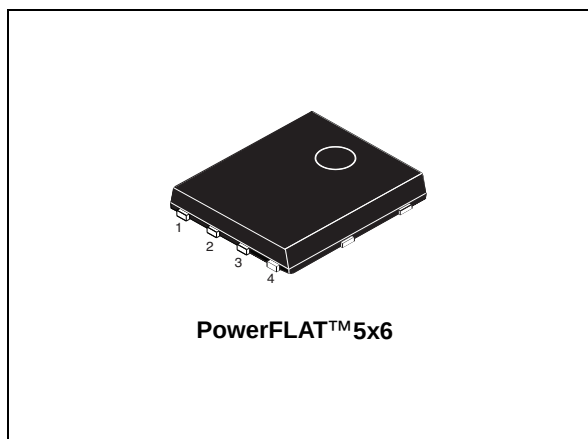


Automotive-grade N-channel 100 V, 0.008 Ω typ., 16 A STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 package

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

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.

Figure 1. Internal schematic diagram

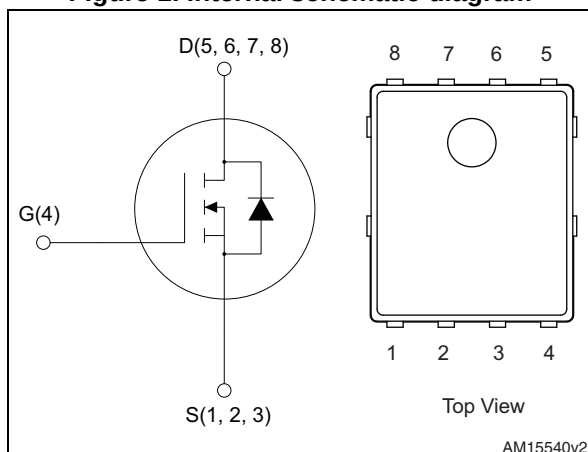


Table 1. Device summary

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

Contents

1 **Electrical ratings** **3**

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4 **Package mechanical data** **9**

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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 $T_C = 25\text{ °C}$	70	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ °C}$	50	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25\text{ °C}$	16	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 100\text{ °C}$	11	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	64	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ °C}$	100	W
$P_{TOT}^{(2)}$	Total dissipation at $T_{pcb} = 25\text{ °C}$	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

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

Table 4. On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	100			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 100\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}$, $T_C = 125\text{ }^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2.5	3.5	4.5	V
$R_{DS(on)}$	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
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\text{ V}$, $I_D = 8\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 15 and Figure 18)	-	19	-	ns
t_r	Rise time		-	32	-	ns
$t_{d(off)}$	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 Figure 18)	-	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)

