

ULTRAFAST RECTIFIER PDP ENERGY RECOVERY

Table 1: Main Product Characteristics

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

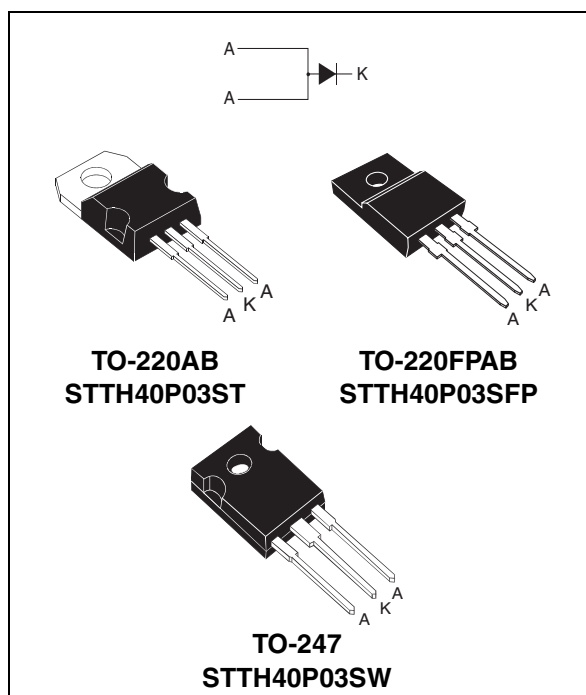


Table 2: Order Codes

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
$I_{F(RMS)}$	RMS forward voltage		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

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: * $t_p = 5\text{ ms}$, $\delta < 2\%$ ** $t_p = 380\text{ μs}$, $\delta < 2\%$ 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	$T_j = 100^\circ\text{C}$	$I_F = 40\text{A}$ $V_R = 100\text{V}$ $di_F/dt = 200\text{ A/μs}$		5	6.5	A
S_{factor}	Softness factor				0.5		-

