STP110N8F6



N-channel 80 V, 0.0056 Ω typ.,110 A, STripFET™ F6 Power MOSFET in a TO-220 package

Datasheet - production data

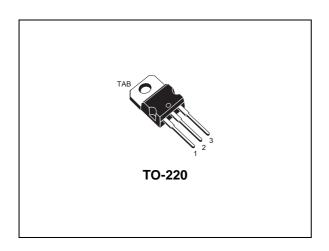
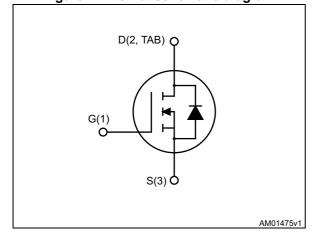


Figure 1. Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)max}	I _D	P _{TOT}
STP110N8F6	80 V	0.0065 Ω	110 A	200 W

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

Applications

Switching applications

Description

This device is an N-channel Power MOSFET developed using the STripFETTM F6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low $R_{DS(on)}$ in all packages.

Table 1. Device summary

Order code	Marking	Package	Packing
STP110N8F6	110N8F6	TO-220	Tube

Contents STP110N8F6

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STP110N8F6 Electrical ratings

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source voltage	80	V
V _{GS}	Gate-source voltage	±20	V
I _D	Drain current (continuous) at T _C = 25 °C	110	Α
I _D	Drain current (continuous) at T _C = 100 °C	85	Α
I _{DM} ⁽¹⁾	Drain current (pulsed)	440	А
P _{TOT}	Total dissipation at T _C = 25 °C	200	W
E _{AS} ⁽²⁾	Single pulse avalanche energy	180	mJ
TJ	Operating junction temperature	-55 to 175	°C
T _{stg}	Storage temperature	-55 to 175	°C

^{1.} Pulse width is limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R _{thj-case}	Thermal resistance junction-case max.	0.75	°C/W
R _{thj-amb}	Thermal resistance junction-ambient max.	62.5	°C/W

^{2.} Starting $T_J = 25$ °C, $I_D = 55$ A, $V_{DD} = 60$ V

Electrical characteristics STP110N8F6

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified)

Table 4. On/off-state

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source breakdown voltage	$V_{GS} = 0$, $I_D = 1$ mA	80			V
	Zero-gate voltage	$V_{GS} = 0, V_{DS} = 80 \text{ V}$			1	μΑ
Dec	drain current	$V_{GS} = 0$, $V_{DS} = 80$ V, $T_{C} = 125$ °C			100	μΑ
I _{GSS}	Gate-body leakage current	V _{DS} = 0, V _{GS} = +20 V			100	nA
V _{GS(th)}	Gate threshold voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.5		4.5	V
R _{DS(on)}	Static drain-source on- resistance	V _{GS} = 10 V, I _D = 55 A		0.0056	0.0065	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
C _{iss}	Input capacitance		-	9130	-	pF
C _{oss}	Output capacitance	$V_{DS} = 40 \text{ V, f} = 1 \text{ MHz,}$	-	320	-	pF
C _{rss}	Reverse transfer capacitance	$V_{GS} = 0$	-	225	-	pF
Qg	Total gate charge	V _{DD} = 40 V, I _D = 110 A,	-	150	-	nC
Q_{gs}	Gate-source charge	V _{GS} = 10 V	-	40	-	nC
Q _{gd}	Gate-drain charge	(see Figure 14)	-	30	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Turn-on delay time	$V_{DD} = 40 \text{ V}, I_{D} = 55 \text{ A},$ $R_{G} = 4.7 \Omega, V_{GS} = 10 \text{ V}$ (see <i>Figure 13</i>)	-	24	-	ns
t _r	Rise time		-	61	-	ns
t _{d(off)}	Turn-off delay time		-	162	-	ns
t _f	Fall time		-	48	-	ns



Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{SD} ⁽¹⁾	Forward on voltage	$I_{SD} = 110 \text{ A}, V_{GS} = 0$	-		1.2	V
t _{rr}	Reverse recovery time	I _{SD} = 110 A, di/dt = 100 A/μs V _{DD} = 64 V (see <i>Figure 15</i>)	-	30		ns
Q _{rr}	Reverse recovery charge		-	34		nC
I _{RRM}	Reverse recovery current	TOD THE COST (SEE FIGURE 10)	1	2.3		Α

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



Electrical characteristics STP110N8F6

2.1 Electrical characteristics (curves)

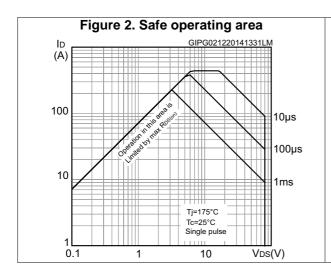


Figure 3. Thermal impedance GIPG031220140942LM 0.2 0.1 0.02 10- $Z_{th} = k R_{thJ-c}$ 0.01 $\delta = t_p / \tau$ Single pulse 10⁻² 10⁻⁵ 10⁻⁴ 10⁻³ 10⁻² tp(s)

Figure 4. Output characteristics

GIPG031220141042LM

VGS=6, 7,8,9, 10V

250

200

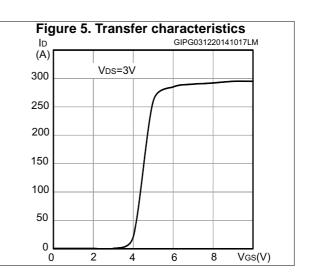
150

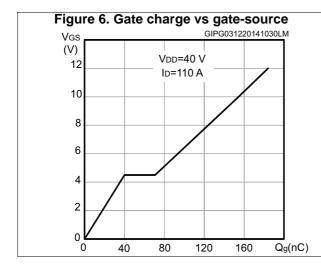
100

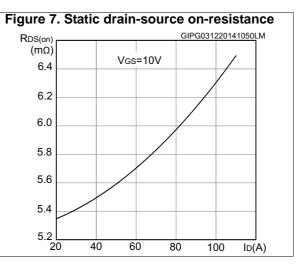
50

0

1 2 3 4 VDS(V)







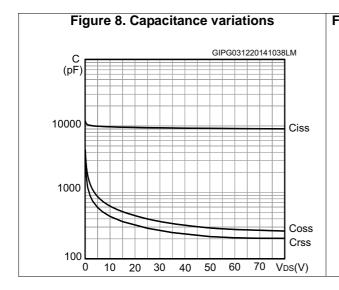


Figure 9. Normalized gate threshold voltage vs temperature

VGS(th)
(norm)

1.0

0.8

0.4

-75

-25

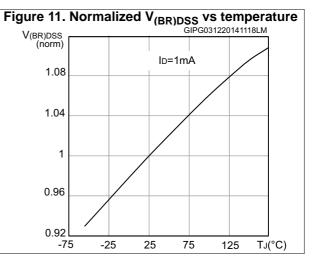
25

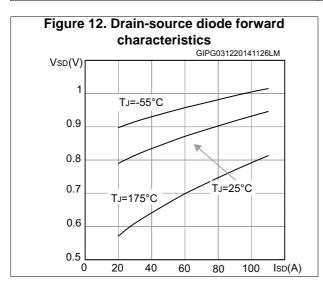
75

125

TJ(°C)

Figure 10. Normalized on-resistance GIPG031220141059LM RDS(on) (norm) Vgs=10V 2.5 2 1.5 1 0.5 0 -75 -25 25 75 125 T_J(°C)





