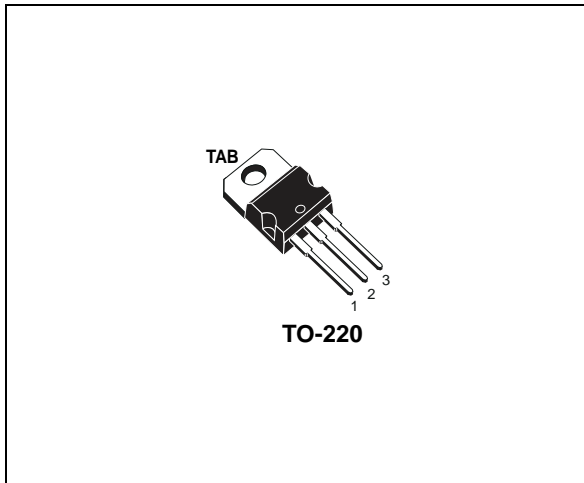


## N-channel 60 V, 4.7 mΩ typ., 100 A STripFET™ F7 Power MOSFET in a TO-220 package

Datasheet - production data



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>	P <sub>TOT</sub>
STP100N6F7	60 V	5.6 mΩ	100A	125 W

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent figure of merit (FoM)
- Low C<sub>rss</sub>/C<sub>iss</sub> 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.

Figure 1. Internal schematic diagram

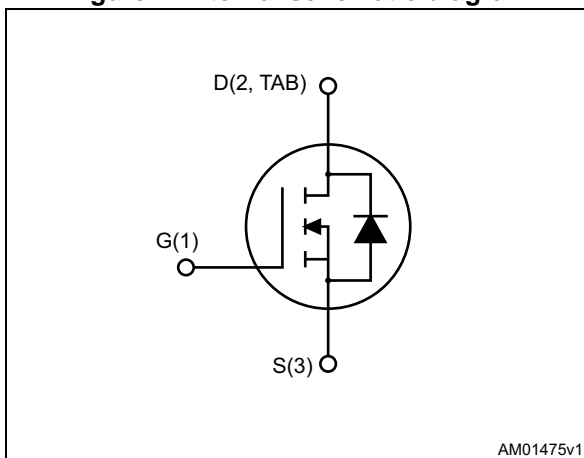


Table 1. Device summary

Order code	Marking	Package	Packaging
STP100N6F7	100N6F7	TO-220	Tube

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	100	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	75	A
$I_{DM}^{(1)}$	Drain current (pulsed)	400	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	125	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	200	mJ
$T_j$	Operating junction temperature	- 55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature		

1. Pulse width is limited by safe operating area

2. Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 20\text{ A}$ ,  $V_{DD} = 30\text{ V}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	1.2	$^\circ\text{C/W}$
$R_{thj-amb}$	thermal resistance junction-ambient	62.5	$^\circ\text{C/W}$

## 2 Electrical characteristics

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

**Table 4. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	60			V
$I_{DSS}$	Zero gate voltage Drain current	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}, T_J = 125\text{ °C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate-source 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		4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		4.7	5.6	m $\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	-	1980	-	pF
$C_{oss}$	Output capacitance		-	970	-	pF
$C_{riss}$	Reverse transfer capacitance		-	86	-	pF
$Q_g$	Total gate charge	$V_{DD} = 30\text{ V}, I_D = 100\text{ A}, V_{GS} = 10\text{ V}$	-	30	-	nC
$Q_{gs}$	Gate-source charge		-	12.6	-	nC
$Q_{gd}$	Gate-drain charge		-	5.9	-	nC

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}, I_D = 50\text{ A}, R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$	-	21.6	-	ns
$t_r$	Rise time		-	55.5	-	ns
$t_{d(off)}$	Turn-off-delay time		-	28.6	-	ns
$t_f$	Fall time		-	15	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$V_{GS} = 0 \text{ V}$ , $I_{SD} = 100 \text{ A}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 100 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$ , $V_{DD} = 48 \text{ V}$	-	48.4		ns
$Q_{rr}$	Reverse recovery charge		-	47		nC
$I_{RRM}$	Reverse recovery current		-	2.0		A

