



PXP015-30QL

30 V, P-channel Trench MOSFET

19 January 2022

Product data sheet

1. General description

P-channel enhancement mode Field-Effect Transistor (FET) in an MLPAK33 (SOT8002) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Logic-level compatible
- Trench MOSFET technology
- MLPAK33 package (3.3 x 3.3 mm footprint)

3. Applications

- High-side load switch
- Battery management
- DC-to-DC conversion
- Switching circuits

4. Quick reference data

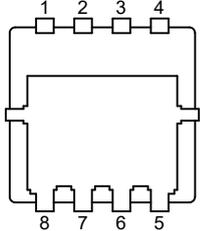
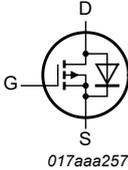
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-30	V
V_{GS}	gate-source voltage		-25	-	25	V
I_D	drain current	$V_{GS} = -10\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	-12.8	A
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = -10\text{ V}; I_D = -8.1\text{ A}; T_j = 25\text{ °C}$	-	13.6	15.8	mΩ
		$V_{GS} = -4.5\text{ V}; I_D = -6.8\text{ A}; T_j = 25\text{ °C}$	-	17.9	22	mΩ

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p>MLPAK33 (SOT8002-1)</p>	 <p>017aaa257</p>
2	S	source		
3	S	source		
4	G	gate		
5	D	drain		
6	D	drain		
7	D	drain		
8	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PXP015-30QL	MLPAK33	plastic thermal enhanced surface mounted package; mini leads; 8 terminals; pitch 0.65 mm; 3.3 x 3.3 x 0.8 mm body	SOT8002-1

