



# STL180N4LLF6

N-channel 40 V, 1.8 mΩ, 34 A, PowerFLAT™ 5x6  
STripFET™ VI DeepGATE Power MOSFET

Preliminary data

## Features

Type	V <sub>DSS</sub>	R <sub>DS(on) max</sub>	I <sub>D</sub>
STL180N4LLF6	40 V	2.1 mΩ	34 A <sup>(1)</sup>

1. The value is rated according R<sub>thj-pcb</sub>

- Low gate charge
- Very low on-resistance
- High avalanche ruggedness

## Applications

- Switching applications

## Description

This device is an N-channel Power MOSFET developed using STMicroelectronics' STripFET™V technology. The device has been optimized to achieve very low on-state resistance, contributing to an FOM that is among the best in its class.



Figure 1. Internal schematic diagram

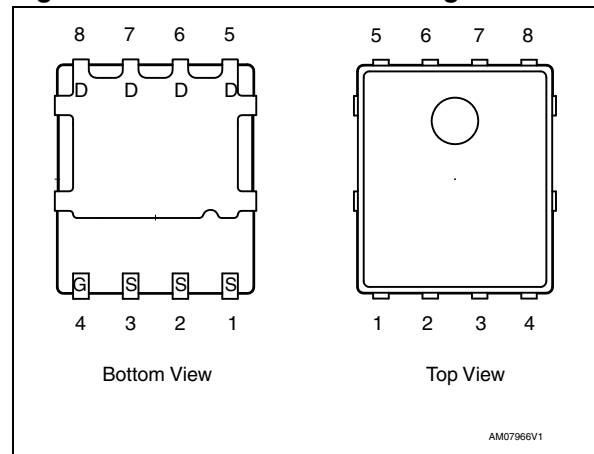


Table 1. Device summary

Order code	Marking	Package	Packaging
STL180N4LLF6	180N4LLF6	PowerFLAT™ 5x6	Tape and reel

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0$ )	40	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	180	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	115	A
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	34	A
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	21	A
$I_{DM}^{(2)}$	Drain current (pulsed)	720	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	136	W
$P_{TOT}^{(1)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	5	W
$T_J$ $T_{stg}$	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. When mounted on FR-4 board of 1inch<sup>2</sup>, 2oz Cu,  $t < 10$  sec
2. Pulse width limited by safe operating area

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	1.1	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	31.3	$^\circ\text{C/W}$

1. When mounted on FR-4 board of 1inch<sup>2</sup>, 2oz Cu,  $t < 10$  sec

## 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 ( $V_{GS} = 0$ )	$I_D = 250\ \mu\text{A}$	40			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = 40\ \text{V}$ $V_{DS} = 40\ \text{V } T_C=125\text{ °C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	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		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\ \text{V}, I_D = 17\ \text{A}$ $V_{GS} = 4.5\ \text{V}, I_D = 17\ \text{A}$		1.8	2.1 3.4	$\text{m}\Omega$ $\text{m}\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\ \text{V}, f = 1\ \text{MHz},$ $V_{GS} = 0$	-	6750	-	pF
$C_{oss}$	Output capacitance			1100		
$C_{rss}$	Reverse transfer capacitance			600		
$Q_g$	Total gate charge	$V_{DD} = 15\ \text{V}, I_D = 34\ \text{A}$ $V_{GS} = 4.5\ \text{V}$ <i>Figure 3</i>	-	63	-	nC
$Q_{gs}$	Gate-source charge			TBD		
$Q_{gd}$	Gate-drain charge			TBD		

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=37\text{ V}$ , $I_D=10\text{ A}$ , $R_G=4.7\ \Omega$ , $V_{GS}=10\text{ V}$ <i>Figure 2</i>	-	TBD	-	ns
$t_r$	Rise time			TBD		ns
$t_{d(off)}$	Turn-off delay time			TBD		ns
$t_f$	Fall time			TBD		ns

