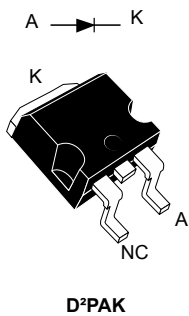



## 1200 V Automotive ultrafast recovery, high voltage diode



### Features

- AEC-Q101 qualified 
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- ECOPACK® compliant

### Applications

- On Board Battery charger (OBC)
- Surge bypass diodes

### Description

The high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate competitive advantage for this device for automotive applications.

#### Product status link

[STTH1512-Y](#)

#### Product summary

$I_{F(AV)}$	15 A
$V_{RRM}$	1200 V
$V_F$ (typ.)	1.20 V
$t_{rr}$ (typ.)	53 ns
$T_j$	-40 °C to 175 °C

# 1 Characteristics

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

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	Forward rms current	50	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$ , square wave	$T_C = 130\text{ °C}$	A
$I_{FRM}$	Repetitive peak forward current	$t_p = 5\ \mu\text{s}$ , $F = 5\text{ kHz}$ square	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	A
$T_{stg}$	Storage temperature range	-65 to +175	°C
$T_j$	Operating junction temperature range	-40 to +175	°C

**Table 2. Thermal parameters**

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°C/W

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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		15	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	10	100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-		2.10	V
		$T_j = 150\text{ °C}$		-	1.25	1.90	
		$T_j = 150\text{ °C}$		-	1.20	1.80	

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

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

To evaluate the conduction losses, use the following equation:

$$P = 1.4 \times I_{F(AV)} + 0.027 \times I_F^2 \text{ (RMS)}$$

**Table 4. Dynamic electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}, V_R = 30\text{ V}, dI_F/dt = -50\text{ A}/\mu\text{s}$	-		105	ns
			$I_F = 1\text{ A}, V_R = 30\text{ V}, dI_F/dt = -100\text{ A}/\mu\text{s}$	-	53	75	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}, V_R = 600\text{ V}, dI_F/dt = -200\text{ A}/\mu\text{s}$	-	20	28	A
$S_{factor}$	Softness factor	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}, V_R = 600\text{ V}, dI_F/dt = -200\text{ A}/\mu\text{s}$	-	1.5		
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}, V_{FR} = 1.5 \times V_{Fmax}, dI_F/dt = 50\text{ A}/\mu\text{s}$	-		600	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}, dI_F/dt = 50\text{ A}/\mu\text{s}$		5.5		V

