

## RN4905

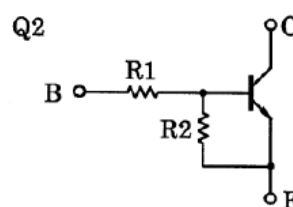
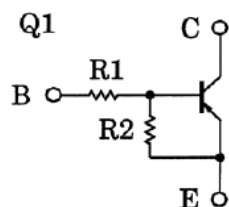
### 1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

### 2. Features

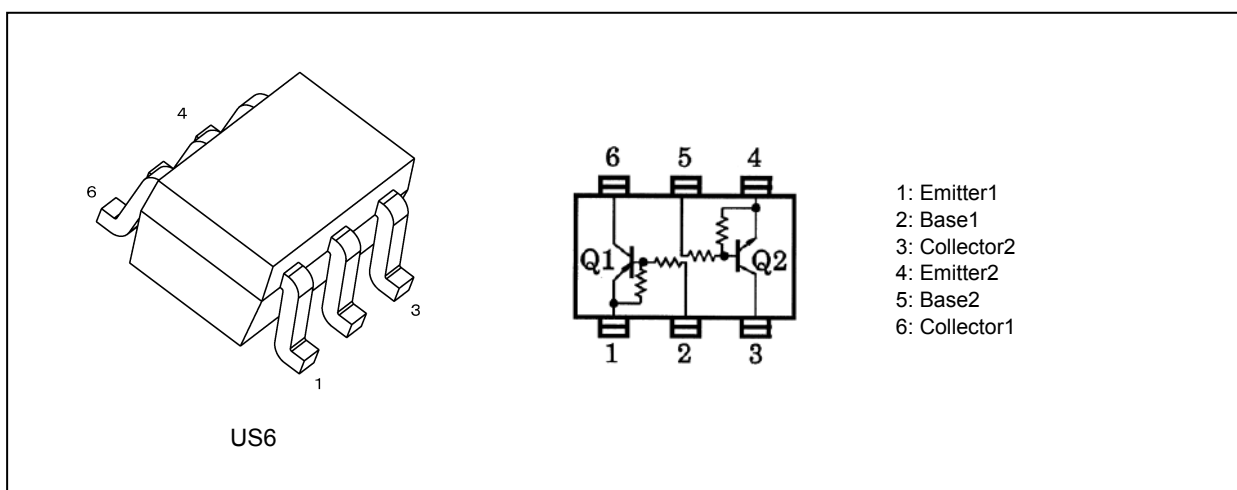
- (1) AEC-Q101 qualified (Please see the orderable part number list)
- (2) Including two devices in US6 (ultra super mini type with 6 leads)
- (3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.

### 3. Equivalent Circuit



R1: 2.2 kΩ  
R2: 47 kΩ  
(Q1, Q2 Common)

### 4. Packaging and Pin Assignment



### 5. Orderable part number

| Orderable part number | AEC-Q101     | Note                    |
|-----------------------|--------------|-------------------------|
| RN4905,LF             | —            | General Use             |
| RN4905,LXGF           | YES (Note 1) | Unintended Use (Note 1) |
| RN4905,LXHF           | YES          | Automotive Use          |

Note 1: For more information, please contact our sales or use the inquiry form on our website.

Start of commercial production

1990-10

## 6. Q1 Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics           | Symbol    | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-base voltage    | $V_{CB0}$ | -50    | V    |
| Collector-emitter voltage | $V_{CE0}$ | -50    |      |
| Emitter-base voltage      | $V_{EB0}$ | -5     |      |
| Collector current         | $I_C$     | -100   | mA   |

## 7. Q2 Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics           | Symbol    | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-base voltage    | $V_{CB0}$ | 50     | V    |
| Collector-emitter voltage | $V_{CE0}$ | 50     |      |
| Emitter-base voltage      | $V_{EB0}$ | 5      |      |
| Collector current         | $I_C$     | 100    | mA   |

