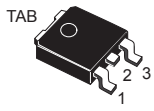
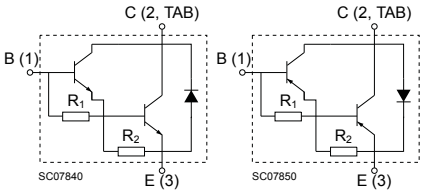
# MJD122T4, MJD127T4

Datasheet

## Complementary power Darlington transistors




**DPAK**




NPN: $R_1$ = 7 kΩ, $R_2$ = 70 Ω  PNP: $R_1$ = 16 kΩ, $R_2$ = 60 Ω

STPOWER

## Features

- Low collector-emitter saturation voltage
- Monolithic Darlington configuration with integrated antiparallel collector-emitter diode

## Application

- Linear and switching industrial equipment

## Description

These devices are manufactured in planar technology with “base island” layout and monolithic Darlington configuration.

| Product status links |
|---|
| MJD122T4 |
| MJD127T4 |

| Product summary | |
|---|---|
| **Order code** | **MJD122T4** |
| **Marking** | MJD122 |
| **Polarity** | NPN |
| **Package** | DPAK |
| **Packing** | Tape and reel |
| **Order code** | **MJD127T4** |
| **Marking** | MJD127 |
| **Polarity** | PNP |
| **Package** | DPAK |
| **Packing** | Tape and reel |

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0 A) | 100 | V |
| $V_{CBO}$ | Collector-base voltage ($I_E$ = 0 A) | | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0 A) | 5 | V |
| $I_C$ | Collector current | 8 | A |
| $I_{CM}$ | Collector peak current | 16 | A |
| $I_B$ | Base current | 120 | mA |
| $P_{TOT}$ | Total power dissipation at $T_C$ = 25 °C | 20 | W |
| $T_{stg}$ | Storage temperature range | -65 to 150 | °C |
| $T_J$ | Operating junction temperature range | | |

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

**Table 2. Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thJC}$ | Thermal resistance, junction-to-case | 6.25 | °C/W |

# 2 Electrical characteristics

$T_C$ = 25°C unless otherwise specified.

**Table 3. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector cut-off current | $V_{CB}$ = 100 V, $I_E$ = 0 A | | - | 10 | µA |
| $I_{CEO}$ | Collector cut-off current | $V_{CE}$ = 50 V, $I_B$ = 0 A | | - | 10 | µA |
| $I_{EBO}$ | Emitter cut-off current | $V_{EB}$ = 5 V, $I_C$ = 0 A | | - | 2 | mA |
| $V_{CEO(sus)}$ (1) | Collector-emitter sustaining voltage | $I_C$ = 30 mA, $I_B$ = 0 A | 100 | - | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = 4 A, $I_B$ = 16 mA | | - | 2 | V |
| | | $I_C$ = 8 A, $I_B$ = 80 mA | | - | 4 | |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = 8 A, $I_B$ = 80 mA | | - | 4.5 | V |
| $V_{BE(on)}$ | Base-emitter on voltage | $I_C$ = 4 A, $V_{CE}$ = 4 V | | - | 2.8 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = 4 A, $V_{CE}$ = 4 V | 1000 | - | 12000 | |
| | | $I_C$ = 8 A, $V_{CE}$ = 4 V | 100 | - | | |

