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Electronic Components Sourcing Information

Product Reference Information

Part Number:	BUK78150-55A,115
Manufacturer:	NXP USA Inc.
Package:	Please confirm with sales
Availability:	Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nxp-usa-inc/buk78150-55a-115.html>

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



BUK78150-55A

N-channel TrenchMOS standard level FET

Rev. 02 — 16 June 2010

Product data sheet

1. Product profile

1.1 General description

Standard 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

- Low conduction losses due to low on-state resistance
- Suitable for standard level gate drive sources
- Q101 compliant

1.3 Applications

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

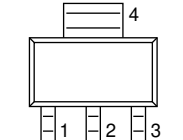
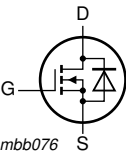
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 150\text{ °C}$	-	-	55	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{sp} = 25\text{ °C}$; see Figure 1 ; see Figure 3	-	-	5.5	A
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C}$; see Figure 2	-	-	8	W
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 5\text{ A}$; $T_j = 150\text{ °C}$; see Figure 12 ; see Figure 13	-	-	278	mΩ
		$V_{GS} = 10\text{ V}$; $I_D = 5\text{ A}$; $T_j = 25\text{ °C}$; see Figure 12 ; see Figure 13	-	128	150	mΩ
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 5\text{ A}$; $V_{sup} \leq 55\text{ V}$; $R_{GS} = 50\text{ Ω}$; $V_{GS} = 10\text{ V}$; $T_{j(init)} = 25\text{ °C}$; unclamped	-	-	25	mJ

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 SOT223 (SC-73)	 mbb076
2	D	drain		
3	S	source		
4	D	drain		

3. Ordering information

Table 3. Ordering information

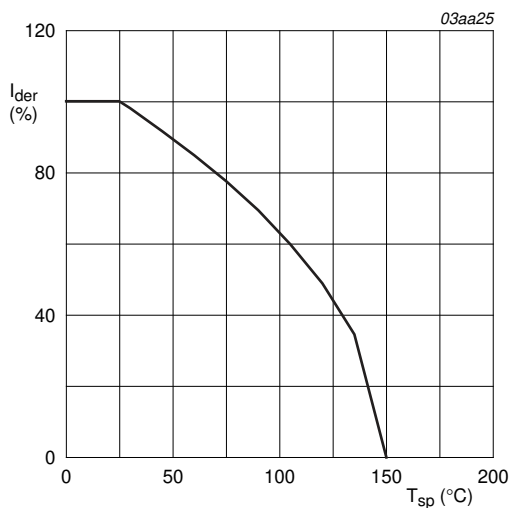
Type number	Package		
	Name	Description	Version
BUK78150-55A	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

4. Limiting values

Table 4. Limiting values

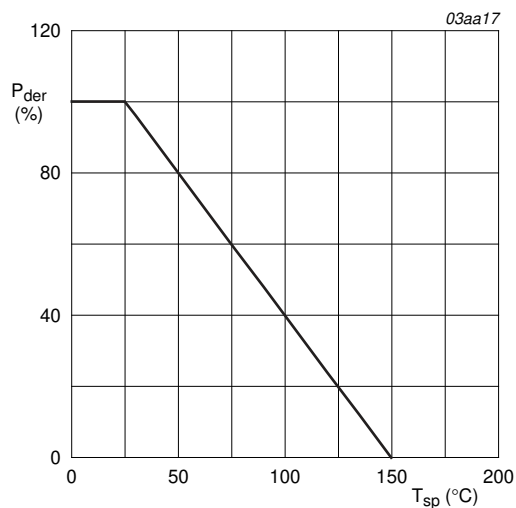
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 150\text{ °C}$	-	-	55	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	-	55	V
V_{GS}	gate-source voltage		-20	-	20	V
I_D	drain current	$T_{sp} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; see Figure 1 ; see Figure 3	-	-	5.5	A
		$T_{sp} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; see Figure 1	-	-	3.8	A
I_{DM}	peak drain current	$T_{sp} = 25\text{ °C}$; $t_p \leq 10\text{ }\mu\text{s}$; pulsed; see Figure 3	-	-	22	A
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C}$; see Figure 2	-	-	8	W
T_{stg}	storage temperature		-55	-	150	°C
T_j	junction temperature		-55	-	150	°C
Source-drain diode						
I_S	source current	$T_{sp} = 25\text{ °C}$	-	-	5.5	A
I_{SM}	peak source current	$t_p \leq 10\text{ }\mu\text{s}$; pulsed; $T_{sp} = 25\text{ °C}$	-	-	22	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 5\text{ A}$; $V_{sup} \leq 55\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ °C}$; unclamped	-	-	25	mJ



