



**THE DATASHEET OF
STL100N1VH5**





STL100N1VH5

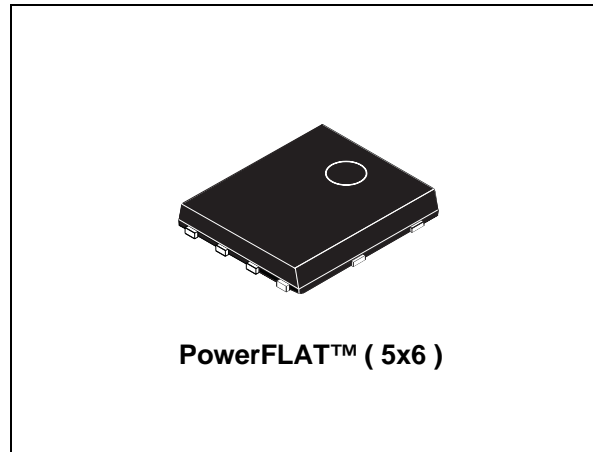
N-channel 12 V, 0.0022 Ω , 25 A PowerFLAT™ (5x6)
STripFET™ V Power MOSFET

Features

Order code	V _{DSS}	R _{DS(on) max.}	I _D
STL100N1VH5	12 V	<0.003 Ω	25 A ⁽¹⁾

1. The value is rated according R_{thj-pcb}

- R_{DS(on)} * Q_g industry benchmark
- Extremely low on-resistance R_{DS(on)}
- Very low switching gate charge
- High avalanche ruggedness
- Low gate drive power losses



Application

Switching applications

Description

This device is a 12 V N-channel STripFET™ V Power MOSFET which has been designed to achieve very low on-state resistance providing also one of the best-in-class figure of merit (FOM).

Figure 1. Pin-out configuration

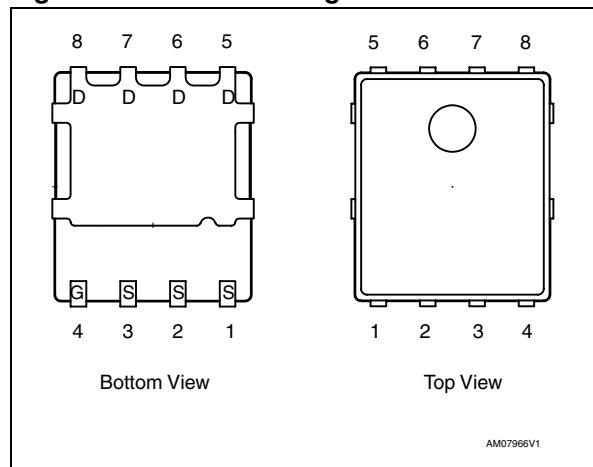


Table 1. Device summary

Order code	Marking	Package	Packaging
STL100N1VH5	100N1VH5	PowerFLAT™ (5x6)	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	12	V
V_{GS}	Gate-source voltage	± 8	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	100	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	62.5	A
$I_D^{(2)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	25	A
$I_D^{(2)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	15.6	A
$I_{DM}^{(3)}$	Drain current (pulsed)	100	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25^\circ\text{C}$	60	W
$P_{TOT}^{(2)}$	Total dissipation at $T_C = 25^\circ\text{C}$	4	W
	Derating factor	0.03	W/ $^\circ\text{C}$
T_J	Operating junction temperature	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature		

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 (Drain) (steady state)	2.08	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-ambient	31.3	$^\circ\text{C}/\text{W}$

1. When mounted on FR-4 board of 1inch², 2oz Cu, $t < 10$ sec

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current (pulse width limited by T_J Max)	12.5	A
E_{AS}	Single pulse avalanche energy (starting $T_J = 25^\circ\text{C}$, $I_D = I_{AV}$, $V_{DD} = 12$ V)	300	mJ

