Bipolar Transistors Silicon NPN Epitaxial Type

# 2SC2712

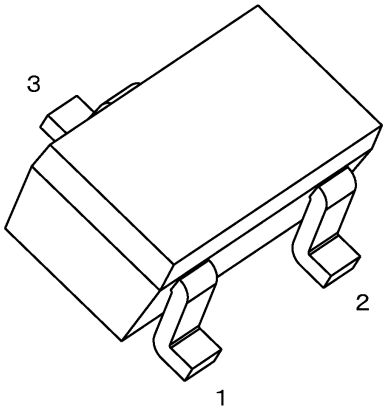
## 1. Applications

- Low-Frequency Amplifiers
- Audio Frequency General Purpose Amplifier Applications
- AM Amplifiers

## 2. Features

(1) AEC-Q101 qualified (Please see the orderable part number list)
(2) High voltage: $V_{CEO}$ = 50 V
(3) High collector current: $I_C$ = 150 mA (max)
(4) High $h_{FE}$: $h_{FE}$ = 70 to 700
(5) Excellent $h_{FE}$ linearity: $h_{FE}$ ($I_C$ = 0.1 mA)/$h_{FE}$ ($I_C$ = 2 mA) = 0.95 (typ.)
(6) Low noise: NF = 1 dB (typ.), 10 dB (max)
(7) Complementary to 2SA1162

## 3. Packaging




1: Base
2: Emitter
3: Collector

S-Mini

Start of commercial production
1982-10

## 4. Orderable part number

| Orderable part number | | AEC-Q101 | | Note | |
|---|---|---|---|---|---|
| 2SC2712-O | 2SC2712-O,LF | — | | General Use | |
| | 2SC2712-O,LXGF | YES | (Note 1) | Unintended Use | (Note 1) |
| | 2SC2712-O,LXHF | YES | | Automotive Use | |
| 2SC2712-Y | 2SC2712-Y,LF | — | | General Use | |
| | 2SC2712-Y,LXGF | YES | (Note 1) | Unintended Use | (Note 1) |
| | 2SC2712-Y,LXHF | YES | | Automotive Use | |
| 2SC2712-GR | 2SC2712-GR,LF | — | | General Use | |
| | 2SC2712-GR,LXGF | YES | (Note 1) | Unintended Use | (Note 1) |
| | 2SC2712-GR,LXHF | YES | | Automotive Use | |
| 2SC2712-BL | 2SC2712-BL,LF | — | | General Use | |
| | 2SC2712-BL,LXGF | YES | (Note 1) | Unintended Use | (Note 1) |
| | 2SC2712-BL,LXHF | YES | | Automotive Use | |

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

## 5. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | | $V_{CBO}$ | 60 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 50 | V |
| Emitter-base voltage | | $V_{EBO}$ | 5 | V |
| Collector current (DC) | | $I_C$ | 150 | mA |
| Base current | | $I_B$ | 30 | mA |
| Collector power dissipation | (Note 2), (Note 4) | $P_C$ | 200 | mW |
| | (Note 3) | | 150 | |
| Junction temperature | (Note 2) | $T_j$ | 150 | °C |
| | (Note 3) | | 125 | |
| Storage temperature | (Note 2) | $T_{stg}$ | -55 to 150 | °C |
| | (Note 3) | | -55 to 125 | |

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 2: For devices with the ordering part number ending in LF(T.

Note 3: For devices with the ordering part number ending in XGF(T, XHF(T.

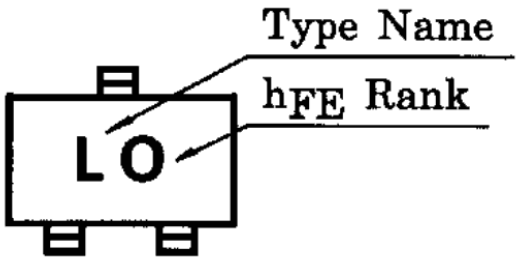
Note 4: Device mounted on an 25.4 mm × 25.4 mm × 1.6 mm FR4 glass epoxy board (Cu pad: 0.8 $mm^2$ × 3)

