To all our customers

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

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Keep safety first in your circuit designs!

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2SC1213A(K)

Silicon NPN Epitaxial

RENESAS

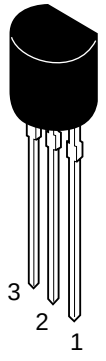
ADE-208-1049 (Z)
1st. Edition
Mar. 2001

Application

- Low frequency amplifier
- Medium speed switching

Outline

TO-92 (1)



1. Emitter
2. Collector
3. Base

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	Tj	150	°C
Storage temperature	Tstg	–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 µA, I_E = 0
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	50	—	—	V	I_C = 1.0 mA, R_{BE} =
Emitter to base breakdown voltage	$V_{(BR)EBO}$	4	—	—	V	I_E = 10 µA, I_C = 0
Collector cutoff current	I_{CBO}	—	—	0.5	µA	V_{CB} = 20 V, I_E = 0
DC current transfer ratio	h_{FE}*[1]	60	—	320		V_{CE} = 3 V, I_C = 10 mA
	h_{FE}	10	—	—		V_{CE} = 3 V, I_C = 500 mA*[2]
Base to emitter voltage	V_{BE}		0.64	—	V	V_{CE} = 3 V, I_C = 10 mA
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	0.12	0.6	V	I_C = 150 mA, I_B = 15 mA*[2]
Base to emitter satruation voltage	$V_{BE(sat)}$	—	0.83	1.2	V	I_C = 150 mA, I_B = 15 mA*[2]
Collector output capacitance	Cob	—	7.0	—	pF	V_{CB} = 10 V, I_E = 0, f = 1 MHz
Gain bandwidth product	f_T	—	120	—	MHz	V_{CE} = 3 V, I_C = 10 mA
Turn on time	t_{on}	—	0.25	—	µS	V_{CC} = 10.3 V I_C = 10 I_{B1} = –10 I_{B2} = 10 mA
Turn off time	t_{off}	—	0.85	—	µS	
Storage time	t_{stg}	—	0.4	—	µS	V_{CC} = 5 V I_C = I_{B1} = –I_{B2} = 20 mA

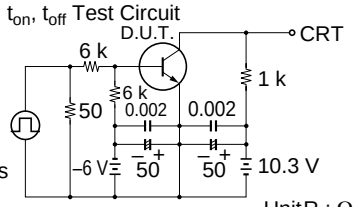
Notes: 1. The 2SC1213A(K) is grouped by h_{FE} as follows.

2. Pulse test

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

Switching Time Test Circuit

t_{on}, t_{off} Test Circuit

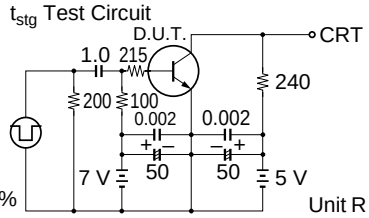


P.G.
t_r, $t_f \leq 15$ ns
PW ≥ 5 µs
duty ratio ≤ 10%

Unit R : Ω
C : µF

Switching Time Test Circuit

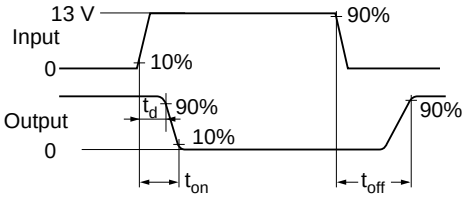
t_{stg} Test Circuit



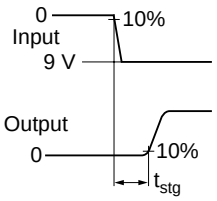
P.G.
$t_r \leq 5$ ns
PW ≥ 5 µs
duty ratio ≤ 2%

