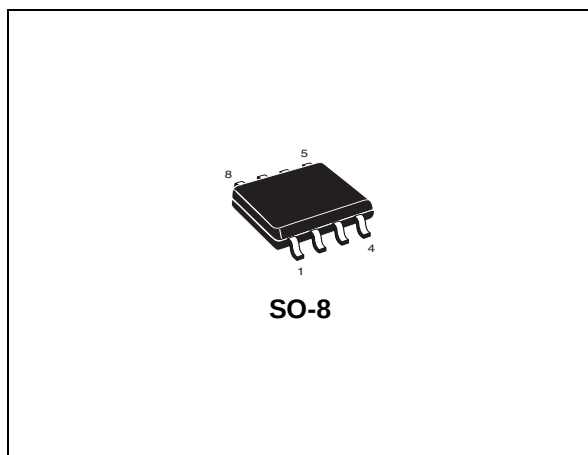


Dual N-channel 30 V, 0.017 Ω typ., 8 A, STripFET™ II Power MOSFET in a SO-8 package

Datasheet - production data



Features

Order code	V_{DS}	$R_{DS(on)max}$	I_D
STS8DNF3LL	30 V	0.020 Ω	8 A

- Optimal $R_{DS(on)} \times Q_g$ trade-off @ 4.5 V
- Conduction losses reduced
- Switching losses reduced

Applications

- Switching applications

Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

Figure 1. Internal schematic diagram

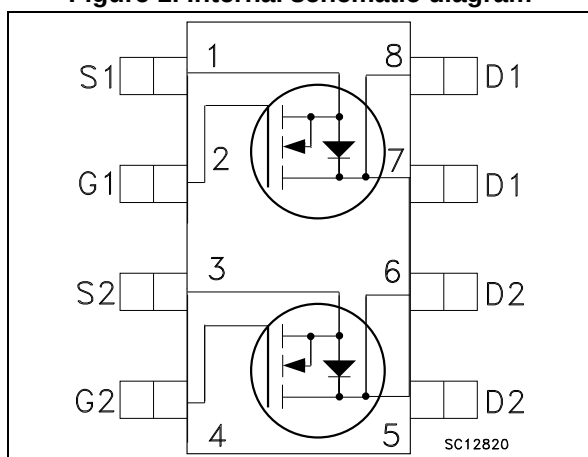


Table 1. Device summary

Order code	Marking	Package	Packaging
STS8DNF3LL	8DF3LL	SO-8	Tape and reel

Contents

1 **Electrical ratings** 3

2 **Electrical characteristics** 4

 2.1 **Electrical characteristics (curves)** 6

3 **Test circuit** 8

4 **Package mechanical data** 9

5 **Packaging mechanical data** 11

6 **Revision history** 13



1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	30	V
V_{GS}	Gate- source voltage	± 16	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$ single operating	8	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$ single operating	5	A
$I_{DM}^{(1)}$	Drain current (pulsed)	32	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$ dual operating	2	W
	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$ single operating	1.6	W

1. Pulse width limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-amb}^{(1)}$	Thermal resistance junction-ambient single operating	78	$^{\circ}\text{C/W}$
	Thermal resistance junction-ambient dual operating	62.5	$^{\circ}\text{C/W}$
T_J	Thermal operating junction-ambient	150	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-55 to 150	$^{\circ}\text{C}$

1. Mounted on FR-4 board with 0.5 in² pad of Cu

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = 30\ \text{V}$			1	μA
		$V_{DS}=30\ \text{V}$, $T_C=125^{\circ}\text{C}$			10	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 16\ \text{V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	1			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\ \text{V}$, $I_D = 4\ \text{A}$		0.017	0.020	W
		$V_{GS} = 4.5\ \text{V}$, $I_D = 4\ \text{A}$		0.020	0.024	W

