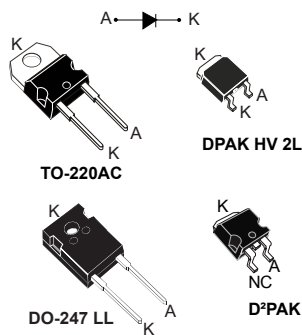


1200 V power Schottky silicon carbide diode



Features

- No or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- Operating from -40 °C to 175 °C
- Low V_F
- ECOPACK[®]2 compliant

Description

The SiC diode, available in TO-220AC, DPAK HV, D²PAK and DO-247 LL, is an ultrahigh performance power Schottky rectifier. It is manufactured using a silicon carbide substrate. The wide band-gap material allows the design of a low V_F Schottky diode structure with a 1200 V rating. Due to the Schottky construction, no recovery is shown at turn-off and ringing patterns are negligible. The minimal capacitive turn-off behavior is independent of temperature. Especially suited for use in PFC and secondary side applications, this ST SiC diode will boost the performance in hard switching conditions. This rectifier will enhance the performance of the targeted application. Its high forward surge capability ensures a good robustness during transient phases.

Product status

STPSC10H12

Table 1. Device summary

| Symbol | Value |
|-------------|--------|
| $I_{F(AV)}$ | 10 A |
| V_{RRM} | 1200 V |
| T_j (max) | 175 °C |
| V_F (typ) | 1.35 V |

1 Characteristics

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

| Symbol | Parameter | | Value | Unit | |
|--------------|---|--|-----------------------|------|---|
| V_{RRM} | Repetitive peak reverse voltage ($T_j = -40\text{ °C}$ to $+175\text{ °C}$) | | 1200 | V | |
| $I_{F(RMS)}$ | Forward rms current | | 25 | A | |
| $I_{F(AV)}$ | Average forward current | TO-220AC, DPAK HV 2L, D ² PAK, $T_C = 155\text{ °C}^{(1)}$, DC current | 10 | A | |
| | | DO-247 LL, $T_C = 150\text{ °C}^{(1)}$, DC current | | | |
| I_{FRM} | Repetitive peak forward current | TO-220AC, DPAK HV 2L, D ² PAK, $T_C = 155\text{ °C}$, $T_j = 175\text{ °C}$, $\delta = 0.1$ | 38 | A | |
| | | DO-247 LL, $T_C = 150\text{ °C}$, $T_j = 175\text{ °C}$, $\delta = 0.1$ | 42 | | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | $T_C = 25\text{ °C}$ | 71 | A |
| | | | $T_C = 150\text{ °C}$ | 60 | |
| | | $t_p = 10\text{ }\mu\text{s}$ square | $T_C = 25\text{ °C}$ | 420 | |
| T_{stg} | Storage temperature range | | -65 to +175 | °C | |
| T_j | Operating junction temperature range | | -40 to +175 | °C | |

1. Value based on $R_{th(j-c)}$ max.

Table 3. Thermal parameters

| Symbol | Parameter | | Typ. | Max. | Unit |
|---------------|------------------|--|------|------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AC, DPAK HV 2L, D ² PAK | 0.65 | 0.9 | °C/W |
| | | DO-247 LL | 0.70 | 0.95 | |

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | 5 | 60 | μA |
| | | $T_j = 150\text{ °C}$ | | - | 30 | 400 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}$ | - | 1.35 | 1.50 | V |
| | | $T_j = 150\text{ °C}$ | | - | 1.75 | 2.25 | |

1. Pulse test: $t_p = 10\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 500\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.03 \times I_{F(AV)} + 0.122 I_F^2 (RMS)$$

Table 5. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|----------------|-------------------------|---|------|------|------|------|
| $Q_{Cj}^{(1)}$ | Total capacitive charge | $V_R = 800 \text{ V}$ | - | 57 | - | nC |
| C_j | Total capacitance | $V_R = 0 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$ | - | 725 | - | pF |
| | | $V_R = 800 \text{ V}, T_c = 25 \text{ }^\circ\text{C}, F = 1 \text{ MHz}$ | - | 47 | - | |

1. Most accurate value for the capacitive charge:

$$Q_{Cj}(V_R) = \int_0^{V_R} C_j(V) dV$$

1.1 Characteristics (curves)

Figure 1. Forward voltage drop versus forward current (typical values)

