



STW14NM50

N-CHANNEL 500V - 0.32Ω - 14A TO-247

MDmesh™ Power MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STW14NM50	500V	< 0.35Ω	14 A

- TYPICAL R_{DS(on)} = 0.32Ω
- HIGH dv/dt AND AVALANCHE CAPABILITIES
- 100% AVALANCHE TESTED
- LOW INPUT CAPACITANCE AND GATE CHARGE
- LOW GATE INPUT RESISTANCE
- TIGHT PROCESS CONTROL AND HIGH MANUFACTURING YIELDS

DESCRIPTION

The MDmesh™ is a new revolutionary MOSFET technology that associates the Multiple Drain process with the Company's PowerMESH™ horizontal layout. The resulting product has an outstanding low on-resistance, impressively high dv/dt and excellent avalanche characteristics. The adoption of the Company's propriety strip technique yields overall dynamic performance that is significantly better than that of similar completion's products.

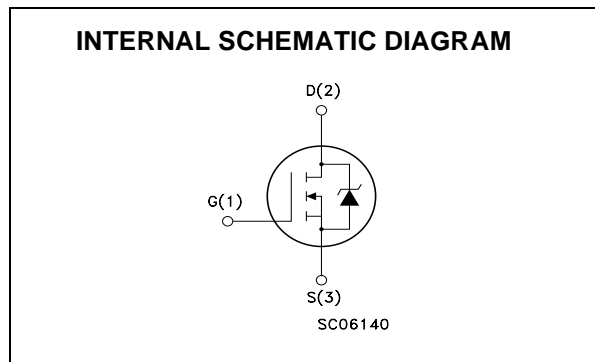
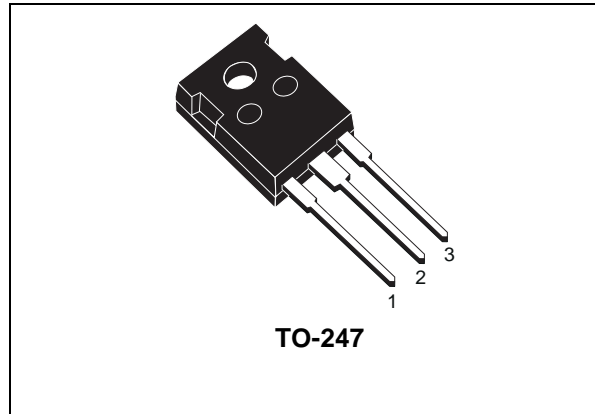
APPLICATIONS

The MDmesh™ family is very suitable for increase the power density of high voltage converters allowing system miniaturization and higher efficiencies.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	500	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	500	V
V _{GS}	Gate- source Voltage	±30	V
I _D	Drain Current (continuous) at T _C = 25°C	14	A
I _D	Drain Current (continuous) at T _C = 100°C	8.8	A
I _{DM} ⁽¹⁾	Drain Current (pulsed)	56	A
P _{TOT}	Total Dissipation at T _C = 25°C	175	W
	Derating Factor	1.28	W/°C
dv/dt	Peak Diode Recovery voltage slope	6	V/ns
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(*)Pulse width limited by safe operating area
 (*)Limited only by maximum temperature allowed



(1)I_{SD} ≤ 12A, di/dt ≤ 100A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

STW14NM50

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.715	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	12	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	400	mJ

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	500			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ±30V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	3	4	5	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V, I _D = 6A		0.3	0.35	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 6A		5.2		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1000		pF
C _{oss}	Output Capacitance			180		pF
C _{rss}	Reverse Transfer Capacitance			25		pF
C _{oss eq.} (1)	Equivalent Output Capacitance	V _{GS} = 0V, V _{DS} = 0V to 400V		90		pF
R _G	Gate Input Resistance	f=1 MHz Gate DC Bias = 0 Test Signal Level = 20mV Open Drain		1.6		Ω

