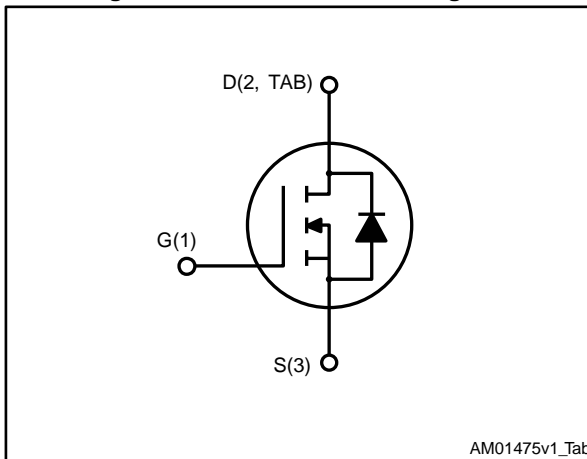


## N-channel 60 V, 4.2 mΩ typ., 80 A STripFET™ F7 Power MOSFET in a DPAK package

Datasheet - production data



Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>	P <sub>TOT</sub>
STD130N6F7	60 V	5.0 mΩ	80 A	134 W

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>rss</sub>/C<sub>iss</sub> ratio for EMI immunity
- High avalanche ruggedness

### Applications

- Switching applications

### Description

This N-channel Power MOSFET utilizes STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1: Device summary

Order code	Marking	Package	Packing
STD130N6F7	130N6F7	DPAK	Tape and reel

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## Contents

<b>1</b>	<b>Electrical ratings .....</b>	<b>3</b>
<b>2</b>	<b>Electrical characteristics .....</b>	<b>4</b>
	2.1 Electrical characteristics (curves).....	5
<b>3</b>	<b>Test circuits .....</b>	<b>7</b>
<b>4</b>	<b>Package information .....</b>	<b>8</b>
	4.1 DPAK package information .....	9
<b>5</b>	<b>Revision history .....</b>	<b>12</b>

# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	±20	V
$I_D^{(1)}$	Drain current (continuous) at $T_{case} = 25\text{ °C}$	80	A
	Drain current (continuous) at $T_{case} = 100\text{ °C}$	80	
$I_{DM}^{(2)}$	Drain current (pulsed)	320	A
$P_{TOT}$	Total dissipation at $T_{case} = 25\text{ °C}$	134	W
$E_{AS}^{(3)}$	Single pulse avalanche energy	200	mJ
$dV/dt^{(4)}$	Drain-body diode dynamic $dV/dt$ ruggedness	5.0	V/ns
$T_{stg}$	Storage temperature range	-55 to 175	°C
$T_j$	Operating junction temperature range		

**Notes:**

- (1) Current is limited by package.  
 (2) Pulse width is limited by safe operating area.  
 (3) starting  $T_j = 25\text{ °C}$ ,  $I_D = 20\text{ A}$ ,  $V_{DD} = 30\text{ V}$ .  
 (4)  $I_{SD} = 80\text{ A}$ ;  $di/dt = 600\text{ A}/\mu\text{s}$ ;  $V_{DD} = 48\text{ V}$ ;  $T_j < T_{jmax}$

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	50	°C/W
$R_{thj-amb}$	Thermal resistance junction-ambient	1.12	

**Notes:**

- (1) When mounted on FR-4 board of 1 inch<sup>2</sup>, 2oz Cu,  $t < 10\text{ sec}$

## 2 Electrical characteristics

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

**Table 4: Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 1\text{ mA}$	60			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 60\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 40\text{ A}$		4.2	5.0	m $\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 30\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	2600	-	pF
$C_{oss}$	Output capacitance		-	1200	-	
$C_{rss}$	Reverse transfer capacitance		-	115	-	
$Q_g$	Total gate charge	$V_{DD} = 30\text{ V}$ , $I_D = 80\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	42	-	nC
$Q_{gs}$	Gate-source charge		-	13.6	-	
$Q_{gd}$	Gate-drain charge		-	13	-	

