



# STS8DN3LLH5

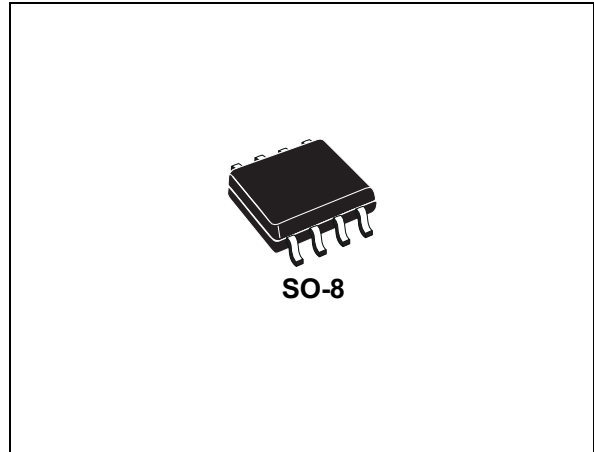
Dual N-channel 30 V, 0.0155  $\Omega$ , 10 A, SO-8  
STripFET™ V Power MOSFET

## Features

Type	V <sub>DSS</sub>	R <sub>DS(on) max</sub>	I <sub>D</sub>
STS8DN3LLH5	30 V	< 0.019 $\Omega$	10 A <sup>(1)</sup>

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

- R<sub>DS(on)</sub> \* Q<sub>g</sub> industry benchmark
- Extremely low on-resistance R<sub>DS(on)</sub>
- Very low switching gate charge
- High avalanche ruggedness
- Low gate drive power losses



## Application

- Switching applications

## Description

This STripFET™V Power MOSFET technology is among the latest improvements, which have been especially tailored to achieve very low on-state resistance providing also one of the best-in-class FOM.

Figure 1. Internal schematic diagram

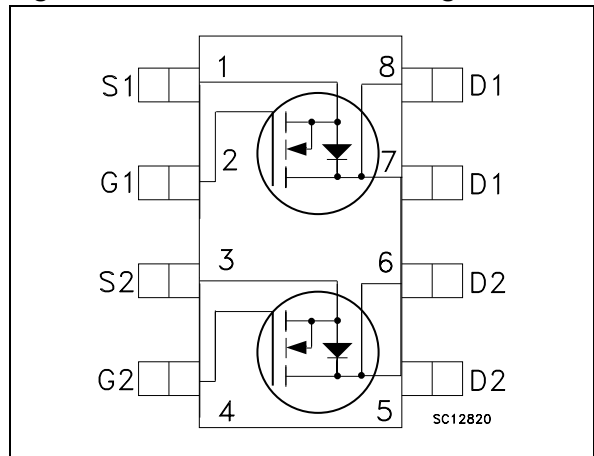


Table 1. Device summary

Order code	Marking	Package	Packaging
STS8DN3LLH5	8DN3LL	SO-8	Tape and reel

# Contents

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# 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	$\pm 22$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	10	A
$I_D^{(1)}$	Drain current (continuous) at $T_C=100\text{ }^\circ\text{C}$	9	A
$I_{DM}^{(2)}$	Drain current (pulsed)	40	A
$P_{TOT}^{(2)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	2.7	W
	Derating factor	0.02	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

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-ambient	47	$^\circ\text{C}/\text{W}$

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

## 2 Electrical characteristics

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

**Table 4. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu A, V_{GS} = 0$	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 ( $V_{DS} = 0$ )	$V_{GS} = \pm 22 V$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 V, I_D = 5 A$ $V_{GS} = 4.5 V, I_D = 5 A$		0.0155 0.020	0.019 0.022	$\Omega$ $\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{ISS}$	Input capacitance	$V_{DS} = 25 V, f = 1 \text{ MHz},$ $V_{GS} = 0$	-	724		pF
$C_{OSS}$	Output capacitance			132		pF
$C_{RSS}$	Reverse transfer capacitance			21		pF
$Q_g$	Total gate charge	$V_{DD} = 15 V, I_D = 10 A$ $V_{GS} = 4.5 V$ <i>Figure 14</i>	-	5.4		nC
$Q_{gs}$	Gate-source charge			2		nC
$Q_{gd}$	Gate-drain charge			2.1		nC
$R_G$	Intrinsic gate resistance	f=1 MHz gate dc bias=0 test signal level = 20 mV open drain	-		3.3	$\Omega$

