



NX3020NAKRA-Q

30 V, dual N-channel Trench MOSFET

11 August 2025

Product data sheet

1. General description

Dual N-channel enhancement mode Field-Effect Transistor (FET) in an ultra small DFN1412-6 (SOT1268) leadless Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection
- AEC-Q101 qualified

3. Applications

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

4. Quick reference data

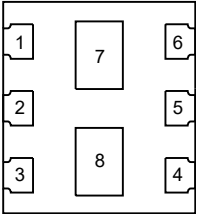
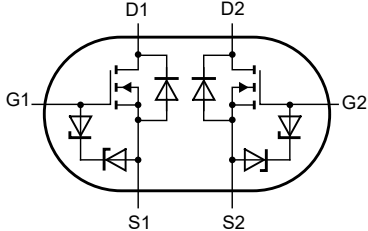
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$		-	-	30	V
V_{GS}	gate-source voltage			-20	-	20	V
I_D	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-	320	mA
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 100\text{ mA}; T_j = 25\text{ °C}$		-	2.2	2.9	Ω

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S1	source TR1	 Transparent top view DFN1412-6 (SOT1268)	 017aaa256
2	G1	gate TR1		
3	D2	drain TR2		
4	S2	source TR2		
5	G2	gate TR2		
6	D1	drain TR1		
7	D1	drain TR1		
8	D2	drain TR2		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NX3020NAKRA-Q	DFN1412-6	plastic, thin small outline package; no leads; 6 terminals; 1.4 mm x 1.2 mm x 0.47 mm body	SOT1268

7. Marking

Table 4. Marking codes

Type number	Marking code
NX3020NAKRA-Q	D5

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
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]	-	320	mA
		V _{GS} = 10 V; T _{amb} = 100 °C	[1]	-	200	mA
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	3.7	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	420	mW
			[1]	-	590	mW
		T _{sp} = 25 °C		-	5	W
Per device						
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	630	mW
T _j	junction temperature			-55	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C
Source-drain diode (per transistor)						
I _S	source current	T _{amb} = 25 °C	[1]	-	320	mA
ESD maximum rating (per transistor)						
V _{ESD}	electrostatic discharge voltage	HBM		-	500	V
Avalanche ruggedness (per transistor)						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	T _{J(init)} = 25 °C; I _D = 20 mA; DUT in avalanche (unclamped)		-	6.6	mJ

