

STL92N10F7AG

Automotive-grade N-channel 100 V, 0.008 Ω typ.,16 A STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data

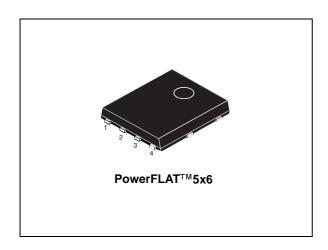
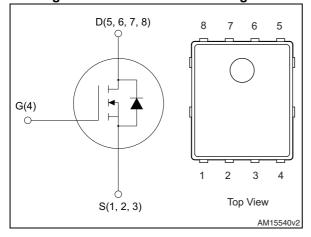


Figure 1. Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)} max	I _D	P _{TOT}
STL92N10F7AG	100 V	0.0095 Ω	16 A	5 W

- Designed for automotive applications and AEC-Q101 qualified
- Among the lowest R_{DS(on)} on the market
- Excellent figure of merit (FoM)
- Low C_{rss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness
- Wettable flank package

Applications

· Switching applications

Description

This N-channel Power MOSFET utilizes STripFET™ F7 technology with an enhanced trench gate structure that results in very low onstate resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1. Device summary

	Order code	Marking	Package	Packaging
Ī	STL92N10F7AG	92N10F7	PowerFLAT TM 5x6	Tape and reel

Contents STL92N10F7AG

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
	2.1 Electrical characteristics (curves)	6
3	Test circuits	8
4	Package mechanical data	9
	4.1 PowerFLAT™ 5x6 WF type R package information	0
	4.2 PowerFLAT™ 5x6 packing information	3
5	Revision history1	5

STL92N10F7AG Electrical ratings

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source voltage	100	V
V _{GS}	Gate-source voltage	± 20	V
I _D ⁽¹⁾	Drain current (continuous) at T _C = 25 °C	70	Α
I _D ⁽¹⁾	Drain current (continuous) at T _C = 100 °C	50	Α
I _D ⁽²⁾	Drain current (continuous) at T _{pcb} = 25 °C	16	Α
I _D ⁽²⁾	Drain current (continuous) at T _{pcb} = 100 °C	11	Α
I _{DM} ⁽²⁾⁽³⁾	Drain current (pulsed)	64	Α
P _{TOT} ⁽¹⁾	Total dissipation at T _C = 25 °C	100	W
P _{TOT} ⁽²⁾	Total dissipation at T _{pcb} = 25 °C	5	W
T _{stg}	Storage temperature	-55 to 175 °C	°C
Tj	Operating junction temperature	-55 10 175 C	

- 1. This value is rated according to R_{thj-c}
- 2. This value is rated according to $R_{\mbox{\scriptsize thj-pcb}}$
- 3. Pulse width limited by safe operating area.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R _{thj-pcb} ⁽¹⁾	Thermal resistance junction-pcb max	31	°C/W
R _{thj-case}	Thermal resistance junction-case max	1.5	°C/W

^{1.} When mounted on FR-4 board of 1 inch², 2 oz Cu.

Electrical characteristics STL92N10F7AG

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified)

Table 4. On /off states

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source breakdown voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0$	100			V
1	Zero gate voltage	V _{DS} = 100 V			1	μΑ
DSS	I_{DSS} drain current ($V_{GS} = 0$)	V _{DS} = 100 V, T _C =125 °C			100	μA
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	3.5	4.5	V
R _{DS(on)}	Static drain-source on-resistance	V _{GS} = 10 V, I _D = 8 A		0.008	0.0095	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
C _{iss}	Input capacitance		-	3100	-	pF
C _{oss}	Output capacitance	$V_{DS} = 50 \text{ V, f} = 1 \text{ MHz,}$	-	700	-	pF
C _{rss}	Reverse transfer capacitance	$V_{GS} = 0$	-	45	-	pF
Qg	Total gate charge	V _{DD} = 50 V, I _D = 16 A,	-	45	-	nC
Q _{gs}	Gate-source charge	V _{GS} = 10 V	-	18	-	nC
Q _{gd}	Gate-drain charge	(see Figure 14)	-	13	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Turn-on delay time		-	19	-	ns
t _r	Rise time	$V_{DD} = 50 \text{ V}, I_D = 8 \text{ A},$ $R_G = 4.7 \Omega, V_{GS} = 10 \text{ V}$	-	32	-	ns
t _{d(off)}	Turn-off delay time	$ \kappa_{G} = 4.7 \Omega$, $v_{GS} = 10 V$ (see <i>Figure 15</i> and <i>Figure 18</i>)	-	36	-	ns
t _f	Fall time		-	13	-	ns

