



SANYO Semiconductors

## DATA SHEET

# 2SC4428 — 800V / 6A Switching Regulator Applications

NPN Triple Diffused Planar Silicon Transistor

## Features

- High breakdown voltage, high reliability.
- High-speed switching ( $t_r$  : 0.1 $\mu$ s typ).
- Wide ASO.
- Adoption of MBIT process.
- Attachment workability is good by Mica-less package.

## Specifications

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

| Parameter                    | Symbol    | Conditions                                        | Ratings     | Unit             |
|------------------------------|-----------|---------------------------------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                                                   | 1100        | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                                                   | 800         | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                                                   | 7           | V                |
| Collector Current            | $I_C$     |                                                   | 6           | A                |
| Collector Current (Pulse)    | $I_{CP}$  | $PW \leq 300\mu\text{s}$ , duty cycle $\leq 10\%$ | 20          | A                |
| Base Current                 | $I_B$     |                                                   | 3           | A                |
| Collector Dissipation        | $P_C$     |                                                   | 3           | W                |
|                              |           | $T_c=25^\circ\text{C}$                            | 55          | W                |
| 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 | $I_{CBO}$ | $V_{CB}=800\text{V}$ , $I_E=0\text{A}$ |         |     | 10  | $\mu\text{A}$ |
| Emitter Cutoff Current   | $I_{EBO}$ | $V_{EB}=5\text{V}$ , $I_C=0\text{A}$   |         |     | 10  | $\mu\text{A}$ |
| DC Current Gain          | $h_{FE1}$ | $V_{CE}=5\text{V}$ , $I_C=0.4\text{A}$ | 10*     |     | 40* |               |
|                          | $h_{FE2}$ | $V_{CE}=5\text{V}$ , $I_C=2\text{A}$   | 8       |     |     |               |

Continued on next page.

\* : The  $h_{FE1}$  of the 2SC4428 is classified as follows. When specifying the  $h_{FE1}$  rank, specify two ranks or more in principle.

| Rank     | K        | L        | M        |
|----------|----------|----------|----------|
| $h_{FE}$ | 10 to 20 | 15 to 30 | 20 to 40 |

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## 2SC4428

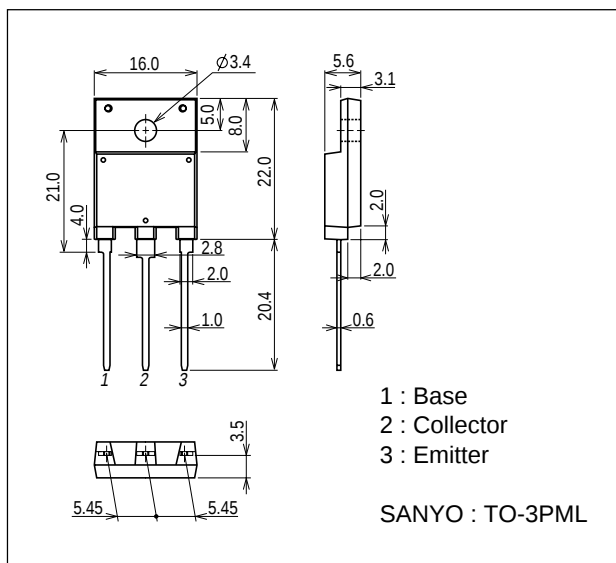
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| Parameter                               | Symbol         | Conditions                                                      | Ratings |     |     | Unit    |
|-----------------------------------------|----------------|-----------------------------------------------------------------|---------|-----|-----|---------|
|                                         |                |                                                                 | min     | typ | max |         |
| Gain-Bandwidth Product                  | $f_T$          | $V_{CE}=10V, I_C=0.4A$                                          |         | 15  |     | MHz     |
| Output Capacitance                      | $C_{ob}$       | $V_{CB}=10V, f=1MHz$                                            |         | 120 |     | pF      |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$  | $I_C=3A, I_B=0.6A$                                              |         |     | 2.0 | V       |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$  | $I_C=3A, I_B=0.6A$                                              |         |     | 1.5 | V       |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$  | $I_C=1mA, I_E=0A$                                               | 1100    |     |     | V       |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$  | $I_C=5mA, R_{BE}=\infty$                                        | 800     |     |     | V       |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$  | $I_E=1mA, I_C=0A$                                               | 7       |     |     | V       |
| Collector-to-Emitter Sustain Voltage    | $V_{CEX(sus)}$ | $I_C=3A, I_{B1}=0.6A, I_{B2}=-0.6A, L=1mH, \text{Clamped}$      | 800     |     |     | V       |
| Turn-ON Time                            | $t_{on}$       | $V_{CC}=400V, I_{B1}=0.8A, I_{B2}=-1.6A, I_C=4A, R_L=100\Omega$ |         |     | 0.5 | $\mu s$ |
| Storage Time                            | $t_{stg}$      | $V_{CC}=400V, I_{B1}=0.8A, I_{B2}=-1.6A, I_C=4A, R_L=100\Omega$ |         |     | 3.0 | $\mu s$ |
| Fall Time                               | $t_f$          | $V_{CC}=400V, I_{B1}=0.8A, I_{B2}=-1.6A, I_C=4A, R_L=100\Omega$ |         |     | 0.3 | $\mu s$ |