Figure 1: Application Characteristics

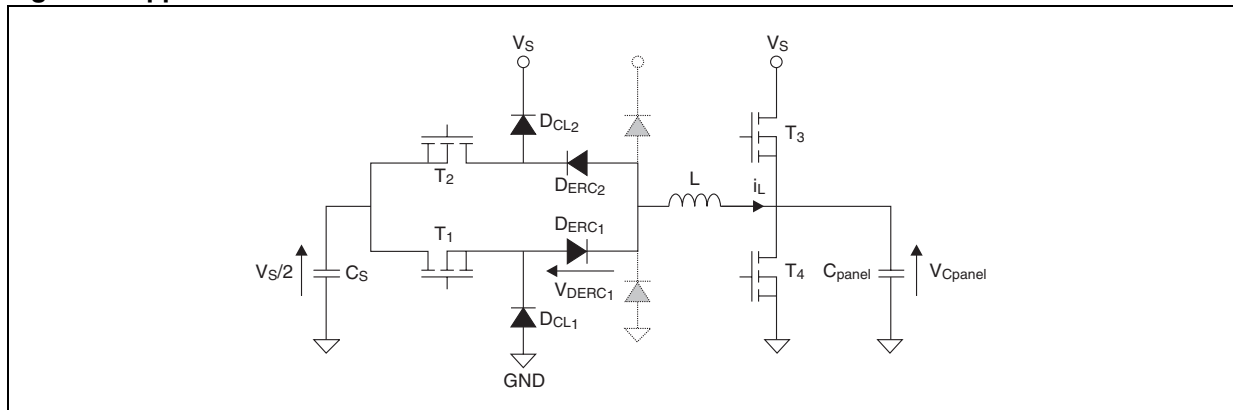


Figure 2: Application Waveforms

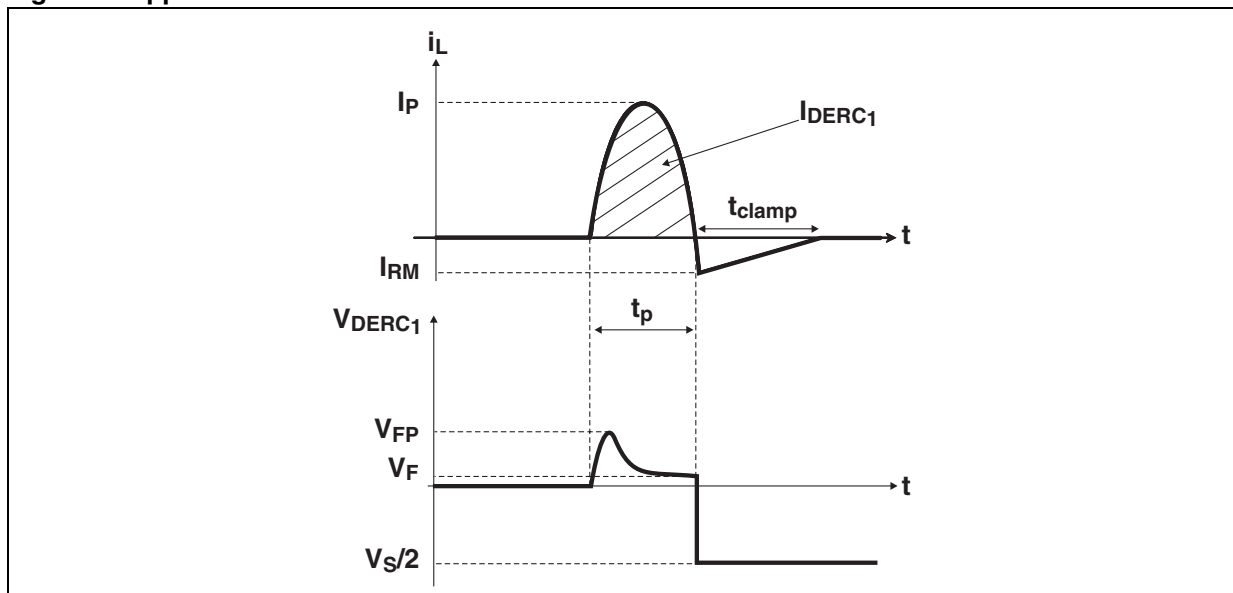


Figure 3: Forward voltage drop versus forward current

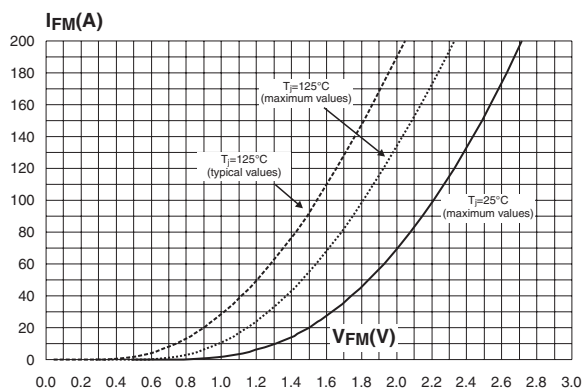


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB / TO-247)

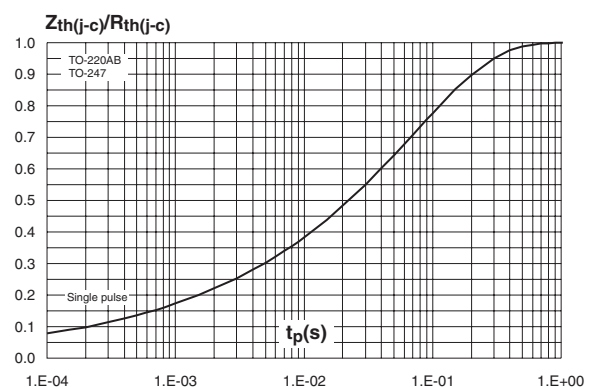


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

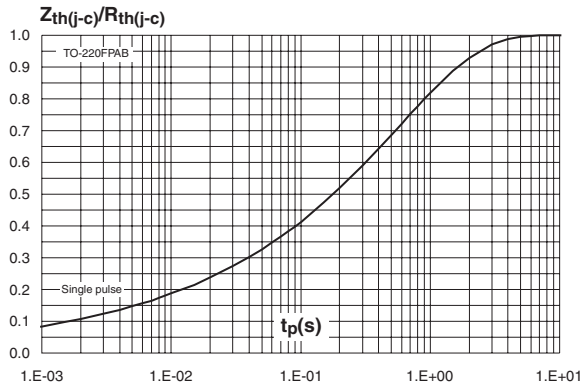


Figure 6: Peak reverse recovery current versus di_F/dt (typical values)

