



THE DATASHEET OF PMXB65ENEZ





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 × 1.0 × 0.37 mm
- Exposed drain pad for excellent thermal conduction
- ElectroStatic Discharge (ESD) protection 1 kV
- Very low Drain-Source on-state resistance $R_{DSon} = 44 \text{ m}\Omega$

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

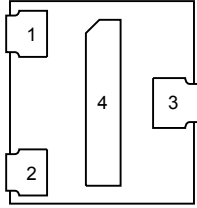
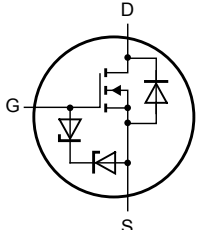
Table 1. Quick reference data

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

[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	 <p>Transparent top view DFN1010D-3 (SOT1215)</p>	 <p>017aaa255</p>
2	S	source		
3	D	drain		
4	D	drain		

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

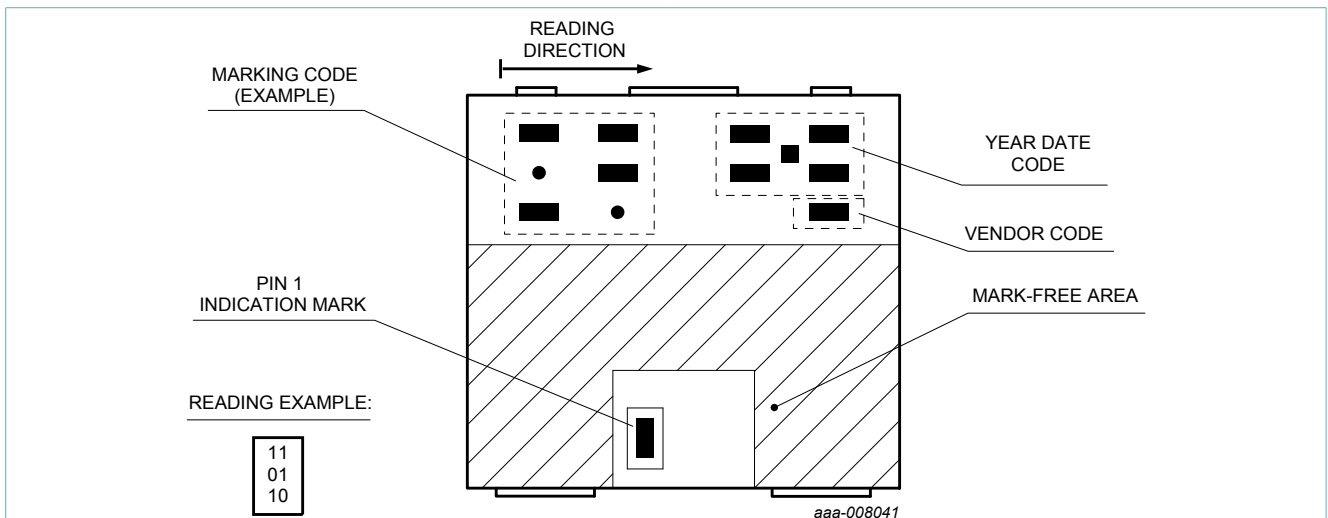


