

N-channel 650 V, 0.290 Ω typ., 8 A MDmesh™ M2 Power MOSFET in a PowerFLAT™ 5x6 HV package

Datasheet - preliminary data

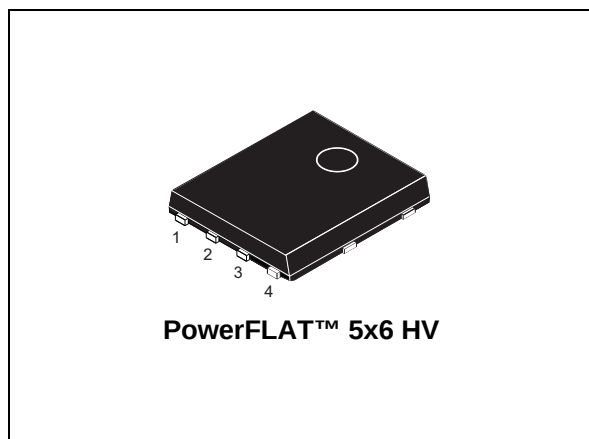
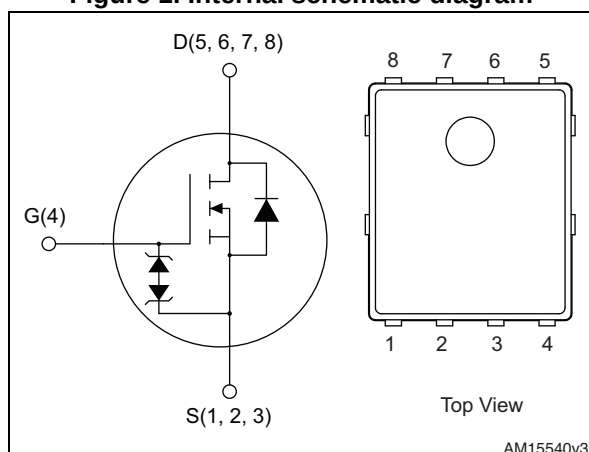


Figure 1. Internal schematic diagram



Features

Order codes	$V_{DS} @ T_{Jmax}$	$R_{DS(on)} max$	I_D
STL18N65M2	715 V	0.365 Ω	8 A

- Extremely low gate charge
- Excellent output capacitance (C_{oss}) profile
- 100% avalanche tested
- Zener-protected

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using MDmesh™ M2 technology. Thanks to its strip layout and an improved vertical structure, the device exhibits low on-resistance and optimized switching characteristics, rendering it suitable for the most demanding high efficiency converters.

Table 1. Device summary

Order codes	Marking	Package	Packaging
STL18N65M2	18N65M2	PowerFLAT™ 5x6 HV	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	± 25	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	8	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	5	A
$I_{DM}^{(2)}$	Drain current (pulsed)	32	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	57	W
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_j max)	1.8	A
E_{AS}	Single pulse avalanche energy (starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	120	mJ
$dv/dt^{(3)}$	Peak diode recovery voltage slope	15	V/ns
$dv/dt^{(4)}$	MOSFET dv/dt ruggedness	50	V/ns
T_{stg}	Storage temperature	- 55 to 150	$^\circ\text{C}$
T_j	Max. operating junction temperature	150	$^\circ\text{C}$

1. The value is rated according to $R_{thj-case}$ and limited by package
2. Pulse width limited by safe operating area
3. $I_{SD} \leq 8\text{ A}$, $di/dt \leq 400\text{ A}/\mu\text{s}$, $V_{DSpeak} \leq V_{(BR)DSS}$, $V_{DD} = 80\% V_{(BR)DSS}$
4. $V_{DS} \leq 520\text{ V}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	2.2	$^\circ\text{C}/\text{W}$
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb max	59	$^\circ\text{C}/\text{W}$

