TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

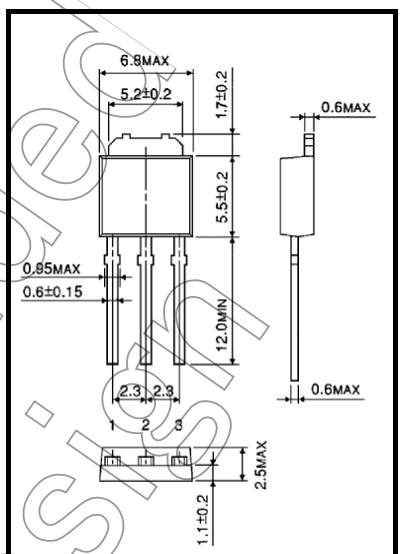
2SD1160

Switching Applications

Suitable for Motor Drive Applications

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

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-7B1A

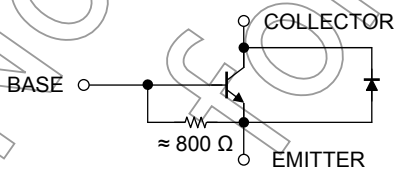
Weight: 0.36 g (typ.)

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).

Equivalent Circuit



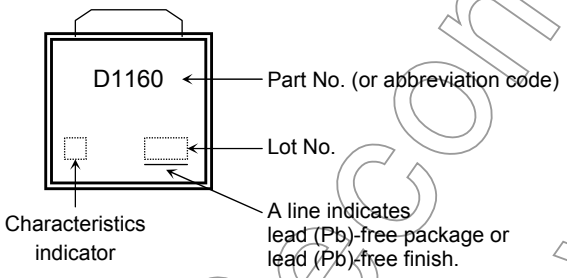
Electrical Characteristics (Ta = 25°C)

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

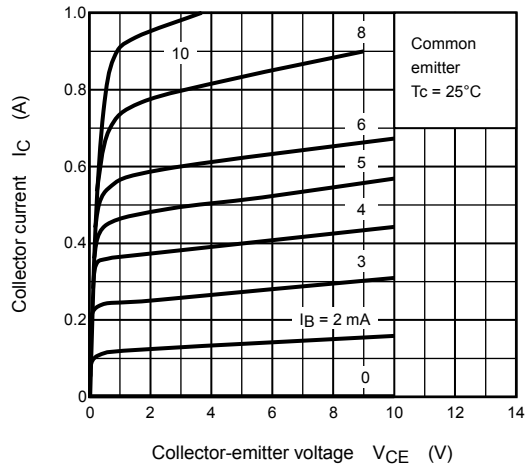
Note: $h_{FE\ (1)}$ classification O: 100 to 200, Y: 150 to 300

