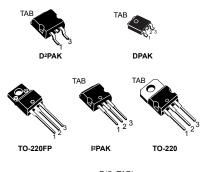
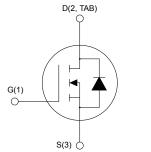


STB100N10F7, STD100N10F7, STF100N10F7 STI100N10F7, STP100N10F7

Datasheet

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





AM01475v1_noZen

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



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.





Product status links
STB100N10F7
STD100N10F7
STF100N10F7
STI100N10F7
STP100N10F7



1 Electrical ratings

Table 1. Absolute maximum ratings

			Value				
Symbol	Parameter		TO-220FP	D ² PAK I ² PAK TO-220	Unit		
V_{DS}	Drain-source voltage		100		V		
V _{GS}	Gate-source voltage		±20		V		
1-	Drain current (continuous) at T _C = 25 °C	80	45 ⁽¹⁾	80	Α		
Ι _D	Drain current (continuous) at T _C = 100 °C	62	32 ⁽¹⁾	70	Α		
I _{DM} ⁽²⁾	Drain current (pulsed)	320	180	320	Α		
P _{TOT} ⁽¹⁾	Total power 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		TO-220FP	I ² PAK TO-220	Unit	
R _{thJC}	Thermal resistance, junction-to-case	1	1.25	5	1	°C/W	
R _{thJA}	Thermal resistance, junction-to-ambient			62.5		°C/W	
R _{thJB} ⁽¹⁾	Thermal resistance, junction-to-board	30	50			°C/W	

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

Table 3. Avalanche characteristics

Sy	/mbol	Parameter	Value	Unit
	E _{AS}	Single pulse avalanche energy ($T_J = 25$ °C, L = 3.5 mH, $I_{AS} = 15$ A, $V_{DD} = 50$ V, $V_{GS} = 10$ V)	400	mJ

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



2 Electrical characteristics

 T_{CASE} = 25 °C unless otherwise specified.

Table 4. On-/off-states

		Test condi	Test conditions				
Symbol	Parameter	D ² PAK, DPAK I ² PAK, TO-220	TO-220FP	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 V, V _{GS} = 0 V,				100	
		$T_C = 125 ^{\circ}C^{(1)}$				100	μA
I _{GSS}	Gate-body leakage current	V _{GS} = 20 V, V _{DS} = 0 V	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	$V_{GS} = 10 \text{ V},$ $I_{D} = 40 \text{ A}$	$V_{GS} = 10 \text{ V},$ $I_D = 22.5 \text{ A}$		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 V, f = 1 MHz, V _{GS} = 0 V		823	-	pF
C _{rss}	Reverse transfer capacitance	VGS = 0 V		36	-	pF
Qg	Total gate charge	V _{DD} = 50 V, I _D = 80 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 Figure 21. Switching time waveform)		46	-	ns
t _f	Fall time			15	-	ns

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Table 7. Source-drain diode

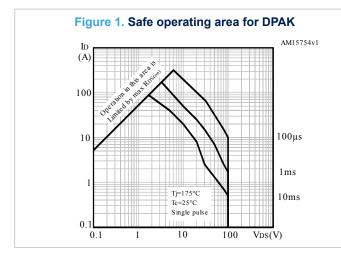
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{SD}	Source-drain current		-		80	Α
I _{SDM} ⁽¹⁾	Source-drain current (pulsed)		-		320	Α
V _{SD} ⁽²⁾	Forward on voltage	I _{SD} = 80 A, V _{GS} = 0 V	-		1.2	V
t _{rr}	Reverse recovery time	I _{SD} = 80 A, di/dt = 100 A/μs	-	77		ns
Q _{rr}	Reverse 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		Α

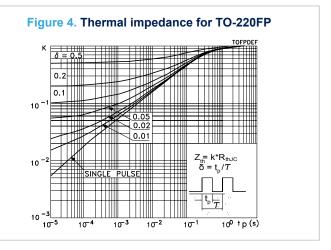
- 1. Pulse width is limited by safe operating area.
- 2. Pulsed: pulse duration = 300 μs, duty cycle 1.5%

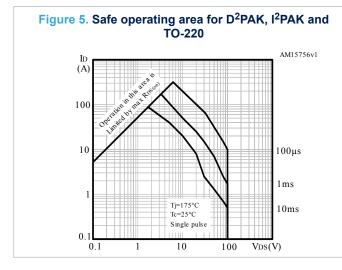
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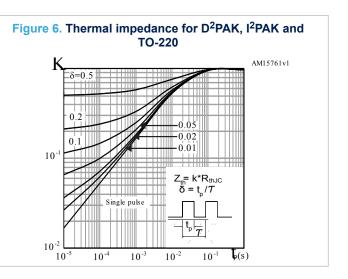


