



STL8NH3LL

N-channel 30 V, 0.012 Ω , 8 A - PowerFLAT™ (3.3x3.3)
ultra low gate charge STripFET™ Power MOSFET

Features

Type	V _{DSS}	R _{DS(on)}	I _D
STL8NH3LL	30V	<0.015 Ω	8A ⁽¹⁾

- Improved die-to-footprint ratio
- Very low profile package (1mm max)
- Very low thermal resistance
- Very low gate charge
- Low threshold device
- In compliance with the 2002/95/EC European directive

Description

This application specific Power MOSFET is the latest generation of STMicroelectronics unique STripFET™ technology. The resulting transistor is optimized for low on-resistance and minimal gate charge. The chip-scaled PowerFLAT™ package allows a significant board space saving, still boosting the performance.

Applications

- Switching application

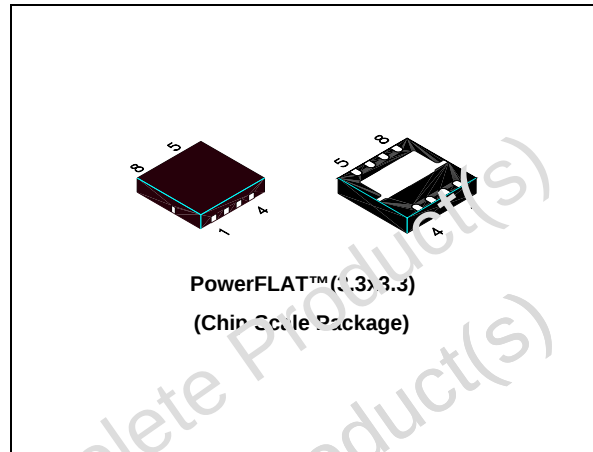


Figure 1. Internal schematic diagram

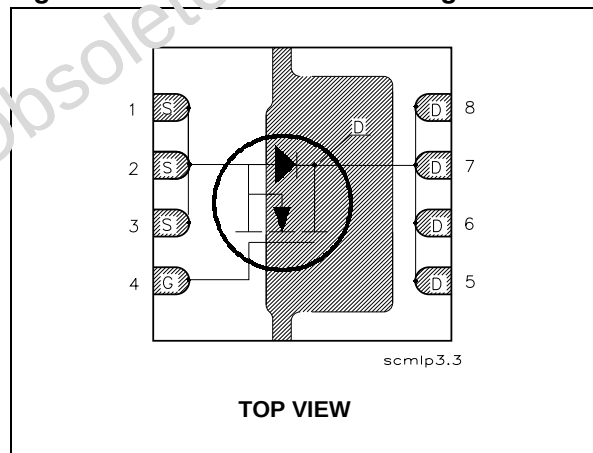


Table 1. Device summary

Order code	Marking	Package	Packaging
STL8NH3LL	8NH3L	PowerFLAT™ (3.3x3.3)	Tape and reel

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Obsolete Product(s) - Obsolete Product(s)

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}	Gate-source voltage	± 18	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	8	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	5	A
$I_{DM}^{(2)}$	Drain current (pulsed)	32	A
$P_{TOT}^{(3)}$	Total dissipation at $T_C = 25^\circ\text{C}$	50	W
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25^\circ\text{C}$	2	W
	Derating factor	0.4	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 $R_{thj-pcb}$
2. Pulse width limited by safe operating area.
3. The value is rated according R_{thj-c}

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case (drain)	2.5	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	42.8	$^\circ\text{C/W}$
$R_{thj-pcb}^{(2)}$	Thermal resistance junction-pcb	63.5	$^\circ\text{C/W}$

