

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

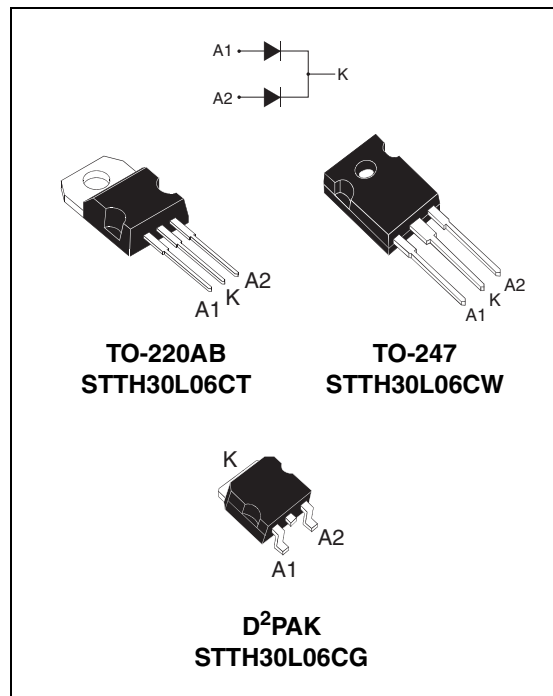
$I_{F(AV)}$	Up to 2 x 20 A
$V_{RRM}$	600 V
$T_j$	175°C
$V_F$ (typ)	0.95 V
$t_{rr}$ (max)	55 ns

### FEATURES AND BENEFITS

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching & conduction losses

### DESCRIPTION

The STTH30L06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.



**Table 2: Order Codes**

Part Number	Marking
STTH30L06CT	STTH30L06CT
STTH30L06CW	STTH30L06CW

Part Number	Marking
STTH30L06CG	STTH30L06CG
STTH30L06GG-TR	STTH30L06CG

**Table 3: Absolute Ratings** (limiting values, per diode)

Symbol	Parameter	Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage	600	V	
$I_{F(RMS)}$	RMS forward current	30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	$T_c = 140^\circ\text{C}$ Per diode	15	A
		$T_c = 125^\circ\text{C}$ Per device	30	
		$T_c = 120^\circ\text{C}$ Per diode	20	
		$T_c = 110^\circ\text{C}$ Per device	40	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ms}$ sinusoidal	130	A
$T_{stg}$	Storage temperature range	-65 to + 175	°C	
$T_j$	Maximum operating junction temperature	175	°C	

## STTH30L06C

**Table 4: Thermal Resistance**

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.7	°C/W
		Total	1.15	
$R_{th(c)}$	Coupling		0.6	°C/W

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$$

**Table 5: Static Electrical Characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^*$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$			40	400	
$V_F^{**}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$			1.55	V
		$T_j = 150^\circ\text{C}$			0.95	1.2	
		$T_j = 25^\circ\text{C}$	$I_F = 30\text{A}$			1.76	
		$T_j = 150^\circ\text{C}$			1.15	1.45	

Pulse test: \*  $t_p = 5 \text{ ms}$ ,  $\delta < 2\%$

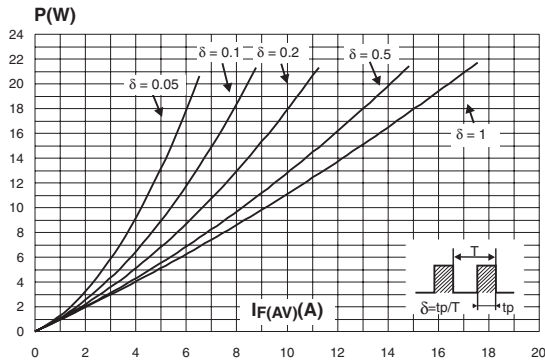
\*\*  $t_p = 380 \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.94 \times I_F(\text{AV}) + 0.017 I_F^2(\text{RMS})$

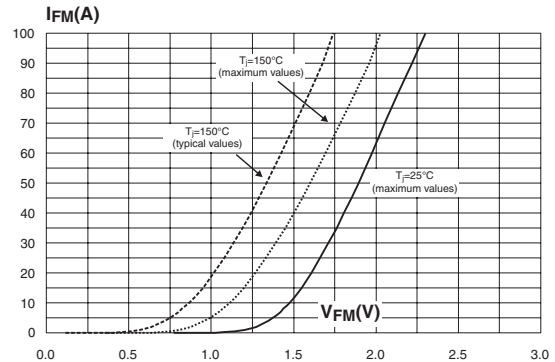
**Table 6: Dynamic Characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$			55	ns
			$I_F = 1\text{A}$ $di_F/dt = 50 \text{ A}/\mu\text{s}$ $V_R = 30\text{V}$		60	85	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 15\text{A}$ $V_R = 400\text{V}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$		8.5	12	A
$t_{fr}$	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			300	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$		3.0		V

