

High voltage ultrafast diode

Main product characteristics

| | |
|----------------|--------|
| $I_{F(AV)}$ | 2 A |
| V_{RRM} | 1200 V |
| T_j | 175°C |
| V_F (typ) | 1.0 V |
| t_{rr} (max) | 75 ns |

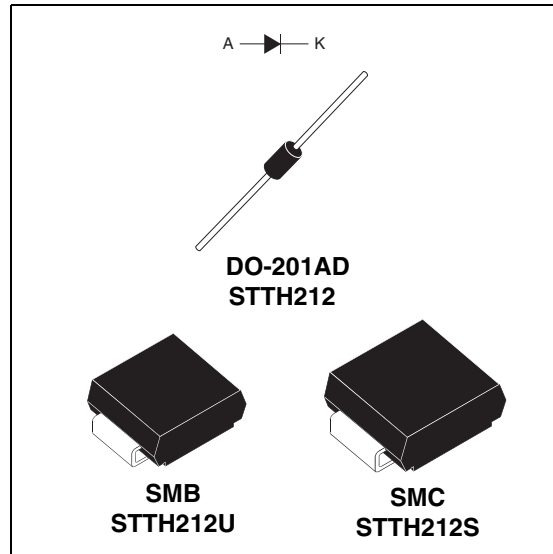
Features and benefits

- Low forward voltage drop
- High reliability
- High surge current capability
- Soft switching for reduced EMI disturbances
- Planar technology

Description

The STTH212, which is using ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications.

Housed in axial, SMB, and SMC packages, this diode will reduce the losses in high switching frequency operations.



Order codes

| Part Number | Marking |
|-------------|---------|
| STTH212 | STTH212 |
| STTH212RL | STTH212 |
| STTH212U | U22 |
| STTH212S | S12 |

1 Electrical characteristics

Table 1. Absolute Ratings (limiting values)

| Symbol | Parameter | | | Value | Unit |
|--------------|--|--------------------|---------------------------|--------------|------------------|
| V_{RRM} | Repetitive peak reverse voltage | | | 1200 | V |
| $V_{(RMS)}$ | RMS voltage | | | 850 | V |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | DO-201AD | $T_j = 105^\circ\text{C}$ | 2 | A |
| | | SMB | $T_j = 90^\circ\text{C}$ | | |
| | | SMC | $T_j = 105^\circ\text{C}$ | | |
| $I_{F(RMS)}$ | RMS forward current | DO-201AD, SMB, SMC | | 10 | A |
| I_{FSM} | Forward surge current $t_p = 8.3\text{ms}$ | DO-201AD, SMB, SMC | | 40 | A |
| T_{stg} | Storage temperature range | | | -50 to + 175 | $^\circ\text{C}$ |
| T_j | Maximum operating junction temperature | | | 175 | $^\circ\text{C}$ |

Table 2. Thermal parameters

| Symbol | Parameter | | | Value | Unit |
|---------------|---------------------|-----------|----------|-------|--------------------|
| $R_{th(j-l)}$ | Junction to lead | L = 10 mm | DO-201AD | 20 | $^\circ\text{C/W}$ |
| | | | SMB | 25 | |
| | | | SMC | 20 | |
| $R_{th(j-a)}$ | Junction to ambient | L = 10 mm | DO-201AD | 75 | $^\circ\text{C/W}$ |

Table 3. Static Electrical Characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|--------|-------------------------|---------------------------|-------------------|------|------|------|---------------|
| I_R | Reverse leakage current | $T_j = 25^\circ\text{C}$ | $V_R = V_{RRM}$ | | | 10 | μA |
| | | $T_j = 125^\circ\text{C}$ | | | | 100 | |
| V_F | Forward voltage drop | $T_j = 25^\circ\text{C}$ | $I_F = 2\text{A}$ | | | 1.75 | V |
| | | $T_j = 125^\circ\text{C}$ | | | 1.07 | 1.50 | |
| | | $T_j = 150^\circ\text{C}$ | | | 1.0 | - | |

To evaluate the conduction losses use the following equation: $P = 1.26 \times I_{F(AV)} + 0.12 I_{F(RMS)}^2$

Table 4. Dynamic Electrical Characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|----------|--------------------------|--------------------------|---|------|-----|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{A}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$ | | | 75 | ns |
| t_{fr} | Forward recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 2\text{A}$ $di_F/dt = 50\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ | | | 500 | ns |
| V_{FP} | Forward recovery voltage | | | | | 30 | V |

