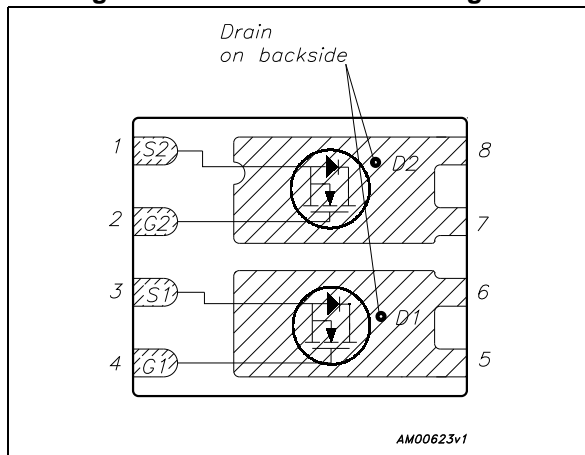


## Automotive-grade dual N-channel 30 V, 0.016 $\Omega$ typ., 40 A STripFET™ H5 Power MOSFET in a PowerFLAT™ 5x6 DI package

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>
STL40DN3LLH5	30 V	0.018 $\Omega$	40 A



- AEC-Q101 qualified
- Low on-resistance
- High avalanche ruggedness
- Low gate drive power loss
- Wettable flank package

### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using STMicroelectronics' STripFET™ H5 technology. The device has been optimized to achieve very low on-state resistance, contributing to a FoM that is among the best in its class.

**Table 1. Device summary**

Order code	Marking	Package	Packing
STL40DN3LLH5	40DN3LLH5	PowerFLAT™ 5x6 double island	Tape and reel

# Contents

<b>1</b>	<b>Electrical ratings</b> .....	<b>3</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>4</b>
2.1	Electrical characteristics (curves) .....	6
<b>3</b>	<b>Test circuits</b> .....	<b>8</b>
<b>4</b>	<b>Package information</b> .....	<b>9</b>
4.1	PowerFLAT 5x6 double island WF type R .....	10
<b>5</b>	<b>Packing information</b> .....	<b>13</b>
<b>6</b>	<b>Revision history</b> .....	<b>15</b>

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	30	V
$V_{GS}$	Gate-source voltage	$\pm 22$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	40	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	28	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25^\circ\text{C}$	11	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb}=100^\circ\text{C}$	7	A
$I_{DM}^{(2)(3)}$	Drain current (pulsed)	44	A
$I_{DM}^{(1)(3)}$	Drain current (pulsed)	160	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25^\circ\text{C}$	50	W
$P_{TOT}^{(2)}$	Total dissipation at $T_{pcb} = 25^\circ\text{C}$	4.7	W
$T_J$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		

1. The value is rated according  $R_{thj-c}$
2. The value is rated according  $R_{thj-pcb}$
3. Pulse width limited by safe operating area

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	3.0	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	32	$^\circ\text{C/W}$

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

## 2 Electrical characteristics

( $T_{CASE}=25\text{ °C}$  unless otherwise specified)

**Table 4. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\ \mu\text{A}$ , $V_{GS} = 0\ \text{V}$	30			V
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 30\ \text{V}$ , $V_{GS} = 0\ \text{V}$			1	$\mu\text{A}$
		$V_{DS} = 30\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_J = 125\text{ °C}^{(1)}$			10	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current	$V_{GS} = \pm 22\ \text{V}$ , $V_{DS} = 0\ \text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	1	1.5		V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\ \text{V}$ , $I_D = 5.5\ \text{A}$		0.016	0.018	$\Omega$
		$V_{GS} = 4.5\ \text{V}$ , $I_D = 5.5\ \text{A}$		0.02	0.025	$\Omega$

1. Defined by design, not subject to production test

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\ \text{V}$ , $f = 1\ \text{MHz}$ , $V_{GS} = 0\ \text{V}$	-	475	-	pF
$C_{oss}$	Output capacitance		-	97	-	pF
$C_{rss}$	Reverse transfer capacitance		-	19	-	pF
$Q_g$	Total gate charge	$V_{DD} = 15\ \text{V}$ , $I_D = 11\ \text{A}$ $V_{GS} = 4.5\ \text{V}$ (see <a href="#">Figure 13</a> )	-	4.5	-	nC
$Q_{gs}$	Gate-source charge		-	1.7	-	nC
$Q_{gd}$	Gate-drain charge		-	1.9	-	nC

