

## N-channel 60 V, 4.2 mΩ typ., 80 A STripFET™ F7 Power MOSFET in a TO-220 package

Datasheet - production data

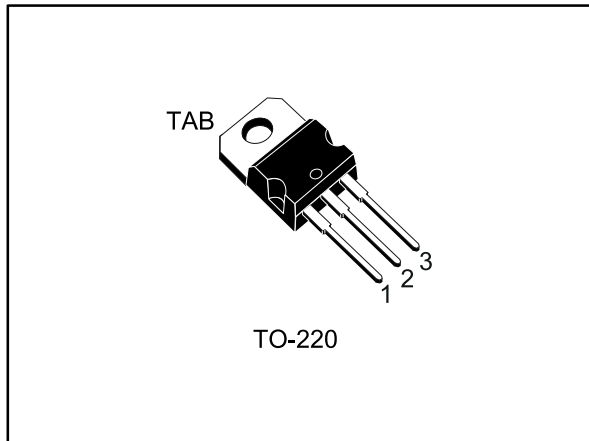
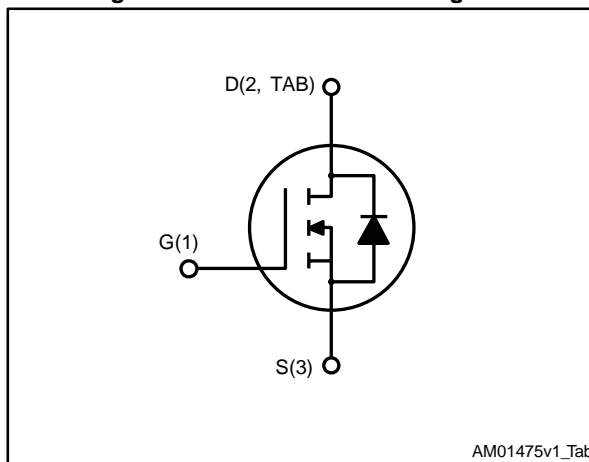


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>	P <sub>TOT</sub>
STP130N6F7	60 V	5.0 mΩ	80 A	160 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.

Table 1: Device summary

Order code	Marking	Package	Packing
STP130N6F7	130N6F7	TO-220	Tube

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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
$I_D^{(1)}$	Drain current (continuous) at $T_{case} = 25\text{ }^\circ\text{C}$	80	A
	Drain current (continuous) at $T_{case} = 100\text{ }^\circ\text{C}$	80	
$I_{DM}^{(2)}$	Drain current (pulsed)	320	A
$P_{TOT}$	Total dissipation at $T_{case} = 25\text{ }^\circ\text{C}$	160	W
$E_{AS}^{(3)}$	Single pulse avalanche energy	200	mJ
$T_{stg}$	Storage temperature	175 to -55	$^\circ\text{C}$
$T_j$	Operating junction temperature		

**Notes:**

- (1) Current is limited by package.
- (2) Pulse width is limited by safe operating area.
- (3) starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 20\text{ A}$ ,  $V_{DD} = 40\text{ V}$ .

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	0.94	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient	62.5	

