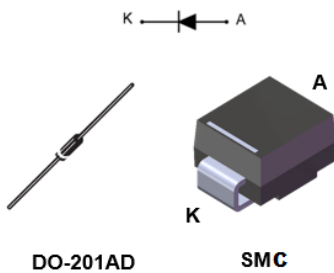


1000 V - 3 A high efficiency ultrafast diode



Features

- Low forward voltage drop
- High reliability
- High surge current capability
- Soft switching for reduced EMI disturbances
- Planar technology
- ECOPACK2 compliant

Applications

- Switching diode
- Auxiliary power supply

Description

The STTH310, which uses ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications.

Product status	
STTH310	
Product summary	
Symbol	Value
$I_{F(AV)}$	3 A
V_{RRM}	1000 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.98 V
$t_{rr(max.)}$	75 ns

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		1000	V	
$I_{F(AV)}$	Average forward current $\delta = 0.5$, square wave	DO-201AD	$T_L = 75\text{ °C}$	3	A
		SMC	$T_L = 75\text{ °C}$		
I_{FSM}	Surge non repetitive forward current	DO-201AD	$t_p = 8.3\text{ ms}$ sinusoidal	55	A
		SMC		45	
T_{stg}	Storage temperature range		-65 to +175	°C	
T_j	Maximum operating junction temperature		+175	°C	

Table 2. Thermal resistance parameter

Symbol	Parameter		Max. value	Unit
$R_{th(j-l)}$	Junction to lead		20	°C/W
	Junction to lead		20	
$R_{th(j-a)}$	Junction to ambient	Lead length = 10 mm	75	

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		10	μA
		$T_j = 125\text{ °C}$		-		50	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 3\text{ A}$	-		1.7	V
		$T_j = 150\text{ °C}$		-	0.98	1.42	

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:

$$P = 1.20 \times I_{F(AV)} + 0.075 \times I_F^2_{(RMS)}$$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

Table 4. Dynamic characteristics ($T_j = 25\text{ °C}$ unless otherwise stated)

Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$	-	-	75	ns
t_{fr}	Forward recovery time	$I_F = 3\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_{FR} = 1.1 V_{F(max)}$	-	-	300	ns
V_{FP}	Forward recovery voltage		-	-	12	V

1.1 Characteristics (curves)

Figure 1. Conduction losses versus average current

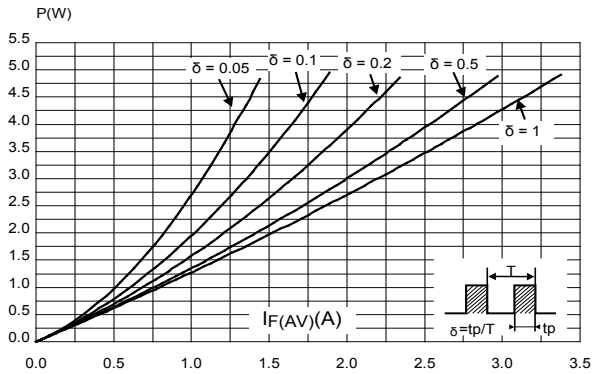


Figure 2. Forward voltage drop versus forward current

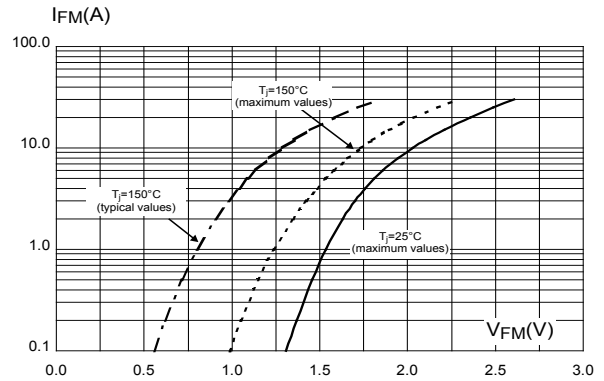


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-201AD)

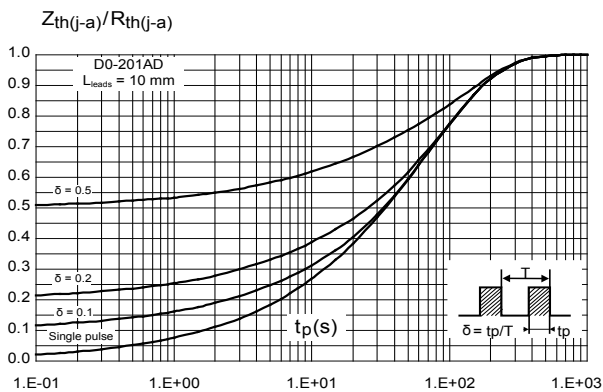


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMC)

