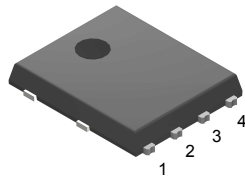
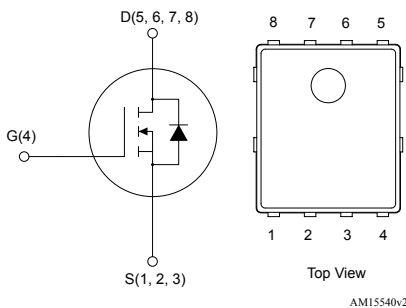



## Automotive N-channel 80 V, 5.6 mΩ typ., 95 A, STripFET F7 Power MOSFET in a PowerFLAT 5x6 package


**PowerFLAT 5x6**


### Features

Order code	$V_{DS}$	$R_{DS(on)}$ max.	$I_D$
STL105N8F7AG	80 V	6.5 mΩ	95 A

- AEC-Q101 qualified 
- 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
- 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.



#### Product status link

[STL105N8F7AG](#)

#### Product summary

<b>Order code</b>	STL105N8F7AG
<b>Marking</b>	105N8F7
<b>Package</b>	PowerFLAT 5x6
<b>Packing</b>	Tape and reel

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	80	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	95	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	68	
$I_{DM}^{(1)}$	Drain current (pulsed)	380	A
$P_{TOT}$	Total power dissipation at $T_C = 25\text{ }^\circ\text{C}$	127	W
$I_{AV}$	Avalanche current, repetitive or not repetitive (pulse width limited by maximum junction temperature)	40	A
$E_{AS}$	Single pulse avalanche energy ( $T_J = 25\text{ }^\circ\text{C}$ , $I_D = I_{AV}$ , $V_{DD} = 60\text{ V}$ , $R_G \text{ min} = 47\text{ }\Omega$ )	135	mJ
$T_J$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		$^\circ\text{C}$

1. Pulse width limited by safe operating area.

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance, junction-to-case	1.18	$^\circ\text{C/W}$
$R_{thJB}^{(1)}$	Thermal resistance, junction-to-board	31.3	$^\circ\text{C/W}$

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

## 2 Electrical characteristics

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

**Table 3. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	80			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 80\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 25\text{ A}$		5.6	6.5	m $\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	3475	-	pF
$C_{oss}$	Output capacitance		-	904	-	pF
$C_{rss}$	Reverse transfer capacitance		-	88	-	pF
$Q_g$	Total gate charge	$V_{DD} = 40\text{ V}$ , $I_D = 95\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$ (see Figure 13. Test circuit for gate charge behavior)	-	46	-	nC
$Q_{gs}$	Gate-source charge		-	24	-	nC
$Q_{gd}$	Gate-drain charge		-	10	-	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 40\text{ V}$ , $I_D = 50\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$	-	19	-	ns
$t_r$	Rise time		-	22	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	31	-	ns
$t_f$	Fall time		-	13	-	ns

**Table 6. Source-drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current				95	A
$V_{SD}^{(1)}$	Source-drain voltage	$I_{SD} = 95\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 50\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 64\text{ V}$	-	37		ns
$Q_{rr}$	Reverse recovery charge		-	37		nC
$I_{RRM}$	Reverse recovery current	(see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	1.5		A

