

To our customers,

Old Company Name in Catalogs and Other Documents

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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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SILICON POWER TRANSISTOR

2SD1691

NPN SILICON EPITAXIAL TRANSISTOR

FOR LOW-FREQUENCY POWER AMPLIFIERS AND MID-SPEED SWITCHING

FEATURES

- Large current capacity and low $V_{CE(sat)}$:
 $I_{C(DC)} = 5.0 \text{ A}$, $I_{C(pulse)} = 8.0 \text{ A}$
 $V_{CE(sat)} = 0.1 \text{ V TYP. (@ } I_C = 2.0 \text{ A, } I_B = 0.2 \text{ A)}$
- Large power dissipation TO-126 type power transistor
 $P_T = 1.3 \text{ W (@ } T_a = 25^\circ\text{C)}$, $20 \text{ W (@ } T_c = 25^\circ\text{C)}$
- Complementary transistor: 2SB1151

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	60	V
Collector to emitter voltage	V_{CEO}	60	V
Emitter to base voltage	V_{EBO}	7.0	V
Collector current (DC)	$I_{C(DC)}$	5.0	A
Collector current (pulse)	$I_{C(pulse)}^*$	8.0	A
Base current (DC)	$I_{B(DC)}$	1.0	A
Total power dissipation	$P_T (T_a = 25^\circ\text{C})$	1.3	W
Total power dissipation	$P_T (T_c = 25^\circ\text{C})$	20	W
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

* $PW \leq 10 \text{ ms}$, duty cycle $\leq 50\%$

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	$V_{CB} = 50 \text{ V}$, $I_E = 0$			10	μA
Emitter cutoff current	I_{EBO}	$V_{EB} = 7.0 \text{ V}$, $I_C = 0$			10	μA
DC current gain	h_{FE1}^{**}	$V_{CE} = 1.0 \text{ V}$, $I_C = 0.1 \text{ A}$	60			
DC current gain	h_{FE2}^{**}	$V_{CE} = 1.0 \text{ V}$, $I_C = 2.0 \text{ A}$	100		400	
DC current gain	h_{FE3}^{**}	$V_{CE} = 1.0 \text{ V}$, $I_C = 5.0 \text{ A}$	50			
Collector saturation voltage	$V_{CE(sat)}^{**}$	$I_C = 2.0 \text{ A}$, $I_B = 0.2 \text{ A}$		0.1	0.3	V
Base saturation voltage	$V_{BE(sat)}^{**}$	$I_C = 2.0 \text{ A}$, $I_B = 0.2 \text{ A}$		0.9	1.2	V
Turn-on time	t_{on}	$I_C = 2.0 \text{ A}$, $I_{B1} = -I_{B2} = 0.2 \text{ A}$ $R_L = 5.0 \Omega$, $V_{CC} \equiv 10 \text{ V}$		0.2	1.0	μs
Storage time	t_{stg}			1.1	2.5	μs
Fall time	t_f			0.2	1.0	μs

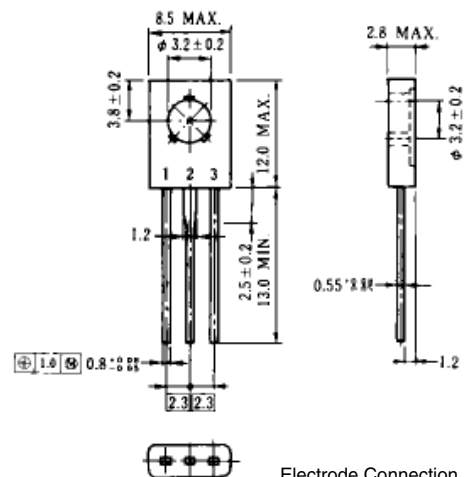
** Pulse test $PW \leq 350 \mu\text{s}$, duty cycle $\leq 2\%$

h_{FE} CLASSIFICATION

Marking	M	L	K
h_{FE2}	100 to 200	160 to 320	200 to 400

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PACKAGE DRAWING (UNIT: mm)

