

## Automotive-grade N-channel 60 V, 2.3 mΩ typ., 180 A STripFET™ F6 Power MOSFET in a TO-220 package

Datasheet - production data

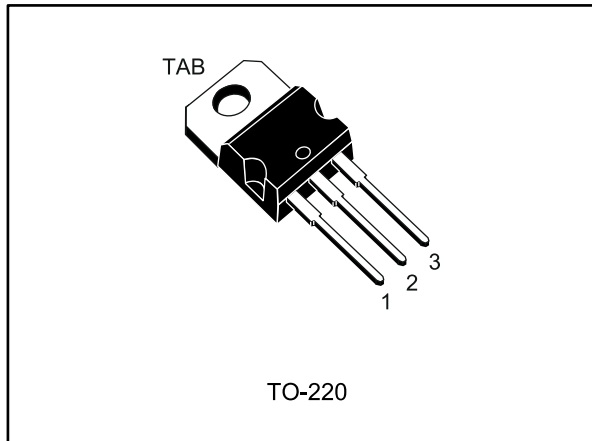


Figure 1: Internal schematic diagram

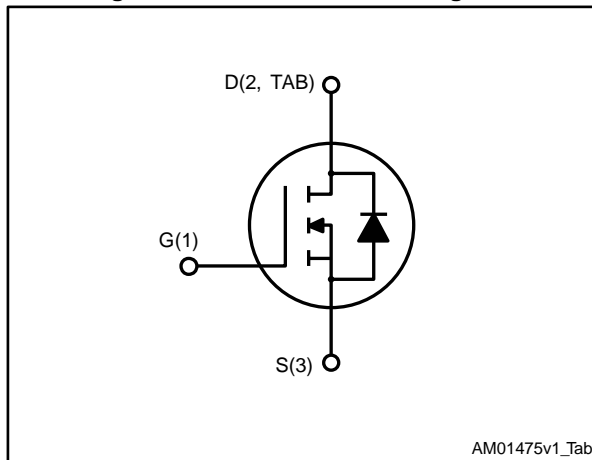


Table 1: Device summary

Order code	Marking	Package	Packing
STP265N6F6AG	265N6F6	TO-220	Tube

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STP265N6F6AG	60 V	2.85 mΩ	180 A

- AEC-Q101 qualified
- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss



### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using the STripFET™ F6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low R<sub>DS(on)</sub> in all packages.

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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 $T_C = 25\text{ }^\circ\text{C}$	180	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	180	A
$I_{DM}^{(2)}$	Drain current (pulsed)	720	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
$E_{AS}$	Single pulse avalanche energy (Starting $T_J = 25\text{ }^\circ\text{C}$ , $I_D = 80\text{ A}$ )	720	mJ
$T_{stg}$	Storage temperature range	- 55 to 175	$^\circ\text{C}$
$T_j$	Operating junction temperature range		

**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 max	0.5	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-amb max	62.5	$^\circ\text{C}/\text{W}$

## 2 Electrical characteristics

(T<sub>CASE</sub> = 25 °C unless otherwise specified)

**Table 4: On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	60			V
I <sub>DSS</sub>	Zero gate voltage drain current	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 60 V, T <sub>C</sub> = 125 °C <sup>(1)</sup> V <sub>GS</sub> = 0 V			100	μA
I <sub>GSS</sub>	Gate-body leakage current	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V			± 100	nA
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2		4	V
R <sub>DS(on)</sub>	Static drain-source on-resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 60 A		2.3	2.85	mΩ

**Notes:**

<sup>(1)</sup>Defined by design, not subject to production test.

