IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

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As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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WeEn Semiconductors

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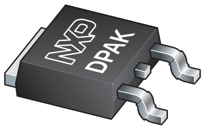


BUJ105AD

Silicon diffused power transistor

Rev. 2 — 3 November 2011 Product data sheet

1. Product profile

1.1 General description

High-voltage, high-speed planar-passivated NPN power switching transistor in a SOT428 (D-PAK) surface mounted package.

1.2 Features and benefits

- Low thermal resistance
- Fast switching

1.3 Applications

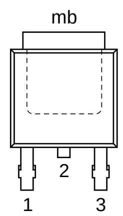
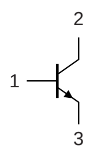
- Electronic lighting ballast
- Inverters
- DC-to-DC converters
- Motor control systems

1.4 Quick reference data

- $V_{CESM} \leq 700$ V
- $P_{tot} \leq 80$ W
- $I_C \leq 8$ A
- $h_{FEsat} = 11$ (typ)

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	base	 SOT428 (D-PAK)	 sym056
2	collector [1]		
3	emitter		
mb	mounting base; connected to collector		

[1] It is not possible to make a connection to pin 2 of the SOT428 (D-PAK) package.

3. Ordering information

Table 2. Ordering information

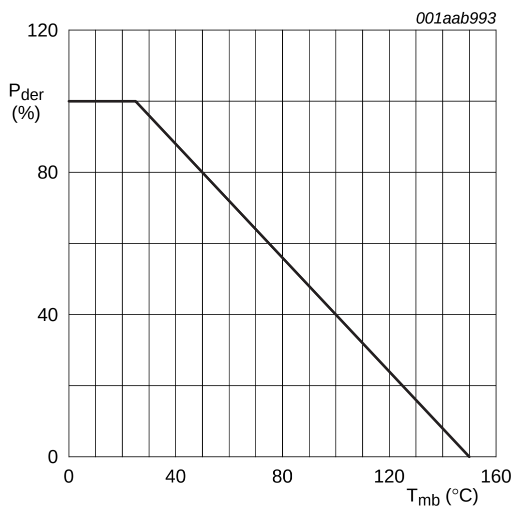
Type number	Package		
	Name	Description	Version
BUJ105AD	D-PAK	plastic single-ended surface mounted package; 3 leads (one lead cropped)	SOT428

4. Limiting values

Table 3. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CESM}	peak collector-emitter voltage	V_{BE} = 0 V	-	700	V
V_{CEO}	collector-emitter voltage	open base	-	400	V
V_{CBO}	collector-base voltage	open emitter	-	700	V
I_C	collector current (DC)		-	8	A
I_{CM}	peak collector current		-	16	A
I_B	base current (DC)		-	4	A
I_{BM}	peak base current		-	8	A
P_{tot}	total power dissipation	T_{mb} = ≤ 25 °C; see Figure 1	-	80	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		-	150	°C



$$P_{der}(\%) = \frac{P_{tot}}{P_{tot(25\,°C)}} \times 100\%$$

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

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 2		-	-	1.56	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	75	-	K/W

