TOSHIBA Power Transistor Module Silicon NPN Epitaxial Type (Darlington power transistor 4 in 1)

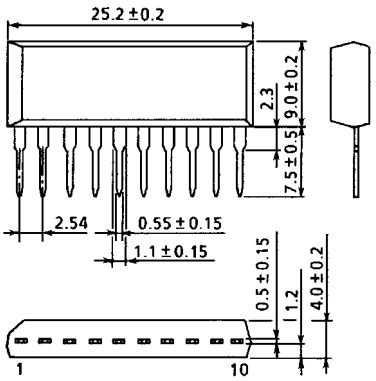
MP4013

Industrial Applications

High Power Switching Applications.

Hammer Drive, Pulse Motor Drive and Inductive Load Switching.

Unit: mm



1, 10 EMITTER
2, 4, 6, 8 BASE
3, 5, 7, 9 COLLECTOR

JEDEC	—
JEITA	—
TOSHIBA	2-25A1A

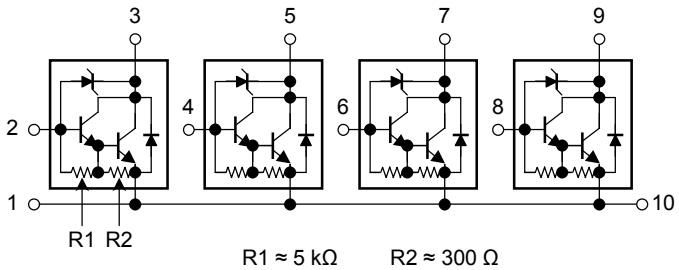
Weight: 2.1 g (typ.)

- Small package by full molding (SIP 10 pin)
- High collector power dissipation (4 devices operation)
  : P_T = 4 W (Ta = 25°C)
- High collector current: $I_{C\ (DC)}$ = 2 A (max)
- High DC current gain: h_{FE} = 2000 (min) (V_{CE} = 2 V, I_C = 1 A)
- Zener diode included between collector and base.

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	80 ± 10	V
Collector-emitter voltage		V_{CEO}	80 ± 10	V
Emitter-base voltage		V_{EBO}	8	V
Collector current	DC	I_C	2	A
	Pulse	I_{CP}	3	
Continuous base current		I_B	0.5	A
Collector power dissipation (1 device operation)		P_C	2.0	W
Collector power dissipation (4 devices operation)		P_T	4.0	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

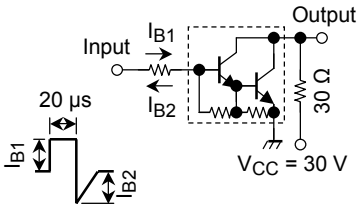
Array Configuration



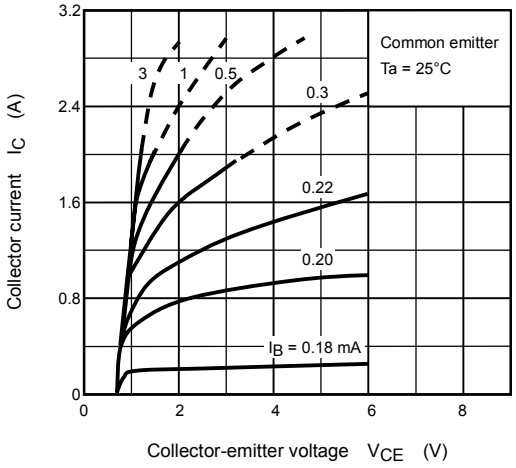
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of junction to ambient (4 devices operation, Ta = 25°C)	$\Sigma R_{th\ (j\text{-}a)}$	31.3	°C/W
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	T_L	260	°C

