2SC3336

Silicon NPN Triple Diffused

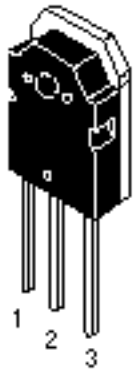
HITACHI

Application

High voltage, high speed and high power switching

Outline

TO-3P



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

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

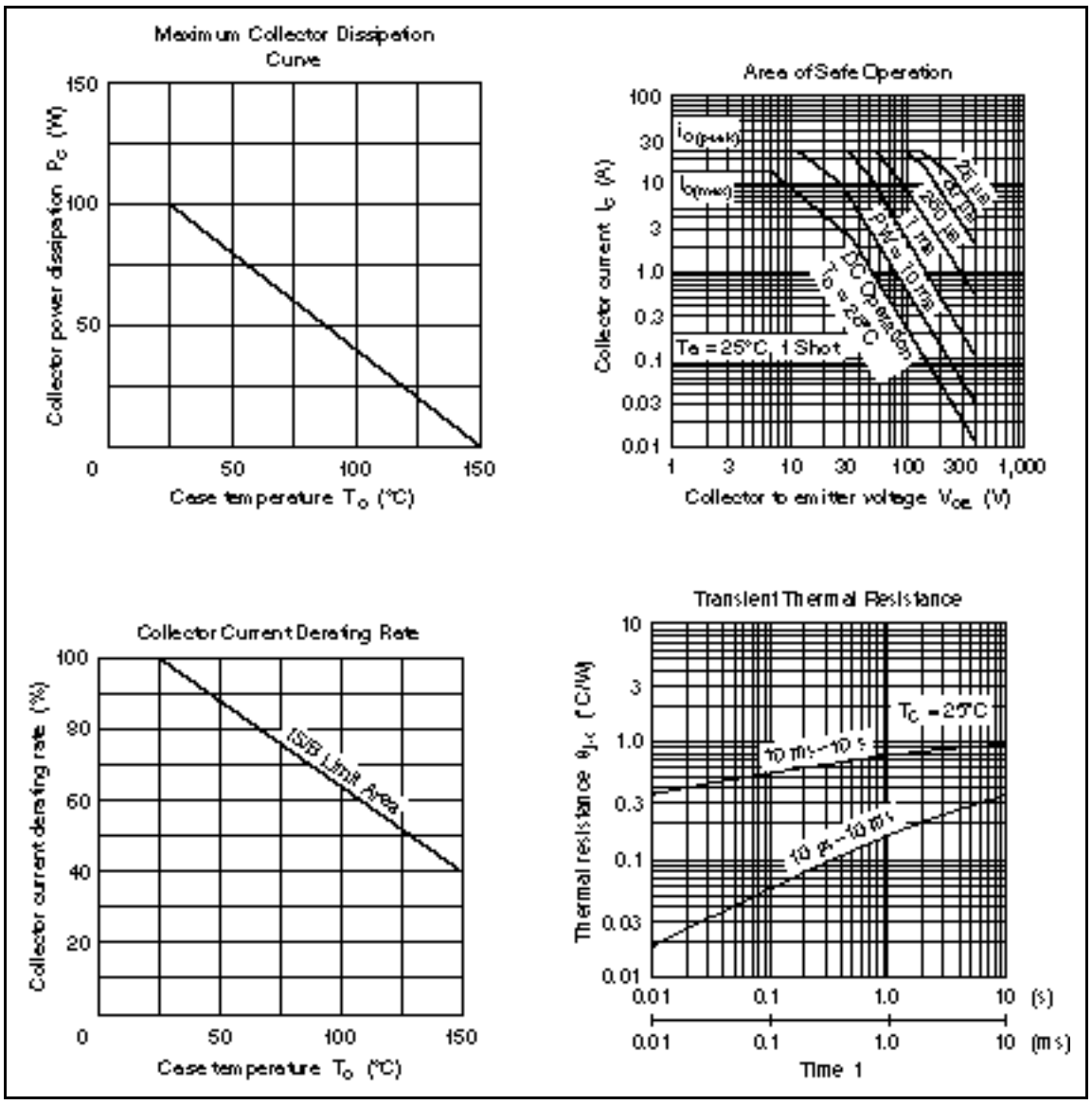
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	500	V
Collector to emitter voltage	V_{CEO}	400	V
Emitter to base voltage	V_{EBO}	10	V
Collector current	I_C	15	A
Collector peak current	$I_{C(peak)}$	25	A
Base current	I_B	7.5	A
Collector power dissipation	P_C*[1]	100	W
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

