

TOSHIBA Power Transistor Module  
Silicon NPN Triple Diffused Type (Darlington power transistor 4 in 1)

# MP4015

High Power Switching Applications.  
Hammer Drive, Pulse Motor Drive.  
Inductive Load Switching.

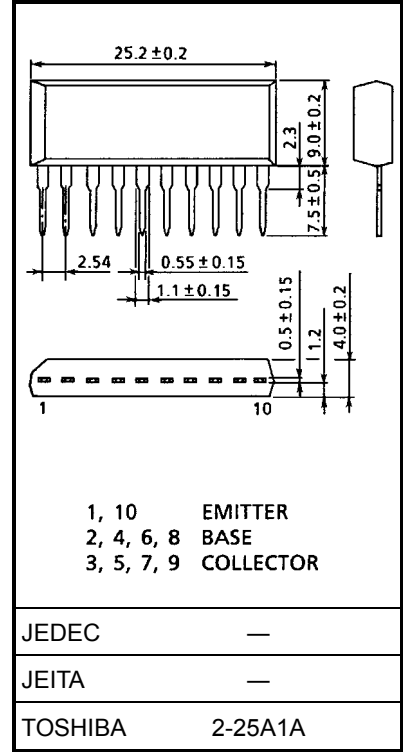
- Small package by full molding (SIP 10 pin)
- High collector power dissipation (4 devices operation)  
:  $P_T = 4 \text{ W}$  ( $T_a = 25^\circ\text{C}$ )
- High collector current:  $I_C$  (DC) = 5 A (max)
- High DC current gain:  $h_{FE} = 1000$  (min) ( $V_{CE} = 4 \text{ V}$ ,  $I_C = 3 \text{ A}$ )
- Zener diode included between collector and base.
- Unclamped inductive load energy:  $E_{S/B} = 100 \text{ mJ}$  (min)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	55	V
Collector-emitter voltage	$V_{CEO}$	$60 \pm 10$	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	DC	$I_C$	5
	Pulse	$I_{CP}$	8
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	$^\circ\text{C}$

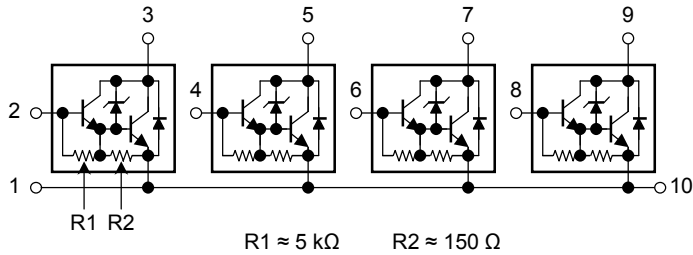
Industrial Applications

Unit: mm



Weight: 2.1 g (typ.)

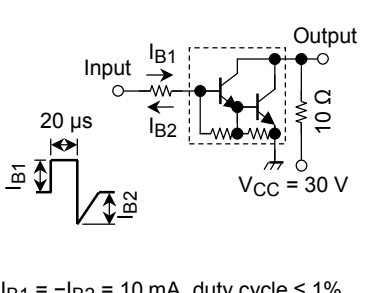
## Array Configuration

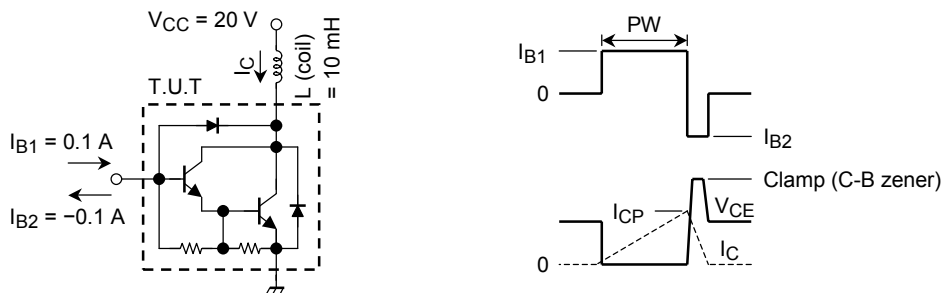


## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance of 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 <sub>L</sub>	260	°C

