

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

RN47A6

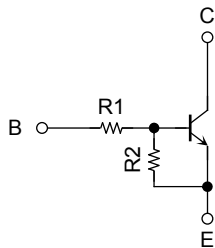
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

Unit: mm

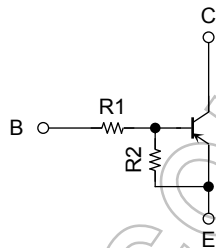
- Two devices are incorporated into an Ultra-Super-Mini (5 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.

Equivalent Circuit and Bias Resistor Values

Q1



Q2



Q1

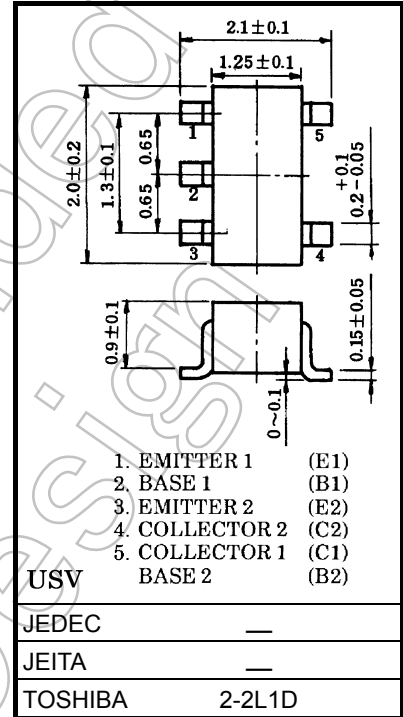
R1: 100 kΩ, R2: 100 kΩ

Q2

R1: 100 kΩ, R2: 100 kΩ

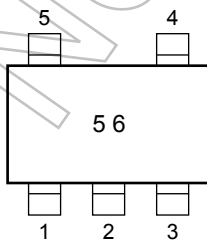
Q1: RN1130F

Q2: RN2130F

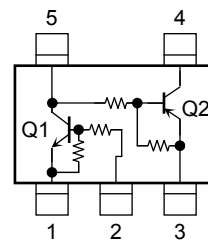


Weight: 0.0062g (typ.)

Marking



Equivalent Circuit (top view)



Start of commercial production
2002-08

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

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

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

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

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P _C (Note 1)	200	mW
Junction temperature	T _j	150	°C
Storage temperature range	T _{stg}	-55 to 150	°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.).

