

STPS40L45C-Y

Automotive power Schottky rectifier

Datasheet - production data

Features

- Low forward voltage drop meaning very small conduction losses
- Low switching losses allowing high frequency operation
- Avalanche capability specified
- AEC-Q101 qualified

Description

Dual center tap Schottky barrier rectifier designed for high frequency switched mode power supplies and DC to DC converters.

Packaged in D²PAK, this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection for automotive applications.

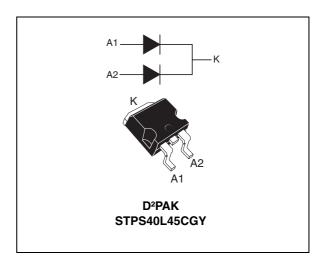


Table 1. Device summary

| Symbol | Value |
|----------------------|----------|
| I _{F(AV)} | 2 x 20 A |
| V _{RRM} | 45 V |
| T _j (max) | 150 °C |
| V _F (max) | 0.49 V |

Characteristics STPS40L45C-Y

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Table 2. Absolute ratings (limiting values, per diode)

| Symbol | Paramete | Value | Unit | | |
|---------------------|---|--|--------------|--------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | | 45 | V |
| I _{F(RMS)} | Forward rms current | | | 30 | Α |
| I _{F(AV)} | Average forward current $ \begin{array}{c} T_c = 130 \ ^{\circ}C \\ \delta = 0.5 \end{array} \begin{array}{c} \text{per diode} \\ \text{per device} \end{array} $ | | 20 40 | Α | |
| I _{FSM} | Surge non repetitive forward current | $t_p = 10 \text{ ms sir}$ | nusoidal | 230 | Α |
| I _{RRM} | Repetitive peak reverse current | t _p = 2 μs square F = 1 kHz | | 2 | Α |
| I _{RSM} | Non repetitive peak reverse current | ent t _p = 100 µs square | | 3 | Α |
| P _{ARM} | Repetitive peak avalanche power $t_p = 1 \mu s T_j = 25 ^{\circ}C$ | | 8100 | W | |
| T _{stg} | Storage temperature range | | | -65 to + 150 | °C |
| Tj | Operating junction temperature (1) | | -40 to + 150 | °C | |
| dV/dt | Critical rate of rise of reverse voltage | | | 10000 | V/µs |

^{1.} $\frac{dPtot}{dT_j} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

| Symbol | Parameter | Value | Unit | |
|-----------------------|------------------|--------------------|------------|------|
| R _{th (j-c)} | Junction to case | Per diode Total | 1.5 0.8 | °C/W |
| R _{th(c)} | Coupling | | 0.1 | °C/W |

When the diodes 1 and 2 are used simultaneously : $\Delta T_i(\text{diode 1}) = P(\text{diode1}) \times R_{th(i-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$.

Table 4. Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Тур. | Max. | Unit |
|-------------------------------|---|-------------------------|-----------------------|------|------|------|------|
| _{I_} (1) | IR ⁽¹⁾ Reverse leakage current | T _j = 25 °C | $V_R = V_{RRM}$ | | | 0.6 | mA |
| 'R' | | T _j = 125 °C | | | 140 | 280 | mA |
| | (1) Forward voltage drop | T _j = 25 °C | I _F = 20 A | | | 0.53 | |
| V _E ⁽¹⁾ | | T _j = 125 °C | I _F = 20 A | | 0.42 | 0.49 | V |
| V _F Forward vo | | T _j = 25 °C | I _F = 40 A | | | 0.69 | V |
| | | T _j = 125 °C | I _F = 40 A | | 0.6 | 0.7 | |

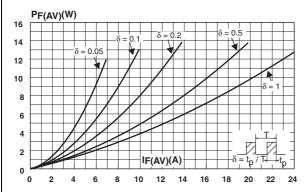
^{1.} Pulse test: $t_p = 380 \mu s$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.28 \times I_{F(AV)} + 0.0105 I_{F}^{2}_{(RMS)}$$

STPS40L45C-Y Characteristics

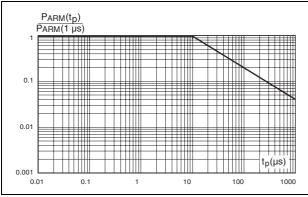
Figure 1. Average forward power dissipation Figure 2. Average forward current versus awerage forward current (per diode) (δ = 0.5, per diode)



