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# 2SC5138

Silicon NPN Epitaxial

# HITACHI

ADE-208-225A (Z)

2nd. Edition

Mar. 2001

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## Application

VHF / UHF wide band amplifier

## Features

- High gain bandwidth product  
 $f_T = 6 \text{ GHz typ}$
- High gain, low noise figure  
 $PG = 13 \text{ dB typ}$ ,  $NF = 1.8 \text{ dB typ}$  at  $f = 900 \text{ MHz}$

## Outline

SMPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "YL-".

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

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

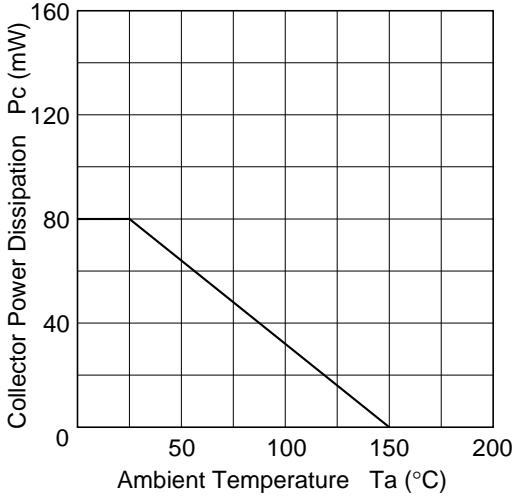
## Absolute Maximum Ratings (Ta = 25°C)

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	$I_C$	30	mA
Collector power dissipation	$P_C$	80	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	−55 to +150	°C

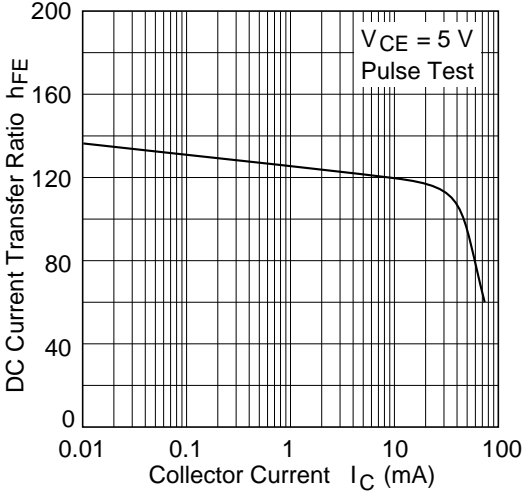
## Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	$I_{CBO}$	—	—	10	μA	$V_{CB} = 20\text{ V}, I_E = 0$
	$I_{CEO}$	—	—	1	mA	$V_{CE} = 12\text{ V}, R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	10	μA	$V_{EB} = 2\text{ V}, I_C = 0$
DC current transfer ratio	$h_{FE}$	50	120	250		$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Collector output capacitance	$C_{ob}$	—	0.65	1.05	pF	$V_{CB} = 5\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$
Gain bandwidth product	$f_T$	4	6	—	GHz	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Power gain	PG	9.5	13	—	dB	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA},$ $f = 900\text{ MHz}$
Noise figure	NF	—	1.8	3.0	dB	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA},$ $f = 900\text{ MHz}$

