

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

MP4501

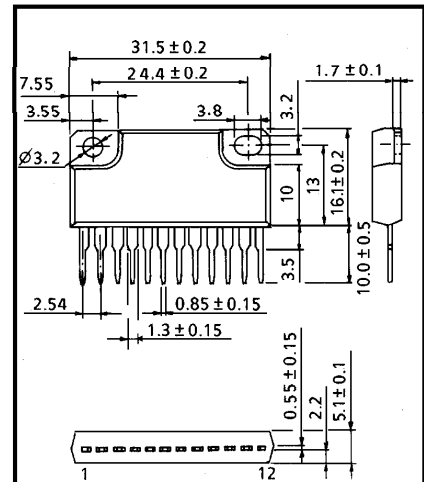
HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

INDUSTRIAL APPLICATIONS

Unit in mm

- 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.



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

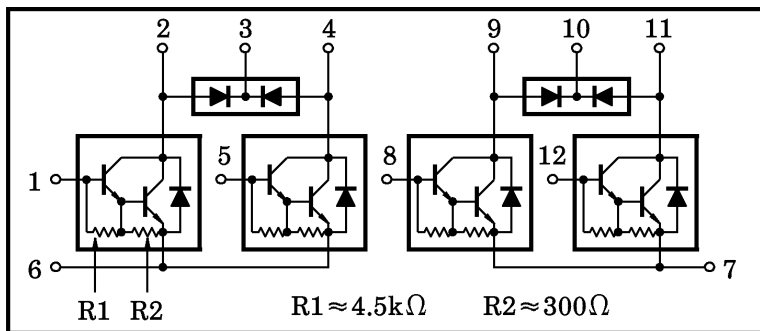
MAXIMUM RATINGS ($T_a = 25^\circ C$)

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	μA				
Collector Cut-off Current	I_{CEO}	$V_{CE} = 100\text{V}, I_B = 0$	—	—	10	μA				
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	—	μs
	Storage Time	t_{stg}					—	2.0	—	
	Fall Time	t_f	$I_{B1} = -I_{B2} = 3\text{mA}$, 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	—	μs
Reverse Recovery Charge	Q_{rr}		—	5	—	μC

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	μA
Reverse Voltage	V_R	$I_R = 100\mu A$	120	—	—	V
Forward Voltage	V_F	$I_F = 0.5A$	—	—	1.8	V

