

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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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

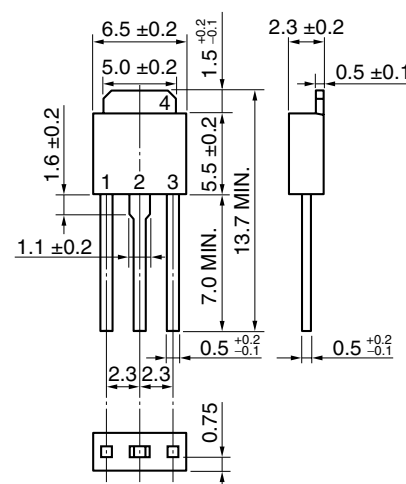
- Low collector saturation voltage
 $V_{CE(sat)} = 0.3 \text{ V MAX. (} I_C = 3.0 \text{ A / } I_B = 0.15 \text{ A)}$
- Fast switching speed:
 $t_f \leq 0.3 \mu\text{s MAX. (} I_C = 3.0 \text{ A)}$
- High DC current gain

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

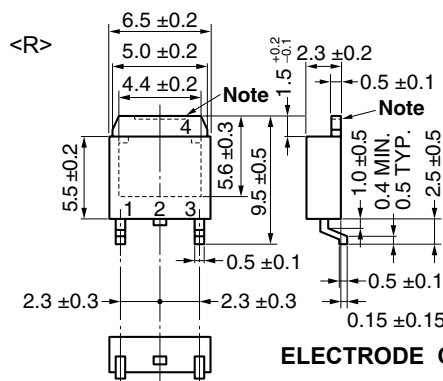
Collector to Base Voltage	V_{CBO}	100	V
Collector to Emitter Voltage	V_{CEO}	60	V
Base to Emitter Voltage	V_{EBO}	7.0	V
Collector Current (DC)	$I_{C(DC)}$	5.0	A
Collector Current (pulse)	$I_{C(pulse)}$ ^{Note1}	10	A
Base Current (DC)	$I_{B(DC)}$	2.5	A
Total Power Dissipation	$P_T (T_C = 25^\circ\text{C})$	15	W
Total Power Dissipation	$P_T (T_A = 25^\circ\text{C})$	1.0 ^{Note2} , 2.0 ^{Note3}	W
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

- Notes**
1. $PW \leq 10 \text{ ms}$, duty cycle $\leq 50\%$
 2. Printing board mounted
 3. $7.5 \text{ cm}^2 \times 0.7 \text{ mm}$, ceramic board mounted

PACKAGE DRAWINGS (Unit: mm)



TO-251 (MP-3)



ELECTRODE CONNECTION

- 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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ELECTRICAL CHARACTERISTICS (TA = 25°C)

