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## Dual N-channel 60 V, 9 mΩ typ., 57 A STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 double island package

Datasheet - production data

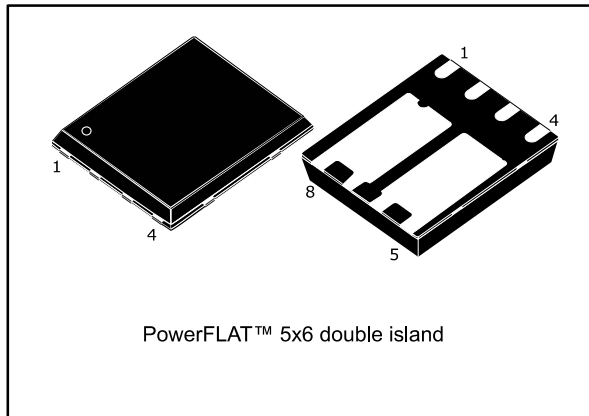
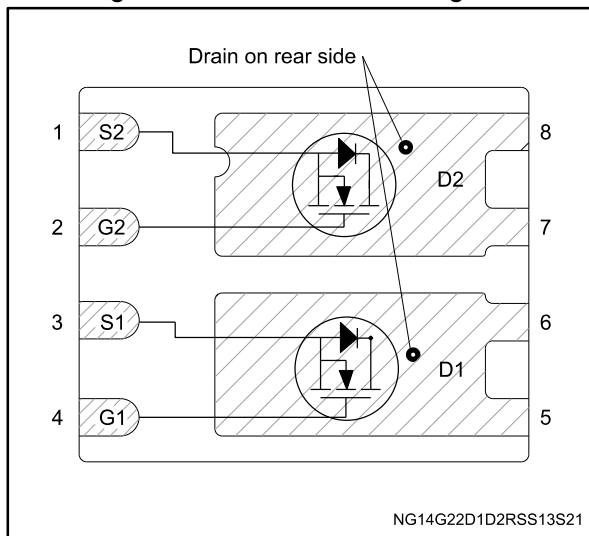


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STL50DN6F7	60 V	11 mΩ	57 A

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent figure of merit (FoM)
- Low C<sub>rss</sub>/C<sub>iss</sub> ratio for EMI immunity
- High avalanche ruggedness

### Applications

- Switching applications

### Description

This dual 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
STL50DN6F7	50DN6F7	PowerFLAT™ 5x6 double island	Tape and reel

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# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	57	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	41	
$I_{DM}^{(1)(2)}$	Drain current (pulsed)	228	A
$I_D^{(3)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	15	A
	Drain current(continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	11	
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	60	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	62.5	W
	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	4.8	
$T_J$	Operating junction temperature	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature		

**Notes:**

- (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
$R_{thj-case}$	Thermal resistance junction-case	2.4	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	31.3	$^\circ\text{C}/\text{W}$

**Notes:**

- (1) When mounted on FR-4 board of 1inc2, 2oz Cu,  $t < 10\text{ sec}$

## 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	$V_{GS} = 0\text{ V}$ , $I_D = 1\text{ mA}$	60			V
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 7.5\text{ A}$		9	11	m $\Omega$

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 30\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	1035	-	pF
$C_{oss}$	Output capacitance		-	450	-	pF
$C_{rss}$	Reverse transfer capacitance		-	53	-	pF
$Q_g$	Total gate charge	$V_{DD} = 30\text{ V}$ , $I_D = 15\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	17	-	nC
$Q_{gs}$	Gate-source charge		-	5.7	-	nC
$Q_{gd}$	Gate-drain charge		-	5.7	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$ , $I_D = 7.5\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13: "Test circuit for resistive load switching times"</a> )	-	14.5	-	ns
$t_r$	Rise time		-	15.3	-	ns
$t_{d(off)}$	Turn-off delay time		-	19.4	-	ns
$t_f$	Fall time		-	8	-	ns

