

STB200NF04 - STB200NF04-1

N-CHANNEL 40V - 120 A - 3.3 mΩ TO-220/D²PAK/I²PAK
STripFET™II MOSFET

Table 1: General Features

Type	V _{DSS}	R _{DS(on)}	I _D	P _w
STB200NF04	40 V	< 0.0037 Ω	120 A	310 W
STB200NF04-1	40 V	< 0.0037 Ω	120 A	310 W
STP200NF04	40 V	< 0.0037 Ω	120 A	310 W

- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED

DESCRIPTION

This MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED
- AUTOMOTIVE

Figure 1: Package

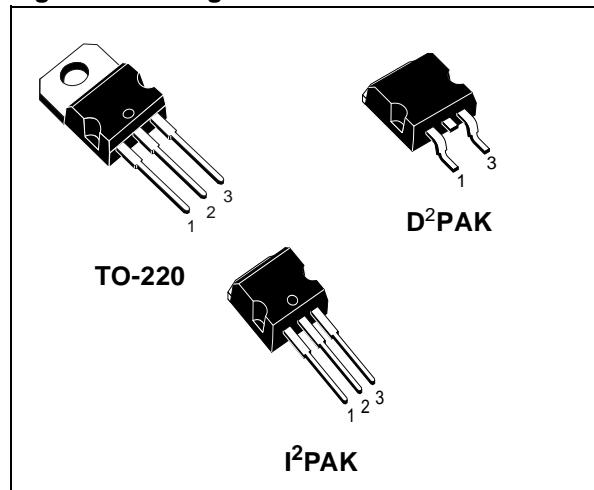


Figure 2: Internal Schematic Diagram

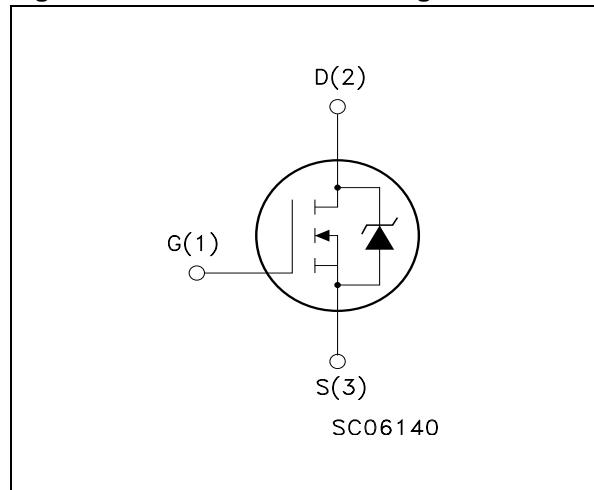


Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STB200NF04T4	B200NF04	D ² PAK	TAPE & REEL
STB200NF04-1	B200NF04	I ² PAK	TUBE
STP200NF04	P200NF04	TO-220	TUBE

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Table 3: Absolute Maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage ($V_{GS} = 0$)	40	V
V_{DGR}	Drain-gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	40	V
V_{GS}	Gate- source Voltage	± 20	V
I_D (#)	Drain Current (continuos) at $T_C = 25^\circ\text{C}$	120	A
I_D (#)	Drain Current (continuos) at $T_C = 100^\circ\text{C}$	120	A
I_{DM} (•)	Drain Current (pulsed)	480	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	310	W
	Derating Factor	2.07	W/ $^\circ\text{C}$
dv/dt (1)	Peak Diode Recovery voltage slope	1.5	V/ns
EAS (2)	Single Pulse Avalanche Energy	1.3	J
T_j T_{stg}	Operating Junction Temperature Storage Temperature	-55 to 175	$^\circ\text{C}$

(•) Pulse width limited by safe operating area

(1) $I_{SD} \leq 120\text{A}$, $di/dt \leq 500\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$.

(2) Starting $T_j = 25^\circ\text{C}$, $I_d = 60\text{A}$, $V_{DD}=30 \text{ V}$

(#) Current Limited by Package

Table 4: Thermal Data

		TO-220 / I ² PAK / D ² PAK	
R _{thj-case}	Thermal Resistance Junction-case Max	0.48	$^\circ\text{C/W}$
R _{thj-pcb}	Thermal Resistance Junction-pcb Max	(see Figure 17)	$^\circ\text{C/W}$
R _{thj-amb}	Thermal Resistance Junction-ambient (Free air) Max	62.5	$^\circ\text{C/W}$
T_l	Maximum Lead Temperature For Soldering Purpose	300	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)

Table 5: On/Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250 \mu\text{A}$, $V_{GS} = 0$	40			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{V}$, $I_D = 90 \text{ A}$		3.3	3.7	m Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)**Table 6: Dynamic**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} = 15 \text{ V}$, $I_D = 90 \text{ A}$		150		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $f = 1 \text{ MHz}$, $V_{GS} = 0$		5100		pF
C_{oss}	Output Capacitance			1600		pF
C_{rss}	Reverse Transfer Capacitance			600		pF

