STL65N3LLH5

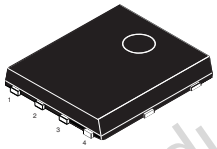
N-channel 30 V, 0.0048 Ω, 19 A, PowerFLAT™ 5x6 STripFET™ V Power MOSFET

Features

Order code	V_{DSS}	$R_{DS(on)}$ max	I_D
STL65N3LLH5	30 V	<0.0058 Ω	19 A (1)

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

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



PowerFLAT™ 5x6

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

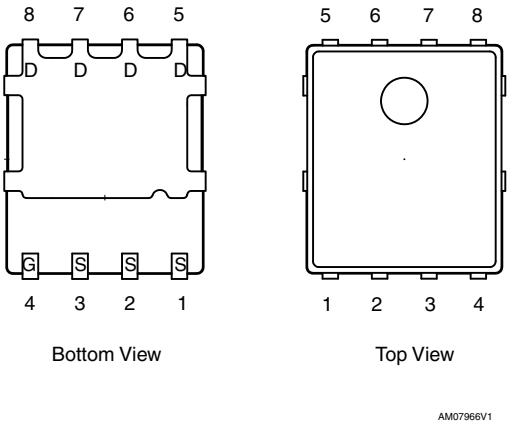


Table 1. Device summary

Order code	Marking	Package	Packaging
STL65N3LLH5	65N3LLH5	PowerFLAT™ 5x6	Tape and reel

Obsolete Product(s) - Obsolete Product(s)

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2.1 Electrical characteristics (curves) 6

3 Test circuits 8

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Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	30	V
V_{GS}	Gate-source voltage	± 22	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	65	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	41	A
I_D (2)	Drain current (continuous) at T_{pcb} = 25 °C	19	A
I_D (2)	Drain current (continuous) at T_{pcb}=100°C	11.8	A
I_{DM} (3)	Drain current (pulsed)	76	A
P_{TOT} (1)	Total dissipation at T_C = 25°C	60	W
P_{TOT} (2)	Total dissipation at T_{pcb} = 25°C	4	W
	Derating factor	0.03	W/°C
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 150	°C

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

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	2.08	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb	31.3	°C/W

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

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current, (pulse width limited by Tj Max)	8.5	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AV} , V_{DD} = 24 V)	180	mJ

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250 µA, V_{GS}= 0	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 30 V, V_{DS} = 30 V at T_C= 125 °C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±22 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	1	1.65	2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 9.5 A V_{GS}= 4.5 V, I_D= 9.5 A		0.0048 0.006	0.0058 0.0075	Ω Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25 V, f=1 MHz, V_{GS}=0	-	1500 295 39	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=15 V, I_D = 19 A V_{GS} =4.5 V *(see Figure 14)*	-	12 4 4.7	-	nC nC nC

Obsolete Product(s) - Obsolete Product(s)

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD}=15 V, I_D= 9.5 A, R_G=4.7 Ω, V_{GS}=10 V *(see Figure 13)*	-	9.3 14.5 22.7 4.5	-	ns ns ns ns

Table 8. 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)		-		76	A
V_{SD}(2)	Forward on voltage	I_{SD} = 19 A, V_{GS}=0	-		1.1	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 19 A, di/dt = 100 A/µs, V_{DD}=25 V, Tj=150 °C	-	25 17.5 1.4		ns nC A

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

Obsolete Product(s) - Obsolete Product(s)

