



STP12NB30 STP12NB30FP

N-CHANNEL 300V - 0.34Ω - 12A TO-220/TO-220FP

PowerMESH™ MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP12NB30	300 V	< 0.40 Ω	12A
STP12NB30FP	300 V	< 0.40 Ω	12A

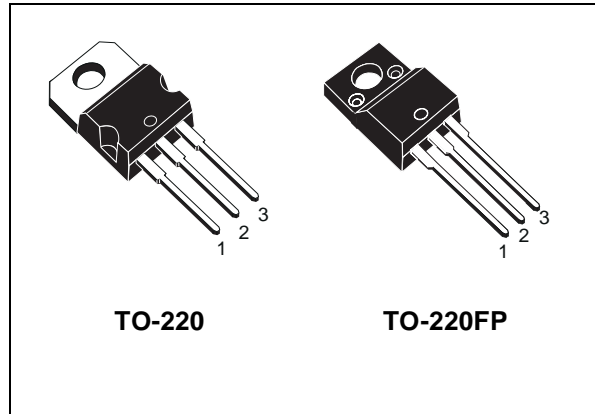
- TYPICAL R_{DS(on)} = 0.34Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics 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

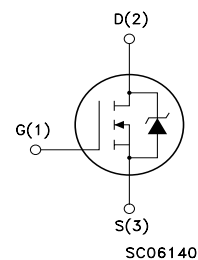
- HIGH CURRENT, HIGH SPEED SWITCHING
- UNINTERRUPTIBLE POWER SUPPLY (UPS)
- DC-DC & DC-AC CONVERTERS FOR TELECOM, INDUSTRIAL AND CONSUMER ENVIRONMENT



TO-220

TO-220FP

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP12NB30	STP12NB30FP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	300		V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	300		V
V _{GS}	Gate- source Voltage	± 30		V
I _D	Drain Current (continuous) at T _C = 25°C	12	12 (*)	A
I _D	Drain Current (continuous) at T _C = 100°C	7.5	7.5 (*)	A
I _{DM} (●)	Drain Current (pulsed)	48	48 (*)	A
P _{TOT}	Total Dissipation at T _C = 25°C	125	35	W
	Derating Factor	1	0.28	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	5.5		V/ns
V _{ISO}	Insulation Withstand Voltage (DC)	--	2500	V
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature			

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 60A, di/dt ≤ 400 A/μs, V_{DD} ≤ 24V, T_j ≤ T_{JMAX}
(*) Limited only by maximum temperature allowed

STP12NB30 - STP12NB30FP

THERMAL DATA

			TO-220	TO-220FP	
Rthj-case	Thermal Resistance Junction-case	Max	1	3.57	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	62.5		°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} = 30 V)	250	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 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	300			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} = ± 20V			±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 = 6 A		0.34	0.4	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		7.2		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1050		pF
C _{oss}	Output Capacitance			200		pF
C _{rss}	Reverse Transfer Capacitance			25		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 150\text{ V}$, $I_D = 6\text{ A}$		18		ns
t_r	Rise Time	$R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		8		ns
Q_g	Total Gate Charge	$V_{DD} = 240\text{ V}$, $I_D = 12\text{ A}$,		29	40	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10\text{ V}$		11		nC
Q_{gd}	Gate-Drain Charge			12		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 240\text{ V}$, $I_D = 12\text{ A}$		10		ns
t_f	Fall Time	$R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$		10		ns
t_c	Cross-over Time	(see test circuit, Figure 3)		18		ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				12	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				48	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 12\text{ A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 12\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$,		250		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 100\text{ V}$, $T_j = 150^\circ\text{C}$		2		μC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		16		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by safe operating area.