

TOSHIBA Power Transistor Module Silicon Triple Diffused Type  
(Four Darlingtons Power Transistors in One)

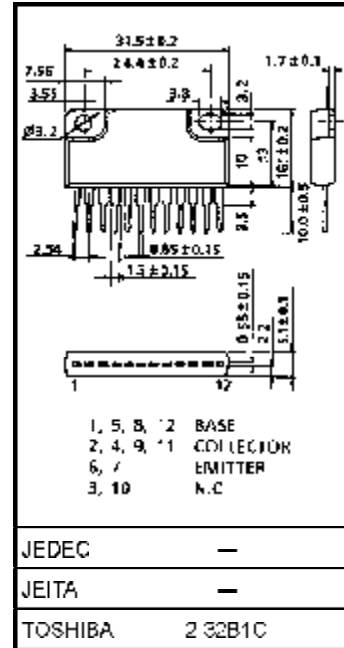
# MP4507

**High Power Switching Applications**  
**Hammer Drive, Pulse Motor Drive and Inductive Load Switching**

Industrial Applications

Unit: mm

- Package with heat sink isolated to lead (SIP 12 pins)
- High collector power dissipation (1-device operation)  
 $P_C = 5\text{ W}$  ( $T_a = 25^\circ\text{C}$ )
- High collector current:  $I_C(\text{DC}) = -5\text{ A}$  (max)
- High DC current gain:  $h_{FE} = 1000$  (min) ( $V_{CE} = 10\text{ V}$ ,  $I_C = -3\text{ A}$ )

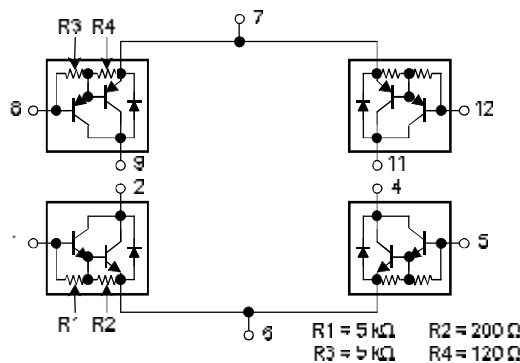


Weight: 6.0 g (typ.)

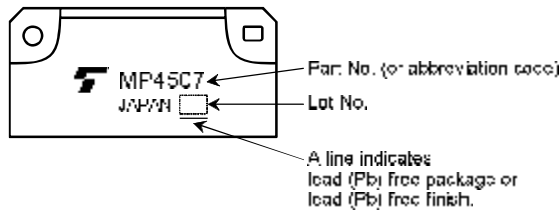
## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating		Unit
		NPN	PNP	
Collector-base voltage	$V_{C_{CB}}$	100	-100	V
Collector-emitter voltage	$V_{C_{CE}}$	100	-100	V
Emitter-base voltage	$V_{E_{BE}}$	5	-5	V
Collector current	DC	$I_C$	5	A
	Pulse	$I_{CP}$	8	
Continuous base current	$I_B$	0.1	-0.1	A
Collector power dissipation (1-device operation)	$P_C$	3.0		W
Collector power dissipation (4-device operation)	$T_a = 25^\circ\text{C}$	5.0		W
	$T_c = 25^\circ\text{C}$	25		
Isolation voltage	$V_{iso}$	1000		V
Junction temperature	$T_j$	150		$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150		$^\circ\text{C}$

## Array Configuration



**Marking**



**Thermal Characteristics**

Characteristics	Symbol	Max	Unit
Thermal resistance from channel to ambient (4 devices operation, Ta = 25°C)	$\Delta R_{\theta(j-a)}$	25	°C/W
Thermal resistance from channel to case (4 devices operation, Tc = 25°C)	$\Delta R_{\theta(j-c)}$	5.0	°C/W
Maximum lead temperature for soldering purposes (3.2 mm from case for 10 s)	T <sub>L</sub>	280	°C

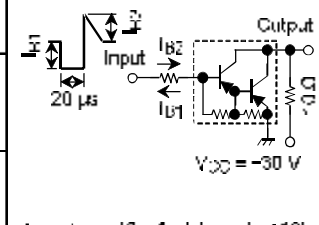
**Electrical Characteristics (Ta = 25°C) (NPN transistor)**

