

NPN SILICON DARLINGTON TRANSISTOR

2SD1939

DESCRIPTION The 2SD1939 is a darlington transistor including a dumper diode at E-C.

It is suitable for general driving use, such as hammer, solenoid, lamp or motor.

FEATURES

- High DC current gain.
- High current capability, wide ASO and low collector saturation voltage.
- Includes a dumper diode at E-C.

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

Storage Temperature -55 to +150 °C

Junction Temperature 150 °C Maximum

Maximum Power Dissipation ($T_a = 25\text{ °C}$)

Total Power Dissipation 0.75 W

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

V_{CBO} Collector to Base Voltage 150 V

V_{CEO} Collector to Emitter Voltage 80 V

V_{EBO} Emitter to Base Voltage 8.0 V

I_C Collector Current (DC) ± 1.5 A

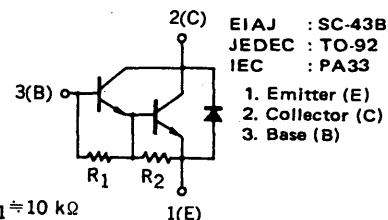
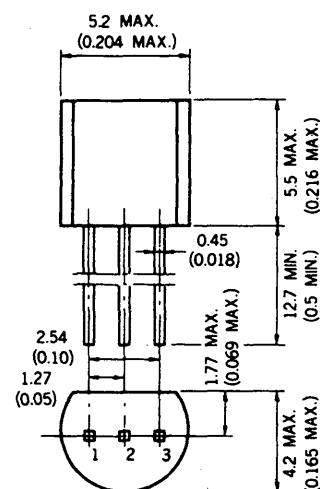
I_C Collector Current (Pulse)* ± 3.0 A

I_B Base Current (DC) 0.15 A

*PW $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 10\%$

PACKAGE DIMENSIONS

in millimeters (inches)



$R_1 \approx 10\text{ k}\Omega$
 $R_2 \approx 500\text{ }\Omega$

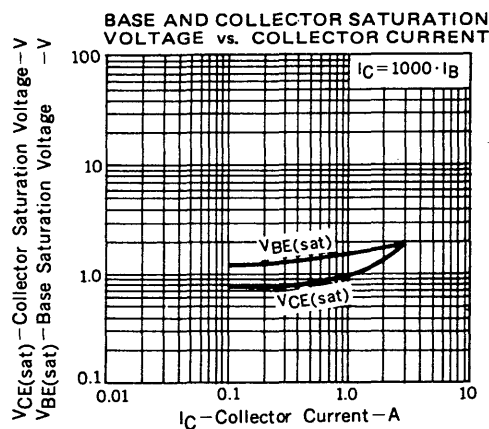
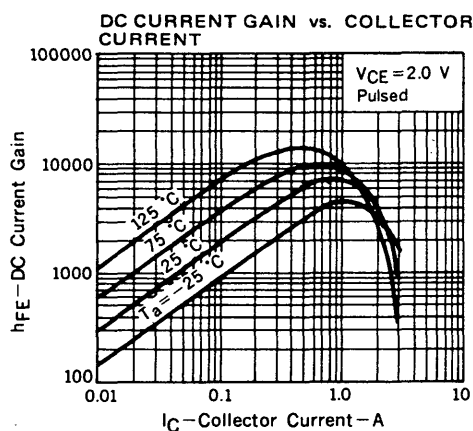
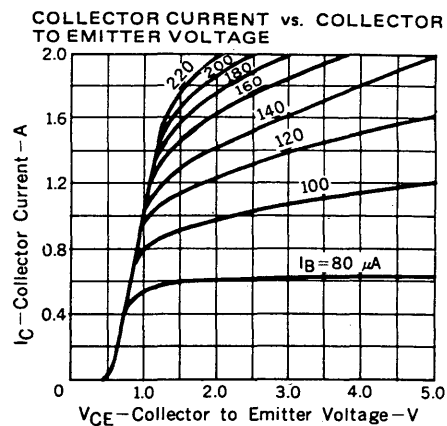
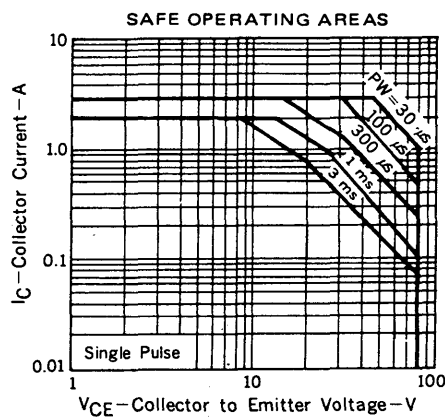
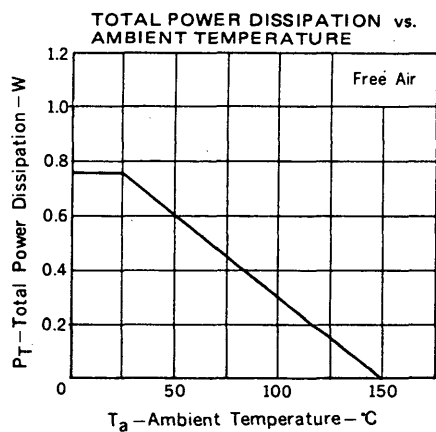
ELECTRICAL CHARACTERISTICS ($T_a = 25\text{ °C}$)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
h_{FE1}	DC Current Gain	1000			—	$V_{CE} = 2.0\text{ V}$, $I_C = 0.5\text{ A}$
h_{FE2}	DC Current Gain	2000		30000	—	$V_{CE} = 2.0\text{ V}$, $I_C = 1.0\text{ A}$
t_{on}	Turn-On Time		0.5		μs	$I_C = 1.0\text{ A}$, $R_L = 50\text{ }\Omega$ $I_{B1} = -I_{B2} = 1.0\text{ mA}$, $V_{CC} = 50\text{ V}$ See Test Circuit
t_{stg}	Storage Time		1.0		μs	
t_f	Fall Time		1.0		μs	
I_{CBO}	Collector Cutoff Current			10	μA	$V_{CB} = 80\text{ V}$, $I_E = 0$
I_{CER}	Collector Cutoff Current			1.0	mA	$V_{CE} = 80\text{ V}$, $R_{BE} = 51\text{ }\Omega$, $T_a = 125\text{ °C}$
I_{CEX1}	Collector Cutoff Current			10	μA	$V_{CE} = 80\text{ V}$, $V_{BE(off)} = -1.5\text{ V}$
I_{CEX2}	Collector Cutoff Current			1.0	mA	$V_{CE} = 80\text{ V}$, $V_{BE(off)} = -15\text{ V}$, $T_a = 125\text{ °C}$
I_{EBO}	Emitter Cutoff Current			1.0	mA	$V_{EB} = 5.0\text{ V}$, $I_C = 0$
$V_{CE(sat)}$	Collector Saturation Voltage			1.5	V	$I_C = 1.0\text{ A}$, $I_B = 1.0\text{ mA}$
$V_{BE(sat)}$	Base Saturation Voltage			2.0	V	
f_T	Gain Bandwidth Product		60		MHz	$V_{CE} = 10\text{ V}$, $I_E = -1.0\text{ A}$

Classification of h_{FE2}

Rank	M	L	K
Range	2000 to 5000	4000 to 10000	8000 to 30000

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

TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)SWITCHING TIME (t_{on} , t_{stg} , t_f) TEST CIRCUIT