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

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

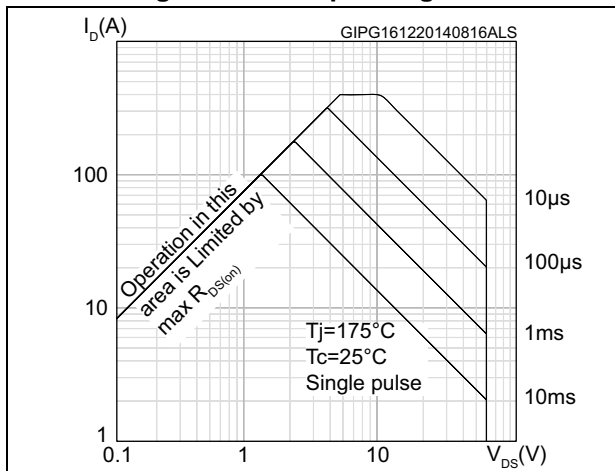


Figure 3. Thermal impedance

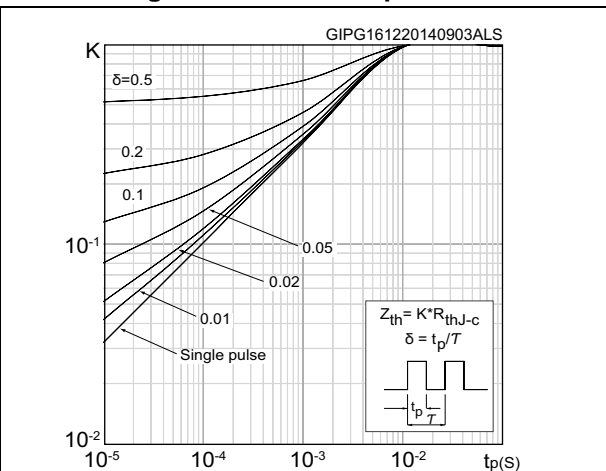


Figure 4. Output characteristics

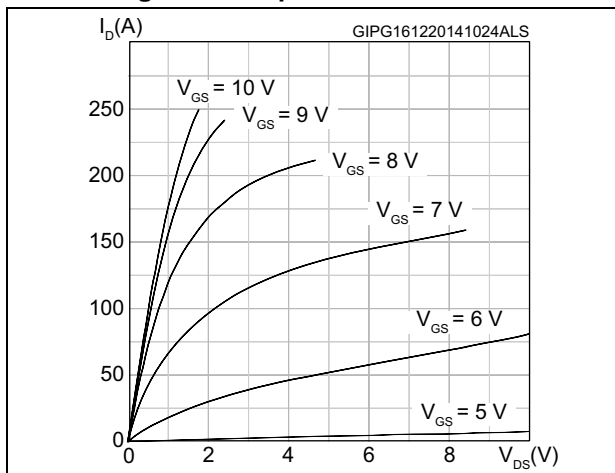


Figure 5. Transfer characteristics