Note 1: Total rating

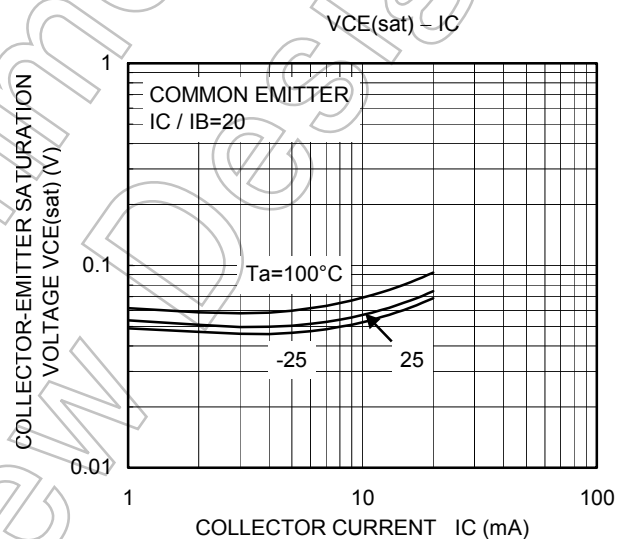
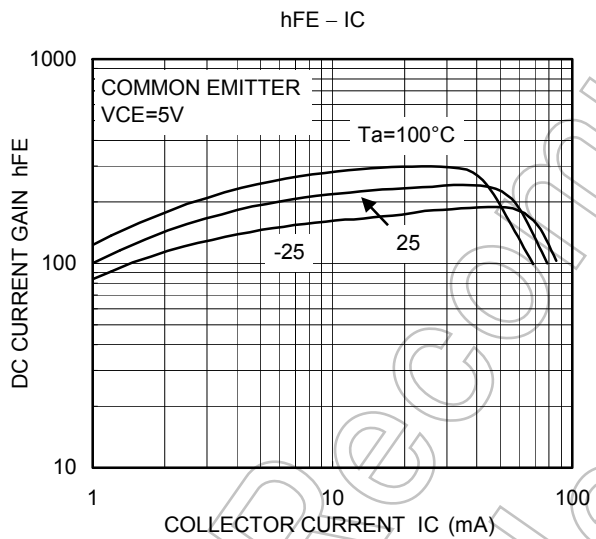
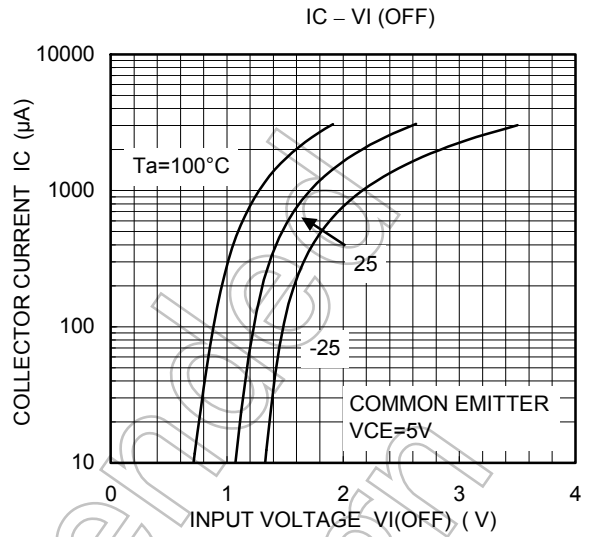
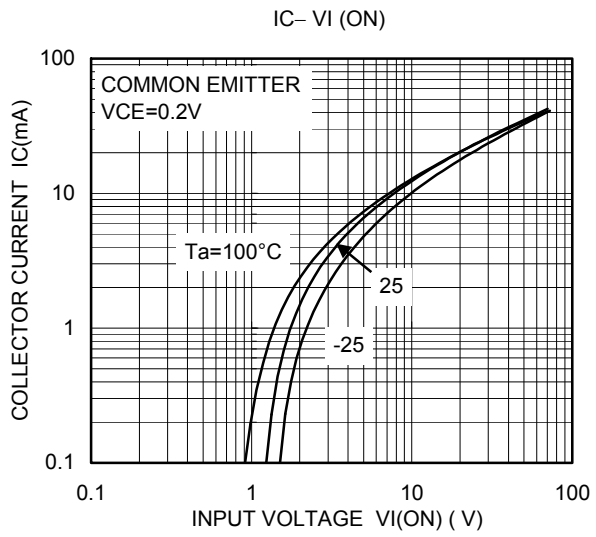
Electrical Characteristics (Ta = 25°C) (Q1)

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}	$V_{EB} = 10\text{ V}, I_C = 0$	0.038	—	0.072	mA
DC current gain	h_{FE}	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	100	—	—	
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)	$V_I(ON)$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	1.7	—	8.2	V
Input voltage (OFF)	$V_I(OFF)$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	1.0	—	1.6	V
Transition frequency	f_T	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	—	pF
Input resistor	R1	—	70	100	130	kΩ
Resistor ratio	R1/R2	—	0.8	1.0	1.2	