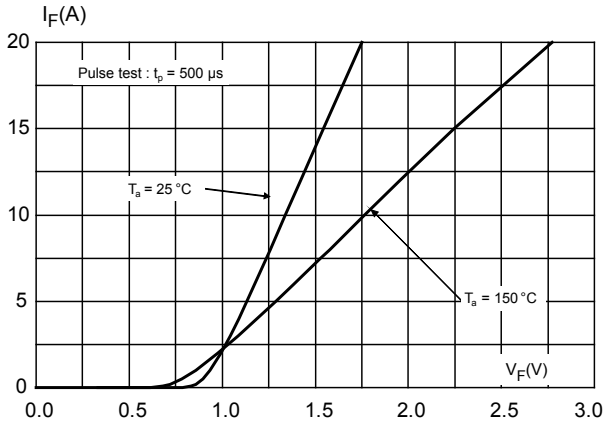


Figure 2. Reverse leakage current versus reverse voltage applied (typical values)

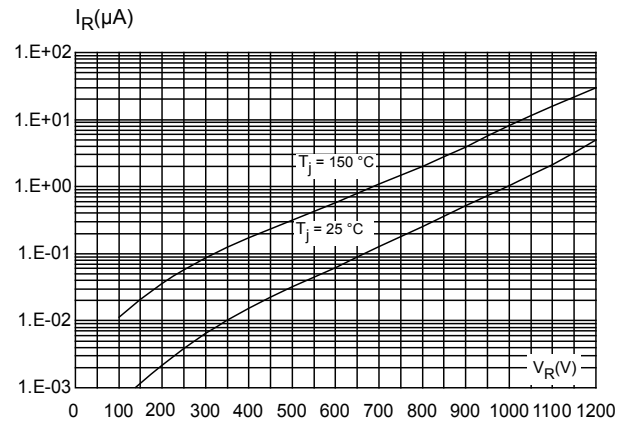


Figure 3. Peak forward current versus case temperature (TO-220AC, DPAK HV 2L, D²PAK)

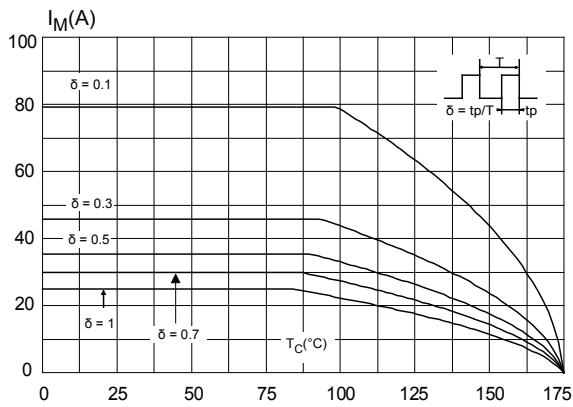


Figure 4. Peak forward current versus case temperature (DO-247 LL)

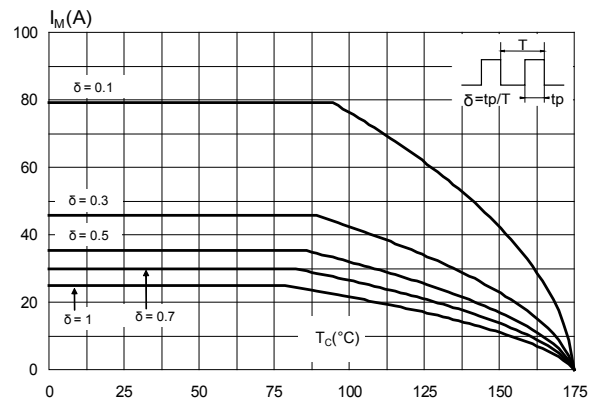


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

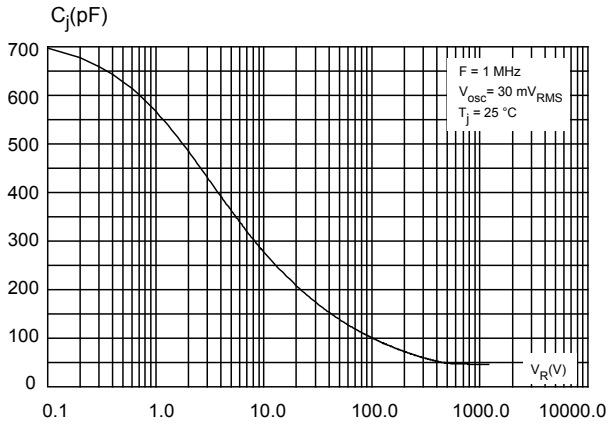


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK HV 2L, D²PAK)