$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100\%$$

Fig 1. Normalized continuous drain current as a function of solder point temperature



$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100\%$$

Fig 2. Normalized total power dissipation as a function of solder point temperature

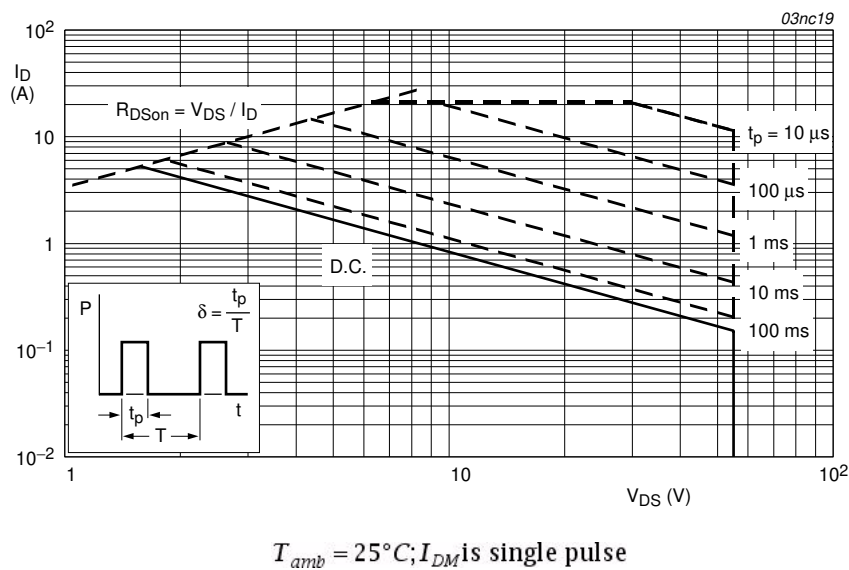


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	see Figure 4	-	70	-	K/W

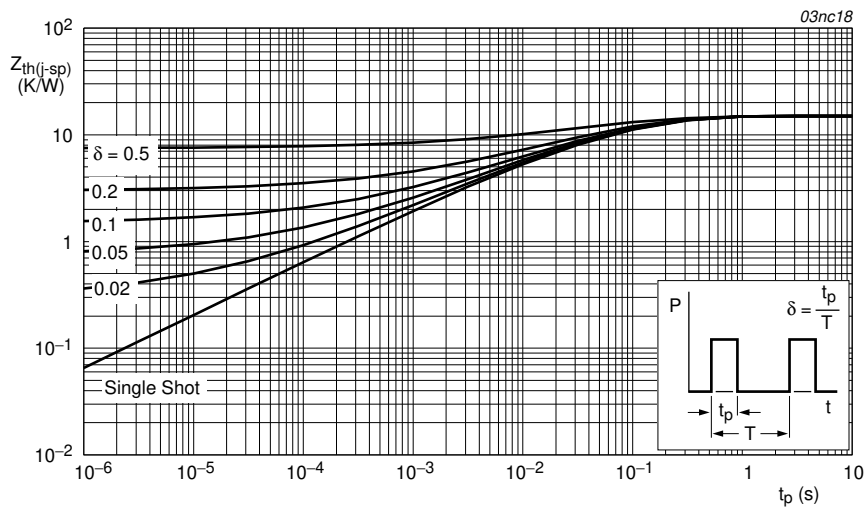


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 0.25 mA; V _{GS} = 0 V; T _j = 25 °C	55	-	-	V
		I _D = 0.25 mA; V _{GS} = 0 V; T _j = -55 °C	50	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; T _j = 25 °C; see Figure 11	2	3	4	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _j = 150 °C; see Figure 11	1	-	-	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _j = -55 °C; see Figure 11	-	-	4.4	V
I _{DSS}	drain leakage current	V _{DS} = 55 V; V _{GS} = 0 V; T _j = 150 °C	-	-	500	μA
		V _{DS} = 55 V; V _{GS} = 0 V; T _j = 25 °C	-	0.05	10	μA
I _{GSS}	gate leakage current	V _{DS} = 0 V; V _{GS} = 20 V; T _j = 25 °C	-	2	100	nA
		V _{DS} = 0 V; V _{GS} = -20 V; T _j = 25 °C	-	2	100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 5 A; T _j = 150 °C; see Figure 12 ; see Figure 13	-	-	278	mΩ
		V _{GS} = 10 V; I _D = 5 A; T _j = 25 °C; see Figure 12 ; see Figure 13	-	128	150	mΩ
Dynamic characteristics						
C _{iss}	input capacitance	V _{GS} = 0 V; V _{DS} = 25 V; f = 1 MHz; T _j = 25 °C; see Figure 14	-	170	230	pF
C _{oss}	output capacitance		-	54	65	pF
C _{rss}	reverse transfer capacitance		-	37	52	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; R _L = 2.7 Ω; V _{GS} = 10 V; R _{G(ext)} = 5.6 Ω; T _j = 25 °C	-	3	-	ns
t _r	rise time		-	26	-	ns
t _{d(off)}	turn-off delay time		-	8	-	ns
t _f	fall time		-	10	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 5 A; V _{GS} = 0 V; T _j = 25 °C; see Figure 15	-	0.85	1.2	V
t _{rr}	reverse recovery time	I _S = 10 A; dI _S /dt = -100 A/μs; V _{GS} = -10 V; V _{DS} = 30 V; T _j = 25 °C	-	32	-	ns
Q _r	recovered charge		-	50	-	nC