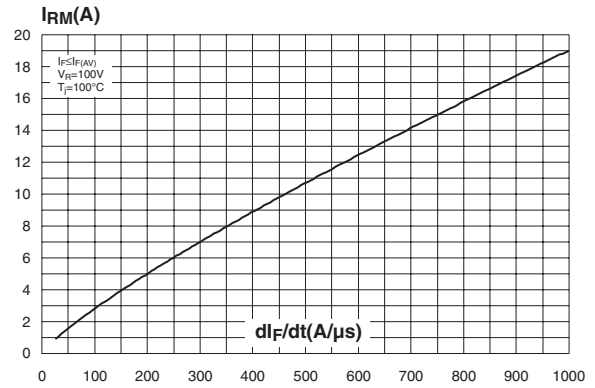


Figure 7: Reverse recovery time versus di_F/dt (typical values)

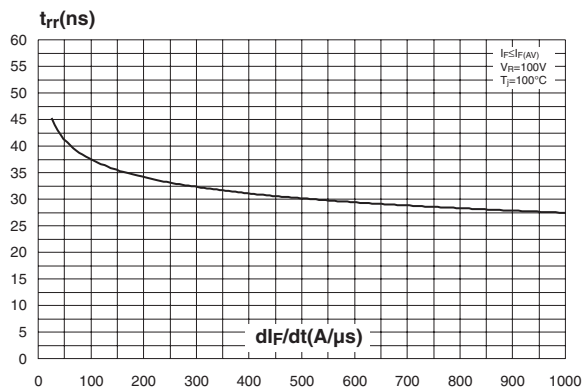


Figure 8: Reverse recovery softness factor versus di_F/dt (typical values)

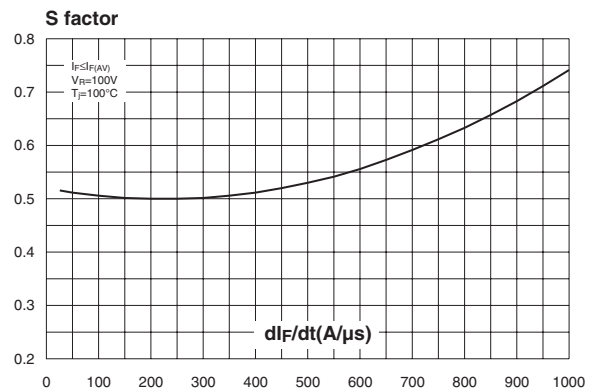


Figure 9: Relative variations of dynamic parameters versus junction temperature

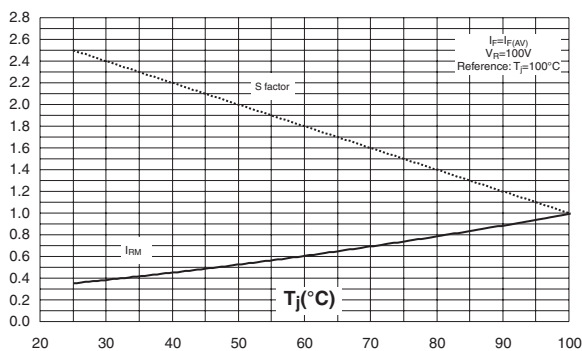


Figure 10: Transient peak forward voltage versus di_F/dt (typical values)