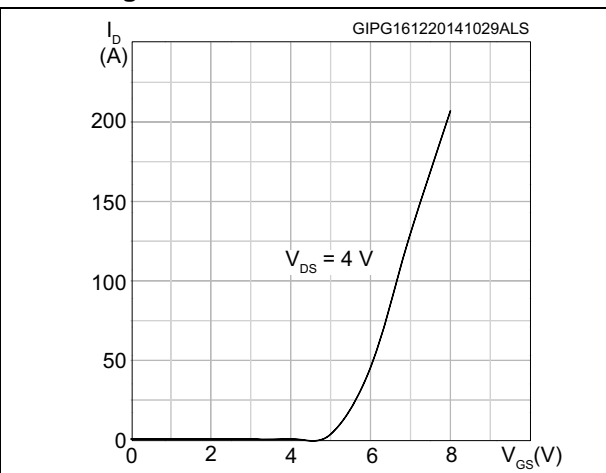


Figure 6. Gate charge vs gate-source voltage

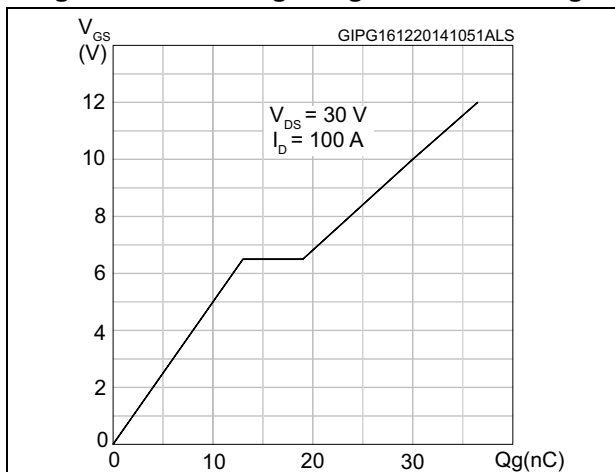


Figure 7. Static drain-source on-resistance

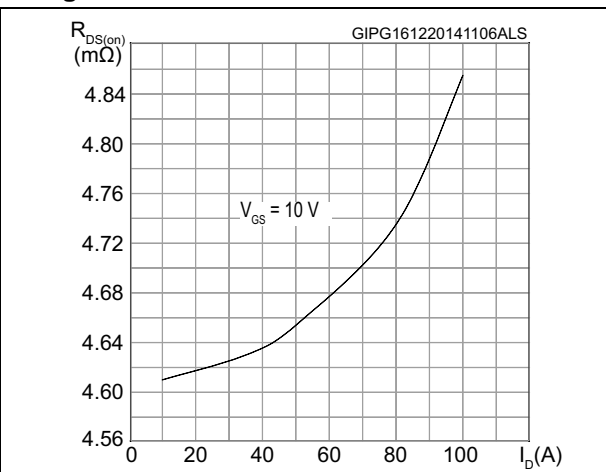


Figure 8. Capacitance variations

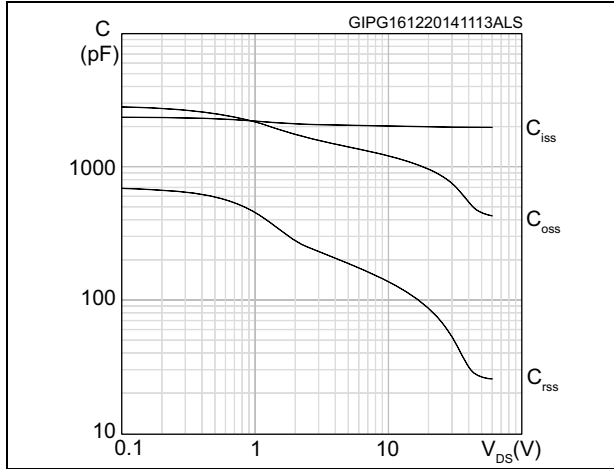


Figure 9. Normalized gate threshold voltage vs temperature

