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# 2SC4592

Silicon NPN Epitaxial

# HITACHI

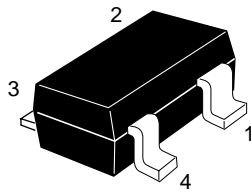
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## Application

UHF / VHF wide band amplifier

## Outline

MPAK-4



- 1. Collector
- 2. Emitter
- 3. Base
- 4. Emitter

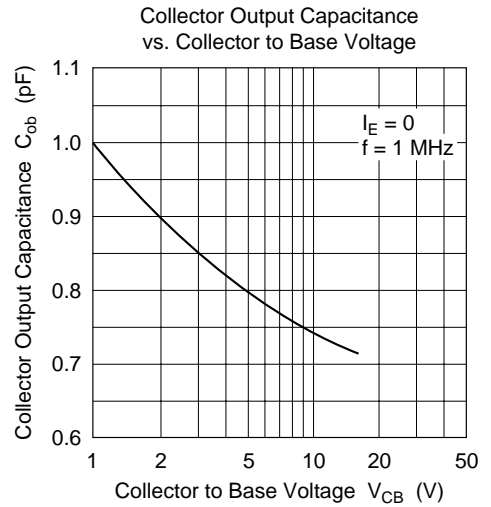
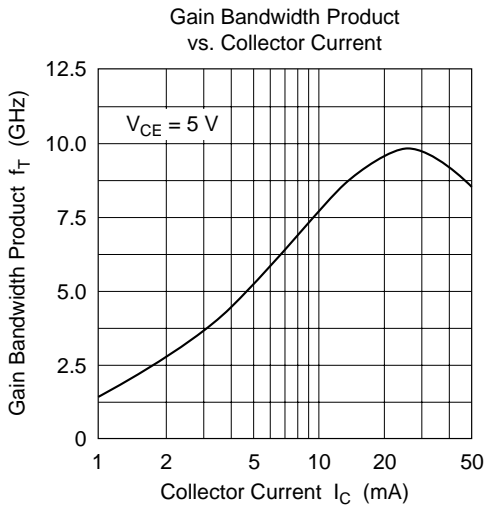
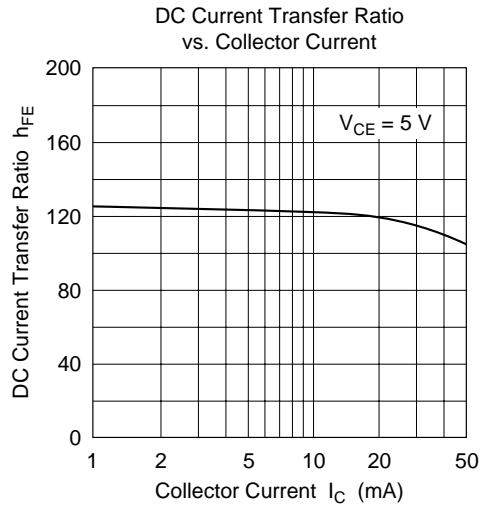
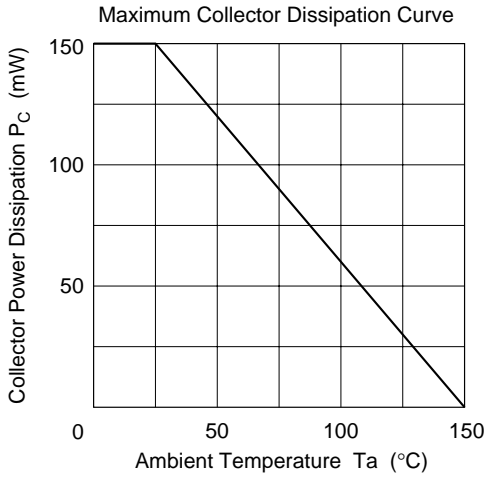
**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