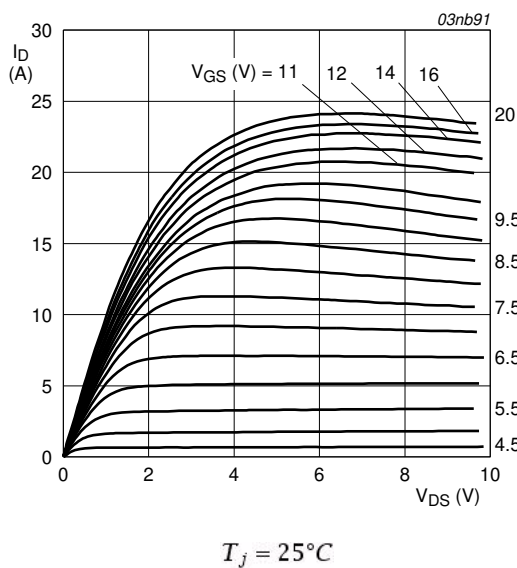


Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values

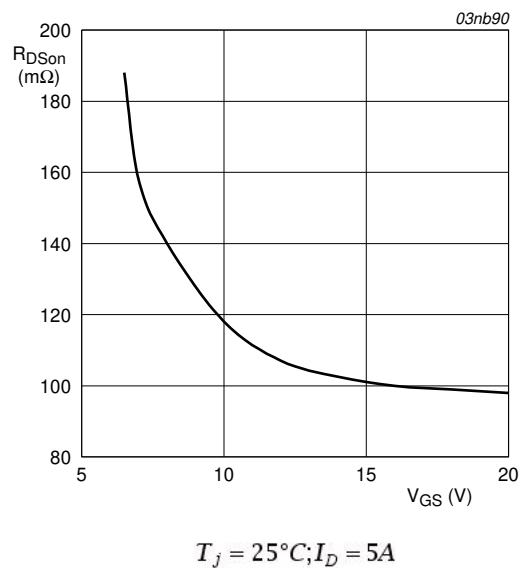


Fig 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

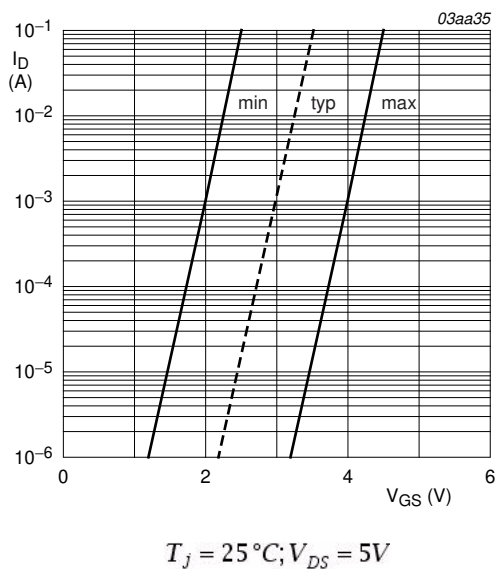


Fig 7. Sub-threshold drain current as a function of gate-source voltage

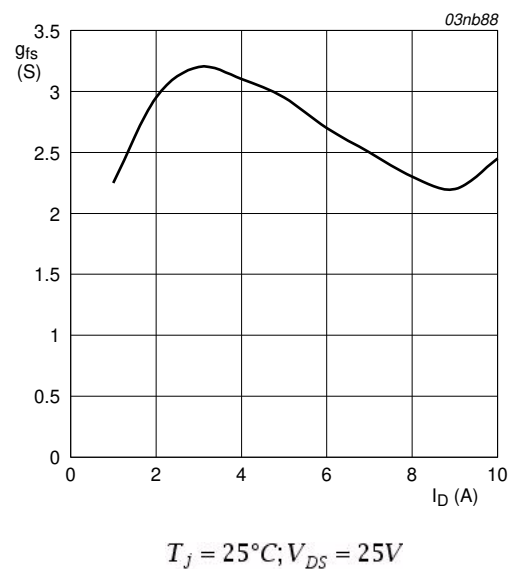