2.1 Electrical characteristics (curves)









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Figure 7. Output characteristics AM15757v1 ΙD (A) Vgs=10V 300 9V 250 8V 200 7V 150 100 6V 50 5V $\overline{V}_{DS}(V)$

Figure 8. Transfer characteristics AM15745v1 (A) VDS=5V 300 250 200 150 100 50 3 6 7 8 9 10 Vgs(V) 4 5

Figure 9. Normalized V_{(BR)DSS} vs temperature

V_{(BR)DSS (norm)}

1.04

1.02

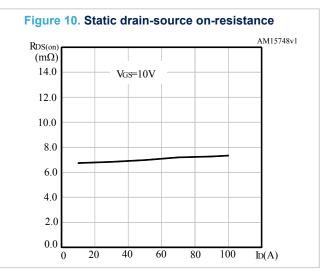
1

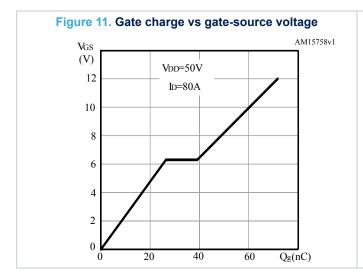
0.98

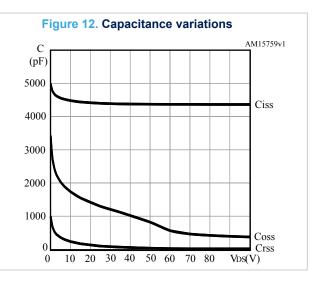
0.96

0.94

-55 -30 -5 20 45 70 95 120 Tr(°C)







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Figure 13. Normalized gate threshold voltage vs temperature

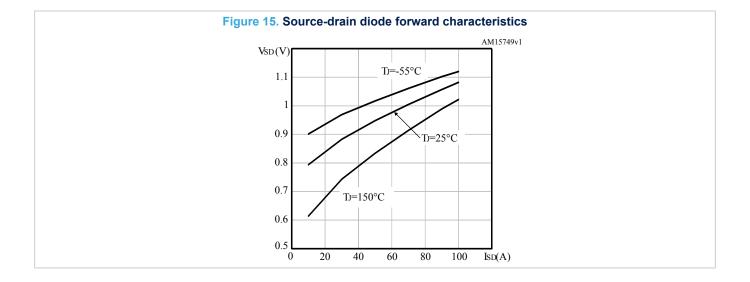
VGS(th)
(norm)
1.04
ID= 250 μA
1.02
1
0.98
0.96
0.94

95 120

T_J(°C)

-30 -5 20 45 70

Figure 14. Normalized on-resistance vs temperature AM15760v2 2 $I_{D} = 40 \text{ A}$ 1.8 $V_{GS} = 10 \text{ V}$ 1.6 1.4 1.2 0.8 0.6 0.4 -55 -30 -5 20 45 70 95 120 $\mathrm{TJ}(^{\circ}\mathrm{C})$



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3 Test circuits

Figure 16. Test circuit for resistive load switching times

V_D

V_D

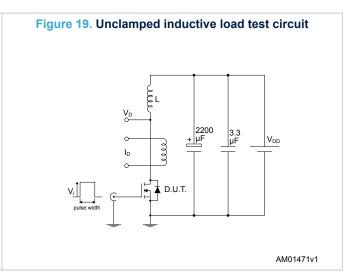
V_D

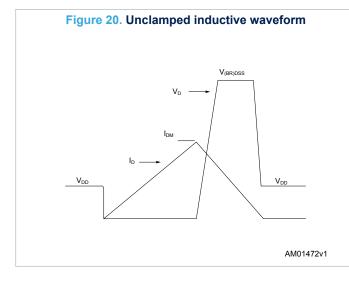
D.U.T.