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 in a power diode

### 1.1 Characteristic (curves)

Figure 1. Conduction losses versus average current

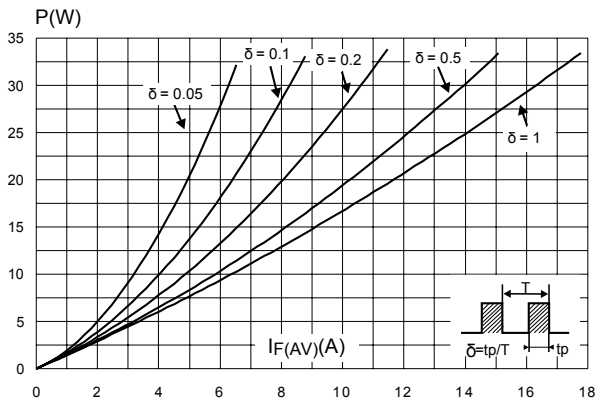


Figure 2. Forward voltage drop versus forward current

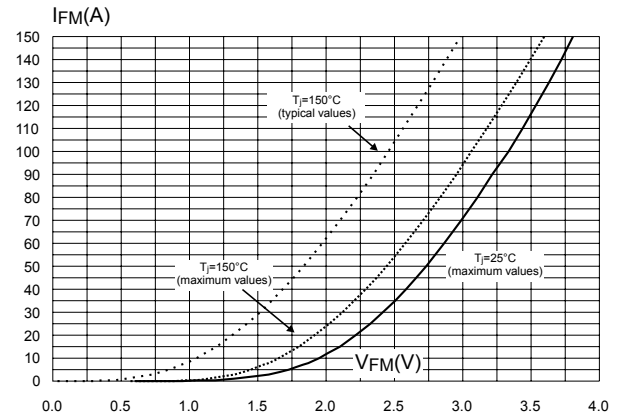


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

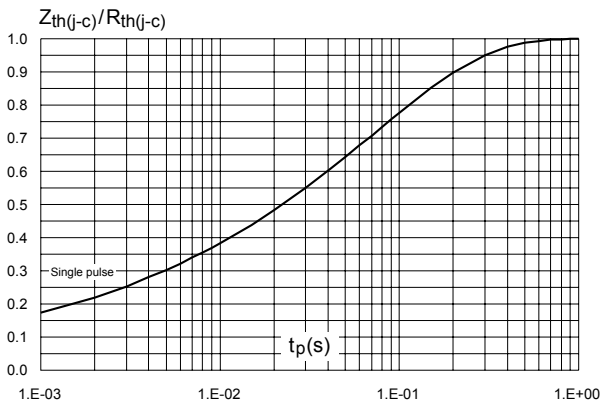


Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)

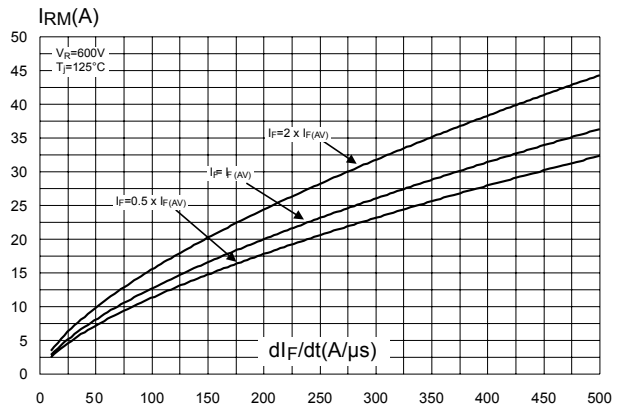


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)

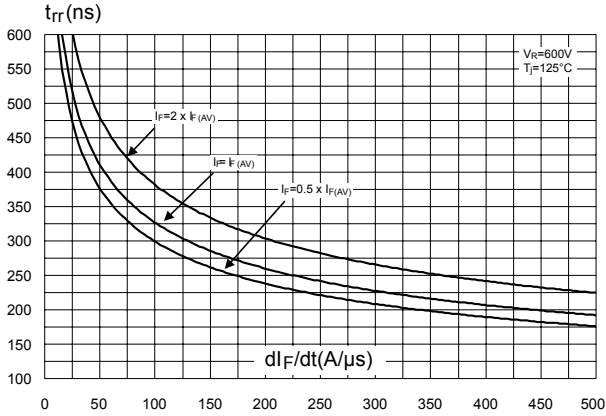


Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)

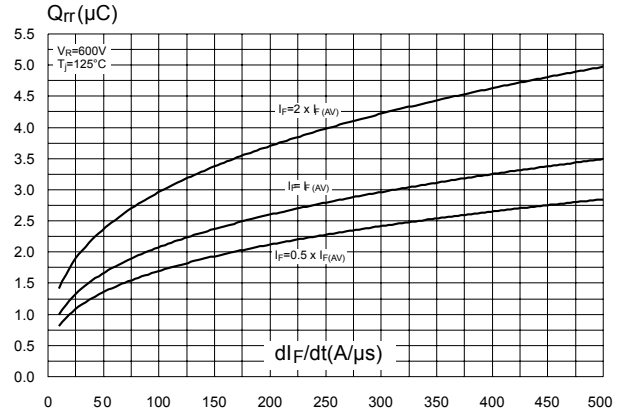


Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)

