

## N-channel 60 V, 0.0046 $\Omega$ typ., 90 A STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data

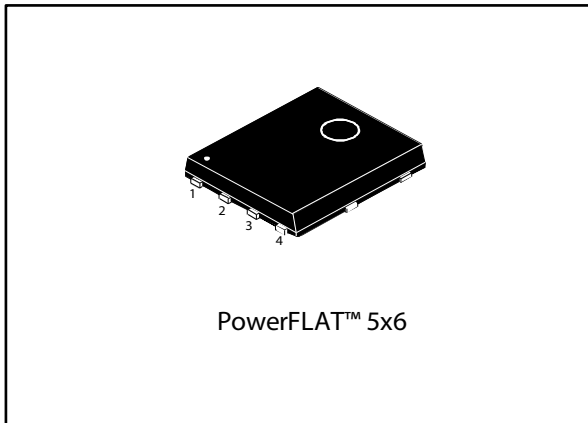
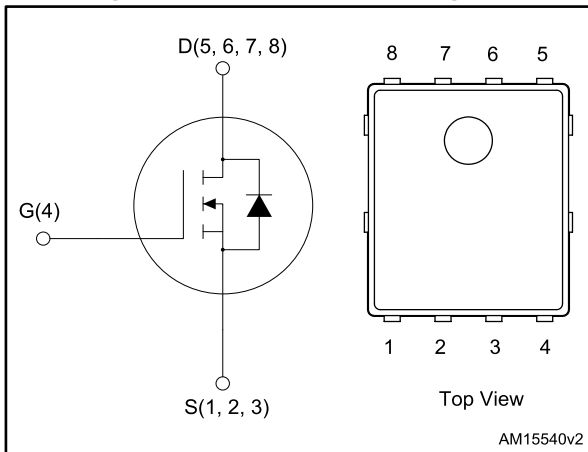


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STL90N6F7	60 V	0.0054 $\Omega$	90 A

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent figure of merit (FoM)
- 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
STL90N6F7	90N6F7	PowerFLAT™ 5x6	Tape and reel

---

# Contents

- 1 Electrical ratings ..... 3**
- 2 Electrical characteristics ..... 4**
  - 2.1 Electrical characteristics..... 5
- 3 Test circuits ..... 7**
- 4 Package information ..... 8**
  - 4.1 PowerFLAT™ 5X6 package information ..... 8
  - 4.2 PowerFLAT™ 5x6 packing information..... 10
- 5 Revision history ..... 12**



# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	90	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	66	A
$I_{DM}^{(1)(2)}$	Drain current (pulsed)	360	A
$I_D^{(3)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	21	A
$I_D^{(3)}$	Drain current (continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	15	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	84	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	94	W
$P_{TOT}^{(3)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	4.8	W
$T_{stg}$	Storage temperature	-55 to 175	$^\circ\text{C}$
$T_j$	Max. operating junction temperature	175	$^\circ\text{C}$

**Notes:**

- (1) This value is rated according to  $R_{thj-c}$   
 (2) Pulse width limited by safe operating area  
 (3) This value is rated according to  $R_{thj-pcb}$

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max.	31.3	$^\circ\text{C}/\text{W}$
$R_{thj-case}$	Thermal resistance junction-case max.	1.6	$^\circ\text{C}/\text{W}$

**Notes:**

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

## 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	$I_D = 1\text{ mA}$ , $V_{GS} = 0\text{ V}$	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	$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$			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	$V_{GS} = 10\text{ V}$ , $I_D = 10.5\text{ A}$		0.0046	0.0054	$\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	1600	-	pF
$C_{oss}$	Output capacitance		-	880	-	pF
$C_{rss}$	Reverse transfer capacitance		-	66	-	pF
$Q_g$	Total gate charge	$V_{DD} = 30\text{ V}$ , $I_D = 21\text{ A}$ , $V_{GS} = 10\text{ V}$	-	25	-	nC
$Q_{gs}$	Gate-source charge		-	7.2	-	nC
$Q_{gd}$	Gate-drain charge		-	8.1	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$ , $I_D = 10.5\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$	-	15	-	ns
$t_r$	Rise time		-	17.6	-	ns
$t_{d(off)}$	Turn-off delay time		-	24.4	-	ns
$t_f$	Fall time		-	7.8	-	ns

