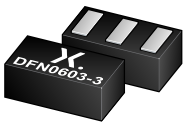


PMX700EN

60 V, N-channel Trench MOSFET

29 July 2022

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DFN0603-3 (SOT8013) Surface-Mounted Device (SMD) using Trench MOSFET technology.

2. Features and benefits

- Logic-level compatible
- Leadless ultra small package 0.63mm x 0.33 mm x 0.25 mm
- Trench MOSFET technology
- Low profile (0.25 mm)

3. Applications

- Battery switch
- High-speed line driver
- Low-side load switch
- Switching circuits

4. Quick reference data

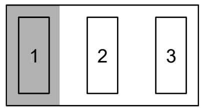
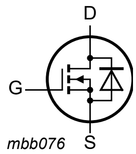
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	T_j = 25 °C		-	-	60	V
V_{GS}	gate-source voltage			-20	-	20	V
I_D	drain current	V_{GS} = 10 V; T_{amb} = 25 °C	[1]	-	-	0.3	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 0.4 A; T_j = 25 °C		-	680	800	mΩ

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 Transparent top view **DFN0603-3 (SOT8013)**	
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMX700EN	DFN0603-3	DFN0603-3; plastic, ultra small and leadless full encapsulated package; 3 terminals; 0.225 mm pitch; 0.63 mm x 0.33 mm x 0.25 mm body	SOT8013

7. Marking

Table 4. Marking codes

Type number	Marking code
PMX700EN	D

8. Limiting values

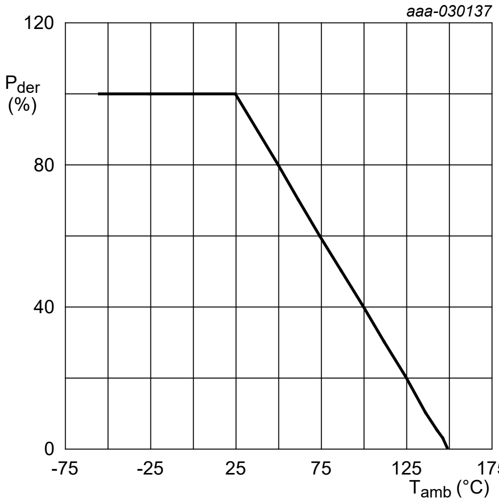
Table 5. Limiting values

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		-	60	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	V_{GS} = 10 V; T_{amb} = 25 °C	[1]	-	0.3	A
		V_{GS} = 10 V; T_{amb} = 100 °C	[1]	-	0.2	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; $t_p \leq$ 10 µs		-	1.3	A
P_{tot}	total power dissipation	T_{amb} = 25 °C	[2]	-	300	mW
			[1]	-	500	mW
		T_{sp} = 25 °C		-	4.7	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]	-	0.3	A

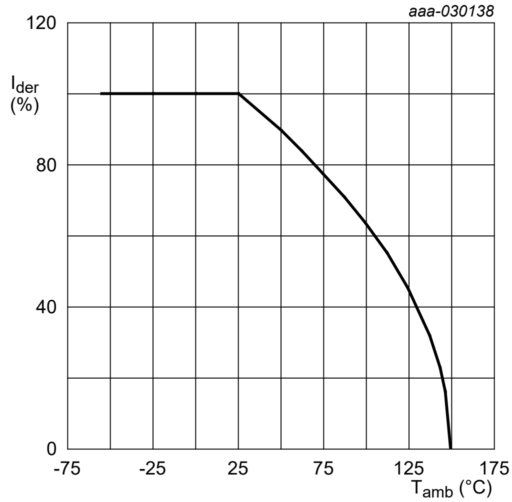
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 1 cm^2.

