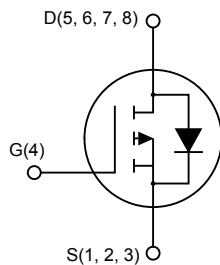
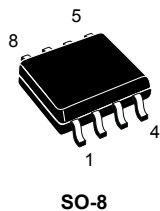


## P-channel -30 V, 10 mΩ typ., -12.5 A, STripFET H6 Power MOSFET in an SO-8 package



AM01475v4

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STS10P3LLH6	-30 V	12 mΩ	-12.5 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<sub>DS(on)</sub> in all packages.



#### Product status link

[STS10P3LLH6](#)

#### Product summary

<b>Order code</b>	STS10P3LLH6
<b>Marking</b>	10K3L
<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 $T_{amb} = 25\text{ }^{\circ}\text{C}$	-12.5	A
	Drain current (continuous) at $T_{amb} = 100\text{ }^{\circ}\text{C}$	-7.8	
$I_{DM}^{(1)}$	Drain current (pulsed)	-50	A
$P_{TOT}$	Total power dissipation at $T_{amb} = 25\text{ }^{\circ}\text{C}$	2.7	W
$E_{AS}$	Single pulse avalanche energy (starting $T_J = 25\text{ }^{\circ}\text{C}$ , $I_D = -5\text{ A}$ )	70	mJ
$T_{stg}$	Storage temperature range	-55 to 150	$^{\circ}\text{C}$
$T_J$	Operating junction temperature range		

1. Pulse width limited by safe operating area.

**Table 2. Thermal data**

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

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

## 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	$I_D = -250\ \mu\text{A}$	-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	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$			-100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1.0	-1.7	-2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = -10\ \text{V}, I_D = -5\ \text{A}$		10	12	m $\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -5\ \text{A}$		14	17	

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

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = -25\ \text{V}, f = 1\ \text{MHz}, V_{GS} = 0\ \text{V}$	-	3350	-	pF
$C_{oss}$	Output capacitance		-	414	-	pF
$C_{rss}$	Reverse transfer capacitance		-	287	-	pF
$Q_g$	Total gate charge	$V_{DD} = -15\ \text{V}, I_D = -10\ \text{A}, V_{GS} = -4.5\ \text{V}$ (see Figure 13. Gate charge test circuit)	-	33	-	nC
$Q_{gs}$	Gate-source charge		-	14	-	nC
$Q_{gd}$	Gate-drain charge		-	11	-	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = -15\ \text{V}, I_D = -5\ \text{A},$ $R_G = 4.7\ \Omega, V_{GS} = -10\ \text{V}$	-	12.8	-	ns
$t_r$	Rise time		-	112	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 12. Switching times test circuit for resistive load)	-	61	-	ns
$t_f$	Fall time		-	45	-	ns

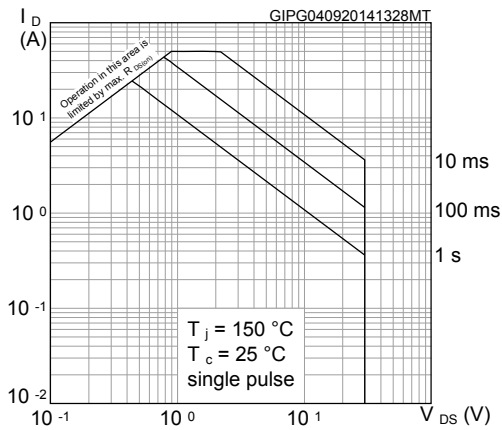
**Table 6. Source drain diode**

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	$I_{SD} = -5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,	-	25.2		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = -24\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$	-	17.4		nC
$I_{RRM}$	Reverse recovery current	(see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	-1.4		A

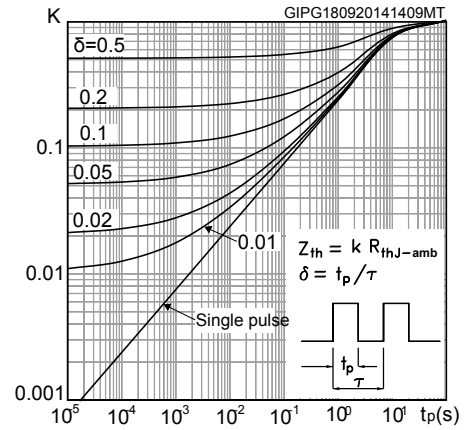
1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)

