

No. 2481

2 S C 4.1 6 0

NPN Triple Diffused Planar Type  
Silicon Transistor

## SWITCHING REGULATOR APPLICATIONS

## Features

- . High breakdown voltage, high reliability
- . Fast switching speed ( $t_f=0.1\mu s$  typ)
- . Wide ASO
- . Adoption of MBIT process
- . Micaless package facilitating mounting

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

|                              |           |             |    |
|------------------------------|-----------|-------------|----|
| Collector-to-Base Voltage    | $V_{CB0}$ | 500         | V  |
| Collector-to-Emitter Voltage | $V_{CE0}$ | 400         | V  |
| Emitter-to-Base Voltage      | $V_{EB0}$ | 7           | V  |
| Collector Current            | $I_C$     | 4           | A  |
| Peak Collector Current       | $i_{cp}$  | 8           | A  |
| Base Current                 | $I_B$     | 1.5         | A  |
| Collector Dissipation        | $P_C$     | 2           | W  |
| Junction Temperature         | $T_j$     | 25          | °C |
| Storage Temperature          | $T_{stg}$ | -55 to +150 | °C |

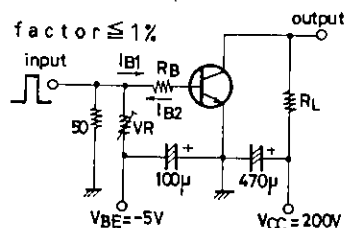
### Electrical Characteristics at Ta=25°C

|                          |               |                          |     |         |
|--------------------------|---------------|--------------------------|-----|---------|
| Collector Cutoff Current | $I_{CBO}$     | $V_{CB}=400V, I_E=0$     | 10  | $\mu A$ |
| Emitter Cutoff Current   | $I_{EBO}$     | $V_{EB}=5V, I_C=0$       | 10  | $\mu A$ |
| DC Current Gain          | $h_{FE1}$     | $V_{CE}=5V, I_C=0.4A$    | 15* | 50*     |
|                          | $h_{FE2}$     | $V_{CE}=5V, I_C=2A$      | 10  |         |
|                          | $h_{FE3}$     | $V_{CE}=5V, I_C=10mA$    | 10  |         |
| Gain-Bandwidth Product   | $f_T$         | $V_{CE}=10V, I_C=0.4A$   | 20  | MHz     |
| Output Capacitance       | $c_{ob}$      | $V_{CB}=10V, f=1MHz$     | 50  | pF      |
| C-E Saturation Voltage   | $V_{CE(sat)}$ | $I_C=2A, I_B=0.4A$       | 0.8 | V       |
| B-E Saturation Voltage   | $V_{BE(sat)}$ | $I_C=2A, I_B=0.4A$       | 1.5 | V       |
| C-B Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C=1mA, I_E=0$         | 500 | V       |
| C-E Breakdown Voltage    | $V_{(BR)CEO}$ | $I_C=5mA, R_{BE}=\infty$ | 400 | V       |
| E-B Breakdown Voltage    | $V_{(BR)EBO}$ | $I_E=1mA, I_C=0$         | 7   | V       |

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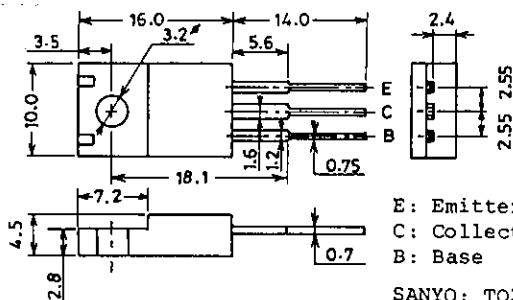
## Switching Time Test Circuit

PW=20 $\mu$ s, duty factor $\leq$ 1%

Unit (Resistance :  $\Omega$ , Capacitance : F)

## Package Dimensions 2041

(unit: mm)



E: Emitter  
C: Collector  
B: Base

SANYO: TO220MT.

