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.

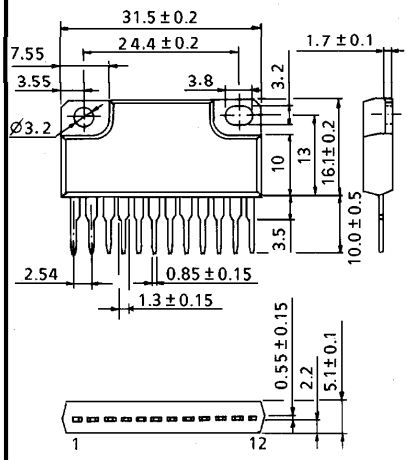
INDUSTRIAL APPLICATIONS

- Package with Heat Sink Isolated to Lead (SIP 12 Pin)
- High Collector Power Dissipation (4 Devices Operation)
  : P_T = 5W (Ta = 25°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.

MAXIMUM RATINGS (Ta = 25°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	A
	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)	Ta = 25°C	P_T	5.0	W
	Tc = 25°C		25	
Isolation Voltage		V_{Isol}	1000	°C
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

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		

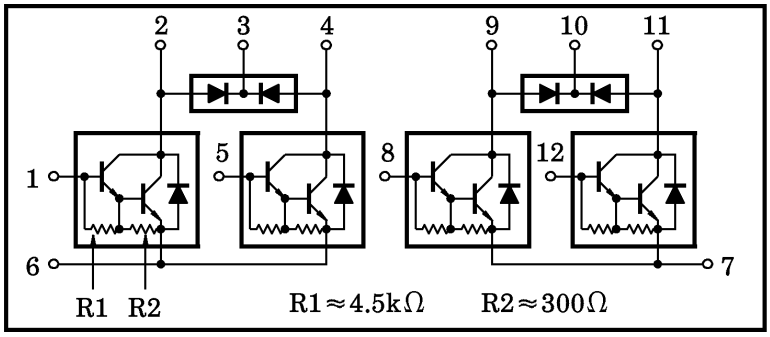
JEDEC	—
EIAJ	—
TOSHIBA	2-32B1A

Weight : 6.0g

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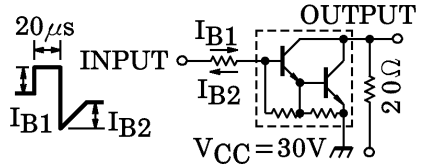
ARRAY CONFIGURATION



THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

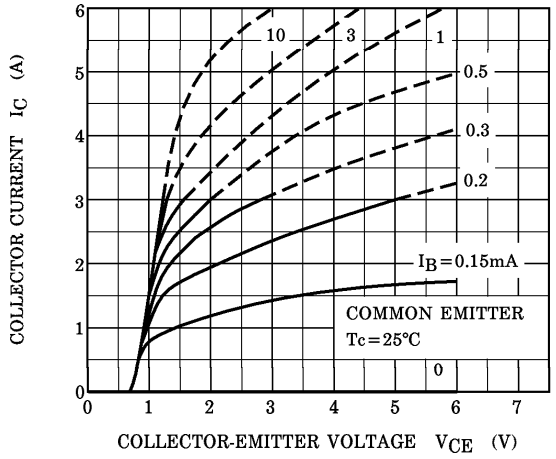
EMITTER-COLLECTOR DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

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

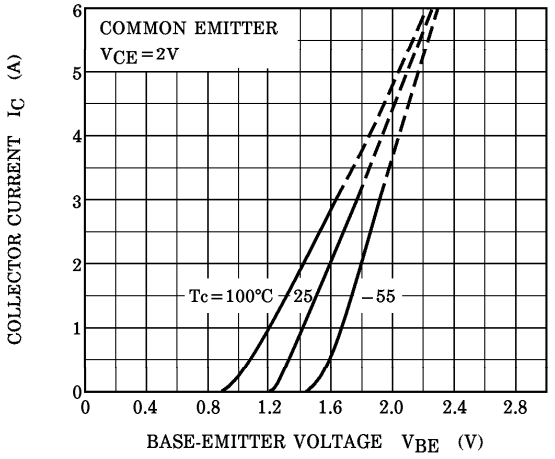
FLYBACK-DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

