



BUK7880-55A

N-channel TrenchMOS standard level FET

Rev. 01 — 1 November 2007

Product data sheet

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1. Product profile

1.1 General description

N-channel enhancement mode power Field-Effect Transistor (FET) in a plastic package using NXP General Purpose Automotive (GPA) TrenchMOS technology.

1.2 Features

- Very low on-state resistance
- 150 °C rated
- Q101 compliant
- Standard level compatible

1.3 Applications

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

1.4 Quick reference data

- $E_{DS(AL)S} \leq 53$ mJ
- $I_D \leq 7$ A
- $R_{DSon} = 68$ m Ω (typ)
- $P_{tot} \leq 8$ W

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	gate (G)	<p style="text-align: center;"><i>sot223_so</i></p> <p style="text-align: center;">SOT223 (SC-73)</p>	<p style="text-align: center;"><i>mbb076</i></p>
2	drain (D)		
3	source (S)		
4	solder point; connected to drain (D)		

3. Ordering information

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Table 2. Ordering information

Type number	Package		Version
	Name	Description	
BUK7880-55A	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

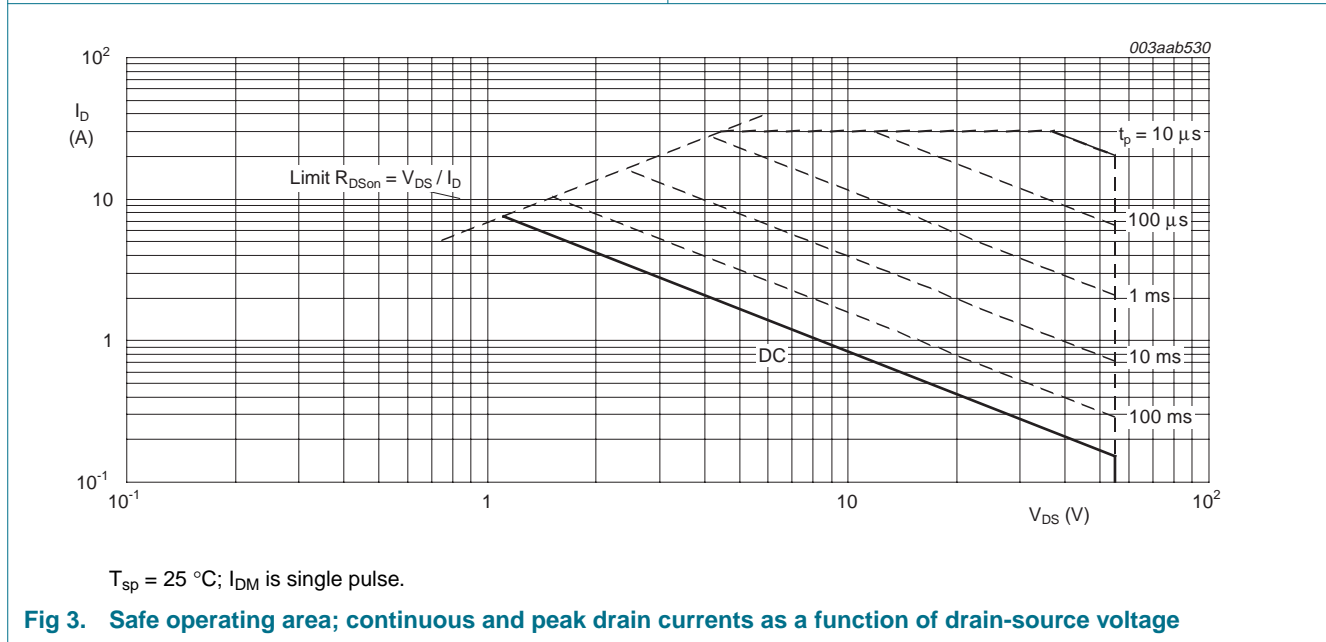
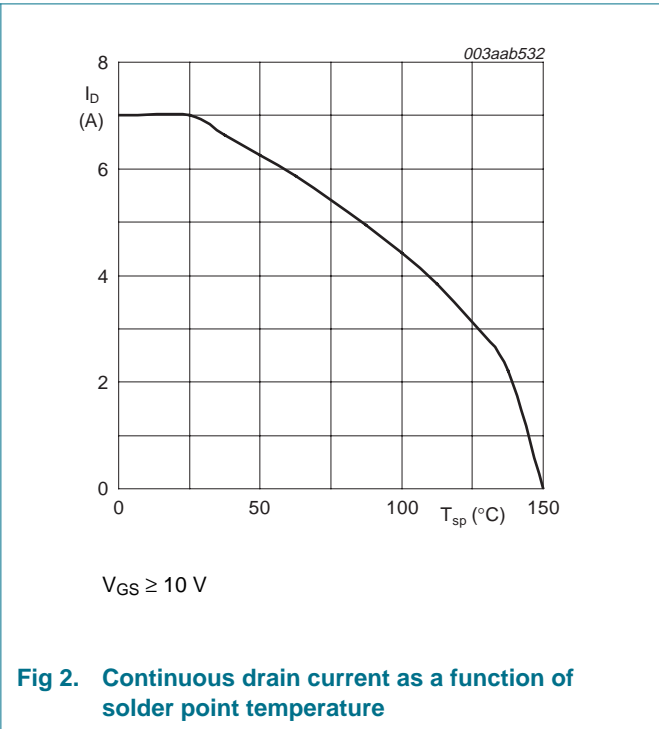
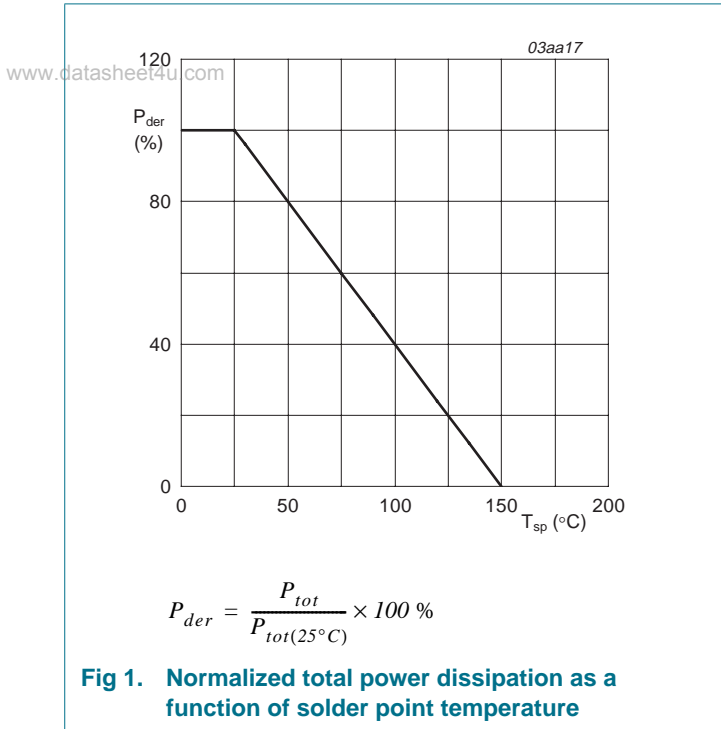
4. Limiting values

