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## N-channel 250 V, 0.29 $\Omega$ typ., 8 A STripFET™ II Power MOSFET in IPAK package

Datasheet - production data

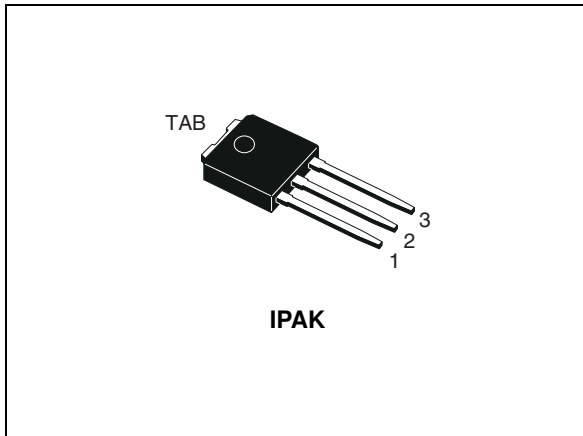
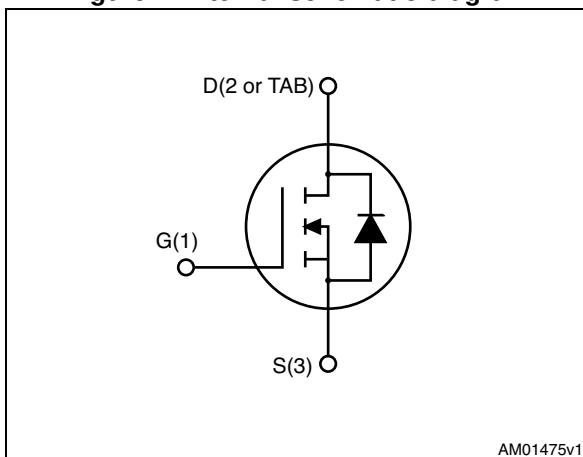


Figure 1. Internal schematic diagram



### Features

Order code	$V_{DSS}$	$R_{DS(on)}$ max.	$I_D$
STU7NF25	250 V	0.42 $\Omega$	8 A

- 100% avalanche tested
- 175 °C junction temperature

### Applications

- Switching applications

### Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

Table 1. Device summary

Order code	Marking	Package	Packaging
STU7NF25	7NF25	IPAK	Tube

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	250	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	8	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	6	A
$I_{DM}^{(1)}$	Drain current (pulsed)	32	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	72	W
$T_J$ $T_{stg}$	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. Pulse width limited by safe operating area.

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	2.08	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-amb max	100	

**Table 4. Avalanche data**

Symbol	Parameter	Value	Unit
$I_{AV}$	Non-repetitive avalanche current	8	A
$E_{AS}$	Single pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$ , $I_D = I_{AV}$ , $V_{DD} = 50\text{ V}$ )	110	mJ

## 2 Electrical characteristics

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

**Table 5. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$ , $V_{GS} = 0$	250	-		V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = 250\text{ V}$ $V_{DS} = 250\text{ V}$ , $T_c=125\text{ °C}$		-	1 50	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20\text{ V}$		-	$\pm 100$	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	$V_{GS} = 10\text{ V}$ , $I_D = 4\text{ A}$		0.29	0.42	$\Omega$

**Table 6. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$	-	500	-	pF
$C_{oss}$	Output capacitance		-	90	-	pF
$C_{rss}$	Reverse transfer capacitance		-	15	-	pF
$Q_g$	Total gate charge	$V_{DD} = 200\text{ V}$ , $I_D = 8\text{ A}$ $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14</a> )	-	16	-	nC
$Q_{gs}$	Gate-source charge		-	3.5	-	nC
$Q_{gd}$	Gate-drain charge		-	8	-	nC

**Table 7. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 125\text{ V}$ , $I_D = 4\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13</a> and <a href="#">Figure 18</a> )	-	13	-	ns
$t_r$	Rise time		-	10	-	ns
$t_{d(off)}$	Turn-off delay time		-	26	-	ns
$t_f$	Fall time		-	6	-	ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}$	Source-drain current Source-drain current (pulsed)		-		8 32	A A
$V_{SD}$	Forward on voltage	$I_{SD}=8\text{ A}$ , $V_{GS}=0\text{ V}$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 8\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 50\text{ V}$ (see <a href="#">Figure 15</a> )	-	115		ns
$Q_{rr}$	Reverse recovery charge		-	470		nC
$I_{RRM}$	Reverse recovery current		-	8.5		A
$t_{rr}$	Reverse recovery time	$I_{SD} = 8\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 50\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$ (see <a href="#">Figure 15</a> )	-	130		ns
$Q_{rr}$	Reverse recovery charge		-	580		nC
$I_{RRM}$	Reverse recovery current		-	9.5		A

