

## P-channel -30 V, 0.01 $\Omega$ typ., -12.5 A, STripFET™ H6 Power MOSFET in an SO-8 package

Datasheet - production data

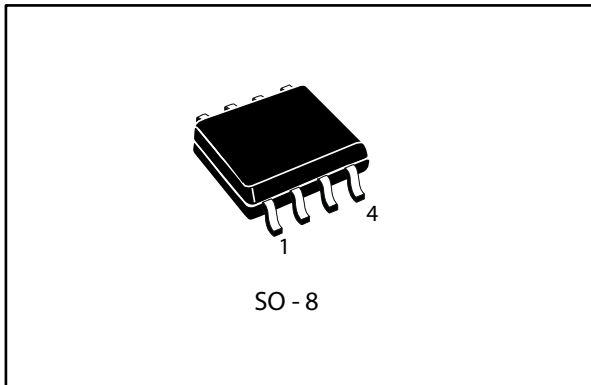


Figure 1: Internal schematic diagram

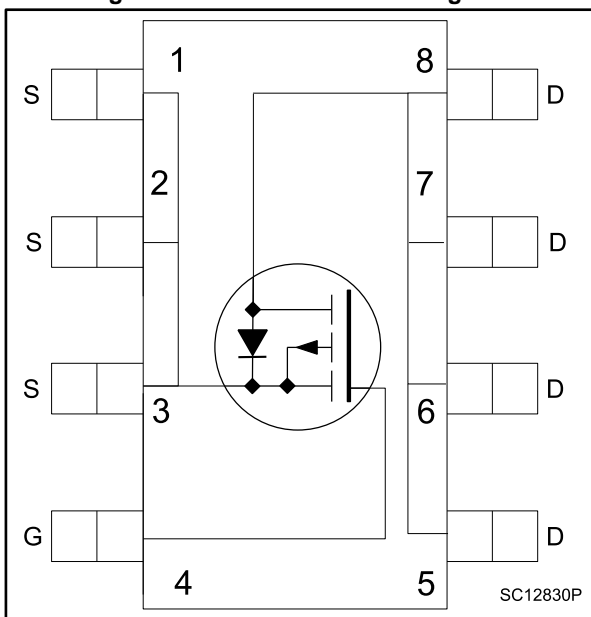


Table 1: Device summary

Order code	Marking	Packages	Packing
STS10P3LLH6	10K3L	SO-8	Tape and reel

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STS10P3LLH6	-30 V	0.012 $\Omega$	-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.

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# 1 Electrical ratings

**Table 2: 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 $T_{amb} = 25^\circ\text{C}$	-12.5	A
	Drain current (continuous) at $T_{amb} = 100^\circ\text{C}$	-7.8	
$I_{DM}^{(1)}$	Drain current (pulsed)	-50	A
$P_{TOT}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	2.7	W
$T_{stg}$	Storage temperature	-55 to 150	$^\circ\text{C}$
$T_j$	Operating junction temperature		

**Notes:**

<sup>(1)</sup>Pulse width limited by safe operating area

**Table 3: Thermal data**

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

**Notes:**

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

## 2 Electrical characteristics

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

**Table 4: On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = -250\ \mu\text{A}$	-30			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = -30\ \text{V}$			-1	$\mu\text{A}$
		$V_{DS} = -30\ \text{V}, T_C = 125\text{ °C}$			-10	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20\ \text{V}$			-100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	1			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = -10\ \text{V}, I_D = -5\ \text{A}$		0.01	0.012	$\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -5\ \text{A}$		0.014	0.017	

**Table 5: Dynamic**

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

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = -15\ \text{V}, I_D = -5\ \text{A}$ $R_G = 4.7\ \Omega, V_{GS} = -10\ \text{V}$ (see <a href="#">Figure 13: "Switching times test circuit for resistive load"</a> )	-	12.8	-	ns
$t_r$	Rise time		-	112	-	
$t_{d(off)}$	Turn-off delay time		-	61	-	
$t_f$	Fall time		-	45	-	

