

## Automotive-grade N-channel 100 V, 25 mΩ typ., 7.8 A STripFET™ F3 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data

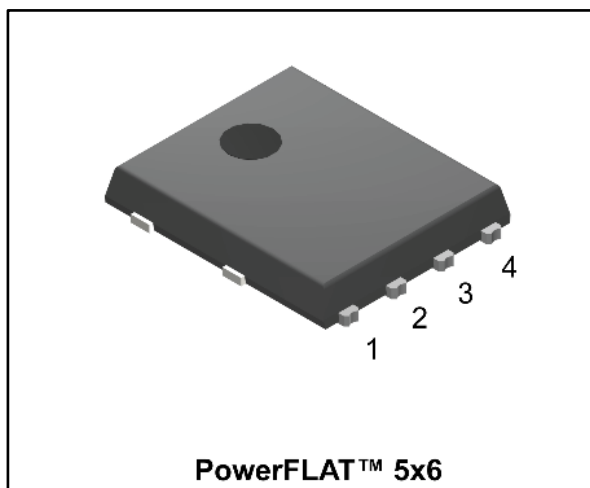
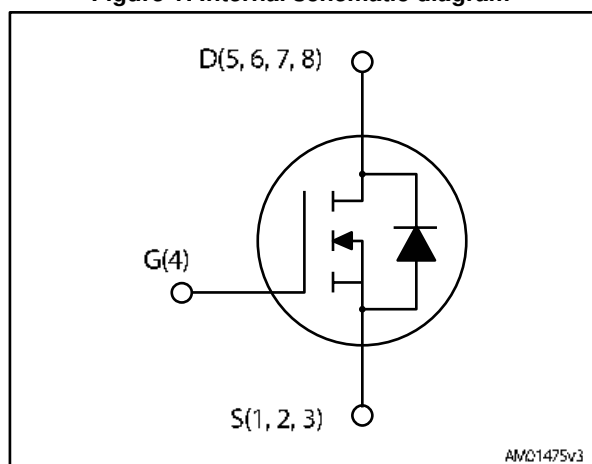


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STL8N10LF3	100 V	35 mΩ	7.8 A



- AEC-Q101 qualified
- Logic level V<sub>GS(th)</sub>
- 175 °C maximum junction temperature
- 100% avalanche rated
- Wettable flank package

### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using STripFET™ F3 technology. It is designed to minimize on-resistance and gate charge to provide superior switching performance.

Table 1: Device summary

Order code	Marking	Package	Packing
STL8N10LF3	8N10LF3	PowerFLAT™ 5x6	Tape and reel

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## Contents

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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 $T_C = 25\text{ }^\circ\text{C}$	20	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	20	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	7.8	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	5.5	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	31.2	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	70	W
$P_{TOT}^{(2)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	4.3	W
$I_{AV}$	Not-repetitive avalanche current	7.8	A
$E_{AS}^{(4)}$	Single pulse avalanche energy	190	mJ
$T_j$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		

**Notes:**

- (1) This value is rated according to  $R_{thj-case}$  and limited by package
- (2) This value is rated according to  $R_{thj-pcb}$
- (3) Pulse width limited by safe operating area.
- (4) Starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $I_D = 7.8\text{ A}$ ,  $V_{DD} = 25\text{ V}$ .

**Table 3: Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	2.1	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	35	$^\circ\text{C/W}$

**Notes:**

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

## 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	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	100			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 100\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1		3	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 4\text{ A}$		25	35	$\text{m}\Omega$
		$V_{GS} = 5\text{ V}$ , $I_D = 4\text{ A}$		40	50	$\text{m}\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{ISS}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	970	-	pF
$C_{OSS}$	Output capacitance		-	115	-	
$C_{RSS}$	Reverse transfer capacitance		-	11.5	-	
$Q_g$	Total gate charge	$V_{DD} = 50\text{ V}$ , $I_D = 7.8\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13: "Test circuit for gate charge behavior"</a> )	-	20.5	-	nC
$Q_{gs}$	Gate-source charge		-	4	-	
$Q_{gd}$	Gate-drain charge		-	5	-	
$R_G$	Intrinsic gate resistance	$f = 1\text{ MHz}$ open drain	-	3.65	-	$\Omega$

