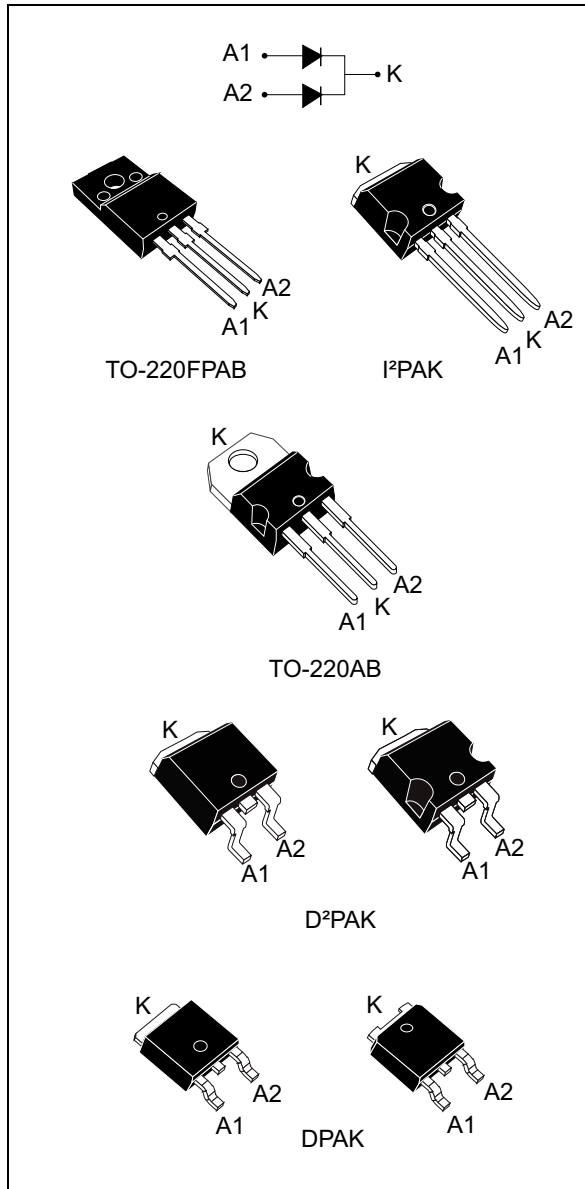


High efficiency ultrafast diode

Datasheet - production data



Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- Insulated package: TO-220FPAB
 - Insulating voltage: 2000 V_{RMS} sine
- High junction temperature
- Low leakage current
- ECOPACK[®]2 compliant component for DPAK and D²PAK on demand

Description

Dual center tap rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in DPAK, D²PAK, TO-220AB, I²PAK and TO-220FPAB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

Table 1. Device summary

| Symbol | Value |
|----------------|---------------|
| $I_{F(AV)}$ | Up to 2 x 8 A |
| V_{RRM} | 200 V |
| T_j (max) | 175 °C |
| V_F (typ) | 0.78 V |
| t_{rr} (typ) | 20 ns |

1 Characteristics

Table 2. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)

| Symbol | Parameter | | Value | Unit | |
|--------------|---|--|----------------------------------|------|---|
| V_{RRM} | Repetitive peak reverse voltage | | 200 | V | |
| $I_{F(RMS)}$ | Forward rms current | $I^2PAK, D^2PAK, TO-220AB, TO-220FPAB$ | 20 | A | |
| | | DPAK | 10 | | |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$, square wave | $I^2PAK, DPAK, D^2PAK, TO-220AB$ | $T_c = 155\text{ °C}$ Per diode | 5 | A |
| | | | $T_c = 150\text{ °C}$ Per device | 10 | |
| | | | $T_c = 135\text{ °C}$ Per diode | 8 | |
| | | | $T_c = 125\text{ °C}$ Per device | 16 | |
| | | TO-220FPAB | $T_c = 140\text{ °C}$ Per diode | 5 | |
| | | | $T_c = 120\text{ °C}$ Per device | 10 | |
| | | | $T_c = 110\text{ °C}$ Per diode | 8 | |
| | | | $T_c = 75\text{ °C}$ Per device | 16 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 50 | A | |
| T_{stg} | Storage temperature range | | -65 to +175 | °C | |
| T_j | Maximum operating junction temperature | | 175 | °C | |

Table 3. Thermal parameter

| Symbol | Parameter | | Max. value | Unit | |
|---------------|------------------|----------------------------------|------------|------|------|
| $R_{th(j-c)}$ | Junction to case | $I^2PAK, DPAK, D^2PAK, TO-220AB$ | Per diode | 4.0 | °C/W |
| | | | Per device | 2.5 | |
| | | TO-220FPAB | Per diode | 6.5 | |
| | | | Per device | 5.0 | |
| $R_{th(c)}$ | Coupling | $I^2PAK, DPAK, D^2PAK, TO-220AB$ | 1.0 | | |
| | | TO-220FPAB | 3.5 | | |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P(\text{diode1}) \times R_{th(j-c)} (\text{per diode}) + P(\text{diode2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 5 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 3 | 40 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ | - | | 1.10 | V |
| | | | $I_F = 10\text{ A}$ | - | | 1.25 | |
| | | $T_j = 150\text{ °C}$ | $I_F = 5\text{ A}$ | - | 0.78 | 0.89 | |
| | | | $I_F = 10\text{ A}$ | - | | 1.05 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.73 \times I_{F(AV)} + 0.032 \times I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|--|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | 20 | 25 | ns |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 5\text{ A}$ $V_R = 160\text{ V}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ | - | 5.9 | 7.6 | A |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ $V_{FR} = 1.1 \times V_{Fmax}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | | 110 | ns |
| V_{FP} | Forward recovery voltage | | $I_F = 5\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | 2.4 | | V |

