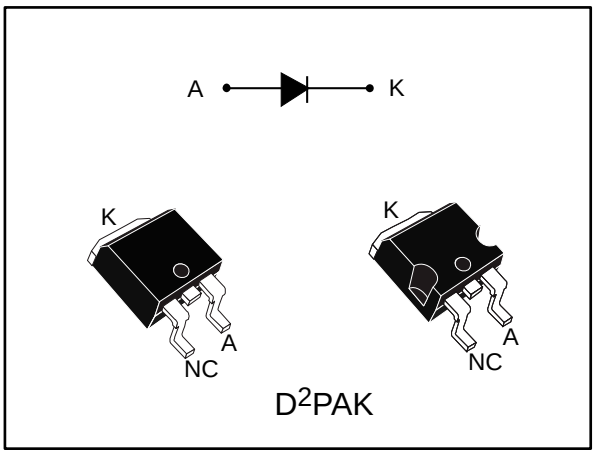
STTH10R04

High efficiency rectifier

Datasheet - production data



Features

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- ECOPACK®2 compliant component for D²PAK on demand

Description

The device is an ultrafast recovery power rectifier dedicated to energy recovery in PDP application.

It is especially designed for clamping function in energy recovery block.

The compromise between forward voltage drop and recovery time offers optimized performance.

Table 1: Device summary

Symbol	Value
$I_{F(peak)}$	10 A
V_{RRM}	400 V
T_j (max)	175 °C
V_F (typ)	1.15 V
t_{rr} (typ.)	15 ns

1 Characteristics

Table 2: Absolute ratings (limiting values, at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		400	V
$I_{F(RMS)}$	Forward rms current		20	A
$I_{F(peak)}$	Peak working forward current	T_C = 135 °C δ = 0.5 square wave	10	A
I_{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal	100	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature		175	°C

Table 3: Thermal parameter

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	3.5	°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	$V_R = V_{RRM}$	-		10	µA
		T_j = 125 °C		-	10	100	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	1.50	1.70	V
		T_j = 125 °C		-	1.15	1.35	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 1.05 \times I_{F(AV)} + 0.03 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A	-	15	20	ns
			I_F = 1 A, V_R = 30 V, dI_F/dt = -50 A/µs	-		40	
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}	-		140	ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs	-		3	V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 10 A, V_R = 200 V dI_F/dt = 200 A/µs	-	6.2	8.0	A
S_{factor}	Softness factor			-	0.3		-