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

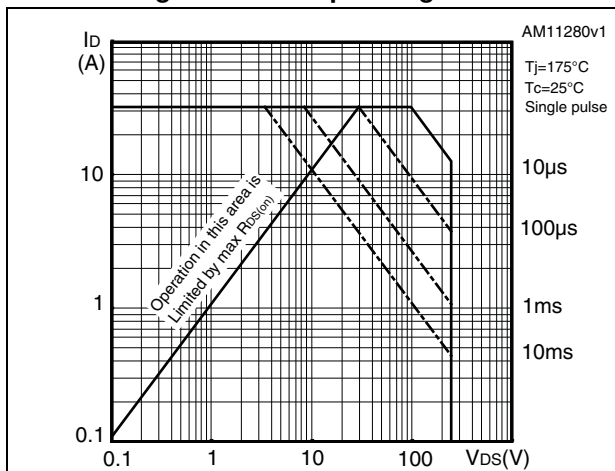


Figure 3. Thermal impedance

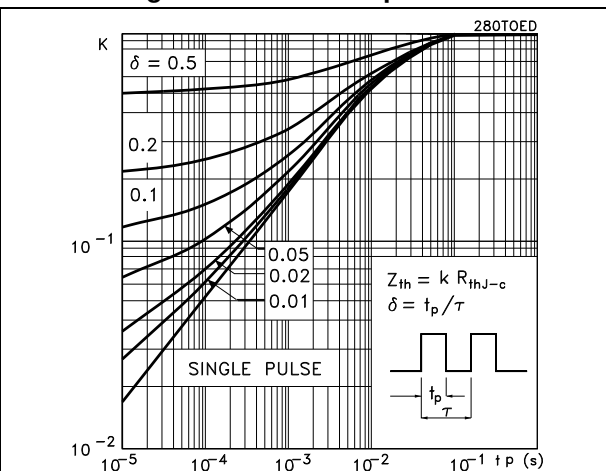


Figure 4. Output characteristics

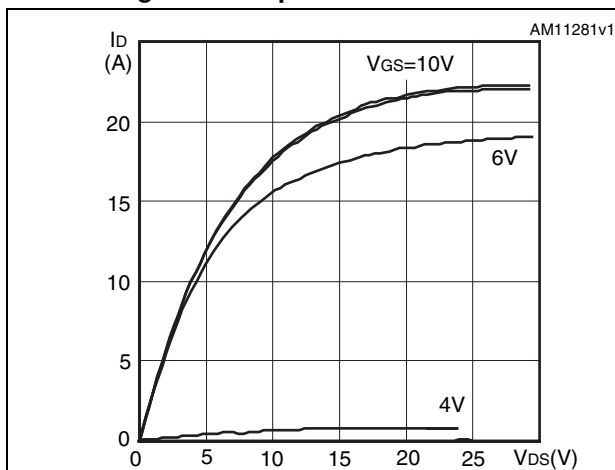


Figure 5. Transfer characteristics

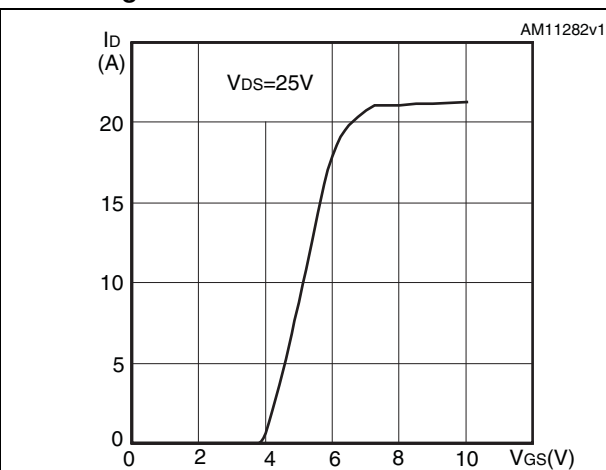