IF(AV)(A) 22 20 $R_{th(j-a)} = R_{th(j-c)}$ 18 16 14 12 10 R_{th(j-a)} 8 6 2 Tamb(°C) 0 0 75 100 150

Figure 3. Normalized avalanche power derating versus pulse duration

Figure 4. Normalized avalanche power derating versus junction temperature



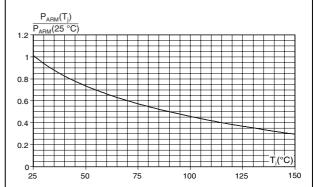
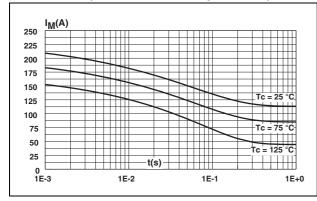
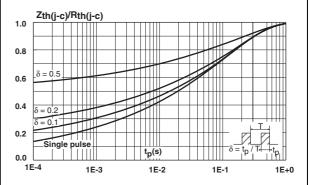


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

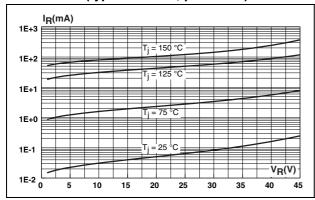




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Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)



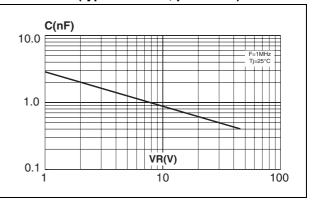
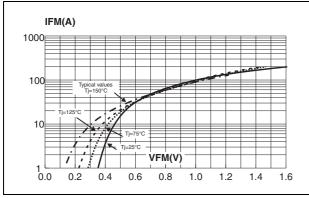
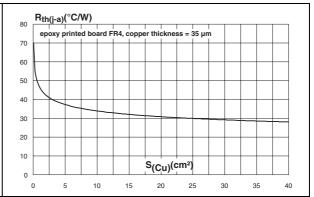


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)

Figure 10. Thermal resistance junction to ambient versus copper surface under tab.





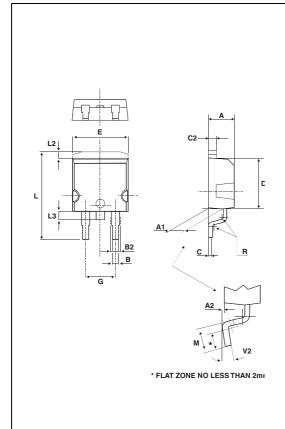
STPS40L45C-Y Package information

2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

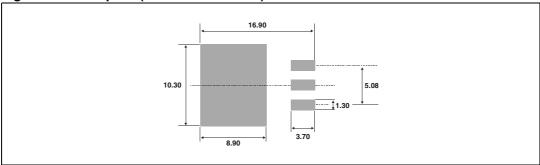
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Table 5. D²PAK dimensions



| | Dimensions | | | | |
|------|-------------|-------|------------|-------|--|
| Ref. | Millimeters | | Inches | | |
| | Min. | Max. | Min. | Max. | |
| Α | 4.40 | 4.60 | 0.173 | 0.181 | |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 | |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 | |
| В | 0.70 | 0.93 | 0.027 | 0.037 | |
| B2 | 1.14 | 1.70 | 0.045 | 0.067 | |
| С | 0.45 | 0.60 | 0.017 | 0.024 | |
| C2 | 1.23 | 1.36 | 0.048 | 0.054 | |
| D | 8.95 | 9.35 | 0.352 | 0.368 | |
| Е | 10.00 | 10.40 | 0.393 | 0.409 | |
| G | 4.88 | 5.28 | 0.192 | 0.208 | |
| L | 15.00 | 15.85 | 0.590 | 0.624 | |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 | |
| L3 | 1.40 | 1.75 | 0.055 | 0.069 | |
| М | 2.40 | 3.20 | 0.094 | 0.126 | |
| R | 0.40 typ. | | 0.016 typ. | | |
| V2 | 0° | 8° | 0° | 8° | |

Figure 11. Footprint (dimensions in mm)



Ordering information STPS40L45C-Y

3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-----------------|--------------|--------------------|--------|----------|---------------|
| STPS40L45CGY-TR | STPS40L45CGY | D ² PAK | 1.8 g | 500 | Tape and Reel |

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 25-Jun-2012 | 1 | First issue. |

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