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\text{ V}$ , $I_D = 7.8\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 12: "Test circuit for resistive load switching times"</a> )	-	8.7	-	ns
$t_r$	Rise time		-	9.6	-	
$t_{d(off)}$	Turn-off delay time		-	50.6	-	
$t_f$	Fall time		-	5.2	-	

Table 7: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		7.8	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		31.2	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{DS} = 7.8 \text{ A}$ , $V_{GS} = 0$			1.3	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 7.8 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$	-	42.5		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 48 \text{ V}$ , $T_j = 150 \text{ }^\circ\text{C}$ (see <a href="#">Figure 14: "Test circuit for inductive load switching and diode recovery times"</a> )	-	87		nC
$I_{RRM}$	Reverse recovery current		-	4.08		A

**Notes:**

<sup>(1)</sup>Pulse width limited by safe operating area

<sup>(2)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

## 2.1 Electrical characteristics (curves)

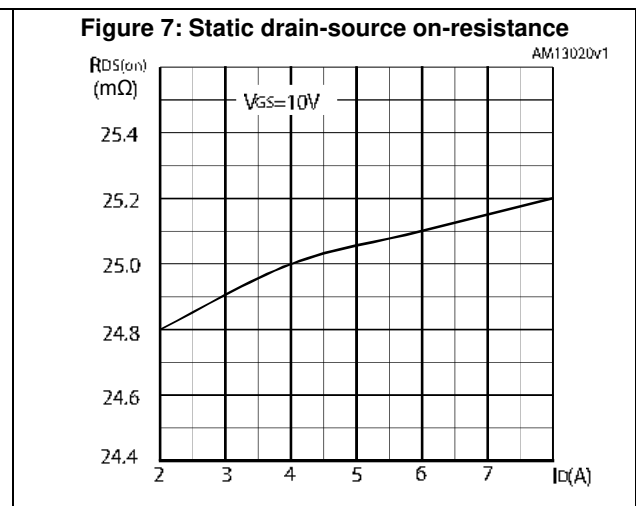
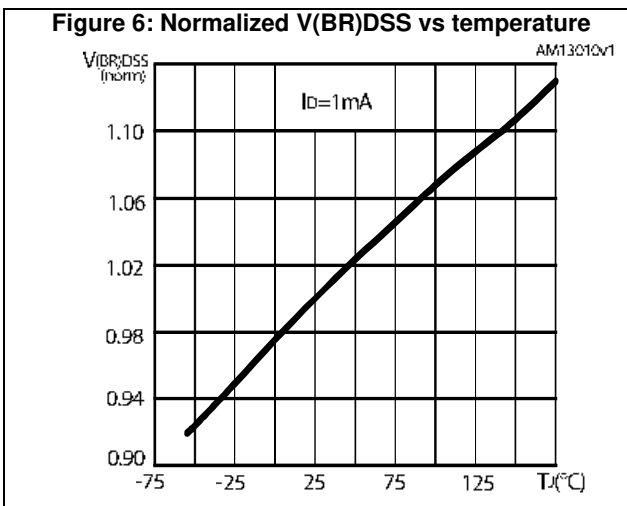
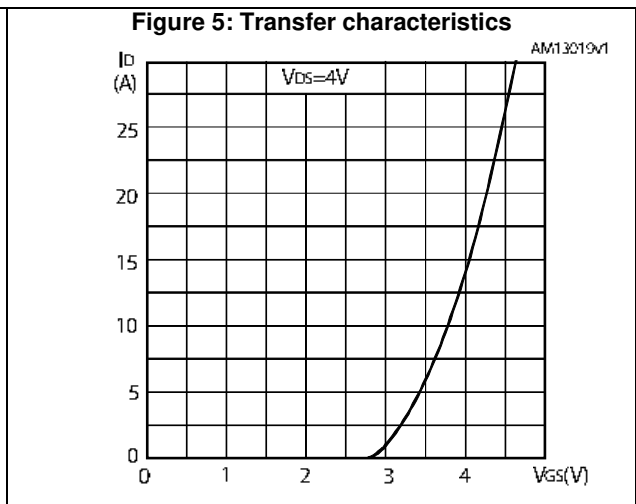
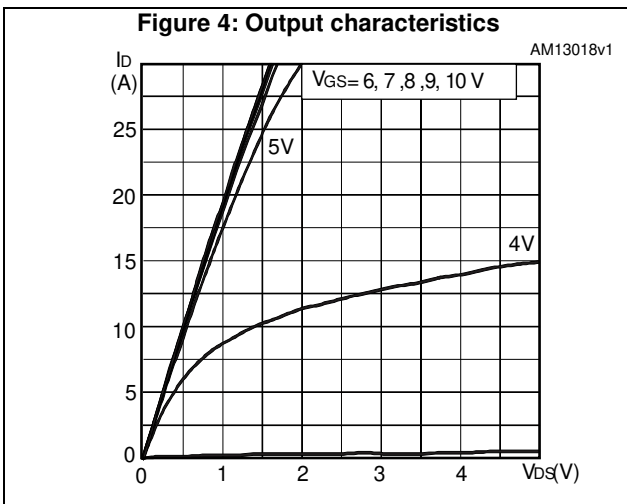
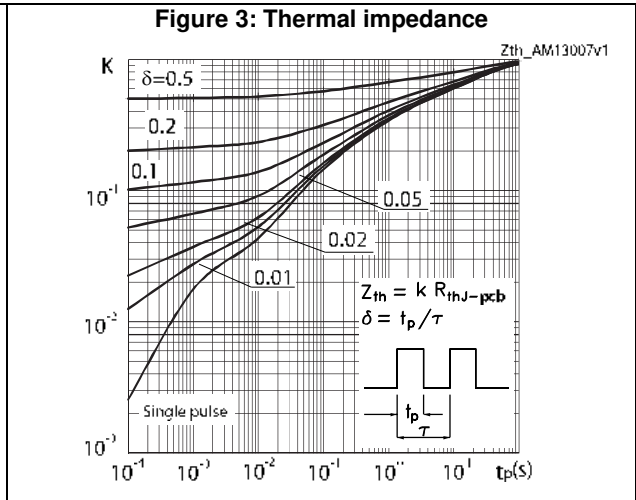
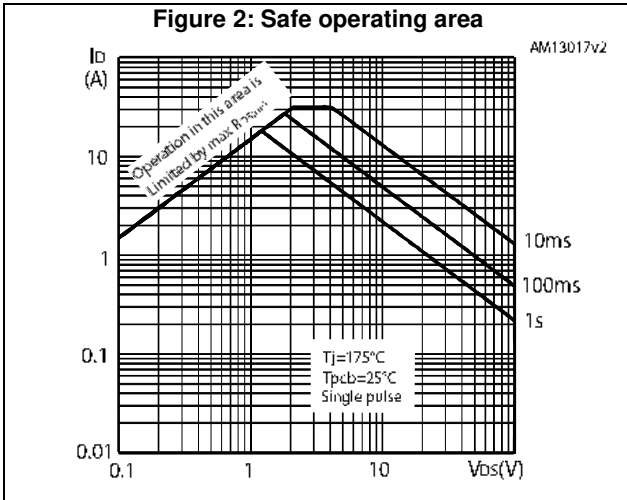