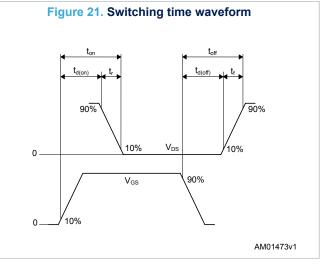
AM01468v1

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

AM01470v1







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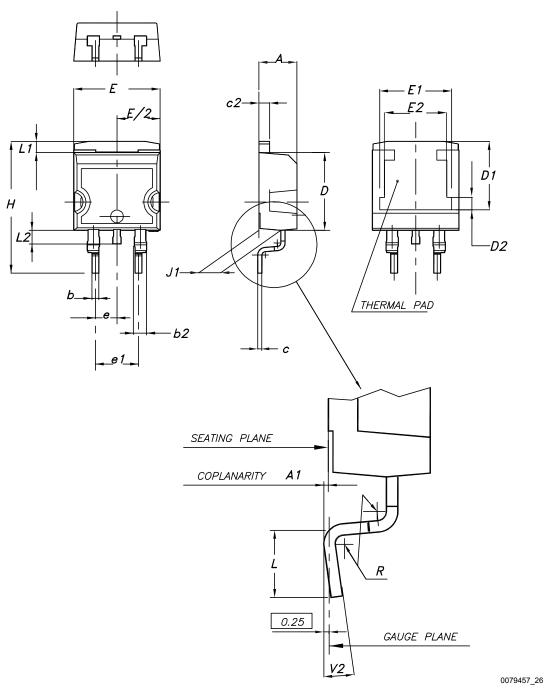


4 Package information

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.

4.1 D²PAK (TO-263) type A package information

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



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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°			

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9.75 16.90 2.54 5.08

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

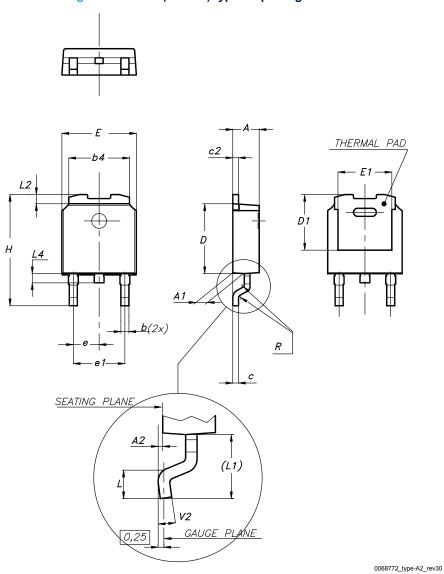
0079457_Rev26_footprint

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4.2 DPAK (TO-252) type A2 package information

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



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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		
E	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°		

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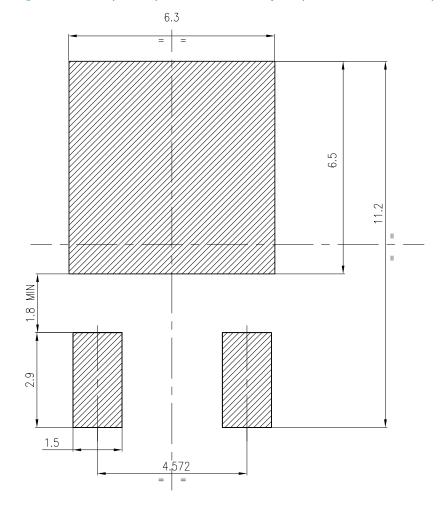


Figure 25. DPAK (TO-252) recommended footprint (dimensions are in mm)

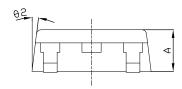
FP_0068772_30

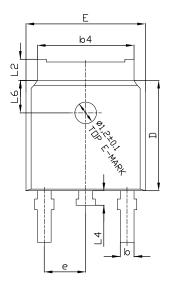
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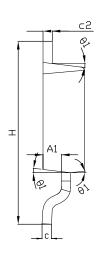


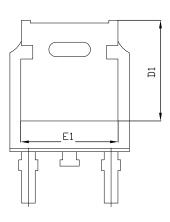
4.3 DPAK (TO-252) type C package information

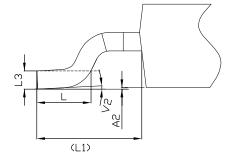
Figure 26. DPAK (TO-252) type C package outline











0068772_C_30

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Table 10. DPAK (TO-252) type C mechanical data

Dim.	mm				
Dim.	Min.	Тур.	Max.		
A	2.20	2.30	2.38		
A1	0.90	1.01	1.10		
A2	0.00		0.10		
b	0.72		0.85		
b4	5.13	5.33	5.46		
С	0.47		0.60		
c2	0.47		0.60		
D	6.00	6.10	6.20		
D1	5.25				
E	6.50	6.60	6.70		
E1	4.70				
е	2.186	2.286	2.386		
Н	9.80	10.10	10.40		
L	1.40	1.50	1.70		
L1		2.90 REF			
L2	0.90		1.25		
L3		0.51 BSC			
L4	0.60	0.80	1.00		
L6		1.80 BSC			
θ1	5°	7°	9°		
θ2	5°	7°	9°		
V2	0°		8°		

