



# STL100NH3LL

N-channel 30 V - 0.0032  $\Omega$  - 25 A - PowerFLAT™ (6x5)  
STripFET™ III Power MOSFET

## Features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STL100NH3LL	30 V	<0.0035 $\Omega$	25A <sup>(1)</sup>

1. The value is rated according R<sub>thj-pcb</sub>

- Improved die-to-footprint ratio
- Very low profile package (1 mm max)
- Very low thermal resistance
- Conduction losses reduced
- Switching losses reduced

## Application

- Switching applications

## Description

This series utilizes the last advanced design rules of ST's proprietary STripFET™ technology. This process complete to unique metallization technique realised the most advanced low-voltage Power MOSFET in PowerFLAT™(6x5). The chip-scaled PowerFLAT™ package allows a significant board space saving, still boosting the performance.

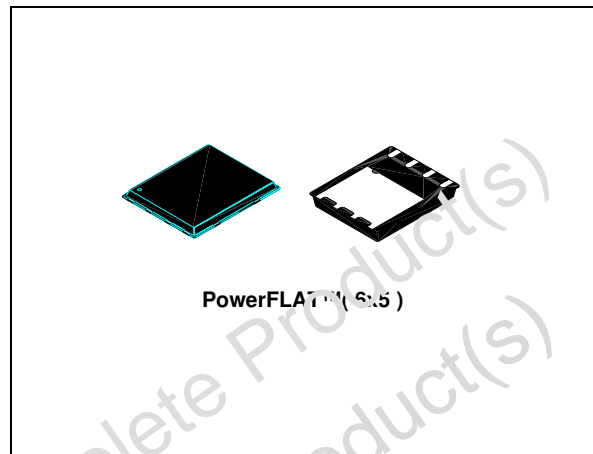


Figure 1. Internal schematic diagram

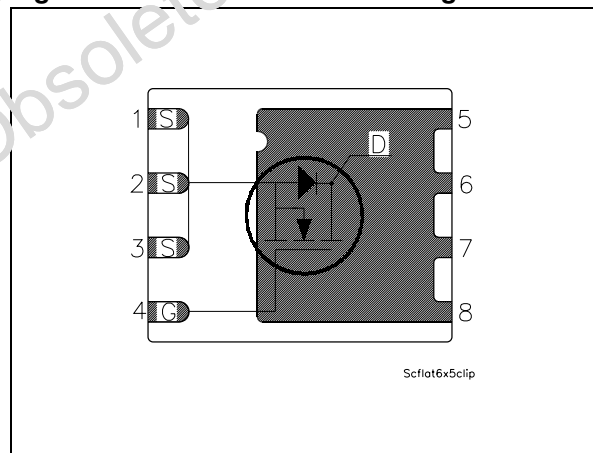


Table 1. Device summary

Order code	Marking	Package	Packaging
STL100NH3LL	L100NH3LL	PowerFLAT™ (6x5)	Tape and reel

# Contents

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Obsolete Product(s) - Obsolete Product(s)

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0$ )	30	V
$V_{GS}^{(1)}$	Gate-source voltage	$\pm 16$	V
$V_{GS}^{(2)}$	Gate-source voltage	$\pm 18$	V
$I_D^{(3)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	100	A
$I_D^{(3)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	71	A
$I_D^{(5)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	15.6	A
$I_{DM}^{(4)}$	Drain current (pulsed)	100	A
$I_D^{(5)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	25	A
$P_{TOT}^{(3)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	80	W
$P_{TOT}^{(5)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	4	W
	Derating factor	0.03	W/ $^\circ\text{C}$
$T_J$ $T_{stg}$	Operating junction temperature Storage temperature	-55 to 150	$^\circ\text{C}$

1. Continuous mode
2. Guaranteed for test time  $\leq 15\text{ms}$
3. The value is rated according  $R_{th-jc}$
4. Pulse width limited by safe operating area
5. The value is rated according  $R_{thj-pcb}$

**Table 3. Thermal resistance**

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

1. When mounted on FR-4 board of  $1\text{inch}^2$ , 2oz Cu,  $t < 10\text{ sec}$

**Table 4. Avalanche data**

Symbol	Parameter	Value	Unit
$I_{AV}$	Not-repetitive avalanche current	7.5	A
$E_{AS}$	Single pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$ , $I_D = 7.5\text{ A}$ )	150	mJ

## 2 Electrical characteristics

( $T_{CASE}=25^{\circ}C$  unless otherwise specified)