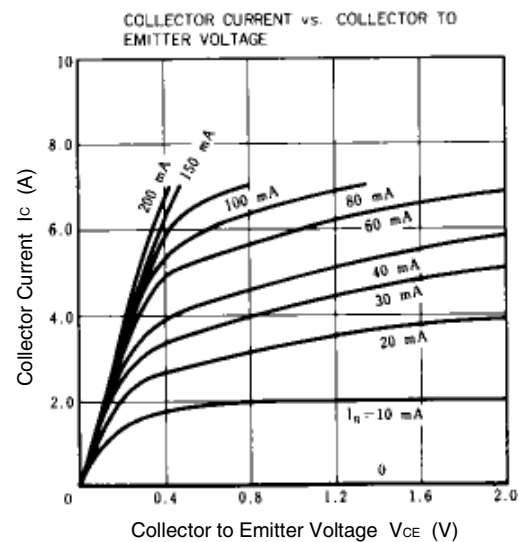
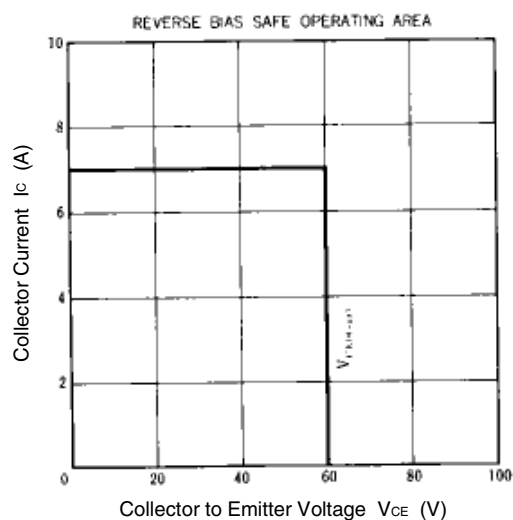
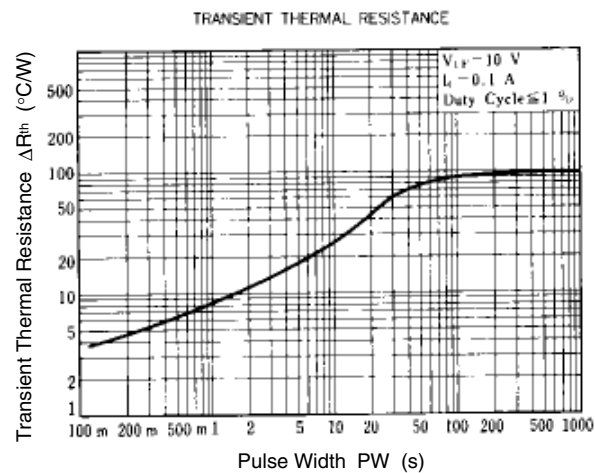
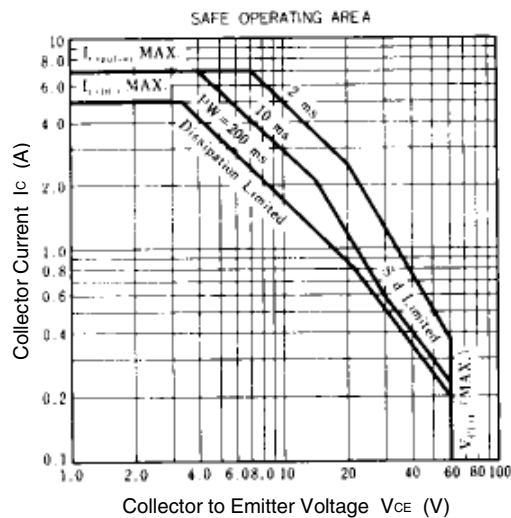
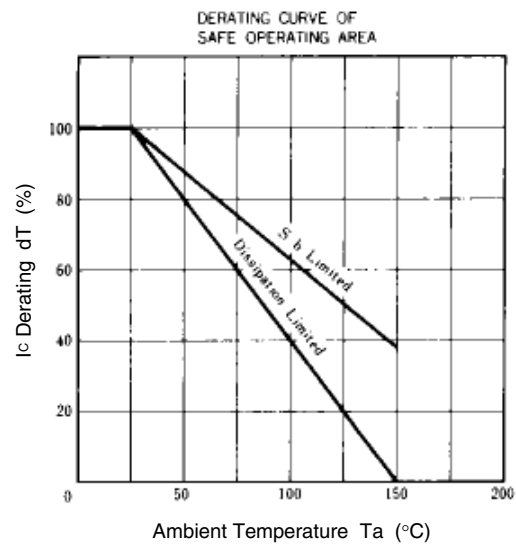


