
2SC5139

Silicon NPN Epitaxial

HITACHI

ADE-208-226

1st. Edition

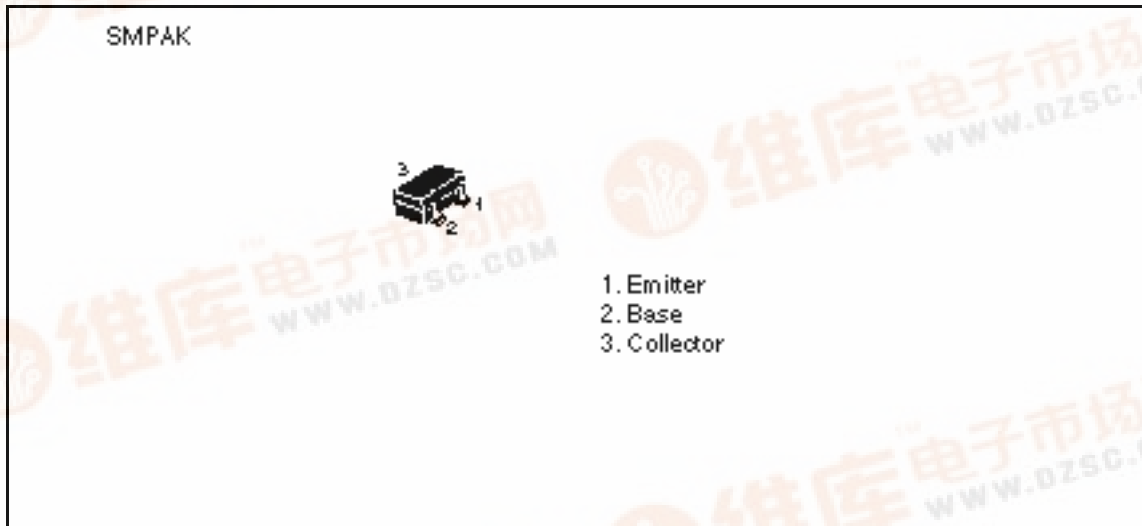
Application

VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 11 \text{ GHz typ}$
- High gain, low noise figure
 $PG = 15 \text{ dB typ, NF} = 1.1 \text{ dB typ at } f = 900 \text{ MHz}$

Outline



2SC5139

Absolute Maximum Ratings (Ta = 25°C)