Figure 1. Conduction losses versus average forward current

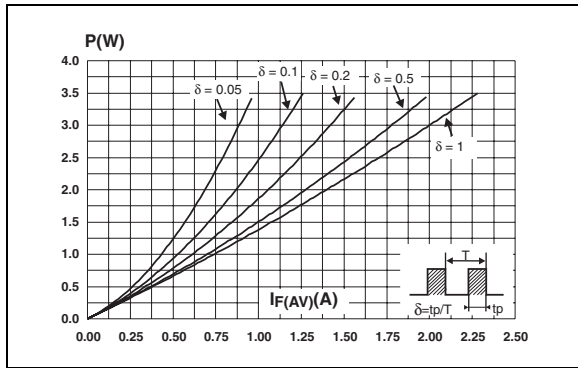


Figure 2. Forward voltage drop versus forward current

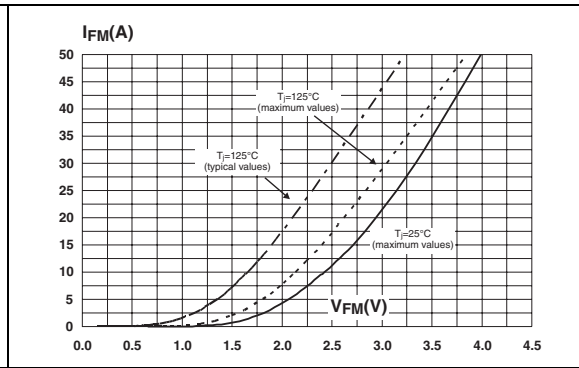


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (Epoxy printed circuit board FR4, $L_{Leads} = 10\text{mm}$)

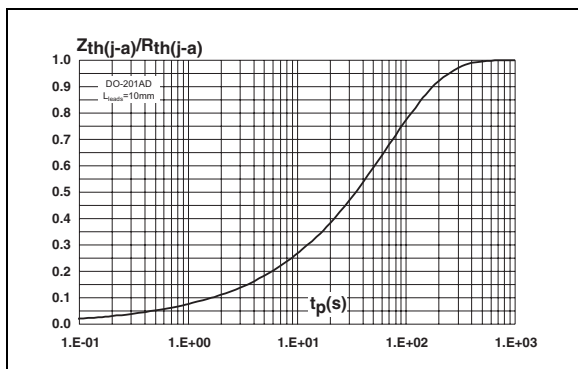


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (Epoxy printed circuit board FR4, $S_{CU} = 1\text{cm}^2$)

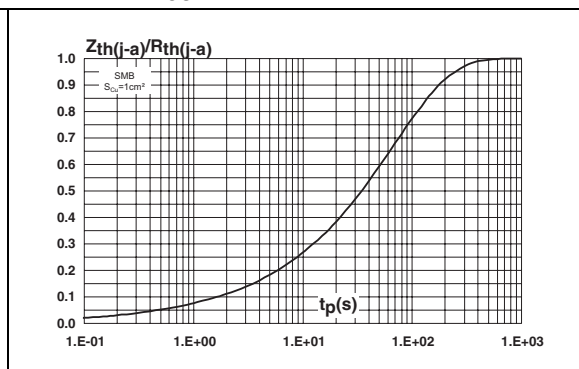


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (Epoxy printed circuit board FR4, $S_{CU} = 1\text{cm}^2$)

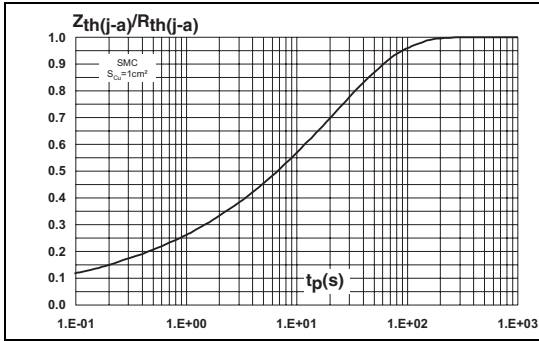


Figure 6. Reverse recovery current versus di_F/dt (typical values)

