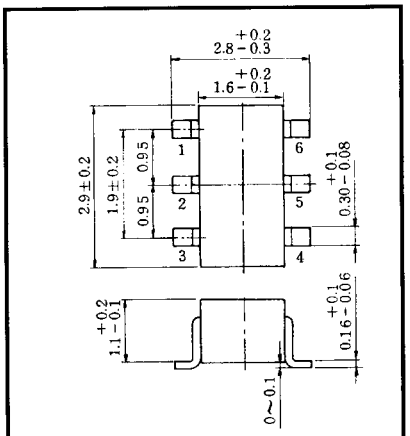
TOSHIBA Transistor
Silicon PNP Epitaxial Type (PCT process) Silicon NPN Epitaxial Type (PCT process)

R N 4 6 A 1

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications.

- Including two devices in SM6 (super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process

Unit in mm



1.	EMITTER 1	(E1)
2.	BASE 1	(B1)
3.	COLLECTOR 2	(C2)
4.	EMITTER 2	(E2)
5.	BASE 2	(B2)
6.	COLLECTOR 1	(C1)

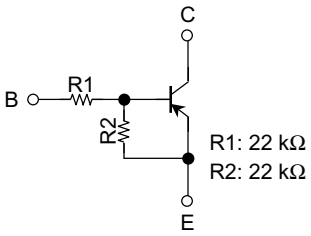
SM6

JEDEC	—
EIAJ	SC-74
TOSHIBA	2-3N1A

Weight : 0.015g

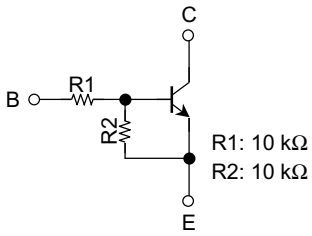
Equivalent Circuit and Bias Resistor Values

Q1



R1: 22 kΩ
R2: 22 kΩ

Q2

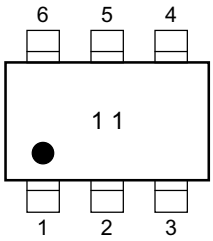


R1: 10 kΩ
R2: 10 kΩ

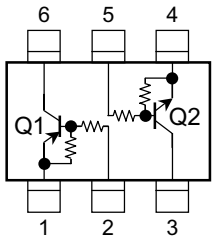
Q1: RN2103F

Q2: RN1102F

Marking
Circuit (top view)



Equivalent



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Q1 Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	−50	V
Collector-emitter voltage	V_{CEO}	−50	V
Emitter-base voltage	V_{EBO}	−10	V
Collector current	I_C	−100	mA

Q2 Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	10	V
Collector current	I_C	100	mA

Q1, Q2 Common Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P_C (Note)	300	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Note: Total rating

Q1 Electrical Characteristics (Ta = 25°C)

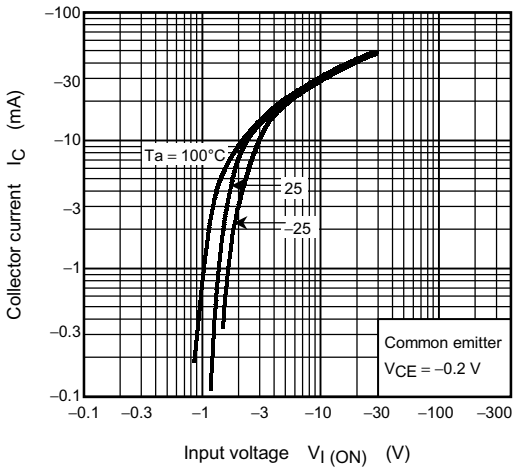
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = –50 V, I_E = 0	—	—	–100	nA
	I_{CEO}	V_{CE} = –50 V, I_B = 0	—	—	–500	
Emitter cut-off current	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.17	—	–0.33	mA
DC current gain	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	70	—	—	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.3	—	–3.0	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
Transition frequency	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	R1	—	15.4	22	28.6	kΩ
Resistor ratio	R1/R2	—	0.9	1.0	1.1	

Q2 Electrical Characteristics (Ta = 25°C)

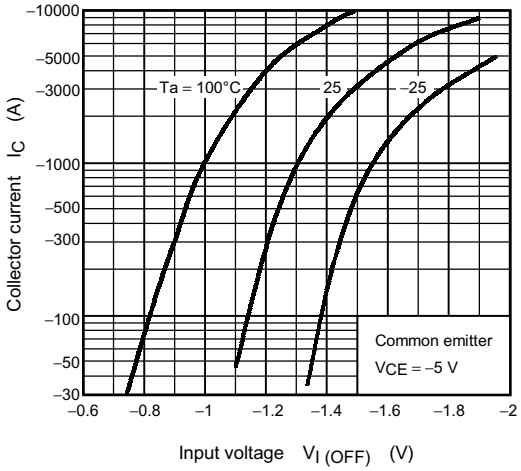
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 50 V, I_E = 0	—	—	100	nA
	I_{CEO}	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cut-off current	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.38	—	0.71	mA
DC current gain	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	50	—	—	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.2	—	2.4	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	V
Transition frequency	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	R1	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	0.9	1.0	1.1	

