



NSF080120T2A1-Q

1200 V, 80 mΩ, N-channel SiC MOSFET for automotive applications

29 May 2026

Product data sheet

1. General description

The NSF080120T2A1 is a Silicon Carbide based 1200 V power MOSFET in a 7-pin X.PAK plastic package for surface mounted, topside-cooled technology. Its excellent R_{DSon} temperature stability, combined with fast switching speed, makes it a product of choice in high power and high voltage automotive applications, such as E-vehicle onboard charger DC-DC converter and auxiliary drives.

2. Features and benefits

- Excellent R_{DSon} temperature stability
- Very low switching losses
- Fast reverse recovery
- Fast switching speed
- Temperature independent turn-off switching losses
- Very fast and robust intrinsic body diode
- Faster commutation and improved switching due to the additional Kelvin source pin
- Qualified for automotive applications, based on AEC-Q101

3. Applications

- Onboard charger
- DC-DC converter
- Auxiliary drives

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage			-	-	1200	V
V_{GS}	gate-source voltage		[1]	-10	-	22	V
I_D	drain current	$T_c = 25\text{ °C}$	[2]	-	-	31	A
		$T_c = 100\text{ °C}$	[2]	-	-	22	A
I_{DM}	peak drain current	pulsed; t_p limited by T_j (max)	[3]	-	-	60	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	$V_{GS} = 18\text{ V}; I_D = 15\text{ A}; T_j = 25\text{ °C}$		-	80	120	mΩ

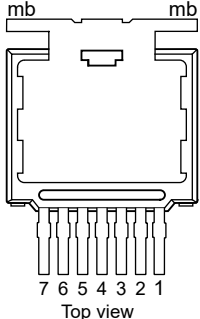
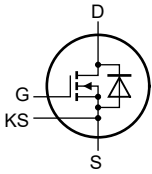
[1] Recommended turn off gate voltage is -5 V to 0 V. Recommended turn on gate voltage is 15 V to 18 V. Do not use with $V_{GSon} < 13\text{ V}$.

[2] Limited by the maximum values of T_j , $R_{th(j-c)}$ and $R_{DSon}(T_j)$.

[3] Designed value (not tested).

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 Top view X.PAK (SOT8107-2)	 aaa-036675
2	KS	Kelvin source		
3 to 7	S	source		
mb	D	mounting base; connected to drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NSF080120T2A1-Q	X.PAK	Plastic, surface-mounted Top Side Cooling (TSC) Package; 1.27 mm pitch; 14.0 mm x 11.8 mm x 3.5 mm body	SOT8107-2

7. Marking

Table 4. Marking codes

Type number	Marking code
NSF080120T2A1-Q	NSF080120T2A1 - Q

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			-	1200	V
V _{GS}	gate-source voltage		[1]	-10	22	V
I _D	drain current	T _c = 25 °C	[2]	-	31	A
		T _c = 100 °C	[2]	-	22	A
I _{DM}	peak drain current	pulsed; t _p limited by T _j (max)	[3]	-	60	A
P _{tot}	total power dissipation	T _c = 25 °C	[2]	-	127	W
T _j	junction temperature			-55	175	°C
T _{stg}	storage temperature			-55	150	°C
Source-drain diode						
I _S	source current	T _c = 25 °C	[2]	-	26	A
I _{SM}	peak source current	pulsed; limited by T _j (max)	[3]	-	45	A

[1] Recommended turn off gate voltage is -5 V to 0 V. Recommended turn on gate voltage is 15 V to 18 V. Do not use with V_{GSon} < 13 V.
[2] Limited by the maximum values of T_j, R_{th(j-c)} and R_{DSon}(T_j).
[3] Designed value (not tested).

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R _{th(j-c)}	thermal resistance from junction to case			-	0.91	1.18	K/W

