

Automotive-grade dual N-channel 60 V, 22.5 mΩ typ., 7.8 A STripFET™ III Power MOSFET in a PowerFLAT™ 5x6 double island package

Datasheet — production data

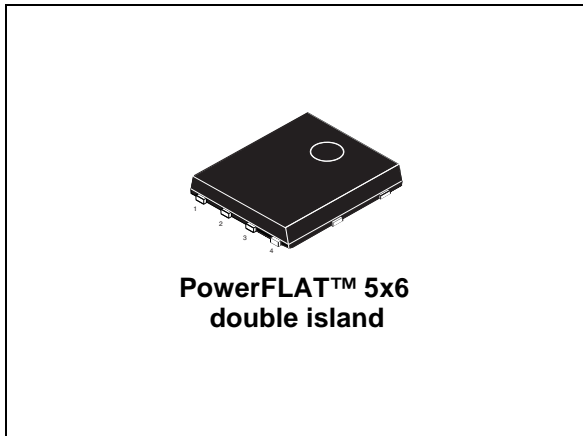
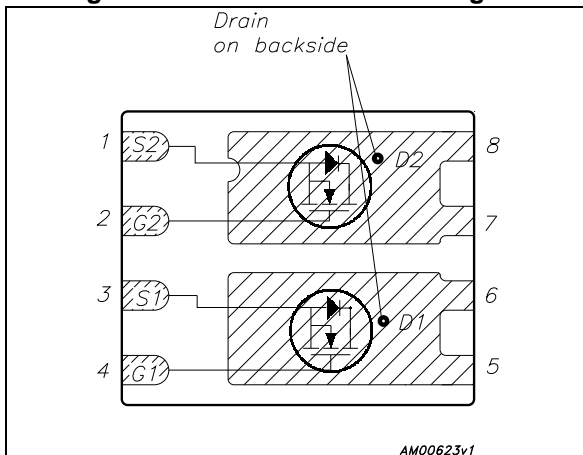


Figure 1. Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)} max	I _D
STL8DN6LF3	60 V	30 mΩ	7.8 A

- Designed for automotive applications and AEC-Q101 qualified
- Logic level V_{GS(th)}
- 175 °C junction temperature
- 100% avalanche rated
- Wettable flank package

Applications

- Switching applications

Description

This device is an N-channel enhancement mode Power MOSFET produced using STMicroelectronics' STripFET™ III technology, which is specifically designed to minimize on-resistance and gate charge to provide superior switching performance.

Table 1. Device summary

Order code	Marking	Packages ⁽¹⁾	Packaging
STL8DN6LF3	8DN6LF3	PowerFLAT™ 5x6 double island	Tape and reel

1. For wettable flank option, please contact ST sale offices

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
	2.1 Electrical characteristics (curves)	6
3	Test circuits	8
4	Package mechanical data	9
5	Packaging mechanical data	15
6	Revision history	17



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
$I_D^{(1),(2)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	20	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	20	A
$I_D^{(4)}$	Drain current (continuous) at $T_{pcb} = 25^\circ\text{C}$	7.8	A
$I_D^{(4)}$	Drain current (continuous) at $T_{pcb}=100^\circ\text{C}$	5.5	A
$I_{DM}^{(3),(4)}$	Drain current (pulsed)	31.2	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$	65	W
$P_{TOT}^{(4)}$	Total dissipation at $T_{pcb} = 25^\circ\text{C}$	4.3	W
I_{AV}	Not-repetitive avalanche current	7.8	A
$E_{AS}^{(5)}$	Single pulse avalanche energy	190	mJ
T_J	Operating junction temperature	-55 to 175	$^\circ\text{C}$
T_{stg}	Storage temperature		$^\circ\text{C}$

1. Specified by design. Not subject to production test.
2. Current is limited by bonding, with an $R_{thJC} = 2.3^\circ\text{C/W}$ the chip is able to carry 30 A at 25°C .
3. Pulse width limited by safe operating area
4. When mounted on FR-4 board of 1inch^2 , 2oz Cu, $t < 10\text{ sec}$
5. Starting $T_J = 25^\circ\text{C}$, $I_D = 8\text{ A}$, $V_{DD} = 25\text{ V}$, per channel, 100% tested.

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	2.3	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	35	$^\circ\text{C/W}$

1. When mounted on FR-4 board of 1inch^2 , 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 ($V_{GS} = 0$)	$I_D = 250\ \mu A$	60			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 60\text{ V}$			1	μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu A$	1		2.5	V
$R_{DS(on)}$	Static drain-source on- resistance	$V_{GS} = 10\text{ V}$, $I_D = 4\text{ A}$		22.5	30	m Ω
		$V_{GS} = 5\text{ V}$, $I_D = 4\text{ A}$		30	44	m Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	668	-	pF
C_{oss}	Output capacitance		-	144	-	pF
C_{rss}	Reverse transfer capacitance		-	14	-	pF
Q_g	Total gate charge	$V_{DD} = 30\text{ V}$, $I_D = 7.8\text{ A}$	-	13	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 10\text{ V}$	-	2.4	-	nC
Q_{gd}	Gate-drain charge	Figure 15	-	3	-	nC
R_G	Intrinsic gate resistance	$f = 1\text{ MHz}$ open drain	-	4	-	Ω