**Table 6. Switching times**

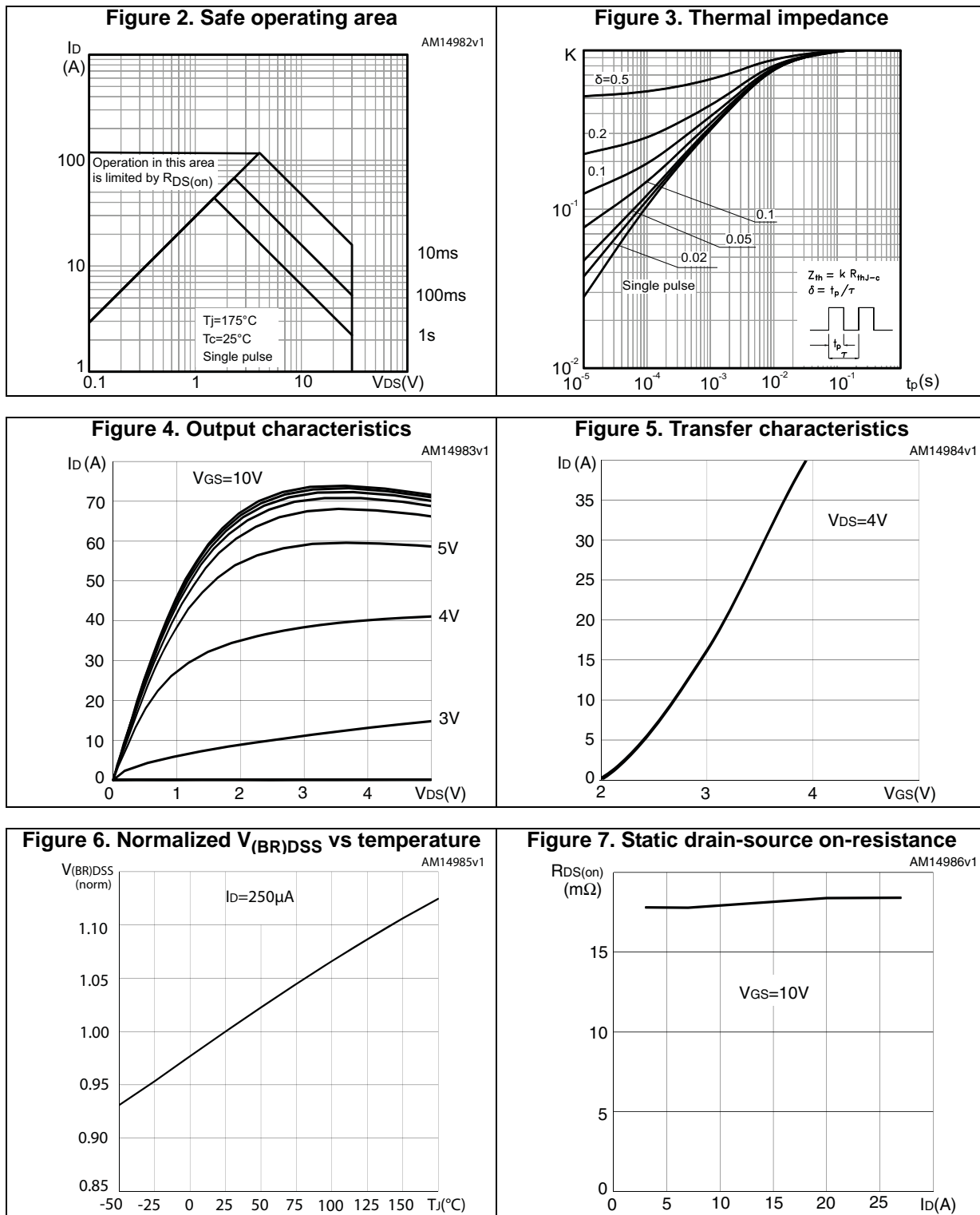
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\ \text{V}$ , $I_D = 11\ \text{A}$ , $R_G = 4.7\ \Omega$ , $V_{GS} = 10\ \text{V}$ (see <a href="#">Figure 12</a> )	-	4	-	ns
$t_r$	Rise time		-	22	-	ns
$t_{d(off)}$	Turn-off delay time		-	13	-	ns
$t_f$	Fall time		-	2.8	-	ns

