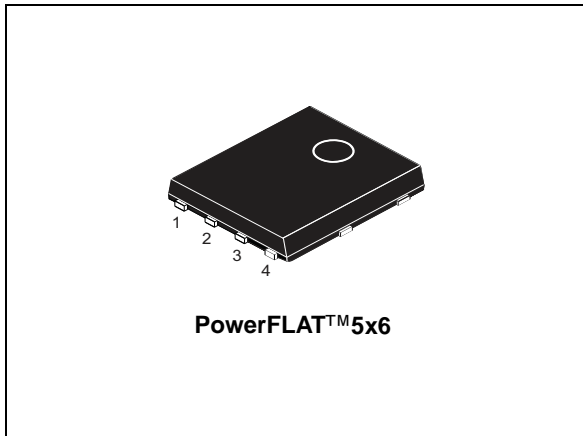


## N-channel 30 V, 0.0027 $\Omega$ typ., 120 A STripFET™ H7 Power MOSFET plus monolithic Schottky in a PowerFLAT™ 5x6

Datasheet - production data



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STL110NS3LLH7	30 V	0.0034 $\Omega$	120 A

- Very low on-resistance
- Very low Q<sub>g</sub>
- High avalanche ruggedness
- Embedded Schottky diode

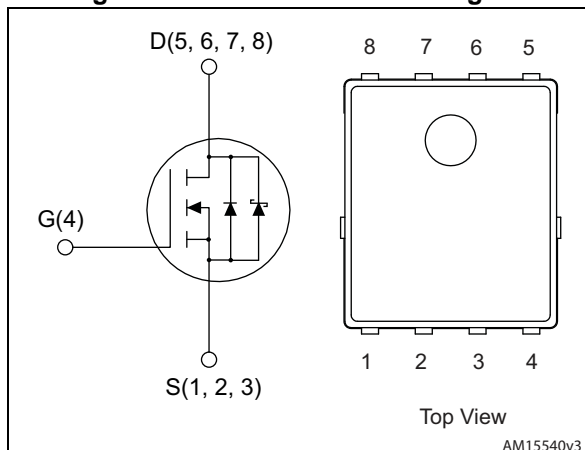
### Applications

- Switching applications

### Description

This device exhibits low on-state resistance and capacitance for improved conduction and switching performance.

**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packing
STL110NS3LLH7	110NS3LL	PowerFLAT™ 5x6	Tape and reel

# 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) .....	6
<b>3</b>	<b>Test circuits</b> .....	<b>8</b>
<b>4</b>	<b>Package information</b> .....	<b>9</b>
4.1	PowerFLAT™ 5x6 type C package information .....	9
4.2	Packing information .....	11
<b>5</b>	<b>Revision history</b> .....	<b>13</b>



# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	30	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous)	120	A
	Drain current (continuous) at $T_C = 100\text{ °C}$	75	
$I_{DM}^{(1)(2)}$	Drain current (pulsed)	480	A
$I_D^{(3)}$	Drain current (continuous)	28	A
	Drain current (continuous) at $T_{pcb} = 100\text{ °C}$	17.5	
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	112	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ °C}$	$75^{(1)}$	W
	Total dissipation at $T_{pcb} = 25\text{ °C}$	$4^{(3)}$	
$T_{stg}$	Storage temperature	-55 to 150	°C
$T_j$	Operating junction temperature		

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	°C/W
$R_{thj-case}$	Thermal resistance junction-case max	1.65	°C/W

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. Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$ , $V_{GS} = 0\text{ V}$	30			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ $V_{DS} = 24\text{ V}$			500	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 1\text{ mA}$	1.2		2.3	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 14\text{ A}$		0.0027	0.0034	$\Omega$
		$V_{GS} = 4.5\text{ V}$ , $I_D = 14\text{ A}$		0.004	0.005	$\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	2110	-	pF
$C_{oss}$	Output capacitance		-	640	-	pF
$C_{riss}$	Reverse transfer capacitance		-	42	-	pF
$Q_g$	Total gate charge	$V_{DD} = 15\text{ V}$ , $I_D = 28\text{ A}$ , $V_{GS} = 4.5\text{ V}$ (see <a href="#">Figure 11</a> )	-	13.7	-	nC
$Q_{gs}$	Gate-source charge		-	7.5	-	nC
$Q_{gd}$	Gate-drain charge		-	3.3	-	nC