7. Marking

Table 4. Marking codes

Type number	Marking code
PXP015-30QL	8AA

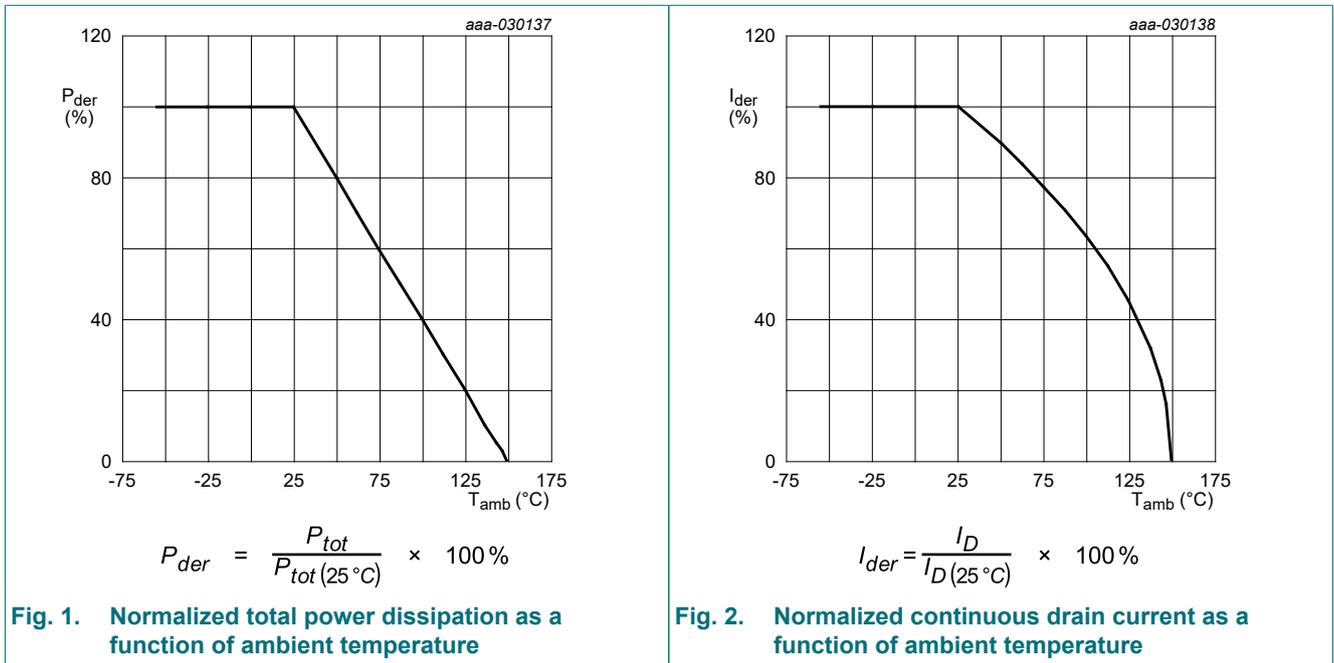
8. Limiting values

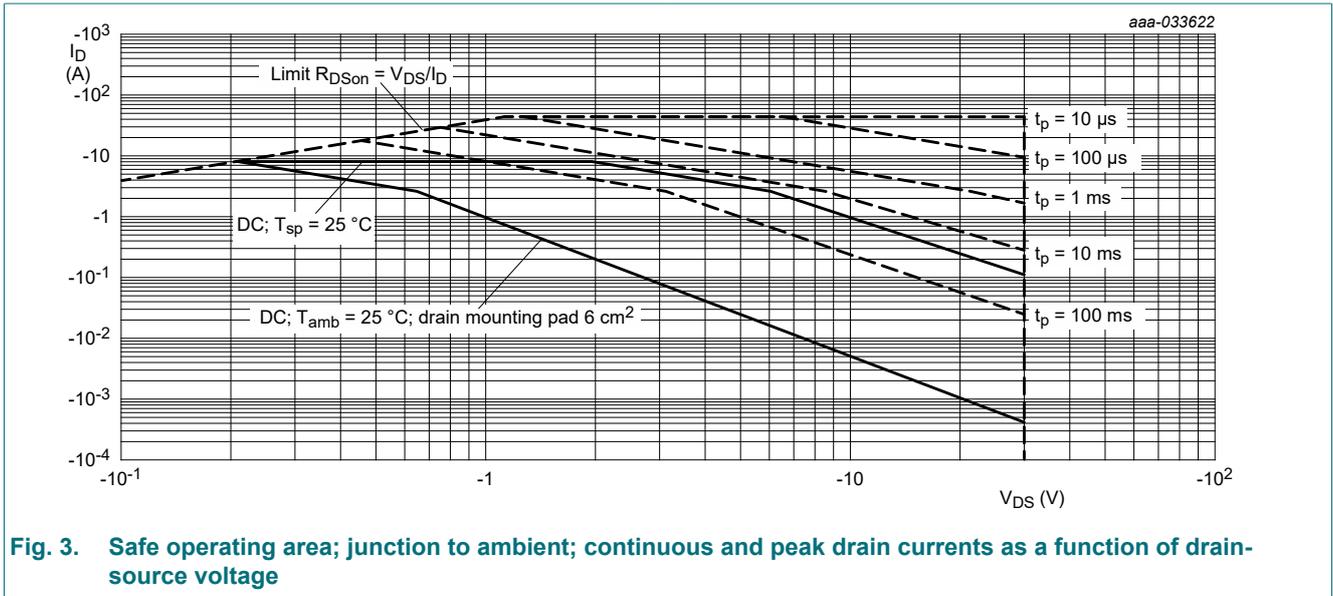
Table 5. Limiting values

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		-25	25	V	
I _D	drain current	V _{GS} = -10 V; T _{amb} = 25 °C; t ≤ 5 s	[1]	-	-12.8	A
		V _{GS} = -10 V; T _{amb} = 25 °C	[1]	-	-8	A
		V _{GS} = -10 V; T _{amb} = 100 °C	[1]	-	-5.1	A
		V _{GS} = -10 V; T _{sp} = 25 °C		-	-24.7	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs	-	-43.8	A	
P _{tot}	total power dissipation	T _{amb} = 25 °C; t ≤ 5 s	[1]	-	4.2	W
		T _{amb} = 25 °C	[1]	-	1.7	W
		T _{sp} = 25 °C		-	16	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]	-	-1.7	A

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





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]	-	150	190	K/W
			[2]	-	60	75	K/W
		in free air; $t \leq 5$ s	[2]	-	25	30	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	4	8	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 6 cm².