## 6. Electrical Characteristics (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | Symbol | Note | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | $I_{CBO}$ | | $V_{CB}$ = 60 V, $I_E$ = 0 mA | — | — | 0.1 | μA |
| Emitter cut-off current | $I_{EBO}$ | | $V_{EB}$ = 5 V, $I_C$ = 0 mA | — | — | 0.1 | μA |
| DC current gain | $h_{FE}$ | (Note 5) | $V_{CE}$ = 6 V, $I_C$ = 2 mA | 70 | — | 700 | — |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | | $I_C$ = 100 mA, $I_B$ = 10 mA | — | 0.1 | 0.25 | V |
| Transition frequency | $f_T$ | | $V_{CE}$ = 10 V, $I_C$ = 1 mA | 80 | — | — | MHz |
| Collector output capacitance | $C_{ob}$ | | $V_{CB}$ = 10 V, $I_E$ = 0 A, f = 1 MHz | — | 2.0 | 3.5 | pF |
| Noise figure | NF | | $V_{CE}$ = 6 V, $I_C$ = 0.1 mA, f = 1 kHz, $R_G$ = 10 kΩ | — | 1.0 | 10 | dB |

Note 5: $h_{FE}$ classification O (O): 70 to 140, Y (Y): 120 to 240, GR (G): 200 to 400, BL (L): 350 to 700
( ) marking symbol