**Table 7: Source-drain diode**

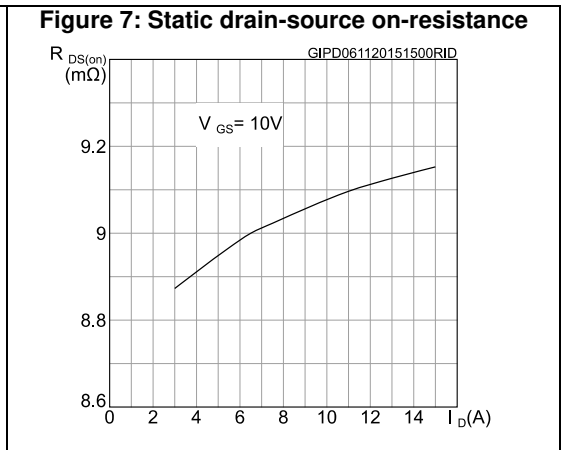
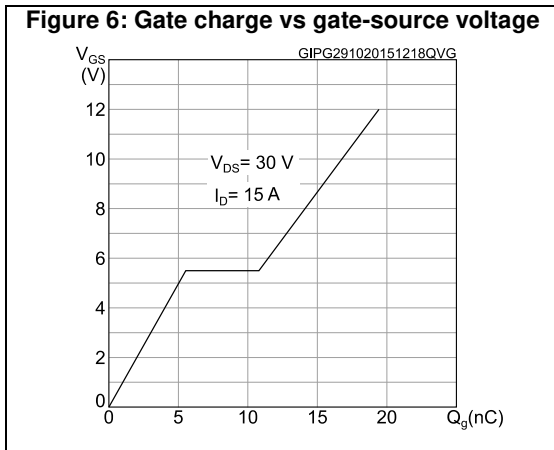
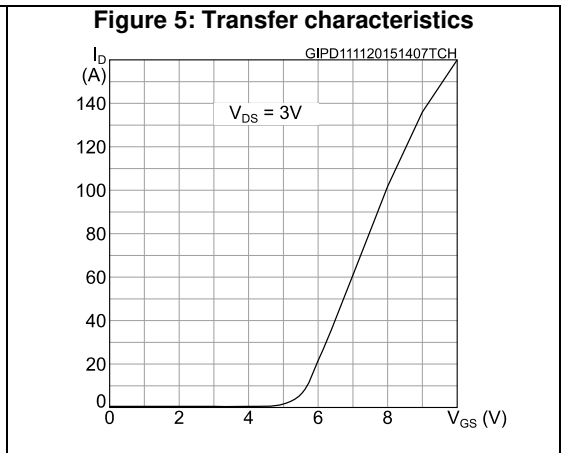
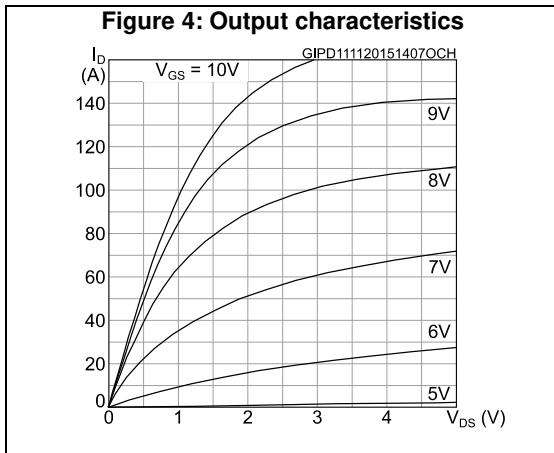
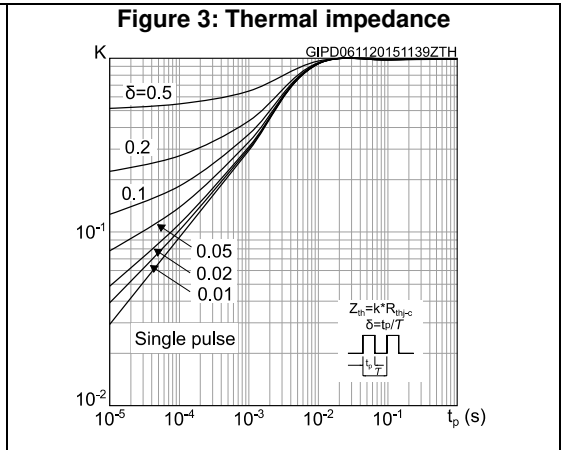
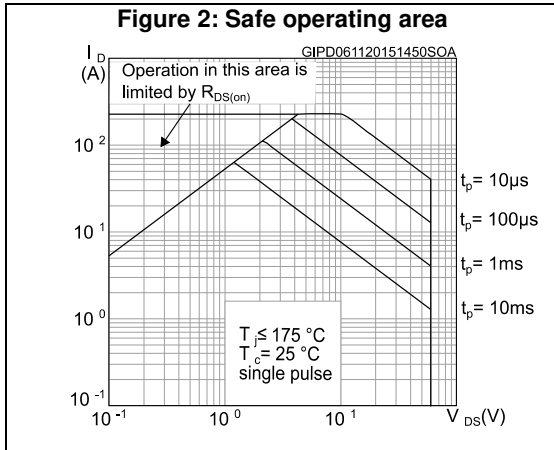
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 15\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 15\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 48\text{ V}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	26.8		ns
$Q_{rr}$	Reverse recovery charge		-	14.2		nC
$I_{RRM}$	Reverse recovery current		-	1.06		A

