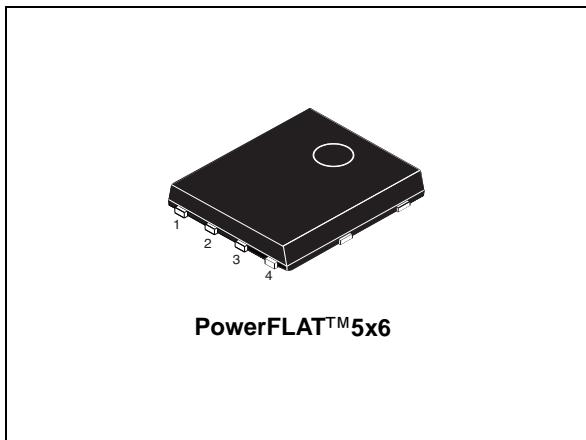


Automotive-grade N-channel 100 V, 0.008 Ω typ., 16 A STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 package

Datasheet - production data

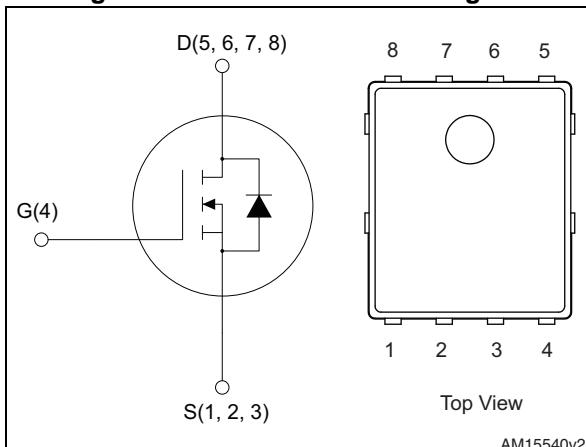


Features

Order code	V _{DS}	R _{DS(on)} max	I _D	P _{TOT}
STL92N10F7AG	100 V	0.0095 Ω	16 A	5 W

- Designed for automotive applications and AEC-Q101 qualified
- Among the lowest R_{DS(on)} on the market
- Excellent figure of merit (FoM)
- Low C_{rss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness
- Wettable flank package

Figure 1. Internal schematic diagram



Applications

- Switching applications

Description

This N-channel Power MOSFET utilizes STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1. Device summary

Order code	Marking	Package	Packaging
STL92N10F7AG	92N10F7	PowerFLAT™ 5x6	Tape and reel

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	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	70	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	50	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25^\circ\text{C}$	16	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 100^\circ\text{C}$	11	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	64	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25^\circ\text{C}$	100	W
$P_{TOT}^{(2)}$	Total dissipation at $T_{pcb} = 25^\circ\text{C}$	5	W
T_{stg}	Storage temperature	-55 to 175 °C	°C
T_j	Operating junction temperature		

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.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	31	°C/W
$R_{thj-case}$	Thermal resistance junction-case max	1.5	°C/W

1. When mounted on FR-4 board of 1 inch², 2 oz Cu.

2 Electrical characteristics

($T_C = 25^\circ\text{C}$ unless otherwise specified)

