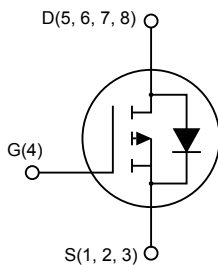
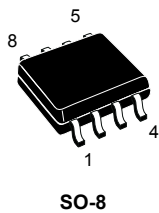


## P-channel 30 V, 48 mΩ typ., 5 A, STripFET H6 Power MOSFET in an SO-8 package



AM01475v4

### Features

Order code	$V_{DS}$	$R_{DS(on)}$ max.	$I_D$
STS5P3LLH6	30 V	56 mΩ	5 A

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

### Applications

- Switching applications

### Description

This device is a P-channel Power MOSFET developed using the STripFET H6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low  $R_{DS(on)}$  in all packages.



#### Product status link

[STS5P3LLH6](#)

#### Product summary

<b>Order code</b>	STS5P3LLH6
<b>Marking</b>	5K3L
<b>Package</b>	SO-8
<b>Packing</b>	Tape and reel

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	30	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_{amb} = 25\text{ }^\circ\text{C}$	5	A
	Drain current (continuous) at $T_{amb} = 100\text{ }^\circ\text{C}$	3.2	
$I_{DM}^{(1)}$	Drain current (pulsed)	20	A
$P_{TOT}$	Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	2.7	W
$T_{stg}$	Storage temperature range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating junction temperature	150	$^\circ\text{C}$

1. Pulse width 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 1 inch<sup>2</sup> FR-4 board, 2 oz. Cu.,  $t \leq 10\text{ s}$ .

**Note:** For the P-channel Power MOSFET the actual polarity of the voltages and the current must be reversed.

## 2 Electrical characteristics

( $T_C = 25\text{ °C}$  unless otherwise specified)

**Table 3. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	30			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 30\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = 30\text{ V}$ , $T_C = 125\text{ °C}^{(1)}$			10	
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1.0		2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 2.5\text{ A}$		48	56	m $\Omega$
		$V_{GS} = 4.5\text{ V}$ , $I_D = 2.5\text{ A}$		75	90	

1. Defined by design, not subject to production test.

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	639	-	pF
$C_{oss}$	Output capacitance		-	79	-	pF
$C_{rSS}$	Reverse transfer capacitance		-	52	-	pF
$Q_g$	Total gate charge	$V_{DD} = 15\text{ V}$ , $I_D = 5\text{ A}$ , $V_{GS} = 4.5\text{ V}$ (see Figure 13. Gate charge test circuit)	-	6	-	nC
$Q_{gs}$	Gate-source charge		-	1.9	-	nC
$Q_{gd}$	Gate-drain charge		-	2.1	-	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}$ , $I_D = 5\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$	-	5.4	-	ns
$t_r$	Rise time		-	5	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 12. Switching times test circuit for resistive load)	-	19.2	-	ns
$t_f$	Fall time		-	3.4	-	ns

**Table 6. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 5\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,	-	11.2		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 16\text{ V}$ , $T_J = 150\text{ °C}$	-	3.5		nC
$I_{RRM}$	Reverse recovery current	(see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	0.6		A

