

## Automotive-grade N-channel 40 V, 1.46 mΩ typ., 120 A STripFET™ F6 Power MOSFETs in I<sup>2</sup>PAK and TO-220 packages

Datasheet - production data

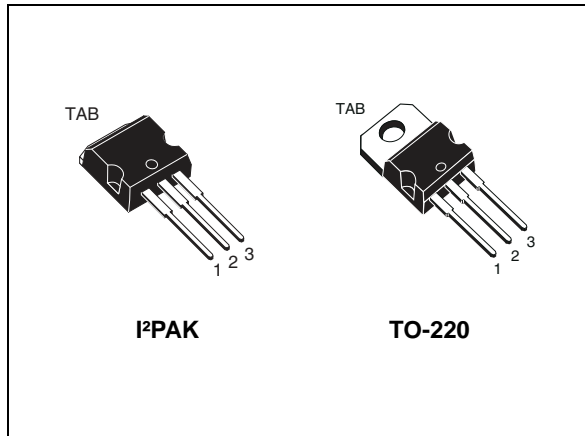
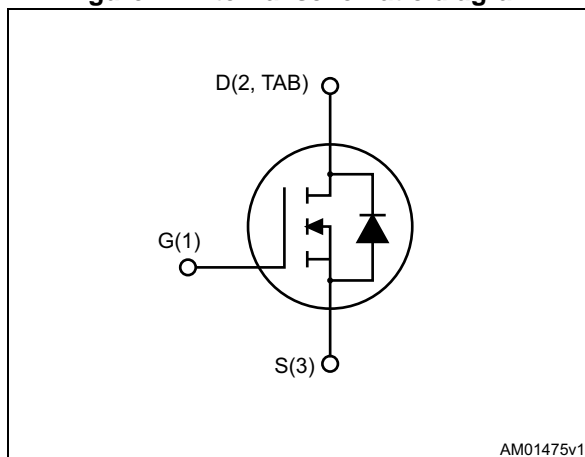


Figure 1. Internal schematic diagram



### Features

Order codes	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STI360N4F6	40 V	1.8 mΩ	120 A
STP360N4F6			

- Designed for automotive applications and AEC-Q101 qualified
- Very low on-resistance
- Low gate charge
- High avalanche ruggedness
- Low gate drive power loss

### Applications

- Switching applications

### Description

These devices are N-channel Power MOSFETs developed using the STripFET™ F6 technology with a new trench gate structure. The resulting Power MOSFETs exhibit very low R<sub>DS(on)</sub> in all packages.

Table 1. Device summary

Order codes	Marking	Packages	Packing
STI360N4F6	360N4F6	I <sup>2</sup> PAK	Tube
STP360N4F6		TO-220	

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	40	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)(2)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	120	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	120	
$I_{DM}^{(1)}$	Drain current (pulsed)	480	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
$T_{stg}$	Storage temperature	- 55 to 175	$^\circ\text{C}$
$T_j$	Operating junction temperature		

1. Current limited by package.
2. Pulse width is limited by safe operating area.

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.5	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5	

## 2 Electrical characteristics

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

**Table 4. Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	40			V
$I_{DSS}$	Zero gate voltage Drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 40\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = 40\text{ V}$ , $T_C = 125\text{ °C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 0\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	3		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 60\text{ A}$		1.46	1.8	m $\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{ISS}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	17800	-	pF
$C_{OSS}$	Output capacitance		-	1750	-	
$C_{RSS}$	Reverse transfer capacitance		-	1305	-	
$Q_g$	Total gate charge	$V_{DD} = 20\text{ V}$ , $I_D = 120\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14: Gate charge test circuit</a> )	-	304	-	nC
$Q_{gs}$	Gate-source charge		-	96	-	
$Q_{gd}$	Gate-drain charge		-	87	-	