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

**Table 4: Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source breakdown voltage	$V_{\text{GS}} = 0\text{ V}$ , $I_{\text{D}} = 1\text{ mA}$	60			V
$I_{\text{DSS}}$	Zero gate voltage drain current	$V_{\text{GS}} = 0\text{ V}$ , $V_{\text{DS}} = 60\text{ V}$			1	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-body leakage current	$V_{\text{DS}} = 0\text{ V}$ , $V_{\text{GS}} = 20\text{ V}$			100	nA
$V_{\text{GS}(\text{th})}$	Gate threshold voltage	$V_{\text{DS}} = V_{\text{GS}}$ , $I_{\text{D}} = 250\text{ }\mu\text{A}$	2		4	V
$R_{\text{DS}(\text{on})}$	Static drain-source on-resistance	$V_{\text{GS}} = 10\text{ V}$ , $I_{\text{D}} = 40\text{ A}$		4.2	5.0	$\text{m}\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{\text{iss}}$	Input capacitance	$V_{\text{DS}} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{\text{GS}} = 0\text{ V}$	-	2600	-	pF
$C_{\text{oss}}$	Output capacitance		-	1200	-	
$C_{\text{rss}}$	Reverse transfer capacitance		-	115	-	
$Q_{\text{g}}$	Total gate charge	$V_{\text{DD}} = 30\text{ V}$ , $I_{\text{D}} = 80\text{ A}$ , $V_{\text{GS}} = 10\text{ V}$ (see <a href="#">Figure 14: "Gate charge test circuit"</a> )	-	42	-	nC
$Q_{\text{gs}}$	Gate-source charge		-	13.6	-	
$Q_{\text{gd}}$	Gate-drain charge		-	13	-	

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{\text{d}(\text{on})}$	Turn-on delay time	$V_{\text{DD}} = 30\text{ V}$ , $I_{\text{D}} = 40\text{ A}$ , $R_{\text{G}} = 4.7\text{ }\Omega$ , $V_{\text{GS}} = 10\text{ V}$ (see <a href="#">Figure 13: "Switching times test circuit for resistive load"</a> and <a href="#">Figure 18: "Switching time waveform"</a> )	-	24	-	ns
$t_{\text{r}}$	Rise time		-	44	-	
$t_{\text{d}(\text{off})}$	Turn-off delay time		-	62	-	
$t_{\text{f}}$	Fall time		-	24	-	

