



STL25N15F3

N-channel 150 V, 0.045 Ω , 6 A PowerFLAT™ (6x5)
STripFET™ III Power MOSFET

Features

Type	V _{DSS}	R _{DS(on) max}	I _D
STL25N15F3	150 V	< 0.057 Ω	6 A ⁽¹⁾

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

- Improved die-to-footprint ratio
- Very low profile package (1mm max)
- Very low thermal resistance
- Low on-resistance

Application

- Switching application

Description

This product utilizes the latest advanced design rules of ST's proprietary STripFET™ technology which is suitable for the most demanding DC-DC converter applications where high efficiency is required.

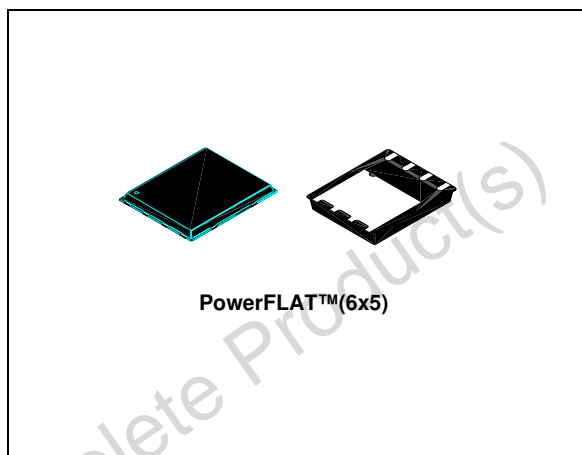


Figure 1. Internal schematic diagram

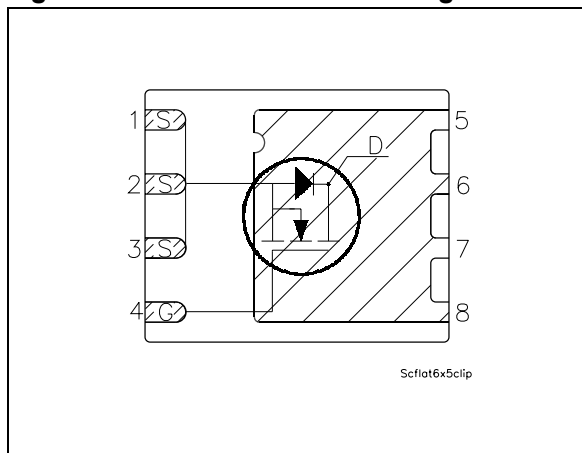


Table 1. Device summary

Order code	Marking	Package	Packaging
STL25N15F3	L25N15F3	PowerFLAT™ (6x5)	Tape and reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	5
	2.1 Electrical characteristics (curves)	7
3	Test circuit	9
4	Package mechanical data	10
5	Revision history	12

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_J T_{stg}	Operating junction temperature Storage temperature	-55 to 150	$^\circ\text{C}$

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)	1.56	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	31.3	$^\circ\text{C/W}$

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

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AS}	Avalanche current repetitive or not repetitive, (pulse width limited by $T_J \text{ Max}$)	2.5	A
E_{AS}	Single pulse avalanche energy (starting $T_J=25\text{ }^\circ\text{C}$, $I_D=I_{AS}$, $V_{DD}=50\text{ V}$)	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	$I_D = 1\text{ mA}$, $V_{GS} = 0$	150			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 ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 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	$V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$		0.045	0.057	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		1300		pF
C_{oss}	Output capacitance			140		pF
C_{rss}	Reverse transfer capacitance			20.5		pF
Q_g	Total gate charge	$V_{DD} = 15\text{ V}$, $I_D = 6\text{ A}$ $V_{GS} = 10\text{ V}$ <i>Figure 14</i>		29		nC
Q_{gs}	Gate-source charge			3.6		nC
Q_{gd}	Gate-drain charge			14.6		nC
R_G	Gate input resistance	$f = 1\text{ MHz}$ Gate DC Bias = 0 Test signal level = 20 mV open drain		3.7		Ω

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=15\text{ V}$, $I_D=3\text{ A}$, $R_G=4.7\ \Omega$, $V_{GS}=10\text{ V}$ <i>Figure 13</i>		9		ns
t_r	Rise time			13		ns
$t_{d(off)}$	Turn-off delay time			46		ns
t_f	Fall time			20		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}	Reverse recovery time	$I_{SD}=6\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD}=120\text{ V}$, $T_j=150\text{ }^\circ\text{C}$		110		ns
Q_{rr}	Reverse recovery charge			497		nC
I_{RRM}	Reverse recovery current			9.1		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

