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Team Nexperia



PMXB65ENE

30 V, N-channel Trench MOSFET

3 November 2016

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Trench MOSFET technology
- Leadless ultra small and thin SMD plastic package: $1.1 \times 1.0 \times 0.37$ mm
- Exposed drain pad for excellent thermal conduction
- ElectroStatic Discharge (ESD) protection 1 kV
- Very low Drain-Source on-state resistance $R_{DSon} = 44$ mΩ

3. Applications

- Low-side load switch and charging switch for portable devices
- Power management in battery-driven portables
- LED driver
- DC-to-DC converters

4. Quick reference data

Table 1. Quick reference data

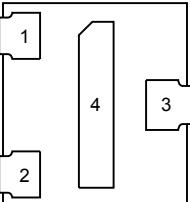
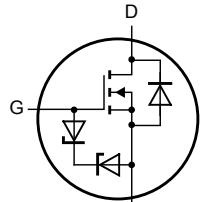
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25$ °C		-	-	30	V
V_{GS}	gate-source voltage			-20	-	20	V
I_D	drain current	$V_{GS} = 10$ V; $T_{amb} = 25$ °C	[1]	-	-	3.2	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 3.2$ A; $T_j = 25$ °C		-	44	67	mΩ

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	S	source		
3	D	drain		
4	D	drain	 Transparent top view	 017aaa255

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMXB65ENE	DFN1010D-3	DFN1010D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 1.1 x 1.0 x 0.37 mm	SOT1215