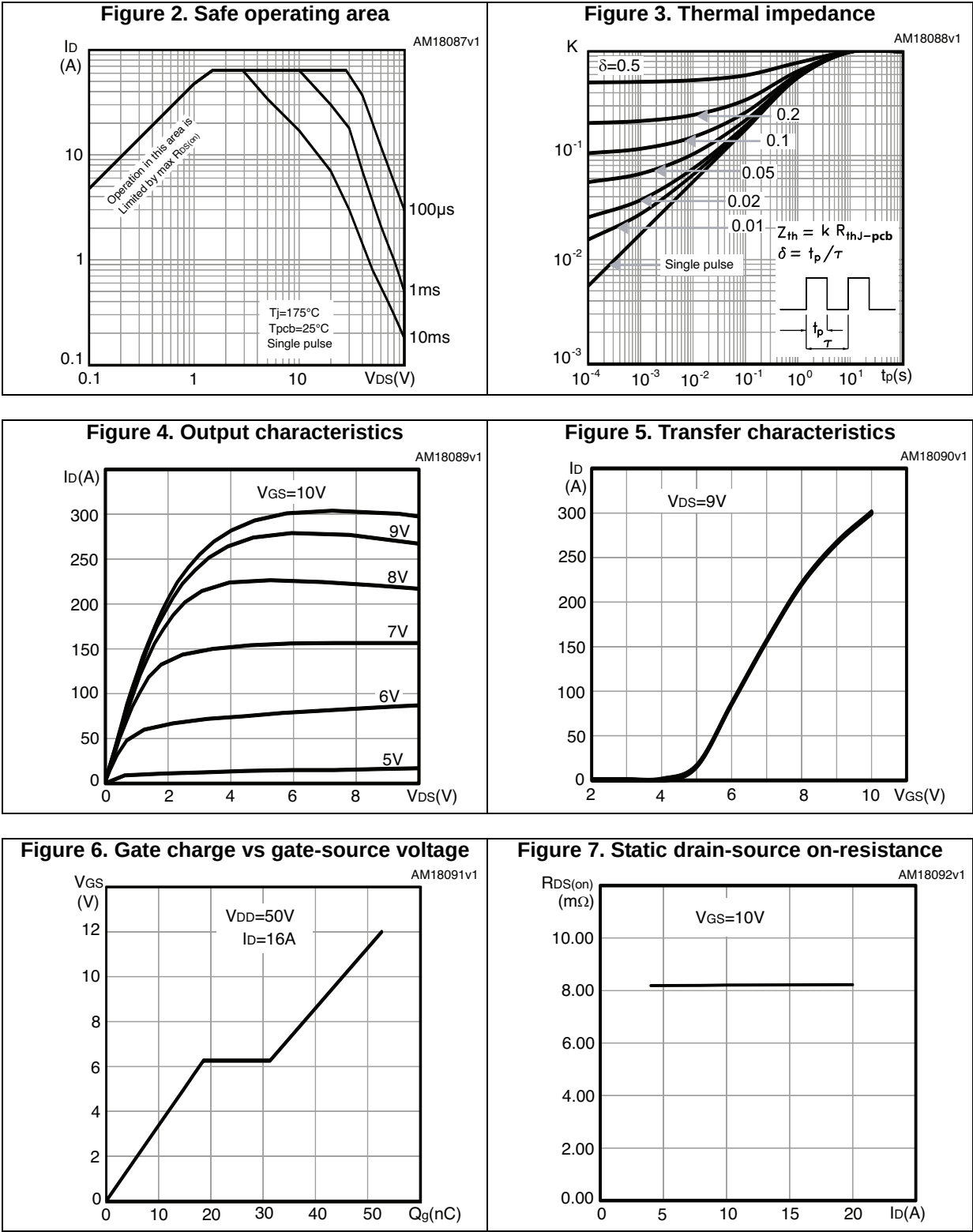


Figure 8. Capacitance variations

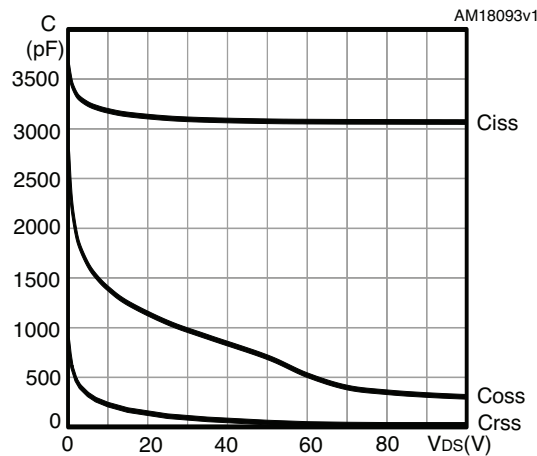


Figure 9. Normalized gate threshold voltage vs temperature

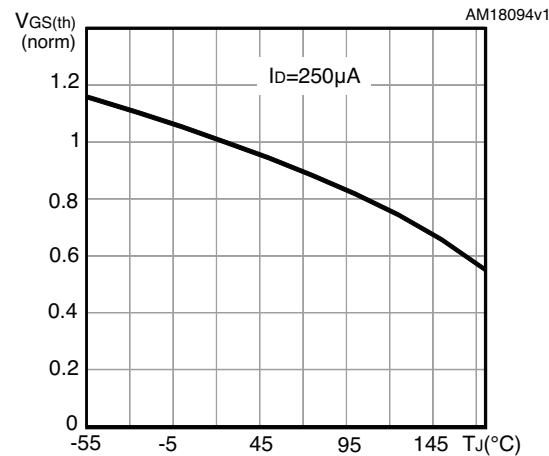


Figure 10. Normalized on-resistance vs temperature

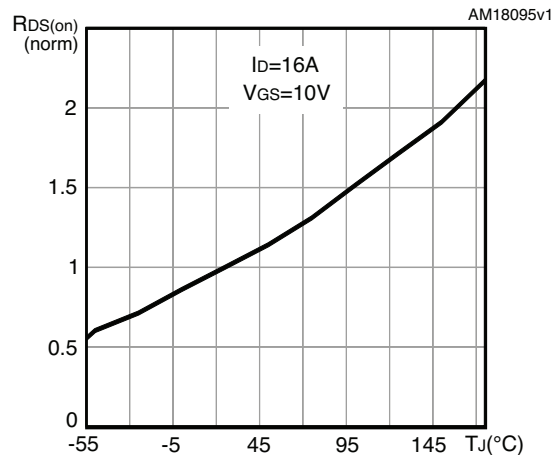


Figure 11. Normalized $V_{(BR)DSS}$ vs temperature

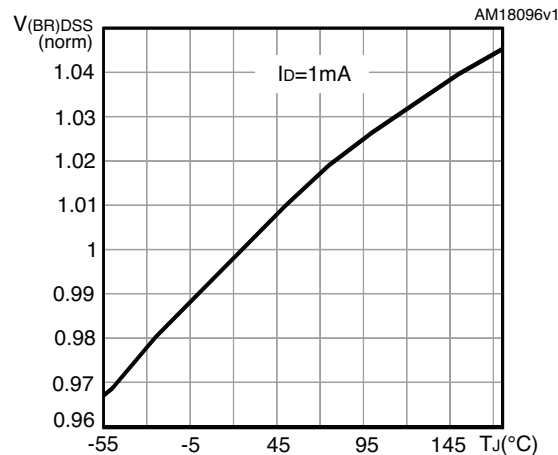