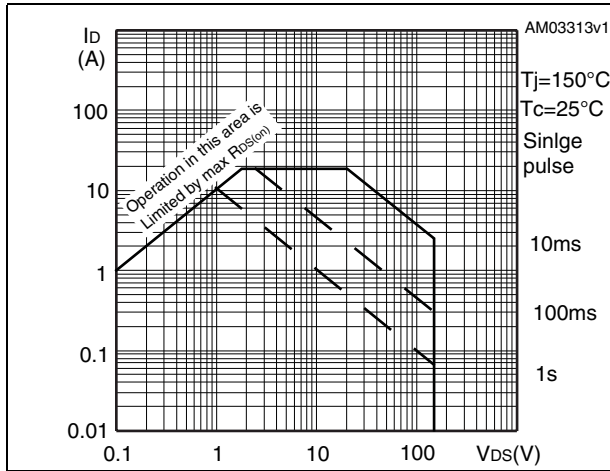


Figure 3. Thermal impedance

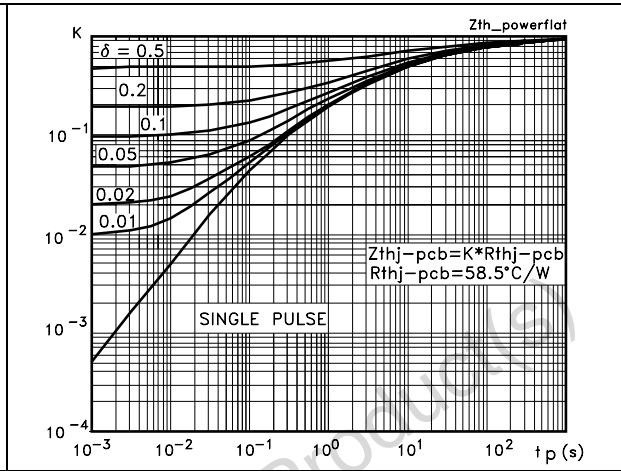


Figure 4. Output characteristics

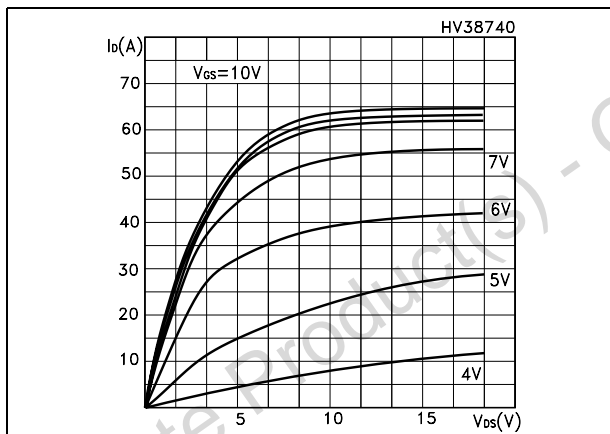


Figure 5. Transfer characteristics

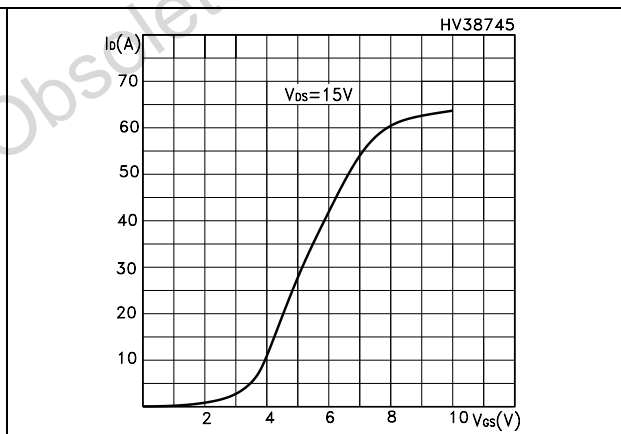


Figure 6. Normalized BV_{DSS} vs temperature

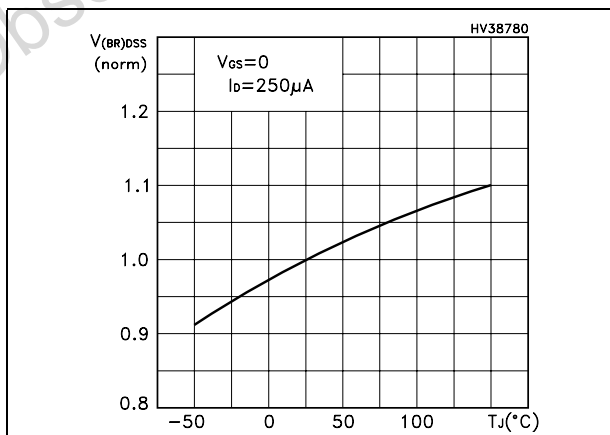


Figure 7. Static drain-source on resistance

