

## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

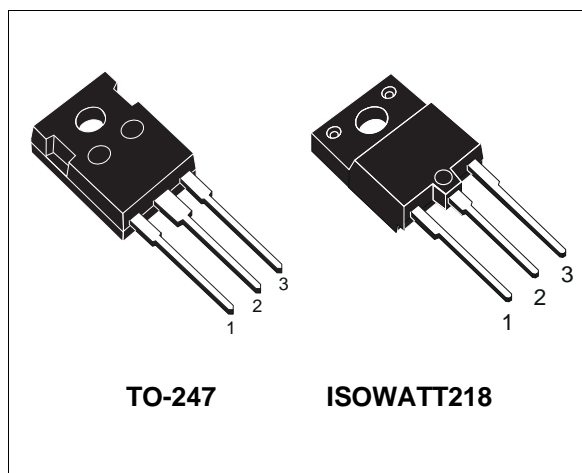
### PRELIMINARY DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STW5NA100	1000 V	< 3.5 Ω	4.6 A
STH5NA100FI	1000 V	< 3.5 Ω	2.9 A

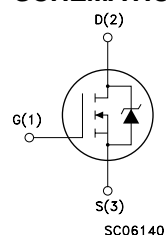
- TYPICAL R<sub>DS(on)</sub> = 2.9 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- GATE CHARGE MINIMISED
- REDUCED THRESHOLD VOLTAGE SPREAD

#### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLY (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE



#### INTERNAL SCHEMATIC DIAGRAM



#### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STW5NA100	STH5NA100FI	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	1000		V
V <sub>DGR</sub>	Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)	1000		V
V <sub>GS</sub>	Gate-source Voltage	± 30		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C	4.6	2.9	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 100 °C	2.9	1.8	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	18.4	18.4	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	150	60	W
	Derating Factor	1.2	0.48	W/°C
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	—	4000	V
T <sub>stg</sub>	Storage Temperature	-65 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature	150		°C

(●) Pulse width limited by safe operating area

## STW5NA100-STH5NA100FI

### THERMAL DATA

		TO-247	ISOWATT218	
R <sub>thj-case</sub>	Thermal Resistance Junction-case Max	0.83	2.1	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient Max	30		°C/W
R <sub>thc-sink</sub>	Thermal Resistance Case-sink Typ	0.1		°C/W
T <sub>l</sub>	Maximum Lead Temperature For Soldering Purpose	300		°C

### AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I <sub>AR</sub>	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max, $\delta < 1\%$ )	4.2	A
E <sub>AS</sub>	Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 50 V)	160	mJ

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

#### OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 $\mu$ A V <sub>GS</sub> = 0	1000			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating T <sub>c</sub> = 100 °C			50 250	$\mu$ A $\mu$ A
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = $\pm$ 30 V			$\pm$ 100	nA

#### ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250 $\mu$ A	2.25	3	3.75	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V I <sub>D</sub> = 2.1 A		2.9	3.5	$\Omega$ $\Omega$
I <sub>D(on)</sub>	On State Drain Current	V <sub>DS</sub> > I <sub>D(on)</sub> x R <sub>DS(on)max</sub> V <sub>GS</sub> = 10 V	4.2			A

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> > I <sub>D(on)</sub> x R <sub>DS(on)max</sub> I <sub>D</sub> = 2.1 A	2	5.5		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V f = 1 MHz V <sub>GS</sub> = 0		1650	2150	pF
C <sub>oss</sub>	Output Capacitance			127	165	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			31	41	pF

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 500\text{ V}$ $I_D =$		14	20	ns
$t_r$	Rise Time	2.1 A $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		12	16	ns
$Q_g$	Total Gate Charge	$V_{DD} = 800\text{ V}$ $I_D = 4.2\text{ A}$ $V_{GS} = 10\text{ V}$		59	83	nC
$Q_{gs}$	Gate-Source Charge			9.4		nC
$Q_{gd}$	Gate-Drain Charge			26.5		nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 800\text{ V}$ $I_D = 4.2\text{ A}$		94	132	ns
$t_f$	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		30	42	ns
$t_c$	Cross-over Time			142	199	ns