**SANYO Electric Co., Ltd. Semiconductor Business Headquarters**

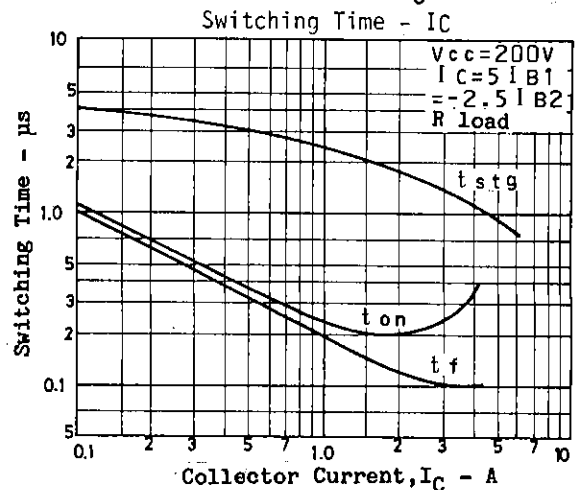
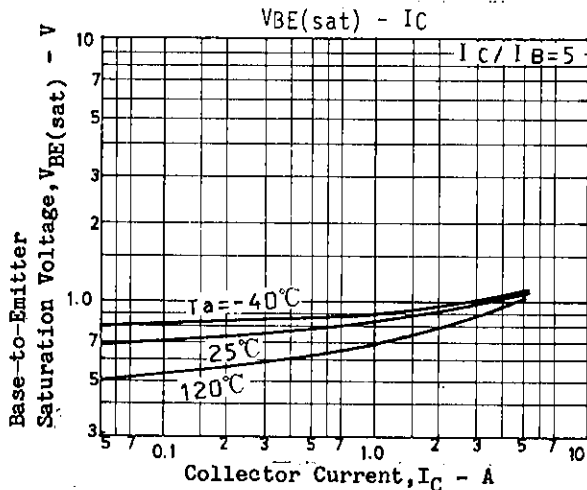
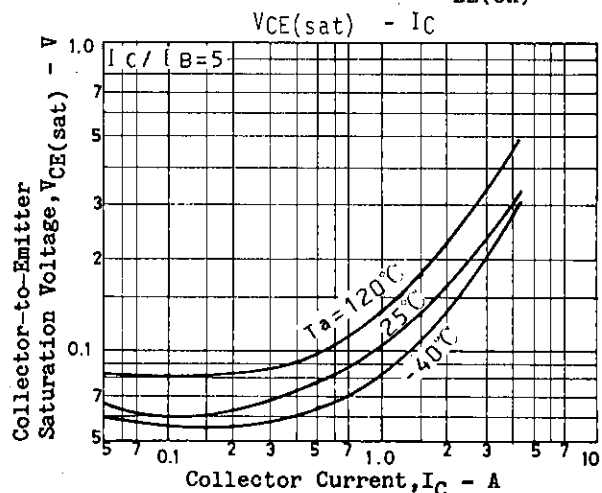
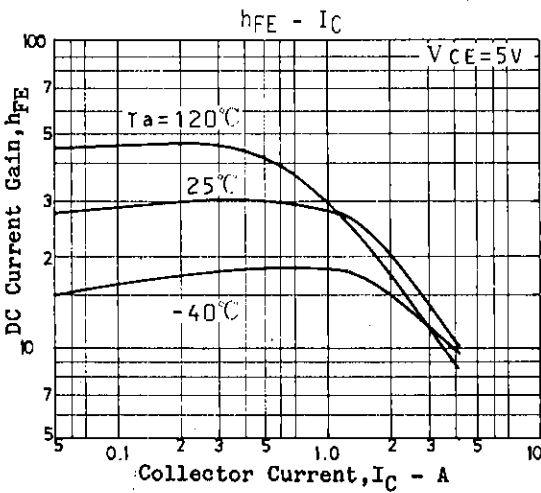
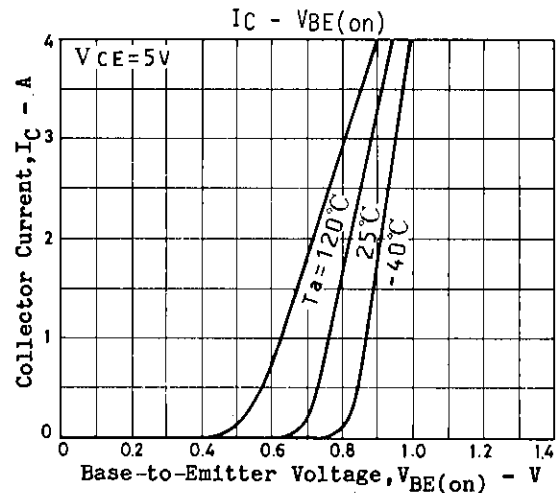
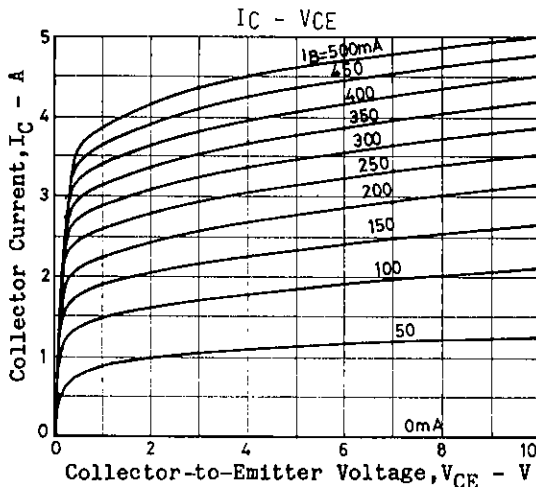
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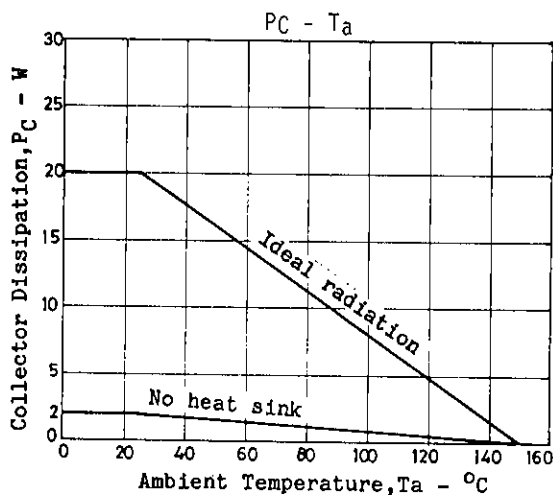
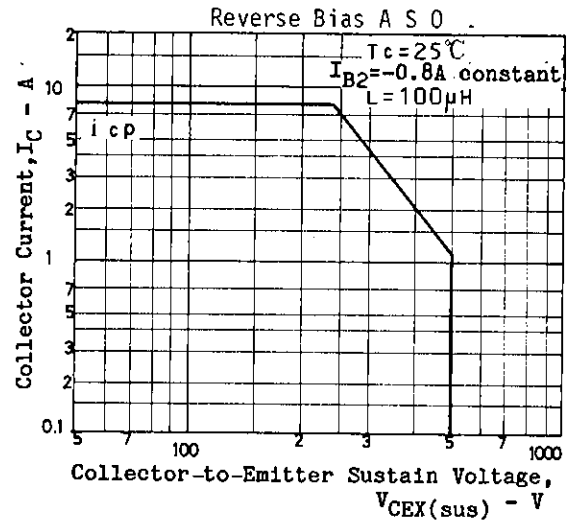
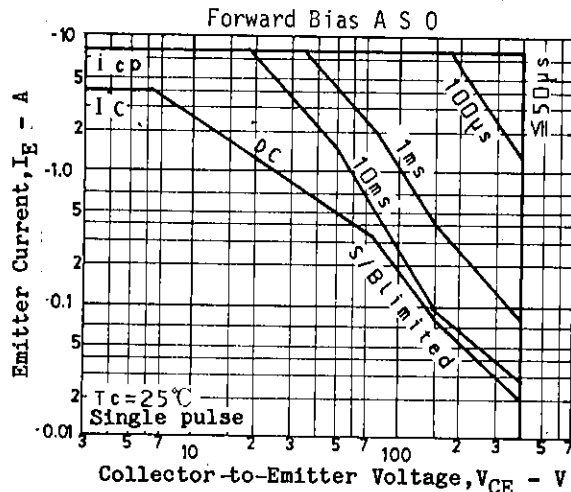
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|                     |                |                                                                       | min | typ | max | unit    |
|---------------------|----------------|-----------------------------------------------------------------------|-----|-----|-----|---------|
| C-E Sustain Voltage | $V_{CEX(sus)}$ | $I_C=2A, I_{B1}=0.2A,$<br>$I_{B2}=-0.8A, L=1mH, \text{clamped}$       | 400 |     |     | V       |
| Turn-on Time        | $t_{on}$       | $I_C=3A, I_{B1}=0.6A, I_{B2}=-1.2A,$<br>$R_L=66.6\Omega, V_{CC}=200V$ |     |     | 0.5 | $\mu s$ |
| Storage Time        | $t_{stg}$      | " "                                                                   |     |     | 2.5 | $\mu s$ |
| Fall Time           | $t_f$          | " "                                                                   |     |     | 0.3 | $\mu s$ |

\*: The  $h_{FE1}$  of the 2SC4160 is classified as follows. When specifying the  $h_{FE1}$  rank, specify two ranks or more in principle.

|    |   |    |    |   |    |    |   |    |
|----|---|----|----|---|----|----|---|----|
| 15 | L | 30 | 20 | M | 40 | 30 | N | 50 |
|----|---|----|----|---|----|----|---|----|





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