

SILICON POWER TRANSISTOR 2SC4332,4332-Z

NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SC4332 and 2SC4332-Z are mold power transistors developed for high-speed switching and feature a very low collector-to-emitter saturation voltage.

This transistor is ideal for use in switching regulators, DC/DC converters, motor drivers, solenoid drivers, and other low-voltage power supply devices, as well as for high-current switching.

FEATURES

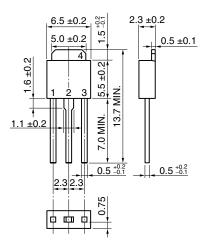
- Low collector saturation voltage
 VCE(sat) = 0.3 V MAX. (Ic = 3.0 A / IB = 0.15 A)
- Fast switching speed: $t_f \leq 0.3~\mu s~\text{MAX.}~\text{(Ic} = 3.0~\text{A)}$
- High DC current gain

ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

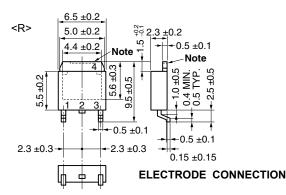
| Collector to Base Voltage | Vсво | 100 | V |
|------------------------------|-------------------------------|---|----|
| Collector to Emitter Voltage | Vceo | 60 | ٧ |
| Base to Emitter Voltage | VEBO | 7.0 | ٧ |
| Collector Current (DC) | Ic(DC) | 5.0 | Α |
| Collector Current (pulse) | C(pulse) Note1 | 10 | Α |
| Base Current (DC) | I _{B(DC)} | 2.5 | Α |
| Total Power Dissipation | P_T (Tc = 25°C) | 15 | W |
| Total Power Dissipation | P_T ($T_A = 25^{\circ}C$) | 1.0 ^{Note2} , 2.0 ^{Note3} | W |
| Junction Temperature | Tj | 150 | °C |
| Storage Temperature | Tstg | -55 to +150 | °C |

- **Notes 1.** PW \leq 10 ms, duty cycle \leq 50%
 - 2. Printing board mounted
 - 3. 7.5 cm² x 0.7 mm, ceramic board mounted

PACKAGE DRAWINGS (Unit: mm)



TO-251 (MP-3)



TO-252 (MP-3Z)

- 1. Base
- 2. Collector
- 3. Emitter
- 4. Collector Fin

Note The depth of notch at the top of the fin is from 0 to 0.2 mm.

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The mark <R> shows major revised points.

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ELECTRICAL CHARACTERISTICS (TA = 25°C)

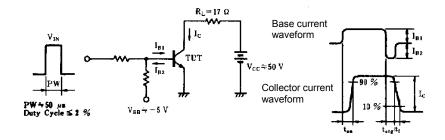
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|---------------------------------------|--|--|------|------|------|
| Collector to Emitter Voltage | VCEO(SUS) | Ic = 3.0 A, Iв = 0.3 A, L = 1 mH | A, I _B = 0.3 A, L = 1 mH 60 | | | V |
| Collector to Emitter Voltage | VCEX(SUS) | $Ic = 3.0 \text{ A}, I_{B1} = -I_{B2} = 0.3 \text{ A},$ 60 $V_{BE(OFF)} = -1.5 \text{ V}, L = 180 \ \mu\text{H}, clamped$ | | | | V |
| Collector Cut-off Current | Ісво | Vce = 60 V, Ie = 0 | | | 10 | μΑ |
| Collector Cut-off Current | ICER | $V_{CE}=60~V,~R_{BE}=51~\Omega,~T_{A}=125^{\circ}C$ | | | 1.0 | mA |
| Collector Cut-off Current | ICEX1 | VCE = 60 V, VBE(OFF) = -1.5 V | | | 10 | μΑ |
| Collector Cut-off Current | ICEX2 | $V_{CE} = 60 \text{ V}, V_{BE(OFF)} = -1.5 \text{ V},$ $T_A = 125^{\circ}\text{C}$ | | | 1.0 | mA |
| Emitter Cut-off Current | ІЕВО | V _{EB} = 5.0 V, I _C = 0 | | | 10 | μΑ |
| DC Current Gain | hFE1 ^{Note} | Vce = 2.0 V, Ic = 0.5 A | 100 | | | |
| DC Current Gain | hFE2 ^{Note} | Vce = 2.0 V, Ic = 1.0 A | 100 | | 400 | |
| DC Current Gain | hFE3 ^{Note} | Vce = 2.0 V, Ic = 3.0 A | 60 | | | |
| Collector Saturation Voltage | VCE(sat)1 Note | Ic = 3.0 A, Iв = 0.15 A | | | 0.3 | V |
| Collector Saturation Voltage | VCE(sat)2 ^{Note} | Ic = 4.0 A, I _B = 0.2 A | | | 0.5 | ٧ |
| Base Saturation Voltage | V _{BE(sat)1} ^{Note} | Ic = 3.0 A, Iв = 0.15 A | | | 1.2 | ٧ |
| Base Saturation Voltage | V _{BE(sat)2} Note | Ic = 4.0 A, I _B = 0.2 A | | | 1.5 | ٧ |
| Collector Capacitance | Cob | V _{CB} = 10 V, I _E = 0, f = 1.0 MHz | | 130 | | pF |
| Gain Bandwidth Product | f⊤ | Vce = 10 V, Ie = -0.5 A | | 150 | | MHz |
| Turn-on Time | ton | Ic = 3.0 A, R _L = 16.7 Ω , | | | 0.3 | μs |
| Storage Time | tstg | l _{B1} = −l _{B2} = 0.15 A, V _{CC} = 50 V Refer to the test circuit. | | | 1.5 | μs |
| Fall Time | tr | Tiolor to the test should. | | | 0.3 | μs |

