

NPN Epitaxial Planar Silicon Transistor



# 2SC4406

## VHF Frequency Mixer, Local Oscillator Applications

### Applications

- VHF mixer, frequency converters, local oscillators.

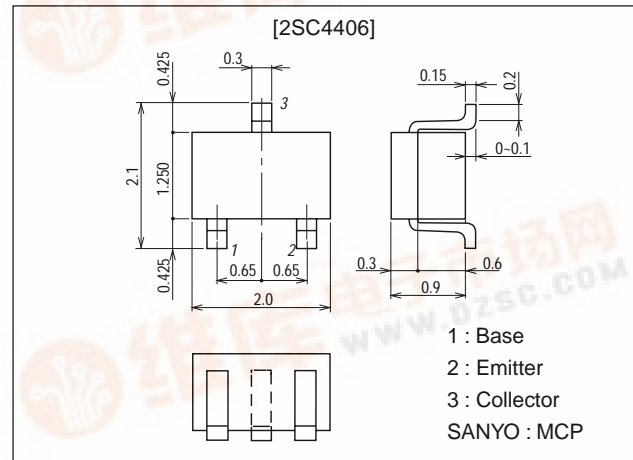
### Features

- High cutoff frequency :  $f_T=1.2\text{GHz}$  typ
- High power gain :  $PG=15\text{dB}$  typ ( $f=0.4\text{GHz}$ )
- Good dependence of  $f_T$  on current.
- Very small-sized package permitting 2SC4406-applied sets to be made smaller and slimmer.

### Package Dimensions

unit:mm

2059B



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		30	V
Collector-to-Emitter Voltage	$V_{CE0}$		15	V
Emitter-to-Base Voltage	$V_{EB0}$		3	V
Collector Current	$I_C$		50	mA
Collector Dissipation	$P_C$		150	mW
Junction Temperature	$T_J$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CB0}$	$V_{CB}=15\text{V}, I_E=0$			0.1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB}=2\text{V}, I_C=0$			1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=10\text{V}, I_C=5\text{mA}$	40*		200*	
Gain-Bandwidth Product	$f_T$	$V_{CE}=10\text{V}, I_C=10\text{mA}$	0.6	1.2		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.75	1.1	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.5		pF

\* : The 2SC4406 is classified by 5mA  $h_{FE}$  as follows :

40	2	80	60	3	120	100	4	200
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(Note) Marking : JY

$h_{FE}$  rank : 2, 3, 4

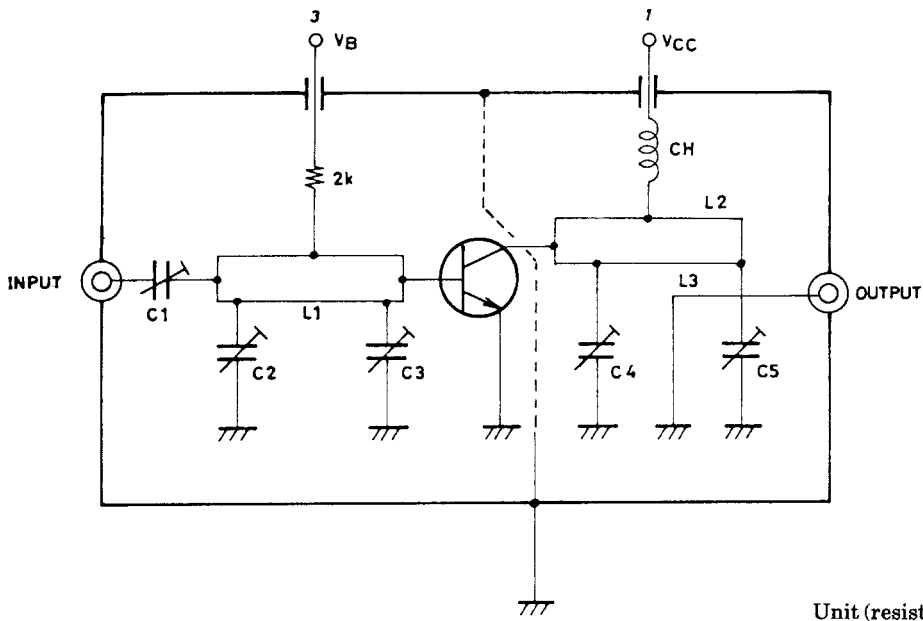
- For CP package version, use the 2SC4269.