7. Marking

Table 4. Marking codes

Type number	Marking code
PMXB65ENE	00 10 00

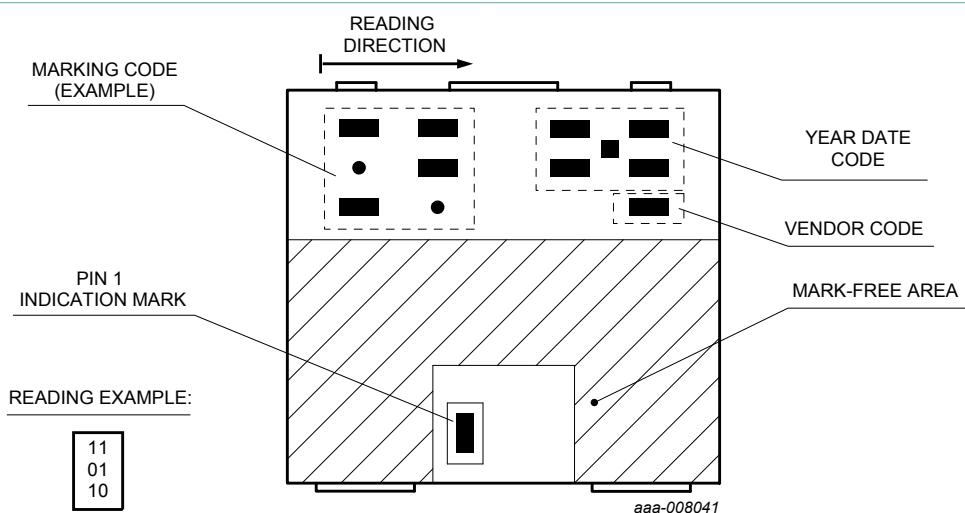


Fig. 1. DFN1010D-3 (SOT1215) binary marking code description

8. Limiting values

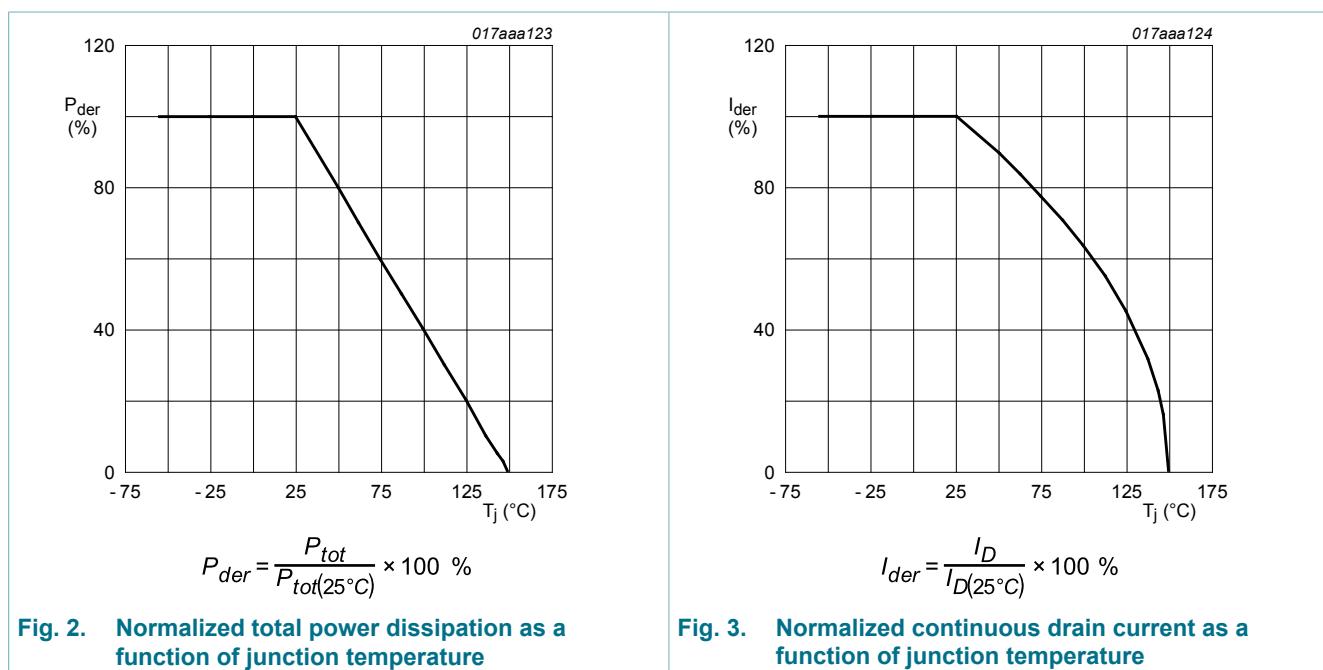
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25^\circ\text{C}$		-	30	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25^\circ\text{C}$	[1]	-	3.2	A
		$V_{GS} = 10\text{ V}; T_{amb} = 100^\circ\text{C}$	[1]	-	2.5	A
I_{DM}	peak drain current	$T_{amb} = 25^\circ\text{C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	12.8	A
P_{tot}	total power dissipation	$T_{amb} = 25^\circ\text{C}$	[2]	-	0.4	W
			[1]	-	1.07	W
		$T_{sp} = 25^\circ\text{C}$		-	8.33	W
T_j	junction temperature			-55	150	$^\circ\text{C}$
T_{amb}	ambient temperature			-55	150	$^\circ\text{C}$
T_{stg}	storage temperature			-65	150	$^\circ\text{C}$
Source-drain diode						
I_S	source current	$T_{amb} = 25^\circ\text{C}$	[1]	-	0.9	A

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm^2 .

