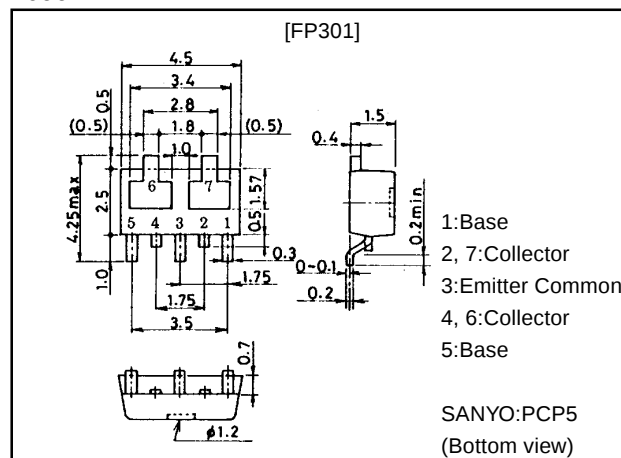


TR:NPN Epitaxial Planar Silicon Transistor  
SBD:Schottky Barrier Diode

## Features

- ## Package Dimensions

2099A

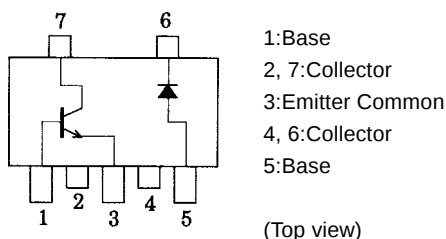


### Absolute Maximum Ratings at Ta = 25°C

| Parameter                                 | Symbol    | Conditions                                           | Ratings     | Unit |
|-------------------------------------------|-----------|------------------------------------------------------|-------------|------|
| [TR]                                      |           |                                                      |             |      |
| Collector-to-Base Voltage                 | $V_{CBO}$ |                                                      | 30          | V    |
| Collector-to-Emitter Voltage              | $V_{CEO}$ |                                                      | 25          | V    |
| Emitter-to-Base Voltage                   | $V_{EBO}$ |                                                      | 6           | V    |
| Collector Current                         | $I_C$     |                                                      | 2           | A    |
| Collector Current (Pulse)                 | $I_{CP}$  |                                                      | 5           | A    |
| Base Current                              | $I_B$     |                                                      | 400         | mA   |
| Collector Dissipation                     | $P_C$     | Mounted on ceramic board (250mm <sup>2</sup> ×0.8mm) | 0.8         | W    |
| Junction Temperature                      | $T_j$     |                                                      | 150         | °C   |
| [SBD]                                     |           |                                                      |             |      |
| Repetitive Peak Reverse Voltage           | $V_{RRM}$ |                                                      | 30          | V    |
| Non-repetitive Peak Reverse Surge Voltage | $V_{RSM}$ |                                                      | 35          | V    |
| Average Rectified Current                 | $I_O$     |                                                      | 700         | mA   |
| Surge Forward Current                     | $I_{FSM}$ | 50Hz sine wave, 1 cycle                              | 5           | A    |
| Junction Temperature                      | $T_j$     |                                                      | −55 to +125 | °C   |
| Storage Temperature                       | $T_{stg}$ |                                                      | −55 to +125 | °C   |

## Electrical Connection

Continued on next page.



1:Base  
2, 7:Collector  
3:Emitter Common  
4, 6:Collector  
5:Base

(Top view)

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52098HA (KT)/53094TH (KOTO) BX-0215 No.4539-1/4

Continued from preceding page.

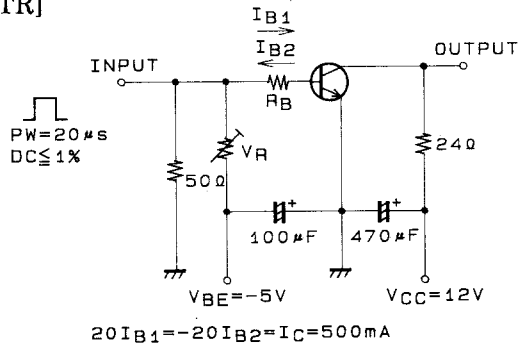
**Electrical Characteristics at Ta=25°C**

