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BUK9575-55A



N-channel TrenchMOS logic level FET Rev. 2 — 8 February 2011

Product data sheet

Product profile 1.

1.1 General description

Logic level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

1.2 Features and benefits

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance
- Suitable for logic level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

1.3 Applications

- 12 V and 24 V loads
- Automotive and general purpose power switching
- Motors, lamps and solenoids

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V_{DS}	drain-source voltage	$T_j \ge 25 ^{\circ}\text{C}; T_j \le 175 ^{\circ}\text{C}$	-	-	55	V
I _D	drain current	V _{GS} = 5 V; T _{mb} = 25 °C; see <u>Figure 1</u> ; see <u>Figure 3</u>	-	-	20	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C; see <u>Figure 2</u>	-	-	62	W



Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static chara	acteristics					
R _{DSon}	drain-source on-state	$V_{GS} = 4.5 \text{ V}; I_D = 10 \text{ A};$ $T_j = 25 \text{ °C}$	-	-	81	mΩ
	resistance	$V_{GS} = 10 \text{ V}; I_D = 10 \text{ A};$ $T_j = 25 \text{ °C}$	-	58	68 75	mΩ
		$V_{GS} = 5 \text{ V}; I_D = 10 \text{ A};$ $T_j = 25 \text{ °C}; \text{ see } \frac{\text{Figure } 12}{\text{see } \frac{\text{Figure } 13}};$	-	64		mΩ
Avalanche	ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	$\begin{split} I_D &= 12 \text{ A; } V_{sup} \leq 55 \text{ V;} \\ R_{GS} &= 50 \Omega; V_{GS} = 5 \text{ V;} \\ T_{j(init)} &= 25 ^{\circ}\text{C; } unclamped \end{split}$	-	-	72	mJ

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	D	drain	mb	D
3	S	source		
mb	D	mounting base; connected to drain		mbb076 S
			SOT78A (TO-220AB)	

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK9575-55A	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78A

4. Limiting values

Table 4. 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; T _j ≤ 175 °C	-	55	V
V _{DGR}	drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	55	V
V _{GS}	gate-source voltage		-10	10	V
I _D	drain current	T_{mb} = 25 °C; V_{GS} = 5 V; see <u>Figure 1</u> ; see <u>Figure 3</u>	-	20	Α
		T_{mb} = 100 °C; V_{GS} = 5 V; see <u>Figure 1</u>	-	14	Α
I _{DM}	peak drain current	T_{mb} = 25 °C; pulsed; $t_p \le 10 \mu s$; see Figure 3	-	81	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C; see <u>Figure 2</u>	-	62	W
T _{stg}	storage temperature		-55	175	°C
T _j	junction temperature		-55	175	°C
V_{GSM}	peak gate-source voltage	pulsed; t _p ≤ 50 μs	-15	15	V
Source-drain	diode				
Is	source current	T _{mb} = 25 °C	-	20	Α
I _{SM}	peak source current	pulsed; $t_p \le 10 \ \mu s$; $T_{mb} = 25 \ ^{\circ}C$	-	81	Α
Avalanche rug	gedness				
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I_D = 12 A; V_{sup} ≤ 55 V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 °C; unclamped	-	72	mJ