Fig. 1. DFN1010D-3 (SOT1215) binary marking code description

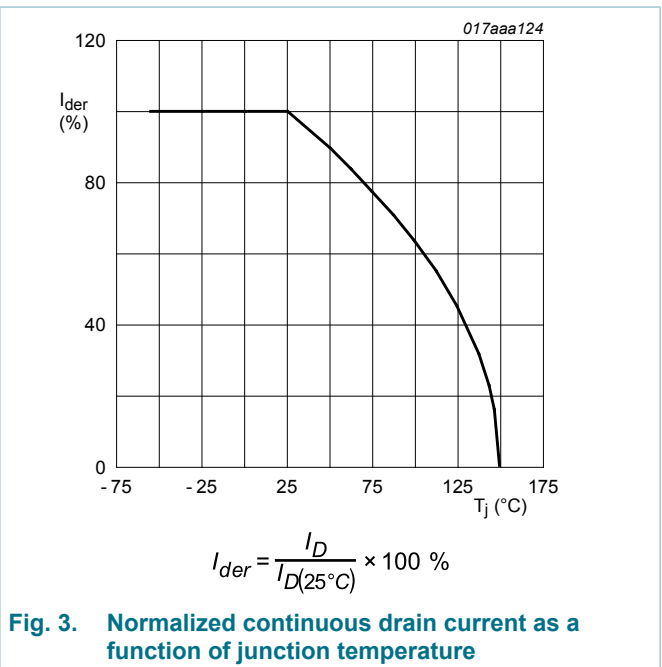
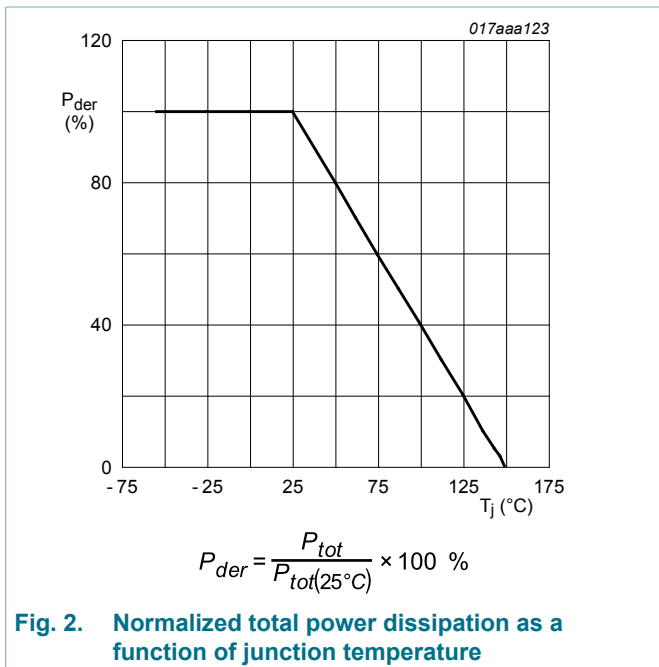
8. Limiting values

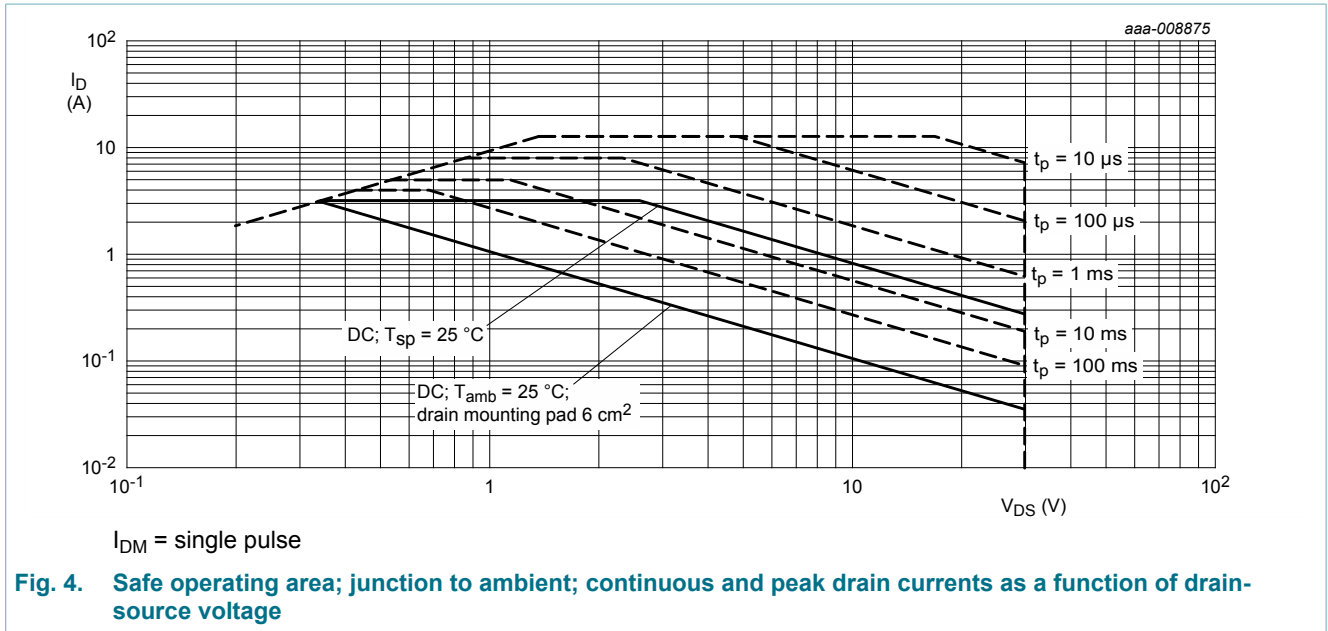
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V _{DS}	drain-source voltage	T _j = 25 °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
		V _{GS} = 10 V; T _{amb} = 100 °C	[1]	-	2.5	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	12.8	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	0.4	W
			[1]	-	1.07	W
		T _{sp} = 25 °C		-	8.33	W
T _j	junction temperature			-55	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C
Source-drain diode						
I _S	source current	T _{amb} = 25 °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 cm².
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.





