



# STPS41L45CG/CT/CR

## LOW DROP POWER SCHOTTKY RECTIFIER

### MAIN PRODUCTS CHARACTERISTICS

|             |          |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 20 A |
| $V_{RRM}$   | 45 V     |
| $T_j (max)$ | 150 °C   |
| $V_F (max)$ | 0.47 V   |

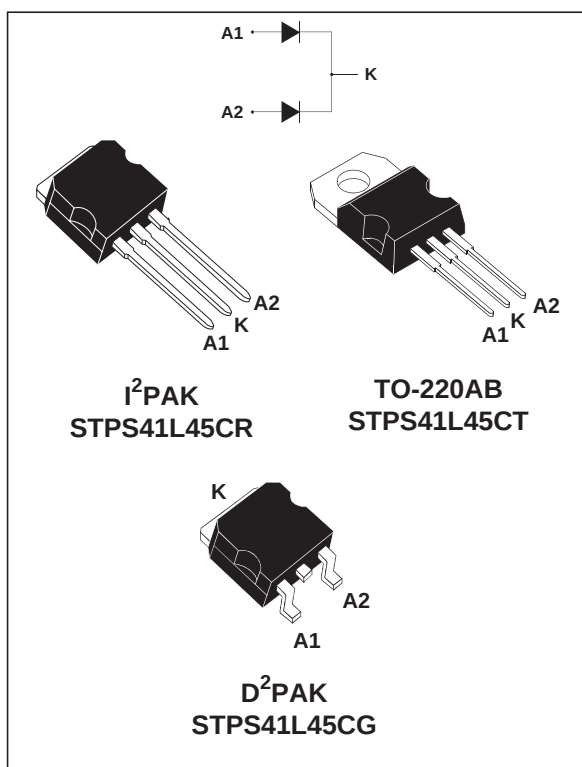
### FEATURES AND BENEFITS

- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- LOW FORWARD VOLTAGE DROP
- LOW THERMAL RESISTANCE
- AVALANCHE CAPABILITY SPECIFIED

### DESCRIPTION

Dual center tab Schottky rectifier suited for 5V output in off line AC/DC power supplies.

Packaged in D<sup>2</sup>PAK, I<sup>2</sup>PAK and TO-220AB this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection applications.



### ABSOLUTE RATINGS (limiting values, per diode)

| Symbol       | Parameter                                |                                                |                         | Value         | Unit             |
|--------------|------------------------------------------|------------------------------------------------|-------------------------|---------------|------------------|
| $V_{RRM}$    | Repetitive peak reverse voltage          |                                                |                         | 45            | V                |
| $I_{F(RMS)}$ | RMS forward current                      |                                                |                         | 30            | A                |
| $I_{F(AV)}$  | Average forward current                  | $T_c = 130^\circ\text{C}$<br>$\delta = 0.5$    | Per diode<br>Per device | 20<br>40      | A                |
| $I_{FSM}$    | Surge non repetitive forward current     | $t_p = 10 \text{ ms}$ sinusoidal               |                         | 220           | A                |
| $I_{RRM}$    | Peak repetitive reverse current          | $t_p = 2 \mu\text{s}$ square $F = 1\text{kHz}$ |                         | 1             | A                |
| $P_{ARM}$    | Repetitive peak avalanche power          | $t_p = 1 \mu\text{s}$ $T_j = 25^\circ\text{C}$ |                         | 10000         | W                |
| $T_{stg}$    | Storage temperature range                |                                                |                         | - 65 to + 175 | °C               |
| $T_j$        | Maximum operating junction temperature * |                                                |                         | 150           | °C               |
| $dV/dt$      | Critical rate of rise reverse voltage    |                                                |                         | 10000         | V/ $\mu\text{s}$ |

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

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### THERMAL RESISTANCES

| Symbol        | Parameter        |                    | Value      | Unit |
|---------------|------------------|--------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode<br>Total | 1.5<br>0.8 | °C/W |
| $R_{th(c)}$   | Coupling         |                    | 0.1        |      |

