

To our customers,

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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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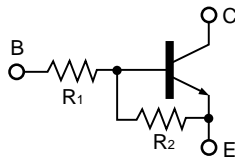
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COMPOUND TRANSISTOR FB1 SERIES

ON-CHIP RESISTOR NPN SILICON EPITAXIAL TRANSISTOR FOR MID-SPEED SWITCHING

FEATURES

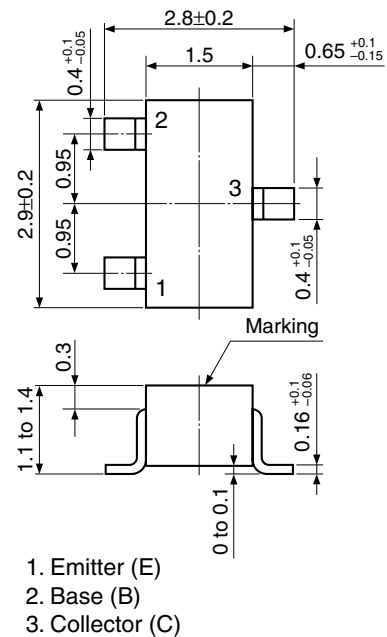
- Up to 0.7 A current drive available
 - On-chip bias resistor
 - Low power consumption during drive
- <R>
- Package: 3-pin Mini Mold (SC-59)



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)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| Parameter | Symbol | Ratings | Unit |
|---|-----------------------|-------------|------|
| Collector to Base Voltage | V _{CB0} | 30 | V |
| Collector to Emitter Voltage | V _{CE0} | 25 | V |
| Emitter to Base Voltage | V _{EB0} | 10 | V |
| Collector Current (DC) | I _{C(DC)} | 0.7 | A |
| Collector Current (pulse) ^{Note} | 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 |

Note PW ≤ 10 ms, Duty Cycle ≤ 50%

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

FB1A4A

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|----------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | I _{CB0} | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 300 | | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 300 | | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | | | – |
| Collector Saturation Voltage ^{Note} | V _{CE(sat)} | I _C = 0.5 A, I _B = 5 mA | | 0.27 | 0.4 | V |
| Low Level Input Voltage ^{Note} | V _{IL} | V _{CE} = 5.0 V, I _C = 100 μA | | | 0.3 | V |
| Input Resistance | R ₁ | | – | – | – | Ω |
| Emitter to Base Resistance | R ₂ | | 7 | 10 | 13 | kΩ |

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1L2Q

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | I _{CB0} | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 150 | 400 | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 300 | 700 | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | 600 | | – |
| Low Level Output Voltage ^{Note} | V _{OL} | V _{IN} = 5.0 V, I _C = 0.5 A | | 0.2 | 0.3 | V |
| Low Level Input Voltage ^{Note} | V _{IL} | V _{CE} = 5.0 V, I _C = 100 μA | | 0.62 | 0.3 | V |
| Input Resistance | R ₁ | | 329 | 470 | 611 | Ω |
| Emitter to Base Resistance | R ₂ | | 3.29 | 4.7 | 6.11 | kΩ |

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1A3M

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | I _{CB0} | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 80 | | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 100 | | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | | | – |
| Low Level Output Voltage ^{Note} | V _{OL} | V _{IN} = 5.0 V, I _C = 0.5 A | | 0.3 | 0.4 | V |
| Low Level Input Voltage ^{Note} | 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 |
| Emitter to Base Resistance | R ₂ | | 0.7 | 1.0 | 1.3 | kΩ |

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1F3P

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | ICBO | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 300 | | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 300 | | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | | | – |
| Low Level Output Voltage ^{Note} | V _{OL} | V _{IN} = 5.0 V, I _C = 0.3 A | | | 0.3 | V |
| Low Level Input Voltage ^{Note} | 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 |
| Emitter to Base Resistance | R ₂ | | 7 | 10 | 13 | kΩ |

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1J3P

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | ICBO | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 300 | 600 | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 300 | 700 | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | 600 | | – |
| Low Level Output Voltage ^{Note} | V _{OL} | V _{IN} = 5.0 V, I _C = 0.2 A | | 0.14 | 0.3 | V |
| Low Level Input Voltage ^{Note} | 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 |
| Emitter to Base Resistance | R ₂ | | 7 | 10 | 13 | kΩ |

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1L3N

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|--|------|------|------|------|
| Collector to Base Cut-off Current | ICBO | V _{CB} = 30 V, I _E = 0 A | | | 100 | nA |
| DC Current Gain ^{Note} | h _{FE1} | V _{CE} = 2.0 V, I _C = 0.1 A | 300 | | | – |
| | h _{FE2} | V _{CE} = 2.0 V, I _C = 0.5 A | 300 | | | – |
| | h _{FE3} | V _{CE} = 2.0 V, I _C = 0.7 A | 135 | | | – |
| Low Level Output Voltage ^{Note} | V _{OL} | V _{IN} = 5.0 V, I _C = 0.2 A | | | 0.3 | V |
| Low Level Input Voltage ^{Note} | 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 |
| Emitter to Base Resistance | R ₂ | | 7 | 10 | 13 | kΩ |

