



STI400N4F6, STP400N4F6

N-channel 40 V, 120 A STripFET™ VI DeepGATE™
Power MOSFET in I²PAK and TO-220 packages

Datasheet – preliminary data

Features

Order codes	V _{DSS}	R _{DS(on)} max	I _D
STI400N4F6 STP400N4F6	40 V	< 1.7 mΩ	120 A ⁽¹⁾

1. Limited by package

- Low gate charge
- Very low on-resistance
- High avalanche ruggedness

Applications

- Switching applications

Description

These devices are N-channel Power MOSFETs developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFETs exhibit the lowest R_{DS(on)} in all packages.

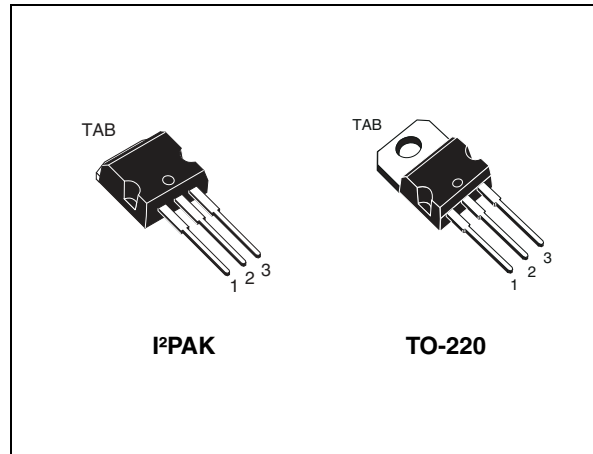


Figure 1. Internal schematic diagram

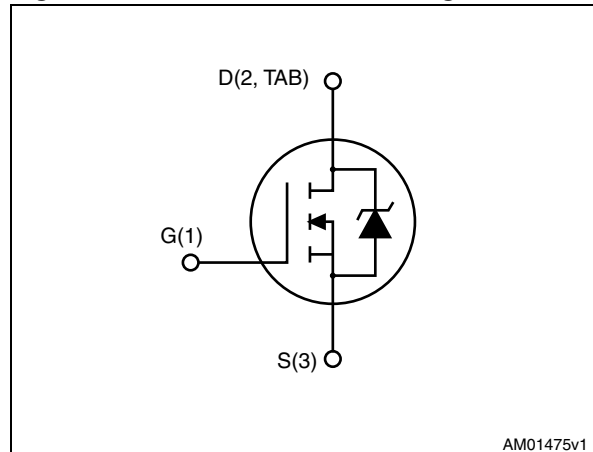


Table 1. Device summary

Order codes	Marking	Package	Packaging
STI400N4F6	400N4F6	I ² PAK	Tube
STP400N4F6		TO-220	

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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	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	120	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	120	A
$I_{DM}^{(1)}$	Drain current (pulsed)	480	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2	W/ $^\circ\text{C}$
T_{stg}	Storage temperature	- 55 to 175	$^\circ\text{C}$
T_j	Operating junction temperature		

1. Current limited by package

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.5	$^\circ\text{C}/\text{W}$
R_{thj-a}	Thermal resistance junction-ambient max	62.5	$^\circ\text{C}/\text{W}$
T_l	Maximum lead temperature for soldering purpose	300	$^\circ\text{C}$

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage ($V_{GS} = 0$)	$I_D = 250\ \mu A$	40			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = 40\ V$ $V_{DS} = 40\ V, T_C = 125\text{ °C}$			1 100	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\ V$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu A$	3		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\ V, I_D = 60\ A$		TBD	1.7	m Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance			20000		pF
C_{oss}	Output capacitance	$V_{DS} = 25\ V, f = 1\ MHz,$ $V_{GS} = 0$	-	1740	-	pF
C_{rss}	Reverse transfer capacitance			1305		pF
Q_g	Total gate charge			377		nC
Q_{gs}	Gate-source charge	$V_{DD} = 20\ V, I_D = 120\ A,$ $V_{GS} = 10\ V$	-	TBD	-	nC
Q_{gd}	Gate-drain charge			TBD		nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	$V_{DD} = 20\ V, I_D = 60\ A$ $R_G = 4.7\ \Omega, V_{GS} = 10\ V$	-	TBD	-	ns
$t_{d(off)}$ t_f	Turn-off-delay time Fall time		-	TBD	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$I_{SD}^{(1)}$	Source-drain current		-		120	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		480	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 120 \text{ A}, V_{GS} = 0$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD} = 120 \text{ A}, V_{DD} = 32 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s},$ $T_j = 150 \text{ }^\circ\text{C}$	-	TBD		ns
Q_{rr}	Reverse recovery charge					nC
I_{RRM}	Reverse recovery current					A