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
$t_{d(on)}$	Turn-on delay time	$V_{DD}=15\text{ V}$ , $I_D=5\text{ A}$ , $R_G=4.7\ \Omega$ , $V_{GS}=10\text{ V}$ <i>Figure 13</i>		4		ns	
$t_r$	Rise time		-	4.2	-	ns	
$t_{d(off)}$	Turn-off delay time				21.1		ns
$t_f$	Fall time				3.5		ns

**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
$I_{SD}$	Source-drain current		-		10	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		40	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 10\text{ A}$ , $V_{GS}=0$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 25\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$		20.8		ns
$Q_{rr}$	Reverse recovery charge		-	10.5		nC
$I_{RRM}$	Reverse recovery current				1	

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

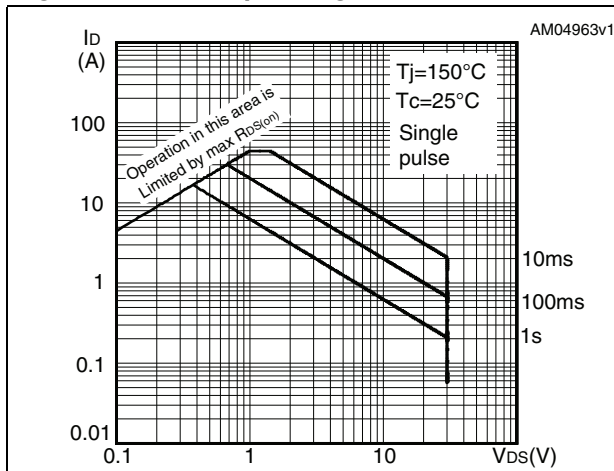


Figure 3. Thermal impedance

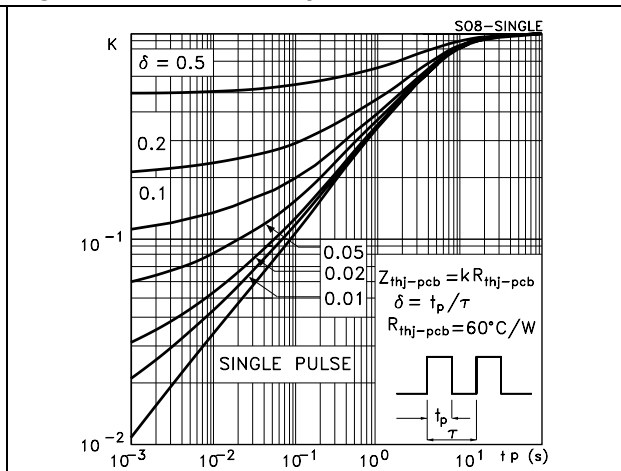


Figure 4. Output characteristics

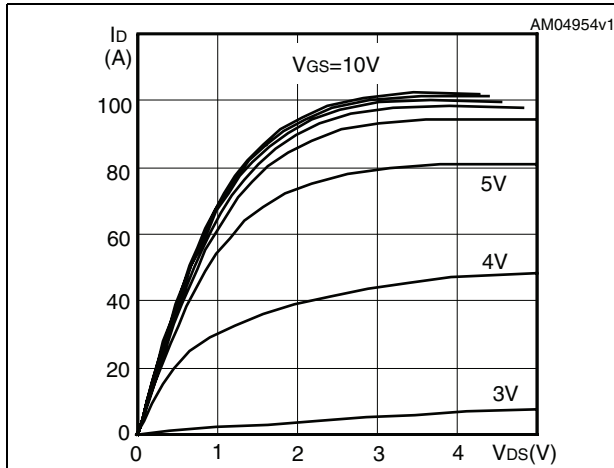


Figure 5. Transfer characteristics

