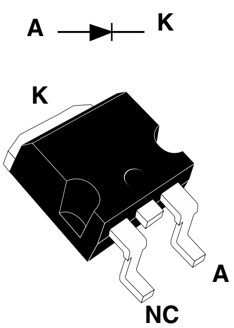
STTH1512-Y

Automotive ultrafast recovery, high voltage diode

Datasheet — production data



D2PAK
STTH1512GY

Features

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

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.

Table 1. Device summary

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

This is information on a product in full production.

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1 Characteristics

Table 2. 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	D^2PAK		50	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	D^2PAK	$T_c = 130$ °C	15	A
I_{FRM}	Repetitive peak forward current	$t_p = 5$ µs, F = 5 kHz square		200	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms Sinusoidal		200	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Operating junction temperature range			-40 to + 175	°C

Table 3. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	D^2PAK	1.3	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	$T_j = 25$ °C	$V_R = V_{RRM}$			15	µA
		$T_j = 125$ °C			10	100	
V_F (2)	Forward voltage drop	$T_j = 25$ °C	$I_F = 15$ A			2.10	V
		$T_j = 125$ °C			1.25	1.90	
		$T_j = 150$ °C			1.20	1.80	

1. Pulse test: $t_p = 5$ ms, $\delta < 2\%$
2. Pulse test: $t_p = 380$ µs, $\delta < 2\%$

To evaluate the conduction losses use the following equation:
$P = 1.4 \times I_{F(AV)} + 0.027\ I_F^2{}_{(RMS)}$