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



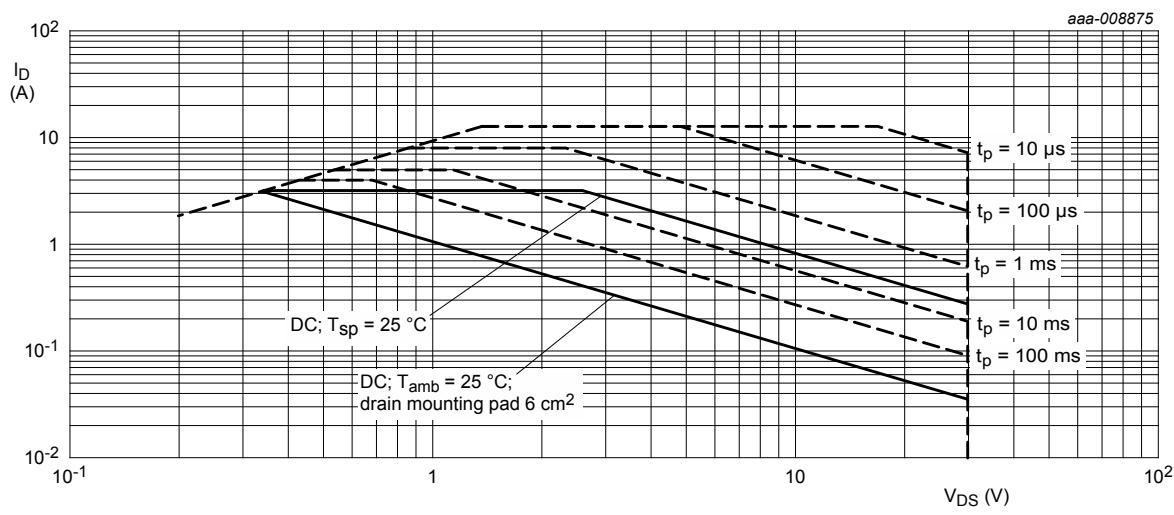


Fig. 4. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

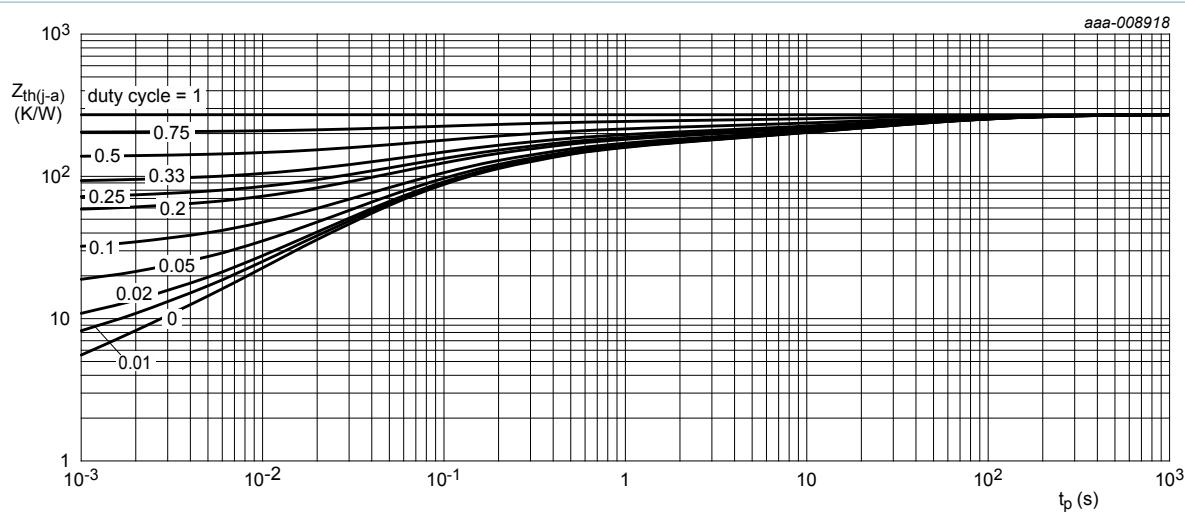
9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	271	312	K/W
			[2]	-	102	117	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	10	15	K/W

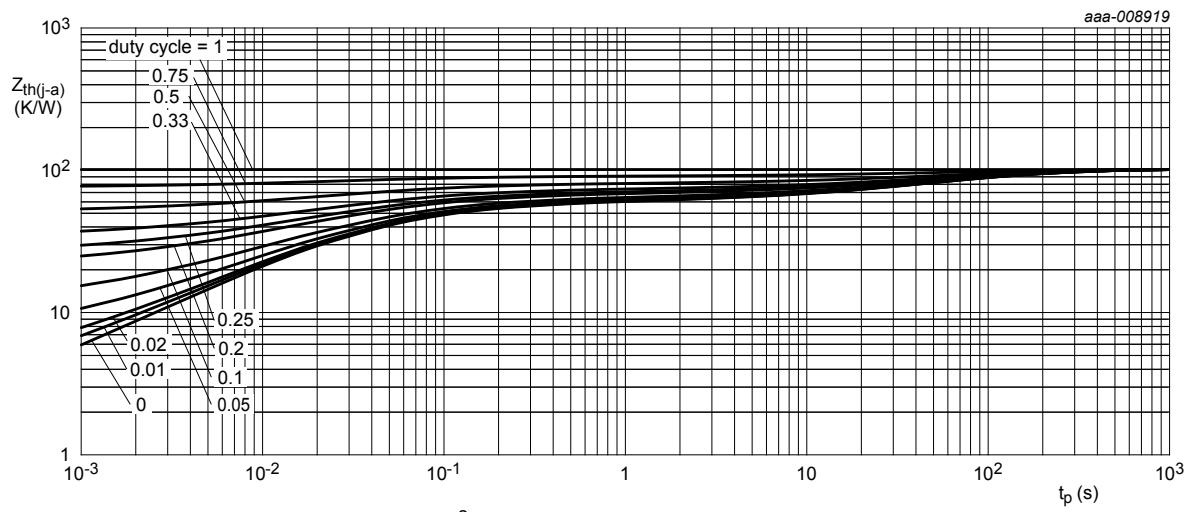
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 cm².