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0$	12			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{max rating}$, $V_{DS} = \text{max rating @ } 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 8\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	0.5			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 4.5\text{ V}$, $I_D = 12.5\text{ A}$ $V_{GS} = 2.5\text{ V}$, $I_D = 12.5\text{ A}$		0.0022 0.0032	0.003 0.004	Ω Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 10\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	2085	-	pF
C_{oss}	Output capacitance			949		pF
C_{rss}	Reverse transfer capacitance			240		pF
Q_g	Total gate charge	$V_{DD} = 6\text{ V}$, $I_D = 12.5\text{ A}$	-	26.5	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 4.5\text{ V}$		5.2		nC
Q_{gd}	Gate-drain charge	Figure 14		4.8		nC

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=6\text{ V}$, $I_D=12.5\text{ A}$, $R_G=4.7\ \Omega$, $V_{GS}=4.5\text{ V}$ <i>Figure 13</i>	-	14.4	-	ns
t_r	Rise time			31.6		ns
$t_{d(off)}$	Turn-off delay time			50		ns
t_f	Fall time			16		ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current		-		25	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		100	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD}=25\text{ A}$, $V_{GS}=0$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD}=25\text{ A}$,	-	49		ns
Q_{rr}	Reverse recovery charge	$di/dt=100\text{ A}/\mu\text{s}$,		54		nC
I_{RRM}	Reverse recovery current	$V_{DD}=10\text{ V}$, $T_j=150\text{ }^\circ\text{C}$		2.2		A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration= 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