1. C_{oss eq.} is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}.

ELECTRICAL CHARACTERISTICS (CONTINUED)
SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 250\text{ V}$, $I_D = 6\text{ A}$ $R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		20		ns
t_r	Rise Time			10		ns
Q_g	Total Gate Charge	$V_{DD} = 400\text{ V}$, $I_D = 12\text{ A}$, $V_{GS} = 10\text{ V}$		28		nC
Q_{gs}	Gate-Source Charge			8		nC
Q_{gd}	Gate-Drain Charge			15		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 400\text{ V}$, $I_D = 12\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 5)		19		ns
t_f	Fall Time			8		ns
t_c	Cross-over Time			18		ns

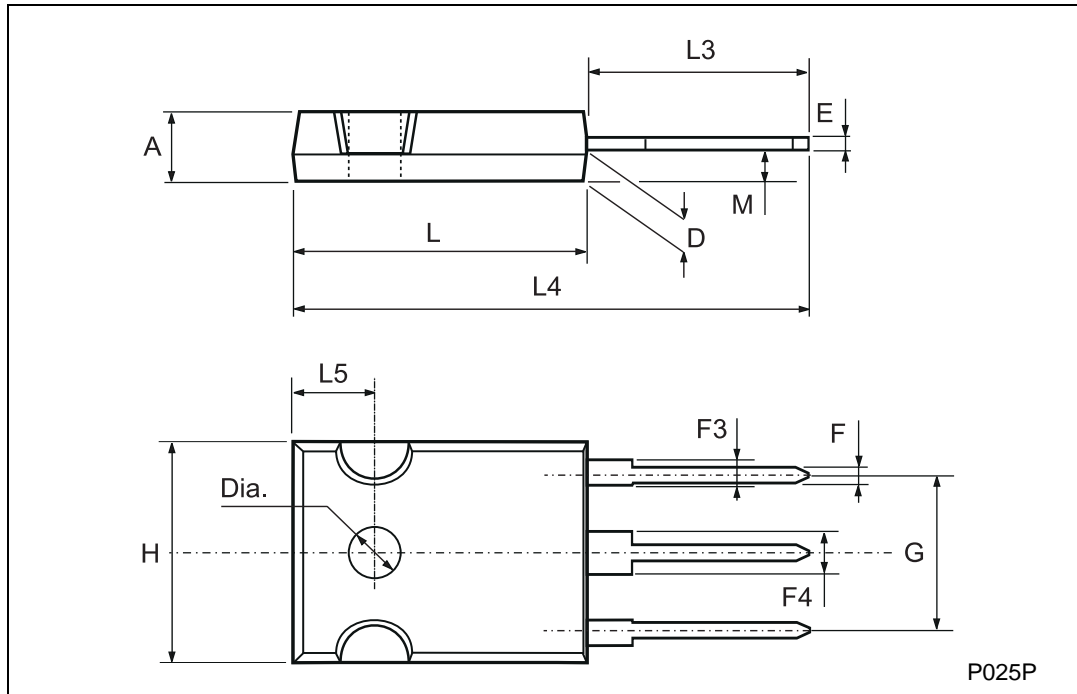
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				12	A
$I_{SDM}^{(1)}$	Source-drain Current (pulsed)				48	A
$V_{SD}^{(2)}$	Forward On Voltage	$I_{SD} = 12\text{ A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 12\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 100\text{ V}$, $T_j = 25^\circ\text{C}$ (see test circuit, Figure 5)		270		ns
Q_{rr}	Reverse Recovery Charge			2.23		μC
I_{RRM}	Reverse Recovery Current			16.5		A
t_{rr}	Reverse Recovery Time	$I_{SD} = 12\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 100\text{ V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		340		ns
Q_{rr}	Reverse Recovery Charge			3		μC
I_{RRM}	Reverse Recovery Current			18		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. 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		0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>