

N-channel 80 V, 0.0056 Ω typ., 110 A, STripFET™ F6 Power MOSFET in a TO-220 package

Datasheet - production data

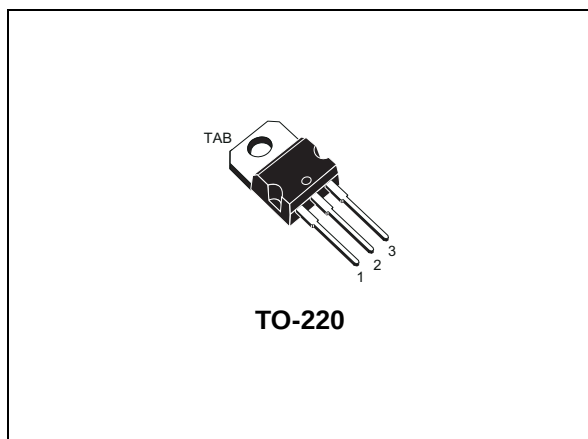
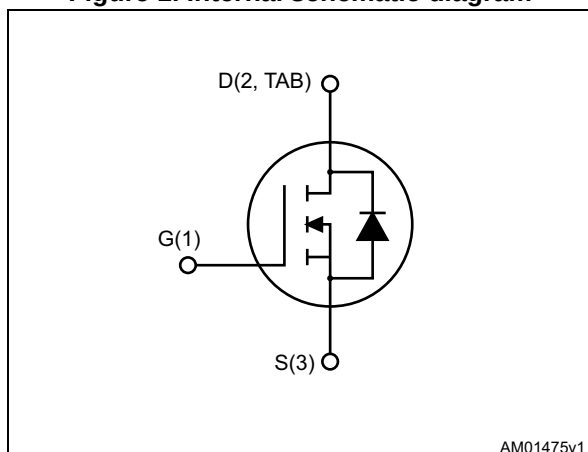


Figure 1. Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)max}$	I_D	P_{TOT}
STP110N8F6	80 V	0.0065 Ω	110 A	200 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 $R_{DS(on)}$ in all packages.

Table 1. Device summary

Order code	Marking	Package	Packing
STP110N8F6	110N8F6	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	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	110	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	85	A
$I_{DM}^{(1)}$	Drain current (pulsed)	440	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	200	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	180	mJ
T_J	Operating junction temperature	-55 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature		$^{\circ}\text{C}$

1. Pulse width is limited by safe operating area

2. Starting $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = 55\text{ A}$, $V_{DD} = 60\text{ V}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max.	0.75	$^{\circ}\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max.	62.5	$^{\circ}\text{C/W}$

2 Electrical characteristics

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

Table 4. On/off-state

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0, I_D = 1\text{ mA}$	80			V
I_{DSS}	Zero-gate voltage drain current	$V_{GS} = 0, V_{DS} = 80\text{ V}$			1	μA
		$V_{GS} = 0, V_{DS} = 80\text{ V}, T_C = 125\text{ }^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0, V_{GS} = +20\text{ V}$			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	$V_{GS} = 10\text{ V}, I_D = 55\text{ A}$		0.0056	0.0065	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 40\text{ V}, f = 1\text{ MHz}, V_{GS} = 0$	-	9130	-	pF
C_{oss}	Output capacitance		-	320	-	pF
C_{rss}	Reverse transfer capacitance		-	225	-	pF
Q_g	Total gate charge	$V_{DD} = 40\text{ V}, I_D = 110\text{ A}, V_{GS} = 10\text{ V}$ (see Figure 14)	-	150	-	nC
Q_{gs}	Gate-source charge		-	40	-	nC
Q_{gd}	Gate-drain charge		-	30	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 40\text{ V}, I_D = 55\text{ A}, R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$ (see Figure 13)	-	24	-	ns
t_r	Rise time		-	61	-	ns
$t_{d(off)}$	Turn-off delay time		-	162	-	ns
t_f	Fall time		-	48	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 110\text{ A}$, $V_{GS} = 0$	-		1.2	V
t_{rr}	Reverse recovery time	$I_{SD} = 110\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 64\text{ V}$ (see Figure 15)	-	30		ns
Q_{rr}	Reverse recovery charge		-	34		nC
I_{RRM}	Reverse recovery current		-	2.3		A