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$ , $I_D = 40\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13: "Test circuit for resistive load switching times"</a> and <a href="#">Figure 18: "Switching time waveform"</a> )	-	24	-	ns
$t_r$	Rise time		-	44	-	
$t_{d(off)}$	Turn-off delay time		-	62	-	
$t_f$	Fall time		-	24	-	

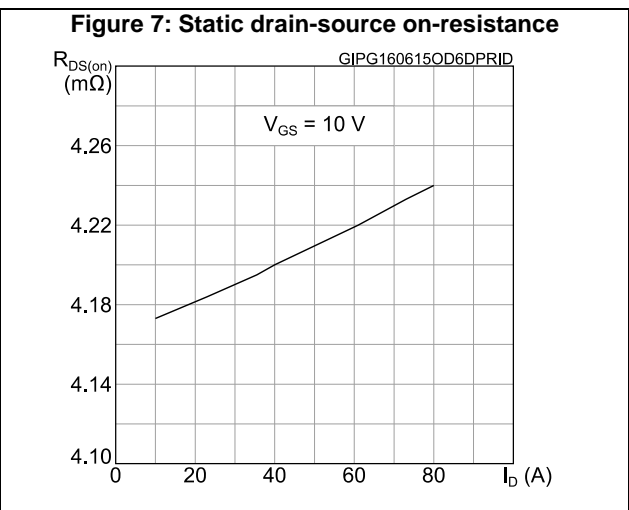
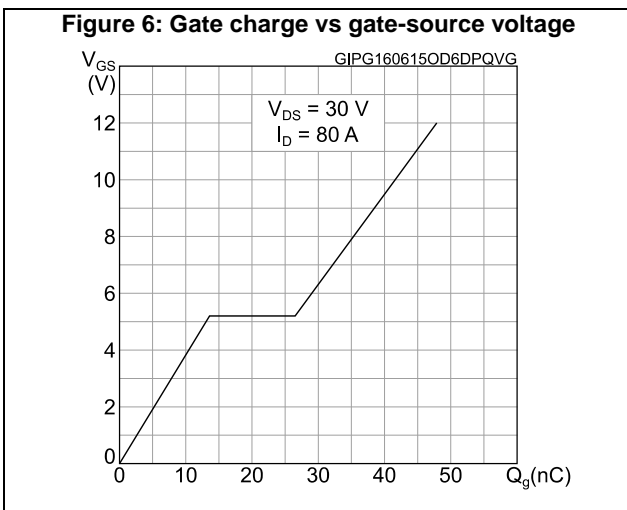
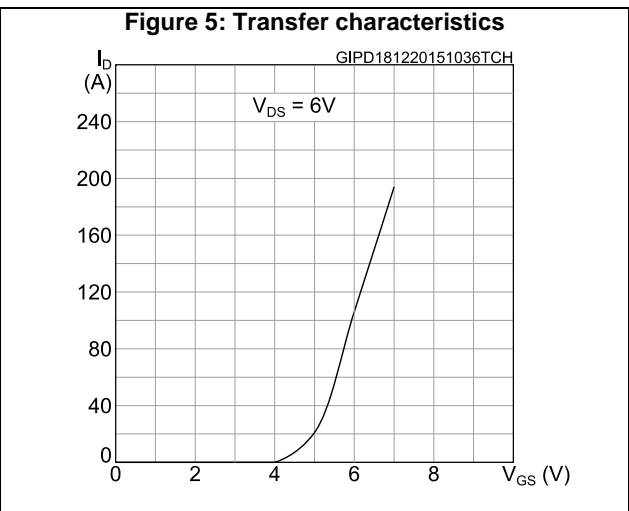
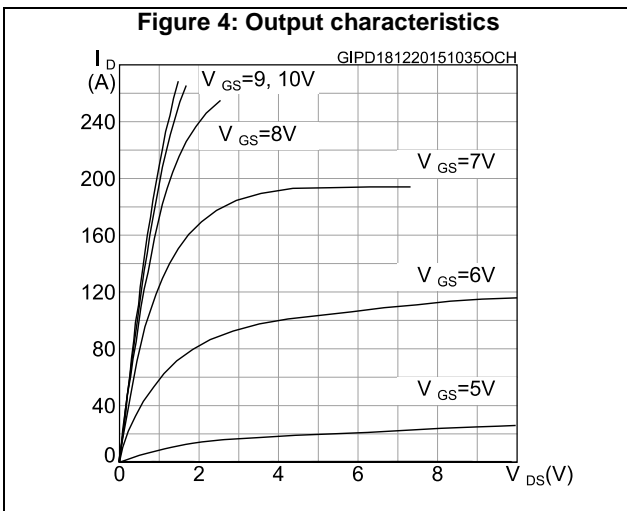
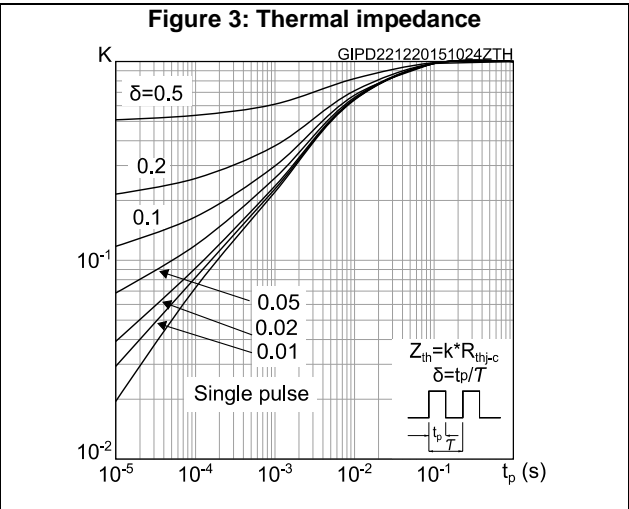
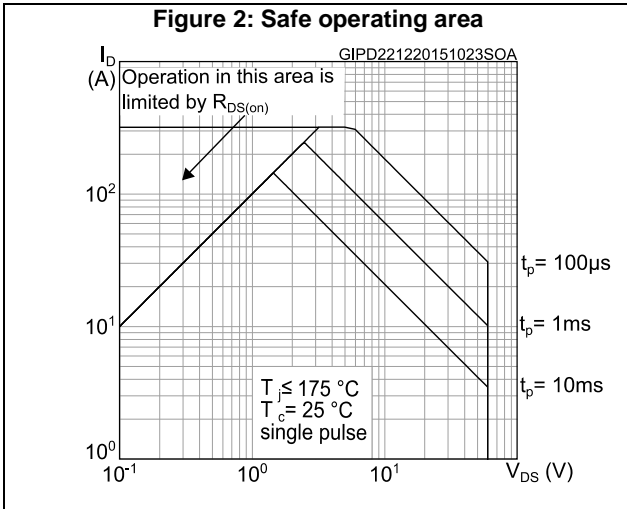
**Table 7: Source-drain diode**

