

## 1. General description

WMS30N020V 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

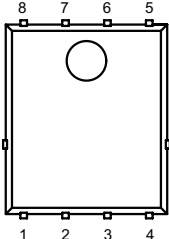
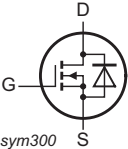
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
<b>Absolute maximum rating</b>							
$V_{DS}$	drain-source voltage			30			V
$V_{GS}$	gate-source voltage			±20			V
$I_D$	continuous drain current	$V_{GS} = 10\text{ V}; T_{mb} = 25\text{ °C}$	[1]	150			A
$P_{tot}$	power dissipation	$T_{mb} = 25\text{ °C}$		74			W
$T_j$	junction temperature			-55 to 150			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		-	1.6	2.0	mΩ
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		-	2.1	3.3	mΩ
<b>Dynamic characteristics</b>							
$Q_{G(tot)}$	total gate charge	$I_D = 20\text{ A}; V_{DS} = 15\text{ V}; V_{GS} = 10\text{ V}$		-	146	-	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
WMS30N020V	PDFN5X6	WMS30N020VJ	Reel	4000	PDFN5X6N	21-Jul-2022

## 7. Marking

Table 4. Marking codes

Type number	Marking codes
WMS30N020V	WMS 30N020

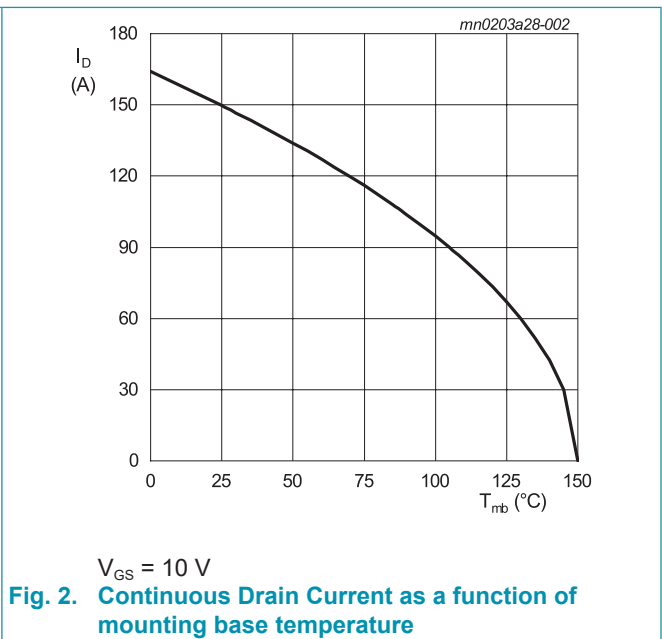
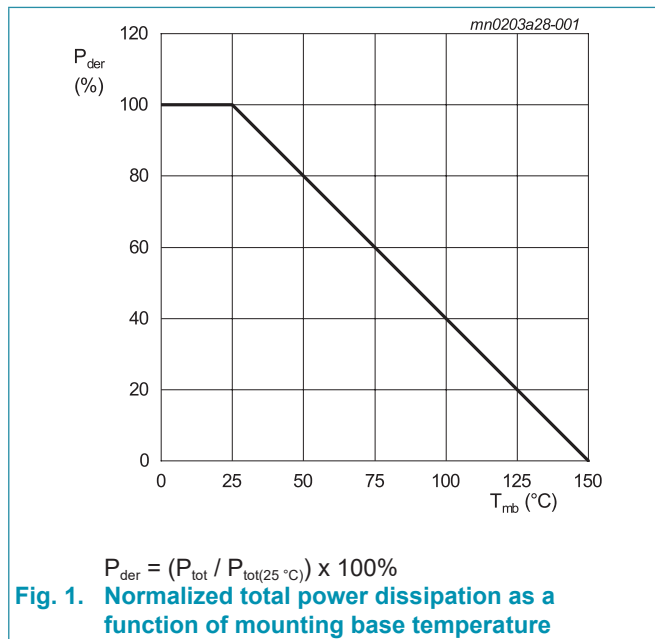
## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Notes	Values	Unit
V <sub>DS</sub>	drain-source voltage			30	V
V <sub>GS</sub>	gate-source voltage			±20	V
I <sub>D</sub>	continuous drain current	V <sub>GS</sub> = 10 V; T <sub>mb</sub> = 25 °C	[1]	150	A
		V <sub>GS</sub> = 10 V; T <sub>mb</sub> = 120 °C		73	A
I <sub>DM</sub>	pulsed drain current	t <sub>p</sub> = 10 μs; T <sub>mb</sub> = 25 °C		600	A
P <sub>tot</sub>	power dissipation	T <sub>mb</sub> = 25 °C		74	W
E <sub>as</sub>	single pulse drain-to-source avalanche	I <sub>AS</sub> = 40 A; L = 0.1 mH; R <sub>GS</sub> = 25 Ω; V <sub>GS</sub> = 10 V; T <sub>j</sub> = 25 °C		80	mJ
T <sub>stg</sub>	storage temperature			-55 to 150	°C
T <sub>j</sub>	junction temperature			-55 to 150	°C