[1] Device mounted on a printed-circuit board; minimum footprint

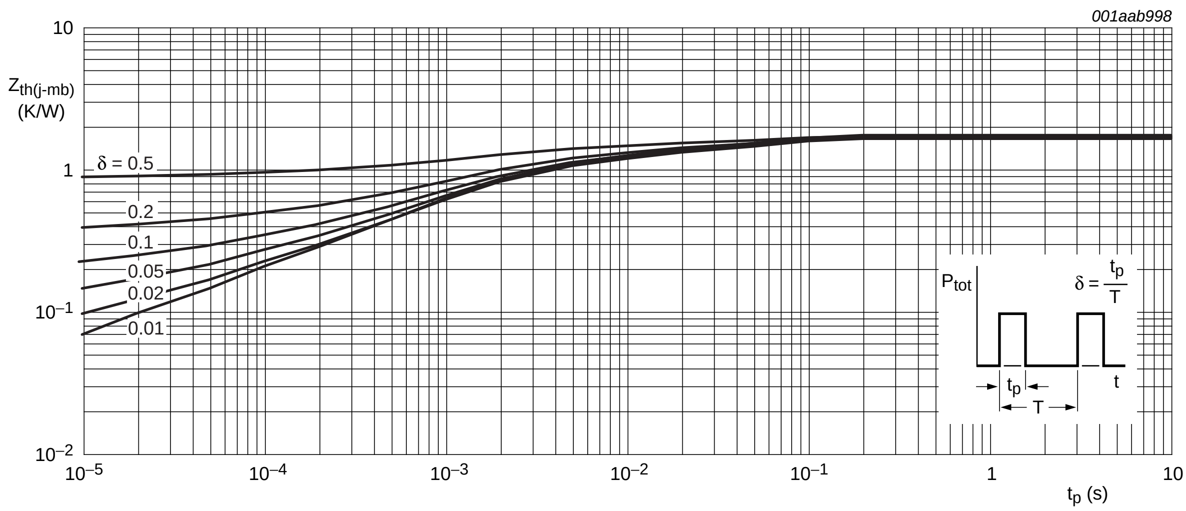


Fig 2. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

Table 5. Characteristics

T_{mb} = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{CES}	collector-emitter cut-off current	V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$	[1]	-	-	0.2	mA
		V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$; T_j = 125 °C	[1]	-	-	0.5	mA
I_{CBO}	collector-base cut-off current	V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$	[1]	-	-	0.2	mA
I_{CEO}	collector-emitter cut-off current	V_{CEO} = $V_{CEOMmax}$ = 400 V	[1]	-	-	0.1	mA
I_{EBO}	emitter-base cut-off current	V_{EB} = 9 V; I_C = 0 A		-	-	1	mA
V_{CEOsus}	collector-emitter sustaining voltage	I_B = 0 A; I_C = 10 mA; L = 25 mH; see Figure 3 and 4		400	-	-	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 4.0 A; I_B = 0.8 A; see Figure 11		-	0.3	1.0	V
V_{BEsat}	base-emitter saturation voltage	I_C = 4.0 A; I_B = 0.8 A; see Figure 12		-	1.0	1.5	V
h_{FE}	DC current gain	I_C = 1 mA; V_{CE} = 5 V		10	14	34	
		I_C = 500 mA; V_{CE} = 5 V; see Figure 10		13	23	36	
h_{FEsat}	DC saturation current gain	I_C = 4.0 A; V_{CE} = 5 V		8	11	15	

Table 5. Characteristics *...continued*

T_{mb} = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
Switching times (resistive load); see Figure 5 and 6						
t_{on}	turn-on time	I_{Con} = 5 A; I_{Bon} = –I_{Boff} = 1 A; R_L = 75 Ω	-	0.65	1	μs
t_{stg}	storage time		-	1.8	2.5	μs
t_f	fall time		-	0.3	0.5	μs
Switching times (inductive load); see Figure 7 and 8						
t_{stg}	storage time	I_{Con} = 5 A; I_{Bon} = 1 A; L_B = 1 μH; V_{BB} = –5 V	-	1.2	1.7	μs
t_f	fall time		-	20	50	ns
Switching times (inductive load); see Figure 7 and 8						
t_{stg}	storage time	I_{Con} = 5 A; I_{Bon} = 1 A; L_B = 1 μH; V_{BB} = –5 V; T_j = 100 °C	-	1.4	1.9	μs
t_f	fall time		-	25	100	ns

[1] Measured with half sine-wave voltage (curve tracer).

