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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RENESAS

SILICON POWER TRANSISTOR

Phase-out/Discontinued

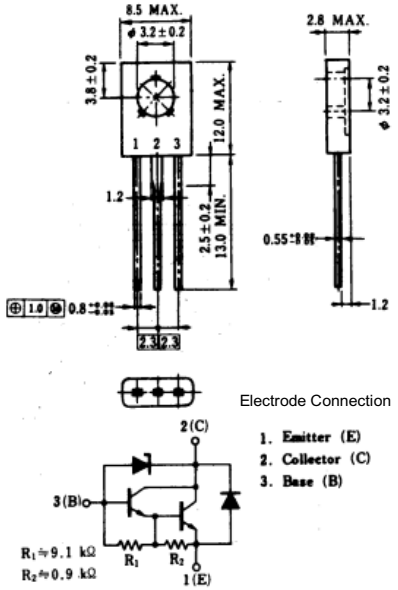
2SD1693

NPN SILICON EPITAXIAL TRANSISTOR (DARLINGTON CONNECTION) FOR LOW-FREQUENCY POWER AMPLIFIERS

FEATURES

- On-chip Zener diode
- High DC current gain due to Darlington connection
- Large current capacity and low $V_{CE(sat)}$
- Large power dissipation TO-126 type power transistor
- Complementary transistor: 2SB1150

PACKAGE DRAWING (UNIT: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	60 ±10	V
Collector to emitter voltage	V_{CEO}	60 ±10	V
Emitter to base voltage	V_{EBO}	8.0	V
Collector current (DC)	$I_{C(DC)}$	±3.0	A
Collector current (pulse)	$I_{C(pulse)}$*	±5.0	A
Total power dissipation	P_T (T_A = 25°C)	1.3	W
Total power dissipation	P_T (T_C = 25°C)	15	W
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	−55 to +150	°C

* PW ≤ 10 ms, duty cycle ≤ 50%

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to base voltage	V_{CBO}	I_C = 1.0 mA, I_E = 0	50	60	70	V
Collector to emitter voltage	V_{CEO}	I_C = 10 mA, R_{BE} = ∞	50	60	70	V
Collector to emitter voltage	$V_{CEO(SUS)}$	I_C = 3.0 A, I_B = 3.0 mA, L = 1.0 mH	50			V
Collector cutoff current	I_{CBO}	V_{CB} = 40 V, I_E = 0			10	μA
Collector cutoff current	I_{CEO}	V_{CE} = 40 V, R_{BE} = ∞			1.0	mA
DC current gain	h_{FE1}**	V_{CE} = 2.0 V, I_C = 1.5 A	2,000		20,000	
DC current gain	h_{FE2}**	V_{CE} = 2.0 V, I_C = 3.0 A	1,000			
Collector saturation voltage	$V_{CE(sat)}$**	I_C = 1.5 A, I_B = 1.5 mA		0.9	1.2	V
Base saturation voltage	$V_{BE(sat)}$**	I_C = 1.5 A, I_B = 1.5 mA		1.5	2.0	V
Turn-on time	t_{on}	I_C = 1.5 A I_{B1} = −I_{B2} = 1.5 mA R_L = 27 Ω, V_{CC} ≅ 40 V		0.5		μs
Storage time	t_{stg}			2.0		μs
Fall time	t_f			1.0		μs

** Pulse test PW ≤ 350 μs, duty cycle ≤ 2%/per pulsed

h_{FE} CLASSIFICATION

Marking	M	L	K
h_{FE1}	2,000 to 5,000	4,000 to 12,000	3,000 to 20,000

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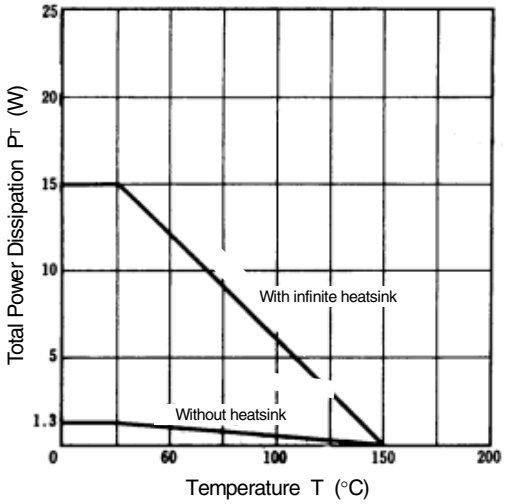
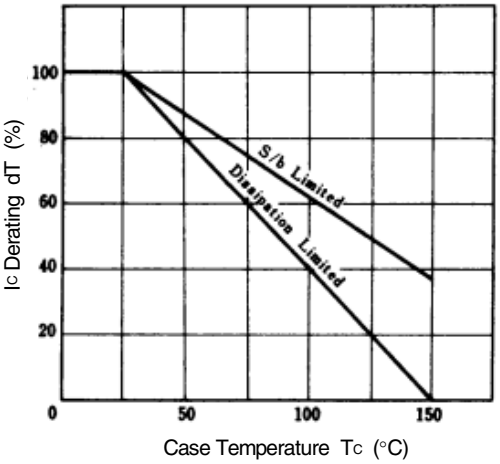
Printed in Japan

TYPICAL CHARACTERISTICS (T_A = 25°C)