Note Pulse test PW \leq 350 μ s, duty cycle \leq 2%

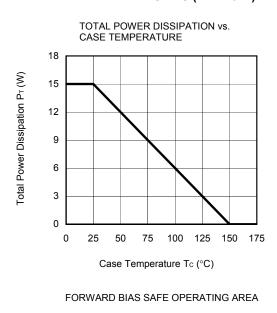
hfe CLASSIFICATION

| Marking | М | L | К |
|------------------|------------|------------|------------|
| h _{FE2} | 100 to 200 | 150 to 300 | 200 to 400 |

SWITCHING TIME (ton, tstg, tf) TEST CIRCUIT



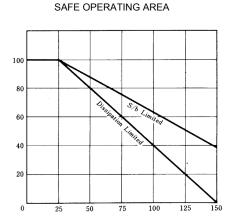
TYPICAL CHARACTERISTICS (TA = 25°C)





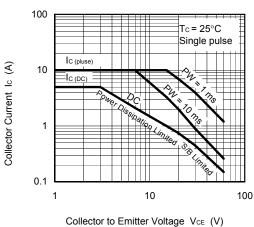
Transient Thermal Resistance rth(j-c) (°C/W)

DC Current Gain hre

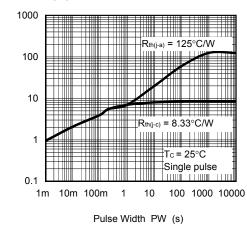


DERATING CURVE OF

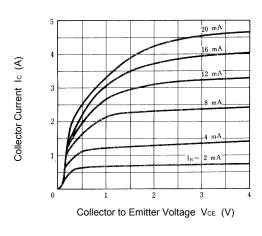
Case Temperature Tc (°C)



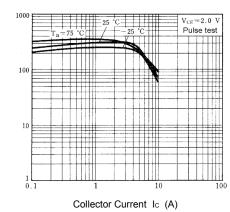
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

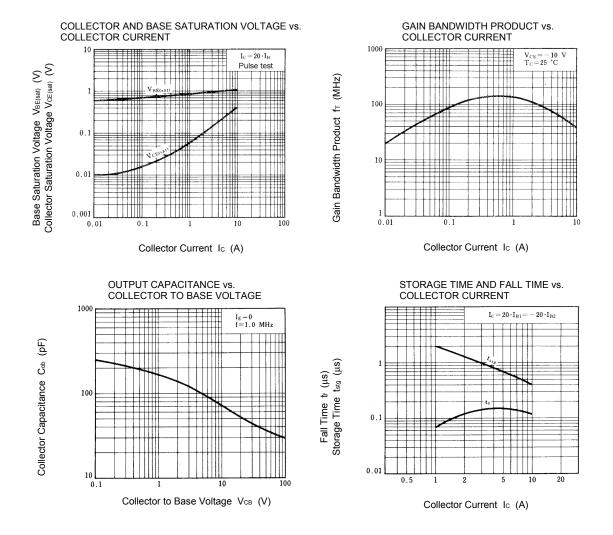


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT





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