

TOSHIBA Power Transistor Module
Silicon NPN&PNP Epitaxial Type (Four Darlingtons in One)

MP4006

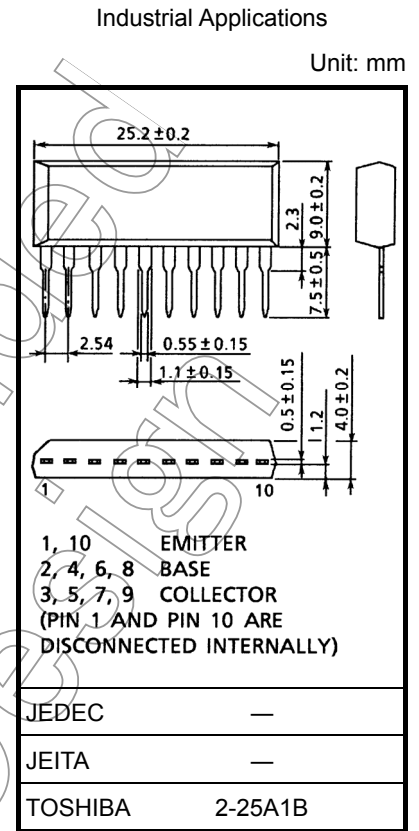
High Power Switching Applications.

Hammer Drive, Pulse Motor Drive and Inductive Load Switching.

- Small package by full molding (SIP 10 pins)
- High collector power dissipation (4-device operation)
: IC (DC) = ±2 A (max)
- High DC current gain: hFE = 2000 (min) (VCE = ±2 V, IC = ±1 A)

Absolute Maximum Ratings (Ta = 25°C)

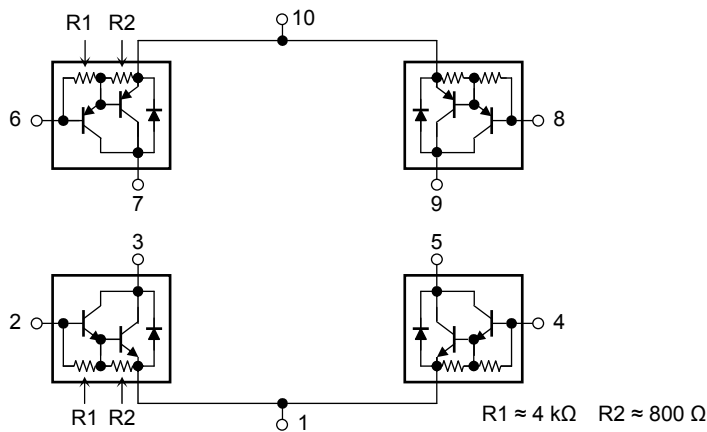
Characteristics	Symbol	Rating		Unit
		NPN	PNP	
Collector-base voltage	V _{CBO}	80	-80	V
Collector-emitter voltage	V _{CEO}	80	-80	V
Emitter-base voltage	V _{EBO}	8	-8	V
Collector current	DC	I _C	2	A
	Pulse	I _{CP}	3	
Continuous base current	I _B	0.5	-0.5	A
Collector power dissipation (1-device operation)	P _C	2.0		W
Collector power dissipation (4-device operation)	P _T	4.0		W
Junction temperature	T _j	150		°C
Storage temperature range	T _{stg}	-55 to 150		°C



Weight: 2.1 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Array Configuration



Thermal Characteristics

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

Electrical Characteristics ($T_a = 25^\circ\text{C}$) (NPN transistor)