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

### STATIC ELECTRICAL CHARACTERISTICS (per diode)

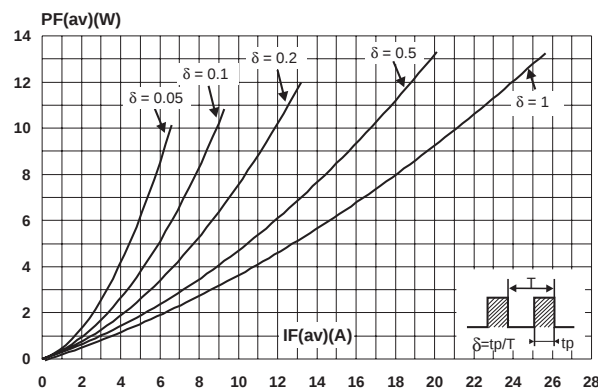
| Symbol  | Parameter               | Tests Conditions          |                     | Min. | Typ. | Max. | Unit |
|---------|-------------------------|---------------------------|---------------------|------|------|------|------|
| $I_R^*$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$     |      |      | 1.2  | mA   |
|         |                         | $T_j = 125^\circ\text{C}$ |                     |      | 110  | 220  | mA   |
| $V_F^*$ | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 20\text{ A}$ |      |      | 0.53 | V    |
|         |                         | $T_j = 125^\circ\text{C}$ | $I_F = 20\text{ A}$ |      | 0.42 | 0.47 |      |
|         |                         | $T_j = 25^\circ\text{C}$  | $I_F = 40\text{ A}$ |      |      | 0.68 |      |
|         |                         | $T_j = 125^\circ\text{C}$ | $I_F = 40\text{ A}$ |      | 0.60 | 0.66 |      |

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

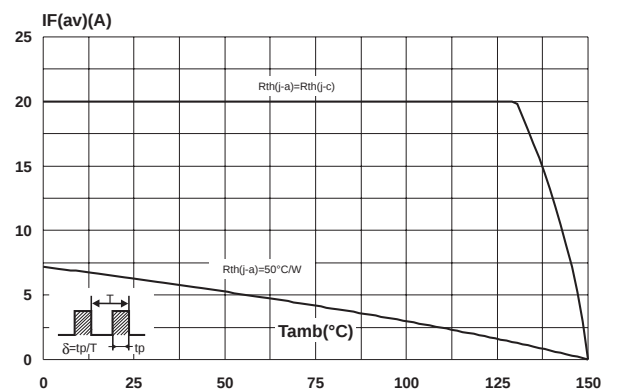
To evaluate the conduction losses use the following equation :

$$P = 0.28 \times I_{F(AV)} + 0.0095 I_{F(RMS)}^2$$

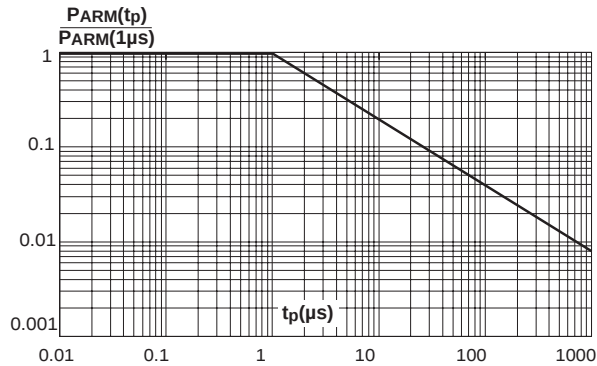
**Fig. 1:** Conduction losses versus average current.