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



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

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



$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$

Fig. 2. Normalized continuous drain current as a function of ambient temperature

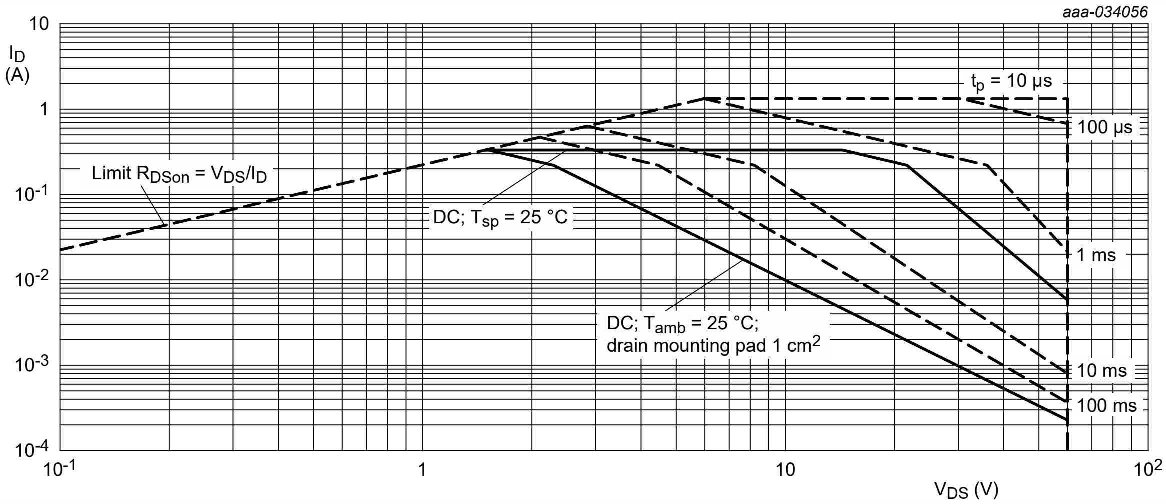


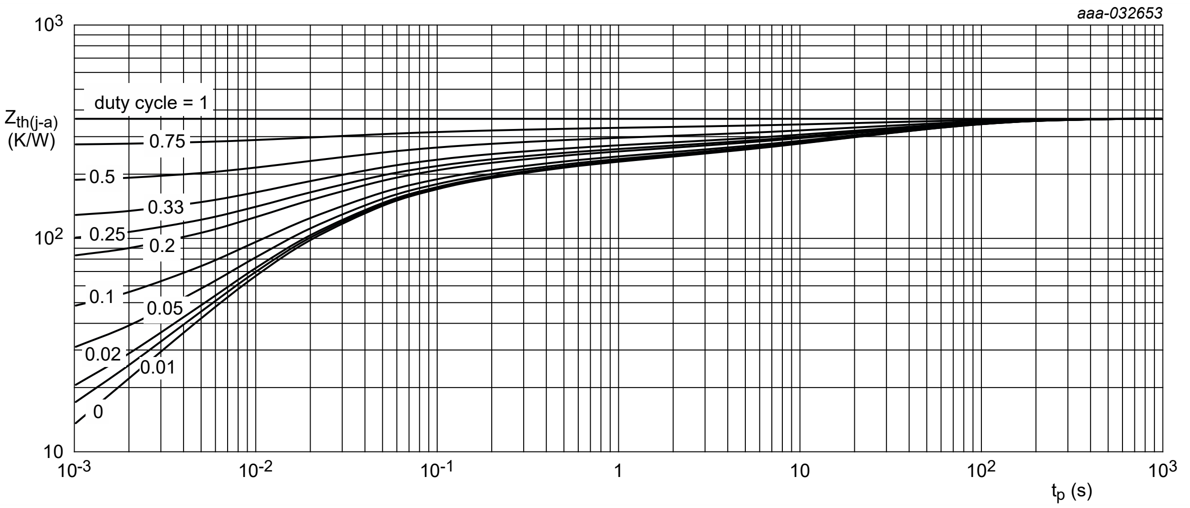
Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

