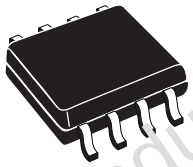
STS30N3LLH6

N-channel 30 V, 0.0016 Ω, 30 A, SO-8 STripFET™ VI DeepGATE™ Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D
STS30N3LLH6	30 V	0.0024 Ω	30 A

- $R_{DS(on)}$ * Q_g industry benchmark
- Extremely low on-resistance $R_{DS(on)}$
- High avalanche ruggedness
- Low gate drive power losses
- Very low switching gate charge



SO-8

Application

- Switching applications

Description

This product utilizes the 6th generation of design rules of ST's proprietary STripFET™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest $R_{DS(on)}$ in a standard package, that makes it suitable for the most demanding DC-DC converter applications, where high power density has to be achieved.

Figure 1. Internal schematic diagram

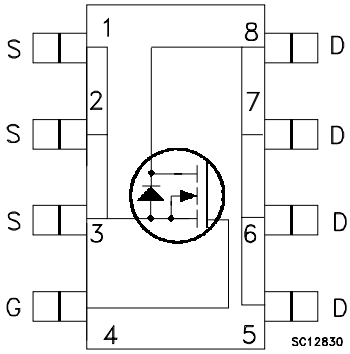


Table 1. Device summary

Order code	Marking	Packag	Packaging
STS30N3LLH6	30G3L	SO-8	Tape and reel

Obsolete Product(s) - Obsolete Product(s)

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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	± 20	V
I_D	Drain current (continuous) at T_C = 25 °C	30	A
I_D	Drain current (continuous) at T_C=100 °C	18.75	A
I_{DM}(2)	Drain current (pulsed)	120	A
P_{TOT}	Total dissipation at T_C = 25 °C	2.7	W
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 150	°C

1. Continuous mode
2. Pulse width limited by safe operating area

Table 3. Thermal resistance

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

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

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current	40	A
E_{AS}	Single pulse avalanche energy (starting Tj=25 °C, I_D=I_{AV})	525	mJ

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

(T_{CASE} = 25 °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 µA, V_{GS}= 0	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125 °C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	1			V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 15 A V_{GS}= 4.5 V, I_D= 15 A		0.0016 0.0025	0.0024 0.0035	Ω Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25 V, f=1 MHz, V_{GS}=0	-	4040 740 425	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=15 V, I_D = 30 A V_{GS} =4.5 V *Figure 19*	-	40 13 16	-	nC nC nC
R_G	Gate Input Resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20 mV open drain	-	1.4	-	Ω

Obsolete Product(s) - Obsolete Product(s)

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD}=15 V, I_D= 15 A, R_G=4.7 Ω, V_{GS}=4.5 V *Figure 13*	-	17 18 75 46	-	ns ns ns ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current		-		30	A
I_{SDM}(1)	Source-drain current (pulsed)		-		120	A
V_{SD}(2)	Forward on Voltage	I_{SD}=15 A, V_{GS}=0	-		1.1	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=15 A, di/dt = 100 A/µs, V_{DD}=20 V, Tj=150 °C *Figure 15*	-	34 35 2.1		ns nC A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration=300 µs, duty cycle 1.5%

Obsolete Product(s) - Obsolete Product(s)