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 1 mA; V _{GS} = 0 V; T _j = 25 °C		1200	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1.5 mA; V _{DS} = V _{GS} ; T _j = 25 °C	[1]	1.7	2.3	2.9	V
		I _D = 7.5 mA; V _{DS} = V _{GS} ; T _j = 25 °C	[1]	-	2.77	-	V
I _{DSS}	drain leakage current	V _{DS} = 1200 V; V _{GS} = 0 V; T _j = 25 °C		-	-	100	μA
I _{GSS}	gate leakage current	V _{GS} = 22 V; V _{DS} = 0 V; T _j = 25 °C		-	-	100	nA
		V _{GS} = -10 V; V _{DS} = 0 V; T _j = 25 °C		-	-	100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 15 V; I _D = 15 A; T _j = 25 °C		-	106	-	mΩ
		V _{GS} = 15 V; I _D = 15 A; T _j = 175 °C		-	140	-	mΩ
		V _{GS} = 18 V; I _D = 15 A; T _j = 25 °C		-	80	120	mΩ
		V _{GS} = 18 V; I _D = 15 A; T _j = 175 °C		-	129	-	mΩ
g _{fs}	forward transconductance	V _{DS} = 10 V; I _D = 15 A; T _j = 25 °C		-	5	-	S
R _{G(int)}	internal gate resistance	f = 0.5 MHz; T _j = 25 °C		-	2	-	Ω
Dynamic characteristics							
Q _{G(tot)}	total gate charge	V _{DD} = 800 V; I _D = 15 A; V _{GS} = -5/+18 V; T _j = 25 °C		-	41	-	nC
Q _{GS}	gate-source charge			-	18	-	nC
Q _{GD}	gate-drain charge			-	11	-	nC
C _{iss}	input capacitance	V _{DD} = 800 V; f = 0.5 MHz; V _{GS} = 0 V; T _j = 25 °C		-	1045	-	pF
C _{oss}	output capacitance			-	61	-	pF
C _{rss}	reverse transfer capacitance			-	3	-	pF
t _{d(on)}	turn-on delay time	V _{DD} = 800 V; I _D = 15 A; R _{G(ext)} = 2.2 Ω; L _L = 82 μH; V _{GS} = -5/+18 V; T _j = 25 °C		-	11	-	ns
t _r	rise time			-	6	-	ns
t _{d(off)}	turn-off delay time			-	13	-	ns
t _f	fall time			-	9	-	ns
E _{on}	turn-on switching loss			-	161	-	μJ
E _{off}	turn-off switching loss			-	25	-	μJ
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 15 A; V _{GS} = -5 V; T _j = 25 °C		-	4.4	-	V
t _{rr}	reverse recovery time	V _{DD} = 800 V; I _S = 15 A; V _{GS} = -5 V; dI _S /dt = -5608 A/μs; T _j = 25 °C		-	13	-	ns
Q _r	recovered charge			-	134	-	nC

[1] Measured according to JEP183.

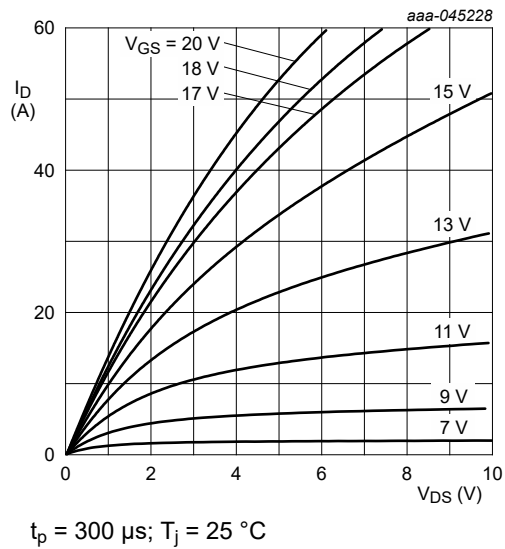


Fig. 1. Output characteristics: drain current as a function of drain-source voltage; typical values

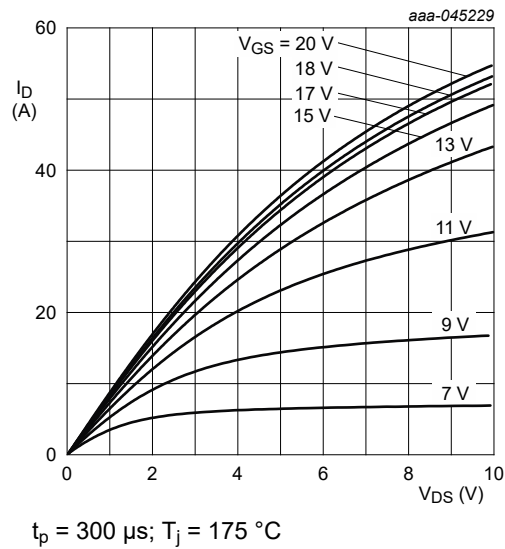


Fig. 2. Output characteristics: drain current as a function of drain-source voltage; typical values

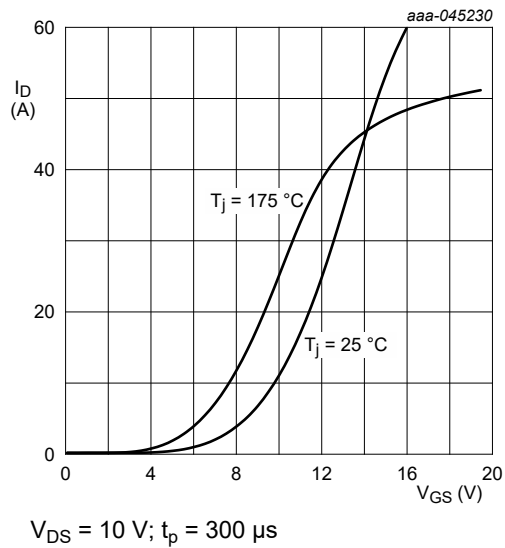


Fig. 3. Transfer characteristics: drain current as a function of gate-source voltage; typical values