Table 3. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage		-	55	V
V_{DGR}	drain-gate voltage (DC)	$R_{GS} = 20 \text{ k}\Omega$	-	55	V
V_{GS}	gate-source voltage		-	± 20	V
I_D	drain current	$T_{sp} = 25 \text{ }^\circ\text{C}$; $V_{GS} = 10 \text{ V}$; see Figure 2 and 3	-	7	A
		$T_{sp} = 100 \text{ }^\circ\text{C}$; $V_{GS} = 10 \text{ V}$; see Figure 2	-	5	A
I_{DM}	peak drain current	$T_{sp} = 25 \text{ }^\circ\text{C}$; pulsed; $t_p \leq 10 \text{ }\mu\text{s}$; see Figure 3	-	30	A
P_{tot}	total power dissipation	$T_{sp} = 25 \text{ }^\circ\text{C}$; see Figure 1	-	8	W
T_{stg}	storage temperature		-55	+150	$^\circ\text{C}$
T_j	junction temperature		-55	+150	$^\circ\text{C}$
Source-drain diode					
I_{DR}	reverse drain current	$T_{sp} = 25 \text{ }^\circ\text{C}$	-	7	A
I_{DRM}	peak reverse drain current	$T_{sp} = 25 \text{ }^\circ\text{C}$; pulsed; $t_p \leq 10 \text{ }\mu\text{s}$	-	30	A
Avalanche ruggedness					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	unclamped inductive load; $I_D = 7 \text{ A}$; $V_{DS} \leq 55 \text{ V}$; $R_{GS} = 50 \text{ }\Omega$; $V_{GS} = 10 \text{ V}$; starting at $T_j = 25 \text{ }^\circ\text{C}$	-	53	mJ
$E_{DS(AL)R}$	repetitive drain-source avalanche energy		[1]	-	J

[1] Conditions:

- Maximum value not quoted. Repetitive rating defined in [Figure 16](#).
- Single-pulse avalanche rating limited by $T_{j(max)}$ of $150 \text{ }^\circ\text{C}$.
- Repetitive avalanche rating limited by an average junction temperature of $150 \text{ }^\circ\text{C}$.
- Refer to application note *AN10273* for further information.