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 1. Safe operating area**

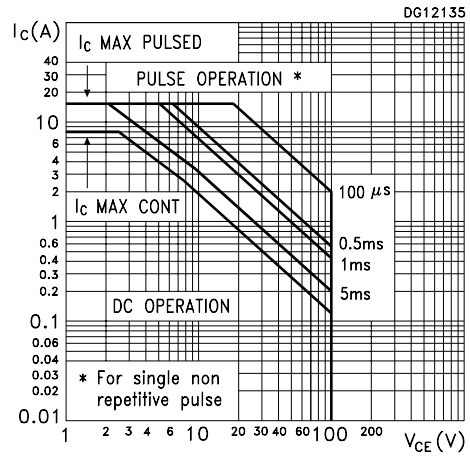



**Figure 2. Derating curve**

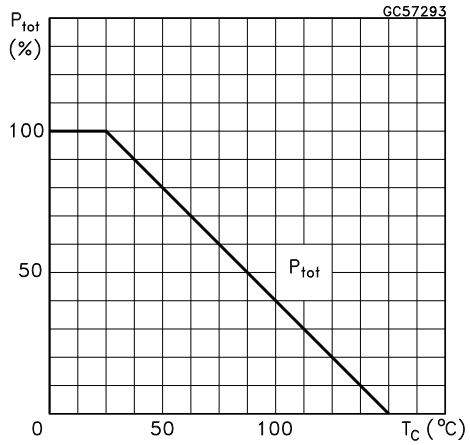



**Figure 3. DC current gain (NPN)**

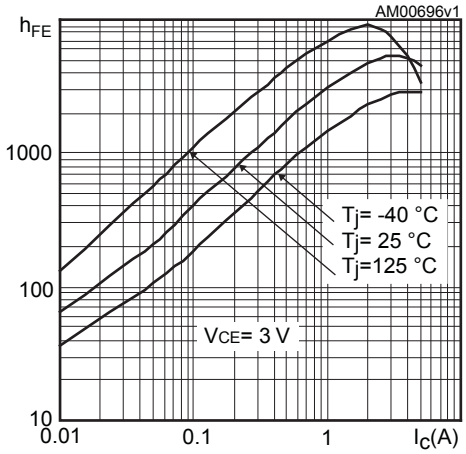



**Figure 4. DC current gain (PNP)**

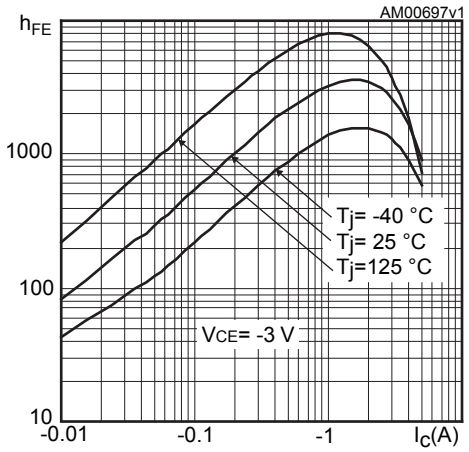



**Figure 5. Collector-emitter saturation voltage (NPN)**

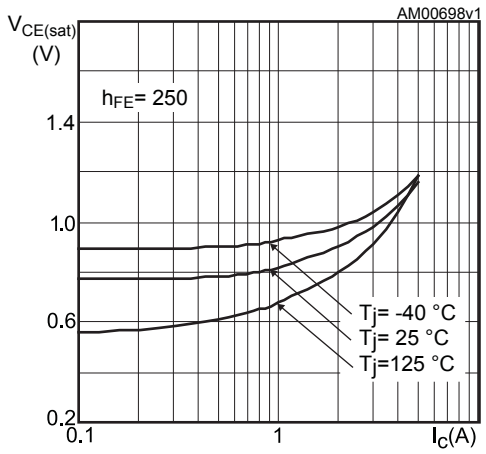



