

To our customers,

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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 2SC4331,4331-Z

NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SC4331 and 2SC4331-Z are mold power transistors developed for high-speed switching and features 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

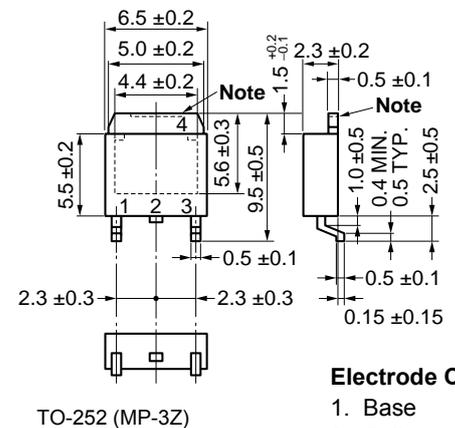
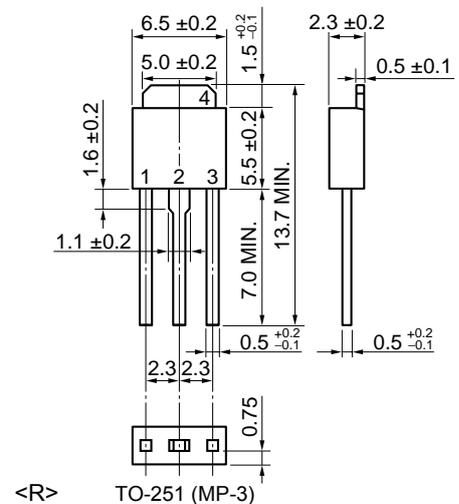
- Available for high-current control in small dimension
- Z type is a lead-processed product and is deal for mounting a hybrid IC.
- Low collector saturation voltage
 $V_{CE(sat)} = 0.3 \text{ V MAX. (I}_c = 3.0 \text{ A)}$
- Fast switching speed:
 $t_r \leq 0.4 \mu\text{s MAX. (I}_c = 3.0 \text{ A)}$
- High DC current gain and excellent linearity

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Collector to Base Voltage	V _{CB0}	150	V
Collector to Emitter Voltage	V _{CEO}	100	V
Emitter to Base Voltage	V _{EB0}	7.0	V
Collector Current (DC)	I _{C(DC)}	5.0	A
Collector Current (pulse) ^{Note 1}	I _{C(pulse)}	10	A
Base Current (DC)	I _{B(DC)}	2.5	A
Total Power Dissipation (T _c = 25°C)	P _{T1}	15	W
Total Power Dissipation (T _A = 25°C)	P _{T2}	1.0 ^{Note 2} , 2.0 ^{Note 3}	W
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

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

PACKAGE DRAWING (Unit: mm)



Electrode Connection

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 (T_A = 25°C)

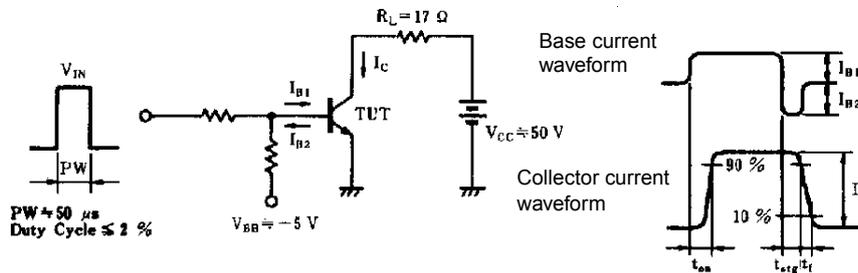
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	V _{CE(SUS)}	I _C = 2.5 A, I _B = 0.25 A, L = 1 mH	100			V
Collector to emitter voltage	V _{CEX(SUS)}	I _C = 2.5 A, I _{B1} = -I _{B2} = 0.25 A, V _{BE(OFF)} = -1.5 V, L = 180 μH, clamped	100			V
Collector cutoff current	I _{CB0}	V _{CE} = 100 V, I _E = 0			10	μA
Collector cutoff current	I _{CER}	V _{CE} = 100 V, R _{BE} = 50 Ω, T _A = 125°C			1.0	mA
Collector cutoff current	I _{CEx1}	V _{CE} = 100 V, V _{BE(OFF)} = -1.5 V			10	μA
Collector cutoff current	I _{CEx2}	V _{CE} = 100 V, V _{BE(OFF)} = -1.5 V, T _A = 125°C			1.0	mA
Emitter cutoff current	I _{EBO}	V _{EB} = 5.0 V, I _C = 0			10	μA
DC current gain ^{Note}	h _{FE1}	V _{CE} = 2.0 V, I _C = 0.5 A	100			
DC current gain ^{Note}	h _{FE2}	V _{CE} = 2.0 V, I _C = 1.0 A	100	200	400	
DC current gain ^{Note}	h _{FE3}	V _{CE} = 2.0 V, I _C = 3.0 A	60			
Collector saturation voltage ^{Note}	V _{CE(sat)1}	I _C = 3.0 A, I _B = 0.15 A			0.3	V
Collector saturation voltage ^{Note}	V _{CE(sat)2}	I _C = 4.0 A, I _B = 0.2 A			0.5	V
Base saturation voltage ^{Note}	V _{BE(sat)1}	I _C = 3.0 A, I _B = 0.15 A			1.2	V
Base saturation voltage ^{Note}	V _{BE(sat)2}	I _C = 4.0 A, I _B = 0.2 A			1.5	V
Collector capacitance	C _{ob}	V _{CB} = 10 V, I _E = 0, f = 1.0 MHz		60		pF
Gain bandwidth product	f _r	V _{CE} = 10 V, I _E = -0.5 A		150		MHz
Turn-on time	t _{on}	I _C = 3.0 A, R _L = 17 Ω, I _{B1} = -I _{B2} = 0.15 A, V _{CC} ≐ 50 V Refer to the test circuit.			0.3	μs
Storage time	t _{stg}				1.5	μs
Fall time	t _f				0.4	μs

