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STMicroelectronics
STD1802T4-A

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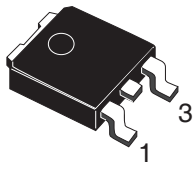
# STD1802T4-A

## Low voltage fast-switching NPN power transistor

## Features

- This device is qualified for automotive application
- Very low collector to emitter saturation voltage
- High current gain characteristic
- Fast-switching speed
- Surface-mounting DPAK (TO-252) power package in tape & reel (suffix “T4)




**TO-252**
**DPAK**
(suffix “T4”)

## Description

The device is manufactured in Planar technology with “Base Island” layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

## Applications

- CCFL drivers
- Voltage regulators
- Relay drivers
- High efficiency, low voltage, switching applications

**Figure 1. Internal schematic diagram**

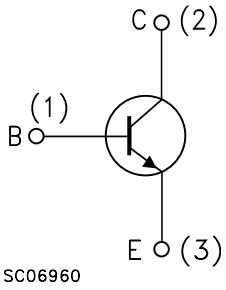



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| STD1802T4-A | D1802 | DPAK | Tape & reel |

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base voltage ($I_E$ =0) | 80 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ =0) | 60 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ =0) | 6 | V |
| $I_C$ | Collector current | 3 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5ms) | 6 | A |
| $I_B$ | Base current | 1 | A |
| $P_{tot}$ | Total dissipation at $T_c \leq 25°C$ | 15 | W |
| $T_{stg}$ | Storage temperature | -65 to 150 | °C |
| $T_J$ | Max. operating junction temperature | 150 | °C |

**Table 3. Thermal data**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal resistance junction-case | max | 8.33 | °C/W |

# 2 Electrical characteristics

($T_{case}$ = 25°C unless otherwise specified)

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector cut-off current ($I_E$ =0) | $V_{CB}$ = 40V | | | 0.1 | µA |
| $I_{EBO}$ | Emitter cut-off current ($I_C$ =0) | $V_{EB}$ = 4V | | | 0.1 | µA |
| $V_{(BR)CBO}$ | Collector-base breakdown voltage ($I_E$ = 0) | $I_C$ =100µA | 80 | | | V |
| $V_{(BR)CEO}$ | Collector-emitter breakdown voltage ($I_B$ = 0) | $I_C$ =1mA | 60 | | | V |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage ($I_C$ = 0) | $I_E$ =100µA | 6 | | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ =2A $I_B$ =100mA<br>$I_C$ =3A $I_B$ =150mA | | 150<br>200 | 300<br>400 | mV<br>mV |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ =2A $I_B$ =100mA | | 0.9 | 1.2 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ =100mA $V_{CE}$ =2V<br>$I_C$ =3A $V_{CE}$ =2V | 200<br>100 | | 400 | |
| $f_T$ | Transition frequency | $V_{CE}$ =10V $I_C$ =50mA | | 150 | | MHz |
| $C_{CBO}$ | Collector-base capacitance | $V_{CB}$ =10V f = 1MHz | | 50 | | pF |
| $t_{ON}$<br>$t_s$<br>$t_f$ | Resistive load<br>Turn-on time<br>Storage time<br>Fall time | $I_C$ =1A $V_{CC}$ =30V<br>$I_{B1}$ =-$I_{B2}$ =0.1A | | 50<br>1.35<br>120 | | ns<br>µs<br>ns |

Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

## 2.1 Electrical characteristics (curves)

**Figure 2. Derating curve**

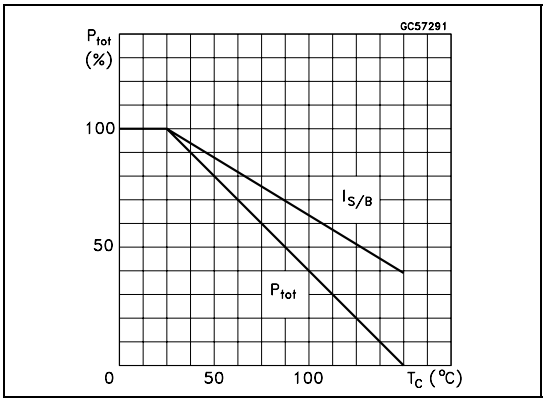



**Figure 3. DC current gain**

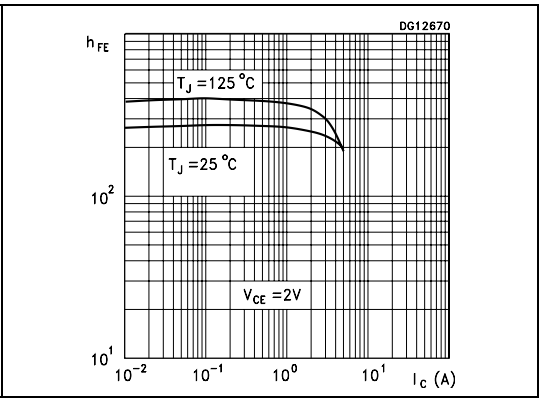



**Figure 4. Collector-emitter saturation voltage**

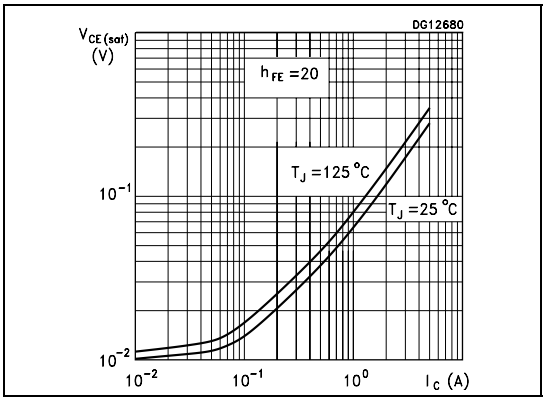



**Figure 5. Collector-emitter saturation voltage**

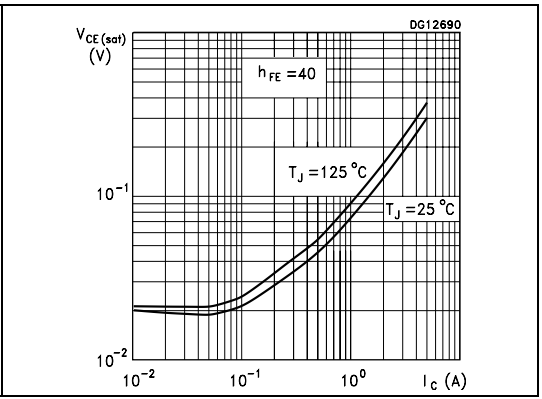



**Figure 6. Base-emitter saturation voltage**

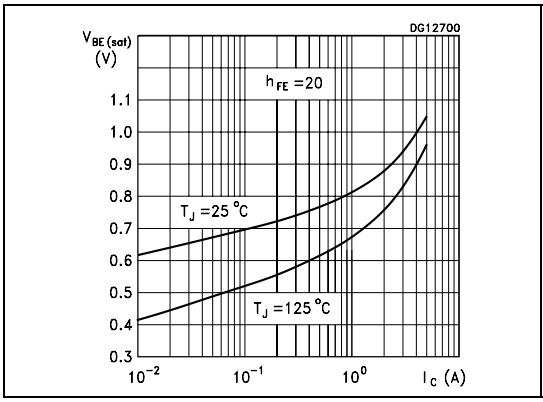



**Figure 7. Base-emitter on voltage**

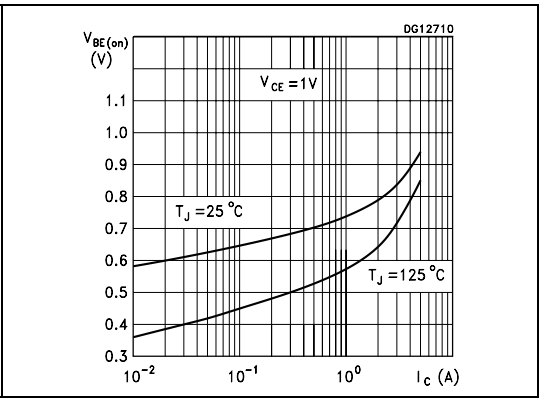


**Figure 8. Switching times resistive load**

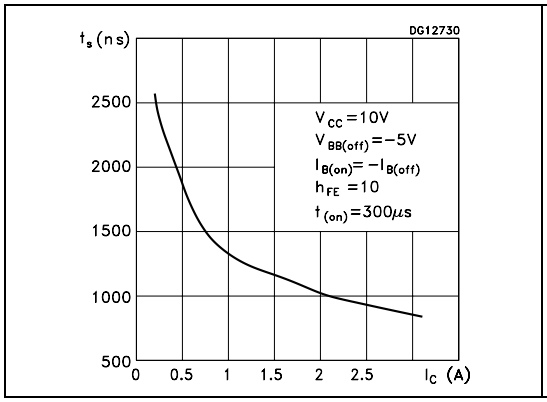



