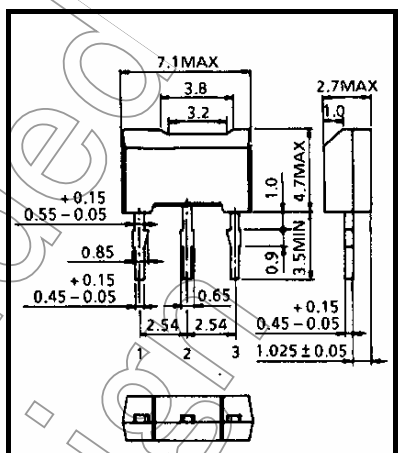
TOSHIBA Transistor Silicon NPN Triple Diffused Type

# 2SC6040

High-Speed and High-Voltage Switching Applications
Switching Regulator Applications
DC-DC Converter Applications

- High-speed switching: $t_f$ = 0.2 μs (max) ($I_C$ = 0.3 A)
- High breakdown voltage: $V_{CES}$ = 800 V, $V_{CEO}$ = 410 V

Unit: mm




| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-7D101A |

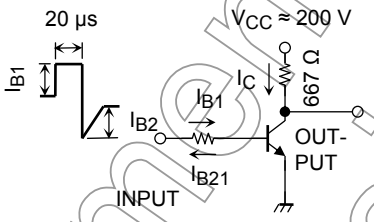
Weight: 0.2 g (typ.)

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

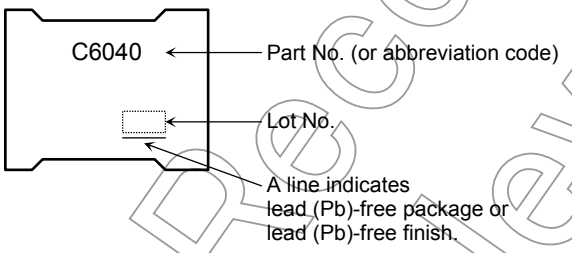
| Characteristic | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | | $V_{CBO}$ | 800 | V |
| Collector-emitter voltage | | $V_{CES}$ | 800 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 410 | V |
| Emitter-base voltage | | $V_{EBO}$ | 8 | V |
| Collector current | DC | $I_C$ | 1.0 | A |
| | Pulse | $I_{CP}$ | 2.0 | |
| Base current | | $I_B$ | 0.5 | A |
| Collector power dissipation | Ta = 25°C | $P_C$ | 1.0 | W |
| 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).

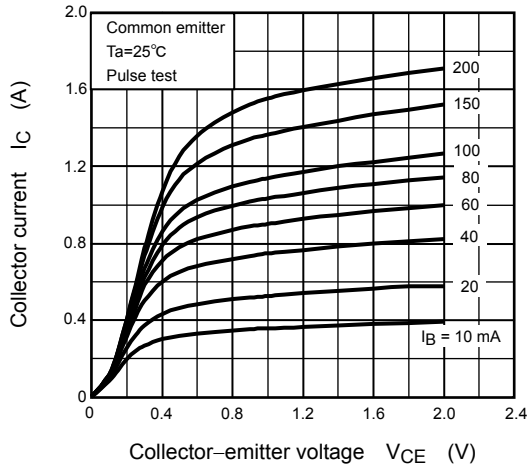
## Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | | $I_{CBO}$ | $V_{CB}$ = 800 V, $I_E$ = 0 | — | — | 100 | μA |
| Emitter cut-off current | | $I_{EBO}$ | $V_{EB}$ = 8 V, $I_C$ = 0 | — | — | 100 | μA |
| Collector-base breakdown voltage | | $V_{(BR)\ CBO}$ | $I_C$ = 1 mA, $I_B$ = 0 | 800 | — | — | V |
| Collector-emitter breakdown voltage | | $V_{(BR)\ CEO}$ | $I_C$ = 10 mA, $I_B$ = 0 | 410 | — | — | V |
| DC current gain | | $h_{FE\ (1)}$ | $V_{CE}$ = 5 V, $I_C$ = 1 mA | 50 | — | — | |
| | | $h_{FE\ (2)}$ | $V_{CE}$ = 5 V, $I_C$ = 0.1 A | 60 | — | 120 | |
| | | $h_{FE\ (3)}$ | $V_{CE}$ = 5 V, $I_C$ = 0.2 A | 50 | — | — | |
| Collector emitter saturation voltage | | $V_{CE\ (sat)}$ | $I_C$ = 0.8 A, $I_B$ = 0.1 A | — | — | 1.0 | V |
| Base-emitter saturation voltage | | $V_{BE\ (sat)}$ | $I_C$ = 0.8 A, $I_B$ = 0.1 A | — | — | 1.3 | V |
| Switching time | Rise time | $t_r$ |  | — | — | 0.5 | μs |
| | Storage time | $t_{stg}$ | | — | — | 4.0 | |
| | Fall time | $t_f$ | $I_{B1}$ = 0.1 A, $-I_{B2}$ = 50 mA<br>DUTY CYCLE ≤ 1% | — | — | 0.2 | |