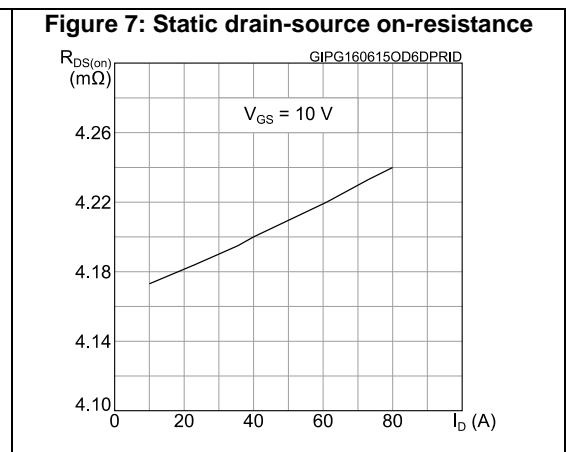
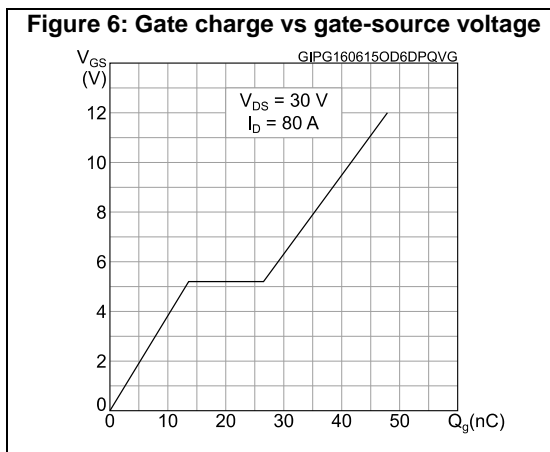
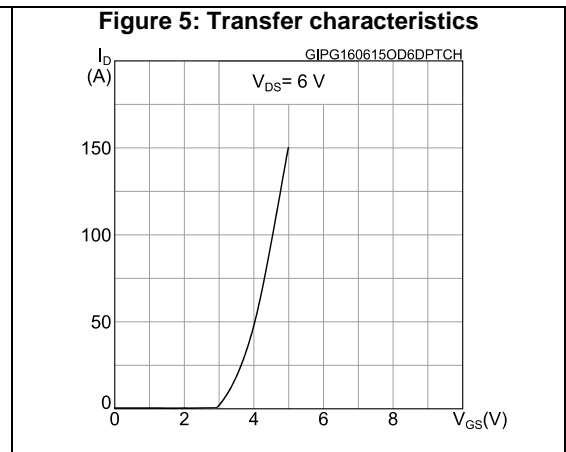
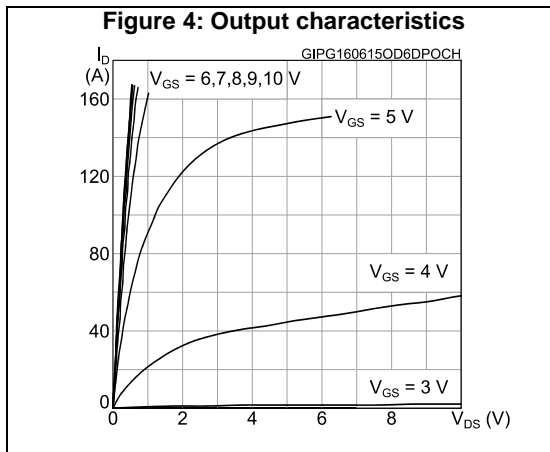
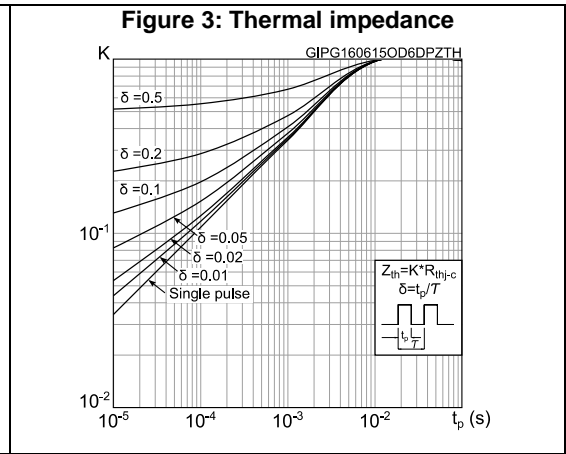
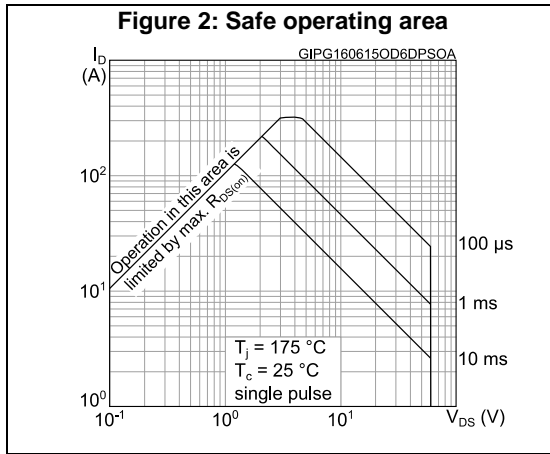
**Table 7: Source-drain diode**

