



STL25N15F4

N-channel 150 V, 0.057 Ω , 6 A, PowerFLAT™(5x6)
STripFET™ DeepGATE™ Power MOSFET

Features

Type	V _{DSS}	R _{DS(on) max}	I _D
STL25N15F4	150 V	< 0.063 Ω	6 A

- N-channel enhancement mode
- 100% avalanched rated
- Low gate charge
- Very low on-resistance

Application

- Switching applications

Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performance.

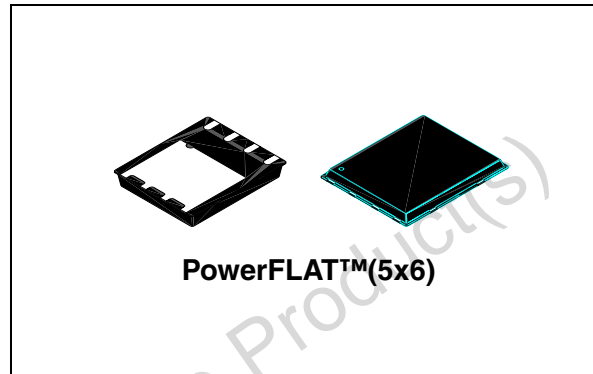


Figure 1. Internal schematic diagram

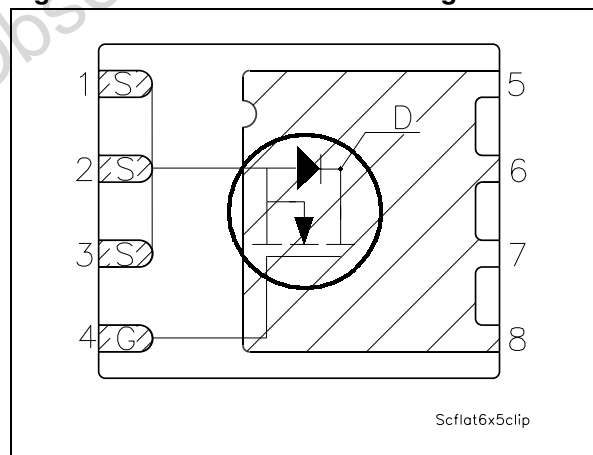


Table 1. Device summary

Order code	Marking	Package	Packaging
STL25N15F4	25N15F4	PowerFLAT™ (5x6)	Tape and reel

Contents

1	Electrical ratings	2
2	Electrical characteristics	3
2.1	Electrical characteristics (curves)	5
3	Test circuits	7
4	Package mechanical data	8
5	Revision history	10

Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	150	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	25	A
$I_D^{(2)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	6	A
$I_D^{(2)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	3.75	A
$I_{DM}^{(3)}$	Drain current (pulsed)	24	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	80	W
$P_{TOT}^{(2)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	4	W
T_{stg}	Storage temperature	-55 to 150	$^\circ\text{C}$
T_j	Operating junction temperature		

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

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	31.3	$^\circ\text{C}/\text{W}$
$R_{thj-case}$	Thermal resistance junction-case (drain) (steady state) max.	1.56	$^\circ\text{C}/\text{W}$

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

Table 4. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I_{AS}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_j max)	12.5	A
E_{AS}	Single pulse avalanche energy (starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = I_{AS}$, $V_{DD} = 50\text{ V}$)	125	mJ

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$, $V_{GS} = 0$	150			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 150\text{ V}$, $V_{DS} = 150\text{ V}$, @ 125 °C			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 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	$V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$		0.057	0.063	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		2710		pF
C_{oss}	Output capacitance		-	180	-	pF
C_{rss}	Reverse transfer capacitance				69.5	pF
Q_g	Total gate charge	$V_{DD} = 75\text{ V}$, $I_D = 6\text{ A}$ $V_{GS} = 10\text{ V}$ (see Figure 14)		48		nC
Q_{gs}	Gate-source charge		-	10.8	-	nC
Q_{gd}	Gate-drain charge				13.7	nC
R_g	Gate input resistance	$f = 1\text{ MHz}$ Gate DC Bias=0 test signal level=20 mV open drain	-	1.9	-	Ω