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

Electrical Characteristics (Ta = 25°C) (PNP transistor)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = -80\text{ V}, I_E = 0\text{ A}$	—	—	-10	μA
Collector cut-off current		I_{CEO}	$V_{CE} = -80\text{ V}, I_B = 0\text{ A}$	—	—	-10	μA
Emitter cut-off current		I_{EBO}	$V_{EB} = -8\text{ V}, I_C = 0\text{ A}$	-0.8	—	-4.0	mA
Collector-base breakdown voltage		$V_{(BR)CBO}$	$I_C = -1\text{ mA}, I_E = 0\text{ A}$	-80	—	—	V
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = -10\text{ mA}, I_B = 0\text{ A}$	-80	—	—	V
DC current gain		h_{FE}	$V_{CE} = -2\text{ V}, I_C = -1\text{ A}$	2000	—	—	—
Saturation voltage	Collector-emitter	$V_{CE(sat)}$	$I_C = -1\text{ A}, I_B = -1\text{ mA}$	—	—	-1.5	V
	Base-emitter	$V_{BE(sat)}$	$I_C = -1\text{ A}, I_B = -1\text{ mA}$	—	—	-2.0	
Transition frequency		f_T	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	—	50	—	MHz
Collector output capacitance		C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$	—	30	—	pF
Switching time	Turn-on time	t_{on}	<p>$-I_{B1} = I_{B2} = 1\text{ mA}, \text{duty cycle} \leq 1\%$</p>	—	0.4	—	μs
	Storage time	t_{stg}		—	2.0	—	
	Fall time	t_f		—	0.4	—	

Marking

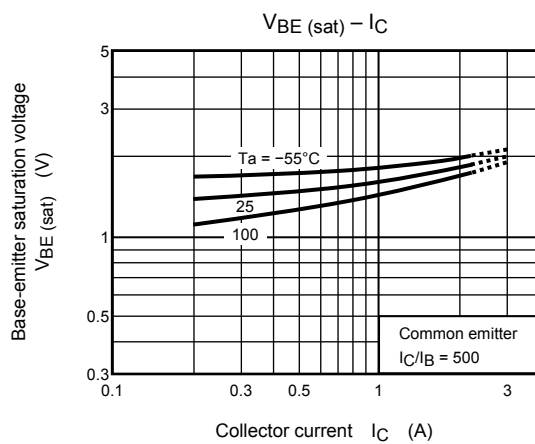
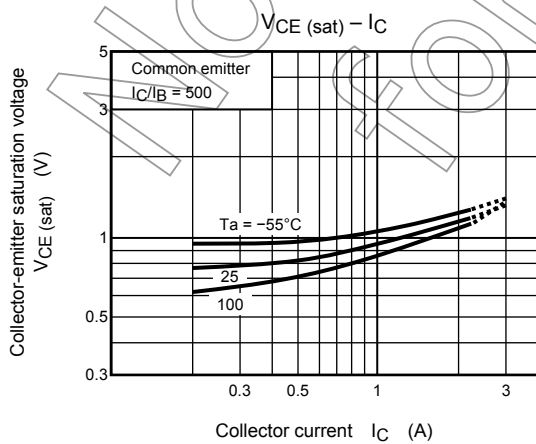
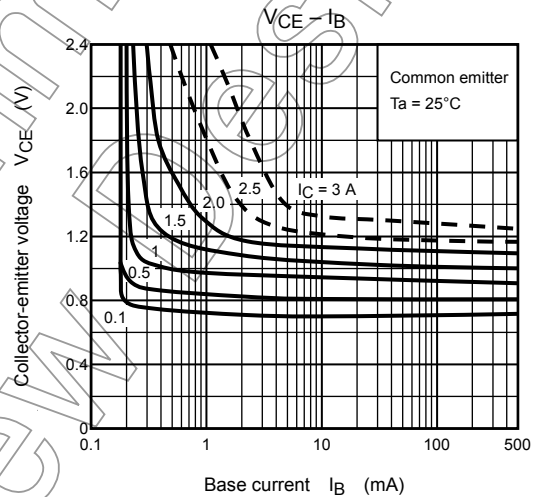
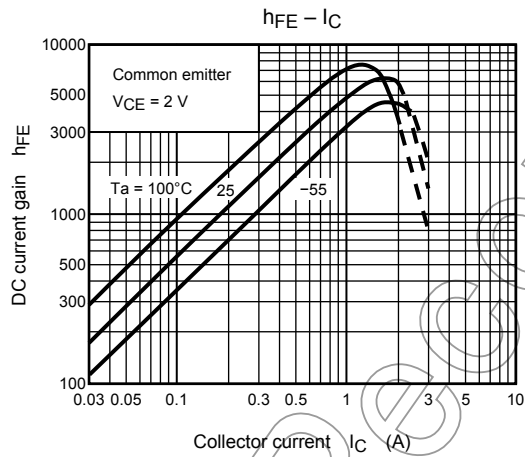
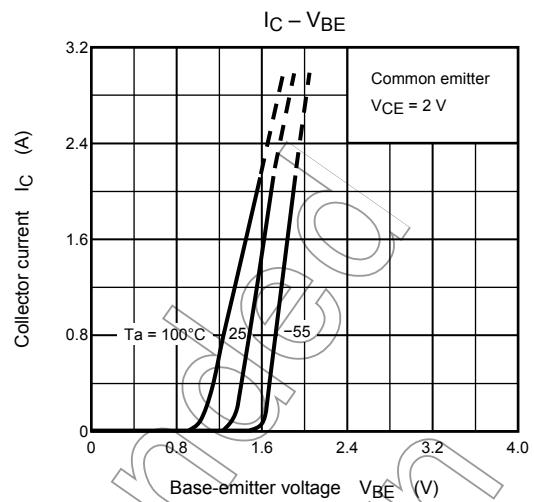
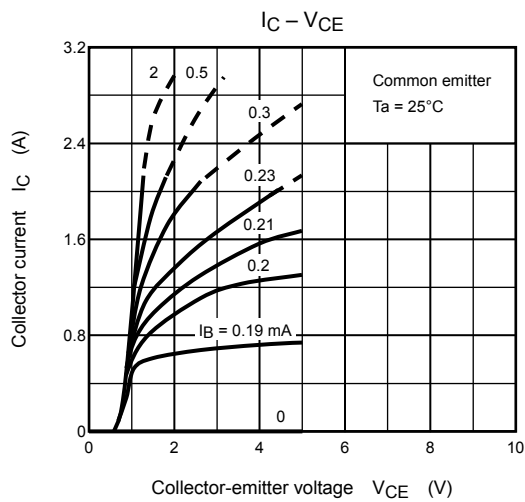