Table 5. Dynamic characteristics

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

Figure 1. Conduction losses versus average current

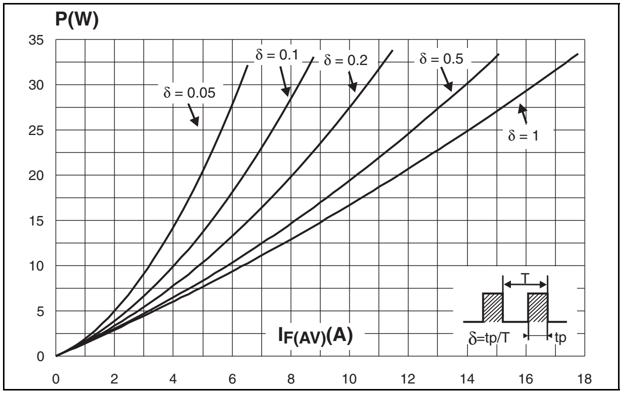


Figure 2. Forward voltage drop versus forward current

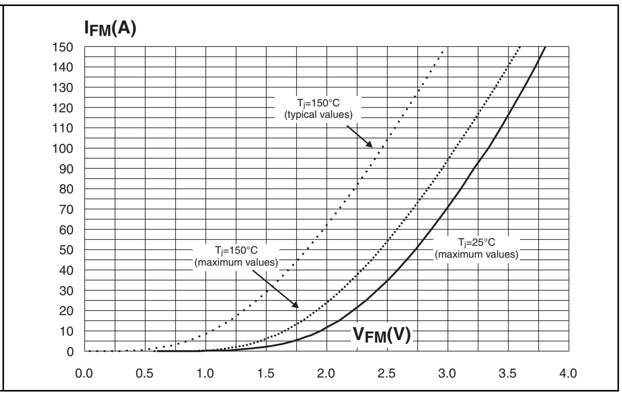


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

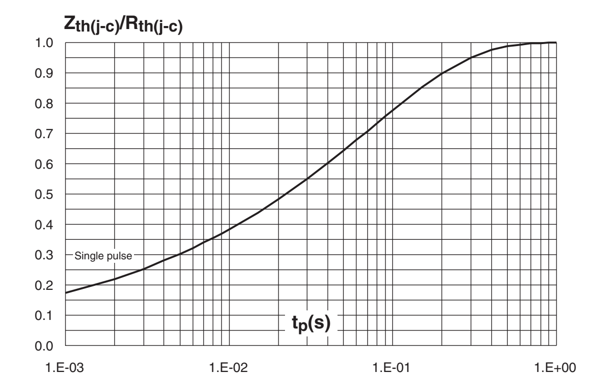


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

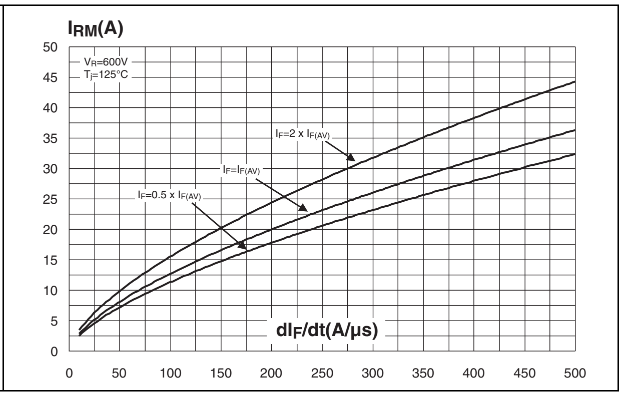


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

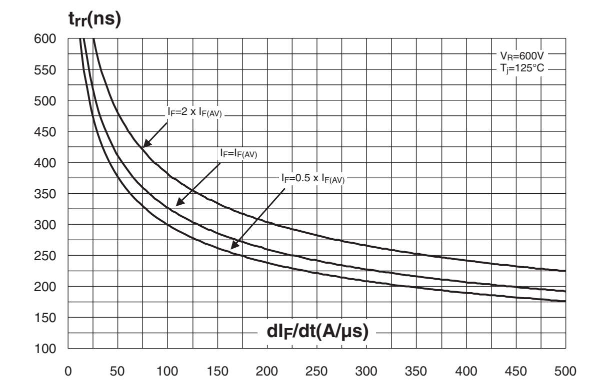


Figure 6. Reverse recovery charge versus dI_F/dt (typical values)

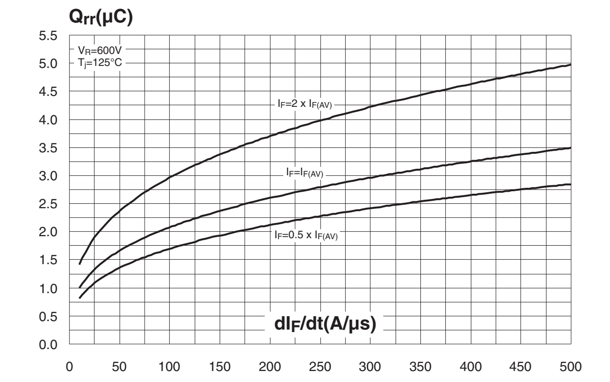


Figure 7. Softness factor versus dI_F/dt (typical values)