Table 6. Switching times

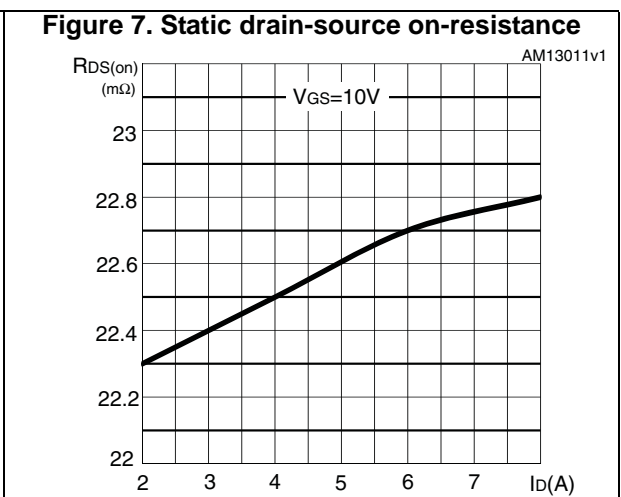
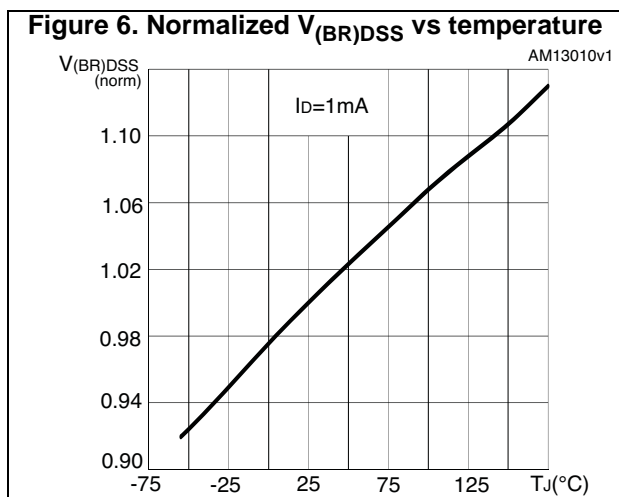
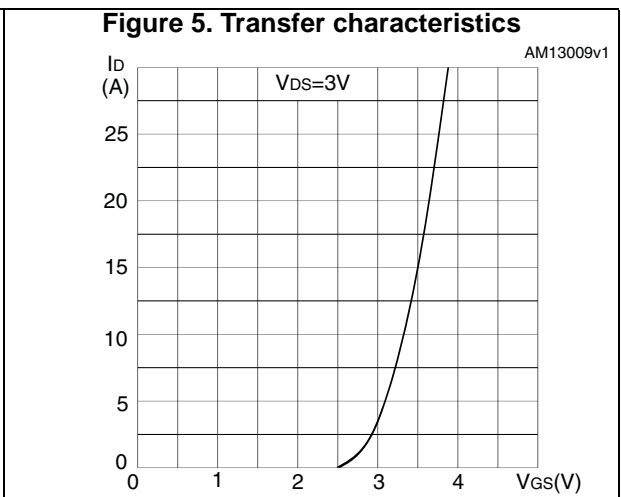
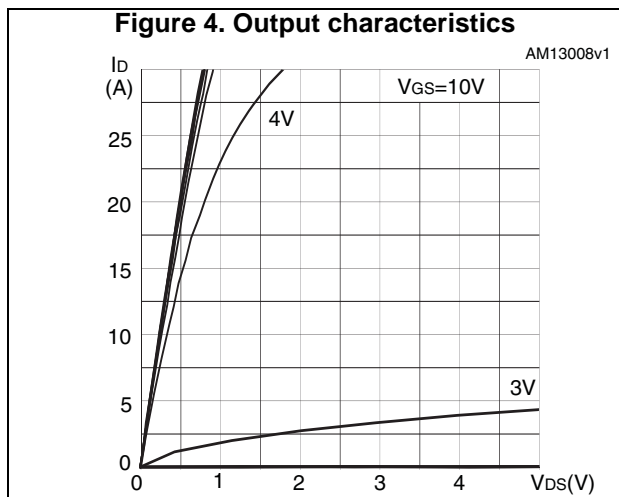
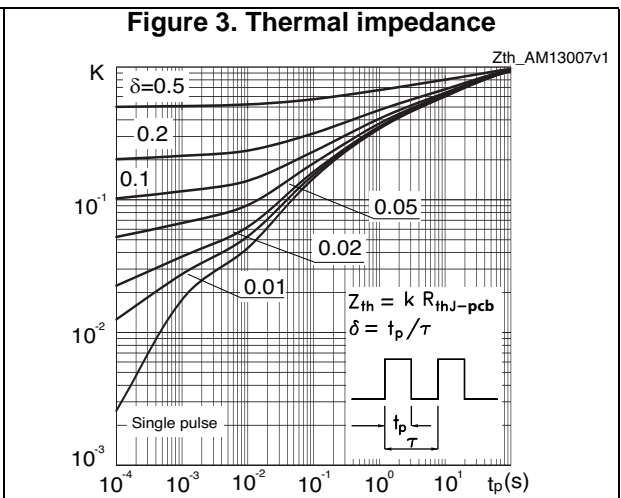
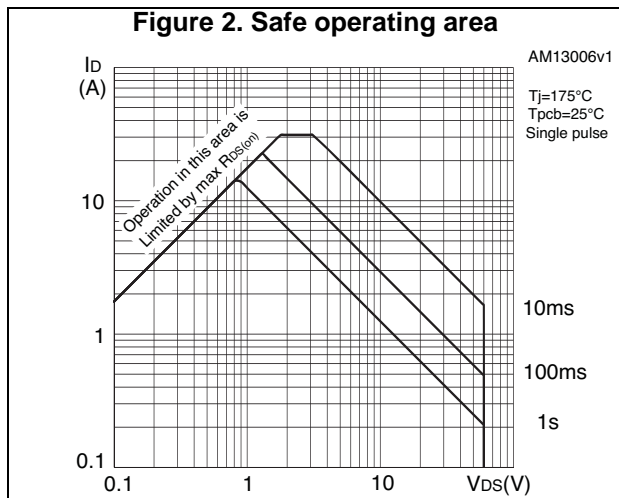
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ Figure 14	-	9	-	ns
t_r	Rise time		-	7.7	-	ns
$t_{d(off)}$	Turn-off delay time		-	32.5	-	ns
t_f	Fall time		-	5	-	ns