Part No. (or abbreviation code)

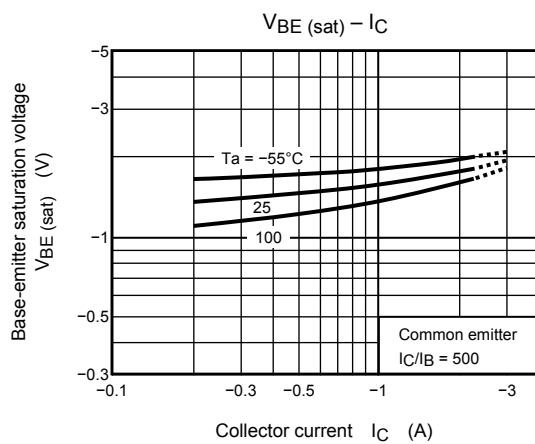
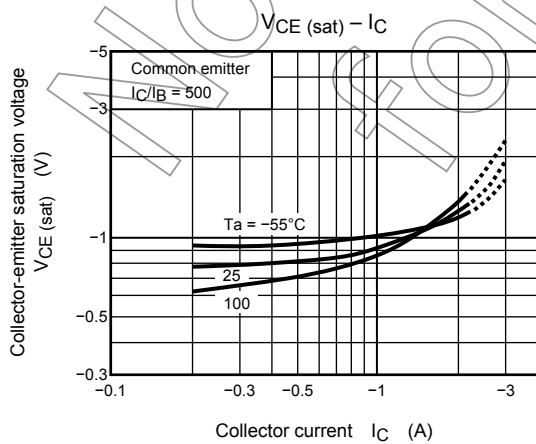
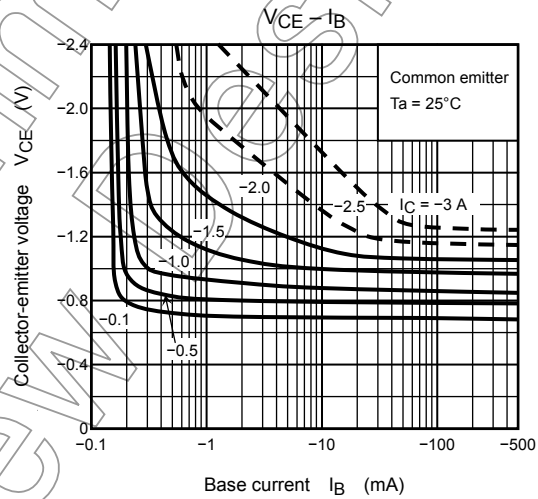
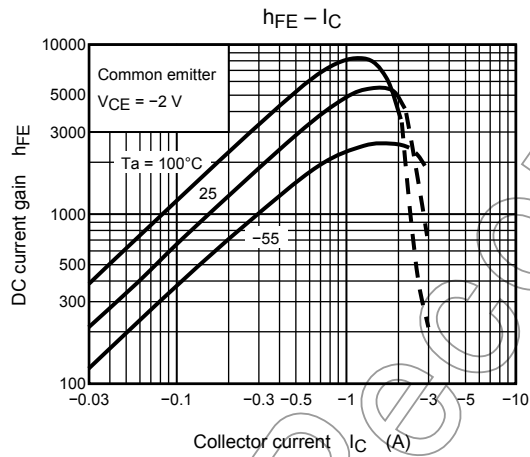
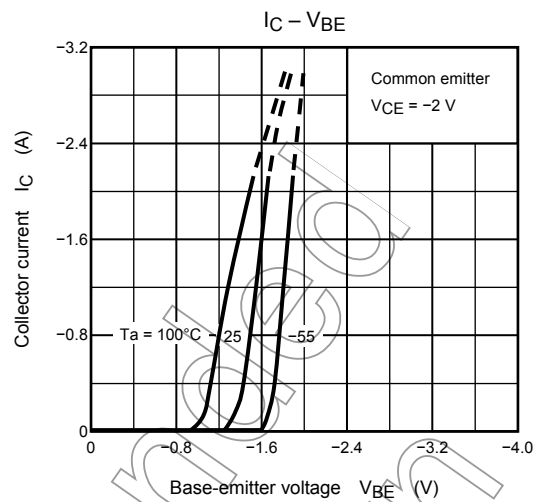
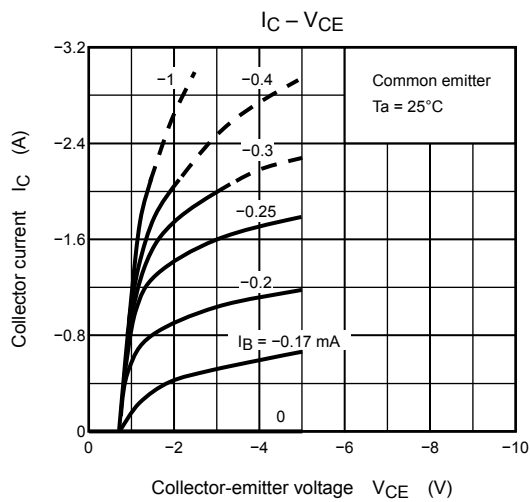
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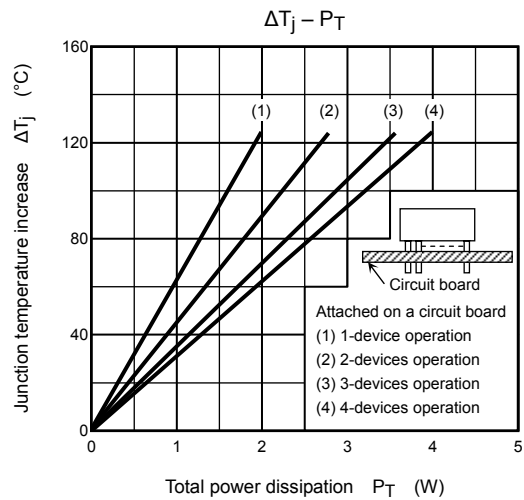
