

# STP12NB30 STP12NB30FP

## N - CHANNEL ENHANCEMENT MODE PowerMESH™ MOSFET

### PRELIMINARY DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STP3NB60	300 V	< 0.40 Ω	12A
STP12NB30FP	300 V	< 0.40 Ω	6.5 A

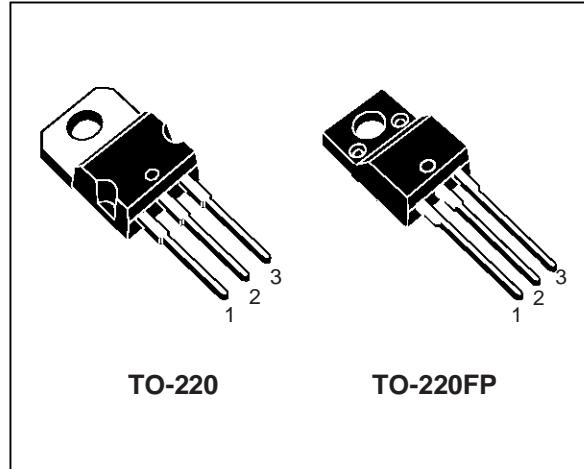
- TYPICAL R<sub>DS(on)</sub> = 0.34 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

### DESCRIPTION

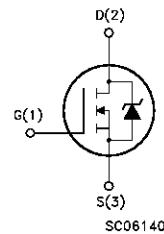
Using the latest high voltage MESH OVERLAY™ process, SGS-Thomson has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R<sub>DS(on)</sub> per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.

### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- UNINTERRUPTIBLE POWER SUPPLY(UPS)
- DC-DC & DC-AC CONVERTERS FOR TELECOM, INDUSTRIAL AND CONSUMER ENVIRONMENT



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP12NB30	STP12NB30FP	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	300	300	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	300	300	V
V <sub>GS</sub>	Gate-source Voltage	± 30		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C	12	6.5	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 100 °C	7.5	4	A
I <sub>DM(•)</sub>	Drain Current (pulsed)	48	48	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	125	35	W
	Derating Factor	1	0.28	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	5.5	5.5	V/ns
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	—	2000	V
T <sub>stg</sub>	Storage Temperature	-65 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature	150		°C

## STP12NB30/FP

---

### THERMAL DATA

			TO-220	TO220-FP	
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	1	3.57	°C/W
R <sub>thj-amb</sub> R <sub>thc-sink</sub>	Thermal Resistance Junction-ambient Thermal Resistance Case-sink	Max Typ	62.5 0.5	300	°C/W °C/W °C
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose				

### 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, δ < 1%)	12	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)	250	mJ

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 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	300			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 10	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 30 V			± 100	nA

ON (\*)

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> = 250 μA	3	4	5	V
R <sub>D(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V I <sub>D</sub> = 6 A		0.34	0.4	Ω
I <sub>D(on)</sub>	On State Drain Current	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>D(on)max</sub> V <sub>GS</sub> = 10 V	12			A

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>D(on)max</sub> I <sub>D</sub> = 6 A	3			S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>DS</sub> = 25 V f = 1 MHz V <sub>GS</sub> = 0		1000 200 25	1400 270 35	pF pF pF

**ELECTRICAL CHARACTERISTICS** (continued)

## SWITCHING ON

<b>Symbol</b>	<b>Parameter</b>	<b>Test Conditions</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
$t_{d(on)}$ $t_r$	Turn-on Time Rise Time	$V_{DD} = 150 \text{ V}$ $I_D = 6 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 10 \text{ V}$		20 10	28 14	ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 240 \text{ V}$ $I_D = 12 \text{ A}$ $V_{GS} = 10 \text{ V}$		29 11 12	40	nC nC nC

## SWITCHING OFF

<b>Symbol</b>	<b>Parameter</b>	<b>Test Conditions</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
$t_{r(v_{off})}$ $t_f$ $t_c$	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 240 \text{ V}$ $I_D = 12 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 10 \text{ V}$		10 10 20	14 14 28	ns ns ns

## SOURCE DRAIN DIODE

<b>Symbol</b>	<b>Parameter</b>	<b>Test Conditions</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
$I_{SD}$ $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				12 48	A A
$V_{SD} (\ast)$	Forward On Voltage	$I_{SD} = 12 \text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 12 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 100 \text{ V}$ $T_j = 150 \text{ }^\circ\text{C}$		250 2 16		ns $\mu\text{C}$ A

(\ast) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area