## Electrical Characteristics (Ta = 25°C)

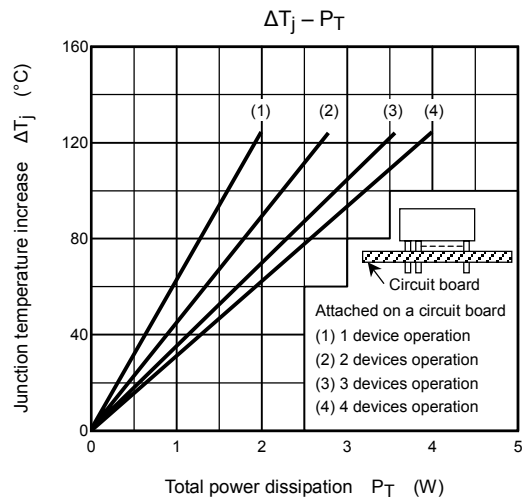
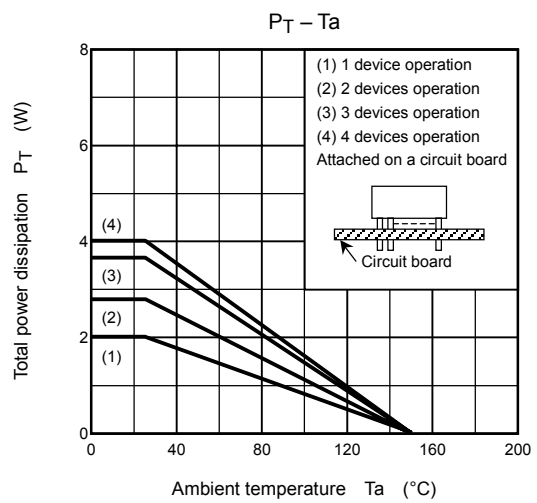
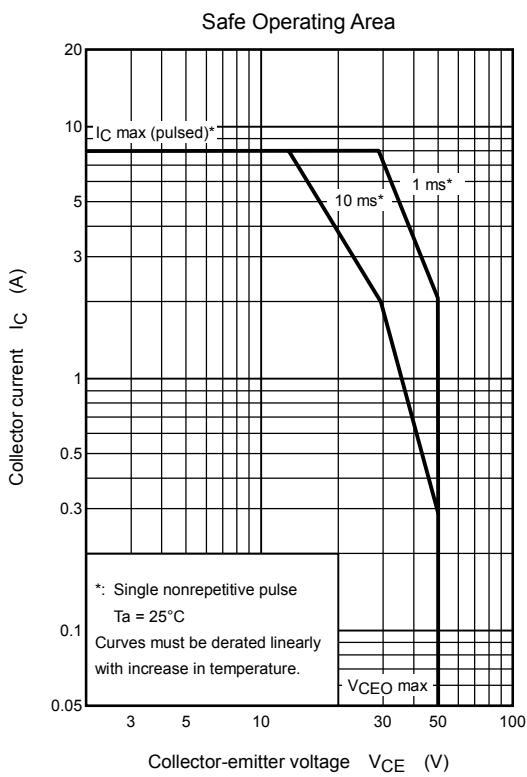
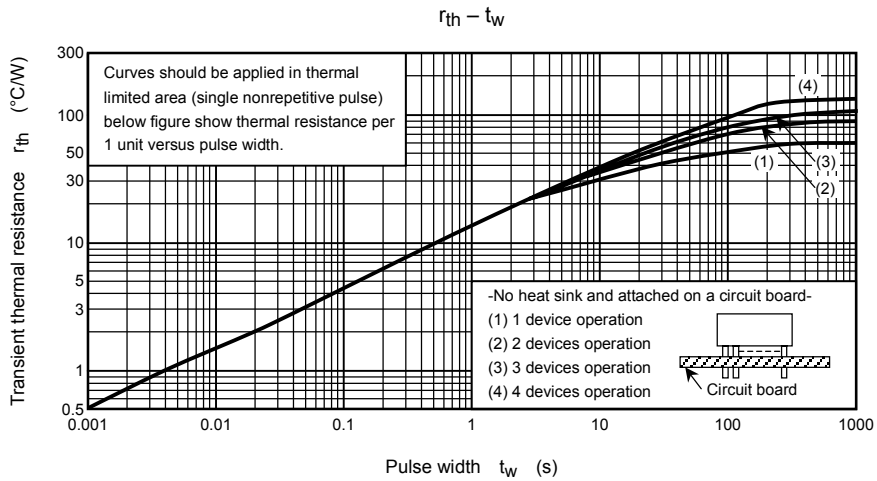
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I <sub>CBO</sub>	V <sub>CB</sub> = 45 V, I <sub>E</sub> = 0 A	—	—	10	μA
Collector cut-off current		I <sub>CEO</sub>	V <sub>CE</sub> = 45 V, I <sub>B</sub> = 0 A	—	—	10	μA
Emitter cut-off current		I <sub>EBO</sub>	V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0 A	0.3	—	10	mA
Collector-base breakdown voltage		V <sub>(BR)CBO</sub>	I <sub>C</sub> = 10 mA, I <sub>E</sub> = 0 A	50	—	70	V
DC current gain		h <sub>FE</sub> (1)	V <sub>CE</sub> = 4 V, I <sub>C</sub> = 1 A	1000	—	—	—
		h <sub>FE</sub> (2)	V <sub>CE</sub> = 4 V, I <sub>C</sub> = 3 A	1000	—	—	
Saturation voltage	Collector-emitter	V <sub>CE</sub> (sat) (1)	I <sub>C</sub> = 1 A, I <sub>B</sub> = 4 mA	—	0.9	1.4	V
		V <sub>BE</sub> (sat) (2)	I <sub>C</sub> = 3 A, I <sub>B</sub> = 10 mA	—	1.3	2.0	
Base-emitter	V <sub>BE</sub> (sat)	I <sub>C</sub> = 1 A, I <sub>B</sub> = 4 mA	—	1.6	2.0		
Base-emitter voltage		V <sub>BE</sub>	V <sub>CE</sub> = 4 V, I <sub>B</sub> = 3 A	—	1.8	2.5	V
Transition frequency		f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 0.5 A	—	7	—	MHz
Collector output capacitance		C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 A, f = 1 MHz	—	44	—	pF
Switching time	Turn-on time	t <sub>on</sub>		—	0.6	—	μs
	Storage time	t <sub>stg</sub>		—	4.2	—	
	Fall time	t <sub>f</sub>		—	—	2.3	
Unclamped inductive load energy		E <sub>S/B</sub>	Refer to Figure 1	100	—	—	mJ



Note 1: Pulse width adjusted for desired I<sub>CP</sub> (I<sub>CP</sub> = 4.48 A min)

Note 2:  $E_{S/B} = \frac{1}{2} L \cdot I_{CP}^2$

**Figure 1 Measurement Circuit of Unclamped Inductive Load Energy E<sub>S/B</sub>**



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