# STD840DN40

## Dual NPN high voltage transistors in a single package

**Datasheet — production data**

## Features

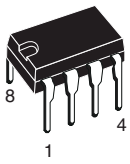
- Low $V_{CE(sat)}$
- Simplified circuit design
- Reduced component count
- Fast switching speed

## Applications

- Compact fluorescent lamp (CFL) 220 V mains
- Electronic ballast for fluorescent lighting

## Description

This device is a dual NPN high voltage power transistor manufactured using multi-epitaxial planar technology. It is housed in a dual-island DIP-8 package, with separated terminals for a high degree of mounting flexibility.




**DIP-8**

**Figure 1. Internal schematic diagram**

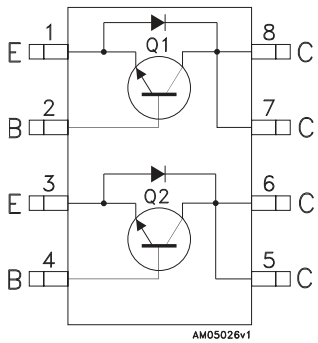



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| STD840DN40 | D840DN40 | DIP-8 | Tube |

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base voltage ($I_E$ = 0) | 700 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | 400 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0, $I_B$ = 1.5 A, $t_p$ < 10 ms) | $V_{(BR)EBO}$ | V |
| $I_C$ | Collector current | 4 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5 ms) | 8 | A |
| $I_B$ | Base current | 1.5 | A |
| $I_{BM}$ | Base peak current ($t_P$ < 5 ms) | 3 | A |
| $P_{TOT}$ | Total dissipation at $T_{amb}$ = 25 °C single transistor | 3 | W |
| | Total dissipation at $T_{case}$ = 25 °C single transistor | 45 | 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 |
|---|---|---|---|
| $R_{thJA}$ (1) | Thermal resistance junction-ambient (single transistor) | 42 | °C/W |
| $R_{thJC}$ | Thermal resistance junction-case (single transistor) | 2.7 | °C/W |

1. Device mounted on PCB area of 25 mm².

# 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector cut-off current ($V_{BE}$ = 0) | $V_{CE}$ = 700 V<br>$V_{CE}$ = 700 V $T_c$ = 125 °C | | | 100<br>500 | µA<br>µA |
| $I_{CEO}$ | Collector cut-off current ($I_B$ = 0) | $V_{CE}$ = 400 V | | | 250 | µA |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage ($I_C$ = 0) | $I_E$ = 10 mA | 9 | | 18 | V |
| $V_{CEO(sus)}$(1) | Collector-emitter sustaining voltage ($I_B$ = 0) | $I_C$ = 10 mA | 400 | | | V |
| $V_{CE(sat)}$(1) | Collector-emitter saturation voltage | $I_C$ = 1 A $I_B$ = 0.2 A<br>$I_C$ = 2 A $I_B$ = 0.4 A | | | 0.5<br>1 | V<br>V |
| $V_{BE(sat)}$(1) | Base-emitter saturation voltage | $I_C$ = 1 A $I_B$ = 0.2 A<br>$I_C$ = 2 A $I_B$ = 0.4 A | | | 1.2<br>1.3 | V<br>V |
| $h_{FE}$(1) | DC current gain | $I_C$ = 10 mA $V_{CE}$ = 5 V<br>$I_C$ = 2 A $V_{CE}$ = 5 V | 10<br>8 | | <br>24 | |
| $V_F$ | Diode forward voltage | $I_F$ = 1 A | | | 2.5 | V |
| <br>$t_s$<br>$t_f$ | Resistive load<br>Storage time<br>Fall time | <br>$I_C$ = 1 A $I_{B1}$ = - $I_{B2}$ = 0.2 A<br>$V_{CC}$ = 125 V $t_p$ = 20 µs | | <br>2.5<br>0.2 | | <br>µs<br>µs |