Test circuits STP110N8F6

3 Test circuits

Figure 13. Switching times test circuit for resistive load

Figure 14. Gate charge test circuit

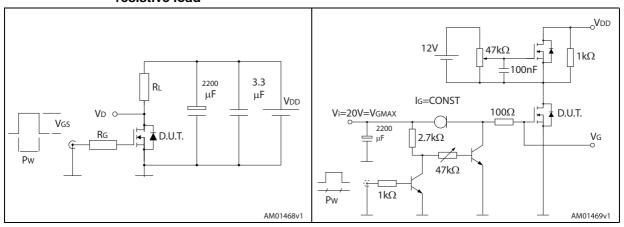


Figure 15. Test circuit for inductive load switching and diode recovery times

Figure 16. Unclamped inductive load test circuit

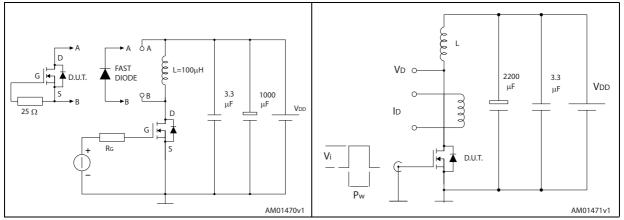
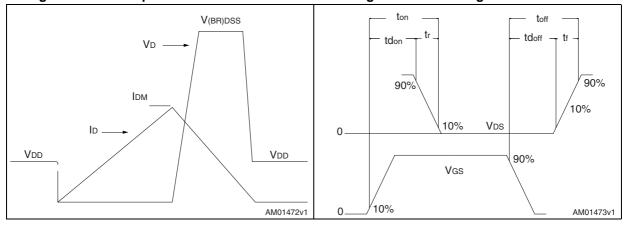


Figure 17. Unclamped inductive waveform

Figure 18. Switching time waveform



4 Package information

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.



Package information STP110N8F6

4.1 TO-220 package information

Figure 19. TO-220 type A outline

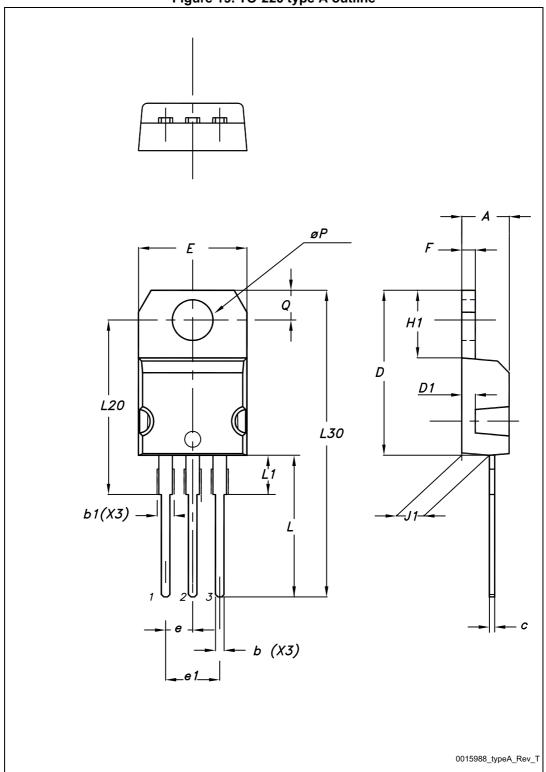


Table 8. TO-220 type A mechanical data

Dim		mm	
Dim.	Min.	Тур.	Max.
Α	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
С	0.48		0.70
D	15.25		15.75
D1		1.27	
Е	10		10.40
е	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	
øΡ	3.75		3.85
Q	2.65		2.95

Revision history STP110N8F6

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
26-Sep-2014	1	First release.
05-Dec-2014	2	Updated in cover page the title and features. Product status promoted from preliminary to production data. Updated E _{AS} parameter in <i>Table 2</i> and R _{DS(on)} in <i>Table 4</i> . Updated <i>Table 5</i> , <i>Table 6</i> and <i>Table 7</i> . Inserted Section 2.1.

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