**Figure 6. Collector-emitter saturation voltage (PNP)**

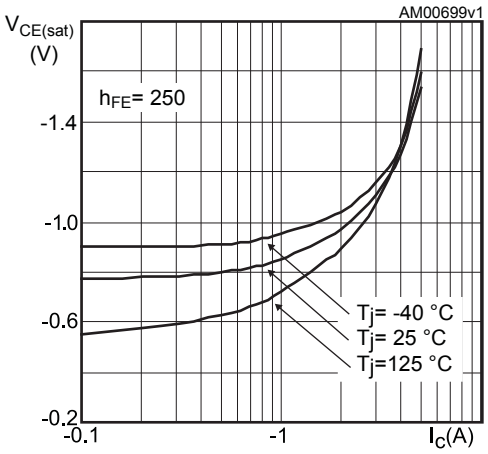


**Figure 7. Base-emitter saturation voltage (NPN)**

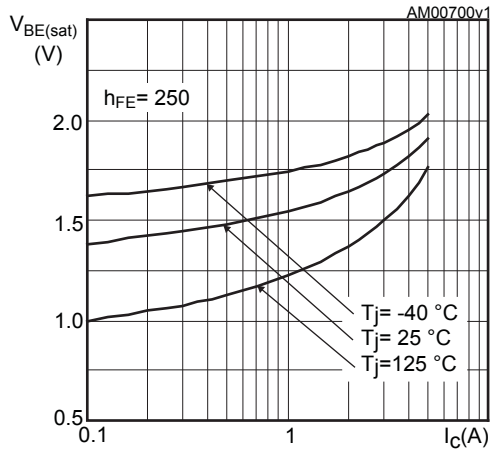



**Figure 8. Base-emitter saturation voltage (PNP)**

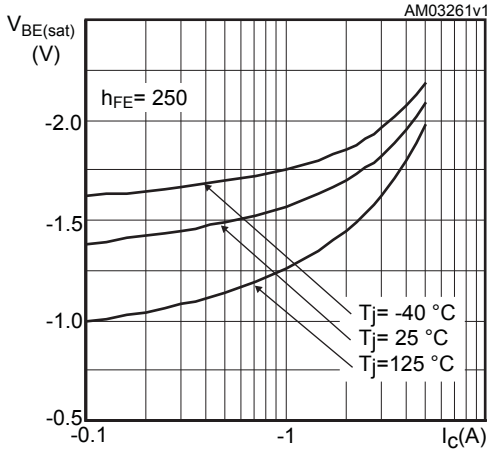



**Figure 9. Base-emitter on voltage (NPN)**

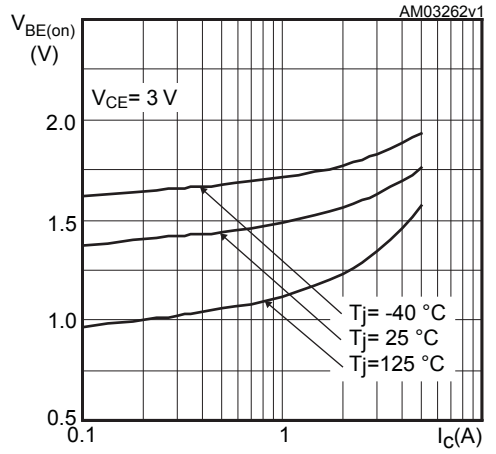



**Figure 10. Base-emitter on voltage (PNP)**

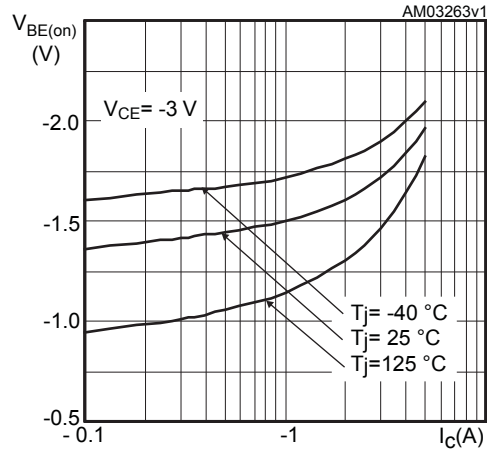



**Figure 11. Resistive load switching time (NPN, on)**

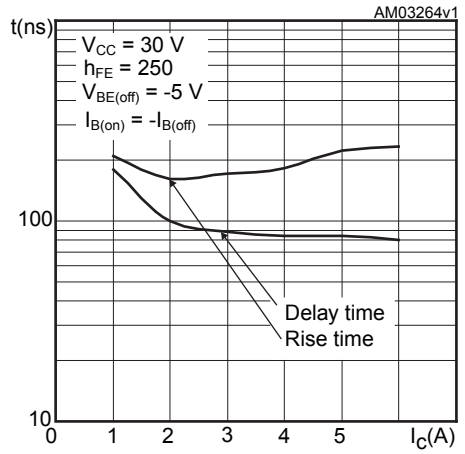



