

ULTRAFAST RECTIFIER PDP ENERGY RECOVERY

Table 1: Main Product Characteristics

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

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.

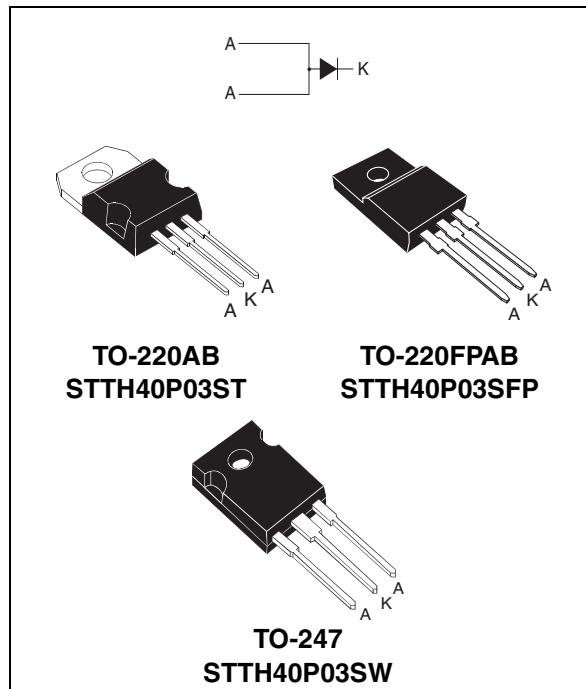


Table 2: Order Codes

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

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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	$T_j = 25^\circ C$	$V_R = V_{RRM}$			50	μA
		$T_j = 125^\circ C$			0.05	0.5	mA
V_F **	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 20A$			1.5	V
		$T_j = 125^\circ C$			0.9	1.15	
		$T_j = 25^\circ C$	$I_F = 40A$		1.1	1.8	V
		$T_j = 125^\circ C$				1.42	