**Table 7: Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = -5\ \text{A}, V_{GS} = 0$	-		-1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = -5\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$ $V_{DD} = -24\ \text{V}, T_j = 150\text{ °C}$ (see <a href="#">Figure 15: "Source-drain diode forward characteristics"</a> )	-	25.2		ns
$Q_{rr}$	Reverse recovery charge		-	17.4		nC
$I_{RRM}$	Reverse recovery current		-	-1.4		A

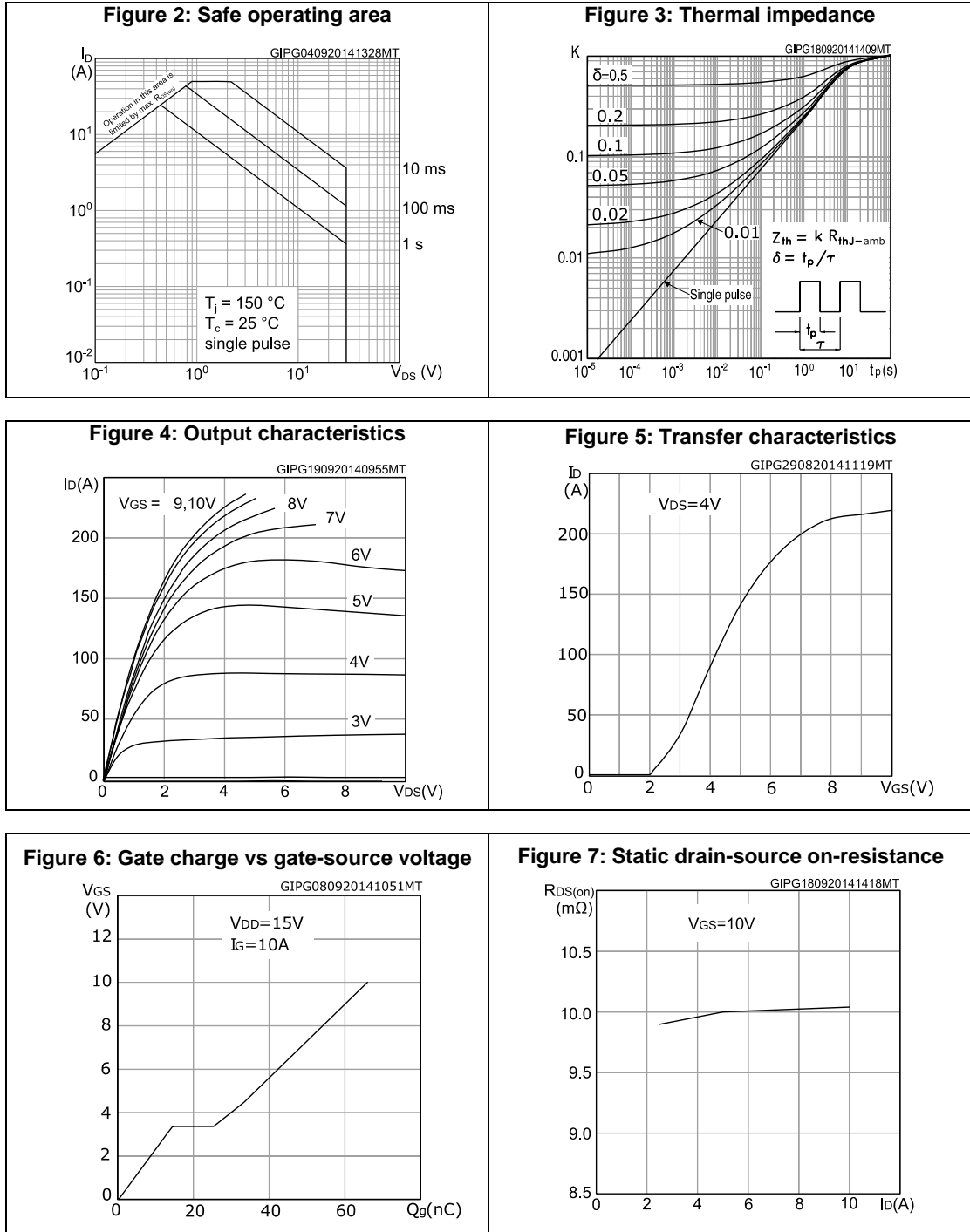
**Notes:**

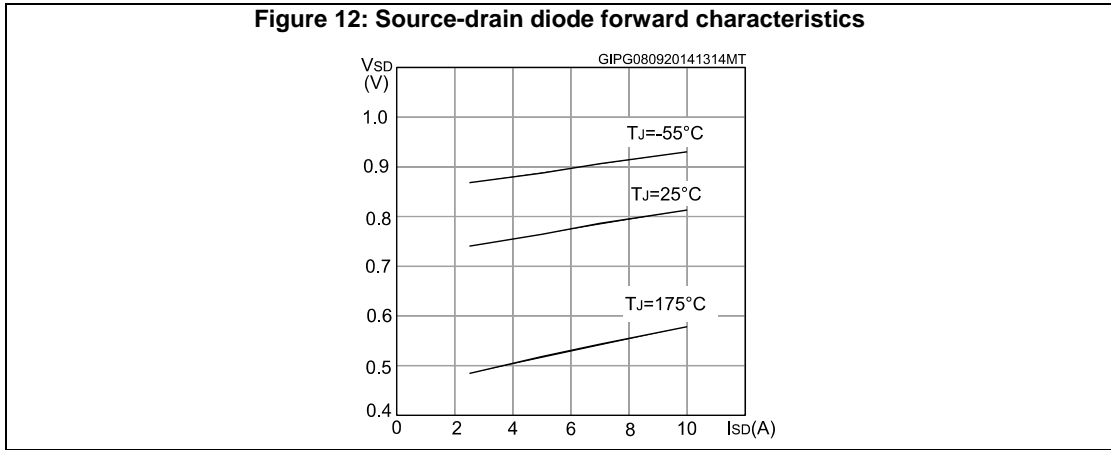
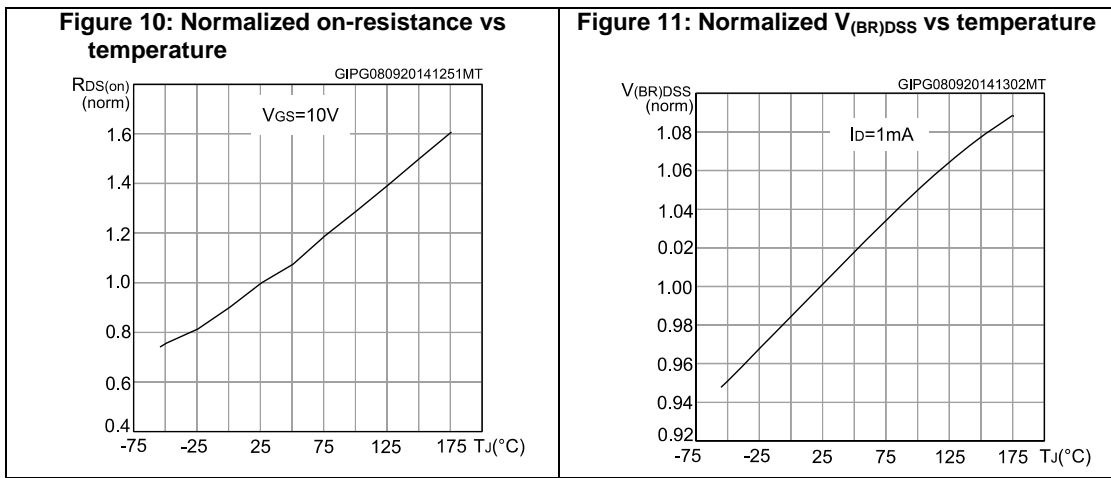
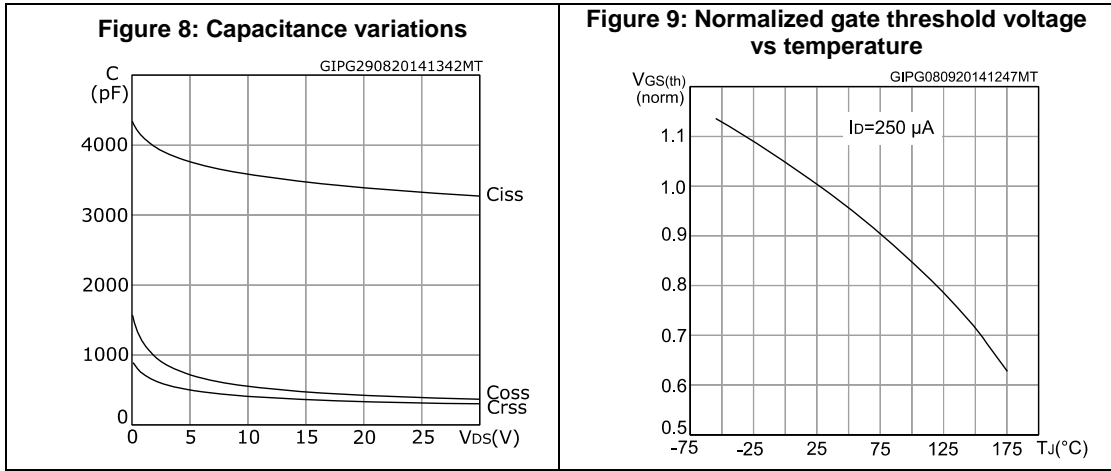
<sup>(1)</sup>Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)



