

STFW4N150 STP4N150, STW4N150

N-channel 1500 V, 5 Ω , 4 A, PowerMESH™ Power MOSFET
in TO-220, TO-247, TO-3PF

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D	P_w
STFW4N150	1500 V	< 7 Ω	4 A	63 W
STP4N150	1500 V	< 7 Ω	4 A	160 W
STW4N150	1500 V	< 7 Ω	4 A	160 W

- 100% avalanche tested
- Intrinsic capacitances and Qg minimized
- High speed switching
- Fully isolated TO-3PF plastic packages
- Creepage distance path is 5.4 mm (typ.) for TO-3PF

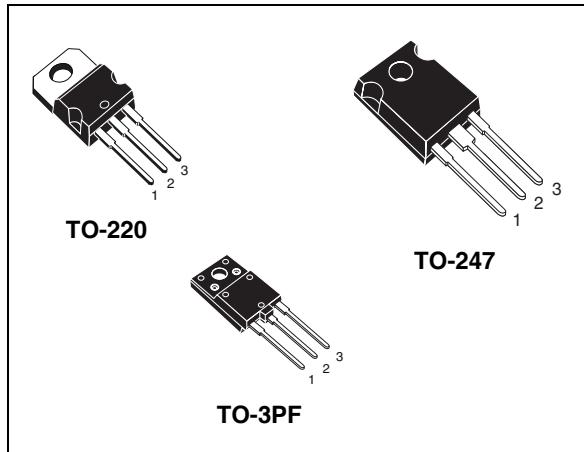


Figure 1. Internal schematic diagram.

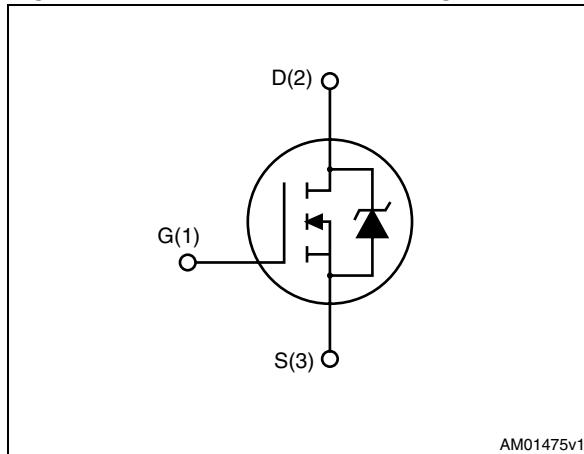


Table 1. Device summary

Order codes	Marking	Package	Packaging
STFW4N150	4N150	TO-3PF	Tube
STP4N150	P4N150	TO-220	Tube
STW4N150	W4N150	TO-247	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-3PF	
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	1500			V
V_{GS}	Gate- source voltage	± 30			V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$	4	4	4 (1)	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	2.5	2.5	2.5 (1)	A
$I_{DM}^{(1)}$	Drain current (pulsed)	12	12	12 (1)	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$	160		63	W
V_{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink ($t=1\text{ s}; T_C=25^\circ\text{C}$)			3500	V
T_{stg}	Storage temperature	-55 to 150			$^\circ\text{C}$
T_j	Max. operating junction temperature	150			$^\circ\text{C}$

1. Pulse width limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-3PF	
$R_{thj-case}$	Thermal resistance junction-case max	0.78		2	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5		50	$^\circ\text{C}/\text{W}$

Table 4. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_j max)	4	A
E_{AS}	Single pulse avalanche energy (starting $T_j = 25^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	350	mJ

2 Electrical characteristics

($T_{CASE} = 25^\circ\text{C}$ unless otherwise specified)

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	$I_D = 1 \text{ mA}, V_{GS} = 0$	1500			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$ $V_{DS} = \text{Max rating}, T_C = 125^\circ\text{C}$			10 500	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 30 \text{ V}$			± 100	nA
$V_{GS(\text{th})}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	3	4	5	V
$R_{DS(\text{on})}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}, I_D = 2 \text{ A}$		5	7	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 30 \text{ V}, I_D = 2 \text{ A}$	-	3.5		s
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GS} = 0$	-	1300 120 12		pF pF pF
$t_{d(on)}$ T_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	$V_{DD} = 750 \text{ V}, I_D = 2 \text{ A}, R_G = 4.7 \Omega, V_{GS} = 10 \text{ V}$	-	35 30 45 45		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	$V_{DD} = 600 \text{ V}, I_D = 4 \text{ A}, V_{GS} = 10 \text{ V}$	-	30 10 9	50	nC nC nC

