

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number:	BSS84AKW,115
Manufacturer:	Nexperia USA Inc.
Package:	Please confirm with sales
Availability:	Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/bss84akw-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.



BSS84AKW

50 V, 150 mA P-channel Trench MOSFET

Rev. 1 — 23 May 2011

Product data sheet

1. Product profile

1.1 General description

P-channel enhancement mode Field-Effect Transistor (FET) in a small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

1.2 Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology
- ESD protection up to 1 kV
- AEC-Q101 qualified

1.3 Applications

- Relay driver
- High-speed line driver
- High-side loadswitch
- Switching circuits

1.4 Quick reference data

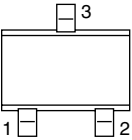
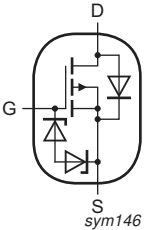
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-50	V
V_{GS}	gate-source voltage		-20	-	20	V
I_D	drain current	$V_{GS} = -10\text{ V}$; $T_{amb} = 25\text{ °C}$	[1]	-	-150	mA
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -10\text{ V}$; $I_D = -100\text{ mA}$; $T_j = 25\text{ °C}$	-	4.5	7.5	Ω

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 SOT323 (SC-70)	 sym146
2	S	source		
3	D	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSS84AKW	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
BSS84AKW	%VT

[1] % = placeholder for manufacturing site code

5. 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	$T_j = 25\text{ °C}$	-	-50	V
V_{GS}	gate-source voltage		-20	20	V
I_D	drain current	$V_{GS} = -10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-150 mA
		$V_{GS} = -10\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-95 mA
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$	-	-0.6	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	260 mW
			[1]	-	310 mW
		$T_{sp} = 25\text{ °C}$	-	830	mW
T_j	junction temperature		-55	150	°C
T_{amb}	ambient temperature		-55	150	°C
T_{stg}	storage temperature		-65	150	°C

Source-drain diode

I_S	source current	$T_{amb} = 25\text{ °C}$	[1]	-	-150 mA
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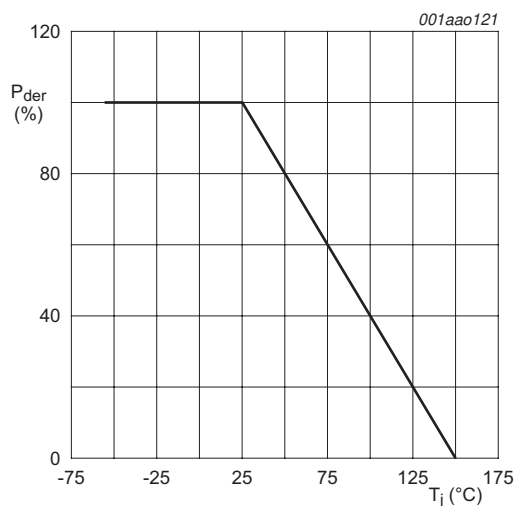
ESD maximum rating

V_{ESD}	electrostatic discharge voltage	HBM	[3]	-	1000 V
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[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

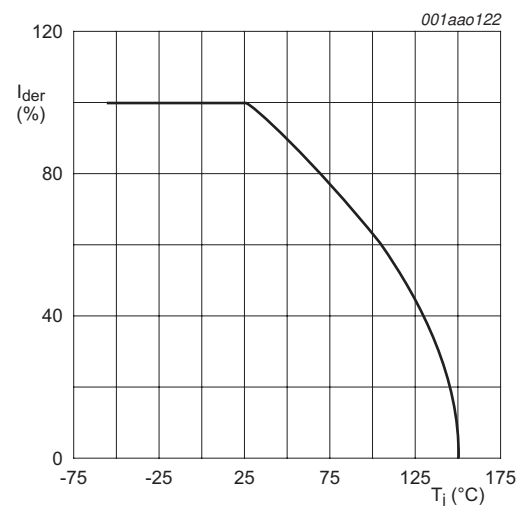
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[3] Measured between all pins.



