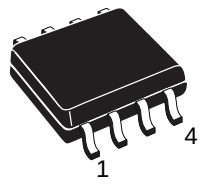
STS10P4LLF6

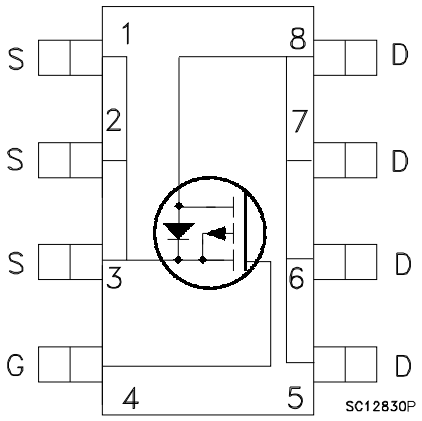
P-channel 40 V, 0.013 Ω typ., 10 A, STripFET™ VI DeepGATE™ Power MOSFET in a SO-8 package

Datasheet - preliminary data



SO-8

Figure 1. Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D
STS10P4LLF6	40 V	0.017 Ω	10A

- $R_{DS(on)}$* Q_g industry benchmark
- Extremely low on-resistance $R_{DS(on)}$
- High avalanche ruggedness

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest $R_{DS(on)}$ in all packages.

Table 1. Device summary

Order code	Marking	Packages	Packaging
STS10P4LLF6	10K4L	SO-8	Tape and reel

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed.

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	40	V
V_{GS}	Gate- source voltage	±20	V
I_D (1)	Drain current (continuous) at T_{amb} = 25°C	10	A
I_D (1)	Drain current (continuous) at T_{amb} = 100°C	5.6	A
I_{DM} (2)	Drain current (pulsed)	40	A
P_{TOT} (1)	Total dissipation at T_{amb} = 25°C	2.7	W
T_{stg}	Storage temperature	-55 to 150	°C
T_j	Operating junction temperature	150	°C

1. This value is rated according to $R_{thj\text{-}amb}$
2. Pulse width limited by safe operating area

Table 3. Thermal data

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

1. When mounted on 1 inch² FR-4 board, 2 oz. Cu., t ≤ 10 sec

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed.

2 Electrical characteristics

(T_{CASE} = 25 °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 µA	40			V V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 40 V			1	µA
		V_{DS} = 30V, T_C= 125°C			10	
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	1			V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10V, I_D = 3 A		0.013	0.017	Ω
		V_{GS} = 4.5V, I_D = 3 A		0.018	0.0235	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} =32 V, f = 1 MHz, V_{GS} = 0	-	2900	-	pF
C_{oss}	Output capacitance		-	400	-	pF
C_{rss}	Reverse transfer capacitance		-	150	-	pF
Q_g	Total gate charge	V_{DD}=32 V I_D=10 A V_{GS}= 4.5 V	-	30	-	nC
Q_{gs}	Gate-source charge		-	TBD	-	nC
Q_{gd}	Gate-drain charge		-	TBD	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 32 V, I_D = 5 A R_G=4.7 Ω, V_{GS} = 10 V *Figure 2*	-	TBD	-	ns
t_r	Rise time		-	TBD	-	
$t_{d(off)}$	Turn-off delay time		-	TBD	-	
t_f	Fall time		-	TBD	-	

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		10	A
I_{SDM} (1)	Source-drain current (pulsed)		-		40	A
V_{SD} (2)	Forward on voltage	I_{SD} = 3A, V_{GS} = 0	-		1.1	V
t_{rr}	Reverse recovery time	I_{SD} = 5 A, di/dt = 100 A/µs V_{DD}=10 V, T_j =150 °C	-	TBD		ns
Q_{rr}	Reverse recovery charge		-	TBD		nC
I_{RRM}	Reverse recovery current		-	TBD		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300 µs, duty cycle 1.5%