1.1 Characteristics (curves)

Figure 1: Conduction losses versus average forward current

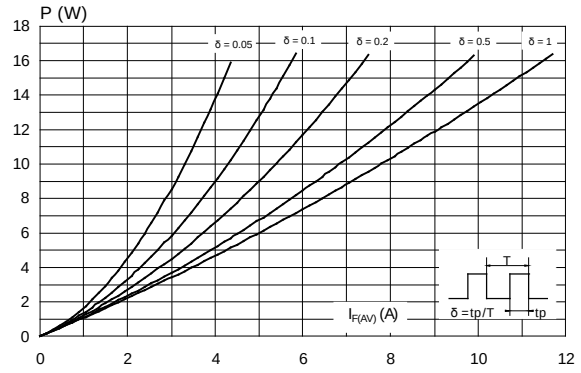


Figure 2: Forward voltage drop versus forward current

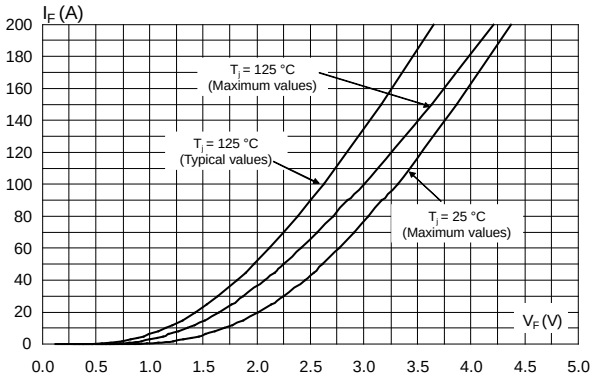


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

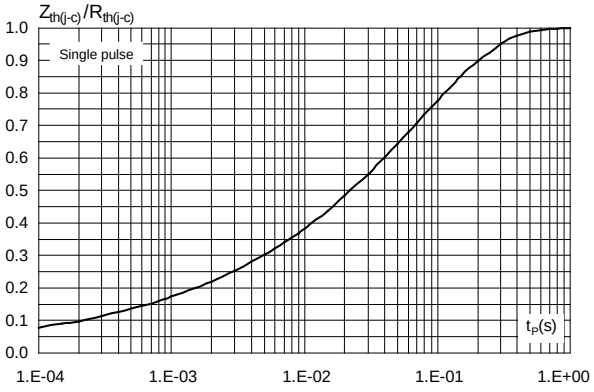


Figure 4: Peak reverse recovery current versus dI_F/dt (typical values)

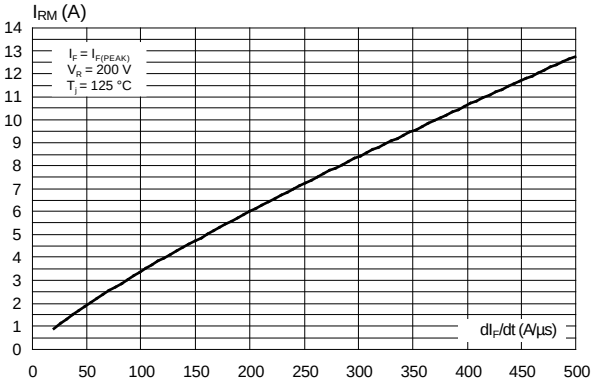


Figure 5: Reverse recovery time versus dI_F/dt (typical values)

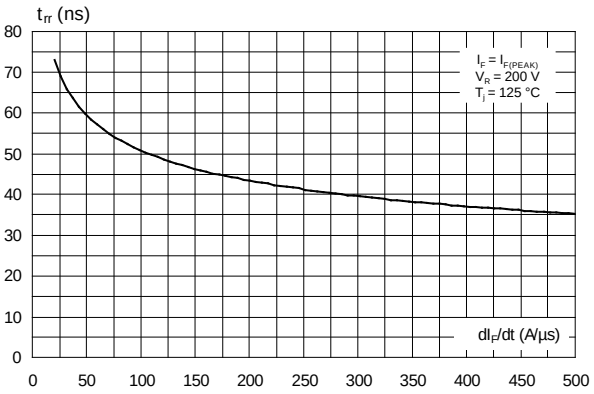


Figure 6: Reverse recovery charges versus dI_F/dt (typical values)

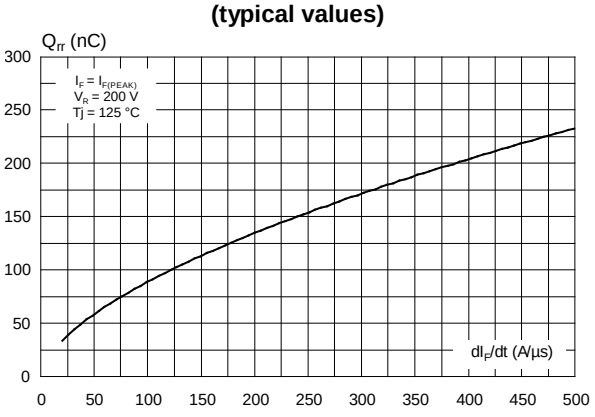


Figure 7: Reverse recovery softness factor versus dI_F/dt (typical values)

