

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

# MP4501

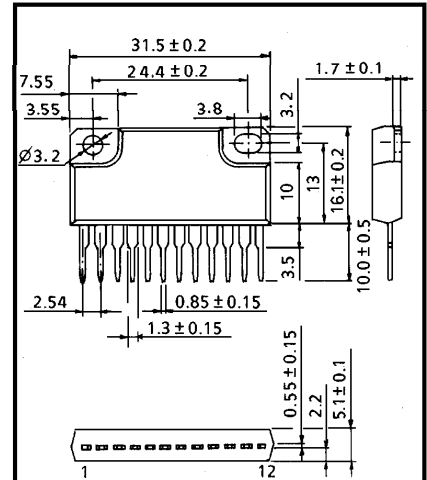
HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

- Package with Heat Sink Isolated to Lead (SIP 12 Pin)
- High Collector Power Dissipation (4 Devices Operation)  
:  $P_T=5W$  ( $T_a=25^\circ C$ )
- High Collector Current :  $I_C(DC)=3A$  (Max.)
- High DC Current Gain :  $h_{FE}=2000$  (Min.) ( $V_{CE}=2V$ ,  $I_C=1.5A$ )
- Diode Included for Absorbing Fly-Back Voltage.

INDUSTRIAL APPLICATIONS

Unit in mm



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

JEDEC	—
EIAJ	—
TOSHIBA	2-32B1A

Weight : 6.0g

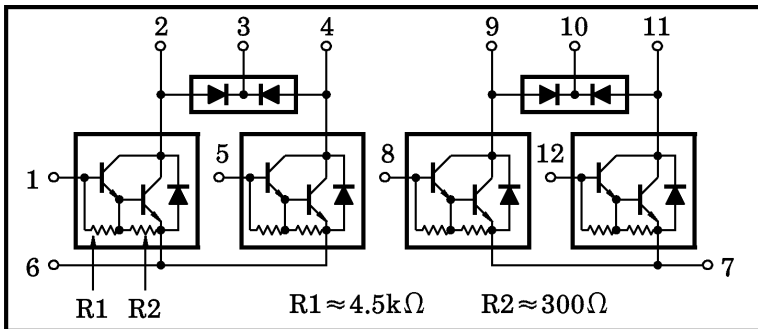
MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

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	$I_C$	3
	Pulse	$I_{CP}$	6
Continuous Base Current	$I_B$	0.5	A
Collector Power Dissipation (1 Device Operation)	$P_C$	3.0	W
Collector Power Dissipation (4 Devices Operation)	$T_a=25^\circ C$	$P_T$	5.0
	$T_c=25^\circ C$		25
Isolation Voltage	$V_{Isol}$	1000	$^\circ C$
Junction Temperature	$T_j$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$

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**ARRAY CONFIGURATION**



**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Junction to Ambient (4 Devices Operation, $T_a = 25^\circ\text{C}$ )	$\Sigma R_{th(j-a)}$	25	$^\circ\text{C} / \text{W}$
Thermal Resistance of Junction to Case (4 Devices Operation, $T_c = 25^\circ\text{C}$ )	$\Sigma R_{th(j-c)}$	5.0	$^\circ\text{C} / \text{W}$
Maximum Lead Temperature for Soldering Purposes (3.2mm from Case for 10s)	$T_L$	260	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )**

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		$I_{CBO}$	$V_{CB} = 120\text{V}, I_E = 0$	—	—	10	$\mu\text{A}$
Collector Cut-off Current		$I_{CEO}$	$V_{CE} = 100\text{V}, I_B = 0$	—	—	10	$\mu\text{A}$
Emitter Cut-off Current		$I_{EBO}$	$V_{EB} = 6\text{V}, I_C = 0$	0.5	—	2.5	mA
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$	$I_C = 1\text{mA}, I_E = 0$	120	—	—	V
Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$	$I_C = 10\text{mA}, I_B = 0$	100	—	—	V
DC Current Gain		$h_{FE(1)}$	$V_{CE} = 2\text{V}, I_C = 1.5\text{A}$	2000	—	15000	
		$h_{FE(2)}$	$V_{CE} = 2\text{V}, I_C = 3\text{A}$	1000	—	—	
Saturation Voltage	Collector-Emitter	$V_{CE(sat)}$	$I_C = 1.5\text{A}, I_B = 3\text{mA}$	—	—	1.5	V
	Base-Emitter	$V_{BE(sat)}$	$I_C = 1.5\text{A}, I_B = 3\text{mA}$	—	—	2.0	
Transition Frequency		$f_T$	$V_{CE} = 2\text{V}, I_C = 0.5\text{A}$	—	60	—	MHz
Collector Output Capacitance		$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$	—	30	—	pF
Switching Time	Turn-on Time	$t_{on}$		—	0.3	—	$\mu\text{s}$
	Storage Time	$t_{stg}$		—	2.0	—	
	Fall Time	$t_f$		$I_{B1} = -I_{B2} = 3\text{mA}, \text{DUTY CYCLE} \leq 1\%$	—	0.4	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Forward Current	$I_{FM}$	—	—	—	3	A
Surge Current	$I_{FSM}$	t = 1s, 1 shot	—	—	6	A
Forward Voltage	$V_F$	$I_F = 1A, I_B = 0$	—	1.2	1.8	V
Reverse Recovery Time	$t_{rr}$	$I_F = 3A, V_{BE} = -3V,$ $dI_F / dt = -50A / \mu s$	—	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	$I_{FM}$	—	—	—	3	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

