

## N-channel 40 V, 1.95 mΩ typ., 90 A, STripFET™ F7 Power MOSFET in a TO-220FP package

Datasheet - preliminary data

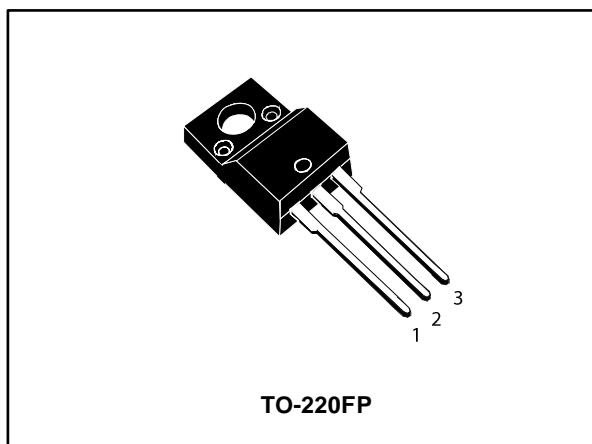
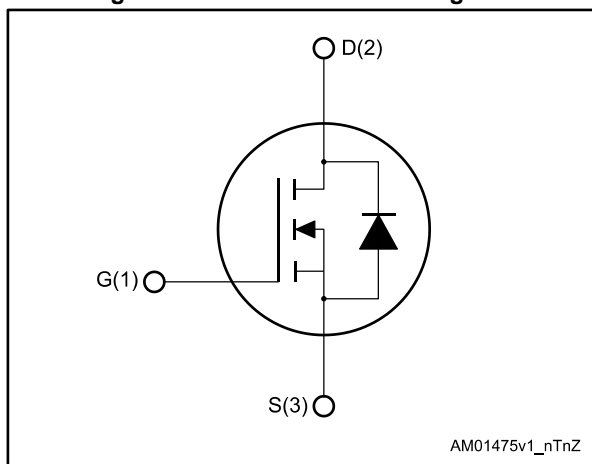


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STF260N4F7	40 V	2.5 mΩ	35 W

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent figure of merit (FoM)
- Low C<sub>rss</sub>/C<sub>iss</sub> ratio for EMI immunity
- High avalanche ruggedness

### Applications

- Switching applications

### Description

This N-channel Power MOSFET utilizes STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1: Device summary

Order code	Marking	Package	Packaging
STF260N4F7	260N4F7	TO-220FP	Tube

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# 1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	40	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	90	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	64	A
$I_{DM}^{(1)}$	Drain current (pulsed)	360	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	35	W
$V_{iso}$	Insulation withstand voltage (RMS) from all three leads to external heat sink ( $t = 1\text{ s}$ ; $T_C = 25\text{ }^{\circ}\text{C}$ )	2.5	kV
$T_{stg}$	Storage temperature	-55 to 175	$^{\circ}\text{C}$
$T_J$	Operation junction temperature		

**Notes:**

<sup>(1)</sup> Pulse width limited by safe operating area

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	4.29	$^{\circ}\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5	$^{\circ}\text{C}/\text{W}$

## 2 Electrical characteristics

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

**Table 4: On /off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	40			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 40\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = 40\text{ V}$ $T_C = 125\text{ }^{\circ}\text{C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = +20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on- resistance	$V_{GS} = 10\text{ V}$ , $I_D = 60\text{ A}$		1.95	2.5	m $\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	-	5640	-	pF
$C_{oss}$	Output capacitance		-	2370	-	pF
$C_{rss}$	Reverse transfer capacitance		-	34	-	pF
$Q_g$	Total gate charge	$V_{DD} = 20\text{ V}$ , $I_D = 120\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 3: "Test circuit for gate charge behavior"</a> )	-	67	-	nC
$Q_{gs}$	Gate-source charge		-	31	-	nC
$Q_{gd}$	Gate-drain charge		-	10	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 20\text{ V}$ , $I_D = 60\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 2: "Test circuit for resistive load switching times"</a> and <a href="#">Figure 7: "Switching time waveform"</a> )	-	30	-	ns
$t_r$	Rise time		-	21	-	ns
$t_{d(off)}$	Turn-off delay time		-	42	-	ns
$t_f$	Fall time		-	13	-	ns

