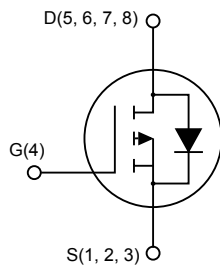
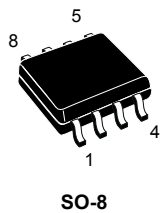


## P-channel 30 V, 24 mΩ typ., 6 A, STripFET H6 Power MOSFET in an SO-8 package



AM01475v4

### Features

Order code	$V_{DS}$	$R_{DS(on)}$ max.	$I_D$
STS6P3LLH6	30 V	30 mΩ	6 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

[STS6P3LLH6](#)

#### Product summary

<b>Order code</b>	STS6P3LLH6
<b>Marking</b>	6K3L
<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 $T_{amb} = 25\text{ }^{\circ}\text{C}$	6	A
	Drain current (continuous) at $T_{amb} = 100\text{ }^{\circ}\text{C}$	4	
$I_{DM}^{(1)}$	Drain current (pulsed)	24	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	$^{\circ}\text{C}/\text{W}$

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	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$		24	30	m $\Omega$
		$V_{GS} = 4.5\text{ V}$ , $I_D = 3\text{ A}$		38	50	

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

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 24\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	1450	-	pF
$C_{oss}$	Output capacitance		-	178	-	pF
$C_{rSS}$	Reverse transfer capacitance		-	120	-	pF
$Q_g$	Total gate charge	$V_{DD} = 24\text{ V}$ , $I_D = 6\text{ A}$ , $V_{GS} = 4.5\text{ V}$ (see Figure 13. Gate charge test circuit)	-	12	-	nC
$Q_{gs}$	Gate-source charge		-	4.4	-	nC
$Q_{gd}$	Gate-drain charge		-	5	-	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 24\text{ V}$ , $I_D = 3\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see Figure 12. Switching times test circuit for resistive load)	-	15	-	ns
$t_r$	Rise time		-	15	-	ns
$t_{d(off)}$	Turn-off delay time		-	24	-	ns
$t_f$	Fall time		-	21	-	ns

**Table 6. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		6	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		24	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 3\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,	-	15		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 16\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$	-	6.5		nC
$I_{RRM}$	Reverse recovery current	(see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	0.9		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

