

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

MP4503

HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

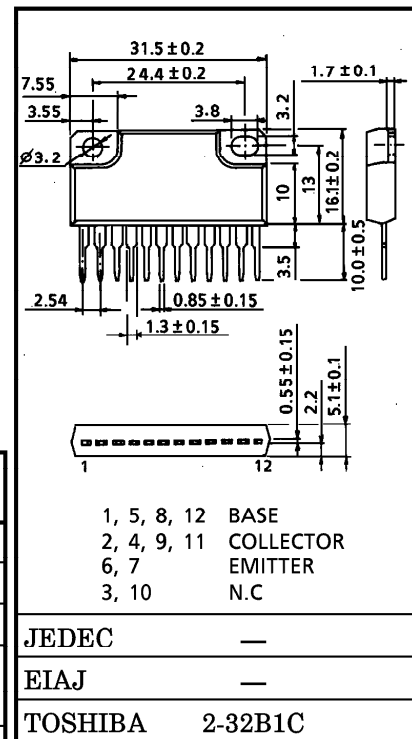
INDUSTRIAL APPLICATIONS

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 : $I_C (DC) = \pm 4A$ (Max.)
- High DC Current Gain : $h_{FE} = 2000$ (Min.)
($V_{CE} = \pm 2V, I_C = \pm 1A$)

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

CHARACTERISTIC	SYMBOL	RATING		UNIT	
		NPN	PNP		
Collector-Base Voltage	V_{CBO}	100	-100	V	
Collector-Emitter Voltage	V_{CEO}	80	-80	V	
Emitter-Base Voltage	V_{EBO}	5	-5	V	
Collector Current	DC	I_C	4	-4	A
	Pulse	I_{CP}	6	-6	
Continuous Base Current	I_B	0.4	-0.4	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		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		$^\circ C$	

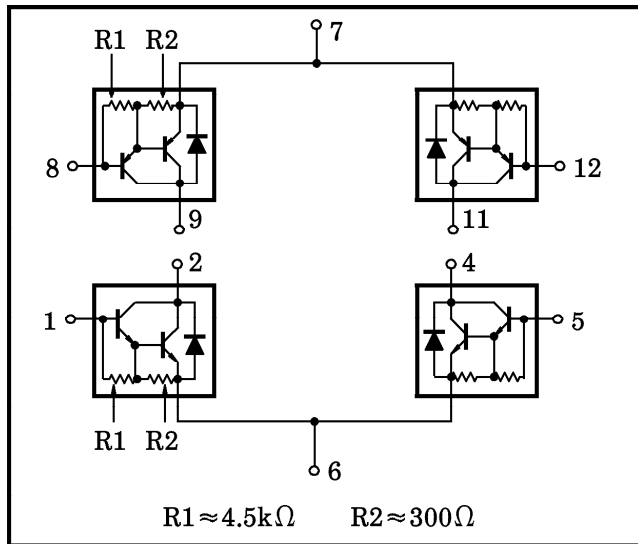


Weight : 6.0g

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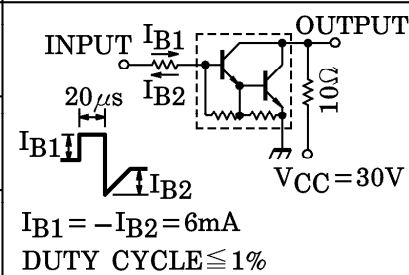
ARRAY CONFIGURATION



