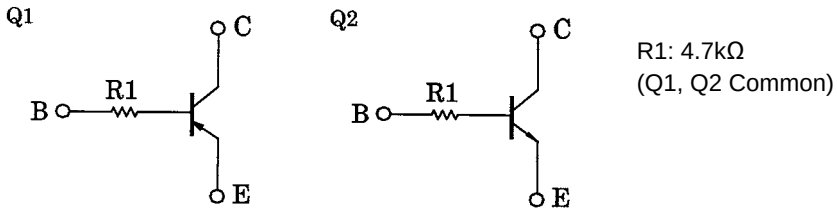
TOSHIBA Transistor Silicon PNP/NPN Epitaxial Type (PCT Process) (Transistor with Built-in Bias Resistor)

RN4910

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

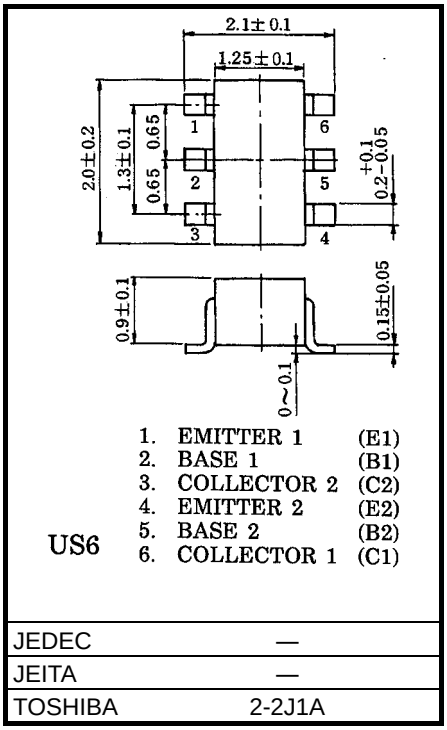
- Including two devices in US6 (ultra super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process

Equivalent Circuit and Bias Resister Values



R1: 4.7kΩ
(Q1, Q2 Common)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-2J1A

Weight: 6.8mg (typ.)

Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	−50	V
Collector-emitter voltage	V_{CEO}	−50	V
Emitter-base voltage	V_{EBO}	−5	V
Collector current	I_C	−100	mA

Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	100	mA

Start of commercial production
1990-10

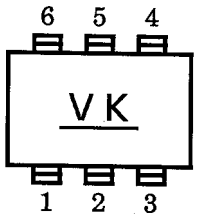
Q1, Q2 Common Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C *	200	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

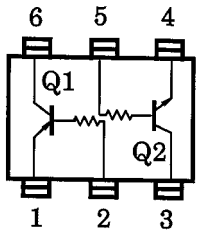
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

* Total rating

Marking



Equivalent Circuit (Top View)



Q1 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} = −50V, I_E = 0A	—	—	−100	nA
Emitter cut-off current	I_{EBO}	—	V_{EB} = −5V, I_C = 0A	—	—	−100	nA
DC current gain	h_{FE}	—	V_{CE} = −5V, I_C = −1mA	120	—	400	—
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	—	I_C = −5mA, I_B = −0.25mA	—	−0.1	−0.3	V
Transition frequency	f_T	—	V_{CE} = −10V, I_C = −5mA	—	200	—	MHz
Collector output capacitance	C_{ob}	—	V_{CB} = −10V, I_E = 0A, f = 1MHz	—	3	6	pF

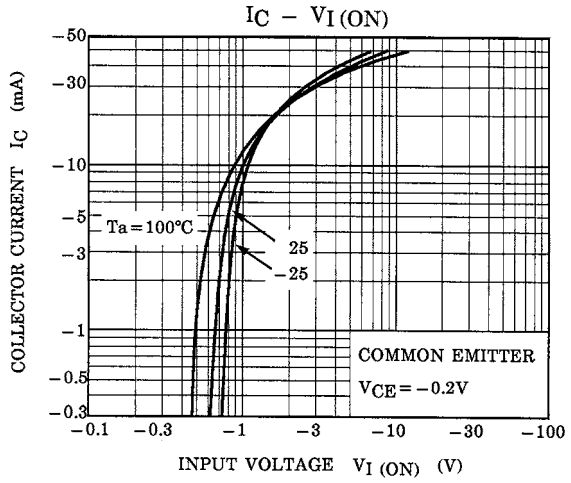
Q2 Electrical Characteristics (Ta = 25°C)