Figure 8: Gate charge vs gate-source voltage

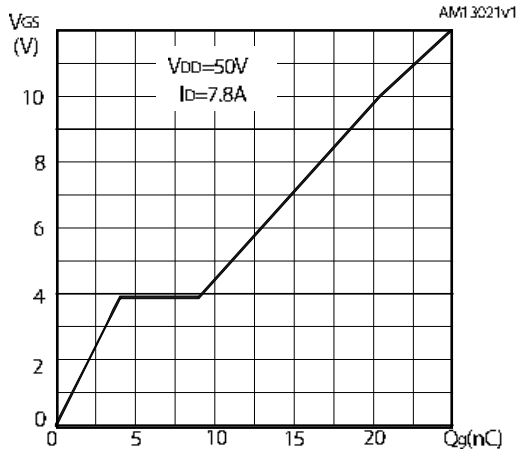


Figure 9: capacitance variation

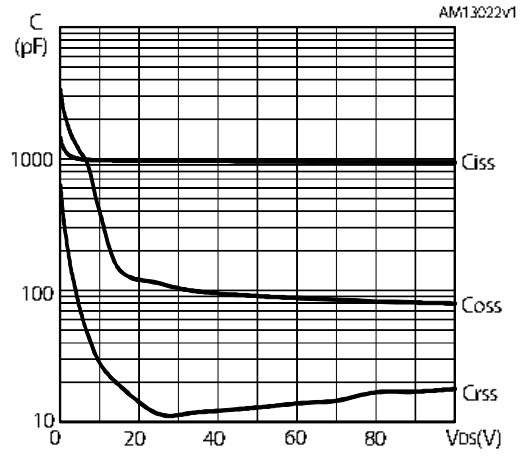


Figure 10: Normalized gate threshold voltage vs temperature

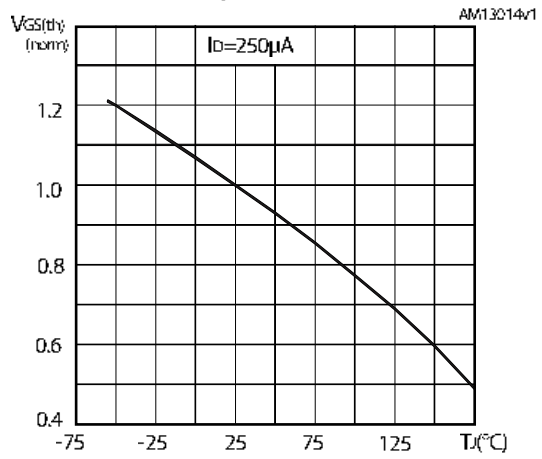
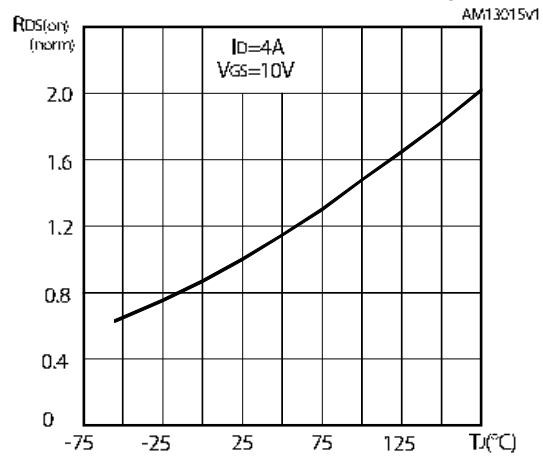
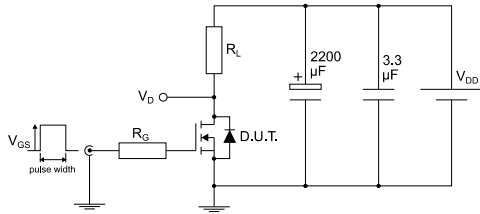


Figure 11: Normalized on resistance vs temperature



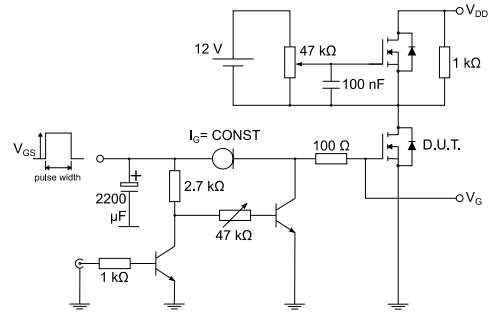
### 3 Test circuits

**Figure 12: Test circuit for resistive load switching times**



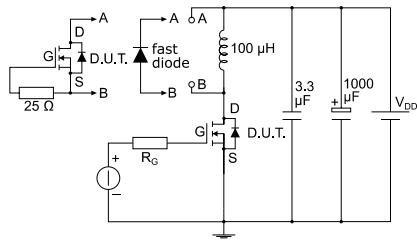
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**Figure 13: Test circuit for gate charge behavior**



