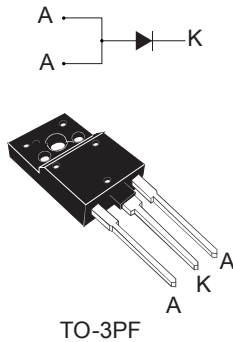


600 V, 30 A ultrafast high voltage diode



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

- Air conditioning equipment
- Power supplies and converters
- Boost PFC
- Rectification diode
- Freewheeling diode
- LLC clamping diode

Description

The **STTH30M06S** is an ultrafast recovery power rectifier especially suited for boost or 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	$\delta = 0.5$ 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
		Max.	2.3

For more information, 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	$T_j = 25\text{ °C}$	$V_R = 600\text{ V}$	-		60	μA
		$T_j = 125\text{ °C}$		-	70	800	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-	2.1		V
		$T_j = 150\text{ °C}$		-	1.3		
		$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$	-	2.6	3.8	
		$T_j = 150\text{ °C}$		-	1.7	2.3	

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:

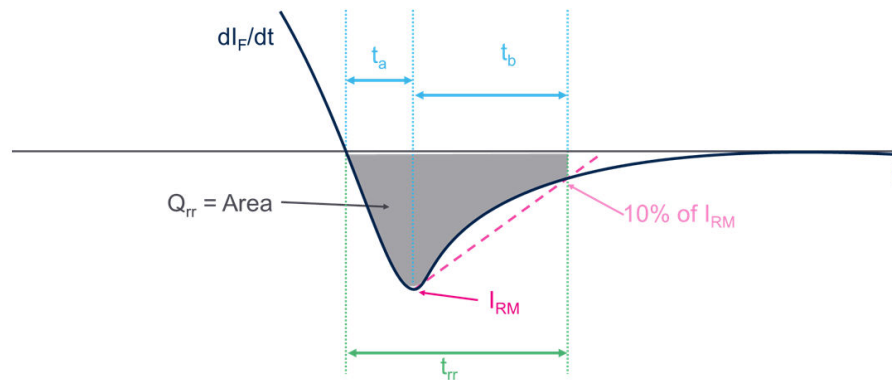
$$P = 1.08 \times I_{F(AV)} + 0.04 \times I_F^2(RMS)$$

For more information, 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 electrical characteristics

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$ $dI_F/dt = -50\text{ A/}\mu\text{s}$ $V_R = 30\text{ V}$	-		50	ns
			$I_F = 1\text{ A}$ $dI_F/dt = -100\text{ A/}\mu\text{s}$ $V_R = 30\text{ V}$	-	25	35	
		$T_j = 125\text{ °C}$	$I_F = 30\text{ A}$ $dI_F/dt = -200\text{ A/}\mu\text{s}$ $V_R = 400\text{ V}$	-	100		
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 30\text{ A}$ $dI_F/dt = -200\text{ A/}\mu\text{s}$	-	5.2		A
Q_{rr}	Reverse recovery charge		$dI_F/dt = -200\text{ A/}\mu\text{s}$ $V_R = 400\text{ V}$	-	380		nC

Figure 1.


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

- [AN5028](#): Calculation of turn-off power losses generated by an ultrafast diode

1.1 Characteristics (curves)

Figure 2. Average forward power dissipation versus average forward current (square waveform)

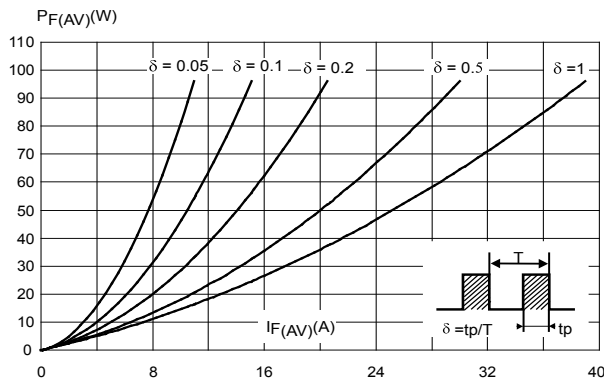


Figure 3. Forward voltage drop versus forward current (typical values)