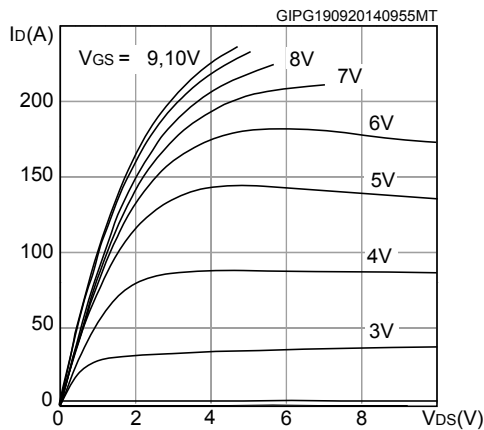
**Figure 1. Safe operating area**



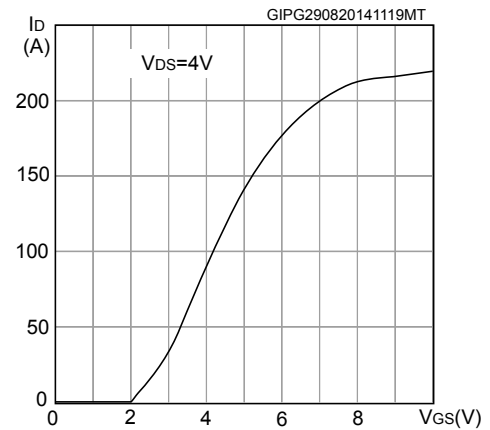
**Figure 2. Thermal impedance**



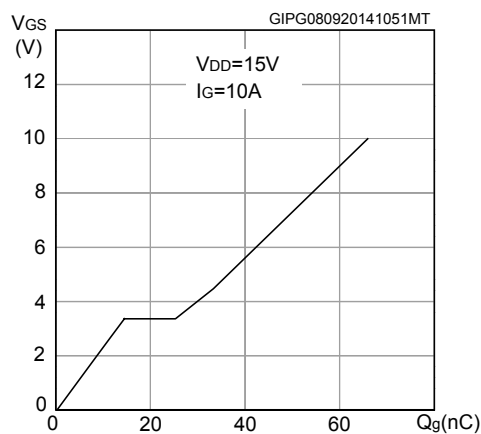
**Figure 3. Output characteristics**



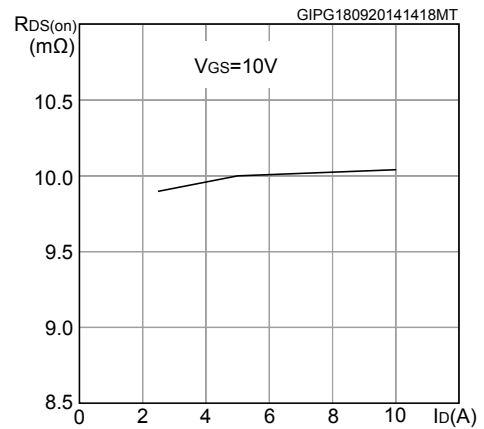
**Figure 4. Transfer characteristics**



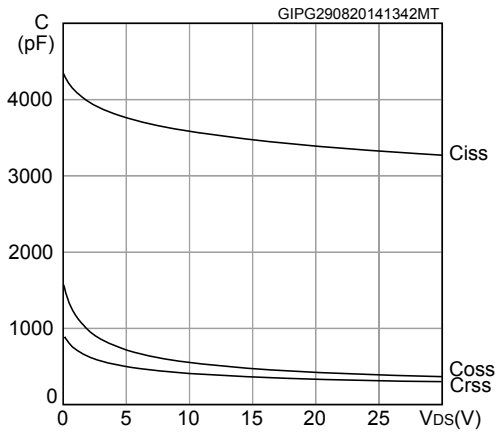
**Figure 5. Gate charge vs gate-source voltage**