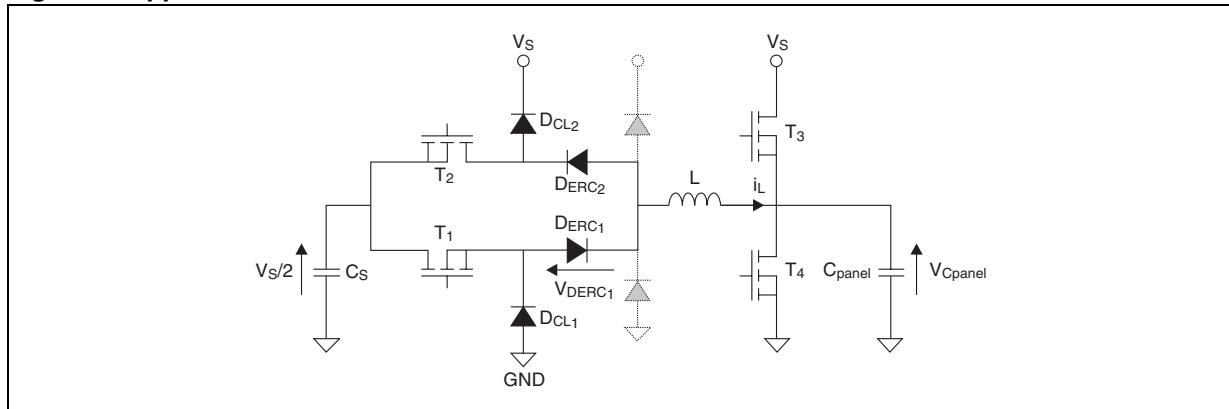
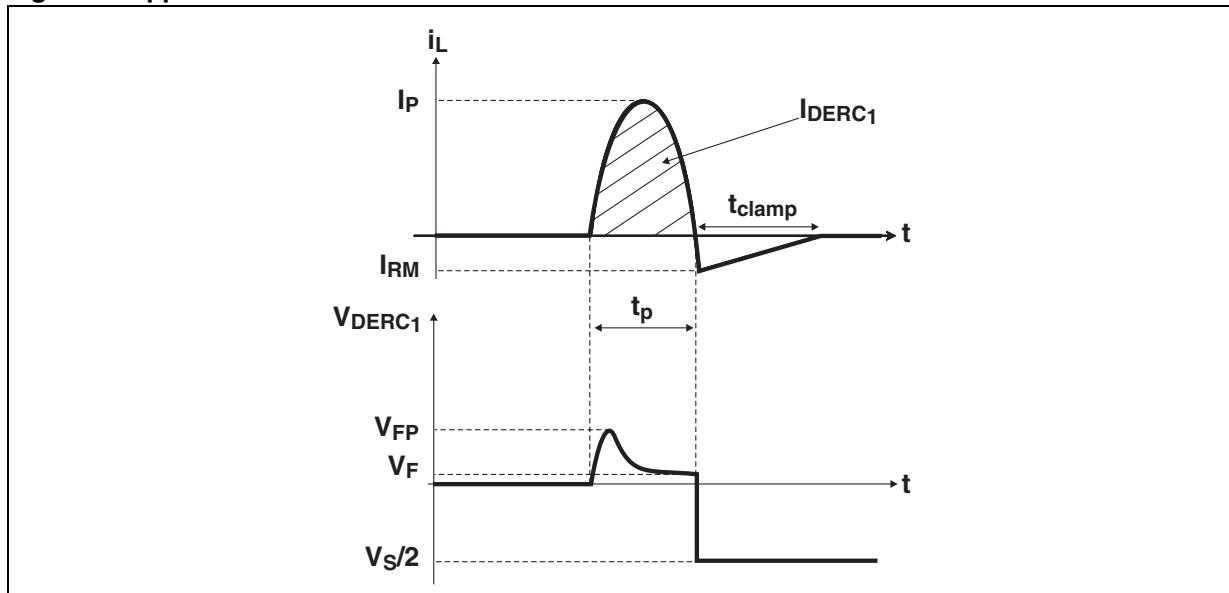
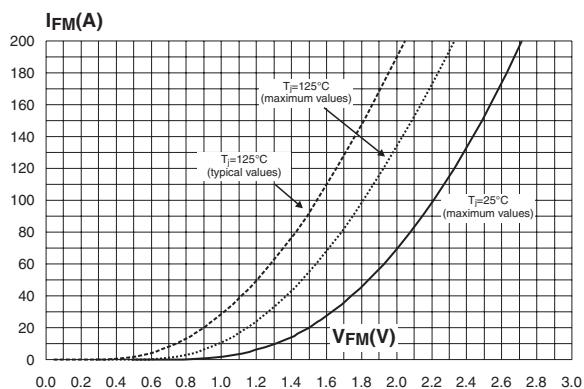
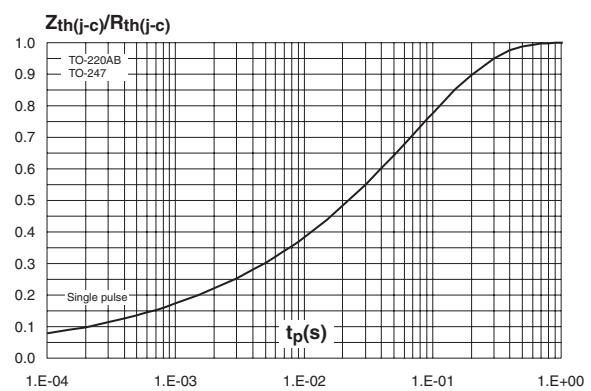
Pulse test: * tp = 5 ms, δ < 2%

** tp = 380 μs, δ < 2%

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

Table 6: Switching Characteristics

Symbol	Parameter	Test conditions			Min.	Typ	Max.	Unit
I_{RM}	Reverse recovery current	$T_j = 100^\circ C$ $I_F = 40A$ $V_R = 100V$ $dI_F/dt = 200 A/\mu s$				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)**

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

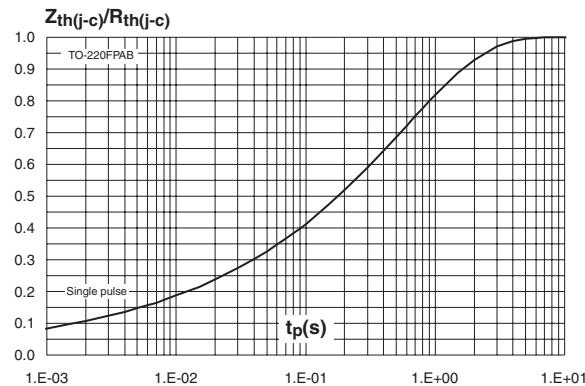


Figure 7: Reverse recovery time versus dI_F/dt (typical values)

