



NX3008NBKW

30 V, 350 mA N-channel Trench MOSFET

5 November 2022

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a very small SOT323 (SC70) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Very fast switching
- Low threshold voltage
- Trench MOSFET technology
- ESD protection up to 2 kV
- AEC-Q101 qualified

3. Applications

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

4. Quick reference data

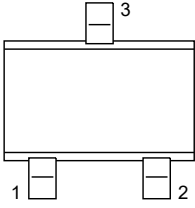
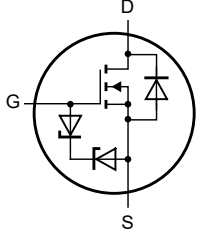
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	30	V
V_{GS}	gate-source voltage		-8	-	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	350	mA
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 350\text{ mA}; T_j = 25\text{ °C}$	-	1	1.4	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	G	gate	 <p>SC-70 (SOT323)</p>	 <p>017aaa255</p>
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NX3008NBKW	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
NX3008NBKW	AA%

[1] % = placeholder for manufacturing site code

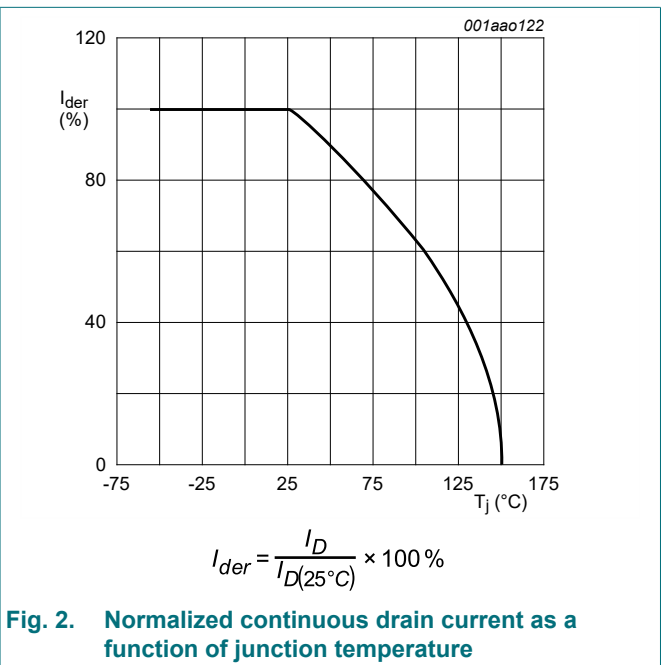
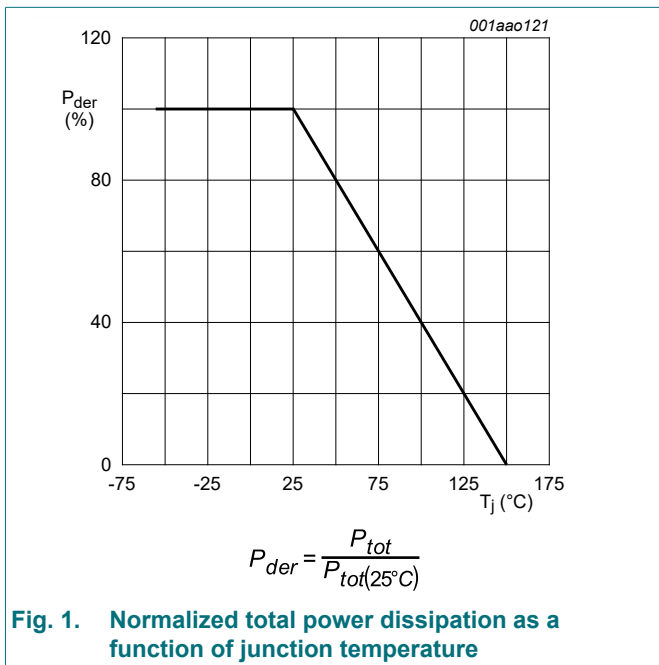
8. Limiting values

