

UBA2080/1

Half-bridge driver IC

Rev. 1.1 — 6 December 2011

Objective data sheet

1. General description

The UBA2080 and UBA2081 are high voltage monolithic integrated circuits made using the latch-up free Silicon-On-Insulator (SOI) process. The circuit is designed for driving MOSFETs in a half-bridge configuration.

2. Features and benefits

- Integrated half-bridge driver circuit
- Integrated bootstrap diode
- Maximum voltage of 600 V
- Output driver capability: $I_{O(\text{sink})} = 400 \text{ mA}$ and $I_{O(\text{source})} = 200 \text{ mA}$
- Maximum frequency 800 kHz
- UBA2080:
 - ◆ Outputs in phase with inputs
- UBA2081:
 - ◆ Adjustable dead-time
 - ◆ Shutdown input

3. Applications

- Driver (via external MOSFETs) for any kind of load in a half-bridge configuration

4. Ordering information

Table 1. Ordering information

Type number	Package		Version
	Name	Description	
UBA2080P	DIP8	plastic dual in-line package; 8 leads	SOT97-1
UBA2081P			
UBA2080T	SO8	plastic small outline package; 8 leads	SOT96-1
UBA2081T			
UBA2080AT	SO14	plastic small outline package; 14 leads	SOT108-1



5. Block diagram

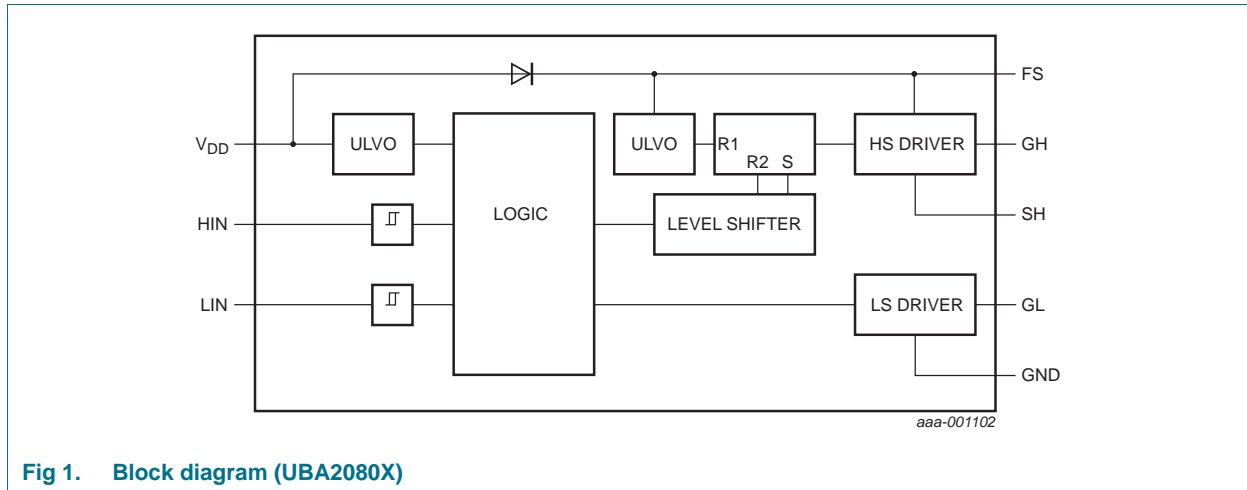


Fig 1. Block diagram (UBA2080X)