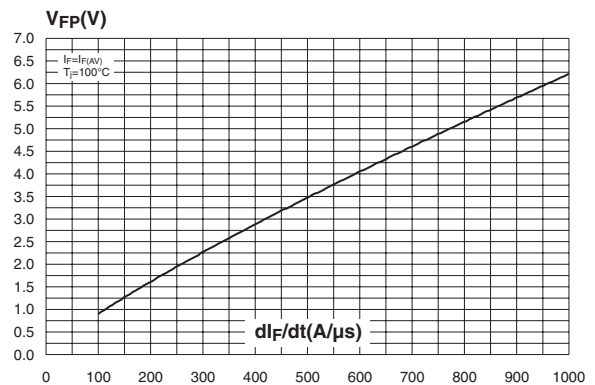


Figure 11: Forward recovery time versus di_F/dt (typical values)

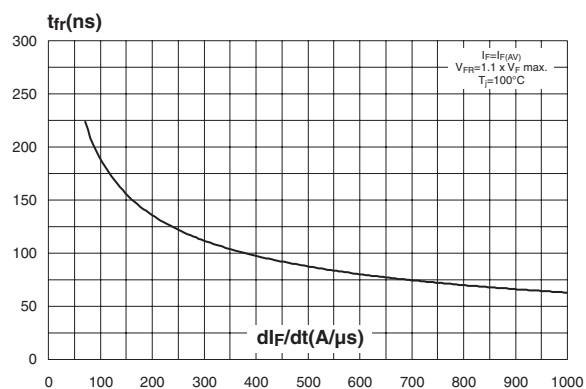


Figure 12: TO-220FPAB Package Mechanical Data

