

# STB100N10F7, STD100N10F7, STF100N10F7, STP100N10F7

N-channel 100 V, 0.0068 Ω typ., 80 A, STripFET™ VII DeepGATE™  
Power MOSFET in D<sup>2</sup>PAK, DPAK, TO-220FP and TO-220

Datasheet - production data

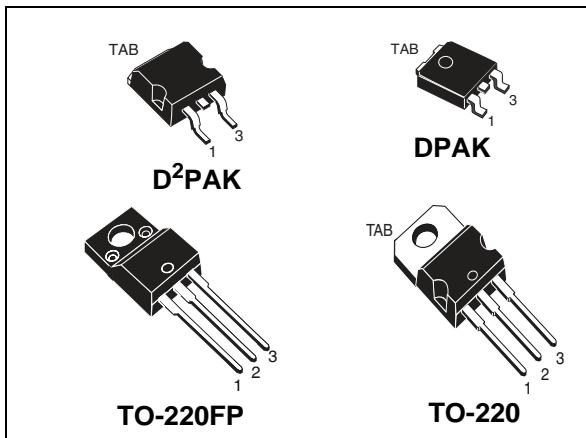
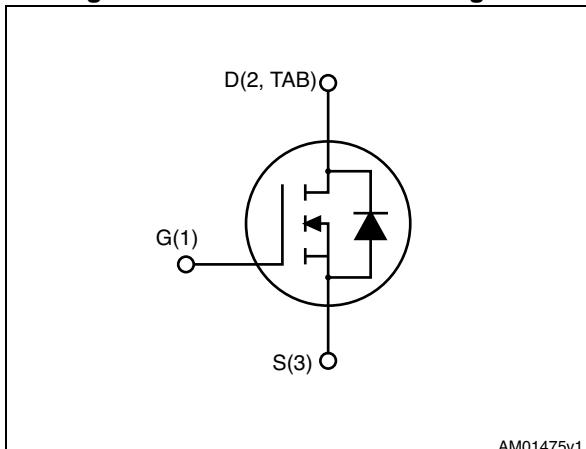


Figure 1. Internal schematic diagram



## Features

Order codes	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>	P <sub>TOT</sub>
STB100N10F7	100 V	0.008 Ω	80 A	120 W
STD100N10F7			80 A	120W
STF100N10F7			45 A	30 W
STP100N10F7			80A	150 W

- Ultra low on-resistance
- 100% avalanche tested

## 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<sub>DS(on)</sub> in all packages.

Table 1. Device summary

Order codes	Marking	Packages	Packaging
STB100N10F7	100N10F7	D <sup>2</sup> PAK	Tape and reel
STD100N10F7		DPAK	Tape and reel
STF100N10F7		TO-220FP	Tube
STP100N10F7		TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value			Unit
		DPAK	TO-220FP	TO-220 D <sup>2</sup> PAK	
$V_{DS}$	Drain-source voltage	100			V
$V_{GS}$	Gate-source voltage	$\pm 20$			V
$I_D$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	80	45 <sup>(1)</sup>	80	A
$I_D$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	62	32 <sup>(1)</sup>	70	A
$I_{DM}^{(2)}$	Drain current (pulsed)	320	180	320	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25^\circ\text{C}$	120	30	150	W
$T_J$	Operating junction temperature	-55 to 175			$^\circ\text{C}$
$T_{stg}$	Storage temperature				$^\circ\text{C}$

1. This value is limited by package.
2. Pulse width limited by safe operating area.

**Table 3. Thermal resistance**

Symbol	Parameter	Value				Unit
		D <sup>2</sup> PAK	DPAK	TO-220FP	TO-220	
$R_{thj-case}$	Thermal resistance junction-case	1	1.25	5	1	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient			62.50		$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	30	50			$^\circ\text{C}/\text{W}$

