STB100N6F7



N-channel 60 V, 4.7 mΩ typ.,100 A STripFET™ F7 Power MOSFET in a D²PAK package

Datasheet - production data

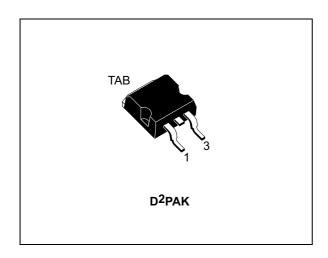
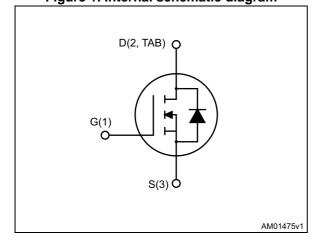


Figure 1. Internal schematic diagram



Features

Order code	V_{DS}	R _{DS(on)} max.	I _D	P _{TOT}
STB100N6F7	60 V	5.6 mΩ	100A	125 W

- 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

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
STB100N6F7	100N6F7	D²PAK	Tape and Reel

Contents STB100N6F7

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STB100N6F7 Electrical ratings

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source voltage	60	V
V _{GS}	Gate-source voltage	± 20	V
I _D	Drain current (continuous) at T _C = 25 °C	100	Α
I _D	Drain current (continuous) at T _C = 100 °C	75	Α
I _{DM} ⁽¹⁾	Drain current (pulsed)	400	Α
P _{TOT}	Total dissipation at T _C = 25 °C	125	W
E _{AS} ⁽²⁾	Single pulse avalanche energy	200	mJ
T _j	Operating junction temperature	- 55 to 175	°C
T _{stg}	Storage temperature	- 55 to 175)

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

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R _{thj-case}	Thermal resistance junction-case	1.2	°C/W
R _{thj-pcb} ⁽¹⁾	thermal resistance junction-pcb	35	°C/W

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

^{2.} Starting Tj =25 °C, I_D = 20 A, V_{DD} = 30 V

Electrical characteristics STB100N6F7

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	V _{GS} = 0 V, I _D = 1 mA	60			٧
	Zero gate voltage	$V_{GS} = 0 \text{ V}, V_{DS} = 60 \text{ V}$			1	μΑ
I _{DSS} Drain current	o o	$V_{GS} = 0 \text{ V}, V_{DS} = 60 \text{ V},$ $T_{J} = 125 \text{ °C}$			100	μA
I _{GSS}	Gate-source leakage current	V _{DS} = 0 V, V _{GS} = 20 V			100	nA
V _{GS(th)}	Gate threshold voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2		4	V
R _{DS(on)}	Static drain-source on-resistance	V _{GS} =10 V, I _D = 50 A		4.7	5.6	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
C _{iss}	Input capacitance		-	1980	-	pF
C _{oss}	Output capacitance	$V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V},$	-	970	-	pF
C _{rss}	Reverse transfer capacitance	f = 1 MHz	-	86	-	pF
Qg	Total gate charge		-	30	-	nC
Q _{gs}	Gate-source charge	$V_{DD} = 30 \text{ V}, I_{D} = 100 \text{ A},$ $V_{GS} = 10 \text{ V}$	-	12.6	-	nC
Q _{gd}	Gate-drain charge	163 15 1	-	5.9	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Turn-on delay time		-	21.6	-	ns
t _r	Rise time	V _{DD} = 30 V, I _D = 50 A,	-	55.5	-	ns
t _{d(off)}	Turn-off-delay time	$R_G = 4.7 \Omega, V_{GS} = 10 V$	-	28.6	-	ns
t _f	Fall time		-	15	-	ns



Table 7. Source drain diode

Symbol	ol Parameter Test conditions		Min.	Тур.	Max.	Unit
V _{SD} ⁽¹⁾	Forward on voltage	V _{GS} = 0 V, I _{SD} = 100A	-		1.2	V
t _{rr}	Reverse recovery time	400 A 11/14 400 A/	-	48.4		ns
Q _{rr}	Reverse recovery charge	ge		47		nC
I _{RRM}	Reverse recovery current	י פטיי ניי טטיי	-	2.0		Α

