

To all our customers

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

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# 2SC1213A(K)

Silicon NPN Epitaxial

**RENESAS**

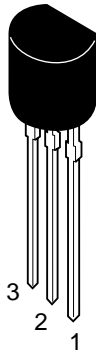
ADE-208-1049 (Z)  
1st. Edition  
Mar. 2001

## Application

- Low frequency amplifier
- Medium speed switching

## Outline

TO-92 (1)



1. Emitter
2. Collector
3. Base

# 2SC1213A (K)

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

Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	50	V
Collector to emitter voltage	$V_{CEO}$	50	V
Emitter to base voltage	$V_{EBO}$	4	V
Collector current	$I_C$	500	mA
Collector power dissipation	$P_C$	400	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

## Electrical Characteristics (Ta = 25°C)

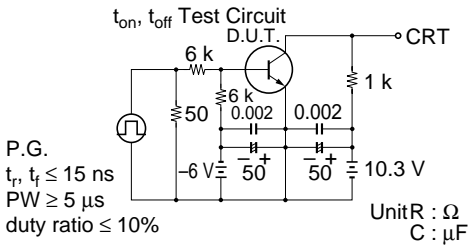
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	50	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	50	—	—	V	$I_C = 1.0 \text{ mA}, R_{BE} =$
Emitter to base breakdown voltage	$V_{(BR)EBO}$	4	—	—	V	$I_E = 10 \mu A, I_C = 0$
Collector cutoff current	$I_{CBO}$	—	—	0.5	$\mu A$	$V_{CB} = 20 \text{ V}, I_E = 0$
DC current transfer ratio	$h_{FE}^{*1}$	60	—	320		$V_{CE} = 3 \text{ V}, I_C = 10 \text{ mA}$
	$h_{FE}$	10	—	—		$V_{CE} = 3 \text{ V}, I_C = 500 \text{ mA}^{*2}$
Base to emitter voltage	$V_{BE}$		0.64	—	V	$V_{CE} = 3 \text{ V}, I_C = 10 \text{ mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	0.12	0.6	V	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}^{*2}$
Base to emitter saturation voltage	$V_{BE(sat)}$	—	0.83	1.2	V	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}^{*2}$
Collector output capacitance	$C_{ob}$	—	7.0	—	pF	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$
Gain bandwidth product	$f_T$	—	120	—	MHz	$V_{CE} = 3 \text{ V}, I_C = 10 \text{ mA}$
Turn on time	$t_{on}$	—	0.25	—	$\mu S$	$V_{CC} = 10.3 \text{ V}$ $I_C = 10 \text{ mA}, I_{B1} = -10 \text{ mA}, I_{B2} = 10 \text{ mA}$
Turn off time	$t_{off}$	—	0.85	—	$\mu S$	
Storage time	$t_{stg}$	—	0.4	—	$\mu S$	$V_{CC} = 5 \text{ V}$ $I_C = I_{B1} = -I_{B2} = 20 \text{ mA}$

Notes: 1. The 2SC1213A(K) is grouped by  $h_{FE}$  as follows.

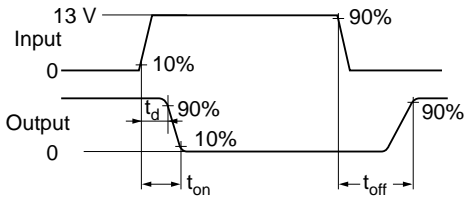
2. Pulse test

B	C	D
60 to 120	100 to 200	160 to 320

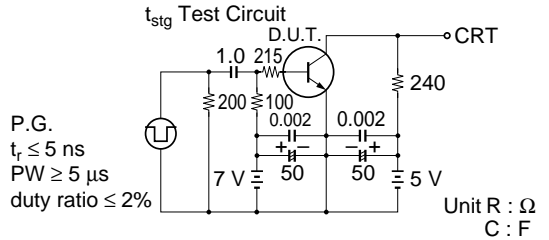
Switching Time Test Circuit



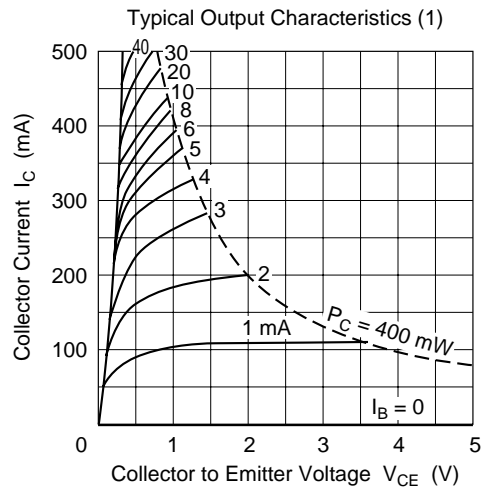
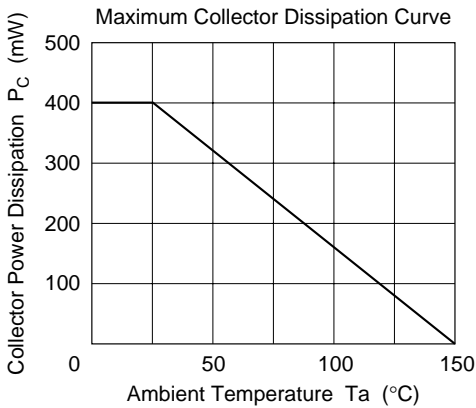
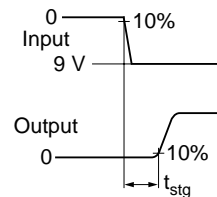
Response Waveform