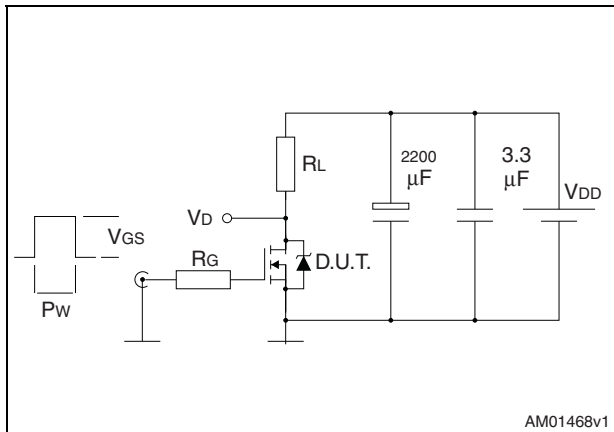
**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
$I_{SD}$	Source-drain current		-		19	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		80	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD}=19\text{ A}$ , $V_{GS}=0$	-		1.3	V
$t_{rr}$	Reverse recovery time	$I_{SD}=19\text{ A}$ , $di/dt=100\text{ A}/\mu\text{s}$ , $V_{DD}=120\text{ V}$ , $T_j=150\text{ }^\circ\text{C}$	-	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 $\mu\text{s}$ , duty cycle 1.5%

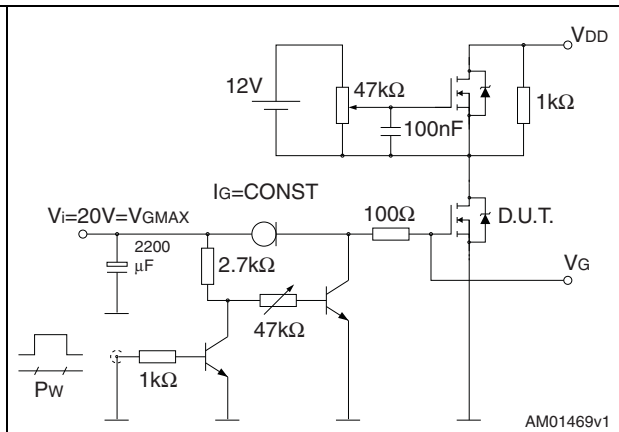
### 3 Test circuits

**Figure 2. Switching times test circuit for resistive load**



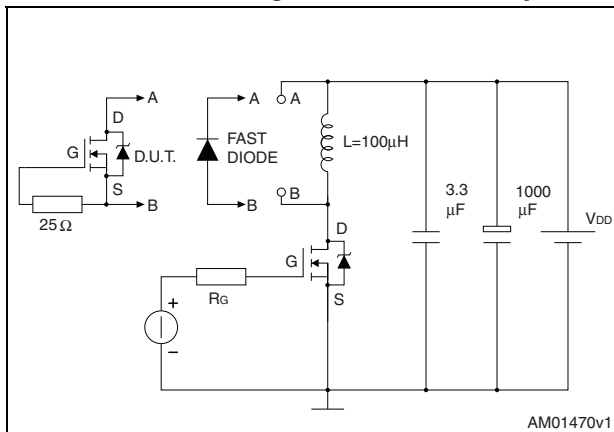
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**Figure 3. Gate charge test circuit**



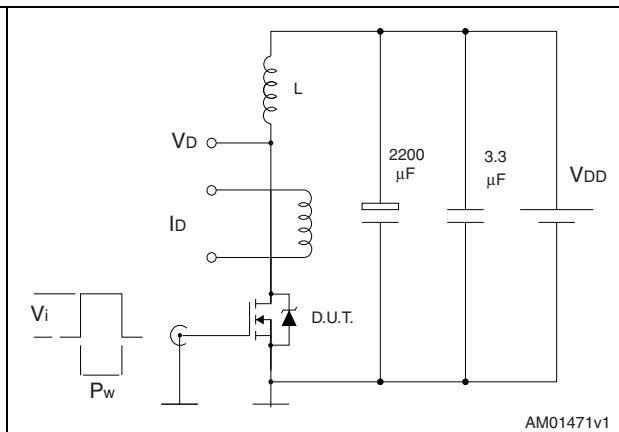
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**Figure 4. Test circuit for inductive load switching and diode recovery times**



