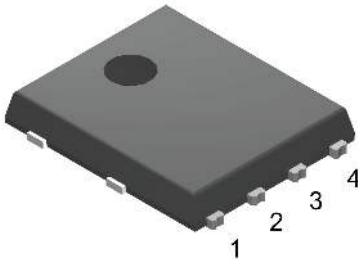
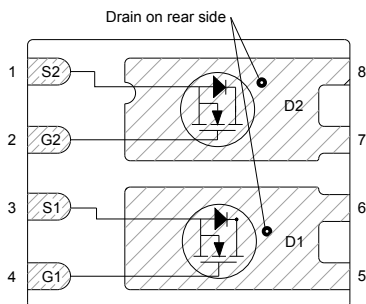


## Automotive-grade dual N-channel, 40 V, 7.0 mΩ typ., 40 A, STripFET™ F7 Power MOSFET in a PowerFLAT™ 5x6 double island package



**PowerFLAT™ 5x6  
double island**



NG14G22D1D2RSS13S21

### Product status link


[STL64DN4F7AG](#)

### Product summary

<b>Order code</b>	STL64DN4F7AG
<b>Marking</b>	64DN4F7
<b>Package</b>	PowerFLAT™ 5x6 double island
<b>Packing</b>	Tape and reel

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STL64DN4F7AG	40 V	8.5 mΩ	40 A

- AEC-Q101 qualified 
- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>rss</sub>/C<sub>iss</sub> 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.

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	40	V
$V_{GS}$	Gate-source voltage	±20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ °C}$	40	A
	Drain current (continuous) at $T_C = 100\text{ °C}$	40	A
$I_{DM}^{(2)}$	Drain current (pulsed at 10 $\mu$ s)	240	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ °C}$	57	W
$T_j$	Operating junction temperature range	-55 to 175	°C
$T_{stg}$	Storage temperature range		

1. Drain current is limited by package, the current capability of the silicon is 64 A at 25 °C.

2. Pulse width limited by safe operating area

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	32	°C/W
$R_{thj-case}$	Thermal resistance junction-case	2.6	°C/W

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

## 2 Electrical characteristics

( $T_C = 25\text{ °C}$  unless otherwise specified).

**Table 3. On-/off-states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 1\text{ mA}$	40			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 40\text{ V}$			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		4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$		7.0	8.5	m $\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	637	-	pF
$C_{oss}$	Output capacitance		-	240	-	pF
$C_{riss}$	Reverse transfer capacitance		-	26	-	pF
$Q_g$	Total gate charge	$V_{DD} = 20\text{ V}$ , $I_D = 40\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$ (see Figure 13. Test circuit for gate charge behavior)	-	9.8	-	nC
$Q_{gs}$	Gate-source charge		-	3.8	-	nC
$Q_{gd}$	Gate-drain charge		-	3.1	-	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 20\text{ V}$ , $I_D = 20\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	18.8	-	ns
$t_r$	Rise time		-	102.6	-	ns
$t_{d(off)}$	Turn-off delay time		-	21.4	-	ns
$t_f$	Fall time		-	13.3	-	ns

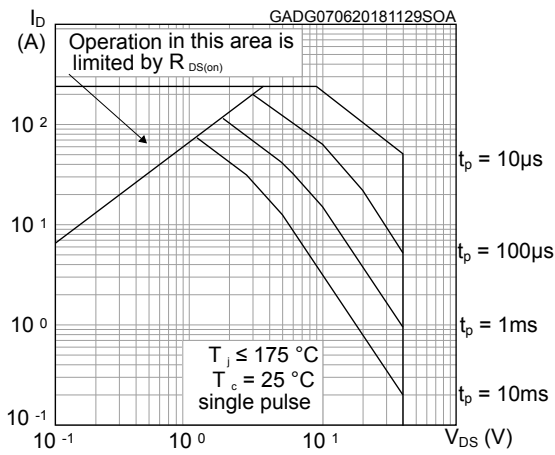
**Table 6. Source-drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 40\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.3	V
$t_{rr}$	Reverse recovery time	$I_D = 40\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$	-	27.5		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 32\text{ V}$	-	17.3		nC
$I_{RRM}$	Reverse recovery current	(see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	1.4		A