9. Thermal characteristics

Table 6. Thermal characteristics

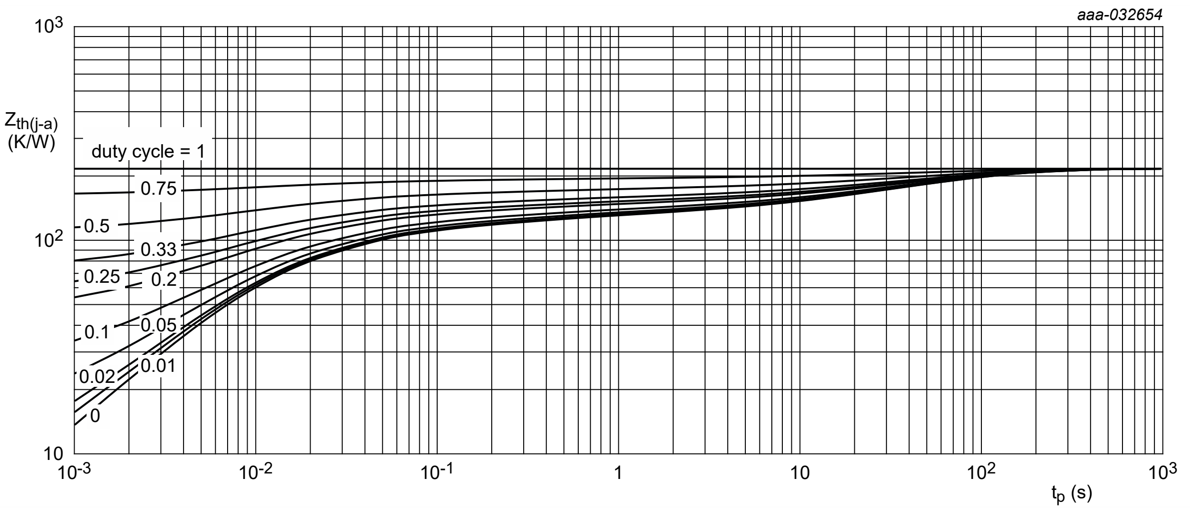
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	360	415	K/W
			[2]	-	215	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	23	26.5	K/W

[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 and mounting pad for drain 1 cm^2.



