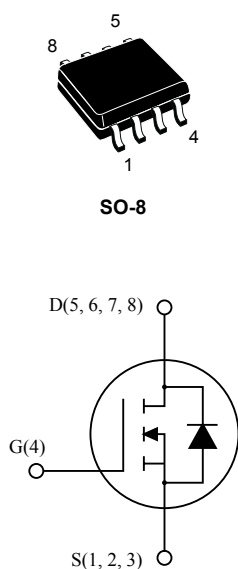


Automotive-grade N-channel 60 V, 21 mΩ typ., 8 A STripFET F6 Power MOSFET in an SO-8 package



SO-8

AM01475v3

Features

Order code	V _{DS}	R _{DS(on)} max.	I _D	P _{TOT}
STS8N6LF6AG	60 V	24 mΩ	8 A	3.2 W

- AEC-Q101 qualified 
- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss
- Logic level

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using the STripFET F6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low R_{DS(on)} in all packages.



Product status link

[STS8N6LF6AG](#)

Product summary

Order code	STS8N6LF6AG
Marking	8N6LF6
Package	SO-8
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	60	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_{amb} = 25\text{ }^{\circ}\text{C}$	8	A
	Drain current (continuous) at $T_{amb} = 100\text{ }^{\circ}\text{C}$	5.8	
$I_{DM}^{(2)}$	Drain current (pulsed)	32	A
P_{TOT}	Total power dissipation at $T_{amb} = 25\text{ }^{\circ}\text{C}$	3.2	W
T_{stg}	Storage temperature range	-55 to 175	$^{\circ}\text{C}$
T_J	Operating junction temperature range		$^{\circ}\text{C}$

1. When mounted on a 1-inch² FR-4, 2 Oz copper board, $t < 10\text{ s}$.
2. Pulse width is limited by safe operating area.

Table 2. Thermal data

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

1. When mounted on an 1-inch² FR-4, 2 Oz copper board, $t < 10\text{ s}$.

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AV}	Avalanche current, not repetitive	6	A
$E_{AS}^{(1)}$	Single pulse avalanche energy	72	mJ

1. Starting $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AV}$, $V_{DD} = 43.5\text{ V}$.

2 Electrical characteristics

$T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	60			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 60\text{ V}$			1	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 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	$V_{GS} = 10\text{ V}$, $I_D = 4\text{ A}$		21	24	m Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 4\text{ A}$		22	26	

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	1340	-	pF
C_{oss}	Output capacitance		-	90	-	pF
C_{rss}	Reverse transfer capacitance		-	60	-	pF
Q_g	Total gate charge	$V_{DD} = 30\text{ V}$, $I_D = 8\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 14. Test circuit for gate charge behavior)	-	27	-	nC
Q_{gs}	Gate-source charge		-	4.6	-	nC
Q_{gd}	Gate-drain charge		-	4.3	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	9.6	-	ns
t_r	Rise time		-	20	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 13. Test circuit for resistive load switching times and Figure 18. Switching time waveform)	-	56	-	ns
t_f	Fall time		-	7	-	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	$V_{GS} = 0\text{ V}$, $I_{SD} = 8\text{ A}$	-		1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 8\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 48\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$ (see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	22.5		ns
Q_{rr}	Reverse recovery charge		-	22.2		nC
I_{RRM}	Reverse recovery current		-	2.0		A

