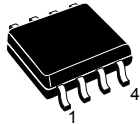
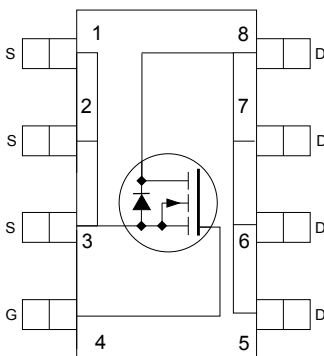


## N-channel 20 V, 30 mΩ typ., 6 A, 2.7 V drive, STripFET™ II Power MOSFET in an SO-8 package



SO-8



SC12830N

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STS6NF20V	20 V	40 mΩ (@4.5 V)	6 A
		45 mΩ (@2.7 V)	

- Ultra low threshold gate drive
- 100% avalanche tested
- Low gate charge

### Applications

- Switching applications

### Description

This Power MOSFET series has been developed using STMicroelectronics' unique STripFET™ process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

#### Product status link

[STS6NF20V](#)

#### Product summary

<b>Order code</b>	STS6NF20V
<b>Marking</b>	6F20V-
<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	20	V
$V_{GS}$	Gate-source voltage	$\pm 12$	V
$I_D$	Drain current (continuous) at $T_{amb} = 25\text{ }^\circ\text{C}$	6	A
	Drain current (continuous) at $T_{amb} = 100\text{ }^\circ\text{C}$	3.8	A
$I_{DM}^{(1)}$	Drain current (pulsed)	24	A
$P_{TOT}$	Total dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	2.5	W
$T_{stg}$	Storage temperature range	-55 to 150	$^\circ\text{C}$
$T_j$	Operating junction temperature range		$^\circ\text{C}$

1. Pulse width limited by safe operating area.

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal resistance junction-ambient	50	$^\circ\text{C/W}$

## 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	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	20			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 20\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = 20\text{ V}$ $T_C = 125\text{ °C}$ <sup>(1)</sup>			10	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DD} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	0.6			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 4.5\text{ V}$ , $I_D = 3\text{ A}$		30	40	m $\Omega$
		$V_{GS} = 2.7\text{ V}$ , $I_D = 3\text{ A}$		37	45	
		$V_{GS} = 1.95\text{ V}$ , $I_D = 0.9\text{ A}$			90	

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

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}$	Forward transconductance		6.5	10	15	S
$C_{iss}$	Input capacitance	$V_{DS} = 15\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	320	460	640	pF
$C_{oss}$	Output capacitance		130	200	280	pF
$C_{rss}$	Reverse transfer capacitance		33	50	68	pF
$Q_g$	Total gate charge	$V_{DD} = 16\text{ V}$ , $I_D = 6\text{ A}$	5.5	8.5	11.5	nC
$Q_{gs}$	Gate-source charge	$V_{GS} = 0$ to $4.5\text{ V}$	1.2	1.8	2.5	nC
$Q_{gd}$	Gate-drain charge	(see Figure 12. Test circuit for gate charge behavior)	1.6	2.4	3.4	nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 10\text{ V}$ , $I_D = 3\text{ A}$ ,	-	7	20	ns
$t_r$	Rise time	$R_G = 4.7\text{ }\Omega$ , $V_{GS} = 4.5\text{ V}$	-	33	45	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 11. Test circuit for resistive load switching times and Figure 16. Switching time waveform)	-	27	40	ns
$t_f$	Fall time		-	10	20	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	$I_{SD} = 6\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 6\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,	-	26		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 10\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$	-	13		nC
$I_{RRM}$	Reverse recovery current	(see <a href="#">Figure 16. Switching time waveform</a> )	-	1		A