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 15\ \text{V}$, $I_D = 4\ \text{A}$	-	12.5		S
C_{iss}	Input capacitance	$V_{DS} = 25\ \text{V}$, $f = 1\ \text{MHz}$, $V_{GS} = 0$	-	800		pF
C_{oss}	Output capacitance		-	250		pF
C_{rss}	Reverse transfer capacitance		-	60		pF
Q_g	Total gate charge	$V_{DD} = 15\ \text{V}$, $I_D = 8\ \text{A}$, $V_{GS} = 5\ \text{V}$ (see Figure 15)	-	12.5	17	nC
Q_{gs}	Gate-source charge		-	3.2		nC
Q_{gd}	Gate-drain charge		-	4.5		nC

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	$V_{DD}=15\ \text{V}$, $I_D=4\ \text{A}$, $R_G=4.7\ \Omega$, $V_{GS}= 4.5\text{V}$ (see Figure 14)	-	18	-	ns
t_r	Rise time		-	32	-	ns
$t_{d(off)}$	Turn-off delay time	$V_{DD}=15\ \text{V}$, $I_D=4\text{A}$, $R_G=4.7\ \Omega$, $V_{GS}= 4.5\ \text{V}$ (see Figure 14)	-	21	-	ns
t_f	Fall time		-	11	-	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	$I_{SD} = 8\text{ A}$, $V_{GS} = 0$	-		1.2	V
t_{rr}	Reverse recovery time	$I_{SD} = 8\text{ A}$, $V_{DD} = 15\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $T_j = 150\text{ }^\circ\text{C}$ (see Figure 16)	-	23		ns
Q_{rr}	Reverse recovery charge			17		nC
I_{RRM}	Reverse recovery current			1.5		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

