

Table 1: General Features

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB200NF04L	40 V	3.5 mΩ	120 A
STP200NF04L	40 V	3.8 mΩ	120 A
STB200NF04L-1	40 V	3.8 mΩ	120 A

- TYPICAL R_{DS(on)} = 3mΩ
- 100% AVALANCHE TESTED
- LOW THERESHOLD DRIVE

DESCRIPTION

This MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" stripbased 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. This new improved device has been specifically designed for Automotive applications.

APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED

Figure 1: Package

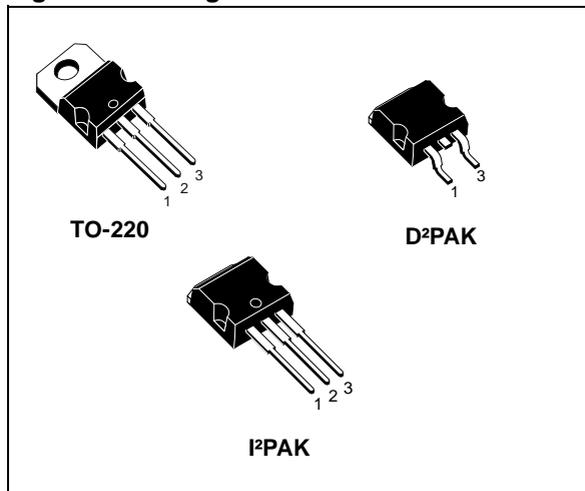


Figure 2: Internal Schematic Diagram

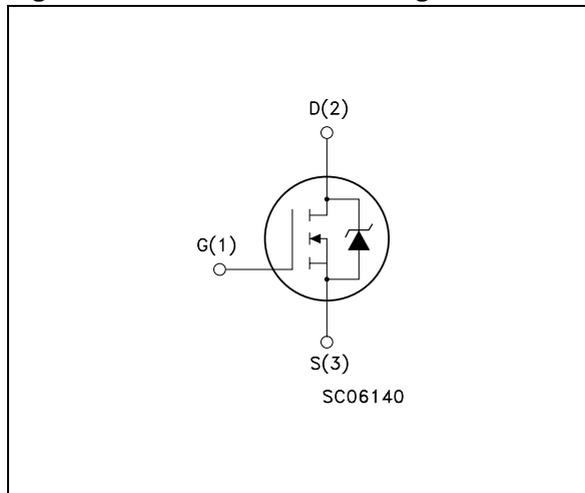


Table 2: Order Codes

PART NUMBER	MARKING	PACKAGE	PACKAGING
STP200NF04L	P200NF04L	TO-220	TUBE
STB200NF04L	B200NF04L	D ² PAK	TAPE & REEL
STB200NF04L-1	B200NF04L	I ² PAK	TUBE

Table 3: Absolute Maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage ($V_{GS} = 0$)	40	V
V_{GDR}	Drain-gate Voltage ($R_{GS}=20\text{ K}\Omega$)	40	V
V_{GS}	Gate- source Voltage	± 16	V
$I_D (**)$	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	120	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	120	A
$I_{DM} (2)$	Drain Current (pulsed)	480	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	300	W
	Derating Factor	2	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	3.6	V/ns
$E_{AS} (3)$	Single Pulse Avalanche Energy	1.4	J
T_{stg}	Storage Temperature	-55 to 175	°C
T_j	Max. Operating Junction Temperature		

(1) $I_{SD} \leq 100\text{ A}$, $di/dt \leq 240\text{ A}/\mu\text{s}$, $V_{DD} \leq 32$, $T_j \leq T_{JMAX}$

(2) Pulse width limited by safe operating area.

(3) Starting $T_j = 25^\circ\text{C}$, $I_{AR} = 50\text{ A}$, $V_{DD} = 30\text{ V}$

(**) Current limited by Package

Table 4: Thermal Data

			TO-220/I ² PAK	D ² PAK	Unit
Rthj-case	Thermal Resistance Junction-case	Max	0.50		°C/W
Rthj-pcb (*)	Thermal Resistance Junction-pcb	Max		35	°C/W
Rthja	Thermal Resistance Junction-ambient	Max	62.5	--	
T_l	Maximum Lead Temperature For Soldering Purpose		300	--	°C

(*)When mounted on 1 inch² FR4 2oz Cu

ELECTRICAL CHARACTERISTICS ($T_{CASE} = 25^\circ\text{C}$ 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 ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_D = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			1 10	μA μA	
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 16\text{V}$			± 100	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	1		4	V	
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$, $I_D = 50\text{ A}$ $V_{GS} = 5\text{ V}$, $I_D = 50\text{ A}$	TO-220 I²PAK		3.3 3.8	3.8 4.6	m Ω m Ω
		$V_{GS} = 10\text{ V}$, $I_D = 50\text{ A}$ $V_{GS} = 5\text{ V}$, $I_D = 50\text{ A}$	D²PAK		3.0 3.5	3.5 4.3	m Ω m Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 6: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (4)	Forward Transconductance	$V_{DS} = 15\text{ V}$, $I_D = 20\text{ A}$		60		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		6400 1300 190		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time	$V_{DD} = 20\text{ V}$, $I_D = 50\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 16)		37 270 90 80		ns ns ns ns
$t_{r(Voff)}$ t_f t_c	Turn-off Delay Time Fall Time Cross-over Time	$V_{clamp} = 32\text{ V}$, $I_D = 100\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 17)		85 125 160		ns ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 32\text{ V}$, $I_D = 100\text{ A}$, $V_{GS} = 4.5\text{ V}$ (see Figure 19)		72 20 28.5	90	nC nC nC