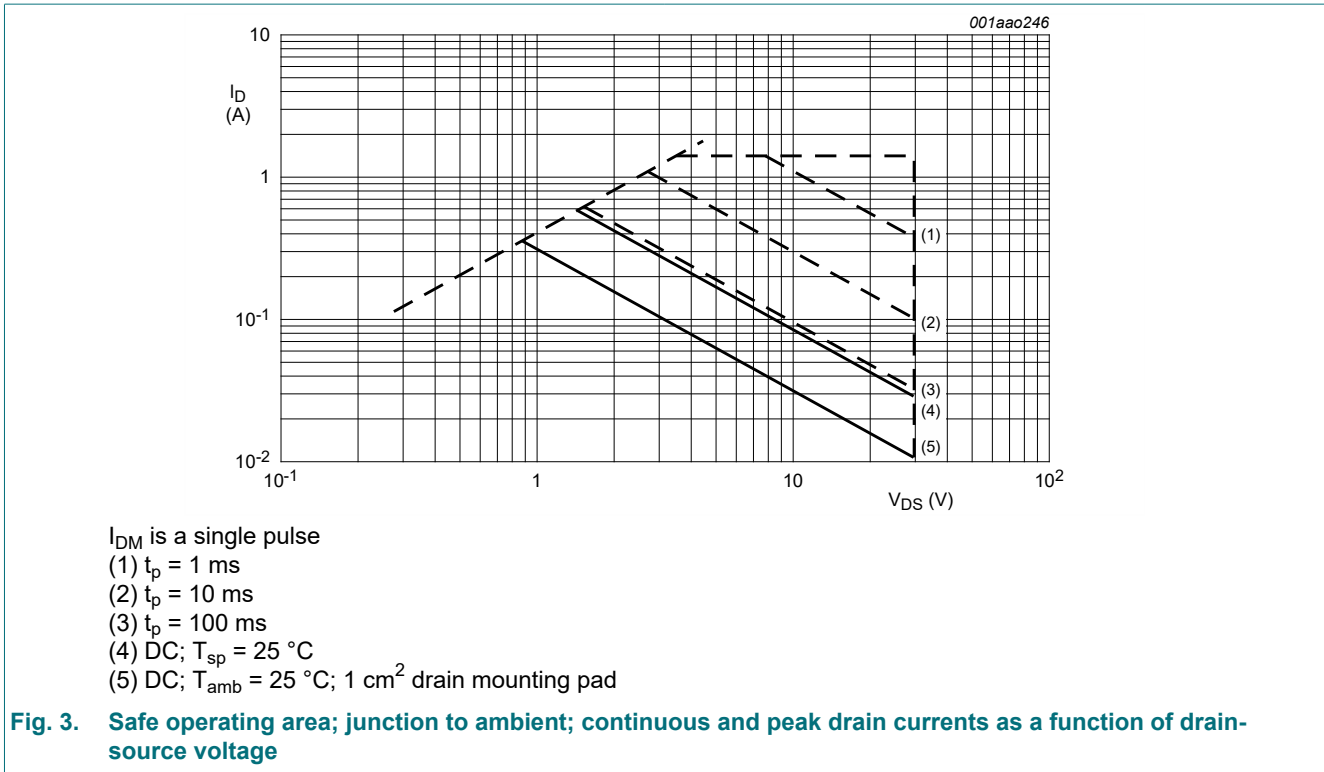
Table 5. Limiting values

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			-8	8	V
I _D	drain current	V _{GS} = 4.5 V; T _{amb} = 25 °C	[1]	-	350	mA
		V _{GS} = 4.5 V; T _{amb} = 100 °C	[1]	-	230	mA
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	1.4	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	260	mW
			[1]	-	310	mW
		T _{sp} = 25 °C		-	830	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						
I _S	source current	T _{amb} = 25 °C	[1]	-	300	mA
ESD maximum rating						
V _{ESD}	electrostatic discharge voltage	HBM	[3]	-	2000	V

- [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.
- [3] Measured between all pins.





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]	-	310	370	K/W
			[2]	-	260	300	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	115	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.