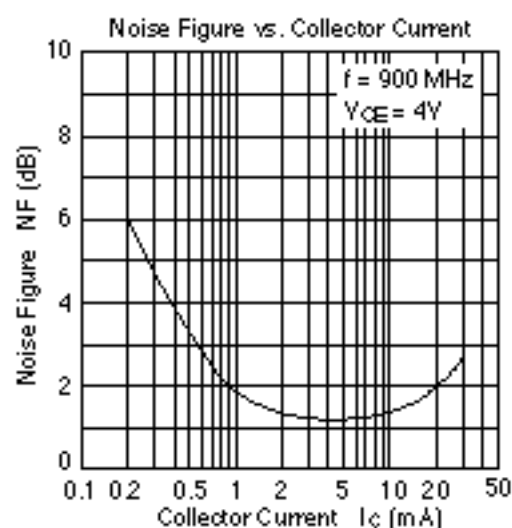
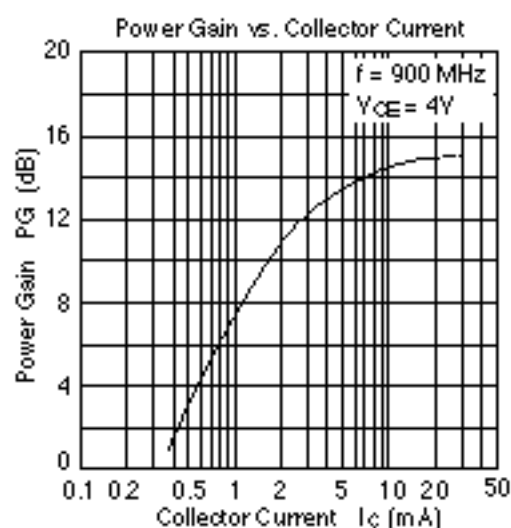
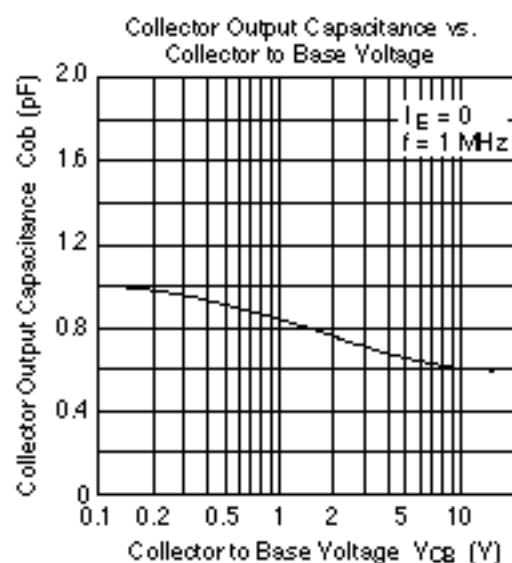
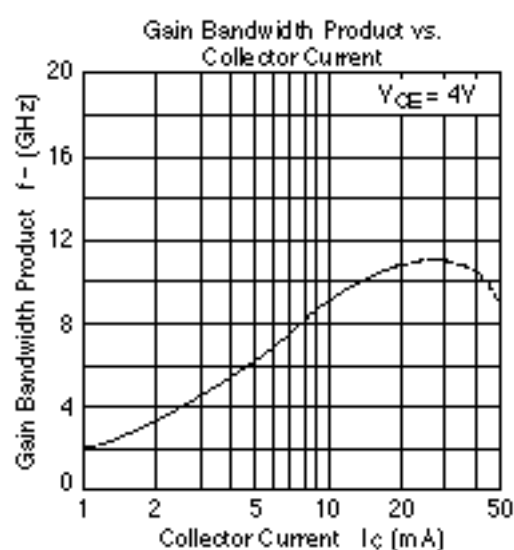
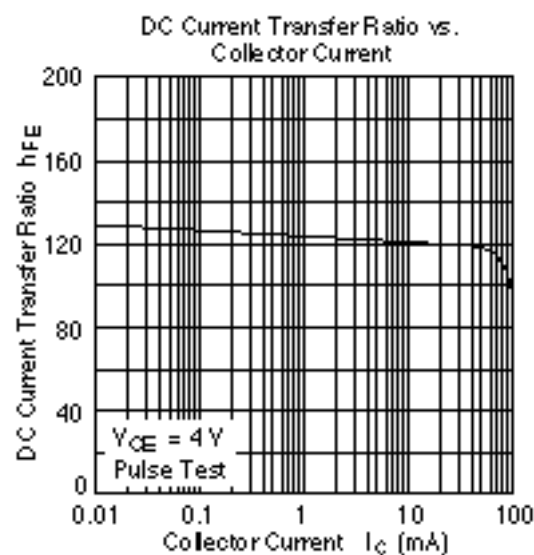
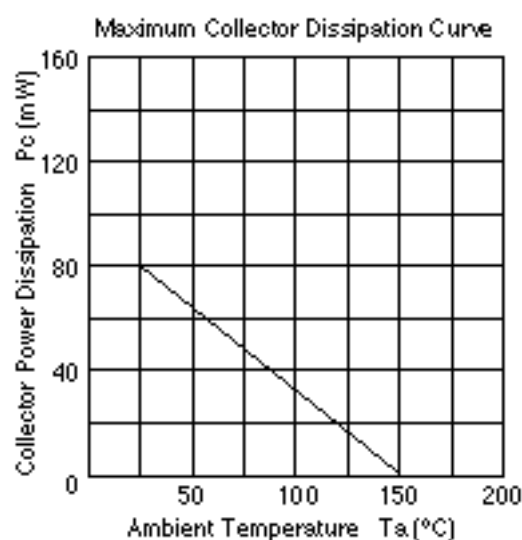
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	50	mA
Collector power dissipation	P_C	80	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

Note: Marking is “YZ–”.

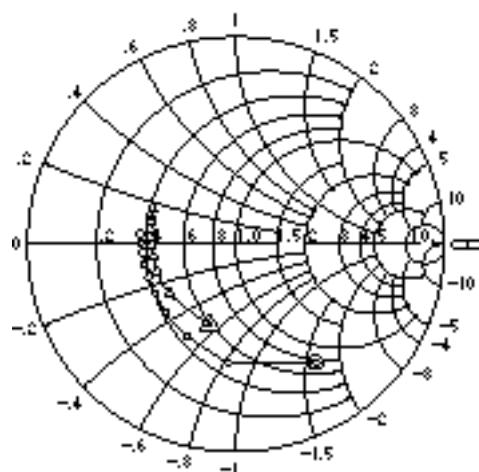
Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.



Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A$, $I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 12 V$, $I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 8 V$, $R_{BE} =$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5 V$, $I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 4 V$, $I_C = 20 mA$
Collector output capacitance	C_{ob}	—	0.65	1.15	pF	$V_{CB} = 5 V$, $I_E = 0$, $f = 1 MHz$
Gain bandwidth product	f_T	8	11	—	GHz	$V_{CE} = 4 V$, $I_C = 20 mA$
Power gain	PG	11.5	15	—	dB	$V_{CE} = 4 V$, $I_C = 20 mA$, $f = 900 MHz$
Noise figure	NF	—	1.1	2.0	dB	$V_{CE} = 4 V$, $I_C = 5 mA$, $f = 900 MHz$



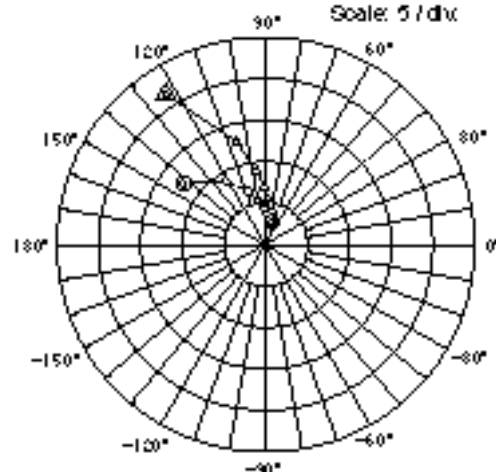
S11 Parameter vs. Frequency





Condition: $V_{CE} = 4 \text{ V}$, $Z_0 = 50 \Omega$
200 to 2000 MHz (200 MHz step)
 \longrightarrow \triangleleft ($I_c = 5 \text{ mA}$)
 \longrightarrow \triangleleft ($I_c = 20 \text{ mA}$)

S21 Parameter vs. Frequency

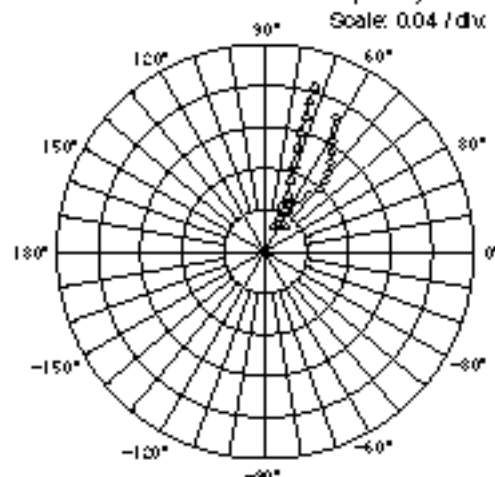
Scale: 5 / dB





Condition: $V_{CE} = 4 \text{ V}$, $Z_0 = 50 \Omega$
200 to 2000 MHz (200 MHz step)
 \longrightarrow \triangleleft ($I_c = 5 \text{ mA}$)
 \longrightarrow \triangleleft ($I_c = 20 \text{ mA}$)

