

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

## Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# 2SD1978

Silicon NPN Epitaxial, Darlington

**RENESAS**

ADE-208-1162 (Z)

1st. Edition

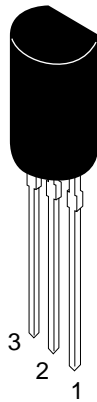
Mar. 2001

## Application

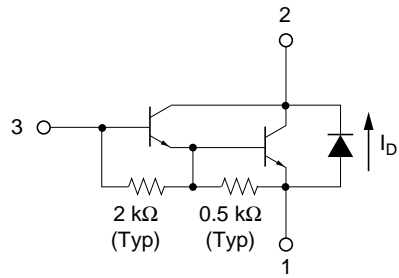
- Low frequency power amplifier
- Complementary pair with 2SB1387

## Outline

TO-92MOD



1. Emitter
2. Collector
3. Base



## Absolute Maximum Ratings (Ta = 25°C)

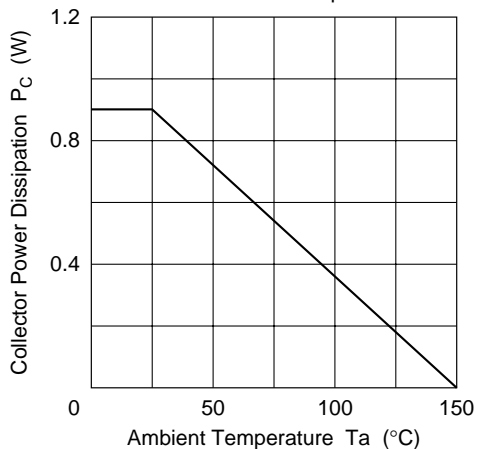
Item	Symbol	Rated	Unit
Collector to base voltage	$V_{CBO}$	120	V
Collector to emitter voltage	$V_{CEO}$	120	V
Emitter to base voltage	$V_{EBO}$	7	V
Collector current	$I_C$	1.5	A
Collector peak current	$i_{c (peak)}$	3.0	A
Collector power dissipation	$P_C$	0.9	W
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C
E to C diode forward current	$I_D$	1.5	A

## Electrical Characteristics (Ta = 25°C)

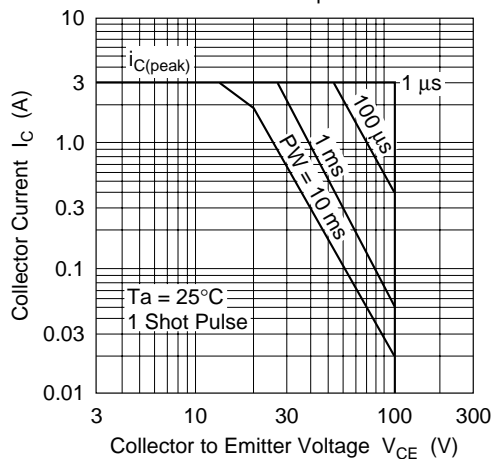
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	120	—	—	V	$I_C = 0.1 \text{ mA}, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	120	—	—	V	$I_C = 10 \text{ mA}, R_{BE} = \infty$
Emitter to base breakdown voltage	$V_{(BR)EBO}$	7	—	—	V	$I_E = 50 \text{ mA}, I_C = 0$
Collector cutoff current	$I_{CBO}$	—	—	1.0	$\mu\text{A}$	$V_{CB} = 100 \text{ V}, I_E = 0$
	$I_{CEO}$	—	—	10	$\mu\text{A}$	$V_{CE} = 100 \text{ V}, R_{BE} = \infty$
DC current transfer ratio	$h_{FE}$	2000	—	30000		$V_{CE} = 3 \text{ V}, I_C = 1 \text{ A}^{*1}$
Collector to emitter saturation voltage	$V_{CE(sat)1}$	—	—	1.5	V	$I_C = 1 \text{ A}, I_B = 1 \text{ mA}^{*1}$
	$V_{CE(sat)2}$	—	—	2.0	V	$I_C = 1.5 \text{ A}, I_B = 1.5 \text{ mA}^{*1}$
Base to emitter saturation voltage	$V_{BE(sat)1}$	—	—	2.0	V	$I_C = 1 \text{ A}, I_B = 1 \text{ mA}^{*1}$
	$V_{BE(sat)2}$	—	—	2.5	V	$I_C = 1.5 \text{ A}, I_B = 1.5 \text{ mA}^{*1}$
E to C diode forward voltage	$V_D$	—	—	3.0	V	$I_D = 1.5 \text{ A}^{*1}$