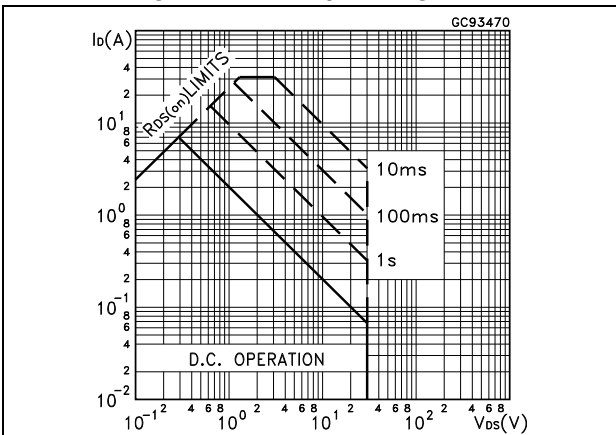


Figure 3. Thermal impedance

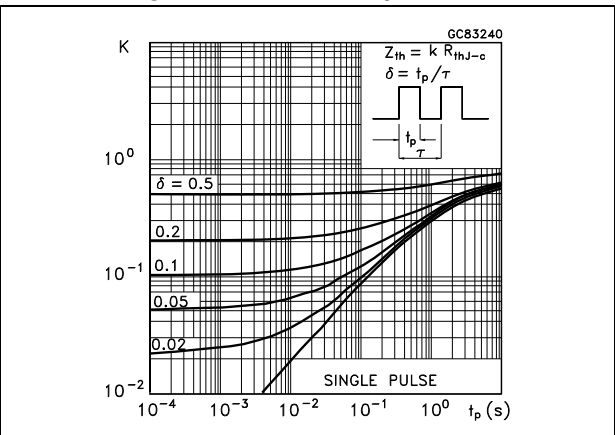


Figure 4. Output characteristics

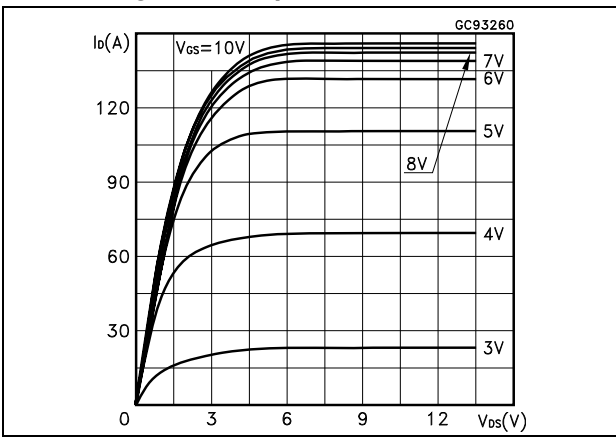


Figure 5. Transfer characteristics

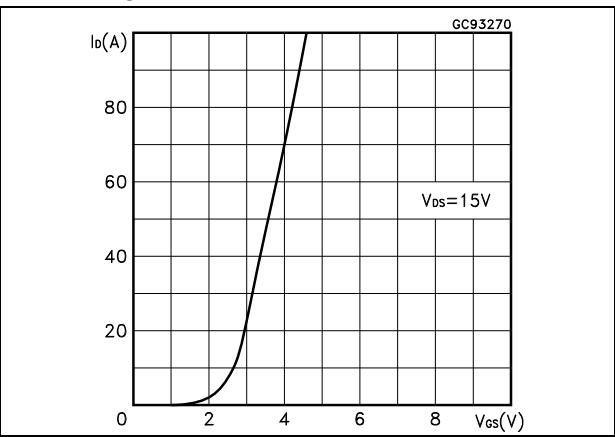


Figure 6. Transconductance

