To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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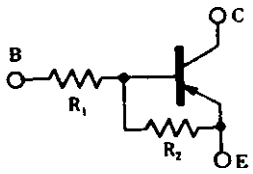
RENESAS

COMPOUND TRANSISTOR
FP1 SERIES

on-chip resistor PNP silicon epitaxial transistor
For mid-speed switching

FEATURES

- Up to 0.7 A current drive available
- On-chip bias resistor
- Low power consumption during drive

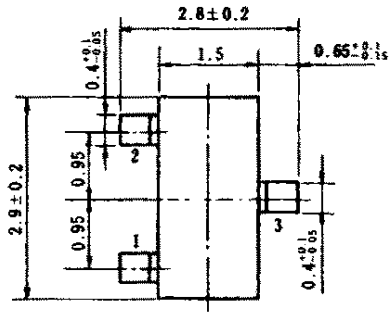


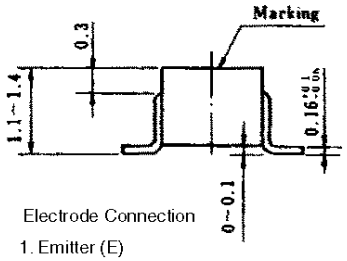
QUALITY GRADES

- Standard

Please refer to “Quality Grades on NEC Semiconductor Devices” (Document No. C11531E) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

PACKAGE DRAWING (UNIT: mm)





Electrode Connection
1. Emitter (E)
2. Base (B)
3. Collector (C)

FP1 SERIES LISTS

Products	Marking	R_1 (KΩ)	R_2 (KΩ)
FP1A4A	S30	–	10
FP1L2Q	S31	0.47	4.7
FP1A3M	S32	1.0	1.0
FP1F3P	S33	2.2	10
FP1J3P	S36	3.3	10
FP1L3N	S34	4.7	10
FP1A4M	S35	10	10

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	–25	V
Collector to emitter voltage	V_{CEO}	–25	V
Emitter to base voltage	V_{EBO}	–10	V
Collector current (DC)	$I_{C(DC)}$	–0.7	A
Collector current (Pulse)	$I_{C(pulse)}$ *	–1.0	A
Base current (DC)	$I_{B(DC)}$	–20	mA
Total power dissipation	P_T	200	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

* PW ≤ 10 ms, duty cycle ≤ 50 %

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FP1A4A
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	200			–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100			–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50			–
Collector saturation voltage	$V_{CE(sat)}$ **	I_C = –0.3 A, I_B = –6 mA		0.28	0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA			–0.3	V
Input resistance	R_1		–	–	–	Ω
E-to-B resistance	R_2		7	10	13	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FP1L2Q
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	150	350		–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100	300		–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50	200		–
Low level output voltage	V_{OL} **	V_{IN} = –5.0 V, I_C = –0.3 A		–0.3	–0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA		–0.65	–0.3	V
Input resistance	R_1		329	470	611	Ω
E-to-B resistance	R_2		3.29	4.7	6.11	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FP1A3M
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	80			–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100			–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50			–
Low level output voltage	V_{OL} **	V_{IN} = –5.0 V, I_C = –0.2 A		–0.3	–0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA			–0.3	V
Input resistance	R_1		0.7	1.0	1.3	kΩ
E-to-B resistance	R_2		0.7	1.0	1.3	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FP1F3P
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	200			–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100			–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50			–
Low level output voltage	V_{OL} **	V_{IN} = –5.0 V, I_C = –0.2 A			–0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA			–0.3	V
Input resistance	R_1		1.54	2.2	2.86	kΩ
E-to-B resistance	R_2		7	10	13	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FP1J3P
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	200	470		–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100	300		–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50	200		–
Low level output voltage	V_{OL} **	V_{IN} = –5.0 V, I_C = –150 mA		–0.2	–0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA		–0.65	–0.3	V
Input resistance	R_1		2.3	3.3	4.3	kΩ
E-to-B resistance	R_2		7	10	13	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FP1L3N
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	200			–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100			–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50			–
Low level output voltage	V_{OL} **	V_{IN} = –5.0 V, I_C = –150 mA			–0.45	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA			–0.3	V
Input resistance	R_1		3.29	4.7	6.11	kΩ
E-to-B resistance	R_2		7	10	13	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FB1A4M

