# <u>TOSHIBA</u>

Unit: mm

TOSHIBA Power Transistor Module Silicon NPN Epitaxial Type (Fourd Darlington Power tTransistors in One)

# MP4020

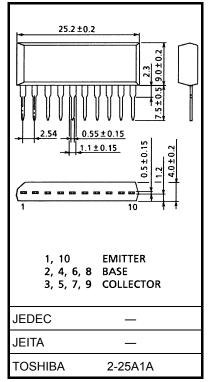
#### High Power Switching Applications

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<sub>T</sub> = 4 W (Ta = 25°C)
- High collector current: IC (DC) = 2 A (max)
- High DC current gain:  $h_{FE} = 2000 \text{ (min)} (V_{CE} = 2 \text{ V}, I_C = 1 \text{ A})$
- Zener diode included between collector and base

### Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Collector-base voltage		V <sub>CBO</sub>	50	V	
Collector-emitter voltage		V <sub>CEO</sub>	60 ± 10	V	
Emitter-base voltage		V <sub>EBO</sub>	8	V	
Collector current	DC	Ι <sub>C</sub>	2	A	
	Pulse	I <sub>CP</sub>	3		
Continuous base current		Ι <sub>Β</sub>	0.5	А	
Collector power dissipation		P <sub>C</sub>	2.0	W	
(1 device operation) Collector power dissipation				W	
(4 devices operation)		PT	4.0		
Junction temperature		Tj	150	°C	
Storage temperature range		T <sub>stg</sub>	-55 to 150	°C	

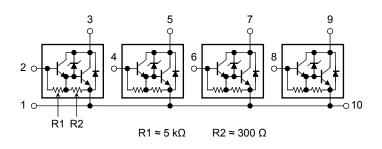


Weight: 2.1 g (typ.)

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**



Industrial Applications

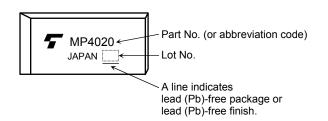
## **Thermal Characteristics**

Characteristics	Symbol	Max	Unit	
Thermal resistance from junction to ambient	ΣR <sub>th (j-a)</sub>	31.3	°C/W	
(4-devices operation, Ta = 25°C)	<b>,</b>			
Maximum lead temperature for soldering purposes	TL	260	°C	
(3.2 mm from case for 10 s)				

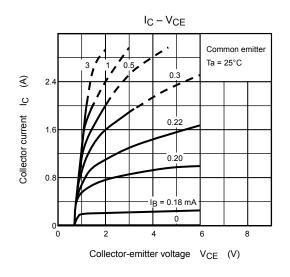
# Electrical Characteristics (Ta = 25°C)

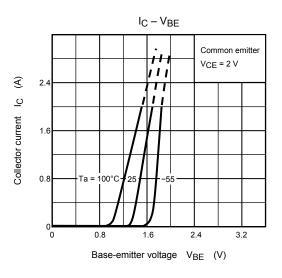
Characteristics		Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current		I <sub>CBO</sub>	V <sub>CB</sub> = 45 V, I <sub>E</sub> = 0 A	—	—	10	μA
Collector cut-off current		ICEO	V <sub>CE</sub> = 45 V, I <sub>B</sub> = 0 A	_	_	10	μA
Emitter cut-off current		I <sub>EBO</sub>	V <sub>EB</sub> = 8 V, I <sub>C</sub> = 0 A	0.8	—	4.0	mA
Collector-emitter breakdown voltage		V (BR) CEO	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0 A	50	60	70	V
DC current gain		h <sub>FE</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 1 A	2000	_	_	_
Saturation voltage	Collector-emitter	V <sub>CE (sat)</sub>	I <sub>C</sub> = 1 A, I <sub>B</sub> = 1 mA	_	_	1.5	v
	Base-emitter	V <sub>BE (sat)</sub>	I <sub>C</sub> = 1 A, I <sub>B</sub> = 1 mA	_	_	2.0	
Transition frequency		fT	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 0.5 A	_	100	_	MHz
Collector output capacitance		C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 A, f = 1 MHz	_	20	_	pF
Switching time	Turn-on time	t <sub>on</sub>	Input <sup>I</sup> B1 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	_	0.4	_	μs
	Storage time	t <sub>stg</sub>	$20 \ \mu s$ $B_2$ $C_C = 30 \ V$ $C_C = 30 \ V$ $C_R = -I_{B2} = 1 \ mA, \ duty \ cycle \le 1\%$	_	4.0	_	
	Fall time	t <sub>f</sub>		_	0.6	_	

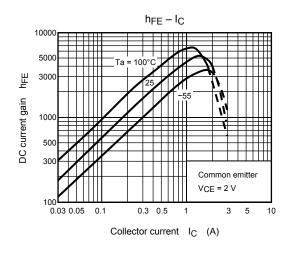
## Marking

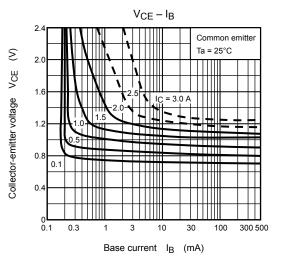


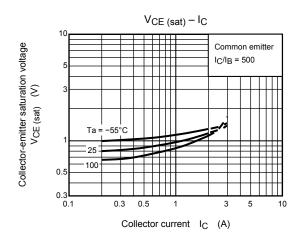
# **TOSHIBA**

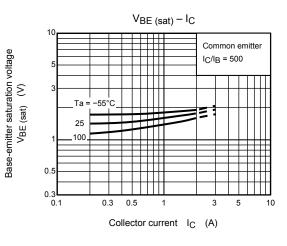


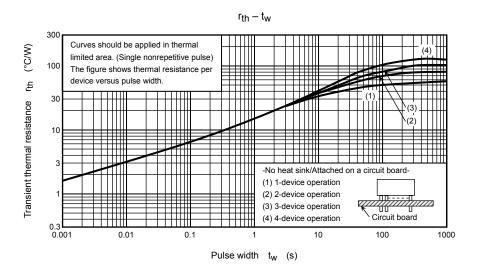


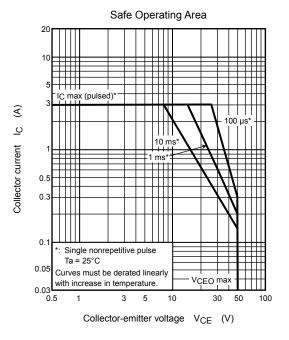




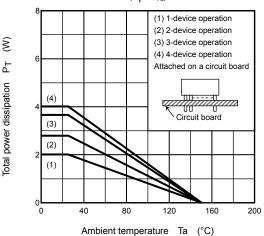


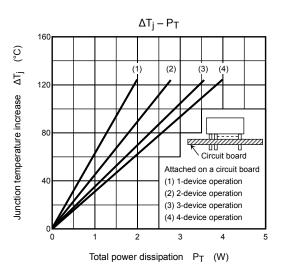






P<sub>T</sub> – Ta





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