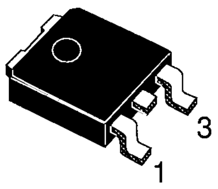
STD5NB20

N - CHANNEL 200V - 0.70Ω - 5A DPAK
PowerMESH™ MOSFET

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STD5NB20	200 V	< 0.8 Ω	5 A

- TYPICAL $R_{DS(on)}$ =0.7 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- FOR TROUGH-HOLE VERSION CONTACT SALES OFFICE



DPAK
TO-252
(Suffix "T4")

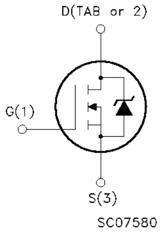
DESCRIPTION

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 EFFICIENCY DC-DC CONVERTERS
- 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)	200	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	200	V
V_{GS}	Gate-source Voltage	± 30	V
I_D	Drain Current (continuous) at T_c = 25 °C	5	A
I_D	Drain Current (continuous) at T_c = 100 °C	3	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	20	A
P_{tot}	Total Dissipation at T_c = 25 °C	45	W
	Derating Factor	0.36	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	5.5	V/ns
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

(1) $I_{SD} \leq 5A$, $di/dt \leq 200$ A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case Max	2.78	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	100	oC/W
$R_{thc-sink}$	Thermal Resistance Case-sink Typ	1.5	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	275	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	5	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	40	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	200			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 =2.5 A		0.7	0.8	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10 V	5			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 =2.5 A	1	2		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		260 76 10.5	350 100 15	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} = 100 V I_D =3. 5 A R_G = 4.7 Ω V_{GS} = 10 V		10 13	13.5 18	ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 160 V I_D =7 A V_{GS} = 10 V		12 8.5 3	16	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} = 160 V I_D = 7 A R_G = 4.7 Ω V_{GS} = 10 V		10 8 17	14 11 23	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)				5 20	A A
V_{SD} (∗)	Forward On Voltage	I_{SD} = 5 A V_{GS} = 0			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 7 A di/dt = 100 A/µs V_{DD} = 50 V T_j = 150 °C		145 650 9	200 878 12.12	ns nC A

(∗) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(•) Pulse width limited by safe operating area

TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039