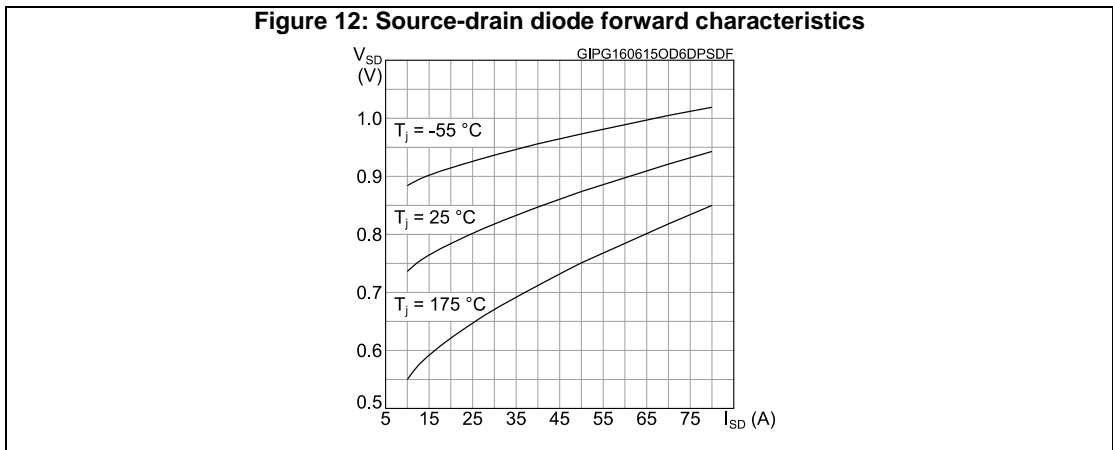
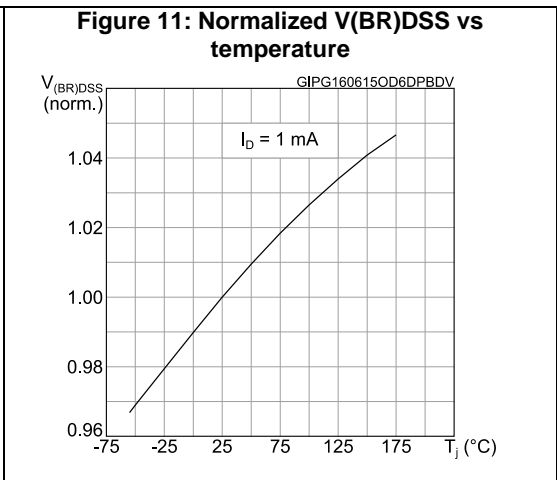
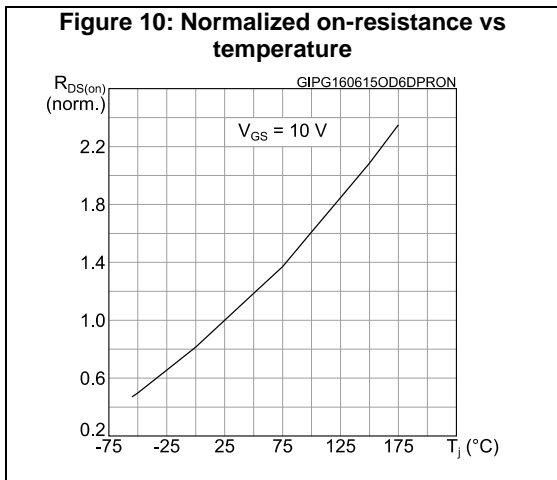
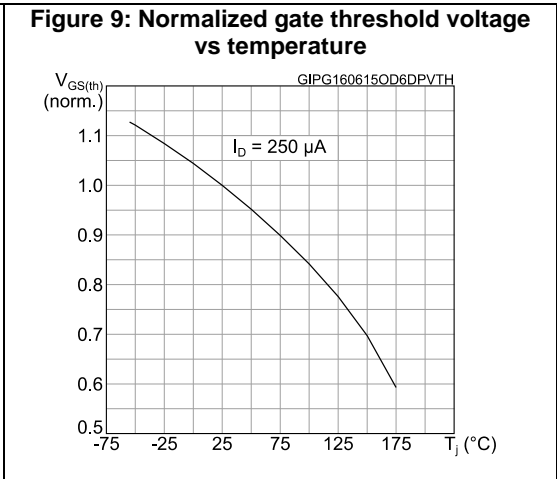
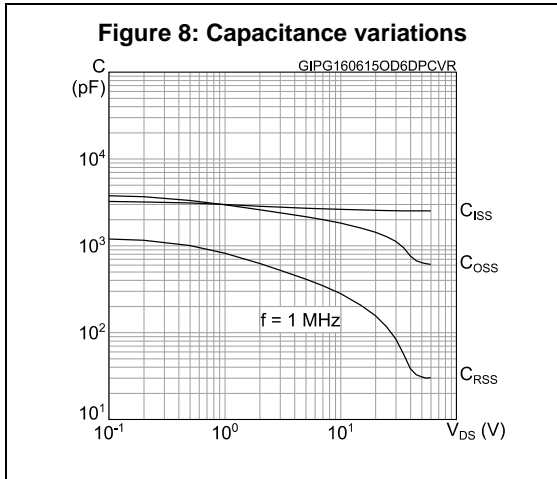
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{\text{SD}}^{(1)}$	Forward on voltage	$V_{\text{GS}} = 0\text{ V}$ , $I_{\text{SD}} = 80\text{ A}$	-		1.2	V
$t_{\text{rr}}$	Reverse recovery time	$I_{\text{SD}} = 80\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{\text{DD}} = 48\text{ V}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	50		ns
$Q_{\text{rr}}$	Reverse recovery charge		-	56		nC
$I_{\text{RRM}}$	Reverse recovery current		-	2.2		A