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CE} = 100\text{ V}, I_B = 0\text{ A}$	—	—	10	μA
Collector cut-off current		$I_{CEO}$	$V_{CE} = 100\text{ V}, I_B = 0\text{ A}$	—	—	10	μA
Emitter cut off current		$I_{EBO}$	$V_{EB} = 5\text{ V}, I_C = 0\text{ A}$	0.3	—	2.0	mA
Collector-base breakdown voltage		$V_{(BR)CB}$	$I_C = 1\text{ mA}, I_E = 0\text{ A}$	100	—	—	V
Collector emitter breakdown voltage		$V_{(BR)CE}$	$I_C = 30\text{ mA}, I_B = 0\text{ A}$	100	—	—	V
DC current gain		$h_{FE(1)}$	$V_{CE} = 3\text{ V}, I_C = 0.5\text{ A}$	1000	—	—	—
		$h_{FE(2)}$	$V_{CE} = 3\text{ V}, I_C = 5\text{ A}$	1000	—	—	
Saturation voltage	Collector-emitter	$V_{CE(sat)}$	$I_C = 3\text{ A}, I_B = 12\text{ mA}$	—	—	2.0	V
	Base-emitter	$V_{BE(sat)}$	$I_C = 3\text{ A}, I_B = 12\text{ mA}$	—	—	2.5	
Transition frequency		f	$V_{CE} = 3\text{ V}, I_C = 0.5\text{ A}$	3	—	—	MHz
Collector output capacitance		$C_{op}$	$V_{CE} = 50\text{ V}, I_C = 0\text{ A}, f = 1\text{ MHz}$	—	10	—	pF
Switching time	Turn-on time	$t_{on}$	<p><math>i_{B1} = -i_{B2} = 12\text{ mA}, \text{duty cycle} \leq 1\%</math></p>	—	0.5	—	μs
	Storage time	$t_{stg}$		—	3.0	—	
	Fall time	t		—	2.0	—	

**Emitter-Collector Diode Ratings and Characteristics (Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward current	$I_{FM}$	—	—	—	5	A
Surge current	$I_{FSM}$	$t = 1 \text{ s, 1 shot}$	—	—	8	A
Forward voltage	$V_F$	$I_F = 1 \text{ A, } I_S = 0 \text{ A}$	—	—	2.0	V
Reverse recovery time	$t_r$	$I_F = 5 \text{ A, } V_{S\text{-}} = -3 \text{ V, } dI_F/dt = -50 \text{ A}/\mu\text{s}$	—	1.0	—	$\mu\text{s}$
Reverse recovery charge	$Q_r$		—	8	—	$\mu\text{C}$