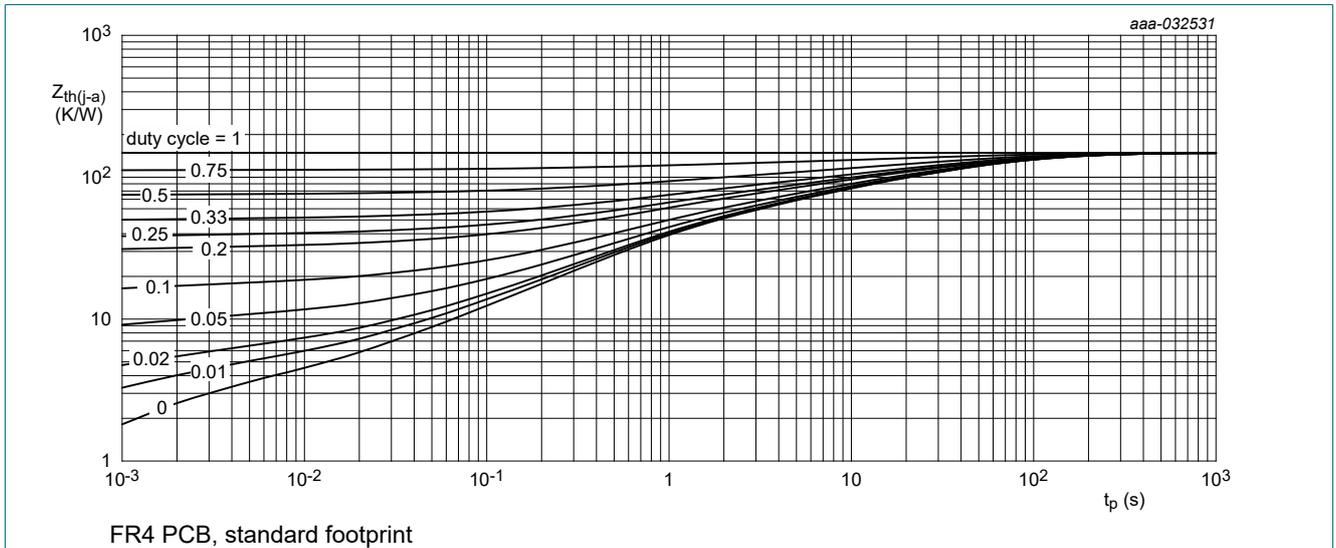


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

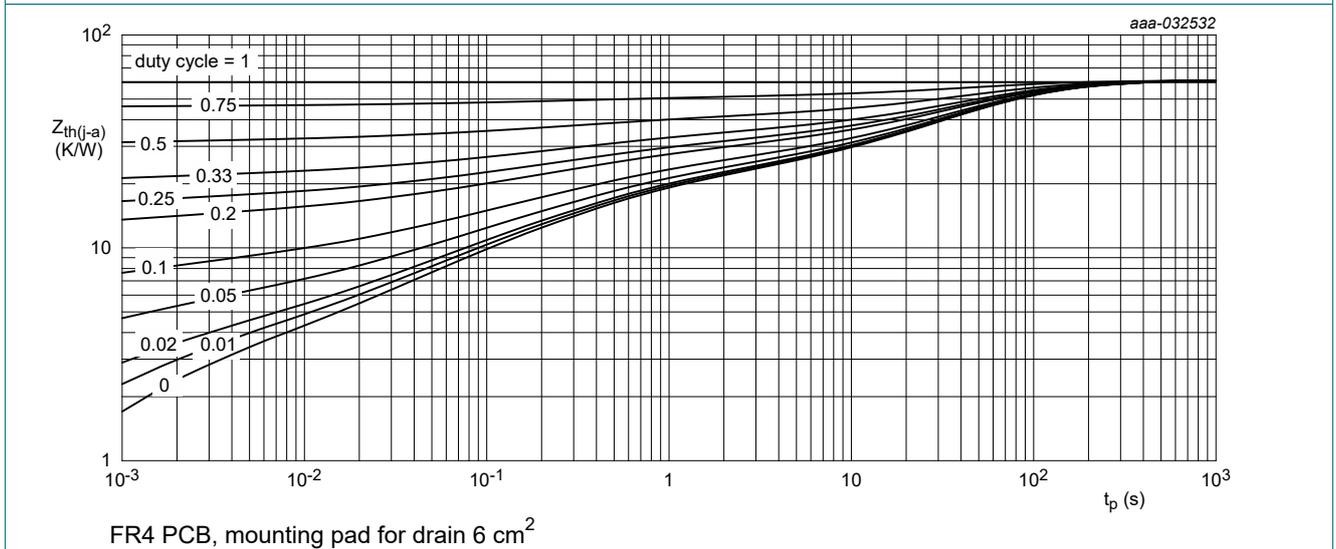


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu\text{A}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-30	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = -250 \mu\text{A}$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ\text{C}$	-1	-1.6	-2	V
I_{DSS}	drain leakage current	$V_{DS} = -30 \text{ V}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-1	μA
I_{GSS}	gate leakage current	$V_{GS} = -20 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{GS} = 20 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = -10 \text{ V}$; $I_D = -8.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	13.6	15.8	m Ω
		$V_{GS} = -10 \text{ V}$; $I_D = -8.1 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	22	25.6	m Ω
		$V_{GS} = -4.5 \text{ V}$; $I_D = -6.8 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	17.9	22	m Ω
g_{fs}	forward transconductance	$V_{DS} = -10 \text{ V}$; $I_D = -8.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	22	-	S
R_G	gate resistance	$f = 1 \text{ MHz}$	-	22	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -15 \text{ V}$; $I_D = -8.1 \text{ A}$; $V_{GS} = -10 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	24.6	36.9	nC