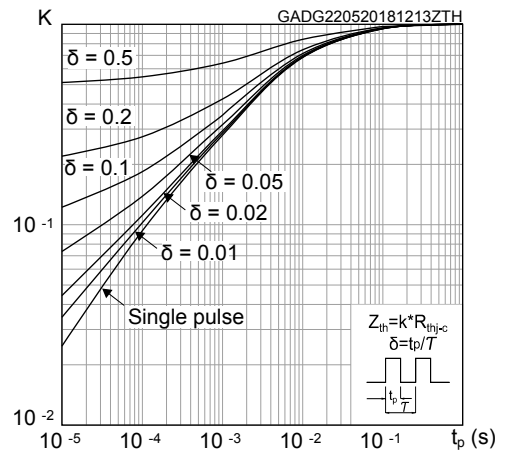
1. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

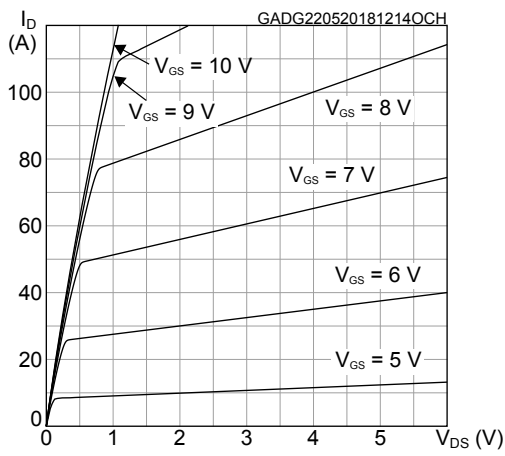
**Figure 1. Safe operating area**



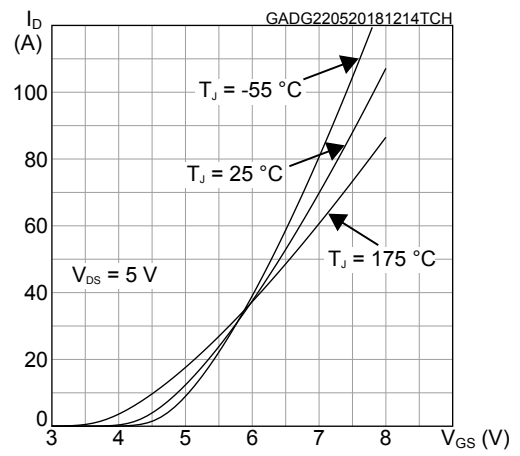
**Figure 2. Thermal impedance**



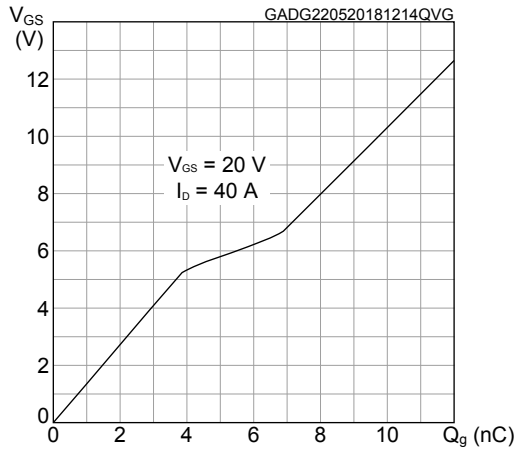
**Figure 3. Output characteristics**



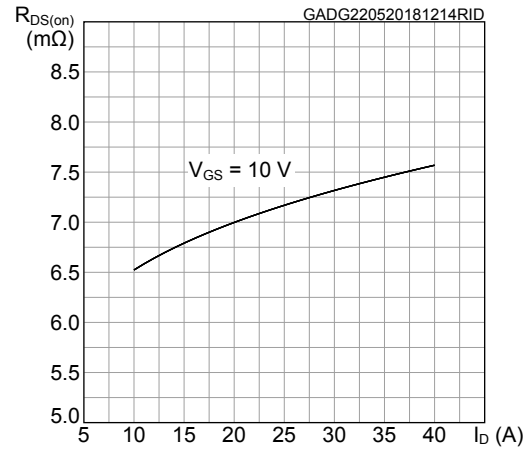
