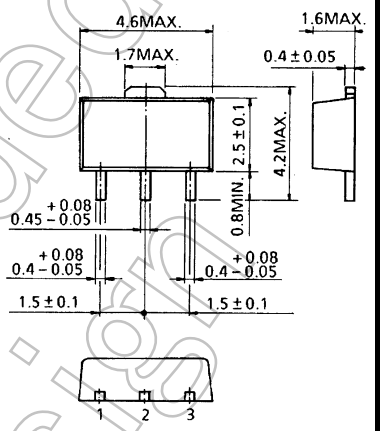
TOSHIBA Transistor Silicon PNP Epitaxial Type

2SA2069

High-Speed Switching Applications
DC-DC Converter Applications

- High DC current gain: h_{FE} = 200 to 500 (I_C = −0.15 A)
- Low collector-emitter saturation voltage: $V_{CE\ (sat)}$ = −0.14 V (max)
- High-speed switching: t_f = 37 ns (typ.)

Unit: mm



1. Base
2. Collector (heat sink)
3. Emitter

JEDEC	—
JEITA	SC-62
TOSHIBA	2-5K1A

Weight: 0.05 g (typ.)

Absolute Maximum Ratings (Ta = 25°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	−1.5	A
	Pulse	I_{CP}	−2.5	
Base current		I_B	−150	mA
Collector power dissipation	t = 10 s	P_C	2.0	W
	DC	(Note 1)	1.0	
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).

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Electrical Characteristics (Ta = 25°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 = −0.15 A	200	—	500	
		h_{FE} (2)	V_{CE} = −2 V, I_C = −0.5 A	125	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = −0.5 A, I_B = −17 mA	—	—	−0.14	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = −0.5 A, I_B = −17 mA	—	—	−1.10	V
Collector output capacitance		C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	12	—	pF
Switching time	Rise time	t_r	See Figure 1.	—	40	—	ns
	Storage time	t_{stg}	V_{CC} ≈ −10 V, R_L = 20 Ω	—	135	—	
	Fall time	t_f	$-I_{B1} = I_{B2}$ = −17 mA	—	37	—	

Marking

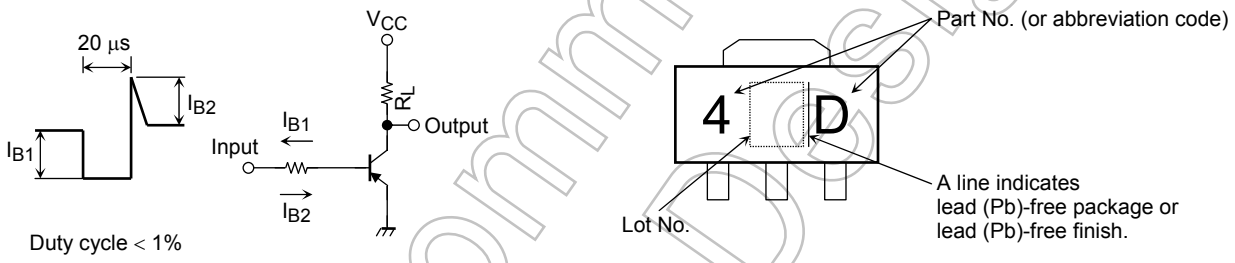

Figure 1 Switching Time Test Circuit & Timing Chart

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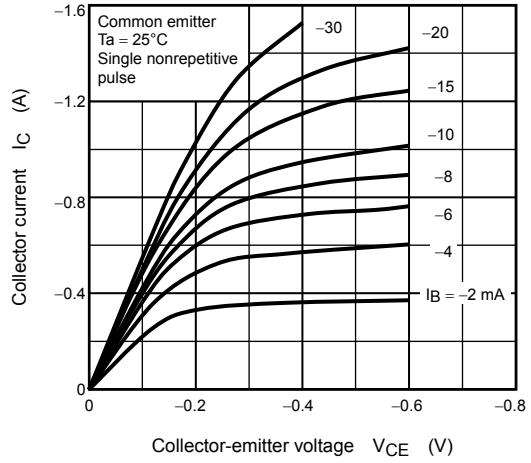
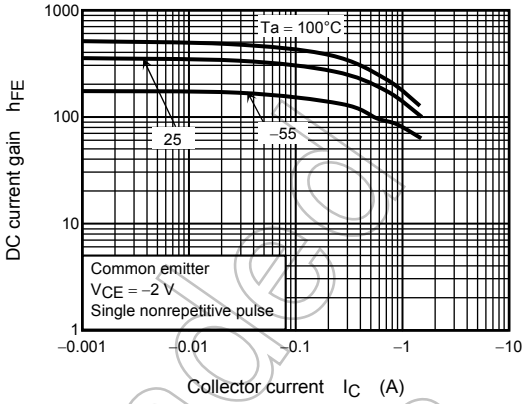
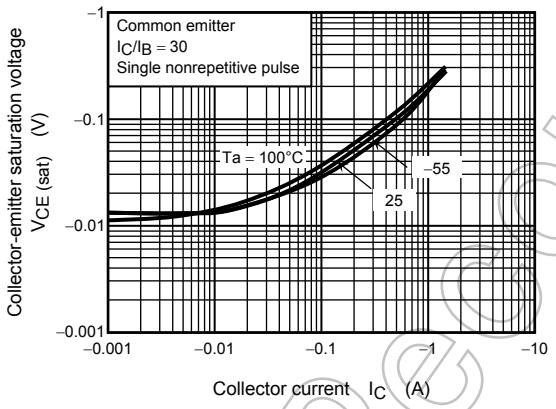
$I_C - V_{CE}$