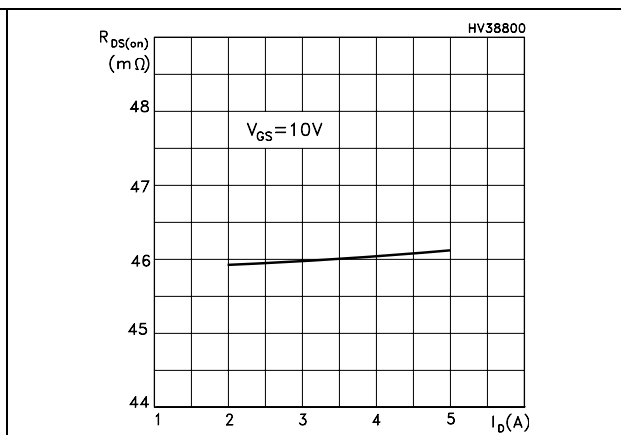


Figure 8. Capacitance variations

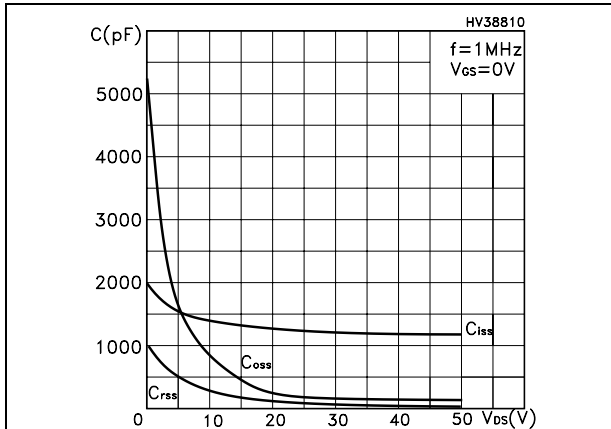


Figure 9. Gate charge vs gate-source voltage

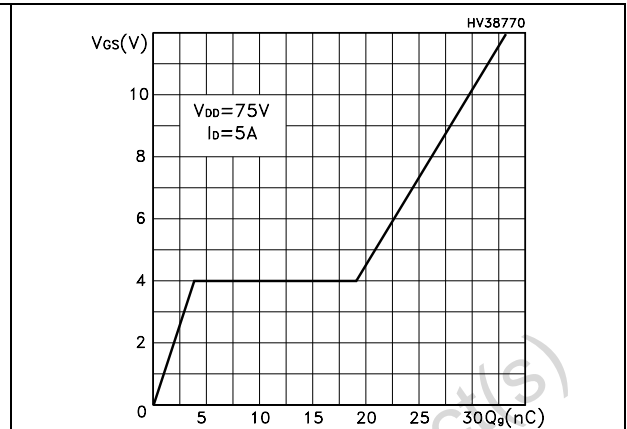


Figure 10. Normalized gate threshold voltage vs temperature

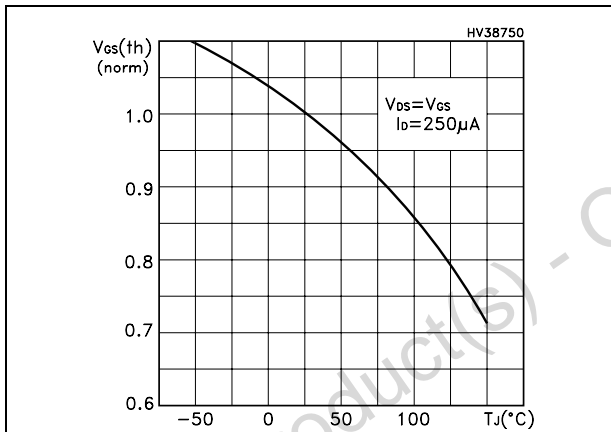


Figure 11. Normalized on resistance vs temperature

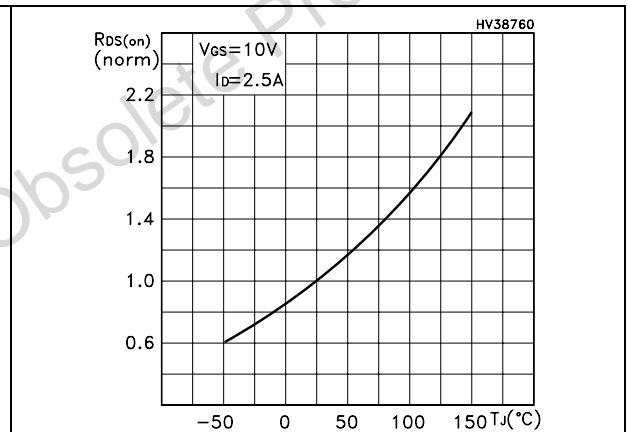