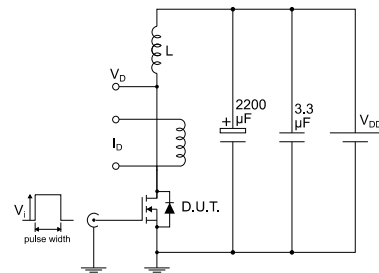
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**Figure 14: Test circuit for inductive load switching and diode recovery times**



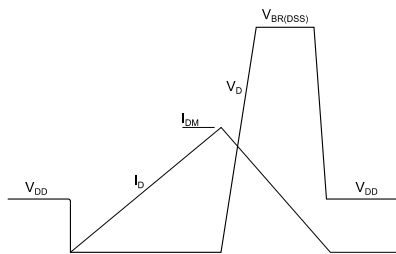
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**Figure 15: Unclamped inductive load test circuit**



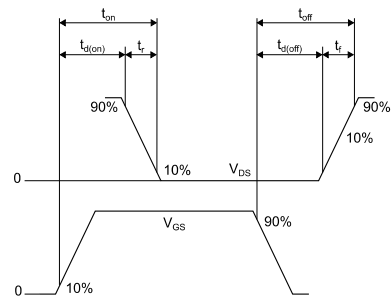
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**Figure 16: Unclamped inductive waveform**



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**Figure 17: Switching time waveform**



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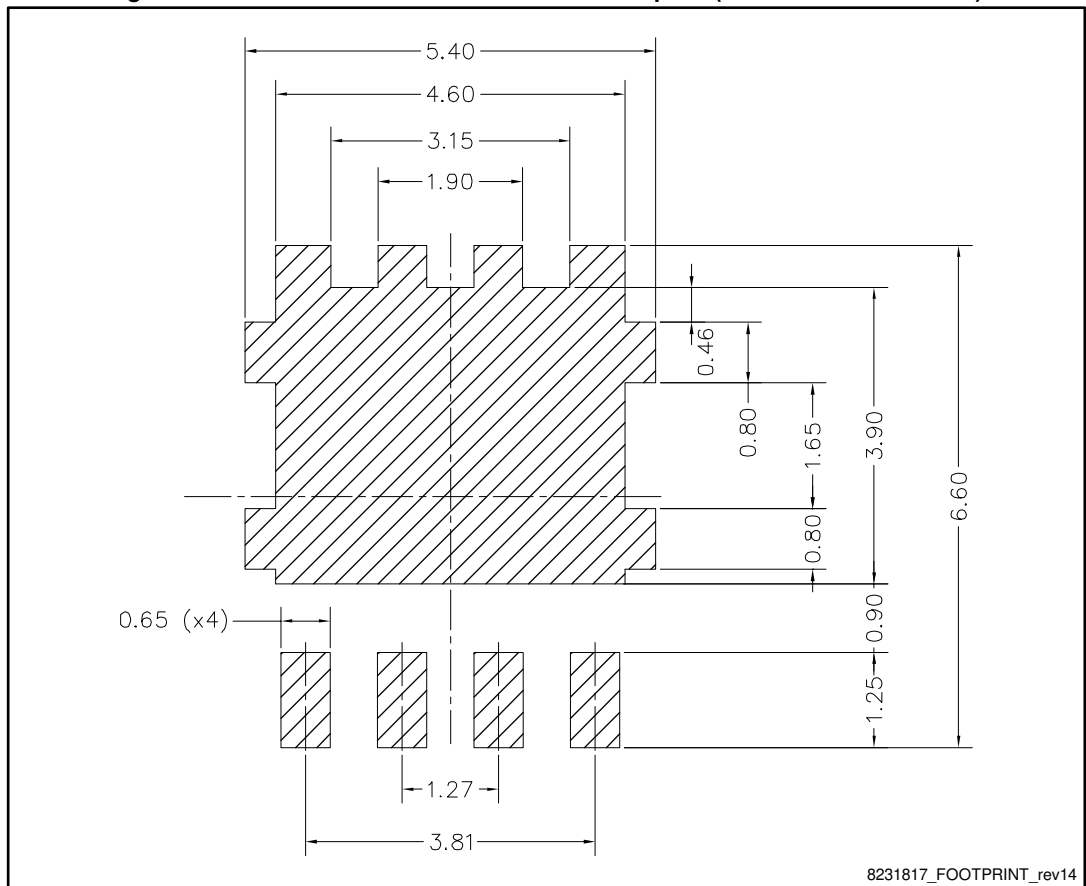