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

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

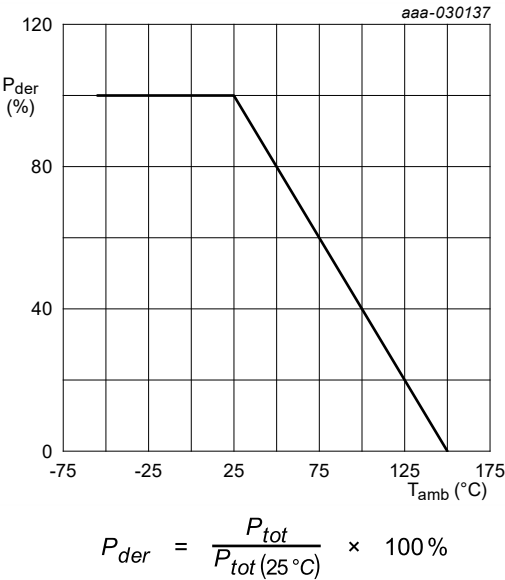


Fig. 1. Normalized total power dissipation as a function of ambient temperature

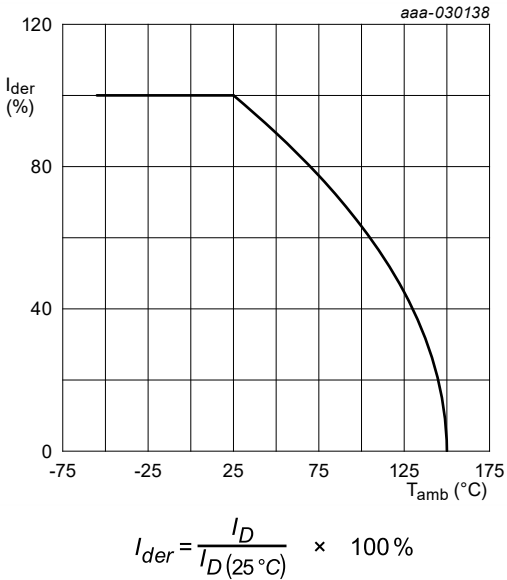


Fig. 2. Normalized continuous drain current as a function of ambient temperature

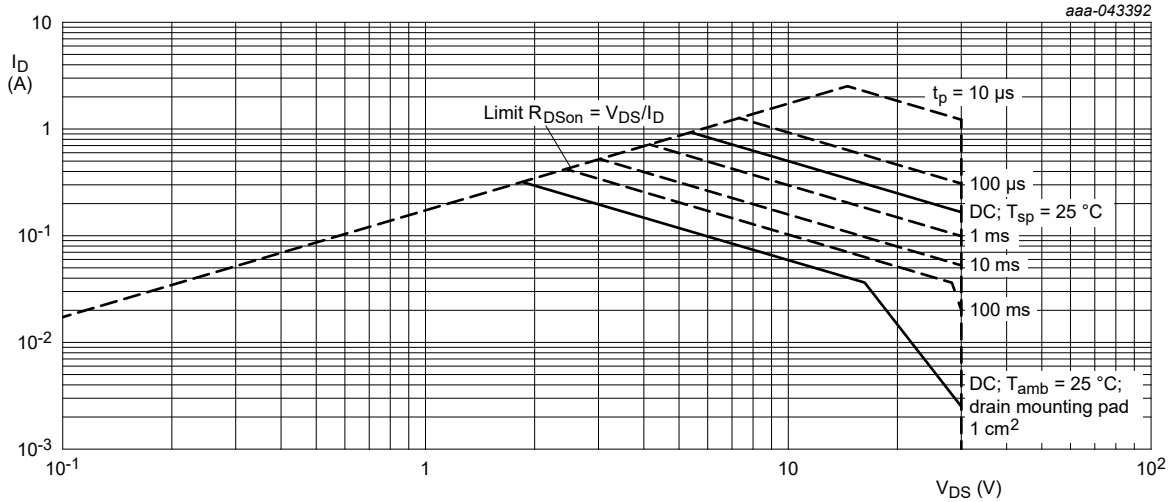


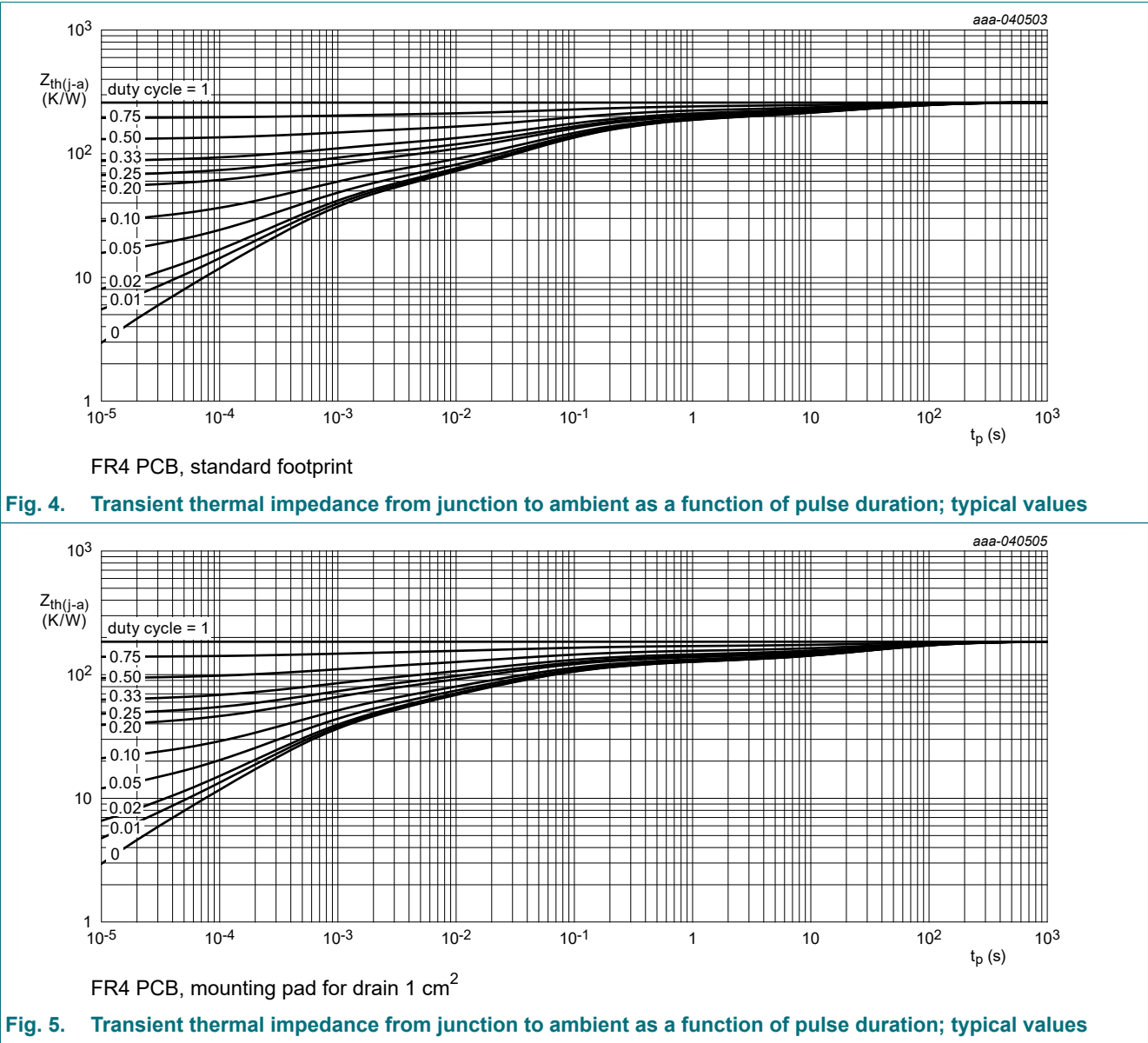
Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	260	300	K/W
			[2]	-	184	212	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	20	25	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	200	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 1 cm².



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		30	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = 250 μA; V _{DS} = V _{GS} ; T _j = 25 °C		0.8	1.1	1.5	V
I _{DSS}	drain leakage current	V _{DS} = 30 V; V _{GS} = 0 V; T _j = 25 °C		-	-	500	nA
		V _{DS} = 30 V; V _{GS} = 0 V; T _j = 125 °C		-	-	5	μA
I _{GSS}	gate leakage current	V _{GS} = 20 V; V _{DS} = 0 V; T _j = 25 °C		-	-	10	μA
		V _{GS} = -20 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-10	μA
		V _{GS} = 10 V; V _{DS} = 0 V; T _j = 25 °C		-	-	1	μA
		V _{GS} = -10 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-1	μA