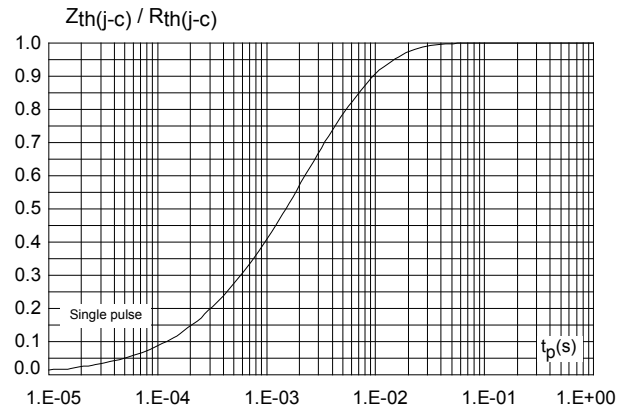


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (DO-247LL)

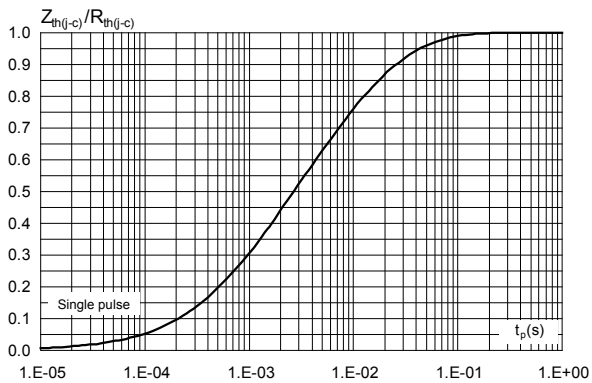


Figure 8. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

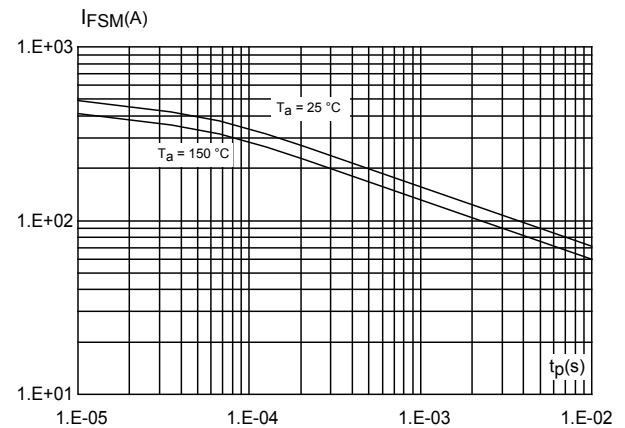


Figure 9. Total capacitive charges versus reverse voltage applied (typical values)

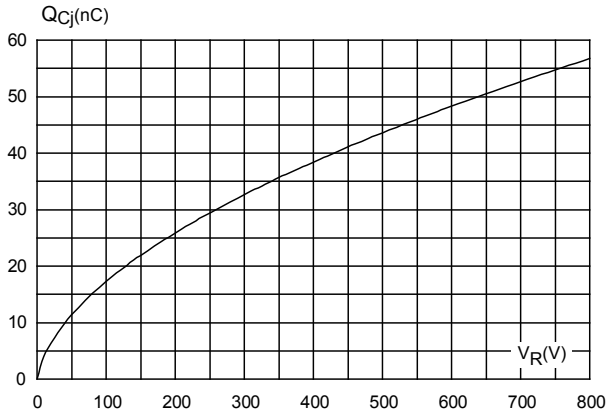


Figure 10. Thermal resistance junction to ambient versus copper surface under tab on epoxy printed board FR4, $e_{Cu} = 35 \mu m$ (typical values)

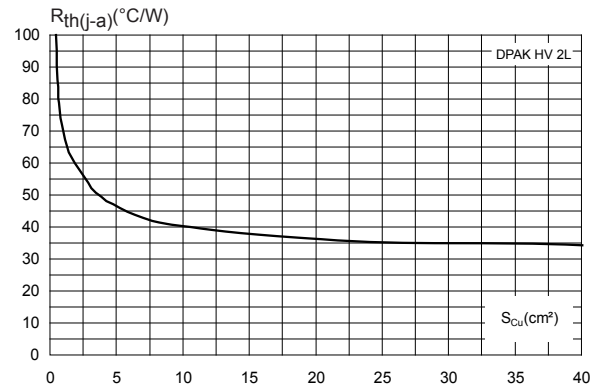
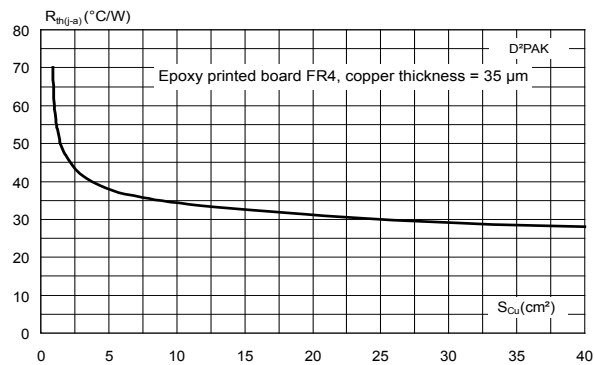