**Table 5. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu A, V_{GS} = 0$	30			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max rating},$ $V_{DS} = \text{Max rating} @ 125^{\circ}C$			1 10	$\mu A$ $\mu A$
$I_{GSS}$	Gate body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 16 V$			±100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 V, I_D = 12.5 A$ $V_{GS} = 4.5 V, I_D = 12.5 A$		0.0032 0.004	0.0035 0.005	$\Omega$ $\Omega$

**Table 6. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 10 V, I_D = 12.5 A$		30		S
$C_{iss}$	Input capacitance	$V_{DS} = 25 V, f = 1 \text{ MHz},$ $V_{GS} = 0$		4450		pF
$C_{oss}$	Output capacitance			655		pF
$C_{rss}$	Reverse transfer capacitance			50		pF
$Q_g$	Total gate charge	$V_{DD} = 15 V, I_D = 25 A$ $V_{GS} = 4.5 V$ <i>(see Figure 8)</i>		30	40	nC
$Q_{gs}$	Gate-source charge			12.5		nC
$Q_{gd}$	Gate-drain charge			10		nC
$R_G$	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20 mV open drain	1	2	3	$\Omega$

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

**Table 7. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=15\text{ V}$ , $I_D=12.5\text{ A}$ , $R_G=4.7\ \Omega$ , $V_{GS}=10\text{ V}$ <i>(see Figure 14)</i>		18		ns
$t_r$	Rise time			50		ns
$t_{d(off)}$	Turn-off delay time			75		ns
$t_f$	Fall time			8		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	$I_{SD}=25\text{ A}$ , $V_{GS}=0$			1.3	V
$t_{rr}$	Reverse recovery time	$I_{SD}=25\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD}=25\text{ V}$ , $T_I=150\text{ }^\circ\text{C}$		32		ns
$Q_{rr}$	Reverse recovery charge			34		nC
$I_{RRM}$	Reverse recovery current			2.1		A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration=300 $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