**Notes:**

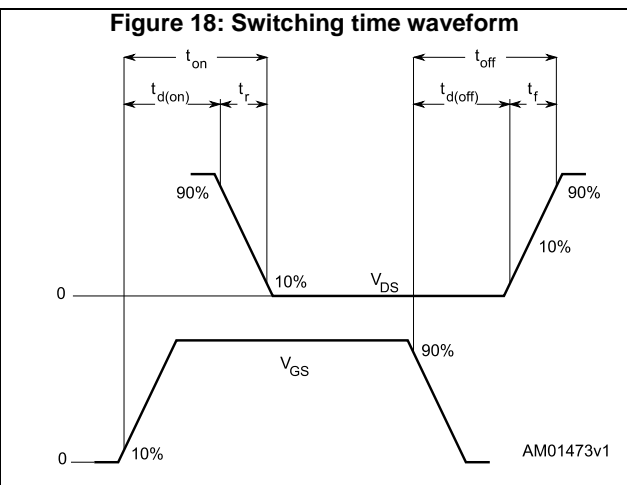
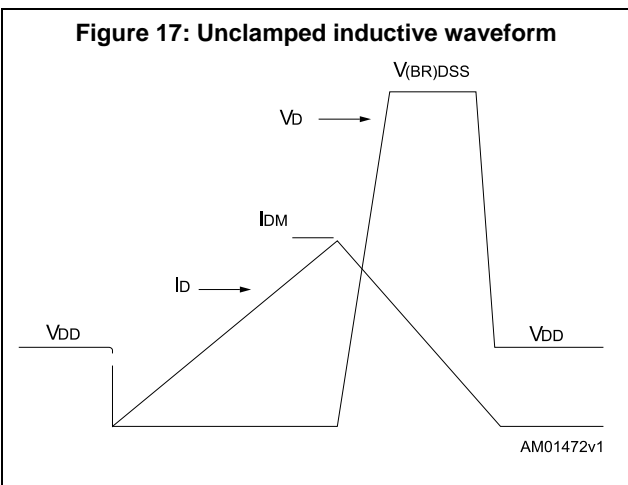
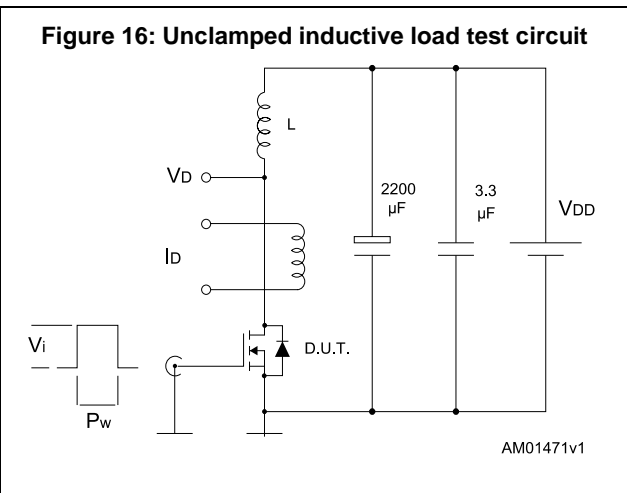
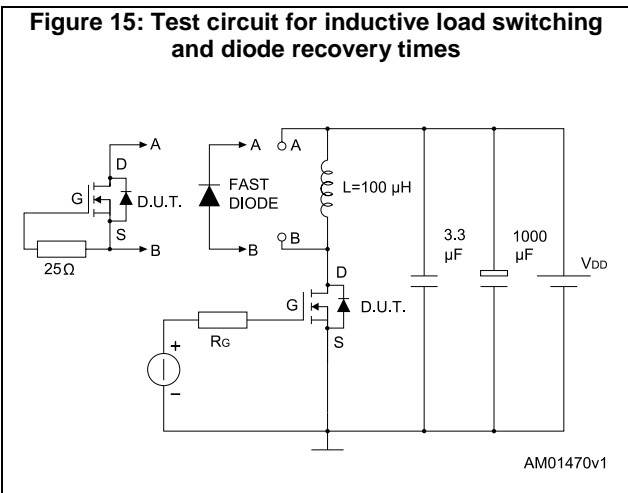
