



STL75N8LF6

N-channel 80 V, 5.6 mΩ, 18 A, PowerFLAT™ 5x6
STripFET™ VI DeepGATE™ Power MOSFET

Features

Order code	V _{DSS}	R _{DS(on) max}	I _D
STL75N8LF6	80 V	< 7.4 mΩ	18 A ⁽¹⁾

1. The value is rated according R_{thj-pcb}

- R_{DS(on)} * Q_g industry benchmark
- Extremely low on-resistance R_{DS(on)}
- High avalanche ruggedness
- Low gate drive power losses

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.



Figure 1. Internal schematic diagram

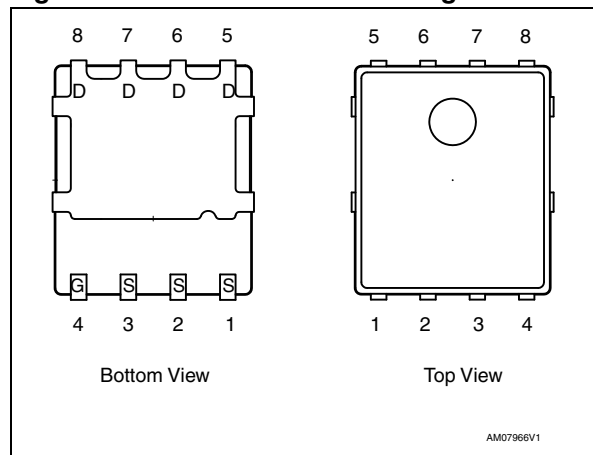


Table 1. Device summary

Order code	Marking	Package	Packaging
STL75N8LF6	75N8LF6	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	80	V
V_{GS}	Gate-source voltage	+20 / -16	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ °C}$	75	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ °C}$	50	A
$I_D^{(2)}$	Drain current (continuous) at $T_{pcb} = 25\text{ °C}$	18	A
$I_D^{(3)}$	Drain current (continuous) at $T_{pcb}=100\text{ °C}$	11	A
$I_{DM}^{(3)}$	Drain current (pulsed)	72	A
$P_{TOT}^{(1)}$	Total dissipation at $T_C = 25\text{ °C}$	80	W
$P_{TOT}^{(3)}$	Total dissipation at $T_{pcb} = 25\text{ °C}$	4	W
	Derating factor	0.03	W/°C
T_J	Operating junction temperature	-55 to 175	°C
T_{stg}	Storage temperature		

1. The value is rated according to $R_{thj-case}$
2. The value is rated according to $R_{thj-pcb}$
3. Pulse width limited by safe operating area

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case (drain, steady state)	1.56	°C/W
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-ambient	31.3	°C/W

1. When mounted on FR-4 board of 1inch², 2oz Cu, $t < 10\text{ sec}$

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current, (pulse width limited by $T_J\text{ Max}$)	18	A
E_{AS}	Single pulse avalanche energy (starting $T_J = 25\text{ °C}$, $I_D = I_{AV}$, $V_{DD} = 50\text{ V}$)	670	mJ

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage ($V_{GS} = 0$)	$I_D = 250\ \mu A$	80			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 80\text{ V}$, $V_{DS} = 80\text{ V}$, $T_C = 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = +20 / -16\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu A$	1			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 9\text{ A}$ $V_{GS} = 5\text{ V}$, $I_D = 9\text{ A}$		5.6 6	7.4 8.2	$m\Omega$ $m\Omega$

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	6895	-	pF
C_{oss}	Output capacitance			516		pF
C_{rss}	Reverse transfer capacitance			207		pF
Q_g	Total gate charge	$V_{DD} = 40\text{ V}$, $I_D = 18\text{ A}$	-	51	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 4.5\text{ V}$		14		nC
Q_{gd}	Gate-drain charge	(see Figure 14)		17		nC
R_G	Gate input resistance	$f = 1\text{ MHz}$ Gate DC Bias = 0 Test signal level = 20 mV open drain	-	1.52	-	Ω