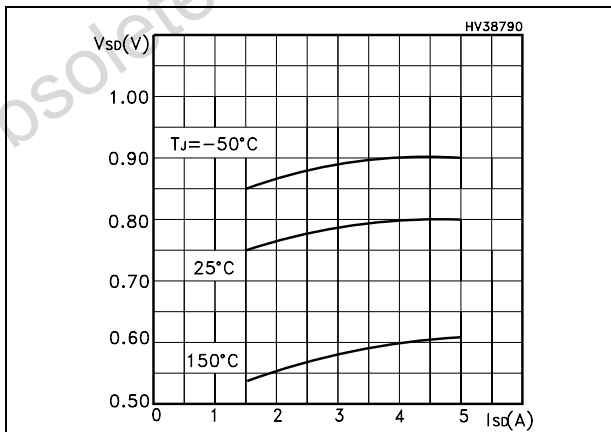
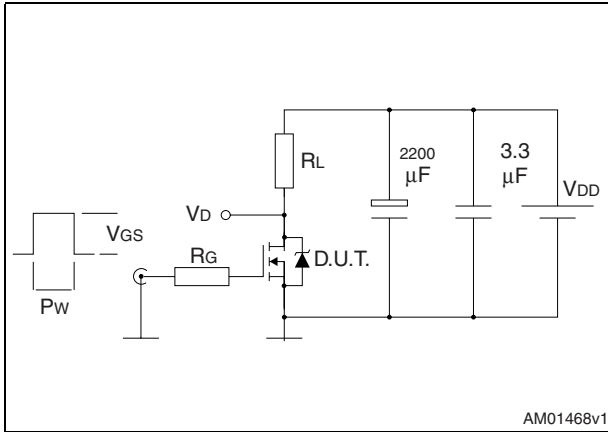


Figure 12. Source-drain diode forward characteristics



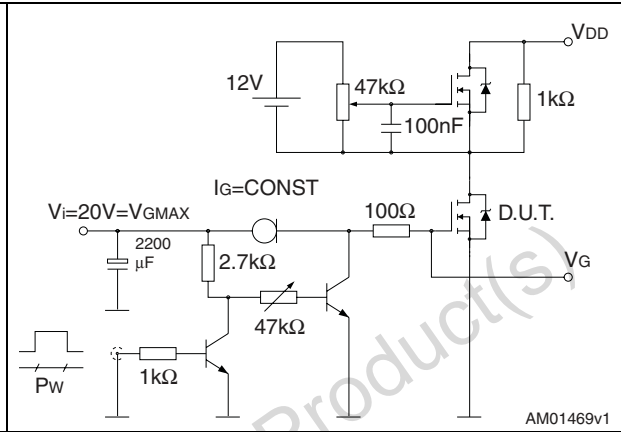
3 Test circuit

Figure 13. Switching times test circuit for resistive load



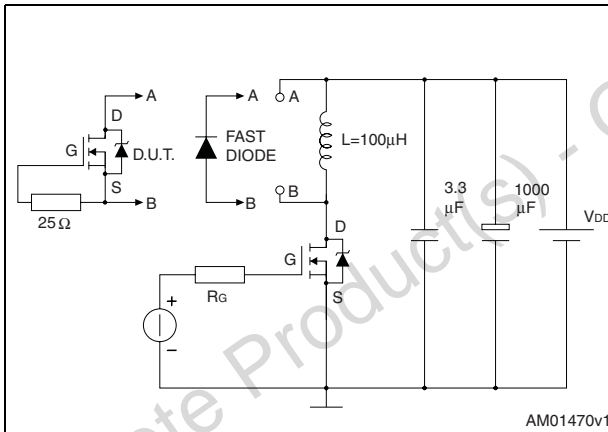
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Figure 14. Gate charge test circuit