| Parameter                 | Symbol               | Conditons                                                          | Ratings |      |      | Unit |
|---------------------------|----------------------|--------------------------------------------------------------------|---------|------|------|------|
|                           |                      |                                                                    | min     | typ  | max  |      |
| [TR]                      |                      |                                                                    |         |      |      |      |
| Collector Cutoff Current  | I <sub>CBO</sub>     | V <sub>CB</sub> =20V, I <sub>E</sub> =0                            |         |      | 0.1  | μA   |
| Emitter Cutoff Current    | I <sub>EBO</sub>     | V <sub>EB</sub> =4V, I <sub>C</sub> =0                             |         |      | 0.1  | μA   |
| DC Current Gain           | h <sub>FE1</sub>     | V <sub>CE</sub> =2V, I <sub>C</sub> =100mA                         | 140     |      | 560  |      |
|                           | h <sub>FE2</sub>     | V <sub>CE</sub> =2V, I <sub>C</sub> =1.5A                          | 65      |      |      |      |
| Gain-Bandwidth Product    | f <sub>T</sub>       | V <sub>CE</sub> =10V, I <sub>C</sub> =50mA                         |         | 150  |      | MHz  |
| Output Capacitance        | C <sub>ob</sub>      | V <sub>CE</sub> =10V, f=1MHz                                       |         | 19   |      | pF   |
| C-E Saturation Voltage    | V <sub>CE(sat)</sub> | I <sub>C</sub> =1.5A, I <sub>B</sub> =75mA                         |         | 0.18 | 0.4  | V    |
| B-E Saturation Voltage    | V <sub>BE(sat)</sub> | I <sub>C</sub> =1.5A, I <sub>B</sub> =75mA                         |         | 0.85 | 1.2  | V    |
| C-B Breakdown Voltage     | V <sub>(BR)CBO</sub> | I <sub>C</sub> =10μA, I <sub>E</sub> =0                            | 30      |      |      | V    |
| C-E Breakdown Voltage     | V <sub>(BR)CEO</sub> | I <sub>C</sub> =1mA, R <sub>BE</sub> =∞                            | 25      |      |      | V    |
| E-B Breakdown Voltage     | V <sub>(BR)EBO</sub> | I <sub>E</sub> =10μA, I <sub>C</sub> =0                            | 6       |      |      | V    |
| Turn-ON Time              | t <sub>on</sub>      | See specified Test Circuit                                         |         | 60   |      | ns   |
| Storage Time              | t <sub>stg</sub>     | See specified Test Circuit                                         |         | 500  |      | ns   |
| Fall Time                 | t <sub>f</sub>       | See specified Test Circuit                                         |         | 25   |      | ns   |
| [SBD]                     |                      |                                                                    |         |      |      |      |
| Reverse Voltage           | V <sub>R</sub>       | I <sub>R</sub> =300μA                                              | 30      |      |      | V    |
| Forward Voltage           | V <sub>F</sub>       | I <sub>F</sub> =700mA                                              |         |      | 0.55 | V    |
| Reverse Current           | I <sub>R</sub>       | V <sub>R</sub> =15V                                                |         |      | 80   | μA   |
| Interterminal Capacitance | C                    | V <sub>R</sub> =10V, f=1MHz cycle                                  |         | 28   |      | pF   |
| Reverse Recovery Time     | t <sub>rr</sub>      | I <sub>F</sub> =I <sub>R</sub> =100mA, See sepcified Test Circuit. |         |      | 10   | ns   |
| Thermal Resistance        | R <sub>thj-a</sub>   | Mounted on ceramic board (250mm²×0.8mm)                            |         | 170  |      | °C/W |

Marking:301

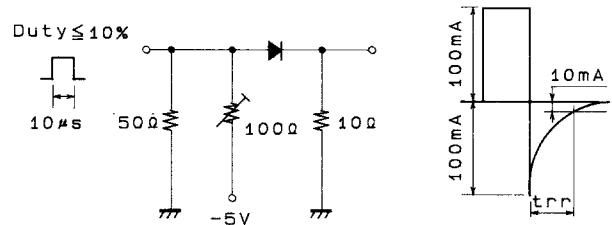
**Switching Time Test Circuit**

[TR]

