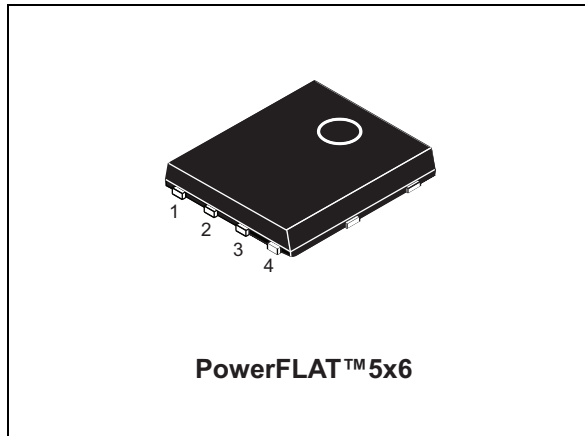


## N-channel 100 V, 0.005 Ω typ., 107 A, STripFET™ H7 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>	P <sub>TOT</sub>
STL110N10F7	100 V	0.006 Ω (V <sub>GS</sub> = 10 V)	107 A	136 W

- 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

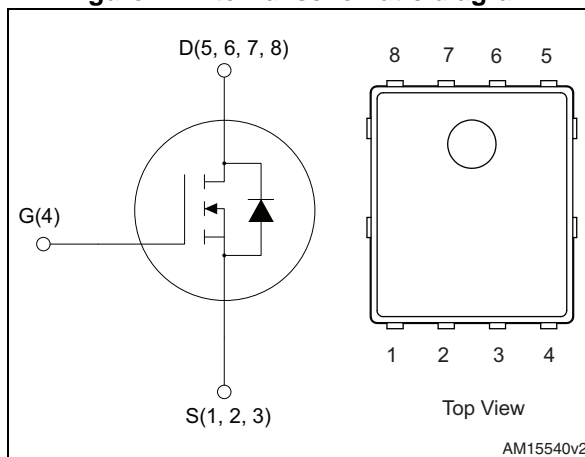
### Applications

- Switching applications

### Description

This N-channel Power MOSFET utilizes the STripFET™ H7 technology with a trench gate structure combined with extremely low on-resistance. The device also offers ultra-low capacitances for higher switching frequency operations.

**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
STL110N10F7	110N10F7	PowerFLAT™ 5x6	Tape and reel

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	100	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	107	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	75	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	21	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb}=100\text{ }^\circ\text{C}$	14	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	84	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	136	W
$P_{TOT}^{(2)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	4.8	W
$E_{AS}^{(4)}$	Single pulse avalanche energy	490	mJ
$T_J$ $T_{stg}$	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. This value is rated according to  $R_{thj-c}$ .
2. This value is rated according to  $R_{thj-pcb}$ .
3. Pulse width limited by safe operating area.
4. Starting  $T_J=25\text{ }^\circ\text{C}$ ,  $I_d=18\text{ A}$ ,  $V_{dd}=50\text{ V}$

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	1.1	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	31.3	$^\circ\text{C/W}$

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

## 2 Electrical characteristics

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

**Table 4. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS}=0, I_D=250\text{ }\mu\text{A}$	100			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS}=0, V_{DS}=100\text{ V}$			1	$\mu\text{A}$
		$V_{GS}=0, V_{DS}=100\text{ V}, T_C=125\text{ °C}$			10	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current	$V_{DS}=0, V_{GS}=20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS}=10\text{ V}, I_D=10\text{ A}$		0.005	0.006	$\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS}=50\text{ V}, f=1\text{ MHz}, V_{GS}=0$	-	5117	-	pF
$C_{oss}$	Output capacitance		-	992	-	pF
$C_{rss}$	Reverse transfer capacitance		-	39	-	pF
$Q_g$	Total gate charge	$V_{DD}=50\text{ V}, I_D=21\text{ A}$ $V_{GS}=10\text{ V}$ <i>Figure 14</i>	-	72	-	nC
$Q_{gs}$	Gate-source charge		-	30	-	nC
$Q_{gd}$	Gate-drain charge		-	17	-	nC

