

SILICON POWER TRANSISTORS 2SC4331, 2SC4331-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
 $V_{CE(sat)} = 0.3 \text{ V MAX. (@ } I_c = 3 \text{ A)}$
- Fast switching speed:
 $t_f \leq 0.4 \mu\text{s MAX. (@ } I_c = 3 \text{ A)}$
- High DC current gain and excellent linearity

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

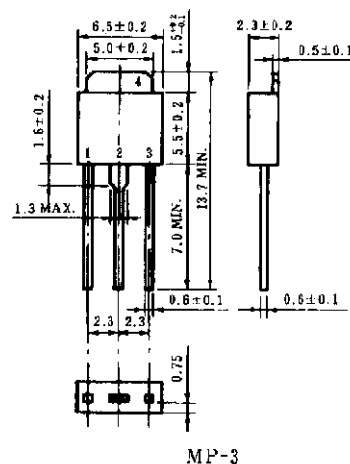
Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	150	V
Collector to emitter voltage	V_{CEO}	100	V
Base to emitter voltage	V_{EBO}	7.0	V
Collector current (DC)	$I_{C(DC)}$	5.0	A
Collector current (pulse)	$I_{C(pulse)}^*$	10	A
Base current (DC)	$I_{B(DC)}$	2.5	A
Total power dissipation	$P_T (T_C = 25^\circ\text{C})$	15	W
Total power dissipation	$P_T (T_A = 25^\circ\text{C})$	1.0**, 2.0***	W
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

* $PW \leq 10 \text{ ms}$, duty cycle $\leq 50\%$

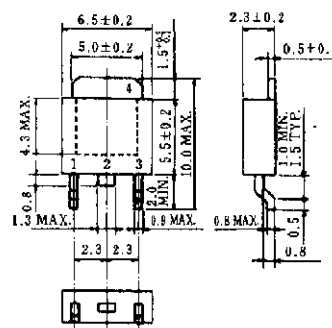
** Printing board mounted

*** $7.5 \text{ mm}^2 \times 0.7 \text{ mm}$, ceramic board mounted

PACKAGE DRAWING (UNIT: mm)



MP-3



MP-3Z

Electrode Connection

1. Base
2. Collector
3. Emitter
4. Fin (collector)

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

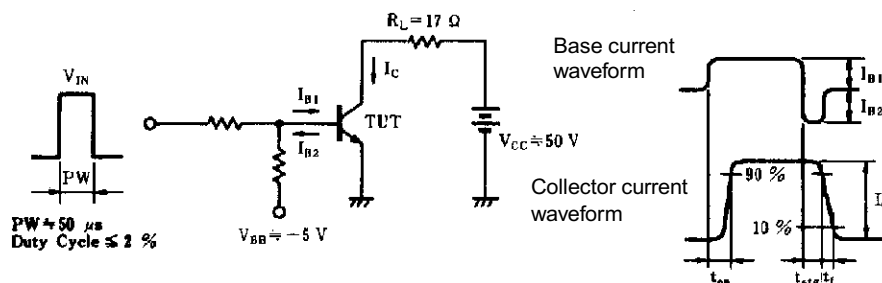
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	V _{CEO(SUS)}	I _C = 2.5 A, I _B = 0.25 A, L = 1 mH	100			V
Collector to emitter voltage	V _{CEX(SUS)}	I _C = 2.5 A, I _{B1} = -I _{B2} = 0.25 A, V _{BE(OFF)} = -1.5 V, L = 180 μH, clamped	100			V
Collector cutoff current	I _{CBO}	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	h _{FE1} *	V _{CE} = 2.0 V, I _C = 0.5 A	100			
DC current gain	h _{FE2} *	V _{CE} = 2.0 V, I _C = 1.0 A	100	200	400	
DC current gain	h _{FE3} *	V _{CE} = 2.0 V, I _C = 3.0 A	60			
Collector saturation voltage	V _{CE(sat)1} *	I _C = 3.0 A, I _B = 0.15 A			0.3	V
Collector saturation voltage	V _{CE(sat)2} *	I _C = 4.0 A, I _B = 0.2 A			0.5	V
Base saturation voltage	V _{BE(sat)1} *	I _C = 3.0 A, I _B = 0.15 A			1.2	V
Base saturation voltage	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 _T	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

