

Power Transistor (80V, 0.5A)

2SD1782K

●Features

1) Low $V_{CE(sat)}$.

$$V_{CE(sat)} = 0.2V \text{ (Typ.)}$$

$$(I_C/I_B = 0.5A/50mA)$$

2) High breakdown voltage.

$$BV_{CEO} = 80V$$

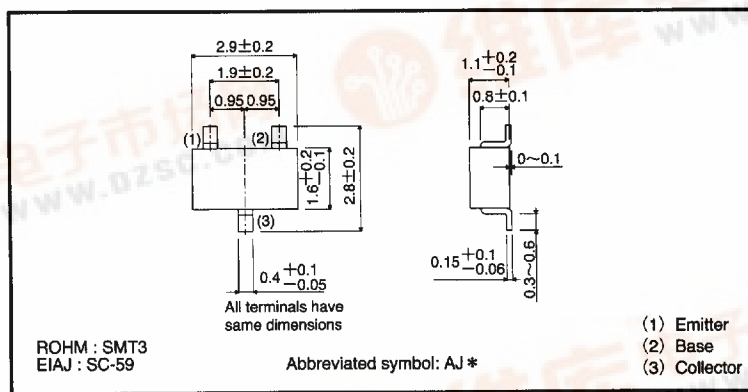
3) Complements the 2SB1198K.

●Structure

Epitaxial planar type

NPN silicon transistor

●External dimensions (Units: mm)



* Denotes hrf

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

Parameter	Symbol	Limits	Unit
Collector-base voltage	V_{CB0}	80	V
Collector-emitter voltage	V_{CE0}	80	V
Emitter-base voltage	V_{EB0}	5	V
Collector current	I_C	0.5	A
Collector power dissipation	P_C	0.2	W
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55~150	$^\circ\text{C}$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV_{CBO}	80	—	—	V	$I_C = 50\ \mu\text{A}$
Collector-emitter breakdown voltage	BV_{CEO}	80	—	—	V	$I_C = 2\text{mA}$
Emitter-base breakdown voltage	BV_{EBO}	5	—	—	V	$I_E = 50\ \mu\text{A}$
Collector cutoff current	I_{CBO}	—	—	0.5	μA	$V_{CB} = 50\text{V}$
Emitter cutoff current	I_{EBO}	—	—	0.5	μA	$V_{EB} = 4\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.2	0.5	V	$I_C/I_B = 500\text{mA}/50\text{mA}$
DC current transfer ratio	h_{FE}	120	—	390	—	$V_{CE} = 3\text{V}$, $I_C = 100\text{mA}$
Transition frequency	f_T	—	180	—	MHz	$V_{CE} = 10\text{V}$, $I_E = -50\text{mA}$, $f = 100\text{MHz}$
Output capacitance	C_{ob}	—	7.5	—	pF	$V_{CB} = 10\text{V}$, $I_E = 0\text{A}$, $f = 1\text{MHz}$

●Packaging specifications and h_{FE}

Type	h_{FE}	Package name	Taping
		Symbol	T146
		Basic ordering unit (pieces)	3000
2SD1782K	QR		○

 h_{FE} values are classified as follows :

