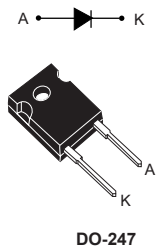


## Automotive turbo 2 ultrafast high voltage rectifier



### Features

- AEC-Q101 qualified
- High junction temperature capability
- Ultrafast with soft recovery behavior
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses
- PPAP capable

### Description

The [STTH60RQ06-Y](#) has been developed for applications requiring a high-voltage secondary rectification for LLC full bridge topology.

Also it is ideal for switching power supplies, industrial and automotive applications, as rectification, freewheeling and clamping diode.

Product status link	
<a href="#">STTH60RQ06-Y</a>	
Product summary	
Symbol	Value
$I_{F(AV)}$	60 A
$V_{RRM}$	600 V
$V_{F(max)}$	1.45 V
$t_{rr(max)}$	35 ns
$T_j$	-40 to +175 °C

# 1 Characteristics

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

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage ( $T_j = -40\text{ °C}$ to $+175\text{ °C}$ )		600	V
$I_{F(RMS)}$	Forward rms current		90	A
$I_{F(AV)}$	Average forward current		60	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	425	A
$T_{stg}$	Storage temperature range		-65 to +175	°C
$T_j$	Operating junction temperature range		-40 to +175	°C

**Table 2. Thermal resistance parameters**

Symbol	Parameter	Max.	Unit
$R_{th(j-c)}$	Junction to case	0.38	°C/W

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		80	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	160	1600	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$	-		2.45	V
		$T_j = 150\text{ °C}$		-	1.15	1.45	
		$T_j = 25\text{ °C}$	$I_F = 60\text{ A}$	-		2.95	
		$T_j = 150\text{ °C}$		-	1.45	1.85	

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:

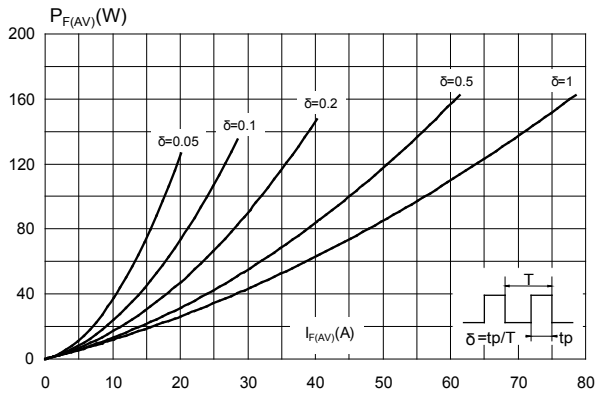
$$P = 1.05 \times I_{F(AV)} + 0.013 \times I_{F(RMS)}^2$$

**Table 4. Dynamic electrical characteristics**

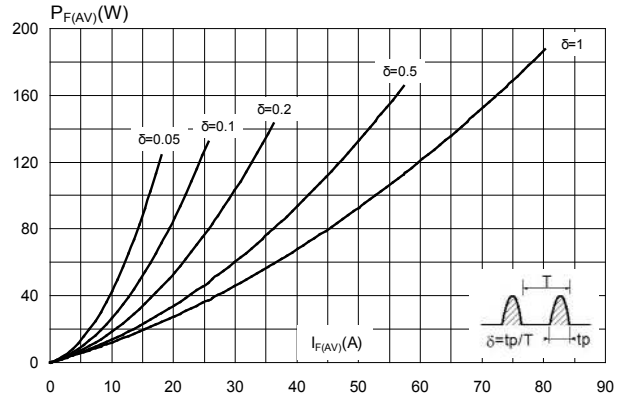
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ , $I_R = 1\text{ A}$	-		35	ns
			$I_F = 1\text{ A}$ , $V_R = 30\text{ V}$ , $dI_F/dt = -50\text{ A}/\mu\text{s}$	-	50	65	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 60\text{ A}$ , $V_R = 400\text{ V}$ , $dI_F/dt = -200\text{ A}/\mu\text{s}$	-	12	16	A
$Q_{rr}$	Reverse recovery charge			-	660		nC
$t_{rr}$	Reverse recovery time			-	92		ns