1. Pulse width is limited by safe operating area.

2. Pulse test: pulse duration = 300 μs , duty cycle 1.5%.

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

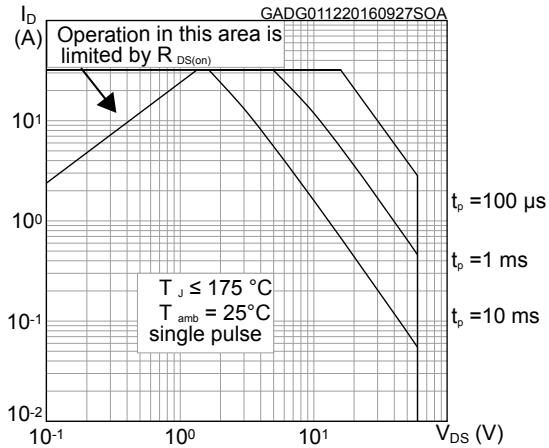


Figure 2. Thermal impedance

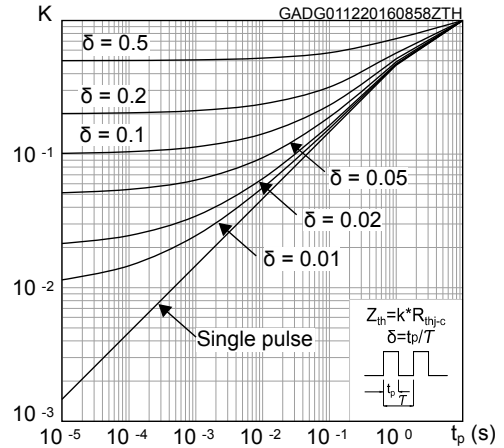


Figure 3. Output characteristics

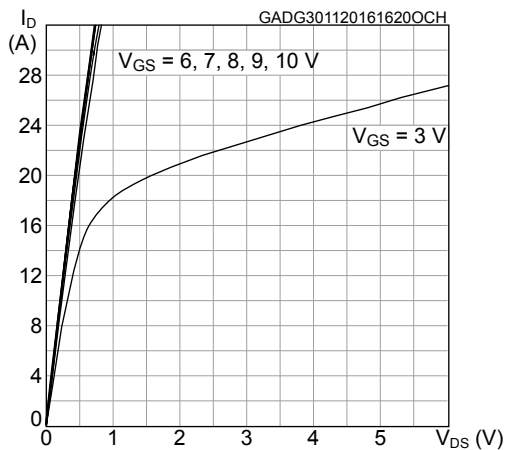


Figure 4. Transfer characteristics

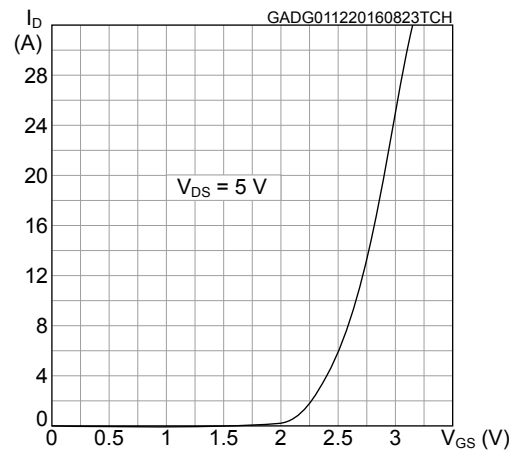


Figure 5. Gate charge vs gate-source voltage

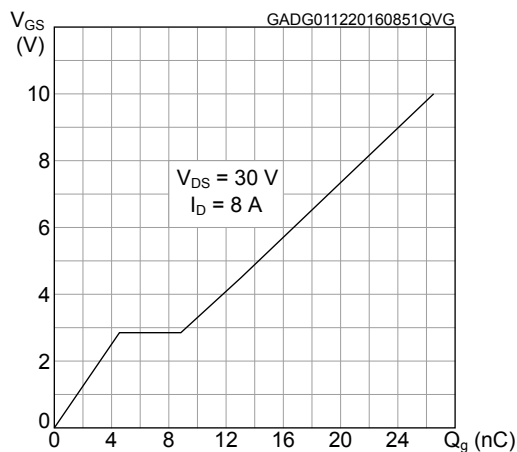


