# STD815CP40

## Complementary transistor pair in a single package

**Datasheet — production data**

## Features

- Low $V_{CE(sat)}$
- Simplified circuit design
- Reduced component count
- Low spread of dynamic parameters

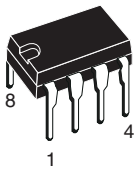
## Application

- Compact fluorescent lamp (CFL) 220 V mains

## Description

The STD815CP40 is a hybrid complementary pair of power bipolar transistors manufactured by using the high voltage multi-epitaxial planar technology for high switching speeds and medium voltage capability.

The STD815CP40 is housed in dual island DIP-8 package with separated terminals for higher assembly flexibility, specifically recommended to be used in a new solution for compact fluorescent lamp (CFL).




**DIP-8**

**Figure 1. Internal schematic diagram**

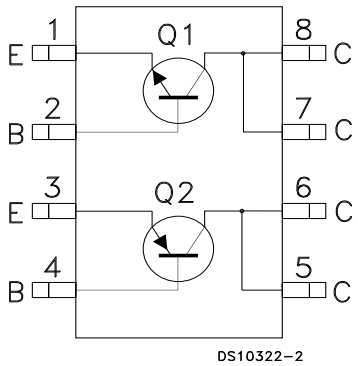



**Table 1. Device summary**

| Order code | Marking | Package | Packing |
|---|---|---|---|
| STD815CP40 | D815CP40 | DIP-8 | Tube |



This is information on a product in full production. www.st.com

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | | Unit |
|---|---|---|---|---|
| | | NPN | PNP | |
| $V_{CBO}$ | Collector-base voltage ($I_E$ = 0) | 700 | 500 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | 400 | | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0, $I_B$ = 0.75 A, $t_p$ < 10 ms) | $V_{(BR)EBO}$ | | V |
| $I_C$ | Collector current | 1.5 | | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5 ms) | 3 | | A |
| $I_B$ | Base current | 0.75 | | A |
| $I_{BM}$ | Base peak current ($t_P$ < 1 ms) | 1.5 | | A |
| $P_{TOT}$ | Total dissipation at $T_{amb}$ = 25 °C single transistor | 2.6 | | W |
| $P_{TOT}$ | 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) | 48 | °C/W |
| $R_{thJC}$ (1) | Thermal resistance junction-case (single transistor) | 2.7 | °C/W |

1. When mounted on 25mm square pad of 2 oz. copper, t ≤10 sec.

*Note: For PNP types voltage and current values are negative.*

# 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) | For NPN:<br>$V_{CE}$ = 700 V<br>$V_{CE}$ = 700 V $T_C$ = 125°C<br>For PNP:<br>$V_{CE}$ = 500 V<br>$V_{CE}$ = 500 V $T_C$ = 125°C | | | <br>1<br>5<br><br>1<br>5 | <br>mA<br>mA<br><br>mA<br>mA |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage ($I_C$ = 0) | $I_E$ = 10 mA<br>For NPN:<br>For PNP: | <br>12<br>5 | | <br>18<br>10 | <br>V<br>V |
| $V_{CEO(sus)}$ (1) | Collector-emitter sustaining voltage ($I_B$ = 0) | $I_C$ = 5 mA | 400 | | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = 0.5 A $I_B$ = 0.1 A<br>$I_C$ = 0.35 A $I_B$ = 50 mA | | | 0.5<br>1 | V<br>V |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = 0.5 A $I_B$ = 0.1 A | | | 1 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = 10 mA $V_{CE}$ = 5 V<br>$I_C$ = 0.35A $V_{CE}$ = 5 V<br>$I_C$ = 1 A $V_{CE}$ = 5 V | 10<br>16<br>4 | | 34 | |
| <br>$t_r$<br>$t_s$<br>$t_f$ | Resistive load<br>Rise time<br>Storage time<br>Fall time | <br>$I_C$ = 0.35 A $V_{CC}$ = 125 V<br>$I_{B1}$ = 70 mA $I_{B2}$ = -70 mA<br>$t_p \geq 25$ µs | | <br>100<br>2.2<br>0.2 | | <br>ns<br>µs<br>µs |
| <br>$t_s$<br>$t_f$ | Inductive load<br>Storage time<br>Fall time | $I_C$ = 0.5 A $I_{B1}$ = 0.1 A<br>$V_{BE(off)}$ = -5 V<br>$V_{clamp}$ = 300 V L = 10 mH | | <br>450<br>80 | | <br>ns<br>ns |

