

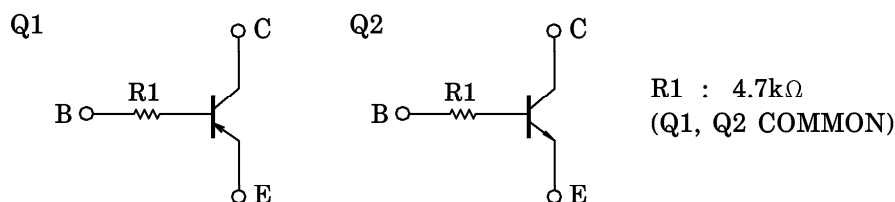
TOSHIBA TRANSISTOR  
SILICON PNP EPITAXIAL TYPE (PCT PROCESS) SILICON NPN EPITAXIAL TYPE (PCT PROCESS)

# RN 4610

SWITCHING, INVERTER CIRCUIT, INTERFACE CIRCUIT  
AND DRIVER CIRCUIT APPLICATIONS.

- Including 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



### 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   |

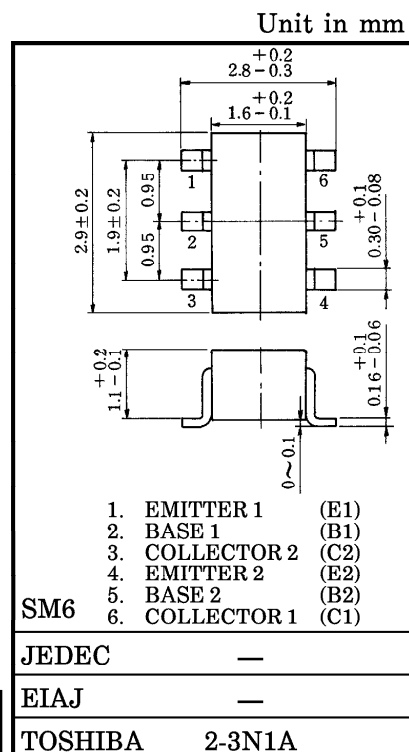
## Q2 MAXIMUM RATINGS (Ta = 25°C)

| 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)

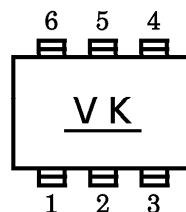
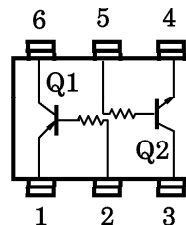
| CHARACTERISTIC              | SYMBOL           | RATING  | UNIT |
|-----------------------------|------------------|---------|------|
| Collector Power Dissipation | P <sub>C</sub> * | 300     | mW   |
| Junction Temperature        | T <sub>j</sub>   | 150     | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | −55~150 | °C   |

\* : Total Rating



Weight : 0.015g

### MARKING

EQUIVALENT CIRCUIT  
(TOP VIEW)

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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

## 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 | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB} = -5V, I_C = 0$            | —    | —    | -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         | $C_{ob}$      | $V_{CB} = -10V, I_E = 0, f = 1MHz$ | —    | 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  | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB} = 5V, I_C = 0$            | —    | —    | 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         | $C_{ob}$      | $V_{CB} = 10V, I_E = 0, f = 1MHz$ | —    | 3    | 6    | pF   |

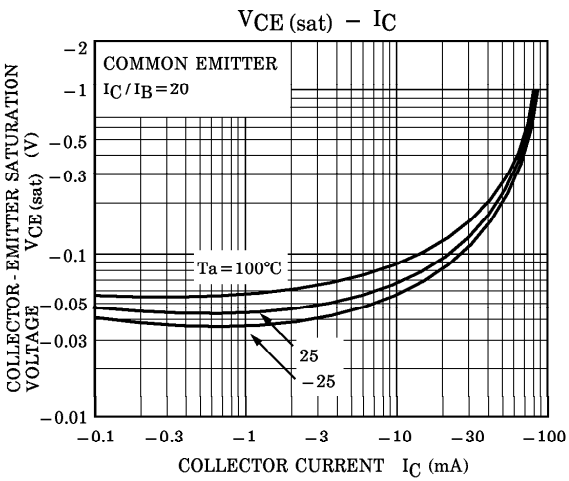
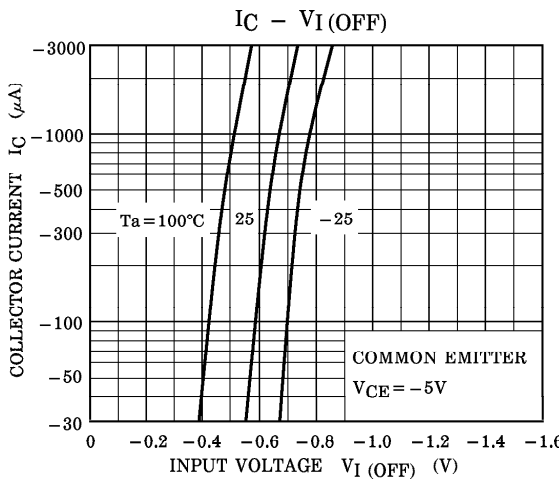
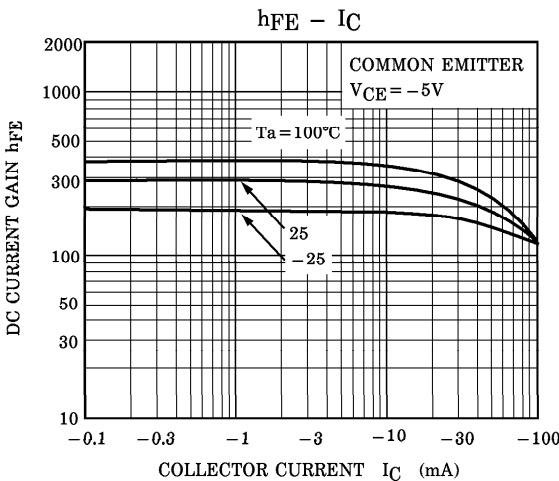
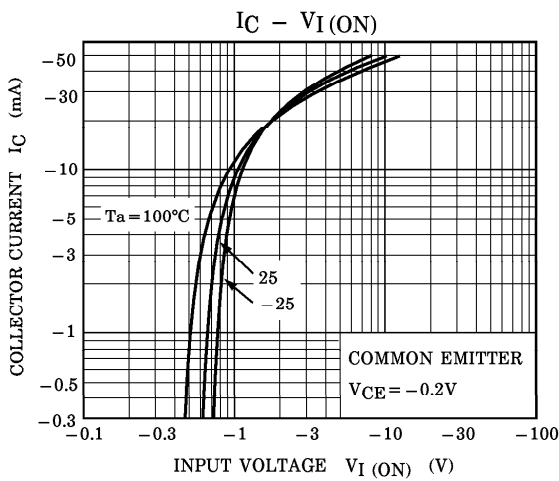
## Q1, Q2 COMMON ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

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Q1



Q2