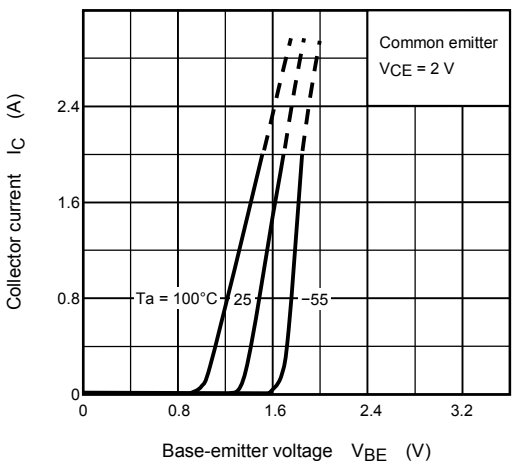
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 60 V, I_E = 0 A	—	—	10	μA
Collector cut-off current		I_{CEO}	V_{CE} = 60 V, I_B = 0 A	—	—	10	μA
Emitter cut-off current		I_{EBO}	V_{EB} = 8 V, I_C = 0 A	0.8	—	4.0	mA
Collector-base breakdown voltage		$V_{(BR)\ CBO}$	I_C = 100 μA, I_E = 0 A	70	80	90	V
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0 A	70	80	90	V
DC current gain		$h_{FE\ (1)}$	V_{CE} = 2 V, I_C = 1 A	2000	—	—	—
Saturation voltage	Collector-emitter	$V_{CE\ (sat)}$	I_C = 1 A, I_B = 1 mA	—	—	1.5	V
	Base-emitter	$V_{BE\ (sat)}$	I_C = 1 A, I_B = 1 mA	—	—	2.0	
Transition frequency		f_T	V_{CE} = 2 V, I_C = 0.5 A	—	100	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0 A, f = 1MHz	—	20	—	pF
Switching time	Turn-on time	t_{on}	 $I_{B1} = -I_{B2}$ = 1 mA, duty cycle ≤ 1%	—	0.4	—	μs
	Storage time	t_{stg}		—	4.0	—	
	Fall time	t_f		—	0.6	—	