[1] Calculated continuous current based on maximum allowable junction temperature. Package current limitation is 90A.



## 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			-	1.3	1.7	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<sup>2</sup>, 1 oz copper.

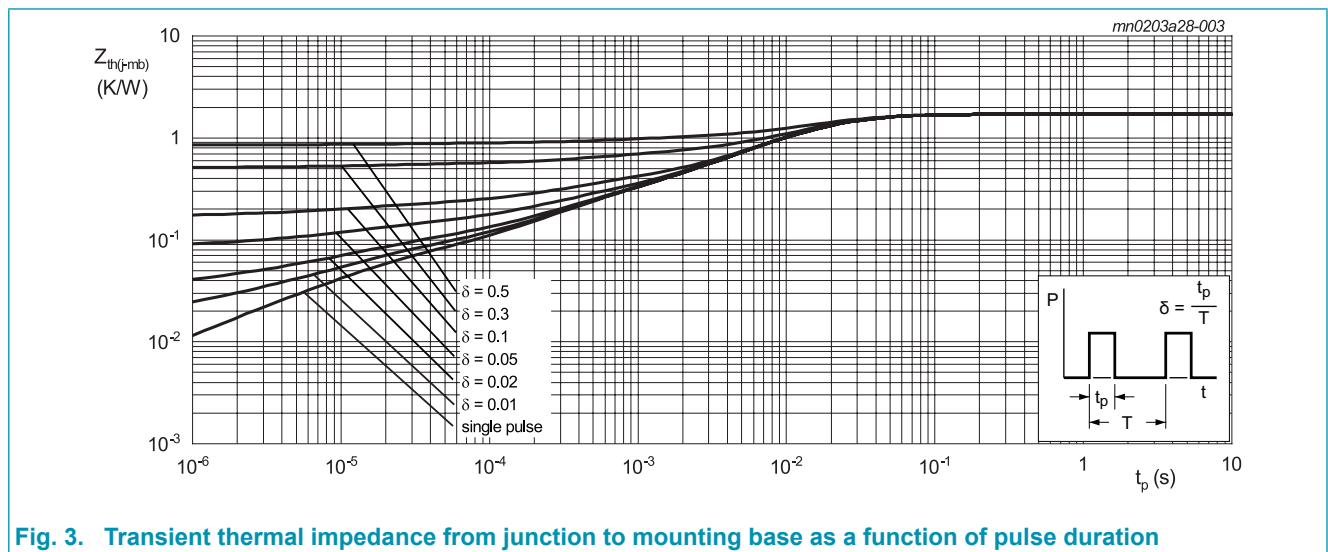
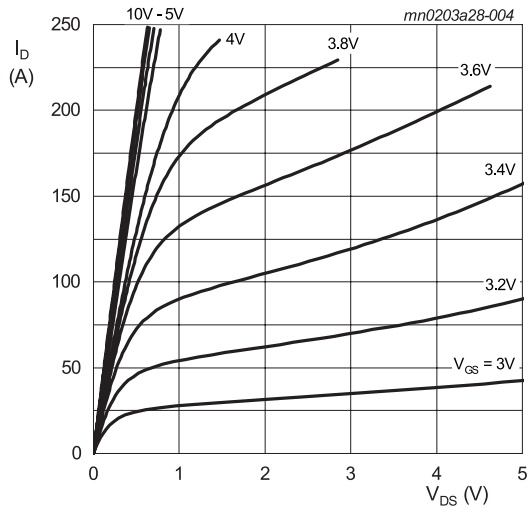


