STL45P3LLH6

P-channel -30 V, 11 mΩ typ., -45 A STripFET™ H6 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data

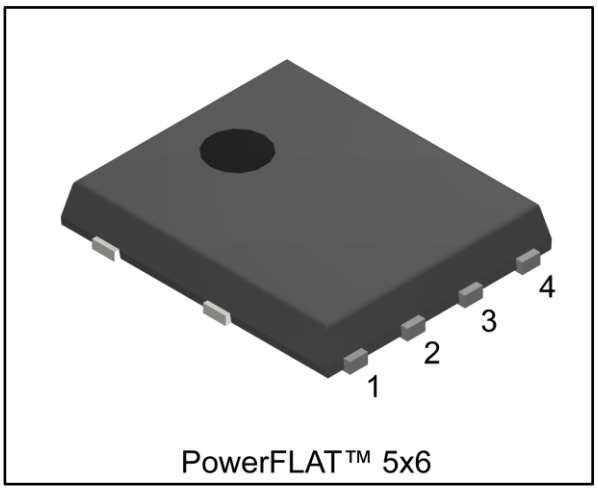
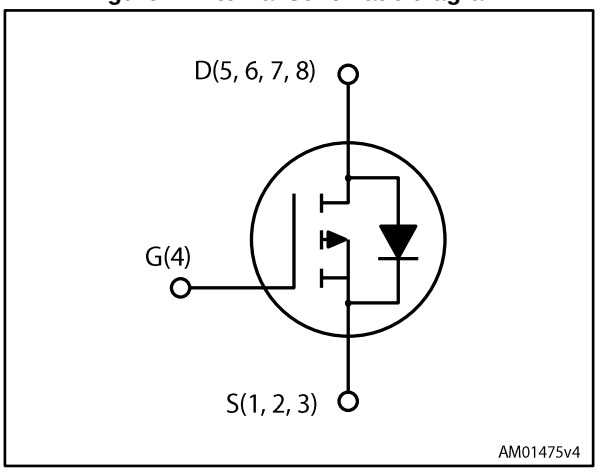


Figure 1: Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D
STL45P3LLH6	-30 V	13 mΩ	-45 A

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

Applications

- Switching applications

Description

This device is a P-channel Power MOSFET developed using the STripFET™ H6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low $R_{DS(on)}$ in all packages.

Table 1: Device summary

Order code	Marking	Package	Packing
STL45P3LLH6	45P3LLH6	PowerFLAT™ 5x6	Tape and reel

Contents

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) at T_C = 25 °C	-45	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	-34	A
I_D (2)	Drain current (continuous) at T_{pcb} = 25 °C	-12	A
I_D (2)	Drain current (continuous) at T_{pcb} = 100 °C	-8.7	A
I_{DM} (1)(3)	Drain current (pulsed)	-180	A
I_{DM} (2)(3)	Drain current (pulsed)	-48	A
P_{TOT} (1)	Total dissipation at T_c= 25 °C	75	W
P_{TOT} (2)	Total dissipation at T_{pcb}= 25 °C	4.8	W
T_{stg}	Storage temperature range	- 55 to 175	°C
T_j	Operating junction temperature range		

Notes:

(1)The value is rated according to $R_{thj\text{-}c}$.

(2)This value is rated according to $R_{thj\text{-}pcb}$

(3)Pulse width is limited by safe operating area

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	2.00	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb	31.3	°C/W

Notes:

(1)When mounted on FR-4 board of 1inch², 2oz Cu, t < 10 sec

2 Electrical characteristics

(T_C = 25 °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 = - 1 mA	-30			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0, V_{DS} = -30 V			-1	µA
		V_{GS} = 0, V_{DS} = -30 V, T_C = 125 °C (1)			-10	µA
I_{GSS}	Gate-body leakage current	V_{DS} = 0, V_{GS} = ± 20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = -250 µA	-1			V
$R_{DS(on)}$	Static drain-source on- resistance	V_{GS} = -10 V, I_D =-6 A		11	13	mΩ
		V_{GS} = -4.5 V, I_D = -6 A		16	19.5	mΩ

Notes:

(1)Defined by design, not subject to production test.

