

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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Phase-out/Discontinued

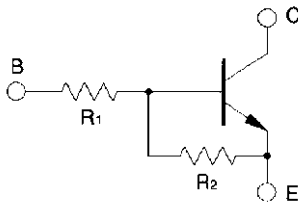
COMPOUND TRANSISTOR  
BB1 SERIES

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

The BB1 Series is an N type small signal transistor and enables the reduction of component counts and downsizing of sets due to on-chip resistors. This transistor is especially ideal for use in household electronic appliances and OA equipments such as VCRs and TVs.

FEATURES

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



QUALITY GRADES

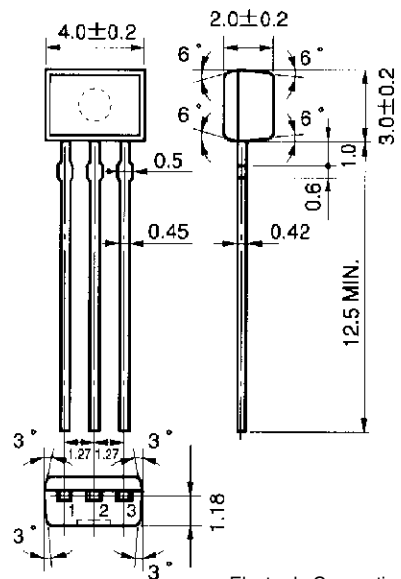
- Standard

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.

BB1 SERIES LISTS

Products	R <sub>1</sub> (KΩ)	R <sub>2</sub> (KΩ)
BB1A4A	—	10
BB1L2Q	0.47	4.7
BB1A3M	1.0	1.0
BB1F3P	2.2	10
BB1J3P	3.3	10
BB1L3N	4.7	10
BB1A4M	10	10

PACKAGE DRAWING (UNIT: mm)



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

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**ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)**

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V <sub>CB0</sub>	30	V
Collector to emitter voltage	V <sub>CEO</sub>	25	V
Emitter to base voltage	V <sub>EBO</sub>	10	V
Collector current (DC)	I <sub>C(DC)</sub>	0.7	A
Collector current (Pulse)	I <sub>C(pulse)</sub> <sup>Note 1</sup>	1.0	A
Base current (DC)	I <sub>B(DC)</sub>	0.02	A
Total power dissipation	P <sub>T</sub>	250	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

**Note 1** PW ≤ 10 ms, duty cycle ≤ 50 %

**BB1A4A**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0			100	nA
DC current gain	h <sub>FE1</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.1 A	300			–
DC current gain	h <sub>FE2</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A	300			–
DC current gain	h <sub>FE3</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.7 A	135			–
Collector saturation voltage	V <sub>CE(sat)</sub> <sup>Note 2</sup>	I <sub>C</sub> = 0.5 A, I <sub>B</sub> = 5 mA		0.27	0.4	V
Low level input voltage	V <sub>IL</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA			0.3	V
Input resistance	R <sub>1</sub>		–	–	–	Ω
E-to-B resistance	R <sub>2</sub>		7	10	13	kΩ

**Note 2** PW ≤ 350 μs, duty cycle ≤ 2 %

**BB1L2Q**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0			100	nA
DC current gain	h <sub>FE1</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.1 A	150	400		–
DC current gain	h <sub>FE2</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A	300	700		–
DC current gain	h <sub>FE3</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.7 A	135	600		–
Low level output voltage	V <sub>OL</sub> <sup>Note 2</sup>	V <sub>IN</sub> = 5.0 V, I <sub>C</sub> = 0.5 A		0.2	0.3	V
Low level input voltage	V <sub>IL</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA			0.3	V
Input resistance	R <sub>1</sub>		329	470	611	Ω
E-to-B resistance	R <sub>2</sub>		3.29	4.7	6.11	kΩ