## 8. Q1, Q2 Common Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics                      | Symbol    | Rating     | Unit             |
|--------------------------------------|-----------|------------|------------------|
| Collector power dissipation (Note 1) | $P_C$     | 200        | mW               |
| Junction temperature                 | $T_j$     | 150        | $^\circ\text{C}$ |
| Storage temperature                  | $T_{stg}$ | -55 to 150 |                  |

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

## 9. Q1 Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics                      | Symbol        | Test Condition   | Min    | Typ. | Max    | Unit |
|--------------------------------------|---------------|--|--------|------|--------|------|
| Collector cut-off current            | $I_{CB0}$     | $V_{CB} = -50\text{ V}, I_E = 0\text{ mA}$                   | —      | —    | -100   | nA   |
| Collector cut-off current            | $I_{CE0}$     | $V_{CE} = -50\text{ V}, I_B = 0\text{ mA}$                   | —      | —    | -500   |      |
| Emitter cut-off current              | $I_{EB0}$     | $V_{EB} = -5\text{ V}, I_C = 0\text{ mA}$                    | -0.078 | —    | -0.145 | mA   |
| DC current gain                      | $h_{FE}$      | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$                  | 80     | —    | —      | —    |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$                  | —      | -0.1 | -0.3   | V    |
| Input voltage (ON)                   | $V_{I(ON)}$   | $V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$                 | -0.6   | —    | -1.1   |      |
| Input voltage (off)                  | $V_{I(off)}$  | $V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$                 | -0.5   | —    | -0.8   |      |
| Transition frequency                 | $f_T$         | $V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$                  | —      | 200  | —      | MHz  |
| Collector output capacitance         | $C_{ob}$      | $V_{CB} = -10\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$ | —      | 3    | 6      | pF   |

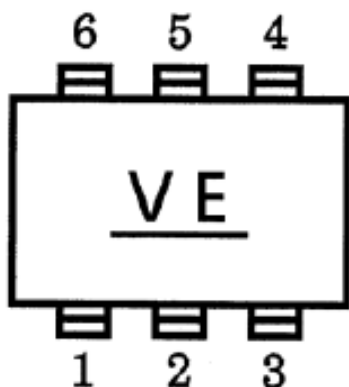
## 10. Q2 Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics                      | Symbol        | Test Condition  | Min   | Typ. | Max   | Unit |
|--------------------------------------|---------------|---|-------|------|-------|------|
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = 50\text{ V}, I_E = 0\text{ mA}$                   | —     | —    | 100   | nA   |
| Collector cut-off current            | $I_{CEO}$     | $V_{CE} = 50\text{ V}, I_B = 0\text{ mA}$                   | —     | —    | 500   |      |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = 5\text{ V}, I_C = 0\text{ mA}$                    | 0.078 | —    | 0.145 | mA   |
| DC current gain                      | $h_{FE}$      | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                   | 80    | —    | —     | —    |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$                   | —     | 0.1  | 0.3   | V    |
| Input voltage (ON)                   | $V_{I(ON)}$   | $V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$                  | 0.6   | —    | 1.1   |      |
| Input voltage (off)                  | $V_{I(off)}$  | $V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$                  | 0.5   | —    | 0.8   |      |
| Transition frequency                 | $f_T$         | $V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$                   | —     | 250  | —     | MHz  |
| Collector output capacitance         | $C_{ob}$      | $V_{CB} = 10\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$ | —     | 3    | 6     | pF   |