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 75\text{ V}$, $I_D = 3\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 13)		13.5		ns
t_r	Rise time		-	5.1	-	ns
$t_{d(off)}$	Turn-off delay time				39.7	ns
t_f	Fall time				11.4	ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current		-		6	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		24	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 6\text{ A}, V_{GS} = 0$	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 6\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s},$ $V_{DD} = 120\text{ V}, T_J = 150\text{ }^\circ\text{C}$ (see Figure 15)	-	85 351 8.2		ns nC 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

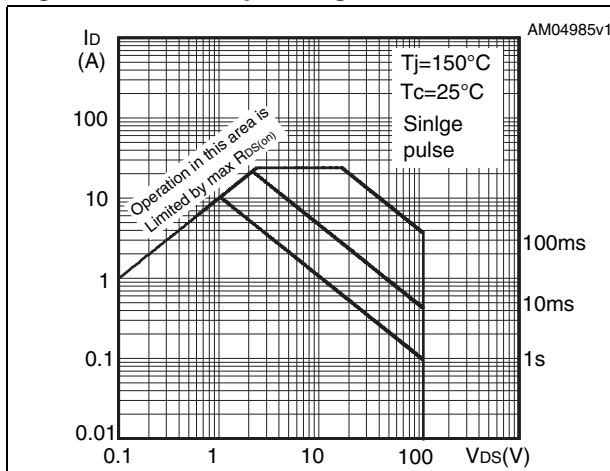


Figure 3. Thermal impedance

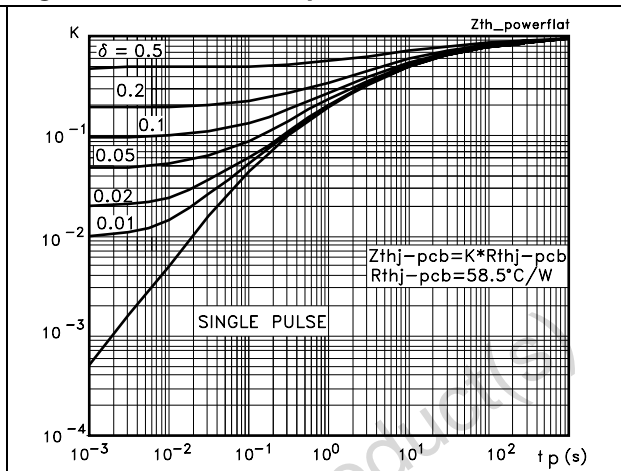


Figure 4. Output characteristics

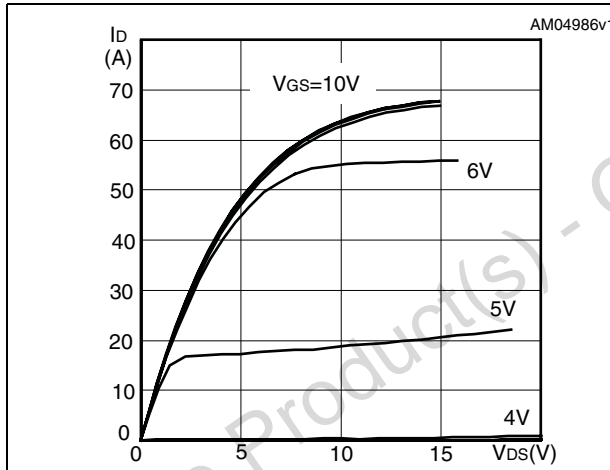


Figure 5. Transfer characteristics

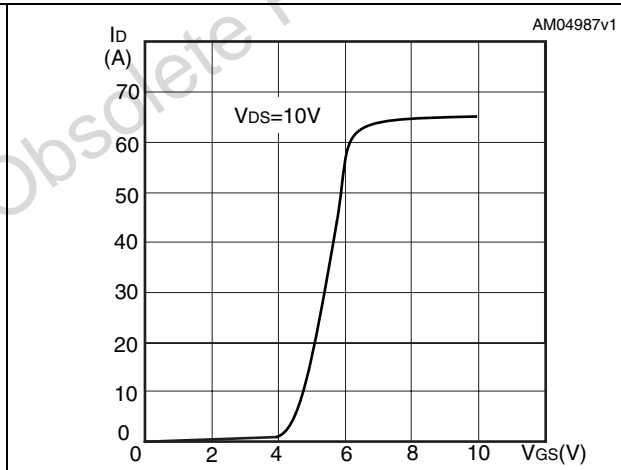