		V _{GS} = 5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	500	nA
		V _{GS} = -5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-500	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 100 mA; T _j = 25 °C		-	2.2	2.9	Ω
		V _{GS} = 10 V; I _D = 100 mA; T _j = 150 °C		-	4.4	5.8	Ω
		V _{GS} = 4.5 V; I _D = 50 mA; T _j = 25 °C		-	2.6	3.7	Ω
		V _{GS} = 2.5 V; I _D = 10 mA; T _j = 25 °C		-	3.4	12	Ω
g _{fs}	forward transconductance	V _{DS} = 5 V; I _D = 100 mA; T _j = 25 °C		-	0.3	-	S
Dynamic characteristics							
Q _{G(tot)}	total gate charge	V _{DS} = 15 V; I _D = 100 mA; V _{GS} = 10 V; T _j = 25 °C		-	0.21	0.315	nC
Q _{GS}	gate-source charge			-	0.022	-	nC
Q _{GD}	gate-drain charge			-	0.051	-	nC
C _{iss}	input capacitance	V _{DS} = 15 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C		-	9	-	pF
C _{oss}	output capacitance			-	1.8	-	pF
C _{rss}	reverse transfer capacitance			-	1.1	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 15 V; I _D = 100 mA; 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			-	2	-	ns
t _f	fall time			-	3	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 210 mA; V _{GS} = 0 V; T _j = 25 °C		-	1	1.6	V
t _{rr}	reverse recovery time	I _S = 210 mA; dI _S /dt = -100 A/μs; V _{GS} = 0 V; V _{DS} = 15 V; T _j = 25 °C		-	7	-	ns
Q _r	recovered charge			-	1	-	nC