Item	Q	R
h_{FE}	120~270	180~390

●Electrical characteristic curves

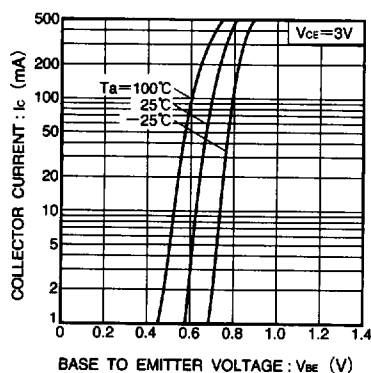


Fig.1 Grounded emitter propagation characteristics

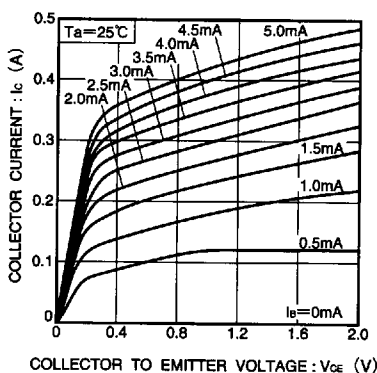


Fig.2 Grounded emitter output characteristics

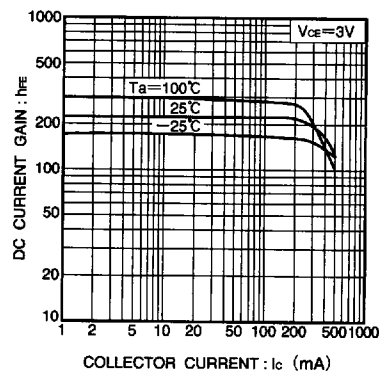


Fig.3 DC current gain vs. collector current

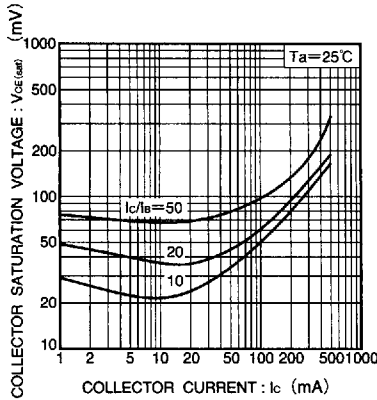


Fig. 4 Collector-emitter saturation voltage vs. collector current (I)

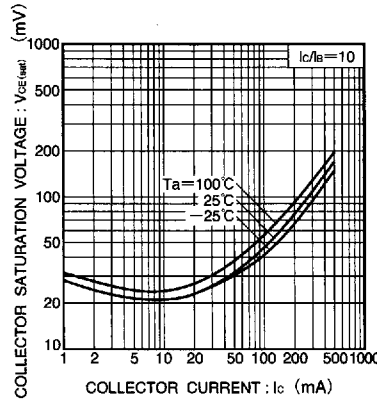


Fig. 5 Collector-emitter saturation voltage vs. collector current (II)

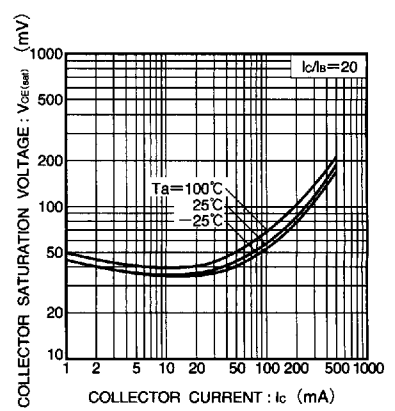


Fig. 6 Collector-emitter saturation voltage vs. collector current (III)

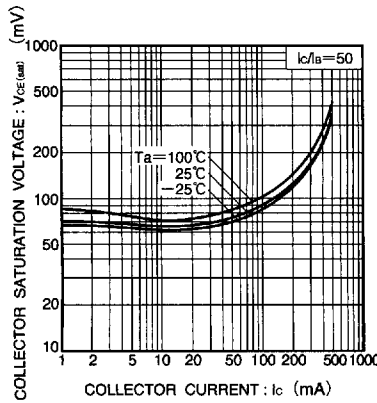


Fig. 7 Collector-emitter saturation voltage vs. collector current (IV)

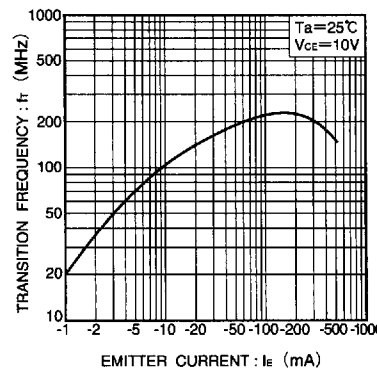


Fig. 8 Gain bandwidth product vs. emitter current

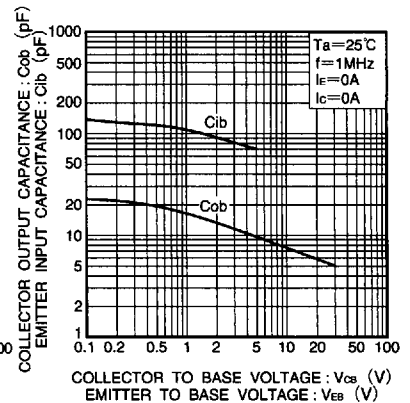


Fig. 9 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

Packages

ROHM has been manufacturing transistors since 1975. In the development of products, we constantly strive to anticipate the needs of our customers. Regarding packages, the demands of the market for compactness, low power consumption, low power dissipation and automatic mounting support are becoming ever greater, and we are strengthening our product development system to meet these needs.