1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

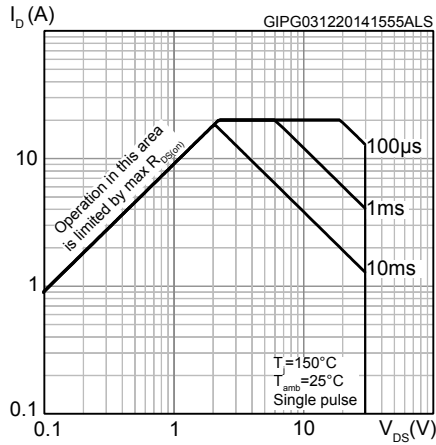


Figure 2. Thermal impedance

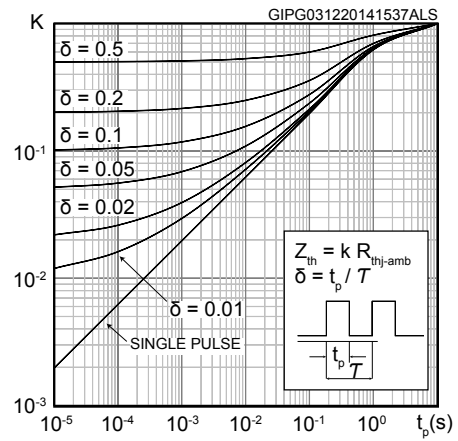


Figure 3. Output characteristics

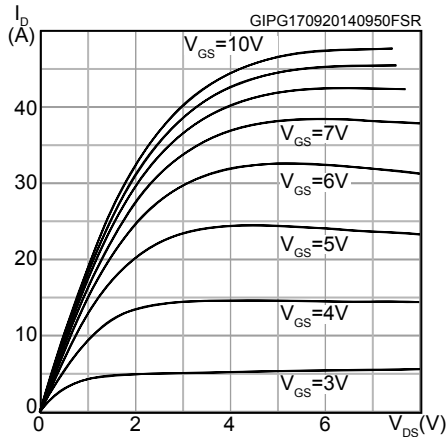


Figure 4. Transfer characteristics

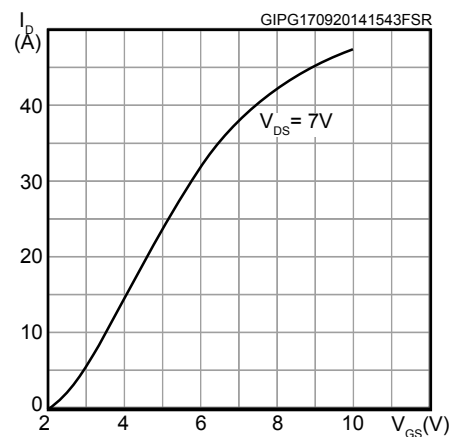


Figure 5. Gate charge vs gate-source voltage

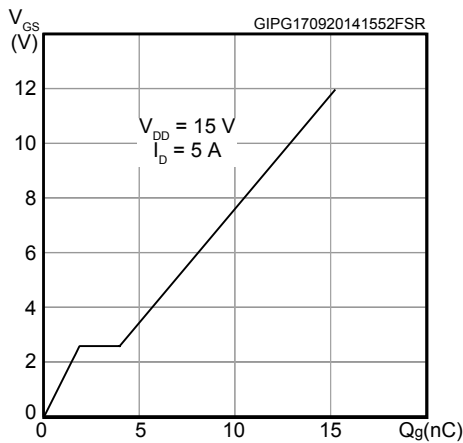
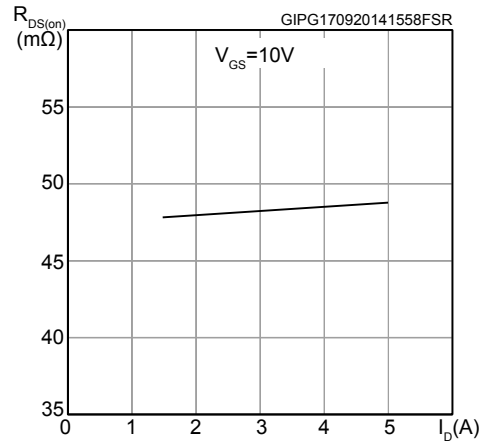
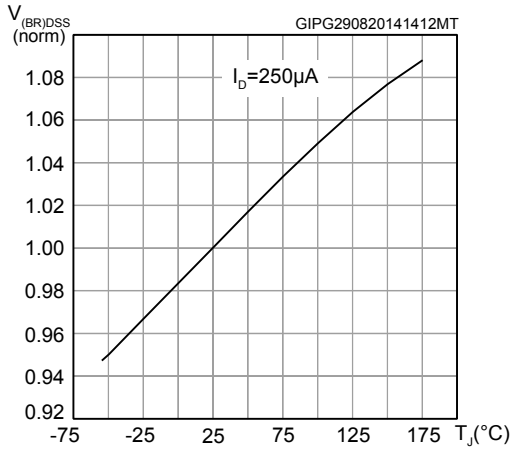