Figure 11. Thermal resistance junction to ambient versus copper surface under tab for D²PAK package (typical values)



2 Package information

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-220AC package information

- Cooling method: by conduction (C)
- Epoxy meets UL94,V0
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

Figure 12. TO-220AC package outline

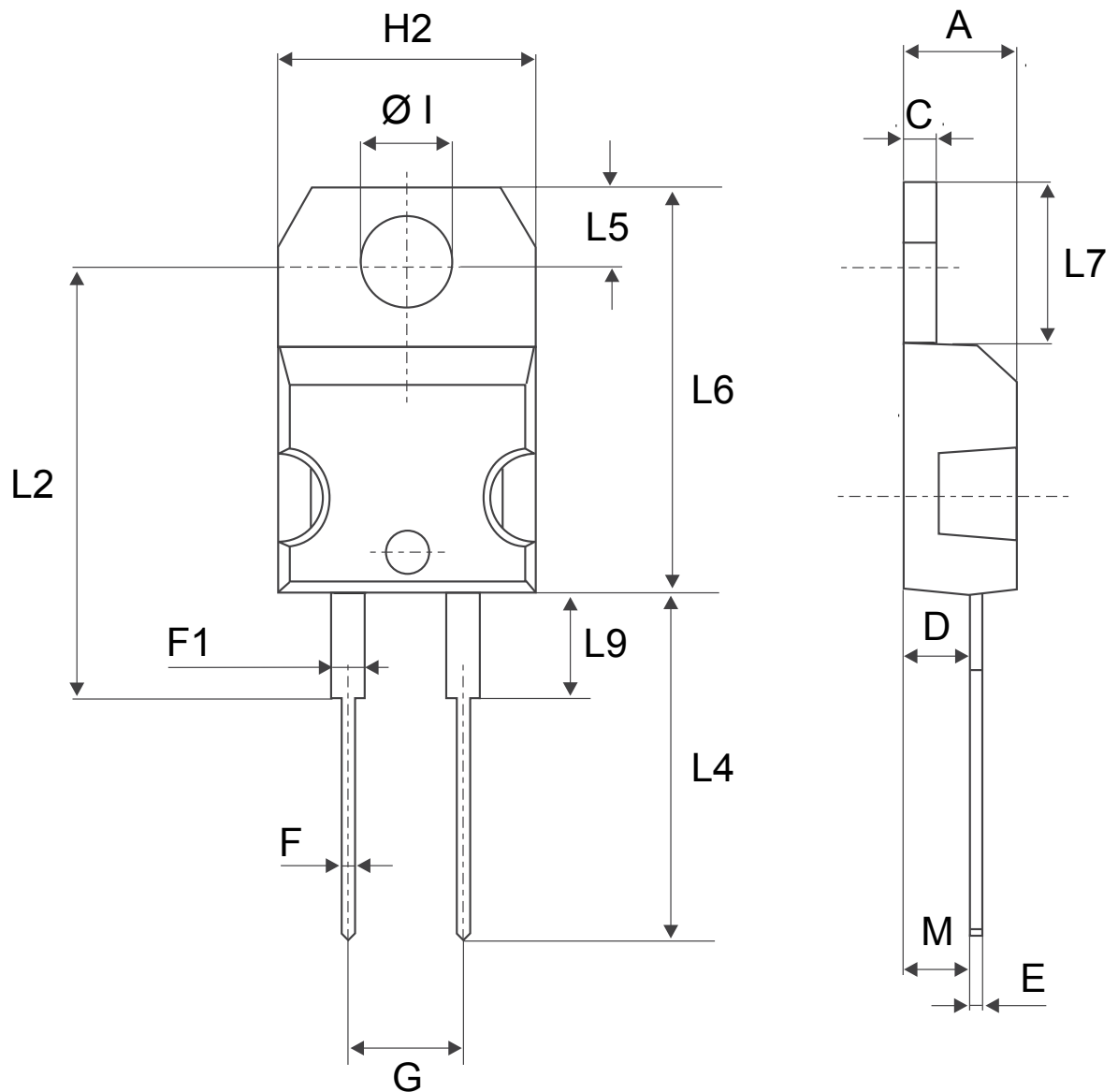


Table 6. TO-220AC package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| H2 | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.40 typ. | | 0.645 typ. | |
| L4 | 13.00 | 14.00 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam | 3.75 | 3.85 | 0.147 | 0.151 |