1. Pulsed: pulse duration=300 μs , duty cycle 1.5%

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}^{(1)}$	Source-drain current		-		4	A
	Source-drain current (pulsed)				12	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 4 \text{ A}, V_{GS} = 0$	-		2	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 4 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 45 \text{ V}$	-	510 3 12		ns μC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 4 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 45 \text{ V}, T_j = 150^\circ\text{C}$	-	615 4 12.6		ns μC A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration=300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area for TO-220

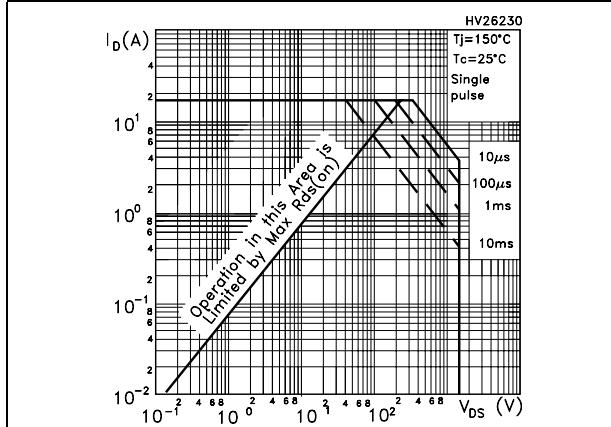


Figure 3. Thermal impedance for TO-220

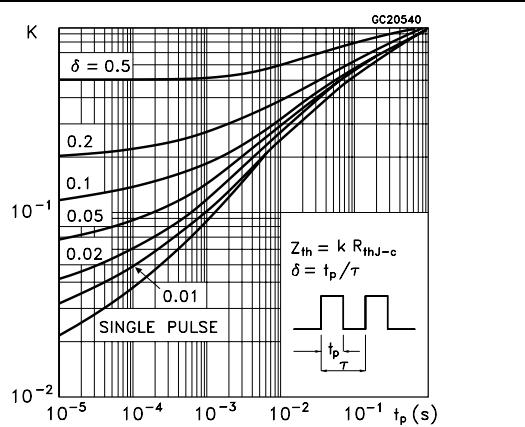


Figure 4. Safe operating area for TO-3PF

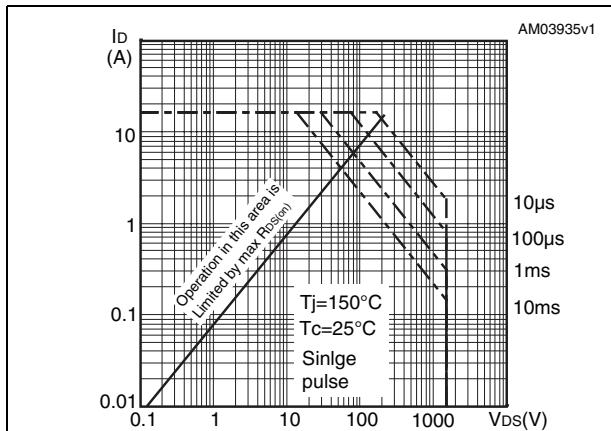


Figure 5. Thermal impedance for TO-3PF

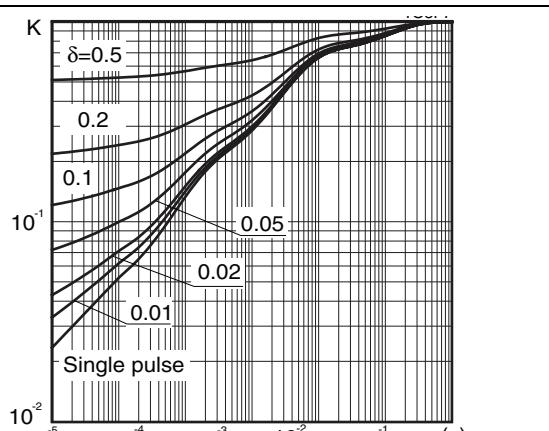


Figure 6. Safe operating area for TO-247

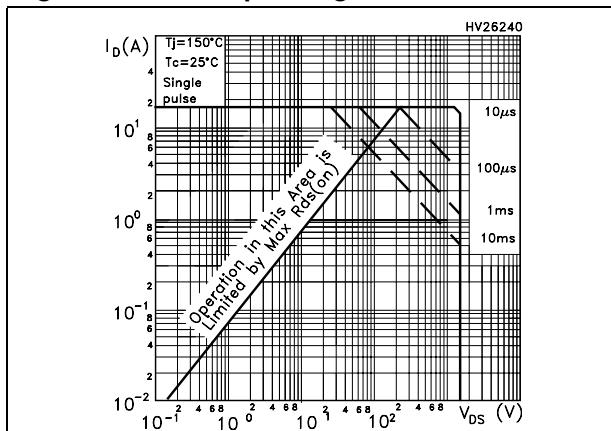


Figure 7. Thermal impedance for TO-247

