WMS30N250K

N-Channel Silicon MOSFET

Rev.01 - 07 November 2022 Product data sheet

1. General description

WMS30N250K is a high performance logic level N-channel MOSFET in SOT23 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.

RoHS Halogen-Free Lead-Free

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
- RoHS Compliant and Halogen Free and Lead Free

3. Applications

- Load Switch
- General PWM Applications

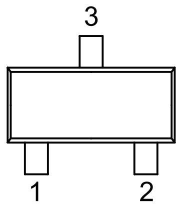
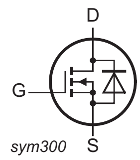
4. Quick reference data

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_a = 25 °C		5.9			A
P_{tot}	power dissipation	T_a = 25 °C		1.4			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 = 5.9 A		-	18	25	mΩ
		V_{GS} = 4.5 V, I_D = 3 A		-	26	35	mΩ
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 5.9 A; V_{DS} = 15 V; V_{GS} = 10 V		-	11	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	S	source		
3	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
WMS30N250K	SOT23	WMS30N250KX	Reel	3000	SOT23L	22-Aug-2022

7. Marking

Table 4. Marking codes

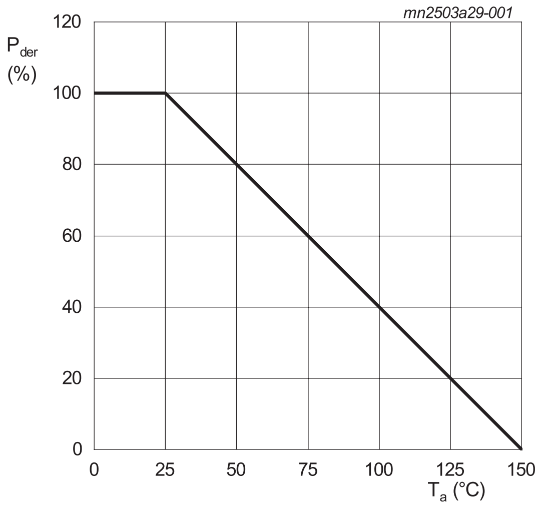
Type number	Marking codes
WMS30N250K	AE

8. Limiting values

Table 5. Limiting values

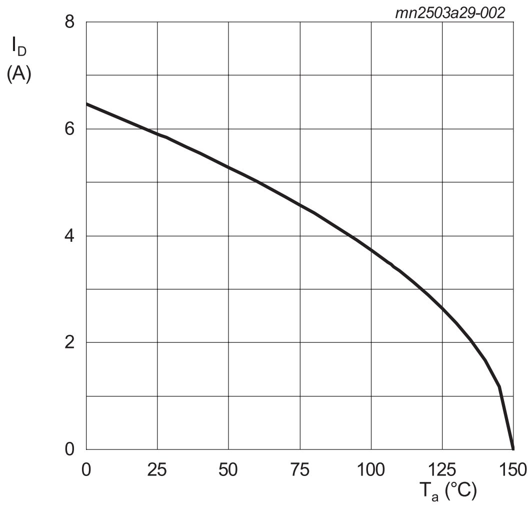
In accordance with the Absolute Maximum Rating System (IEC 60134).

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_a = 25 °C		5.9	A
		V_{GS} = 10 V; T_a = 70 °C		4.7	A
I_{DM}	pulsed drain current	t_p = 10 µs; T_a = 25 °C		23.6	A
P_{tot}	power dissipation	T_a = 25 °C		1.4	W
T_{stg}	storage temperature			-55 to 150	°C
T_j	junction temperature			-55 to 150	°C



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

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



V_{GS} = 4.5 V

Fig. 2. Continuous Drain Current as a function of ambient temperature

9. Thermal & Mechanical characteristics

Table 6. Thermal & Mechanical characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	t ≤ 10s	[1]	-	72	90	K/W
		in free air	[1]	-	95	120	K/W

[1] Surface mount on FR4 board of 1 inch², 1 oz copper.