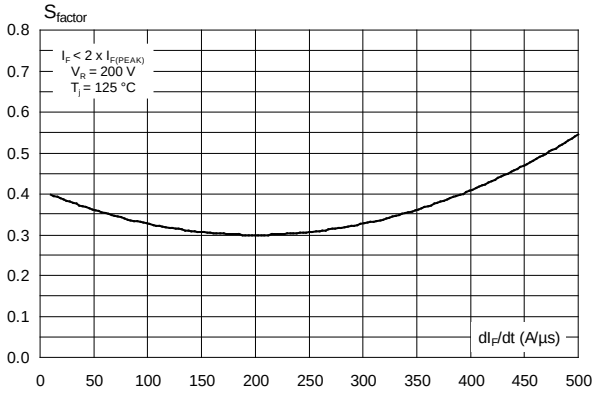


Figure 8: Relative variation of dynamic parameters versus junction temperature

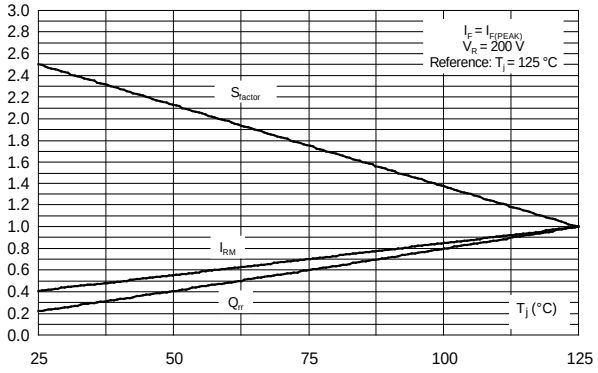


Figure 9: Forward recovery voltage versus dI_F/dt (typical values)

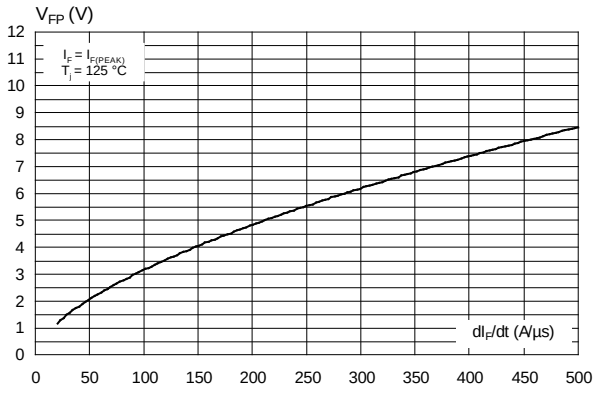


Figure 10: Forward recovery time versus dI_F/dt (typical values)

