

1 Characteristics

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

Symbol	Parai	Value	Unit		
V _{RRM}	Repetitive peak reverse voltage	Repetitive peak reverse voltage $T_j = -40 ^{\circ}\text{C}$ to +175 $^{\circ}\text{C}$			V
I _{F(RMS)}	Forward rms current			50	Α
I _{F(AV)}	Average forward current δ = 0.5, square wave T_C = 125 °C			30	Α
leau	Surge non repetitive forward current	t _n = 10 ms sinusoidal	D²PAK, D²PAK HV	180	Α
I _{FSM} Surge non repetitive forward current		tp = 10 ms sinusoidai	TO-220AC, DO-247	200	
T _{stg}	Storage temperature range				°C
Tj	Operating junction temperature range			-40 to +175	°C

Table 2. Thermal parameters

Symbol	Parameter	Max. value	Unit	
$R_{th(j-c)}$	Junction to case	0.7	°C/W	

Table 3. Static electrical characteristics

Symbol	Parameter	Test co	Min.	Тур.	Max.	Unit	
I_ (1)	Deverse leakage surrent	T _j = 25 °C	V _R = V _{RRM}	-		40	
I _R ⁽¹⁾ Re	Reverse leakage current	T _j = 150 °C	VR = VRRM	-	80	800	μA
		T _j = 25 °C	I _F = 15 A	-		2.45	
V _F ⁽²⁾	Forward voltage drop	T _j = 150 °C	IF - 13 X	-	1.15	1.45	V
VF (=)		T _j = 25 °C	I _F = 30 A	-		2.95	
		T _j = 150 °C		-	1.45	1.85	

^{1.} Pulse test: $t_p = 5$ ms, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

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

Table 4. Dynamic electrical characteristics

Symbol	Parameter		Test conditions				Unit
t _{rr} Reverse recovery time T _i = 25 °C		I _F = 0.5 A, I _R = 1 A, I _{rr} = 0.25 A			30	no	
ι _{ττ}	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	ns
I _{RM}	Reverse recovery current			-	8	11	Α
Q _{RR}	Reverse recovery charge	T _j = 125 °C	$I_F = 30 \text{ A}, V_R = 400 \text{ V}, dI_F/dt = -200 \text{ A}/\mu\text{s}$	-	485		nC
t _{rr}	Reverse recovery time			-	95		ns

DS12165 - Rev 3 page 2/17

^{2.} Pulse test: $t_p = 380 \ \mu s, \ \delta < 2\%$



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 in a power diode

1.1 Characteristics (curves)

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

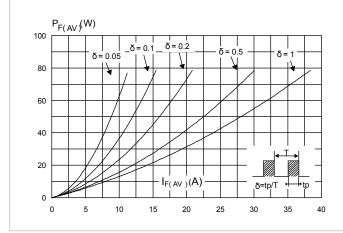


Figure 2. Average forward power dissipation versus average forward current (sinusoidal waveform)

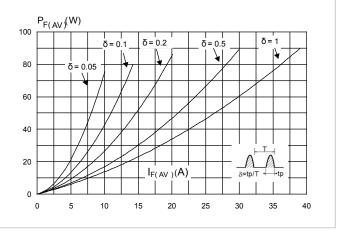


Figure 3. Forward voltage drop versus forward current (typical values)

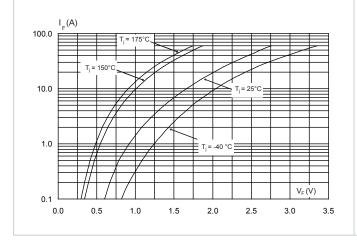
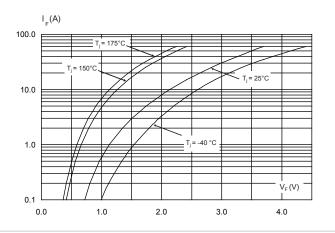


Figure 4. Forward voltage drop versus forward current (maximum values)



DS12165 - Rev 3 page 3/17



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

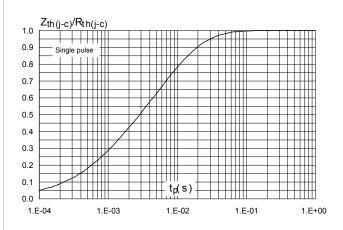


Figure 6. Peak reverse recovery current versus dl_F/dt (typical values)

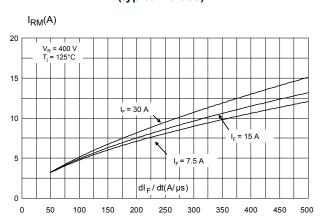


Figure 7. Reverse recovery time versus dl_F/dt (typical values)

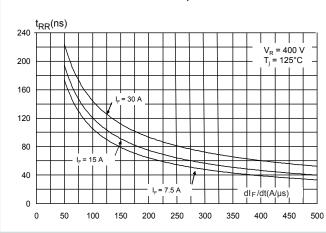


Figure 8. Reverse recovery charges versus dl_F/dt (typical values)