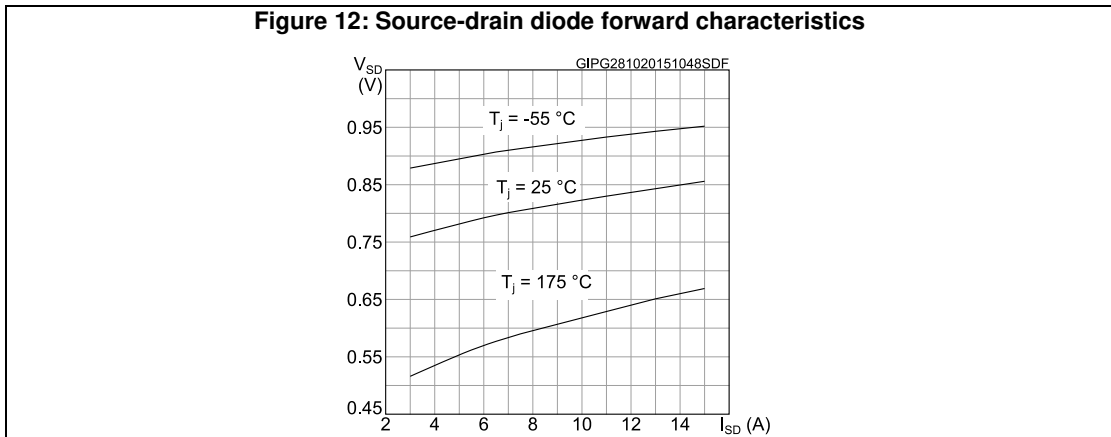
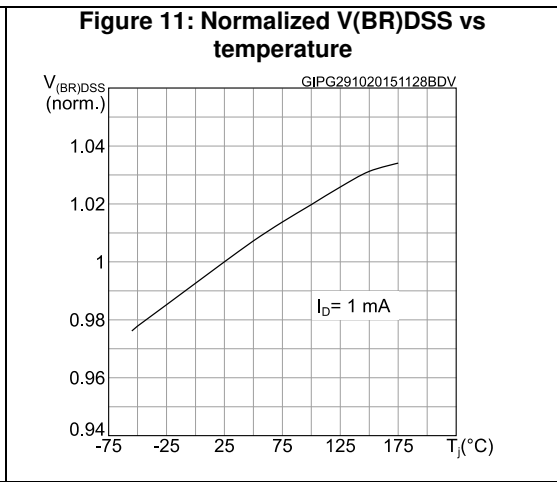
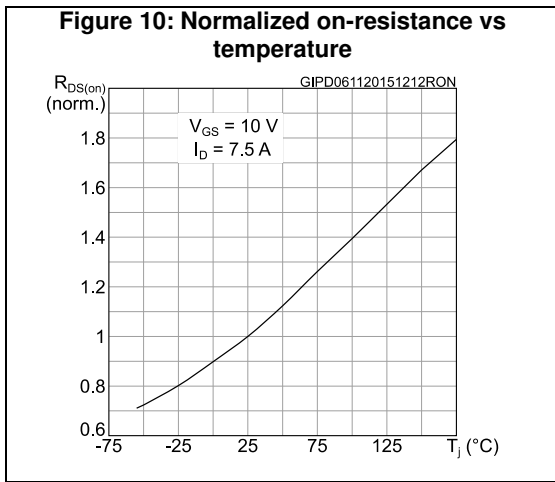
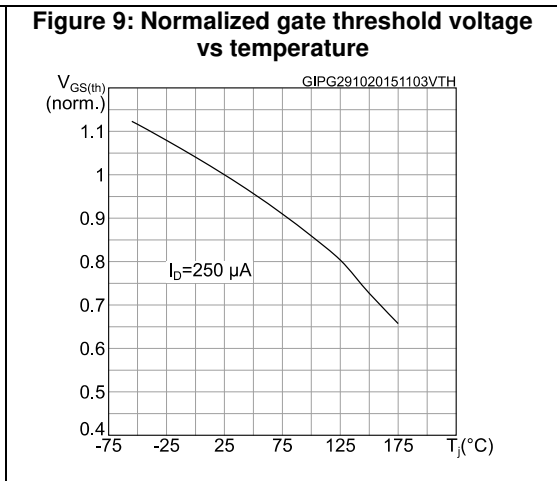
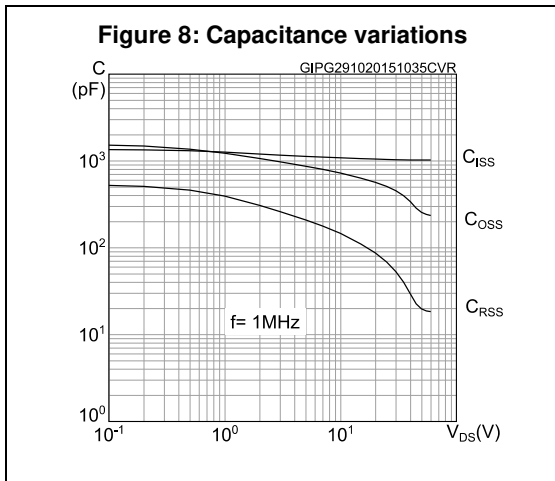
**Notes:**