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 25 V, f = 1 MHz, V <sub>GS</sub> = 0 V	-	11800	-	pF
C <sub>oss</sub>	Output capacitance		-	1235	-	pF
C <sub>rss</sub>	Reverse transfer capacitance		-	488	-	pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 120 A, V <sub>GS</sub> = 10 V (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	183	-	nC
Q <sub>gs</sub>	Gate-source charge		-	53	-	nC
Q <sub>gd</sub>	Gate-drain charge		-	41	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 60 A, R <sub>G</sub> = 4.7 Ω, V <sub>GS</sub> = 10 V (see <a href="#">Figure 13: "Test circuit for resistive load switching times"</a> and <a href="#">Figure 18: "Switching time waveform"</a> )	-	31	-	ns
t <sub>r</sub>	Rise time		-	165	-	ns
t <sub>d(off)</sub>	Turn-off-delay time		-	144	-	ns
t <sub>f</sub>	Fall time		-	63	-	ns

Table 7: Source drain diode

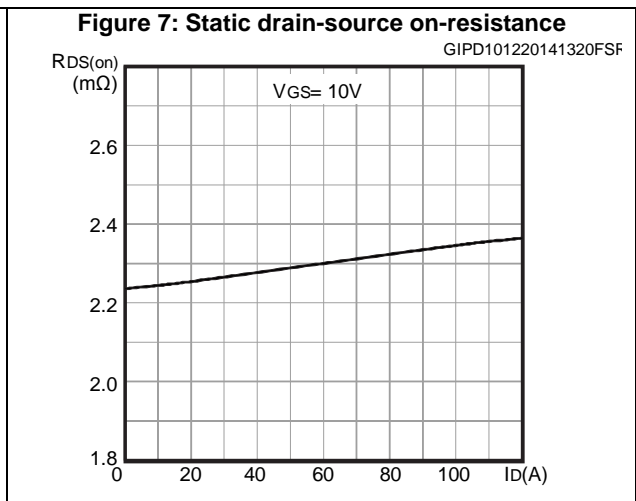
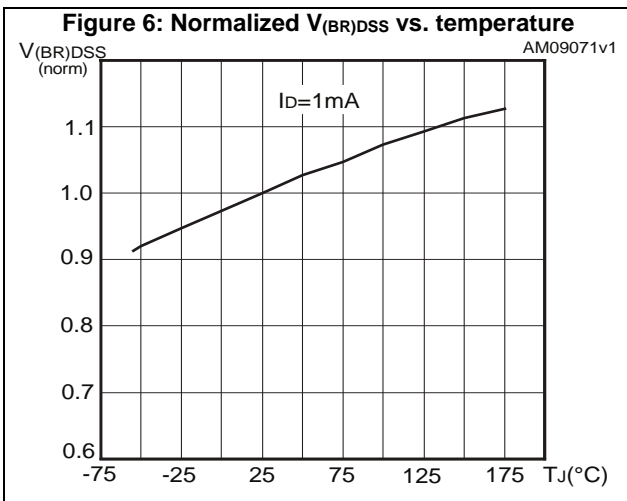
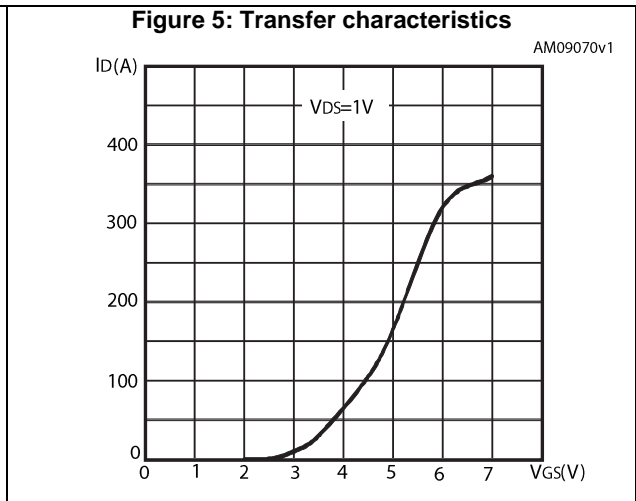
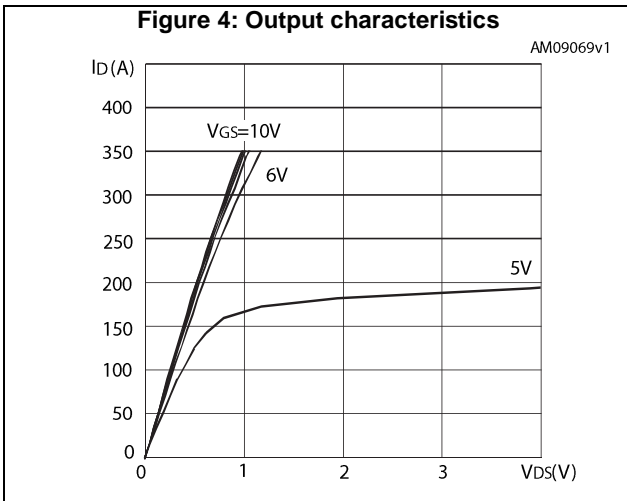
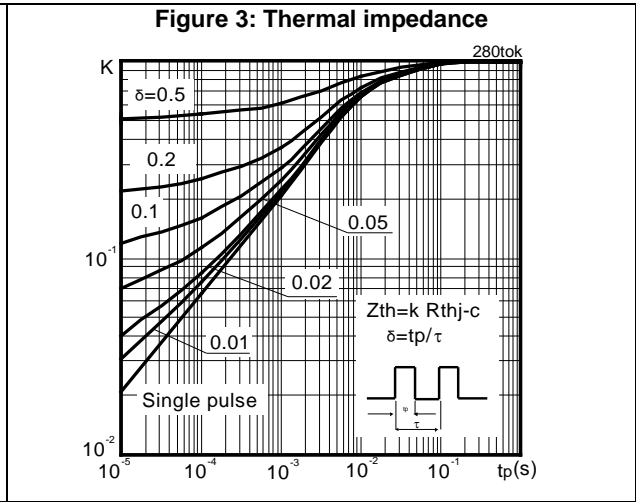
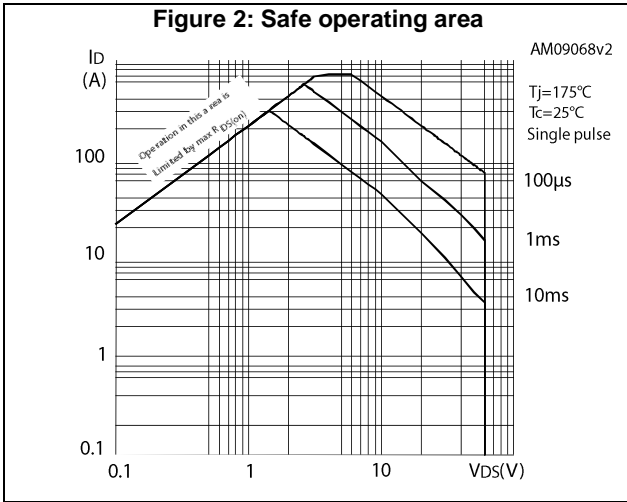
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current				180	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				720	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 180 \text{ A}$ , $V_{GS} = 0 \text{ V}$			1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 120 \text{ A}$ , $V_{DD} = 48 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s}$ , $T_j = 150 \text{ }^\circ\text{C}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	56	-	ns
$Q_{rr}$	Reverse recovery charge		-	116	-	nC
$I_{RRM}$	Reverse recovery current		-	3.8	-	A

