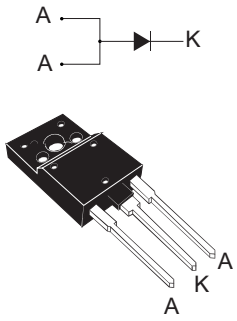
STTH30M06S

Datasheet

600 V, 30 A ultrafast high voltage diode



TO-3PF

Features

- Ultrafast recovery, soft recovery
- Low power losses at high switching frequency operations
- Low leakage current
- High junction temperature
- High overcurrent capability
- ECOPACK2 compliant
- Insulated package TO-3PF:
  - Insulated voltage: 2000 V_{RMS}

Applications

- PFC
- Boost diode
- LLC clamping diode

Description

The STTH30M06S is an ultrafast recovery power rectifier especially suited for boost or LLC clamping circuits working at high switching frequencies in heavy duty applications such as air conditioning equipment or telecom power supplies.

Designed with the latest ST's ultrafast technology, this 600 V 30 A diode in TO-3PF has a robust behavior against electrostatic discharge and high overcurrent capability.

Product status
STTH30M06S

Product summary	
Symbol	**Value**
$I_{F(AV)}$	30 A
V_{RRM}	600 V
$t_{rr(typ.)}$	25 ns
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	1.7 V

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
$I_{F(AV)}$	Average forward current	δ = 0.5 square	30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	170	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature		+175	°C

Table 2. Thermal resistance parameter

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Typ.	1.6	°C/W
		Max.	2.3	

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 °C	V_R = 600 V	-		60	µA
		T_j = 125 °C		-	70	800	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 15 A	-	2.1		V
		T_j = 150 °C		-	1.3		
		T_j = 25 °C	I_F = 30 A	-	2.6	3.8	
		T_j = 150 °C		-	1.7	2.3	

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:

$P = 1.1 \times I_{F(AV)} + 0.035 \times I_F{}^2{}_{(RMS)}$

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

- AN604: Calculation of conduction losses in a power rectifier
- AN4058: Calculation of turn-off power losses generated by an ultrafast diode

Table 4. Dynamic electrical characteristics

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A dI_F/dt = -50 A/µs V_R = 30 V	-		50	ns
			I_F = 1 A dI_F/dt = -100 A/µs V_R = 30 V	-	25	35	
		T_j = 125 °C	I_F = 15 A dI_F/dt = -200 A/µs V_R = 400 V	-	55		
			I_F = 30 A dI_F/dt = -200 A/µs V_R = 400 V	-	70		
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A dI_F/dt = -200 A/µs V_R = 400 V	-	7		A
Q_{rr}	Reverse recovery charge			-	300		nC

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (square waveform)

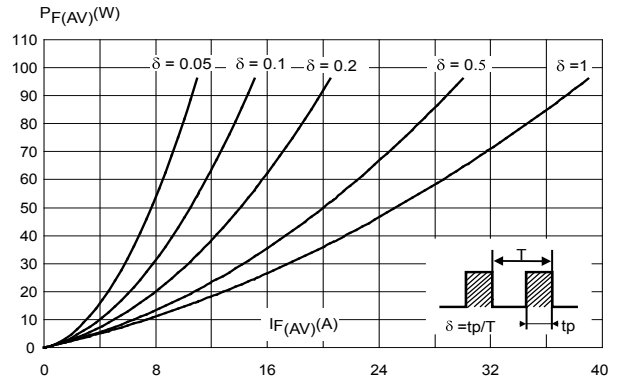


Figure 2. Forward voltage drop versus forward current (typical values)

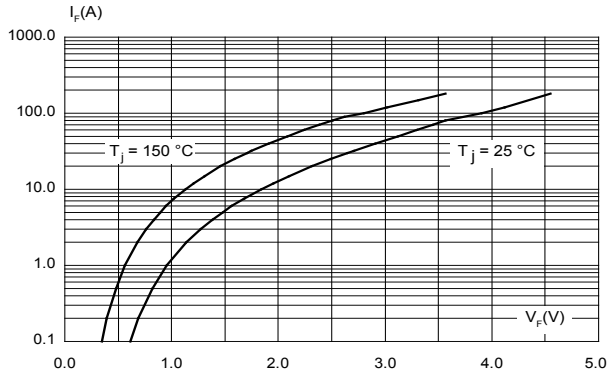


Figure 3. Forward voltage drop versus forward current (maximum values)