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

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

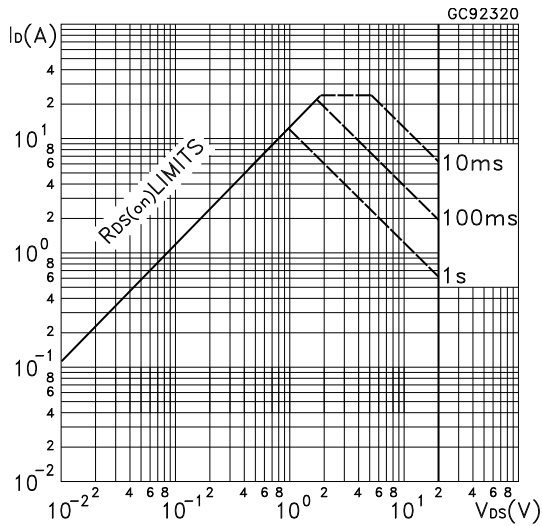


Figure 2. Thermal impedance

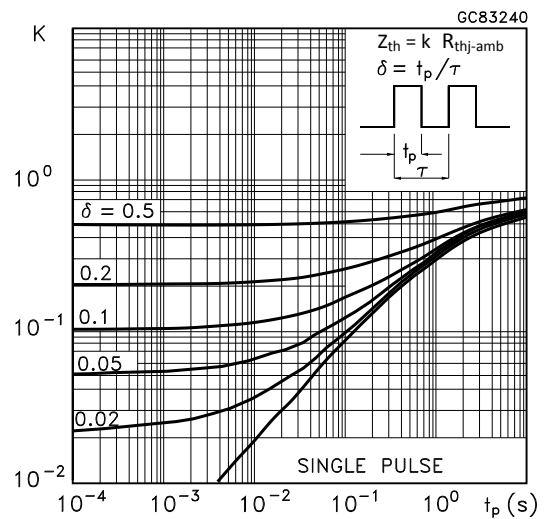


Figure 3. Output characteristics

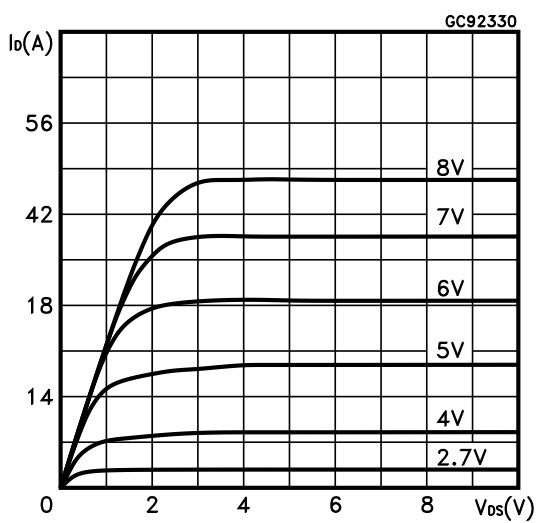