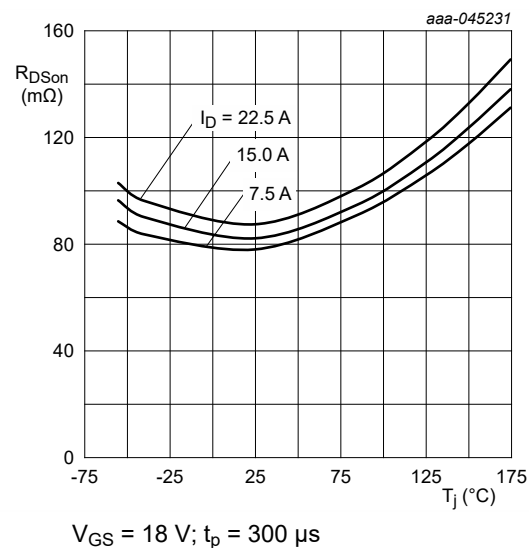


Fig. 4. Drain-source on-state resistance as a function of junction temperature; typical values

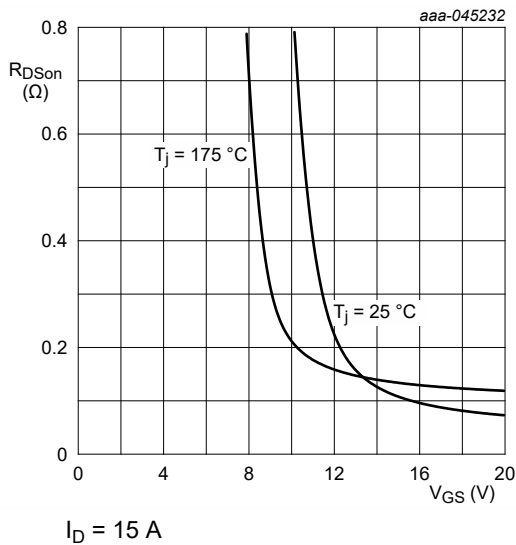


Fig. 5. Drain-source on-state resistance as a function of gate-source voltage

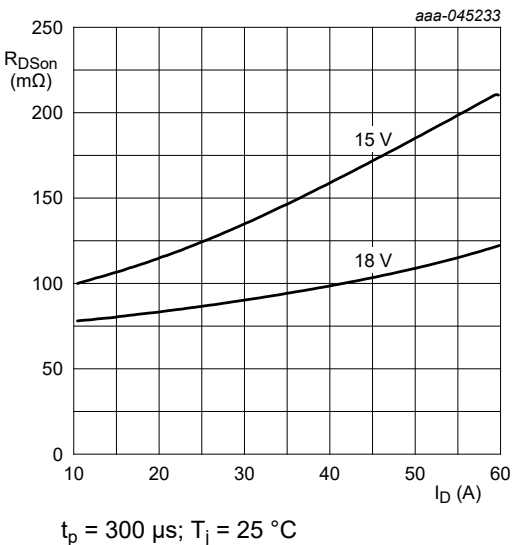


Fig. 6. Drain-source on-state resistance as a function of drain current; typical values

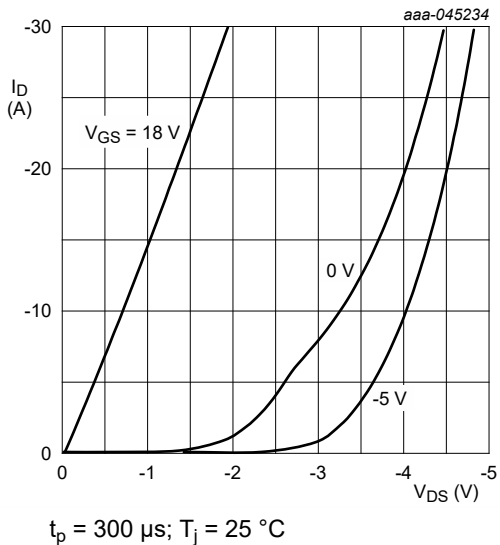


Fig. 7. Drain current as a function of drain-source voltage; typical values (third quadrant characteristics)

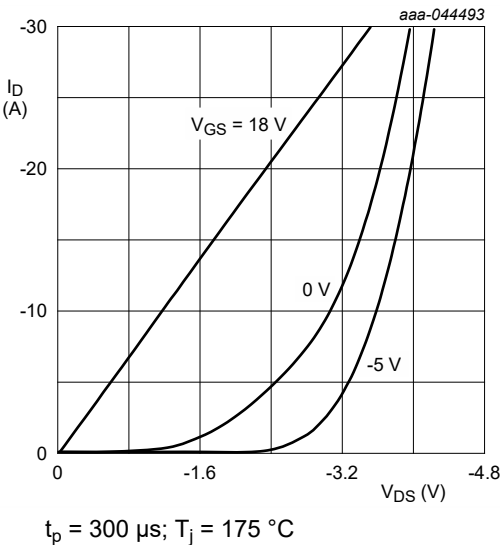


Fig. 8. Drain current as a function of drain-source voltage; typical values (third quadrant characteristics)