1. When mounted on 1inch² FR-4 board, 2 oz Cu

2 Electrical characteristics

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

Table 4. On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$, $V_{GS} = 0$	650			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 650\text{ V}$			1	μA
		$V_{DS} = 650\text{ V}$, $T_C = 125\text{ °C}$			100	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 25\text{ V}$			± 10	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 4\text{ A}$		0.290	0.365	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 100\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	764	-	pF
C_{oss}	Output capacitance		-	35.5	-	pF
C_{rss}	Reverse transfer capacitance		-	1.2	-	pF
$C_{oss\text{ eq.}}^{(1)}$	Output equivalent capacitance	$V_{DS} = 0\text{ to }520\text{ V}$, $V_{GS} = 0$	-	175.5	-	pF
R_G	Intrinsic gate resistance	$f = 1\text{ MHz}$ open drain	-	6	-	Ω
Q_g	Total gate charge	$V_{DD} = 520\text{ V}$, $I_D = 12\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 3)	-	21.5	-	nC
Q_{gs}	Gate-source charge		-	3.2	-	nC
Q_{gd}	Gate-drain charge		-	11.3	-	nC

1. $C_{oss\text{ eq.}}$ is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DS} .

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 325\text{ V}$, $I_D = 6.5\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 6\text{ V}$ (see Figure 7)	-	11	-	ns
t_r	Rise time		-	7.5	-	ns
$t_{d(off)}$	Turn-on delay time		-	46	-	ns
t_f	Fall time		-	12.5	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		8	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		32	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 8\text{ A}$, $V_{GS} = 0$	-		1.6	V
t_{rr}	Reverse recovery time	$I_{SD} = 12\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 60\text{ V}$ (see Figure 4)	-	331		ns
Q_{rr}	Reverse recovery charge		-	3.4		μC
I_{RRM}	Reverse recovery current		-	20.5		A
t_{rr}	Reverse recovery time	$V_{DD} = 60\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $I_{SD} = 12\text{ A}$ $T_j = 150\text{ }^\circ\text{C}$ (see Figure 4)	-	462		ns
Q_{rr}	Reverse recovery charge		-	4.6		μC
I_{RRM}	Reverse recovery current		-	20		A

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

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.

