

To all our customers

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

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# HTT1213S

Silicon NPN Epitaxial Twin Transistor

**RENESAS**

ADE-208-1448(Z)

Preliminary  
Rev. 0  
Aug. 2001

## Features

- Include 2 transistors in a small size SMD package: SMFPAK-6 (6 Leads: 1.5 x 1.1 x 0.55 mm)

**Q1:**  
**Equivalent**  
**Buffer Transistor**

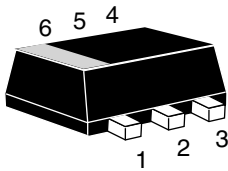
**Q2:**  
**Equivalent**  
**OSC Transistor**

2SC5700

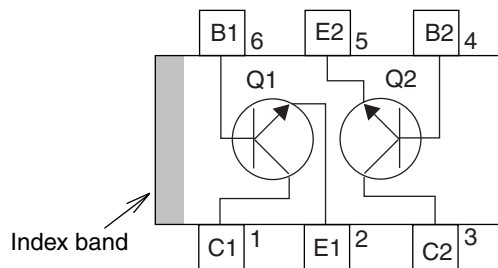
2SC5700

## Outline

SMFPAK-6



Pin Arrangement



- |                 |               |
|-----------------|---------------|
| 1. Collector Q1 | 4. Base Q2    |
| 2. Emitter Q1   | 5. Emitter Q2 |
| 3. Collector Q2 | 6. Base Q1    |

Note: Marking is "CK1".

## Absolute Maximum Ratings

(Ta = 25 °C)

Item	Symbol	Ratings	
		Q1 and Q2	Unit
Collector to base voltage	$V_{CBO}$	15	V
Collector to emitter voltage	$V_{CEO}$	4	V
Emitter to base voltage	$V_{EBO}$	1.5	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$	Total 220*	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

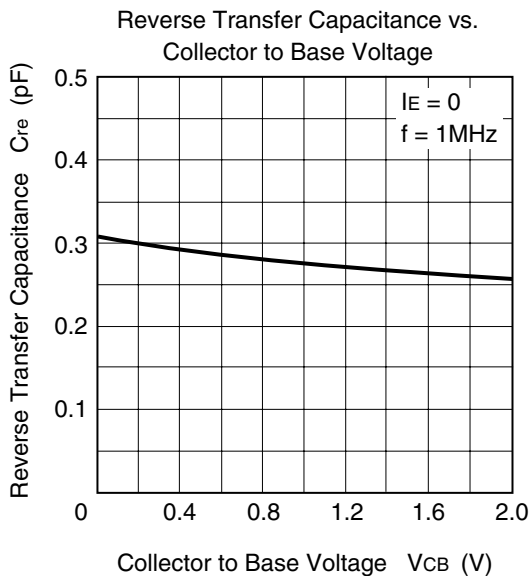
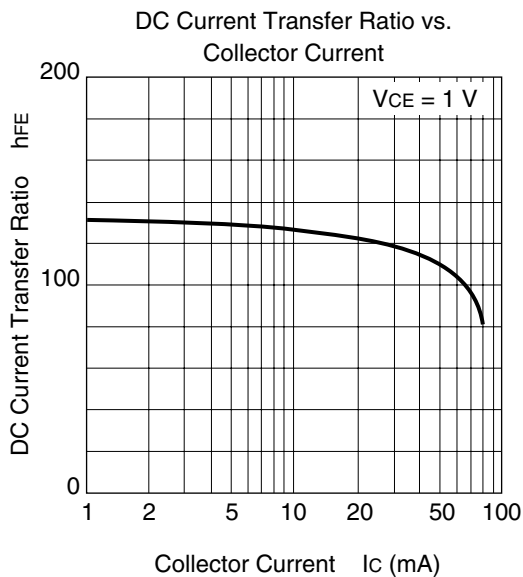
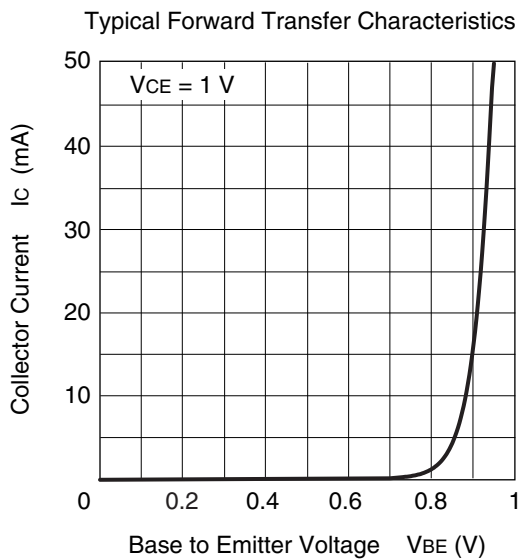
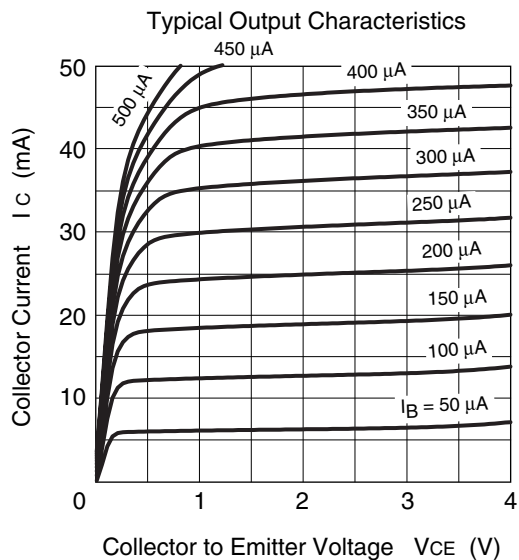
\*Value on PCB. (FR-4 (13 x 13 x 0.635 mm) )