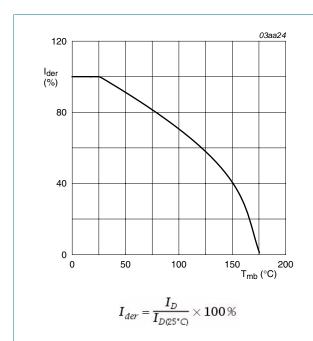
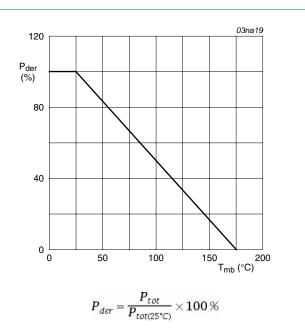
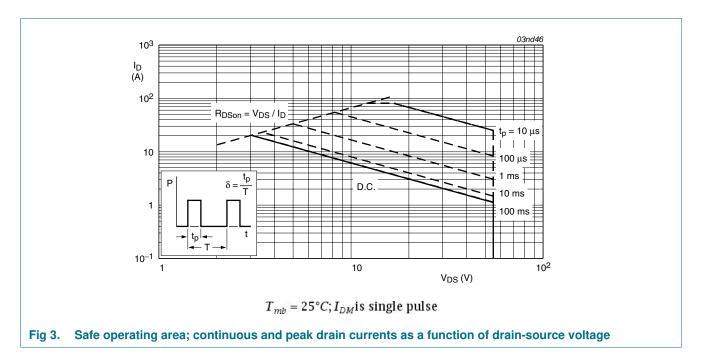


Fig 1. Normalized continuous drain current as a function of mounting base temperature



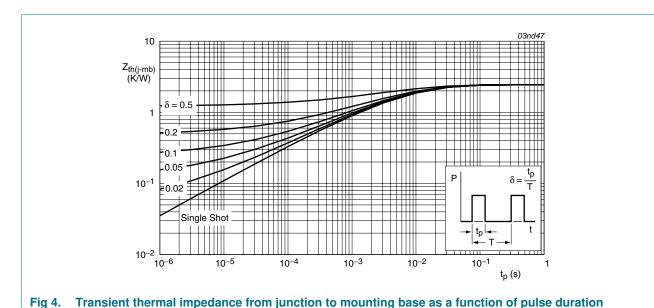
ig 2. Normalized total power dissipation as a function of mounting base temperature



5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R _{th(j-mb)}	thermal resistance from junction to mounting base	see Figure 4	-	-	2.4	K/W
R _{th(j-a)}	thermal resistance from junction to ambient	vertical in still air	-	60	-	K/W



BUK9575-55A

6. Characteristics

Table 6. Characteristics

Table 6.	Characteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	aracteristics					
V _{(BR)DSS}	drain-source	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ °C}$	50	-	-	V
	breakdown voltage	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	55	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = 175$ °C; see Figure 11	0.5	-	-	V
		$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = 25$ °C; see Figure 11	1	1.5	2	V
		$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = -55$ °C; see Figure 11	-	-	2.3	V
I _{DSS}	drain leakage current	$V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.05	10	μΑ
		$V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 175 \text{ °C}$	-	-	500	V V V V V V V V V V V V PA O nA O nA O mΩ mΩ mΩ mΩ mΩ mΩ mΩ mΩ mn ns ns ns ns ns ns ns ns ns ns ns ns ns
I _{GSS}	gate leakage current	$V_{GS} = 10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	2	100	$\begin{array}{c} V \\ V \\ V \\ V \\ \end{array}$
		$V_{GS} = -10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	$\frac{1}{2}$ - $\frac{1}{2}$ 100 nA $\frac{1}{2}$ $\frac{1}$			
R_{DSon}	drain-source on-state resistance	$V_{GS} = 5 \text{ V}$; $I_D = 10 \text{ A}$; $T_j = 175 \text{ °C}$; see Figure 12; see Figure 13	-	-	150	mΩ
		$V_{GS} = 4.5 \text{ V}; I_D = 10 \text{ A}; T_j = 25 ^{\circ}\text{C}$	-	-	81	mΩ
		$V_{GS} = 10 \text{ V}; I_D = 10 \text{ A}; T_j = 25 \text{ °C}$	-	58	68	mΩ
		$V_{GS} = 5 \text{ V}; I_D = 10 \text{ A}; T_j = 25 ^{\circ}\text{C};$ see Figure 12; see Figure 13	-	64	75	mΩ
Dynamic	characteristics					
C _{iss}	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz};$	-	440	643	pF
C _{oss}	output capacitance	$T_j = 25 ^{\circ}\text{C}$; see Figure 14	-	90	111	pF
C_{rss}	reverse transfer capacitance		-	60	93	pF
t _{d(on)}	turn-on delay time	$V_{DS} = 30 \text{ V}; R_L = 1.2 \Omega; V_{GS} = 5 \text{ V};$	-	10	-	ns
t _r	rise time	$R_{G(ext)} = 10 \Omega; T_j = 25 °C$	-	47	-	ns
t _{d(off)}	turn-off delay time		-	28	-	ns
t _f	fall time		-	33	-	ns
L _D	internal drain inductance	from contact screw on mounting base to centre of die; $T_j = 25$ °C	-	3.5	-	nΗ
		from drain lead 6 mm from package to centre of die; $T_j = 25$ °C	-	4.5	-	nΗ
L _S	internal source inductance	from source lead to source bond pad; $T_j = 25 ^{\circ}\text{C}$	-	7.5	-	nΗ
Source-d	rain diode					
V_{SD}	source-drain voltage	$I_S = 15 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 ^{\circ}\text{C};$ see Figure 15	-	0.85	1.2	V
t _{rr}	reverse recovery time	$I_S = 20 \text{ A}; dI_S/dt = -100 \text{ A/}\mu\text{s};$	-	33	-	ns
Q _r	recovered charge	$V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_j = 25 \text{ °C}$	-	60	-	nC