**Figure 12. Resistive load switching time (PNP, on)**

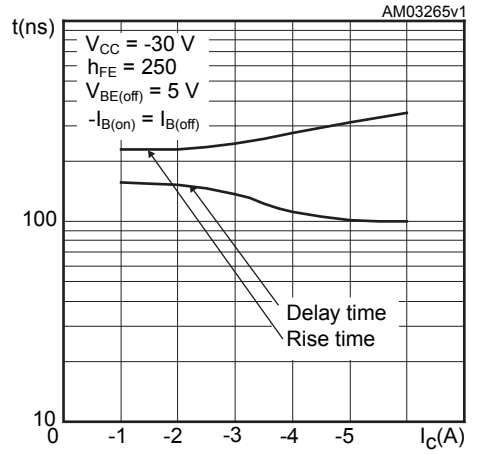


**Figure 13. Resistive load switching time (NPN, off)**

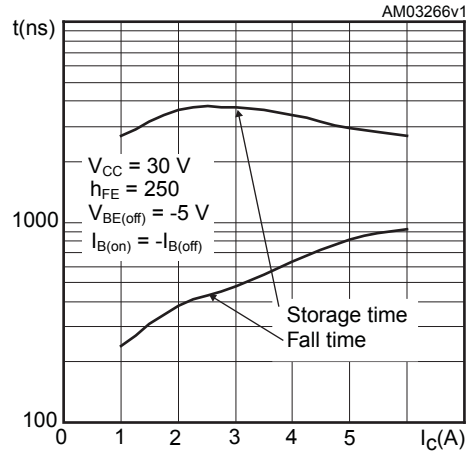



**Figure 14. Resistive load switching time (PNP, off)**

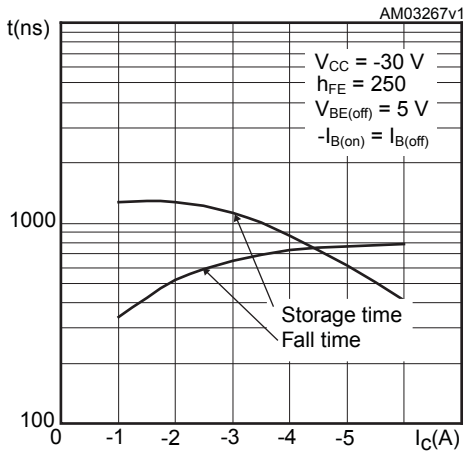



**Figure 15. Capacitance characteristics (NPN)**

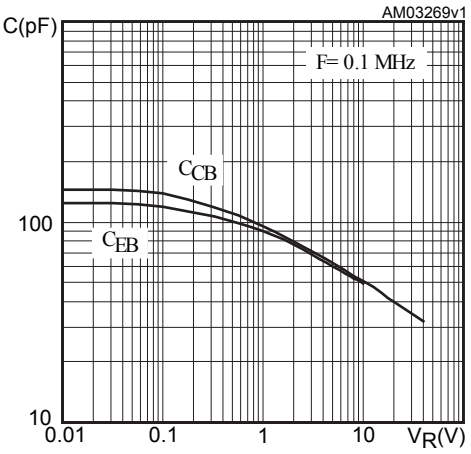
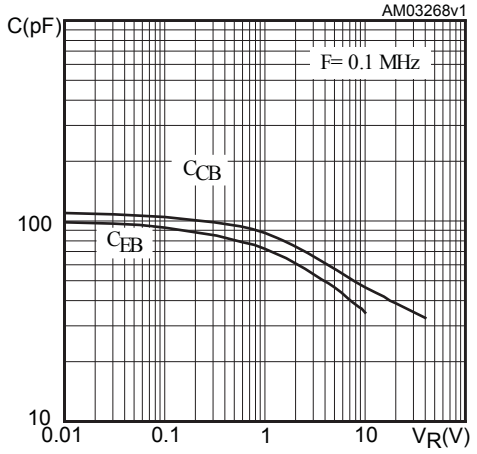
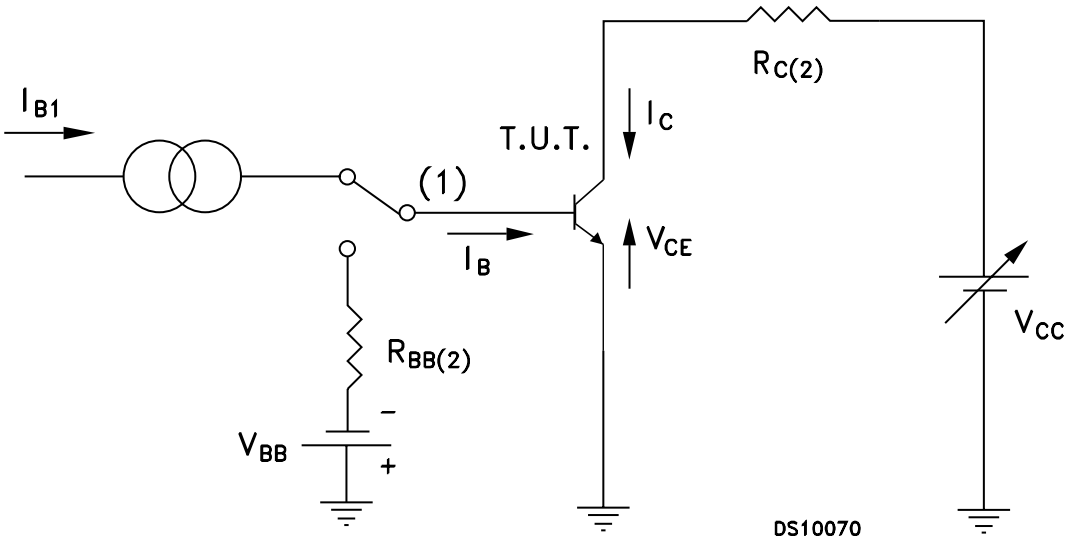