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

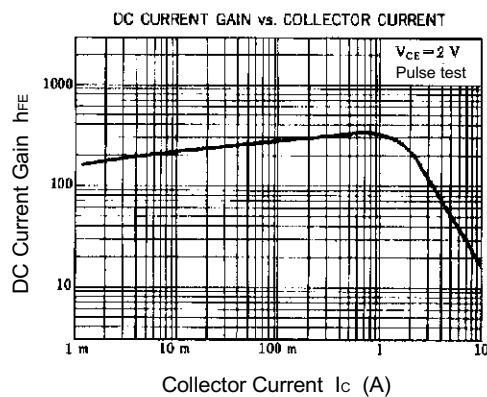
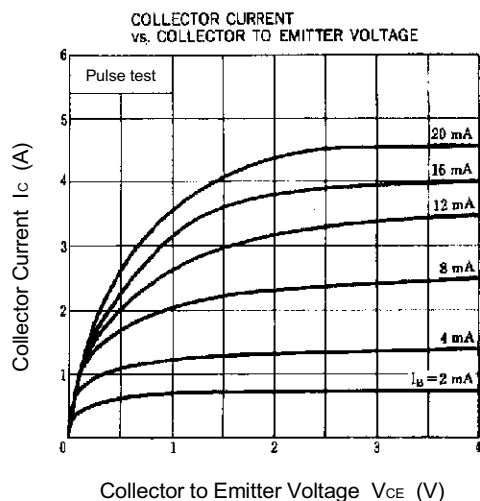
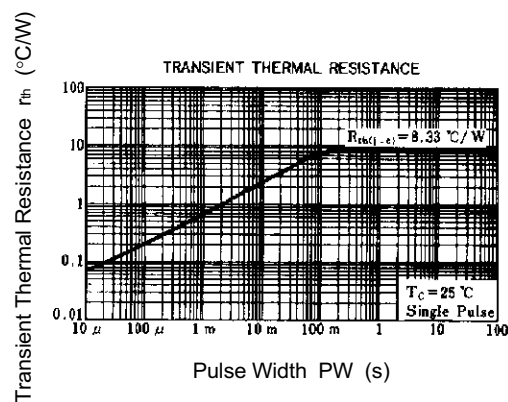
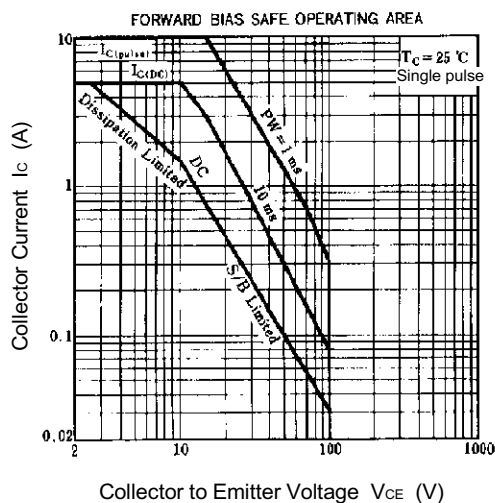
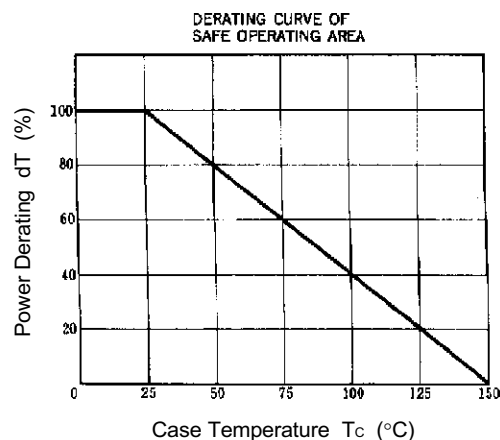
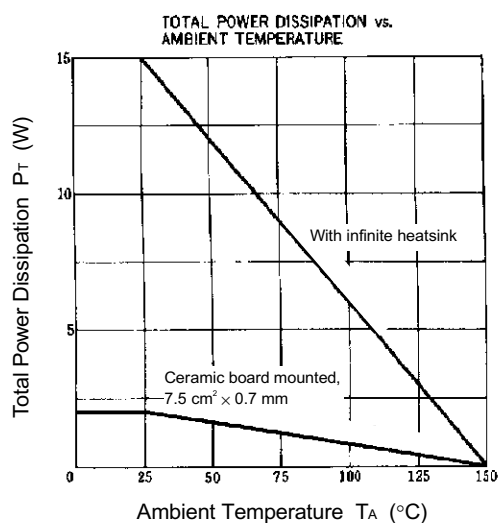
h_{FE} CLASSIFICATION

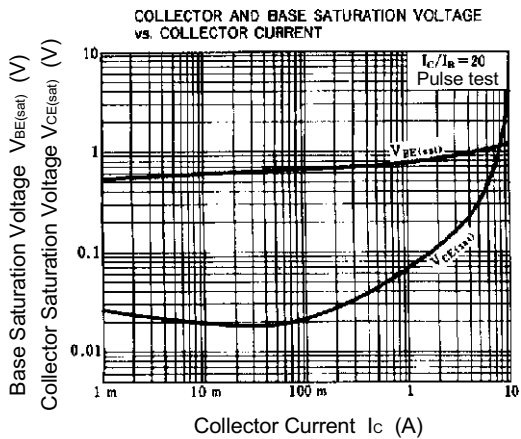
Marking	M	L	K
h _{FE2}	100 to 200	150 to 300	200 to 400

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



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)





[MEMO]

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