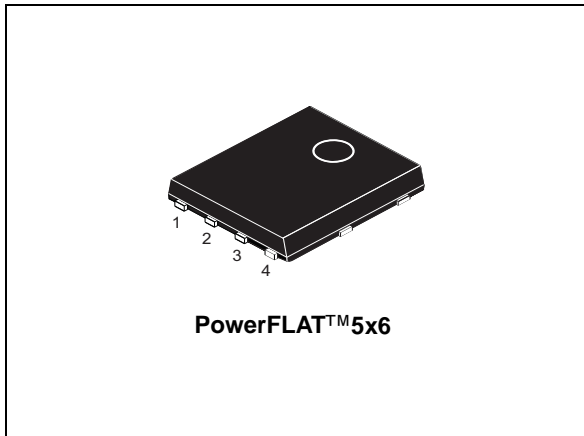


N-channel 30 V, 0.0027 Ω typ., 120 A STripFET™ H7 Power MOSFET plus monolithic Schottky in a PowerFLAT™ 5x6

Datasheet - production data



Features

Order code	V _{DS}	R _{DS(on)} max	I _D
STL110NS3LLH7	30 V	0.0034 Ω	120 A

- Very low on-resistance
- Very low Q_g
- 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

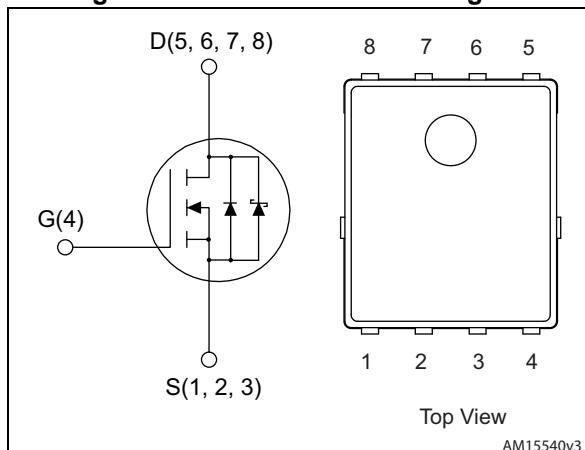


Table 1. Device summary

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

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- 2 Electrical characteristics 4**
 - 2.1 Electrical characteristics (curves) 6
- 3 Test circuits 8**
- 4 Package information 9**
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 - 4.2 Packing information 11
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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	30	V
V_{GS}	Gate-source voltage	± 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 inch², 2oz Cu, t < 10 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	μA
I_{GSS}	Gate-body leakage current	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{ V}$			± 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	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 14\text{ A}$		0.004	0.005	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	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 Figure 11)	-	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 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

