



BUK6Q8R2-30P

30 V, P-channel Trench MOSFET

2 June 2025

Product data sheet

1. General description

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

2. Features and benefits

- Logic-level compatible
- Trench MOSFET technology
- Side-wettable flanks for optical solder inspection
- Thermally efficient package in a small form factor (3.3 mm x 3.3 mm footprint)
- AEC-Q101 qualified

3. Applications

- Reverse polarity protection
- High-speed line driver
- High-side load switch
- Relay driver

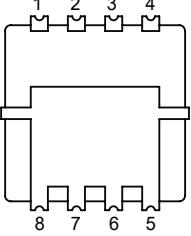
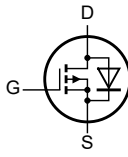
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$	-	-	-30	V
V_{GS}	gate-source voltage	$T_j = 25\text{ °C}$	-20	-	20	V
I_D	drain current	$V_{GS} = -10\text{ V}; T_{mb} = 25\text{ °C}$	-	-	-82	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$	-	-	94	W
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = -10\text{ V}; I_D = -12\text{ A}; T_j = 25\text{ °C}$	-	6.5	8.2	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p>MLPAK33 (SOT8002-3)</p>	 <p>017aaa094</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
BUK6Q8R2-30P	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
BUK6Q8R2-30P	NXB

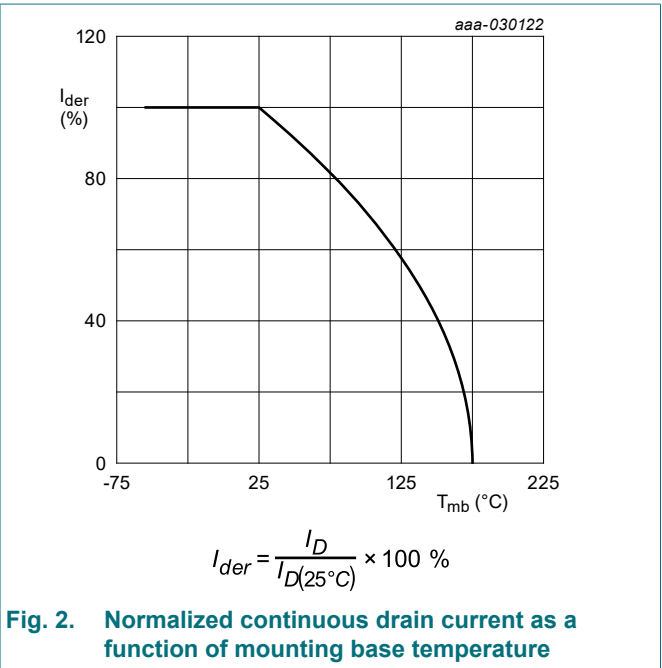
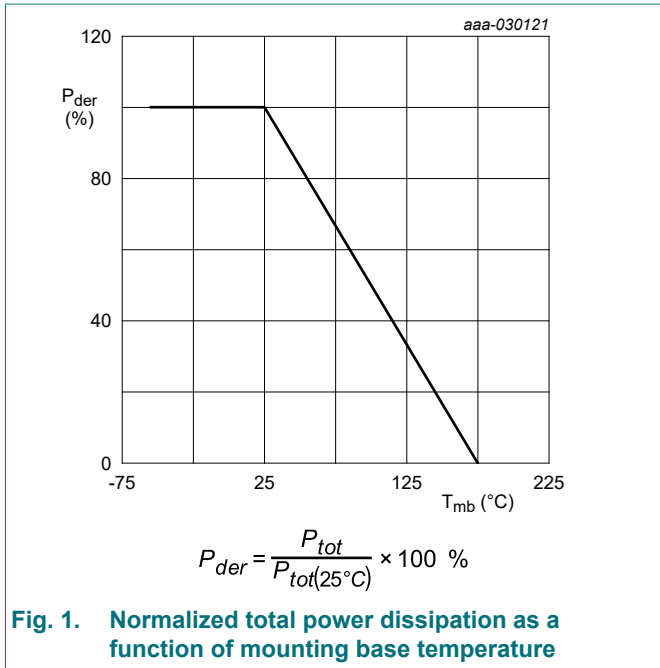
8. Limiting values