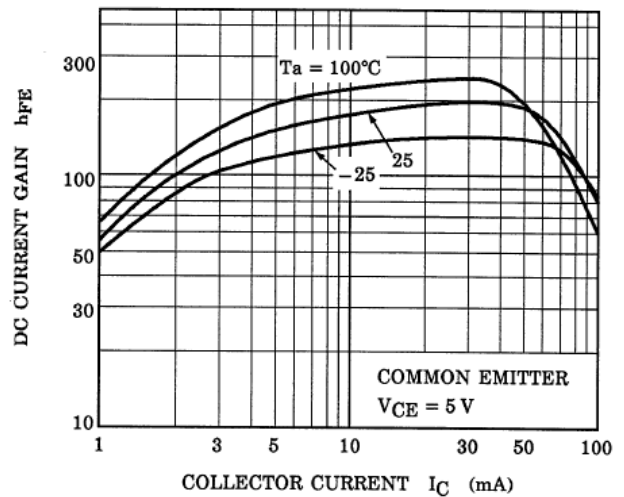
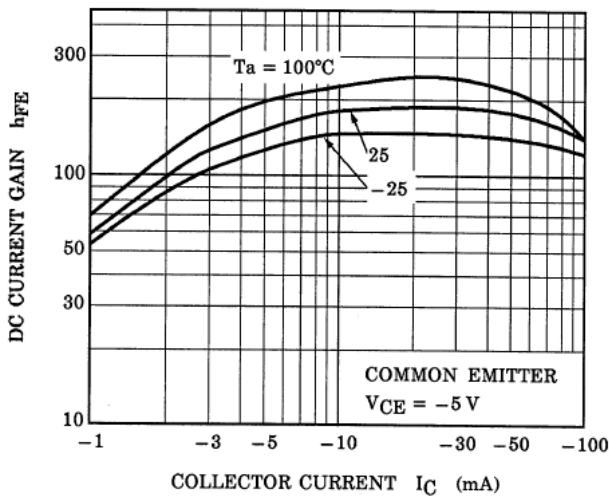
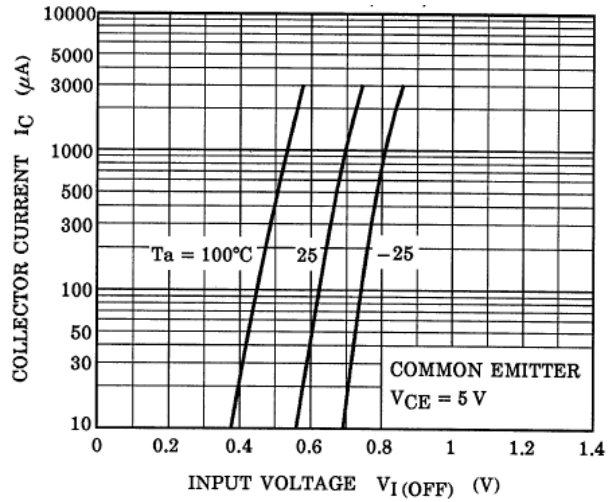
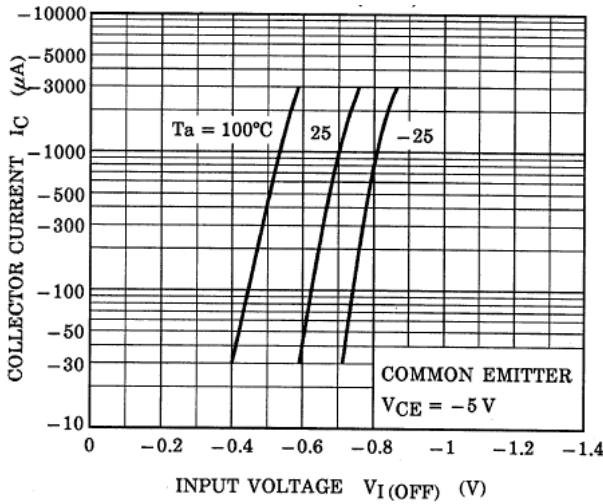
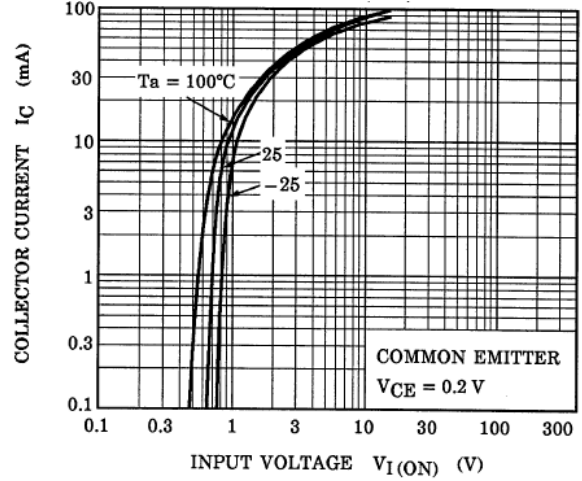
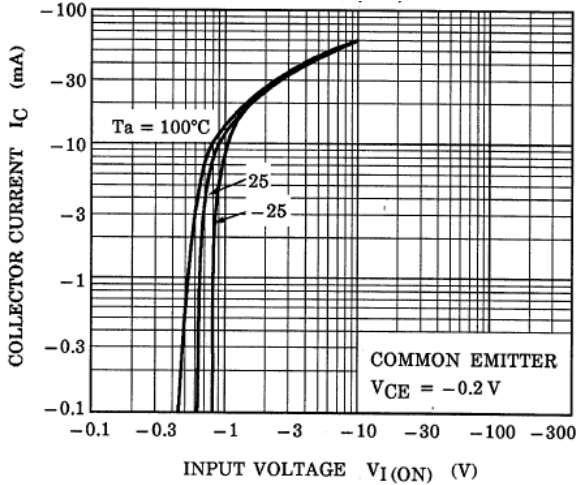
## 11. Q1, Q2 Common Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics  | Symbol | Test Condition | Min    | Typ.   | Max    | Unit       |
|------------------|--------|----------------|--------|--------|--------|------------|
| Input resistance | $R_1$  | -              | 1.54   | 2.2    | 2.86   | k $\Omega$ |
| Resistor ratio   | R1/R2  | -              | 0.0421 | 0.0468 | 0.0515 | —          |