●Types and features of surface-mount packages

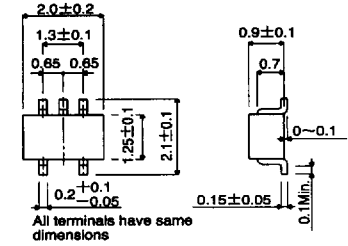
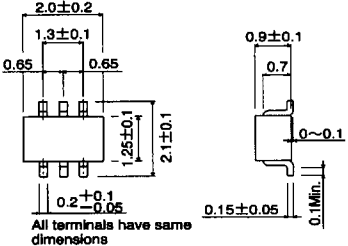
Type	External dimensions (Units : mm)	Features
EMT3 SC-75A type		<p>A more compact version of the UMT3 (SC-70), the EMT3 is the world's smallest transistor with a mold size of 1.6×0.8 mm. The mounting area is approximately 60% of the UMT3 and 30% of the SMT3, making it ideal for ultra-high density mounting. Mounting is possible with the same type of automatic mounting machine as the UMT3.</p>
UMT3 SC-70 type		<p>The UMT3 is a smaller version of the SMT3 (SC-59). The mounting area is approximately 60% of the SMT3, making it optimum for high density mounting. The taping size is the same as the SMT3, allowing use of conventional automatic mounting machines. Electrical characteristics and reliability are the same as the SMT3.</p>
SMT3 SC-59 type		<p>The SMT3 is a compact package suitable for small electronic devices and hybrid IC applications. With proven performance, this is one of the most basic small packages. With the exception of P_c (collector power dissipation), electrical characteristics are similar to leaded packages. Reliability is on the same level as the TO-92.</p>
MPT3 SC-62 type		<p>By itself the MPT3 has a P_c of 0.5 W ($T_a = 25^\circ\text{C}$), but when used on a $40 \times 40 \times 0.7$ mm ceramic board, $P_c = 2$ W ($T_c = 25^\circ\text{C}$), allowing high power to be obtained with a small package. The flat package makes it suitable for applications requiring compactness such as hybrid ICs. Available on tape for automatic mounting.</p>

Transistors

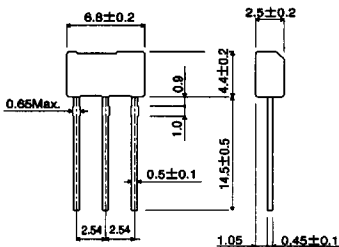
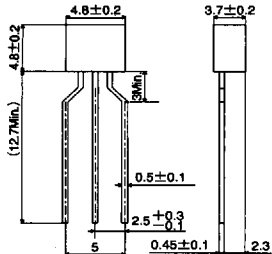
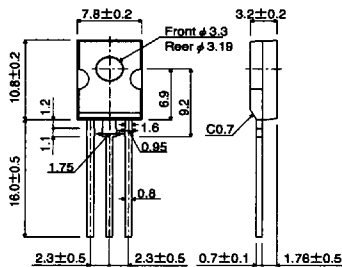
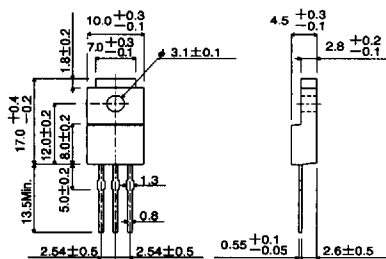
Packages

Type	External dimensions (Units : mm)	Features
CPT 3 SC-63 type	<p>Technical drawing of CPT 3 SC-63 type package. Dimensions include: 6.5±0.2, 5.1±0.2, 1.5±0.3, 5.5±0.3, 0.75, 0.9, 0.65±0.1, 2.3±0.2, 2.3±0.2, 2.3±0.2, 0.9, 2.3±0.2, 0.5±0.1, 1.5, 9.5±0.5, 0.55±0.1, 1.0±0.2, C0.5, and a note (R 0.5).</p>	<p>By itself the CPT3 has a P_c of 1 W ($T_a = 25^\circ\text{C}$), but a large P_c 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.</p> <p>For vertical high density mounting, the leaded CPT (SC-64) type with the same mold size is also available.</p>
PSD3	<p>Technical drawing of PSD3 package. Dimensions include: 10.1±0.3, 13.1±0.5, 3.2, 8.8±0.2, 2.54, 0.78, 1.24, 5.08, 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 P_c 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>
SMT5 SC-74A type	<p>Technical drawing of SMT5 SC-74A type package. Dimensions include: 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, 1.1±0.2, 0.1, 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>
SMT6 SC-74 type	<p>Technical drawing of SMT6 SC-74 type package. Dimensions include: 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, 1.1±0.2, 0.1, 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

