



# STW10NC60 STH10NC60FI

N-CHANNEL 600V - 0.6Ω - 10A - TO-247/ISOWATT218  
PowerMesh™II MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STW10NC60	600 V	< 0.75 Ω	10 A
STH10NC60FI	600 V	< 0.75 Ω	10 A (*)

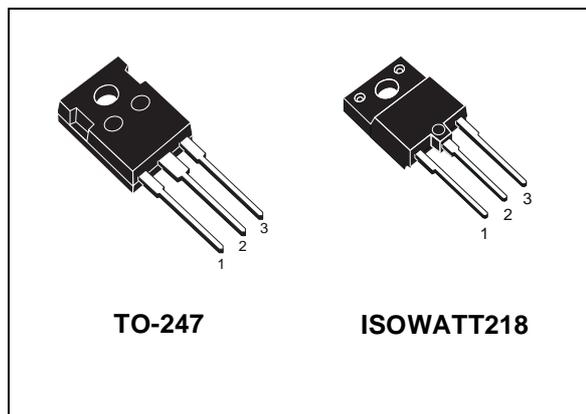
- TYPICAL R<sub>DS(on)</sub> = 0.6 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- NEW HIGH VOLTAGE BENCHMARK
- GATE CHARGE MINIMIZED

## DESCRIPTION

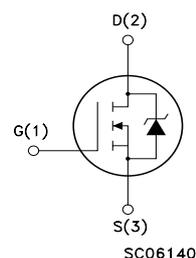
The PowerMESH™II is the evolution of the first generation of MESH OVERLAY™. The layout refinements introduced greatly improve the Ron\*area figure of merit while keeping the device at the leading edge for what concerns switching speed, gate charge and ruggedness.

## APPLICATIONS

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



## INTERNAL SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STW10NC60	STH10NC60FI	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	600		V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	600		V
V <sub>GS</sub>	Gate- source Voltage	±30		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	10	10 (*)	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	6.3	6.3 (*)	A
I <sub>DM</sub> (1)	Drain Current (pulsed)	40	40 (*)	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	160	60	W
	Derating Factor	1.28	0.48	W/°C
dv/dt	Peak Diode Recovery voltage slope	3.5		V/ns
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	-	2500	V
T <sub>stg</sub>	Storage Temperature	- 55 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature			

(\*) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 10A, di/dt ≤ 100A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>

(\*) Limited only by Maximum Temperature Allowed

## STW10NC60 / STH10NC60FI

### THERMAL DATA

		TO-247	ISOWATT218	
Rthj-case	Thermal Resistance Junction-case Max	0.78	2.08	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30		°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)	10	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)	820	mJ

### ELECTRICAL CHARACTERISTICS (TCASE = 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 μA, V <sub>GS</sub> = 0	600			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> = 125 °C			1 50	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ±30V			±100	nA

ON (1)

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> = 250μA	2	3	4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5 A		0.6	0.75	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> = 20 V, I <sub>D</sub> = 4.5A		9		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, f = 1 MHz, V <sub>GS</sub> = 0		1420		pF
C <sub>oss</sub>	Output Capacitance			205		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			35		pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)**

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 300V, I_D = 4.5 A$ $R_G = 4.7\Omega, V_{GS} = 10V$		20		ns
$t_r$	Rise Time	(see test circuit, Figure 3)		16		ns
$Q_g$	Total Gate Charge	$V_{DD} = 480V, I_D = 9.0 A,$ $V_{GS} = 10V$		55	77	nC
$Q_{gs}$	Gate-Source Charge			4.5		nC
$Q_{gd}$	Gate-Drain Charge			31		nC

**SWITCHING OFF**

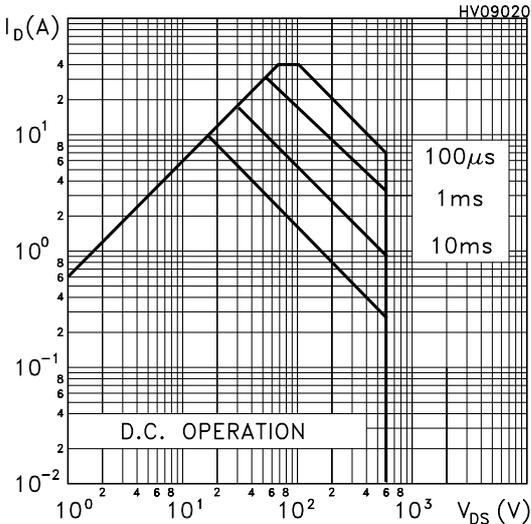
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off Delay Time	$V_{DD} = 300 V, I_D = 4.5 A$ $R_G = 4.7\Omega, V_{GS} = 10 V$		64		ns
$t_f$	Fall Time	(Resistive Load see, Figure 3)		32		ns
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 480V, I_D = 9.0 A,$ $R_G = 4.7\Omega, V_{GS} = 10V$		19		ns
$t_f$	Fall Time	(Inductive Load see, Figure 5)		13		ns
$t_c$	Cross-over Time			32		ns

**SOURCE DRAIN DIODE**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				10	A
$I_{SDM} (2)$	Source-drain Current (pulsed)				40	A
$V_{SD} (1)$	Forward On Voltage	$I_{SD} = 9 A, V_{GS} = 0$			1.6	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 9 A, di/dt = 100A/\mu s,$ $V_{DD} = 100V, T_j = 150^\circ C$		600		ns
$Q_{rr}$	Reverse Recovery Charge	(see test circuit, Figure 5)		4.7		$\mu C$
$I_{RRM}$	Reverse Recovery Current			15.5		A

Note: 1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.  
2. Pulse width limited by safe operating area.

**Safe Operating Area for TO-247**



**Safe Operating Area for ISOWATT218**