## 12. Marking



**13. Characteristics Curves (Note)**



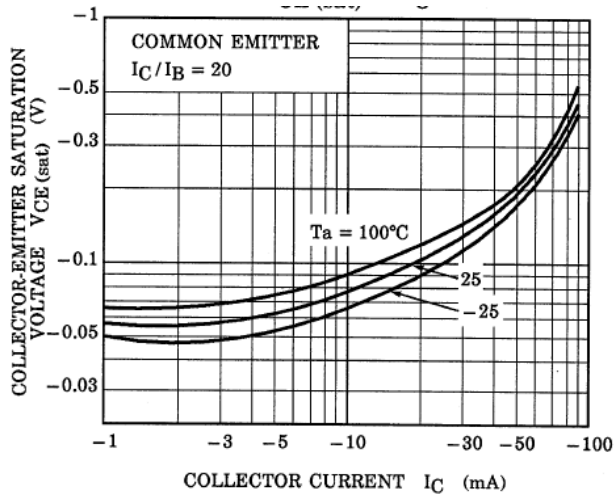


Fig. 13.7 Q1  $V_{CE(sat)}-I_C$

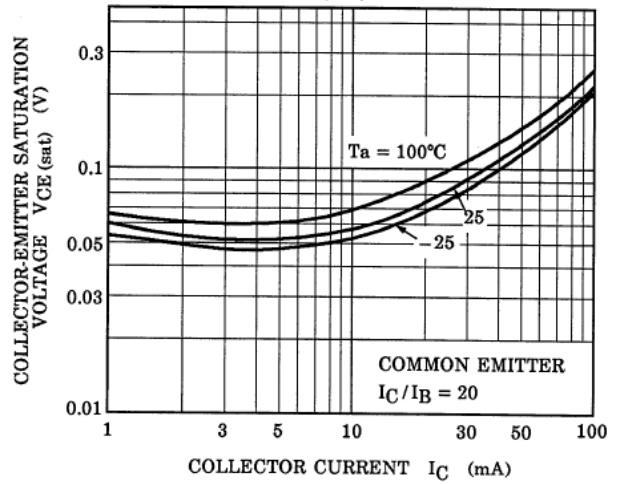
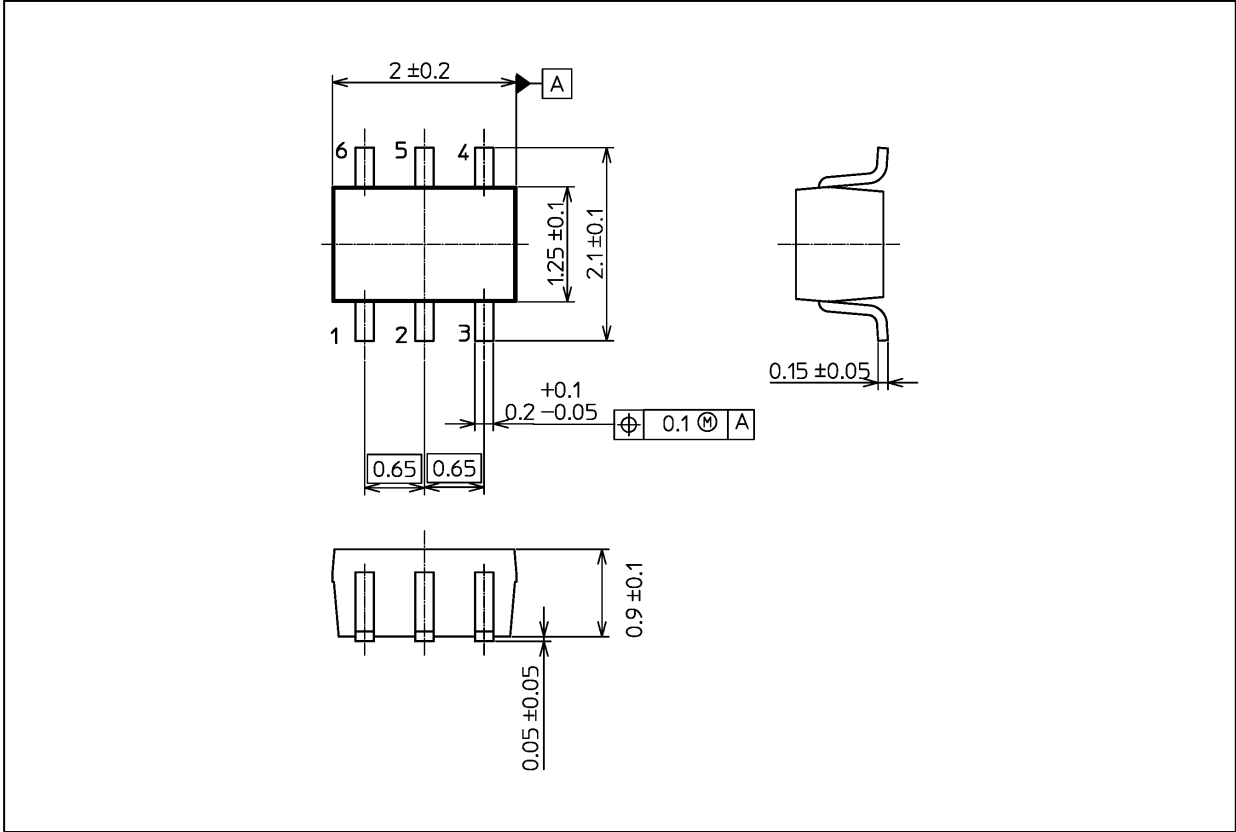


Fig. 13.8 Q2  $V_{CE(sat)}-I_C$

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 6.8 mg (typ.)

| Package Name(s) |
|-----------------|
| TOSHIBA: 1-2T1S |
| Nickname: US6   |

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