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

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{max rating}$, $V_{DS} = \text{max rating @ } 125^{\circ}\text{C}$			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 18\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 4\text{ A}$ $V_{GS} = 4.5\text{ V}$, $I_D = 4\text{ A}$		0.012 0.0135	0.015 0.017	Ω Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 15\text{ V}$, $I_D = 4\text{ A}$		30		S
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		965		pF
C_{oss}	Output capacitance			285		pF
C_{rss}	Reverse transfer capacitance			38		pF
Q_g	Total gate charge	$V_{DD} = 15\text{ V}$, $I_D = 8\text{ A}$ $V_{GS} = 4.5\text{ V}$ (see Figure 8)		9	12	nC
Q_{gs}	Gate-source charge			3.7		nC
Q_{gd}	Gate-drain charge			3		nC
R_G	Gate input resistance	$f = 1\text{ MHz}$ gate DC bias = 0 test signal level = 20mV open drain	0.5	1.5	2.5	Ω

1. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 14)	-	15	-	ns
t_r	Rise time			32		ns
$t_{d(off)}$	Turn-off delay time			18		ns
t_f	Fall Time			8.5		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current		-		8	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		32	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 8\text{ A}$, $V_{GS} = 0$	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 8\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 20\text{ V}$, $T_j = 150\text{ }^\circ\text{C}$ (see Figure 16)	-	24 17.4 1.45		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