1. When mounted on FR-4 board of 1inch<sup>2</sup>, 2oz Cu, t < 10 sec

**Table 4. Avalanche characteristics**

Symbol	Parameter	Value	Unit
$E_{AS}$	Single pulse avalanche energy ( $T_J = 25^\circ\text{C}$ , L = 3.5 mH, $I_{AS} = 15\text{ A}$ , $V_{DD} = 50\text{ V}$ , $V_{GS} = 10\text{ V}$ )	400	mJ

## 2 Electrical characteristics

( $T_{CASE}=25\text{ }^{\circ}\text{C}$  unless otherwise specified)

**Table 5. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage ( $V_{GS}=0$ )	$I_D=250\text{ }\mu\text{A}$	100		-	V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS}=0$ )	$V_{DS}=100\text{ V}$ $V_{DS}=100\text{ V}; T_C=125\text{ }^{\circ}\text{C}$			1 100	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate body leakage current ( $V_{DS}=0$ )	$V_{GS}=20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	For D <sup>2</sup> PAK, DPAK and TO-220 $V_{GS}=10\text{ V}, I_D=40\text{ A}$ For TO-220-FP $V_{GS}=10\text{ V}, I_D=22.5\text{ A}$		0.0068	0.008	$\Omega$

**Table 6. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS}=50\text{ V}, f=1\text{ MHz}, V_{GS}=0$	-	4369	-	pF
$C_{oss}$	Output capacitance		-	823	-	pF
$C_{rss}$	Reverse transfer capacitance		-	36	-	pF
$Q_g$	Total gate charge	$V_{DD}=50\text{ V}, I_D=80\text{ A}$ $V_{GS}=10\text{ V}$	-	61	-	nC
$Q_{gs}$	Gate-source charge		-	26	-	nC
$Q_{gd}$	Gate-drain charge		-	13	-	nC

**Table 7. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=50\text{ V}, I_D=40\text{ A}, R_G=4.7\text{ }\Omega, V_{GS}=10\text{ V}$	-	27	-	ns
$t_r$	Rise time		-	40	-	ns
$t_{d(off)}$	Turn-off delay time		-	46	-	ns
$t_f$	Fall time		-	15	-	ns

**Table 8. Source drain diode**

<b>Symbol</b>	<b>Parameter</b>	<b>Test conditions</b>	<b>Min</b>	<b>Typ.</b>	<b>Max</b>	<b>Unit</b>
$I_{SD}$	Source-drain current		-		80	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		320	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 80 \text{ A}, V_{GS}=0$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 80 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD}=80 \text{ V}, T_j=150 \text{ }^\circ\text{C}$	-	77		ns
$Q_{rr}$	Reverse recovery charge		-	146		nC
$I_{RRM}$	Reverse recovery current		-	4		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

