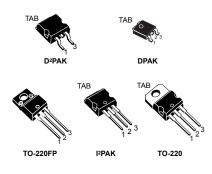
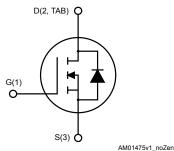


STB100N10F7, STD100N10F7, STF100N10F7 STI100N10F7, STP100N10F7

Datasheet

N-channel 100 V, 6.8 mΩ typ., 80 A STripFET™ F7 Power MOSFETs in D²PAK, DPAK, TO-220FP, I²PAK and TO-220 packages





Product status links	
STB100N10F7	
STD100N10F7	
STF100N10F7	
STI100N10F7	

STP100N10F7

Features

Order codes	V _{DS}	R _{DS(on)} max.	l _D	Package
STB100N10F7		8.0 mΩ	80 A	D ² PAK
STD100N10F7			80 A	DPAK
STF100N10F7	100 V		45 A	TO-220FP
STI100N10F7			80 A	I ² PAK
STP100N10F7			80 A	TO-220

- Among the lowest R_{DS(on)} on the market
- Excellent FoM (figure of merit)
- Low C_{rss}/C_{iss} ratio for EMI immunity
- · High avalanche ruggedness

Applications

· Switching applications

Description

These N-channel Power MOSFETs utilize STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.



1 Electrical ratings

Table 1. Absolute maximum ratings

			Value			
Symbol	Parameter	DPAK	TO-220FP	TO-220 D ² PAK I ² PAK	Unit	
V _{DS}	Drain-source voltage		100		V	
V _{GS}	Gate-source voltage	±20			V	
	Drain current (continuous) at T _C = 25 °C	80	45 ⁽¹⁾	80	А	
I _D	Drain current (continuous) at T _C = 100 °C	62	32 ⁽¹⁾	70	А	
I _{DM} ⁽²⁾	Drain current (pulsed)	320	180	320	А	
P _{TOT} ⁽¹⁾	Total dissipation at T _C = 25 °C	120	30	150	W	
V _{ISO}	Insulation withstand voltage (RMS) from all three leads to external heatsink (t = 1 s, T _C = 25 °C)		2.5		kV	
TJ	Operating junction temperature				°C	
T _{stg}	Storage temperature range		-55 to 175		°C	

^{1.} This value is limited by package.

Table 2. Thermal resistance

		Value				
Symbol	Parameter	D ² PAK	DPAK	TO-220FP	TO-220 I ² PAK	Unit
R _{thj-case}	Thermal resistance junction-case	1	1.25	5	1	°C/W
R _{thj-amb}	Thermal resistance junction-ambient			62.5		°C/W
R _{thj-pcb} ⁽¹⁾	Thermal resistance junction-pcb	30	50			°C/W

^{1.} When mounted on an 1-inch² FR-4 board, 2oz CU, t < 10 s.

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
E	Single pulse avalanche energy	400	m l
E _{AS}	$(T_J = 25 ^{\circ}\text{C}, L = 3.5 \text{mH}, I_{AS} = 15 \text{A}, V_{DD} = 50 \text{V}, V_{GS} = 10 \text{V})$	400	mJ

DS9291 - Rev 5 page 2/28

^{2.} Pulse width is limited by safe operating area.



2 Electrical characteristics

(T_{CASE} = 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 μA, V _{GS} = 0 V	100			V
		V _{DS} = 100 V, V _{GS} = 0 V			1	μA
I _{DSS}	Zero gate voltage drain current	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V},$ $T_C = 125 {}^{\circ}\text{C}^{(1)}$			100	μA
I _{GSS}	Gate-body leakage current	V _{GS} = 20 V, V _{DS} = 0 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	For D ² PAK, DPAK, I ² PAK and TO-220: $V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$ For TO-220FP: $V_{GS} = 10 \text{ V}, I_D = 22.5 \text{ A}$		6.8	8.0	mΩ

^{1.} Defined by design, not subject to production test.