1. Pulse test: pulse duration ≤300 µs, duty cycle ≤ 2 %.

## 2.1 Electrical characteristics (curves)

**Figure 2. DC current gain ($V_{CE}$ = 1 V)**

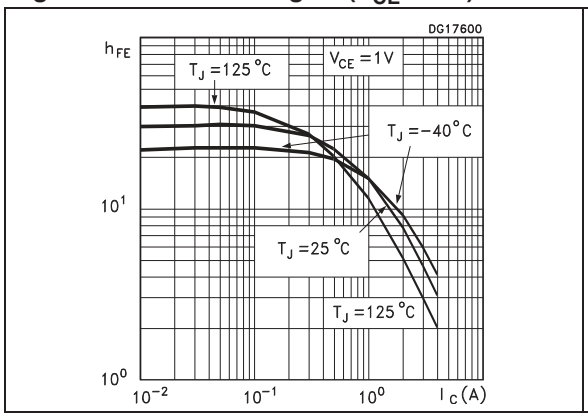



**Figure 3. DC current gain ($V_{CE}$ = 5 V)**

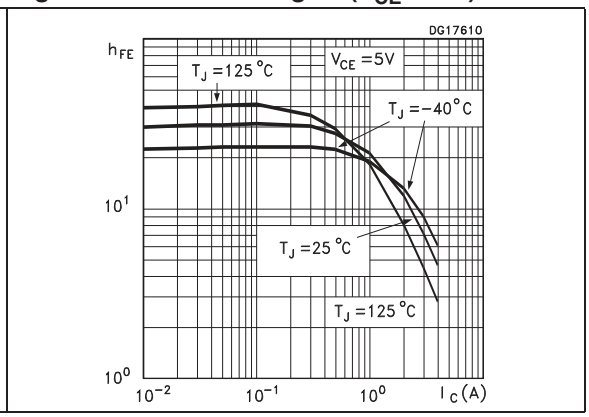