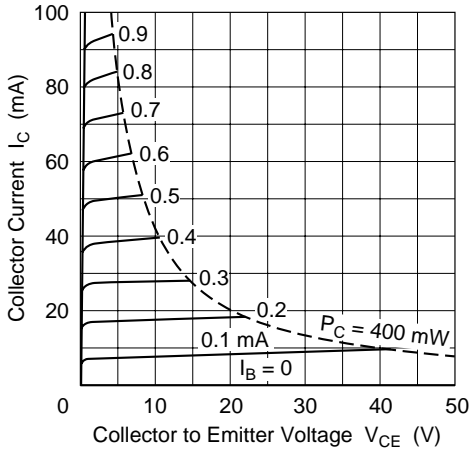
Switching Time Test Circuit



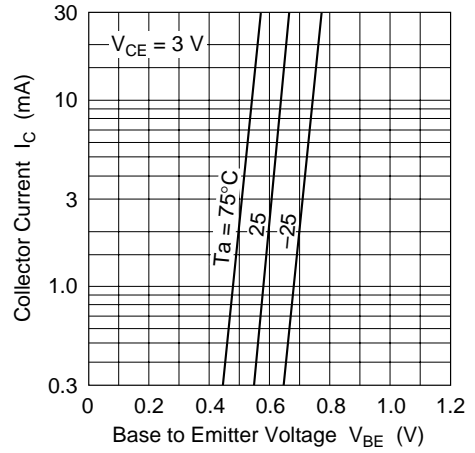
Response Waveform



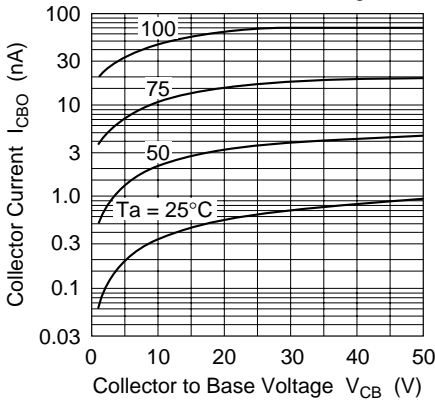
Typical Output Characteristics (2)



