



WMS20N270SE

N-Channel Silicon MOSFET

Rev.01 - 18 January 2023

Product data sheet

1. General description

WMS20N270SE is a high performance super logic level N-channel MOSFET in PDFN3.3X3.3 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, Halogen Free and Lead Free

3. Applications

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

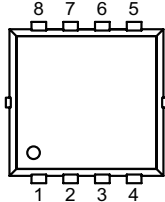
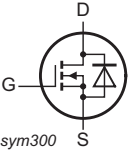
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{DS}	drain-source voltage			20			V
V_{GS}	gate-source voltage			±10			V
I_D	continuous drain current	$V_{GS} = 4.5\text{ V}; T_{mb} = 25\text{ °C}$	[1]	18			A
P_{tot}	power dissipation	$T_{mb} = 25\text{ °C}$		14			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	$V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$		-	17	27	mΩ
		$V_{GS} = 2.5\text{ V}, I_D = 3\text{ A}$		-	25	44	mΩ
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	$I_D = 8\text{ A}; V_{DS} = 10\text{ V}; V_{GS} = 4.5\text{ V}$		-	5.1	-	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
WMS20N270SE	PDFN3.3X3.3	WMS20N270SEJ	Reel	5000	PDFN3.3X3.3N	22-Sep-2022

7. Marking

Table 4. Marking codes

Type number	Marking codes
WMS20N270SE	2N270S

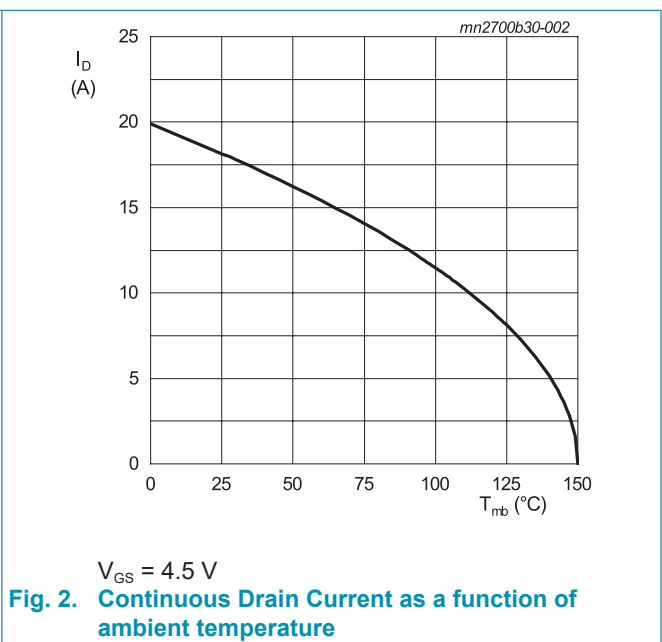
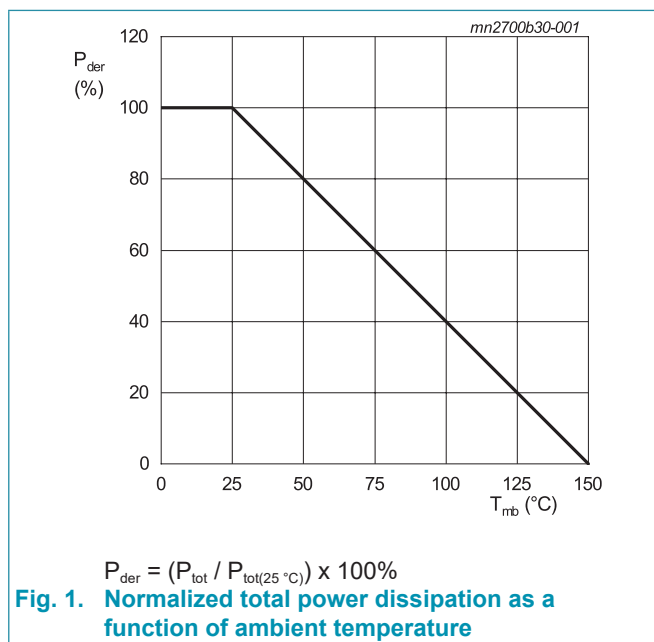
8. Limiting values

