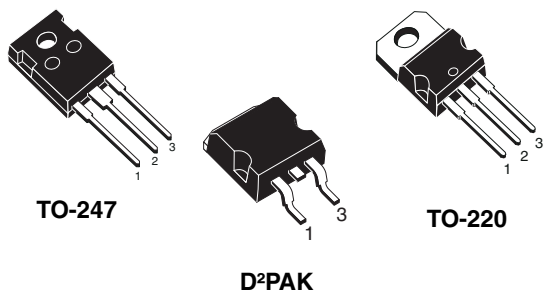
STP30NF20 - STB30NF20
STW30NF20

N-channel 200V - 0.065Ω - 30A - TO-220/TO-247/D^{2}PAK
Low gate charge STripFET™ Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D	P_{TOT}
STP30NF20	200V	0.075Ω	30A	125W
STW30NF20	200V	0.075Ω	30A	125W
STB30NF20	200V	0.075Ω	30A	125W

- Gate charge minimized
- 100% avalanche tested
- Excellent figure of merit (R_{DS}*Q_g)
- Very good manufactuing repeability
- Very low intrinsic capacitances



Application

- Switching applications

Description

This Power MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters.

Figure 1. Internal schematic diagram

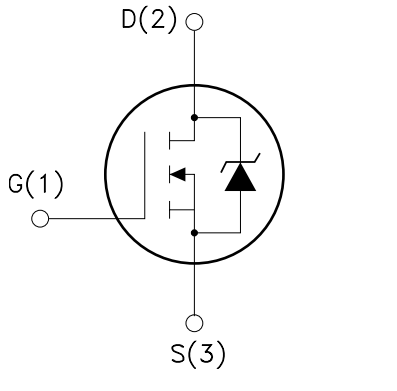


Table 1. Device summary

Order codes	Marking	Package	Packaging
STP30NF20	30NF20	TO-220	Tube
STW30NF20	30NF20	TO-247	Tube
STB30NF20	30NF20	D²PAK	Tape & reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	200	V
V_{GS}	Gate-source voltage	±20	V
I_D	Drain current (continuous) at T_C = 25°C	30	A
I_D	Drain current (continuous) at T_C=100°C	19	A
I_{DM}(1)	Drain current (pulsed)	120	A
P_{TOT}	Total dissipation at T_C = 25°C	125	W
	Derating factor	1	W/°C
dv/dt(2)	Peak diode recovery voltage slope	10	V/ns
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 150	°C
T_l	Maximum lead temperature for soldering purpose	300	°C

1. Pulse width limited by safe operating area
2. $I_{SD} \leq 30A$, di/dt $\leq$ 200A/µs, V_{DD} = 80%$V_{(BR)DSS}$

Table 3. Thermal data

Symbol	Parameter	TO-220/ D²PAK	TO-247	Unit
R_{thJC}	Thermal resistance junction-case max	1		°C/W
R_{thJA}	Thermal resistance junction-ambient max	62.5	50	°C/W

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by Tjmax)	30	A
E_{AS}	Single pulse avalanche energy (starting Tj=25°C, I_D=I_{AR}, V_{DD}=50V)	140	mJ

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1mA, V_{GS}= 0	200			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating,Tc=125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 15A		0.065	0.075	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} =15V, I_D = 15A		20		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25V, f=1 MHz, V_{GS}=0		1597 320 43		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=160V, I_D = 30A V_{GS} =10V		38 8 18		nC nC nC

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

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD}=100V, I_D=15A, R_G=4.7Ω, V_{GS}=10V		35 15.7		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD}=100V, I_D=15A, R_G=4.7Ω, V_{GS}=10V		38 8.8		ns ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)				30 120	A A
V_{SD}(2)	Forward on voltage	I_{SD}=30A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=30A, di/dt = 100A/µs, V_{DD}=100 V, Tj=25°C		155 0.96 12.4		ns µC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=30A, di/dt = 100A/µs, V_{DD}=100 V, Tj=150°C		194 1.42 14.6		ns µC A

