

## PRODUCT / PROCESS CHANGE INFORMATION

### 1. PCI basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCI No.		ADG/22/13595
1.3 Title of PCI		STL220N6F7 (OD68): Datasheet Updated
1.4 Product Category		STL220N6F7
1.5 Issue date		2022-08-02

### 2. PCI Team

2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Mario ASTUTI
2.1.2 Marketing Manager	Michele SCUTO
2.1.3 Quality Manager	Daniela FAZIO

### 3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
General Product & Design	Modification of datasheet : Errata/error fix	NA

### 4. Description of change

	Old	New
4.1 Description	Datasheet revision 4	Datasheet revision 5
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No Impact	

### 5. Reason / motivation for change

5.1 Motivation	Datasheet update
5.2 Customer Benefit	SERVICE CONTINUITY

### 6. Marking of parts / traceability of change

6.1 Description	Datasheet available on <a href="http://www.st.com">www.st.com</a>
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### 7. Timing / schedule

7.1 Date of qualification results	2022-08-01
7.2 Intended start of delivery	2022-09-01
7.3 Qualification sample available?	Not Applicable

### 8. Qualification / Validation

8.1 Description	13595 DS_STL220N6F7_rev5.pdf	
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date

### 9. Attachments (additional documentations)

13595 Public product.pdf
13595 DS_STL220N6F7_rev5.pdf
13595 Details.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	STL220N6F7	

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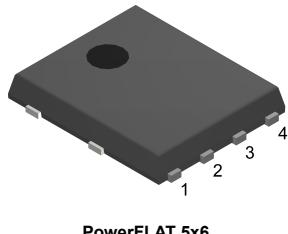
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## PRODUCT/PROCESS CHANGE INFORMATION

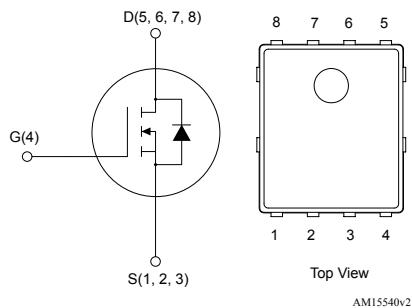
<b>TITLE</b>	STL220N6F7 (OD68): Datasheet Update
<b>CHANGE REASON</b>	Service Continuity
<b>CHANGE DESCRIPTION</b>	Document update  See Datasheet history for details
<b>TRACEABILITY</b>	Datasheets available on <a href="http://www.st.com">www.st.com</a> and included in this communication

## N-channel 60 V, 1.2 mΩ typ., 120 A STripFET F7 Power MOSFET in a PowerFLAT 5x6 package


**PowerFLAT 5x6**

Order code	$V_{DS}$	$R_{DS(on)} \text{ max.}$	$I_D$
STL220N6F7	60 V	1.4 mΩ	120 A

- Among the lowest  $R_{DS(on)}$  on the market
- Excellent FoM (figure of merit)
- Low  $C_{rss}/C_{iss}$  ratio for EMI immunity
- High avalanche ruggedness



### 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.



#### Product status link

[STL220N6F7](#)

#### Product summary

Order code	STL220N6F7
Marking	220N6F7
Package	PowerFLAT 5x6
Packing	Tape and reel

# 1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$ <sup>(1)</sup>	Drain current (continuous) at $T_C = 25^\circ\text{C}$	120	A
$I_D$ <sup>(1)</sup>	Drain current (continuous) at $T_C = 100^\circ\text{C}$	120	A
$I_{DM}$ <sup>(2) (1)</sup>	Drain current (pulsed)	480	A
$I_D$ <sup>(3)</sup>	Drain current (continuous) at $T_{pcb} = 25^\circ\text{C}$	40	A
$I_D$ <sup>(3)</sup>	Drain current (continuous) at $T_{pcb} = 100^\circ\text{C}$	28.5	A
$I_{DM}$ <sup>(2) (3)</sup>	Drain current (pulsed)	160	A
$E_{AS}$	Single pulse avalanche energy (starting $T_j = 25^\circ\text{C}$ , $I_{AS} = 20\text{ A}$ )	900	mJ
$P_{TOT}$ <sup>(1)</sup>	Total power dissipation at $T_C = 25^\circ\text{C}$	188	W
$P_{TOT}$ <sup>(3)</sup>	Total power dissipation at $T_{pcb} = 25^\circ\text{C}$	4.8	W
$T_j$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
	Storage temperature range		

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 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-pcb}$ <sup>(1)</sup>	Thermal resistance junction-pcb	31.3	$^\circ\text{C/W}$
$R_{thj-case}$	Thermal resistance junction-case	0.8	$^\circ\text{C/W}$

1. When mounted on FR-4 board of 1 inch<sup>2</sup>, 2oz Cu,  $t < 10\text{ s}$ .

## 2 Electrical characteristics

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

**Table 3. On /off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source breakdown voltage	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$	60			V
$I_{\text{DSS}}$	Zero gate voltage drain current	$V_{GS} = 0 \text{ V}$ $V_{DS} = 60 \text{ V}$			1	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-body leakage current	$V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$			100	nA
$V_{\text{GS}(\text{th})}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2		4	V
$R_{\text{DS}(\text{on})}$	Static drain-source on-resistance	$V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$		1.2	1.4	$\text{m}\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{\text{iss}}$	Input capacitance		-	6500	-	pF
$C_{\text{oss}}$	Output capacitance	$V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GS} = 0 \text{ V}$	-	3200	-	pF
$C_{\text{rss}}$	Reverse transfer capacitance		-	230	-	pF
$Q_g$	Total gate charge	$V_{DD} = 30 \text{ V}, I_D = 40 \text{ A},$	-	98	-	nC
$Q_{\text{gs}}$	Gate-source charge	$V_{GS} = 0 \text{ to } 10 \text{ V}$ (see Figure 13. Test circuit for gate charge behavior)	-	38	-	nC
$Q_{\text{gd}}$	Gate-drain charge		-	28	-	nC