**Figure 16. Capacitance characteristics (PNP)**



# 3 Test circuits

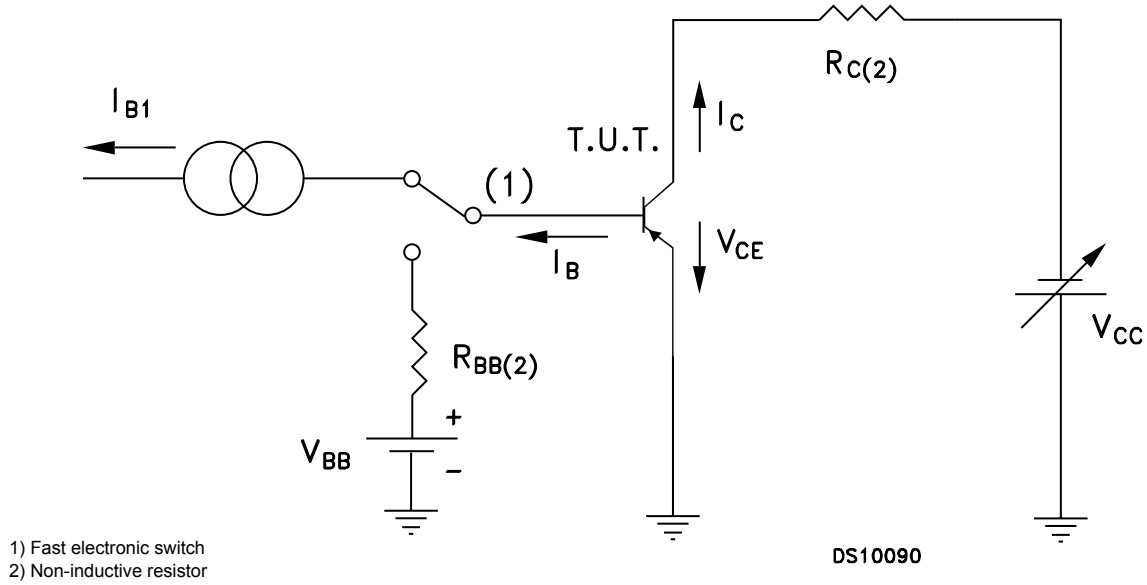
Figure 17. **Resistive load switching for NPN type**




