FEATURE

- Compatible with ISO/IEC 14443A Standard
- No external power supply required
- 13.56MHz operating frequency
- **Total** embedded 2048 bit OTP memory
- 100% ASK demodulator
- Cascaded two level 7 byte serial number
- 106 kbps for high data rate,
- Manchester encoding TX data output

OTP Memory

- 224 x 8 bits of data memory organized in 56 pages
- Each page is organized in 4 bytes for one time programming
- Data retention up to 10 years
- Private 32bits password protected Self destruct function

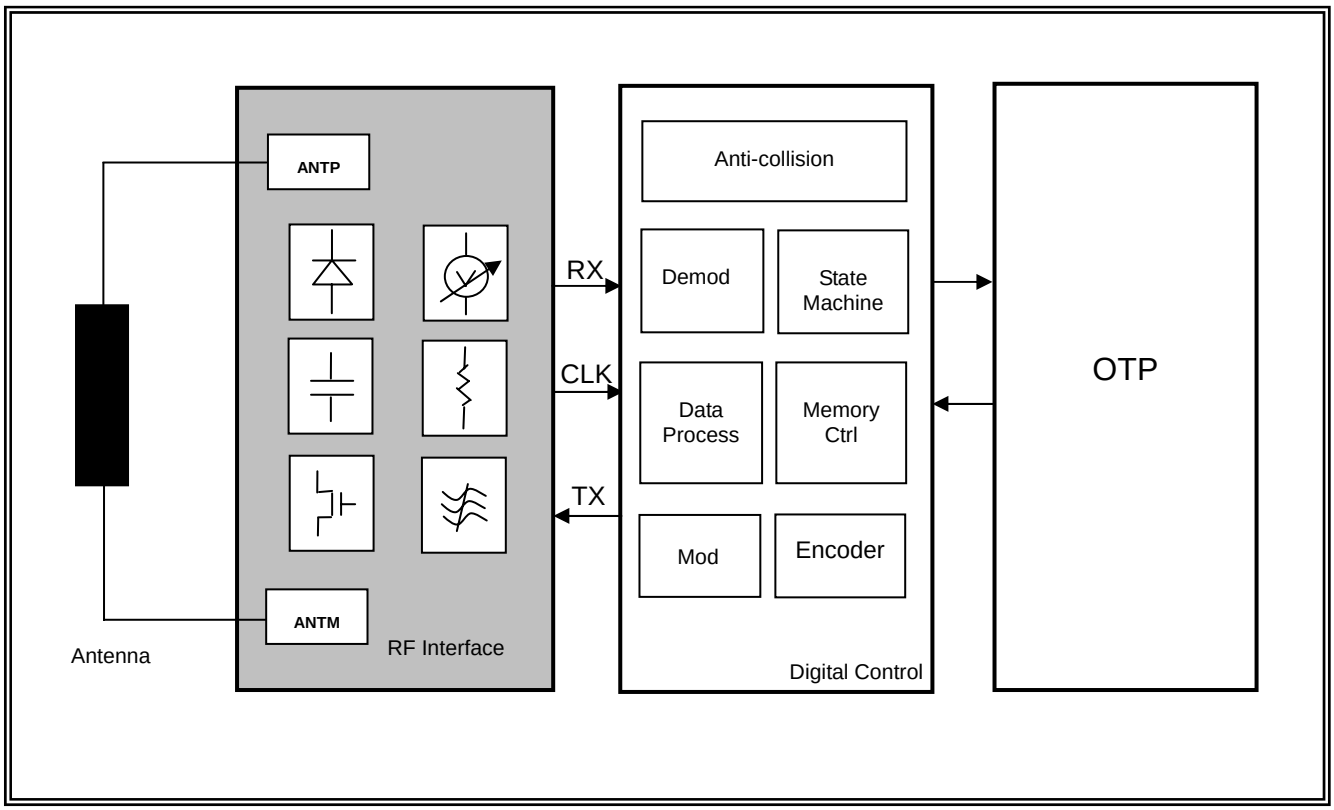


Figure 1: A9211B Block System Diagram

General Description

A9211B is a contactless RFID Tag IC for use with proximity coupling device according to ISO/IEC 14443A standard. The communication protocol complies with parts 2 and 3 of the ISO/IEC 14443A specification.

