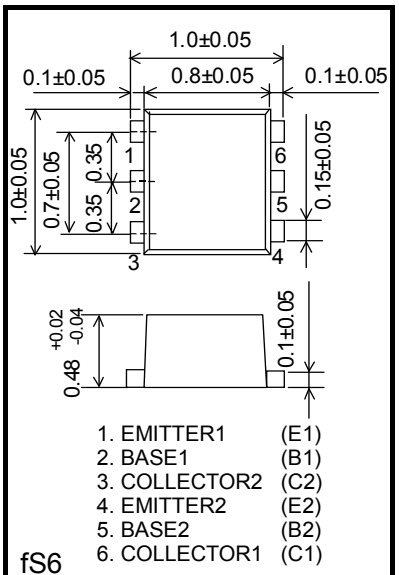
TOSHIBA Transistor Silicon NPN／PNP Epitaxial Type
(PCT Process) (Transistor with Built-in Bias Resistor)

RN4984AFS

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- Two devices are incorporated into a fine-pitch, small-mold (6-pin) package.
- Incorporating a bias resistor into the transistor reduces the number of parts, so enabling the manufacture of ever more compact equipment and lowering assembly cost.

Unit: mm

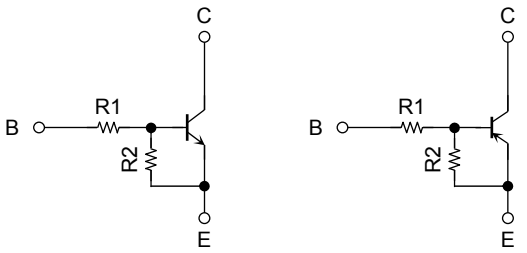


JEDEC	—
JEITA	—
TOSHIBA	2-1F1D

Weight: 0.001 g (typ.)

Equivalent Circuit and Bias Resistor Values

Q1 **Q2**

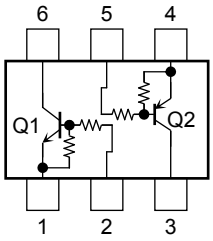


R1: 47 kΩ

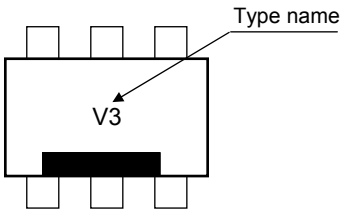
R2: 47 kΩ

(Q1, Q2 common)

Equivalent Circuit (top view)



Marking



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

Characteristic	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	80	mA

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

Characteristic	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	−80	mA

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

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C (Note 1)	50	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55~150	°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 cutoff current	I_{CBO}	V_{CB} = 50 V, I_E = 0	—	—	100	nA
	I_{CEO}	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cutoff current	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.088	—	0.133	mA
DC current gain	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	80	—	—	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	—	0.15	V
Input voltage (ON)	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.5	—	5.0	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.8	—	1.5	V
Collector output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	0.7	—	pF

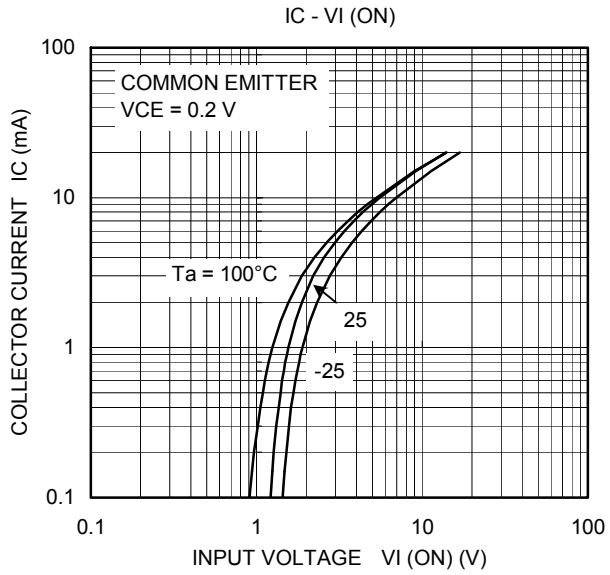
Electrical Characteristics (Ta = 25°C) (Q2)