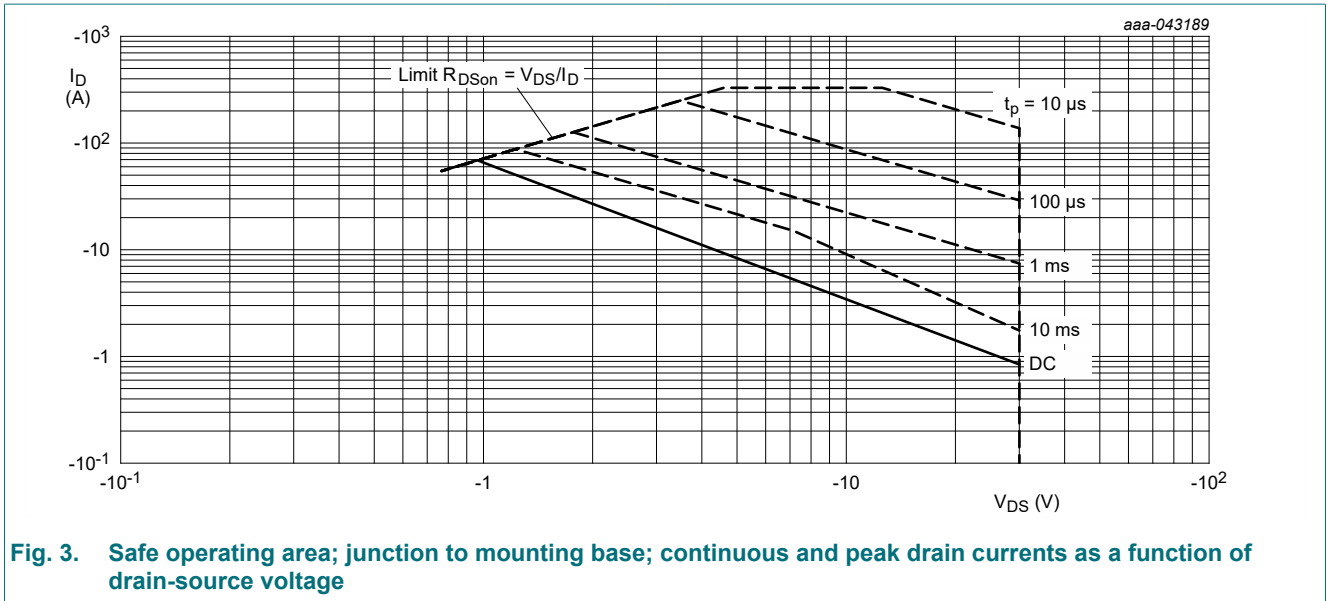
Table 5. Limiting values

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	-	-30	V
V _{GS}	gate-source voltage	T _j = 25 °C	-20	20	V
I _D	drain current	V _{GS} = -10 V; T _{mb} = 25 °C	-	-82	A
		V _{GS} = -10 V; T _{mb} = 100 °C	-	-58	A
I _{DM}	peak drain current	single pulse; t _p ≤ 10 μs; T _{mb} = 25 °C	-	-328	A
P _{tot}	total power dissipation	T _{mb} = 25 °C	-	94	W
T _j	junction temperature		-55	175	°C
T _{amb}	ambient temperature		-55	175	°C
T _{stg}	storage temperature		-65	175	°C
Source-drain diode					
I _S	source current	T _{mb} = 25 °C	-	-82	A
I _{SM}	peak source current	single pulse; t _p ≤ 10 μs; T _{mb} = 25 °C	-	-328	A
Avalanche ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V _{sup} ≤ -30 V; V _{GS} = -10 V; T _{j(init)} = 25 °C; R _{GS} = 50 Ω; I _D = -44.5 A; unclamped	[1] [2]	-	162 mJ
I _{AS}	non-repetitive avalanche current	T _{j(init)} = 25 °C	[3]	-	-44.5 A

- [1] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.
- [2] Refer to application note AN10273 for further information.
- [3] Protected by 100% test.





