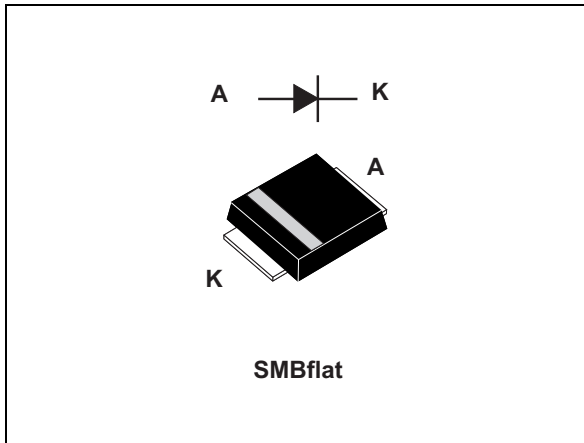


## Automotive Turbo 2 ultrafast high voltage rectifier

Datasheet - production data


**Features**

- Ultrafast recovery
- Low switching losses
- High surge capability
- Low leakage current
- High junction temperature
- AEC-Q101 qualified
- ECOPACK<sup>®</sup>2 compliant component
- $V_{RRM}$  guaranteed from -40 to +175 °C

**Description**

The STTH3R06-Y is an ultrafast recovery power rectifier dedicated to energy recovery in automotive application housed in SMBflat to improve space saving.

It is especially designed for clamping function in energy recovery block.

The compromise between forward voltage drop and recovery time offers optimized performances.

**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	3 A
$V_{RRM}$	600 V
$T_{j(max)}$	175 °C
$V_F$ (typ)	1.1 V
$T_{rr}$ (typ)	35 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	$T_j = -40\text{ to }+175\text{ °C}$	600	V
$I_{F(AV)}$	Average forward current, square waveform	$T_L = 90\text{ °C } \delta = 0.5$	3	A
$I_{FSM}$	Forward Surge current	$t_p = 10\text{ ms}$	30	A
$T_{stg}$	Storage temperature range		-65 to + 175	°C
$T_j^{(1)}$	Operating temperature range		-40 to + 175	°C

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to lead	16	°C/W

**Table 4. Static electrical characteristics**

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = 600\text{ V}$	-		3	$\mu\text{A}$
		$T_j = 150\text{ °C}$		-	15	100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 3\text{ A}$	-		1.9	V
		$T_j = 150\text{ °C}$		-	1.1	1.4	

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:

$$P = 1.1 \times I_{F(AV)} + 0.1 \times I_{F(RMS)}^2$$

**Table 5. Dynamic electrical characteristics**

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$ , $dI_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$	-	35	50	ns
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 3\text{ A}$ , $dI_F/dt = 100\text{ A}/\mu\text{s}$ , $V_{FR} = 2.0\text{ V}$	-		130	
$V_{FP}$	Forward recovery voltage			-			5

Figure 1. Average forward power dissipation versus average forward current

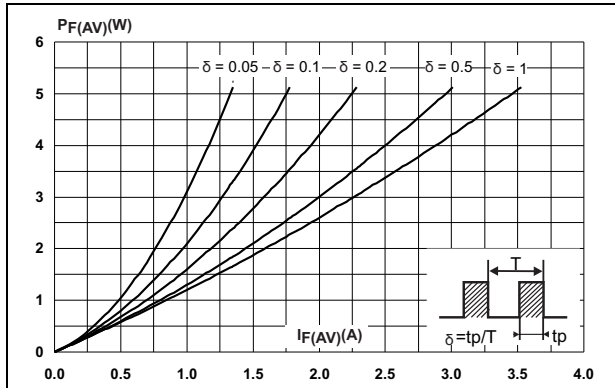


Figure 2. Forward voltage drop versus forward current (typical values)

