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# STD70N6F3

## N-channel 60 V, 8.0 mΩ, 70 A DPAK STripFET™ III Power MOSFET

Preliminary data

### Features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>	P <sub>w</sub>
STD70N6F3	60 V	< 10.5 mΩ	70 A	110 W

- Standard threshold drive
- 100% avalanche tested

### Application

- Switching applications

### Description

This STripFET™ III Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance providing superior switching performance.



Figure 1. Internal schematic diagram

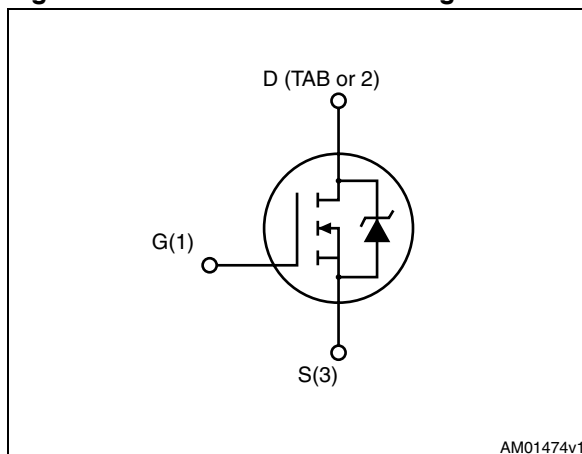


Table 1. Device summary

Order code	Marking	Package	Packaging
STD70N6F3	70N6F3	DPAK	Tape & reel

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## Contents

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STD70N6F3

Electrical ratings

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS}=0$ )	60	V
$V_{GS}$	Gate-Source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	70	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	50	A
$I_{DM}^{(1)}$	Drain current (pulsed)	280	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	110	W
	Derating factor	0.73	W/ $^\circ\text{C}$
$dv/dt^{(2)}$	Peak diode recovery voltage slope	TBD	V/ns
$E_{AS}^{(3)}$	Single pulse avalanche energy	TBD	mJ
$T_j$ $T_{stg}$	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. Pulse width limited by safe operating area
2.  $I_{SD} \leq 70\text{ A}$ ,  $di/dt \leq 300\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_j \leq T_{jmax}$
3. Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_d = 35\text{ A}$ ,  $V_{dd} = 40\text{ V}$

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	1.36	$^\circ\text{C}/\text{W}$
Rthj-pcb <sup>(1)</sup>	Thermal resistance junction-pcb max	50	$^\circ\text{C}/\text{W}$

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

Electrical characteristics

STD70N6F3

## 2 Electrical characteristics

(T<sub>CASE</sub>=25°C unless otherwise specified)

**Table 4. Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0	60			V
I <sub>DSS</sub>	Zero gate voltage drain current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max rating, V <sub>DS</sub> = Max rating, T <sub>c</sub> = 125 °C			10 100	μA μA
I <sub>GSS</sub>	Gate body leakage current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ±20 V			±200	nA
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2		4	V
R <sub>DS(on)</sub>	Static drain-source on resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 35 A		8.0	10.5	mΩ

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min	Typ.	Max.	Unit
g <sub>fs</sub> <sup>(1)</sup>	Forward transconductance	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 35 A	-	Tbd		S
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 25 V, f = 1MHz, V <sub>GS</sub> = 0	-	2200		pF
C <sub>oss</sub>	Output capacitance			500		pF
C <sub>rss</sub>	Reverse transfer capacitance			25		pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 48 V, I <sub>D</sub> = 70 A	-	35	TBD	nC
Q <sub>gs</sub>	Gate-source charge	V <sub>GS</sub> = 10 V		15		nC
Q <sub>gd</sub>	Gate-drain charge	(see Figure 5)		10		nC

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

**STD70N6F3**
**Electrical characteristics**
**Table 6. Switching on/off (inductive load)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on delay time Rise time	$V_{DD}=30\text{ V}$ , $I_D=35\text{ A}$ , $R_G=4.7\ \Omega$ , $V_{GS}=10\text{ V}$ <i>(see Figure 4),</i> <i>(see Figure 7)</i>	-	TBD TBD	-	ns ns
$t_{d(off)}$ $t_f$	Turn-off delay time Fall time	$V_{DD}=30\text{ V}$ , $I_D=35\text{ A}$ , $R_G=4.7\ \Omega$ , $V_{GS}=10\text{ V}$ <i>(see Figure 4),</i> <i>(see Figure 7)</i>	-	TBD TBD	-	ns ns