Anti-collision

A9211B's anti-collision function allows multiple RFID tags operating in reader's magnetic field simultaneously. The anti-collision function enables the detection and operation of A9211B when other A9211B equipped tags are also present.

Cascaded Unique Identification Number

A9211B's unique identification number (UID) is 7 bytes long and supports cascade level-2 format according to ISO / IEC 14443-3.

Pin Descriptions

Symbol	Type	Description
ANTM	-	Antenna pad A
ANTP	-	Antenna pad B
TIO1	-	Reserved
TIO2	-	Reserved
TIO3		Reserved

Table 1

Floor Plan

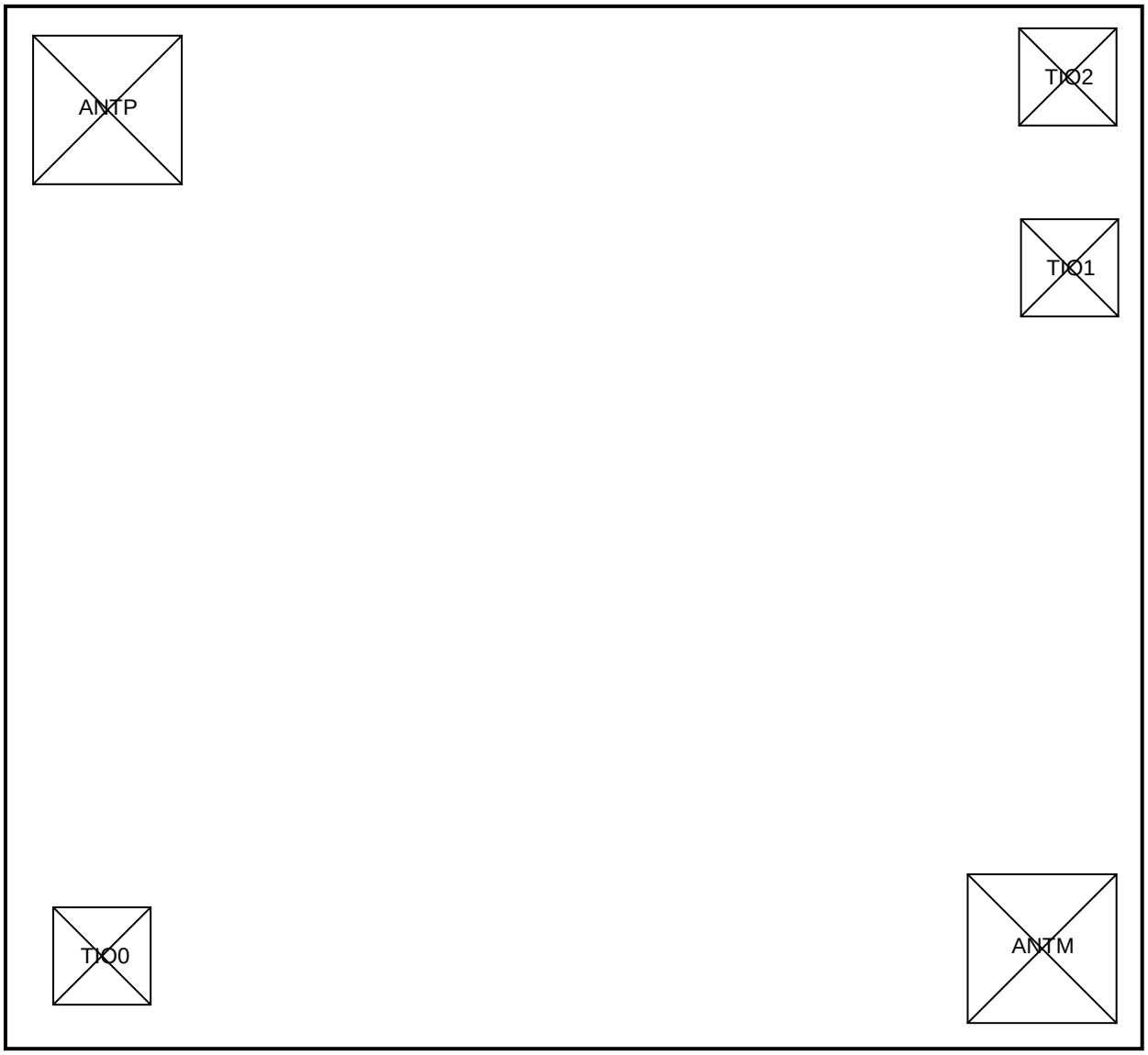


Figure 2: A9211B Pin-out Diagram

OTP Memory Mapping

Page	OTP Addr	Byte0	Byte1	Byte2	Byte3
0	0x00~0x03	SN0	SN1	SN2	BCC0
1	0x04~0x07	SN3	SN4	SN5	SN6
2	0x08~0x0b	BCC1	Reserved	Lock0	Lokc1
3	0x0c~0x0f	UCData0	UCData1	UCData2	UCData3
4	0x10~0x13	Data0	Data1	Data2	Data3