**Figure 4. Transfer characteristics**



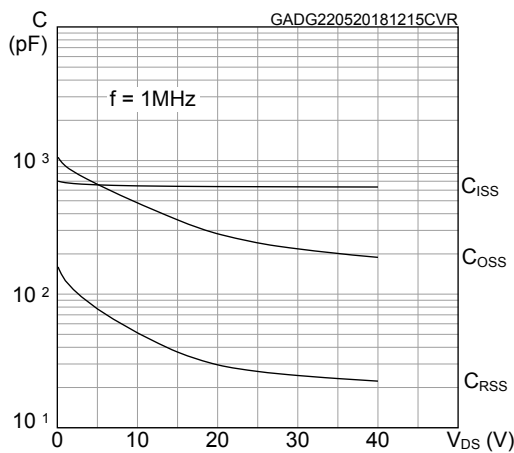
**Figure 5. Gate charge vs gate-source voltage**



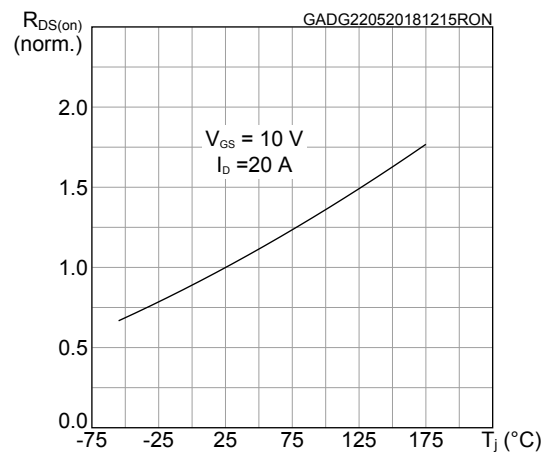
**Figure 6. Static drain-source on-resistance**



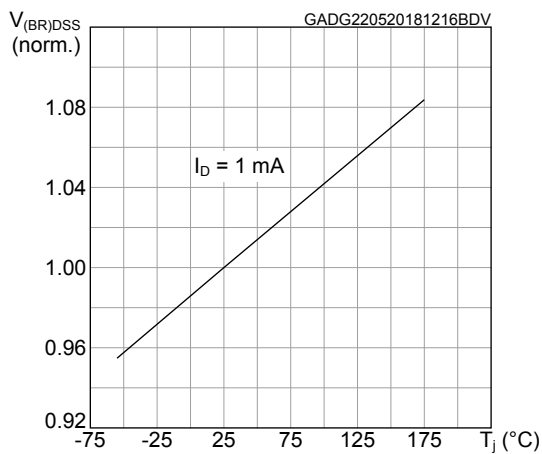
**Figure 7. Capacitance variations**



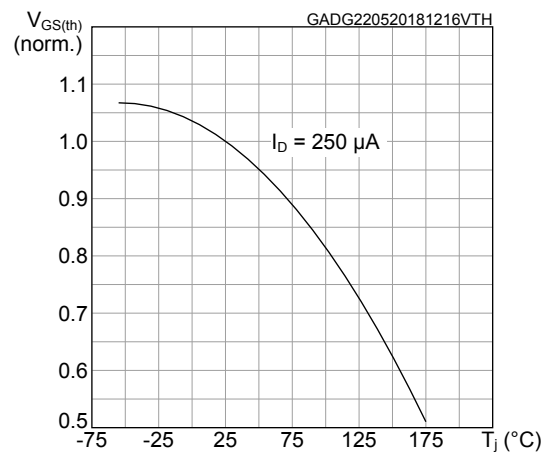
**Figure 8. Normalized on-resistance vs temperature**



