
2SC5218

Silicon NPN Epitaxial

HITACHI

ADE-208-279
1st. Edition

Application

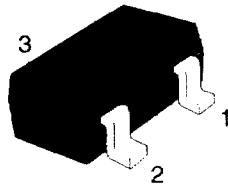
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 9 \text{ GHz typ}$
- High gain, low noise figure
 $PG = 13.0 \text{ dB typ}$, $NF = 1.2 \text{ dB typ}$ at $f = 900 \text{ MHz}$

Outline

MPAK



1. Emitter
2. Base
3. Collector

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

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

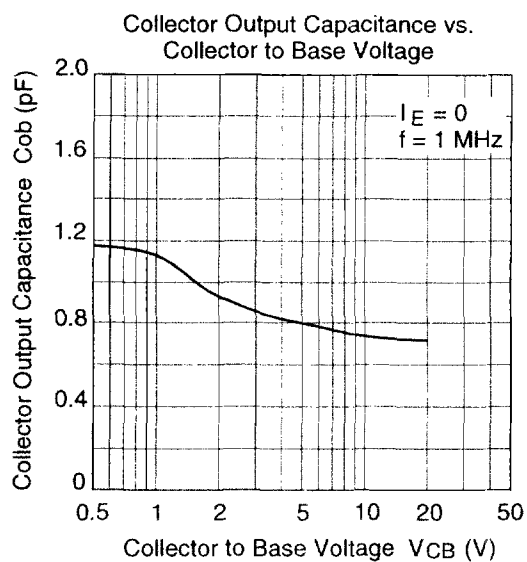
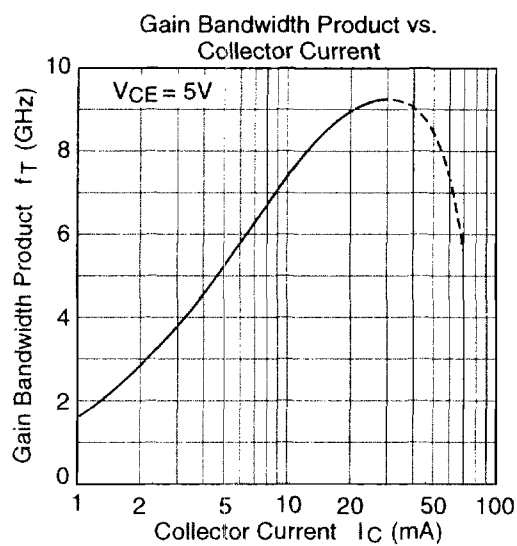
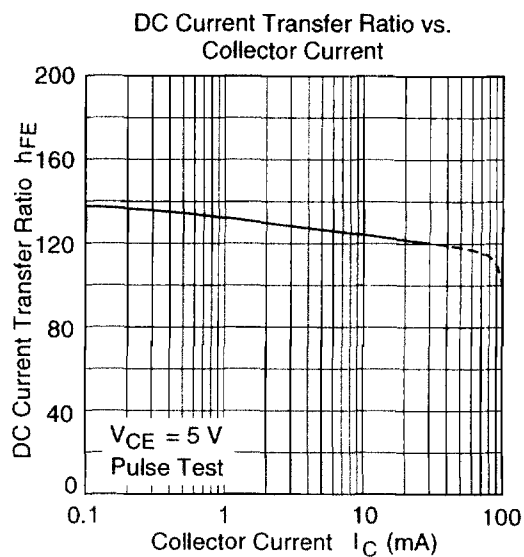
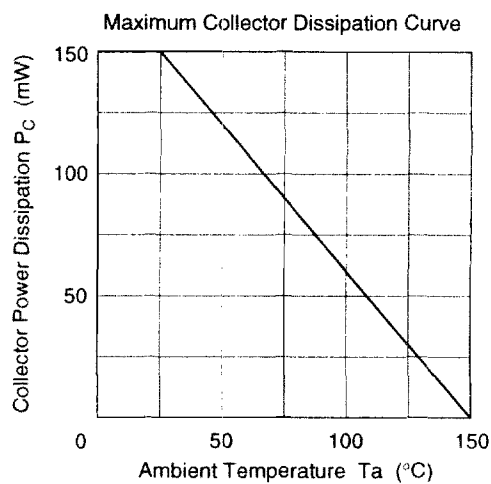
Note: Marking is "YK-".