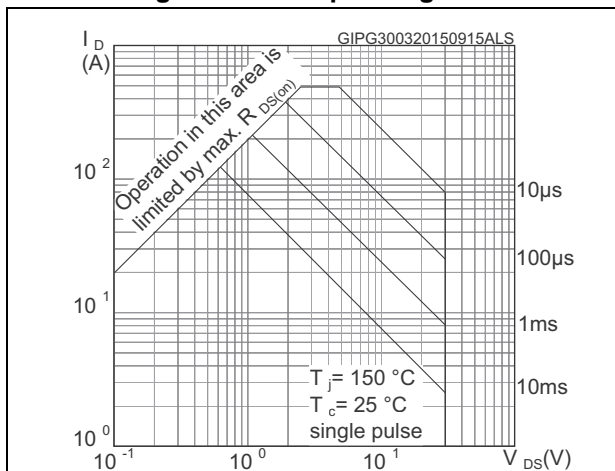


Figure 3. Thermal impedance

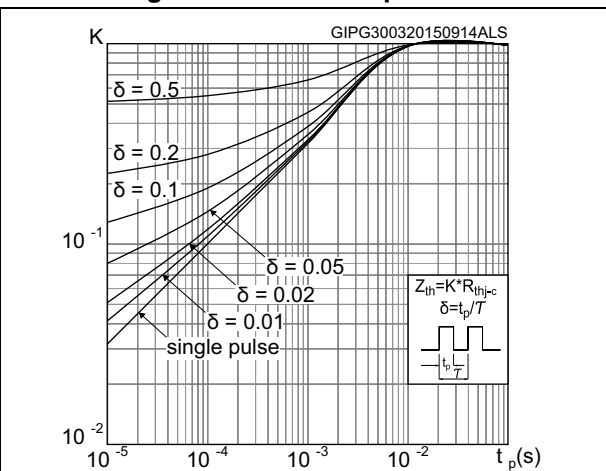


Figure 4. Output characteristics

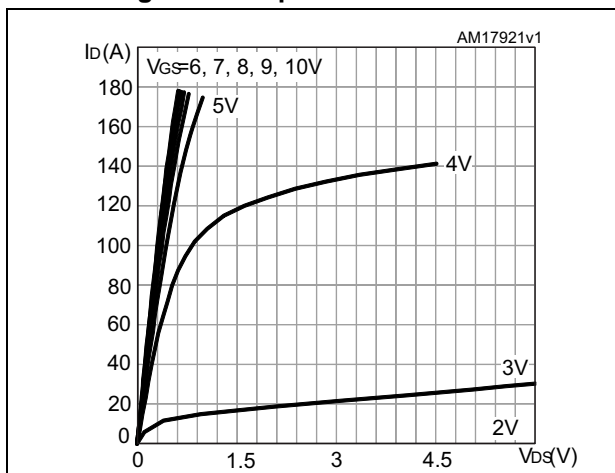


Figure 5. Transfer characteristics

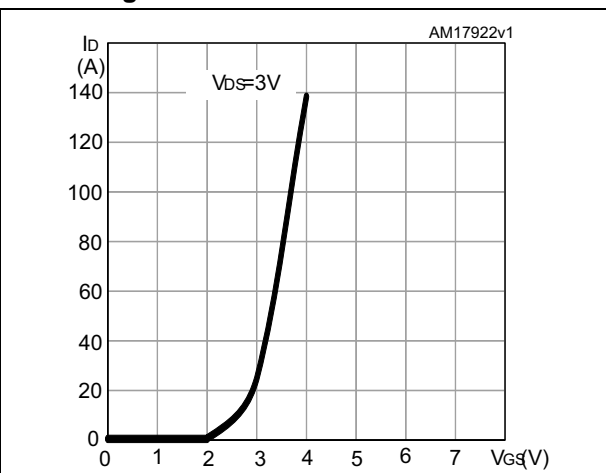


