STL35N6F3

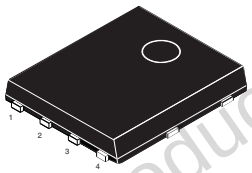
N-channel 60 V, 0.019 Ω 10 A STripFET™ III Power MOSFET in PowerFLAT™ 5x6 package

Datasheet — production data

Features

Order code	V_{DSS}	$R_{DS(on)}$ max	I_D
STL35N6F3	60 V	< 0.022 Ω	10 A

- N-channel enhancement mode
- 100% avalanched rated
- Low gate charge
- Very low on-resistance



PowerFLAT™ 5x6

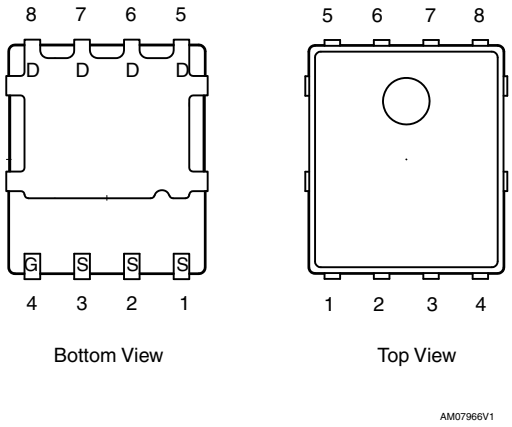
Applications

- Switching applications

Description

This device is an N-channel enhancement mode Power MOSFET produced using STMicroelectronics' STripFET™ III technology, which is specifically designed to minimize on-resistance and gate charge to provide superior switching performance.

Figure 1. Internal schematic diagram



Obsolete Product(s) - Obsolete Product(s)

Table 1. Device summary

Order code	Marking	Package	Packaging
STL35N6F3	35N6F3	PowerFLAT™ 5x6	Tape and reel

This is information on a product in full production. www.st.com

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2 Electrical characteristics 4

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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	60	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	35	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	25	A
I_D (2)	Drain current (continuous) at T_{pcb} = 25 °C	10	A
I_D (2)	Drain current (continuous) at T_{pcb}=100 °C	7	A
I_{DM} (3)	Drain current (pulsed)	100	A
P_{TOT} (1)	Total dissipation at T_C = 25 °C	80	W
P_{TOT} (2)	Total dissipation at T_{pcb} = 25 °C	5	W
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Operating junction temperature		

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 data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb max	31.3	°C/W
$R_{thj\text{-}case}$	Thermal resistance junction-case max.	1.9	°C/W

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

Table 4. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I_{AV}	Not-repetitive avalanche current	5	A
E_{AS}	Single pulse avalanche energy (starting T_j = 25 °C, I_D = I_{AV}, V_{DD} = 50 V)	409	mJ

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

(T_J = 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	60			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 60 V, V_{DS} = 60 V, T_C = 125 °C			1 10	µA µA
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	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS}= 10 V, I_D= 10 A		0.019	0.022	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	-	762 173 16	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 30 V, I_D = 10 A V_{GS} =10 V (see *Figure 13*)	-	13.6 5.0 3.7	-	nC nC nC
R_g	Gate input resistance	f=1 MHz open drain	-	3.2	-	Ω

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}= 30 V, I_D= 5 A, R_G=4.7 Ω, V_{GS}=10 V (see *Figure 12*)	-	9.7 2.9 19 4	-	ns ns ns ns

Table 8. 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} = 10 A, V_{GS} = 0	-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 10 A, di/dt = 100 A/µs, V_{DD}= 48 V, T_J = 150 °C (see *Figure 14*)	-	33 51.2 3.1		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