Table 4. On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source breakdown voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0$	100			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 100 \text{ V}$			1	μA
		$V_{DS} = 100 \text{ V}, T_C = 125^\circ\text{C}$			100	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20 \text{ V}$			± 100	nA
$V_{GS(\text{th})}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2.5	3.5	4.5	V
$R_{DS(\text{on})}$	Static drain-source on-resistance	$V_{GS} = 10 \text{ V}, I_D = 8 \text{ A}$		0.008	0.0095	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 50 \text{ V}, f = 1 \text{ MHz}, V_{GS} = 0$	-	3100	-	pF
C_{oss}	Output capacitance		-	700	-	pF
C_{rss}	Reverse transfer capacitance		-	45	-	pF
Q_g	Total gate charge	$V_{DD} = 50 \text{ V}, I_D = 16 \text{ A}, V_{GS} = 10 \text{ V}$ (see Figure 14)	-	45	-	nC
Q_{gs}	Gate-source charge		-	18	-	nC
Q_{gd}	Gate-drain charge		-	13	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(\text{on})}$	Turn-on delay time	$V_{DD} = 50 \text{ V}, I_D = 8 \text{ A}, R_G = 4.7 \Omega, V_{GS} = 10 \text{ V}$ (see Figure 15 and Figure 18)	-	19	-	ns
t_r	Rise time		-	32	-	ns
$t_{d(\text{off})}$	Turn-off delay time		-	36	-	ns
t_f	Fall time		-	13	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		16	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		64	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 16 \text{ A}, V_{GS} = 0$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD} = 16 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 80 \text{ V}, T_j=150 \text{ }^\circ\text{C}$ (see <i>Figure 18</i>)	-	70		ns
Q_{rr}	Reverse recovery charge		-	125		nC
I_{RRM}	Reverse recovery current		-	3.6		A