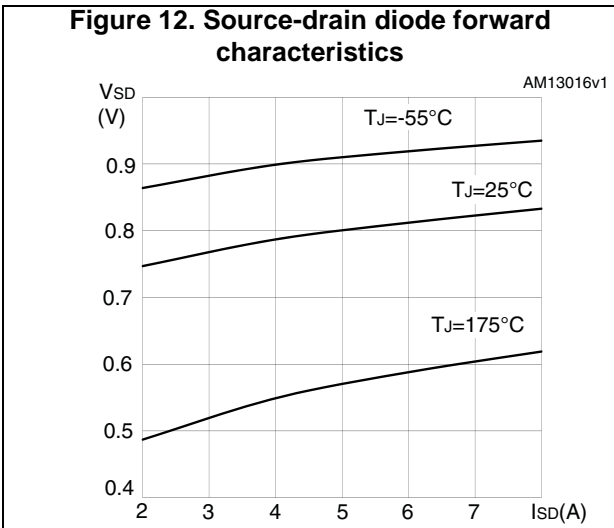
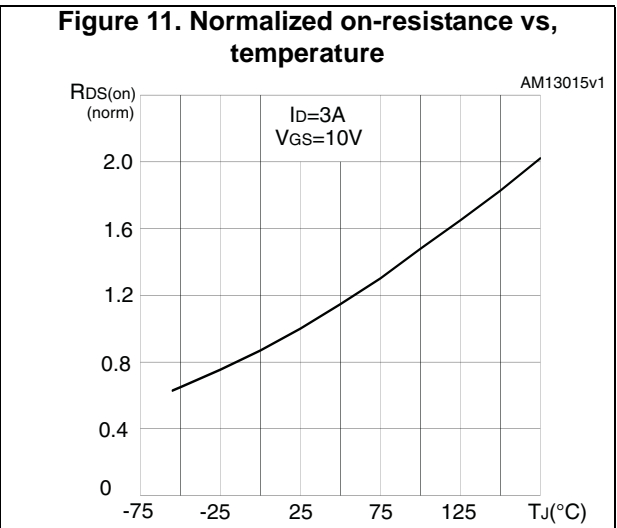
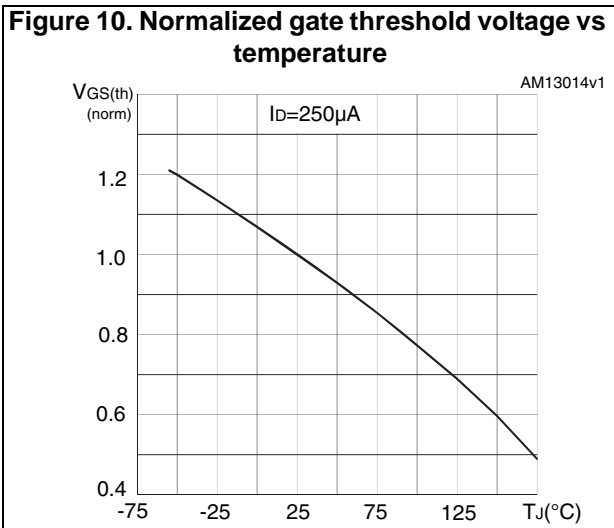
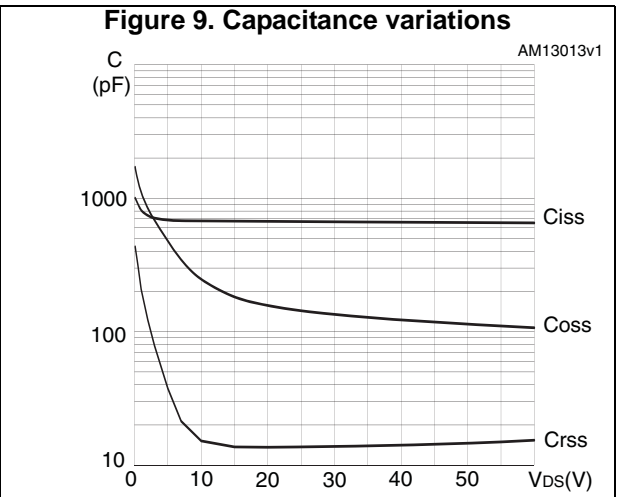
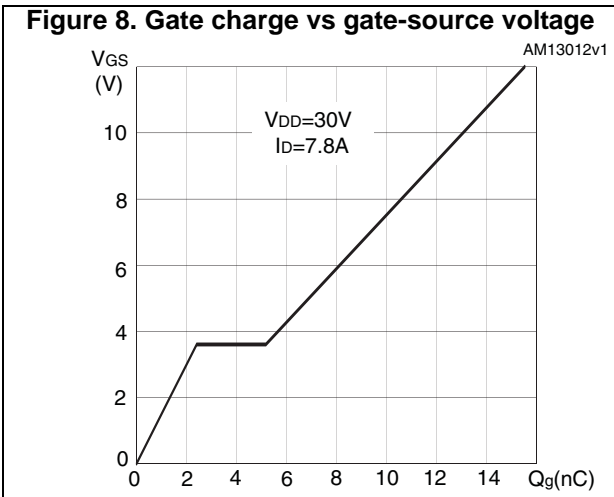
Table 7. Source drain diode

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	$I_{SD} = 7.8 \text{ A}, V_{GS} = 0$	-		1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 7.8 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD} = 48 \text{ V}, T_j = 150 \text{ }^\circ\text{C}$	-	30		ns
Q_{rr}	Reverse recovery charge		-	35		nC
I_{RRM}	Reverse recovery current		-	2.35		A

