



STP80N70F4

N-channel 68 V, 8.2 mΩ, 85 A TO-220
STripFET™ DeepGATE™ Power MOSFET

Preliminary data

Features

Order code	V _{DSS}	R _{DS(on)} max	I _D
STP80N70F4	68 V	< 9.8 mΩ	85 A

- N-channel enhancement mode
- 100% avalanche rated
- Low gate charge
- Very low on-resistance

Application

Switching applications

Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performances.



Figure 1. Internal schematic diagram

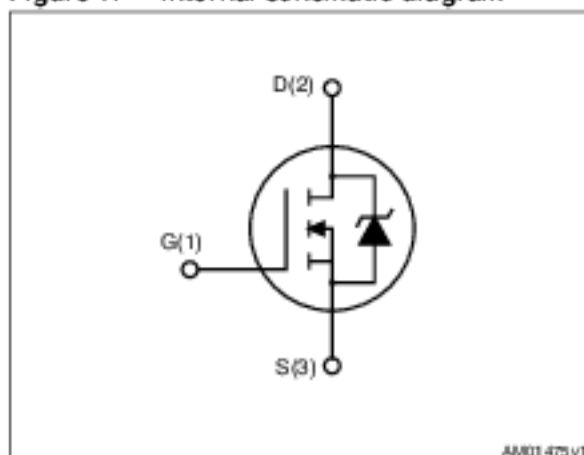


Table 1. Device summary

Order code	Marking	Package	Packaging
STP80N70F4	80N70F4	TO-220	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	68	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	85	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	60	A
$I_{DM}^{(1)}$	Drain current (pulsed)	340	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	150	W
	Dereating factor	1	W/ $^{\circ}\text{C}$
$E_{AS}^{(2)}$	Single pulse avalanche energy	185	mJ
T_{stg}	Storage temperature	- 55 to 175	$^{\circ}\text{C}$
T_J	Operating junction temperature		

1. Pulse width limited by safe operating area

2. Starting $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = 35\text{ A}$, $V_{DS} = 34\text{ V}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{th(jc)}$	Thermal resistance junction-case max	1	$^{\circ}\text{C/W}$
$R_{th(ja)}$	Thermal resistance junction-ambient max	62.5	$^{\circ}\text{C/W}$
T_l	Maximum lead temperature for soldering purpose	300	$^{\circ}\text{C}$

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	68			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = \text{max rating}$			1	μA
		$V_{DS} = \text{max rating}$, $T_C = 125\text{ }^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			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	$V_{GS} = 10\text{ V}$, $I_D = 40\text{ A}$		8.2	9.8	m Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	5015	-	pF
C_{oss}	Output capacitance			382		pF
C_{rss}	Reverse transfer capacitance			218		pF
Q_g	Total gate charge	$V_{DD} = 37.5\text{ V}$, $I_D = 78\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 3)	-	76	-	nC
Q_{gs}	Gate-source charge			23		nC
Q_{gd}	Gate-drain charge			18.5		nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time	$V_{DD} = 37.5\text{ V}$, $I_D = 39\text{ A}$ $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2)	-	25	-	ns
	Rise time			33		ns
$t_{d(off)}$ t_f	Turn-off-delay time		-	61	-	ns
	Fall time			14		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current		-		85	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		340	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 78\text{ A}$, $V_{GS} = 0$	-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 78\text{ A}$, $V_{DD} = 60\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 150\text{ }^{\circ}\text{C}$ (see Figure 4)	-	67 183 5.5		ns nC A