		$V_{DS} = -15 \text{ V}$; $I_D = -6.8 \text{ A}$; $V_{GS} = -4.5 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	12.1	18.2	nC
Q_{GS}	gate-source charge		-	2.8	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge		-	1.8	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	1	-	nC
Q_{GD}	gate-drain charge		-	4.7	-	nC
V_{GSpl}	gate-source plateau voltage	$V_{DS} = -15 \text{ V}$; $I_D = -6.8 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-2.4	-	V
C_{iss}	input capacitance	$V_{DS} = -15 \text{ V}$; $f = 1 \text{ MHz}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	1200	-	pF
C_{oss}	output capacitance		-	150	-	pF
C_{rss}	reverse transfer capacitance		-	120	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -15 \text{ V}$; $I_D = -6.8 \text{ A}$; $V_{GS} = -4.5 \text{ V}$; $R_{G(ext)} = 5 \text{ } \Omega$; $T_j = 25 \text{ }^\circ\text{C}$	-	4	-	ns
t_r	rise time		-	39	-	ns
$t_{d(off)}$	turn-off delay time		-	58	-	ns
t_f	fall time		-	58	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = -1.7 \text{ A}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-0.6	-1.2	V
t_{rr}	reverse recovery time	$I_S = -1.7 \text{ A}$; $di_S/dt = 100 \text{ A}/\mu\text{s}$; $V_{GS} = -4.5 \text{ V}$; $V_{DS} = -15 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	14	-	ns
Q_r	recovered charge		-	4	-	nC
t_a	reverse recovery rise time		-	7	-	ns
t_b	reverse recovery fall time		-	7	-	ns