FR4 PCB, standard footprint

Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



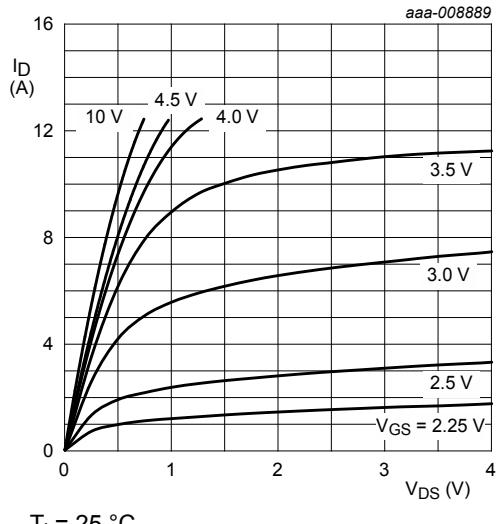
FR4 PCB, mounting pad for drain 6 cm²

Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

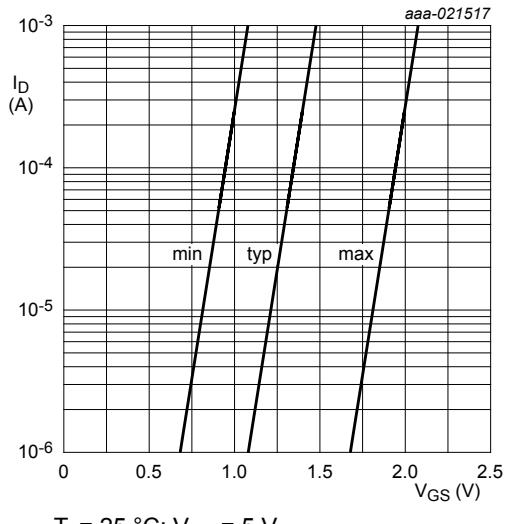
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25^\circ C$		30	-	-	V
V_{GSTh}	gate-source threshold voltage	$I_D = 250 \mu A$; $V_{DS}=V_{GS}$; $T_j = 25^\circ C$		1	1.4	2	V
I_{DSS}	drain leakage current	$V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25^\circ C$		-	-	1	μA
I_{GSS}	gate leakage current	$V_{GS} = 16 V$; $V_{DS} = 0 V$; $T_j = 25^\circ C$		-	-	10	μA
		$V_{GS} = -16 V$; $V_{DS} = 0 V$; $T_j = 25^\circ C$		-	-	-10	μA
		$V_{GS} = 10 V$; $V_{DS} = 0 V$; $T_j = 25^\circ C$		-	-	1	μA
		$V_{GS} = -10 V$; $V_{DS} = 0 V$; $T_j = 25^\circ C$		-	-	-1	μA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 V$; $I_D = 3.2 A$; $T_j = 25^\circ C$		-	44	67	$m\Omega$
		$V_{GS} = 10 V$; $I_D = 3.2 A$; $T_j = 150^\circ C$		-	71	107	$m\Omega$
		$V_{GS} = 4.5 V$; $I_D = 2.9 A$		-	56	79	$m\Omega$
g_{fs}	forward transconductance	$V_{DS} = 10 V$; $I_D = 3.2 A$; $T_j = 25^\circ C$		-	26	-	S
R_G	gate resistance	$f = 1 MHz$		-	1	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 V$; $I_D = 3.2 A$; $V_{GS} = 10 V$; $T_j = 25^\circ C$		-	6	11	nC
Q_{GS}	gate-source charge			-	0.7	-	nC
Q_{GD}	gate-drain charge			-	0.9	-	nC
C_{iss}	input capacitance	$V_{DS} = 15 V$; $f = 1 MHz$; $V_{GS} = 0 V$; $T_j = 25^\circ C$		-	295	-	pF
C_{oss}	output capacitance			-	40	-	pF
C_{rss}	reverse transfer capacitance			-	31	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15 V$; $I_D = 3.2 A$; $V_{GS} = 10 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25^\circ C$		-	3	-	ns
t_r	rise time			-	12	-	ns
$t_{d(off)}$	turn-off delay time			-	11	-	ns
t_f	fall time			-	3	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	$I_S = 0.9 A$; $V_{GS} = 0 V$; $T_j = 25^\circ C$		-	0.8	1.2	V