Figure 1. Peak current versus duty cycle (per diode)

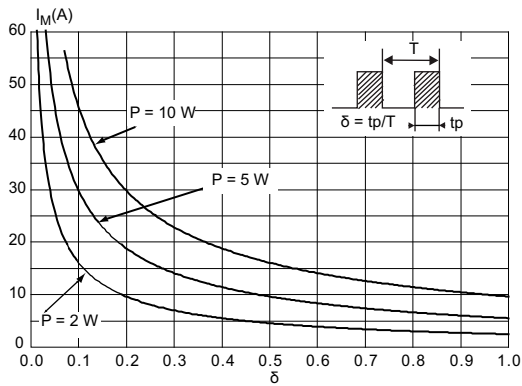


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

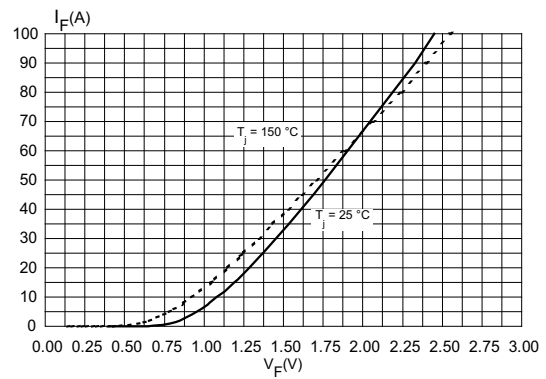


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

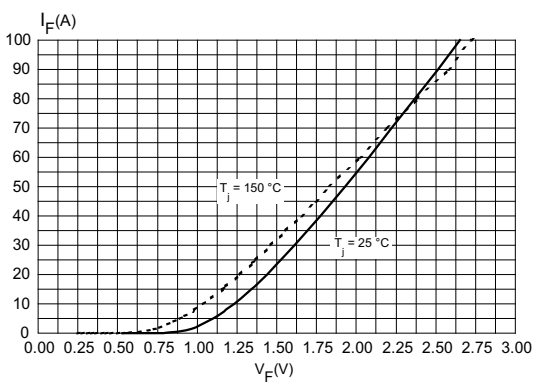


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

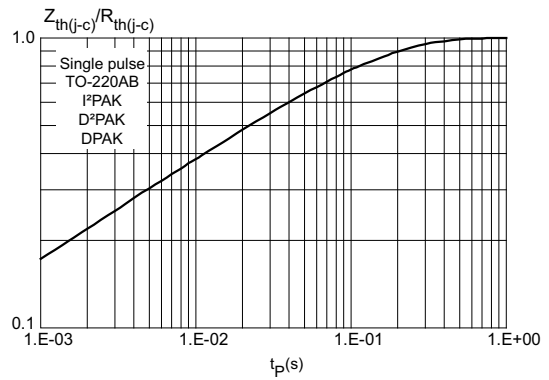


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

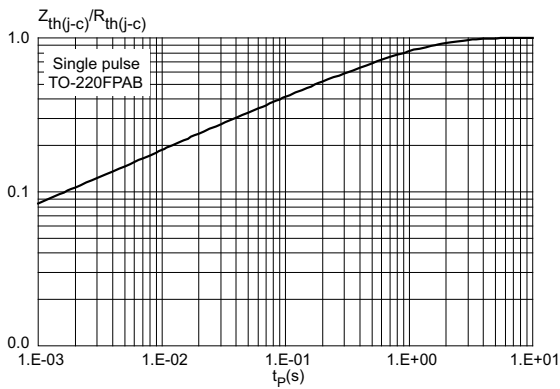


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

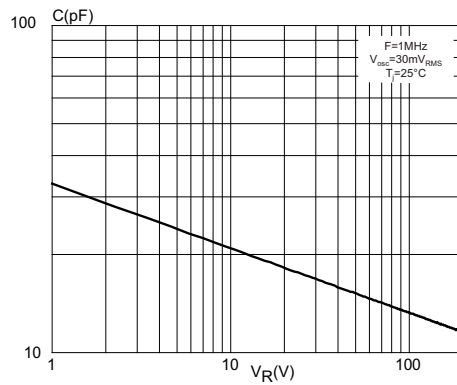


Figure 7. Reverse recovery charges versus di_F/dt (typical values, per diode)