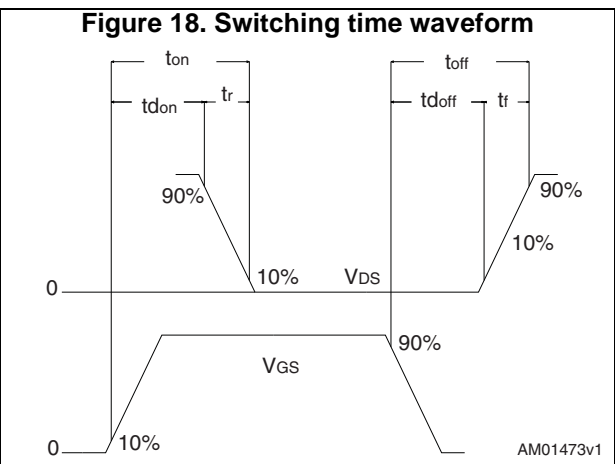
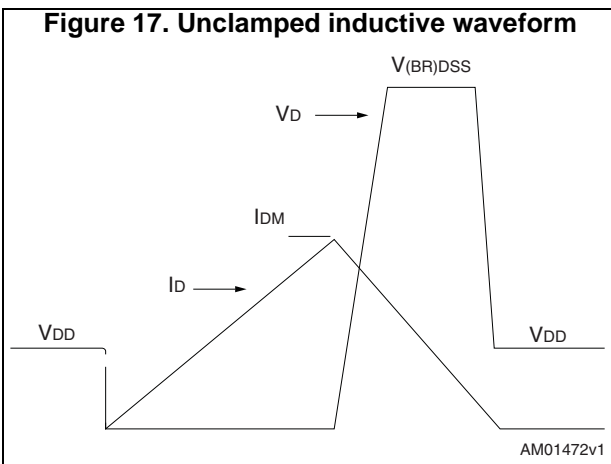
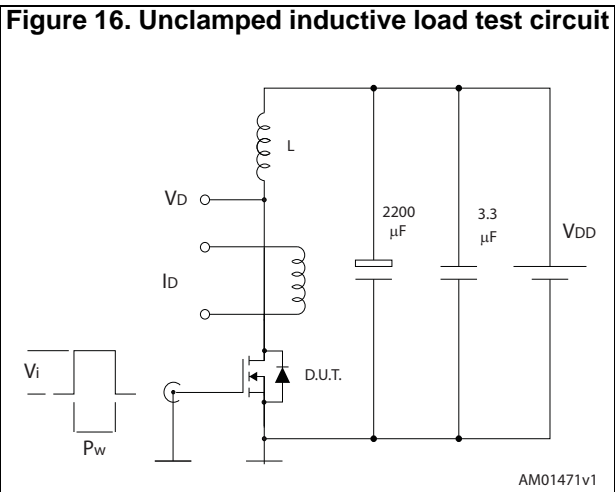
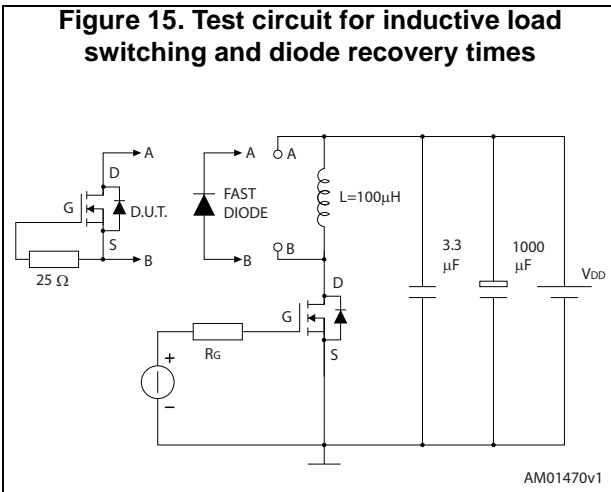
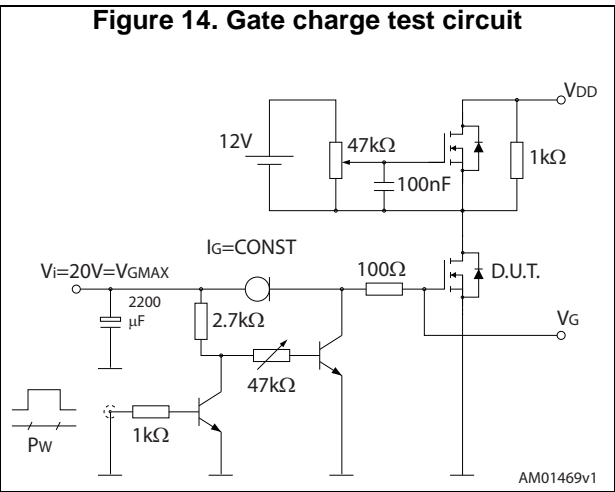
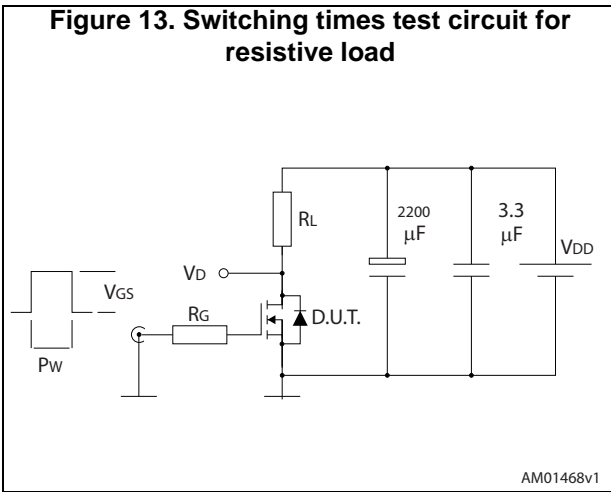
1. Pulse width limited by safe operating area
2. Pulsed: pulse duration= 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)





