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

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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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HTT1129E

Silicon NPN Epitaxial Twin Transistor

RENESAS

ADE-208-1541A (Z)

Rev.1
Jan. 2003

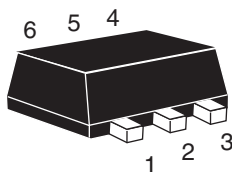
Features

- Include 2 transistors in a small size SMD package: EMFPAK-6 (6 Leads: 1.2 x 0.8 x 0.5 mm)

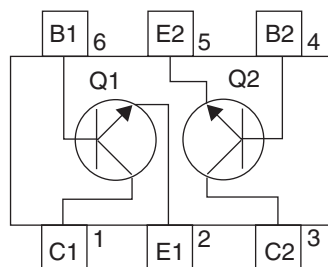
Q1: Equivalent Buffer transistor	Q2: Equivalent OSC transistor
2SC5849	2SC5872

Outline

EMFPAK-6



Pin Arrangement



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

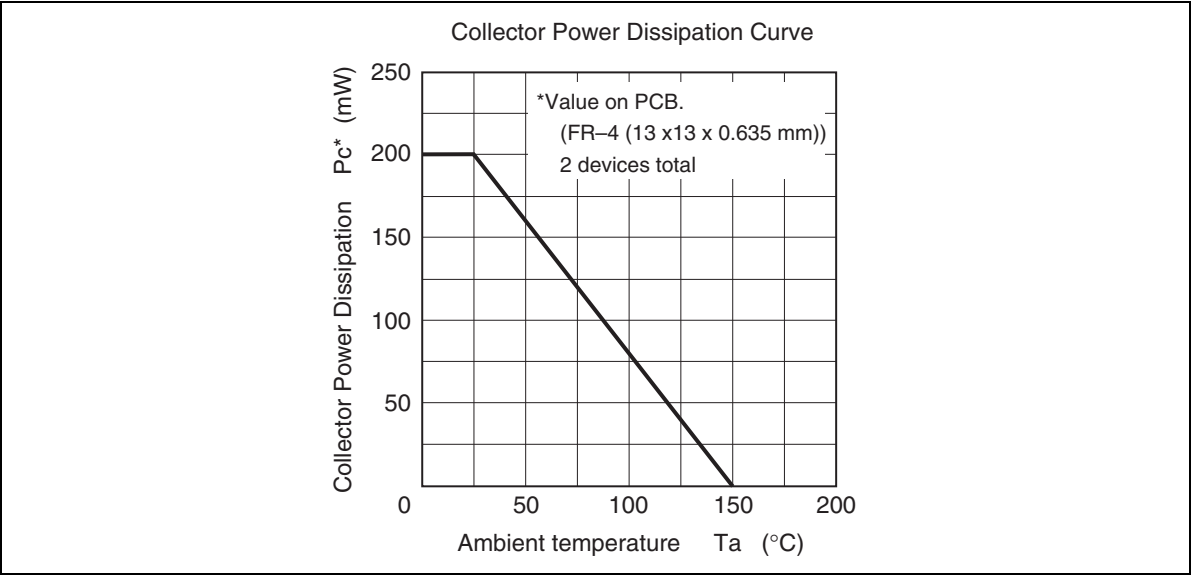
Note: Mark is "Z".

Absolute Maximum Ratings

(Ta = 25 °C)

Item	Symbol	Ratings		Unit
		Q1	Q2	
Collector to base voltage	V _{CBO}	15	15	V
Collector to emitter voltage	V _{CEO}	6	6	V
Emitter to base voltage	V _{EBO}	1.5	0.8	V
Collector current	I _C	80	50	mA
Collector power dissipation	P _C	Total 200*		mW
Junction temperature	Tj	150	150	°C
Storage temperature	Tstg	−55 to +150	−50 to +150	°C