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

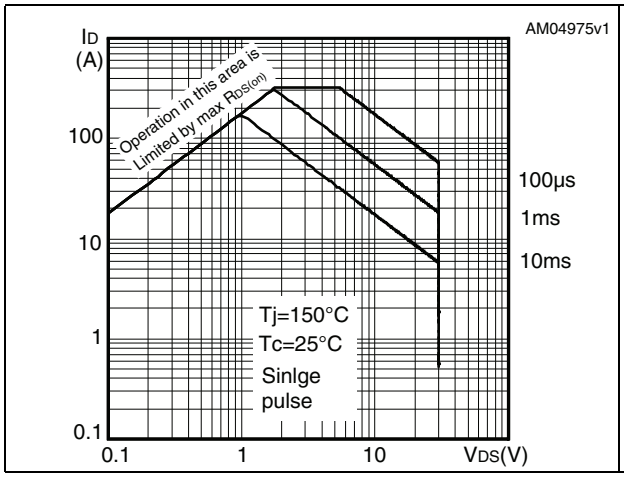


Figure 3. Thermal impedance

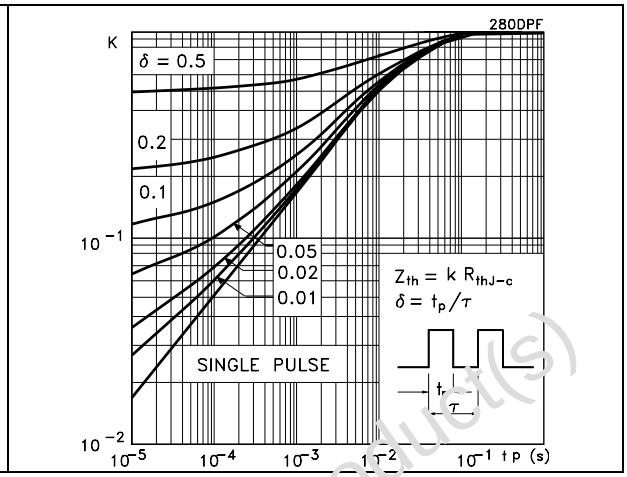


Figure 4. Output characteristics

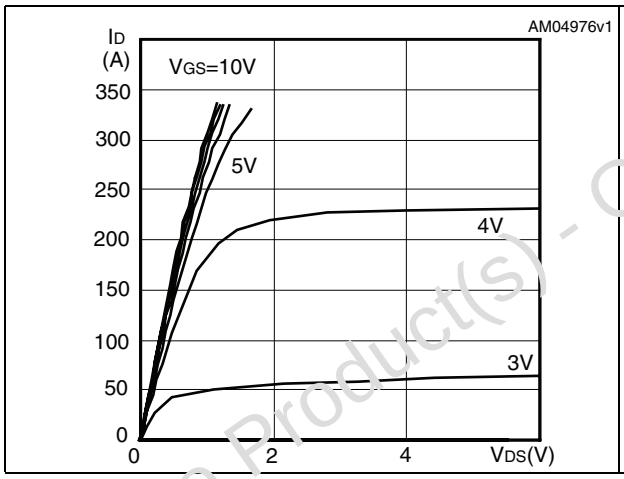


Figure 5. Transfer characteristics

