

# STD80N10F7, STF80N10F7, STH80N10F7-2, STP80N10F7

N-channel 100 V, 0.008  $\Omega$  typ., 80 A STripFET™ VII DeepGATE™  
Power MOSFETs in DPAK, TO-220FP, H<sup>2</sup>PAK-2 and TO-220

Datasheet - production data

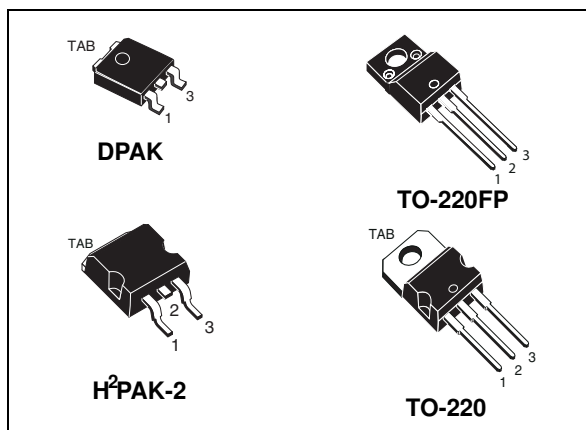
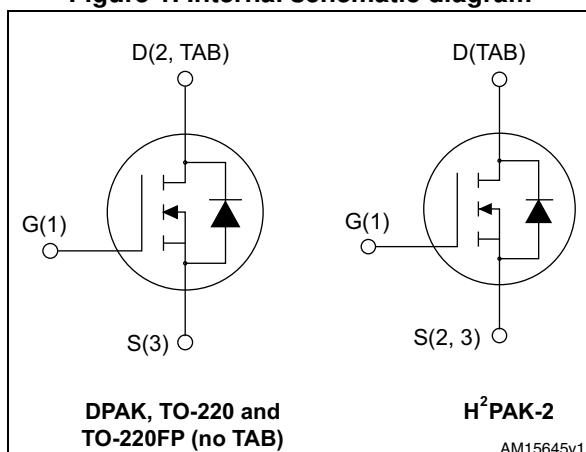


Figure 1. Internal schematic diagram



## Features

Order codes	$V_{DS@T_{Jmax}}$	$R_{DS(on)max}$	$I_D$	$P_{TOT}$
STD80N10F7	100 V	0.01 $\Omega$	70 A	85 W
STF80N10F7		0.01 $\Omega$	40 A	30 W
STH80N10F7-2		0.0095 $\Omega$	80 A	110 W
STP80N10F7		0.01 $\Omega$		

- Extremely low gate charge
- Ultra low on-resistance
- Low gate input resistance

## Applications

- Switching applications

## Description

These devices utilize the 7<sup>th</sup> generation of design rules of ST's proprietary STripFET™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest  $R_{DS(on)}$  in all packages.

Table 1. Device summary

Order codes	Marking	Package	Packaging
STD80N10F7	80N10F7	DPAK	Tape and reel
STF80N10F7		TO-220FP	Tube
STH80N10F7-2		H <sup>2</sup> PAK-2	Tape and reel
STP80N10F7		TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value			Unit
		DPAK	H <sup>2</sup> PAK-2 TO-220	TO-220FP	
V <sub>DS</sub>	Drain-source voltage	100			V
V <sub>GS</sub>	Gate-source voltage	± 20			V
I <sub>D</sub>	Drain current (continuous) at T <sub>C</sub> = 25 °C	70	80	40	A
I <sub>D</sub>	Drain current (continuous) at T <sub>C</sub> = 100 °C	48	54	30	A
I <sub>DM</sub> <sup>(1)</sup>	Drain current (pulsed)	280	320	160	A
P <sub>TOT</sub>	Total dissipation at T <sub>C</sub> = 25 °C	85	110	30	W
T <sub>stg</sub>	Storage temperature	- 55 to 175			°C
T <sub>j</sub>	Max. operating junction temperature				

