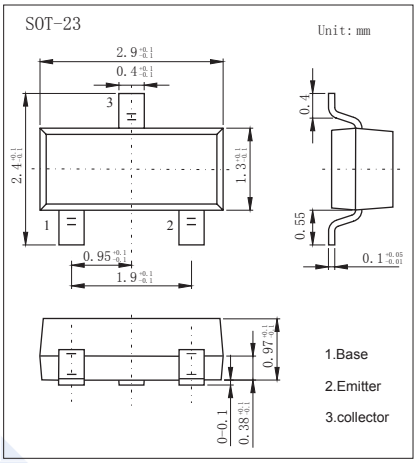
# NPN Transistors

# 2SD1328




## ■ Features

- Collector Current Capability $I_C$=0.5A
- Collector Emitter Voltage $V_{CEO}$=20V

## ■ Absolute Maximum Ratings Ta = 25℃

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Collector - Base Voltage | $V_{CBO}$ | 25 | V |
| Collector - Emitter Voltage | $V_{CEO}$ | 20 | |
| Emitter - Base Voltage | $V_{EBO}$ | 12 | |
| Collector Current - Continuous | $I_C$ | 0.5 | A |
| Collector Current - Pulse | $I_{CP}$ | 1 | |
| Collector Power Dissipation | $P_C$ | 200 | mW |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature Range | $T_{stg}$ | -55 to 150 | |

## ■ Electrical Characteristics Ta = 25℃

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector- base breakdown voltage | $V_{CBO}$ | $I_C$= 100 μA, $I_E$= 0 | 25 | | | V |
| Collector- emitter breakdown voltage | $V_{CEO}$ | $I_C$= 1 mA, $I_B$= 0 | 20 | | | |
| Emitter - base breakdown voltage | $V_{EBO}$ | $I_E$= 100 μ A, $I_C$= 0 | 12 | | | |
| Collector-base cut-off current | $I_{CBO}$ | $V_{CB}$=25 V , $I_E$= 0 | | | 0.1 | uA |
| Emitter-base cut-off current | $I_{EBO}$ | $V_{EB}$=12 V , $I_C$= 0 | | | 0.1 | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$=500mA, $I_B$=20mA | | | 0.4 | V |
| Base - emitter saturation voltage | $V_{BE(sat)}$ | $I_C$=500mA, $I_B$=20mA | | | 1.2 | |
| DC current gain | $h_{FE}$ | $V_{CE}$= 2V, $I_C$= 500mA | 200 | | 800 | |
| ON resistanse | $R_{on}$ | | | 1 | | Ω |
| Collector output capacitance | $C_{ob}$ | $V_{CB}$= 10V,$I_E$=0,f=1MHz | | 10 | | pF |
| Transition frequency | $f_T$ | $V_{CB}$=10V, $I_E$=-50mA,f=200MHz | | 200 | | MHz |

## ■ Classification of $h_{fe}$

| Type | 2SD1328-R | 2SD1328-S | 2SD1328-T |
|---|---|---|---|
| Range | 200-350 | 300-500 | 400-800 |
| Marking | 1DR | 1DS | 1DT |

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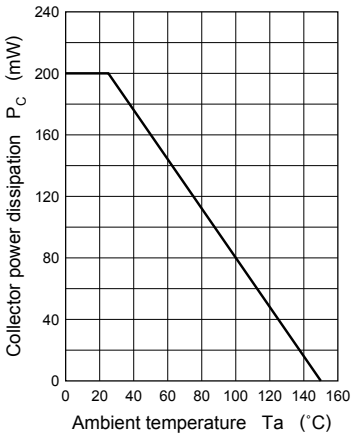
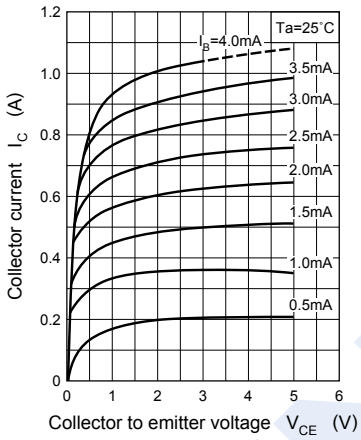
■ Typical Characterisitics

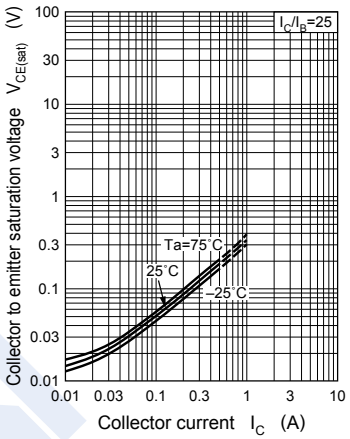
$P_C$ — Ta



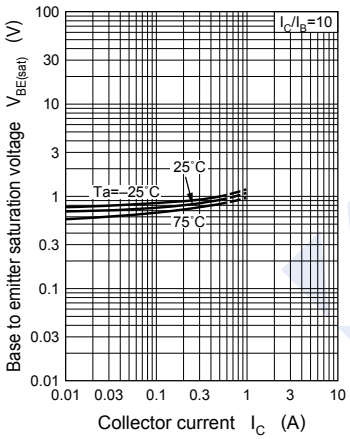

$I_C$ — $V_{CE}$



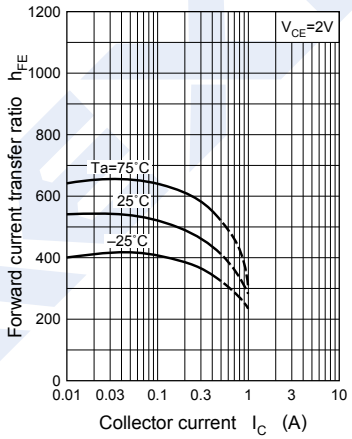

$V_{CE(sat)}$ — $I_C$



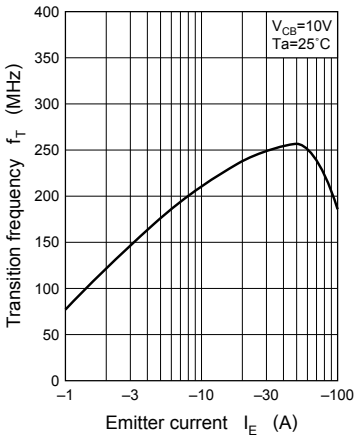

$V_{BE(sat)}$ — $I_C$



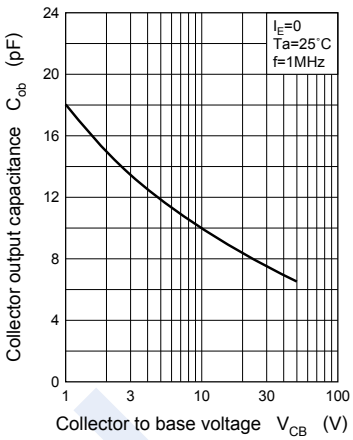

$h_{FE}$ — $I_C$



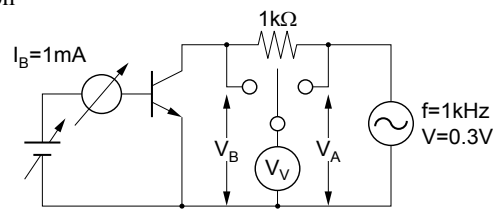

$f_T$ — $I_E$




$C_{ob}$ — $V_{CB}$




$R_{on}$ Measurement circuit




$$R_{on}=\frac{V_B}{V_A-V_B}\cdot 1000(\Omega)$$