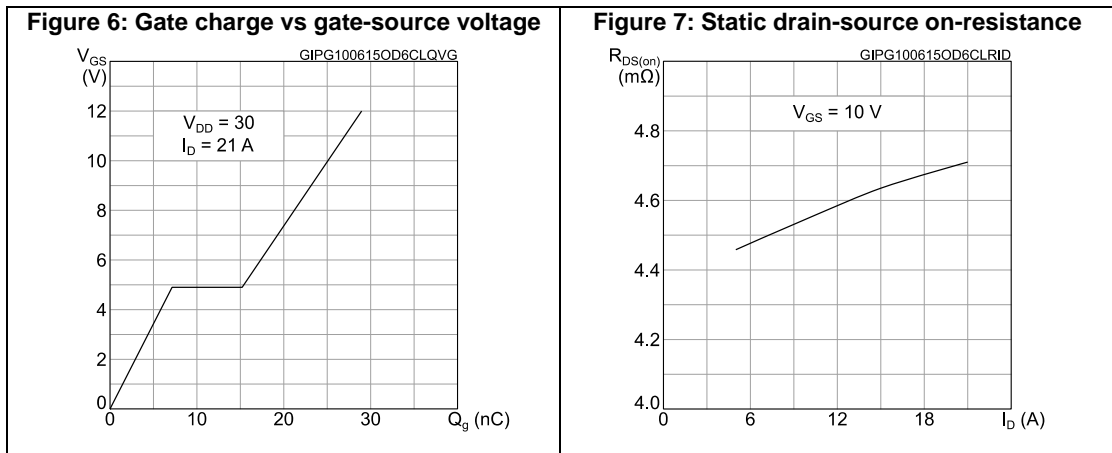
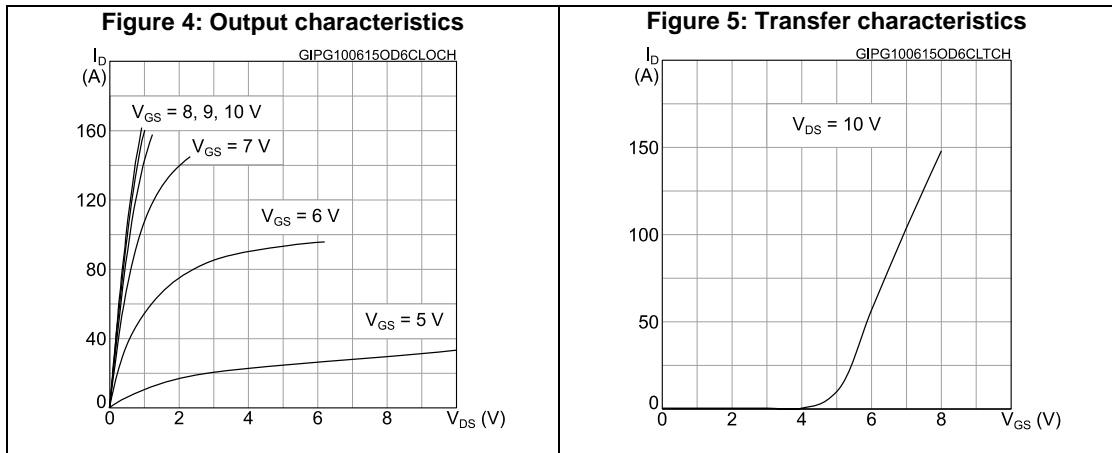
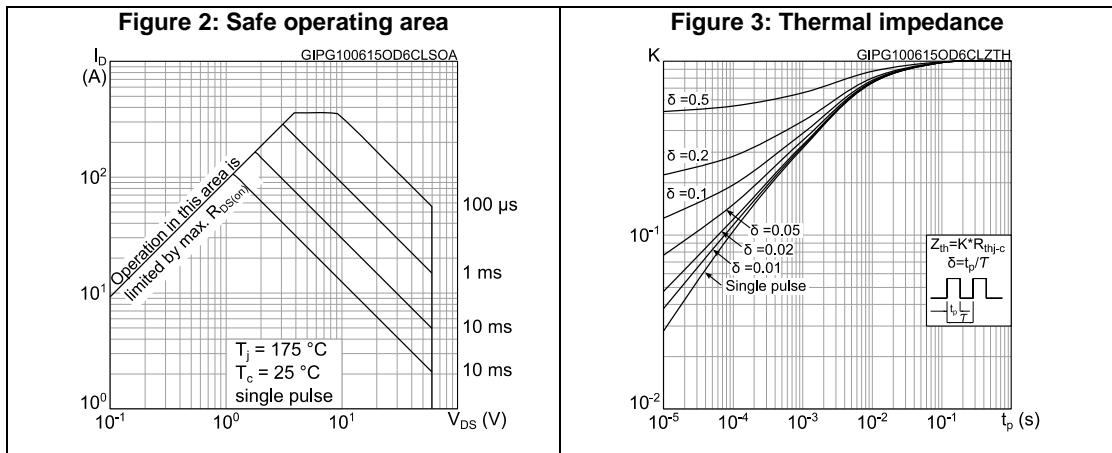
**Table 7: Source-drain diode**