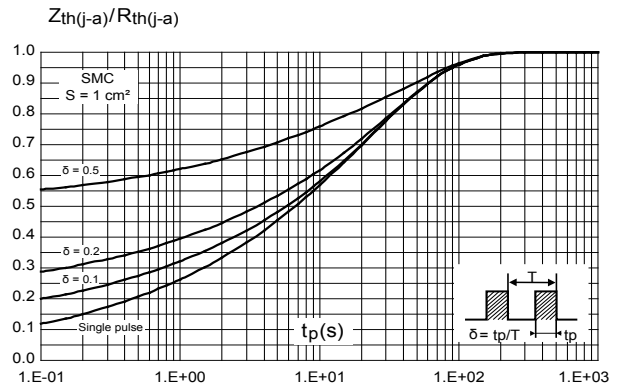


Figure 5. Thermal resistance versus lead length (DO-201AD)

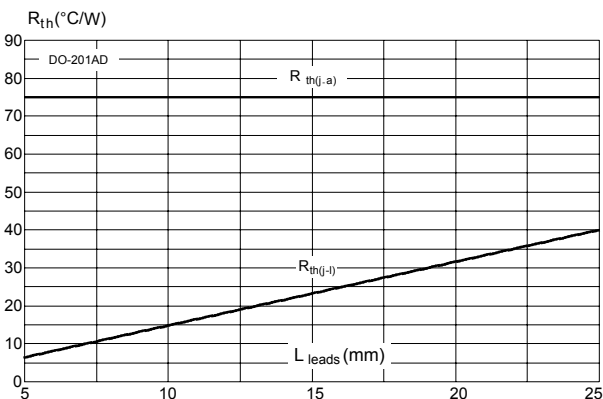
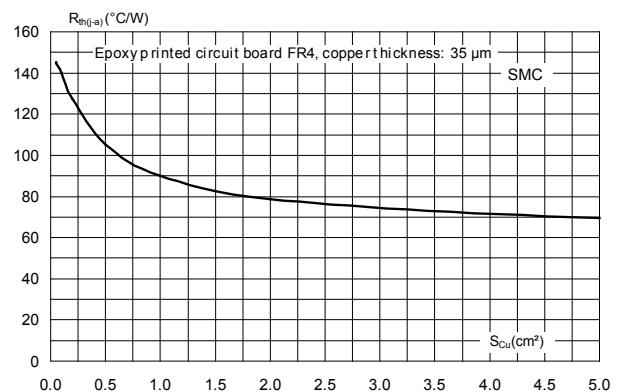


Figure 6. Thermal resistance junction to ambient versus copper surface under each lead (typical values) (SMC)



2 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.