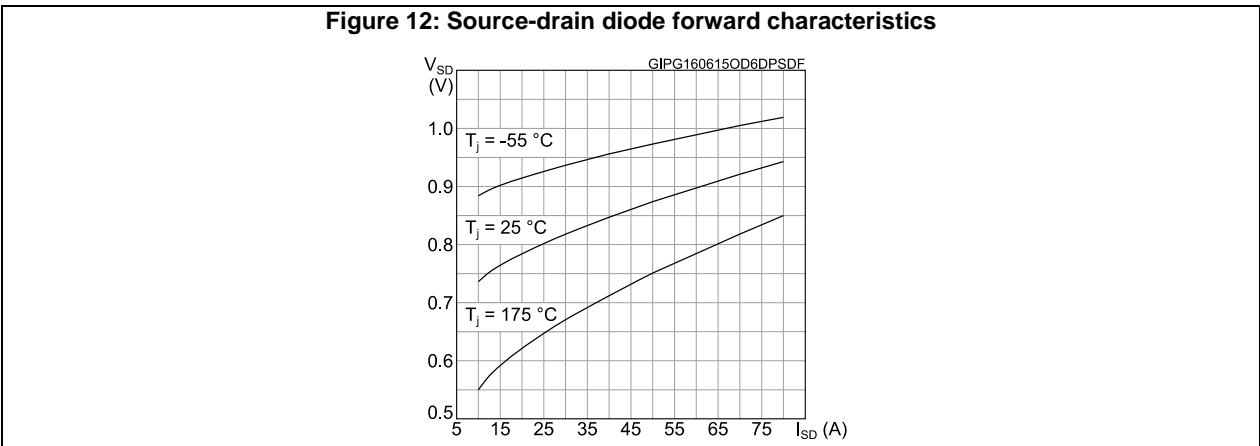
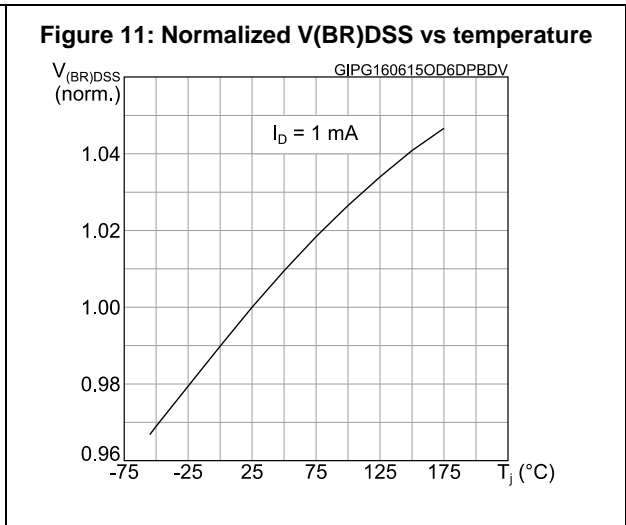
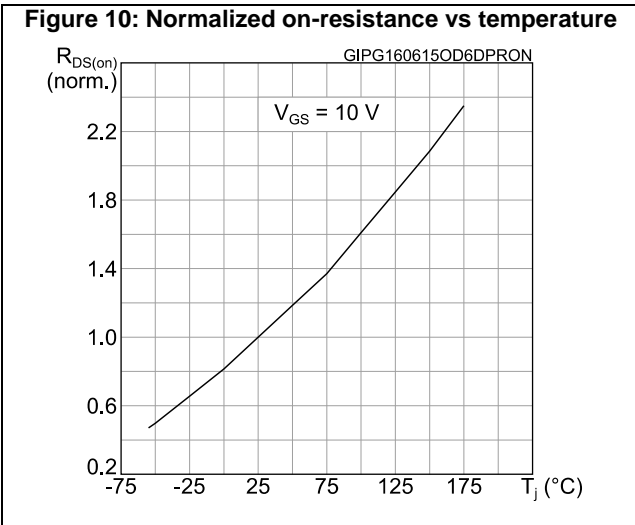
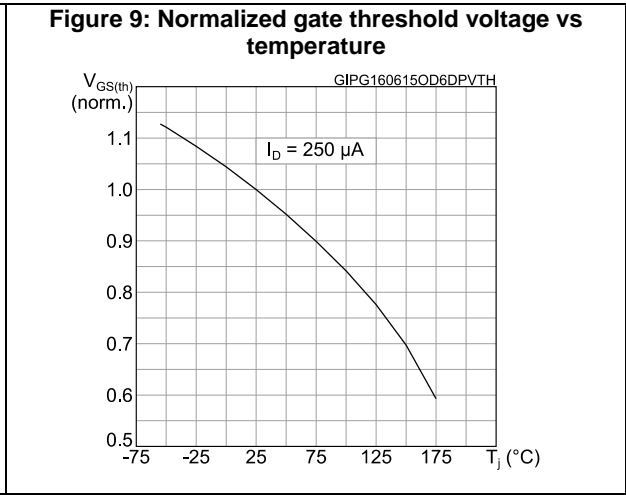
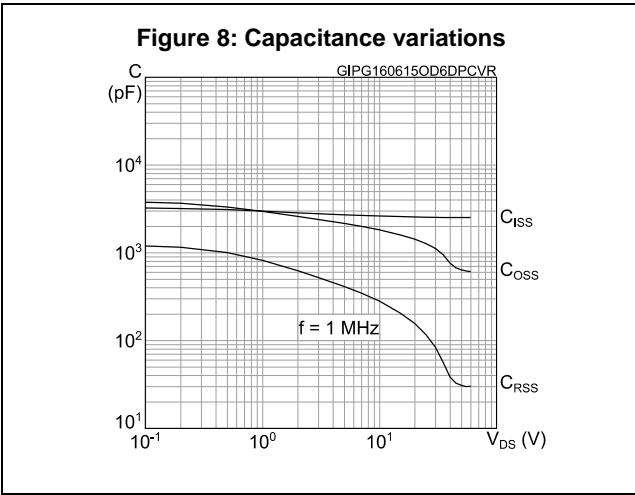
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$V_{GS} = 0\text{ V}$ , $I_{SD} = 80\text{ A}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 80\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 48\text{ V}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	50		ns
$Q_{rr}$	Reverse recovery charge		-	56		nC
$I_{RRM}$	Reverse recovery current		-	2.2		A

