

TOSHIBA Transistor Silicon PNP Epitaxial Type

# 2SA2059

High-Speed Switching Applications  
 DC-DC Converter Applications  
 Strobe Applications

- High DC current gain:  $h_{FE} = 200$  to  $500$  ( $I_C = -0.5$  A)
- Low collector-emitter saturation voltage:  $V_{CE(sat)} = -0.19$  V (max)
- High-speed switching:  $t_f = 40$  ns (typ.)

### Absolute Maximum Ratings (Ta = 25°C)

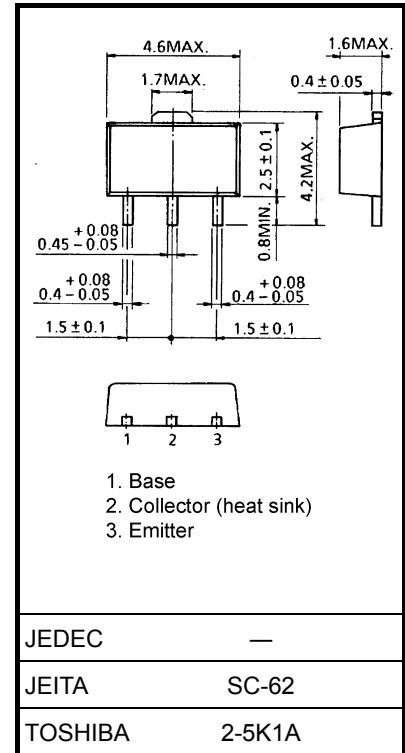
Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CB0}$	-20	V
Collector-emitter voltage		$V_{CEO}$	-20	V
Emitter-base voltage		$V_{EBO}$	-7	V
Collector current	DC	$I_C$	-3.0	A
	Pulse	$I_{CP}$	-5.0	
Base current		$I_B$	-0.3	A
Collector power dissipation	DC	$P_C$	1.0	W
	t = 10 s	(Note)	2.5	
Junction temperature		$T_j$	150	°C
Storage temperature range		$T_{stg}$	-55 to 150	°C

Note 1: Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm<sup>2</sup>)

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).

Unit: mm

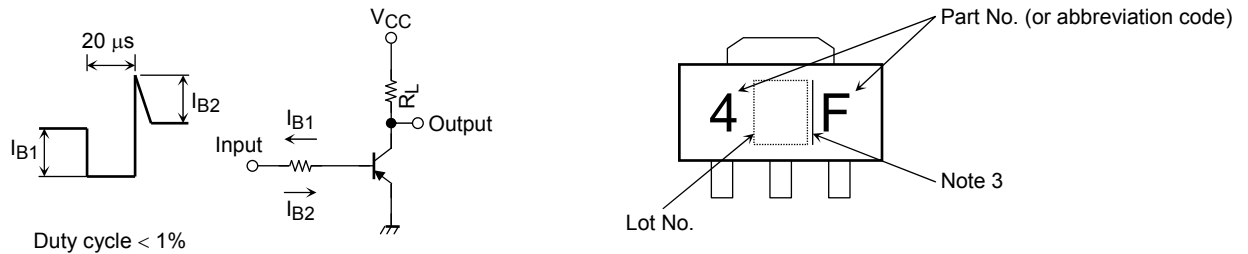


Weight: 0.05 g (typ.)

**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	$I_{EBO}$	$V_{EB} = -7\text{ V}, I_C = 0$	—	—	-100	nA
Collector-emitter breakdown voltage	$V_{(BR) CEO}$	$I_C = -10\text{ mA}, I_B = 0$	-20	—	—	V
DC current gain	$h_{FE} (1)$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	200	—	500	
	$h_{FE} (2)$	$V_{CE} = -2\text{ V}, I_C = -1.6\text{ A}$	100	—	—	
Collector-emitter saturation voltage	$V_{CE (sat)}$	$I_C = -1.6\text{ A}, I_B = -53\text{ mA}$	—	—	-0.19	V
Base-emitter saturation voltage	$V_{BE (sat)}$	$I_C = -1.6\text{ A}, I_B = -53\text{ mA}$	—	—	-1.10	V
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	28	—	pF
Switching time	Rise time	$t_r$	See Figure 1 circuit diagram.		70	ns
	Storage time	$t_{stg}$	$V_{CC} \approx -12\text{ V}, R_L = 7.5\ \Omega$		150	
	Fall time	$t_f$	$I_{B1} = 53.3\text{ mA}, I_{B2} = 53.3\text{ mA}$		40	