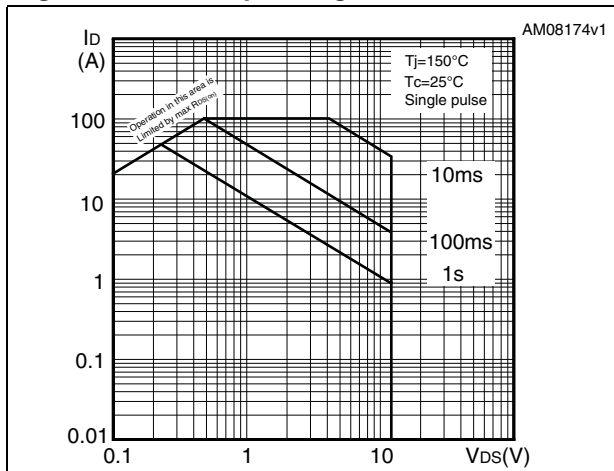


Figure 3. Thermal impedance

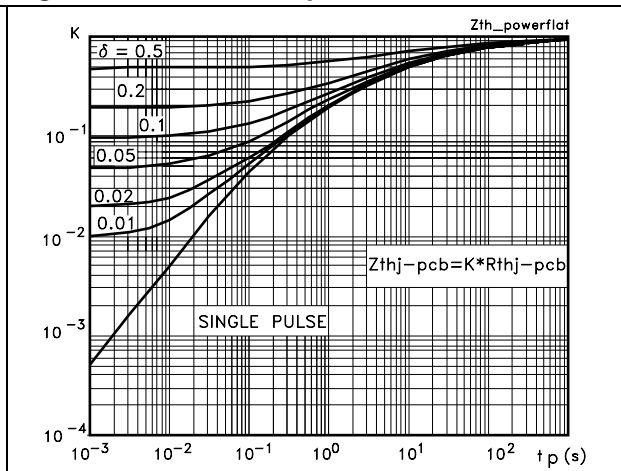


Figure 4. Output characteristics

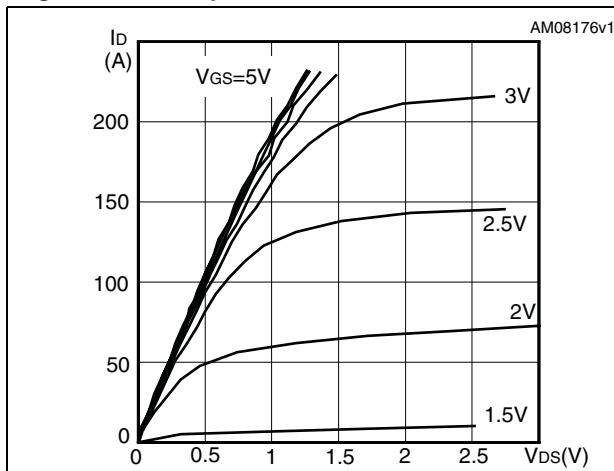


Figure 5. Transfer characteristics

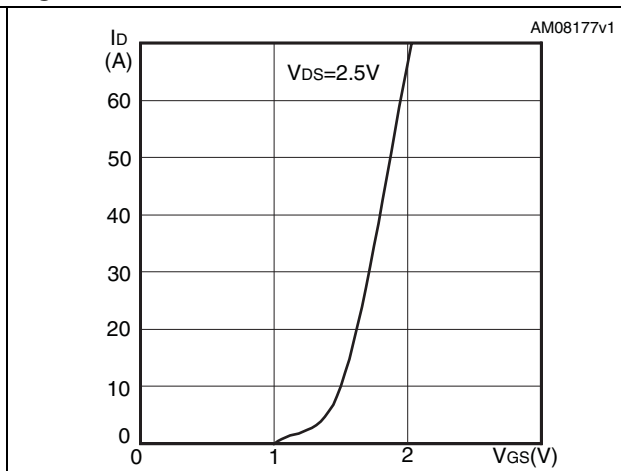


Figure 6. Normalized B_{VDSS} vs temperature

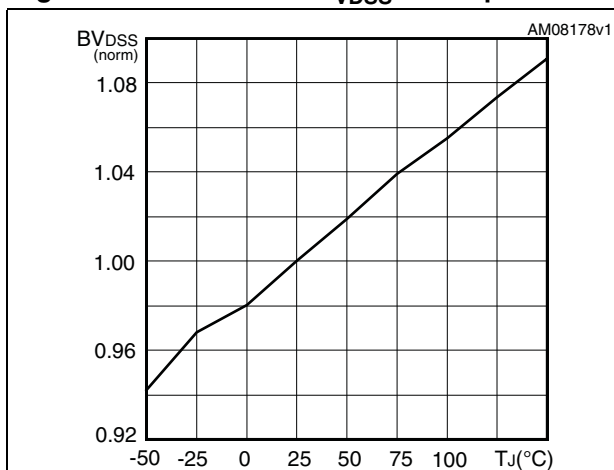


