

**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.

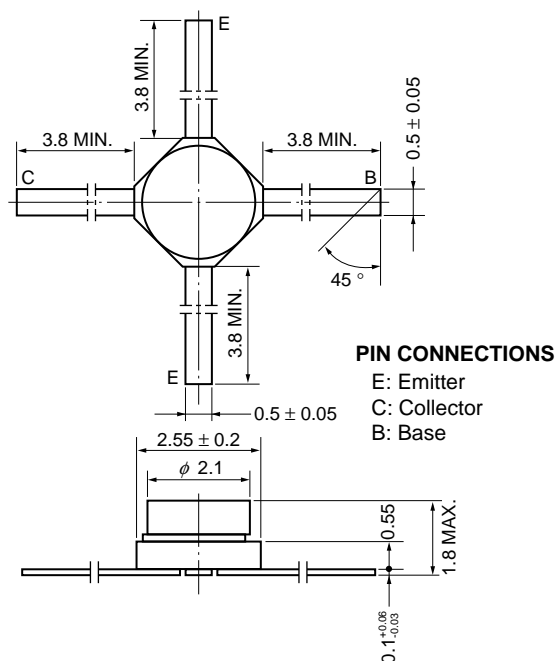
FEATURES

- 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_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	V _{CB0}	20	V
Collector to Emitter Voltage	V _{CE0}	12	V
Emitter to Base Voltage	V _{EB0}	3	V
Collector Current	I _c	100	mA
Total Power Dissipation	P _T (T _C = 25 °C)	580	mW
Junction Temperature	T _j	200	°C
Storage Temperature	T _{stg}	-65 to +150	°C

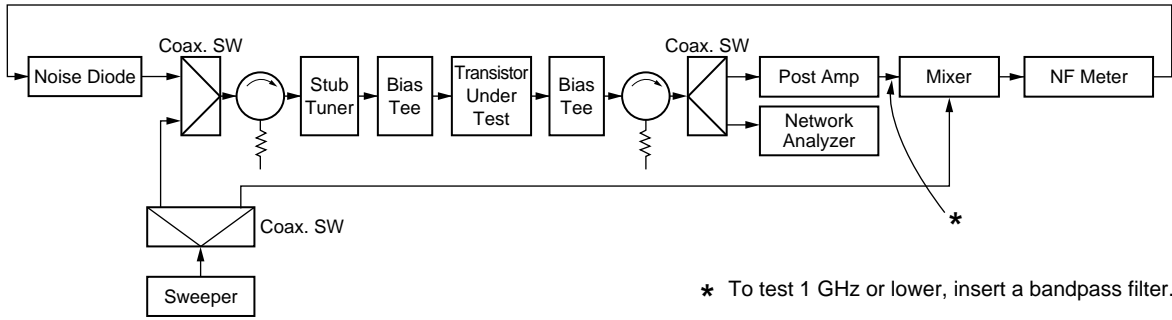
PACKAGE DIMENSIONS (in mm)



