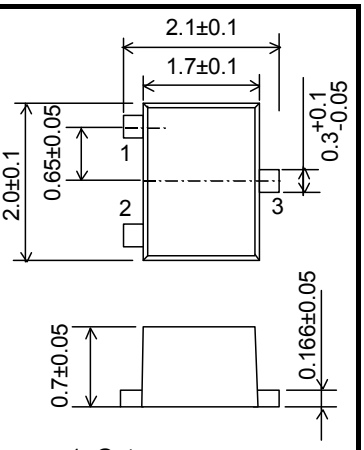
TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC6133

High-Speed Switching Applications
DC-DC Converter Applications

- High DC current gain: h_{FE} = 400 to 1000 (I_C = 0.15A)
- Low collector-emitter saturation voltage: $V_{CE\ (sat)}$ = 0.12 V (max)
- High-speed switching: t_f = 45 ns (typ.)

Unit: mm



1 :Gate
2 :Source
3 :Drain

UFM

JEDEC	—
JEITA	—
TOSHIBA	2-2U1A

Weight: 6.6 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	40	V
Collector-emitter voltage		V_{CEX}	30	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		P_C (Note1)	800	mW
		P_C (Note2)	500	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

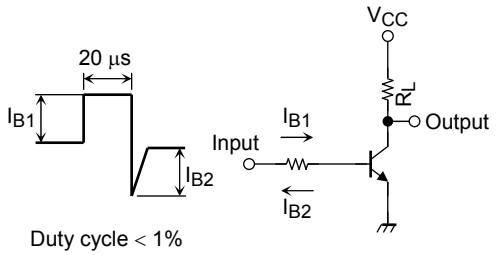
Note1: Mounted on ceramic board.
(25.4 mm × 25.4 mm × 0.8 mm, Cu Pad: 645 mm^2)

Note2: Mounted on FR4 board.
(25.4 mm × 25.4 mm × 1.6 mm, Cu Pad: 645 mm^2)

Note3: 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} = 40 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	400	—	1000	
		h_{FE} (2)	V_{CE} = 2 V, I_C = 0.5 A	200	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 0.5 A, I_B = 10 mA	—	—	0.12	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 0.5 A, I_B = 10 mA	—	—	1.10	V
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	18	—	pF
Switching time	Rise time	t_r	See Figure 1.	—	43	—	ns
	Storage time	t_{stg}	$V_{CC} \approx$ 12 V, R_L = 24 Ω	—	295	—	
	Fall time	t_f	$I_{B1} = -I_{B2}$ = 17 mA	—	45	—	



Marking

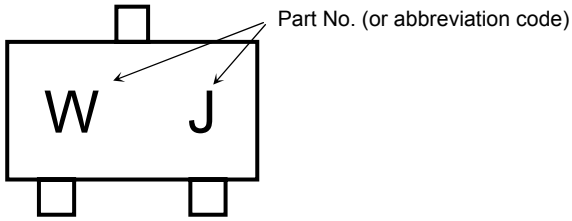
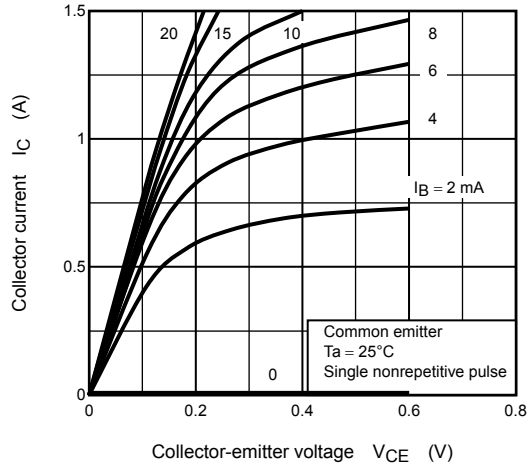
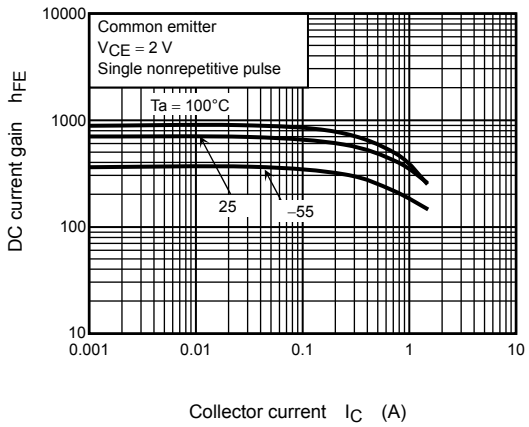


Figure 1 Switching Time Test Circuit & Timing Chart

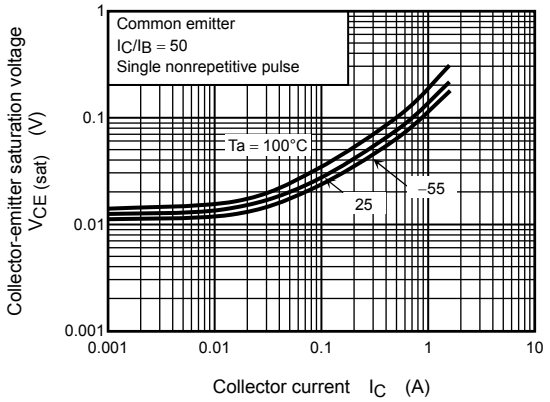
$I_C - V_{CE}$



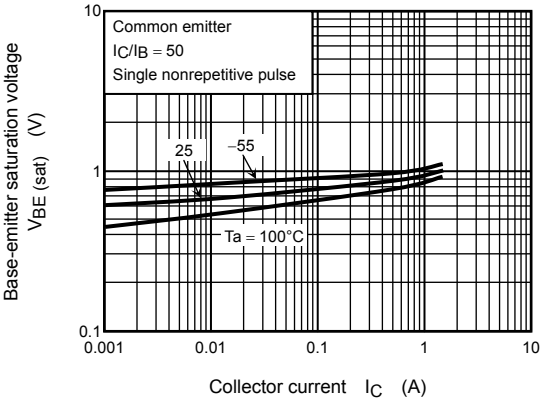
$h_{FE} - I_C$



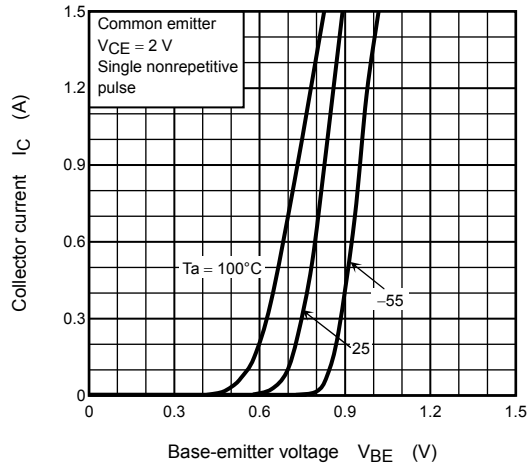
$V_{CE\ (sat)} - I_C$



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



$I_C - V_{BE}$



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