NEC

SILICON POWER TRANSISTORS
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 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

- Low collector saturation voltage
  $V_{CE(sat)}$ = 0.3 V MAX. (I_C = 3 A / I_B = 0.15 A)
- Fast switching speed:
  $t_f \leq 0.3$ μs MAX. (I_C = 3 A)
- High DC current gain

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

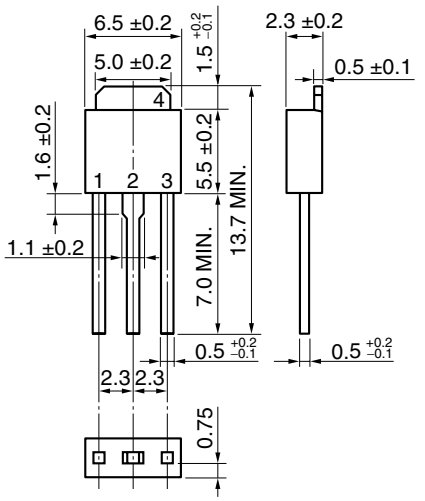
Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	100	V
Collector to Emitter Voltage	V_{CEO}	60	V
Base to Emitter Voltage	V_{EBO}	7.0	V
Collector Current (DC)	$I_{C(DC)}$	5.0	A
Collector Current (pulse)	$I_{C(pulse)}$ Note1	10	A
Base Current (DC)	$I_{B(DC)}$	2.5	A
Total Power Dissipation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

Notes 1. PW ≤ 10 ms, duty cycle ≤ 50%

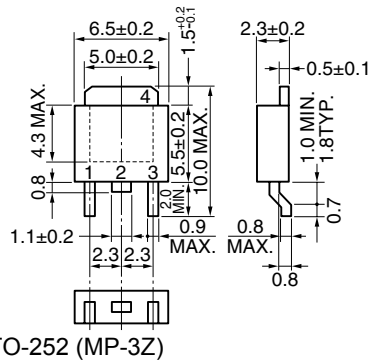
2. Printing borard mounted

3. 7.5 mm^2 x 0.7 mm, ceramic board mounted

PACKAGE DRAWINGS (Unit: mm)



TO-251 (MP-3)



TO-252 (MP-3Z)

ELECTRODE CONNECTION

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

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The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

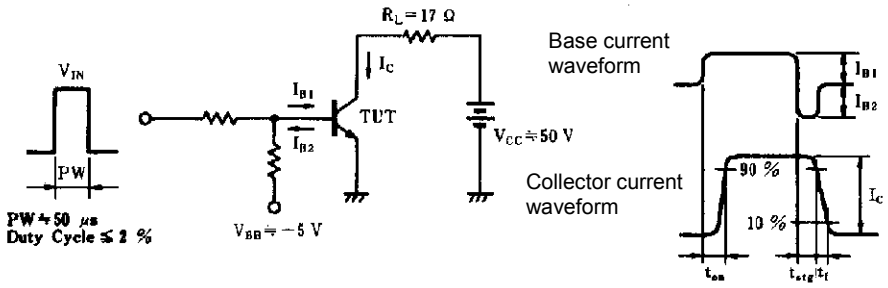
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Emitter Voltage	$V_{CEO(SUS)}$	I_C = 3.0 A, I_B = 0.3 A, L = 1 mH	60			V
Collector to Emitter Voltage	$V_{CEX(SUS)}$	I_C = 3.0 A, I_{B1} = $-I_{B2}$ = 0.3 A, $V_{BE(OFF)}$ = −1.5 V, L = 180 μH, clamped	60			V
Collector Cut-off Current	I_{CBO}	V_{CE} = 60 V, I_E = 0			10	μA
Collector Cut-off Current	I_{CER}	V_{CE} = 60 V, R_{BE} = 51 Ω, T_A = 125°C			1.0	mA
Collector Cut-off Current	I_{CEX1}	V_{CE} = 60 V, $V_{BE(OFF)}$ = −1.5 V			10	μA
Collector Cut-off Current	I_{CEX2}	V_{CE} = 60 V, $V_{BE(OFF)}$ = −1.5 V, T_A = 125°C			1.0	mA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 5.0 V, I_C = 0			10	μA
DC Current Gain	h_{FE1}[Note]	V_{CE} = 2.0 V, I_C = 0.5 A	100			
DC Current Gain	h_{FE2}[Note]	V_{CE} = 2.0 V, I_C = 1.0 A	100		400	
DC Current Gain	h_{FE3}[Note]	V_{CE} = 2.0 V, I_C = 3.0 A	60			
Collector Saturation Voltage	$V_{CE(sat)1}$[Note]	I_C = 3.0 A, I_B = 0.15 A			0.3	V
Collector Saturation Voltage	$V_{CE(sat)2}$[Note]	I_C = 4.0 A, I_B = 0.2 A			0.5	V
Base Saturation Voltage	$V_{BE(sat)1}$[Note]	I_C = 3.0 A, I_B = 0.15 A			1.2	V
Base Saturation Voltage	$V_{BE(sat)2}$[Note]	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		130		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 = 16.7 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				0.3	μs