**Marking**



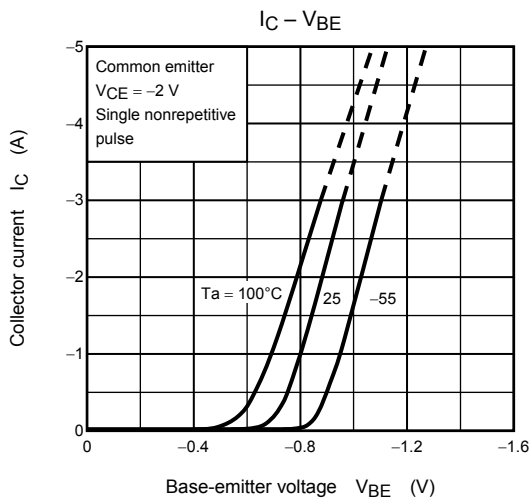
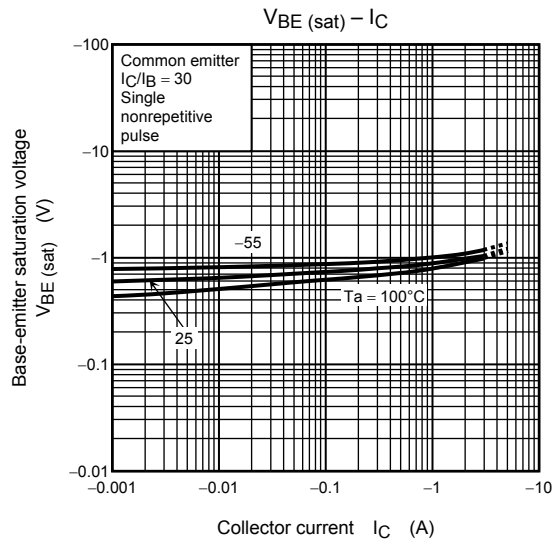
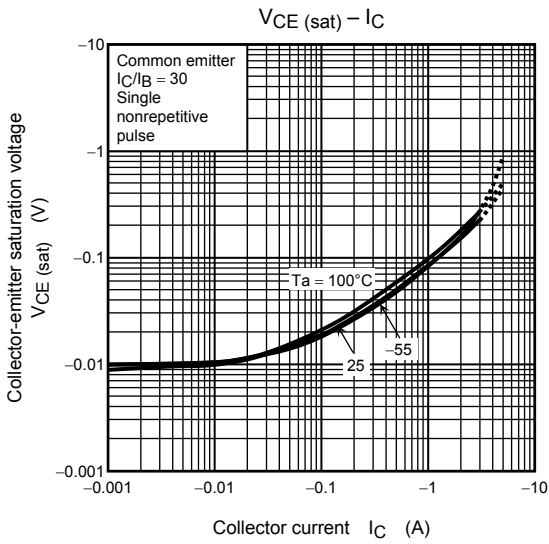
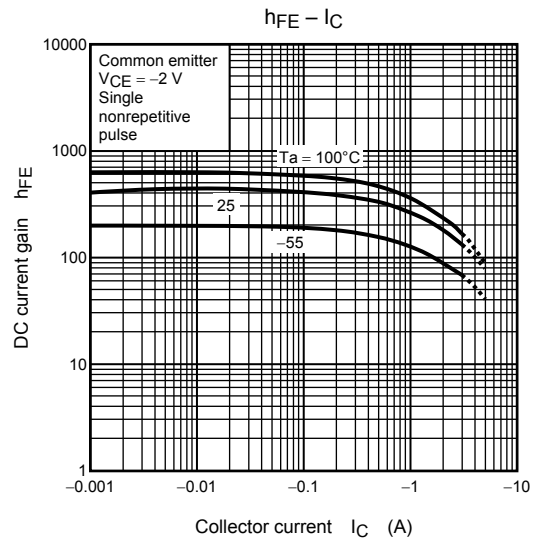
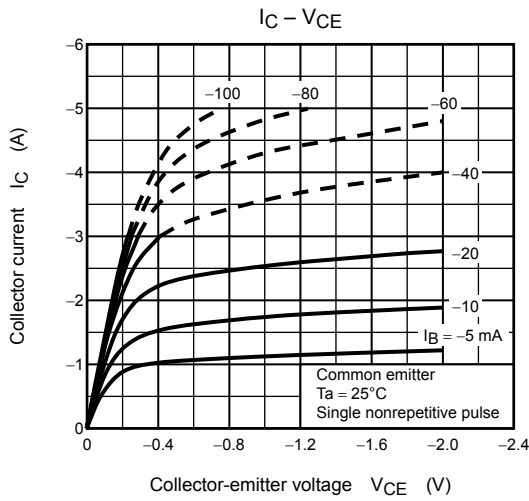
**Figure 1 Switching Time Test Circuit & Timing Chart**

