STL35N75LF3

N-channel 75 V, 20 mΩ typ., 32 A STripFET™ F3 Power MOSFET in a PowerFLAT™ 3.3x3.3 package

Datasheet - production data

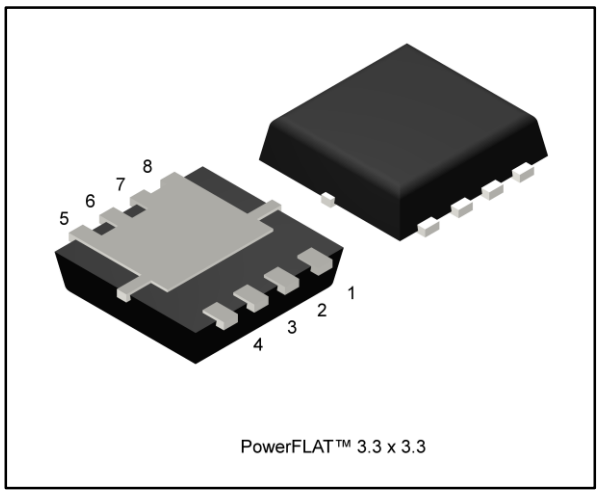
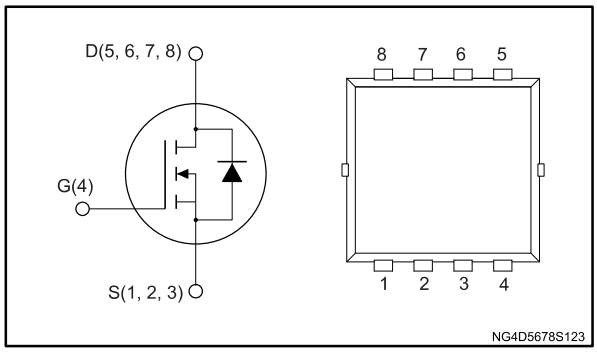


Figure 1: Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D	P_{TOT}
STL35N75LF3	75 V	25 mΩ	32 A	50 W

- Low gate charge
- Low threshold voltage device

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using STripFET™ F3 technology. It is designed to minimize on-resistance and gate charge to provide superior switching performance.

Table 1: Device summary

Order code	Marking	Package	Packing
STL35N75LF3	35N75	PowerFLAT™ 3.3x3.3	Tape and reel

Contents

1 Electrical ratings 3
2 Electrical characteristics 4
2.1 Electrical characteristics (curves) 6
3 Test circuits 8
4 Package information 9
4.1 PowerFLAT™ 3.3x3.3 package information 10
5 Revision history 13

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	75	V
V_{GS}	Gate-source voltage	±20	V
I_D (1)	Drain current (continuous) at T_{case} = 25 °C	32	A
	Drain current (continuous) at T_{case} = 100 °C	20	
I_{DM} (1)(2)	Drain current (pulsed)	128	A
I_D (3)	Drain current (continuous) at T_{pcb} = 25 °C	8	A
	Drain current (continuous) at T_{pcb} = 100 °C	5	
P_{TOT} (1)	Total dissipation at T_{case} = 25 °C	50	W
P_{TOT} (3)	Total dissipation at T_{pcb} = 25 °C	2.9	W
E_{AS} (4)	Single pulse avalanche energy	230	mJ
T_{stg}	Storage temperature range	-55 to 150	°C
T_j	Operating junction temperature range		

Notes:

(1)The value is rated according to $R_{thj\text{-}case}$.

(2) Pulse width is limited by safe operating area.

(3)The value is rated according to $R_{thj\text{-}pcb}$.

(4)Starting T_j = 25 °C, I_D = 6 A, V_{DD} = 50 V.

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case max.	2.5	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb max.	42.8	

Notes:

(1)When mounted on a 1 inch², 2 oz Cu, FR-4 board, t < 10 s.

