

DESCRIPTION The 2SD1693 is a darlington transistor built-in a zener diode at B-C and a dumper diode at E-C.
It is suitable for use to operate from IC without predriver, such as hammer driver.

- FEATURES**
- High DC Current Gain.
 - Built-in a Zener Diode at B-C and a Dumper Diode at E-C.
 - Low Collector Saturation Voltage.
 - High Power Dissipation: $P_T = 1.3 \text{ W}$ (at $T_a = 25^\circ\text{C}$)

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

Storage Temperature -55 to $+150^\circ\text{C}$
Junction Temperature 150°C Maximum

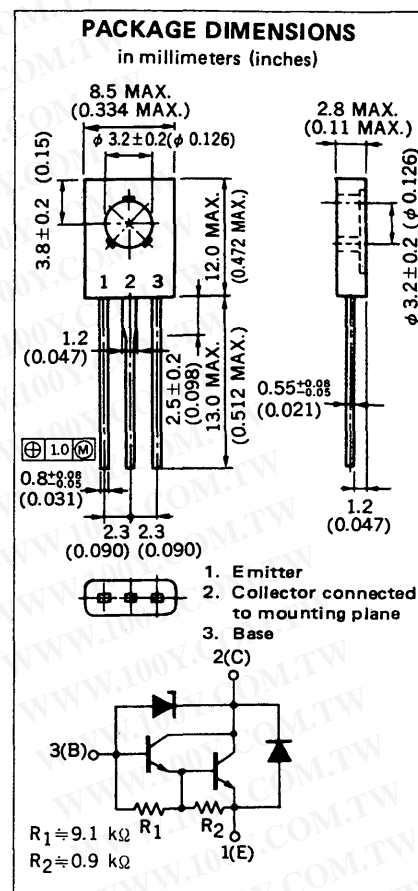
Maximum Power Dissipations

Total Power Dissipation ($T_a = 25^\circ\text{C}$) 1.3 W
Total Power Dissipation ($T_c = 25^\circ\text{C}$) 15 W

Maximum Voltages and Currents ($T_a = 25^\circ\text{C}$)

V_{CBO} Collector to Base Voltage $60 \pm 10 \text{ V}$
 V_{CEO} Collector to Emitter Voltage $60 \pm 10 \text{ V}$
 V_{EBO} Emitter to Base Voltage 8.0 V
 $I_{C(DC)}$ Collector Current $\pm 3.0 \text{ A}$
 $I_{C(pulse)}$ Collector Current $\pm 5.0 \text{ A}$

* $PW \leq 10 \text{ ms}$, Duty Cycle $\leq 50\%$



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

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
h_{FE1}^{**}	DC Current Gain	2000		20000	—	$V_{CE} = 2.0 \text{ V}$, $I_C = 1.5 \text{ A}$
h_{FE2}^{**}	DC Current Gain	1000			—	$V_{CE} = 2.0 \text{ V}$, $I_C = 3.0 \text{ A}$
V_{CBO}	Collector to Base Voltage	50	60	70	V	$I_C = 1.0 \text{ mA}$, $I_E = 0$
V_{CEO}	Collector to Emitter Voltage	50	60	70	V	$I_C = 10 \text{ mA}$, $R_{BE} = \infty$
t_{on}	Turn On Time		0.5		μs	$I_C = 1.5 \text{ A}$, $R_L = 27 \Omega$ $I_{B1} = -I_{B2} = 1.5 \text{ mA}$, $V_{CC} \approx 40 \text{ V}$
t_{stg}	Storage Time		2.0		μs	
t_f	Fall Time		1.0		μs	
I_{CBO}	Collector Cutoff Current			10	μA	$V_{CB} = 40 \text{ V}$, $I_E = 0$
I_{EBO}	Emitter Cutoff Current			1.0	mA	$V_{EB} = 5.0 \text{ V}$, $I_C = 0$
$V_{CE(sat)}^{**}$	Collector Saturation Voltage		0.9	1.2	V	$I_C = 1.5 \text{ A}$, $I_B = 1.5 \text{ mA}$
$V_{BE(sat)}^{**}$	Base Saturation Voltage		1.5	2.0	V	$I_C = 1.5 \text{ A}$, $I_B = 1.5 \text{ mA}$