**Table 6. Switching times**

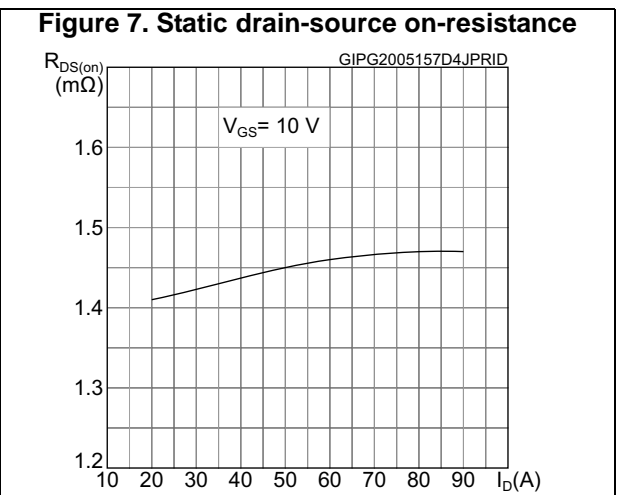
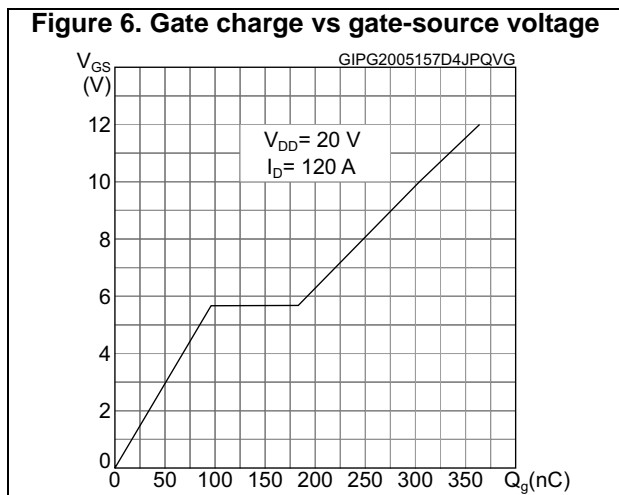
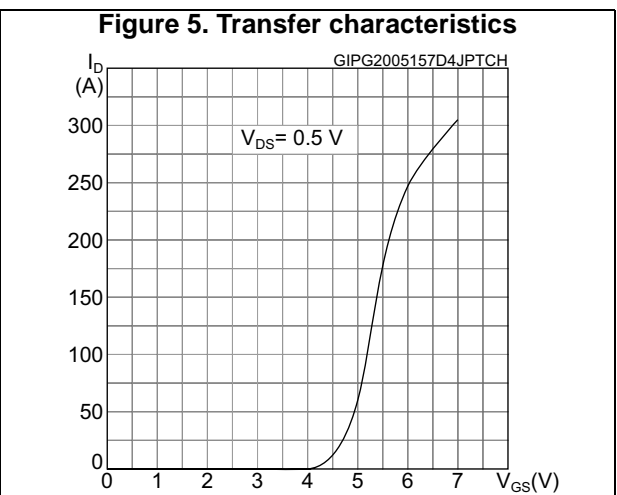
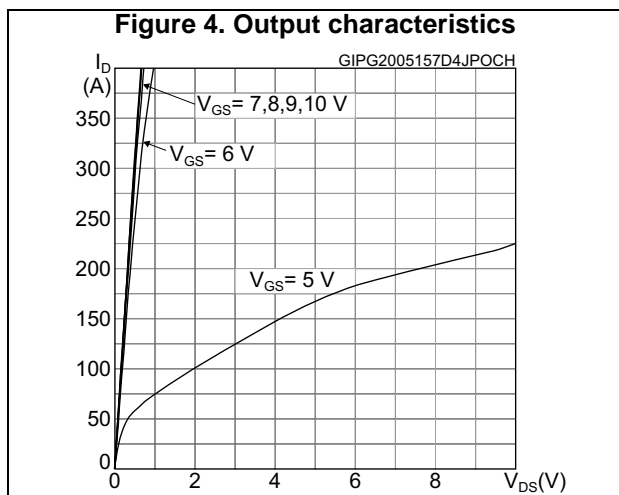
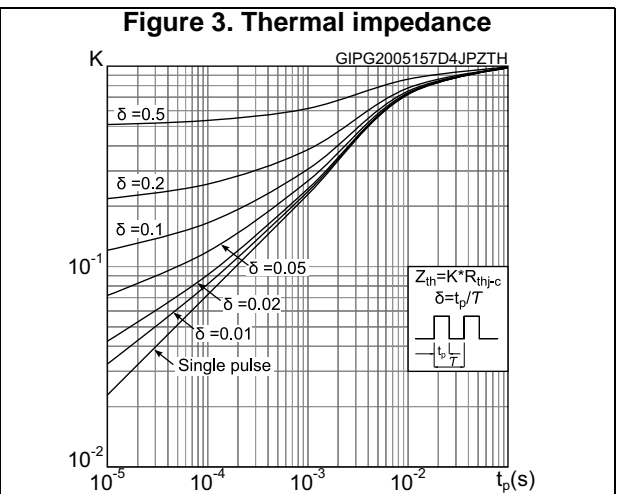
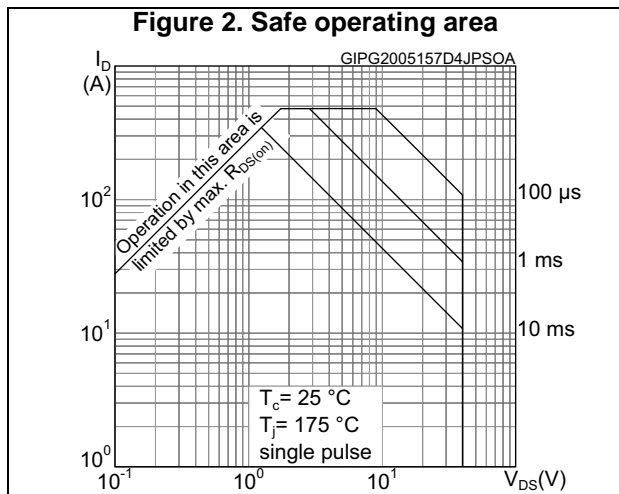
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 20\text{ V}$ , $I_D = 60\text{ A}$ $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13: Switching times test circuit for resistive load</a> and <a href="#">Figure 18: Switching time waveform</a> )	-	64	-	ns
$t_r$	Rise time		-	182	-	
$t_{d(off)}$	Turn-off-delay time		-	240	-	
$t_f$	Fall time		-	130	-	