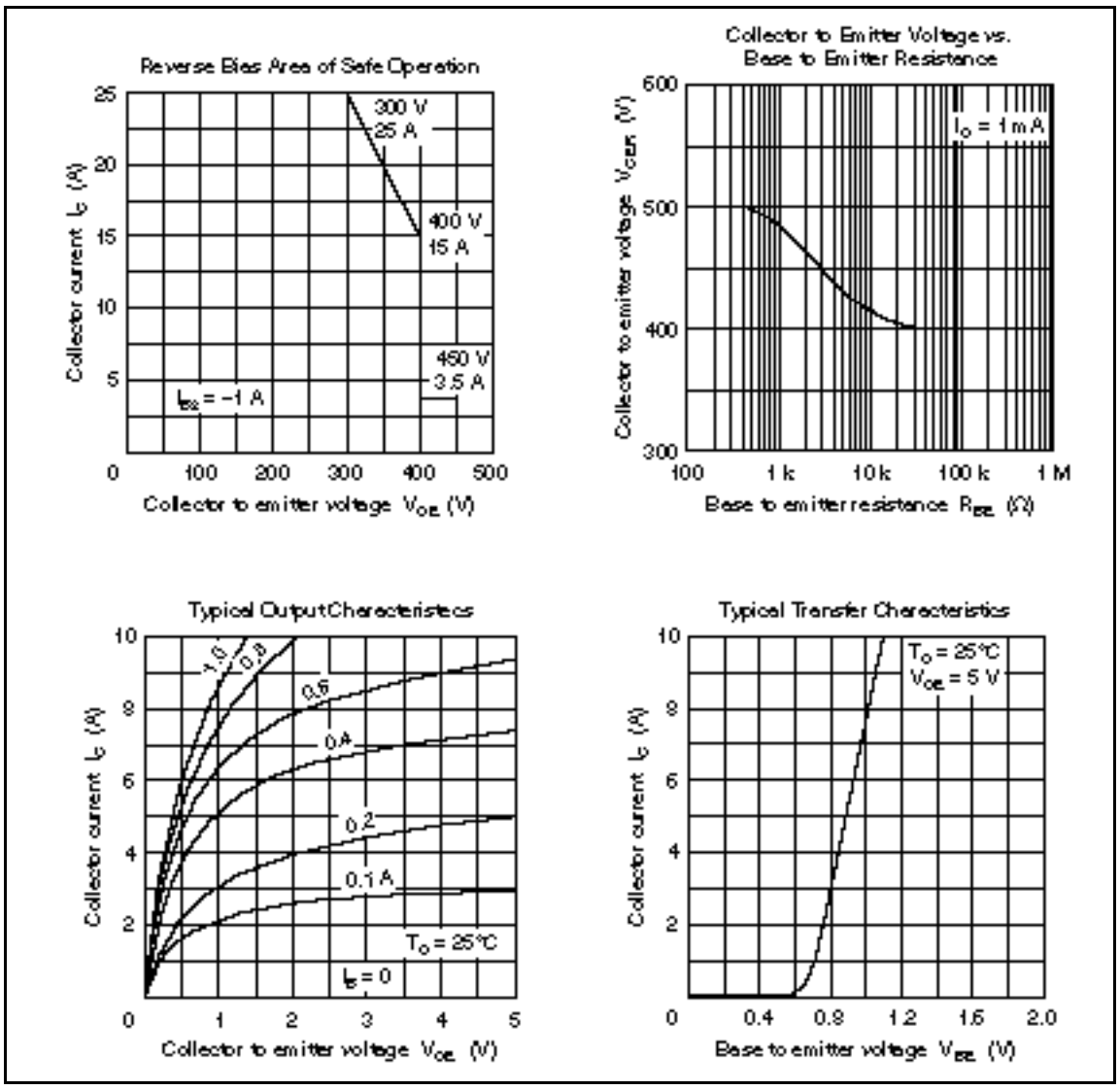
Note: 1. Value at T_C = 25°C

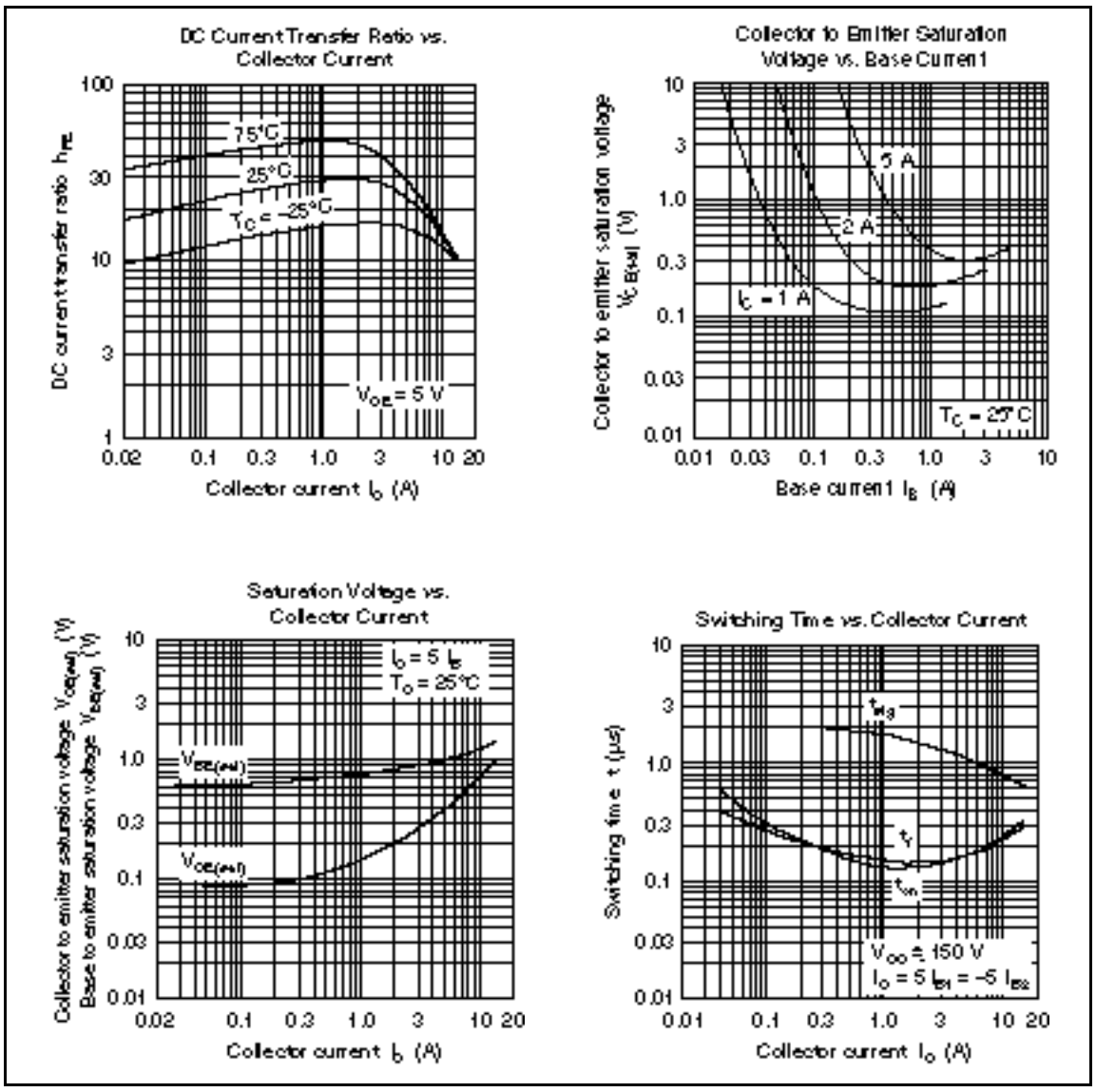
Electrical Characteristics (Ta = 25°C)

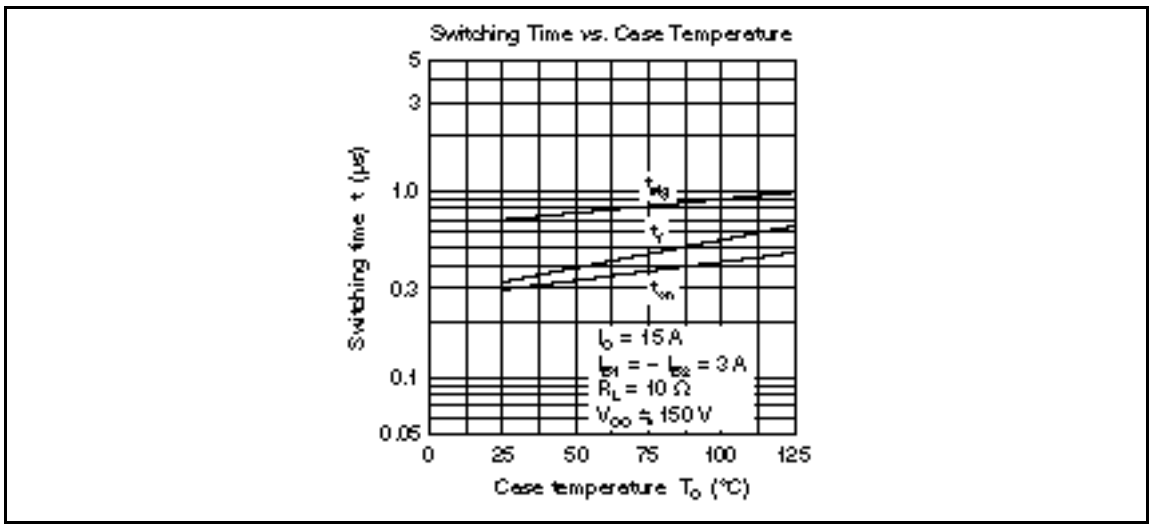
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to emitter sustain voltage	$V_{CEO(sus)}$	400	—	—	V	I_C = 0.2 A, R_{BE} = ∞, L = 100 mH
	$V_{CEX(sus)}$	400	—	—	V	I_C = 15 A, I_{B1} = 3.0 A, I_{B2} = –1 A V_{BE} = –5.0 V, L = 180 µH, Clamped
Emitter to base breakdown voltage	$V_{(BR)EBO}$	10	—	—	V	I_E = 10 mA, I_C = 0
Collector cutoff current	I_{CBO}	—	—	50	µA	V_{CB} = 400 V, I_E = 0
	I_{CEO}	—	—	50	µA	V_{CE} = 350 V, R_{BE} = ∞
DC current transfer ratio	h_{FE1}	12	—	—		V_{CE} = 5.0 V, I_C = 7.5 A*[1]
	h_{FE2}	5	—	—		V_{CE} = 5.0 V, I_C = 15 A*[1]
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	1.0	V	I_C = 7.5 A, I_B = 1.5 A*[1]
Base to emitter saturation voltage	$V_{BE(sat)}$	—	—	1.5	V	
Turn on time	t_{on}	—	—	0.5	µs	I_C = 15 A, I_{B1} = $-I_{B2}$ = 3.0 A
Storage time	t_{stg}	—	—	1.5	µs	V_{CC} = 150 V
Fall time	t_f	—	0.3	0.5	µs	