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]	-	60	80	K/W
$R_{th(j-mb)}$	thermal resistance from junction to mounting base			-	1	1.6	K/W

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

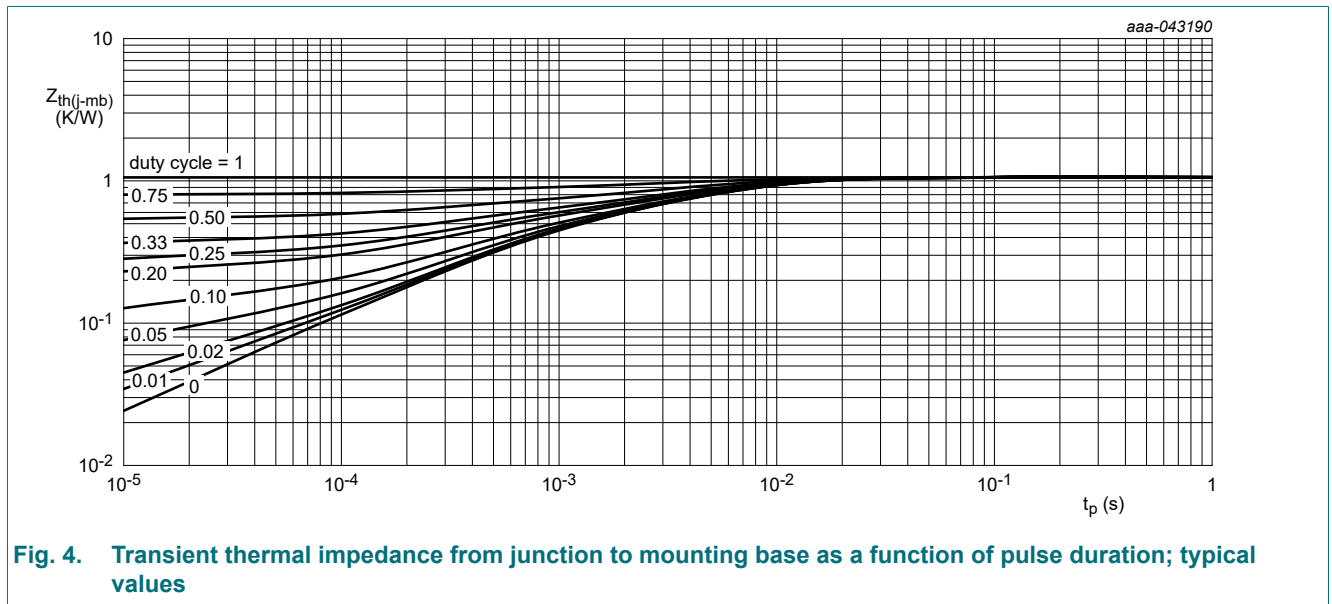


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration; typical values

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	$I_D = -1 \text{ mA}$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ\text{C}$	-1.4	-2	-2.7	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	$V_{GS} = -10 \text{ V}$; $I_D = -12 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	6.5	8.2	m Ω
		$V_{GS} = -10 \text{ V}$; $I_D = -12 \text{ A}$; $T_j = 175 \text{ }^\circ\text{C}$	-	11	14	m Ω
		$V_{GS} = -4.5 \text{ V}$; $I_D = -8 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	12.9	18	m Ω
g_{fs}	forward transconductance	$V_{DS} = -10 \text{ V}$; $I_D = -30 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	80	-	S
R_G	gate resistance	$f = 1 \text{ MHz}$	-	6	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -15 \text{ V}$; $I_D = -12 \text{ A}$; $V_{GS} = -10 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	73	110	nC
Q_{GS}	gate-source charge		-	13	-	nC
Q_{GD}	gate-drain charge		-	17	-	nC
C_{iss}	input capacitance	$V_{DS} = -15 \text{ V}$; $f = 1 \text{ MHz}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	3800	-	pF
C_{oss}	output capacitance		-	440	-	pF
C_{rss}	reverse transfer capacitance		-	400	-	pF
$t_{d(on)}$	turn-on delay time		$V_{DS} = -15 \text{ V}$; $I_D = -12 \text{ A}$; $V_{GS} = -10 \text{ V}$; $R_{G(ext)} = 5 \text{ } \Omega$; $T_j = 25 \text{ }^\circ\text{C}$	-	6	-
t_r	rise time	-		18	-	ns
$t_{d(off)}$	turn-off delay time	-		91	-	ns
t_f	fall time	-		43	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = -1.9 \text{ A}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-0.7	-1.2	V
t_{rr}	reverse recovery time	$I_S = -1.9 \text{ A}$; $dI_S/dt = 100 \text{ A}/\mu\text{s}$; $V_{GS} = 0 \text{ V}$; $V_{DS} = -15 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	21	-	ns
Q_r	recovered charge		-	14	-	nC