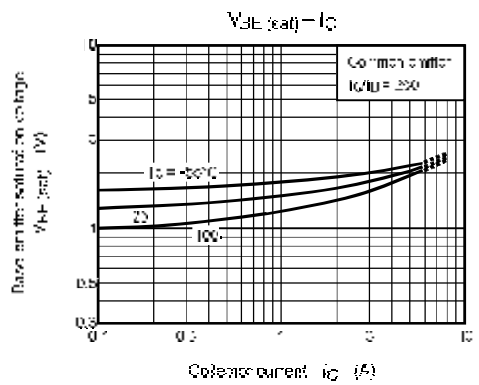
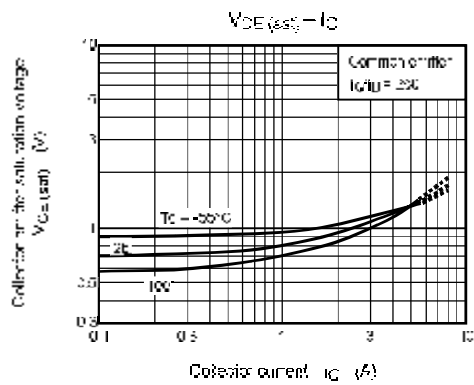
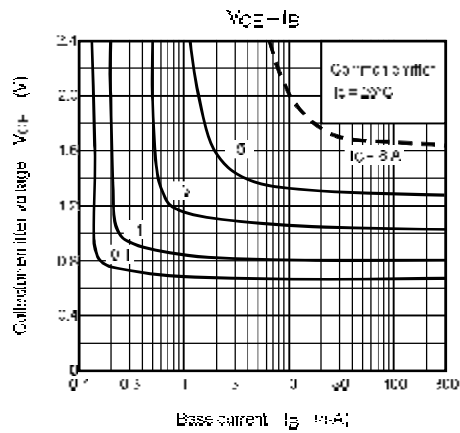
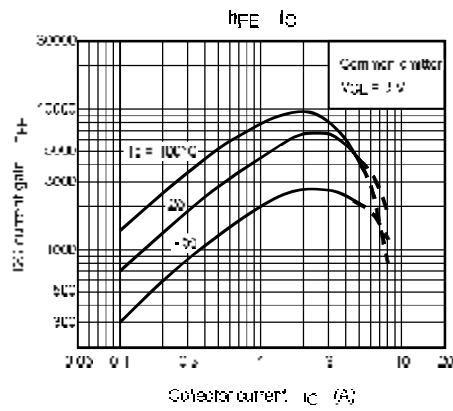
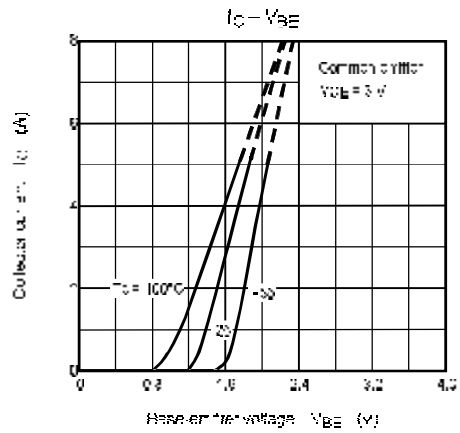
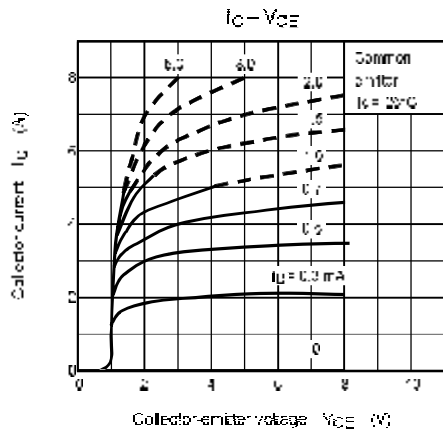
**Electrical Characteristics (Ta = 25°C) (PNP transistor)**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{C\text{-}CO}$	$V_{CE} = -100 \text{ V, } I_L = 0 \text{ A}$	—	—	-10	$\mu\text{A}$
Collector cut off current	$I_{C\text{-}EO}$	$V_{CE} = -100 \text{ V, } I_B = 0 \text{ A}$	—	—	-10	$\mu\text{A}$
Emitter cut-off current	$I_{E\text{-}CO}$	$V_{EB} = -5 \text{ V, } I_C = 0 \text{ A}$	-0.3	—	-2.0	mA
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -1 \text{ mA, } I_E = 0 \text{ A}$	-100	—	—	V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -30 \text{ mA, } I_B = 0 \text{ A}$	-100	—	—	V
DC current gain	$h_{FE(1)}$	$V_{CE} = -3 \text{ V, } I_C = -0.5 \text{ A}$	1000	—	—	—
	$h_{FE(2)}$	$V_{CE} = -3 \text{ V, } I_C = -3 \text{ A}$	1000	—	—	—
Saturation voltage	Collector-emitter $V_{CE(sat)}$	$I_C = -3 \text{ A, } I_B = -12 \text{ mA}$	—	—	-2.0	V
	Base-emitter $V_{BE(sat)}$	$I_C = -3 \text{ A, } I_B = -12 \text{ mA}$	—	—	-2.5	
Transition frequency	$f_T$	$V_{CE} = -3 \text{ V, } I_C = -0.5 \text{ A}$	3	—	—	MHz
Collector output capacitance	$C_{op}$	$V_{CE} = -50 \text{ V, } I_L = 0 \text{ A, } f = 1 \text{ MHz}$	—	40	—	pF
Switching time	Turn on time	$t_{on}$		—	0.5	$\mu\text{s}$
	Storage time	$t_{stg}$		—	3.0	
	Fall time	$t_f$		—	2.0	