FR4 PCB, standard footprint

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



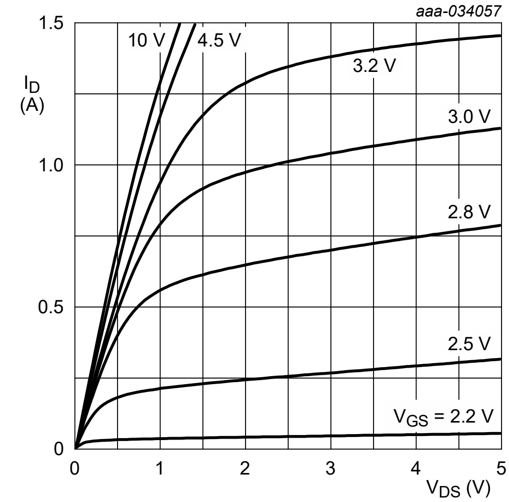
FR4 PCB, mounting pad for drain 1 cm^2

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

10. Characteristics

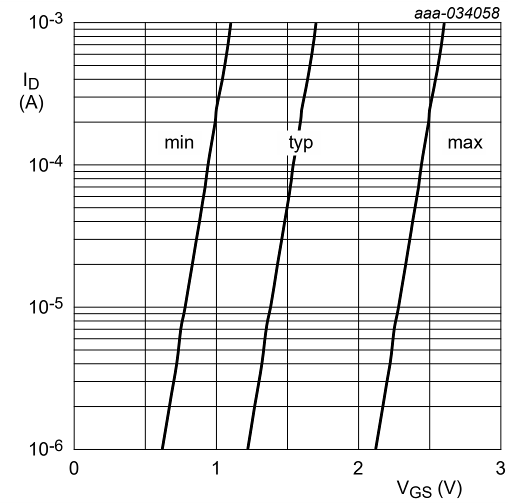
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 250 μA; V_{GS} = 0 V; T_j = 25 °C		60	-	-	V
V_{GSth}	gate-source threshold voltage	I_D = 250 μA; V_{DS} = V_{GS}; T_j = 25 °C		1	1.8	2.5	V
I_{DSS}	drain leakage current	V_{DS} = 60 V; V_{GS} = 0 V; T_j = 25 °C		-	-	1	μA
I_{GSS}	gate leakage current	V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 °C		-	-	-100	nA
		V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 °C		-	-	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 0.4 A; T_j = 25 °C		-	680	800	mΩ
		V_{GS} = 10 V; I_D = 0.4 A; T_j = 150 °C		-	1300	1600	mΩ
		V_{GS} = 4.5 V; I_D = 0.3 A; T_j = 25 °C		-	760	1000	mΩ
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.4 A; T_j = 25 °C		-	1.1	-	S
R_G	gate resistance	f = 1 MHz		-	40	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	V_{DS} = 30 V; I_D = 0.4 A; V_{GS} = 10 V; T_j = 25 °C		-	0.7	1.1	nC
Q_{GS}	gate-source charge			-	0.1	-	nC
Q_{GD}	gate-drain charge			-	0.1	-	nC
C_{iss}	input capacitance	V_{DS} = 30 V; f = 1 MHz; V_{GS} = 0 V; T_j = 25 °C		-	39	-	pF
C_{oss}	output capacitance			-	3	-	pF
C_{rss}	reverse transfer capacitance			-	2	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 30 V; I_D = 0.4 A; V_{GS} = 10 V; $R_{G(ext)}$ = 6 Ω; T_j = 25 °C		-	1	-	ns
t_r	rise time			-	1	-	ns
$t_{d(off)}$	turn-off delay time			-	7	-	ns
t_f	fall time			-	4	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	I_S = 0.33 A; V_{GS} = 0 V; T_j = 25 °C		-	0.8	1.2	V



