NEC

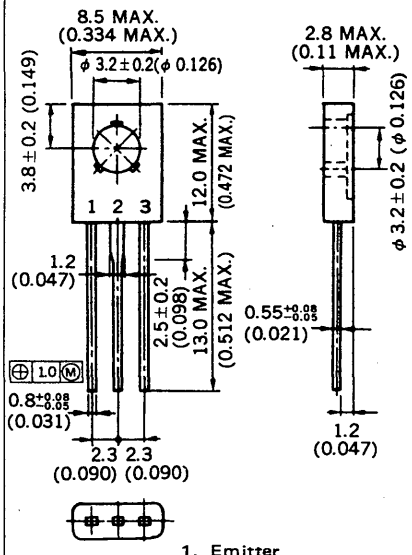
NPN SILICON POWER TRANSISTOR
2SD1691

DESCRIPTION The 2SD1691 is a Low $V_{CE(sat)}$ transistor which has a large current capability and wide SOA.
It is suitable for DC-DC converter, or driver of solenoid or motor.

FEATURES

- Low Collector Saturation Voltage.
  $V_{CE(sat)}$ = 0.1 V TYP. (@ I_C/I_B = 2.0 A/0.2 A)
- Large Current.
  $I_{C(DC)}$ = 5.0 A, $I_{C(pulse)}$ = 8.0 A
- High Total Power Dissipation : P_T = 1.3 W
- Complementary to 2SB1151.

PACKAGE DIMENSIONS
in millimeters (inches)



1. Emitter
2. Collector connected to mounting plane
3. Base

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

- Storage Temperature . . . . . −55 to +150 °C
- Junction Temperature . . . . . +150 °C Maximum

Maximum Power Dissipations

Total Power Dissipation (T_a = 25 °C)	1.3	W
Total Power Dissipation (T_c = 25 °C)	20	W

Maximum Voltages and Currents (T_a = 25 °C)

V_{CBO}	Collector to Base Voltage	60	V
V_{CEO}	Collector to Emitter Voltage	60	V
V_{EBO}	Emitter to Base Voltage	7.0	V
$I_{C(DC)}$	Collector Current	5.0	A
$I_{C(pulse)}$	Collector Current*	8.0	A
$I_{B(DC)}$	Base Current	1.0	A

* PW ≦ 10 ms, Duty Cycle ≦ 50 %

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$V_{CE(sat)}$**	Collector Saturation Voltage		0.1	0.3	V	I_C = 2.0 A, I_B = 0.2 A
$V_{BE(sat)}$**	Base Saturation Voltage		0.9	1.2	V	I_C = 2.0 A, I_B = 0.2 A
h_{FE1}**	DC Current Gain	60			—	V_{CE} = 1.0 V, I_C = 0.1 A
h_{FE2}**	DC Current Gain	100		400	—	V_{CE} = 1.0 V, I_C = 2.0 A
h_{FE3}**	DC Current Gain	50			—	V_{CE} = 1.0 V, I_C = 5.0 A
I_{CBO}	Collector Cutoff Current			10	μA	V_{CB} = 50 V, I_E = 0
I_{EBO}	Emitter Cutoff Current			10	μA	V_{EB} = 7.0 V, I_C = 0
t_{on}	Turn On Time		0.2	1.0	μs	I_C = 2.0 A, I_{B1} = −I_{B2} = 0.2 A R_L = 5.0 Ω, V_{CC} ≒ 10 V
t_{stg}	Storage Time		1.1	2.5	μs	
t_f	Fall Time		0.2	1.0	μs	

** PW ≦ 350 μs, Duty Cycle ≦ 2 %

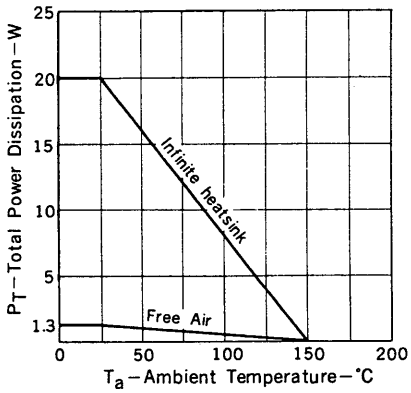
Classification of h_{FE2}

Rank	M	L	K
Range	100 to 200	160 to 320	200 to 400

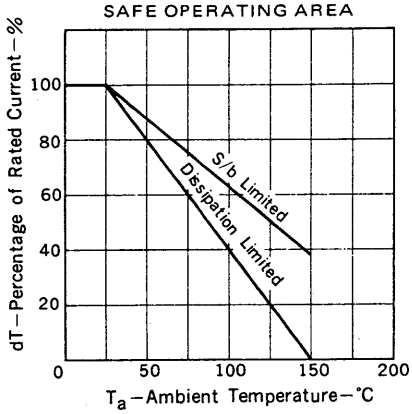
Test Conditions: V_{CE} = 1.0 V, I_C = 2.0 A