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

*Note: For PNP types voltage and current values are negative*

## 2.1 Electrical characteristics (curves)

**Figure 2. DC current gain NPN ($V_{CE}$ = 5 V)**

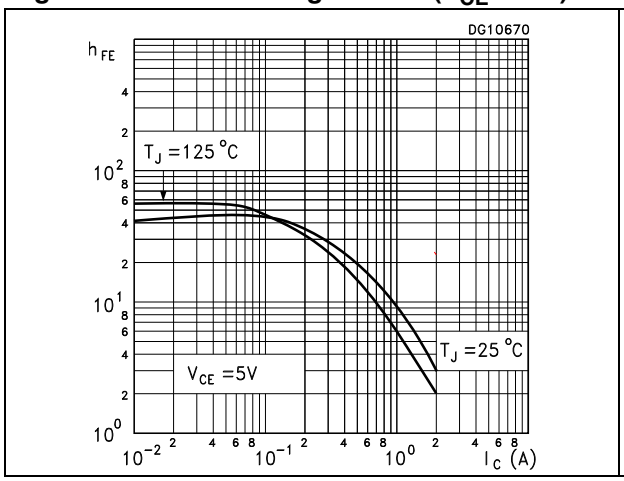



**Figure 3. DC current gain PNP ($V_{CE}$ = - 5 V)**

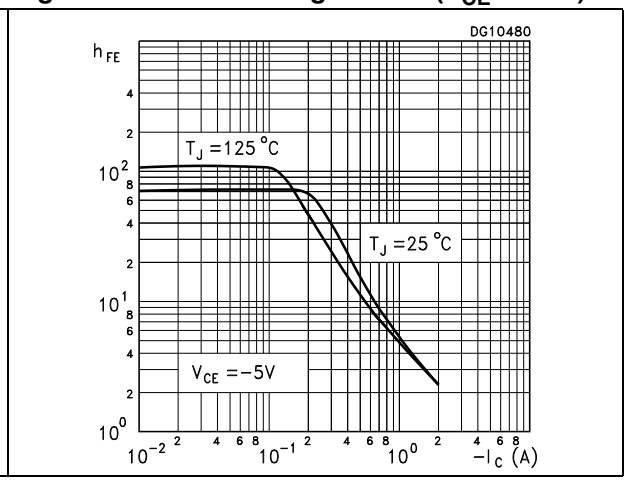