5	0x14~0x17	Data4	Data5	Data6	Data7
6	0x18~0x1b	Data8	Data9	Data10	Data11
7	0x1c~0x1f	Data12	Data13	Data14	Data15
8	0x20~0x23	Data16	Data17	Data18	Data19
9	0x24~0x27	Data20	Data21	Data22	Data23
10	0x28~0x2b	Data24	Data25	Data26	Data27
11	0x2c~0x2f	Data28	Data29	Data30	Data31
12	0x30~0x33	Data32	Data33	Data34	Data35
13	0x34~0x37	Data36	Data37	Data38	Data39
14	0x38~0x3b	Data40	Data41	Data42	Data43
15	0x3c~0x3f	Data44	Data45	Data46	Data47
16	0x40~0x43	Data48	Data49	Data50	Data51
:::	:::::::	:::::::	:::::::	:::::::	:::::::
:::	:::::::	:::::::	:::::::	:::::::	:::::::
59	0xec~0xef	Data220	Data221	Data222	Data223
60	0xf0~0xf3	Reserved	Reserved	Reserved	Reserved
61	0xf4~0xf7	Reserved	Reserved	Reserved	Reserved
62	0xf8~0xfb	Reserved	0x00	0x00	0x00
63	0x0c~0xff	Reserved	Reserved	Reserved	Reserved

Table2: OTP Memory Mapping Table

Unique Identifier (UID)