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 (Ta = 25°C) (NPN TRANSISTOR)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		ICBO	V _{CB} = 100V, I _E = 0	—	—	20	μA
Collector Cut-off Current		ICEO	V _{CE} = 80V, I _B = 0	—	—	20	μA
Emitter Cut-off Current		IEBO	V _{EB} = 5V, I _C = 0	0.5	—	2.5	mA
Collector-Base Breakdown Voltage		V _{(BR)CBO}	I _C = 1mA, I _E = 0	100	—	—	V
Collector-Emitter Breakdown Voltage		V _{(BR)CEO}	I _C = 10mA, I _B = 0	80	—	—	V
DC Current Gain		h _{FE} (1)	V _{CE} = 2V, I _C = 1A	2000	—	—	
		h _{FE} (2)	V _{CE} = 2V, I _C = 3A	1000	—	—	
Saturation Voltage	Collector-Emitter	V _{CE(sat)}	I _C = 3A, I _B = 6mA	—	—	1.5	V
	Base-Emitter	V _{BE(sat)}	I _C = 3A, I _B = 6mA	—	—	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}	 <p>I_{B1} = -I_{B2} = 6mA DUTY CYCLE ≤ 1%</p>	—	0.2	—	μs
	Storage Time	t _{stg}		—	1.5	—	
	Fall Time	t _f		—	0.6	—	

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

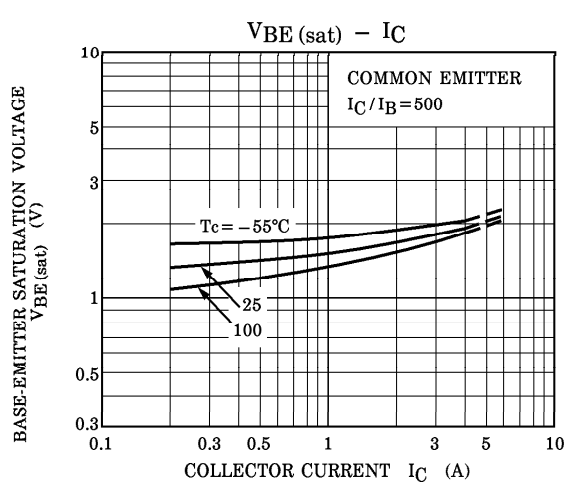
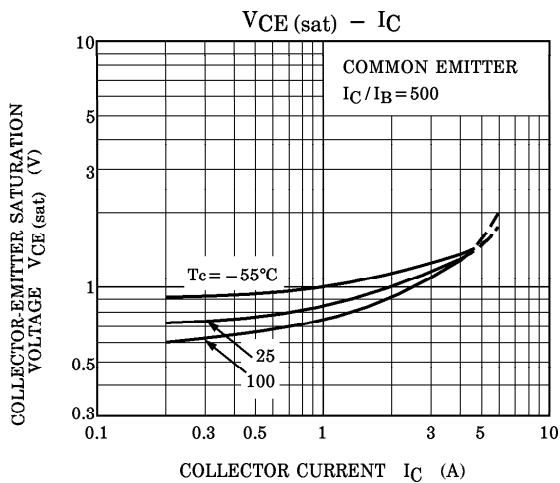
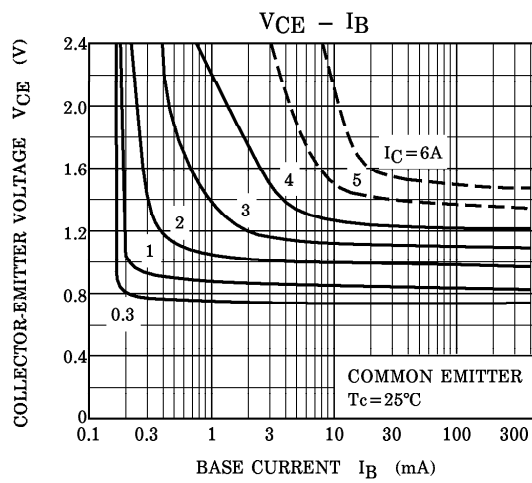
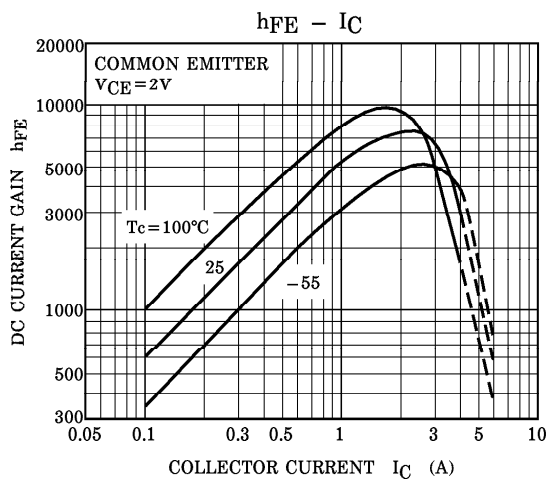
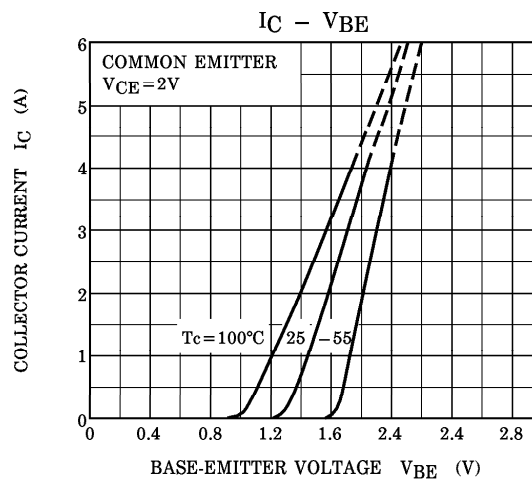
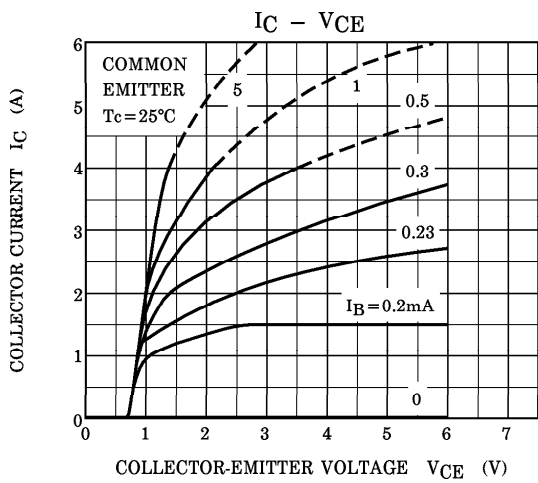
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Current	I _{FM}	—	—	—	4	A
Surge Current	I _{FSM}	t = 1s, 1 shot	—	—	6	A
Forward Voltage	V _F	I _F = 1A, I _B = 0	—	—	2.0	V
Reverse Recovery Time	t _{rr}	I _F = 4A, V _{BE} = -3V,	—	1.0	—	μs
Reverse Recovery Charge	Q _{rr}	dI _F / dt = -50A / μs	—	8	—	μC