## 7. Marking



## 8. Characteristics Curves (Note)

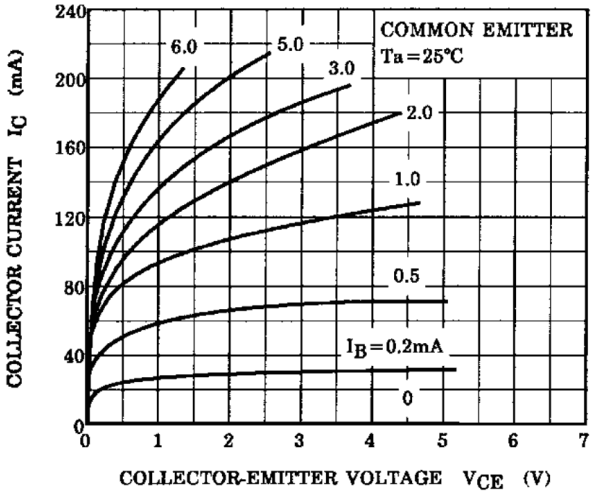



Fig. 8.1 $I_C$ - $V_{CE}$

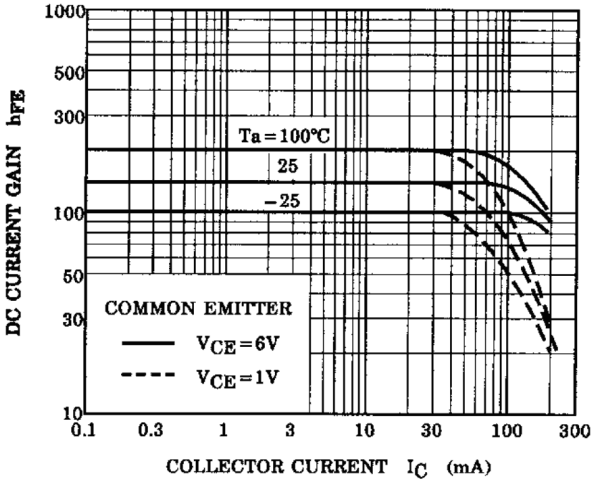



Fig. 8.2 $h_{FE}$ - $I_C$

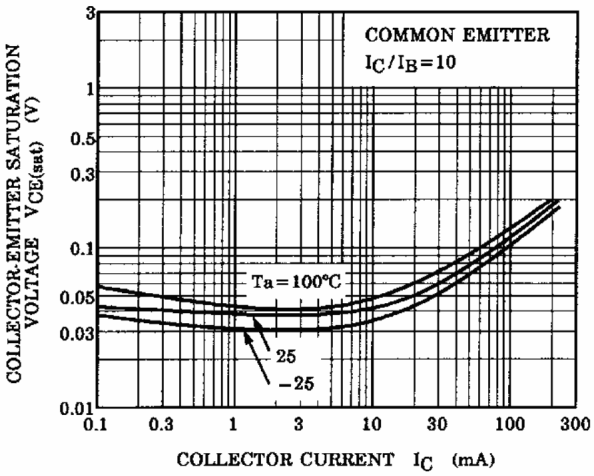



Fig. 8.3 $V_{CE(sat)}$ - $I_C$

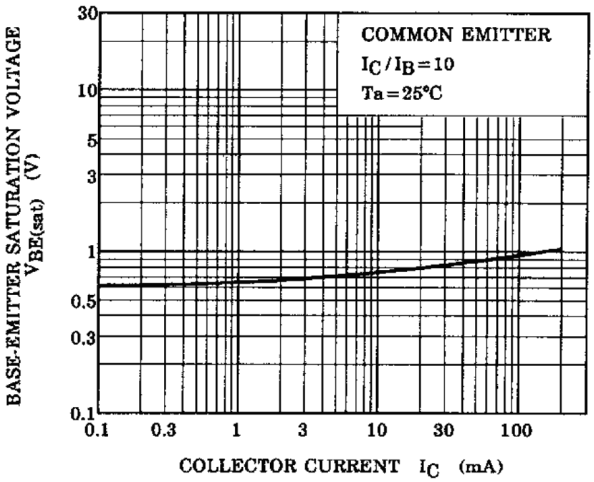



Fig. 8.4 $V_{BE(sat)}$ - $I_C$

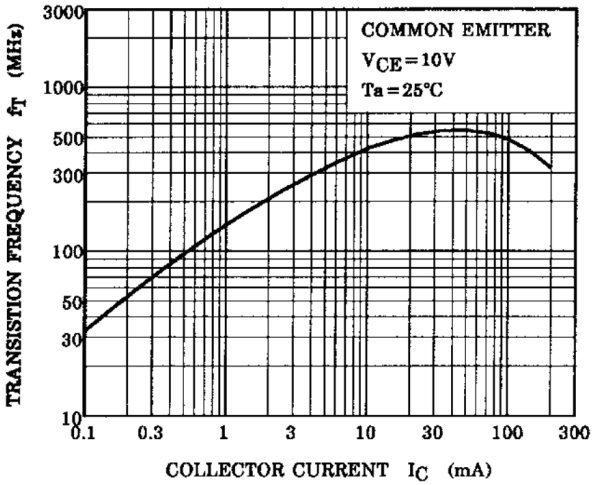