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
$t_{d(on)}$	Turn-on delay time	$V_{DD}=40\text{ V}$, $I_D=9\text{ A}$, $R_G=4.7\ \Omega$, $V_{GS}=10\text{ V}$ <i>(see Figure 13)</i>		17		ns	
t_r	Rise time			14		ns	
$t_{d(off)}$	Turn-off delay time			-	112	-	ns
t_f	Fall time				26		ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit	
I_{SD}	Source-drain current				18	A	
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		72	A	
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD}=18\text{ A}$, $V_{GS}=0$	-		1.1	V	
t_{rr}	Reverse recovery time	$I_{SD}=18\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$, $V_{DD}=63\text{ V}$		37		ns	
Q_{rr}	Reverse recovery charge			-	49		nC
I_{RRM}	Reverse recovery current				2.7		A

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

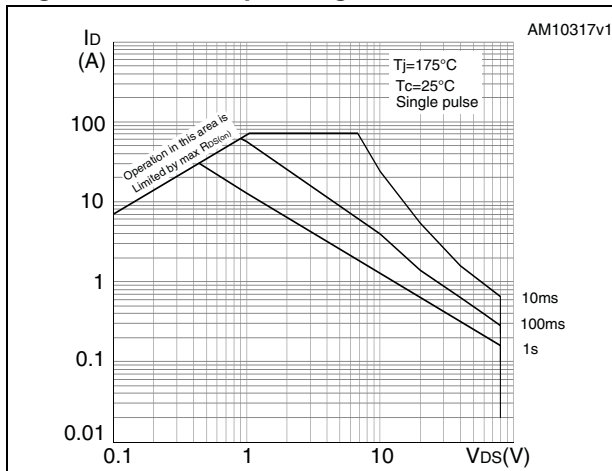


Figure 3. Thermal impedance

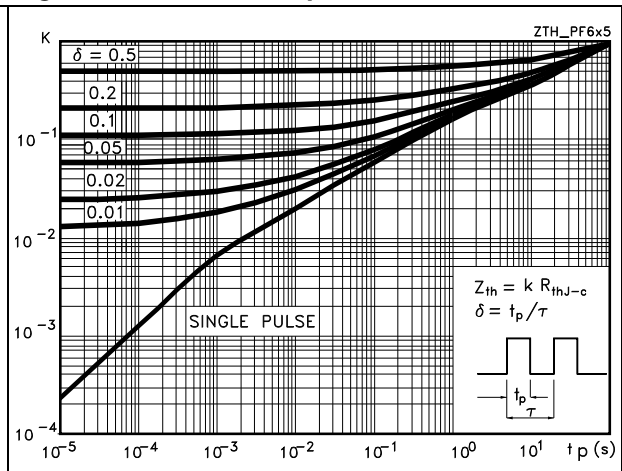


Figure 4. Output characteristics

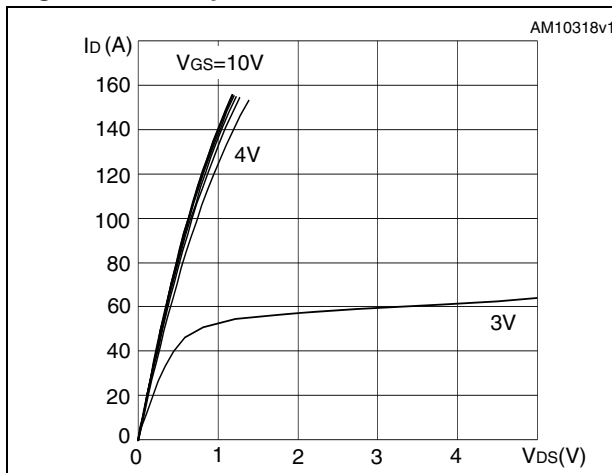


Figure 5. Transfer characteristics

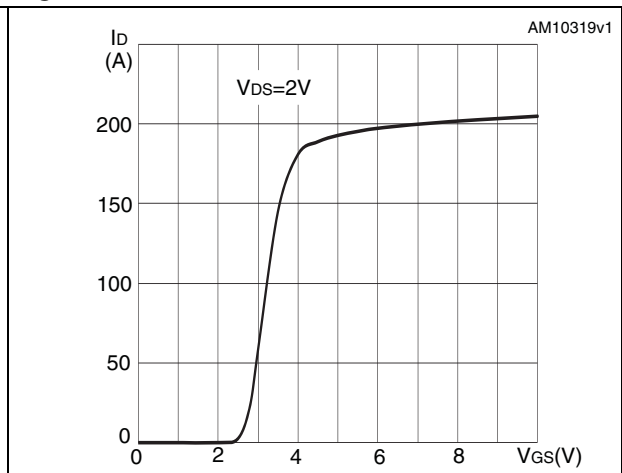


Figure 6. Normalized BV_{DSS} vs temperature

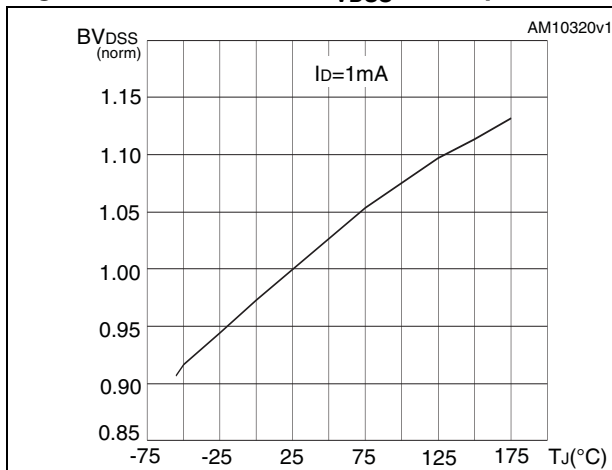


Figure 7. Static drain-source on resistance

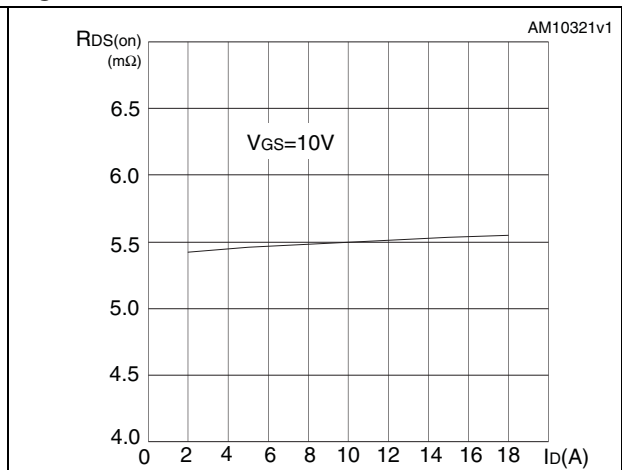


Figure 8. Gate charge vs gate-source voltage **Figure 9. Capacitance variations**

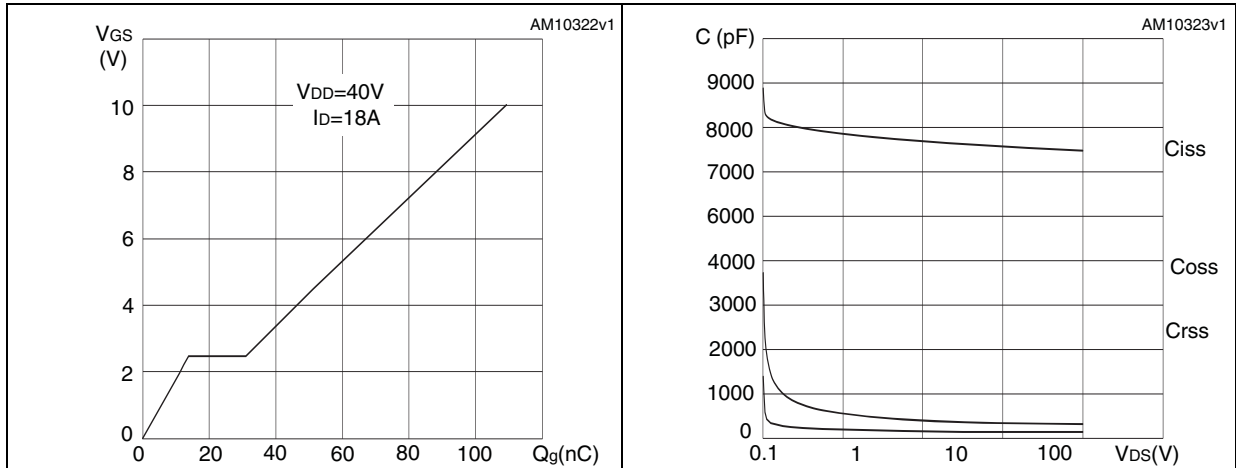


Figure 10. Normalized gate threshold voltage vs temperature **Figure 11. Normalized on resistance vs temperature**

