TOSHIBA Transistor Silicon NPN Triple Diffused Type (Darlington)

2SD1409A

High Voltage Switching Applications

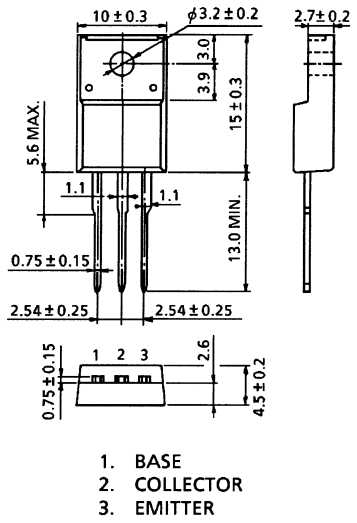
Industrial Applications

- High DC current gain: h_{FE} = 600 (min.) (V_{CE} = 2 V, I_C = 2 A)
- Monolithic construction with built-in base-emitter shunt resistor

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	600	V
Collector-emitter voltage		V_{CEO}	400	V
Emitter-base voltage		V_{EBO}	5	V
Collector current		I_C	6	A
Base current		I_B	1	A
Collector power dissipation	Ta = 25°C	P_C	2.0	W
	Tc = 25°C		25	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

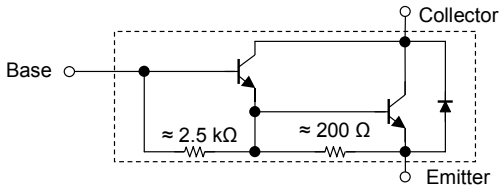
Unit: mm



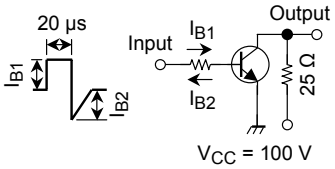
JEDEC	—
JEITA	SC-67
TOSHIBA	2-10R1A

Weight: 1.7 g (typ.)

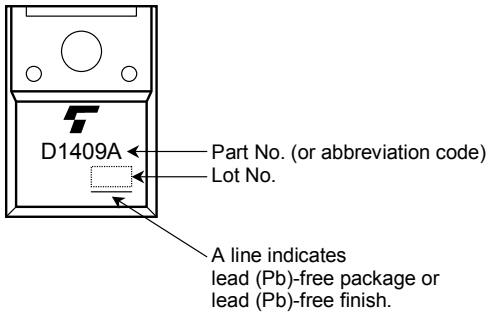
Equivalent Circuit



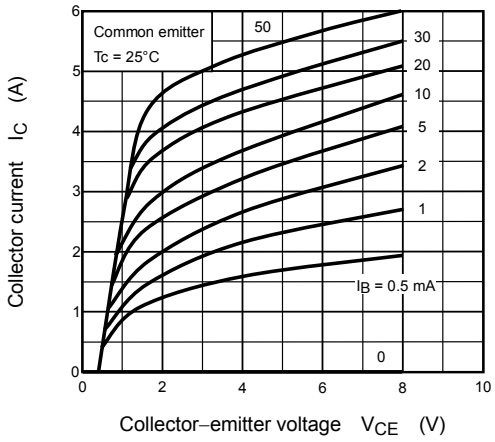
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 600 V, I_E = 0	—	—	0.5	mA
Emitter cut-off current		I_{EBO}	V_{EB} = 5 V, I_C = 0	—	—	3	mA
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0	400	—	—	V
DC current gain		$h_{FE\ (1)}$	V_{CE} = 2 V, I_C = 2 A	600	—	—	
		$h_{FE\ (2)}$	V_{CE} = 2 V, I_C = 4 A	100	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 4 A, I_B = 0.04 A	—	—	2.0	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 4 A, I_B = 0.04 A	—	—	2.5	V
Emitter-collector forward voltage		V_{ECF}	I_E = 4 A, I_B = 0	—	—	3.0	V
Collector output capacitance		C_{ob}	V_{CB} = 50 V, I_E = 0, f = 1 MHz	—	35	—	pF
Switching time	Turn-on time	t_{on}		—	1	—	μs
	Storage time	t_{stg}		—	8	—	
	Fall time	t_f	$I_{B1} = -I_{B2}$ = 0.04 A, duty cycle ≤ 1%	—	5	—	

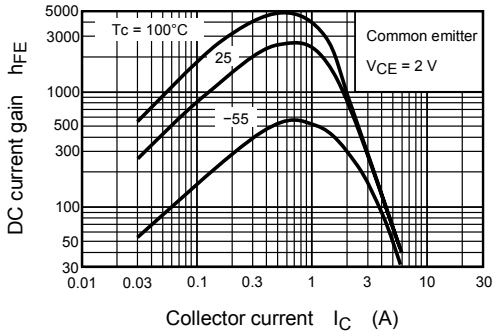
Marking



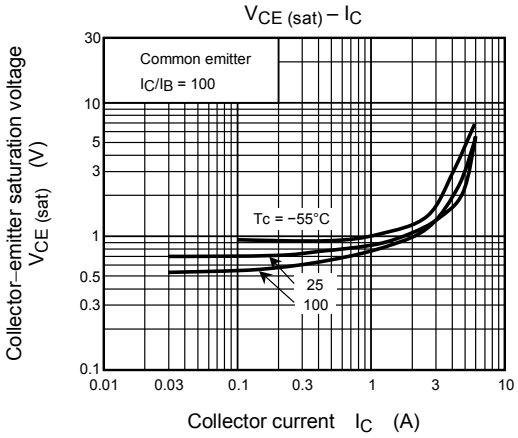
$I_C - V_{CE}$



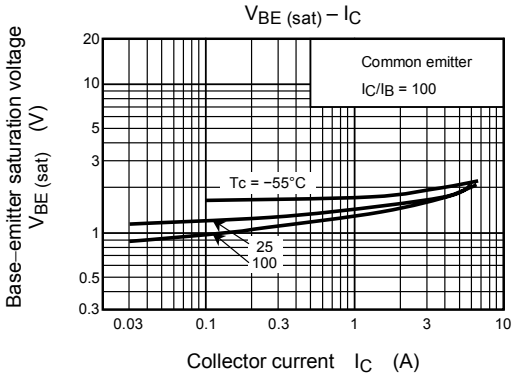
$h_{FE} - I_C$



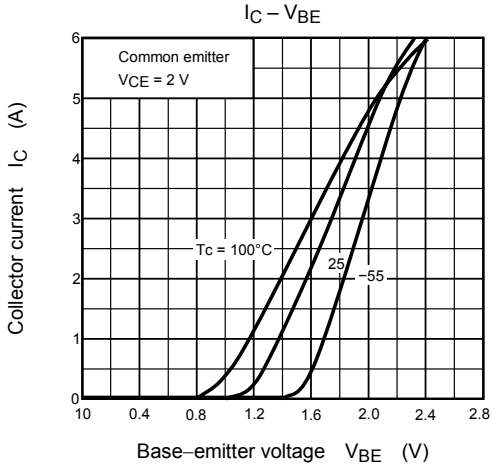
$V_{CE\ (sat)} - I_C$



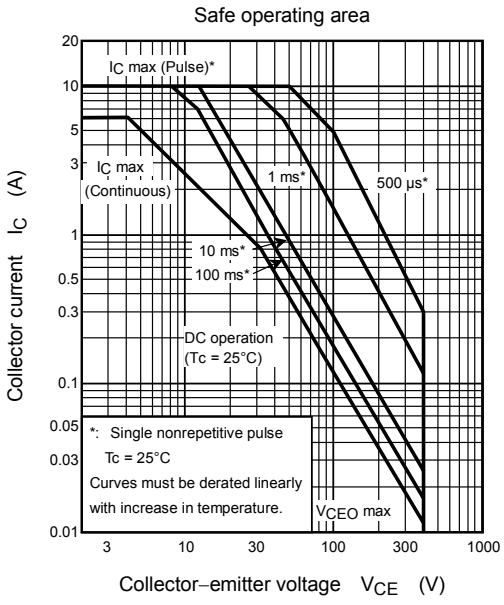
$V_{BE\ (sat)} - I_C$



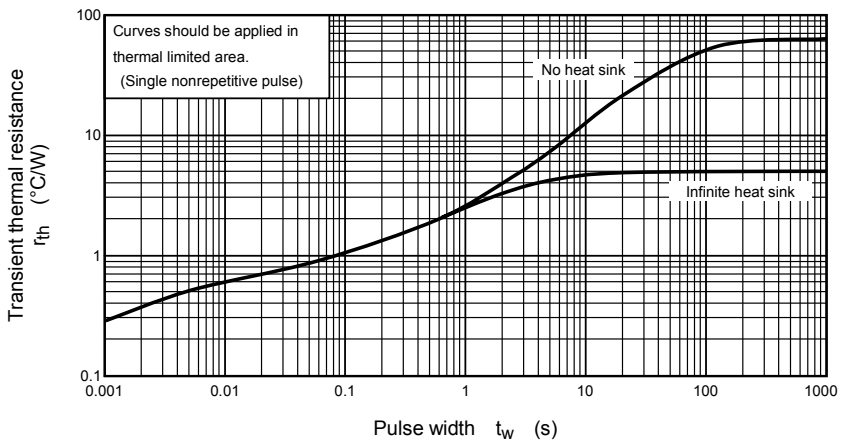
$I_C - V_{BE}$



Safe operating area



$r_{th} - t_w$


Curves should be applied in
thermal limited area.
(Single nonrepetitive pulse)
No heat sink
Infinite heat sink
Transient thermal resistance
r_{th} (°C/W)
100
10
1
0.1
0.001
0.01
0.1
1
10
100
1000
Pulse width t_w (s)

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