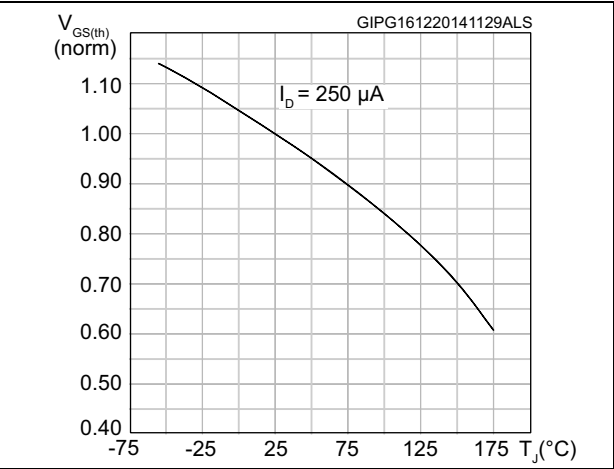


Figure 10. Normalized on-resistance vs temperature

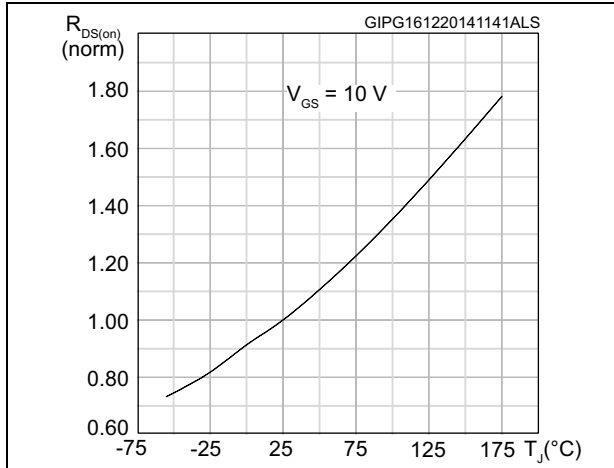


Figure 11. Source-drain diode forward characteristics

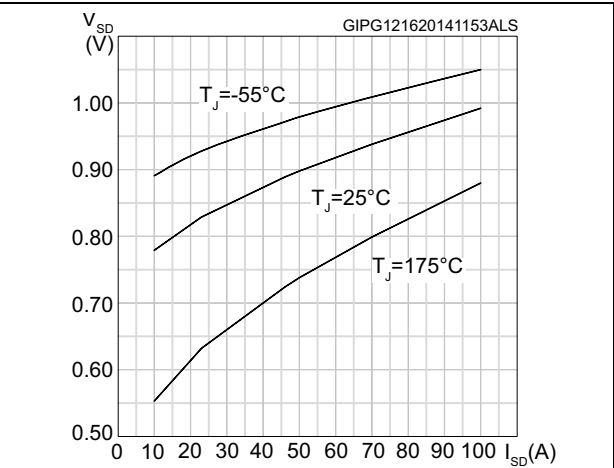
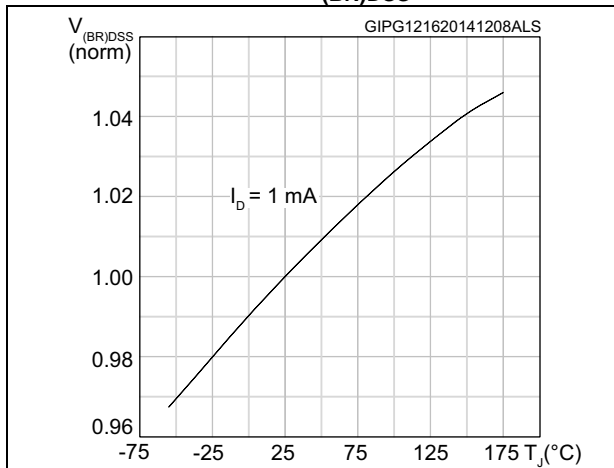
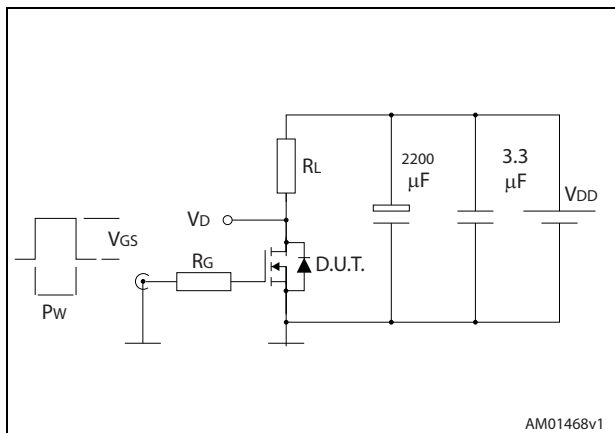