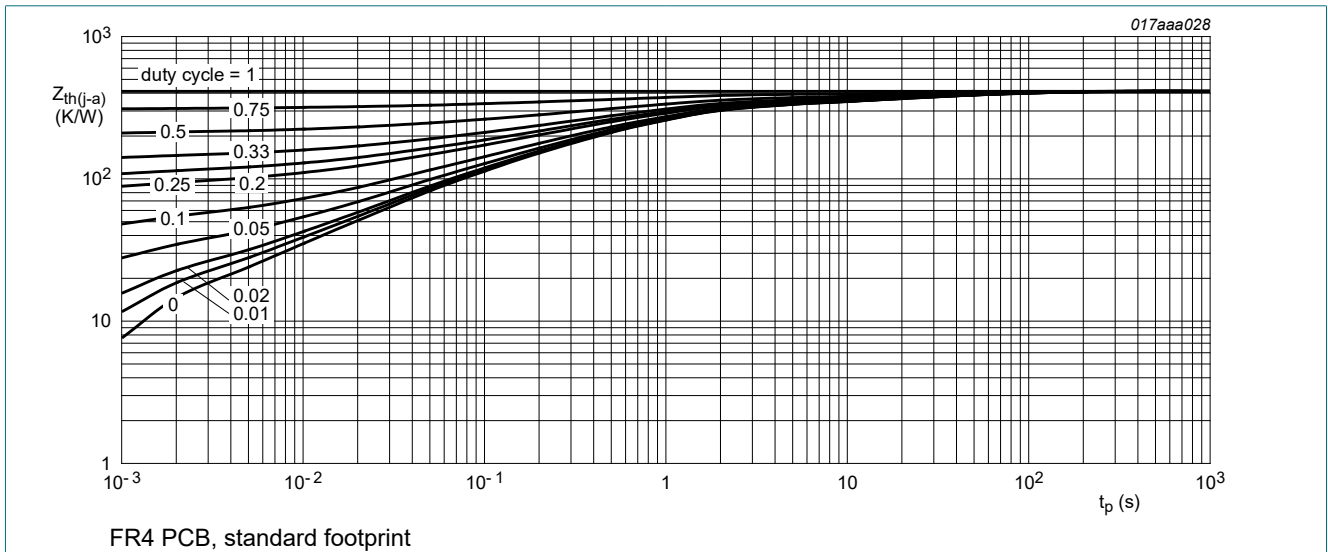


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

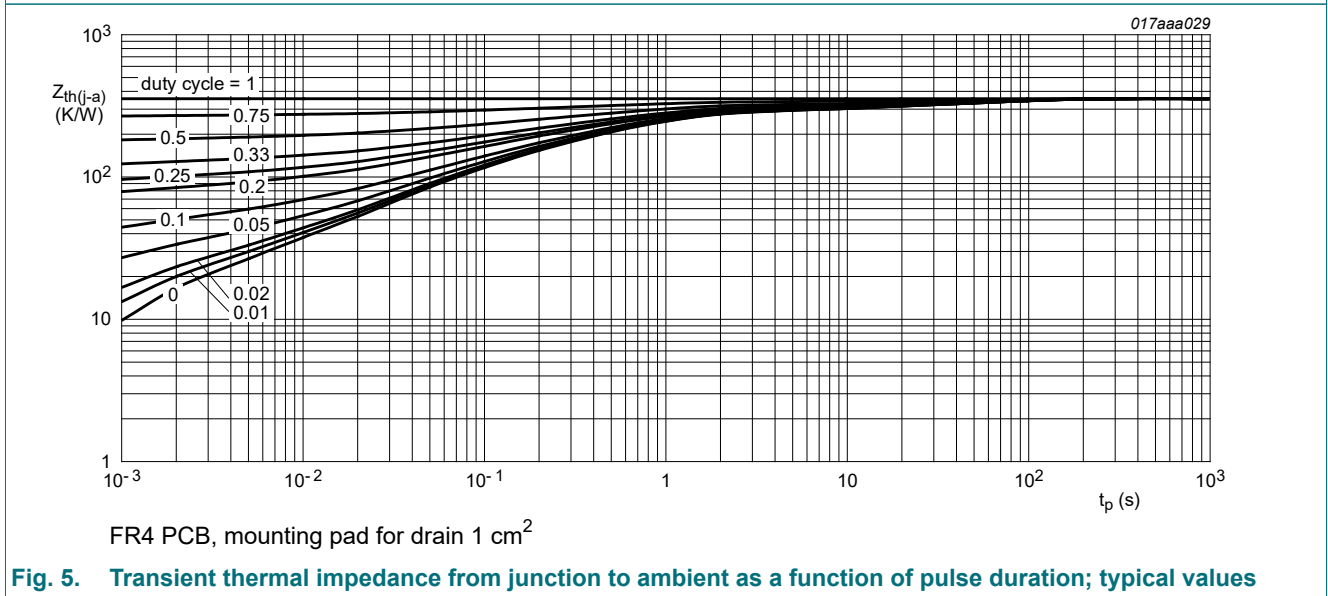


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	30	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$	0.6	0.9	1.1	V
I_{DSS}	drain leakage current	$V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	1	μA
		$V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 150 \text{ }^\circ C$	-	-	10	μA
I_{GSS}	gate leakage current	$V_{GS} = 8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	0.2	1	μA
		$V_{GS} = -8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	0.2	1	μA
		$V_{GS} = 4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	10	-	nA
		$V_{GS} = -4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	10	-	nA
		$V_{GS} = 2.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	1	-	nA
		$V_{GS} = -2.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	1	-	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5 V$; $I_D = 350 \text{ mA}$; $T_j = 25 \text{ }^\circ C$	-	1	1.4	Ω
		$V_{GS} = 4.5 V$; $I_D = 350 \text{ mA}$; $T_j = 150 \text{ }^\circ C$	-	1.8	2.5	Ω
		$V_{GS} = 2.5 V$; $I_D = 200 \text{ mA}$; $T_j = 25 \text{ }^\circ C$	-	1.4	2.1	Ω
		$V_{GS} = 1.8 V$; $I_D = 10 \text{ mA}$; $T_j = 25 \text{ }^\circ C$	-	2	2.8	Ω
g_{fs}	forward transconductance	$V_{DS} = 10 V$; $I_D = 350 \text{ mA}$; $T_j = 25 \text{ }^\circ C$	-	310	-	mS
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 V$; $I_D = 350 \text{ mA}$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$	-	0.52	0.68	nC
Q_{GS}	gate-source charge		-	0.17	-	nC
Q_{GD}	gate-drain charge		-	0.08	-	nC
C_{iss}	input capacitance	$V_{DS} = 15 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	34	50	pF
C_{oss}	output capacitance		-	6.5	-	pF
C_{rss}	reverse transfer capacitance		-	2.2	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 20 V$; $R_L = 250 \Omega$; $V_{GS} = 4.5 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$	-	15	30	ns
t_r	rise time		-	11	-	ns
$t_{d(off)}$	turn-off delay time		-	69	138	ns
t_f	fall time		-	19	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 350 \text{ mA}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	0.47	0.85	1.2	V