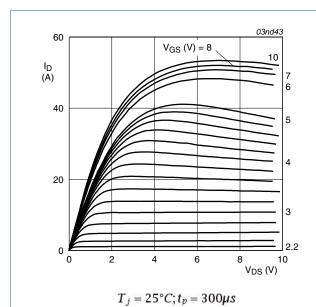


Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values

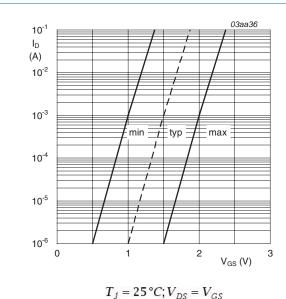
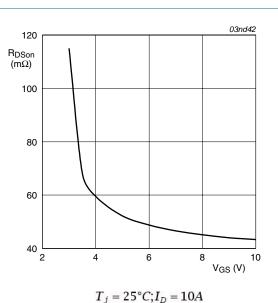


Fig 7. Sub-threshold drain current as a function of gate-source voltage



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

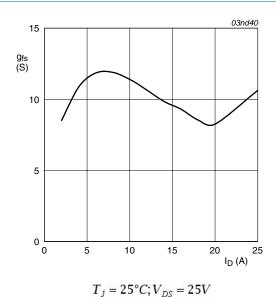
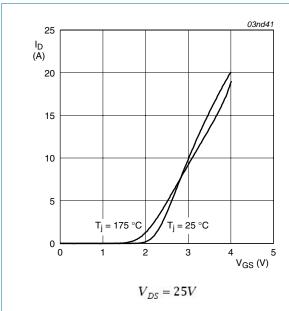
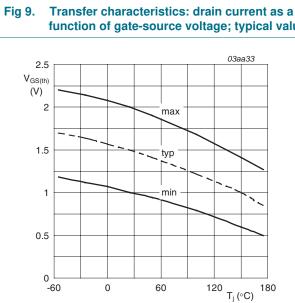


Fig 8. Forward transconductance as a function of drain current; typical values

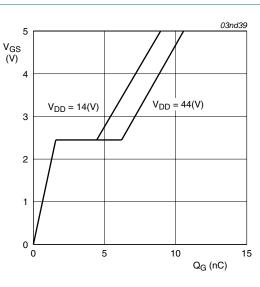


function of gate-source voltage; typical values



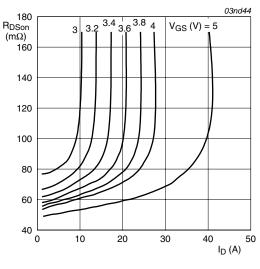
 $I_D = 1mA; V_{DS} = V_{GS}$ Fig 11. Gate-source threshold voltage as a function of

junction temperature



 $T_j = 25^{\circ}C; I_D = 10A$

Fig 10. Gate-source voltage as a function of turn-on gate charge; typical values



 $T_j = 25^{\circ}C$

Fig 12. Drain-source on-state resistance as a function of drain current; typical values