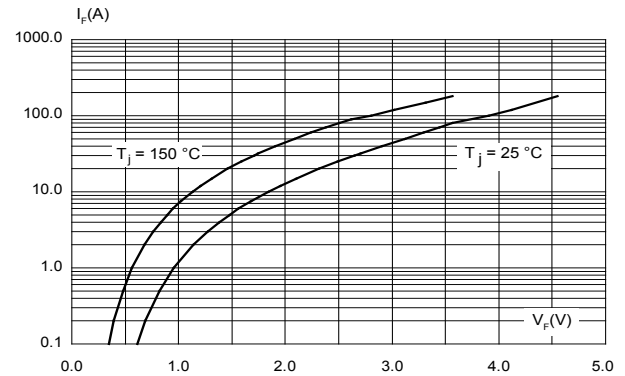


Figure 4. Forward voltage drop versus forward current (maximum values)

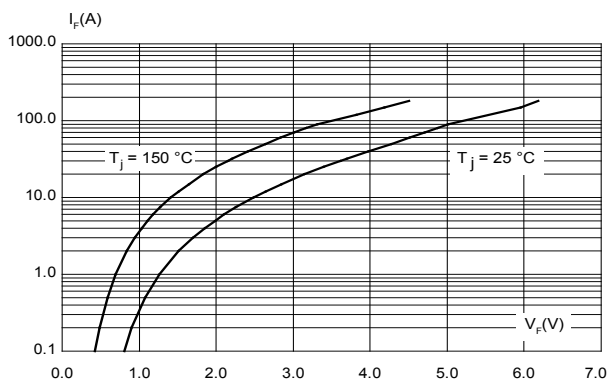


Figure 5. Relative variation of thermal impedance, junction to case versus pulse duration

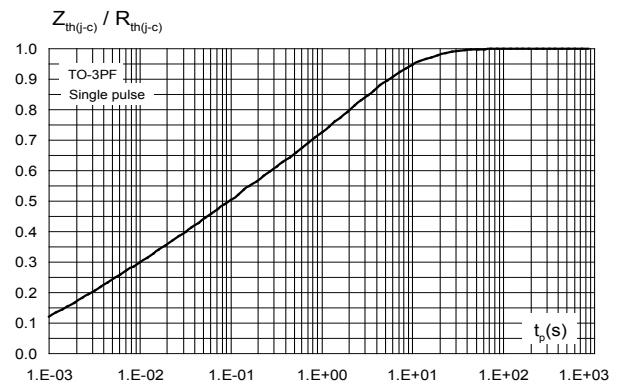


Figure 6. Peak reverse recovery current versus di_F/dt (typical values)

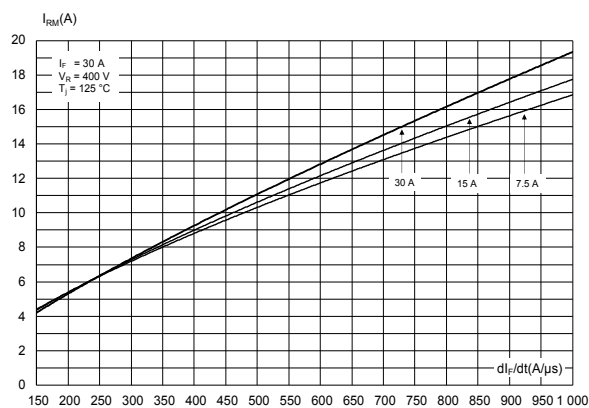


Figure 7. Reverse recovery time versus di_F/dt (typical values)