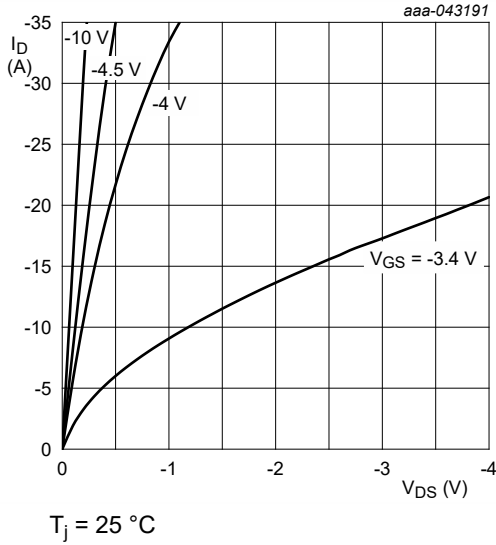


Fig. 5. Output characteristics: drain current as a function of drain-source voltage; typical values

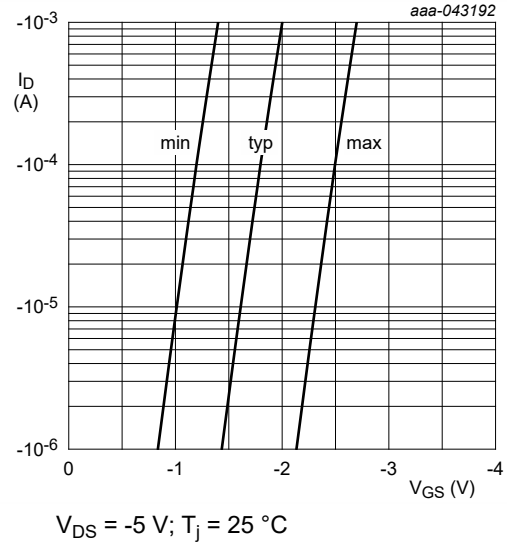


Fig. 6. Sub-threshold drain current as a function of gate-source voltage

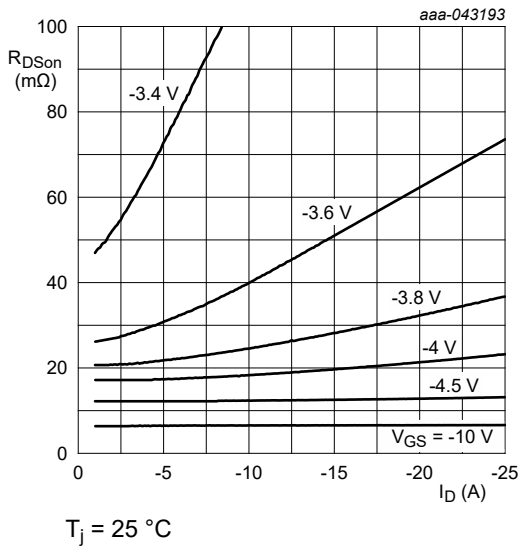


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values