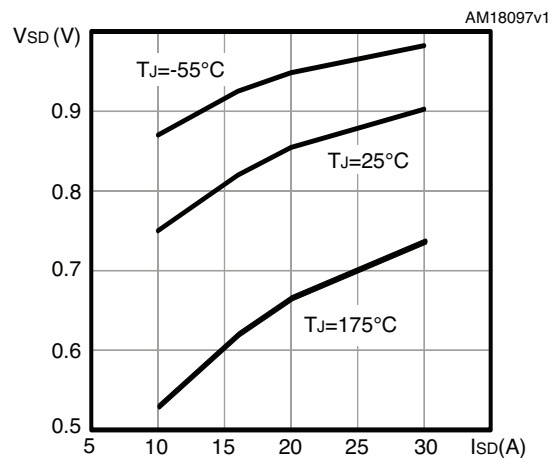
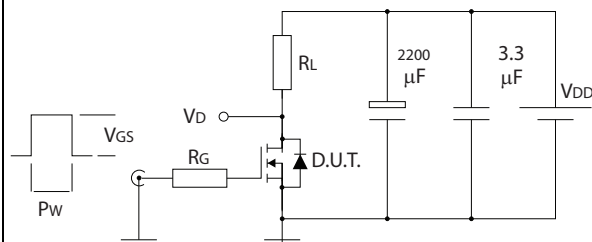


Figure 12. Source-drain diode forward characteristics



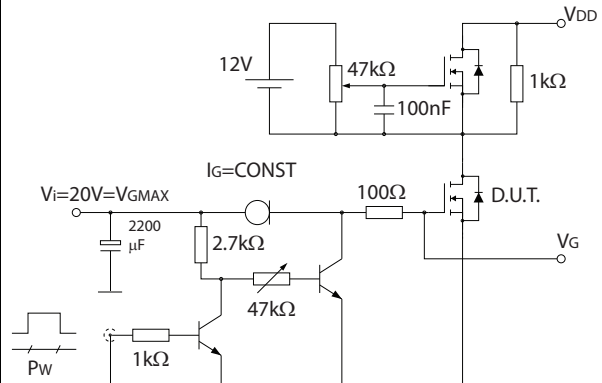
3 Test circuits

Figure 13. Switching times test circuit for resistive load



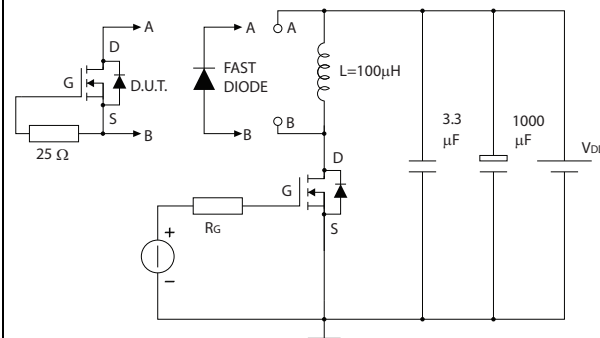
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Figure 14. Gate charge test circuit