Figure 6. Normalized BV<sub>DSS</sub> vs temperature

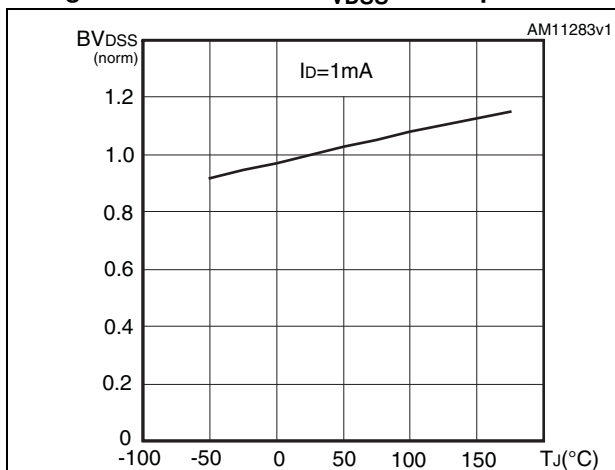


Figure 7. Static drain-source on-resistance

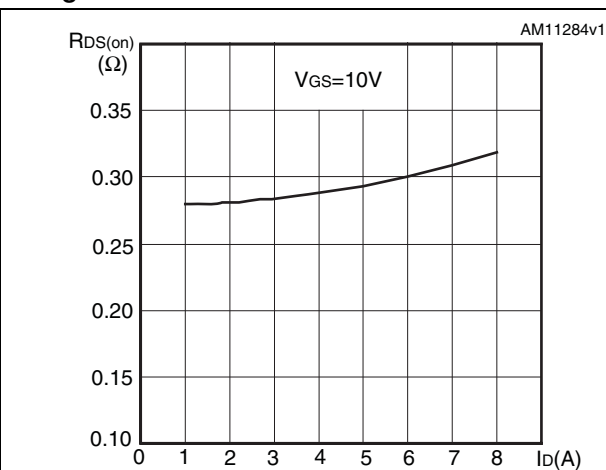


Figure 8. Gate charge vs gate-source voltage

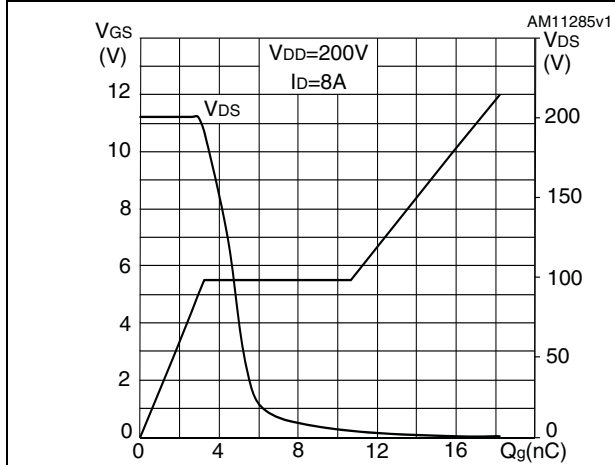


Figure 9. Capacitance variations