Figure 6. Static drain-source on-resistance

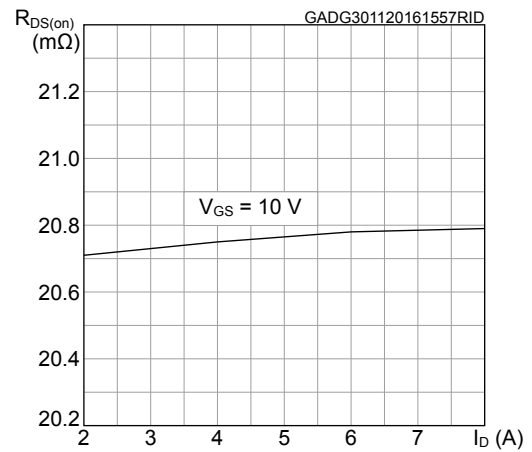


Figure 7. Capacitance variations

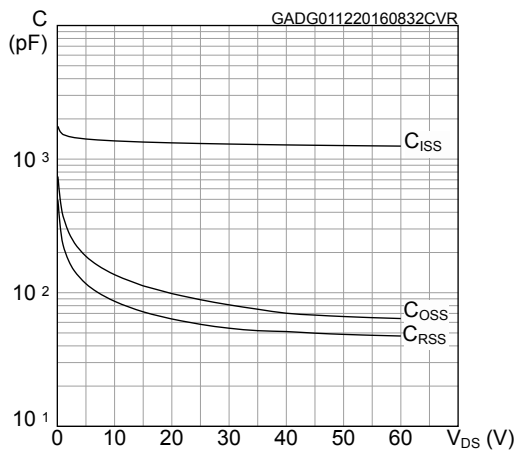


Figure 8. Normalized gate threshold voltage vs temperature

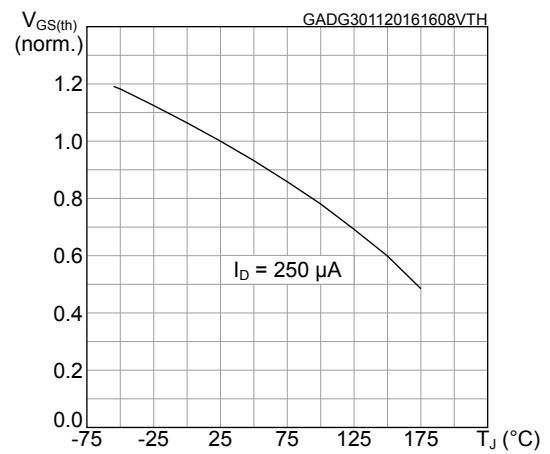


Figure 9. Normalized on-resistance vs temperature

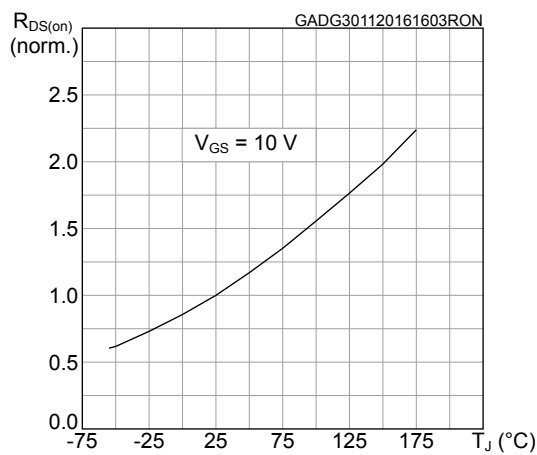


Figure 10. Normalized $V_{(BR)DSS}$ vs temperature

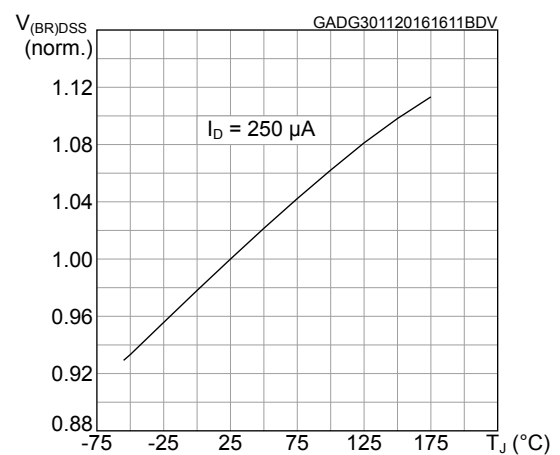
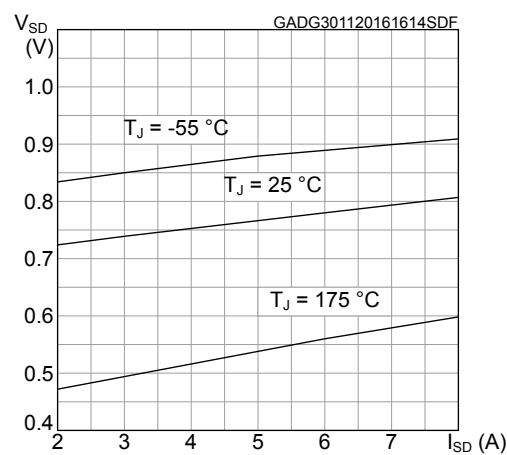
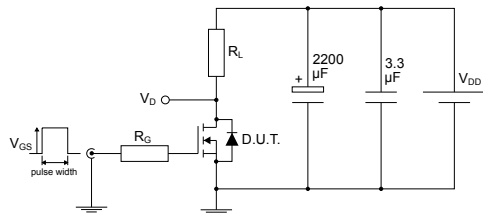