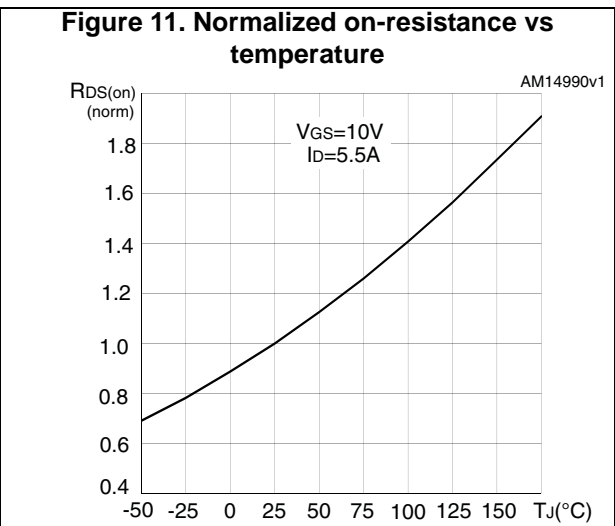
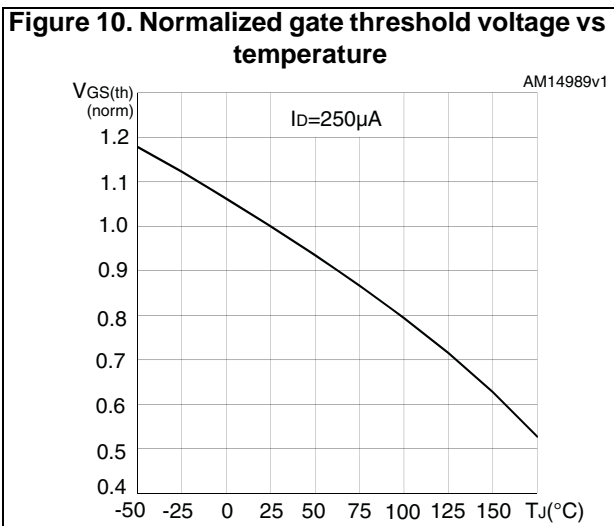
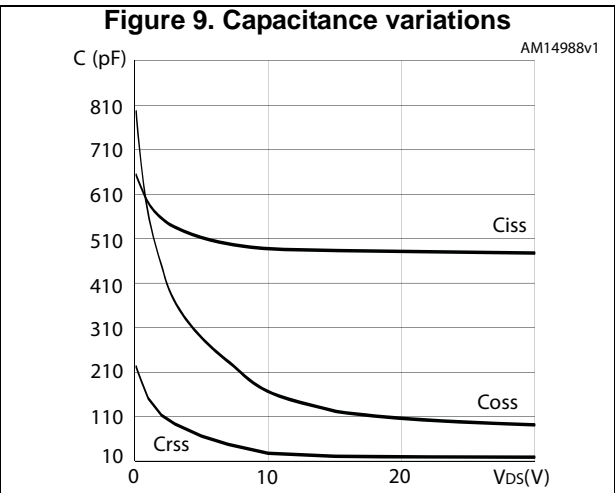
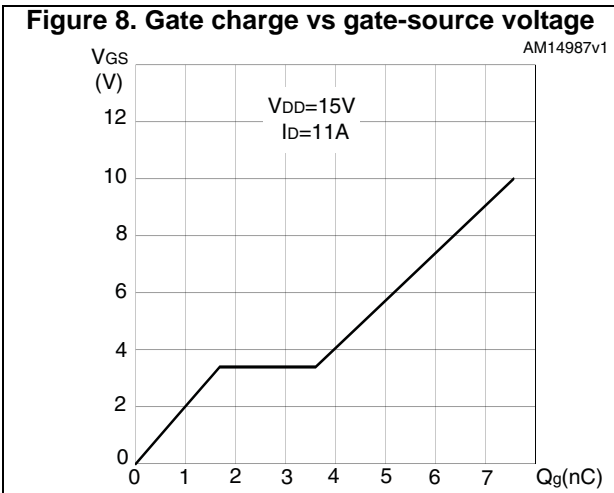
Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 11 \text{ A}$ , $V_{GS} = 0 \text{ V}$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 11 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$ , $V_{DD} = 25 \text{ V}$ , $T_j = 150 \text{ }^\circ\text{C}$	-	16.2		ns
$Q_{rr}$	Reverse recovery charge		-	1		nC
$I_{RRM}$	Reverse recovery current		-	8.1		A

