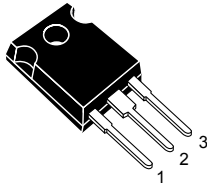
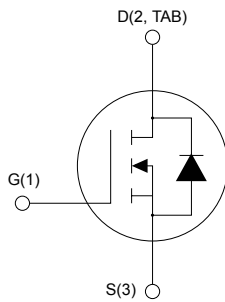


N-channel 600 V, 135 mΩ typ., 20 A MDmesh II Power MOSFET in a TO-247 package



TO-247



AM01475v1_noZen



Product status link

[STW26NM60N](#)

Product summary

Order code	STW26NM60N
Marking	26NM60N
Package	TO-247
Packing	Tube

Features

Order code	V _{DS}	R _{DS(on)} max.	I _D
STW26NM60N	600 V	165 mΩ	20 A

- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using the second generation of MDmesh technology. This revolutionary Power MOSFET associates a vertical structure to the company's strip layout to yield one of the world's lowest on-resistance and gate charge. It is therefore suitable for the most demanding high efficiency converters.

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	600	V
V_{GS}	Gate-source voltage	± 30	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	20	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	12.6	A
$I_{DM}^{(1)}$	Drain current (pulsed)	80	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ }^\circ\text{C}$	140	W
$dv/dt^{(2)}$	Peak diode recovery voltage slope	15	V/ns
T_J	Operating junction temperature range	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature range		

1. Pulse width limited by safe operating area.
2. $I_{SD} \leq 20\text{ A}$, $di/dt \leq 400\text{ A}/\mu\text{s}$, $V_{DS} (\text{peak}) \leq V_{(BR)DSS}$, $V_{DD} = 480\text{ V}$.

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	0.89	$^\circ\text{C}/\text{W}$
R_{thJA}	Thermal resistance, junction-to-ambient	50	$^\circ\text{C}/\text{W}$

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_J max.)	6	A
E_{AS}	Single pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	610	mJ

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$, $V_{GS} = 0\text{ V}$	600	-	-	V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 600\text{ V}$	-	-	1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 600\text{ V}$, $T_C = 125\text{ °C}^{(1)}$	-	-	100	μA
I_{GSS}	Gate body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 25\text{ V}$	-	-	± 100	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	$V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$	-	135	165	m Ω

1. Specified by design, not tested in production.

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 50\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	1800	-	pF
C_{oss}	Output capacitance		-	115	-	pF
C_{rss}	Reverse transfer capacitance		-	6	-	pF
$C_{oss\text{ eq.}}^{(1)}$	Equivalent capacitance time related	$V_{DS} = 0\text{ to }480\text{ V}$, $V_{GS} = 0\text{ V}$	-	310	-	pF
R_g	Intrinsic gate resistance	$f = 1\text{ MHz}$ open drain	-	2.8	-	Ω
Q_g	Total gate charge	$V_{DD} = 480\text{ V}$, $I_D = 20\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$ (see the Figure 13. Test circuit for gate charge behavior)	-	60	-	nC
Q_{gs}	Gate-source charge		-	8.5	-	nC
Q_{gd}	Gate-drain charge		-	30	-	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_{DSS} .

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 300\text{ V}$, $I_D = 10\text{ A}$, $R_G = 4.7\text{ }\Omega$ $V_{GS} = 10\text{ V}$	-	13	-	ns
t_r	Rise time		-	25	-	ns
$t_{d(off)}$	Turn-off delay time	(see the Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	85	-	ns
t_f	Fall time		-	50	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-	-	20	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-	-	80	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 20\text{ A}$, $V_{GS} = 0\text{ V}$	-	-	1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 60\text{ V}$	-	370	-	ns
Q_{rr}	Reverse recovery charge	(see the Figure 14. Test circuit for inductive load switching and diode recovery times)	-	5.8	-	μC
I_{RRM}	Reverse recovery current		-	31.6	-	A
t_{rr}	Reverse recovery time	$I_{SD} = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 60\text{ V}$	-	450	-	ns
Q_{rr}	Reverse recovery charge	$T_J = 150\text{ }^\circ\text{C}$	-	7.5	-	μC
I_{RRM}	Reverse recovery current	(see the Figure 14. Test circuit for inductive load switching and diode recovery times)	-	32.5	-	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 1. Safe operating area

