TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Darlington power transistor)

# 2SD1140

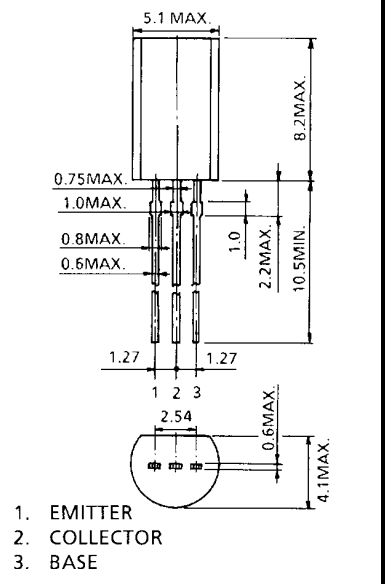
Micro Motor Drive, Hammer Drive Applications
Switching Applications
Power Amplifier Applications

- High DC current gain: $h_{FE}$ = 4000 (min) ($V_{CE}$ = 2 V, $I_C$ = 150 mA)
- Low saturation voltage: $V_{CE\ (sat)}$ = 1.5 V (max) ($I_C$ = 1 A, $I_B$ = 1 mA)

## Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | 30 | V |
| Collector-emitter voltage | $V_{CEO}$ | 30 | V |
| Emitter-base voltage | $V_{EBO}$ | 10 | V |
| Collector current | $I_C$ | 1.5 | A |
| Base current | $I_B$ | 50 | mA |
| Collector power dissipation | $P_C$ | 900 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature range | $T_{stg}$ | −55 to 150 | °C |

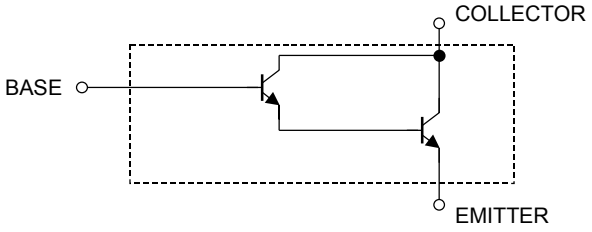
Unit: mm



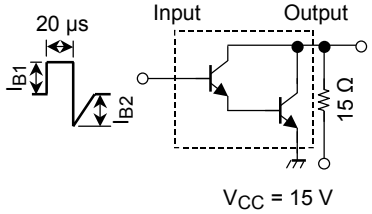

| | |
|---|---|
| JEDEC | TO-92MOD |
| JEITA | — |
| TOSHIBA | 2-5J1A |

Weight: 0.36 g (typ.)

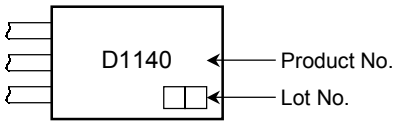
## Equivalent Circuit



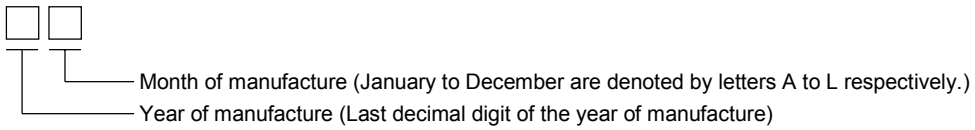
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | | $I_{CBO}$ | $V_{CB}$ = 30 V, $I_E$ = 0 | — | — | 10 | μA |
| Emitter cut-off current | | $I_{EBO}$ | $V_{EB}$ = 10 V, $I_C$ = 0 | — | — | 10 | μA |
| Collector-emitter breakdown voltage | | $V_{(BR)\ CEO}$ | $I_C$ = 10 mA, $I_B$ = 0 | 30 | — | — | V |
| DC current gain | | $h_{FE}$ | $V_{CE}$ = 2 V, $I_C$ = 150 mA | 4000 | — | — | |
| Collector-emitter saturation voltage | | $V_{CE\ (sat)}$ | $I_C$ = 1 A, $I_B$ = 1 mA | — | | 1.5 | V |
| Base-emitter saturation voltage | | $V_{BE\ (sat)}$ | $I_C$ = 1 A, $I_B$ = 1 mA | — | | 2.2 | V |
| Switching time | Turn-on time | $t_{on}$ |  | — | 0.2 | — | μs |
| | Storage time | $t_{stg}$ | | — | 0.6 | — | |
| | Fall time | $t_f$ | $I_{B1} = -I_{B2}$ = 1 mA, duty cycle ≤ 1% | — | 0.3 | — | |