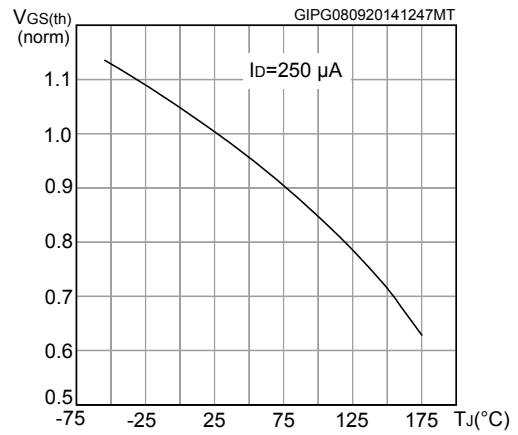
**Figure 6. Static drain-source on-resistance**



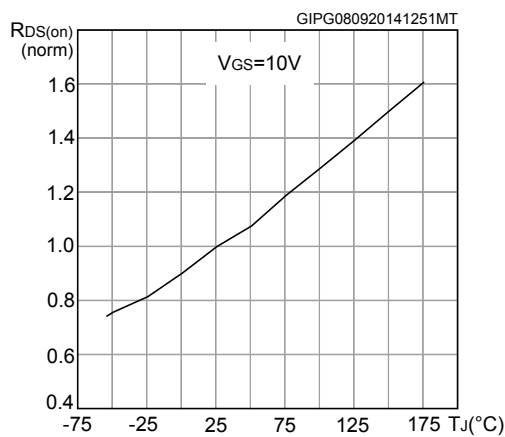
**Figure 7. Capacitance variations**



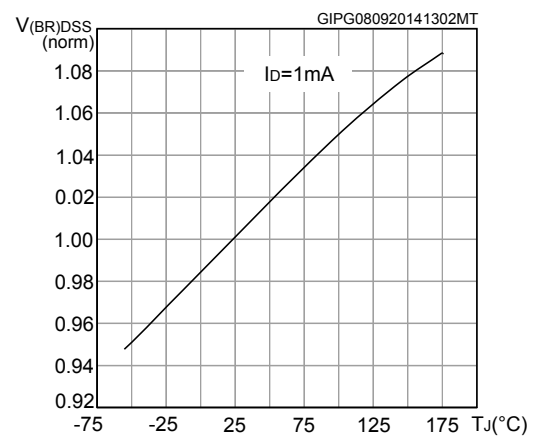
**Figure 8. Normalized gate threshold voltage vs temperature**



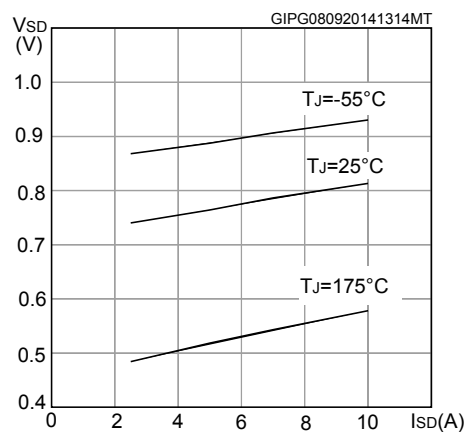
**Figure 9. Normalized on-resistance vs temperature**



**Figure 10. Normalized V(BR)DSS vs temperature**



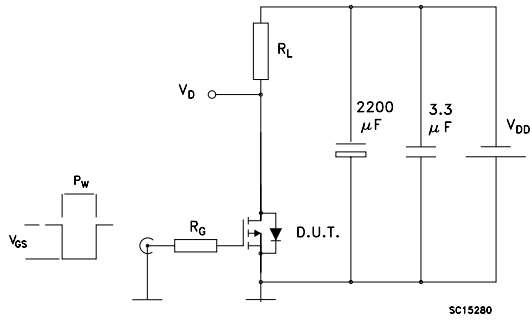
**Figure 11. Source-drain diode forward characteristics**