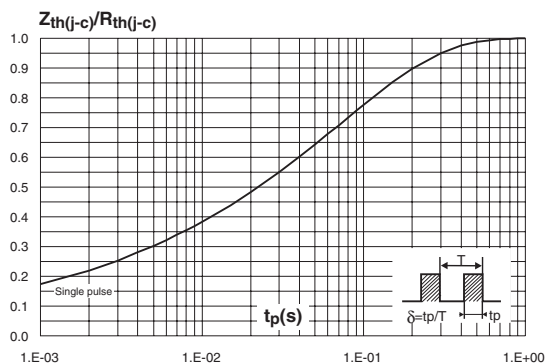
**Figure 1: Conduction losses versus average forward current (per diode)**



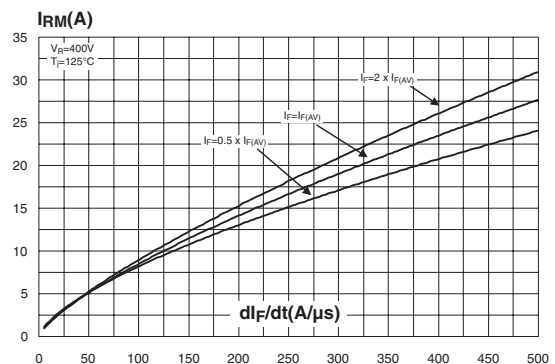
**Figure 2: Forward voltage drop versus forward current (per diode)**



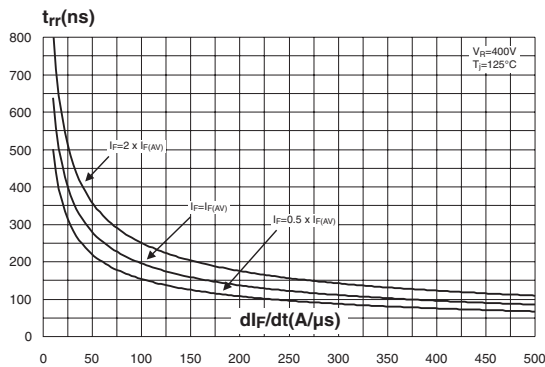
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 4: Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode)**