Table 7: Source drain diode

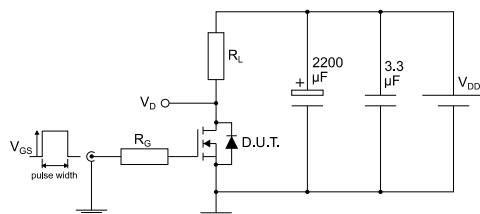
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$V_{GS} = 0\text{ V}$ , $I_{SD} = 120\text{ A}$	-	-	1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 120\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 32\text{ V}$ (see <a href="#">Figure 4: "Test circuit for inductive load switching and diode recovery times"</a> )	-	68		ns
$Q_{rr}$	Reverse recovery charge		-	98		nC
$I_{RRM}$	Reverse recovery current		-	3		A

**Notes:**

<sup>(1)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

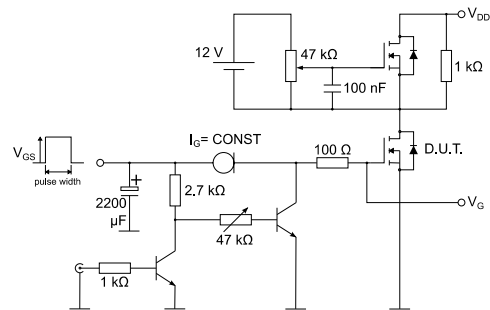
### 3 Test circuits

**Figure 2: Test circuit for resistive load switching times**



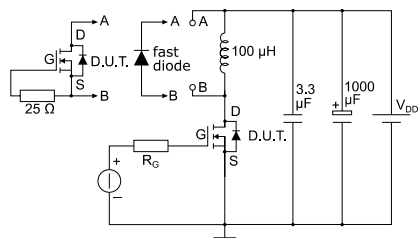
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**Figure 3: Test circuit for gate charge behavior**



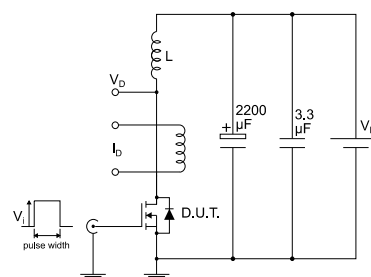
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**Figure 4: Test circuit for inductive load switching and diode recovery times**



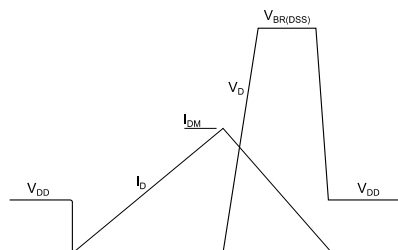
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**Figure 5: Unclamped inductive load test circuit**



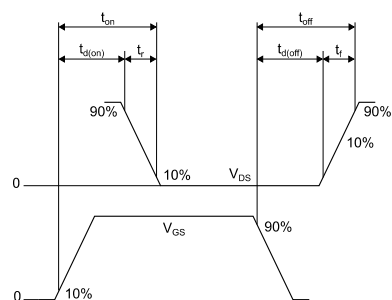
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**Figure 6: Unclamped inductive waveform**



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**Figure 7: Switching time waveform**



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## 4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: **[www.st.com](http://www.st.com)**. ECOPACK<sup>®</sup> is an ST trademark.