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

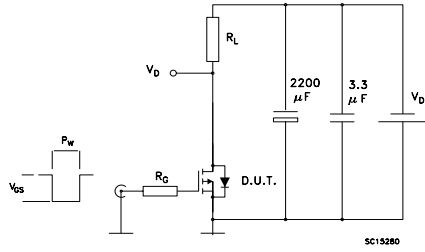




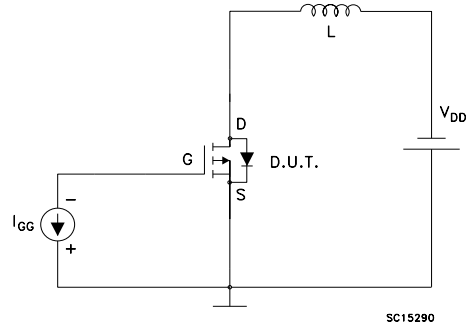
For the P-channel Power MOSFET, current and voltage polarities are reversed

### 3 Test circuits

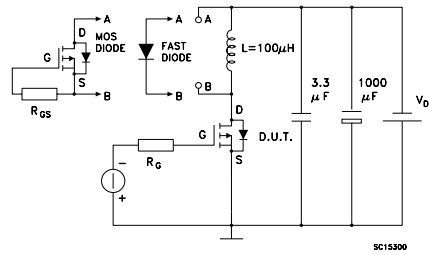
**Figure 13: Switching times test circuit for resistive load**