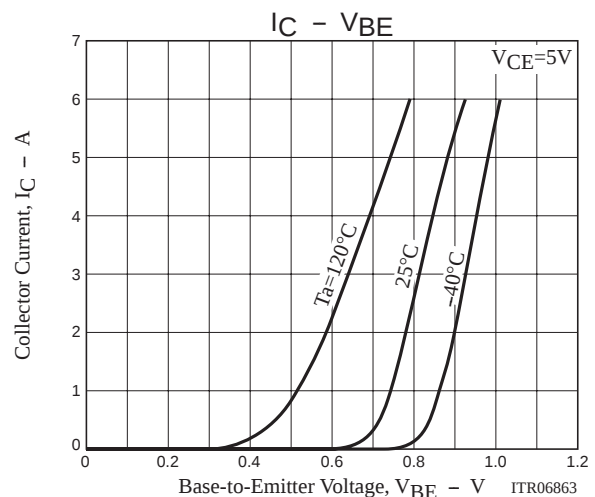
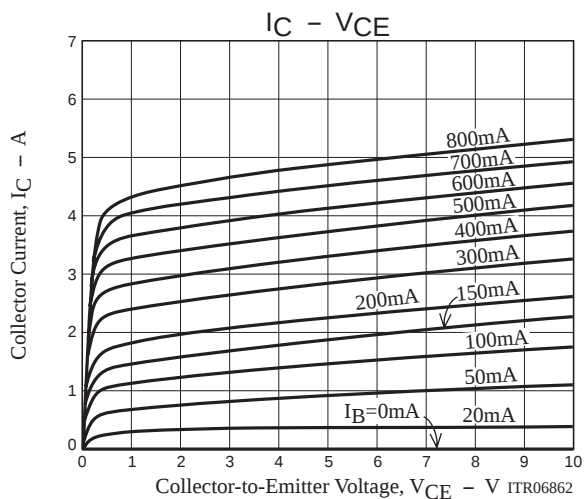
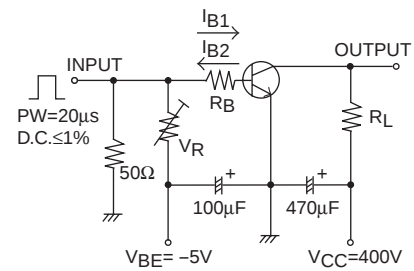
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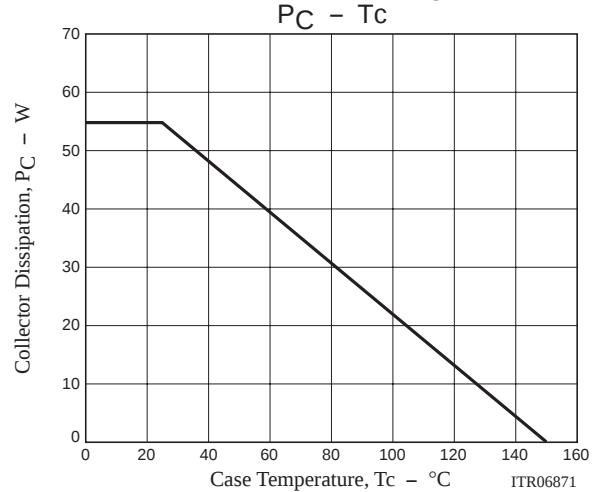
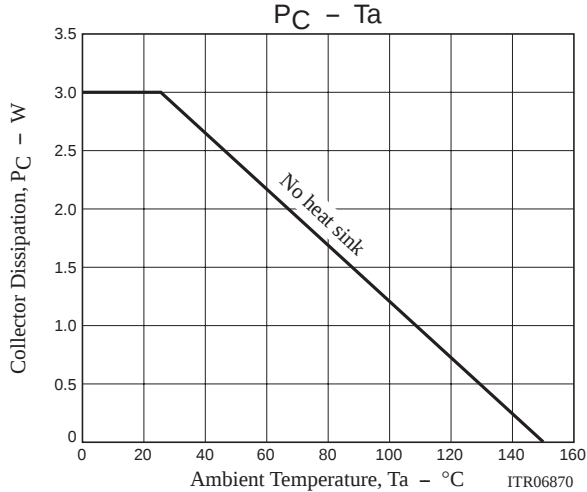