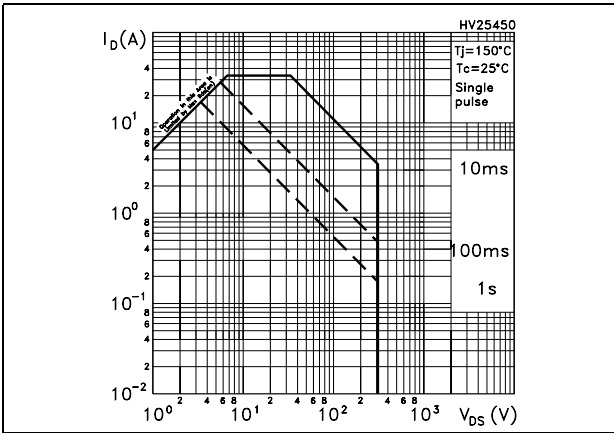


Figure 3. Thermal impedance

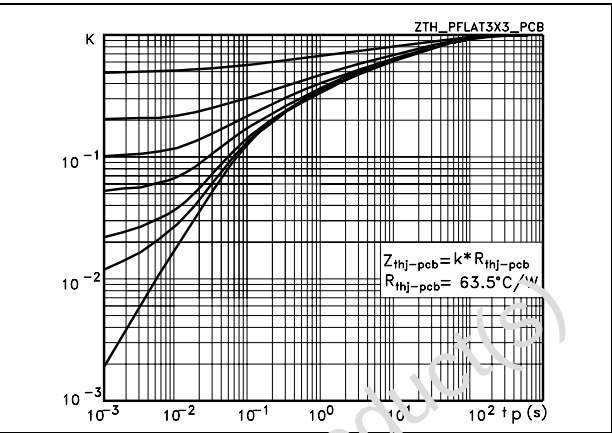


Figure 4. Output characteristics

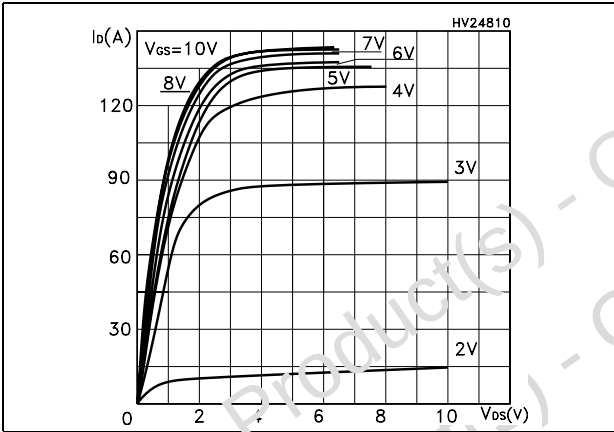