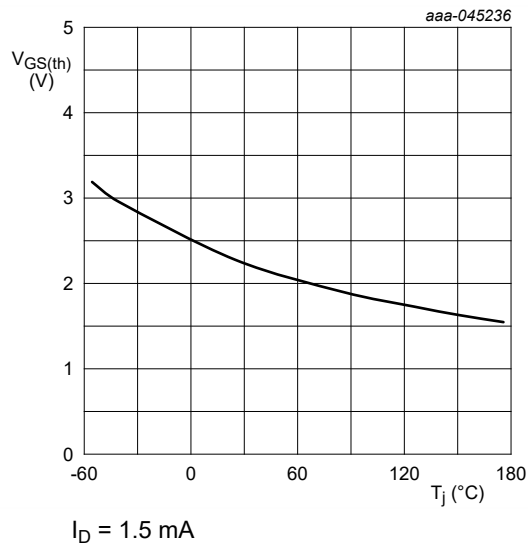


Fig. 9. Gate-source threshold voltage as a function of junction temperature; typical values

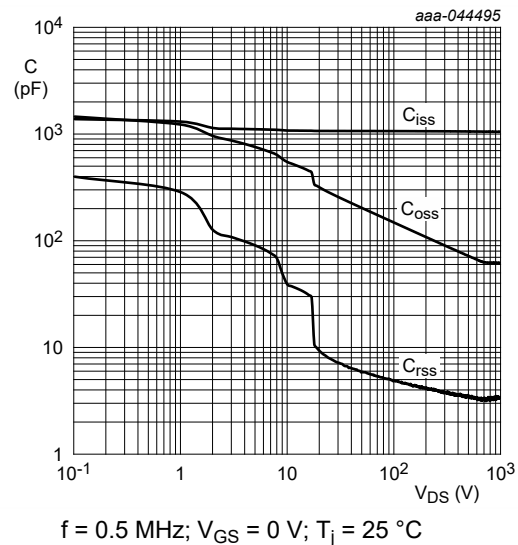


Fig. 10. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

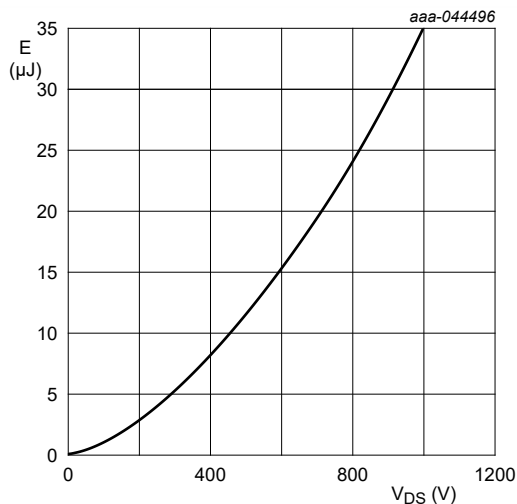


Fig. 11. C_{oss} stored energy as a function of drain-source voltage; typical values