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse duration

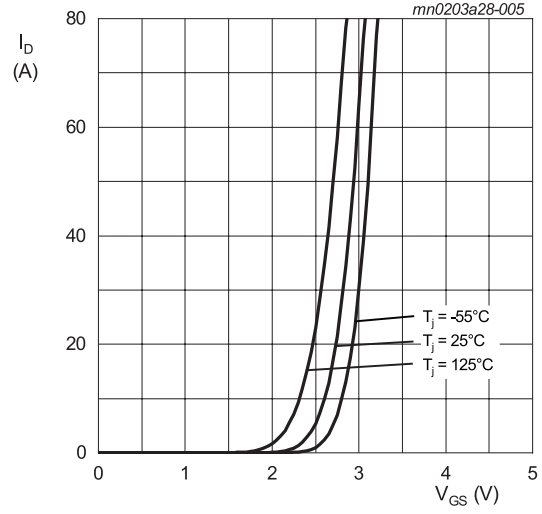
## 10. Characteristics

**Table 7. Characteristics**
 $T_j = 25\text{ °C}$  unless otherwise noted

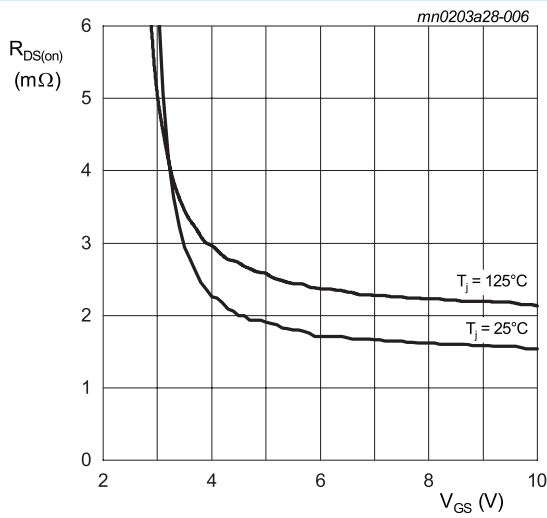
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}; V_{GS} = 0\text{ V}$		30	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 250\text{ }\mu\text{A}; V_{DS} = V_{GS}$		1.0	1.5	2.4	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30\text{ V}; V_{GS} = 0\text{ V}$		-	-	1	$\mu\text{A}$
		$V_{DS} = 30\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ °C}$		-	-	100	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = \pm 20\text{ V}; V_{DS} = 0\text{ V}$		-	-	$\pm 100$	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 20\text{ A}$		-	1.6	2.0	m $\Omega$
		$V_{GS} = 4.5\text{ V}; I_D = 20\text{ A}$		-	2.1	3.3	m $\Omega$
$R_G$	gate resistance	$f = 1\text{ MHz}$		-	1.1	-	$\Omega$
<b>Dynamic characteristics</b>							
$Q_{G(tot)}$	total gate charge	$I_D = 20\text{ A}; V_{DS} = 15\text{ V}; V_{GS} = 10\text{ V}$		-	146	-	nC
$Q_{GS}$	gate-source charge			-	21	-	nC
$Q_{GD}$	gate-drain charge			-	25	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 15\text{ V}; V_{GS} = 0\text{ V}; f = 1\text{ MHz}$		-	7940	-	pF
$C_{oss}$	output capacitance			-	847	-	pF
$C_{rss}$	reverse transfer capacitance			-	710	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15\text{ V}; V_{GS} = 10\text{ V}; R_G = 6\text{ }\Omega;$ $I_D = 20\text{ A}$		-	17	-	ns
$t_r$	rise time			-	31	-	ns
$t_{d(off)}$	turn-off delay time			-	60	-	ns
$t_f$	fall time			-	34	-	ns
<b>Source-drain diode</b>							
$V_{SD}$	source-drain voltage	$V_{GS} = 0\text{ V}; I_S = 1\text{ A}$		-	0.67	1	V
		$V_{GS} = 0\text{ V}; I_S = 1\text{ A}; T_j = 125\text{ °C}$		-	0.50	-	V
$I_S$	body-diode continuous current	$T_{mb} = 25\text{ °C}$		-	-	80	A
$t_{rr}$	reverse recovery time	$V_{GS} = 0\text{ V}; I_S = 20\text{ A}; di/dt = 100\text{ A}/\mu\text{s}$		-	19	-	ns
$Q_{rr}$	reverse recovered charge			-	12	-	nC
$I_{rrm}$	reverse recovery current			-	1	-	A