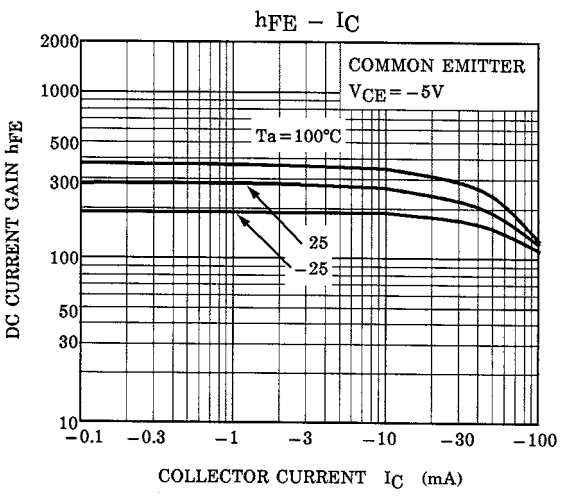
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} = 50V, I_E = 0A	—	—	100	nA
Emitter cut-off current	I_{EBO}	—	V_{EB} = 5V, I_C = 0A	—	—	100	nA
DC current gain	h_{FE}	—	V_{CE} = 5V, I_C = 1mA	120	—	700	—
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	—	I_C = 5mA, I_B = 0.25mA	—	0.1	0.3	V
Transition frequency	f_T	—	V_{CE} = 10V, I_C = 5mA	—	250	—	MHz
Collector output capacitance	C_{ob}	—	V_{CB} = 10V, I_E = 0A, f = 1 MHz	—	3	6	pF

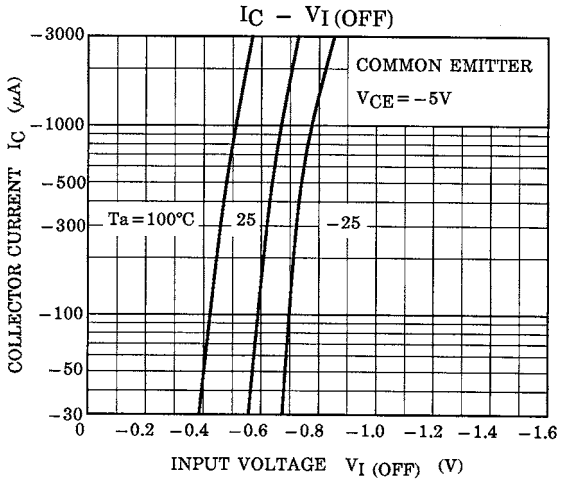
Q1, Q2 Common Electrical Characteristics (Ta = 25°C)

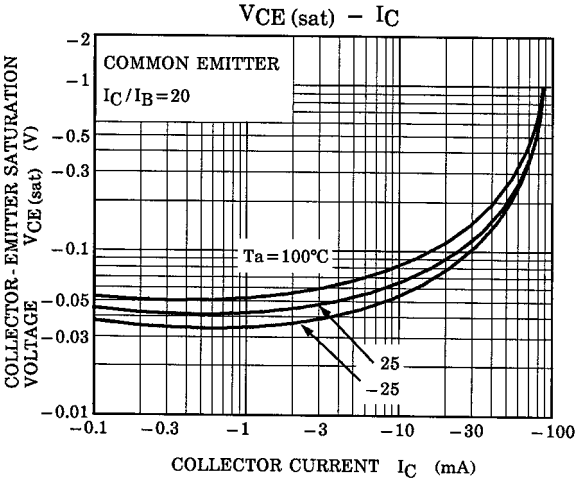
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input resistor	R1	—	—	3.29	4.7	6.11	kΩ