**Figure 5: Reverse recovery time versus  $di_F/dt$  (typical values, per diode)**



**Figure 6: Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**

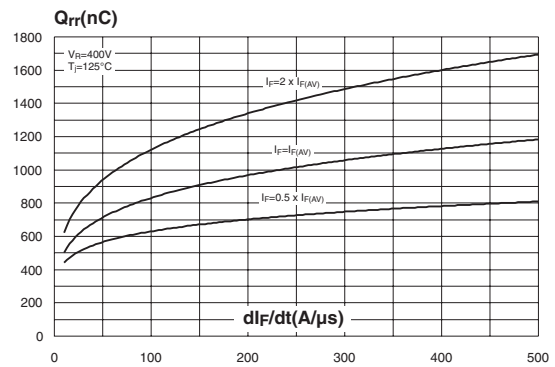


Figure 7: Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

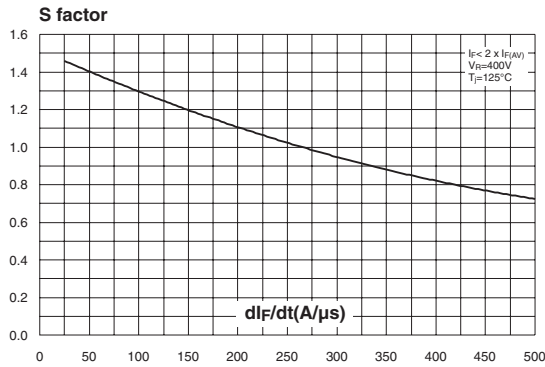


Figure 8: Relative variations of dynamic parameters versus junction temperature

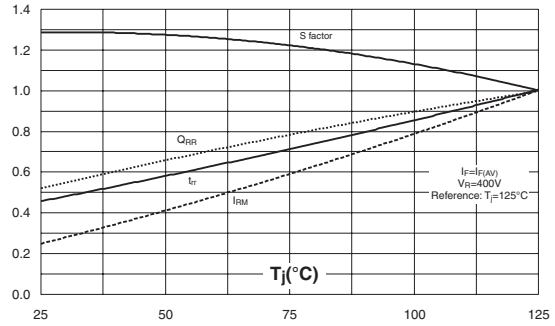


Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

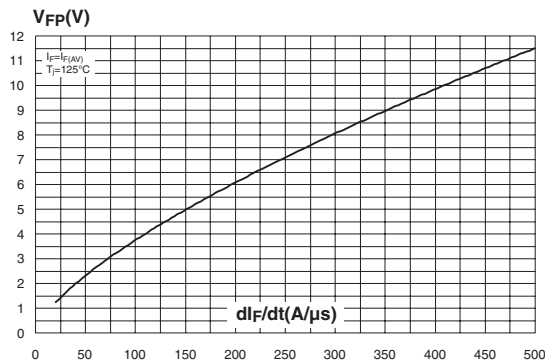


Figure 10: Forward recovery time versus  $di_F/dt$  (typical values, per diode)

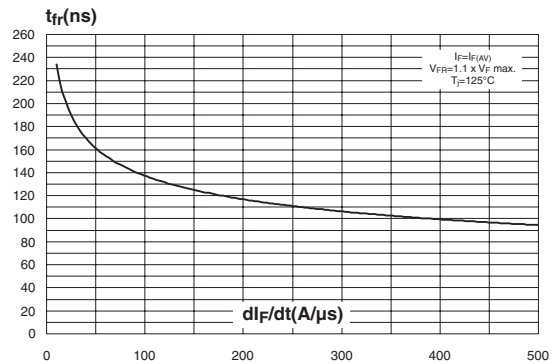


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)

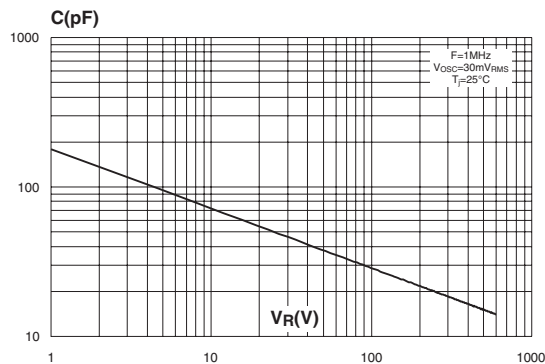


Figure 12: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU} = 35\mu m$ ) (D<sup>2</sup>PAK)