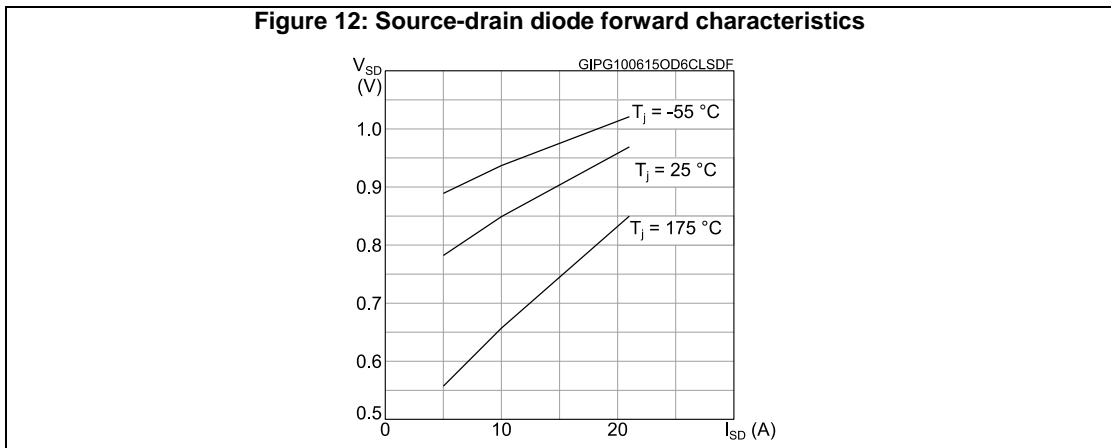
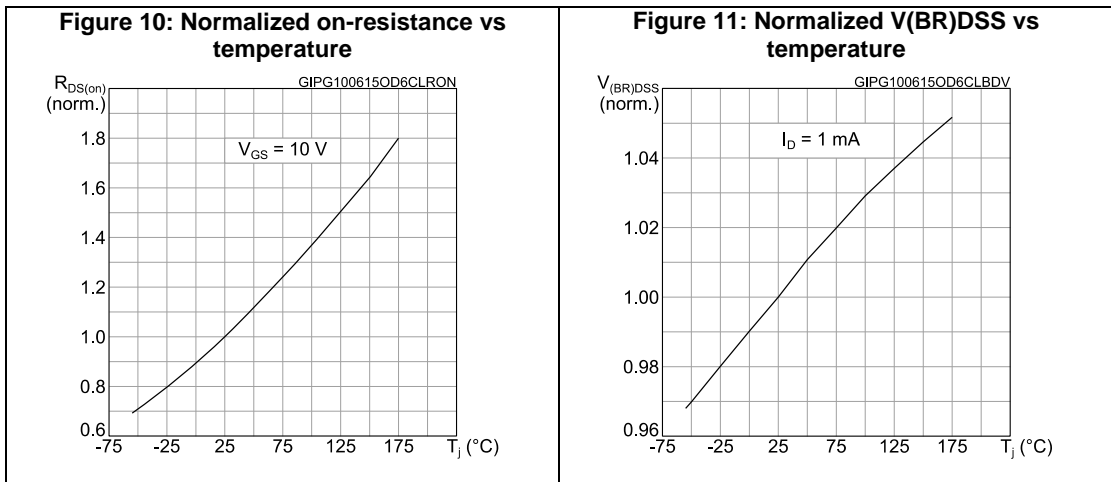
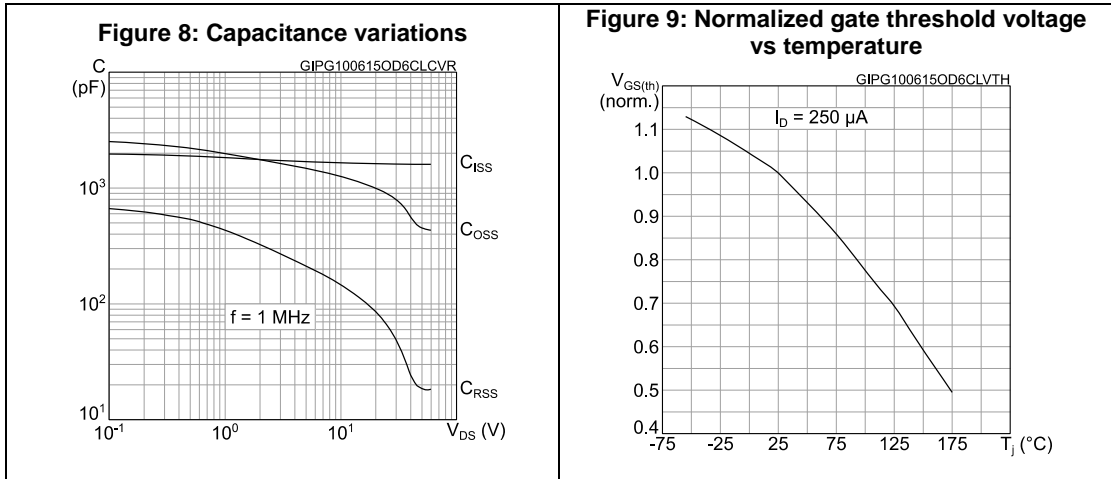
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 21\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_D = 21\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 48\text{ V}$	-	39.6		ns
$Q_{rr}$	Reverse recovery charge		-	36		nC
$I_{RRM}$	Reverse recovery current		-	1.8		A