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

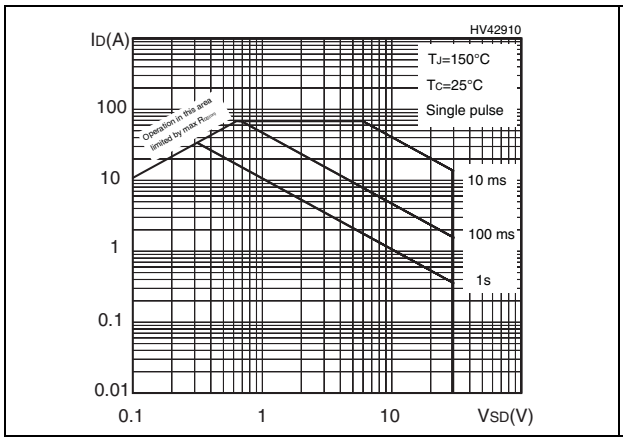


Figure 3. Thermal impedance

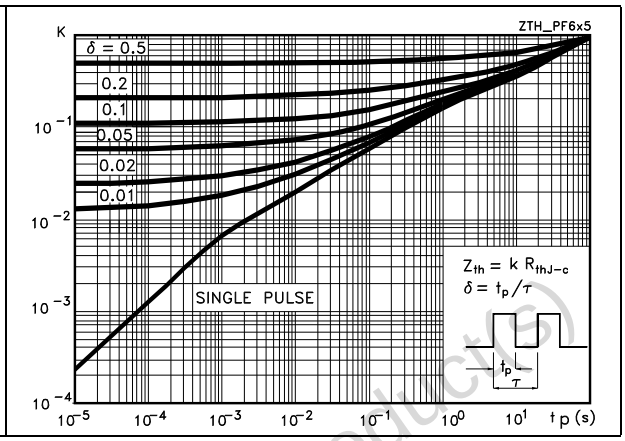


Figure 4. Output characteristics

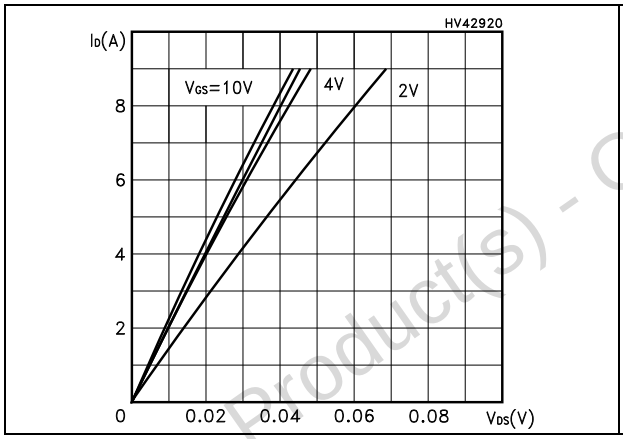


Figure 5. Transfer characteristics

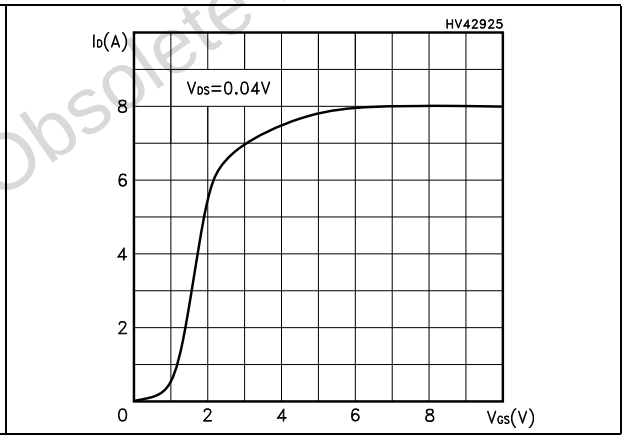


Figure 6. Normalized B_{VDSS} vs temperature

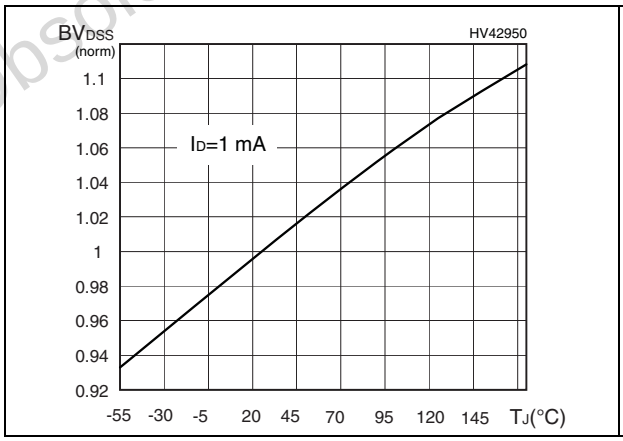
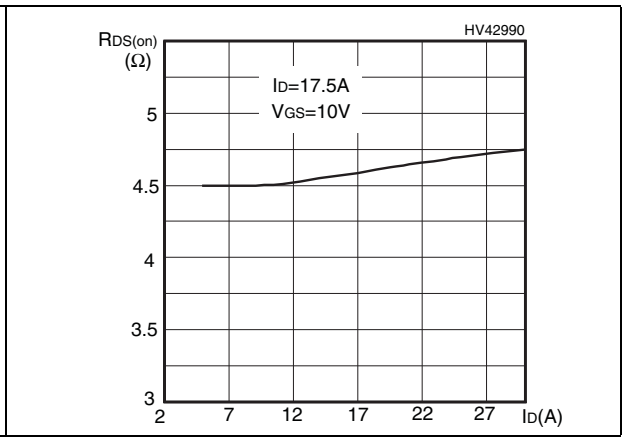


Figure 7. Static drain-source on resistance



Obsolete Product(s) - Obsolete Product(s)

