



**CHENMKO ENTERPRISE CO.,LTD**

*Halogens free devices*

**SURFACE MOUNT  
PNP Switching Transistor**

VOLTAGE 40 Volts CURRENT 0.2 Ampere

**CH3906ZGP**

**APPLICATION**

- \* Telephony and professional communication equipment.
- \* Other switching applications.

**FEATURE**

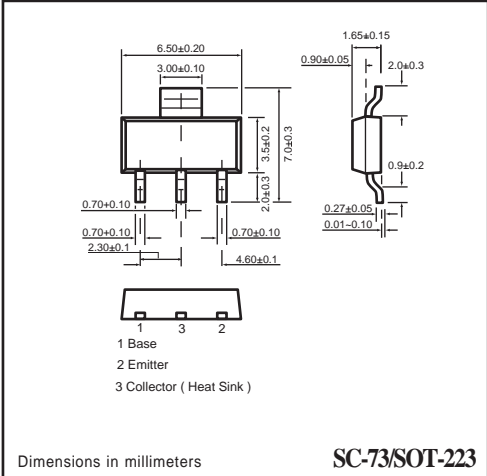
- \* Small flat package. ( SC-73/SOT-223 )
- \* Low current (Max.=200mA).
- \* Suitable for high packing density.
- \* Low voltage (Max.=40V) .
- \* High saturation current capability.
- \* Voltage controlled small signal switch.

**CONSTRUCTION**

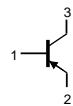
- \* PNP Switching Transistor

**MARKING**

- \* ZGP



**CIRCUIT**



**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL           | PARAMETER                     | CONDITIONS                       | MIN. | MAX. | UNIT |
|------------------|-------------------------------|----------------------------------|------|------|------|
| V <sub>CB0</sub> | collector-base voltage        | open emitter                     | -    | -40  | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                        | -    | -40  | V    |
| V <sub>EBO</sub> | emitter-base voltage          | open collector                   | -    | -5   | V    |
| I <sub>C</sub>   | collector current DC          |                                  | -    | -200 | mA   |
| I <sub>CM</sub>  | peak collector current        |                                  | -    | -200 | mA   |
| I <sub>BM</sub>  | peak base current             |                                  | -    | -100 | mA   |
| P <sub>tot</sub> | total power dissipation       | T <sub>amb</sub> ≤ 25 °C; note 1 | -    | 2.0  | W    |
| T <sub>stg</sub> | storage temperature           |                                  | -65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature          |                                  | -    | 150  | °C   |
| T <sub>amb</sub> | operating ambient temperature |                                  | -65  | +150 | °C   |

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

## RATING CHARACTERISTIC CURVES ( CH3906ZGP )

### THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1     | 500   | K/W  |

#### Note

1. Transistor mounted on an FR4 printed-circuit board.

### CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| SYMBOL      | PARAMETER                            | CONDITIONS  | MIN.                        | MAX.                    | UNIT |
|-------------|--------------------------------------|---|-----------------------------|-------------------------|------|
| $I_{CBO}$   | collector cut-off current            | $I_E = 0; V_{CB} = -30\text{ V}$  | –                           | -50                     | nA   |
| $I_{EBO}$   | emitter cut-off current              | $I_C = 0; V_{EB} = 6\text{ V}$  | –                           | -50                     | nA   |
| $h_{FE}$    | DC current gain                      | $V_{CE} = -1\text{ V}$ ; note 1<br>$I_C = -0.1\text{ mA}$<br>$I_C = -1\text{ mA}$<br>$I_C = -10\text{ mA}$<br>$I_C = -50\text{ mA}$<br>$I_C = -100\text{ mA}$ | 60<br>80<br>100<br>60<br>30 | –<br>–<br>300<br>–<br>– |      |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = -10\text{ mA}; I_B = -1\text{ mA}$   | –                           | -250                    | mV   |
|             |                                      | $I_C = -50\text{ mA}; I_B = -5\text{ mA}$   | –                           | -400                    | mV   |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = -10\text{ mA}; I_B = -1\text{ mA}$   | -650                        | -850                    | mV   |
|             |                                      | $I_C = -50\text{ mA}; I_B = -5\text{ mA}$   | –                           | -950                    | mV   |
| $C_c$       | collector capacitance                | $I_E = i_e = 0; V_{CB} = -5\text{ V}; f = 1\text{ MHz}$   | –                           | 4.5                     | pF   |
| $C_e$       | emitter capacitance                  | $I_C = i_c = 0; V_{EB} = -500\text{ mV}; f = 1\text{ MHz}$  | –                           | 10                      | pF   |
| $f_T$       | transition frequency                 | $I_C = 10\text{ mA}; V_{CE} = -20\text{ V}; f = 100\text{ MHz}$   | 250                         | –                       | MHz  |
| F           | noise figure                         | $I_C = 100\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 1\text{ k}\Omega; f = 10\text{ Hz to }15.7\text{ kHz}$   | –                           | 4                       | dB   |