Figure 5. Transfer characteristics

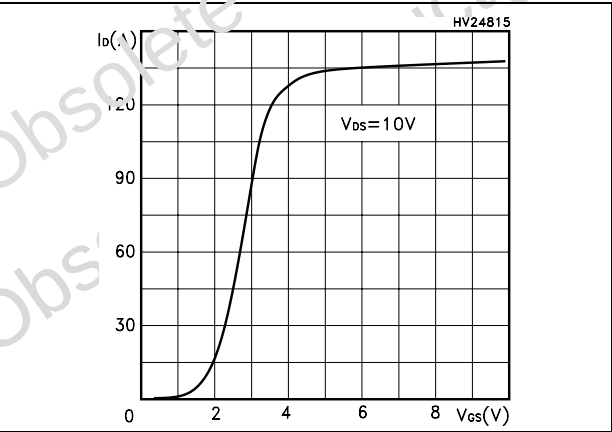


Figure 6. Transconductance

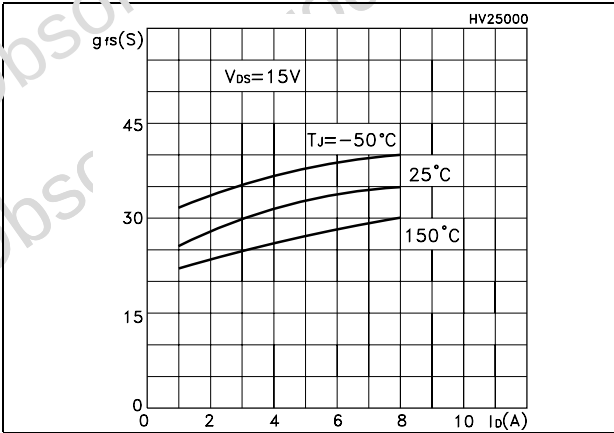


Figure 7. Static drain-source on resistance