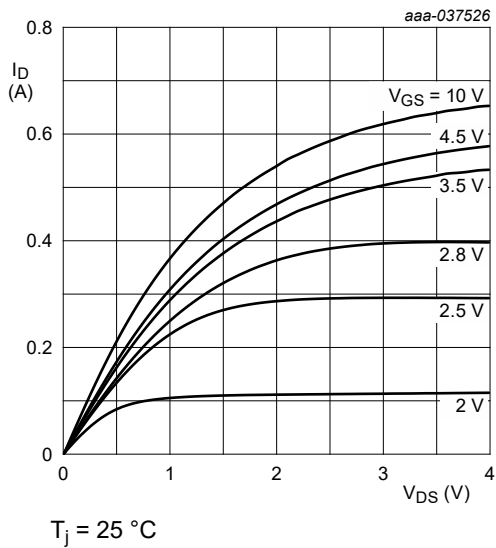


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

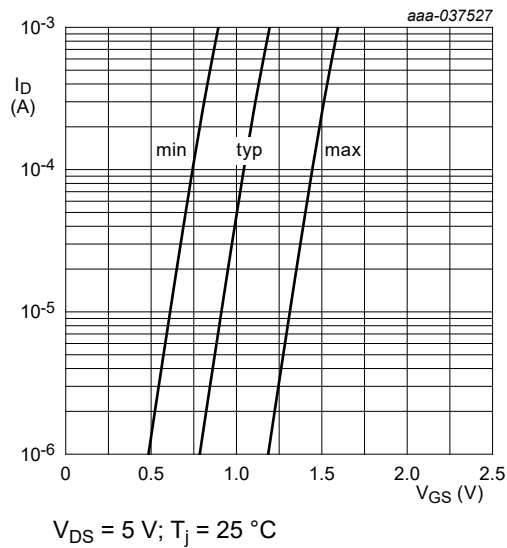


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

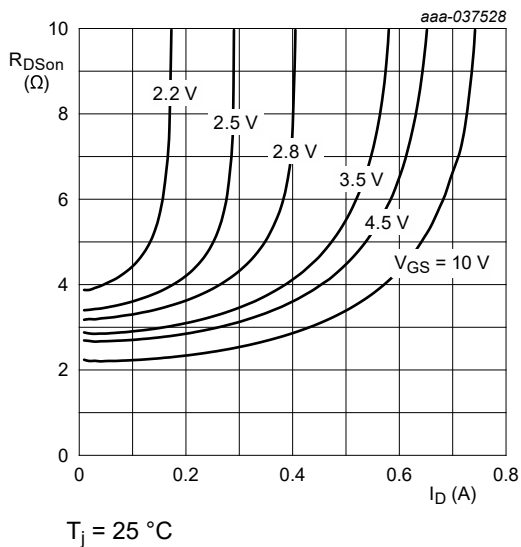


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

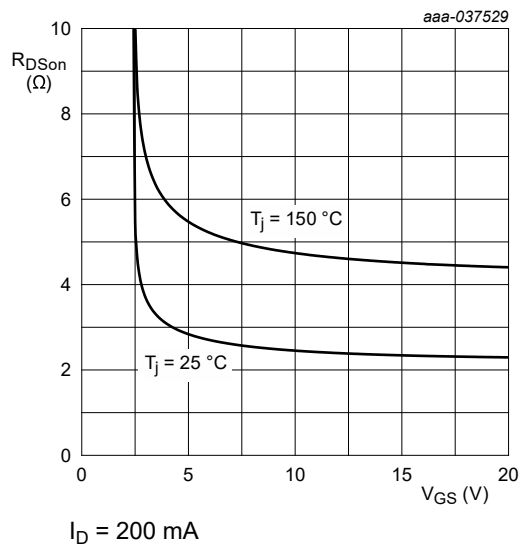