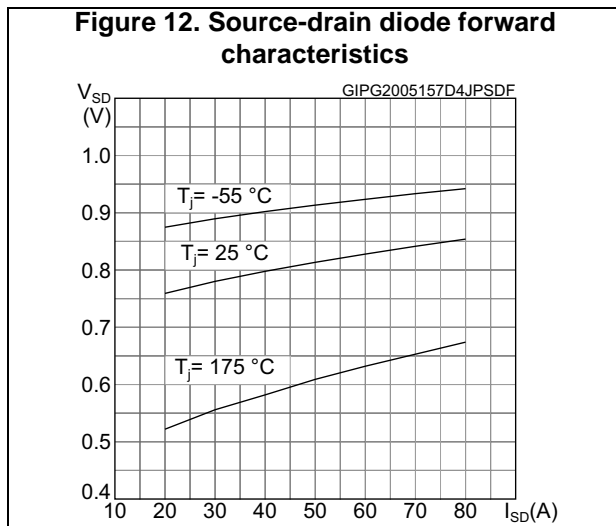
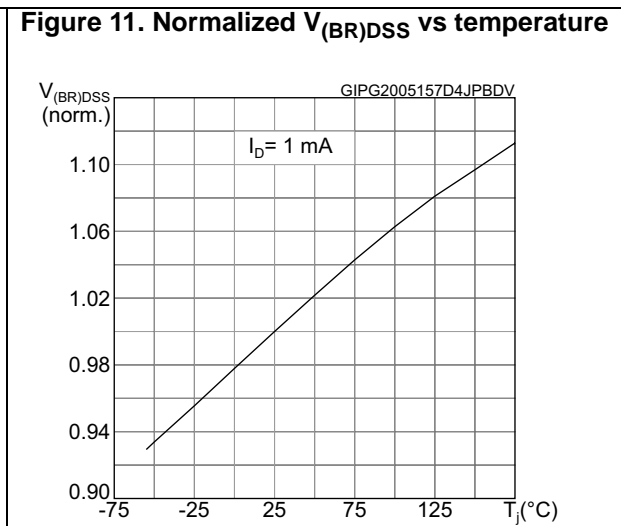
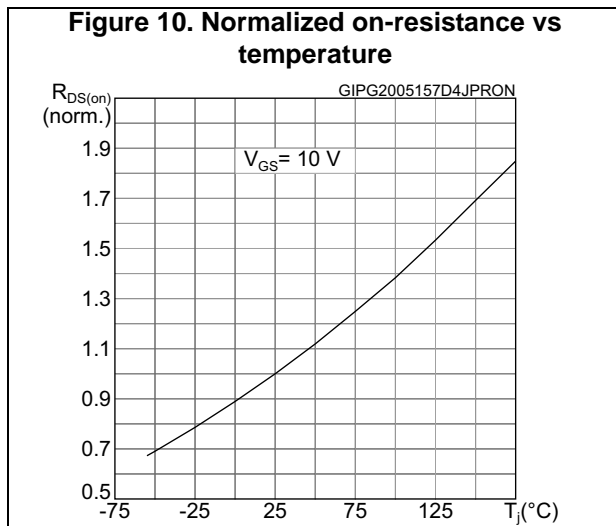
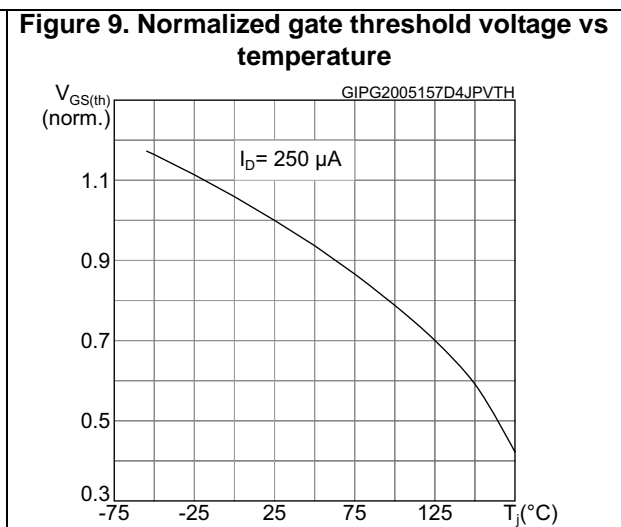
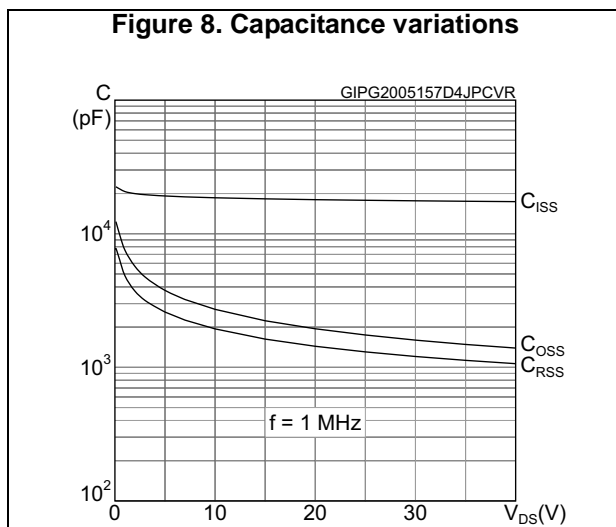
Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}^{(1)}$	Source-drain current		-		120	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		480	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 120 \text{ A}$ , $V_{GS} = 0 \text{ V}$	-		1.3	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 120 \text{ A}$ , $V_{DD} = 32 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s}$ , $T_j = 25 \text{ }^\circ\text{C}$ (see <a href="#">Figure 15: Test circuit for inductive load switching and diode recovery times</a> )	-	44		ns
$Q_{rr}$	Reverse recovery charge		-	47		nC
$I_{RRM}$	Reverse recovery current		-	2.1		A