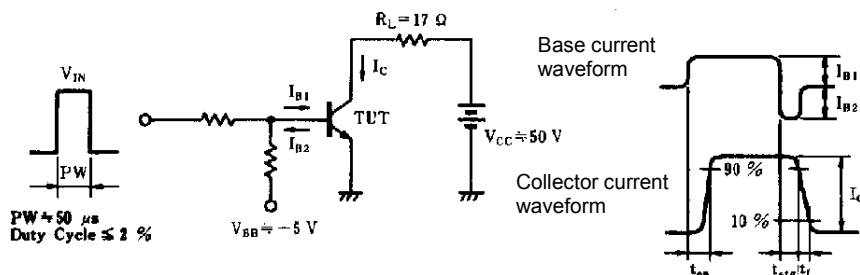
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Emitter Voltage	$V_{CEQ(SUS)}$	$I_C = 3.0\text{ A}, I_B = 0.3\text{ A}, L = 1\text{ mH}$	60			V
Collector to Emitter Voltage	$V_{CEX(SUS)}$	$I_C = 3.0\text{ A}, I_{B1} = -I_{B2} = 0.3\text{ A}, V_{BE(OFF)} = -1.5\text{ V}, L = 180\text{ }\mu\text{H}, \text{ clamped}$	60			V
Collector Cut-off Current	I_{CBO}	$V_{CE} = 60\text{ V}, I_E = 0$			10	μA
Collector Cut-off Current	I_{CER}	$V_{CE} = 60\text{ V}, R_{BE} = 51\text{ }\Omega, T_A = 125^\circ\text{C}$			1.0	mA
Collector Cut-off Current	I_{CEX1}	$V_{CE} = 60\text{ V}, V_{BE(OFF)} = -1.5\text{ V}$			10	μA
Collector Cut-off Current	I_{CEX2}	$V_{CE} = 60\text{ V}, V_{BE(OFF)} = -1.5\text{ V}, T_A = 125^\circ\text{C}$			1.0	mA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 5.0\text{ V}, I_C = 0$			10	μA
DC Current Gain	h_{FE1} ^{Note}	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	100			
DC Current Gain	h_{FE2} ^{Note}	$V_{CE} = 2.0\text{ V}, I_C = 1.0\text{ A}$	100		400	
DC Current Gain	h_{FE3} ^{Note}	$V_{CE} = 2.0\text{ V}, I_C = 3.0\text{ A}$	60			
Collector Saturation Voltage	$V_{CE(sat)1}$ ^{Note}	$I_C = 3.0\text{ A}, I_B = 0.15\text{ A}$			0.3	V
Collector Saturation Voltage	$V_{CE(sat)2}$ ^{Note}	$I_C = 4.0\text{ A}, I_B = 0.2\text{ A}$			0.5	V
Base Saturation Voltage	$V_{BE(sat)1}$ ^{Note}	$I_C = 3.0\text{ A}, I_B = 0.15\text{ A}$			1.2	V
Base Saturation Voltage	$V_{BE(sat)2}$ ^{Note}	$I_C = 4.0\text{ A}, I_B = 0.2\text{ A}$			1.5	V
Collector Capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$		130		pF
Gain Bandwidth Product	f_T	$V_{CE} = 10\text{ V}, I_E = -0.5\text{ A}$		150		MHz
Turn-on Time	t_{on}	$I_C = 3.0\text{ A}, R_L = 16.7\text{ }\Omega, I_{B1} = -I_{B2} = 0.15\text{ A}, V_{CC} = 50\text{ V}$ Refer to the test circuit.			0.3	μs
Storage Time	t_{stg}				1.5	μs
Fall Time	t_f				0.3	μs

Note Pulse test $PW \leq 350\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