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

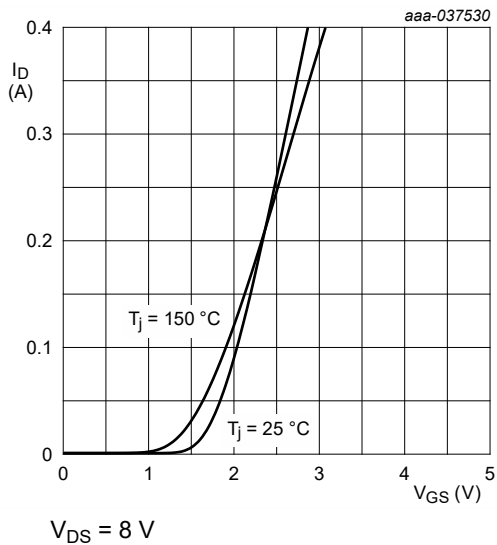


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

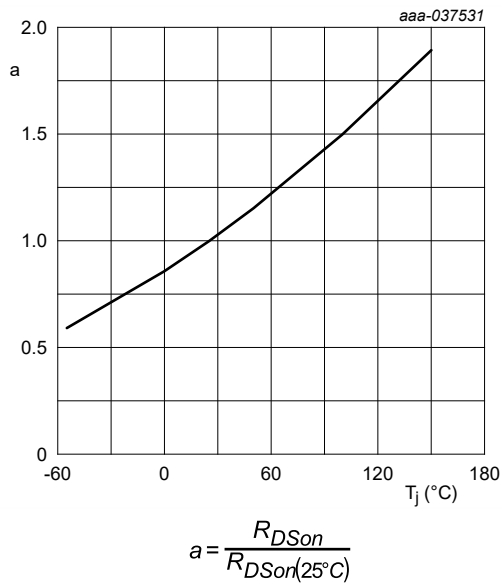


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

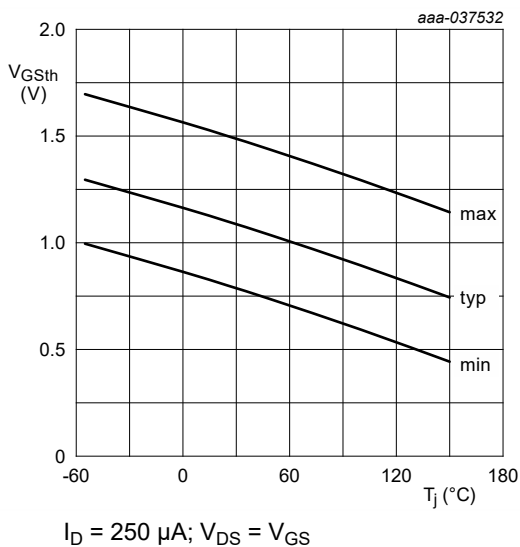