Figure 6. Normalized $B_{V_{DS}}$ vs temperature

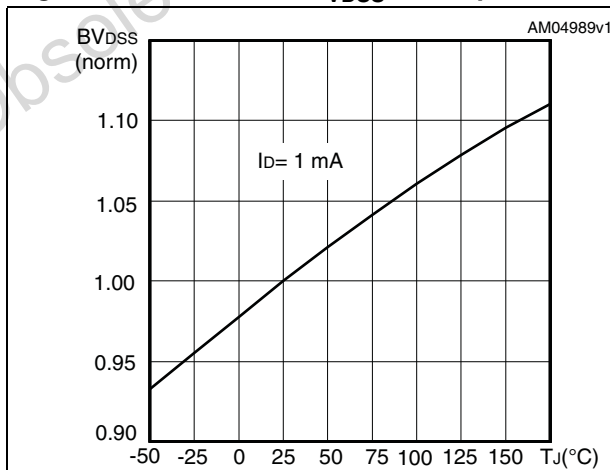


Figure 7. Static drain-source on resistance

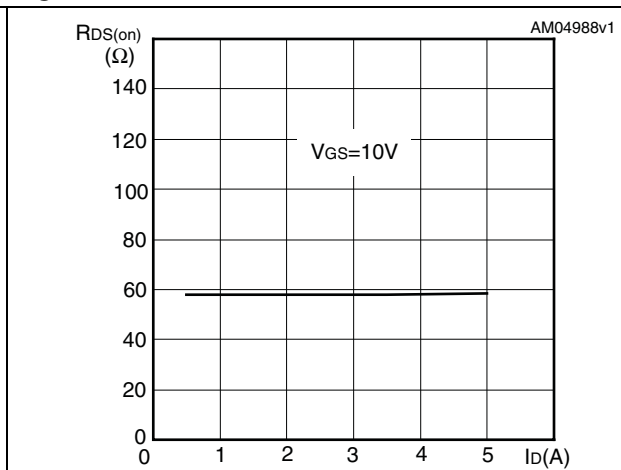


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

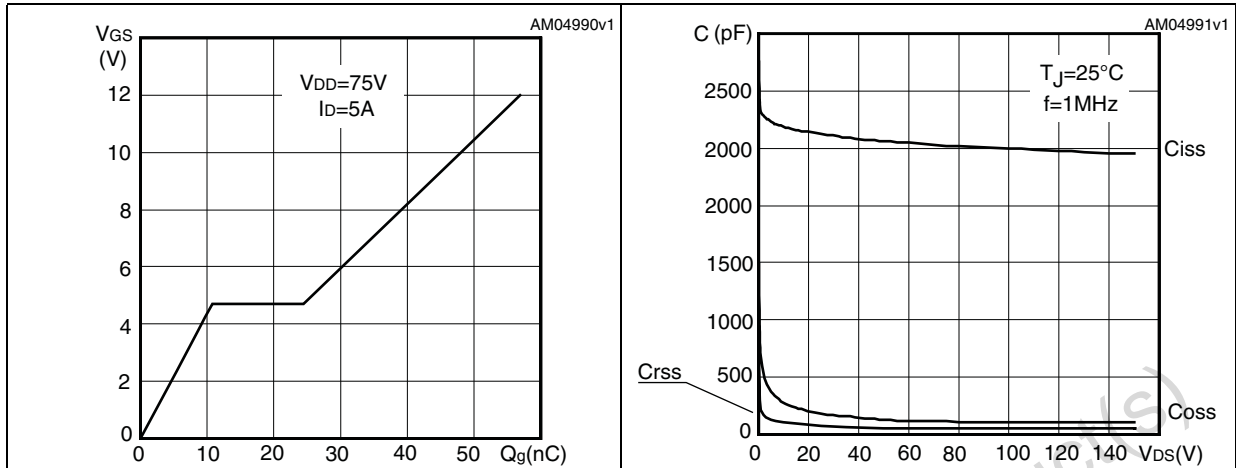


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

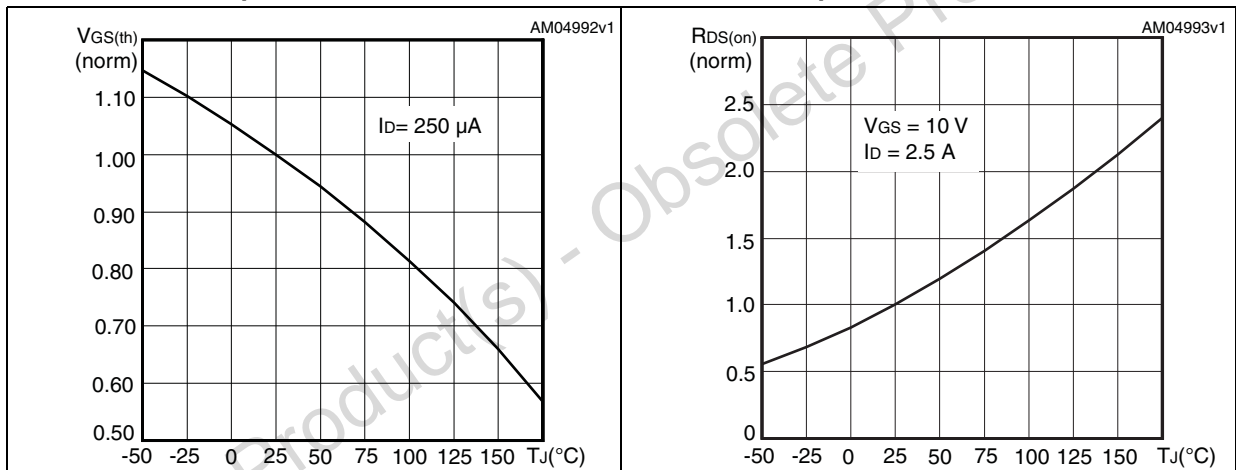
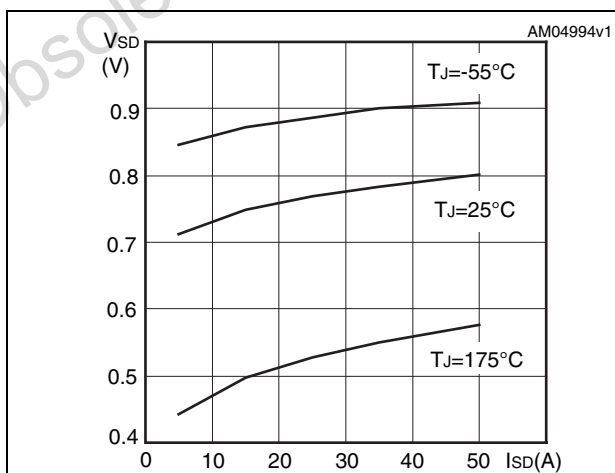
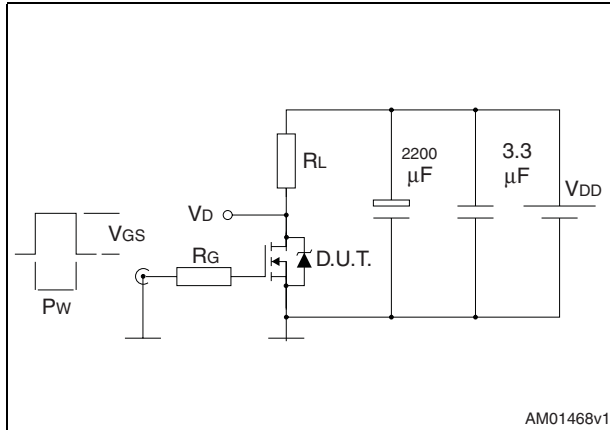