**Table 5. Switching times**

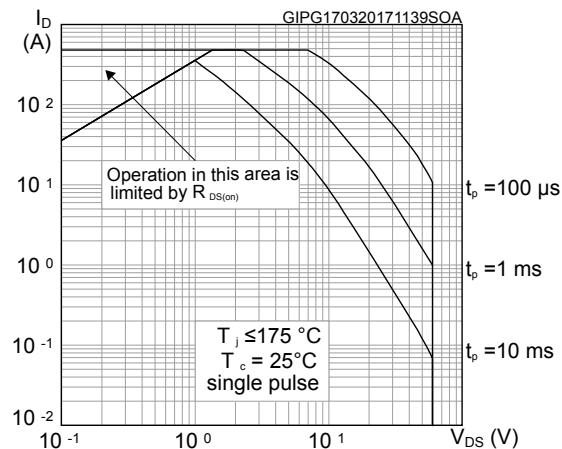
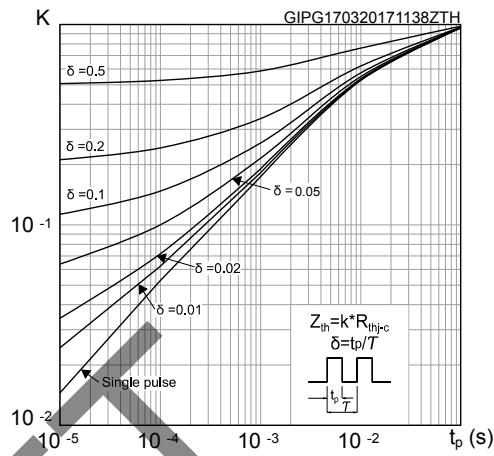
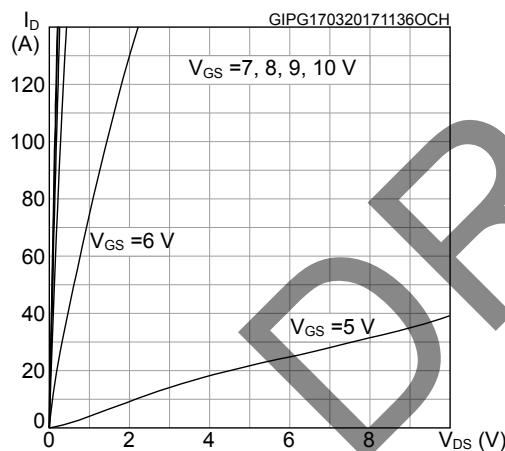
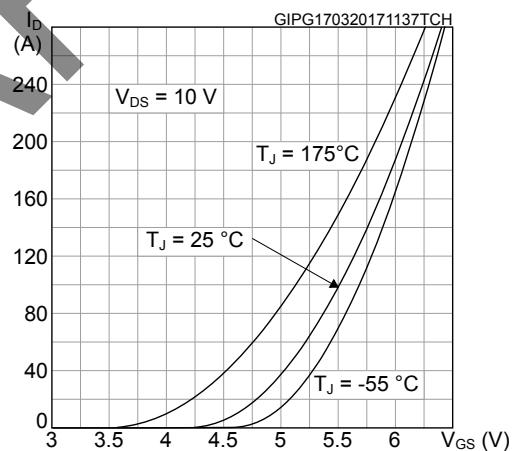
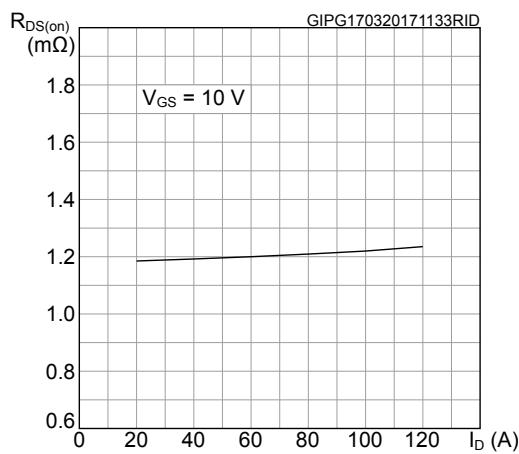
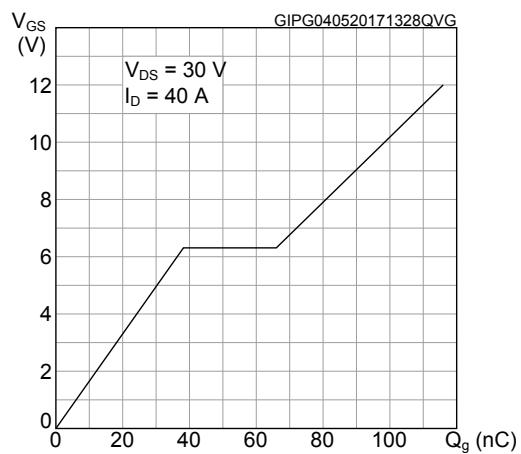
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{\text{d}(\text{on})}$	Turn-on delay time		-	41	-	ns
$t_r$	Rise time	$V_{DD} = 30 \text{ V}, I_D = 20 \text{ A},$	-	45	-	ns
$t_{\text{d}(\text{off})}$	Turn-off delay time	$R_G = 4.7 \Omega, V_{GS} = 10 \text{ V}$ (see and Figure 17. Switching time waveform)	-	68	-	ns
$t_f$	Fall time		-	35	-	ns