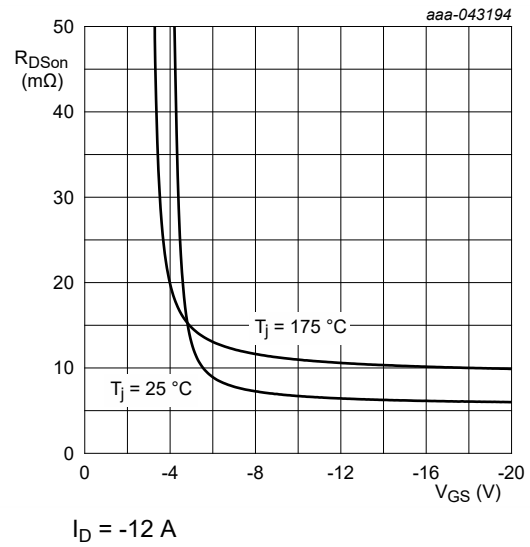


Fig. 8. Drain-source on-state resistance as a function of gate-source voltage; typical values

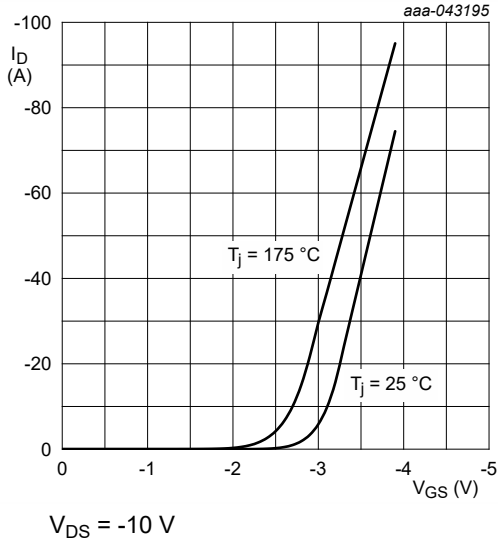


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

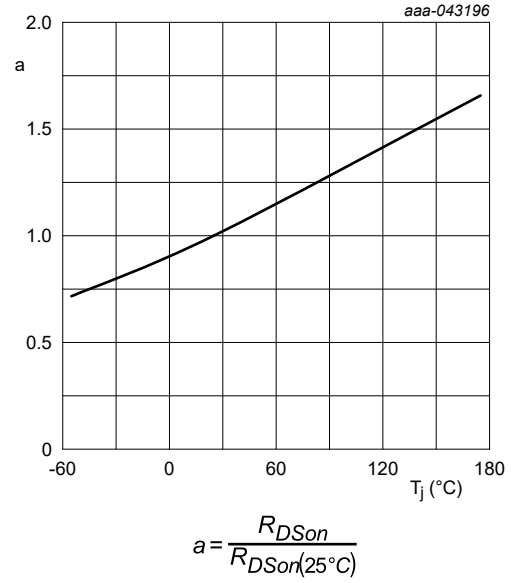


Fig. 10. Normalized drain-source on-state resistance as a function of junction temperature; typical values