Figure 8. Gate charge vs gate-source voltage

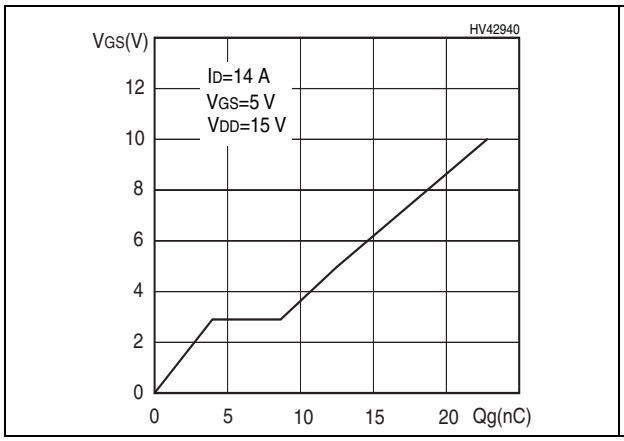


Figure 9. Capacitance variations

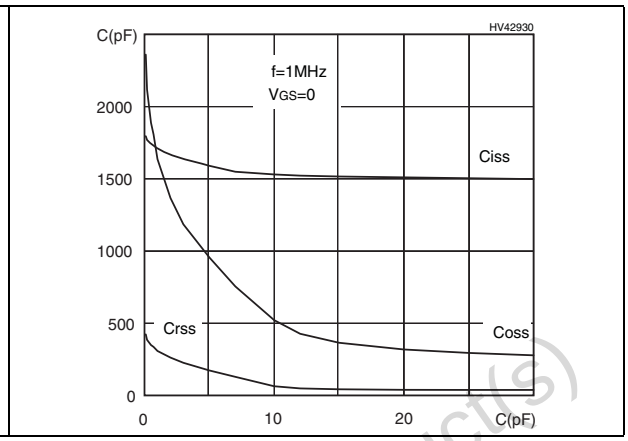


Figure 10. Normalized gate threshold voltage vs temperature

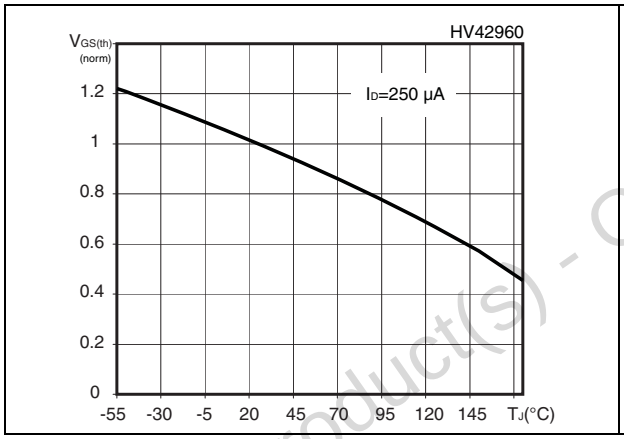


Figure 11. Normalized on resistance vs temperature

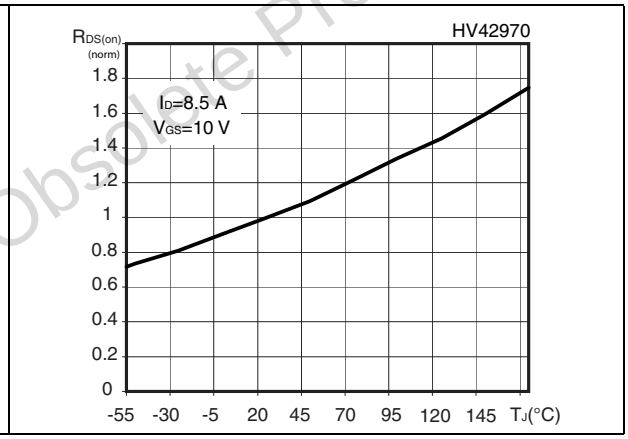
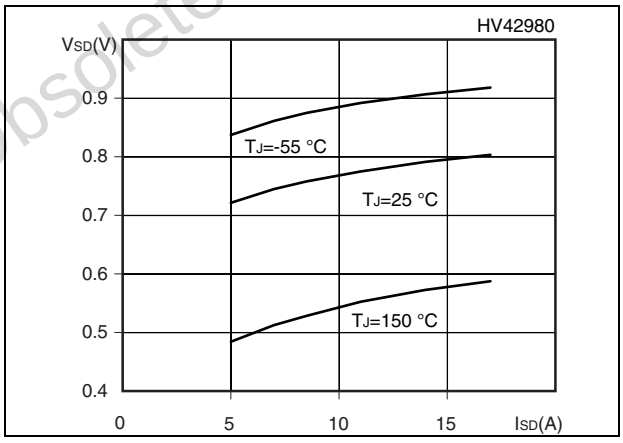


Figure 12. Source-drain diode forward characteristics



Obsolete Product(s) - Obsolete Product(s)