5. Thermal characteristics

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Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	70	-	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	15	K/W

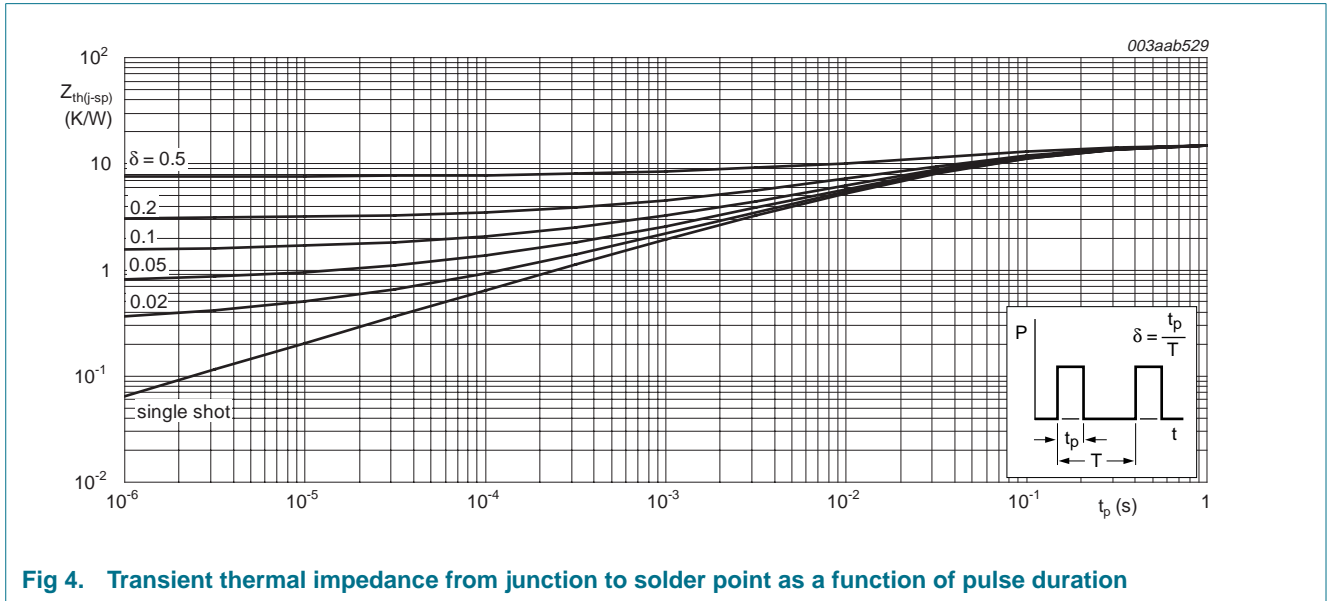