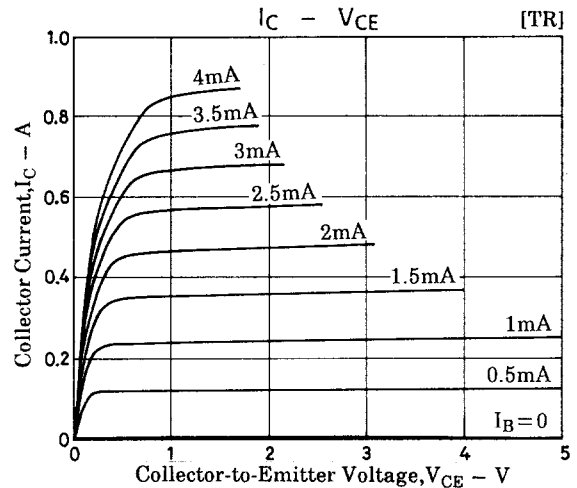
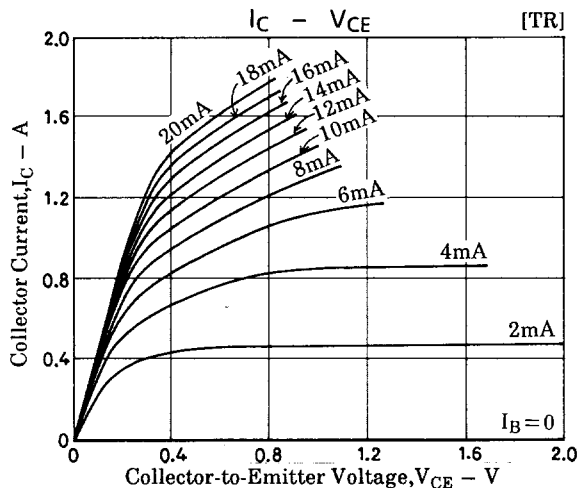