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}$ , $I_D = 14\text{ A}$ , $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$	-	26.4	-	ns
$t_r$	Rise time		-	10.4	-	ns
$t_{d(off)}$	Turn-off delay time		-	31.8	-	ns
$t_f$	Fall time		-	12.5	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 2 \text{ A}$ , $V_{GS} = 0 \text{ V}$	-	0.4	0.7	V
$t_{rr}$	Reverse recovery time	$I_D = 2 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 20 \text{ V}$	-	35.2		ns
$Q_{rr}$	Reverse recovery charge		-	26.4		nC
$I_{RRM}$	Reverse recovery current		-	1.5		A

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

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

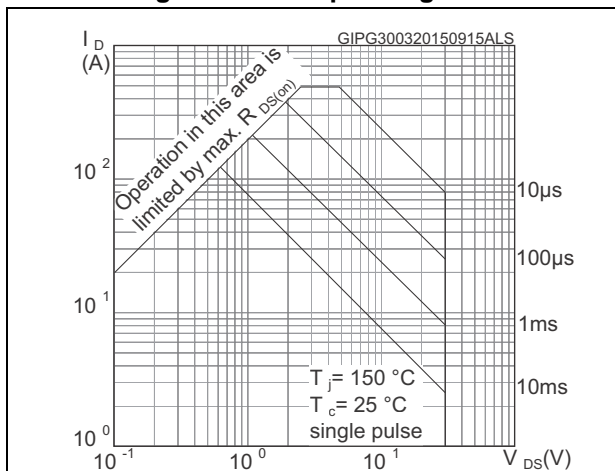


Figure 3. Thermal impedance

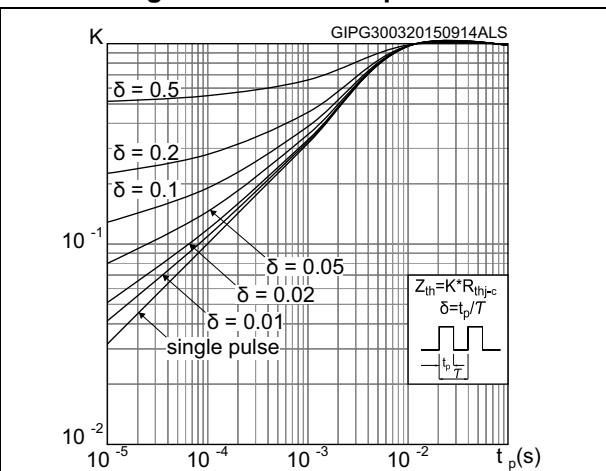


Figure 4. Output characteristics

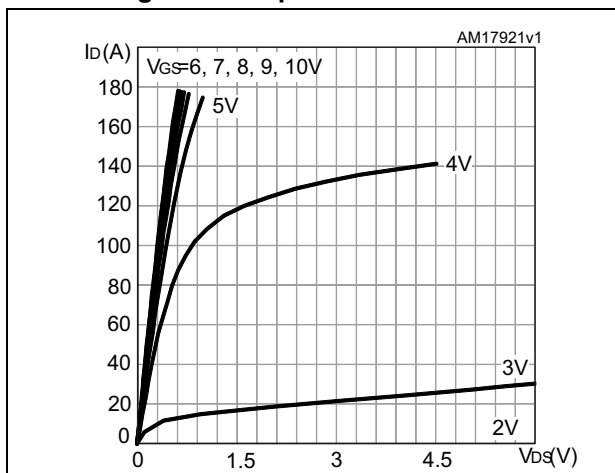


Figure 5. Transfer characteristics

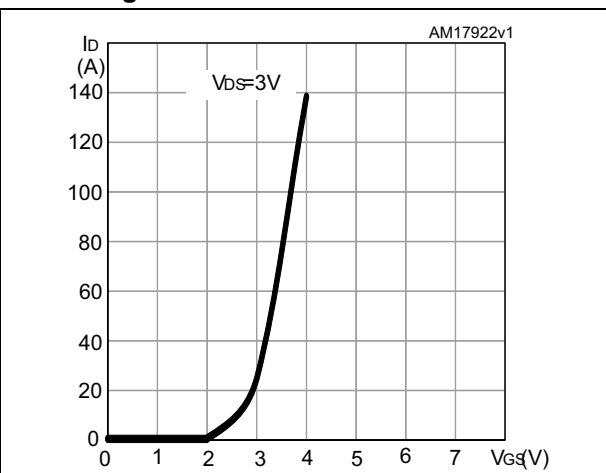


Figure 6. Gate charge vs gate-source voltage