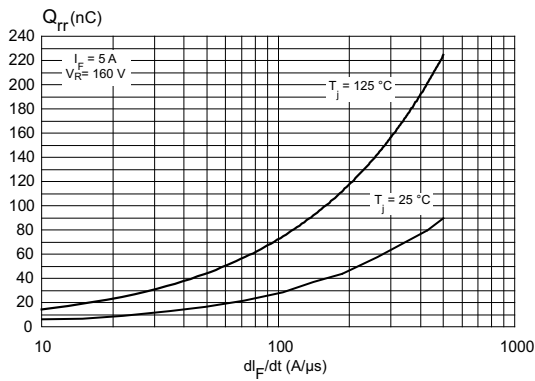


Figure 8. Reverse recovery time versus di_F/dt (typical values, per diode)

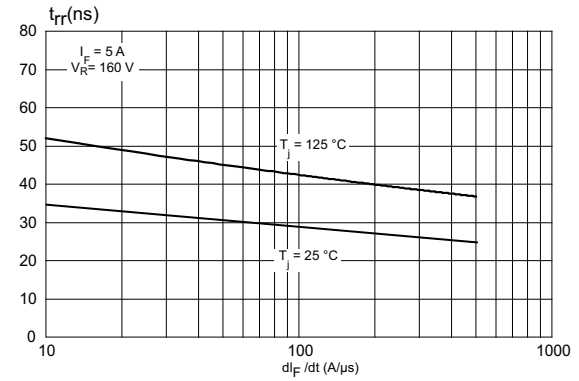


Figure 9. Peak reverse recovery current versus di_F/dt (typical values, per diode)

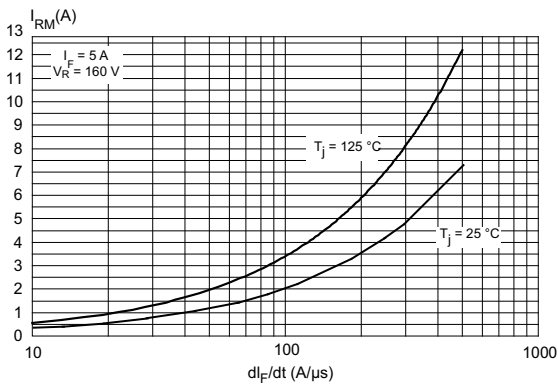


Figure 10. Dynamic parameters versus junction temperature (reference: $T_j = 125^\circ\text{C}$)

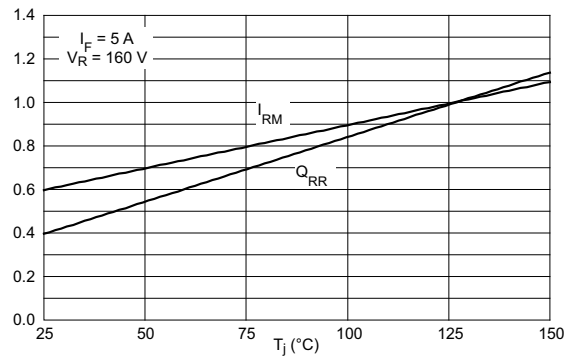


Figure 11. Thermal resistance junction to ambient versus copper surface under tab

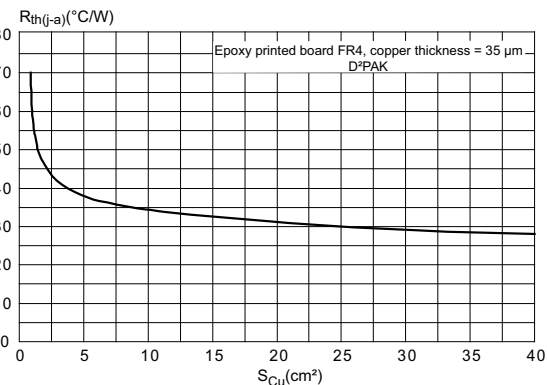
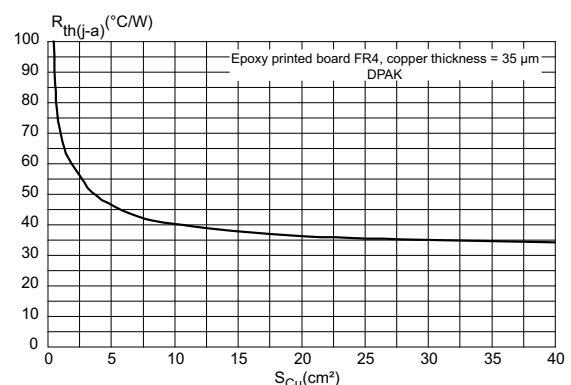


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m for TO-220AB and TO-220FPAB
- Maximum torque value: 0.7 N·m for TO-220AB and TO-220FPAB

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.

