

Turbo 2 ultrafast high voltage rectifier

Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching and conduction losses
- Low thermal resistance

Description

The STTH1L06/U/A, which is using ST Turbo 2 600 V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

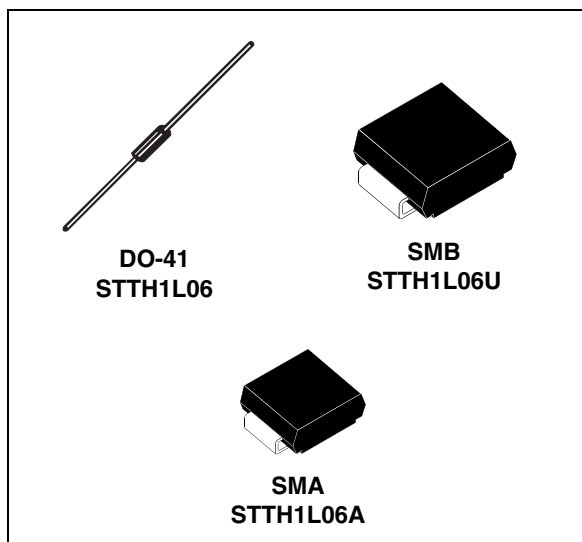


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	600 V
I_R (max)	75 μ A
T_j (max)	175 °C
V_F (max)	1.05 V
t_{rr} (max)	80 ns

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage			600	V
I _{F(RMS)}	Forward rms voltage	DO-41		10	A
		SMA / SMB		7	
I _{F(AV)}	Average forward current δ = 0.5	DO-41	T _c = 120 °C	1	A
		SMA	T _c = 135 °C		
		SMB	T _c = 145 °C		
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms sinusoidal DO-41 t _p = 10 ms sinusoidal SMA / SMB		30 20	A
T _{stg}	Storage temperature range			-65 to + 175	°C
T _j	Maximum operating junction temperature			175	°C

Table 3. Thermal parameters

Symbol	Parameter			Value (max)	Unit
$R_{th(j-l)}$	Junction to lead	L = 10 mm	DO-41	45	$^{\circ}\text{C/W}$
			SMA	30	
			SMB	25	
$R_{th(j-a)}$	Junction to ambient ⁽¹⁾	L = 10 mm	DO-41	70	

1. $R_{th(j-a)}$ is measured with a copper area $S = 5\text{ cm}^2$ (see [Figure 14.](#))

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R	Reverse leakage current	$T_j = 25\text{ }^{\circ}\text{C}$	$V_R = 600\text{ V}$			1	μA
		$T_j = 150\text{ }^{\circ}\text{C}$			10	75	
V_F	Forward voltage drop	$T_j = 25\text{ }^{\circ}\text{C}$	$I_F = 1\text{ A}$			1.3	V
		$T_j = 150\text{ }^{\circ}\text{C}$			0.85	1.05	

To evaluate the conduction losses use the following equation:

$$P = 0.89 \times I_{F(AV)} + 0.165 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$, $di_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$		55	80	ns
t_{fr}	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 3.5\text{ V}$			50	ns
V_{FP}	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$			10	V

Figure 1. Conduction losses versus average current

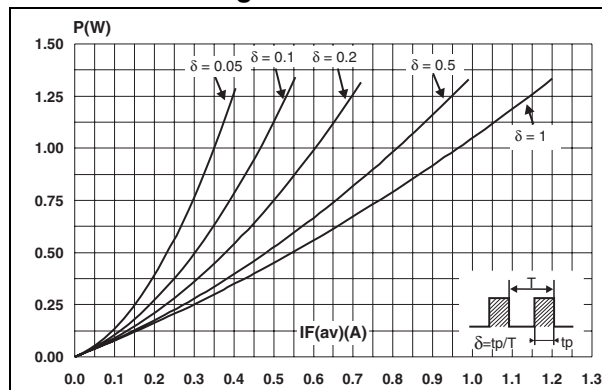


Figure 2. Forward voltage drop versus forward current

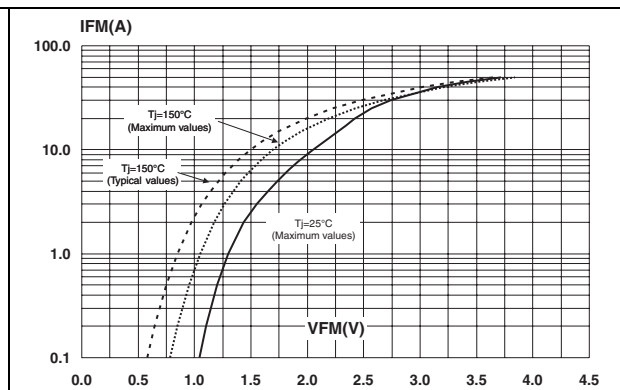


Figure 3. Relative variation of thermal impedance junction ambient versus pulse duration

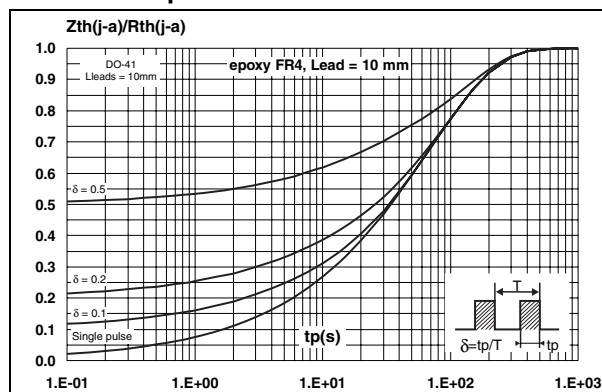


Figure 4. Relative variation of thermal impedance junction ambient versus pulse duration

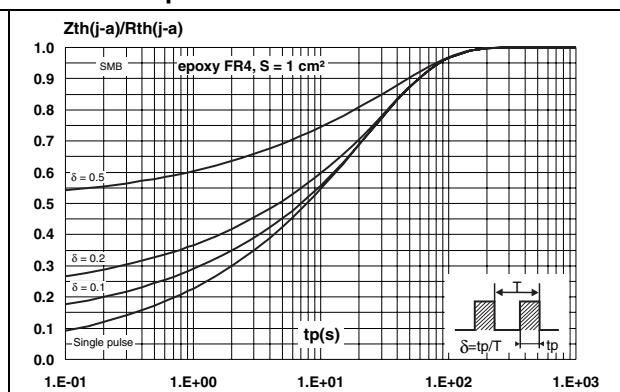


Figure 5. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4)

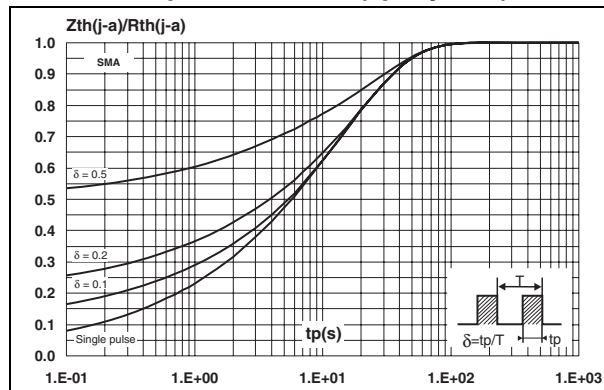


Figure 6. Peak reverse recovery current versus di_F/dt (90% confidence)

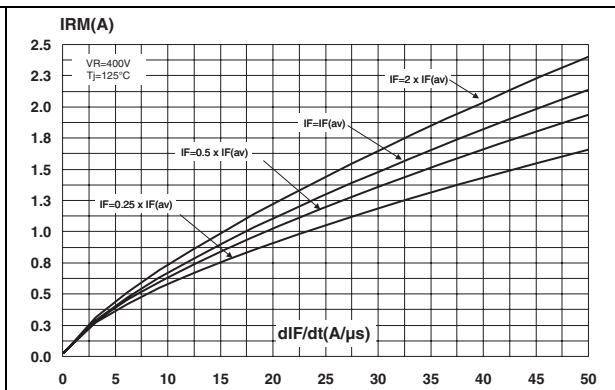


Figure 7. Reverse recovery time versus di_F/dt (90% confidence)

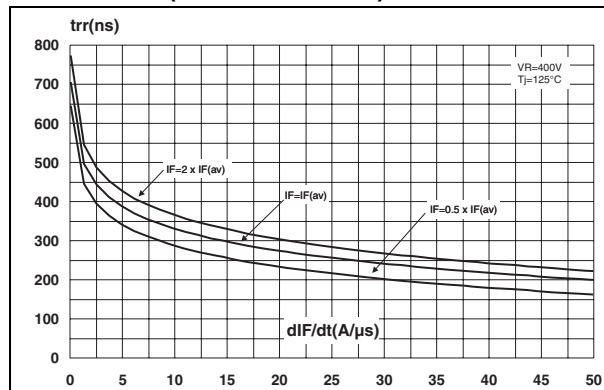


Figure 8. Reverse recovery charges versus di_F/dt (90% confidence)

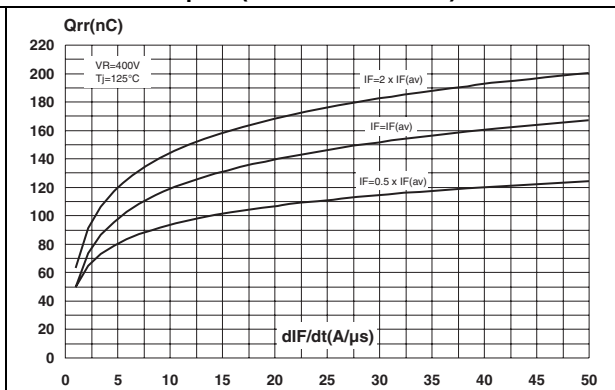


Figure 9. Softness factor versus di_F/dt (typical values)

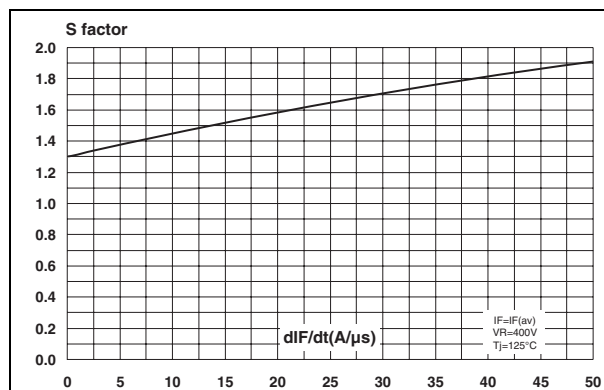


Figure 10. Relative variations of dynamic parameters versus junction temperature

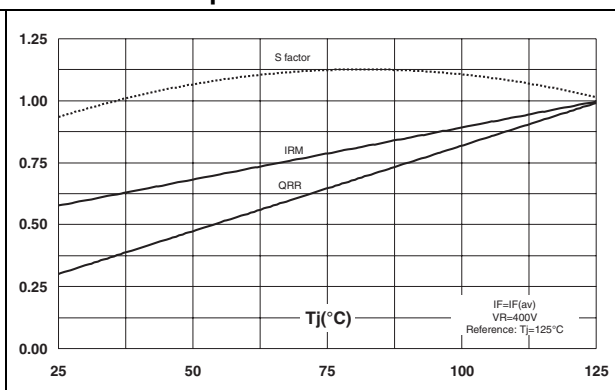


Figure 11. Transient peak forward voltage versus dI_F/dt (90% confidence)

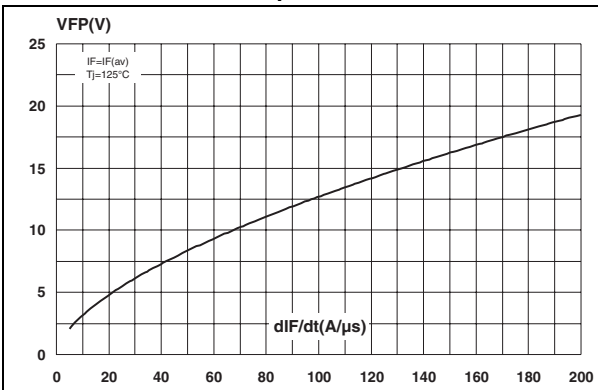


Figure 12. Forward recovery time versus dI_F/dt (90% confidence)

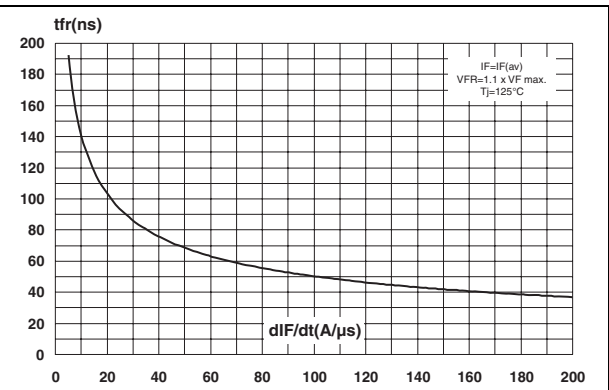


Figure 13. Junction capacitance versus reverse voltage applied (typical values)

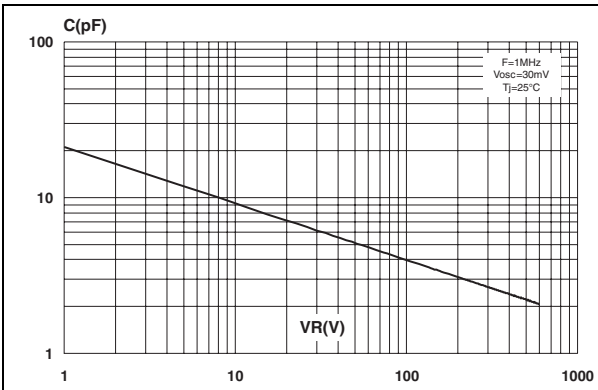


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead

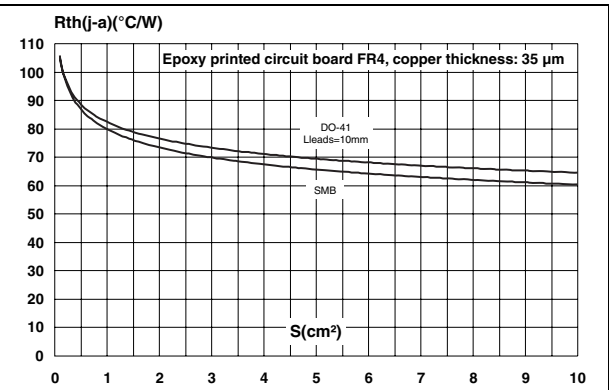
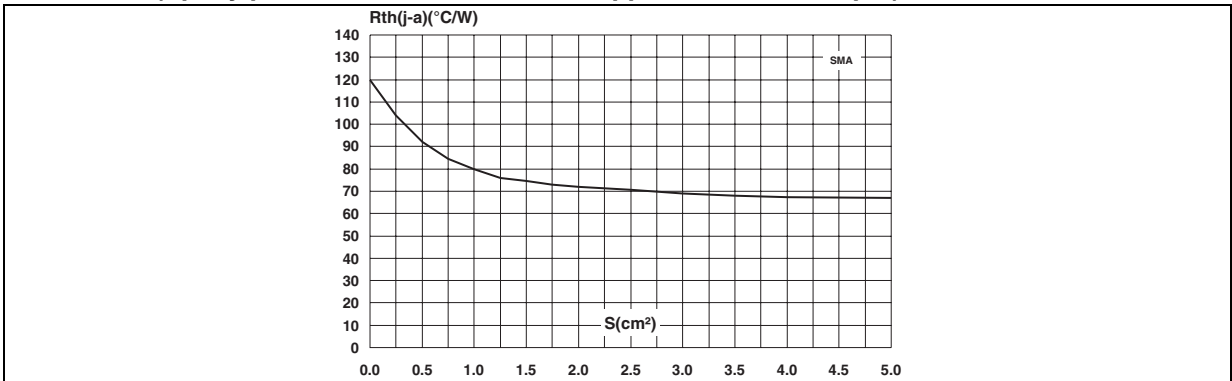


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 μ m)



2 Package information

- Epoxy meets UL 94, V0
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

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.

Table 6. SMA dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 16. Footprint (dimensions in mm)

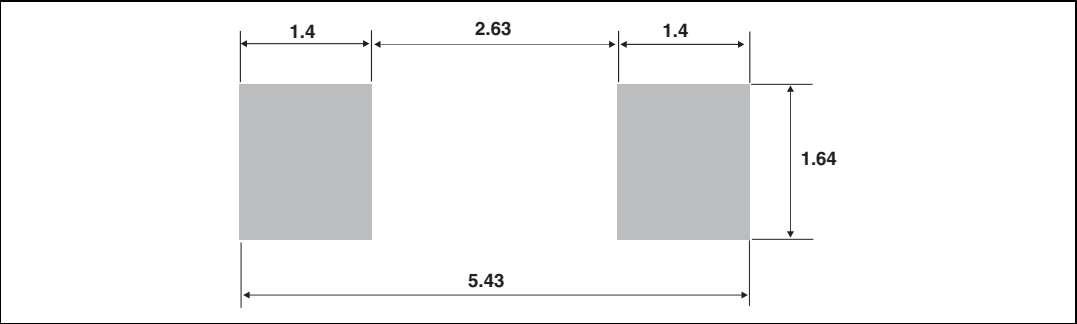


Table 7. SMB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
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	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 17. Footprint (dimensions in mm)

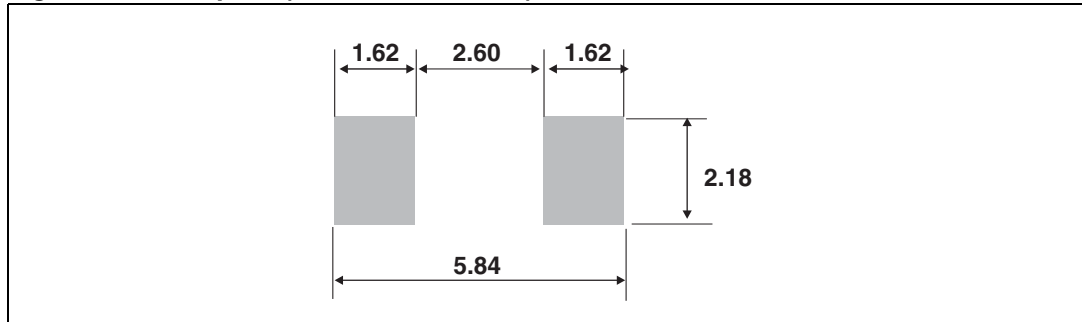


Table 8. DO-41 (plastic) dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.07	5.20	0.160	0.205
B	2.04	2.71	0.080	0.107
C	25.4		1	
D	0.71	0.86	0.028	0.034

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1L06	STTH1L06	DO-41	0.34 g	2000	Ammopack
STTH1L06RL	STTH1L06	DO-41	0.34 g	5000	Tape and reel
STTH1L06U	BL6	SMB	0.11 g	2500	Tape and reel
STTH1L06A	HL6	SMA	0.068 g	5000	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
Jul-2002	3C	Last issue.
30-Sep-2009	4	Updated table 8 package dimensions.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2009 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STTH1L06](#) [STTH1L06U](#) [STTH1L06A](#) [STTH1L06RL](#)