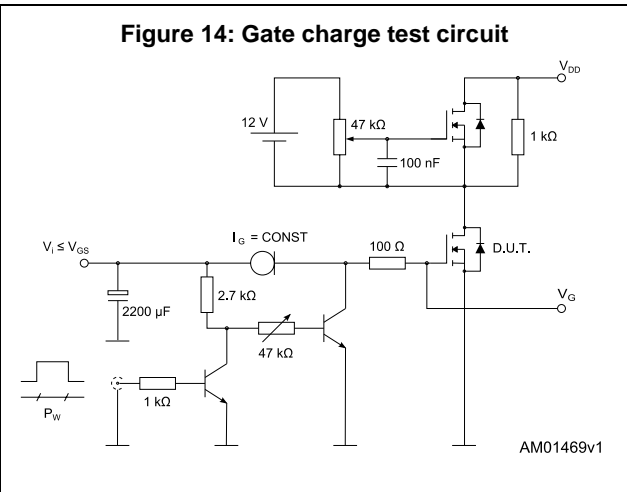
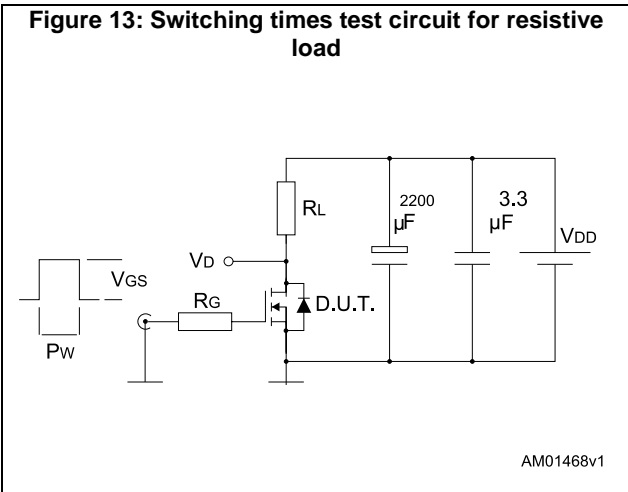
(1) Pulse test: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)





