

## N-channel 80 V, 0.008 $\Omega$ typ., 100 A, STripFET™ F6 Power MOSFET in a TO-220 package

Datasheet - production data

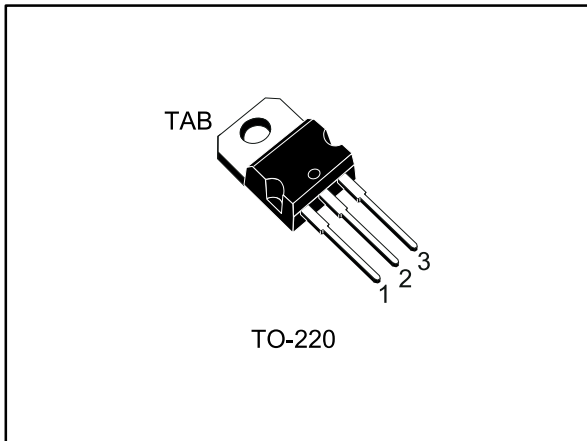
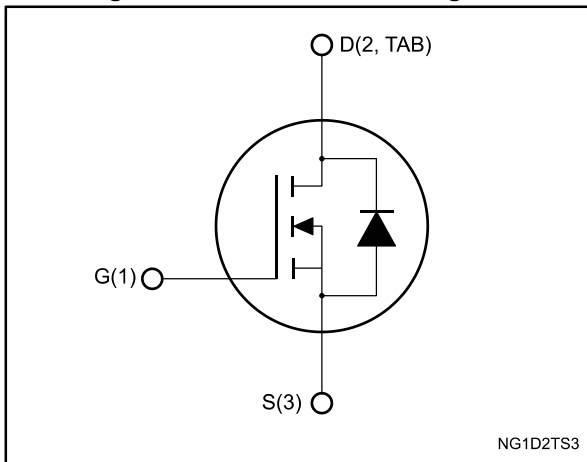


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)max.</sub>	I <sub>D</sub>	P <sub>TOT</sub>
STP100N8F6	80 V	0.009 $\Omega$	100 A	176 W

- 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.

Table 1: Device summary

Order code	Marking	Package	Packing
STP100N8F6	100N8F6	TO-220	Tube

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# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	80	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 $T_C = 100\text{ }^\circ\text{C}$	70	A
$I_{DM}^{(1)}$	Drain current (pulsed)	400	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	176	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	170	mJ
$T_J$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		$^\circ\text{C}$

**Notes:**

(1)Pulse width is limited by safe operating area.

(2)Starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $I_d = 25\text{ A}$ ,  $V_{dd} = 40\text{ V}$ .

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max.	0.85	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max.	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	$V_{GS} = 0, I_D = 250\ \mu A$	80			V
$I_{DSS}$	Zero-gate voltage drain current	$V_{GS} = 0, V_{DS} = 80\ V$			1	$\mu A$
		$V_{GS} = 0, V_{DS} = 80\ V, T_C = 125\text{ °C}$			100	$\mu A$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0, V_{GS} = \pm 20\ V$			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	$V_{GS} = 10\ V, I_D = 50\ A$		0.008	0.009	$\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{GS} = 0, V_{DS} = 25\ V, f = 1\ MHz$	-	5955	-	pF
$C_{oss}$	Output capacitance		-	244	-	pF
$C_{rss}$	Reverse transfer capacitance		-	160	-	pF
$Q_g$	Total gate charge	$V_{DD} = 40\ V, I_D = 100\ A,$	-	100	-	nC
$Q_{gs}$	Gate-source charge	$V_{GS} = 10\ V$ (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	30	-	nC
$Q_{gd}$	Gate-drain charge		-	25	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 40\ V, I_D = 50\ A, R_G = 4.7\ \Omega, V_{GS} = 10\ V$ (see <a href="#">Figure 13: "Test circuit for resistive load switching times"</a> and <a href="#">Figure 18: "Switching time waveform"</a> )	-	33	-	ns
$t_r$	Rise time		-	46	-	ns
$t_{d(off)}$	Turn-off delay time		-	103	-	ns
$t_f$	Fall time		-	21	-	ns