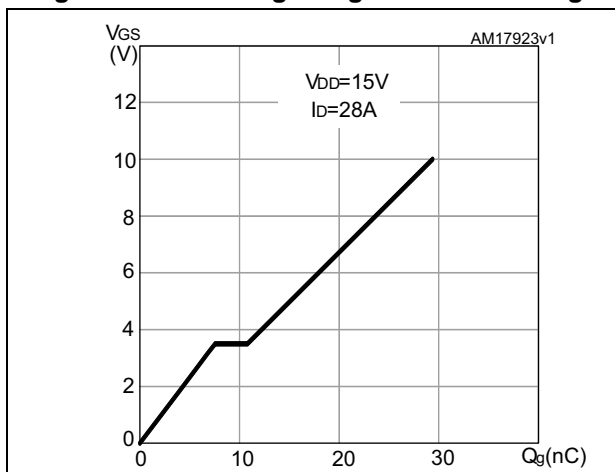


Figure 7. Static drain-source on-resistance

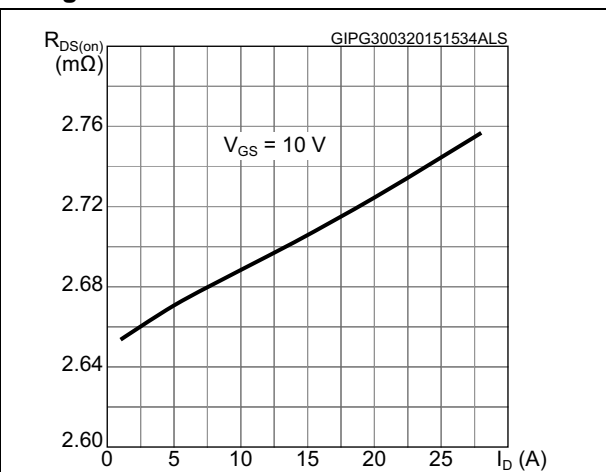


Figure 8. Capacitance variations

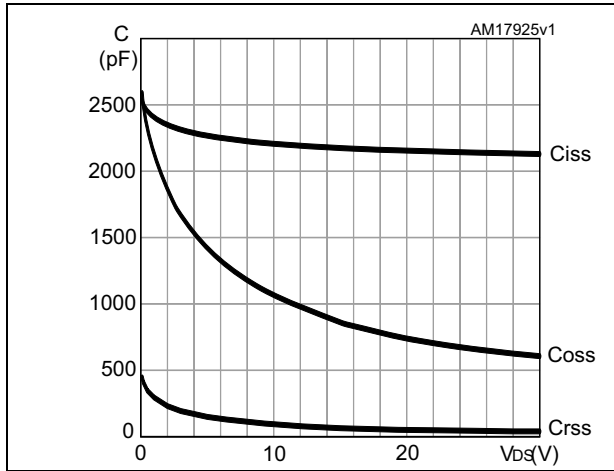
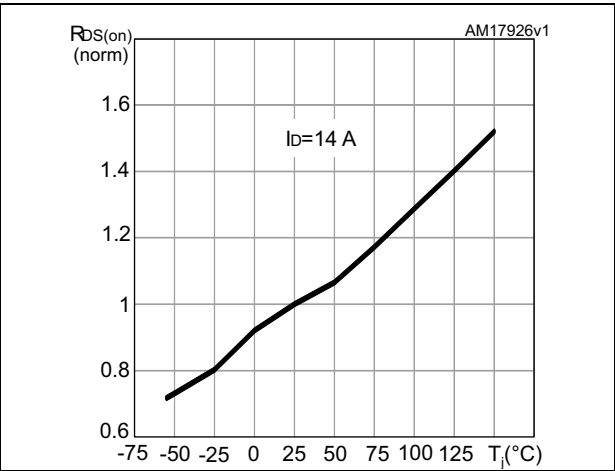
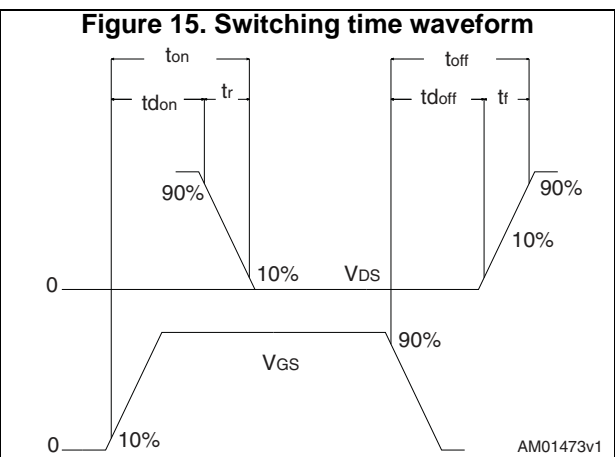
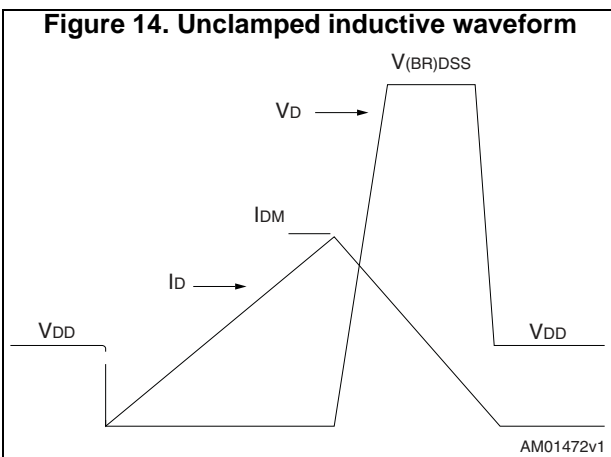
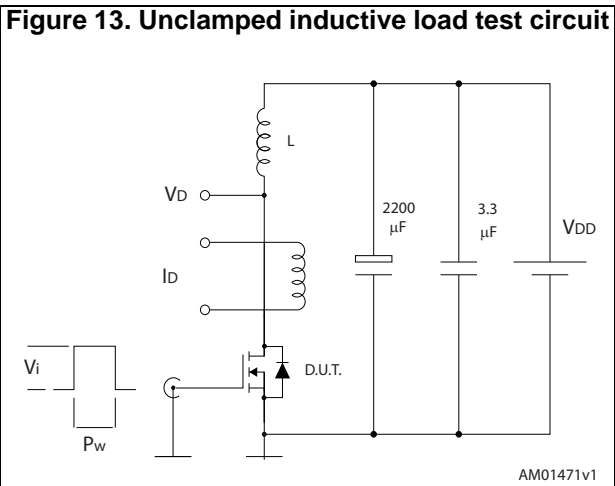
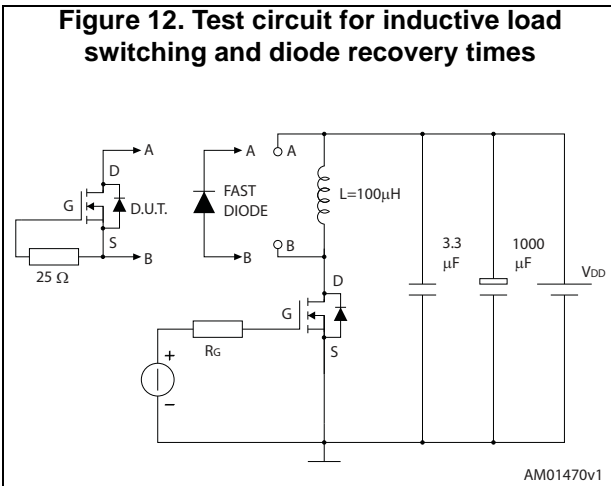
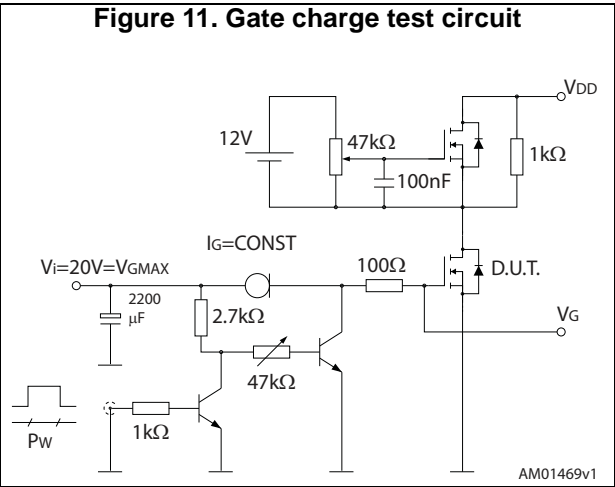
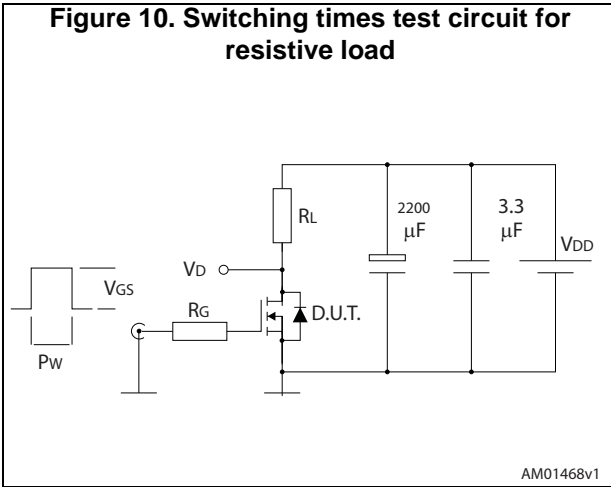