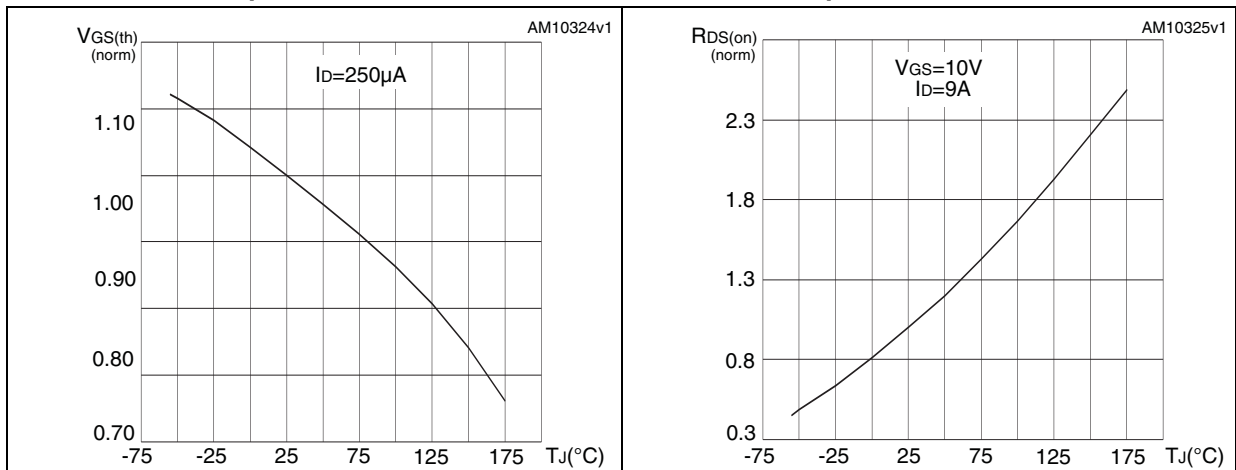
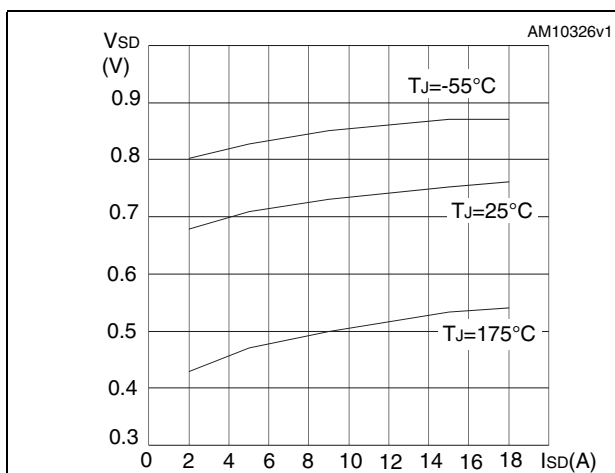
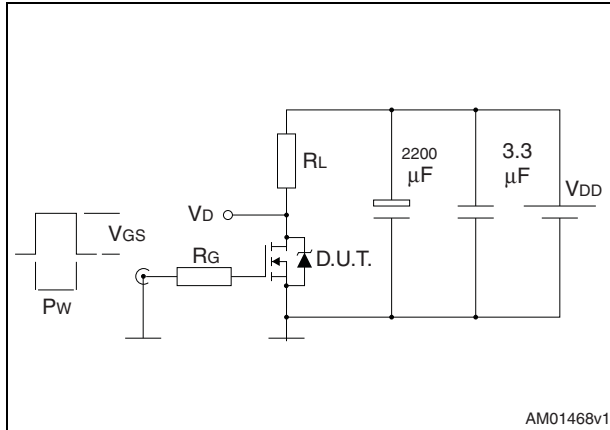