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

2.1 Electrical characteristics (curves)

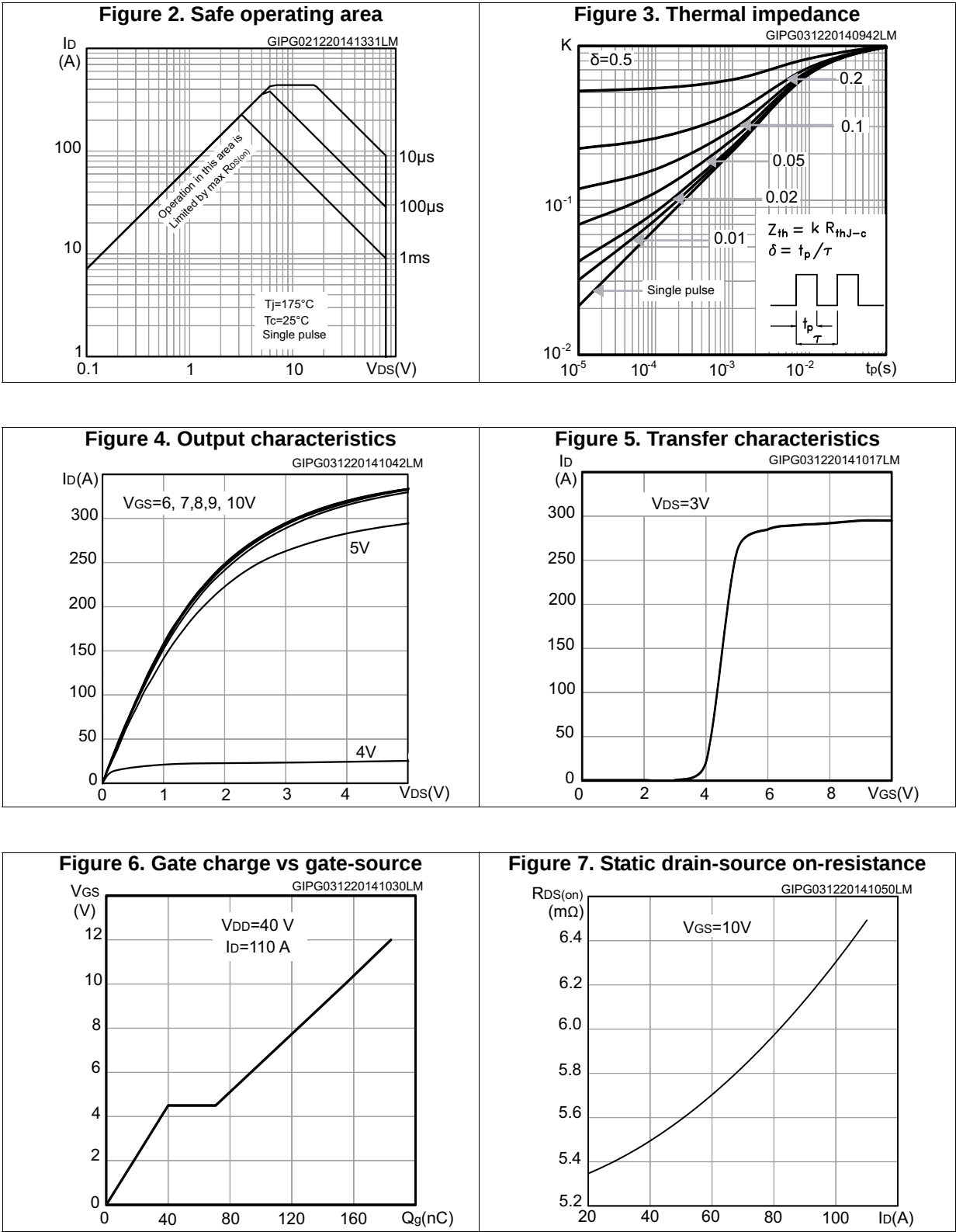


Figure 8. Capacitance variations

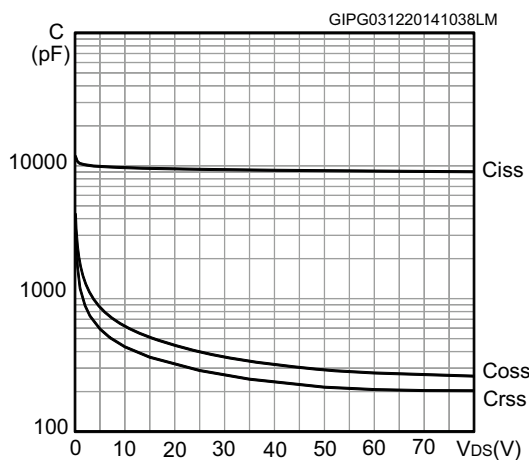


Figure 9. Normalized gate threshold voltage vs temperature

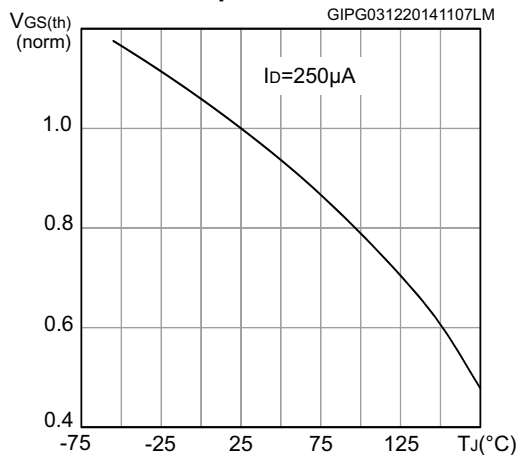