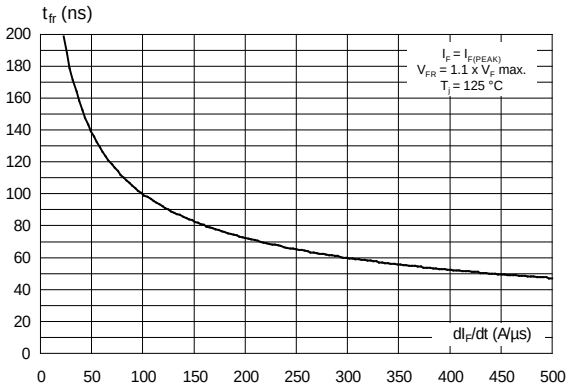


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

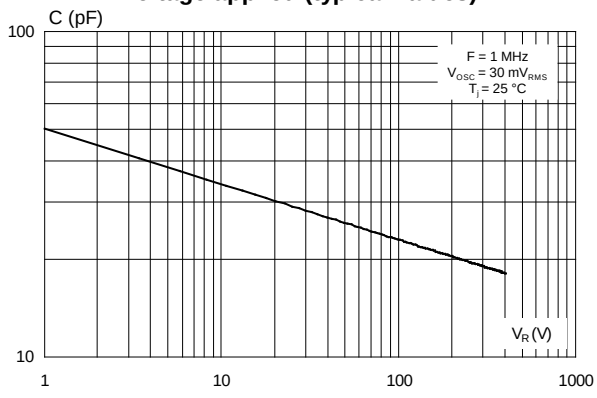
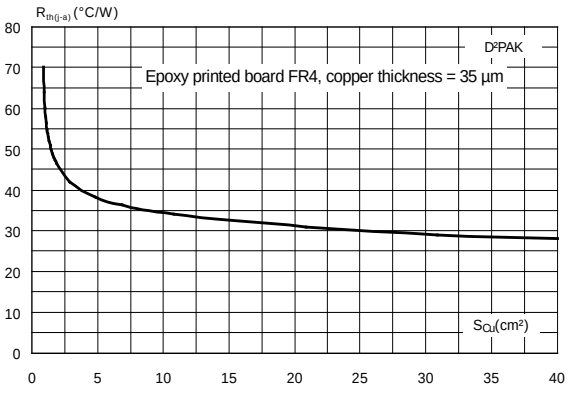


Figure 12: Thermal resistance junction to ambient versus copper surface under tab