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



Q1 Electrical Characteristics

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition
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	μA	$V_{CB} = 15\ V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	0.1	μA	$V_{CE} = 6\ V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	0.1	μA	$V_{EB} = 1.5\ V, I_C = 0$
DC current transfer ratio	h_{FE}	90	120	140	—	$V_{CE} = 1\ V, I_C = 5\ mA$
Reverse transfer capacitance	C_{re}	—	0.50	0.65	pF	$V_{CB} = 1\ V, f = 1\ MHz$ Emitter ground
Gain bandwidth product	f_T	2	4	—	GHz	$V_{CE} = 1\ V, I_C = 5\ mA, f = 1\ GHz$
Forward transfer coefficient	$ S_{21} ^2$	7	11	—	dB	$V_{CE} = 1\ V, I_C = 5\ mA,$ $f = 900\ MHz,$
Noise figure	NF	—	1.7	2.3	dB	$\Gamma_s = \Gamma_L = 50\ \Omega$

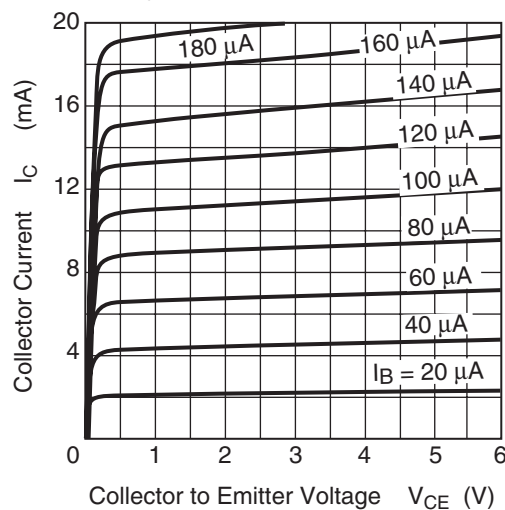
Q2 Electrical Characteristics

(Ta = 25°C)

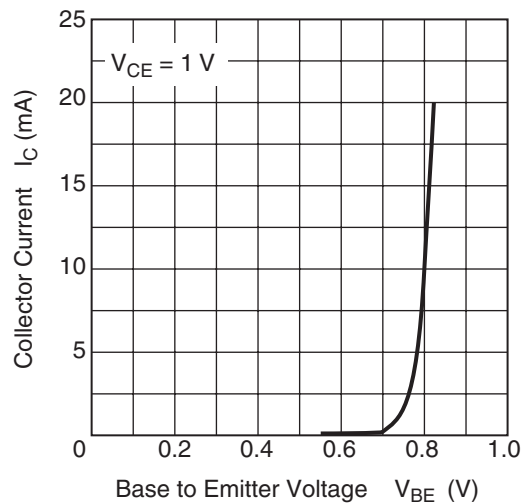
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	16	—	—	V	$I_C = 10\ \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	0.1	μA	$V_{CB} = 15\ V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	0.1	μA	$V_{CE} = 6\ V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	0.1	μA	$V_{EB} = 0.8\ V, I_C = 0$
DC current transfer ratio	h_{FE}	90	120	140	—	$V_{CE} = 1\ V, I_C = 5\ mA$
Reverse transfer capacitance	C_{re}	—	0.25	0.35	pF	$V_{CB} = 1\ V, f = 1\ MHz$ Emitter ground
Gain bandwidth product	f_T	8	10	—	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	1.6	dB	$\Gamma_s = \Gamma_L = 50\ \Omega$