Figure 12. Normalized V\_(BR)DSS vs temperature



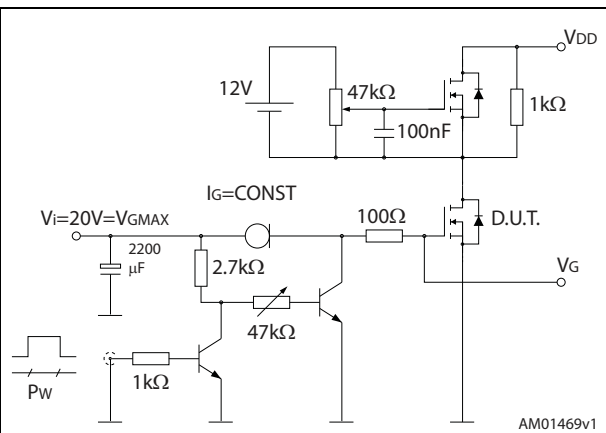
### Test circuits

Figure 13. Switching times test circuit for resistive load



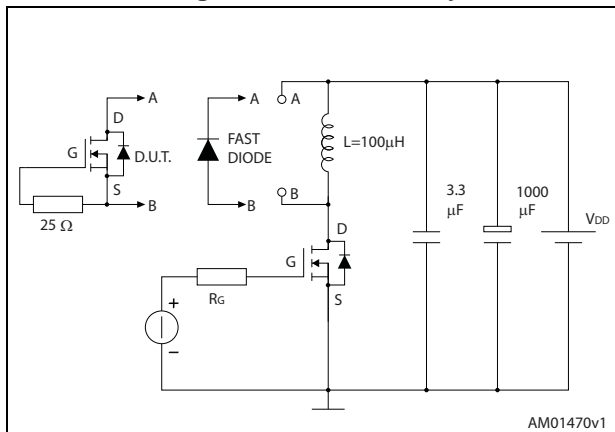
AM01468v1

Figure 14. Gate charge test circuit



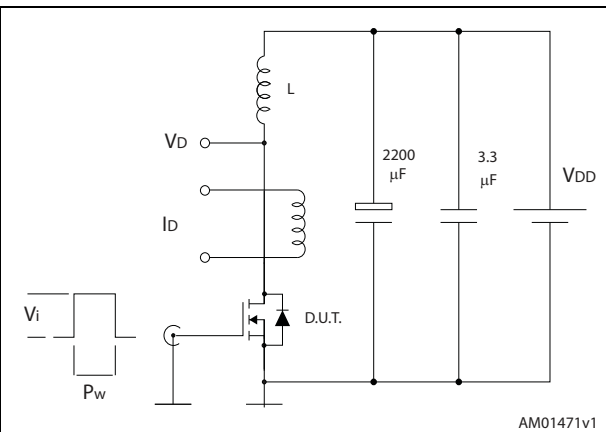
AM01469v1

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



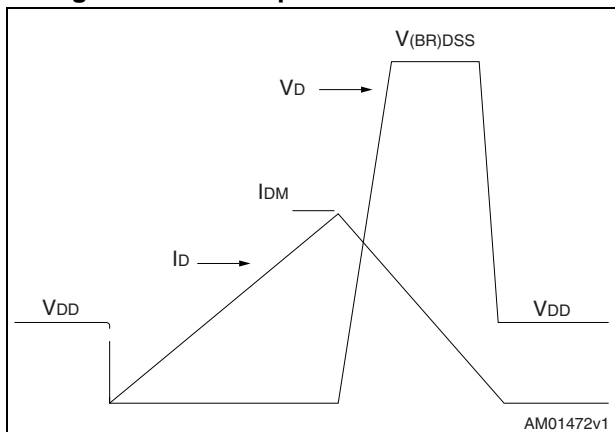
AM01470v1

Figure 16. Unclamped inductive load test circuit



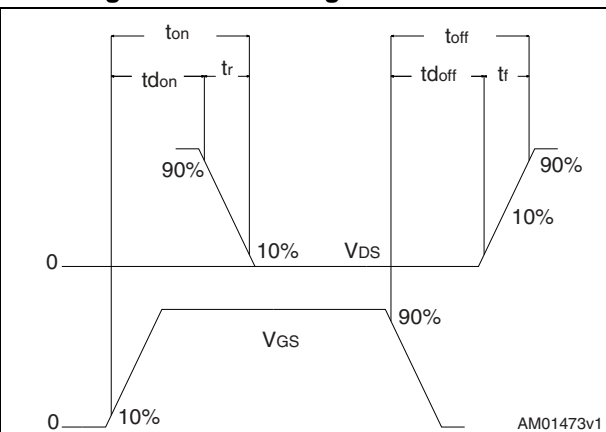
AM01471v1

Figure 17. Unclamped inductive waveform



AM01472v1

Figure 18. Switching time waveform



AM01473v1



### 3 Package mechanical data

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

Figure 19. TO-220 type A drawing