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

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

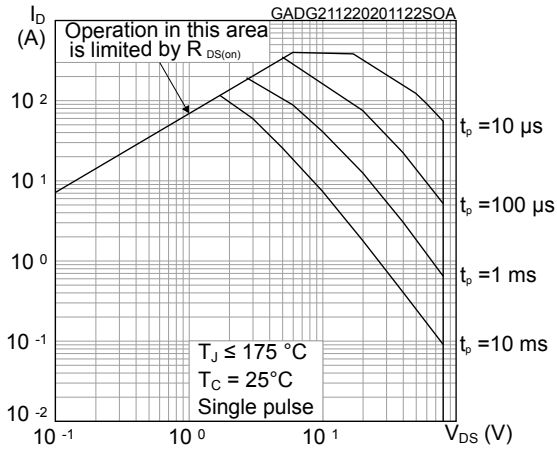


Figure 2. Maximum transient thermal impedance

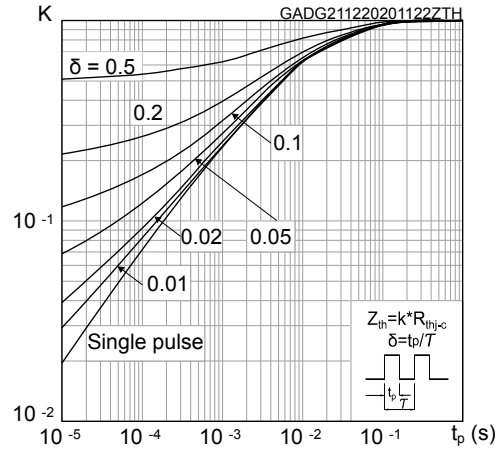


Figure 3. Typical output characteristics

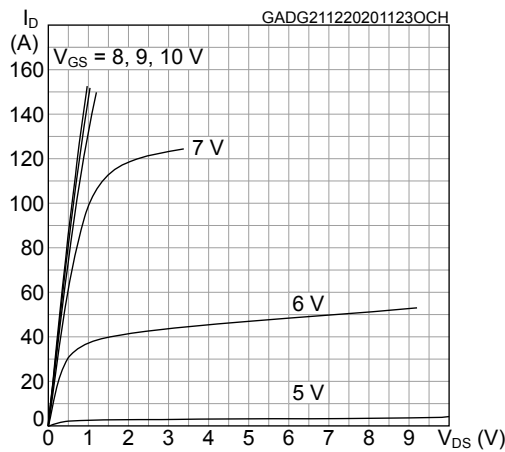


Figure 4. Typical transfer characteristics

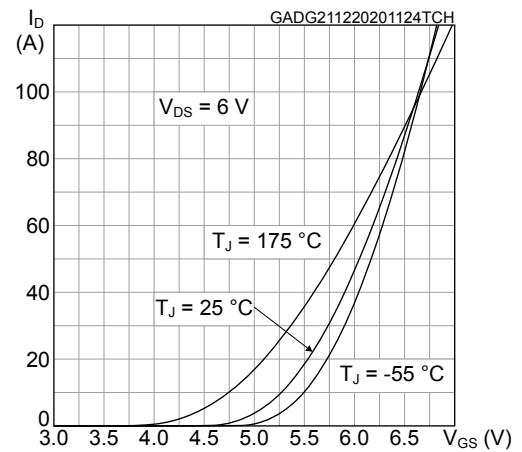


