WMS30N050V

N-Channel Silicon MOSFET

Rev.01 - 16 December 2022 Product data sheet

1. General description

WMS30N050V is a high performance logic level N-channel MOSFET in PDFN5X6 package, which utilizes advanced Trench MOSFET technology to provide low $R_{DS(on)}$ and gate charge. It is designed and qualified in a wide range of industrial and consumer applications.

2. Features and benefits

- Advance High Cell Density Trench Technology
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Switching Losses
- Optimized Gate Charge to Minimize Driver Losses
- 100% UIS Tested
- RoHS Compliant and Halogen Free

3. Applications

- DC−DC Converters
- BLDC Motor Control
- Load Switch
- Lithium-ion Battery Protection

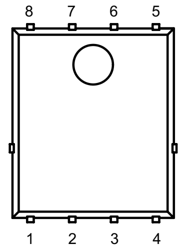
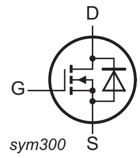
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{DS}	drain-source voltage			30			V
V_{GS}	gate-source voltage			±20			V
I_D	continuous drain current	V_{GS} = 10 V; T_{mb} = 25 °C	[1]	45			A
P_{tot}	power dissipation	T_{mb} = 25 °C		42			W
T_j	junction temperature			-55 to 150			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = 10 V, I_D = 20 A		-	4.1	5.0	mΩ
		V_{GS} = 4.5 V, I_D = 20 A		-	5.8	8.0	mΩ
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 20 A; V_{DS} = 15 V; V_{GS} = 10 V		-	44	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1-3	S	source		
4	G	gate		
5-8	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WMS30N050V	PDFN5X6	WMS30N050VJ	Reel	4000	PDFN5X6N	21-Jul-2022

7. Marking

Table 4. Marking codes

Type number	Marking codes
WMS30N050V	WMS 30N050

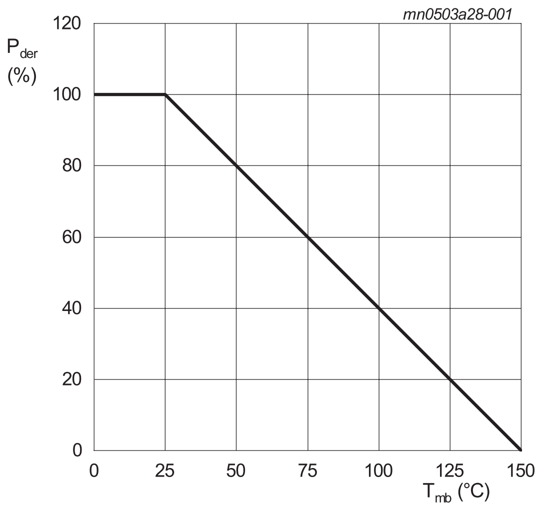
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

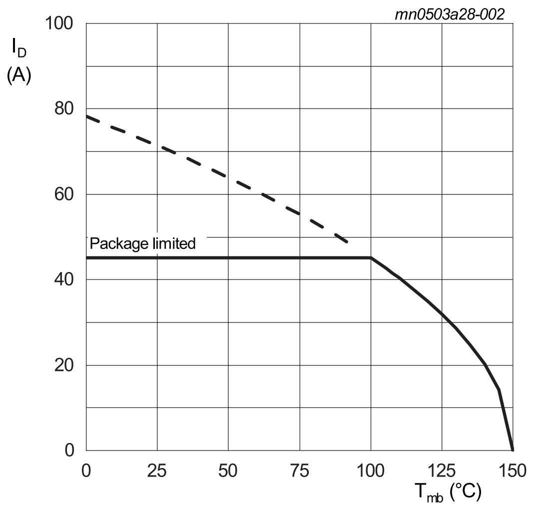
Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DS}	drain-source voltage			30	V
V_{GS}	gate-source voltage			±20	V
I_D	continuous drain current	V_{GS} = 10 V; T_{mb} = 25 °C	[1]	45	A
		V_{GS} = 10 V; T_{mb} = 120 °C		35	A
I_{DM}	pulsed drain current	t_p = 10 µs; T_{mb} = 25 °C		180	A
P_{tot}	power dissipation	T_{mb} = 25 °C		42	W
E_{as}	single pulse drain−to-source avalanche	I_{AS} = 28 A; L = 0.1 mH; R_{GS} = 25 Ω; V_{GS} = 10 V; T_j = 25 °C		39	mJ
T_{stg}	storage temperature			-55 to 150	°C
T_j	junction temperature			-55 to 150	°C