**Figure 4. DC current gain NPN ($V_{CE}$ = 1 V)**

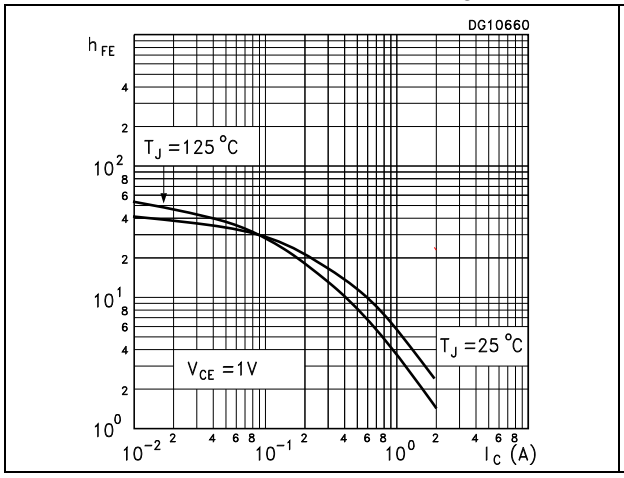



**Figure 5. DC current gain PNP ($V_{CE}$ = - 1 V)**

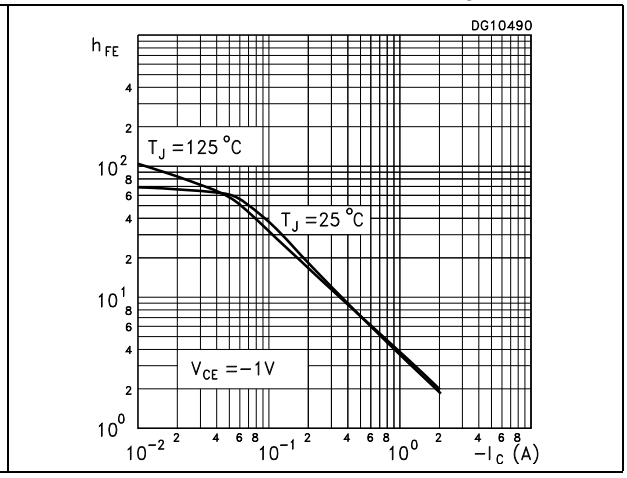



**Figure 6. Derating curve**

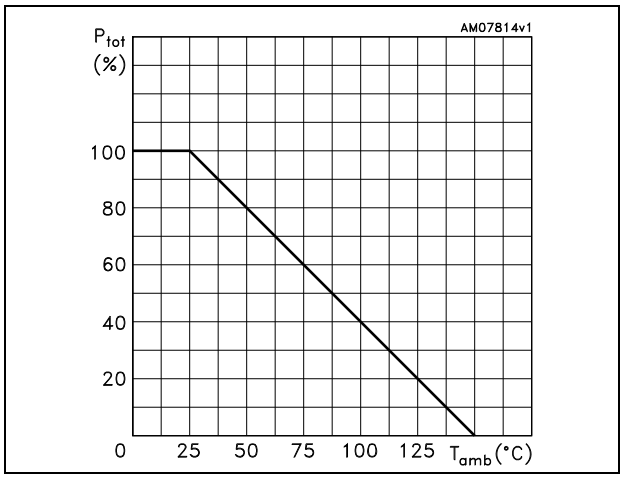


**Figure 7. Collector emitter saturation voltage NPN**

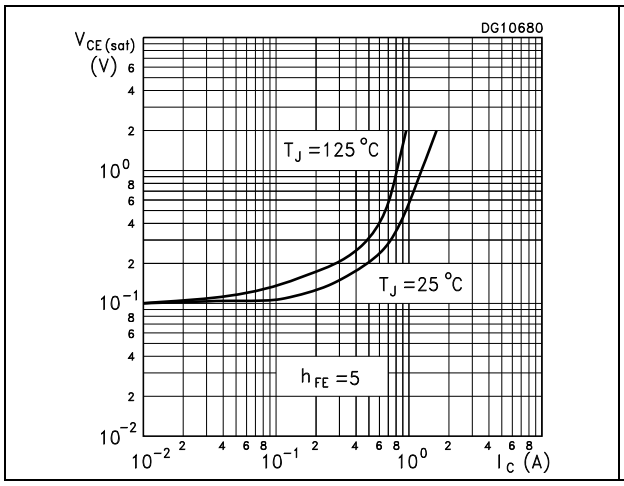



