162-152

SGS-THOMSON MICROELECTRONICS

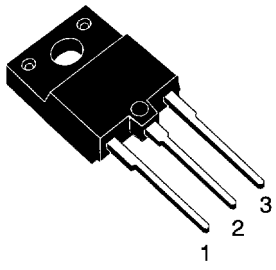
STH15NB50FI

N - CHANNEL ENHANCEMENT MODE MESH OVERLAY™ POWER MOSFET

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STH15NB50FI	500 V	< 0.36 Ω	14 6 A

- TYPICAL $R_{DS(on)}$ = 0.33 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED



ISOWATT218

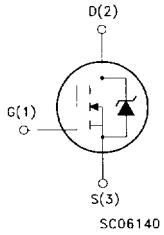
DESCRIPTION

Using the latest high voltage technology, SGS-Thomson has designed an advanced family of power Mosfets with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R_{DS}(on) per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics

APPLICATIONS

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

INTERNAL SCHEMATIC DIAGRAM



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	9 3	A
I_D	Drain Current (continuous) at T_c = 100 °C	5.5	A
I_{DM}(•)	Drain Current (pulsed)	58.4	A
P_{tot}	Total Dissipation at T_c = 25 °C	80	W
	Derating Factor	0 64	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	4	V/ns
V_{ISO}	Insulation Withstand Voltage (DC)	4000	V
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

1) I_{SD} ≤ 15A, di/dt ≤ 200 A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.56	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	30	oC/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.1	°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, $\delta < 1\%$)	14 6	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	850	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	30	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (T_c = 100 °C, pulse width limited by T_j max, $\delta < 1\%$)	9.2	A

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 x 0 8 T_c = 100 °C			25 250	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 30 V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250 µA	3	4	5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 7 5 A V_{GS} = 10 V I_D = 7.5 A T_c = 100°C		0.33	0.36 0.72	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10 V	14.6			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ I_D = 7.5 A	8	12		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		2600 330 40	3400 430 55	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	V_{DD} = 250 V I_D = 7 5 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 3)		24 14	34 20	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 400 V I_D = 15 A R_G = 47 Ω V_{GS} = 10 V (see test circuit, figure 5)		280		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 400 V I_D = 15 A V_{GS} = 10 V		60 15 27	80	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} = 400 V I_D = 15 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 5)		15 25 35	20 33 47	ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(•)	Source-drain Current Source-drain Current (pulsed)				14.6 58 4	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 15 A V_{GS} = 0			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 15 A di/dt = 100 A/µs V_{DD} = 100 V T_j = 150 °C (see test circuit, figure 5)		680 9 26		ns µC A

(*) Pulsed. Pulse duration = 300 µs, duty cycle 1.5 %
(•) Pulse width limited bysafe operating area

Safe Operating Area

Thermal Impedance