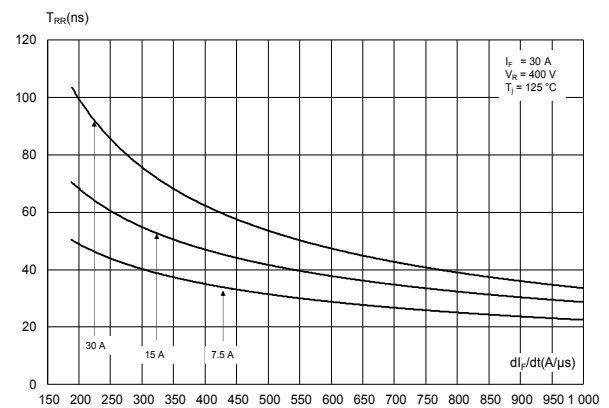
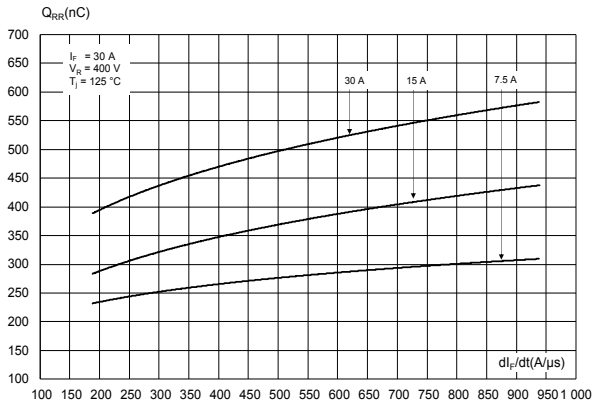
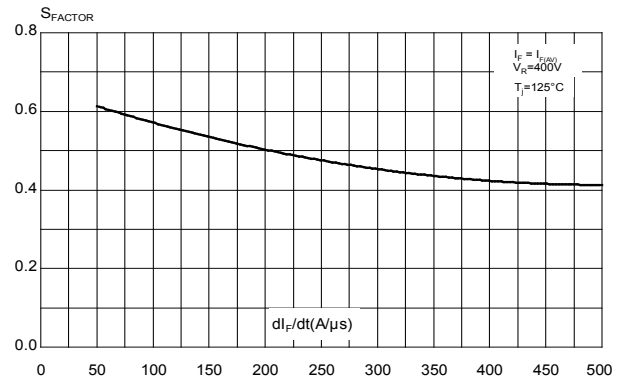
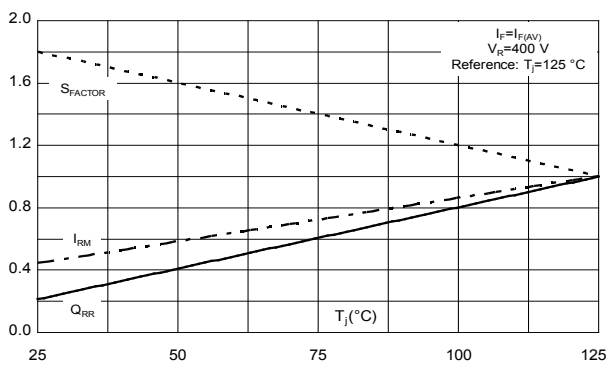
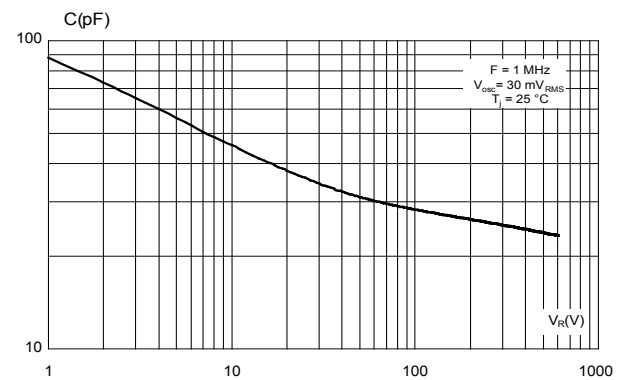
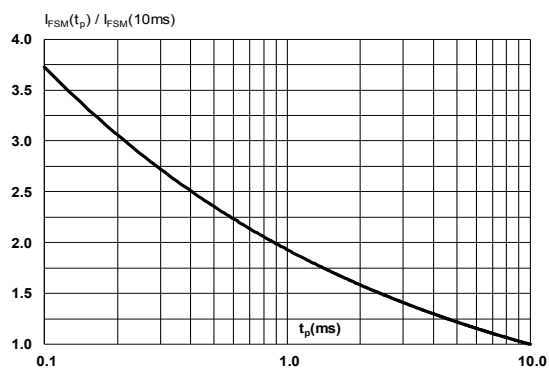
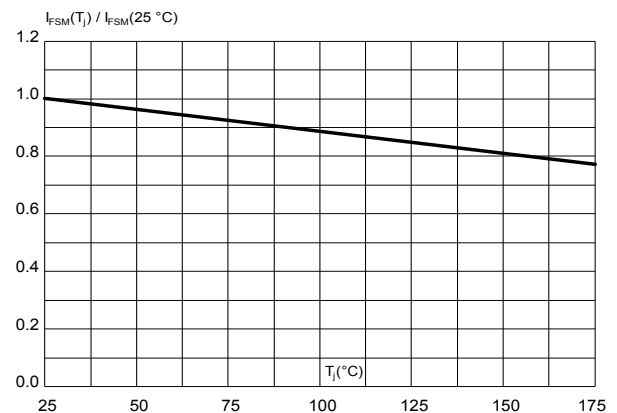