[1] Continuous current is limited by package.



$P_{der} = (P_{tot} / P_{tot(25\ °C)}) \times 100\%$

Fig. 1. Normalized total power dissipation as a function of mounting base temperature



V_{GS} = 10 V

Fig. 2. Continuous Drain Current as a function of mounting base temperature

9. Thermal & Mechanical characteristics

Table 6. Thermal & Mechanical characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base			-	2.3	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[2]	-	-	55	K/W

[2] Surface mount on FR4 board of 1 inch^2, 1 oz copper.

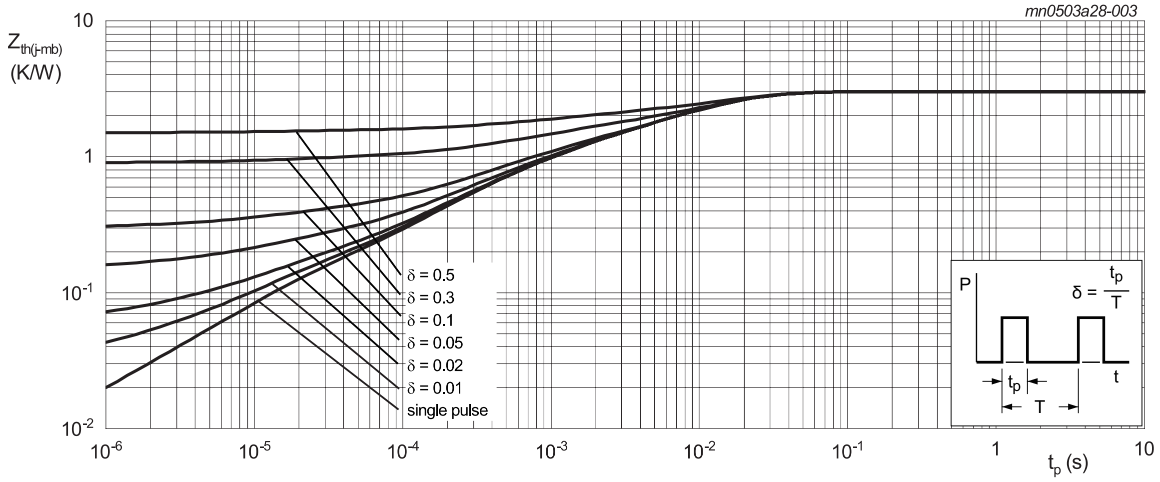


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise noted

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 250 µA; V_{GS} = 0 V		30	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 250 µA; V_{DS} = V_{GS}		1.0	1.6	2.4	V
I_{DSS}	drain leakage current	V_{DS} = 30 V; V_{GS} = 0 V		-	-	1	µA
		V_{DS} = 30 V; V_{GS} = 0 V; T_j = 125 °C		-	-	10	µA
I_{GSS}	gate leakage current	V_{GS} = ±20 V; V_{DS} = 0 V		-	-	±100	nA
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = 10 V; I_D = 20 A		-	4.1	5.0	mΩ