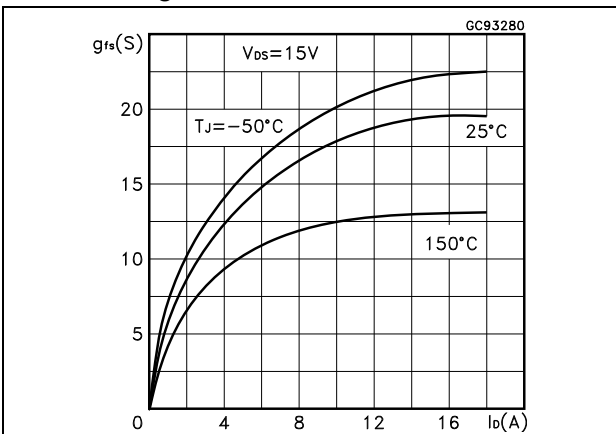


Figure 7. Static drain-source on-resistance

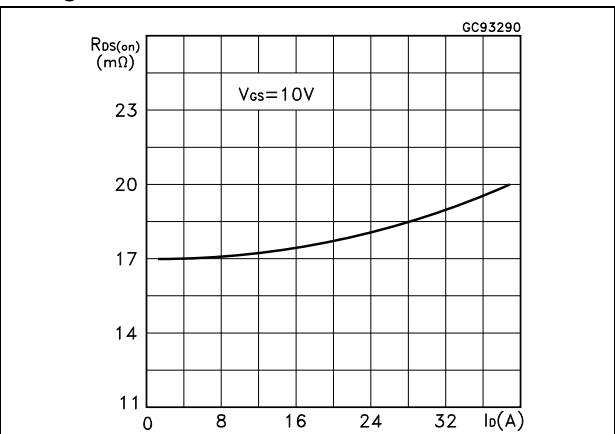


Figure 8. Gate charge vs. gate-source voltage

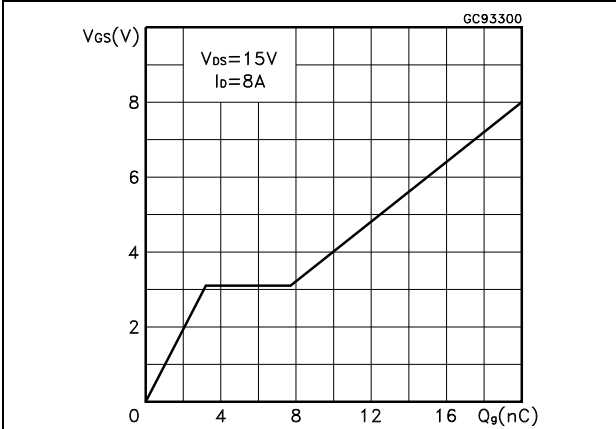


Figure 9. Capacitance variations

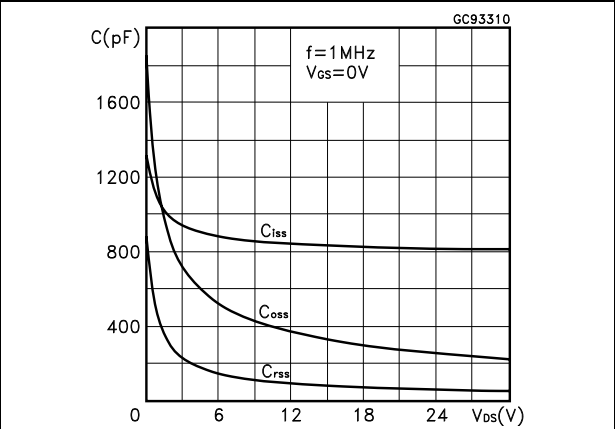