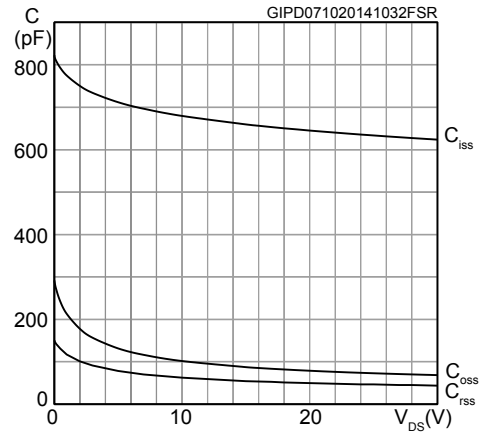
Figure 6. Static drain-source on-resistance



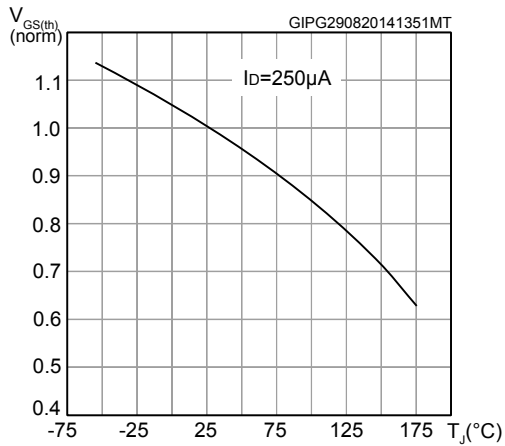
**Figure 7. Normalized  $V_{(BR)DSS}$  vs temperature**



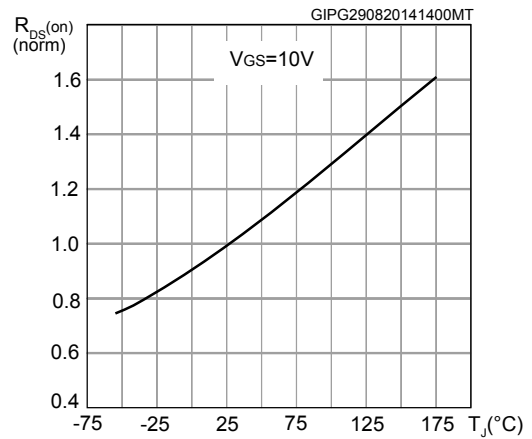
**Figure 8. Capacitance variations**



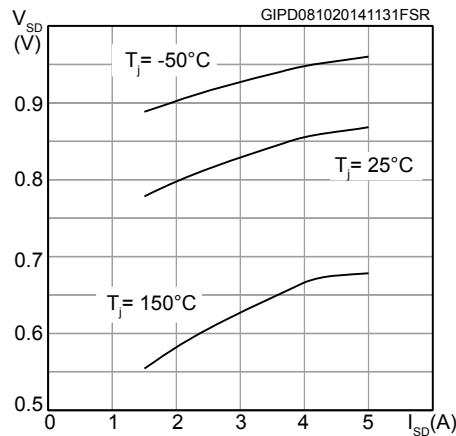
**Figure 9. Normalized gate threshold voltage vs temperature**



**Figure 10. Normalized on-resistance vs temperature**



**Figure 11. Source-drain diode forward characteristics**



Note: For the P-channel Power MOSFET, current and voltage polarities are reversed.