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

2.1 Electrical characteristics (curves)

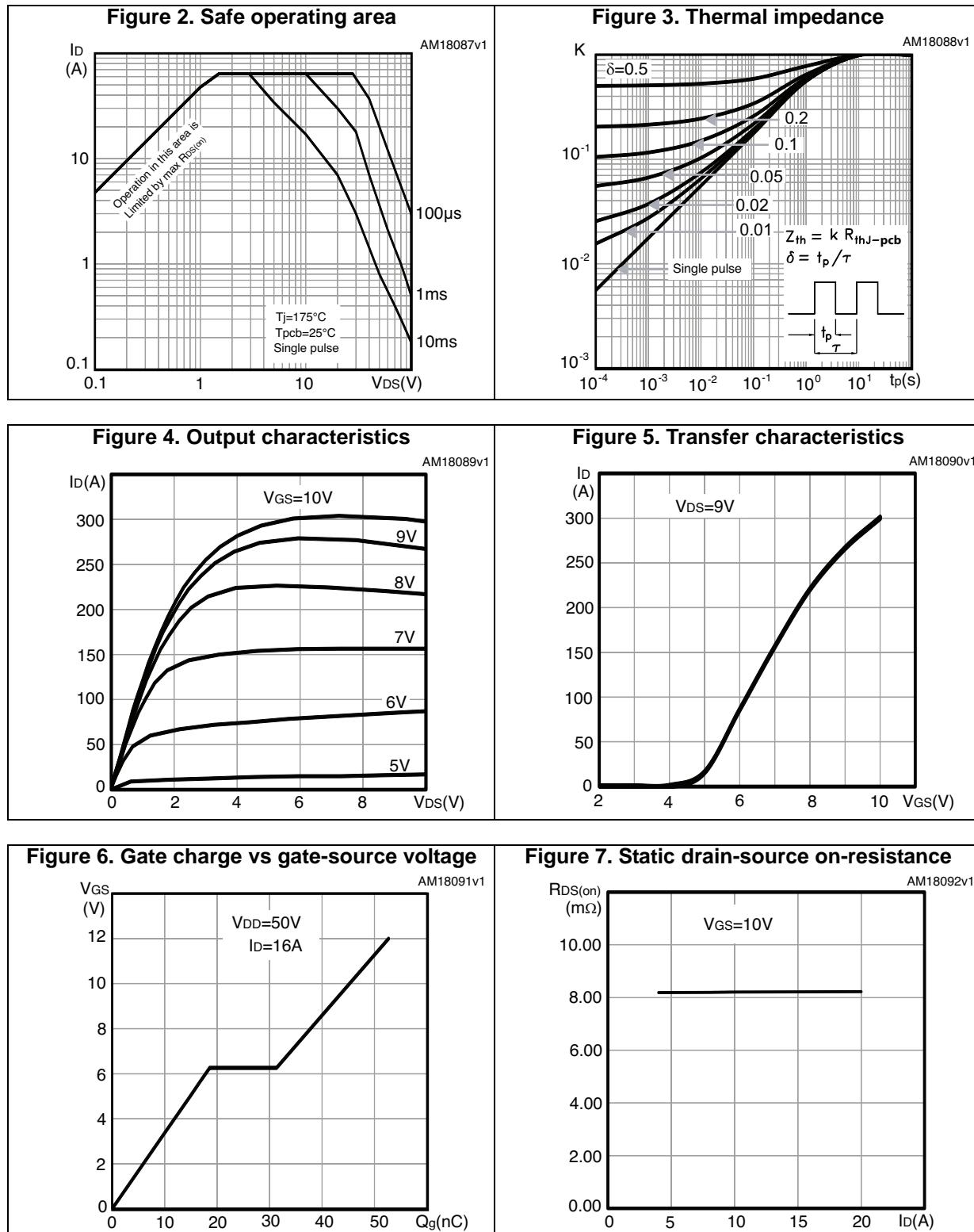
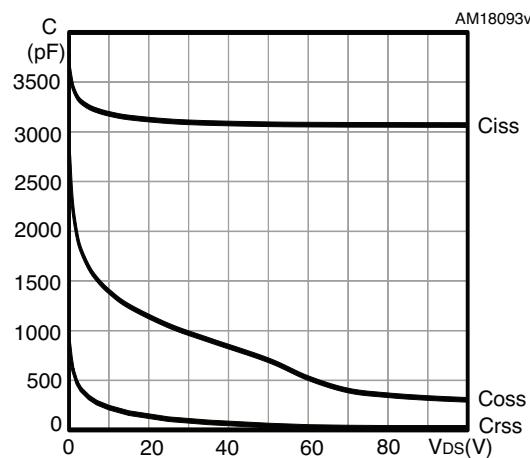