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
C _{iss}	Input capacitance	V 50 V f - 1 MHz	-	4369	-	pF
C _{oss}	Output capacitance	$V_{DS} = 50 \text{ V, f} = 1 \text{ MHz,}$ $V_{GS} = 0 \text{ V}$		823	-	pF
C _{rss}	Reverse transfer capacitance	765 07	-	36	-	pF
Qg	Total gate charge	$V_{DD} = 50 \text{ V}, I_D = 80 \text{ A},$	-	61	-	nC
Q_{gs}	Gate-source charge	V _{GS} = 0 to 10 V	-	26	-	nC
Q _{gd}	Gate-drain charge	(see Figure 17. Test circuit for gate charge behavior)	-	13	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 50 V, I _D = 40 A,	-	27	-	ns
t _r	Rise time	$R_G = 4.7 \Omega, V_{GS} = 10 V$	-	40	-	ns
t _{d(off)}	Turn-off delay time	(see Figure 16. Test circuit for resistive load switching times and	-	46	-	ns
t _f	Fall time	Figure 21. Switching time waveform)	-	15	-	ns

DS9291 - Rev 5 page 3/28



Table 7. Source-drain diode

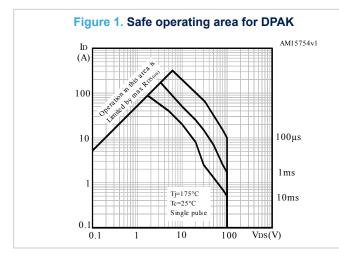
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{SD}	Source-drain current		-		80	Α
I _{SDM} ⁽¹⁾	Source-drain current (pulsed)		-		320	Α
V _{SD} ⁽²⁾	Forward on voltage	I _{SD} = 80 A, V _{GS} = 0 V	-		1.2	V
t _{rr}	Reverse recovery time	I _{SD} = 80 A, di/dt = 100 A/μs	-	77		ns
Q _{rr}	Reverse recovery charge	V _{DD} = 80 V, T _J = 150 °C	-	146		nC
I _{RRM}	Reverse recovery current	(see Figure 18. Test circuit for inductive load switching and diode recovery times)	-	4		A

- 1. Pulse width is limited by safe operating area.
- 2. Pulsed: pulse duration = 300 μ s, duty cycle 1.5%

DS9291 - Rev 5 page 4/28



2.1 Electrical characteristics (curves)



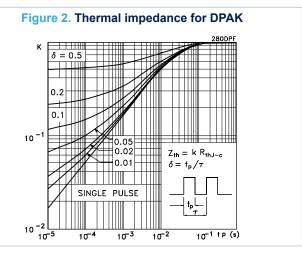
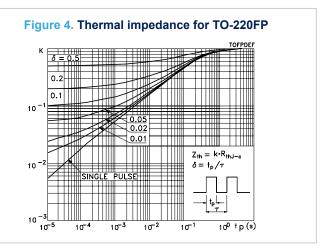


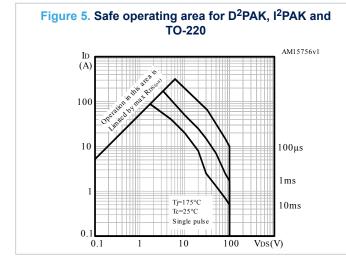
Figure 3. Safe operating area for TO-220FP

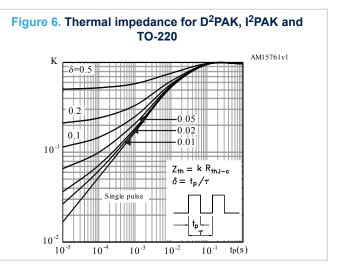
ID
(A)

100

Order for the product of the product o







DS9291 - Rev 5 page 5/28

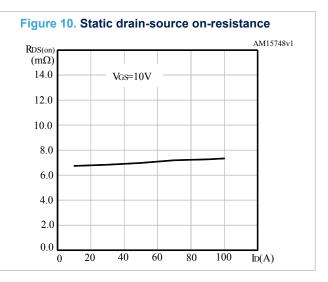


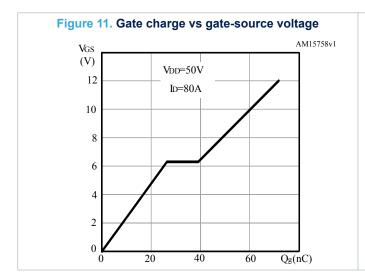
Figure 7. Output characteristics AM15757v1 ΙD (A) Vgs=10V 300 9V 250 8V 200 7V 150 100 6V 50 5V VDS(V)

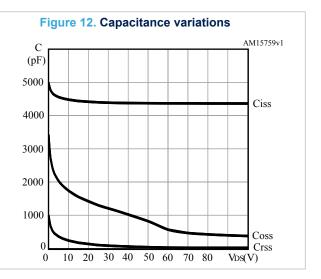
Figure 8. Transfer characteristics

AMI5745v1

Figure 9. Normalized V_{(BR)DSS} vs temperature AM15747v1 $V_{(BR)DSS}$ ID=250 μA 1.04 1.02 0.98 0.96 0.94 95 120 -55 -30 20 45 70 -5 T_J(°C)