### 3 Test circuits

Figure 12. Switching times test circuit for resistive load

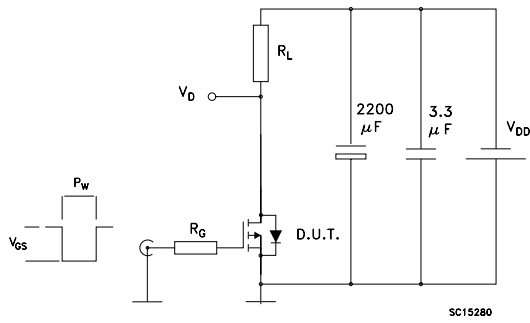


Figure 13. Gate charge test circuit

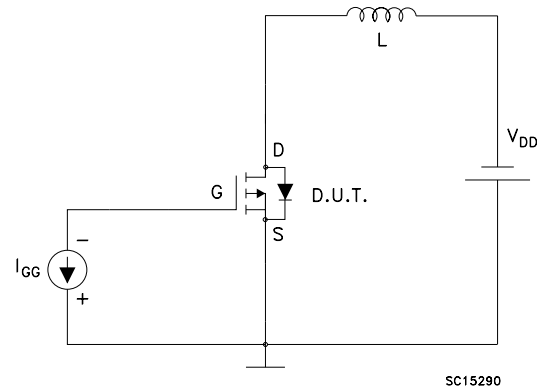
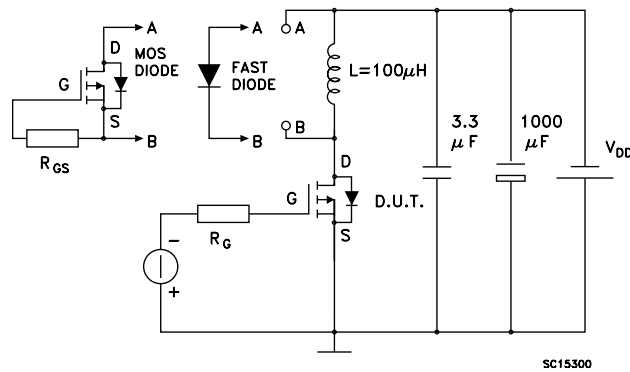