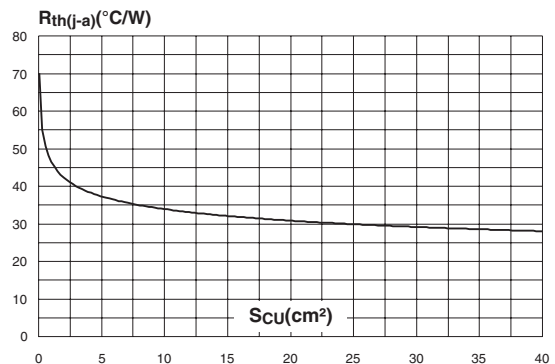


Figure 13: TO-247 Package Mechanical Data

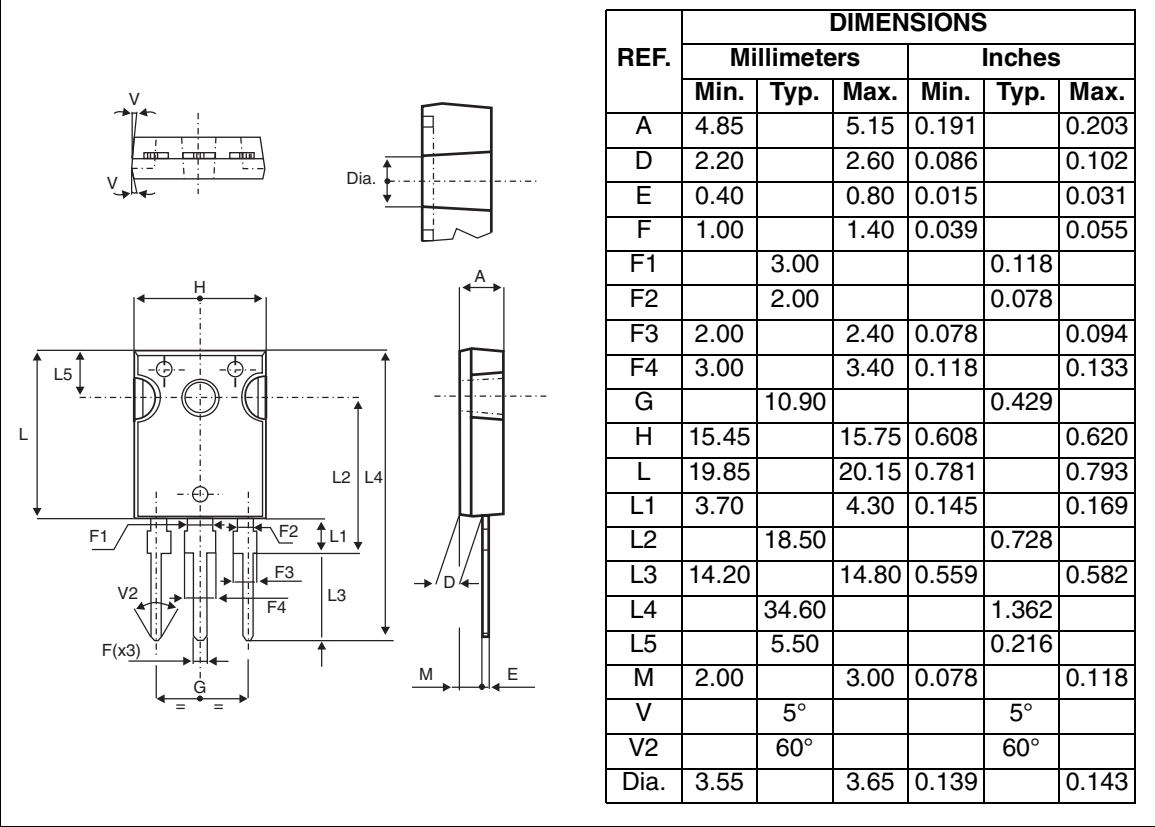


Figure 14: D<sup>2</sup>PAK Package Mechanical Data

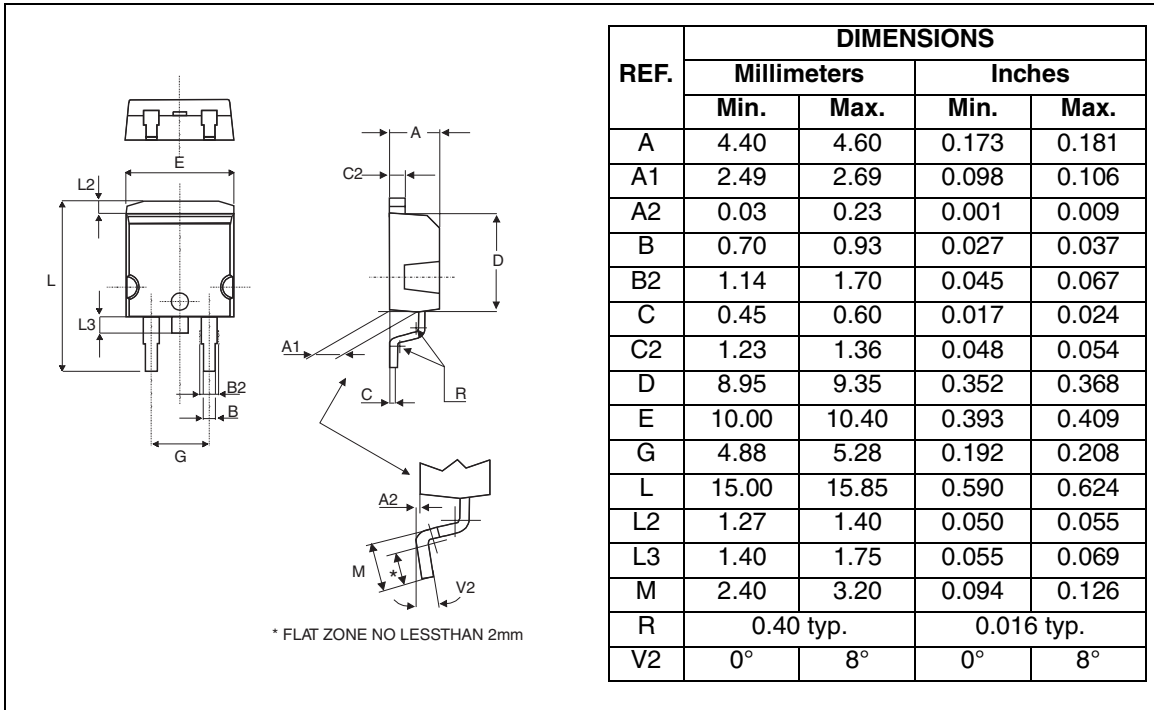


Figure 15: D<sup>2</sup>PAK Foot Print Dimensions (in millimeters)