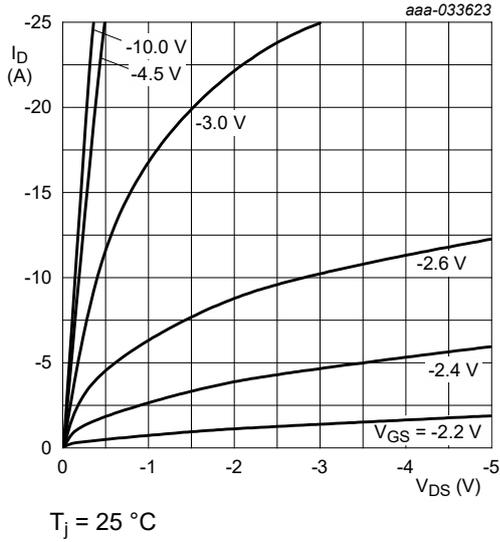


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

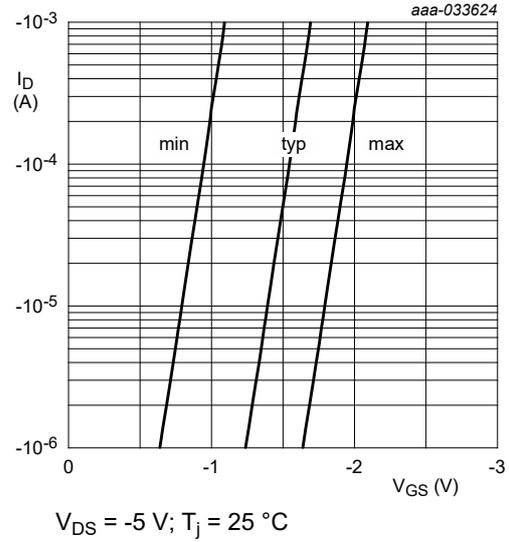


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

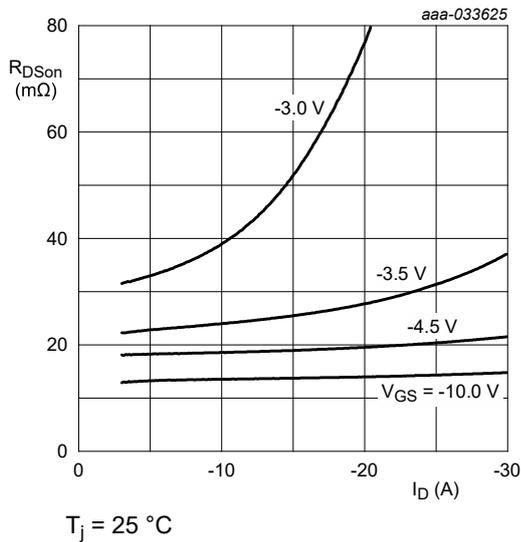


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

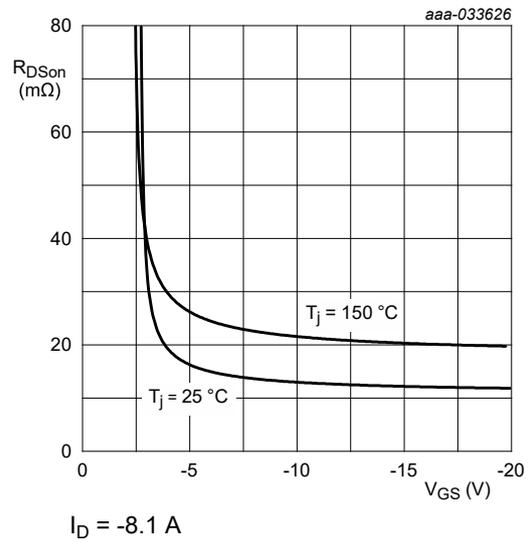


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

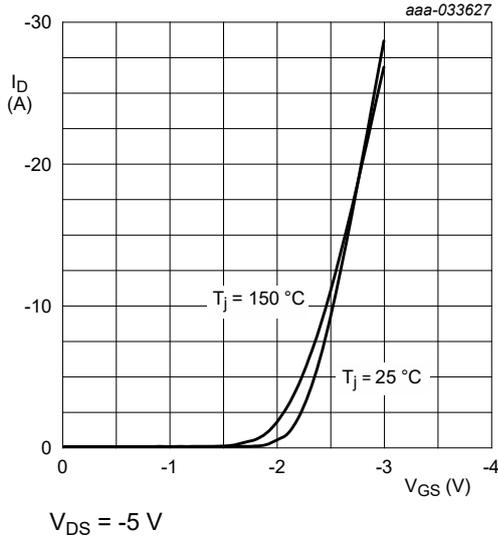
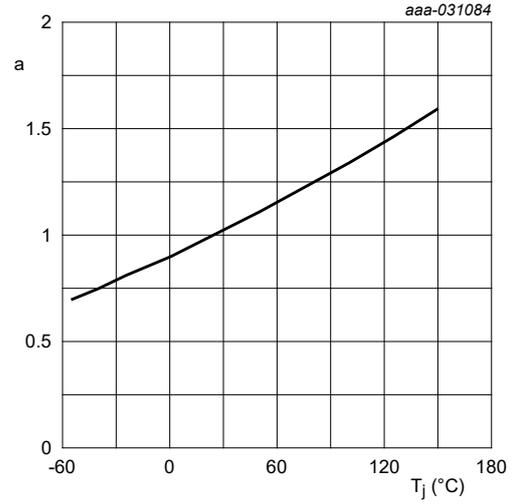