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

h_{FE} CLASSIFICATION

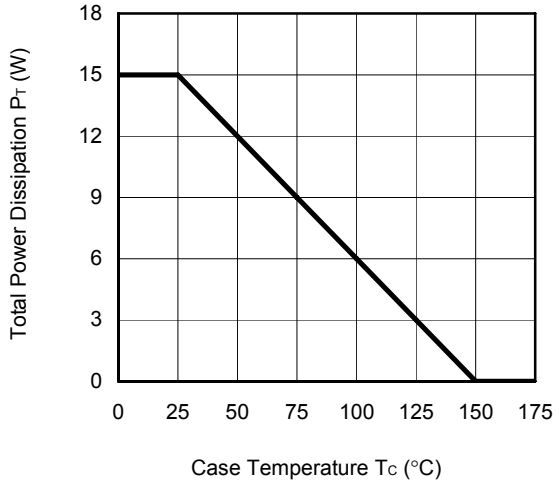
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

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

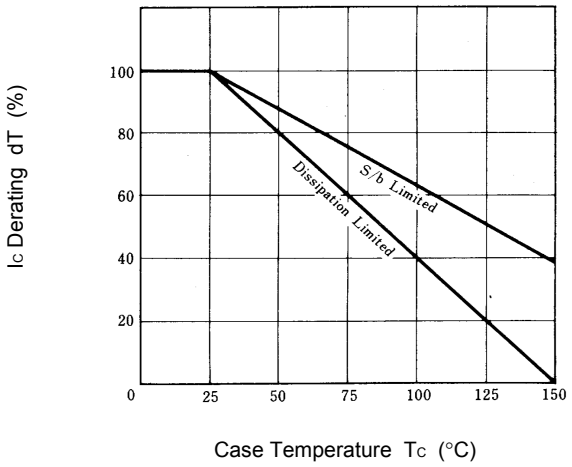


<R> **TYPICAL CHARACTERISTICS (T_A = 25°C)**

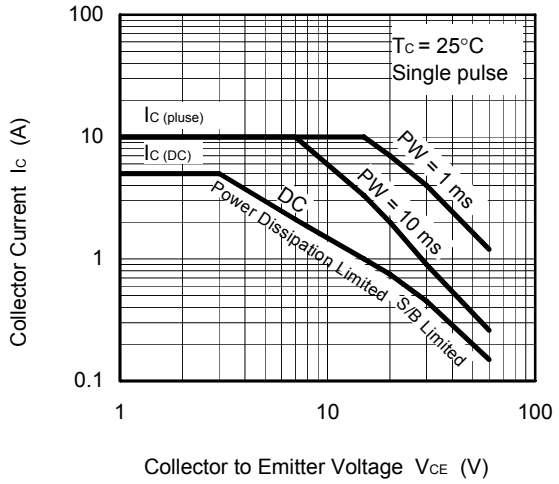
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