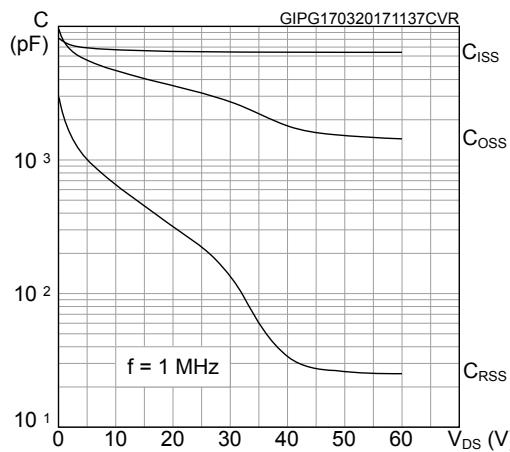
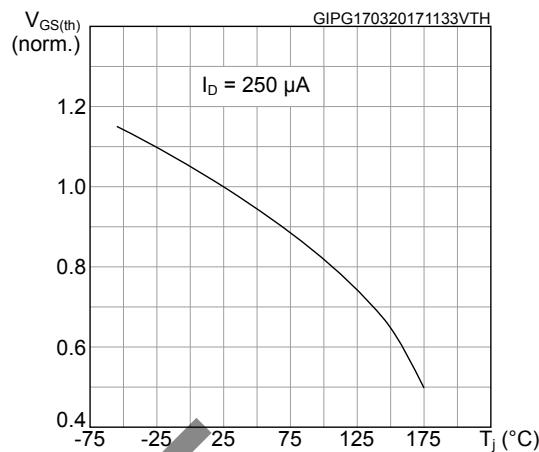
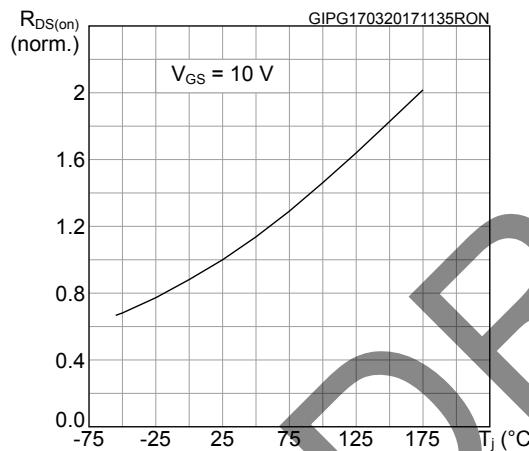
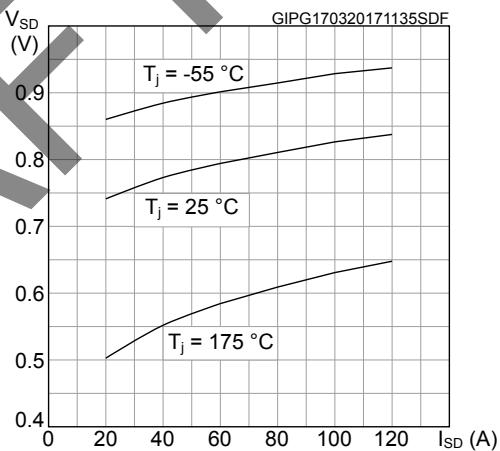
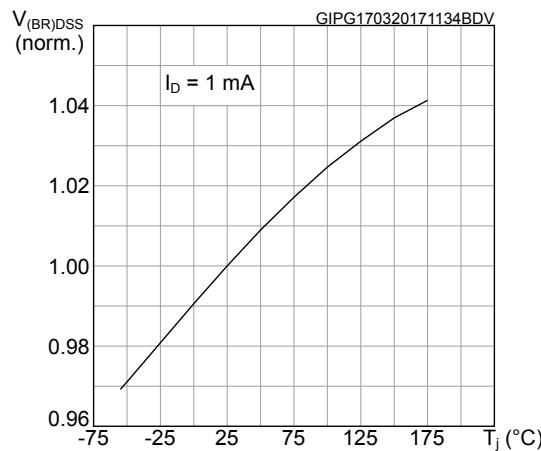
**Table 6. Source-drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}$ (1)	Forward on voltage	$I_{SD} = 40 \text{ A}, V_{GS} = 0 \text{ V}$	-		1.2	V
$t_{\text{rr}}$	Reverse recovery time	$I_D = 40 \text{ A}, \text{di}/\text{dt} = 100 \text{ A}/\mu\text{s}$	-	69		ns
$Q_{\text{rr}}$	Reverse recovery charge	$V_{DD} = 48 \text{ V}$ (see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	103		nC
$I_{\text{RRM}}$	Reverse recovery current		-	3		A

1. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

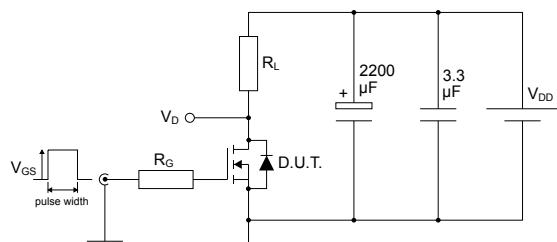
## 2.1 Electrical characteristics (curves)

**Figure 1. Safe operating area**

**Figure 2. Thermal impedance**

**Figure 3. Output characteristics**

**Figure 4. Transfer characteristics**

**Figure 5. Static drain-source on-resistance**

**Figure 6. Gate charge vs gate-source voltage**


**Figure 7. Capacitance variations**

**Figure 8. Normalized gate threshold voltage vs temperature**

**Figure 9. Normalized on-resistance vs temperature**

**Figure 10. Source-drain diode forward characteristics**

**Figure 11. Normalized V\_(BR)DSS vs temperature**


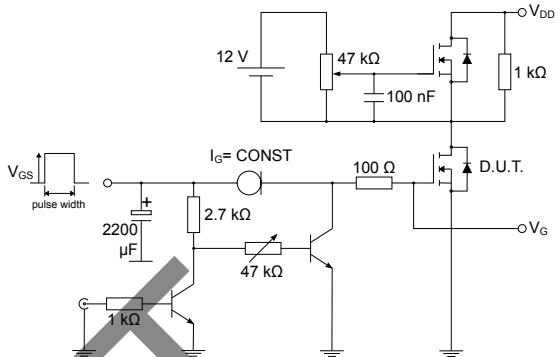
### 3 Test circuits

**Figure 12.** Test circuit for resistive load switching times



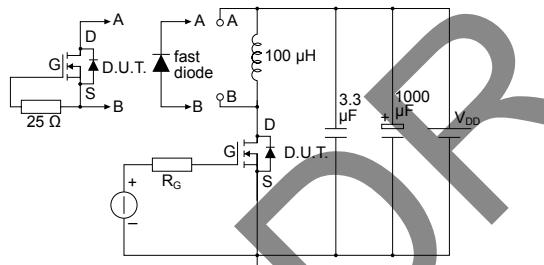
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**Figure 13.** Test circuit for gate charge behavior



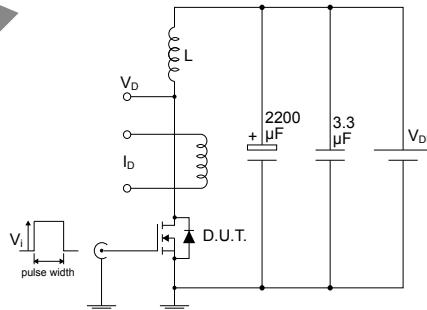
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**Figure 14.** Test circuit for inductive load switching and diode recovery times



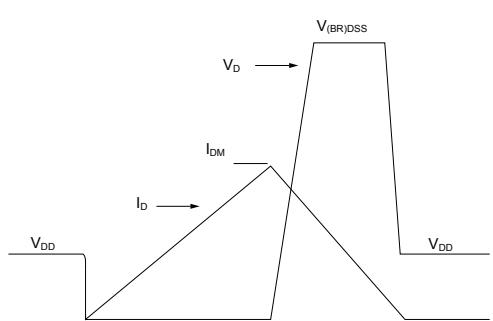
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**Figure 15.** Unclamped inductive load test circuit



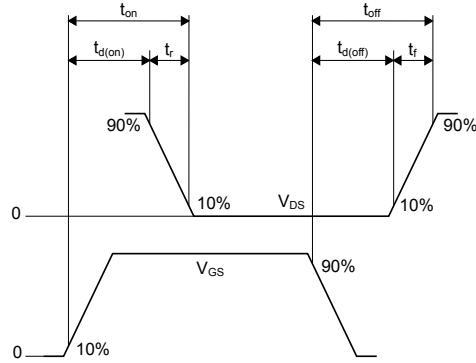
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**Figure 16.** Unclamped inductive waveform



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**Figure 17.** Switching time waveform