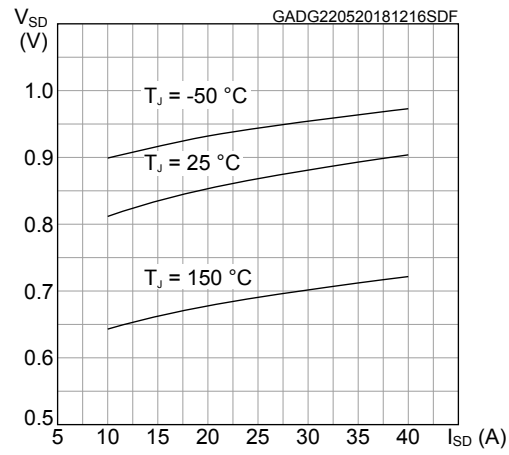
**Figure 9. Normalized  $V_{(BR)DSS}$  vs temperature**



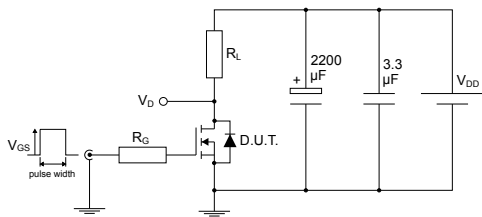
**Figure 10. Normalized gate-threshold voltage vs temperature**



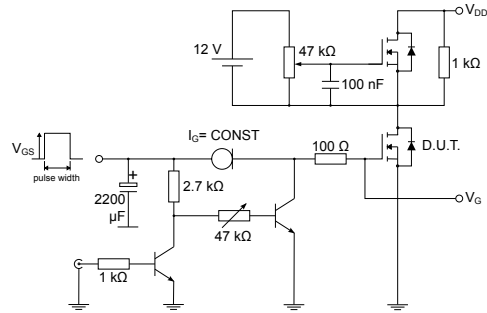
**Figure 11. Source-drain diode forward characteristics**



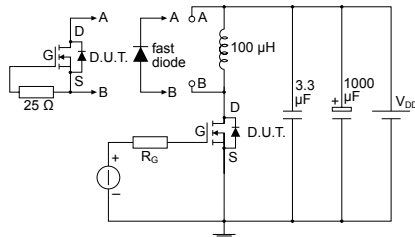
### 3 Test circuits

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


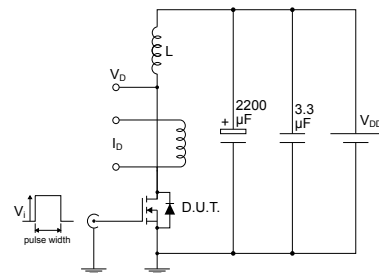
AM01468v1

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


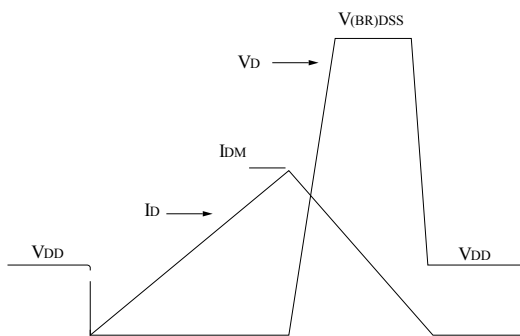
AM01469v1

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


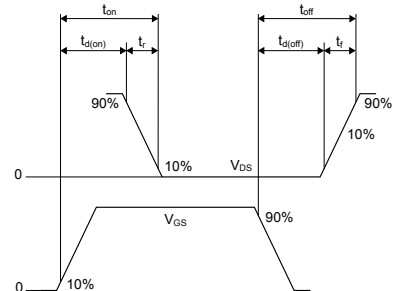
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**Figure 15. Unclamped inductive load test circuit**


