

## ULTRAFast RECTIFIER PDP ENERGY RECOVERY

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	<b>40 A</b>
$V_{RRM}$	<b>300 V</b>
$V_{FP} (typ)$	<b>2.5 V</b>
$I_{RM} (typ)$	<b>5 A</b>
$T_j$	<b>175°C</b>
$V_F (typ)$	<b>0.9 V</b>

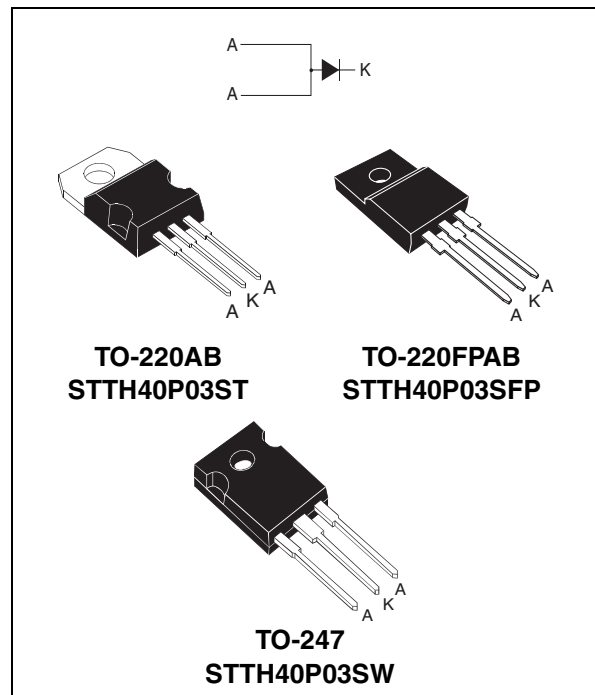
### FEATURES AND BENEFITS

- Ultrafast recovery allowing High Sustain Frequency
- Decrease charge evacuation time ( $t_{clamp}$ ) in the inductance (see figures 1 and 2)
- Minimize switching-on and total power losses
- Increase luminous efficiency and brightness
- Soft and noise-free recovery
- High surge capability
- High junction temperature

### DESCRIPTION

The **STTH40P03S** is an Ultrafast Recovery Power Rectifier dedicated to **energy recovery in PDP application**.

The key parameters of the  $D_{ERC}$  diode for the energy recovery circuit have been optimized in order to decrease power losses.



**Table 2: Order Codes**

Part Number	Marking
STTH40P03ST	STTH40P03S
STTH40P03SFP	STTH40P03S
STTH40P03SW	STTH40P03S

**Table 3: Absolute Ratings** (limiting values)

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		300	V
$I_{F(RMS)}$	RMS forward current		80	A
$I_{F(AV)}$	Average forward current		40	A
$I_{FRM}$	Repetitive peak forward current	$F = 200kHz, t_p = 500ns$ Sinusoidal waveform	120	A
$T_{stg}$	Storage temperature range		-65 to + 175	°C
$T_j$	Maximum operating junction temperature		175	°C

## STTH40P03S

**Table 4: Thermal Parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / TO-247	1.15	°C/W
		TO-220FPAB	4.5	
$Z_{th(j-c)}$	Transient thermal resistance at 1μs		0.002	°C/W

**Table 5: Static Electrical Characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^*$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
		$T_j = 125^\circ\text{C}$			0.05	0.5	mA
$V_F^{**}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 20\text{A}$			1.5	V
		$T_j = 125^\circ\text{C}$			0.9	1.15	
		$T_j = 25^\circ\text{C}$	$I_F = 40\text{A}$		1.1	1.8	V
		$T_j = 125^\circ\text{C}$				1.42	

Pulse test: \*  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$   
 \*\*  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.88 \times I_{F(AV)} + 0.0135 I_F^2(\text{RMS})$