Figure 6. Gate charge vs gate-source voltage

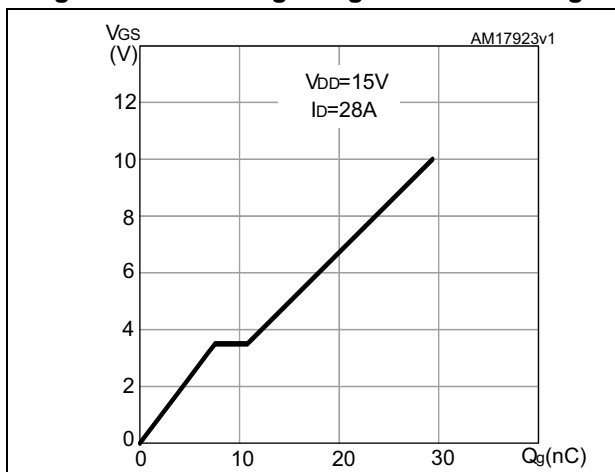


Figure 7. Static drain-source on-resistance

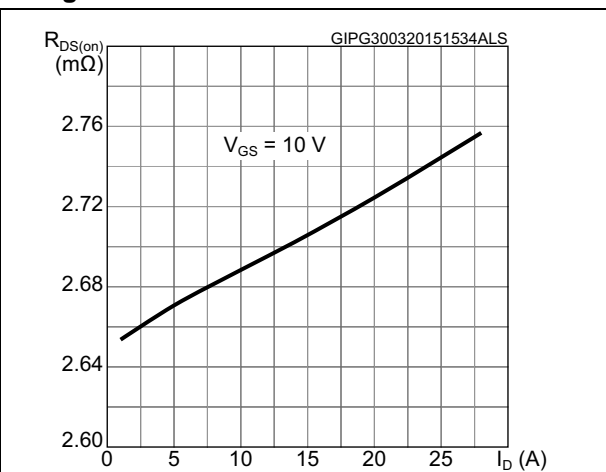


Figure 8. Capacitance variations

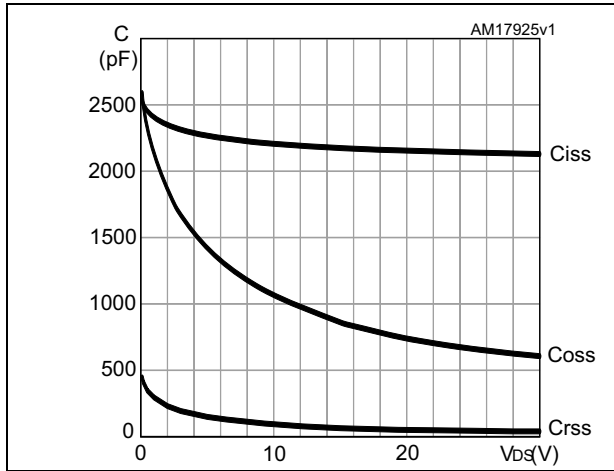