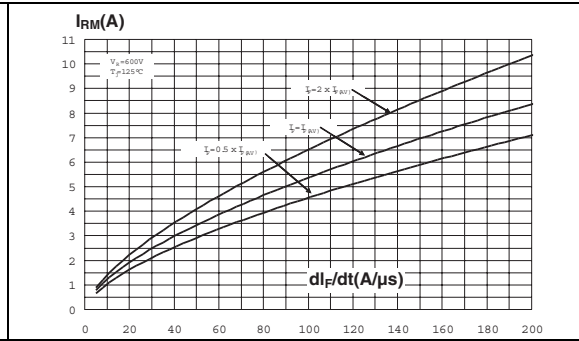


Figure 7. Reverse recovery time versus di_F/dt (typical values)

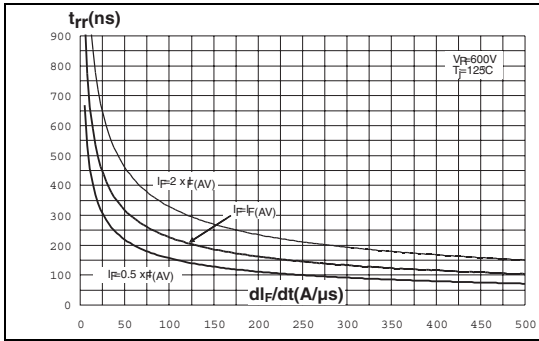


Figure 8. Reverse recovery charges versus di_F/dt (typical values)

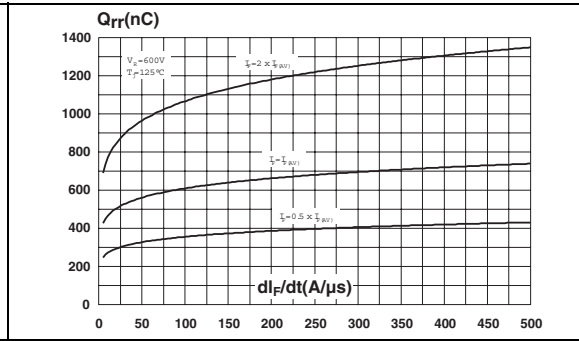


Figure 9. Softness factor versus di_F/dt (typical values)

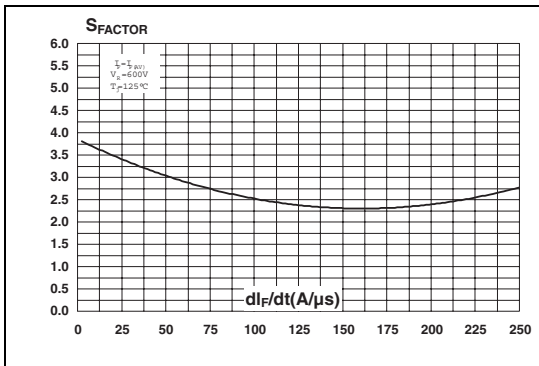


Figure 10. Relative variations of dynamic parameters versus junction temperature

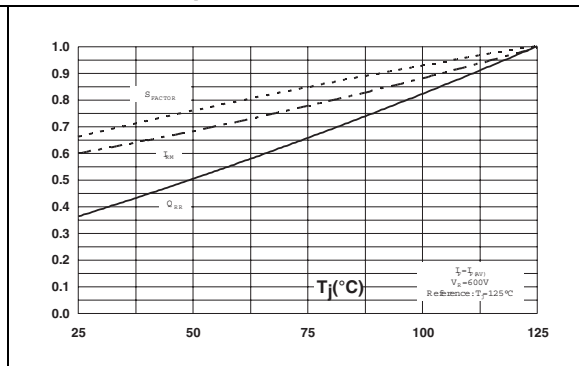


Figure 11. Transient peak forward voltage versus di_F/dt (typical values)

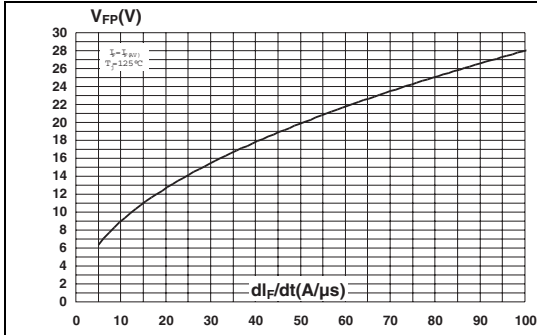


Figure 12. Forward recovery time versus di_F/dt (typical values)