Table 7: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$V_{GS} = 0, I_{SD} = 100 \text{ A}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 100 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s}$	-	38		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 64 \text{ V}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	63		nC
$I_{RRM}$	Reverse recovery current		-	3.3		A

**Notes:**

<sup>(1)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)

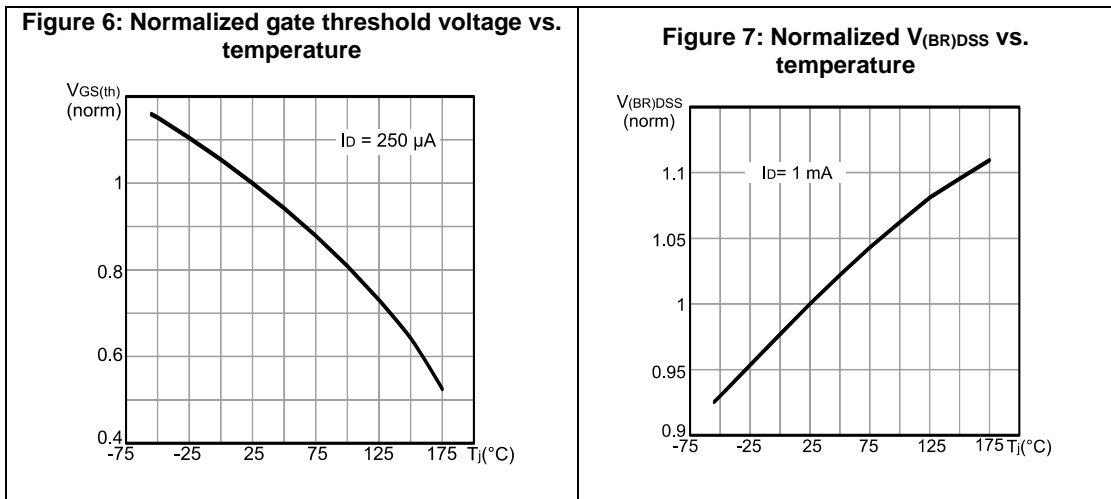
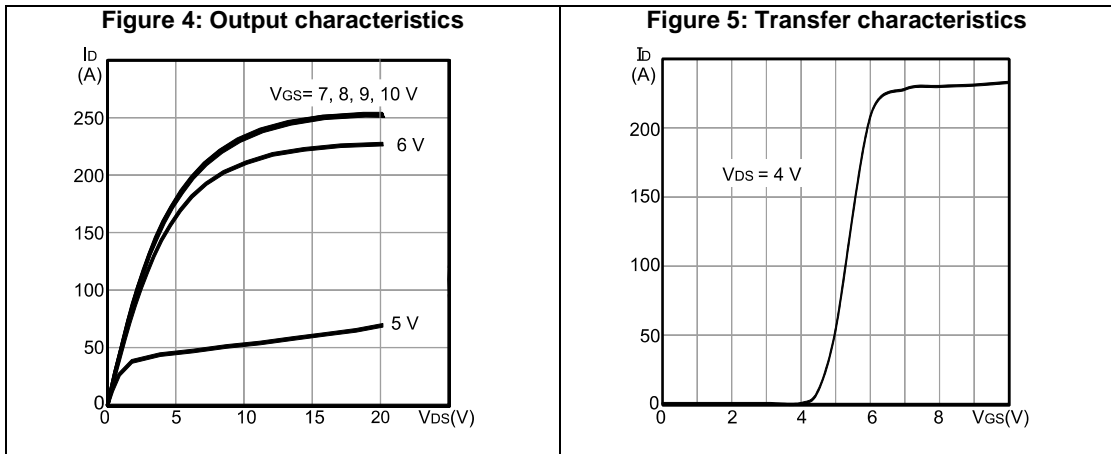
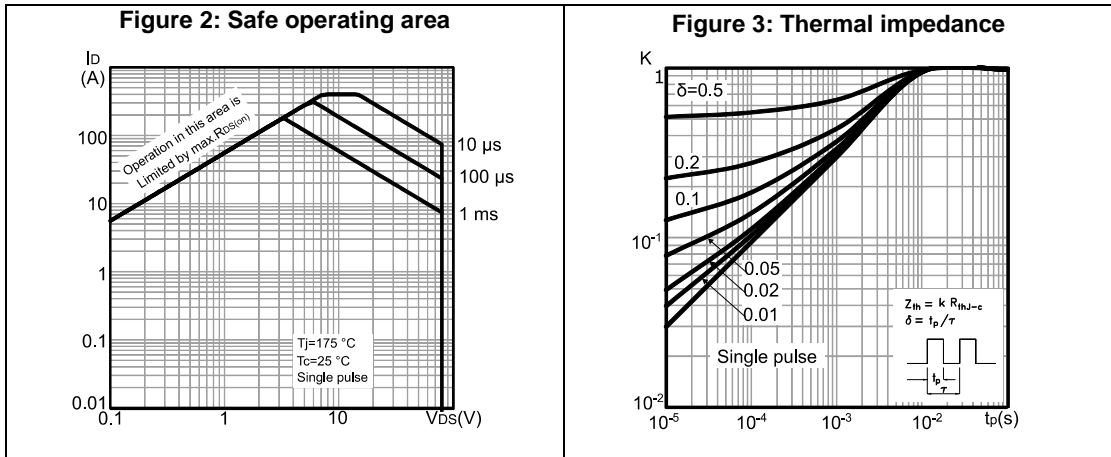