1. Pulse width limited by safe operating area.

**Table 3. Thermal data**

Symbol	Parameter	Value				Unit
		DPAK	TO-220FP	H <sup>2</sup> PAK-2	TO-220	
R <sub>thj-pcb</sub>	Thermal resistance junction-pcb max	50		35		°C/W
R <sub>thj-amb</sub>	Thermal resistance junction-ambient max		62.5		62.5	°C/W
R <sub>thj-case</sub>	Thermal resistance junction-case max	1.76	5	1.36		°C/W

## 2 Electrical characteristics

( $T_C = 25\text{ °C}$  unless otherwise specified)

**Table 4. On /off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\ \mu A, V_{GS} = 0$	100			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = 100\text{ V}$ $V_{DS} = 100\text{ V}, T_C = 125\text{ °C}$			1 100	$\mu A$ $\mu A$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = 20\text{ V}$			100	$\mu A$
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu A$	2.5	3.5	4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	for DPAK, TO-220 and TO-220FP: $I_D = 40\text{ A}, V_{GS} = 10\text{ V}$		0.0085	0.010	$\Omega$
		for H <sup>2</sup> PAK-2: $V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		0.008	0.0095	$\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 50\text{ V}, f = 1\text{ MHz},$ $V_{GS} = 0$	-	3100	-	pF
$C_{oss}$	Output capacitance		-	700	-	pF
$C_{rss}$	Reverse transfer capacitance		-	45	-	pF
$Q_g$	Total gate charge	$V_{DD} = 50\text{ V}, I_D = 80\text{ A},$ $V_{GS} = 10\text{ V}$	-	45	-	nC
$Q_{gs}$	Gate-source charge		-	18	-	nC
$Q_{gd}$	Gate-drain charge		-	13	-	nC

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_d(on)$	Turn-on delay time	$V_{DD} = 50\text{ V}, I_D = 40\text{ A},$ $R_G = 4.7\ \Omega, V_{GS} = 10\text{ V}$	-	19	-	ns
$t_r$	Rise time		-	32	-	ns
$t_d(off)$	Turn-off delay time		-	36	-	ns
$t_f$	Fall time		-	13	-	ns

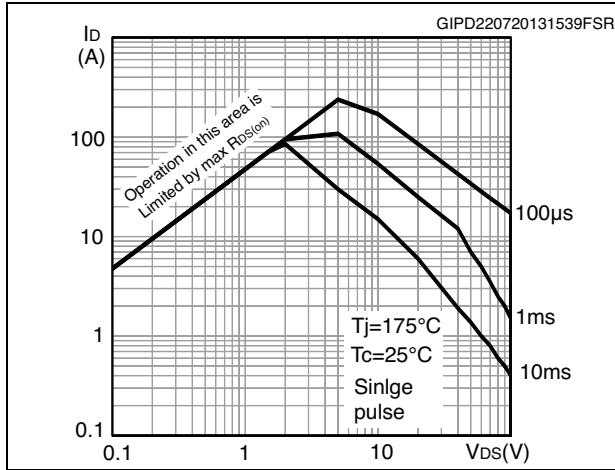
Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		80	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		320	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 80 \text{ A}, V_{GS} = 0$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 80 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 80 \text{ V}, T_j = 150 \text{ }^\circ\text{C}$	-	70		ns
$Q_{rr}$	Reverse recovery charge		-	125		nC
$I_{RRM}$	Reverse recovery current		-	3.6		A