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.

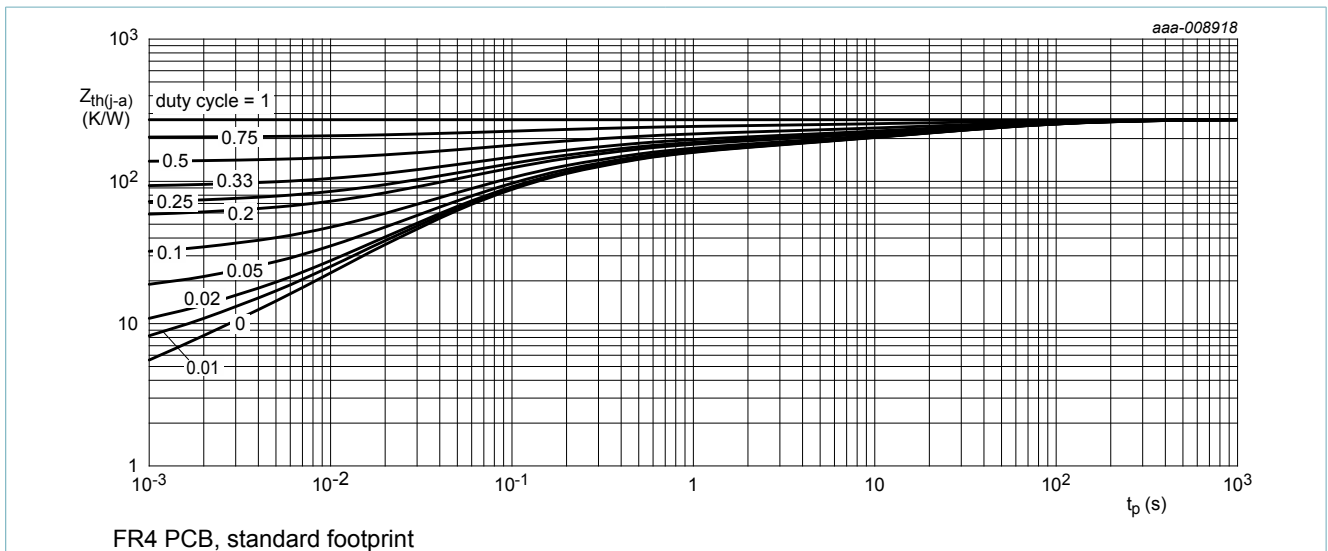


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

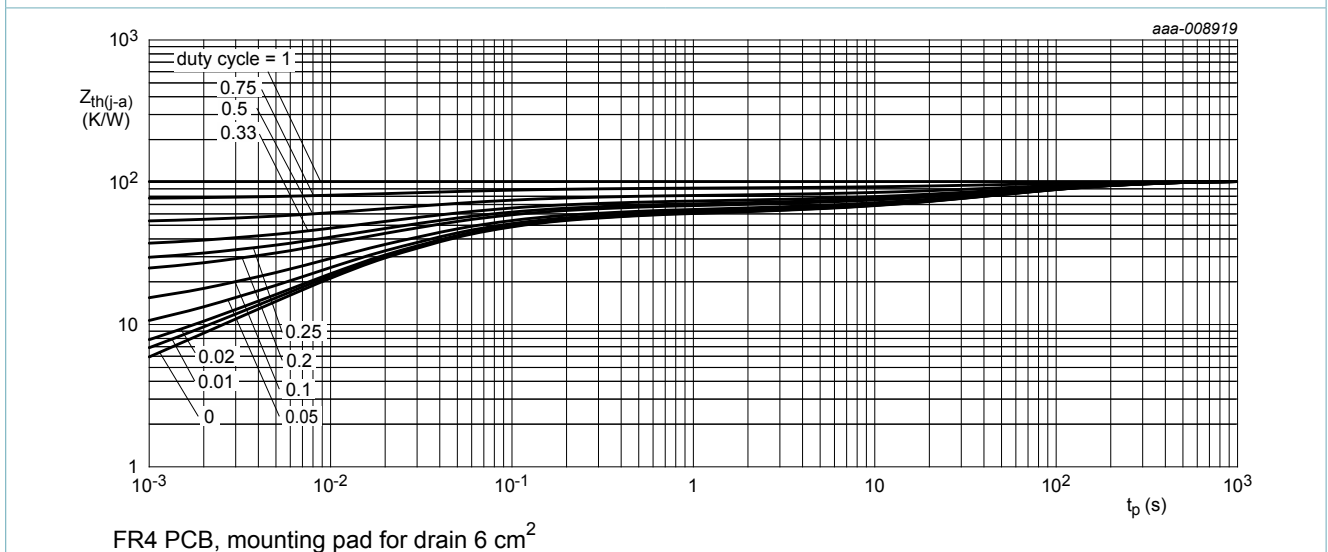


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

