

Automotive ultrafast recovery diode

Datasheet – production data

Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery time
- High surge current capability
- High junction temperature

Description

This dual center tap diode is suited for switch mode power supplies and high frequency DC to DC converters.

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

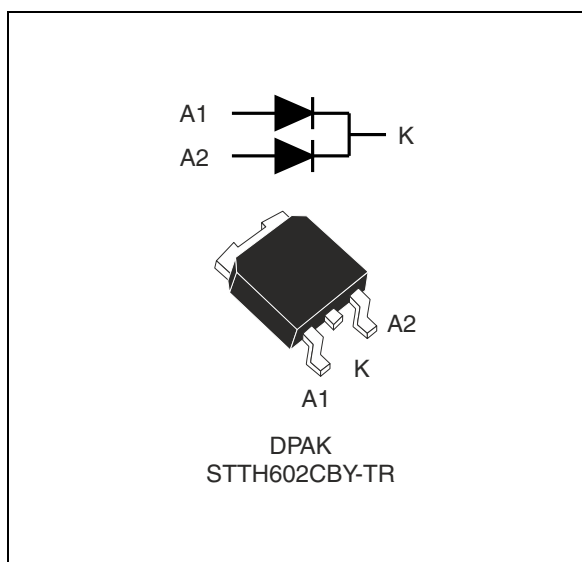


Table 1. Device summary

| | |
|----------------|---------|
| $I_{F(AV)}$ | 2 x 3 A |
| V_{RRM} | 200 V |
| T_j (max) | 175° C |
| V_F (typ) | 0.80 V |
| t_{rr} (typ) | 14 ns |

1 Characteristics

Table 2. Absolute ratings (limiting values at $T_j = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | | Value | Unit |
|--------------|---|--------------------------------------|--------------|------------------|
| V_{RRM} | Repetitive peak reverse voltage | | 200 | V |
| $I_{F(RMS)}$ | RMS forward current | | 11 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | Per diode $T_c = 160^\circ\text{C}$ | 3 | A |
| | | Per device $T_c = 155^\circ\text{C}$ | 6 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ Sinusoidal | 60 | A |
| T_{stg} | Storage temperature range | | -65 to + 175 | $^\circ\text{C}$ |
| T_j | Operating junction temperature | | -40 to + 175 | $^\circ\text{C}$ |

Table 3. Thermal parameters

| Symbol | Parameter | | Value | Unit |
|---------------|------------------|------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 5 | $^\circ\text{C/W}$ |
| | | Per device | 3.0 | |
| $R_{th(c)}$ | Coupling | Per diode | 1 | |
| | | Per diode | 3 | |

When the two diodes 1 and 2 are used simultaneously:

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

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Typ. | Max. | Unit |
|-------------|-------------------------|---------------------------|--------------------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$ | $V_R = V_{RRM}$ | | 3 | μA |
| | | $T_j = 125^\circ\text{C}$ | | 3 | 30 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25^\circ\text{C}$ | $I_F = 3\text{ A}$ | 0.98 | 1.1 | V |
| | | $T_j = 150^\circ\text{C}$ | | 0.8 | 0.95 | |
| | | $T_j = 25^\circ\text{C}$ | $I_F = 6\text{ A}$ | 1.1 | 1.25 | |
| | | $T_j = 150^\circ\text{C}$ | | 0.9 | 1.05 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

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

To evaluate the conduction losses use the following equation:

$$P = 0.85 \times I_{F(AV)} + 0.033 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|----------|--------------------------|--|------|------|------|------|
| t_{rr} | Reverse recovery time | $I_F = 1\text{ A}$, $di_F/dt = -100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$ | | 14 | 20 | ns |
| | | $I_F = 1\text{ A}$, $di_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$ | | 21 | 30 | |
| I_{RM} | Reverse recovery current | $I_F = 3\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 160\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$ | | 4 | 5.5 | A |
| t_{fr} | Forward recovery time | $I_F = 3\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$, $T_j = 25\text{ }^\circ\text{C}$ | | 24 | | ns |
| V_{FP} | Forward recovery voltage | $I_F = 3\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $T_j = 25\text{ }^\circ\text{C}$ | | 3.7 | | V |

Figure 1. Peak current versus duty cycle (per diode)

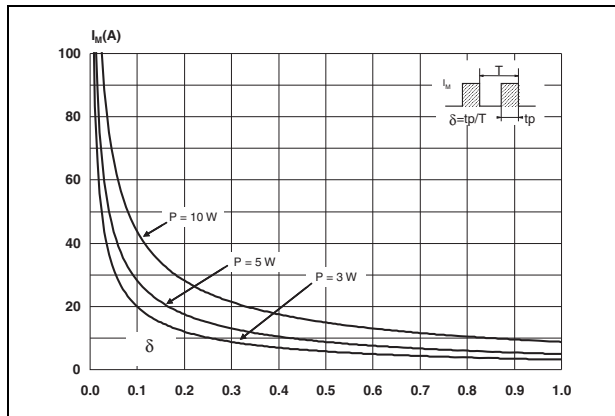


Figure 3. Forward voltage drop versus forward current (maximum values per diode)