**Notes:**

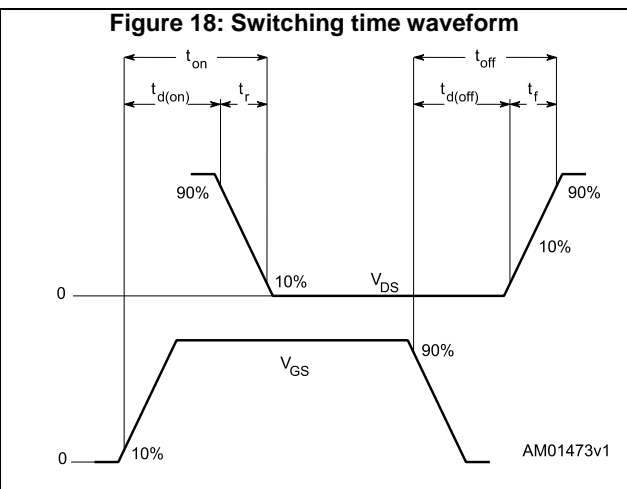
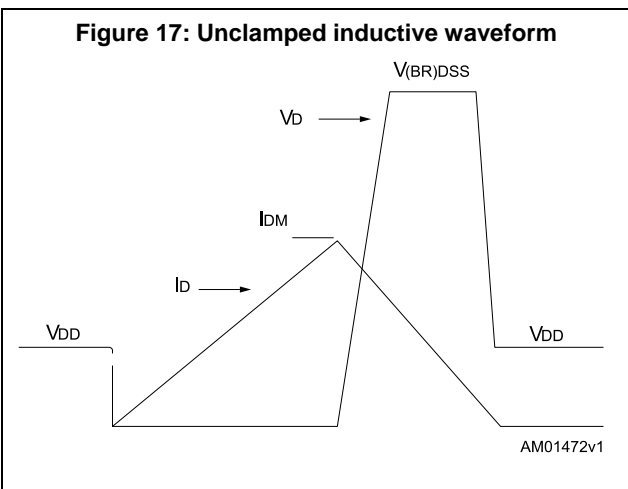
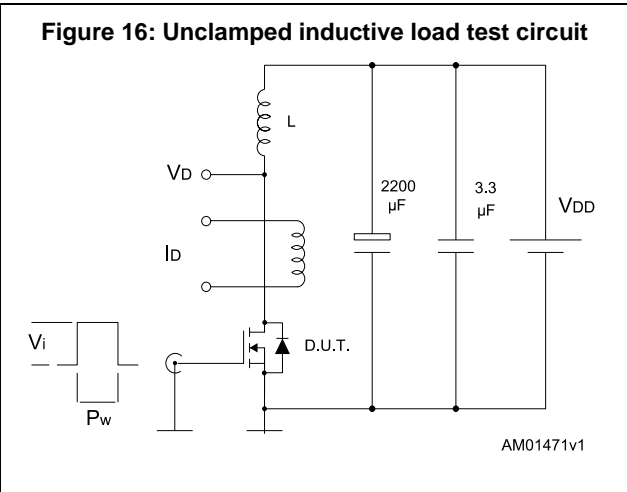
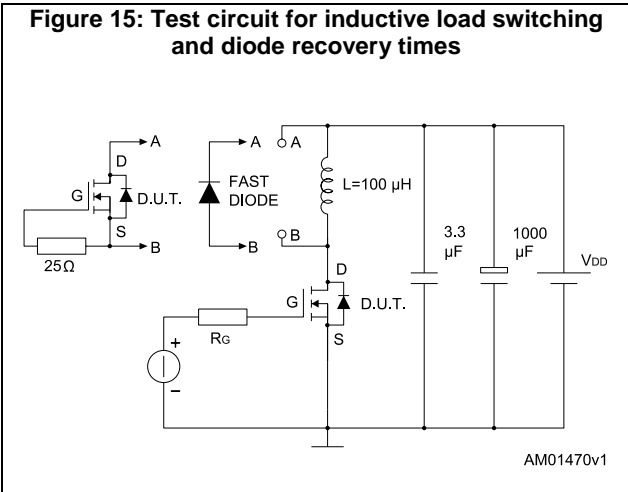
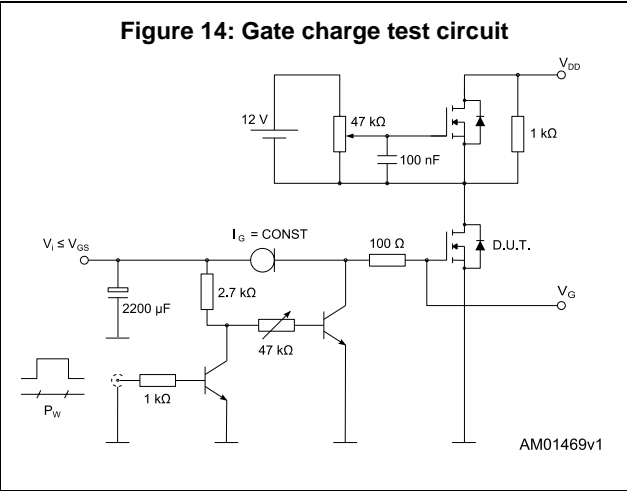
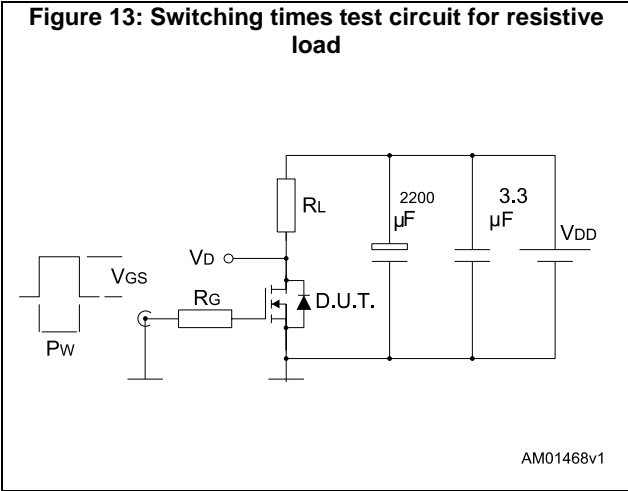
<sup>(1)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics





### 3 Test circuits



## 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 PowerFLAT™ 5X6 package information

Figure 19: PowerFLAT™ 5x6 type R package outline

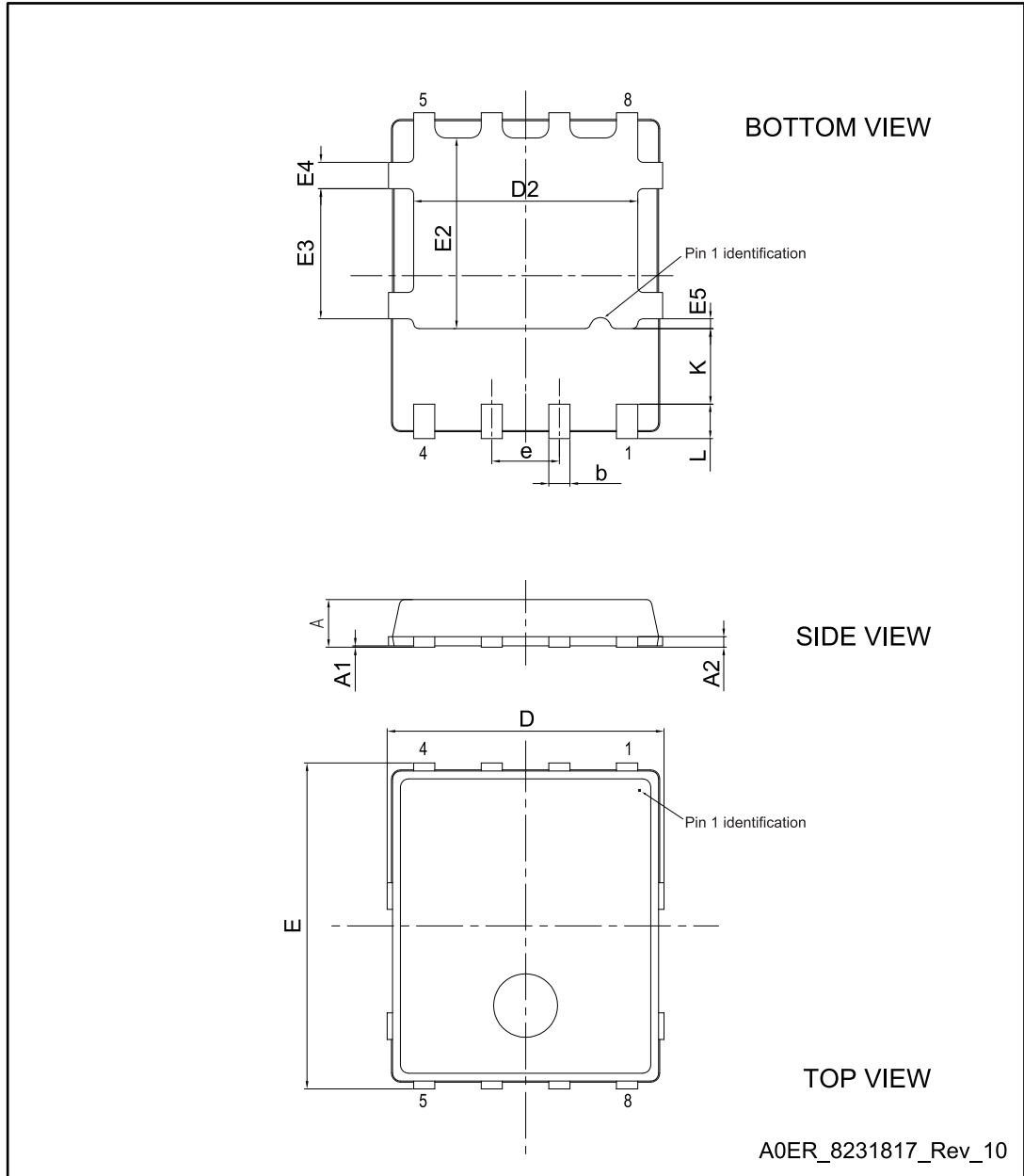
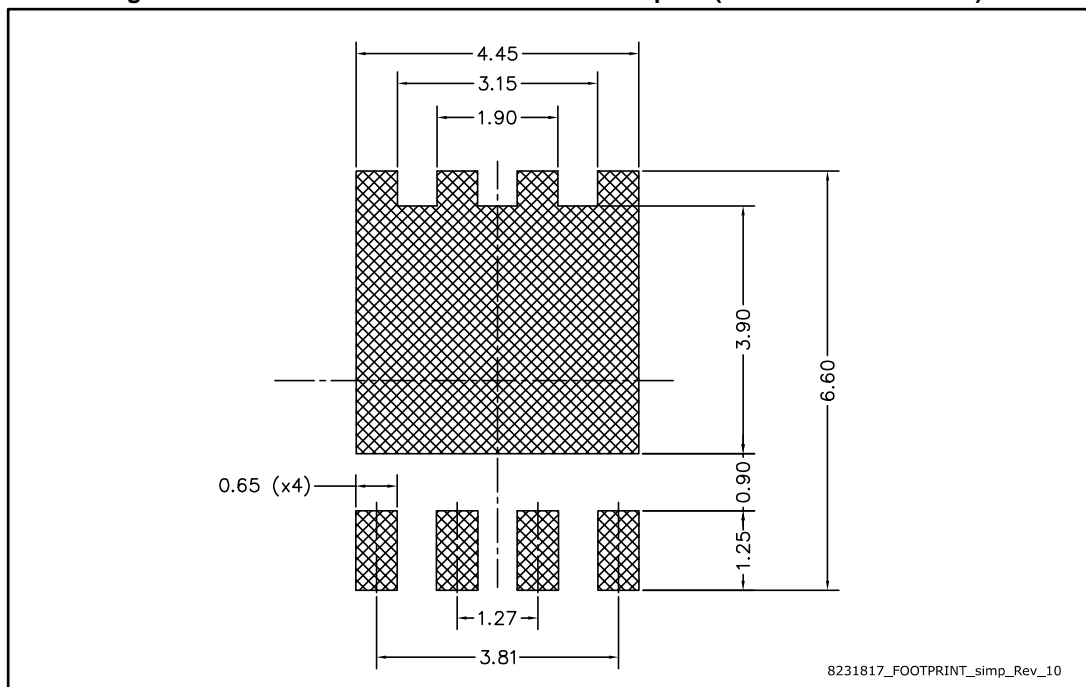