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

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

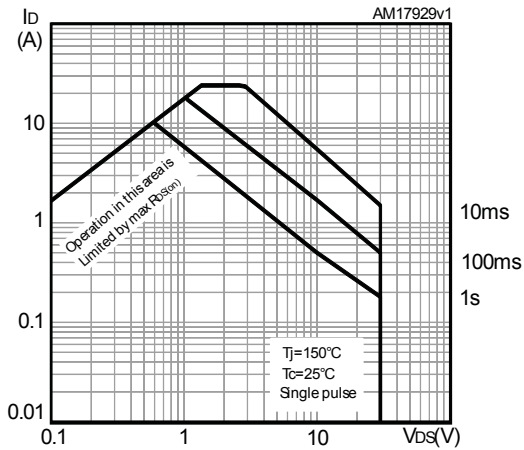


Figure 2. Thermal impedance

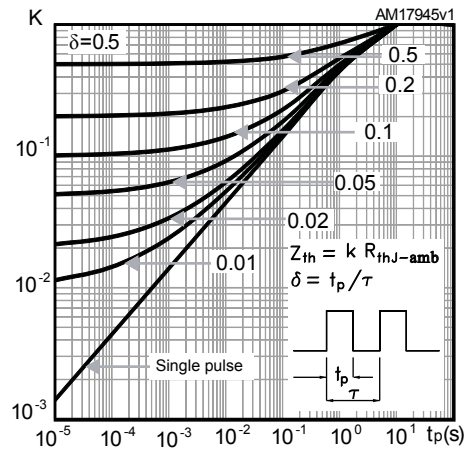


Figure 3. Output characteristics

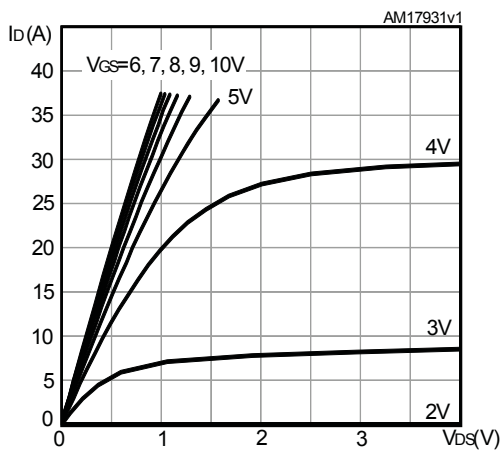


Figure 4. Transfer characteristics

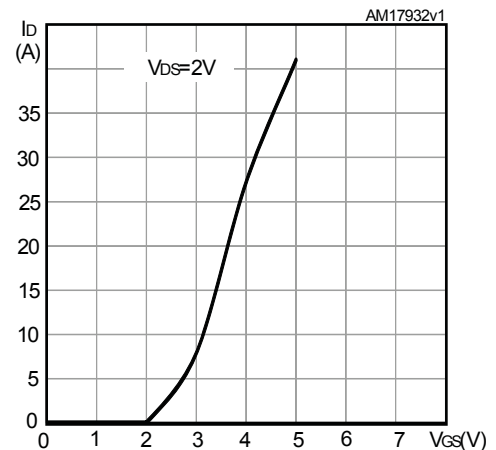


Figure 5. Gate charge vs gate-source voltage

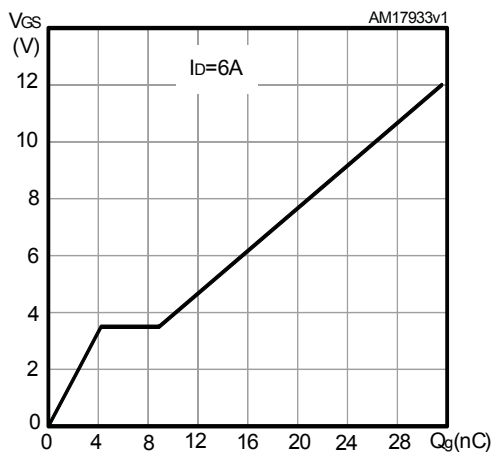


Figure 6. Static drain-source on-resistance