Figure 7. Static drain-source on resistance

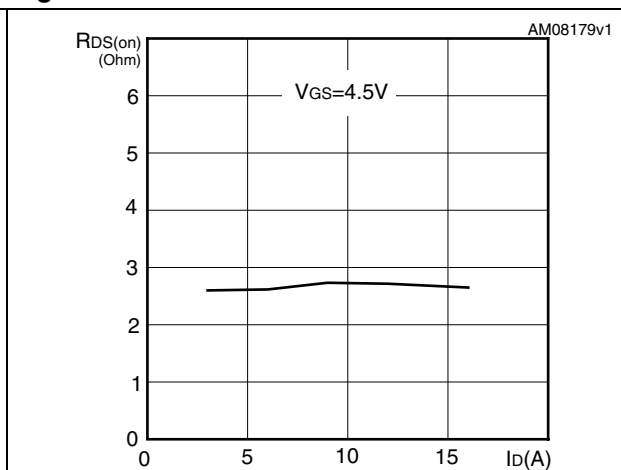


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

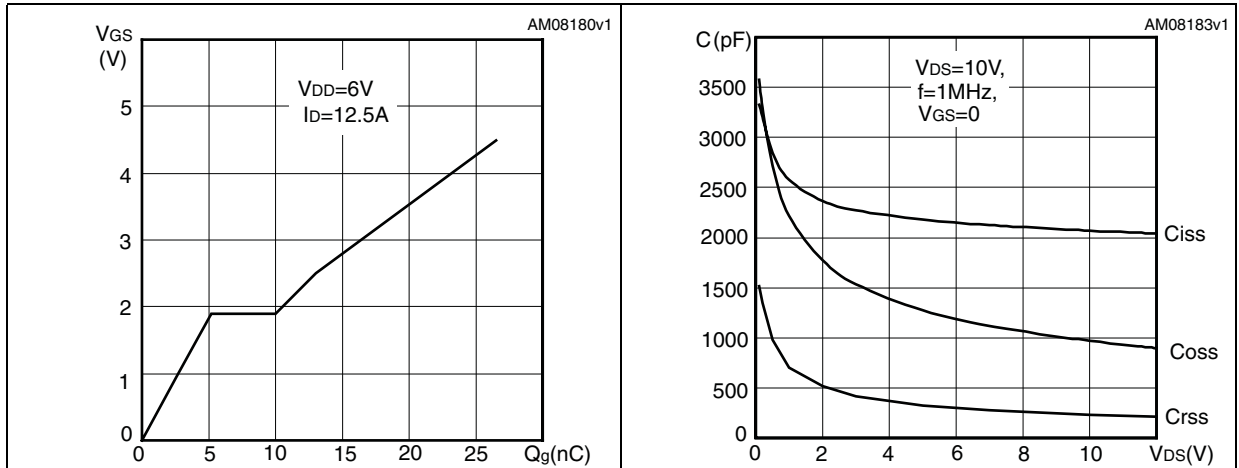


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

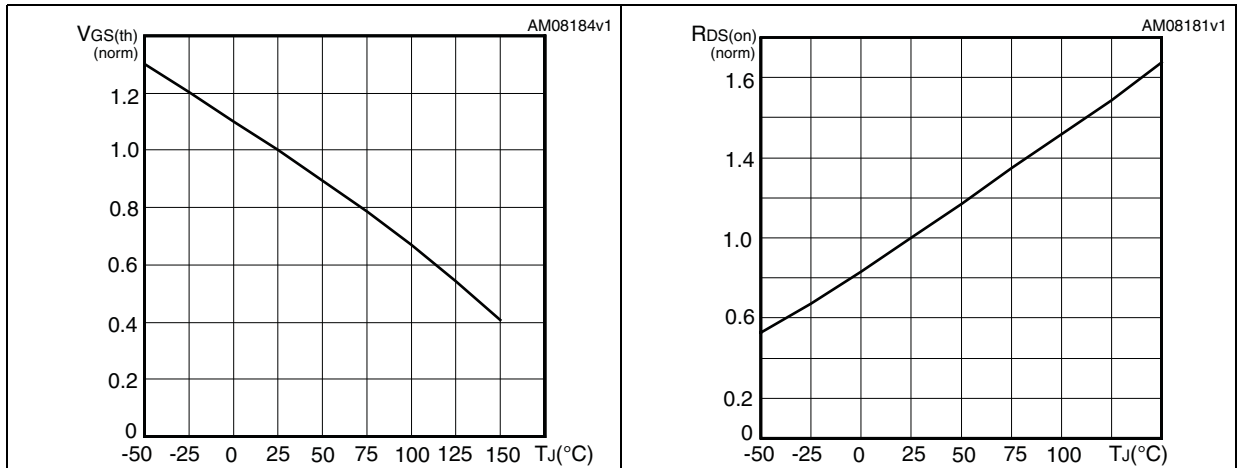
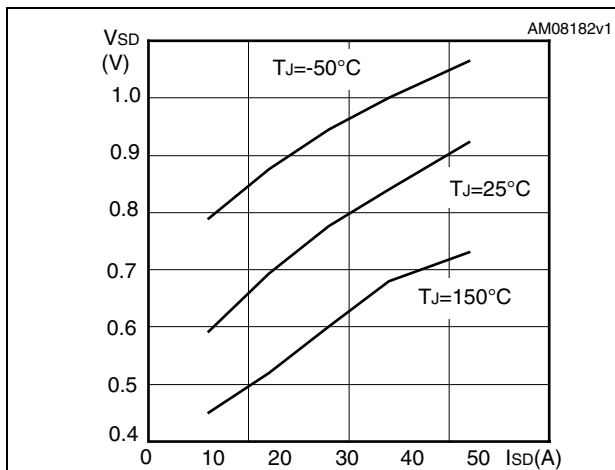
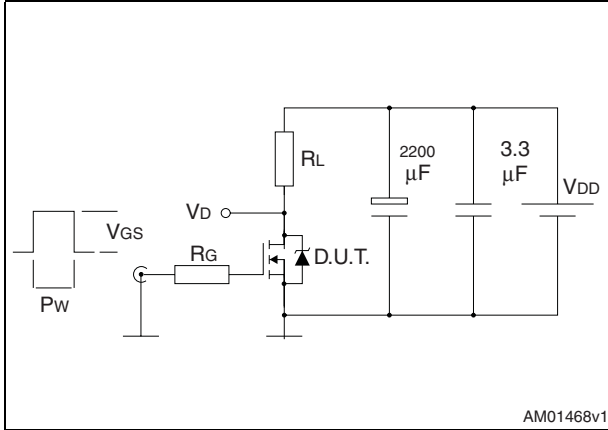