AM01471v1

**Figure 16. Unclamped inductive waveform**


AM01472v1

**Figure 17. Switching time waveform**


AM01473v1

## 4 Package information

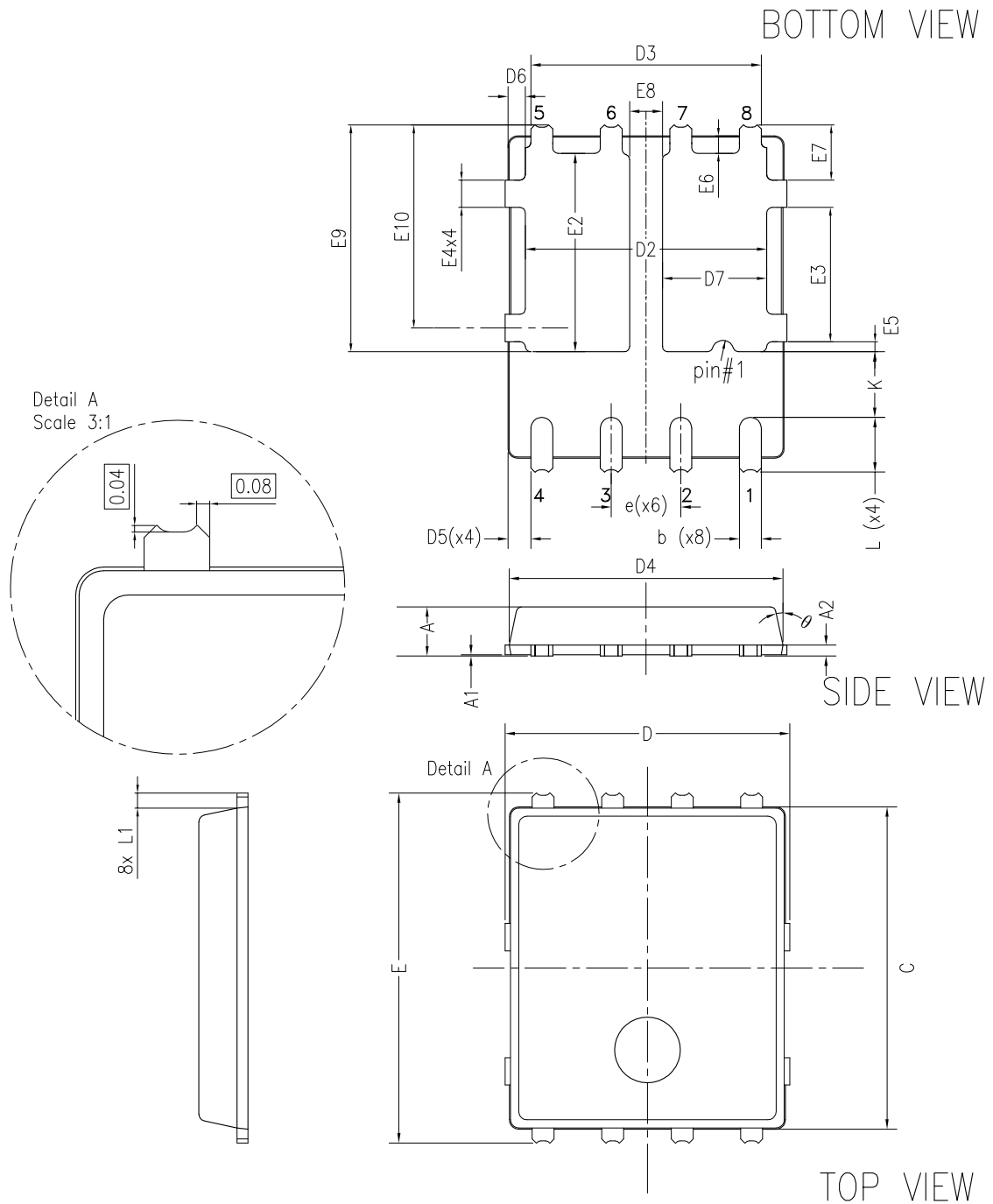
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### 4.1 PowerFLAT™ 5x6 double island WF type C package information