Q1 Main Characteristics

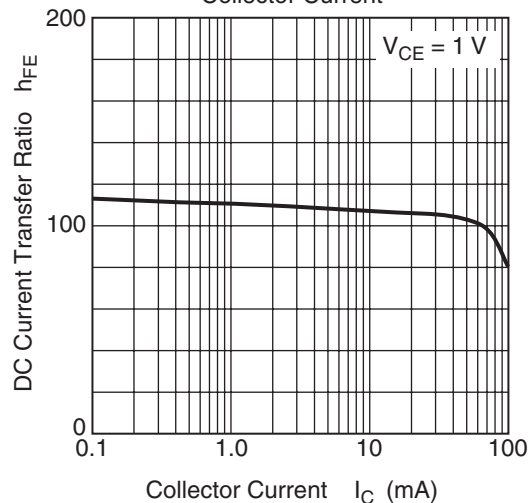
Typical Output Characteristics



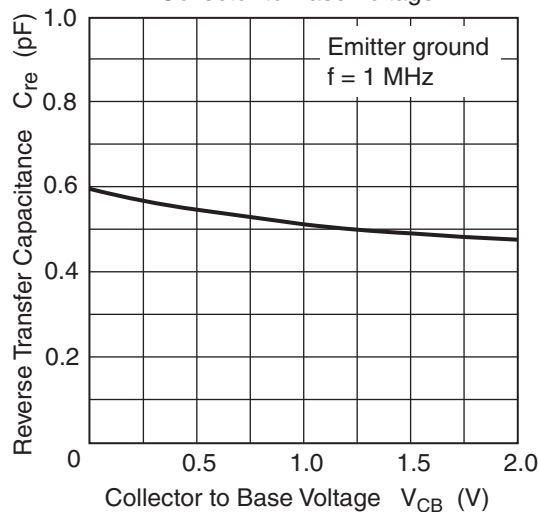
Typical Forward Transfer Characteristics



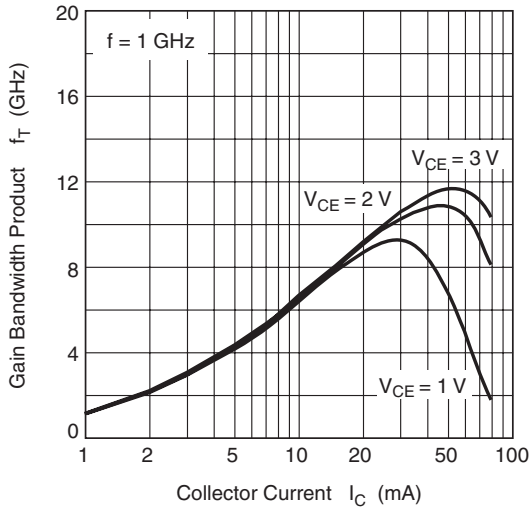
DC Current Transfer Ratio vs. Collector Current



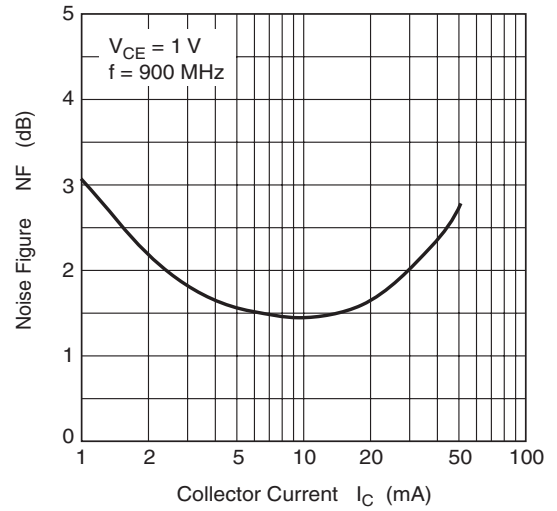
Reverse Transfer Capacitance vs. Collector to Base Voltage



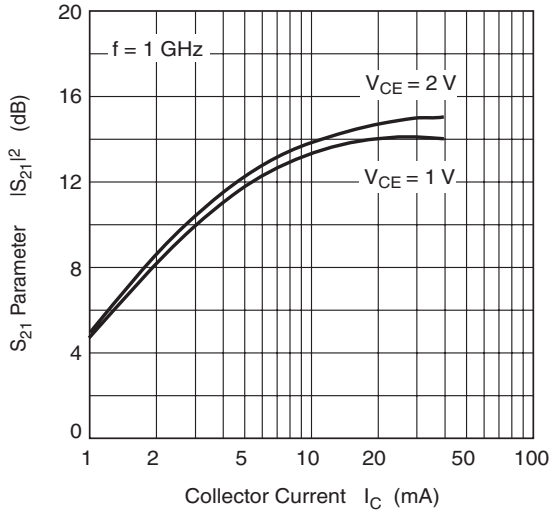
Gain Bandwidth Product vs.
Collector Current