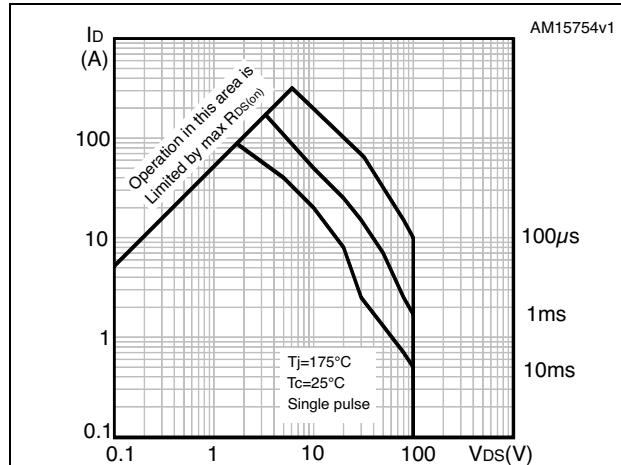


Figure 3. Thermal impedance for DPAK

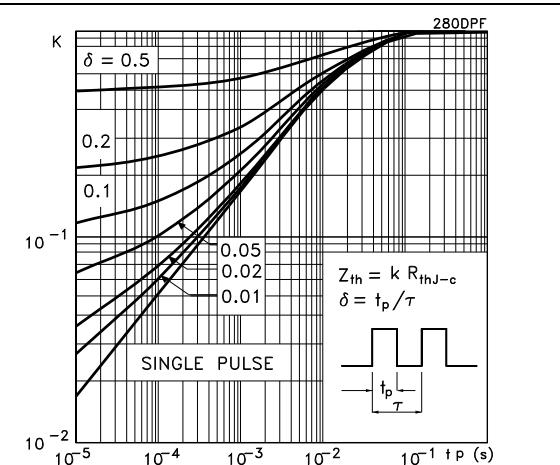


Figure 4. Safe operating area for TO-220FP

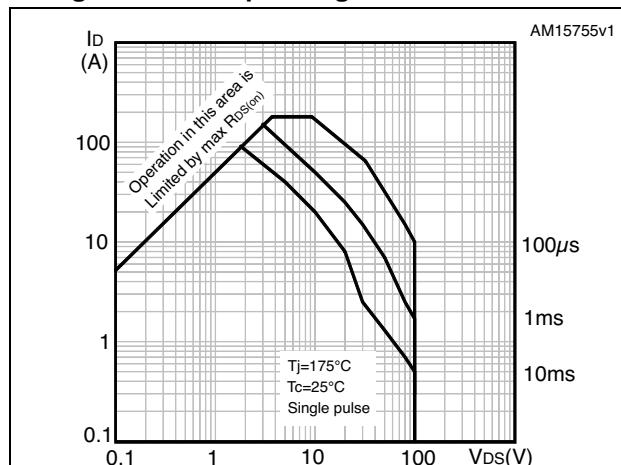
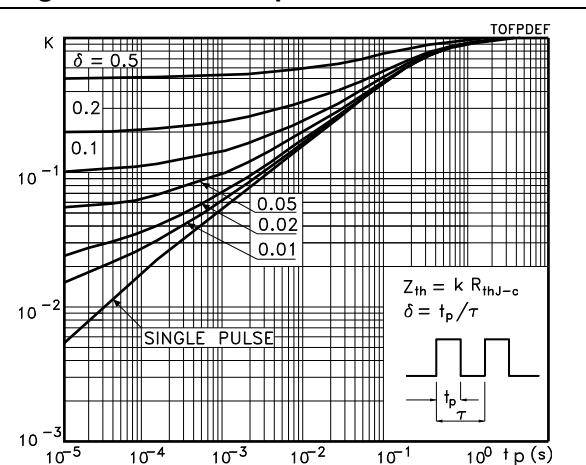
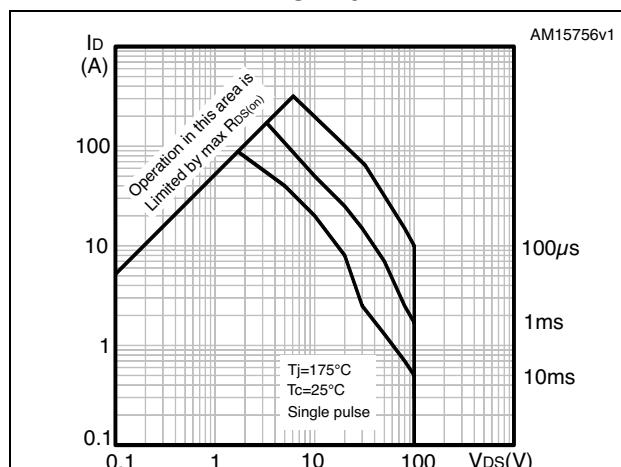


Figure 5. Thermal impedance for TO-220FP

Figure 6. Safe operating area for D<sup>2</sup>PAK and TO-220Figure 7. Thermal impedance for D<sup>2</sup>PAK and TO-220