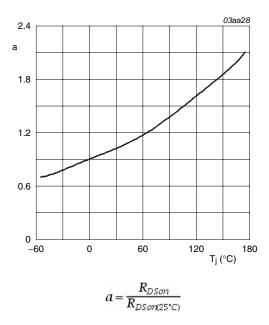


Fig 13. Normalized drain-source on-state resistance factor as a function of junction temperature

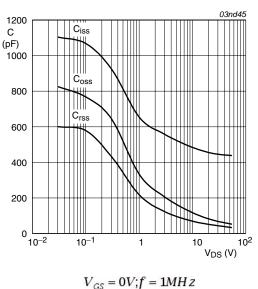


Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

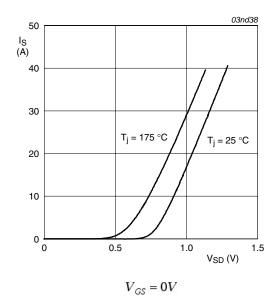


Fig 15. Reverse diode current as a function of reverse diode voltage; typical values

Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78A

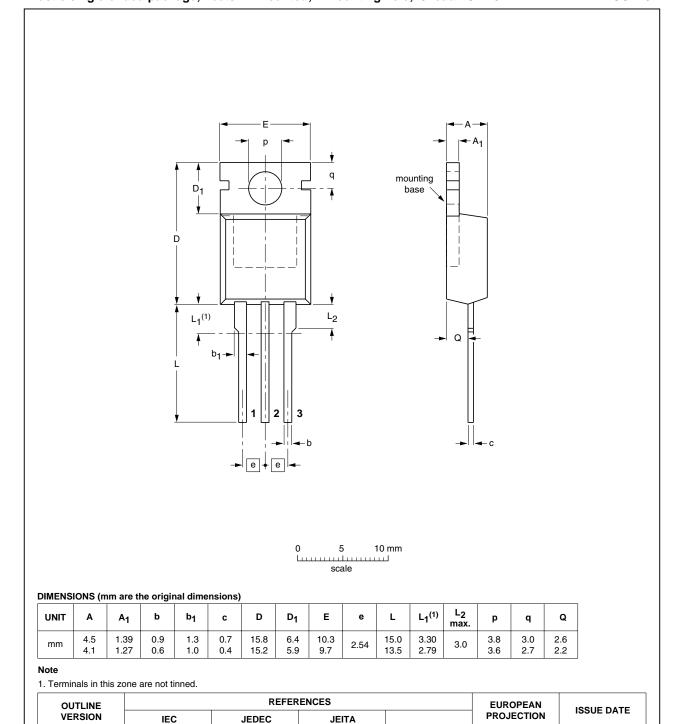


Fig 16. Package outline SOT78A (TO-220AB)

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3-lead TO-220AB

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03-01-22

05-03-14

SOT78A



8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9575-55A v.2	20110208	Product data sheet	-	BUK9575_9675_55A v.1
Modifications:		t of this data sheet has be of NXP Semiconductors	•	comply with the new identity
	 Legal text 	s have been adapted to	the new company i	name where appropriate.
	 Type num 	ber BUK9675-55A sepai	ated from data she	eet BUK9575_9675_55A v.1.
BUK9575_9675_55A v.1	20010209	Product specification	-	-

9. Legal information

9.1 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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions"
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BUK9575-55A

N-channel TrenchMOS logic level FET

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