

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

# MP4513

HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

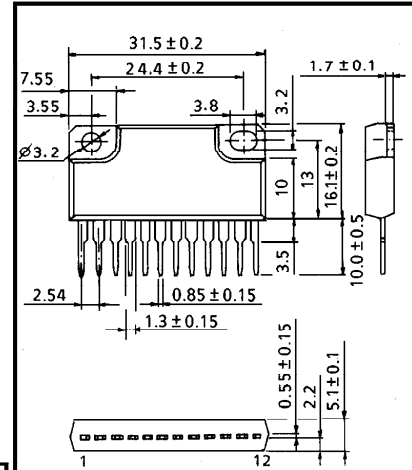
- Package with Heat Sink Isolated to Lead (SIP 12 Pin)
- High Collector Power Dissipation (4 Devices Operation)  
:  $P_T = 5W$  ( $T_a = 25^\circ C$ )
- High Collector Current :  $I_C (DC) = 5A$  (Max.)
- High DC Current Gain :  $h_{FE} = 1000$  (Min.) ( $V_{CE} = 3V$ ,  $I_C = 3A$ )
- Diode Included for Absorbing Fly-Back Voltage.

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

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Base Voltage		$V_{CBO}$	100	V
Collector-Emitter Voltage		$V_{CEO}$	100	V
Emitter-Base Voltage		$V_{EBO}$	5	V
Collector Current	DC	$I_C$	5	A
	Pulse	$I_{CP}$	8	
Continuous Base Current		$I_B$	0.1	A
Collector Power Dissipation (1 Device Operation, $T_a = 25^\circ C$ )		$P_C$	3.0	W
Collector Power Dissipation (4 Devices Operation)	$T_a = 25^\circ C$	$P_T$	5.0	W
	$T_c = 25^\circ C$		25	
Isolation Voltage		$V_{Isol}$	1000	V
Junction Temperature		$T_j$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	-55~150	$^\circ C$

INDUSTRIAL APPLICATIONS

Unit in mm

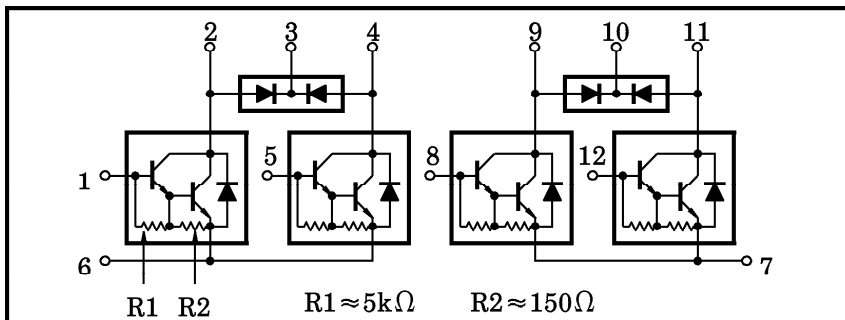


TRANSISTOR PART	DIODE PART
1, 5, 8, 12 BASE	2, 4, 9, 11 ANODE
2, 4, 9, 11 COLLECTOR	3, 10 CATHODE
6, 7 EMITTER	

JEDEC	—
EIAJ	—
TOSHIBA	2-32B1A

Weight : 6.0g

ARRAY CONFIGURATION



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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Junction to Ambient (4 Devices Operation, Ta=25°C)	$\Sigma R_{th(j-a)}$	25	°C / W
Thermal Resistance of Junction to Case (4 Devices Operation, Tc=25°C)	$\Sigma R_{th(j-e)}$	5.0	°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> = 100V, 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> = 5V, I <sub>C</sub> = 0	0.3	—	2.0	mA
Collector-Base Breakdown Voltage		V <sub>(BR) CBO</sub>	I <sub>C</sub> = 1mA, I <sub>E</sub> = 0	100	—	—	V
Collector-Emitter Breakdown Voltage		V <sub>(BR) CEO</sub>	I <sub>C</sub> = 30mA, I <sub>B</sub> = 0	100	—	—	V
DC Current Gain		h <sub>FE</sub> (1)	V <sub>CE</sub> = 3V, I <sub>C</sub> = 0.5A	1000	—	—	
		h <sub>FE</sub> (2)	V <sub>CE</sub> = 3V, I <sub>C</sub> = 3A	1000	—	—	
Saturation Voltage	Collector-Emitter	V <sub>CE (sat)</sub>	I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA	—	—	2.0	V
	Base-Emitter	V <sub>BE (sat)</sub>	I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA	—	—	2.5	
Transition Frequency		f <sub>T</sub>	V <sub>CE</sub> = 3V, I <sub>C</sub> = 0.5A	—	10	—	MHz
Collector Output Capacitance		C <sub>ob</sub>	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1MHz	—	40	—	pF
Switching Time	Turn-on Time	t <sub>on</sub>		—	0.5	—	μs
	Storage Time	t <sub>stg</sub>		—	4.0	—	
	Fall Time	t <sub>f</sub>		I <sub>B1</sub> = -I <sub>B2</sub> = 12mA, DUTY CYCLE ≤ 1%	—	2.5	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Current	$I_{FM}$	—	—	—	5	A
Surge Current	$I_{FSM}$	t = 1s, 1 shot	—	—	8	A
Forward Voltage	$V_F$	$I_F = 1A, I_B = 0$	—	1.1	1.8	V
Reverse Recovery Time	$t_{rr}$	$I_F = 5A, V_{BE} = -3V,$	—	3.0	—	$\mu s$
Reverse Recovery Charge	$Q_{rr}$	$dI_F / dt = -50A / \mu s$	—	40	—	$\mu C$

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Current	$I_{FM}$	—	—	—	3	A
Reverse Current	$I_R$	$V_R = 100V$	—	—	0.4	$\mu A$
Reverse Voltage	$V_R$	$I_R = 100\mu A$	100	—	—	V
Forward Voltage	$V_F$	$I_F = 1A$	—	—	1.8	V