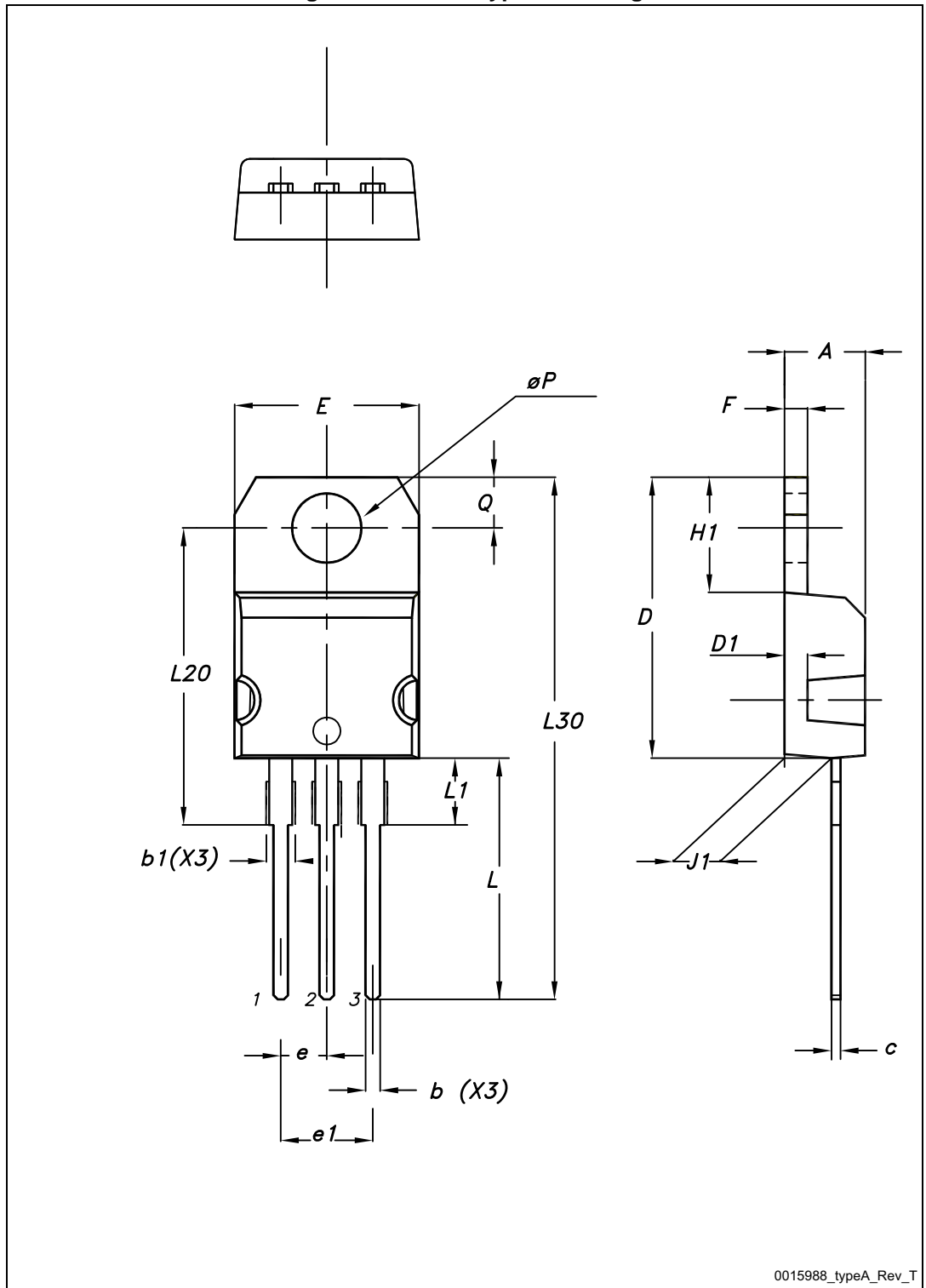


Table 8. TO-220 type A mechanical data

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

## 4 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
27-Nov-2014	1	First release.
16-Dec-2014	2	Text amendments throughout document On cover page: Changed title description Changed features and descriptions Updated <a href="#">Table 2: Absolute maximum ratings</a> Updated <a href="#">Table 4: On/off states</a> Updated <a href="#">Table 5: Dynamic</a> Updated <a href="#">Table 6: Switching times</a> Updated <a href="#">Table 7: Source drain diode</a> Added <a href="#">Section 2.1: Electrical characteristics (curves)</a>

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