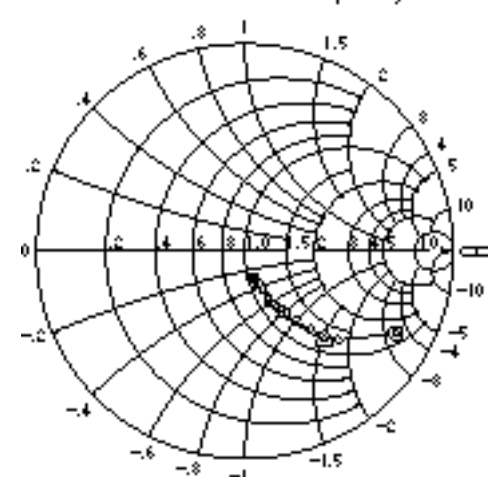
S12 Parameter vs. Frequency



Scale: 0.04 / dB



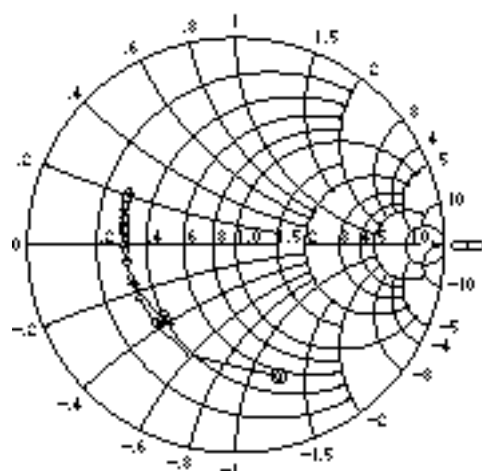
Condition: $V_{CE} = 4 \text{ V}$, $Z_0 = 50 \Omega$
200 to 2000 MHz (200 MHz step)
 \longrightarrow \triangleleft ($I_c = 5 \text{ mA}$)
 \longrightarrow \triangleleft ($I_c = 20 \text{ mA}$)

S22 Parameter vs. Frequency



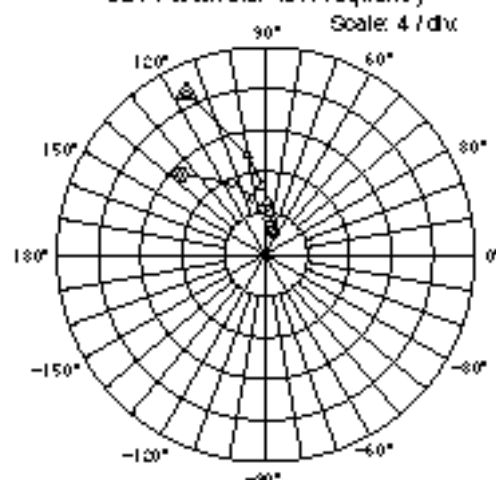
Condition: $V_{CE} = 4 \text{ V}$, $Z_0 = 50 \Omega$
200 to 2000 MHz (200 MHz step)
 \longrightarrow \triangleleft ($I_c = 5 \text{ mA}$)
 \longrightarrow \triangleleft ($I_c = 20 \text{ mA}$)

S11 Parameter vs. Frequency



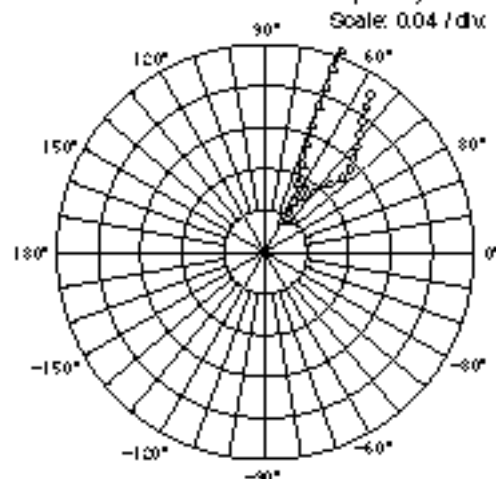
Condition: $V_{CE} = 1 \text{ V}$, $Z_0 = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ($I_C = 5 \text{ mA}$)
 △ — ($I_C = 20 \text{ mA}$)

S21 Parameter vs. Frequency



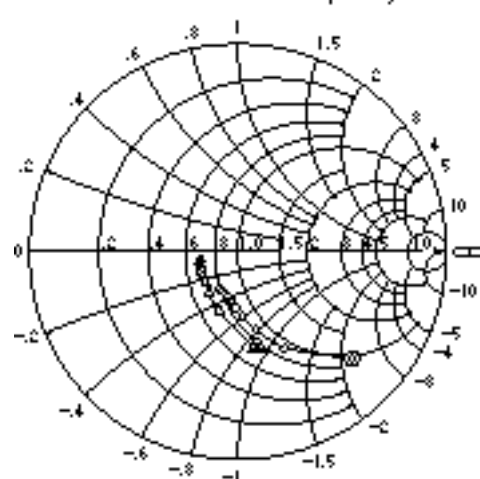
Condition: $V_{CE} = 1 \text{ V}$, $Z_0 = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ($I_C = 5 \text{ mA}$)
 △ — ($I_C = 20 \text{ mA}$)

S12 Parameter vs. Frequency



Condition: $V_{CE} = 1 \text{ V}$, $Z_0 = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ($I_C = 5 \text{ mA}$)
 △ — ($I_C = 20 \text{ mA}$)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 1 \text{ V}$, $Z_0 = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ($I_C = 5 \text{ mA}$)
 △ — ($I_C = 20 \text{ mA}$)

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