

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

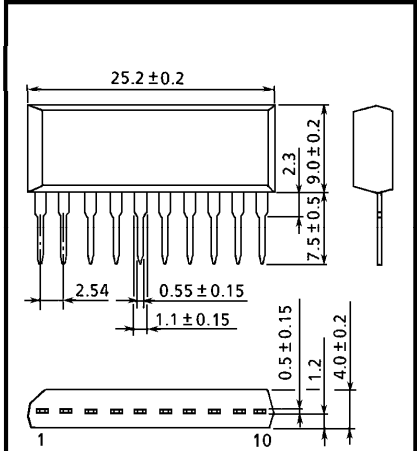
# MP4006

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

INDUSTRIAL APPLICATIONS

Unit in mm

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



1, 10 EMITTER  
2, 4, 6, 8 BASE  
3, 5, 7, 9 COLLECTOR  
(PIN 1 AND PIN 10 IS  
DISCONNECTED INTERNALLY)

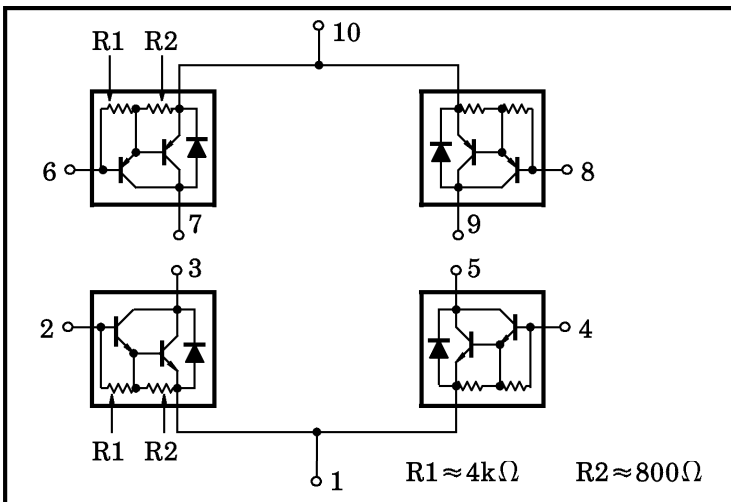
JEDEC	—
EIAJ	—
TOSHIBA	2-25A1B

Weight : 2.1g

MAXIMUM RATINGS (Ta = 25°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	-2
	Pulse	$I_{CP}$	3	-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		°C
Storage Temperature Range	$T_{stg}$	-55~150		°C

ARRAY CONFIGURATION



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HERMAL 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

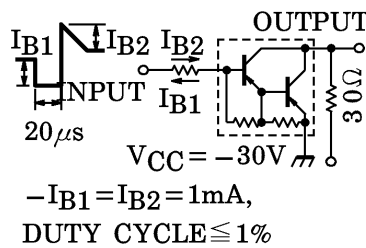
ELECTRICAL CHARACTERISTICS (Ta = 25°C) (NPN TRANSISTOR)

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>	<p>INPUT I<sub>B1</sub> 20 μs I<sub>B2</sub> OUTPUT 30 Ω V<sub>CC</sub> = 30V I<sub>B1</sub> ↓ I<sub>B2</sub> ↓ I<sub>B1</sub> = -I<sub>B2</sub> = 1mA DUTY CYCLE ≤ 1%</p>	—	0.4	—	μs
	Storage Time	t <sub>stg</sub>		—	4.0	—	
	Fall Time	t <sub>f</sub>		—	0.6	—	

