

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

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

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

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# SILICON POWER TRANSISTOR

# 2SC2335

## NPN SILICON TRIPLE DIFFUSED TRANSISTOR FOR HIGH-SPEED HIGH-VOLTAGE SWITCHING

The 2SC2335 is a mold power transistor developed for high-speed high-voltage switching, and is ideal for use as a driver in devices such as switching regulators, DC/DC converters, and high-frequency power amplifiers.

### FEATURES

- Low collector saturation voltage:  $V_{CE(sat)} = 1.0 \text{ V MAX. @ } I_c = 3.0 \text{ A}$
- Fast switching speed:  $t_r = 1.0 \mu\text{s MAX. @ } I_c = 3.0 \text{ A}$
- Wide base reverse-bias SOA:  $V_{CEX(SUS)1} = 450 \text{ V MIN. @ } I_c = 3.0 \text{ A}$

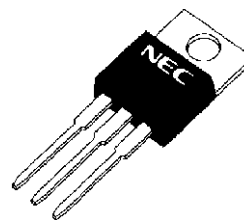
### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Ratings	Unit
Collector to base voltage	$V_{CBO}$		500	V
Collector to emitter voltage	$V_{CEO}$		400	V
Emitter to base voltage	$V_{EBO}$		7.0	V
Collector current (DC)	$I_{C(DC)}$		7.0	A
Collector current (pulse)	$I_{C(pulse)}$	$PW \leq 300 \mu\text{s}$ , duty cycle $\leq 10\%$	15	A
Base current (DC)	$I_{B(DC)}$		3.5	A
Total power dissipation	$P_T$	$T_C = 25^\circ\text{C}$	40	W
		$T_A = 25^\circ\text{C}$	1.5	W
Junction temperature	$T_j$		150	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

### ORDERING INFORMATION

Part No.	Package
2SC2335	TO-220AB

(TO-220AB)



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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

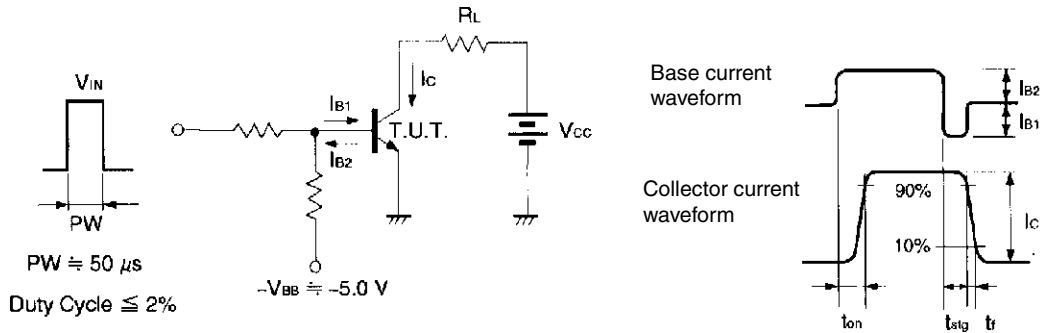
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	V <sub>CE0(SUS)</sub>	I <sub>C</sub> = 3.0 A, I <sub>B1</sub> = 0.6 A, L = 1 mH	400			V
Collector to emitter voltage	V <sub>CEX(SUS)1</sub>	I <sub>C</sub> = 3.0 A, I <sub>B1</sub> = -I <sub>B2</sub> = 0.6 A, V <sub>BE(OFF)</sub> = -5.0 V, L = 180 μH, clamped	450			V
Collector to emitter voltage	V <sub>CEX(SUS)2</sub>	I <sub>C</sub> = 6.0 A, I <sub>B1</sub> = 2.0 A, -I <sub>B2</sub> = 0.6 A, V <sub>BE(OFF)</sub> = -5.0 V, L = 180 μH, clamped	400			V
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = 400 V, I <sub>E</sub> = 0 A			10	μA
Collector cutoff current	I <sub>CER</sub>	V <sub>CE</sub> = 400 V, R <sub>BE</sub> = 51 Ω, T <sub>A</sub> = 125°C			1.0	mA
Collector cutoff current	I <sub>CEx1</sub>	V <sub>CE</sub> = 400 V, V <sub>BE(OFF)</sub> = -1.5 V			10	μA
Collector cutoff current	I <sub>CEx2</sub>	V <sub>CE</sub> = 400 V, V <sub>BE(OFF)</sub> = -1.5 V, T <sub>A</sub> = 125°C			1.0	mA
Emitter cutoff current	I <sub>EBO</sub>	V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0 A			10	μA
DC current gain	h <sub>FE1</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 0.1 A <sup>Note</sup>	20		80	
DC current gain	h <sub>FE2</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 1.0 A <sup>Note</sup>	20		80	
DC current gain	h <sub>FE3</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 3.0 A <sup>Note</sup>	10			
Collector saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 3.0 A, I <sub>B</sub> = 0.6 A <sup>Note</sup>			1.0	V
Base saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 3.0 A, I <sub>B</sub> = 0.6 A <sup>Note</sup>			1.2	V
Turn-on time	t <sub>on</sub>	I <sub>C</sub> = 3.0 A, R <sub>L</sub> = 50 Ω, I <sub>B1</sub> = -I <sub>B2</sub> = 0.6 A, V <sub>CC</sub> ≅ 150 V			1.0	μs
Storage time	t <sub>stg</sub>	Refer to the test circuit.			2.5	μs
Fall time	t <sub>f</sub>				1.0	μs