1. Pulse width limited by safe operating area.

2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

3 Test circuits

Figure 2. Switching times test circuit for resistive load

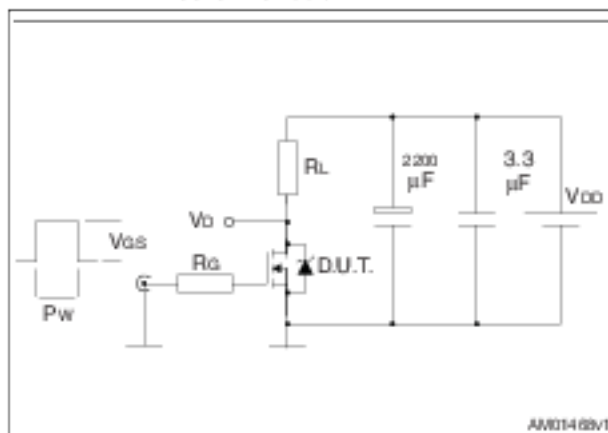


Figure 3. Gate charge test circuit

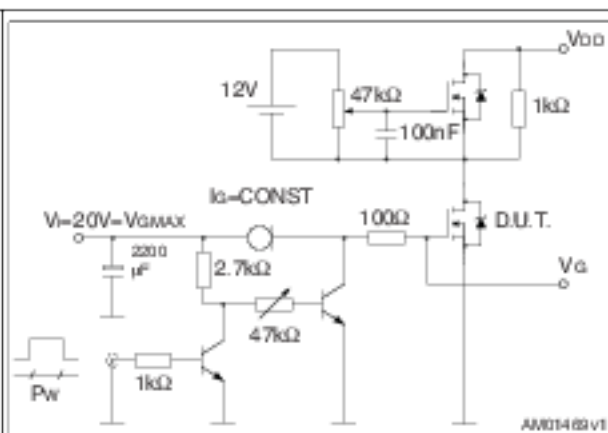


Figure 4. Test circuit for inductive load switching and diode recovery times

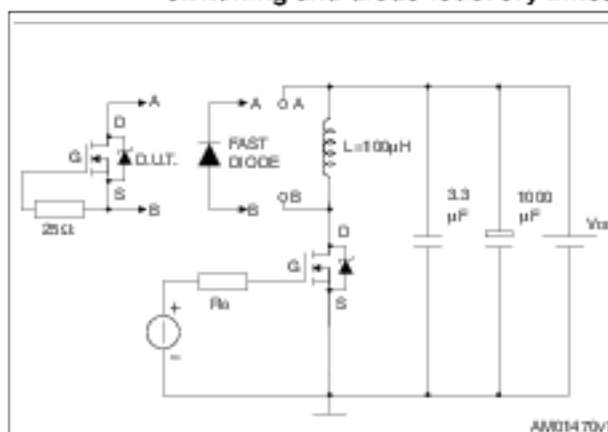


Figure 5. Unclamped inductive load test circuit

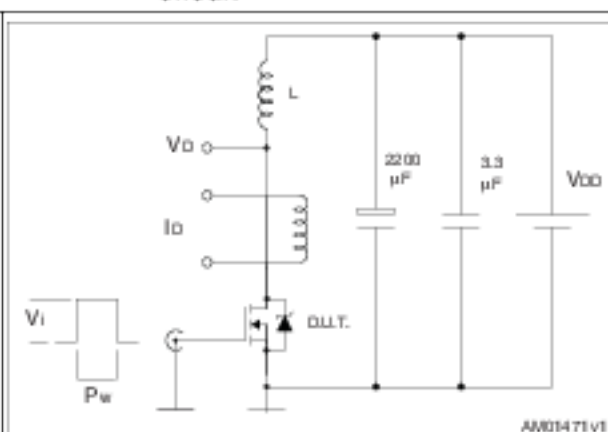


Figure 6. Unclamped inductive waveform

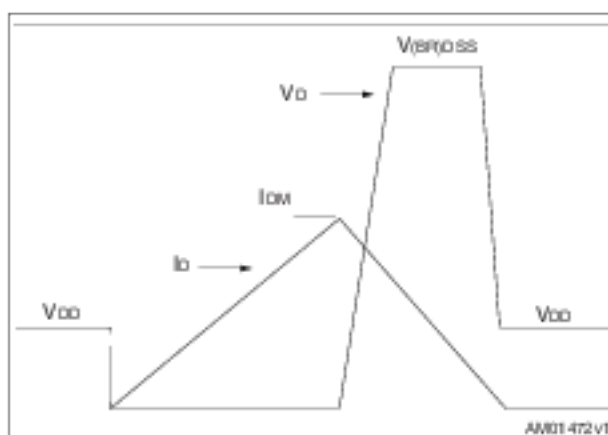
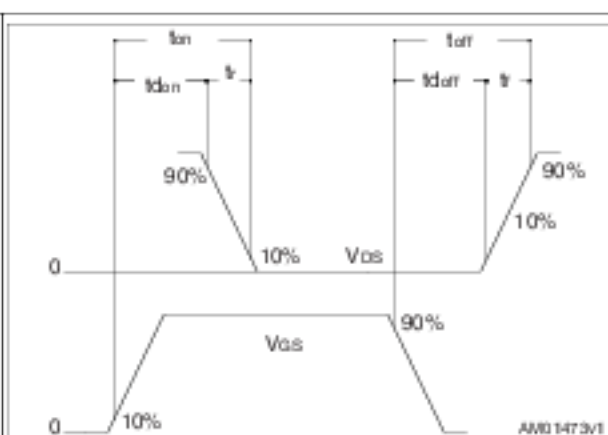