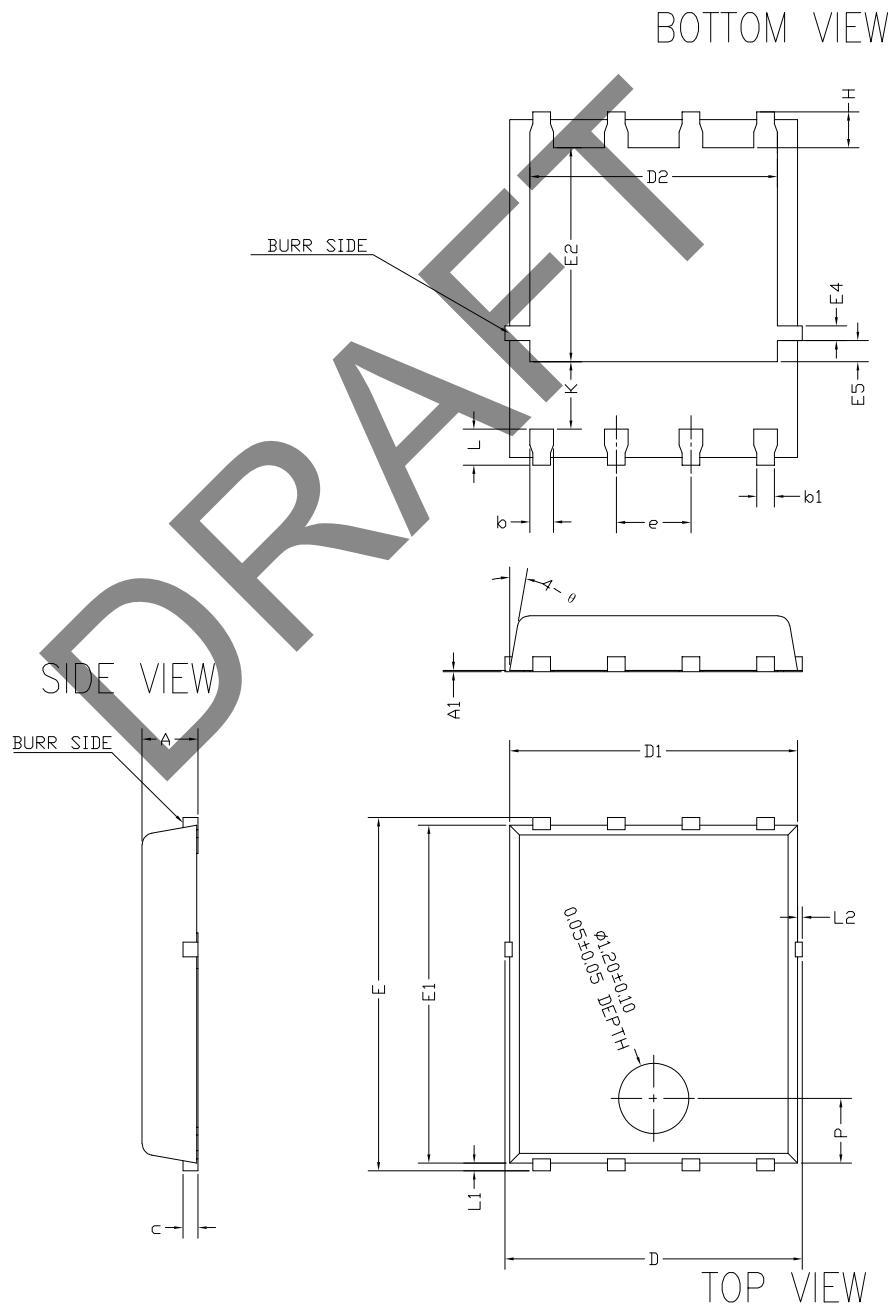
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## 4 Package information

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 type B package information

Figure 18. PowerFLAT 5x6 type B package outline



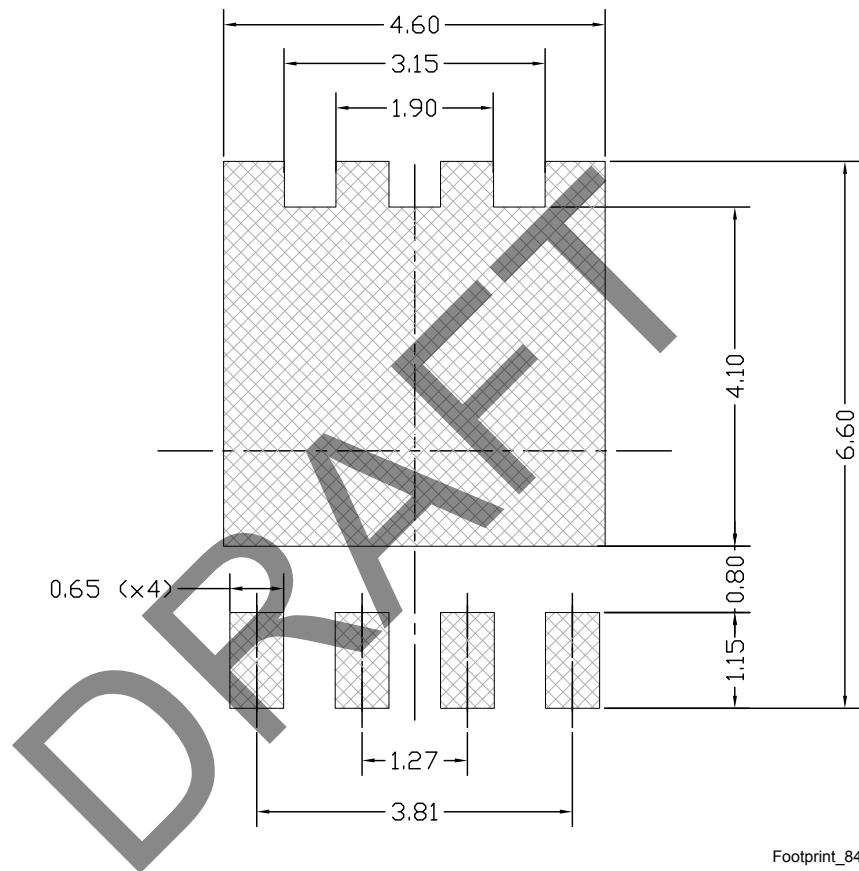
Drawing\_8472137\_typeB rev5

**Table 7. PowerFLAT 5x6 type B mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	0.90	0.95	1.00
A1		0.02	
b	0.35	0.40	0.45
b1		0.30	
c	0.21	0.25	0.34
D	4.80		5.10
D1	4.80	4.90	5.00
D2	4.01	4.21	4.31
e	1.17	1.27	1.37
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.54	3.64	3.74
E4	0.15	0.25	0.35
E5	0.26	0.36	0.46
H	0.51	0.61	0.71
K	0.95		
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
L2			0.10
P	1.00	1.10	1.20
θ	8°	10°	12°