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

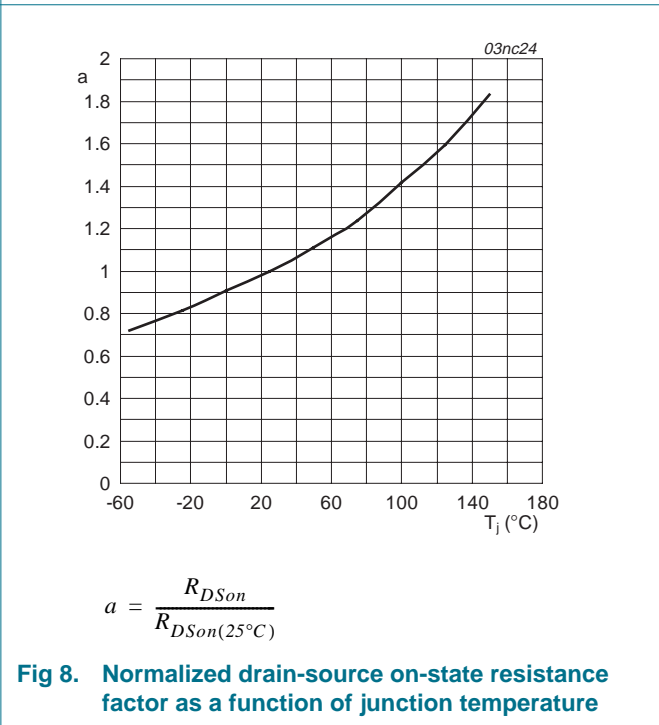
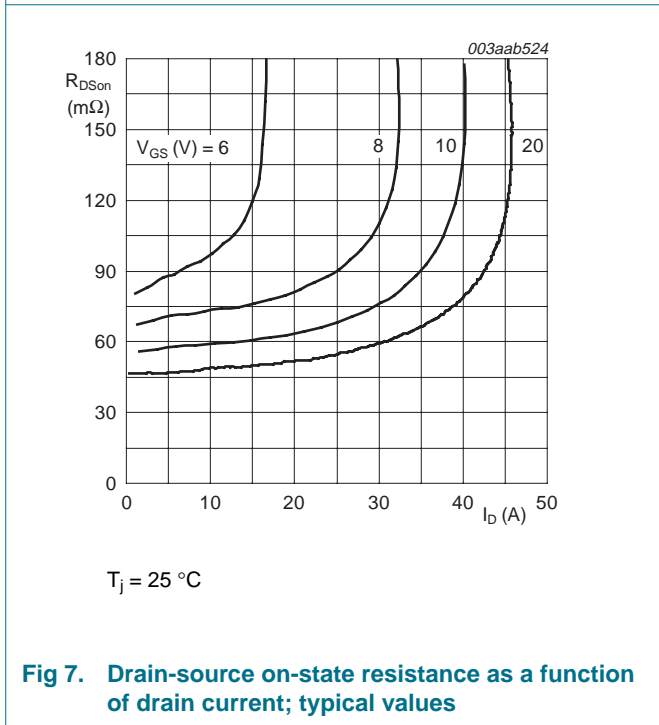
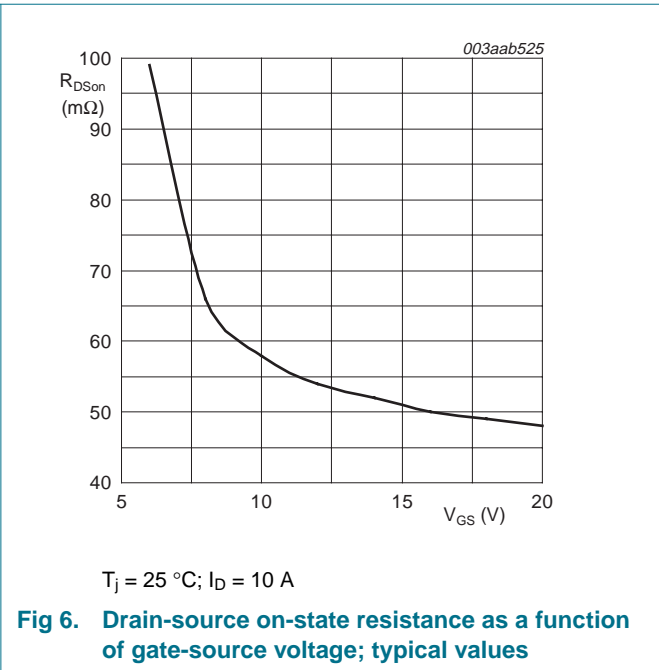
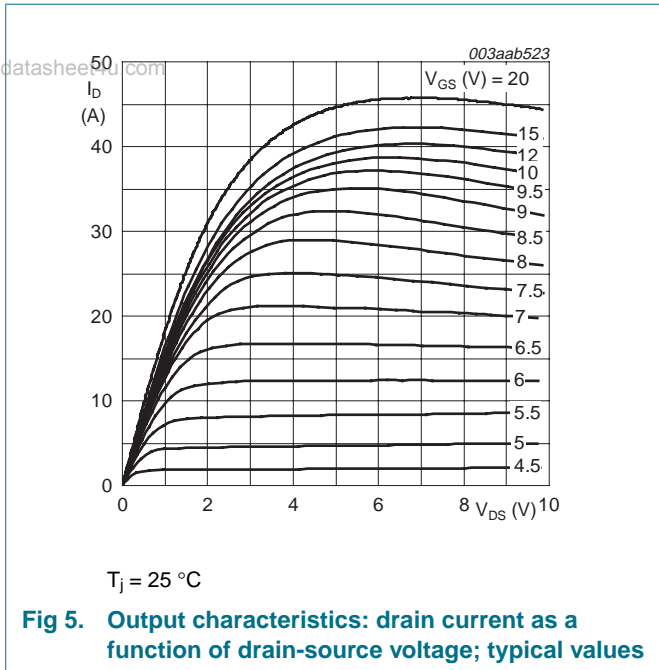
6. Characteristics