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

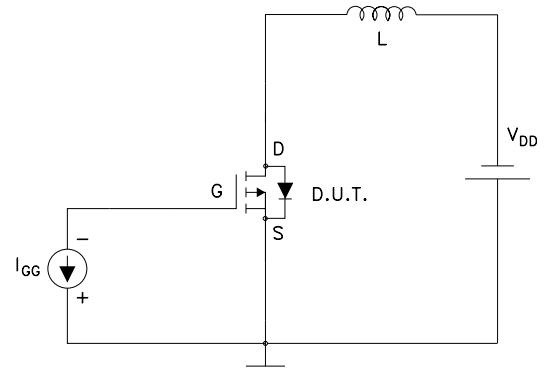
### 3 Test circuits

Figure 12. Switching times test circuit for resistive load



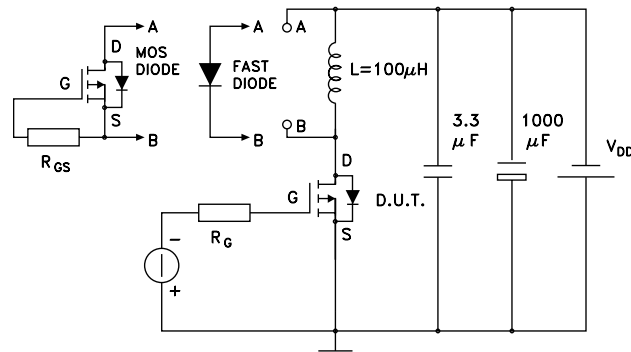
SC15280

Figure 13. Gate charge test circuit



SC15290

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



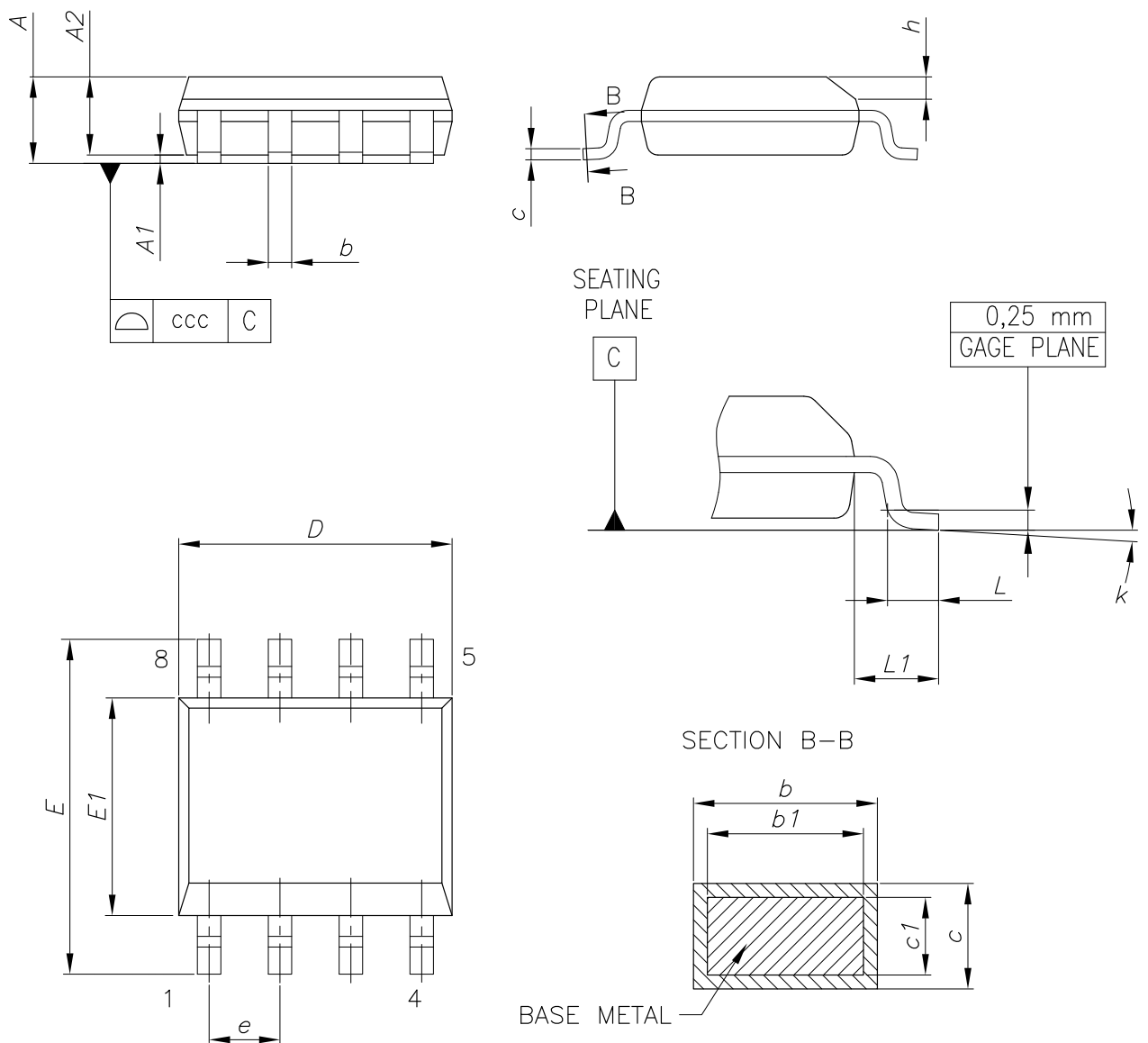
SC15300

## 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



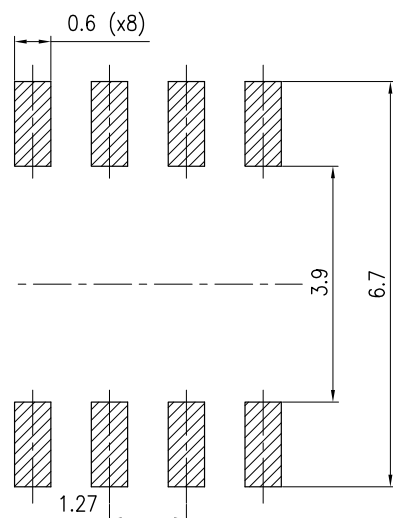
0016023\_So-807\_fig2\_Rev10



**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

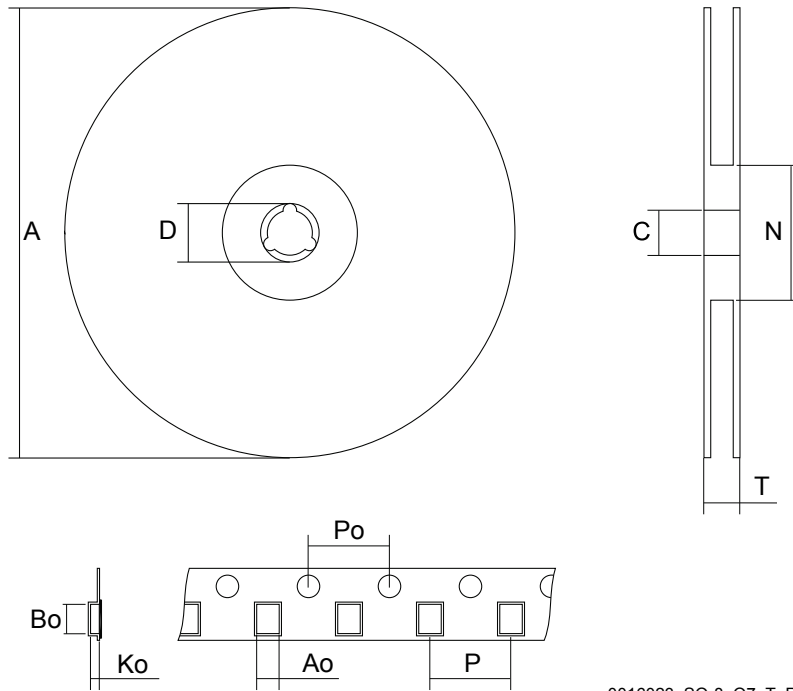
**Figure 16. SO-8 recommended footprint (dimensions are in mm)**



0016023\_So-807\_footprint\_Rev10

## 4.2 SO-8 packing information

Figure 17. SO-8 tape and reel dimensions



0016023\_SO-8\_07\_T\_R

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	Revision	Changes
06-May-2014	1	Initial release.
24-Sep-2014	2	Updated the title, the features and the description in cover page. Updated Section 1: "Electrical ratings", Section 2: "Electrical characteristics". Added Section 2.1: "Electrical characteristics (curves)" Minor text changes.
11-Jun-2015	3	Text and formatting changes throughout document. On cover page: - updated title description and Features table In Section 1 Electrical ratings: - updated Table Absolute maximum ratings In section 2.1 Electrical characteristics (curves) - updated Figure Safe operating area Updated and renamed Section 4.1 SO-8 package information (was SO-8 mechanical data)
24-Aug-2015	4	Updated Table 4: "On/off states".
06-Dec-2016	5	Updated $V_{GS(th)}$ in Table 4: "On/off states". Minor text changes.
03-Apr-2017	6	Added $E_{AS}$ value in <i>Table 2: "Absolute maximum ratings"</i> .
08-Jul-2020	7	Updated <a href="#">Internal schematic</a> . Updated <a href="#">Section 4 Package information</a> .

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