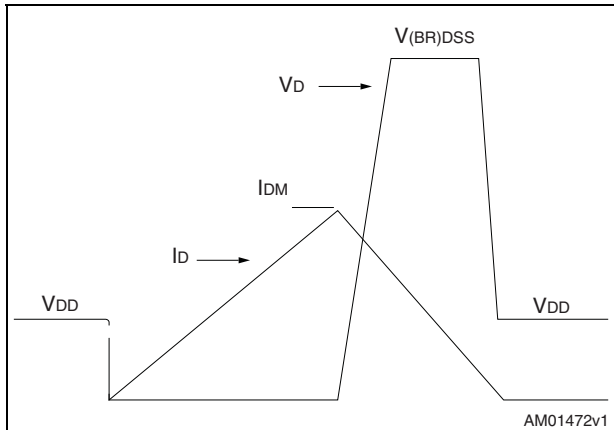
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**Figure 5. Unclamped inductive load test circuit**



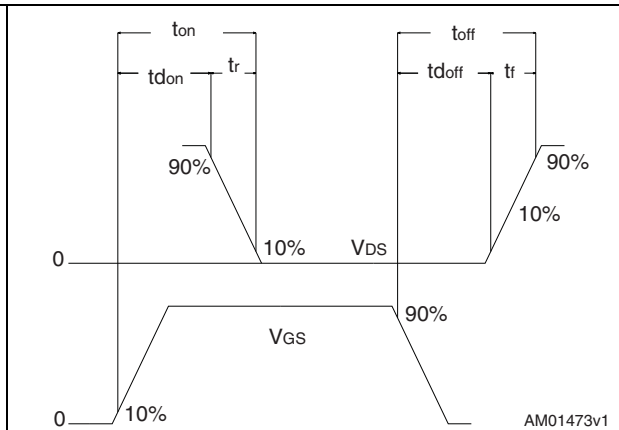
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**Figure 6. Unclamped inductive waveform**



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**Figure 7. Switching time waveform**



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## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

Table 8. PowerFLAT™ 5x6 type S-C mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D		5.20	
E		6.15	
D2	4.11		4.31
E2	3.50		3.70
e		1.27	
e1		0.65	
L	0.715		1.015
K	1.05		1.35