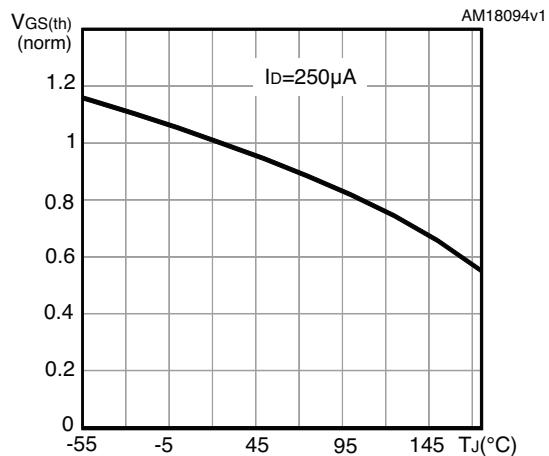
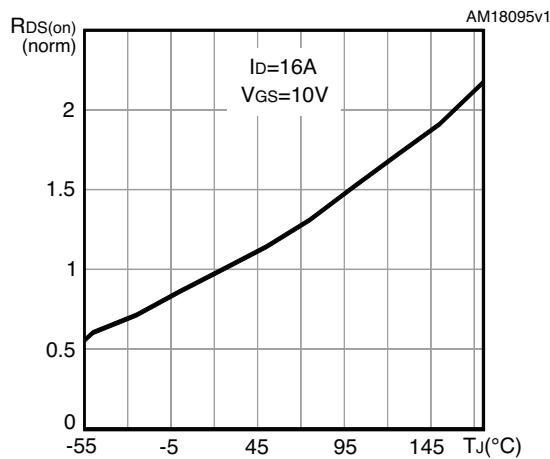
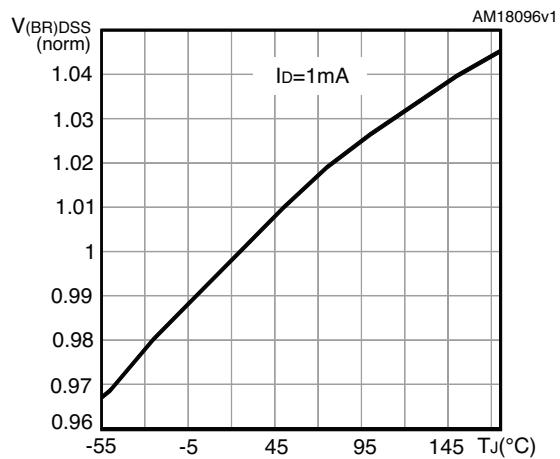
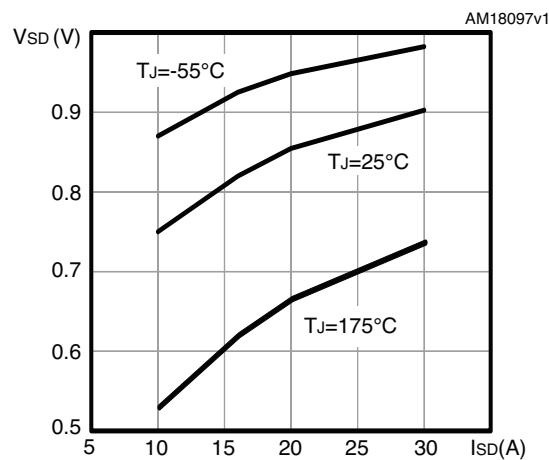
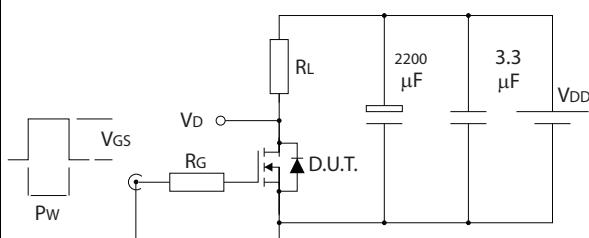