3 Test circuits

Figure 13. Switching times test circuit for resistive load

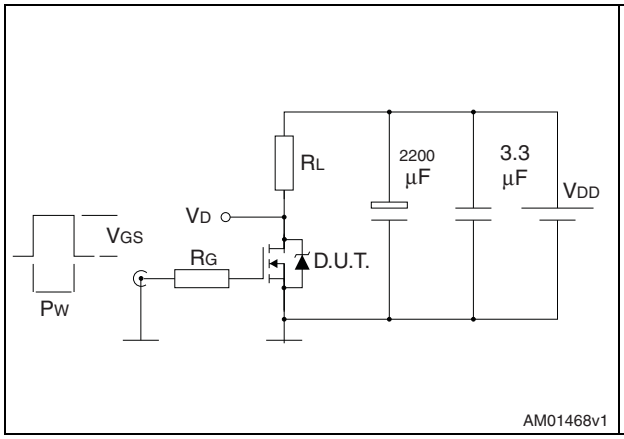


Figure 14. Gate charge test circuit

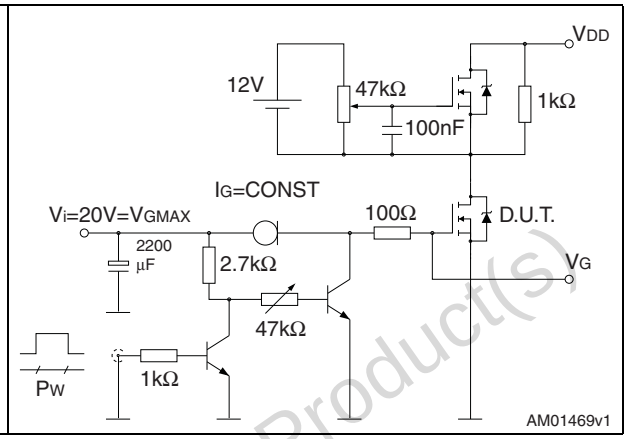


Figure 15. Test circuit for inductive load switching and diode recovery times

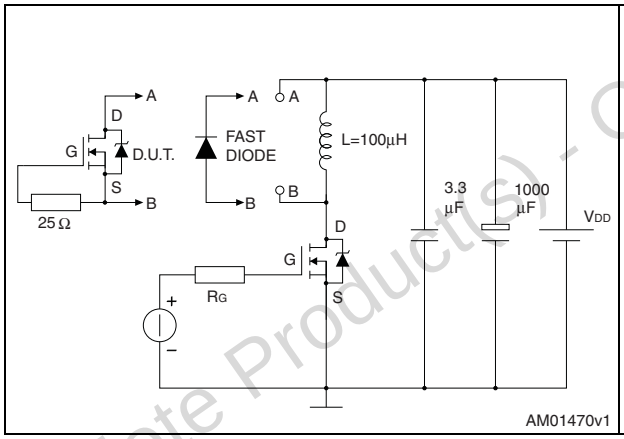


Figure 16. Unclamped inductive load test circuit