2.1 TO-220AB package information

Figure 13. TO-220AB package outline



Table 6. TO-220AB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.170 | 0.181 |
| b | 0.61 | 0.88 | 0.024 | 0.035 |
| b1 | 1.14 | 1.70 | 0.045 | 0.067 |
| c | 0.48 | 0.70 | 0.019 | 0.027 |
| D | 15.25 | 15.75 | 0.600 | 0.620 |
| D1 | 1.27 typ. | | 0.050 typ. | |
| E | 10.00 | 10.40 | 0.393 | 0.41 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| e1 | 4.95 | 5.15 | 0.194 | 0.202 |
| F | 1.23 | 1.32 | 0.048 | 0.052 |
| H1 | 6.20 | 6.60 | 0.244 | 0.259 |
| J1 | 2.40 | 2.72 | 0.094 | 0.107 |
| L | 13.00 | 14.00 | 0.511 | 0.551 |
| L1 | 3.50 | 3.93 | 0.137 | 0.154 |
| L20 | 16.40 typ. | | 0.645 typ. | |
| L30 | 28.90 typ. | | 1.137 typ. | |
| ØP | 3.75 | 3.85 | 0.147 | 0.151 |
| Q | 2.65 | 2.95 | 0.104 | 0.116 |

2.2 TO-220FPAB package information

Figure 14. TO-220FPAB package outline

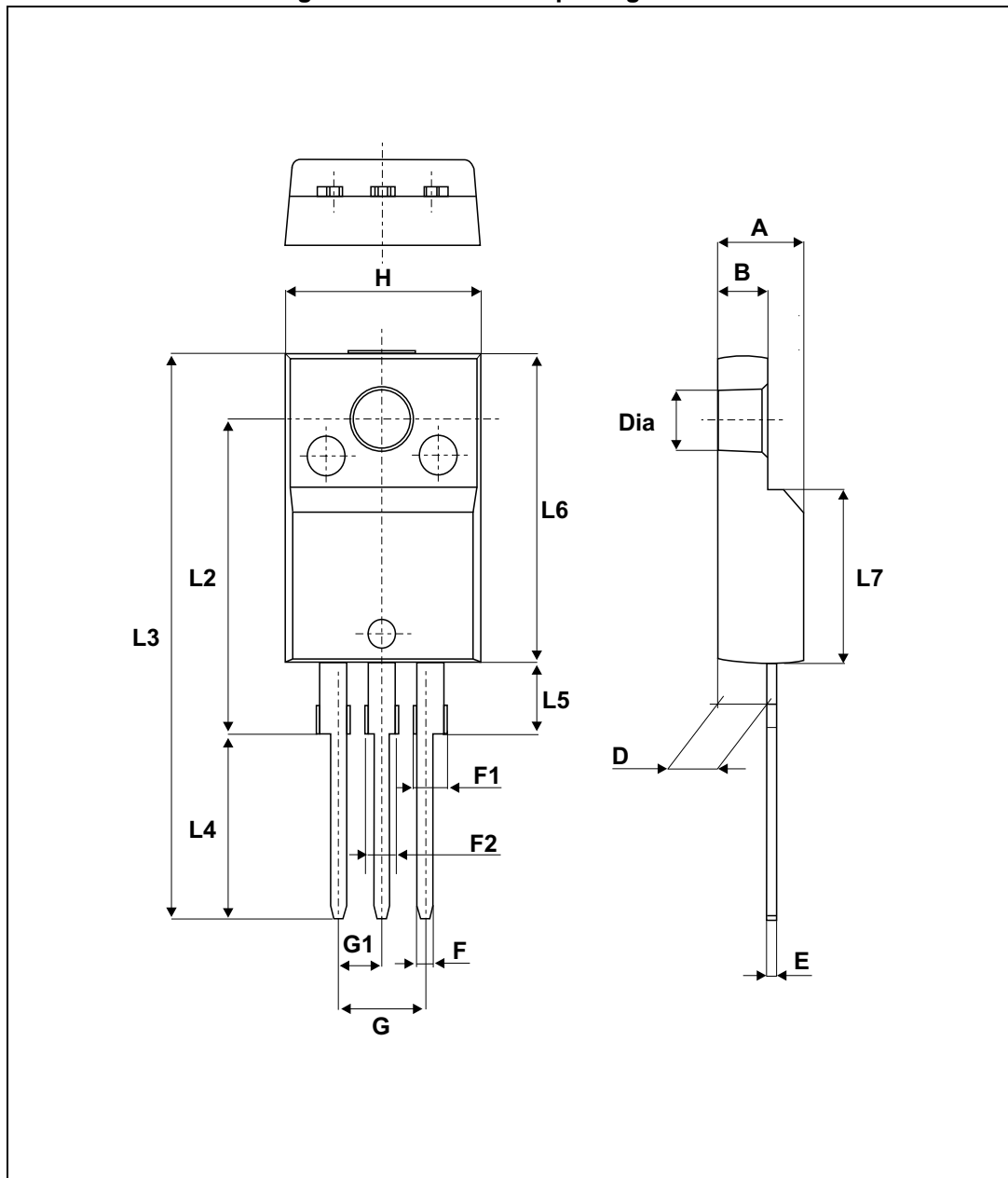
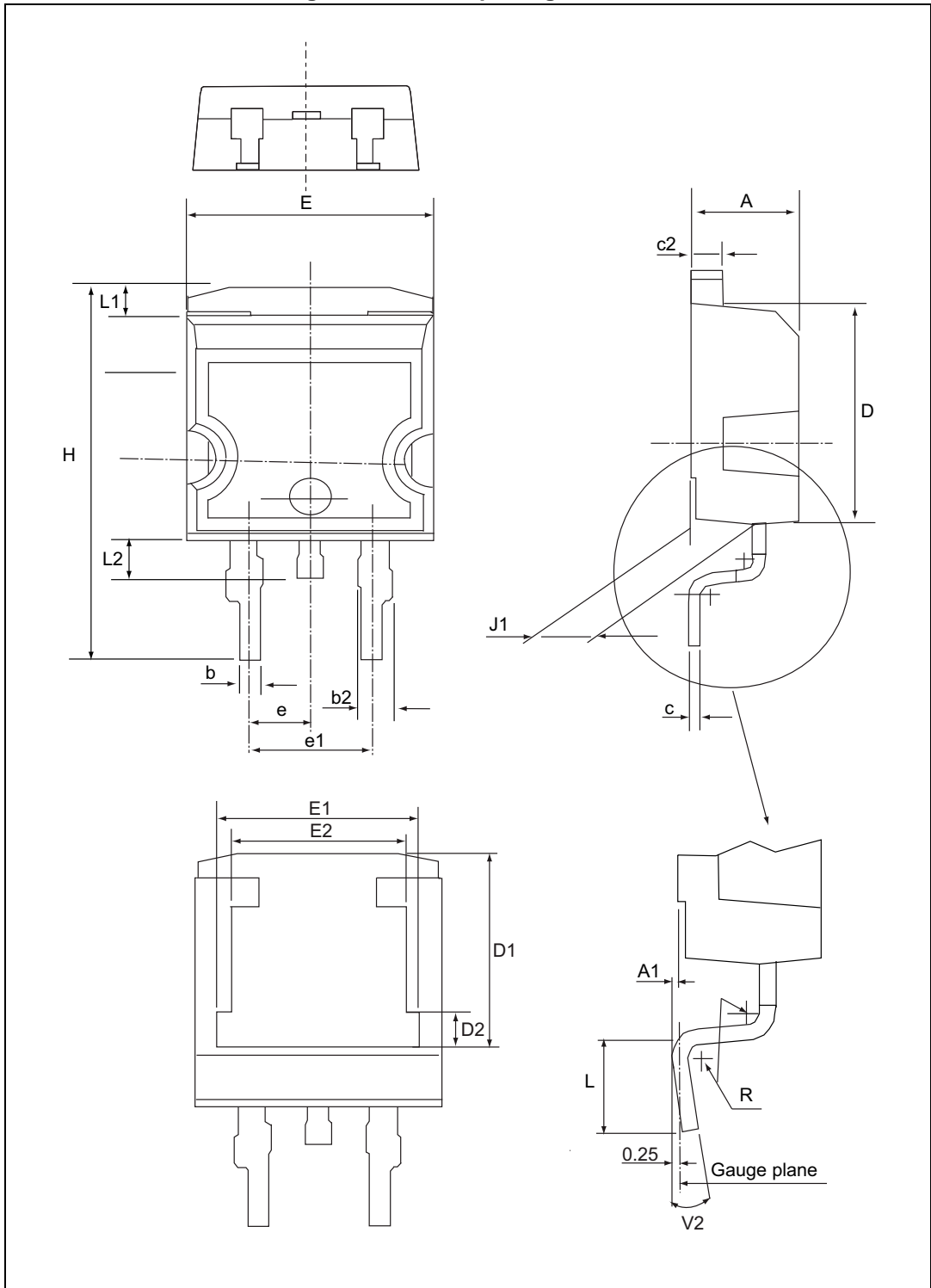