Figure 10. Normalized gate threshold voltage vs. temperature

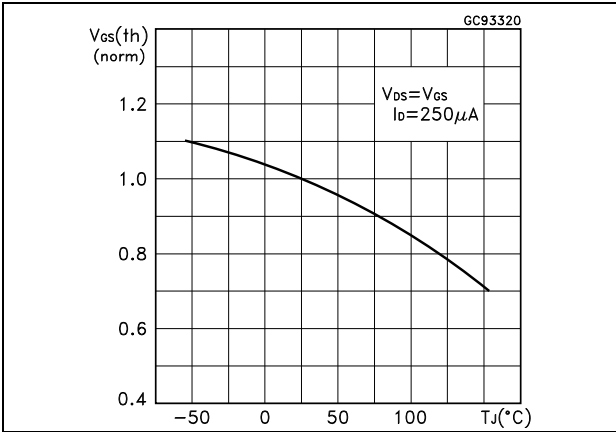


Figure 11. Normalized on-resistance vs. temperature

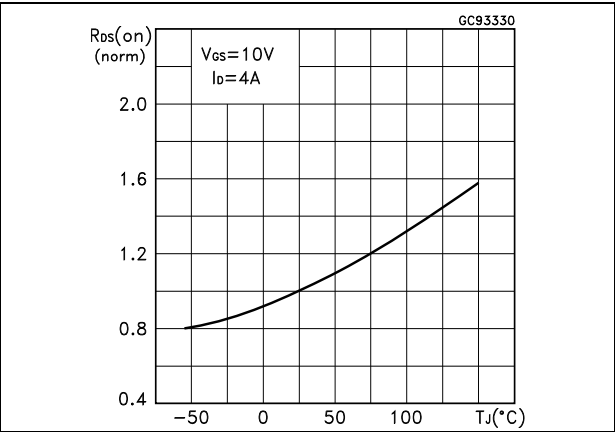


Figure 12. Source-drain diode forward characteristics

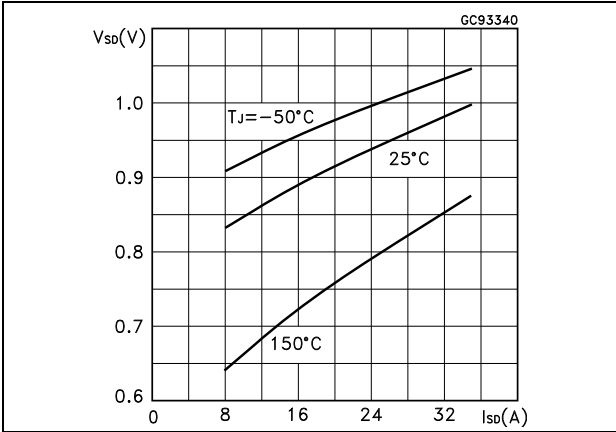
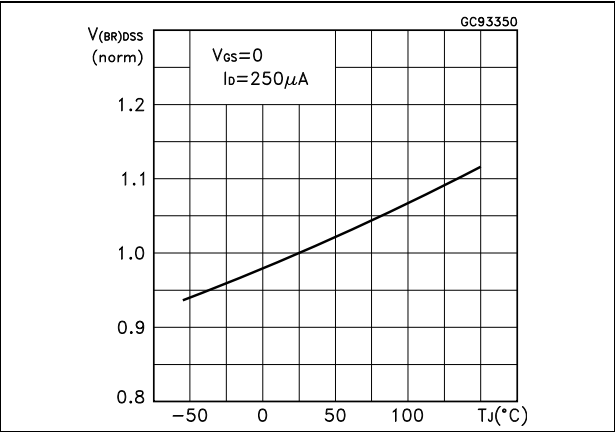


