

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

# MP4020

## High Power Switching Applications

Hammer Drive, Pulse Motor Drive and Inductive Load Switching

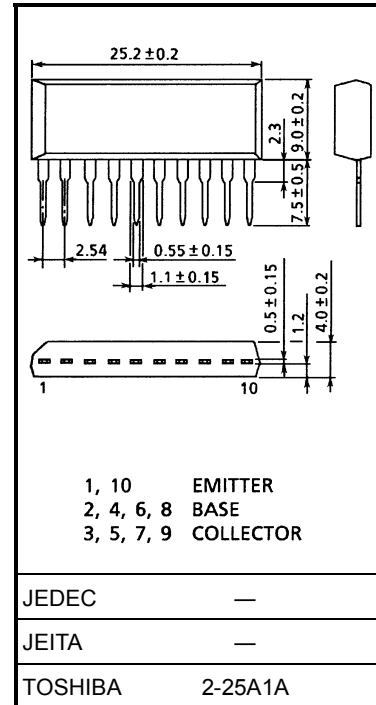
- Small package by full molding (SIP 10 pins)
- High collector power dissipation (4-device operation)  
:  $P_T = 4 \text{ W}$  ( $T_a = 25^\circ\text{C}$ )
- High collector current:  $I_C \text{ (DC)} = 2 \text{ A}$  (max)
- High DC current gain:  $h_{FE} = 2000$  (min) ( $V_{CE} = 2 \text{ V}$ ,  $I_C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

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	50	V
Collector-emitter voltage		$V_{CEO}$	$60 \pm 10$	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	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

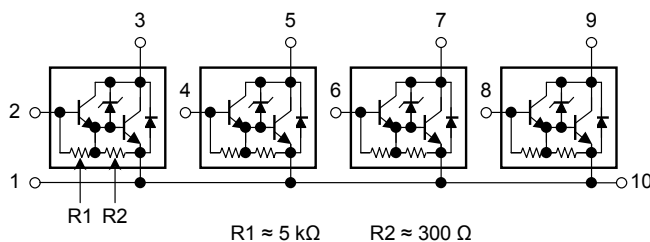
Industrial Applications

Unit: mm



Weight: 2.1 g (typ.)

