

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(RMS)}	Forward rms current			50	Α
I _{F(AV)}	Average forward current	T _C = 103 °C, δ = 0.5 s	T _C = 103 °C, δ = 0.5 square		
leou	Surge non repetitive forward current	t _p = 10 ms sinusoidal	D²PAK, D²PAK HV	180	Α
IFSM	Surge non repetitive forward current	t _p = 10 ms sinusoidar	TO-220AC, DO-247, DO-247 LL	200	
T _{stg}	Storage temperature range			-65 to +175	°C
Tj	Maximum operating junction temperature			175	°C

Table 2. Thermal parameters

Symbol	Parameter	Max. value	Unit
R _{th(j-c)}	Junction to case	0.70	°C/W
R _{th(j-c)}	Junction to case DO-247 LL	0.90	°C/W

For more information, please refer to the following application note:

AN5088: Rectifiers thermal management, handling and mounting recommendation

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
1 (1)		T _j = 25 °C	V V	-		40	
I _R ⁽¹⁾	R (1) Reverse leakage current	T _j = 150 °C	$V_R = V_{RRM}$	-	80	800	μA
		T _j = 25 °C	I _F = 15 A	-		2.45	
V ₋ (2)	V _F ⁽²⁾ Forward voltage drop	T _j = 150 °C	IF - 10 X	-	1.15	1.45	V
VF \		T _j = 25 °C	I _F = 30 A	-		2.95	V
		T _j = 150 °C		-	1.45	1.85	

- 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:

$$P = 1.05 \times I_{F(AV)} + 0.026 \times I_{F}^{2}_{(RMS)}$$

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

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode
- AN5028: Calculation of turn-off power losses generated by an ultrafast diode

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Table 4. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
+	Reverse recovery time	Reverse recovery time $I_F = 0.5 \text{ A}, I_R = 1 \text{ A}, I_{rr} = 0.25 \text{ A}$		-		30	ns
t _{rr}	Reverse recovery time	1, - 25 0	$I_F = 1 \text{ A}, V_R = 30 \text{ V}, dI_F/dt = -50 \text{ A/}\mu\text{s}$	-	40	55	115
I _{RM}	Reverse recovery current		$I_F = 30 \text{ A}, V_R = 400 \text{ V}, dI_F/dt = -200 \text{ A}/\mu\text{s}$	-	8	11	Α
Q _{RR}	Reverse recovery charge	T _j = 125 °C		-	485		nC
t _{rr}	Reverse recovery time			-	95		ns

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1.1 Characteristics (curves)

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

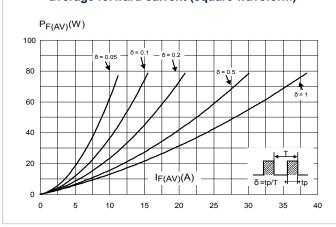


Figure 2. Average forward power dissipation versus average forward current (sinusoidal waveform)

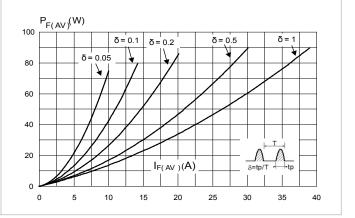


Figure 3. Average forward power dissipation versus average forward current (square waveform, DO-247 LL)

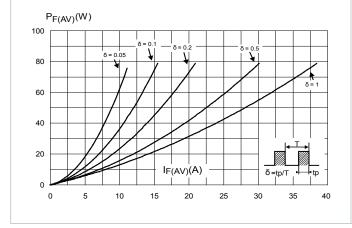


Figure 4. Average forward power dissipation versus average forward current (sinusoidal waveform, DO-247 LL)

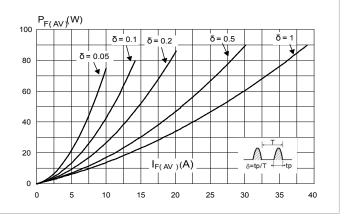


Figure 5. Forward voltage drop versus forward current (typical values)

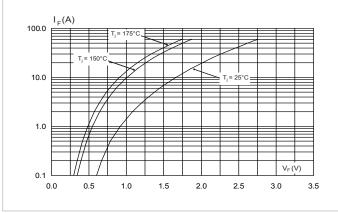
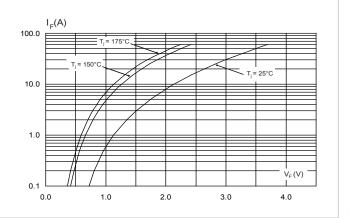