Table 8: PowerFLAT™ 5x6 WF type R mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
C	5.80	6.00	6.10
D	5.00	5.20	5.40
D2	4.15		4.45
D3	4.05	4.20	4.35
D4	4.80	5.00	5.10
D5	0.25	0.4	0.55
D6	0.15	0.3	0.45
e		1.27	
E	6.20	6.40	6.60
E2	3.50		3.70
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28
E6	0.20	0.325	0.45
E7	0.85	1.00	1.15
E9	4.00	4.20	4.40
E10	3.55	3.70	3.85
K	1.275		1.575
L	0.725	0.825	0.925
L1	0.175	0.275	0.375
θ	0°		12°

Figure 19: PowerFLAT™ 5x6 recommended footprint (dimensions are in mm)



## 4.2 Packing information

Figure 20: PowerFLAT™ 5x6 WF tape (dimensions are in mm)

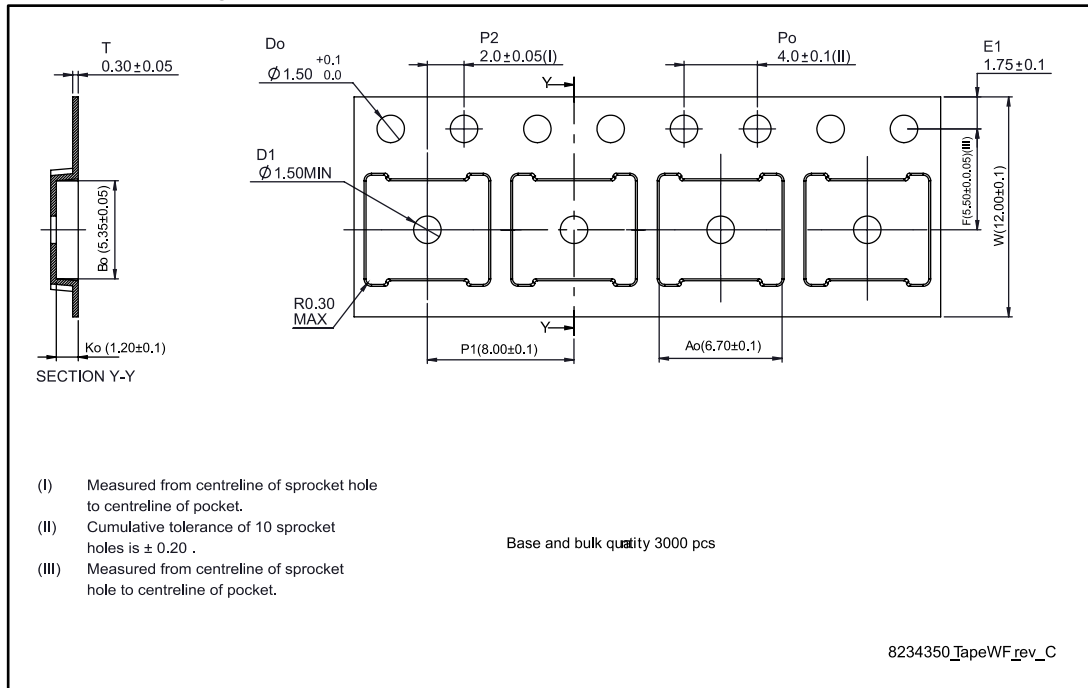


Figure 21: PowerFLAT™ 5x6 package orientation in carrier tape