**Figure 8. Collector emitter saturation voltage PNP**

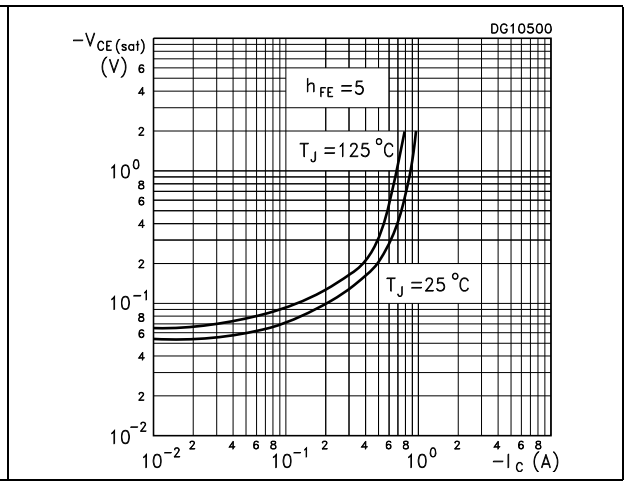



**Figure 9. Base emitter saturation voltage NPN**

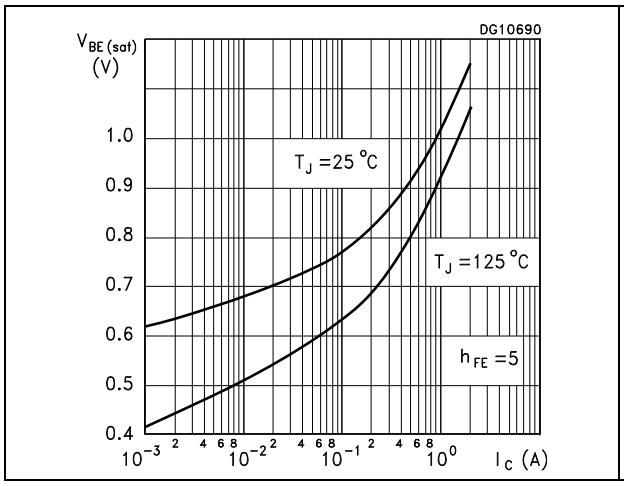



**Figure 10. Base emitter saturation voltage PNP**

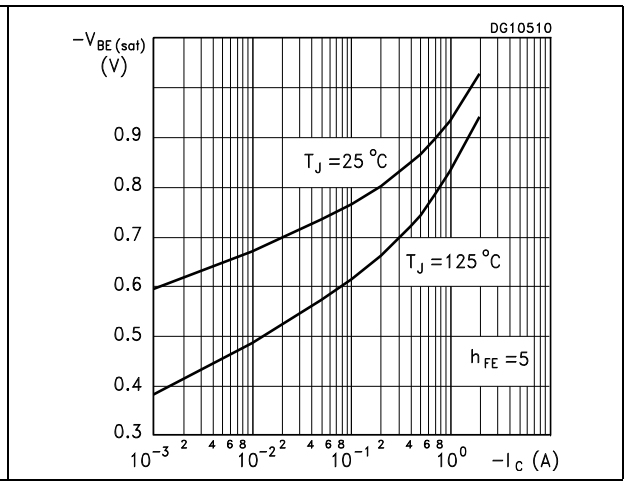



**Figure 11. Resistive load fall time NPN**

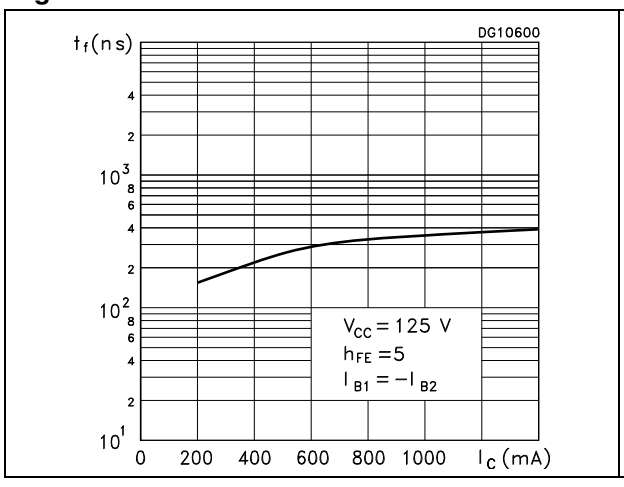