2.2 DO-247 LL package information

- Cooling method: by conduction (C)
- Epoxy meets UL94,V0
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m

Figure 13. DO-247 LL package outline

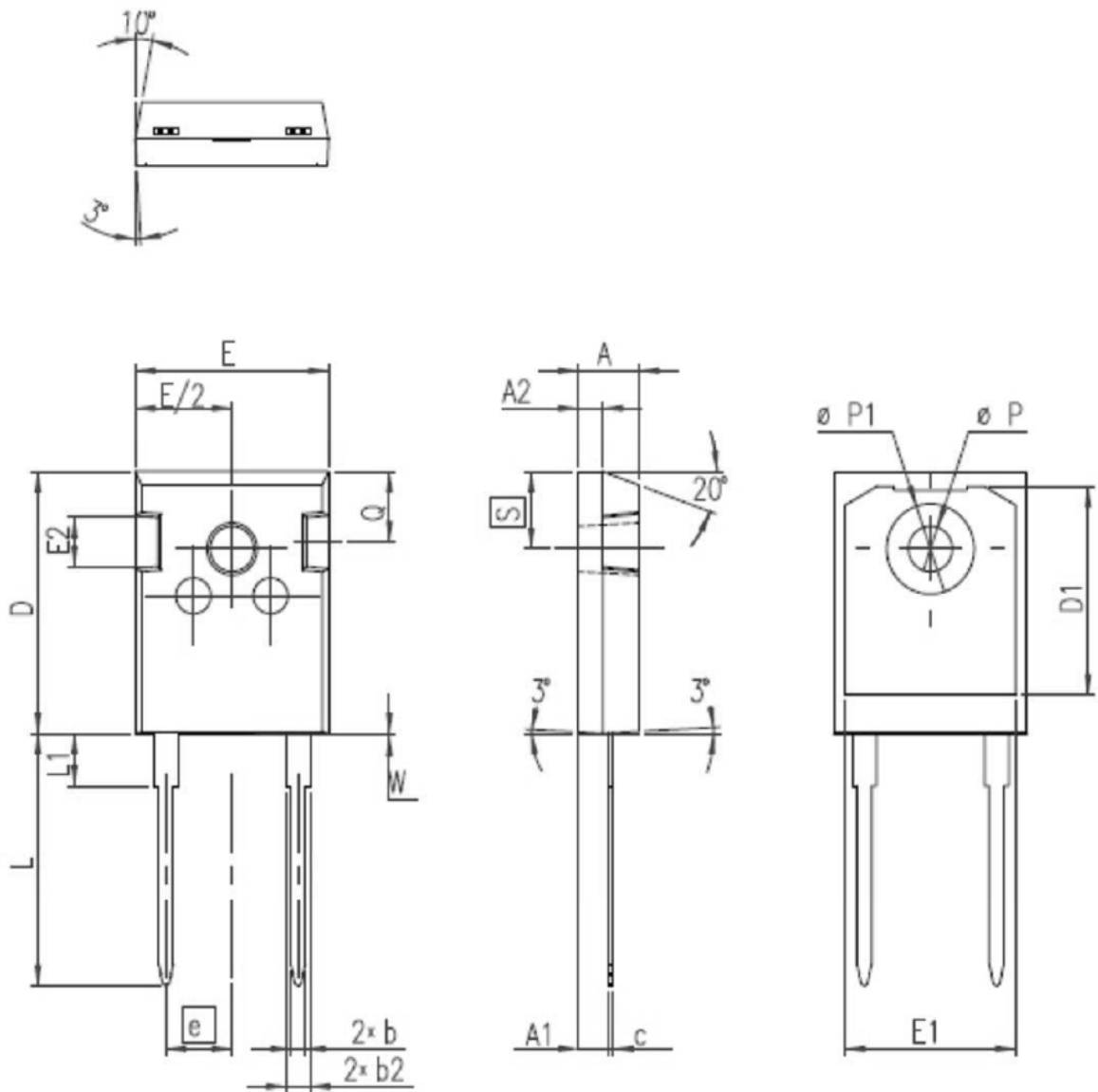


Table 7. DO-247 LL package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------------------|-------|
| | Millimeters | | Inches ⁽¹⁾ | |
| | Min. | Max. | Min. | Max. |
| A | 4.70 | 5.31 | 0.185 | 0.209 |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 |
| A2 | 1.50 | 2.49 | 0.059 | 0.098 |
| b | 0.99 | 1.40 | 0.039 | 0.055 |
| b2 | 1.65 | 2.39 | 0.065 | 0.094 |
| c | 0.38 | 0.89 | 0.015 | 0.035 |
