

N-channel 120 V, 3.9 mΩ typ., 180 A STripFET™ F7 Power MOSFET in a TO-220 package

Datasheet - preliminary data

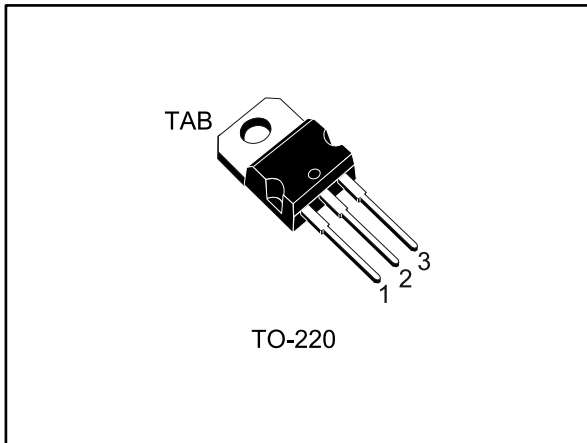
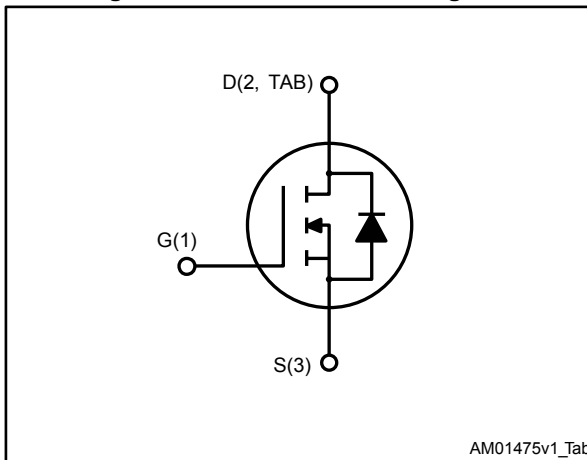


Figure 1: Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)} max.	I _D
STP200N12F7	120 V	4.6 mΩ	180 A

- 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 on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1: Device summary

Order code	Marking	Package	Packaging
STP200N12F7	200N12F7	TO-220	Tube

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1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	120	V
V_{GS}	Gate source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	180	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	140	A
$I_{DM}^{(2)}$	Drain current (pulsed)	720	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	330	W
T_j	Operating junction temperature	- 55 to 175	$^\circ\text{C}$
T_{stg}	Storage temperature		

Notes:

⁽¹⁾Current limited by package.

⁽²⁾Pulse width limited by safe operating area

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	0.45	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient	62.5	$^\circ\text{C/W}$

2 Electrical characteristics

($T_C = 25\text{ °C}$ unless otherwise specified)

Table 4: On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	120			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0$, $V_{DS} = 120\text{ V}$			1	μA
		$V_{GS} = 0$, $V_{DS} = 120\text{ V}$, $T_C = 125\text{ °C}$			100	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 90\text{ A}$		3.9	4.6	m Ω

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 60\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	8100	-	pF
C_{oss}	Output capacitance		-	1300	-	pF
C_{rss}	Reverse transfer capacitance		-	100	-	pF
Q_g	Total gate charge	$V_{DD} = 60\text{ V}$, $I_D = 180\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 3: "Gate charge test circuit")	-	110	-	nC
Q_{gs}	Gate-source charge		-	TBD	-	nC
Q_{gd}	Gate-drain charge		-	TBD	-	nC

Table 6: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 60\text{ V}$, $I_D = 90\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2: "Switching times test circuit for resistive load" and Figure 7: "Switching time waveform")	-	TBD	-	ns
t_r	Rise time		-	TBD	-	ns
$t_{d(off)}$	Turn-off delay time		-	TBD	-	ns
t_f	Fall time		-	TBD	-	ns