		V_{GS} = 4.5 V; I_D = 20 A		-	5.8	8.0	mΩ
R_G	gate resistance	f = 1 MHz		-	2.5	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 20 A; V_{DS} = 15 V; V_{GS} = 10 V		-	44	-	nC
Q_{GS}	gate-source charge			-	7.2	-	nC
Q_{GD}	gate-drain charge			-	7.8	-	nC
C_{iss}	input capacitance	V_{DS} = 15 V; V_{GS} = 0 V; f = 1 MHz		-	2433	-	pF
C_{oss}	output capacitance			-	272	-	pF
C_{rss}	reverse transfer capacitance			-	217	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 15 V; V_{GS} = 10 V; R_G = 6 Ω; I_D = 20 A		-	7.0	-	ns
t_r	rise time			-	22	-	ns
$t_{d(off)}$	turn-off delay time			-	32	-	ns
t_f	fall time			-	25	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	V_{GS} = 0 V; I_S = 1 A		-	0.71	1	V
		V_{GS} = 0 V; I_S = 1 A; T_j = 125 °C		-	0.54	-	V
I_S	body-diode continuous current	T_{mb} = 25 °C	[1]	-	-	45	A
t_{rr}	reverse recovery time	V_{GS} = 0 V; I_S = 20 A; di/dt = 100 A/µs		-	16	-	ns
Q_{rr}	reverse recovered charge			-	8.0	-	nC
I_{rrm}	reverse recovery current			-	1.0	-	A

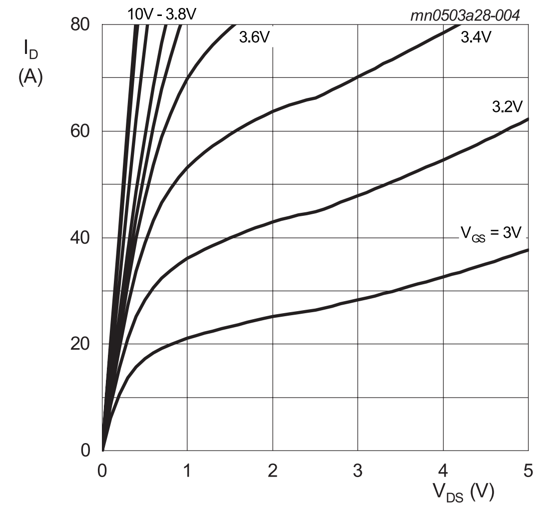
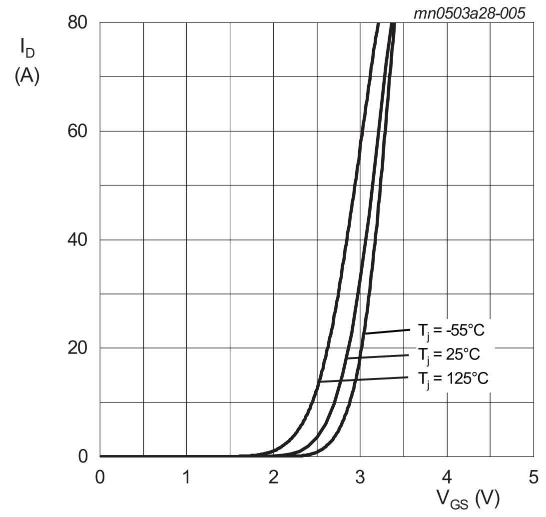
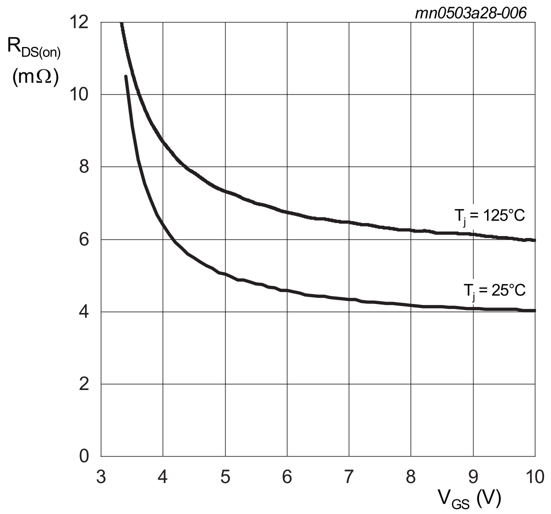