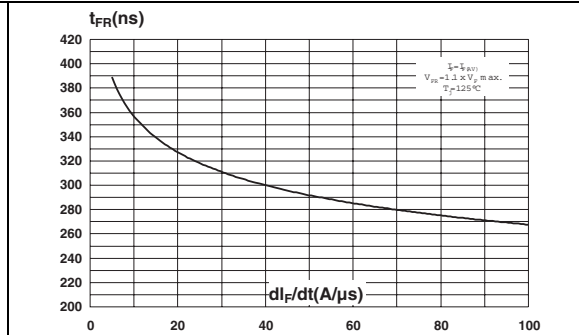


Figure 13. Junction capacitance versus reverse voltage applied (typical values)

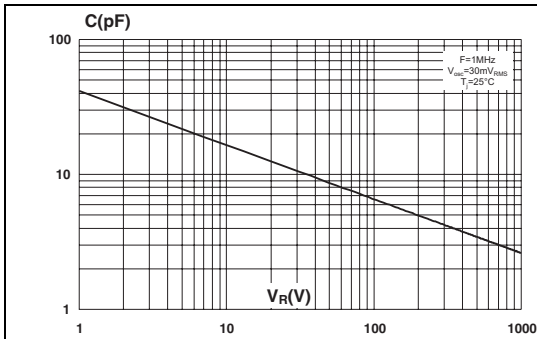


Figure 14. Thermal resistance versus lead length

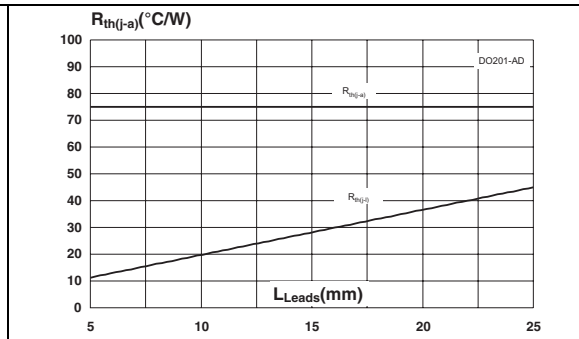


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, $e_{Cu} = 35\mu m$)

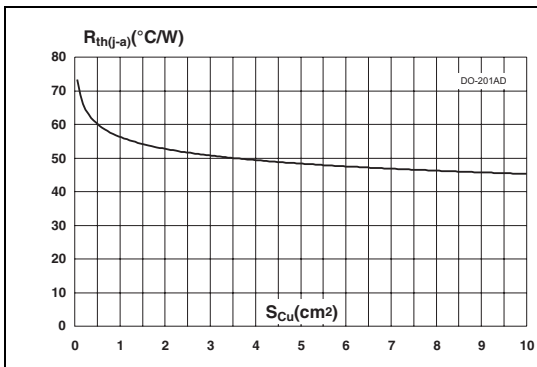
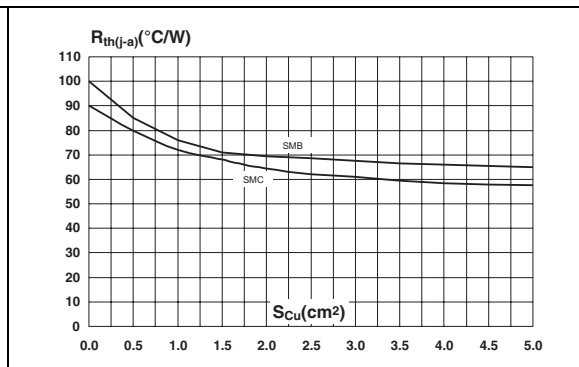


Figure 16. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, $e_{Cu} = 35\mu m$)



2 Package mechanical data

Table 5. SMB dimensions

| REF. | DIMENSIONS | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.096 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.95 | 2.20 | 0.077 | 0.087 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 5.10 | 5.60 | 0.201 | 0.220 |
| E1 | 4.05 | 4.60 | 0.159 | 0.181 |
| D | 3.30 | 3.95 | 0.130 | 0.156 |
| L | 0.75 | 1.60 | 0.030 | 0.063 |

Figure 17. SMB references to dimensions table Figure 18. SMB footprint dimensions (in millimetres)