** Pulsed / $PW \leq 350 \mu\text{s}$, Duty Cycle $\leq 2\%$

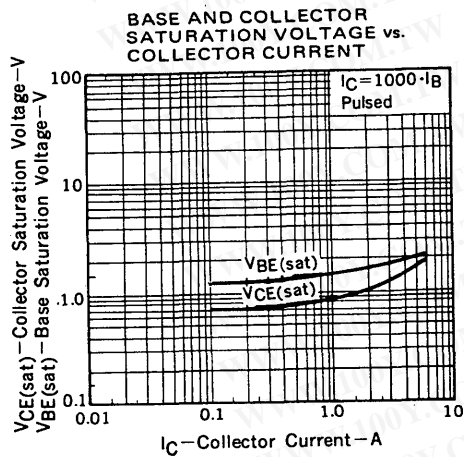
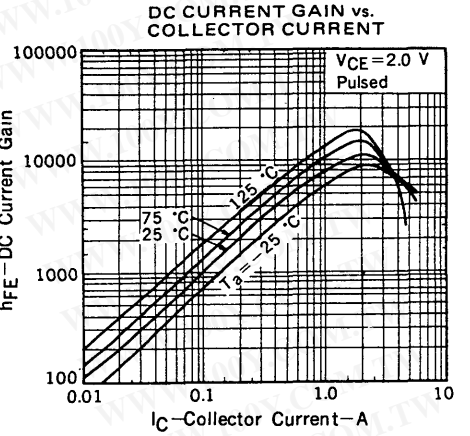
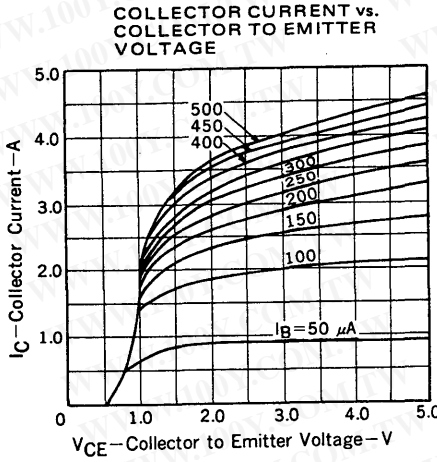
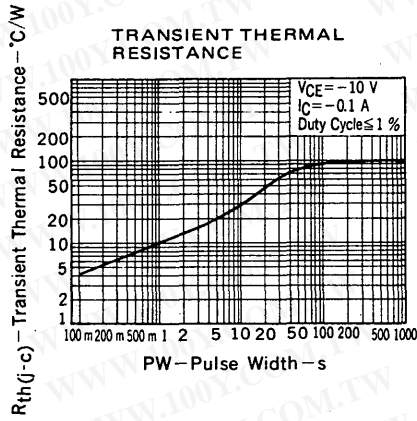
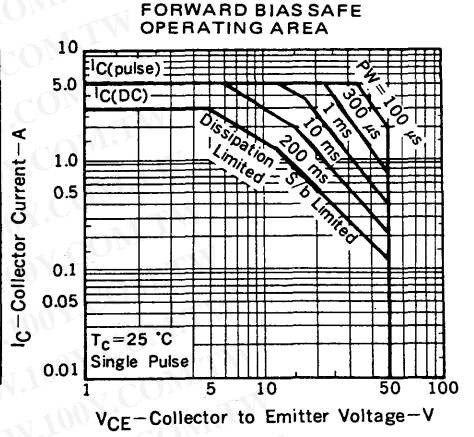
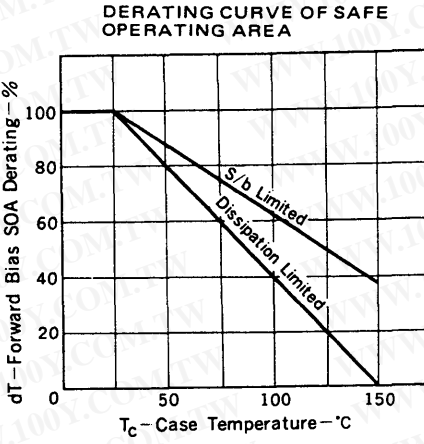
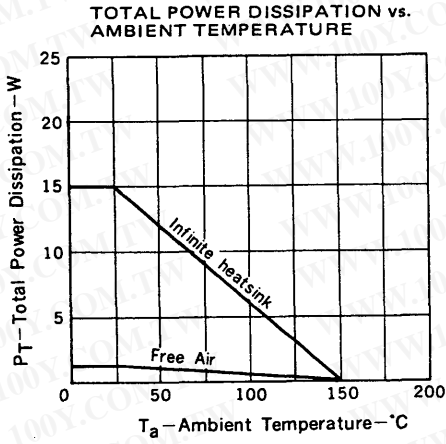
Classification of h_{FE1}

Rank	M	L	K
Range	2000 to 5000	4000 to 10000	8000 to 20000

Test Conditions: $V_{CE} = 2.0 \text{ V}$, $I_C = 1.5 \text{ A}$

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



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