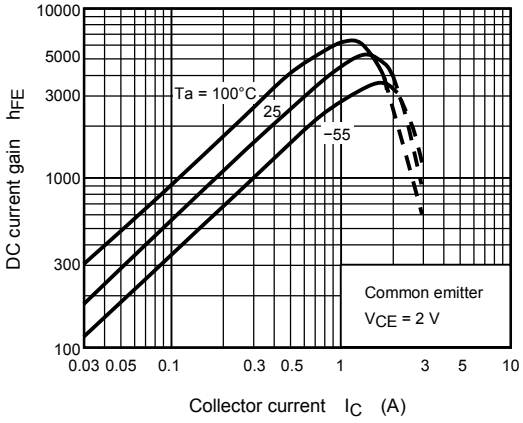
$I_C - V_{CE}$



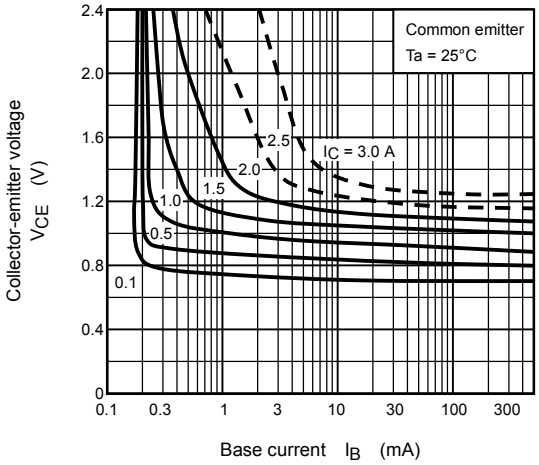
$I_C - V_{BE}$



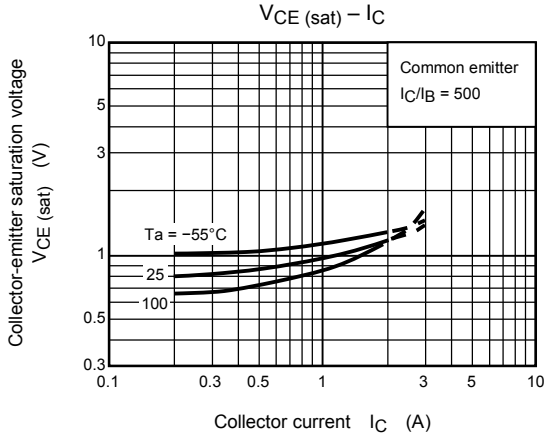
$h_{FE} - I_C$



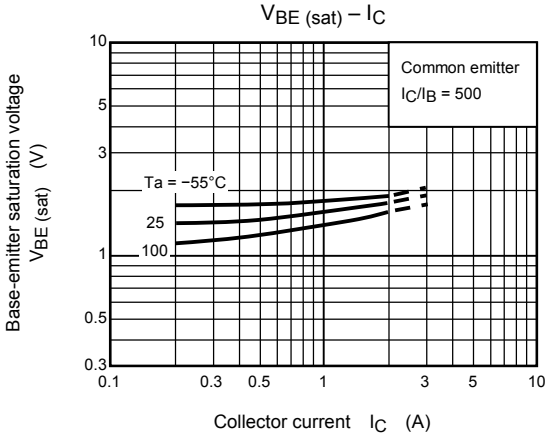
$V_{CE} - I_B$



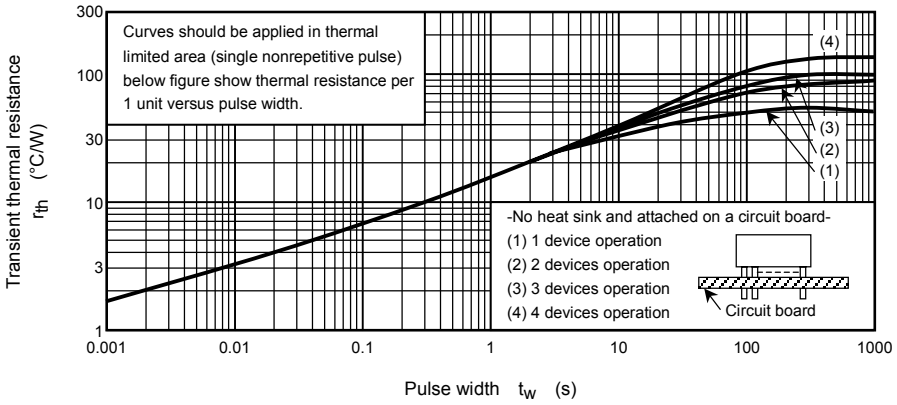
$V_{CE\ (sat)} - I_C$



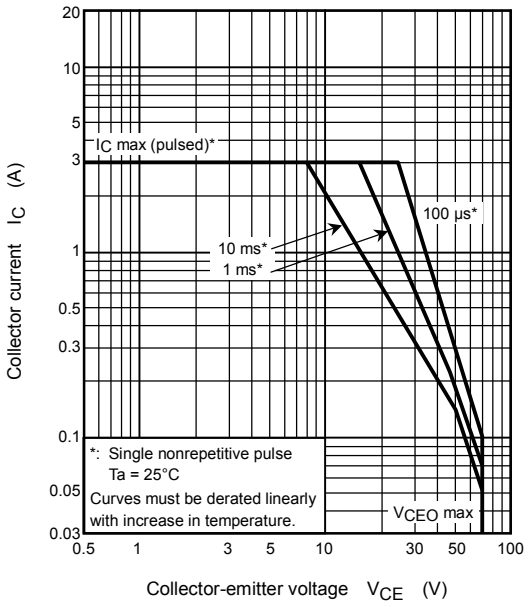
$V_{BE\ (sat)} - I_C$



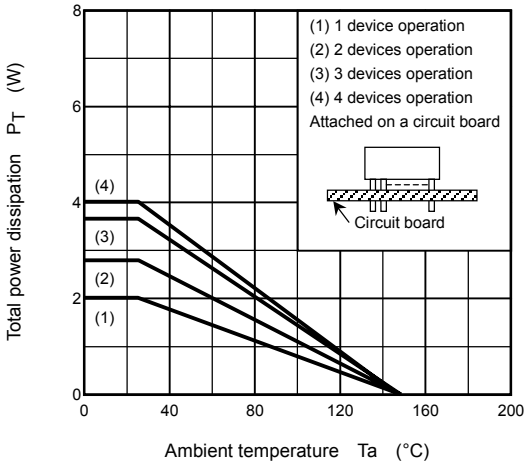
$r_{th} - t_w$



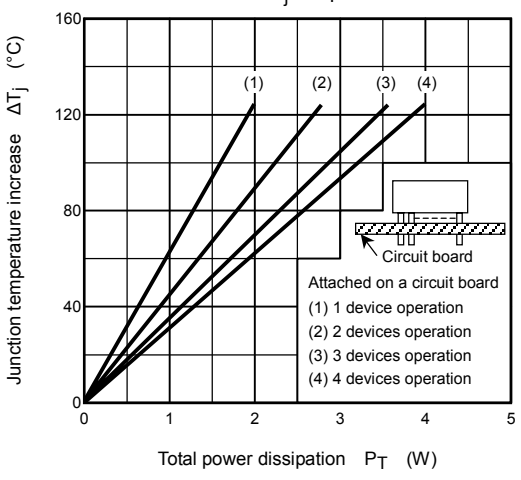
Safe Operating Area



$P_T - Ta$



$\Delta T_j - P_T$



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