Figure 6. Forward voltage drop versus forward current (maximum values)



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Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

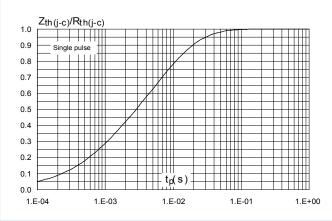


Figure 8. Peak reverse recovery current versus dl_F/dt (typical values)

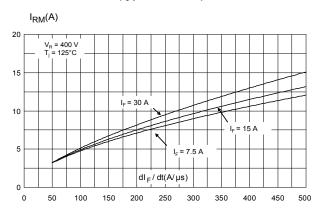


Figure 9. Reverse recovery time versus dI_F/dt (typical values)

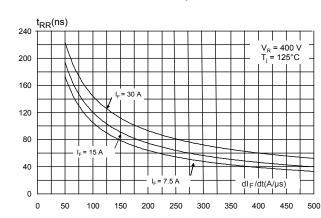


Figure 10. Reverse recovery charges versus dl_F/dt (typical values)

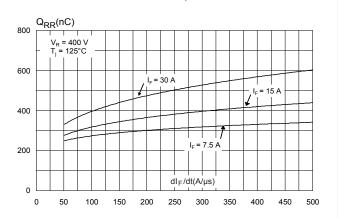


Figure 11. Reverse recovery softness factor versus dl_F/dt (typical values)

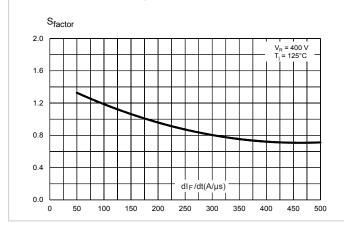
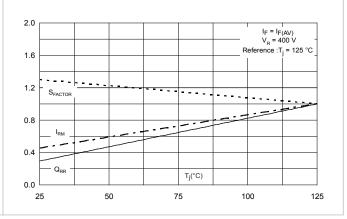


Figure 12. Relative variations of dynamic parameters versus junction temperature



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Figure 13. Junction capacitance versus reverse voltage applied (typical values)

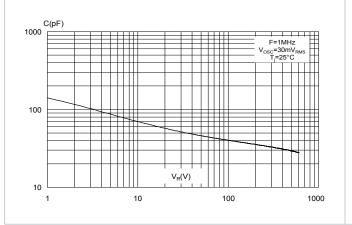


Figure 14. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35 µm)(D²PAK and D²PAK HV)

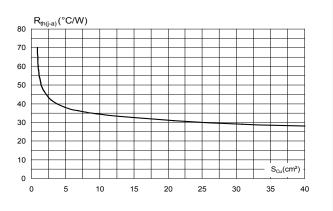


Figure 15. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

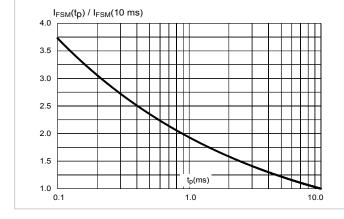
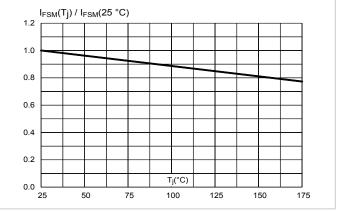


Figure 16. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



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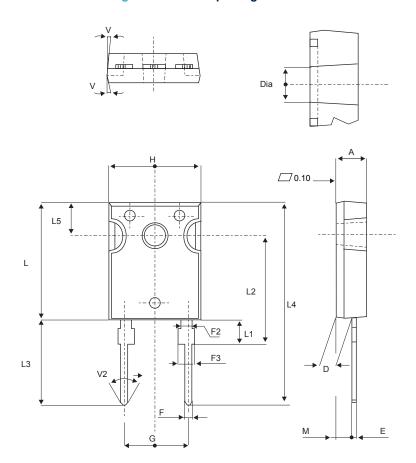
Package information

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 DO-247 package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m (DO-247)
- Maximum torque value: 1.0 N·m (DO-247)

Figure 17. DO-247 package outline



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Table 5. DO-247 package mechanical data

