

TOSHIBA POWER TRANSISTOR MODULE SILICON NPN & PNP EPITAXIAL TYPE (DARLINGTON POWER TRANSISTOR 4 IN 1)

# MP4006

HIGH POWER SWITCHING APPLICATIONS.  
HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE  
LOAD SWITCHING.

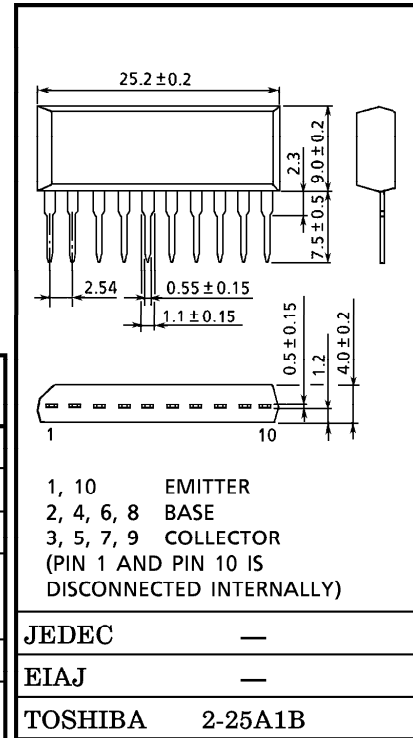
- Small Package by Full Molding (SIP 10 Pin)
- High Collector Power Dissipation (4 Devices Operation)  
:  $P_T = 4W$  ( $T_a = 25^\circ C$ )
- High Collector Current :  $I_C (DC) = \pm 2A$  (Max.)
- High DC Current Gain :  $h_{FE} = 2000$  (Min.)  
( $V_{CE} = \pm 2V, I_C = \pm 1A$ )

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING		UNIT
		NPN	PNP	
Collector-Base Voltage	$V_{CBO}$	80	-80	V
Collector-Emitter Voltage	$V_{CEO}$	80	-80	V
Emitter-Base Voltage	$V_{EBO}$	8	-8	V
Collector Current	DC	$I_C$	2	A
	Pulse	$I_{CP}$	3	
Continuous Base Current	$I_B$	0.5	-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		$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150		$^\circ C$

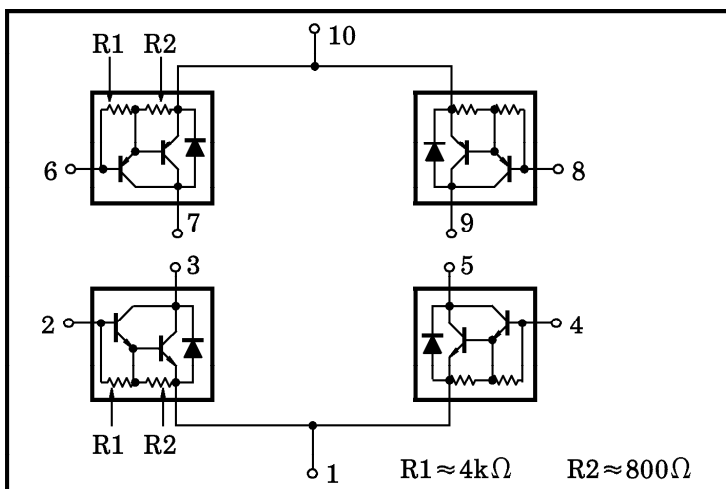
INDUSTRIAL APPLICATIONS

Unit in mm



Weight : 2.1g

ARRAY CONFIGURATION



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**THERMAL CHARACTERISTICS**

CHARACTERISTIC	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 (3.2mm from Case for 10s)	T <sub>L</sub>	260	°C