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values



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

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

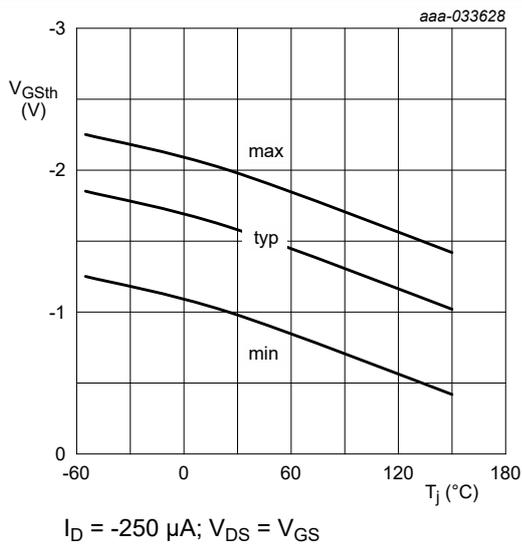


Fig. 12. Gate-source threshold voltage as a function of junction temperature

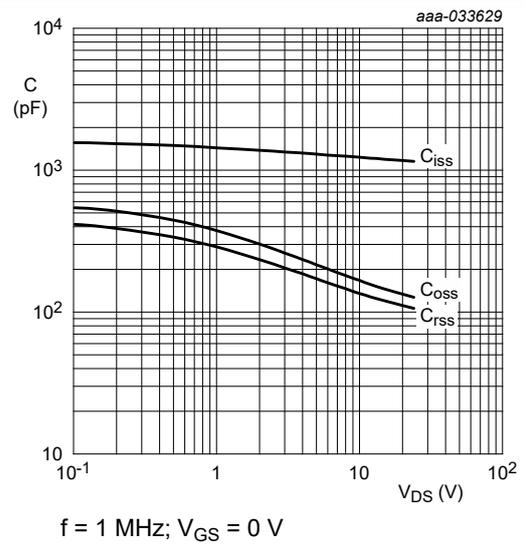


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

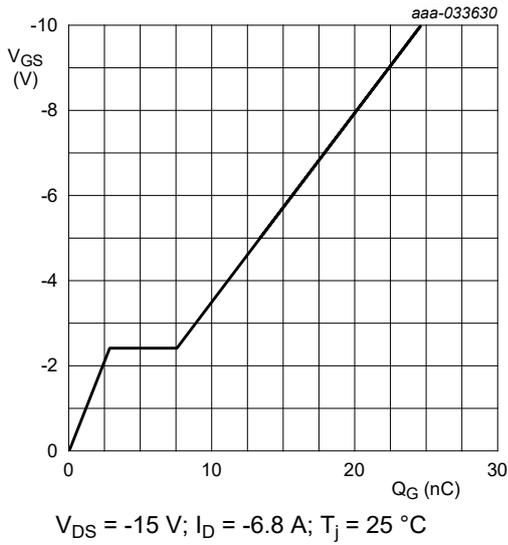


Fig. 14. Gate-source voltage as a function of gate charge; typical values

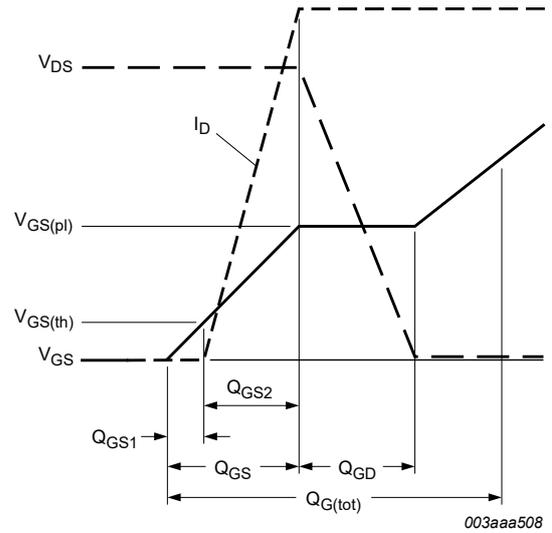