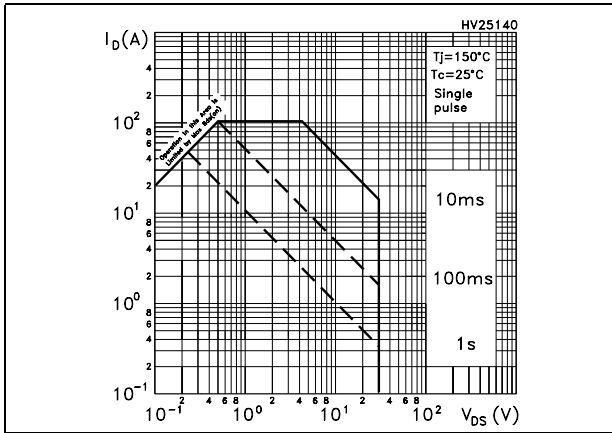


Figure 3. Thermal impedance

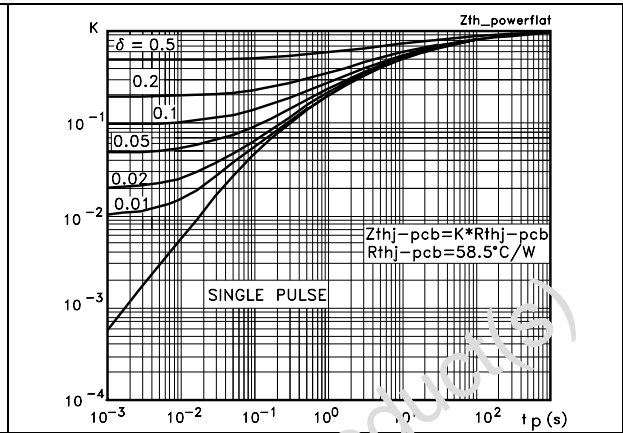


Figure 4. Output characteristics

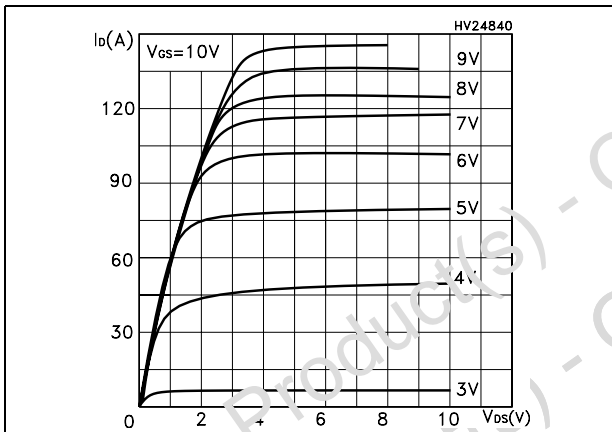


Figure 5. Transfer characteristics

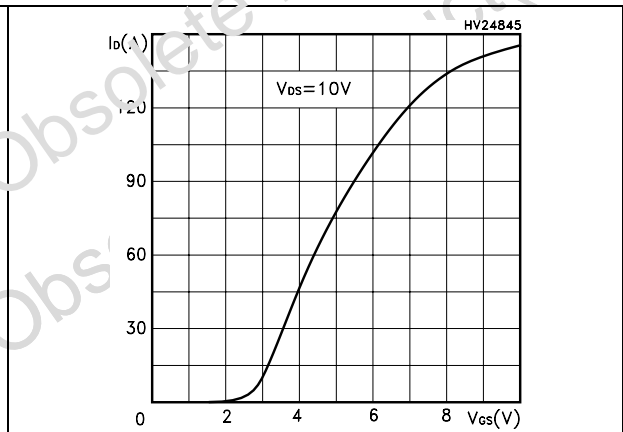


Figure 6. Transconductance

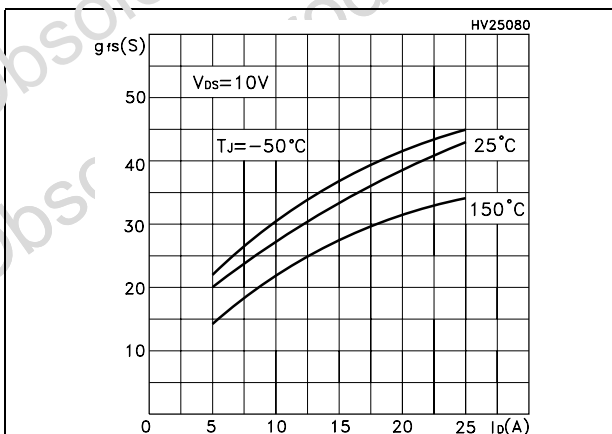


Figure 7. Static drain-source on resistance