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			20	V
V_{GS}	gate-source voltage			± 10	V
I_D	continuous drain current	$V_{GS} = 4.5\text{ V}; T_{mb} = 25\text{ }^\circ\text{C}$	[1]	18	A
		$V_{GS} = 4.5\text{ V}; T_{mb} = 120\text{ }^\circ\text{C}$		8.9	A
I_{DM}	pulsed drain current	$t_p = 10\text{ }\mu\text{s}; T_{mb} = 25\text{ }^\circ\text{C}$		72	A
P_{tot}	power dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$		14	W
E_{as}	single pulse drain-to-source avalanche	$I_{AS} = 7\text{ A}; L = 0.1\text{ mH}; R_{GS} = 25\text{ }\Omega;$ $V_{GS} = 4.5\text{ V}; T_j = 25\text{ }^\circ\text{C}$		2.5	mJ
T_{stg}	storage temperature			-55 to 150	$^\circ\text{C}$
T_j	junction temperature			-55 to 150	$^\circ\text{C}$

[1] Calculated continuous current based on maximum allowable junction temperature. Package current limitation is 8A.



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			-	7	9.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[2]	-	-	60	K/W

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

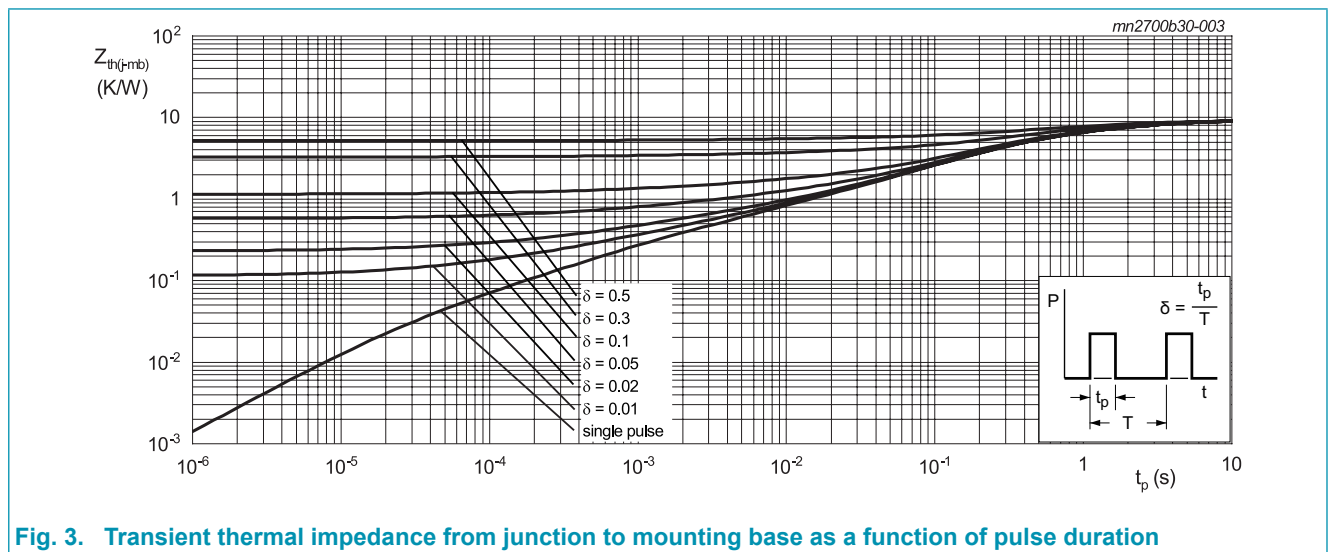


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

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

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}; V_{GS} = 0\text{ V}$		20	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 250\text{ }\mu\text{A}; V_{DS} = V_{GS}$		0.5	0.7	1.1	V
I_{DSS}	drain leakage current	$V_{DS} = 20\text{ V}; V_{GS} = 0\text{ V}$		-	-	1	μA