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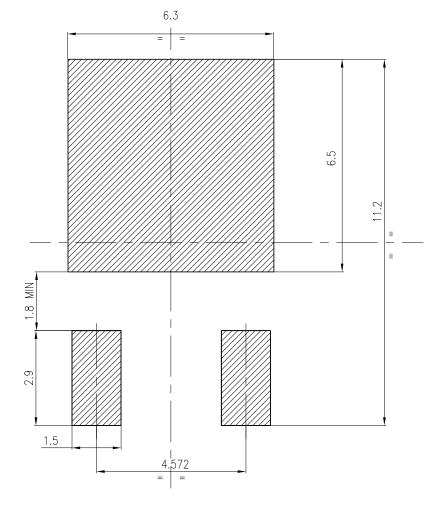


Figure 27. DPAK (TO-252) recommended footprint (dimensions are in mm)

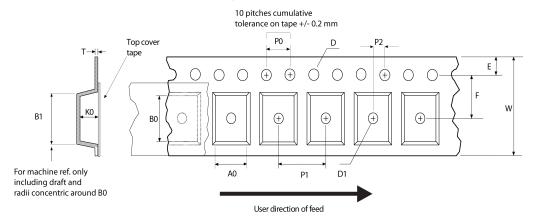
FP_0068772_30

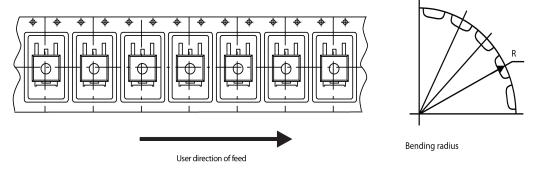
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4.4 D²PAK and DPAK packing information

Figure 28. Tape outline



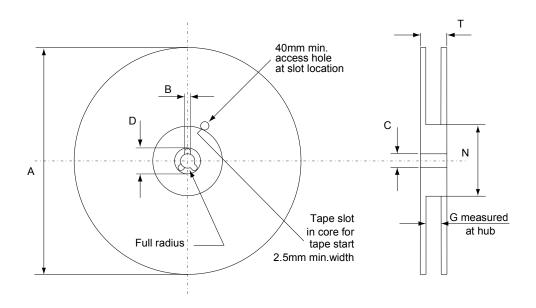


AM08852v1

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Figure 29. Reel outline



AM06038v1

Table 11. D2PAK tape and reel mechanical data

Таре			Reel		
Dim	mm		Dim	mm	
Dim.	Min.	Max.	Dim.	Min.	Max.
A0	10.5	10.7	А		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 quantity		1000
P2	1.9	2.1	Bulk quantity		1000
R	50				
Т	0.25	0.35			
W	23.7	24.3			

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Table 12. DPAK tape and reel mechanical data

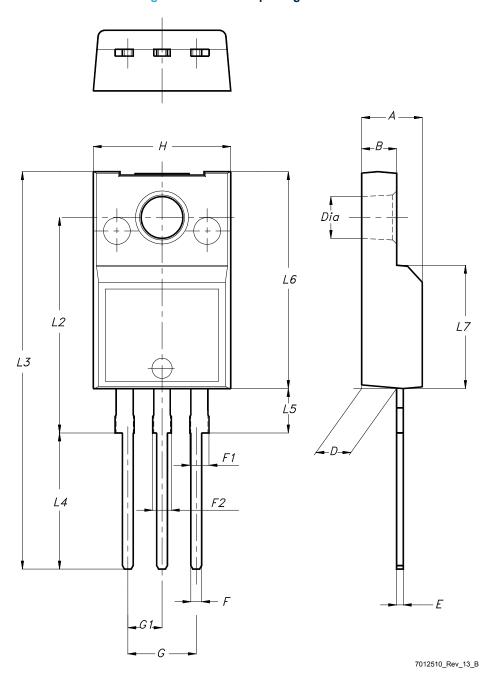
Таре			Reel			
5.	mm		Dis.		mm	
Dim.	Min.	Max.	Dim.	Min.	Max.	
A0	6.8	7	А		330	
В0	10.4	10.6	В	1.5		
B1		12.1	С	12.8	13.2	
D	1.5	1.6	D	20.2		
D1	1.5		G	16.4	18.4	
E	1.65	1.85	N	50		
F	7.4	7.6	Т		22.4	
K0	2.55	2.75				
P0	3.9	4.1	Base qty.		2500	
P1	7.9	8.1	Bulk qty.		2500	
P2	1.9	2.1				
R	40					
Т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

