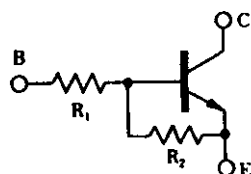


on-chip resistor NPN silicon epitaxial transistor
For mid-speed switching

FEATURES

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



QUALITY GRADES

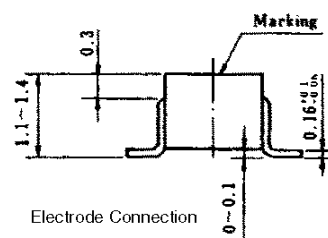
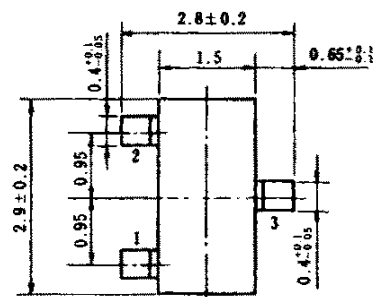
- Standard

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.

FB1 SERIES LISTS

Products	Marking	R ₁ (KΩ)	R ₂ (KΩ)
FB1A4A	P30	—	10
FB1L2Q	P31	0.47	4.7
FB1A3M	P32	1.0	1.0
FB1F3P	P33	2.2	10
FB1J3P	P36	3.3	10
FB1L3N	P34	4.7	10
FB1A4M	P35	10	10

PACKAGE DRAWING (UNIT: mm)



Electrode Connection

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

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V _{CBO}	30	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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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

FB1A4A

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} **	$V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$	300			–
DC current gain	h_{FE2} **	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	300			–
DC current gain	h_{FE3} **	$V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$	135			–
Collector saturation voltage	$V_{CE(sat)}$ **	$I_C = 0.5\text{ A}, I_B = 5\text{ mA}$		0.27	0.4	V
Low level input voltage	V_{IL} **	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$			0.3	V
Input resistance	R_1		–	–	–	Ω
E-to-B resistance	R_2		7	10	13	k Ω

** PW ≤ 350 μs, duty cycle ≤ 2 %

FB1L2Q

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} **	$V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$	150	400		–
DC current gain	h_{FE2} **	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	300	700		–
DC current gain	h_{FE3} **	$V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$	135	600		–
Low level output voltage	V_{OL} **	$V_{IN} = 5.0\text{ V}, I_C = 0.5\text{ A}$		0.2	0.3	V
Low level input voltage	V_{IL} **	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$		0.62	0.3	V
Input resistance	R_1		329	470	611	Ω
E-to-B resistance	R_2		3.29	4.7	6.11	k Ω

** PW ≤ 350 μs, duty cycle ≤ 2 %

FB1A3M

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} **	$V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$	80			–
DC current gain	h_{FE2} **	$V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	100			–
DC current gain	h_{FE3} **	$V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$	135			–
Low level output voltage	V_{OL} **	$V_{IN} = 5.0\text{ V}, I_C = 0.5\text{ A}$		0.3	0.4	V
Low level input voltage	V_{IL} **	$V_{CE} = 5.0\text{ V}, I_C = 100\text{ }\mu\text{A}$			0.3	V
Input resistance	R_1		0.7	1.0	1.3	k Ω
E-to-B resistance	R_2		0.7	1.0	1.3	k Ω

** PW ≤ 350 μs, duty cycle ≤ 2 %

FB1F3P
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CB0}	V _{CB} = 30 V, I _E = 0			100	nA
DC current gain	h _{FE1} **	V _{CE} = 2.0 V, I _C = 0.1 A	300			—
DC current gain	h _{FE2} **	V _{CE} = 2.0 V, I _C = 0.5 A	300			—
DC current gain	h _{FE3} **	V _{CE} = 2.0 V, I _C = 0.7 A	135			—
Low level output voltage	V _{OL} **	V _{IN} = 5.0 V, I _C = 0.3 A			0.3	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 %

FB1J3P
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CB0}	V _{CB} = 30 V, I _E = 0			100	nA
DC current gain	h _{FE1} **	V _{CE} = 2.0 V, I _C = 0.1 A	300	600		—
DC current gain	h _{FE2} **	V _{CE} = 2.0 V, I _C = 0.5 A	300	700		—
DC current gain	h _{FE3} **	V _{CE} = 2.0 V, I _C = 0.7 A	135	600		—
Low level output voltage	V _{OL} **	V _{IN} = 5.0 V, I _C = 0.2 A		0.14	0.3	V
Low level input voltage	V _{IL} **	V _{CE} = 5.0 V, I _C = 100 μA		0.6	0.3	V
Input resistance	R ₁		2.31	3.3	4.29	kΩ
E-to-B resistance	R ₂		7	10	13	kΩ