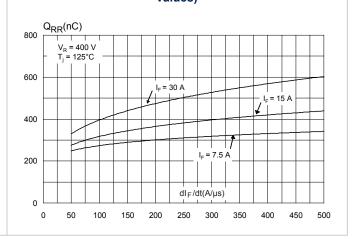


Figure 9. Reverse recovery softness factor versus dl_F/dt (typical values)

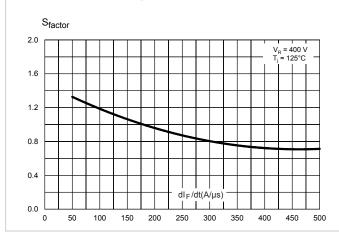
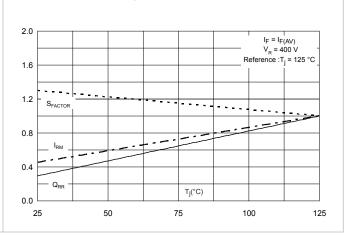


Figure 10. Relative variations of dynamic parameters versus junction temperature



DS12165 - Rev 3 page 4/17



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

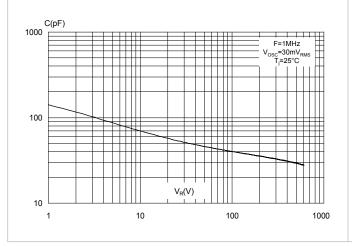


Figure 12. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35 µm)(D²PAK and D²PAK HV)

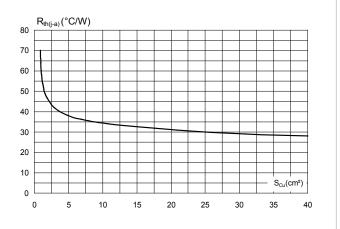


Figure 13. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

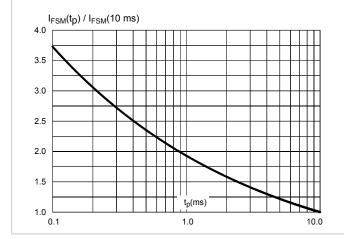
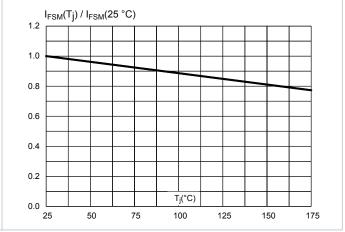


Figure 14. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



DS12165 - Rev 3 page 5/17



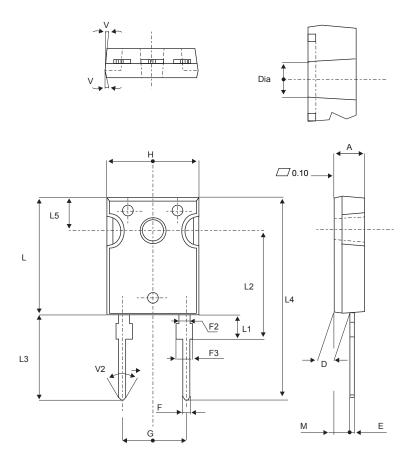
2 Package information

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 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 15. DO-247 package outline



DS12165 - Rev 3 page 6/17



Table 5. DO-247 package mechanical data

	Dimensions					
Ref.	Millimeters		Inch	es		
	Min.	Max.	Min.	Max.		
Α	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	0	5°			
V2	60)°	60	0		
Dia.	3.55	3.65	0.139	0.143		



D²PAK package information 2.2

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

THERMAL PAD SEATING PLANE COPLANARITY 0.25 GAUGE PLANE V2

Figure 16. D²PAK package outline

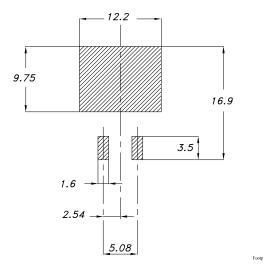
page 8/17 Downloaded from Arrow.com.



Table 6. D²PAK package mechanical data

	Dimensions						
Ref.	Millimeters			Inches (for reference only)			
	Min.	Тур.	Max.	Min.	Тур.	Max.	
А	4.40		4.60	0.173		0.181	
A1	0.03		0.23	0.001		0.009	
b	0.70		0.93	0.028		0.037	
b2	1.14		1.70	0.045		0.067	
С	0.45		0.60	0.018		0.024	
c2	1.23		1.36	0.048		0.053	
D	8.95		9.35	0.352		0.368	
D1	7.50	7.75	8.00	0.295	0.305	0.315	
D2	1.10	1.30	1.50	0.043	0.051	0.060	
E	10.00		10.40	0.394		0.409	
E1	8.30	8.50	8.70	0.335	0.343	0.346	
E2	6.85	7.05	7.25	0.266	0.278	0.282	
е		2.54			0.100		
e1	4.88		5.28	0.190		0.205	
Н	15.00		15.85	0.591		0.624	
J1	2.49		2.69	0.097		0.106	
L	2.29		2.79	0.090		0.110	
L1	1.27		1.40	0.049		0.055	
L2	1.30		1.75	0.050		0.069	
R		0.40			0.015		
V2	0°		8°	0°		8°	