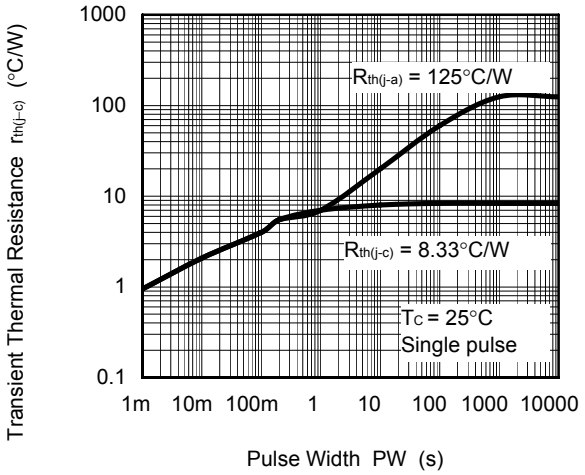
DERATING CURVE OF SAFE OPERATING AREA



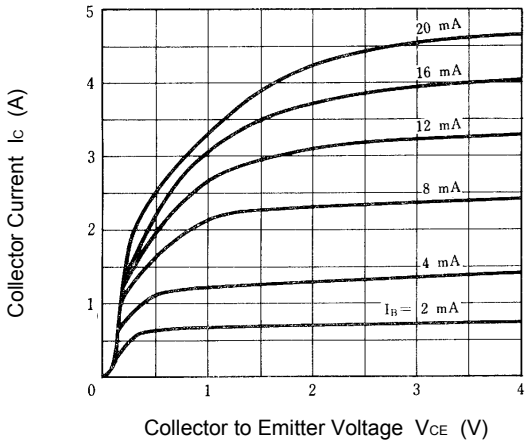
FORWARD BIAS SAFE OPERATING AREA



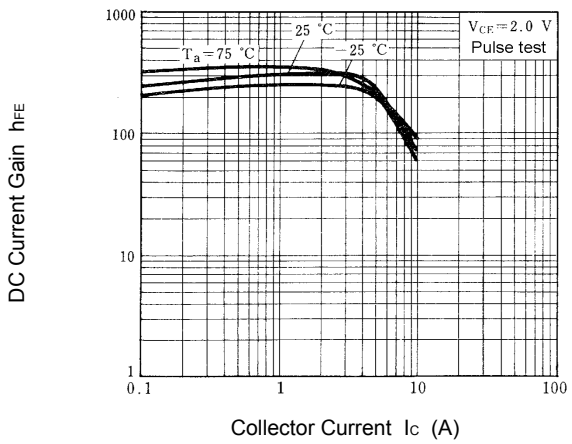
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



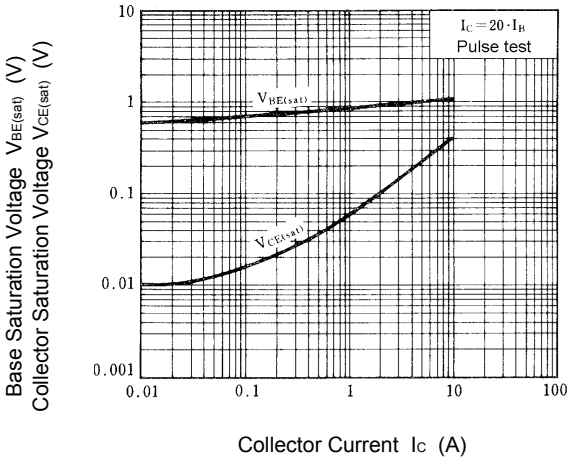
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



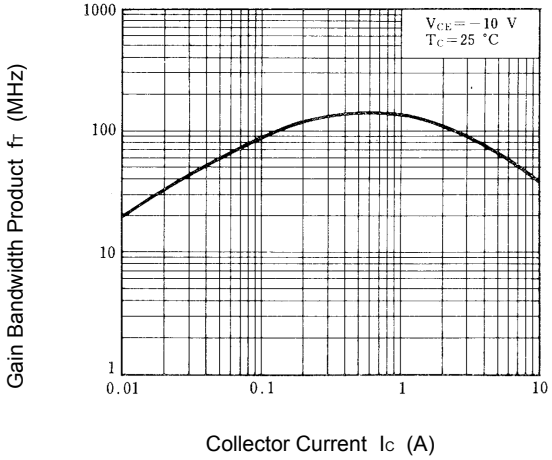
DC CURRENT GAIN vs. COLLECTOR CURRENT



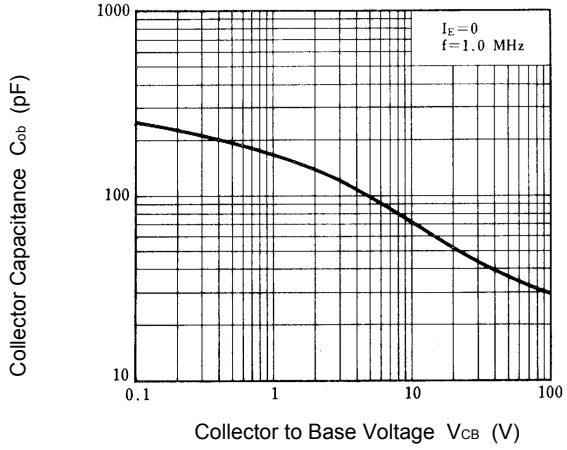
COLLECTOR AND BASE SATURATION VOLTAGE vs.
COLLECTOR CURRENT



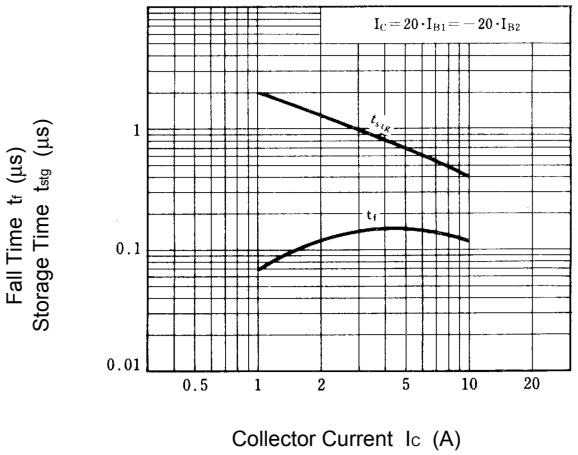
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



STORAGE TIME AND FALL TIME vs.
COLLECTOR CURRENT



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