Bipolar Transistors Silicon NPN Triple-Diffused Type

TTC005

1. Applications

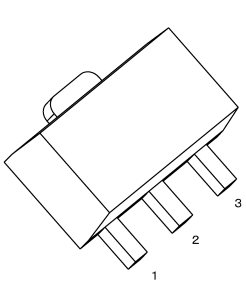
- High-Speed High-Voltage Switching
- Switching Voltage Regulators
- High-Speed DC-DC Converters

2. Features

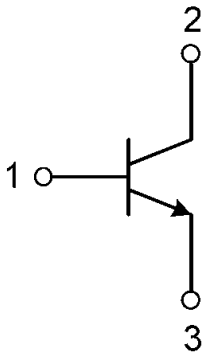
(1) High DC current gain: h_{FE} = 100 to 200 (I_C = 0.1 A)

(2) High-speed switching: t_f = 0.13 μs (typ.) (I_C = 0.3 A)

3. Packaging and Internal Circuit



PW-Mini



1. Base
2. Collector (Heatsink)
3. Emitter

4. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25°C)

Characteristics			Symbol	Rating	Unit
Collector-base voltage			V_{CBO}	600	V
Collector-emitter voltage			V_{CEX}	600	
Collector-emitter voltage			V_{CEO}	285	
Emitter-base voltage			V_{EBO}	8	
Collector current (DC)		(Note 1)	I_C	1	A
Collector current (pulsed)		(Note 1)	I_{CP}	2	
Base current			I_B	0.5	
Collector power dissipation	(t = 10 s)	(Note 2)	P_C	2.8	W
Collector power dissipation	DC	(Note 2)		1.1	
Junction temperature			T_j	150	°C
Storage temperature			T_{stg}	-55 to 150	

Note: 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).

Note 1: Ensure that the junction temperature does not exceed 150°C.

Note 2: Device mounted on a 25.4 mm x 25.4 mm x 1.6 mm FR-4 glass epoxy board (with a dissipating copper surface of 645 mm^2)

Start of commercial production
2009-01

5. Electrical Characteristics

5.1. Static Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 600 V, I_E = 0 A	—	—	100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = 8 V, I_C = 0 A	—	—	100	
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C = 1 mA, I_E = 0 A	600	—	—	V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 10 mA, I_B = 0 A	285	—	—	
DC current gain	$h_{FE(1)}$	V_{CE} = 5 V, I_C = 1 mA	80	—	200	—
	$h_{FE(2)}$	V_{CE} = 5 V, I_C = 0.1 A	100	—	200	
	$h_{FE(3)}$	V_{CE} = 5 V, I_C = 0.2 A	60	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 0.6 A, I_B = 75 mA	—	—	1	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 0.6 A, I_B = 75 mA	—	—	1.3	

5.2. Dynamic Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Switching time (rise time)	t_r	See Figure 5.2.1 $V_{CC} \approx$ 200 V, R_L = 667 Ω, I_{B1} = 20 mA, I_{B2} = -50 mA, Duty cycle ≤ 1%	—	0.2	—	μs
Switching time (storage time)	t_{stg}		—	2	—	
Switching time (fall time)	t_f		—	0.13	—	

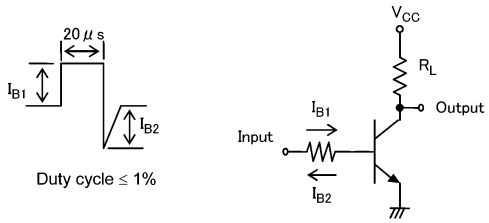


Fig. 5.2.1 Switching Time Test Circuit

6. Marking (Note)

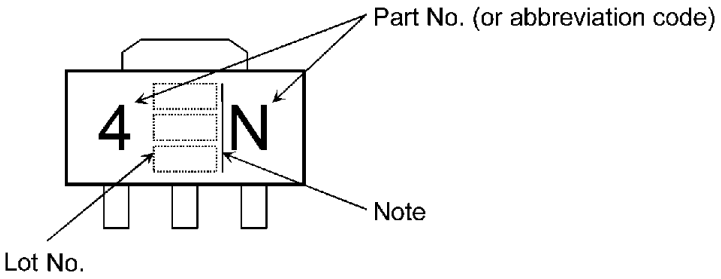
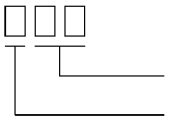