		$V_{DS} = 20\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ °C}$		-	-	10	μA
I_{GSS}	gate leakage current	$V_{GS} = \pm 10\text{ V}; V_{DS} = 0\text{ V}$		-	-	± 100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 8\text{ A}$		-	17	27	m Ω
		$V_{GS} = 2.5\text{ V}; I_D = 3\text{ A}$		-	25	44	m Ω
R_G	gate resistance	$f = 1\text{ MHz}$		-	3.3	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	$I_D = 8\text{ A}; V_{DS} = 10\text{ V}; V_{GS} = 4.5\text{ V}$		-	5.1	-	nC
Q_{GS}	gate-source charge			-	0.7	-	nC
Q_{GD}	gate-drain charge			-	1.6	-	nC
C_{iss}	input capacitance	$V_{DS} = 10\text{ V}; V_{GS} = 0\text{ V}; f = 1\text{ MHz}$		-	388	-	pF
C_{oss}	output capacitance			-	79	-	pF
C_{rss}	reverse transfer capacitance			-	70	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 10\text{ V}; V_{GS} = 10\text{ V}; R_G = 6\text{ }\Omega;$ $I_D = 8\text{ A}$		-	7.0	-	ns
t_r	rise time			-	15	-	ns
$t_{d(off)}$	turn-off delay time			-	26	-	ns
t_f	fall time			-	12	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	$V_{GS} = 0\text{ V}; I_S = 1\text{ A}$		-	0.71	1	V
		$V_{GS} = 0\text{ V}; I_S = 1\text{ A}; T_j = 125\text{ °C}$		-	0.55	-	V
I_S	body-diode continuous current	$T_{mb} = 25\text{ °C}$		-	-	15	A
t_{rr}	reverse recovery time	$V_{GS} = 0\text{ V}; I_S = 8\text{ A}; di/dt = 100\text{ A}/\mu\text{s}$		-	13	-	ns
Q_{rr}	reverse recovered charge			-	4.7	-	nC
I_{rrm}	reverse recovery current			-	0.6	-	A