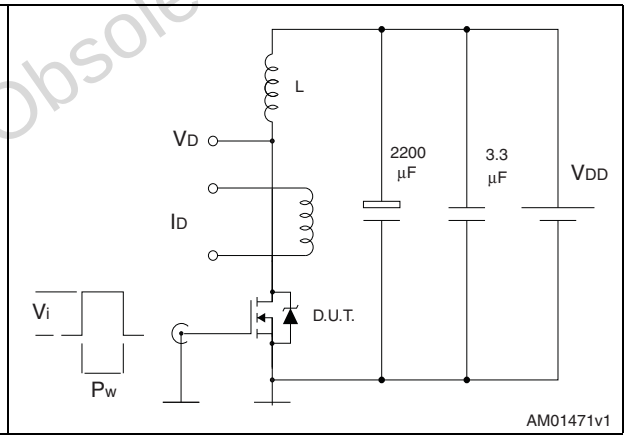


Figure 17. Unclamped inductive waveform

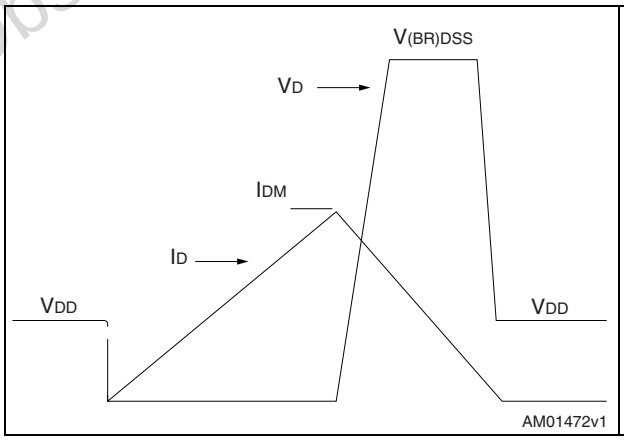
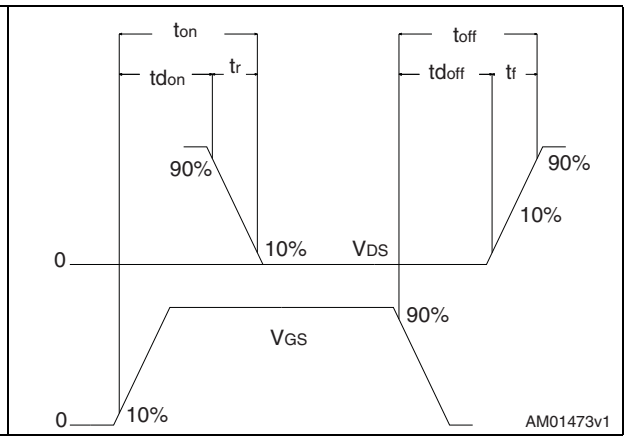


Figure 18. Switching time waveform



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4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® 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.