Fig. 8.5 $f_T$ - $I_C$

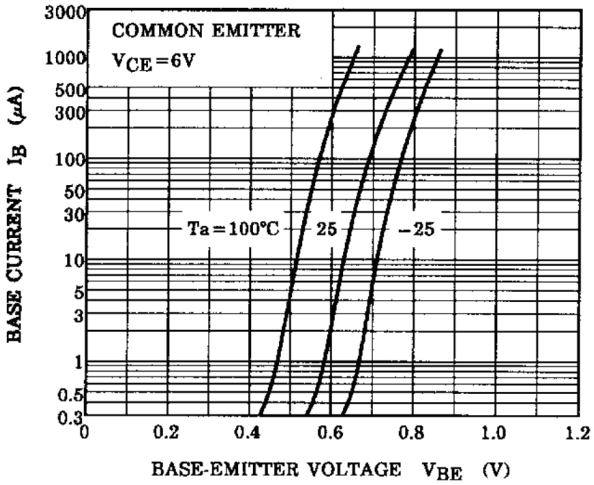



Fig. 8.6 $I_B$ - $V_{BE}$

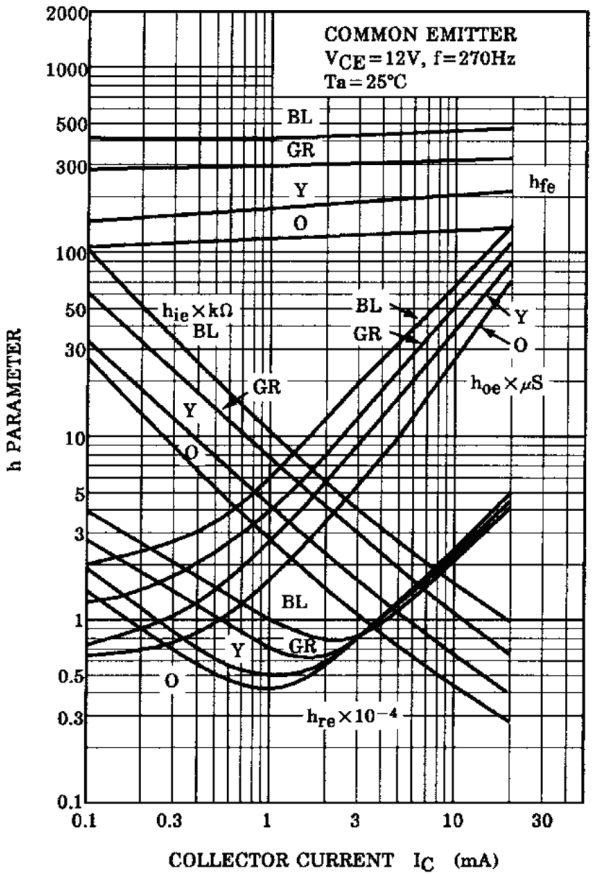



Fig. 8.7 h PARAMETER - $I_C$

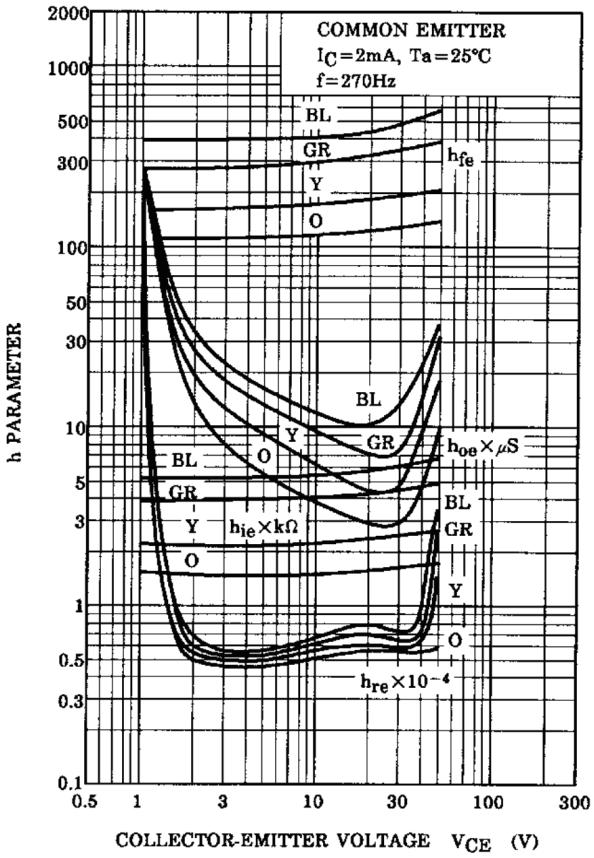



Fig. 8.8 h PARAMETER - $V_{CE}$

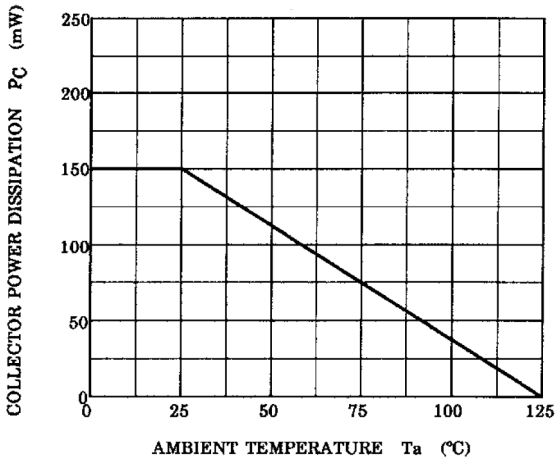



Fig. 8.9 $P_C$ - $T_a$
Reference only with $T_j$ of 125 °C.