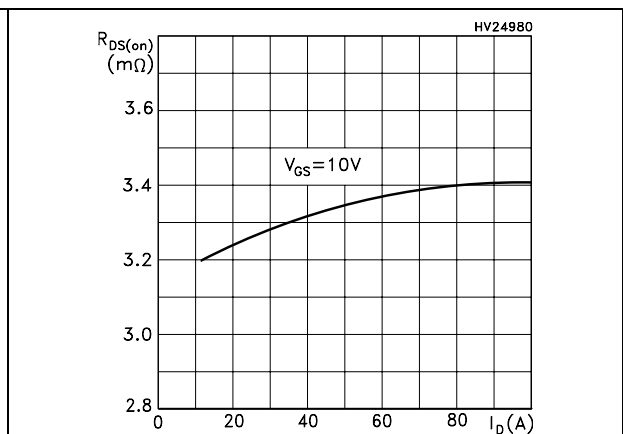


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

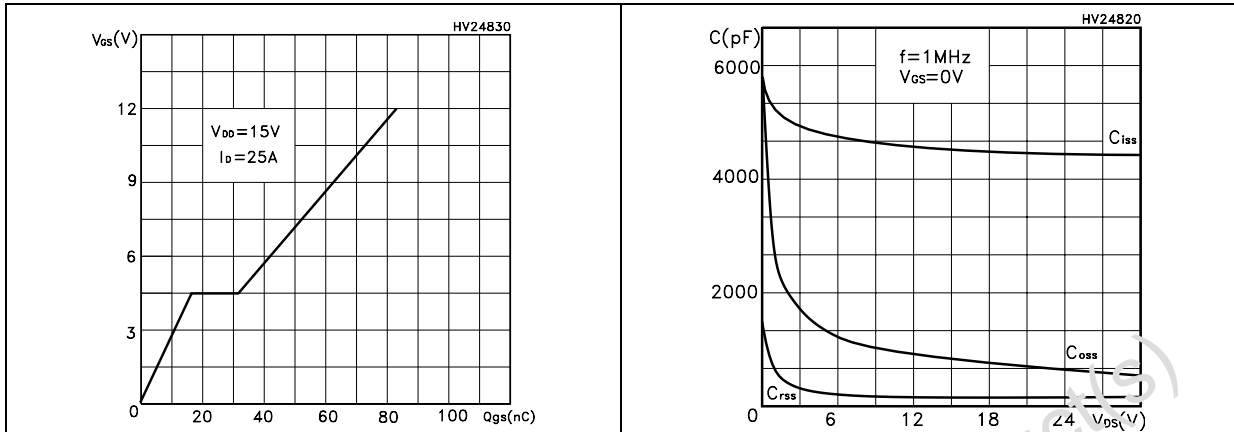


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

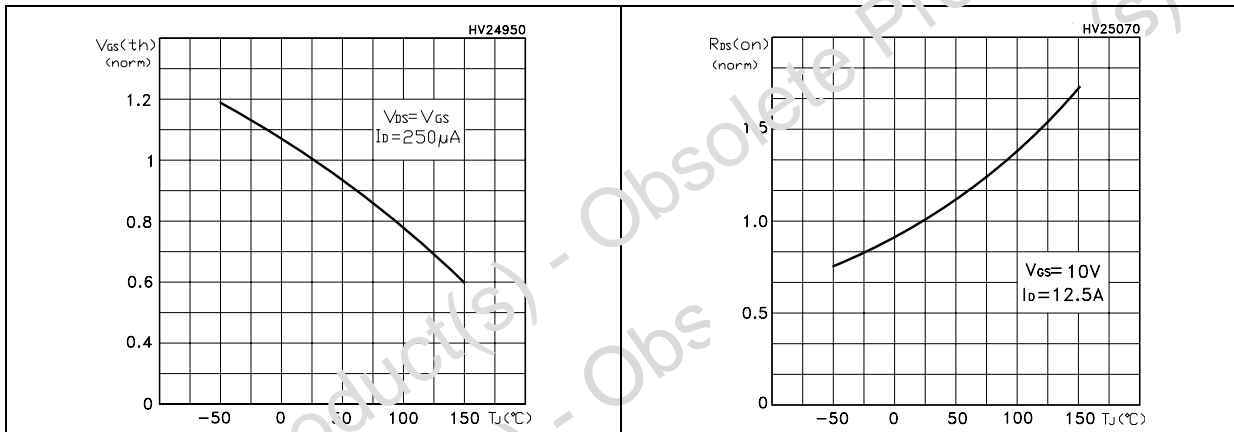
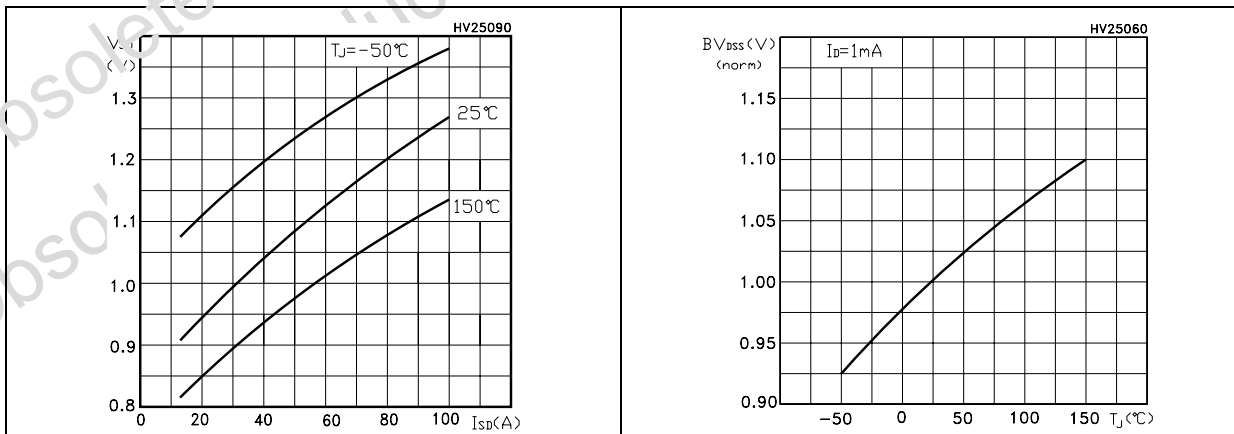


Figure 12. Source-drain diode forward characteristics Figure 13. Normalized  $B_{V_{DS}}$  vs temperature



