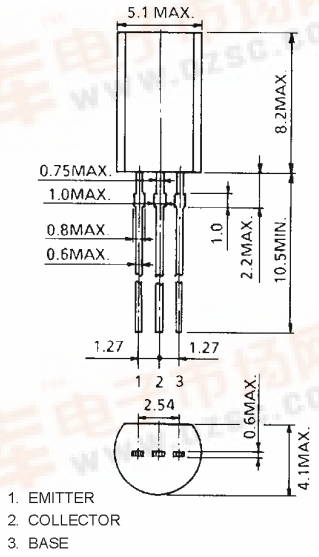
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process)

# 2SA1013

Color TV Verttical Deflection Output Applications
Power Switching Applications

- High voltage: $V_{CEO}$ = −160 V
- Large continuous collector current capability
- Recommended for vertical deflection output & sound output applications for line-operated TV.
- Complementary to 2SC2383.

Unit: mm




| | |
|---|---|
| JEDEC | TO-92MOD |
| JEITA | — |
| TOSHIBA | 2-5J1A |

Weight: 0.36 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | −160 | V |
| Collector-emitter voltage | $V_{CEO}$ | −160 | V |
| Emitter-base voltage | $V_{EBO}$ | −6 | V |
| Collector current | $I_C$ | −1 | A |
| Base current | $I_B$ | −0.5 | A |
| Collector power dissipation | $P_C$ | 900 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature range | $T_{stg}$ | −55 to 150 | °C |

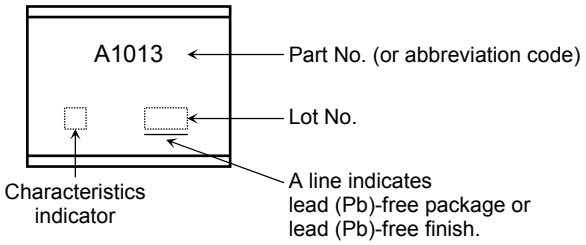
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

## Electrical Characteristics (Ta = 25°C)

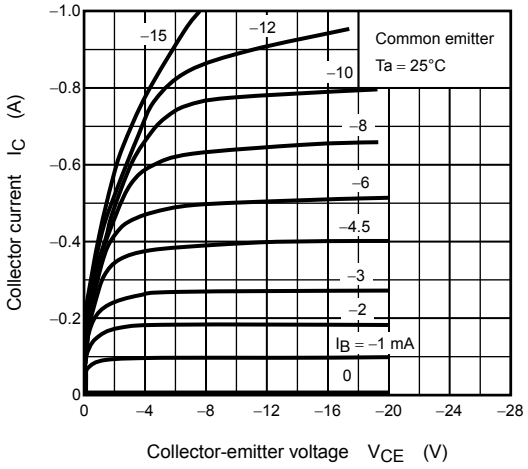
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Collector cut-off current | $I_{CBO}$ | $V_{CB}$ = −150 V, $I_E$ = 0 | — | — | −1.0 | μA |
| Emitter cut-off current | $I_{EBO}$ | $V_{EB}$ = −6 V, $I_C$ = 0 | — | — | −1.0 | μA |
| Collector-emitter breakdown voltage | $V_{(BR)\ CEO}$ | $I_C$ = −10 mA, $I_B$ = 0 | −160 | — | — | V |
| DC current gain | $h_{FE}$ (Note) | $V_{CE}$ = −5 V, $I_C$ = −200 mA | 60 | — | 200 | |
| Collector-emitter saturation voltage | $V_{CE\ (sat)}$ | $I_C$ = −500 mA, $I_B$ = −50 mA | — | — | −1.5 | V |
| Base-emitter voltage | $V_{BE}$ | $V_{CE}$ = −5 V, $I_C$ = −5 mA | −0.45 | — | −0.75 | V |
| Transition frequency | $f_T$ | $V_{CE}$ = −5 V, $I_C$ = −200 mA | 15 | 50 | — | MHz |
| Collector output capacitance | $C_{ob}$ | $V_{CB}$ = −10 V, $I_E$ = 0, f = 1 MHz | — | — | 35 | pF |