2 Electrical characteristics

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

Table 4: Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 250 µA	75			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 75 V			1	µA
		V_{GS} = 0 V, V_{DS} = 75 V, T_{case} = 125 °C(1)			10	
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	1		2.4	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 4 A		20	25	mΩ
		V_{GS} = 4.5 V, I_D = 4 A		25	30	mΩ

Notes:

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

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 50 V, f = 1 MHz, V_{GS} = 0 V	-	800	-	pF
C_{oss}	Output capacitance		-	110	-	
C_{rss}	Reverse transfer capacitance		-	15	-	
Q_g	Total gate charge	V_{DD} = 37.5 V, I_D = 8 A, V_{GS} = 4.5 V (see *Figure 14: "Test circuit for gate charge behavior"*)	-	7.5	-	nC
Q_{gs}	Gate-source charge		-	3.2	-	
Q_{gd}	Gate-drain charge		-	3.0	-	

Table 6: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 37.5 V, I_D = 4 A R_G = 4.7 Ω, V_{GS} = 10 V (see *Figure 13: "Test circuit for resistive load switching times"* and *Figure 18: "Switching time waveform"*)	-	6.8	-	ns
t_r	Rise time		-	3	-	
$t_{d(off)}$	Turn-off delay time		-	22.8	-	
t_f	Fall time		-	2.2	-	

Table 7: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}(1)	Forward on voltage	V_{GS} = 0 V, I_{SD} = 8 A	-		1.1	V
t_{rr}	Reverse recovery time	I_{SD} = 8 A, di/dt = 100 A/µs, V_{DD} = 60 V	-	26		ns
Q_{rr}	Reverse recovery charge		-	24		nC
I_{RRM}	Reverse recovery current		-	1.8		A

Notes:

(1) Pulse test: pulse duration = 300 µs, duty cycle 1.5%.