MSB LSB

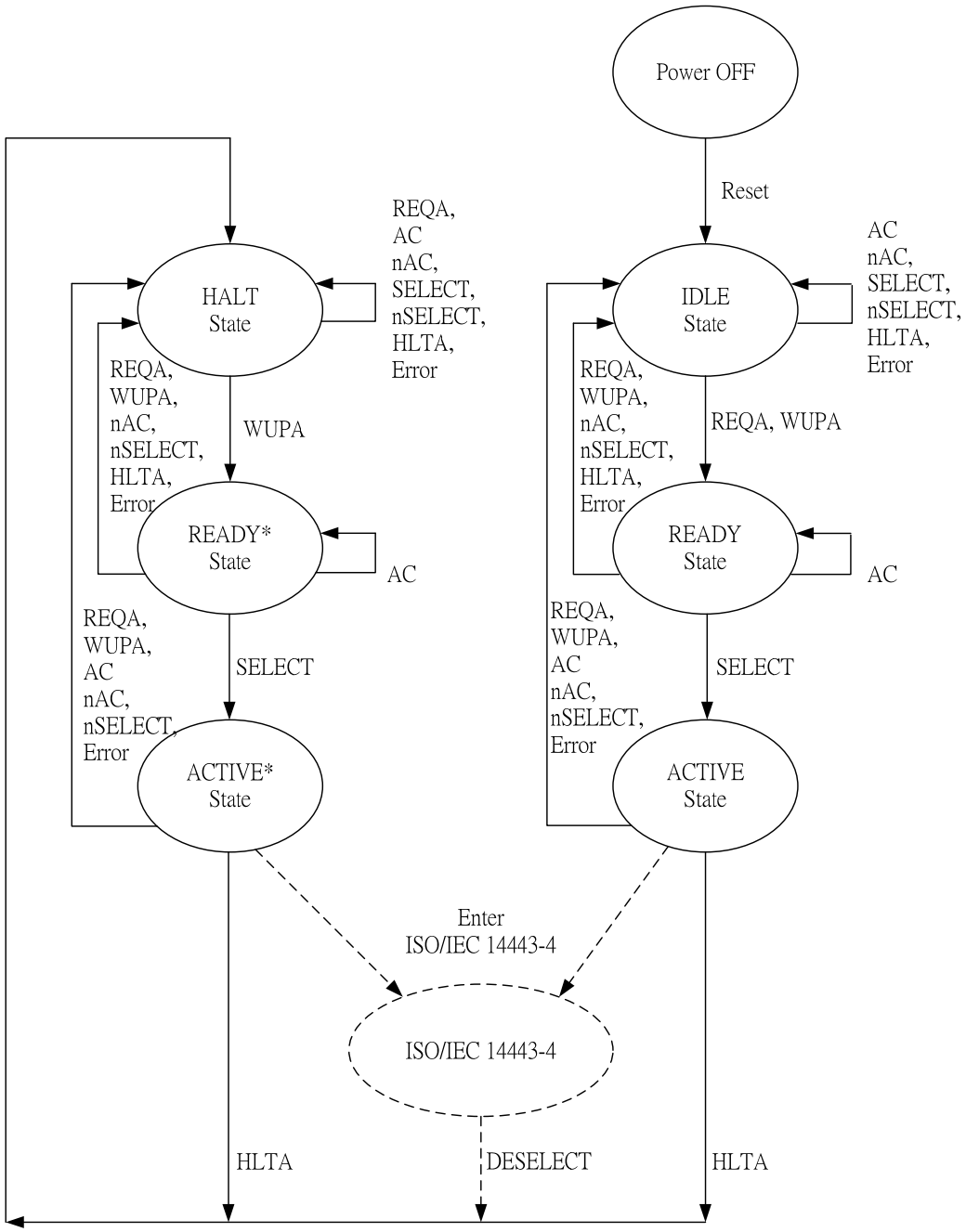
56 9	8 1
IC Manufacturer Serial Number	IC Mfg Code (0x33)

The UID, in ISO/IEC 14443A format, is programmed by IC manufacturer during production process and cannot be changed afterwards.

Bit56 ~ Bit 9: 48-bit unique serial number
Bit 8 ~ Bit 1: IC manufacturer code for AMIC

A9211B State Diagram

The stat diagram shown below describes the operation of A9211B. For detail explanation of state definition, please refer to ISO/IEC 14443A-3 documents.



Remarkj: A9211B does **not** support ISO/IEC 14443-4 (shown in dotted line).

RFID Tag IC Command List

	Command	Command Code	Description
1	REQA	0x26	Request Type A
2	WUPA	0x52	Wake Up Type A
3	SEL	0x93/0x95	Select for 2-layer anticollision
4	HLTA	0x50	Halt Type A
5	READ	0x30	Read page data
6	WRITE	0xA2	Write page data
7	CWRITE	0xA0	Compatibility write

Absolute Maximum Rating

Parameter	Symbol	Min	Type	Max	Unit
Storage Temperature	T_{sto}	-55	-	140	℃
Junction Temperature	T_j	-55	-	140	℃
Electrostatic Discharge Voltage	V_{ESD}	-	-	$2K_{(1)}$	V
Maximum input peak current	$I_{Max\ P-M}$	-	-	50	mA
Operating junction temperature	T_{jop}	-40	-	120	℃
Input current	I_{P-M}	-	-	30	mA

(1) Applicable for ANTP and ANTM pads

DC Electrical Characteristics

Parameter	Symbol	Condition	Min	Typical	Max	Unit
Operating Frequency	f_{OP}			13.560	TBD	MHz
Input Capacitance	C_{in}	V_{P-M}	23.4	26.0	28.6	pf
OTP Data Retention	t_{ret}	T		10		Years
OTP Write Endurance	n_{wr}		1	-	5	Cycles