Figure 12. Source-drain diode forward characteristics



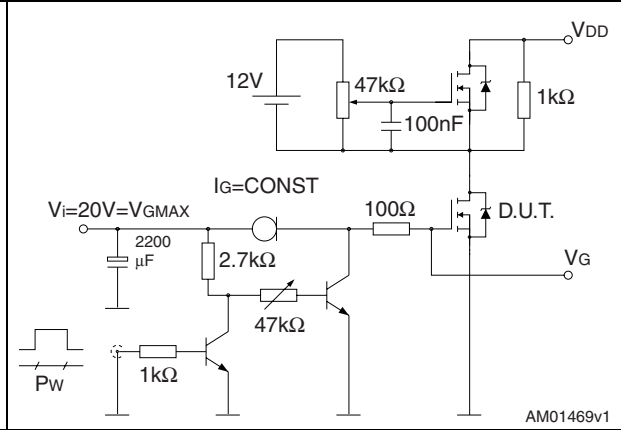
3 Test circuits

Figure 13. Switching times test circuit for resistive load



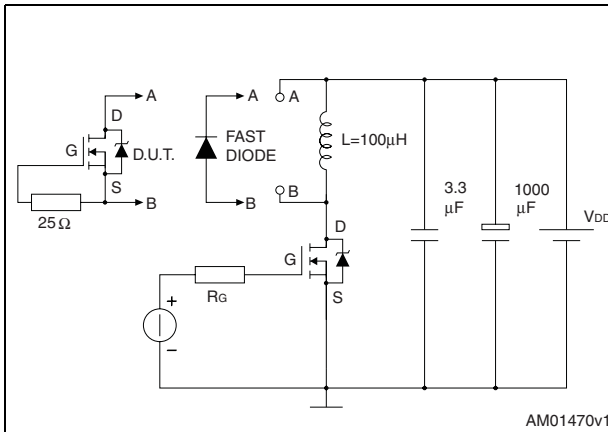
AM01468v1

Figure 14. Gate charge test circuit



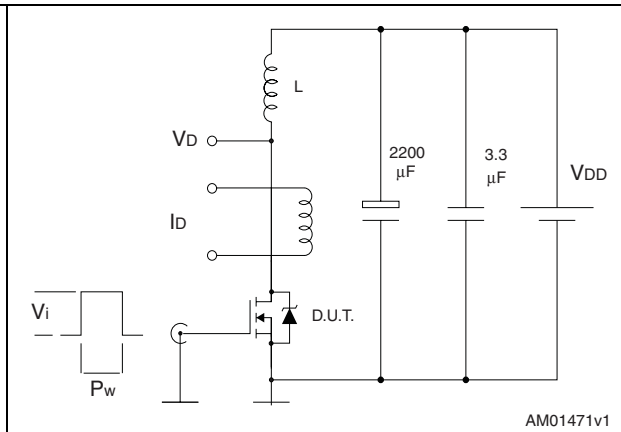
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Figure 15. Test circuit for inductive load switching and diode recovery times



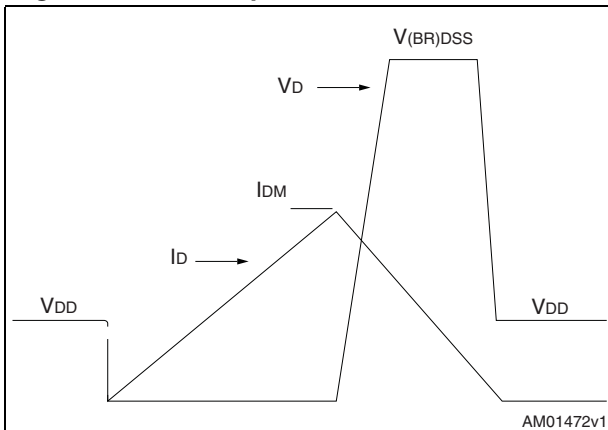
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Figure 16. Unclamped inductive load test circuit