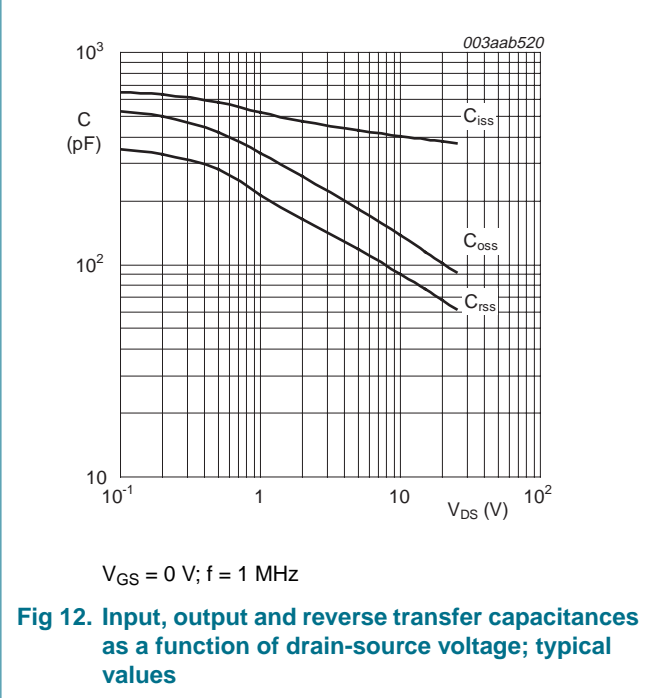
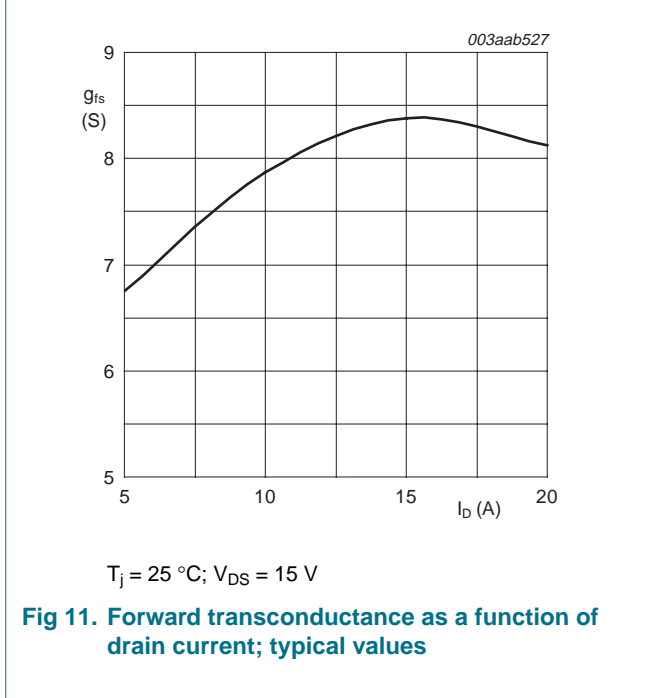
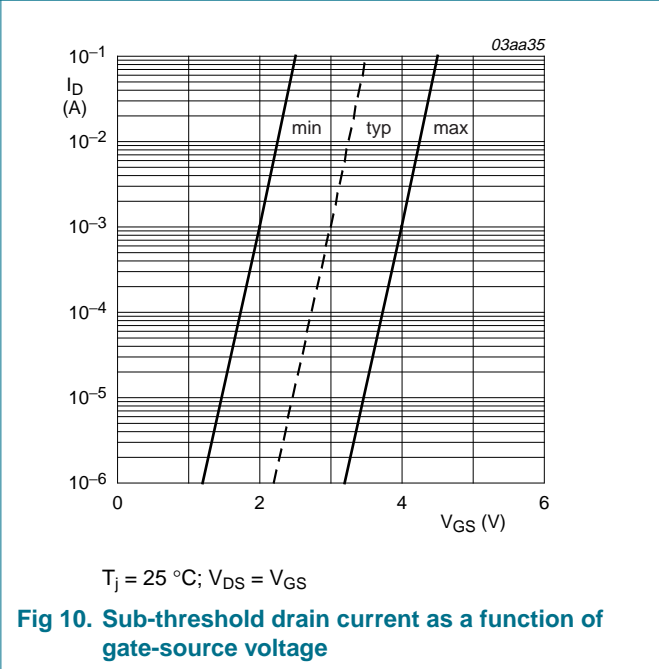
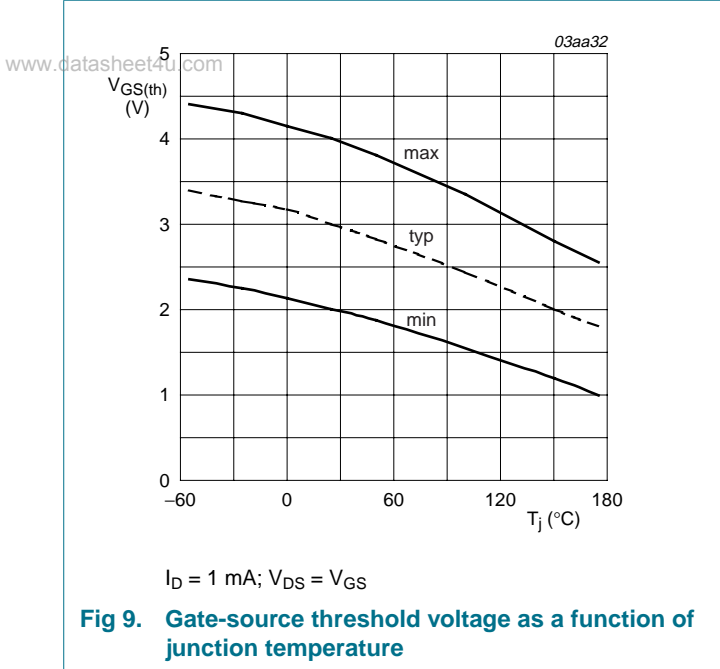
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Table 5. Characteristics