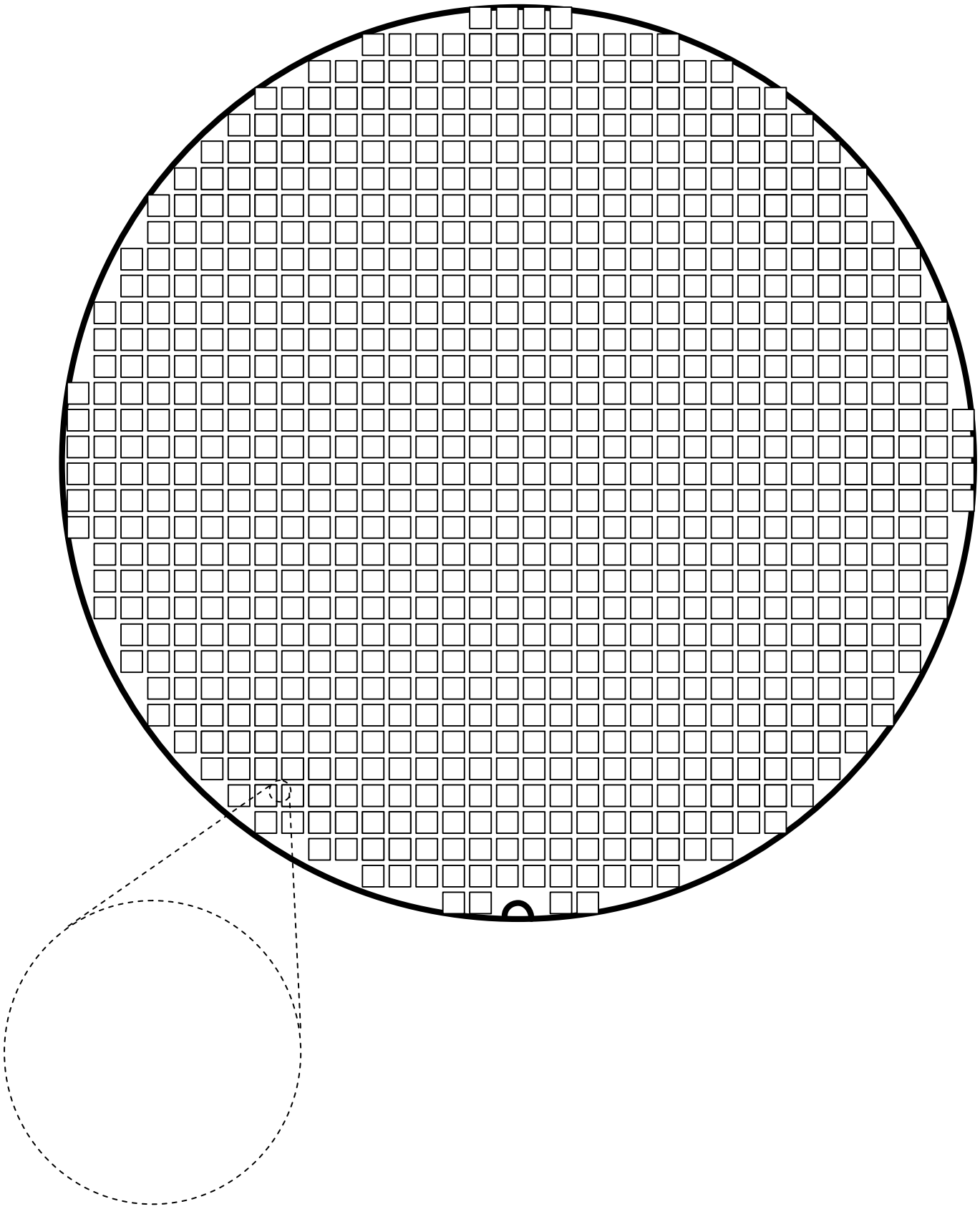
10. Mechanical Specification

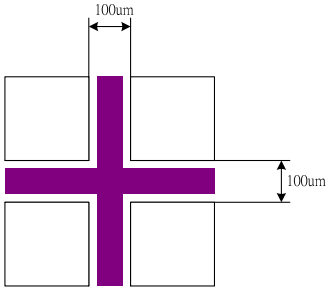
- Wafer diameter: 8”
- Wafer thickness: Raw wafer (150*u*m ± 15 *u*m)
- Backside material: Si
- Backside treatment: Etched; to achieve 30~50% brightness relative to surface
- Backside roughness: Not specified
- Chip size: 1073.68um x 972.26um
- Scribe line: 100um
- Passivation type: PSG and SIN
- Passivation material: PSG and SIN
- Passivation Thickness: PSG2.5K Å and SIN 3K Å