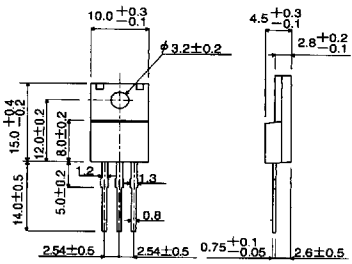
Type	External dimensions (Units : mm)	Features
<p>UMT5 SC-88A type</p>	 <p>Top view dimensions: 2.0±0.2, 1.3±0.1, 0.65, 0.65, 1.25±0.1, 2.1±0.1, 0.2+0.1/-0.05. Side view dimensions: 0.9±0.1, 0.7, 0~0.1, 0.15±0.05, 0.1Min. All terminals have same dimensions.</p>	<p>The UMT5 consists of two connected transistors 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>Top view dimensions: 2.0±0.2, 1.3±0.1, 0.65, 0.65, 1.25±0.1, 2.1±0.1, 0.2+0.1/-0.05. Side view dimensions: 0.9±0.1, 0.7, 0~0.1, 0.15±0.05, 0.1Min. 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>

EXPLANATION

Type	External dimensions (Units : mm)	Features
ATV	 <p>Top view dimensions: 6.8±0.2, 0.65Max., 2.54, 2.54, 0.5±0.1, 1.0, 0.9, 4.4±0.2, 14.5±0.5, 1.05, 0.45±0.1.</p> <p>Side view dimensions: 2.5±0.2, 1.05, 0.45±0.1.</p>	The ATV is a radial tapering version of the highly popular ATR. This enables automatic high-density mounting with a radial insertion machine.
TO-92 (SC-43 type)	 <p>Top view dimensions: 4.8±0.2, 4.8±0.2, 3.7±0.2, 0.5±0.1, 2.5±0.3, 0.1, 0.45±0.1, 2.3.</p> <p>Side view dimensions: 4.8±0.2, 3.7±0.2, 0.5±0.1, 2.5±0.3, 0.1, 0.45±0.1, 2.3.</p>	The SC-43 is for general purpose small signals.
TO-126FP	 <p>Top view dimensions: 7.8±0.2, 10.8±0.2, 1.2, 1.1, 1.75, 0.95, 0.8, 2.3±0.5, 2.3±0.5, 0.7±0.1, 1.78±0.5.</p> <p>Side view dimensions: 3.2±0.2, 0.7, 1.78±0.5.</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.
TO-220FP (SC-67 type)	 <p>Top view dimensions: 10.0±0.3, 7.0±0.3, 1.8±0.2, 1.2, 1.3, 0.8, 2.54±0.5, 2.54±0.5, 0.55±0.1, 0.05, 2.6±0.5.</p> <p>Side view dimensions: 4.5±0.3, 2.8±0.2, 0.1, 2.6±0.5.</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.

Transistors

Packages

Type	External dimensions (Units : mm)	Features
TO-220FN	 <p>Technical drawing of the TO-220FN transistor package. The drawing includes a top view and a side view. The top view shows a rectangular body with a central circular feature. Dimensions include: overall width 10.0 ± 0.3 mm, central hole diameter $\phi 3.2 \pm 0.2$ mm, body width 14.0 ± 0.5 mm, body height 15.0 ± 0.4 mm, mounting hole diameter 12.0 ± 0.2 mm, mounting hole offset 8.0 ± 0.2 mm, mounting hole offset 5.0 ± 0.2 mm, mounting hole offset 1.2 mm, mounting hole offset 1.3 mm, mounting hole offset 0.8 mm, mounting hole offset 2.54 ± 0.5 mm, mounting hole offset 2.54 ± 0.5 mm, mounting hole offset 0.75 ± 0.1 mm, mounting hole offset 0.05 mm, mounting hole offset 2.8 ± 0.5 mm. The side view shows a rectangular body with a central circular feature. Dimensions include: overall height 4.5 ± 0.3 mm, mounting hole offset 2.8 ± 0.1 mm, mounting hole offset 0.2 mm, mounting hole offset 0.1 mm.</p>	<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