Figure 8. PowerFLAT™ 5x6 type S-C drawing

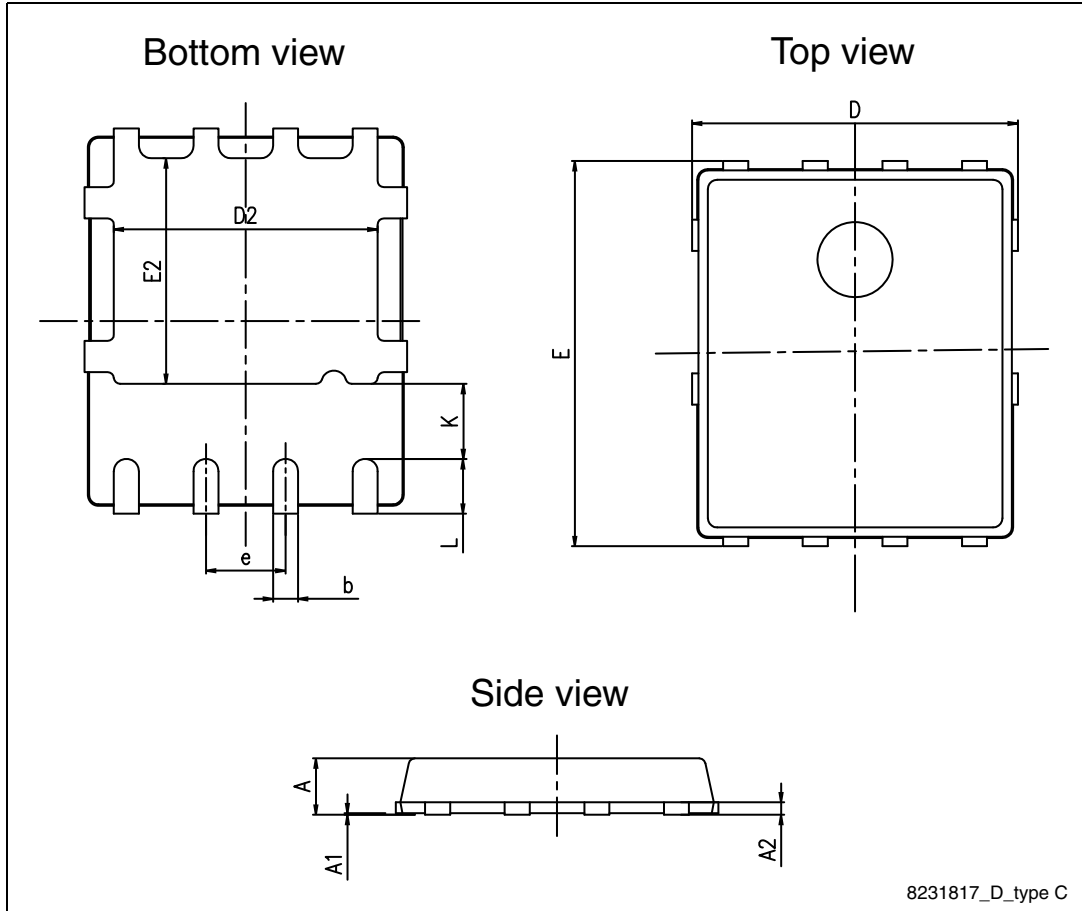
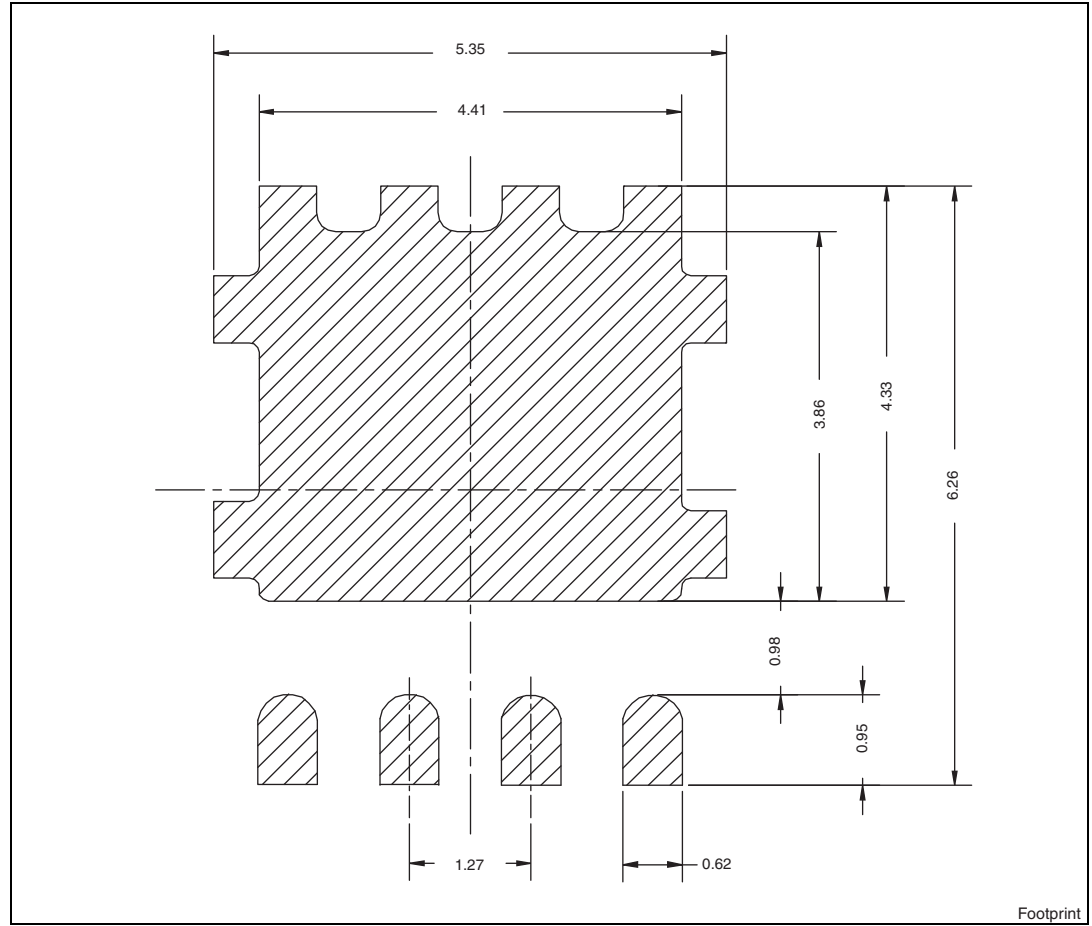


Figure 9. Recommended footprint



## 5 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
27-Sep-2011	1	First release.
22-Nov-2011	2	Updated test conditions for Gate charge in <a href="#">Table 5: Dynamic</a> .

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