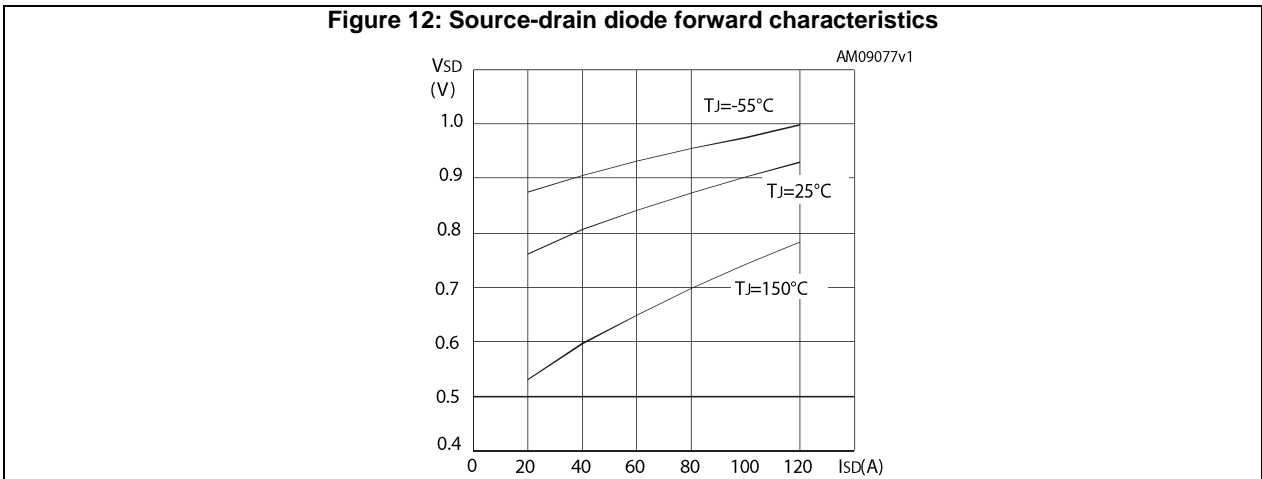
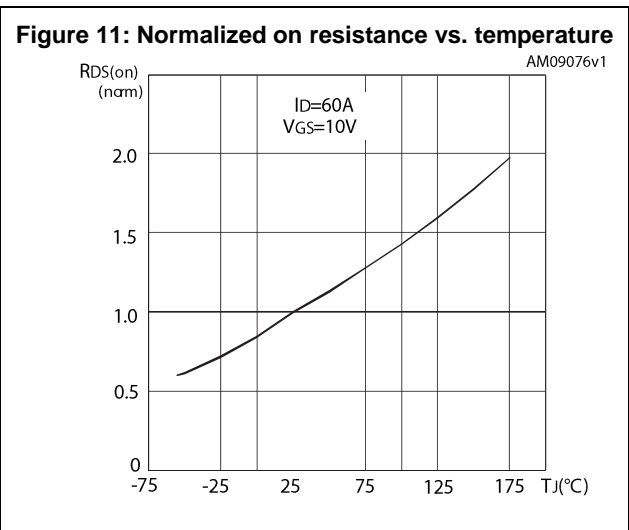
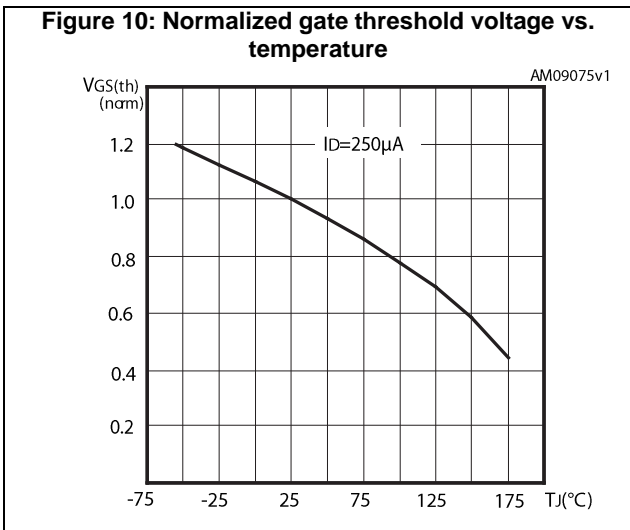
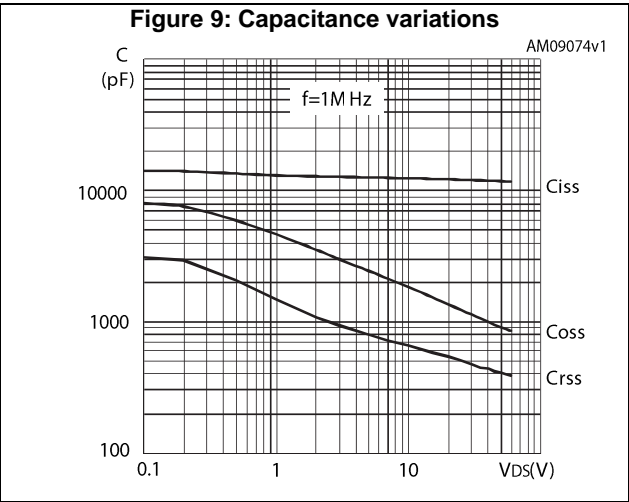
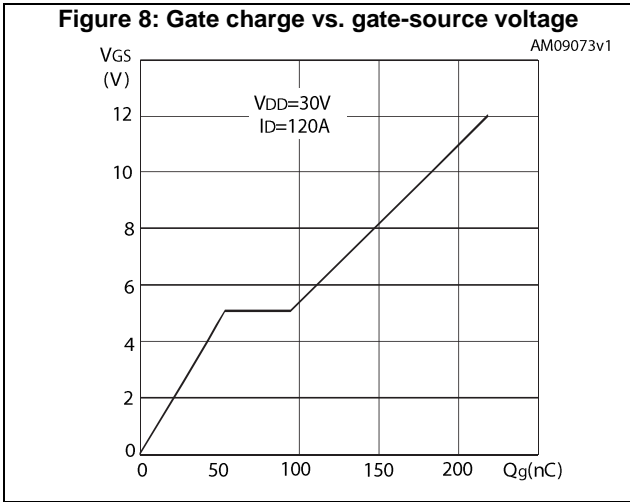
**Notes:**