### 3 Test circuits



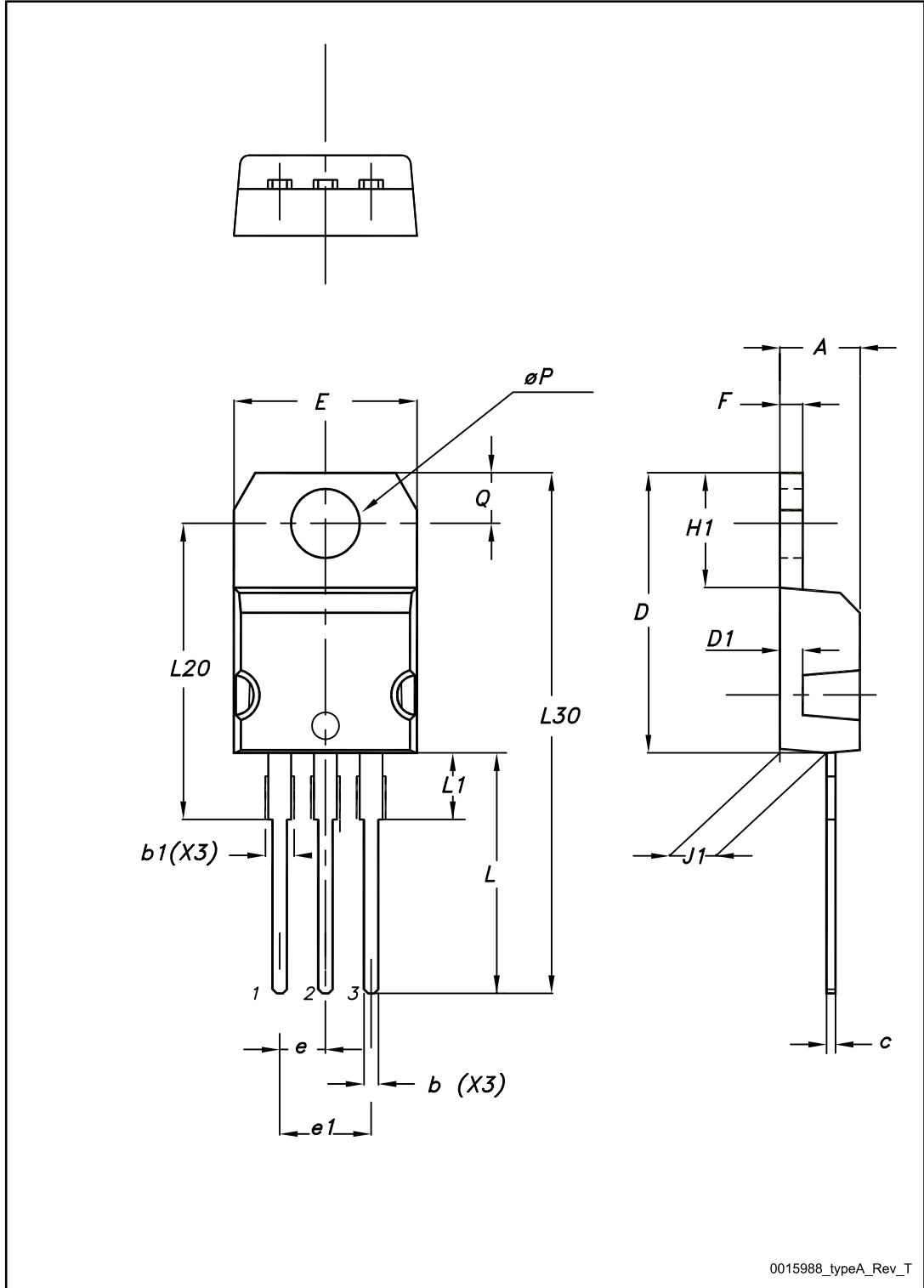
## 4 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.



### 4.1 TO-220 type A package information

Figure 19: TO-220 type A package outline



0015988\_typeA\_Rev\_T

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
26-Jan-2015	1	First release.
16-Jun-2015	2	Datasheet promoted from preliminary data to production data Text and formatting edits throughout document In Section Electrical ratings: - updated Table Absolute maximum ratings In Section Electrical characteristics: - updated and renamed Table Static (was On/off states) - updated Table Switching times - updated Table Source drain diode Added Section Electrical characteristics (curves)
08-Jul-2015	3	In Section <i>Electrical characteristics (curves)</i> : - updated Figures <i>Output characteristics</i> and <i>Transfer characteristics</i>
20-Jul-2015	4	In Section <i>Electrical characteristics (curves)</i> : - updated Figure <i>Output characteristics</i>

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