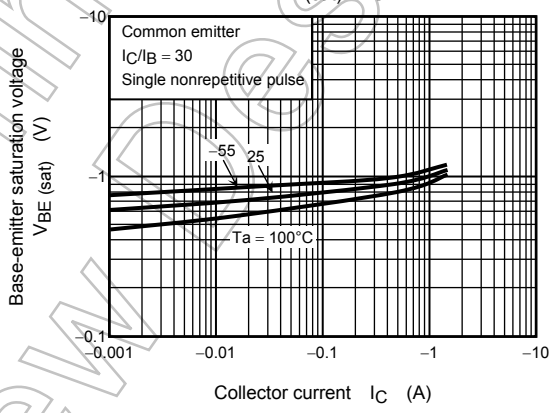
$h_{FE} - I_C$



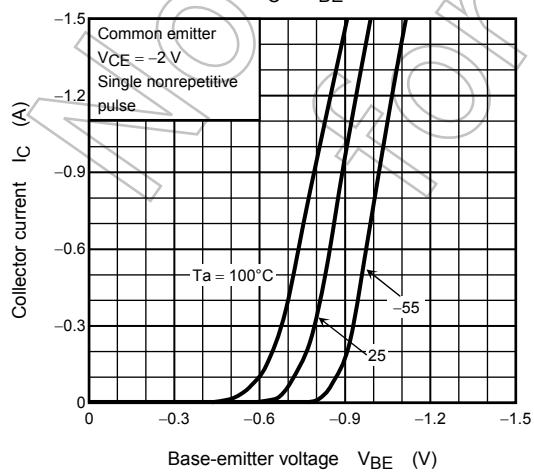
$V_{CE\ (sat)} - I_C$



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



$I_C - V_{BE}$



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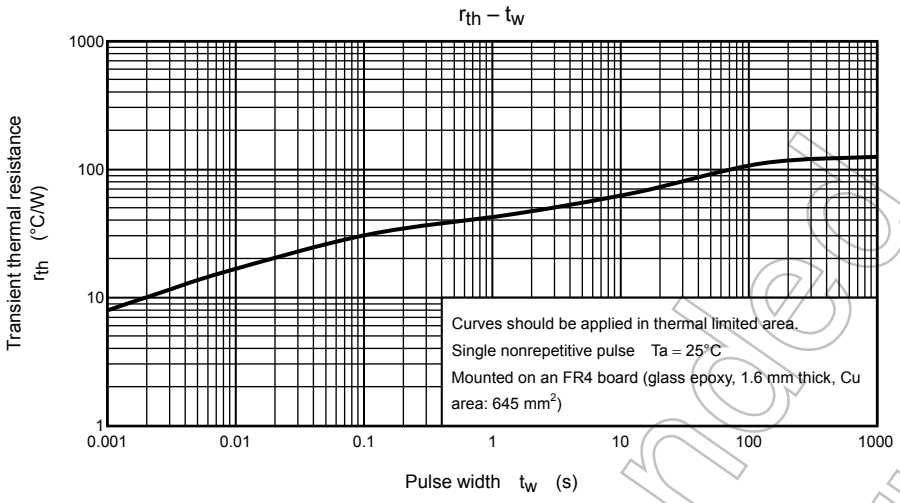

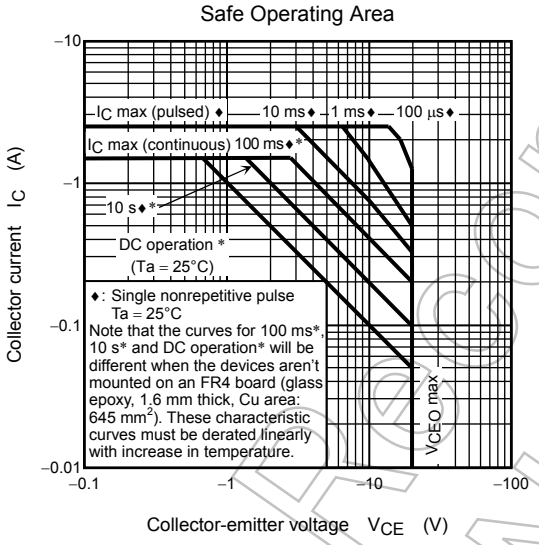

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