

# 2SA1160

Strobe Flash Applications  
 Medium Power Amplifier Applications

Unit: mm

- High DC current gain and excellent  $h_{FE}$  linearity  
 :  $h_{FE} (1) = 140$  to  $600$  ( $V_{CE} = -1$  V,  $I_C = -0.5$  A)  
 :  $h_{FE} (2) = 60$  (min),  $120$  (typ.) ( $V_{CE} = -1$  V,  $I_C = -4$  A)
- Low saturation voltage  
 :  $V_{CE(sat)} = -0.5$  V (max) ( $I_C = -2$  A,  $I_B = -50$  mA)

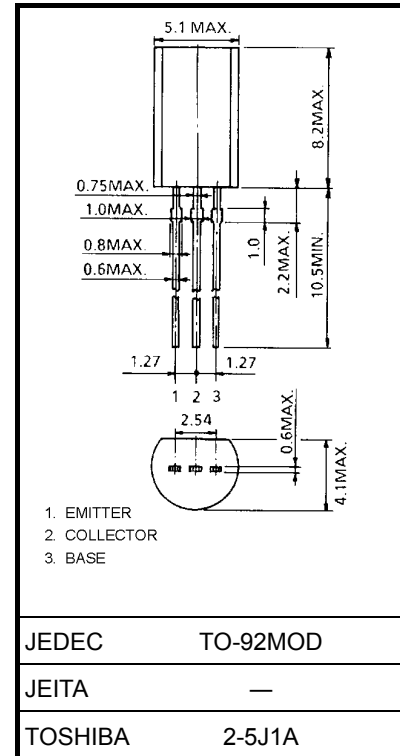
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	-20	V
Collector-emitter voltage		$V_{CEO}$	-10	V
Emitter-base voltage		$V_{EBO}$	-6	V
Collector current	DC	$I_C$	-2	A
	Pulsed (Note 1)	$I_{CP}$	-4	
Base current		$I_B$	-2	A
Collector power dissipation		$P_C$	900	mW
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note 1: Pulse width = 10 ms (max), duty cycle = 30% (max)

Note 2: 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).



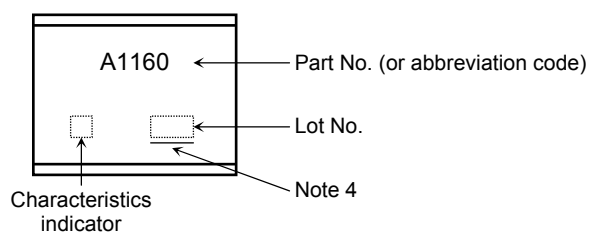
Weight: 0.36 g (typ.)

## Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -20\text{ V}, I_E = 0$	—	—	-100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -6\text{ V}, I_C = 0$	—	—	-100	nA
Collector-emitter breakdown voltage	$V_{(BR) CEO}$	$I_C = -10\text{ mA}, I_B = 0$	-10	—	—	V
Emitter-base breakdown voltage	$V_{(BR) EBO}$	$I_E = -1\text{ mA}, I_C = 0$	-6	—	—	V
DC current gain	$h_{FE} (1)$ (Note 3)	$V_{CE} = -1\text{ V}, I_C = -0.5\text{ A}$	140	—	600	
	$h_{FE} (2)$	$V_{CE} = -1\text{ V}, I_C = -4\text{ A}$	60	120	—	
Collector-emitter saturation voltage	$V_{CE (sat)}$	$I_C = -2\text{ A}, I_B = -50\text{ mA}$	—	-0.20	-0.50	V
Base-emitter voltage	$V_{BE}$	$V_{CE} = -1\text{ V}, I_C = -2\text{ A}$	—	-0.83	-1.5	V
Transition frequency	$f_T$	$V_{CE} = -1\text{ V}, I_C = -0.5\text{ A}$	—	140	—	MHz
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	50	—	pF

Note 3:  $h_{FE} (1)$  Classification A: 140 to 280, B: 200 to 400, C: 300 to 600