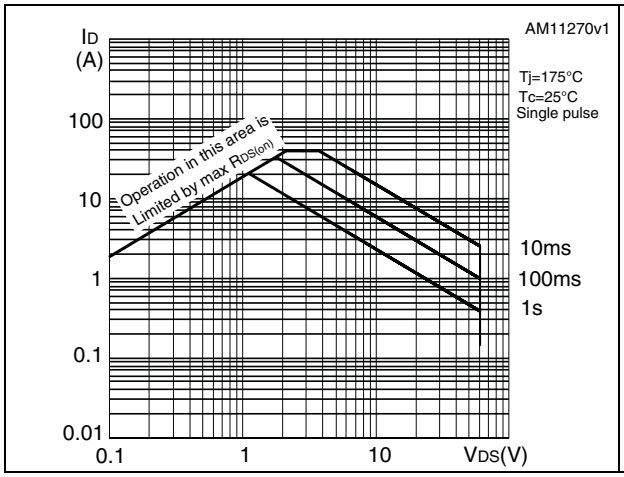


Figure 3. Thermal impedance

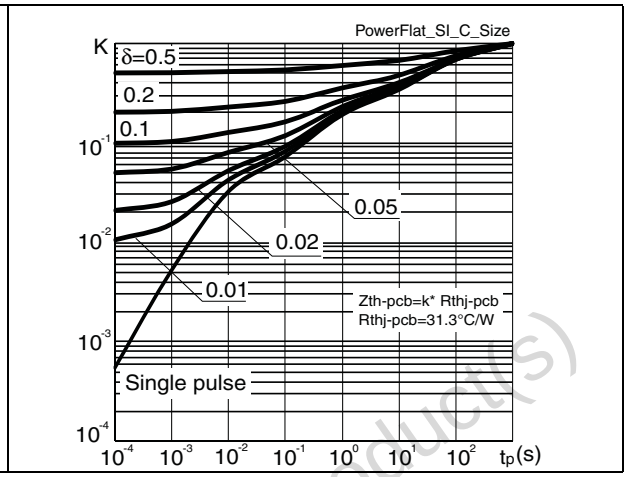


Figure 4. Output characteristics

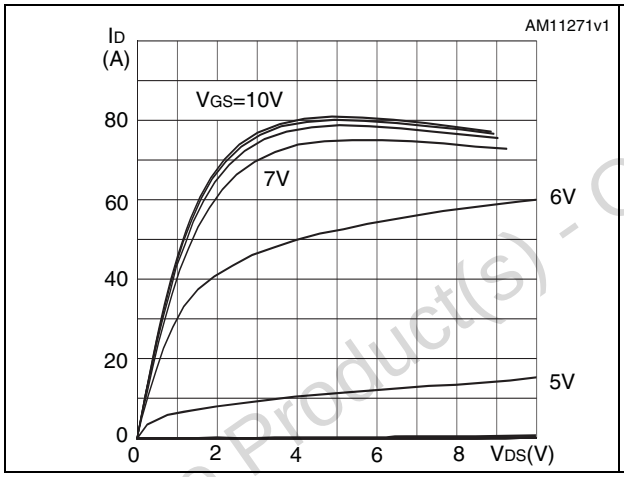


Figure 5. Transfer characteristics

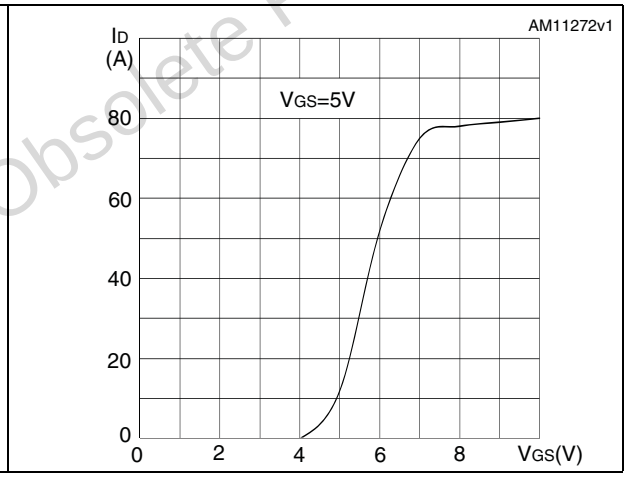


Figure 6. Normalized V_{DS} vs temperature

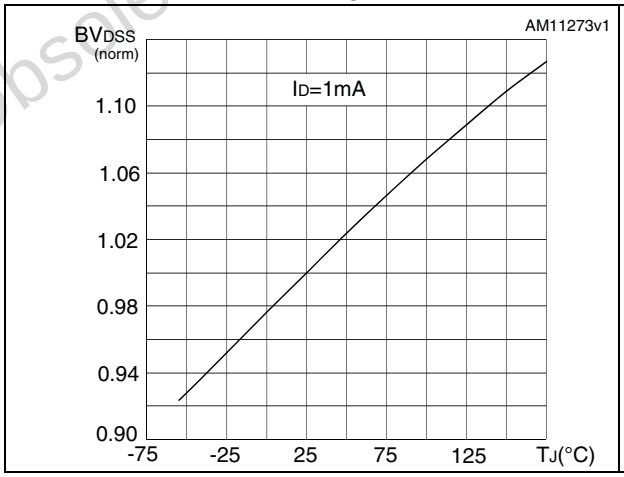
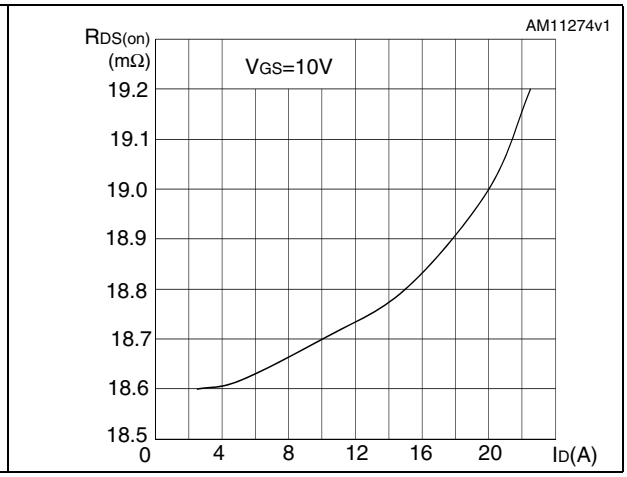