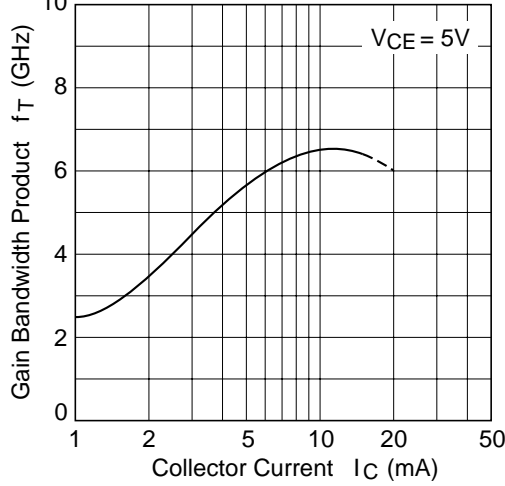
Maximum Collector Dissipation Curve



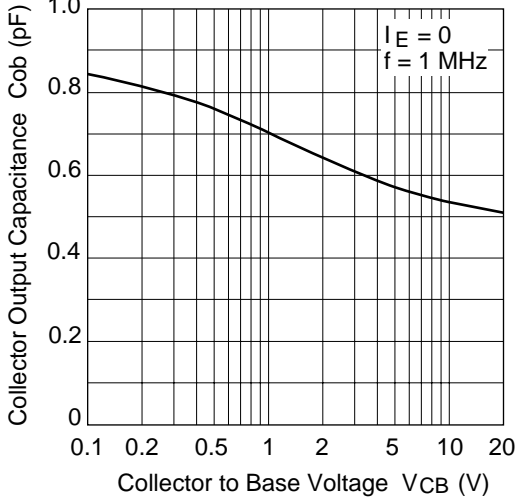
DC Current Transfer Ratio vs. Collector Current

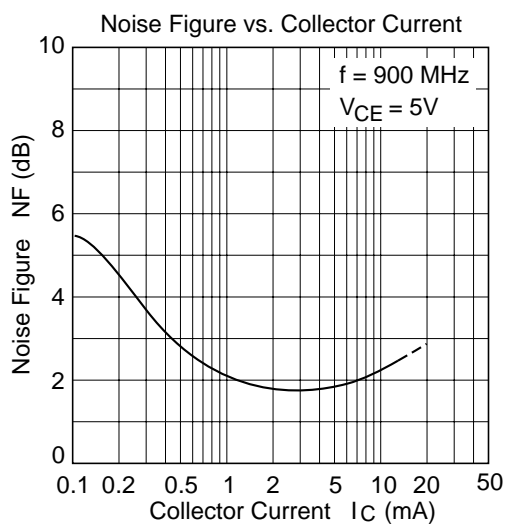
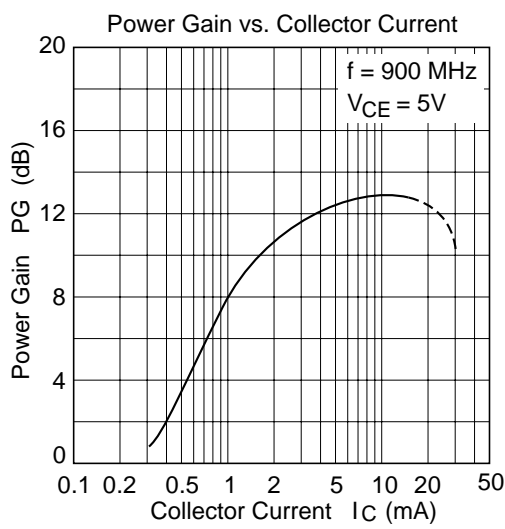