DS9291 - Rev 5 page 6/28



0.92

-55 -30

-5 20 45 70

Figure 13. Normalized gate threshold voltage vs temperature

VGS(th)

1.04

1.02

1

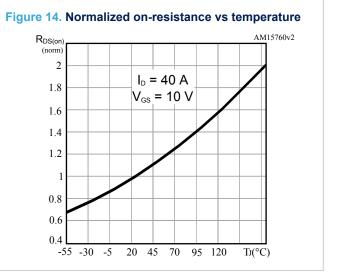
0.98

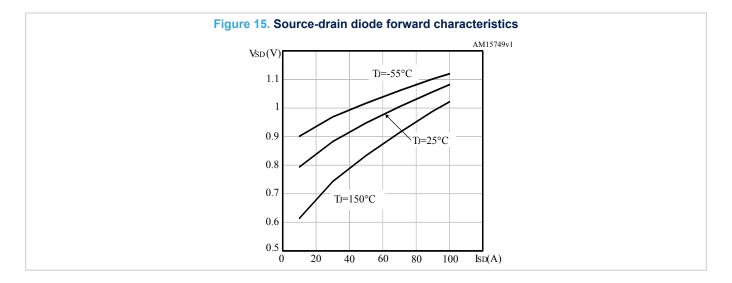
0.96

0.94

95 120

T_J(°C)





DS9291 - Rev 5 page 7/28



3 Test circuits

Figure 16. Test circuit for resistive load switching times

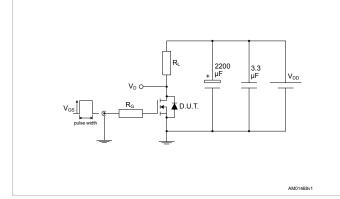


Figure 17. Test circuit for gate charge behavior

AM01469v1

Figure 18. Test circuit for inductive load switching and diode recovery times

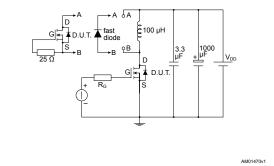
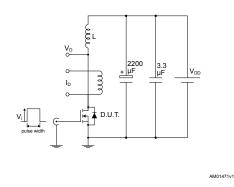


Figure 19. Unclamped inductive load test circuit



AM01470v1

Figure 20. Unclamped inductive waveform

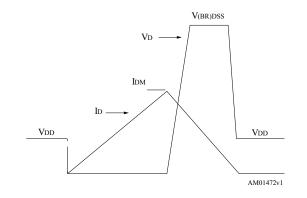
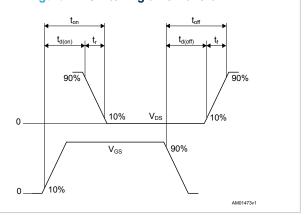


Figure 21. Switching time waveform



DS9291 - Rev 5 page 8/28



4 Package information

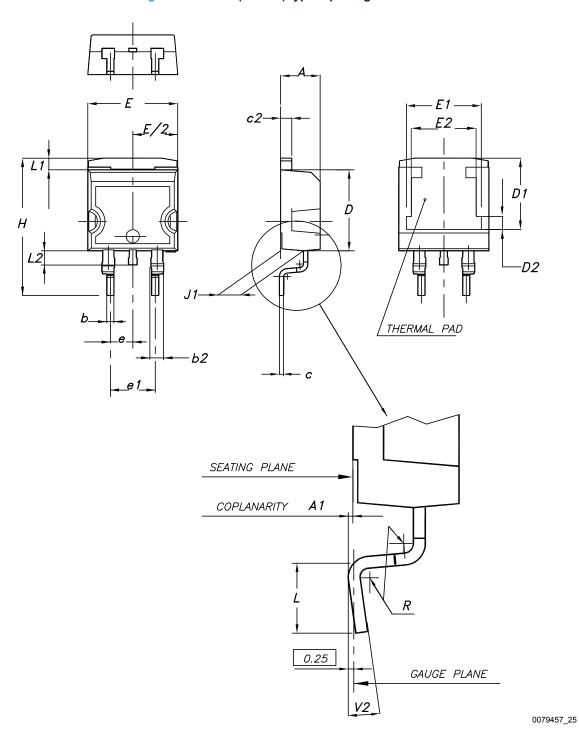
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