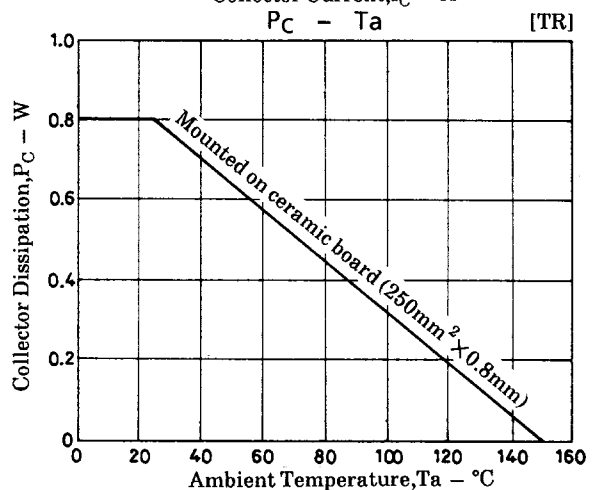
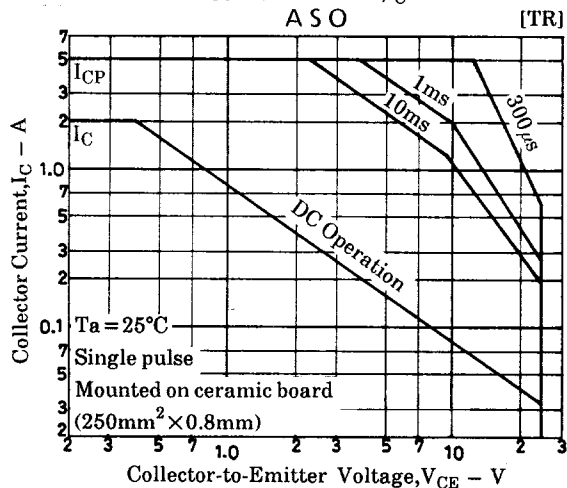
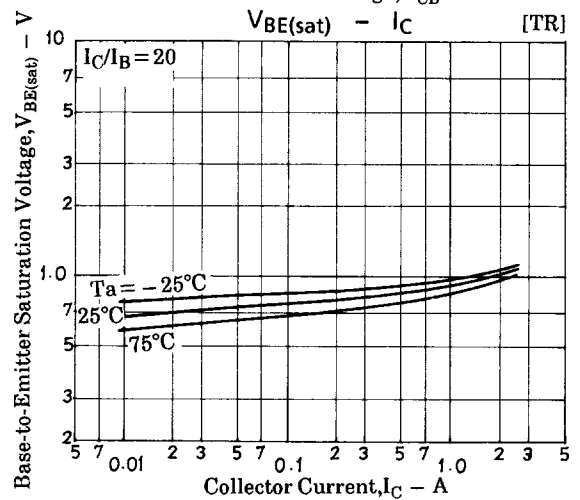
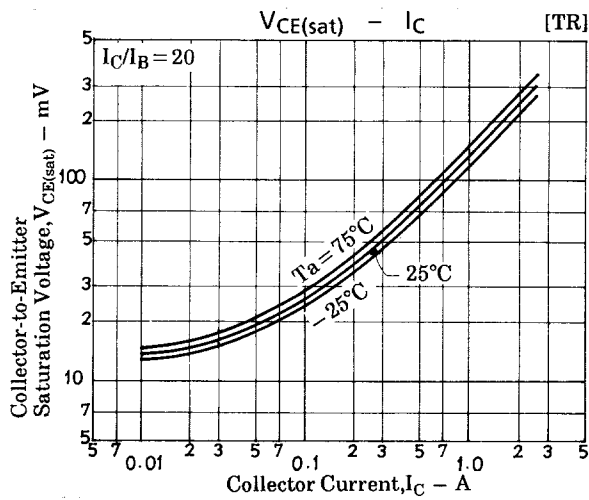
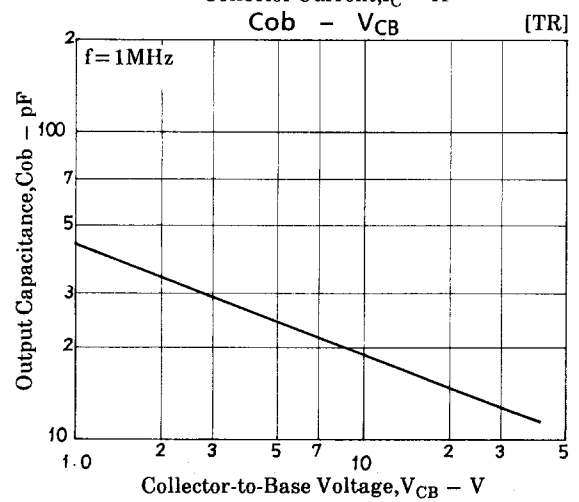
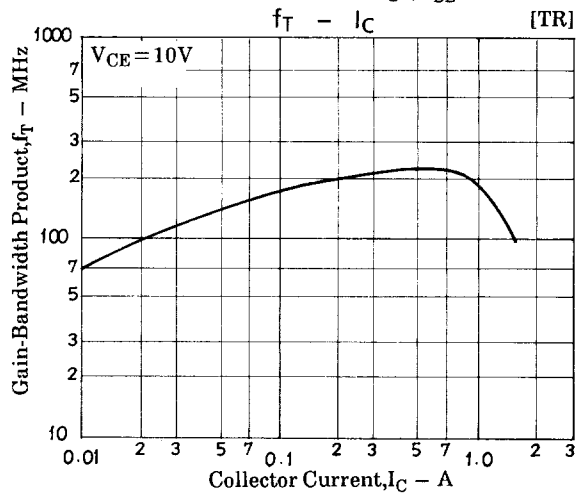
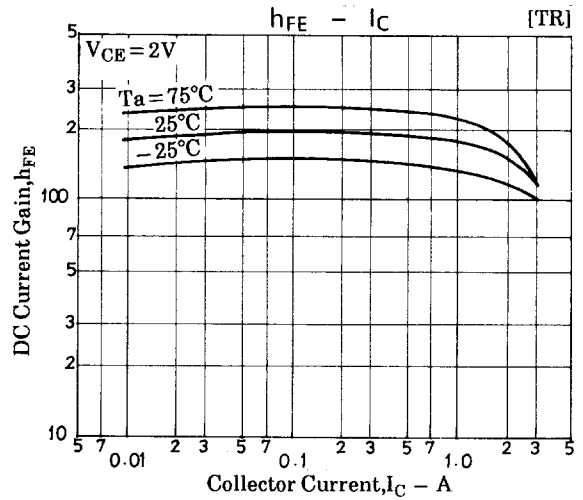
