

BUK9Q29-60E

60 V, N-channel Trench MOSFET

18 April 2025

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a small SOT8002-3 (MLPAK33) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology
- Fully automotive qualified to AEC-Q101 at 175°C
- Side-wettable flanks for optical solder inspection

3. Applications

- LED Lighting
- Switching circuits
- DC-DC conversion

4. Quick reference data

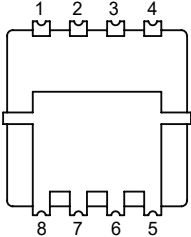
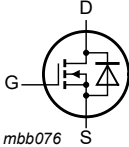
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$	-	-	60	V
V_{GS}	gate-source voltage	DC; $T_j \leq 175\text{ °C}$	-20	-	20	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$	[1]	-	21	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$	-	-	27	W
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 5.6\text{ A}$; $T_j = 25\text{ °C}$	-	23.7	29	mΩ
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{DS} = 30\text{ V}$; $I_D = 5.6\text{ A}$; $V_{GS} = 10\text{ V}$; $T_j = 25\text{ °C}$	-	2.4	-	nC

[1] 21 A continuous current has been successfully demonstrated during application tests. Practically the current will be limited by PCB, thermal design and operating temperature.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 MLPAK33 (SOT8002-3)	 mbb076
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
BUK9Q29-60E	MLPAK33	plastic thermal enhanced surface mounted package with side-wettable flanks (SWF); mini leads; 8 terminals;pitch 0.65 mm; 3.3 x 3.3 x 0.8 mm body	SOT8002-3

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK9Q29-60E	7AA

8. Limiting values

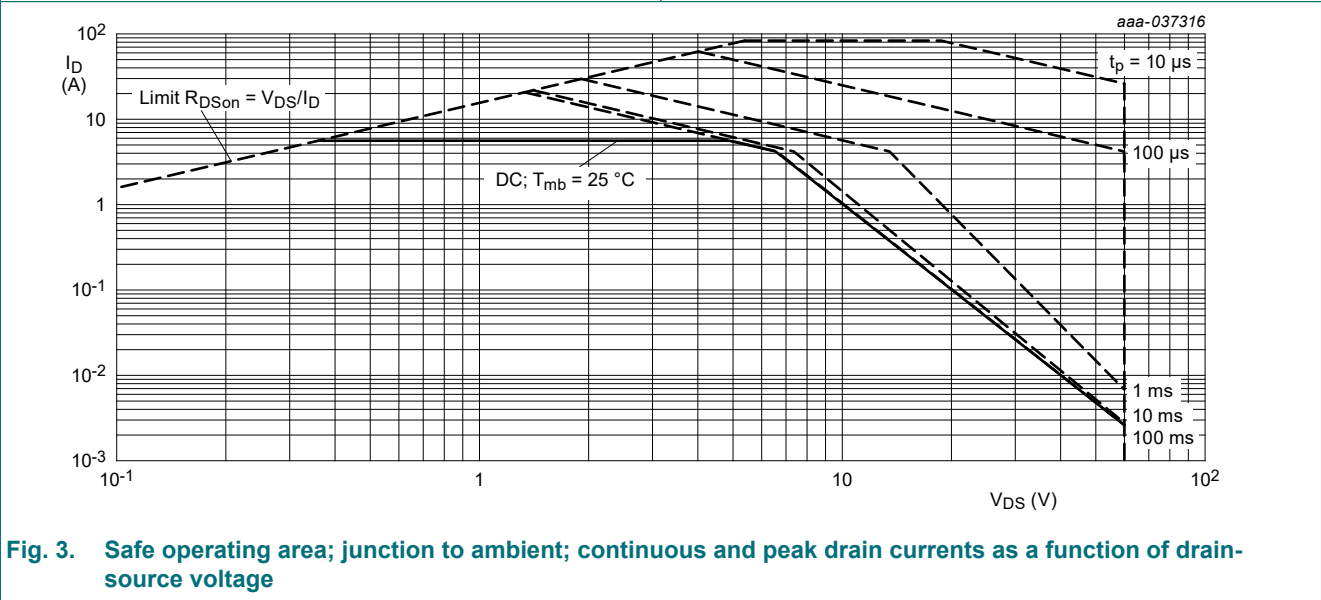
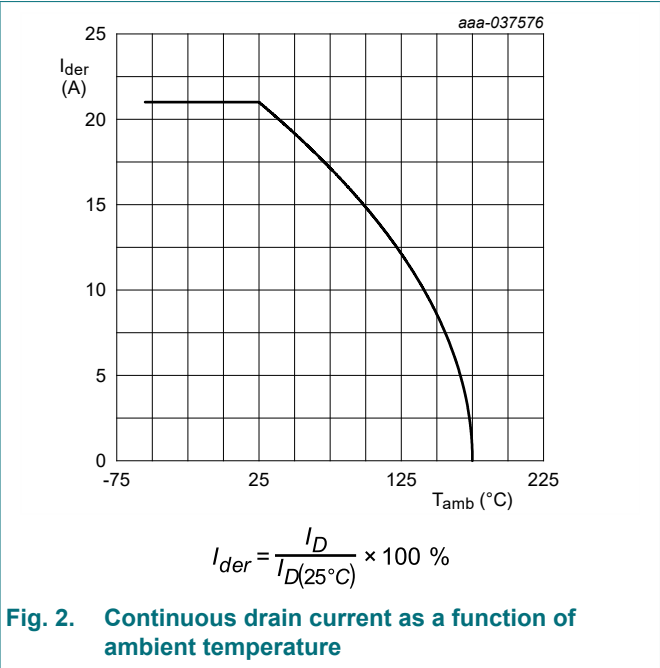
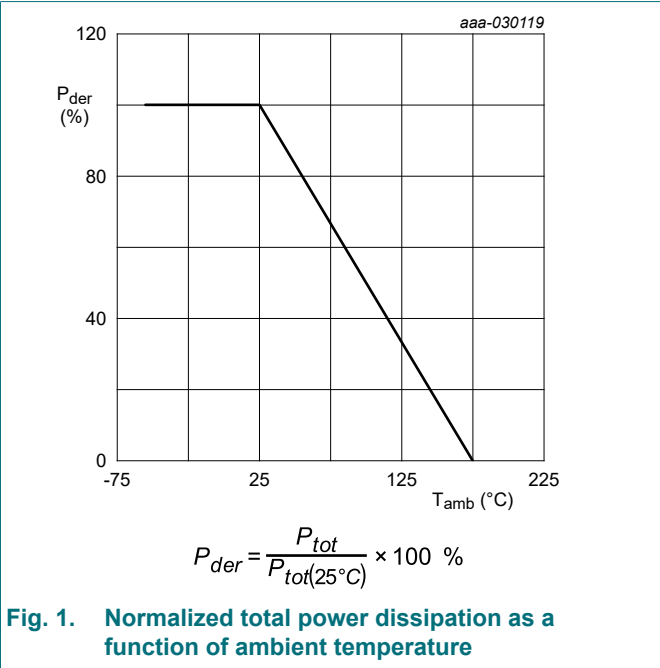
Table 5. Limiting values