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

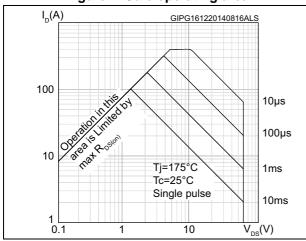


Electrical characteristics STB100N6F7

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

Figure 3. Thermal impedance



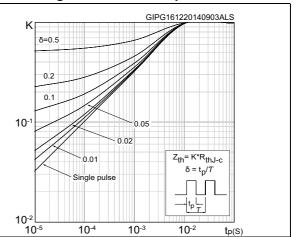
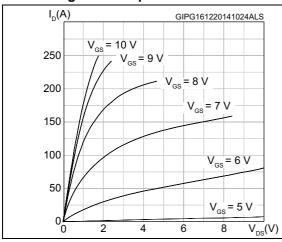


Figure 4. Output characteristics

Figure 5. Transfer characteristics



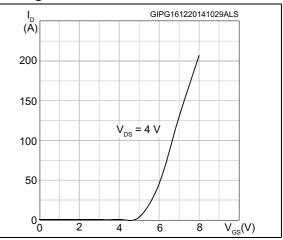
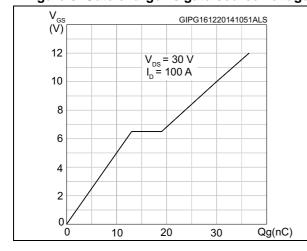
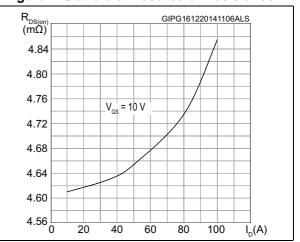


Figure 6. Gate charge vs gate-source voltage

Figure 7. Static drain-source on-resistance

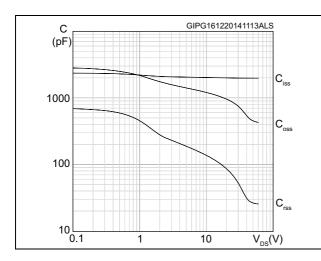




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Figure 8. Capacitance variations

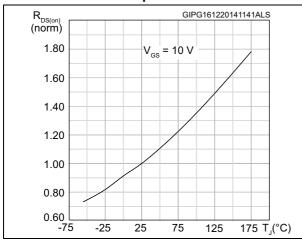
Figure 9. Normalized gate threshold voltage vs temperature



 $V_{GS(th)}$ (norm) GIPG161220141129ALS 1.10 I_D = 250 μA 1.00 0.90 0.80 0.70 0.60 0.50 0.40 L -75 -25 25 75 125 175 T_J(°C)

Figure 10. Normalized on-resistance vs temperature

Figure 11. Source-drain diode forward characteristics



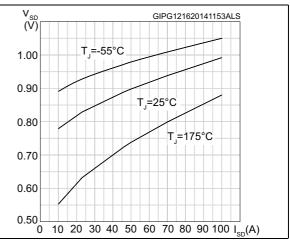
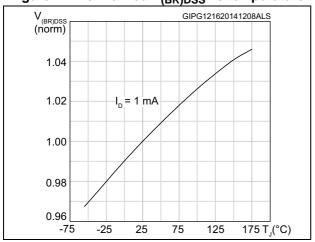


