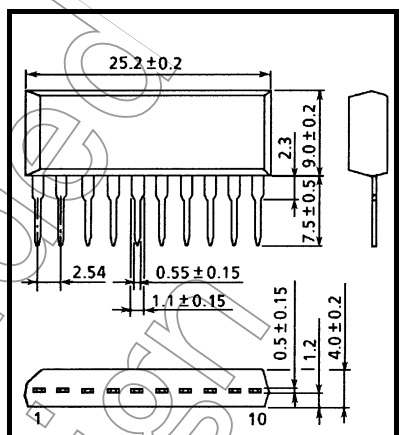
TOSHIBA Power Transistor Module Silicon NPN Epitaxial Type
(Four Darlington Power Transistors in One)

MP4101

Industrial Applications

High Power Switching Applications
Hammer Drive, Pulse Motor Drive
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.)

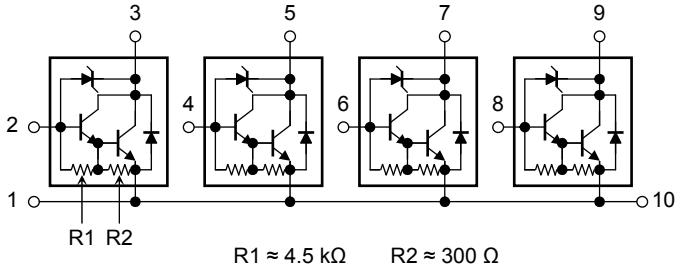
- Small package by full molding (SIP 10 pins)
- High collector power dissipation (4-device operation)
  : P_T = 4 W (Ta = 25°C)
- High collector current: $I_{C\ (DC)}$ = 4 A (max)
- High DC current gain: h_{FE} = 2000 (min) (V_{CE} = 2 V, I_C = 1 A)
- Zener diode included between collector and base.

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	60 ± 10	V
Collector-emitter voltage		V_{CEO}	60 ± 10	V
Emitter-base voltage		V_{EBO}	6	V
Collector current	DC	I_C	4	A
	Pulse	I_{CP}	6	
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	°C
Storage temperature range		T_{stg}	−55 to 150	°C

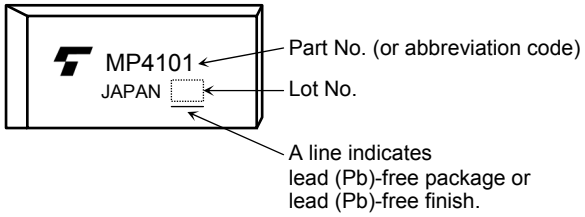
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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



R1 ≈ 4.5 kΩ R2 ≈ 300 Ω

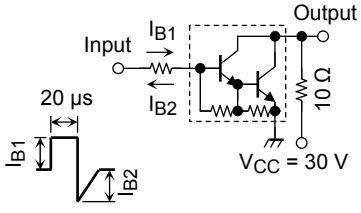
Marking



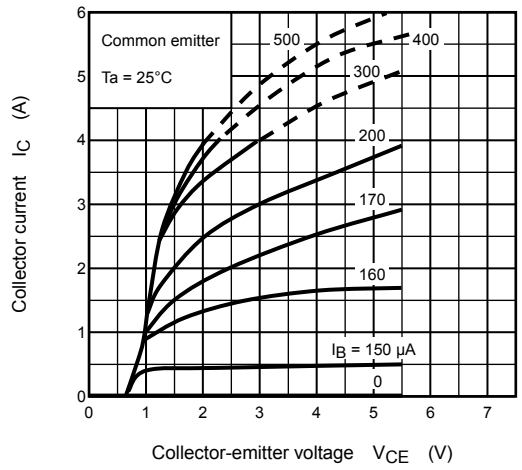
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance from junction to ambient (4-device 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