Table 8: PowerFLAT™ 5x6 type R mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D	5.00	5.20	5.40
E	5.95	6.15	6.35
D2	4.11		4.31
e		1.27	
L	0.60		0.80
K	1.275		1.575
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28

Figure 20: PowerFLAT™ 5x6 recommended footprint (dimensions are in mm)



### 4.2 PowerFLAT™ 5x6 packing information

Figure 21: PowerFLAT™ 5x6 tape outline (dimensions are in mm)

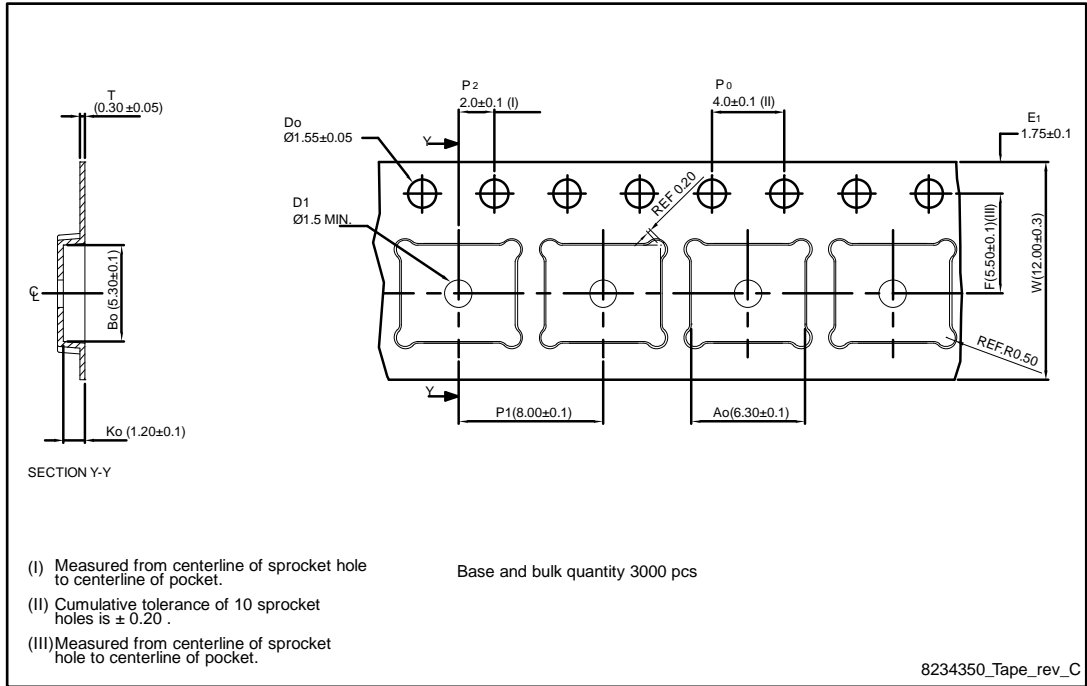


Figure 22: PowerFLAT™ 5x6 package orientation in carrier tape