Figure 8. Reverse recovery charges versus di_F/dt (typical values)

Figure 9. Reverse recovery softness factor versus di_F/dt (typical values)

Figure 10. Relative variations of dynamic parameters versus junction temperature

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

Figure 12. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

Figure 13. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)


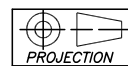
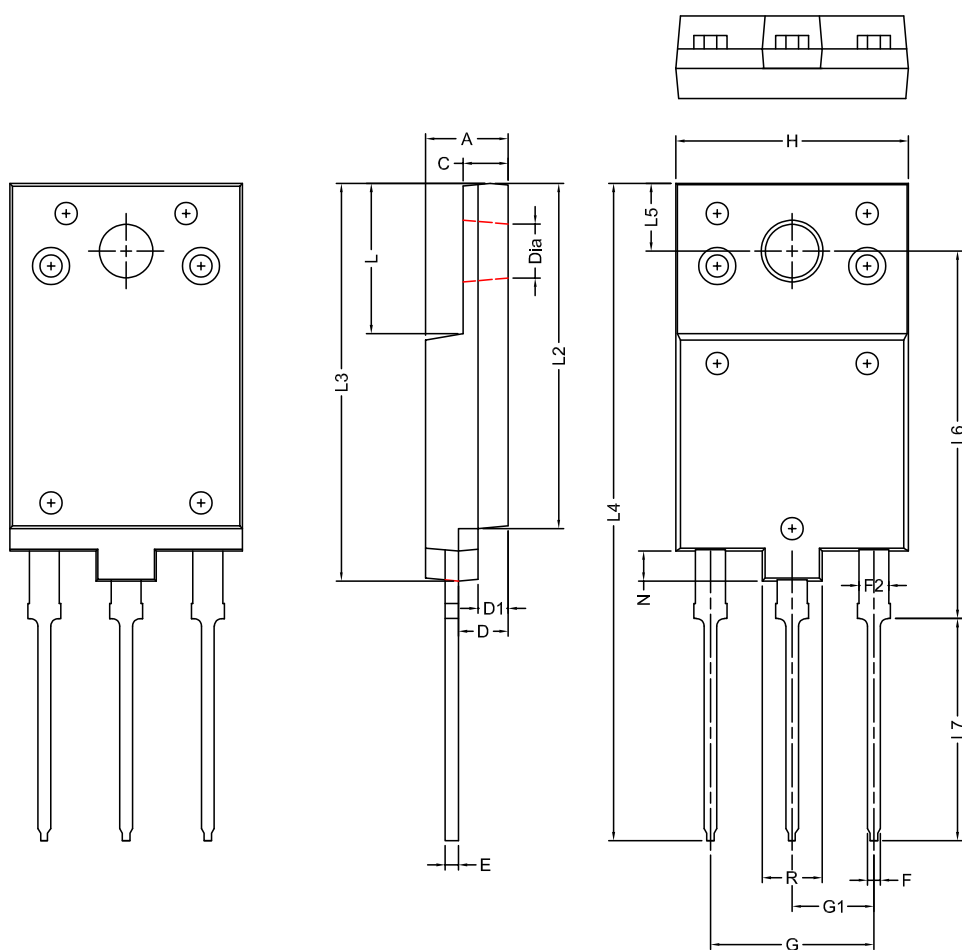
2 Package information

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 14. TO-3PF package outline



7627132_2_9

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	5.50	5.70
C	2.80	3.00	3.20
D	3.10	3.30	3.50
D1	1.80	2.00	2.20
E	0.80	0.95	1.10
F	0.65	0.80	0.95
F2	1.80	2.00	2.20
G	10.30	10.90	11.50
G1		5.45	
H	15.30	15.50	15.70
L	9.80	10.00	10.20
L2	22.80	23.00	23.20
L3	26.30	26.50	26.70
L4	43.20	43.80	44.40
L5	4.30	4.50	4.70
L6	24.30	24.50	24.70
L7	14.60	14.80	15.00
N	1.80	2.00	2.20
R	3.80	4.00	4.20
Dia	3.40	3.60	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.
16-Dec-2025	3	Updated Section Applications , Table 4 , Figure 6 , Figure 7 , Figure 8 and TO-3PF package information.

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