**Table 6: Switching Characteristics**

Symbol	Parameter	Test conditions			Min.	Typ	Max.	Unit
$I_{RM}$	Reverse recovery current	$T_j = 100^\circ\text{C}$	$I_F = 40\text{A}$	$V_R = 100\text{V}$		5	6.5	A
$S_{factor}$	Softness factor					0.5		-

Figure 1: Application Characteristics

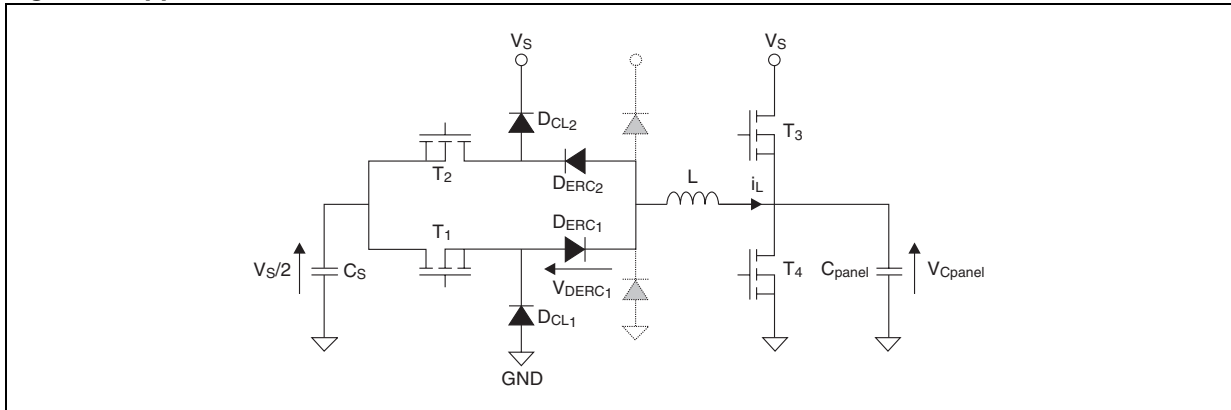


Figure 2: Application Waveforms

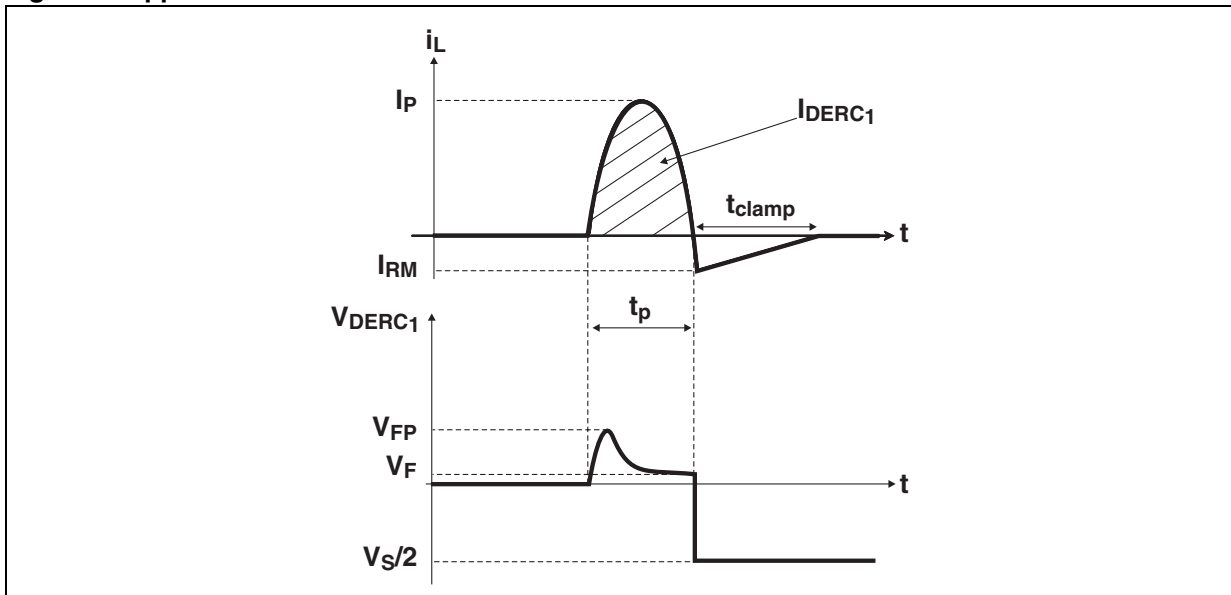


Figure 3: Forward voltage drop versus forward current