#### Switching times (between 10% and 90% levels);

|           |               |   |   |     |    |
|-----------|---------------|---|---|-----|----|
| $t_{on}$  | turn-on time  | $I_{Con} = -10\text{ mA}; I_{Bon} = -1\text{ mA}; I_{Boff} = 1\text{ mA}$ | – | 65  | ns |
| $t_d$     | delay time    |   | – | 35  | ns |
| $t_r$     | rise time     |   | – | 35  | ns |
| $t_{off}$ | turn-off time |   | – | 300 | ns |
| $t_s$     | storage time  |   | – | 225 | ns |
| $t_f$     | fall time     |   | – | 75  | ns |

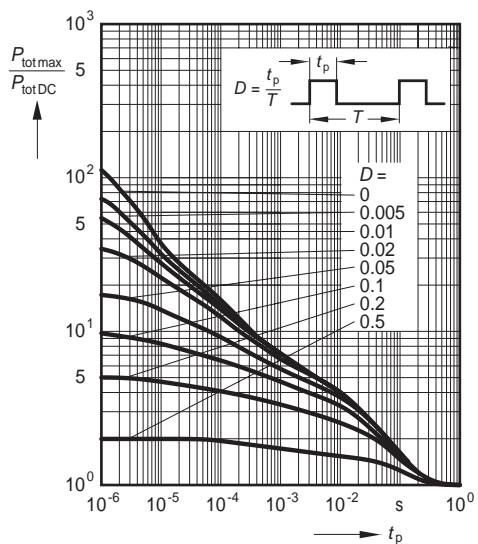
#### Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