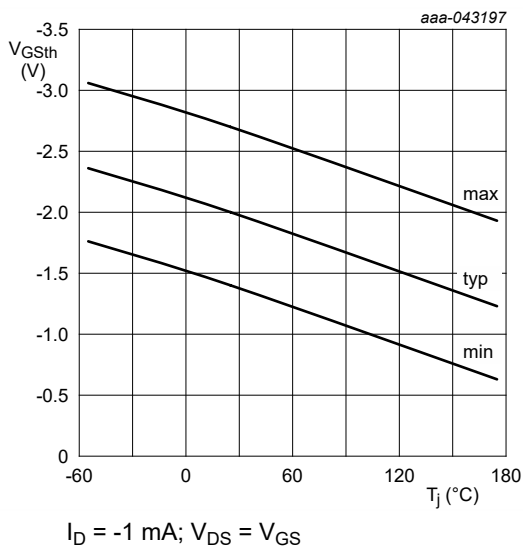


Fig. 11. Gate-source threshold voltage as a function of junction temperature

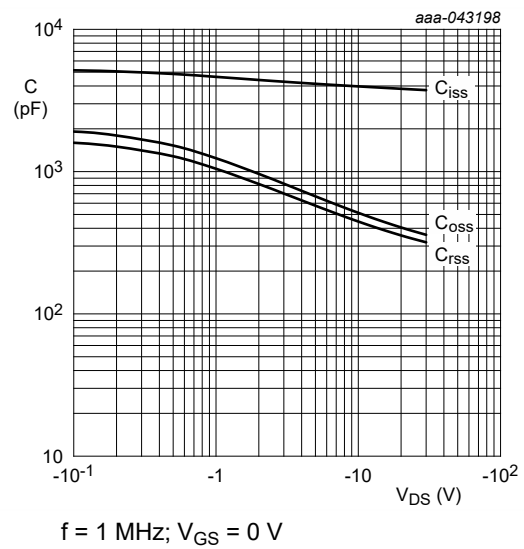
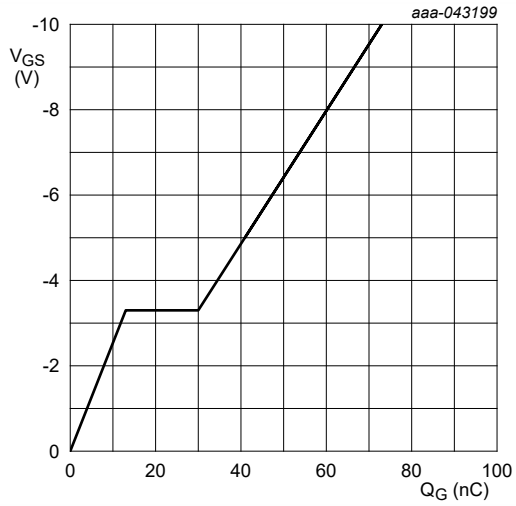


Fig. 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$V_{DS} = -15$ V; $I_D = -12$ A; $T_j = 25$ °C

Fig. 13. Gate-source voltage as a function of gate charge; typical values

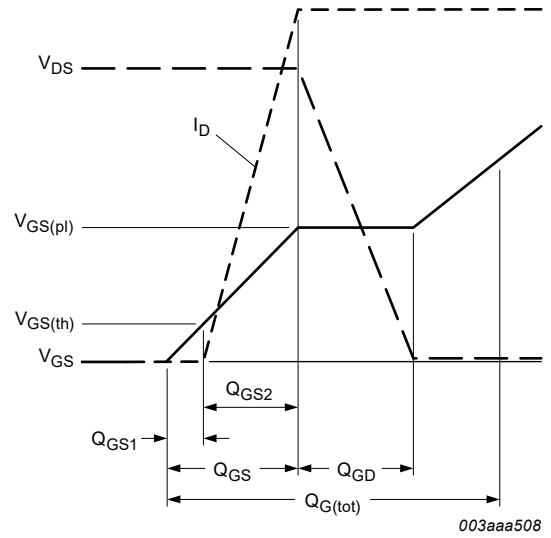
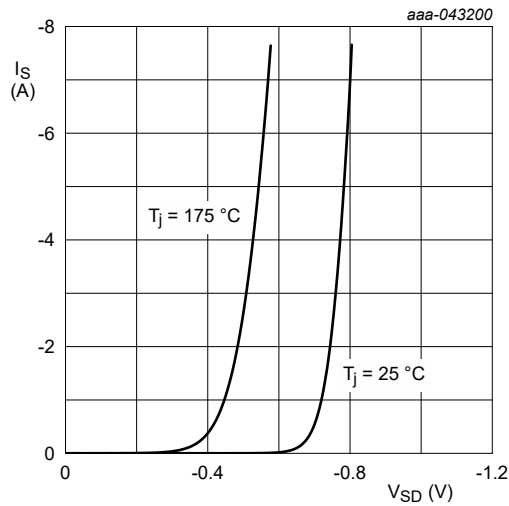