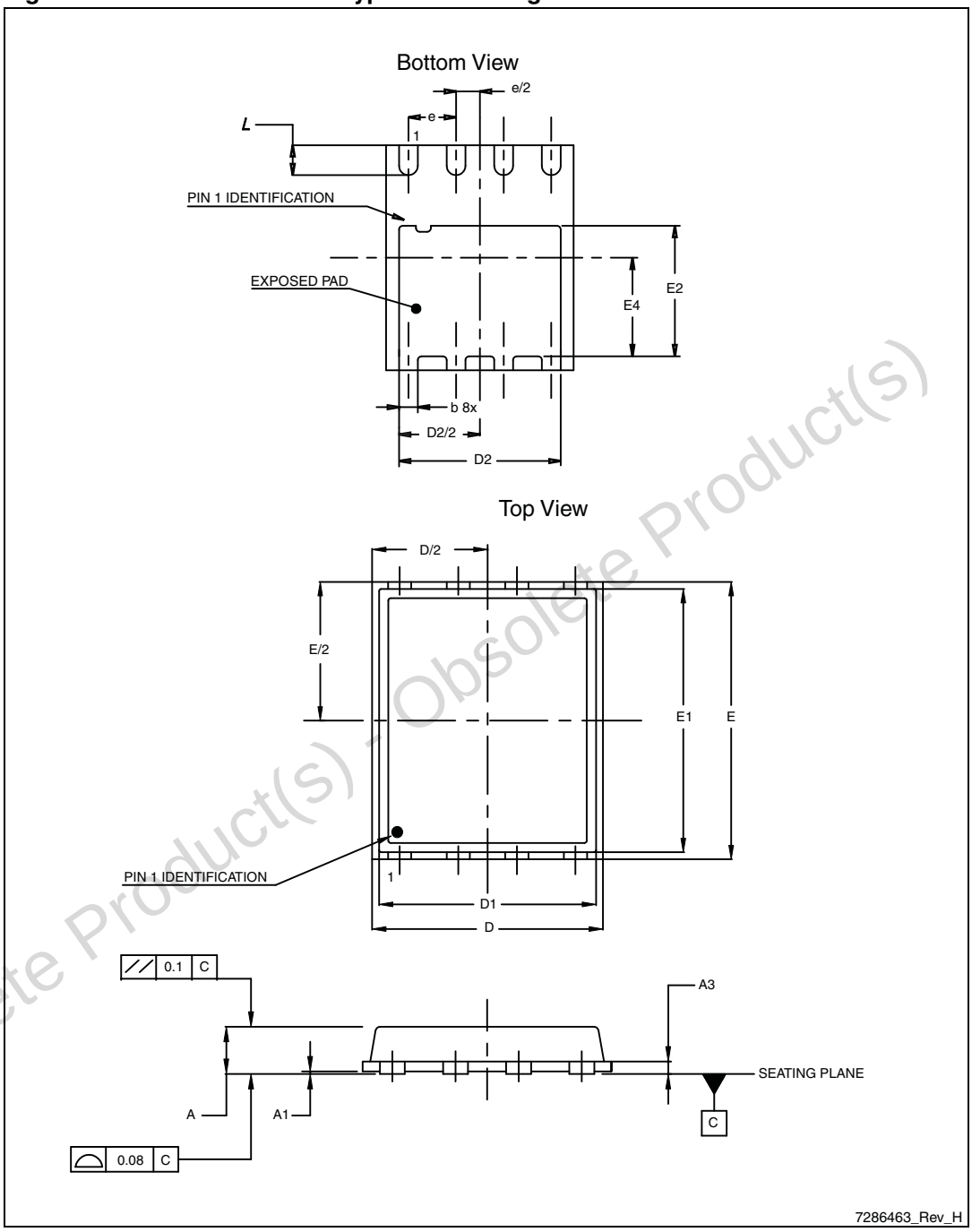
Obsolete Product(s) - Obsolete Product(s)