Figure 13. Normalized breakdown voltage vs. temperature



3 Test circuit

Figure 14. Switching times test circuit for resistive load

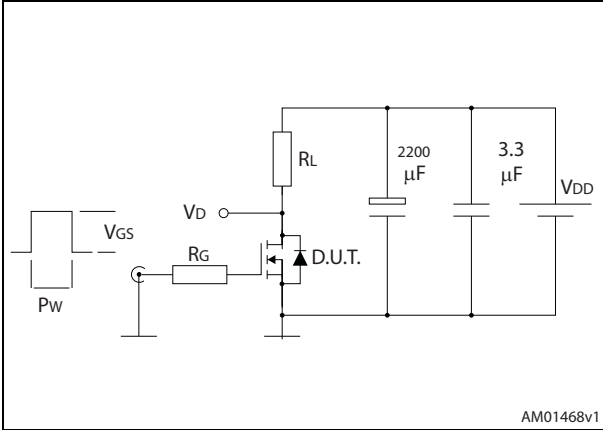


Figure 15. Gate charge test circuit

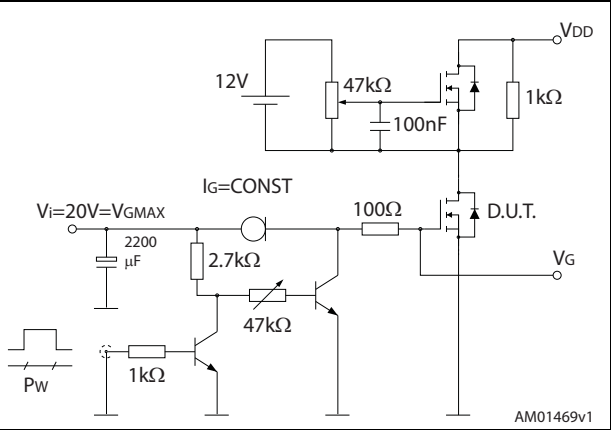


Figure 16. Test circuit for inductive load switching and diode recovery times

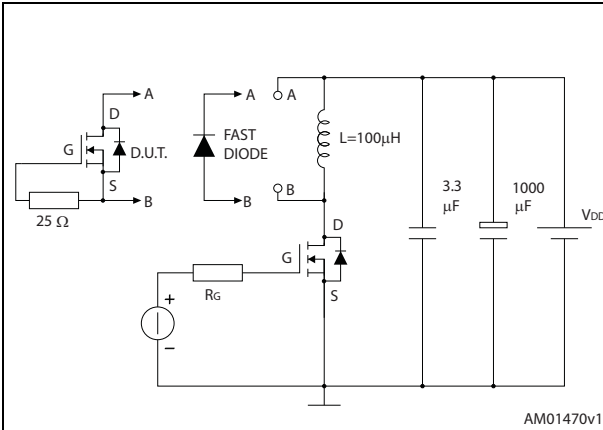


Figure 17. Unclamped Inductive load test circuit

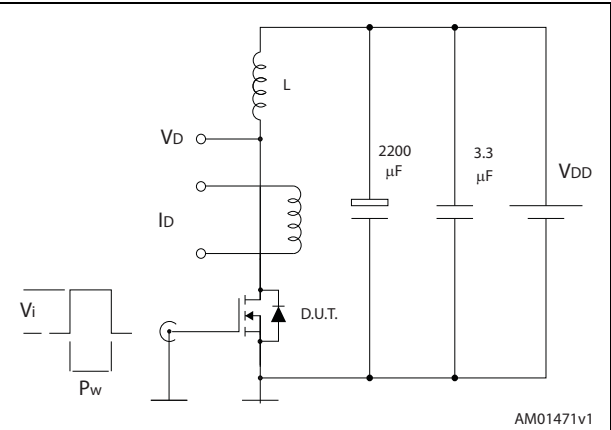


Figure 18. Unclamped inductive waveform

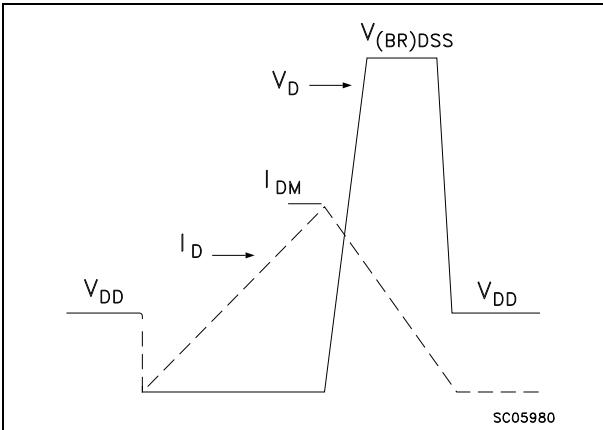
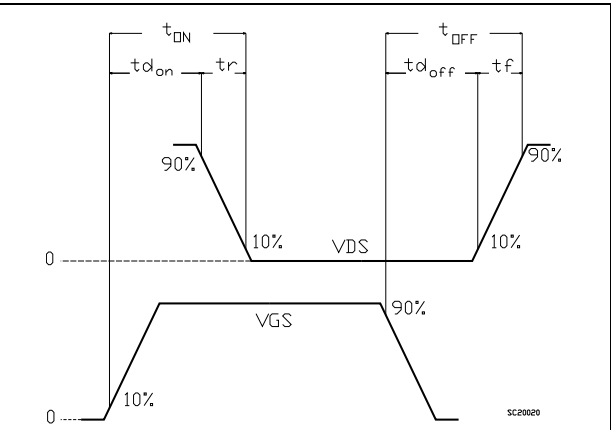


Figure 19. Switching time waveform



4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in 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. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.31		0.51
b1	0.28		0.48
c	0.10		0.25
c1	0.10		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
L2		0.25	
k	0°		8°
ccc			0.10