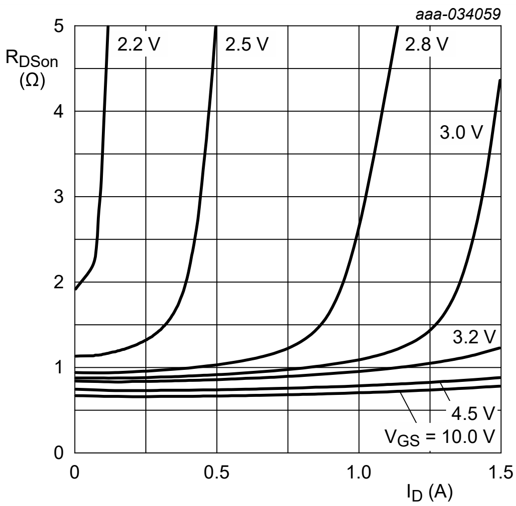
T_j = 25 °C

Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values



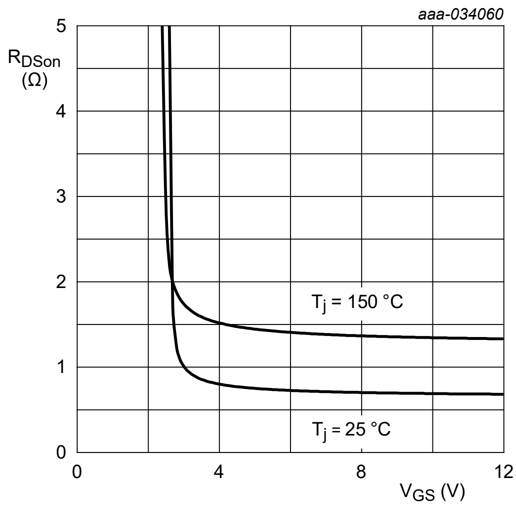
T_j = 25 °C; V_{DS} = 5 V

Fig. 7. Sub-threshold drain current as a function of gate-source voltage



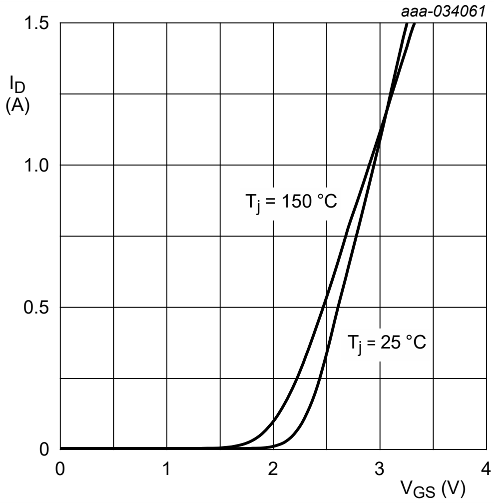
T_j = 25 °C

Fig. 8. Drain-source on-state resistance as a function of drain current; typical values



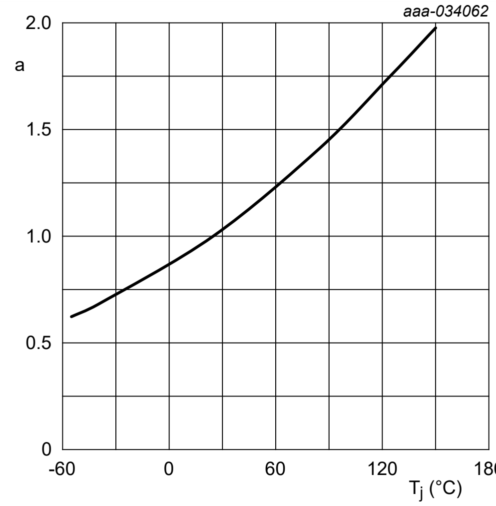
I_D = 0.4 A

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



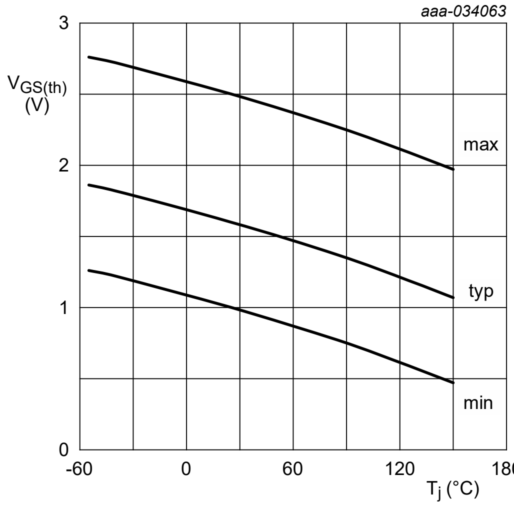
V_{DS} = 5 V

Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values



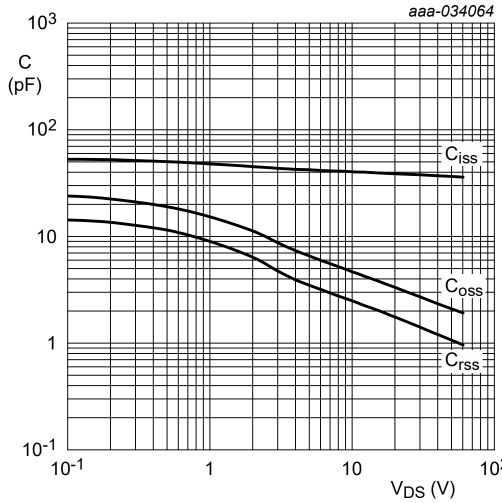
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values