| D | 20.80 | 21.46 | 0.819 | 0.845 |
| D1 | 13.08 | | 0.515 | |
| E | 15.49 | 16.26 | 0.610 | 0.640 |
| e | 5.44 typ. | | 0.214 | |
| E1 | 13.46 | | 0.530 | |
| E2 | 3.43 | 3.99 | 0.135 | 0.157 |
| L | 19.81 | 20.32 | 0.780 | 0.800 |
| L1 | | 4.50 | | 0.177 |
| P | 3.56 | 3.66 | 0.140 | 0.144 |
| P1 | 7.06 | 7.39 | 0.278 | 0.291 |
| Q | 5.38 | 6.20 | 0.219 | 0.244 |
| S | 6.17 typ. | | 0.243 | |
| W | | 0.15 | | 0.006 |

1. Inches dimensions given for reference only

2.3 D²PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 14. D²PAK package outline

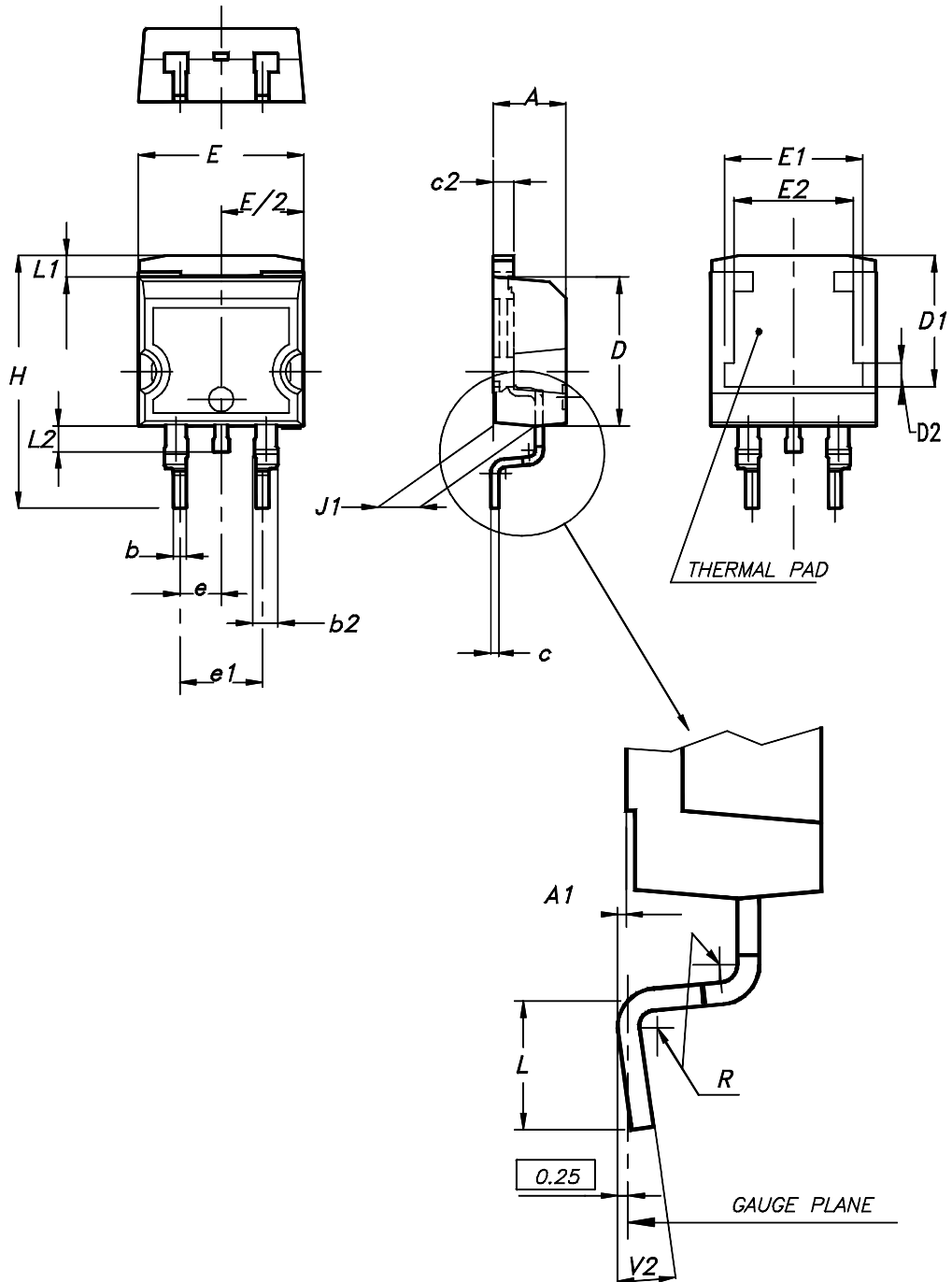
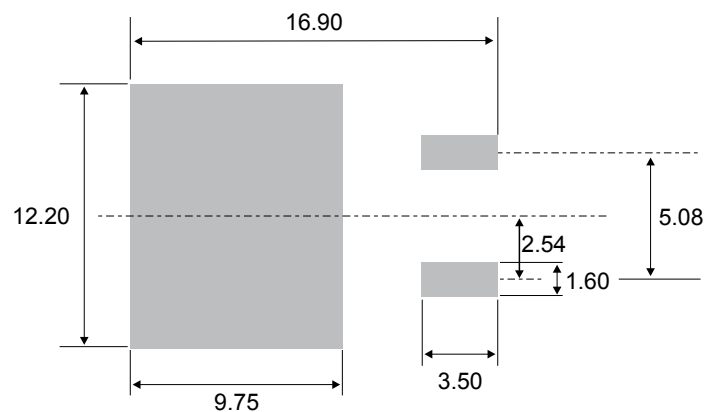


