



STI300N4F6

N-channel 40 V, 1.4 m Ω , 160 A, I²PAK
STripFET™ VI DeepGATE™ Power MOSFET

Preliminary data

Features

Order code	V _{DSS}	R _{DS(on)} max.	I _D
STI300N4F6	40 V	2.0 m Ω	160 A ⁽¹⁾

1. Limited by wire bonding

- Standard level V_{GS(th)}
- 175 °C junction temperature
- 100% avalanche rated

Application

- Switching applications
 - Automotive

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 performance.

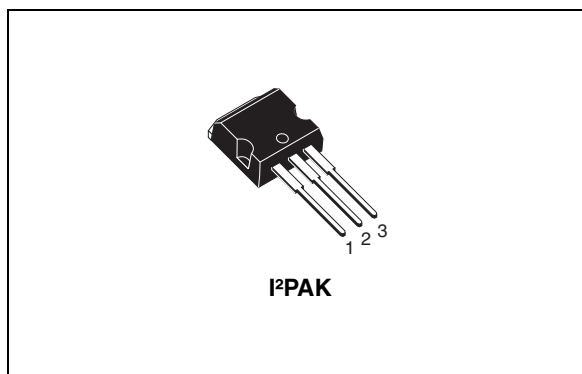


Figure 1. Internal schematic diagram

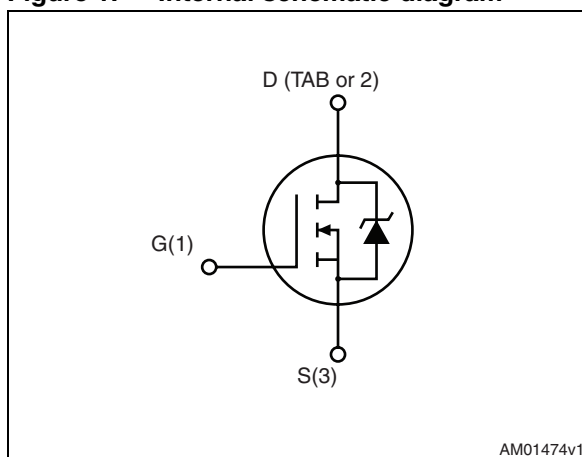


Table 1. Device summary

Order code	Marking	Package	Packaging
STI300N4F6	300N4F6	I ² PAK	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	40	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	160	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	160	A
I_{DM}	Drain current (pulsed)	640	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
E_{AS}	Single pulse avalanche energy	TBD	mJ
T_{stg}	Storage temperature	- 55 to 175	$^\circ\text{C}$
T_j	Operating junction temperature		

1. Limited by wire bonding

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max.	0.5	$^\circ\text{C/W}$

Table 4. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I_{AS}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_j max)	TBD	A
E_{AS}	Single pulse avalanche energy (starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = I_{AS}$, $V_{DD} = 50\text{ V}$)	TBD	mJ

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0, I_D = 250\ \mu\text{A}$	40			V
I_{DSS}	Zero gate voltage drain current	$V_{DS} = \text{max ratings}, V_{GS} = 0$			1	μA
I_{GSS}	Gate-source leakage current	$V_{GS} = \pm 20\ \text{V}, V_{DS} = 0$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\ \text{V}, I_D = 80\ \text{A}$		1.4	2.0	m Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\ \text{V}, f = 1\ \text{MHz}, V_{GS} = 0$	-	11.6	-	nF
C_{oss}	Output capacitance			2		nF
C_{rss}	Reverse transfer capacitance			1		nF
Q_g	Total gate charge	$V_{DD} = 37\ \text{V}, I_D = 160\ \text{A}$	-	200	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 10\ \text{V}$		TBD		nC
Q_{gd}	Gate-drain charge	(see Figure 3)		TBD		nC

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 37\ \text{V}, I_D = 80\ \text{A}, R_G = 4.7\ \Omega, V_{GS} = 10\ \text{V}$ (see Figure 2)	-	TBD	-	ns
t_r	Rise time			TBD		ns
$t_{d(off)}$	Turn-off delay time			TBD		ns
t_f	Fall time			TBD		ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current		-		160	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		640	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 160 \text{ A}, V_{GS} = 0$	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 160 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD} = 120 \text{ V}, T_J = 150 \text{ }^\circ\text{C}$ (see Figure 4)	-	TBD TBD TBD		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