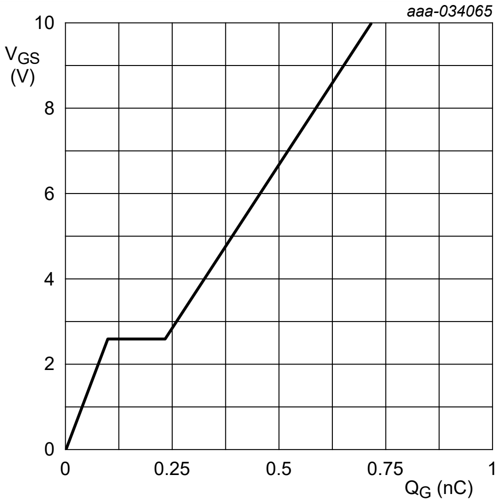
I_D = 250 μA; $V_{DS} = V_{GS}$

Fig. 12. Gate-source threshold voltage as a function of junction temperature



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

Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



V_{DS} = 30 V; I_D = 0.4 A; T_j = 25 °C

Fig. 14. Gate-source voltage as a function of gate charge; typical values

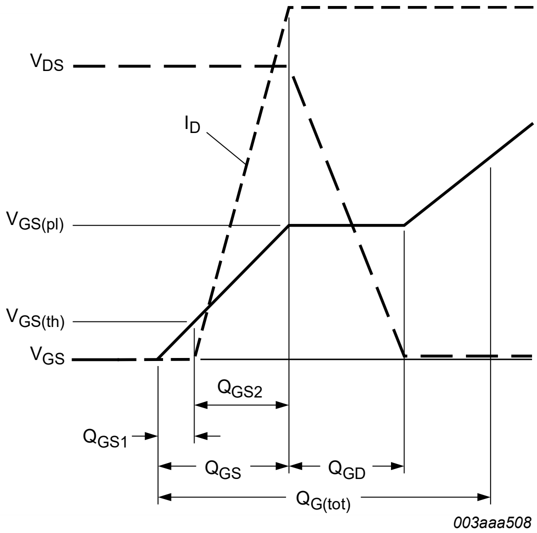
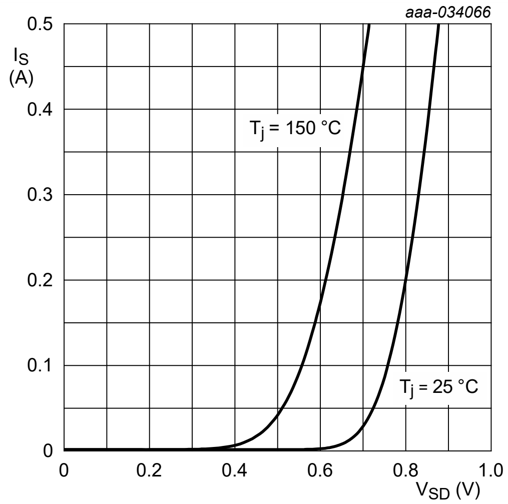