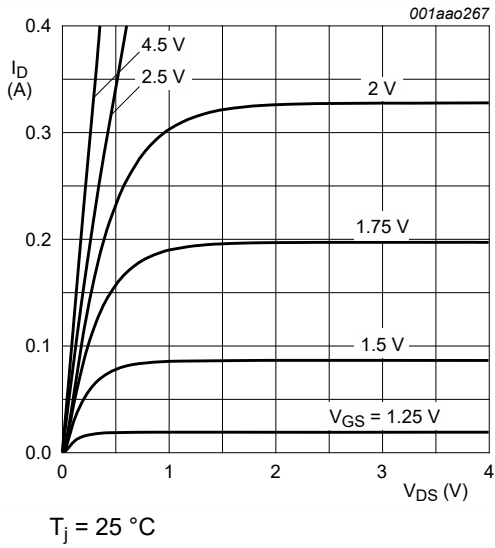


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

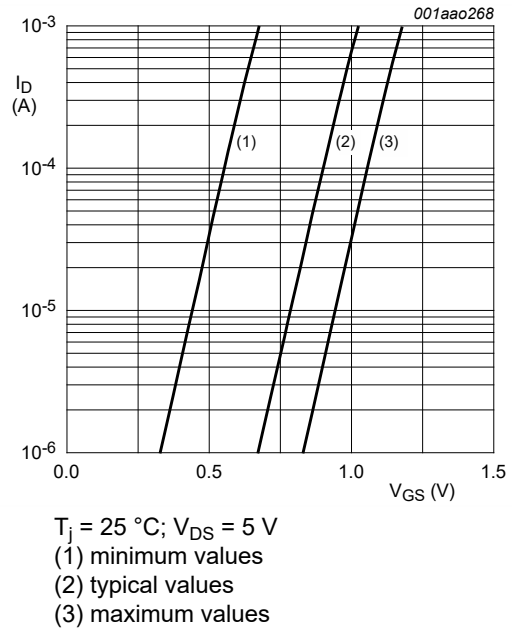


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

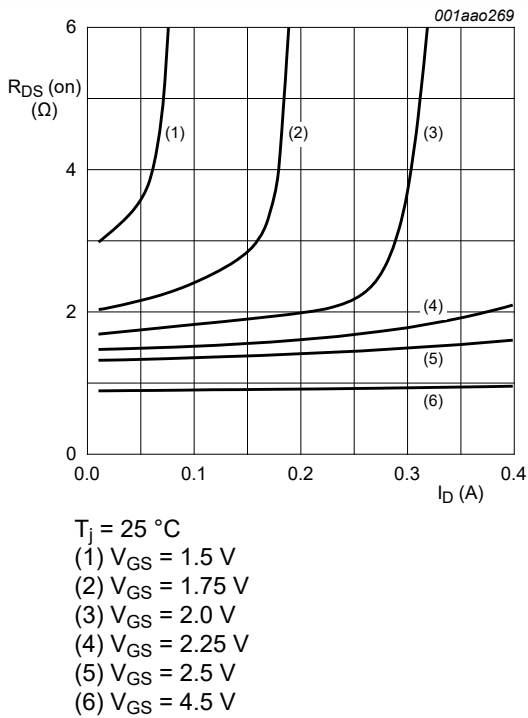


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

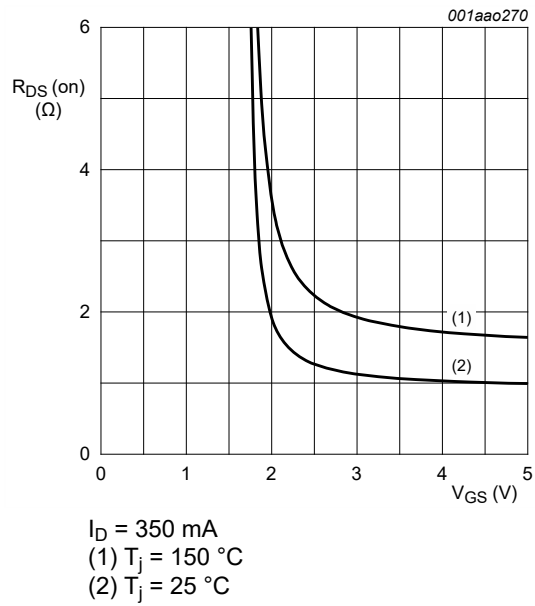


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

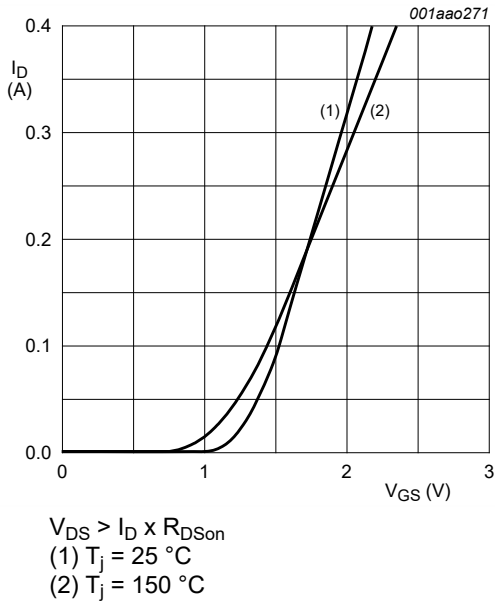


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

