

High-voltage switching Transistor (Camera strobes and Telephone, Power supply)

2SA1920

●Features

- 1) High breakdown voltage. ($V_{CE0} = -400V$)
- 2) Low $V_{CE(sat)}$. (Typ. $-0.2V$ at $I_C/I_B = -20/-2mA$)
- 3) Fast switching. (t_f : Typ. $1\mu s$ at $I_C = -100mA$)
- 4) Wide SOA (safe operating area).

●Packaging specifications and hFE

Type	2SA1920
Package	ATV
hFE	P
Marking	—
Code	TV2
Basic ordering unit (pieces)	2500

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV_{CBO}	-600	—	—	V	$I_C = -50\mu A$
Collector-emitter breakdown voltage	BV_{CEO}	-600	—	—	V	$I_C = -1mA$
Emitter-base breakdown voltage	BV_{EBO}	-7	—	—	V	$I_E = -50\mu A$
Collector cutoff current	I_{CBO}	—	—	-10	μA	$V_{CB} = -400V$
Emitter cutoff current	I_{EBO}	—	—	-10	μA	$V_{EB} = -6V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	-0.2	-0.5	V	$I_C/I_B = -20mA/-2mA$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	-1.2	V	$I_C/I_B = -20mA/-2mA$
DC current transfer ratio	hFE	82	—	180	—	$V_{CE} = -10V, I_C = -10mA$
Transition frequency	f_T	—	12	—	MHz	$V_{CE} = -10V, I_E = 10mA, f = 5MHz$
Output capacitance	Cob	—	13	—	pF	$V_{CB} = -10V, I_E = 0A, f = 1MHz$
Turn-on time	t_{on}	—	0.7	—	μs	$I_C = -100mA, R_L = 1.5k\Omega$
Storage time	t_{stg}	—	1.8	—	μs	$I_{B1} = -I_{B2} = -10mA$
Fall time	t_f	—	1	—	μs	$V_{CC} = -150V$

(SPEC-A324)

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	V_{CBO}	-600	V
Collector-emitter voltage	V_{CEO}	-600	V
Emitter-base voltage	V_{EBO}	-7	V
Collector current	I_C	-0.1	A (DC)
		-0.2	A (Pulse) *1
Collector power dissipation	P_C	1	W *2
Junction temperature	T_J	150	°C
Storage temperature	T_{stg}	-55~150	°C

- *1 Single pulse $P_w = 100ms$
- *2 On $40 \times 40 \times 0.7$ mm ceramic board.

High-speed Switching Transistor (-60V, -12A)

2SA1870

●Features

- 1) High speed switching (t_f : Typ. $0.17\mu s$ at $I_C = -6A$)
- 2) Low $V_{CE(sat)}$. (Typ. $-0.2V$ at $I_C/I_B = -6/-0.3A$)
- 3) Wide SOA (safe operating area)

●Packaging specifications and hFE

Type	2SA1870
Package	PSD3
hFE	EF
Code	TL
Basic ordering unit (pieces)	1000

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	V_{CBO}	-100	V
Collector-emitter voltage	V_{CEO}	-60	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-12	A
		-20	A (Pulse) *
Collector power dissipation	P_C	35	W ($T_C = 25^\circ C$)
Junction temperature	T_J	150	°C
Storage temperature	T_{stg}	-55~150	°C

* Single pulse $P_w = 100ms$

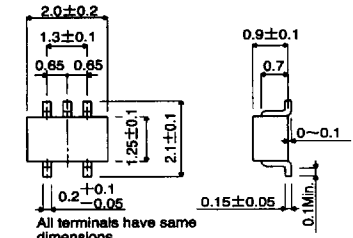
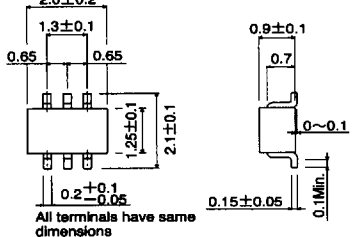
●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV_{CBO}	-100	—	—	V	$I_C = -50\mu A$
Collector-emitter breakdown voltage	$BV_{CE0(sus)}$	-60	—	—	V	$I_C = -6A, I_B = -0.6A, L = 1mH$
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	μA	$V_{CB} = -100V$
Emitter cutoff current	I_{EBO}	—	—	-10	μA	$V_{EB} = -5V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	-0.2	-0.3	V	$I_C/I_B = -6A/-0.3A$
		—	—	-0.5	V	$I_C/I_B = -8A/-0.4A$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	-1.2	V	$I_C/I_B = -6A/-0.3A$
		—	—	-1.5	V	$I_C/I_B = -8A/-0.4A$
DC current transfer ratio	hFE	100	—	320	—	$V_{CE} = -2V, I_C = -2A$
Transition frequency	f_T	—	80	—	MHz	$V_{CB} = -10V, I_E = -1A, f = 30MHz$
Output capacitance	Cob	—	250	—	pF	$V_{CE} = -10V, I_E = 0A, f = 1MHz$
Turn-on time	t_{on}	—	—	0.3	μs	$I_C = -6A$
Storage time	t_{stg}	—	—	1.5	μs	$I_{B1} = -I_{B2} = -0.3A$
Fall time	t_f	—	0.17	0.3	μs	$V_{CC} = -30V$

(96-113-A325)

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, 0.65±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 diameter: C0.5. Lead length: 5.5+0.3/-0.1, 1.5±0.3, 0.75, 0.9.</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. 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, 5.08, 0.78, 1.24, 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 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>
<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, 0.1, 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>
<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, 0.1, 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>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>

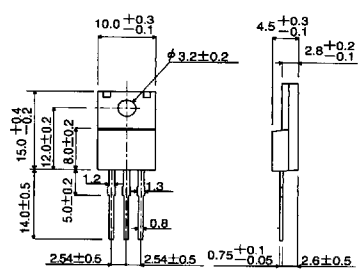
●Types and features of leaded packages

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 mm³) has been reduced to 1/4 that of the TO-92 (5×5×4 mm³). 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_c=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>

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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"> Front view dimensions: <ul style="list-style-type: none"> Top width: $10.0^{+0.3}_{-0.1}$ Top diameter: $\phi 3.2 \pm 0.2$ Left side height: $15.0^{+0.4}_{-0.2}$ Left side width: 12.0 ± 0.2 Left side width: 8.0 ± 0.2 Left side width: 5.0 ± 0.2 Left side width: 1.2 Left side width: 1.3 Left side width: 0.8 Bottom width: 2.54 ± 0.5 Bottom width: 2.54 ± 0.5 Bottom width: $0.75^{+0.1}_{-0.05}$ Bottom width: 2.6 ± 0.5 Side view dimensions: <ul style="list-style-type: none"> Top width: $4.5^{+0.3}_{-0.1}$ Top width: $2.8^{+0.2}_{-0.1}$ Bottom width: 2.6 ± 0.5 <td data-bbox="651 170 1243 512"> <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> </td>	<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

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