TOSHIBA Transistor   Silicon NPN Epitaxial Type

2SC5886

High-Speed Swtching Applications

DC-DC Converter Applications

Unit: mm

- High DC current gain: h_{FE} = 400 to 1000 (I_C = 0.5 A)
- Low collector-emitter saturation: $V_{CE (sat)}$ = 0.22 V (max)
- High-speed switching: t_f = 55 ns (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	100	V
Collector-emitter voltage		V_{CEX}	80	V
		V_{CEO}	50	
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC	I_C	5	A
	Pulse	I_{CP}	10	
Base current		I_B	0.5	A
Collector power dissipation	Ta = 25°C	P_C	1	W
	Tc = 25°C		20	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

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

JEDEC	—
JEITA	—
TOSHIBA	2-7J1A
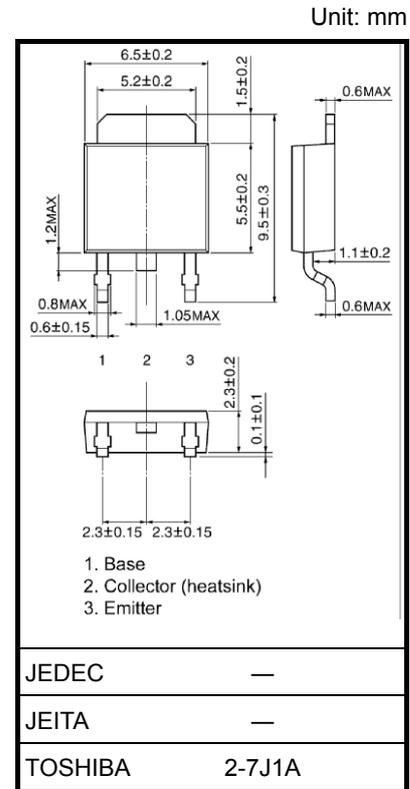
Weight: 0.36 g (typ.)

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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = 100$ 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, $I_C = 0.5$ A	400	—	1000	
		h_{FE} (2)	$V_{CE} = 2$ V, $I_C = 1.6$ A	200	—	—	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 1.6$ A, $I_B = 32$ mA	—	—	0.22	V
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = 1.6$ A, $I_B = 32$ mA	—	—	1.10	V
Switching time	Rise time	t_r	See Figure 1. $V_{CC} \simeq 24$ V, $R_L = 15$ Ω $I_{B1} = 32$ mA, $I_{B2} = -53$ mA	—	63	—	ns
	Storage time	t_{stg}		—	560	—	
	Fall time	t_f		—	55	—	

Duty cycle < 1%
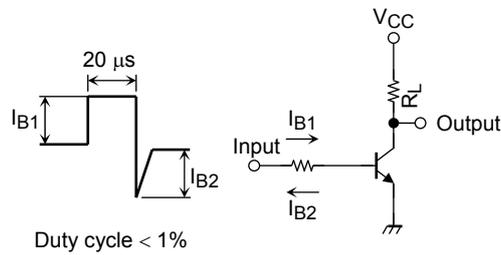
Figure 1   Switching Time Test Circuit & Timing Chart

Marking

C5886 ← Part No. (or abbreviation code)

← Lot No.

A line indicates lead (Pb)-free package or lead (Pb)-free finish.

$I_C - V_{CE}$

Collector current I_C (A)

Collector-emitter voltage V_{CE} (V)

Common emitter
Tc = 25°C

70 mA
50 mA · 30 mA · 20 mA
10 mA
5 mA
2 mA
I_B = 1 mA
0

$h_{FE} - I_C$

DC current gain h_{FE}

Collector current I_C (A)

Common emitter
V_{CE} = 2 V

Tc = 100°C
25°C
−55°C

$V_{CE (sat)} - I_C$

Collector emitter saturation voltage $V_{CE (sat)}$ (V)

Collector current I_C (A)

Common emitter
I_C/I_B = 50

Tc = 100°C
25°C
−55°C

$V_{BE (sat)} - I_C$

Base-emitter saturation voltage $V_{BE (sat)}$ (V)

Collector current I_C (A)

Common emitter
I_C/I_B = 50

Tc = −55°C
25°C
100°C

$I_C - V_{BE}$

Collector current I_C (A)

Base-emitter voltage V_{BE} (V)

Common emitter
V_{CE} = 2 V

Tc = 100°C
−55°C
25°C

$V_{CE} - I_B$

Collector-emitter saturation voltage V_{CE} (V)

Base current I_B (A)

Common emitter
Tc = 25°C

I_C = 2.5 A
2 A
1 A

2006-11-10

$r_{th(j-c)} - t_w$

Transient thermal resistance (junction-case) $r_{th(j-c)}$ (°C/W)

Pulse width t_w (s)

Tc = 25°C Infinite heat sink
Curves should be applied in
thermal limited area.
(single nonrepetitive pulse)

Safe Operation Area

Collector current I_C (A)

Collector-emitter voltage V_{CEO} (V)

I_C max (pulsed) *

100 μs*

10 μs*

I_C max (continuous)

1 ms*

DC OPERATION
(Tc = 25°C)

10 ms*

100 ms*

V_{CEO} max

*: Single pulse   Tc = 25°C
Curves must be derated
linearly with increase in
temperature