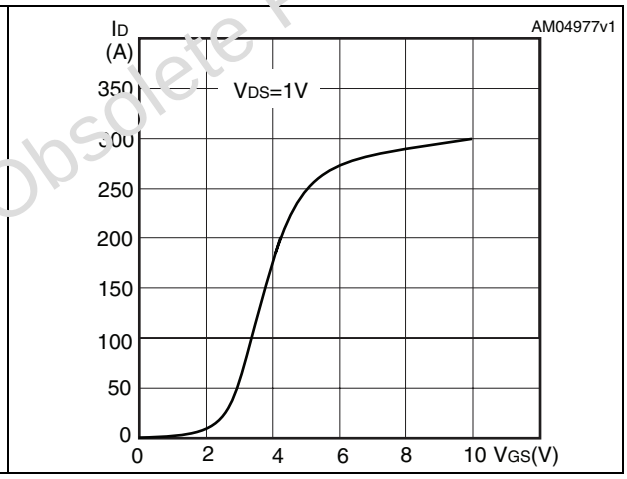


Figure 6. Normalized BV_{DSS} vs temperature

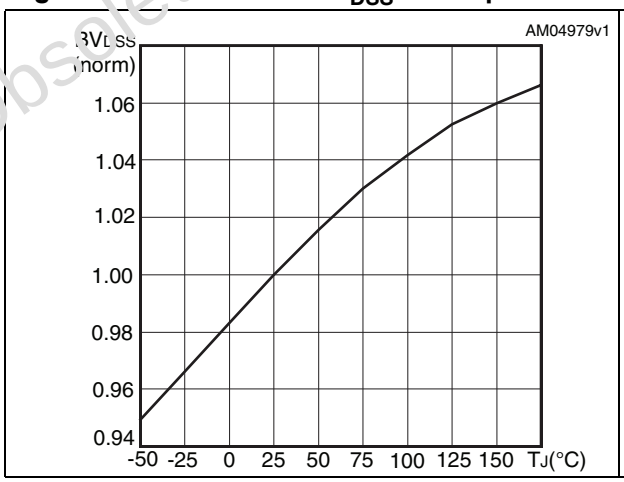
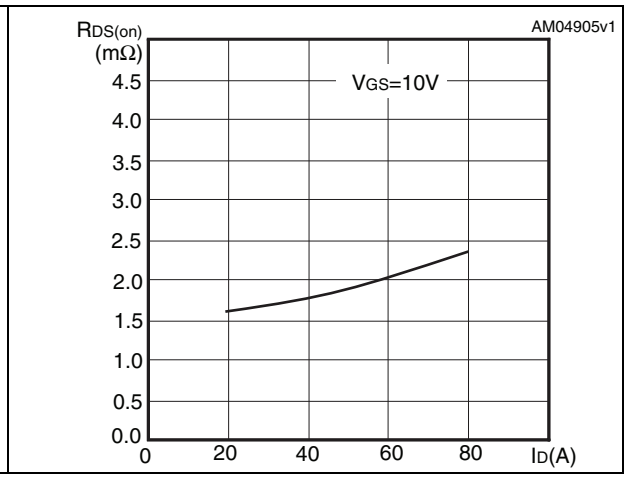


Figure 7. Static drain-source on resistance



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Figure 8. Gate charge vs gate-source voltage