Table 8. D²PAK package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.36 | 4.60 | 0.172 | 0.181 |
| A1 | 0.00 | 0.25 | 0.000 | 0.010 |
| b | 0.70 | 0.93 | 0.028 | 0.037 |
| b2 | 1.14 | 1.70 | 0.045 | 0.067 |
| c | 0.38 | 0.69 | 0.015 | 0.027 |
| c2 | 1.19 | 1.36 | 0.047 | 0.053 |
| D | 8.60 | 9.35 | 0.339 | 0.368 |
| D1 | 6.90 | 8.00 | 0.272 | 0.311 |
| D2 | 1.10 | 1.50 | 0.043 | 0.060 |
| E | 10.00 | 10.55 | 0.394 | 0.415 |
| E1 | 8.10 | 8.90 | 0.319 | 0.346 |
| E2 | 6.85 | 7.25 | 0.266 | 0.282 |
| e | 2.54 typ. | | 0.100 | |
| e1 | 4.88 | 5.28 | 0.190 | 0.205 |
| H | 15.00 | 15.85 | 0.591 | 0.624 |
| J1 | 2.49 | 2.90 | 0.097 | 0.112 |
| L | 1.90 | 2.79 | 0.075 | 0.110 |
| L1 | 1.27 | 1.65 | 0.049 | 0.065 |
| L2 | 1.30 | 1.78 | 0.050 | 0.070 |
| R | 0.4 typ. | | 0.015 | |
| V2 | 0° | 8° | 0° | 8° |

Figure 15. D²PAK Recommended footprint



2.4 DPAK HV 2L package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 16. DPAK HV 2L package outline

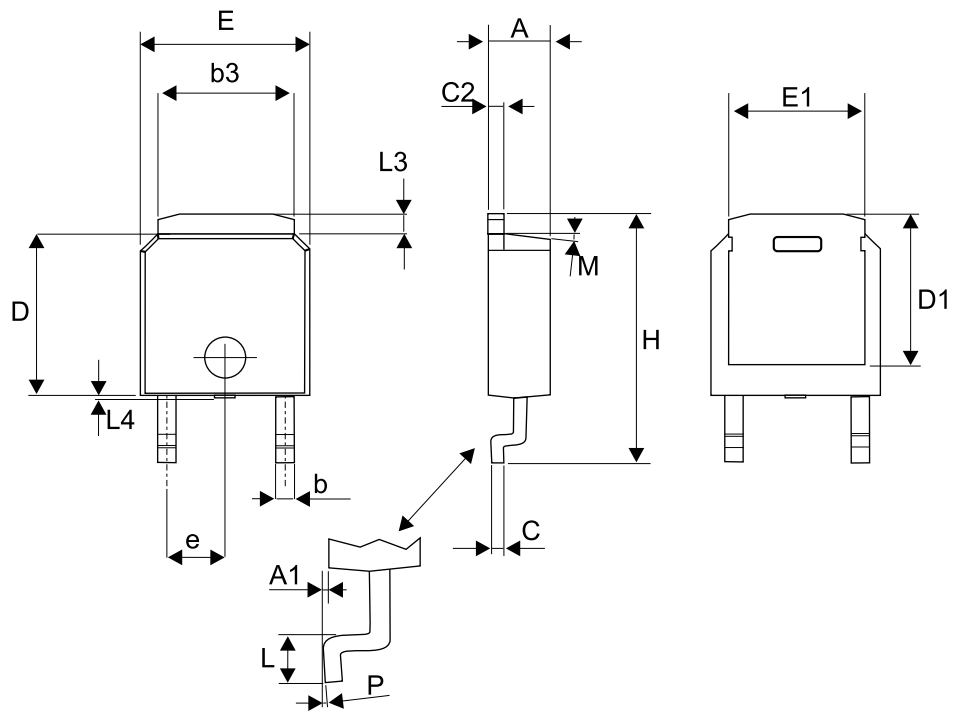
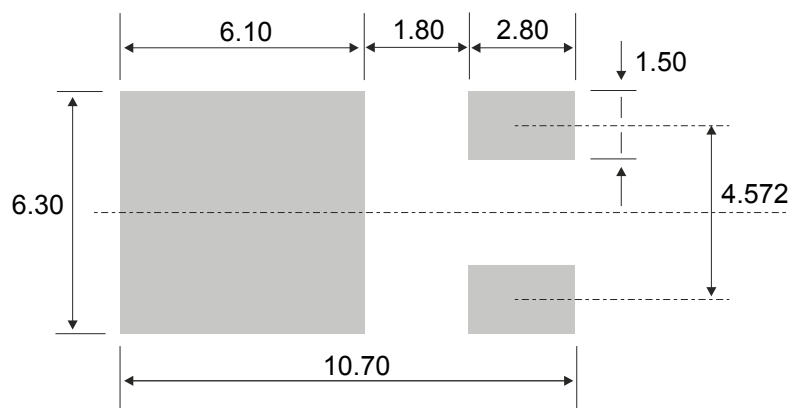