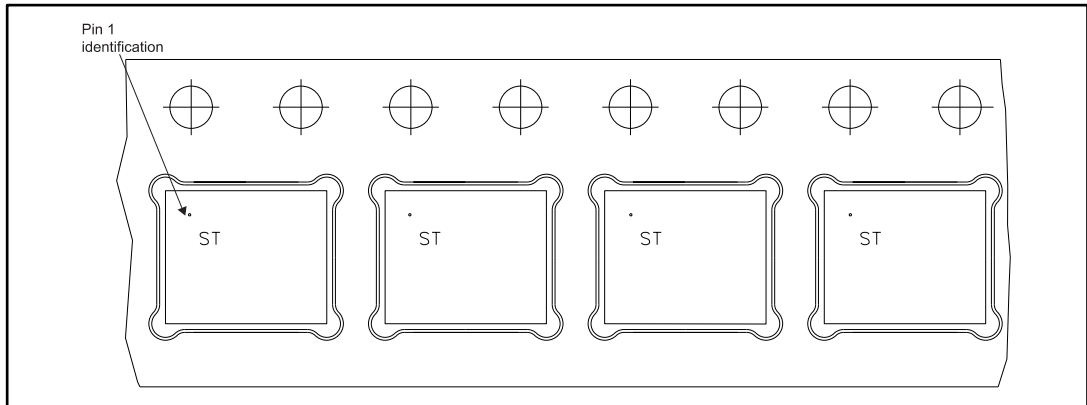
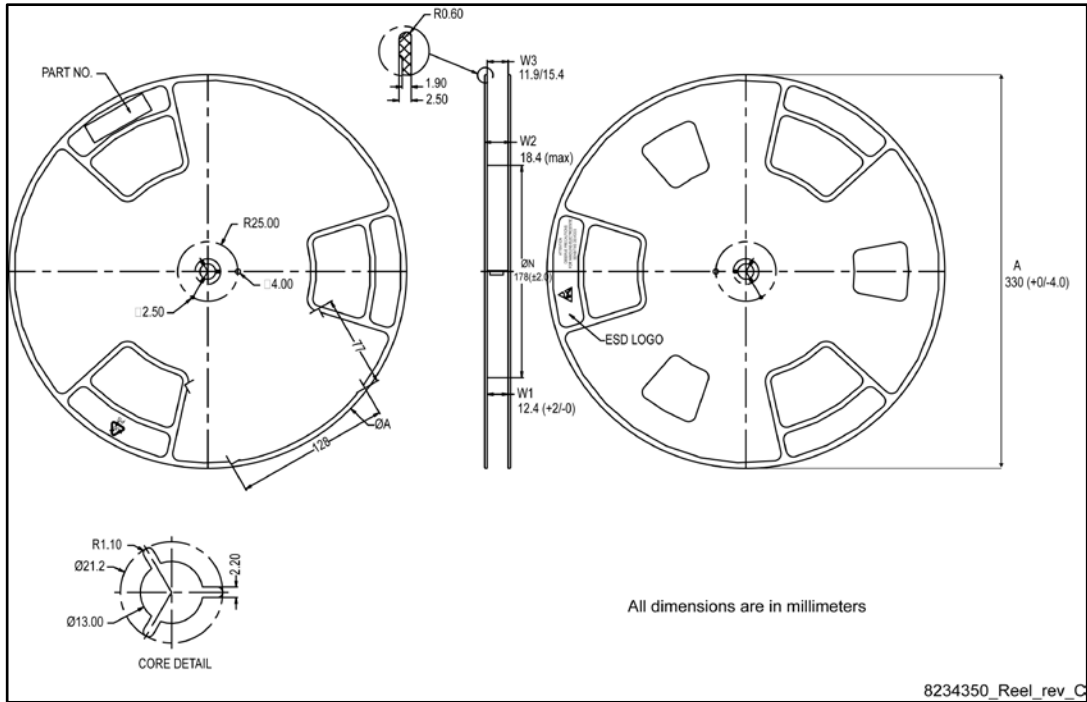


Figure 23: PowerFLAT™ 5x6 reel outline



## 5 Revision history

**Table 9: Document revision history**

Date	Revision	Changes
03-Mar-2015	1	First release.
10-Jun-2015	2	In Section 2 Electrical characteristics: - updated Table 5: Dynamic - updated Table 6: Switching times - updated Table 7: Source-drain diode Added Section 2.1 Electrical characteristics (curves)

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STL90N6F7](#)