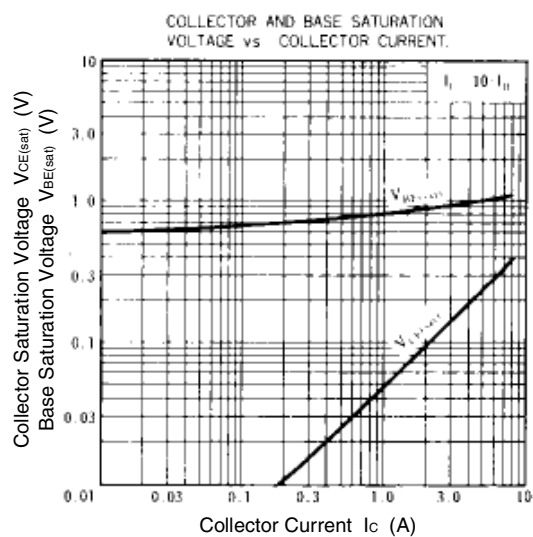
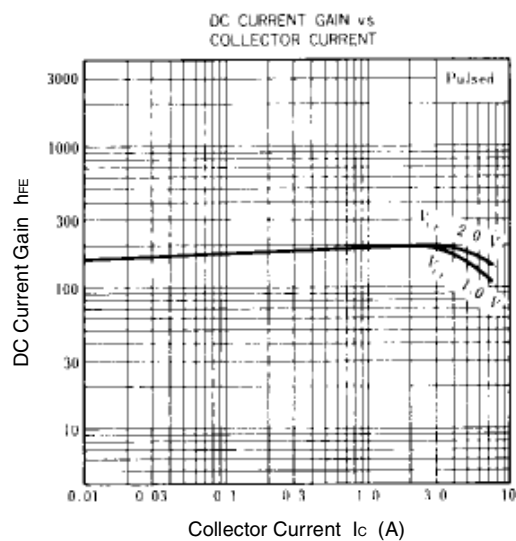
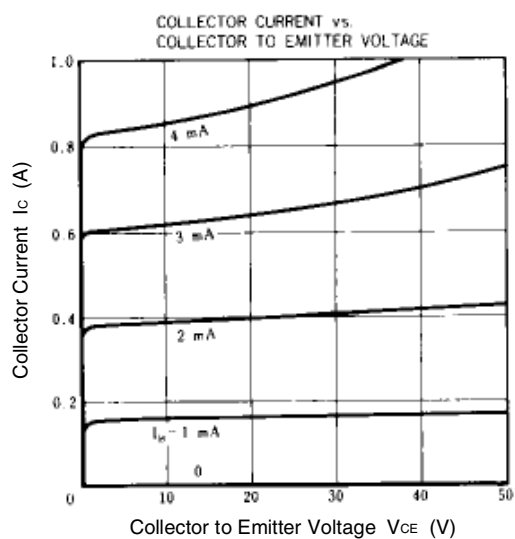
Electrode Connection

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

The graph shows the relationship between total power dissipation and temperature for a MOSFET. The y-axis represents Total Power Dissipation P_T (W) on a logarithmic scale with major ticks at 1.3, 5, 10, 15, 20, and 25. The x-axis represents Temperature T ($^{\circ}\text{C}$) on a linear scale from 0 to 200 with major ticks every 50 units. Two curves are plotted: one for 'Without heatsink' and one for 'With infinite heatsink'. The 'Without heatsink' curve starts at approximately 1.3 W at 0 $^{\circ}\text{C}$ and rises slightly to about 1.5 W at 25 $^{\circ}\text{C}$ before decreasing to 1.3 W at 150 $^{\circ}\text{C}$. The 'With infinite heatsink' curve starts at 20 W at 0 $^{\circ}\text{C}$, remains constant until 25 $^{\circ}\text{C}$, and then decreases linearly to 1.3 W at 150 $^{\circ}\text{C}$.

Temperature T ($^{\circ}\text{C}$)	Without heatsink (P_T (W))	With infinite heatsink (P_T (W))
0	~1.3	20
25	~1.5	20
50	~1.4	~16
75	~1.35	~12
100	~1.32	~8
125	~1.31	~4
150	1.3	1.3





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