

# Power Transistor (−60V, −4A)

## 2SB1335

### ●Features

- 1) Low  $V_{CE(sat)}$ . (Typ. −0.5V at  $I_C/I_B = -3/-0.3A$ )
- 2) Excellent DC current gain characteristics.
- 3) Wide SOA (safe operating area).
- 4) Complements the 2SD1855.

### ●Packaging specifications and $h_{FE}$

Type	2SB1335
Package	TO-220FP
$h_{FE}$	EF
Code	—
Basic ordering unit (pieces)	500

### ●Absolute maximum ratings ( $T_a=25^{\circ}C$ )

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	−80	V
Collector-emitter voltage	$V_{CEO}$	−60	V
Emitter-base voltage	$V_{EBO}$	−5	V
Collector current	$I_C$	−4	A (DC)
		−6	A (Pulse) *
Collector power dissipation	$P_C$	2	W
		30	W ( $T_C=25^{\circ}C$ )
Junction temperature	$T_J$	150	$^{\circ}C$
Storage temperature	$T_{stg}$	−55~150	$^{\circ}C$

\* Single pulse  $P_w=100ms$

### ●Electrical characteristics ( $T_a=25^{\circ}C$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	−80	—	—	V	$I_C = -50 \mu A$
Collector-emitter breakdown voltage	$BV_{CEO}$	−60	—	—	V	$I_C = -1mA$
Emitter-base breakdown voltage	$BV_{EBO}$	−5	—	—	V	$I_E = -50 \mu A$
Collector cutoff current	$I_{CBO}$	—	—	−10	$\mu A$	$V_{CB} = -80V$
Emitter cutoff current	$I_{EBO}$	—	—	−10	$\mu A$	$V_{EB} = -4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	−1.5	V	$I_C/I_B = -3A/-0.3A$ *
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	−1.5	V	$I_C/I_B = -3A/-0.3A$ *
DC current transfer ratio	$h_{FE}$	100	—	320	—	$V_{CE}/I_C = -5V/-1A$
Transition frequency	$f_T$	—	12	—	MHz	$V_{CE} = -5V, I_E = 0.5A, f = 5MHz$ *
Output capacitance	$C_{ob}$	—	100	—	pF	$V_{CB} = -10V, I_E = 0A, f = 1MHz$

\* Measured using pulse current

(94L-356-B14)

# Power Transistor (60V, 4A)

## 2SD1855

### ●Features

- 1) Low  $V_{CE(sat)}$ . (Typ. 0.3V at  $I_C/I_B = 3/0.3A$ )
- 2) Excellent DC current gain characteristics.
- 3) Wide SOA (safe operating area).
- 4) Complements the 2SB1335.

### ●Packaging specifications and $h_{FE}$

Type	2SD1855
Package	TO-220FP
$h_{FE}$	EF
Code	—
Basic ordering unit (pieces)	500

### ●Absolute maximum ratings ( $T_a=25^{\circ}C$ )

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	80	V
Collector-emitter voltage	$V_{CEO}$	60	V
Emitter-base voltage	$V_{EBO}$	5	V
Collector current	$I_C$	4	A (DC)
		6	A (Pulse) *
Collector power dissipation	$P_C$	2	W
		30	W ( $T_C=25^{\circ}C$ )
Junction temperature	$T_J$	150	$^{\circ}C$
Storage temperature	$T_{stg}$	−55~150	$^{\circ}C$

\* Single pulse  $P_w=100ms$

### ●Electrical characteristics ( $T_a=25^{\circ}C$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	80	—	—	V	$I_C = 50 \mu A$
Collector-emitter breakdown voltage	$BV_{CEO}$	60	—	—	V	$I_C = 1mA$
Emitter-base breakdown voltage	$BV_{EBO}$	5	—	—	V	$I_E = 50 \mu A$
Collector cutoff current	$I_{CBO}$	—	—	10	$\mu A$	$V_{CB} = 60V$
Emitter cutoff current	$I_{EBO}$	—	—	10	$\mu A$	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	1	V	$I_C/I_B = 3A/0.3A$ *
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	1.5	V	$I_C/I_B = 3A/0.3A$ *
DC current transfer ratio	$h_{FE}$	100	—	320	—	$V_{CE}/I_C = 5V/1A$
Transition frequency	$f_T$	—	8	—	MHz	$V_{CE} = 5V, I_E = -0.5A, f = 5MHz$ *
Output capacitance	$C_{ob}$	—	90	—	pF	$V_{CB} = 10V, I_E = 0A, f = 1MHz$