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## 2SC4406

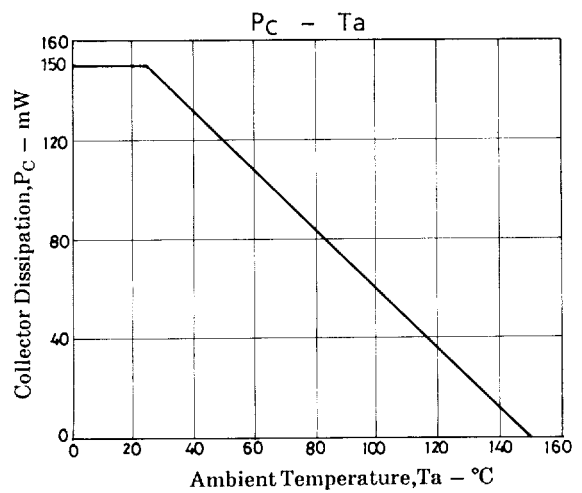
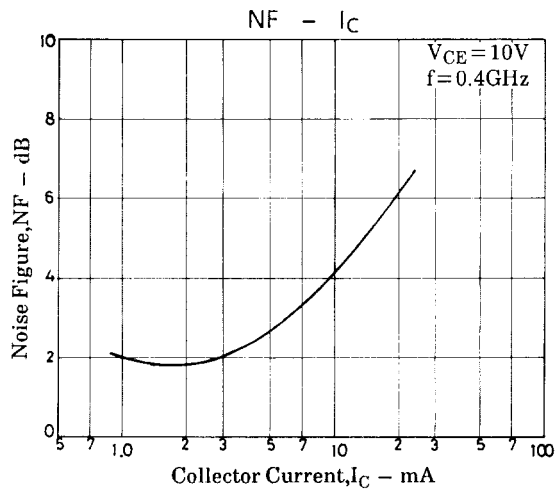
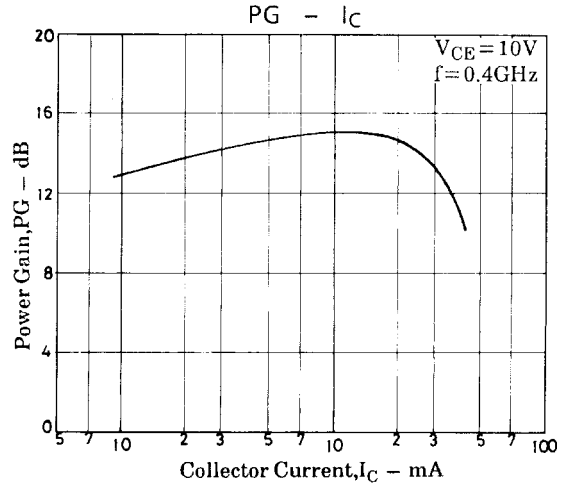
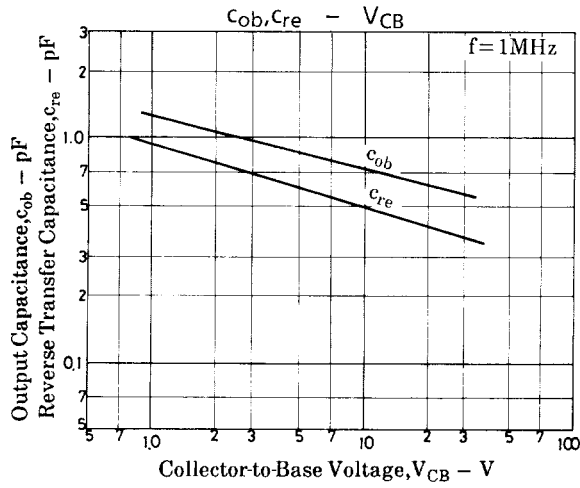
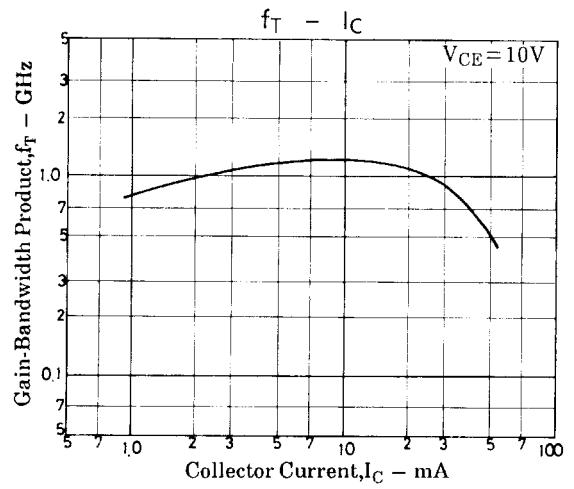
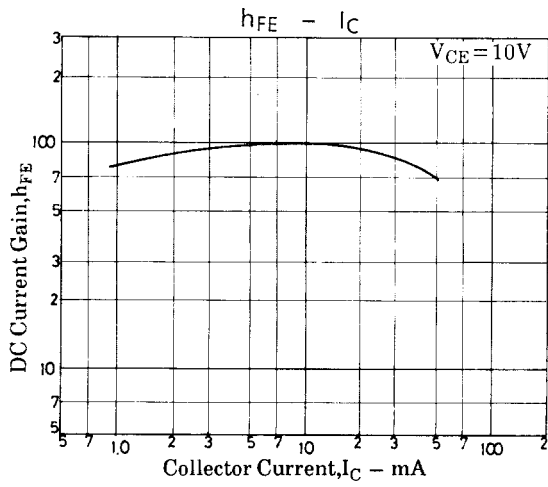
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power Gain	PG	$V_{CE}=10V, I_C=10mA, f=0.4GHz$		15		dB
Noise Figure	NF	$V_{CE}=10V, I_C=3mA, f=0.4GHz$ See specified Test Circuit.		2.0		dB

