

TOSHIBA Transistor Silicon NPN · PNP Epitaxial Type  
(PCT process) (Bias Resistor built-in Transistor)

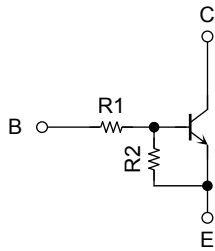
## RN47A7JE

Switching Applications  
Inverter Circuit Applications  
Interface Circuit Applications  
Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (5 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.

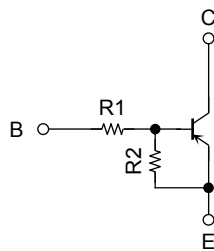
### Equivalent Circuit and Bias Resistor Values

**Q1**



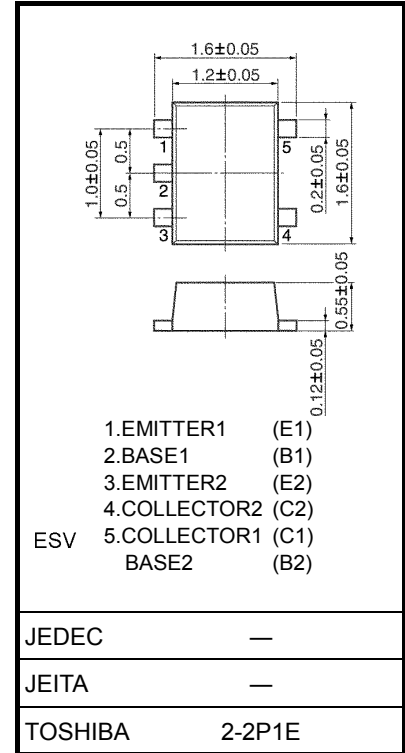
Q1 R1: 10 kΩ, R2: 10 kΩ

**Q2**



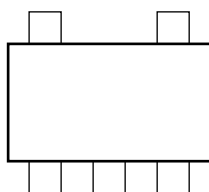
Q2: R1: 4.7 kΩ, R2: 10 kΩ

Unit: mm

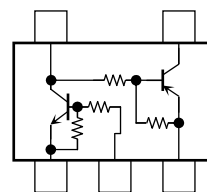


Weight: 3 mg (typ.)

### Marking



### Equivalent Circuit (top view)



## Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V <sub>CB0</sub>	50	V
Collector-emitter voltage	V <sub>CEO</sub>	50	V
Emitter-base voltage	V <sub>EBO</sub>	10	V
Collector current	I <sub>C</sub>	100	mA

## Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V <sub>CB0</sub>	-15	V
Collector-emitter voltage	V <sub>CEO</sub>	-12	V
Emitter-base voltage	V <sub>EBO</sub>	-7	V
Collector current	I <sub>C</sub>	-100	mA

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P <sub>C</sub> (Note 1)	100	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55 to 150	°C

Note 1: Total rating

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).