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

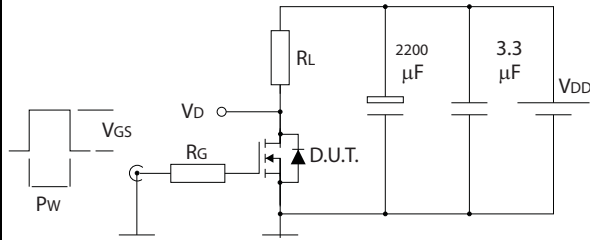
## 2.1 Electrical characteristics (curves)





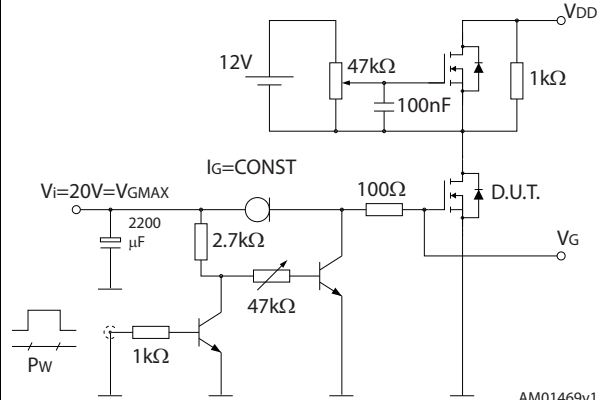
### 3 Test circuits

**Figure 12. witching times test circuit for resistive load**



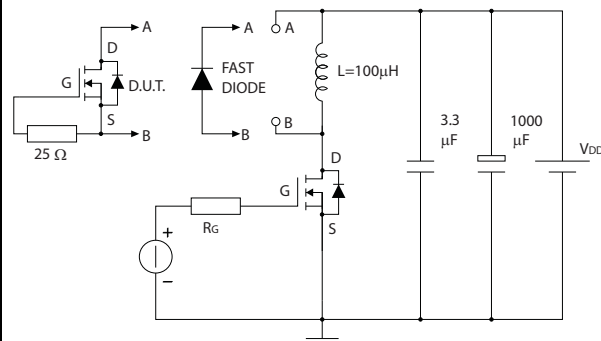