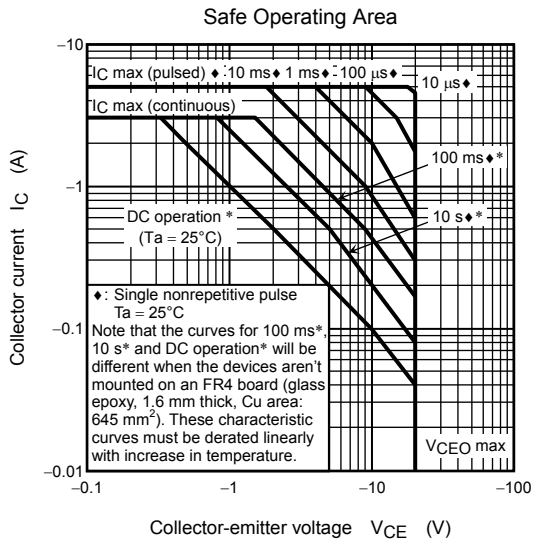
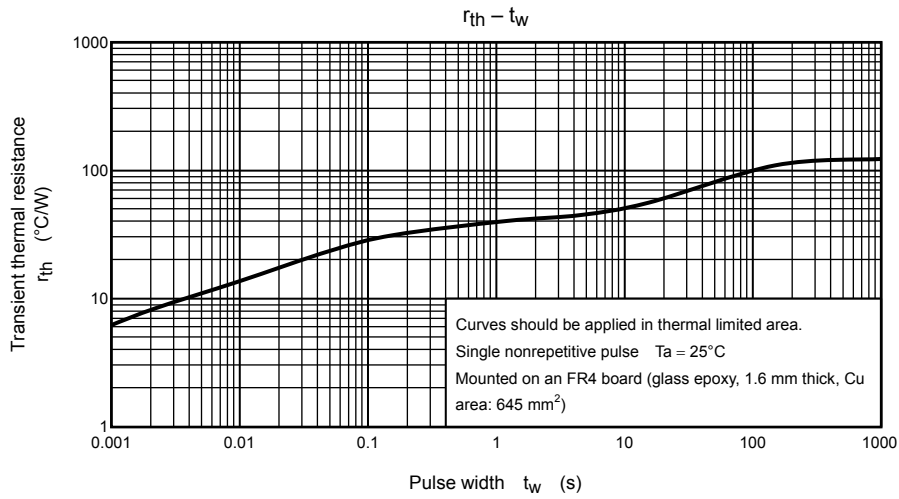
Note 3: A line to the right of a Lot No. identifies the indication of product Labels.

Without a line: [[Pb]]/INCLUDES > MCV

With a line: [[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.





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