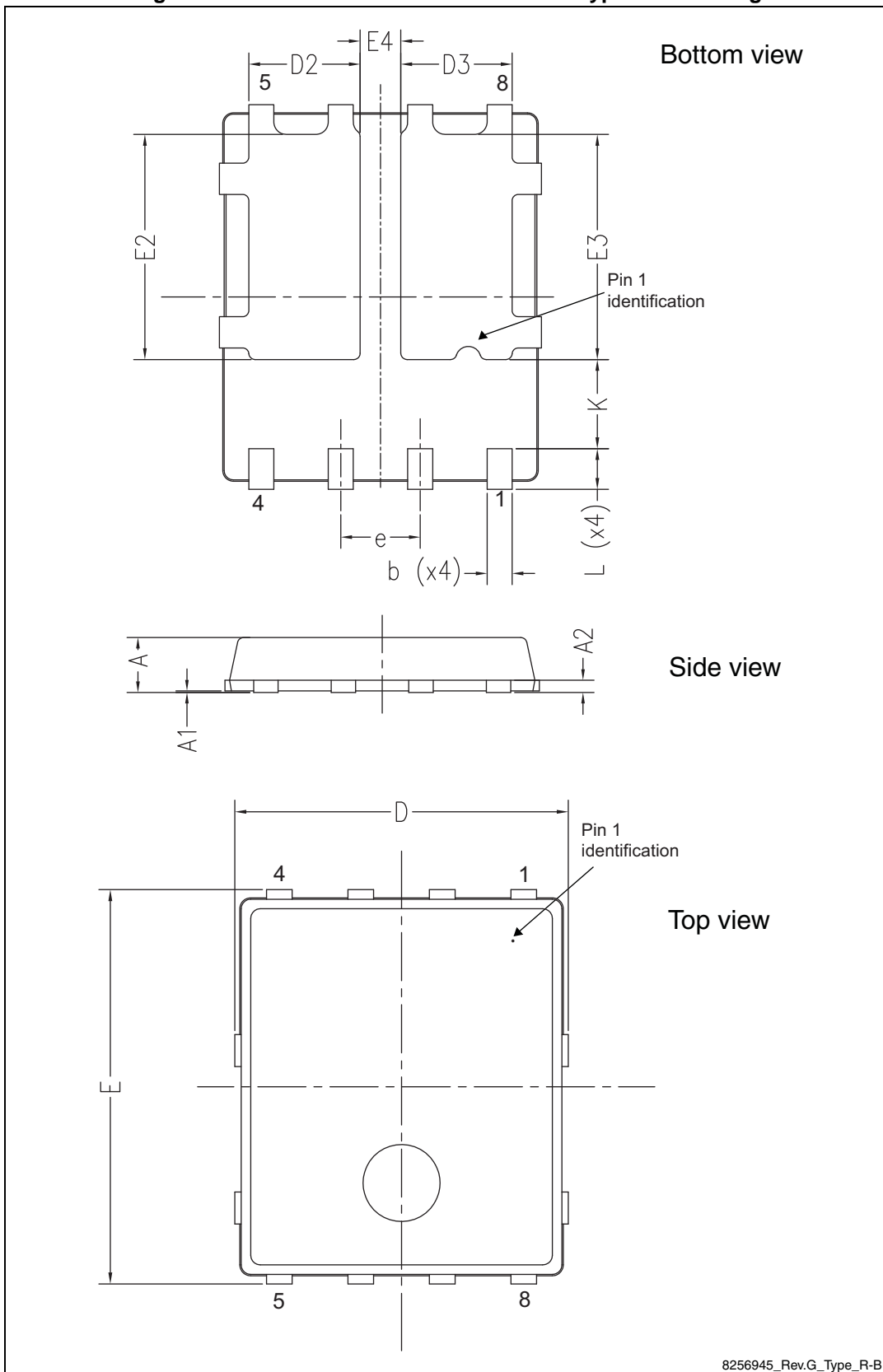
3 Test circuits



4 Package mechanical data

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. ECOPACK[®] is an ST trademark.

Figure 19. PowerFLAT™ 5x6 double island type R-B drawing



8256945_Rev.G_Type_R-B

Table 8. PowerFLAT™ 5x6 double island type R-B mechanical data

Ref.	Dimensions (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	1.68		1.88
E2	3.50		3.70
D3	1.68		1.88
E3	3.50		3.70
E4	0.55		0.75
e		1.27	
L	0.60		0.80
K	1.275		1.575