Gain Bandwidth Product vs. Collector Current

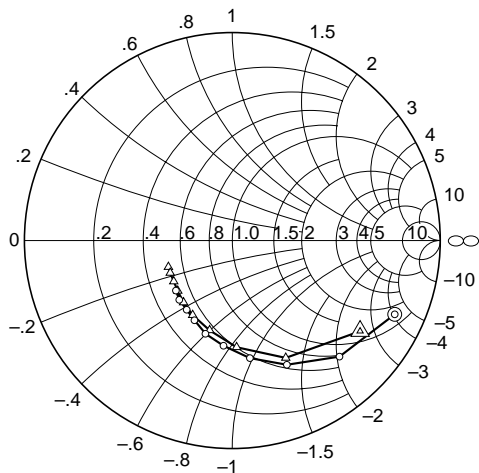


Collector Output Capacitance vs. Collector to Base Voltage





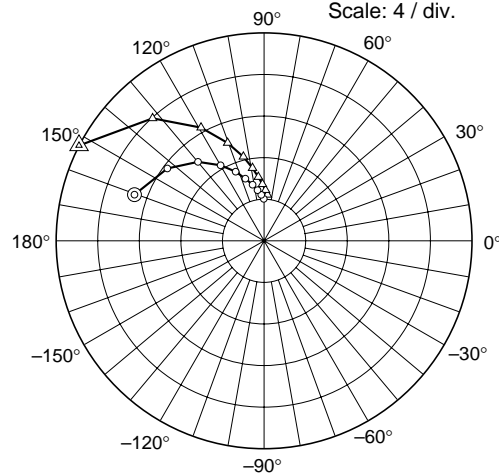
S11 Parameter vs. Frequency



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

○ — ○ ( $I_C = 5 \text{ mA}$ )  
△ — △ ( $I_C = 10 \text{ mA}$ )

S21 Parameter vs. Frequency

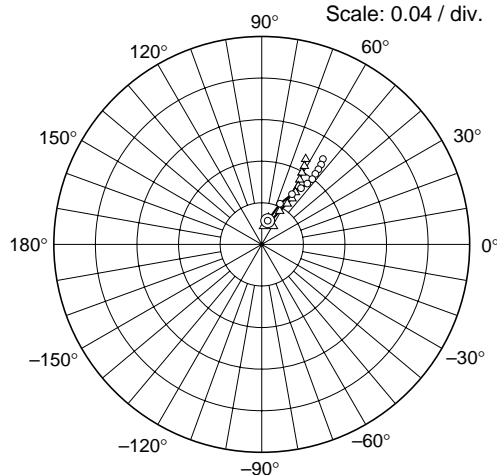


Scale: 4 / div.

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

○ — ○ ( $I_C = 5 \text{ mA}$ )  
△ — △ ( $I_C = 10 \text{ mA}$ )

S12 Parameter vs. Frequency

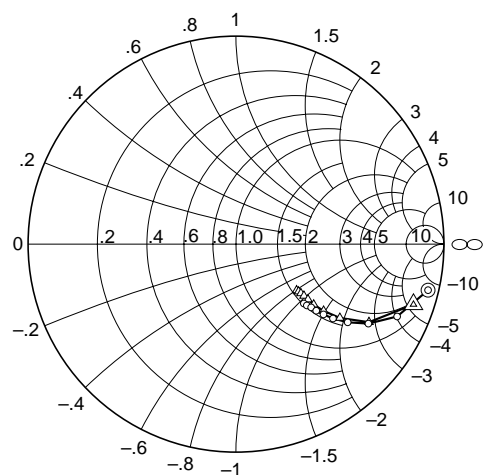


Scale: 0.04 / div.

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

○ — ○ ( $I_C = 5 \text{ mA}$ )  
△ — △ ( $I_C = 10 \text{ mA}$ )

S22 Parameter vs. Frequency

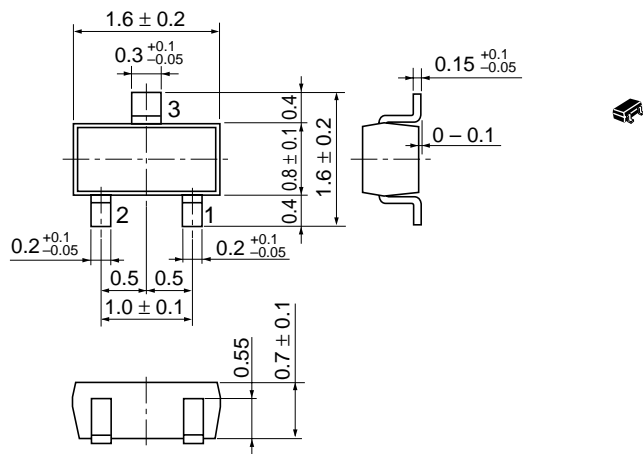


Condition:  $V_{CE} = 5 \text{ V}$ ,  $Z_o = 50 \Omega$   
100 to 1000 MHz (100 MHz step)

○ — ○ ( $I_C = 5 \text{ mA}$ )  
△ — △ ( $I_C = 10 \text{ mA}$ )

Package Dimensions

As of January, 2001  
Unit: mm



Hitachi Code	SMPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.003 g

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