**Figure 12. Resistive load fall time PNP**

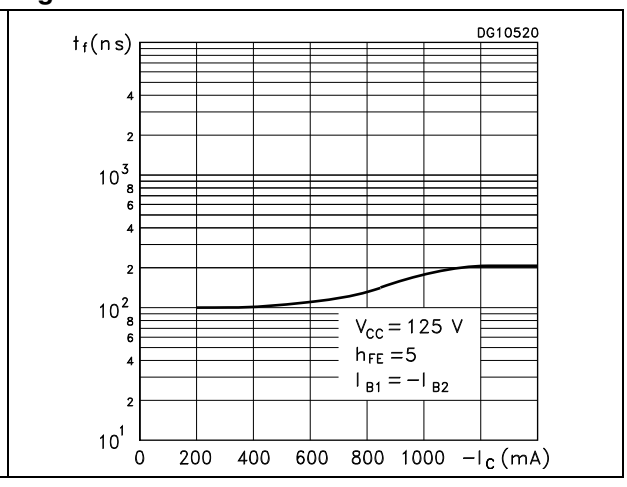


**Figure 13. Resistive load storage time NPN**

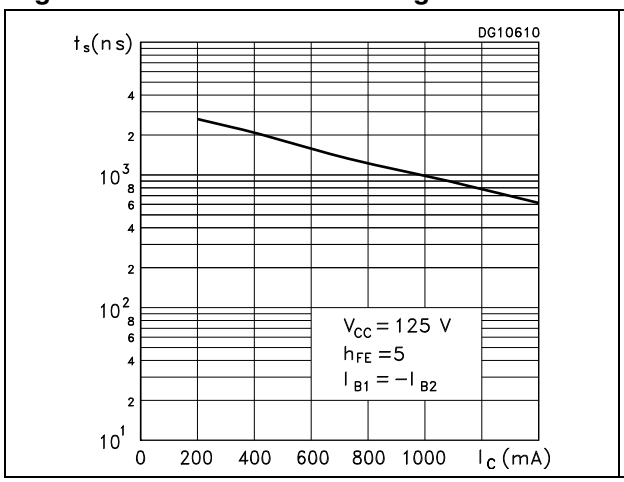



**Figure 14. Resistive load storage time PNP**

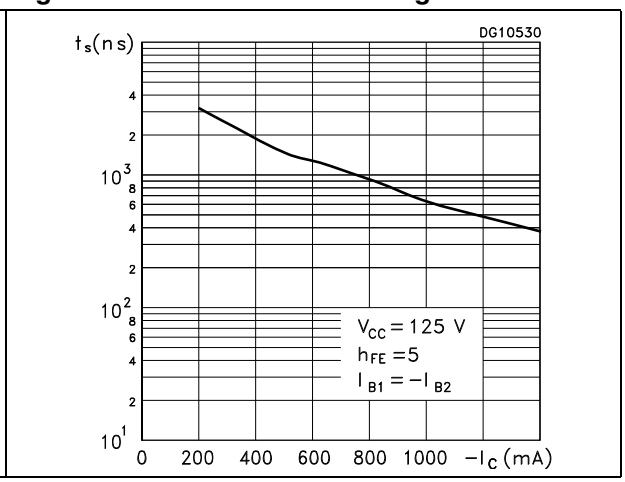



**Figure 15. Inductive load fall time NPN**

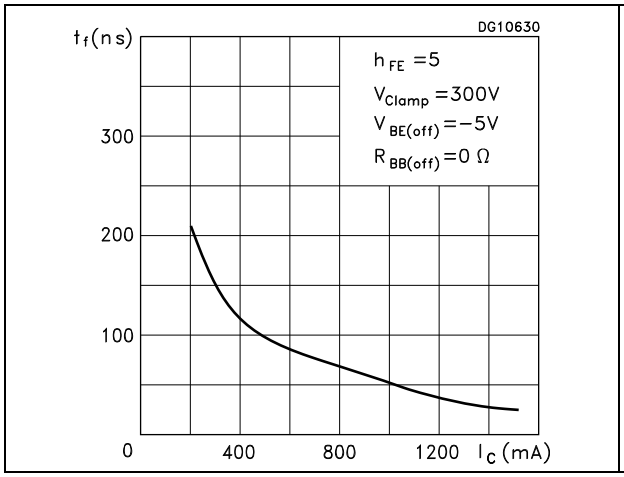