Figure 12. Source-drain diode forward characteristics



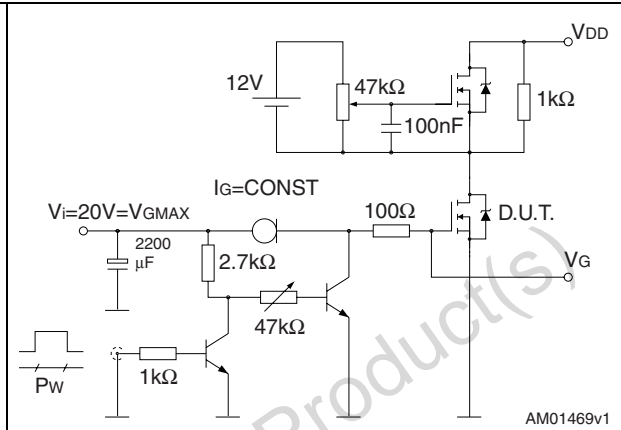
3 Test circuits

Figure 13. Switching times test circuit for resistive load



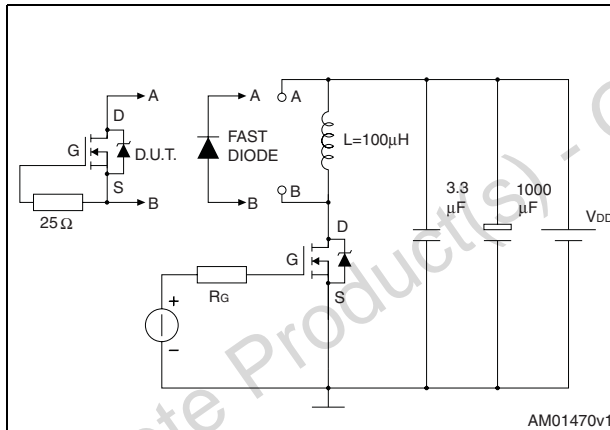
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Figure 14. Gate charge test circuit



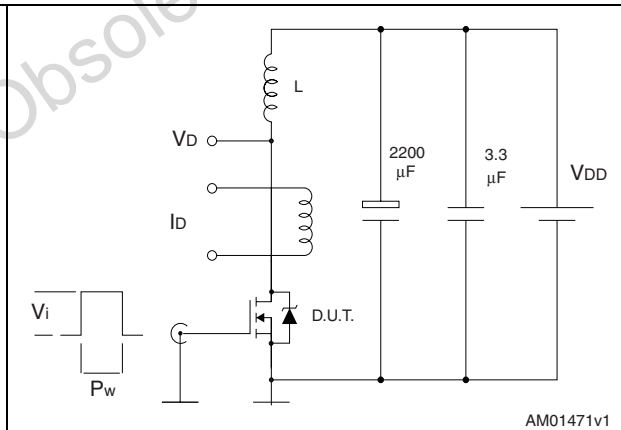
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Figure 15. Test circuit for inductive load switching and diode recovery times



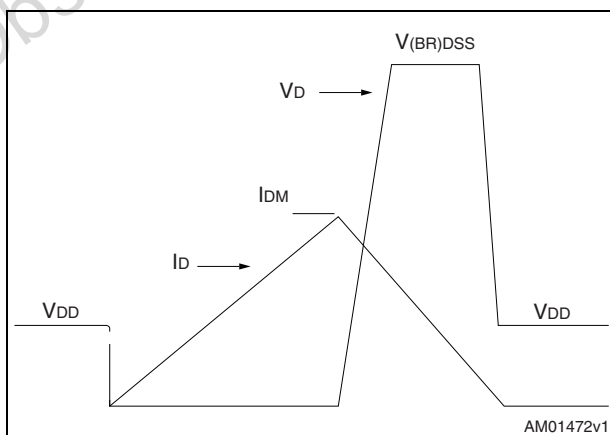
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Figure 16. Unclamped inductive load test circuit