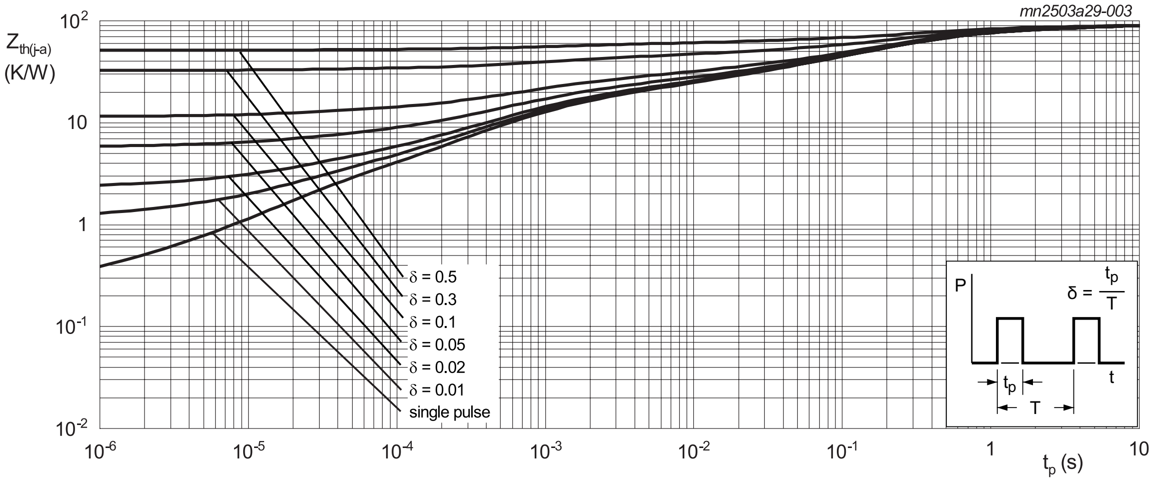


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration

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	1.5	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 = 5.9 A		-	18	25	mΩ
		V_{GS} = 4.5 V; I_D = 3 A		-	26	35	mΩ
R_G	gate resistance	f = 1 MHz		-	2.4	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 5.9 A; V_{DS} = 15 V; V_{GS} = 10 V		-	11	-	nC
Q_{GS}	gate-source charge			-	2.0	-	nC
Q_{GD}	gate-drain charge			-	1.8	-	nC
C_{iss}	input capacitance	V_{DS} = 15 V; V_{GS} = 0 V; f = 1 MHz		-	557	-	pF
C_{oss}	output capacitance			-	73	-	pF
C_{rss}	reverse transfer capacitance			-	55	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 15 V; V_{GS} = 10 V; R_G = 6 Ω; I_D = 5.9 A		-	3.1	-	ns
t_r	rise time			-	3.4	-	ns
$t_{d(off)}$	turn-off delay time			-	13	-	ns
t_f	fall time			-	4.6	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	V_{GS} = 0 V; I_S = 1 A		-	0.76	1	V
		V_{GS} = 0 V; I_S = 1 A; T_j = 125 °C		-	0.61	-	V
I_S	body-diode continuous current	T_a = 25 °C		-	-	2	A
t_{rr}	reverse recovery time	V_{GS} = 0 V; I_S = 5.9 A; di/dt = 100 A/μs		-	12	-	ns
Q_{rr}	reverse recovered charge			-	5.0	-	nC
I_{rrm}	reverse recovery current			-	0.7	-	A