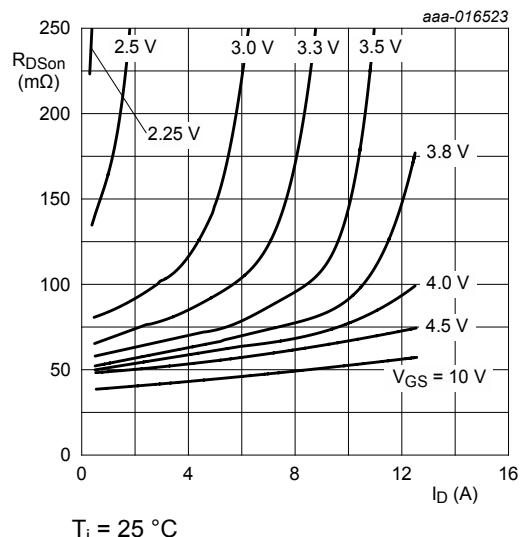
$T_j = 25^\circ\text{C}$

Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values



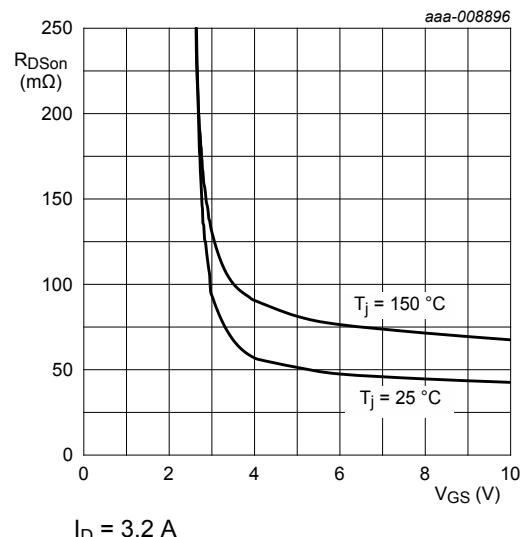
$T_j = 25^\circ\text{C}; V_{DS} = 5\text{ V}$

Fig. 8. Sub-threshold drain current as a function of gate-source voltage



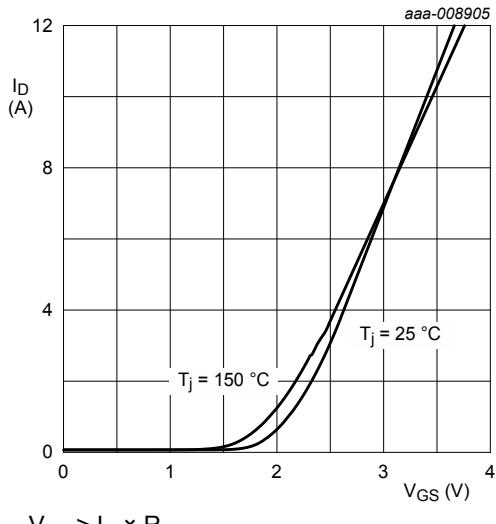
$T_j = 25^\circ\text{C}$

Fig. 9. Drain-source on-state resistance as a function of drain current; typical values