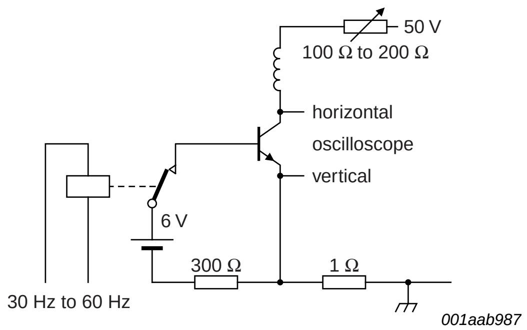


Fig 3. Test circuit for collector-emitter sustaining voltage

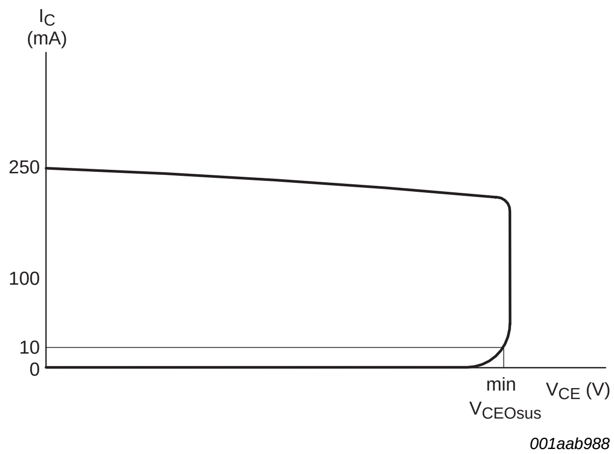
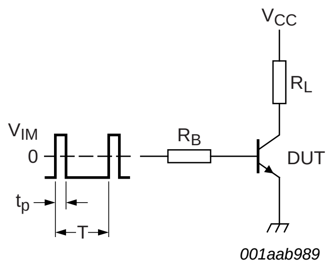


Fig 4. Oscilloscope display for collector-emitter sustaining voltage test waveform



V_{IM} = –6 V to +8 V; V_{CC} = 250 V; t_p = 20 µs;
$\delta = t_p/T$ = 0.01.

R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

Fig 5. Test circuit for resistive load switching

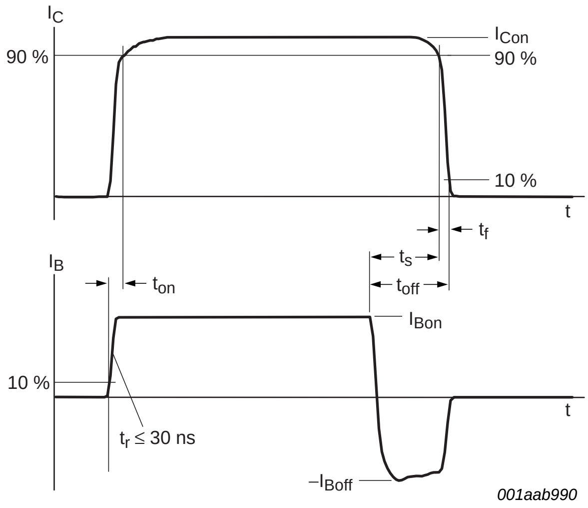
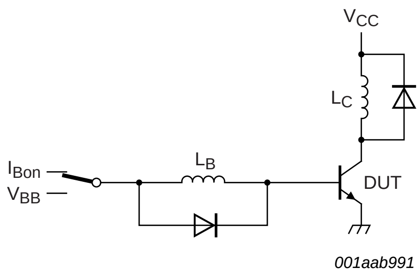


Fig 6. Switching times waveforms for resistive load



V_{CC} = 300 V; V_{BB} = –5 V; L_C = 200 µH; L_B = 1 µH.