**Figure 4. Collector-emitter saturation voltage**

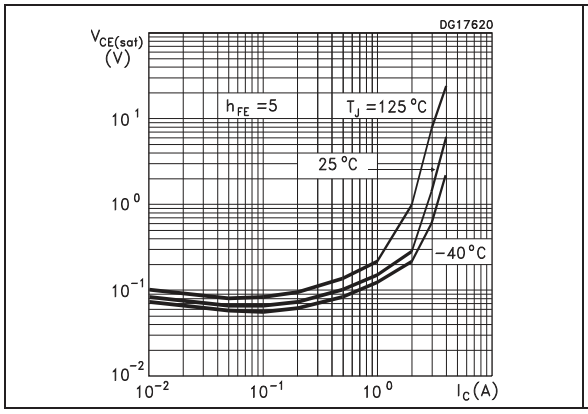



**Figure 5. Base-emitter saturation voltage**

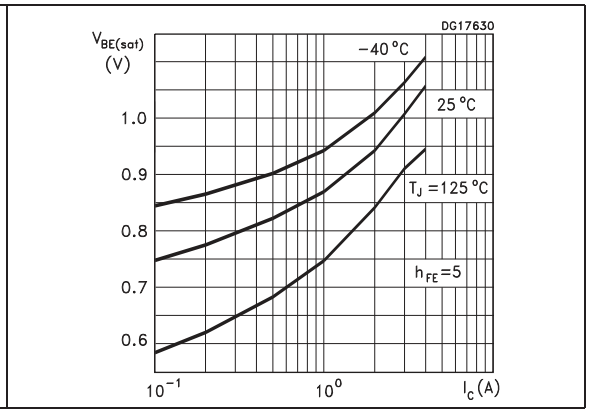



**Figure 6. Freewheel diode forward voltage**

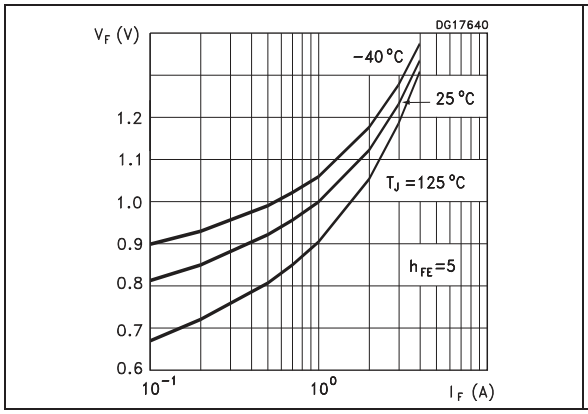
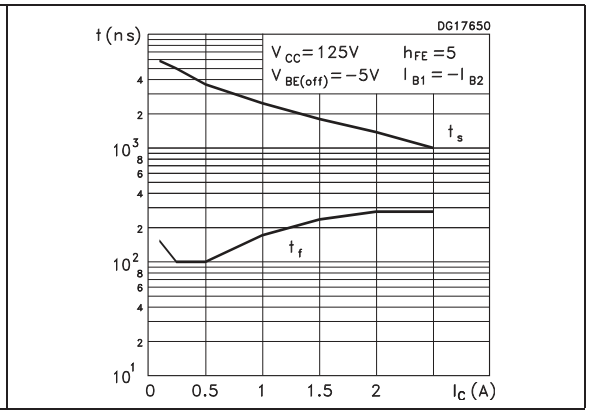
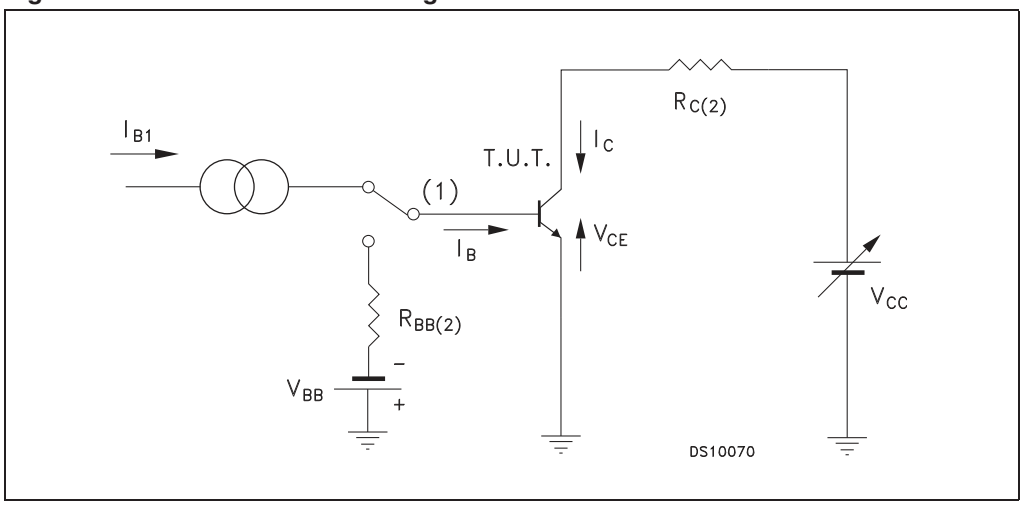