Figure 7. Static drain-source on-resistance



Obsolete Product(s) - Obsolete Product(s)

Figure 8. Gate charge vs gate-source voltage

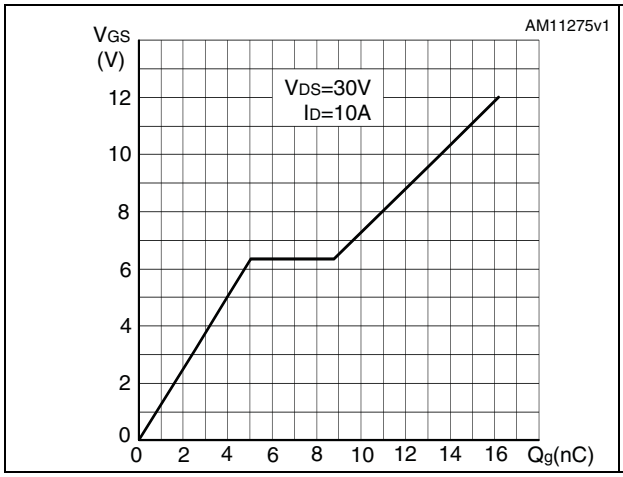


Figure 9. Capacitance variations

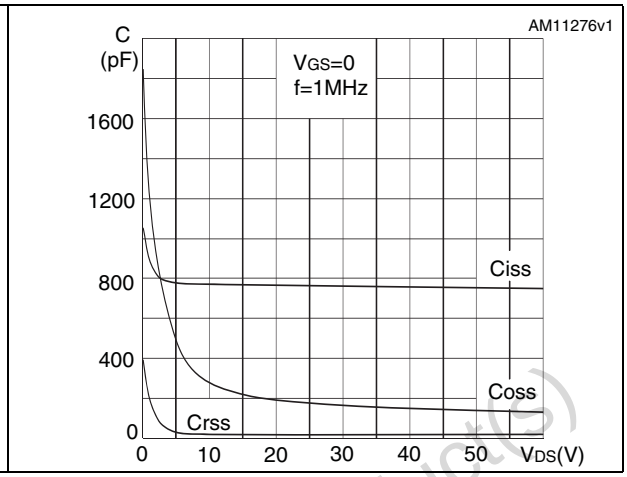


Figure 10. Normalized gate threshold voltage vs temperature

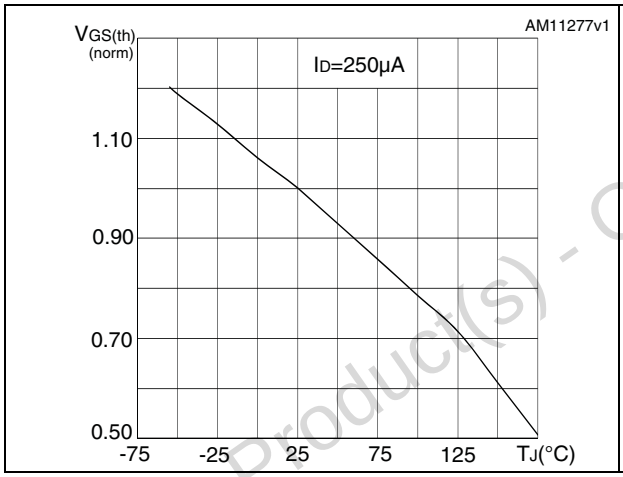
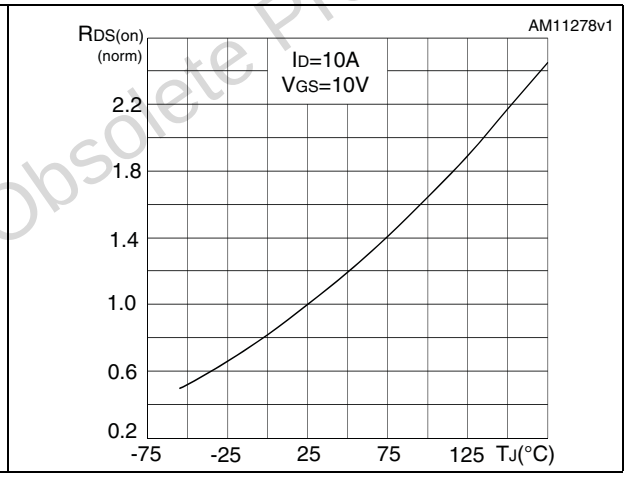


