

TOSHIBA Power Transistor Module Silicon NPN Epitaxial Type
(Four Darlingtons Power Transistors 4 in One)

MP4013

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)
: $P_T = 4 \text{ W}$ ($T_a = 25^\circ\text{C}$)
- High collector current: I_C (DC) = 2 A (max)
- High DC current gain: $h_{FE} = 2000$ (min) ($V_{CE} = 2 \text{ V}$, $I_C = 1 \text{ A}$)
- Zener diode included between collector and base.

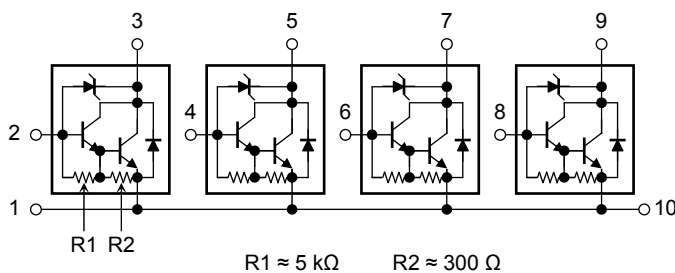
Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

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-device operation)		P_T	4.0	W
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

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.

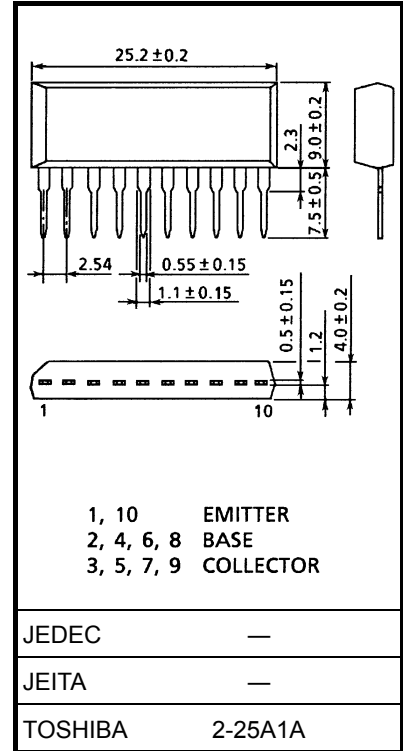
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Array Configuration



Industrial Applications

Unit: mm

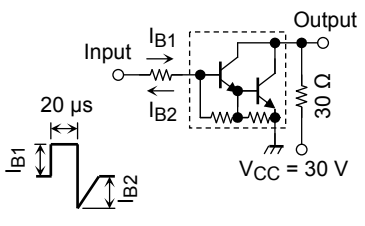


Weight: 2.1 g (typ.)