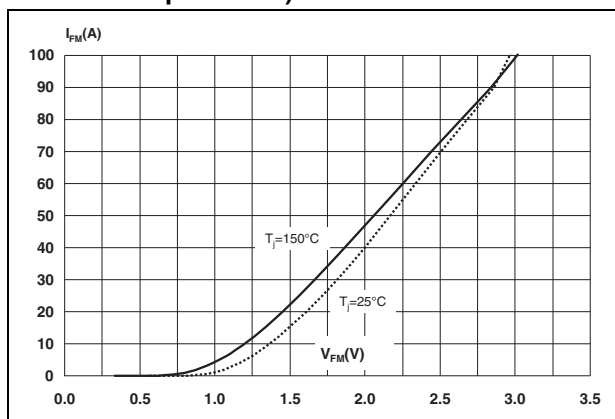


Figure 2. Forward voltage drop versus forward current (typical values per diode)

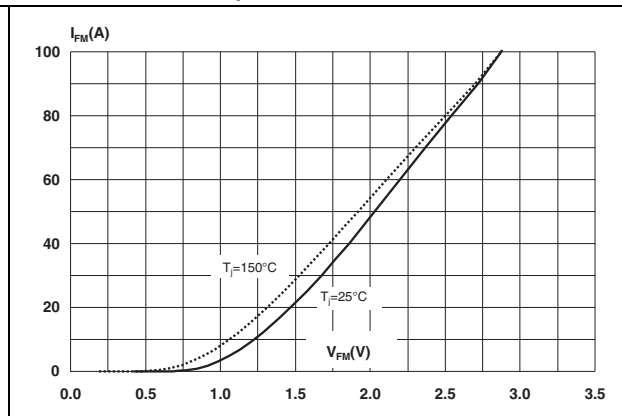


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

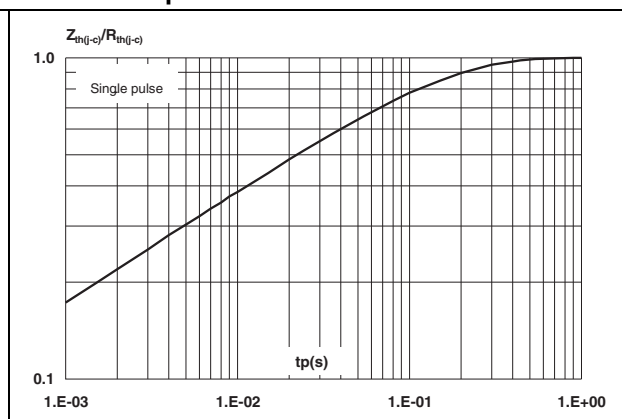


Figure 5. Junction capacitance versus reverse applied voltage (typical values per diode)

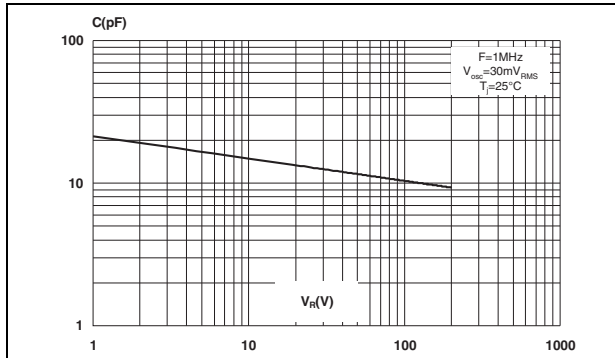


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

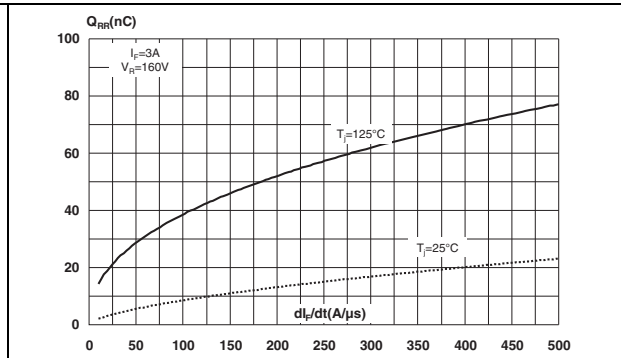


Figure 7. Reverse recovery time versus di_F/dt (typical values)

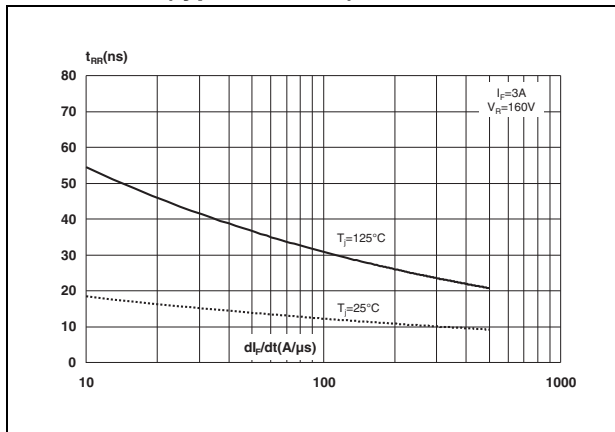


Figure 8. Peak reverse recovery current versus di_F/dt (typical values)