2.1 Electrical characteristics (curves)

Figure 2: Safe operating area

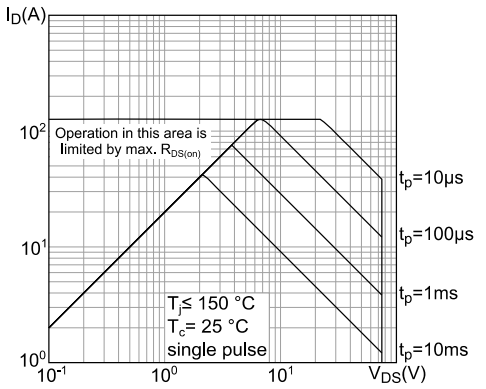


Figure 3: Thermal impedance

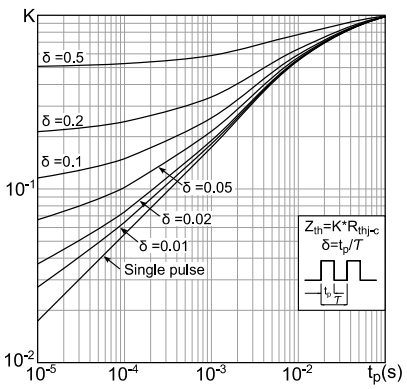


Figure 4: Output characteristics

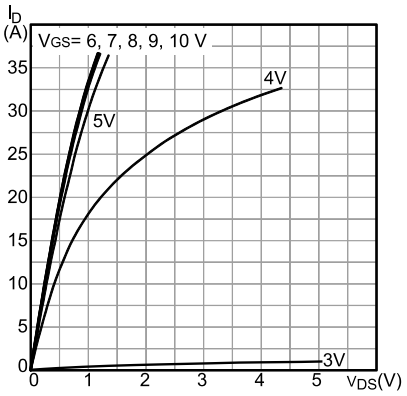


Figure 5: Transfer characteristics

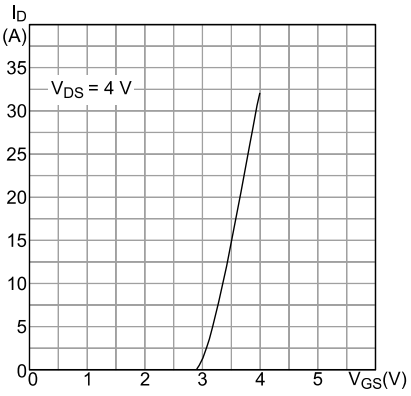


Figure 6: Normalized gate threshold voltage vs. temperature

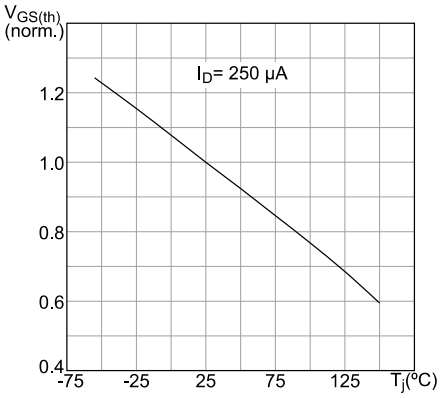


Figure 7: Normalized V(BR)DSS vs. temperature

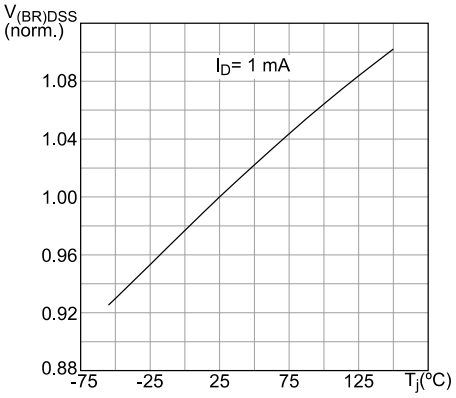


Figure 8: Static drain-source on-resistance

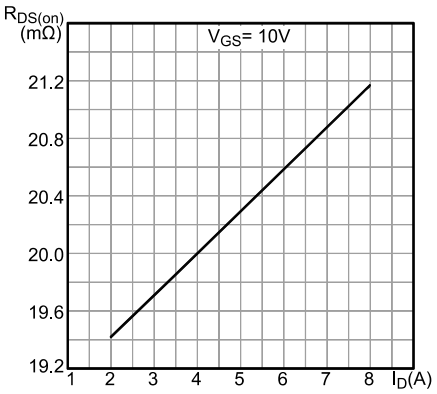


Figure 9: Normalized on-resistance vs. temperature

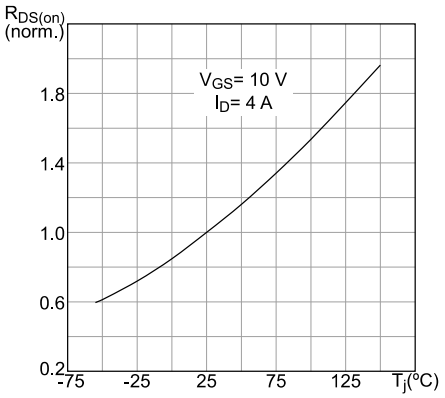


Figure 10: Gate charge vs. gate-source voltage

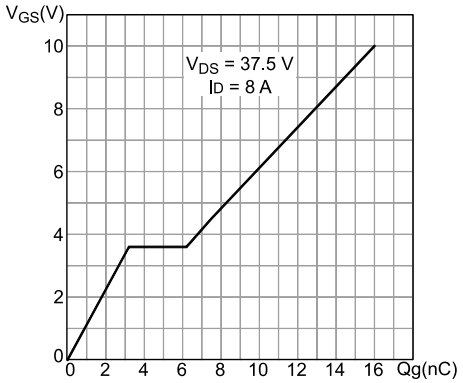


Figure 11: Capacitance variations

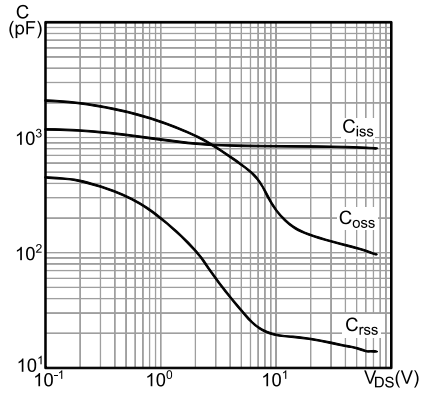
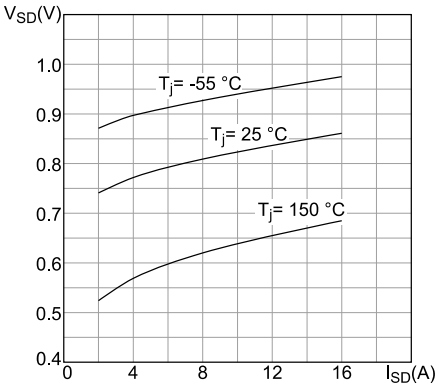