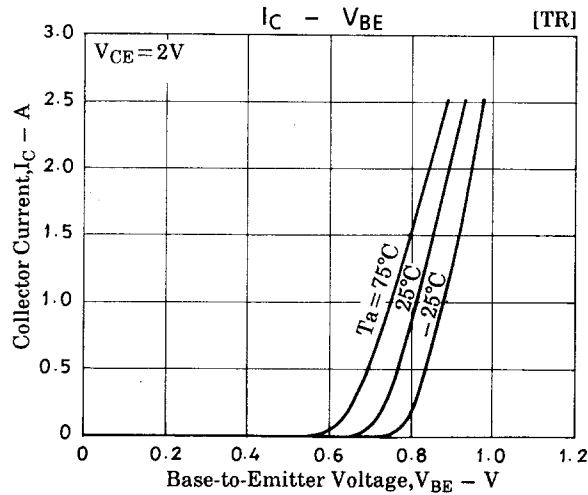
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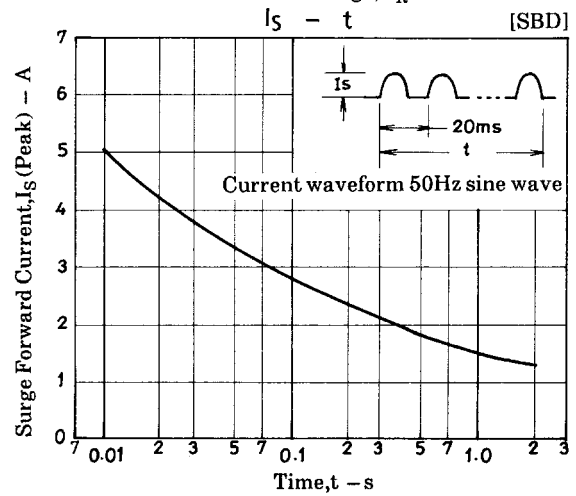
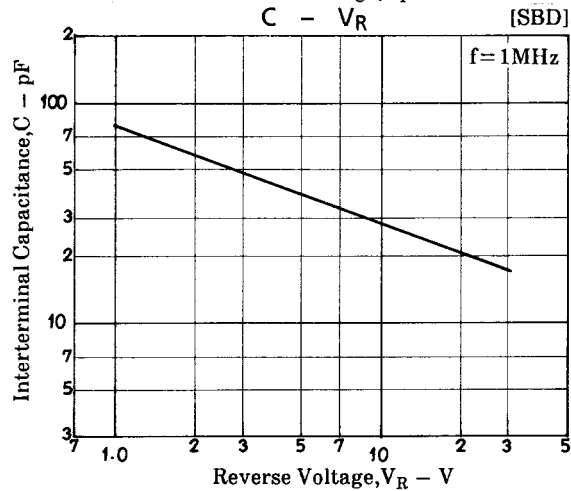
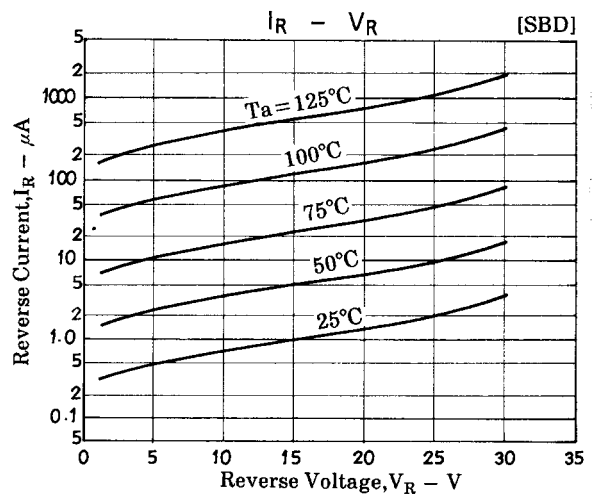
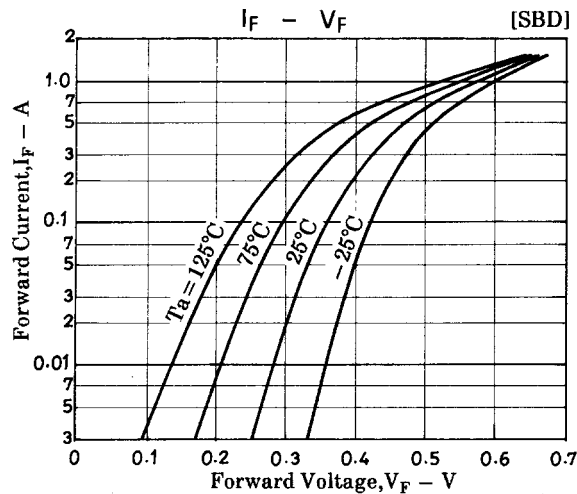
[SBD]



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