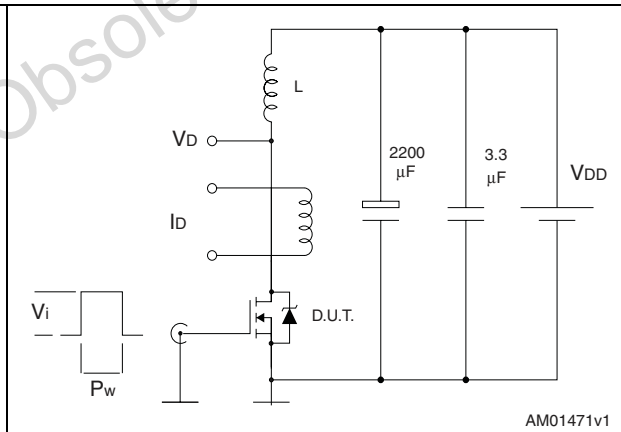
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Figure 15. Test circuit for inductive load switching and diode recovery times



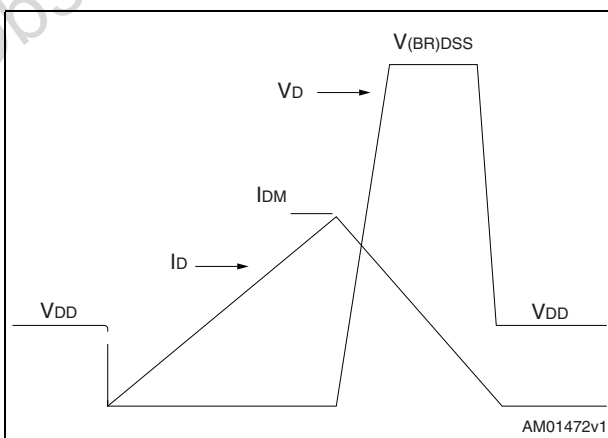
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Figure 16. Unclamped inductive load test circuit



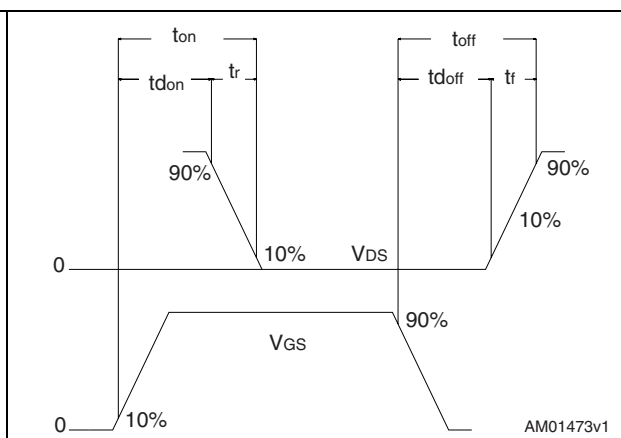
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



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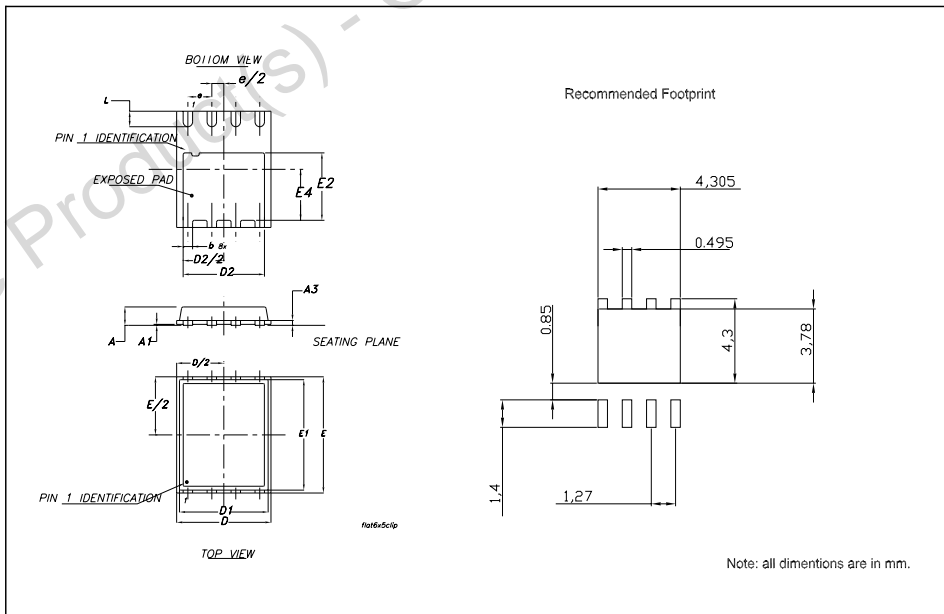
4 Package mechanical data

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™ (6x5) 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
03-Mar-2009	1	Initial release

Obsolete Product(s) - Obsolete Product(s)

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