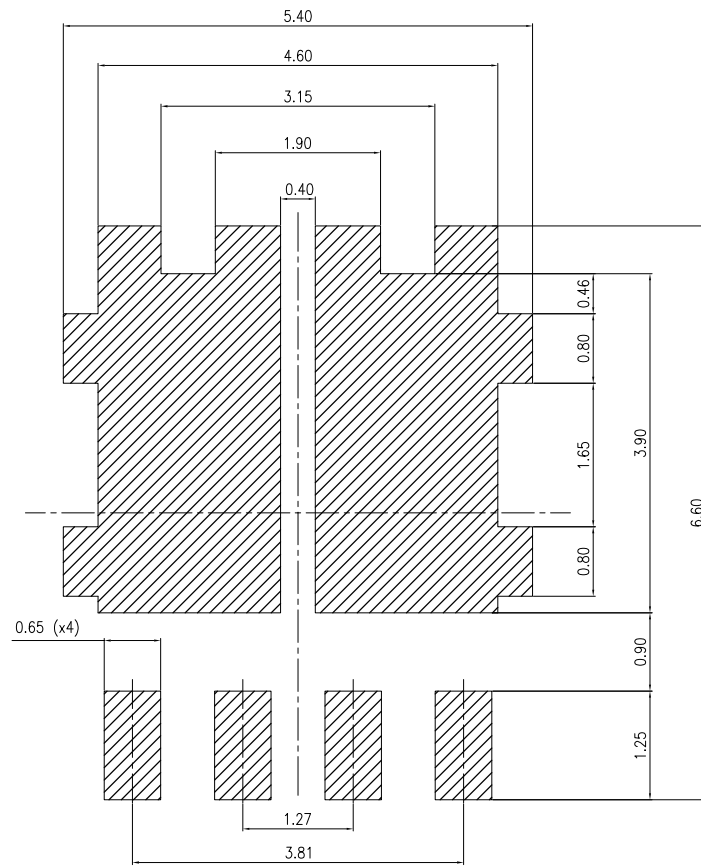
Figure 18. PowerFLAT™ 5x6 double island WF type C package outline



8256945\_DL\_WF\_typeC\_r18

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

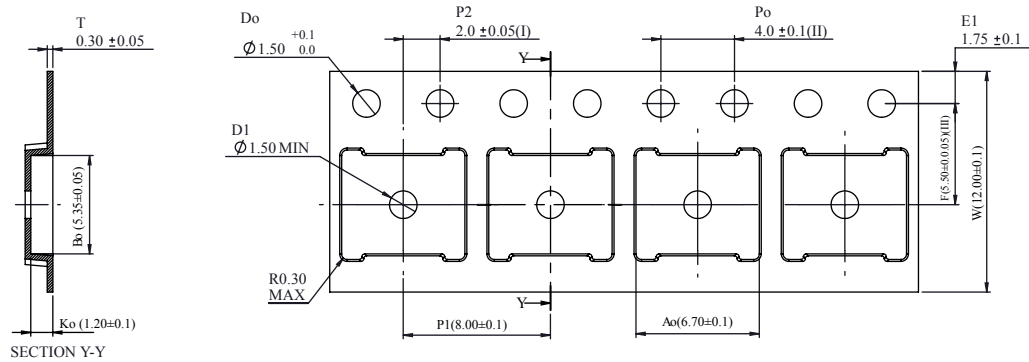
Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
C	5.80	6.00	6.10
D	5.00	5.20	5.40
D2	4.15		4.45
D3	4.05	4.20	4.35
D4	4.80	5.00	5.10
D5	0.25	0.40	0.55
D6	0.15	0.30	0.45
D7	1.68		1.98
e		1.27	
E	6.20	6.40	6.60
E2	3.50		3.70
E3	2.35		2.55
E4	0.40		0.60
E5	0.08		0.28
E6	0.20	0.325	0.45
E7	0.85	1.00	1.15
E8	0.55		0.75
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 double island recommended footprint (dimensions are in mm)**