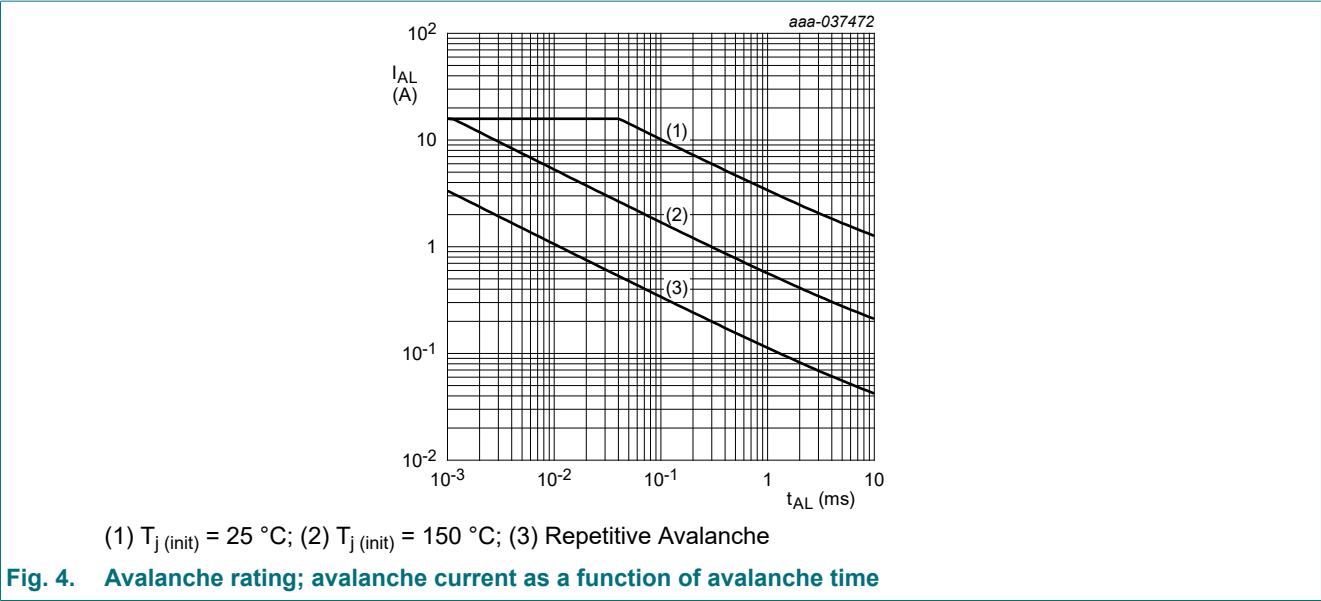
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V _{DS}	drain-source voltage	25 °C ≤ T _j ≤ 175 °C		-	60	V
V _{GS}	gate-source voltage	DC; T _j ≤ 175 °C		-20	20	V
I _D	drain current	V _{GS} = 10 V; T _{mb} = 25 °C	[1]	-	21	A
		V _{GS} = 10 V; T _{mb} = 100 °C		-	14.5	A
I _{DM}	peak drain current	single pulse; t _p ≤ 10 μs; T _{mb} = 25 °C		-	84	A
P _{tot}	total power dissipation	T _{mb} = 25 °C		-	27	W
T _j	junction temperature			-55	175	°C
T _{stg}	storage temperature			-55	175	°C
Source-drain diode						
I _S	source current	T _{mb} = 25 °C	[1]	-	21	A
I _{SM}	peak source current	single pulse; t _p ≤ 10 μs; T _{mb} = 25 °C	[1]	-	84	A