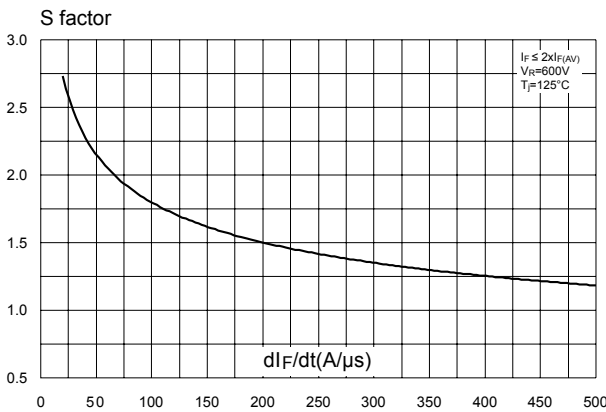


Figure 8. Relative variations of dynamic parameters versus junction temperature

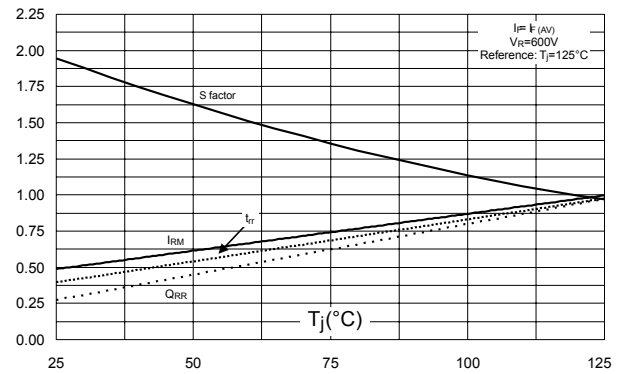


Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)

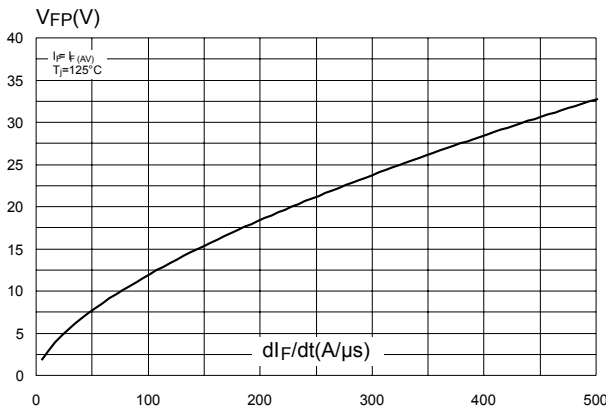
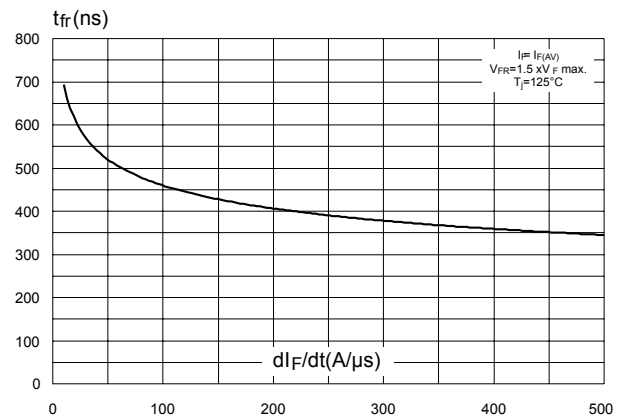
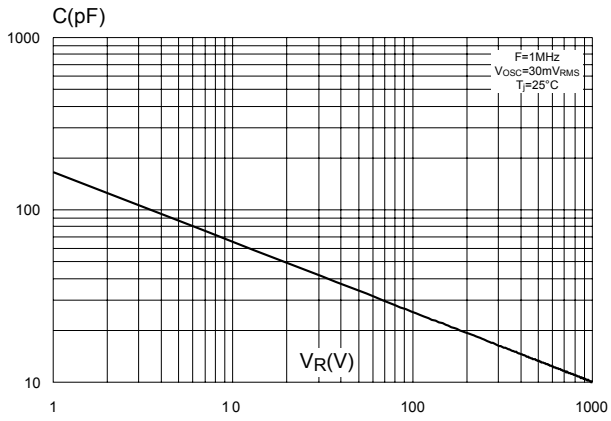


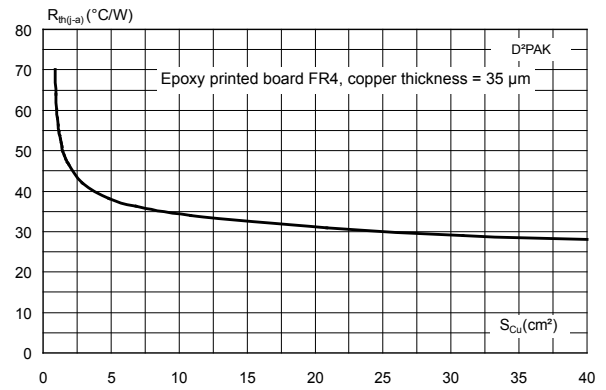
Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 12. Thermal resistance junction to ambient versus copper surface under each lead**