**Note** Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

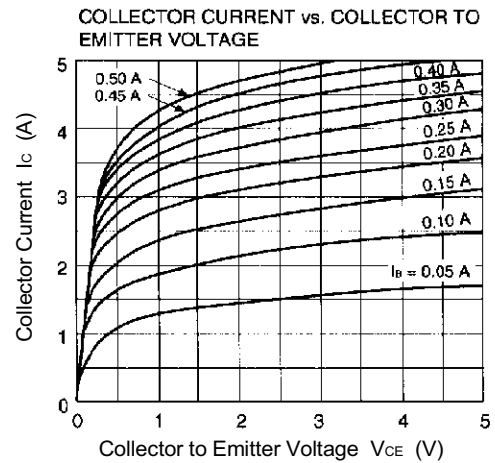
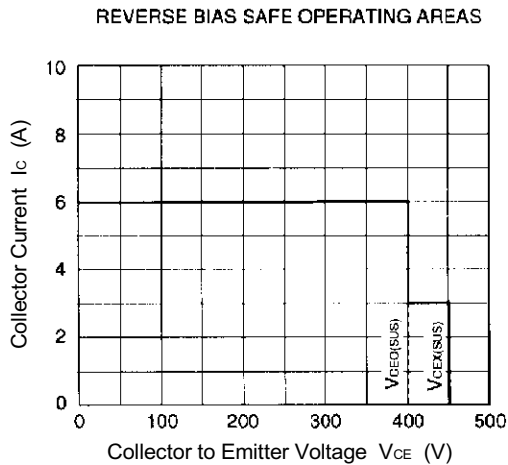
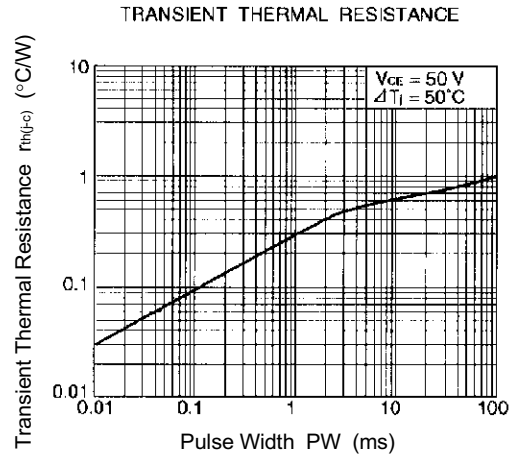
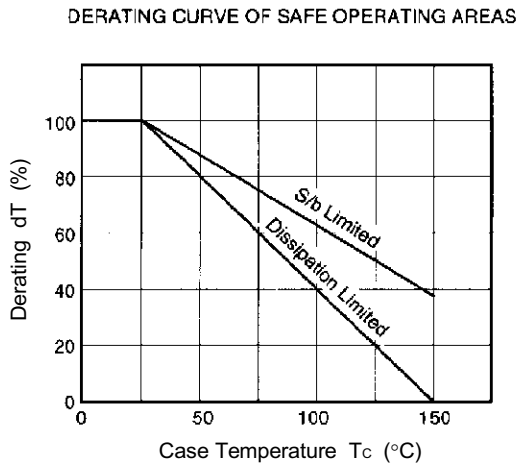
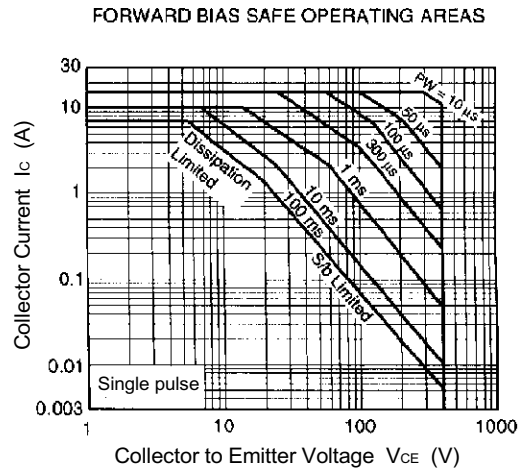
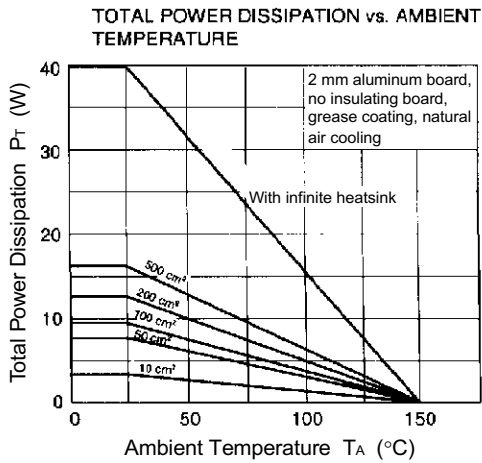
**h<sub>FE</sub> CLASSIFICATION**