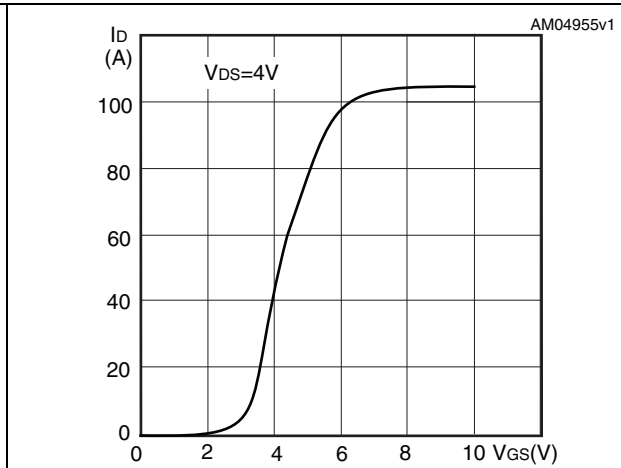


Figure 6. Normalized  $B_{V_{DSS}}$  vs temperature

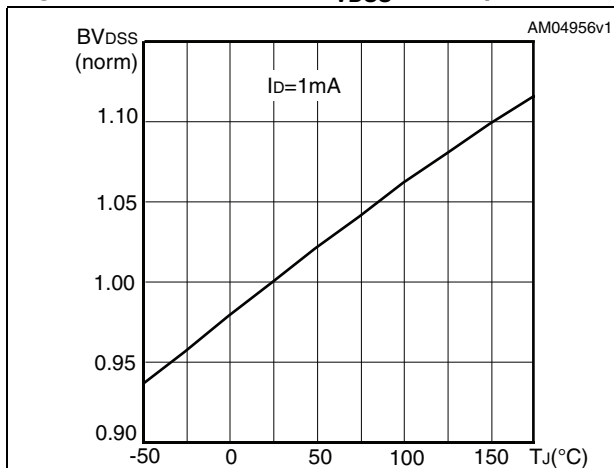


Figure 7. Static drain-source on resistance

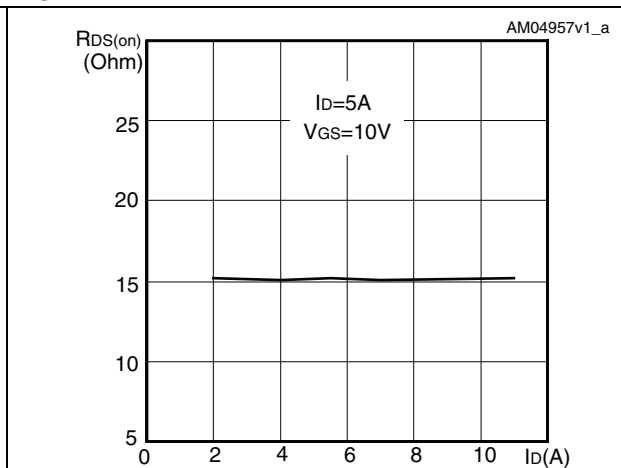


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

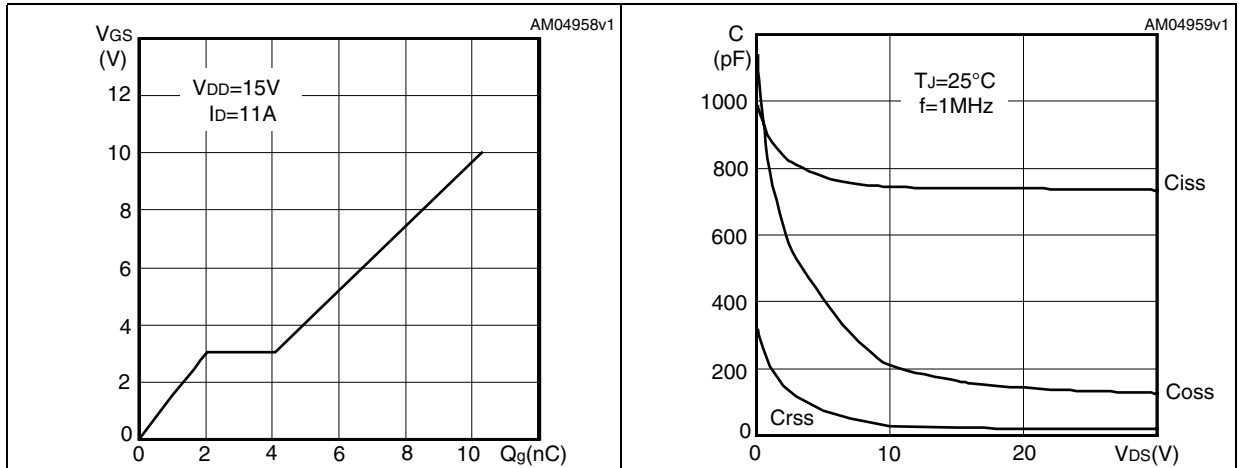


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

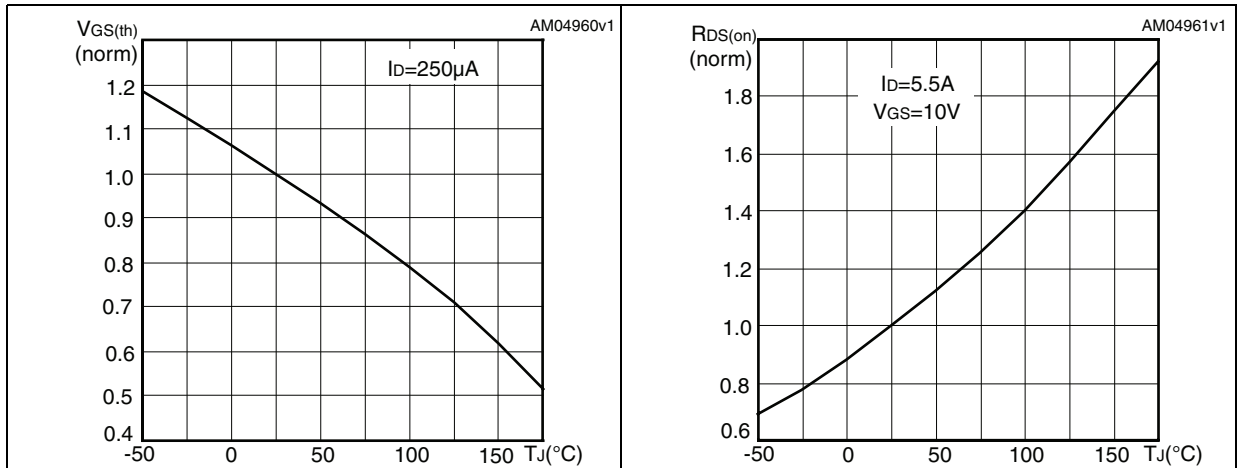
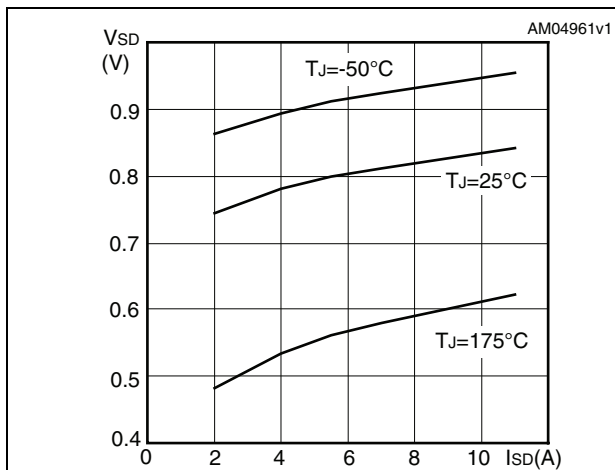
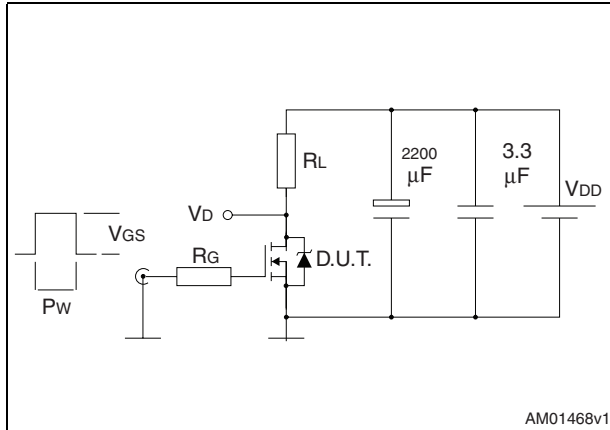