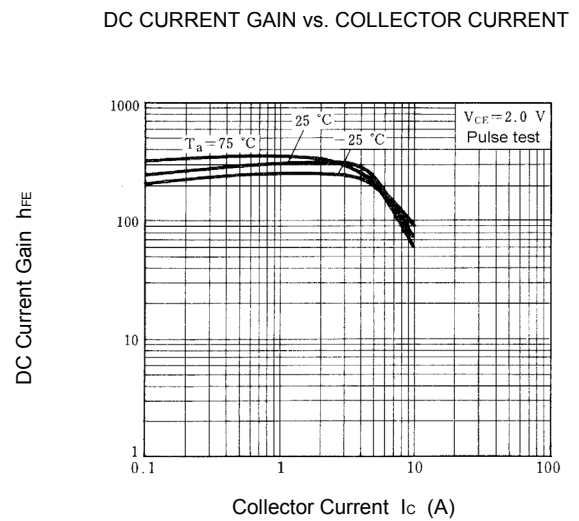
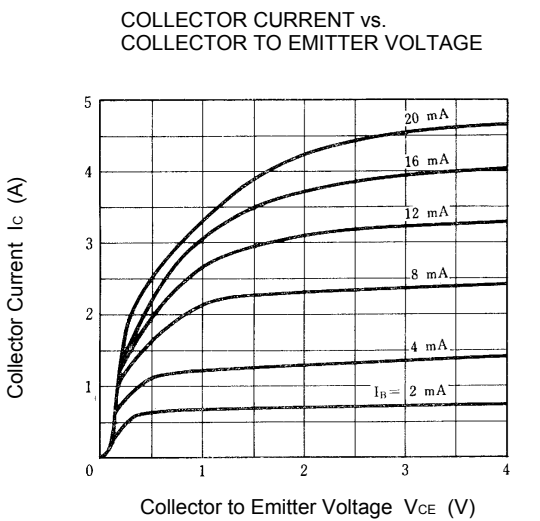
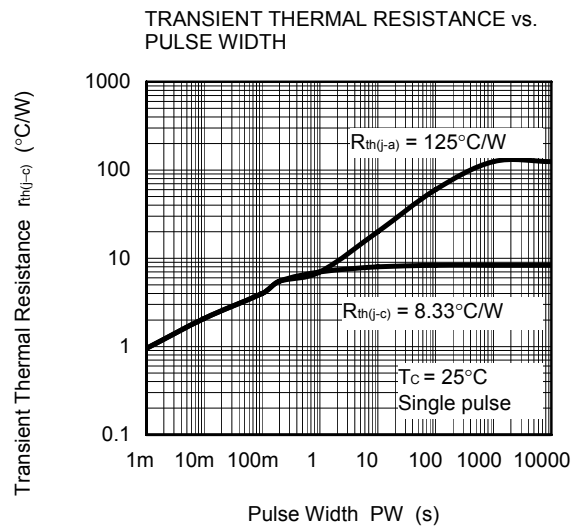
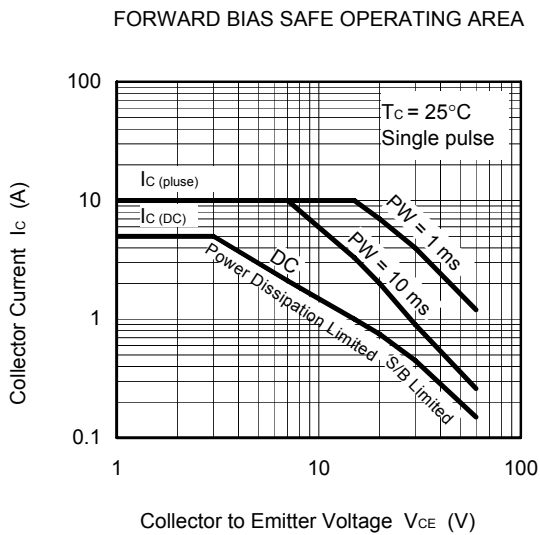
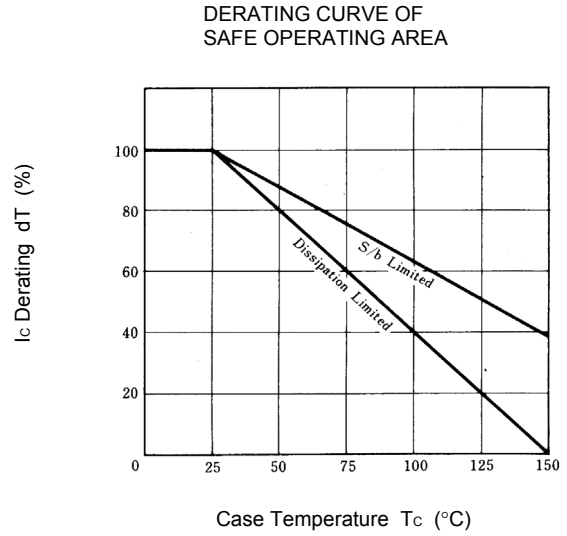
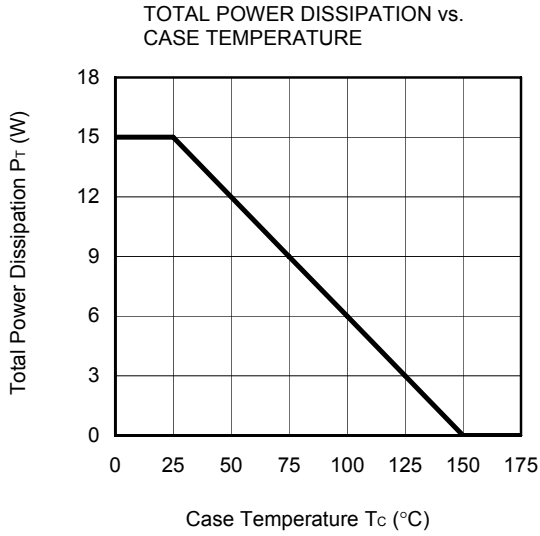
hFE CLASSIFICATION

Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

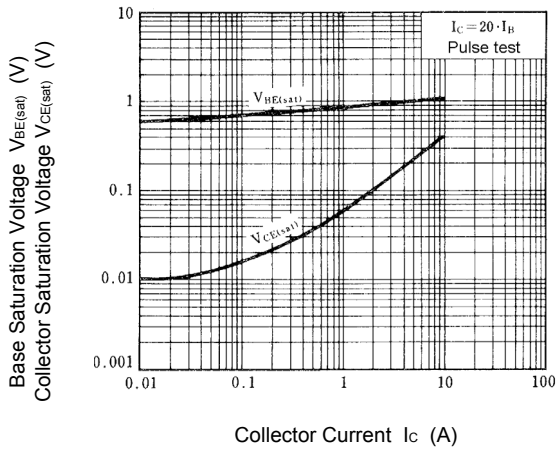
SWITCHING TIME (t_{on} , t_{stg} , t_f) TEST CIRCUIT



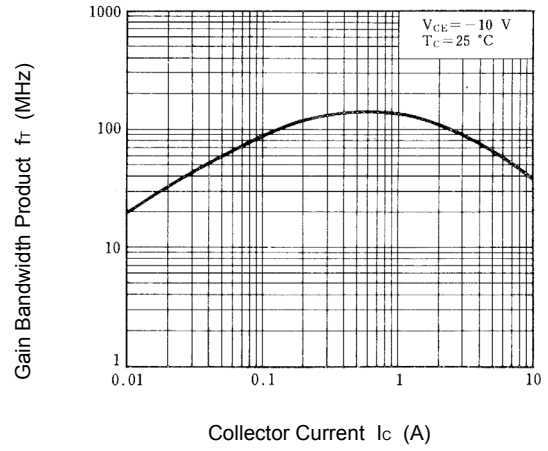
TYPICAL CHARACTERISTICS (T_A = 25°C)



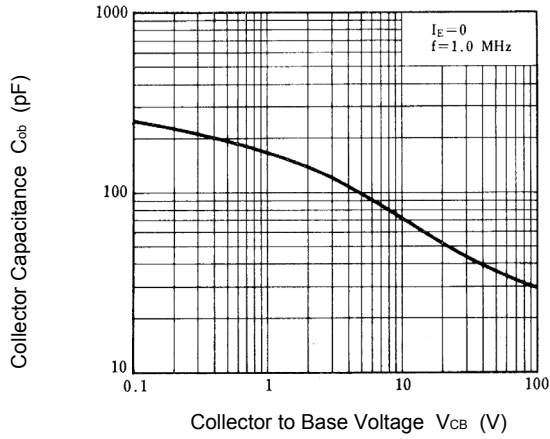
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



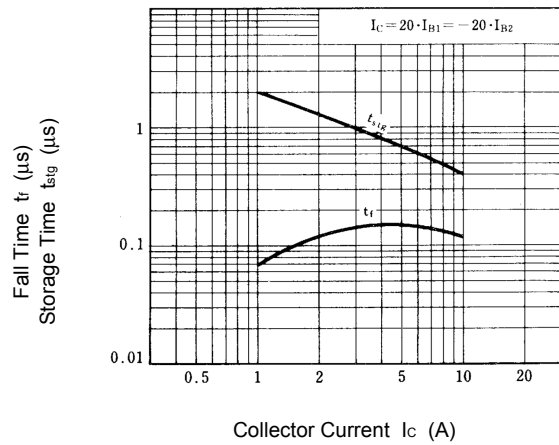
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



STORAGE TIME AND FALL TIME vs. COLLECTOR CURRENT



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