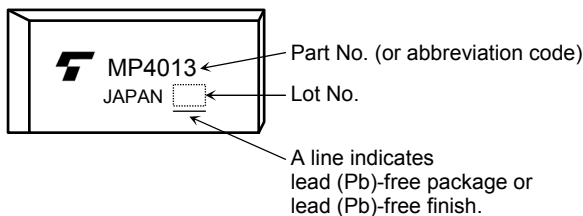
Thermal Characteristics

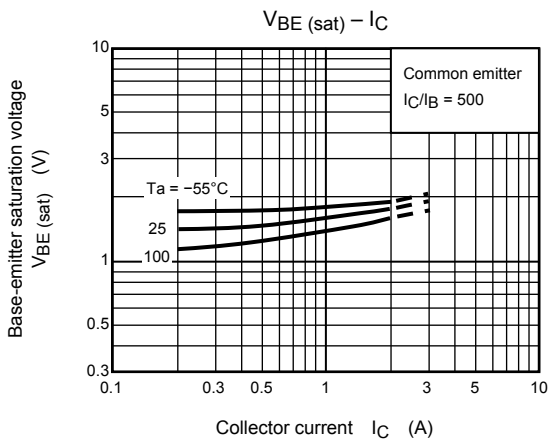
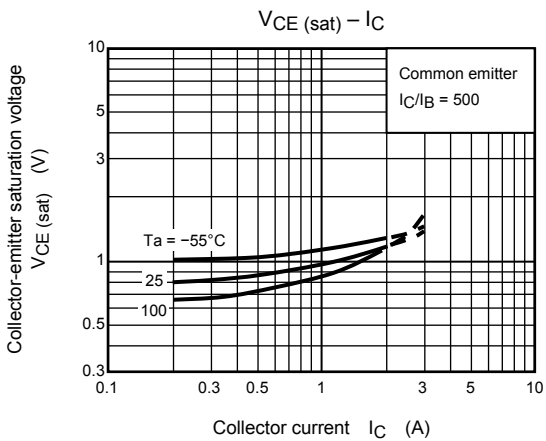
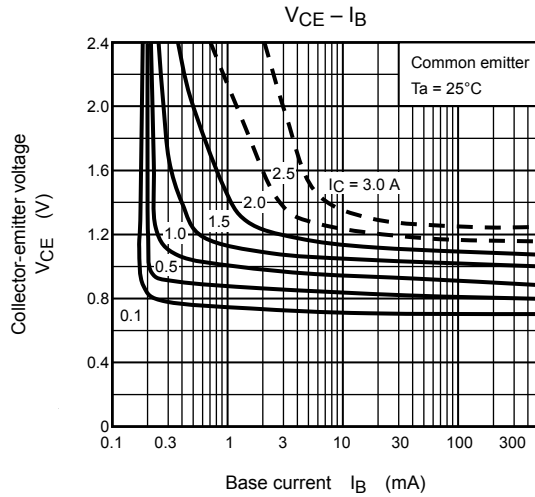
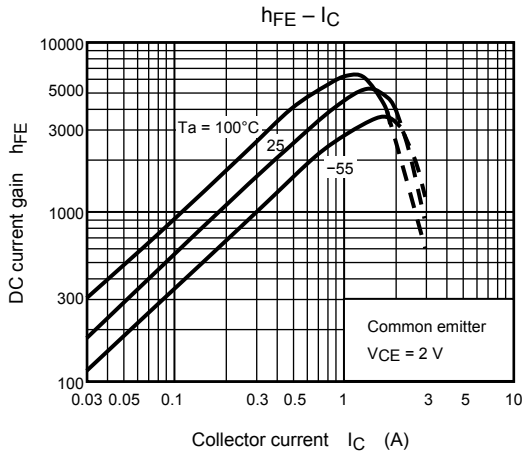
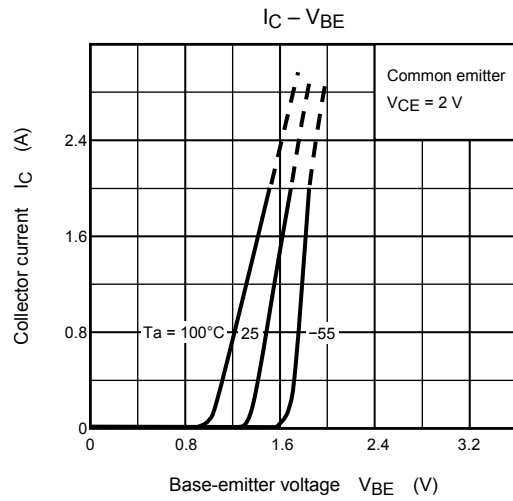
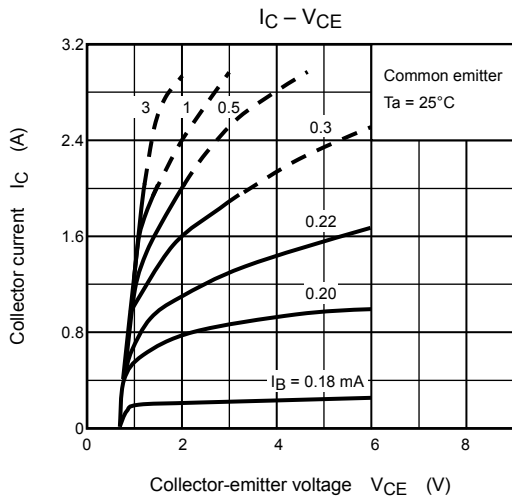
Characteristics	Symbol	Max	Unit
Thermal resistance from junction to ambient (4 devices operation, Ta = 25°C)	$\Sigma R_{th(j-a)}$	31.3	°C/W
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	T _L	260	°C