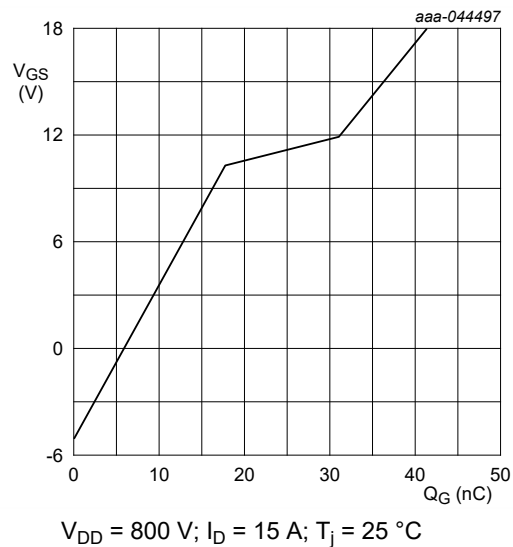


Fig. 12. Gate-source voltage as a function of gate charge; typical values

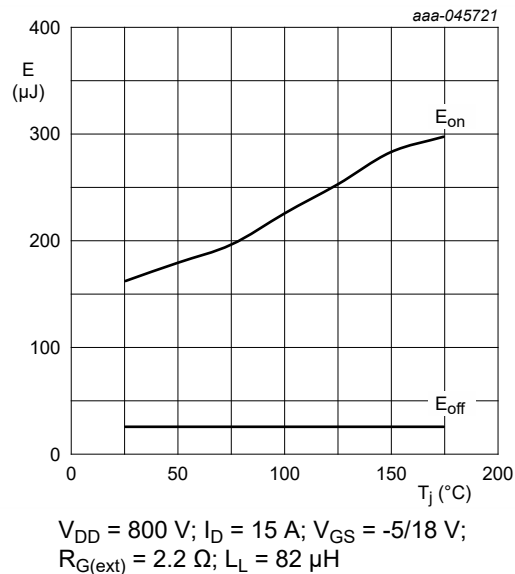


Fig. 13. Switching loss as a function of junction temperature; typical values

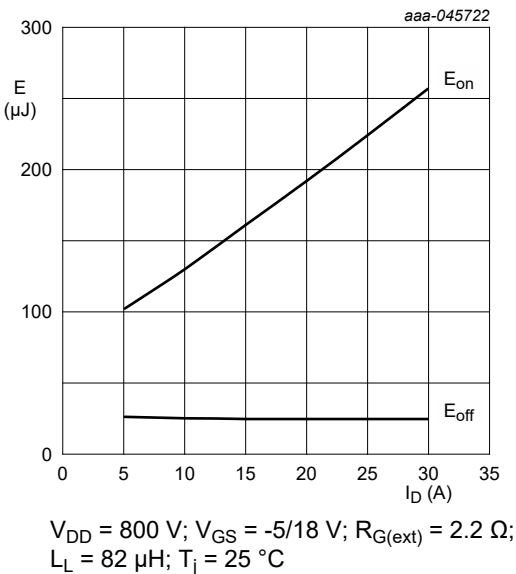


Fig. 14. Switching loss as a function of drain current; typical values

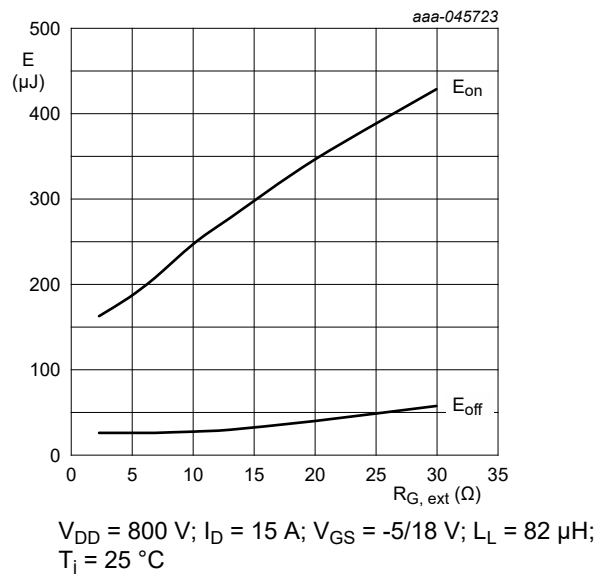


