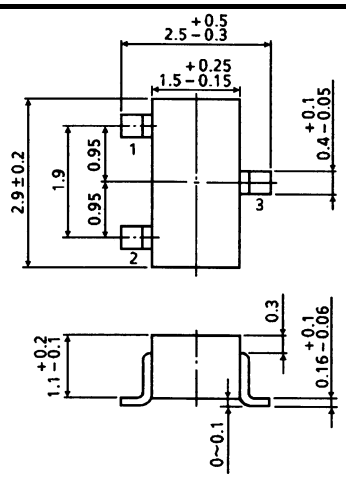
TOSHIBA Transistor Silicon NPN Triple Diffused Type (PCT process)

2SC3138

High Voltage Switching Applications

- High voltage: V_{CBO} = 200 V (max)
  V_{CEO} = 200 V (max)
- Small flat package
- Complementary to 2SA1255

Unit: mm



1. BASE
2. EMITTER
3. COLLECTOR

S-MINI	
JEDEC	TO-236MOD
JEITA	SC-59
TOSHIBA	2-3F1A

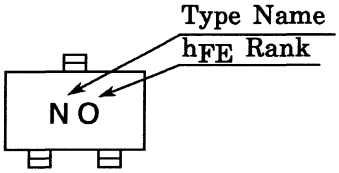
Weight: 0.012 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	200	V
Collector-emitter voltage	V_{CEO}	200	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	50	mA
Base current	I_B	20	mA
Collector power dissipation	P_C	150	mW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55~125	°C

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).

Marking

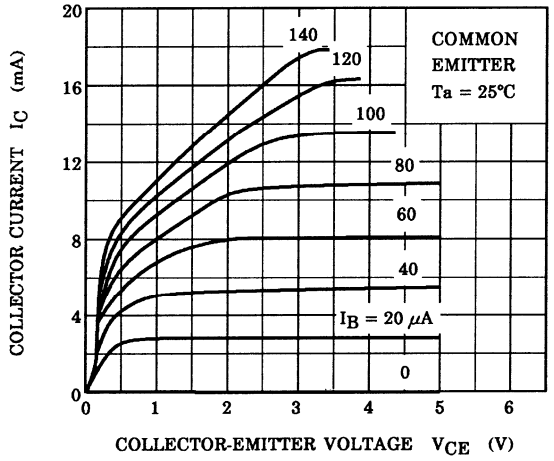


Electrical Characteristics (Ta = 25°C)

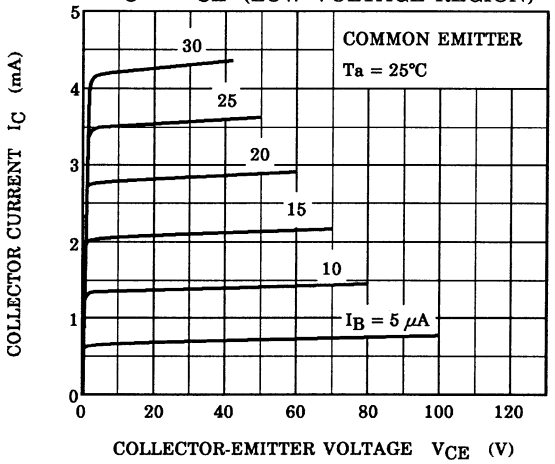
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 200 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current		I_{EBO}	V_{EB} = 5 V, I_C = 0	—	—	0.1	μA
Collector-base breakdown voltage		$V_{(BR)\ CBO}$	I_C = 0.1 mA, I_E = 0	200	—	—	V
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 1 mA, I_B = 0	200	—	—	V
DC current gain		h_{FE} (Note)	V_{CE} = 3 V, I_C = 10 mA	70	—	240	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 10 mA, I_B = 1 mA	—	0.1	0.5	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 10 mA, I_B = 1 mA	—	0.75	1.5	V
Transition frequency		f_T	V_{CE} = 10 V, I_C = 2 mA	50	100	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	2	4	pF
Switching time	Turn-on time	t_{on}	V_{CC} = 50 V, I_C = 6 mA, $I_{B1} = -I_{B2}$ = 0.6 mA, pulse width = 5 μs, duty cycle ≦ 2%	—	0.3	—	μs
	Storage time	t_{stg}		—	2	—	
	Fall time	t_f		—	0.4	—	

Note: h_{FE} classification O: 70~140, Y: 120~240

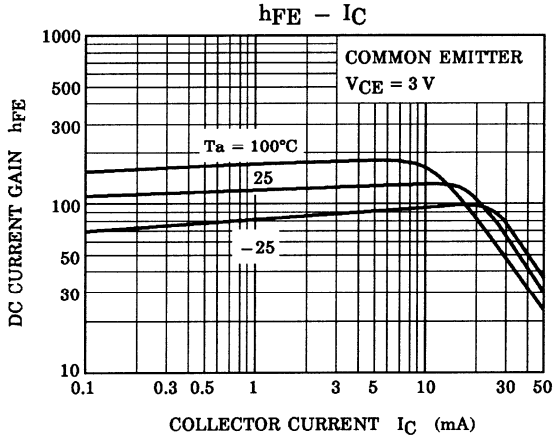
I_C – V_{CE} (LOW VOLTAGE REGION)