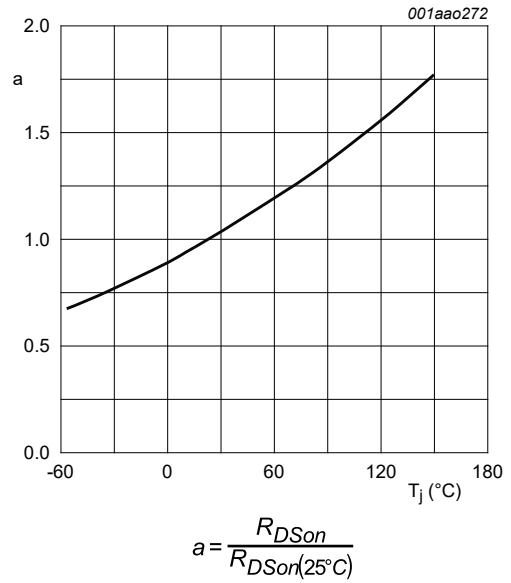


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

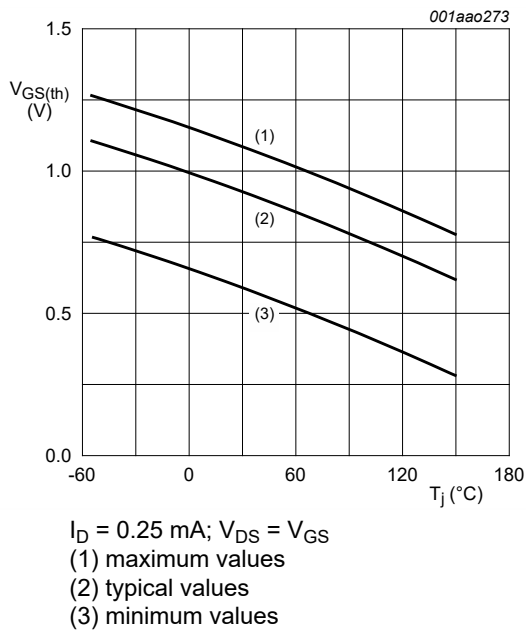


Fig. 12. Gate-source threshold voltage as a function of junction temperature

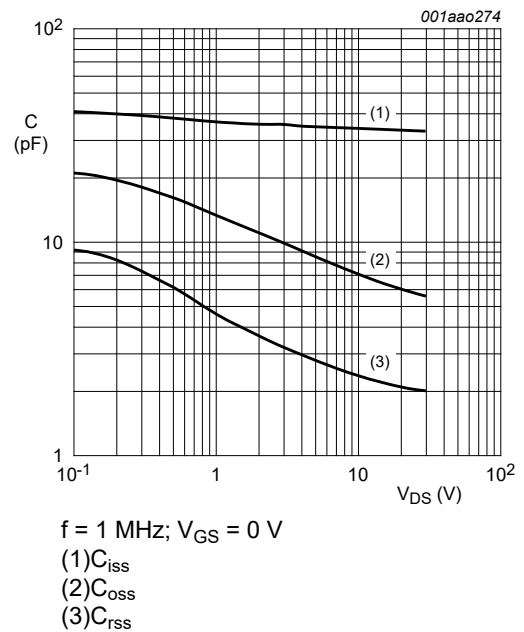


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

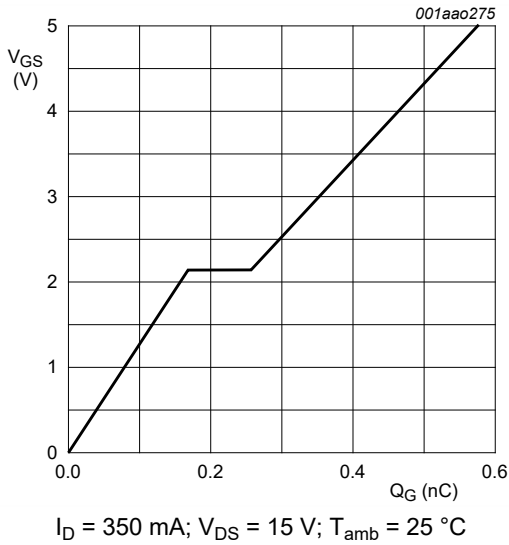


Fig. 14. Gate-source voltage as a function of gate charge; typical values

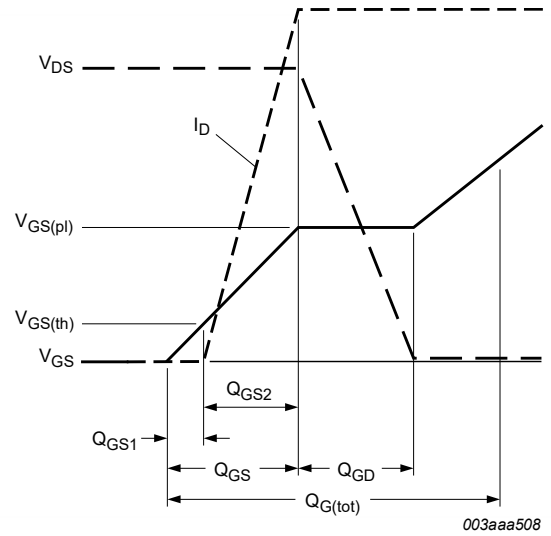
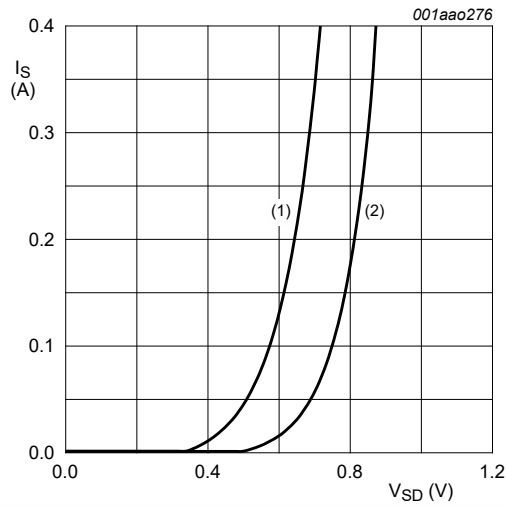