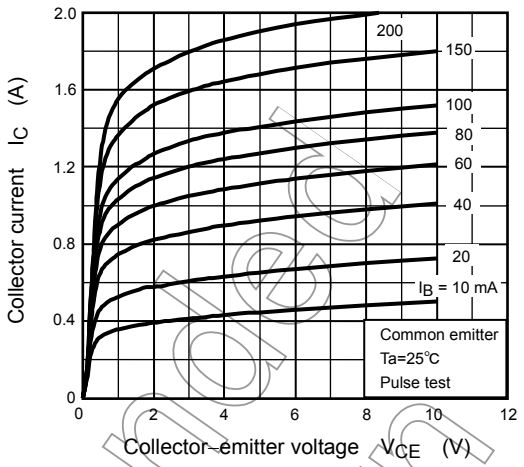
## Marking



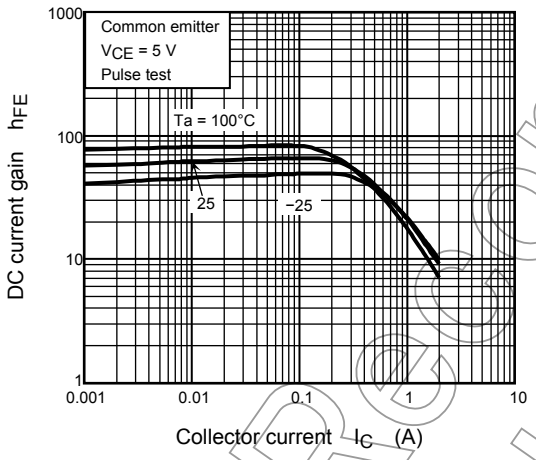
$I_C - V_{CE}$



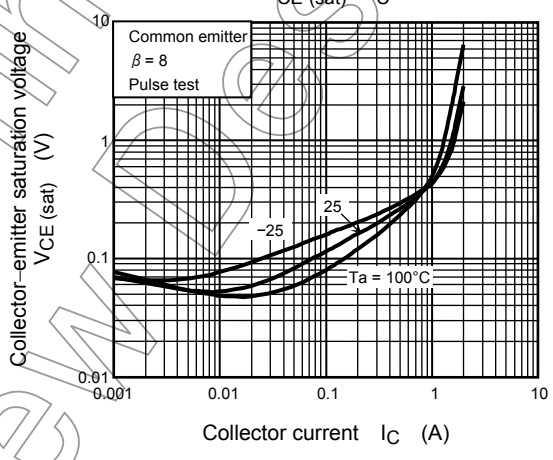

$I_C - V_{CE}$



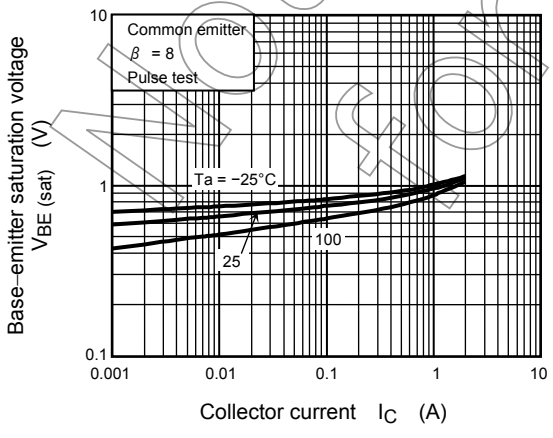

$h_{FE} - I_C$



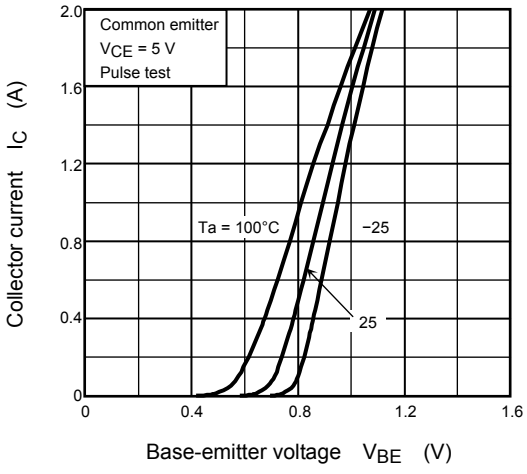

$V_{CE\ (sat)} - I_C$



