

2SC4874

Silicon NPN Bipolar Transistor

Application

VHF & UHF wide band amplifire

Features

- High gain bandwidth product
 $f_T = 5.8$ GHz typ
- High gain, low noise figure
PG = 10.0 dB typ,
NF = 1.8 dB typ at $f = 900$ MHz

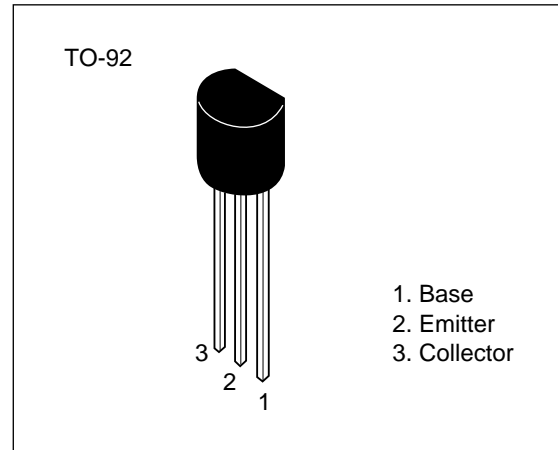


Table 1 Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

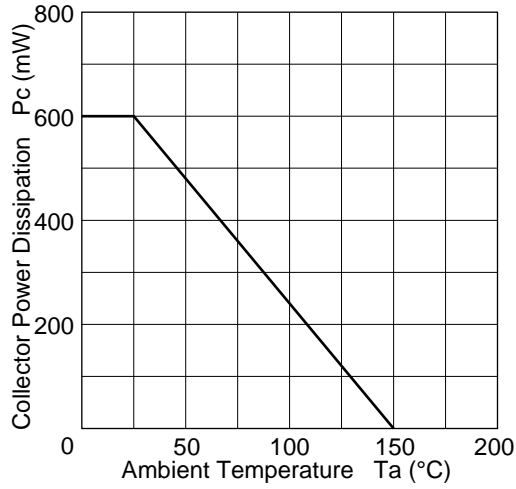
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	20	V
Collector to emitter voltage	V_{CEO}	12	V
Emitter to base voltage	V_{EBO}	2	V
Collector current	I_C	50	mA
Collector power dissipation	P_C	600	mW
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

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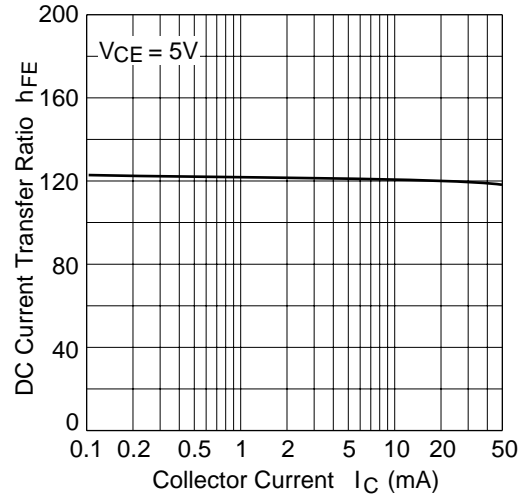
Table 2 Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	20	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 15 V, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 12 V, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 2 V, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5 V, I_C = 20 mA$
Output capacitance	C_{ob}	—	1.3	1.8	pF	$V_{CB} = 5 V, I_E = 0, f = 1 MHz$
Gain bandwidth product	f_T	4.0	5.8	—	GHz	$V_{CE} = 5 V, I_C = 20 mA$
Power gain	PG	7.5	10.0	—	dB	$V_{CE} = 5 V, I_C = 20 mA, f = 900 MHz$
Noise figure	NF	—	1.8	3.0	dB	$V_{CE} = 5 V, I_C = 5 mA, f = 900 MHz$

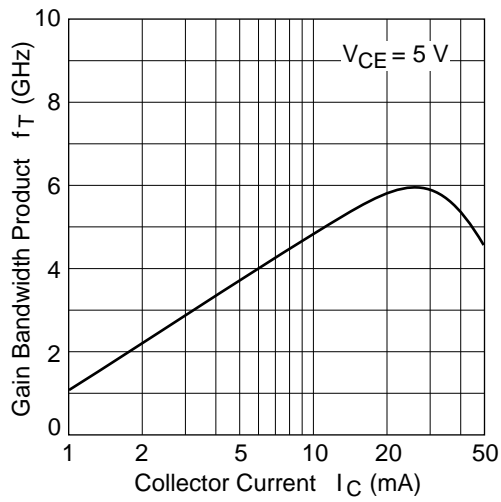
Maximum collector power dissipation curve