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}; V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ }^\circ\text{C}$	55	-	-	V
		$T_j = -55\text{ }^\circ\text{C}$	50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS};$ see Figure 9				
		$T_j = 25\text{ }^\circ\text{C}$	2	3	4	V
		$T_j = 150\text{ }^\circ\text{C}$	1.2	-	-	V
		$T_j = -55\text{ }^\circ\text{C}$	-	-	4.4	V
I_{DSS}	drain leakage current	$V_{DS} = 55\text{ V}; V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ }^\circ\text{C}$	-	0.05	10	μA
		$T_j = 150\text{ }^\circ\text{C}$	-	-	500	μA
I_{GSS}	gate leakage current	$V_{GS} = \pm 20\text{ V}; V_{DS} = 0\text{ V}$	-	2	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 10\text{ A};$ see Figure 6 and 8				
		$T_j = 25\text{ }^\circ\text{C}$	-	68	80	m Ω
		$T_j = 150\text{ }^\circ\text{C}$	-	-	148	m Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 10\text{ A}; V_{DD} = 44\text{ V}; V_{GS} = 10\text{ V};$ see Figure 14	-	12	-	nC
Q_{GS}	gate-source charge		-	2.5	-	nC
Q_{GD}	gate-drain charge		-	5	-	nC
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz};$ see Figure 12	-	374	500	pF
C_{oss}	output capacitance		-	92	110	pF
C_{rss}	reverse transfer capacitance		-	62	85	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 30\text{ V}; R_L = 1.2\text{ }\Omega;$	-	8	-	ns
t_r	rise time	$V_{GS} = 10\text{ V}; R_G = 10\text{ }\Omega$	-	52	-	ns
$t_{d(off)}$	turn-off delay time		-	17	-	ns
t_f	fall time		-	9	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 15\text{ A}; V_{GS} = 0\text{ V};$ 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	$V_{GS} = -10\text{ V}; V_R = 30\text{ V}$	-	31	-	nC





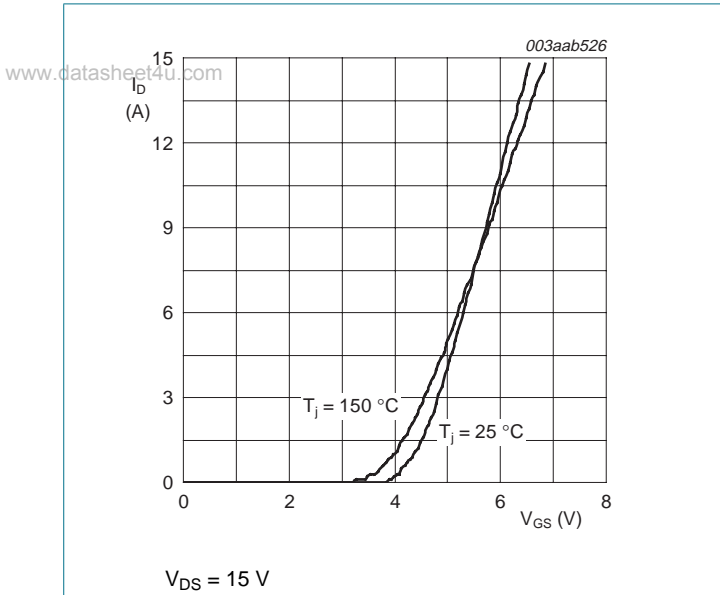


Fig 13. Transfer characteristics: drain current as a function of gate-source voltage; typical values

