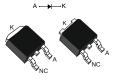
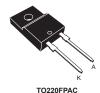


600 V, 25 A ultrafast high voltage diode



DPAK



Features

- Ultrafast recovery, soft recovery
- · Low power losses at high switching frequency operations
- · Low leakage current
- · High junction temperature
- · High overcurrent capability
- ECOPACK2 compliant

Applications

- PFC
- · Boost diode
- · LLC clamping diode

Description

The STTH25M06 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 25 A diode in DPAK and TO-220FPAC has a robust behavior against electrostatic discharge and high overcurrent capability.

Product status	
STTH25M06	

Product summary					
Symbol Value					
I _{F(AV)}	25 A				
V _{RRM}	600 V				
t _{rr(typ.)}	25 ns				
T _{j(max.)}	175 °C				
V _{F(typ.)}	1.6 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	25	Α
I _{FSM}	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$	170	А
T _{stg}	Storage temperature range	-65 to +175	°C
Tj	Maximum operating junction temperature	+175	°C

Table 2. Thermal resistance parameter

Symbol	Parameter			Unit
R _{th(j-c)} Junction to case	lunction to case	DPAK	0.5	°C/W
	Junction to case	TO-220FPAC	2.45	C/VV

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.	Тур.	Max.	Unit
I _R ⁽¹⁾ Reverse leakage current	Devene leeken euwent	T _j = 25 °C	V _R = 600 V	-		60	μΑ
	Reverse leakage current	T _j = 125 °C		-	70	800	
V _F ⁽²⁾ Forward volta		T _j = 25 °C	I _F = 15 A	-	2.1		V
	Forward voltage drop	T _j = 150 °C		-	1.3		
		T _j = 25 °C	I _F = 25 A	-	2.5	3.4	
		T _j = 150 °C		-	1.6	2.0	

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

To evaluate the conduction losses, use the following equation:

$$P = 1.04 \times I_{F(AV)} + 0.0385 \times I_{F^{2}(RMS)}$$

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

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Table 4. Dynamic electrical characteristics

Symbol	Parameters	Test conditions		Min.	Тур.	Max.	Unit
	t _{rr} Reverse recovery time	T _j = 25 °C	$I_F = 1 \text{ A}$ $dI_F/dt = -50 \text{ A/}\mu\text{s}$ $V_R = 30 \text{ V}$ $I_F = 1 \text{ A}$ $dI_F/dt = -100 \text{ A/}\mu\text{s}$ $V_R = 30 \text{ V}$	-	25	50 35	
t _{rr}		T _i = 125 °C	$I_F = 15 \text{ A}$ $dI_F/dt = -200 \text{ A/}\mu\text{s}$ $V_R = 400 \text{ V}$	-	55		ns
		,	$I_F = 25 \text{ A}$ $dI_F/dt = -200 \text{ A/}\mu\text{s}$ $V_R = 400 \text{ V}$	-	60		
I _{RM}	Reverse recovery current		I _F = 25 A	-	7		Α
Q _{rr}	Reverse recovery charge	T _j = 125 °C	$dI_F/dt = -200 \text{ A/}\mu\text{s}$ $V_R = 400 \text{ V}$	-	250		nC





1.1 Characteristics (curves)

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

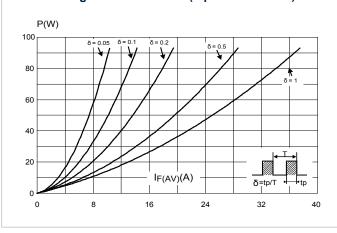


Figure 2. Forward voltage drop versus forward current (typical values)

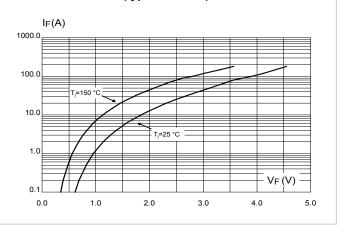


Figure 3. Forward voltage drop versus forward current (maximum values)

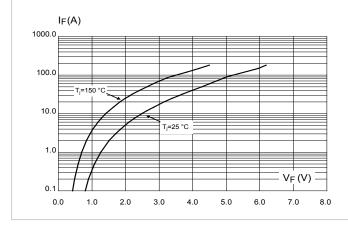


Figure 4. Relative variation of thermal impedance, junction to case versus pulse duration (DPAK)