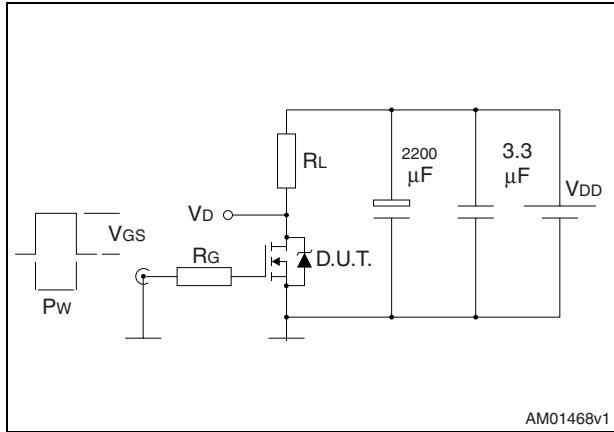


Figure 3. Gate charge test circuit

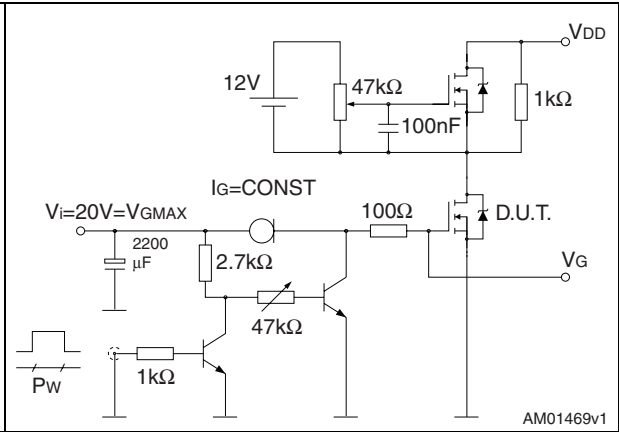


Figure 4. Test circuit for inductive load switching and diode recovery times

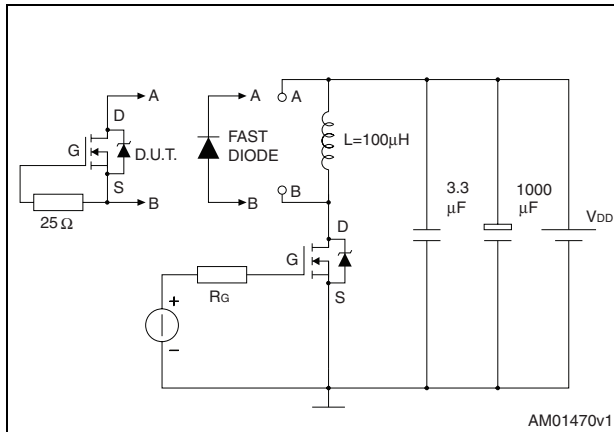


Figure 5. Unclamped inductive load test circuit

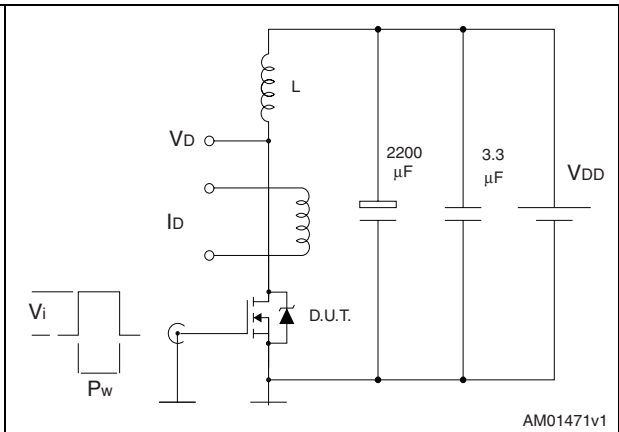


Figure 6. Unclamped inductive waveform

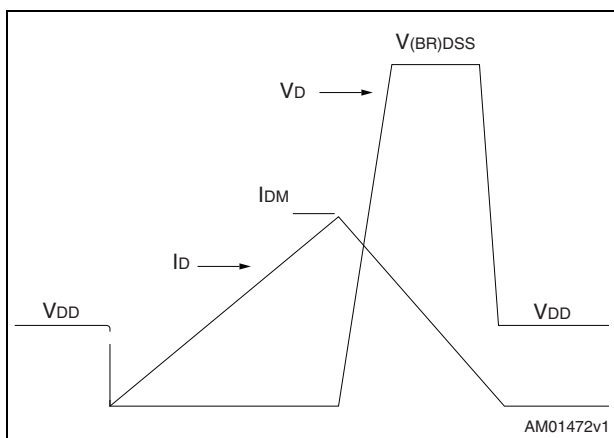
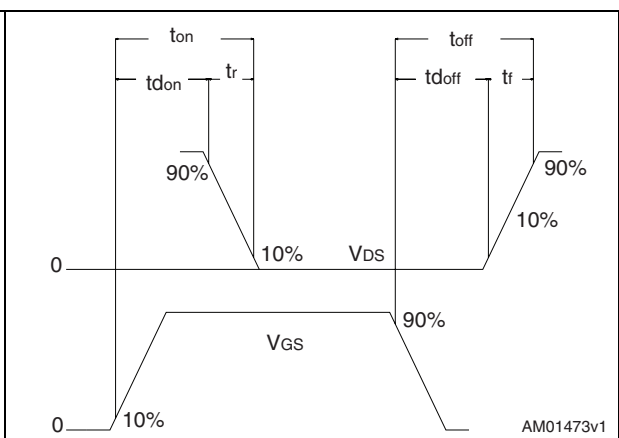


Figure 7. Switching time waveform