Fig 7. Test circuit for inductive load switching

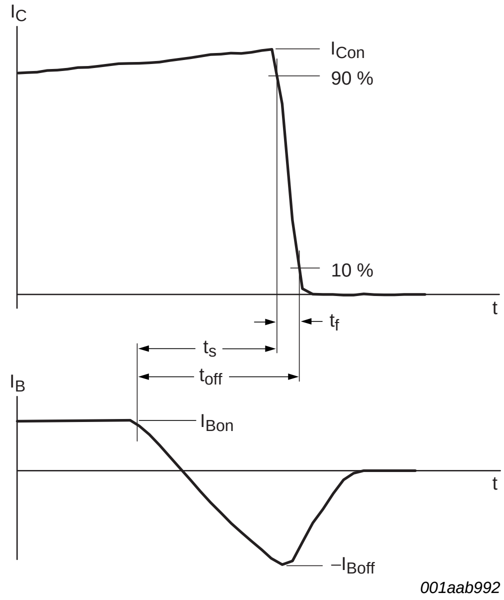


Fig 8. Switching times waveforms for inductive load

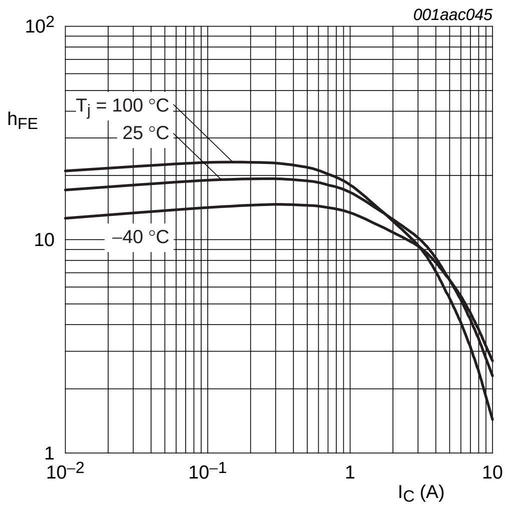


Fig 9. DC current gain as a function of collector current; typical values at V_{CE} = 1 V

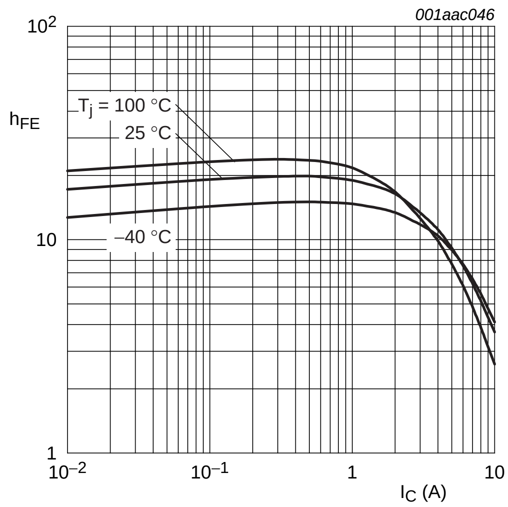
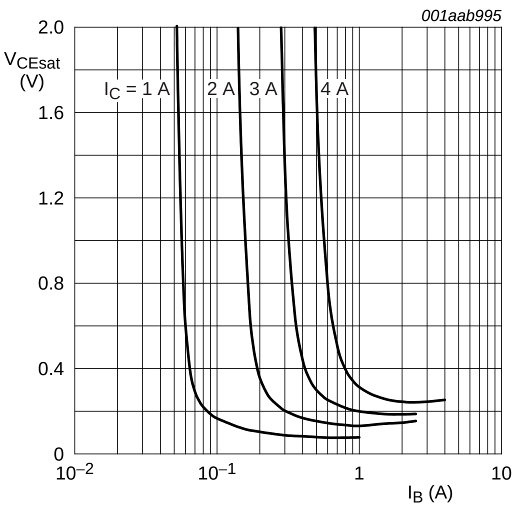
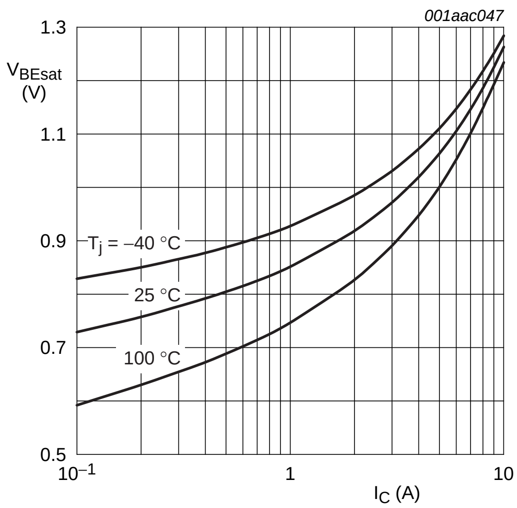