Noise Figure vs. Collector Current

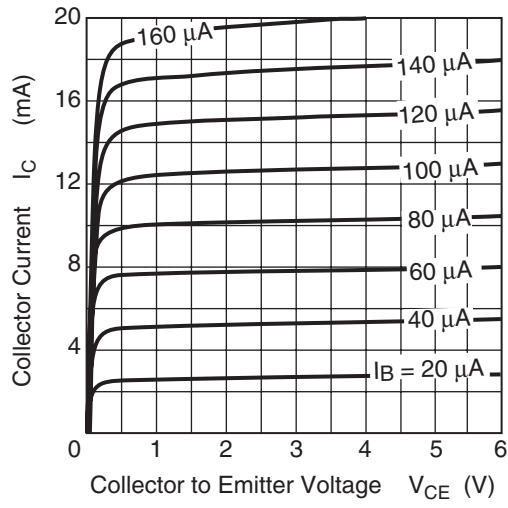


S_{21} Parameter vs. Collector Current

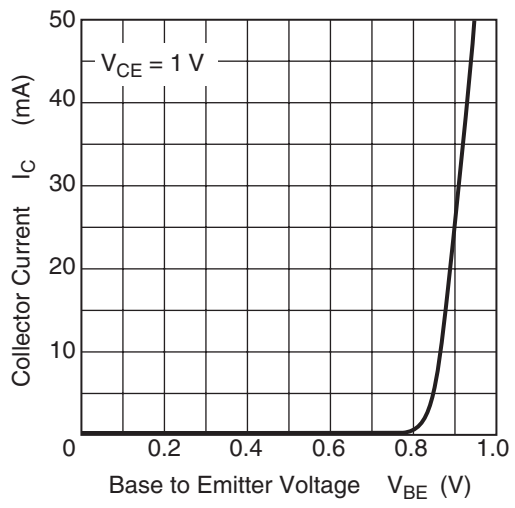


Q2 Main Characteristics

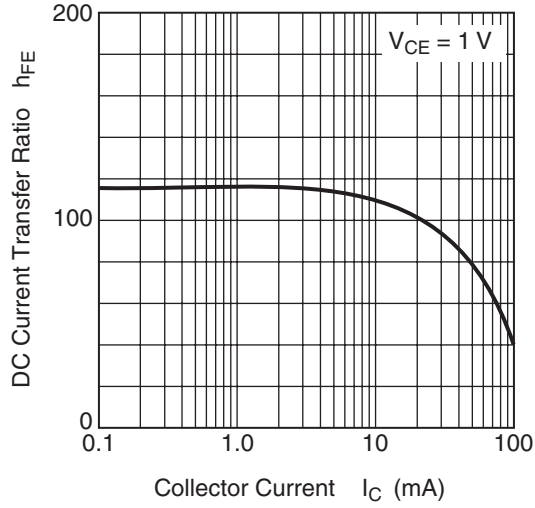
Typical Output Characteristics



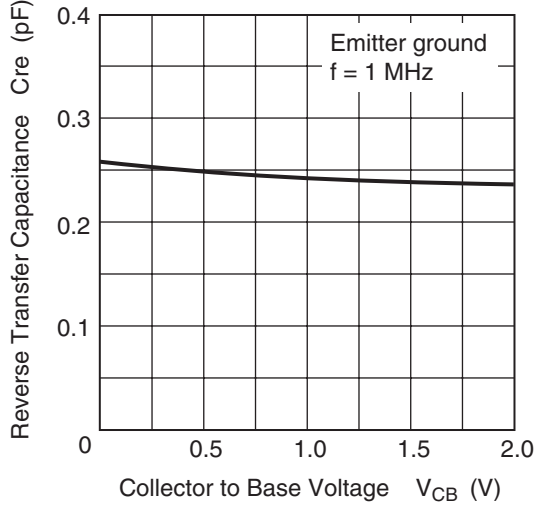
Typical Forward Transfer Characteristics