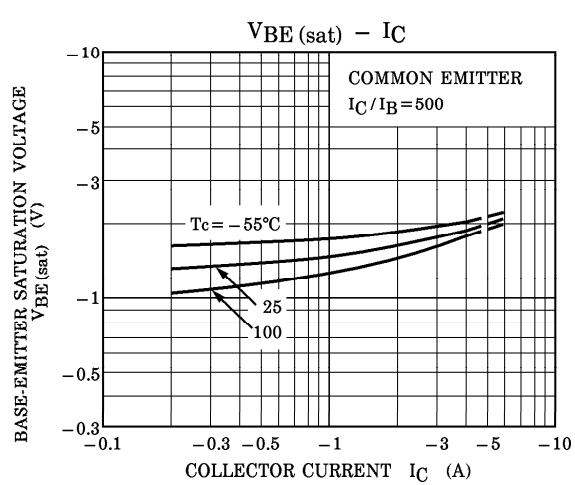
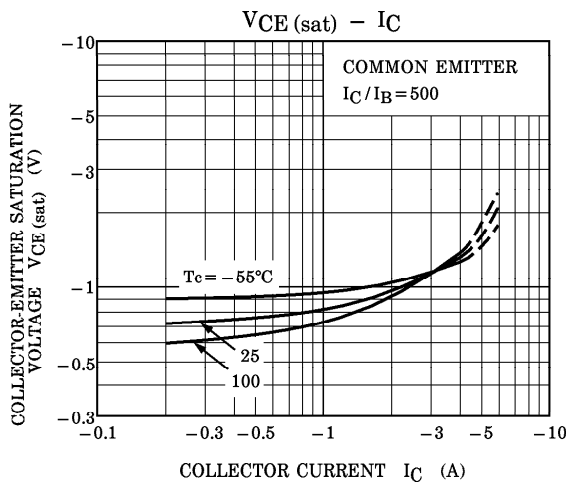
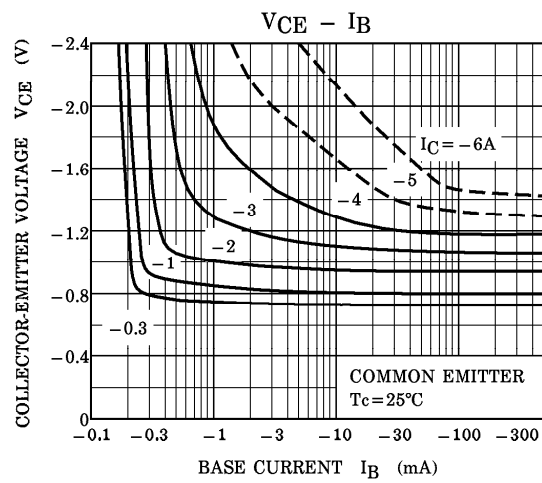
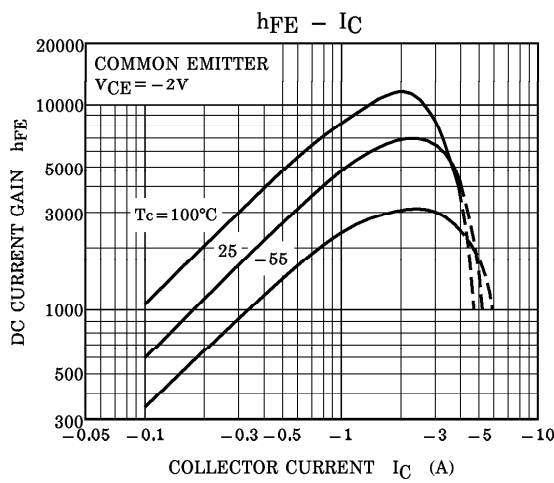
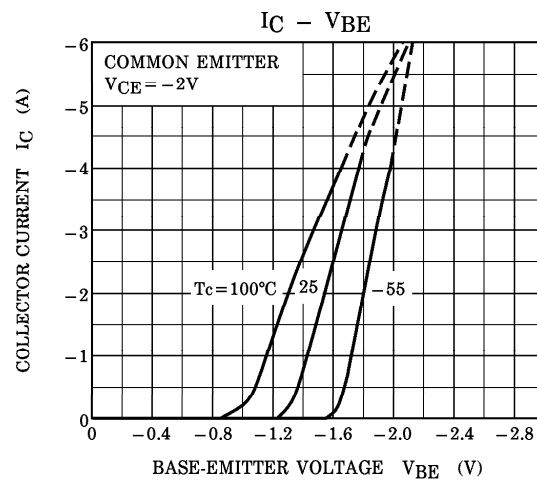
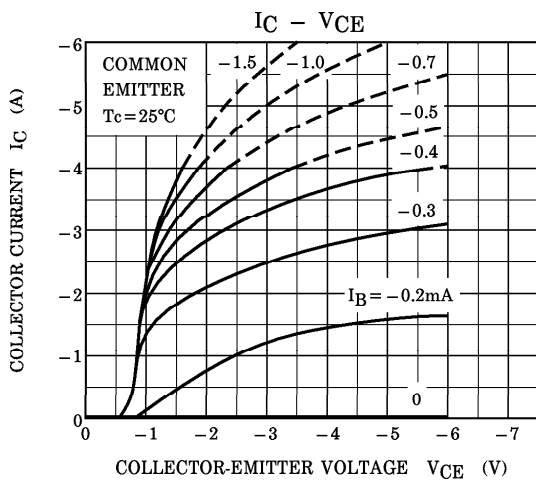
ELECTRICAL CHARACTERISTICS (Ta = 25°C) (PNP TRANSISTOR)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		ICBO	V _{CB} = -100V, I _E = 0	—	—	-20	μA
Collector Cut-off Current		ICEO	V _{CE} = -80V, I _B = 0	—	—	-20	μA
Emitter Cut-off Current		IEBO	V _{EB} = -5V, I _C = 0	-0.5	—	-2.5	mA
Collector-Base Breakdown Voltage		V _{(BR)CBO}	I _C = -1mA, I _E = 0	-100	—	—	V
Collector-Emitter Breakdown Voltage		V _{(BR)CEO}	I _C = -10mA, I _B = 0	-80	—	—	V
DC Current Gain		h _{FE} (1)	V _{CE} = -2V, I _C = -1A	2000	—	—	
		h _{FE} (2)	V _{CE} = -2V, I _C = -3A	1000	—	—	
Saturation Voltage	Collector-Emitter	V _{CE(sat)}	I _C = -3A, I _B = -6mA	—	—	-1.5	V
	Base-Emitter	V _{BE(sat)}	I _C = -3A, I _B = -6mA	—	—	-2.0	
Transition Frequency		f _T	V _{CE} = -2V, I _C = -0.5A	—	40	—	MHz
Collector Output Capacitance		C _{ob}	V _{CB} = -10V, I _E = 0, f = 1MHz	—	55	—	pF
Switching Time	Turn-on Time	t _{on}		—	0.15	—	μs
	Storage Time	t _{stg}		—	0.80	—	
	Fall Time	t _f		-I _{B1} = I _{B2} = 6mA, DUTY CYCLE ≤ 1%	—	0.40	