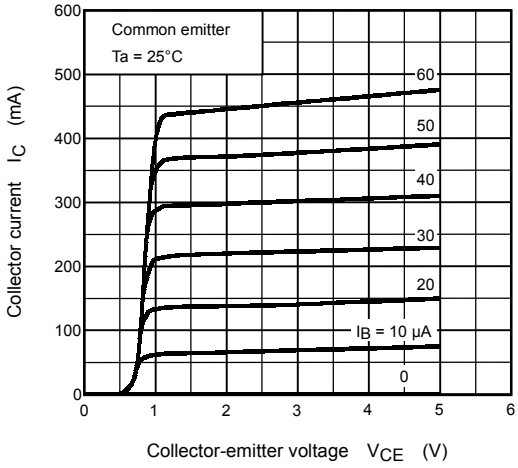
## Marking



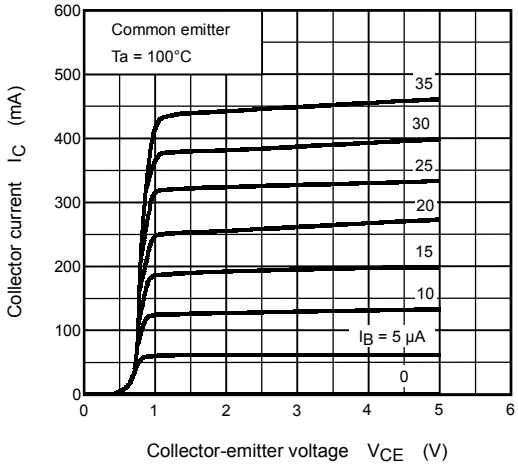

## Explanation of Lot No.



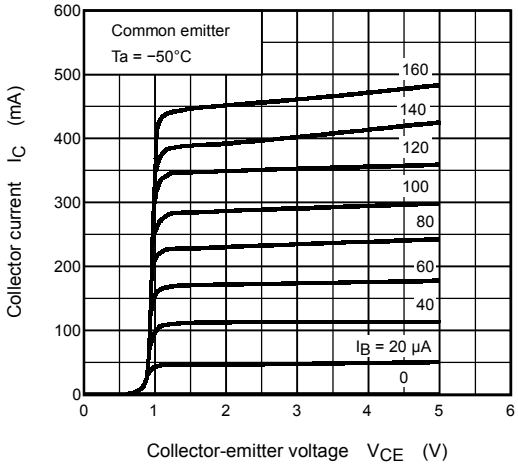
$I_C - V_{CE}$



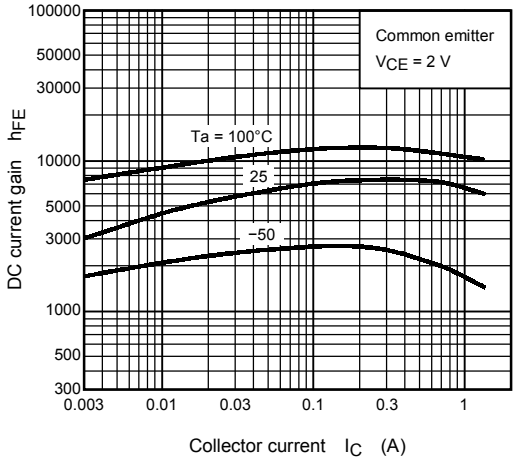

$I_C - V_{CE}$



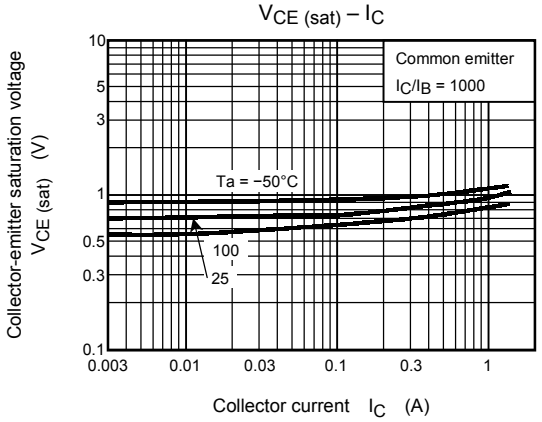

$I_C - V_{CE}$