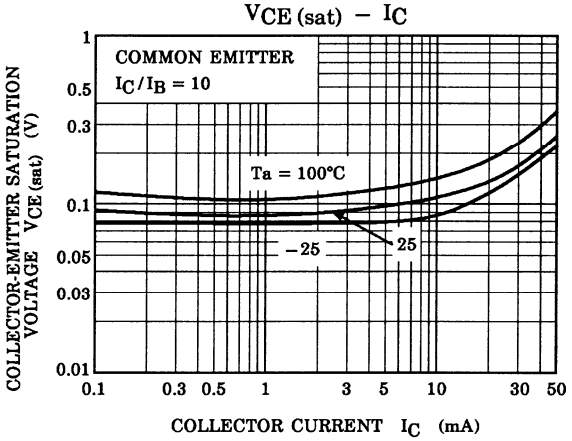
I_C – V_{CE} (LOW VOLTAGE REGION)



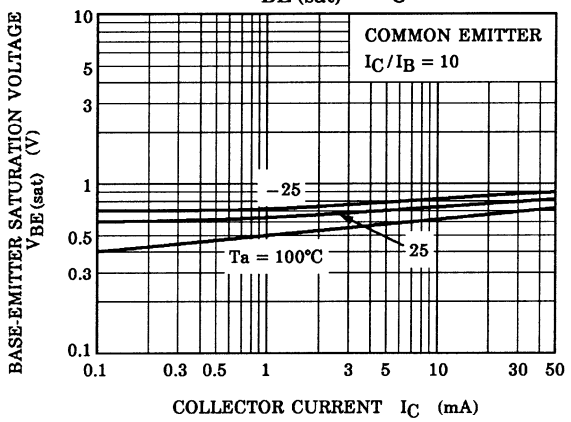
h_{FE} – I_C



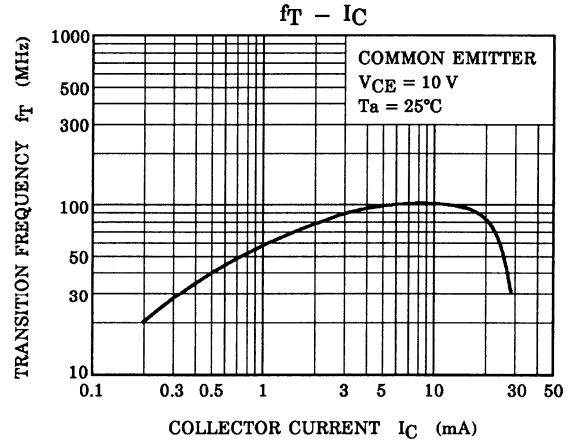
$V_{CE\,(sat)}$ – I_C

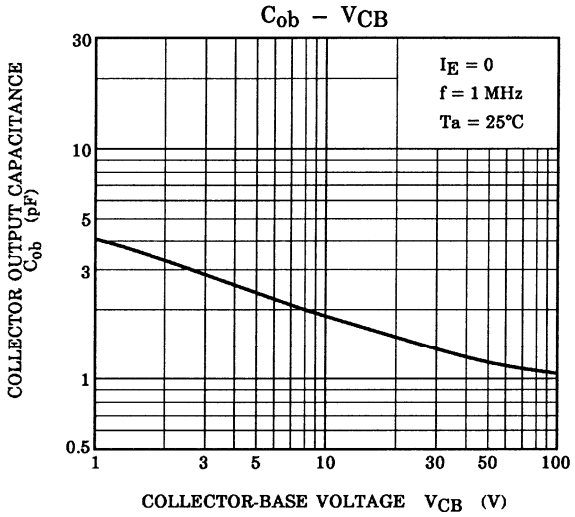


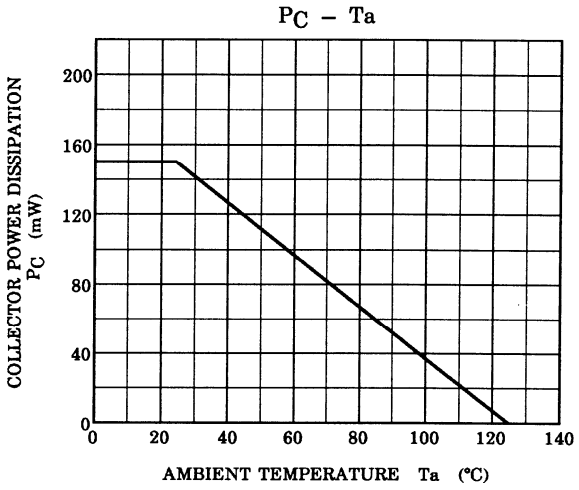
$V_{BE\,(sat)}$ – I_C



f_T – I_C




C_{ob} – V_{CB}
I_E = 0
f = 1 MHz
Ta = 25°C
COLLECTOR OUTPUT CAPACITANCE C_{ob} (pF)
30
10
5
3
1
0.5
1
3
5
10
30
50
100
COLLECTOR-BASE VOLTAGE V_{CB} (V)


P_C – Ta
COLLECTOR POWER DISSIPATION P_C (mW)
200
160
120
80
40
0
0
20
40
60
80
100
120
140
AMBIENT TEMPERATURE Ta (°C)

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