Unit R : Ω
C : F

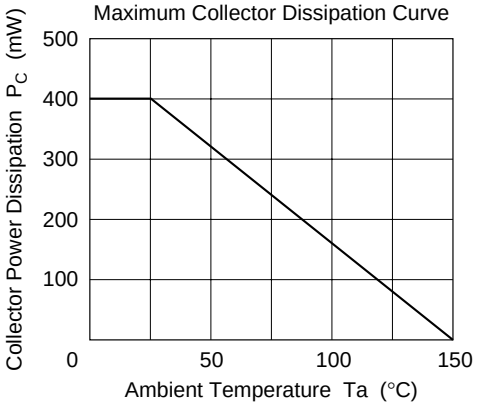
Response Waveform



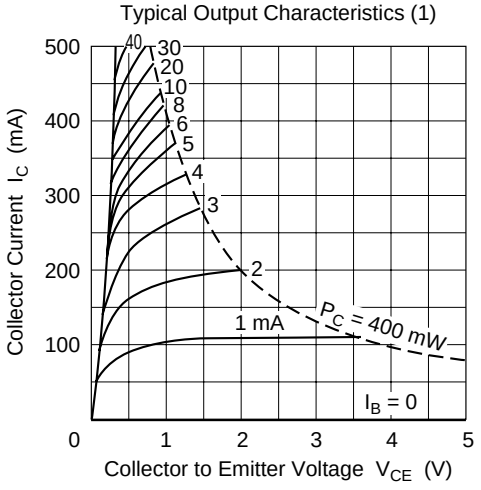
Response Waveform



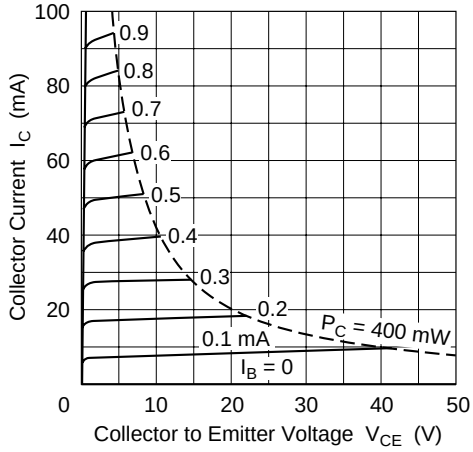
Maximum Collector Dissipation Curve



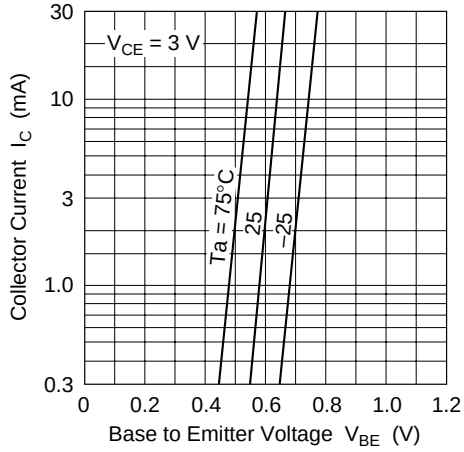
Typical Output Characteristics (1)



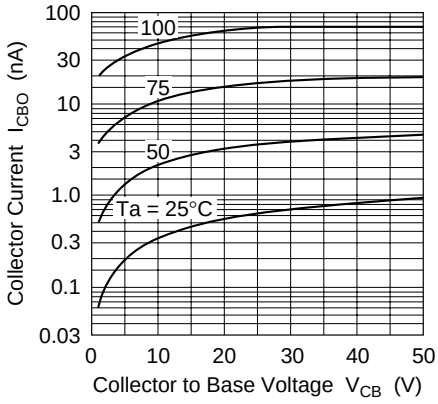
Typical Output Characteristics (2)



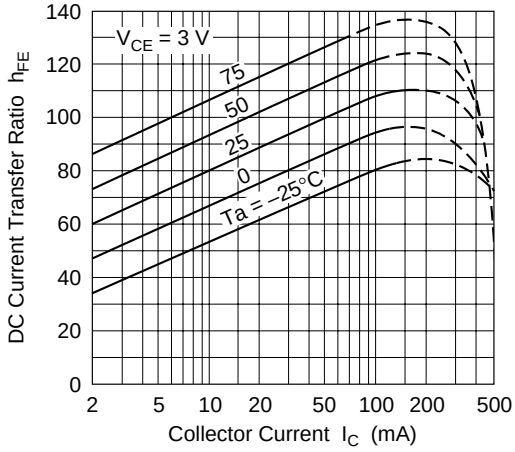
Typical Transfer Characteristics



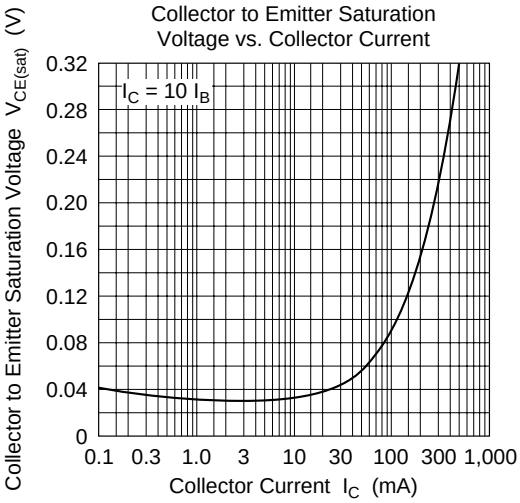
Collector Cutoff Current vs. Collector to Base Voltage



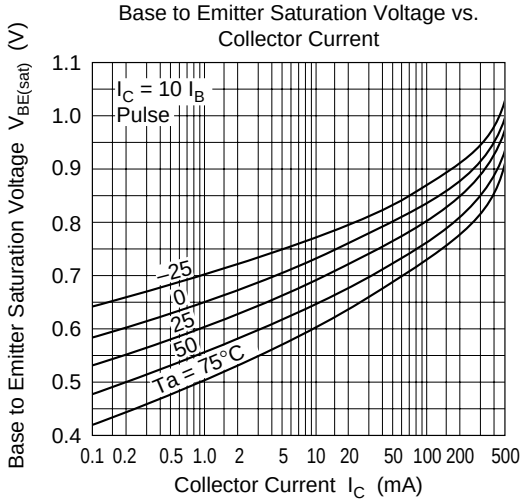
DC Current Transfer Ratio vs. Collector Current