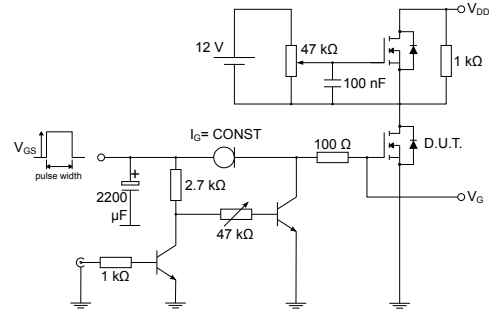
Figure 11. Source-drain diode forward characteristics



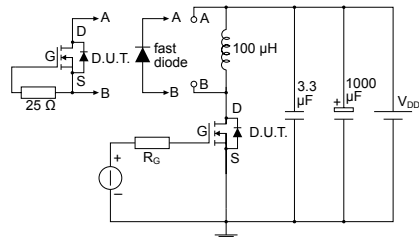
3 Test circuits

Figure 12. Test circuit for resistive load switching times


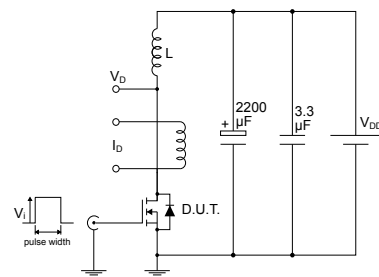
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Figure 13. Test circuit for gate charge behavior


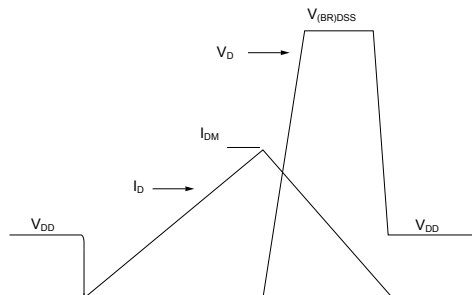
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Figure 14. Test circuit for inductive load switching and diode recovery times


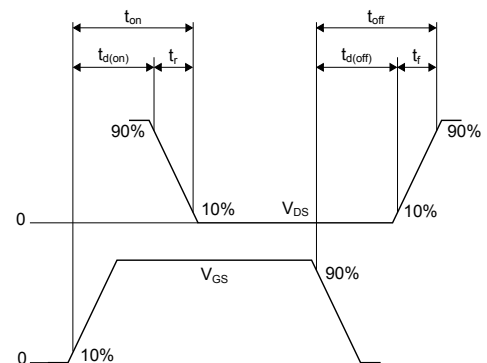
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Figure 15. Unclamped inductive load test circuit


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Figure 16. Unclamped inductive waveform


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Figure 17. Switching time waveform