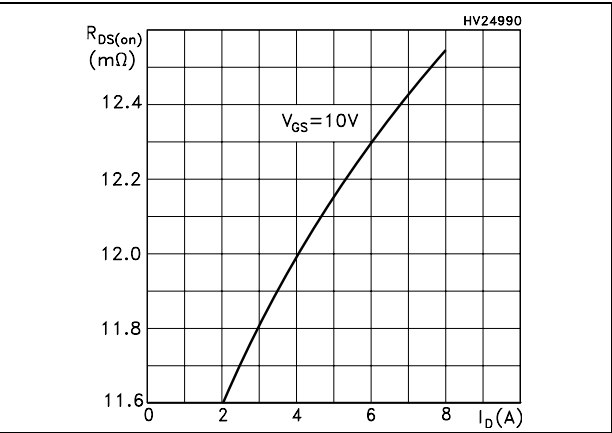


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

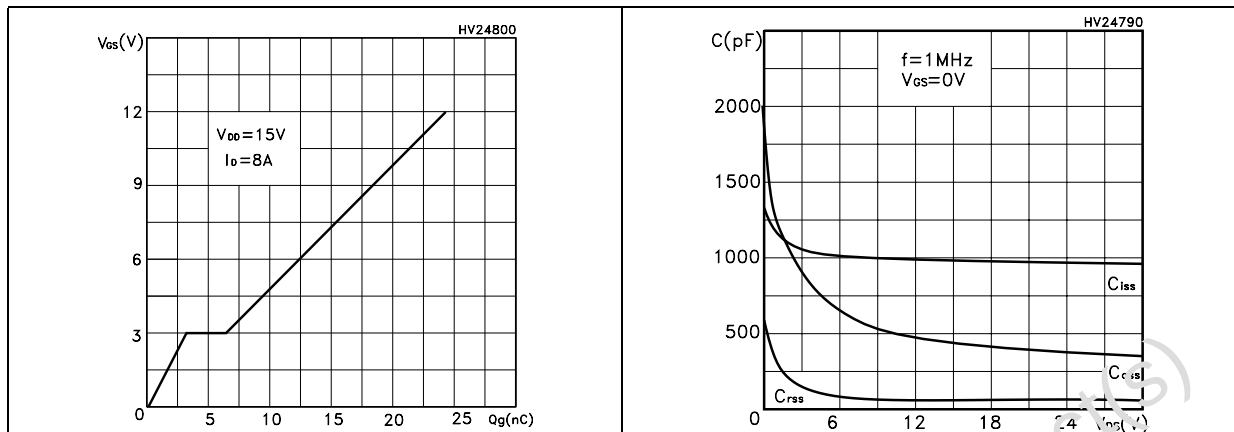
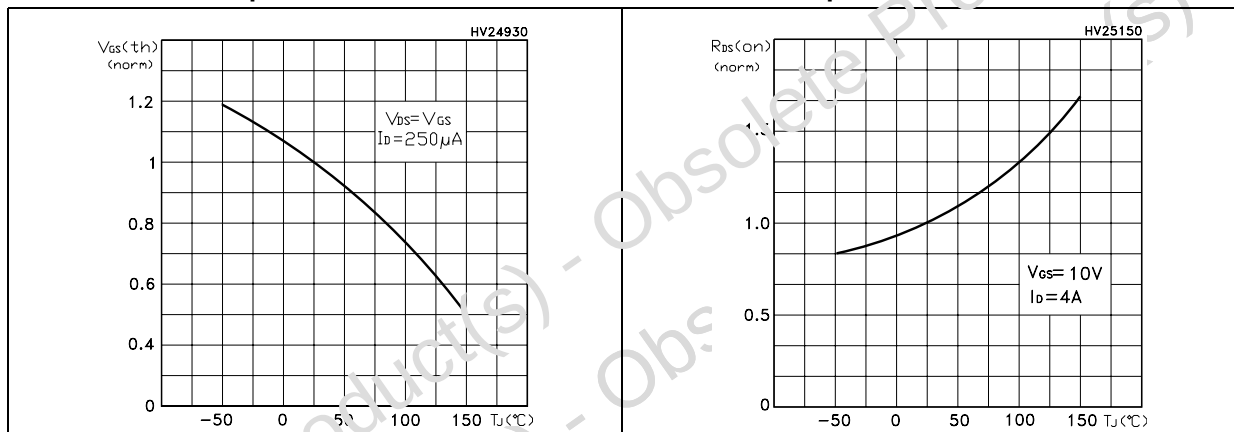
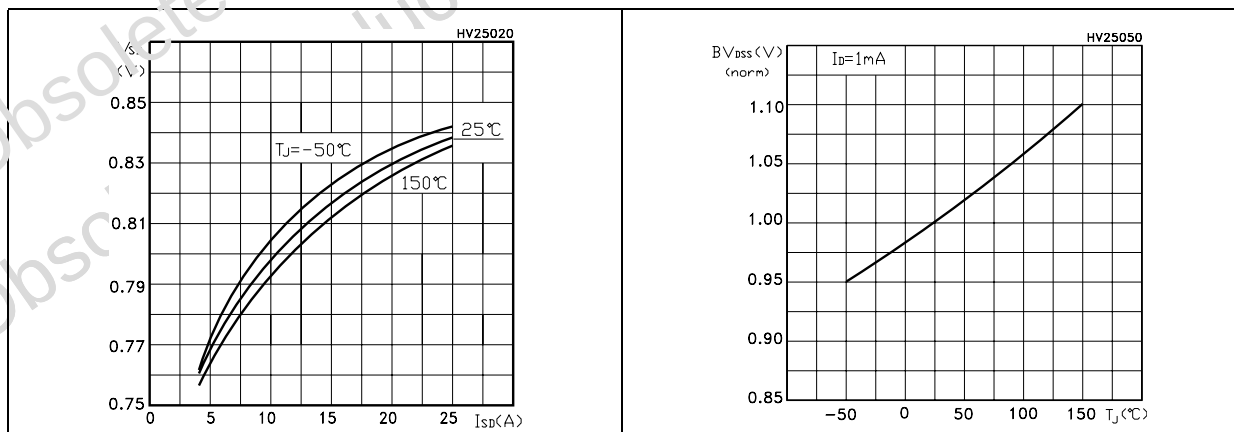