**SOURCE DRAIN DIODE**

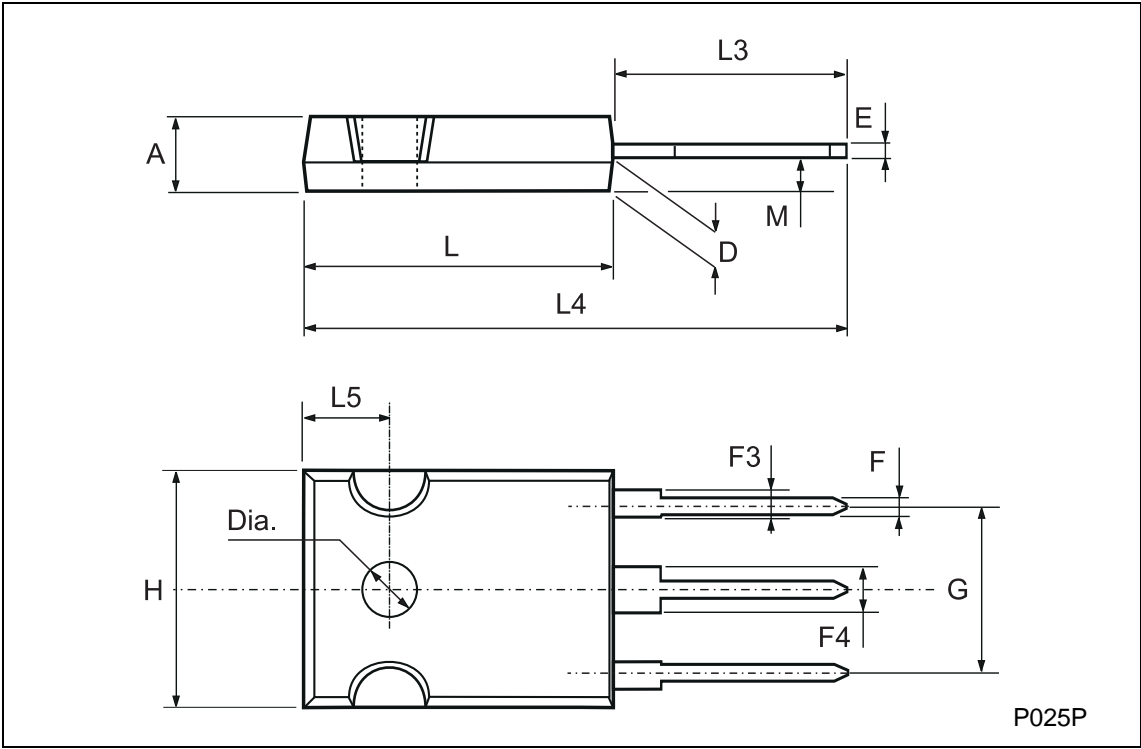
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				4.6	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				18.4	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 4.2\text{ A}$ $V_{GS} = 0$			1.6	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 4.2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$		1000		ns
$Q_{rr}$	Reverse Recovery Charge			14		$\mu\text{C}$
$I_{RRM}$	Reverse Recovery Current			28		A

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

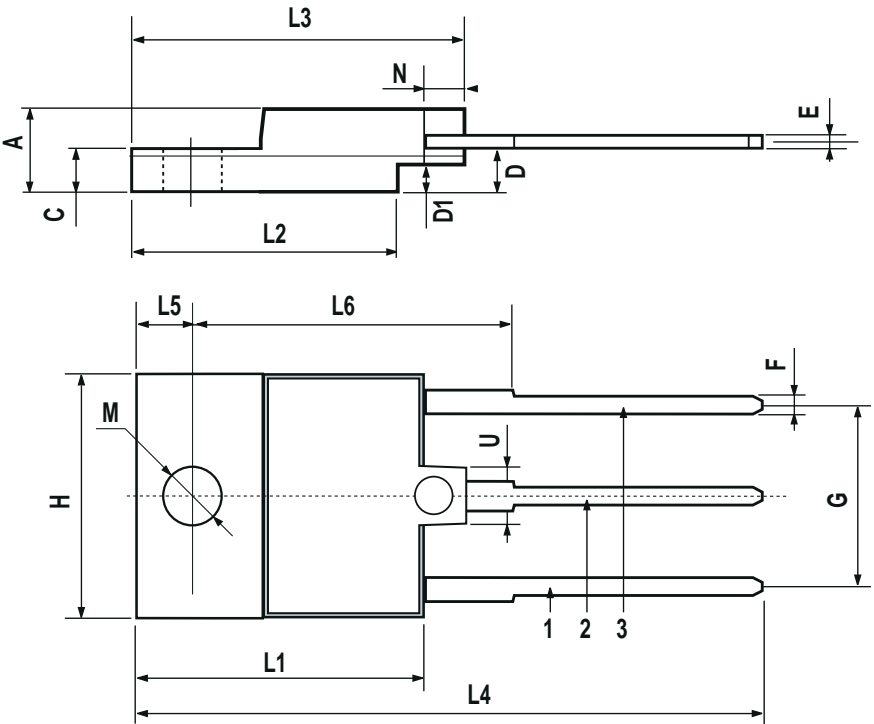
TO-247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
H	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559	0.413	0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118
Dia	3.55		3.65	0.140		0.144



ISOWATT218 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	5.35		5.65	0.210		0.222
C	3.3		3.8	0.130		0.149
D	2.9		3.1	0.114		0.122
D1	1.88		2.08	0.074		0.081
E	0.75		1	0.029		0.039
F	1.05		1.25	0.041		0.049
G	10.8		11.2	0.425		0.441
H	15.8		16.2	0.622		0.637
L1	20.8		21.2	0.818		0.834
L2	19.1		19.9	0.752		0.783
L3	22.8		23.6	0.897		0.929
L4	40.5		42.5	1.594		1.673
L5	4.85		5.25	0.190		0.206
L6	20.25		20.75	0.797		0.817
M	3.5		3.7	0.137		0.145
N	2.1		2.3	0.082		0.090
U		4.6			0.181	



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