

**NPN SILICON EPITAXIAL TRANSISTOR**  
**POWER MINI MOLD**

**DESCRIPTION**

The 2SD1699 is NPN silicon epitaxial darlington transistor designed for pulse motor, printer driver, solenoid driver. Circuits.

**FEATURES**

- High DC Current gain.
- Includes a dumpter diode at E-C.

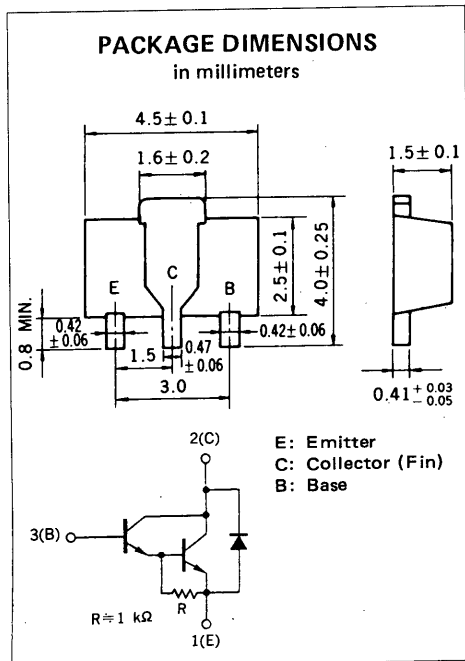
**ABSOLUTE MAXIMUM RATINGS**

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

Collector to Base Voltage	$V_{CBO}$	100	V
Collector to Emitter Voltage	$V_{CEO}$	80	V
Emitter to Base Voltage	$V_{EBO}$	8.0	V
Collector Current (DC)	$I_C$	$\pm 0.8$	A
Collector Current (Pulse)*	$I_C$	$\pm 1.2$	A
Maximum Power Dissipation			
Total Power Dissipation			
at $25^\circ\text{C}$ Ambient Temperature**	$P_T$	2.0	W
Maximum Temperatures			
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$