Marking	M	L	K
h <sub>FE2</sub>	20 to 40	30 to 60	40 to 80

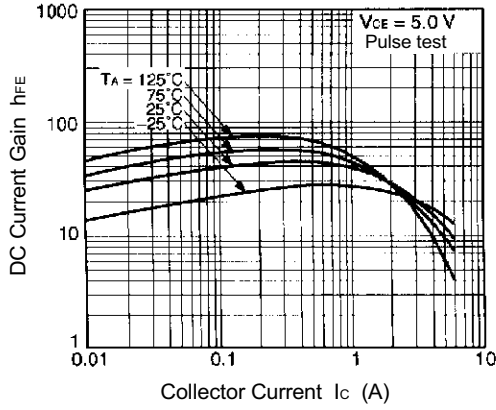
**SWITCHING TIME (t<sub>on</sub>, t<sub>stg</sub>, t<sub>f</sub>) TEST CIRCUIT**



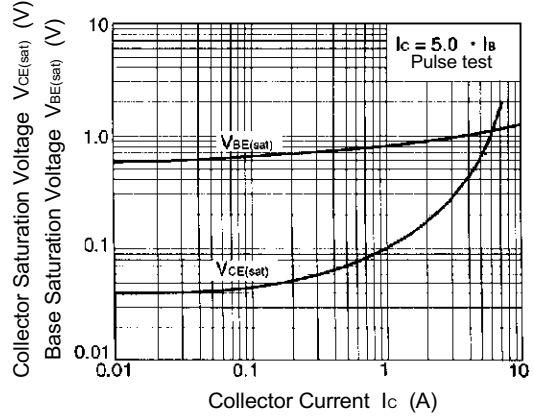
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



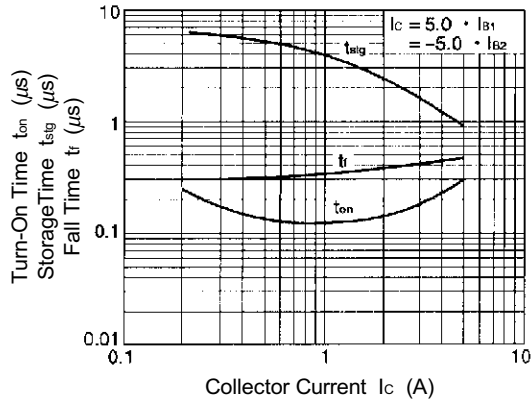
DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT

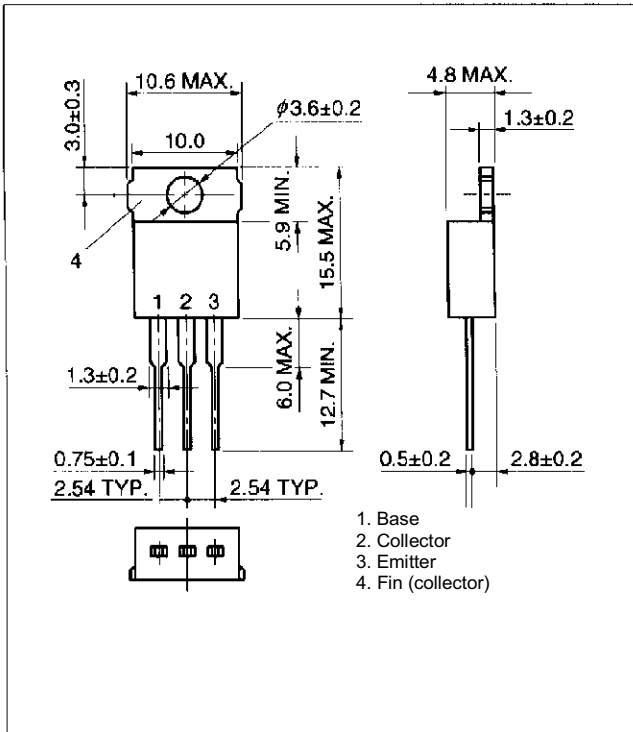


TURN ON TIME, STORAGE TIME AND FALL TIME vs. COLLECTOR CURRENT



PACKAGE DRAWING (UNIT: mm)

TO-220AB (MP-25)



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