Fig 8. Forward transconductance as a function of drain current; typical values

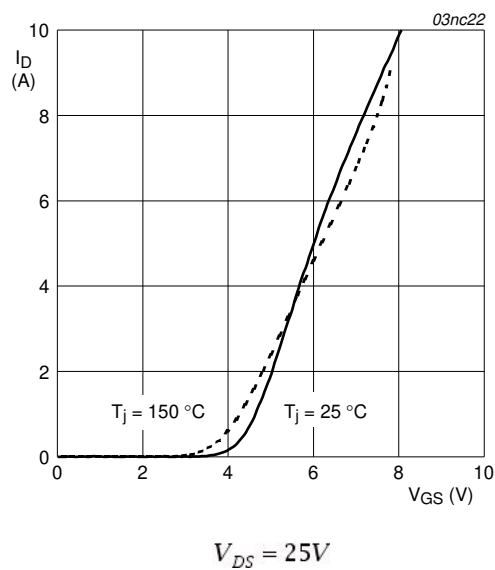


Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

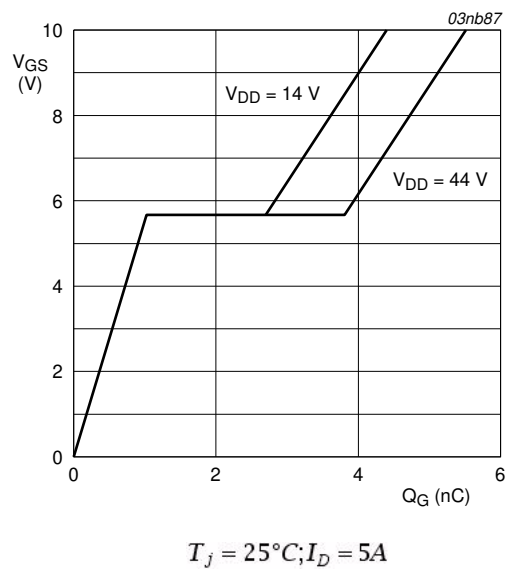


Fig 10. Gate-source voltage as a function of turn-on gate charge; typical values

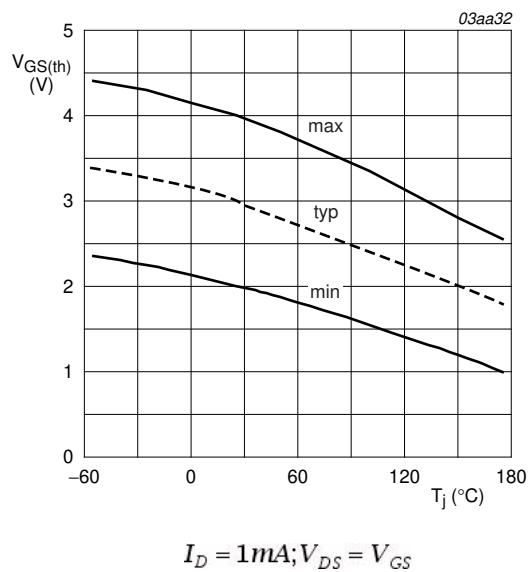


