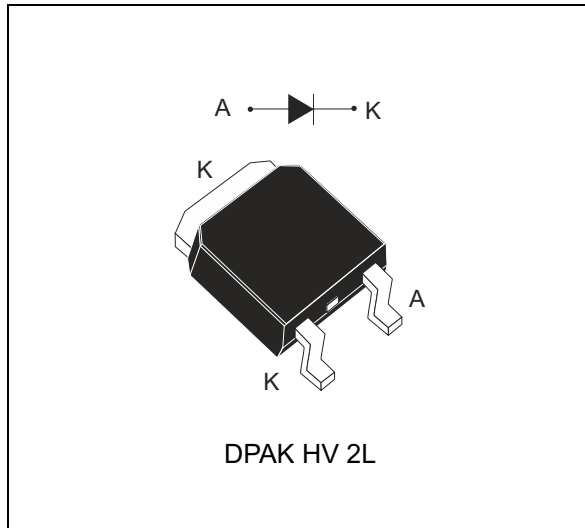


1200 V power Schottky silicon carbide diode

Datasheet - production data



Features

- High frequency free-wheel / boost diode
- Robust high-voltage periphery
- Ultrafast high voltage switching independent of temperature

Description

ST's 1200 V high-performance rectifier is specifically designed to be used in photo-voltaic inverters or in applications where negligible switching losses are required.

The STPSC6H12 helps to increase the application efficiency yield by up to 2% thanks to its ability to work at high frequency whatever the temperature.

The central lead of the DPAK package is removed to meet the IEC60664 and UL 840 standards requirements for a higher voltage.

These characteristics make it the best-in-class 1200 V diode.

Table 1. Device summary

| Symbol | Value |
|-------------------------|--------|
| $I_{F(AV)}$ | 6 A |
| V_{RRM} | 1200 V |
| T_j (max.) | 175 °C |
| V_F (6 A, 25 °C) typ. | 1.55 V |
| C_j (300 V) typ. | 30 pF |

1 Characteristics

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

| Symbol | Parameter | | Value | Unit |
|--------------|---|--|-------------|------|
| V_{RRM} | Repetitive peak reverse voltage | | 1200 | V |
| $I_{F(RMS)}$ | Forward rms current | | 11 | A |
| $I_{F(AV)}$ | Average forward current | $T_C = 125\text{ °C}, \delta = 0.5$ | 6 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms sinusoidal}, T_a = 25\text{ °C}$ | 36 | A |
| | | $t_p = 10\text{ ms sinusoidal}, T_a = 150\text{ °C}$ | 30 | |
| | | $t_p = 10\text{ }\mu\text{s square}, T_a = 25\text{ °C}$ | 100 | |
| I_{FRM} | Repetitive peak forward current | $\delta = 0.1, T_C = 125\text{ °C}$ | 28 | A |
| T_{stg} | Storage temperature range | | -65 to +175 | °C |
| T_j | Operating junction temperature range ⁽¹⁾ | | -40 to +175 | °C |

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

| Symbol | Parameter | Typ. | Max. | Unit |
|---------------|------------------|------|------|------|
| $R_{th(j-c)}$ | Junction to case | 1.3 | 1.9 | °C/W |

Table 4. Static electrical characteristics

| Symbol | Parameter | Tests conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | 100 | 400 | μA |
| | | $T_j = 150\text{ °C}$ | | - | 0.65 | 1.5 | mA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 6\text{ A}$ | - | 1.55 | 1.9 | V |
| | | $T_j = 150\text{ °C}$ | | - | 2.05 | 2.6 | |

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

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

To evaluate the conduction losses use the following equation:

$$P = 0.89 \times I_{F(AV)} + 0.285 \times I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | Typ. | Unit |
|----------------|-------------------------|--|------|------|
| $Q_{cj}^{(1)}$ | Total capacitive charge | $V_R = 800\text{ V}$ | 29 | nC |
| C_j | Total capacitance | $V_R = 0\text{ V}, T_C = 25\text{ °C}, F = 1\text{ MHz}$ | 330 | pF |
| | | $V_R = 300\text{ V}, T_C = 25\text{ °C}, F = 1\text{ MHz}$ | 30 | |