Figure 5. Typical gate charge characteristics

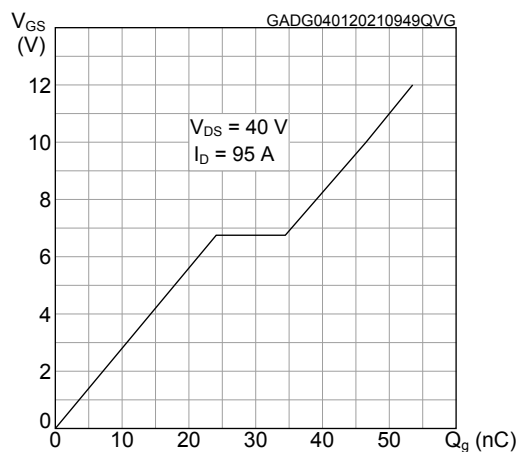
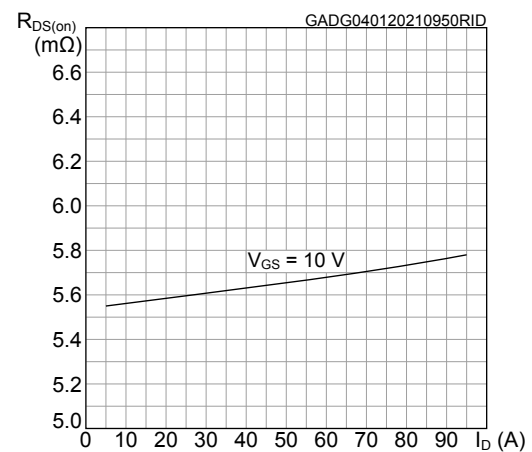
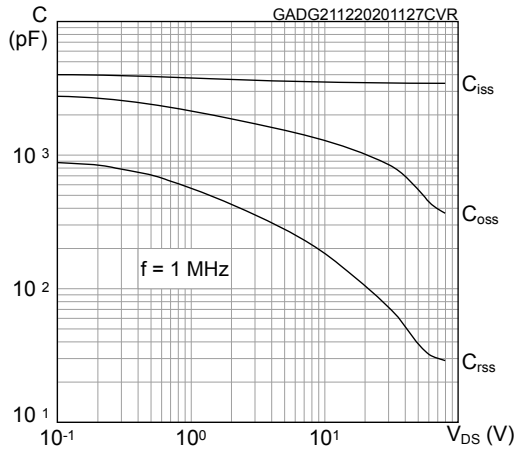


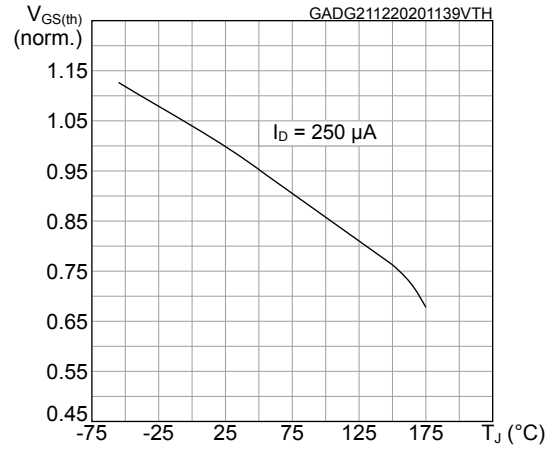
Figure 6. Typical drain-source on-resistance



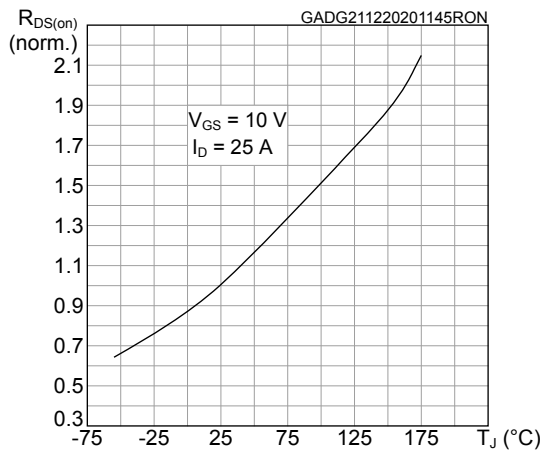
**Figure 7. Typical capacitance characteristics**



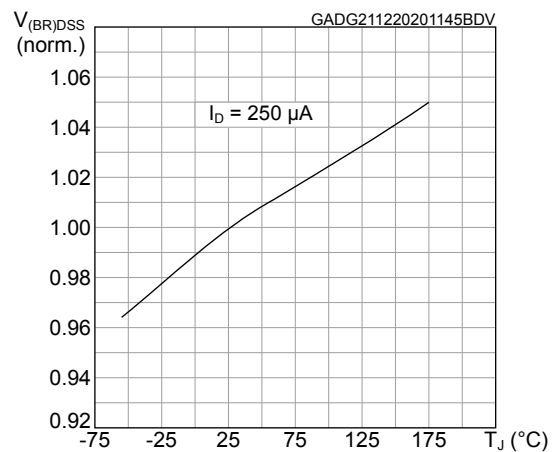
**Figure 8. Normalized gate threshold voltage vs temperature**