Fig. 14. Gate charge waveform definitions



$V_{GS} = 0$ V

Fig. 15. Source current as a function of source-drain voltage; typical values

11. Test information

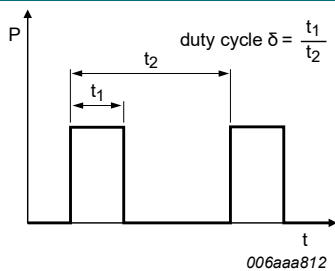


Fig. 16. Duty cycle definition

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

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

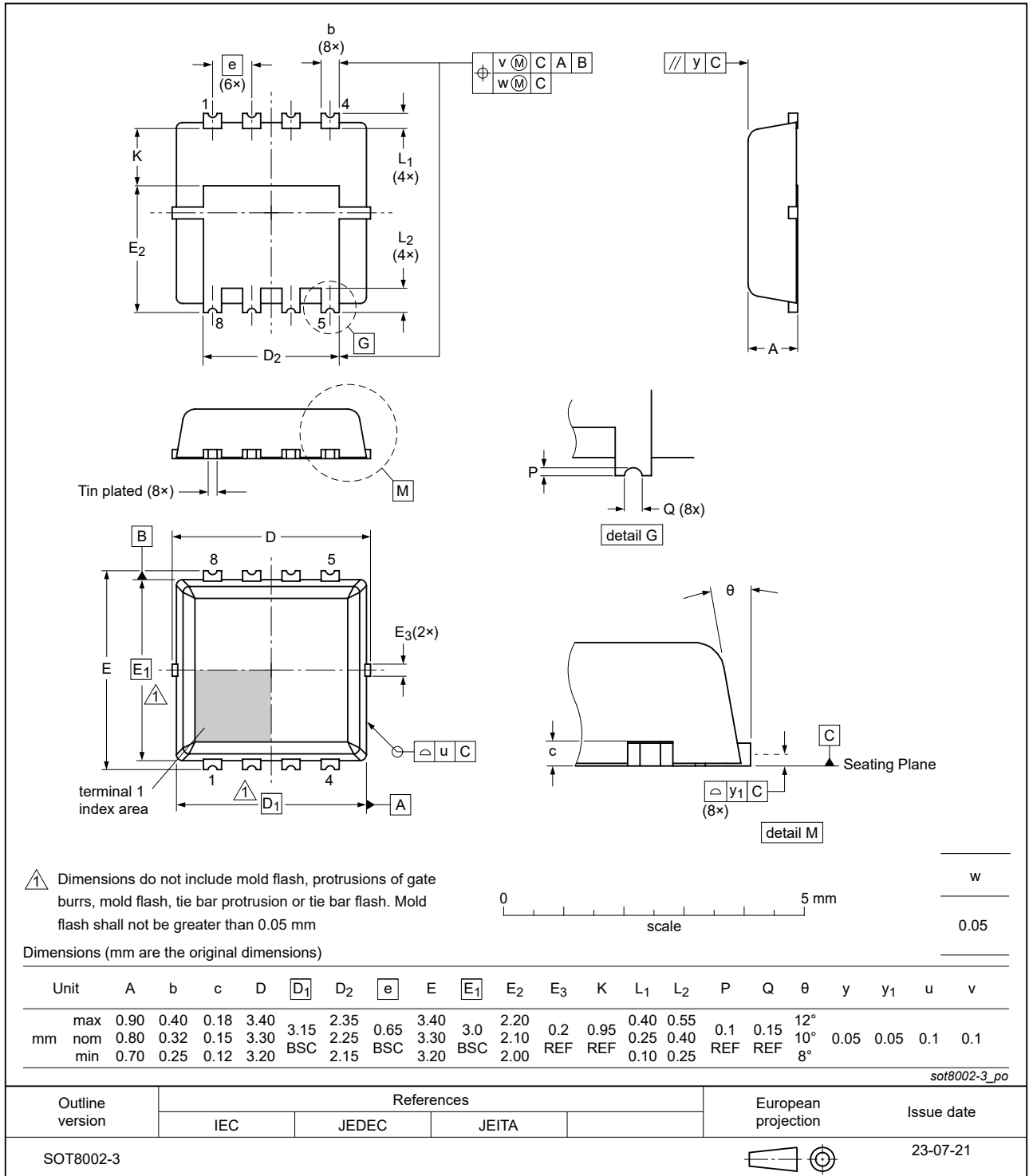


Fig. 17. Package outline MLPAK33 (SOT8002-3)

