



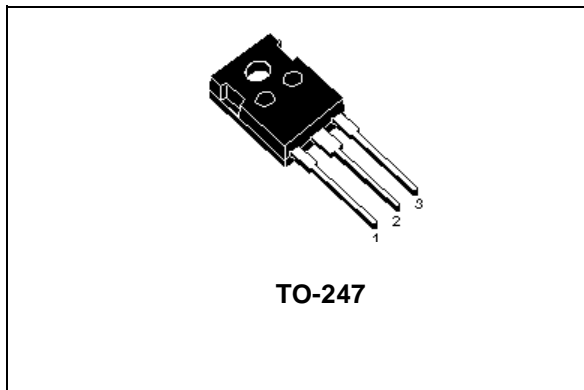
STW26NM60FD

N-CHANNEL 600V - 0.125Ω - 26A TO-247 Zener-Protected MDmesh™ Power MOSFET

ADVANCED DATA

TYPE	V _{DSS}	R _{DS(on)}	R _{ds(on)} *Q _g	I _D
STW26NM60FD	600 V	< 0.135 Ω	9.12 Ω*nC	30 A

- TYPICAL R_{DS(on)} = 0.125Ω
- HIGH dv/dt AND AVALANCHE CAPABILITIES
- IMPROVED ESD CAPABILITY
- LOW INPUT CAPACITANCE AND GATE CHARGE
- LOW GATE INPUT RESISTANCE
- FAST INTERNAL RECOVERY DIODE

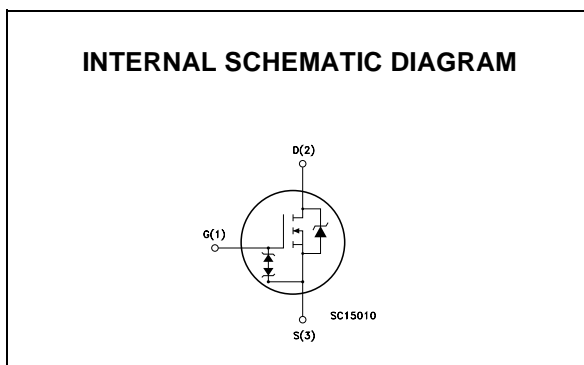


DESCRIPTION

The FDmesh™ associates all advantages of reduced on-resistance and fast switching with an intrinsic fast-recovery body diode. It is therefore strongly recommended for bridge topologies, in particular ZVS phase-shift converters.

APPLICATIONS

- ZVS PHASE-SHIFT FULL BRIDGE CONVERTERS FOR SMPS AND WELDING EQUIPMENT



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STW26NM60FD	W26NM60FD	TO-247	TUBE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage ($V_{GS} = 0$)	600	V
V_{DGR}	Drain-gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	600	V
V_{GS}	Gate- source Voltage	± 30	V
I_D	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	30	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	18.9	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	120	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	313	W
	Derating Factor	2.5	W/ $^\circ\text{C}$
$V_{ESD(G-S)}$	Gate source ESD(HBM-C=100pF, R=1.5K Ω)	6000	V
$dv/dt(1)$	Peak Diode Recovery voltage slope	20	V/ns
T_j	Operating Junction Temperature	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$

(●) Pulse width limited by safe operating area

(1) $I_{SD} \leq 26\text{A}$, $di/dt \leq 400\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$.

(*) Limited only by maximum temperature allowed

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case Max	0.4	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	62.5	$^\circ\text{C}/\text{W}$
T_l	Maximum Lead Temperature For Soldering Purpose	300	$^\circ\text{C}$

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	13	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50 \text{ V}$)	740	mJ

GATE-SOURCE ZENER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{GSO}	Gate-Source Breakdown Voltage	$I_{gss} = \pm 1\text{mA}$ (Open Drain)	30			V

PROTECTION FEATURES OF GATE-TO-SOURCE ZENER DIODES

The built-in back-to-back Zener diodes have specifically been designed to enhance not only the device's ESD capability, but also to make them safely absorb possible voltage transients that may occasionally be applied from gate to source. In this respect the Zener voltage is appropriate to achieve an efficient and cost-effective intervention to protect the device's integrity. These integrated Zener diodes thus avoid the usage of external components.