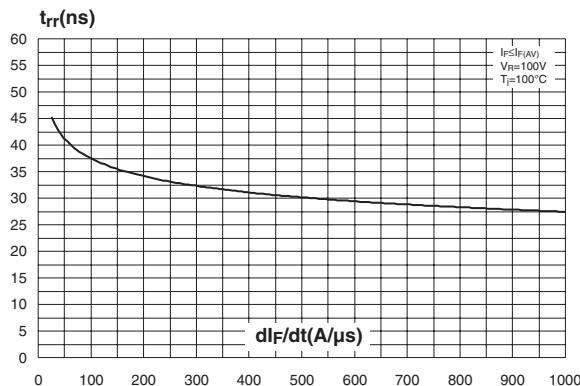


Figure 9: Relative variations of dynamic parameters versus junction temperature

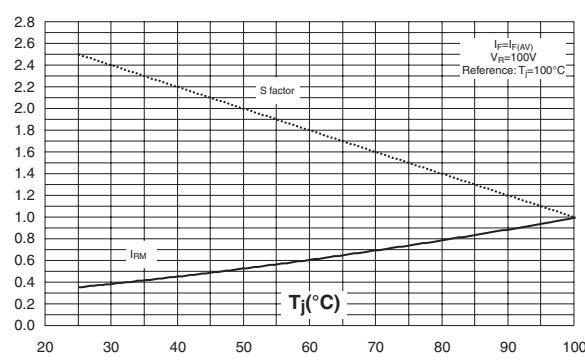


Figure 6: Peak reverse recovery current versus dI_F/dt (typical values)

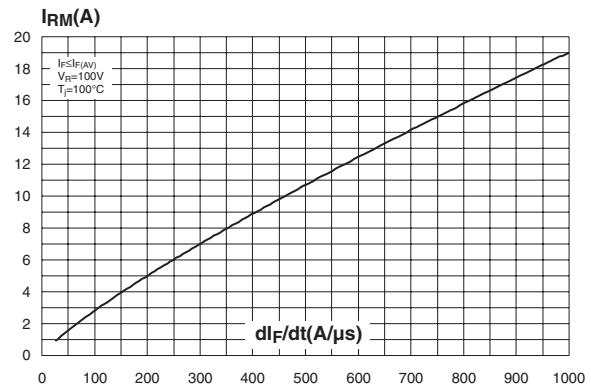


Figure 8: Reverse recovery softness factor versus dI_F/dt (typical values)

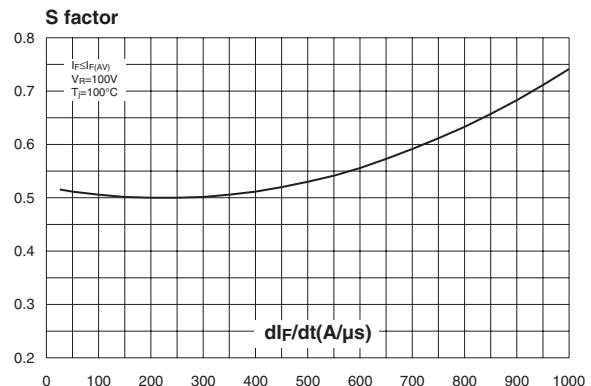


Figure 10: Transient peak forward voltage versus dI_F/dt (typical values)

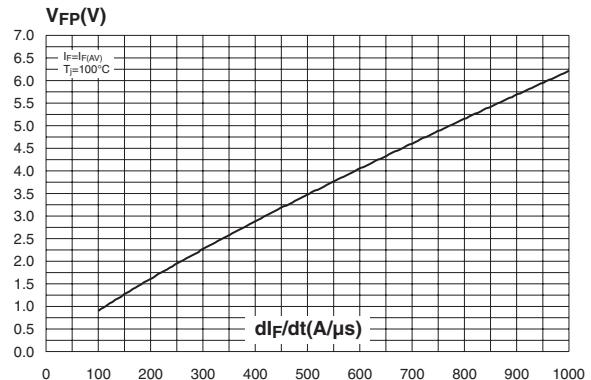


Figure 11: Forward recovery time versus dI_F/dt (typical values)