Figure 11. Normalized on-resistance vs temperature



Obsolete Product(s) - Obsolete Product(s)

3 Test circuits

Figure 12. Switching times test circuit for resistive load

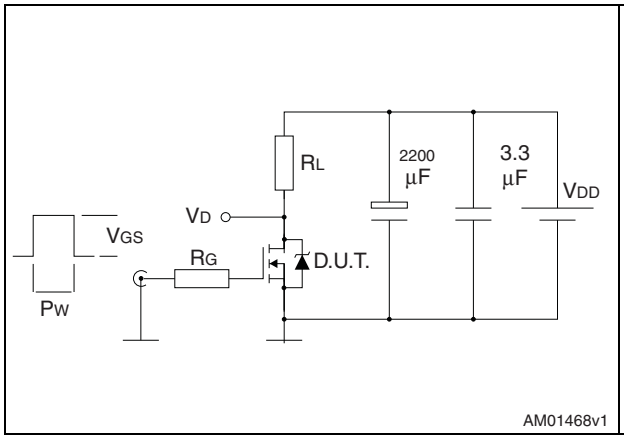


Figure 13. Gate charge test circuit

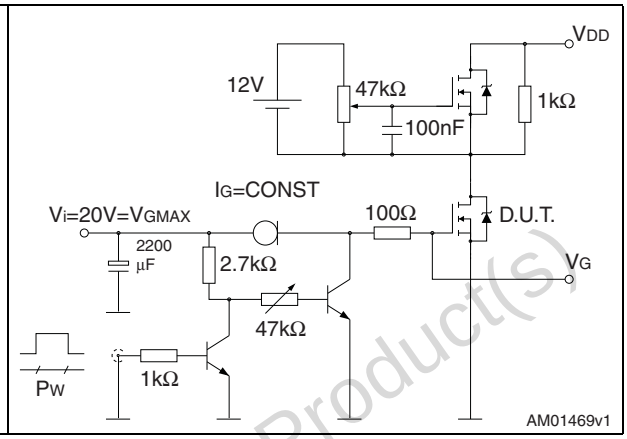


Figure 14. Test circuit for inductive load switching and diode recovery times

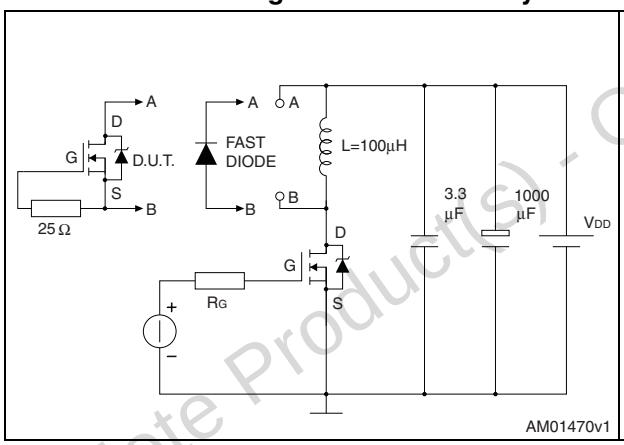


