

162-152

**N - CHANNEL ENHANCEMENT MODE
MESH OVERLAY™ POWER MOSFET**

PRELIMINARY DATA

TYPE	V _{DS}	R _{DS(on)}	I _D
STH15NB50FI	500 V	< 0.36 Ω	14.6 A

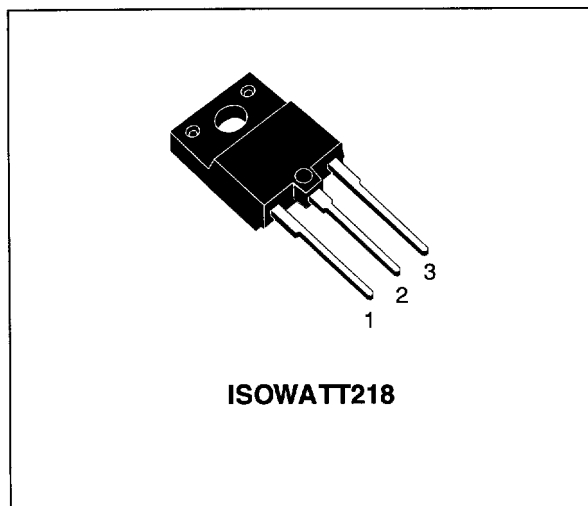
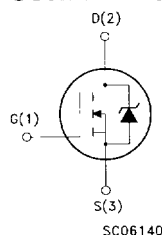
- TYPICAL R_{DS(on)} = 0.33 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

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} ≤ 1.5A, di/dt ≤ 200 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ T_{JMAX}

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THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	1.56	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	30	°C/W
R _{thc-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, δ < 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, δ < 1%)	30	mJ
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _J max, δ < 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)} x 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)} x R _{DS(on)max} I _D = 7.5 A	8	12		S
C _{iss}	Input Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		2600	3400	pF
C _{oss}	Output Capacitance			330	430	pF
C _{rss}	Reverse Transfer Capacitance			40	55	pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 250\text{ V}$ $I_D = 7.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		24 14	34 20	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 400\text{ V}$ $I_D = 15\text{ A}$ $R_G = 47\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 5)		280		A/ μ s
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 400\text{ V}$ $I_D = 15\text{ A}$ $V_{GS} = 10\text{ V}$		60 15 27	80	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 400\text{ V}$ $I_D = 15\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (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} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				14.6 58.4	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 15\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 15\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_J = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		680 9 26		ns μ C A

(*) Pulsed. Pulse duration = 300 μ s, duty cycle 1.5 %
 (•) Pulse width limited by safe operating area

Safe Operating Area

Thermal Impedance