(1) Pulse width limited by safe operating area.

(2) Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)





### 3 Test circuits

**Figure 13: Test circuit for resistive load switching times**



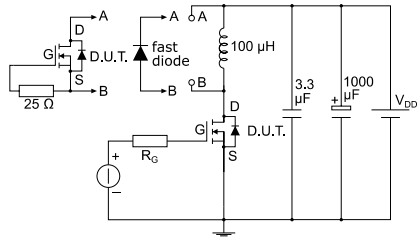
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**Figure 14: Test circuit for gate charge behavior**



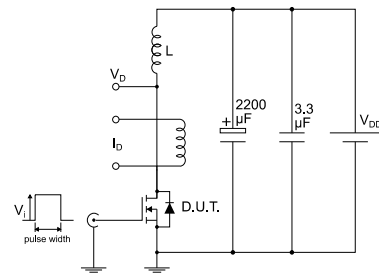
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



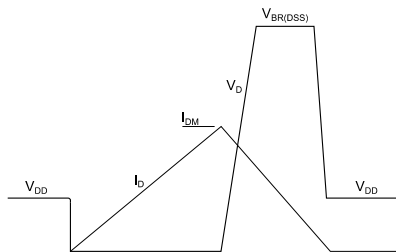
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**Figure 16: Unclamped inductive load test circuit**



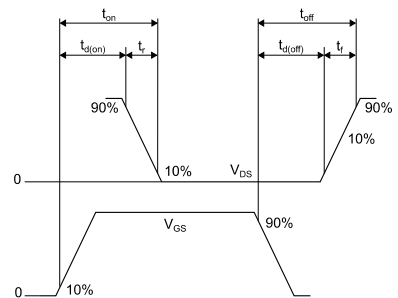
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**Figure 17: Unclamped inductive waveform**



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**Figure 18: Switching time waveform**