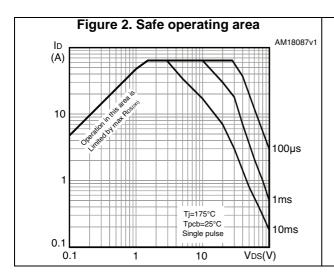
Table 7. Source drain diode

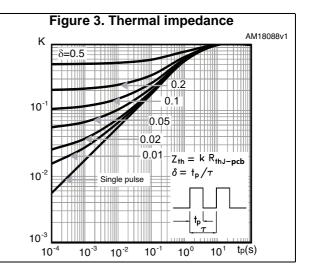
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{SD}	Source-drain current		-		16	Α
I _{SDM} ⁽¹⁾	Source-drain current (pulsed)		-		64	Α
V _{SD} (2)	Forward on voltage	I _{SD} = 16 A, V _{GS} = 0	-		1.1	٧
t _{rr}	Reverse recovery time	I _{SD} = 16 A, di/dt = 100 A/μs	-	70		ns
Q _{rr}	Reverse recovery charge	V _{DD} = 80 V, T _i =150 °C	-	125		nC
I _{RRM}	Reverse recovery current	(see Figure 18)	-	3.6		Α

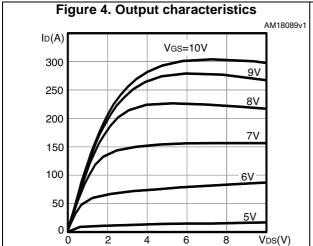
^{1.} Pulse width limited by safe operating area.

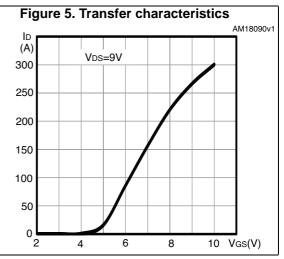
^{2.} Pulsed: pulse duration = $300 \mu s$, duty cycle 1.5%

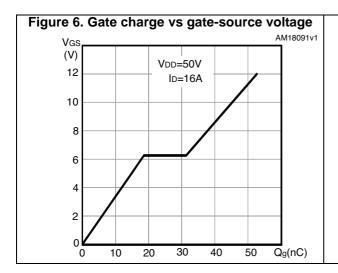
2.1 Electrical characteristics (curves)

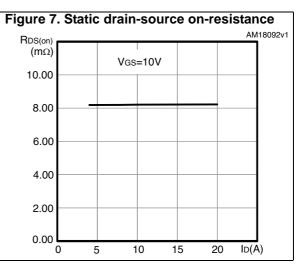












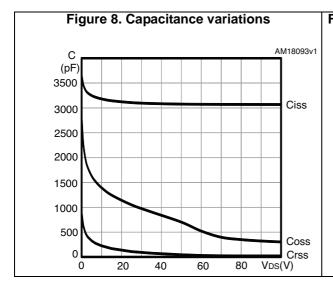


Figure 9. Normalized gate threshold voltage vs temperature

VGS(th) (norm) 1.2 ID=250µA AM18094v1

0.8 0.6 0.4 0.2 0.5 -5 45 95 145 TJ(°C)

45

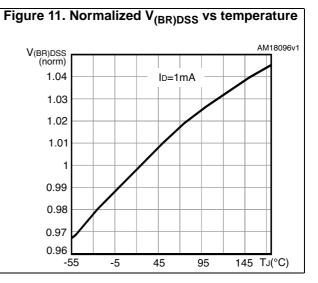
95

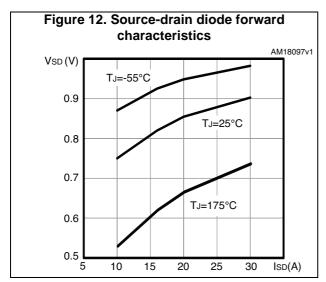
145

T_J(°C)