Fig. 15. Switching loss as a function of external gate resistance; typical values

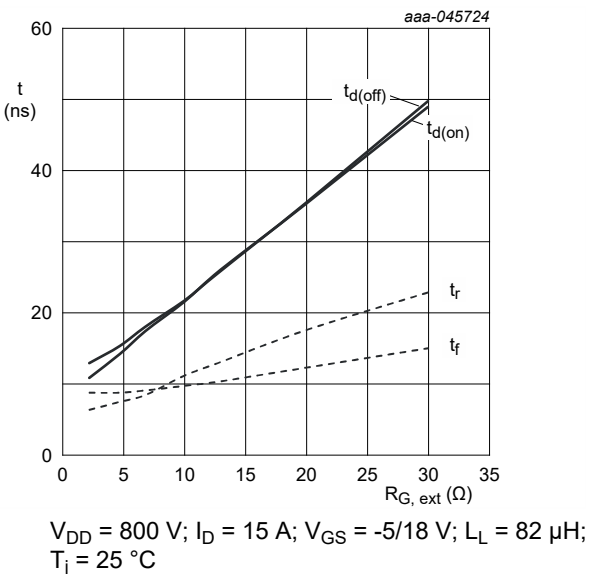


Fig. 16. Switching times as a function of external gate resistance; typical values

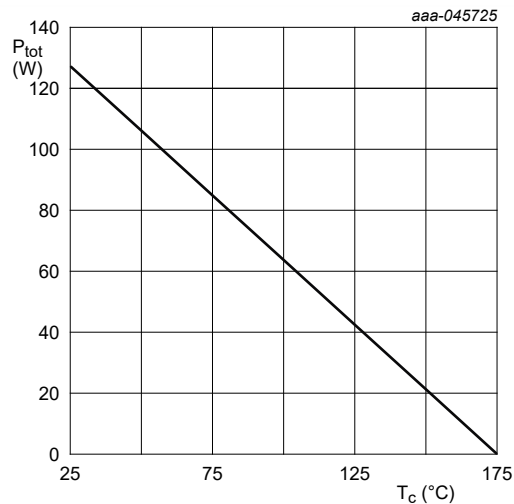


Fig. 17. Power dissipation derating as a function of case temperature; maximum values

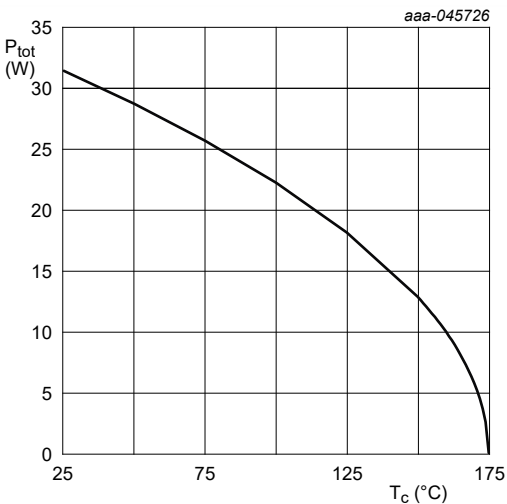
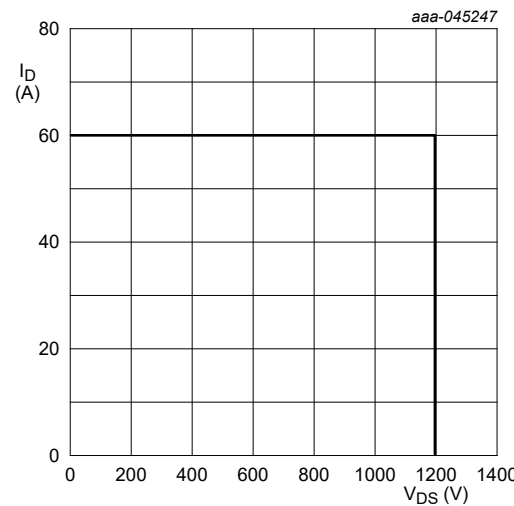