Figure 20. SO-8 drawing

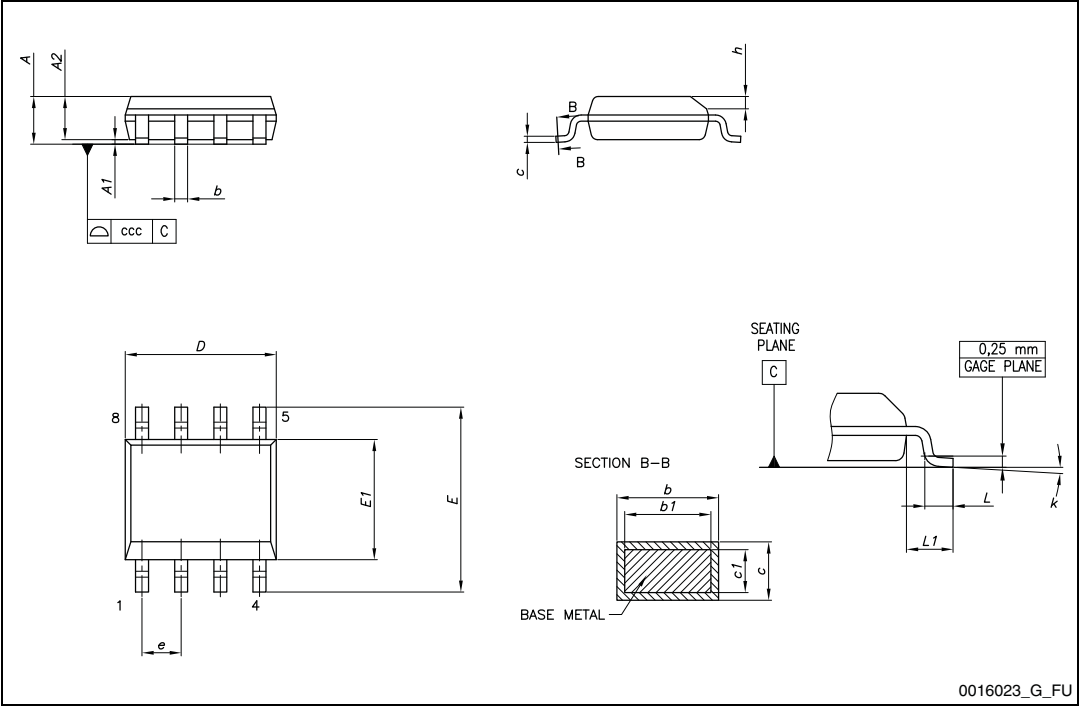
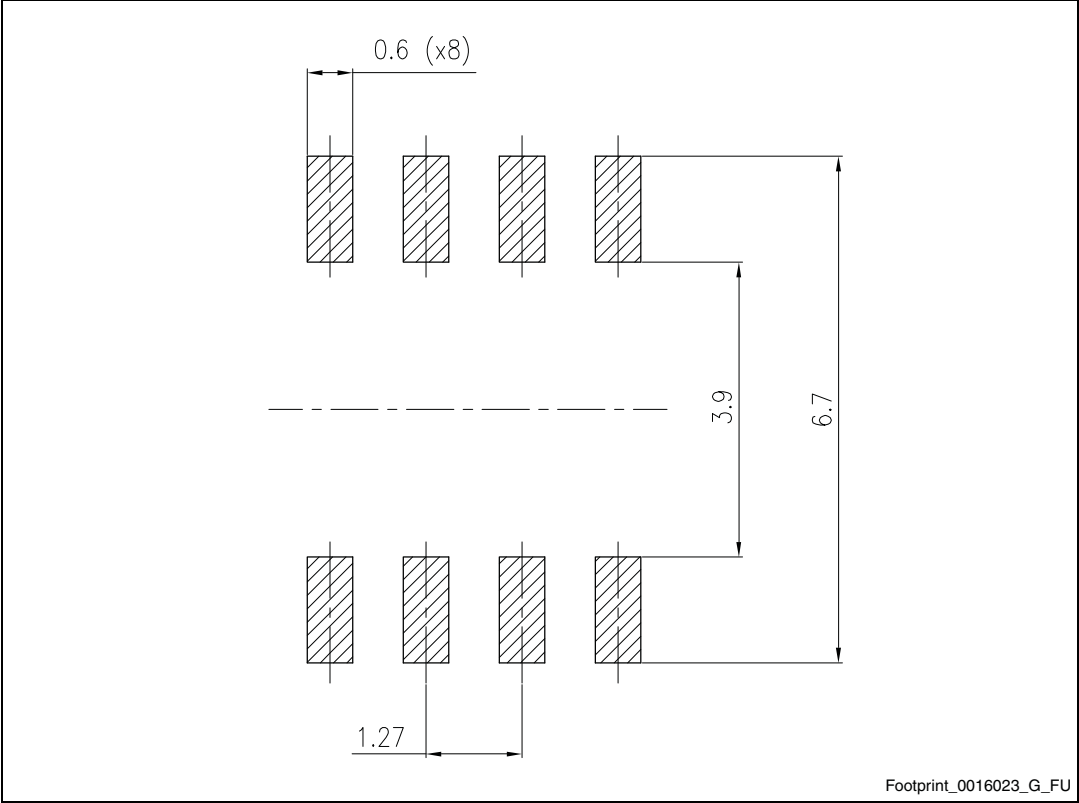