### 3 Test circuit

Figure 14. Switching times test circuit for resistive load

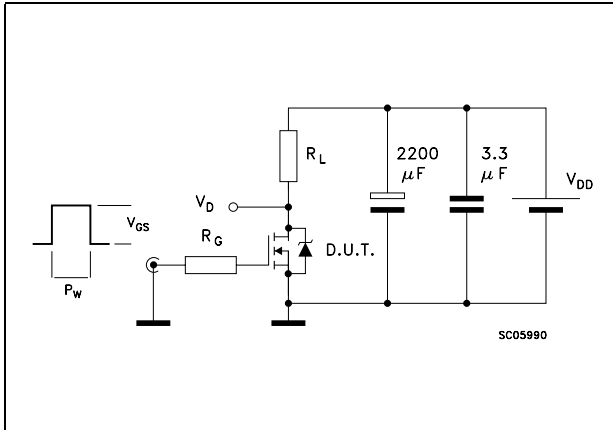


Figure 15. Gate charge test circuit

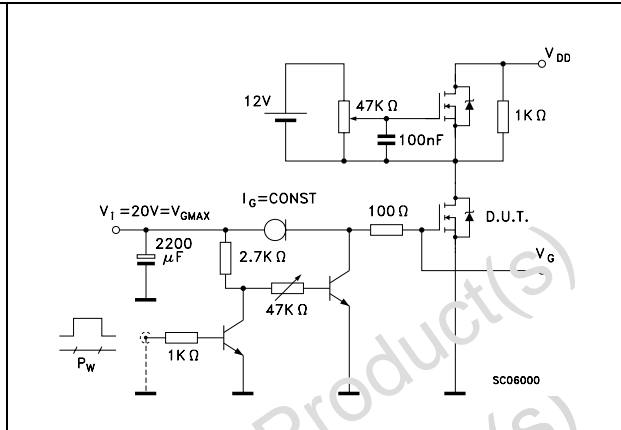


Figure 16. Test circuit for inductive load switching and diode recovery times

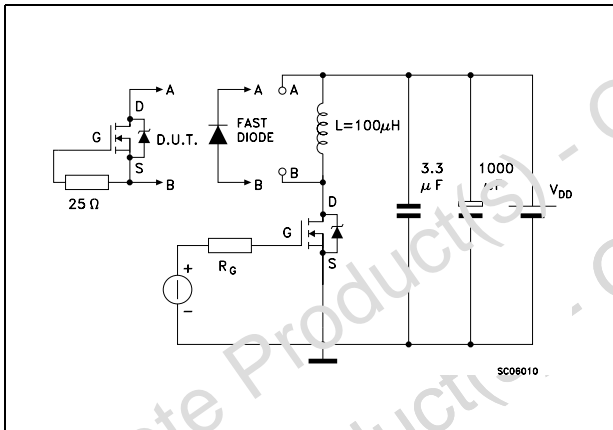


Figure 17. Unclamped inductive load test circuit

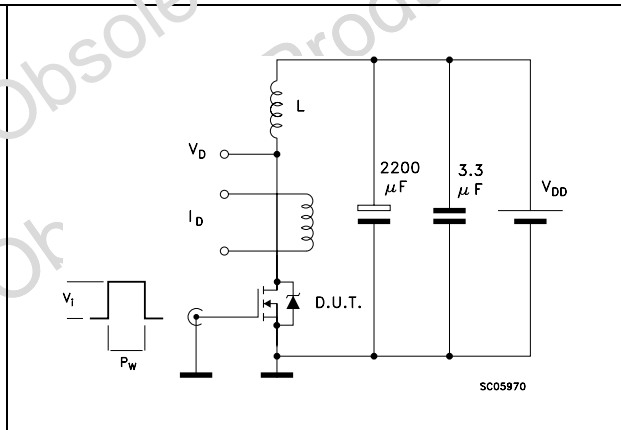


Figure 18. Unclamped inductive waveform

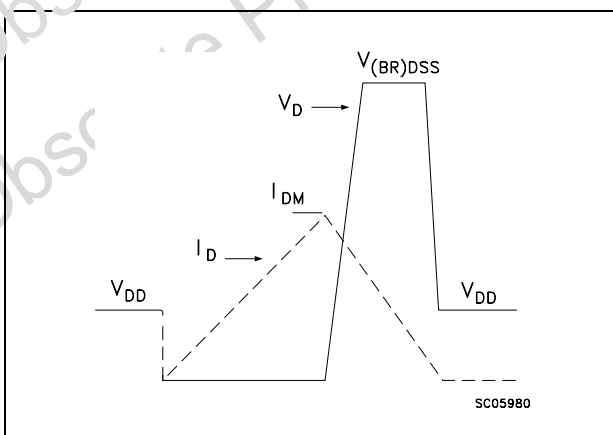
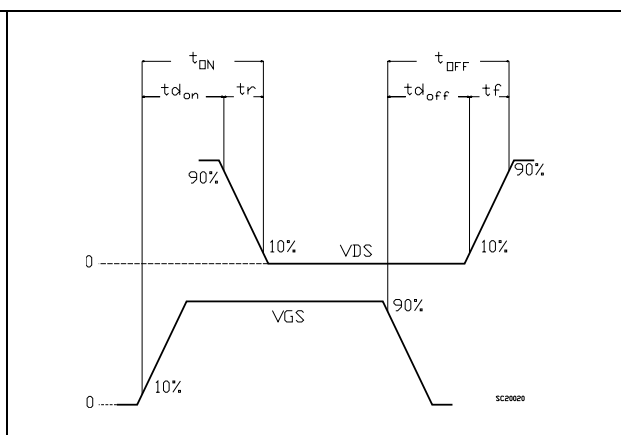


Figure 19. Switching time waveform





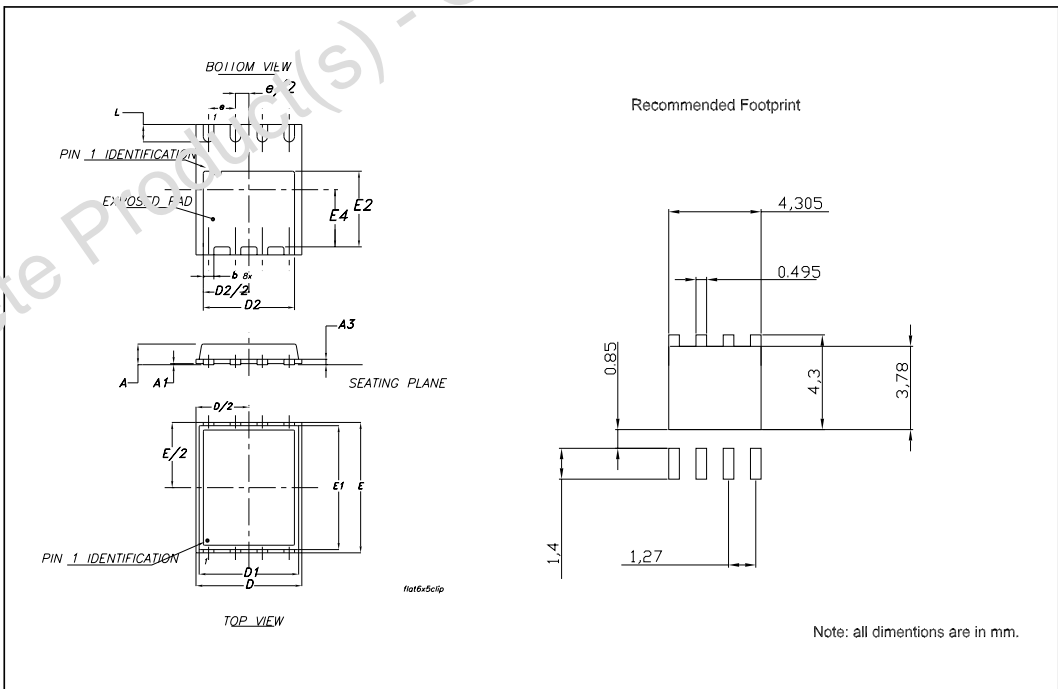
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

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**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	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
18-Apr-2005	1	First Release
20-Jun-2005	2	Updated mechanical data
22-Jun-2005	3	New Rg value on <a href="#">Table 7</a>
10-Oct-2005	4	Inserted ecopack indication
09-Jan-2006	5	New footprint
08-Mar-2006	6	New template
29-Jun-2006	7	Modified curves, see <a href="#">Figure 2</a> and <a href="#">Figure 3</a>
04-Sep-2006	8	The document has been reformatted, no content change
04-Jan-2007	9	New updated on <a href="#">Table 2</a>
10-Dec-2007	10	Updated data on <a href="#">Table 4: Avalanche data</a>
20-Mar-2008	11	New V <sub>GS</sub> max. value inserted on <a href="#">Table 4: Avalanche data</a>

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