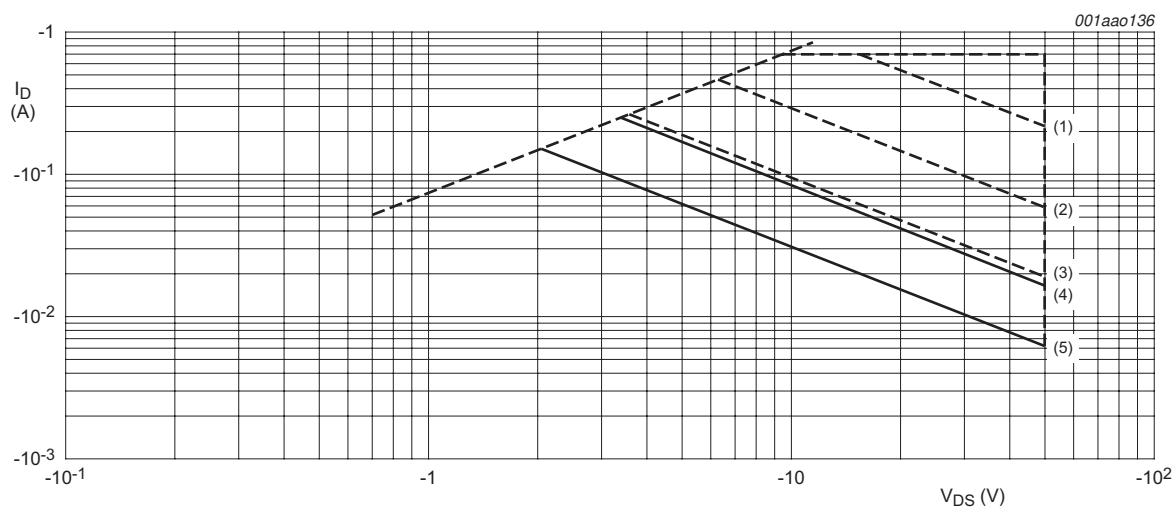
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100\%$$

Fig 1. Normalized total power dissipation as a function of junction temperature



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

Fig 2. Normalized continuous drain current as a function of junction temperature



I_{DM} is single pulse

(1) $t_p = 1 \text{ ms}$

(2) $t_p = 10 \text{ ms}$

(3) $t_p = 100 \text{ ms}$

(4) DC; $T_{sp} = 25 \text{ °C}$

(5) DC; $T_{amb} = 25 \text{ °C}$; drain mounting pad 1 cm^2

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

6. 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]	-	415	K/W
			[2]	-	350	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	150	K/W