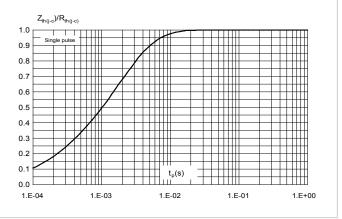


Figure 5. Relative variation of thermal impedance, junction to case versus pulse duration (TO-220FPAC)

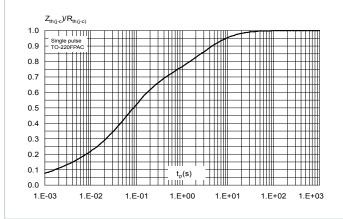
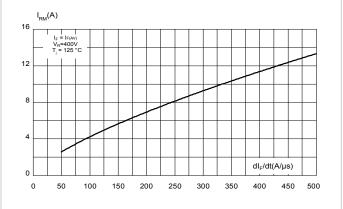


Figure 6. Peak reverse recovery current versus dl_F/dt (typical values)



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

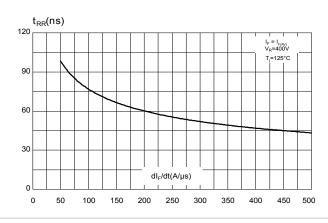


Figure 8. Reverse recovery charges versus dl_F/dt (typical values)

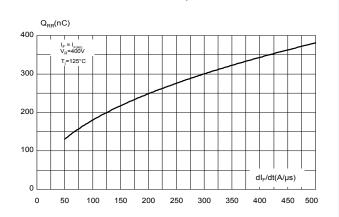


Figure 9. Reverse recovery softness factor versus dl_F/dt (typical values)

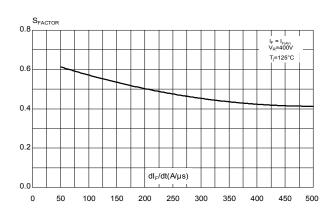


Figure 10. Relative variations of dynamic parameters versus junction temperature

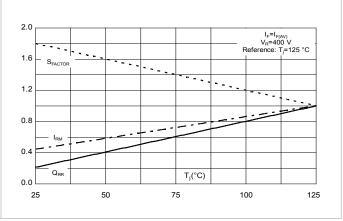


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

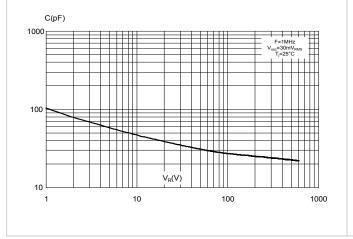
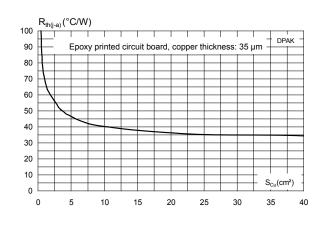


Figure 12. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 70 μ m)



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Figure 13. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

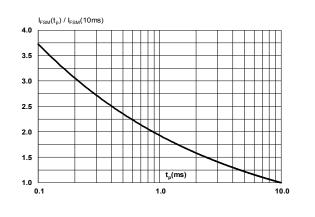
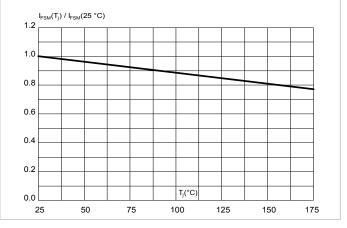


Figure 14. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



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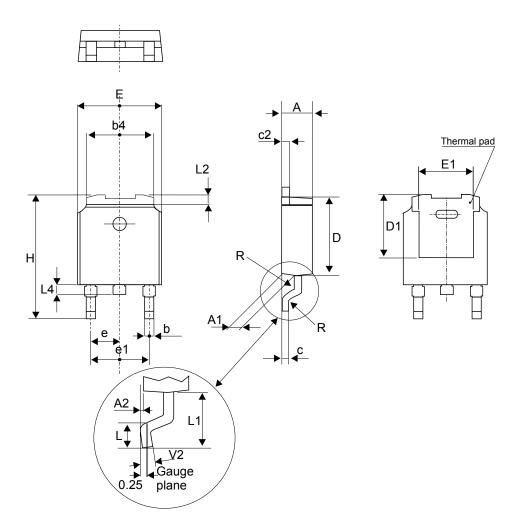
2 Package information

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 DPAK package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 15. DPAK package outline