11. Gold Bump Specification

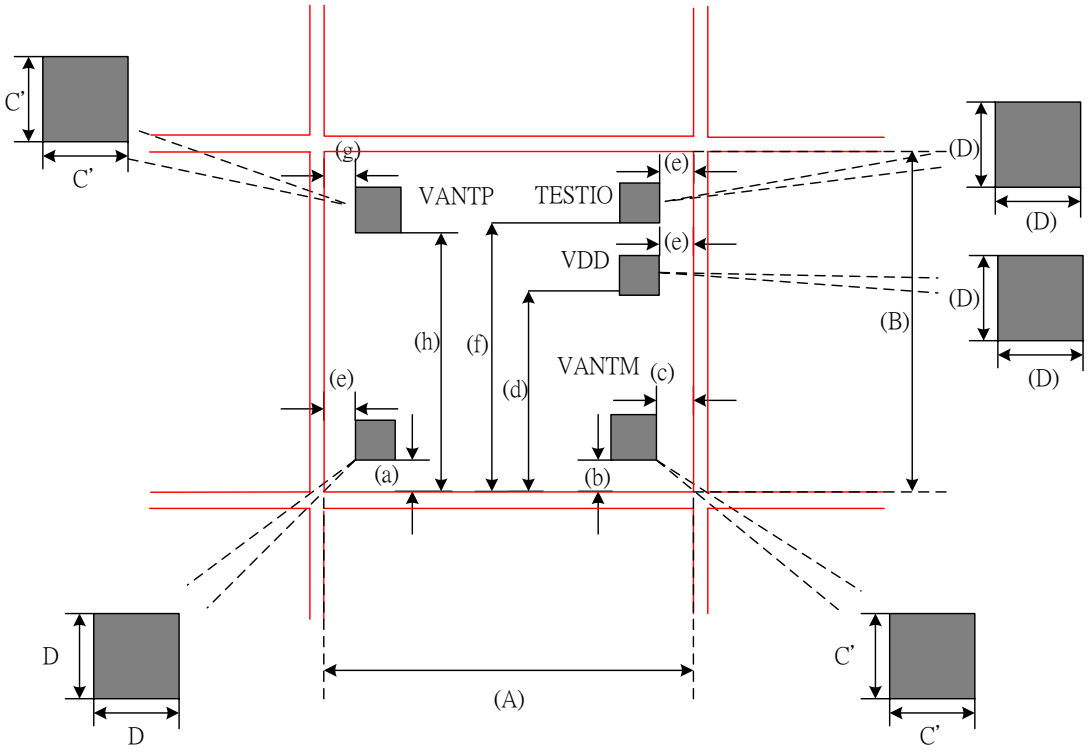
- Bump material: >99.9% pure Au
- Bump hardness: 35 – 80 HV 0.005
- Bump shear strength: >70MPa
- Bump height: 18*u*m
- Bump height uniformly:
  - Within a die ± 2 *u*m
  - Within a wafer ± 3 *u*m
  - Wafer to wafer ± 4 *u*m
- Bump flatness: ± 1.5 *u*m
- Bump size:
  - ANTP, ANTM: 80um x 80um;
  - TIO0 TIO1, TIO2: 50um x 50um
  - Variation: ± 5 *u*m
- Under bump metallization: Sputtered TiW

12. Wafer Mapping




100um
100um

13. Bonding Pad Drawing



Symbol	Dimension
a	108.7um
b	33.34um
c	32.65um
d	688.24um
e	29um
f	895.91um
g	36.32um
h	858.26um
A	1073.68um
B	972.26um
C'	80um
D	50um

Revision History

Rev	Date	Description	By
1.0	Jan, 2010	Initial creation	GW