

TOSHIBA Transistor Silicon PNP Epitaxial Type

# 2SA2059

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

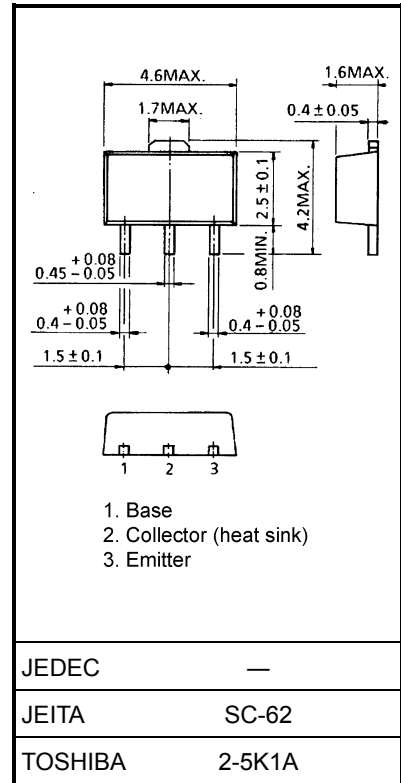
- High DC current gain:  $h_{FE} = 200$  to  $500$  ( $I_C = -0.5$  A)
- Low collector-emitter saturation voltage:  $V_{CE(sat)} = -0.19$  V (max)
- High-speed switching:  $t_f = 40$  ns (typ.)

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	-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		$I_B$	-300	mA
Collector power dissipation	DC	$P_C$ (Note)	1.0	W
	$t = 10$ s		2.5	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area:  $645\text{ mm}^2$ )

Unit: mm



Weight: 0.05 g (typ.)

### Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

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

Marking

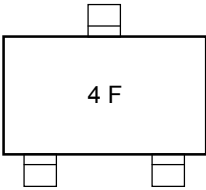
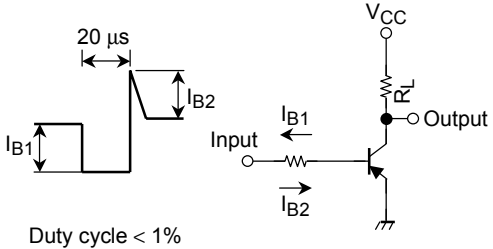
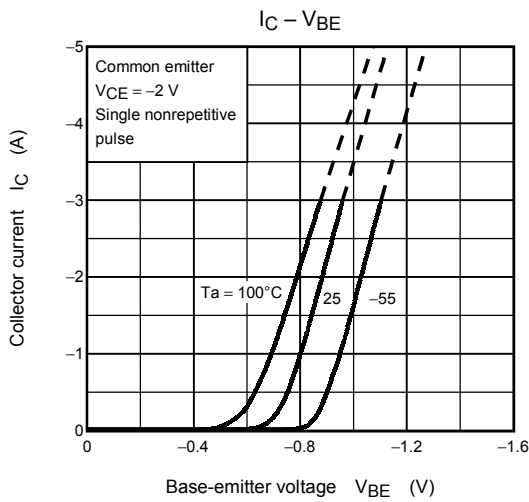
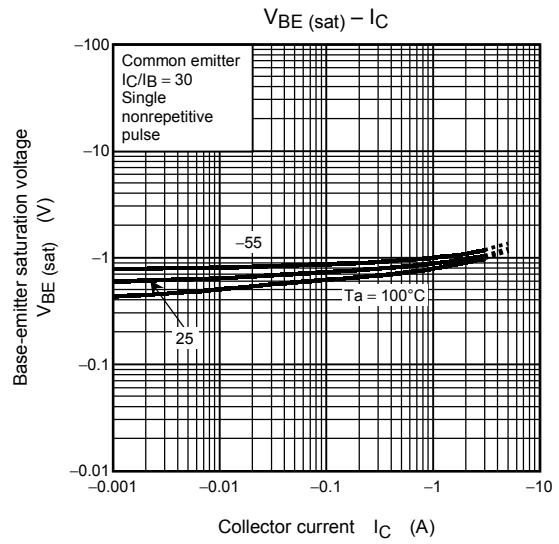
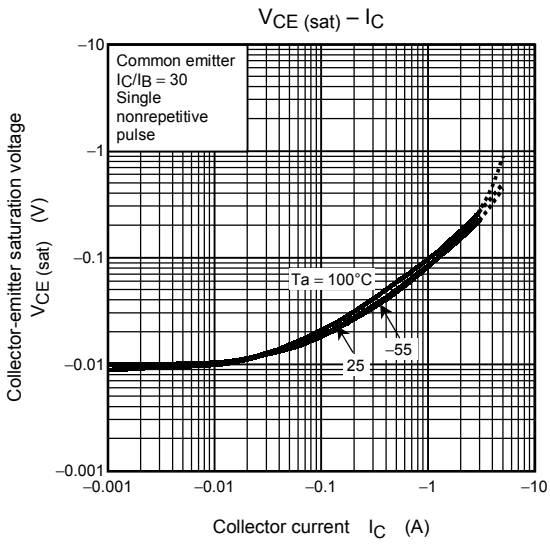
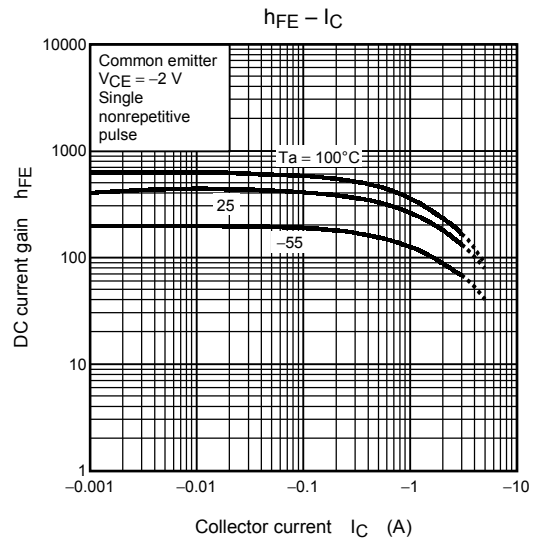
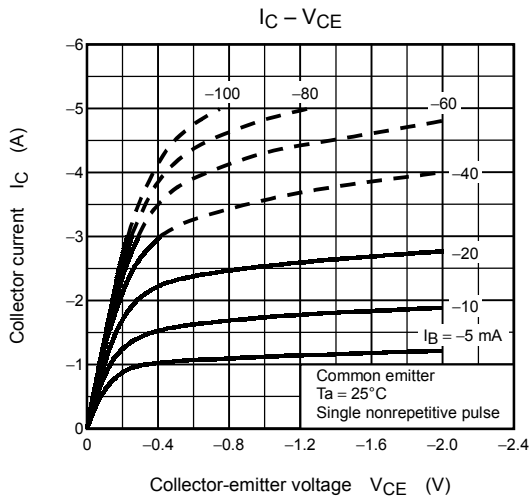
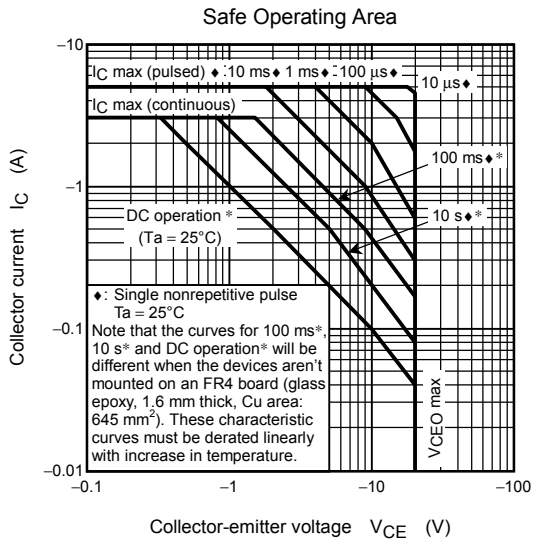
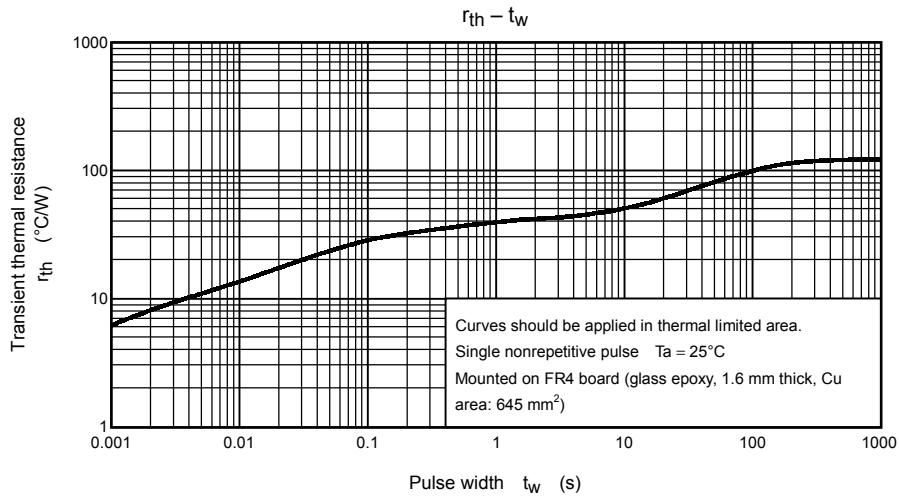


Figure 1 Switching Time Test Circuit & Timing Chart





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