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = -25 V, f = 1 MHz, V_{GS} = 0	-	2615	-	pF
C_{oss}	Output capacitance		-	340	-	pF
C_{rss}	Reverse transfer capacitance		-	235	-	pF
Q_g	Total gate charge	V_{DD} = -15 V, I_D = -12 A, V_{GS} = -4.5 V	-	24	-	nC
Q_{gs}	Gate-source charge		-	9	-	nC
Q_{gd}	Gate-drain charge		-	8	-	nC

Table 6: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = -15 V, I_D = -6 A, R_G = 4.7 Ω, V_{GS} = -10 V	-	13.2	-	ns
t_r	Rise time		-	93	-	ns
$t_{d(off)}$	Turn-off delay time		-	50	-	ns
t_f	Fall time		-	18	-	ns

Table 7: Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD} (1)	Forward on voltage	I_{SD} = -6 A, V_{GS} = 0	-		-1.1	V
t_{rr}	Reverse recovery time	I_{SD} = -6 A, di/dt = 100 A/µs V_{DD} = -16 V, T_j=150 °C	-	20		ns
Q_{rr}	Reverse recovery charge		-	16		nC
I_{RRM}	Reverse recovery current		-	-1.6		A

Notes:

(1)Pulsed: pulse duration = 300 µs, duty cycle 1.5%

2.2 Electrical characteristics (curves)

Note: For the P-channel Power MOSFET, current and voltage polarities are reversed.

