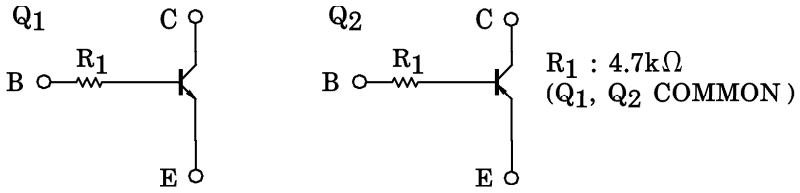
TOSHIBA TRANSISTOR
SILICON NPN EPITAXIAL TYPE (PCT PROCESS) SILICON PNP EPITAXIAL TYPE (PCT PROCESS)

RN4990

SWITCHING, INVERTER CIRCUIT, INTERFACE CIRCUIT
AND DRIVER CIRCUIT APPLICATIONS

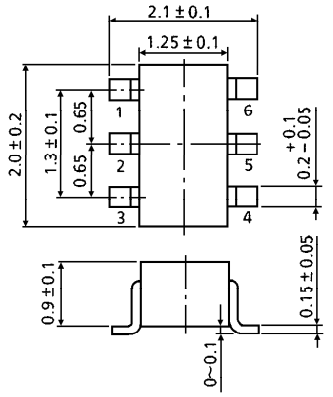
- Including Two Devices in US6 (Ultra Super Mini Type with 6 leads)
- With Built-in Bias Resistors
- Simplify Circuit Design
- Reduce a Quantity of Parts and Manufacturing Process

EQUIVALENT CIRCUIT AND BIAS RESISTOR VALUES



R_1 : 4.7kΩ
(Q_1, Q_2 COMMON)

Unit in mm



	1. EMITTER 1	(E1)
	2. BASE 1	(B1)
	3. COLLECTOR 2	(C2)
	4. EMITTER 2	(E2)
	5. BASE 2	(B2)
US6	6. COLLECTOR 1	(C1)
JEDEC	—	
EIAJ	—	
TOSHIBA	2-2J1A	

Weight : 6.8mg

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}	5	V
Collector Current	I_C	100	mA

Q2 MAXIMUM RATINGS (Ta = 25°C)

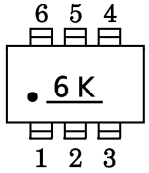
CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	−50	V
Collector-Emitter Voltage	V_{CEO}	−50	V
Emitter-Base Voltage	V_{EBO}	−5	V
Collector Current	I_C	−100	mA

Q1, Q2 COMMON MAXIMUM RATINGS (Ta = 25°C)

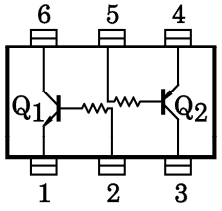
CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector Power Dissipation	P_C ※	200	mW
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	−55~150	°C

※ : Total Rating

MARKING



EQUIVALENT CIRCUIT (TOP VIEW)



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Q1 ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 50V, I_E = 0	—	—	100	mA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 10V, I_C = 0	—	—	100	mA
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 = 0, f = 1MHz	—	3	6	pF

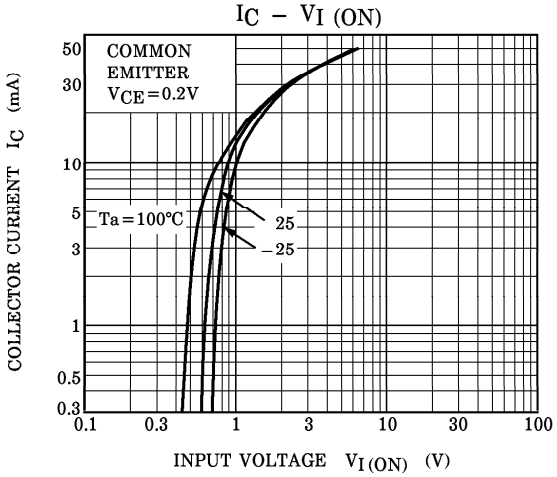
Q2 ELECTRICAL CHARACTERISTICS (Ta = 25°C)

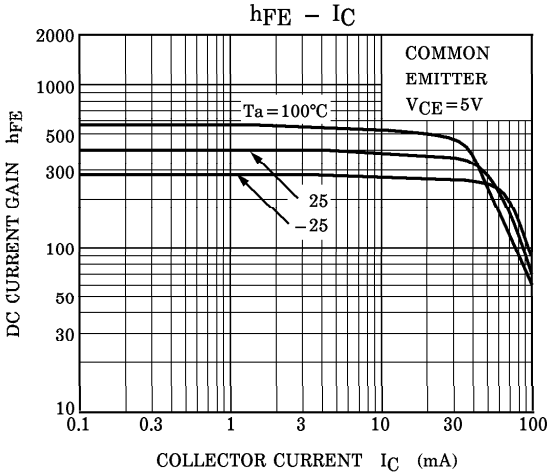
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = −50V, I_E = 0	—	—	−100	mA
Emitter Cut-off Current	I_{EBO}	V_{EB} = −5V, I_C = 0	—	—	−100	mA
DC Current Gain	h_{FE}	V_{CE} = −5V, I_C = −1mA	120	—	400	
Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	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 = 0, f = 1MHz	—	3	6	pF