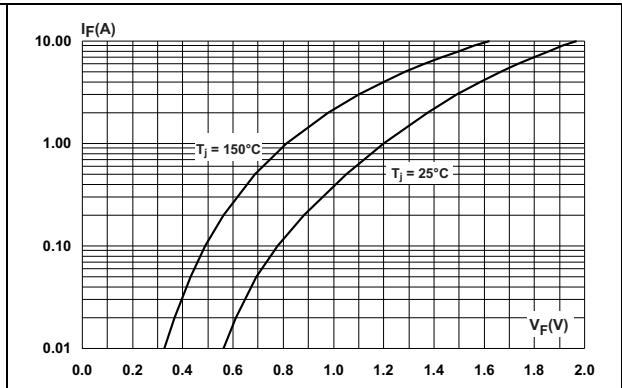


Figure 3. Forward voltage drop versus forward current (maximum values)

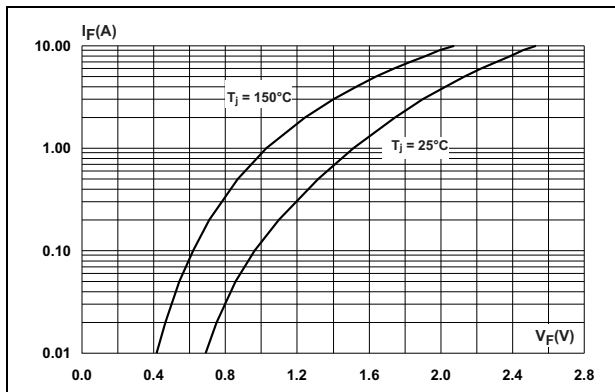


Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration

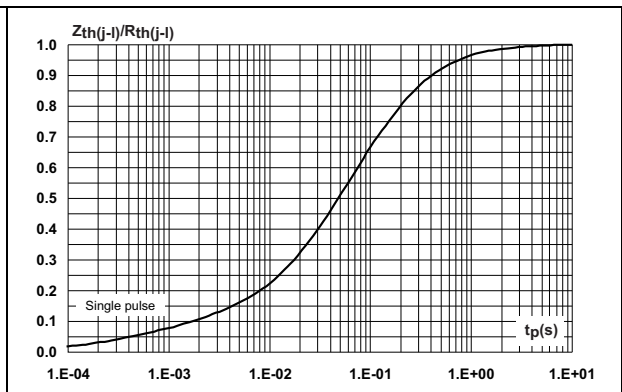


Figure 5. Peak reverse recovery current versus  $di_F/dt$  (typical values)

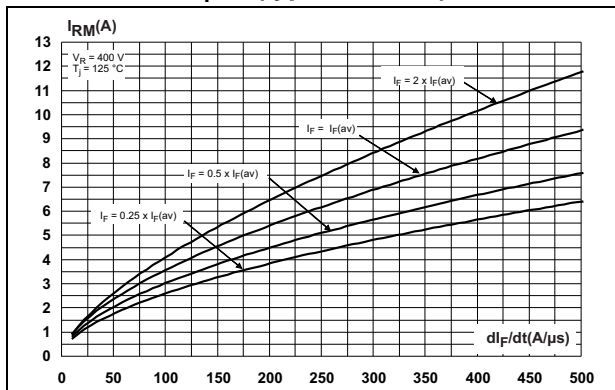


Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)

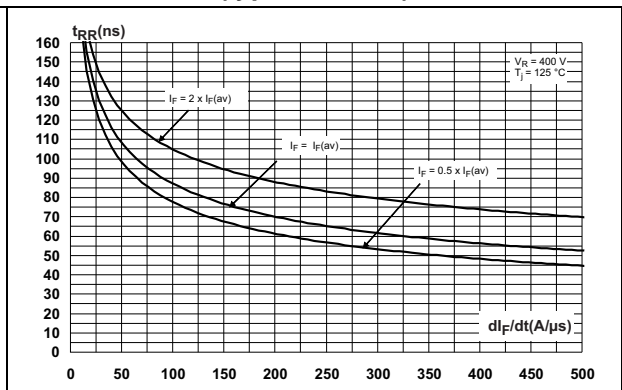


Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)