Fig. 15. Gate charge waveform definitions



$V_{GS} = 0$ V
(1) $T_j = 150$ °C
(2) $T_j = 25$ °C

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

11. Test information

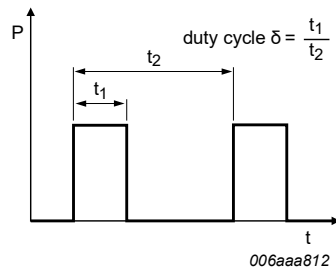


Fig. 17. Duty cycle definition

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

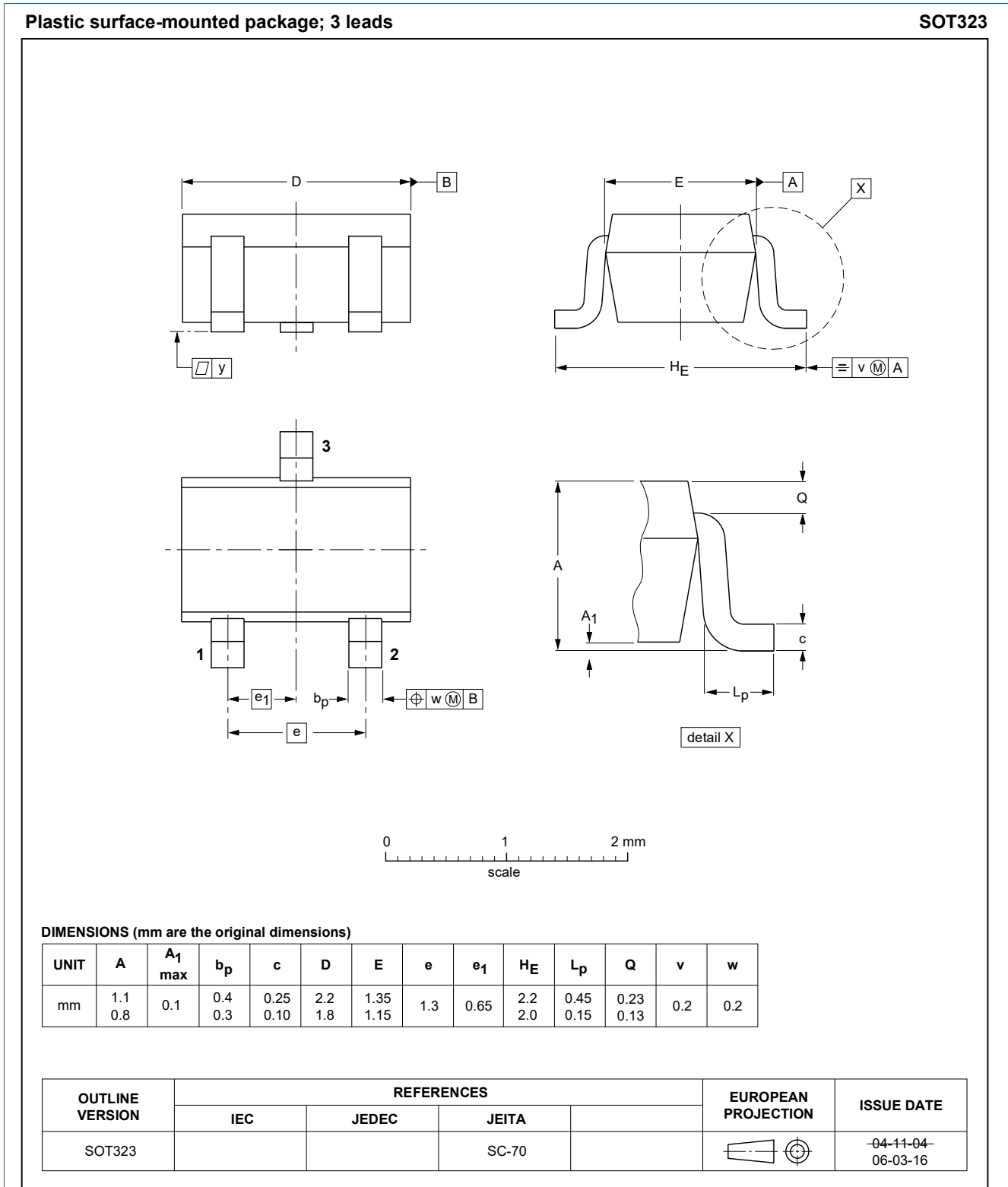


Fig. 18. Package outline SC-70 (SOT323)