AM01468v1

**Figure 13. Gate charge test circuit**



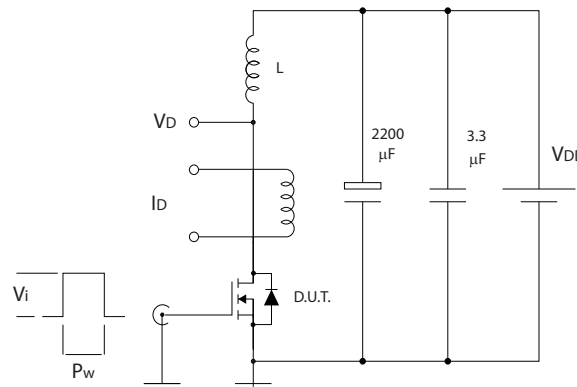
AM01469v1

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



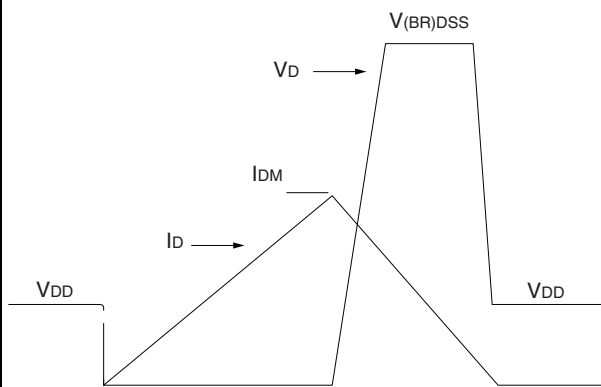
AM01470v1

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



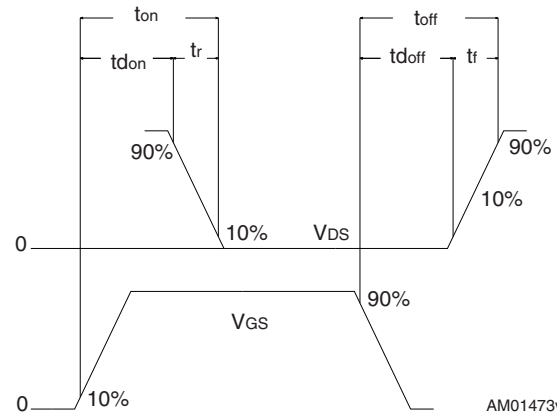