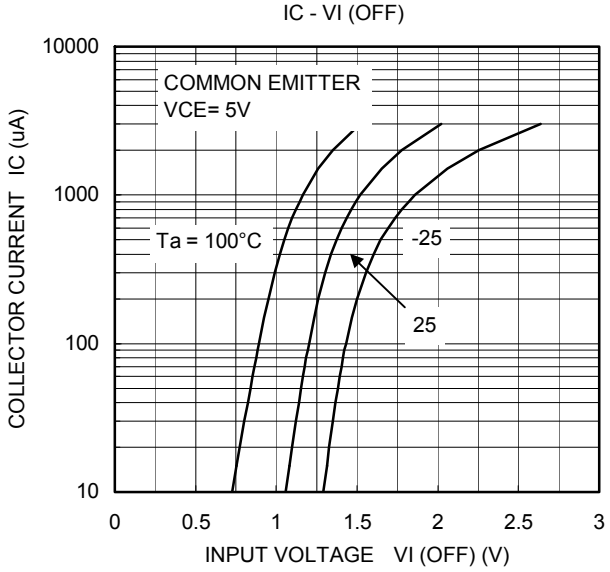
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	I_{CBO}	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
	I_{CEO}	V_{CE} = −50 V, I_B = 0	—	—	−500	
Emitter cutoff current	I_{EBO}	V_{EB} = −10 V, I_C = 0	−0.088	—	−0.133	mA
DC current gain	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	80	—	—	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C = −5 mA, I_B = −0.25 mA	—	—	−0.15	V
Input voltage (ON)	$V_{I\ (ON)}$	V_{CE} = −0.2 V, I_C = −5 mA	−1.5	—	−5.0	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = −5 V, I_C = −0.1 mA	−0.8	—	−1.5	V
Collector output capacitance	C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	0.9	—	pF

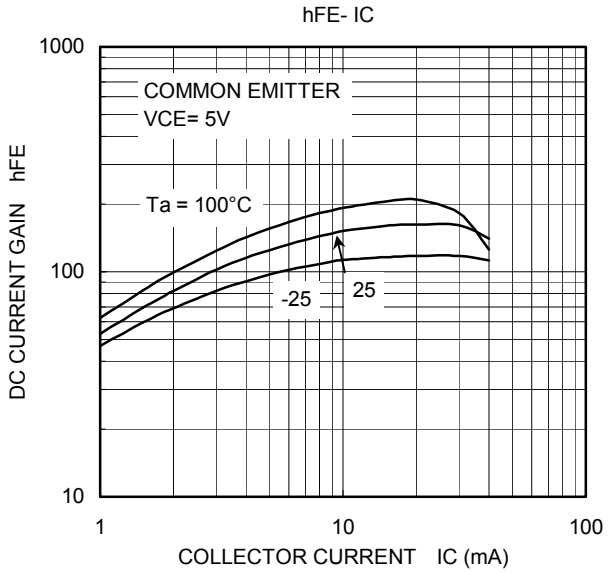
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

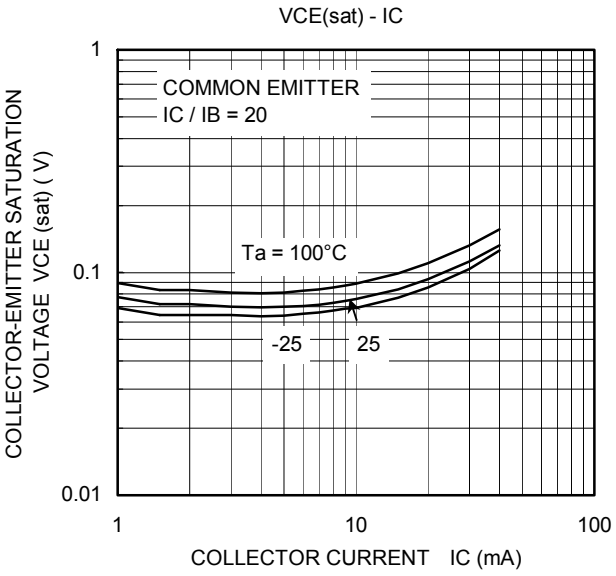
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Input resistor	R1	—	37.6	47	56.4	kΩ
Resistor ratio	R1/R2	—	0.8	1.0	1.2	

Q1

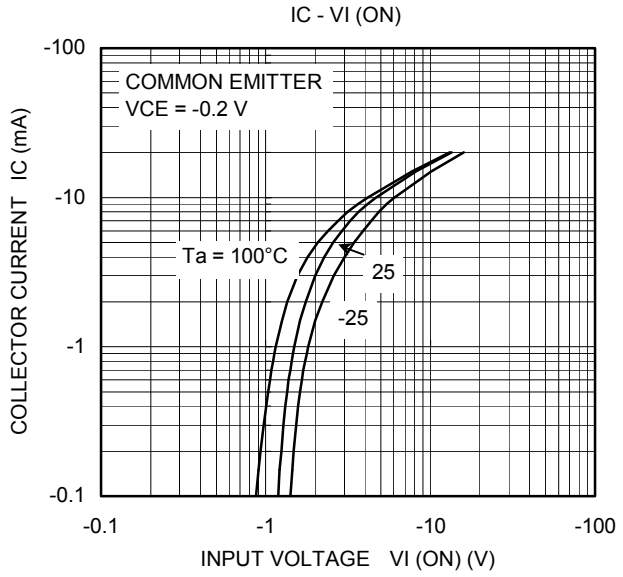

IC - VI (ON)
COMMON EMITTER
VCE = 0.2 V
Ta = 100°C
25
-25
COLLECTOR CURRENT IC (mA)
INPUT VOLTAGE VI (ON) (V)
100
10
1
0.1
0.1
1
10
100