Fig. 15. Gate charge waveform definitions

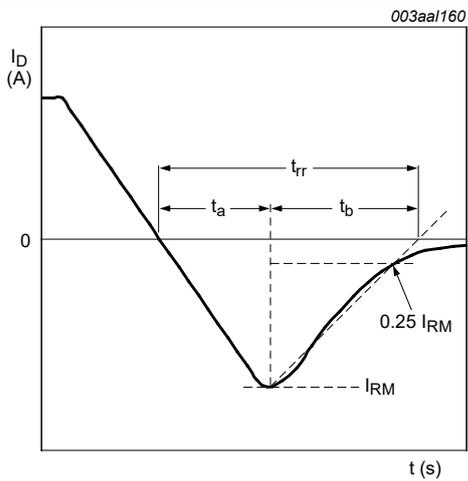


Fig. 16. Reverse recovery timing definition

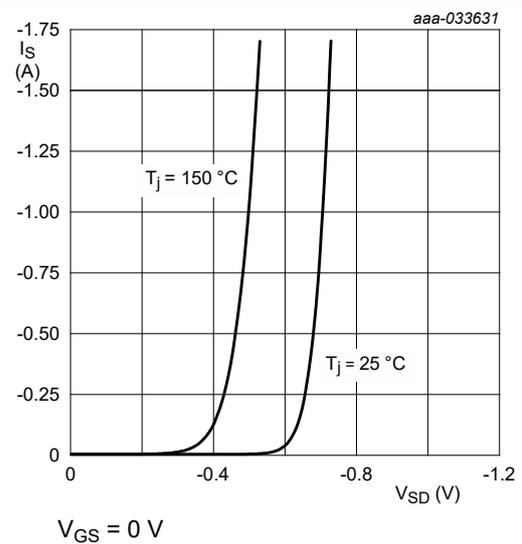


Fig. 17. Source current as a function of source-drain voltage; typical values

11. Test information

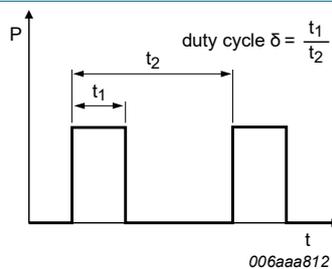


Fig. 18. Duty cycle definition

12. Package outline

MLPAK33: plastic thermal enhanced surface mounted package; mini leads; 8 terminals;
pitch 0.65 mm; 3.3 x 3.3 x 0.8 mm body

SOT8002-1

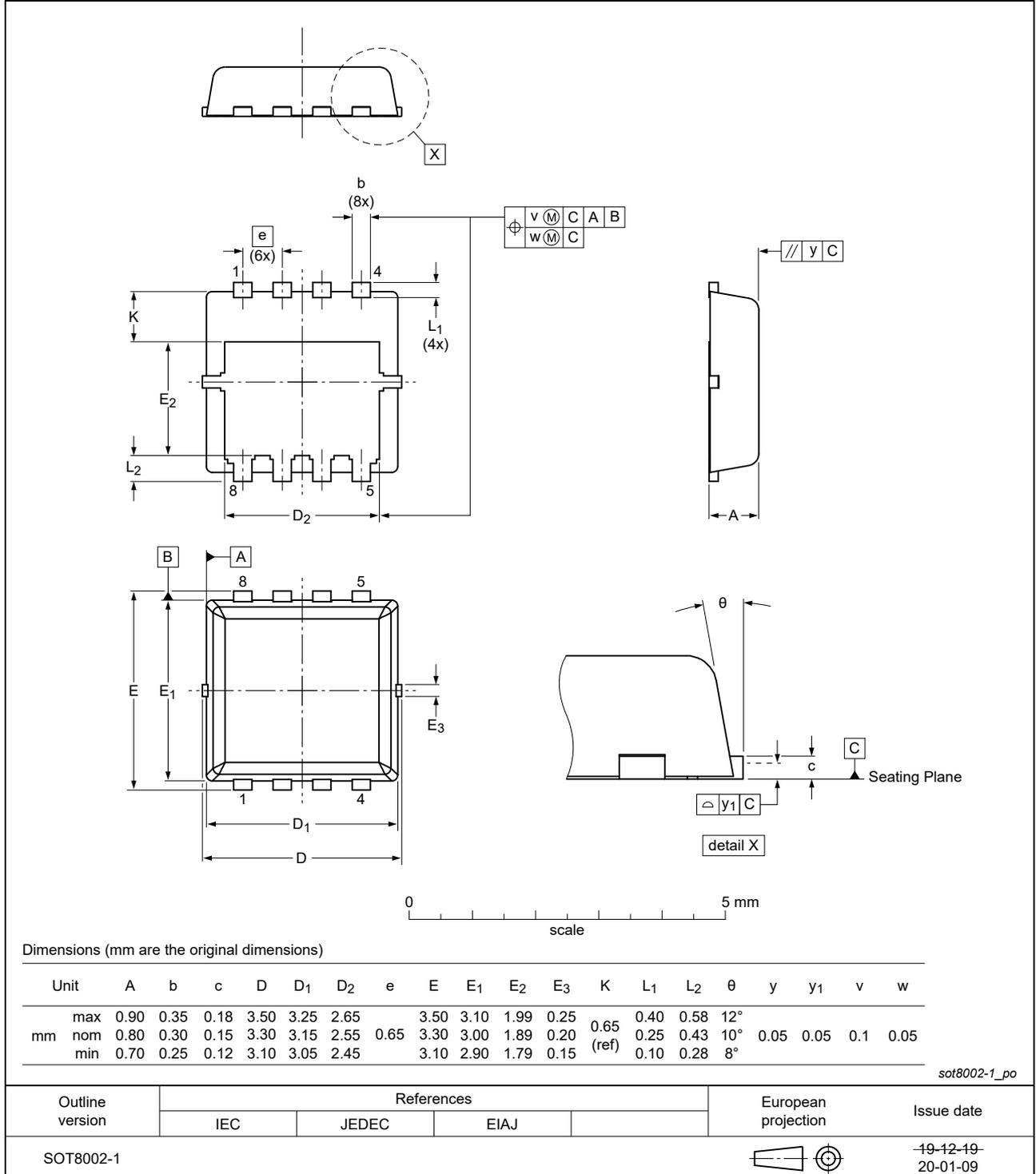


Fig. 19. Package outline MLPAK33 (SOT8002-1)