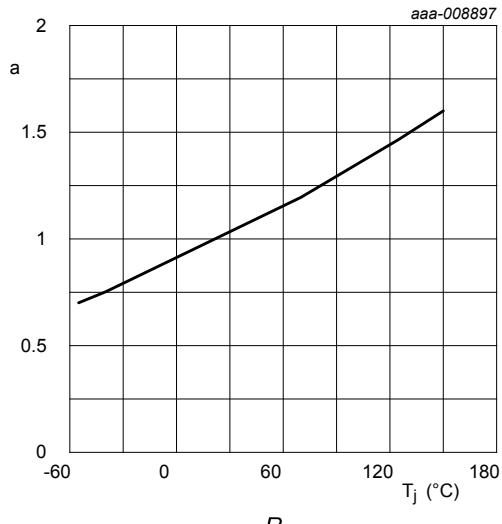
$I_D = 3.2\text{ A}$

Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values



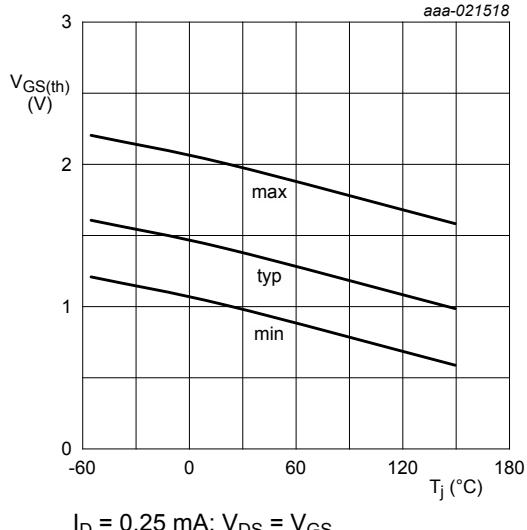
$$V_{DS} > I_D \times R_{DSon}$$

Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values



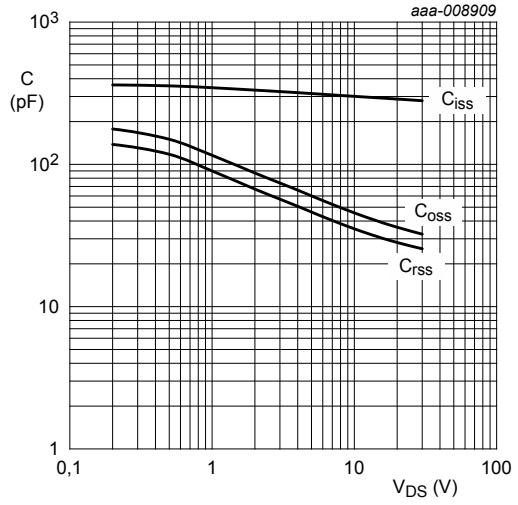
$$a = \frac{R_{DSon}}{R_{DSon}(25^\circ\text{C})}$$

Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values



$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

Fig. 13. Gate-source threshold voltage as a function of junction temperature



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

Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

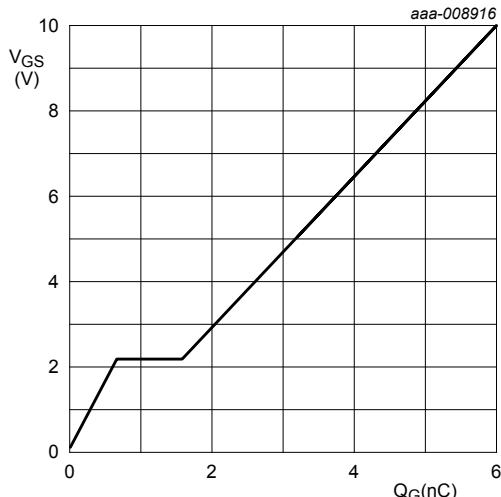


Fig. 15. Gate-source voltage as a function of gate charge; typical values

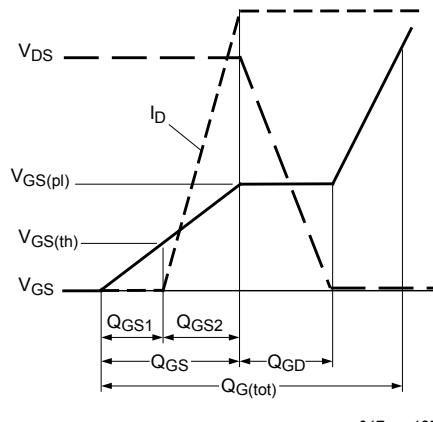
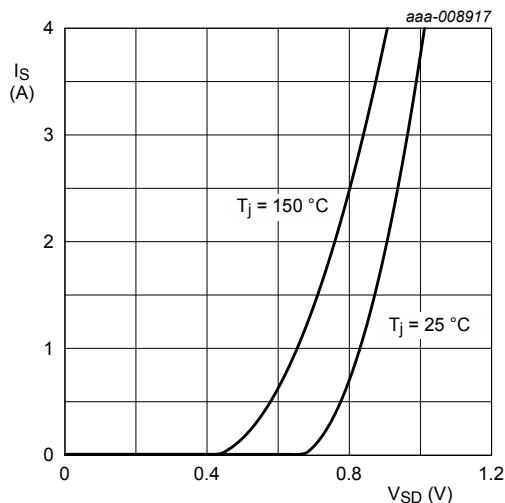