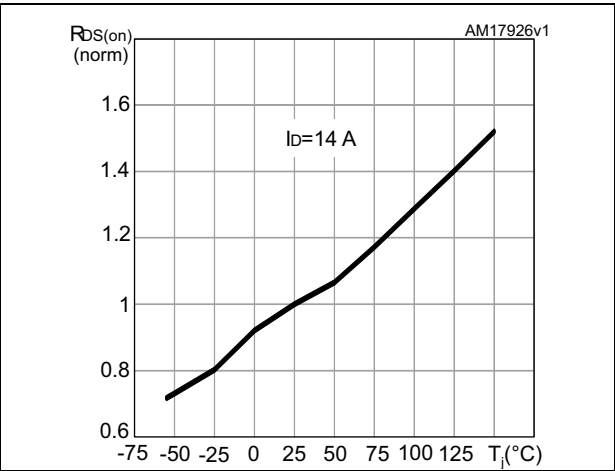
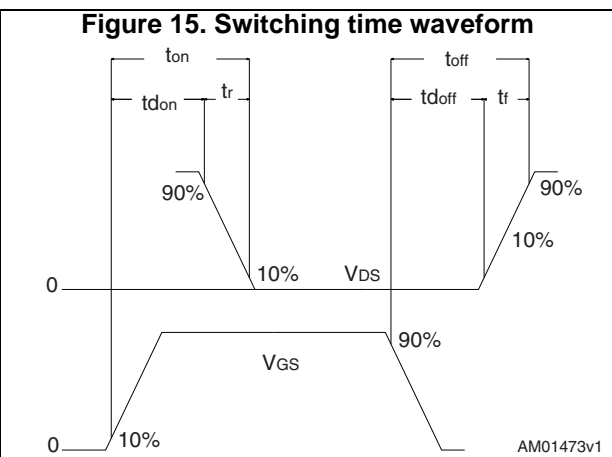
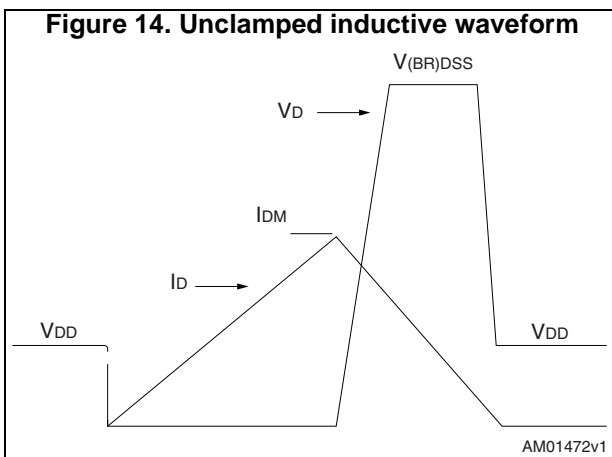
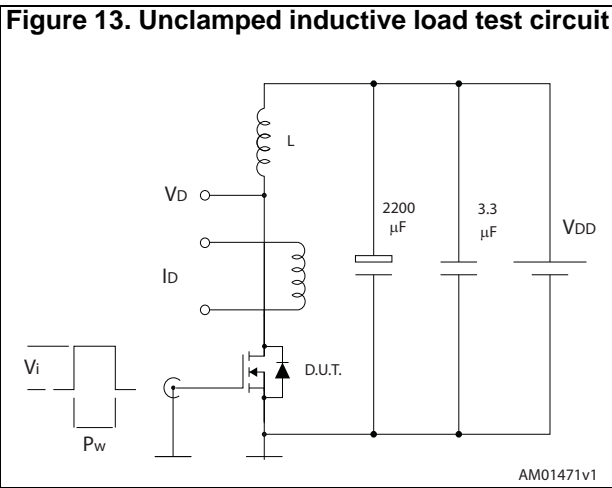
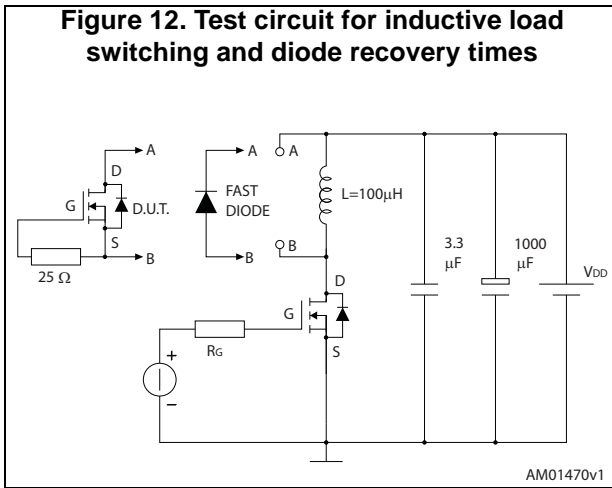
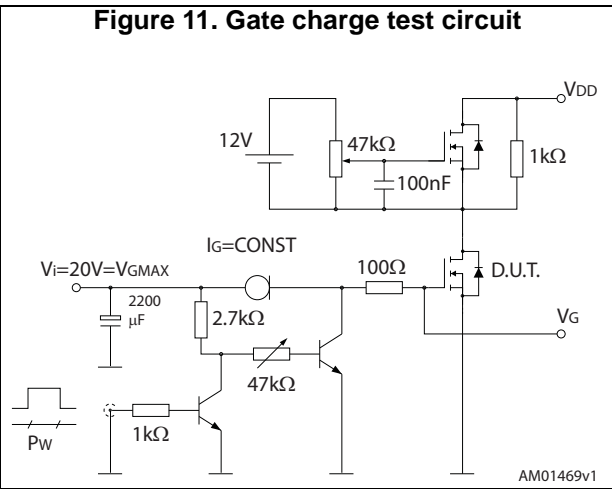
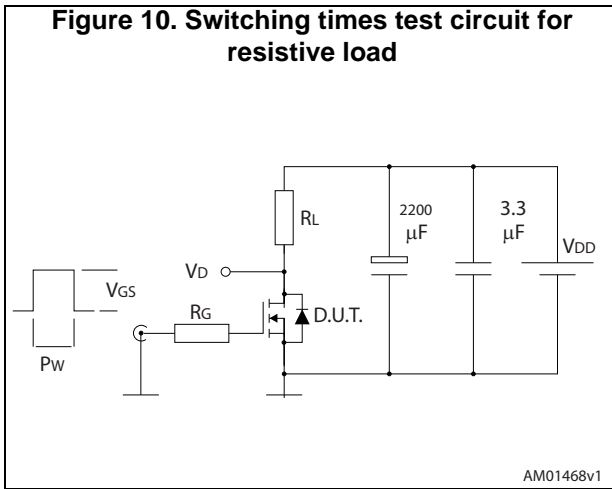