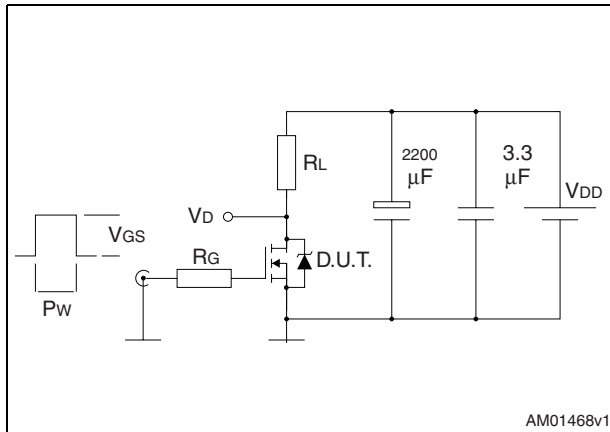
**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		70	A
$I_{SDM}$	Source-drain current (pulsed) <sup>(1)</sup>		-		280	A
$V_{SD}$	Forward on voltage	$I_{SD}=70\text{ A}$ , $V_{GS}=0$	-		1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD}=70\text{ A}$ , $di/dt=100\text{ A}/\mu\text{s}$ , $V_{DD}=30\text{ V}$ , $T_j=150\text{ }^\circ\text{C}$ <i>(see Figure 6)</i>	-	TBD TBD TBD		ns nC A

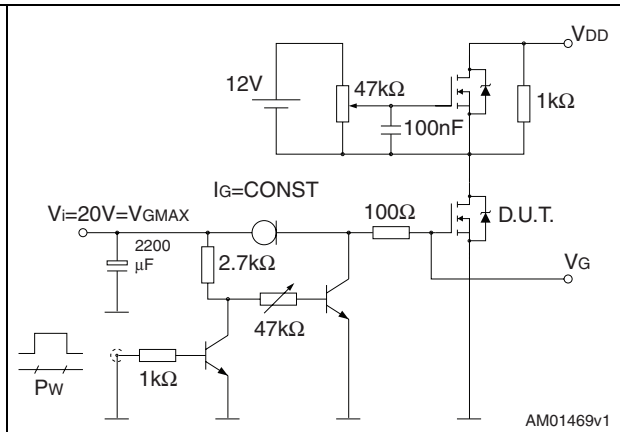
 1. Pulsed: pulse duration = 300 $\mu\text{s}$ , duty cycle 1.5%

### 3 Test circuits

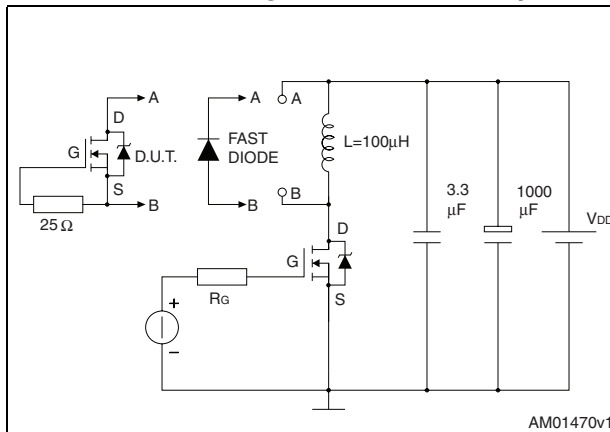
**Figure 2. Switching times test circuit for resistive load**



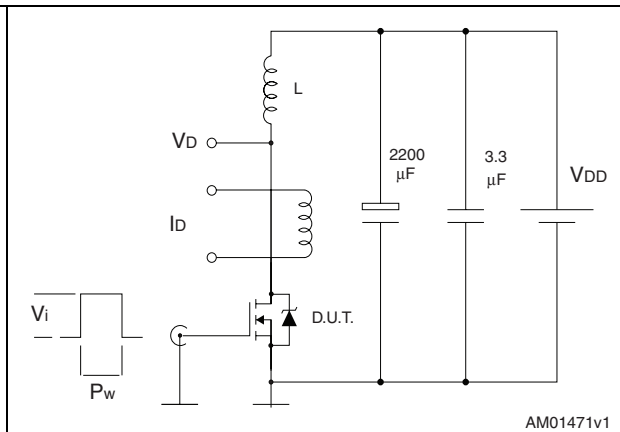
**Figure 3. Gate charge test circuit**



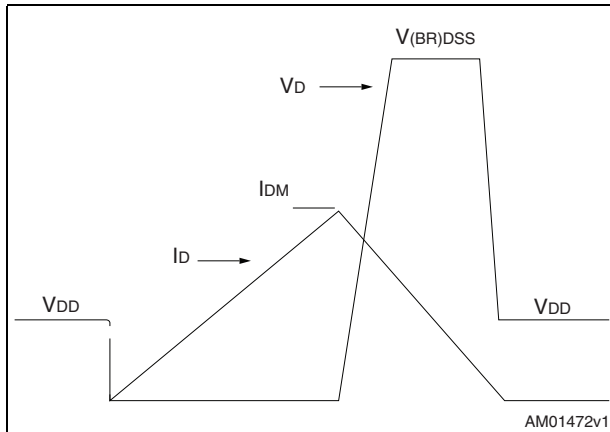
**Figure 4. Test circuit for inductive load switching and diode recovery times**