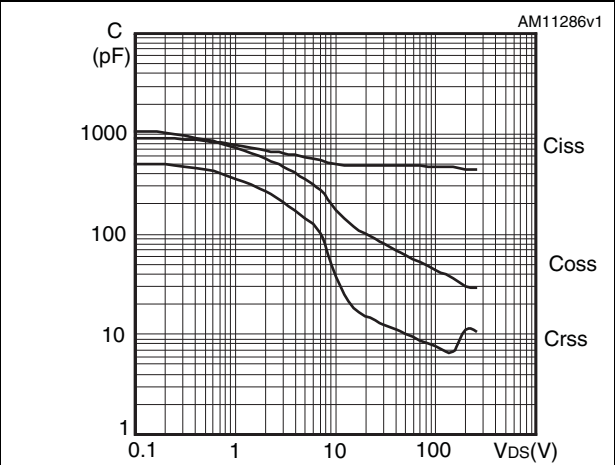


Figure 10. Normalized gate threshold voltage vs temperature

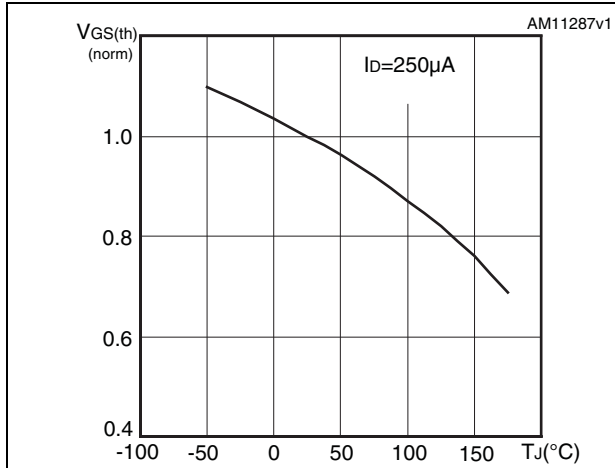


Figure 11. Normalized on resistance vs temperature

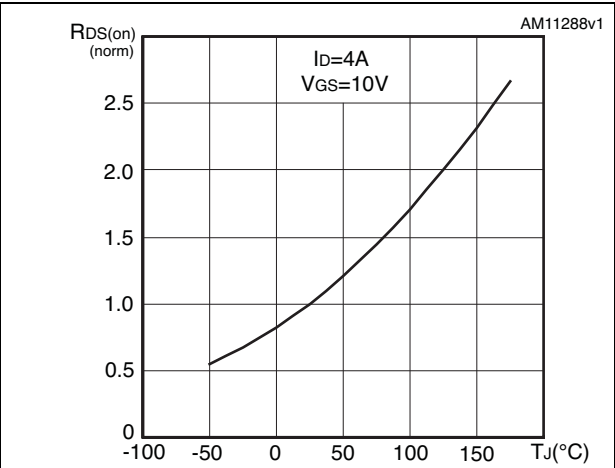
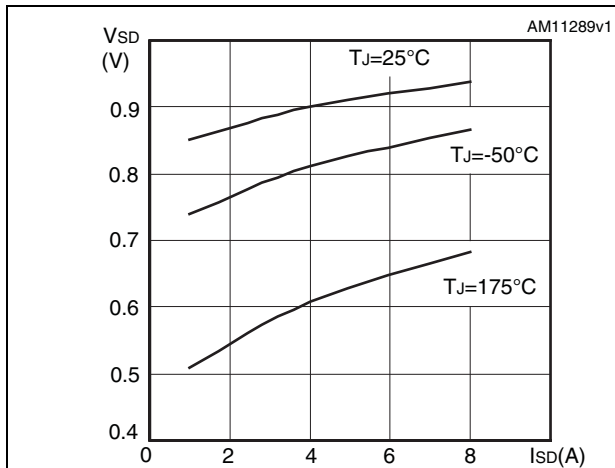
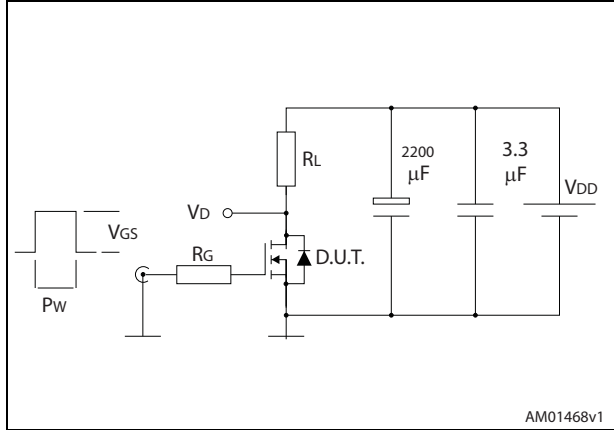