## 1.1 Characteristics (curves)

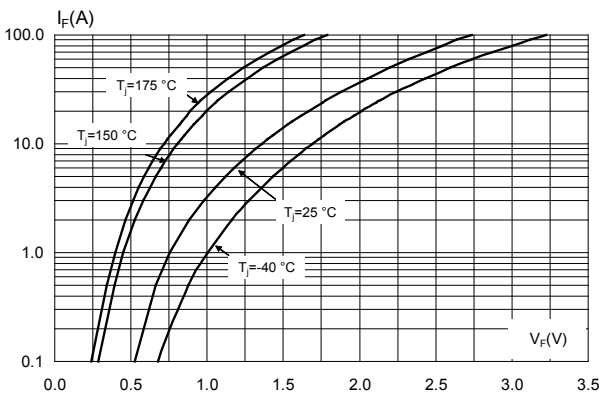
**Figure 1. Average forward power dissipation versus average forward current (square waveform)**



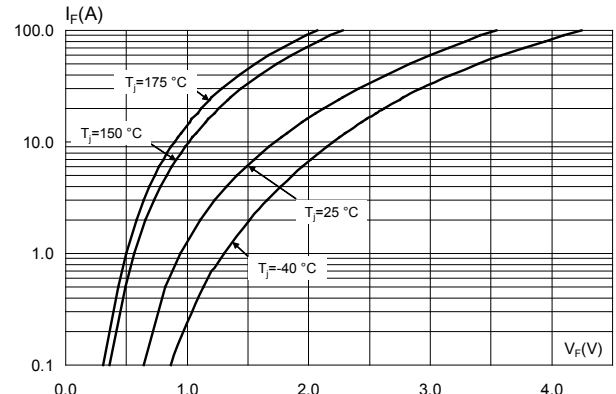
**Figure 2. Average forward power dissipation versus average forward current (sinusoidal waveform)**



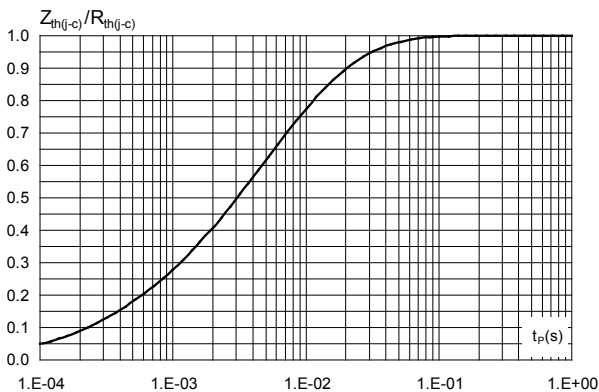
**Figure 3. Forward voltage drop versus forward current (typical values)**



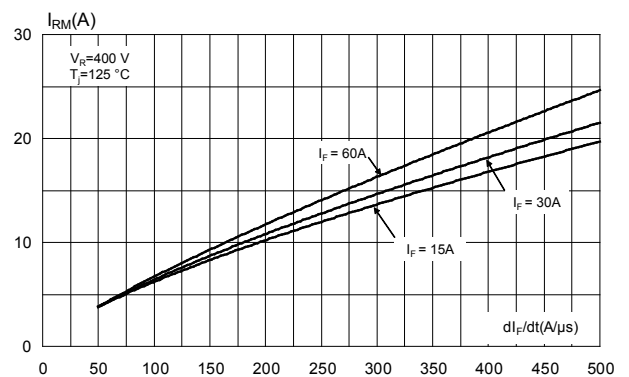
**Figure 4. Forward voltage drop versus forward current (maximum values)**



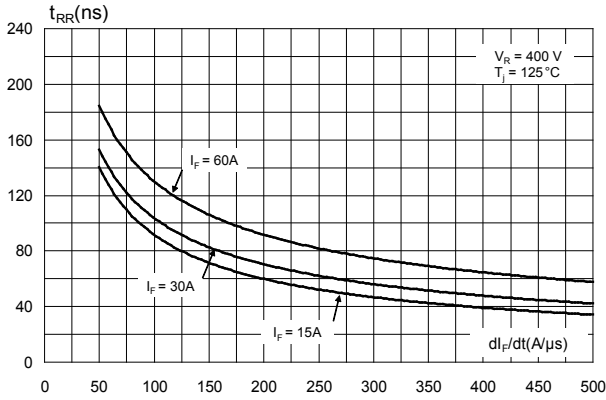
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**