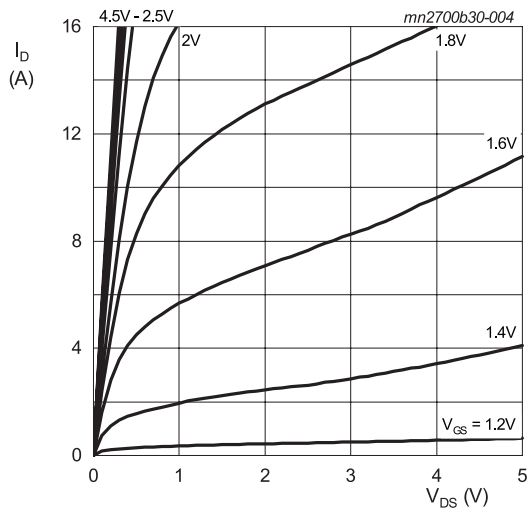


Fig. 4. Drain current as a function of drain-source voltage; typical values

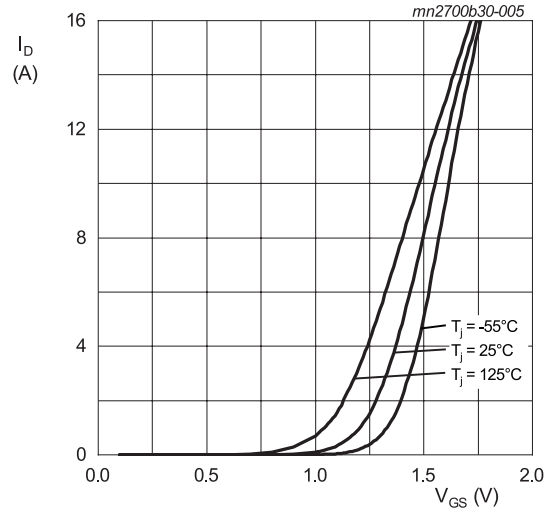


Fig. 5. Drain current as a function of gate-source voltage; typical values

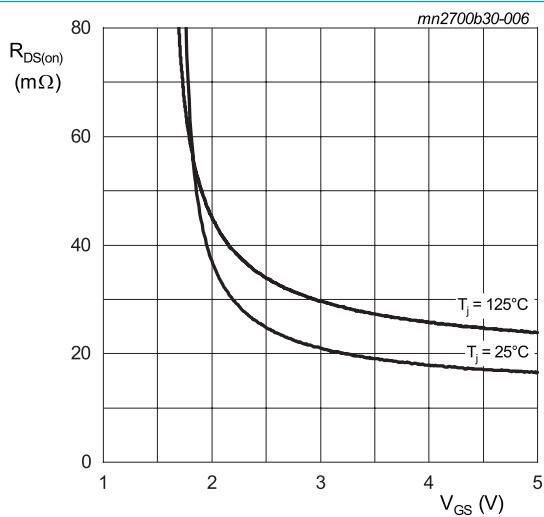


Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

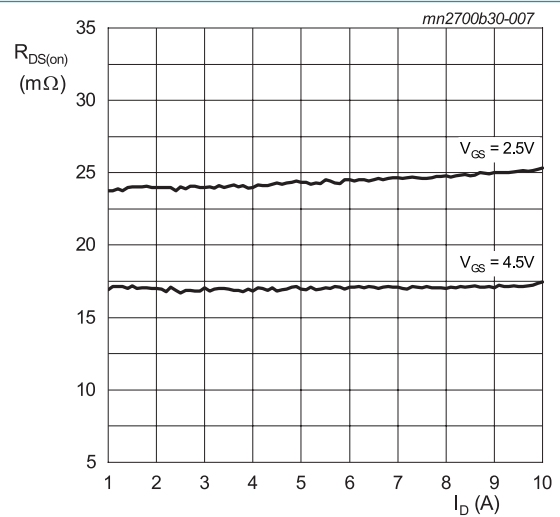
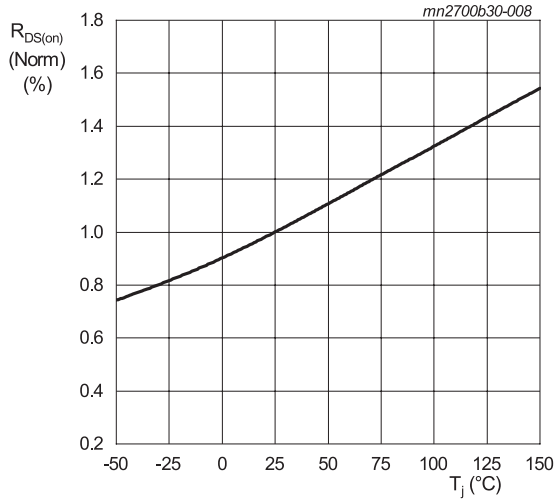
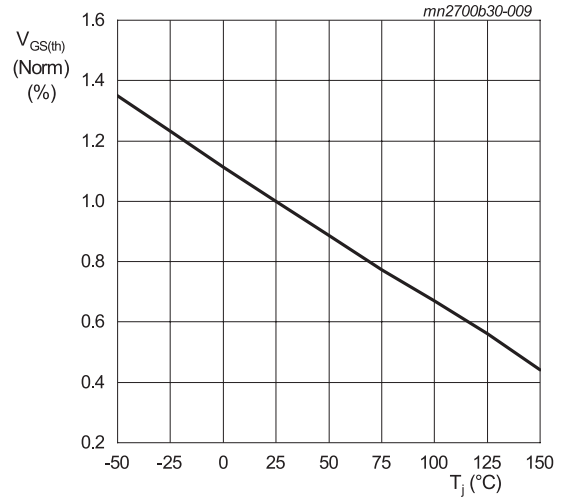