13. Soldering

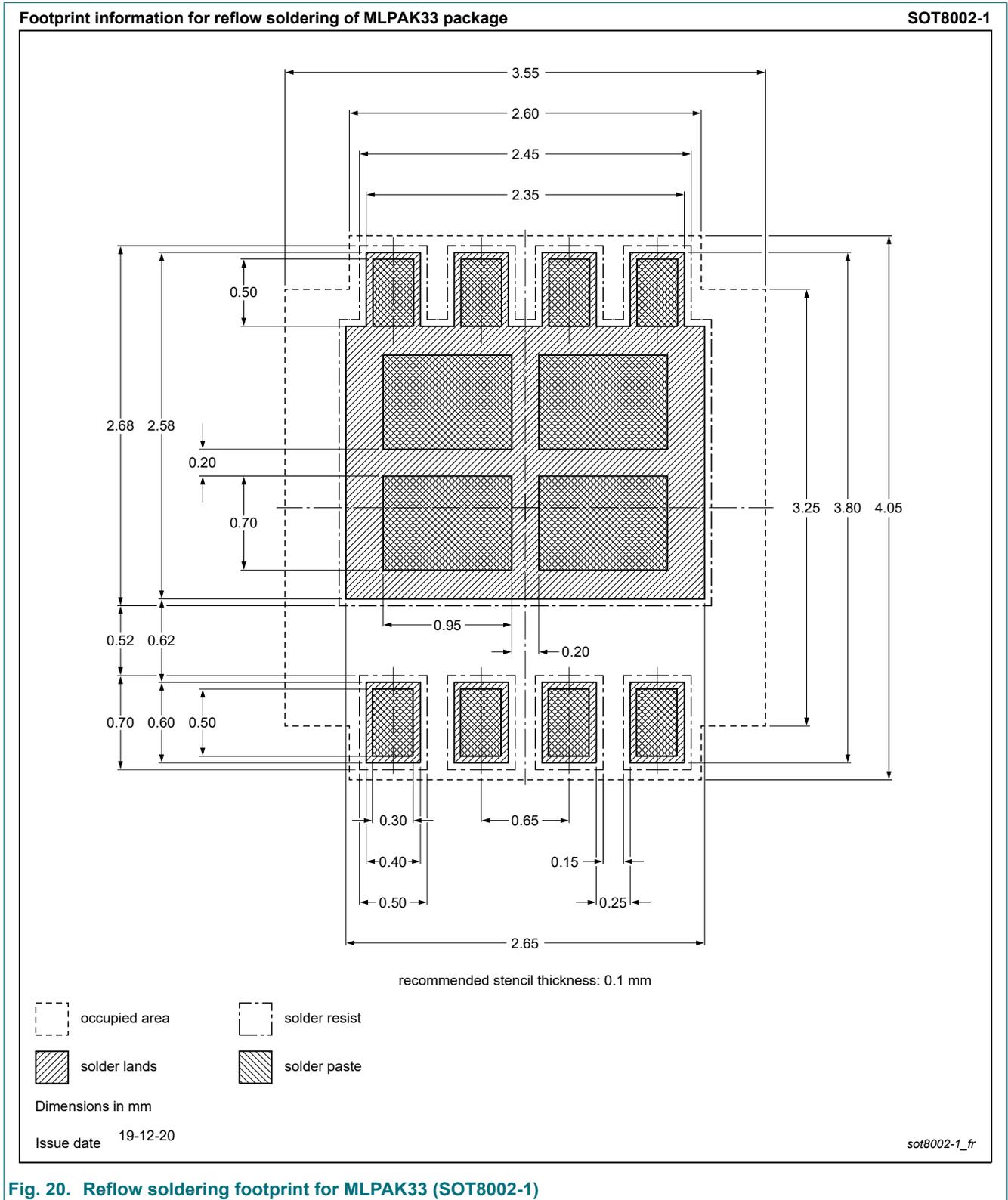


Fig. 20. Reflow soldering footprint for MLPAK33 (SOT8002-1)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PXP015-30QL v.1	20220119	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".
- [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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