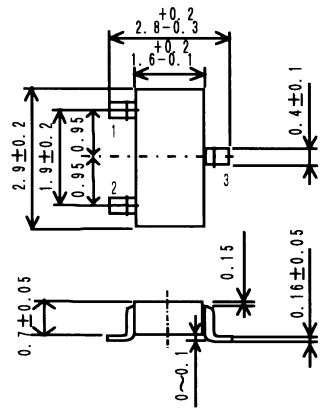
TOSHIBA Transistor Silicon PNP Epitaxial Type

2SA2056

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: $V_{CE\ (sat)}$ = −0.2 V (max)
- High-speed switching: t_f = 90 ns (typ.)

Unit: mm



1. Base
2. Emitter
3. Collector

JEDEC	—
JEITA	—
TOSHIBA	2-3S1A

Weight: 0.01 g (typ.)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage		V_{EBO}	−7	V
Collector current	DC	I_C	−2.0	A
	Pulse	I_{CP}	−3.5	
Base current		I_B	−200	mA
Collector power dissipation	t = 10 s	P_C (Note 1)	1000	mW
	DC		625	
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^2)

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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = -50$ V, $I_E = 0$	—	—	−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, $I_B = 0$	−50	—	—	V
DC current gain		h_{FE} (1)	$V_{CE} = -2$ V, $I_C = -0.3$ A	200	—	500	
		h_{FE} (2)	$V_{CE} = -2$ V, $I_C = -1.0$ A	100	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	$I_C = -1.0$ A, $I_B = -0.033$ A	—	—	−0.2	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	$I_C = -1.0$ A, $I_B = -0.033$ A	—	—	−1.1	V
Collector output capacitance		C_{ob}	$V_{CB} = -10$ V, $I_E = 0$, f = 1 MHz	—	20	—	pF
Switching time	Rise time	t_r	See Figure 1 circuit diagram.	—	60	—	ns
	Storage time	t_{stg}	$V_{CC} \approx -30$ V, $R_L = 30\ \Omega$	—	250	—	
	Fall time	t_f	$-I_{B1} = I_{B2} = -33$ mA	—	90	—	

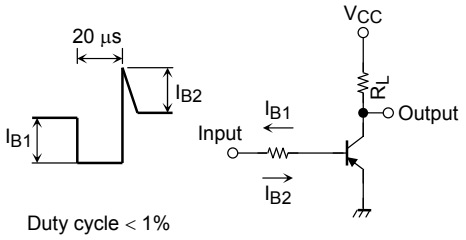
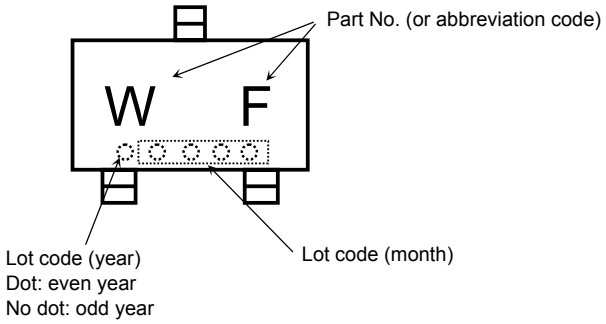
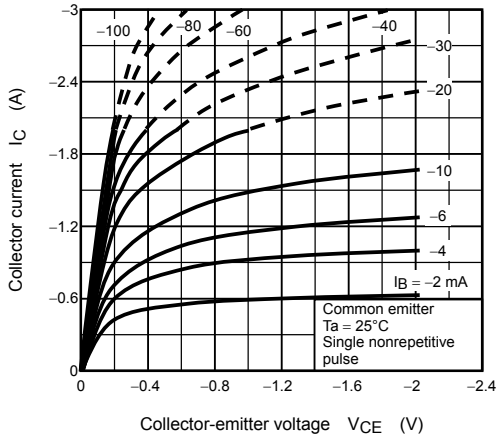