Figure 12. Source-drain diode forward characteristics

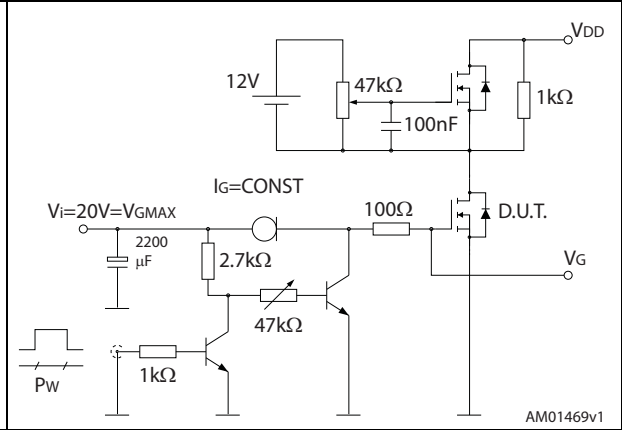


### 3 Test circuits

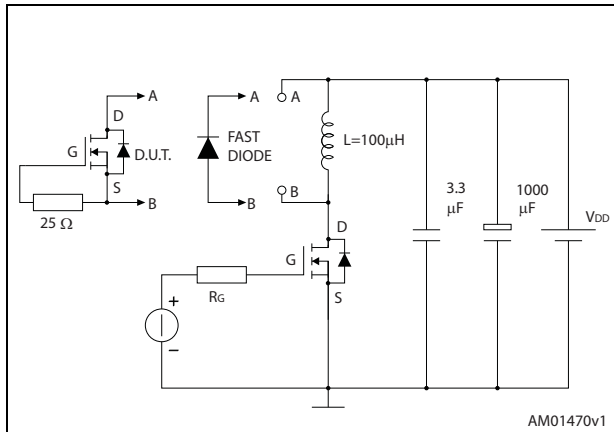
**Figure 13. Switching times test circuit for resistive load**



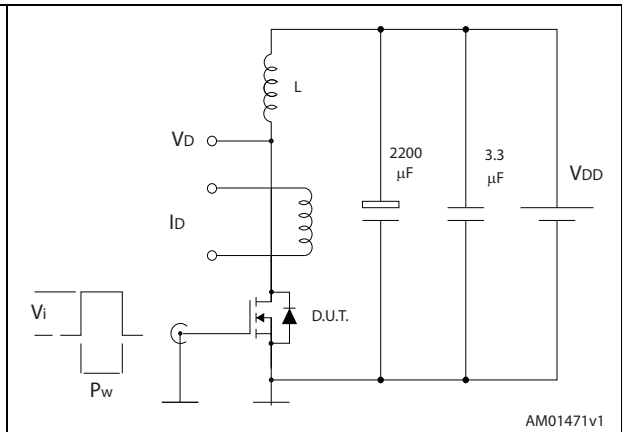
**Figure 14. Gate charge test circuit**



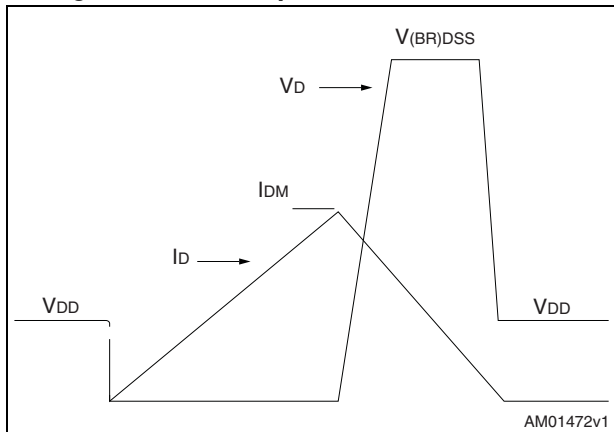
**Figure 15. Test circuit for inductive load switching and diode recovery times**



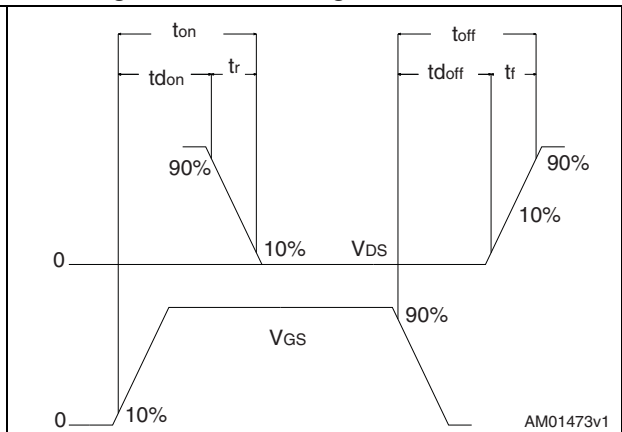
**Figure 16. Unclamped inductive load test circuit**