Table 7. TO-220FPAB package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| B | 2.50 | 2.70 | 0.098 | 0.106 |
| D | 2.50 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1.00 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| F2 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.00 Typ. | | 0.630 Typ. | |
| L3 | 28.60 | 30.60 | 1.126 | 1.205 |
| L4 | 9.80 | 10.60 | 0.386 | 0.417 |
| L5 | 2.90 | 3.60 | 0.114 | 0.142 |
| L6 | 15.90 | 16.40 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

2.3 D²PAK package information

Figure 15. D²PAK package outline

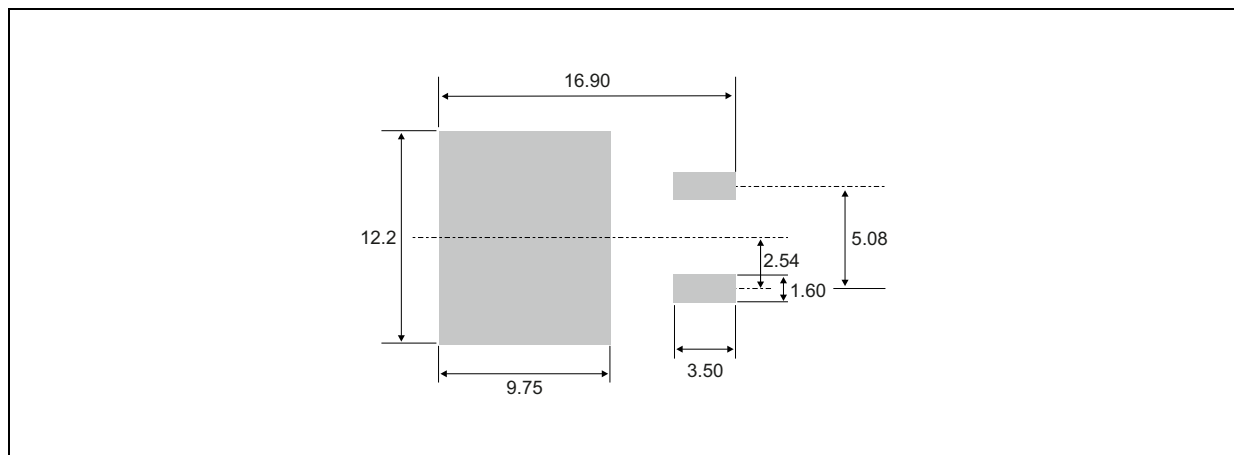


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 8. D²PAK package mechanical data

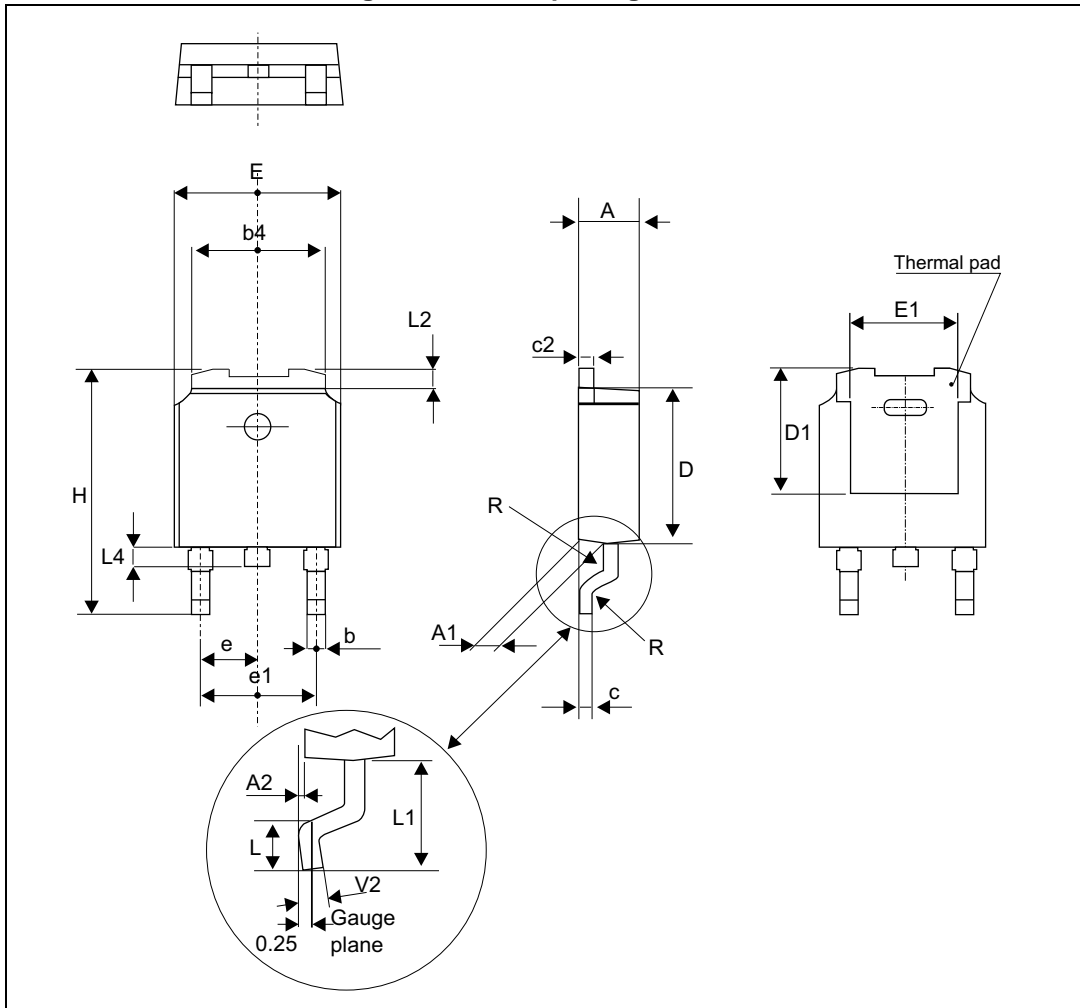
| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.36 | | 4.60 | 0.171 | | 0.181 |
| A1 | 0 | | 0.25 | | | 0.010 |
| b | 0.70 | | 0.93 | 0.027 | | 0.037 |
| b2 | 1.14 | | 1.70 | 0.045 | | 0.067 |
| c | 0.38 | | 0.69 | 0.014 | | 0.027 |
| c2 | 1.19 | | 1.36 | 0.046 | | 0.053 |
| D | 8.60 | | 9.35 | 0.338 | | 0.368 |
| D1 | 6.90 | | 8.00 | 0.271 | | 0.315 |
| D2 | 1.10 | | 1.50 | 0.043 | | 0.060 |
| E | 10.00 | | 10.55 | 0.393 | | 0.415 |
| E1 | 8.10 | | 8.90 | 0.318 | | 0.350 |
| E2 | 6.85 | | 7.25 | 0.269 | | 0.285 |
| e | | 2.54 | | | 0.100 | |
| e1 | 4.88 | | 5.28 | 0.192 | | 0.208 |
| H | 15.00 | | 15.85 | 0.590 | | 0.624 |
| J1 | 2.49 | | 2.90 | 0.098 | | 0.114 |
| L | 1.90 | | 2.79 | 0.074 | | 0.110 |
| L1 | 1.27 | | 1.65 | 0.050 | | 0.065 |
| L2 | 1.30 | | 1.78 | 0.051 | | 0.070 |
| R | | 0.40 | | 0.016 | | |
| V2 | 0° | | 8° | 0° | | 8° |

