



STPS1045HR

Aerospace 2 x 10 A - 45 V Schottky rectifier

Features

- Forward current: 2 x 10 A
- Repetitive peak voltage: 45 V
- Low forward voltage drop: 0.75 V
- Maximum junction temperature: 175 °C
- Negligible switching losses
- Low capacitance
- High reverse avalanche surge capability
- Hermetic package
- Target radiation qualification:
 - 150 krad (Si) low dose rate
 - 1 Mrad high dose rate
- ESCC qualified



Description

This power Schottky rectifier is designed and packaged to comply with the ESCC5000 specification for aerospace products. Housed in a hermetically sealed surface mount package, it is ideal for use in applications for aerospace and other harsh environments.

The STPS1045HR is intended for use in medium voltage applications and in high frequency circuits where low switching losses and low noise are required.

Table 1. Device summary

| Order code | ESCC detailed specification | Quality level | Configuration | Package | Lead finish | EPPL |
|---------------|-----------------------------|-------------------|---------------------------|---------|-------------|------|
| STPS1045CS1 | - | Engineering model | Double die common cathode | SMD.5 | Gold | - |
| STPS1045CSHRB | 5106/017/02 | ESCC flight | | | | - |

1 Characteristics

Table 2. Absolute maximum ratings

| Symbol | Characteristic | Value | Unit |
|--------------|--|-------------|------|
| I_{FSM} | Forward surge current (per diode) ⁽¹⁾ | 200 | A |
| V_{RRM} | Repetitive peak reverse voltage ⁽²⁾ | 45 | V |
| I_{RRM} | Repetitive peak reverse current ⁽³⁾ | 1 | A |
| I_O | Average output rectified current (50% duty cycle): ⁽⁴⁾ per diode per device | 10 | A |
| | | 20 | |
| $I_{F(RMS)}$ | Forward rms current (per diode) | 15 | A |
| T_{OP} | Operating temperature range (case temperature) | -65 to +175 | °C |
| T_J | Junction temperature | +175 | °C |
| T_{STG} | Storage temperature range | -65 to +175 | °C |
| T_{SOL} | Soldering temperature ⁽⁵⁾ | +245 | °C |
| dV/dt | Critical rate of rise of reverse voltage | 10000 | V/μs |

1. Sinusoidal pulse of 10 ms duration
2. Pulsed, duration 5 ms, F = 50 Hz
3. Pulsed, duration 2 μs, F = 1 kHz
4. For $T_{case} > +140$ °C, derate linearly to 0 A at +175 °C.
5. Duration 5 seconds maximum and the same package shall not be resoldered until 3 minutes have elapsed.

Table 3. Thermal resistance

| Symbol | Characteristic | Value | Unit |
|------------------------------|--|-------|------|
| $R_{th(j-c)}$ ⁽¹⁾ | Thermal resistance, junction to case per diode per device ⁽²⁾ | 1.65 | °C/W |
| | | 0.85 | |

1. Package mounted on infinite heatsink
2. The per device ratings apply only when both anode terminals are tied together.

Table 4. Electrical measurements at ambient temperature (per diode), $T_{amb} = 22 \pm 3 \text{ }^\circ\text{C}$

| Symbol | Characteristic | MIL-STD-750 test method | Test conditions | Values | | Units |
|---------------------|--|-------------------------|--|------------------------------|------|--------------------|
| | | | | Min. | Max. | |
| I_R | Reverse Current | 4016 | DC method, $V_R = 45\text{V}$ | - | 100 | μA |
| $V_{F1}^{(1)}$ | Forward Voltage | 4011 | Pulse method, $I_F = 3 \text{ A}$ | - | 620 | mV |
| $V_{F2}^{(1)}$ | | | Pulse method, $I_F = 20 \text{ A}$ | - | 750 | mV |
| $V_{F3}^{(1)}$ | | | Pulse method, $I_F = 20 \text{ A}$ | | 880 | mV |
| C | Capacitance | 4001 | $V_R = 5 \text{ V}$, $F = 1 \text{ MHz}$ | - | 500 | pF |
| $Z_{th(j-c)}^{(2)}$ | Relative thermal impedance, junction to case | 3101 | $I_H = 15 \text{ to } 40 \text{ A}$, $t_H = 50 \text{ ms}$ $I_M = 50 \text{ mA}$, $t_{md} = 100 \text{ } \mu\text{s}$ | Calculate $\Delta V_F^{(3)}$ | | $^\circ\text{C/W}$ |

1. Pulse width $\leq 300 \text{ } \mu\text{s}$, Duty Cycle $\leq 2\%$
2. Performed only during screening tests parameter drift values (initial measurements), go-no-go
3. The limits for ΔV_F shall be defined by the manufacturer on every lot in accordance with MIL-STD-750 Method 3101 and shall guarantee the $R_{th(j-c)}$ limits specified in maximum ratings.