1. Most accurate value for the capacitive charge: $Q_{cj} = \int_0^{V_{OUT}} C_j(V_R).dV_R$

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

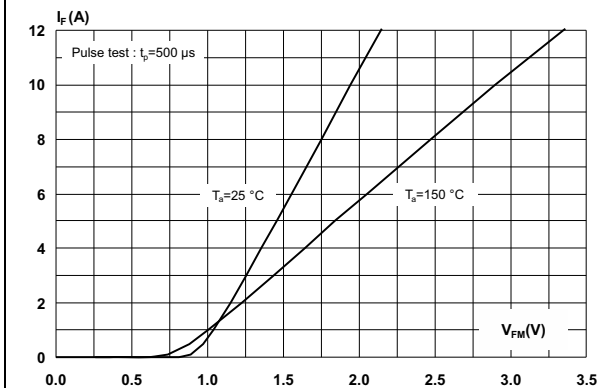


Figure 2. Reverse leakage current versus reverse voltage applied (typical values)

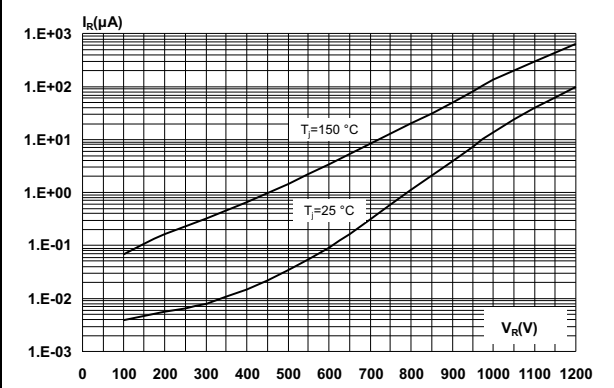


Figure 3. Peak forward current versus case temperature

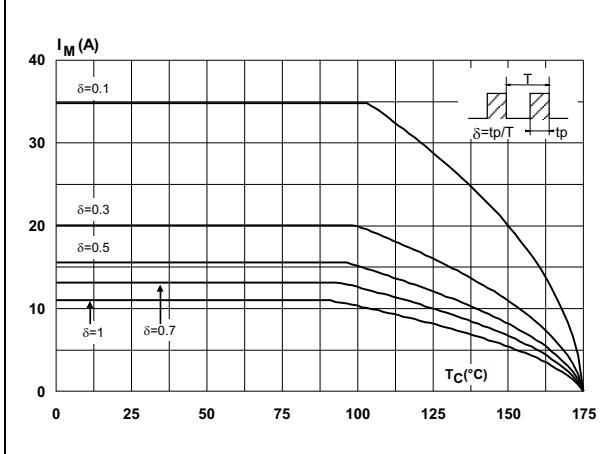


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