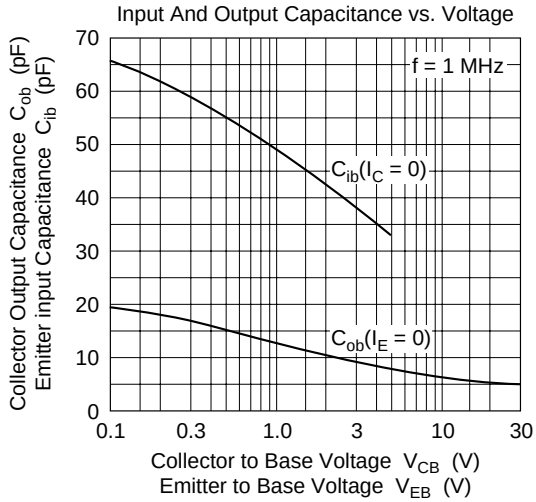
Collector to Emitter Saturation Voltage vs. Collector Current



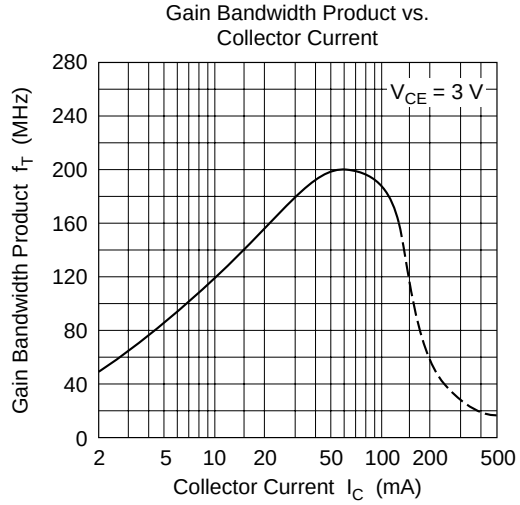
Base to Emitter Saturation Voltage vs. Collector Current

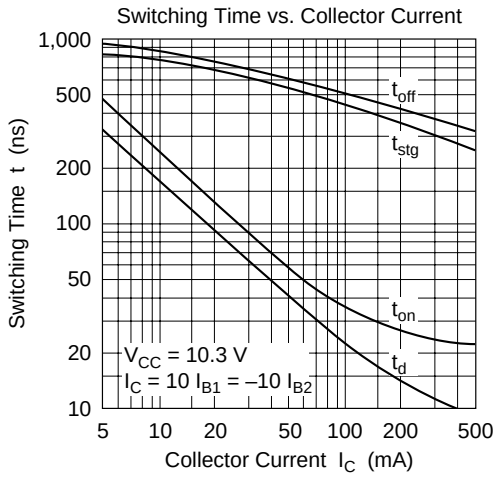


Input And Output Capacitance vs. Voltage



Gain Bandwidth Product vs. Collector Current

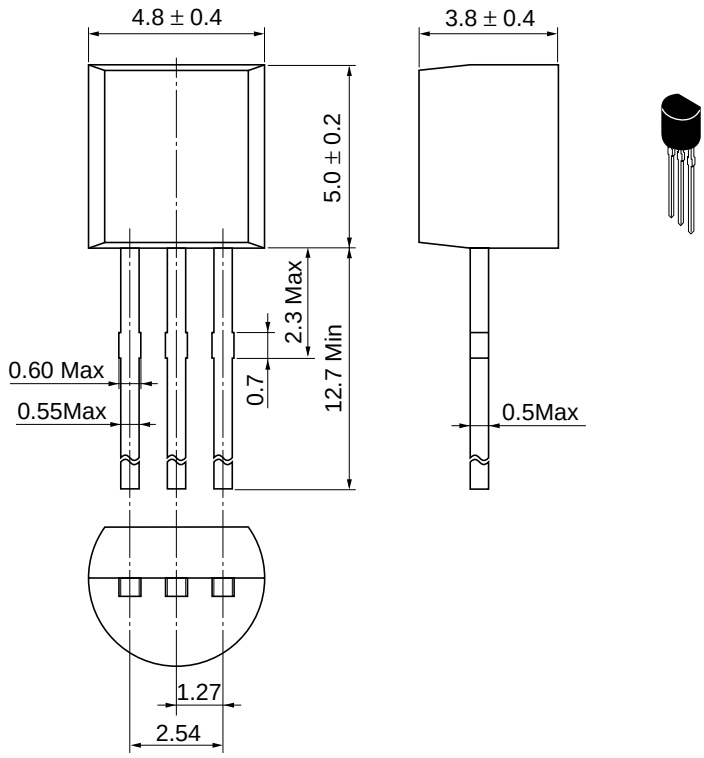



Switching Time vs. Collector Current
1,000
500
200
100
50
20
10
Switching Time t (ns)
5
10
20
50
100
200
500
Collector Current I_C (mA)
t_{off}
t_{stg}
t_{on}
t_d
V_{CC} = 10.3 V
I_C = 10 I_{B1} = –10 I_{B2}

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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