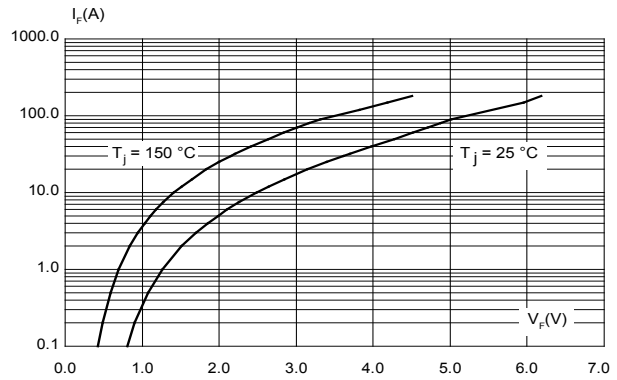


Figure 4. Relative variation of thermal impedance, junction to case versus pulse duration

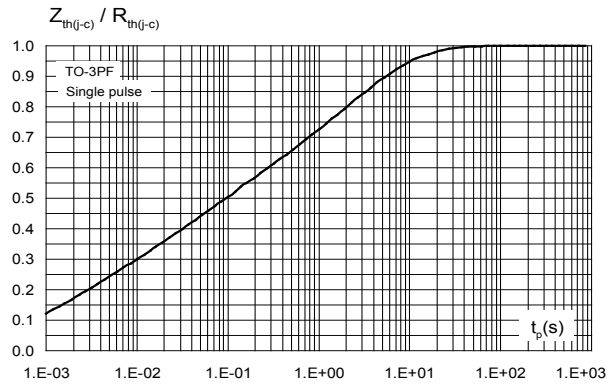


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values)

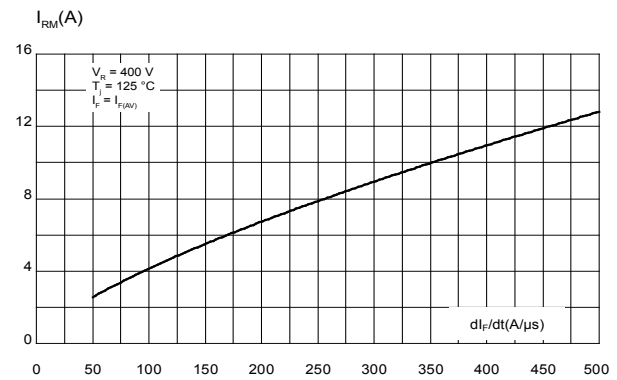


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

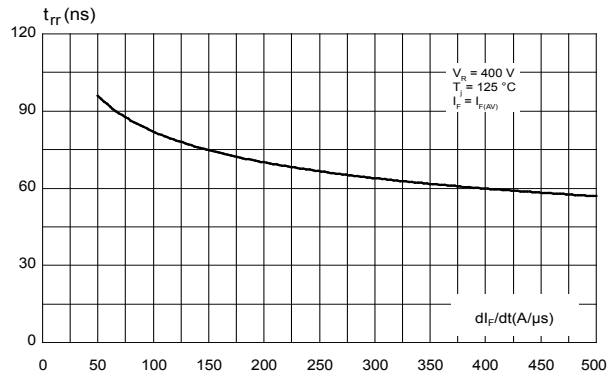


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

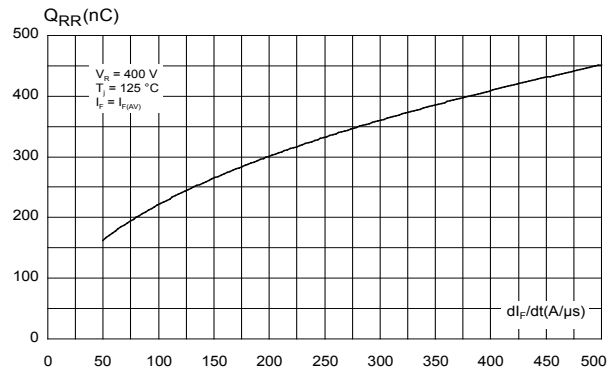


Figure 8. Reverse recovery softness factor versus dI_F/dt (typical values)