Figure 8. Capacitance variations**Figure 9. Normalized gate threshold voltage vs temperature****Figure 10. Normalized on-resistance vs temperature****Figure 11. Normalized V_{(BR)DSS} vs temperature****Figure 12. Source-drain diode forward characteristics**

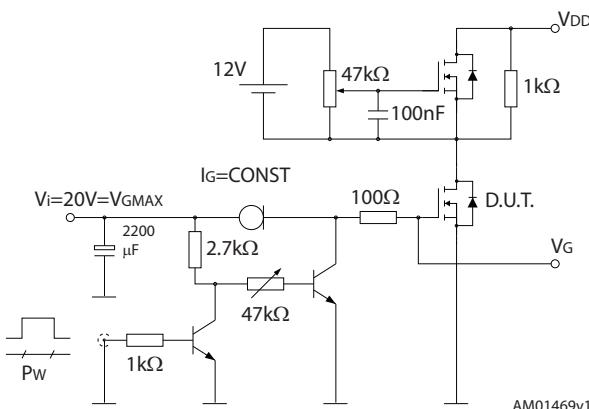
3 Test circuits

Figure 13. Switching times test circuit for resistive load



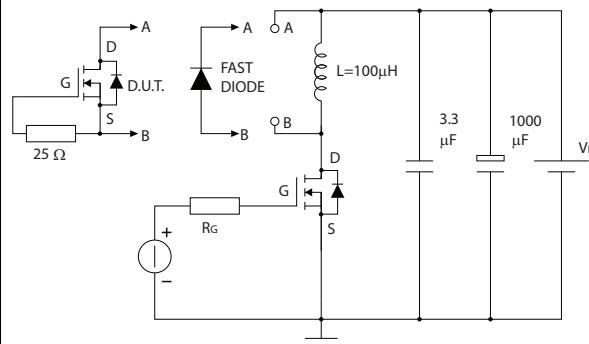
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Figure 14. Gate charge test circuit



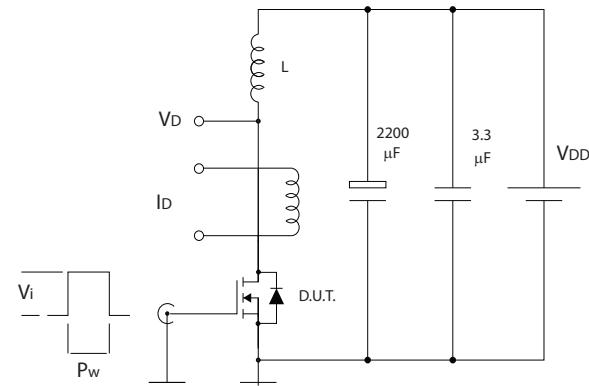
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Figure 15. Test circuit for inductive load switching and diode recovery times