Figure 1 Switching Time Test Circuit & Timing Chart

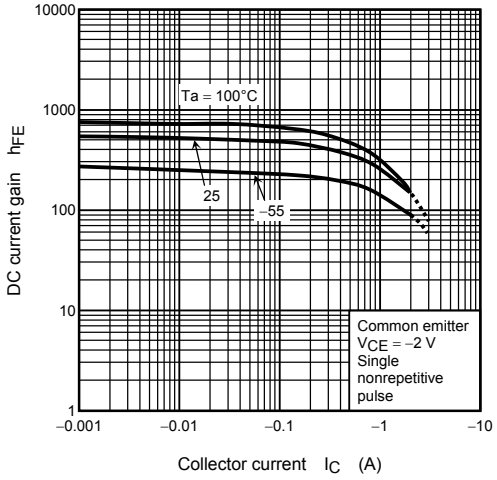
Marking



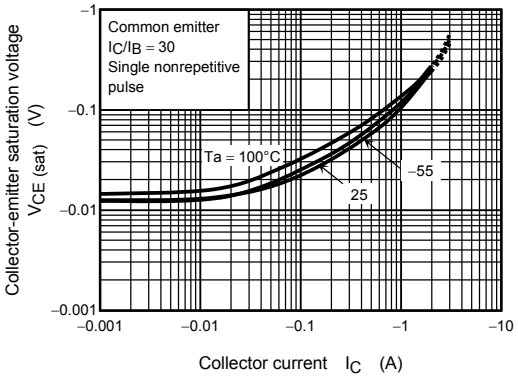
$I_C - V_{CE}$



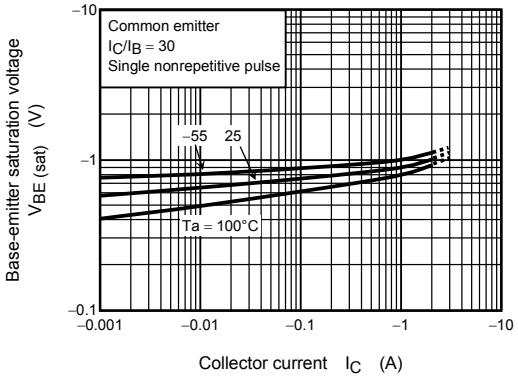
$h_{FE} - I_C$



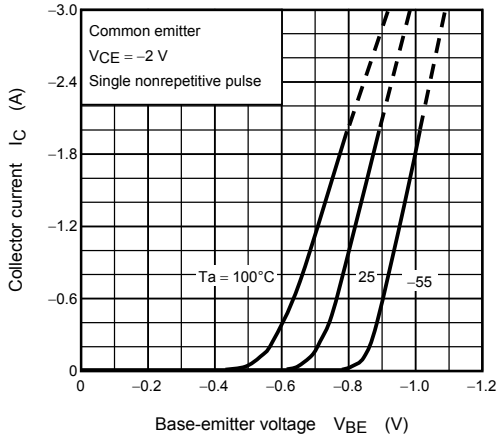
$V_{CE\,(sat)} - I_C$

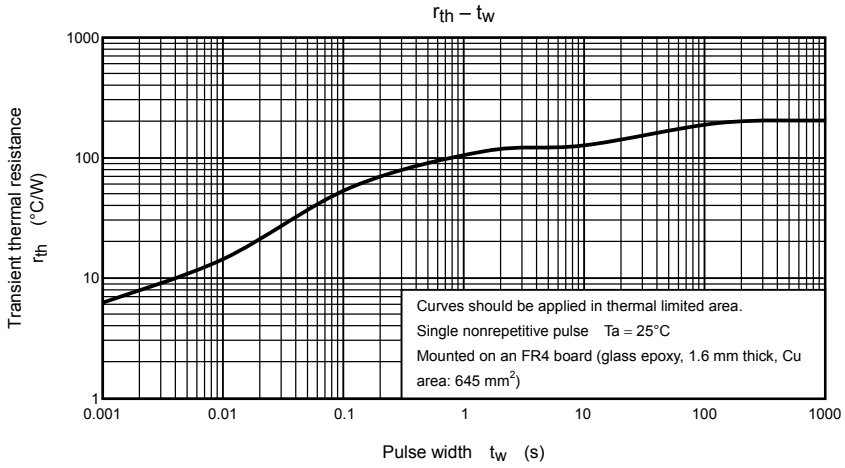


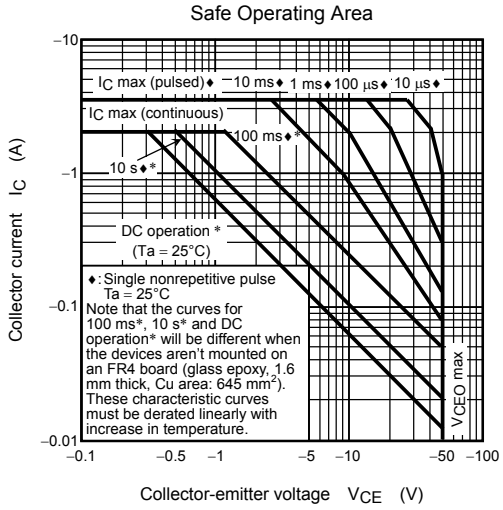
$V_{BE\,(sat)} - I_C$



$I_C - V_{BE}$







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