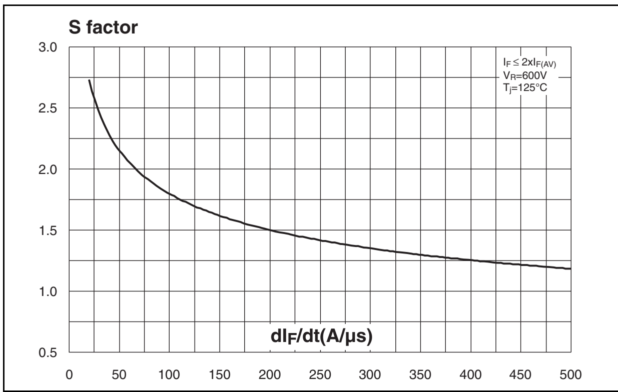


Figure 8. Relative variations of dynamic parameters versus junction temperature

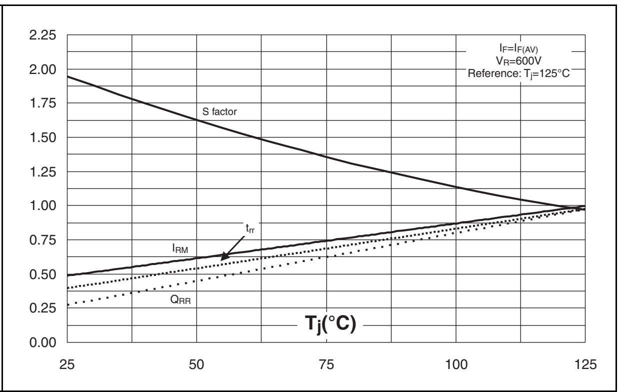


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

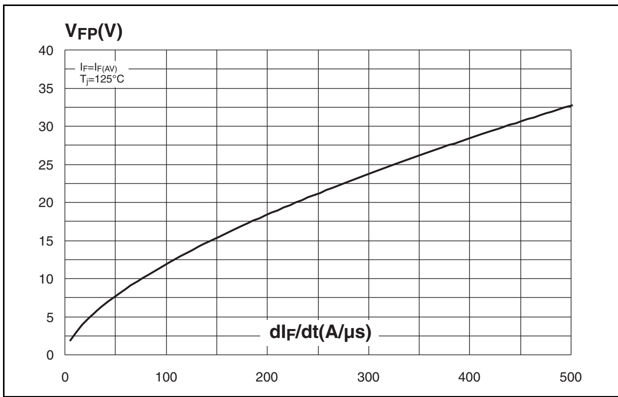


Figure 10. Forward recovery time versus dI_F/dt (typical values)

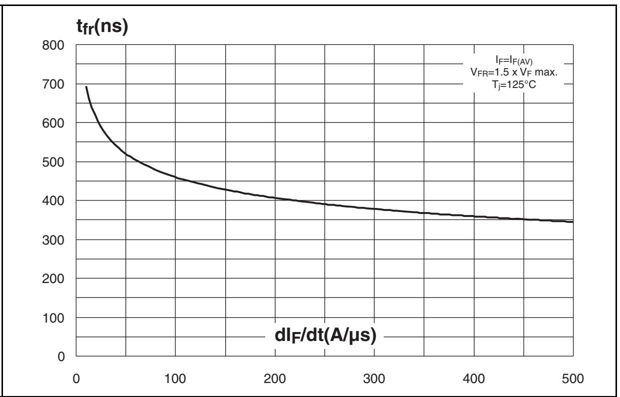


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

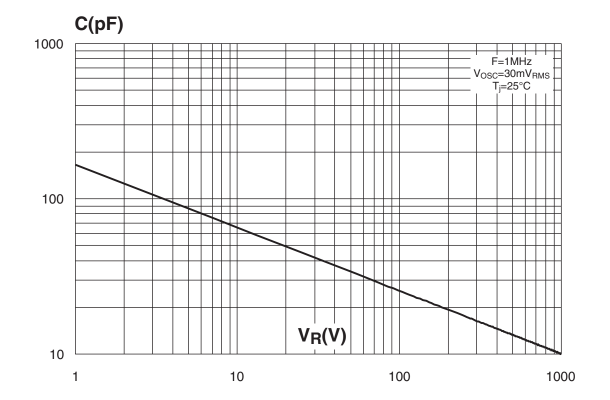
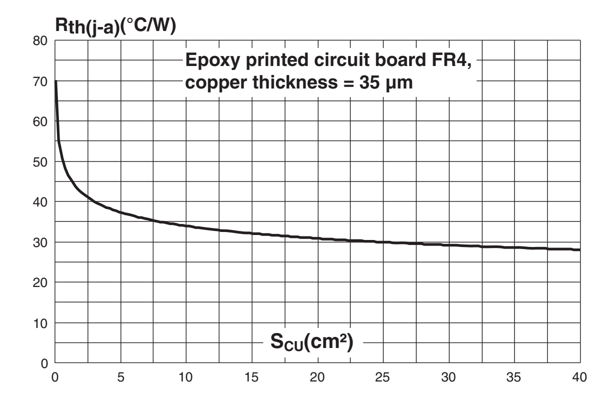


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead



2 Package information

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

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.