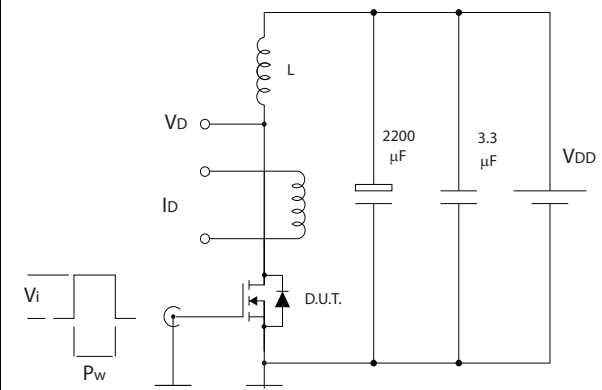
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Figure 15. Test circuit for inductive load switching and diode recovery times



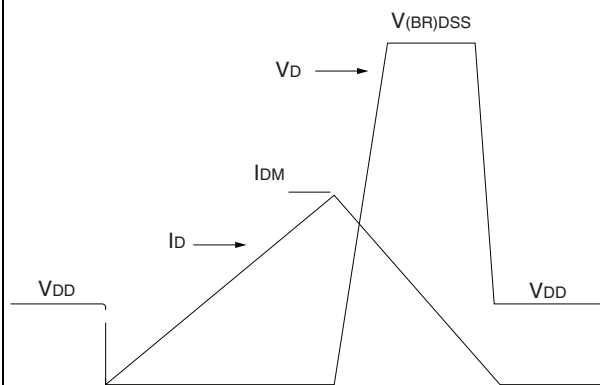
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Figure 16. Unclamped inductive load test circuit



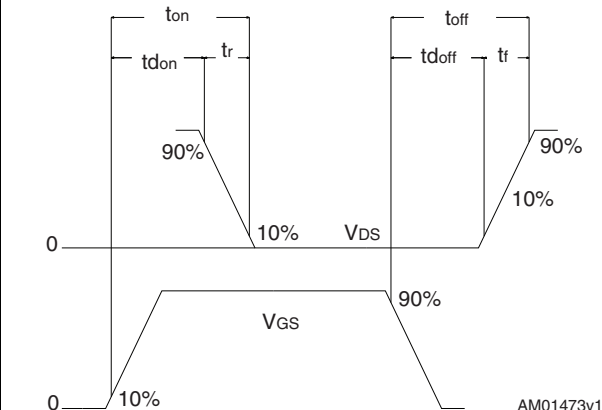
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