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values



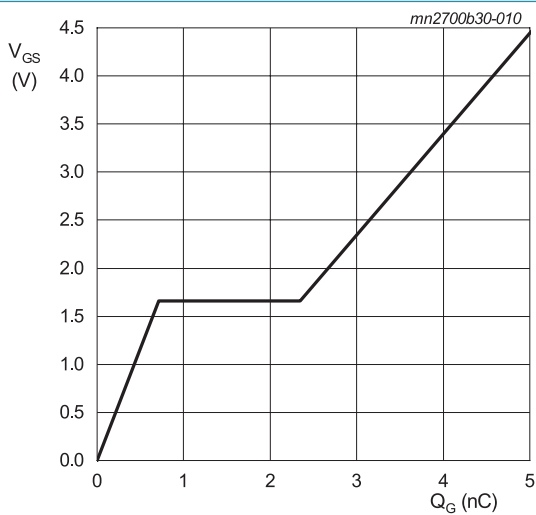
$V_{GS} = 4.5\text{ V}; I_D = 8\text{ A}$

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



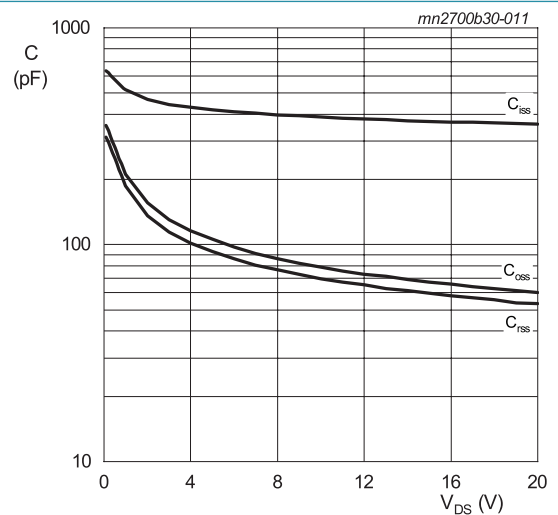
$V_{DS} = V_{GS}; I_D = 250\ \mu\text{A}$

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



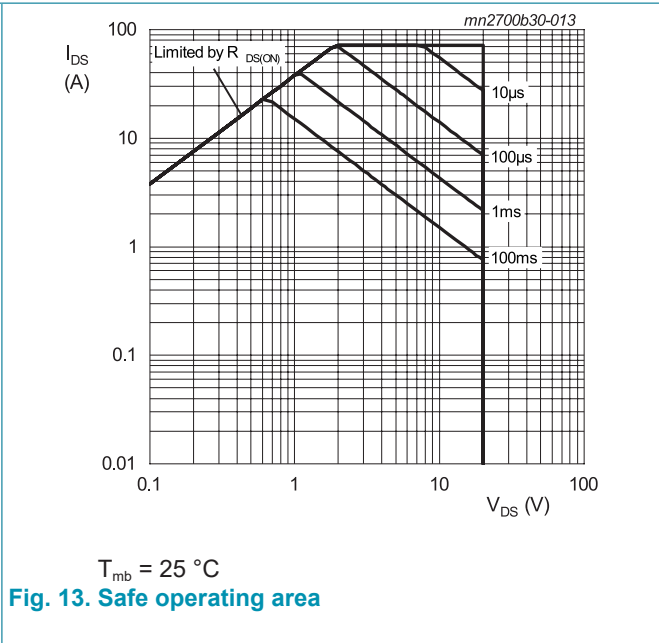
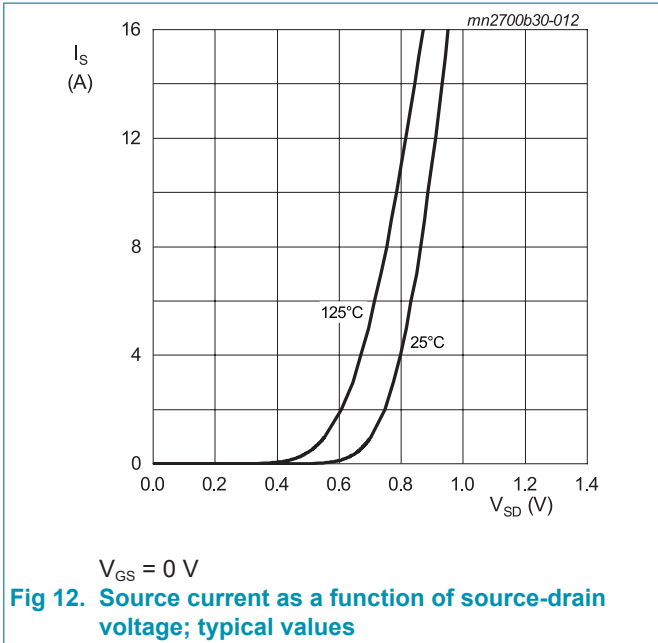
$I_D = 8\text{ A}; V_{DS} = 10\text{ V}$