Figure 12: Source-drain diode forward characteristics



3 Test circuits

Figure 13: Test circuit for resistive load switching times

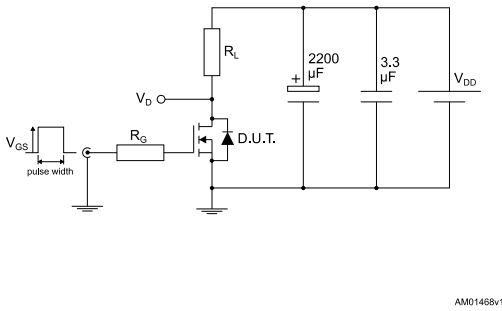


Figure 14: Test circuit for gate charge behavior

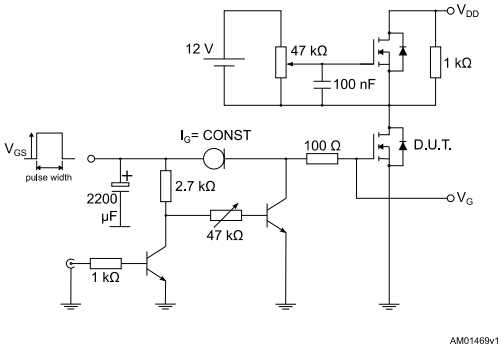


Figure 15: Test circuit for inductive load switching and diode recovery times

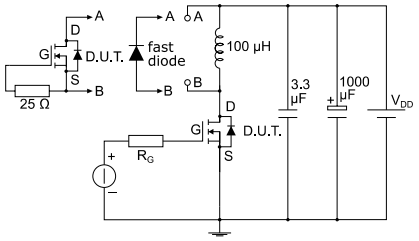


Figure 16: Unclamped inductive load test circuit

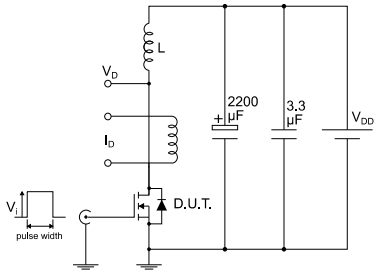


Figure 17: Unclamped inductive waveform

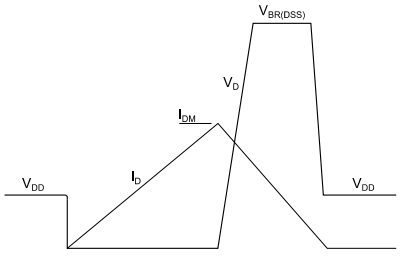
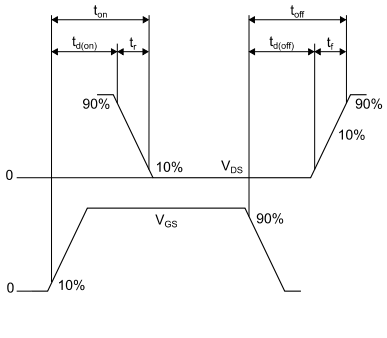


Figure 18: Switching time waveform



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***. ECOPACK® is an ST trademark.