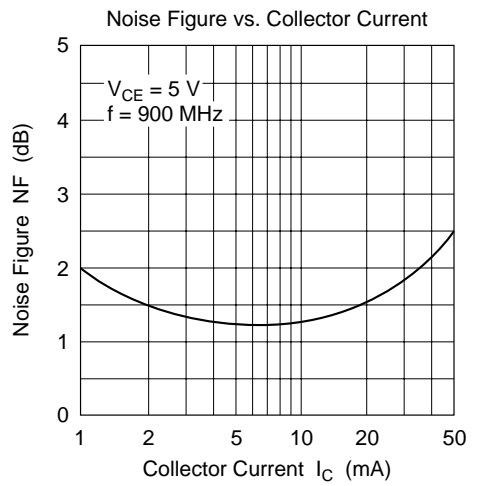
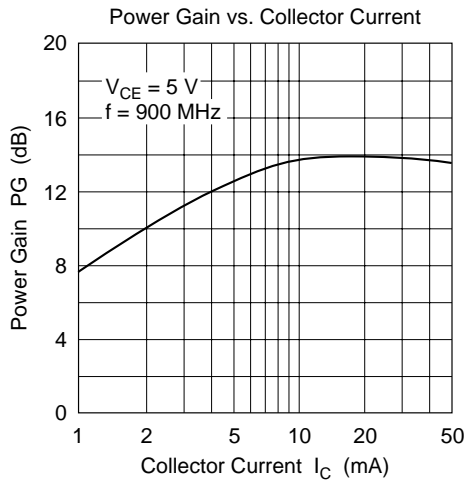
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{\text{CBO}}$	15	V
Collector to emitter voltage	$V_{\text{CEO}}$	9	V
Emitter to base voltage	$V_{\text{EBO}}$	1.5	V
Collector current	$I_{\text{C}}$	50	mA
Collector power dissipation	$P_{\text{C}}$	150	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ )

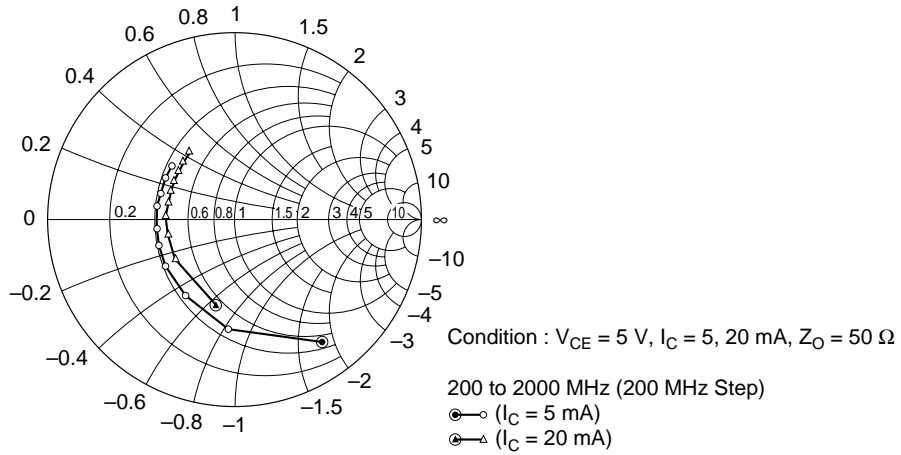
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	15	—	—	V	$I_{\text{C}} = 10 \mu\text{A}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CBO}}$	—	—	1	$\mu\text{A}$	$V_{\text{CB}} = 12 \text{ V}$ , $I_{\text{E}} = 0$
	$I_{\text{CEO}}$	—	—	1	mA	$V_{\text{CE}} = 9 \text{ V}$ , $R_{\text{BE}} = \infty$
Emitter cutoff current	$I_{\text{EBO}}$	—	—	10	$\mu\text{A}$	$V_{\text{EB}} = 1.5 \text{ V}$ , $I_{\text{C}} = 0$
DC current transfer ratio	$h_{\text{FE}}$	40	120	250		$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 20 \text{ mA}$
Collector output capacitance	$C_{\text{ob}}$	—	0.8	1.5	pF	$V_{\text{CB}} = 5 \text{ V}$ , $I_{\text{E}} = 0$ , $f = 1 \text{ MHz}$
Gain bandwidth product	$f_{\text{T}}$	7.0	9.5	—	GHz	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 20 \text{ mA}$
Power gain	PG	11.0	14.0	—	dB	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 20 \text{ mA}$ , $f = 900 \text{ MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 5 \text{ mA}$ , $f = 900 \text{ MHz}$

Note: Marking is "XN-".