Fig 10. DC current gain as a function of collector current; typical values at V_{CE} = 5 V



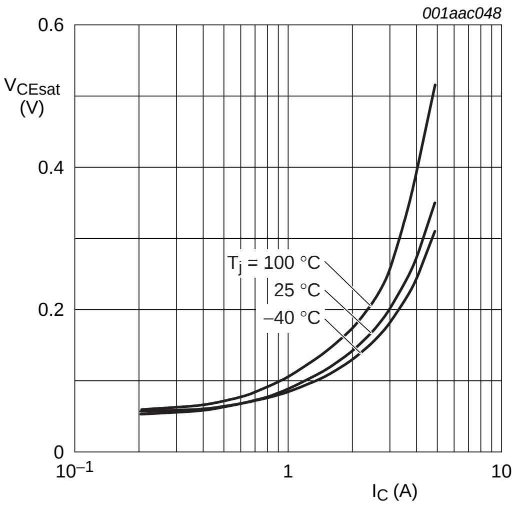
T_j = 25 °C.

Fig 11. Collector-emitter saturation voltage as a function of base current; typical values



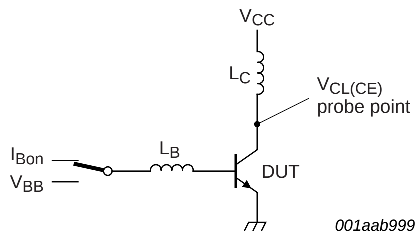
I_C/I_B = 4.

Fig 12. Base-emitter saturation voltage as a function of collector current; typical values



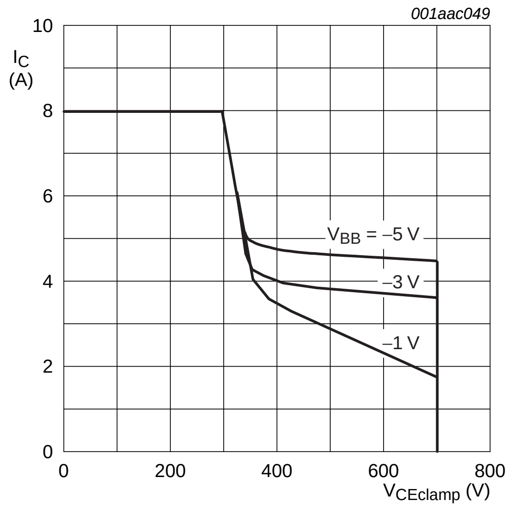
I_C/I_B = 4.

Fig 13. Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CEclamp}$ < 700 V; V_{CC} = 150 V; V_{BB} = −5 V, −3 V and −1 V; L_B = 1 μH; L_C = 200 μH.

Fig 14. Test circuit for reverse bias safe operating area



$T_j < T_{j(max)}$.