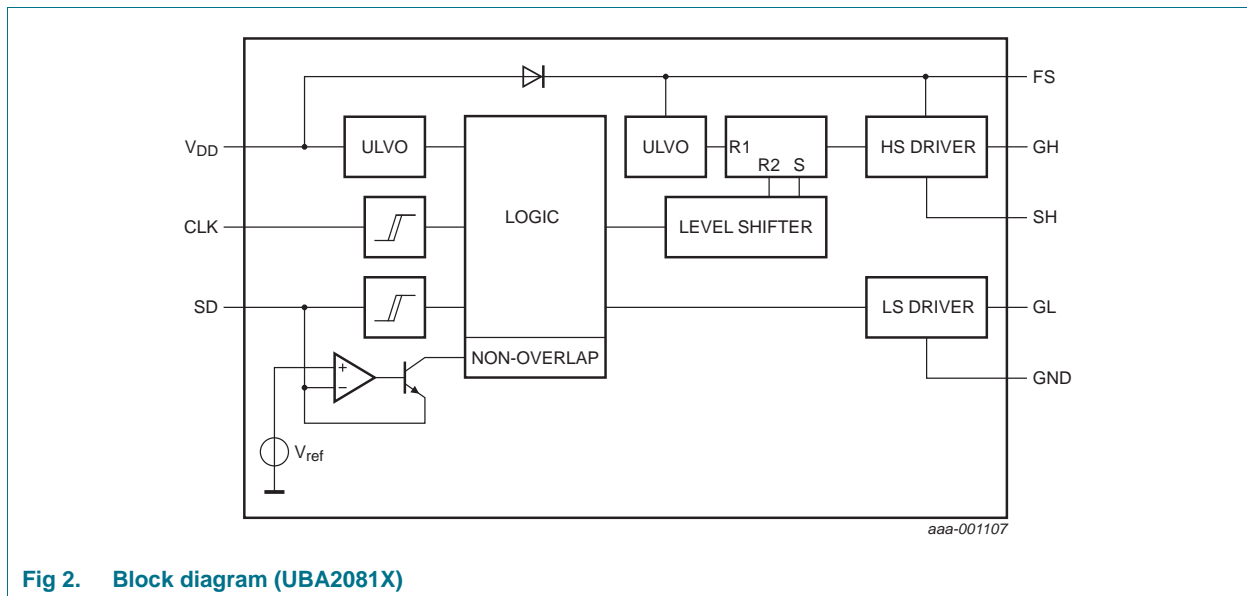
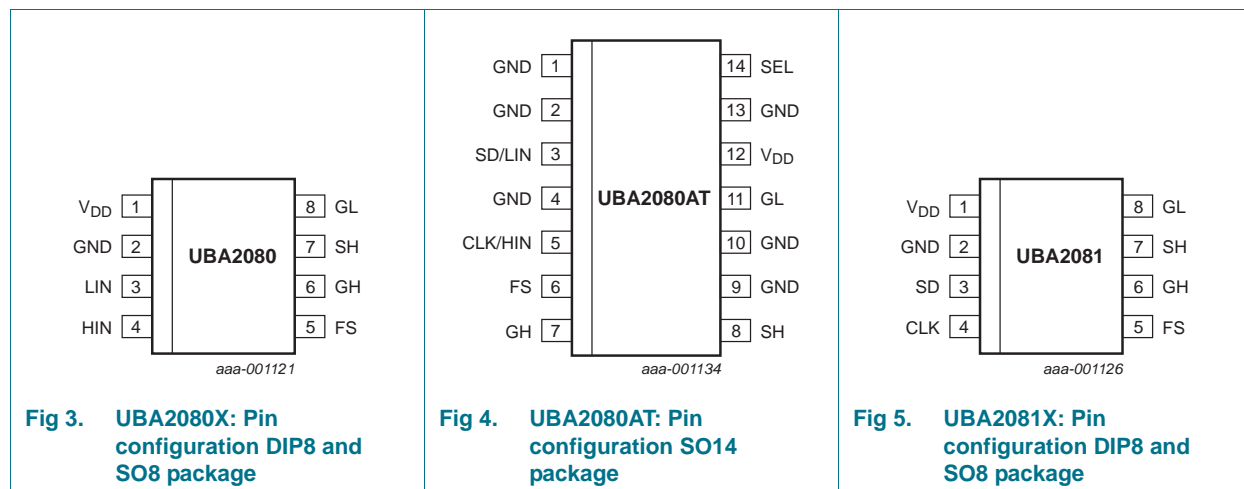


Fig 2. Block diagram (UBA2081X)

Refer to [Figure 7 “Typical UBA2080X application”](#) and [Figure 8 “Typical UBA2081X application”](#) for detailed information on the required application components.