	Dimensions				
Ref.	Millimeters		Inch	es	
	Min.	Max.	Min.	Max.	
А	4.85	5.15	0.191	0.203	
D	2.20	2.60	0.086	0.102	
E	0.40	0.80	0.015	0.031	
F	1.00	1.40	0.039	0.055	
F2	2.00	typ.	0.078	typ.	
F3	2.00	2.40	0.078	0.094	
G	10.90 typ.		0.429 typ.		
Н	15.45	15.75	0.608	0.620	
L	19.85	20.15	0.781	0.793	
L1	3.70	4.30	0.145	0.169	
L2	18.50	typ.	0.728 typ.		
L3	14.20	14.80	0.559	0.582	
L4	34.60	typ.	1.362 typ.		
L5	5.50	typ.	0.216 typ.		
М	2.00	3.00	0.078	0.118	
V	5°		5°		
V2	60)°	60°		
Dia.	3.55	3.65	0.139	0.143	

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2.2 D²PAK package information

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

THERMAL PAD

A1

CAUGE PLANE

V2

Figure 18. D²PAK package outline

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

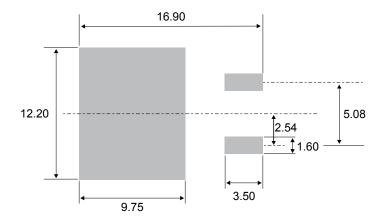
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Table 6. D²PAK package mechanical data

	Dimensions				
Ref.	Millir	neters	Inches (for reference only)		
	Min.	Max.	Min.	Max.	
А	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	
С	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	
е	2.54	4 typ.	0.100		
e1	4.88	5.28	0.190	0.205	
Н	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 19. D²PAK recommended footprint (dimensions in mm)



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2.3 TO-220AC package information

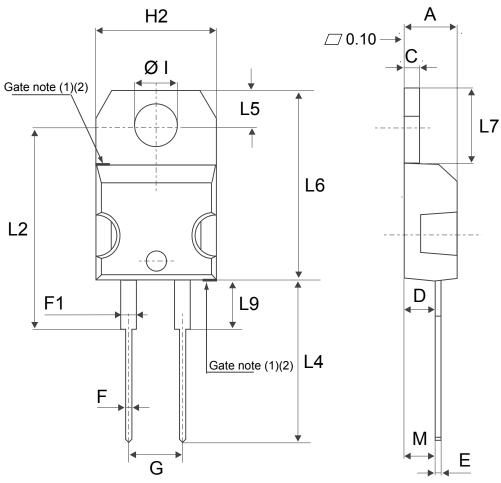
Epoxy meets UL 94,V0

Cooling method: by conduction (C)

• Recommended torque value: 0.55 N·m

Maximum torque value: 0.70 N·m

Figure 20. TO-220AC package outline



- (1): Max resin gate protusion 0.5 mm
- $(2) : Resin \ gate \ position \ is \ accepted \ in \ each \ of \ the \ two \ positions \ shown \ on \ the \ drawings \ or \ their \ symmetrical$

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Table 7. TO-220AC package mechanical data

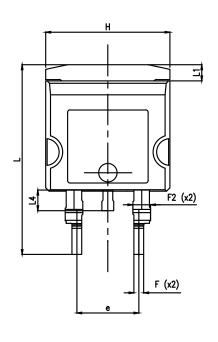
	Dimensions				
Ref.	Millimeters		Inches (for re	ference only)	
	Min.	Max.	Min.	Max.	
A	4.40	4.60	0.173	0.181	
С	1.23	1.32	0.048	0.051	
D	2.40	2.72	0.094	0.107	
E	0.49	0.70	0.019	0.027	
F	0.61	0.88	0.024 0.		
F1	1.14	1.70	0.044	0.066	
G	4.95	5.15	0.194	0.202	
H2	10.00	10.40	0.393	0.409	
L2	16.4	0 typ.	0.645 typ.		
L4	13.00	14.00	0.511	0.551	
L5	2.65	2.95	0.104	0.116	
L6	15.25	15.75	0.600	0.620	
L7	6.20	6.60	0.244	0.259	
L9	3.50	3.93	3.93 0.137 0.1		
M	2.60	typ.	0.102 typ.		
Diam	3.75	3.85	0.147	0.151	

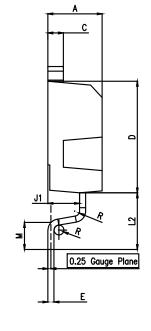
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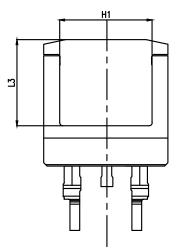