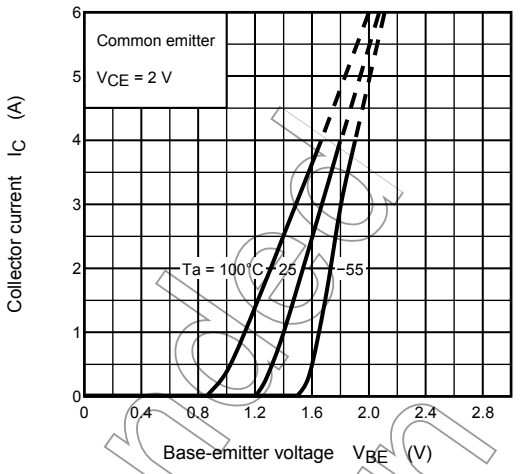
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 45 V, I_E = 0 A	—	—	10	μA
Collector cut-off current		I_{CEO}	V_{CE} = 45 V, I_B = 0 A	—	—	10	μA
Emitter cut-off current		I_{EBO}	V_{EB} = 6 V, I_C = 0 A	0.6	—	20	mA
Collector-base breakdown voltage		$V_{(BR)\ CBO}$	I_C = 10 mA, I_E = 0 A	50	60	70	V
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0 A	50	60	70	V
DC current gain		$h_{FE\ (1)}$	V_{CE} = 2 V, I_C = 1 A	2000	—	15000	—
		$h_{FE\ (2)}$	V_{CE} = 2 V, I_C = 3 A	1000	—	—	
Saturation voltage	Collector-emitter	$V_{CE\ (sat)}$	I_C = 3 A, I_B = 10 mA	—	—	1.5	V
	Base-emitter	$V_{BE\ (sat)}$	I_C = 3 A, I_B = 10 mA	—	—	2.0	
Transition frequency		f_T	V_{CE} = 2 V, I_C = 0.5 A	—	60	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0 A, f = 1 MHz	—	30	—	pF
Switching time	Turn-on time	t_{on}		—	0.2	—	μs
	Storage time	t_{stg}		—	3.0	—	
	Fall time	t_f	I_{B1} = −I_{B2} = 10 mA, duty cycle ≤ 1%	—	0.5	—	