Symbol	Parameter	Conditions		Min	Max	Unit
Avalanche ruggedness						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V _{sup} < 60 V; V _{GS} = 10 V; T _{j(init)} = 25 °C; R _{GS} = 50 Ω; I _D = 15.8 A; unclamped	[2] [3]	-	25	mJ

- [1] 21 A continuous current has been successfully demonstrated during application tests. Practically the current will be limited by PCB, thermal design and operating temperature.
- [2] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.
- [3] Refer to application note AN10273 for further information.

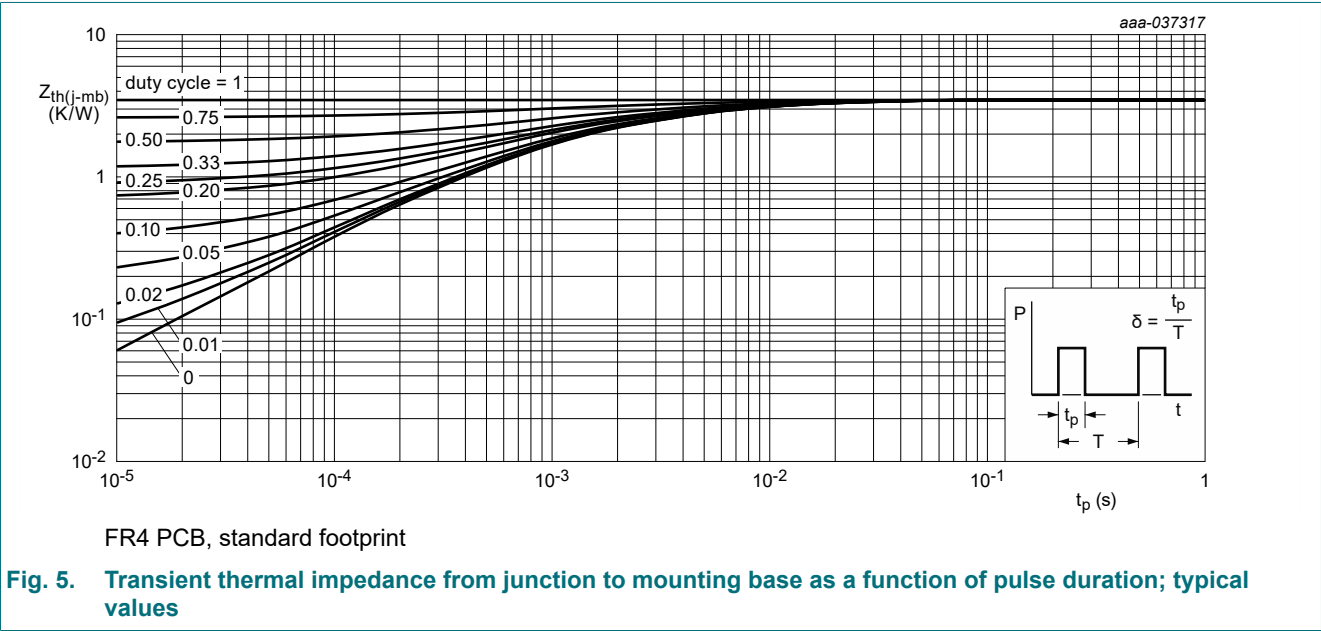




9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base		-	3.5	5.5	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 = 250 μA; V _{GS} = 0 V; T _j = 25 °C		60	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; T _j = 25 °C		1.3	1.7	2.1	V
I _{DSS}	drain leakage current	V _{DS} = 60 V; V _{GS} = 0 V; T _j = 25 °C		-	-	1	μA
		V _{DS} = 60 V; V _{GS} = 0 V; T _j = 125 °C		-	-	20	μA
		V _{DS} = 60 V; V _{GS} = 0 V; T _j = 175 °C		-	-	400	μA
I _{GSS}	gate leakage current	V _{GS} = 20 V; V _{DS} = 0 V; T _j = 25 °C		-	-	0.1	μA
		V _{GS} = -20 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-0.1	μA
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 5.6 A; T _j = 25 °C		-	23.7	29	mΩ
		V _{GS} = 10 V; I _D = 5.6 A; T _j = 105 °C		-	39	51.4	mΩ
		V _{GS} = 10 V; I _D = 5.6 A; T _j = 125 °C		-	42.4	55.9	mΩ
		V _{GS} = 10 V; I _D = 5.6 A; T _j = 175 °C		-	52	64	mΩ
		V _{GS} = 4.5 V; I _D = 4.9 A; T _j = 25 °C		-	28	38	mΩ
		V _{GS} = 4.5 V; I _D = 4.9 A; T _j = 105 °C		-	45.3	63.9	mΩ
		V _{GS} = 4.5 V; I _D = 4.9 A; T _j = 125 °C		-	49.2	69.5	mΩ
		V _{GS} = 4.5 V; I _D = 4.9 A; T _j = 175 °C		-	60.9	83.6	mΩ
g _{fs}	forward transconductance	V _{DS} = 5 V; I _D = 5.6 A		-	18.6	-	S
R _G	gate resistance	f = 1 MHz		-	2	-	Ω
Dynamic characteristics							
Q _{G(tot)}	total gate charge	V _{DS} = 30 V; I _D = 5.6 A; V _{GS} = 10 V; T _j = 25 °C		-	12	18	nC
Q _{GS}	gate-source charge			-	1.6	-	nC
Q _{GD}	gate-drain charge			-	2.4	-	nC
C _{iss}	input capacitance	V _{DS} = 30 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C		-	660	-	pF
C _{oss}	output capacitance			-	67	-	pF
C _{rss}	reverse transfer capacitance			-	40	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; I _D = 5.6 A; V _{GS} = 10 V; R _{G(ext)} = 5 Ω; T _j = 25 °C		-	3	-	ns
t _r	rise time			-	4	-	ns
t _{d(off)}	turn-off delay time			-	13	-	ns
t _f	fall time			-	5	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 2.5 A; V _{GS} = 0 V; T _j = 25 °C		-	0.8	1	V
t _{rr}	reverse recovery time	I _S = 2.5 A; dI _S /dt = -100 A/μs; V _{GS} = 10 V; V _{DS} = 30 V; T _j = 25 °C		-	13	-	ns
Q _r	recovered charge			-	7	-	nC