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

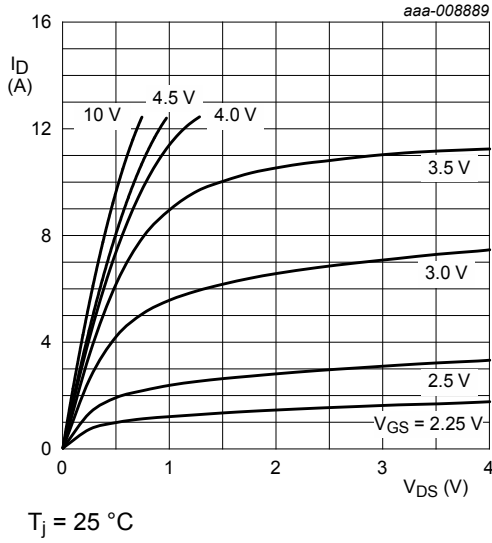


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

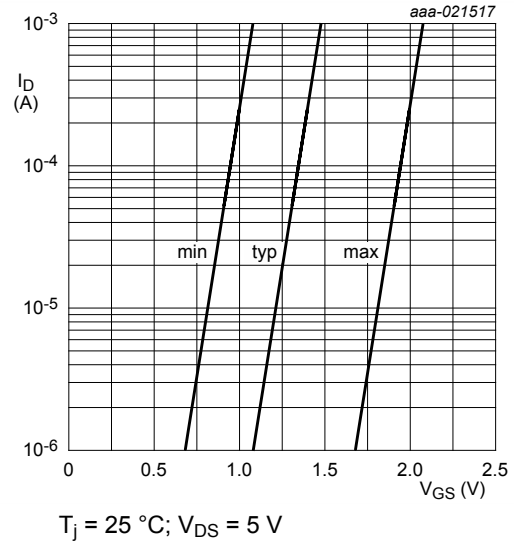


Fig. 8. Sub-threshold drain current as a function of gate-source voltage