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

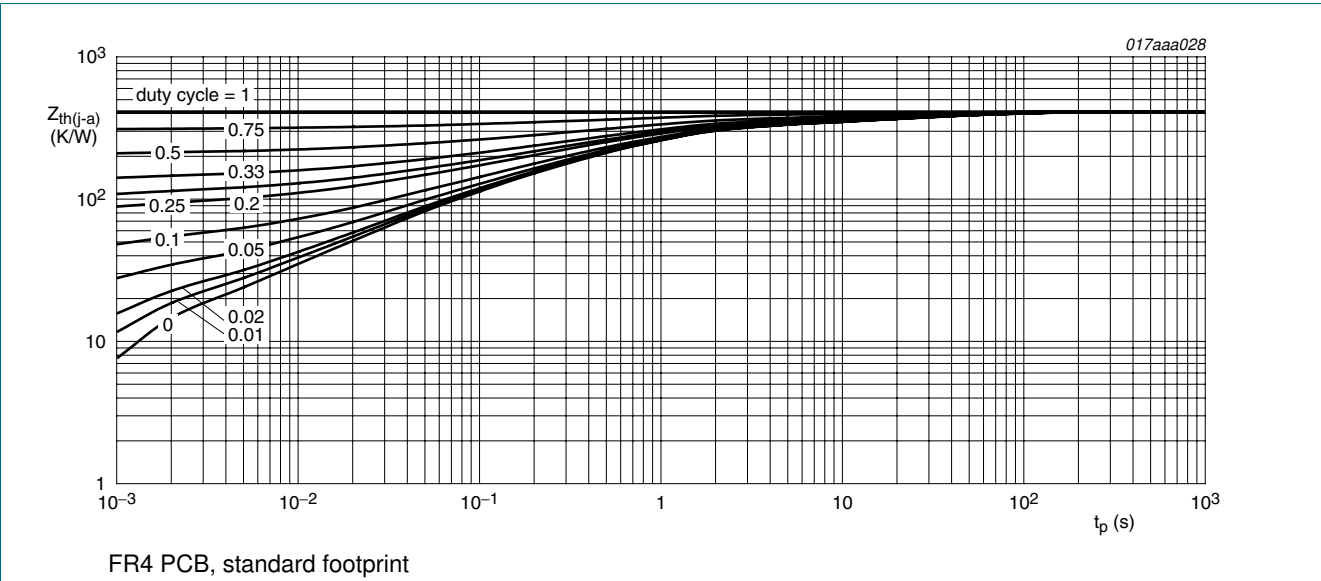


Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

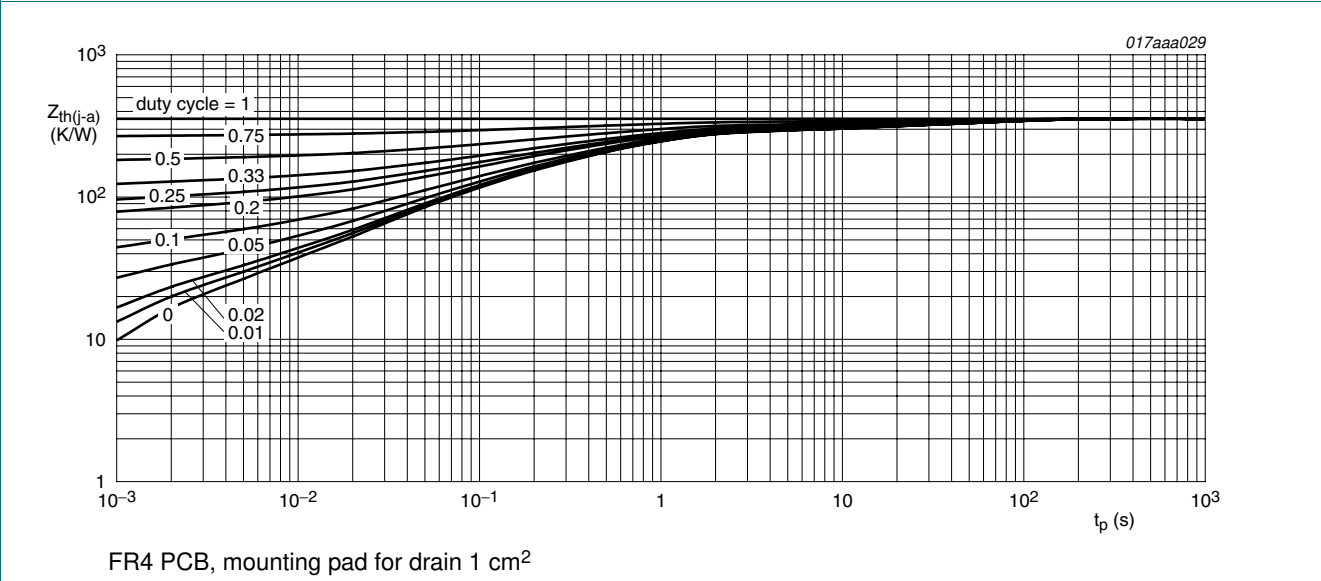


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _{(BR)DSS}	drain-source breakdown voltage	I _D = -10 μA; V _{GS} = 0 V; T _j = 25 °C	-50	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = -250 μA; V _{DS} = V _{GS} ; T _j = 25 °C	-1.1	-1.6	-2.1	V
I _{DSS}	drain leakage current	V _{DS} = -50 V; V _{GS} = 0 V; T _j = 25 °C	-	-	-1	μA
		V _{DS} = -50 V; V _{GS} = 0 V; T _j = 150 °C	-	-	-2	μA
I _{GSS}	gate leakage current	V _{GS} = -20 V; V _{DS} = 0 V; T _j = 25 °C	-	-	-10	μA
		V _{GS} = 20 V; V _{DS} = 0 V; T _j = 25 °C	-	-	-10	μA
R _{DSon}	drain-source on-state resistance	V _{GS} = -10 V; I _D = -100 mA; T _j = 25 °C	-	4.5	7.5	Ω
		V _{GS} = -10 V; I _D = -100 mA; T _j = 150 °C	-	8	13.5	Ω
		V _{GS} = -5 V; I _D = -100 mA; T _j = 25 °C	-	5.7	8.5	Ω