<sup>(1)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%



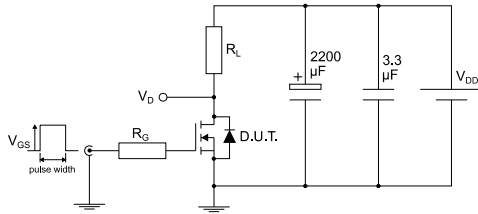
2.1 Electrical characteristics(curve)





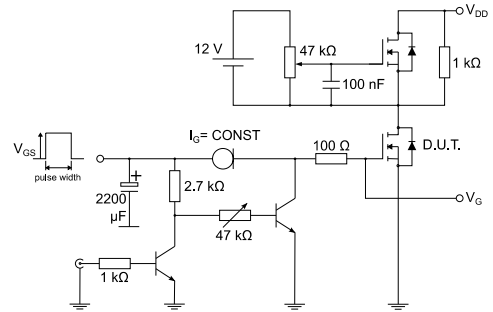
### 3 Test circuits

**Figure 13: Test circuit for resistive load switching times**



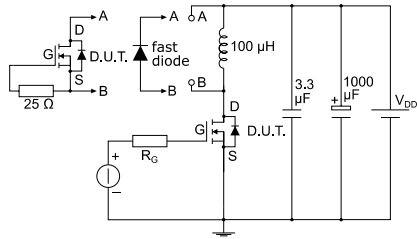
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**Figure 14: Test circuit for gate charge behavior**



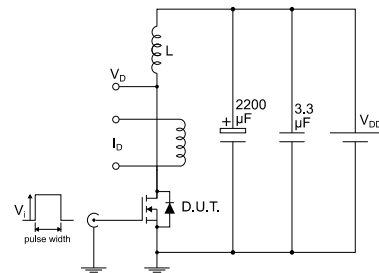
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



