

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

2SD1160

Switching Applications
Suitable for Motor Drive Applications

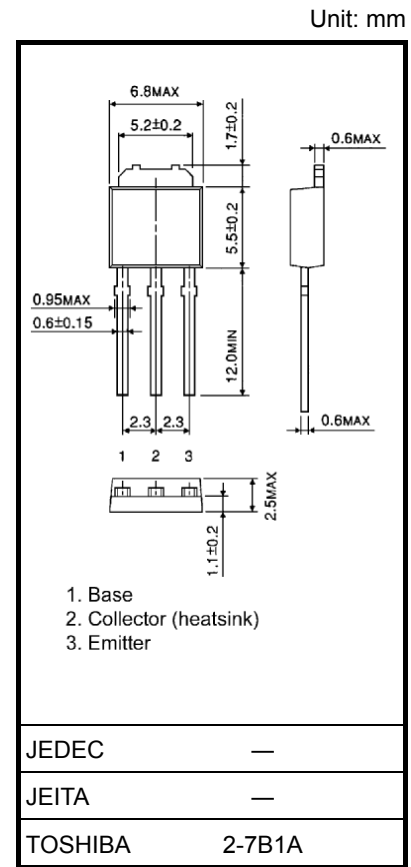
- High DC current gain
- Low saturation voltage: $V_{CE(sat)} = 0.6\text{ V (max)}$ ($I_C = 2\text{ A}$, $I_B = 40\text{ mA}$)
- Built-in free wheel diode

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	20	V
Emitter-base voltage		V_{EBO}	6	V
Collector current	DC	I_C	2	A
	Pulse	I_{CP}	4	
Diode forward surge current (t = 1 s)		I_{FP}	1	A
Collector power dissipation	Ta = 25°C	P_C	1	W
	Tc = 25°C		10	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

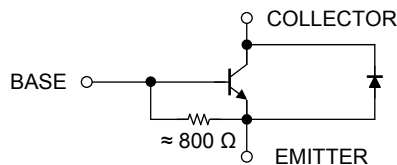
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).



Weight: 0.36 g (typ.)

Equivalent Circuit



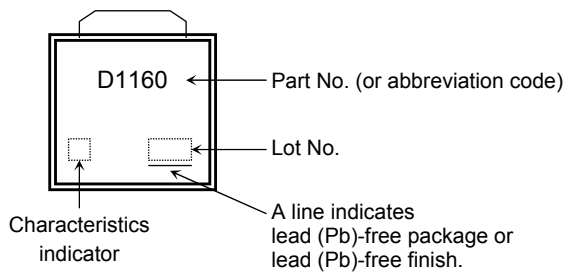
Electrical Characteristics (Ta = 25°C)