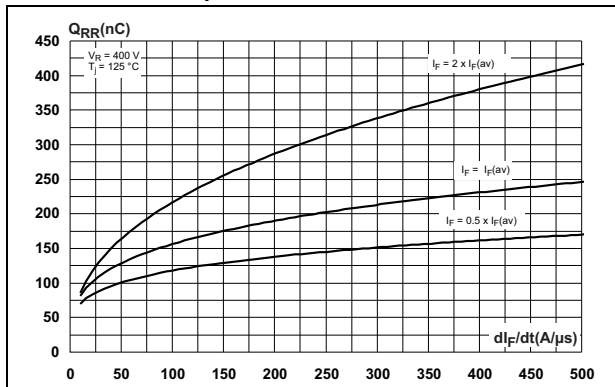


Figure 8. Reverse recovery softness factor versus  $di_F/dt$  (typical values)

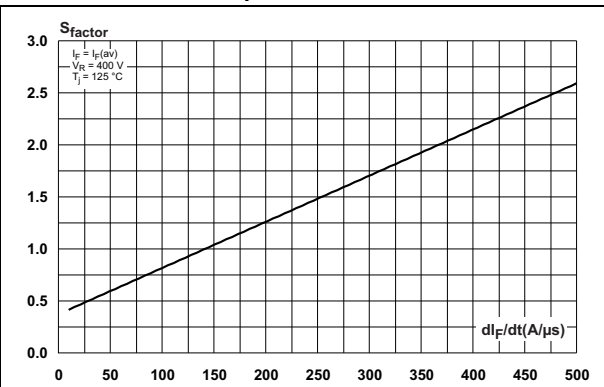


Figure 9. Relative variation of dynamic parameters versus junction temperature

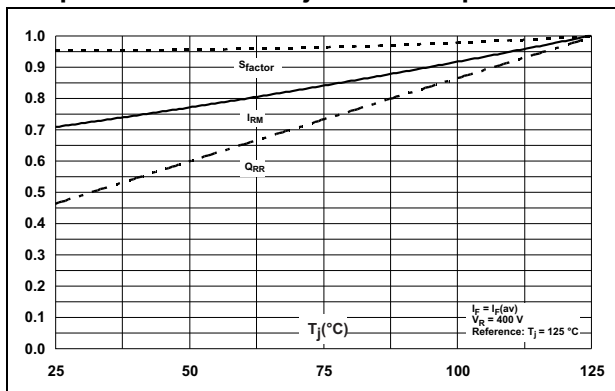


Figure 10. Transient peak forward voltage versus  $di_F/dt$  (typical values)

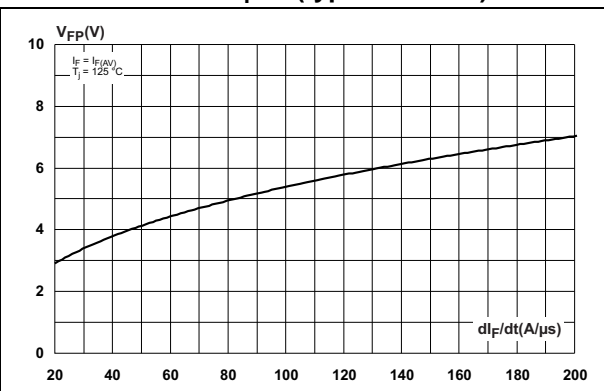


Figure 11. Forward recovery time versus  $di_F/dt$  (typical values)

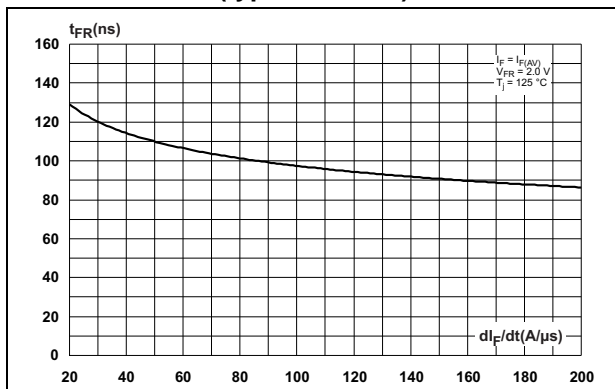


Figure 12. Junction capacitance versus reverse voltage applied (typical values)