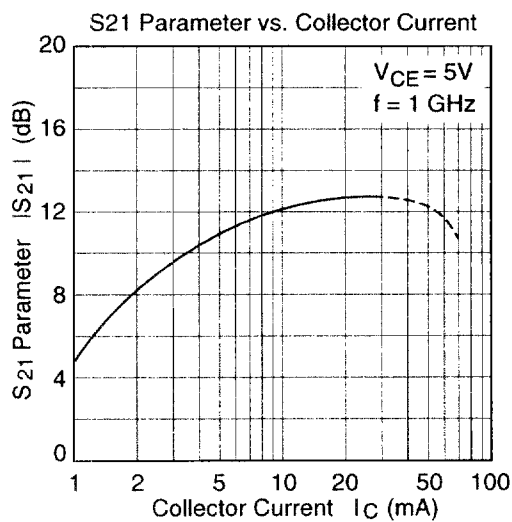
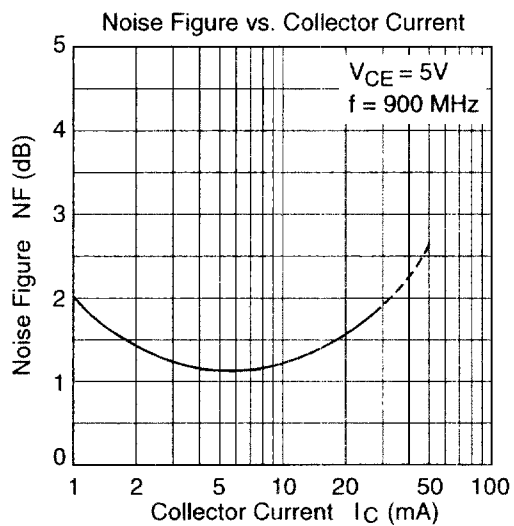
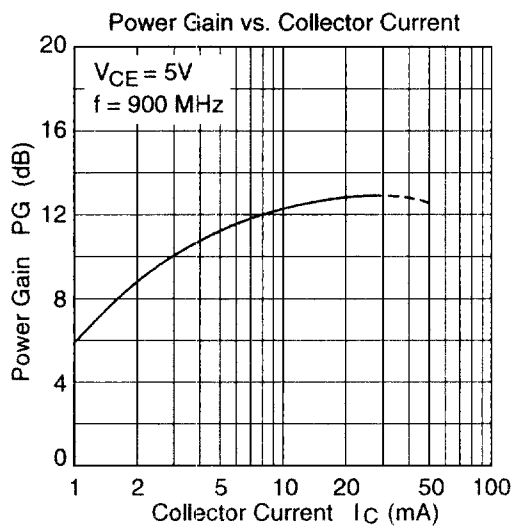
Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

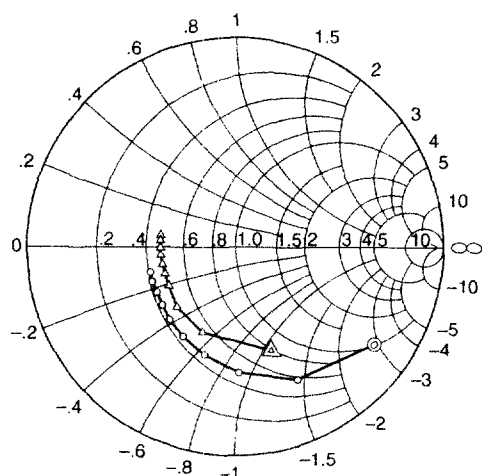
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10\ \mu\text{A}$, $I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 12\ \text{V}$, $I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 9\ \text{V}$, $R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\ \text{V}$, $I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5\ \text{V}$, $I_C = 20\ \text{mA}$
Collector output capacitance	C_{ob}	—	0.8	1.4	pF	$V_{CB} = 5\ \text{V}$, $I_E = 0$, $f = 1\ \text{MHz}$
Gain bandwidth product	f_T	6.0	9.0	—	GHz	$V_{CE} = 5\ \text{V}$, $I_C = 20\ \text{mA}$
Power gain	PG	10	13	—	dB	$V_{CE} = 5\ \text{V}$, $I_C = 20\ \text{mA}$, $f = 900\ \text{MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5\ \text{V}$, $I_C = 5\ \text{mA}$, $f = 900\ \text{MHz}$