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

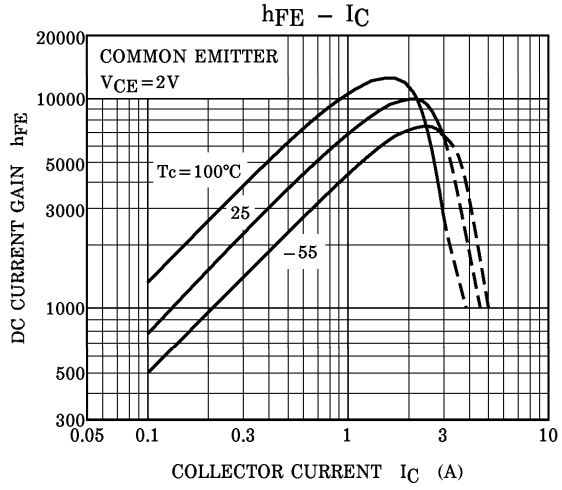
I_C – V_{CE}



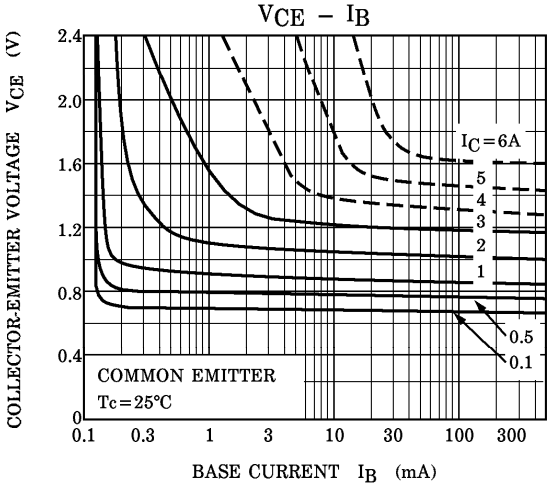
I_C – V_{BE}



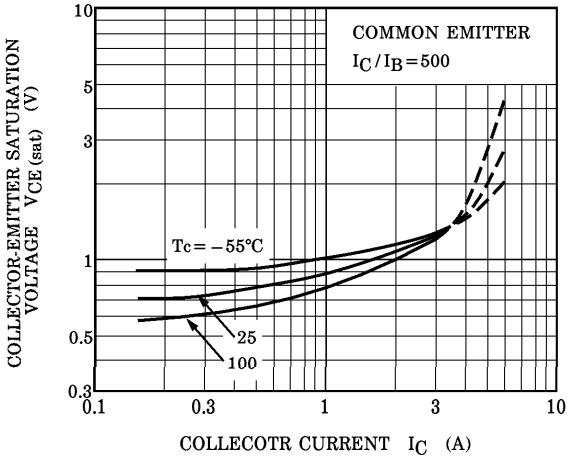
h_{FE} – I_C



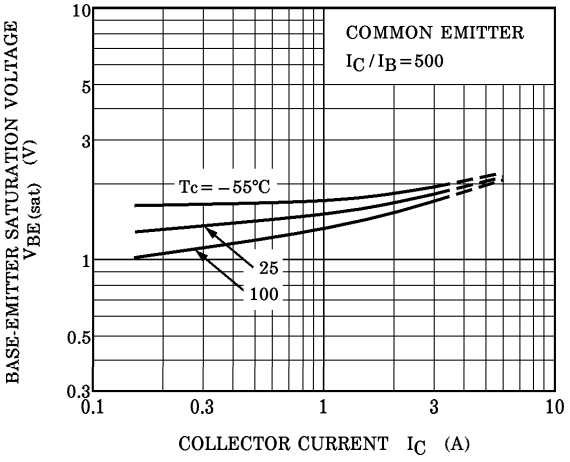