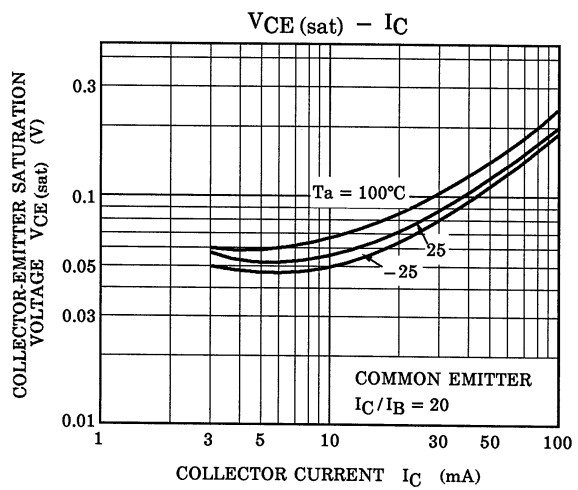
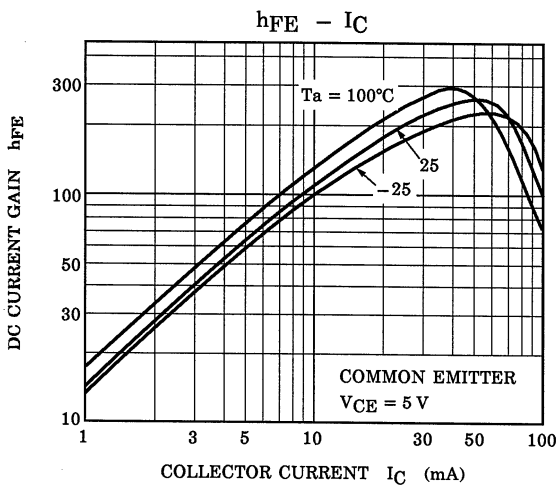
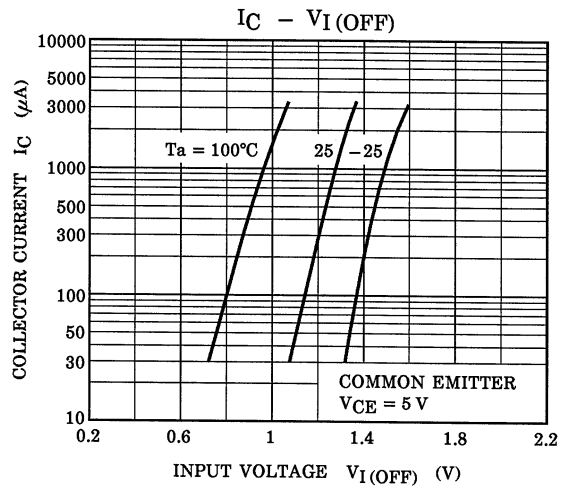
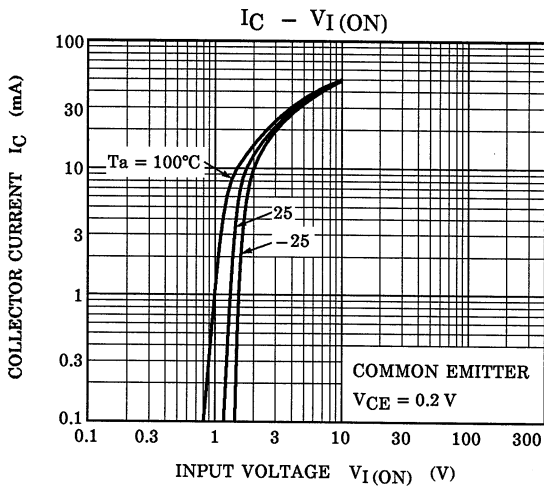
## Q1 Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
	$I_{CEO}$	$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 10\text{ V}, I_C = 0$	0.38	—	0.71	mA
DC current gain	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	50	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	$V_I(ON)$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	1.2	—	2.4	V
Input voltage (OFF)	$V_I(OFF)$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	1.0	—	1.5	V
Collector output capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	—	pF
Input resistance	R1	—	7	10	13	k $\Omega$
Resistance ratio	R1/R2	—	0.8	1.0	1.2	

## Q2 Electrical Characteristics (Ta = 25°C)

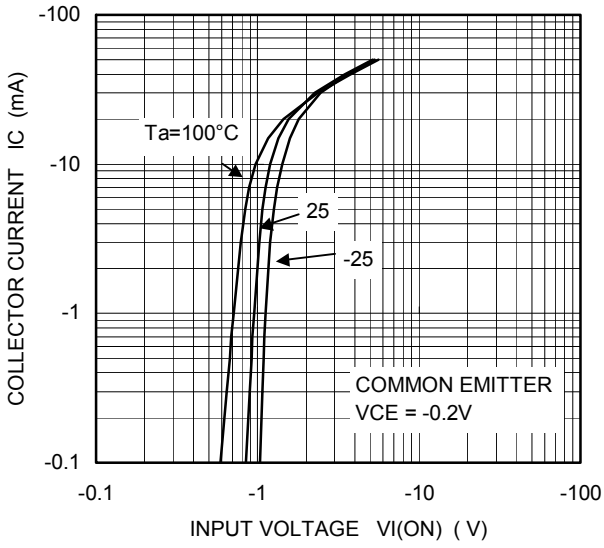
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -15\text{ V}, I_E = 0$	—	—	-100	nA
	$I_{CEO}$	$V_{CE} = -12\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -7\text{ V}, I_C = 0$	-0.36	—	-0.68	mA
DC current gain	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	50	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.05	-0.15	V
Input voltage (ON)	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.8	—	-1.4	V
Input voltage (OFF)	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.5	—	-1.1	V
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	—	pF
Input resistance	R1	—	3.29	4.7	6.11	k $\Omega$
Resistance ratio	R1/R2	—	—	0.47	—	