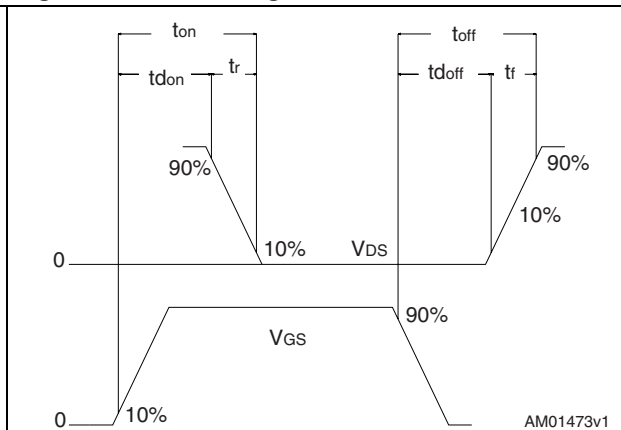
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Figure 17. Unclamped inductive waveform



AM01472v1

Figure 18. Switching time waveform



AM01473v1

4 Package mechanical data

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. ECOPACK is an ST trademark.

Table 9. PowerFLAT 5x6 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
D		5.20	
E		6.15	
D2	4.11		4.31
E2	3.50		3.70
e		1.27	
e1		0.65	
L	0.715		1.015
K	1.05		1.35