### NF Test Circuit



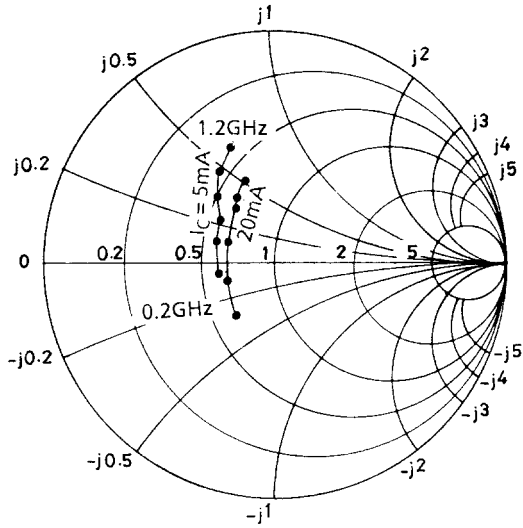
	f=400MHz
C1	~20pF
C2	~10pF
C3	~10pF
C4	~20pF
C5	~30pF
L1	2 $\phi$ , l=40mm 2/3t
L2	2 $\phi$ , l=40mm 2/3t
L3	1 $\phi$ , l=40mm 1/2t

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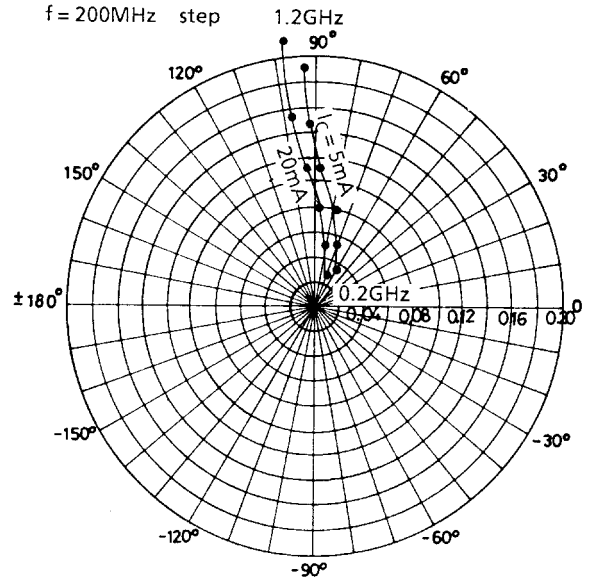


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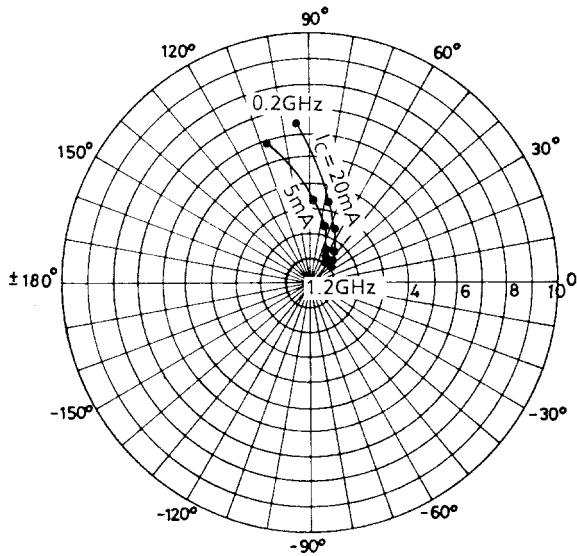
S11e:  $V_{CE} = 10V$   
 $f = 200\text{MHz}$  step



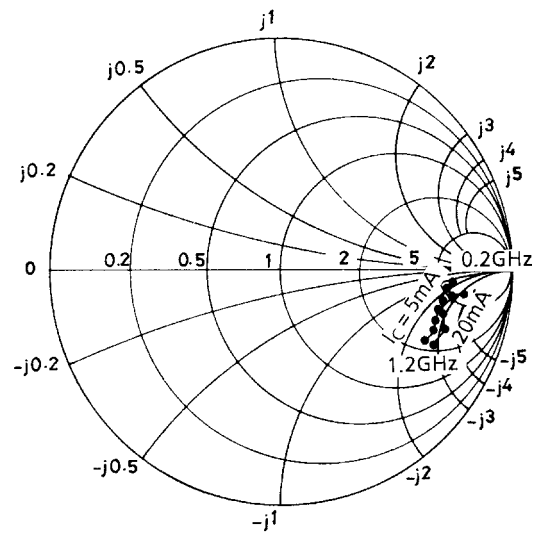
S12e:  $V_{CE} = 10V$   
 $f = 200\text{MHz}$  step



S21e:  $V_{CE} = 10V$   
 $f = 200\text{MHz}$  step



S22e:  $V_{CE} = 10V$   
 $f = 200\text{MHz}$  step



## 2SC4406

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