*Note: (1) Fast electronic switch.*

*Note: (2) Non-inductive resistor.*

Figure 18. **Resistive load switching for PNP type**




*Note: (1) Fast electronic switch.*

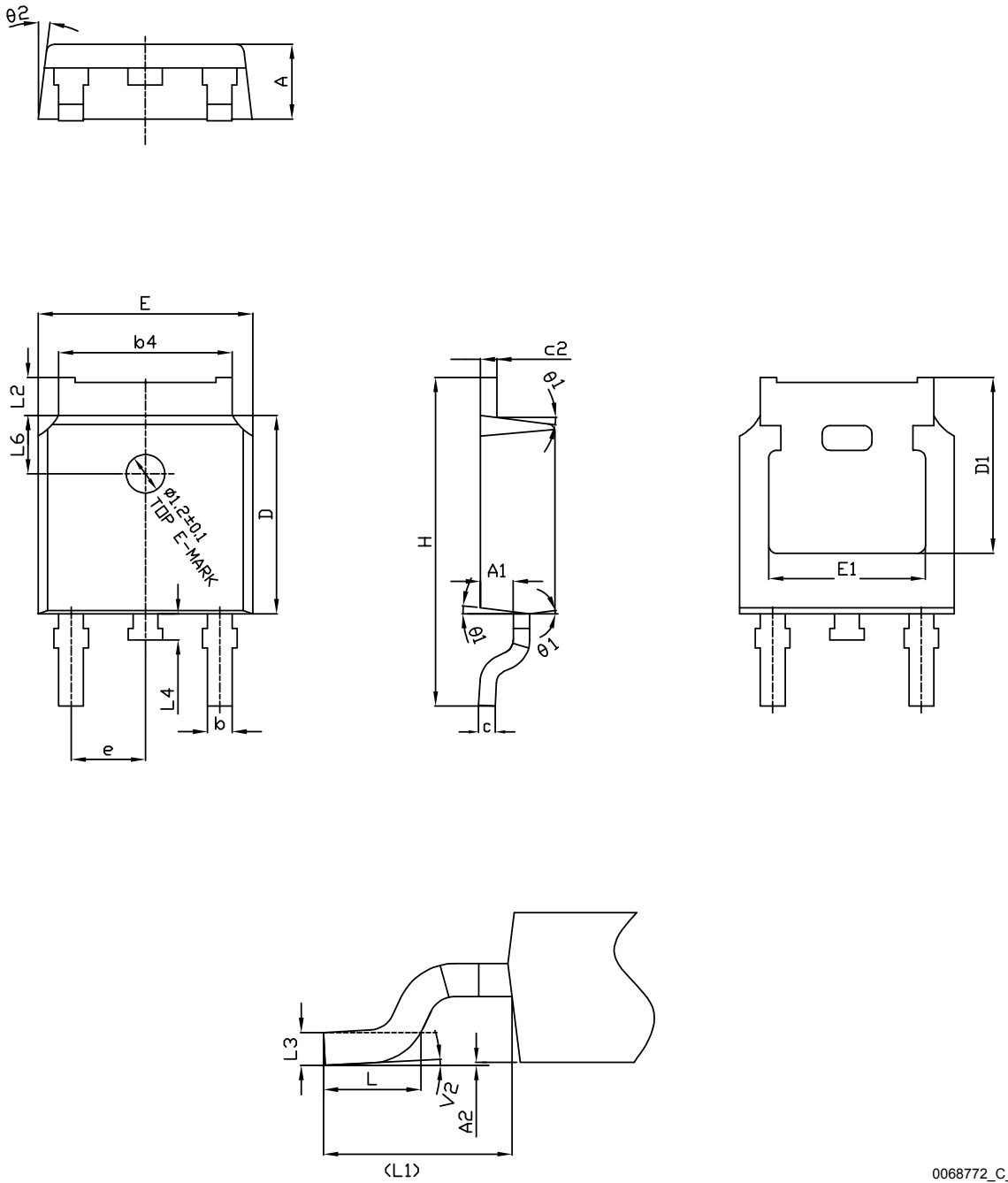
*Note: (2) Non-inductive resistor.*

# 4 Package information

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.