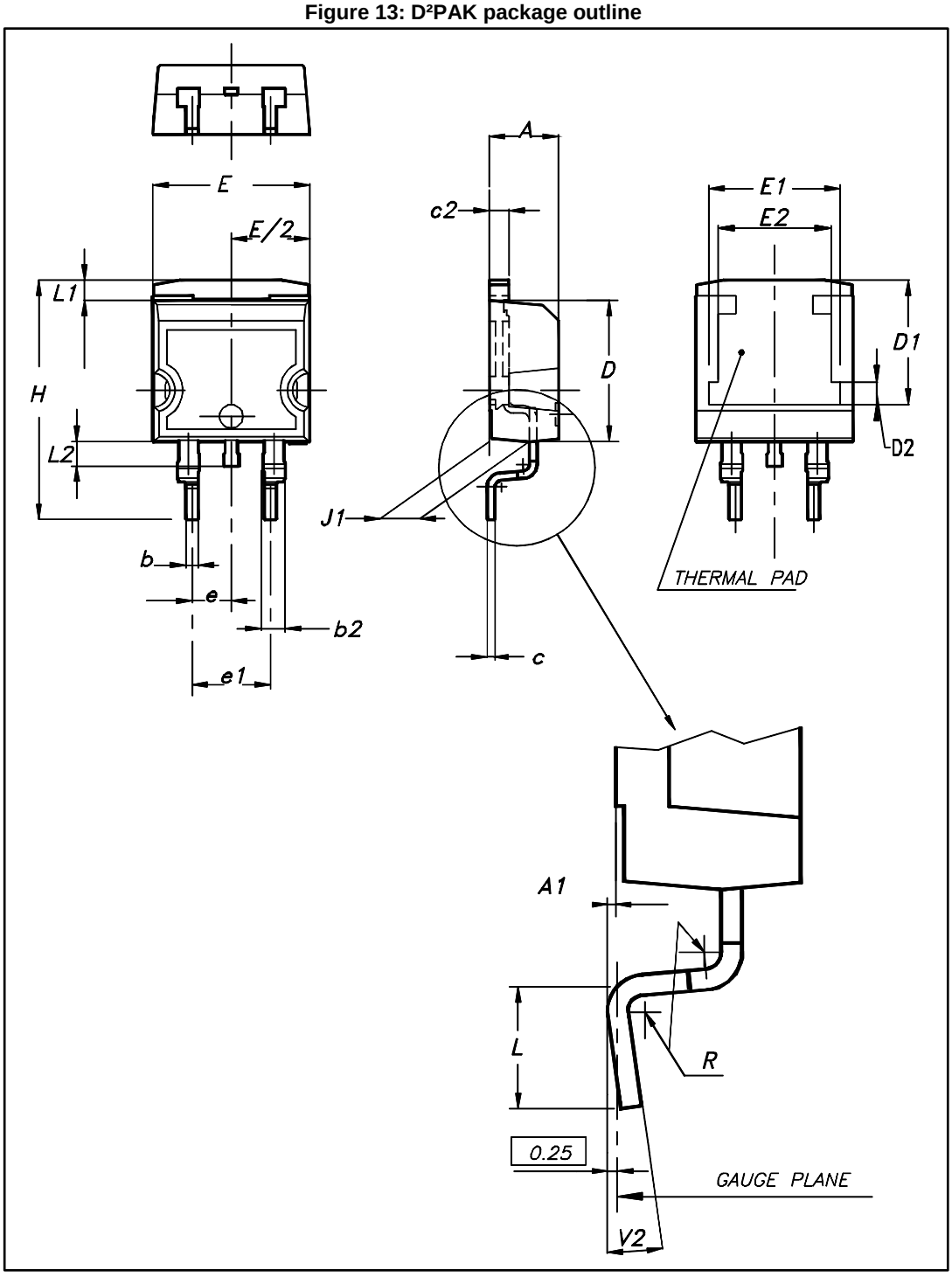
2 Package information

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.

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

2.1 D²PAK package information

Figure 13: D²PAK package outline

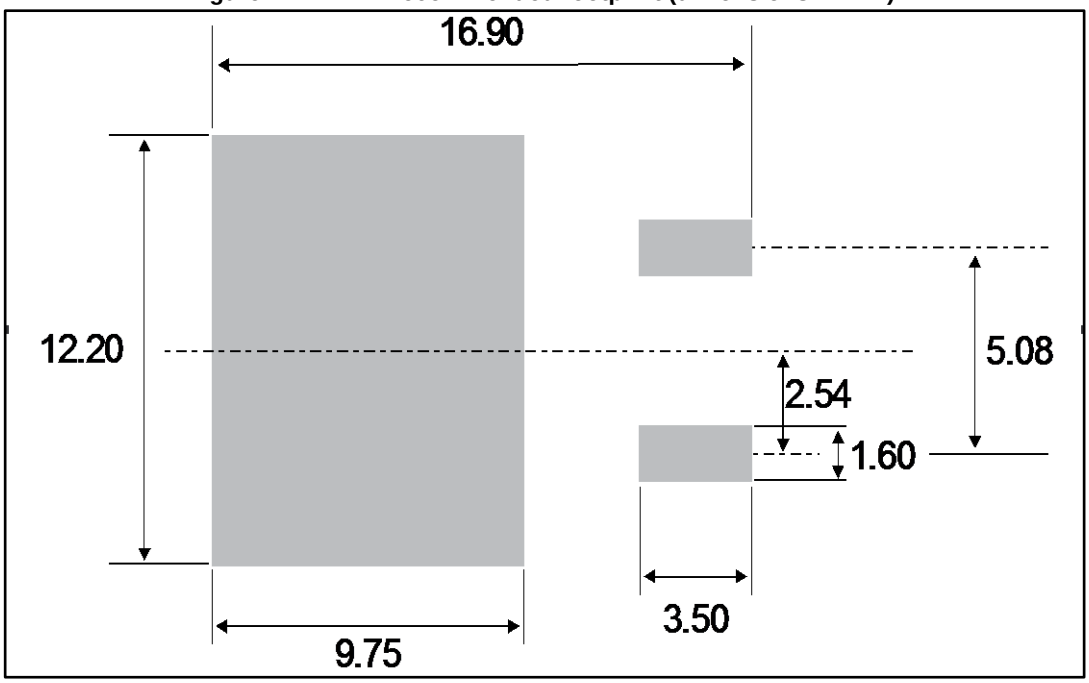


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: D²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	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: D²PAK recommended footprint (dimensions in mm)



3 Ordering information

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH10R04G-TR	STTH10R04G	D^2PAK	1.38 g	1000	Tape and reel

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
07-Nov-2007	1	First issue.
08-Aug-2017	2	Updated features and package silhouette. Minor text changes to improve readability. Updated *Section 1: "Characteristics"*, *Section 1.1: "Characteristics (curves)"*, *Section 2: "Package information"* and *Section 3: "Ordering information"*.

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