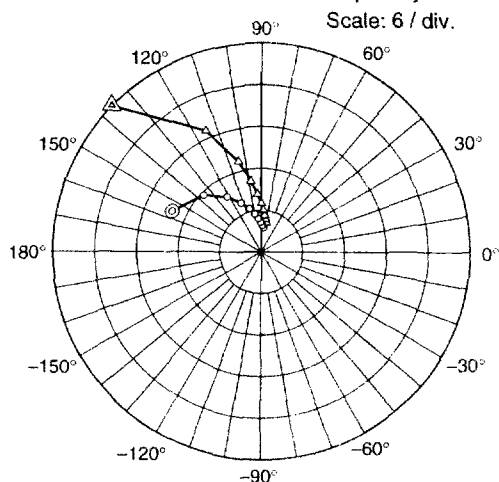
S11 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
100 to 1000 MHz (100 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

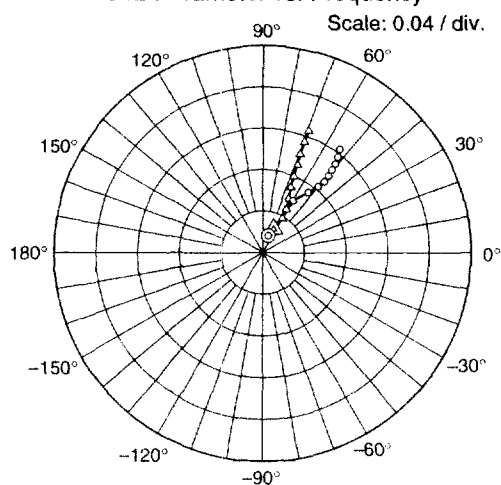
S21 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
100 to 1000 MHz (100 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

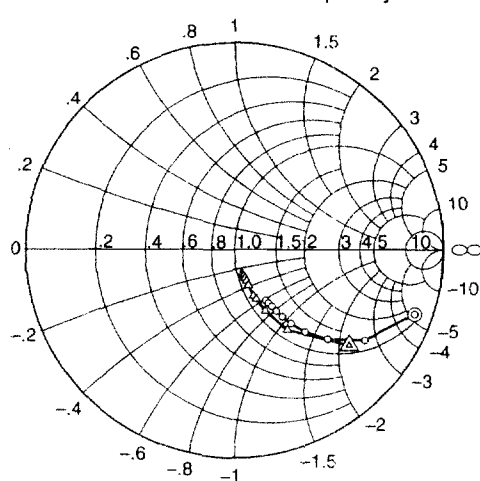
S12 Parameter vs. Frequency



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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S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.817	-34.7	14.1	156	0.034	72.3	0.916	-19.8
200	0.701	-64.5	11.6	136	0.058	59.8	0.761	-34.8
300	0.602	-88.3	9.32	122	0.073	52.9	0.620	-43.9
400	0.536	-106	7.61	112	0.083	49.8	0.520	-49.3
500	0.495	-120	6.40	105	0.091	48.9	0.447	-52.5
600	0.468	-132	5.50	99.5	0.097	49.3	0.396	-54.5
700	0.447	-141	4.80	94.9	0.104	50.0	0.357	-55.7
800	0.434	-150	4.27	90.9	0.110	50.9	0.327	-56.5
900	0.423	-157	3.83	87.2	0.117	52.1	0.305	-57.5
1000	0.428	-164	3.50	83.9	0.124	53.3	0.287	-58.4

S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$, $Z_0 = 50\ \Omega$)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.529	-70.4	29.9	136	0.025	64.9	0.716	-39.8
200	0.427	-111	19.0	115	0.038	60.3	0.462	-56.6
300	0.386	-134	13.4	104	0.048	61.8	0.330	-63.2
400	0.370	-150	10.2	98.0	0.058	64.3	0.260	-66.2
500	0.366	-159	8.28	93.7	0.069	66.6	0.214	-67.8
600	0.367	-167	6.96	89.7	0.080	67.8	0.184	-68.8
700	0.364	-174	6.01	87.0	0.091	68.7	0.162	-69.1
800	0.360	-179	5.28	84.2	0.102	69.5	0.146	-69.7
900	0.362	176	4.71	81.7	0.115	69.4	0.133	-70.4
1000	0.364	171	4.27	79.3	0.126	69.6	0.123	-71.5