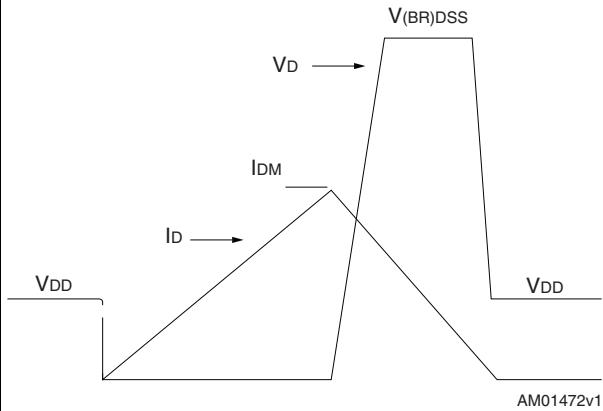
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Figure 16. Unclamped inductive load test circuit



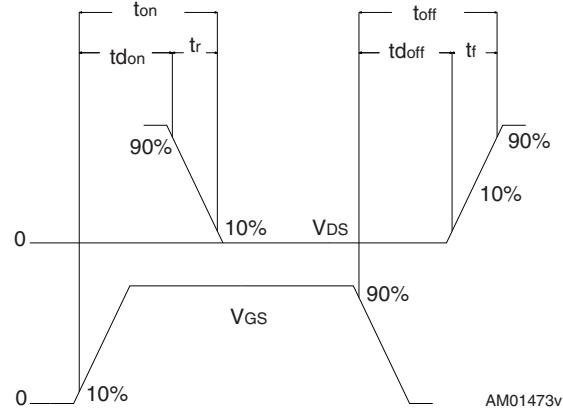
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



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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.

