



STP7NB80 STP7NB80FP

N - CHANNEL 800V - 1.2Ω - 6.5A - TO-220/TO-220FP
PowerMESH™ MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP7NB80	800 V	< 1.5 Ω	6.5 A
STP7NB80FP	800 V	< 1.5 Ω	6.5 A

- TYPICAL R_{DS(on)} = 1.2 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, 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

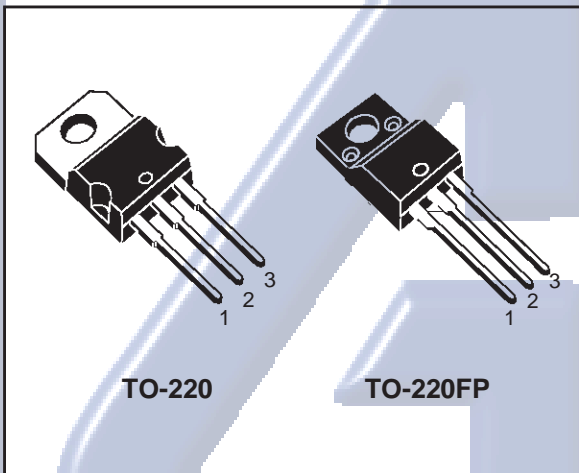
- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE

ABSOLUTE MAXIMUM RATINGS

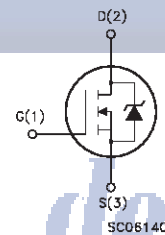
Symbol	Parameter	Value		Unit
		STP7NB80	STP7NB80FP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	800		V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	800		V
V _{GS}	Gate-source Voltage	± 30		V
I _D	Drain Current (continuous) at T _c = 25 °C	6.5	6.5 (*)	A
I _D	Drain Current (continuous) at T _c = 100 °C	4.1	4.1 (*)	A
I _{DM} (•)	Drain Current (pulsed)	26	26	A
P _{tot}	Total Dissipation at T _c = 25 °C	135	40	W
	Derating Factor	1.08	0.32	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	4.5	4.5	V/ns
V _{ISO}	Insulation Withstand Voltage (DC)	--	2000	°C
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature	150		°C

(•) Pulse width limited by safe operating area

(*) Limited only maximum temperature allowed



INTERNAL SCHEMATIC DIAGRAM



STP7NB80/FP**THERMAL DATA**

			TO-220	TO-220FP	
R _{thj-case}	Thermal Resistance Junction-case	Max	0.92	3.13	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	62.5		°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Typ	0.5		°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)	6.5	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	400	mJ

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	800			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating T _c = 125 °C			1 50	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} = 10V I _D = 3.2 A		1.2	1.5	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)max} V _{GS} = 10 V	6.5			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} I _D = 3.2 A	1.5	6.5		S
C _{iss}	Input Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		1400		pF
C _{oss}	Output Capacitance			180		pF
C _{rss}	Reverse Transfer Capacitance				20	

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ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 400\text{ V}$ $I_D = 3.5\text{ A}$		20		ns
t_r	Rise Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		10		ns
Q_g	Total Gate Charge	$V_{DD} = 640\text{ V}$ $I_D = 7\text{ A}$ $V_{GS} = 10\text{ V}$		40	52	nC
Q_{gs}	Gate-Source Charge	$R_G = 4.7\ \Omega$		10		nC
Q_{gd}	Gate-Drain Charge			18		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$	Off-voltage Rise Time	$V_{DD} = 640\text{ V}$ $I_D = 7\text{ A}$		15		ns
t_f	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 5)		15		ns
t_c	Cross-over Time			25		ns

SOURCE DRAIN DIODE

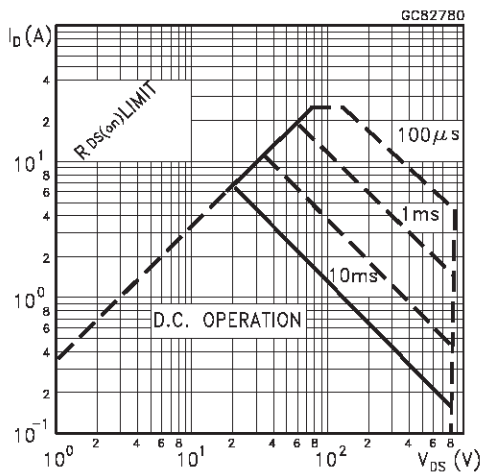
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				6.5	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				26	A
$V_{SD}(\ast)$	Forward On Voltage	$I_{SD} = 6.5\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 7\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		750		ns
Q_{rr}	Reverse Recovery Charge			7.10		μC
I_{RRM}	Reverse Recovery Current			19		A

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(•) Pulse width limited by safe operating area

Electronica S.A. de C.V.

Safe Operating Area for TO-220



Safe Operating Area for TO-220FP