Figure 21. SO-8 recommended footprint (all dimensions are in millimeters)

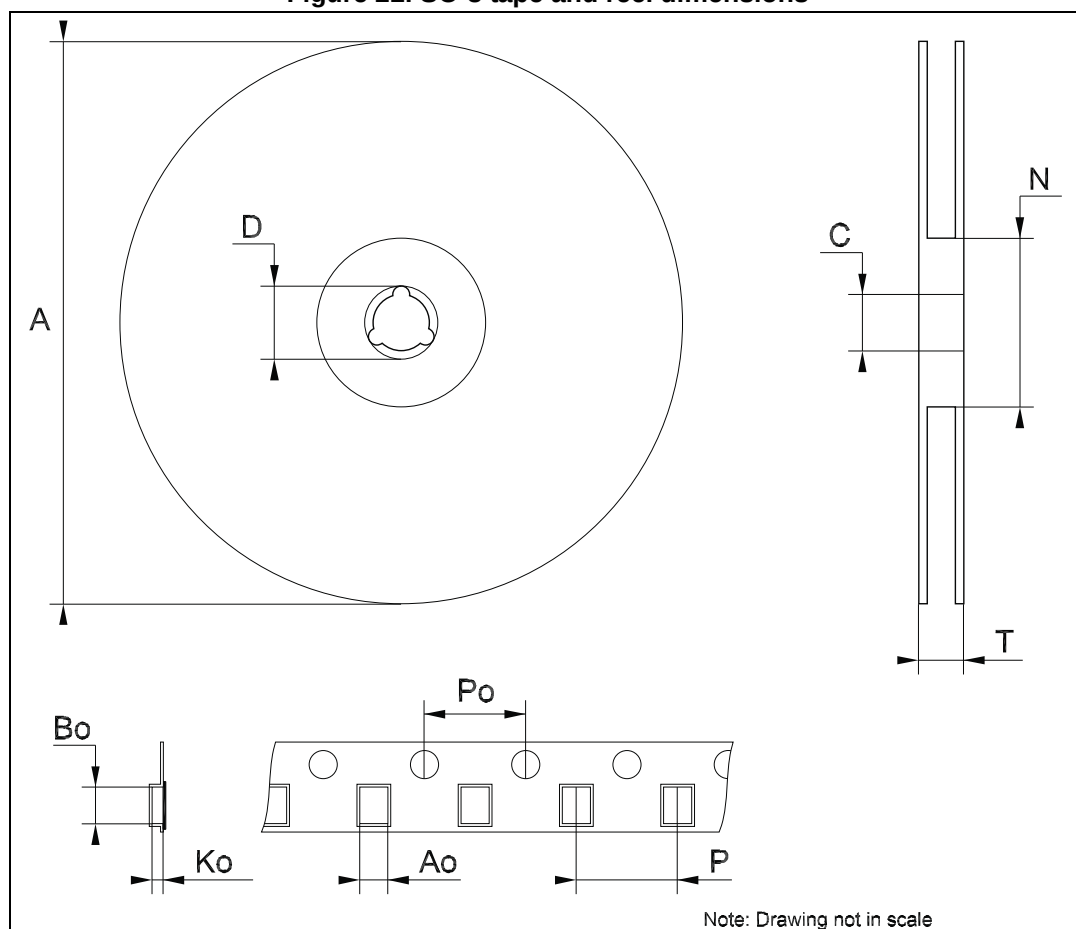


5 Packaging mechanical data

Table 9. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

Figure 22. SO-8 tape and reel dimensions



6 Revision history

Table 10. Revision history

Date	Revision	Changes
11-Sep-2006	8	Complete document
15-Nov-2006	9	The document has been reformatted
30-Jan-2007	10	Typo mistake on Table 2
14-Dec-2012	11	– Typo mistake on Table 2 – Updated: Section 4: Package mechanical data
22-Jul-2013	12	– Updated Table 1: Device summary. – Minor text changes.

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