## Electrical Characteristics (Q1 and Q2)

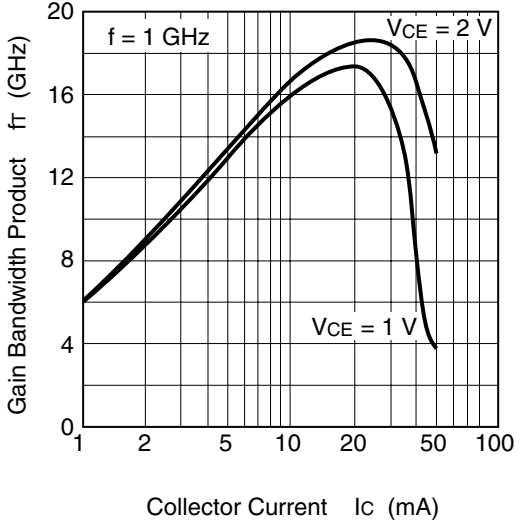
(Ta = 25 °C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	$I_{CBO}$	—	—	0.1	mA	$V_{CB} = 15 V, I_E = 0$
Collector cutoff current	$I_{CEO}$	—	—	1	mA	$V_{CE} = 4 V, R_{BE} = \text{infinite}$
Emitter cutoff current	$I_{EBO}$	—	—	0.2	mA	$V_{EB} = 0.8 V, I_C = 0$
DC current transfer ratio	$h_{FE}$	100	130	170	—	$V_{CE} = 1 V, I_C = 5 mA$
Reverse transfer capacitance	$C_{re}$	—	0.30	0.45	pF	$V_{CB} = 1 V, f = 1 MHz$ Emitter ground
Gain bandwidth product	$f_T$	10	13	—	GHz	$V_{CE} = 1 V, I_C = 5 mA, f = 1 GHz$
Forward transfer coefficient	$ S_{21} ^2$	13	16	—	dB	$V_{CE} = 1 V, I_C = 5 mA,$ $f = 900 MHz,$
Noise figure	NF	—	1.0	2.0	dB	$\Gamma_S = \Gamma_L = 50 \Omega$

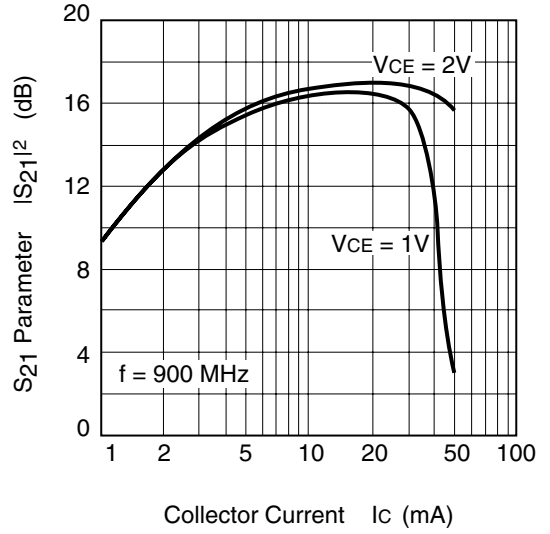
Main Characteristics (Q1 and Q2)