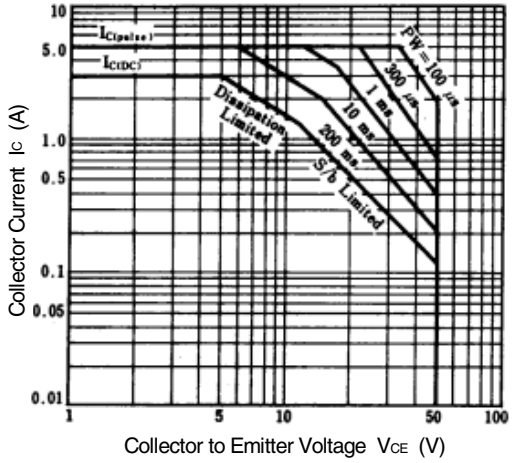
TOTAL POWER DISSIPATION vs. TEMPERATURE



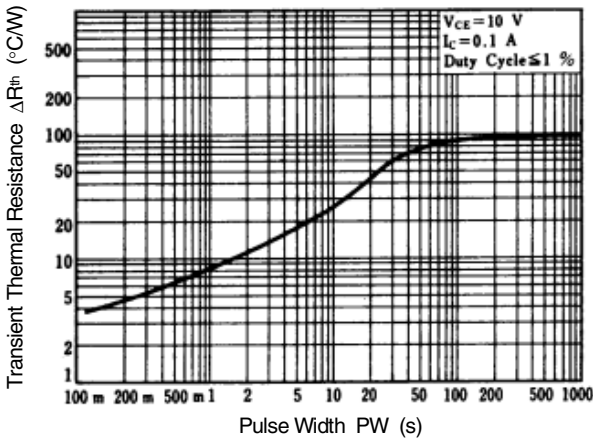
DERATING CURVE OF SAFE OPERATING AREAS



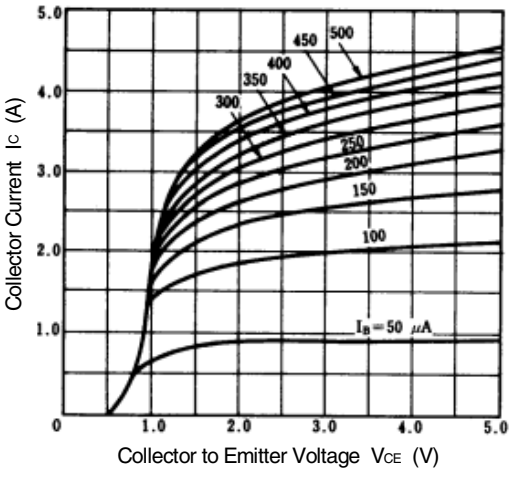
FORWARD BIAS SAFE OPERATING AREA



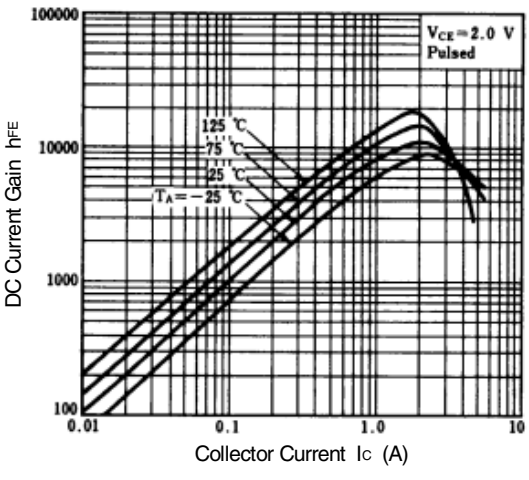
TRANSIENT THERMAL RESISTANCE



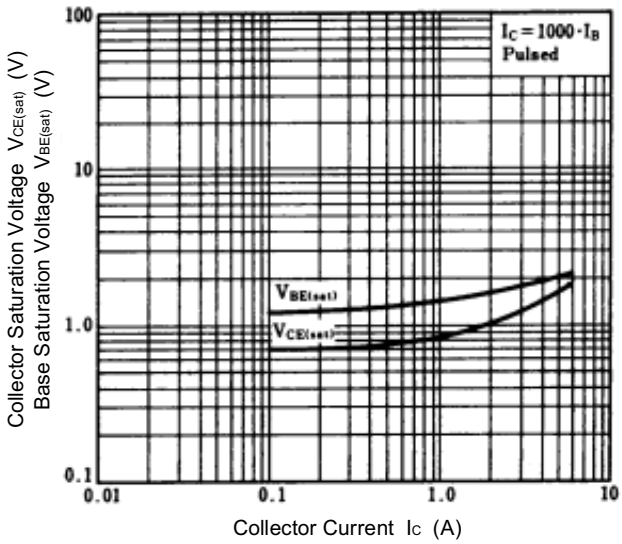
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



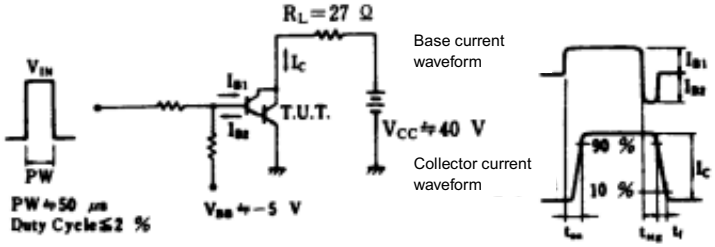
DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT



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