**Notes:**

(1) Pulse test: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

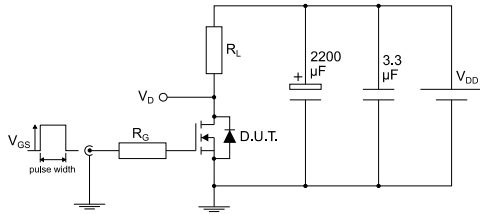
## 2.1 Electrical characteristics (curves)





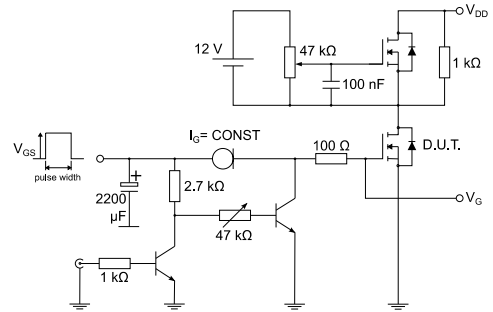
### 3 Test circuits

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



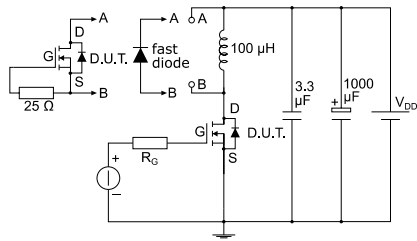
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**Figure 14: Test circuit for gate charge behavior**



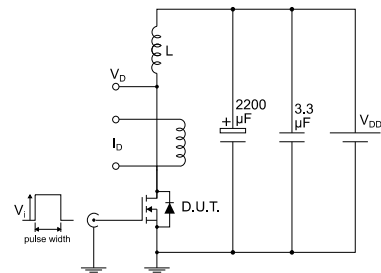
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



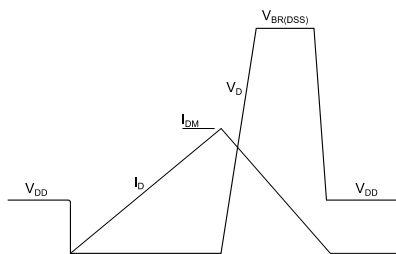
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**Figure 16: Unclamped inductive load test circuit**