DS9291 - Rev 5 page 9/28



4.1 D²PAK (TO-263) type A package information

Figure 22. D²PAK (TO-263) type A package outline



DS9291 - Rev 5 page 10/28



Table 8. D²PAK (TO-263) type A package mechanical data

Dim		mm	
Dim.	Min.	Тур.	Max.
А	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
С	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50	7.75	8.00
D2	1.10	1.30	1.50
E	10.00		10.40
E1	8.30	8.50	8.70
E2	6.85	7.05	7.25
е		2.54	
e1	4.88		5.28
Н	15.00		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.40	
V2	0°		8°

DS9291 - Rev 5 page 11/28



9.75 16.9 2.54 5.08

Figure 23. D²PAK (TO-263) recommended footprint (dimensions are in mm)

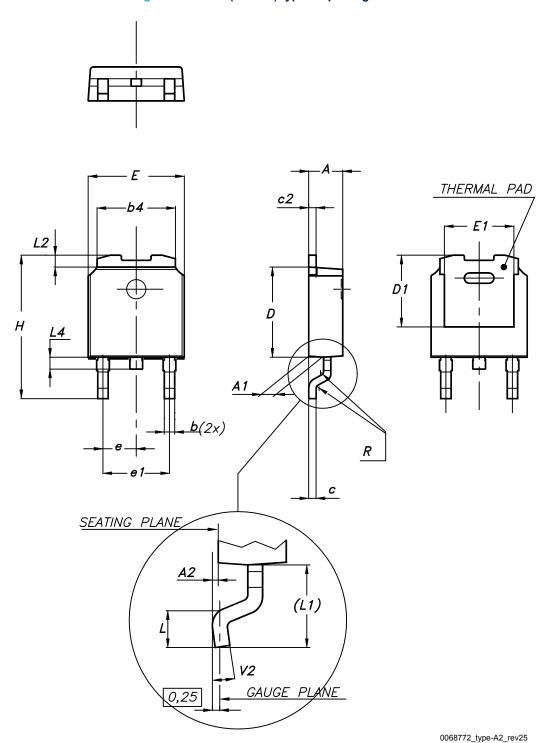
Footprint

DS9291 - Rev 5 page 12/28



4.2 DPAK (TO-252) type A2 package information

Figure 24. DPAK (TO-252) type A2 package outline



DS9291 - Rev 5 page 13/28



Table 9. DPAK (TO-252) type A2 mechanical data

Dim.		mm	
Dim.	Min.	Тур.	Max.
Α	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
С	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1	4.95	5.10	5.25
Е	6.40		6.60
E1	5.10	5.20	5.30
е	2.159	2.286	2.413
e1	4.445	4.572	4.699
Н	9.35		10.10
L	1.00		1.50
L1	2.60	2.80	3.00
L2	0.65	0.80	0.95
L4	0.60		1.00
R		0.20	
V2	0°		8°

DS9291 - Rev 5 page 14/28

Figure 25. DPAK (TO-252) recommended footprint (dimensions are in mm)