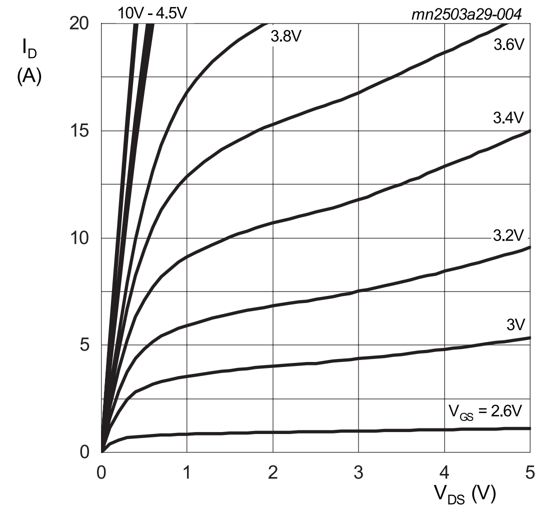
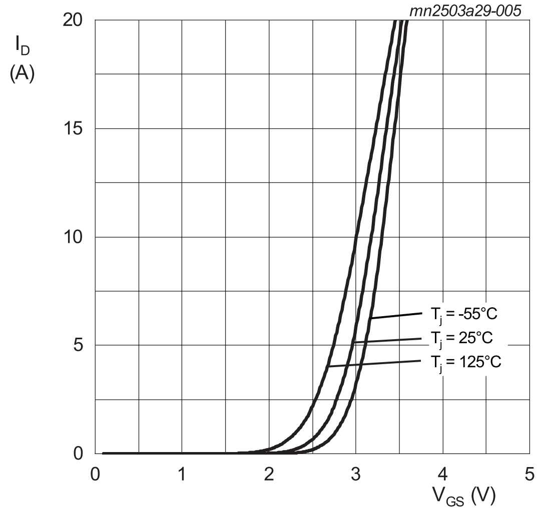
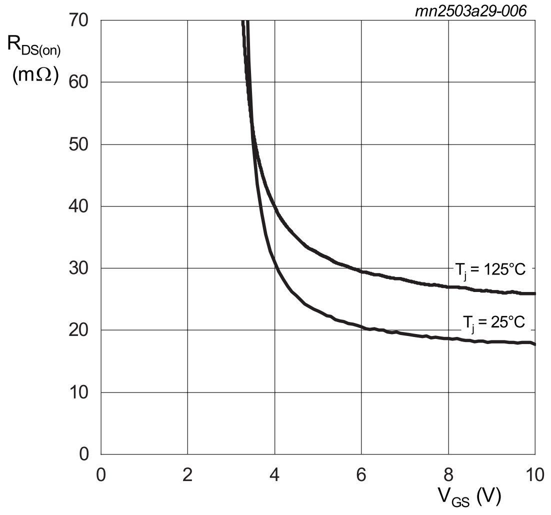


Fig. 4. Drain current as a function of drain-source voltage; typical values



V_{DS} = 5 V

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



V_{GS} = 10 V; I_D = 5.9 A

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

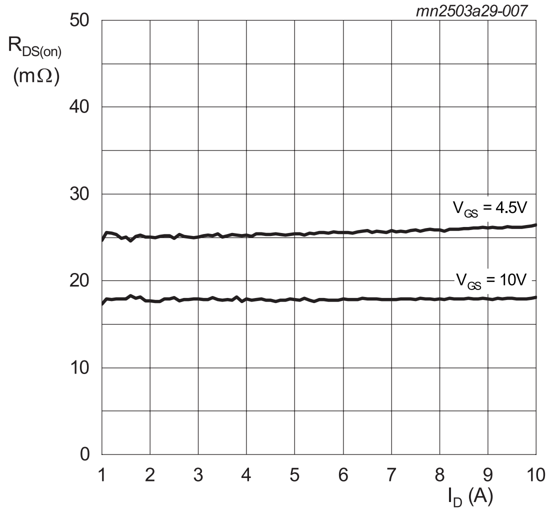
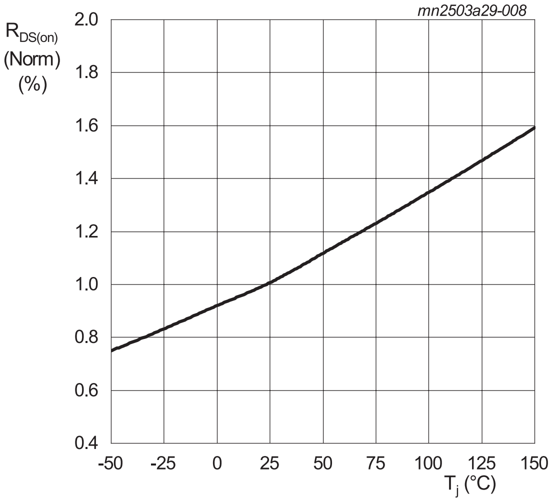
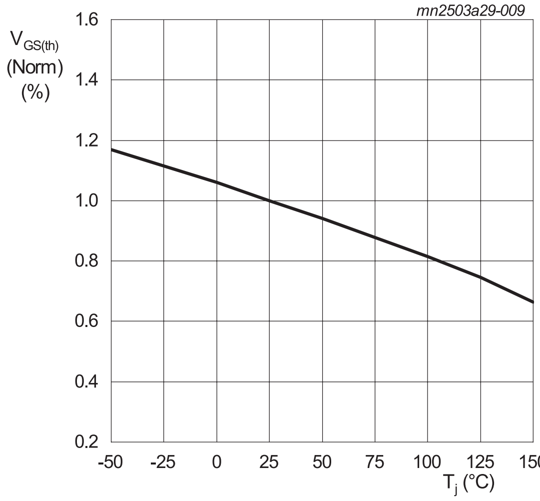