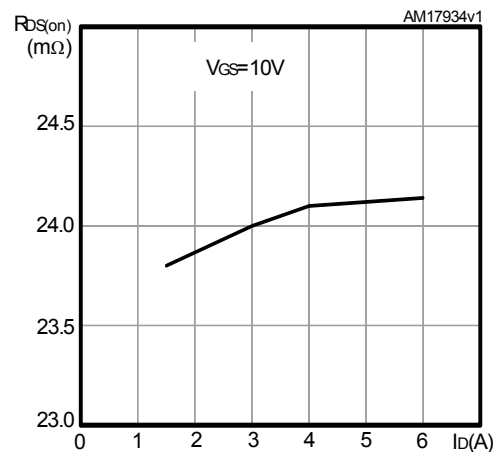


Figure 7. Capacitance variations

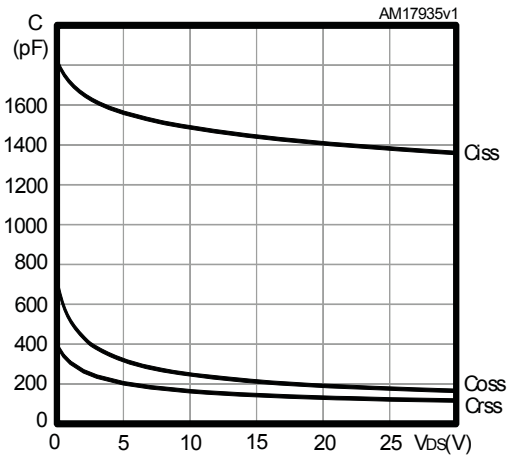


Figure 8. Normalized gate threshold voltage vs temperature

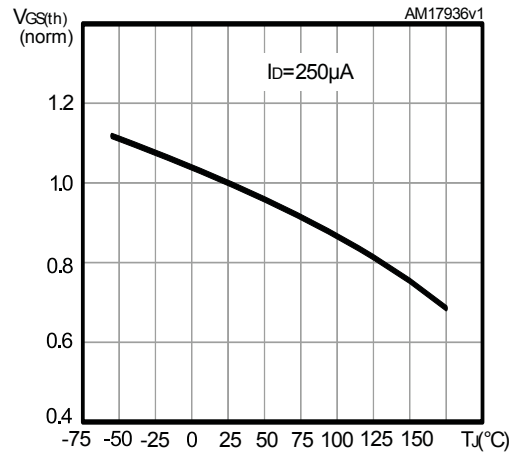


Figure 9. Normalized on-resistance vs temperature

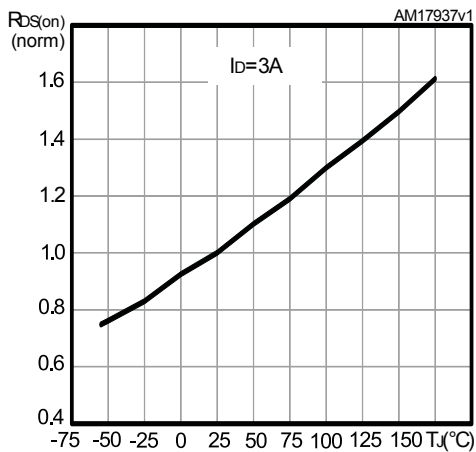


Figure 10. Normalized V<sub>DS</sub> vs temperature

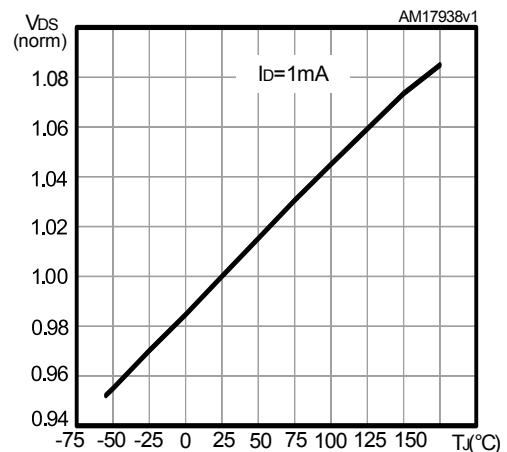
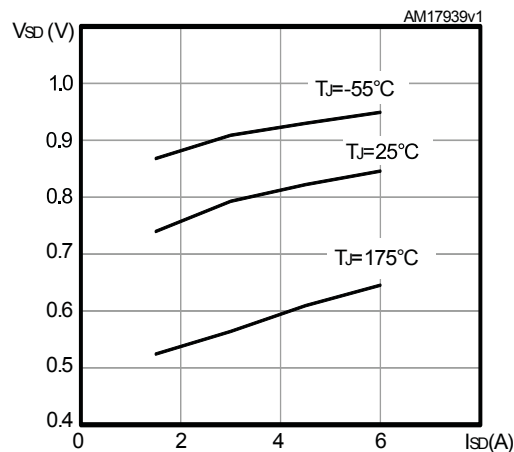


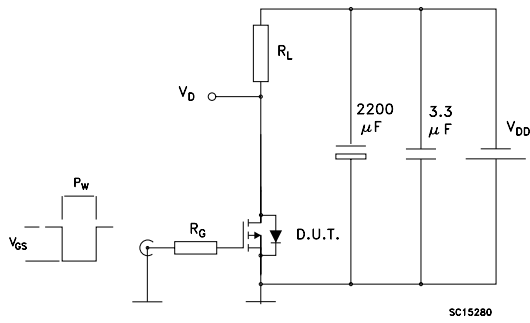
Figure 11. Source-drain diode forward characteristics