g _{fs}	forward transconductance	V _{DS} = -10 V; I _D = -100 mA; T _j = 25 °C	-	150	-	mS
Dynamic characteristics						
Q _{G(tot)}	total gate charge	V _{DS} = -25 V; I _D = -200 mA; V _{GS} = -5 V; T _j = 25 °C	-	0.26	0.35	nC
Q _{GS}	gate-source charge		-	0.12	-	nC
Q _{GD}	gate-drain charge		-	0.09	-	nC
C _{iss}	input capacitance	V _{DS} = -25 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C	-	24	36	pF
C _{oss}	output capacitance		-	4.5	-	pF
C _{rss}	reverse transfer capacitance		-	1.3	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = -30 V; R _L = 250 Ω; V _{GS} = -10 V; R _{G(ext)} = 6 Ω; T _j = 25 °C	-	13	26	ns
t _r	rise time		-	11	-	ns
t _{d(off)}	turn-off delay time		-	48	96	ns
t _f	fall time		-	25	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = -115 mA; V _{GS} = 0 V; T _j = 25 °C	-0.48	-0.85	-1.2	V

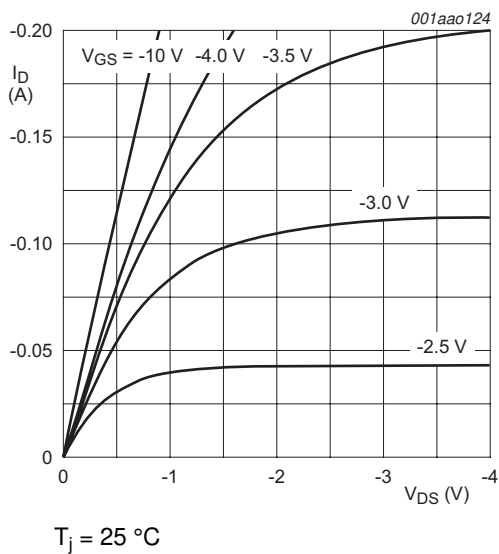


Fig 6. Output characteristics; drain current as a function of drain-source voltage; typical values