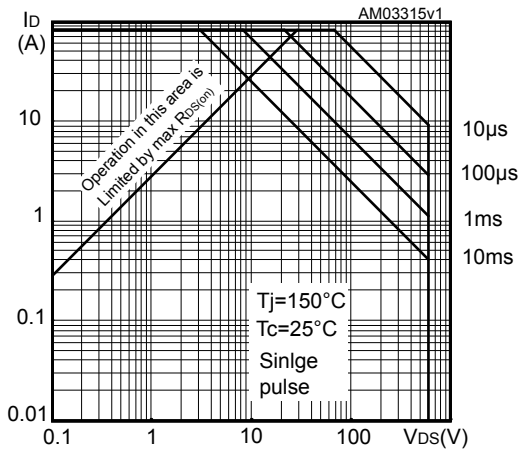


Figure 2. Normalized transient thermal impedance

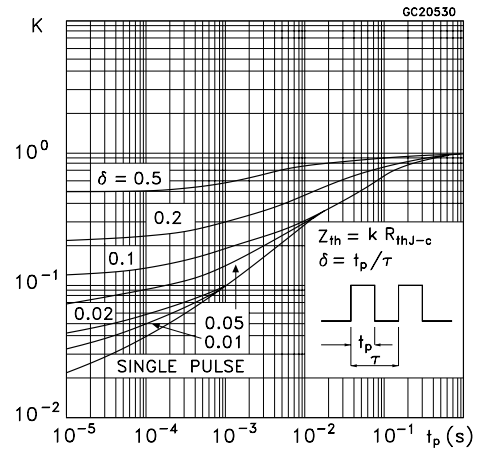


Figure 3. Typical output characteristics

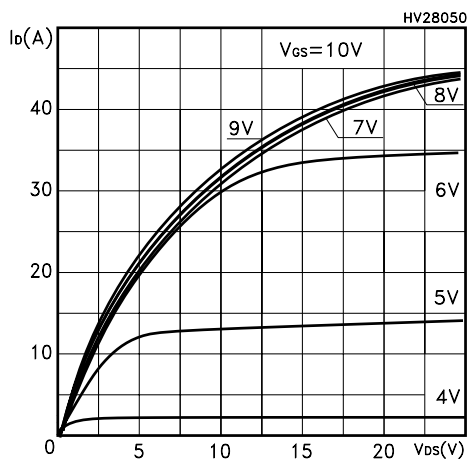


Figure 4. Typical transfer characteristics

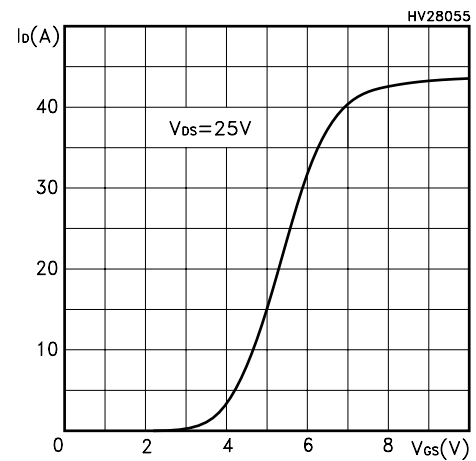


Figure 5. Typical gate charge characteristics

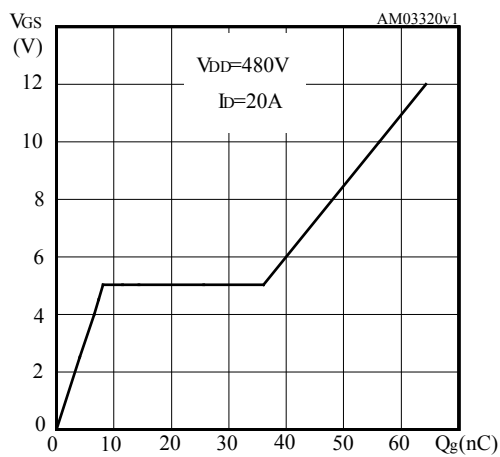


Figure 6. Typical capacitance characteristics

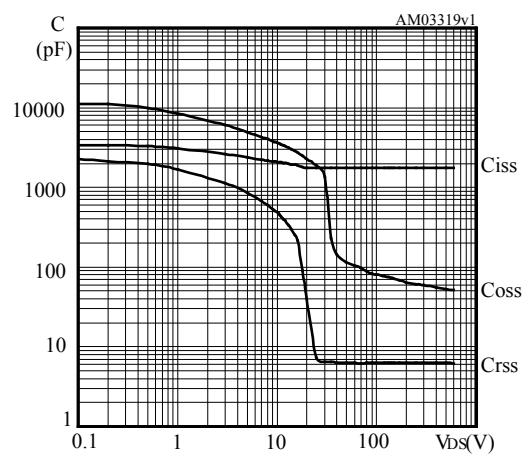


Figure 7. Typical drain-source on-resistance