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

Obsolete Product(s) - Obsolete Product(s)

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



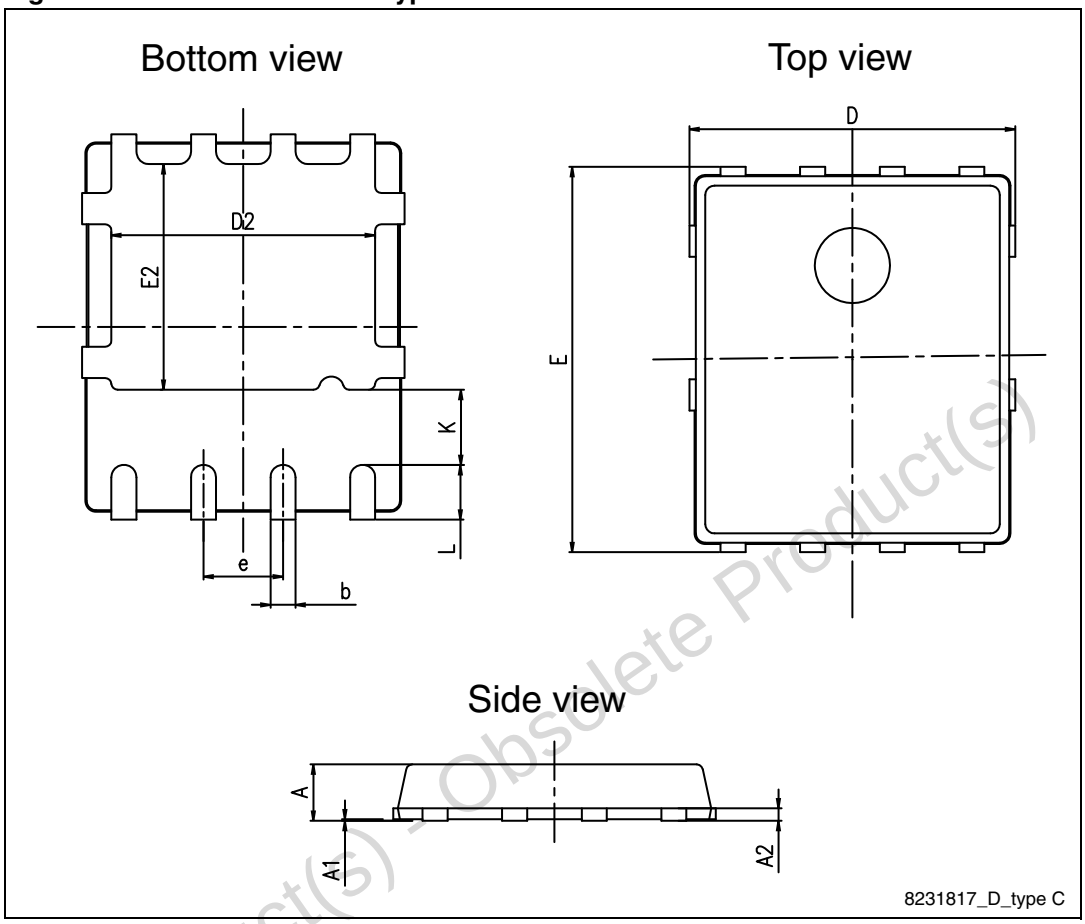
Obsolete Product(s) - Obsolete Product(s)