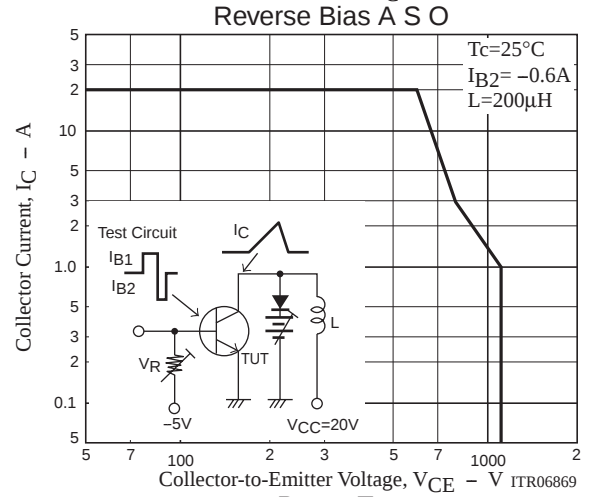
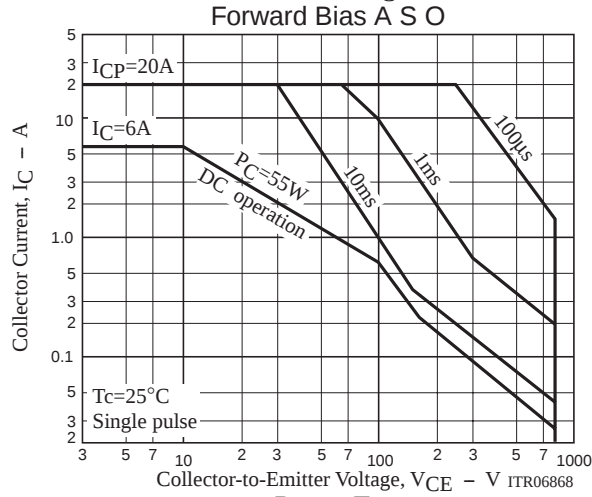
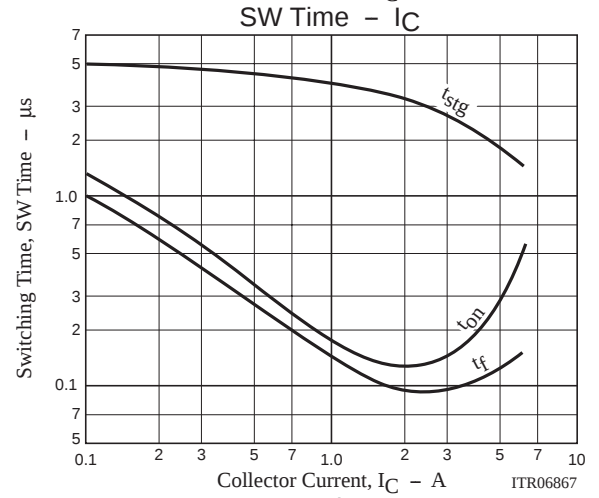
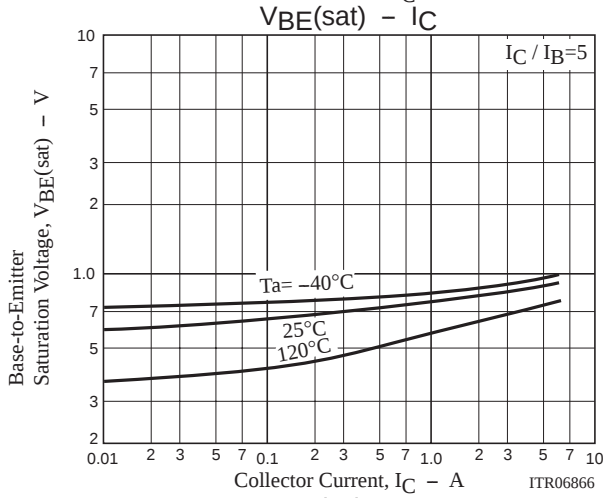
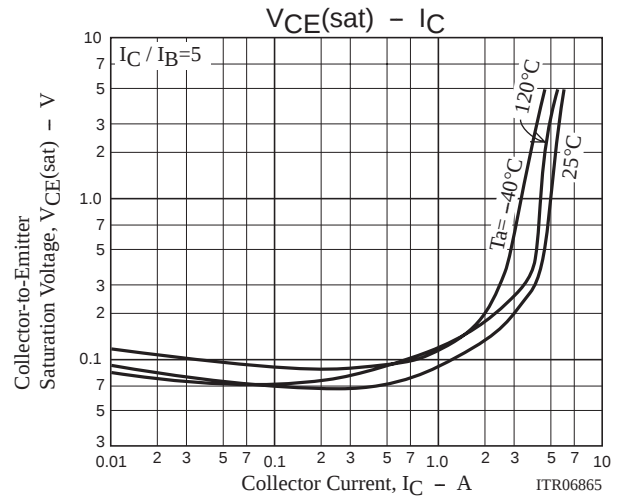
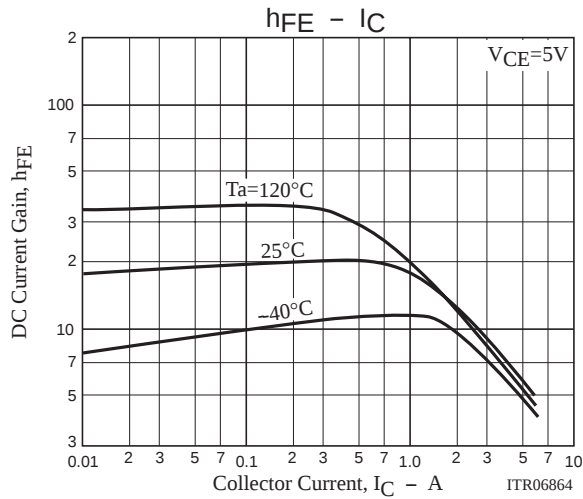
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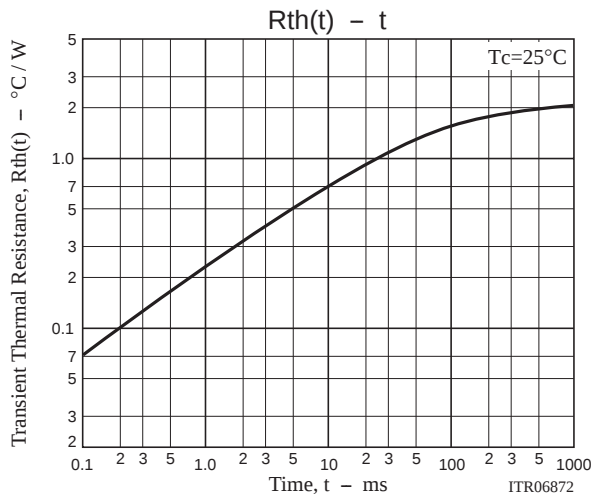
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### Switching Time Test Circuit







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