\* Measured using pulse current

7828999 0016930 648

(94L-878-D14)



Type	External dimensions (Units : mm)	Features
<p>CPT 3 SC-63 type</p>	<p>Technical drawing of CPT 3 SC-63 type transistor. Top view dimensions: 6.5±0.2, 5.1±0.2, 0.9, 0.75, 0.65±0.1, 2.3±0.2, 2.3±0.2. Side view dimensions: 2.3±0.2, 0.5±0.1, 1.5, 2.5, 9.5±0.5, 0.55±0.1, 1.0±0.2. Lead angle is C0.5.</p>	<p>By itself the CPT3 has a <math>P_c</math> of 1 W (<math>T_a = 25^\circ\text{C}</math>), but a large <math>P_c</math> of several watts can be obtained with an appropriate mounting surface. At the same time the CPT3 is compact, making it suitable for high density mounting and hybrid ICs. Available on tape for automatic mounting. For vertical high density mounting, the leaded CPT (SC-64) type with the same mold size is also available.</p>
<p>PSD3</p>	<p>Technical drawing of PSD3 transistor. Top view dimensions: 10.1±0.3, 13.1±0.5, 3.2, 2.54, 0.78, 1.24, 5.08, 8.6±0.2. Side view dimensions: 4.5±0.2, 1.3, 0~0.3, 0.4, 1.3, 0.5Min.</p>	<p>The PSD3 is a TO-220 class surface-mount package. A high <math>P_c</math> can be obtained with an appropriate mounting surface. Surface mounting allows a high vertical density, enabling the design of slim and compact devices. The PSD3 is available on tape for automatic mounting, and it helps improve mounting efficiency and reduce mounting cost.</p>
<p>SMT5 SC-74A type</p>	<p>Technical drawing of SMT5 SC-74A type transistor. Top view dimensions: 2.9±0.2, 1.9±0.2, 0.95, 0.95, 1.6±0.2, 1.6±0.1, 2.8±0.2, 0.3±0.1, 0.05. Side view dimensions: 1.1±0.2, 0.8±0.1, 0~0.1, 0.15±0.1, 0.06, 0.3~0.6.</p> <p>All terminals have same dimensions</p>	<p>The SMT5 consists of two connected transistors or digital transistors in an SMT3 (SC-59) package. The mounting area can be reduced by 50% compared to the SMT3 and the internal circuitry is complete, making this package ideal for high density mounting at half the assembly cost.</p>
<p>SMT6 SC-74 type</p>	<p>Technical drawing of SMT6 SC-74 type transistor. Top view dimensions: 2.9±0.2, 1.9±0.2, 0.95, 0.95, 1.6±0.2, 1.6±0.1, 2.8±0.2, 0.3±0.1, 0.05. Side view dimensions: 1.1±0.2, 0.8±0.1, 0~0.1, 0.15±0.1, 0.06, 0.3~0.6.</p>	<p>The SMT6 consists of two independent transistors or two independent digital transistors in an SMT3 (SC-59) package. The mounting area and mounting cost can be reduced by 50% compared to the SMT3, and the two transistors are independent to allow free configuration of a high density circuit.</p>