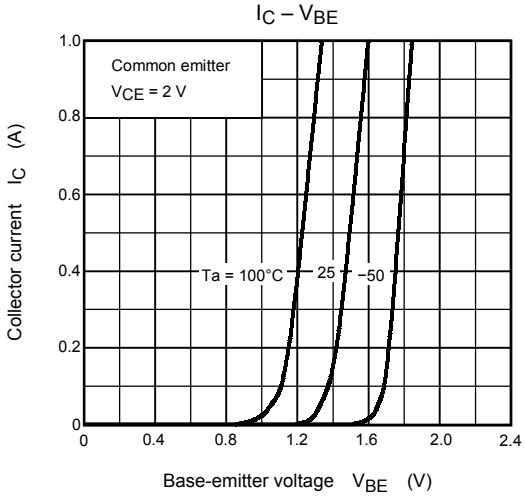

$h_{FE} - I_C$



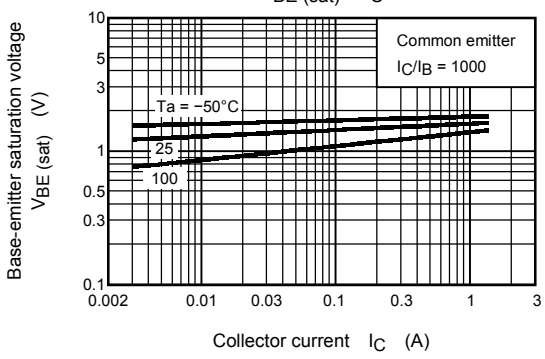

$V_{CE\ (sat)} - I_C$



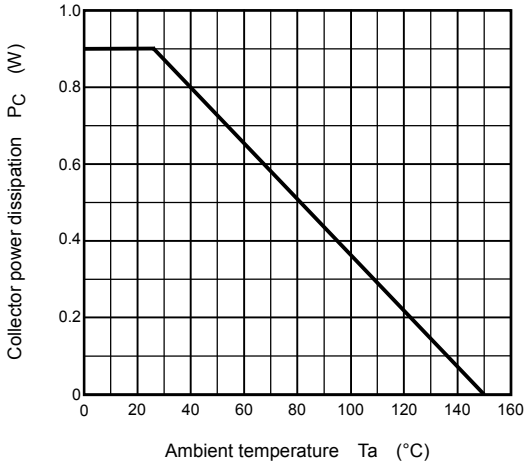

$I_C - V_{BE}$



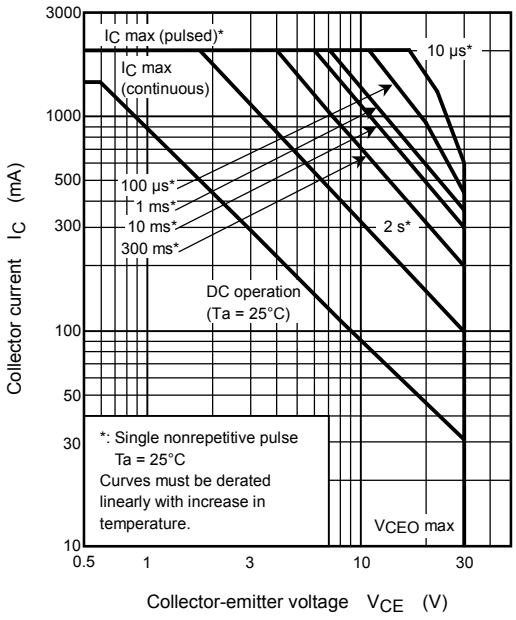
$V_{BE\ (sat)} - I_C$




$P_C - Ta$




Safe Operating Area



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