AM01471v1

**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<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

### 4.1 PowerFLAT 5x6 double island WF type R

Figure 18. PowerFLAT 5x6 double island WF type R outline

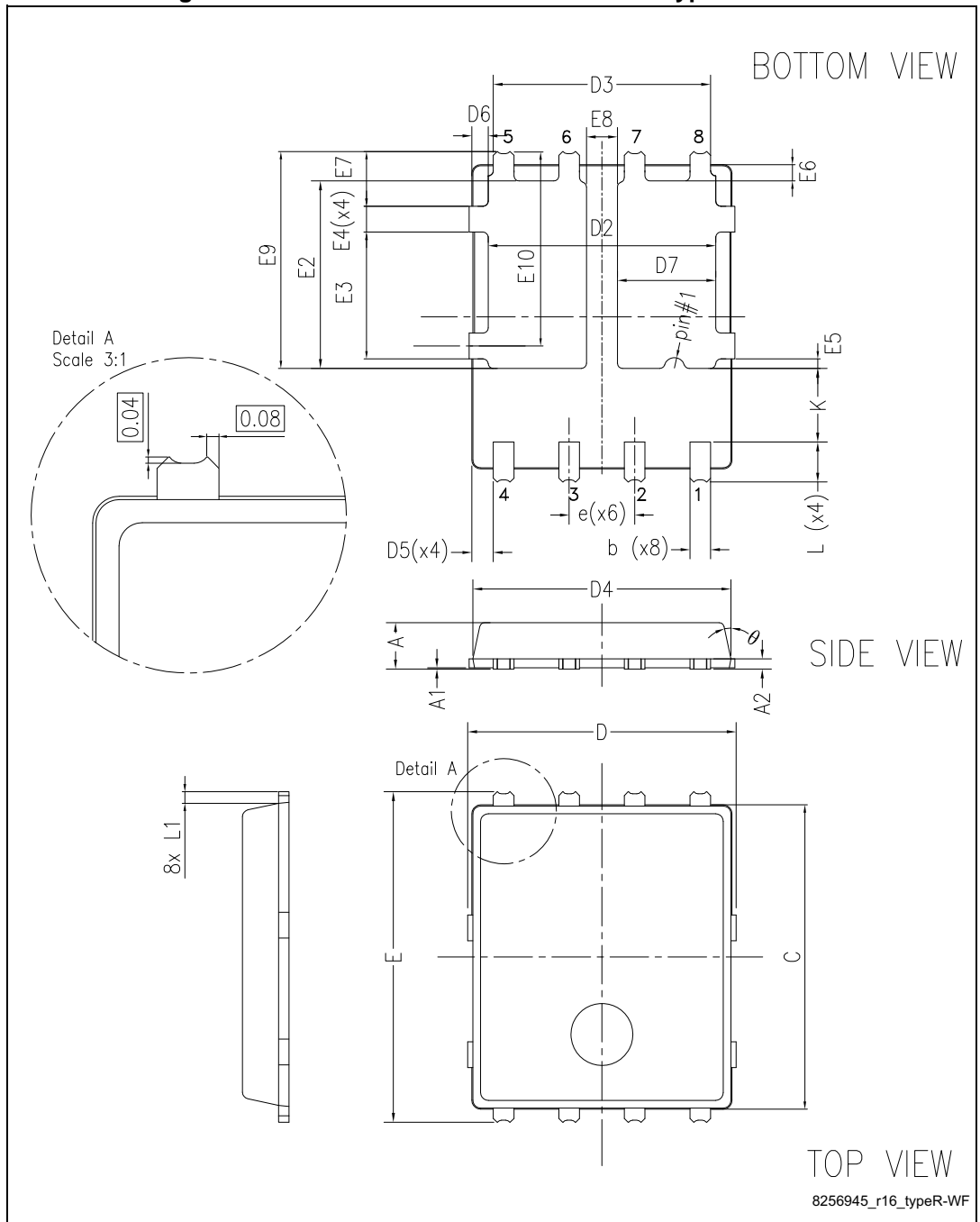
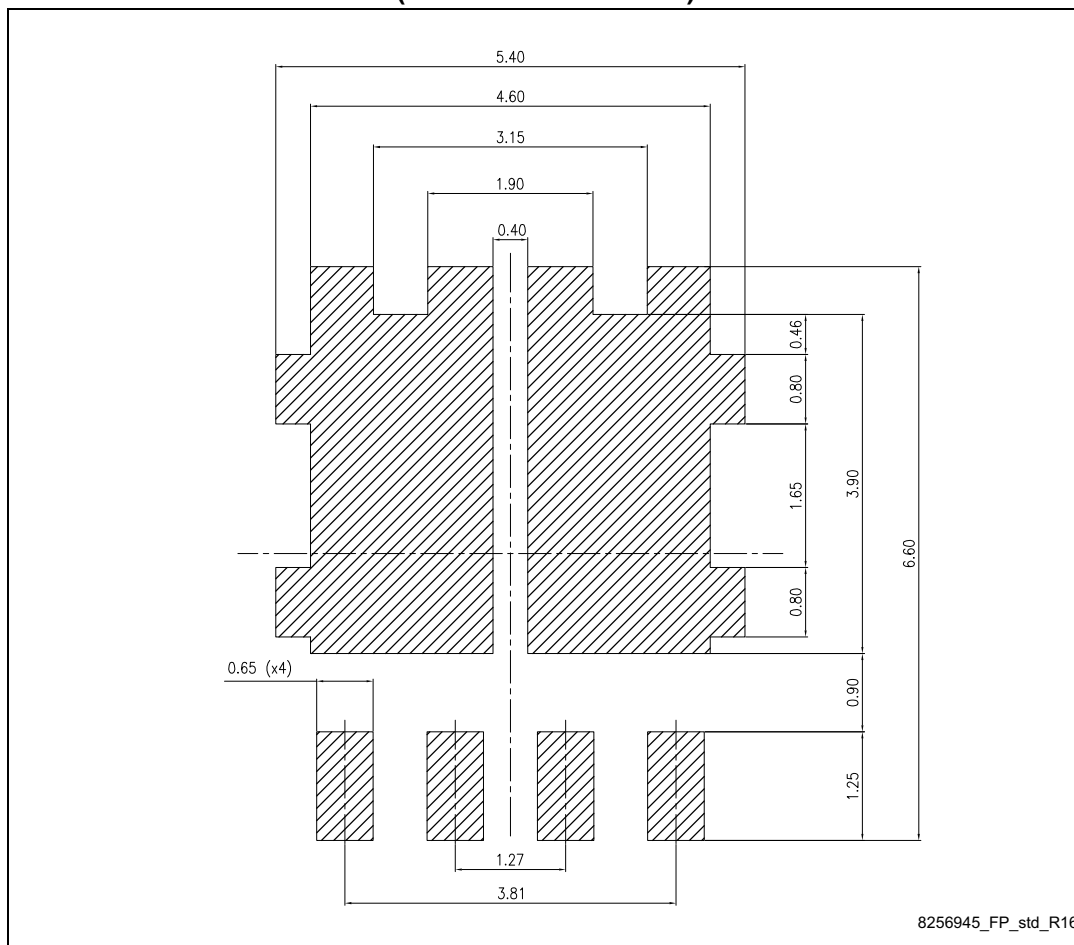