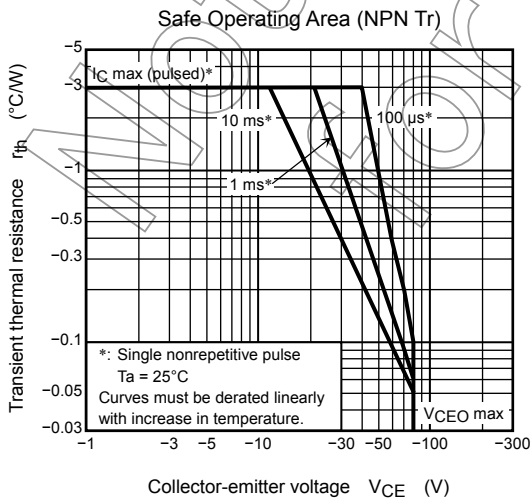
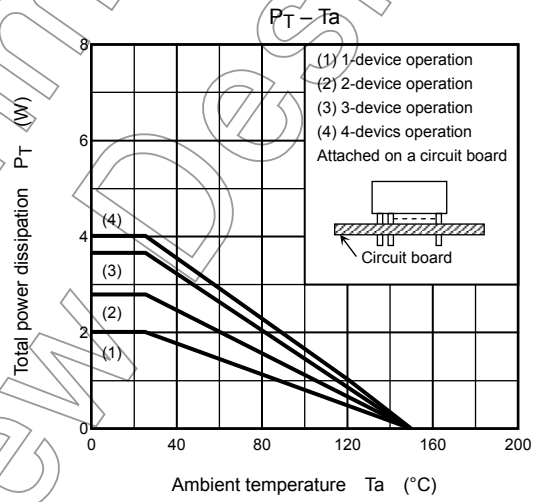
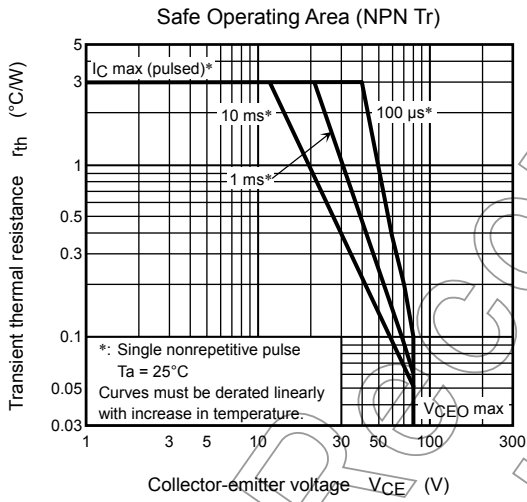
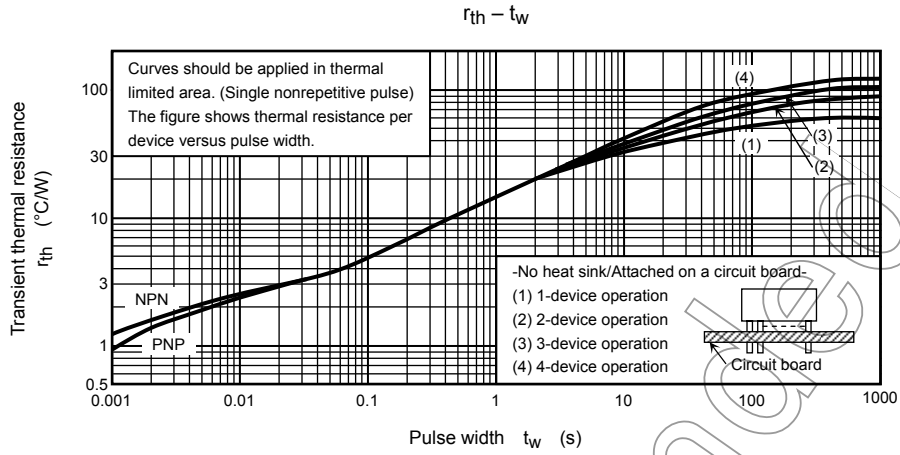
A line indicates lead (Pb)-free package or lead (Pb)-free finish.

(NPN transistor)



(PNP transistor)





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