Figure 12. Source-drain diode forward characteristics



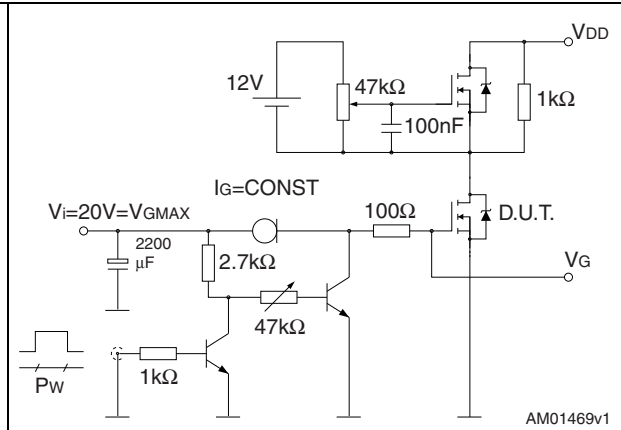
3 Test circuits

Figure 13. Switching times test circuit for resistive load



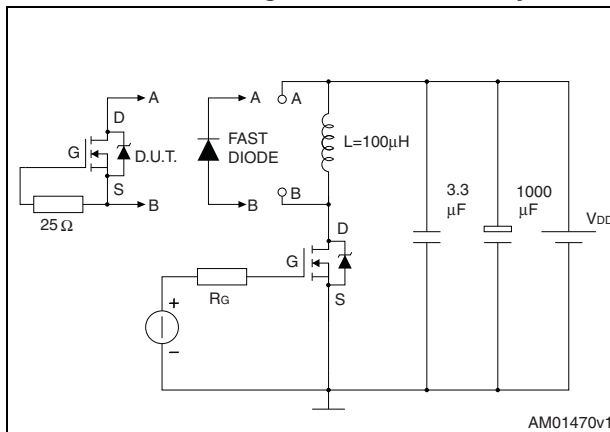
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Figure 14. Gate charge test circuit



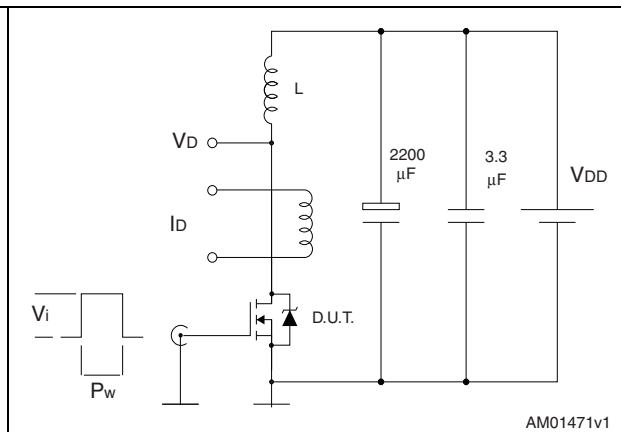
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Figure 15. Test circuit for inductive load switching and diode recovery times



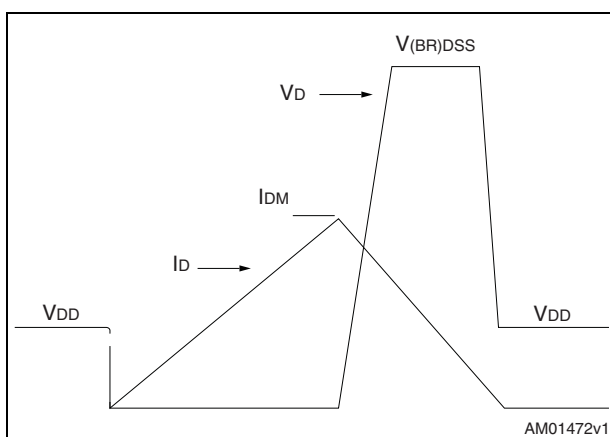
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Figure 16. Unclamped inductive load test circuit