**Figure 14: Gate charge test circuit**



**Figure 15: Source-drain diode forward characteristics**



## 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 16: SO-8 package outline

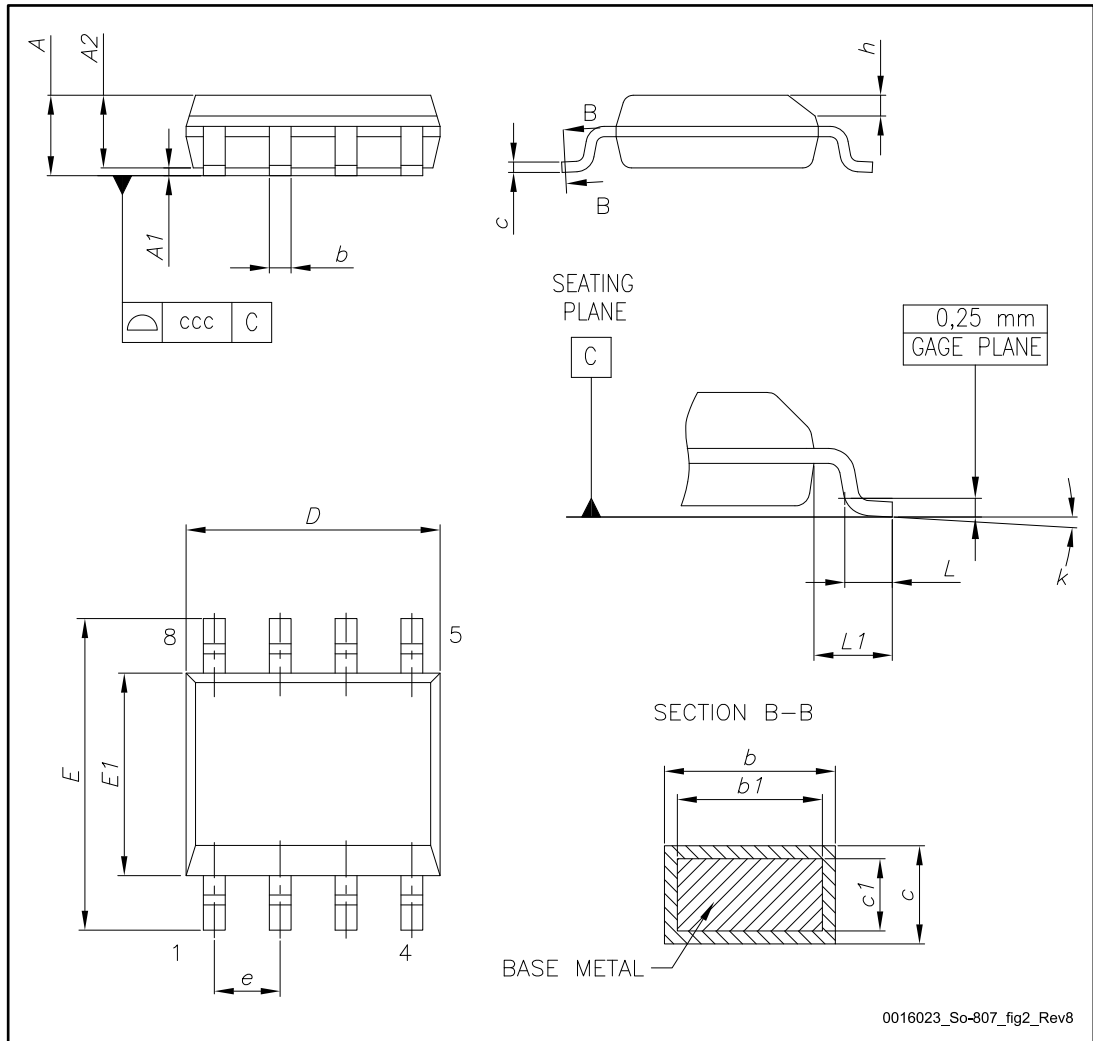
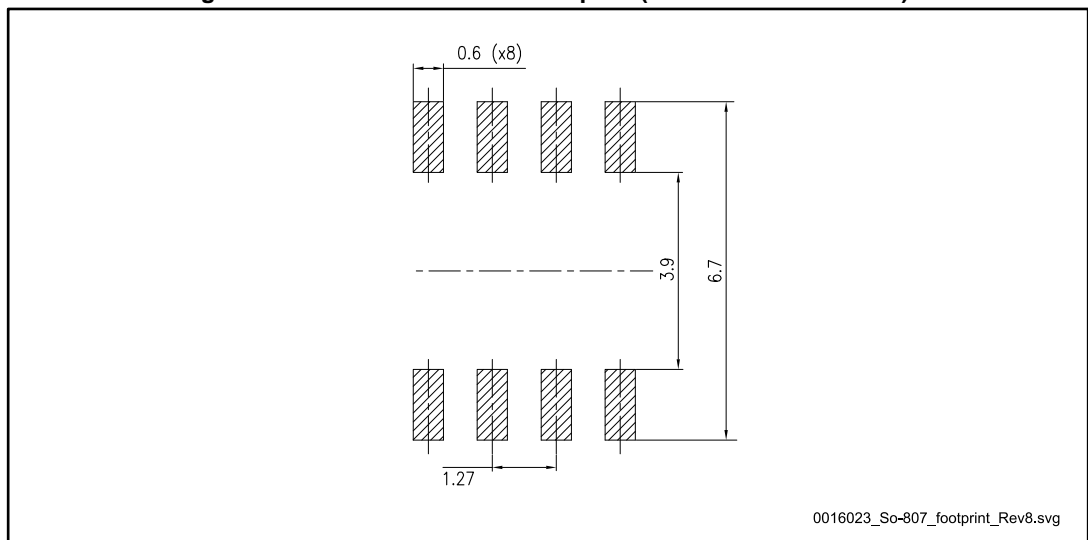