Figure 8. PowerFLAT™ 5x6 HV drawing

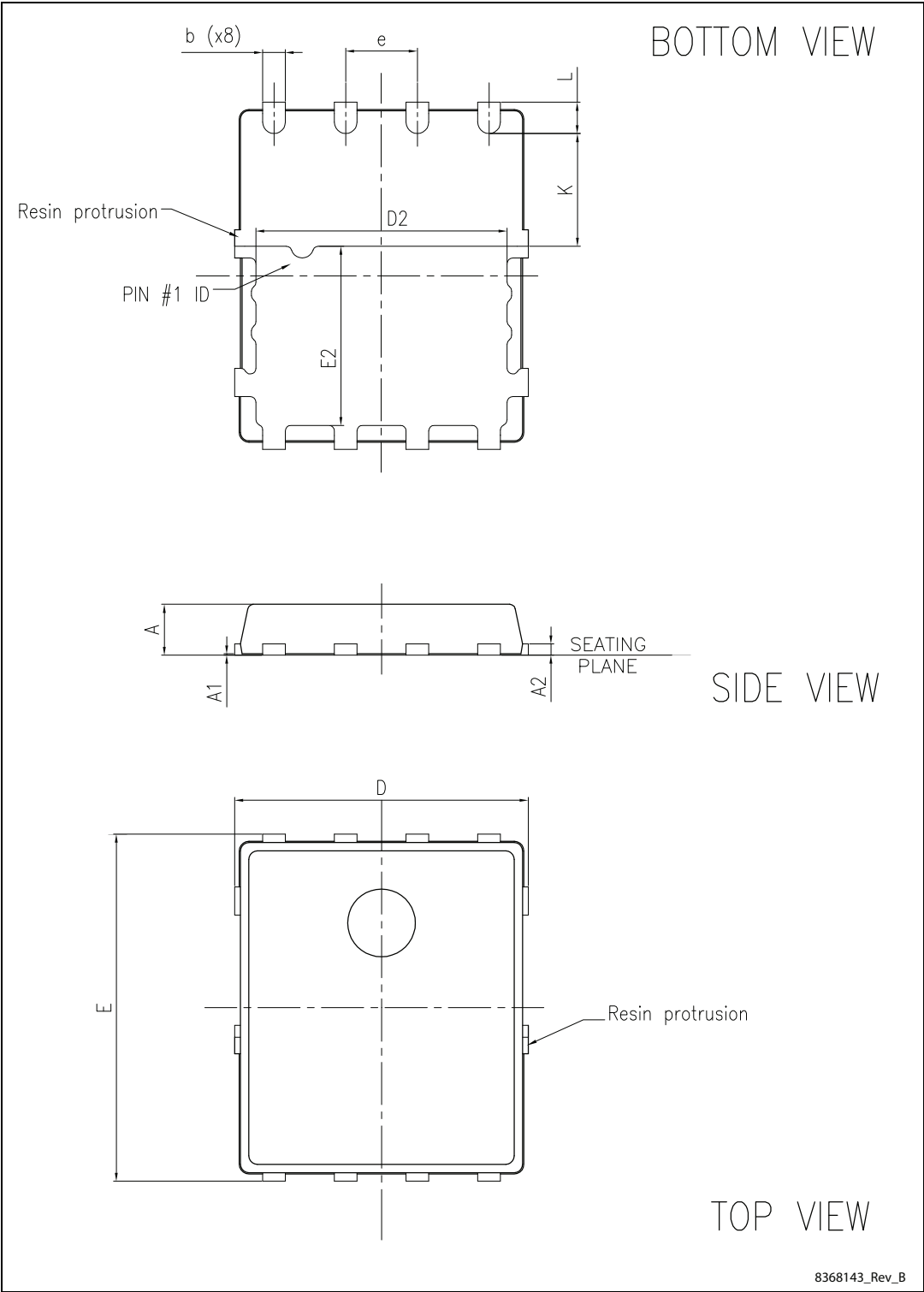
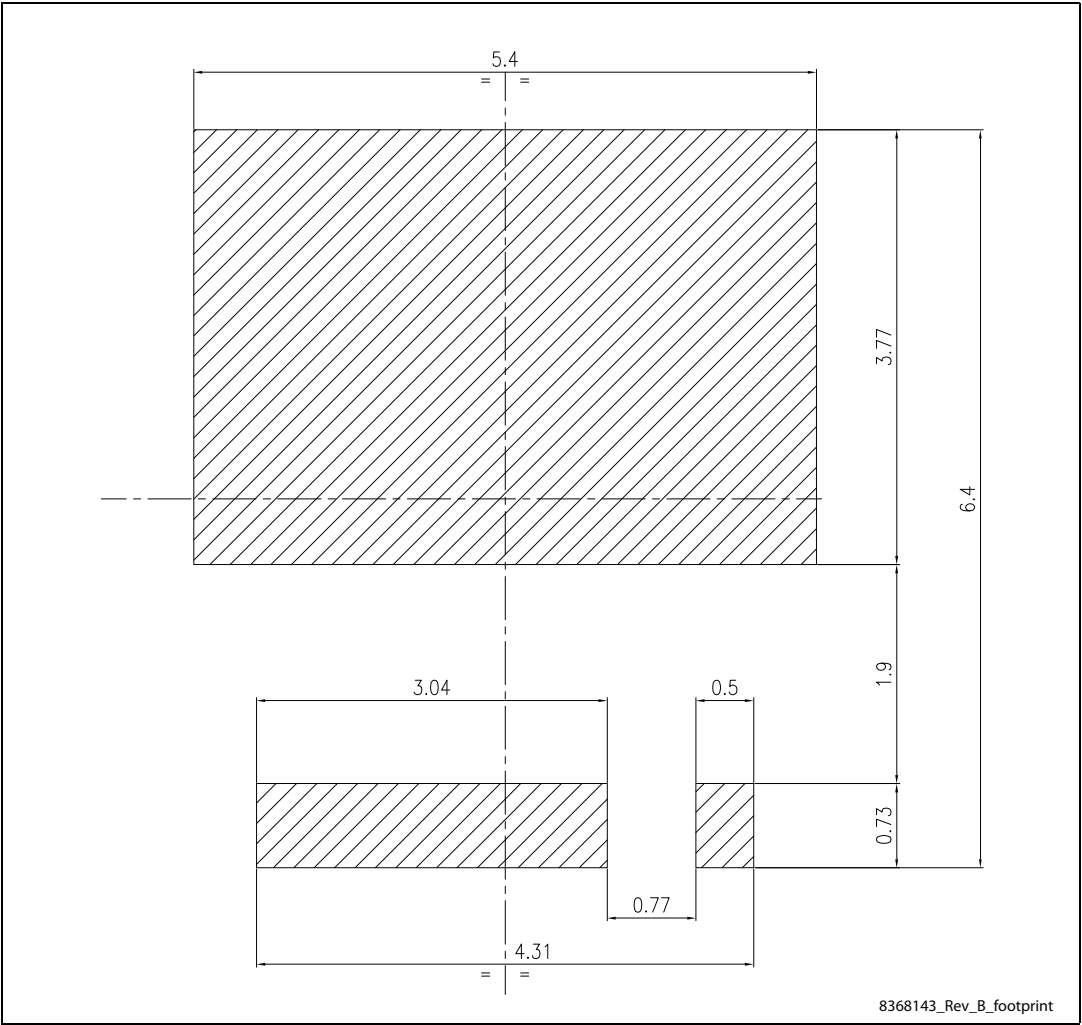