## 4.1 TO-220FP package information

Figure 8: TO-220FP package outline

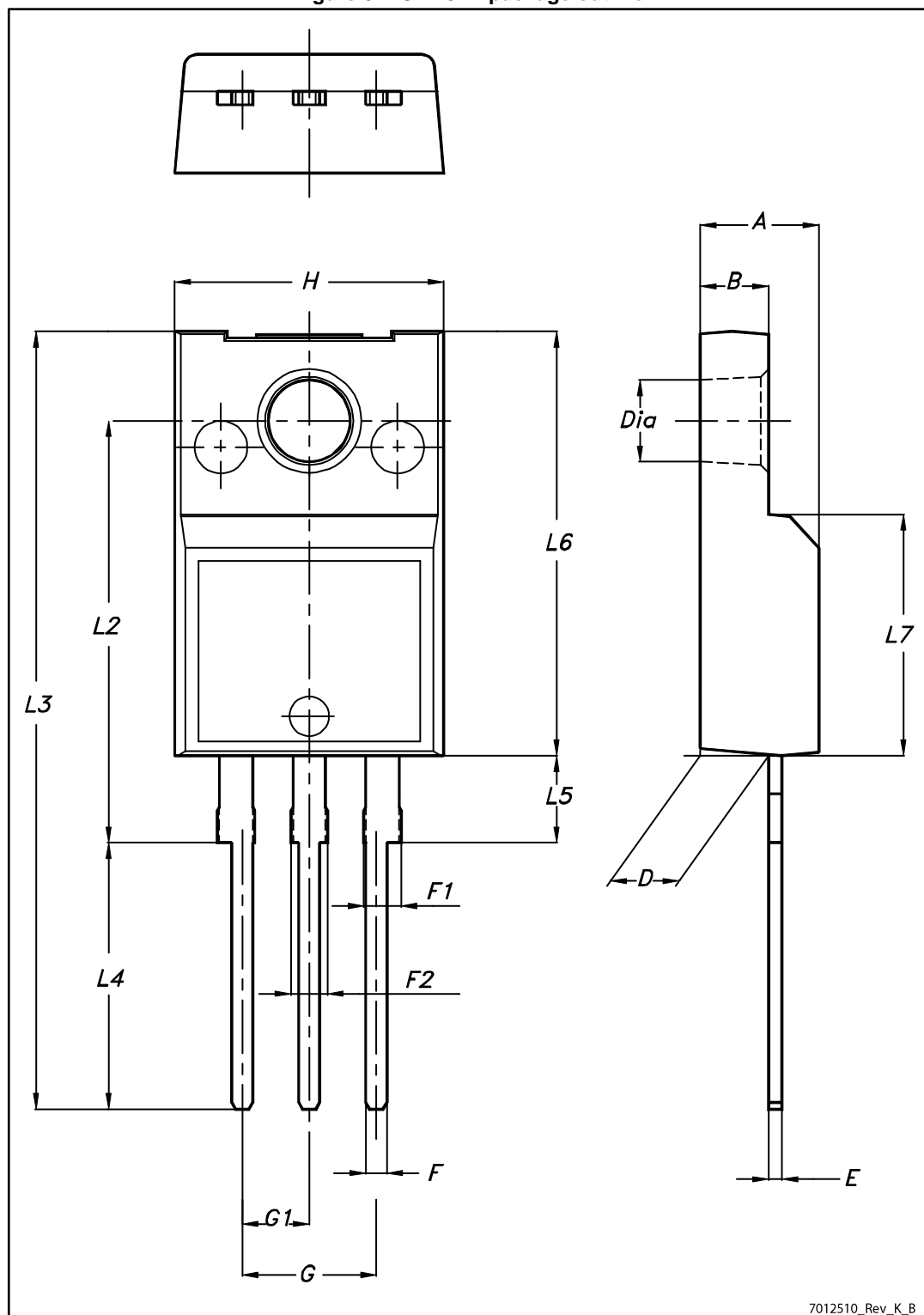




Table 8: TO-220FP package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

## 5 Revision history

Table 9: Document revision history

Date	Revision	Changes
13-Oct-2015	1	Initial release.

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