Fig. 4. Drain current as a function of drain-source voltage; typical values



V_{DS} = 5 V

Fig. 5. Drain current as a function of gate-source voltage; typical values



I_D = 20 A

Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

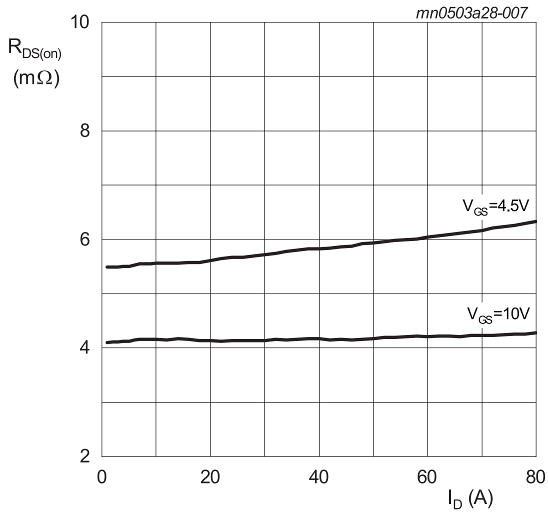
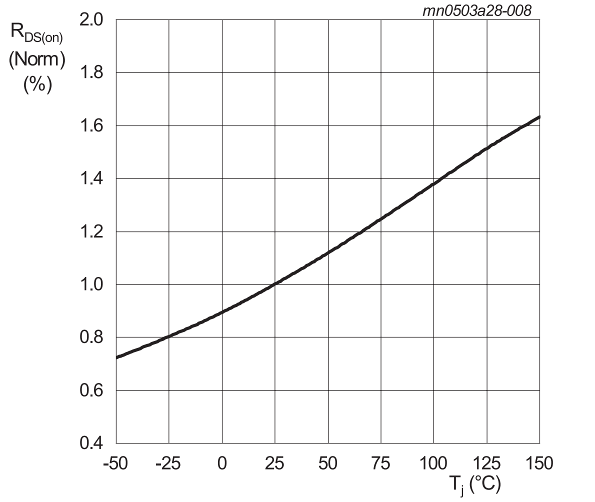
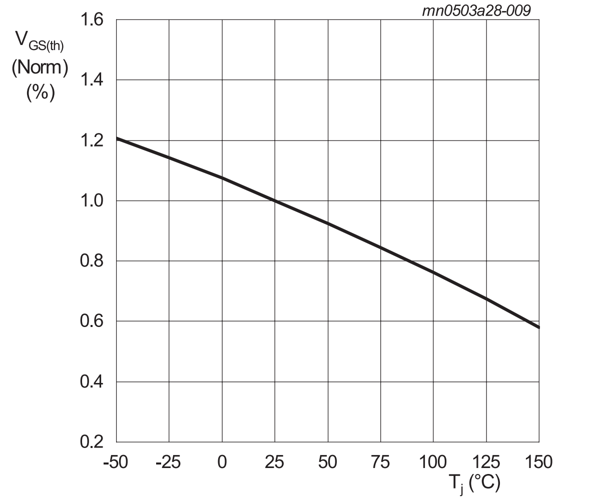