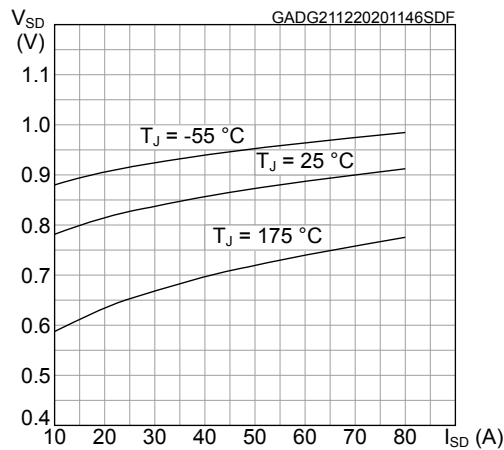
**Figure 9. Normalized on-resistance vs temperature**



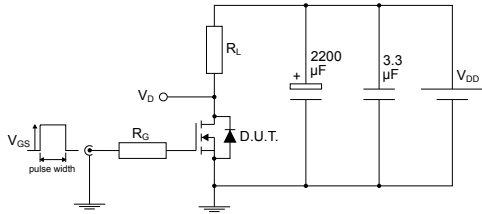
**Figure 10. Normalized  $V_{(BR)DSS}$  vs temperature**



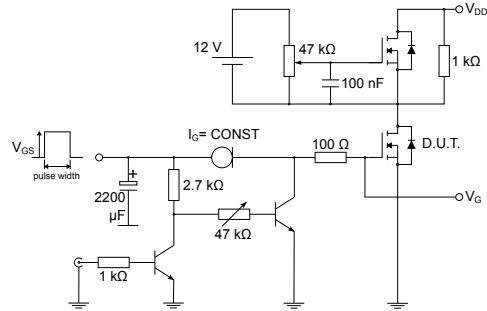
**Figure 11. Typical reverse diode forward characteristics**