## Marking

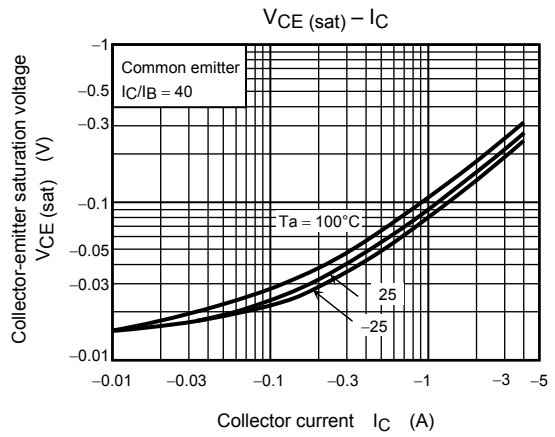
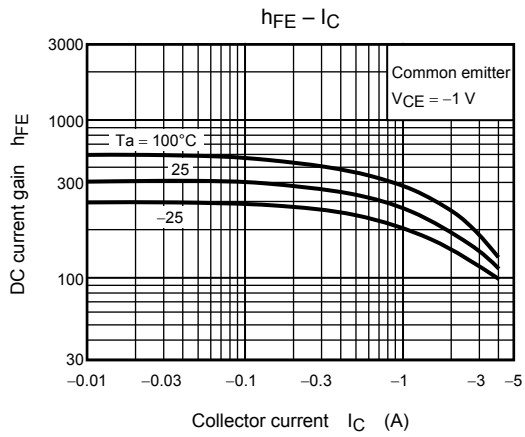
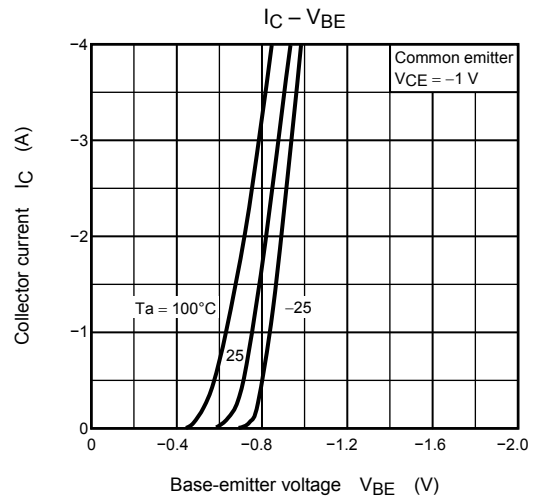
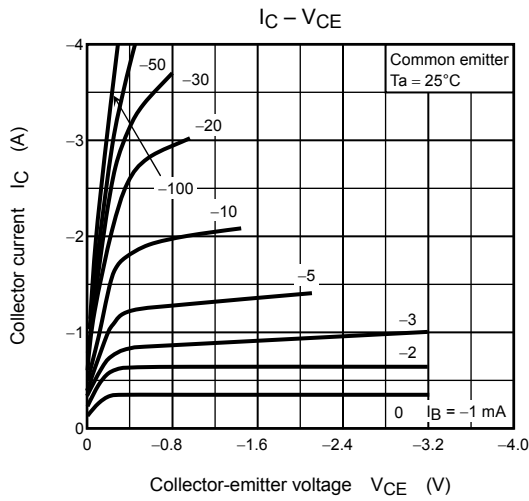


Note 4: A line under a Lot No. identifies the indication of product Labels.

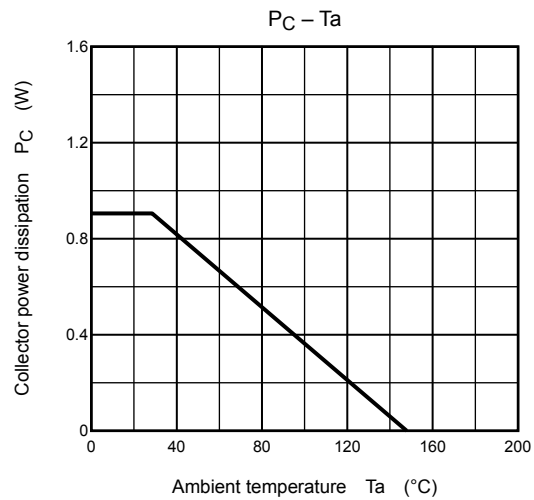
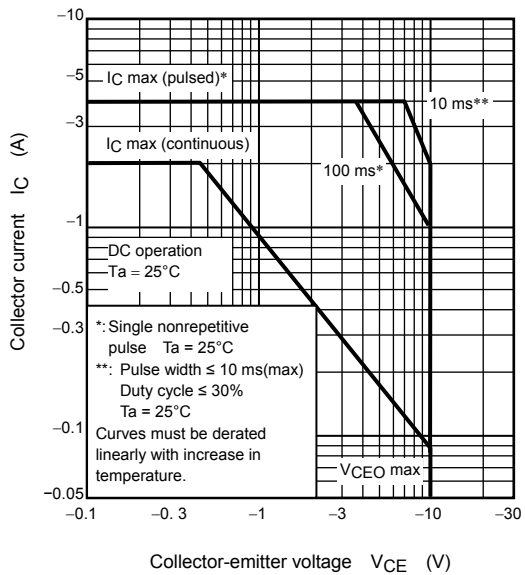
Not underlined:  $[[Pb]]/INCLUDES > MCV$

Underlined:  $[[G]]/RoHS COMPATIBLE$  or  $[[G]]/RoHS [[Pb]]$

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.



**Safe Operating Area**



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