AM01473v1

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

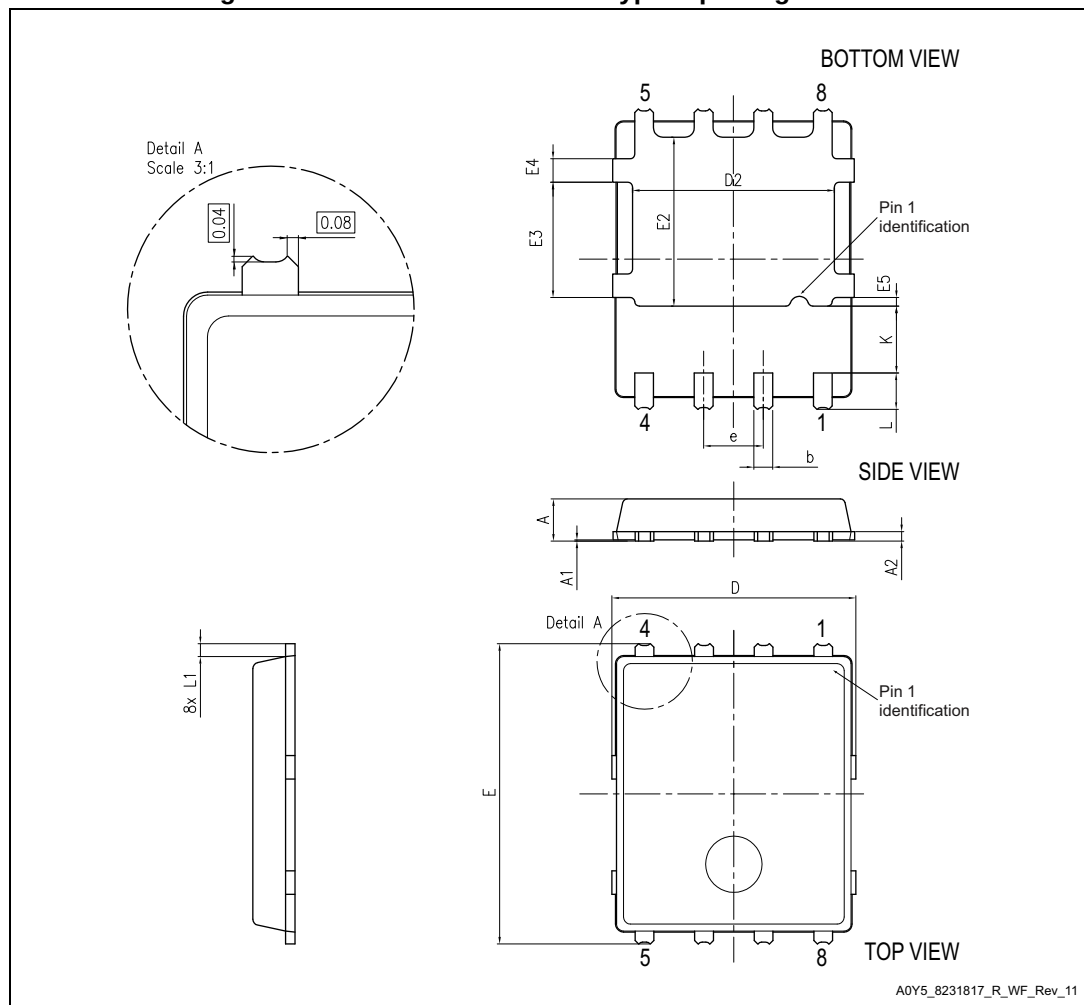


Table 8. PowerFLAT™ 5x6 WF type R mechanical data

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

Technical drawing of a mechanical part, showing a top view and a side view. The part is symmetrical about a vertical centerline.

Top View Dimensions:

- Overall width: 5.40
- Inner width (top): 4.60
- Inner width (middle): 4.45
- Inner width (bottom): 3.15
- Width of central slot: 1.90
- Width of each side slot: 0.65 (x4)
- Distance between side slots: 1.27
- Overall width of base: 3.81

Side View Dimensions:

- Overall height: 6.60
- Height of top section: 0.46
- Height of middle section: 0.80
- Height of bottom section: 1.65
- Height of base: 0.90
- Height of side slot: 1.25