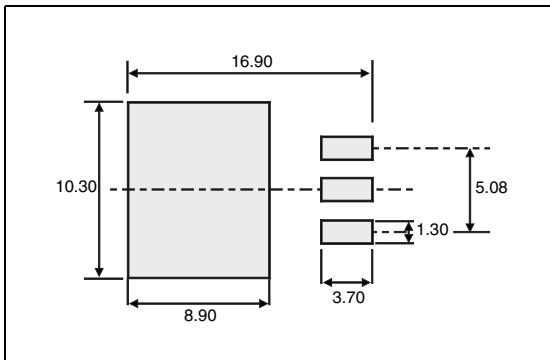


Figure 16: TO-220AB Package Mechanical Data

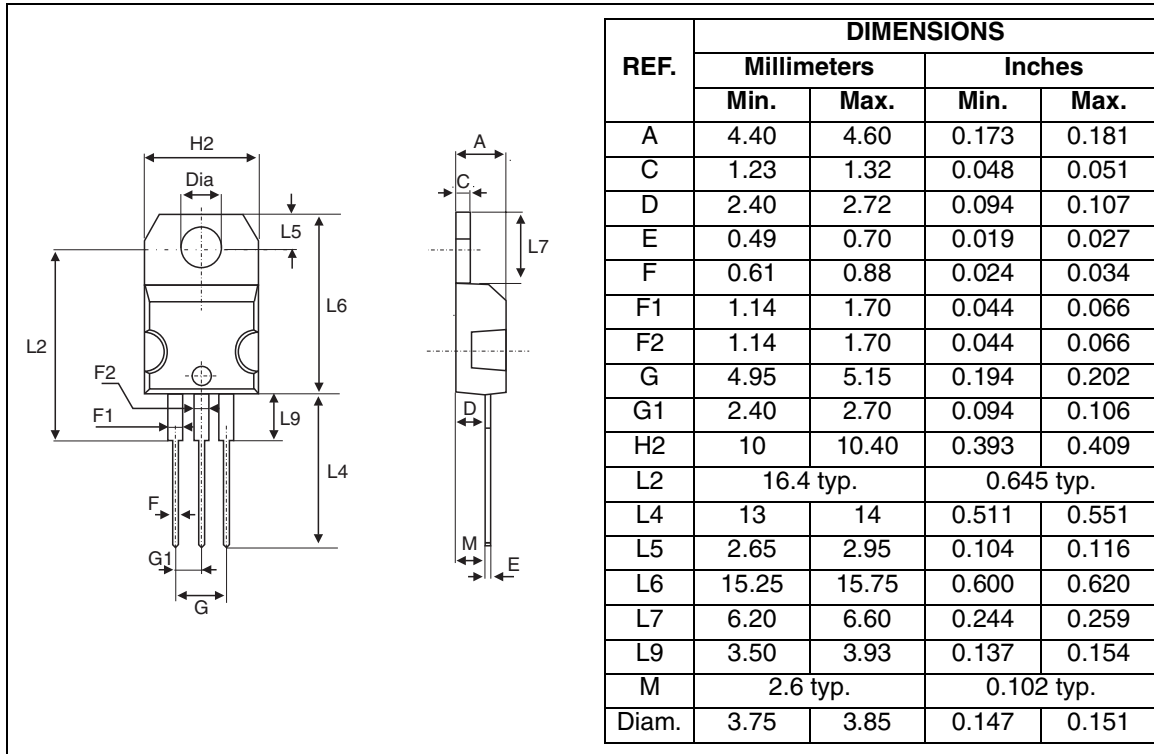


Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH30L06CT	STTH30L06CT	TO-220AB	2.23 g	50	Tube
STTH30L06CG	STTH30L06CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH30L06CG-TR	STTH30L06CG	D <sup>2</sup> PAK	1.48 g	1000	Tape & eel
STTH30L06CW	STTH30L06CW	TO-247	4.46 g	50	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N. (TO-220FPAC) / 0.55 m.N. (TO-220AB)
- Maximum torque value: 1.0 m.N. (TO-220FPAC) / 0.70 m.N. (TO-220AB)

Table 8: Revision History

Date	Revision	Description of Changes
07-Sep-2004	1	First issue

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