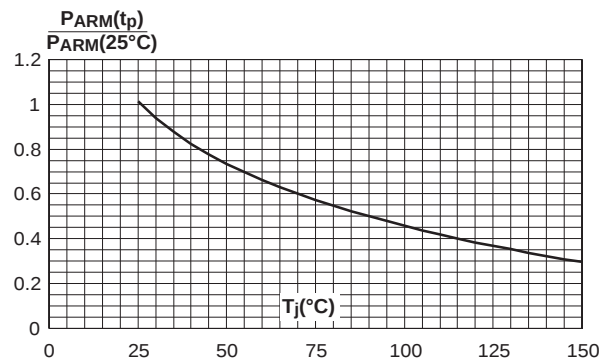
**Fig. 2:** Average forward current versus ambient temperature ( $\delta = 0.5$ ).



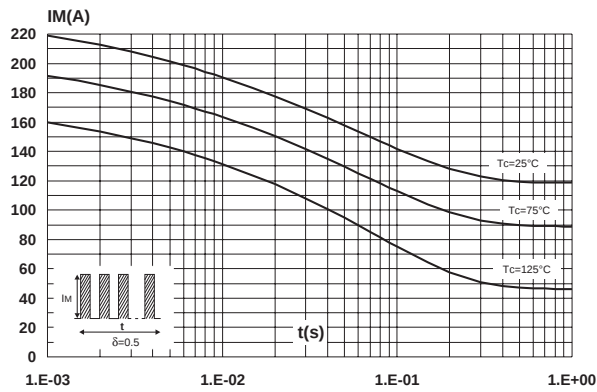
**Fig. 3:** Normalized avalanche power derating versus pulse duration.



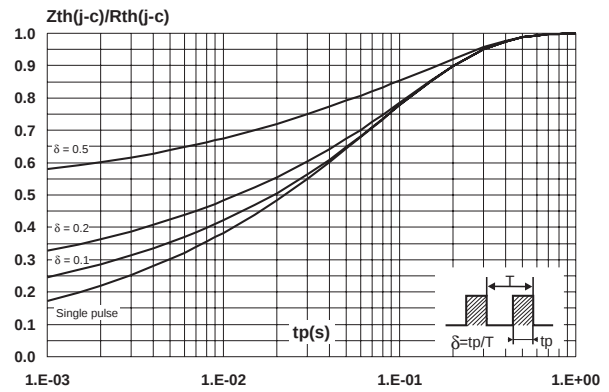
**Fig. 4:** Normalized avalanche power derating versus junction temperature.



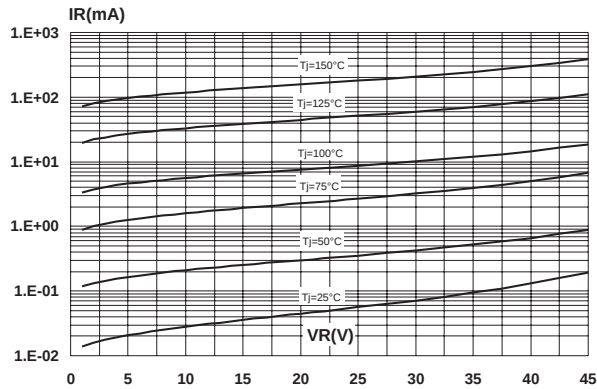
**Fig. 5:** Non repetitive surge peak forward current versus overload duration (maximum values).



**Fig. 6:** Relative variation of thermal impedance junction to case versus pulse duration.



**Fig. 7:** Reverse leakage current versus reverse voltage applied (typical values).



**Fig. 8:** Junction capacitance versus reverse voltage applied (typical values).

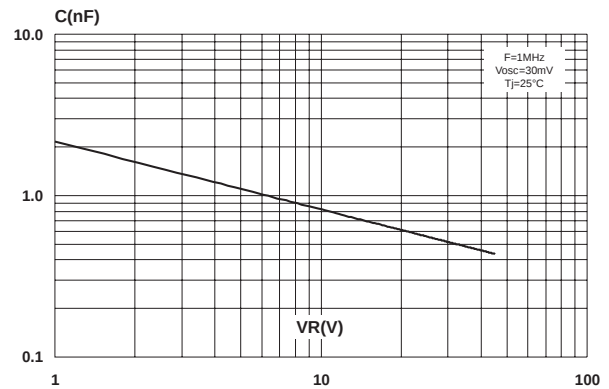


Fig. 9: Forward voltage drop versus forward current.