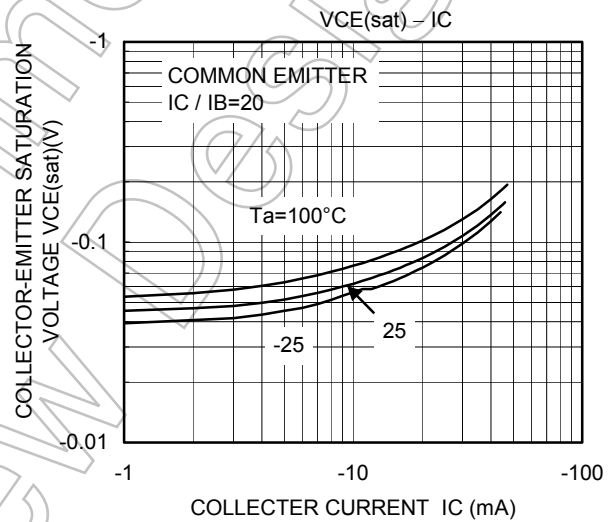
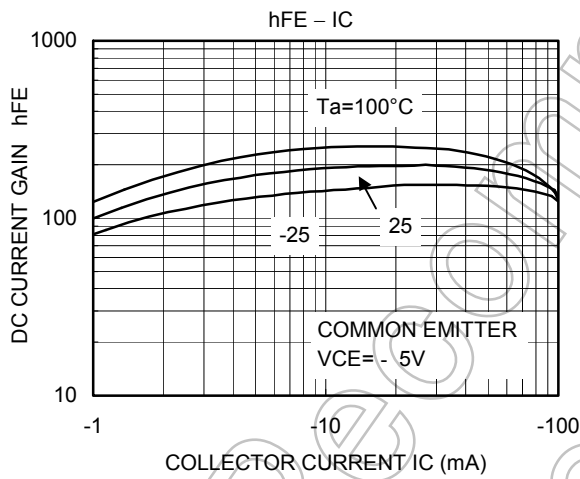
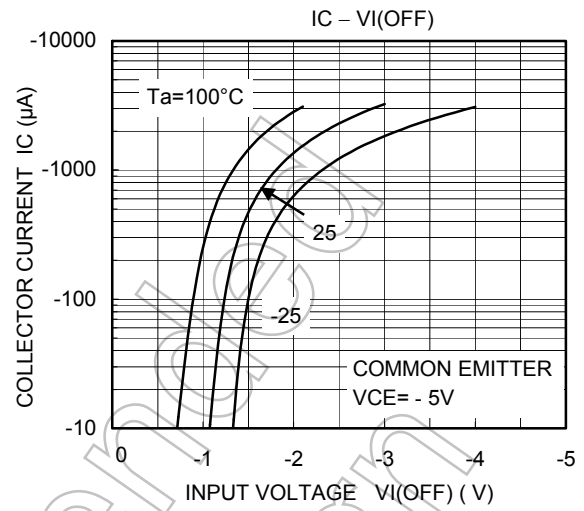
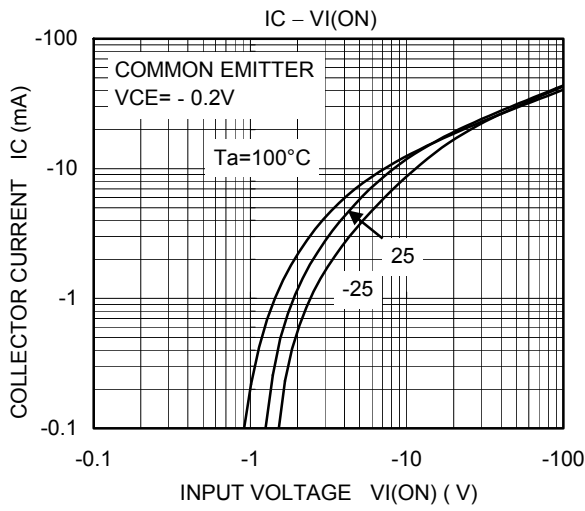
Electrical Characteristics (Ta = 25°C) (Q2)

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}	$V_{EB} = -10\text{ V}, I_C = 0$	-0.038	—	-0.072	mA
DC current gain	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	100	—	—	
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)	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.7	—	-8.2	V
Input voltage (OFF)	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.6	V
Transition frequency	f_T	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	—	pF
Input resistor	R1	—	70	100	130	kΩ
Resistor ratio	R1/R2	—	0.8	1.0	1.2	

Q1

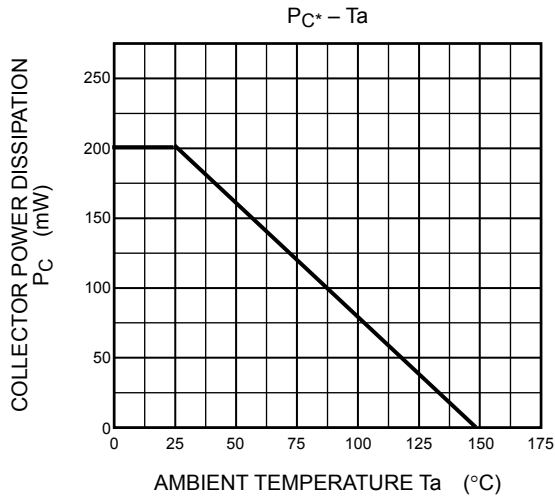


Q2



Not for New

Q1, Q2 Common



*Total Rating.

Not Recommended for New Design

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