DATA SHEET

ADDENDUM

mifare® ultra light

Contactless Single-trip Ticket ICs

MF0 IC U10 01
MF0 IC U11 01

Specification “bumped sawn wafer on UV-tape”

Product Specification

Revision 3.0

PUBLIC

August 2004

Philips Semiconductors

PHILIPS

Bumped sawn wafer on UV-tape

MF0 IC U10 01
MF0 IC U11 01

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MIFARE® is a registered trademark of Philips Electronics N.V.

Bumped sawn wafer on UV-tape

MF0 IC U10 01
MF0 IC U11 01

1 SCOPE

The MF0 IC U10 01 and the MF0 IC U11 01 are contactless Smart Card ICs designed for card IC coils following the mifare® Card IC Coil Design Guide and are qualified to work properly in Philips´ reader environment, which is built according to Philips´ specification.

This specification describes electrical, physical and dimensional properties of wafers.

2 REFERENCE DOCUMENTS

2.1 Philips Documents

- Data Sheet “General Specification for 8” Wafer on UV-tape”
- Data Sheet “Au Bumps Layout Rules and Specification”
- Data Sheet “Contactless Single-trip Ticket IC MF0 IC U1 Functional Specification”
- Application Note “mifare® Card IC Coil Design Guide”
- Data Sheet "Specification of the IBIS wafer map"

3 MECHANICAL SPECIFICATION

3.1 Wafer

- Diameter: 200 mm
- Thickness: 150 µm ± 15 µm
- PGDW: 62861
- PCM location: reticle area

3.2 Wafer Backside

- Material: Si
- Treatment: ground and etched
- Roughness: R_a max. 0.5 µm
  R_t max. 5 µm

3.3 Chip Dimensions

- Chip size: 0.69 x 0.69 mm
- Scribe line: 66.4 / 86.4 µm
- Pad size:
  - LA, LB 104 x 104 µm
  - TEST, VSS [1] 74 x 74 µm

[1] Pads TEST and VSS are disconnected when wafer is sawn.

3.4 Passivation

- Type: sandwich structure
- Material: PSG/Nitride(on top)
- Thickness: 500 nm / 600 nm

3.5 Au Bump

- Bump material: > 99.9% pure Au
- Bump hardness: 35 - 80 HV 0.005
- Bump shear strength: > 70 MPa
- Bump height: 18 µm
- Bump height uniformity:
  - within a die: ± 2 µm
  - within a wafer: ± 3 µm
  - wafer to wafer: ± 4 µm
- Bump flatness: ± 1.5 µm
- Bump size:
  - LA, LB 90 x 90 µm
  - TEST, VSS 60 x 60 µm
- Bump size variation: ± 5 µm
- Under bump metallisation: sputtered TiW

3.6 Fail Die Identification

All fail dies are inked according to electical test results.

Electronic wafer mapping (IBIS format) covers the electrical test results and additionally the results of mechanical / visual inspection.

4 ORDERING INFORMATION

4.1 Bumped Die on Sawn Wafer

- Order Code: MF0ICU1001W/V1D
- 12NC: 9352 774 63005

- Order Code: MF0ICU1101W/V1D
- 12NC: 9352 774 72005

Note: Substrate is connected to VSS.