Figure 2: Safe operating area

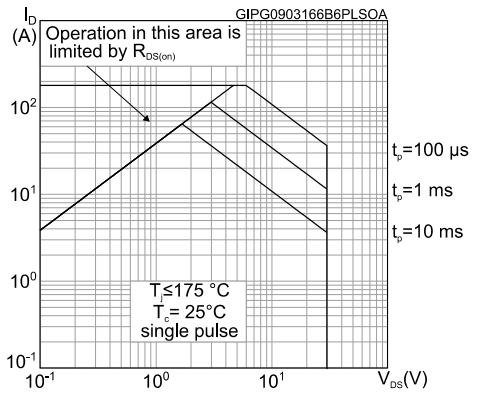


Figure 3: Thermal impedance

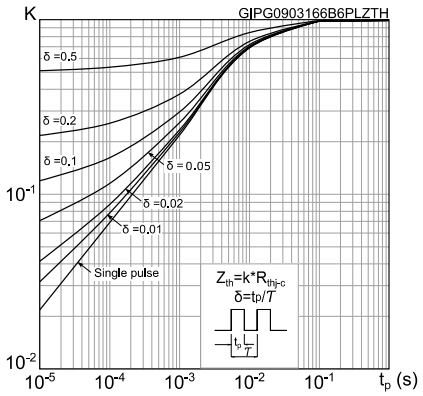


Figure 4: Output characteristics

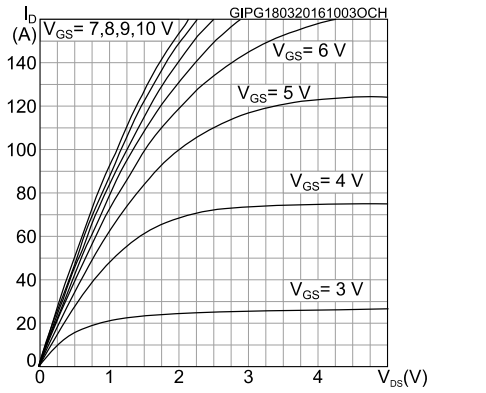


Figure 5: Transfer characteristics

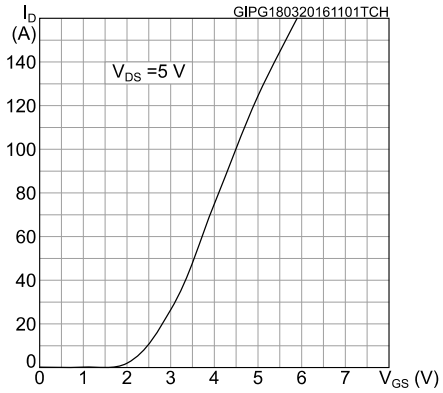


Figure 6: Gate charge vs gate-source voltage

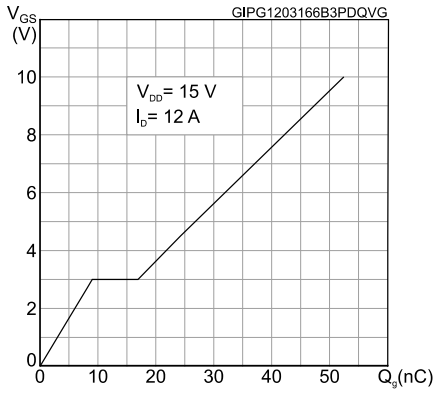


Figure 7: Static drain-source on-resistance

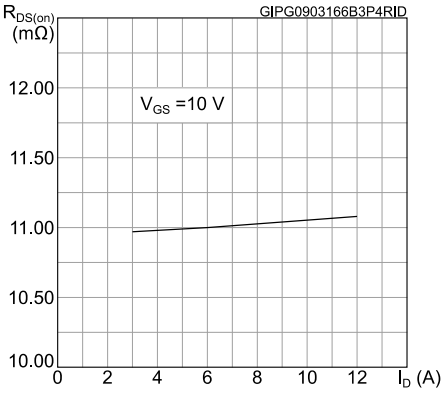


Figure 8: Capacitance variations

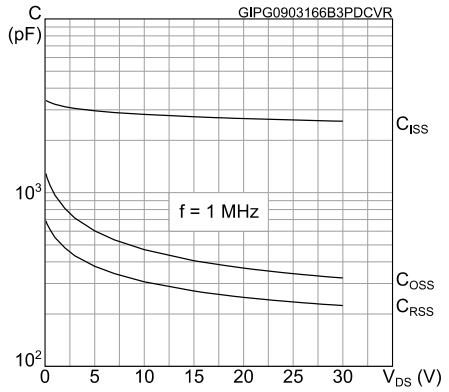


Figure 9: Normalized gate threshold voltage vs temperature

