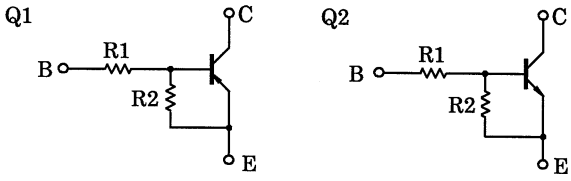
TOSHIBA Transistor
Silicon PNP Epitaxial Type (PCT Process) Silicon NPN Epitaxial Type (PCT Process)

RN4601

Switching, Inverter Circuit, Interface Circuit
And Driver Circuit Applications

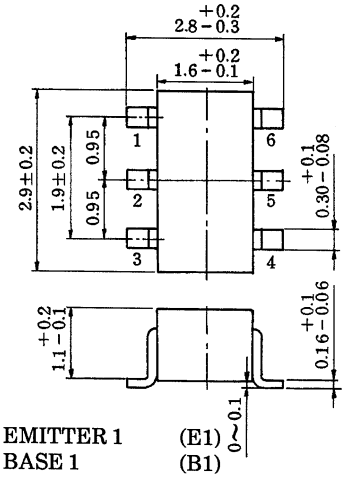
- Includeing two devices in SM6 (super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process

Equivalent Circuit and Bias Resister Values



R1: 4.7kΩ
R2: 4.7kΩ
(Q1, Q2 Common)

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)

JEDEC	—
EIAJ	—
TOSHIBA	2-3N1A

Weight: 0.015g

Q1 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}	−10	V
Collector current	I_C	−100	mA

Q2 Maximum Ratings (Ta = 25°C)

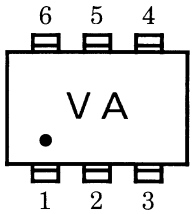
Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	10	V
Collector current	I_C	100	mA

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

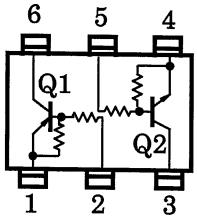
Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C*	300	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55~150	°C

* : Total rating

Marking



Equivalent Circuit (Top View)



Q1 Electrical Characteristics (Ta = 25°C)

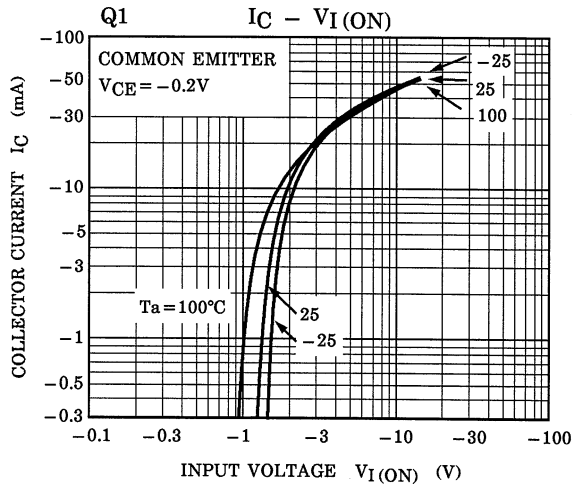
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} = −50V, I_E = 0	—	—	−100	nA
	I_{CEO}	—	V_{CE} = −50V, I_B = 0	—	—	−500	
Emitter cut-off current	I_{EBO}	—	V_{EB} = −10V, I_C = 0	−0.82	—	−1.52	mA
DC current gain	h_{FE}	—	V_{CE} = −5V, I_C = −10mA	30	—	—	—
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	—	I_C = −5mA, I_B = −0.25mA	—	−0.1	−0.3	V
Input voltage (ON)	$V_{I\ (ON)}$	—	V_{CE} = −0.2V, I_C = −5mA	−1.1	—	−2.0	V
Input voltage (OFF)	$V_{I\ (OFF)}$	—	V_{CE} = −5V, I_C = −0.1mA	−1.0	—	−1.5	V
Transition frequency	f_T	—	V_{CE} = −10V, I_C = −5mA	—	200	—	MHz
Collector output capacitance	C_{ob}	—	V_{CB} = −10V, I_E = 0, f = 1MHz	—	3	6	pF