-5

-55





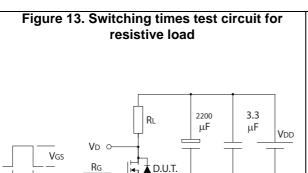
Test circuits STL92N10F7AG

AM01468v1

AM01470v1

3 Test circuits

Pw



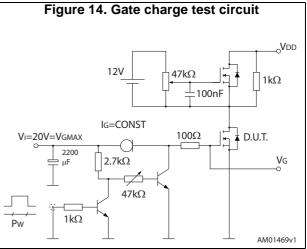
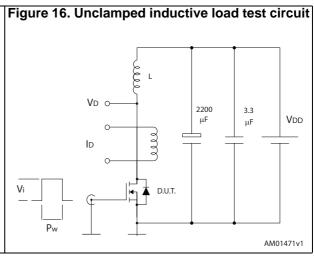
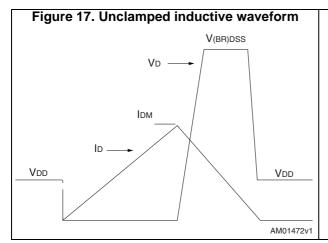
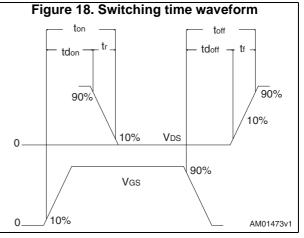


Figure 15. Test circuit for inductive load switching and diode recovery times







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.



4.1 PowerFLAT™ 5x6 WF type R package information

BOTTOM VIEW

Scole 3:1

Detail A Scole 3:1

De

Figure 19. PowerFLAT™ 5x6 WF type R package outline

Table 8. PowerFLAT™ 5x6 WF type R mechanical data

Dim.		mm	
Dilli.	Min.	Тур.	Max.
А	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D	5.00	5.20	5.40
E	6.20	6.40	6.60
D2	4.15		4.45
E2	3.50		3.70
е		1.27	
L	0.70		0.90
L1		0.275	
K	1.275		1.575
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28



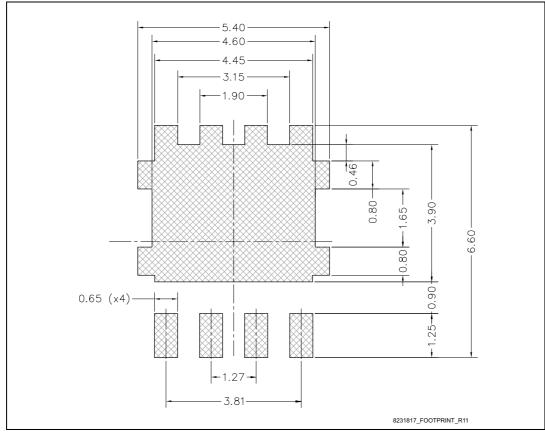


Figure 20. PowerFLAT™ 5x6 recommended footprint

57/

4.2 PowerFLAT™ 5x6 packing information

Figure 21. PowerFLAT™ 5x6 type WF tape^(a)

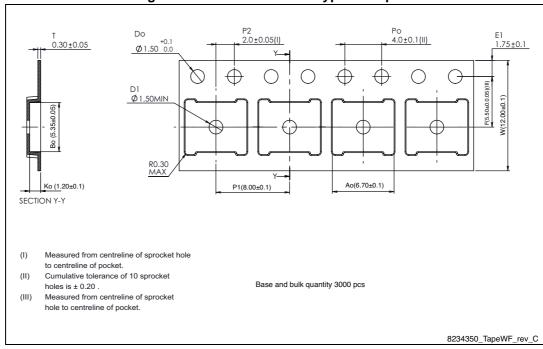
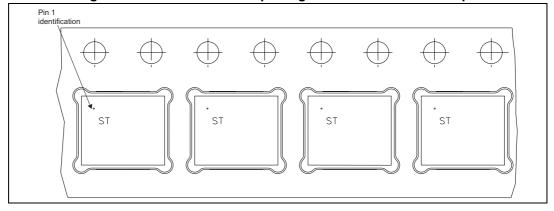


Figure 22. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

PRET NO. 13.00

All dimensions are in millimeters

8234350_Reel_rev_C

Figure 23. PowerFLAT™ 5x6 reel



STL92N10F7AG Revision history

5 Revision history

Table 9. Document revision history

Date	Revision	Changes	
16-Oct-2014	1	First release.	
12-Oct-2015	2	Updated: Section 4.1: PowerFLAT TM 5x6 WF type R package information Datasheet promoted from preliminary data to production data Minor text changes	

IMPORTANT NOTICE - PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics - All rights reserved

577