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

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

3 Test circuits

Figure 14. Switching times test circuit for resistive load



Figure 15. Gate charge test circuit

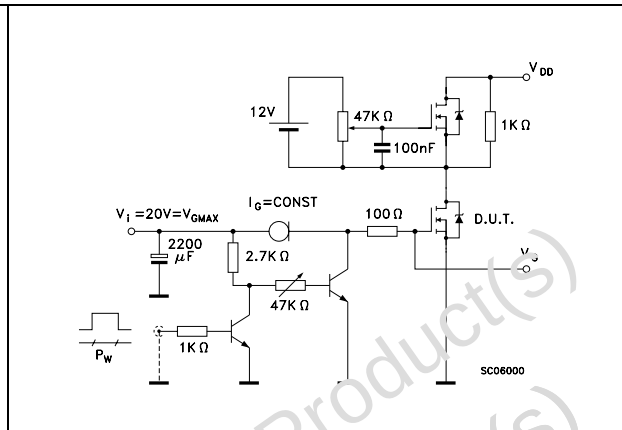


Figure 16. Inductive load switching and diode recovery times

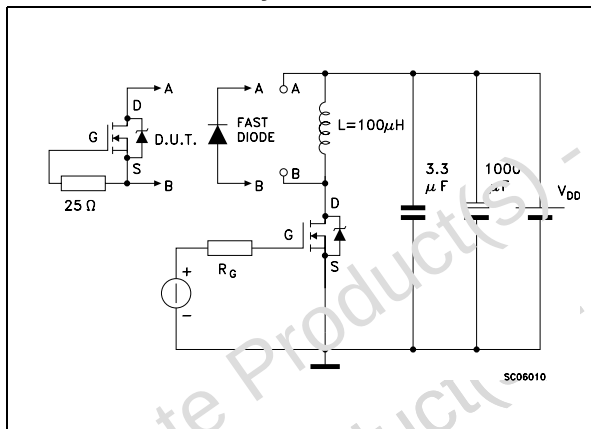


Figure 17. Uncamped inductive load test circuit

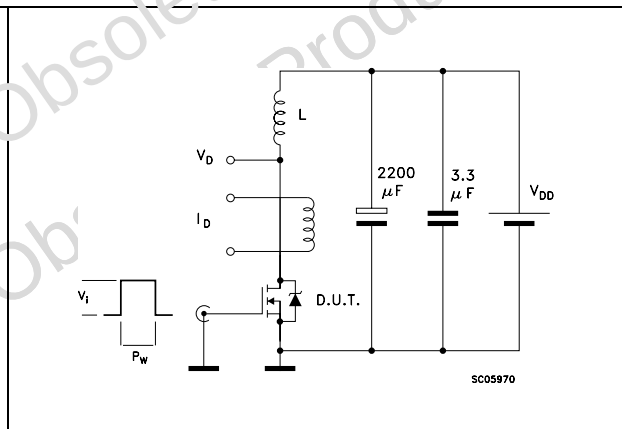


Figure 18. Unclamped inductive waveform

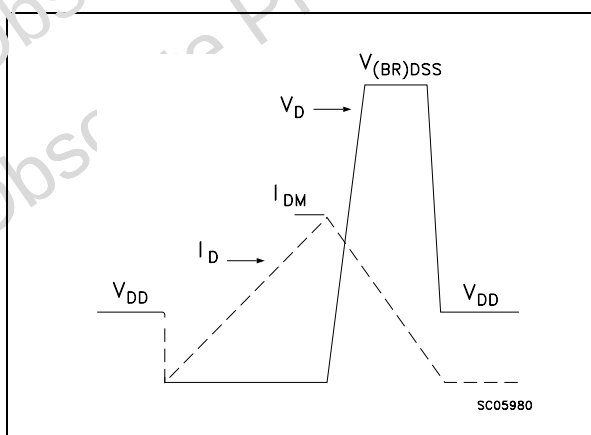
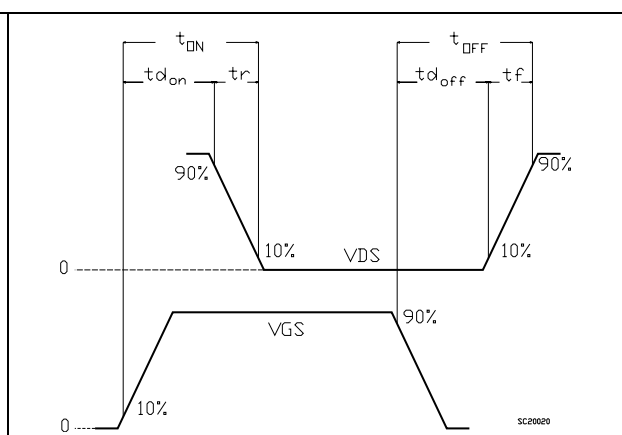


Figure 19. Switching time waveform



4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in 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 8. Package dimensions

Dim.	mm.			inch		
	Min.	Typ	Max.	Min.	Typ.	Max.
A	0.80	0.90	1.00	0.031	0.035	0.039
A1		0.02	0.05		0.0007	0.0019
A3		0.20			0.007	
b	0.23	0.30	0.38	0.009	0.011	0.015
C		0.328			0.012	
C1		0.12			0.004	
D		3.30			0.13	
D2	2.50	2.65	2.75	0.098	0.104	0.108
E		3.30			0.13	
E2	1.25	1.40	1.50	0.049	0.055	0.059
F		1.325			0.052	
F1		0.975			0.038	
e		0.65			0.025	
L	0.30		0.50	0.011		0.019