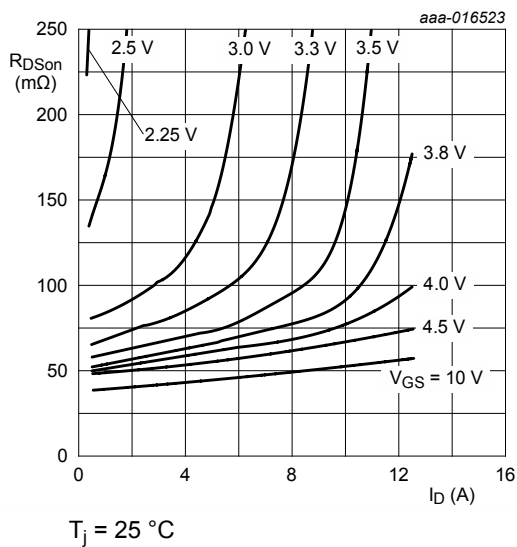


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

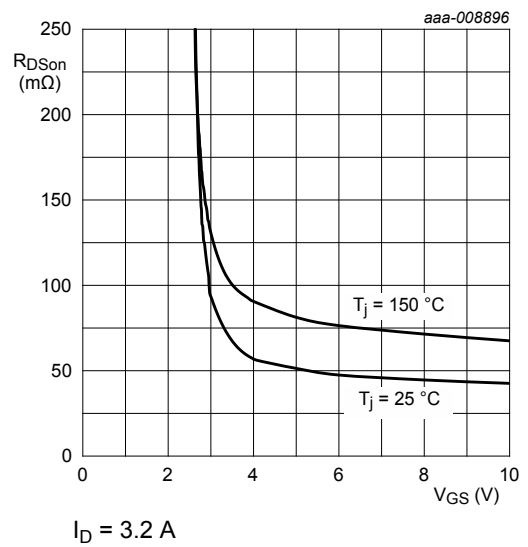
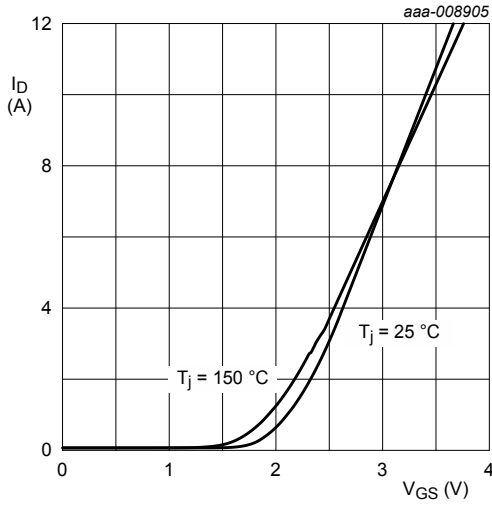
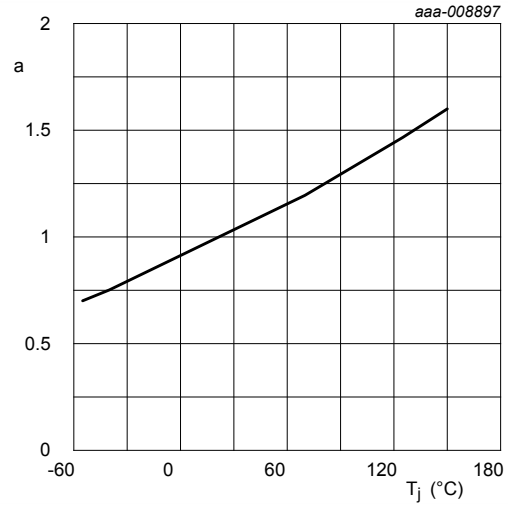