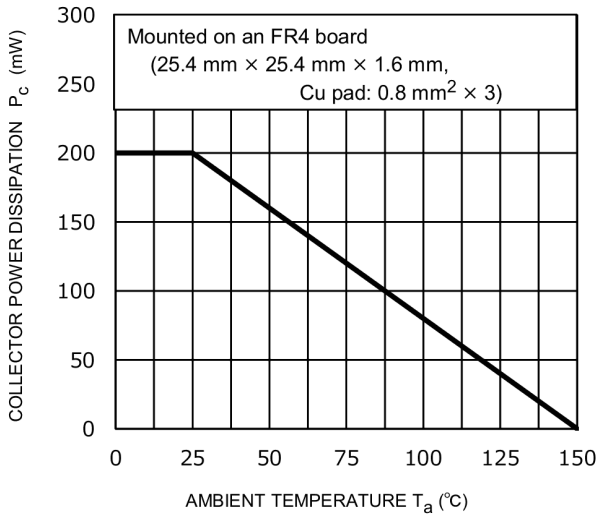
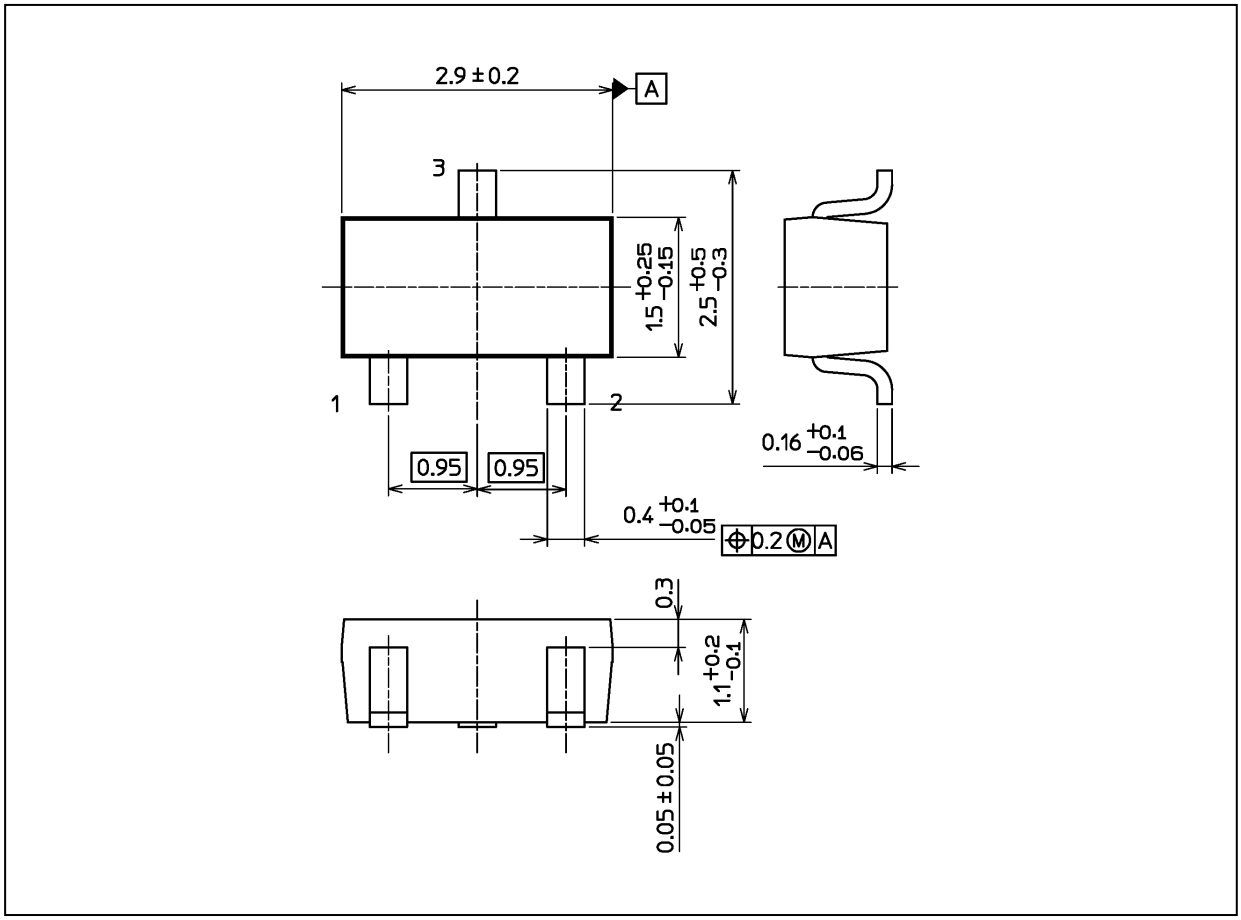



Fig. 8.10 $P_C$ - $T_a$
Reference only with $T_j$ of 150 °C.

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## Package Dimensions

Unit: mm




Weight: 12 mg (typ.)

| Package Name(s) |
|---|
| TOSHIBA: 2-3F1S |
| Nickname: S-Mini |

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