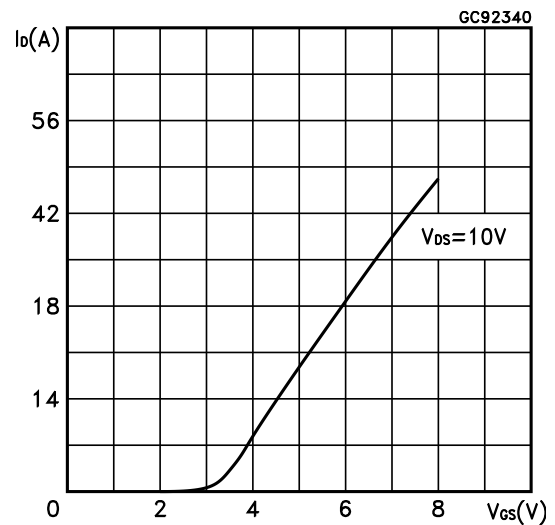
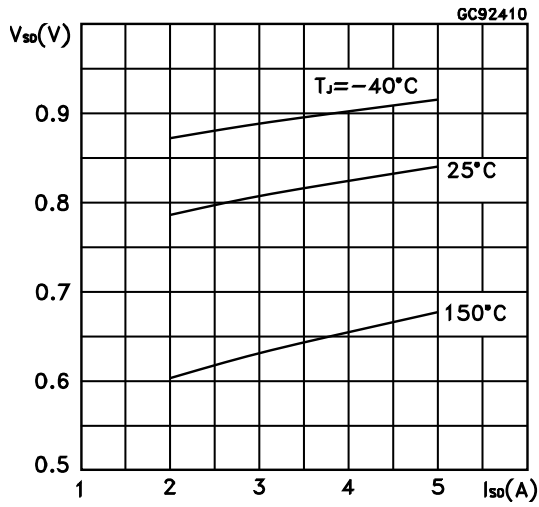
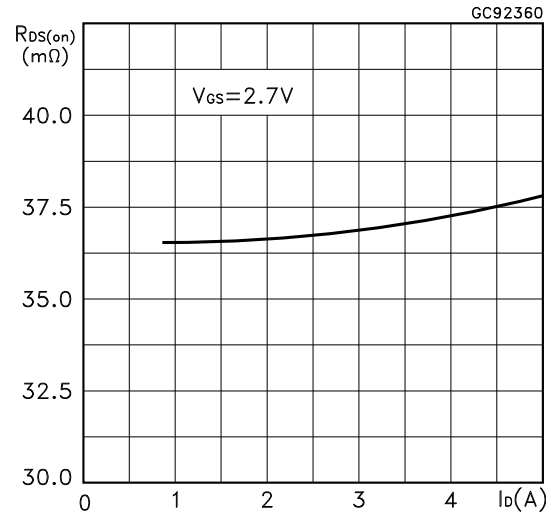
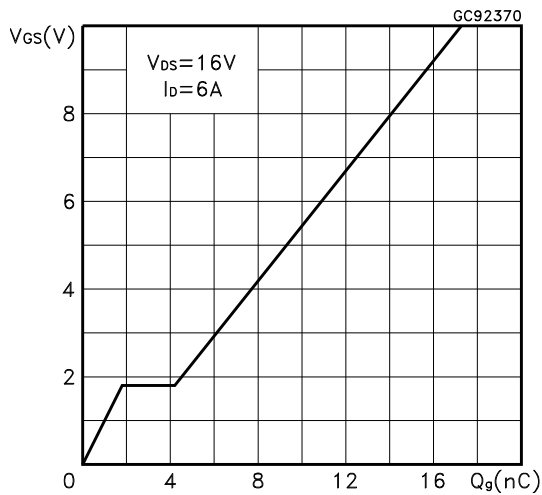
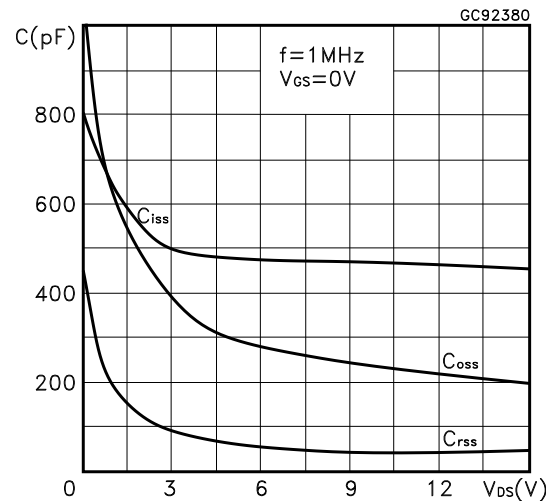
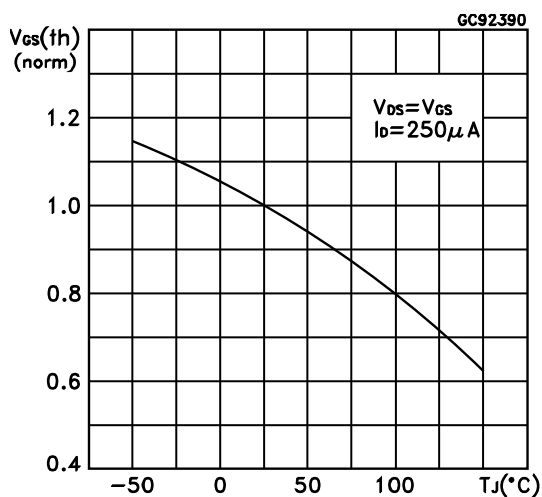
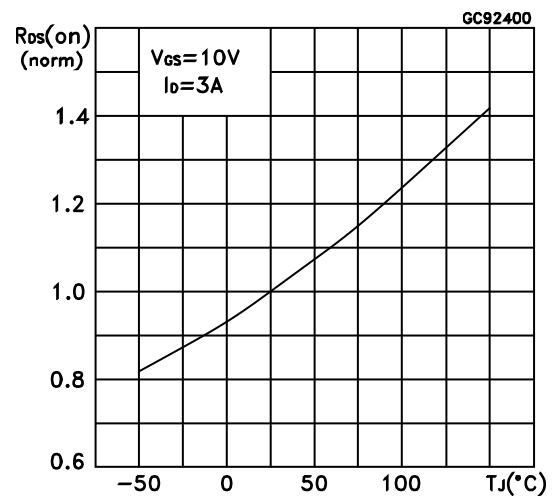
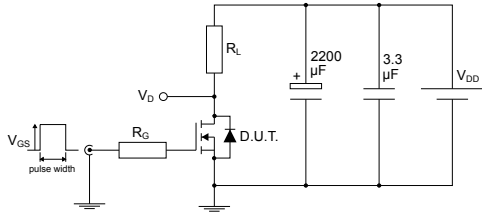