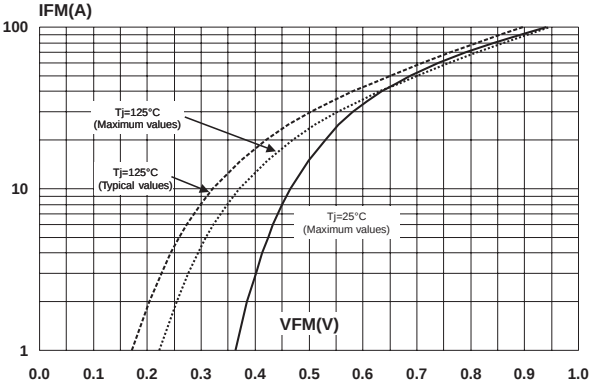
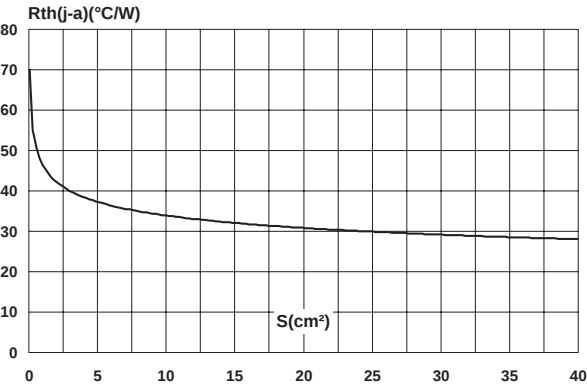
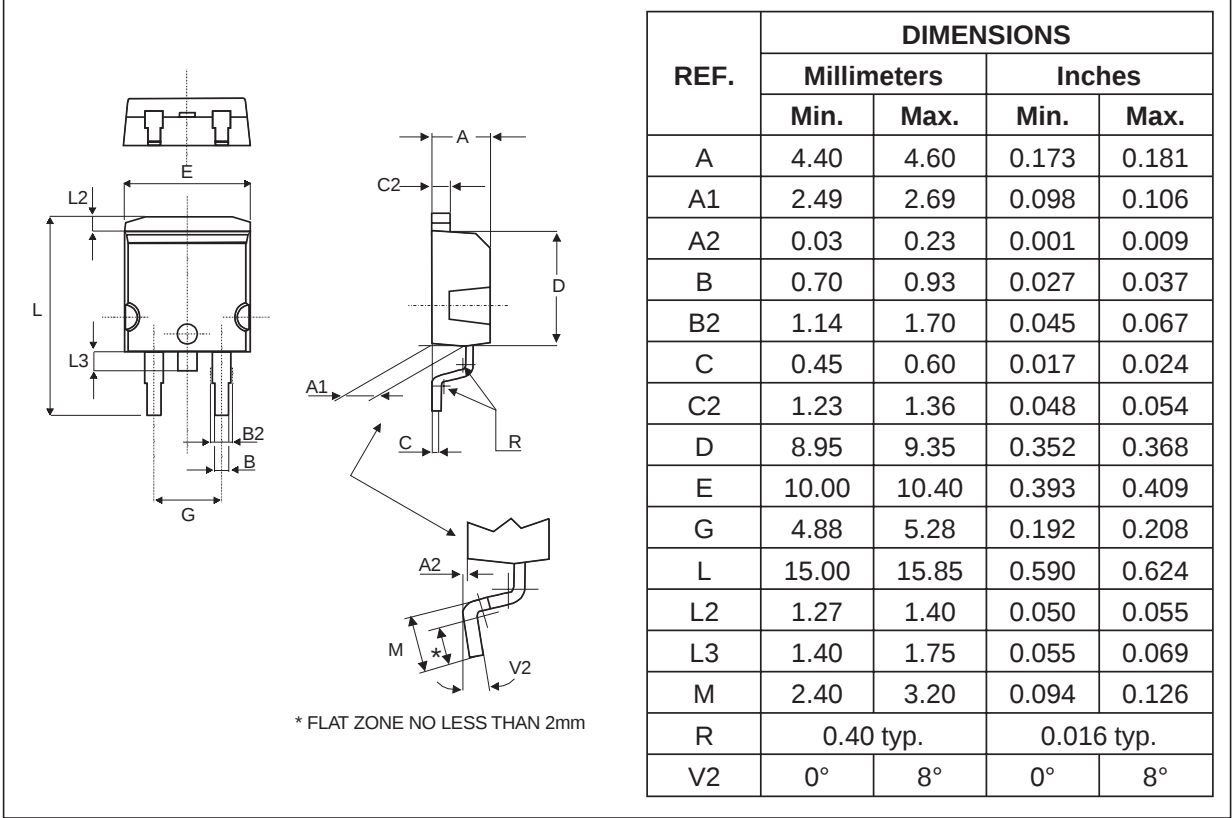