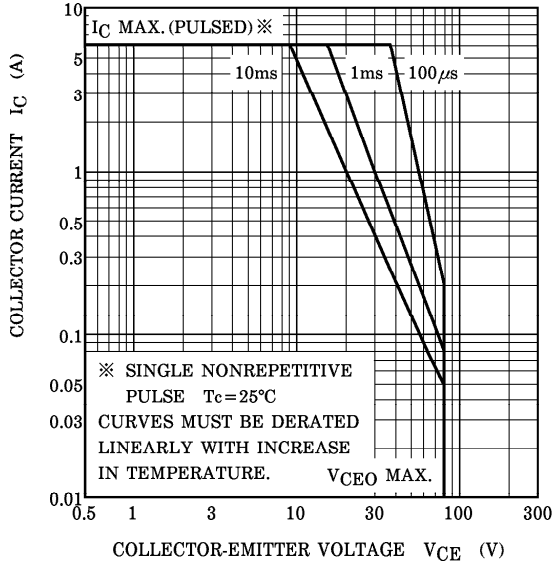
EMITTER-COLLECTOR DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Current	I _{FM}	—	—	—	4	A
Surge Current	I _{FSM}	t = 1s, 1 shot	—	—	6	A
Forward Voltage	V _F	I _F = 1A, I _B = 0	—	—	2.0	V
Reverse Recovery Time	t _{rr}	I _F = 4A, V _{BE} = 3V,	—	1.0	—	μs
Reverse Recovery Charge	Q _{rr}	dI _F / dt = -50A / μs	—	8	—	μC