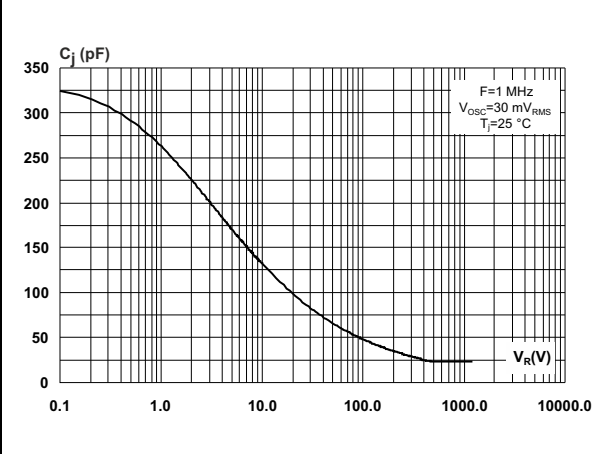


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

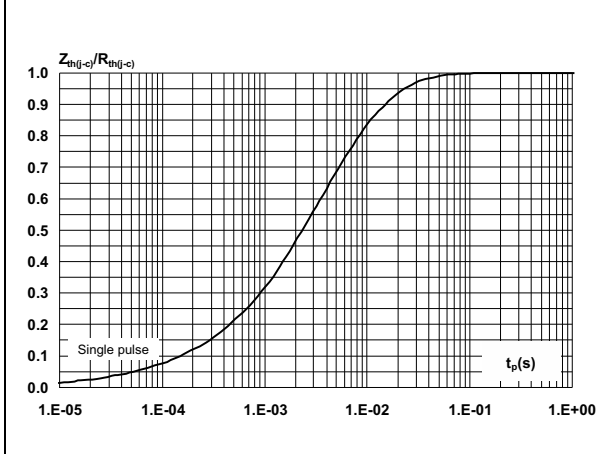


Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

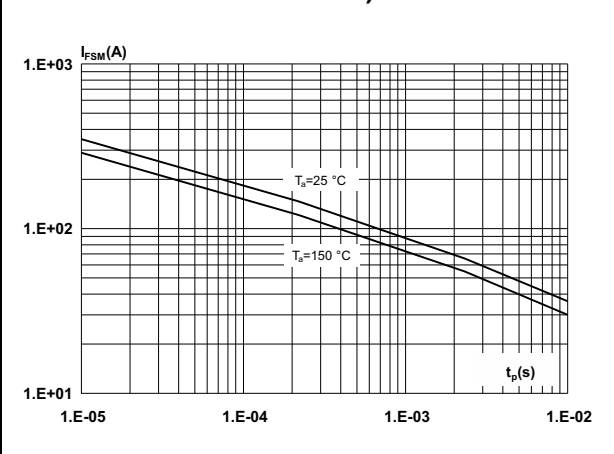
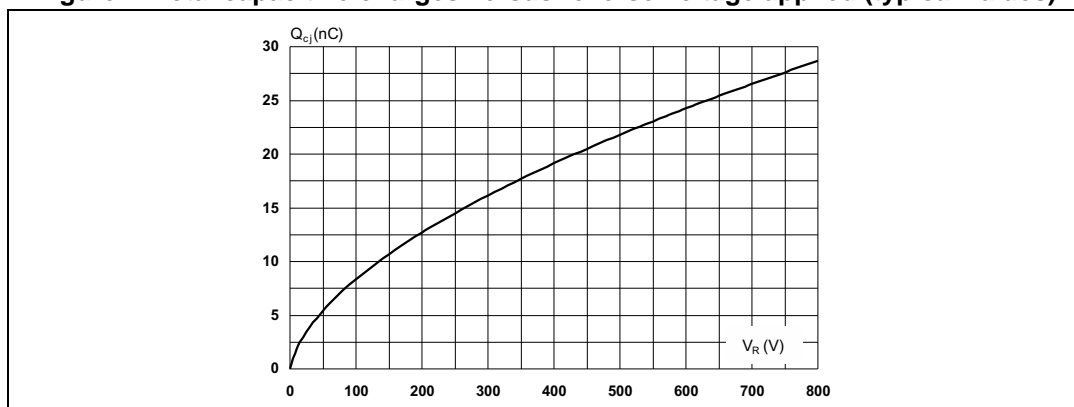


Figure 7. Total capacitive charges versus reverse voltage applied (typical values)



2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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 DPAK HV 2L package information