Bumped sawn wafer on UV-tape

MF0 IC U10 01
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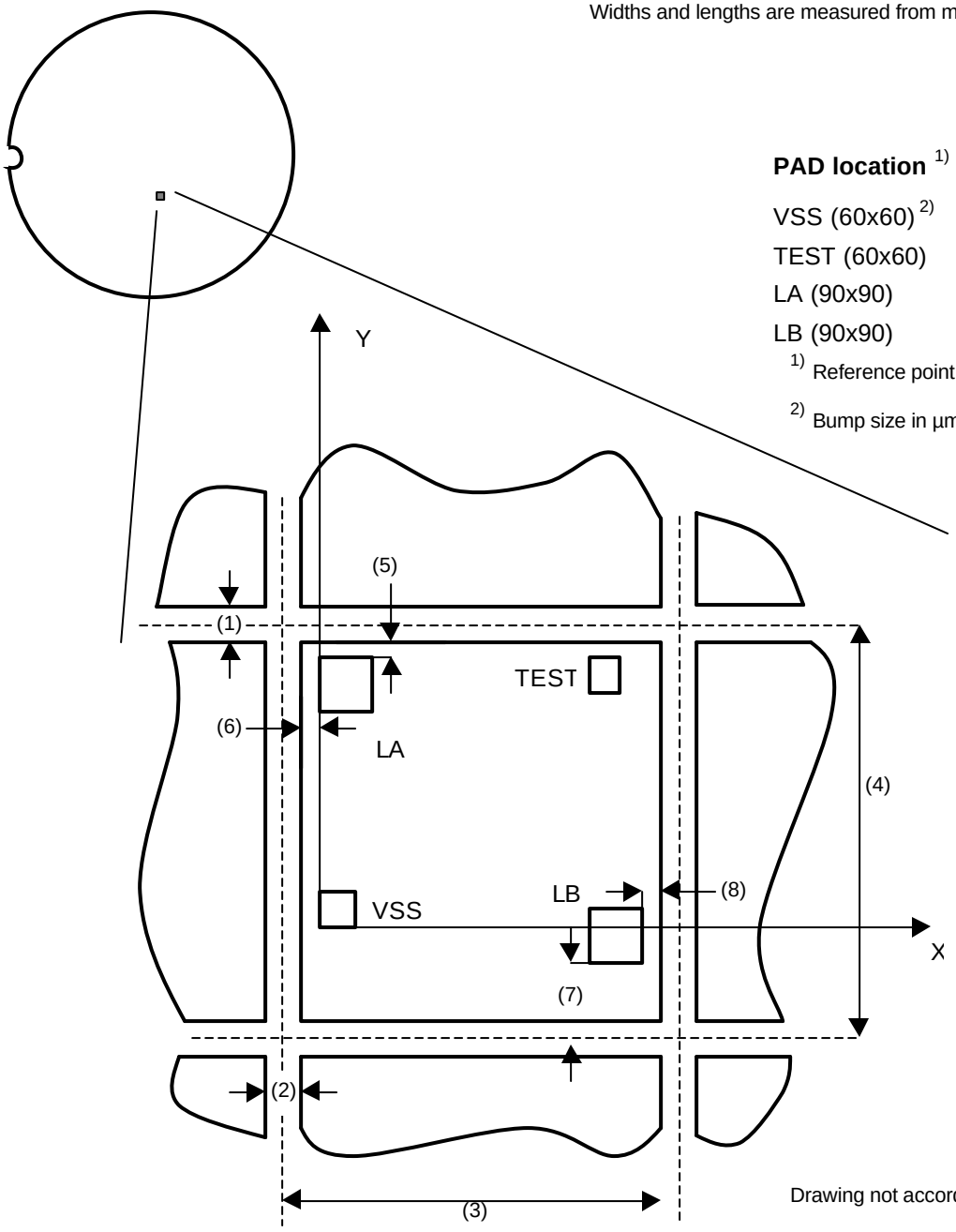
5 CHIP ORIENTATION AND BONDPAD LOCATIONS

Widths and lengths are measured from metal to metal (top layer).

PAD location [1]	x [µm]	y [µm]
VSS (60x60) [2]	0.0	0.0
TEST (60x60)	461.0	382.2
LA (90x90)	0.0	352.2
LB (90x90)	462.0	-79.4

[1] Reference point: Lower left corner of pad.

[2] Bump size in µm



Drawing not according to scale!

(1) X-Scribeline width: 66.4 µm
(2) Y-Scribeline width: 86.4 µm
(3) Chip step, x-length: 0.69 mm
(4) Chip step, y-length: 0.69 mm
(5) LA pad edge to chip edge, y-length: 18.1 µm
(6) LA pad edge to chip edge, x-length: 18.8 µm
(7) LB pad edge to chip edge, y-length: 70.0 µm
(8) LB pad edge to chip edge, x-length: 18.8 µm

Figure 1

6 ELECTRICAL SPECIFICATIONS

6.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT
I_{IN}	input current	-	30	mA
T_{STOR}	storage temperature	-55	125	°C
T_{OP}	operating temperature	-25	70	°C
V_{ESD}	electrostatic discharge voltage[2] LA-LB	2	-	kV
I_{LU}	latchup current	±100		mA

6.2 AC Characteristics MF0 IC U10 01

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
f_{IN}	input frequency		-	13.56	-	MHz
C_{IN}	input capacitance (LCR meter HP4258)	22°C, Cp-D, 13.56 MHz, 2V	-	16.9	-	pF
t_W	EEPROM write time		-	3.8	-	ms
t_{RET}	EEPROM data retention		5			years
N_{WE}	EEPROM write endurance		10000			cycles

6.3 AC Characteristics MF0 IC U11 01

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
f_{IN}	input frequency		-	13.56	-	MHz
C_{IN}	input capacitance (LCR meter HP4258)	22°C, Cp-D, 13.56 MHz, 2V	-	50	-	pF
t_W	EEPROM write time		-	3.8	-	ms
t_{RET}	EEPROM data retention		5			years
N_{WE}	EEPROM write endurance		10000			cycles

[2] MIL Standard 883-C method 3015; Human body model: C = 100 pF, R = 1.5 kΩ

7 DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics section of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

8 LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so on their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

9 REVISION HISTORY

Table 1 Bumped Wafer Specification MF0 IC U10 01, MF0 IC U11 01 Revision History

REVISION	DATE	CPCN	PAGE	DESCRIPTION
3.0	August 2004			Initital version.

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