Table 7: Switching On/Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 20 \text{ V}$, $I_D = 90 \text{ A}$		30		ns
t_r	Rise Time	$R_G = 4.7\Omega$ $V_{GS} = 10 \text{ V}$		320		ns
$t_{d(off)}$	Turn-off Delay Time	(see Figure 20)		140		ns
t_f	Fall Time			120		ns
Q_g	Total Gate Charge	$V_{DD} = 20\text{V}$, $I_D = 120 \text{ A}$,		170		nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 10\text{V}$		30		nC
Q_{gd}	Gate-Drain Charge	(see Figure 23)		62		nC

Table 8: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				120	A
I_{SDM} (2)	Source-drain Current (pulsed)				480	A
V_{SD} (1)	Forward On Voltage	$I_{SD} = 120 \text{ A}$, $V_{GS} = 0$			1.3	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 120 \text{ A}$, $di/dt = 100\text{A}/\mu\text{s}$		85		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 30\text{V}$, $T_j = 150^\circ\text{C}$		190		nC
I_{RRM}	Reverse Recovery Current	(see Figure 21)		4.5		A

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

(2) Pulse width limited by safe operating area.

Figure 3: Safe Operating Area

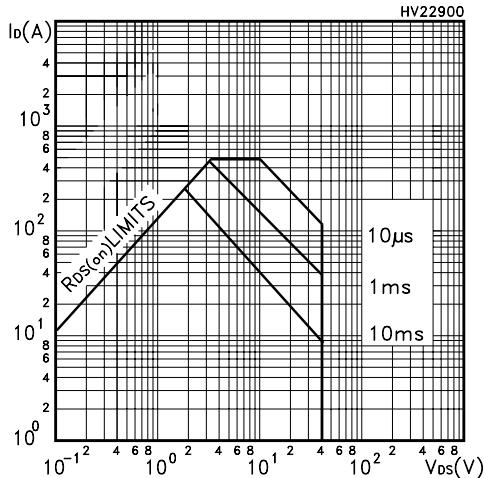


Figure 4: Output Characteristics

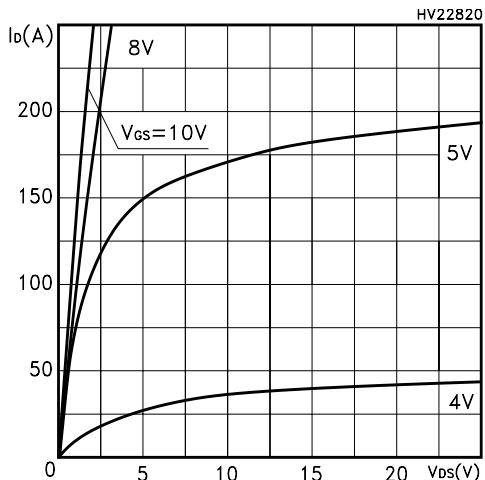


Figure 5: Transconductance

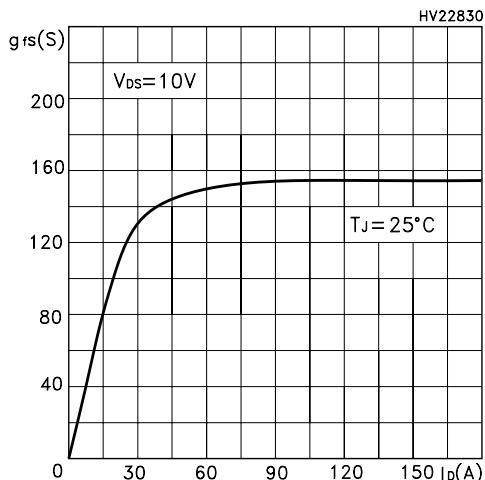


Figure 6: Thermal Impedance

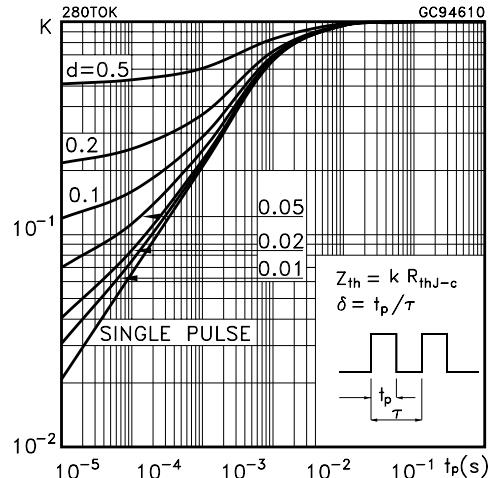


Figure 7: Transfer Characteristics

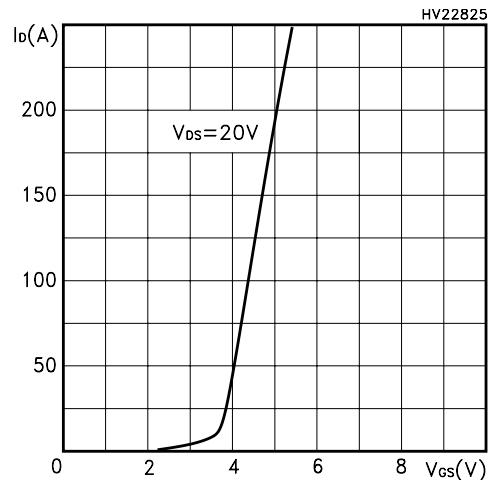


Figure 8: Static Drain-source On Resistance