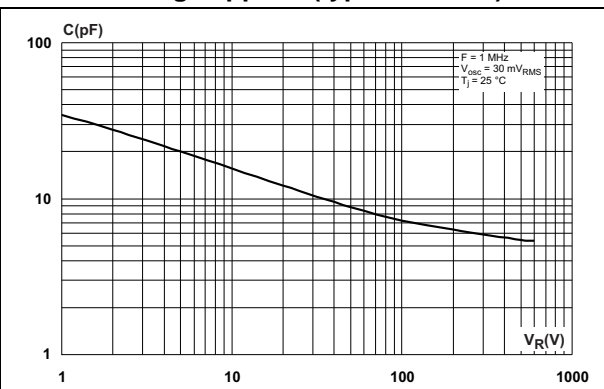
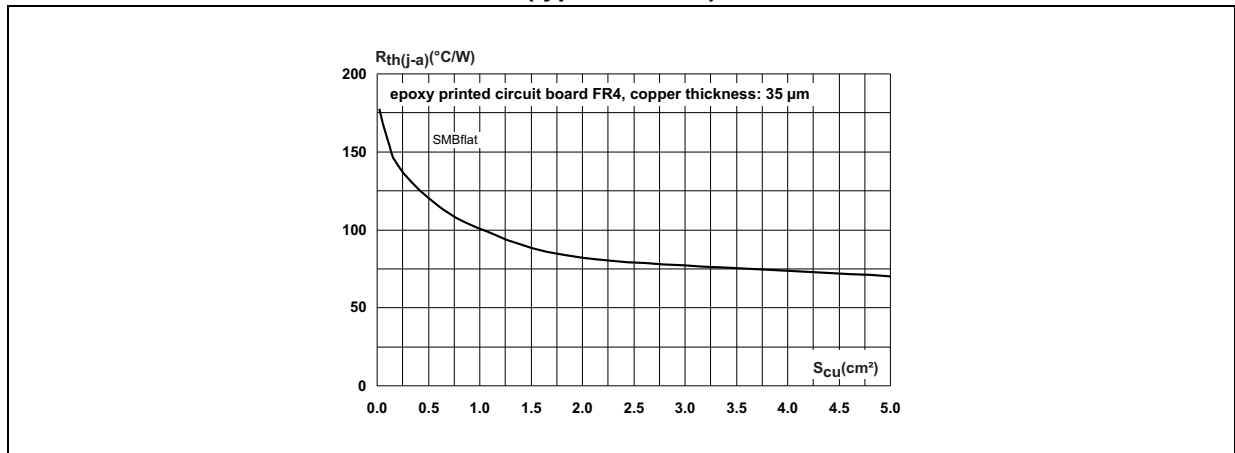


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead  
(typical values)



## 2 Package information

- Epoxy meets UL94,V0
- Lead-free package
- Band indicates cathode

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 14. SMBflat dimensions definitions