Note: 1. Pulse test

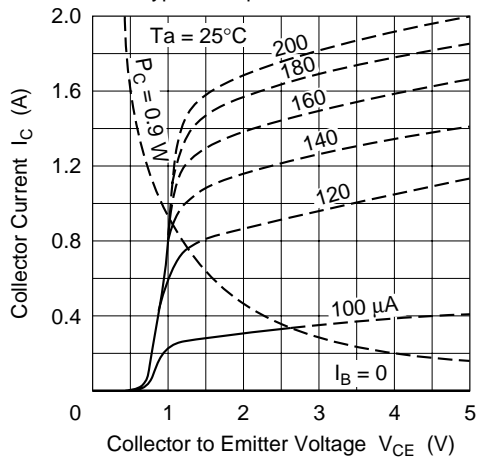
Maximum Collector Dissipation Curve



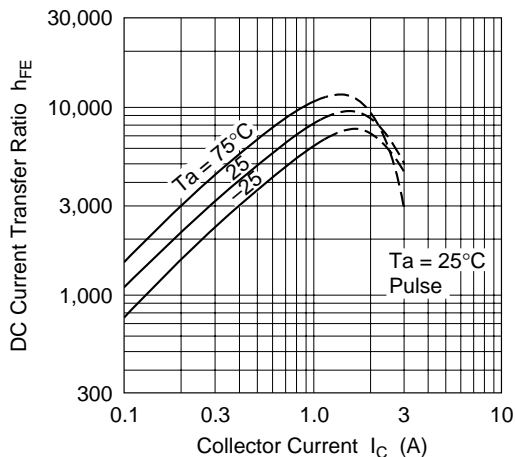
Area of Safe Operation

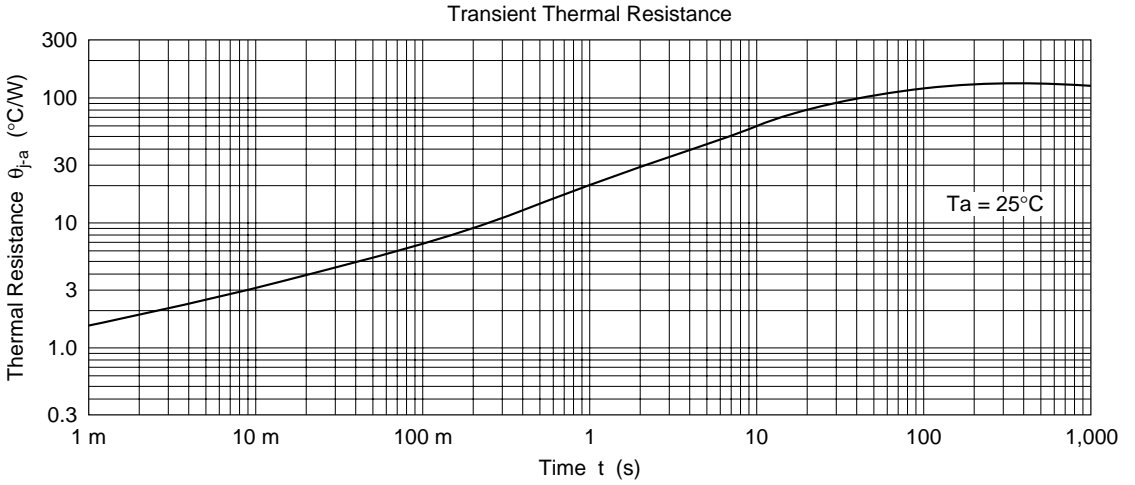
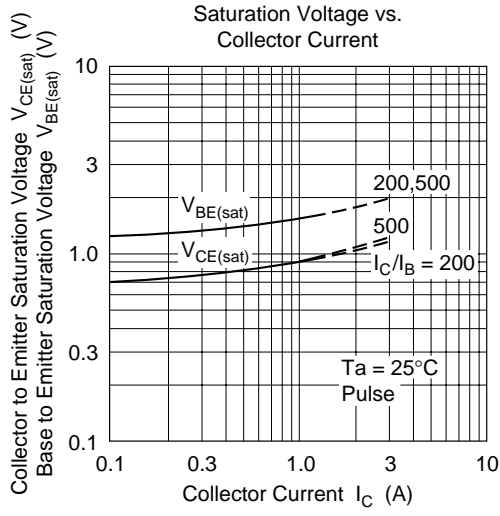


Typical Output Characteristics



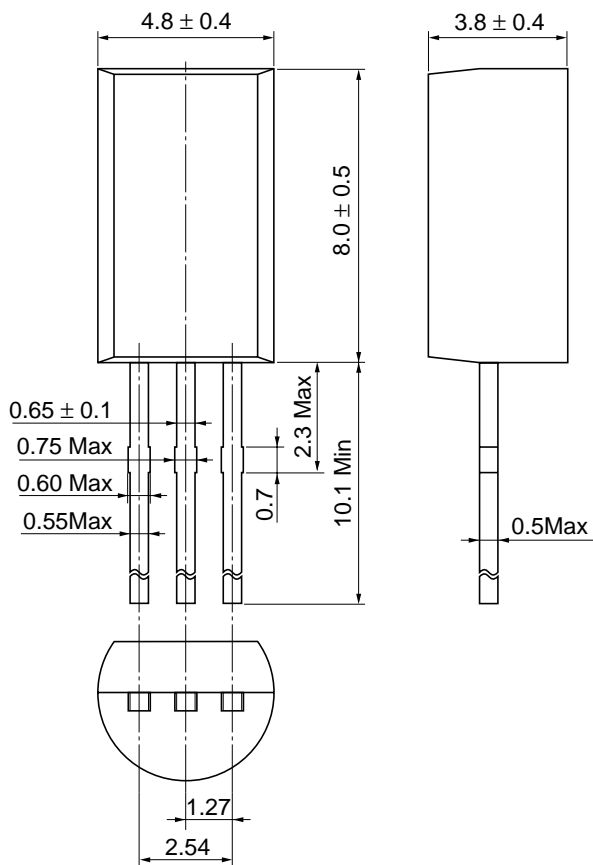
DC Current Transfer Ratio vs. Collector Current





Package Dimensions

As of January, 2001  
Unit: mm



Hitachi Code	TO-92 Mod
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.35 g

## Cautions

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