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=50\text{ V}, I_D=10\text{ A}, R_G=4.7\text{ }\Omega, V_{GS}=10\text{ V}$ <i>Figure 13</i>	-	25	-	ns
$t_r$	Rise time		-	36	-	ns
$t_{d(off)}$	Turn-off delay time		-	52	-	ns
$t_f$	Fall time		-	21	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		21	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		84	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS}=0, I_{SD} = 21 \text{ A}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 21 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD}=80 \text{ V}, T_j=150 \text{ }^\circ\text{C}$	-	77		ns
$Q_{rr}$	Reverse recovery charge		-	150		nC
$I_{RRM}$	Reverse recovery current		-	4.3		A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration=300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

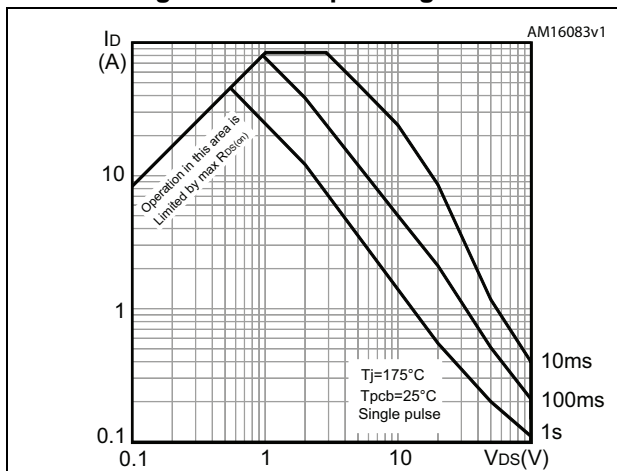