13. Soldering

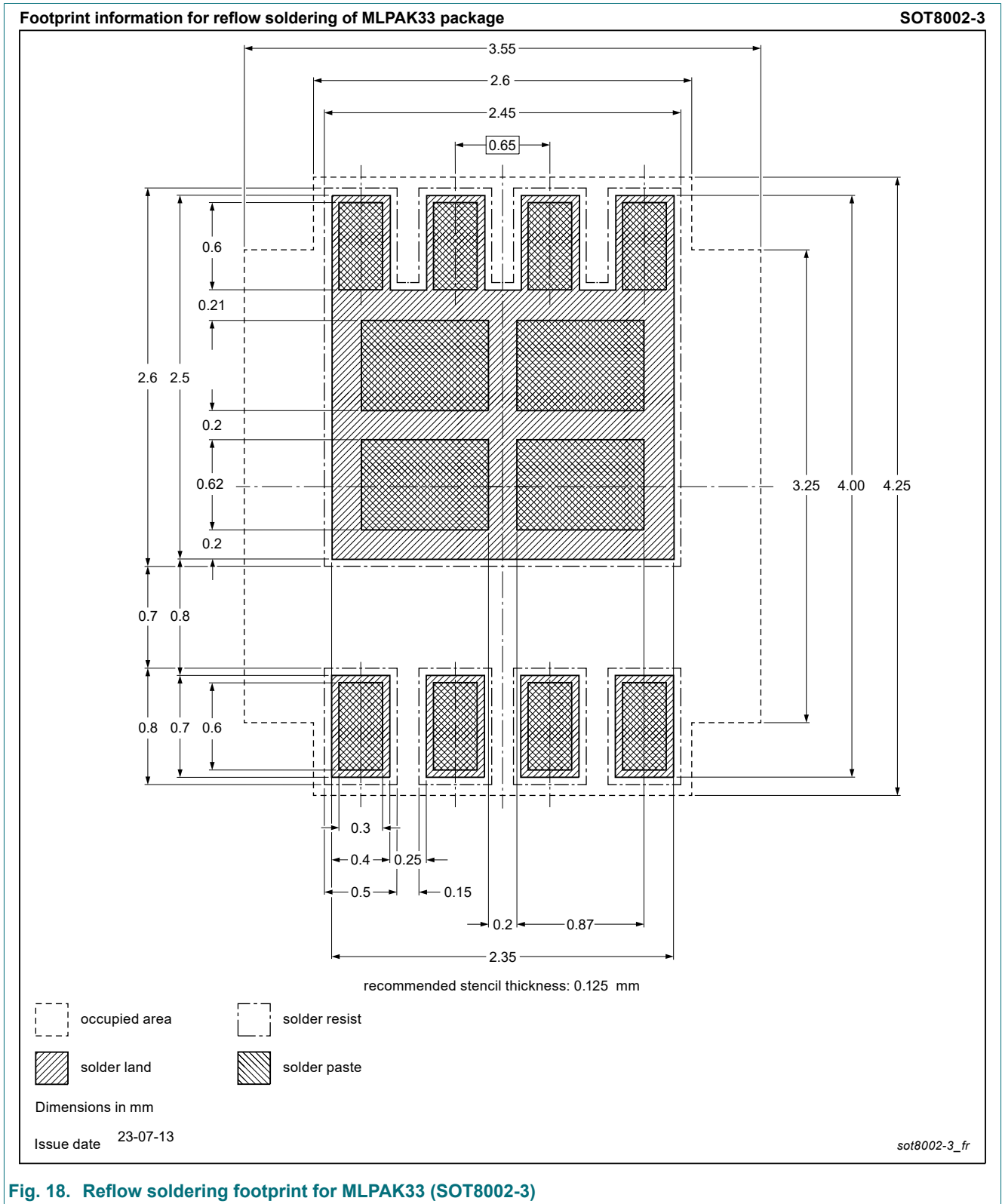


Fig. 18. Reflow soldering footprint for MLPAK33 (SOT8002-3)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BUK6Q8R2-30P v.1	20250602	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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