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed

3 Test circuits

Figure 2. Switching times test circuit for resistive load

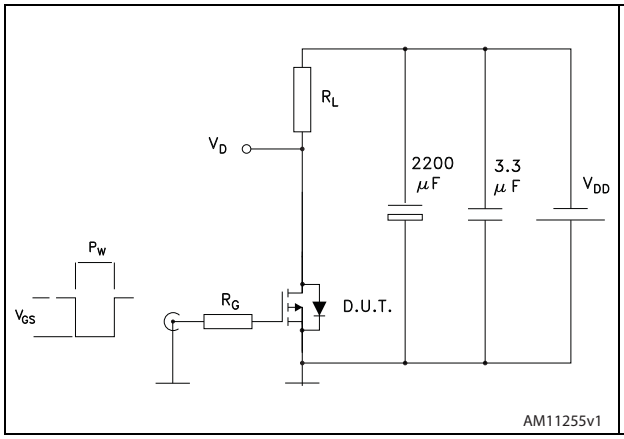


Figure 3. Gate charge test circuit

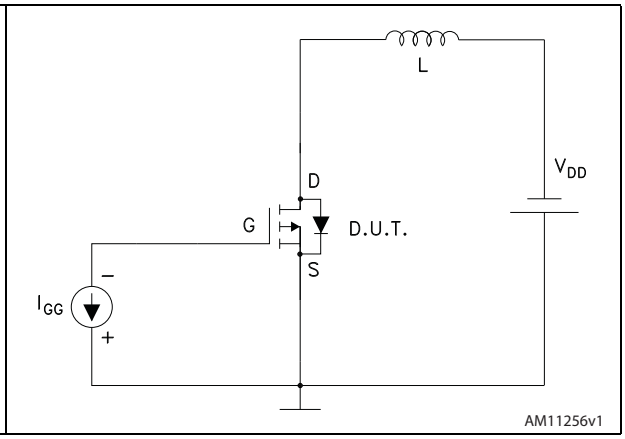
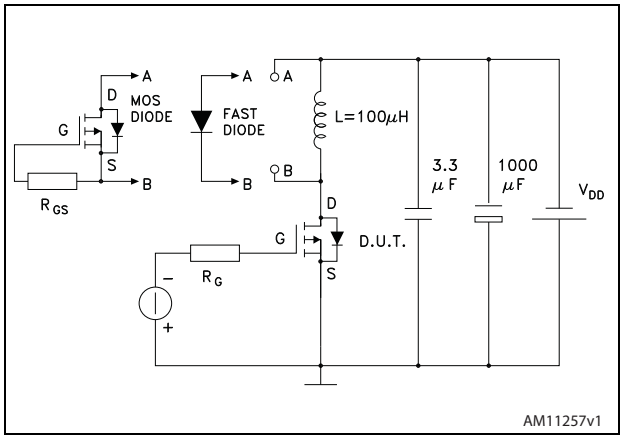


Figure 4. Test circuit for diode recovery behavior



4 Package mechanical data

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*. ECOPACK® is an ST trademark.