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 2. Pin description UBA2080X/1X DIP8 and SO8

Symbol	Pin		Description
	UBA2080X (DIP8/SO8)	UBA2081X (DIP8/SO8)	
V _{DD}	1		IC supply
GND	2		IC ground and low-side driver return
LIN	3	-	low-side driver logic input
SD	-	3	low-side driver logic input
HIN	4	-	high-side driver logic input
CLK	-	4	high-side driver logic input
FS	5		floating supply voltage
GH	6		high-side MOSFET gate
SH	7		high-side MOSFET source
GL	8		low-side MOSFET gate

Table 3. Pin description UBA2080AT (SO14)

Symbol	Pin	Description
GND	1, 2, 4, 9, 10, 13	IC ground and low side driver return
SD/LIN	3	low-side driver logic input
CLK/HIN	5	high-side driver logic input
FS	6	floating supply voltage
SH	8	high-side MOSFET source
GH	7	high-side MOSFET gate

Table 3. Pin description UBA2080AT (SO14) ...continued

Symbol	Pin	Description
GL	11	low-side MOSFET gate
V _{DD}	12	IC supply
SEL	14	select UBA2080 or UBA2081 functionality

7. Functional description

7.1 Start-up state

The IC enters the start-up state when the supply voltage on pin V_{DD} increases. In the start-up state, the high-side power transistor is non-conducting and the low-side power transistor is switched on. The internal circuit is reset and the capacitor on the bootstrap pin FS is charged. The start-up state is defined until the value of V_{DD} = the V_{DD(start)} value. After which the IC switches to the oscillation state.

The circuit enters the start-up state again when the voltage on pin V_{DD} < V_{DD(stop)}.

7.2 UBA2080 oscillation state

In the oscillation state, the output voltage of the GL and GH drivers depend on the logical signals HIN and LIN, see [Table 4](#)

To prevent cross conduction in the half-bridge MOSFETs, the combination HIN = LIN = 1 is not allowed. Both GL and GH are LOW under this condition.

Table 4. logic table

State	HIN	LIN	GL	GH
Start-up	-	-	HIGH	LOW
Oscillation	0	0	LOW	LOW
Oscillation	0	1	HIGH	LOW
Oscillation	1	0	LOW	HIGH
Oscillation	1	1	LOW	LOW

7.3 UBA2081 oscillation state

In the oscillation state, the output voltage of the GL and GH drivers depend on the logical signals CLK and SD, see [Table 5](#)

Table 5. logic table

State	CLK	SD	GL	GH
Start-up	-	-	HIGH	LOW
Oscillation	0	0	HIGH	LOW
Oscillation	1	0	LOW	HIGH
Oscillation	0	1	LOW	LOW
Oscillation	1	1	LOW	LOW

7.4 UBA2081 non-overlap time

The external resistor (R_{SD}) on pin SD sets the non-overlap time of the UBA2081. The relationship between this resistor value and actual dead-time is listed in [Figure 6](#).