Figure 15. Unclamped inductive load test circuit

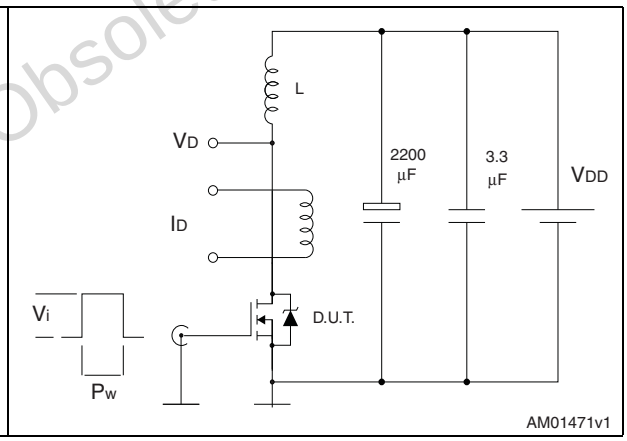


Figure 16. Unclamped inductive waveform

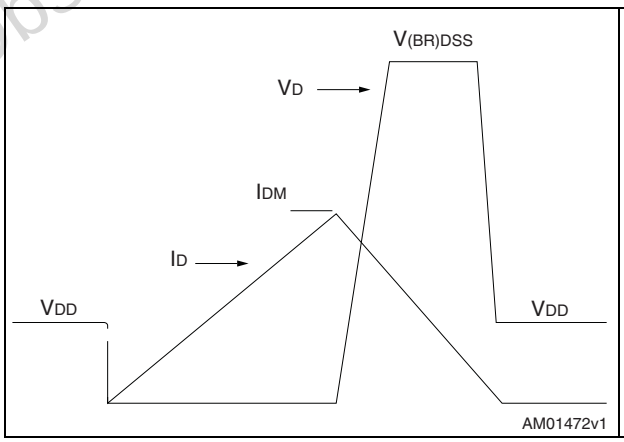
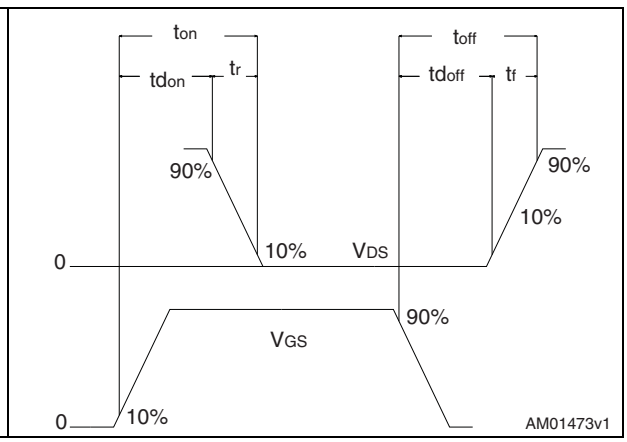


Figure 17. Switching time waveform



Obsolete Product(s) - Obsolete Product(s)

4 Package mechanical data

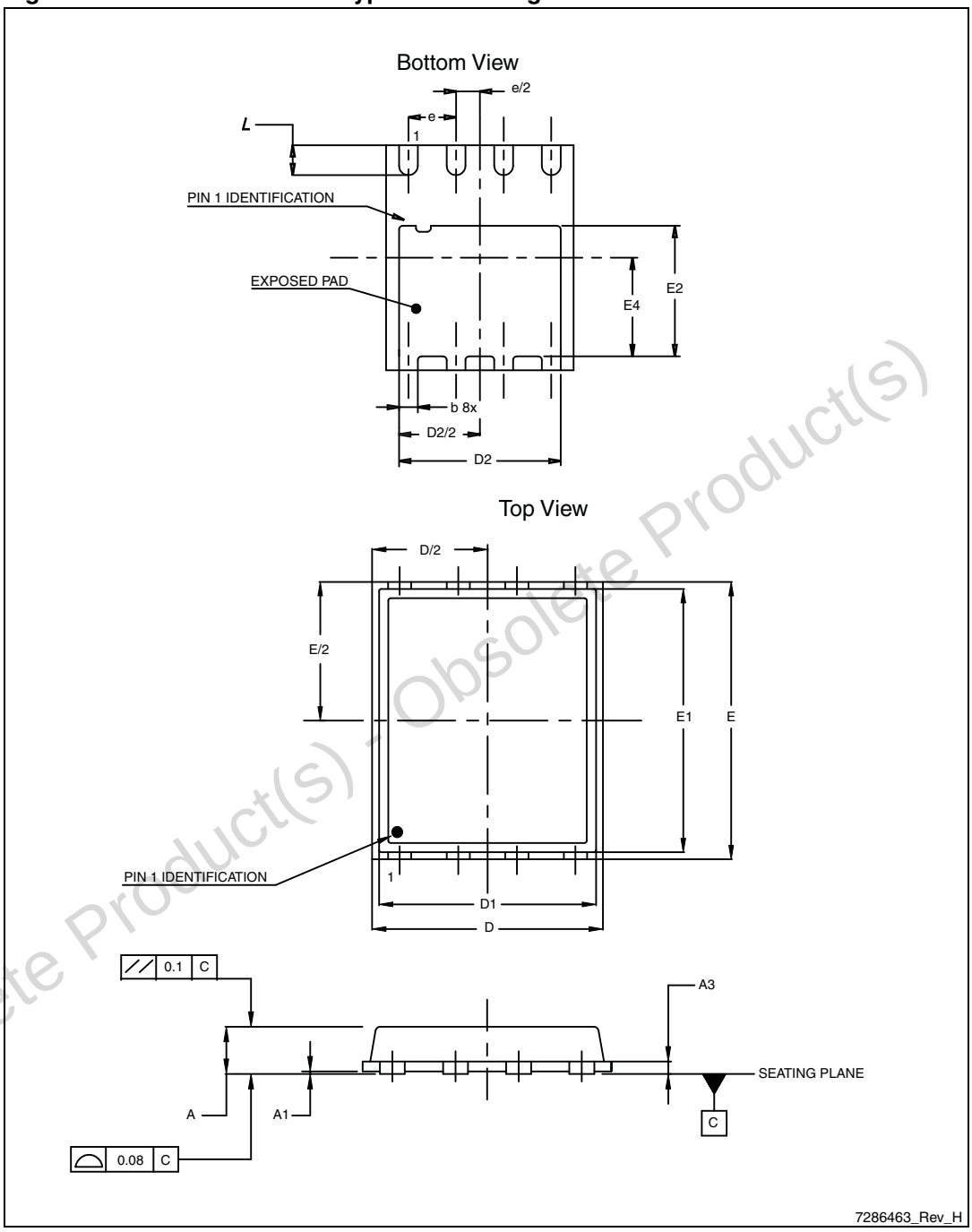
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