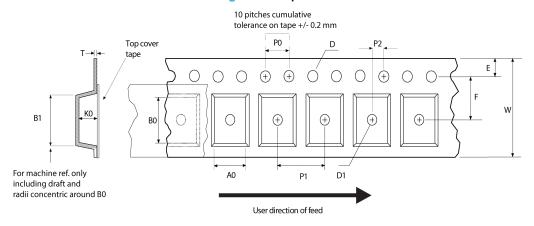
FP_0068772_25

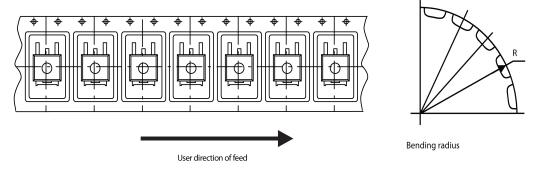
DS9291 - Rev 5 page 15/28



4.3 D²PAK and DPAK packing information

Figure 26. Tape outline



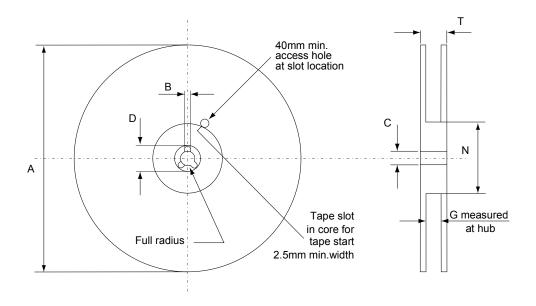


AM08852v1

DS9291 - Rev 5 page 16/28



Figure 27. Reel outline



AM06038v1

Table 10. D2PAK tape and reel mechanical data

Таре			Reel			
Dim.	n	nm	Dim.	mr	n	
Diiii.	Min.	Max.	Diiii.	Min.	Max.	
A0	10.5	10.7	Α		330	
В0	15.7	15.9	В	1.5		
D	1.5	1.6	С	12.8	13.2	
D1	1.59	1.61	D	20.2		
E	1.65	1.85	G	24.4	26.4	
F	11.4	11.6	N	100		
K0	4.8	5.0	Т		30.4	
P0	3.9	4.1				
P1	11.9	12.1	Base qu	uantity	1000	
P2	1.9	2.1	Bulk quantity		1000	
R	50					
Т	0.25	0.35				
W	23.7	24.3				

DS9291 - Rev 5 page 17/28



Table 11. DPAK tape and reel mechanical data

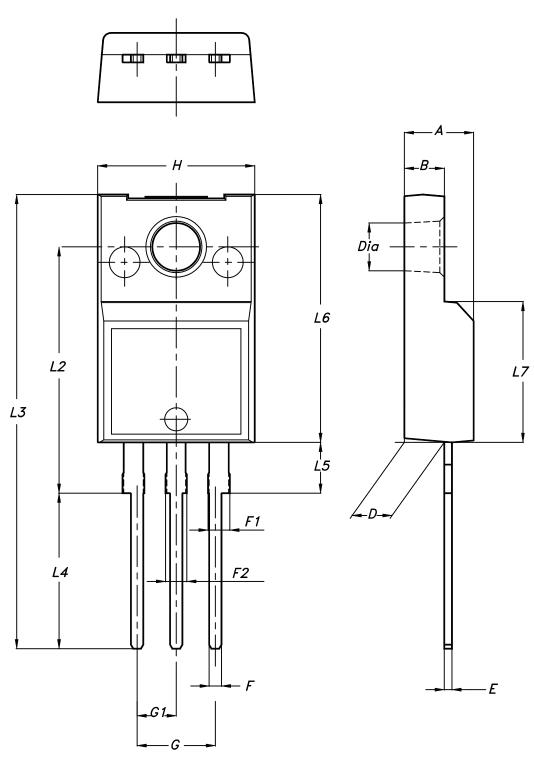
Таре			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.	Dim.	Min.	Max.
A0	6.8	7	А		330
В0	10.4	10.6	В	1.5	
B1		12.1	С	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	Т		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
Т	0.25	0.35			
W	15.7	16.3			

DS9291 - Rev 5 page 18/28



4.4 TO-220FP package information

Figure 28. TO-220FP package outline



7012510_Rev_12_B

DS9291 - Rev 5 page 19/28



Table 12. TO-220FP package mechanical data

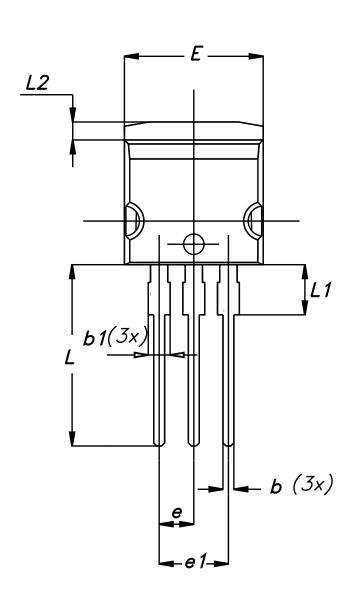
Dim.		mm	
	Min.	Тур.	Max.
А	4.4		4.6
В	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
Н	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

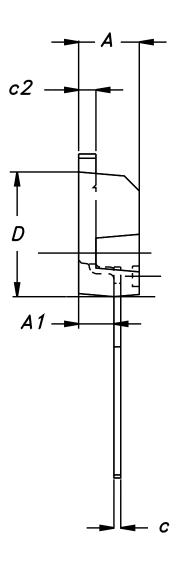
DS9291 - Rev 5 page 20/28



4.5 I²PAK package information

Figure 29. I²PAK package outline





0004982_Rev_H

DS9291 - Rev 5 page 21/28



Table 13. I²PAK package mechanical data

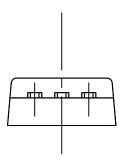
Dim.	mm			
	Min.	Тур.	Max.	
Α	4.40	-	4.60	
A1	2.40	-	2.72	
b	0.61	-	0.88	
b1	1.14	-	1.70	
С	0.49	-	0.70	
c2	1.23	-	1.32	
D	8.95	-	9.35	
е	2.40	-	2.70	
e1	4.95	-	5.15	
E	10	-	10.40	
L	13	-	14	
L1	3.50	-	3.93	
L2	1.27	-	1.40	