Figure 16. Footprint (dimensions in mm)



2.4 DPAK package information

Figure 17. DPAK package outline

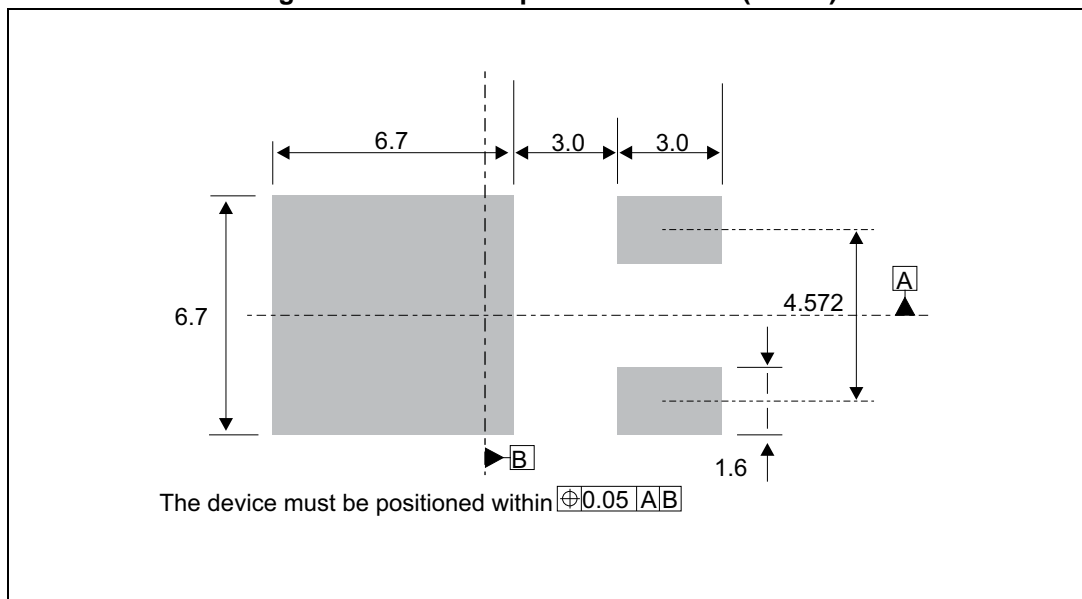


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 9. DPAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.18 | | 2.40 | 0.085 | | 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 |
| b4 | 4.95 | | 5.46 | 0.194 | | 0.214 |
| c | 0.46 | | 0.61 | 0.018 | | 0.024 |
| c2 | 0.46 | | 0.60 | 0.018 | | 0.023 |
| D | 5.97 | | 6.22 | 0.235 | | 0.244 |
| D1 | 4.95 | | 5.60 | 0.194 | | 0.220 |
| E | 6.35 | | 6.73 | 0.250 | | 0.264 |
| E1 | 4.32 | | 5.50 | 0.170 | | 0.216 |
| e | | 2.28 | | | 0.090 | |
| e1 | 4.40 | | 4.70 | 0.173 | | 0.185 |
| H | 9.35 | | 10.40 | 0.368 | | 0.409 |
| L | 1.00 | | 1.78 | 0.039 | | 0.070 |
| L2 | | | 1.27 | | | 0.050 |
| L4 | 0.60 | | 1.02 | 0.023 | | 0.040 |
| V2 | -8° | | +8° | -8° | | 8° |

Figure 18. DPAK footprint dimensions (in mm)