EXPLANATION

Type	External dimensions (Units : mm)	Features
<p>UMT5 SC-88A type</p>	<p>All terminals have same dimensions</p>	<p>The UMT5 consists of two connected transistors or digital transistors in a UMT3 (SC-70) package. The mounting area can be reduced by 50% compared to the UMT3 and the internal circuitry is completed, making this package ideal for high density mounting at half the assembly cost.</p>
<p>UMT6 SC-88 type</p>	<p>All terminals have same dimensions</p>	<p>The UMT6 consists of two independent transistors or two independent digital transistors in a UMT (SC-70) package. The mounting area and mounting cost can be reduced by 50% compared to the UMT3, and the two transistors are independent to allow free configuration of a high density circuit.</p>

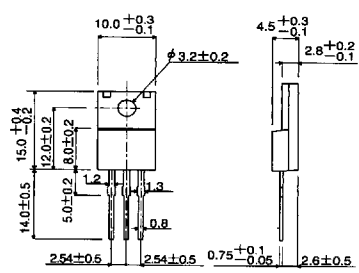
●Types and features of leaded packages

Type	External dimensions (Units : mm)	Features
<p>SPT (SC-72 type)</p>		<p>The SPT is a smaller version of the conventional TO-92 type. The body size (3×4×2 mm<sup>3</sup>) has been reduced to 1/4 that of the TO-92 (5×5×4 mm<sup>3</sup>). The SPT is available on tape for automatic insertion, and less space is occupied on the printed circuit board than the TO-92. Reliability is the same as the TO-92.</p>
<p>FTR</p>		<p>SIL type with a height of 3.4 mm and a lead pitch of 2.54 mm.</p>
<p>FTL</p>		<p>The FTL is a radial taping version of the highly popular FTR. This enables automatic high-density mounting with a radial insertion machine.</p>
<p>ATR (SC-71 type)</p>		<p>SC-71 type with a height of 4.4 mm and a P<sub>c</sub>=1W type.</p>

EXPLANATION

Type	External dimensions (Units : mm)	Features
<p>ATV</p>		<p>The ATV is a radial tapping version of the highly popular ATR. This enables automatic high-density mounting with a radial insertion machine.</p>
<p>TO-92 (SC-43 type)</p>		<p>The SC-43 is for general purpose small signals.</p>
<p>TO-126FP</p>		<p>The TO-126FP is an isolation type package based on a TO-126 full mold. In addition to the features of the TO-126, molded heat sink fins allow easy isolation of the heat sink.</p>
<p>TO-220FP (SC-67 type)</p>		<p>The TO-220FP is an isolation type package based on a TO-220 full mold. In addition to the features of the TO-126 and TO-220, molded heat sink fins allow easy isolation of the heat sink.</p>

7828999 0016713 7T7

Type	External dimensions (Units : mm)	Features
TO-220FN	 <p>Technical drawing of the TO-220FN transistor showing front and side views with dimensions in millimeters:</p> <ul style="list-style-type: none"> <li>Top view dimensions: <math>10.0^{+0.3}_{-0.1}</math> (width), <math>\phi 3.2^{+0.2}</math> (hole diameter), <math>12.0^{+0.2}</math> (height to top of hole), <math>8.0^{+0.2}</math> (height to base of hole), <math>5.0^{+0.2}</math> (height to base of lead), <math>1.2</math> (lead thickness), <math>1.3</math> (lead thickness), <math>0.8</math> (lead thickness).</li> <li>Side view dimensions: <math>14.0^{+0.5}</math> (total height), <math>15.0^{+0.4}_{-0.2}</math> (height to top of hole), <math>4.5^{+0.3}_{-0.1}</math> (height to top of hole), <math>2.8^{+0.2}_{-0.1}</math> (height to base of hole), <math>2.54^{+0.5}</math> (lead length), <math>0.75^{+0.1}_{-0.05}</math> (lead thickness), <math>2.6^{+0.5}</math> (lead length).</li> </ul>	<p>The TO-220FN features the same performance as the TO-220FP with approximately 2 mm less height, allowing the design of slimmer devices. Furthermore, the elimination of support pins in the fin (collector electrode) solves short-circuiting problems with neighboring components and the chassis.</p> <p>To make the height to the installation hole the same as the TO-220FP, it can be replaced as is from the TO-220FP.</p>

EXPLANATION

■ 7828999 0016714 633 ■