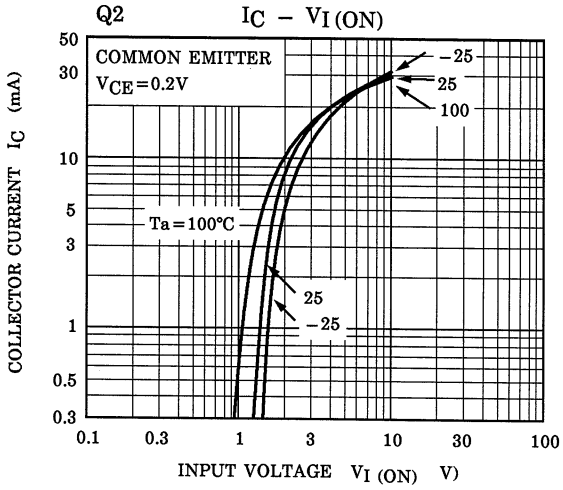
Q2 Electrical Characteristics (Ta = 25°C)

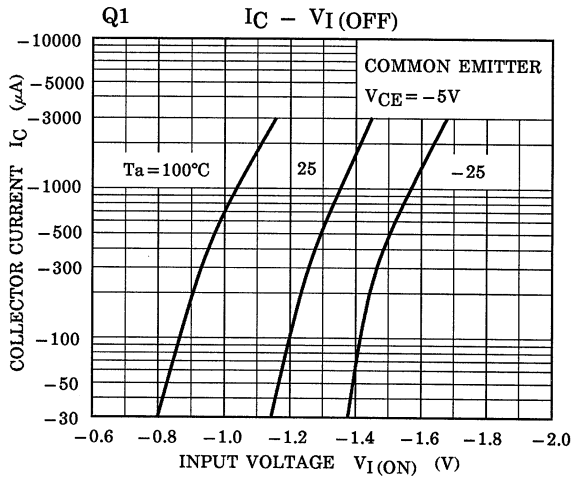
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	V_{CB} =50V, I_E = 0	—	—	100	nA
	I_{CEO}	—	V_{CE} = 50V, I_B = 0	—	—	500	
Emitter cut-off current	I_{EBO}	—	V_{EB} = 10V, I_C = 0	0.82	—	1.52	mA
DC current gain	h_{FE}	—	V_{CE} = 5V, I_C = 10mA	30	—	—	—
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	—	I_C = 5mA, I_B = 0.25mA	—	0.1	0.3	V
Input voltage (ON)	$V_{I\ (ON)}$	—	V_{CE} = 0.2V, I_C = 5mA	1.1	—	2.0	V
Input voltage (OFF)	$V_{I\ (OFF)}$	—	V_{CE} = 5V, I_C = 0.1mA	1.0	—	1.5	V
Transition frequency	f_T	—	V_{CE} = 10V, I_C = 5mA	—	250	—	MHz
Collector output capacitance	C_{ob}	—	V_{CB} = 10V, I_E = 0, f = 1 MHz	—	3	6	pF

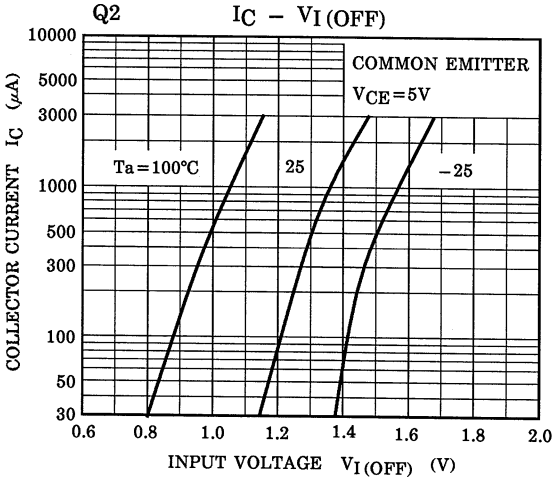
Q1, Q2 Common Electrical Characteristics (Ta = 25°C)