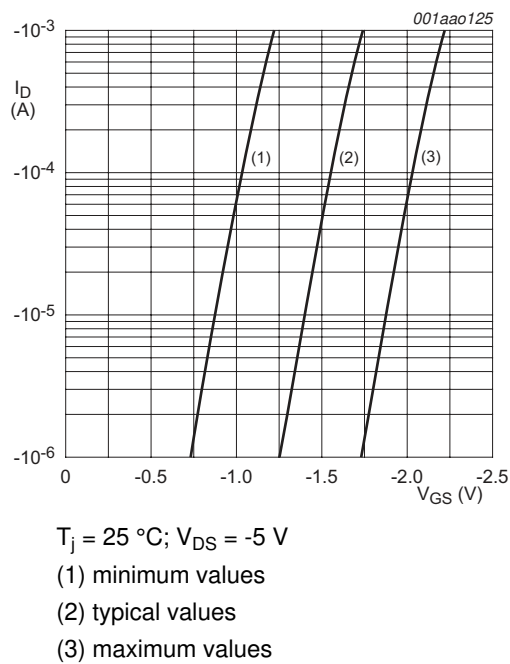


Fig 7. Sub-threshold drain current as a function of gate-source voltage

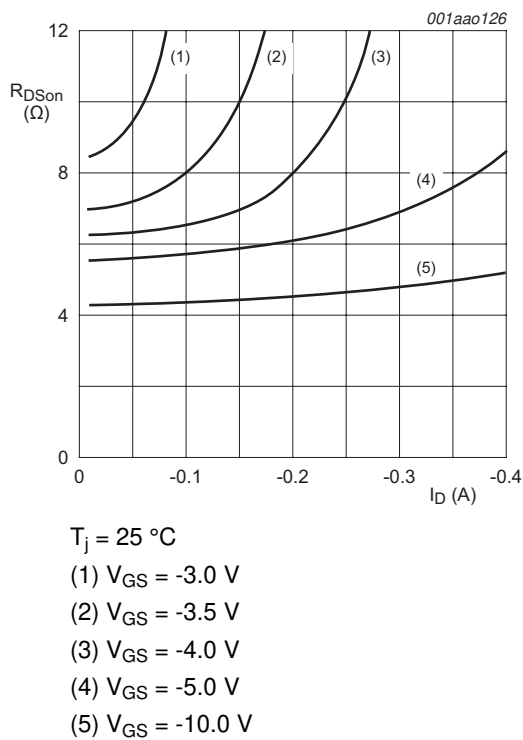


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

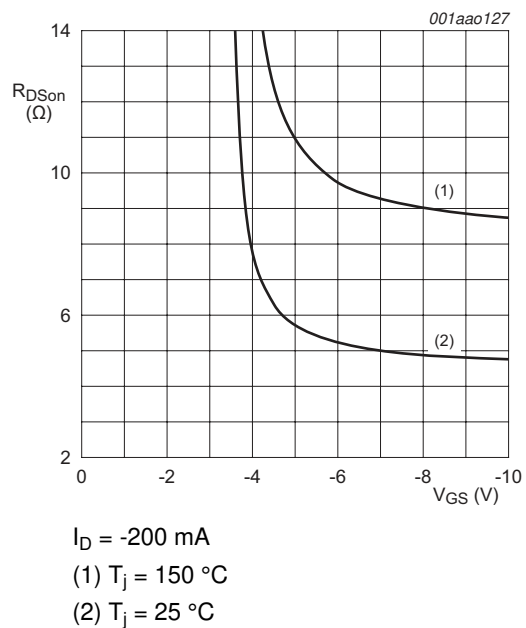
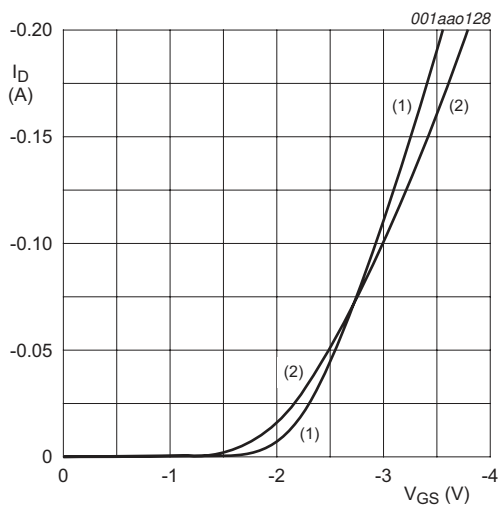
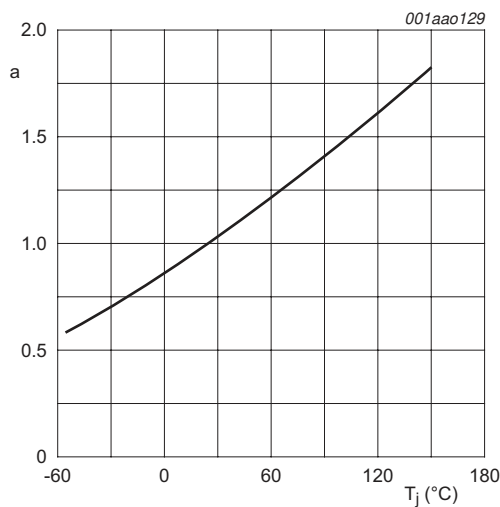


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



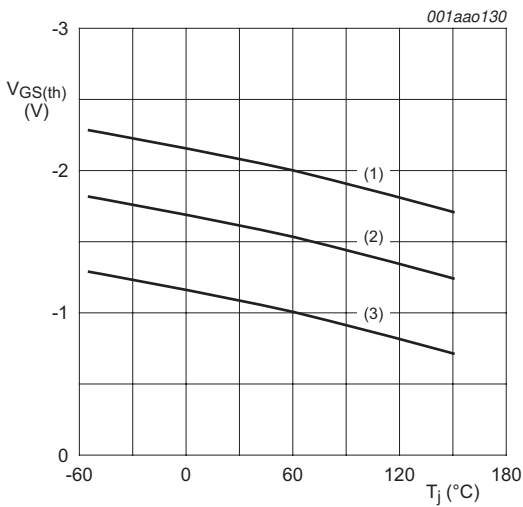
$V_{DS} > I_D \times R_{DSon}$
(1) $T_j = 25\text{ °C}$
(2) $T_j = 150\text{ °C}$