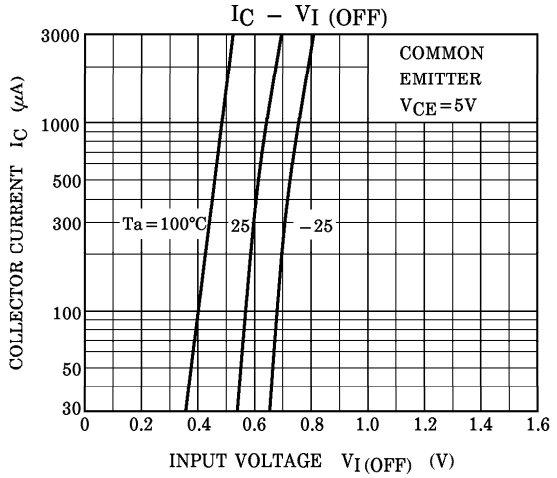
Q1, Q2 COMMON ELECTRICAL CHARACTERISTICS (Ta = 25°C)

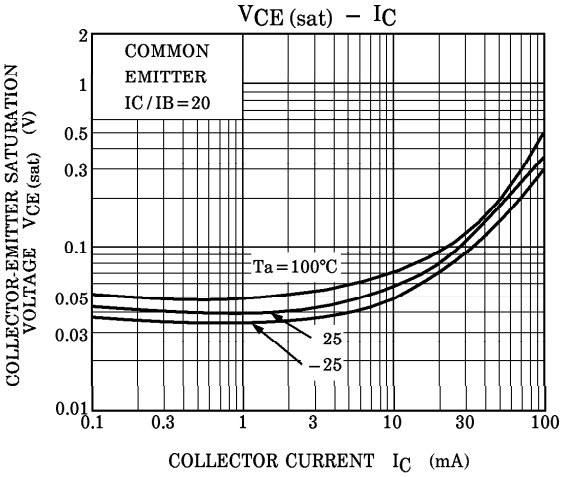
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Resistor	R1	—	3.29	4.7	6.11	kΩ

Q_1


I_C – V_I (ON)
COMMON EMITTER
V_{CE} = 0.2V
Ta = 100°C
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

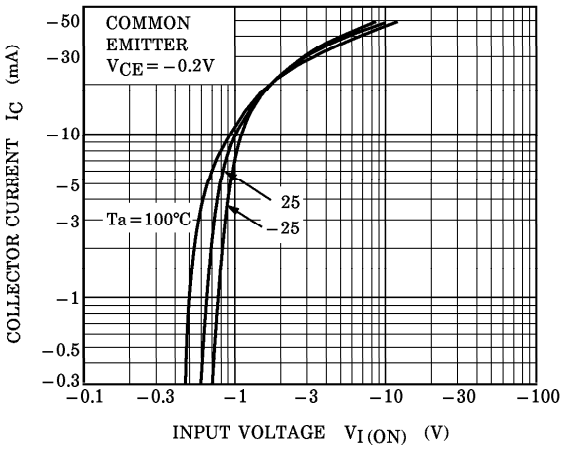

h_{FE} – I_C
COMMON EMITTER
V_{CE} = 5V
Ta = 100°C
25
−25
DC CURRENT GAIN h_{FE}
COLLECTOR CURRENT I_C (mA)
2000
1000
500
300
100
50
30
10
0.1
0.3
1
3
10
30
100


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)
3000
1000
500
300
100
50
30
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

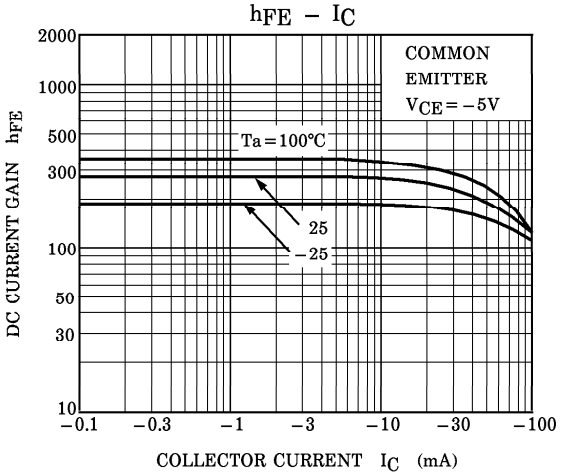

$V_{CE\,(sat)}$ – I_C
COMMON EMITTER
IC / IB = 20
Ta = 100°C
25
−25
COLLECTOR-EMITTER SATURATION VOLTAGE $V_{CE\,(sat)}$ (V)
COLLECTOR CURRENT I_C (mA)
2
1
0.5
0.3
0.1
0.05
0.03
0.01
0.1
0.3
1
3
10
30
100

Q_2

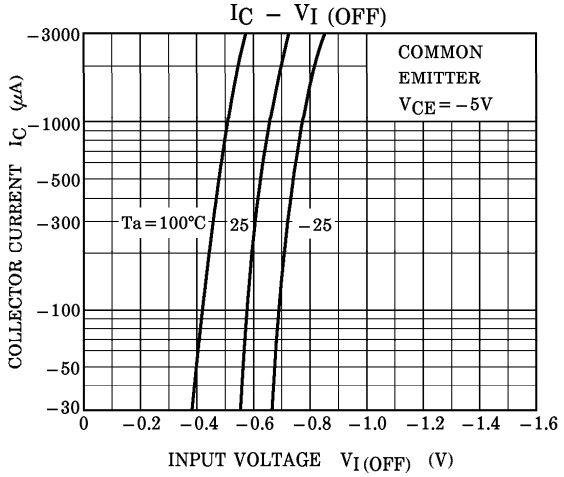
$I_C - V_I$ (ON)



$h_{FE} - I_C$



$I_C - V_I$ (OFF)



V_{CE} (sat) $- I_C$