13. Soldering

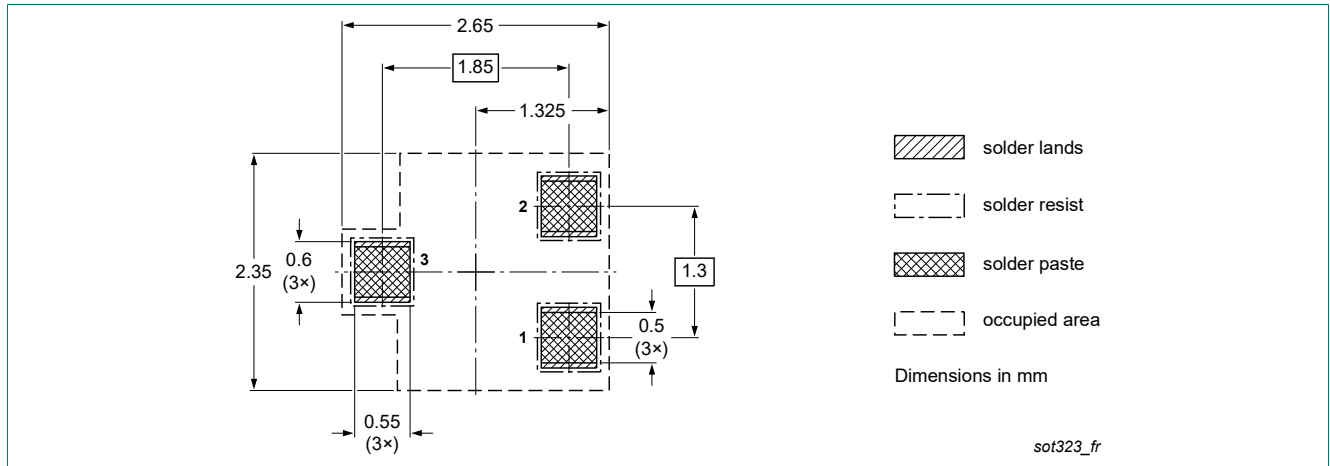


Fig. 19. Reflow soldering footprint for SC-70 (SOT323)

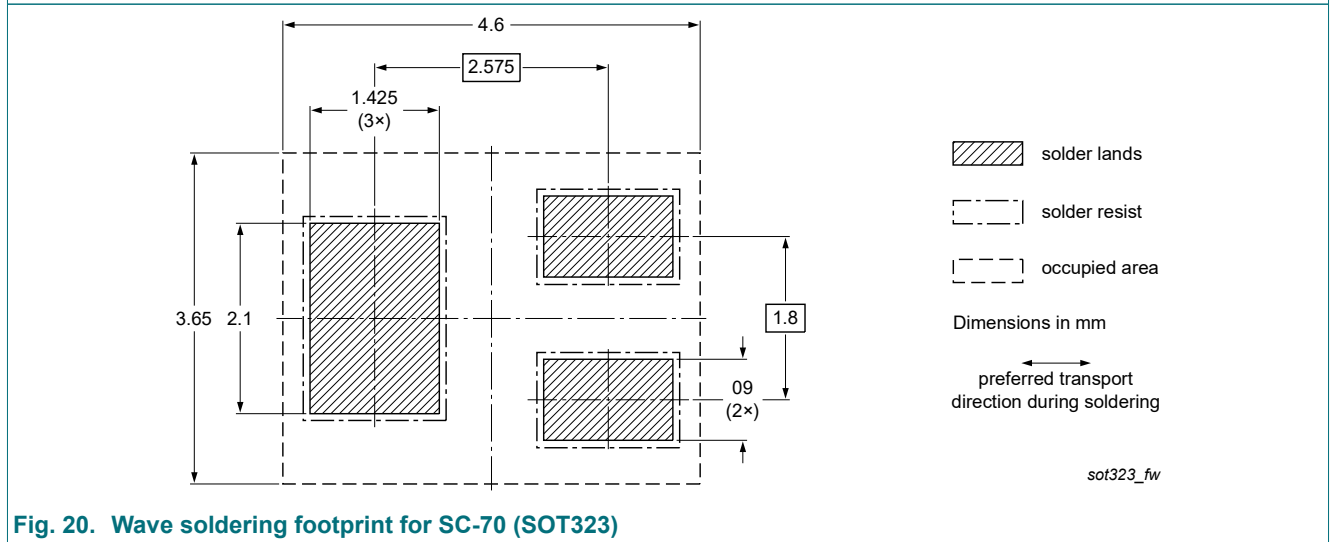


Fig. 20. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
NX3008NBKW v.2	20221105	Product data sheet	-	NX3008NBKW v.1
Modifications:	• Chapter "Characteristics": typo correction, V_{SD} axis scaling for Fig. 16 revised			
NX3008NBKW v.1	20110802	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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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.....	10
12. Package outline.....	11
13. Soldering.....	12
14. Revision history.....	13
15. Legal information.....	14

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