Figure 5. SO-8 drawing

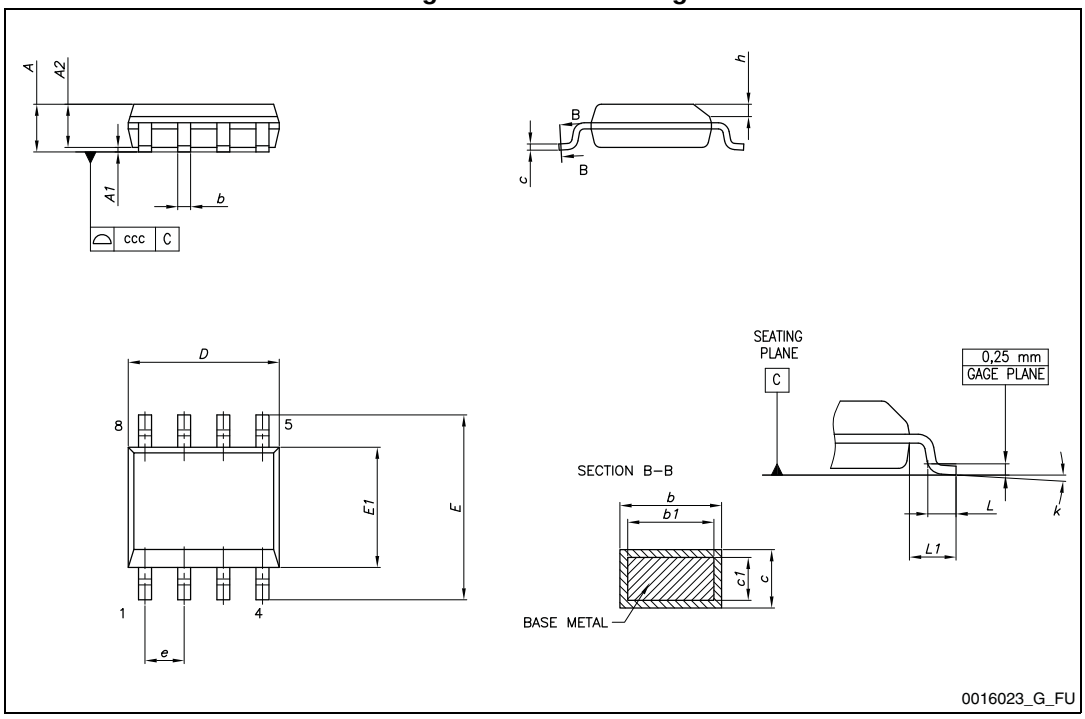
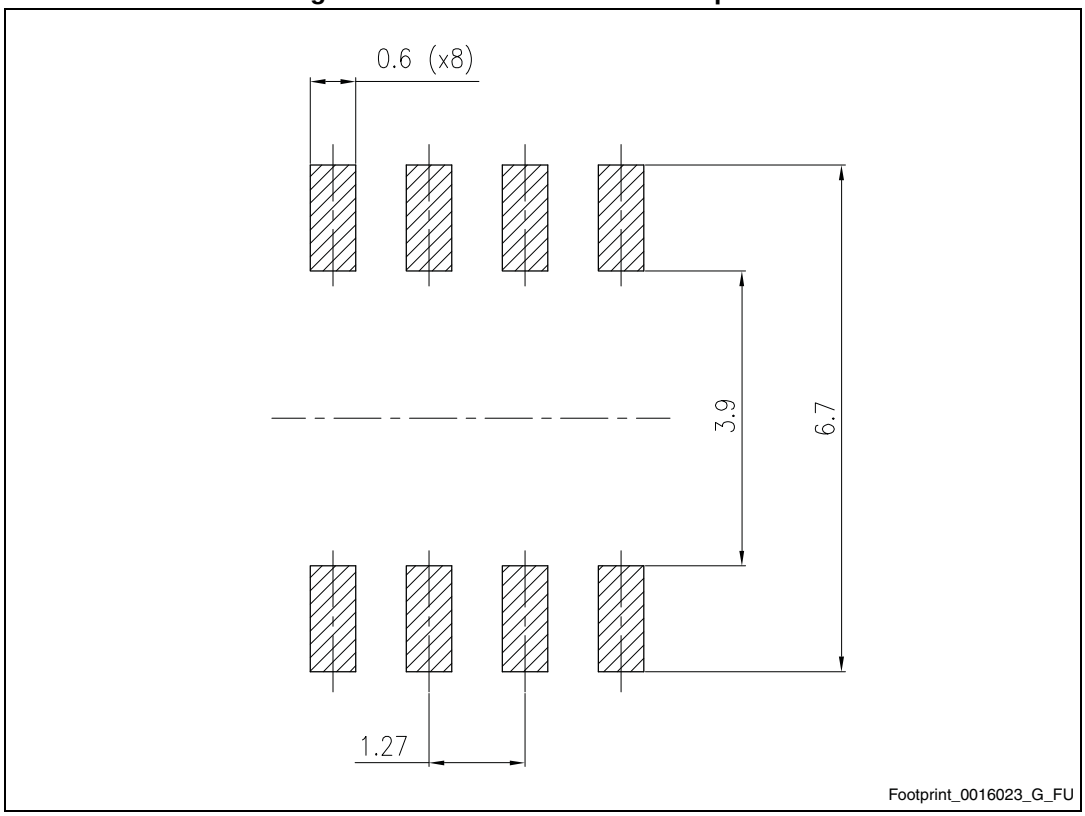


Table 8. SO-8 mechanical data

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 6. SO-8 recommended footprint(a)



a. All dimensions are in millimeters.