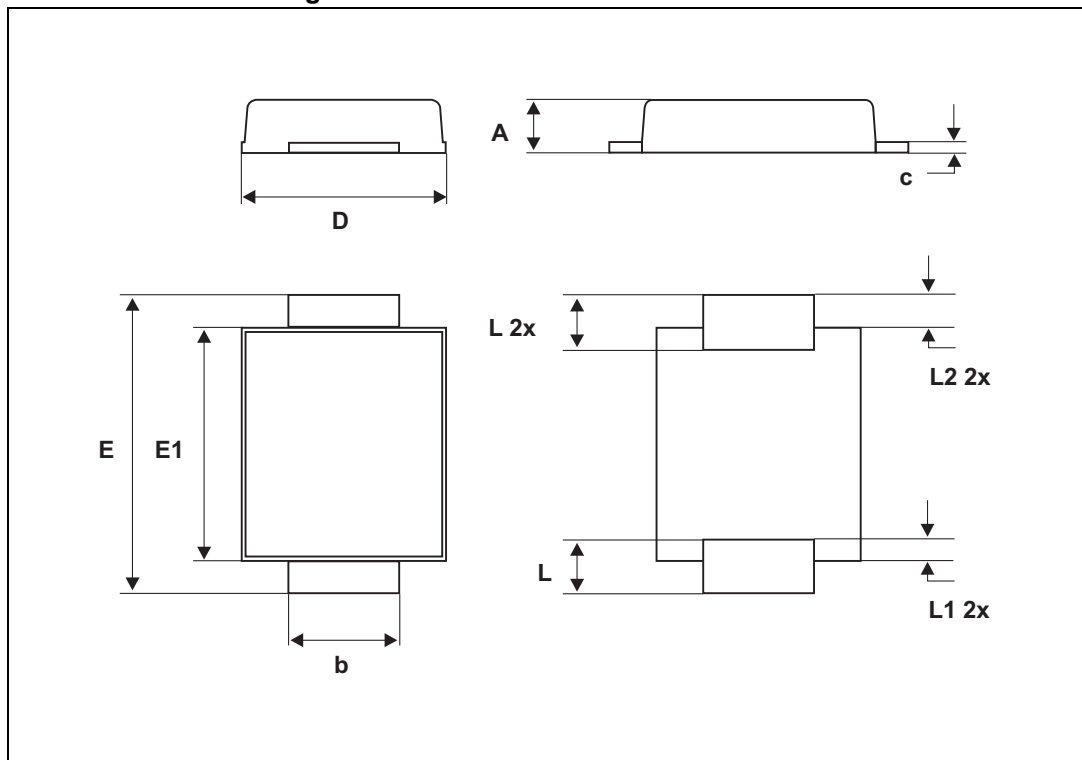
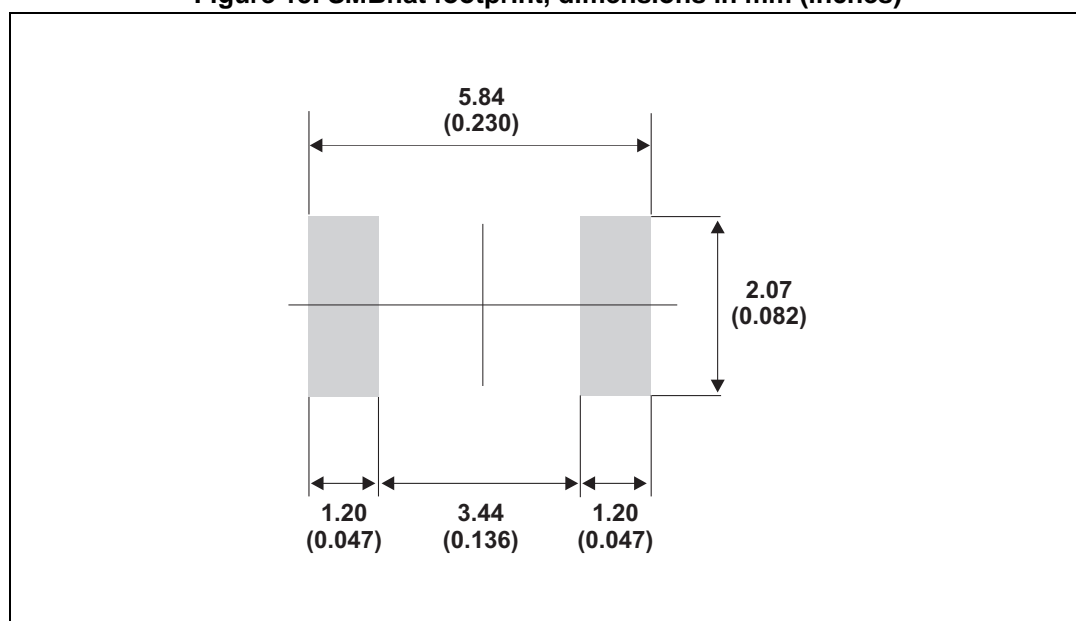


Table 6. SMBflat dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b	1.95		2.20	0.077		0.087
c	0.15		0.40	0.006		0.016
D	3.30		3.95	0.130		0.155
E	5.10		5.60	0.200		0.220
E1	4.05		4.60	0.159		0.181
L	0.75		1.50	0.029		0.059
L1		0.40			0.016	
L2		0.60			0.024	

Figure 15. SMBflat footprint, dimensions in mm (inches)



### 3 Ordering information

Table 7. Ordering information

Order codes	Marking	Package	Weight	Base qty	Delivery mode
STTH3R06UFY	F3R6Y	SMBflat	50 mg	5000	Tape and reel

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
04-Aug-2014	1	Initial release.



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