TYPICAL CHARACTERISTICS (T_a = 25 °C)

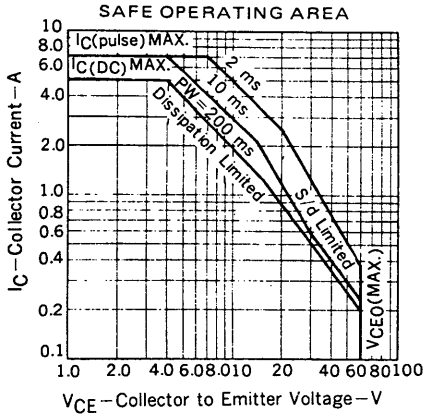
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



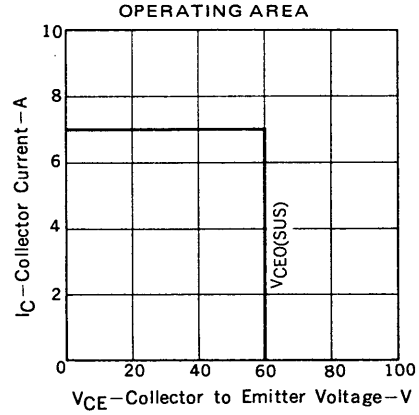
DERATING CURVE OF SAFE OPERATING AREA



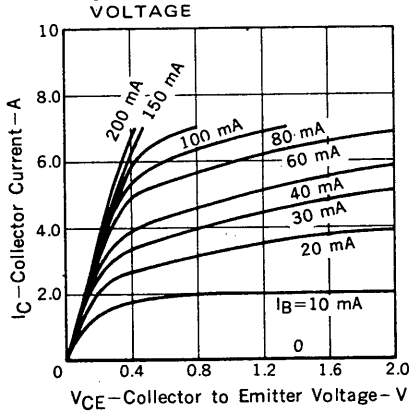
SAFE OPERATING AREA



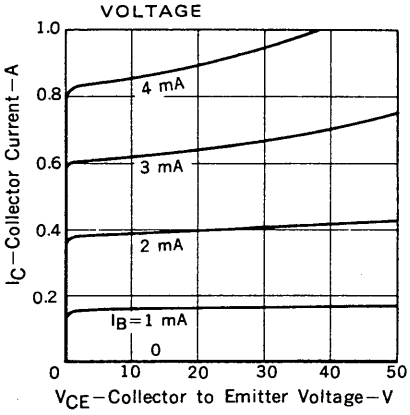
REVERSE BIAS SAFE OPERATING AREA



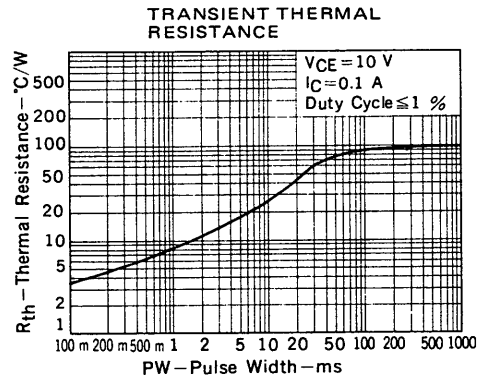
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



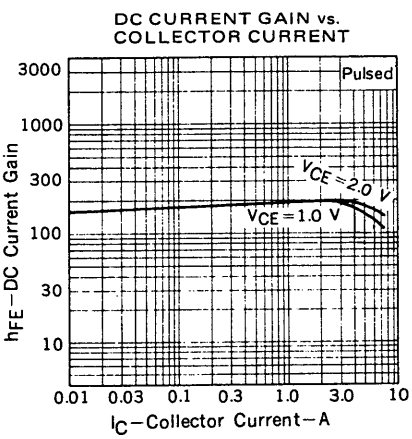
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



TRANSIENT THERMAL RESISTANCE



DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT