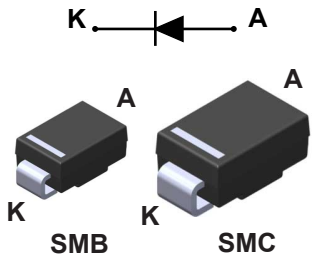
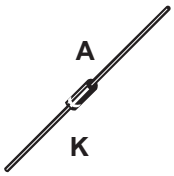
STTH3R06

Datasheet

600 V - 3 A high efficiency ultrafast diode





DO-201AD

Features

- Ultrafast switching
- Low forwarded voltage drop
- Low thermal resistance
- Low leakage current (platinium doping)
- Planar technology
- ECOPACK compliant

Applications

- Switching diode
- Auxiliary power supply

Description

The STTH3R06, which uses ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbering, demagnetization in power supplies and other power switching applications.

Product status
STTH3R06

Product summary	
Symbol	**Value**
$I_{F(AV)}$	3 A
V_{RRM}	600 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	1.00 V
$t_{rr(max.)}$	35 ns

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
$I_{F(RMS)}$	Repetitive peak reverse voltage			10	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	DO-201AD	T_L = 80 °C	3	A
		SMB	T_L = 55 °C		
		SMC	T_L = 80 °C		
I_{FSM}	Surge non repetitive forward current	DO-201AD	t_p = 10 ms sinusoidal	55	A
		SMB / SMC		45	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature			+175	°C

Table 2. Thermal resistance parameter

Symbol	Parameter			Max. value	Unit
$R_{th(j-l)}$	Junction to lead		SMC	20	°C/W
			SMB	25	
	Junction to lead	Lead length = 10 mm	DO-201AD	20	
$R_{th(j-a)}$	Junction to ambient			75	

For more information, refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		3	µA
		T_j = 150 °C		-	15	100	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 3 A	-		1.7	V
		T_j = 150 °C		-	1.0	1.25	

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 1.03 \times I_{F(AV)} + 0.09 \times I_F{}^2{}_{(RMS)}$

For more information, 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

Table 4. **Dynamic characteristics (T_j = 25 °C unless otherwise stated)**

Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A	-		30	ns
		I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V	-	35		
t_{fr}	Forward recovery time	I_F = 3 A, dI_F/dt = 100 A/µs, V_{FR} = 1.1 $V_{F(max.)}$	-		100	ns
V_{FP}	Forward recovery voltage	I_F = 3 A, dI_F/dt = 100 A/µs	-		10	V

1.1 Characteristics (curves)

Figure 1. Conduction losses versus average current

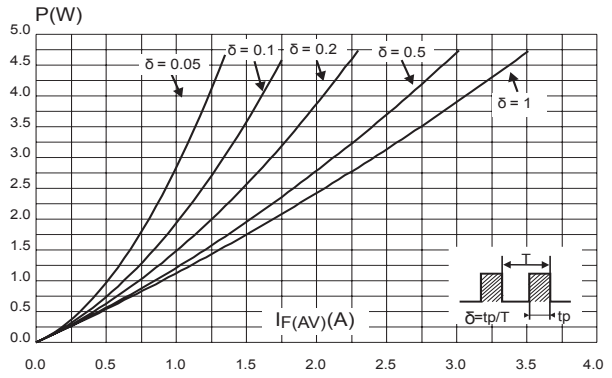


Figure 2. Forward voltage drop versus forward current

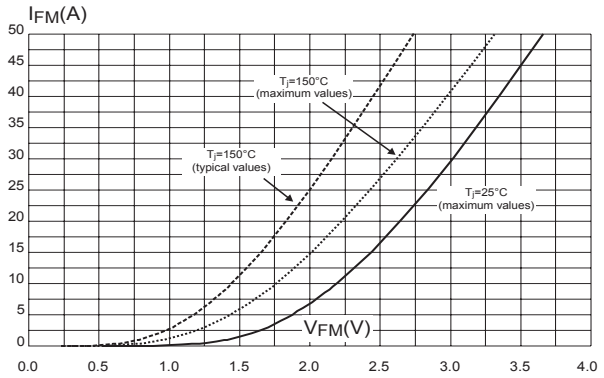


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit FR4, L_{leads} = 10 mm, S_{CU}=1cm²)

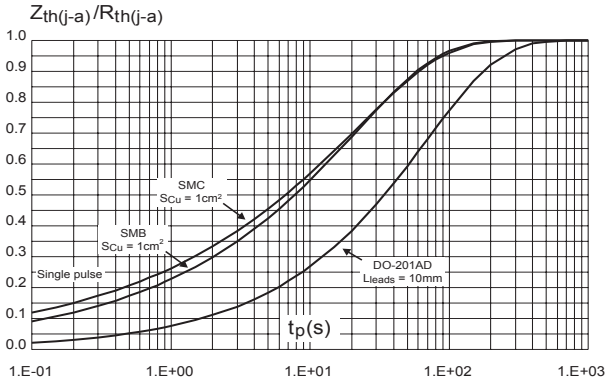


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

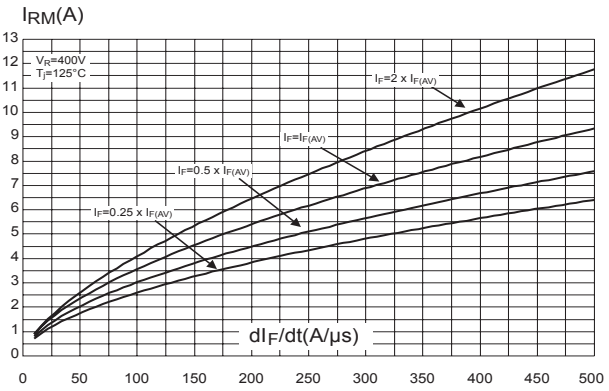


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

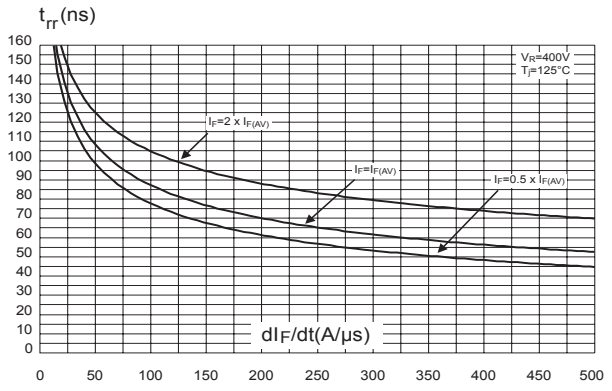


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

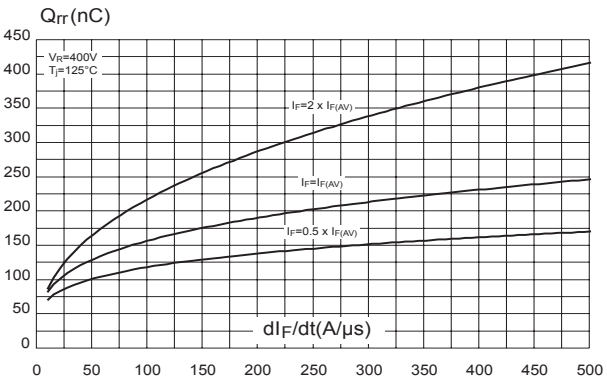


Figure 7. Softness factor versus dI_F/dt (typical values)

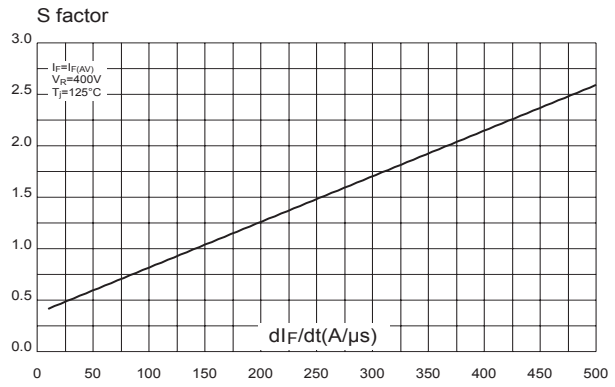


Figure 8. Relative variations of dynamic parameters versus junction temperature

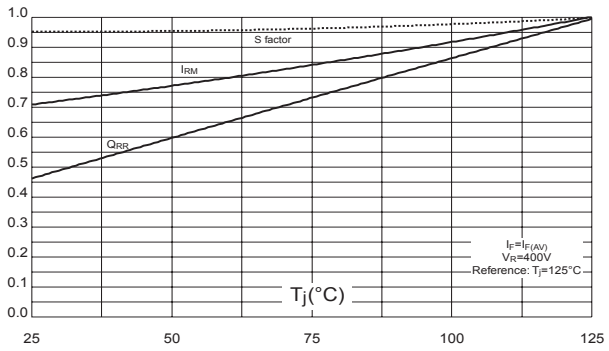


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

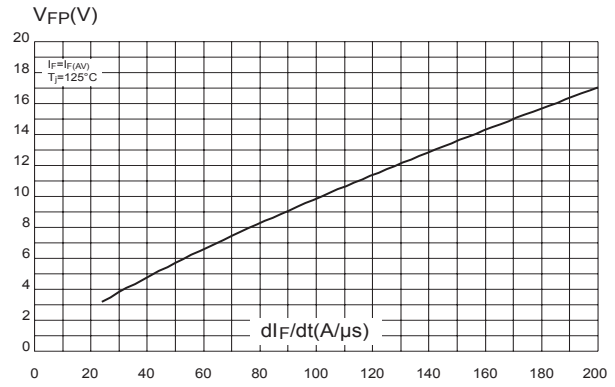


Figure 10. Forward recovery time versus dIF/dt (typical values)

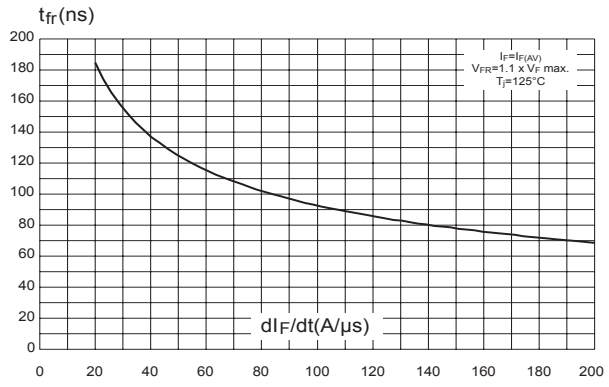


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

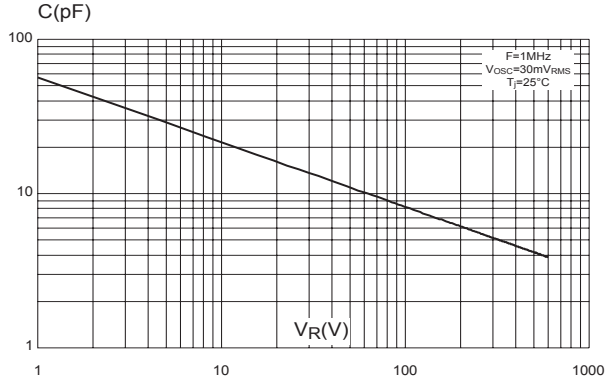


Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (typical values) (SMB)

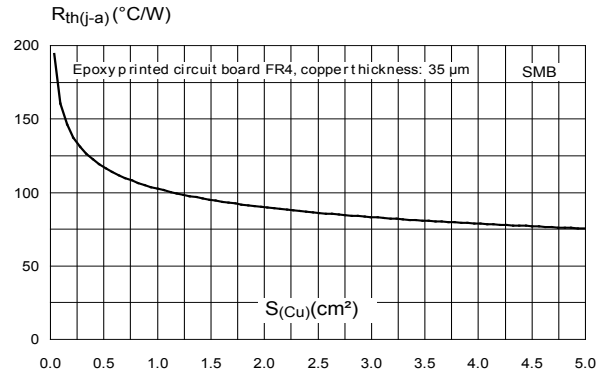


Figure 13. Thermal resistance versus lead length (DO-201AD)

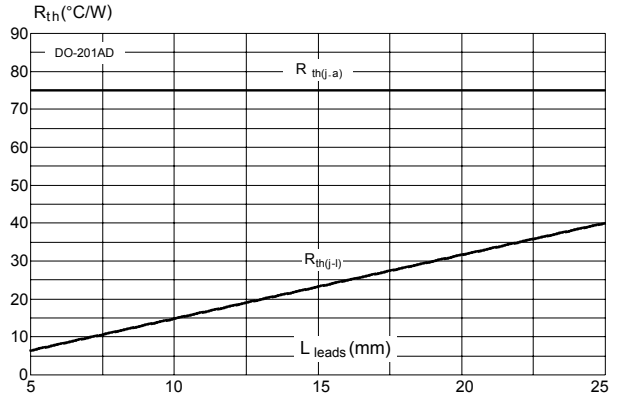
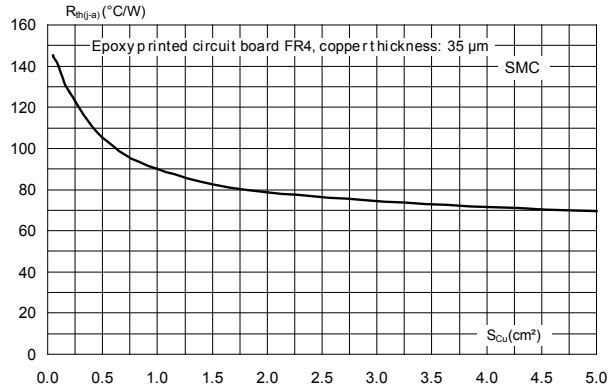


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead (typical values) (SMC)



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-201AD package information

- Epoxy meets UL 94, V0

Figure 15. DO-201AD package outline

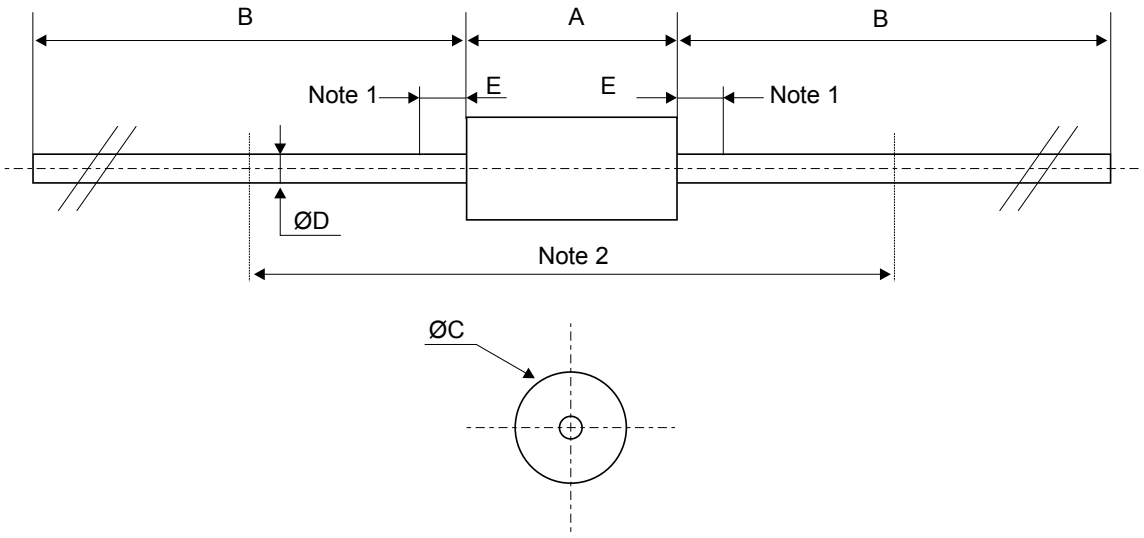


Table 5. DO-201AD package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		-	9.50		-	0.374
B	25.40	-		1.000	-	
C		-	5.30		-	0.209
D(1)		-	1.30		-	0.051
E		-	1.25			0.049
Note 2(2)	15.00			0.590		

1. *The lead diameter D is not controlled over zone E*
2. *The minimum length, which must stay straight between the right angles after bending, is 15 mm (0.59")*

2.2 SMB package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 16. SMB package outline

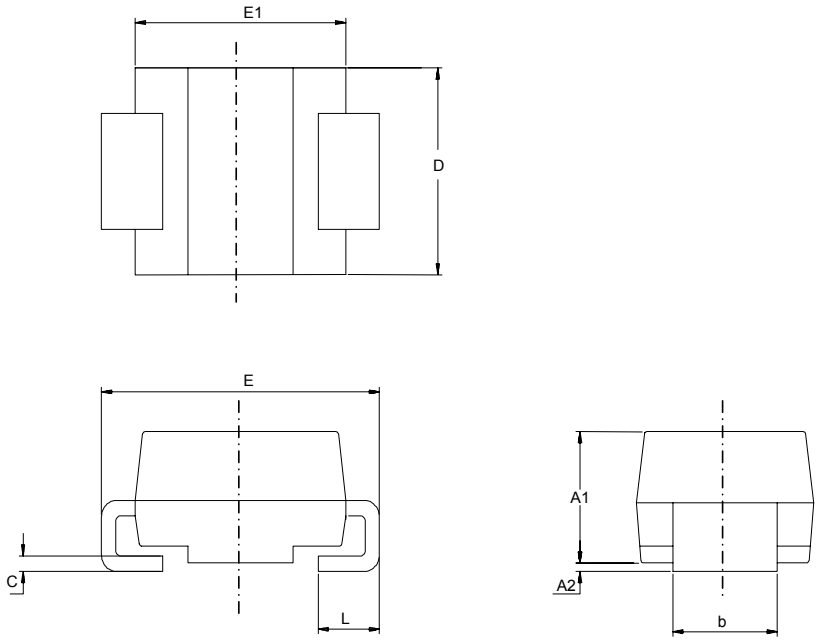
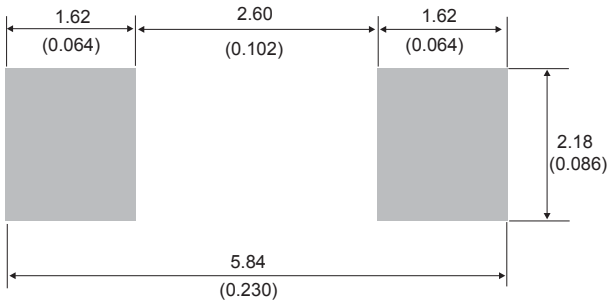


Table 6. SMB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.074	0.097
A2	0.05	0.20	0.001	0.008
b	1.95	2.20	0.076	0.087
c	0.15	0.40	0.005	0.016
D	3.30	3.95	0.129	0.156
E	5.10	5.60	0.200	0.221
E1	4.05	4.60	0.159	0.182
L	0.75	1.50	0.029	0.060

Figure 17. **SMB recommended footprint**



2.3 SMC package information

- Epoxy meets UL94, V0

Figure 18. **SMC package outline**

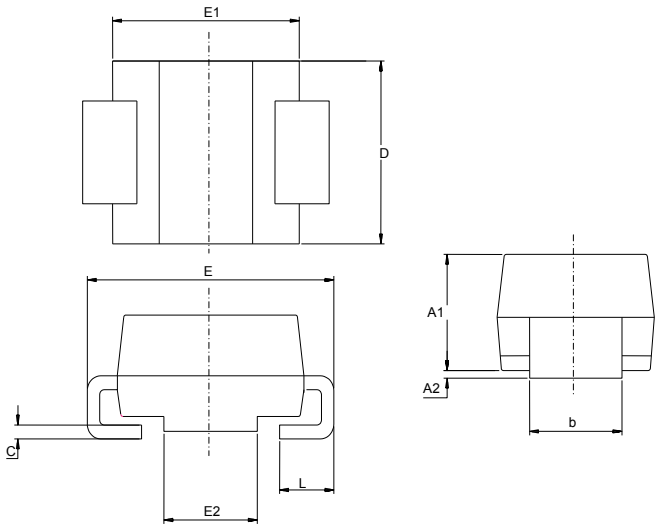
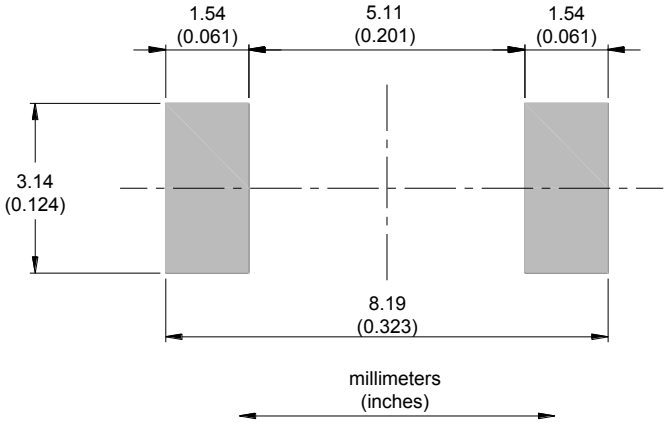


Table 7. **SMC package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.0748	0.0965
A2	0.05	0.20	0.0020	0.0079
b	2.90	3.20	0.1142	0.1260
c	0.15	0.40	0.0059	0.0157
D	5.55	6.25	0.2185	0.2461
E	7.75	8.15	0.3051	0.3209
E1	6.60	7.15	0.2598	0.2815
E2	4.40	4.70	0.1732	0.1850
L	0.75	1.50	0.0295	0.0591

Figure 19. **SMC recommended footprint**



3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH3R06	STTH3R06	DO-201AD	1.16 g	600	Ammopack
STTH3R06-RL	STTH3R06	DO-201AD	1.16 g	1900	Tape and reel
STTH3R06U	3R6U	SMB	0.107 g	2500	Tape and reel
STTH3R06S	R6S	SMC	0.245 g	2500	Tape and reel

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
Mar-2003	1	First issue
07-Sep-2004	2	SMB and SMC packages added
14-Oct-2005	3	Changed marking of STTH3R06U from R06U to 3R6U on page 1. Added ECOPACK statement.
21-Oct-2021	4	Updated pin names. Minor text changes.