**Figure 7. Resistive load switching time**



# 3 Test circuit

**Figure 8. Resistive load switching test circuit**




1. Fast electronic switch
2. Non-inductive resistor

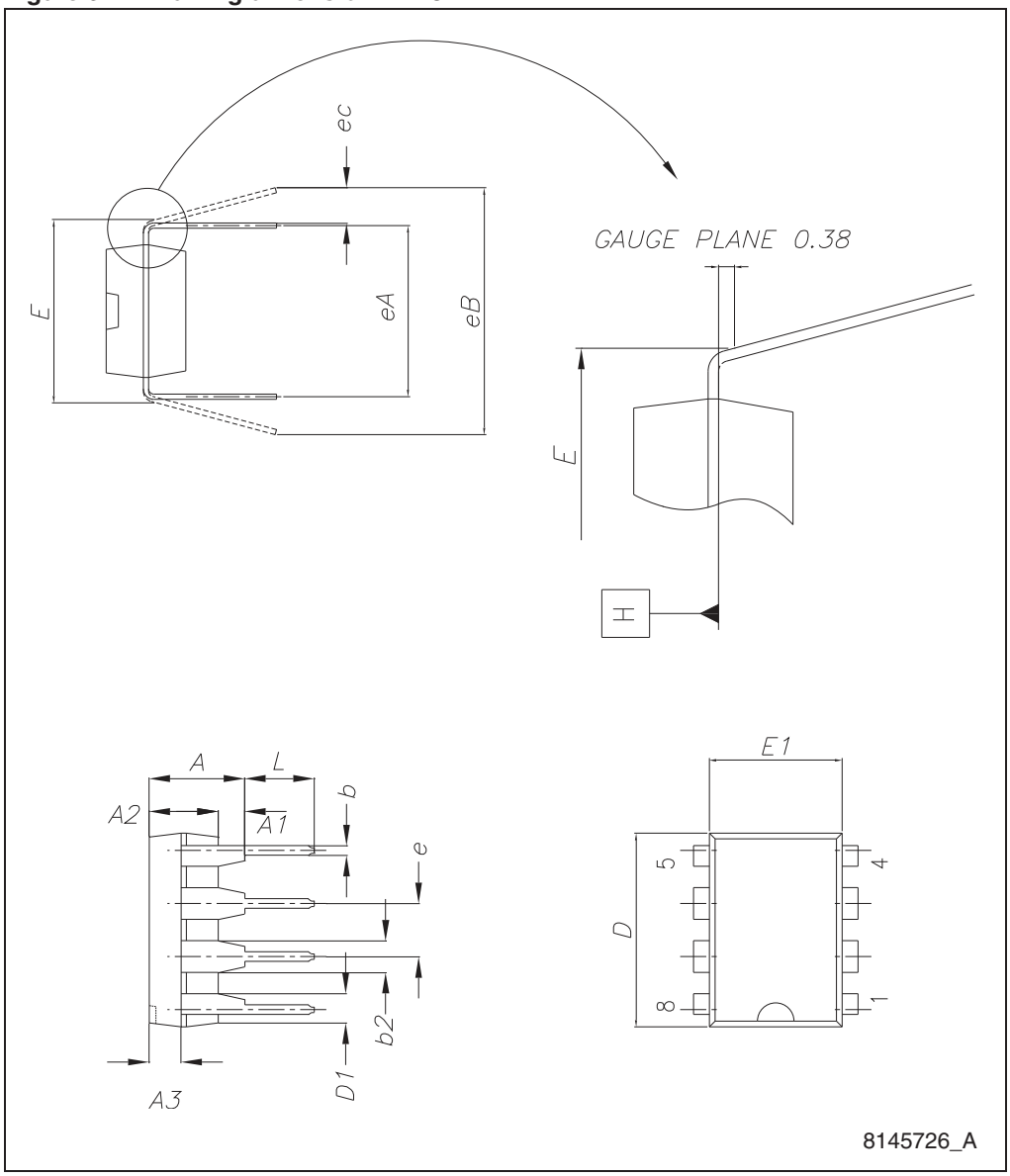
# 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

**Table 5. DIP-8 mechanical data**

| Dim. | mm. | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | | | 4.80 |
| A1 | 0.50 | | |
| A2 | 3.10 | | 3.50 |
| A3 | 1.40 | | 1.60 |
| b | 0.38 | | 0.55 |
| b1 | 0.38 | | 0.51 |
| b2 | 1.47 | | 1.57 |
| b3 | 0.89 | | 1.09 |
| c | 0.21 | | 0.35 |
| c1 | 0.20 | | 0.30 |
| D | 9.10 | | 9.30 |
| D1 | 0.13 | | |
| E | 7.62 | | 8.25 |
| E1 | 6.25 | | 6.45 |
| e | | 2.54 | |
| eA | | 7.62 | |
| eB | 7.62 | | 10.90 |
| eC | 0 | | 1.52 |
| L | 2.92 | | 3.81 |

**Figure 9. Drawing dimension DIP-8**



# 5 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 18-Nov-2009 | 1 | Initial release. |
| 16-Apr-2010 | 2 | Inserted $P_{TOT}$ and $R_{thJA}$ values *Table 2* and *Table 3 on page 2*. |
| 23-Oct-2012 | 3 | Modified $P_{TOT}$ and $R_{thJA}$ values in *Table 2* and *Table 3 on page 2*. Minor text changes. |

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