Figure 12. Normalized V_{(BR)DSS} vs temperature



Test circuits STB100N6F7

3 Test circuits

Figure 13. Switching times test circuit for resistive load

Figure 14. Gate charge test circuit

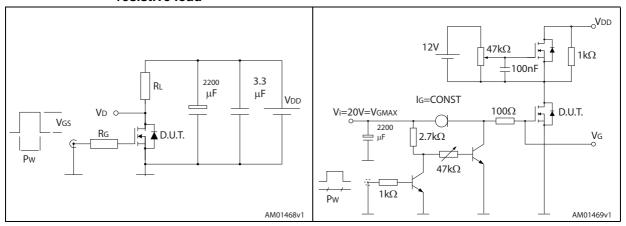


Figure 15. Test circuit for inductive load switching and diode recovery times

Figure 16. Unclamped inductive load test circuit

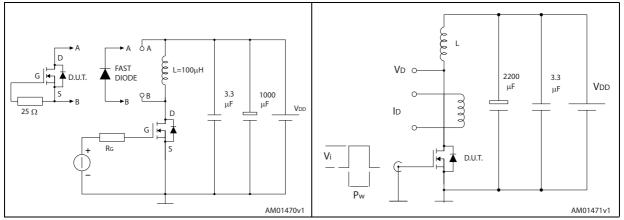
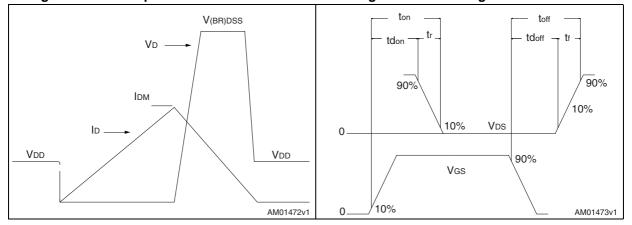


Figure 17. Unclamped inductive waveform

Figure 18. Switching time waveform



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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.

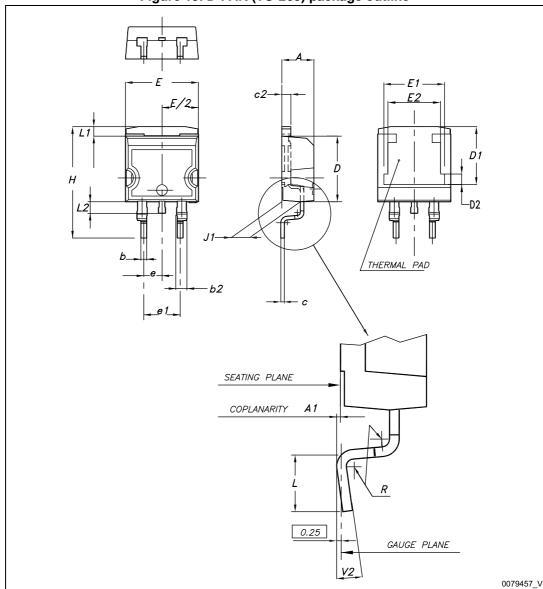


Figure 19. D²PAK (TO-263) package outline

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Table 8. D²PAK (TO-263) 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		10.40
E1	8.50	8.70	8.90
E2	6.85	7.05	7.25
е		2.54	
e1	4.88		5.28
Н	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.4	
V2	0°		8°

9.75

16.9

1.6

2.54

5.08

Figure 20. D²PAK footprint^(a)

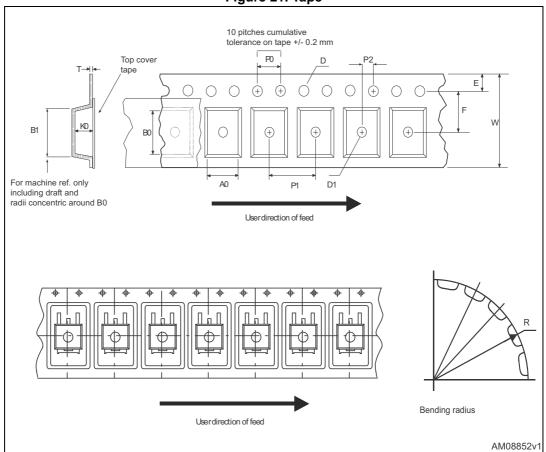
Footprint

a. All dimension are in millimeters

Packing information STB100N6F7

5 Packing information

Figure 21. Tape



40mm min.
Access hole
At slot location

Tape slot
in core for
tape start 25 mm
min. width

Figure 22. Reel

Table 9. D²PAK (TO-263) tape and reel mechanical data

	Таре	(= ===		Reel		
Dim.	n	mm		mm		
Min. Max.	Dim.	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		
Е	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 qty	1000	
P2	1.9	2.1		Bulk qty	1000	
R	50					
Т	0.25	0.35				
W	23.7	24.3				

Revision history STB100N6F7

6 Revision history

Table 10. Document revision history

Date	Revision	Changes
26-Nov-2014	1	First release.
14-Jan-2015	2	Text amendments throughout document On cover page: Changed title description Changed features and descriptions Updated Table 2: Absolute maximum ratings Updated Table 4: On/off states Updated Table 5: Dynamic Updated Table 6: Switching times Updated Table 7: Source drain diode Added Section 2.1: Electrical characteristics (curves) Updated Section 4: Package mechanical data
15-Dec-2015	3	Updated <i>Table 3: Thermal data</i> . Minor text changes.

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