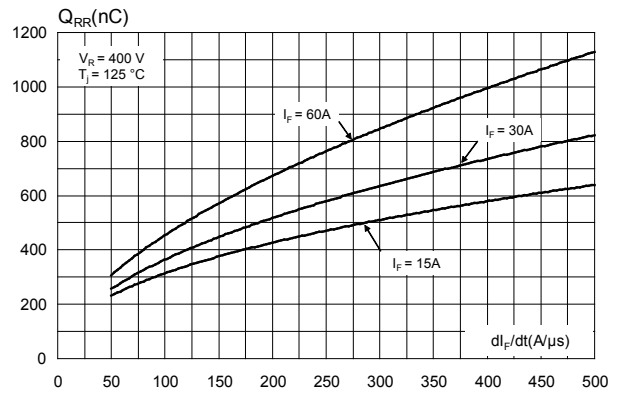
**Figure 6. Peak reverse recovery current versus di\_F/dt (typical values)**



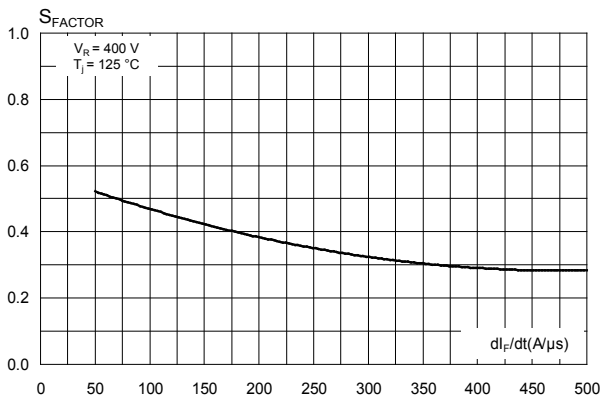
**Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values)**



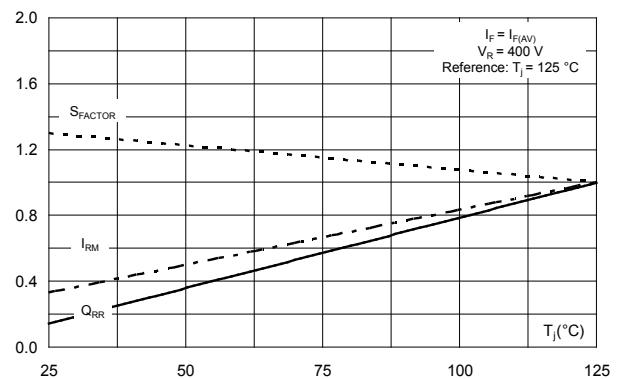
**Figure 8. Reverse recovery charges versus  $di_F/dt$  (typical values)**



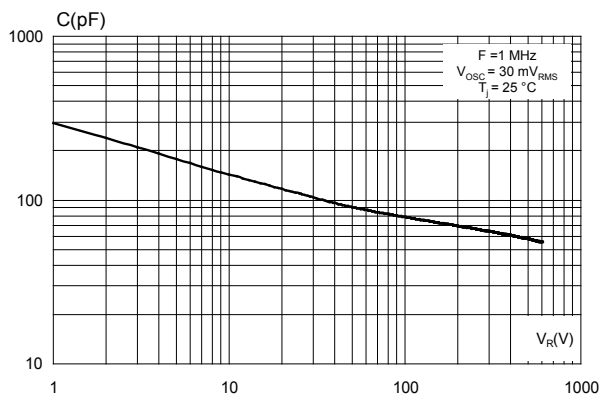
**Figure 9. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



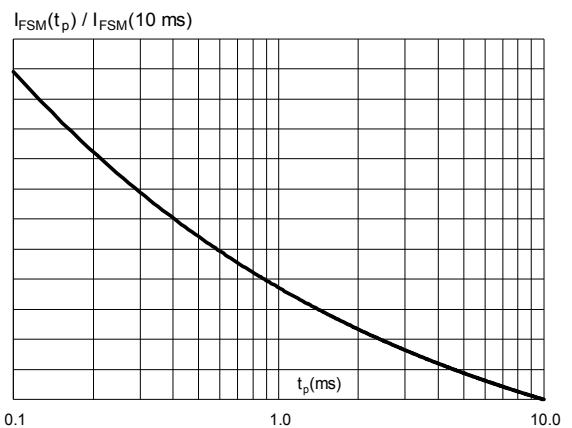
**Figure 10. Relative variations of dynamic parameters versus junction temperature**