Q1

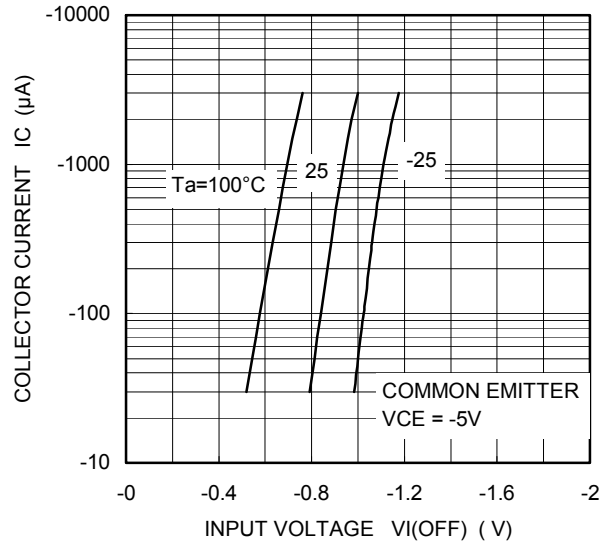


**Q2**

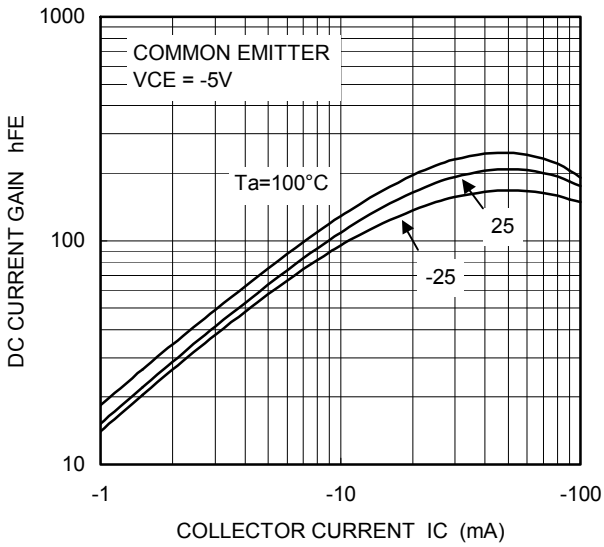
IC - VI(ON)



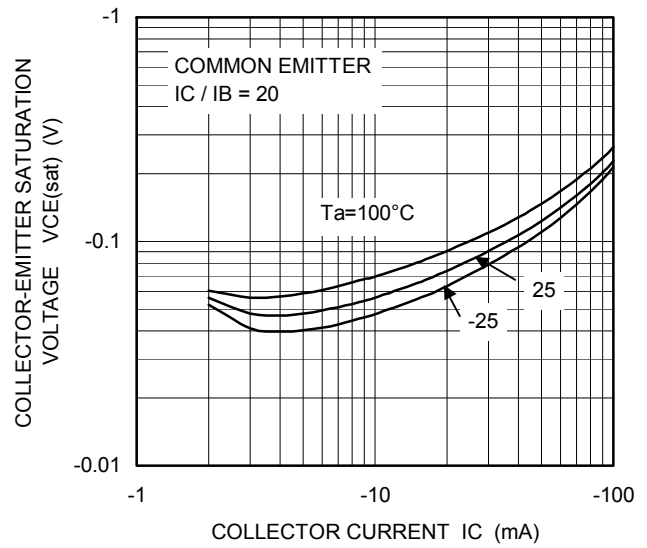
IC - VI(OFF)



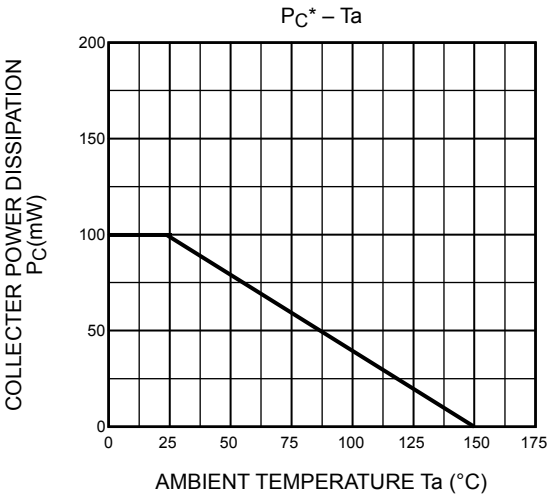
hFE - IC



VCE(sat) - IC



Q1,Q2 COMMON



\*:Total rating

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