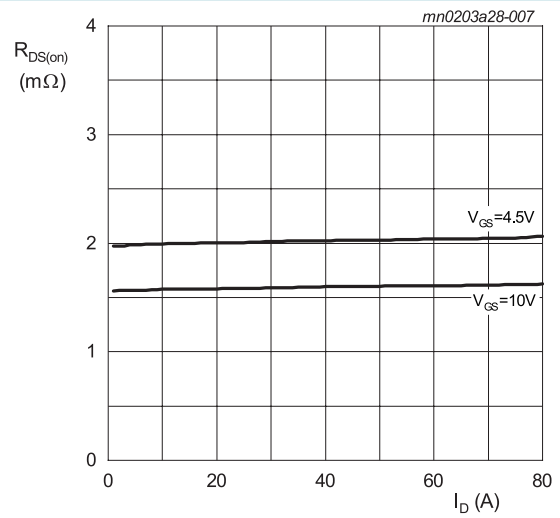
**Fig. 4. Drain current as a function of drain-source voltage; typical values**



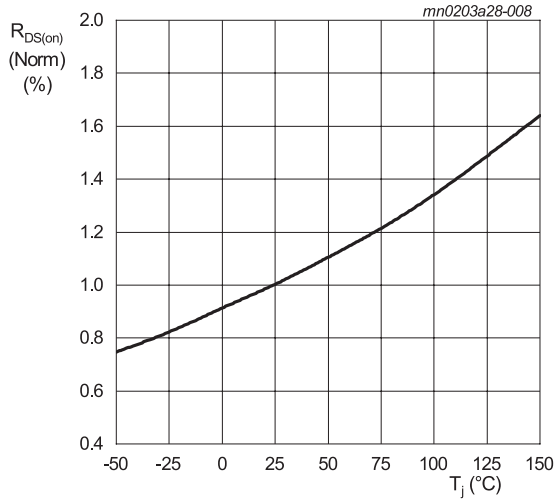
**Fig. 5. Drain current as a function of gate-source voltage; typical values**