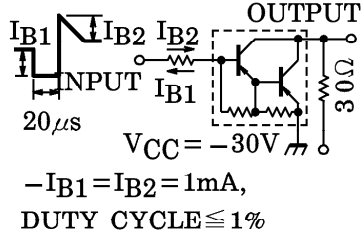
**ELECTRICAL CHARACTERISTICS (Ta = 25°C) (NPN TRANSISTOR)**

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 80V, I <sub>E</sub> = 0	—	—	10	μA	
Collector Cut-off Current	I <sub>CEO</sub>	V <sub>CE</sub> = 80V, I <sub>B</sub> = 0	—	—	10	μA	
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 8V, I <sub>C</sub> = 0	0.8	—	4.0	mA	
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = 1mA, I <sub>E</sub> = 0	80	—	—	V	
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0	80	—	—	V	
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A	2000	—	—		
Saturation Voltage	Collector-Emitter	V <sub>CE(sat)</sub>	I <sub>C</sub> = 1A, I <sub>B</sub> = 1mA	—	—	1.5	V
	Base-Emitter	V <sub>BE(sat)</sub>	I <sub>C</sub> = 1A, I <sub>B</sub> = 1mA	—	—	2.0	
Transition Frequency	f <sub>T</sub>	V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A	—	100	—	MHz	
Collector Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1MHz	—	20	—	pF	
Switching Time	Turn-on Time	t <sub>on</sub>					μs
	Storage Time	t <sub>stg</sub>					
	Fall Time	t <sub>f</sub>					