## RATING CHARACTERISTIC CURVES ( CH3906ZGP )

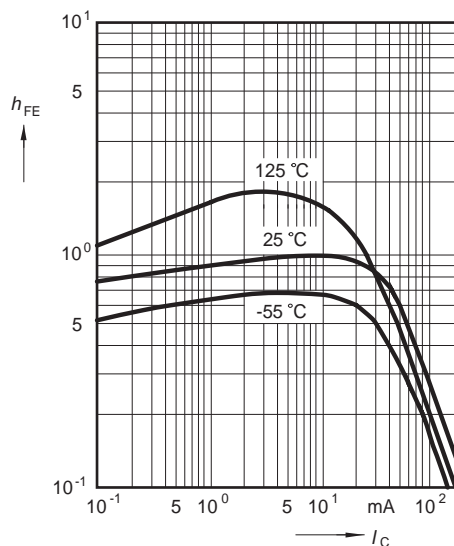
### Permissible Pulse Load

$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$



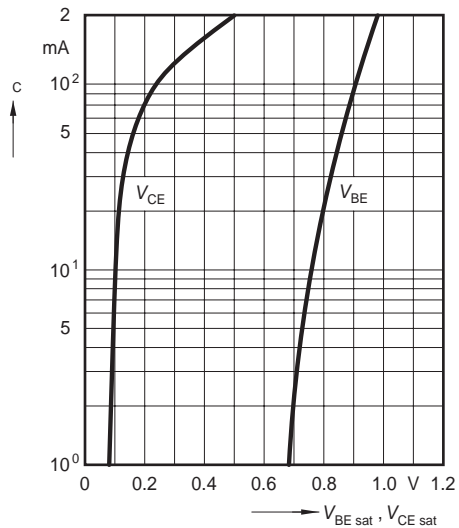
### DC current gain $h_{FE} = f(I_C)$

$$V_{CE} = 1 \text{ V, normalized}$$



### Saturation voltage $I_C = f(V_{BE\text{sat}}, V_{CE\text{sat}})$

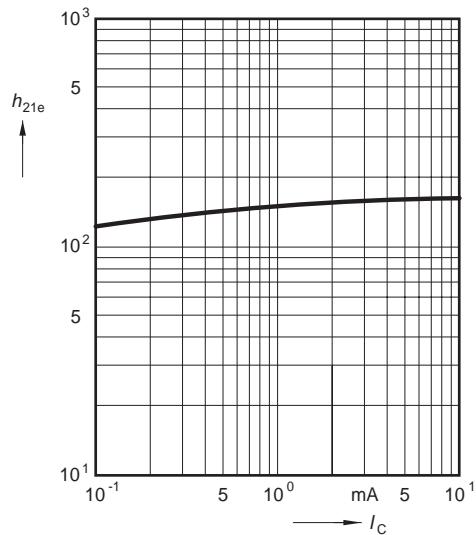
$$h_{FE} = 10$$



### Short-circuit forward current transfer ratio $h_{21e} = f(I_C)$

$$V_{CE} = 10 \text{ V, } f = 1 \text{ MHz}$$

$$V_{CE} = 10 \text{ V, } f = 1 \text{ MHz}$$

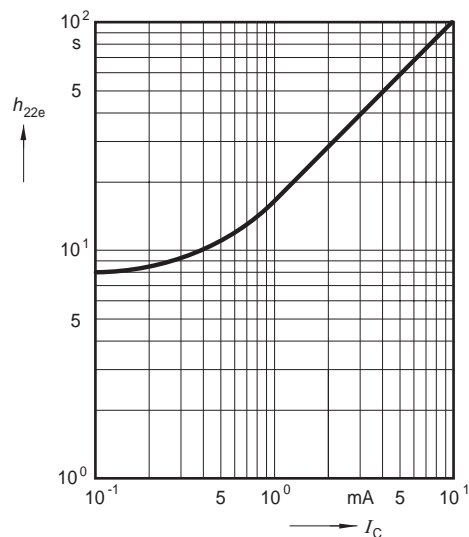


## RATING CHARACTERISTIC CURVES ( CH3906ZGP )

### Open-circuit output admittance

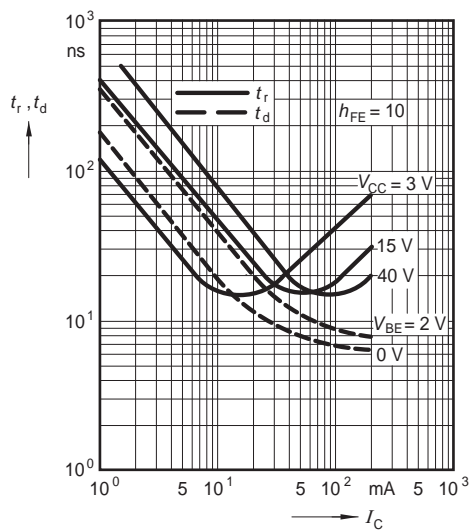