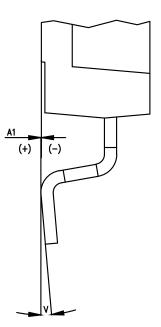
2.4 D²PAK HV package information

Figure 21. D²PAK high voltage package outline









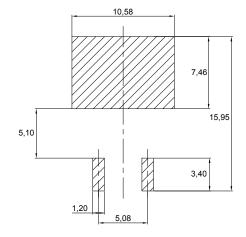
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Table 8. D²PAK high voltage package mechanical data

D. f	Dimensions					
Ref.	Min.	Тур.	Max.			
А	4.30		4.70			
A1	-0.05		0.08			
С	1.17		1.37			
D	8.95		9.35			
е	4.98		5.18			
Е	0.50		0.90			
F	0.78		0.85			
F2	1.20		1.60			
Н	10.00		10.40			
H1	7.40		7.80			
J1	2.49		2.69			
L	15.30		15.80			
L1	1.27		1.40			
L2	4.93		5.23			
L3	6.85		7.25			
L4	1.5		1.7			
M	2.6		2.9			
R	0.20		0.60			
V	0°		8°			

Figure 22. D²PAK High Voltage footprint in mm



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2.4.1 Creepage distance between anode and cathode

Table 9. Creepage distance between anode and cathode

Symbol	Parameter		Value	Unit
Cd _{A-K1}	Minimum creepage distance between A and K1 (with top coating)		5.38	mm
Cd _{A-K2}	Minimum creepage distance between A and K2 (without top coating)		3.48	mm

Note: D²PAK HV creepage distance (anode to cathode) = 5.38 mm min. (refer to IEC 60664-1)

Figure 23. Creepage with top coating

Creepage A K1

Minimum distance between A & K1 = 5.38 mm (with top coating)

Figure 24. Creepage without top coating



Minimum distance between A & K2 = 3.48 mm (without top coating)

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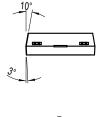
2.5 DO-247 LL package information

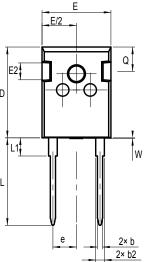
• Epoxy meets UL94, V0

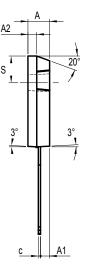
Cooling method: by conduction (C)
 Recommended torque value: 0.8 N·m

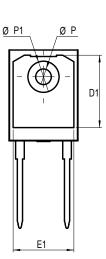
Maximum torque value: 1.0 N·m

Figure 25. DO-247 LL package outline









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Table 10. DO-247 LL package mechanical data

	Dimensions				
Ref.	Millin	neters	Inches (for re	ference only)	
	Min.	Max.	Min.	Max.	
А	4.70	5.31	0.185	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b2	1.65	2.39	0.065	0.094	
С	0.38	0.89	0.015	0.035	
D	20.80	21.46	0.819	0.845	
D1	13.08		0.515		
E	15.49	16.26	0.610	0.640	
е	5.44	typ.	0.214		
E1	13.46		0.530		
E2	3.43	3.99	0.135	0.157	
L	19.81	20.32	0.780	0.800	
L1		4.50		0.177	
Р	3.56	3.66	0.140	0.144	
P1	7.06	7.39	0.278	0.291	
Q	5.38	6.20	0.219	0.244	
S	6.17	7 typ.	0.243		
W		0.15		0.006	

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3 Ordering information

Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30RQ06G-TR	STTH30RQ06G	D²PAK	1.48 g	1000	Tape and reel
STTH30RQ06D	STTH30RQ06D	TO-220AC	1.86 g	50	Tube
STTH30RQ06W	STTH30RQ06W	DO-247	4.40 g	30	Tube
STTH30RQ06G2-TR	TH30RQ06G2	D²PAK HV	1.48 g	1000	Tape and reel
STTH30RQ06WL	STTH30RQ06WL	DO-247 LL	5.9 g	30	Tube

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Revision history

Table 12. Document revision history

Date	Revision	Changes
12-Jun-2017	1	Initial release.
11-Oct-2018	2	Added D²PAK HV package.
20-Nov-2018	3	Updated Features and Table 9. Creepage distance between anode and cathode. Added Figure 24. Creepage without top coating.
02-Mar-2020	4	Added DO-247 LL package information.
30-Mar-2020	5	Updated Figure 1 and Figure 2. Added Figure 3 and Figure 4.



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