**Note 2** PW ≤ 350 μs, duty cycle ≤ 2 %

**BB1A3M**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	ICBO	V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0			100	nA
DC current gain	h <sub>FE1</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.1 A	80			—
DC current gain	h <sub>FE2</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A	100			—
DC current gain	h <sub>FE3</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.7 A	135			—
Low level output voltage	V <sub>OL</sub> <sup>Note 2</sup>	V <sub>IN</sub> = 5.0 V, I <sub>C</sub> = 0.5 A		0.3	0.4	V
Low level input voltage	V <sub>IL</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA			0.3	V
Input resistance	R <sub>1</sub>		0.7	1.0	1.3	kΩ
E-to-B resistance	R <sub>2</sub>		0.7	1.0	1.3	kΩ

**Note 2** PW ≤ 350 μs, duty cycle ≤ 2 %

**BB1F3P**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	ICBO	V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0			100	nA
DC current gain	h <sub>FE1</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.1 A	300			—
DC current gain	h <sub>FE2</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A	300			—
DC current gain	h <sub>FE3</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.7 A	135			—
Low level output voltage	V <sub>OL</sub> <sup>Note 2</sup>	V <sub>IN</sub> = 5.0 V, I <sub>C</sub> = 0.3 A			0.3	V
Low level input voltage	V <sub>IL</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA			0.3	V
Input resistance	R <sub>1</sub>		1.54	2.2	2.86	kΩ
E-to-B resistance	R <sub>2</sub>		7	10	13	kΩ

**Note 2** PW ≤ 350 μs, duty cycle ≤ 2 %

**BP1J3P**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	ICBO	V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0			100	nA
DC current gain	h <sub>FE1</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.1 A	300	600		—
DC current gain	h <sub>FE2</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.5 A	300	700		—
DC current gain	h <sub>FE3</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 0.7 A	135	600		—
Low level output voltage	V <sub>OL</sub> <sup>Note 2</sup>	V <sub>IN</sub> = 5.0 V, I <sub>C</sub> = 0.2 A		0.14	0.3	V
Low level input voltage	V <sub>IL</sub> <sup>Note 2</sup>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA			0.3	V
Input resistance	R <sub>1</sub>		2.31	3.3	4.29	kΩ
E-to-B resistance	R <sub>2</sub>		7	10	13	kΩ

**Note 2** PW ≤ 350 μs, duty cycle ≤ 2 %

**BB1L3N**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = 30\text{ V}, I_E = 0$			100	nA
DC current gain	$h_{FE1}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$	300			–
DC current gain	$h_{FE2}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	300			–
DC current gain	$h_{FE3}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$	135			–
Low level output voltage	$V_{OL}$ <small>Note 2</small>	$V_{IN} = 5.0\text{ V}, I_C = 0.2\text{ A}$			0.3	V
Low level input voltage	$V_{IL}$ <small>Note 2</small>	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$			0.3	V
Input resistance	$R_1$		3.29	4.7	6.11	k $\Omega$
E-to-B resistance	$R_2$		7	10	13	k $\Omega$