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area for TO-247

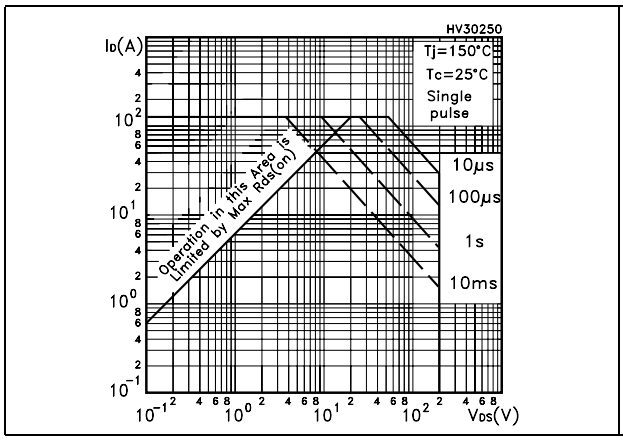


Figure 3. Thermal impedance for TO-247

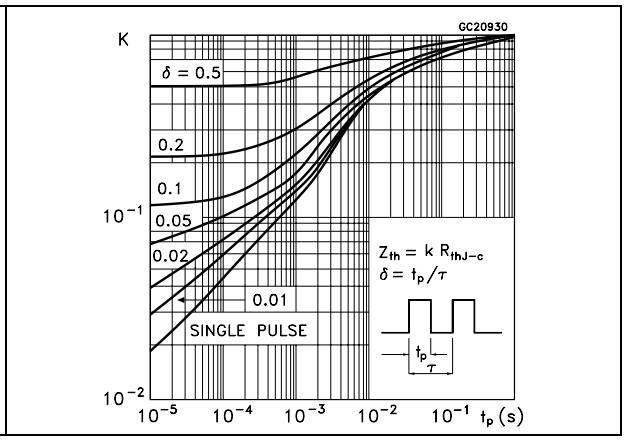


Figure 4. Safe operating area for TO-220/ D²PAK

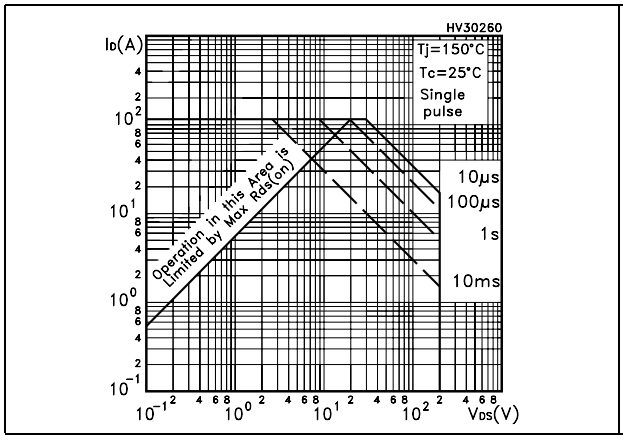


Figure 5. Thermal impedance for TO-220/ D²PAK

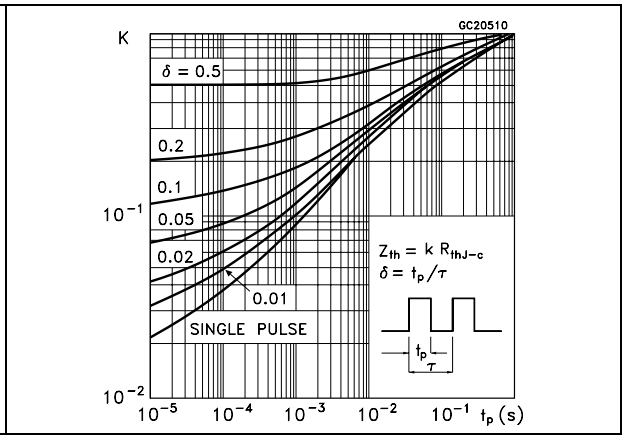


Figure 6. Output characteristics

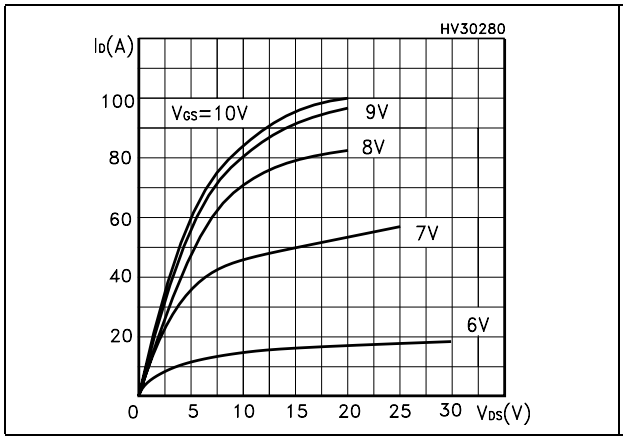


Figure 7. Transfer characteristics