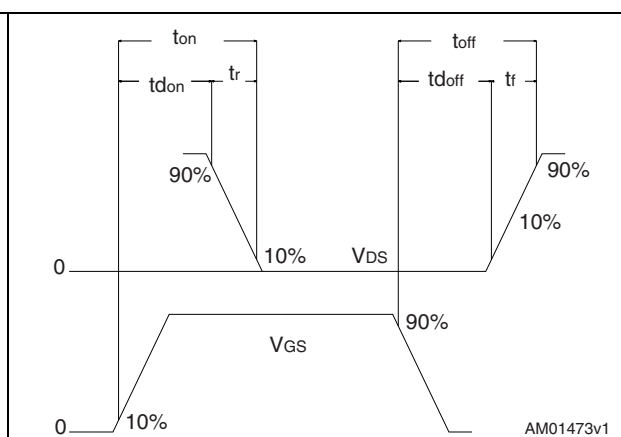
AM01471v1

Figure 17. Unclamped inductive waveform



AM01472v1

Figure 18. Switching time waveform



AM01473v1

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.

Table 9. PowerFLAT™ 5x6 type C-B mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80	0.83	0.93
A1	0	0.02	0.05
A3		0.20	
b	0.35	0.40	0.47
D		5.00	
D1		4.75	
D2	4.15	4.20	4.25
E		6.00	
E1		5.75	
E2	3.43	3.48	3.53
E4	2.58	2.63	2.68
e		1.27	
L	0.70	0.80	0.90