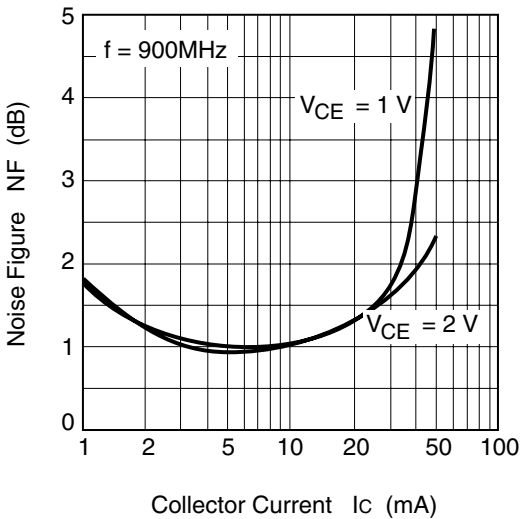
Gain Bandwidth Product vs. Collector Current



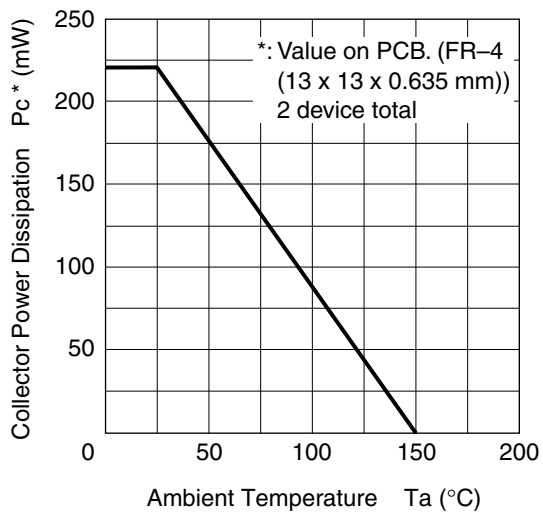
$S_{21}$  Parameter vs. Collector Current



Noise Figure vs. Collector Current



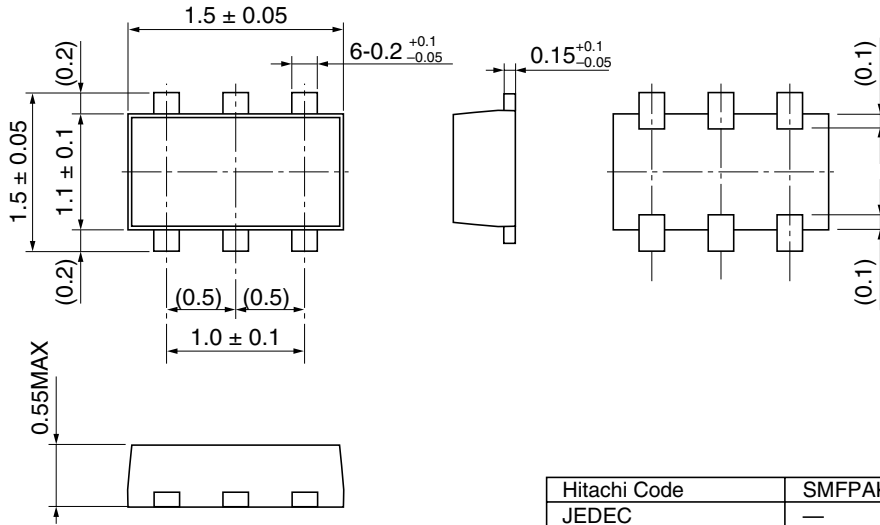
Collector Power Dissipation Curve



## Package Dimensions

As of July, 2001

Unit: mm



Hitachi Code	SMFPAK-6
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.0025 g



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