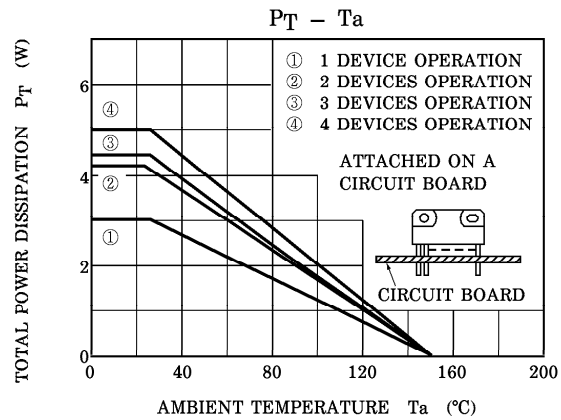
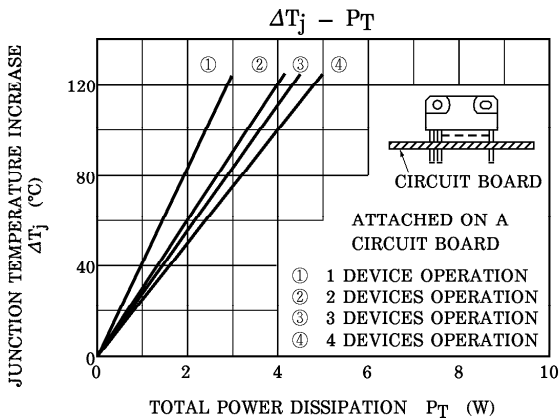
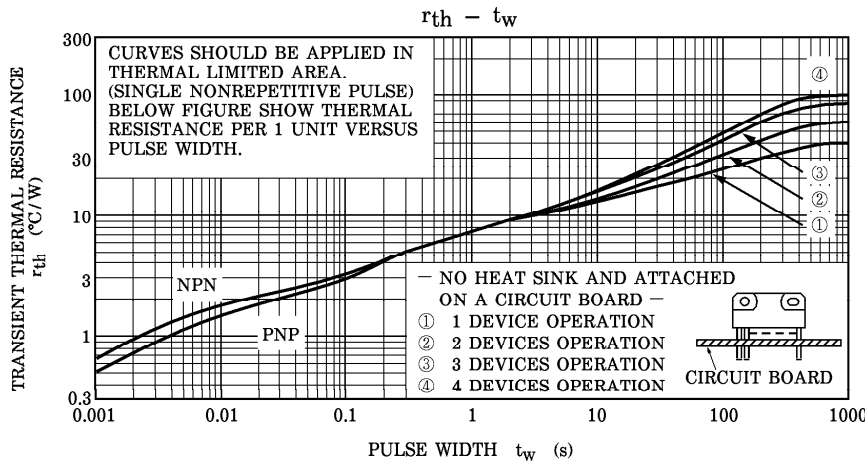
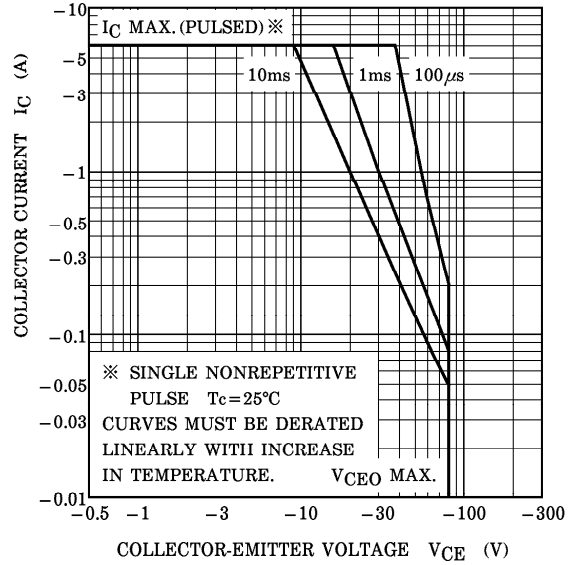




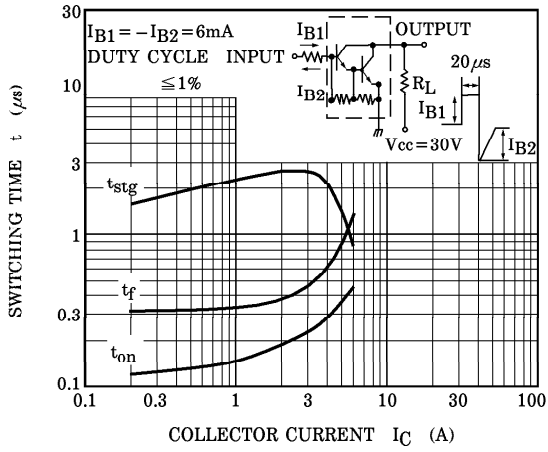
SAFE OPERATING AREA (NPN Tr)



SAFE OPERATING AREA (PNP Tr)



スイッチング特性 (NPN)



スイッチング特性 (PNP)