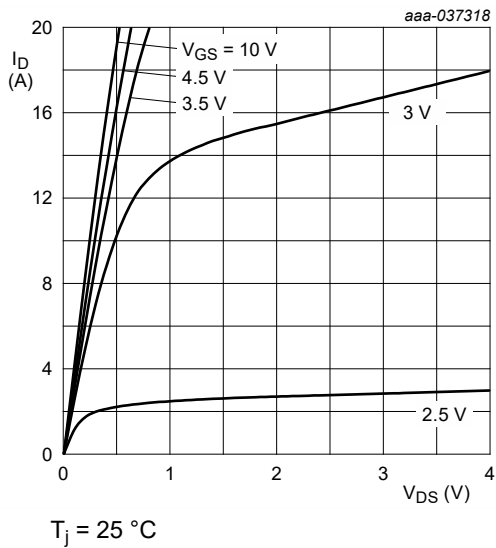


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

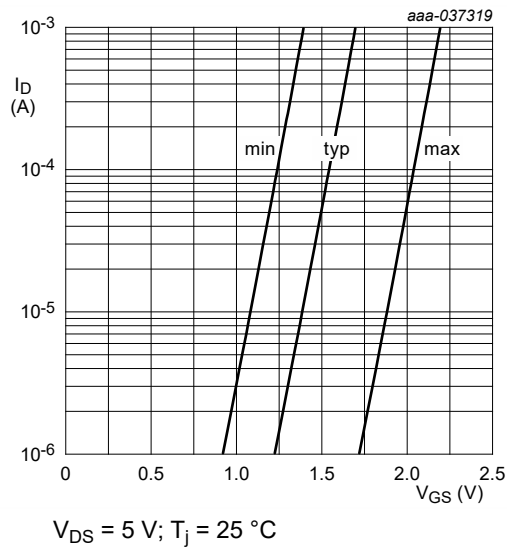


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

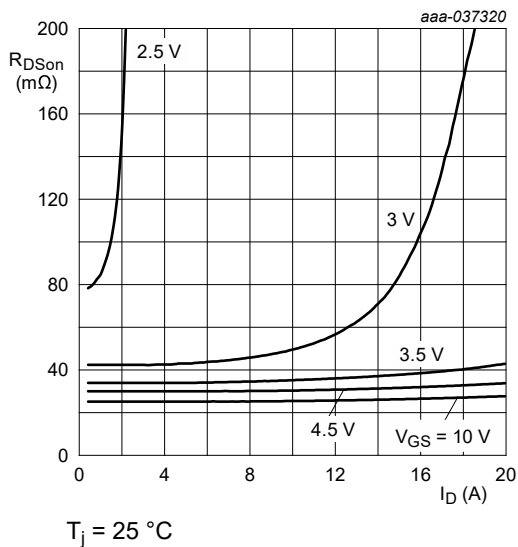


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

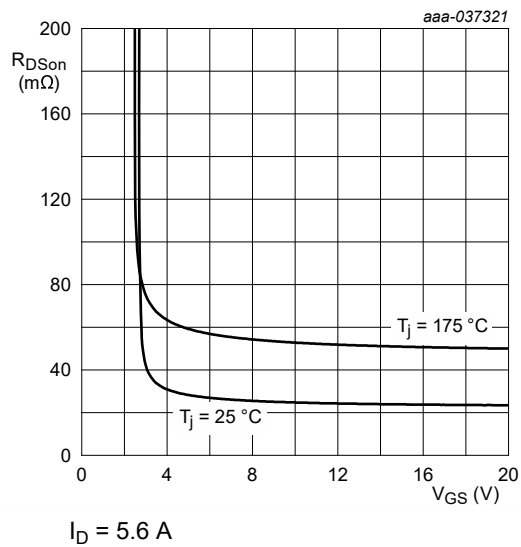


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

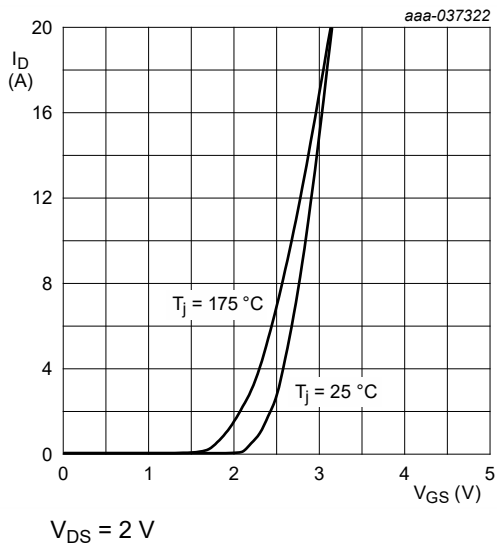