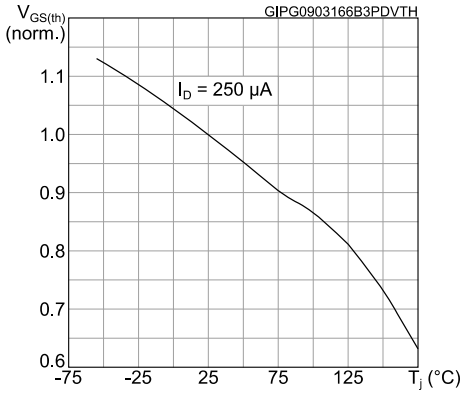


Figure 10: Normalized on-resistance vs temperature

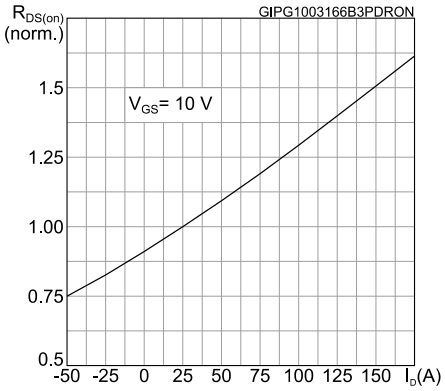


Figure 11: Normalized $V_{(BR)DSS}$ vs temperature

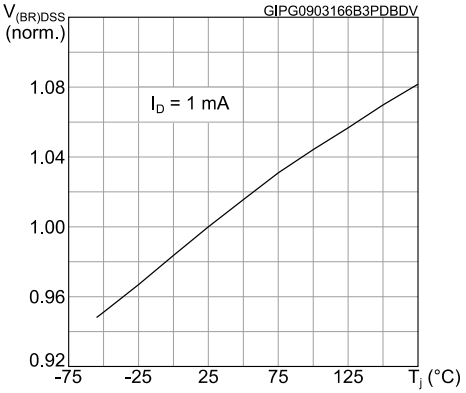
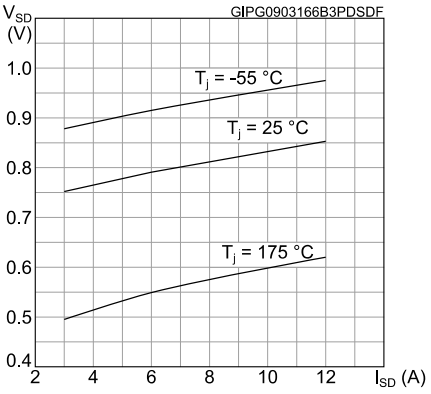


Figure 12: Source-drain diode forward characteristics



3 Test circuits

Figure 13: Switching times test circuit for resistive load

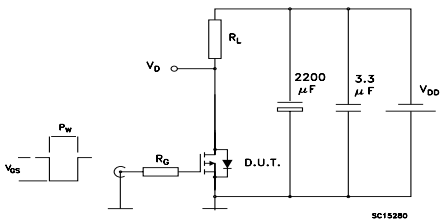


Figure 14: Gate charge test circuit

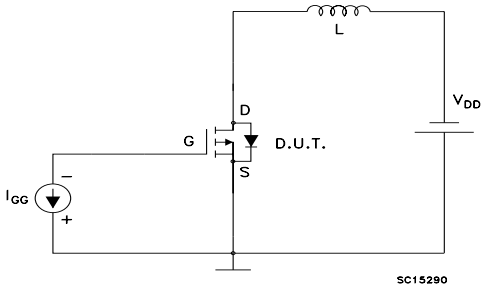
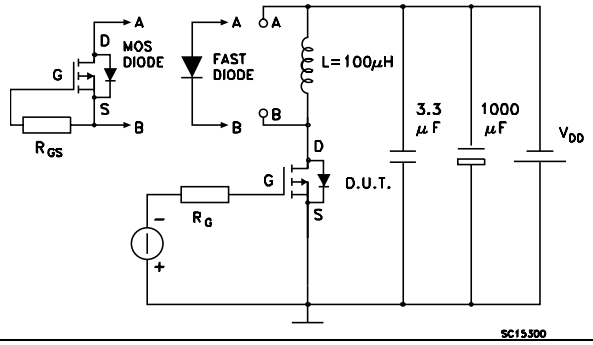