Figure 9. Normalized on-resistance vs temperature



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. ECOPACK® is an ST trademark.

4.1 PowerFLAT™ 5x6 type C package information

Figure 16. PowerFLAT™ 5x6 type C outline

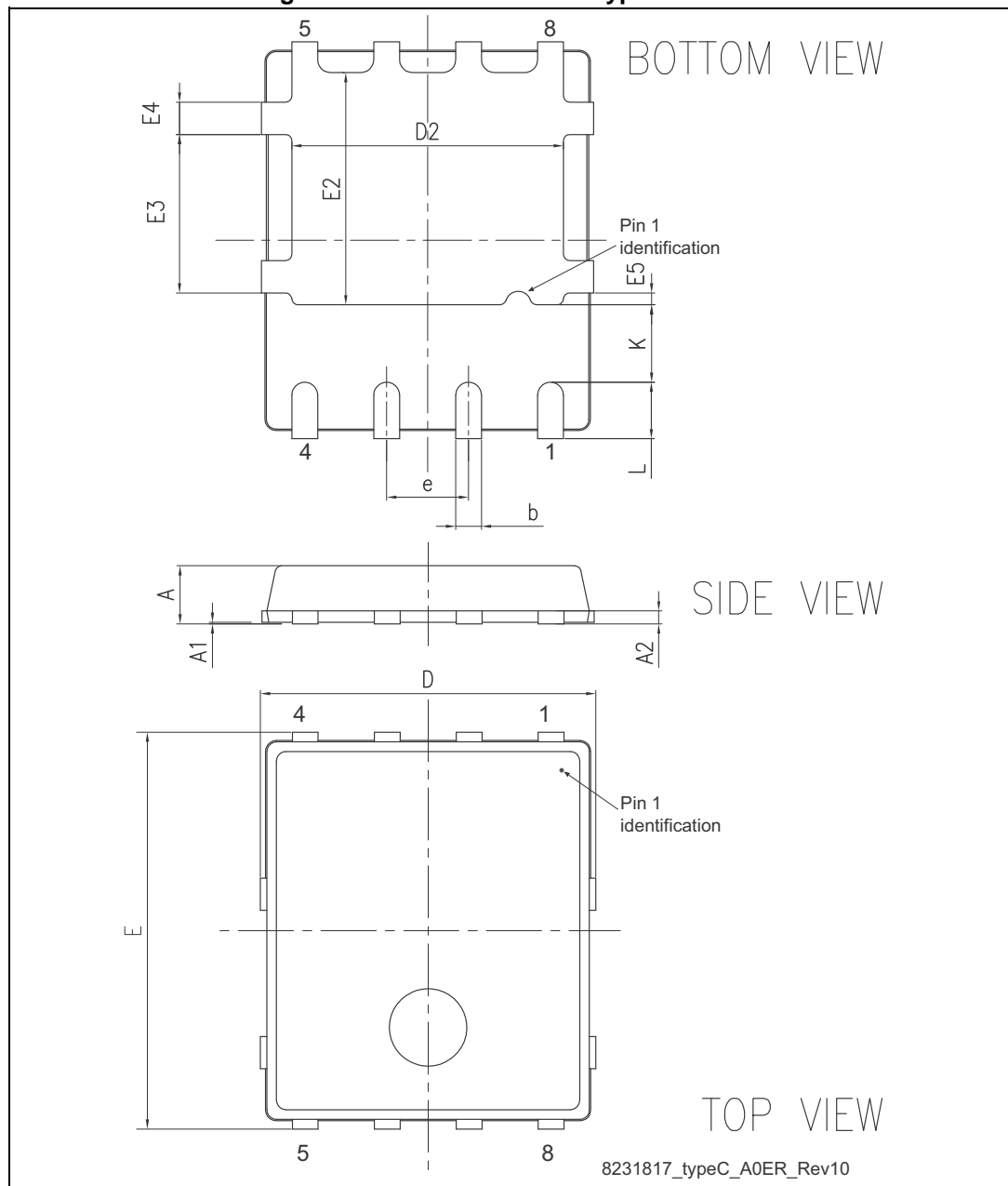
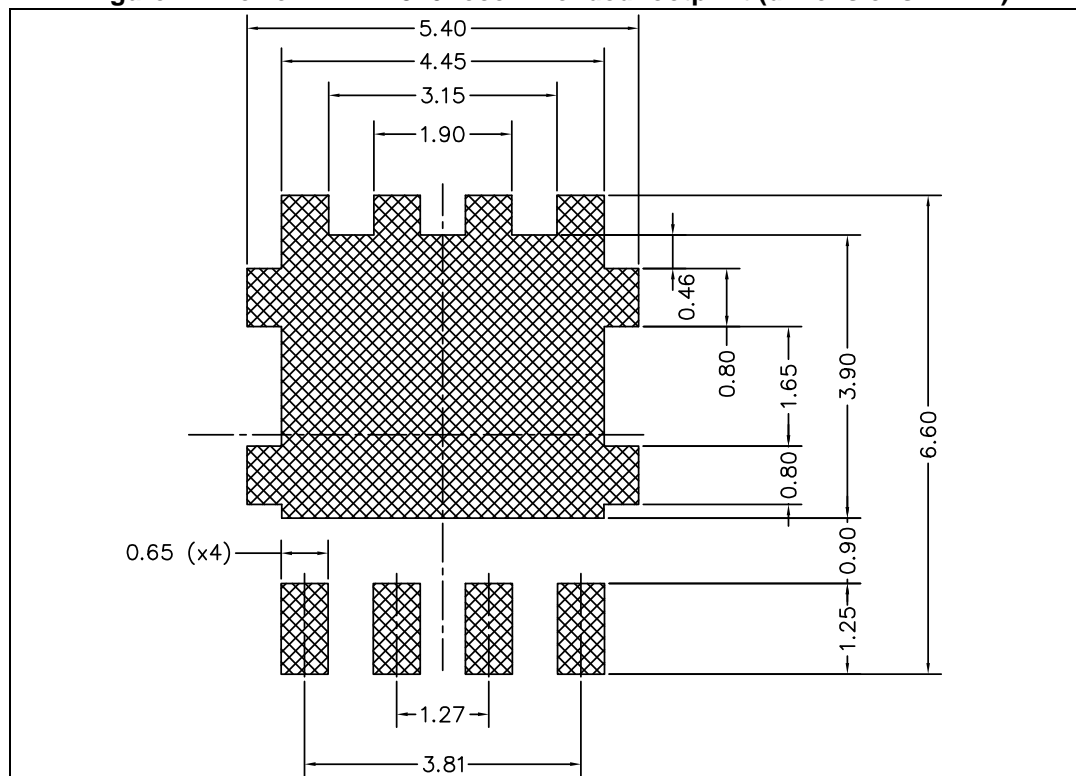