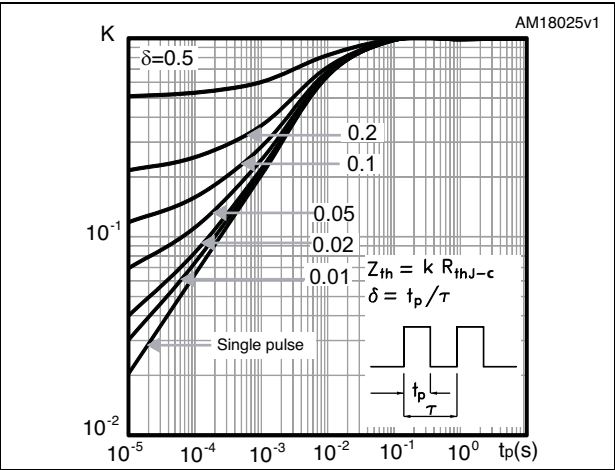
1. Pulse width limited by safe operating area.
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

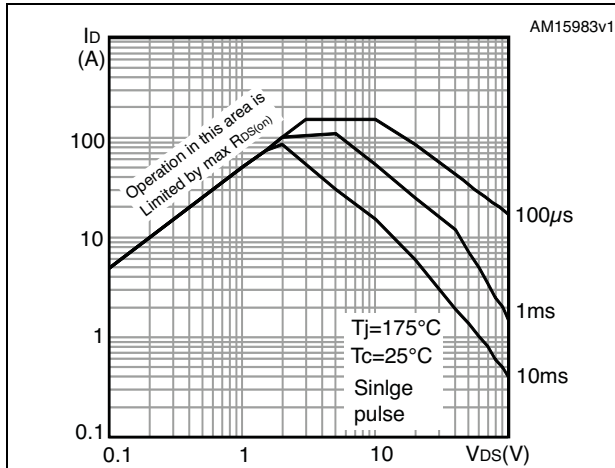
**Figure 2. Safe operating area for DPAK, H<sup>2</sup>PAK-2 and TO-220**



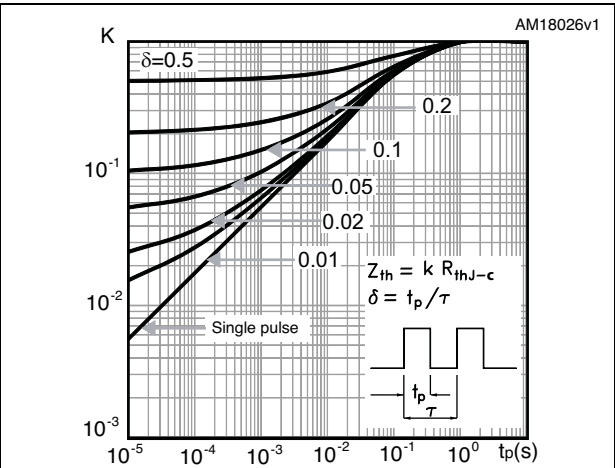
**Figure 3. Thermal impedance for DPAK, H<sup>2</sup>PAK-2 and TO-220**



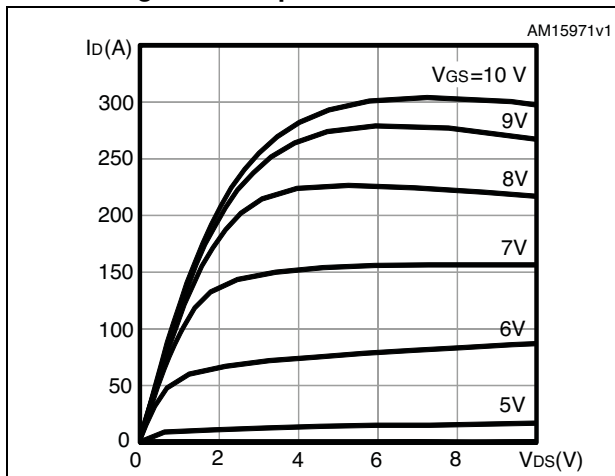
**Figure 4. Safe operating area for TO-220FP**



**Figure 5. Thermal impedance for TO-220FP**



**Figure 6. Output characteristics**



**Figure 7. Transfer characteristics**