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4.5 TO-220FP package information

Figure 30. TO-220FP package outline



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Table 13. TO-220FP package mechanical data

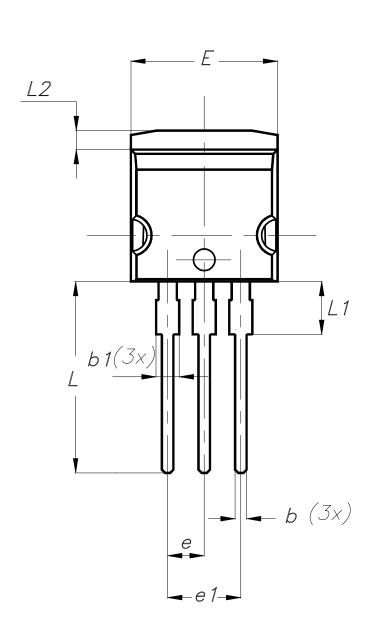
Dim.		mm		
Dim.	Min.	Тур.	Max.	
А	4.40		4.60	
В	2.50		2.70	
D	2.50		2.75	
E	0.45		0.70	
F	0.75		1.00	
F1	1.15		1.70	
F2	1.15		1.70	
G	4.95		5.20	
G1	2.40		2.70	
Н	10.00		10.40	
L2		16.00		
L3	28.60		30.60	
L4	9.80		10.60	
L5	2.90		3.60	
L6	15.90		16.40	
L7	9.00		9.30	
Dia	3.00		3.20	

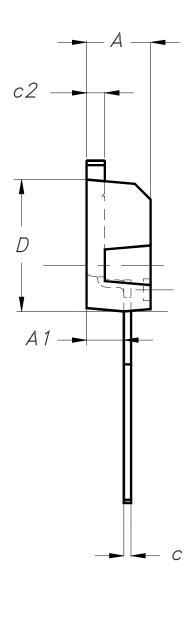
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4.6 I²PAK package information

Figure 31. I²PAK package outline





0004982_Rev_9

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Table 14. I²PAK package mechanical data

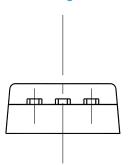
Dim.	mm			
Dim.	Min.	Тур.	Max.	
A	4.40	-	4.60	
A1	2.40	-	2.72	
b	0.61	-	0.88	
b1	1.14	-	1.70	
С	0.49	-	0.70	
c2	1.23	-	1.32	
D	8.95	-	9.35	
е	2.40	-	2.70	
e1	4.95	-	5.15	
E	10.00	-	10.40	
L	13.00	-	14.00	
L1	3.50	-	3.93	
L2	1.27	-	1.40	

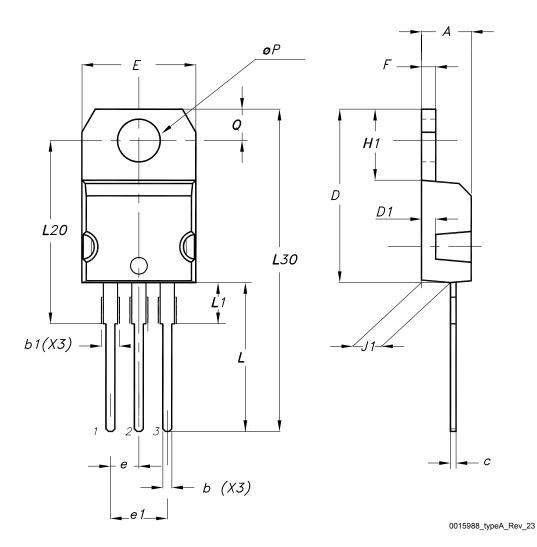
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4.7 TO-220 type A package information

Figure 32. TO-220 type A package outline





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Table 15. TO-220 type A package mechanical data

Dim.		mm	
DIM.	Min.	Тур.	Max.
Α	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	
E	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
Slug flatness		0.03	0.10

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5 Ordering information

Table 16. 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

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Revision history

Table 17. Document revision history

Date	Version	Changes
05-Oct-2012	1	Initial release.
		Inserted device in TO-220FP.
07-Feb-2013	2	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.
		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	3	Inserted: Table 4: Avalanche characteristics and Section 2.1: Electrical characteristics (curves)
		Minor text changes
		Inserted device in D ² PAK.
25-Nov-2013	4	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
18-Jun-2018		cover page.
10 0011 20 10		Updated Table 1. Absolute maximum ratings.
		Updated Section 4 Package information.
		Minor text changes.
02-Mar-2022	6	Updated Section 4 Package information.
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