Figure 4. Transfer characteristics

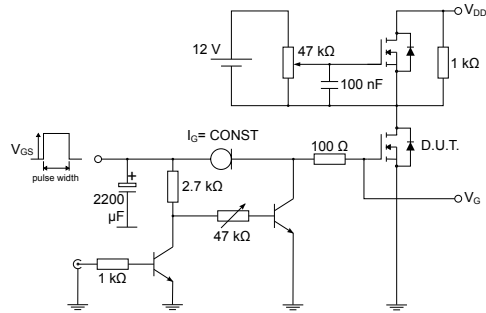


**Figure 5. Source-drain diode forward characteristics**

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

**Figure 7. Gate charge vs gate-source voltage**

**Figure 8. Capacitance variations**

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

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


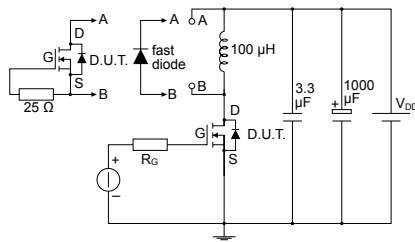
### 3 Test circuits

**Figure 11. Test circuit for resistive load switching times**


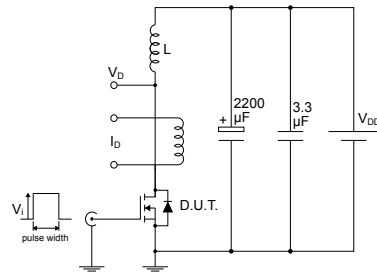
AM01468v1

**Figure 12. Test circuit for gate charge behavior**


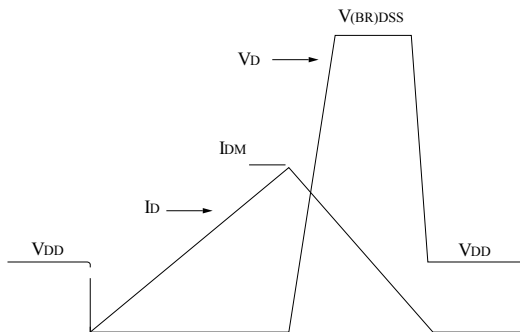
AM01469v1

**Figure 13. Test circuit for inductive load switching and diode recovery times**


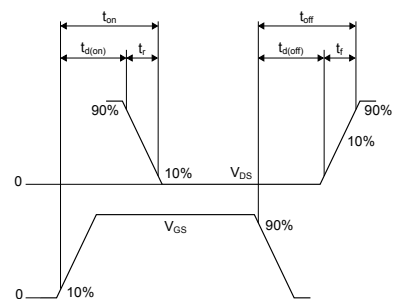