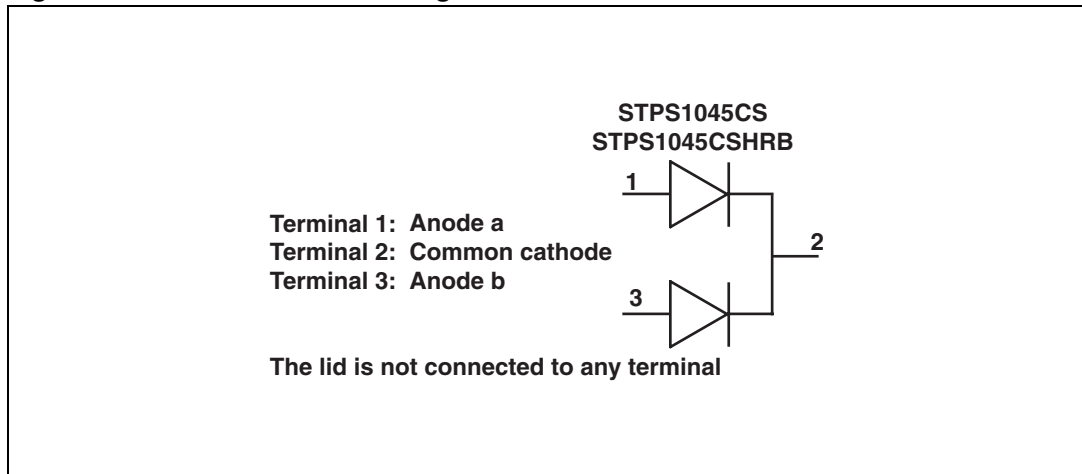
Table 5. Electrical measurements at high and low temperatures (per diode)

| Symbol | Characteristic | MIL-STD-750 test method | Test conditions ⁽¹⁾ | Values | | Units |
|----------------|-----------------|-------------------------|---|--------|------|-------|
| | | | | Min. | Max. | |
| I_R | Reverse Current | 4016 | $T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ DC method, $V_R = 45 \text{ V}$ | - | 15 | mA |
| $V_{F1}^{(2)}$ | Forward Voltage | 4011 | $T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 3 \text{ A}$ | - | 570 | mV |
| $V_{F2}^{(2)}$ | | | $T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 10 \text{ A}$ | - | 700 | mV |
| $V_{F3}^{(2)}$ | | | $T_{case} = -55 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 10 \text{ A}$ | - | 850 | mV |
| | | | $T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 20 \text{ A}$ | - | 800 | mV |

1. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.
2. Performed only during screening tests parameter drift values (initial measurements for HTRB), go-no-go.

2 Configuration

Figure 1. Available device configuration



3 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.

Figure 2. Surface mount package (SMD.5), 3-terminal dimension definitions

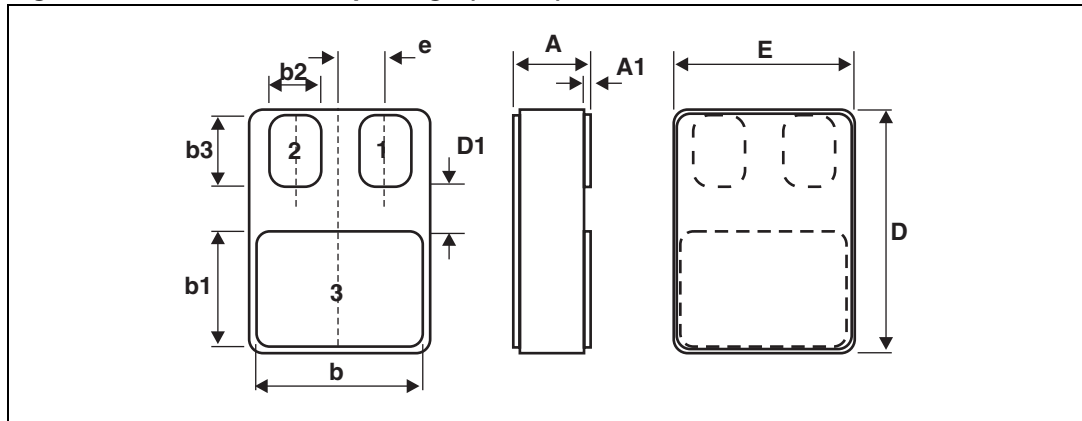


Table 6. Surface mount package (SMD.5), 3-terminal dimension values

| Reference | Dimension in millimetres | | Dimension in inches | |
|-------------------|--------------------------|-------|---------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.84 | 3.15 | 0.112 | 0.124 |
| A1 | 0.25 | 0.51 | 0.010 | 0.20 |
| b | 7.13 | 7.39 | 0.281 | 0.291 |
| b1 | 5.58 | 5.84 | 0.220 | 0.230 |
| b2 ⁽¹⁾ | 2.28 | 2.54 | 0.090 | 0.100 |
| b3 ⁽¹⁾ | 2.92 | 3.18 | 0.115 | 0.125 |
| D | 10.03 | 10.28 | 0.395 | 0.405 |
| D1 ⁽¹⁾ | 0.76 | - | 0.030 | - |
| E | 7.39 | 7.64 | 0.291 | 0.301 |
| e ⁽¹⁾ | 1.91 BSC | | 0.075 | |

1. 2 locations

4 Ordering Information

Table 7. Ordering information

| Order code | ESCC detailed specification | Package | Lead finish | Marking | EPPL | Mass (g) | Packing |
|---------------|-----------------------------|---------|-------------|-------------|------|----------|------------|
| STPS1045CS1 | - | SMD.5 | Gold | STPS1045CS1 | - | 2.0 | Strip pack |
| STPS1045CSHRB | 5106/017/02 | | Gold | 510601702 | - | | |

5 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|--------------|----------|------------------|
| 16-June-2010 | 1 | Initial release. |

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