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

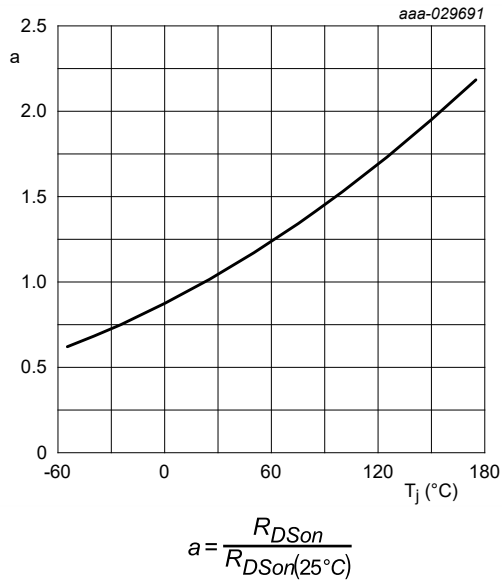


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

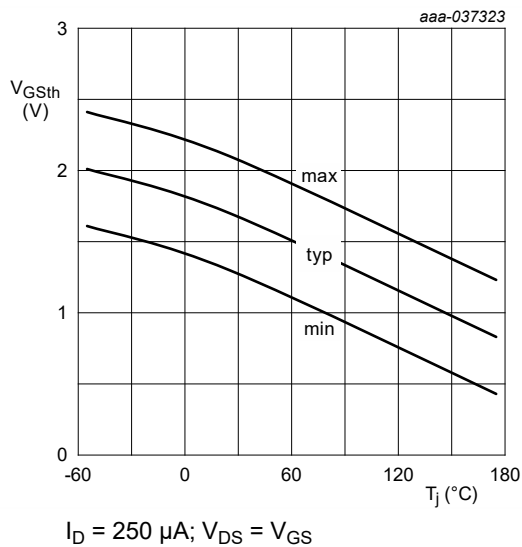


Fig. 12. Gate-source threshold voltage as a function of junction temperature

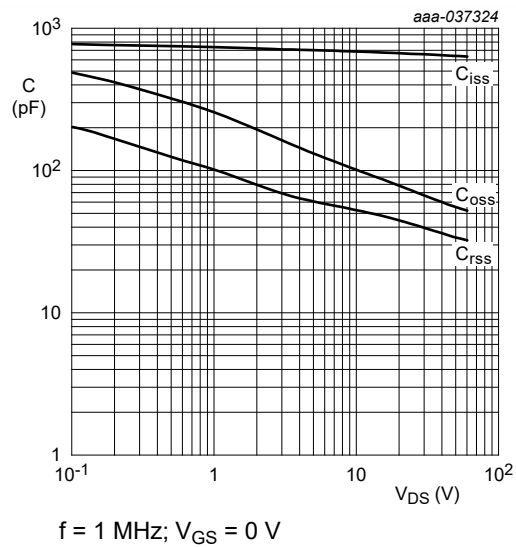


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

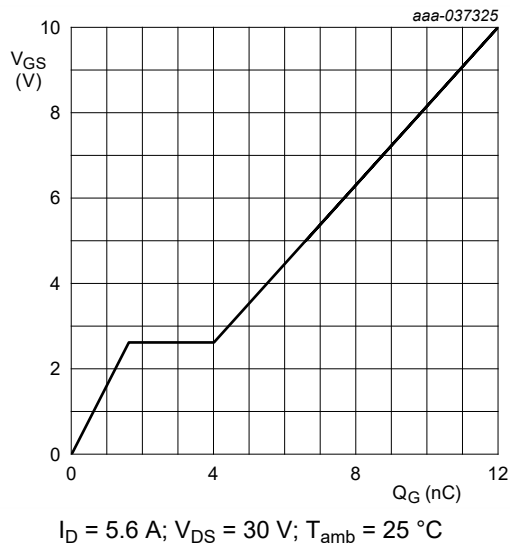