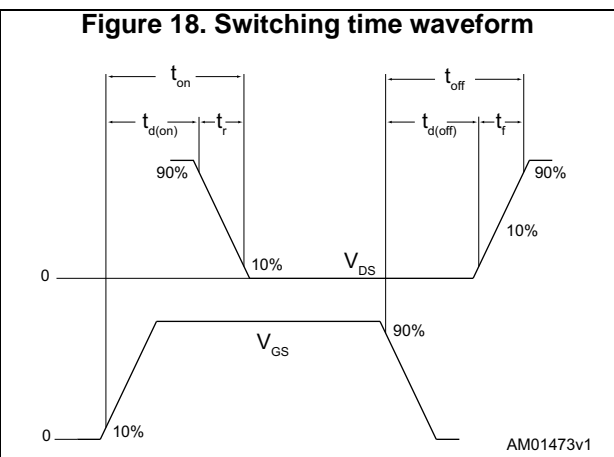
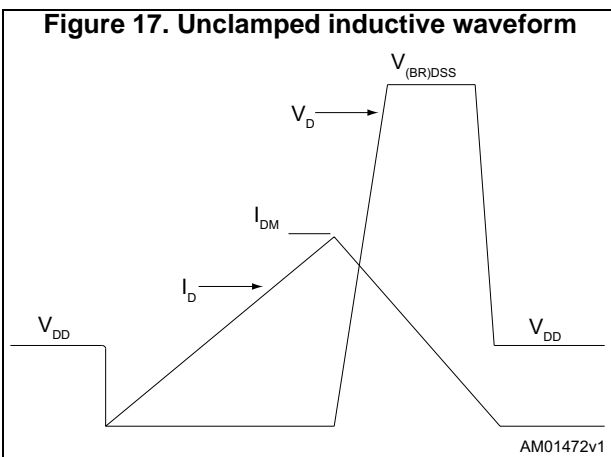
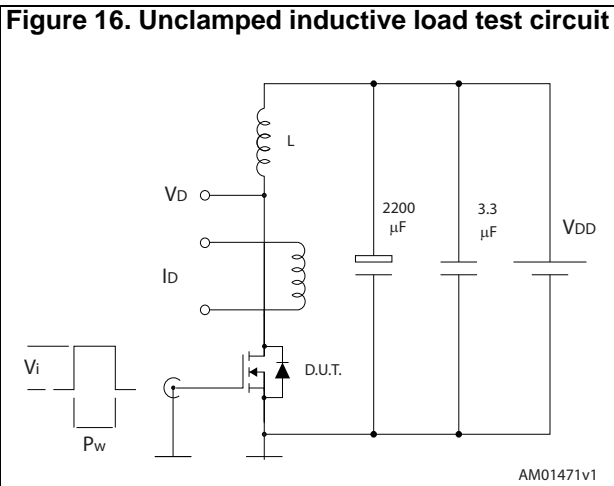
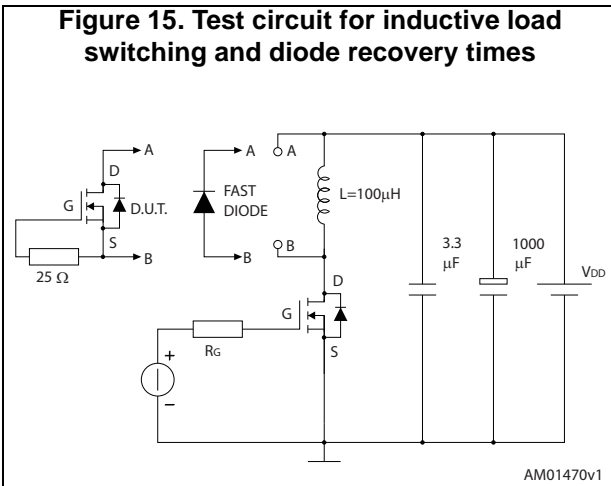
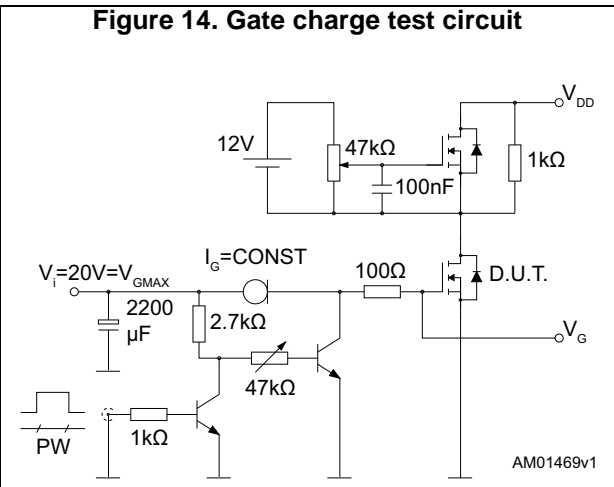
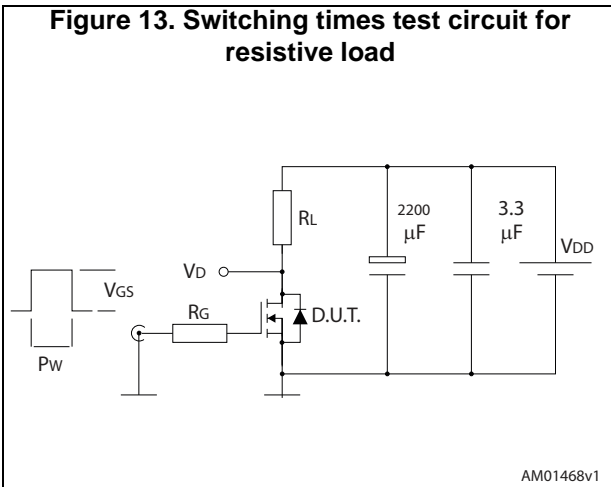
1. Current limited by package
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 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<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