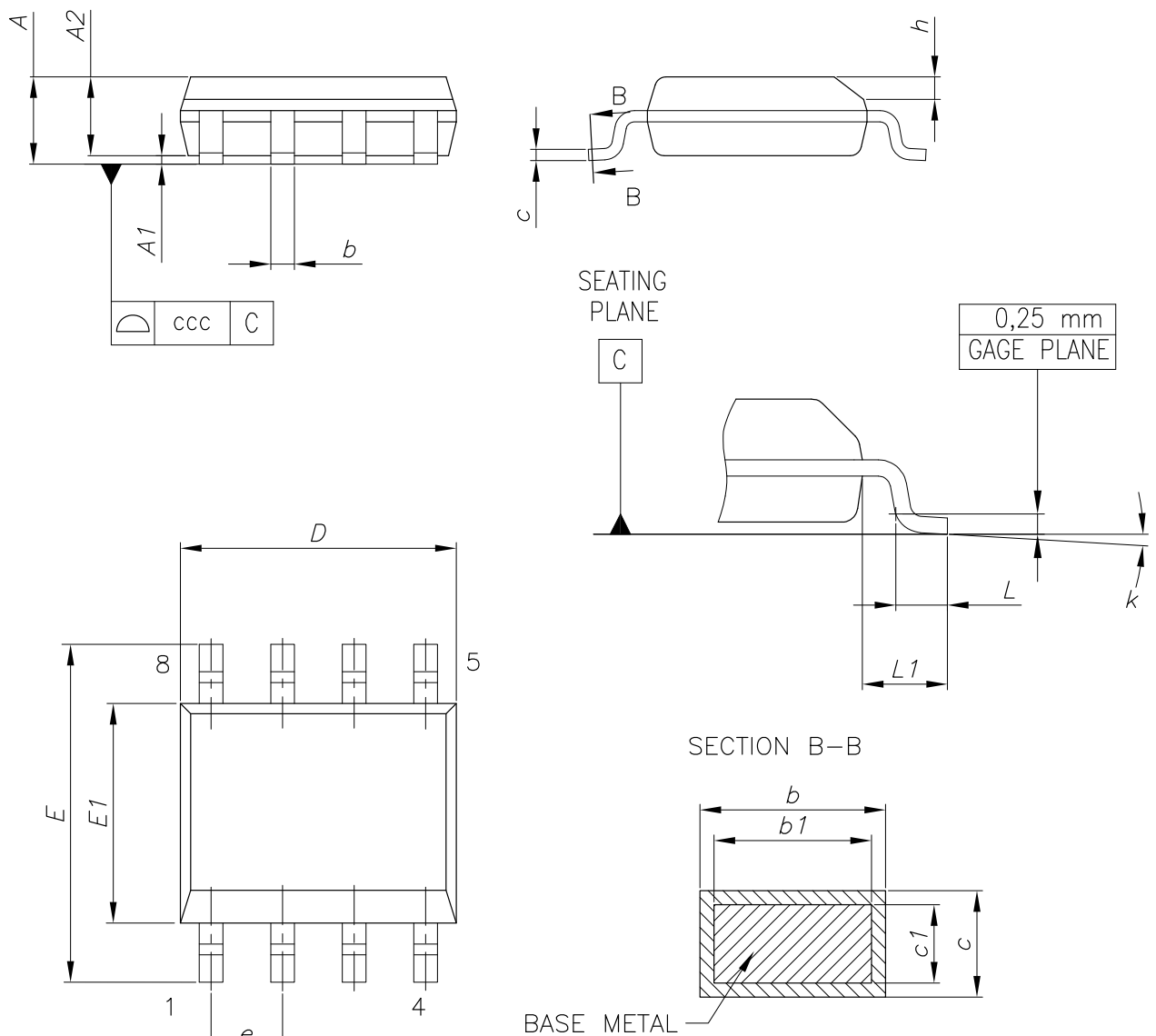
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4 Package information

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.

4.1 SO-8 package information

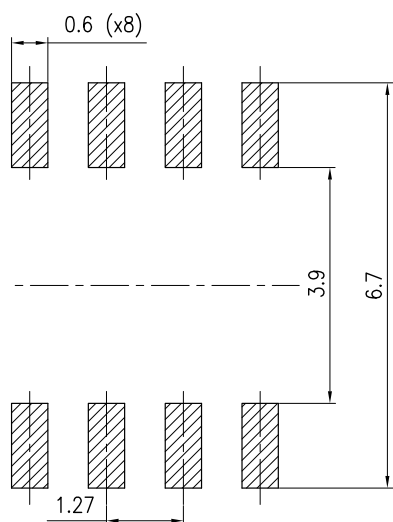
Figure 18. SO-8 package outline



0016023_So-807_fig2_Rev10

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 19. SO-8 recommended footprint (dimensions are in mm)