Fig. 14. Gate-source voltage as a function of gate charge; typical values

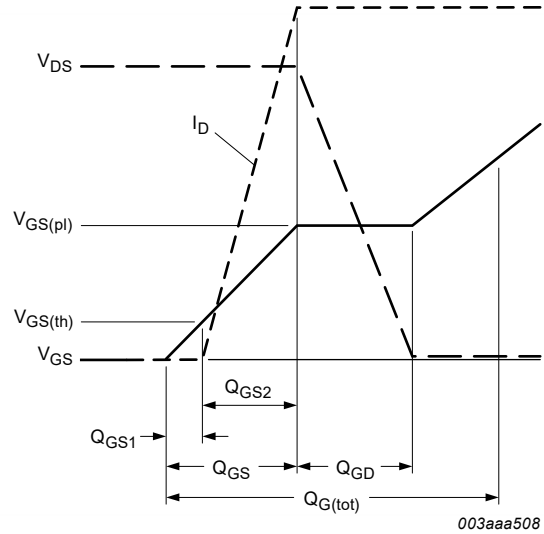


Fig. 15. Gate charge waveform definitions

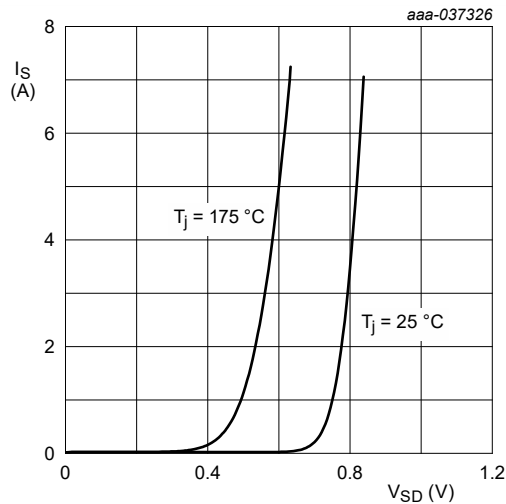


Fig. 16. Source current as a function of source-drain voltage; typical values

11. Package outline

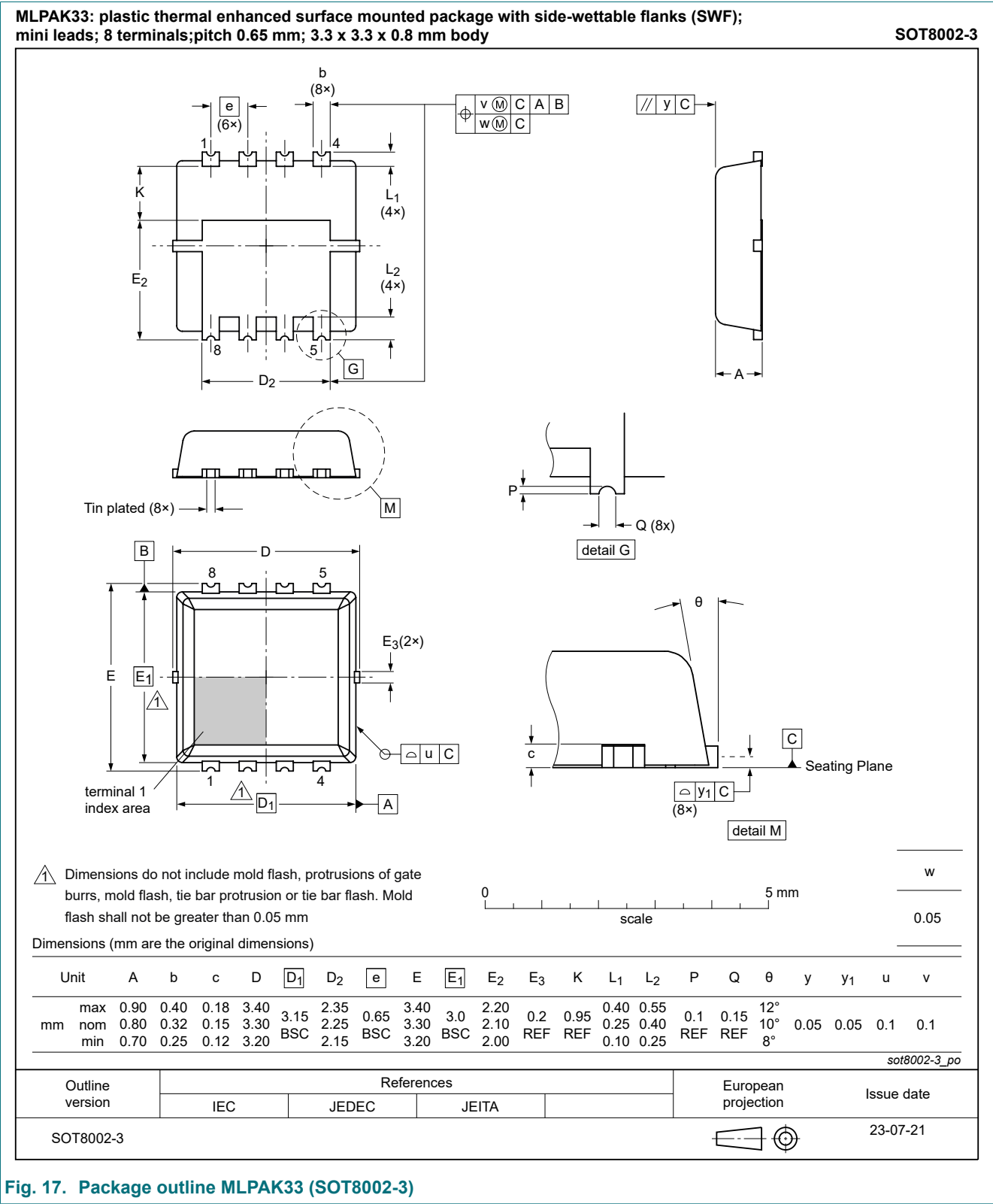


Fig. 17. Package outline MLPAK33 (SOT8002-3)