Note: 1. Pulse test


Maximum Collector Dissipation Curve
Collector power dissipation P_C (W)
150
100
50
0
50
100
150
Case temperature T_O (°C)
Area of Safe Operation
Collector current I_C (A)
100
30
10
3
1.0
0.3
0.1
0.03
0.01
$i_{O(peak)}$
$I_{O(max)}$
25 µs
100 µs
250 µs
1 ms
PW = 10 ms
DC Operation
T_C = 25°C
Ta = 25°C, 1 Shot
1
3
10
30
100
300
1,000
Collector to emitter voltage V_{CE} (V)
Collector Current Derating Rate
Collector current derating rate (%)
100
80
60
40
20
0
50
100
150
ISB Limit Area
Case temperature T_O (°C)
Transient Thermal Resistance
Thermal resistance θ_{j-c} (°C/W)
10
3
1.0
0.3
0.1
0.03
0.01
T_C = 25°C
10 ms~10 s
10 µs~10 ms
0.01
0.1
1.0
10
(s)
0.01
0.1
1.0
10
(ms)
Time 1


Reverse Bias Area of Safe Operation
Collector current I_C (A)
Collector to emitter voltage V_{CE} (V)
300 V
25 A
400 V
15 A
450 V
3.5 A
I_{BE} = −1 A
Collector to Emitter Voltage vs.
Base to Emitter Resistance
Collector to emitter voltage V_{CER} (V)
Base to emitter resistance R_{BE} (Ω)
I_C = 1 mA
Typical Output Characteristics
Collector current I_C (A)
Collector to emitter voltage V_{CE} (V)
1.0
0.8
0.6
0.4
0.2
0.1 A
T_C = 25°C
I_B = 0
Typical Transfer Characteristics
Collector current I_C (A)
Base to emitter voltage V_{BE} (V)
T_C = 25°C
V_{CE} = 5 V


DC Current Transfer Ratio vs. Collector Current
DC current transfer ratio h_{FE}
75°C
25°C
T_C = –25°C
V_{CE} = 5 V
Collector current I_C (A)
Collector to Emitter Saturation Voltage vs. Base Current
Collector to emitter saturation voltage $V_{CE(sat)}$ (V)
5 A
2 A
I_C = 1 A
T_C = 25°C
Base current I_B (A)
Saturation Voltage vs. Collector Current
Collector to emitter saturation voltage $V_{CE(sat)}$ (V)
Base to emitter saturation voltage $V_{BE(sat)}$ (V)
I_C = 5 I_B
T_C = 25°C
$V_{BE(sat)}$
$V_{CE(sat)}$
Collector current I_C (A)
Switching Time vs. Collector Current
Switching time t (µs)
t_{stg}
t_f
t_{on}
V_{CC} = 150 V
I_C = 5 I_{B1} = –5 I_{B2}
Collector current I_C (A)


Switching Time vs. Case Temperature
Switching time t (µs)
5
3
1.0
0.3
0.1
0.05
0
25
50
75
100
125
Case temperature T_C (°C)
t_{stg}
t_f
t_{on}
I_C = 15 A
I_{B1} = − I_{B2} = 3 A
R_L = 10 Ω
V_{CC} ≒ 150 V

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