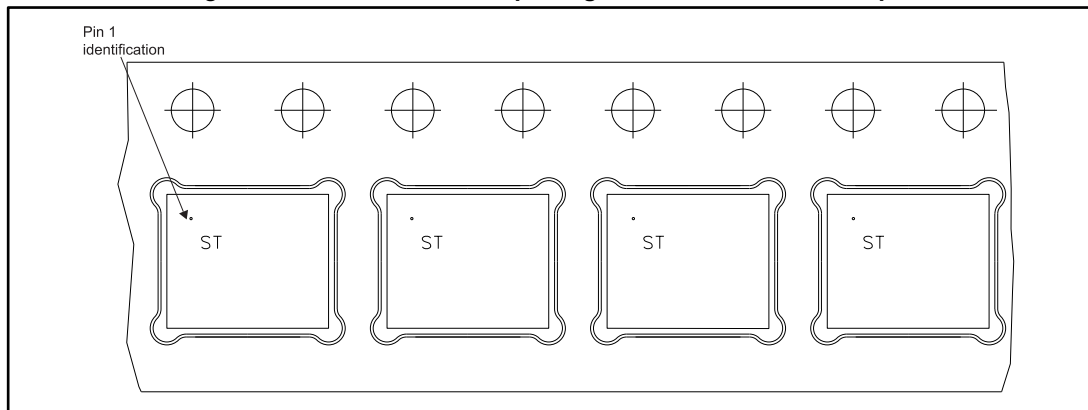
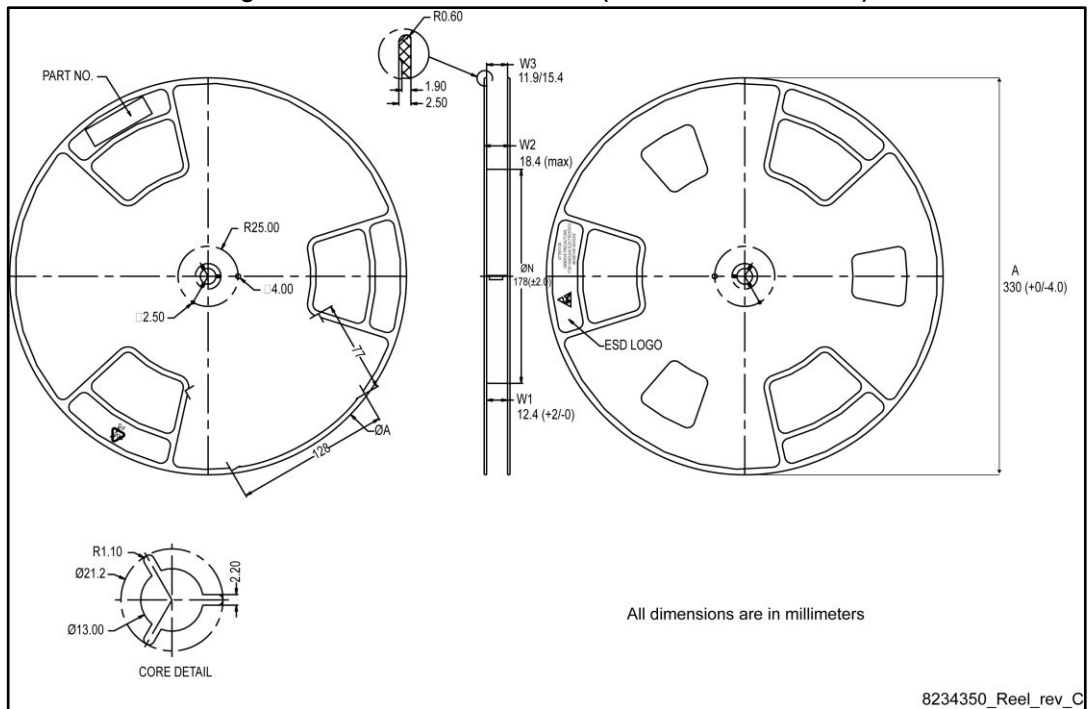


Figure 22: PowerFLAT™ 5x6 reel (dimensions are in mm)



## 5 Revision history

**Table 9: Document revision history**

Date	Revision	Changes
17-Jan-2013	1	First release.
18-May-2015	2	Updated Section 4: Package information. Added Section 5: Packing information. Minor text changes.
09-Nov-2016	3	Updated features in cover page and <i>Table 2: Absolute maximum ratings</i> . Updated <i>Section 4: Package information</i> . Minor text changes
28-Nov-2016	4	Updated test conditions in <i>Table 4: "On/Off states"</i> .

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