ELECTRICAL CHARACTERISTICS (TCASE = 25°C UNLESS OTHERWISE SPECIFIED)
ON/OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250 \mu A$, $V_{GS} = 0$	600			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125^\circ C$			10 100	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20V$			± 10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250 \mu A$	3	4	5	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10V$, $I_D = 13 A$		0.125	0.135	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (1)$	Forward Transconductance	$V_{DS} = 15 V$, $I_D = 13 A$		20		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25V$, $f = 1 \text{ MHz}$, $V_{GS} = 0$		2900 900 40		pF pF pF

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 300V$, $I_D = 13 A$ $R_G = 4.7\Omega$, $V_{GS} = 10 V$ (Resistive Load see, Figure 3)		35 22		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 480V$, $I_D = 26 A$, $V_{GS} = 10V$		73 20 37	102	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 480V$, $I_D = 26 A$, $R_G = 4.7\Omega$, $V_{GS} = 10V$ (Inductive Load see, Figure 5)		14 20 40		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (2)$	Source-drain Current Source-drain Current (pulsed)				26 104	A A
$V_{SD} (1)$	Forward On Voltage	$I_{SD} = 26 A$, $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 26 A$, $di/dt = 100A/\mu s$ $V_{DD} = 60V$, $T_J = 150^\circ C$ (see test circuit, Figure 5)		240 1.4 11.5		ns μC A

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

2. Pulse width limited by safe operating area.

3. $C_{oss eq.}$ 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} .