Table 7: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				100	A
I_{SDM} (1)	Source-drain Current (pulsed)				400	A
V_{SD} (4)	Forward On Voltage	$I_{SD} = 160\text{ A}$, $V_{GS} = 0$			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 100\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 20\text{ V}$, $T_j = 150^\circ\text{C}$ (see Figure 16)		88 240 5.5		ns nC A

(1) Pulse width limited by safe operating area

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

Figure 3: Safe Operating Area

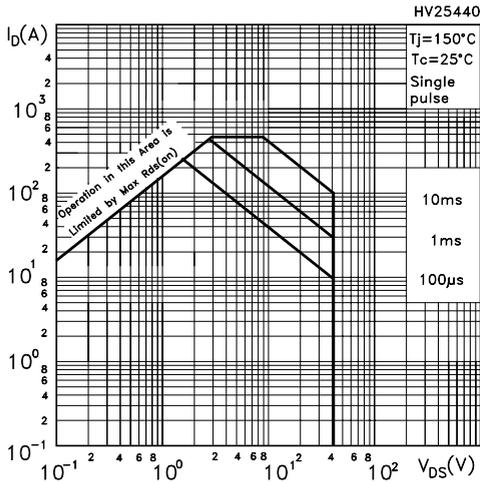


Figure 4: Output Characteristics

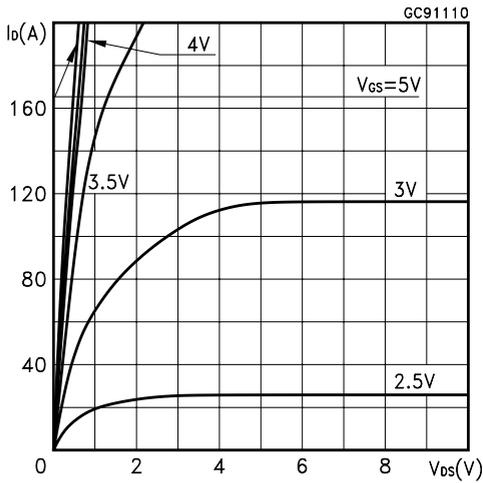


Figure 5: Transconductance

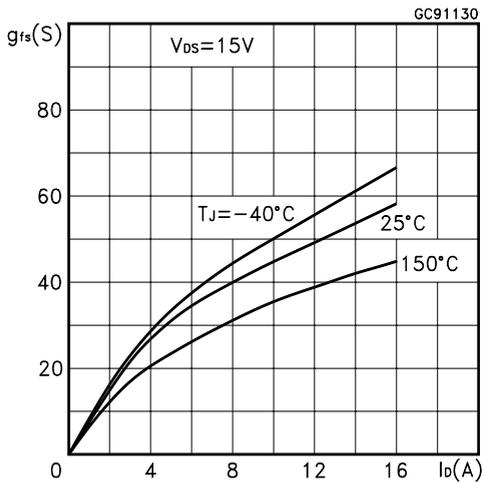


Figure 6: Thermal Impedance

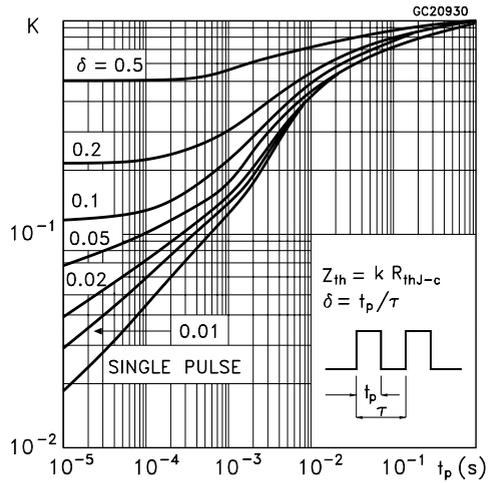


Figure 7: Transfer Characteristics

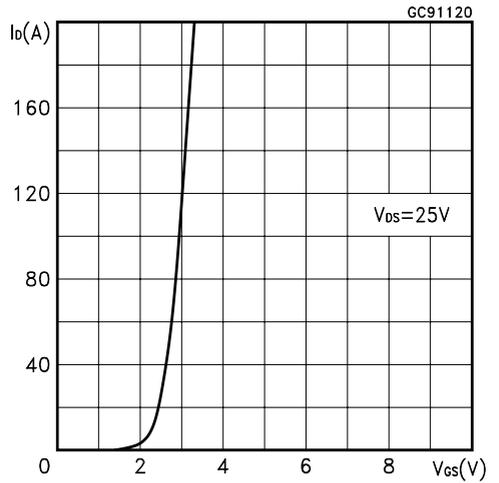


Figure 8: Static Drain-source On Resistance