Table 8: SO-8 mechanical data

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 17: SO-8 recommended footprint (dimensions are in mm)



### 4.2 SO-8 packing information

Figure 18: SO-8 tape and reel outline

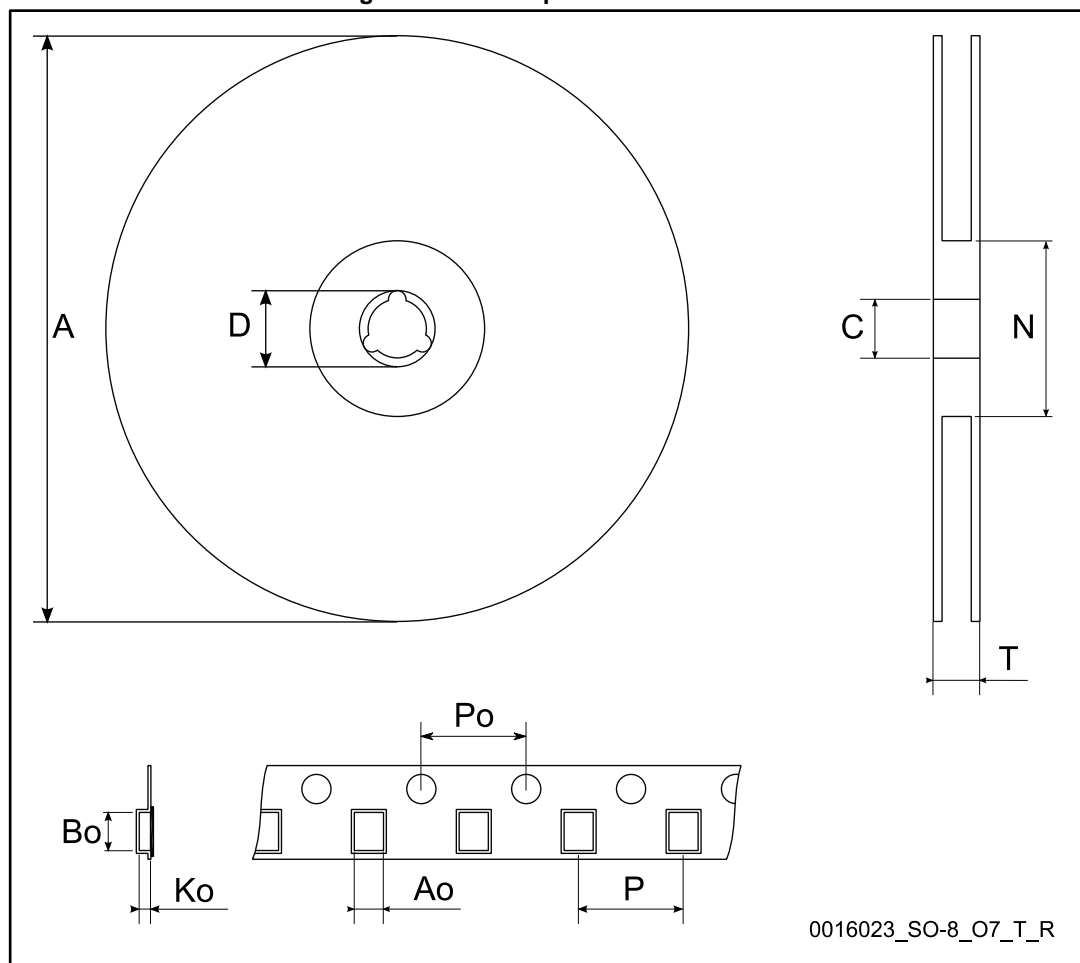


Table 9: SO-8 tape and reel mechanical data

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

## 5 Revision history

Table 10: 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 <i>Section 1: "Electrical ratings"</i> , <i>Section 2: "Electrical characteristics"</i> . Added <i>Section 2.1: "Electrical characteristics (curves)"</i> 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)

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