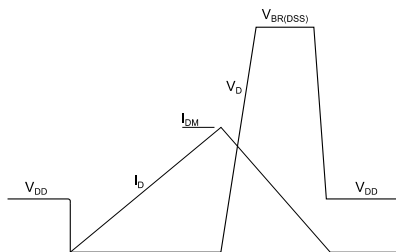
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**Figure 16: Unclamped inductive load test circuit**



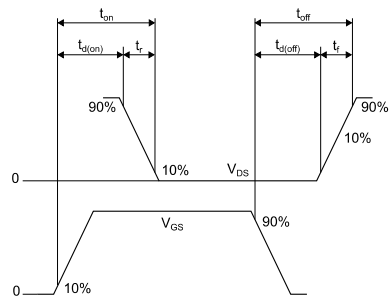
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**Figure 17: Unclamped inductive waveform**



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**Figure 18: Switching time waveform**



AM01473v1

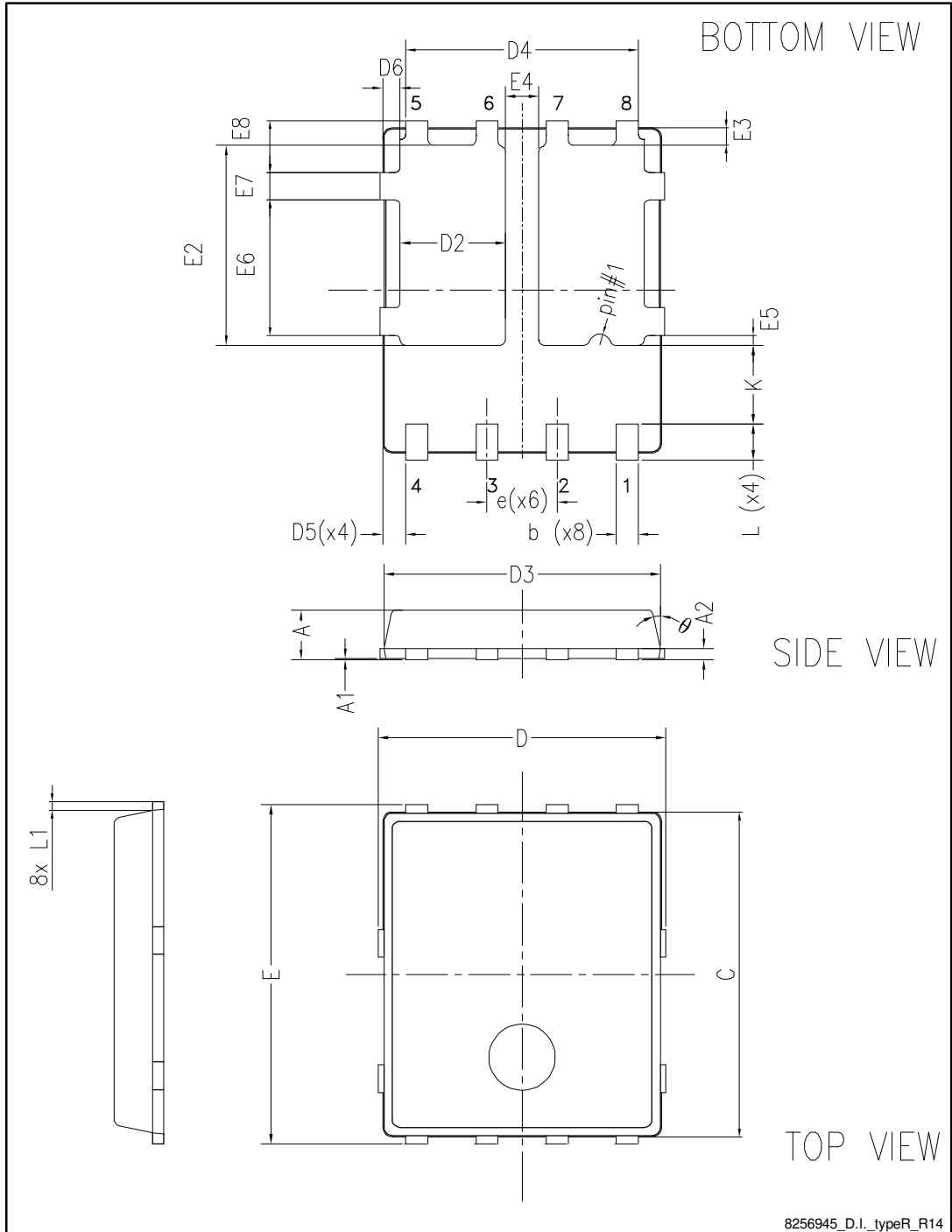


## 4 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 PowerFLAT 5x6 double island type R package information

Figure 19: PowerFLAT™ 5x6 double island type R package outline