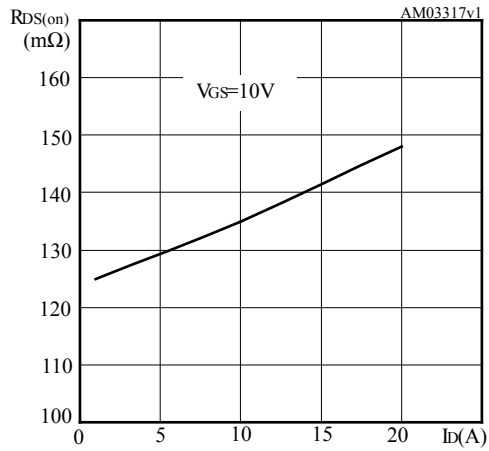


Figure 8. Normalized breakdown voltage vs temperature

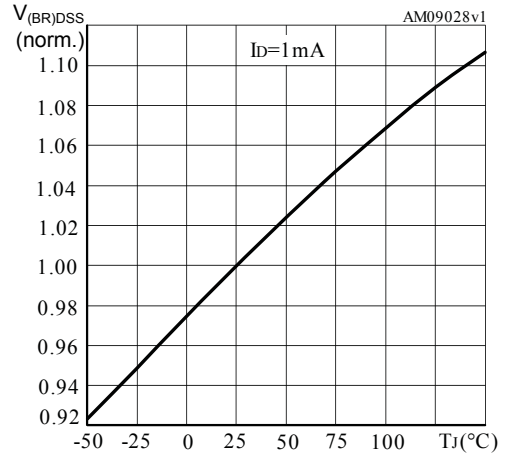


Figure 9. Normalized gate threshold vs temperature

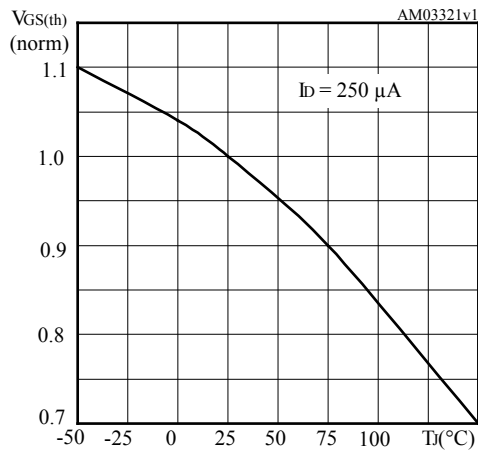


Figure 10. Normalized on-resistance vs temperature

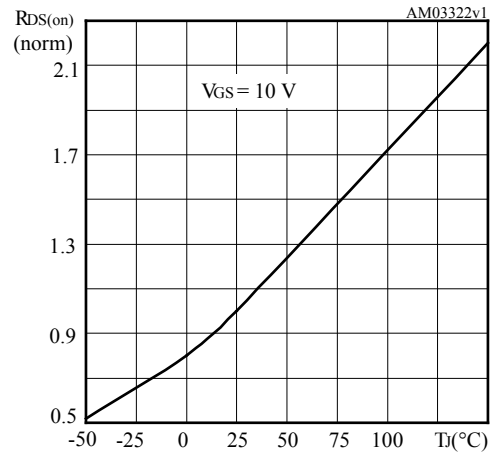
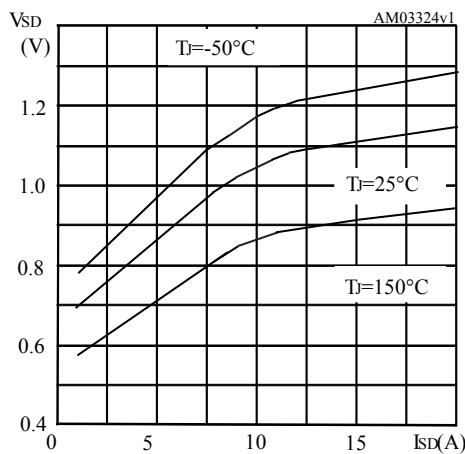


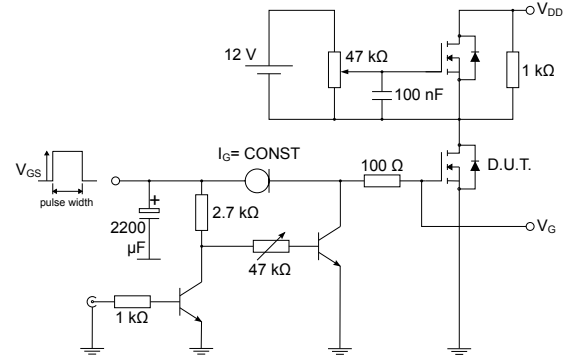
Figure 11. Typical reverse diode forward characteristics



3 Test circuits

Figure 12. Test circuit for resistive load switching times

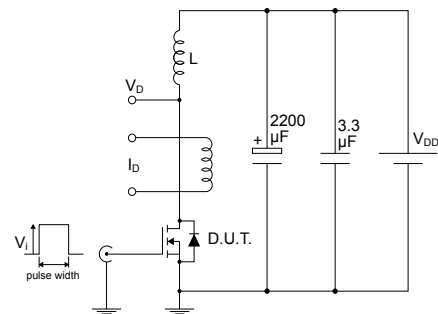

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Figure 13. Test circuit for gate charge behavior


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

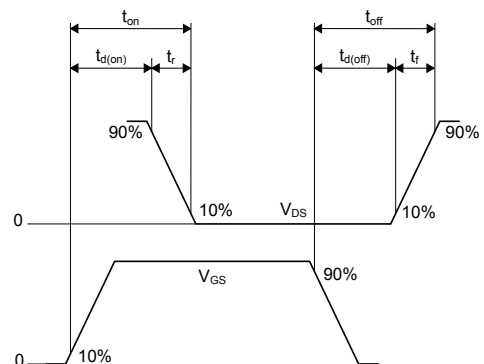

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Figure 15. Unclamped inductive load test circuit


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Figure 16. Unclamped inductive waveform


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Figure 17. Switching time waveform