Figure 20. PowerFLAT 5x6 double island type WF drawing

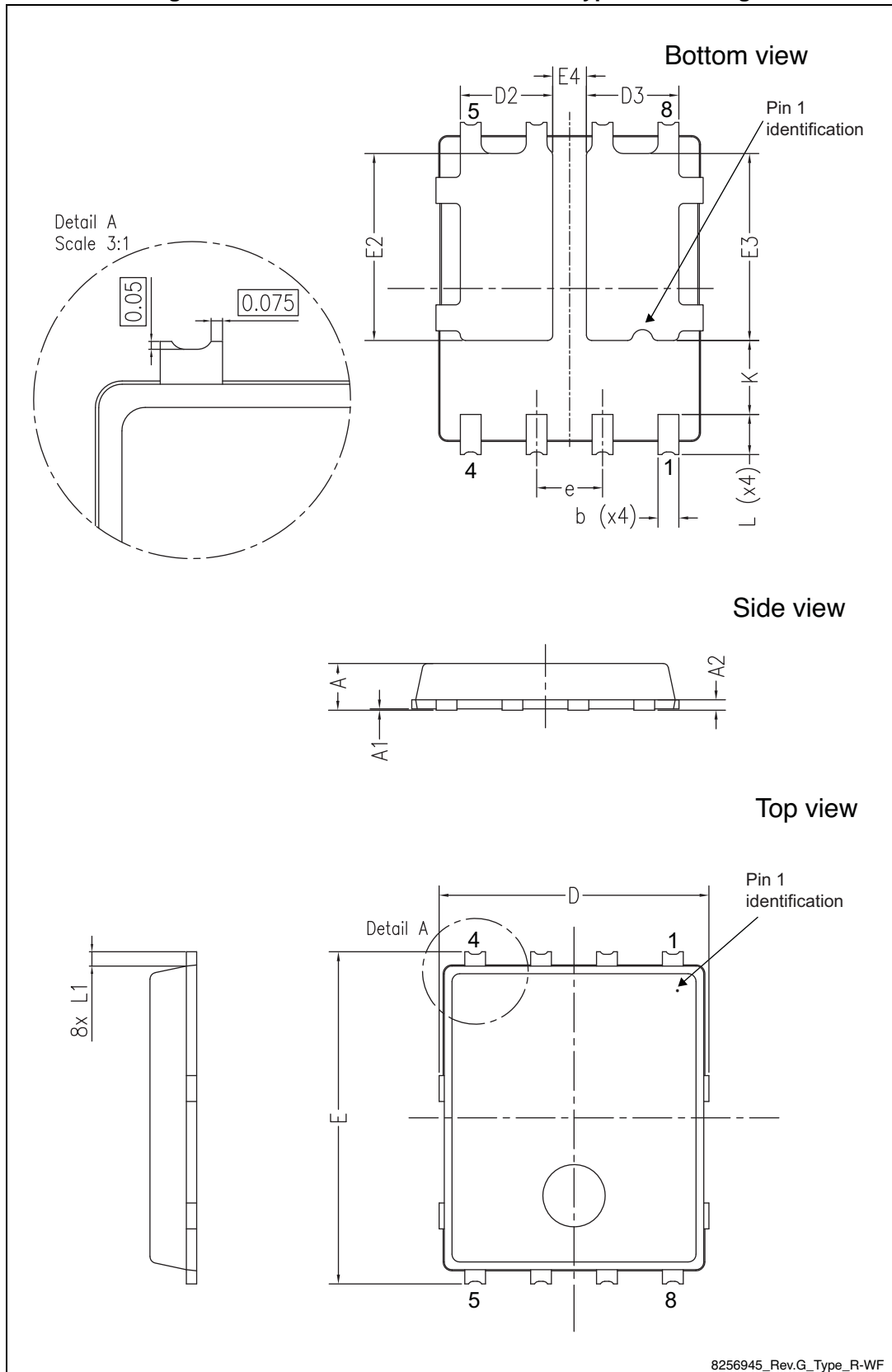
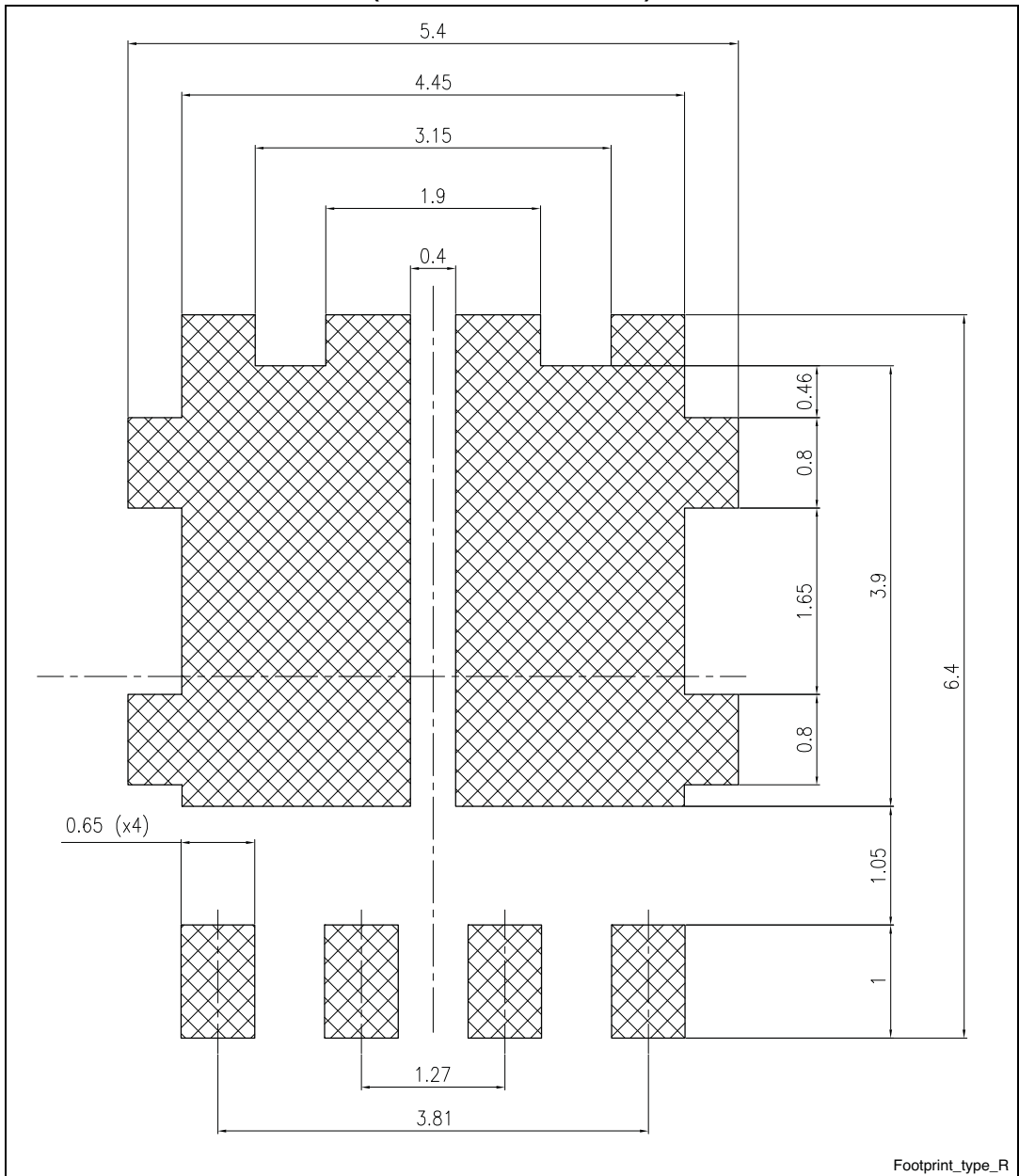