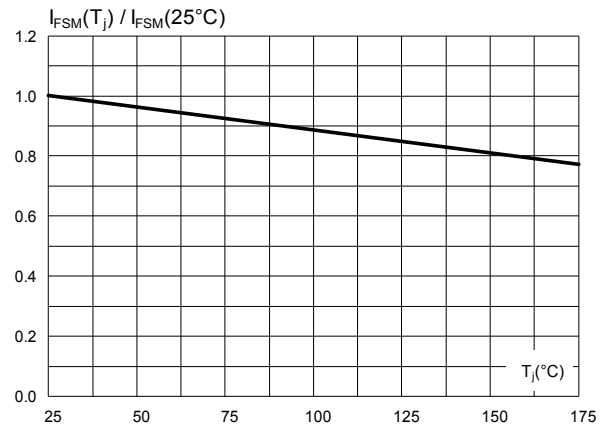
**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



**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)**



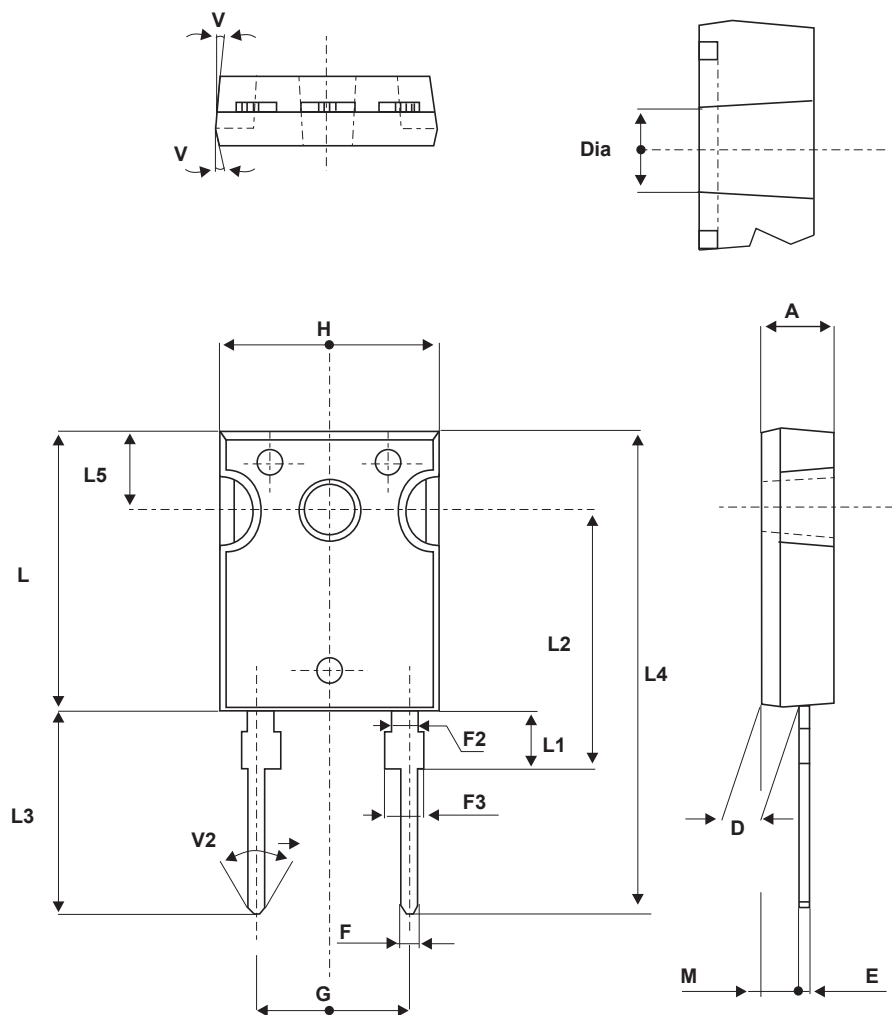
## 2 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 [Package name] 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 14. DO-247 package outline



**Table 5. DO-247 package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	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.	
H	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.	
M	2.00	3.00	0.078	0.118
V	5°		5°	
V2	60°		60°	
Dia.	3.55	3.65	0.139	0.143

### 3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH60RQ06WY	STTH60RQ06WY	DO-247	4.40 g	30	Tube



## Revision history

**Table 7. Document revision history**

Date	Version	Changes
20-Mar-2018	1	Initial release.
05-Apr-2018	2	Updated <a href="#">Section • Features</a> . Minor text changes to improve readability.

**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