Table 8. PowerFLAT 5x6 double island WF type R mechanical data

Ref.	Dimensions (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	5.10
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
E8	0.55	1.00	0.75
E9	4.00	4.20	4.40
E10	3.55	3.70	3.85
K	1.275		1.575
L	0.725	0.825	0.925
L1	0.175	0.275	0.375
$\theta$	0°		12°

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



# 5 Packing information

Figure 20. PowerFLAT™ 5x6 WF tape

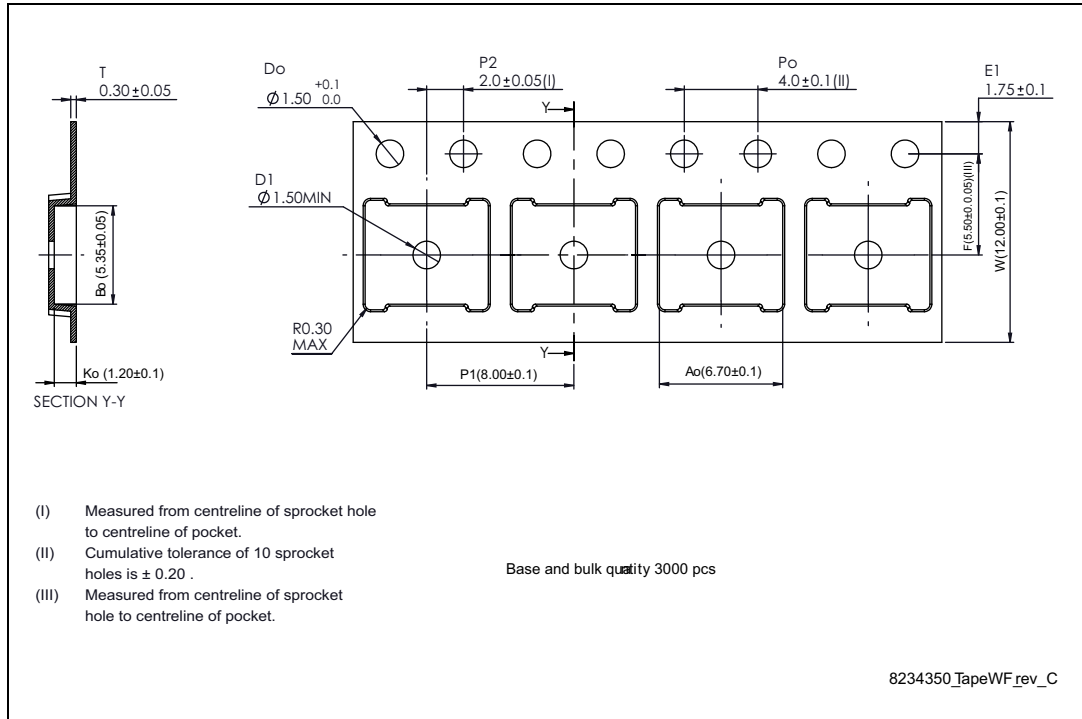


Figure 21. PowerFLAT™ 5x6 package orientation in carrier tape

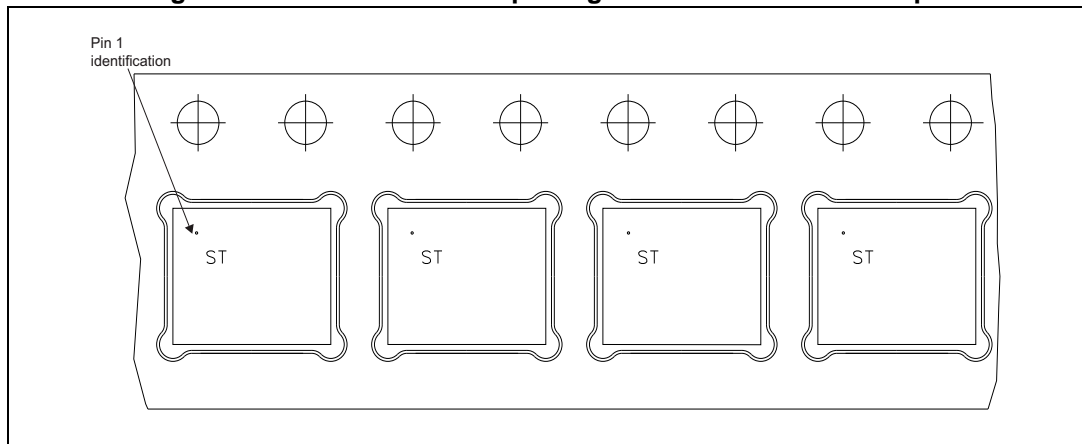
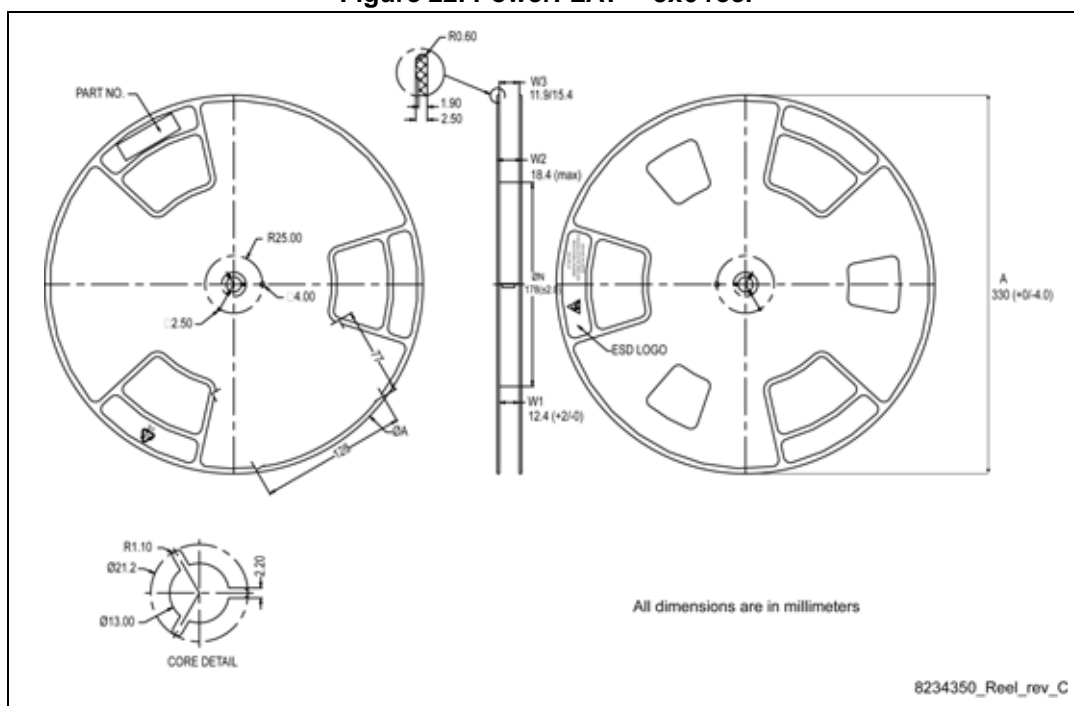