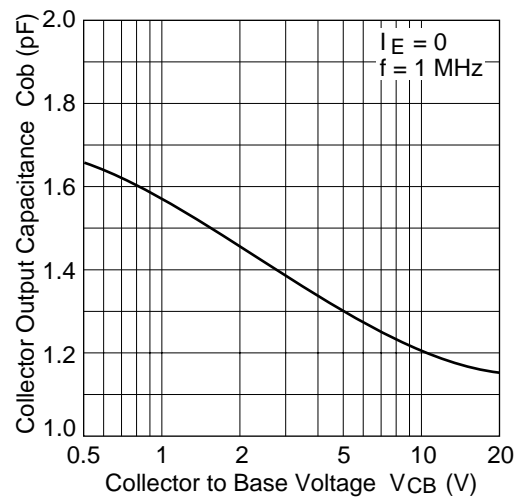
DC current transfer ratio vs. collector current



Gain bandwidth product vs. collector current

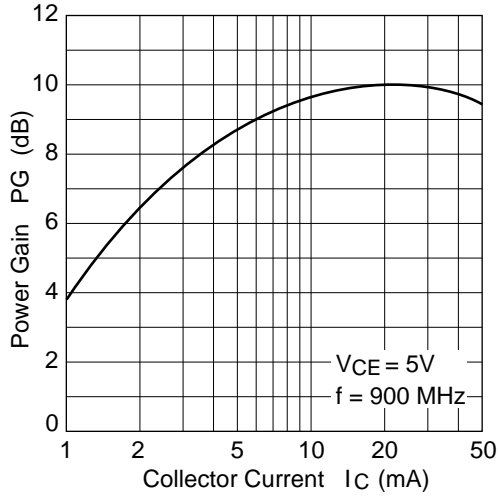


Collector output capacitance vs. collector to base voltage

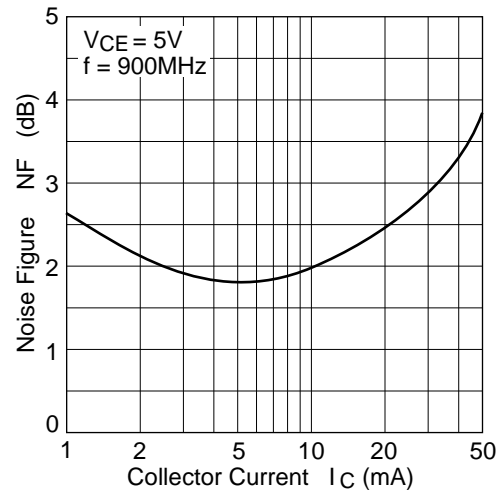


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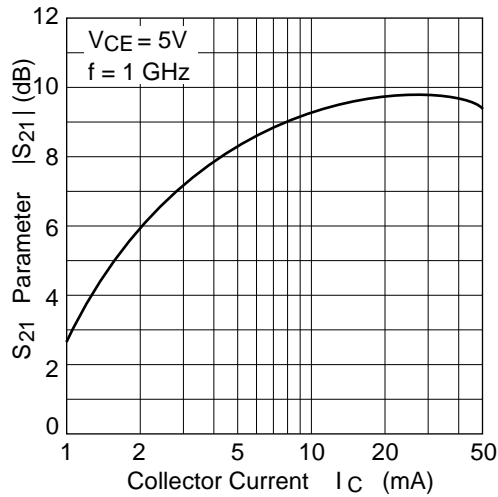
Power gain vs. collector current