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values



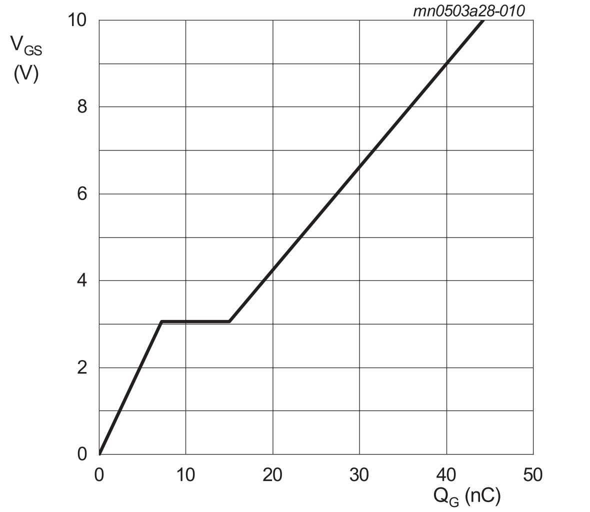
V_{GS} = 10 V; I_D = 20 A

Fig. 8. Normalized drain-source on-state resistance as a function of junction temperature



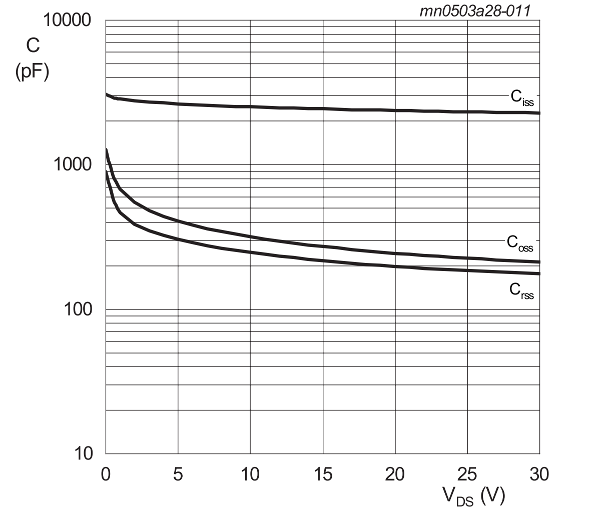
V_{GS} = V_{GS}; I_D = 250 µA

Fig. 9. Normalized gate-source threshold voltage as a function of junction temperature