4.1 PowerFLAT™ 5x6 WF type R package information

Figure 19. PowerFLAT™ 5x6 WF type R package outline

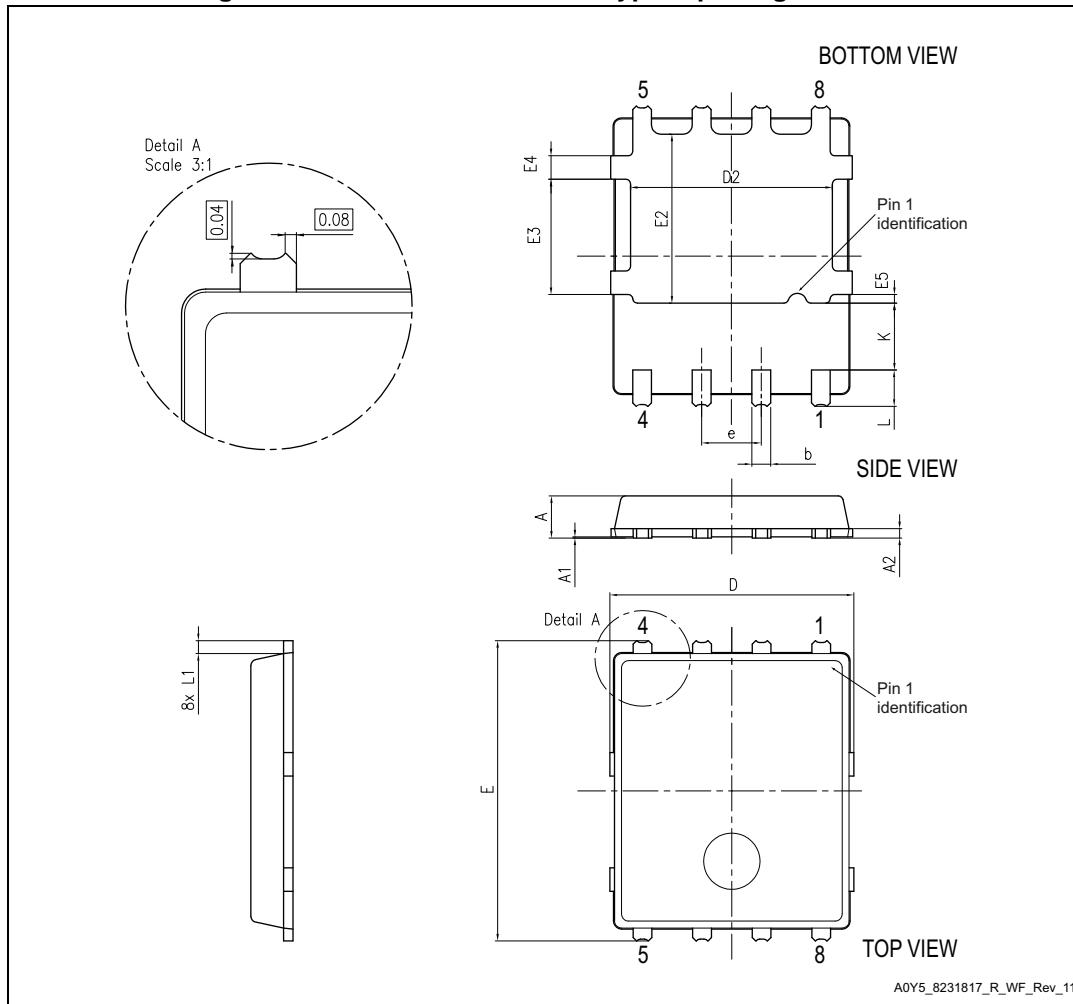
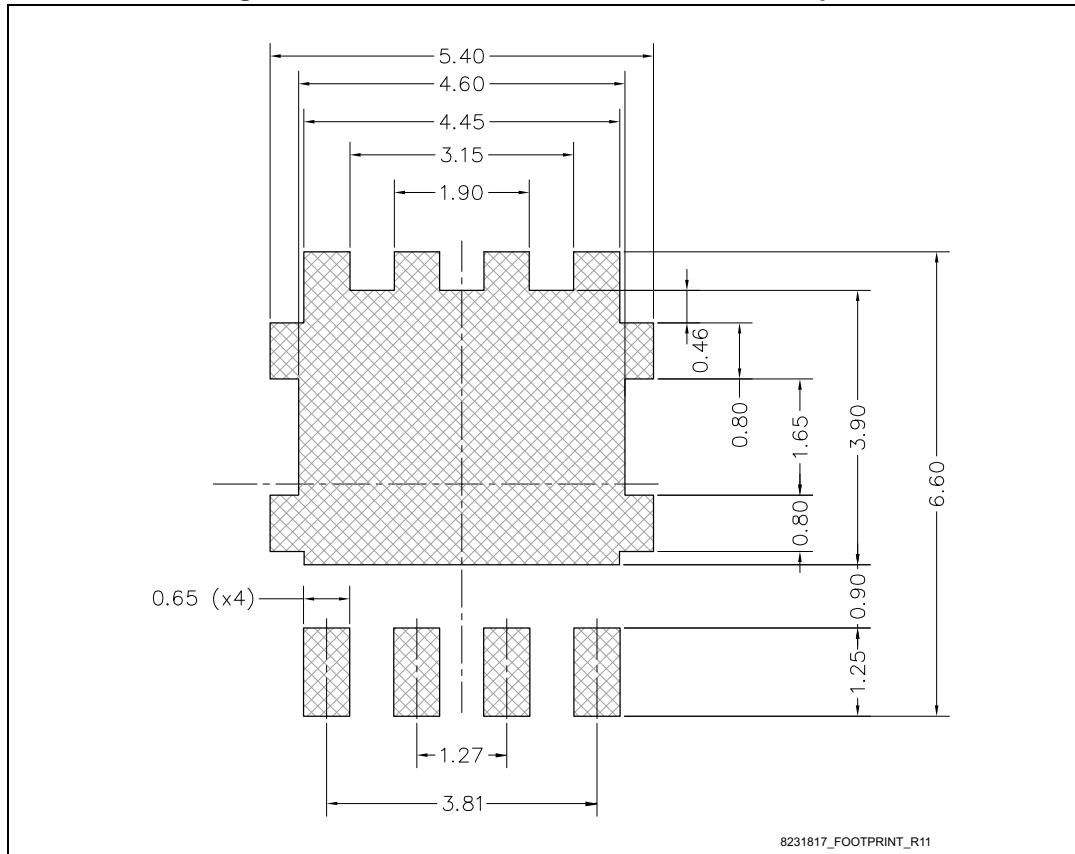