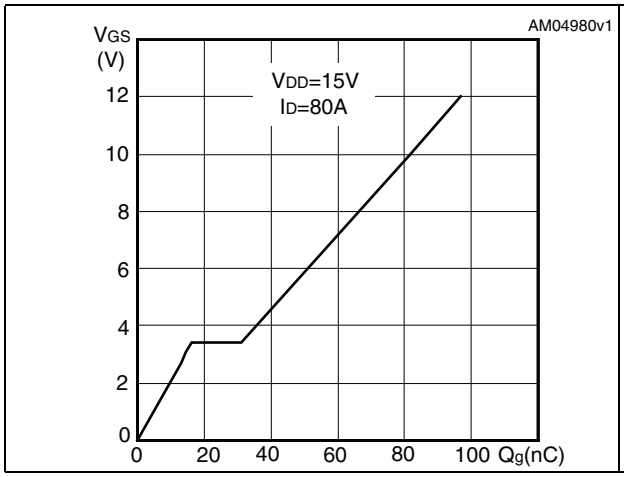


Figure 9. Capacitance variations

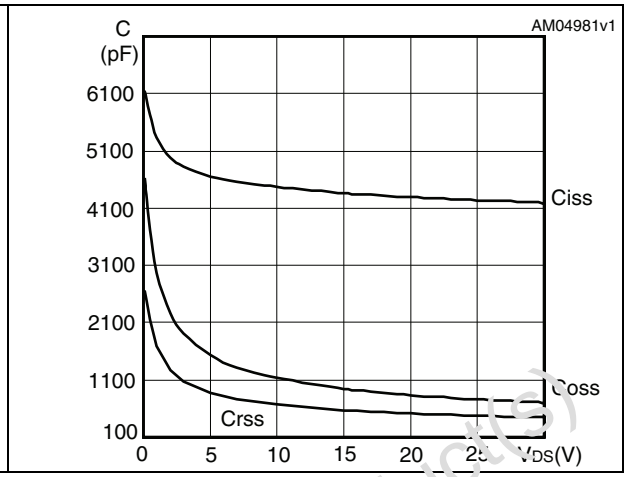


Figure 10. Normalized gate threshold voltage vs temperature

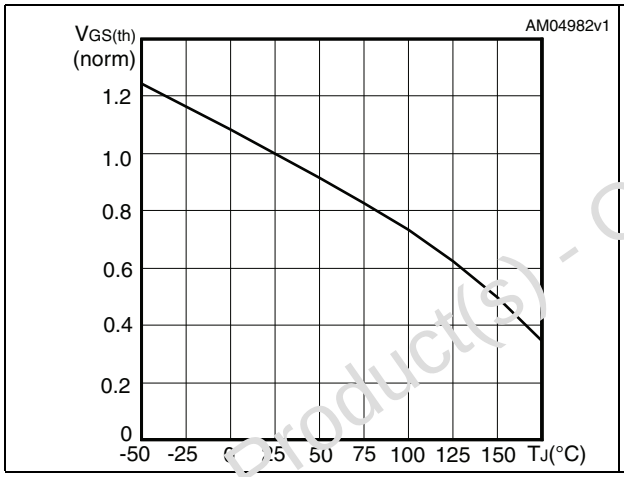


Figure 11. Normalized on resistance vs temperature

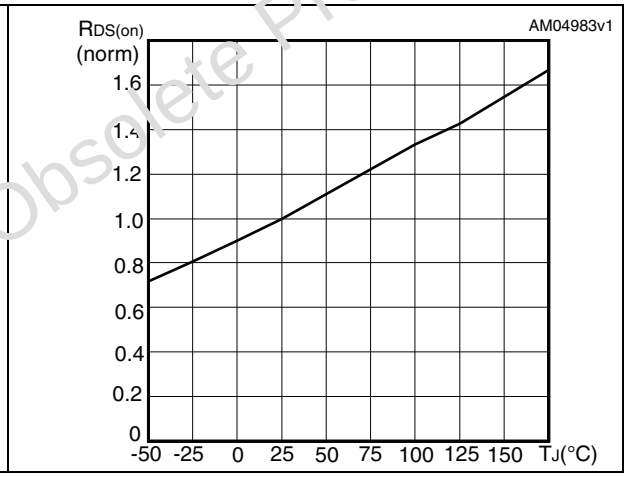
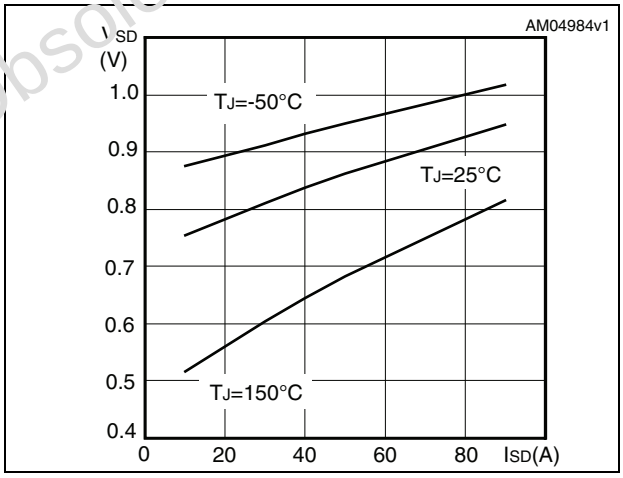