AM01470v1

**Figure 14. Unclamped inductive load test circuit**


AM01471v1

**Figure 15. Unclamped inductive waveform**


AM01472v1

**Figure 16. Switching time waveform**


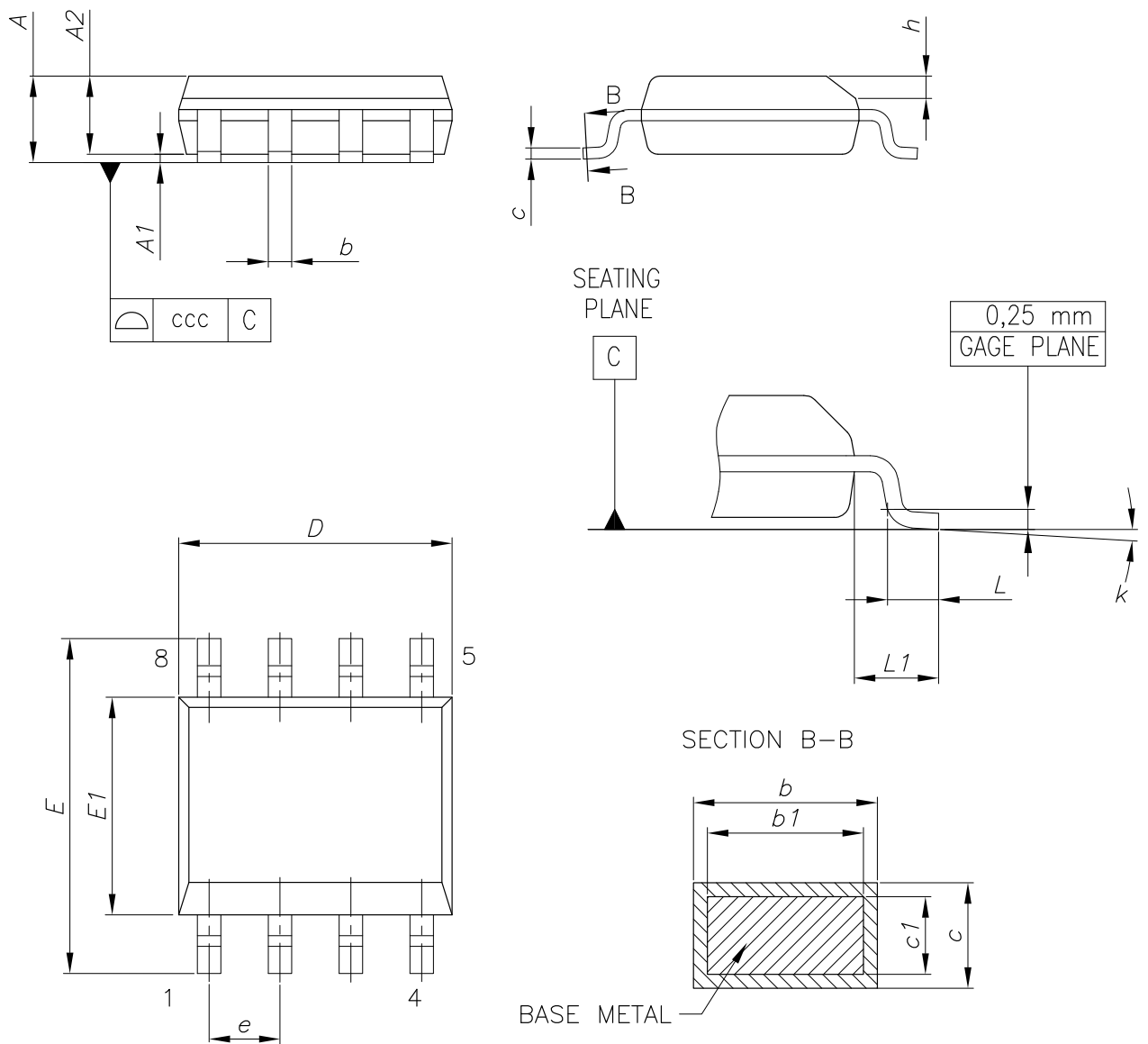
AM01473v1

## 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 17. SO-8 package outline



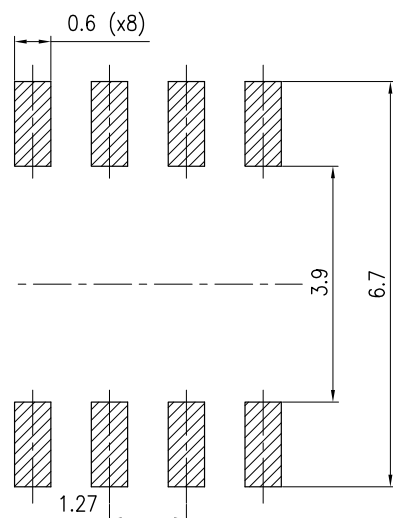
0016023\_So-807\_fig2\_Rev10



**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

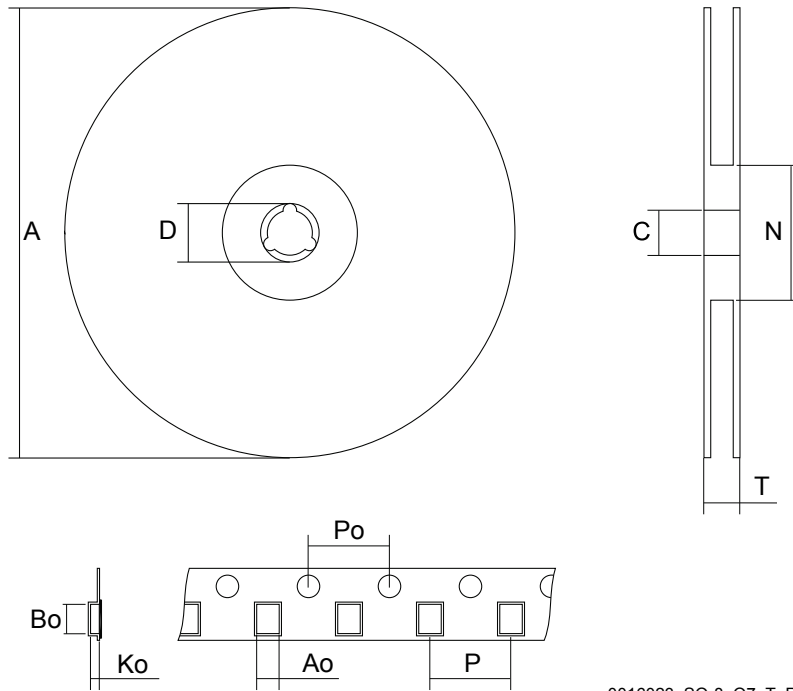
**Figure 18. SO-8 recommended footprint (dimensions are in mm)**



0016023\_So-807\_footprint\_Rev10

## 4.2 SO-8 packing information

Figure 19. 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	8.1	-	8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

## Revision history

**Table 9. Document revision history**

Date	Version	Changes
07-Feb-2008	1	Initial release.
18-Nov-2009	2	Added new RDS(on) value on <i>Table 4: On /off states</i>
29-Nov-2012	3	Max values have been added in <i>Table 5: Dynamic</i> and <i>Table 6: Switching times</i> . <i>Section 4: Package mechanical data</i> has been updated. Minor text changes.
04-Apr-2018	4	Removed maturity status indication from cover page. The document status is production data. Updated product marking on cover page. Updated <a href="#">Table 3. On-/off-states</a> . Updated <a href="#">Section 4 Package information</a> . Minor text changes

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