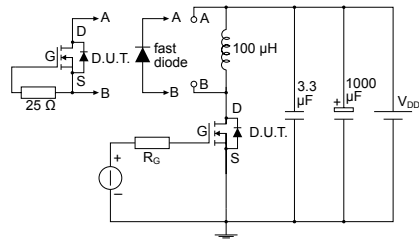
### 3 Test circuits

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


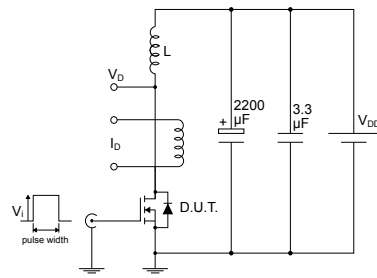
AM01468v1

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


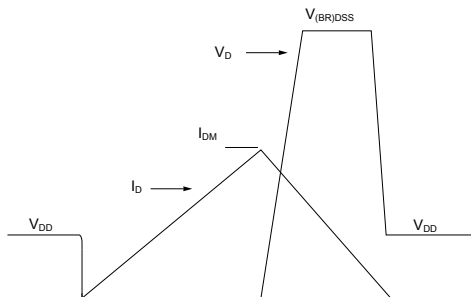
AM01469v1

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


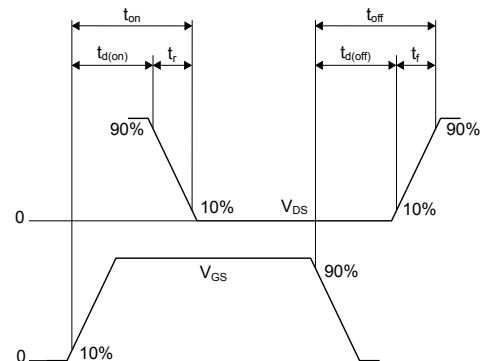
AM01470v1

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


AM01471v1

**Figure 16. Unclamped inductive waveform**


AM01472v1

**Figure 17. Switching time waveform**


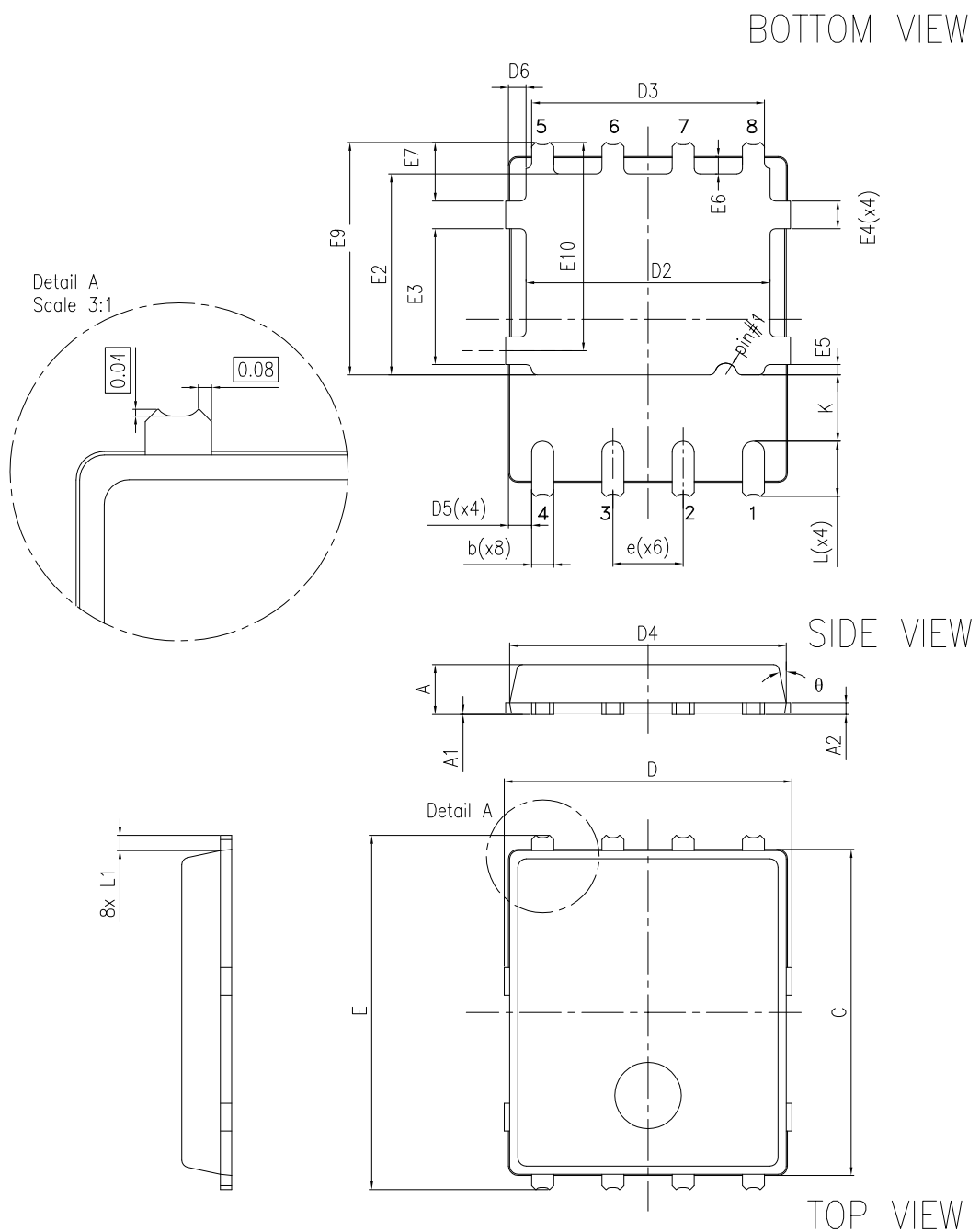
AM01473v1

## 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 WF type C package information

Figure 18. PowerFLAT 5x6 WF type C package outline