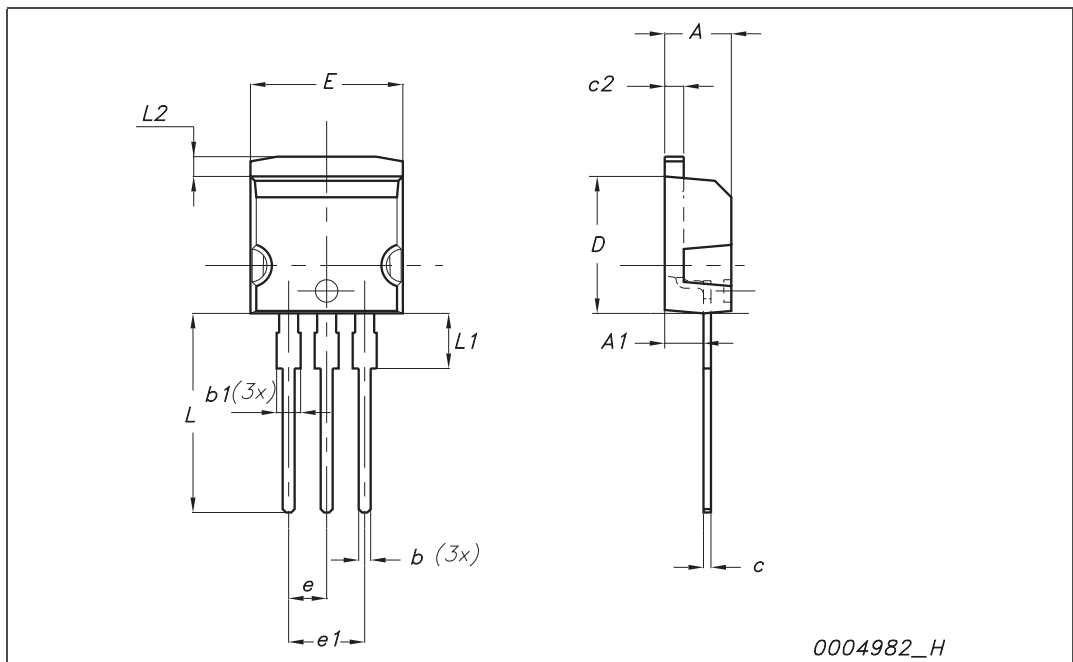


4 Package mechanical data

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.

I²PAK (TO-262) mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.49		0.70	0.019		0.027
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
E	10		10.40	0.393		0.410
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L2	1.27		1.40	0.050		0.055



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
05-Oct-2010	1	First release

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