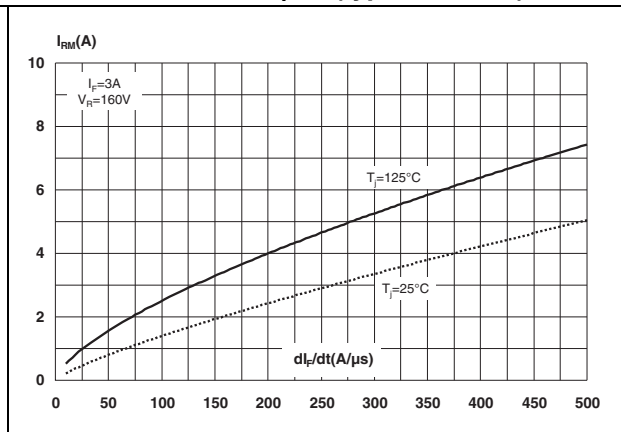
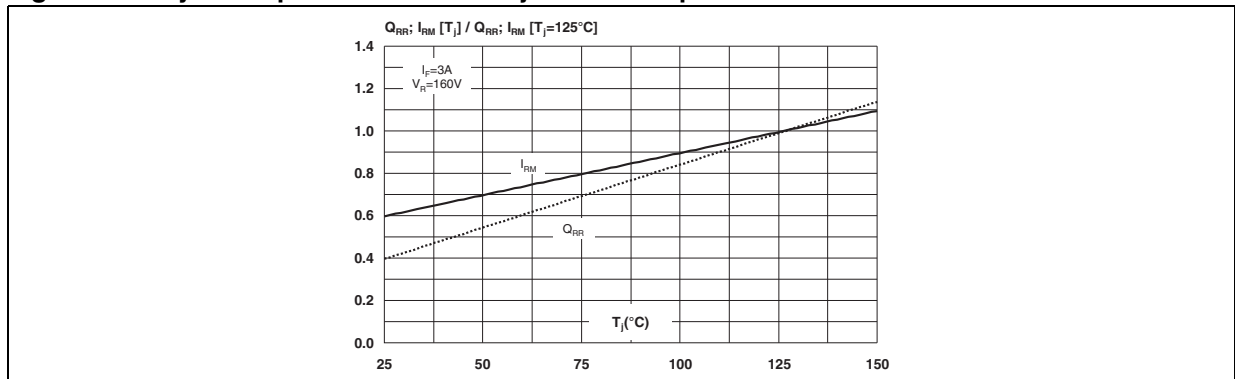


Figure 9. Dynamic parameters versus junction temperature



2 Package information

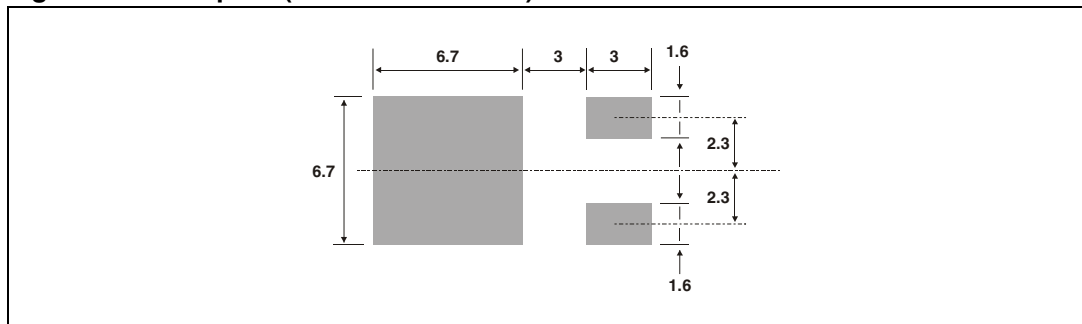
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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Table 6. DPAK dimensions

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 2.20 | 2.40 | 0.086 | 0.094 |
| A1 | 0.90 | 1.10 | 0.035 | 0.043 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.64 | 0.90 | 0.025 | 0.035 |
| B2 | 5.20 | 5.40 | 0.204 | 0.212 |
| C | 0.45 | 0.60 | 0.017 | 0.023 |
| C2 | 0.48 | 0.60 | 0.018 | 0.023 |
| D | 6.00 | 6.20 | 0.236 | 0.244 |
| E | 6.40 | 6.60 | 0.251 | 0.259 |
| G | 4.40 | 4.60 | 0.173 | 0.181 |
| H | 9.35 | 10.10 | 0.368 | 0.397 |
| L2 | 0.80 typ. | | 0.031 typ. | |
| L4 | 0.60 | 1.00 | 0.023 | 0.039 |
| V2 | 0° | 8° | 0° | 8° |

Figure 10. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|------------|---------|--------|----------|---------------|
| STTH602CBY-TR | STTH602CBY | DPAK | 0.30 g | 2500 | Tape and Reel |

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 24-Oct-2012 | 1 | First issue. |

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