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

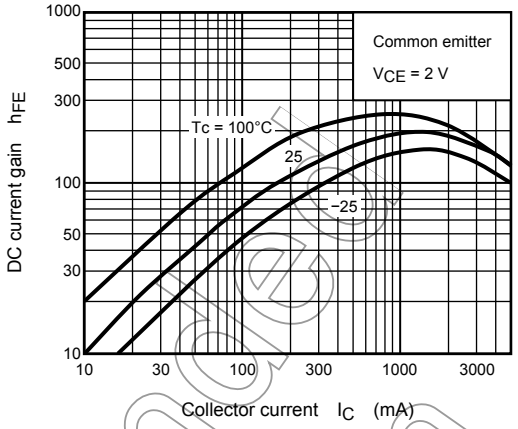
Marking



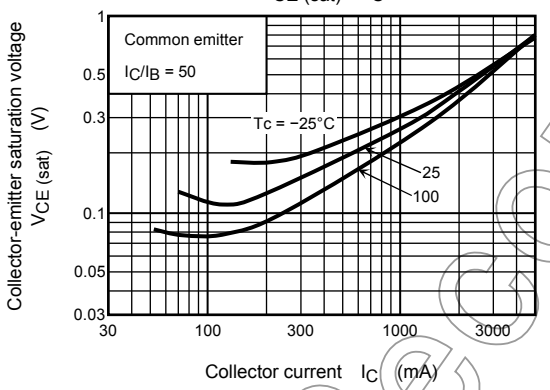
$I_C - V_{CE}$



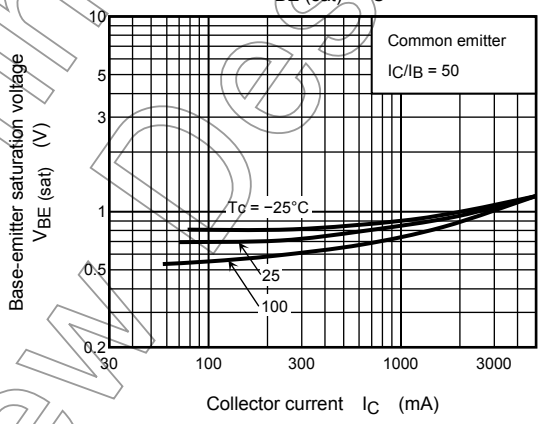
$h_{FE} - I_C$



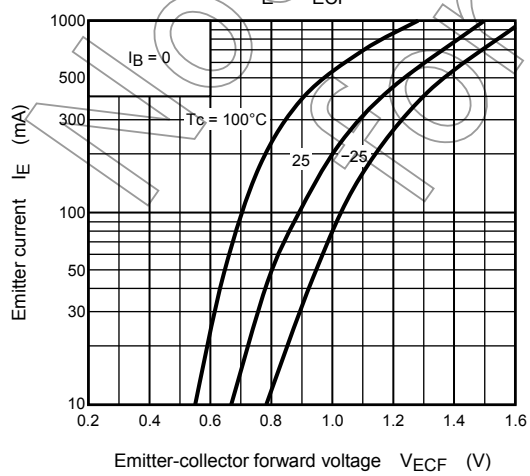
$V_{CE\ (sat)} - I_C$



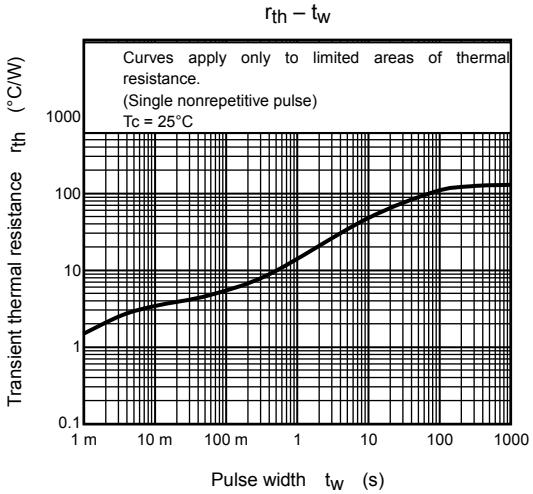
$V_{BE\ (sat)} - I_C$

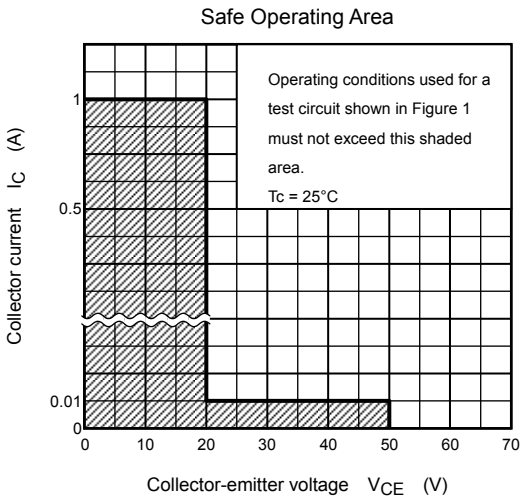


$I_E - V_{ECF}$



$r_{th} - t_w$





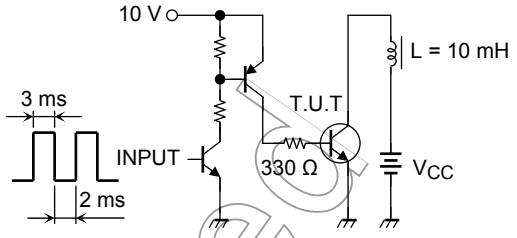
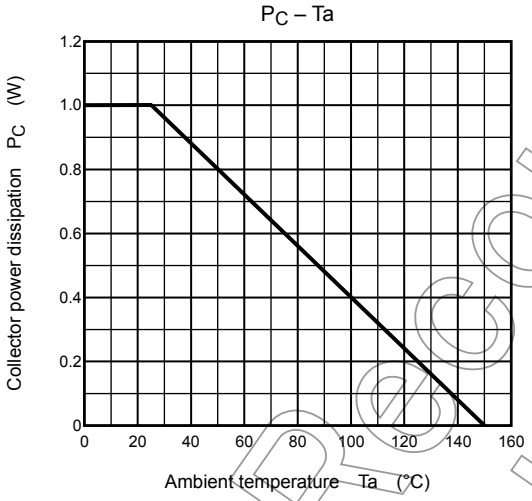


Figure 1 Safe Operating Area Test Circuit



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20070701-EN

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