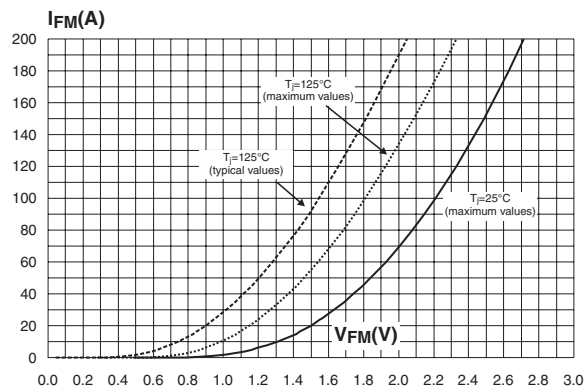


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB / TO-247)

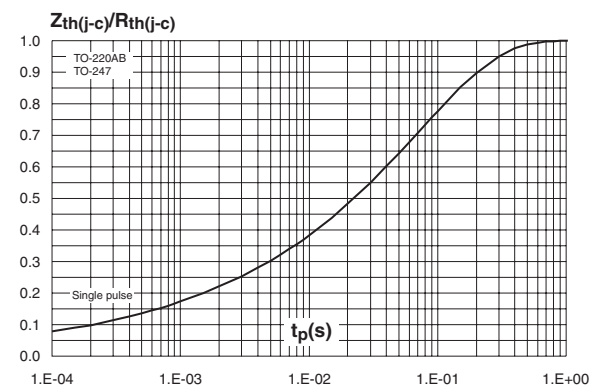


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

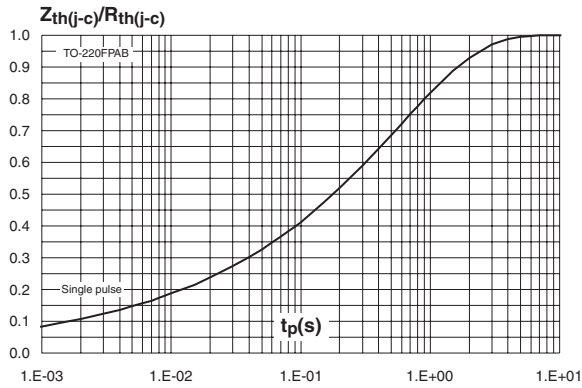


Figure 6: Peak reverse recovery current versus  $di_F/dt$  (typical values)

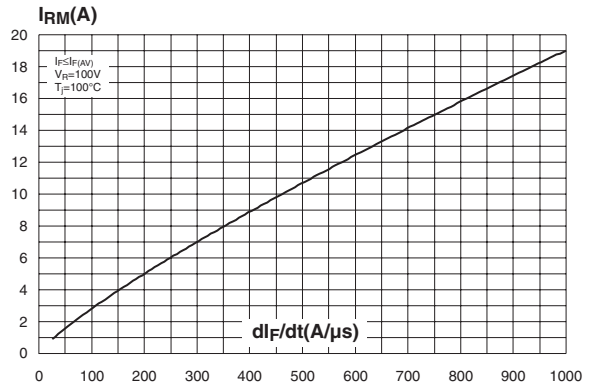


Figure 7: Reverse recovery time versus  $di_F/dt$  (typical values)