Table 8. PowerFLAT™ 5x6 WF type R mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D	5.00	5.20	5.40
E	6.20	6.40	6.60
D2	4.15		4.45
E2	3.50		3.70
e		1.27	
L	0.70		0.90
L1		0.275	
K	1.275		1.575
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28

Figure 20. PowerFLAT™ 5x6 recommended footprint

4.2 PowerFLAT™ 5x6 packing information

Figure 21. PowerFLAT™ 5x6 type WF tape^(a)

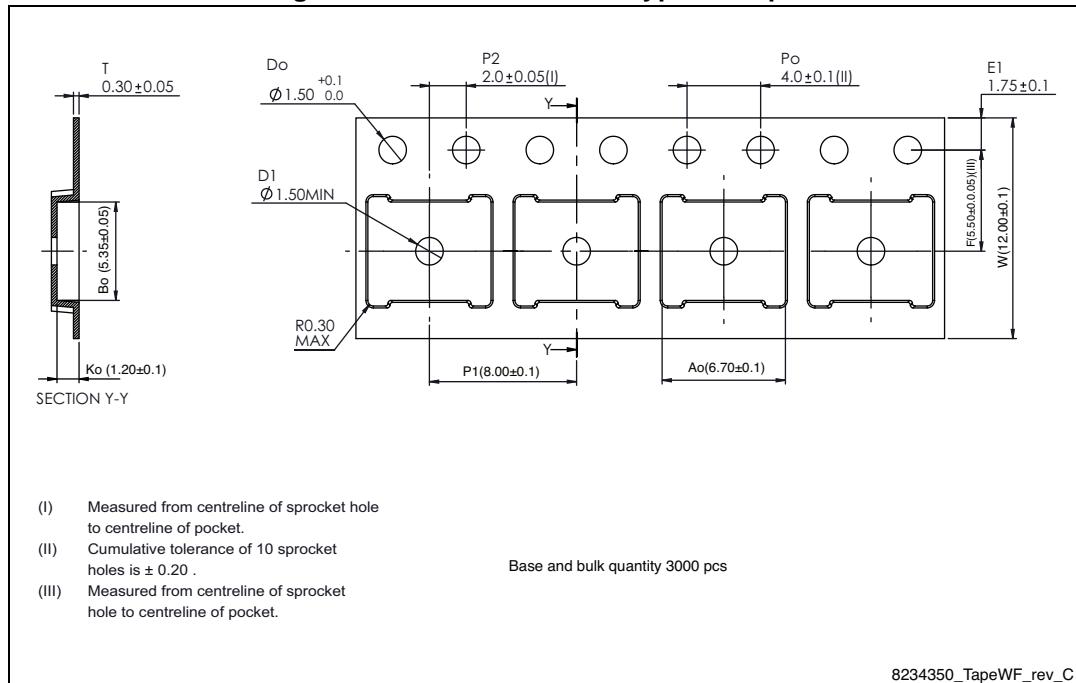
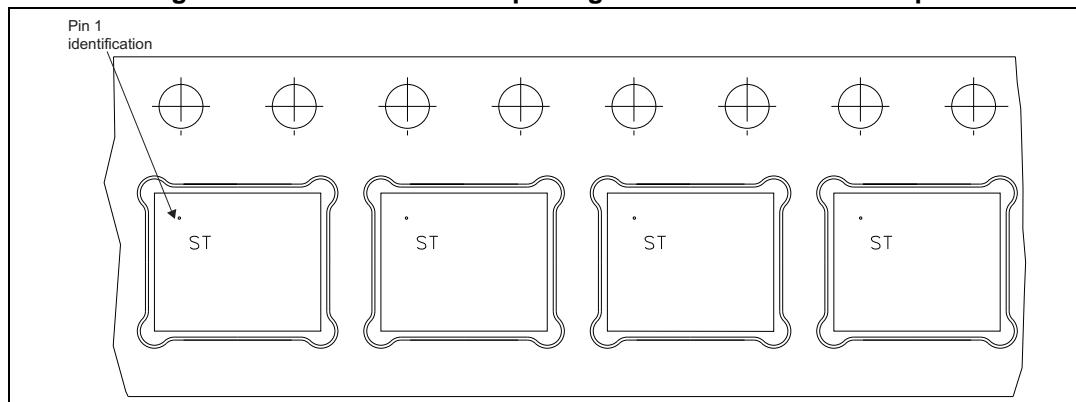
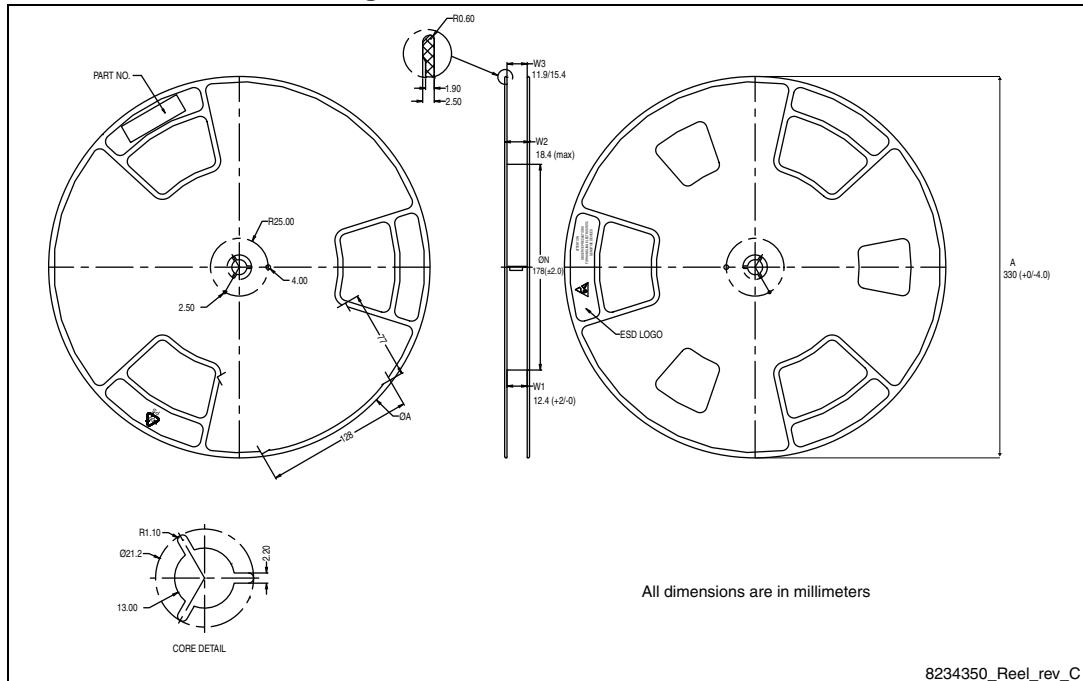


Figure 22. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

Figure 23. PowerFLAT™ 5x6 reel

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
16-Oct-2014	1	First release.
12-Oct-2015	2	Updated: <i>Section 4.1: PowerFLAT™ 5x6 WF type R package information</i> Datasheet promoted from preliminary data to production data Minor text changes

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