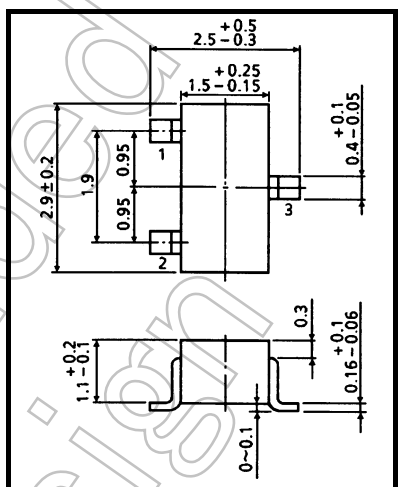
TOSHIBA Transistor Silicon NPN Triple Diffused Type (PCT process)

2SC3138

High Voltage Amplifier Applications
High Voltage Switching Applications

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

Unit: mm



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

Weight: 0.012 g (typ.)

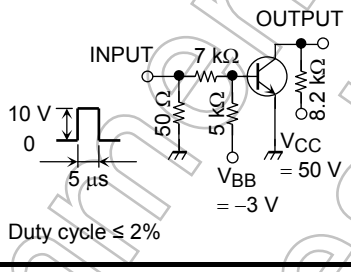
Absolute Maximum Ratings (Ta = 25°C)

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 to 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).

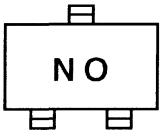
Start of commercial production
1982-10

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}		—	0.3	—	μs
	Storage time	t_{stg}		—	2	—	
	Fall time	t_f		—	0.4	—	

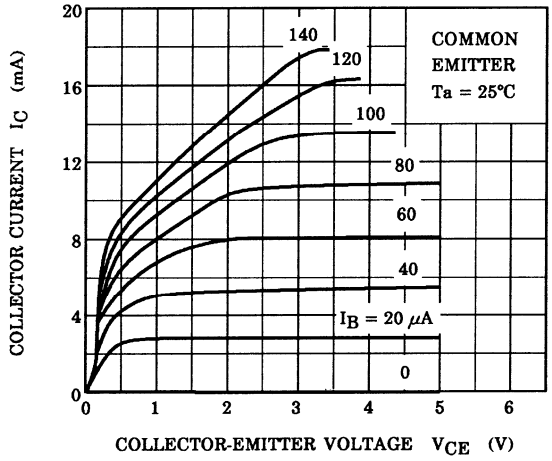
Note: h_{FE} classification O: 70 to 140, Y: 120 to 240

Marking

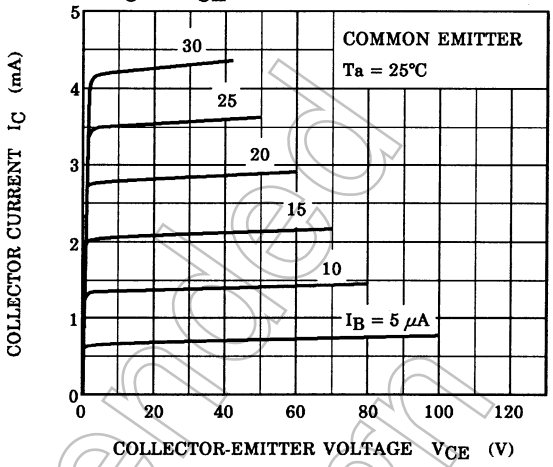


N: Type Name
O: h_{FE} Rank

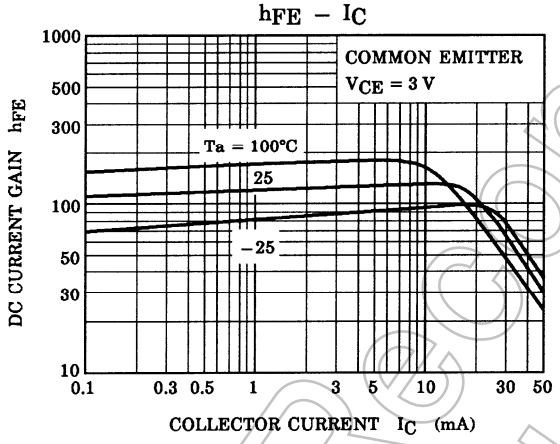
I_C – V_{CE} (LOW VOLTAGE REGION)