Figure 15: Test circuit for inductive load switching and diode recovery times



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 package information

Figure 16: PowerFLAT™ 5x6 type R package outline

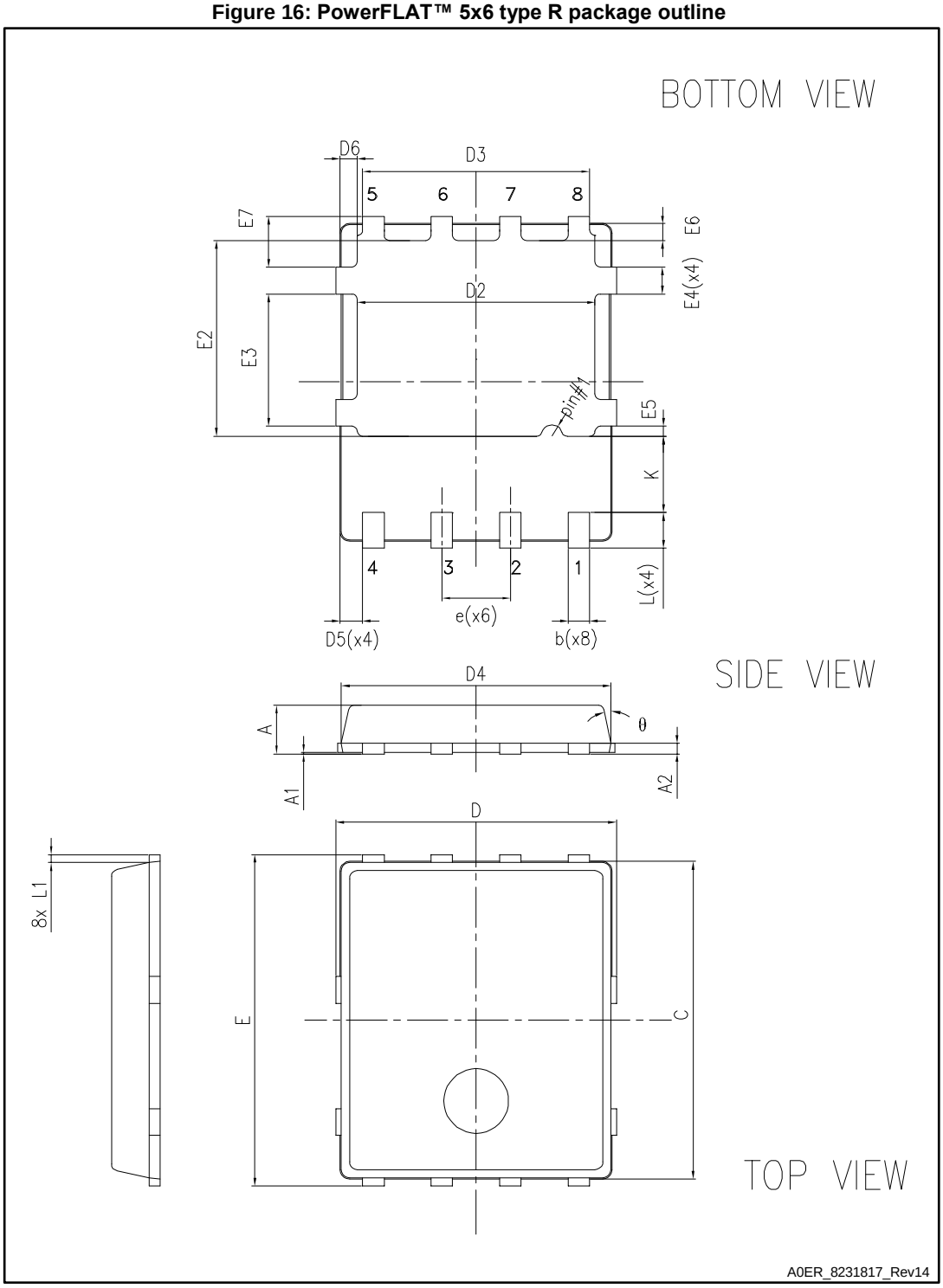
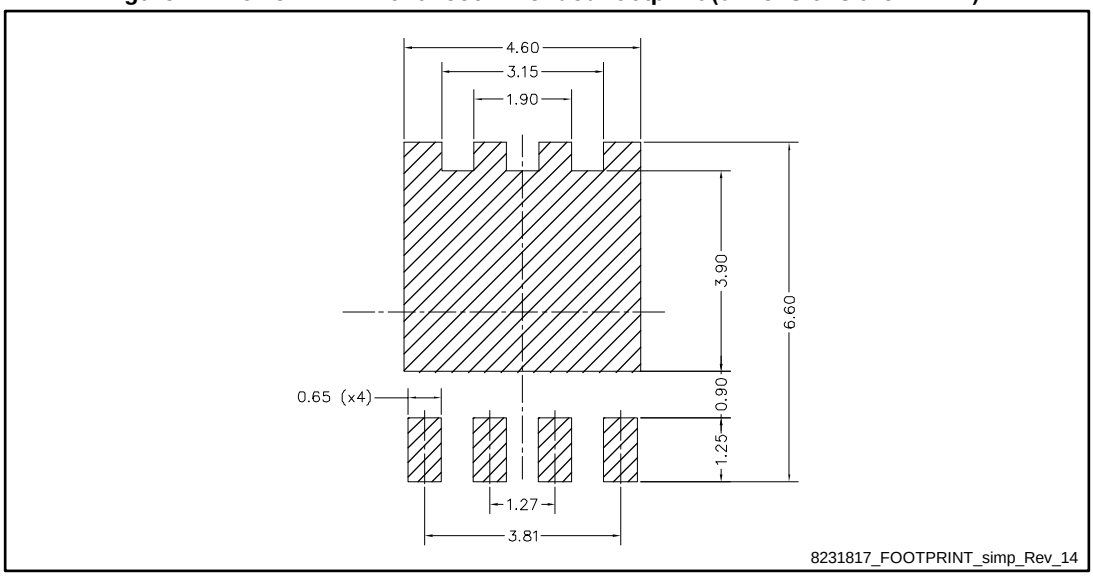