8256945\_FP\_std\_R18

## 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**

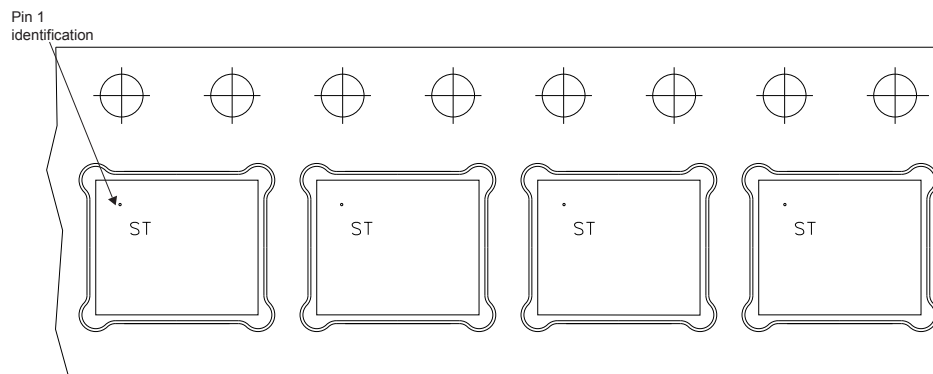
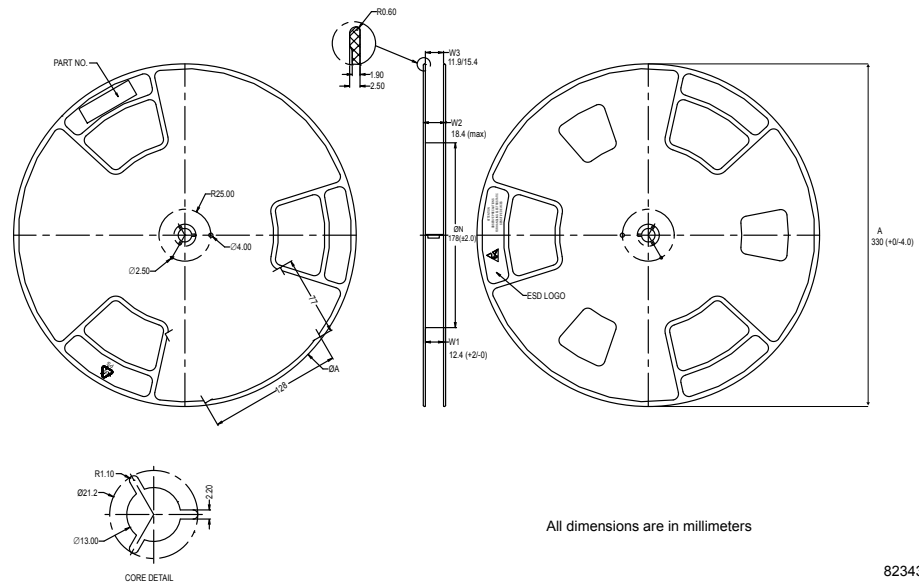


Figure 22. PowerFLAT™ 5x6 reel (dimensions are in mm)



## Revision history

**Table 8. Document revision history**

Date	Version	Changes
28-May-2018	1	Initial release
07-Jun-2018	2	Updated title and features in cover page. Updated <a href="#">Figure 1. Safe operating area.</a>
08-Jun-2018	3	Updated <a href="#">Section 4.1 PowerFLAT™ 5x6 double island WF type C package information.</a>

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