Figure 19. PowerFLAT™ 5x6 type C-B drawing

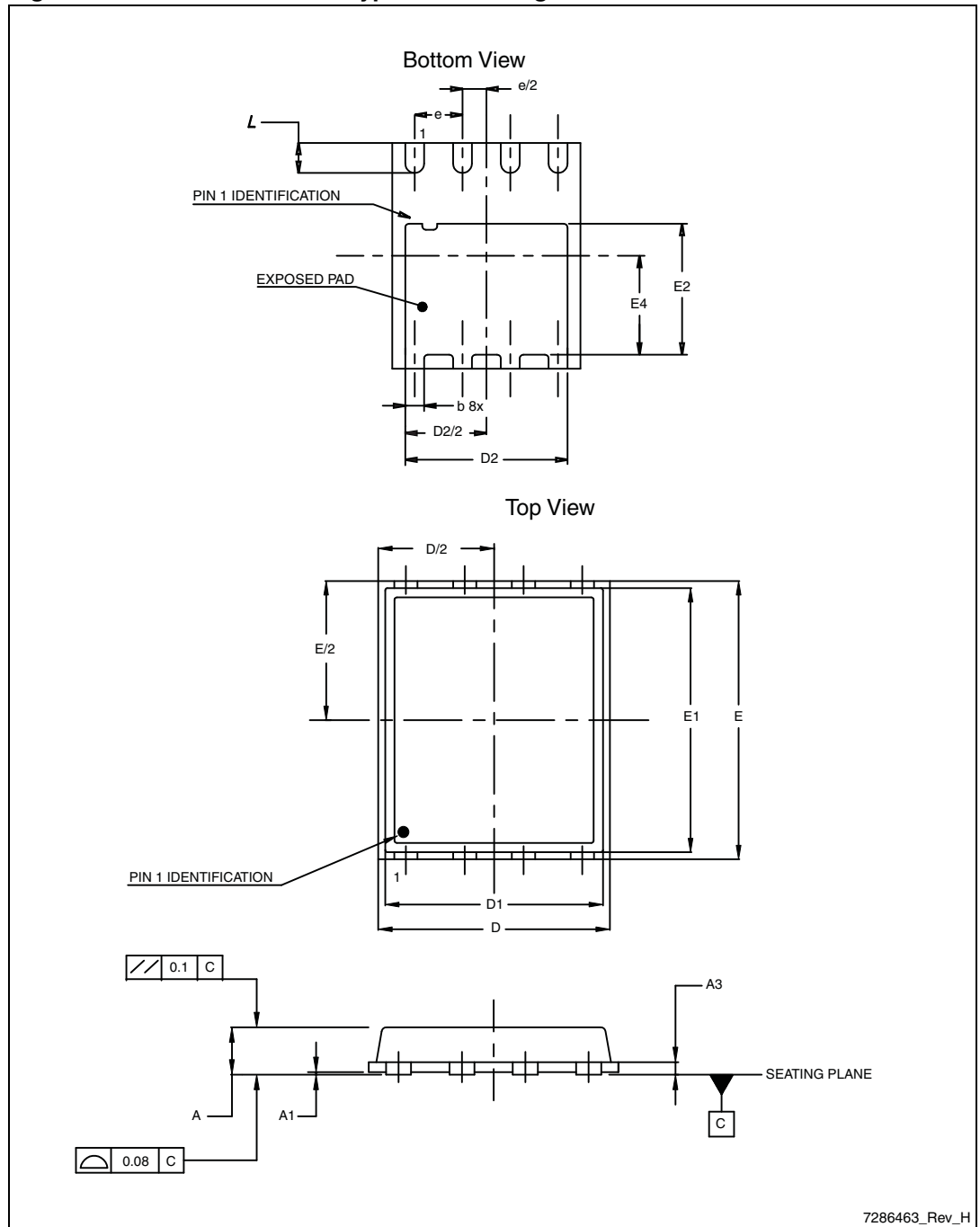


Table 10. PowerFLAT™ 5x6 type S-C mechanical data

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 20. PowerFLAT™ 5x6 type S-C mechanical data