** PW ≤ 350 μs, duty cycle ≤ 2 %

FB1L3N
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CB0}	V _{CB} = 30 V, I _E = 0			100	nA
DC current gain	h _{FE1} **	V _{CE} = 2.0 V, I _C = 0.1 A	300			—
DC current gain	h _{FE2} **	V _{CE} = 2.0 V, I _C = 0.5 A	300			—
DC current gain	h _{FE3} **	V _{CE} = 2.0 V, I _C = 0.7 A	135			—
Low level output voltage	V _{OL} **	V _{IN} = 5.0 V, I _C = 0.2 A			0.3	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 %

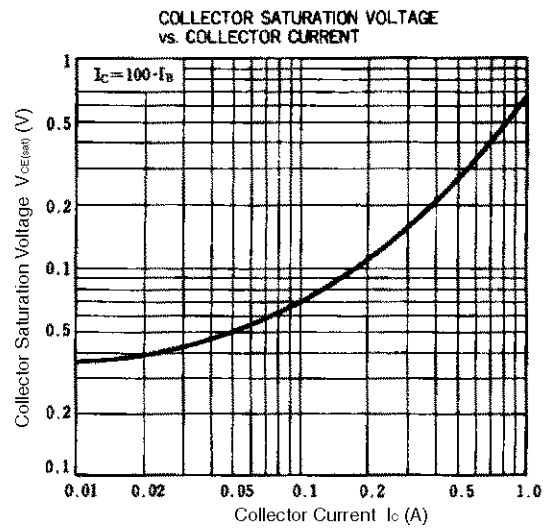
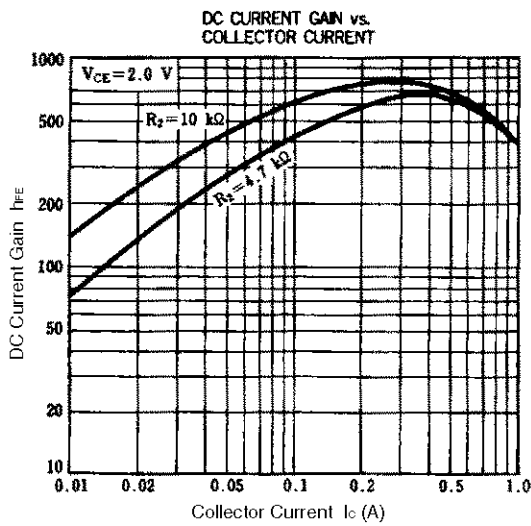
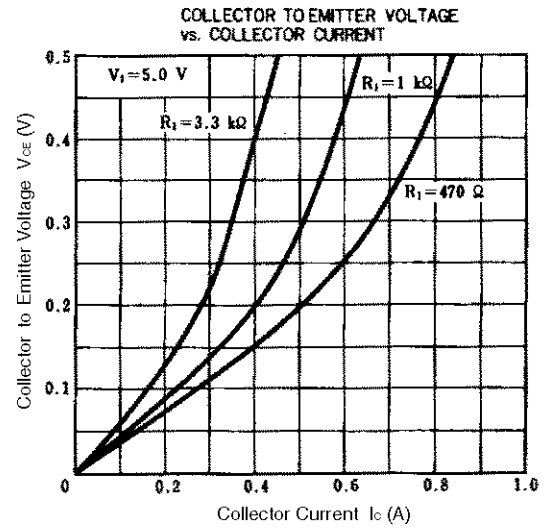
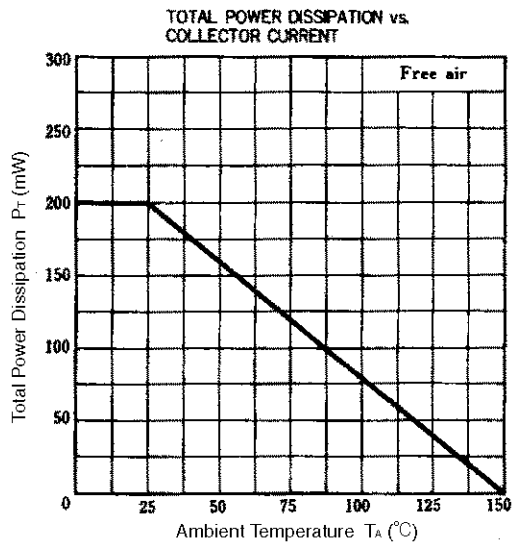
FB1A4M

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

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

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



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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