Figure 19. PowerFLAT 5x6 recommended footprint (dimensions are in mm)

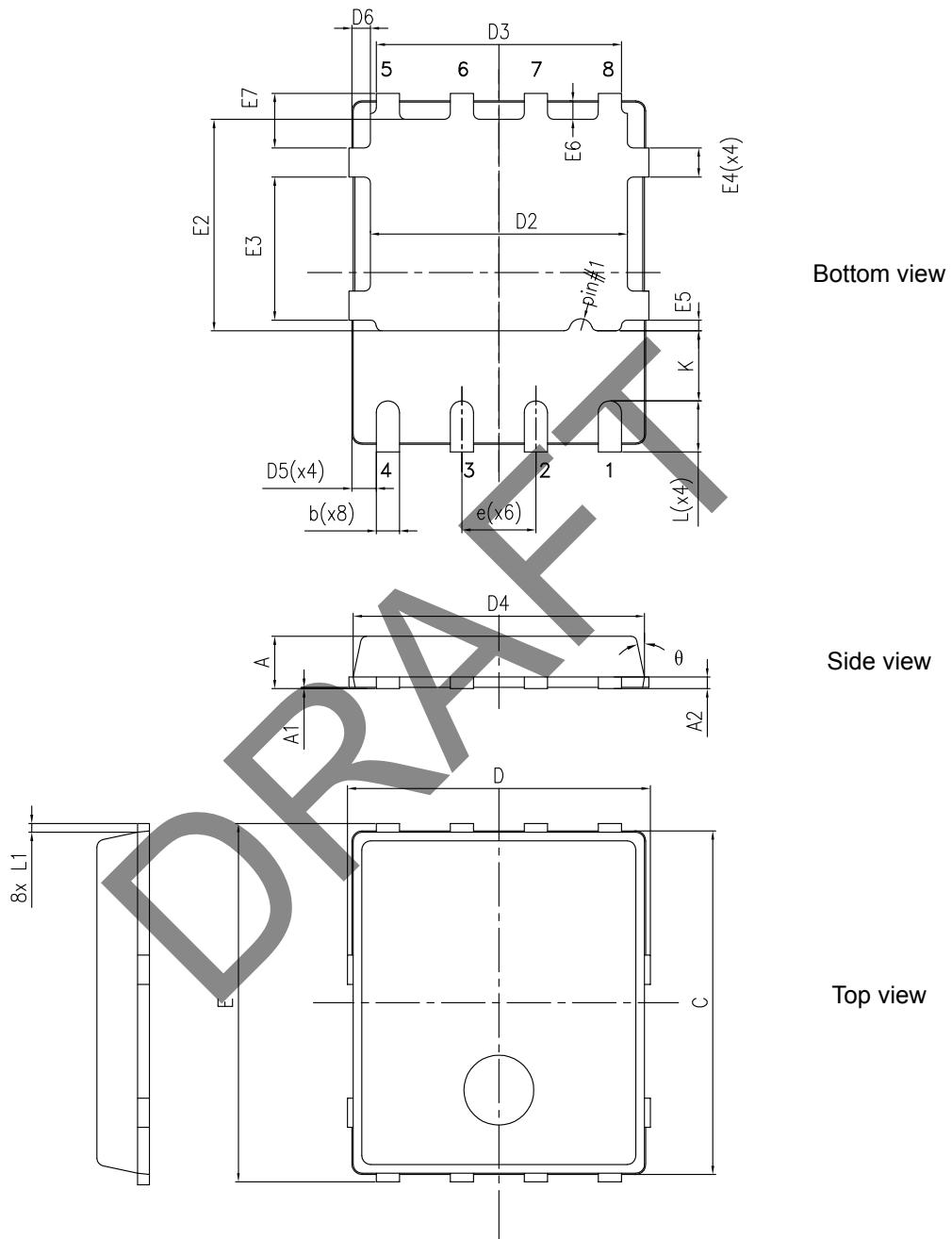
## RECOMMENDED FOOTPRINT



Footprint\_8472137\_typeB rev5

## 4.2 PowerFLAT 5x6 type C package information

**Figure 20. PowerFLAT 5x6 type C package outline**

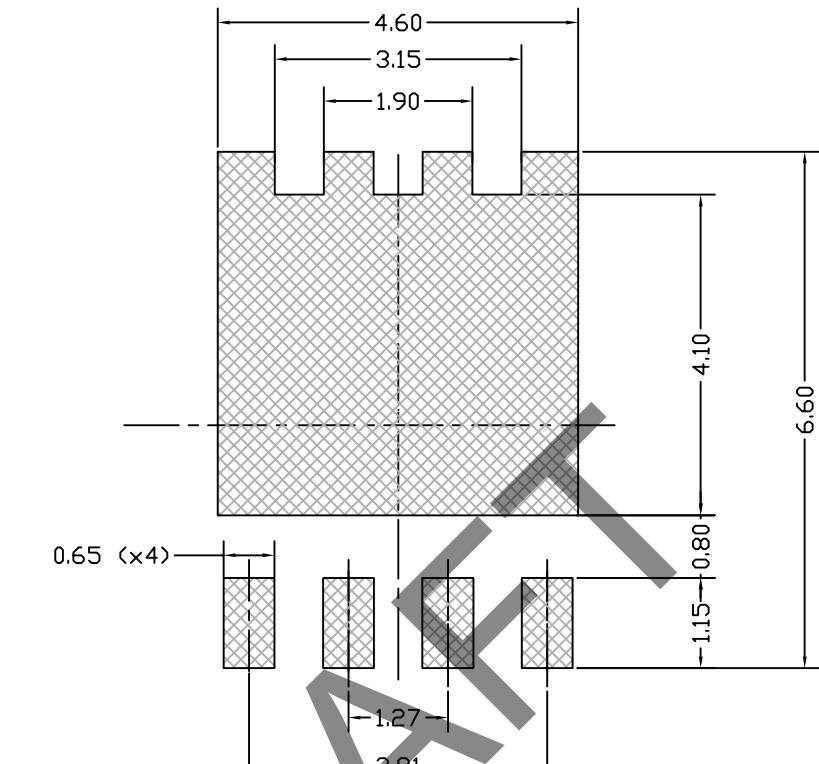


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**Table 8. PowerFLAT 5x6 type C package mechanical data**