Note: $h_{FE}$ classification R: 60 to 120, O: 100 to 200

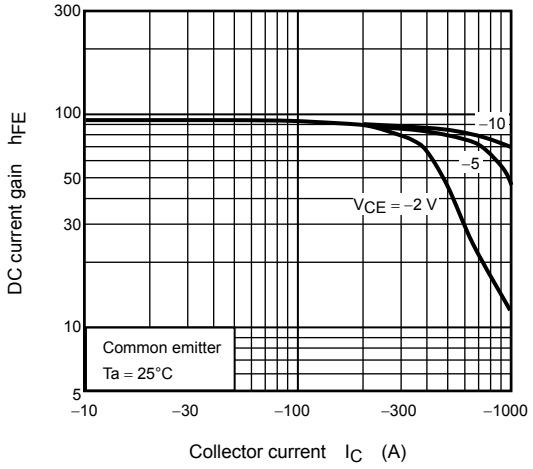
## Marking



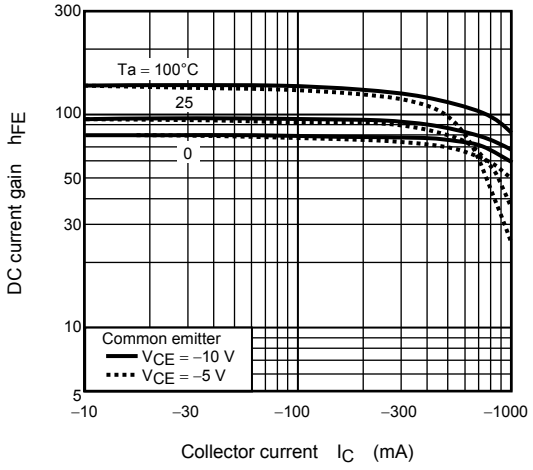
$I_C - V_{CE}$



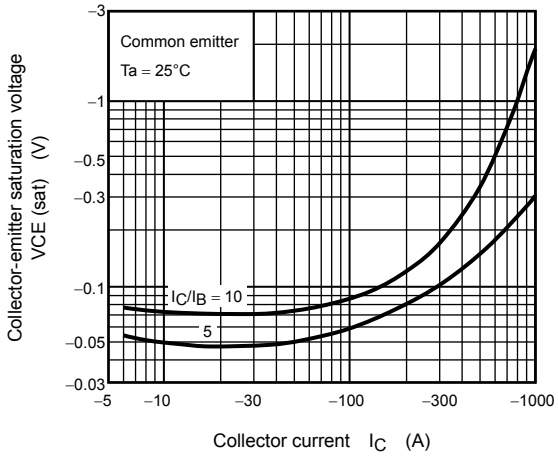

$h_{FE} - I_C$



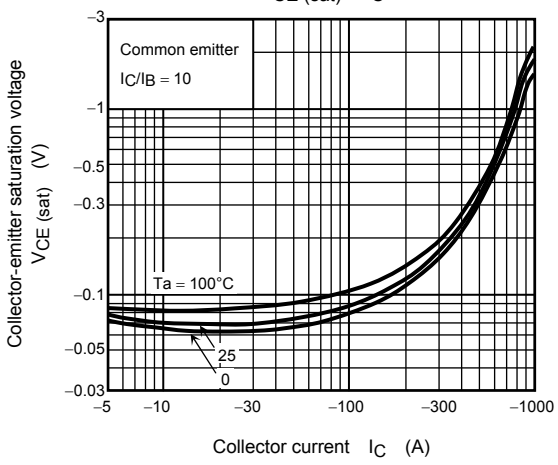

$h_{FE} - I_C$



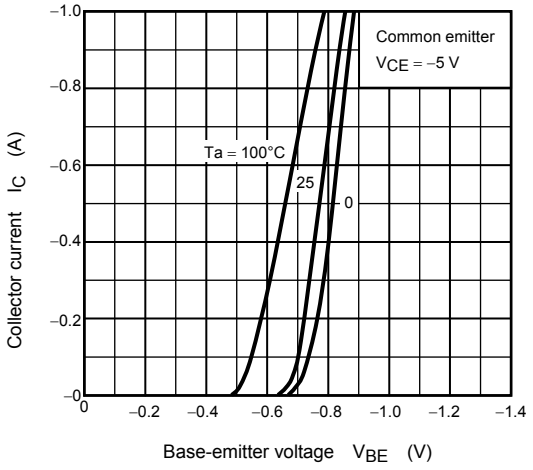

$V_{CE\ (sat)} - I_C$



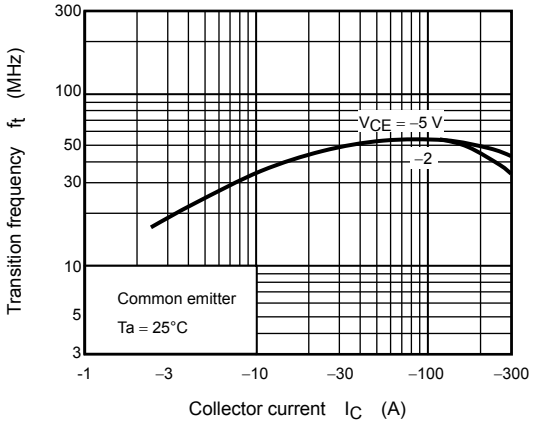

$V_{CE\ (sat)} - I_C$



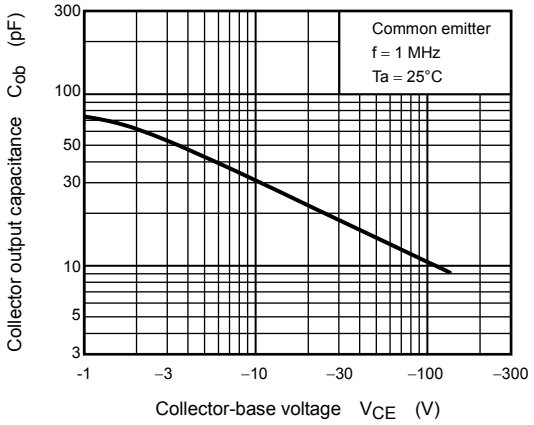

$I_C - V_{BE}$



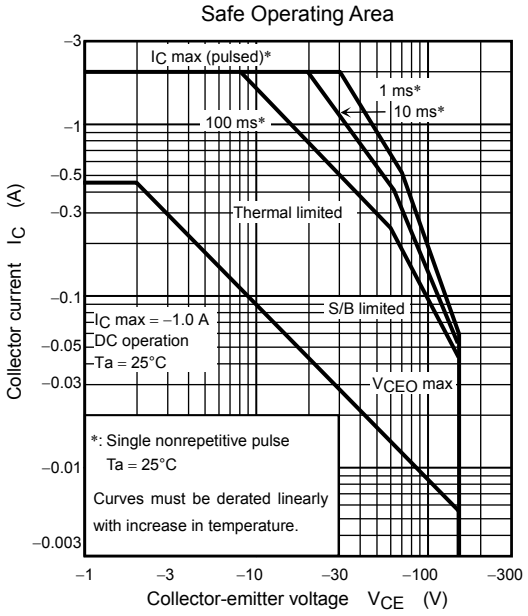
$f_T - I_C$




$C_{ob} - V_{CB}$




Safe Operating Area



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