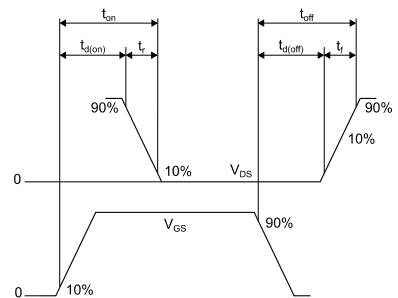
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**Figure 17: Unclamped inductive waveform**



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 DPAK package information

Figure 19: DPAK (TO-252) type A2 package outline

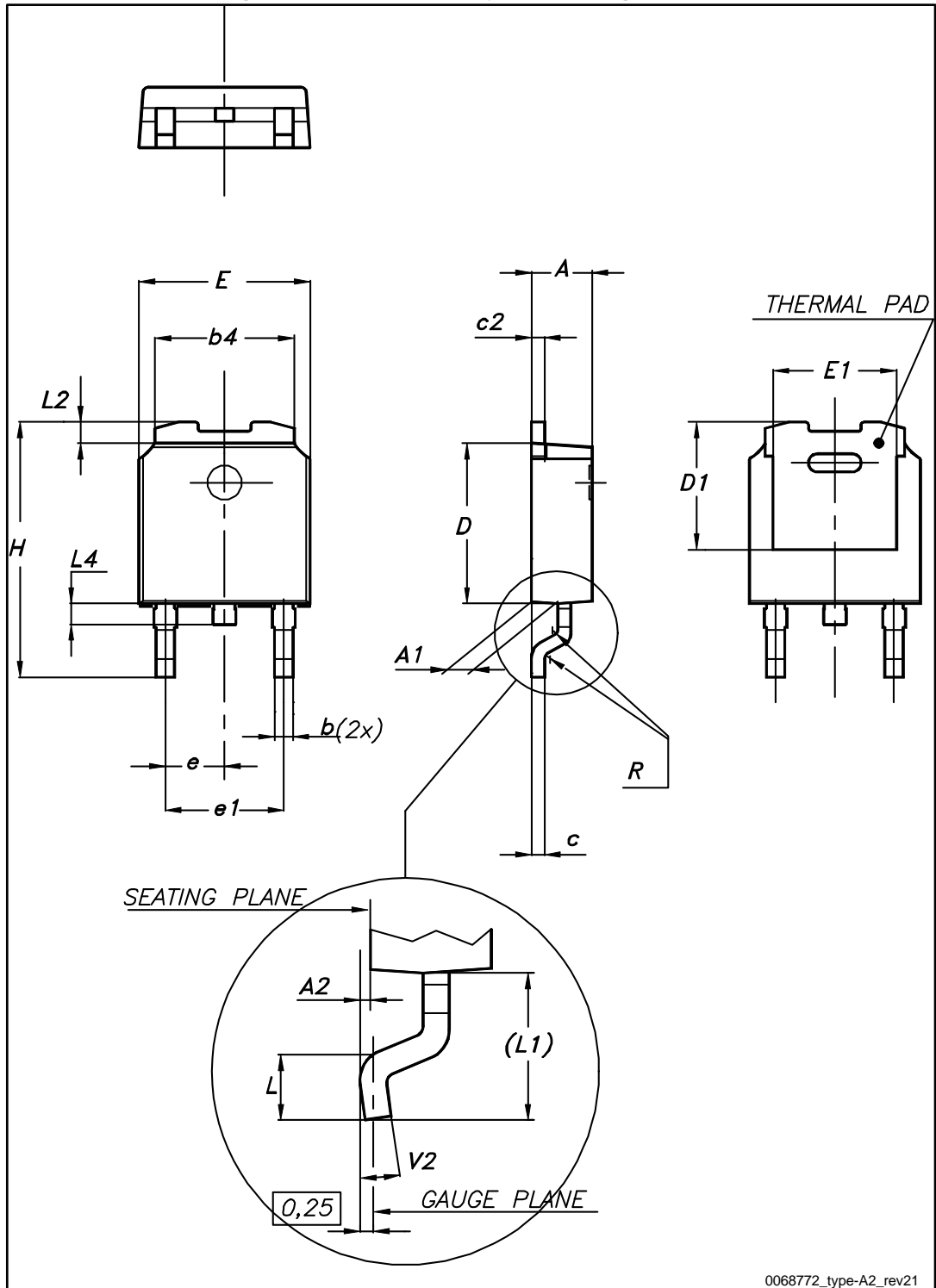
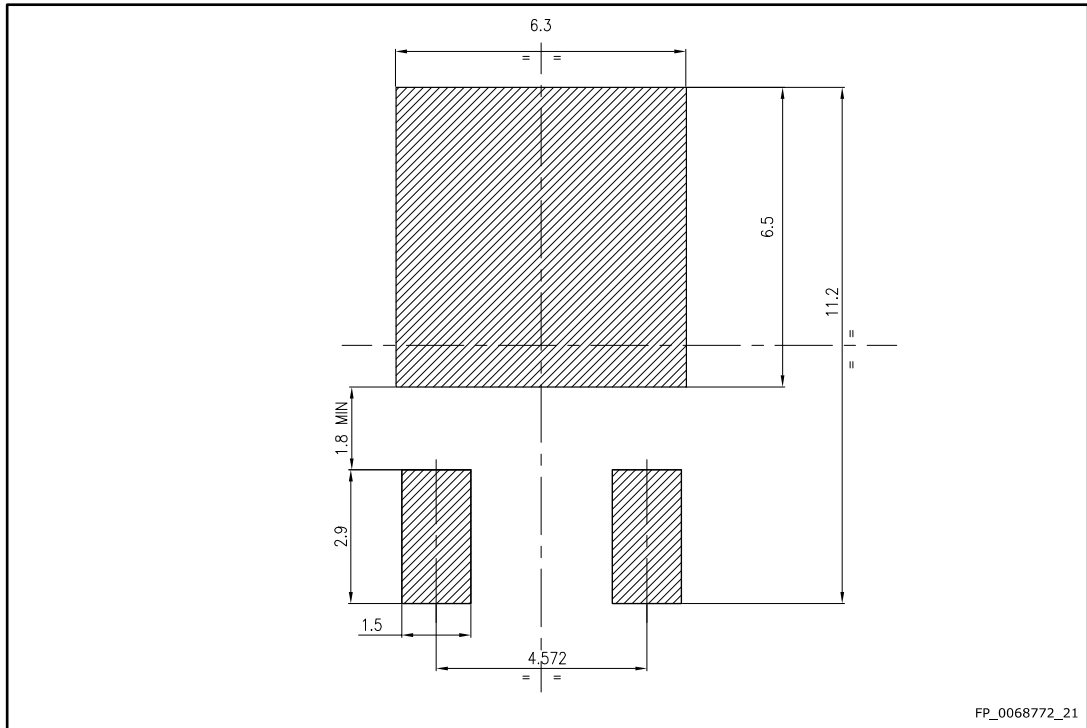


Table 8: DPAK (TO-252) type A2 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1	4.95	5.10	5.25
E	6.40		6.60
E1	5.10	5.20	5.30
e	2.16	2.28	2.40
e1	4.40		4.60
H	9.35		10.10
L	1.00		1.50
L1	2.60	2.80	3.00
L2	0.65	0.80	0.95
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 20: DPAK (TO-252) type A2 recommended footprint (dimensions are in mm)



## 5 Revision history

**Table 9: Document revision history**

Date	Revision	Changes
17-Dec-2015	1	First release.
10-Oct-2016	2	Document status changed from preliminary to production data. Minor text changes.

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