Table 8. PowerFLAT™ 5x6 type C mechanical data

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^(a)

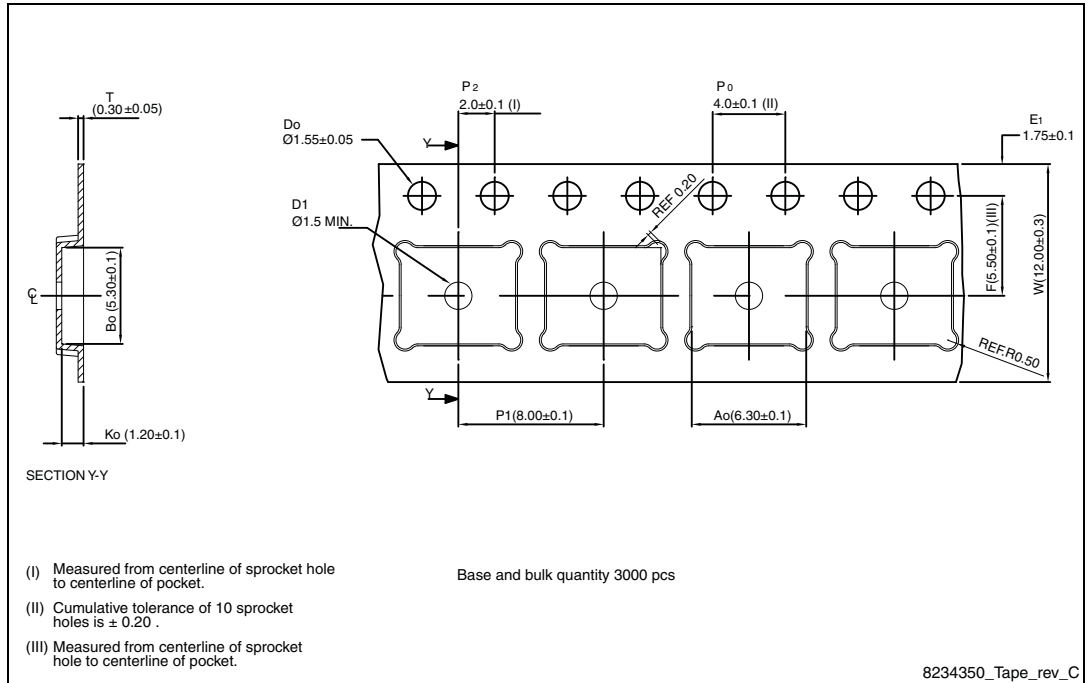
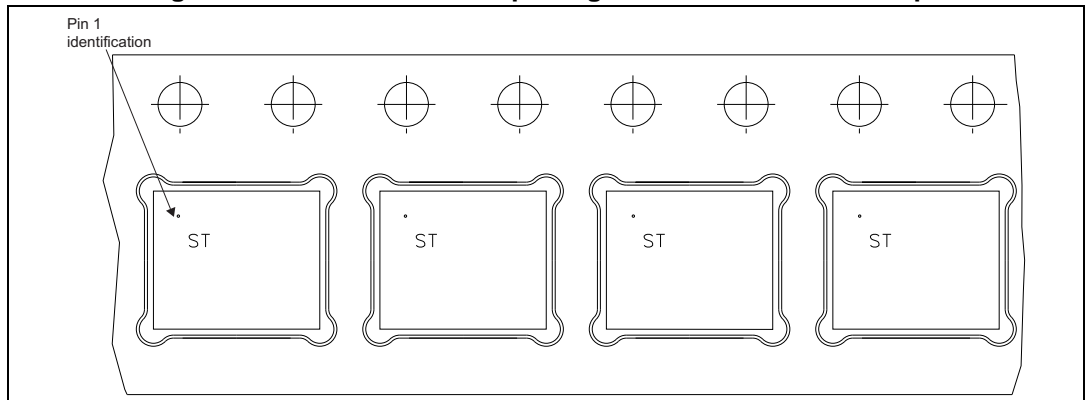
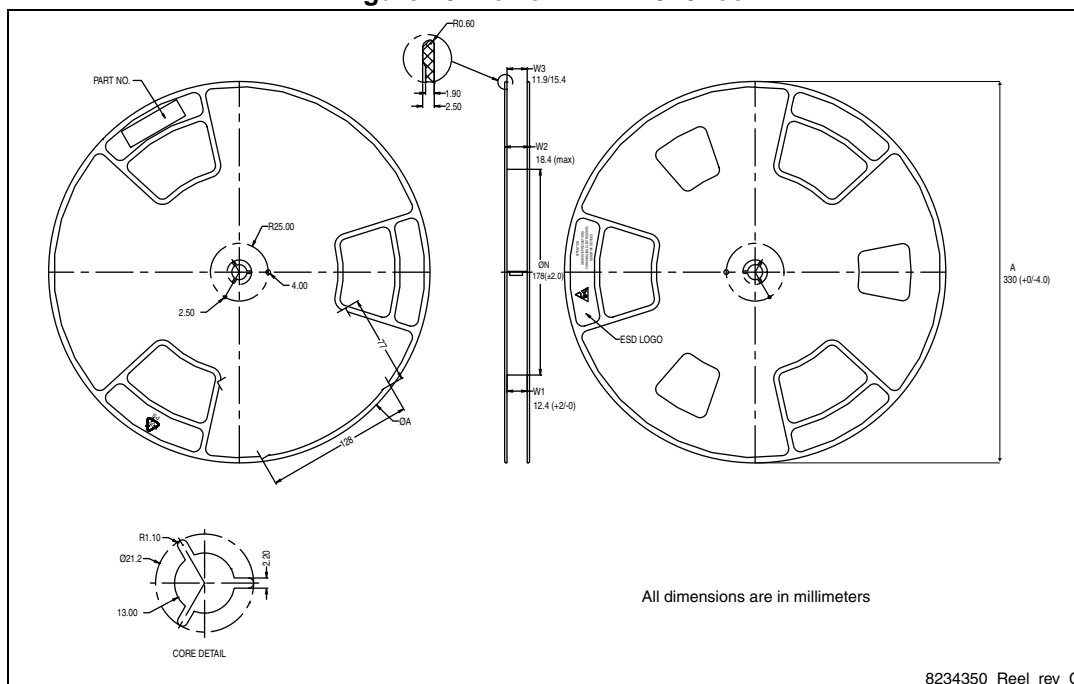


Figure 19. PowerFLAT™ 5x6 package orientation in carrier tape



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: Description 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 Section 1: Electrical ratings : – updated Table 2 and Table 3 In Section 2: Electrical characteristics : – updated Table 7 Added Section 2.1: Electrical characteristics (curves) Updated Section 4: Package information
10-Apr-2015	4	Promoted document from 'Preliminary data' to 'Production data'

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