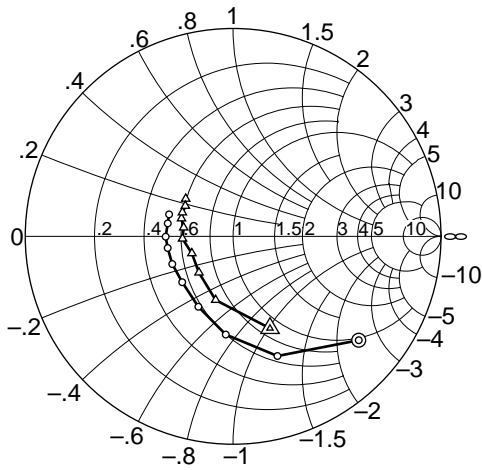
Noise figure vs. collector current



S21 parameter vs. collector current

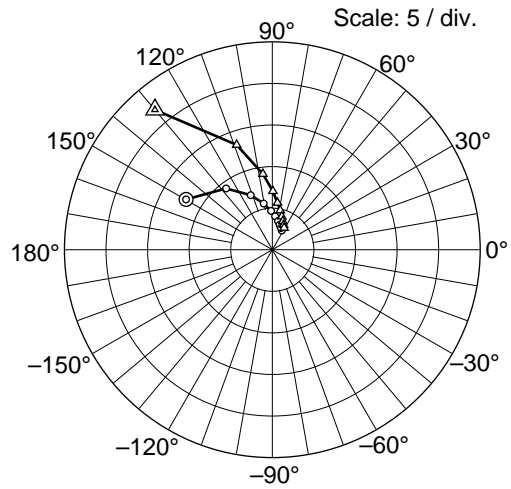


S11 parameter vs. frequency



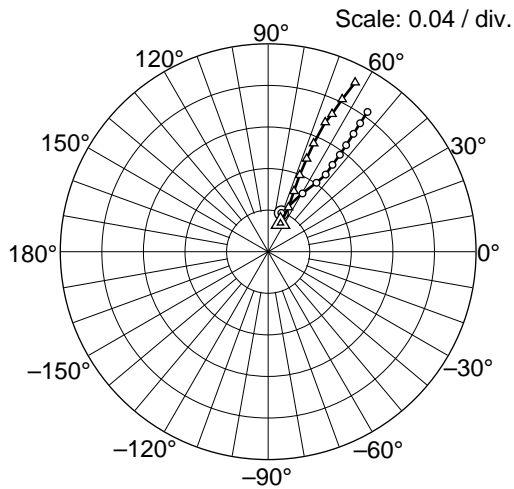
Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

S21 parameter vs. frequency



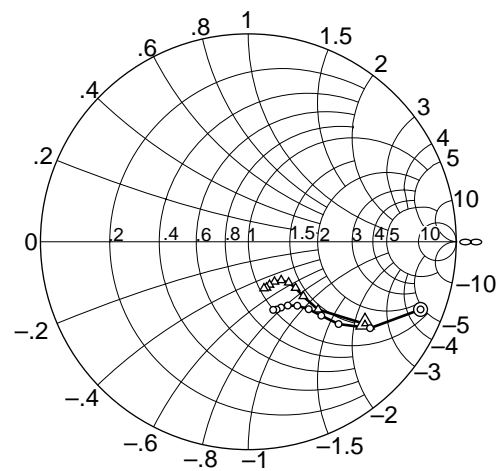
Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

S12 parameter vs. frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

S22 parameter vs. frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

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Table 3 S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $Z_O = 50\ \Omega$, Emitter common)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.784	-39.6	12.03	149.8	0.0396	71.3	0.890	-21.4
200	0.614	-69.7	9.23	127.0	0.0651	59.5	0.718	-35.3
300	0.474	-94.3	7.06	111.6	0.0810	55.0	0.587	-42.3
400	0.378	-116.3	5.66	100.6	0.0926	53.3	0.499	-45.3
500	0.330	-138.0	4.68	91.9	0.104	53.5	0.435	-48.1
600	0.322	-155.5	4.03	85.2	0.116	53.5	0.387	-52.5
700	0.320	-169.9	3.52	78.9	0.127	53.8	0.360	-58.2
800	0.325	-179.7	3.13	73.8	0.140	54.1	0.353	-63.5
900	0.321	168.8	2.81	68.5	0.152	54.4	0.353	-67.3
1000	0.326	161.1	2.58	63.8	0.165	54.6	0.348	-69.9

Table 4 S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$, $Z_O = 50\ \Omega$, Emitter common)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.477	-68.2	21.97	130.0	0.0297	66.5	0.686	-35.2
200	0.318	-105.4	13.32	108.8	0.0469	65.3	0.468	-44.2
300	0.240	-133.3	9.19	97.1	0.0633	66.9	0.372	-44.8
400	0.215	-157.6	7.05	89.5	0.0797	67.6	0.318	-44.4
500	0.224	-177.3	5.68	83.8	0.0968	67.5	0.276	-45.4
600	0.242	170.0	4.81	78.6	0.113	67.2	0.246	-49.5
700	0.263	161.0	4.15	74.0	0.130	66.2	0.230	-56.8
800	0.270	154.9	3.66	69.7	0.146	65.1	0.231	-63.8
900	0.273	147.6	3.27	65.5	0.163	64.1	0.238	-68.4
1000	0.291	141.7	2.99	61.8	0.180	62.8	0.237	-71.5