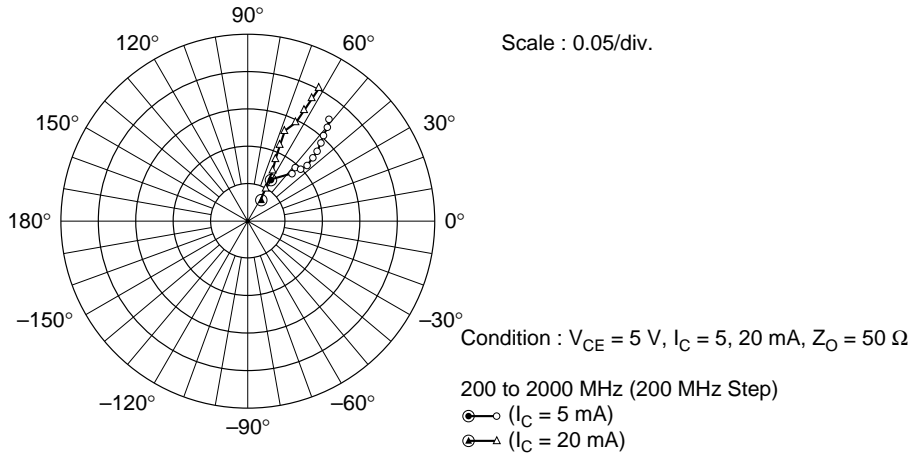




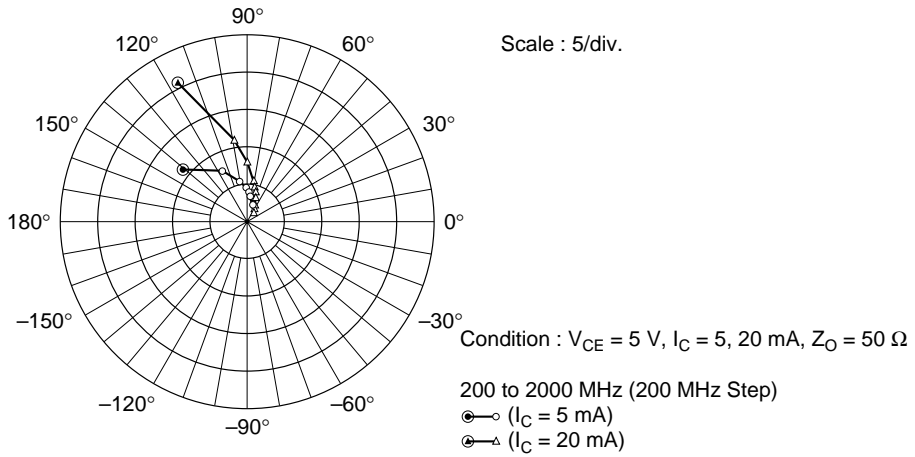
S11-Parameter vs. Frequency



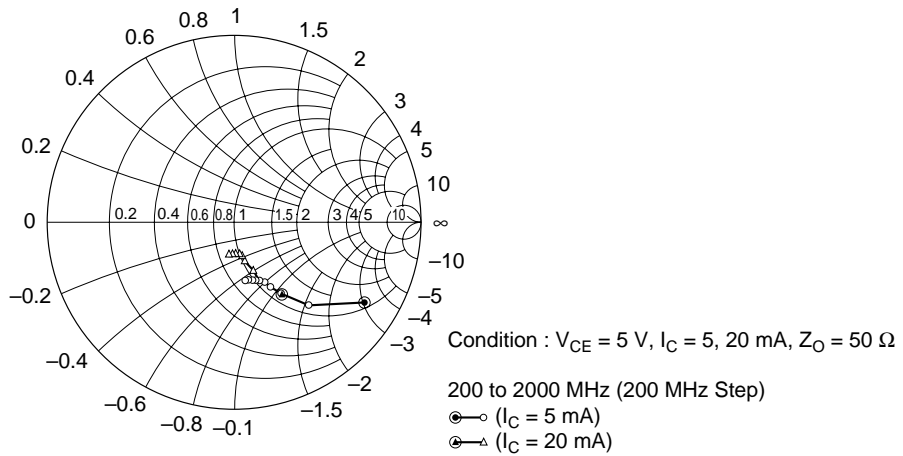
S12-Parameter vs. Frequency



S21-Parameter vs. Frequency



S22-Parameter vs. Frequency



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

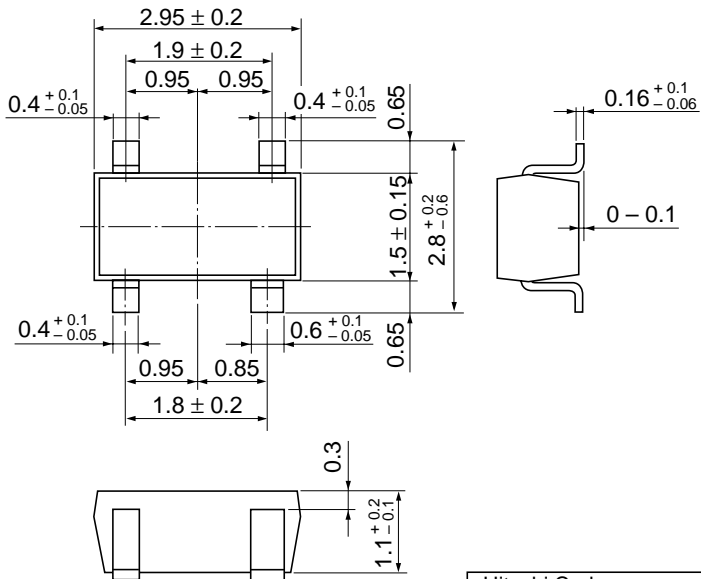
Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.893	-28.8	12.428	159.3	0.034	74.2	0.939	-17.2
200	0.788	-54.8	10.823	141.1	0.058	61.4	0.819	-31.5
300	0.693	-76.3	9.118	127.1	0.076	52.8	0.699	-41.8
400	0.603	-94.1	7.714	116.9	0.087	47.9	0.602	-48.5
500	0.542	-110.1	6.565	108.8	0.094	45.3	0.531	-52.8
600	0.507	-122.6	5.693	102.5	0.100	44.0	0.478	-55.9
700	0.472	-133.8	5.002	96.9	0.105	43.2	0.437	-58.5
800	0.454	-144.1	4.477	92.3	0.110	42.8	0.405	-60.8
900	0.443	-152.1	4.001	88.2	0.115	43.3	0.382	-62.5
1000	0.436	-160.1	3.660	84.2	0.119	44.1	0.363	-64.3
1100	0.423	-167.8	3.372	80.9	0.124	44.6	0.350	-65.9
1200	0.420	-174.8	3.100	77.7	0.129	45.5	0.340	-66.8
1300	0.419	178.6	2.882	74.7	0.134	46.4	0.336	-68.2
1400	0.420	172.4	2.703	71.8	0.139	46.9	0.328	-69.9
1500	0.419	166.2	2.542	69.3	0.144	47.9	0.323	-71.3
1600	0.423	161.8	2.392	66.3	0.150	48.5	0.320	-72.0
1700	0.422	156.4	2.270	63.9	0.155	49.0	0.317	-74.2
1800	0.433	151.3	2.149	61.6	0.161	49.5	0.316	-76.0