**Figure 16. Inductive load fall time PNP**

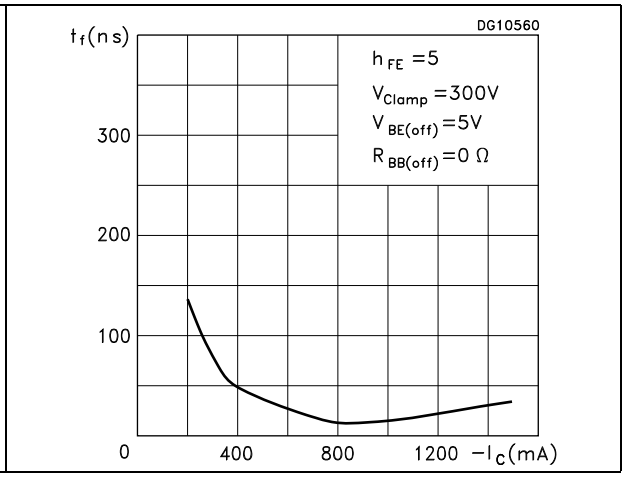



**Figure 17. Inductive load storage time NPN**

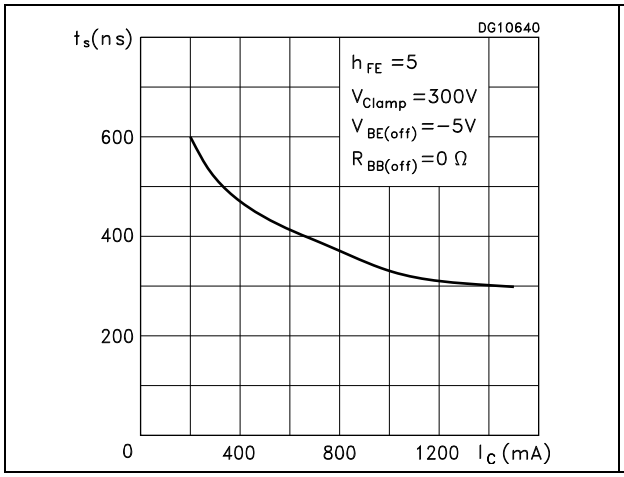



**Figure 18. Inductive load storage time PNP**

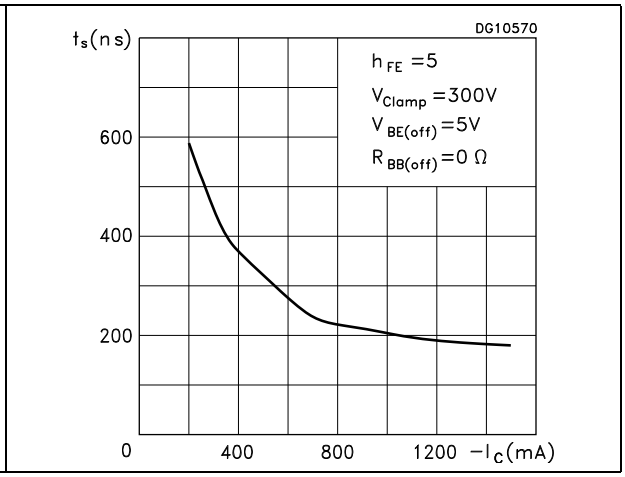


**Figure 19. Reverse biased SOA (NPN)**

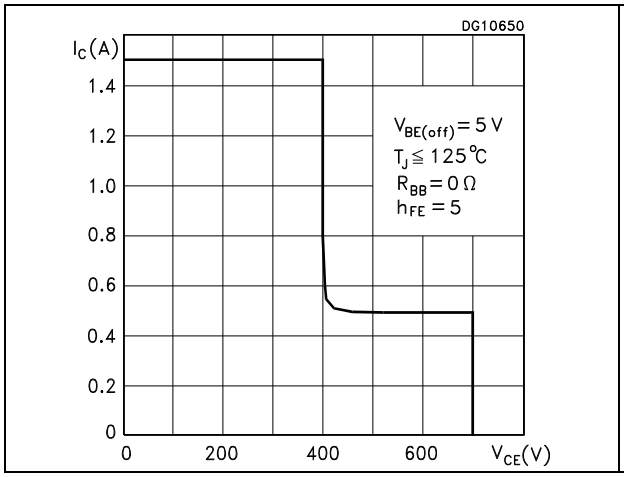
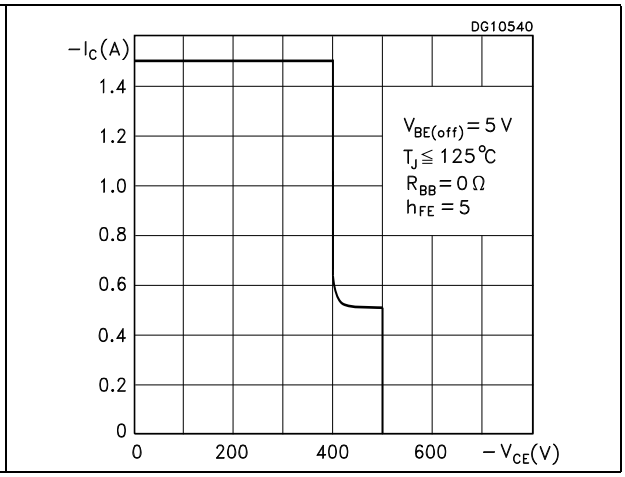