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

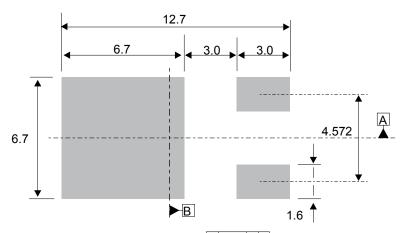
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Table 5. DPAK package mechanical data

		Dimensions				
Ref.	Millim	neters	Inches (for re	eference only)		
	Min.	Max.	Min.	Max.		
Α	2.18	2.40	0.085	0.094		
A1	0.90	1.10	0.035	0.043		
A2	0.03	0.23	0.001	0.009		
b	0.64	0.90	0.025	0.035		
b4	4.95	5.46	0.194	0.215		
С	0.46	0.61	0.018	0.024		
c2	0.46	0.60	0.018	0.023		
D	5.97	6.22	0.235	0.244		
D1	4.95	5.60	0.194	0.220		
E	6.35	6.73	0.250	0.265		
E1	4.32	5.50	0.170	0.216		
е	2.286	6 typ.	0.090	0 typ.		
e1	4.40	4.70	0.173	0.185		
Н	9.35	10.40	0.368	0.409		
L	1.0	1.78	0.039	0.070		
L2		1.27		0.050		
L4	0.60	1.02	0.023	0.040		
V2	-8°	+8°	-8°	+8°		

Figure 16. DPAK recommended footprint (dimensions in mm)



The device must be positioned within $\bigcirc 0.05 \ |A|B$

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2.2 TO-220FPAC package information

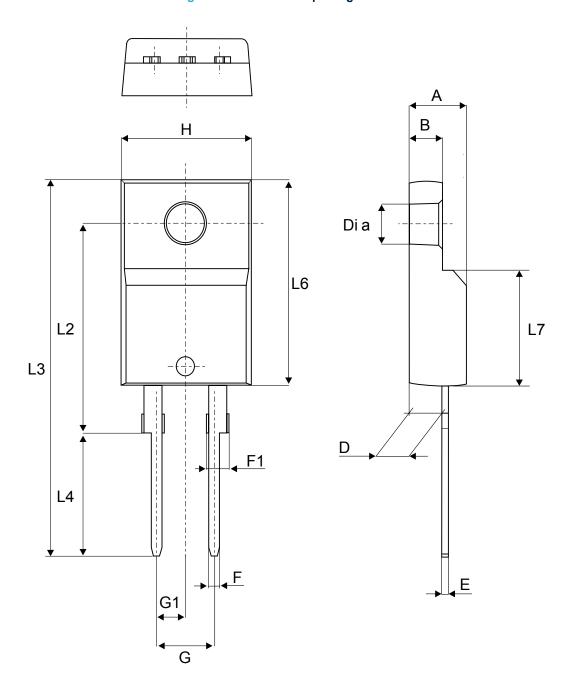
Epoxy meets UL 94,V0

Cooling method: by conduction (C)

• Recommended torque value: 0.55 N·m

• Maximum torque value: 0.70 N·m

Figure 17. TO-220FPAC package outline



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Table 6. TO-220FPAC package mechanical data

	Dimensions				
Ref.	Millir	neters	Inches (for ref	erence only)	
	Min.	Max.	Min.	Max.	
Α	4.40	4.60	0.173	0.181	
В	2.5	2.7	0.098	0.106	
D	2.5	2.75	0.098	0.108	
E	0.45	0.70	0.018	0.027	
F	0.75	1	0.030	0.039	
F1	1.15	1.70	0.045	0.067	
G	4.95	5.20	0.195	0.205	
G1	2.4	2.7	0.094	0.106	
Н	10	10.4	0.393	0.409	
L2	16	typ.	0.63	typ.	
L3	28.6	30.6	1.126	1.205	
L4	9.8	10.6	0.386	0.417	
L6	15.9	16.4	0.626	0.646	
L7	9.00	9.30	0.354	0.366	
Diam	3.00	3.20	0.118	0.126	



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH25M06B-TR	TH25 M06B	DPAK	0.32 g	2500	Tape and reel
STTH25M06FP	STTH25M06FP	TO-220FPAC	1.90 g	50	Tube



Revision history

Table 8. Document revision history

Date	Revision	Changes
09-Dec-2019	1	Initial release.
10-Feb-2020	2	Added TO-220FPAC package information.



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