1900	0.432	147.3	2.050	59.5	0.167	50.1	0.315	-77.4
2000	0.442	142.5	1.958	56.9	0.174	50.6	0.315	-79.0

## 2SC4592

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.619	-64.2	31.361	137.5	0.025	63.5	0.729	-39.2
200	0.475	-104.2	20.515	116.0	0.036	56.8	0.483	-57.2
300	0.417	-128.3	14.505	105.1	0.045	57.8	0.356	-65.2
400	0.385	-145.2	11.189	98.3	0.054	60.1	0.287	-69.2
500	0.374	-157.4	9.053	93.4	0.063	61.6	0.245	-71.9
600	0.367	-166.9	7.608	89.6	0.072	62.8	0.220	-73.8
700	0.367	-175.4	6.547	86.1	0.081	64.1	0.201	-75.5
800	0.366	177.2	5.773	83.0	0.090	64.7	0.189	-77.2
900	0.369	172.0	5.121	80.6	0.100	64.9	0.181	-78.4
1000	0.368	166.2	4.632	77.9	0.109	65.1	0.175	-80.1
1100	0.369	160.6	4.238	75.3	0.119	65.3	0.171	-81.2
1200	0.373	155.7	3.897	73.2	0.128	65.1	0.168	-82.7
1300	0.377	151.2	3.616	71.0	0.137	65.1	0.167	-84.2
1400	0.382	146.9	3.369	68.8	0.147	64.5	0.167	-85.7
1500	0.384	142.1	3.154	66.8	0.156	64.1	0.168	-87.1
1600	0.386	138.7	2.960	64.5	0.166	63.5	0.168	-88.3
1700	0.391	133.7	2.803	62.9	0.175	63.0	0.169	-89.9
1800	0.401	130.6	2.662	60.6	0.185	62.4	0.171	-91.5
1900	0.405	127.4	2.533	59.1	0.193	61.7	0.172	-92.6
2000	0.408	12.8	2.416	57.0	0.202	61.1	0.175	-94.1





Hitachi Code	MPAK-4
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.013 g

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