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	1.05		1.35
L	0.725		1.025
L1	0.05	0.15	0.25
θ	0°		12°

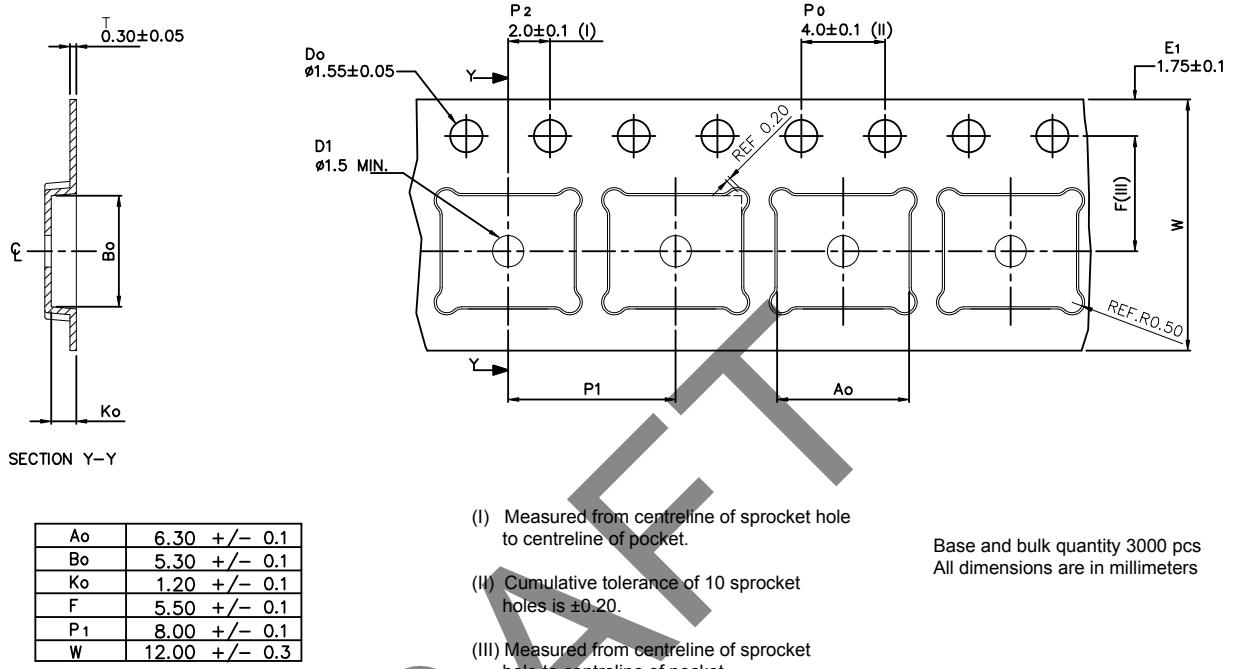
Figure 21. PowerFLAT 5x6 recommended footprint (dimensions are in mm)



8231817\_FOOTPRINT\_simp\_Rev\_20

#### 4.3 PowerFLAT 5x6 packing information

Figure 22. PowerFLAT 5x6 tape (dimensions are in mm)