Figure 7. Switching time waveform



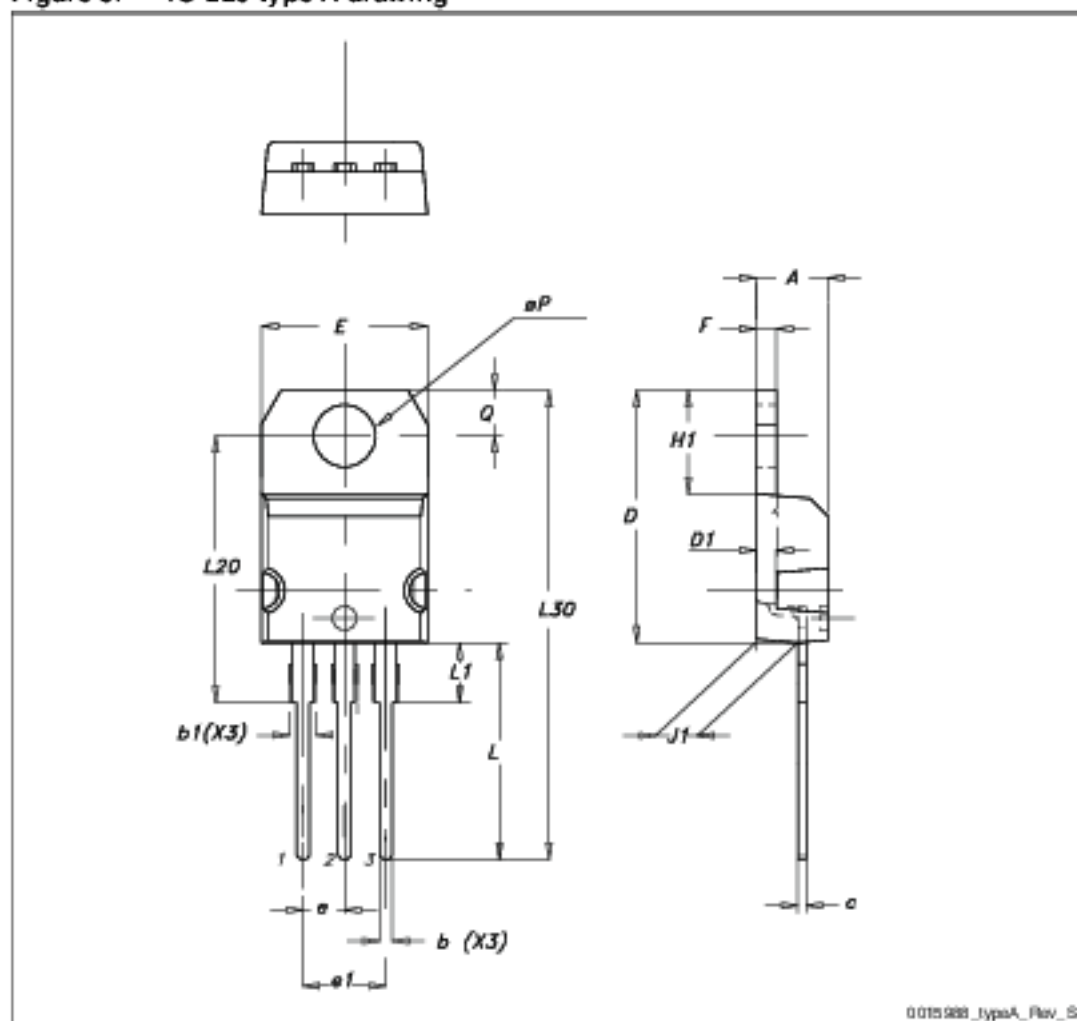
4 Package mechanical data

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

Table 8. TO-220 type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

Figure 8. TO-220 type A drawing



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
12-Jan-2011	1	First release.

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