Fig. 16. MOSFET transistor: Gate charge waveform definitions



$V_{GS} = 0$ V

Fig. 17. Source current as a function of source-drain voltage; typical values

11. Test information

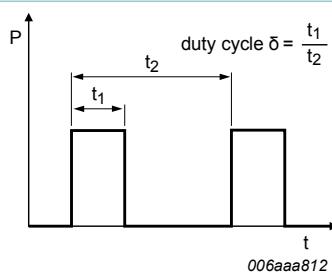


Fig. 18. Duty cycle definition

12. Package outline

DFN1010D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 x 1.0 x 0.37 mm

SOT1215

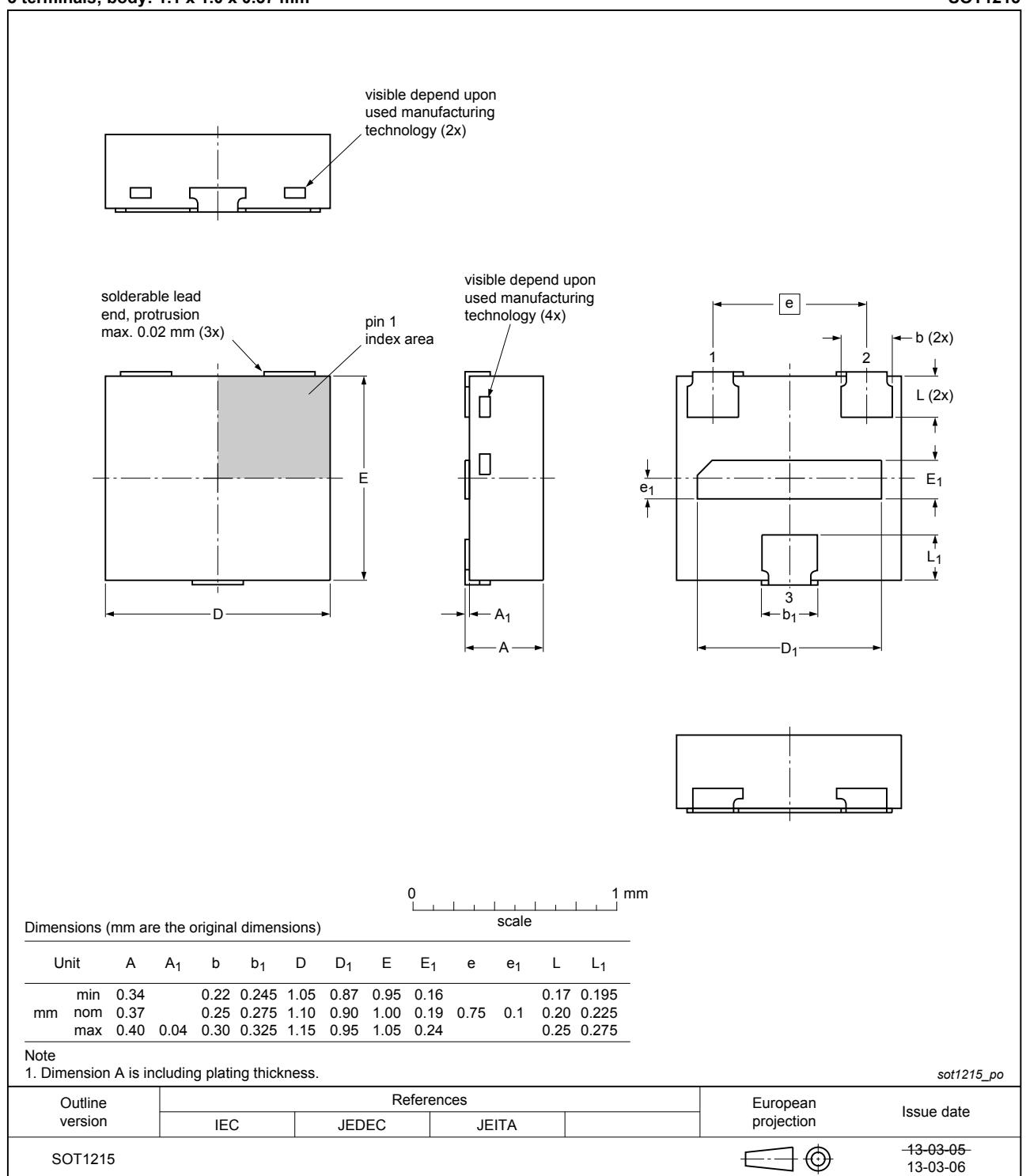
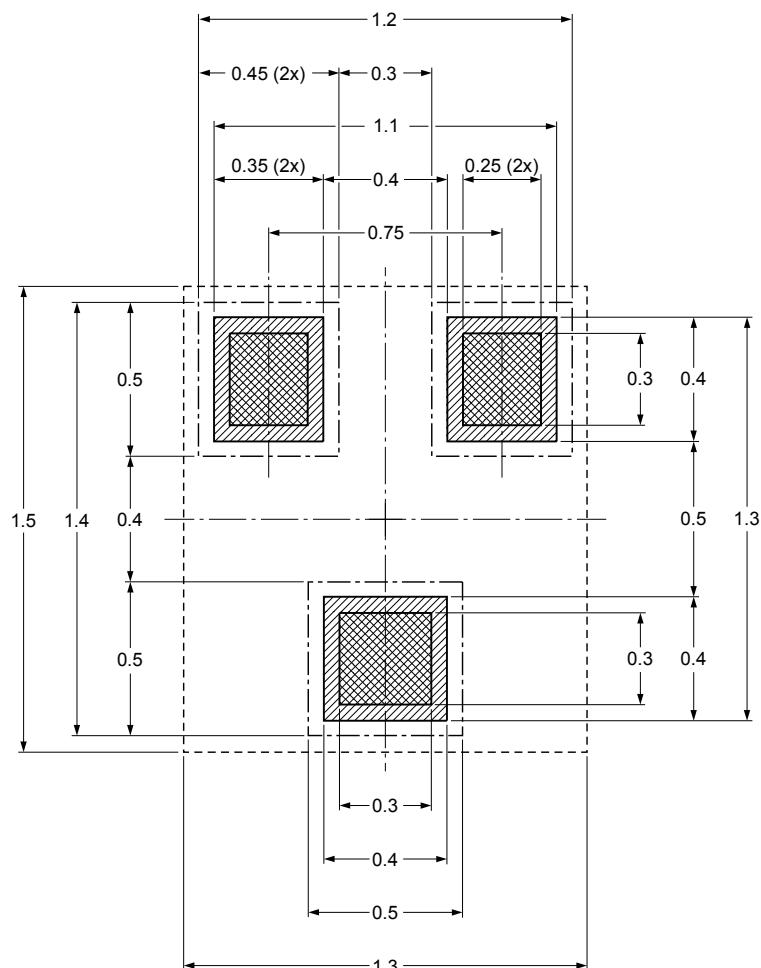


Fig. 19. Package outline DFN1010D-3 (SOT1215)

13. Soldering

Footprint information for reflow soldering of DFN1010D-3 package

SOT1215



solder land

solder land plus solder paste

occupied area

solder resist

Dimensions in mm

Issue date 42-11-23
13-03-06

sot1215_fr

Fig. 20. Reflow soldering footprint for DFN1010D-3 (SOT1215)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMXB65ENE v.4	20161103	Product data sheet	-	PMXB65ENE v.3
Modifications:	<ul style="list-style-type: none">• Maximum value of gate-source threshold voltage revised			
PMXB65ENE v.3	20150520	Product data sheet	-	PMXB65ENE v.2
PMXB65ENE v.2	20130924	Product data sheet	-	PMXB65ENE v.1
PMXB65ENE v.1	20130910	Product data sheet	-	-

15. Legal information

Data sheet status

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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