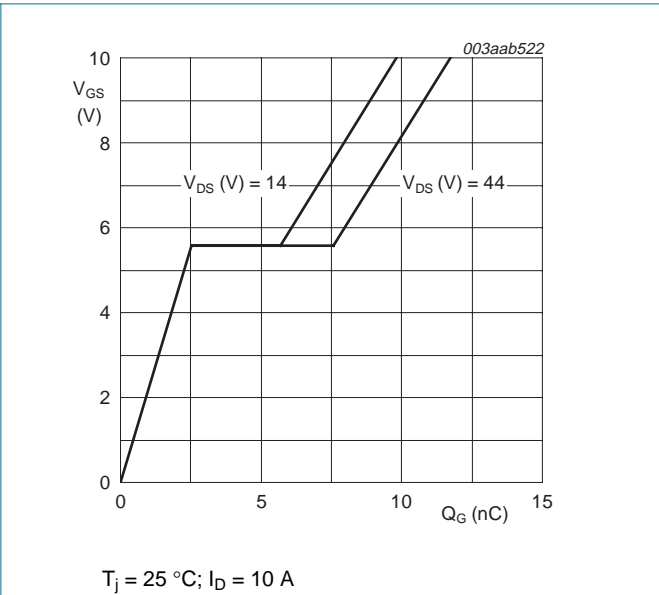


Fig 14. Gate-source voltage as a function of gate charge; typical values

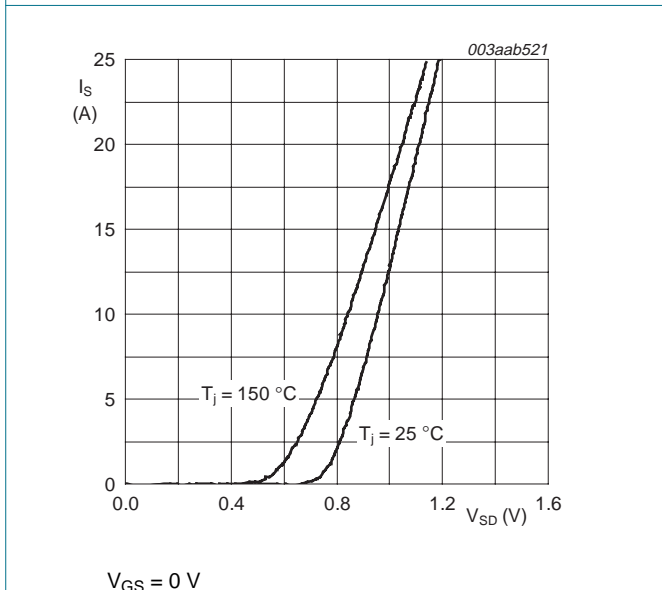
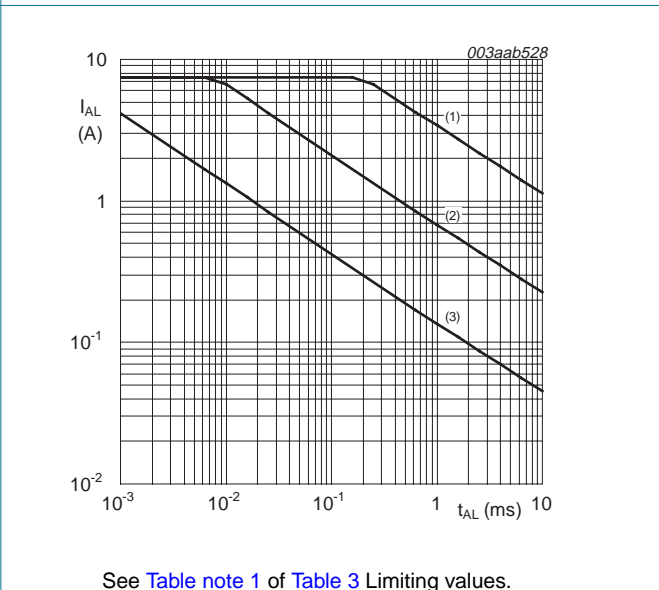


Fig 15. Source current as a function of source-drain voltage; typical values



See [Table note 1](#) of [Table 3](#) Limiting values.

- (1) Single-pulse; $T_j = 25\text{ }^\circ\text{C}$.
- (2) Single-pulse; $T_j = 150\text{ }^\circ\text{C}$.
- (3) Repetitive.

Fig 16. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

7. Package outline

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Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