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values



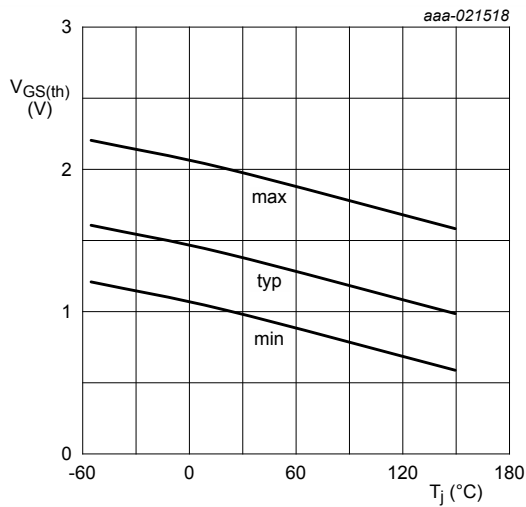
$$V_{DS} > I_D \times R_{DSon}$$

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



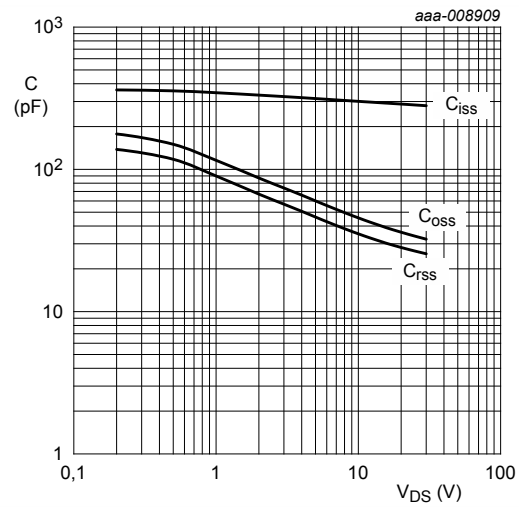
$$a = \frac{R_{DSon}}{R_{DSon(25^\circ C)}}$$

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



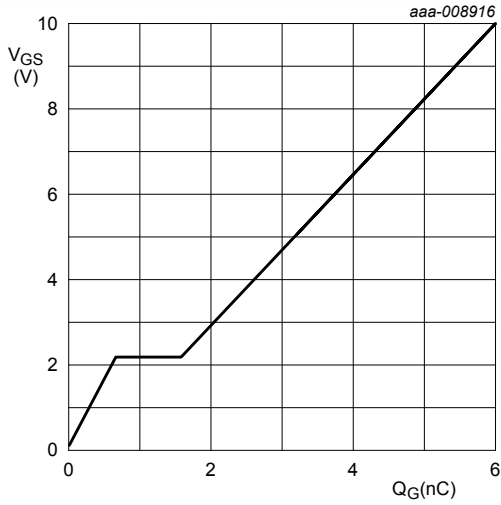
$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

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



$I_D = 3.2 \text{ A}; V_{DS} = 15 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

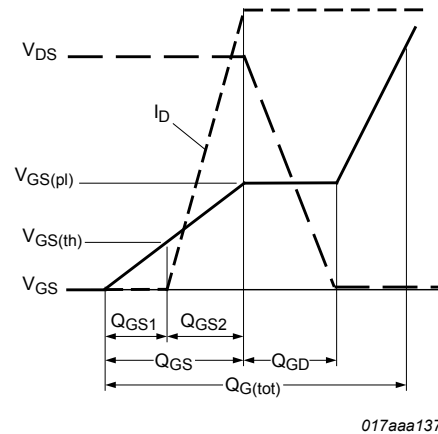
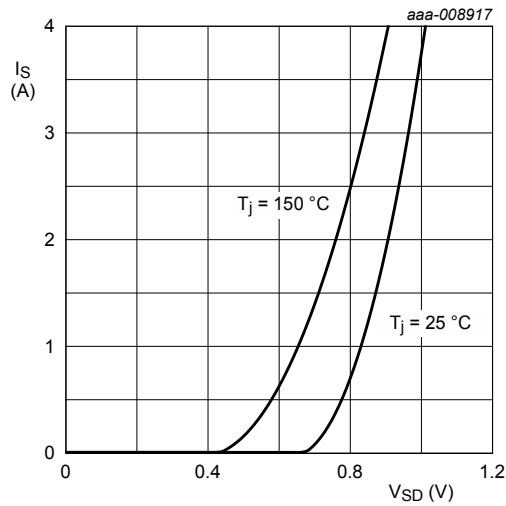