## 4.1 DPAK (TO-252) type C package information

**Figure 19. DPAK (TO-252) type C package outline**

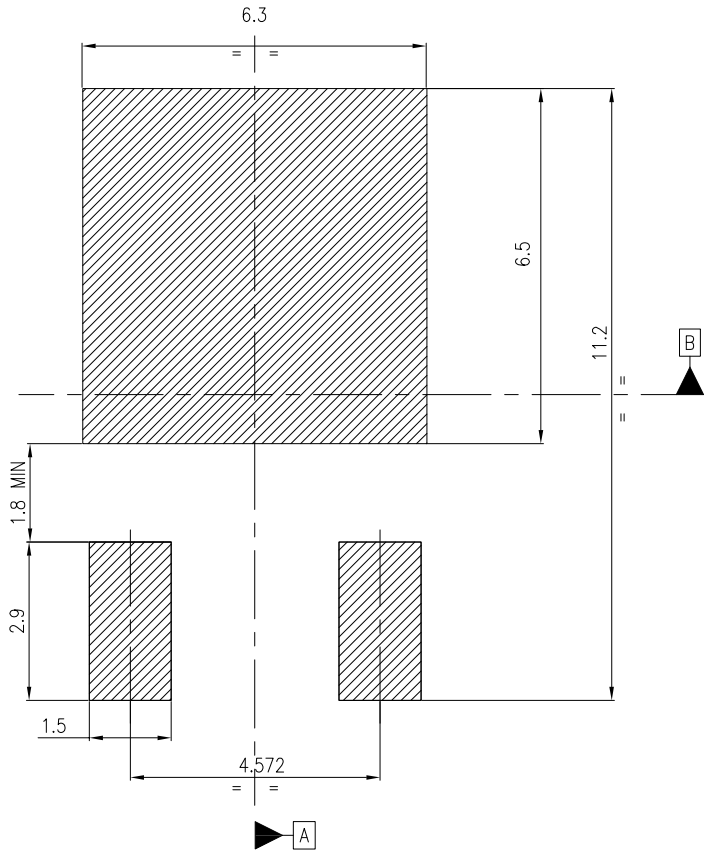



0068772_C_36

Table 4. **DPAK (TO-252) type C mechanical data**

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.90 | 1.01 | 1.10 |
| A2 | 0.00 | | 0.10 |
| b | 0.72 | | 0.85 |
| b4 | 5.13 | 5.33 | 5.46 |
| c | 0.47 | | 0.60 |
| c2 | 0.47 | | 0.60 |
| D | 6.00 | 6.10 | 6.20 |
| D1 | 5.15 | 5.40 | 5.65 |
| E | 6.50 | 6.60 | 6.70 |
| E1 | 4.70 | 4.85 | 5.00 |
| e | 2.186 | 2.286 | 2.386 |
| H | 9.80 | 10.10 | 10.40 |
| L | 1.40 | 1.50 | 1.70 |
| L1 | 2.90 REF | | |
| L2 | 0.90 | | 1.25 |
| L3 | 0.51 BSC | | |
| L4 | 0.60 | 0.80 | 1.00 |
| L6 | 1.80 BSC | | |
| θ1 | 5° | 7° | 9° |
| θ2 | 5° | 7° | 9° |
| V2 | 0° | | 8° |

**Figure 20. DPAK (TO-252) recommended footprint (dimensions are in mm)**




Notes:

1) This footprint is able to ensure insulation up to 630 Vrms (according to CEI IEC 664−1)