Figure 8. DPAK HV 2L package outline

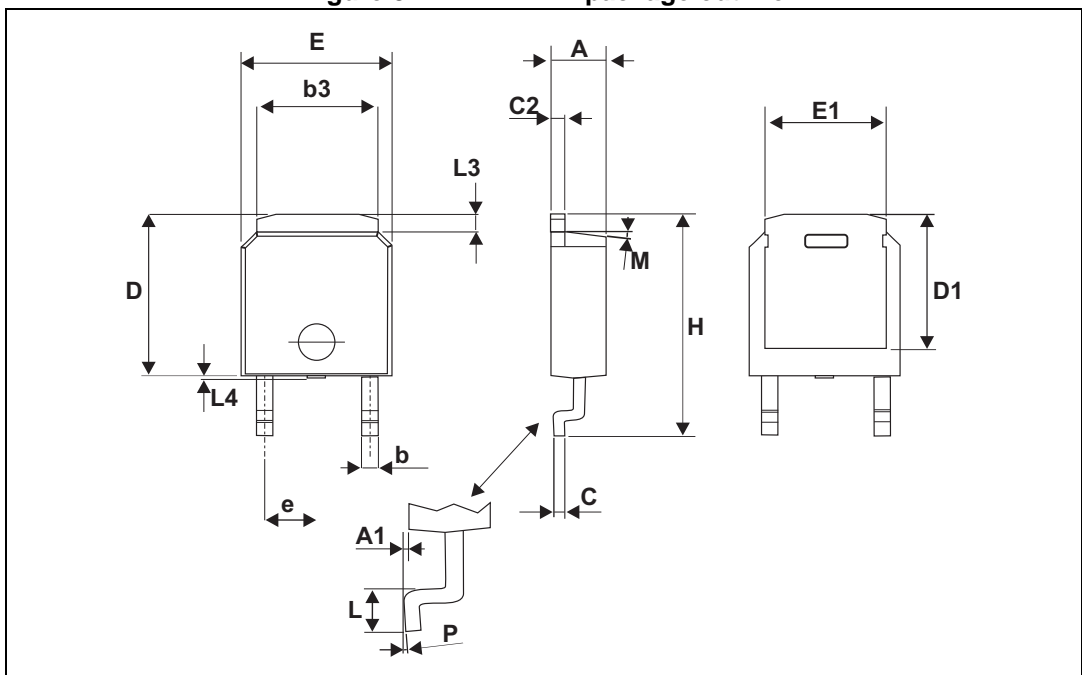
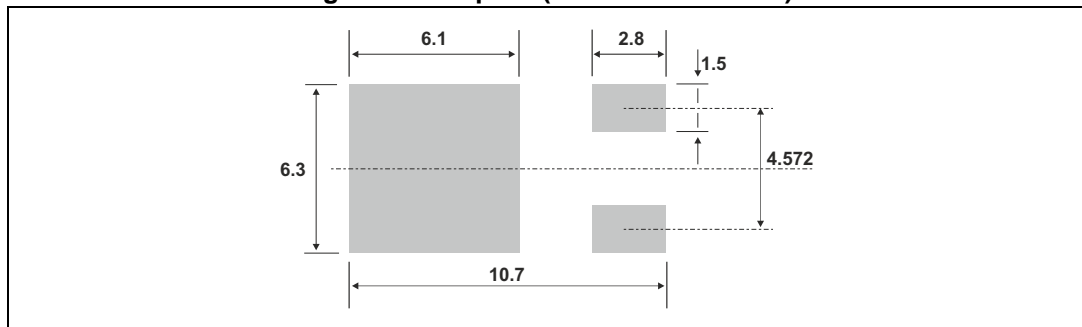


Table 6. DPAK HV 2L package mechanical data

| 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 9. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|------------|------------|--------|----------|---------------|
| STPSC6H12B-TR1 | STPSC 6H12 | DPAK HV 2L | 0.368g | 2500 | Tape and reel |

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 02-Aug-2013 | 1 | First issue. |
| 05-Aug-2013 | 2 | Corrected typographical error in Table 7 . |
| 13-Mar-2015 | 3 | Updated marking information in Table 7: Ordering information . |
| 06-May-2015 | 4 | Updated cover page. Format updated to current standard. |

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