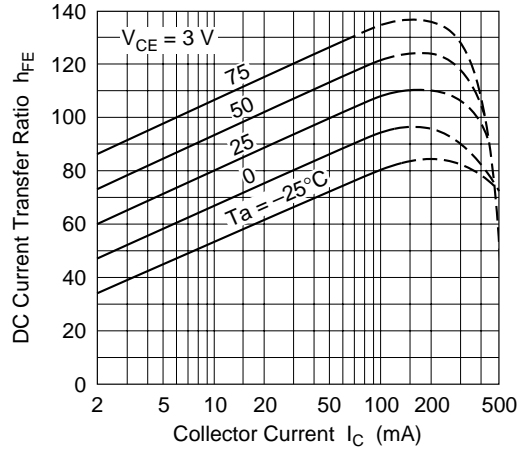
Typical Transfer Characteristics

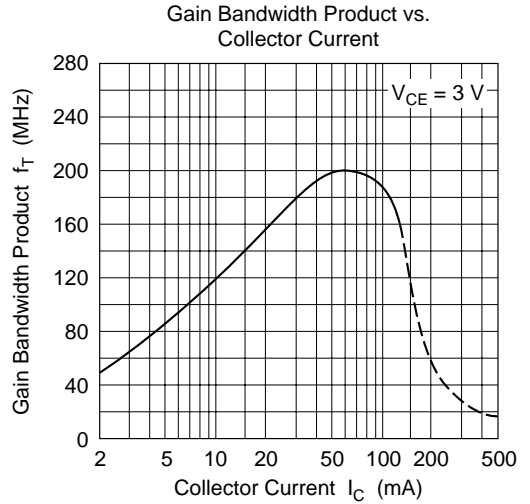
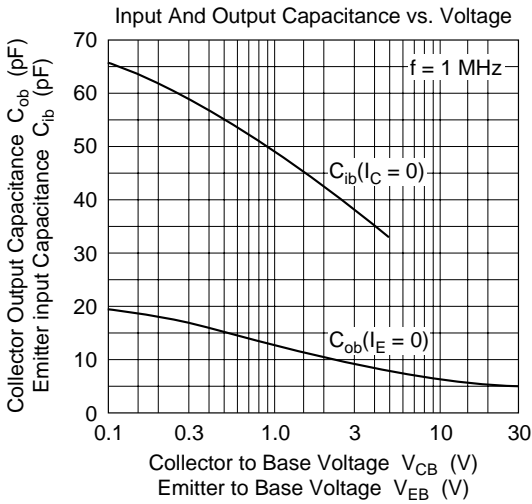
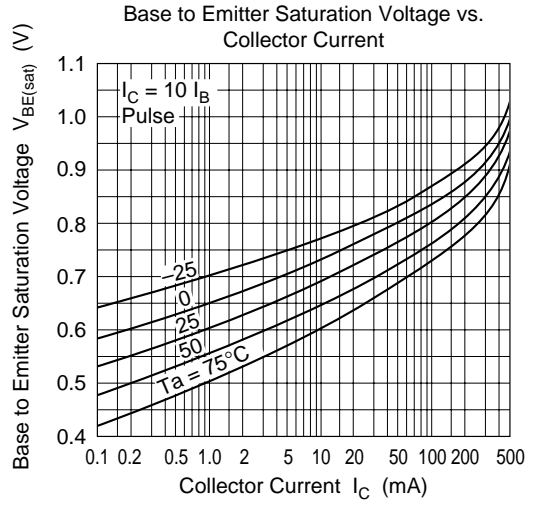
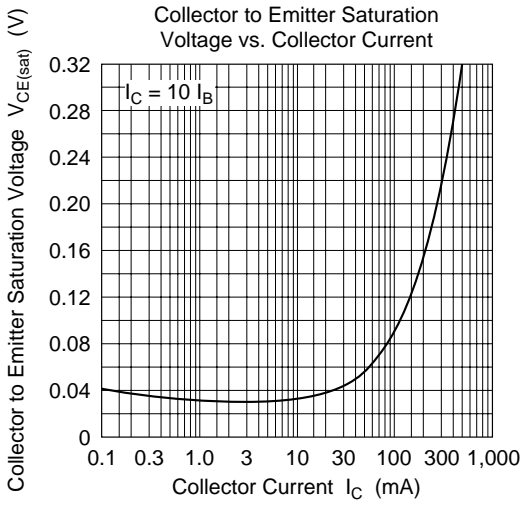


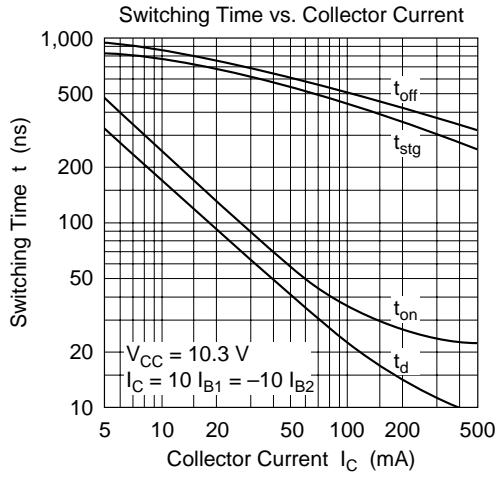
Collector Cutoff Current vs. Collector to Base Voltage



DC Current Transfer Ratio vs. Collector Current





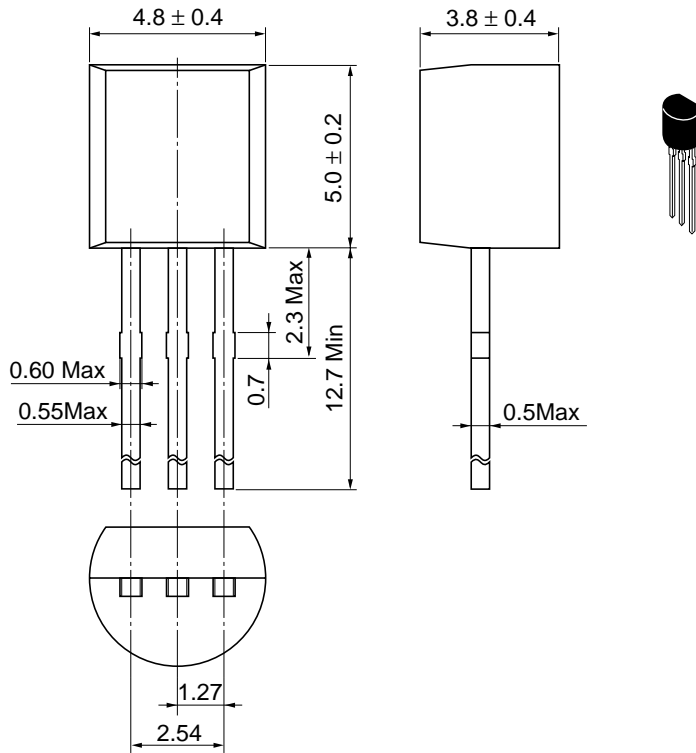




Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	TO-92 (1)
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.25 g

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