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



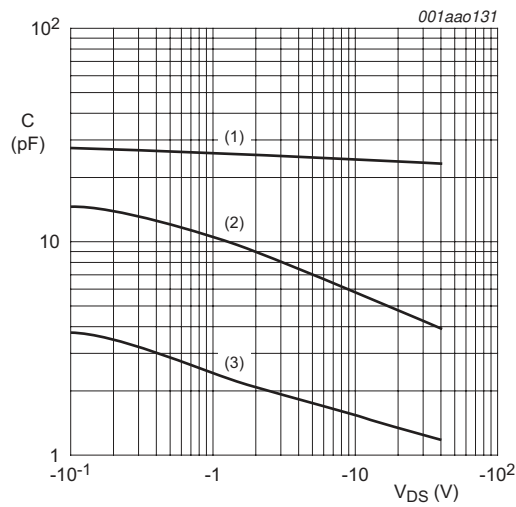
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}\text{C})}}$$

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



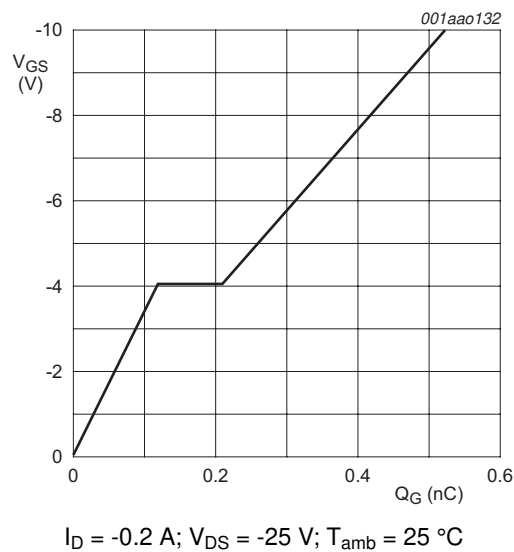
$I_D = -0.25\text{ mA}$; $V_{DS} = V_{GS}$
(1) maximum values
(2) typical values
(3) minimum values

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



$f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$
(1) C_{iss}
(2) C_{oss}
(3) C_{rss}

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



$I_D = -0.2$ A; $V_{DS} = -25$ V; $T_{amb} = 25$ °C

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

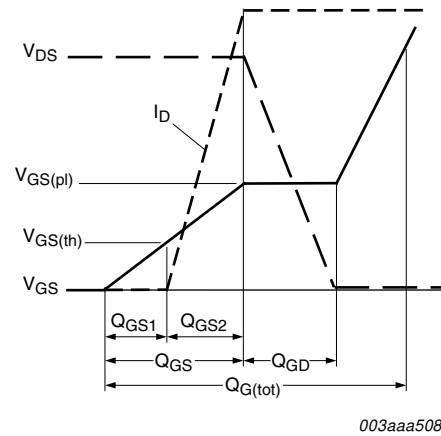
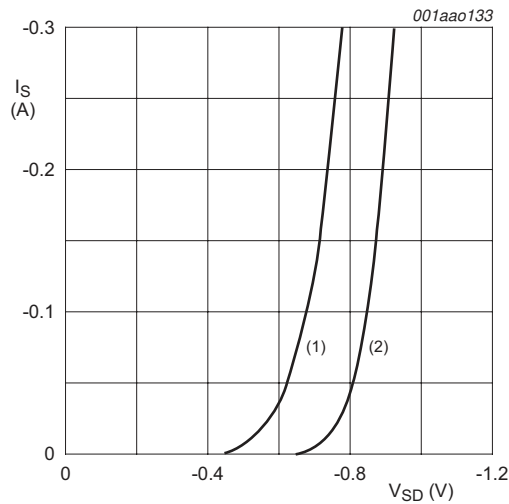


Fig 15. Gate charge waveform definitions



$V_{GS} = 0$ V
(1) $T_j = 150$ °C
(2) $T_j = 25$ °C

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

8. Test information

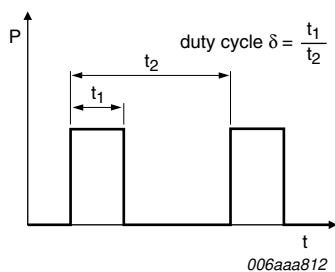


Fig 17. Duty cycle definition

8.1 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.