Figure 14. Test circuit for inductive load switching and diode recovery times

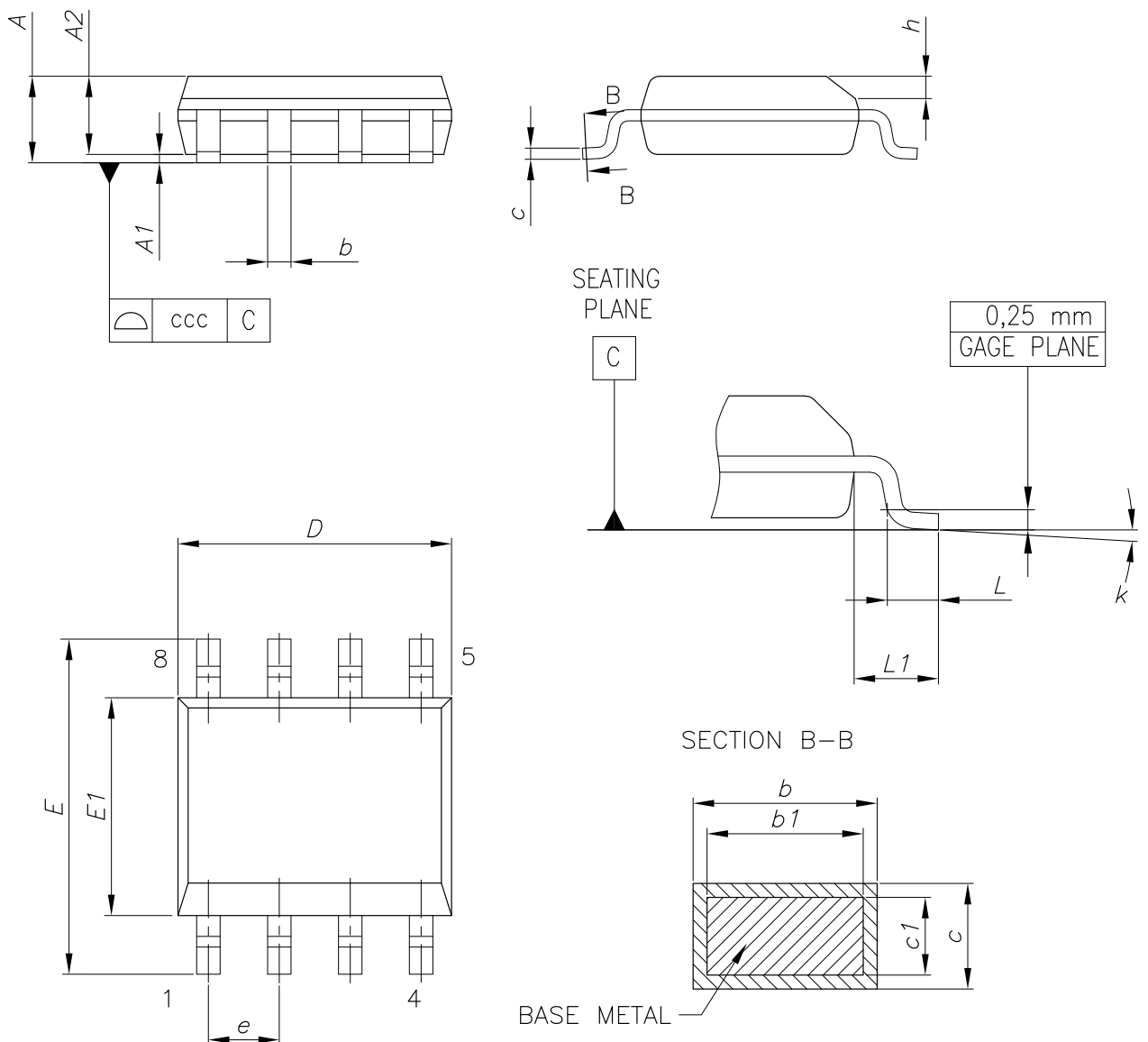


## 4 Package information

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

### 4.1 SO-8 package information

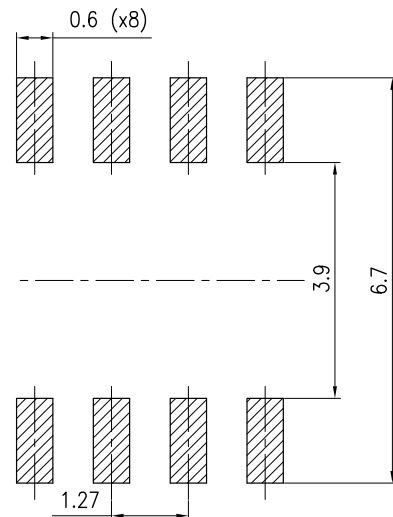
Figure 15. SO-8 package outline



0016023\_So-807\_fig2\_Rev10

**Table 7. 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 16. SO-8 recommended footprint (dimensions are in mm)**


0016023\_So-807\_footprint\_Rev10



## 4.2 SO-8 packing information

Figure 17. SO-8 tape and reel dimensions

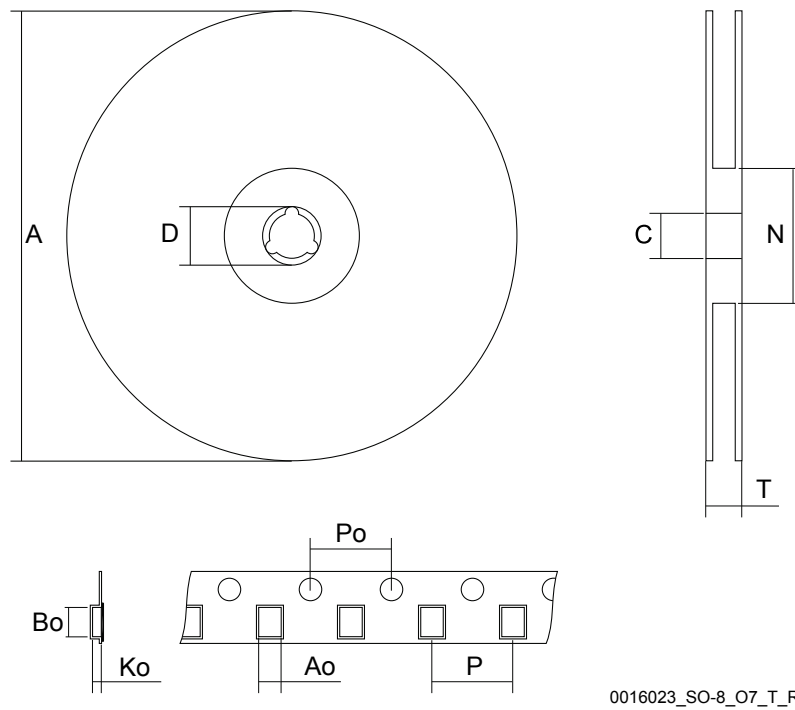
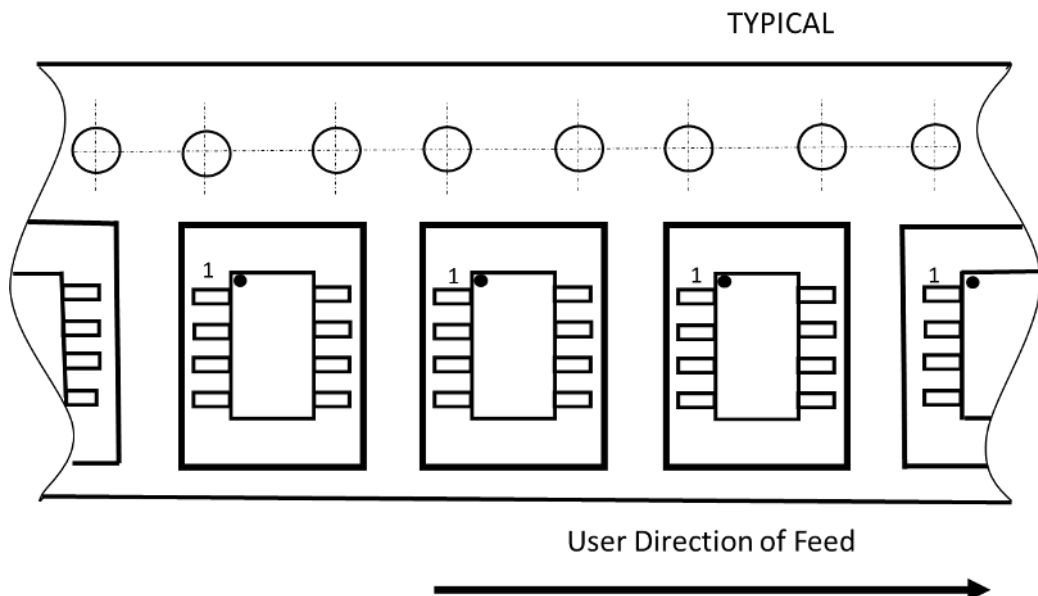


Figure 18. Tape orientation



**Table 8. 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 9. Document revision history**

Date	Version	Changes
09-May-2013	1	First revision.
11-Dec-2014	2	Text edits throughout document On cover page: – changed title description – updated <i>Features</i> – updated <i>Description</i> In <i>Table 4</i> , changed $R_{DS(on)}$ values In <i>Table 5</i> , changed values and test conditions In <i>Table 6</i> , changed values and test conditions In <i>Table 7</i> , changed values and test conditions Added <i>Section 2.1: Electrical characteristics (curves)</i> Updated <i>Section 3: Test circuits</i> Updated <i>Section 4: Package mechanical data</i>
17-Feb-2021	3	Updated <i>Internal schematic</i> . Updated <i>Section 4.2 SO-8 packing information</i> . Minor text changes.

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