Figure 3. Thermal impedance

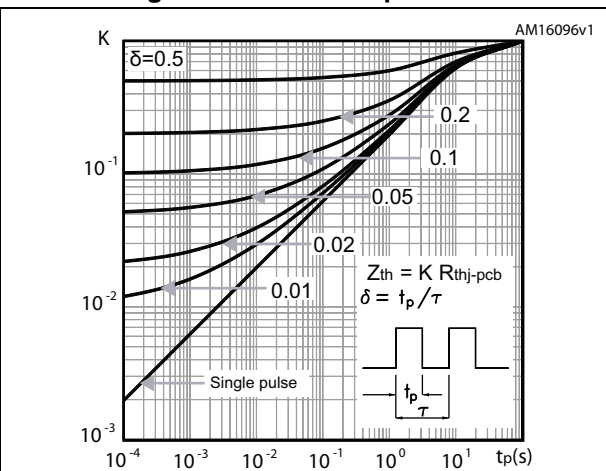


Figure 4. Output characteristics

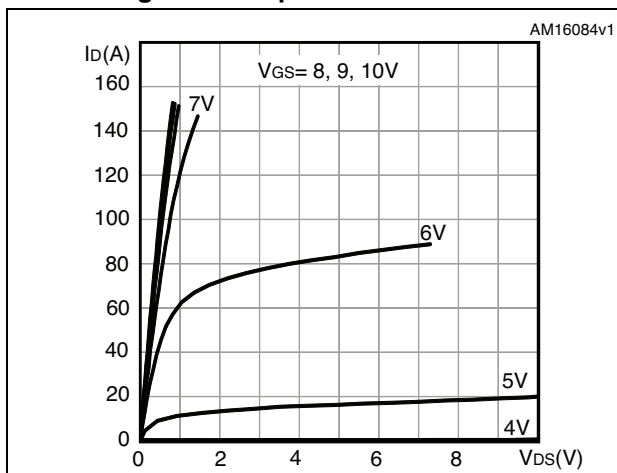


Figure 5. Transfer characteristics

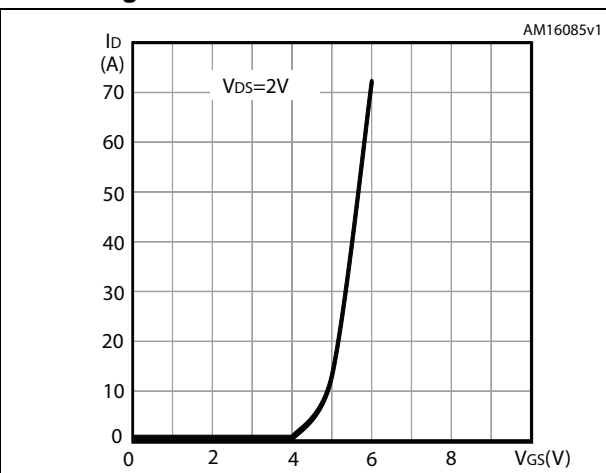


Figure 6. Gate charge vs gate-source voltage

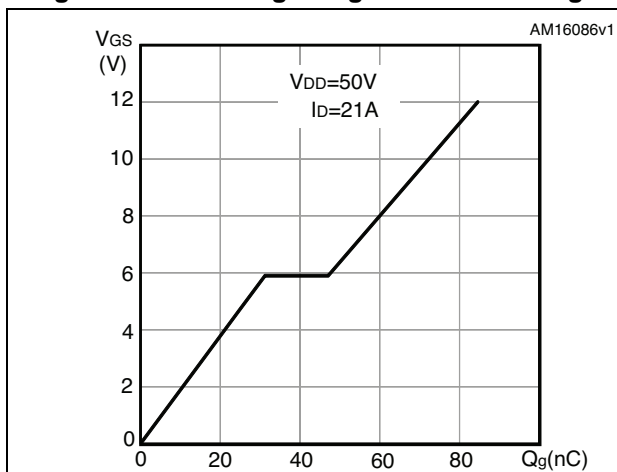


Figure 7. Static drain-source on-resistance

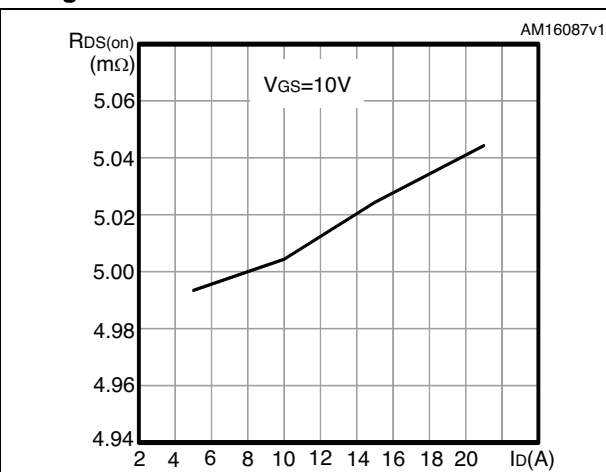


Figure 8. Capacitance variations

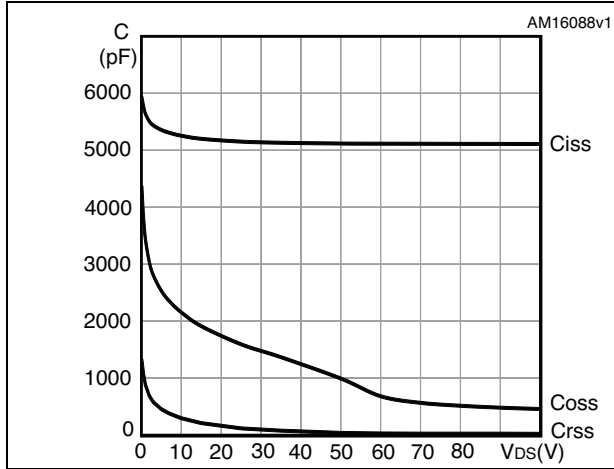


Figure 9. Normalized gate threshold voltage vs temperature

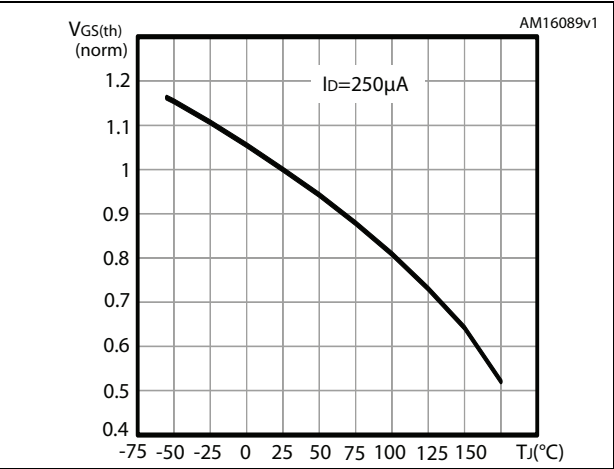


Figure 10. Normalized on-resistance vs temperature

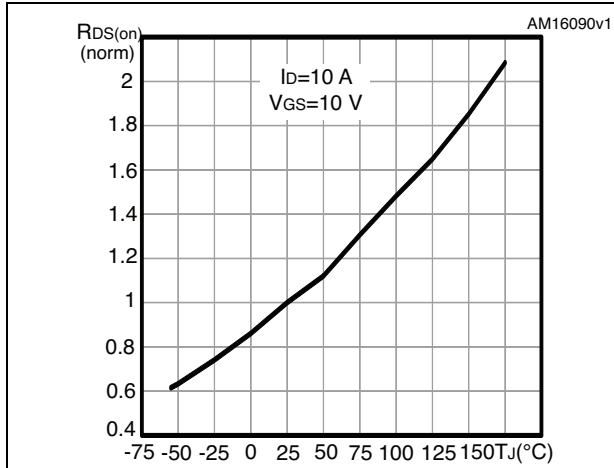


Figure 11. Source-drain diode forward characteristics

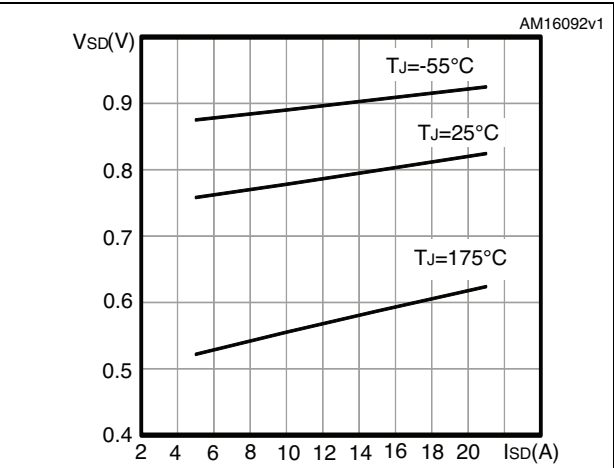
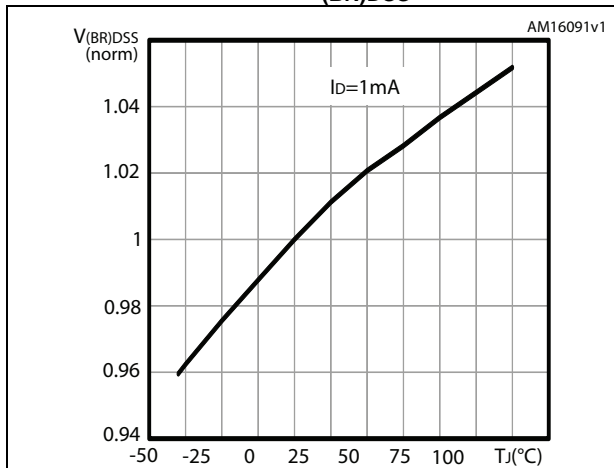