Table 9. PowerFLAT 5x6 double island type WF mechanical data

Ref.	Dimensions (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	6.20	6.40	6.60
D2	1.68		1.88
E2	3.50		3.70
D3	1.68		1.88
E3	3.50		3.70
E4	0.55		0.75
e		1.27	
L	0.70		0.90
L1		0.275	
K	1.275		1.575

Figure 21. PowerFLAT™ 5x6 double island type R drawing recommended footprint (dimensions are in mm)



5 Packaging mechanical data

Figure 22. PowerFLAT™ 5x6 double island type R-B tape^(a)

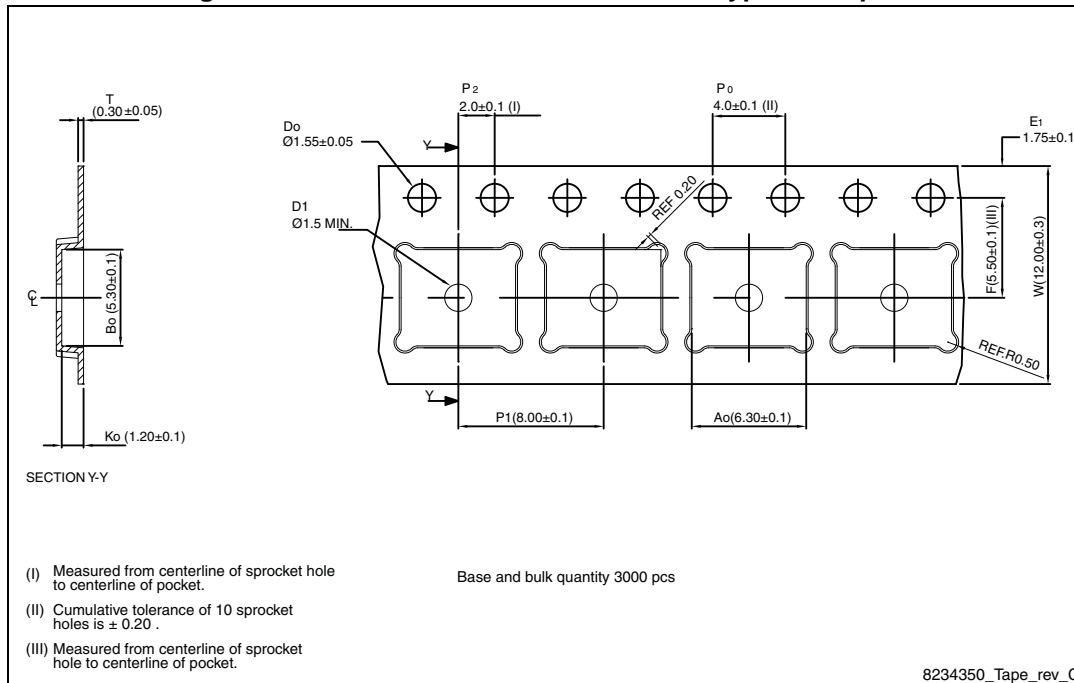
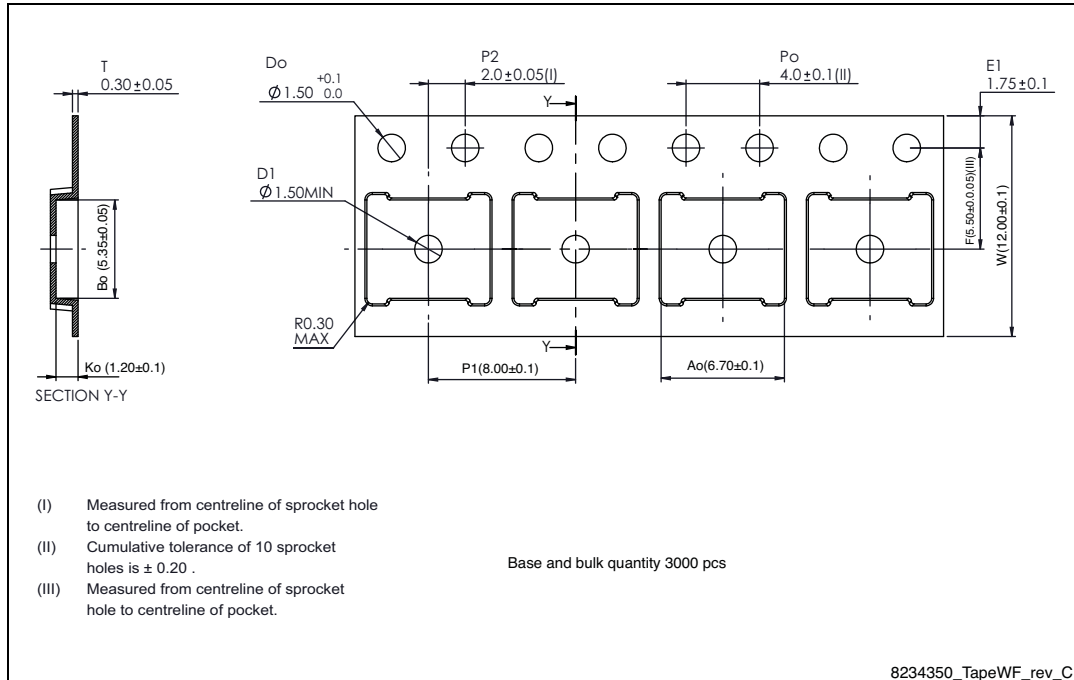