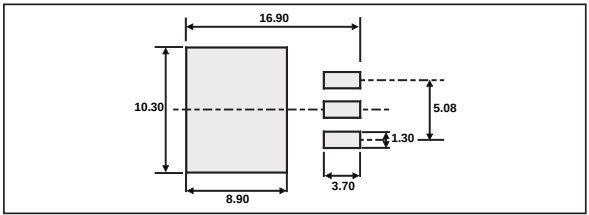
Fig. 10: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, Cu = 35μm) (STPS41L45CG only).



PACKAGE MECHANICAL DATA  
D<sup>2</sup>PAK



FOOTPRINT (dimensions in mm)



PACKAGE MECHANICAL DATA  
I<sup>2</sup>PAK

| REF. | DIMENSIONS  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 4.40        | 4.60 | 0.173  | 0.181 |
| A1   | 2.49        | 2.69 | 0.098  | 0.106 |
| b    | 0.70        | 0.93 | 0.028  | 0.037 |
| b1   | 1.14        | 1.17 | 0.044  | 0.046 |
| b2   | 1.14        | 1.17 | 0.044  | 0.046 |
| c    | 0.45        | 0.60 | 0.018  | 0.024 |
| c2   | 1.23        | 1.36 | 0.048  | 0.054 |
| D    | 8.95        | 9.35 | 0.352  | 0.368 |
| e    | 2.40        | 2.70 | 0.094  | 0.106 |
| E    | 10.0        | 10.4 | 0.394  | 0.409 |
| L    | 13.1        | 13.6 | 0.516  | 0.535 |
| L1   | 3.48        | 3.78 | 0.137  | 0.149 |
| L2   | 1.27        | 1.40 | 0.050  | 0.055 |

**PACKAGE MECHANICAL DATA**  
 TO-220AB

| 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 |
| F2    | 1.14        | 1.70  | 0.044      | 0.066 |
| G     | 4.95        | 5.15  | 0.194      | 0.202 |
| G1    | 2.40        | 2.70  | 0.094      | 0.106 |
| H2    | 10          | 10.40 | 0.393      | 0.409 |
| L2    | 16.4 typ.   |       | 0.645 typ. |       |
| L4    | 13          | 14    | 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 |

| Ordering type  | Marking     | Package            | Weight | Base qty | Delivery mode |
|----------------|-------------|--------------------|--------|----------|---------------|
| STPS41L45CG    | STPS41L45CG | D <sup>2</sup> PAK | 1.48 g | 50       | Tube          |
| STPS41L45CG-TR | STPS41L45CG | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape & reel   |
| STPS41L45CT    | STPS41L45CT | TO-220AB           | 2.20 g | 50       | Tube          |
| STPS41L45CR    | STPS41L45CR | I <sup>2</sup> PAK | 1.49 g | 50       | Tube          |

**■ EPOXY MEETS UL94,V0**

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