Fig. 15. Gate charge waveform definitions



V_{GS} = 0 V

Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information

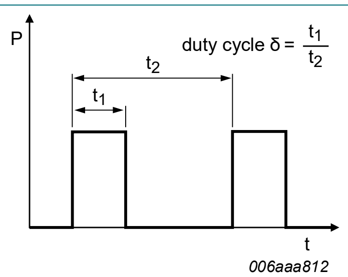
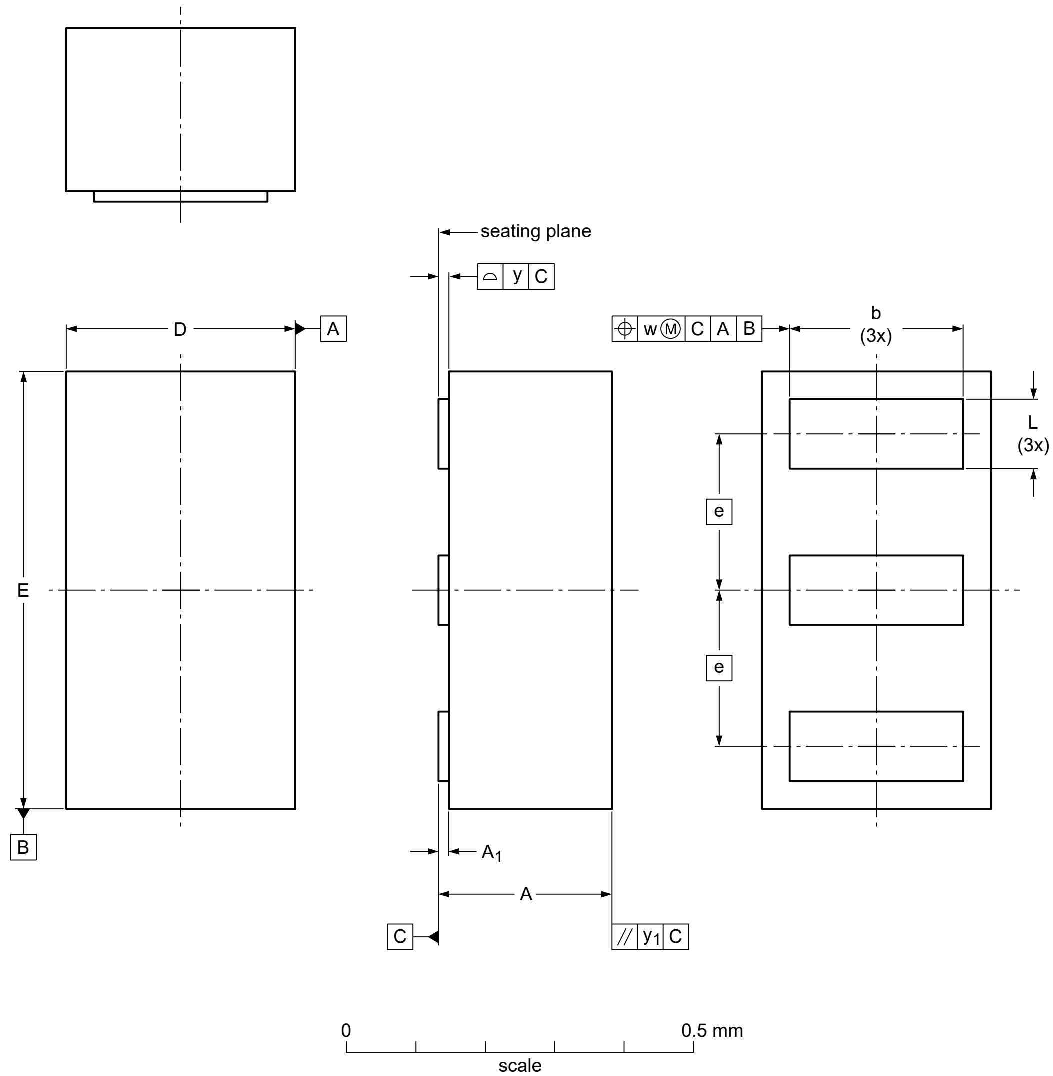


Fig. 17. Duty cycle definition

12. Package outline

DFN0603-3; plastic, ultra small and leadless full encapsulated package; 3 terminals; 0.225 mm pitch; 0.63 mm x 0.33 mm x 0.25 mm body **SOT8013**



Dimensions (mm are the original dimensions)

Unit(1)		A	A_1	b	D	E	e	L	w	y	y_1
mm	max	0.275	0.03	0.27	0.350	0.650		0.12			
	nom						0.225		0.04	0.03	0.05
	min	0.225		0.23	0.305	0.605		0.08			

Note

1. The marking bar indicates Pin 1. For electrical symmetrical devices the marking bar is omitted.

sot8013_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8013	- - -					~~19-08-06~~ 19-08-29

Fig. 18. Package outline DFN0603-3 (SOT8013)

13. Soldering

Footprint information for reflow soldering of ultra small and leadless encapsulated package; 3 terminals **SOT8013**