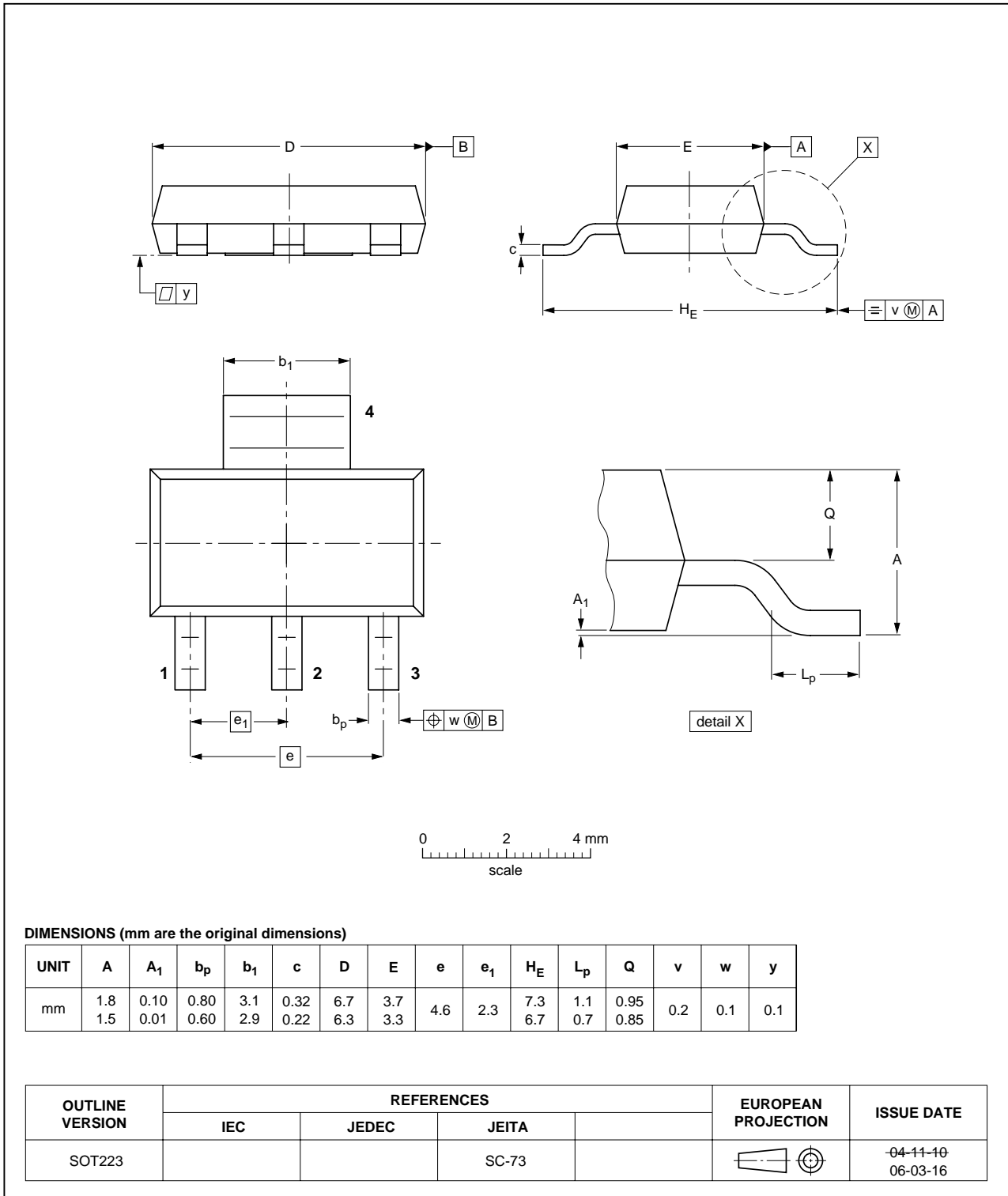


Fig 17. Package outline SOT223 (SC-73)

8. Soldering

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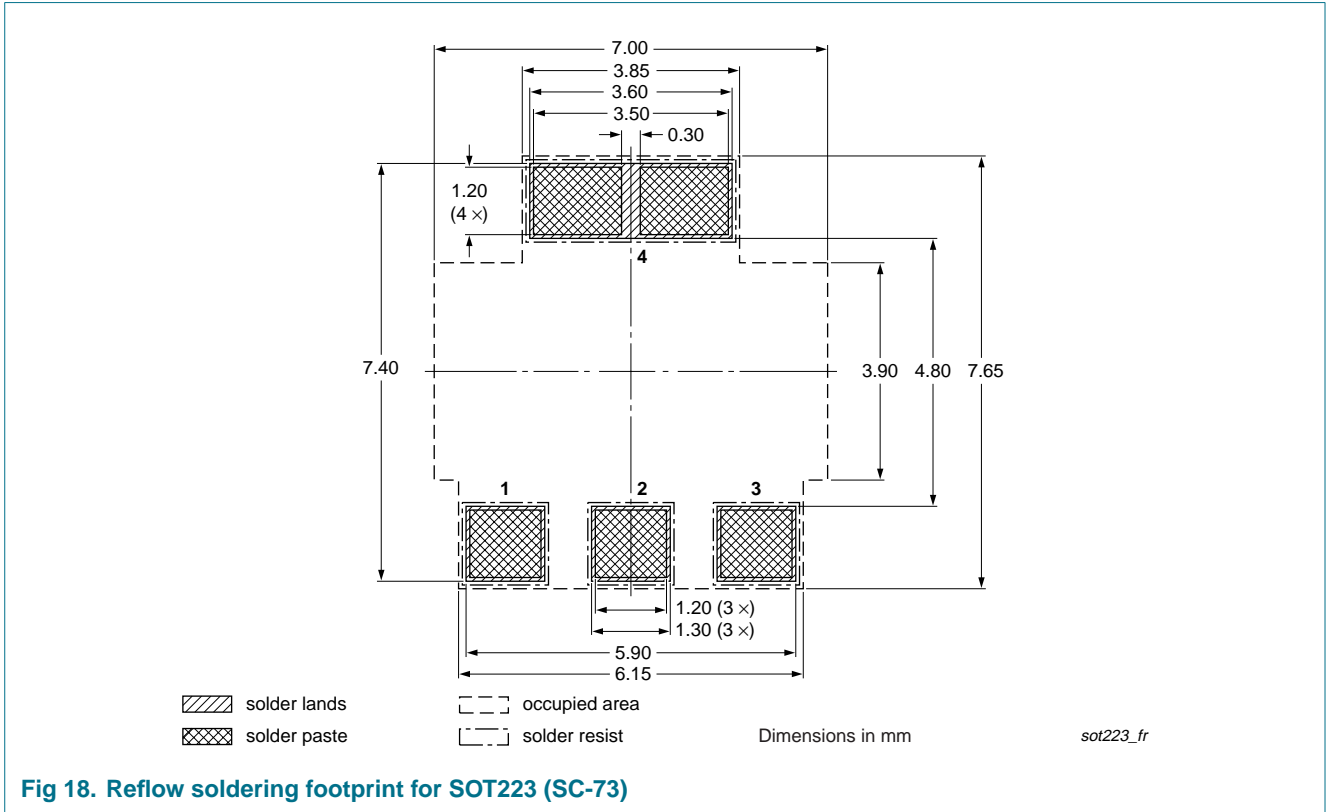


Fig 18. Reflow soldering footprint for SOT223 (SC-73)

9. Revision history

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Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK7880-55A_1	20071101	Product data sheet	-	-

10. Legal information

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10.1 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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Date of release: 1 November 2007

Document identifier: BUK7880-55A_1