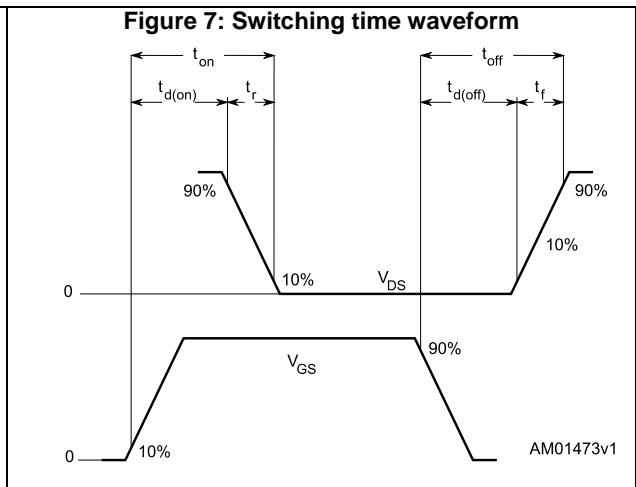
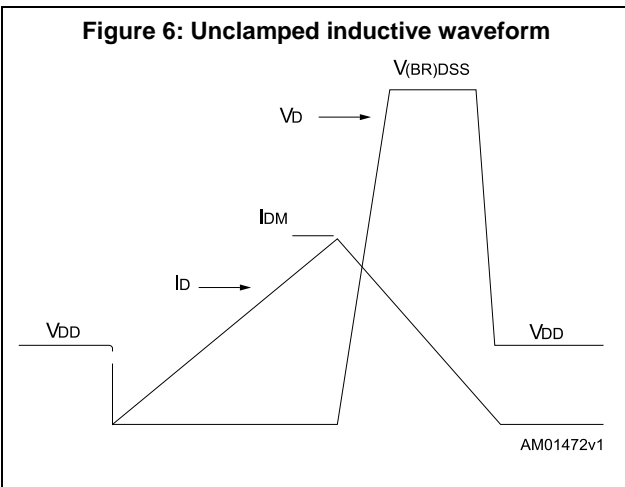
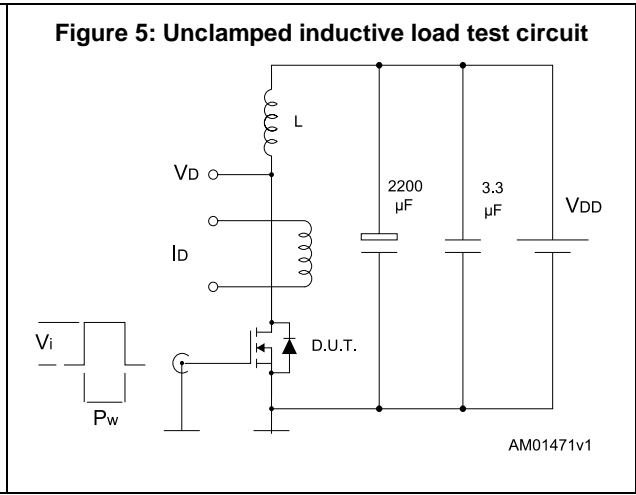
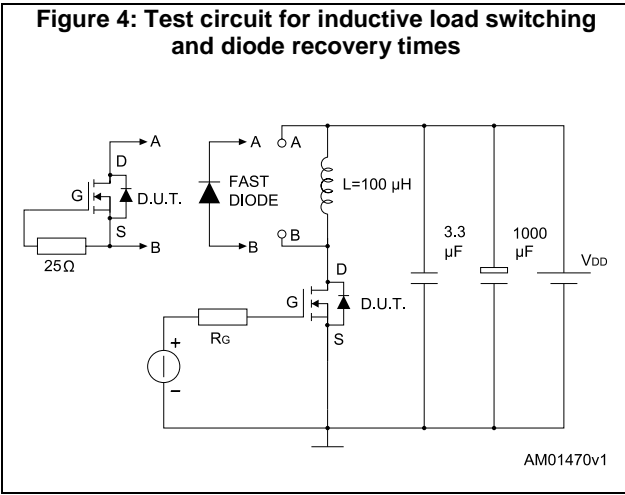
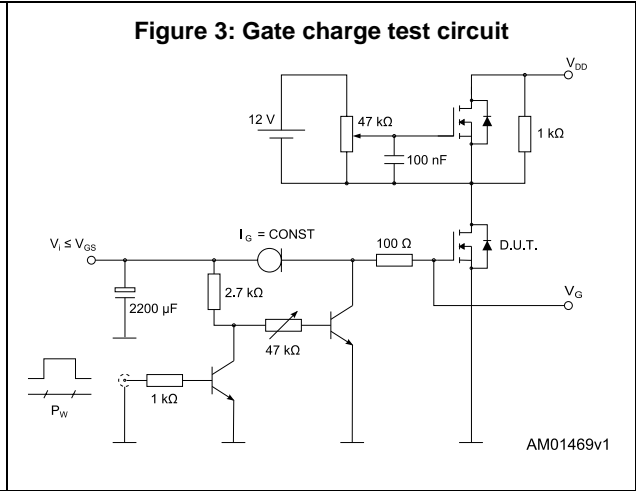
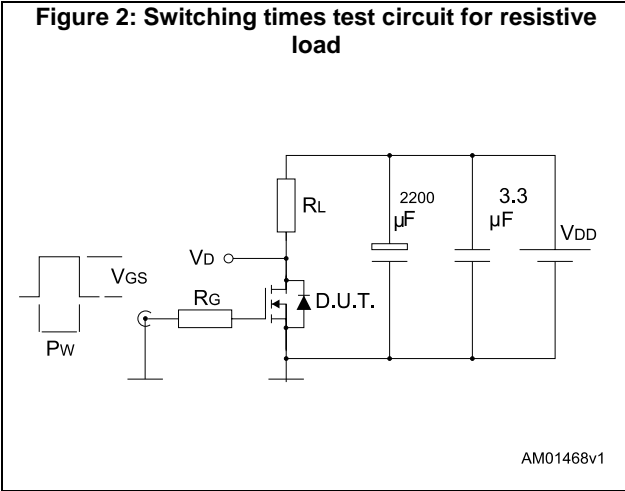
Table 7: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 180 \text{ A}$, $V_{GS} = 0 \text{ V}$	-		1.2	V
t_{rr}	Reverse recovery time	$I_{SD} = 180 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 96 \text{ V}$, $T_J = 150 \text{ }^\circ\text{C}$ (see Figure 4: "Test circuit for inductive load switching and diode recovery times")	-	TBD		ns
Q_{rr}	Reverse recovery charge		-	TBD		nC
I_{RRM}	Reverse recovery current		-	TBD		A