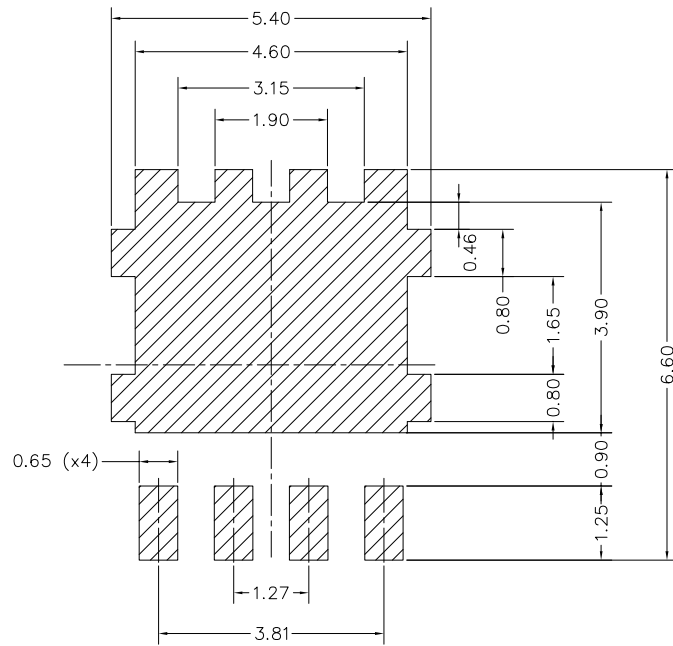
8231817\_WF\_typeC\_r20

**Table 7. PowerFLAT 5x6 WF type C mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.00		0.05
A2		0.25	
b	0.30		0.50
C	5.80	6.00	6.10
D	5.00	5.20	5.40
D2	4.15		4.45
D3	4.05	4.20	4.35
D4	4.80	5.00	5.10
D5	0.25	0.40	0.55
D6	0.15	0.30	0.45
e		1.27	
E	6.20	6.40	6.60
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	0.85	1.00	1.15
E9	4.00	4.20	4.40
E10	3.55	3.70	3.85
K	1.05		1.35
L	0.90	1.00	1.10
L1	0.175	0.275	0.375
θ	0°		12°



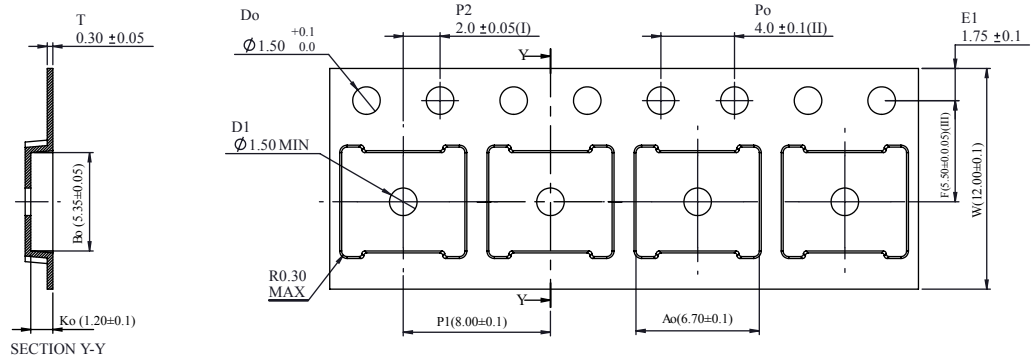
Figure 19. PowerFLAT 5x6 recommended footprint (dimensions are in mm)