Figure 22. PowerFLAT™ 5x6 reel



## 6 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
24-Jan-2011	1	First release.
03-Oct-2012	2	Section 2.1: Electrical characteristics (curves) has been added. Document status promoted from preliminary data to datasheet. Minor text changes.
14-Dec-2012	3	Modified the Applications section on the coverpage to "Automotive switching applications".
23-Feb-2015	4	Updated Section 4: Package mechanical data and added Section 5: Packing information. Updated title and features in cover page. Minor text changes.
27-Oct-2015	5	Updated title and features in cover page. Updated <i>Table 2, Table 3, Table 4 and Table 7</i> . Updated <i>Section 4: Package information</i> Minor text changes.
11-Mar-2016	6	Updated silhouette in cover page. Updated <i>Table 1: Device summary, Table 2: Absolute maximum ratings, Table 3: Thermal resistance and Table 4: On/off states</i> . Updated <i>Figure 2: Safe operating area</i> . Updated <i>Section 4.1: PowerFLAT 5x6 double island WF type R</i> Updated <i>Section 5: Packing information</i> . Minor text changes.
7-Oct-2016	7	Updated marking and <i>Section 4.1: PowerFLAT 5x6 double island WF type R</i> . Minor text changes.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved



## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [MOSFET](#) category:*

*Click to view products by [STMicroelectronics](#) manufacturer:*

Other Similar products are found below :

[614233C](#) [648584F](#) [IRFD120](#) [JANTX2N5237](#) [2N7000](#) [FCA20N60\\_F109](#) [FDZ595PZ](#) [2SK2545\(Q,T\)](#) [405094E](#) [423220D](#)  
[TPCC8103,L1Q\(CM](#) [MIC4420CM-TR](#) [VN1206L](#) [614234A](#) [715780A](#) [NTNS3166NZT5G](#) [SSM6J414TU,LF\(T](#) [751625C](#)  
[IPS70R2K0CEAKMA1](#) [BUK954R8-60E](#) [DMN3404LQ-7](#) [NTE6400](#) [SQJ402EP-T1-GE3](#) [2SK2614\(TE16L1,Q\)](#) [2N7002KW-FAI](#)  
[DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [ECH8691-TL-W](#) [FCAB21350L1](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#) [NTE221](#) [NTE2384](#)  
[NTE2903](#) [NTE2941](#) [NTE2945](#) [NTE2946](#) [NTE2960](#) [NTE2967](#) [NTE2969](#) [NTE2976](#) [NTE455](#) [NTE6400A](#) [NTE2910](#) [NTE2916](#) [NTE2956](#)  
[NTE2911](#) [US6M2GTR](#) [TK10A80W,S4X\(S](#) [SSM6P69NU,LF](#)