2.5 I²PAK package information

Figure 19. I²PAK package outline

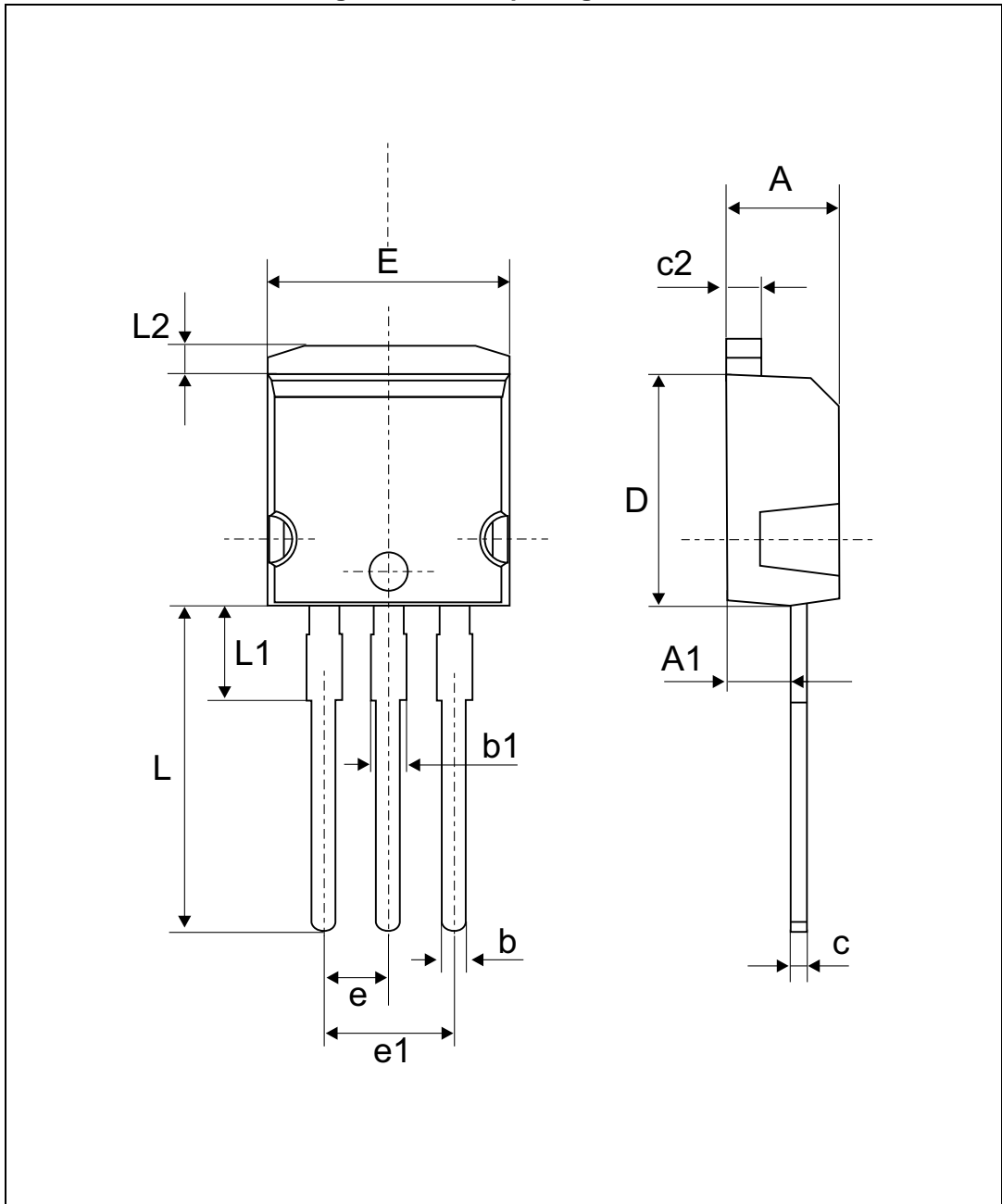


Table 10. I²PAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.40 | 2.72 | 0.094 | 0.107 |
| b | 0.61 | 0.88 | 0.024 | 0.035 |
| b1 | 1.14 | 1.70 | 0.044 | 0.067 |
| c | 0.49 | 0.70 | 0.019 | 0.028 |
| c2 | 1.23 | 1.32 | 0.048 | 0.052 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| e1 | 4.95 | 5.15 | 0.195 | 0.203 |
| E | 10.00 | 10.40 | 0.394 | 0.409 |
| L | 13.00 | 14.00 | 0.512 | 0.551 |
| L1 | 3.50 | 3.93 | 0.138 | 0.155 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |

3 Ordering information

Table 11. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|-------------|--------------------|--------|----------|---------------|
| STTH1002CB | STTH1 002CB | DPAK | 0.32 g | 75 | Tube |
| STTH1002CB-TR | STTH1 002CB | DPAK | 0.32 g | 2500 | Tape and reel |
| STTH1002CT | STTH1002CT | TO-220AB | 1.9 g | 50 | Tube |
| STTH1002CG-TR | STTH1002CG | D ² PAK | 1.38 g | 1000 | Tape and reel |
| STTH1002CR | STTH1002CR | I ² PAK | 1.5 g | 50 | Tube |
| STTH1002CFP | STTH1002CFP | TO-220FPAB | 1.9 g | 50 | Tube |

4 Revision history

Table 12. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| Mar-2004 | 4 | Last issue. |
| 22-Mar-2013 | 5 | Updated Table 7. |
| 05-Jan-2015 | 6 | Updated DPAK and D ² PAK package information. |
| 24-Apr-2015 | 7 | Updated Figure 15. |
| 20-Sep-2016 | 8 | Updated DPAK package information and reformatted to current standard. |

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STTH1002CG-TR](#) [STTH1002CT](#) [STTH1002CR](#) [STTH1002CB](#) [STTH1002CB-TR](#) [STTH1002CFP](#) [STTH1002CG](#)