Table 8. PowerFLAT™ 5x6 HV mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
D	5.00	5.20	5.40
E	5.95	6.15	6.35
D2	4.30	4.40	4.50
E2	3.10	3.20	3.30
e		1.27	
L	0.50	0.55	0.60
K	1.90	2.00	2.10

Figure 9. PowerFLAT™ 5x6 HV recommended footprint (dimensions are in mm)



5 Packaging mechanical data

Figure 10. PowerFLAT™ 5x6 tape^(a)

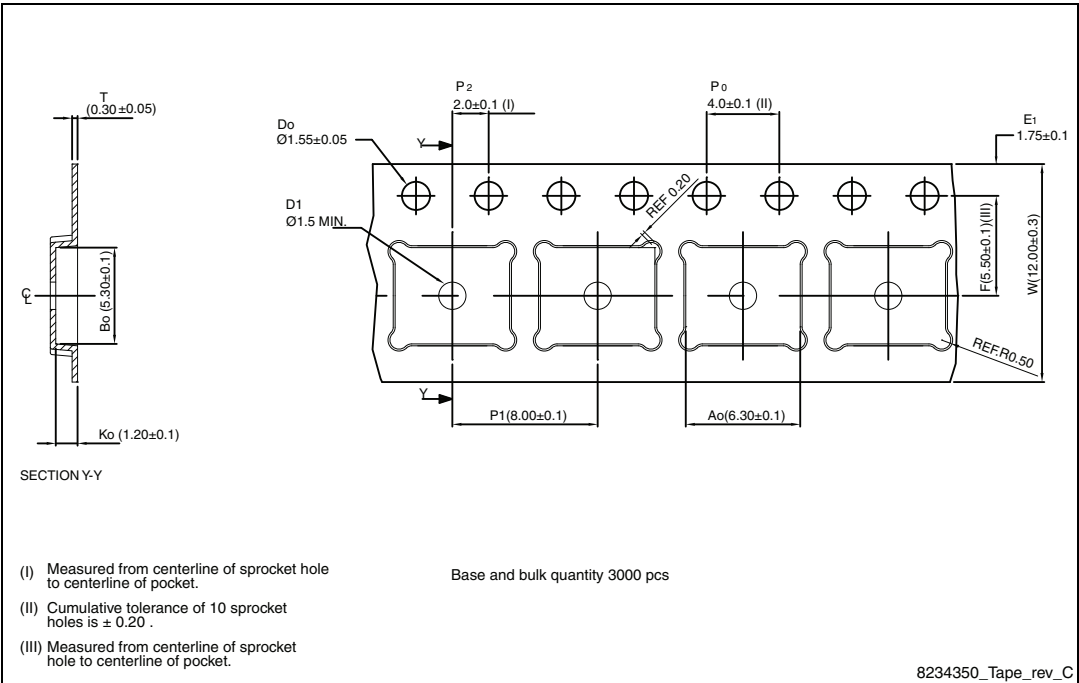
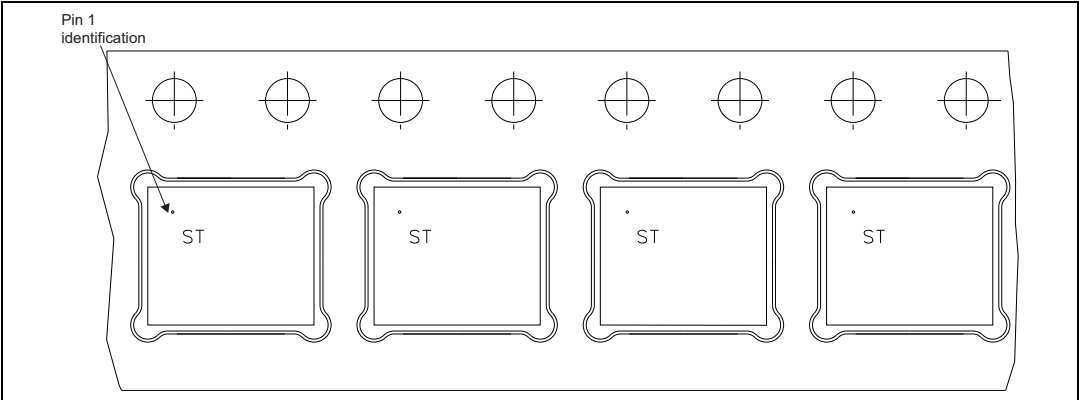
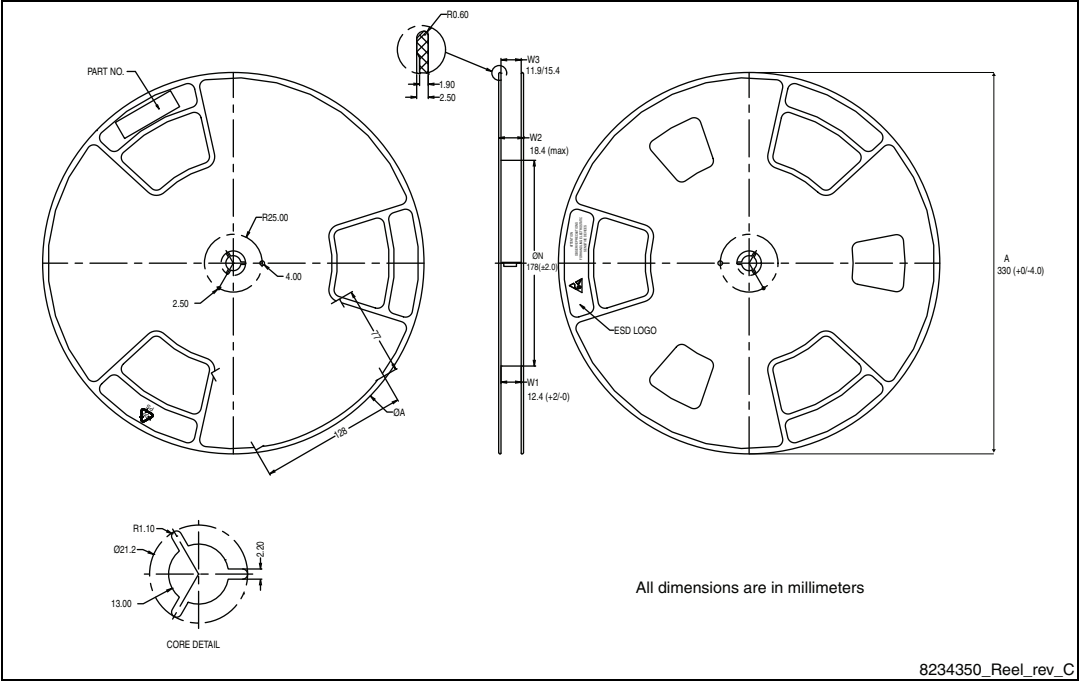


Figure 11. PowerFLAT™ 5x6 package orientation in carrier tape



a. All dimensions are in millimeters.

Figure 12. PowerFLAT™ 5x6 reel



6 Revision history

Table 9. Document revision history

Date	Revision	Changes
14-Mar-2014	1	First release.
25-Mar-2014	2	Updated title and features on cover page. Updated Table 4: On /off states and Table 5: Dynamic Inserted P _{TOT} value in Table 2: Absolute maximum ratings . Minor text changes.
02-Oct-2014	3	Updated values in Table 2: Absolute maximum ratings , Table 4: On /off states , Table 5: Dynamic , Table 6: Switching times and Table 7: Source drain diode . Updated title, features and description in cover page. Minor text changes.

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