Fig 11. Gate-source threshold voltage as a function of junction temperature

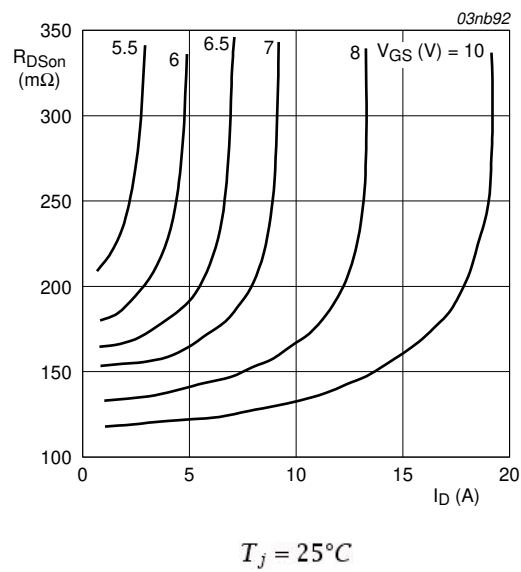
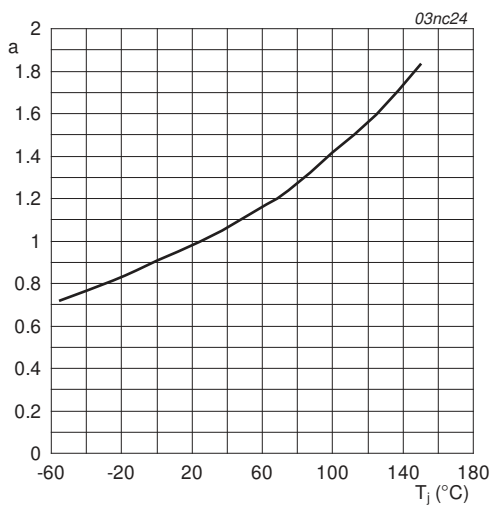
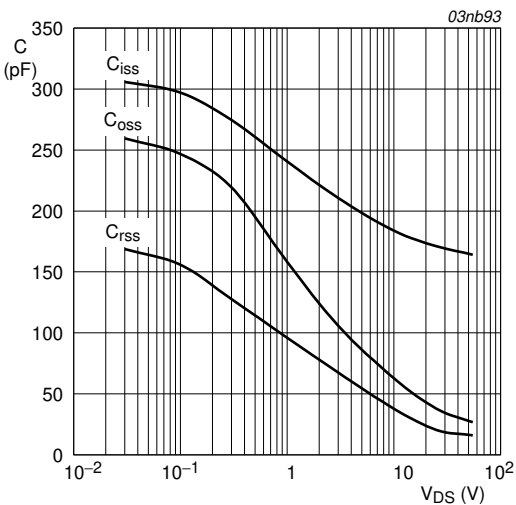


Fig 12. Drain-source on-state resistance as a function of drain current; typical values



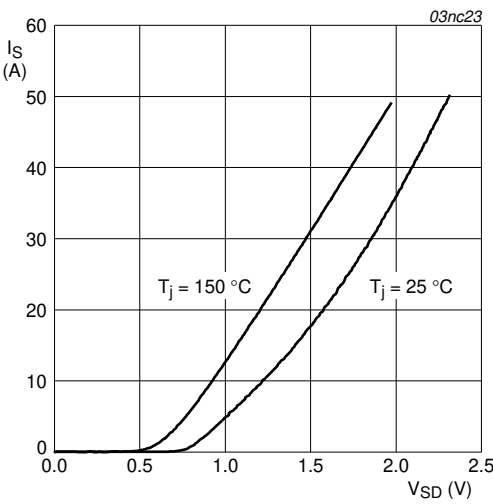
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}\text{C})}}$$