Figure 12. Normalized  $V_{(BR)DSS}$  vs temperature



### 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**

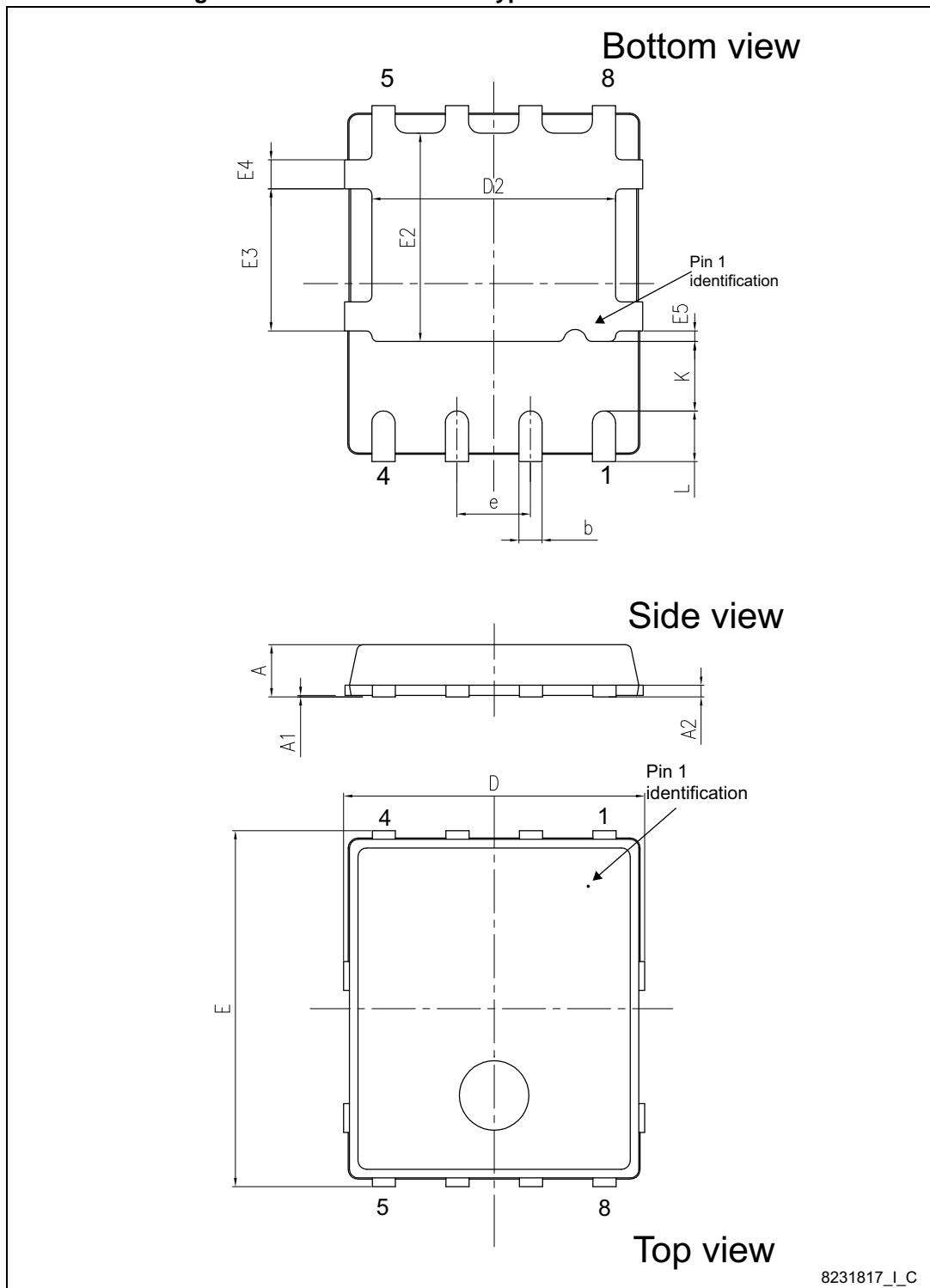




## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<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.