1. Current limited by package
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

3 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. I²PAK (TO-262) mechanical data

DIM.	mm.		
	min.	typ	max.
A	4.40		4.60
A1	2.40		2.72
b	0.61		0.88
b1	1.14		1.70
c	0.49		0.70
c2	1.23		1.32
D	8.95		9.35
e	2.40		2.70
e1	4.95		5.15
E	10		10.40
L	13		14
L1	3.50		3.93
L2	1.27		1.40

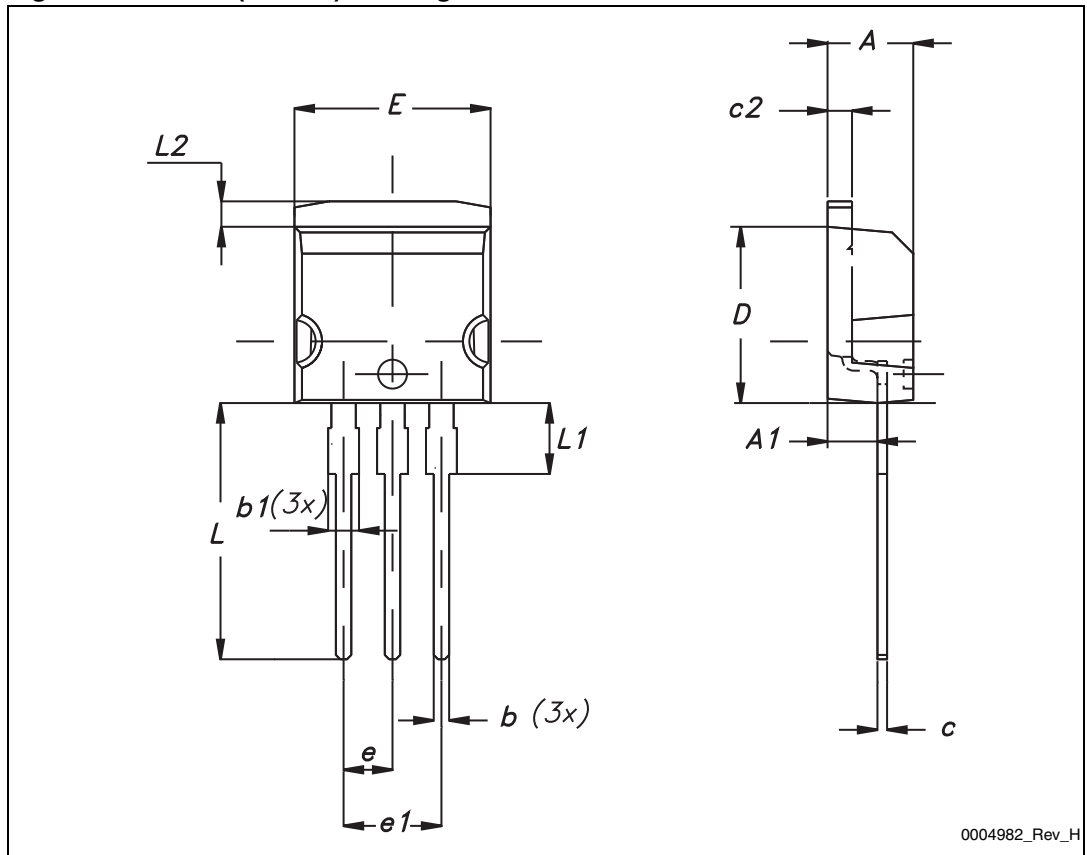
Figure 2. I²PAK (TO-262) drawing

Table 9. 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

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
13-Aug-2012	1	First release.

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