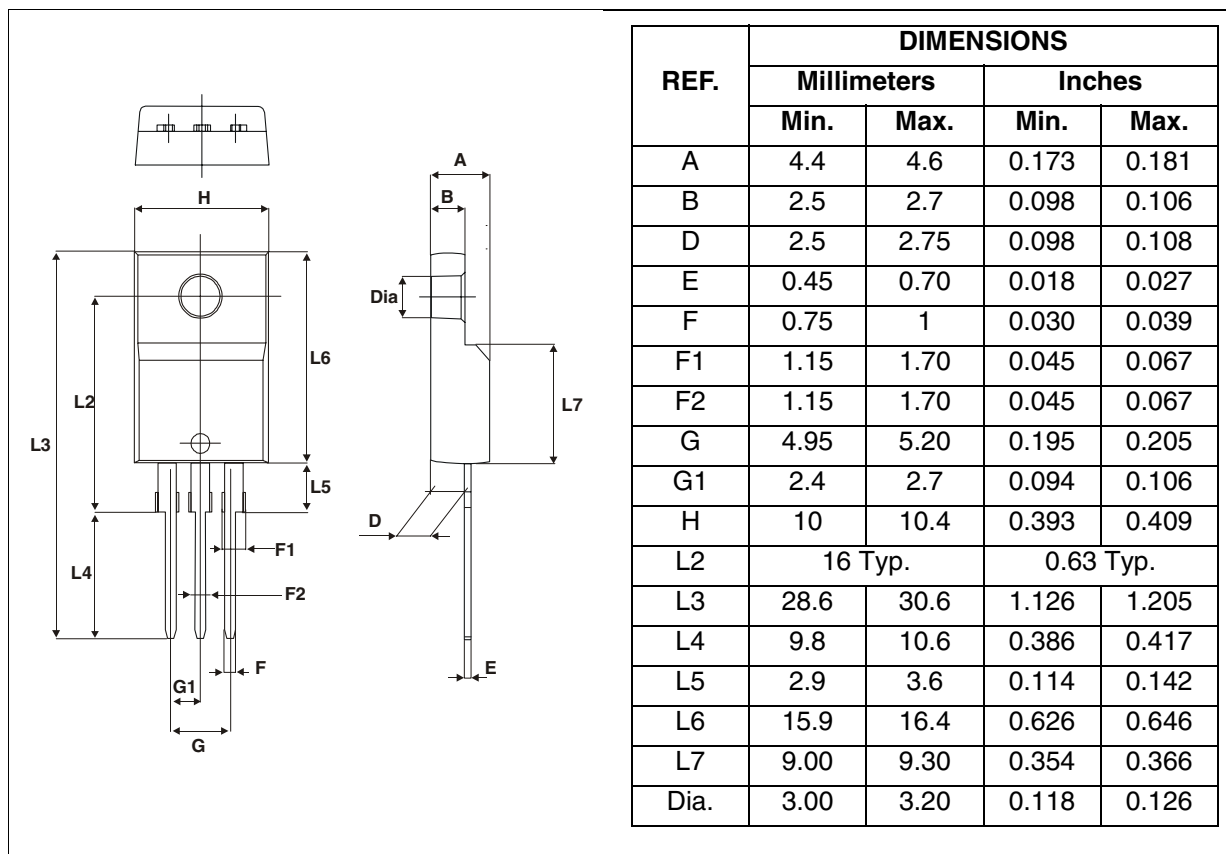


Figure 13: TO-247 Package Mechanical Data

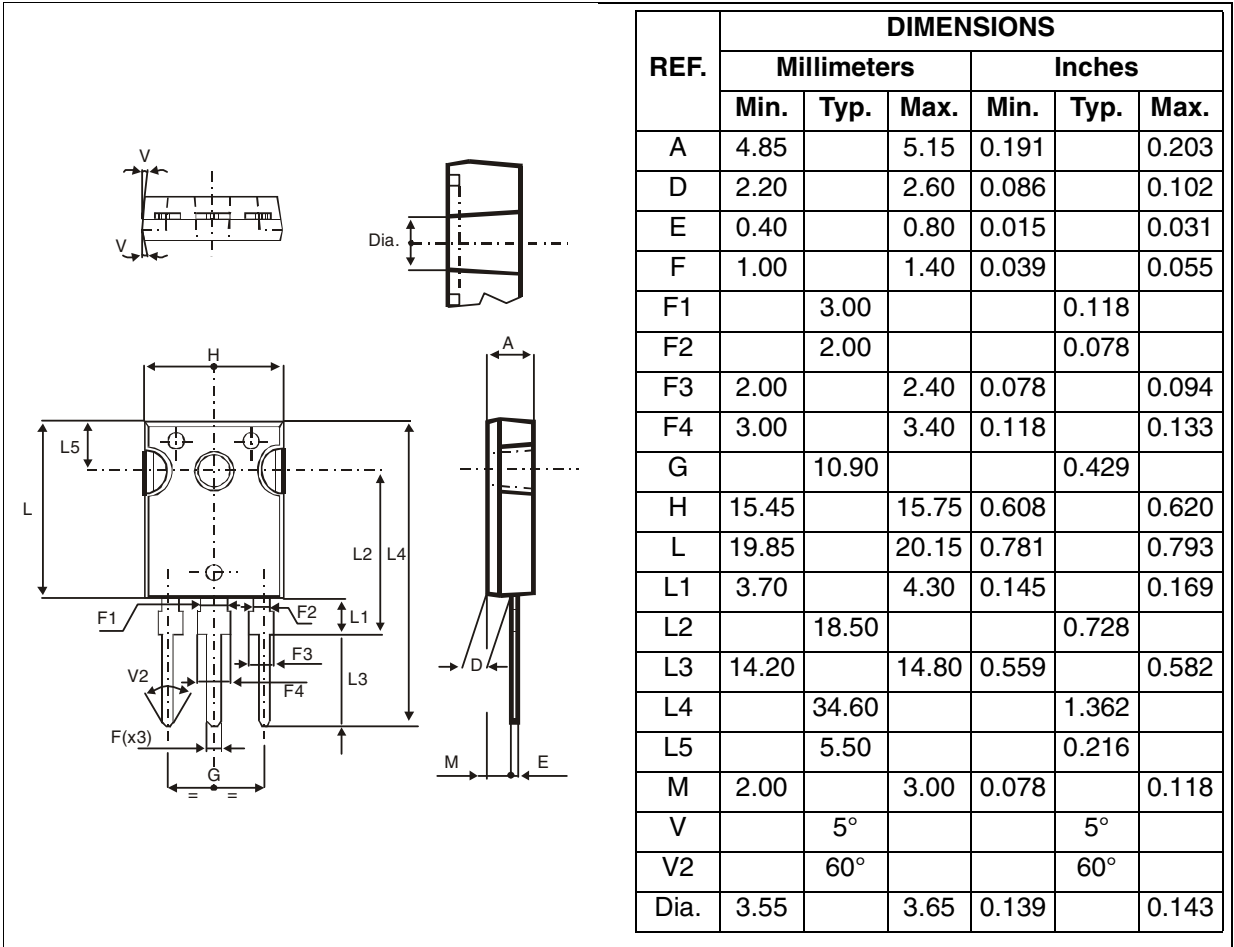


Figure 14: TO-220AB Package Mechanical Data