Figure 19. PowerFLAT™ 5x6 type S-C mechanical data

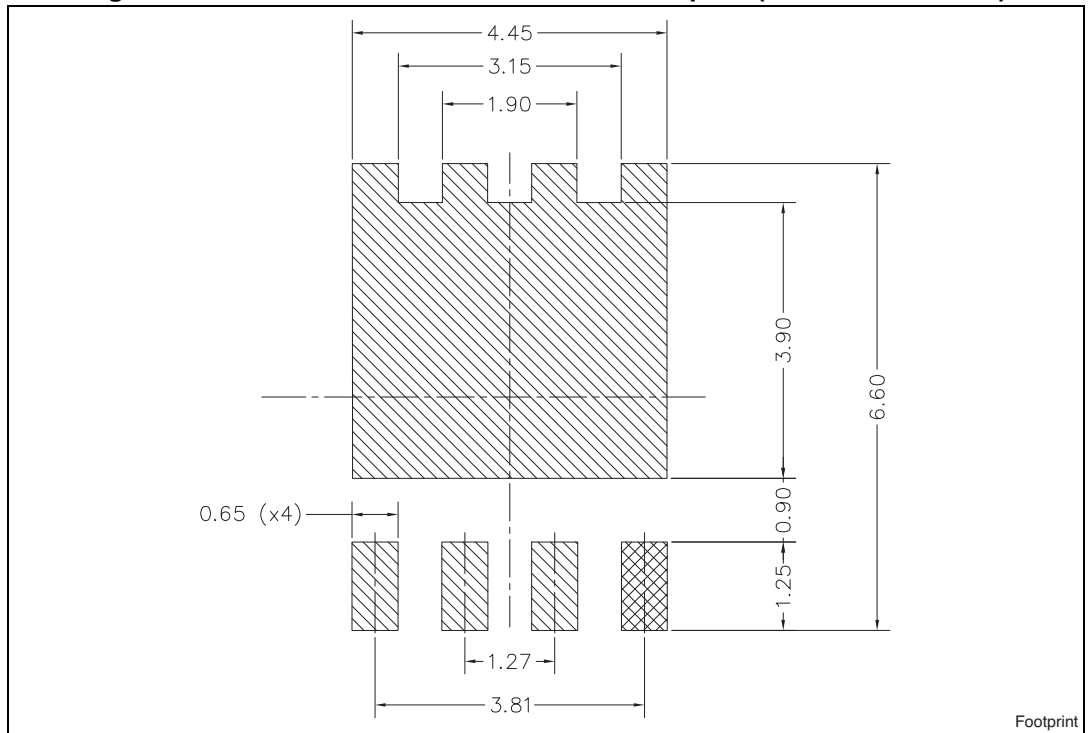


8231817\_I\_C

Table 8. PowerFLAT™ 5x6 type S-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	
D2	4.11		4.31
E		6.15	
e		1.27	
e1		0.65	
E2	3.50		3.70
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28