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

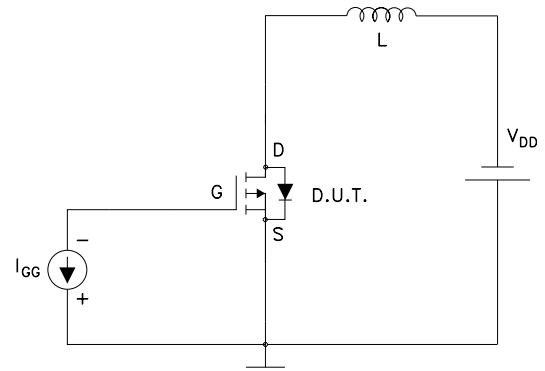
### 3 Test circuits

Figure 12. Switching times test circuit for resistive load



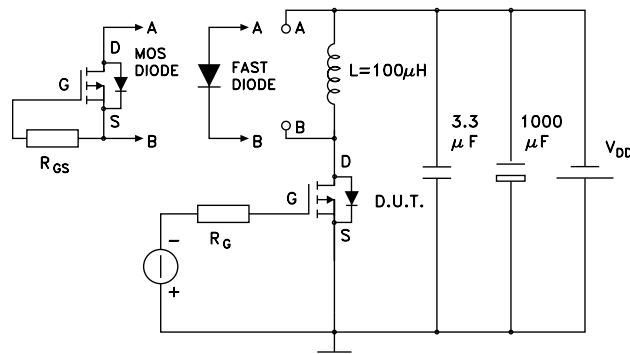
SC15280

Figure 13. Gate charge test circuit



SC15290

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



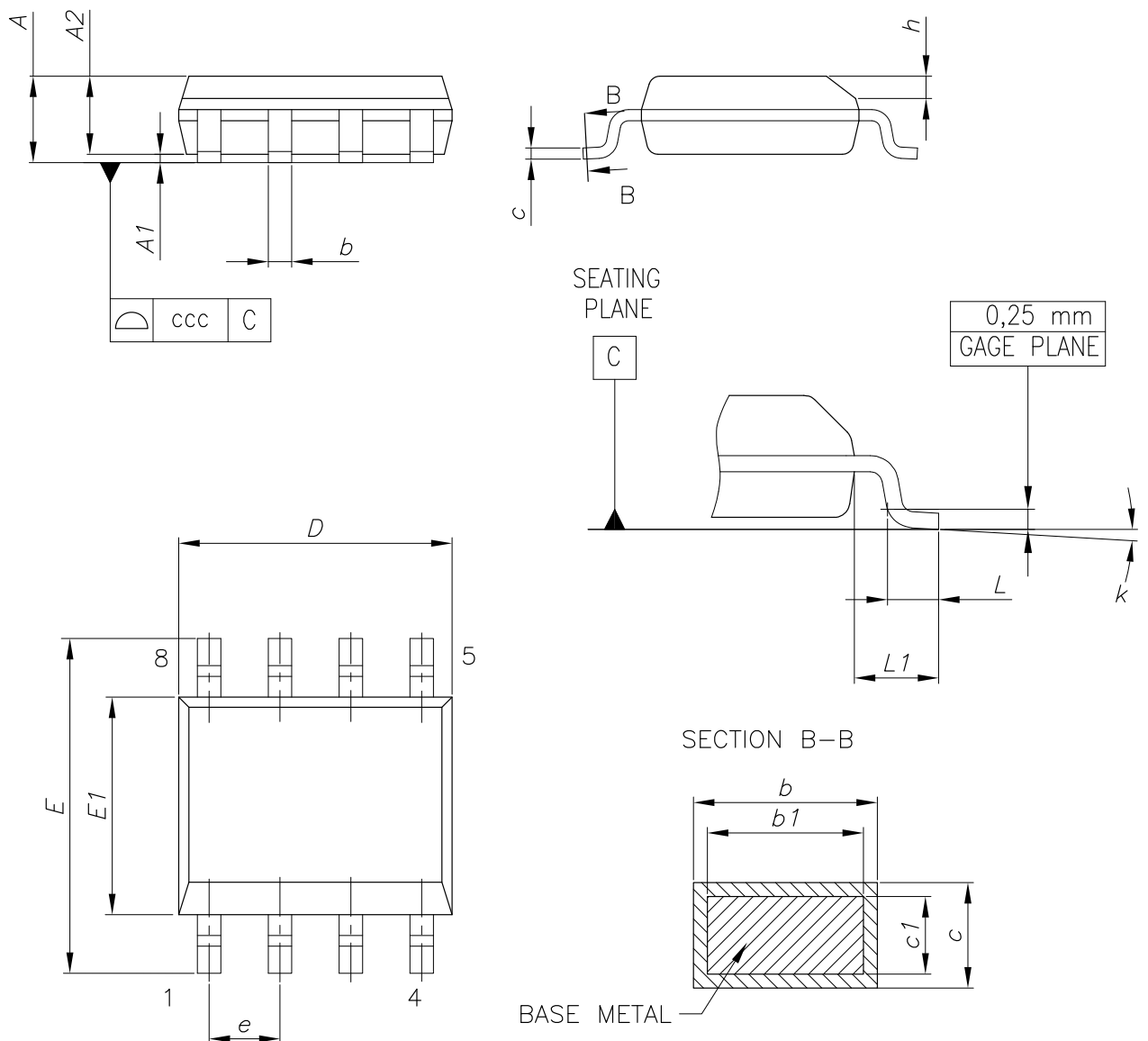
SC15300

## 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



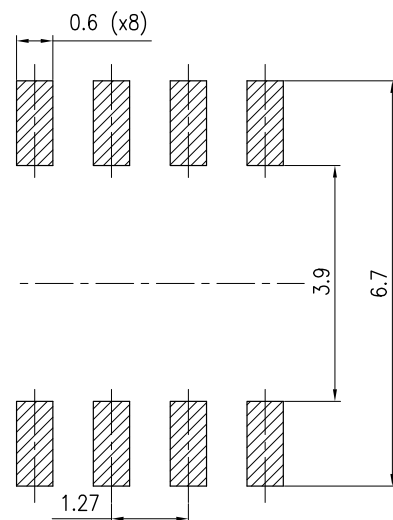
0016023\_So-807\_fig2\_Rev10



**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

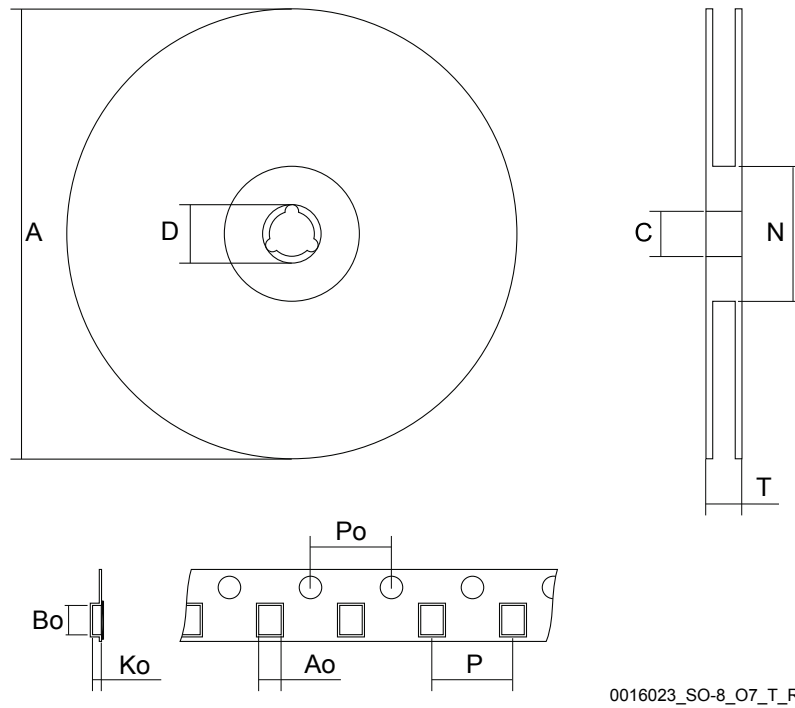
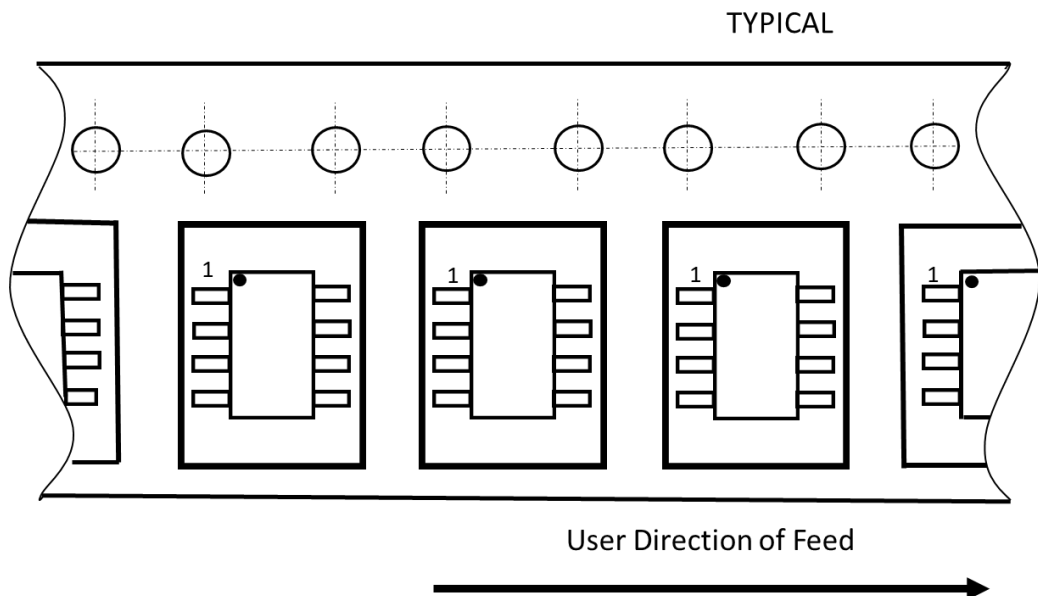