4.1 PowerFLAT™ 3.3x3.3 package information

Figure 19: PowerFLAT™ 3.3x3.3 package outline

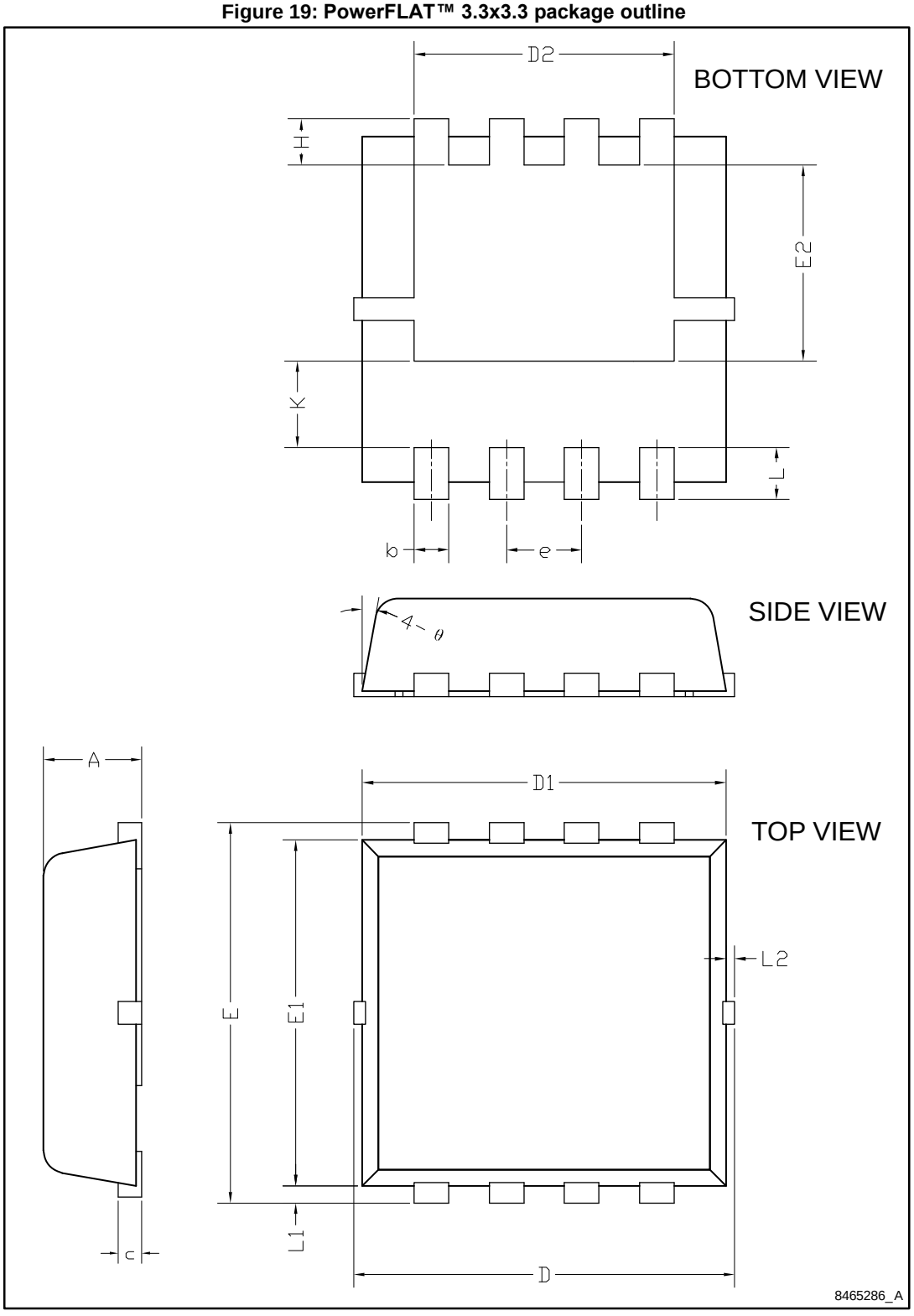
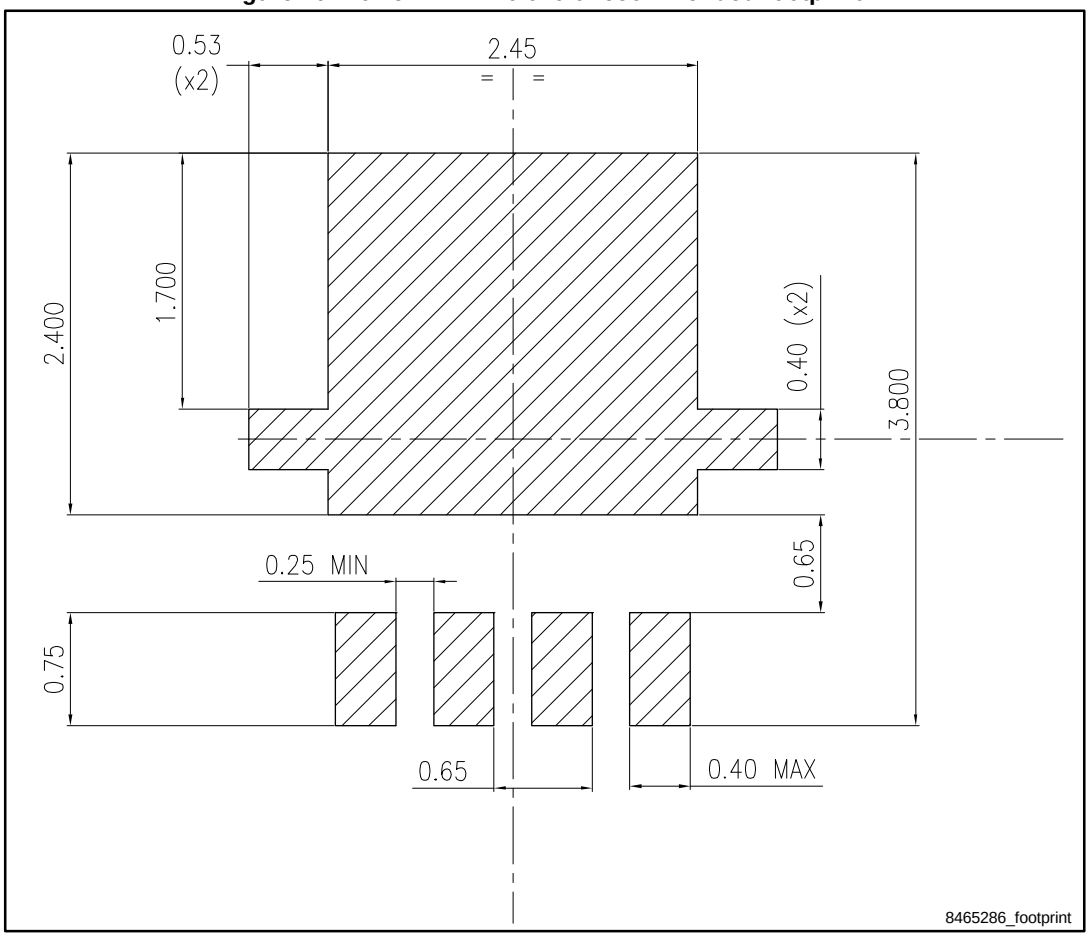


Table 8: PowerFLAT™ 3.3x3.3 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.70	0.80	0.90
b	0.25	0.30	0.39
c	0.14	0.15	0.20
D	3.10	3.30	3.50
D1	3.05	3.15	3.25
D2	2.15	2.25	2.35
e	0.55	0.65	0.75
E	3.10	3.30	3.50
E1	2.90	3.00	3.10
E2	1.60	1.70	1.80
H	0.25	0.40	0.55
K	0.65	0.75	0.85
L	030	0.45	0.60
L1	0.05	0.15	0.25
L2			0.15
θ	8°	10°	12°

Figure 20: PowerFLAT™ 3.3x3.3 recommended footprint



5 Revision history

Table 9: Document revision history

Date	Revision	Changes
16-Jul-2014	1	First release.
12-Nov-2014	2	Document status promoted from preliminary to production data. Added *Section 2.1: Electrical characteristics (curves).* Minor text changes.
27-Jun-2016	3	Updated title and package silhouette in cover page. Updated *Section 1: "Electrical ratings".* Updated *Section 2: "Electrical characteristics".* Updated *Section 2.1: "Electrical characteristics (curves)".* Minor text edits.
08-Aug-2016	4	Updated *Section 2: "Electrical characteristics"*.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.