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

\*\* When mounted on ceramic substrate of  $16\text{ cm}^2 \times 0.7\text{ mm}$



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

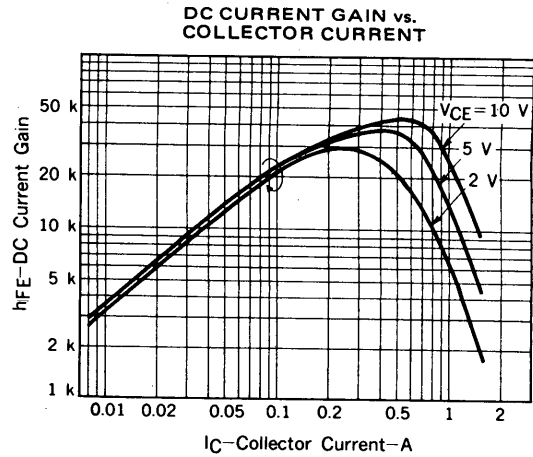
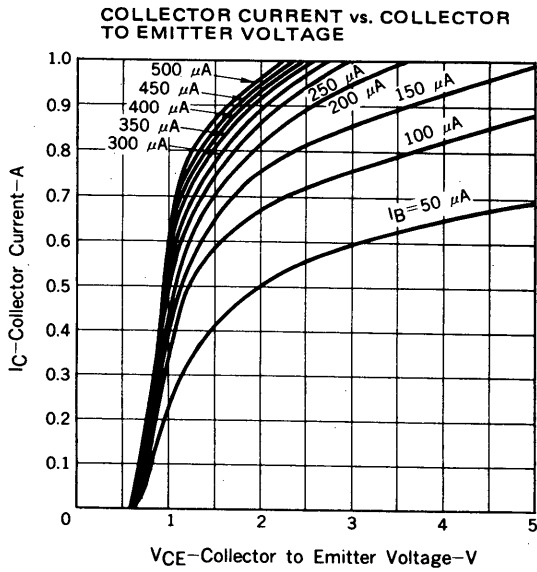
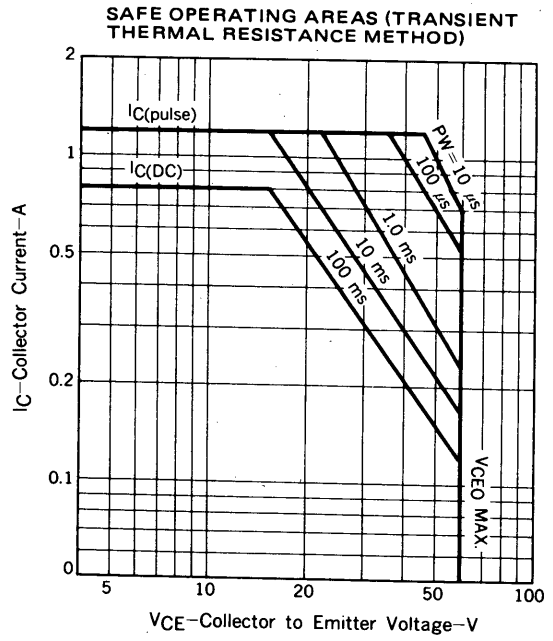
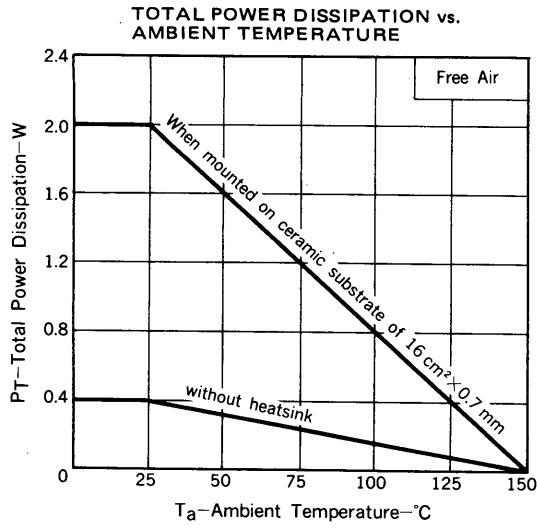
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDICTIONS
DC Current Gain	$h_{FE1}^{***}$	4000		50000		$V_{CE} = 2.0\text{ V}$ , $I_C = 0.3\text{ A}$
DC Current Gain	$h_{FE2}^{***}$	1000				$V_{CE} = 2.0\text{ V}$ , $I_C = 0.8\text{ A}$
Turn-on Time	$t_{on}$		0.5		$\mu\text{s}$	$I_C = 0.5\text{ A}$ $I_{B1} = -I_{B2} = 1.0\text{ mA}$ $V_{CC} = 40\text{ V}$ , $R_L = 80\ \Omega$
Storage Time	$t_{stg}$		2.5		$\mu\text{s}$	
Fall Time	$t_f$		1.0		$\mu\text{s}$	
Collector Saturation Voltage	$V_{CE(sat)}^{***}$		0.9	1.2	V	$I_C = 0.5\text{ A}$ , $I_B = 1.0\text{ mA}$
Base Saturation Voltage	$V_{BE(sat)}^{***}$		1.5	2.0	V	$I_C = 0.5\text{ A}$ , $I_B = 1.0\text{ mA}$
Collector to Base Voltage	$V_{CBO}$	100			V	$I_C = 0.1\text{ mA}$ , $I_E = 0$
Collector to Emitter Voltage	$V_{CEO}$	80			V	$I_C = 5.0\text{ mA}$ , $I_B = 0$
Collector Cutoff Current	$I_{CBO}$			1.0	$\mu\text{A}$	$V_{CB} = 80\text{ V}$ , $I_E = 0$
Emitter Cutoff Current	$I_{EBO}$			1.0	$\mu\text{A}$	$V_{EB} = 5.0\text{ V}$ , $I_C = 0$

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

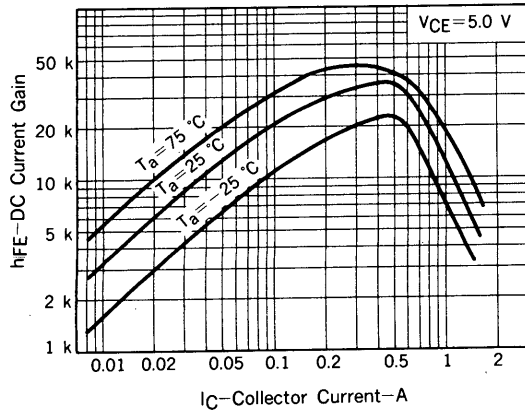
**$h_{FE}$  Classification**

MARKING	TR	TQ
$h_{FE}$	4000 to 12000	8000 to 50000

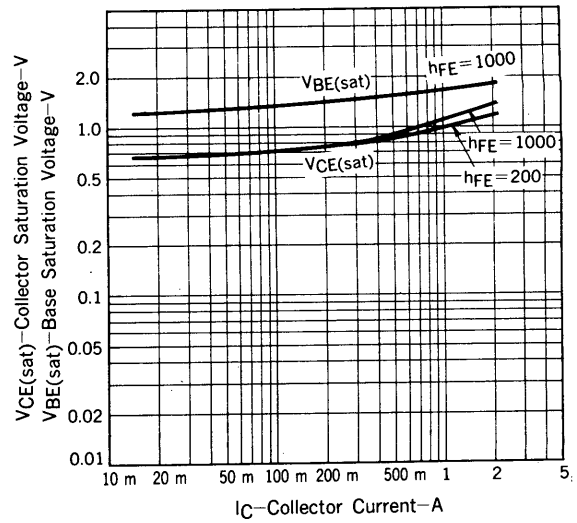
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134

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