Figure 12. Source-drain diode forward characteristics

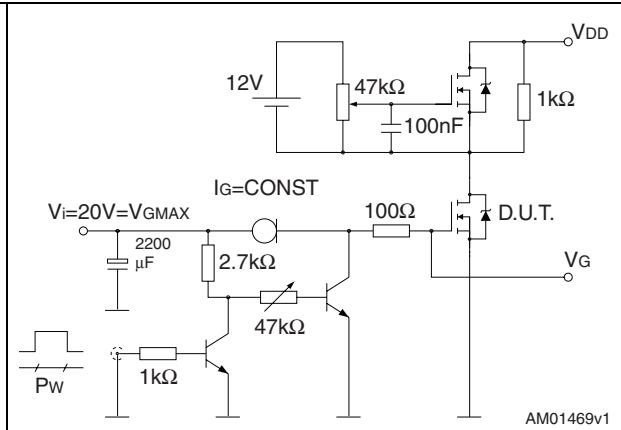


### 3 Test circuits

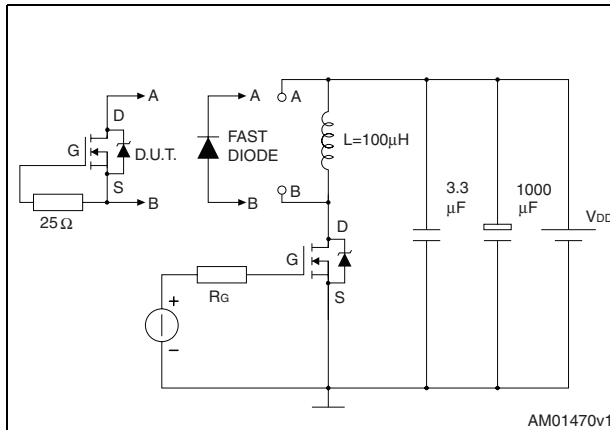
**Figure 13. Switching times test circuit for resistive load**



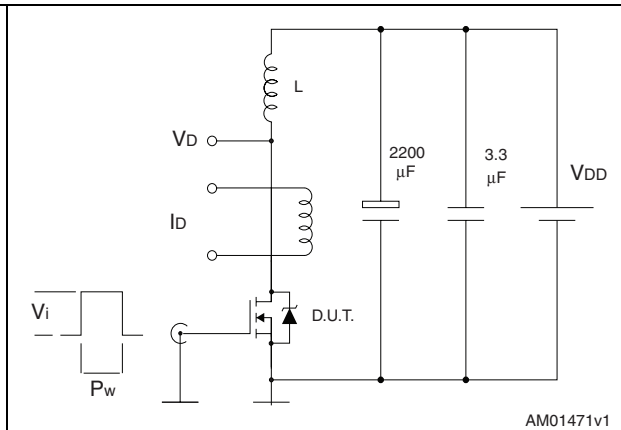
**Figure 14. Gate charge test circuit**



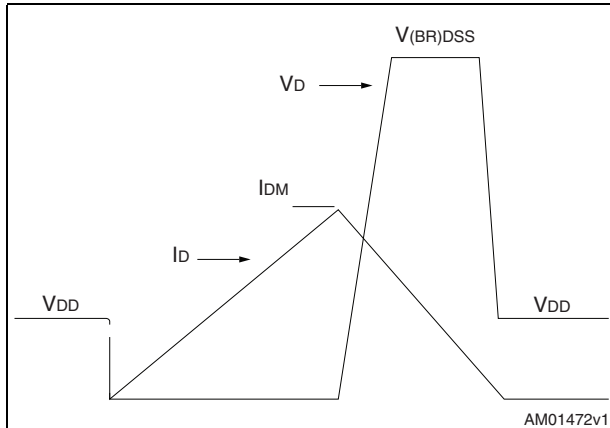
**Figure 15. Test circuit for inductive load switching and diode recovery times**