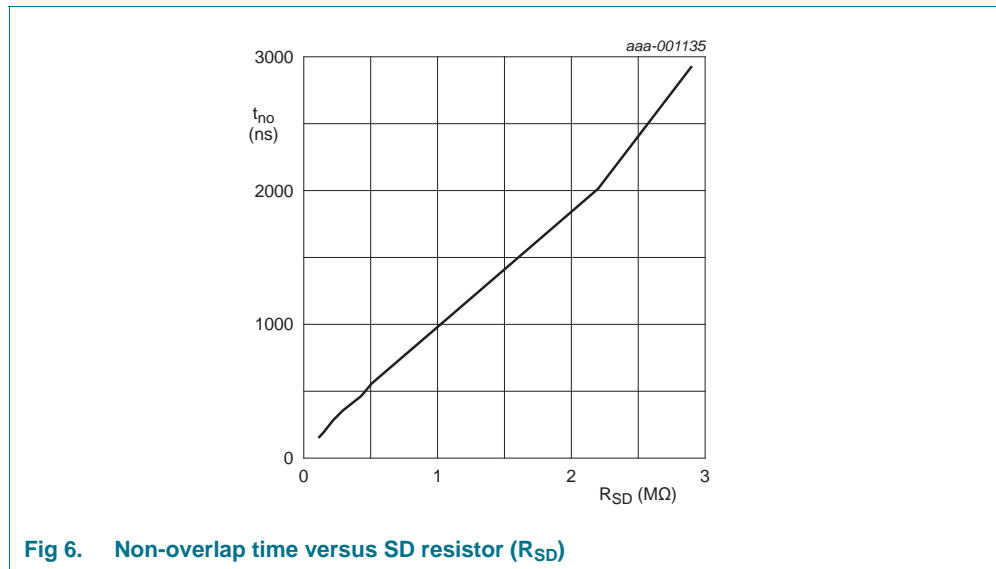


Fig 6. Non-overlap time versus SD resistor (R_{SD})

8. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DD}	supply voltage	nominal	0	14	V
V_{FS}	voltage on pin FS		V_{SH}	$V_{SH} + 14$	V
V_{SH}	voltage on pin SH	source high-side MOSFET	-3	600	V
		$t < 1 \mu s$	-14	600	V
$V_{i(HIN)}$	input voltage on pin HIN	logic input for high-side driver	0	14	V
$V_{i(LIN)}$	input voltage on pin LIN	logic input for low-side driver	0	14	V
V_{CLK}	voltage on pin CLK	logic input for output drivers	0	14	V
$V_{i(SD)}$	input voltage on pin SD	logic input for output drivers and analog input for non-overlap setting	0	14	V
SR	slew rate	on pin SH; repetitive	-6	+6	V/ns
T_j	junction temperature		-40	+150	°C
T_{amb}	ambient temperature		-40	+150	°C
T_{stg}	storage temperature		-55	+150	°C
V_{ESD}	electrostatic discharge voltage	human body model:	[1]		
		pins FS, GH and SH	-	1	kV
		pins V_{DD} , HIN, LIN, SD, CLK	-	2	kV
		machine model:	[2]		
		all pins	-	250	V

[1] In accordance with the Human Body Model (HBM): equivalent to discharging a 100 pF capacitor through a 1.5 k Ω series resistor.

[2] In accordance with the Machine Model (MM): equivalent to discharging a 200 pF capacitor through a 1.5 k Ω series resistor and a 0.75 μ H inductor.

9. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
SO8				
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	160 K/W
SO14 and DIP8				
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	100 K/W

[1] In accordance with IEC 60747-1.

10. Characteristics

Table 8. Characteristics

$T_j = 25\text{ }^\circ\text{C}$; all voltages are measured with respect to SGND; $V_{DD} = 12.8\text{ V}$; positive currents flow into the IC.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
High-voltage supply						
I_{leak}	leakage current	FS = GH = SH = 600 V	-	-	10	μA
Start-up state						
I_{VDD}	current on pin V_{DD}		420	520	620	μA
$V_{DD(start)}$	start supply voltage		11	12	13	V
$V_{DD(stop)}$	stop supply voltage		8	8.5	9	V
$V_{DD(hys)}$	hysteresis of supply voltage	start to stop	3	3.5	4	V
Pin LIN input						
V_{IH}	HIGH-level input voltage		1.6	2.2	2.8	V
$V_{hys(LIN)}$	hysteresis voltage on pin LIN		-	400	-	mV
$I_{I(LIN)}$	input current on pin LIN		-	0	1	μA
Pin HIN input						
V_{IH}	HIGH-level input voltage		1.6	2.2	2.8	V
$V_{hys(HIN)}$	hysteresis voltage on pin HIN		-	400	-	mV
$I_{I(HIN)}$	input current on pin HIN		-	0	1	μA
Pin CLK input						
V_{IH}	HIGH-level input voltage		2.7	-	-	V
V_{IL}	LOW-level input voltage		-	-	0.8	V
$I_{I(CLK)}$	input current on pin CLK		-	0	1	μA
Pin SD input						
V_{IH}	HIGH-level input voltage	to activate shutdown	1.6	2.2	2.8	V
$V_{hys(SD)}$	hysteresis voltage on pin SD		-	400	-	mV
t_{no}	non-overlap time	$R_{SD} = 100\text{ k}\Omega$; typical minimum	-	140	-	ns
		$R_{SD} = 3\text{ M}\Omega$; typical maximum	-	2.4	-	μs
gate drivers						
$I_{O(source)}$	output source current	$V_{FS} = V_{VDD} = 12\text{ V}$; $V_{SH} = 0\text{ V}$; $V_{GH} = V_{GL} = 8\text{ V}$	-	200	-	mA
$I_{O(sink)}$	output sink current	$V_{FS} = V_{VDD} = 12\text{ V}$; $V_{SH} = 0\text{ V}$; $V_{GH} = V_{GL} = 4\text{ V}$	-	400	-	mA
$V_{d(bs)}$	bootstrap diode voltage	$I_{d(bs)} = 20\text{ mA}$	-	2.3	-	V
V_{UVLO}	undervoltage lockout voltage	reset	3.6	4.2	4.8	V
I_{FS}	current on pin FS	$V_{FS} = V_{VDD} = 12\text{ V}$; $V_{SH} = 0\text{ V}$	27	32	37	μA
Timing						
t_d	delay time	UBA2080	-	50	-	ns
t_{on}	turn-on time	UBA2080	-	240	-	ns
t_{off}	turn-off time	UBA2080	-	180	-	ns
f_{max}	maximum frequency		800	-	-	kHz