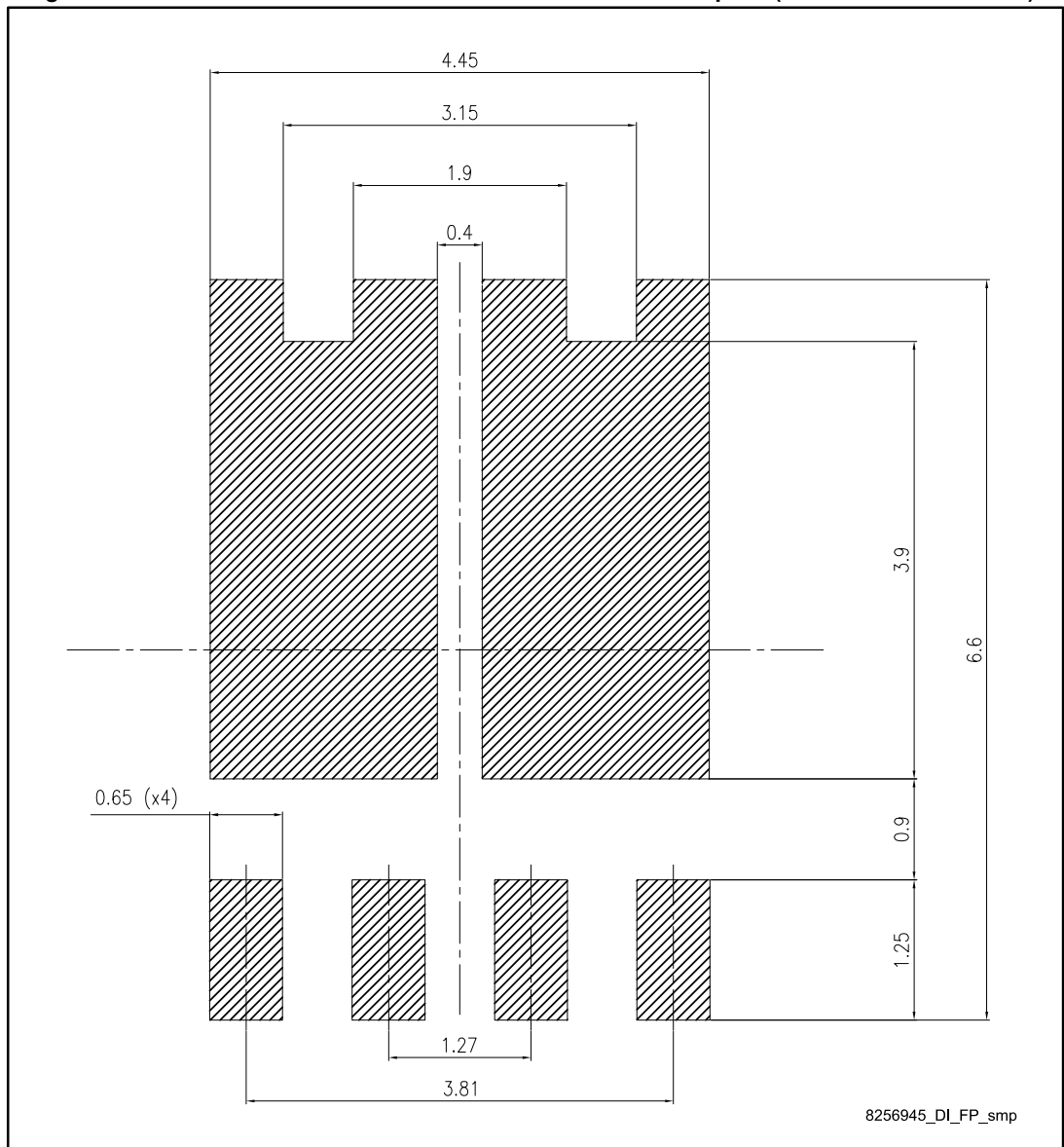


8256945\_D.I.\_typeR\_R14

Table 8: PowerFLAT™ 5x6 double island 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	1.68		1.88
D3	4.80	5.00	5.20
D4	4.05	4.20	4.35
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	0.20	0.325	0.45
E4	0.55		0.75
E5	0.08		0.28
E6	2.35		2.55
E7	0.40		0.60
E8	0.75	0.90	1.05
L	0.60		0.80
L1	0.05	0.15	0.25
K	1.275		1.575
θ	0°		12°

Figure 20: PowerFLAT™ 5x6 double island recommended footprint (dimensions are in mm)



## 4.2 PowerFLAT™ 5x6 packing information

Figure 21: PowerFLAT™ 5x6 tape (dimensions are in mm)

