

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

# MP4303

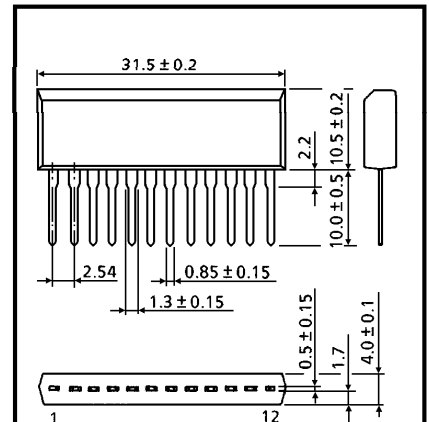
HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

INDUSTRIAL APPLICATIONS

Unit in mm

- Small Package by Full Molding (SIP 12 Pin)
- High Collector Power Dissipation (4 Devices Operation)  
:  $P_T = 4.4W$  ( $T_a = 25^\circ C$ )
- High Collector Current :  $I_C$  (DC) = 2A (Max.)
- High DC Current Gain :  $h_{FE} = 2000$  (Min.) ( $V_{CE} = 2V$ ,  $I_C = 1A$ )



TRANSISTOR PART  
1, 5, 8, 12 BASE  
2, 4, 9, 11 COLLECTOR  
6, 7 EMITTER  
DIODE PART  
2, 4, 9, 11 ANODE  
3, 10 CATHODE

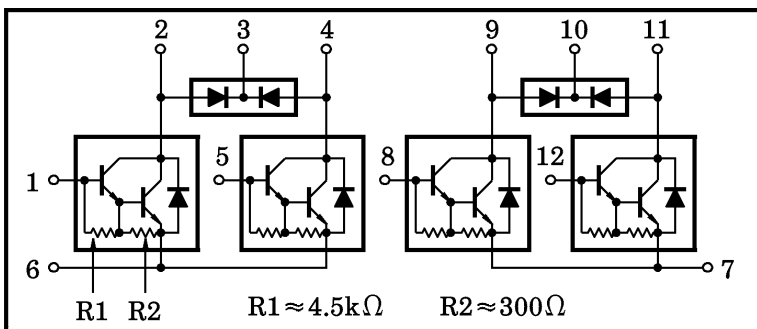
JEDEC	—
EIAJ	—
TOSHIBA	2-32C1B

Weight : 3.9g

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	$V_{CBO}$	120	V
Collector-Emitter Voltage	$V_{CEO}$	100	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Collector Current	DC	$I_C$	2
	Pulse	$I_{CP}$	4
Continuous Base Current	$I_B$	0.5	A
Collector Power Dissipation (1 Device Operation)	$P_C$	2.2	W
Collector Power Dissipation (4 Devices Operation)	$P_T$	4.4	W
Junction Temperature	$T_j$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$

ARRAY CONFIGURATION



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**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Junction to Ambient (4 Devices Operation, Ta = 25°C)	$\Sigma R_{th(j-a)}$	28.4	°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)**

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		I <sub>CBO</sub>	V <sub>CB</sub> = 120V, I <sub>E</sub> = 0	—	—	10	μA
Collector Cut-off Current		I <sub>CEO</sub>	V <sub>CE</sub> = 100V, I <sub>B</sub> = 0	—	—	10	μA
Emitter Cut-off Current		I <sub>EBO</sub>	V <sub>EB</sub> = 6V, I <sub>C</sub> = 0	0.5	—	2.5	mA
Collector-Base Breakdown Voltage		V <sub>(BR)CBO</sub>	I <sub>C</sub> = 1mA, I <sub>E</sub> = 0	120	—	—	V
Collector-Emitter Breakdown Voltage		V <sub>(BR)CEO</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0	100	—	—	V
DC Current Gain		h <sub>FE</sub> (1)	V <sub>CE</sub> = 2V, I <sub>C</sub> = 1A	2000	—	15000	
		h <sub>FE</sub> (2)	V <sub>CE</sub> = 2V, I <sub>C</sub> = 2A	1000	—	—	
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>		—	0.4	—	μs
	Storage Time	t <sub>stg</sub>		—	4.0	—	
	Fall Time	t <sub>f</sub>		I <sub>B1</sub> = -I <sub>B2</sub> = 1mA, DUTY CYCLE ≤ 1%	—	0.6	

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## EMITTER-COLLECTOR DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Forward Current	$I_{FM}$	—	—	—	2	A
Surge Current	$I_{FSM}$	t = 1s, 1 shot	—	—	4	A
Forward Voltage	$V_F$	$I_F = 0.5A, I_B = 0$	—	—	2.0	V
Reverse Recovery Time	$t_{rr}$	$I_F = 2A, V_{BE} = -3V,$ $dI_F / dt = -50A / \mu s$	—	1.0	—	$\mu s$
Reverse Recovery Charge	$Q_{rr}$		—	5	—	$\mu C$

## FLYBACK-DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Forward Current	$I_{FM}$	—	—	—	2	A
Reverse Current	$I_R$	$V_R = 120V$	—	—	0.4	$\mu A$
Reverse Voltage	$V_R$	$I_R = 100\mu A$	120	—	—	V
Forward Voltage	$V_F$	$I_F = 0.5A$	—	—	1.8	V