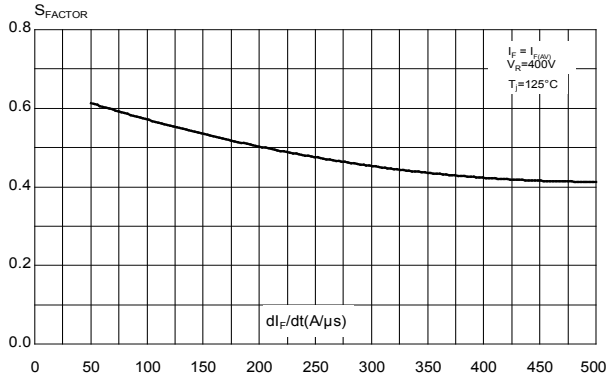


Figure 9. Relative variations of dynamic parameters versus junction temperature

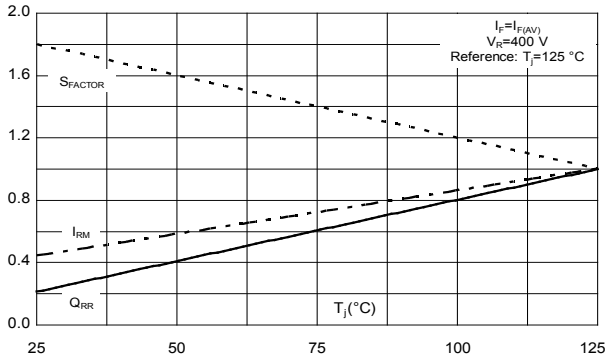


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

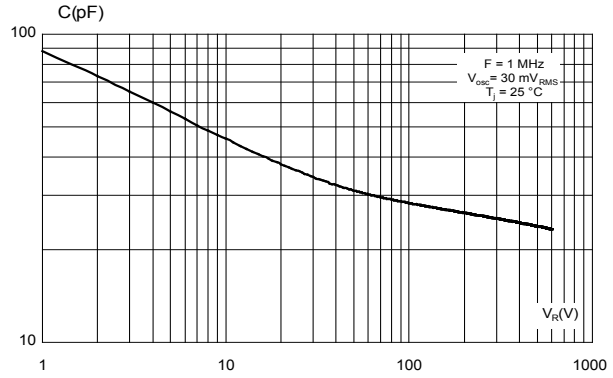


Figure 11. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

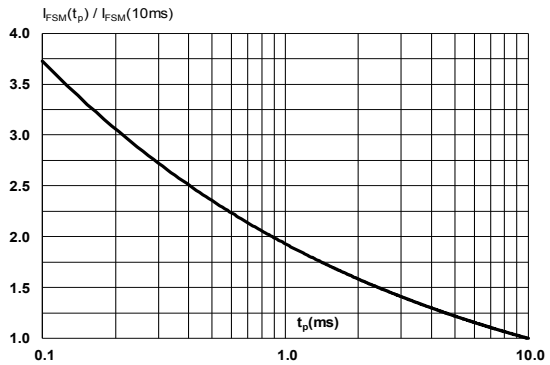
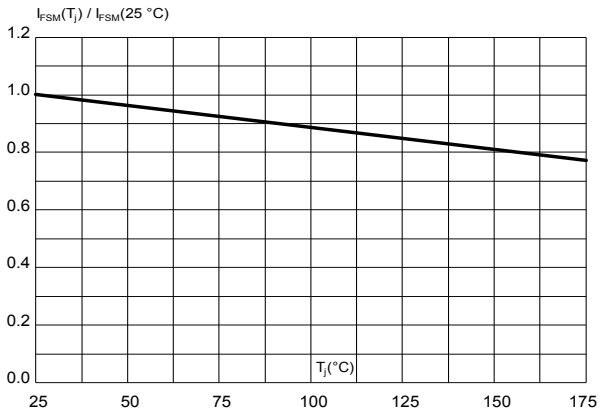