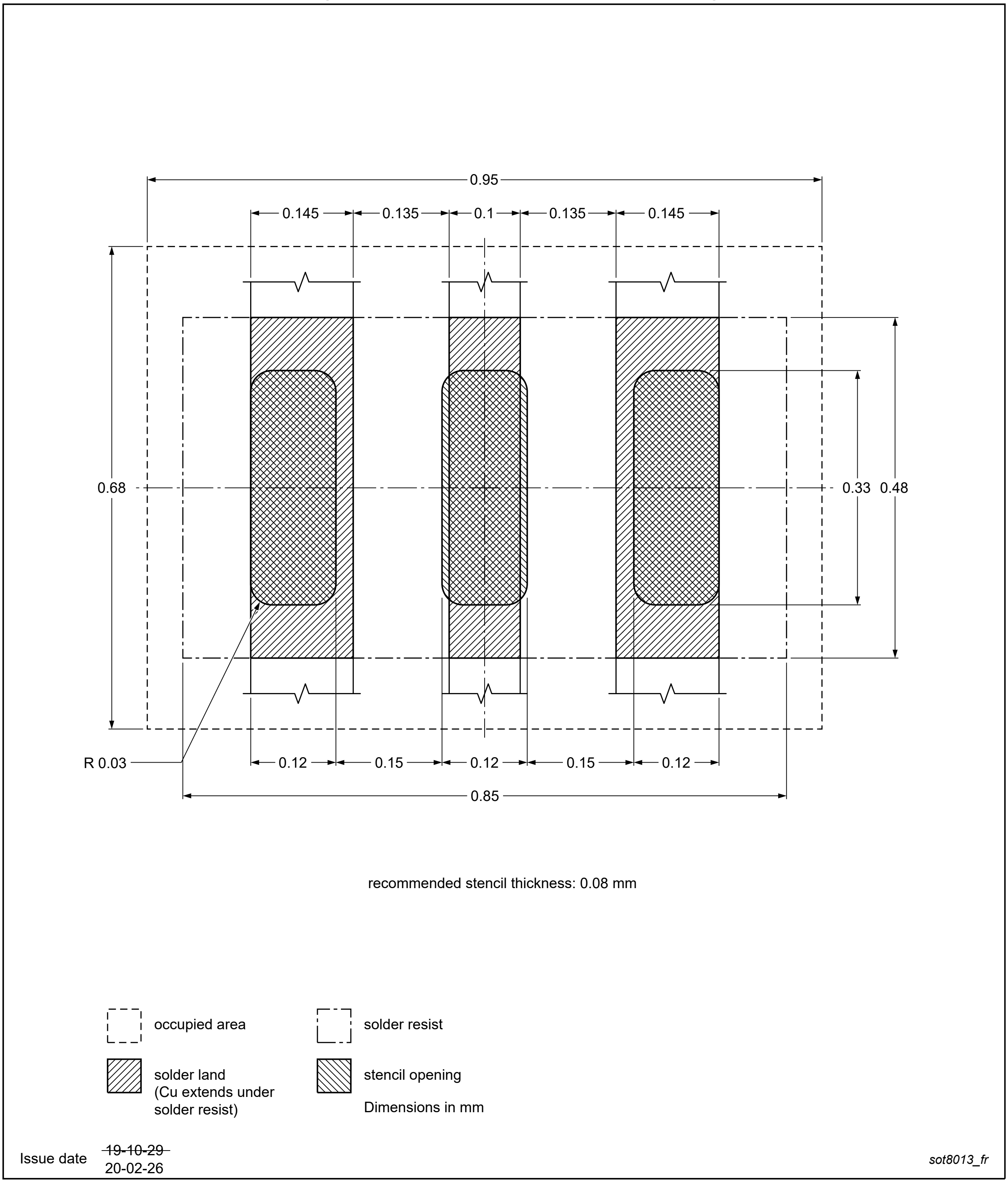


Fig. 19. Reflow soldering footprint for DFN0603-3 (SOT8013)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMX700EN v.2	20220729	Product data sheet	-	PMX700EN v.1
Modifications:	• Changed document status to "Product data sheet"			
PMX700EN v.1	20220616	Preliminary 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.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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