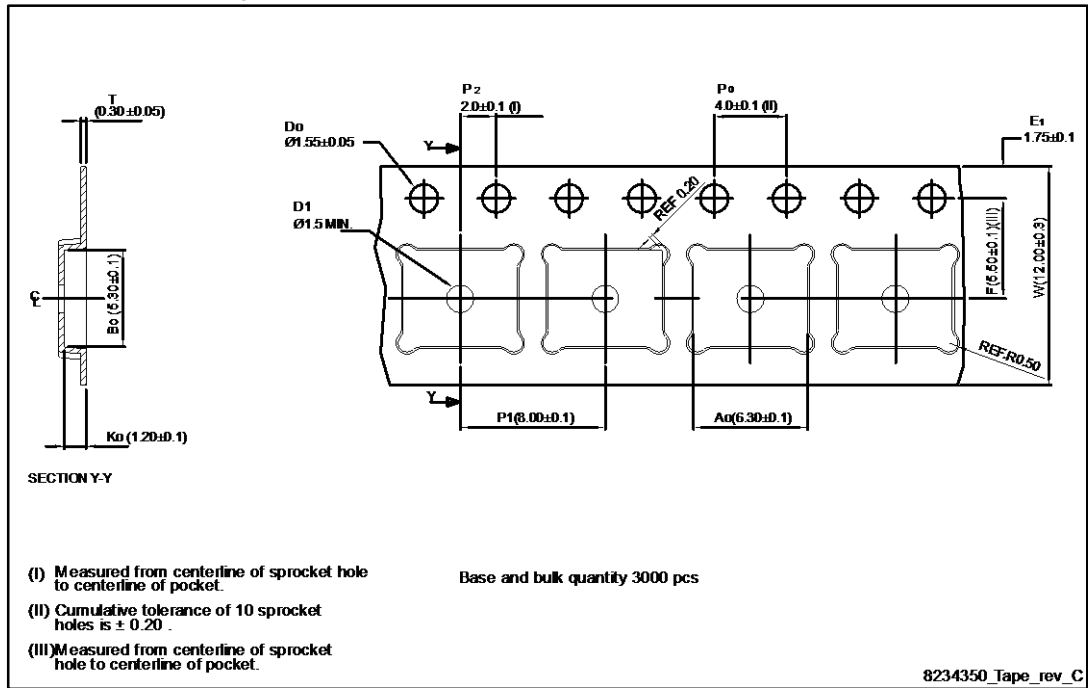


Figure 22: PowerFLAT™ 5x6 package orientation in carrier tape

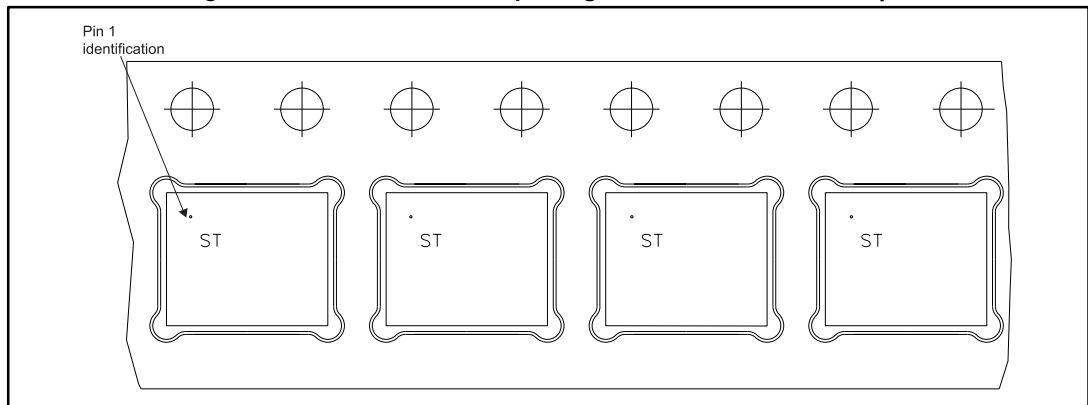
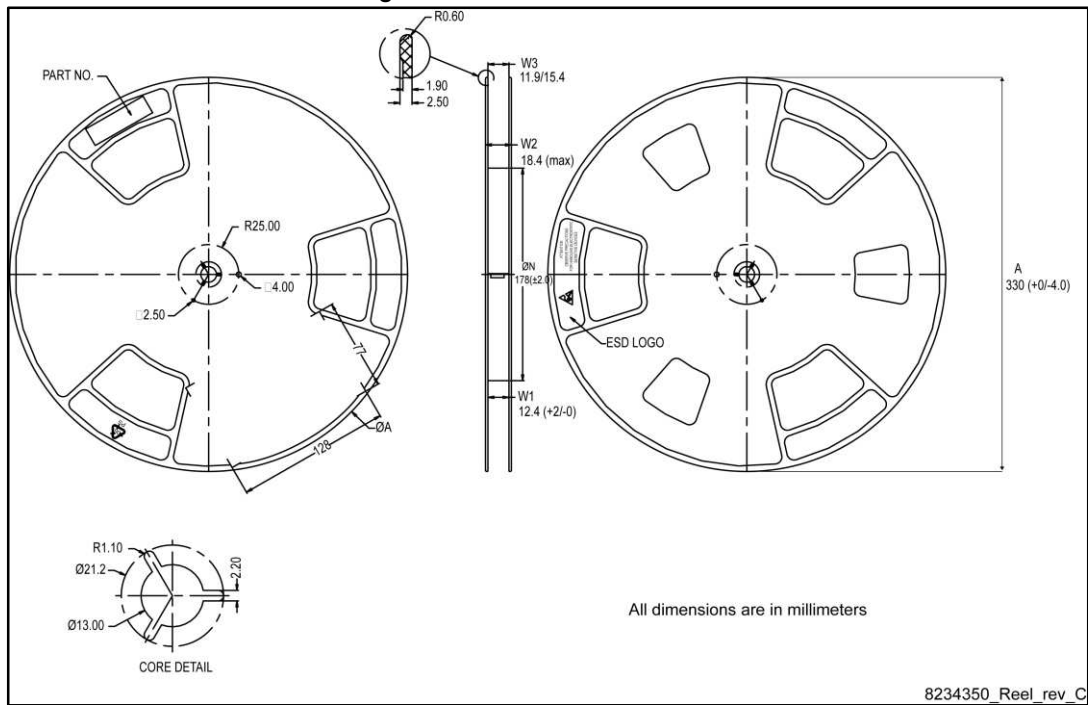


Figure 23: PowerFLAT™ 5x6 reel





## 5 Revision history

**Table 9: Document revision history**

Date	Revision	Changes
17-Jul-2015	1	First release.
13-Nov-2015	2	Document status promoted from preliminary to production data. Updated title and features in cover page. Updated <i>Table 2: "Absolute maximum ratings"</i> and <i>Section 4: "Electrical characteristics"</i> . Added <i>Section 4.1: "Electrical characteristics(curve)"</i> Minor text changes.

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