Fig. 18. Continuous drain current as a function of case temperature; maximum values



$V_{GS} = -5/+18$ V; $T_c = 25$ °C; $T_j \leq 175$ °C;
not for linear use

Fig. 19. Reverse bias safe operating area (RBSOA)

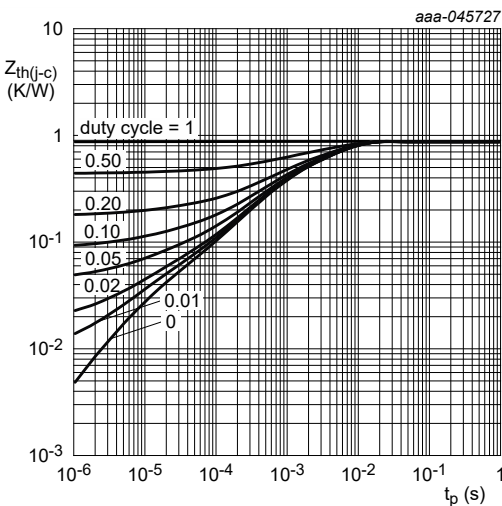
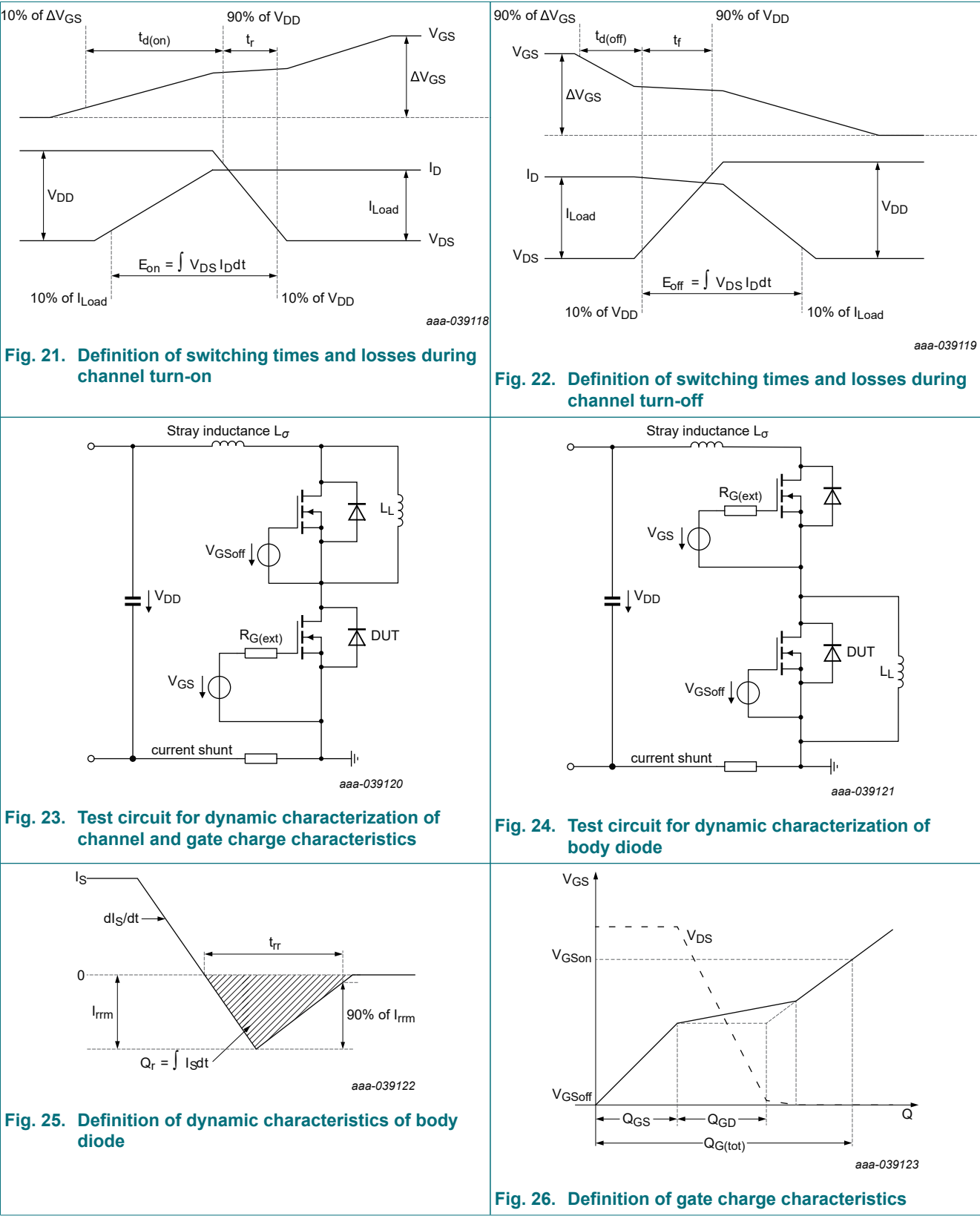
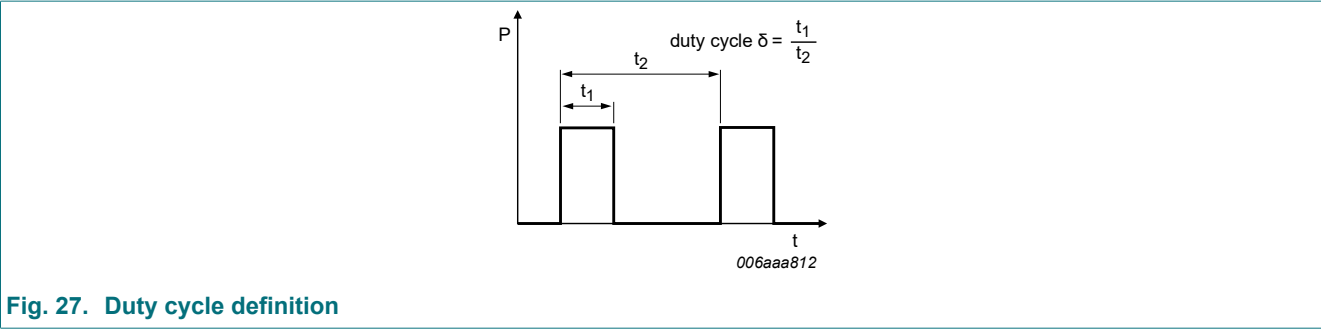