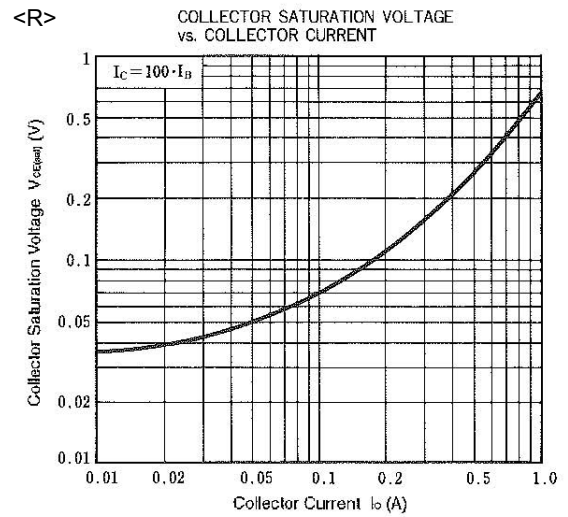
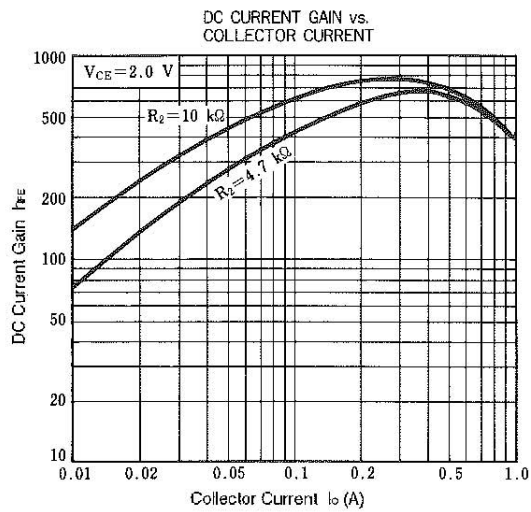
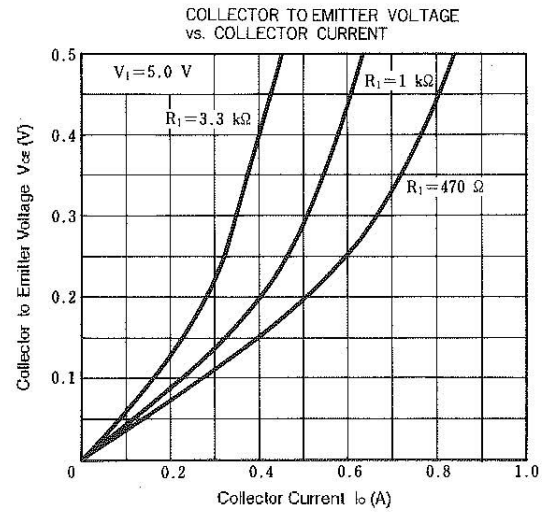
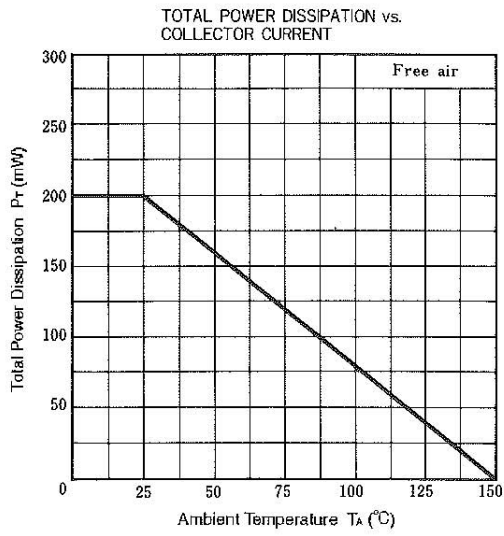
Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1A4M

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|-----------|---|------|------|------|------------|
| Collector to Base Cut-off Current | I_{CBO} | $V_{CB} = 30\text{ V}, I_E = 0\text{ A}$ | | | 100 | nA |
| DC Current Gain ^{Note} | h_{FE1} | $V_{CE} = 2.0\text{ V}, I_C = 0.1\text{ A}$ | 300 | | | – |
| | h_{FE2} | $V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$ | 300 | | | – |
| | h_{FE3} | $V_{CE} = 2.0\text{ V}, I_C = 0.7\text{ A}$ | 135 | | | – |
| Low Level Output Voltage ^{Note} | V_{OL} | $V_{IN} = 5.0\text{ V}, I_C = 0.2\text{ A}$ | | | 0.3 | V |
| Low Level Input Voltage ^{Note} | 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 |
| Emitter to Base Resistance | R_2 | | 7 | 10 | 13 | k Ω |

Note PW \leq 350 μs , Duty Cycle \leq 2%

TYPICAL CHARACTERISTICS (T_A = 25°C)



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