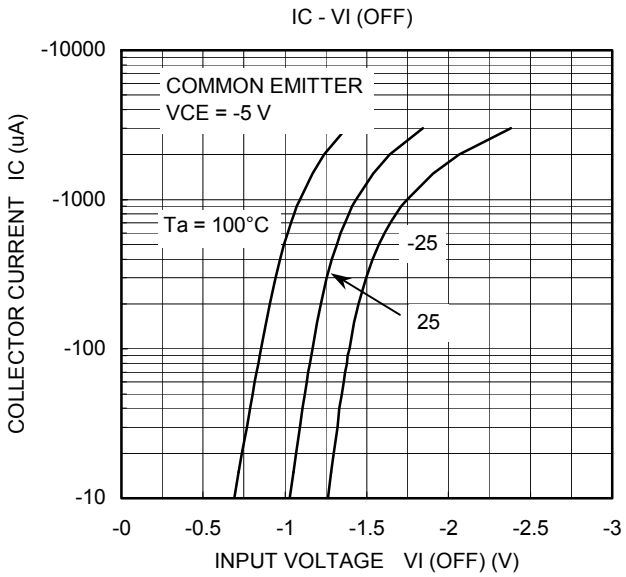

IC - VI (OFF)
COMMON EMITTER
VCE= 5V
Ta = 100°C
-25
25
COLLECTOR CURRENT IC (uA)
INPUT VOLTAGE VI (OFF) (V)
10000
1000
100
10
0
0.5
1
1.5
2
2.5
3

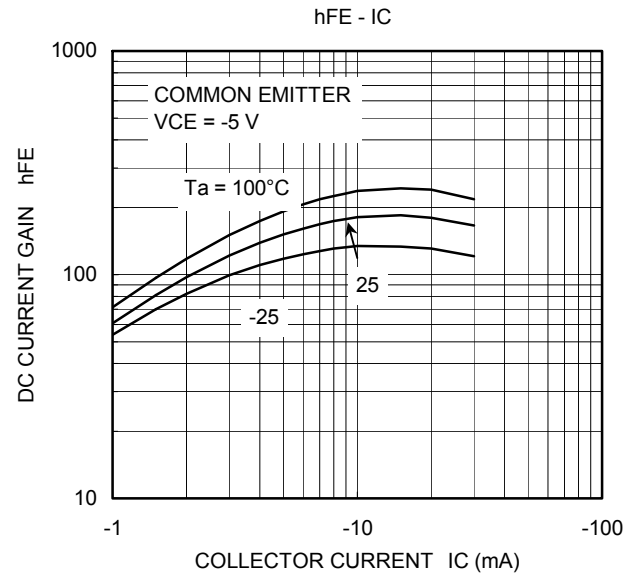

hFE- IC
COMMON EMITTER
VCE= 5V
Ta = 100°C
-25
25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
1
10
100

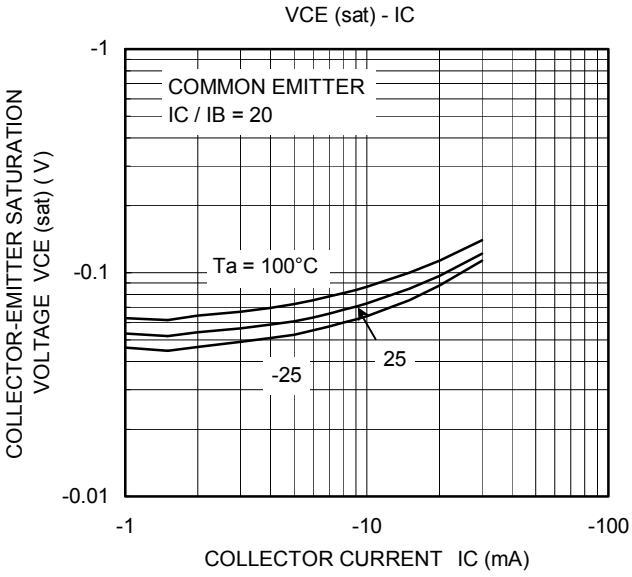

VCE(sat) - IC
COMMON EMITTER
IC / IB = 20
Ta = 100°C
-25
25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE (sat) (V)
COLLECTOR CURRENT IC (mA)
1
0.1
0.01
1
10
100

Q2


IC - VI (ON)
COMMON EMITTER
VCE = -0.2 V
Ta = 100°C
25
-25
COLLECTOR CURRENT IC (mA)
INPUT VOLTAGE VI (ON) (V)
-100
-10
-1
-0.1
-0.1
-1
-10
-100


IC - VI (OFF)
COMMON EMITTER
VCE = -5 V
Ta = 100°C
-25
25
COLLECTOR CURRENT IC (uA)
INPUT VOLTAGE VI (OFF) (V)
-10000
-1000
-100
-10
-0
-0.5
-1
-1.5
-2
-2.5
-3


hFE - IC
COMMON EMITTER
VCE = -5 V
Ta = 100°C
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
-1
-10
-100


VCE (sat) - IC
COMMON EMITTER
IC / IB = 20
Ta = 100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE (sat) (V)
COLLECTOR CURRENT IC (mA)
-1
-0.1
-0.01
-1
-10
-100

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