Fig. 12. Gate-source threshold voltage as a function of junction temperature

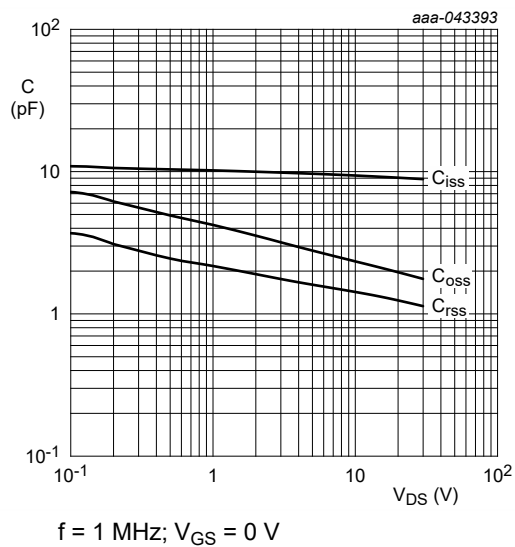


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

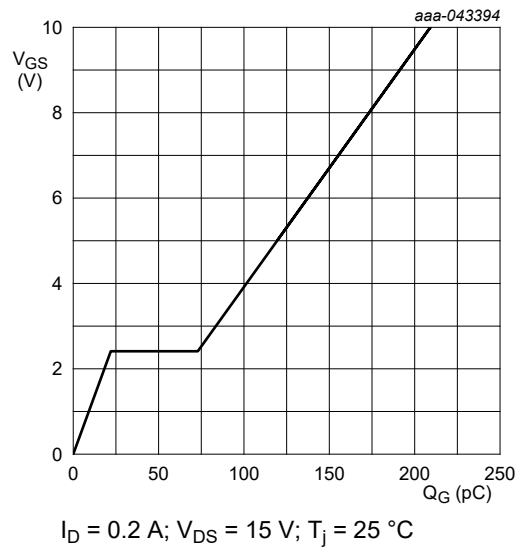


Fig. 14. Gate-source voltage as a function of gate charge; typical values

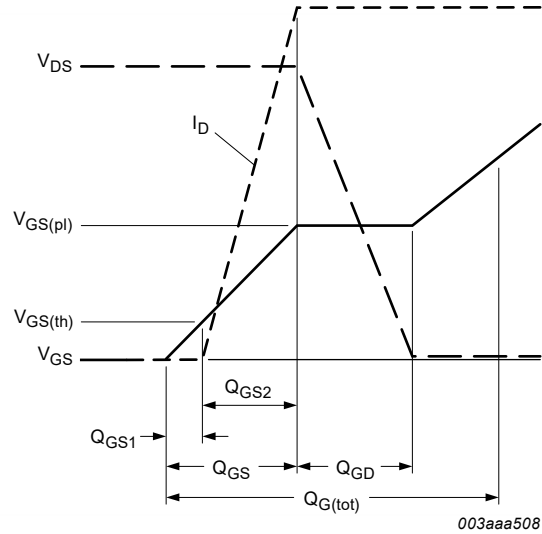


Fig. 15. Gate charge waveform definitions