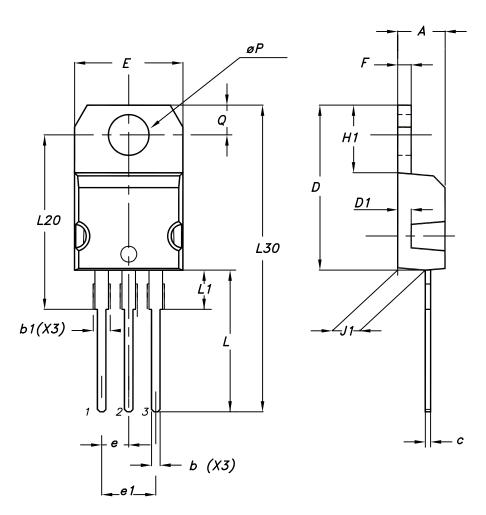
DS9291 - Rev 5 page 22/28



4.6 TO-220 type A package information

Figure 30. TO-220 type A package outline





 $0015988_typeA_Rev_21$

DS9291 - Rev 5 page 23/28



Table 14. TO-220 type A package mechanical data

Dim.		mm	
	Min.	Тур.	Max.
А	4.40		4.60
b	0.61		0.88
b1	1.14		1.55
С	0.48		0.70
D	15.25		15.75
D1		1.27	
Е	10.00		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	13.00		14.00
L1	3.50		3.93
L20		16.40	
L30		28.90	
øΡ	3.75		3.85
Q	2.65		2.95

DS9291 - Rev 5 page 24/28



5 Ordering information

Table 15. Order codes

Order code	Marking	Package	Packing
STB100N10F7	100N10F7	D ² PAK	Tape and reel
STD100N10F7		DPAK	Tape and reel
STF100N10F7		TO-220FP	Tube
STI100N10F7		I ² PAK	Tube
STP100N10F7		TO-220	Tube

DS9291 - Rev 5 page 25/28



Revision history

Table 16. Document revision history

Date	Version	Changes
05-Oct-2012	1	Initial release.
	2	Inserted device in TO-220FP.
07-Feb-2013		Updated title and features on the cover page, <i>Table 1: Device summary, Table 2: Absolute maximum ratings, Table 3: Thermal resistance</i> and <i>Table 5: On/off states</i> accordingly.
		Updated Table 6: Dynamic, Table 7: Switching times, Table 8: Source drain diode and Section 4: Package mechanical data.
		Added Section 5: Packaging mechanical data.
	3	Modified: the entire typical values in <i>Table 6</i> , tf typical value in <i>Table 7</i> , VSD and typical values for trr, qrr, IRRM
29-Apr-2013		Inserted: Table 4: Avalanche characteristics and Section 2.1: Electrical characteristics (curves)
		Minor text changes
	4	Inserted device in D ² PAK.
25-Nov-2013		Updated title and features on the cover page, <i>Table 1: Device summary, Table 2: Absolute maximum ratings, Table 3: Thermal resistance</i> and <i>Table 5: On/off states</i> accordingly.
		Updated Table 6: Dynamic, Section 4: Package mechanical data and Section 5: Packaging mechanical data.
	5	Added STI100N10F7 device and updated the document accordingly.
		Removed maturity status indication, updated title, features and description on cover page.
18-Jun-2018		Updated Table 1. Absolute maximum ratings.
		Updated Section 4 Package information.
		Minor text changes

DS9291 - Rev 5 page 26/28



Contents

1	Elec	ctrical ratings	2		
2					
	2.1	Electrical characteristics (curves)	5		
3	Test	t circuits	8		
4	Pac	kage information	9		
	4.1	D²PAK (TO-263) type A package information	9		
	4.2	DPAK (TO-252) type A2 package information	12		
	4.3	D²PAK and DPAK packing information	15		
	4.4	TO-220FP package information	18		
	4.5	I ² PAK package information	20		
	4.6	TO-220 type A package information	22		
5	Ord	ering information	25		
Rev	ision	history	26		



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.

© 2018 STMicroelectronics - All rights reserved

DS9291 - Rev 5 page 28/28