Fig. 20. Transient thermal impedance from junction to case as a function of pulse duration; typical values

11. Test information

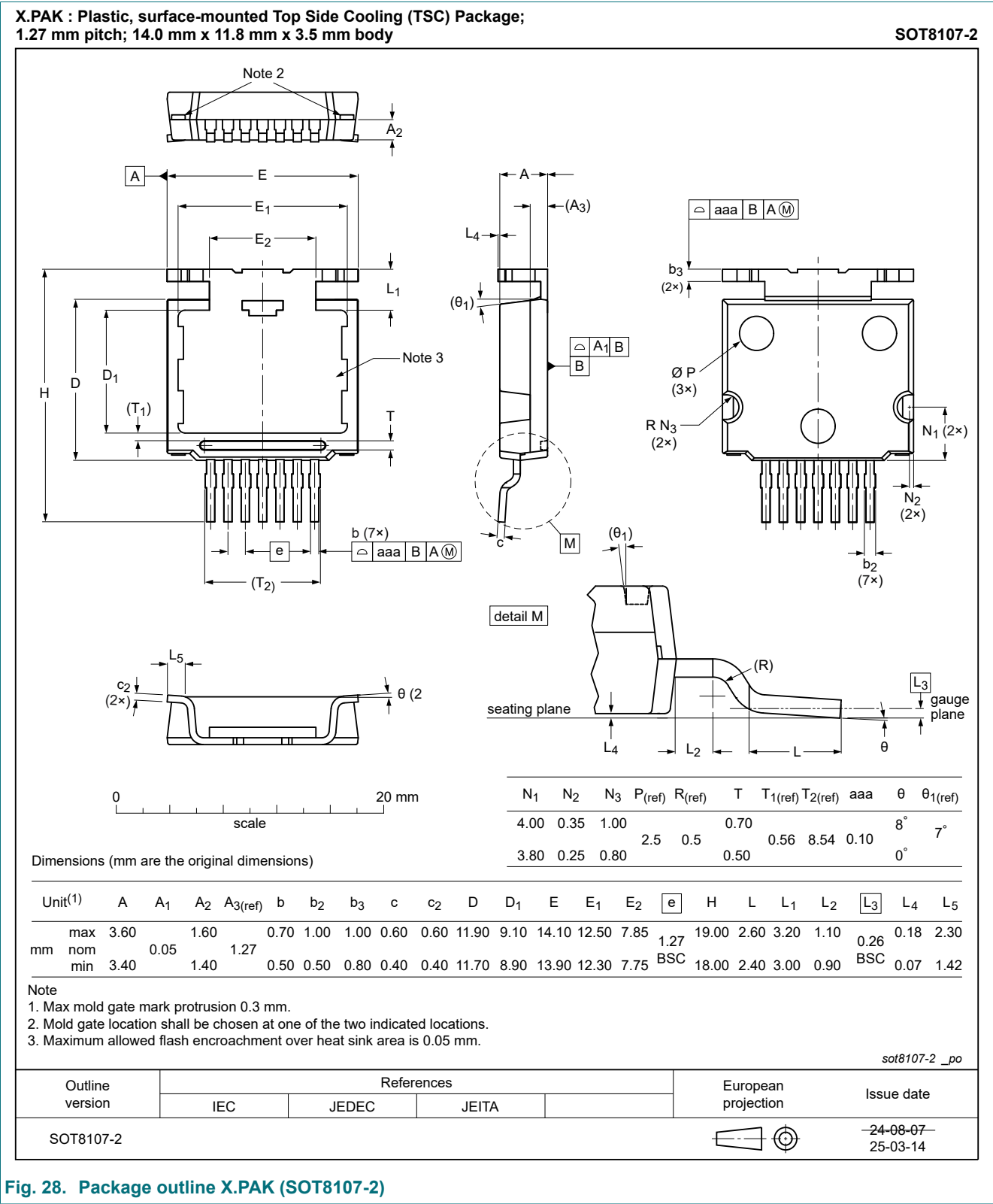




Quality information

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

12. Package outline



13. Soldering

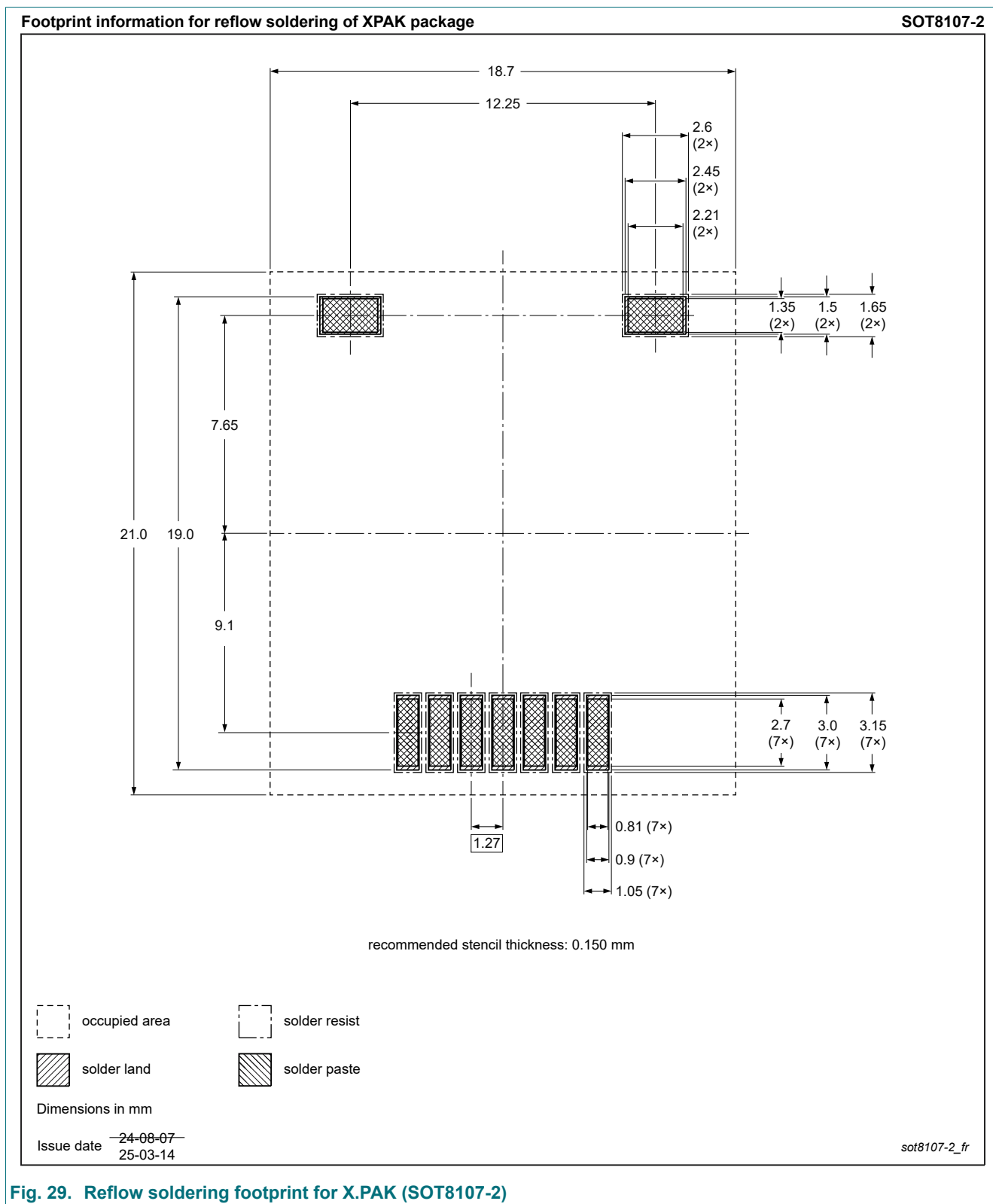


Fig. 29. Reflow soldering footprint for X.PAK (SOT8107-2)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
NSF080120T2A1-Q v.1	20260529	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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