NEC

SILICON POWER TRANSISTOR
2SD1695

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

The 2SD1695 is a Darlington connection transistor and incorporates a dumper diode between the collector and emitter and a constant voltage diode and protection elements between the collector and base. This transistor is ideal for drives in solenoid and actuators.

FEATURES

- On-chip protection elements enable time and cost reduction.
  C to E: Dumper diode
  C to B: Constant diode
- Low collector saturation voltage

QUALITY GRADES

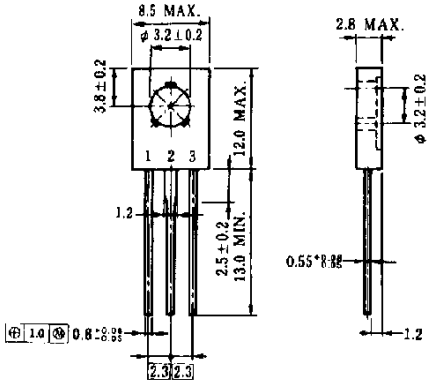
- Standard
  Please refer to “Quality Grades on NEC Semiconductor Devices” (Document No. C11531E) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

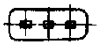
ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	31 ±4	V
Collector to emitter voltage	V_{CEO}	31 ±4	V
Emitter to base voltage	V_{EBO}	8.0	V
Collector current (DC)	$I_{C(DC)}$	±2.0	A
Collector current (pulse)	$I_{C(pulse)}$*	±3.0	A
Base current (DC)	$I_{B(DC)}$	0.2	A
Total power dissipation	P_T (Ta = 25°C)	1.3	W
Total power dissipation	P_T (Tc = 25°C)	10	W
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

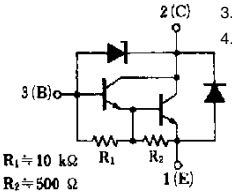
* PW ≤ 10 ms, duty cycle ≤ 50%

PACKAGE DRAWING (UNIT: mm)





Electrode Connection
1. Emitter
2. Collector
3. Base
4. Collector (fin)



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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to base voltage	V_{CBO}	I_C = 1.0 mA, I_E = 0	27	31	35	V
Collector to emitter voltage	V_{CEO}	I_C = 10 mA, R_{BE} = ∞	27	31	35	V
Collector cutoff current	I_{CBO}	V_{CB} = 20 V, I_E = 0			10	μA
DC current gain	h_{FE1}*	V_{CE} = 2.0 V, I_C = 0.5 A	1,000			
DC current gain	h_{FE2}*	V_{CE} = 2.0 V, I_C = 1.0 A	2,000		30,000	
Collector saturation voltage	$V_{CE(sat)}$*	I_C = 1.0 A, I_B = 1.0 mA		0.9	1.2	V
Base saturation voltage	$V_{BE(sat)}$*	I_C = 1.0 A, I_B = 1.0 mA		1.6	2.0	V
Turn-on time	t_{on}	I_C = 1.0 A, I_{B1} = $-I_{B2}$ = 5.0 mA R_L = 20 Ω, V_{CC} ≅ 20 V		0.5		μs
Storage time	t_{stg}			3.0		μs
Fall time	t_f			1.0		μs

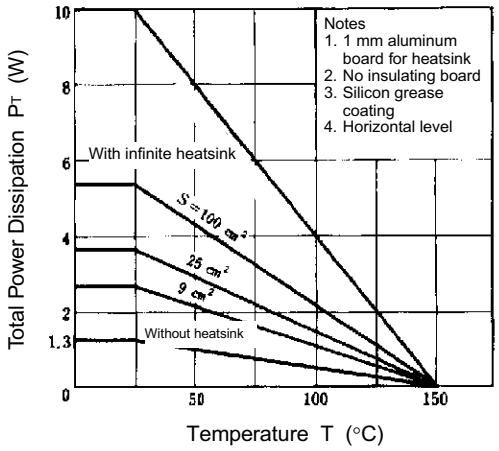
* Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