Figure 10. Normalized on-resistance

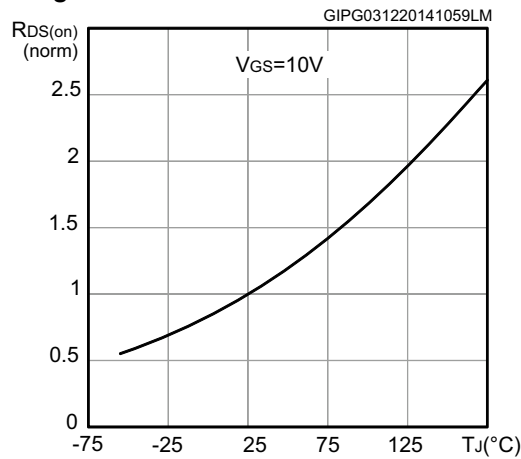


Figure 11. Normalized $V_{(BR)DSS}$ vs temperature

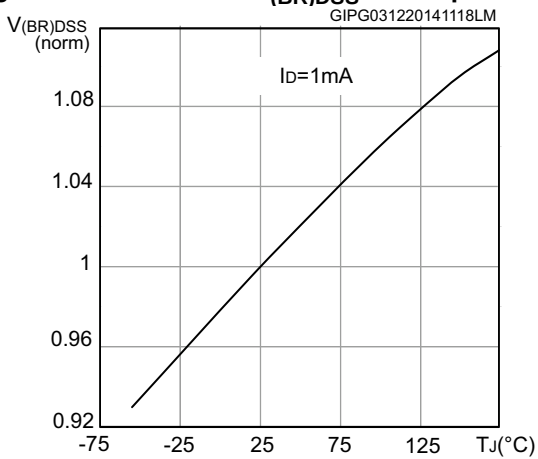
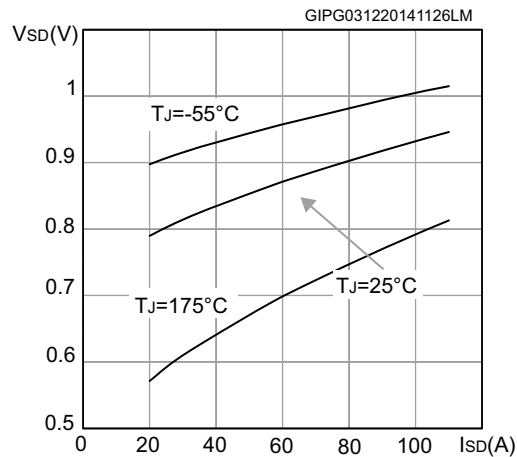
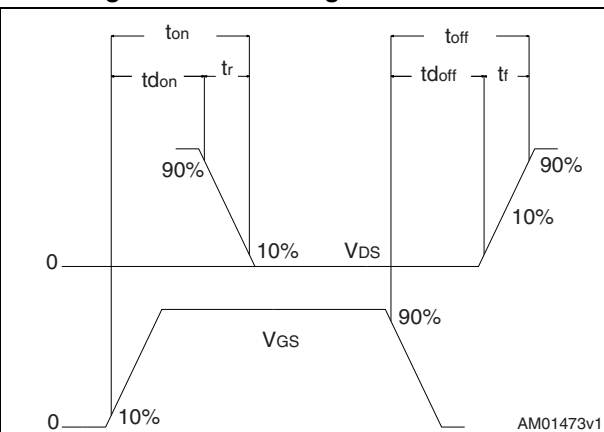
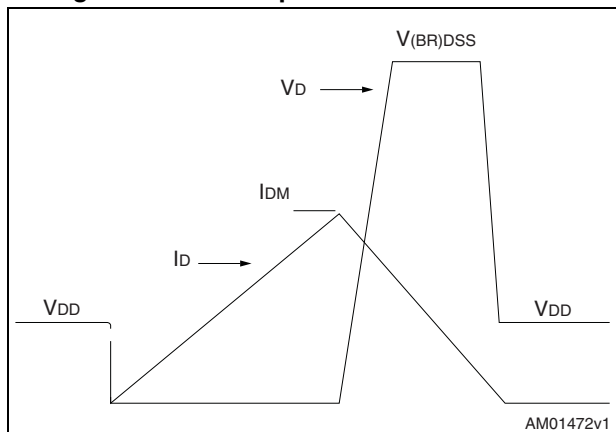