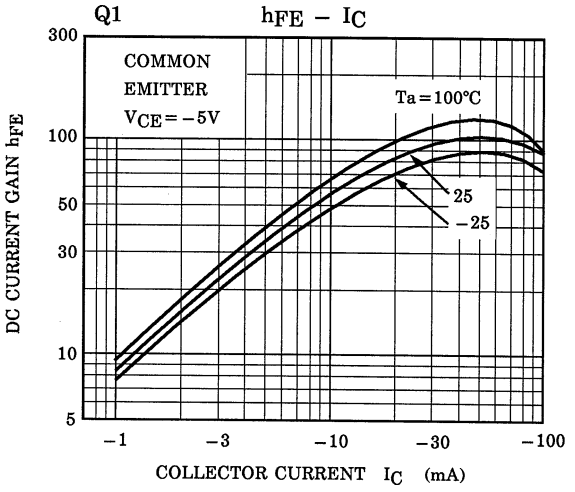
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input resistor	R1	—	—	3.29	4.7	6.11	kΩ
Resistor ratio	R1/R2	—	—	0.9	1.0	1.1	—

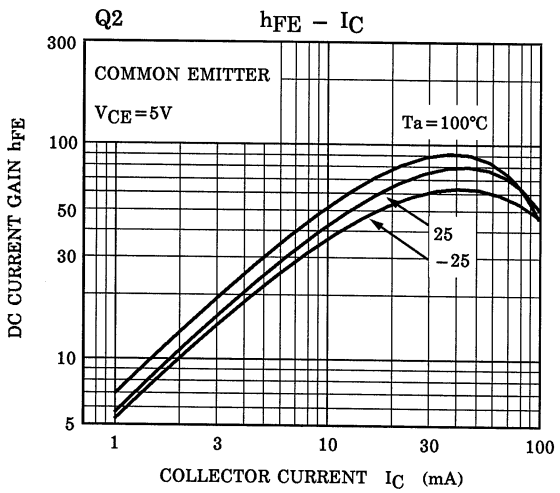

Q1
I_C – $V_{I(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
−25
25
100
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100


Q2
I_C – $V_{I(ON)}$
COMMON EMITTER
V_{CE} = 0.2V
Ta = 100°C
−25
25
100
25
−25
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I(ON)}$ V)
50
30
10
5
3
1
0.5
0.3
0.1
0.3
1
3
10
30
100


Q1
I_C – $V_{I(OFF)}$
COMMON EMITTER
V_{CE} = −5V
Ta = 100°C
25
−25
COLLECTOR CURRENT I_C (μA)
INPUT VOLTAGE $V_{I(ON)}$ (V)
−10000
−5000
−3000
−1000
−500
−300
−100
−50
−30
−0.6
−0.8
−1.0
−1.2
−1.4
−1.6
−1.8
−2.0


Q2
I_C – $V_{I(OFF)}$
COMMON EMITTER
V_{CE} = 5V
Ta = 100°C
25
−25
COLLECTOR CURRENT I_C (μA)
INPUT VOLTAGE $V_{I(OFF)}$ (V)
10000
5000
3000
1000
500
300
100
50
30
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0


Q1
h_{FE} – I_C
COMMON
EMITTER
V_{CE} = −5V
Ta = 100°C
25
−25
DC CURRENT GAIN h_{FE}
COLLECTOR CURRENT I_C (mA)
300
100
50
30
10
5
−1
−3
−10
−30
−100


Q2
h_{FE} – I_C
COMMON EMITTER
V_{CE} = 5V
Ta = 100°C
25
−25
DC CURRENT GAIN h_{FE}
COLLECTOR CURRENT I_C (mA)
300
100
50
30
10
5
1
3
10
30
100

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