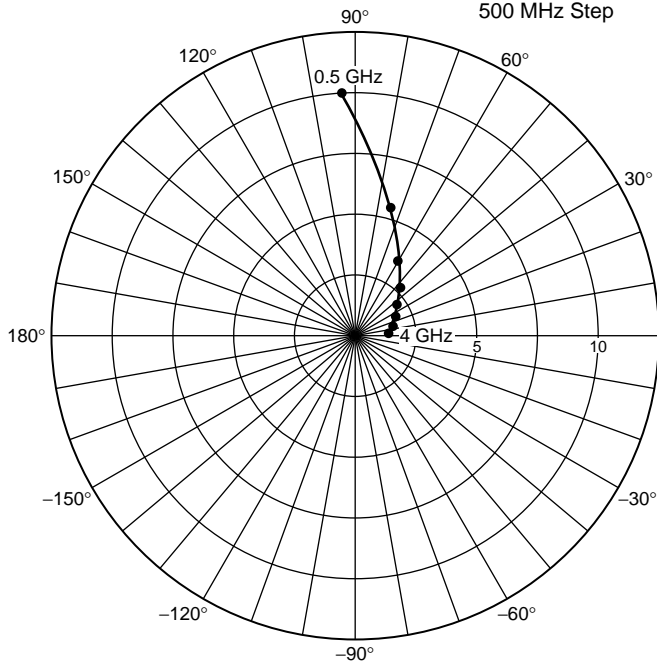
$S_{11e}, S_{22e}$  - FREQUENCY

$V_{CE} = 10\text{ V}$   
 $I_C = 20\text{ mA}$   
 500 MHz Step



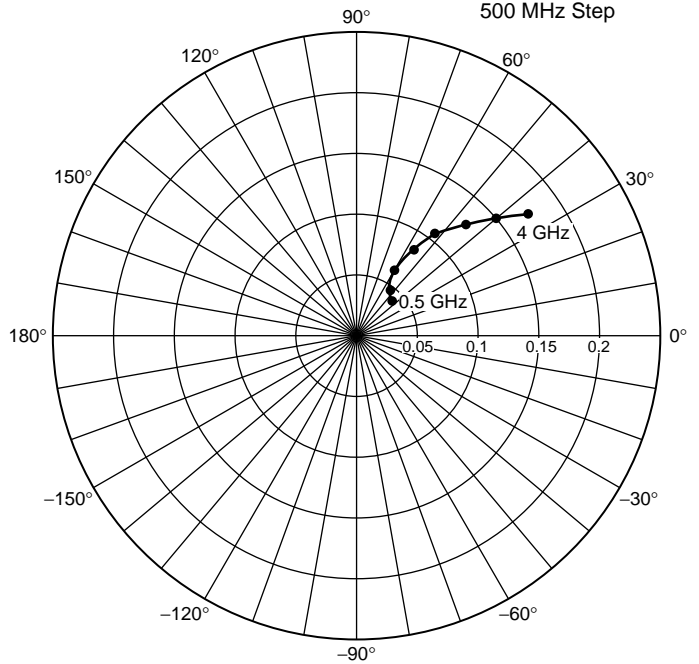
$S_{21}$  - FREQUENCY

$V_{CC} = 10\text{ V}$   
 $I_C = 20\text{ mA}$   
 500 MHz Step



$S_{12}$  - FREQUENCY

$V_{CE} = 10\text{ V}$   
 $I_C = 20\text{ mA}$   
 500 MHz Step



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Anti-radioactive design is not implemented in this product.



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