Figure 9. Normalized on-resistance vs temperature



### 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 type C package information

Figure 16. PowerFLAT™ 5x6 type C outline

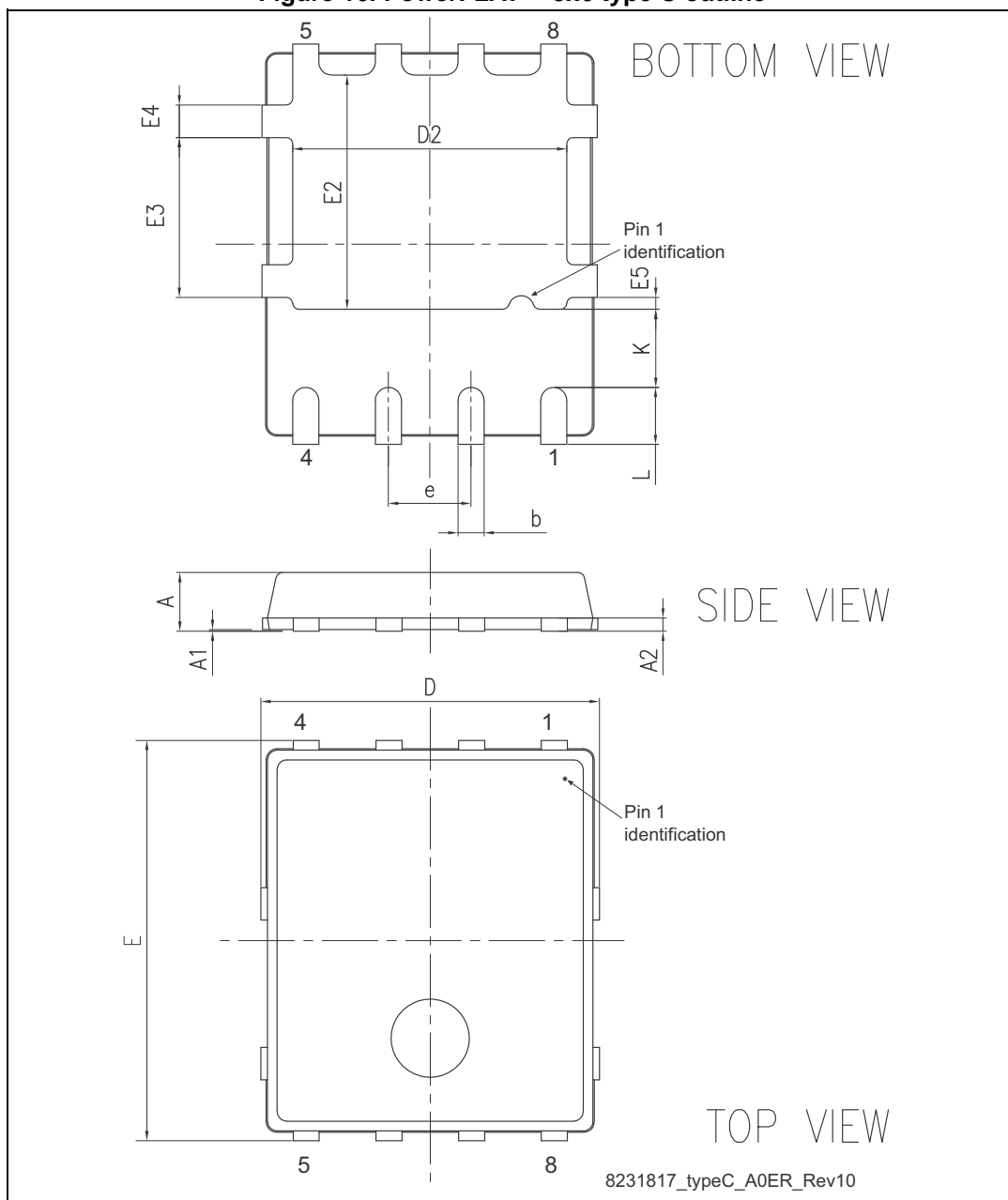
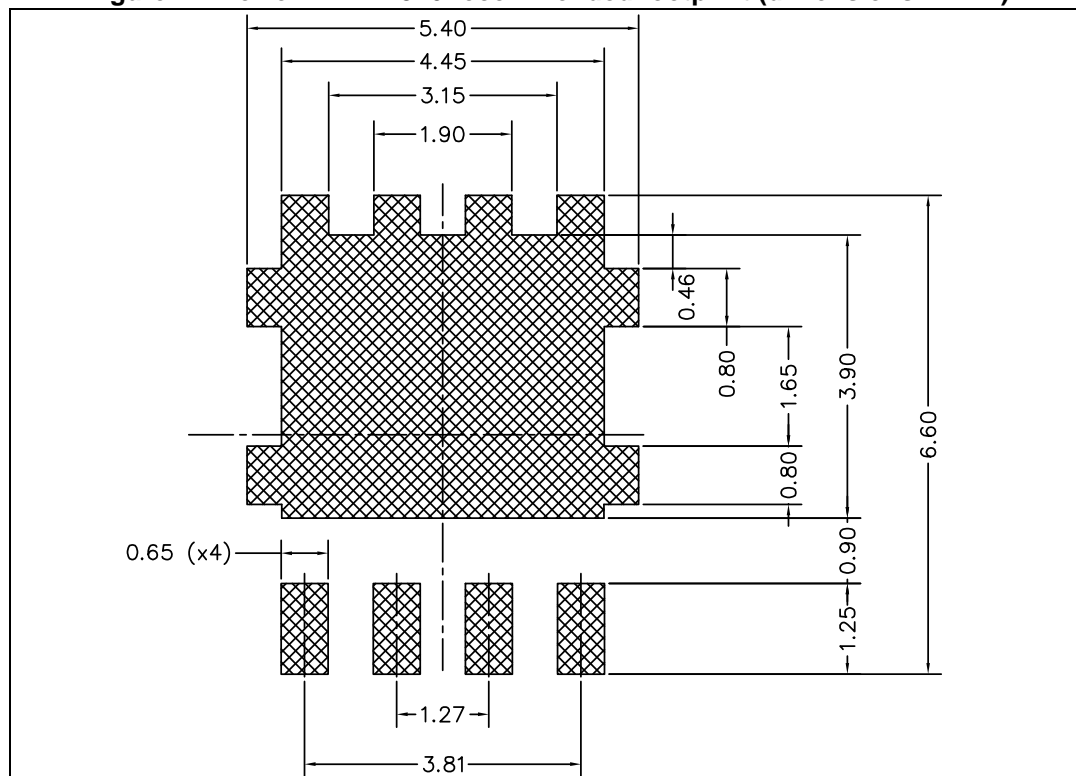