K	1.05		1.35
L	0.715		1.015

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



# 5 Packaging mechanical data

Figure 21. PowerFLAT™ 5x6 tape(a)

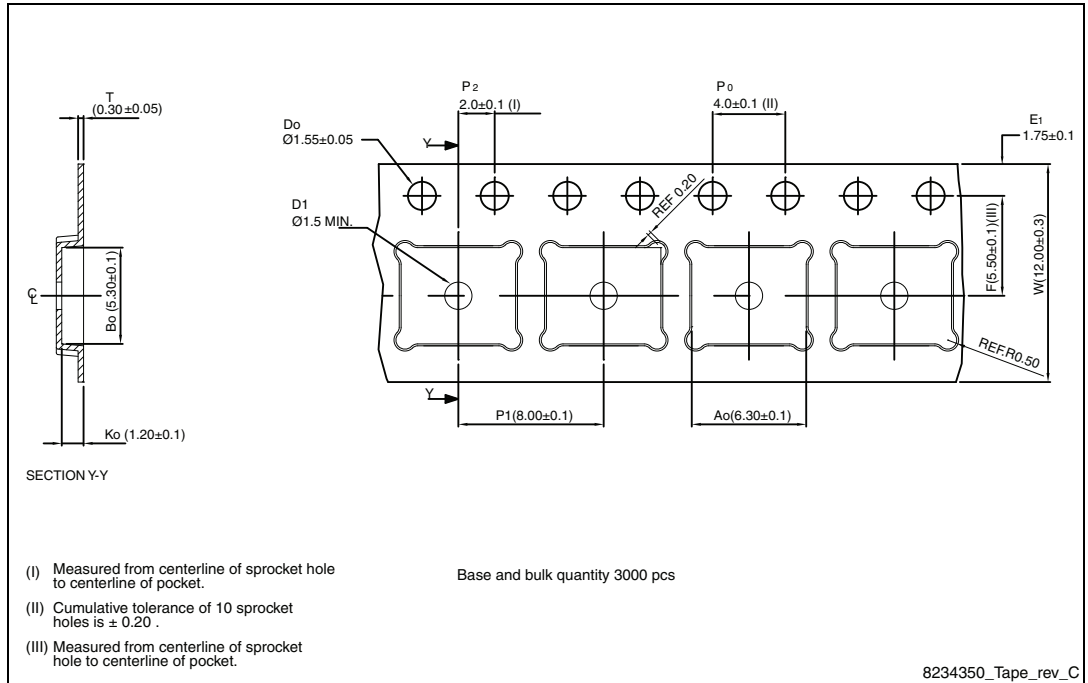
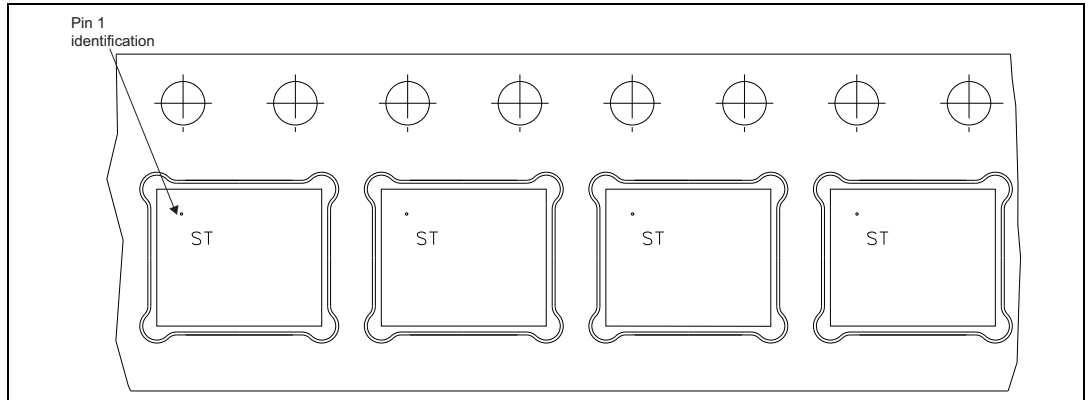
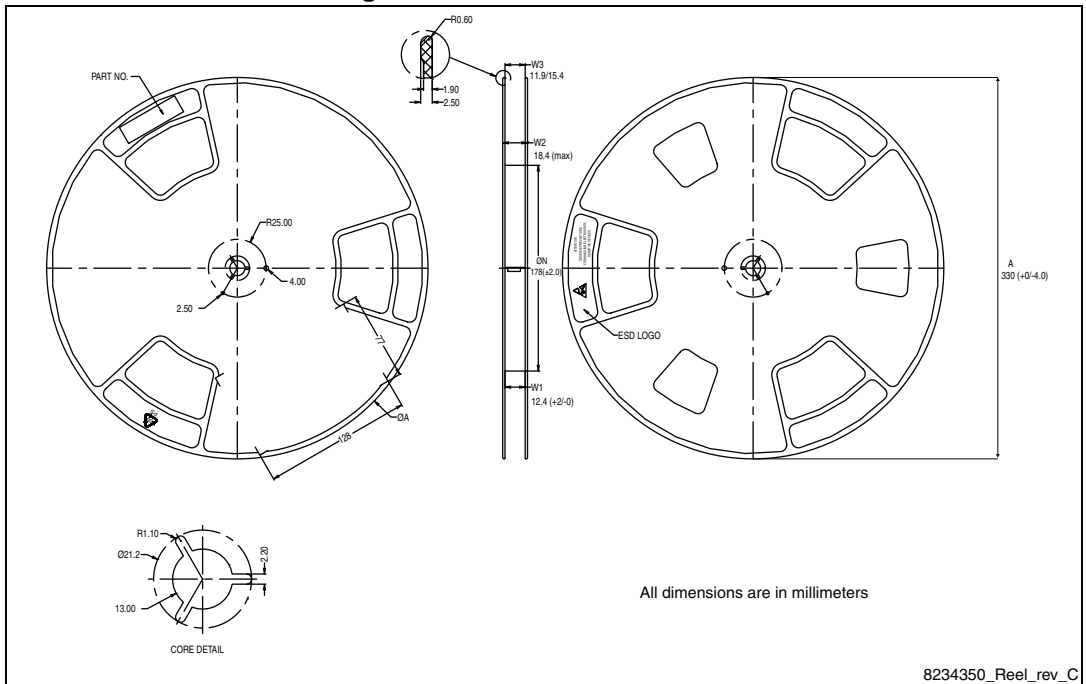