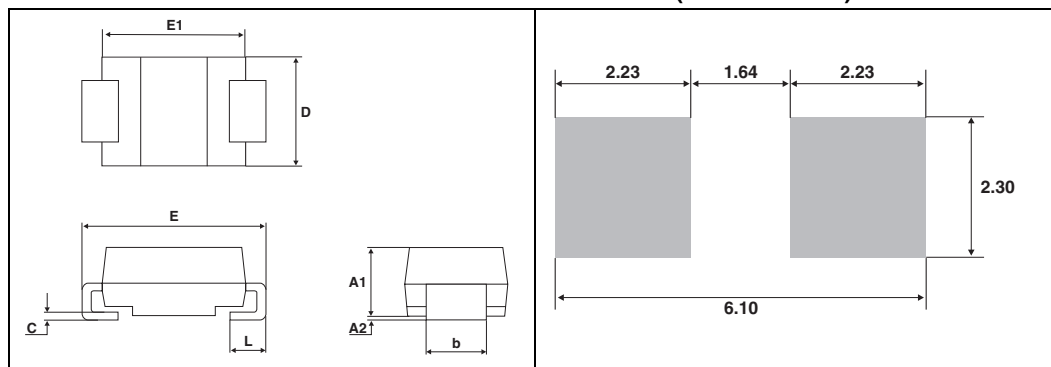


Table 6. SMC dimensions

| REF. | DIMENSIONS | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.096 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 2.90 | 3.2 | 0.114 | 0.126 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 7.75 | 8.15 | 0.305 | 0.321 |
| E1 | 6.60 | 7.15 | 0.260 | 0.281 |
| E2 | 4.40 | 4.70 | 0.173 | 0.185 |
| D | 5.55 | 6.25 | 0.218 | 0.246 |
| L | 0.75 | 1.60 | 0.030 | 0.063 |

Figure 19. SMC references to dimensions table Figure 20. SMC footprint dimensions (in millimetres)

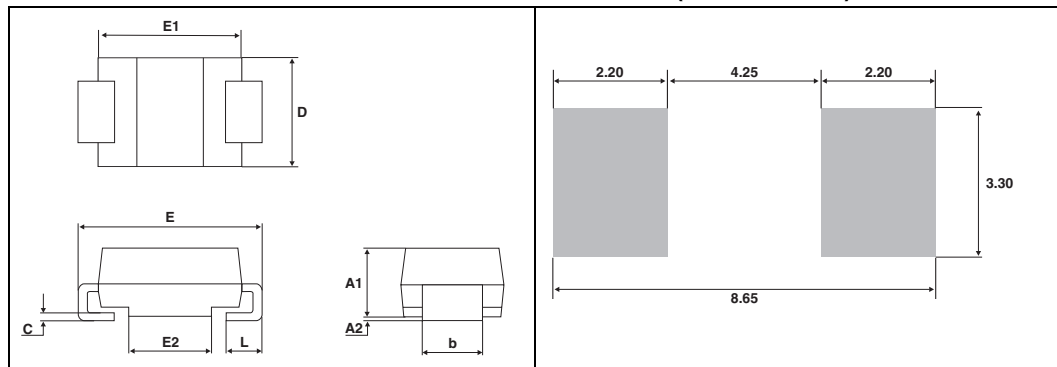


Table 7. DO-201AD dimensions

| REF. | DIMENSIONS | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | - | 9.5 | - | 0.37 |
| B | 25.4 | - | 1.00 | - |
| C | - | 5.3 | - | 0.21 |
| D | - | 1.3 | - | 0.051 |
| E | - | 1.25 | - | 0.048 |

Note: 1 The lead diameter D is not controlled over zone E .

2 The minimum length which must stay straight between the right angles after bending is 15 mm (0.59 inch).

3 Ordering information

| Part Number | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|---------|----------|---------|----------|---------------|
| STTH212 | STTH212 | DO-201AD | 1.12 g | 600 | Ammopack |
| STTH212RL | STTH212 | | | 1900 | Tape & reel |
| STTH212U | U22 | SMB | 0.11 g | 2500 | Tape & reel |
| STTH212S | S12 | SMC | 0.243 g | 2500 | Tape & reel |

4 Revision history

| Date | Revision | Description of Changes |
|-------------|----------|------------------------|
| 28-Jun-2005 | 1 | First issue. |

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