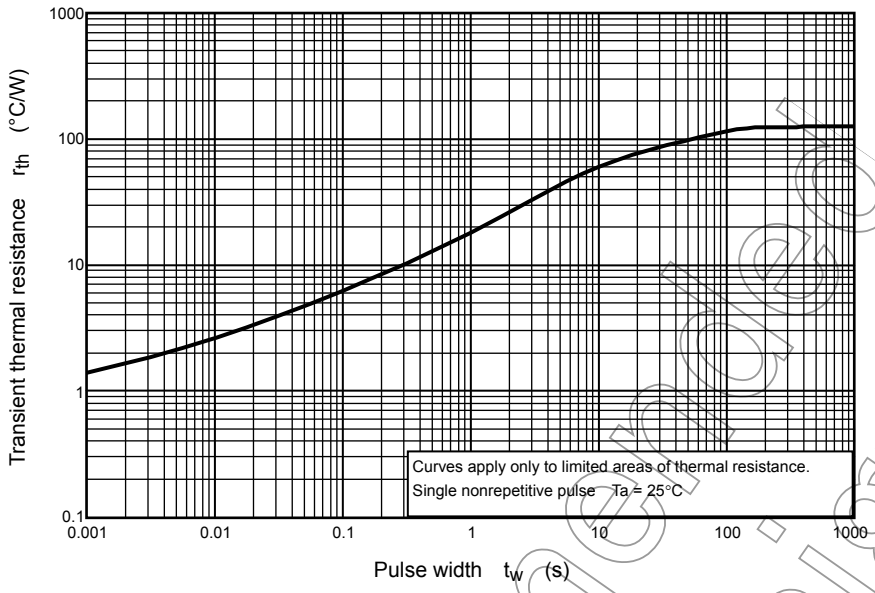

$V_{BE\ (sat)} - I_C$



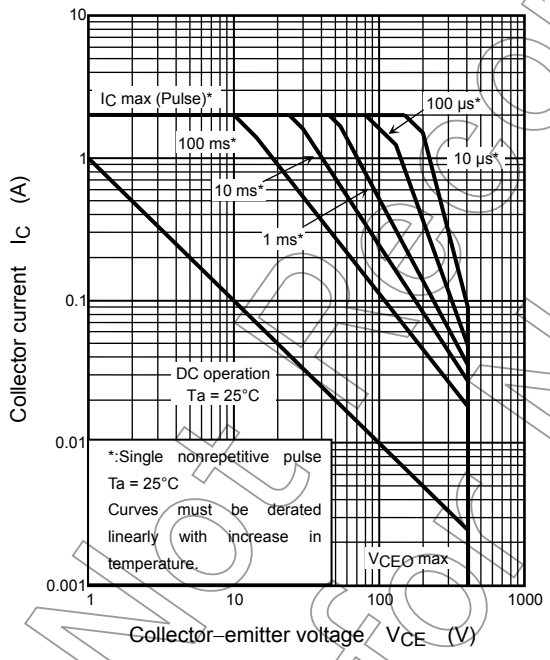

$I_C - V_{BE}$



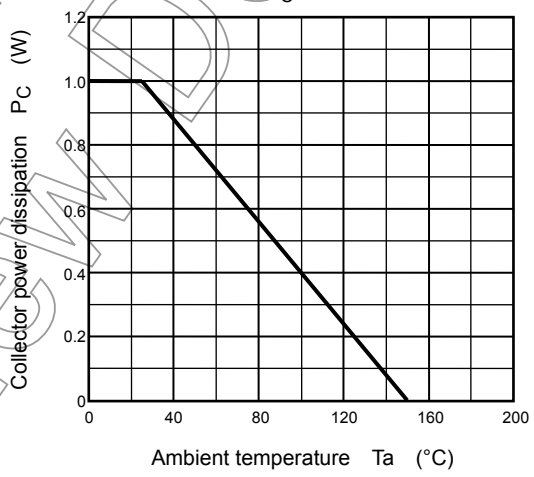
$r_{th} - t_w$




Safe operating area




$P_C - Ta$



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