Figure 19. PowerFLAT 5x6 drawing

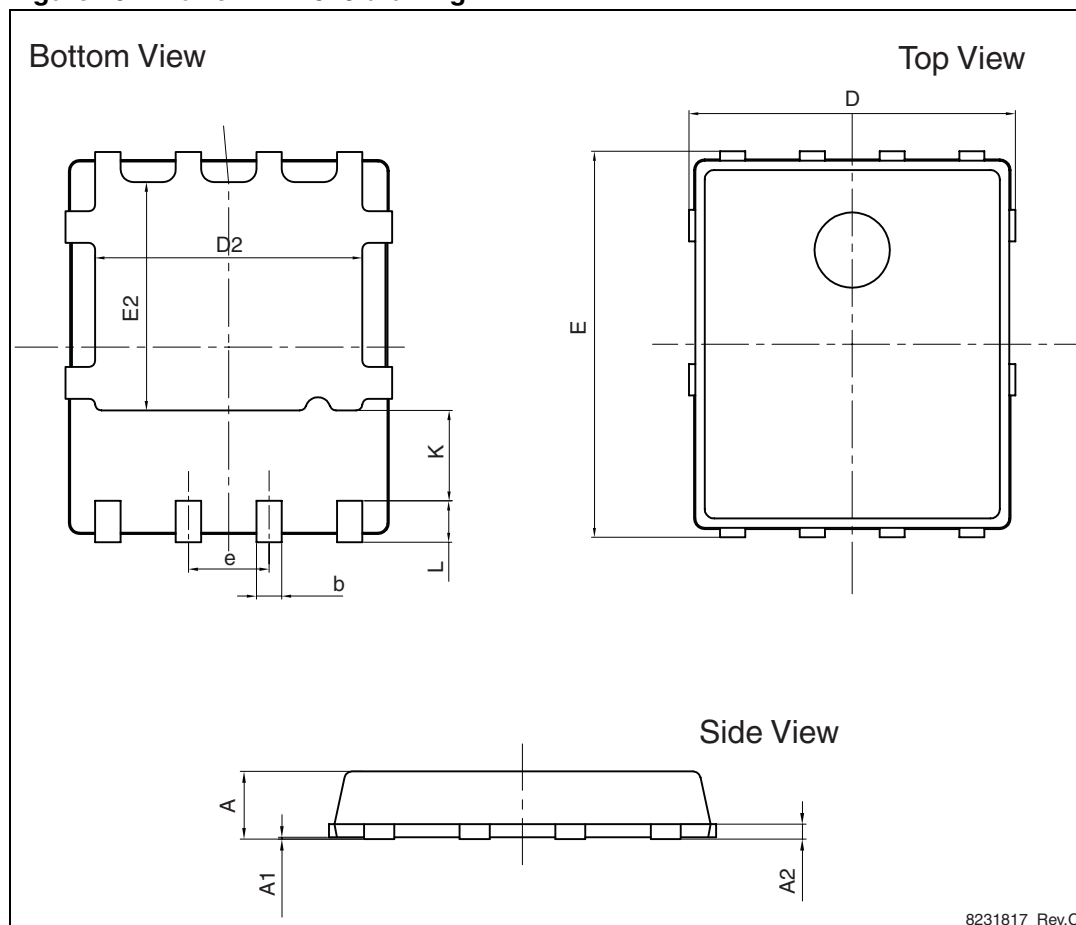
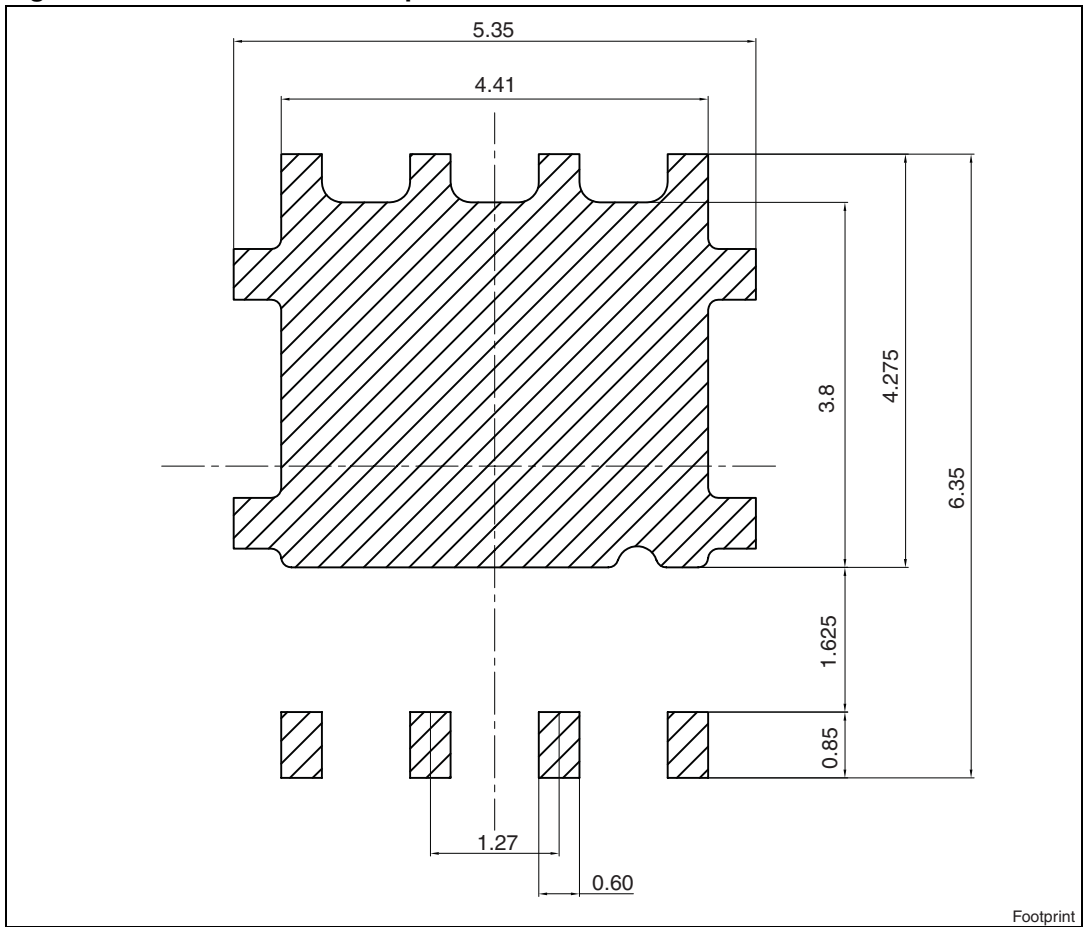


Figure 20. Recommended footprint



5 Revision history

Table 10. Document revision history

Date	Revision	Changes
10-Mar-2011	1	First release.

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