8234350\_Tape\_rev\_C

Figure 23. PowerFLAT 5x6 package orientation in carrier tape

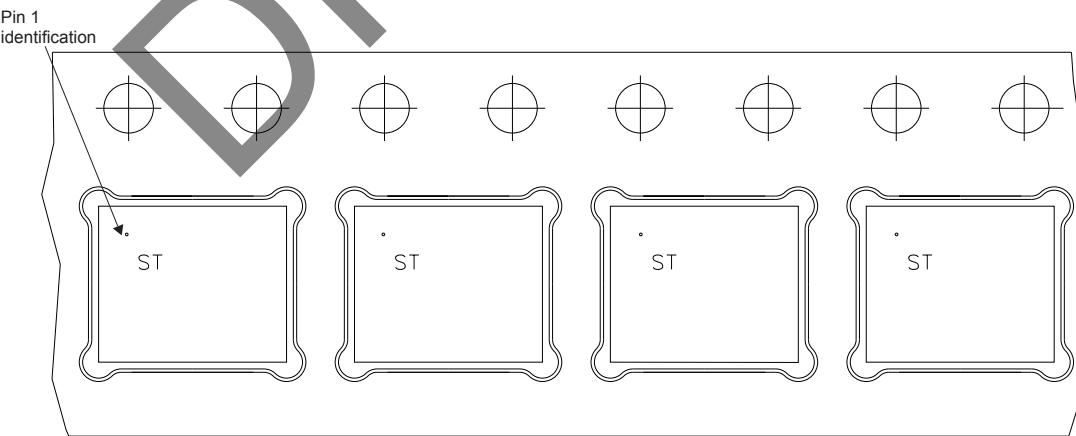
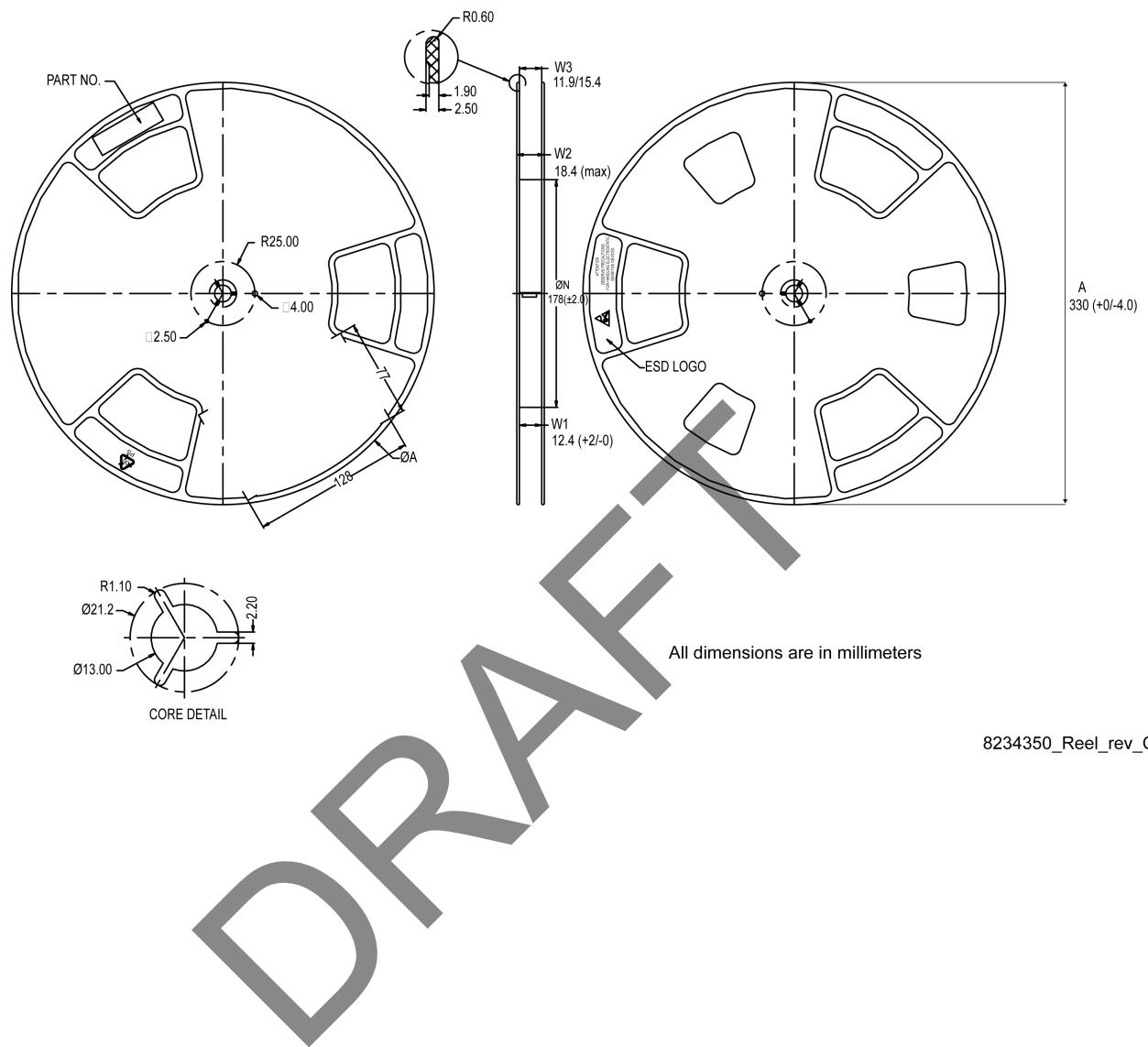


Figure 24. PowerFLAT 5x6 reel



## Revision history

**Table 9. Document revision history**

Date	Revision	Changes
13-Jun-2014	1	First release.
22-Sep-2014	2	Updated title, features and description in cover page. Updated <i>Table 2: "Absolute maximum ratings"</i> , <i>Table 4: "On /off states"</i> , <i>Table 5: "Dynamic"</i> , <i>Table 6: "Switching times"</i> and <i>Table 7: "Source-drain diode"</i> . Added <i>Section 3: "Electrical characteristics (curves)"</i> .
14-Jan-2015	3	Document status promoted from preliminary to production data.
02-May-2017	4	Modified title and features table on cover page. Modified <i>Table 1. Absolute maximum ratings</i> , <i>Table 3. On /off states</i> , <i>Table 4. Dynamic</i> , <i>Table 5. Switching times</i> and <i>Table 6. Source-drain diode</i> . Modified <i>Section 2.1 Electrical characteristics (curves)</i> . Minor text changes.
15-Jul-2022	5	Inserted <i>Section 4.1 PowerFLAT 5x6 type B package information</i> . Minor text changes.

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**PCI Title :** STL220N6F7 (OD68): Datasheet Updated

**PCI Reference :** ADG/22/13595

**Subject :** Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

STL220N6F7		
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