### 4.1 I<sup>2</sup>PAK package information

Figure 19. I<sup>2</sup>PAK (TO-262) package outline

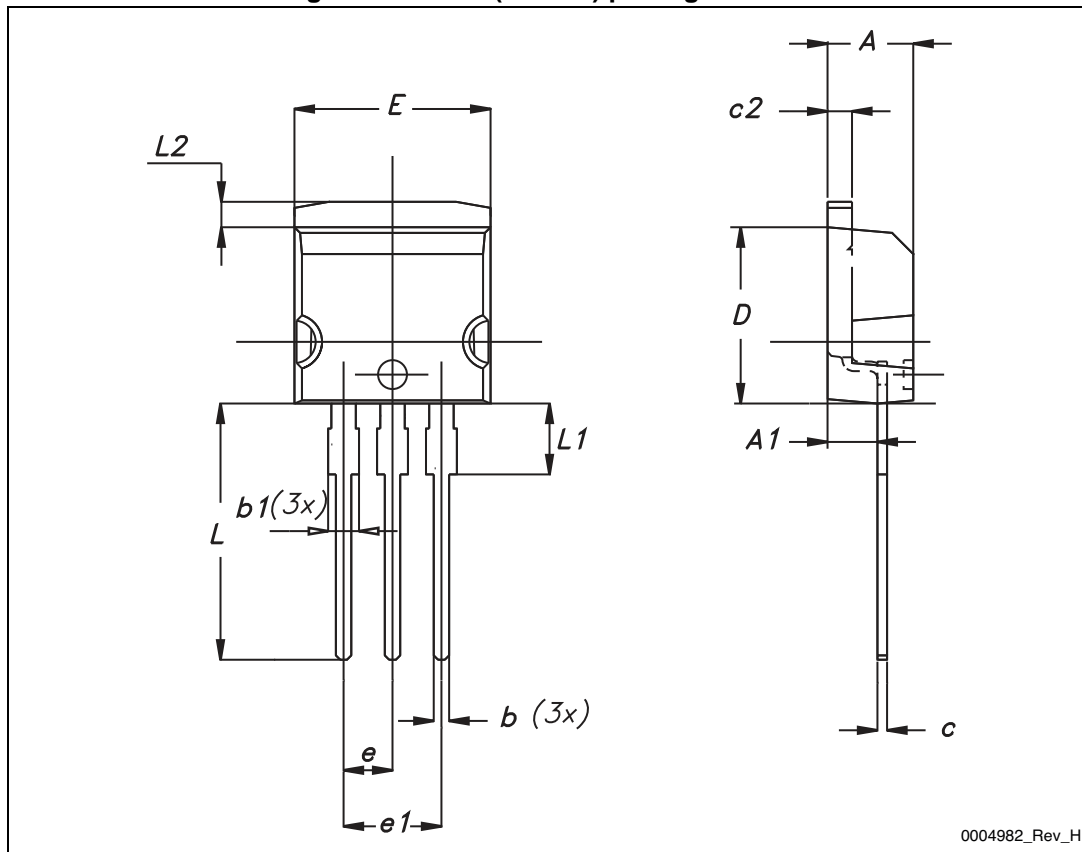
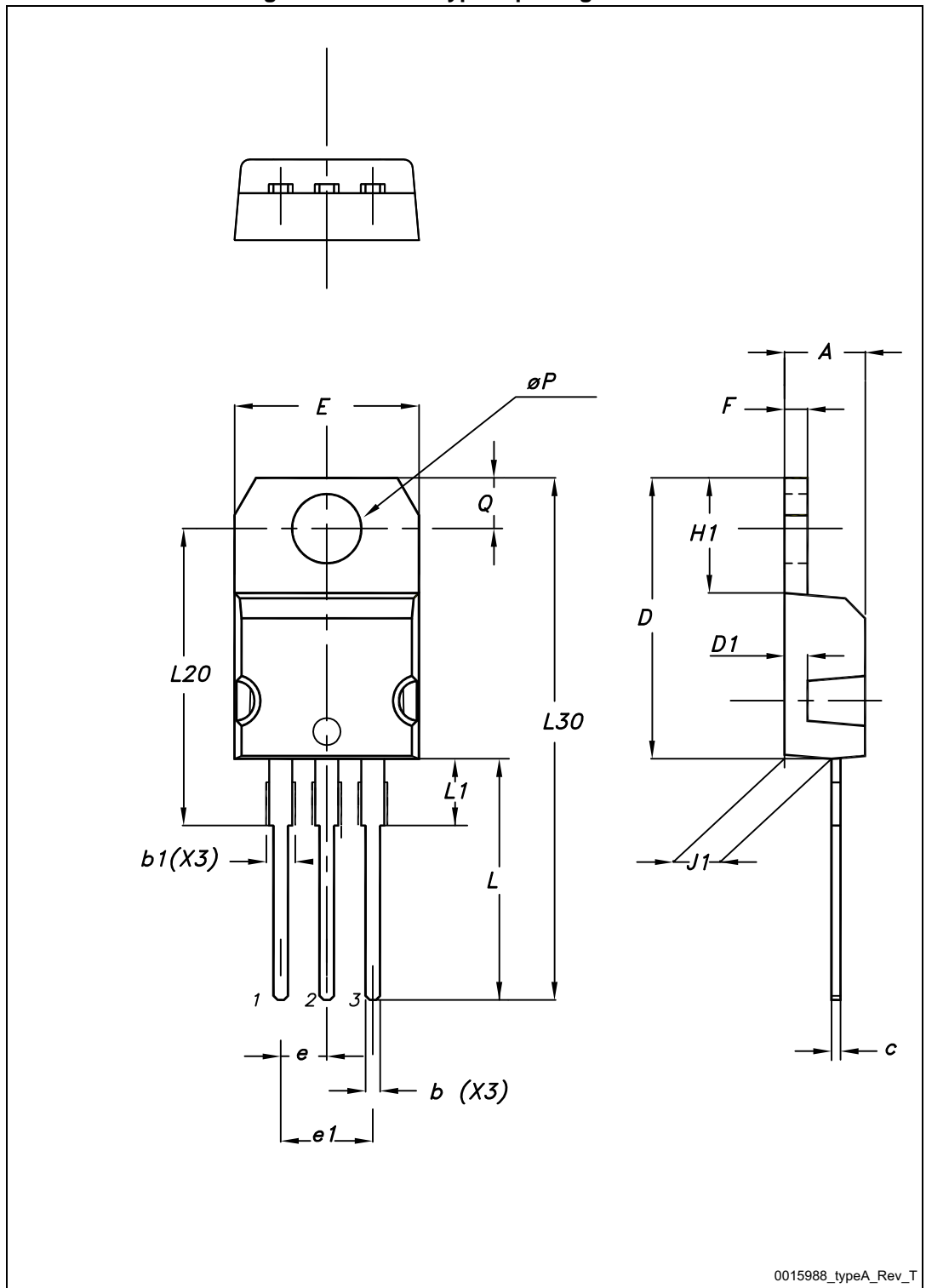


Table 8. I<sup>2</sup>PAK (TO-262) package mechanical data

DIM.	mm.		
	min.	typ	max.
A	4.40		4.60
A1	2.40		2.72
b	0.61		0.88
b1	1.14		1.70
c	0.49		0.70
c2	1.23		1.32
D	8.95		9.35
e	2.40		2.70
e1	4.95		5.15
E	10		10.40
L	13		14
L1	3.50		3.93
L2	1.27		1.40

### 4.2 TO-220 package information

Figure 20. TO-220 type A package outline



0015988\_typeA\_Rev\_T

Table 9. TO-220 type A package 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 10. Document revision history

Date	Revision	Changes
08-Aug-2012	1	First release.
03-Dec-2015	2	Text and formatting changes throughout document Updated <a href="#">Section 1: Electrical ratings</a> Updated <a href="#">Section 2: Electrical characteristics</a> Added: <a href="#">Section 2.1: Electrical characteristics (curves)</a> Added: <a href="#">Section 3: Test circuits</a>

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