11. Application information

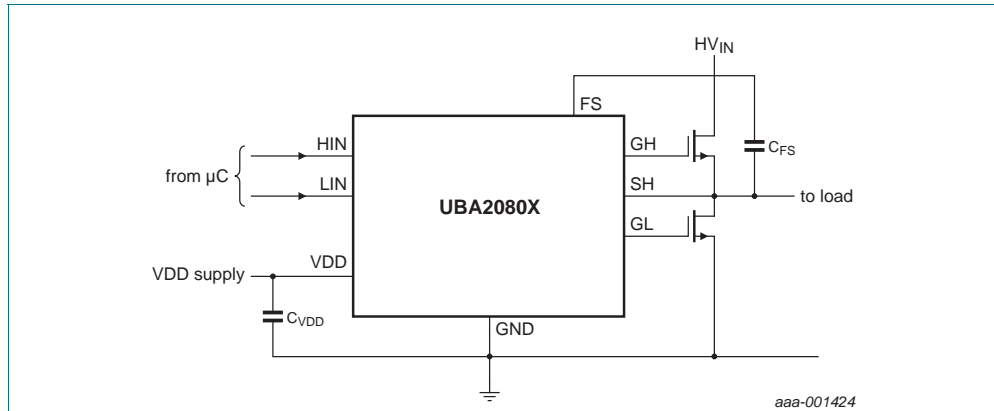
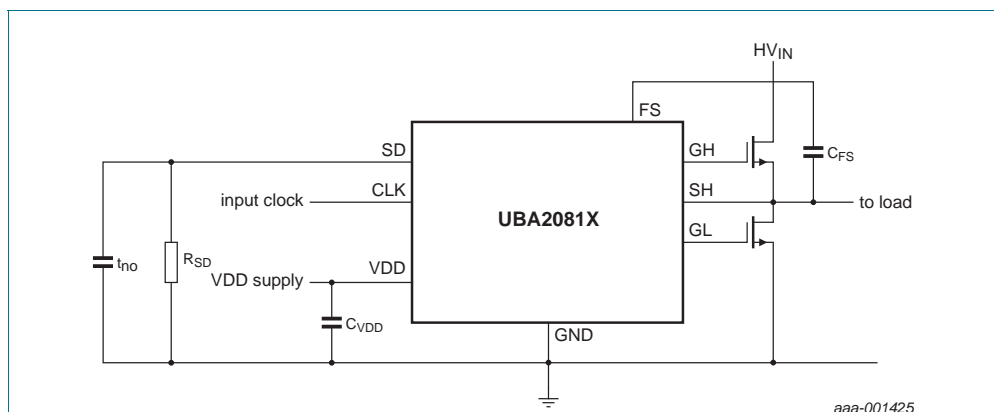


Fig 7. Typical UBA2080X application



Remark: The capacitor connected to the SD pin ensures a noise immune dead-time.