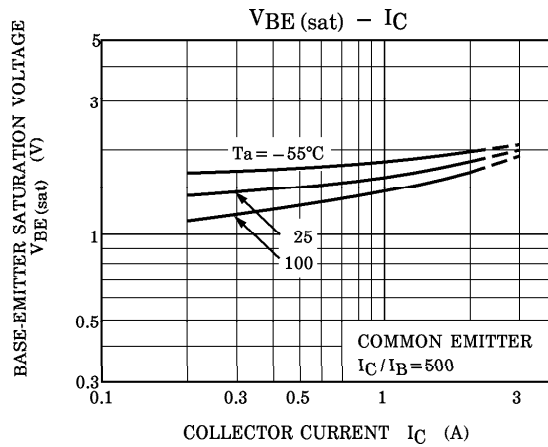
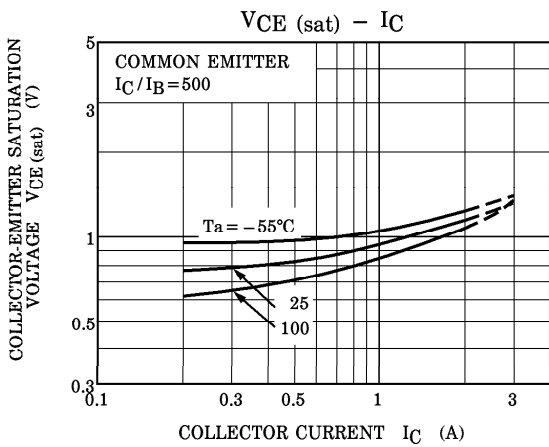
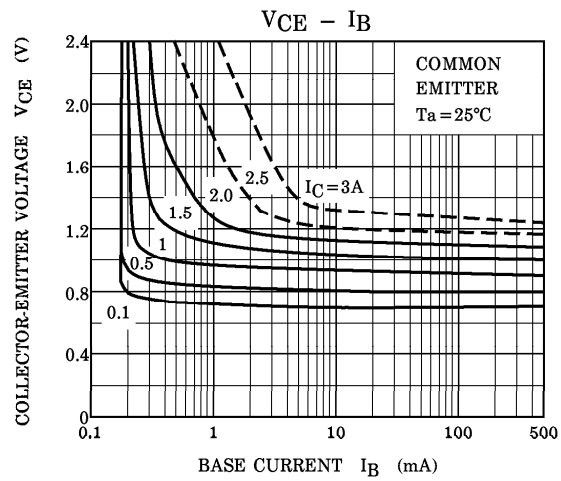
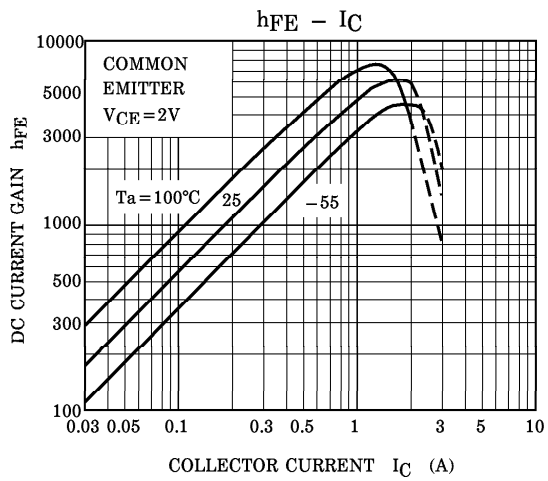
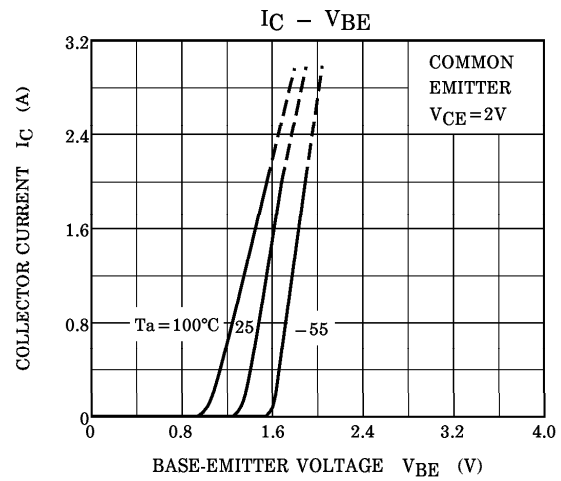
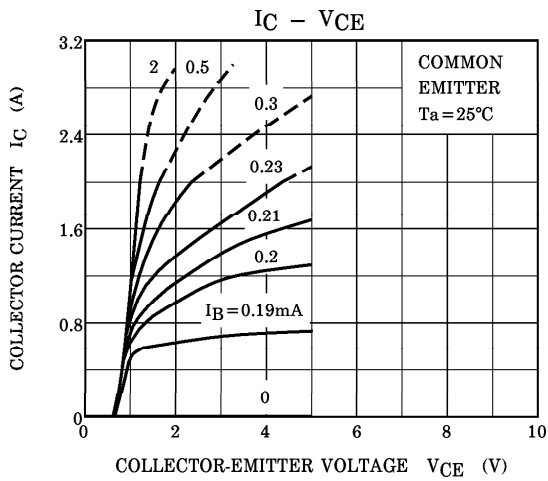
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ELECTRICAL CHARACTERISTICS (Ta = 25°C) (PNP TRANSISTOR)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		ICBO	V <sub>CB</sub> = -80V, I <sub>E</sub> = 0	—	—	-10	μA
Collector Cut-off Current		ICEO	V <sub>CE</sub> = -80V, I <sub>B</sub> = 0	—	—	-10	μA
Emitter Cut-off Current		IEBO	V <sub>EB</sub> = -8V, I <sub>C</sub> = 0	-0.8	—	-4.0	mA
Collector-Base Breakdown Voltage		V <sub>(BR)CBO</sub>	I <sub>C</sub> = -1mA, I <sub>E</sub> = 0	-80	—	—	V
Collector-Emitter Breakdown Voltage		V <sub>(BR)CEO</sub>	I <sub>C</sub> = -10mA, I <sub>B</sub> = 0	-80	—	—	V
DC Current Gain		h <sub>FE</sub>	V <sub>CE</sub> = -2V, I <sub>C</sub> = -1A	2000	—	—	
Saturation Voltage	Collector-Emitter	V <sub>CE(sat)</sub>	I <sub>C</sub> = -1A, I <sub>B</sub> = -1mA	—	—	-1.5	V
	Base-Emitter	V <sub>BE(sat)</sub>	I <sub>C</sub> = -1A, I <sub>B</sub> = -1mA	—	—	-2.0	
Transition Frequency		f <sub>T</sub>	V <sub>CE</sub> = -2V, I <sub>C</sub> = -0.5A	—	50	—	MHz
Collector Output Capacitance		C <sub>ob</sub>	V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz	—	30	—	pF
Switching Time	Turn-on Time	t <sub>on</sub>	 <p> <math>V_{CC} = -30V</math>  <math>-I_{B1} = I_{B2} = 1mA</math>  <math>DUTY\ CYCLE \leq 1\%</math> </p>	—	0.4	—	μs
	Storage Time	t <sub>stg</sub>		—	2.0	—	
	Fall Time	t <sub>f</sub>		—	—	0.4	

(NPN TRANSISTOR)



(PNP TRANSISTOR)