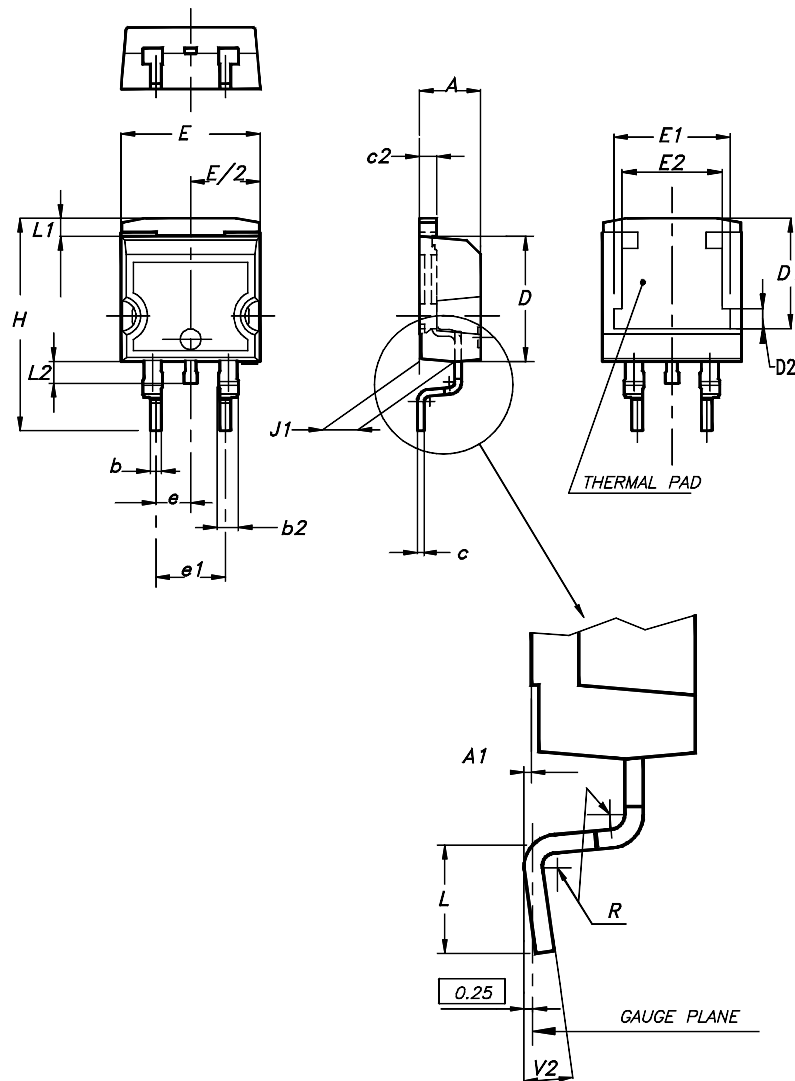
## 2 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 D<sup>2</sup>PAK package information

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

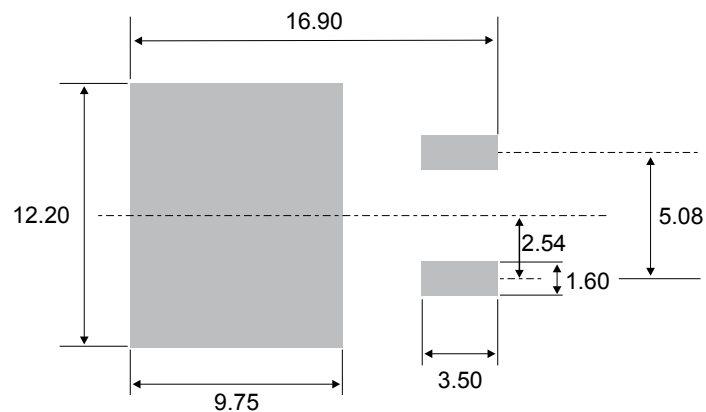
Figure 13. D<sup>2</sup>PAK package outline



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

**Table 5. D<sup>2</sup>PAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

**Figure 14. D<sup>2</sup>PAK recommended footprint (dimensions in mm)**




### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH1512GY-TR	STTH1512GY	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
11-Jul-2013	1	Initial release.
21-Nov-2018	2	Added <a href="#">Section Applications</a> . Updated <a href="#">Table 6</a> . Ordering information.

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