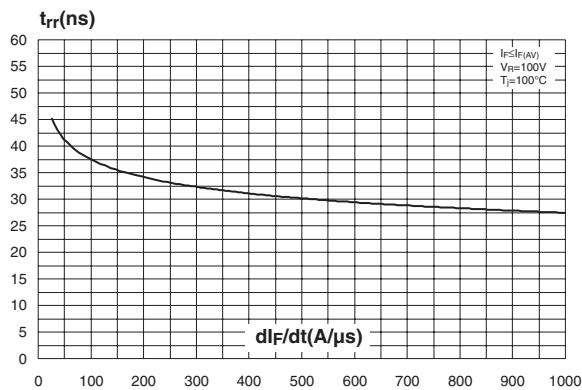


Figure 8: Reverse recovery softness factor versus  $di_F/dt$  (typical values)

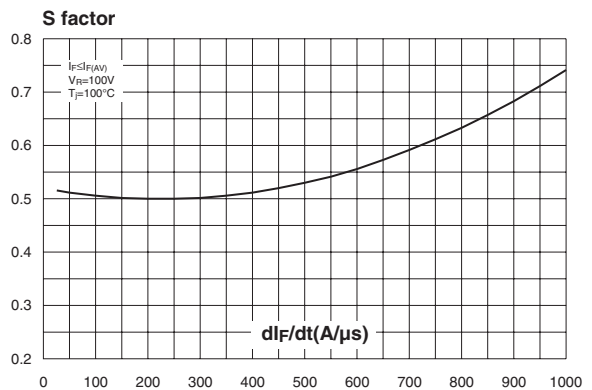


Figure 9: Relative variations of dynamic parameters versus junction temperature

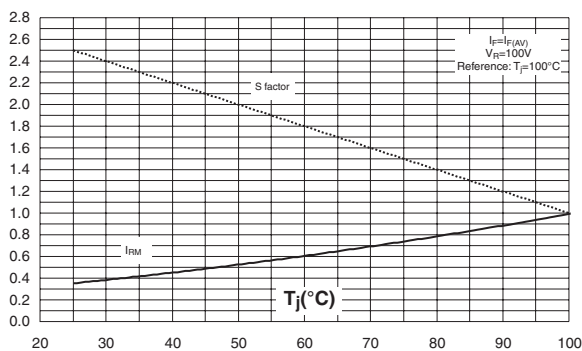


Figure 10: Transient peak forward voltage versus  $di_F/dt$  (typical values)

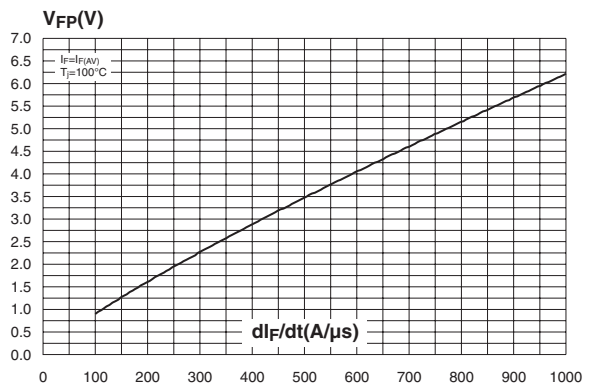


Figure 11: Forward recovery time versus  $di_F/dt$  (typical values)