Fig. 6.1 Marking

Lot No. :

Weekly code (Three digits)



Week of manufacture
(01 for the first week of calendar year; sequential number up to 52 or 53)

Year of manufacture
(Last digit of calendar year)

Note: A line beside 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 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

7. Characteristics Curves (Note)

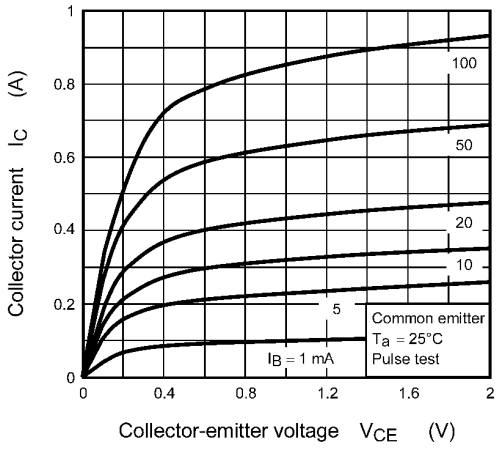


Fig. 7.1 I_C - V_{CE}

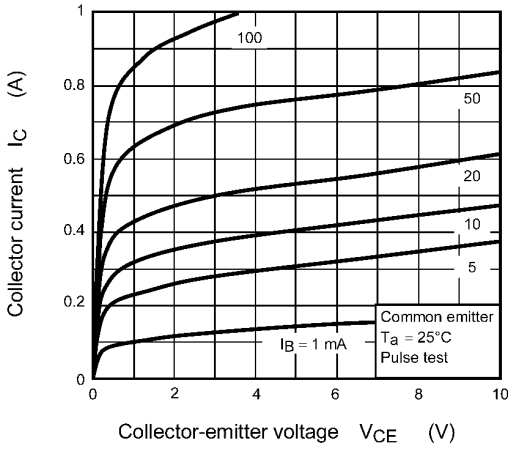


Fig. 7.2 I_C - V_{CE}

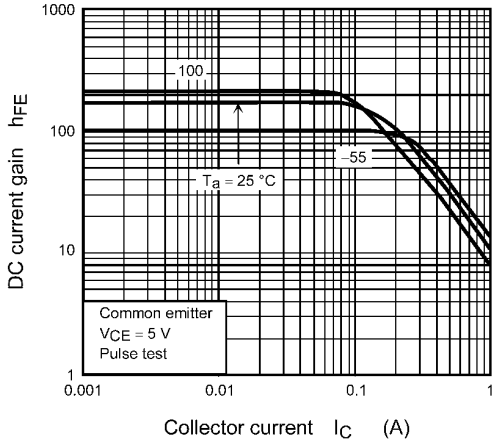


Fig. 7.3 h_{FE} - I_C

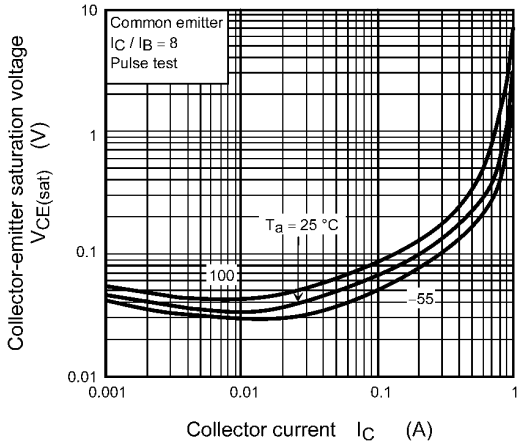


Fig. 7.4 $V_{CE(sat)}$ - I_C

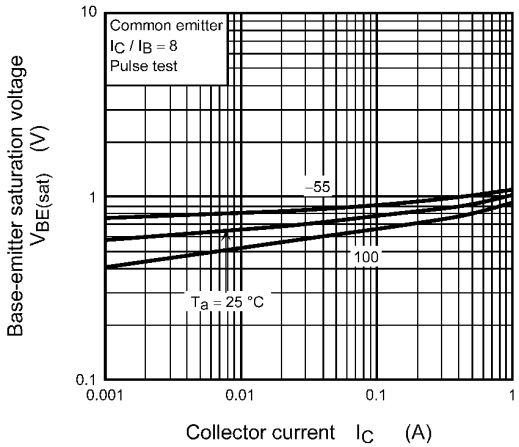


Fig. 7.5 $V_{BE(sat)}$ - I_C

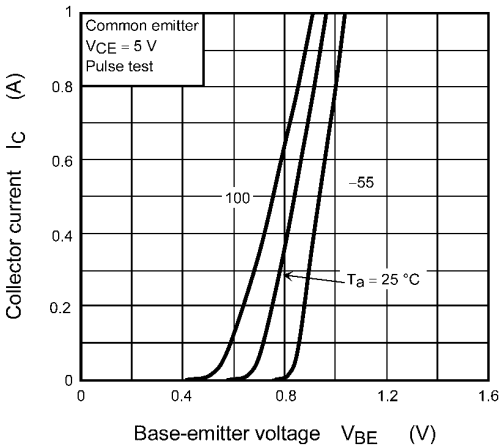


Fig. 7.6 I_C - V_{BE}

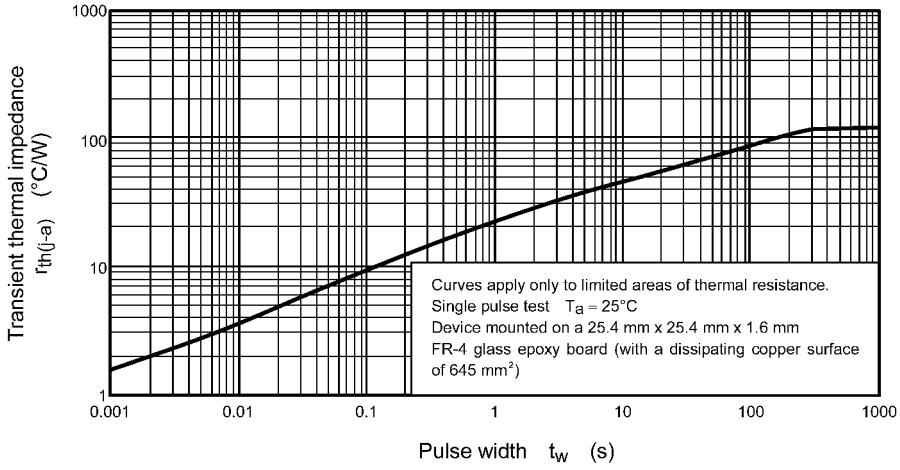


Fig. 7.7 $r_{th(j-a)}$ - t_w(Guaranteed Maximum)