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values



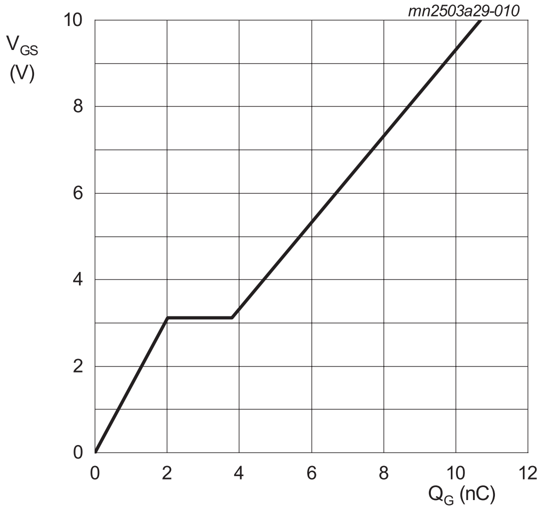
V_{GS} = 10 V; I_D = 5.9 A

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



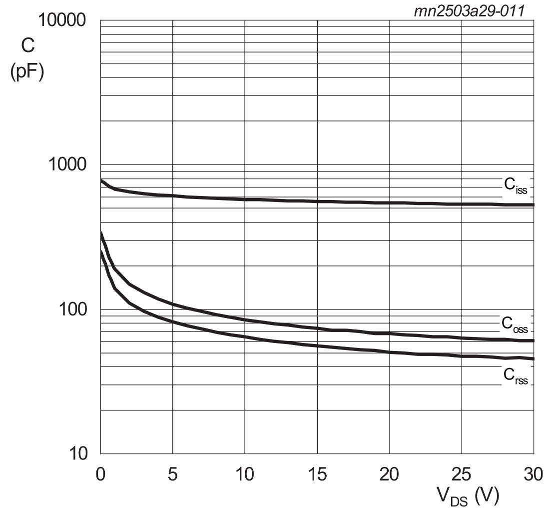
V_{GS} = V_{GS}; I_D = 250 μA

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



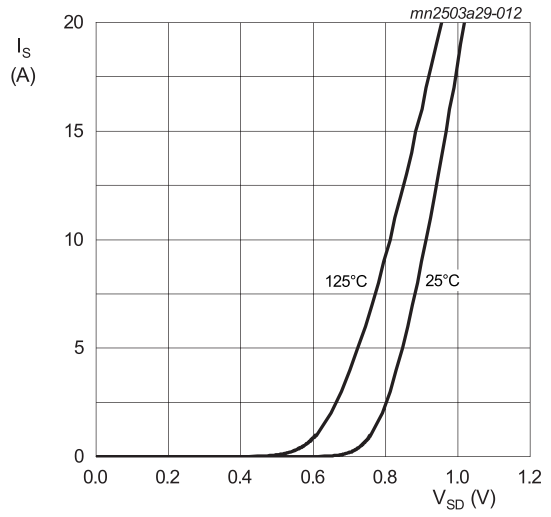
I_D = 5.9 A; V_{DS} = 15 V

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



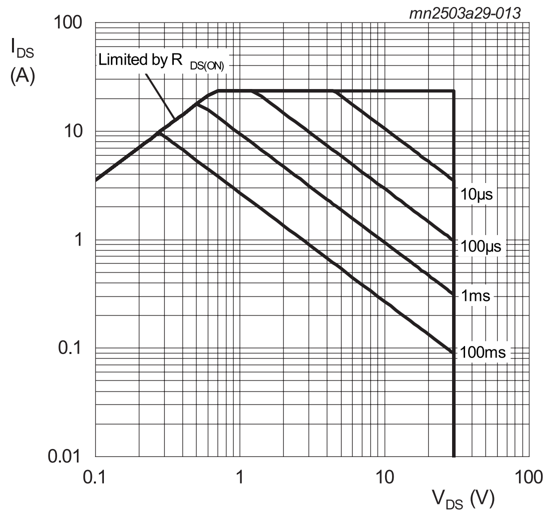
V_{GS} = 0 V; f = 1 MHz