Fig. 1: Unclamped Inductive Load Test Circuit

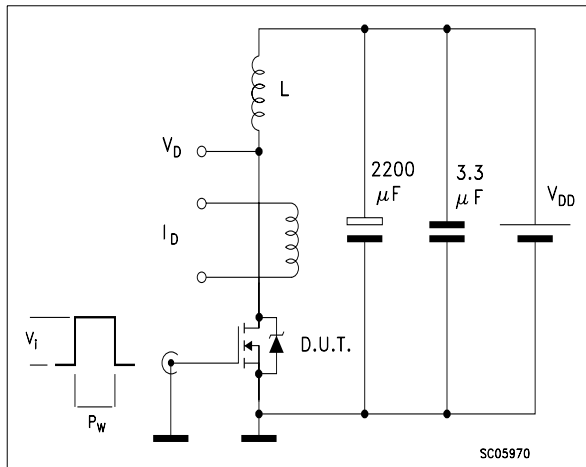


Fig. 2: Unclamped Inductive Waveform

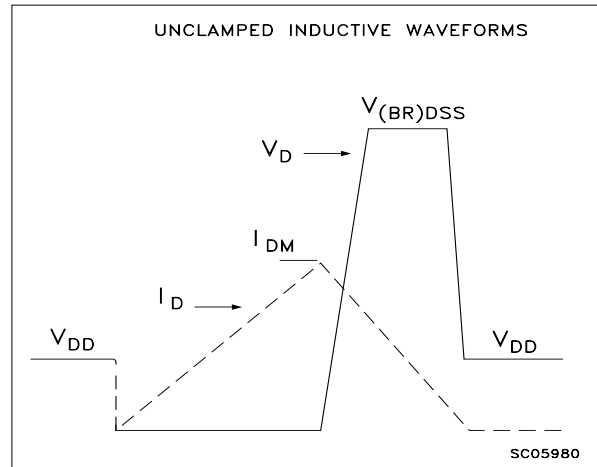


Fig. 3: Switching Times Test Circuit For Resistive Load

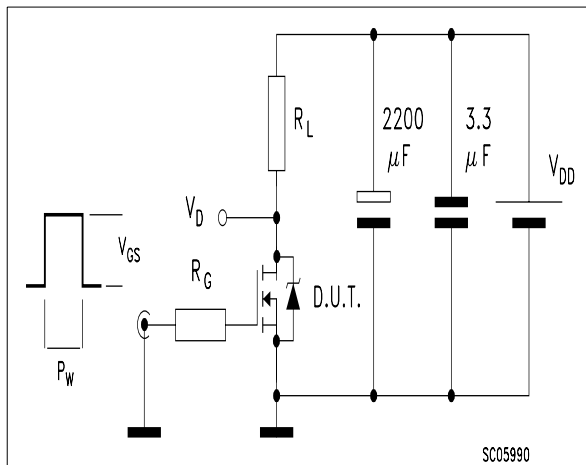


Fig. 4: Gate Charge test Circuit

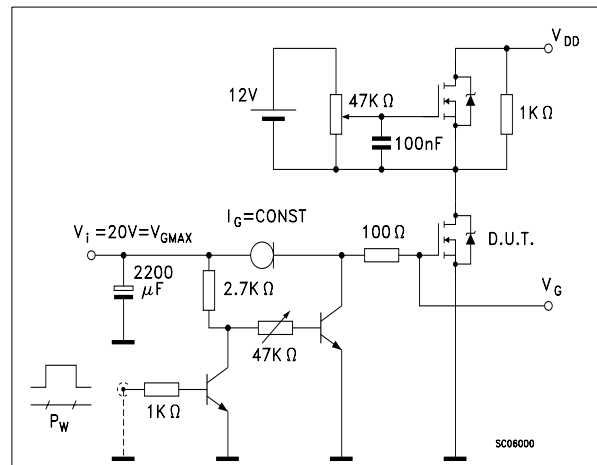
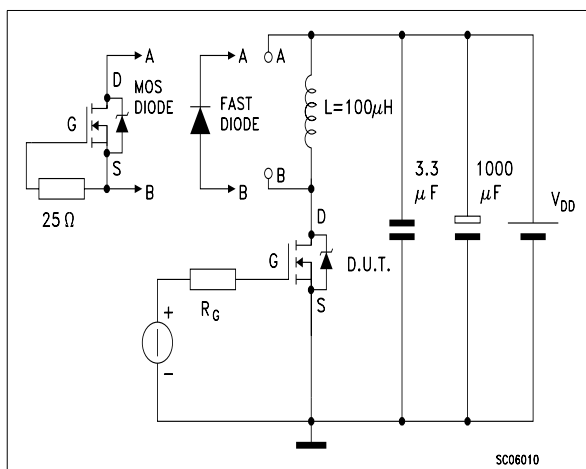
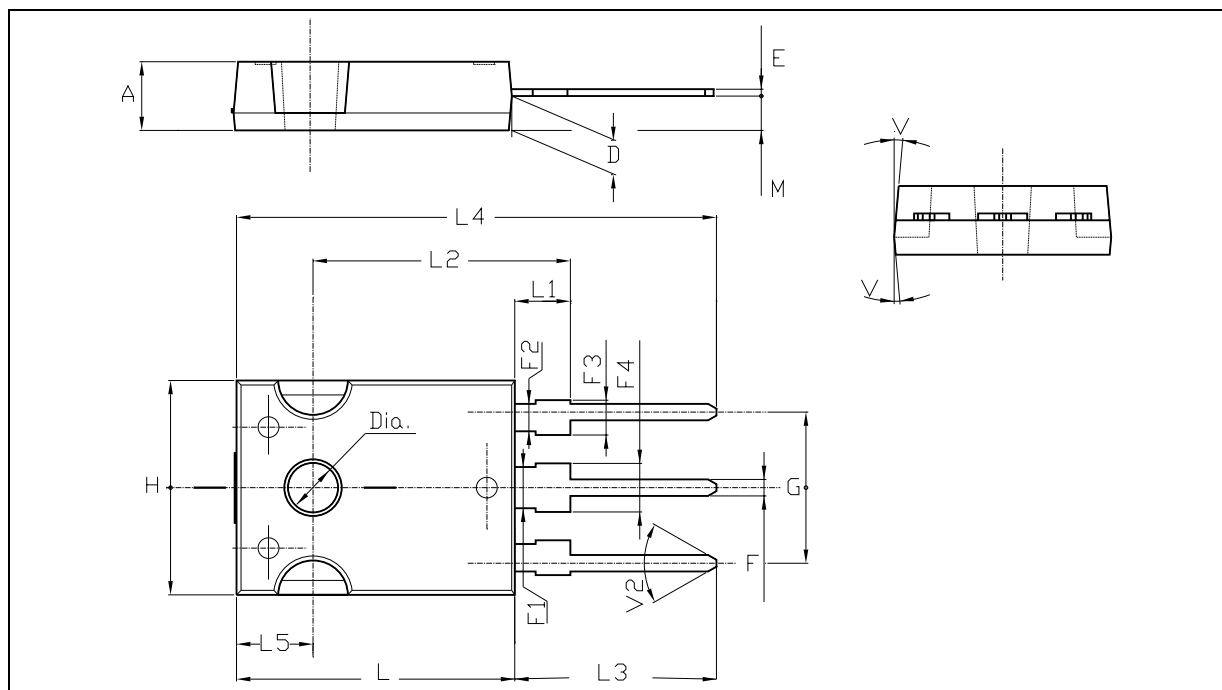


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
D	2.20		2.60	0.08		0.10
E	0.40		0.80	0.015		0.03
F	1		1.40	0.04		0.05
F1		3			0.11	
F2		2			0.07	
F3	2		2.40	0.07		0.09
F4	3		3.40	0.11		0.13
G		10.90			0.43	
H	15.45		15.75	0.60		0.62
L	19.85		20.15	0.78		0.79
L1	3.70		4.30	0.14		0.17
L2		18.50			0.72	
L3	14.20		14.80	0.56		0.58
L4		34.60			1.36	
L5		5.50			0.21	
M	2		3	0.07		0.11
V		5°			5°	
V2		60°			60°	
Dia	3.55		3.65	0.14		0.143



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