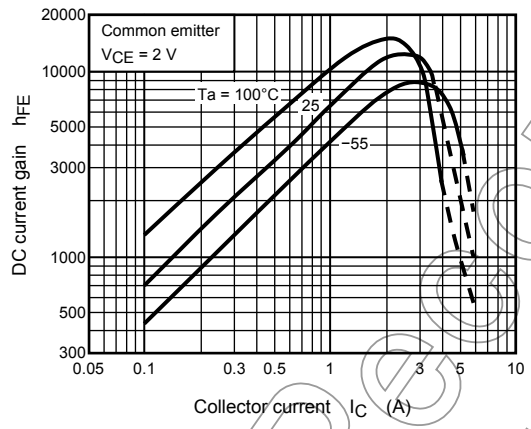
$I_C - V_{CE}$



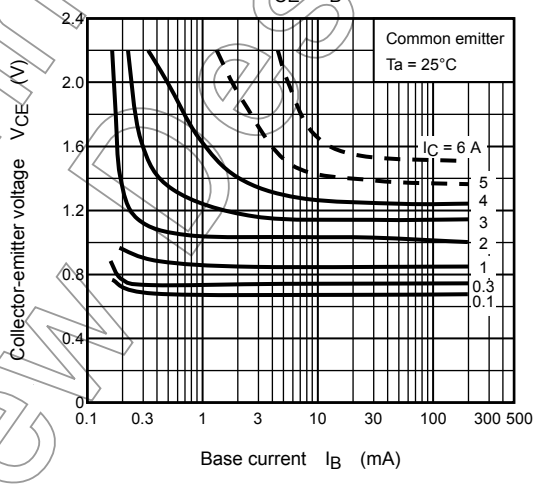
$I_C - V_{BE}$



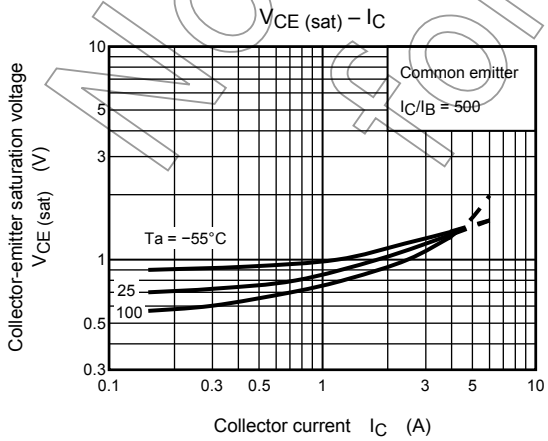
$h_{FE} - I_C$



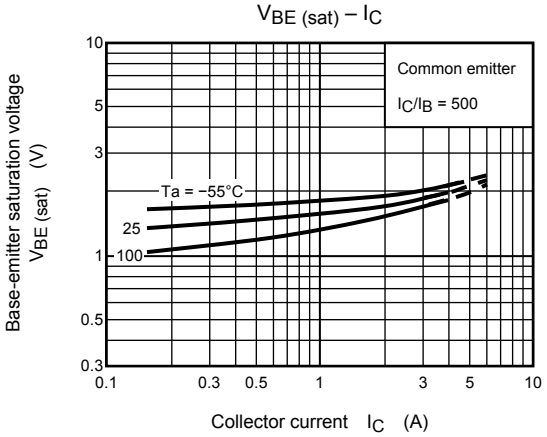
$V_{CE} - I_B$



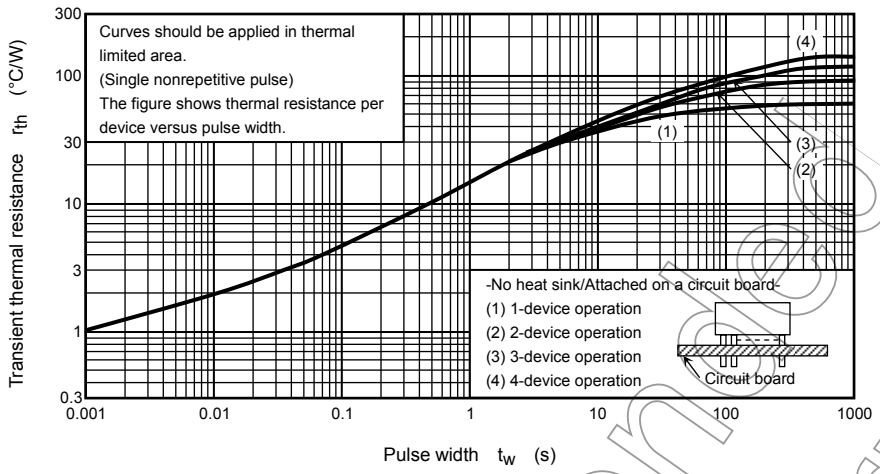
$V_{CE\ (sat)} - I_C$



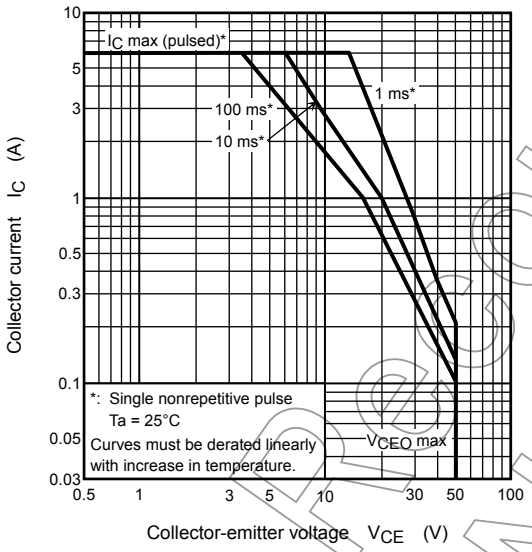
$V_{BE\ (sat)} - I_C$



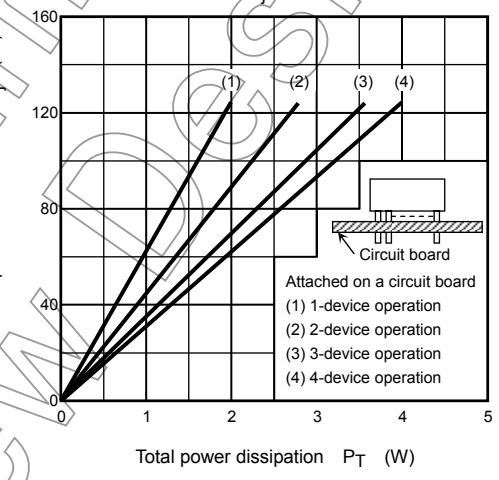
$r_{th} - t_w$



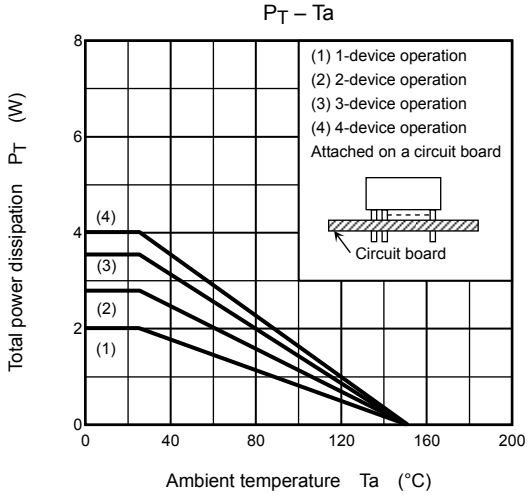
Safe Operating Area



$\Delta T_j - P_T$



$P_T - Ta$



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