Figure 8: Static drain-source on-resistance

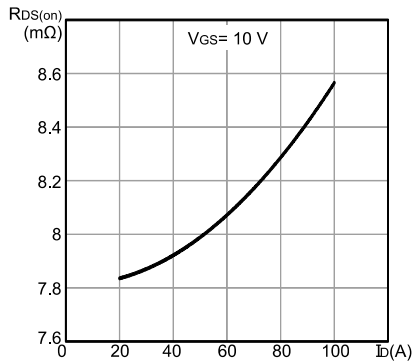


Figure 9: Normalized on-resistance vs. temperature

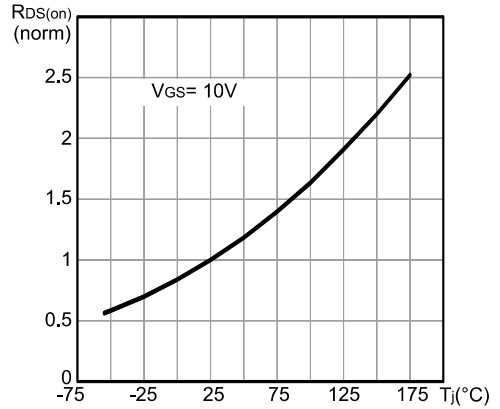


Figure 10: Gate charge vs. gate-source voltage

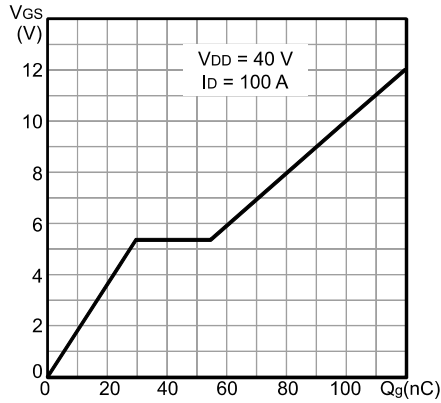


Figure 11: Capacitance variations

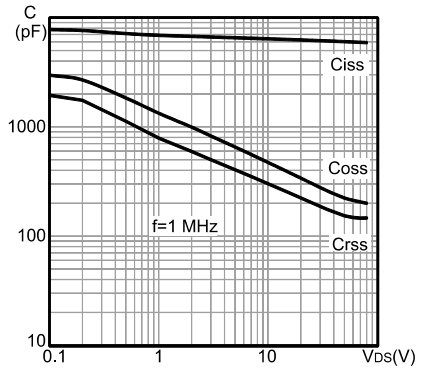
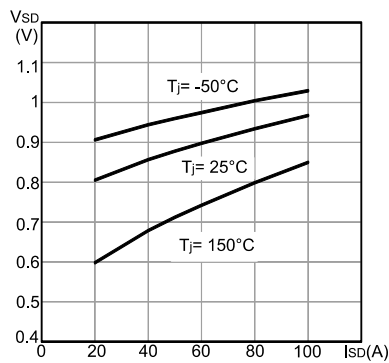
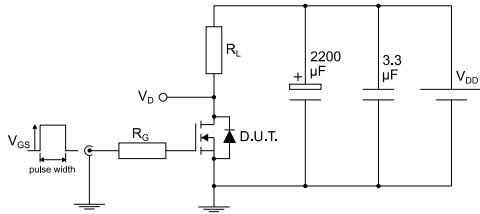


Figure 12: Source-drain diode forward characteristics



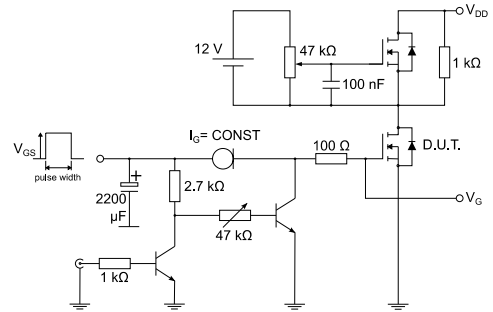
### 3 Test circuits

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