Fig 8. Typical UBA2081X application

12. Package outline

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1

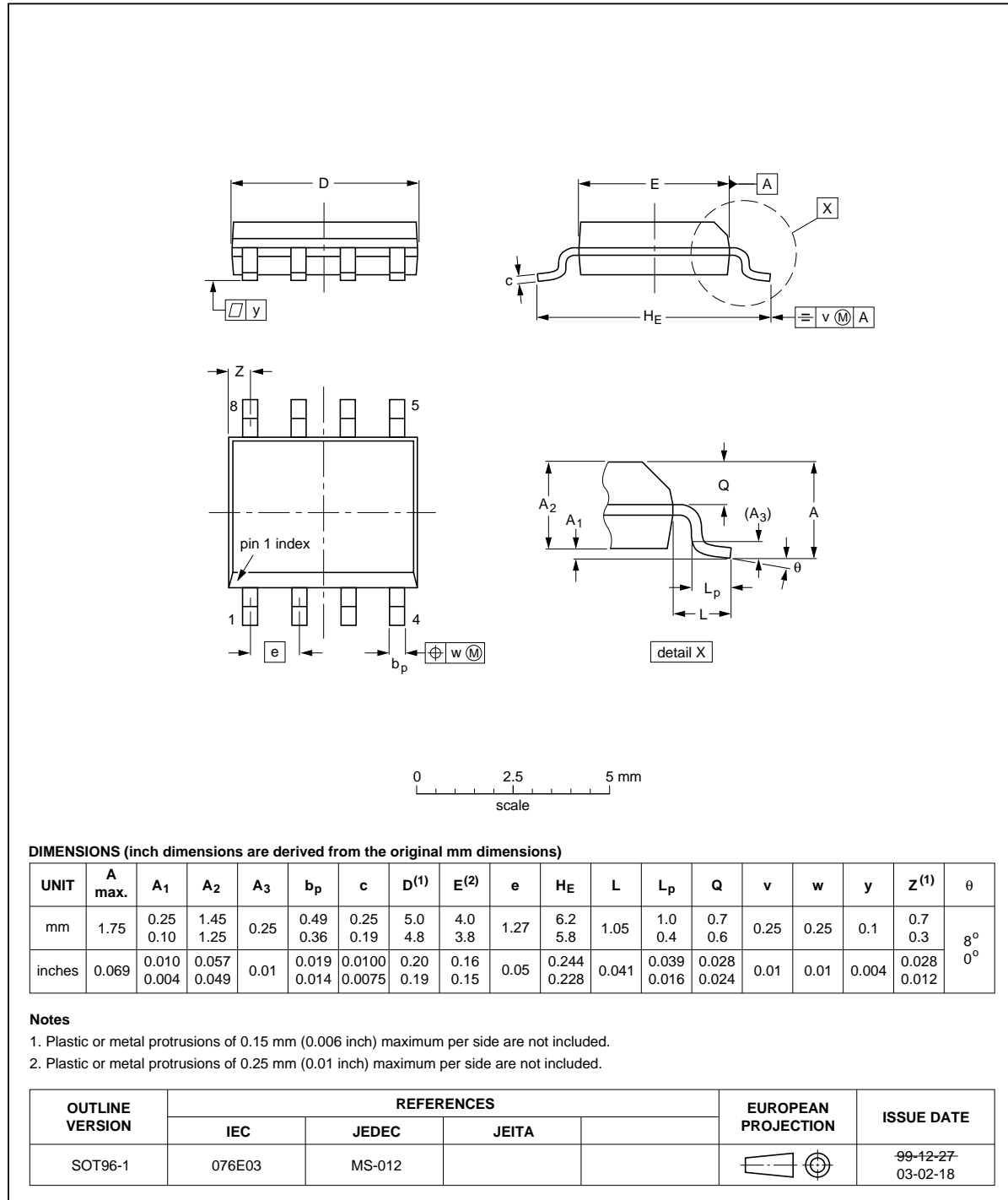


Fig 9. Package outline SOT96-1

DIP8: plastic dual in-line package; 8 leads (300 mil)