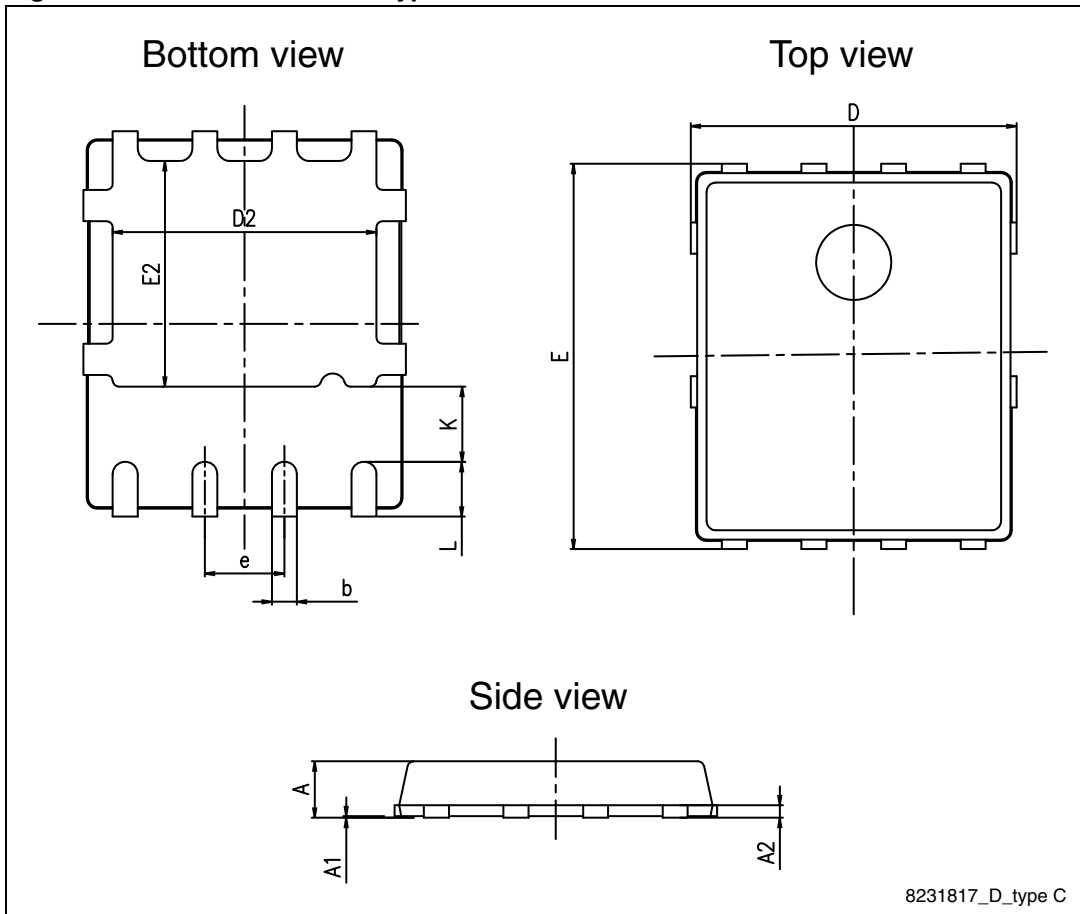
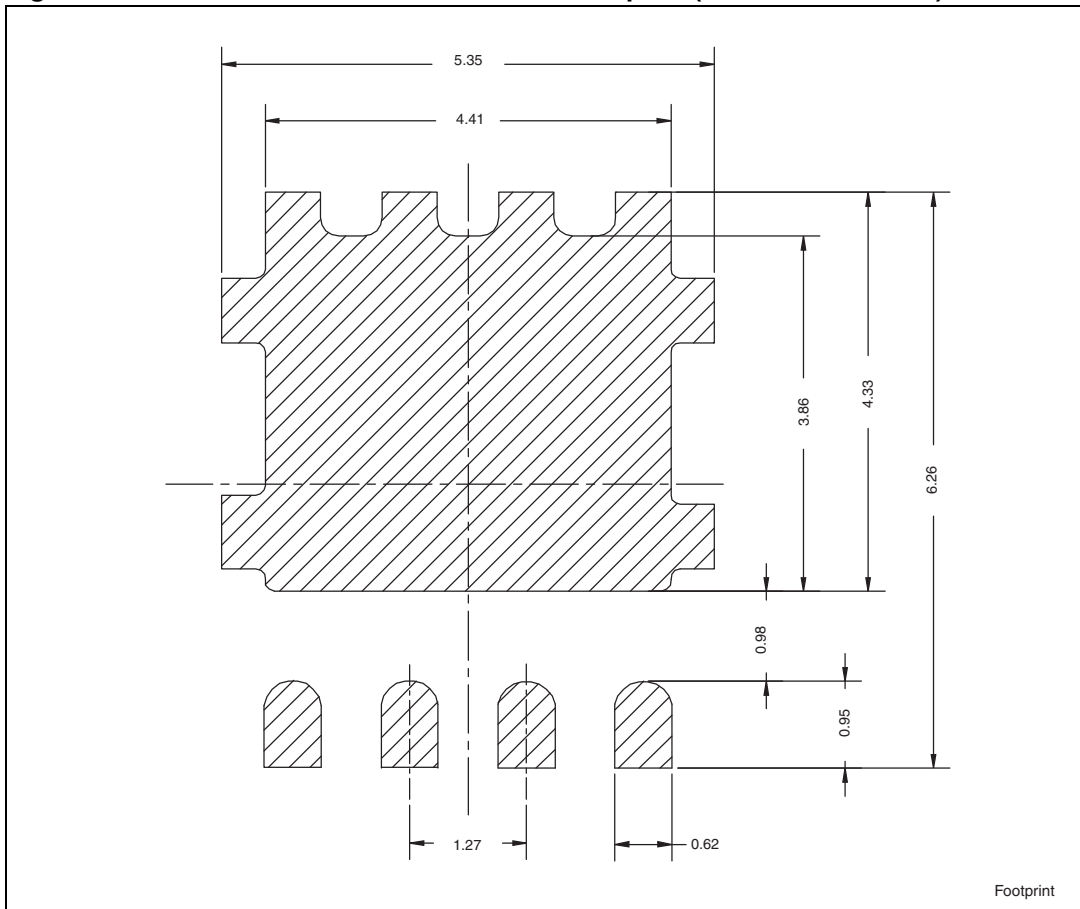


Figure 21. PowerFLAT™ 5x6 recommended footprint (dimensions in mm)



5 Revision history

Table 11. Document revision history

Date	Revision	Changes
11-May-2011	1	First release.
08-Jul-2011	2	Document status promoted from preliminary data to datasheet.
10-Nov-2011	3	Section 4: Package mechanical data has been updated.

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