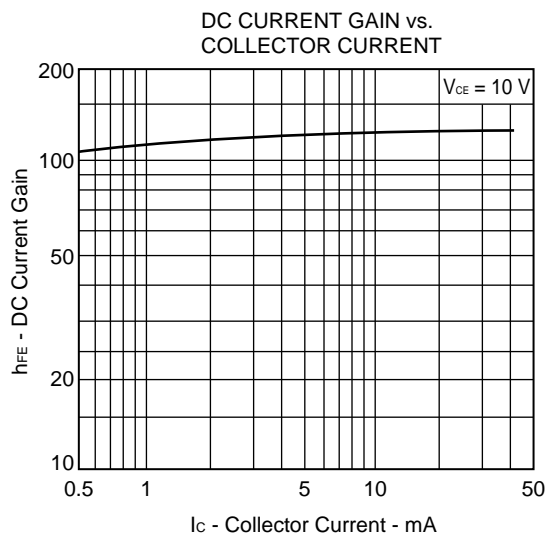
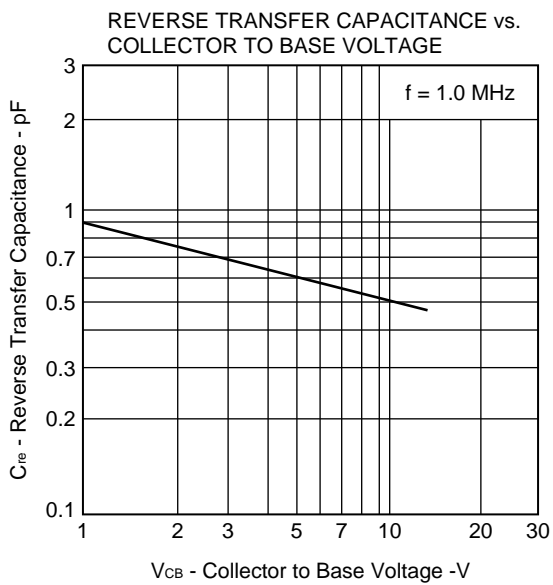
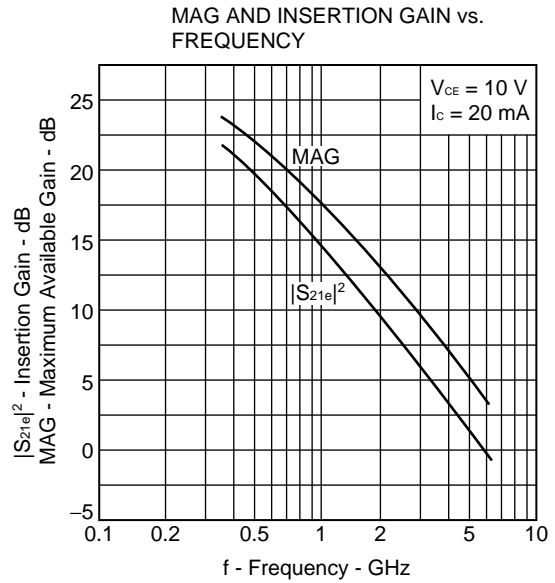
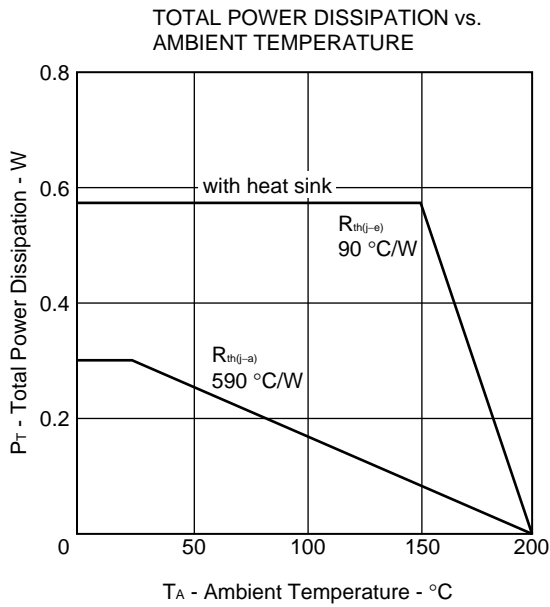
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I _{cBO}	V _{CB} = 10 V, I _E = 0			1.0	μA
Emitter Cut-off Current	I _{eBO}	V _{EB} = 1 V, I _c = 0			1.0	μA
DC Current Gain	h _{FE}	V _{CE} = 10 V, I _c = 20 mA Pulse	50	120	300	
Gain Bandwidth Product	f _T	V _{CE} = 10 V, I _c = 20 mA		7		GHz
Reverse Transfer Capacitance	C _{re}	V _{CB} = 10 V, I _E = 0, f = 1 MHz		0.5	1.0	pF
Noise Figure	NF ^{Note}	V _{CE} = 10 V, I _c = 7 mA, f = 2 GHz		2.1	3.4	dB
Insertion Gain	S _{21e} ²	V _{CE} = 10 V, I _c = 20 mA, f = 2 GHz	7.0	9.0		dB
Maximum Available Gain	MAG	V _{CE} = 10 V, I _c = 20 mA, f = 2 GHz	10.0	12.0		dB
Power Gain	G _A	V _{CE} = 10 V, I _c = 7 mA, f = 2 GHz		10		dB