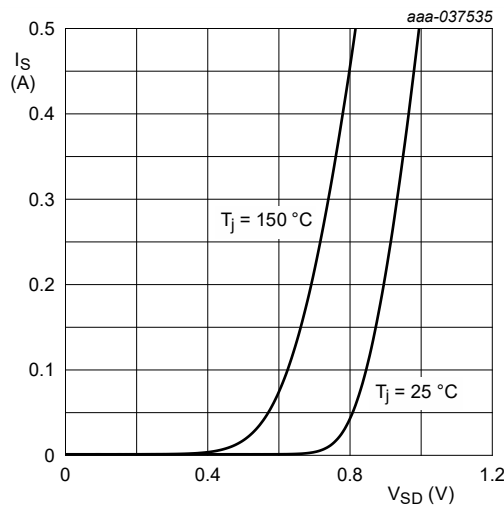


Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information

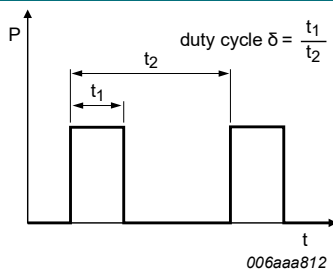


Fig. 17. Duty cycle definition

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

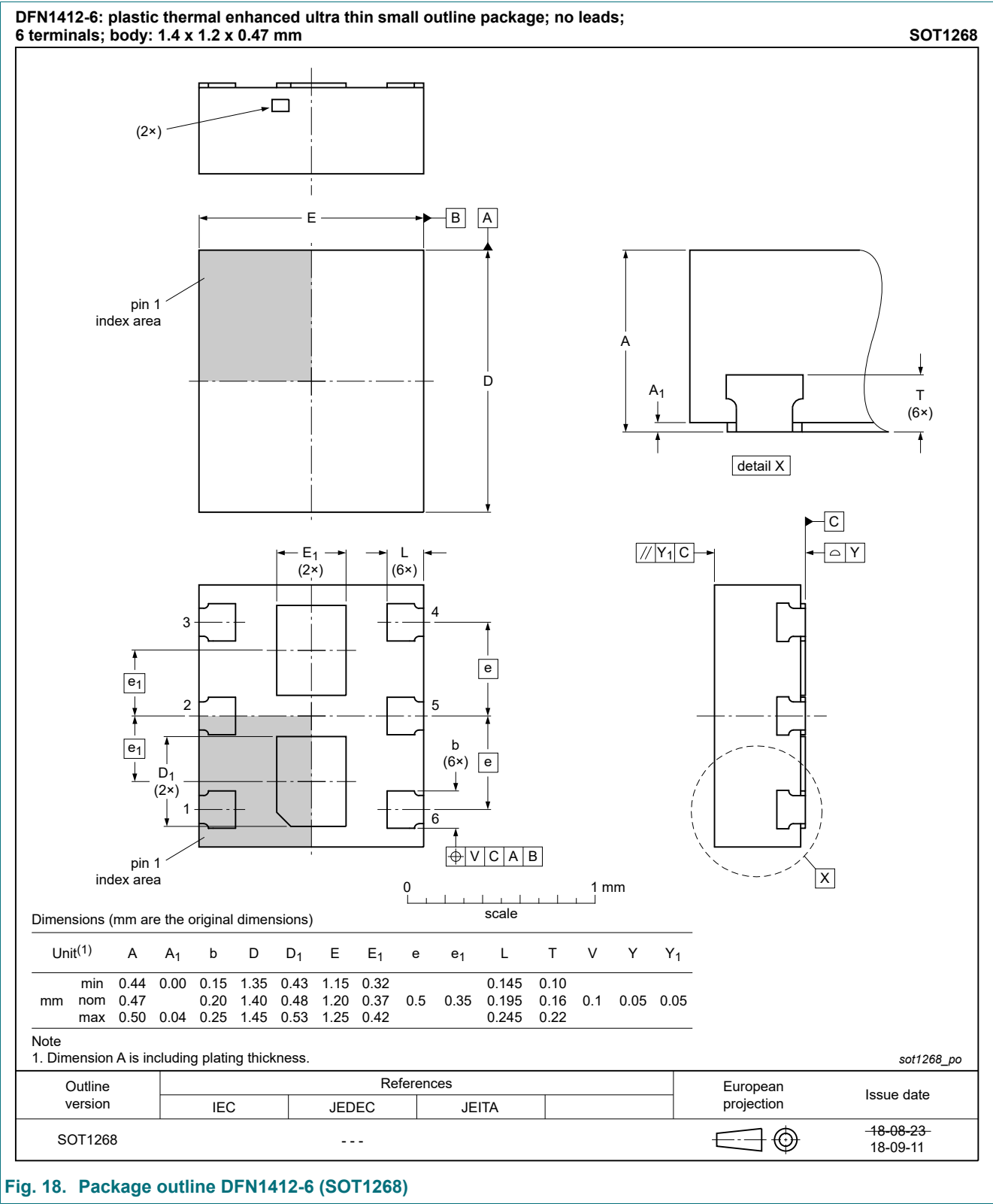


Fig. 18. Package outline DFN1412-6 (SOT1268)

