STW34NB20

N-CHANNEL 200V - 0.062 Ω - 34A TO-247
PowerMESH™ MOSFET

Table 1. General Features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STW34NB20	200 V	< 0.075 Ω	34 A

FEATURES SUMMARY

- TYPICAL $R_{DS(on)}$ = 0.062 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

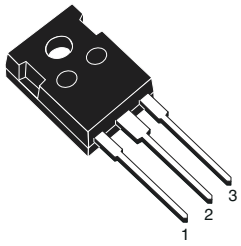
DESCRIPTION

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

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

Figure 1. Package



TO-247

Figure 2. Internal Schematic Diagram

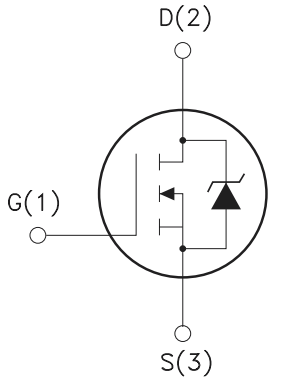


Table 2. Order Codes

Part Number	Marking	Package	Packaging
STW34NB20	W34NB20	TO-247	TUBE

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Table 3. 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 (cont.) at T_C = 25 °C	34	A
I_D	Drain Current (cont.) at T_C = 100 °C	21	A
I_{DM} (1)	Drain Current (pulsed)	136	A
P_{tot}	Total Dissipation at T_C = 25 °C	180	W
	Derating Factor	1.44	W°/C
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

Note: 1. Pulse width limited by safe operating area

Table 4. Thermal Data

Symbol	Parameter		Value	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	0.69	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	30	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose		300	°C

Table 5. Avalanche Characteristics

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, δ < 1%)	34	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C; I_D = I_{AR}; V_{DD} = 50 V)	650	mJ

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ELECTRICAL CHARACTERISTICS (T_{case} = 25°C unless otherwise specified)

Table 6. 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	V_{DS} = Max Rating			1	µA
	Drain Current (V_{GS} = 0)	V_{DS} = Max Rating Tc = 125 °C			10	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 30 V			± 100	nA

Table 7. On (1)

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 = 17 A		0.062	0.075	Ω

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

Table 8. Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$; I_D = 17 A	8	17		S
C_{iss}	Input Capacitance	V_{DS} = 25 V; f = 1 MHz; V_{GS} = 0		2400	3300	pF
C_{oss}	Output Capacitance			650	900	pF
C_{rss}	Reverse Transfer Capacitance			90	130	pF

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

Table 9. Switching On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
td(on)	Turn-on Time	V_{DD} = 100 V; I_D = 17 A; R_G = 4.7 Ω		30	40	ns
tr	Rise Time	V_{GS} = 10 V (see test circuit, Figure 16)		40	55	ns
Q_g	Total Gate Charge	V_{DD} = 160 V; I_D = 34 A; V_{GS} = 10 V		60	80	nC
Q_{gs}	Gate-Source Charge			19		nC
Q_{gd}	Gate-Drain Charge			29		nC

Table 10. Switching Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 160 V; I_D = 34 A; R_G = 4.7 Ω		17	23	ns
t_f	Fall Time	V_{GS} = 10 V (see test circuit, Figure 18)		18	24	ns
t_c	Cross-over Time			35	47	ns

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Table 11. Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				34	A
I_{SDM} (1)	Source-drain Current (pulsed)				136	A
V_{SD} (2)	Forward On Voltage	I_{SD} = 34 A; V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 34 A; di/dt = 100 A/µs			290	ns
Q_{rr}	Reverse RecoveryCharge	V_{DD} = 50 V; T_j = 150 °C (see test circuit, Figure 18)			2.7	µC
I_{RRAM}	Reverse RecoveryCharge				18.5	A