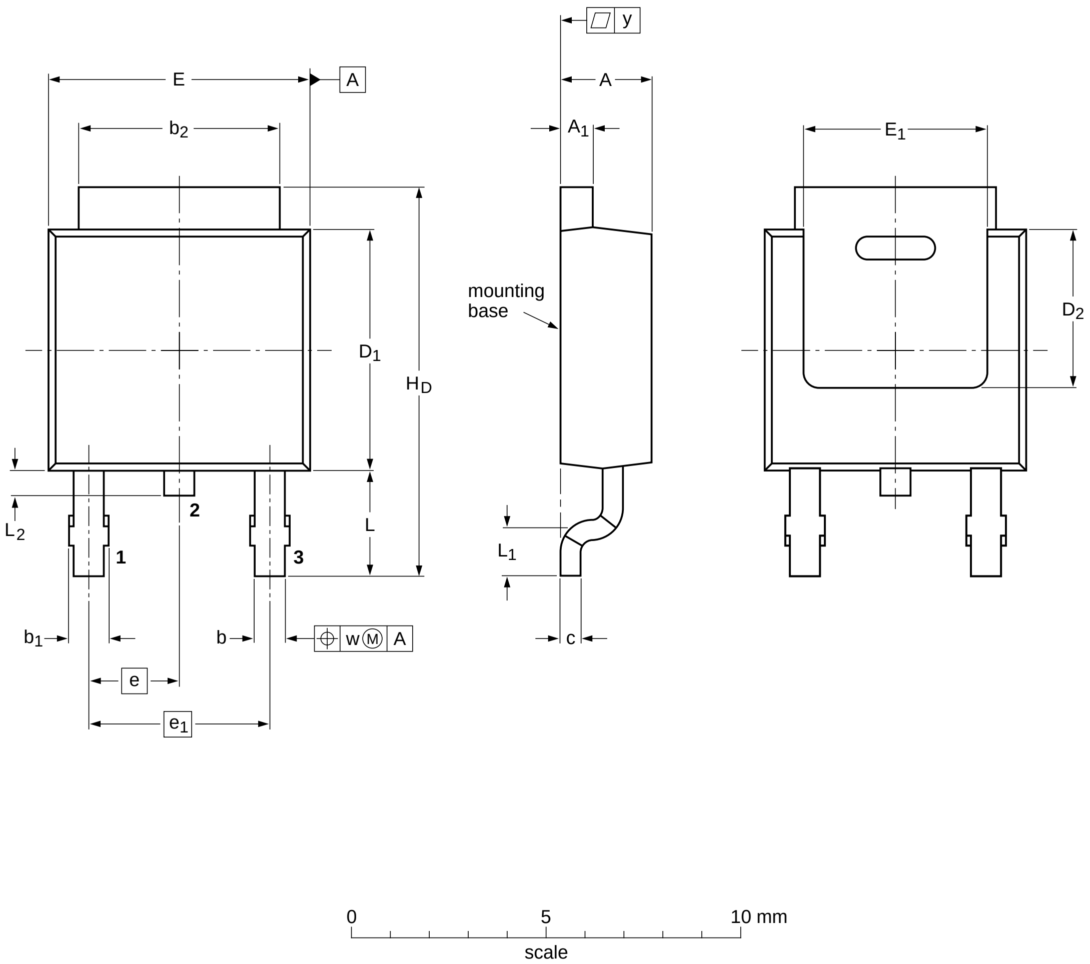
Fig 15. Reverse bias safe operating area

7. Package information

Epoxy meets requirements of UL94 V-0 at ⅛ inch.

8. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) **SOT428**



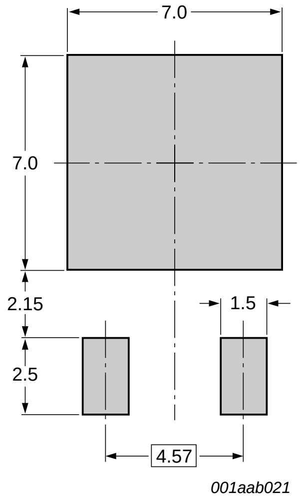
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D_1	D_2 min	E	E_1 min	e	e_1	H_D	L	L_1 min	L_2	w	y max
mm	2.38 2.22	0.93 0.46	0.89 0.71	1.1 0.9	5.46 5.00	0.56 0.20	6.22 5.98	4.0	6.73 6.47	4.45	2.285	4.57	10.4 9.6	2.95 2.55	0.5	0.9 0.5	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT428		TO-252	SC-63			~~06-02-14~~ 06-03-16

Fig 16. Package outline SOT428 (SC-63)

9. Mounting



Dimensions in mm.

Fig 17. SOT428 soldering pattern for surface mounting

10. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUJ105AD v.2	20111103	Product data sheet	-	BUJ105AD 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.			
BUJ105AD v.1	20041214	Product data sheet	-	-

11. Legal information

11.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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13. Contents

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Date of release: 3 November 2011

Document identifier: BUJ105AD