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



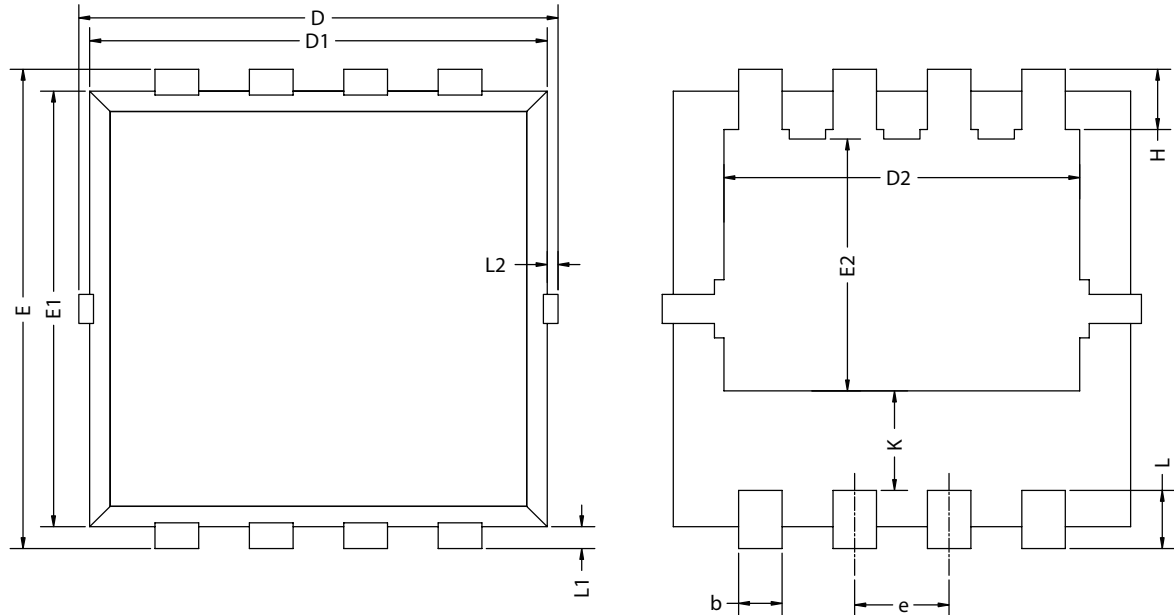
$V_{GS} = 0\text{ V}; f = 1\text{ MHz}$

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



11. Package outline

PDFN3.3X3.3



TOP VIEW

BOTTOM VIEW

SIDE VIEW

Unit	A	b	c	D	D1	D2	E	E1	E2	e	H	K	L	L1	L2
MM	min	0.70	0.20	0.14	3.10	3.05	2.35	3.10	2.90	1.64	0.55	0.32	0.59	0.25	0.10
	max	0.90	0.35	0.22	3.50	3.25	2.55	3.50	3.10	1.84	0.75	0.52	0.79	0.55	0.20

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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- [2] The term 'short data sheet' is explained in section "Definitions".
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13. Contents

1. General description.....	1
2. Features and benefits	1
3. Applications	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Ordering information.....	2
8. Limiting values	3
9. Thermal & Mechanical characteristics	4
10. Characteristics.....	5
11. Package outline	9
12. Legal information	10
13. Contents	12

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