Q1

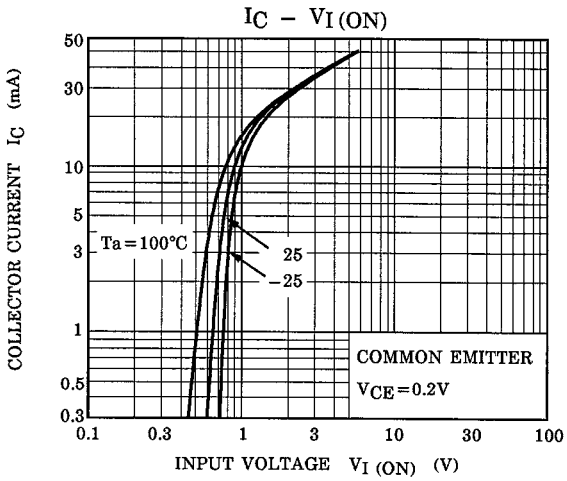


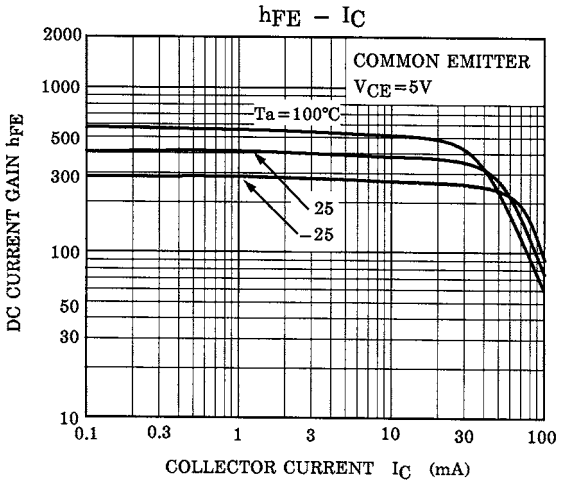


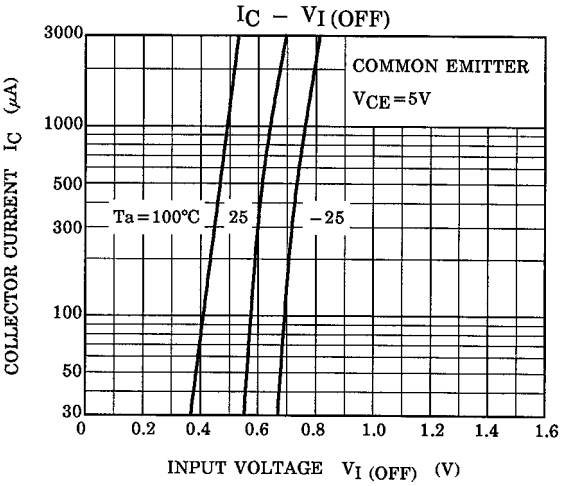


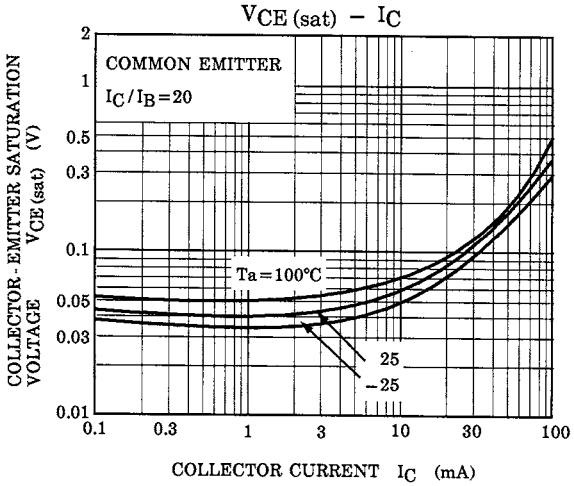


Q2


I_C – $V_{I\,(ON)}$
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
Ta = 100°C
25
−25
COMMON EMITTER
V_{CE} = 0.2V
50
30
10
5
3
1
0.5
0.3
0.1
0.3
1
3
10
30
100


h_{FE} – I_C
DC CURRENT GAIN h_{FE}
COLLECTOR CURRENT I_C (mA)
COMMON EMITTER
V_{CE} = 5V
Ta = 100°C
25
−25
2000
1000
500
300
100
50
30
10
0.1
0.3
1
3
10
30
100


I_C – $V_{I\,(OFF)}$
COLLECTOR CURRENT I_C (μA)
INPUT VOLTAGE $V_{I\,(OFF)}$ (V)
COMMON EMITTER
V_{CE} = 5V
Ta = 100°C
25
−25
3000
1000
500
300
100
50
30
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6


$V_{CE\,(sat)}$ – I_C
COLLECTOR - EMITTER SATURATION VOLTAGE $V_{CE\,(sat)}$ (V)
COLLECTOR CURRENT I_C (mA)
COMMON EMITTER
I_C / I_B = 20
Ta = 100°C
25
−25
2
1
0.5
0.3
0.1
0.05
0.03
0.01
0.1
0.3
1
3
10
30
100

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