Figure 17. D²PAK recommended footprint (dimensions are in mm)



DS12165 - Rev 3 page 9/17



2.3 TO-220AC package information

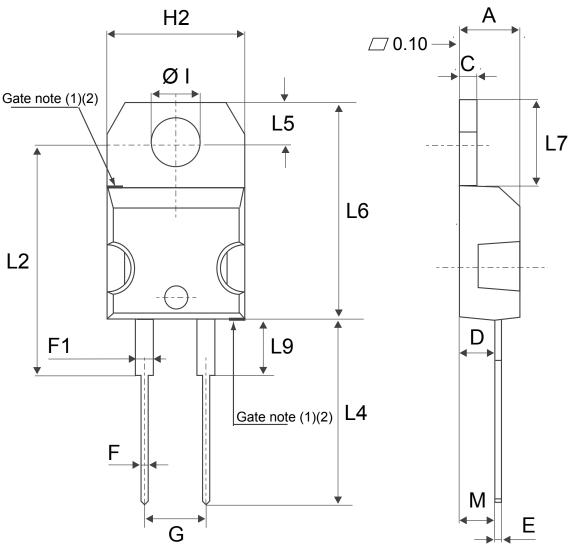
Epoxy meets UL 94,V0

• Cooling method: by conduction (C)

Recommended torque value: 0.55 N·m

Maximum torque value: 0.70 N⋅m

Figure 18. 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

DS12165 - Rev 3 page 10/17



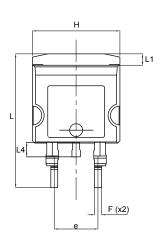
Table 7. TO-220AC package mechanical data

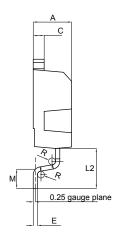
	Dimensions					
Ref.	Millimeters		Inches (for re	ference only)		
	Min.	Max.	Min.	Max.		
Α	4.40	4.60	0.173	0.181		
С	1.23	1.32	0.048	0.051		
D	2.40	2.72	0.094	0.107		
E	0.49	0.70	0.019	0.027		
F	0.61	0.88	0.024	0.034		
F1	1.14	1.70	0.044	0.066		
G	4.95	5.15	0.194	0.202		
H2	10.00	10.40	0.393	0.409		
L2	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	0.137	0.154		
M	2.60	typ.	0.102	typ.		
Diam	3.75	3.85	0.147	0.151		

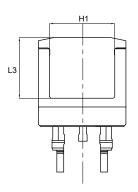


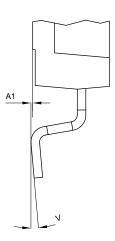
2.4 D²PAK HV package information

Figure 19. D²PAK high voltage package outline









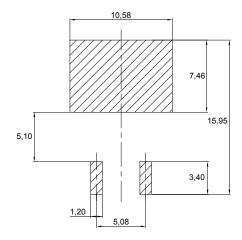
DS12165 - Rev 3 page 12/17



Table 8. D²PAK high voltage package mechanical data

Ref.	Dimensions					
Kei.	Min.	Тур.	Max.			
А	4.30		4.70			
A1	0.03		0.20			
С	1.17		1.37			
е	4.98		5.18			
E	0.50		0.90			
F	0.78		0.85			
Н	10.00		10.40			
H1	7.40		7.80			
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 20. D²PAK High Voltage footprint in mm



DS12165 - Rev 3 page 13/17



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)	D²PAK HV	5.38	
Cd _{A-K2}	Minimum creepage distance between A and K2 (without top coating)	D FAN IIV	3.48	mm

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

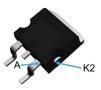
Figure 21. Creepage with top coating

Creepage

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

Figure 22. Creepage without top coating

Creepage



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

page 14/17 Downloaded from Arrow.com.





3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30RQ06GY-TR	STTH30RQ06GY	D²PAK	1.48 g	1000	Tape and reel
STTH30RQ06DY	STTH30RQ06DY	TO-220AC	1.86 g	50	Tube
STTH30RQ06WY	STTH30RQ06WY	DO-247	4.40 g	30	Tube
STTH30RQ06G2Y-TR	TH30RQ06G2Y	D²PAK HV	1.48 g	1000	Tape and reel



Revision history

Table 11. Document revision history

Date	Revision	Changes
12-Jun-2017	1	Initial release.
09-Oct-2018	2	Added D²PAK HV package.
20-Nov-2018	3	Updated Features and Table 9. Creepage distance between anode and cathode. added Figure 22. Creepage without top coating.

DS12165 - Rev 3 page 16/17



IMPORTANT NOTICE - PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics - All rights reserved

DS12165 - Rev 3 page 17/17