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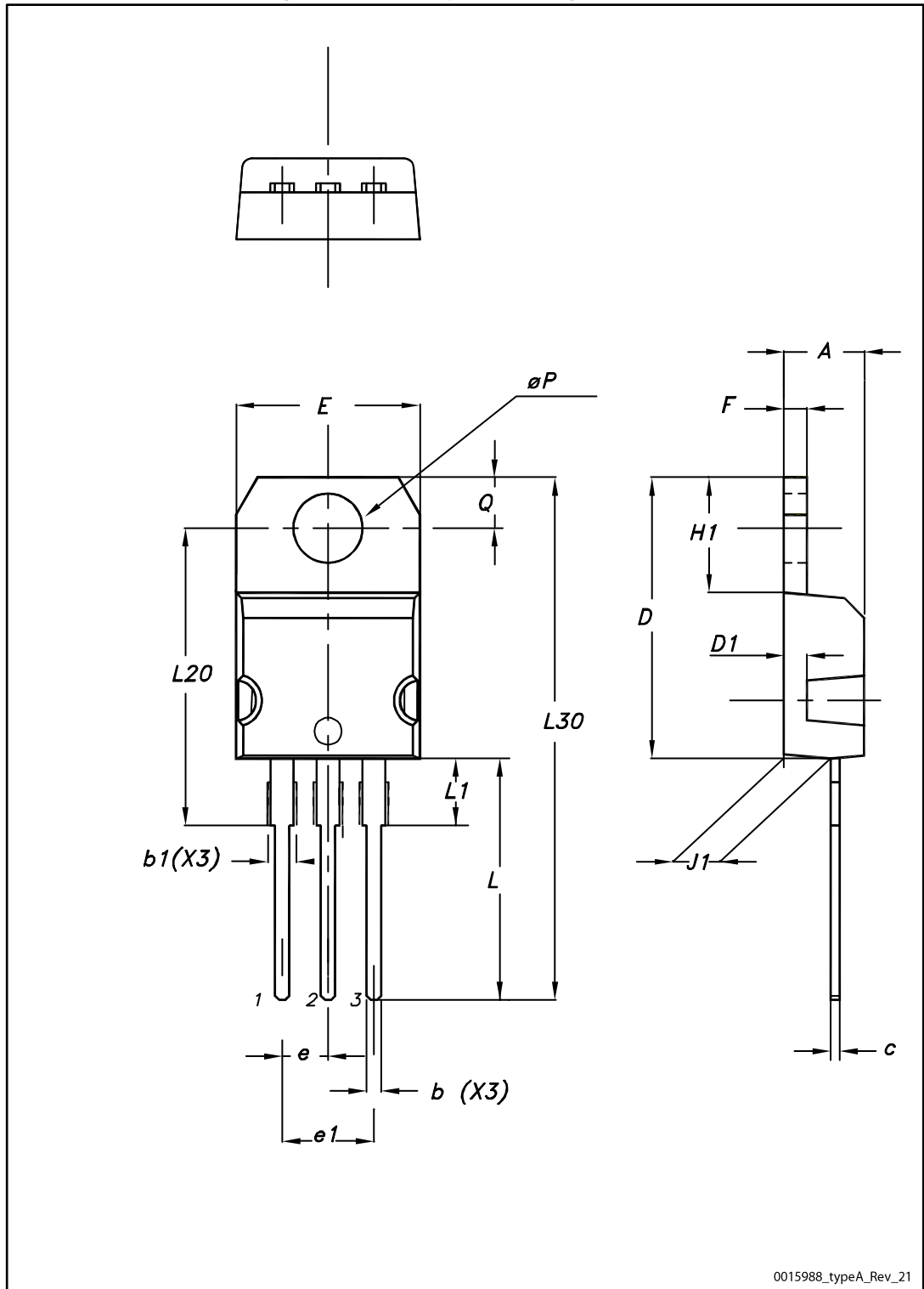


## 4 Package information

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

### 4.1 TO-220 mechanical data

Figure 19: TO-220 type A package outline



0015988\_typeA\_Rev\_21

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		1.55
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10.00		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	13.00		14.00
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
10-Dec-2014	1	First release.
16-Dec-2014	2	Document status promoted from preliminary to production data.
16-Nov-2016	3	The part number STW265N6F6AG has been moved to a separate datasheet. Updated title, cover image, features and description in cover page. Updated <a href="#">Table 1: "Device summary"</a> , <a href="#">Table 3: "Thermal data"</a> , <a href="#">Section 4: "Package information"</a> . Minor text changes.

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