SOT97-1

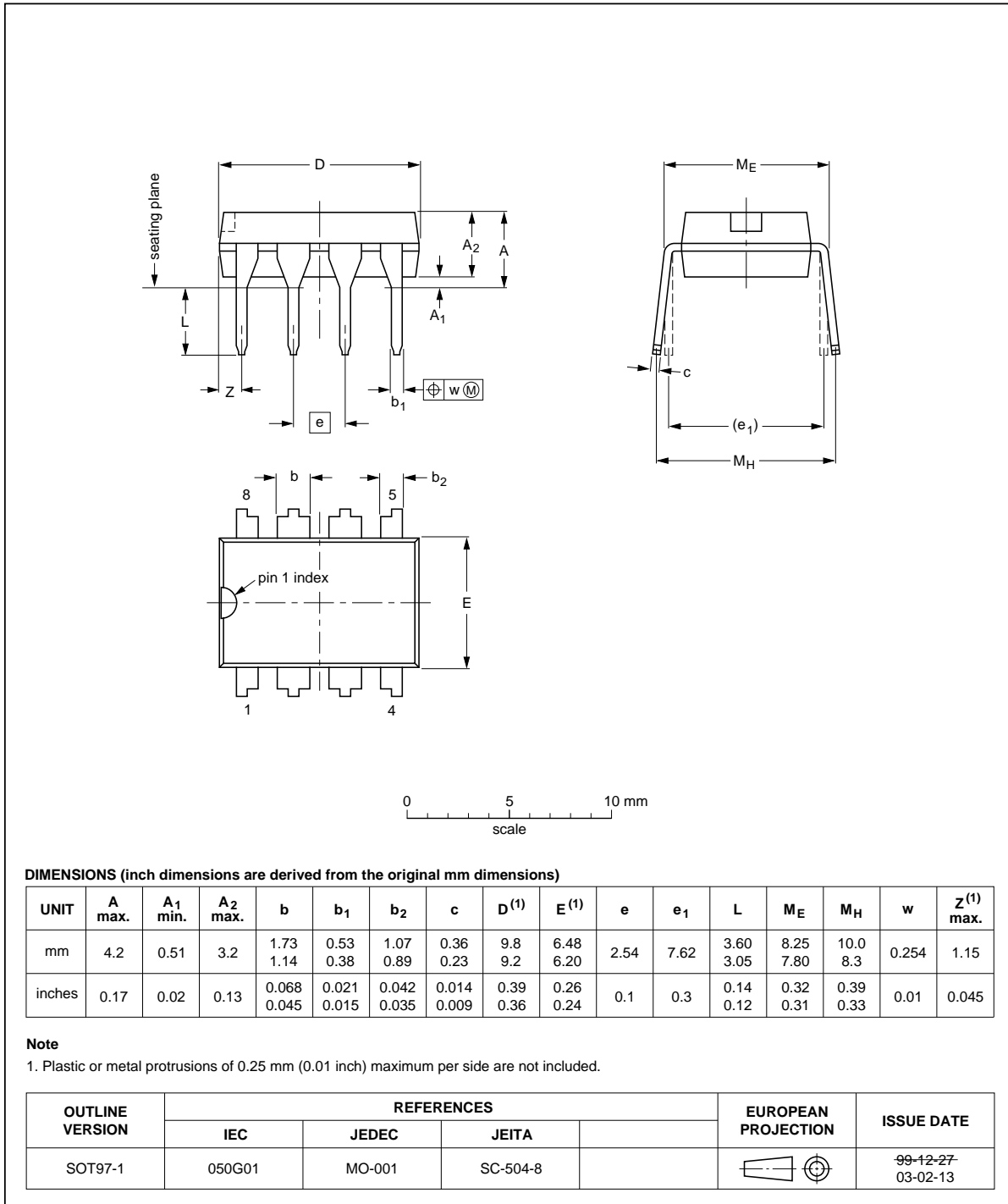


Fig 10. Package outline SOT97-1

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

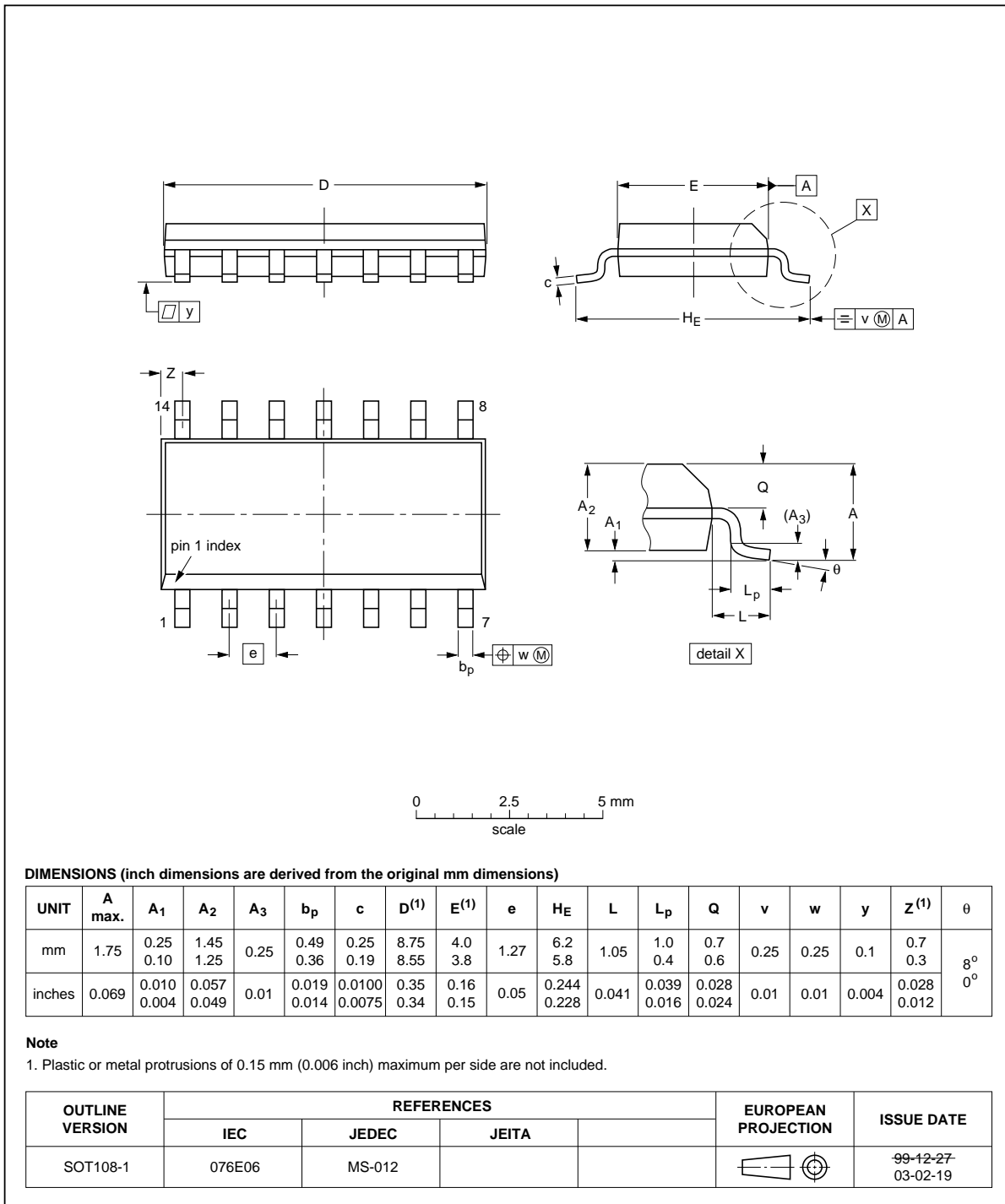


Fig 11. Package outline SOT108-1

13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
UBA2080_UBA2081 v.1.1	20111206	Objective data sheet	-	UBA2080_UBA2081 v.1
Modifications:	• Figure 6 “Non-overlap time versus SD resistor (R_{SD})” on page 5 : Axes units changed.			
UBA2080_UBA2081 v.1	20111116	Objective data sheet	-	

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14.1 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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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