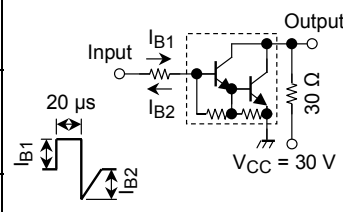
## Array Configuration



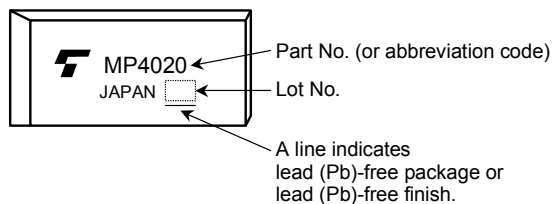
## Thermal Characteristics

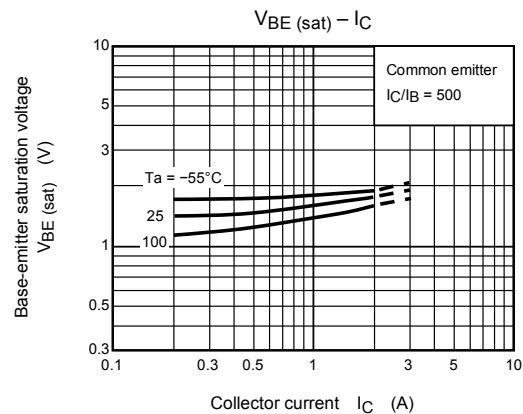
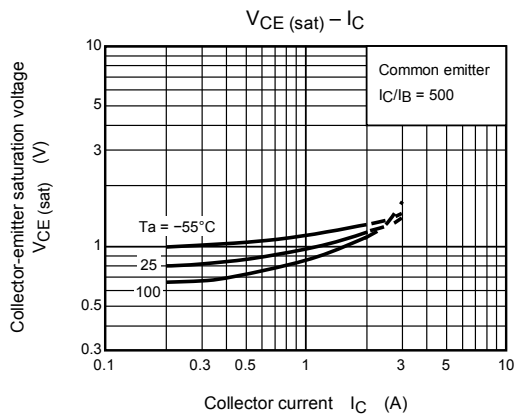
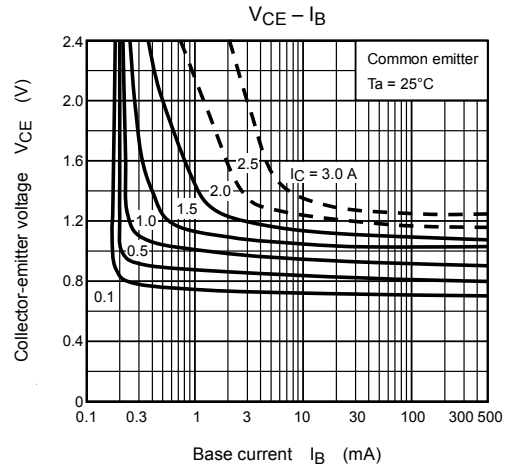
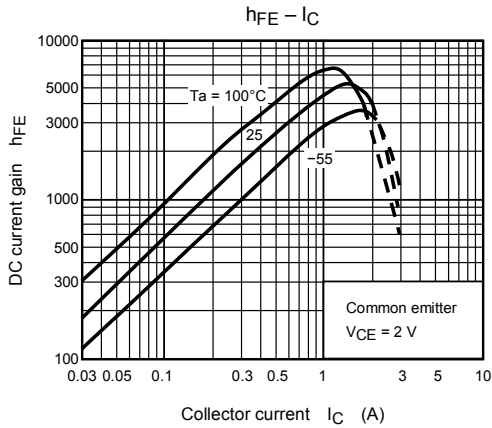
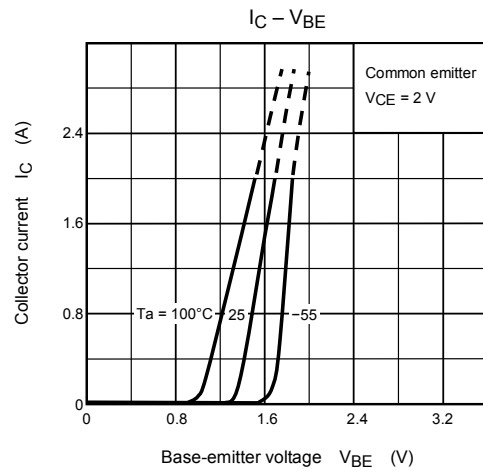
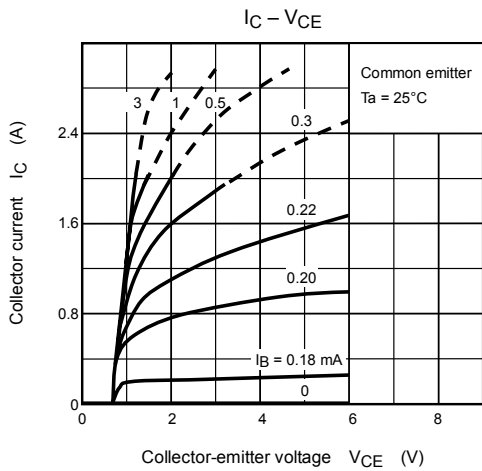
Characteristics	Symbol	Max	Unit
Thermal resistance from junction to ambient (4-devices operation, $T_a = 25^\circ\text{C}$ )	$\Sigma R_{th(j-a)}$	31.3	$^\circ\text{C/W}$
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	$T_L$	260	$^\circ\text{C}$