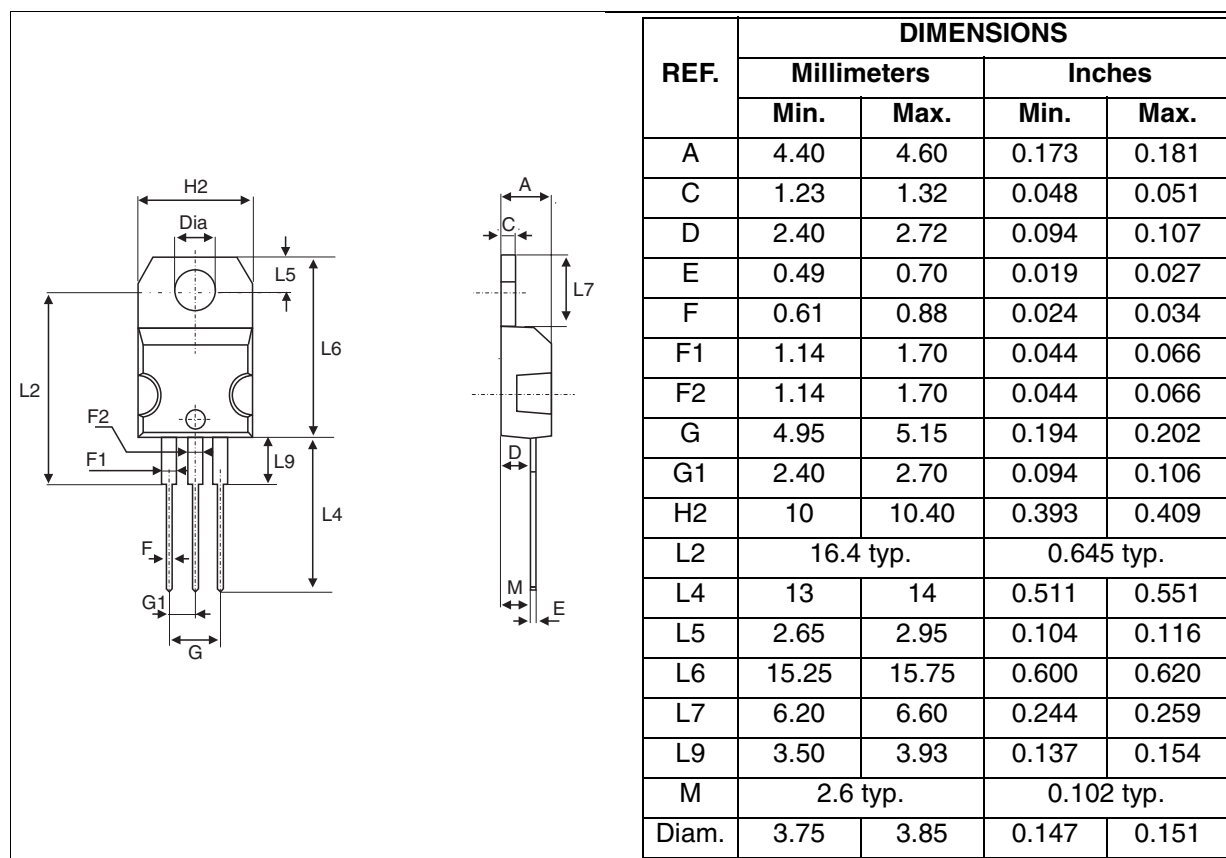


Table 7: Ordering Information

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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