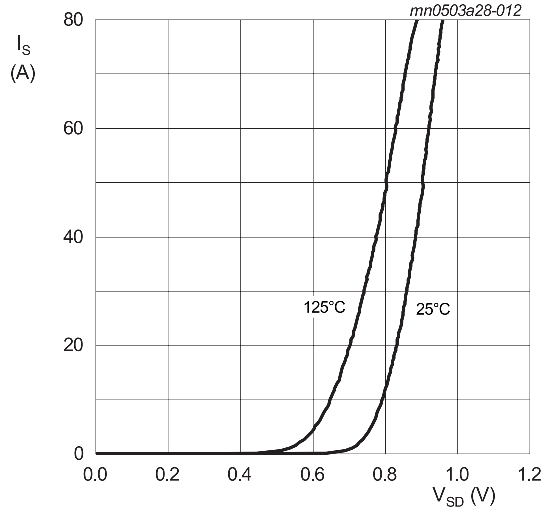
I_D = 20 A; V_{DS} = 15 V

Fig. 10. Gate-source voltage as a function of gate charge; typical values



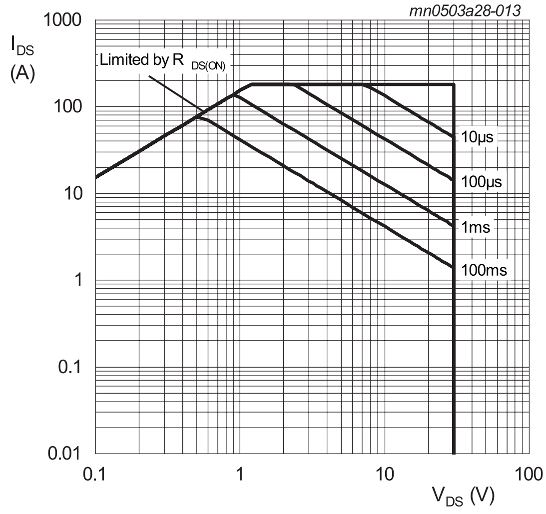
V_{GS} = 0 V; f = 1 MHz

Fig 11. Capacitances as a function of drain-source voltage; typical values



V_{GS} = 0 V

Fig 12. Source current as a function of source-drain voltage; typical values

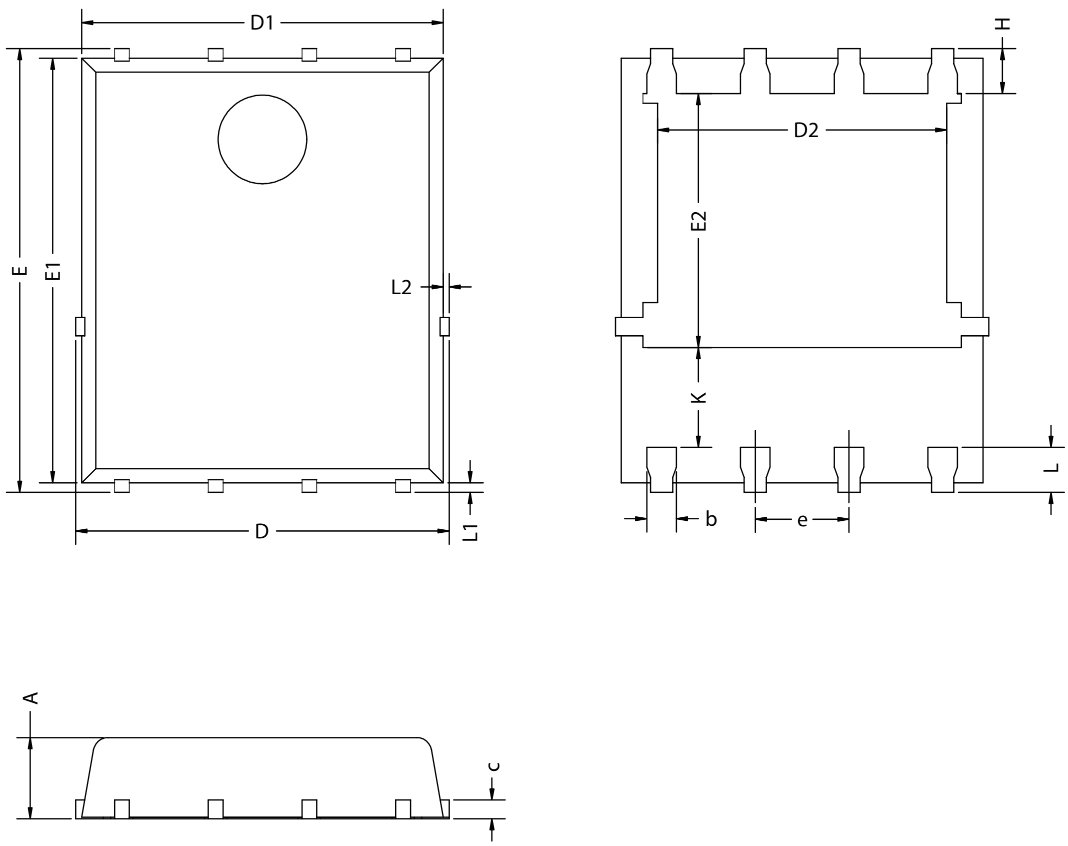


T_{mb} = 25 °C

Fig. 13. Safe operating area

11. Package outline

PDFN5X6



Unit		A	b	c	D	D1	D2	E	E1	E2	e	H	K	L	L1	L2
MM	min	1.00	0.35	0.21		4.80	3.91	5.90	5.70	3.34	1.27 (BSC)	0.51	1.10	0.51	0.06	
	max	1.20	0.45	0.34	5.10	5.00	4.11	6.10	5.80	3.54		0.71		0.71	0.20	0.10

Note:

1. All dimensions don't include mold flash and metal protrusion.

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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13. Contents

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