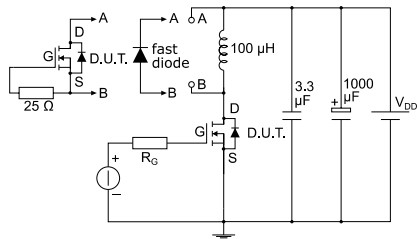
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**Figure 14: Test circuit for gate charge behavior**



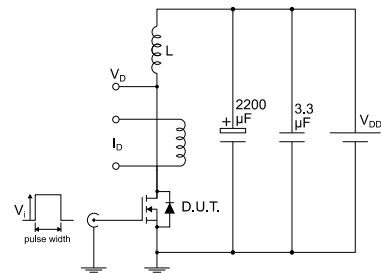
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



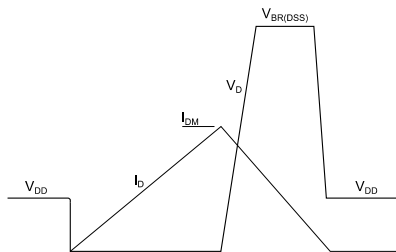
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**Figure 16: Unclamped inductive load test circuit**



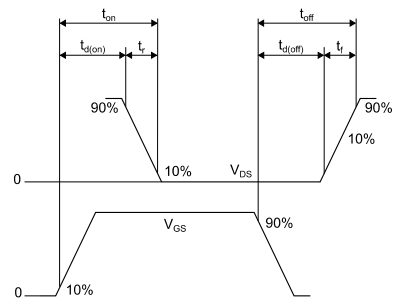
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**Figure 17: Unclamped inductive waveform**