Figure 12. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



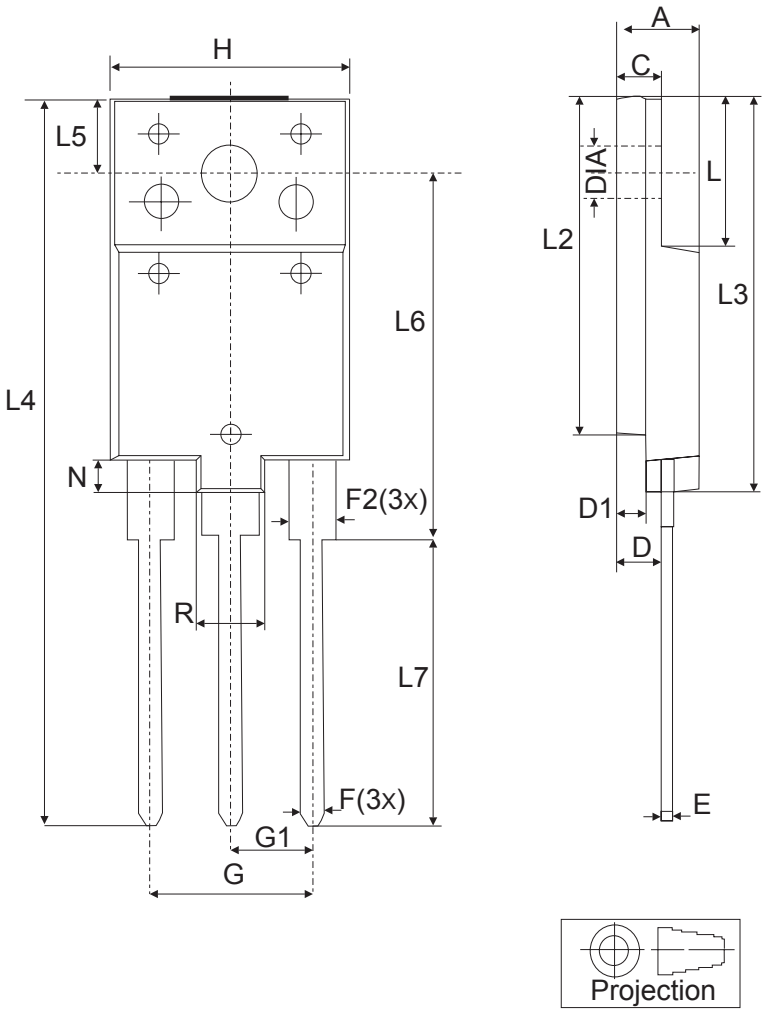
2 Package information

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 TO-3PF package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: 0.8 to 1.0 N·m

Figure 13. TO-3PF package outline



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

Table 5. **TO-3PF mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	5.30		5.70
C	2.80		3.20
D	3.10		3.50
D1	1.80		2.20
E	0.80		1.10
F	0.65		0.95
F2	1.80		2.20
G	10.30		11.50
G1		5.45	
H	15.30		15.70
L	9.80	10.00	10.20
L2	22.80		23.20
L3	26.30		26.70
L4	43.20		44.40
L5	4.30		4.70
L6	24.30		24.70
L7	14.60		15.00
N	1.80		2.20
R	3.80		4.20
Dia	3.40		3.80

3 Ordering information

Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30M06SPF	TH30M06SP	TO-3PF	5.6 g	30	Tube

Revision history

Table 7. **Document revision history**

Date	Version	Changes
27-May-2021	1	Initial release.
03-Jun-2021	2	Updated the name of the package and diode pinout.