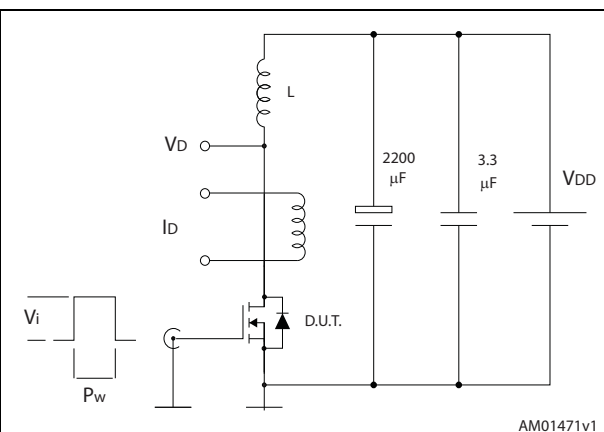
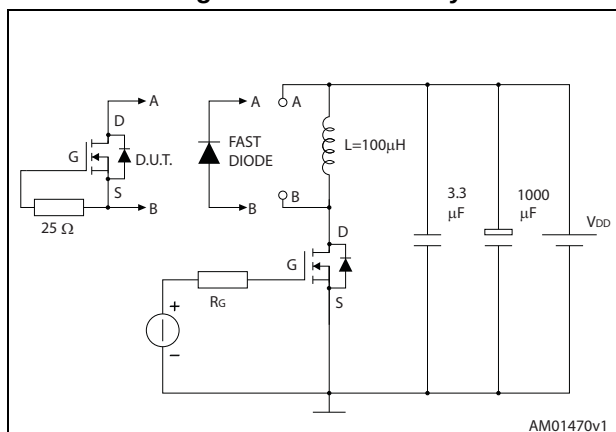
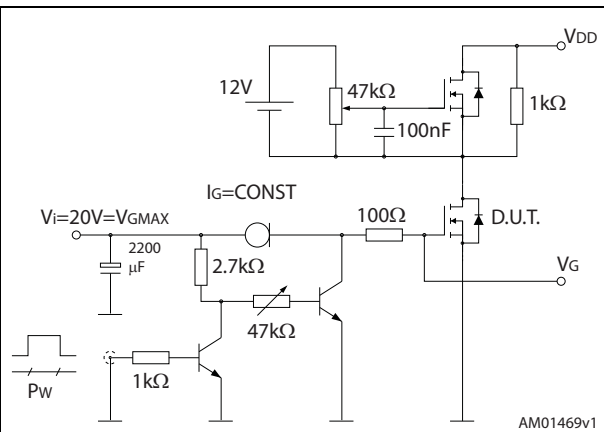
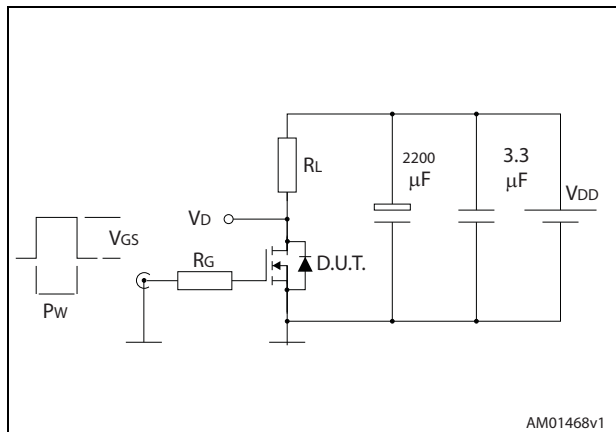


Figure 12. Drain-source diode forward characteristics





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. ECOPACK[®] is an ST trademark.