**Figure 17. Unclamped inductive waveform**



**Figure 18. Switching time waveform**



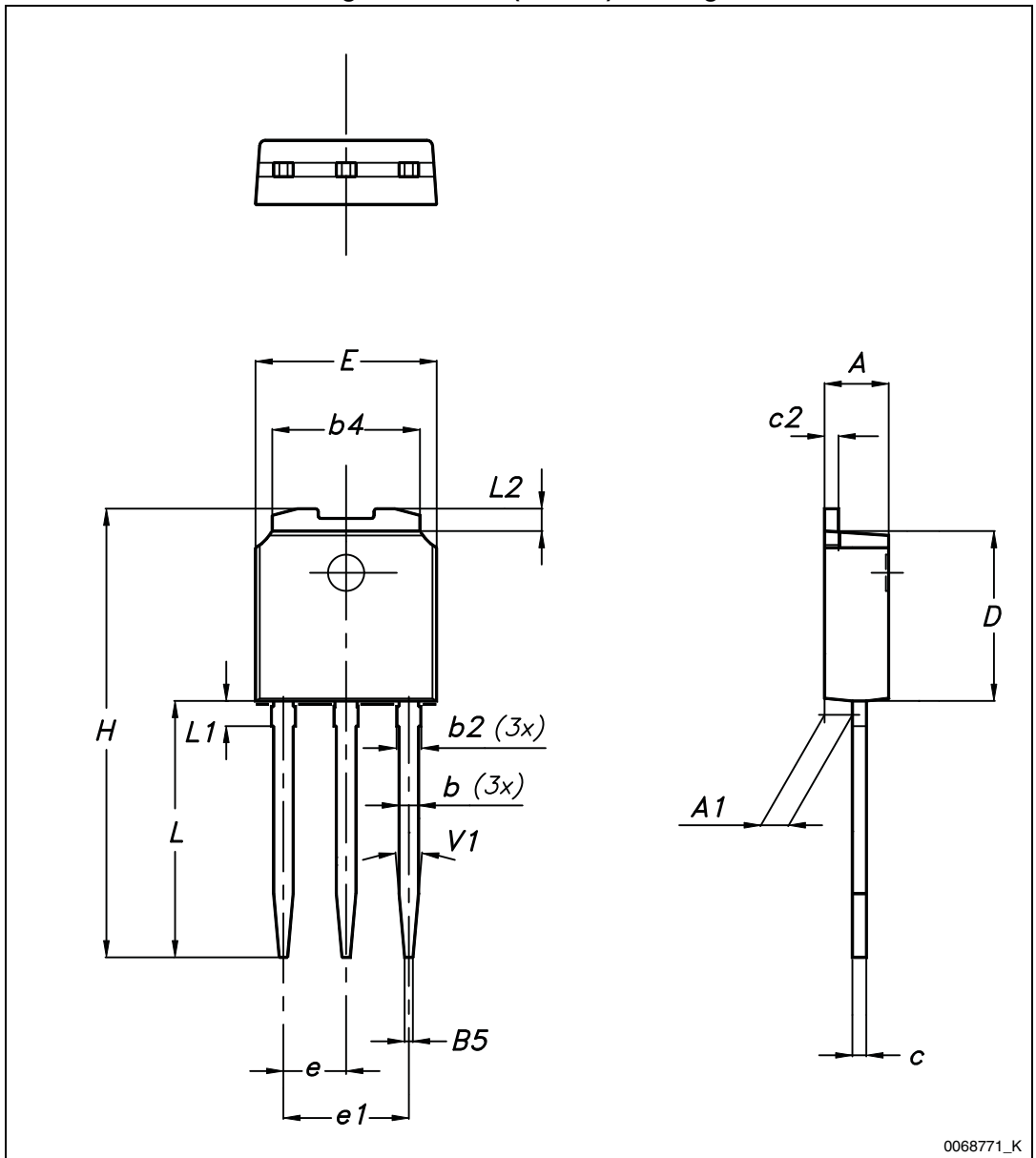
## 4 Package mechanical data

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.

**Table 9. IPAK (TO-251) mechanical data**

DIM	mm.		
	min.	typ.	max.
A	2.20		2.40
A1	0.90		1.10
b	0.64		0.90
b2			0.95
b4	5.20		5.40
B5		0.30	
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
E	6.40		6.60
e		2.28	
e1	4.40		4.60
H		16.10	
L	9.00		9.40
L1	0.80		1.20
L2		0.80	1.00
V1		10°	

Figure 19. IPAK (TO-251) drawing



0068771\_K

## 5 Revision history

Table 10. Document revision history

Date	Revision	Changes
24-Jul-2013	1	First release.

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