8231817\_FOOTPRINT\_rev20

## 4.2 PowerFLAT 5x6 WF packing information

Figure 20. PowerFLAT 5x6 WF tape (dimensions are in mm)

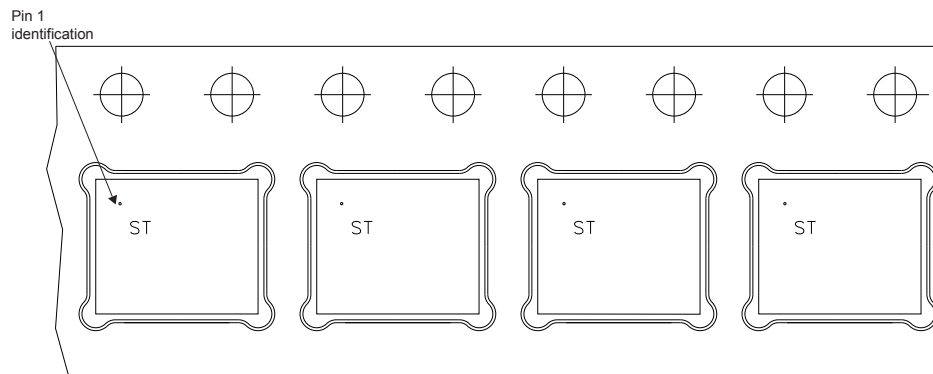


- (I) Measured from centreline of sprocket hole to centreline of pocket.
- (II) Cumulative tolerance of 10 sprocket holes is  $\pm 0.20$ .
- (III) Measured from centreline of sprocket hole to centreline of pocket.

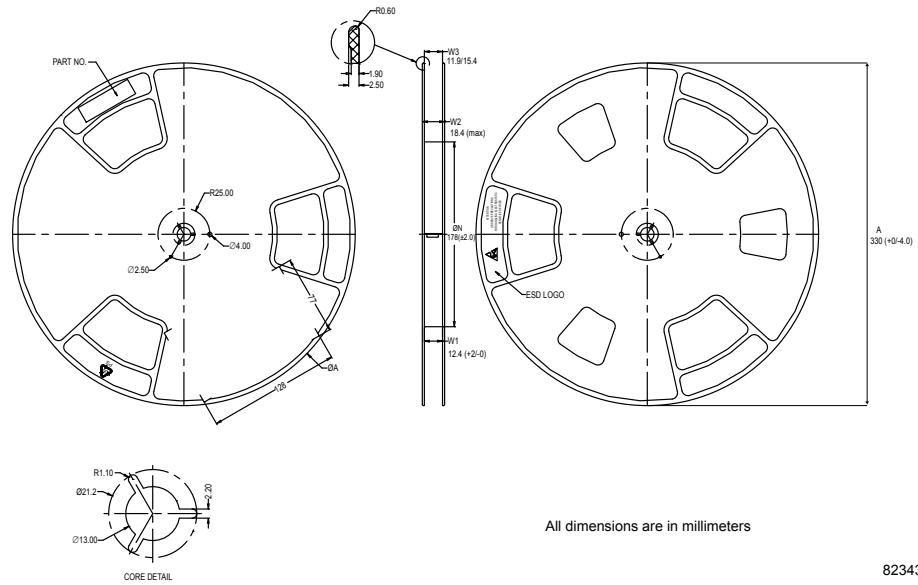
Base and bulk quantity 3000 pcs

8234350\_TapeWF\_rev\_C

Figure 21. PowerFLAT 5x6 package orientation in carrier tape



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



## Revision history

**Table 8. Document revision history**

Date	Version	Changes
04-Jan-2021	1	First release.
08-Mar-2021	2	Updated Table 1. Absolute maximum ratings.

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