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

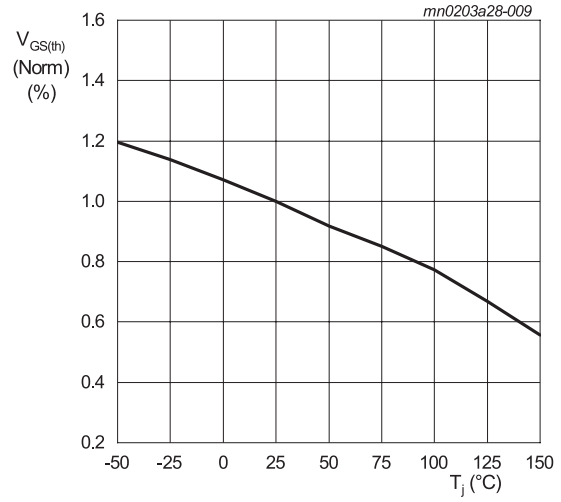


**Fig. 7. Drain-source on-state resistance as a function of drain current; typical values**



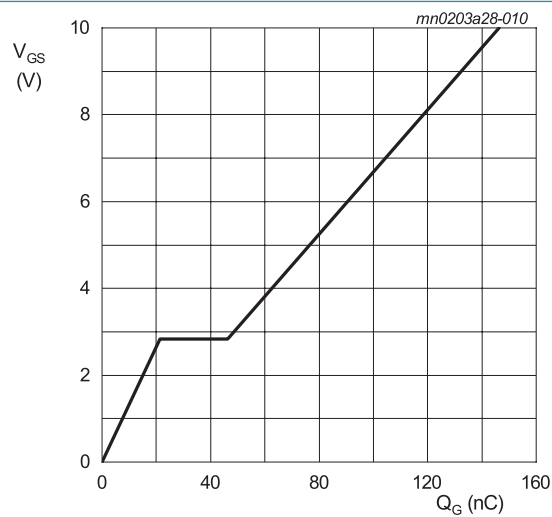
$V_{GS} = 10\text{ V}; I_D = 20\text{ A}$

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



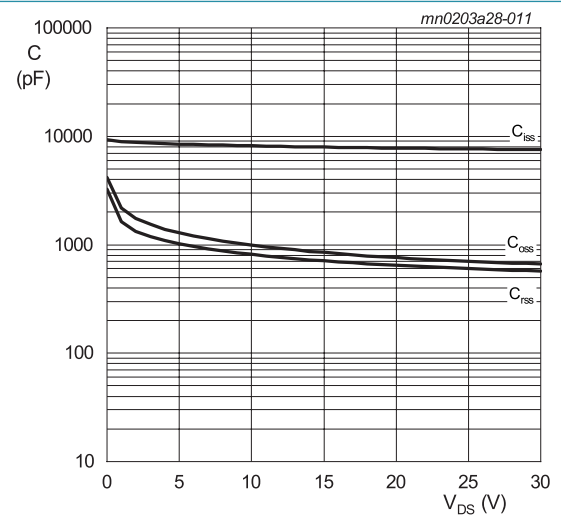
$V_{DS} = V_{GS}; I_D = 250\text{ }\mu\text{A}$

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



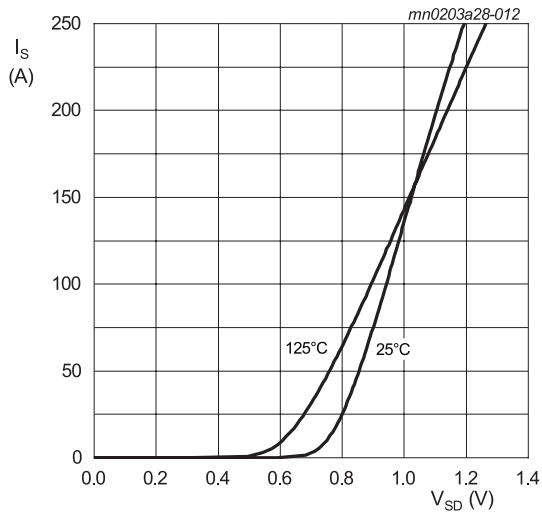
$I_D = 20\text{ A}; V_{DS} = 15\text{ V}$