Figure 22. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

Figure 23. PowerFLAT™ 5x6 reel



## 6 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
03-Dec-2012	1	First release.
12-Dec-2013	2	<ul style="list-style-type: none"> <li>– Modified: <math>P_{TOT}</math> value and <i>Figure 1</i> in cover page</li> <li>– Modified: <math>I_D</math>, <math>I_{DM}</math> and <math>P_{TOT}</math> values in <i>Table 2</i></li> <li>– Added: <math>E_{AS}</math> value in <i>Table 2</i></li> <li>– Modified: all values in <i>Table 3</i></li> <li>– Modified: <math>I_{DSS}</math>, <math>I_{GSS}</math> and <math>I_D</math> for <math>R_{DS(on)}</math></li> <li>– Updated: the entire typical values in <i>Table 5, 6</i> and <i>7</i></li> <li>– Updated: <i>Figure 13, 14, 15</i> and <i>16</i></li> <li>– Minor text changes</li> </ul>
25-Mar-2014	3	<ul style="list-style-type: none"> <li>– Updated title and features on cover page.</li> <li>– Added <math>P_{TOT}</math> value at <math>T_C = 25\text{ °C}</math> in <i>Table 2: Absolute maximum ratings</i>.</li> <li>– Updated <i>Section 4: Package mechanical data</i>.</li> </ul>
20-Aug-2014	4	<ul style="list-style-type: none"> <li>– Modified: title, features and description</li> <li>– Modified: <i>Figure 2</i> and <i>3</i></li> <li>– Updated: <i>Section 4: Package mechanical data</i></li> <li>– Minor text changes</li> </ul>

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