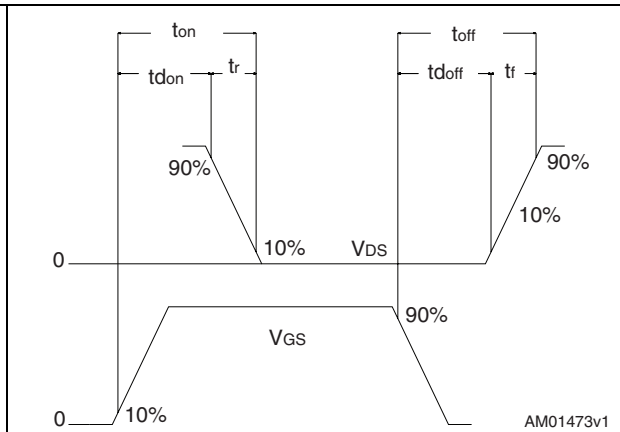
**Figure 5. Unclamped inductive load test circuit**



**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<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 is an ST trademark.

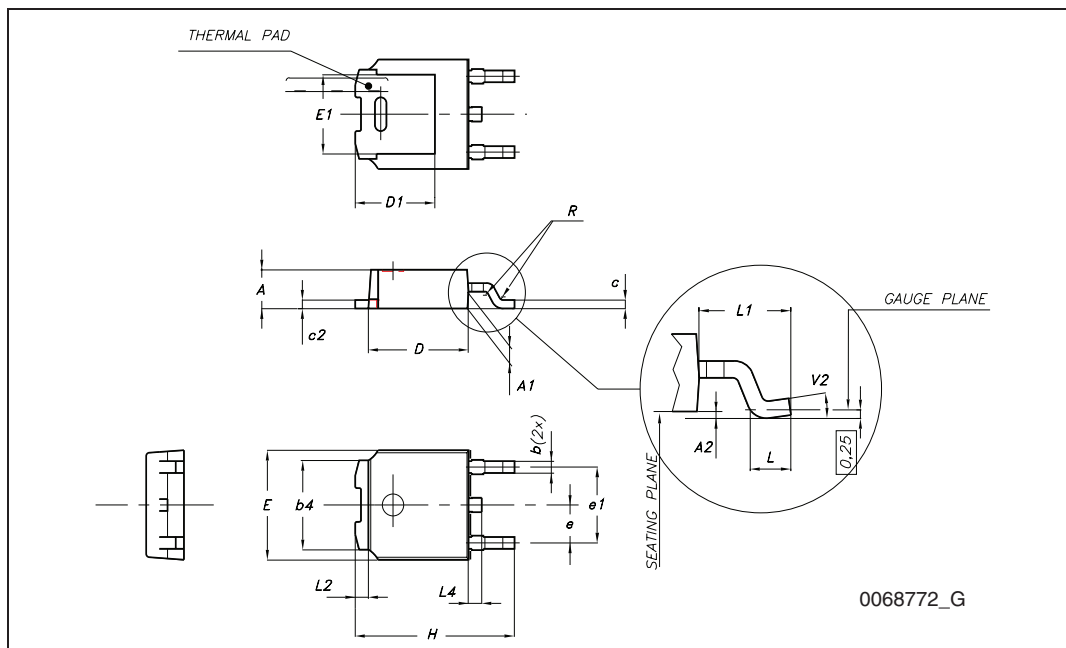


**Package mechanical data**

**STD70N6F3**

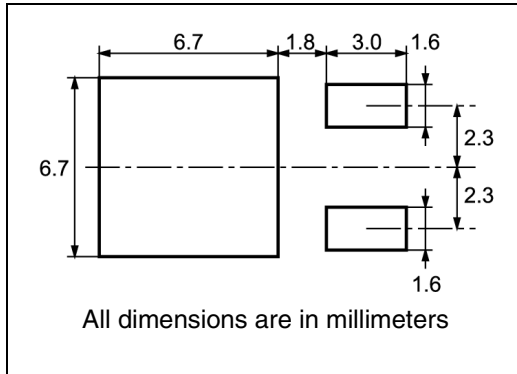
TO-252 (DPAK) mechanical data

DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°



## 5 Packaging mechanical data

### DPAK FOOTPRINT



### TAPE AND REEL SHIPMENT

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

G measured at hub

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

For machine ref. only including draft and radii concentric around B0

TOP COVER TAPE

User Direction of Feed

Center line of cavity

TRL

FEED DIRECTION

Bending radius R min.

P0 - 10 pitches cumulative tolerance on tape +/- 0.2 mm

## 6 Revision history

Table 8. Revision history

Date	Revision	Changes
11-Dec-2009	1	First release

## STD70N6F3

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