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

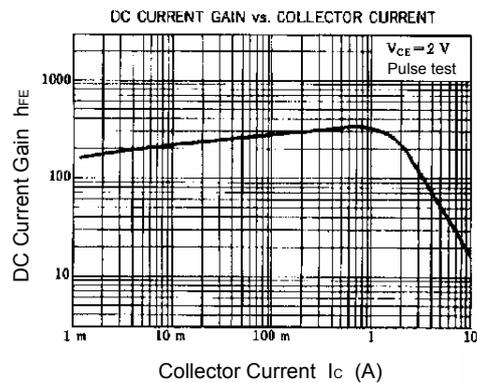
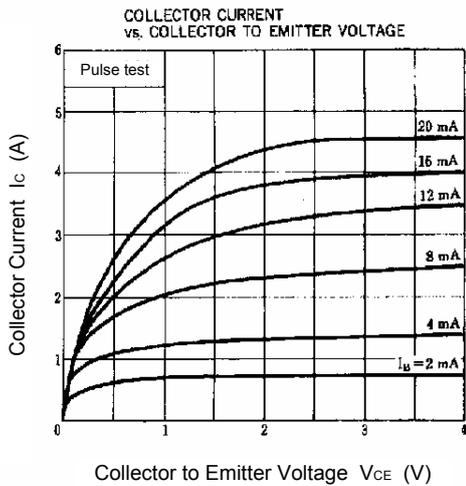
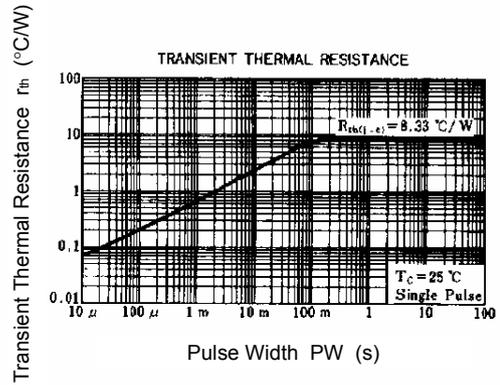
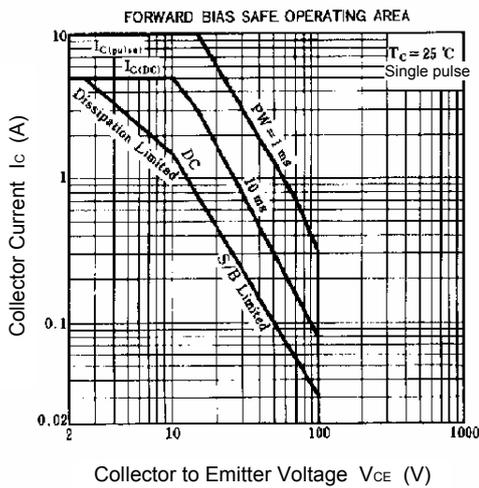
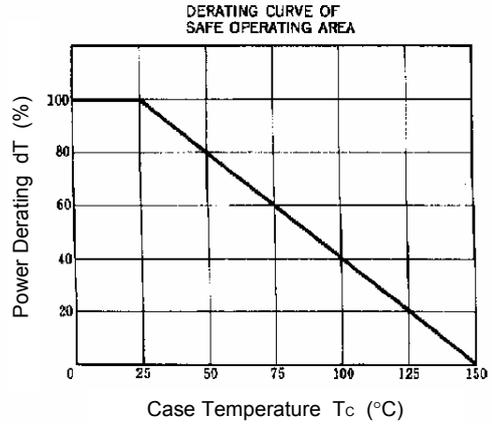
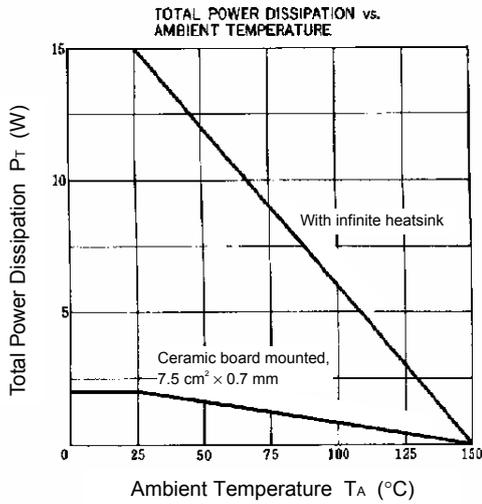
h_{FE} CLASSIFICATION

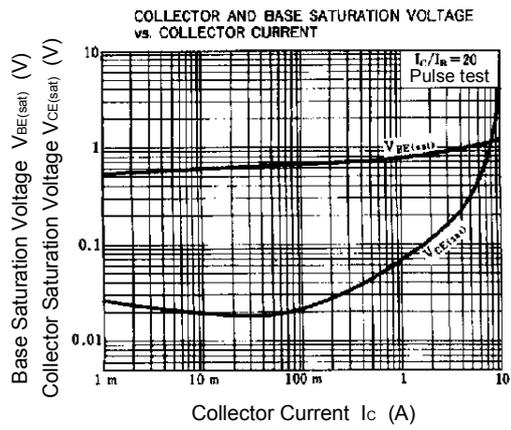
Marking	M	L	K
h _{FE2}	100 to 200	150 to 300	200 to 400

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



TYPICAL CHARACTERISTICS (T_A = 25°C)





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