Figure 12. Source-drain diode forward characteristics



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3 Test circuits

Figure 13. Switching times test circuit for resistive load

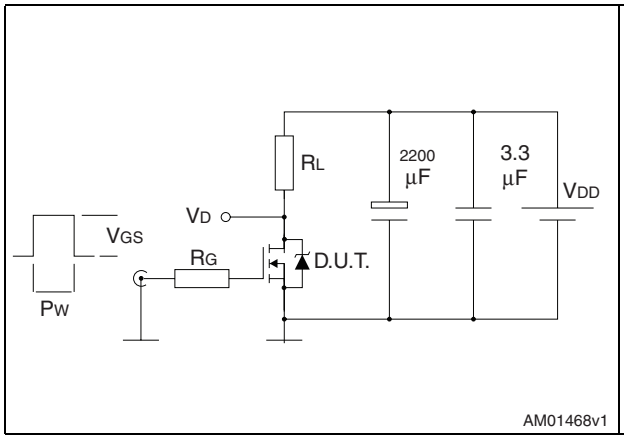


Figure 14. Gate charge test circuit

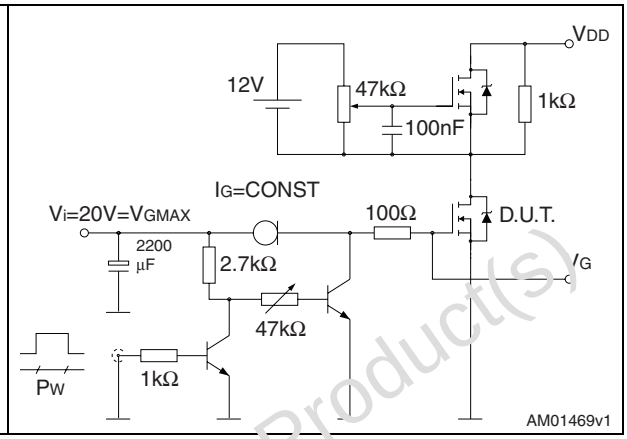


Figure 15. Test circuit for inductive load switching and diode recovery times

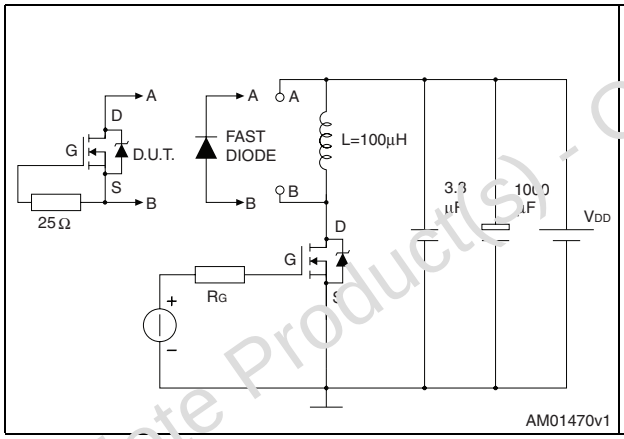


Figure 16. Unclamped inductive load test circuit

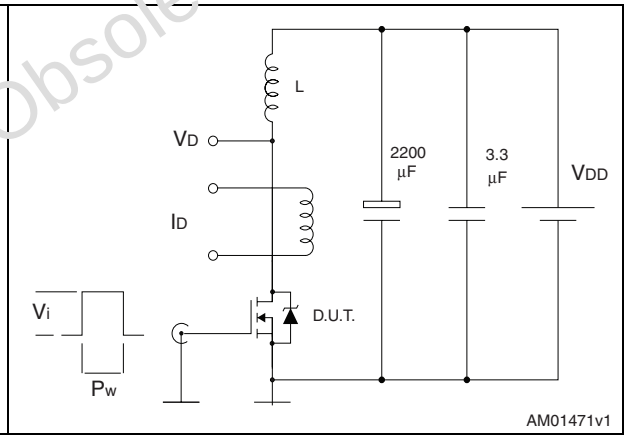


Figure 17. Unclamped inductive waveform

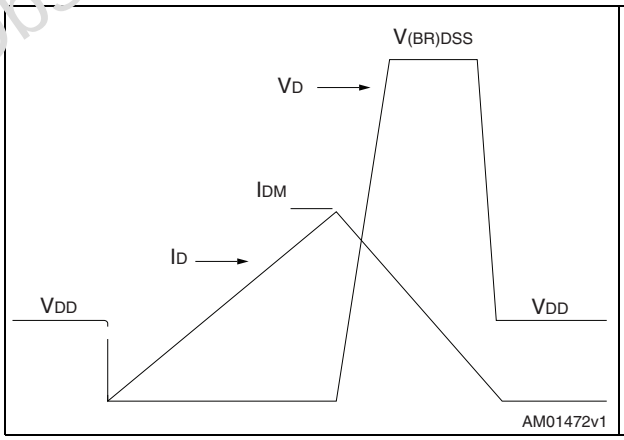
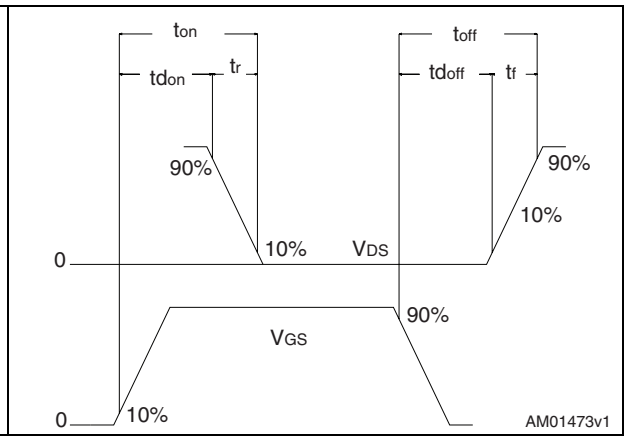
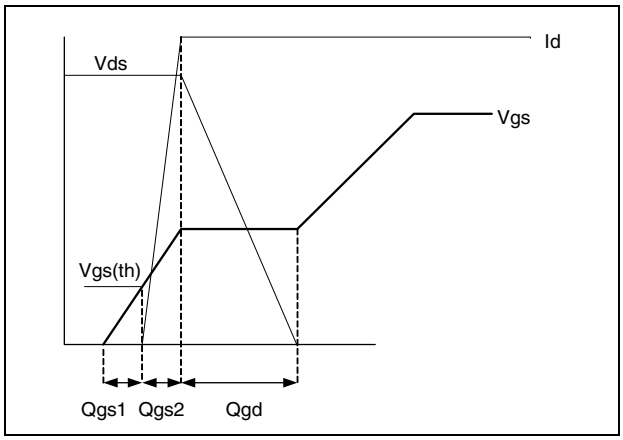