Notes:

⁽¹⁾Pulsed: pulse duration = 300 μs , duty cycle 1.5%

3 Test circuits



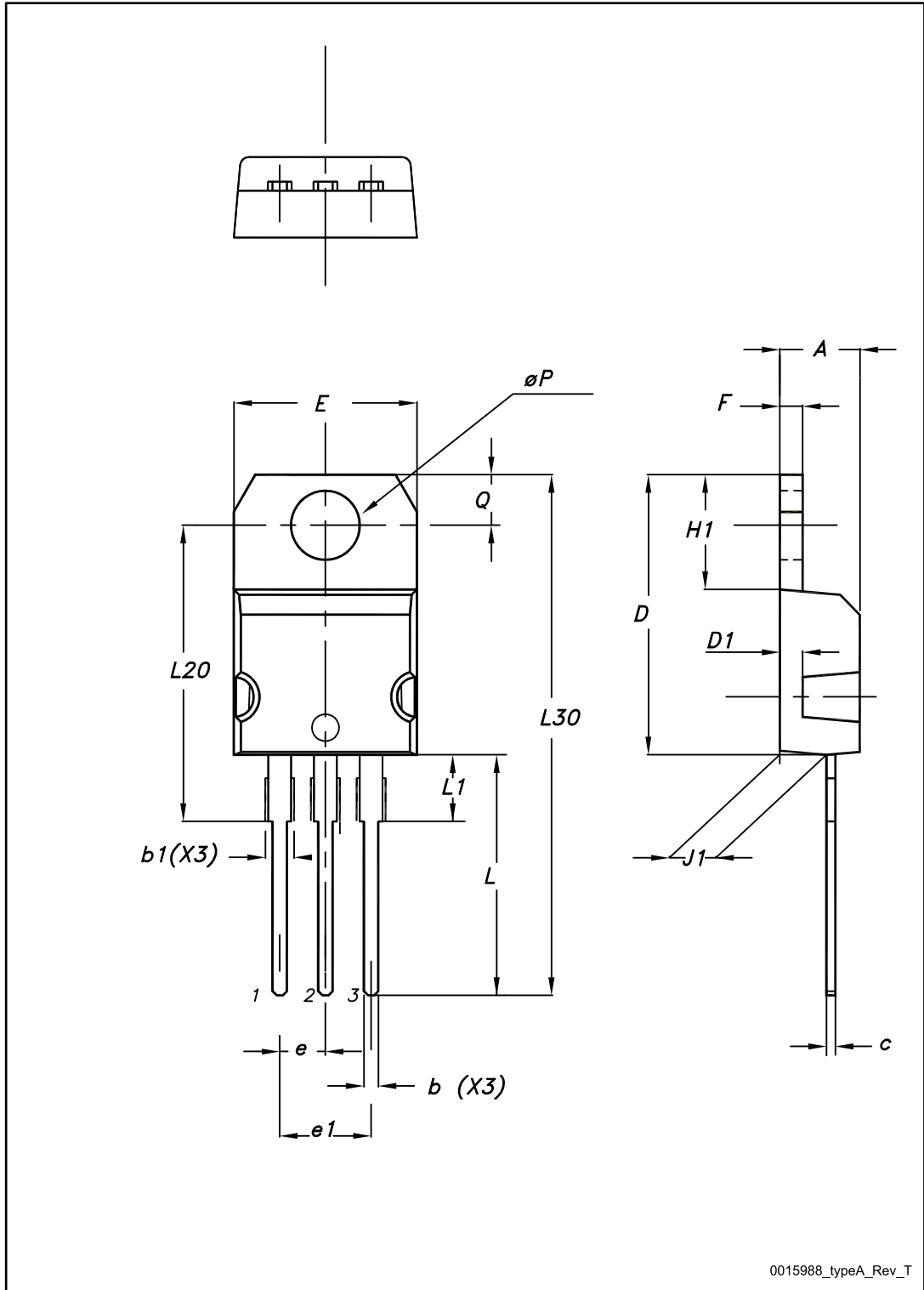
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4 Package mechanical data

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4.1 TO-220 type A package information

Figure 8: TO-220 type A package outline



0015988_typeA_Rev_T

Prerelease product(s)

Table 8: TO-220 type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	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	
øP	3.75		3.85
Q	2.65		2.95

5 Revision history

Table 9: Document revision history

Date	Revision	Changes
03-Dec-2013	1	First release.
21-Jul-2014	2	Modified: title and description – Modified: Ciss, Coss, Crss, Qgs and Qgd typical values in Table 5 – Modified: the entire typical values in Table 6 and Table 7 – Minor text changes
10 Jul-2015	3	Modified title in cover page. Updated Electrical characteristics section. Updated mechanical data. Minor text changes.

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