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

Obsolete Product(s) - Obsolete Product(s)

Figure 18. PowerFLAT™ 5x6 type C-B drawing



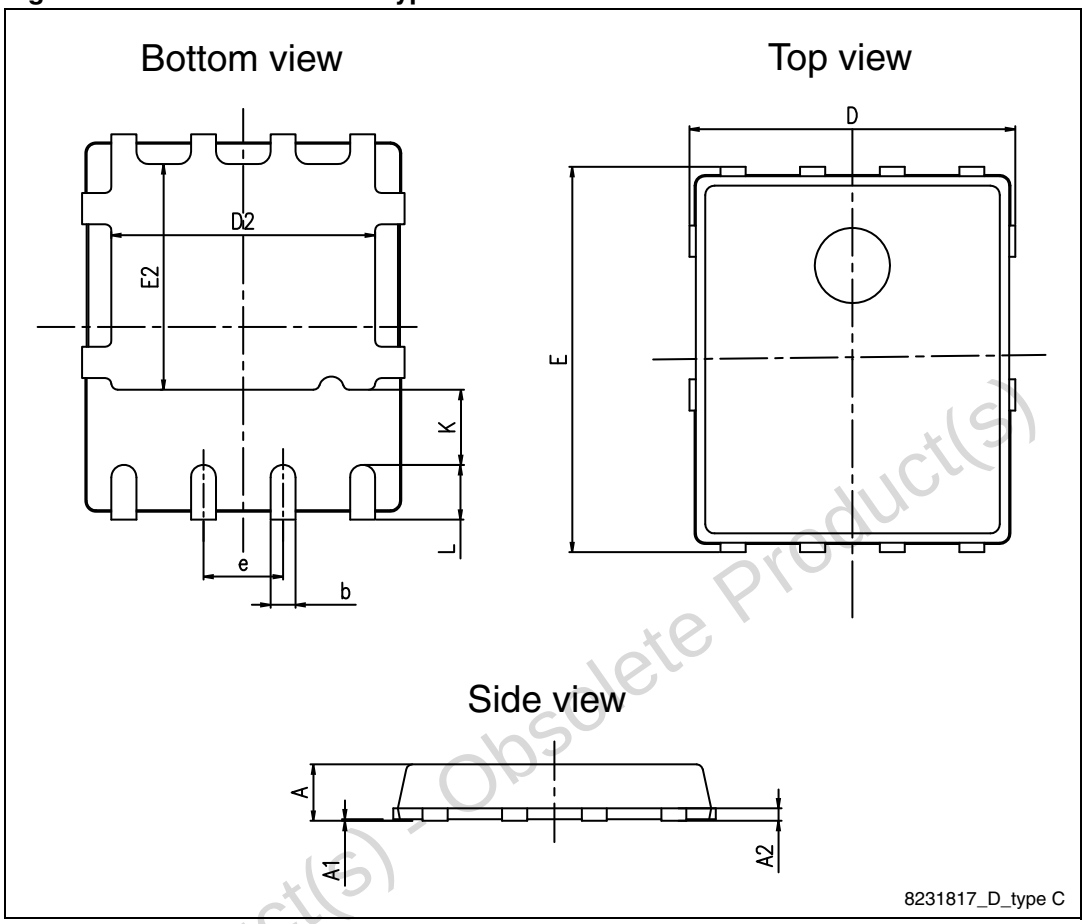
Obsolete Product(s) - Obsolete Product(s)