12. Soldering

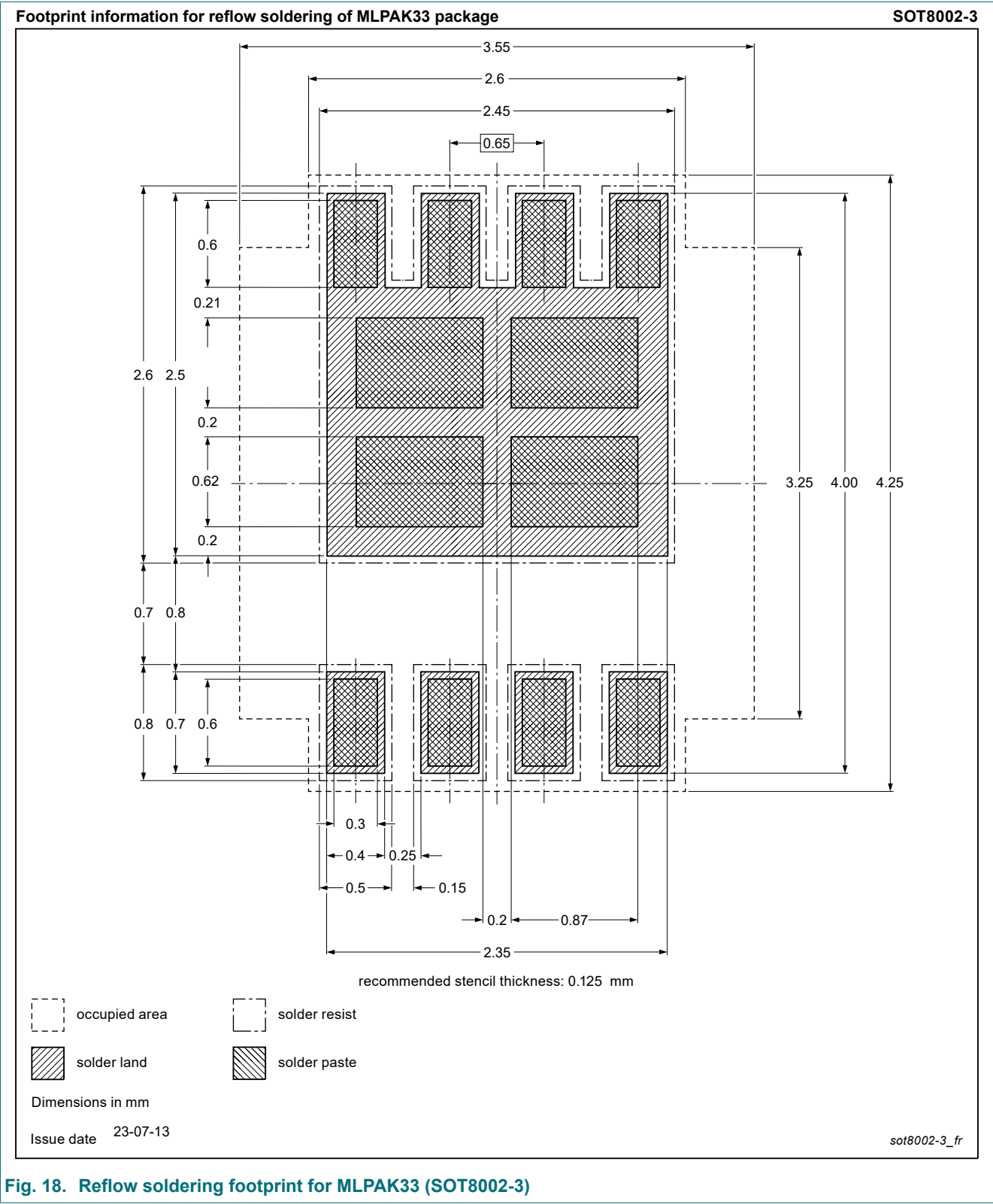


Fig. 18. Reflow soldering footprint for MLPAK33 (SOT8002-3)

13. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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..... 2

9. Thermal characteristics..... 4

10. Characteristics..... 5

11. Package outline..... 9

12. Soldering..... 10

13. Legal information.....11

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Date of release: 18 April 2025