9. Package outline

Plastic surface-mounted package; 3 leads

SOT323

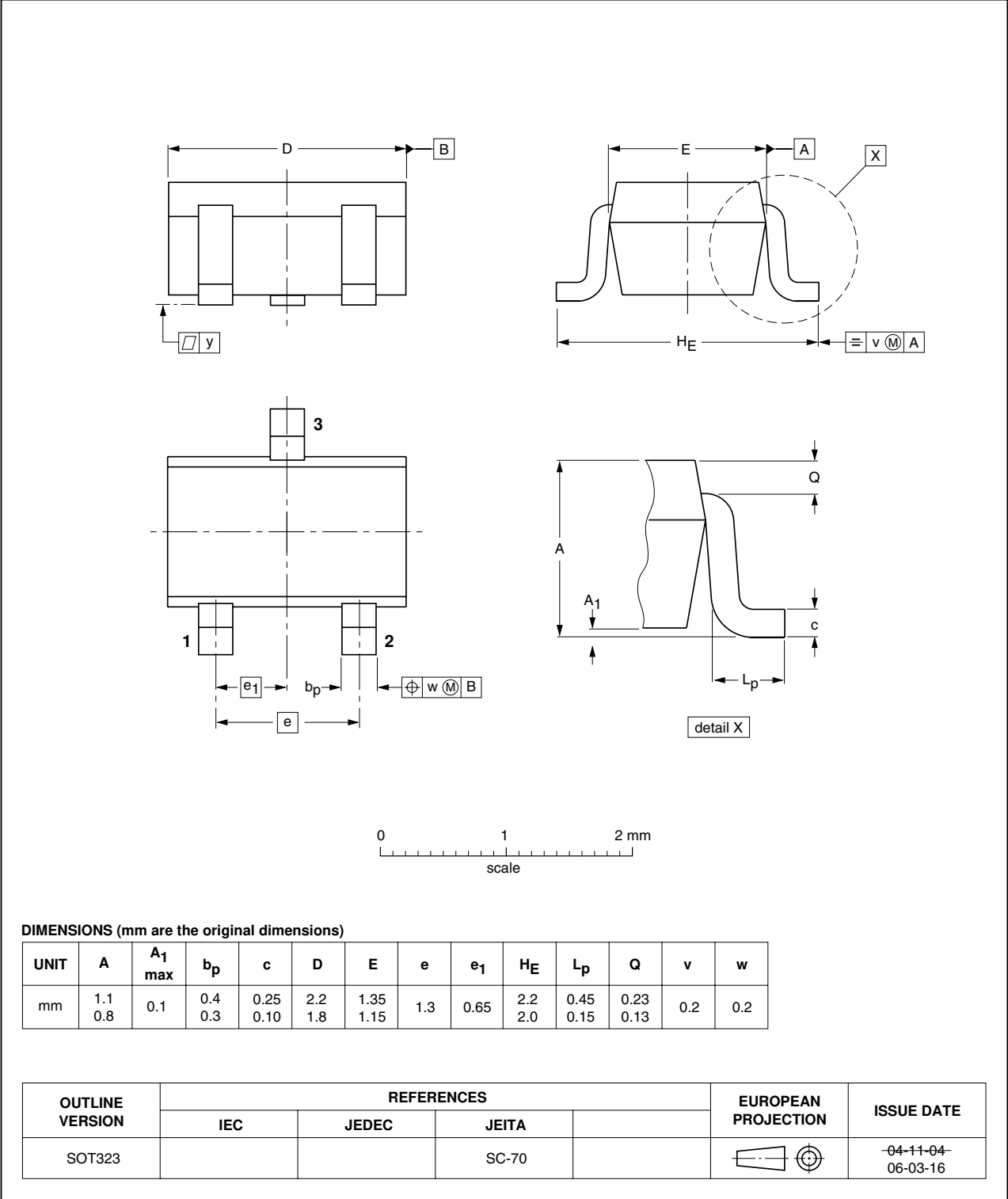
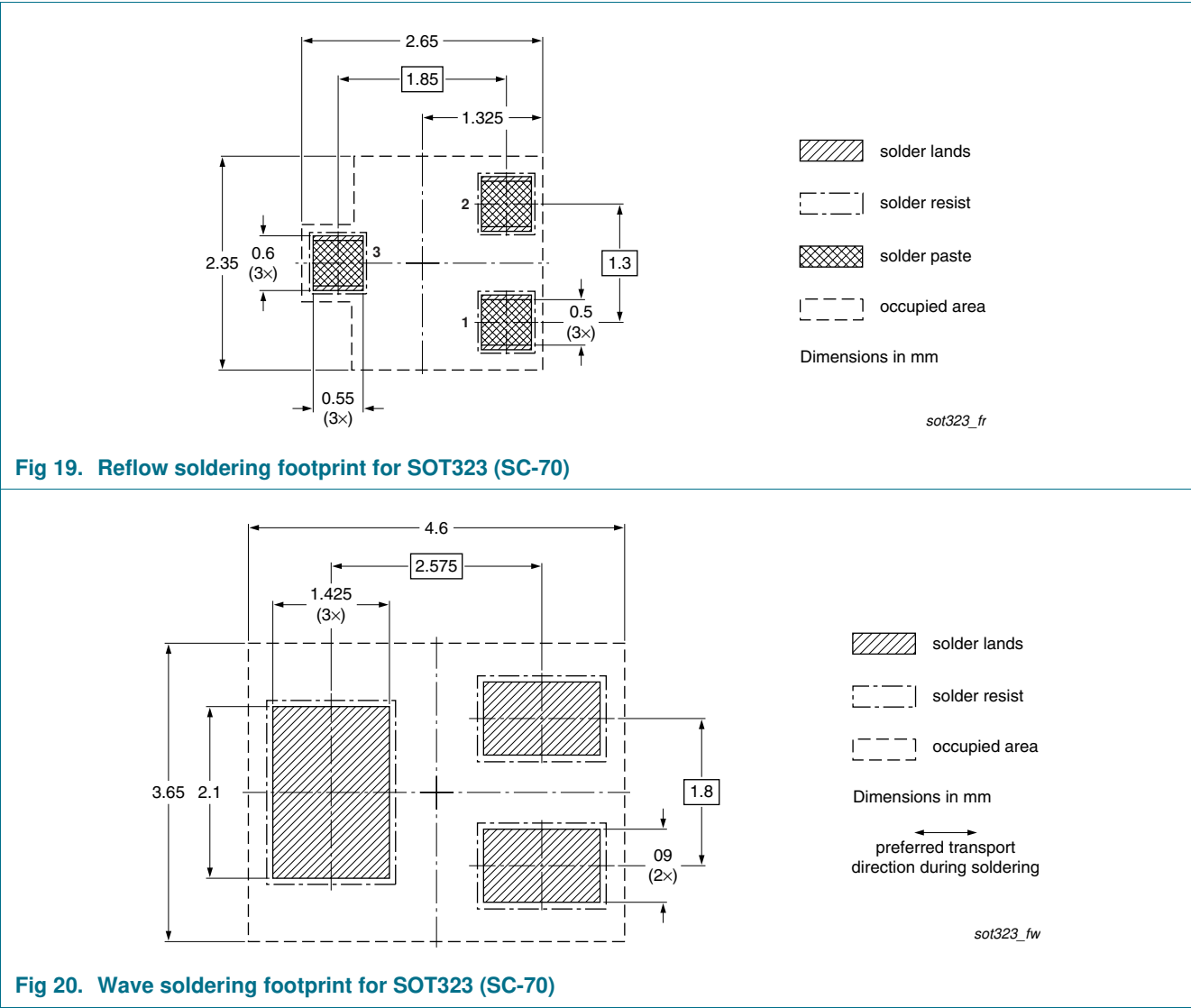


Fig 18. Package outline SOT323 (SC-70)

10. Soldering



11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BSS84AKW v.1	20110523	Product data sheet	-	-

12. Legal information

12.1 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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14. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Thermal characteristics	5
7	Characteristics	6
8	Test information	10
8.1	Quality information	10
9	Package outline	11
10	Soldering	12
11	Revision history	13
12	Legal information	14
12.1	Data sheet status	14
12.2	Definitions	14
12.3	Disclaimers	14
12.4	Trademarks	15
13	Contact information	15