V_{CE} – I_B



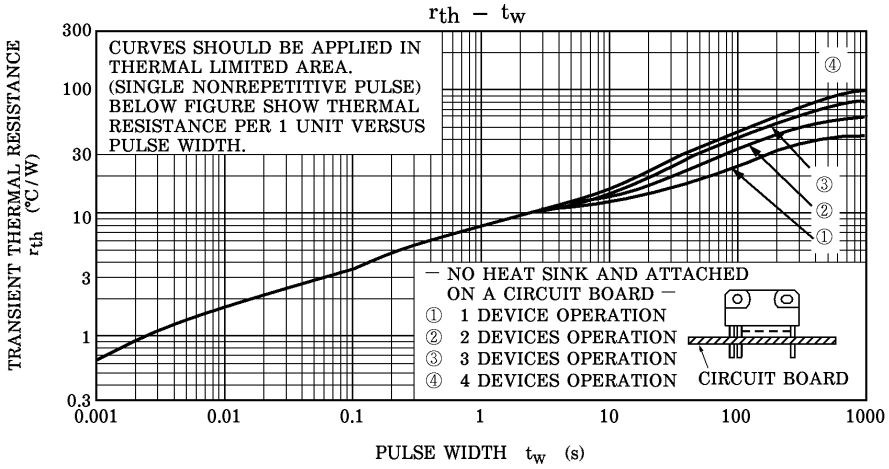
$V_{CE\,(sat)}$ – I_C



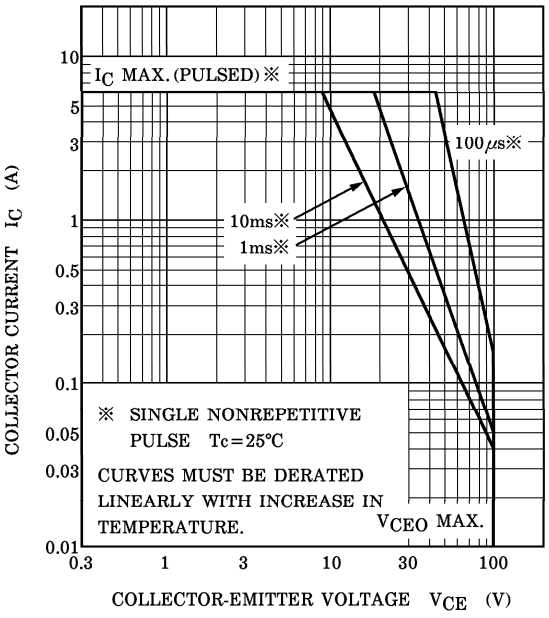
$V_{BE\,(sat)}$ – I_C



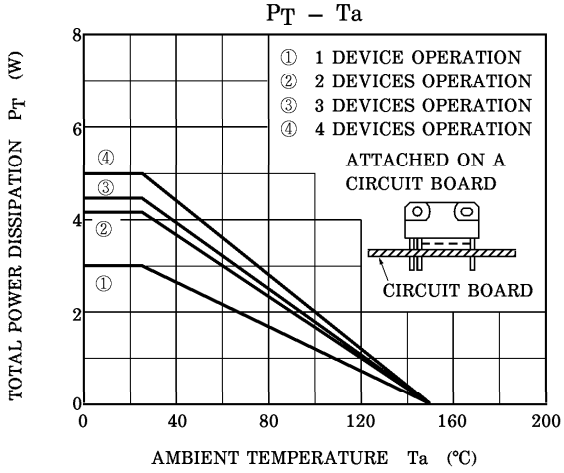
r_{th} – t_w



SAFE OPERATING AREA



P_T – Ta



ΔT_j – P_T

