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April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

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# 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**

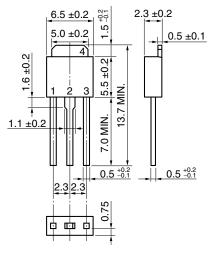
- · Low collector saturation voltage  $V_{CE(sat)} = 0.3 \text{ V MAX}$ . (Ic = 3.0 A / IB = 0.15 A)
- Fast switching speed:  $t_f \le 0.3 \ \mu s \ MAX. \ (Ic = 3.0 \ A)$
- · High DC current gain

#### ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

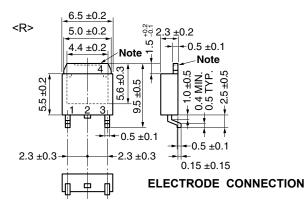
Collector to Base Voltage	VcBo	100	V
Collector to Emitter Voltage	Vceo	60	٧
Base to Emitter Voltage	VEBO	7.0	V
Collector Current (DC)	Ic(DC)	5.0	Α
Collector Current (pulse)	C(pulse) Note1	10	Α
Base Current (DC)	I <sub>B(DC)</sub>	2.5	Α
Total Power Dissipation	P <sub>T</sub> (Tc = 25°C)	15	W
Total Power Dissipation	$P_T$ ( $T_A = 25^{\circ}C$ )	1.0 <sup>Note2</sup> , 2.0 <sup>Note3</sup>	W
Junction Temperature	$T_{j}$	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 cm<sup>2</sup> 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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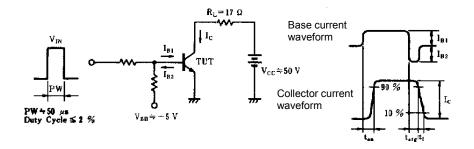
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Emitter Voltage	VCEO(SUS)	Ic = 3.0 A, Iв = 0.3 A, L = 1 mH	60			V
Collector to Emitter Voltage	Vcex(sus)	Ic = 3.0 A, I <sub>B1</sub> = $-I_{B2}$ = 0.3 A, V <sub>BE(OFF)</sub> = $-1.5$ V, L = 180 $\mu$ H, clamped				V
Collector Cut-off Current	Ісво	Vce = 60 V, Ie = 0			10	μΑ
Collector Cut-off Current	ICER	Vce = 60 V, R <sub>BE</sub> = 51 Ω, T <sub>A</sub> = 125°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	Ієво	V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0			10	μΑ
DC Current Gain	hFE1 <sup>Note</sup>	Vce = 2.0 V, Ic = 0.5 A	100			
DC Current Gain	hFE2 <sup>Note</sup>	Vce = 2.0 V, Ic = 1.0 A	100		400	
DC Current Gain	hFE3 <sup>Note</sup>	Vce = 2.0 V, Ic = 3.0 A	60			
Collector Saturation Voltage	VCE(sat)1 <sup>Note</sup>	Ic = 3.0 A, Iв = 0.15 A			0.3	V
Collector Saturation Voltage	VCE(sat)2 <sup>Note</sup>	Ic = 4.0 A, I <sub>B</sub> = 0.2 A			0.5	V
Base Saturation Voltage	VBE(sat)1 Note	Ic = 3.0 A, I <sub>B</sub> = 0.15 A			1.2	V
Base Saturation Voltage	VBE(sat)2 Note	Ic = 4.0 A, I <sub>B</sub> = 0.2 A			1.5	V
Collector Capacitance	Cob	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 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 <sub>L</sub> = 16.7 $\Omega$ ,			0.3	μs
Storage Time	tstg	I <sub>B1</sub> = −I <sub>B2</sub> = 0.15 A, V <sub>CC</sub> = 50 V Refer to the test circuit.			1.5	μs
Fall Time	tr	Tiolor to the test offcult.			0.3	μs

**Note** Pulse test PW  $\leq$  350  $\mu$ s, duty cycle  $\leq$  2%

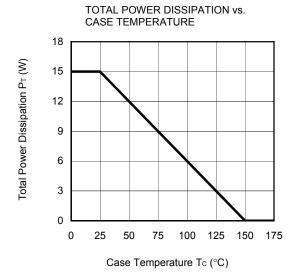
#### **hfe CLASSIFICATION**

Marking	М	L	K
h <sub>FE2</sub>	100 to 200	150 to 300	200 to 400

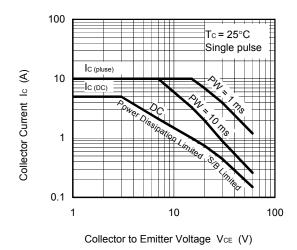
# SWITCHING TIME (ton, tstg, tf) TEST CIRCUIT



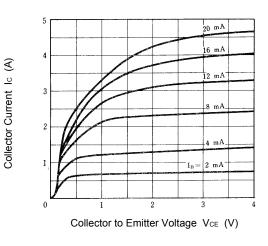
## TYPICAL CHARACTERISTICS (TA = 25°C)



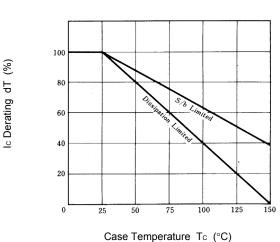
### FORWARD BIAS SAFE OPERATING AREA



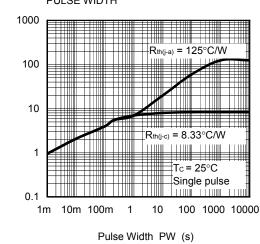
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



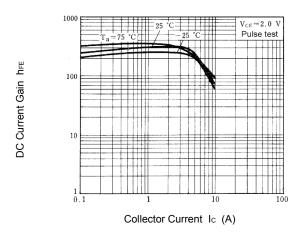
# DERATING CURVE OF SAFE OPERATING AREA



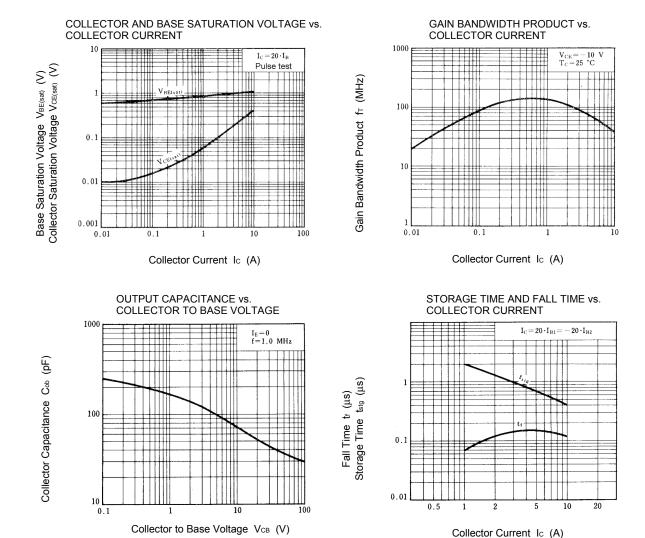
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



DC CURRENT GAIN vs. COLLECTOR CURRENT



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



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