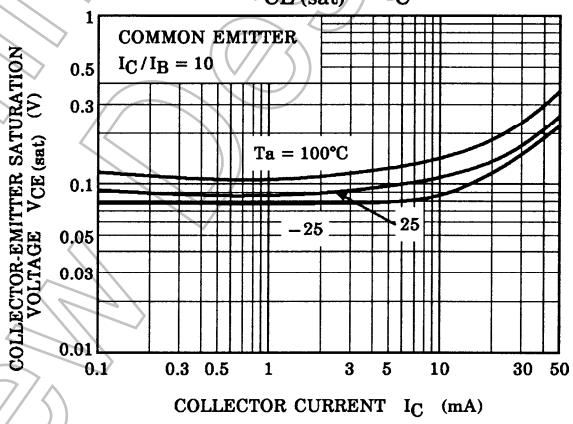
I_C – V_{CE} (LOW CURRENT REGION)



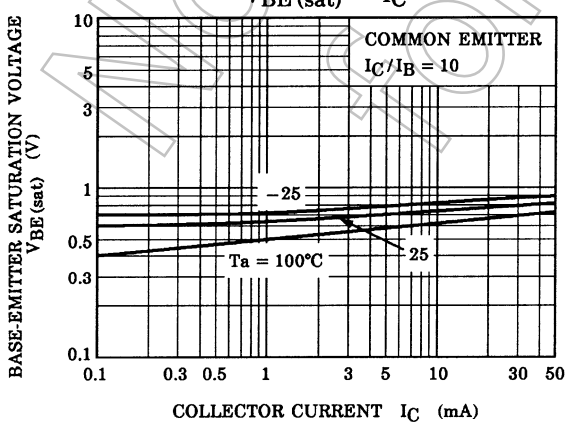
h_{FE} – I_C



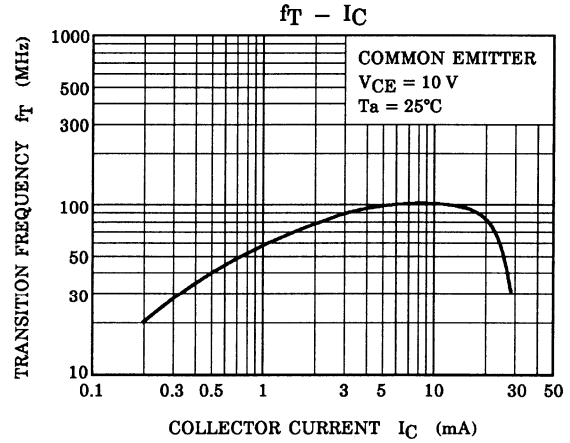
$V_{CE\,(sat)}$ – I_C



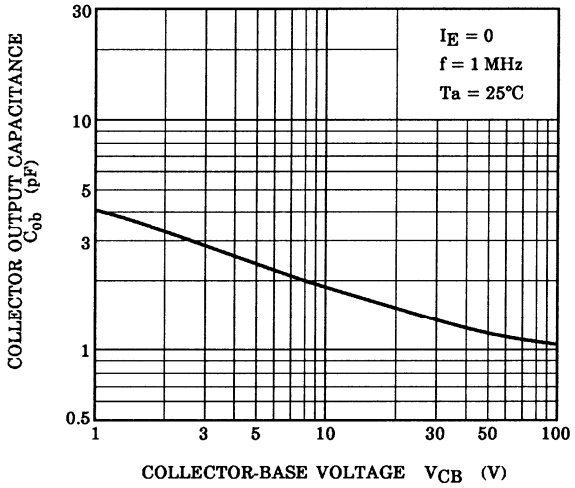
$V_{BE\,(sat)}$ – I_C



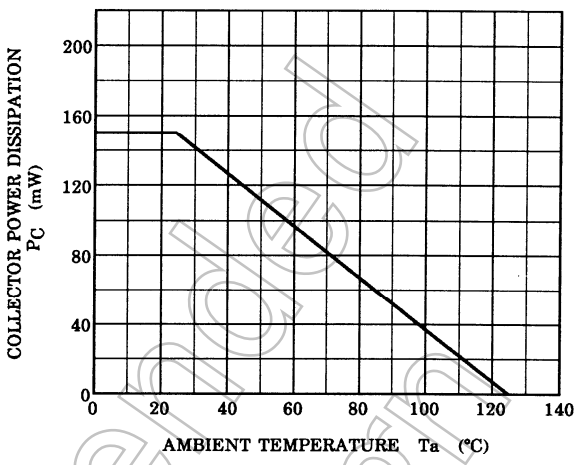
f_T – I_C



C_{ob} – V_{CB}



P_C – Ta



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