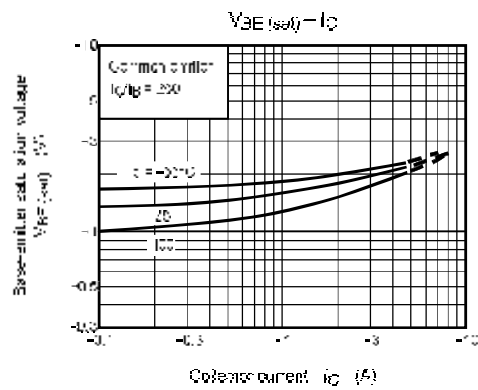
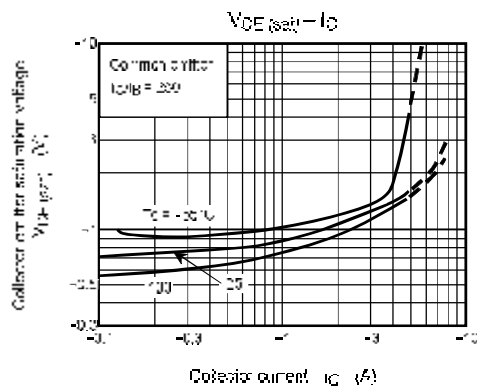
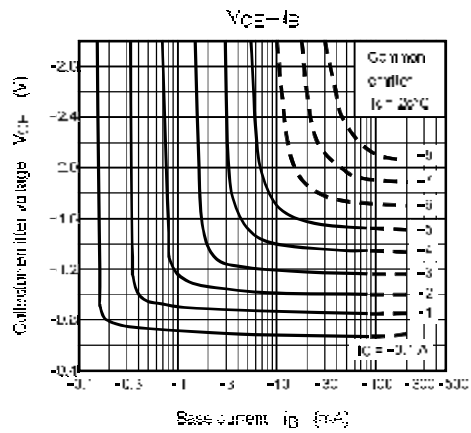
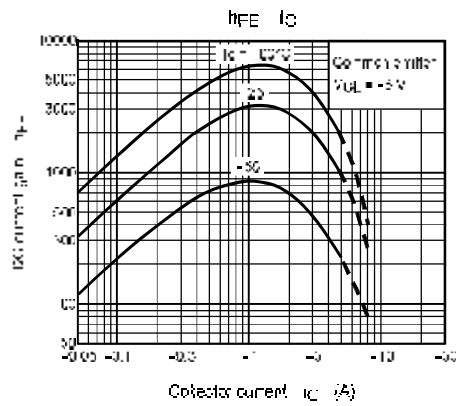
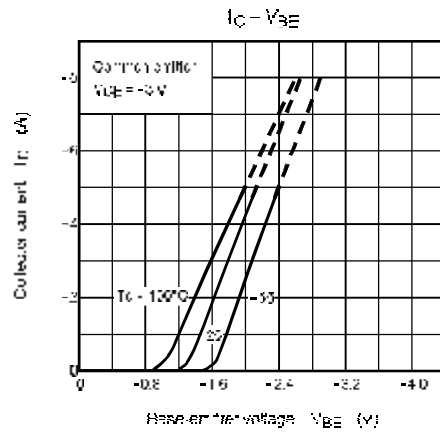
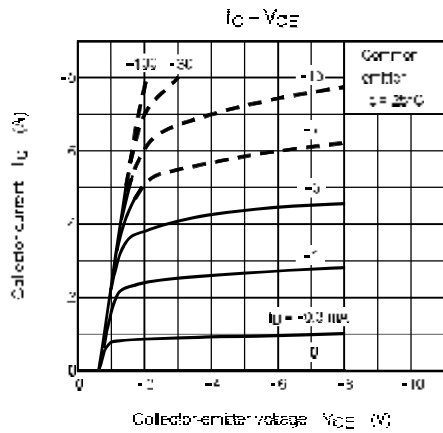
**Emitter-Collector Diode Ratings and Characteristics (Ta = 25°C)**