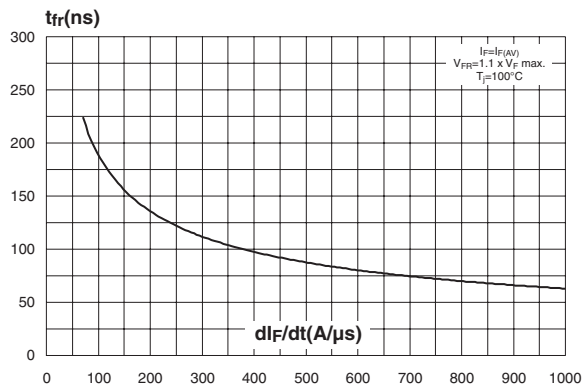


Figure 12: TO-220FPAB Package Mechanical Data

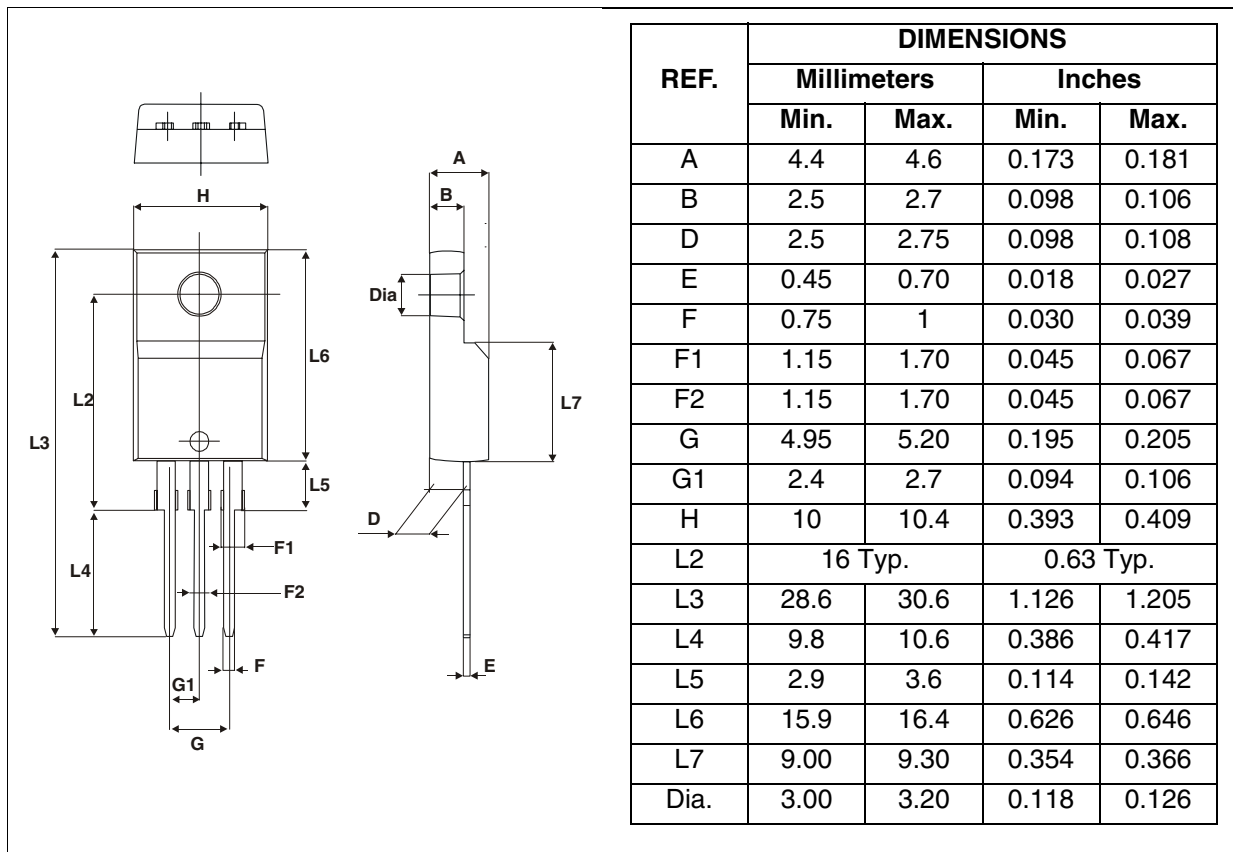


Figure 13: TO-247 Package Mechanical Data

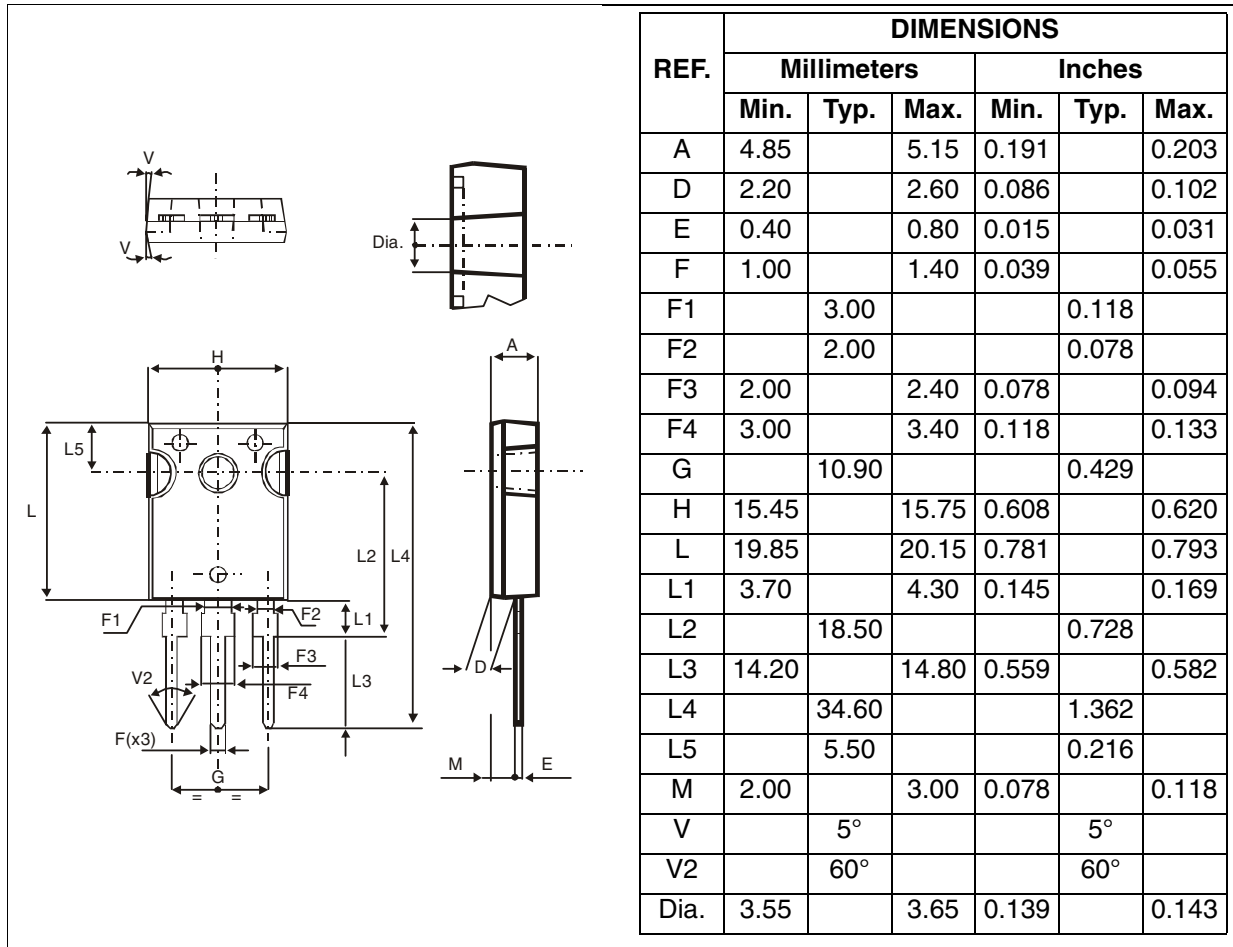


Figure 14: TO-220AB Package Mechanical Data

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151

Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH40P03ST	STTH40P03S	TO-220AB	2.23 g	50	Tube
STTH40P03SFP	STTH40P03S	TO-220FPAB	2.0 g	50	Tube
STTH40P03SW	STTH40P03S	TO-247	4.36 g	30	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 m.N.
- Maximum torque value: 0.70 m.N.

Table 8: Revision History

Date	Revision	Description of Changes
06-Jul-2005	1	First issue.

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