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

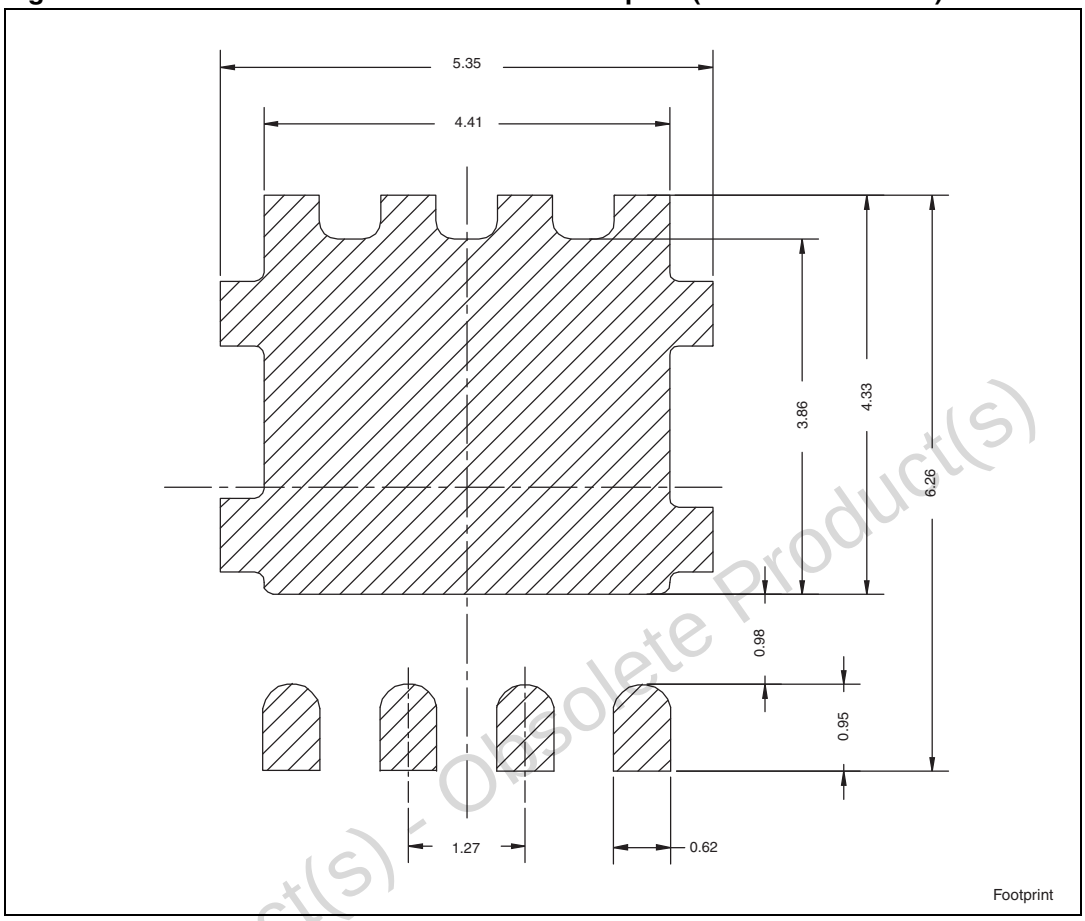
Obsolete Product(s) - Obsolete Product(s)

Figure 19. PowerFLAT™ 5x6 type S-C mechanical data



Obsolete Product(s) - Obsolete Product(s)

Figure 20. PowerFLAT™ 5x6 recommended footprint (dimensions in mm)



Obsolete Product(s) - Obsolete Product(s)