2.1 DO-201AD package information

- Epoxy meets UL 94, V0

Figure 7. DO-201AD package outline

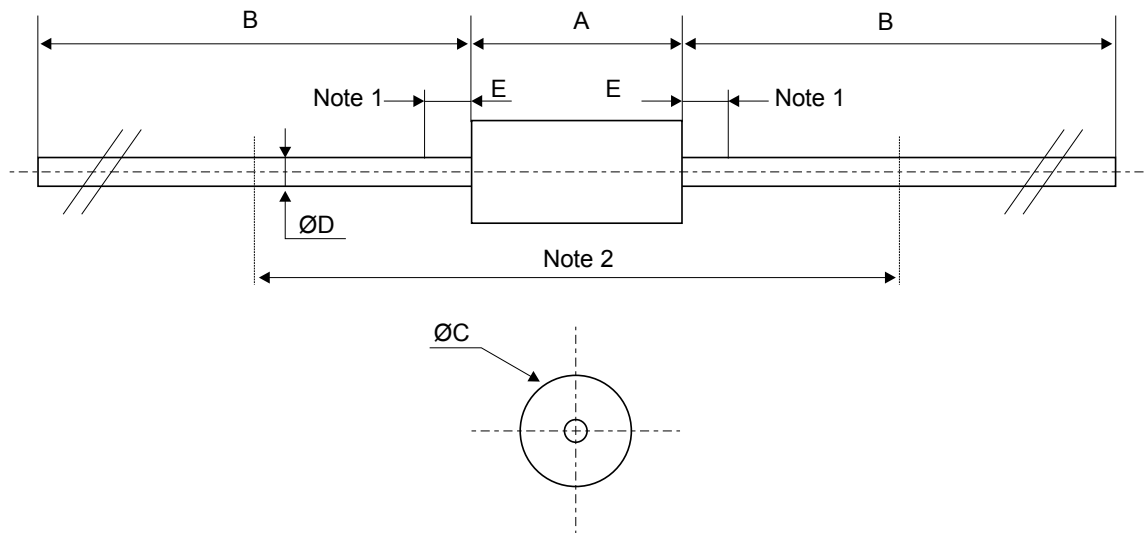


Table 5. DO-201AD package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		-	9.50		-	0.374
B	25.40	-		1.000	-	
C		-	5.30		-	0.209
D ⁽¹⁾		-	1.30		-	0.051
E		-	1.25		-	0.049
Note 2 ⁽²⁾	15.00			0.590		

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")

2.2 SMC package information

- Epoxy meets UL94, V0

Figure 8. SMC package outline

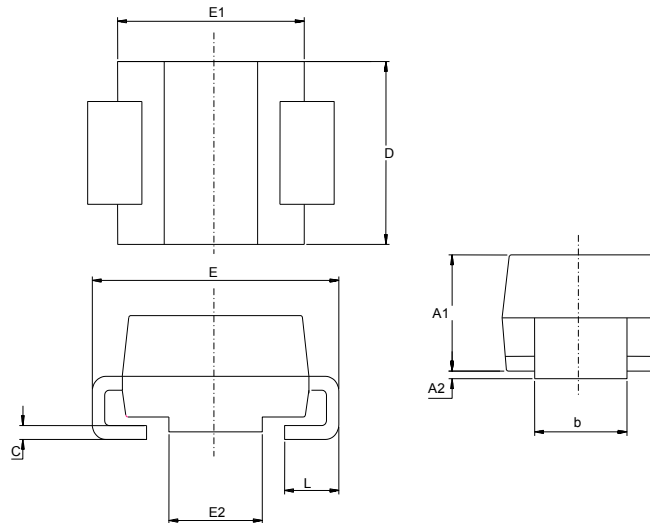
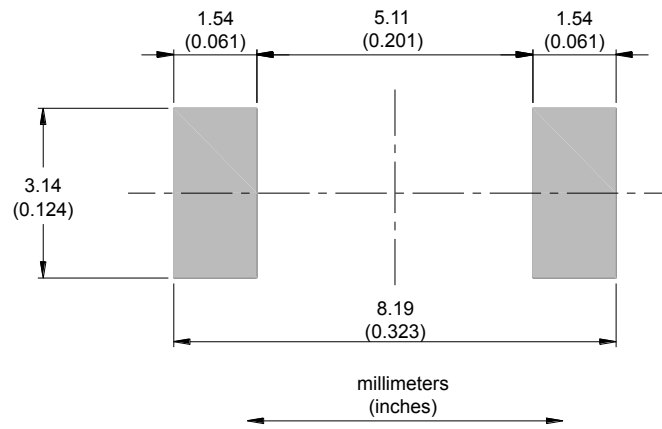


Table 6. SMC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	2.90	3.20	0.1142	0.1260
c	0.15	0.40	0.0059	0.0157
D	5.55	6.25	0.2185	0.2461
E	7.75	8.15	0.3051	0.3209
E1	6.60	7.15	0.2598	0.2815
E2	4.40	4.70	0.1732	0.1850
L	0.75	1.50	0.0295	0.0591

Figure 9. SMC recommended footprint



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH310S	S10	SMC	0.245 g	2500	Tape and reel
STTH310	STTH310	DO-201AD	1.16 g	600	Ammopack
STTH310RL	STTH310		1.16 g	1900	Tape and reel

Revision history

Table 8. Document revision history

Date	Revision	Changes
Jan-2003	1	Initial release.
03-Apr-2007	2	DO-201AD C2 package added. SMC package information updated.
07-Dec-2009	3	Updated Table 6 package dimensions.
21-Jun-2012	4	Updated T_j in Table 1 and Table 2 and change min. T_{stg} to $-65\text{ }^\circ\text{C}$ in Table 2.
31-Mar-2020	5	Updated Figure 4, Figure 5 and Figure 6. Reformatted to current standard.

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