AM01472v1

**Figure 18: Switching time waveform**



AM01473v1



## 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

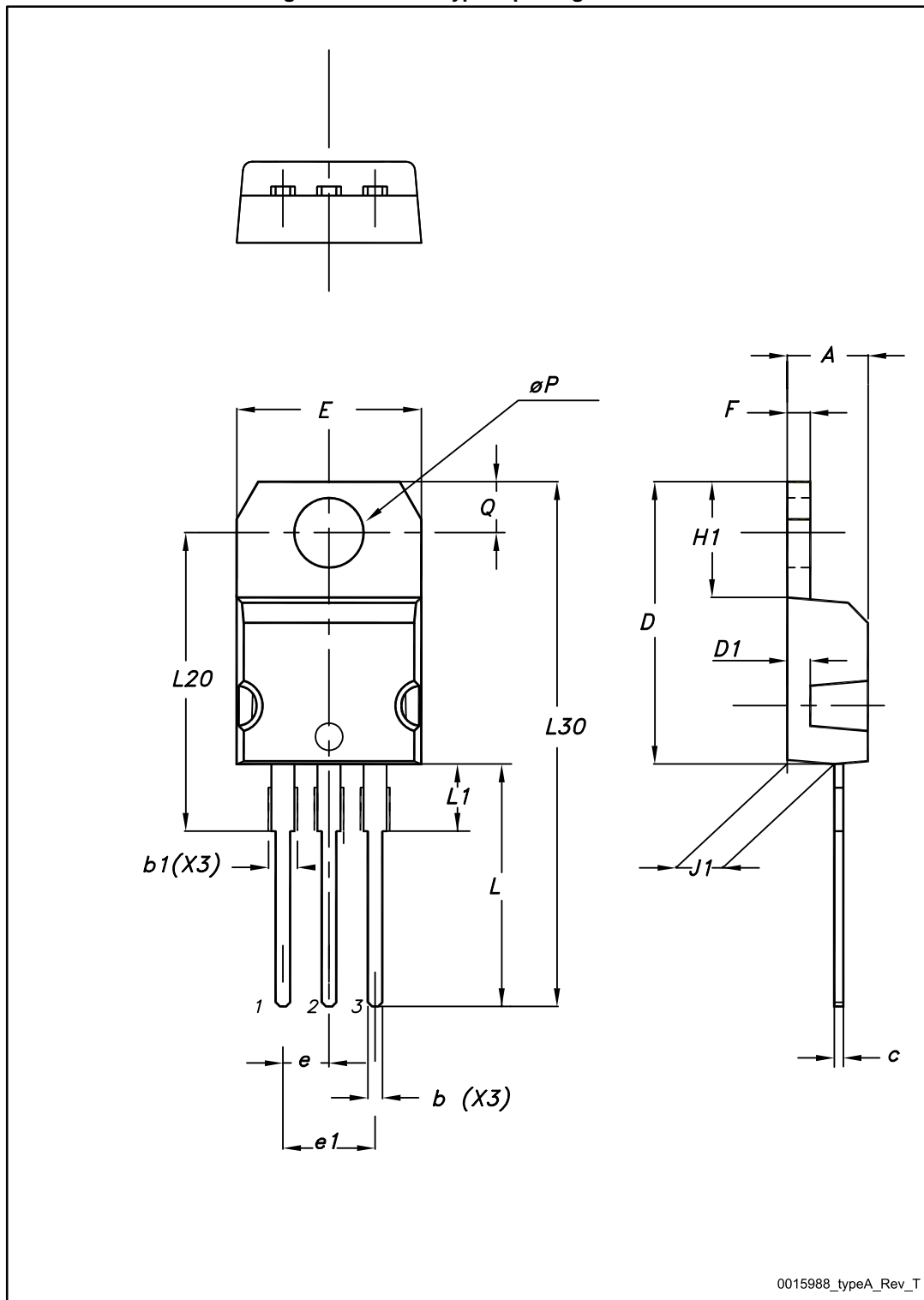


Table 8: TO-220 type A mechanical data

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

### 4.2 TO-220 type H package information

Figure 20: TO-220 type H package outline

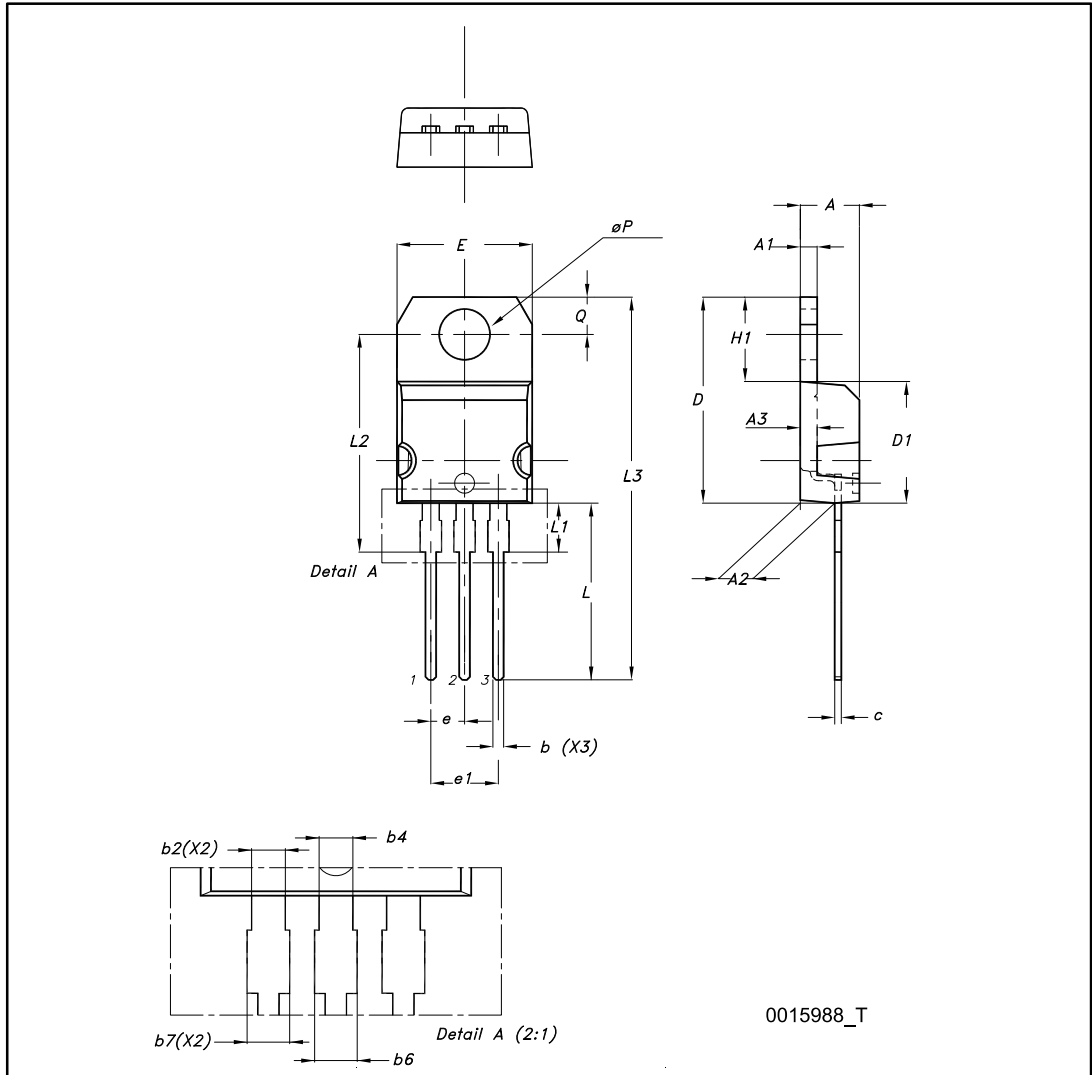


Table 9: TO-220 type H package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40	4.45	4.50
A1	1.22		1.32
A2	2.49	2.59	2.69
A3	1.17	1.27	1.37
b	0.78		0.87
b2	1.25		1.34
b4	1.20		1.29
b6			1.50
b7			1.45
c	0.49		0.56
D	15.40	15.50	15.60
D1	9.05	9.15	9.25
E	10.08	10.18	10.28
e	2.44	2.54	2.64
e1	4.98	5.08	5.18
H1	6.25	6.35	6.45
L	13.20	13.40	13.60
L1	3.50	3.70	3.90
L2	16.30	16.40	16.50
L3	28.70	28.90	29.10
∅P	3.75	3.80	3.85
Q	2.70	2.80	2.90

## 5 Revision history

Table 10: Document revision history

Date	Revision	Changes
02-Sep-2014	1	Initial release.
02-Dec-2014	2	Document status promoted from preliminary to production data. Added the section of electrical characteristics (curves). Minor text changes.
08-Feb-2016	3	Added <a href="#">Section 4.2: "TO-220 type H package information"</a> .

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