Figure 20. Package drawing

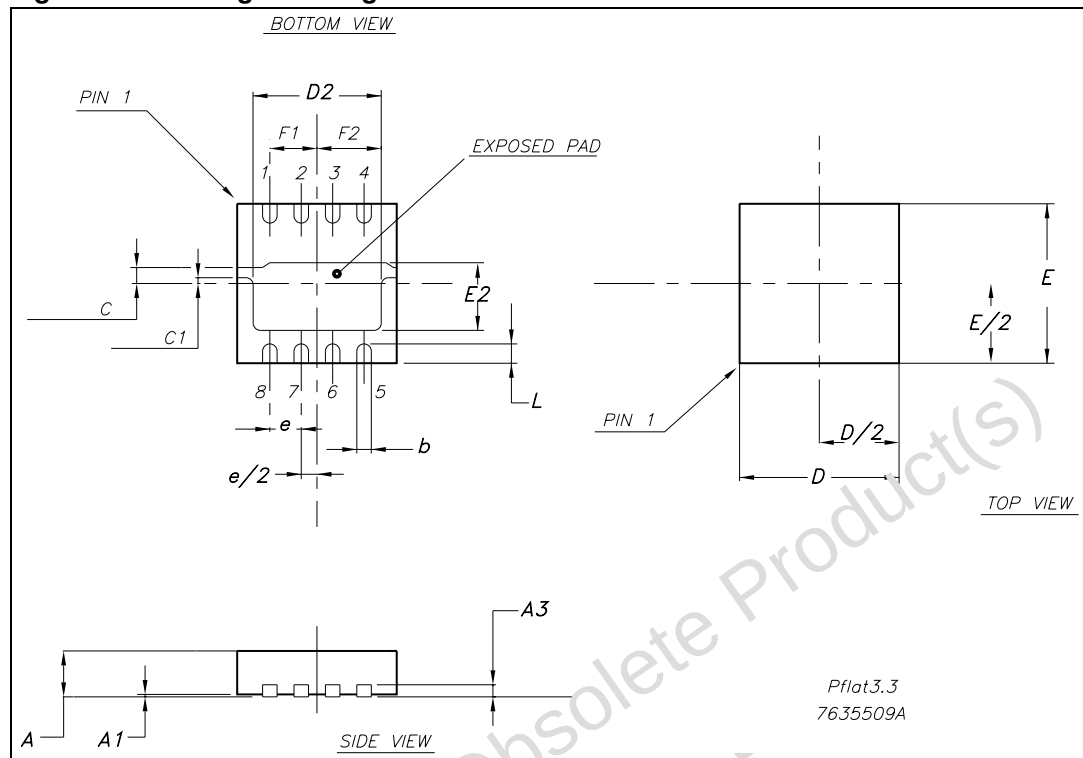
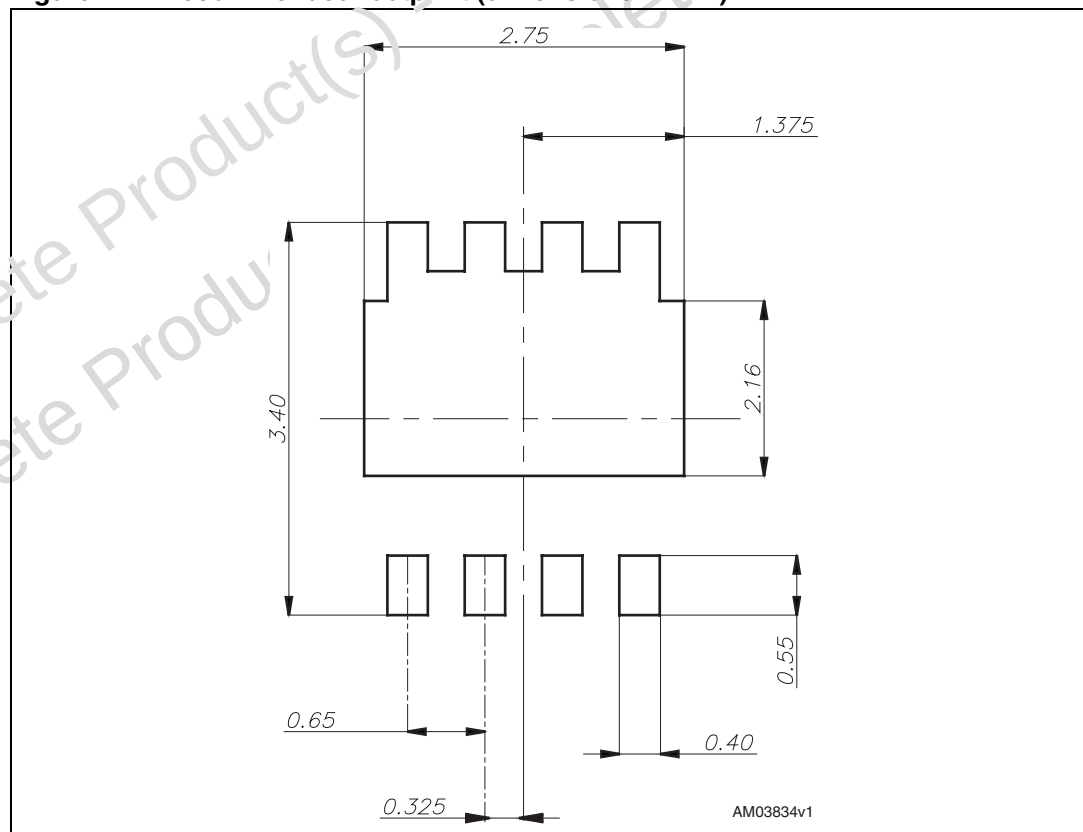


Figure 21. Recommended footprint (dimensions in mm)



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
21-Jul-2004	1	First release
05-Oct-2004	2	Values changed
19-Oct-2004	3	New value inserted
22-Nov-2004	4	Document updated
21-Feb-2005	5	Final version
18-Apr-2005	6	Modified Figure 4 , Figure 6. , Figure 9. , Figure 10.
14-Mar-2006	7	New template
10-Sep-2009	8	Inserted Figure 21

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