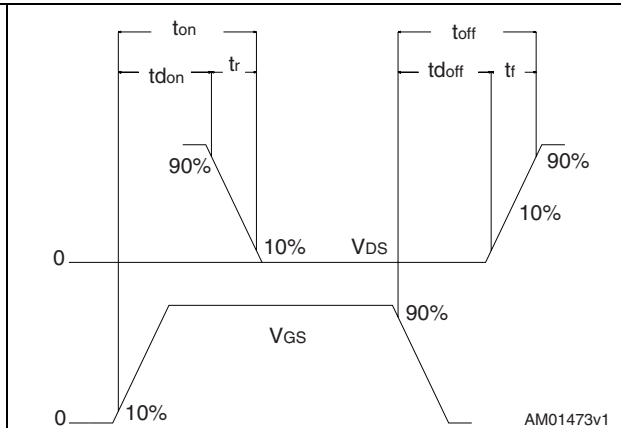
**Figure 16. Unclamped inductive load test circuit**



**Figure 17. Unclamped inductive waveform**



**Figure 18. Switching time waveform**



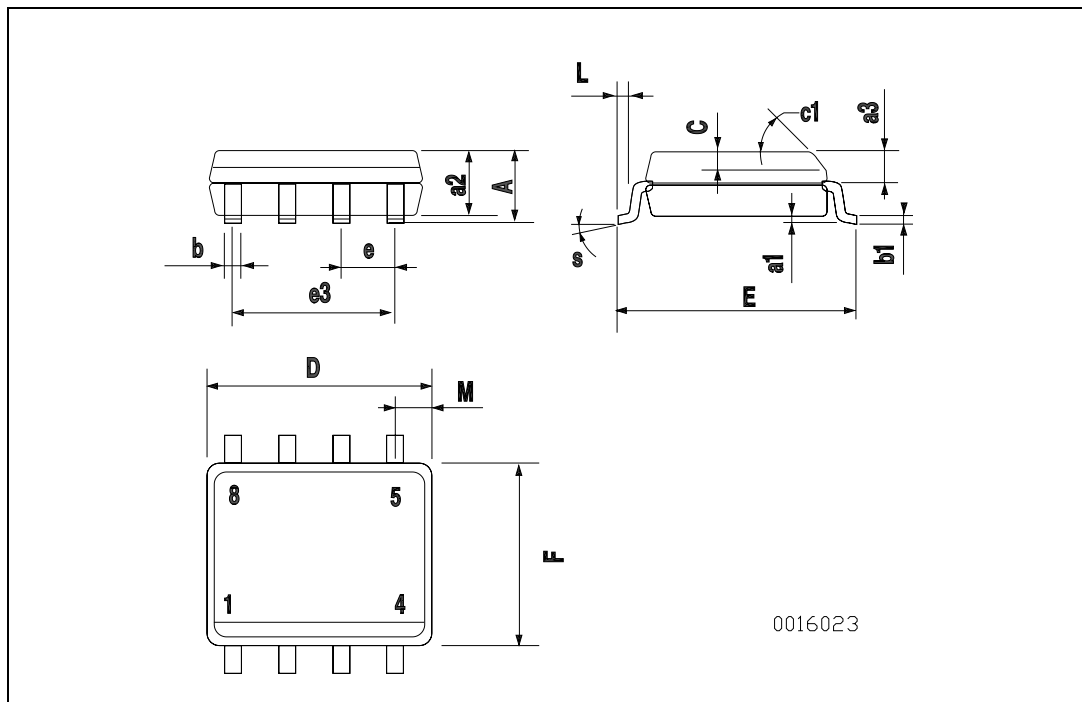


## 4 Package mechanical data

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](http://www.st.com). ECOPACK is an ST trademark.

**SO-8 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



## 5 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
12-Jan-2010	1	First release

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