4.1 TO-220 package information

Figure 19. TO-220 type A outline

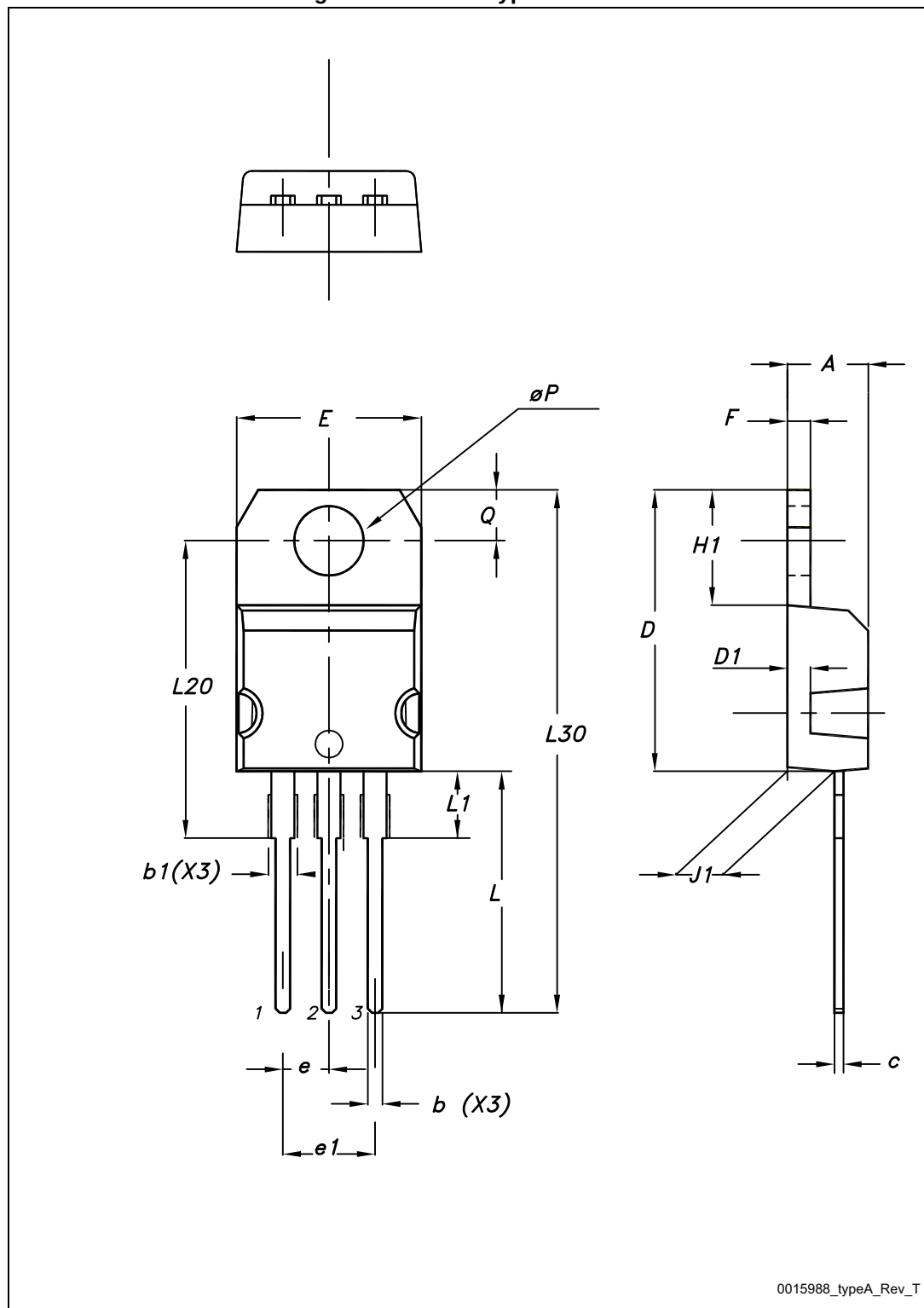


Table 8. TO-220 type A mechanical data

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

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
26-Sep-2014	1	First release.
05-Dec-2014	2	Updated in cover page the title and features. Product status promoted from preliminary to production data. Updated E_{AS} parameter in Table 2 and $R_{DS(on)}$ in Table 4 . Updated Table 5 , Table 6 and Table 7 . Inserted Section 2.1 .

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