Table 8. PowerFLAT™ 5x6 type C mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D		5.20	
E		6.15	
D2	4.11		4.31
E2	3.50		3.70
e		1.27	
e1		0.65	
L	0.715		1.015
K	1.05		1.35
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28

Figure 17. PowerFLAT™ 5x6 recommended footprint (dimensions in mm)



## 4.2 Packing information

Figure 18. PowerFLAT™ 5x6 tape<sup>(a)</sup>

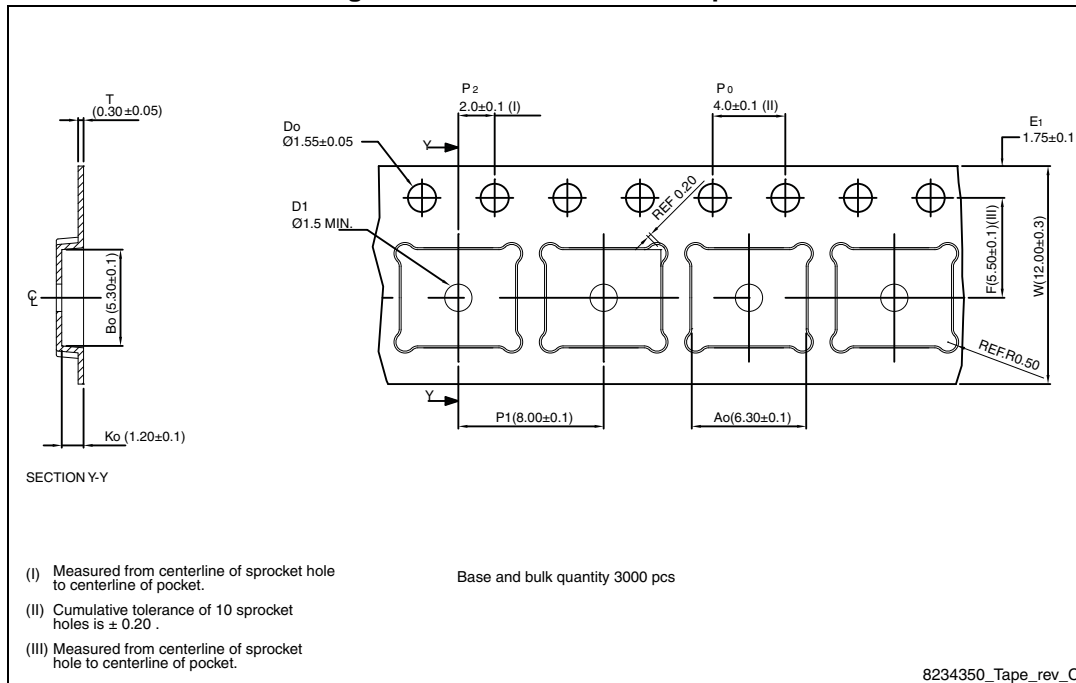
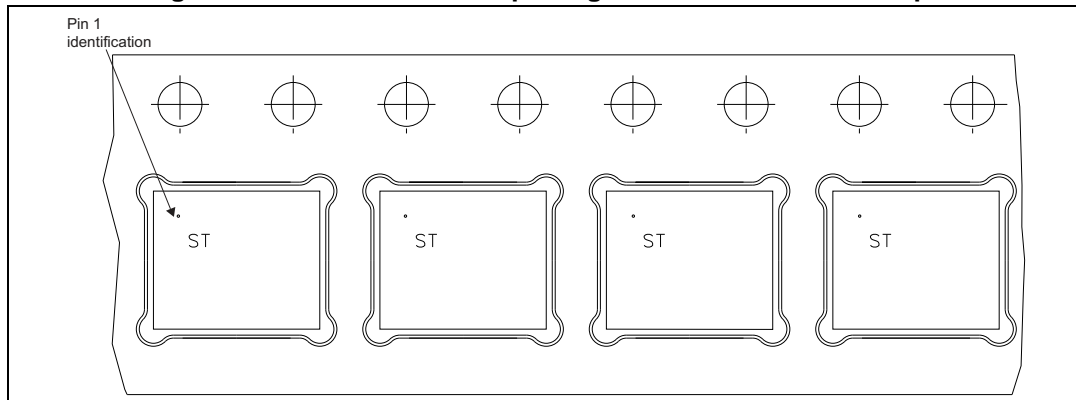
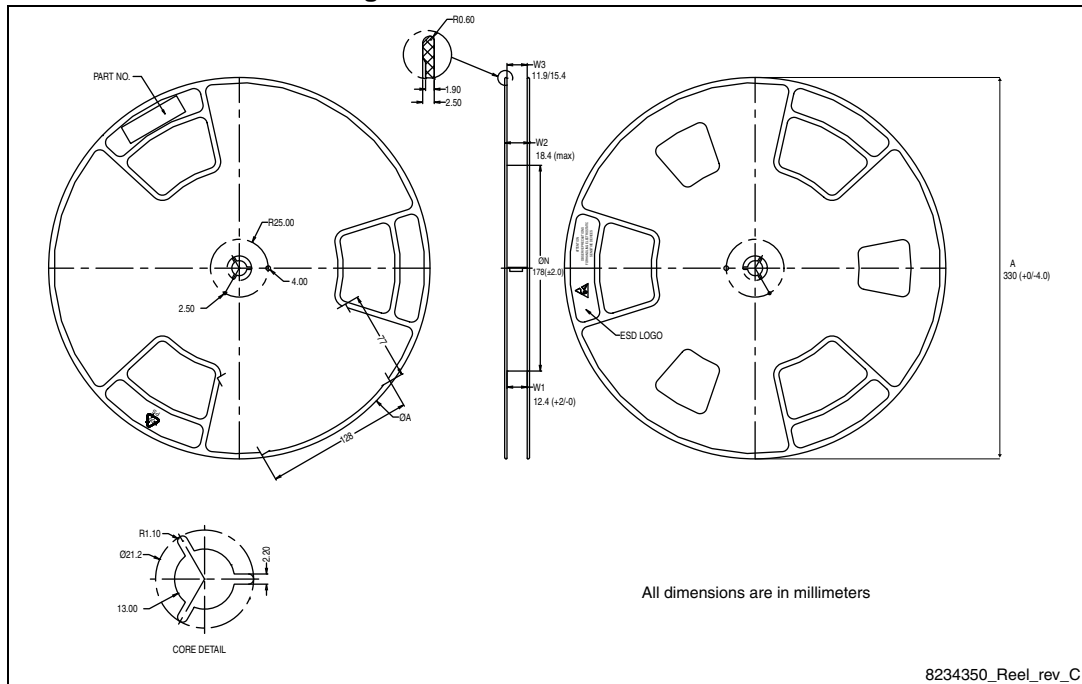


Figure 19. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

Figure 20. PowerFLAT™ 5x6 reel



## 5 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
22-Apr-2013	1	First release.
11-Jun-2013	2	Changed: <i>Description</i> Minor text changes
01-Apr-2015	3	Minor text edits throughout document On cover page: – updated product description – updated features table and features list In <i>Section 1: Electrical ratings</i> : – updated <i>Table 2</i> and <i>Table 3</i> In <i>Section 2: Electrical characteristics</i> : – updated <i>Table 7</i> Added <i>Section 2.1: Electrical characteristics (curves)</i> Updated <i>Section 4: Package information</i>
10-Apr-2015	4	Promoted document from 'Preliminary data' to 'Production data'

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