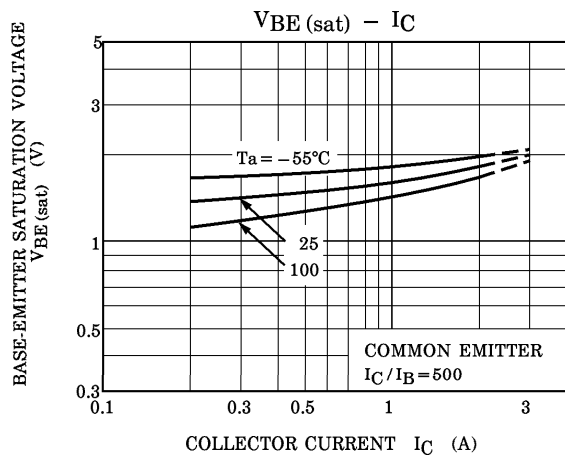
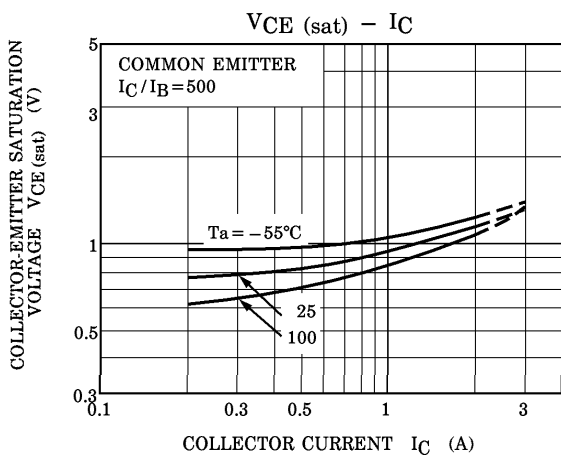
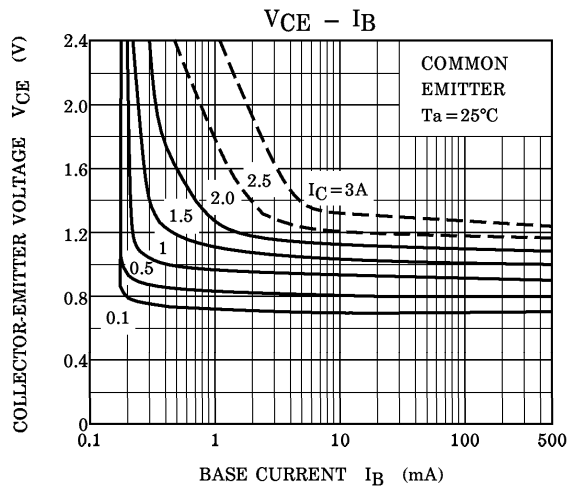
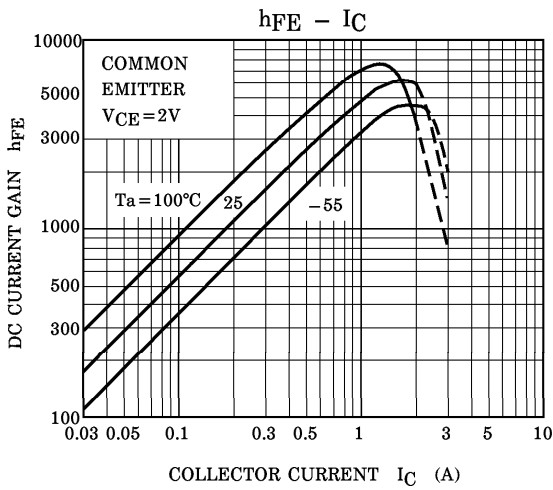
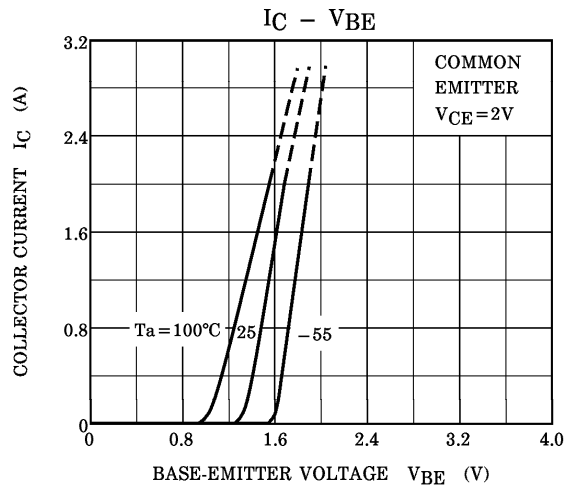
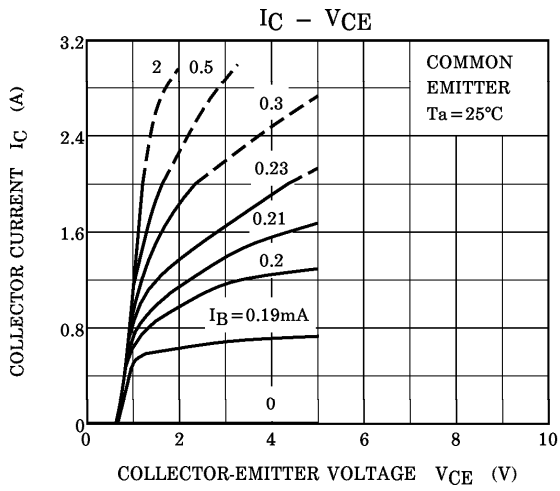
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ELECTRICAL CHARACTERISTICS (Ta = 25°C) (PNP TRANSISTOR)

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 style="text-align: center;">-IB<sub>1</sub> = IB<sub>2</sub> = 1mA, DUTY CYCLE ≤ 1%</p>	—	0.4	—	μs
	Storage Time	t <sub>stg</sub>		—	2.0	—	
	Fall Time	t <sub>f</sub>		—	0.4	—	

(NPN TRANSISTOR)



(PNP TRANSISTOR)