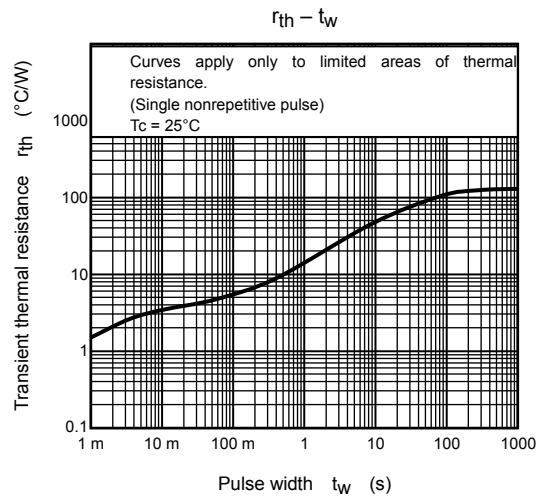
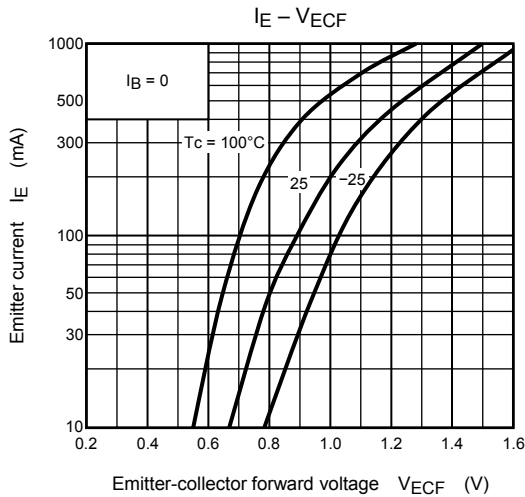
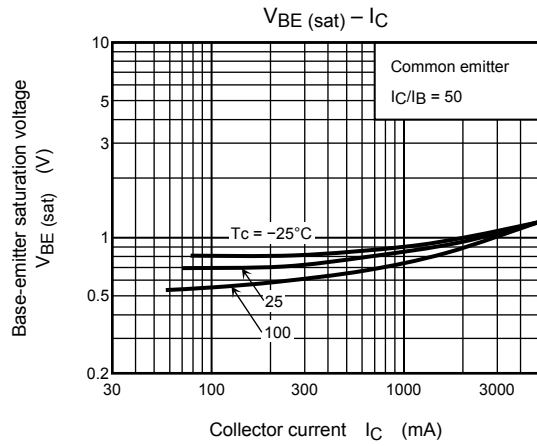
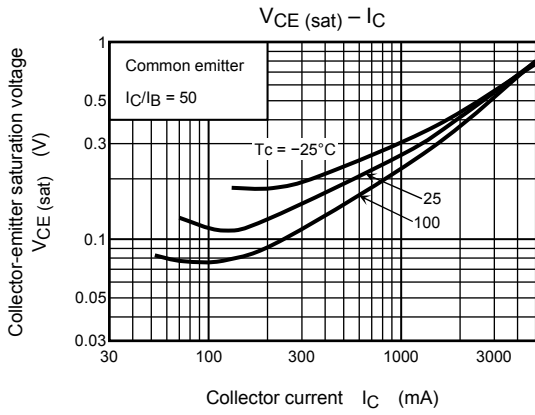
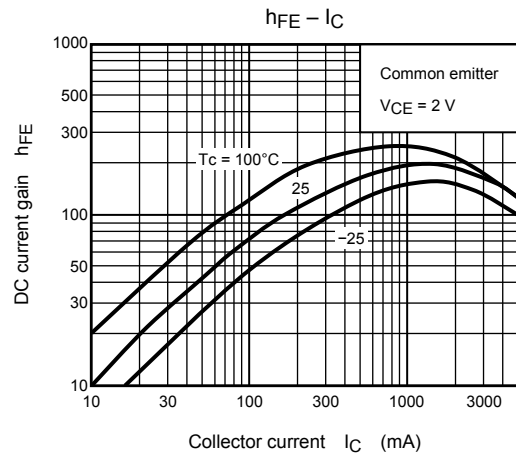
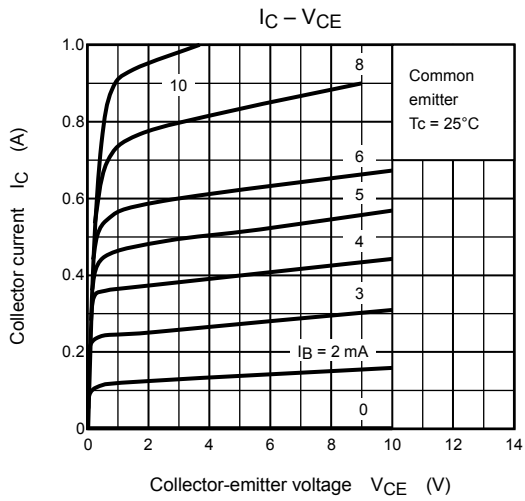
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5\text{ V}, I_C = 0$	2.5	6.25	15	mA
Collector-emitter sustaining voltage	$V_{CEO(SUS)}$	$I_C = 20\text{ mA}, L = 40\text{ mH}$	20	—	—	V
DC current gain	$h_{FE(1)}$ (Note)	$V_{CE} = 2\text{ V}, I_C = 1\text{ A}$	100	—	300	
	$h_{FE(2)}$	$V_{CE} = 2\text{ V}, I_C = 2\text{ A}$	60	—	—	
Collector emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2\text{ A}, I_B = 40\text{ mA}$	—	0.4	0.6	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 2\text{ A}, I_B = 40\text{ mA}$	—	—	1.5	V
Emitter-collector forward voltage	V_{ECF}	$I_E = 1\text{ A}, I_B = 0$	—	—	2.0	V

Note: $h_{FE(1)}$ classification O: 100 to 200, Y: 150 to 300

Classification	Min	Max
2SD1160-O	100	200
2SD1160-Y	150	300

Marking





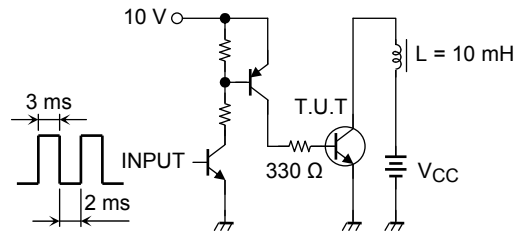
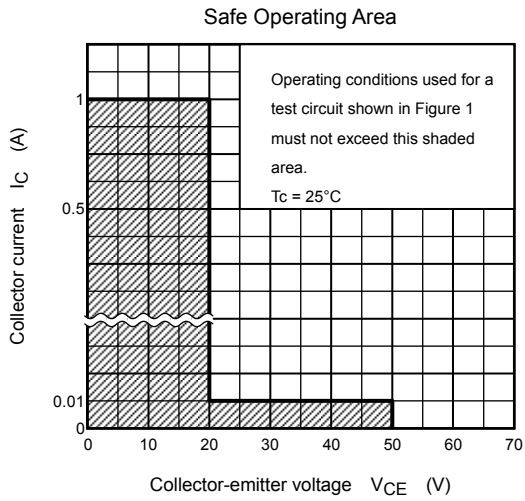
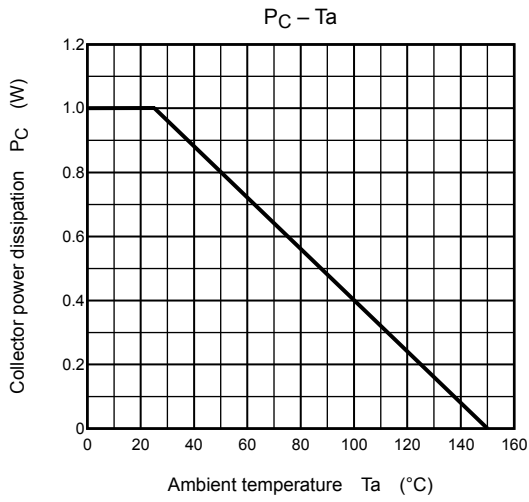


Figure 1 Safe Operating Area Test Circuit



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