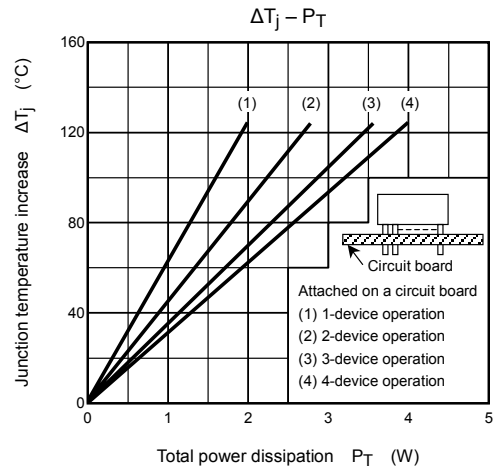
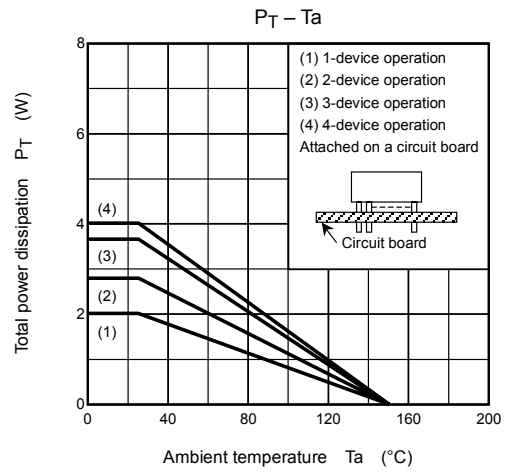
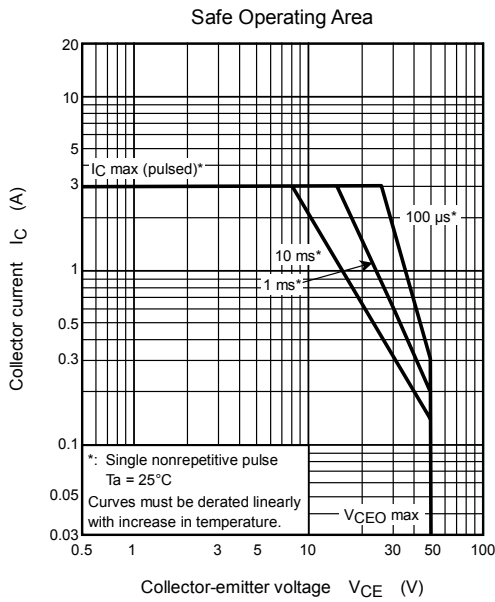
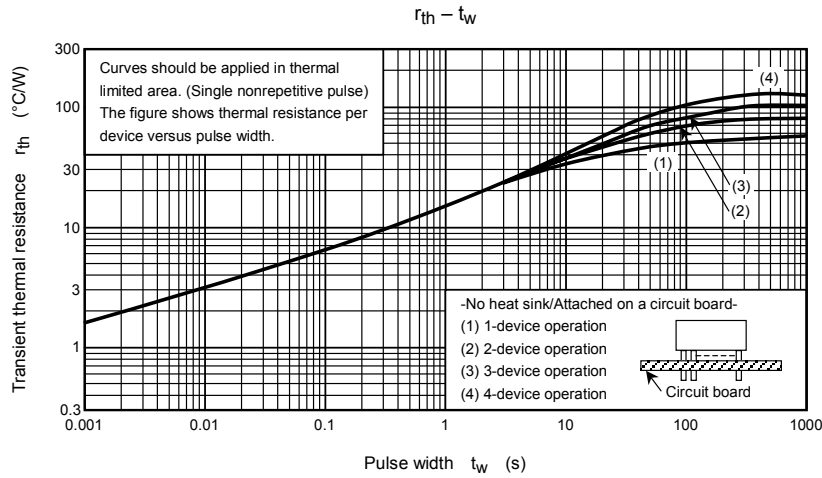
## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 45\text{ V}, I_E = 0\text{ A}$	—	—	10	$\mu\text{A}$
Collector cut-off current		$I_{CEO}$	$V_{CE} = 45\text{ V}, I_B = 0\text{ A}$	—	—	10	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 8\text{ V}, I_C = 0\text{ A}$	0.8	—	4.0	mA
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0\text{ A}$	50	60	70	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	$t_{on}$	 <p><math>I_{B1} = -I_{B2} = 1\text{ mA}, \text{duty cycle} \leq 1\%</math></p>	—	0.4	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	4.0	—	
	Fall time	$t_f$		—	0.6	—	

## Marking







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