Table 8: PowerFLAT™ 5x6 type R mechanical data

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	6.20
D	5.00	5.20	5.40
D2	4.15		4.45
D3	4.05	4.20	4.35
D4	4.80	5.00	5.20
D5	0.25	0.40	0.55
D6	0.15	0.30	0.45
e		1.27	
E	5.95	6.15	6.35
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	0.75	0.90	1.05
K	1.275		1.575
L	0.60		0.80
L1	0.05	0.15	0.25
θ		0°	12°

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



4.2 PowerFLAT™ 5x6 packaging information

Figure 18: PowerFLAT™ 5x6 tape (dimensions are in mm)

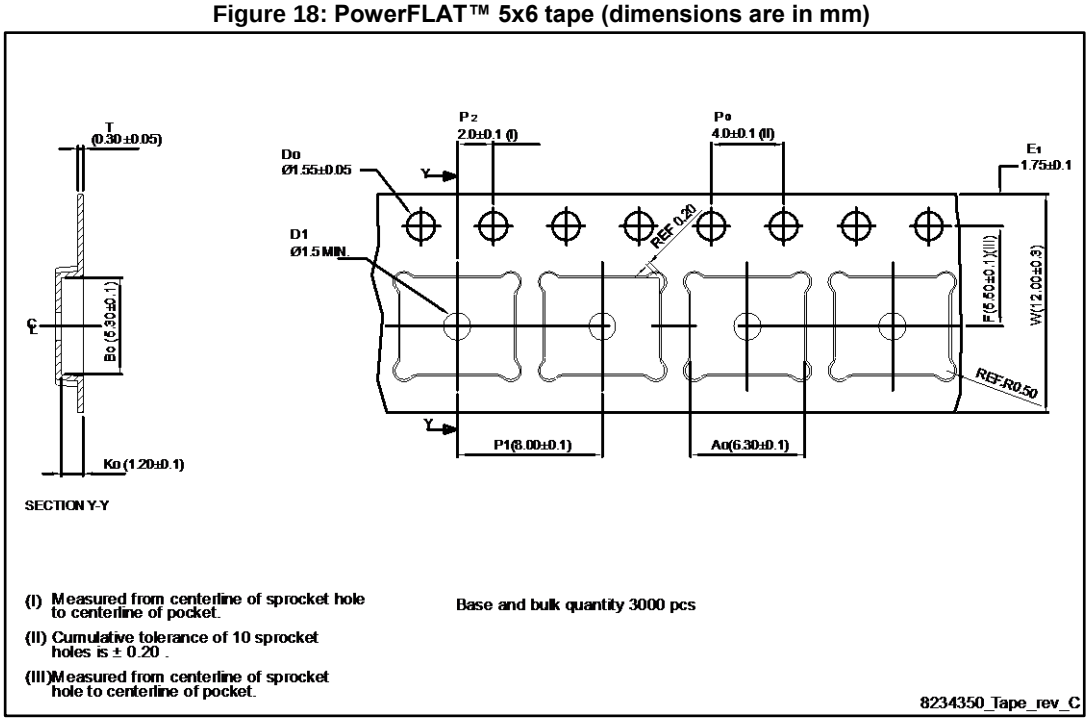


Figure 19: PowerFLAT™ 5x6 package orientation in carrier tape

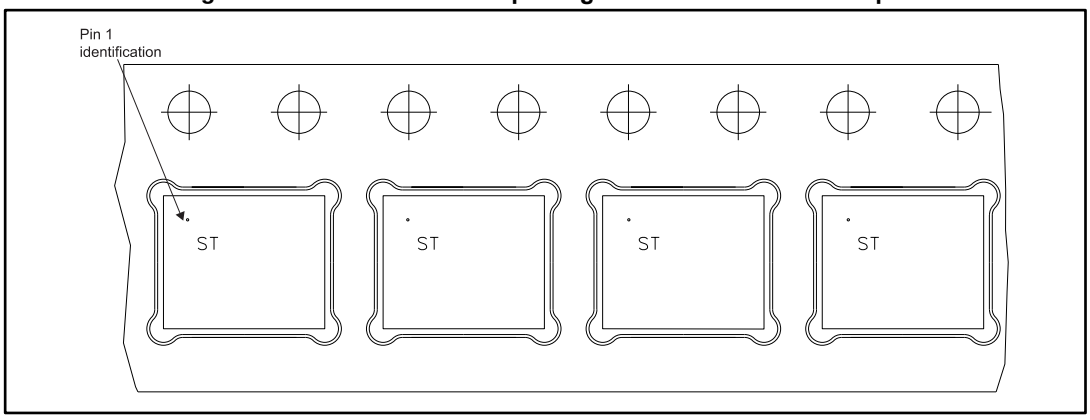
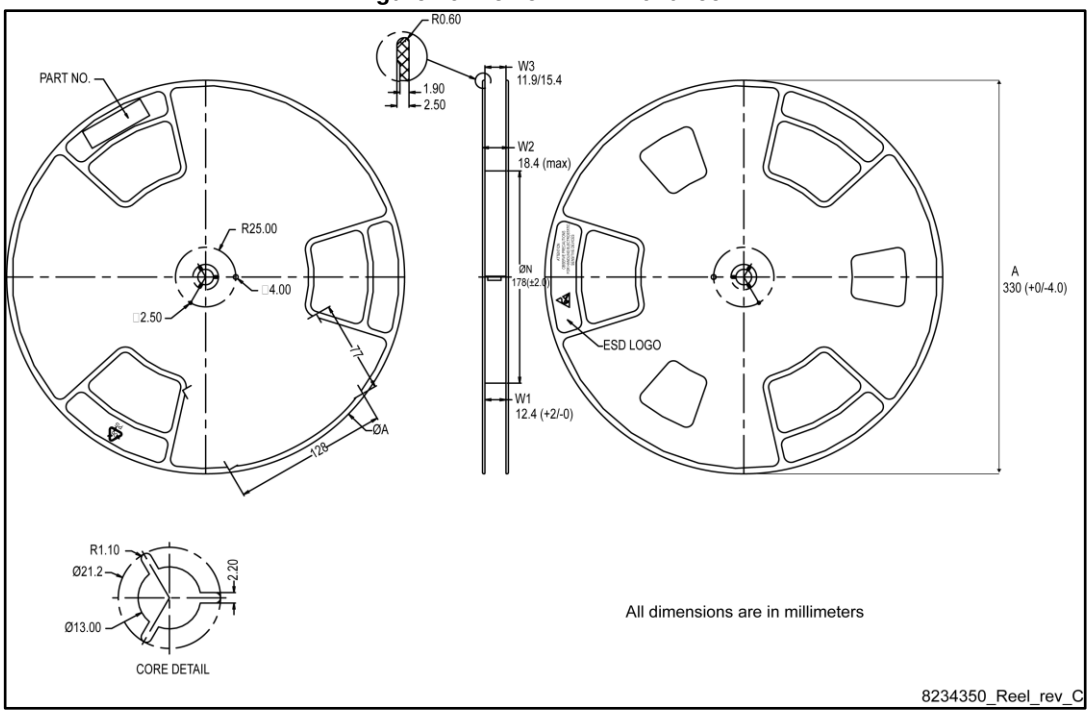


Figure 20: PowerFLAT™ 5x6 reel



5 Revision history

Table 9: Document revision history

Date	Revision	Changes
01-Apr-2016	1	First release.

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