Figure 18. Tape orientation



**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
01-Feb-2013	1	First revision.
28-Nov-2013	2	<ul style="list-style-type: none"> <li>– Modified: <math>R_{DS(on)}</math> value in cover page</li> <li>– Modified: <math>V_{GS}</math> value in <i>Table 2</i></li> <li>– Modified: <math>I_{GSS}</math> test conditions value in <i>Table 4</i></li> <li>– Modified: <math>Q_g</math> typical value in <i>Table 5</i></li> <li>– Added: <i>Section 2.1: Electrical characteristics (curves)</i></li> <li>– Minor text changes.</li> </ul>
17-Feb-2021	3	<p>Updated title and <a href="#">Internal schematic</a> in cover page.</p> <p>Updated <a href="#">Section 4.2 SO-8 packing information</a>.</p> <p>Minor text changes.</p>

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## Contents

<b>1</b>	<b>Electrical ratings</b> .....	<b>2</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>3</b>
<b>2.1</b>	Electrical characteristics (curves) .....	<b>5</b>
<b>3</b>	<b>Test circuits</b> .....	<b>7</b>
<b>4</b>	<b>Package information</b> .....	<b>8</b>
<b>4.1</b>	SO-8 package information .....	<b>8</b>
<b>4.2</b>	SO-8 packing information .....	<b>10</b>
	<b>Revision history</b> .....	<b>12</b>

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