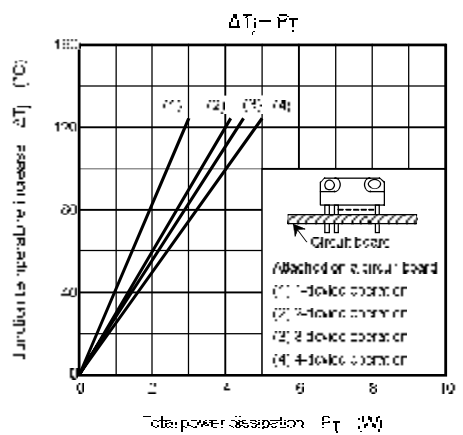
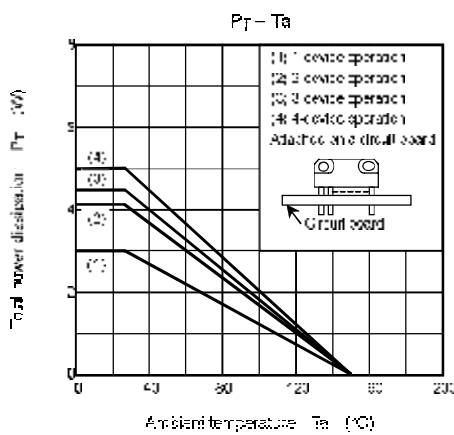
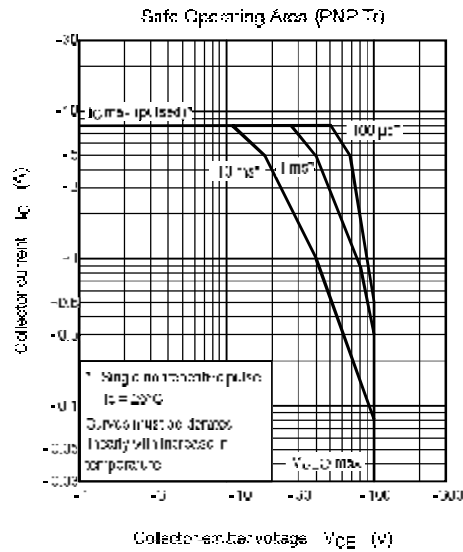
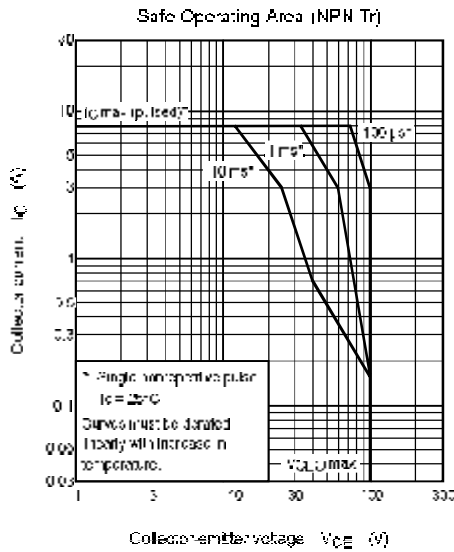
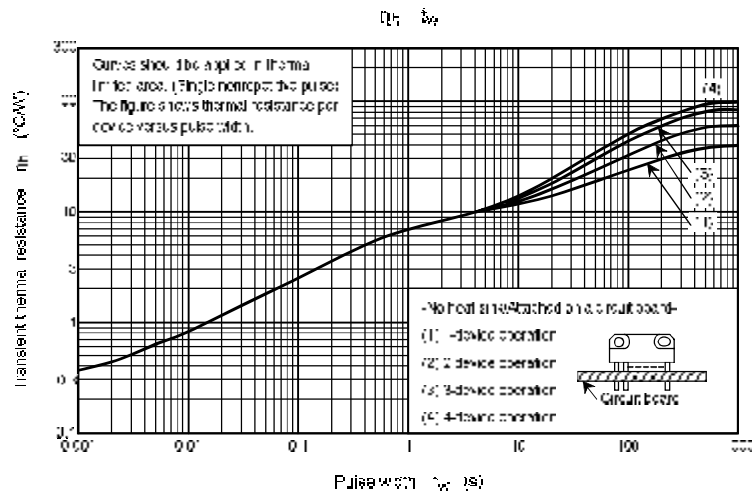
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward current	$I_{FM}$	—	—	—	5	A
Surge current	$I_{FSM}$	$t = 1 \text{ s, 1 shot}$	—	—	8	A
Forward voltage	$V_F$	$I_F = 1 \text{ A, } I_S = 0 \text{ A}$	—	—	2.0	V
Reverse recovery time	$t_r$	$I_F = 5 \text{ A, } V_{S\text{-}} = 3 \text{ V, } dI_F/dt = -50 \text{ A}/\mu\text{s}$	—	1.0	—	$\mu\text{s}$
Reverse recovery charge	$Q_r$		—	8	—	$\mu\text{C}$

(NPN transistor)



(PNP transistor)





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