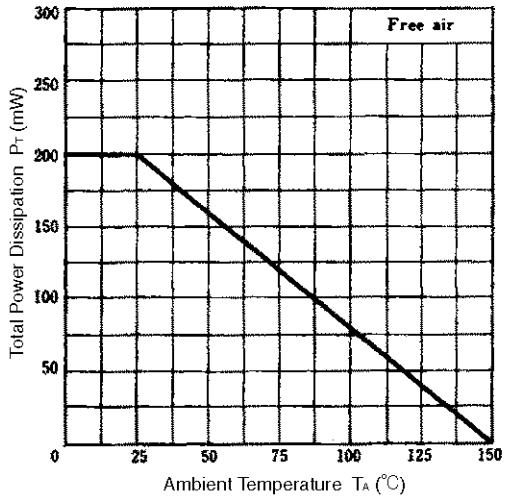
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –22 V, I_E = 0			–100	nA
DC current gain	h_{FE1} **	V_{CE} = –2.0 V, I_C = –0.1 A	200			–
DC current gain	h_{FE2} **	V_{CE} = –2.0 V, I_C = –0.5 A	100			–
DC current gain	h_{FE3} **	V_{CE} = –2.0 V, I_C = –0.7 A	50			–
Collector saturation voltage	$V_{CE(sat)}$ **	V_{IN} = –5.0 V, I_C = –0.1 A			–0.4	V
Low level input voltage	V_{IL} **	V_{CE} = –5.0 V, I_C = –100 μA			–0.3	V
Input resistance	R_1		7	10	13	kΩ
E-to-B resistance	R_2		7	10	13	kΩ

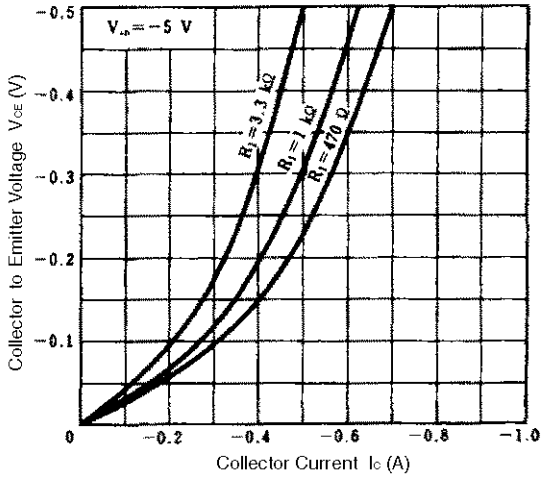
** PW ≤ 350 μs, duty cycle ≤ 2 %

TYPICAL CHARACTERISTICS (T_a = 25°C)

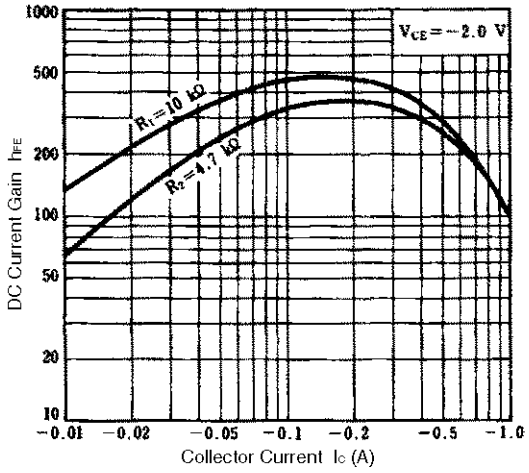
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



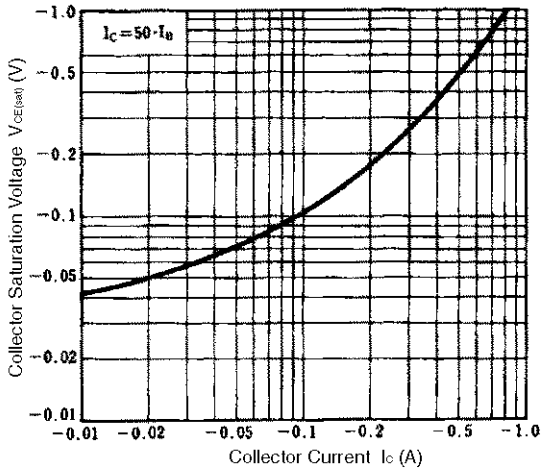
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR SATURATON VOLTAGE vs. COLLECTOR CURRENT



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC sales representative.

Surface MOUNTING TYPE

For details of the recommended soldering conditions, refer to the document Semiconductor Device Mounting Technology Manual (C10535E).

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared reflow	Package peak temperature: 230°C, Time: 30 sec. max. (at 210°C or higher), Count: Once, Exposure limit: None *	IR30-00
VPS	Package peak temperature: 215°C, Time: 40 sec. max. (at 200°C or higher), Count: Once, Exposure limit: None *	VP15-00
Partial heating	Pin temperature: 300°C max., Time: 10 sec. max. Exposure limit: None *	O

* After opening the dry pack, store it at 25°C or less and 65% RH or less for the allowable storage period.

Cautions 1. Do not use different soldering methods together (except for partial heating).

2. Prevent the resin surface temperature from being higher than the board temperature by 20°C or more.

[MEMO]

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