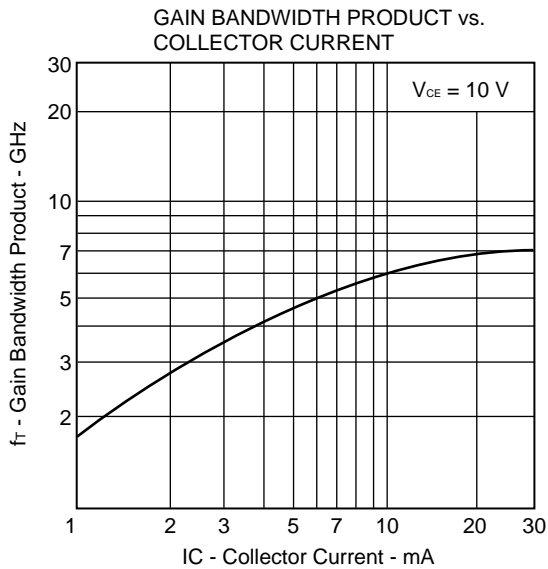
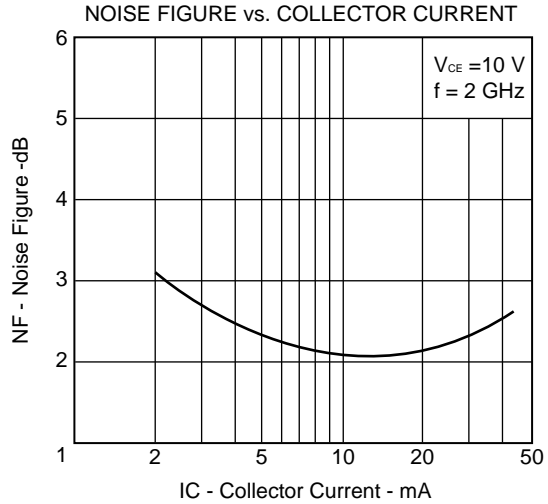
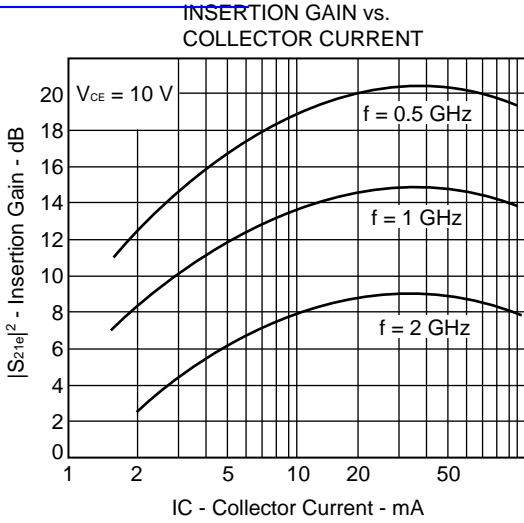
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 Note Test block diagram



TYPICAL CHARACTERISTICS (T_A = 25 °C)



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S PARAMETER

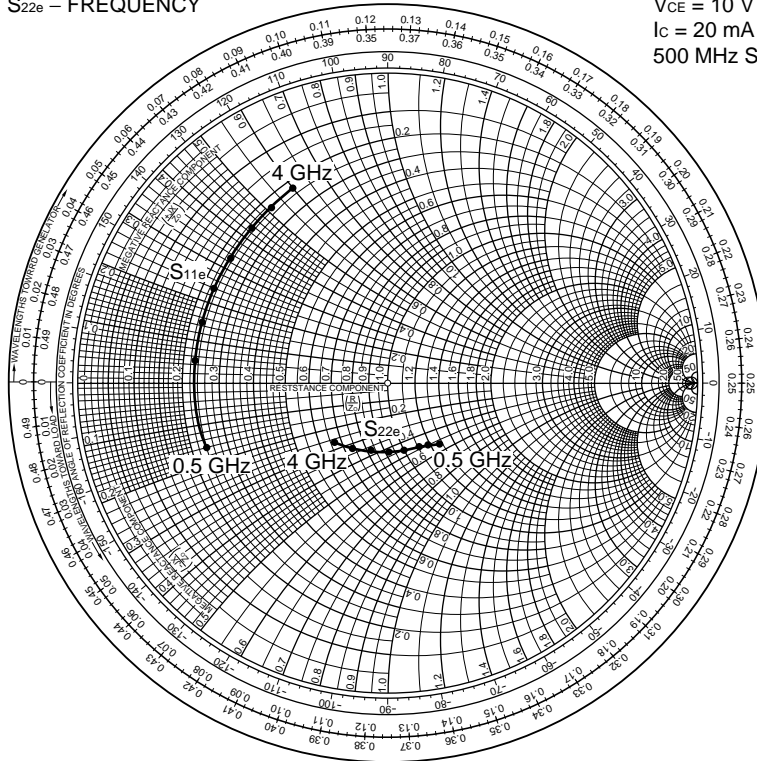
$V_{CE} = 10\text{ V}, I_C = 20\text{ mA}, Z_O = 50\ \Omega$