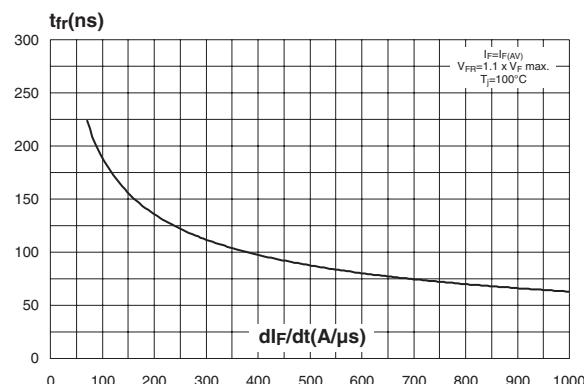
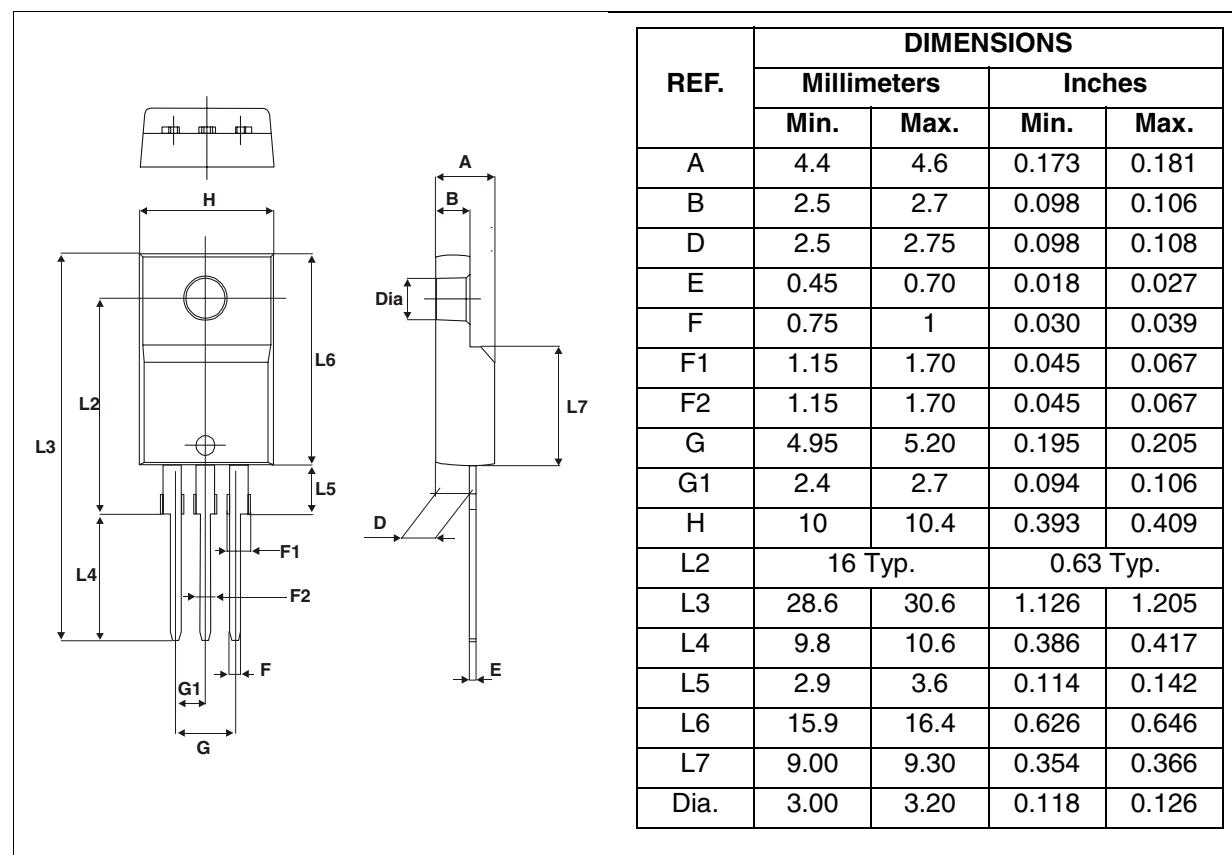


Figure 12: TO-220FPAB Package Mechanical Data



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Figure 13: TO-247 Package Mechanical Data

The technical drawing illustrates the physical dimensions of the STTH40P03S package. It shows a top view with lead spacing (V), lead height (L), and lead thickness (L1). A side view shows the total height (L), lead spacing (H), lead thickness (L1), and lead pitch (L2). Other dimensions include L3, L4, L5, F1 through F5, G, M, E, A, Dia., V, and V2. The drawing also indicates lead tilt angles of 5° and 60°.

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F1		3.00			0.118	
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
F4	3.00		3.40	0.118		0.133
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

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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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