Figure 13. D²PAK dimension definitions

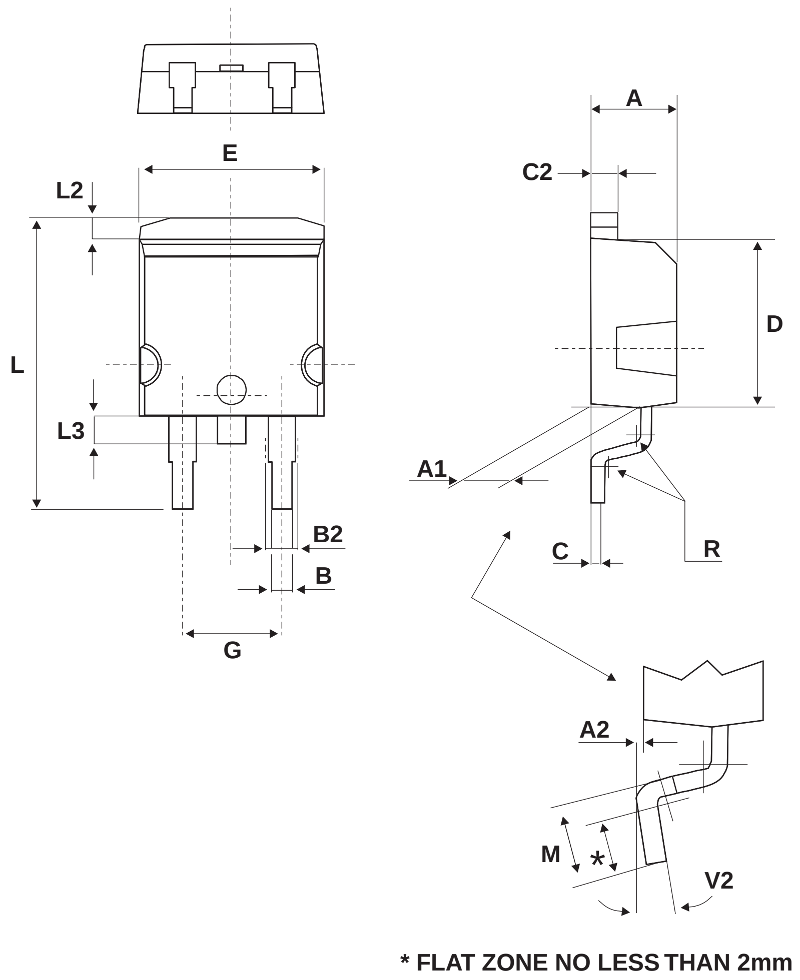
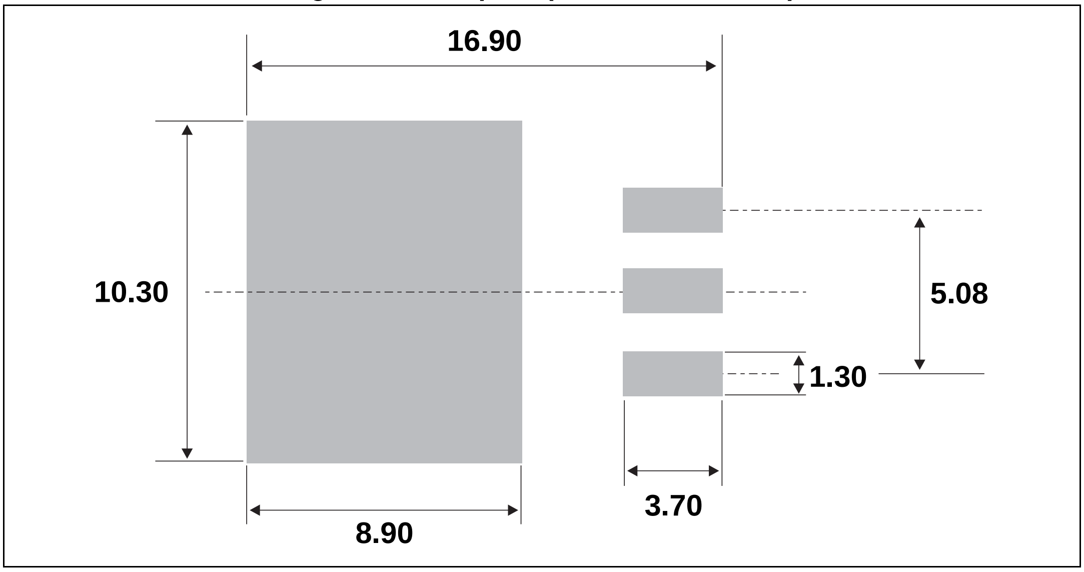


Table 6. D²PAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	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
B	0.70		0.93	0.027		0.037
B2	1.14		1.70	0.045		0.067
C	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
E	10.00		10.40	0.393		0.409
G	4.88	16	5.28	0.192	0.63	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
M	2.40		3.20	0.094		0.126
R		0.40 typ.			0.016 typ.	
V2	0°		8°	0°		8°

Figure 14. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1512GY-TR	STTH1512GY	D^2PAK	1.48 g	10000	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
11-Jul-2013	1	Initial release.