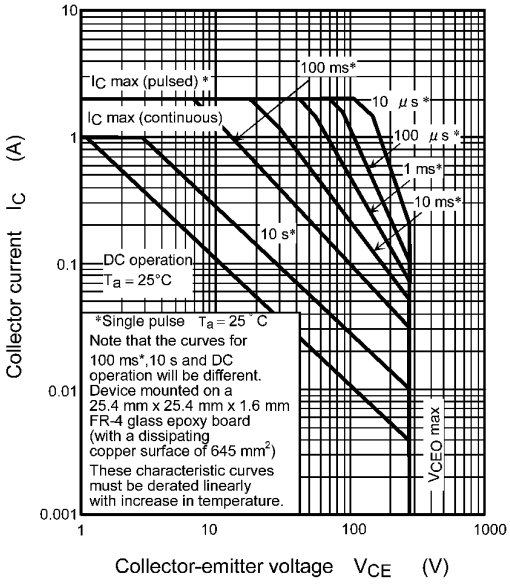
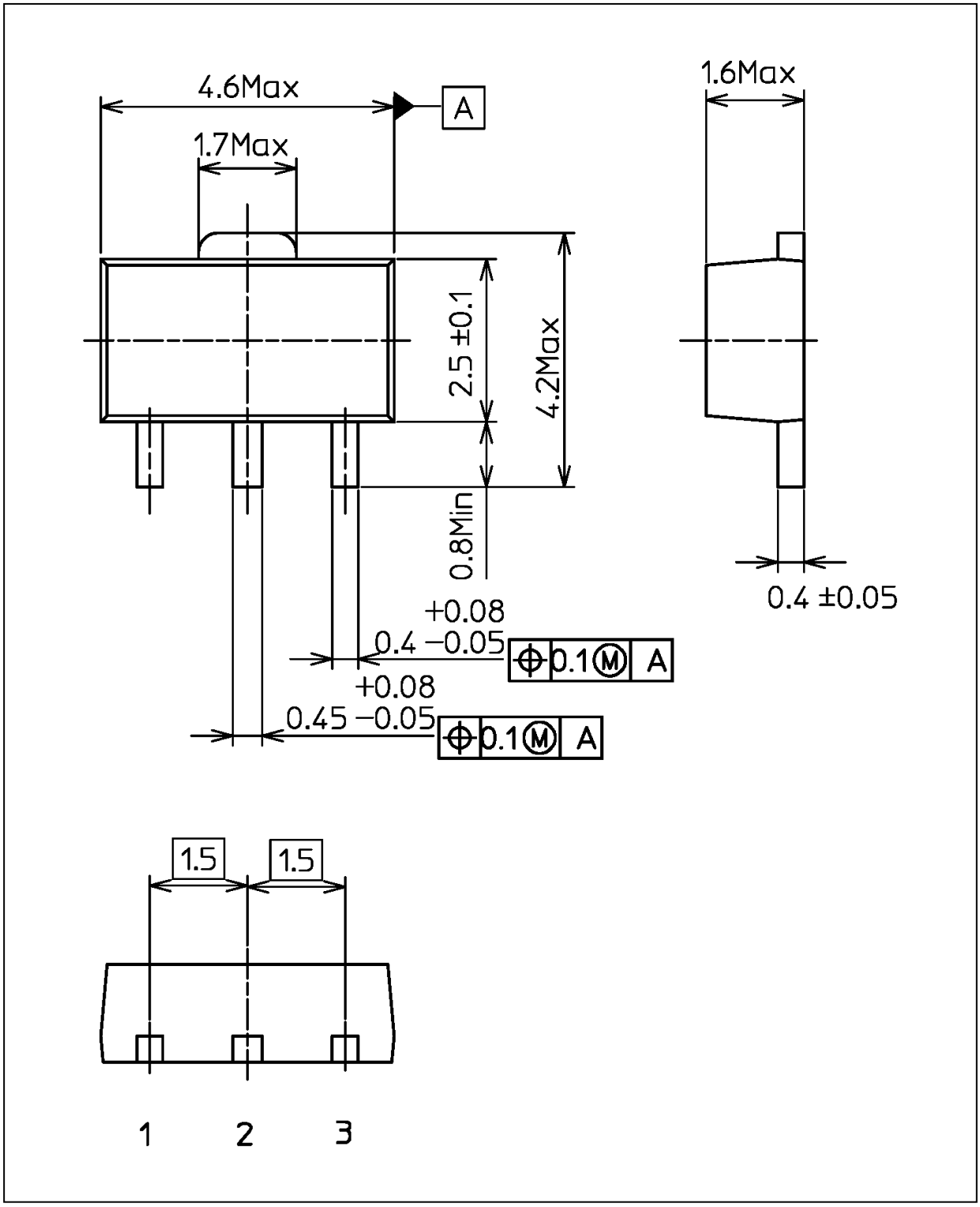


Fig. 7.8 Safe Operating Area (Guaranteed Maximum)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



The drawings shown may not accurately represent the actual shape or dimensions.

Weight: 0.05 g (typ.)

Package Name(s)
TOSHIBA: 2-5K1S
Nickname: PW-Mini

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