**Note 2**  $PW \leq 350\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

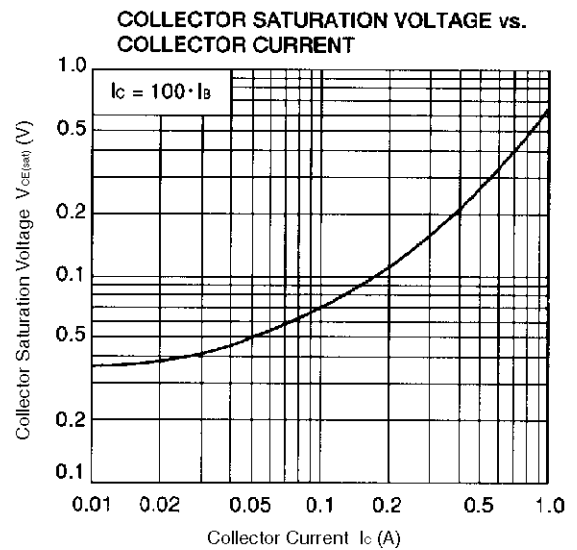
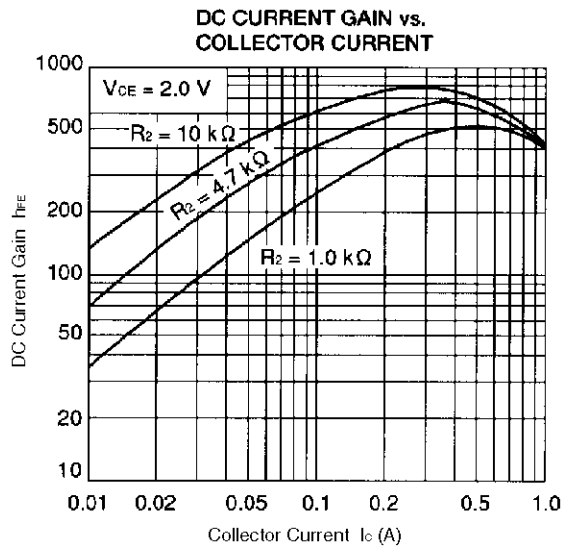
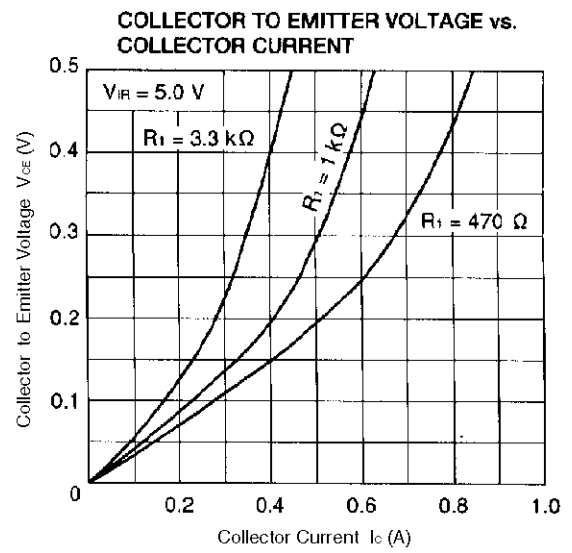
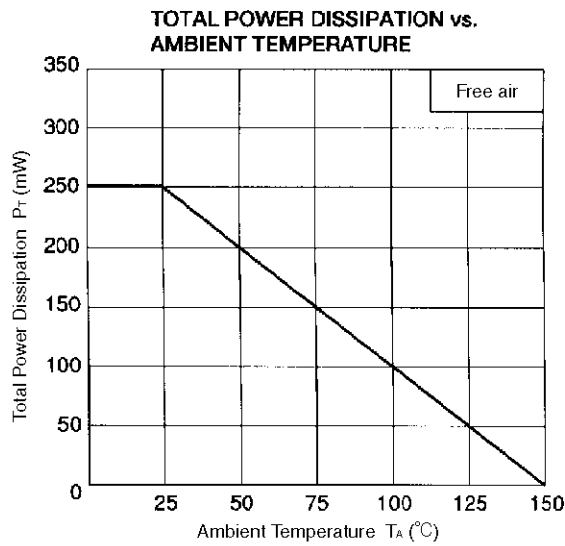
**BB1A4M**

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = 30\text{ V}, I_E = 0$			100	nA
DC current gain	$h_{FE1}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$	300			–
DC current gain	$h_{FE2}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	300			–
DC current gain	$h_{FE3}$ <small>Note 2</small>	$V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$	135			–
Collector saturation voltage	$V_{OL}$ <small>Note 2</small>	$V_{IN} = 5.0\text{ V}, I_C = 0.2\text{ A}$			0.3	V
Low level input voltage	$V_{IL}$ <small>Note 2</small>	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$			0.3	V
Input resistance	$R_1$		7	10	13	k $\Omega$
E-to-B resistance	$R_2$		7	10	13	k $\Omega$

**Note 2**  $PW \leq 350\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



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