Q1

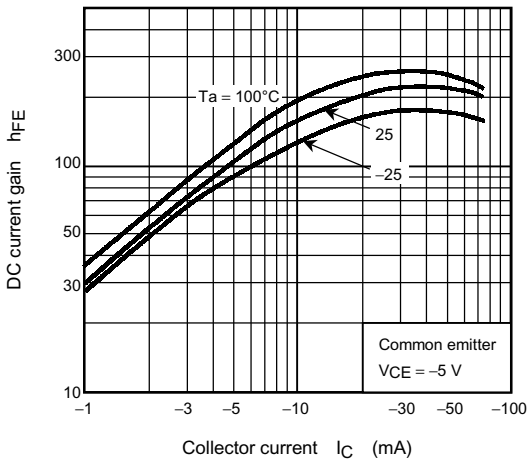
$I_C - V_{I\,(ON)}$



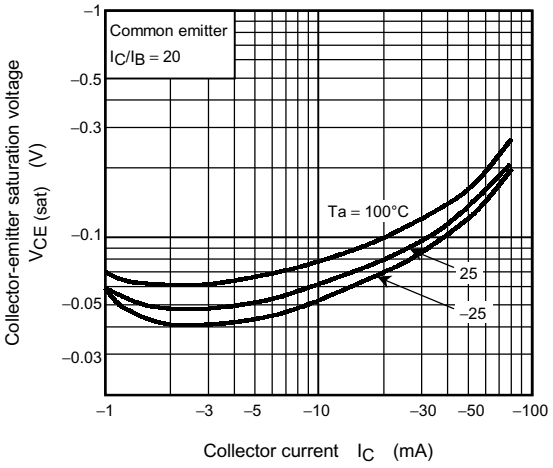
$I_C - V_{I\,(OFF)}$



$h_{FE} - I_C$

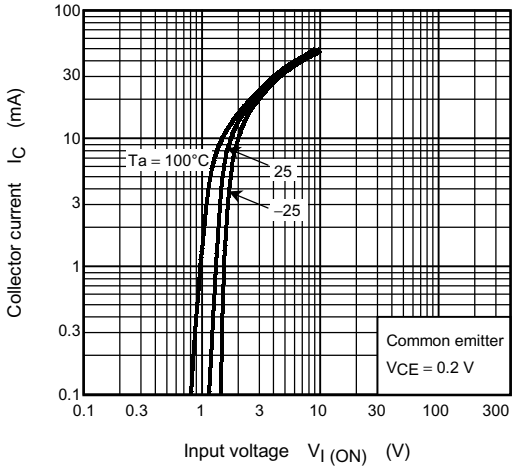


$V_{CE\,(sat)} - I_C$

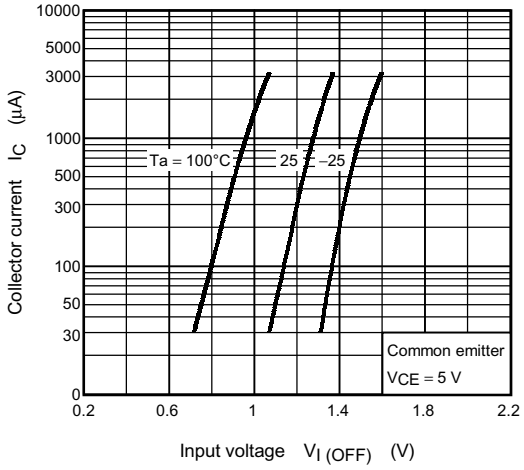


Q2

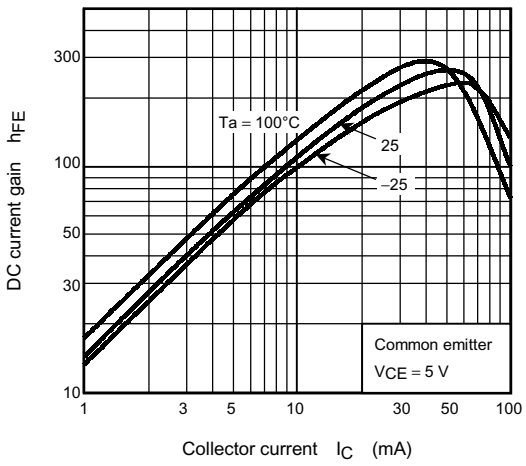
$I_C - V_{I\,(ON)}$



$I_C - V_{I\,(OFF)}$



$h_{FE} - I_C$



$V_{CE\,(sat)} - I_C$