Figure 23. PowerFLAT 5x6 double island type WF tape^(a)



a. All dimensions are in millimeters.

Figure 24. PowerFLAT™ 5x6 package orientation in carrier tape

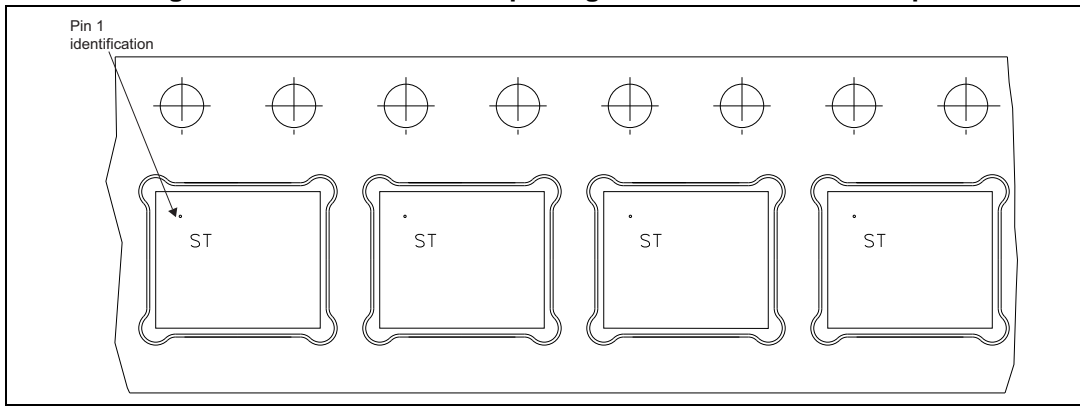
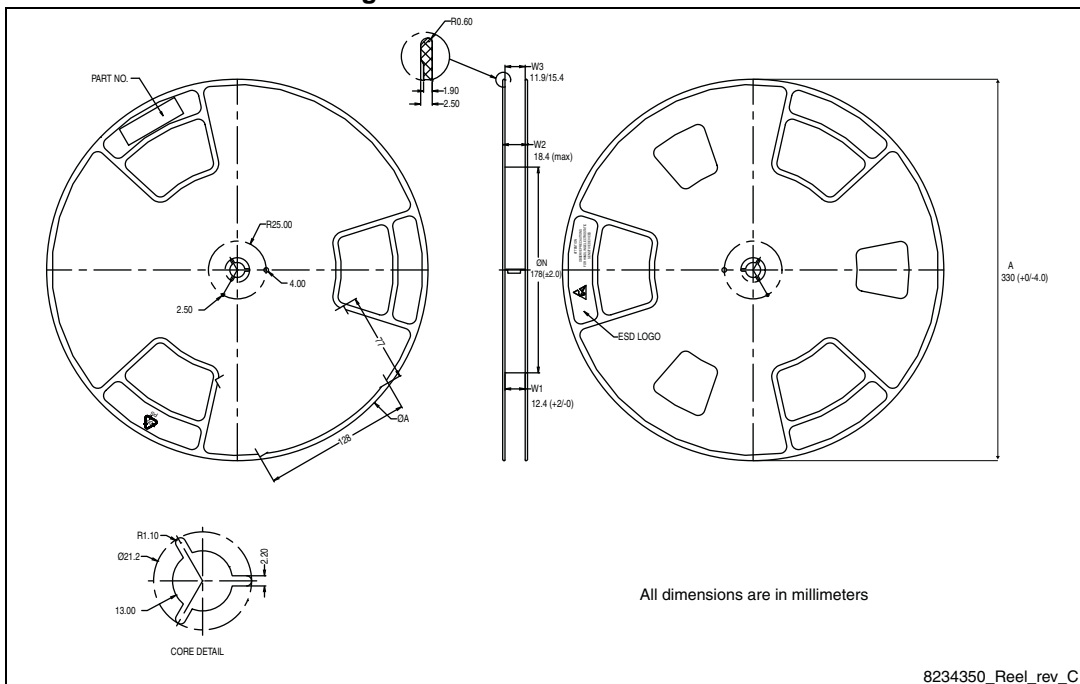


Figure 25. PowerFLAT™ 5x6 reel



6 Revision history

Table 10. Document revision history

Date	Revision	Changes
11-Oct-2011	1	First release.
19-Jun-2012	2	Added Section 2.1: Electrical characteristics (curves) . Updated Section 4: Package mechanical data and title on the cover page.
26-Jun-2012	3	Document status promoted from preliminary to production data.
24-Oct-2013	4	<ul style="list-style-type: none"> – Updated title and features in cover page – Modified: $V_{GS(th)}$ value in Table 4 – Updated: Section 4: Package mechanical data and Section 5: Packaging mechanical data – Minor text changes
20-Feb-2014	5	<ul style="list-style-type: none"> – Added: Features in cover page – Added: note 1 in Table 1 – Added: Table 20 and Table 9 – Added: Figure 23 – Minor text changes

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