13. Soldering

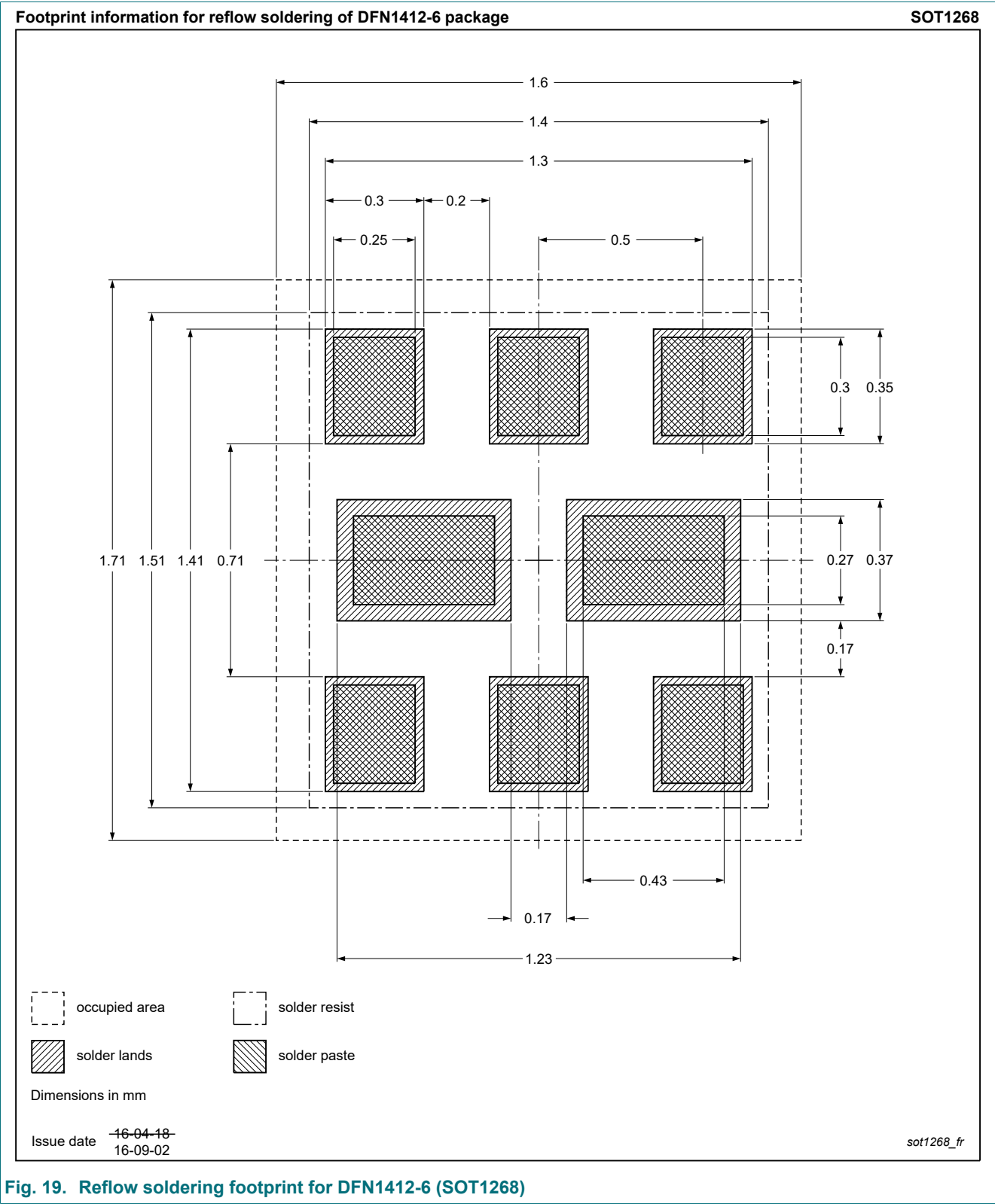


Fig. 19. Reflow soldering footprint for DFN1412-6 (SOT1268)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
NX3020NAKRA-Q v.1	20250811	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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