4.2 PowerFLAT™ 5x6 packing information

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

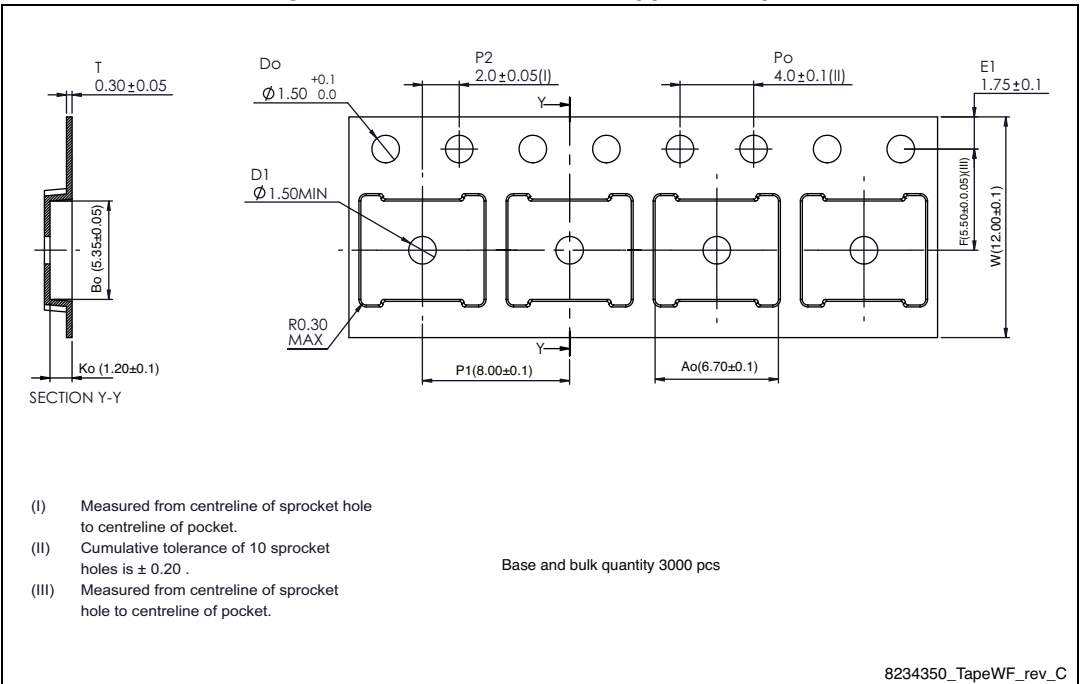
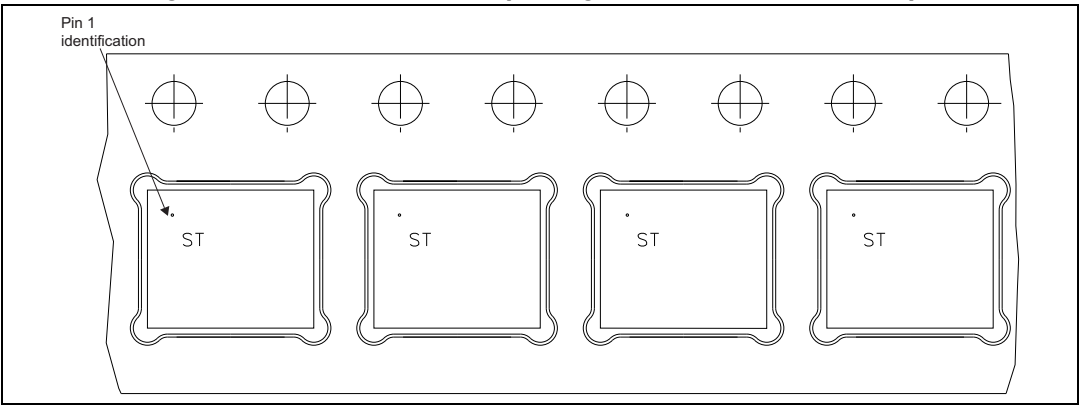


Figure 22. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

Technical drawing of a reel-to-reel tape cassette, showing top, side, and core detail views. Dimensions are in millimeters.

Top View (Left): Shows the circular tape hub with a central hole of diameter 2.50. The outer diameter is 330 (+0/-4.0). The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50. The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50. The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50.

Top View (Right): Shows the circular tape hub with a central hole of diameter 2.50. The outer diameter is 330 (+0/-4.0). The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50. The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50. The distance from the center to the edge of the tape is 4.00. The distance from the center to the edge of the hub is 2.50.

Side View (Center): Shows the profile of the cassette. The total width is 18.4 (max). The distance from the center to the edge of the tape is 11.9/15.4. The distance from the center to the edge of the hub is 1.90. The distance from the center to the edge of the tape is 11.9/15.4. The distance from the center to the edge of the hub is 1.90. The distance from the center to the edge of the tape is 11.9/15.4. The distance from the center to the edge of the hub is 1.90.

Core Detail (Bottom Left): Shows the core assembly with dimensions: R1.10, Ø21.2, 13.00, and 2.20.

ESD LOGO: A logo indicating Electrostatic Discharge (ESD) protection.

Dimensions: All dimensions are in millimeters.

5 Revision history

Table 9. Document revision history

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

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