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

Figure 3. Safe Operating Area

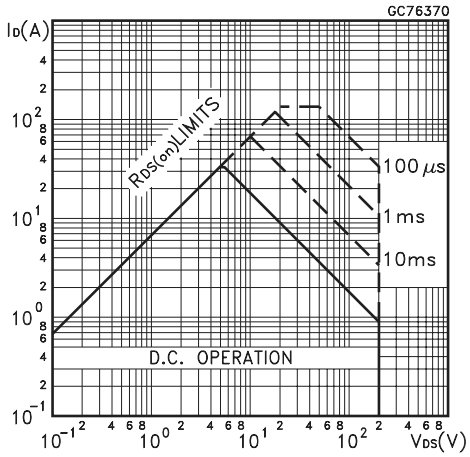


Figure 4. Thermal Impedance

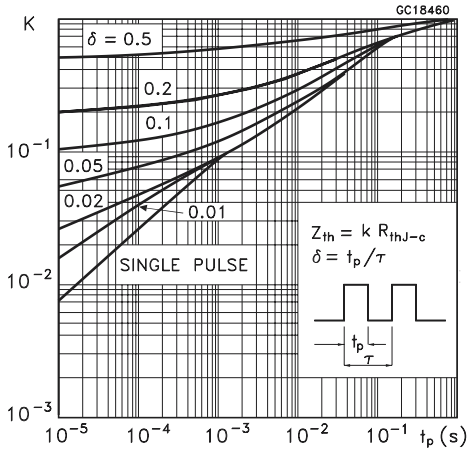


Figure 5. Output Characteristics

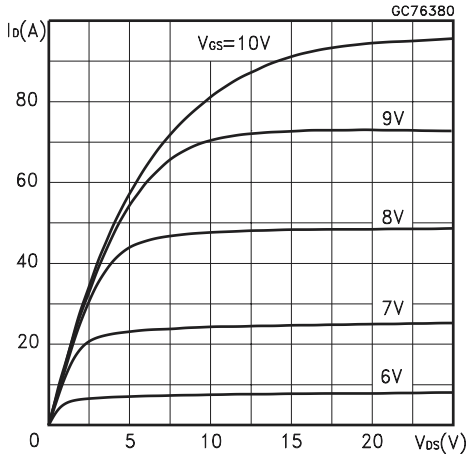
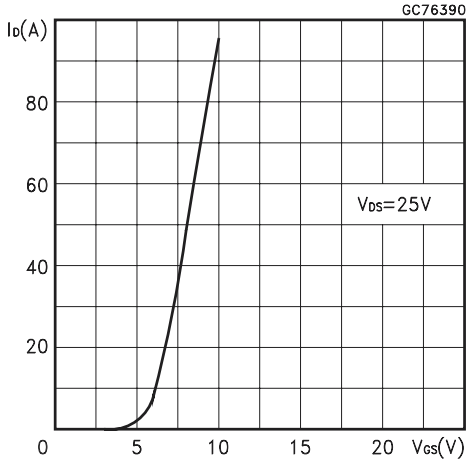


Figure 6. Transfer Characteristics



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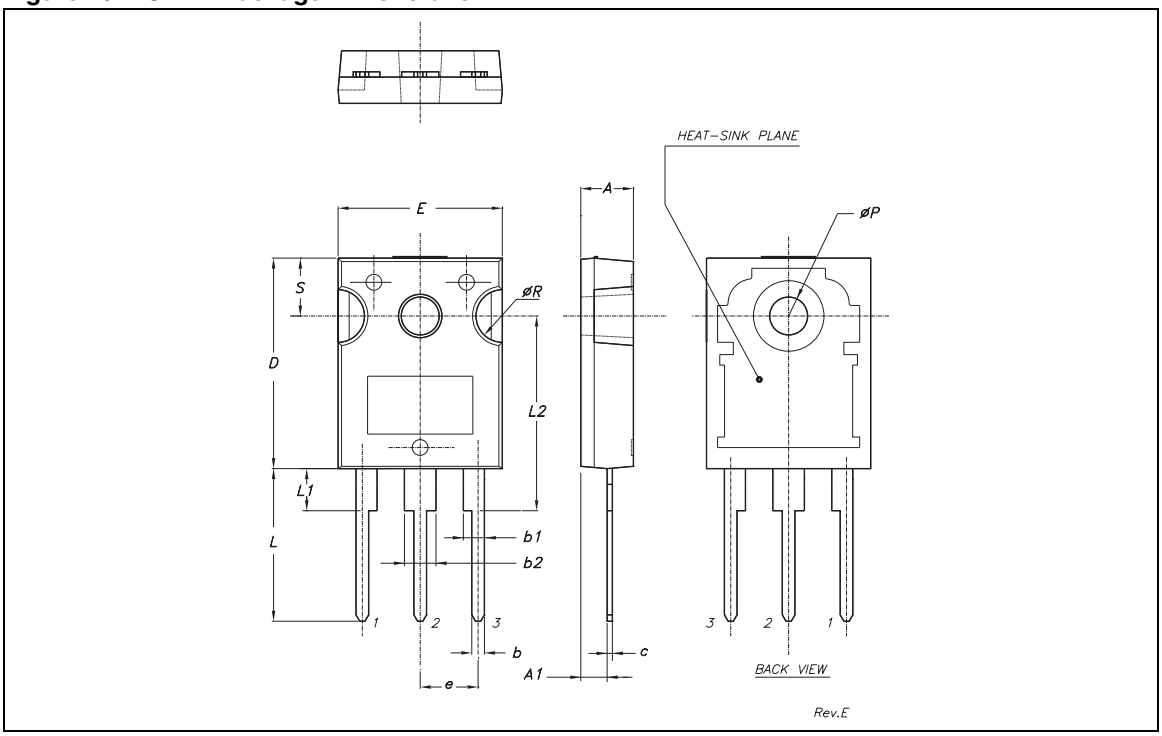
PACKAGE MECHANICAL

Table 12. TO-247 Mechanical Data

Symbol	millimeters			inches		
	Min	Typ	Max	Min	Typ	Max
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
ØP	3.55		3.65	0.140		0.143
ØR	4.50		5.50	0.177		0.216
S		5.50			0.216	

Figure 19. TO-247 Package Dimensions



Note: Drawing is not to scale.

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