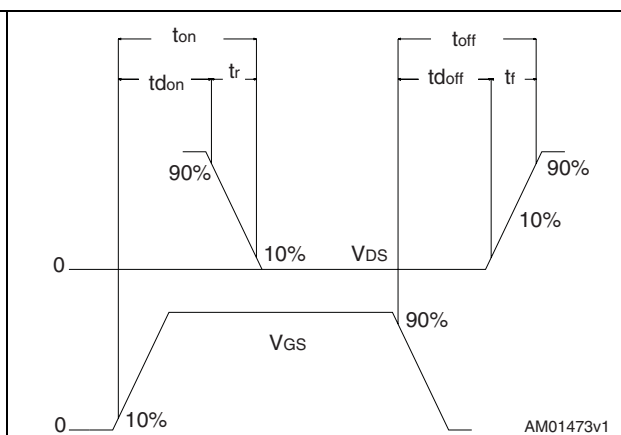
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



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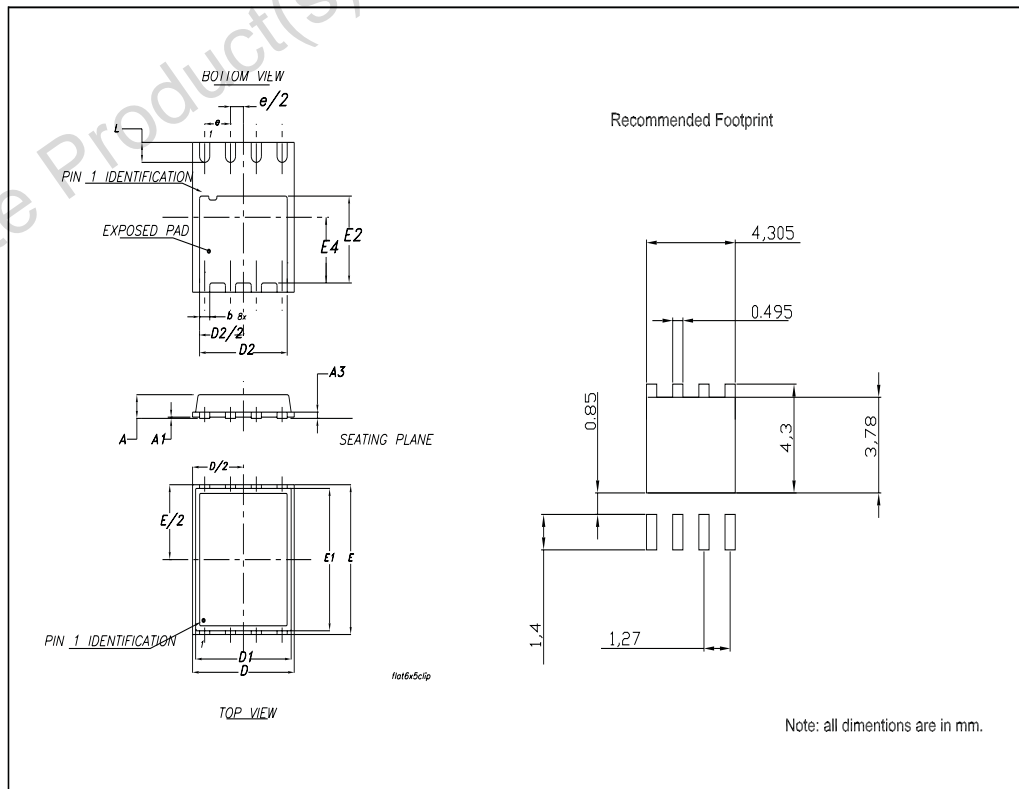
4 Package mechanical data

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.

Obsolete Product(s) - Obsolete Product(s)

PowerFLAT™ (5x6) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.80	0.83	0.93	0.031	0.032	0.036
A1		0.02	0.05		0.0007	0.0019
A3		0.20			0.007	
b	0.35	0.40	0.47	0.013	0.015	0.018
D		5.00			0.196	
D1		4.75			0.187	
D2	4.15	4.20	4.25	0.163	0.165	0.167
E		6.00			0.236	
E1		5.75			0.226	
E2	3.43	3.48	3.53	0.135	0.137	0.139
E4	2.58	2.63	2.68		0.103	0.105
e		1.27			0.050	
L	0.70	0.80	0.90	0.027	0.031	0.035



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
09-Sep-2009	1	First release

Obsolete Product(s) - Obsolete Product(s)

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