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



$$V_{GS} = 0V; f = 1MHz$$

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



$$V_{GS} = 0V$$

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

7. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

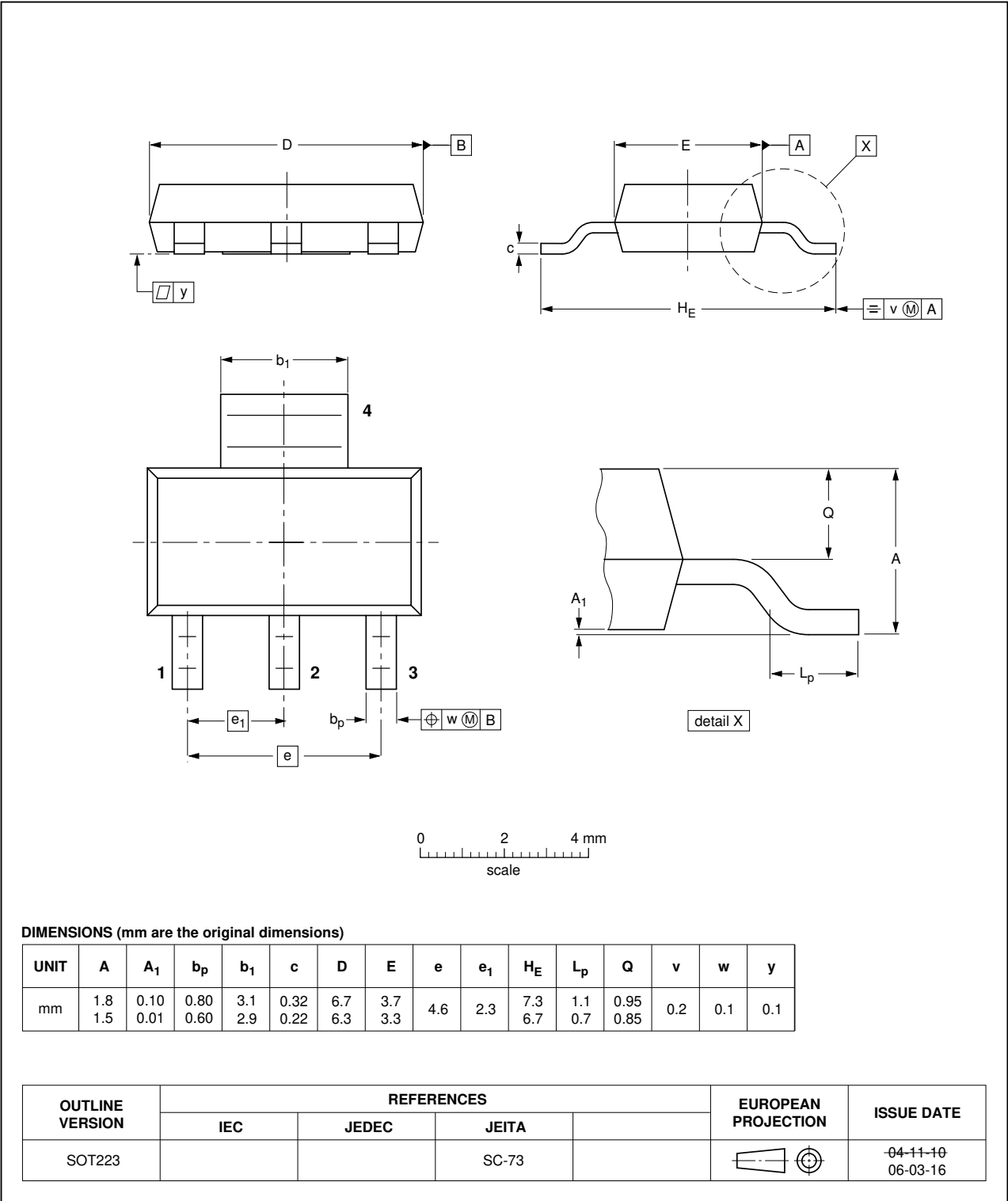


Fig 16. Package outline SOT223 (SC-73)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK78150-55A v.2	20100616	Product data sheet	-	BUK78150-55A v.1
Modifications:	- The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors - Legal texts have been adapted to the new company name where appropriate.			
BUK78150-55A v.1 (9397 750 07738)	20010130	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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