5 Packaging mechanical data

Figure 7. SO-8 tape and reel dimensions

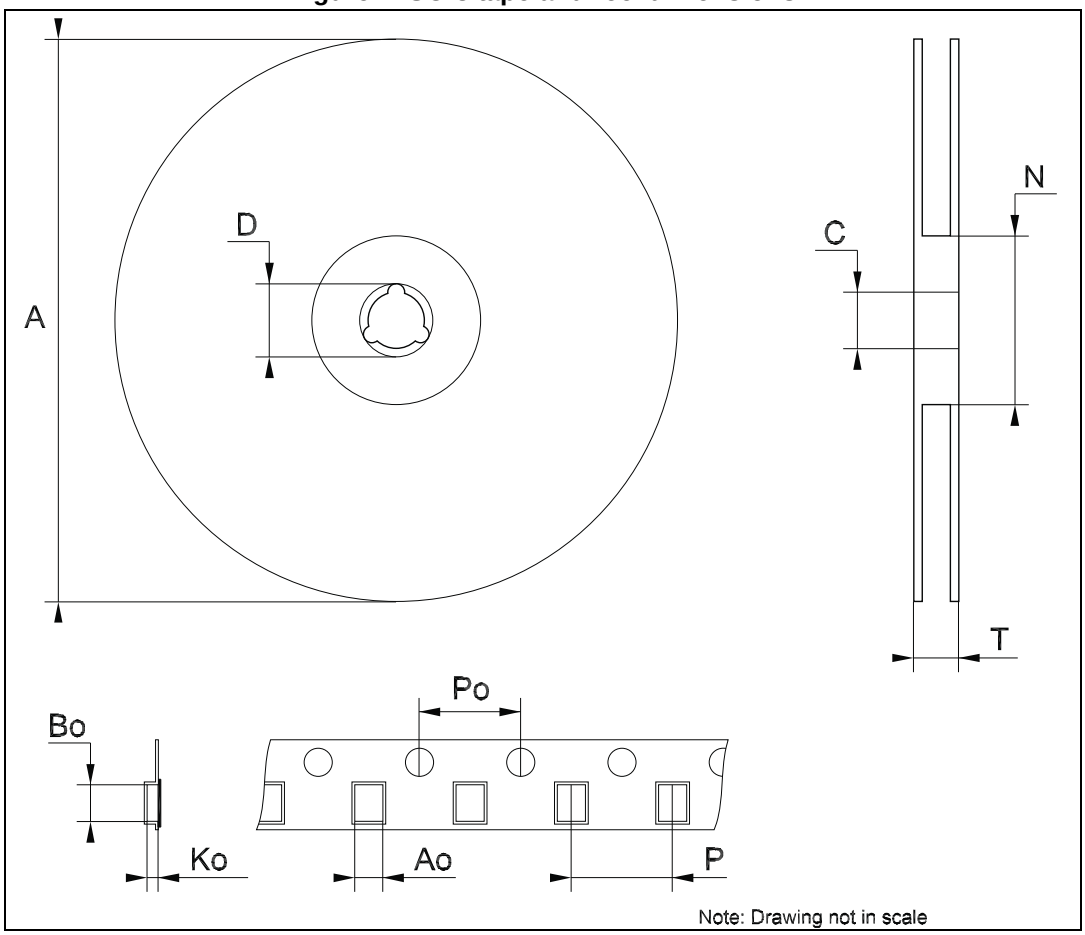


Table 9. SO-8 tape and reel mechanical data

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

6 Revision history

Table 10. Revision history

Date	Revision	Changes
20-Jan-2014	1	First revision.

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