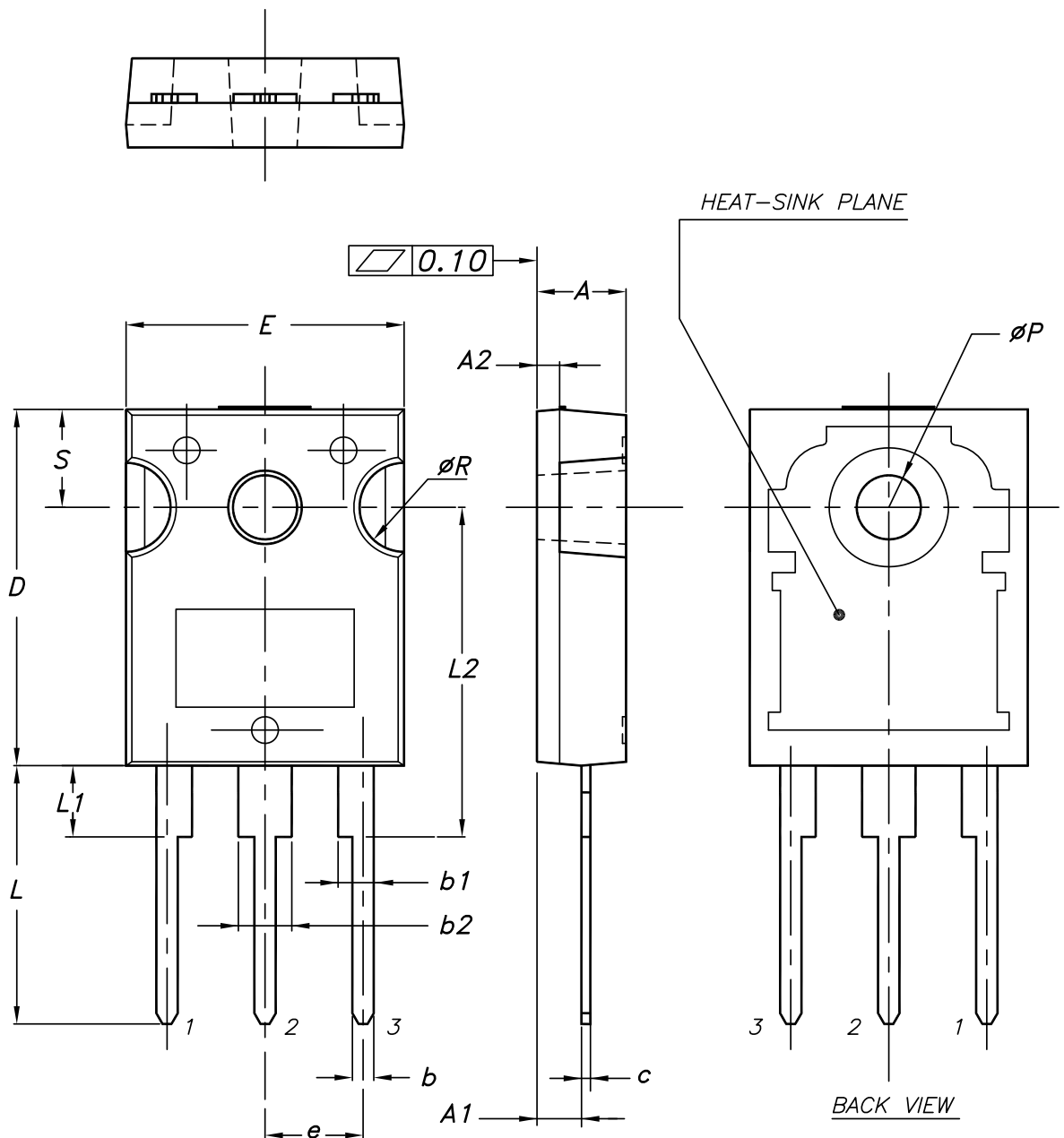
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4 Package information

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 TO-247 package information

Figure 18. TO-247 package outline



0075325_11

Table 8. TO-247 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
A2		1.27	
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
ØP	3.55		3.65
ØR	4.50		5.50
S	5.30	5.50	5.70

Revision history

Table 9. Document revision history

Date	Revision	Changes
07-Jul-2016	1	First release.
12-Dec-2016	2	Modified <i>Table 6: "Dynamic"</i> and <i>Table 8: "Source-drain diode"</i> . Modified <i>Section 2.1: "Electrical characteristics (curves)"</i> . Minor text changes
13-Jan-2026	3	Updated <i>Section 4: Package information</i> . Minor text changes.

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