2) The device must be positioned within ⌖ 0.05 A B

FP_0068772_36

## 4.2 DPAK (TO-252) packing information

Figure 21. **DPAK (TO-252) tape outline**

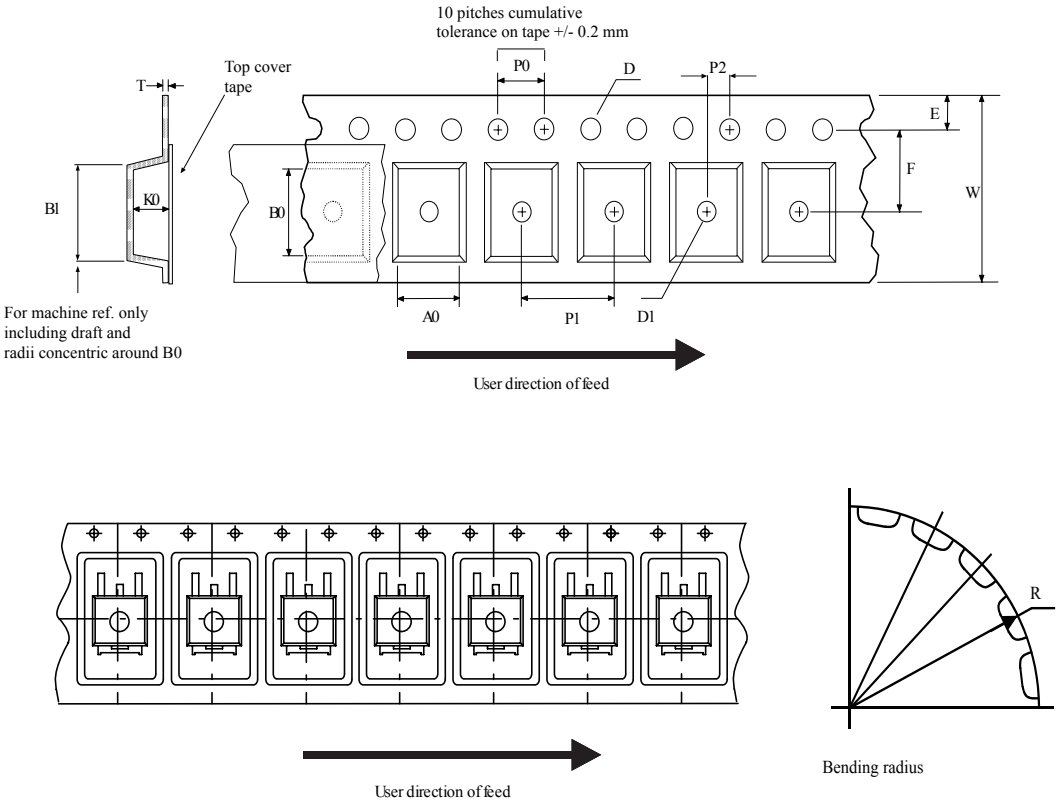
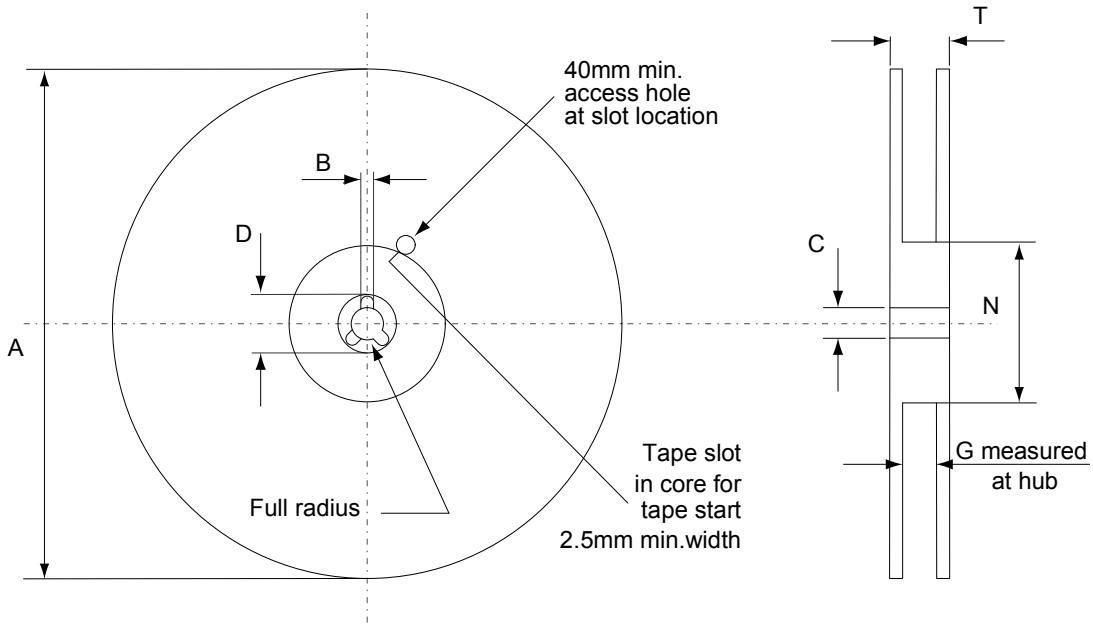


Figure 22. **DPAK (TO-252) reel outline**




AM06038v1

Table 5. **DPAK (TO-252) tape and reel mechanical data**

| Tape | | | Reel | | |
|---|---|---|---|---|---|
| Dim. | mm | | Dim. | mm | |
| | Min. | Max. | | Min. | Max. |
| A0 | 6.8 | 7 | A | | 330 |
| B0 | 10.4 | 10.6 | B | 1.5 | |
| B1 | | 12.1 | C | 12.8 | 13.2 |
| D | 1.5 | 1.6 | D | 20.2 | |
| D1 | 1.5 | | G | 16.4 | 18.4 |
| E | 1.65 | 1.85 | N | 50 | |
| F | 7.4 | 7.6 | T | | 22.4 |
| K0 | 2.55 | 2.75 | | | |
| P0 | 3.9 | 4.1 | Base qty. | | 2500 |
| P1 | 7.9 | 8.1 | Bulk qty. | | 2500 |
| P2 | 1.9 | 2.1 | | | |
| R | 40 | | | | |
| T | 0.25 | 0.35 | | | |
| W | 15.7 | 16.3 | | | |

## Revision history

Table 6. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 28-Apr-2025 | 1 | First release. |
| 16-Jun-2025 | 2 | Updated Table 3. Electrical characteristics.<br>Updated Section 4.1: DPAK (TO-252) type C package information. |

# Contents

1 **Electrical ratings** . . . . . 2
2 **Electrical characteristics** . . . . . 3
2.1 Electrical characteristics (curves) . . . . . 4
3 **Test circuits** . . . . . 7
4 **Package information** . . . . . 8
4.1 DPAK (TO-252) type C package information . . . . . 8
4.2 DPAK (TO-252) packing information . . . . . 11
**Revision history** . . . . . 13