$$h_{22e} = f(I_C)$$

$V_{CE} = 10V, f = 1MHz$

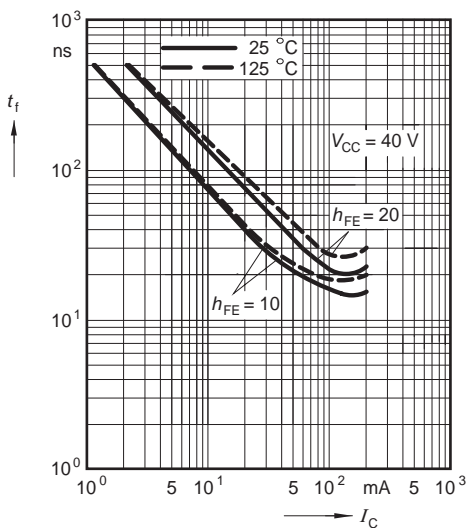


### Delay time $t_d = f(I_C)$

### Rise time $t_r = f(I_C)$



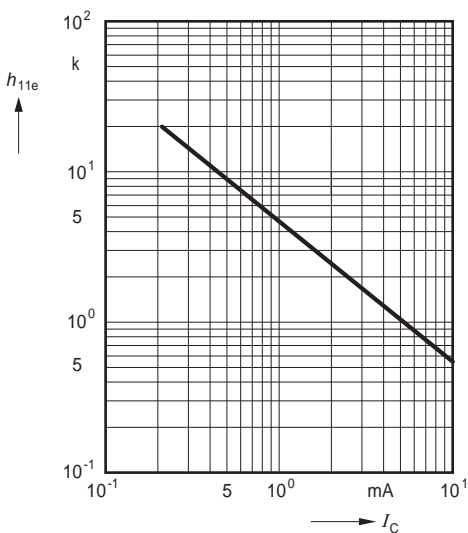
### Fall time $t_f = f(I_C)$



### Input impedance

$$h_{11e} = f(I_C)$$

$V_{CE} = 10V, f = 1kHz$

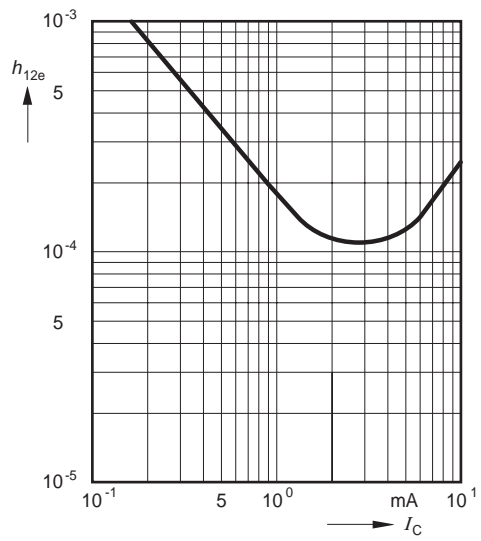


## RATING CHARACTERISTIC CURVES ( CH3906ZGP )

Open-circuit reverse voltage

transfer ratio  $h_{12e} = f(I_C)$

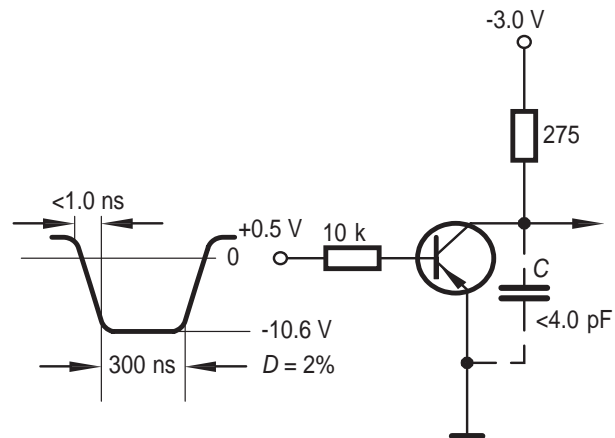
$V_{CE} = 10V, f = 1kHz$



## RATING CHARACTERISTIC CURVES ( CH3906ZGP )

### Test circuit

#### Delay and rise time



#### Storage and fall time