0016023_So-807_footprint_Rev10

4.2 SO-8 packing information

Figure 20. SO-8 tape and reel dimensions

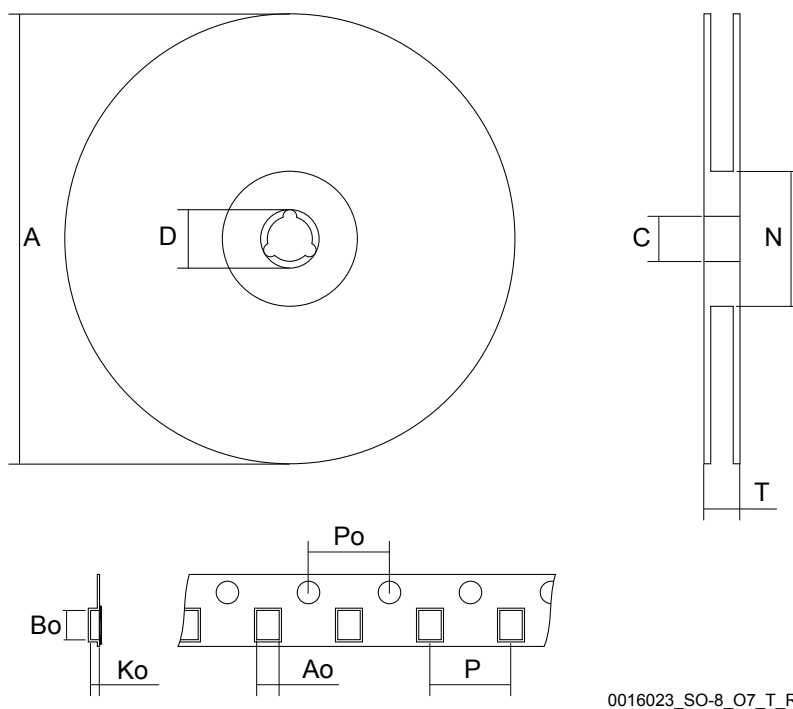


Figure 21. Tape orientation

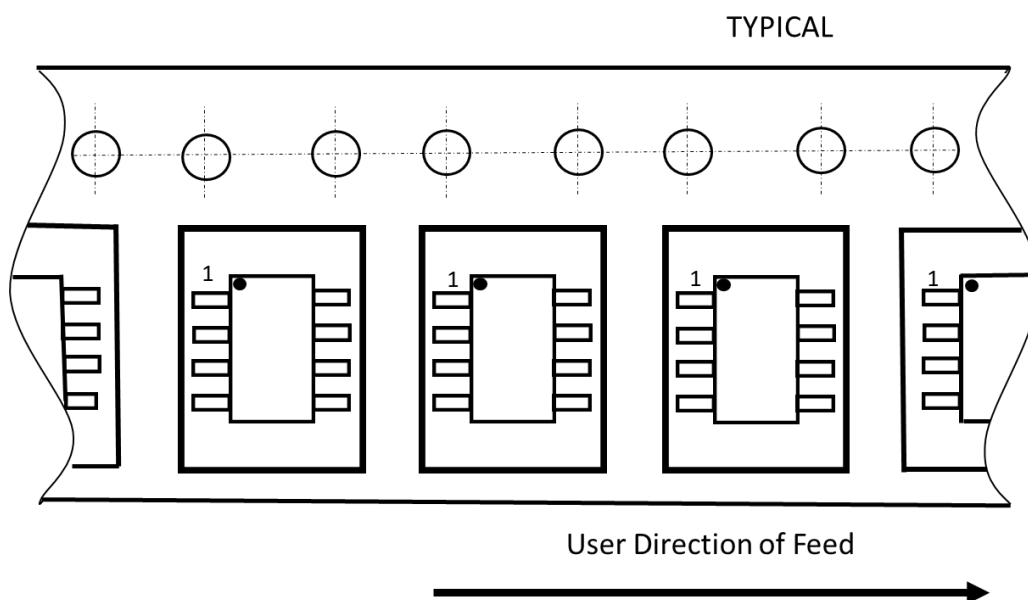


Table 9. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A		-	330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	6.5		6.7
Bo	5.4		5.6
Ko	2.0		2.2
Po	3.9		4.1
P	7.9		8.1

Revision history

Table 10. Document revision history

Date	Version	Changes
24-Jan-2017	1	First release.
08-Mar-2021	2	Updated Internal schematic. Updated Section 4.2 SO-8 packing information. Minor text changes.
21-Jul-2021	3	Updated Section Internal schematic.

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