f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
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

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S-PARAMETER

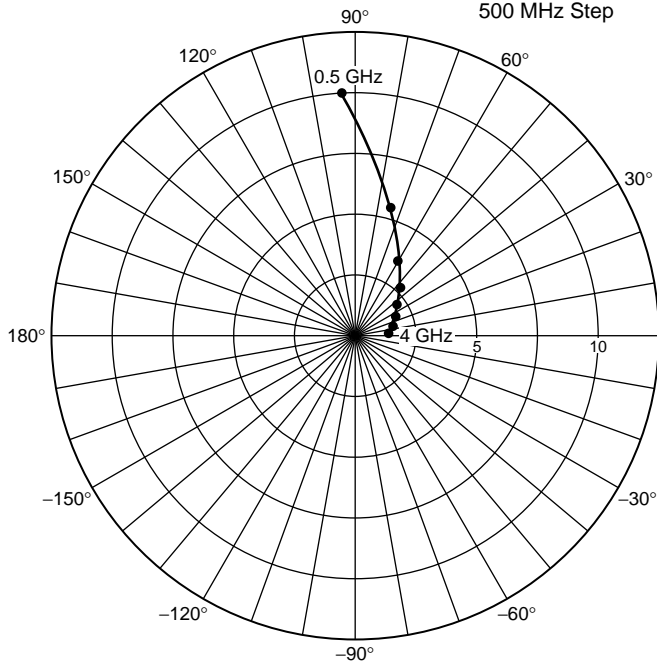
S_{11e}, S_{22e} – FREQUENCY

V_{CE} = 10 V
I_c = 20 mA
500 MHz Step



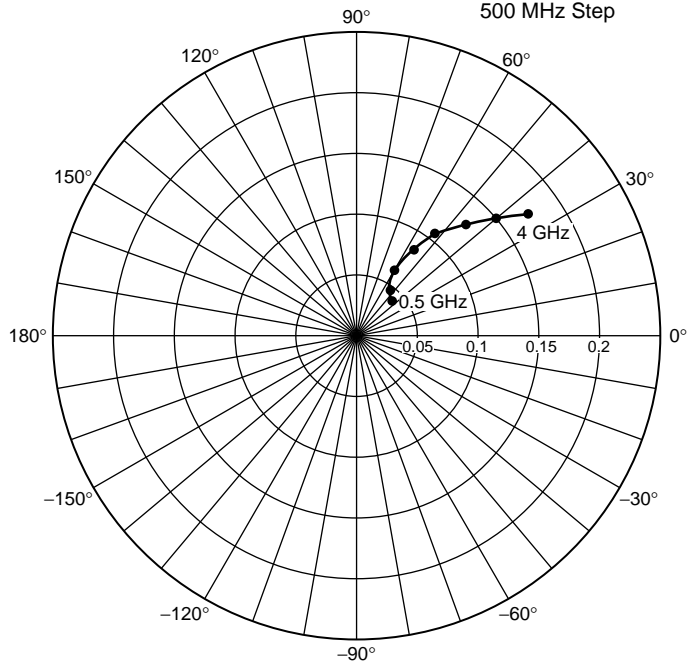
S₂₁ – FREQUENCY

V_{CC} = 10 V
I_c = 20 mA
500 MHz Step



S₁₂ – FREQUENCY

V_{CE} = 10 V
I_c = 20 mA
500 MHz Step



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