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



V_{GS} = 0 V

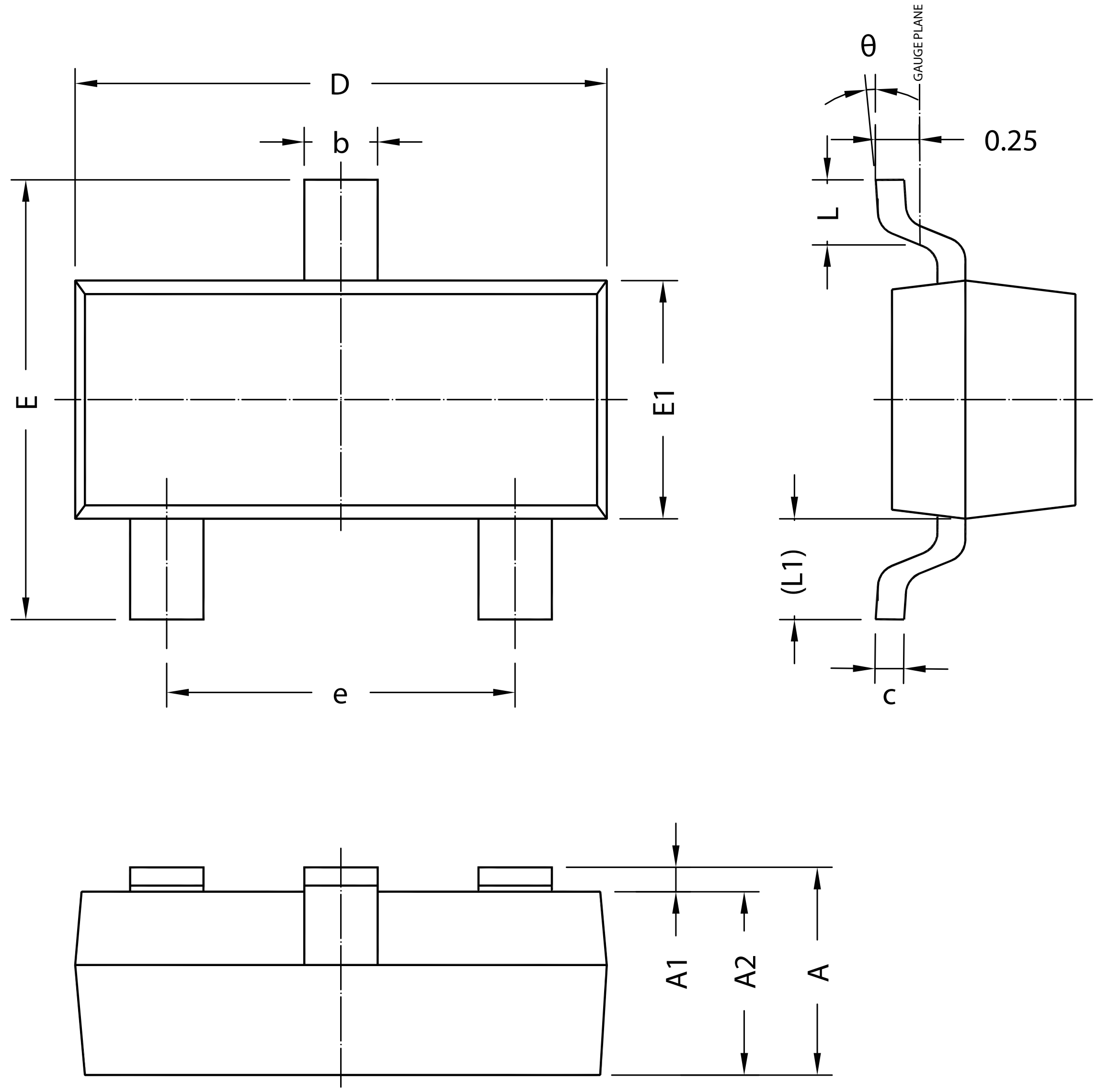
Fig 12. Source current as a function of source-drain voltage; typical values



T_a = 25 °C

Fig. 13. Safe operating area

11. Package outline



UNIT		A	A1	A2	b	c	D	E	E1	e	L	L1	
mm	Min	0.90	0.00	0.90	0.30	0.13	2.80	2.25	1.20	1.80	0.30	(0.55)	0°
	Max	1.20	0.10	1.10	0.50	0.20	3.00	2.55	1.40	2.00	0.50		8°

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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