**Figure 9. Switching times resistive load**

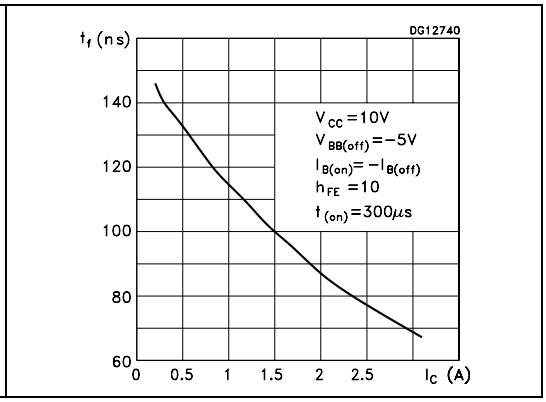



**Figure 10. Switching times resistive load**

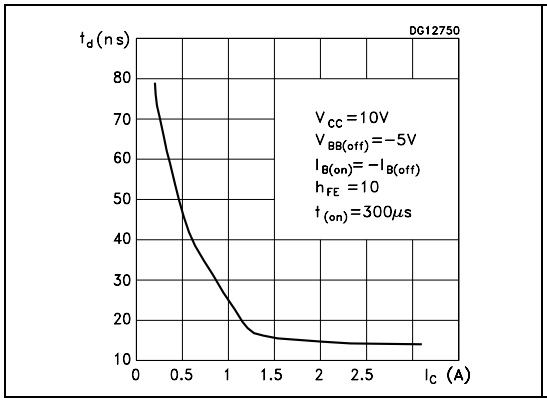



**Figure 11. Switching times inductive load**

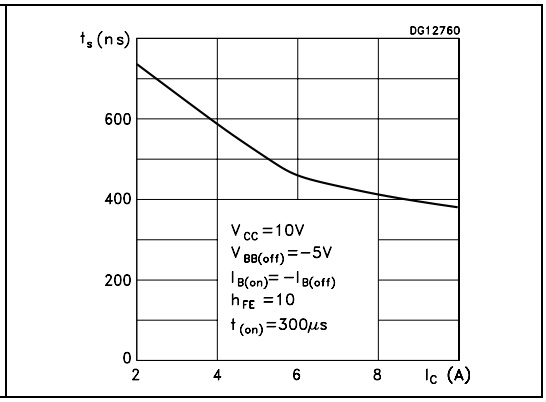
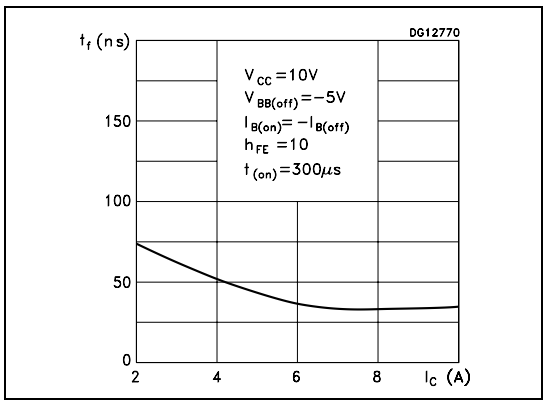
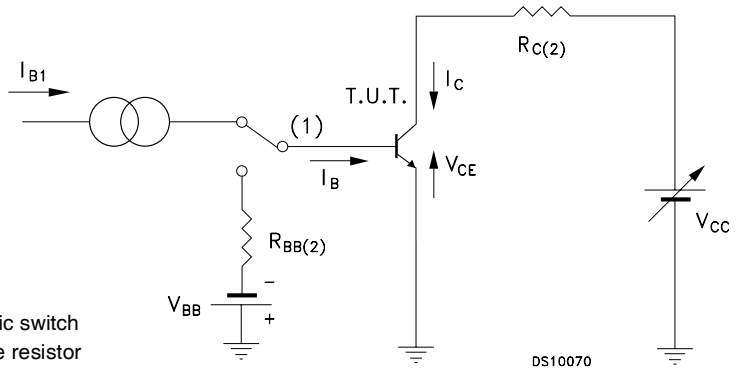



**Figure 12. Switching times resistive load**



## 2.2 Test circuits

**Figure 13. Resistive load switching test circuit**



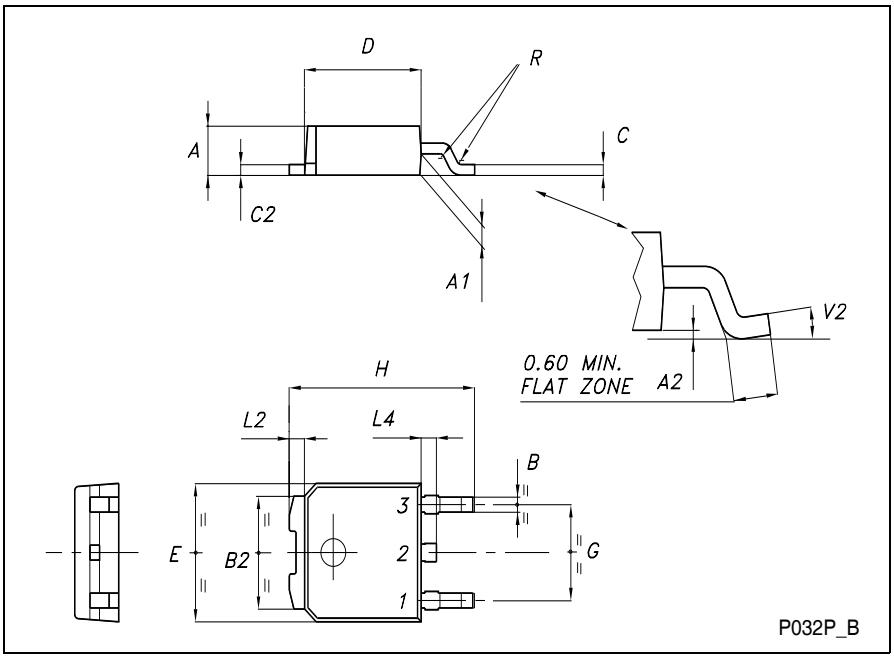

1) Fast electronic switch
2) Non-inductive resistor

# 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

## TO-252 (DPAK) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.20 | | 2.40 | 0.087 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 5.40 | 0.204 | | 0.213 |
| C | 0.45 | | 0.60 | 0.018 | | 0.024 |
| C2 | 0.48 | | 0.60 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| G | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | 9.35 | | 10.10 | 0.368 | | 0.398 |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.60 | | 1.00 | 0.024 | | 0.039 |
| V2 | 0° | | 8° | 0° | | 0° |



# 4 Revision history

**Table 5. Revision history**

| Date | Revision | Changes |
|---|---|---|
| 28-Jun-2007 | 1 | Initial release. |

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