5 Packaging mechanical data

Figure 21. PowerFLAT™ 5x6 tape

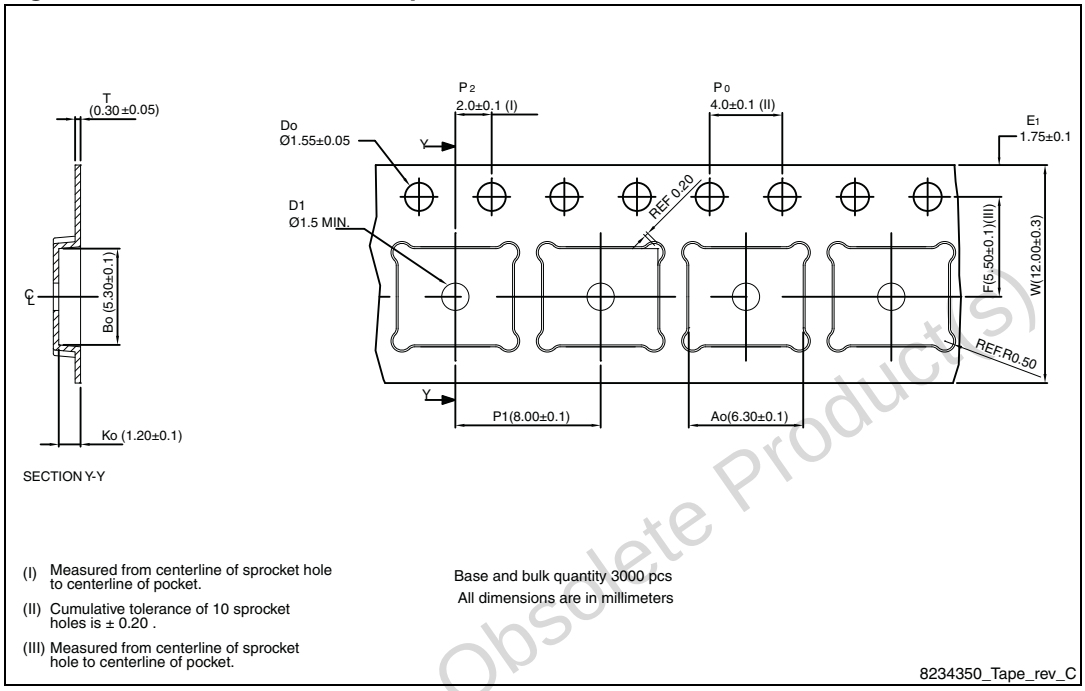
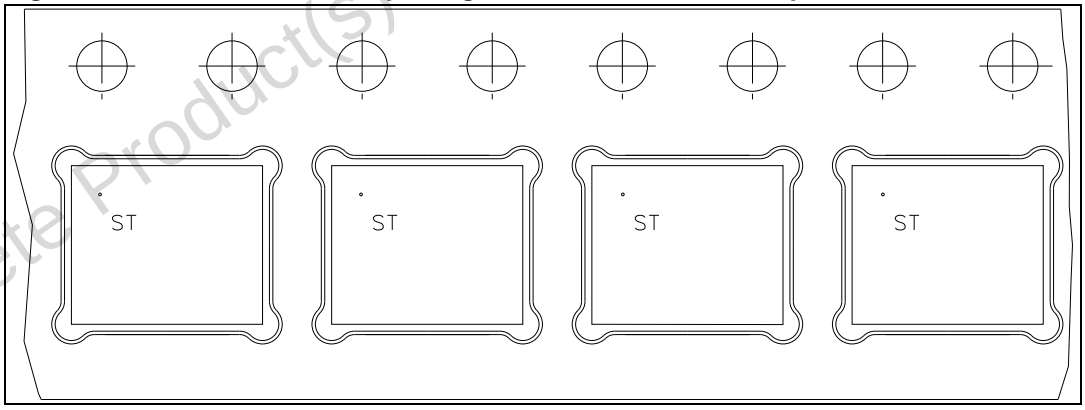
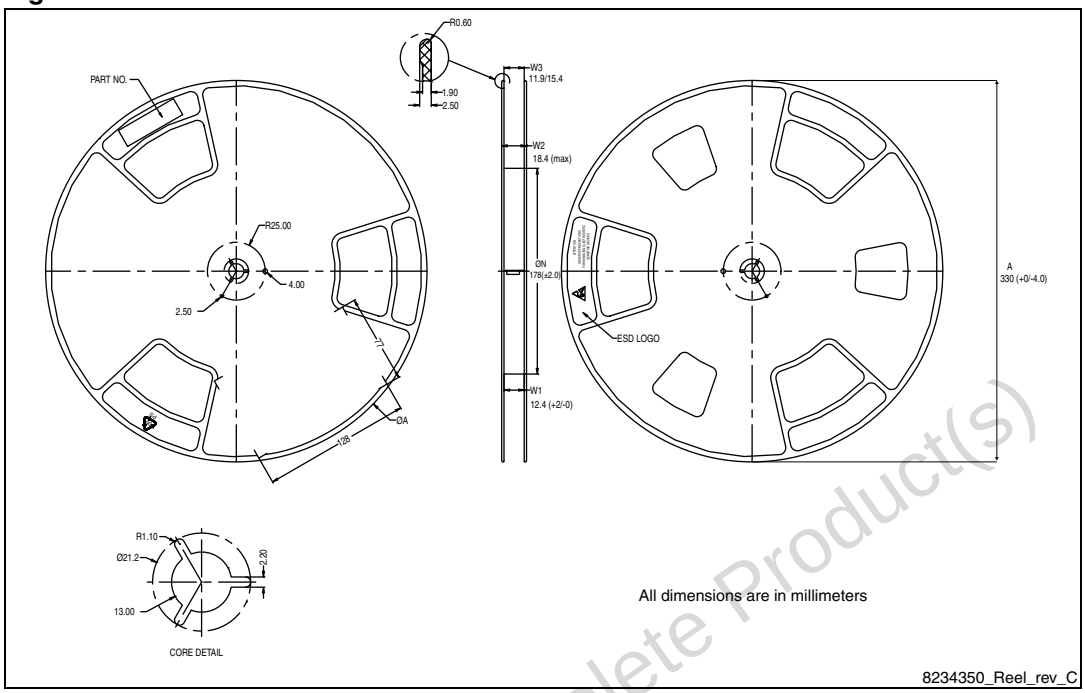


Figure 22. PowerFLAT™ 5x6 package orientation in carrier tape.



Obsolete Product(s) - Obsolete Product(s)

Figure 23. PowerFLAT™ 5x6 reel



Obsolete Product(s) - Obsolete Product(s)

6 Revision history

Table 11. Document revision history

Date	Revision	Changes
29-Oct-2009	1	First release.
15-Nov-2011	2	*Section 4: Package mechanical data* has been updated. Minor text changes. Document status promoted from preliminary data to datasheet.
27-Mar-2012	3	*Section 2.1: Electrical characteristics (curves)* has been inserted.
11-May-2012	4	*Figure 2: Safe operating area* and *Figure 3: Thermal impedance* have been changed.

Obsolete Product(s) - Obsolete Product(s)

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