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



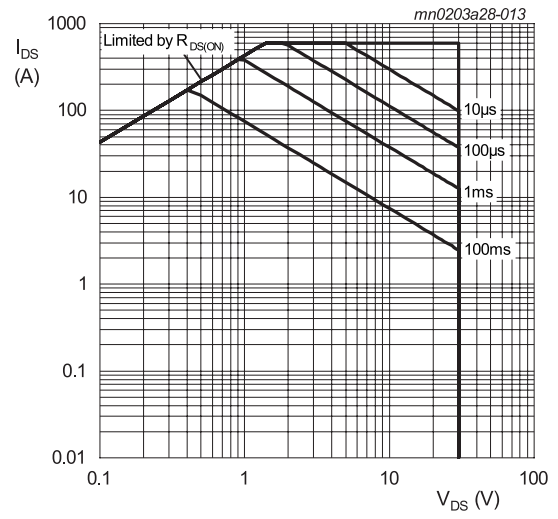
$V_{GS} = 0\text{ V}; f = 1\text{ MHz}$

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



$V_{GS} = 0\text{ V}$

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



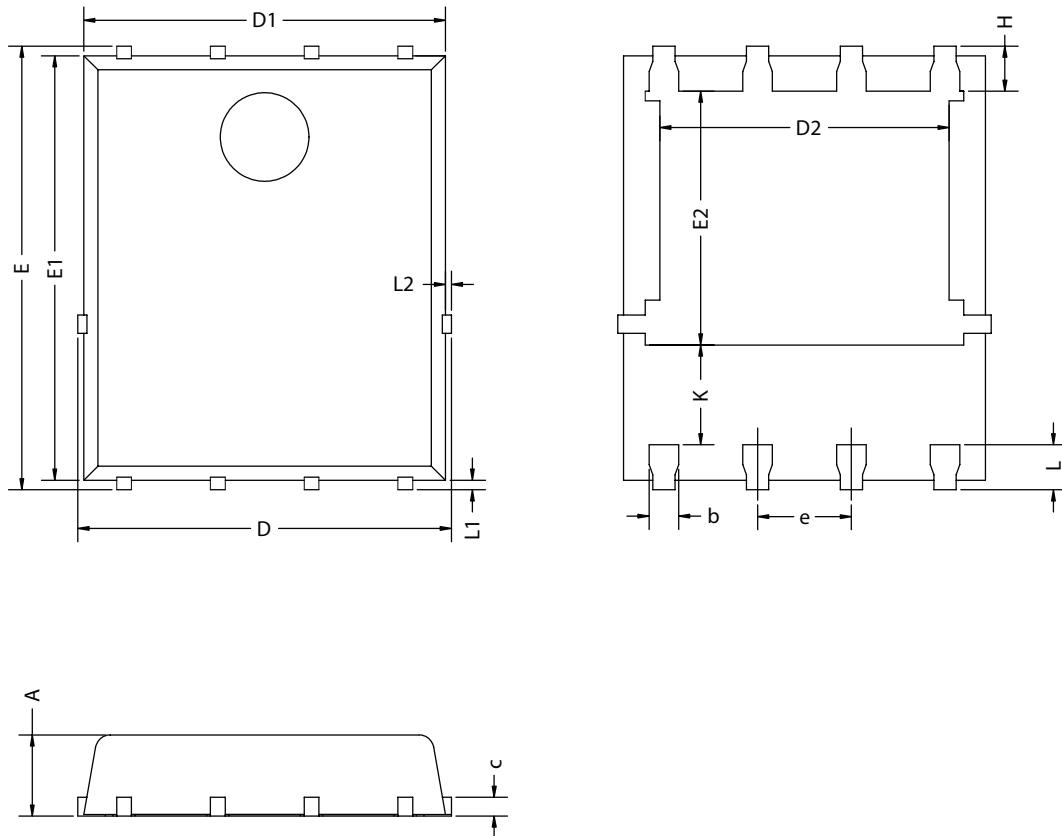
$T_{mb} = 25\text{ °C}$

**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
min	1.00	0.35	0.21		4.80	3.91	5.90	5.70	3.34		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	1.27 (BSC)	0.71		0.71	0.20	0.10

**Note:**

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

## 12. Legal information

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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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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