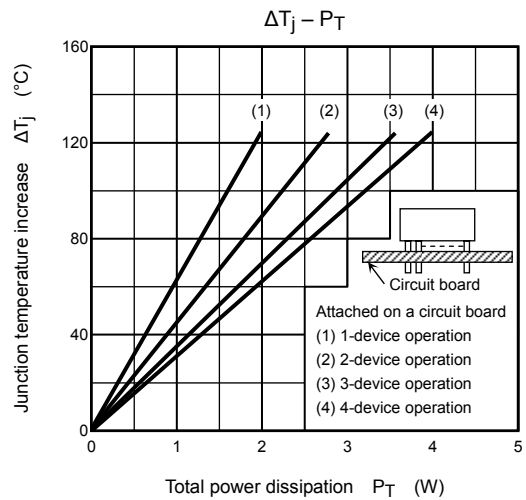
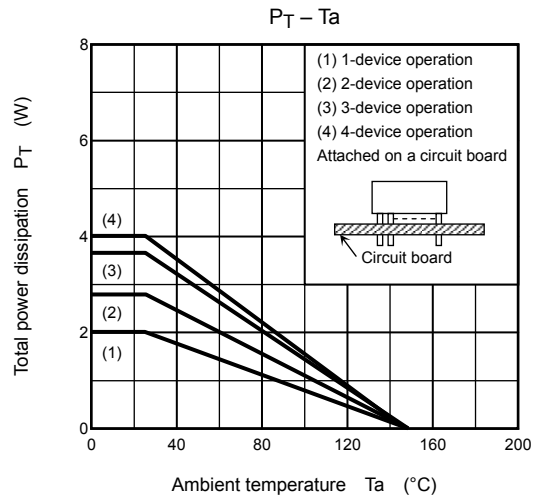
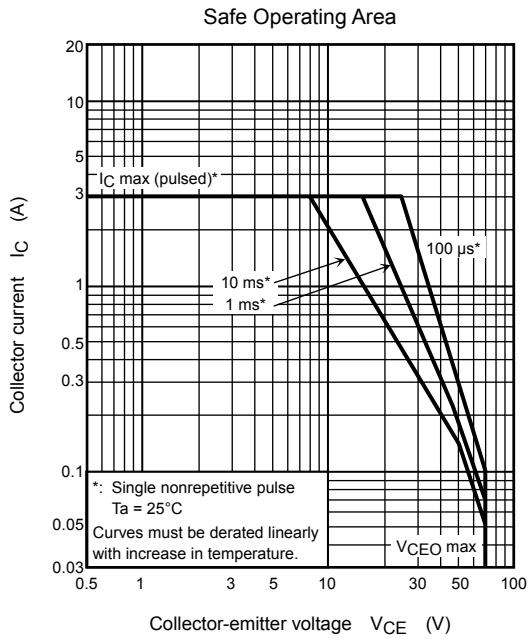
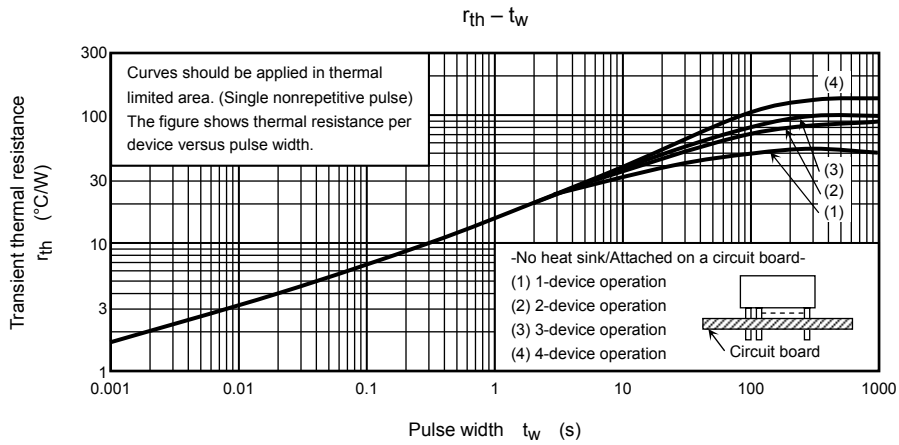
Electrical Characteristics (Ta = 25°C)

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}	 <p>Input I_{B1}, I_{B2}, Output, 30 Ω, V_{CC} = 30 V</p> <p>20 μs</p> <p>I_{B1} = -I_{B2} = 1 mA, duty cycle ≤ 1%</p>	—	0.4	—	μs
	Storage time	t _{stg}		—	4.0	—	
	Fall time	t _f		—	0.6	—	

Marking







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20070701-EN

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