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

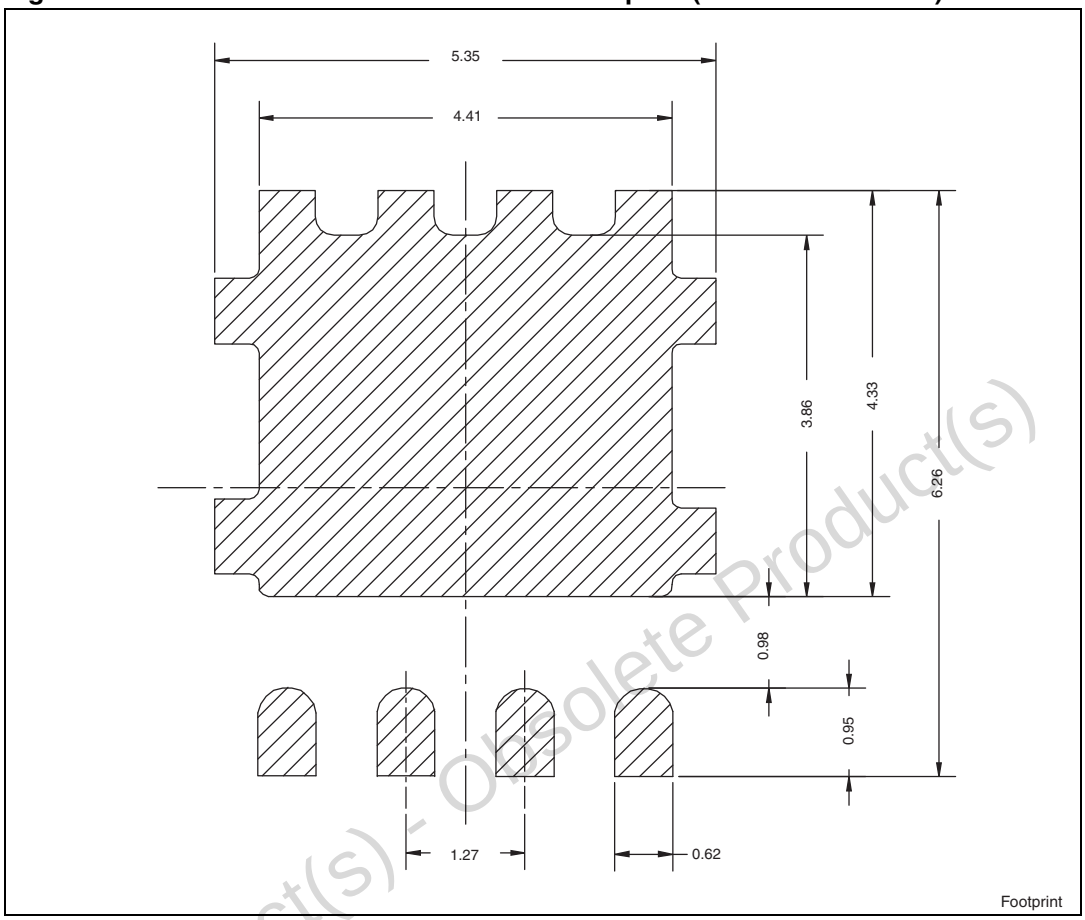
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Figure 20. PowerFLAT™ 5x6 type S-C mechanical data



Obsolete Product(s) - Obsolete Product(s)

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



Obsolete Product(s) - Obsolete Product(s)

5 Revision history

Table 11. Document revision history

Date	Revision	Changes
04-Jan-2007	1	First release
01-Apr-2008	2	Document status promoted from preliminary data to datasheet.
07-May-2008	3	Updated *Figure 9: Capacitance variations*.
23-Sep-2008	4	V_{GS} value has been changed on *Table 2* and *Table 5*.
02-Dec-2011	5	*Figure 7: Static drain-source on resistance* has been modified. *Section 4: Package mechanical data* has been updated. Minor text changes.

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