h_{FE2} CLASSIFICATION

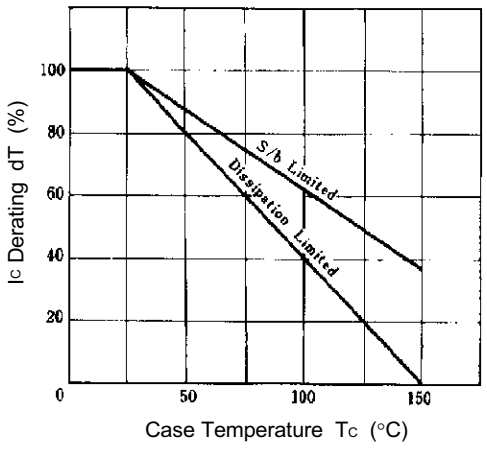
Marking	M	L	K
h_{FE2}	2,000 to 5,000	4,000 to 10,000	8,000 to 30,000

TYPICAL CHARACTERISTICS (Ta = 25°C)

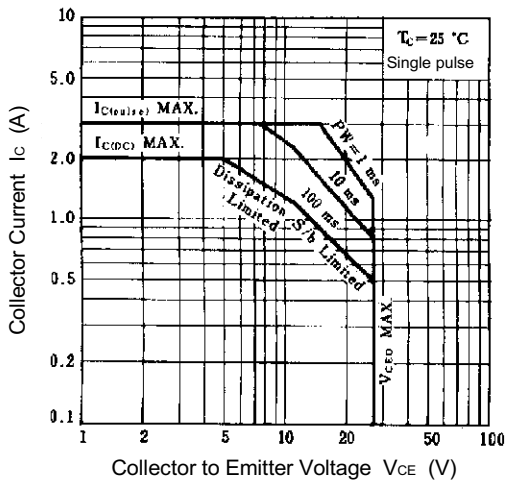
TOTAL POWER DISSIPATION vs. TEMPERATURE



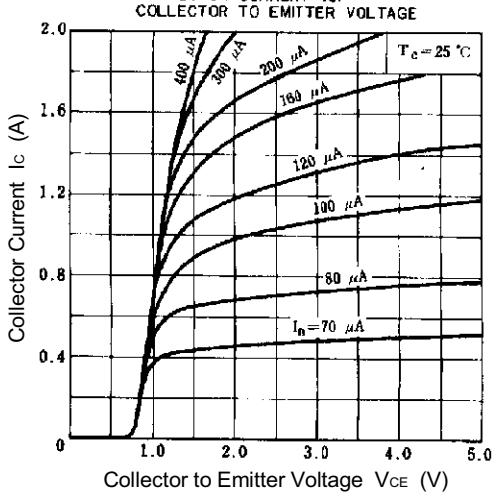
DERATING CURVE OF SAFE OPERATING AREA



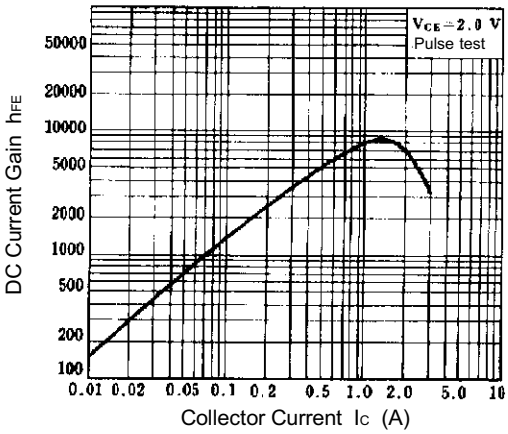
SAFE OPERATING AREA



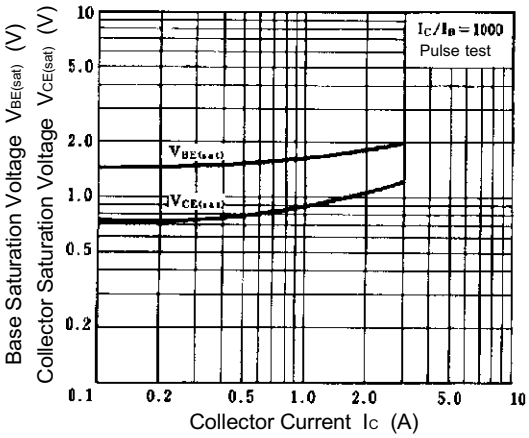
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR AND BASE SATURATION
VOLTAGE vs. COLLECTOR CURRENT



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