Fig. 16. MOSFET transistor: Gate charge waveform definitions



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

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

11. Test information

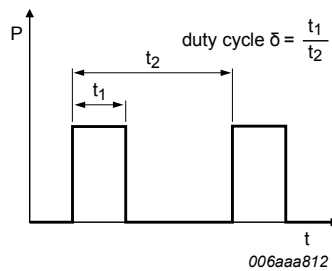


Fig. 18. Duty cycle definition

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

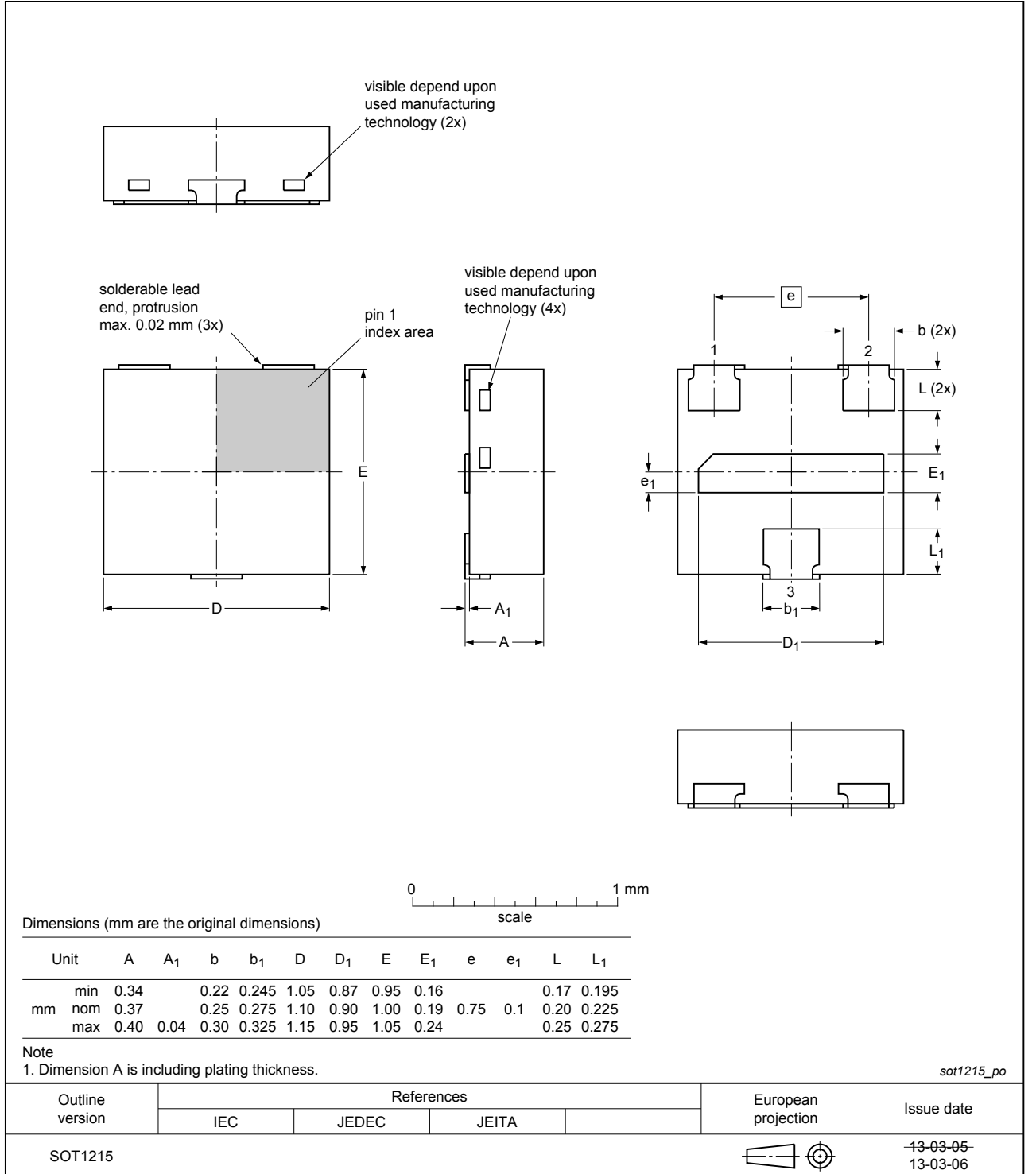
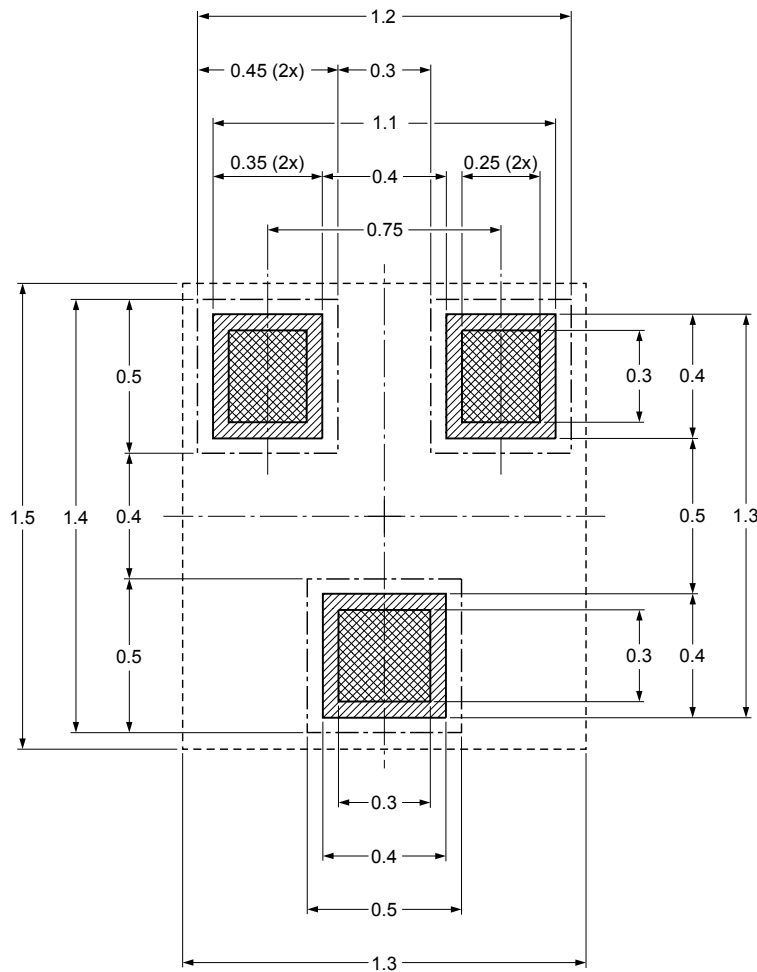


Fig. 19. Package outline DFN1010D-3 (SOT1215)

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 ~~12-11-23~~
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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16. 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. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	5
10. Characteristics.....	6
11. Test information.....	9
12. Package outline.....	10
13. Soldering.....	11
14. Revision history.....	12
15. Legal information.....	13

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