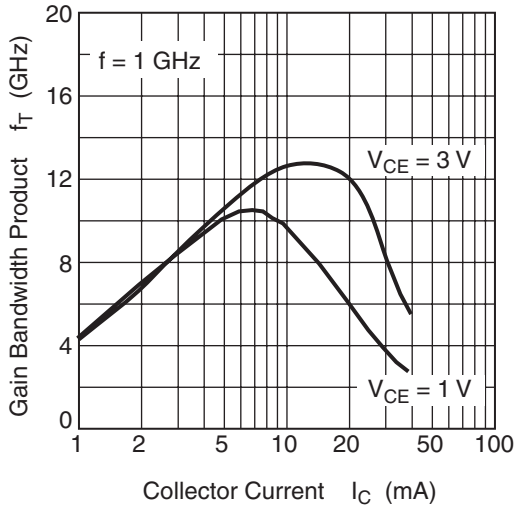


DC Current Transfer Ratio vs. Collector Current

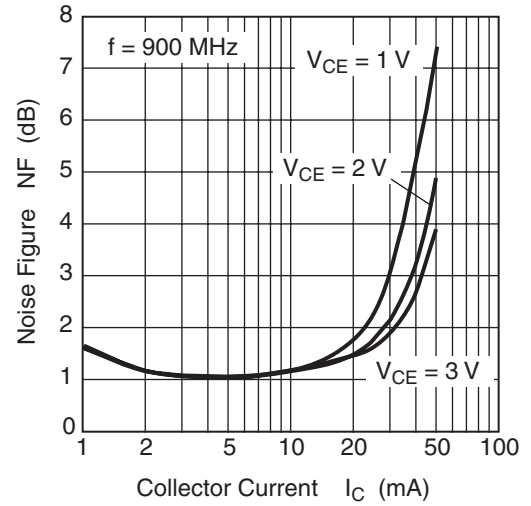
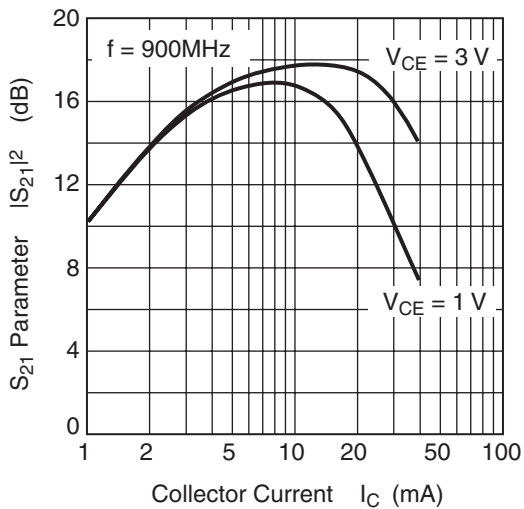


Reverse Transfer Capacitance vs. Collector to Base Voltage



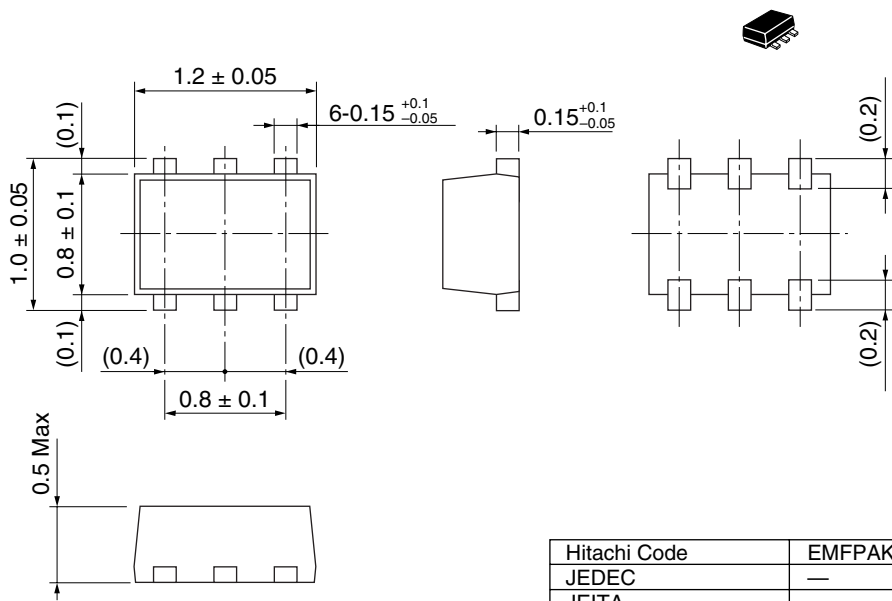
Gain Bandwidth Product vs.
Collector Current

Noise Figure vs. Collector Current

 S_{21} Parameter vs. Collector Current

Package Dimensions

As of July, 2002
Unit: mm



Hitachi Code	EMFPAK-6
JEDEC	—
JEITA	—
Mass (reference value)	0.0012 g

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