Figure 18. Switching time waveform



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Figure 19. Gate charge waveform



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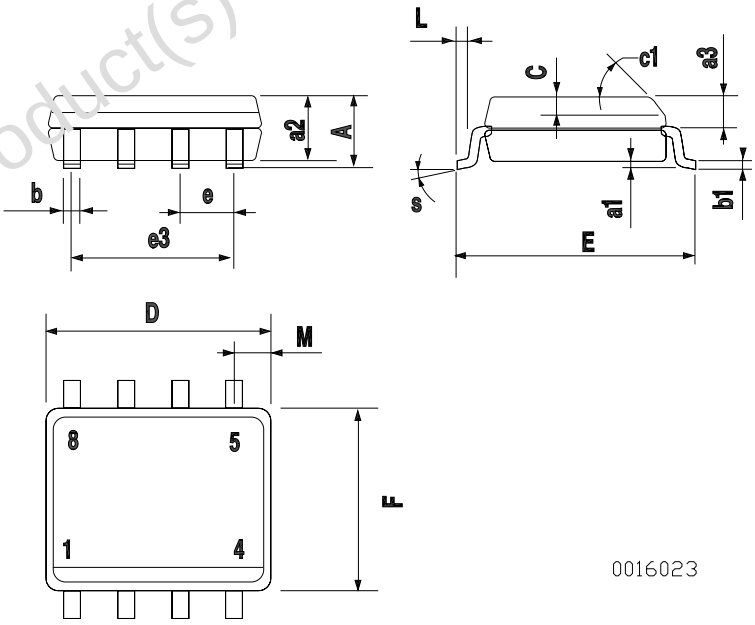
4 Package mechanical data

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.

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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.)					



Obsolete Product(s) - Obsolete Product(s)

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
27-Jan-2009	1	First release
17-Jul-2009	2	Document status promoted from preliminary data to datasheet

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