Table 9. DPAK HV 2L package mechanical data

| Ref. | Dimensions | | | | | |
|-------------------|-------------|------|-------|-----------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.16 | 2.29 | 2.40 | 0.085 | 0.090 | 0.094 |
| A1 | 0.06 | 0.08 | 0.13 | 0.002 | 0.003 | 0.005 |
| b | 0.71 | 0.76 | 1.07 | 0.028 | 0.029 | 0.030 |
| b3 | 5.004 | 5.10 | 5.21 | 0.197 | 0.201 | 0.205 |
| c | 0.46 | 0.51 | 0.56 | 0.018 | 0.020 | 0.025 |
| c2 | 0.76 | 0.81 | 0.86 | 0.029 | 0.032 | 0.034 |
| D | 5.97 | 6.10 | 6.22 | 0.235 | 0.240 | 0.245 |
| D1 | 5.84 REF | | | 0.230 REF | | |
| E | 6.48 | 6.60 | 6.73 | 0.255 | 0.260 | 0.265 |
| E1 | 4.95 | 5.08 | 5.21 | 0.195 | 0.200 | 0.205 |
| e | 2.29 REF | | | 0.90 REF | | |
| H | 9.70 | 9.83 | 10.08 | 0.382 | 0.387 | 0.397 |
| L | 1.02 | 1.14 | 1.40 | 0.040 | 0.045 | 0.055 |
| L3 | | | 1.14 | | | 0.045 |
| L4 ⁽¹⁾ | 0.000 | | 0.15 | 0.000 | | 0.006 |
| M | | 7° | | | 7° | |
| P | | | 5° | | | 5° |

1. Maximum plastic protrusion

Figure 17. Footprint (dimensions in mm)



3 Ordering information

Table 10. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-----------------|--------------|--------------------|---------|-----------|---------------|
| STPSC10H12D | STPSC10H12D | TO-220AC | 1.86 g | 50 | Tube |
| STPSC10H12WL | STPSC10H12WL | DO-247 LL | 5.9 g | 30 | Tube |
| STPSC10H12B-TR1 | STPSC 10H12 | DPAK HV 2L | 0.368 g | 2500 | Tape and reel |
| STPSC10H12G-TR | STPSC10H12G | D ² PAK | 1.48 g | 1000 | Tape and reel |

Revision history

Table 11. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 03-May-2016 | 1 | First issue |
| 06-Feb-2016 | 2 | Added DPAK HV 2L package. Updated Table 5: "Dynamic electrical characteristics". |
| 10-Apr-2017 | 3 | Added D ² PAK package. |
| 10-Sep-2017 | 4 | Added DO-247 LL package. Updated Section 1: "Characteristics" and Table 10: "Ordering information". |
| 23-Apr-2018 | 5 | Updated Figure 13. DO-247 LL package outline . |

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.

© 2018 STMicroelectronics – All rights reserved

单击下面可查看定价，库存，交付和生命周期等信息

[>>STMicro\(意法半导体\)](#)