**Figure 20. Reverse biased SOA (PNP)**



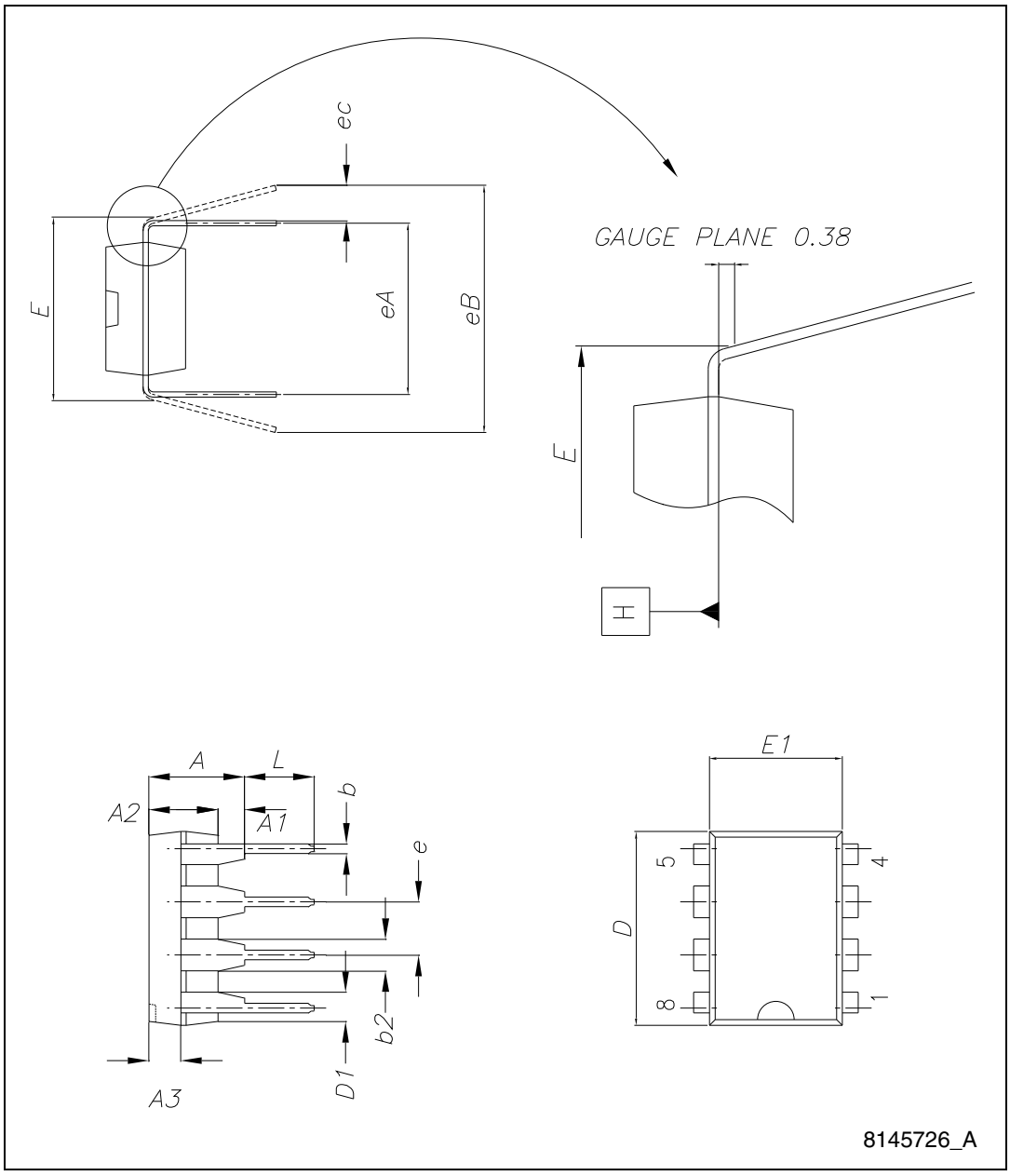
# 3 Package mechanical data

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 21. Drawing dimension DIP-8**



# 4 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 20-Jun-2008 | 1 | Initial release |
| 26-May-2009 | 2 | Updated mechanical data *Table 5 on page 8* and *Figure 21 on page 9*. |
| 29-Jun-2010 | 3 | Modified: *Table 2* and *Table 3 on page 2*, added *Section 2.1: Electrical characteristics (curves)*. |
| 05-Oct-2012 | 4 | *Table 2* and *Table 3 on page 2* have been modified. |

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