Datasheet

Of

WM-N-BM-09 WICED Module

Introduction

The WM-N-BM-09 wireless SiP module which refers as “SiP module” is a small size module and consists of a Broadcom BCM43362 single-chip, a ST STM32F205 MCU. The WM-N-BM-09 provides for the highest level integration for electronic accessories on WICED licensing, featuring integrated IEEE 802.11b/g and handheld device class 802.11n.

It includes a 2.4 GHz WLAN CMOS power amplifier (PA) that meets the output power requirements of most handheld systems. An optional external low-noise amplifier (LNA) and external PA are also supported. Along with the integrated power amplifier, the WM-N-BM-09 also includes integrated transmit and receive baluns, further reducing the overall solution cost.

The small size & low profile physical design make it easier for system design to enable high performance wireless connectivity without space constrain. This multi- functionality and board to board physical interface provides SPI/USB/UART interface options.

Hardware WAPI acceleration engine, AES, TKIP, WPA and WPA2 are supported to provide the latest security requirement on your network.

For the software and driver development, USI provides extensive technical document and reference software code for the system integration under the agreement of Broadcom International Ltd.

Hardware evaluation kit and development utilities will be released base on listed OS and processors to OEM customers.

STM32F205RGY6 Microprocessor

- ARM 32-bit Cortex-M3 CPU
- CPU frequency up to 120MHz
- 1 MB Flash memory
- 128 kB SRAM
- Low-power sleep, standby and stop modes

WM-N-BM-09 Wireless Sip Module

- Featuring integrated IEEE 802.11 b/g/n.
- Supports per packet Rx Antenna diversity
- Low power consumption & excellent power management performance extend battery life.
- Small size suitable for low volume system integration.
- Easy for integration into mobile and handheld device with flexible system configuration.
- 2.412-2.484 GHz two SKUs for worldwide market.
- Lead Free design which supporting Green design requirement, RoHS Compliance.

Features

BCM43362 Wi-Fi

- Single band 2.4GHz IEEE 802.11b/g/n
- Supports wireless data rates up to 65Mbit/s
- Integrated RF power amplifier

Device Package

- **11x12 mm LQFP 58 pin**

Change Sheet					
Rev.	Date	Description of change			Approval & Date
		Page	Par	Change(s)	
2.1	12/10/25	All	All	Release version	Kevin / Scarrie
2.2	13/03/07	14	14	Update Metal shielding type	Jason
2.3	13/05/13	9	9	Modify operating high temp to 70 degrees	Jason
2.4	13/11/14	9	9	Modify operating high temp to 85°C	Donny

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The WM-N-BM-09 module - is one of the product families in UG's product offering, targeting for system integration requiring a smaller form factor. It also provides the standard migration to high data rate to UG's current SIP customers.

The purpose of this document is to define the product specification for 802.11b/g/n (draft n) WiFi module WM-N-BM-09. All the data in this document is based on Broadcom 43362 data sheet , STM32F205xx datasheet and other documents provided from Broadcom and ST . The data will be updated after implementing the measurement of the module.

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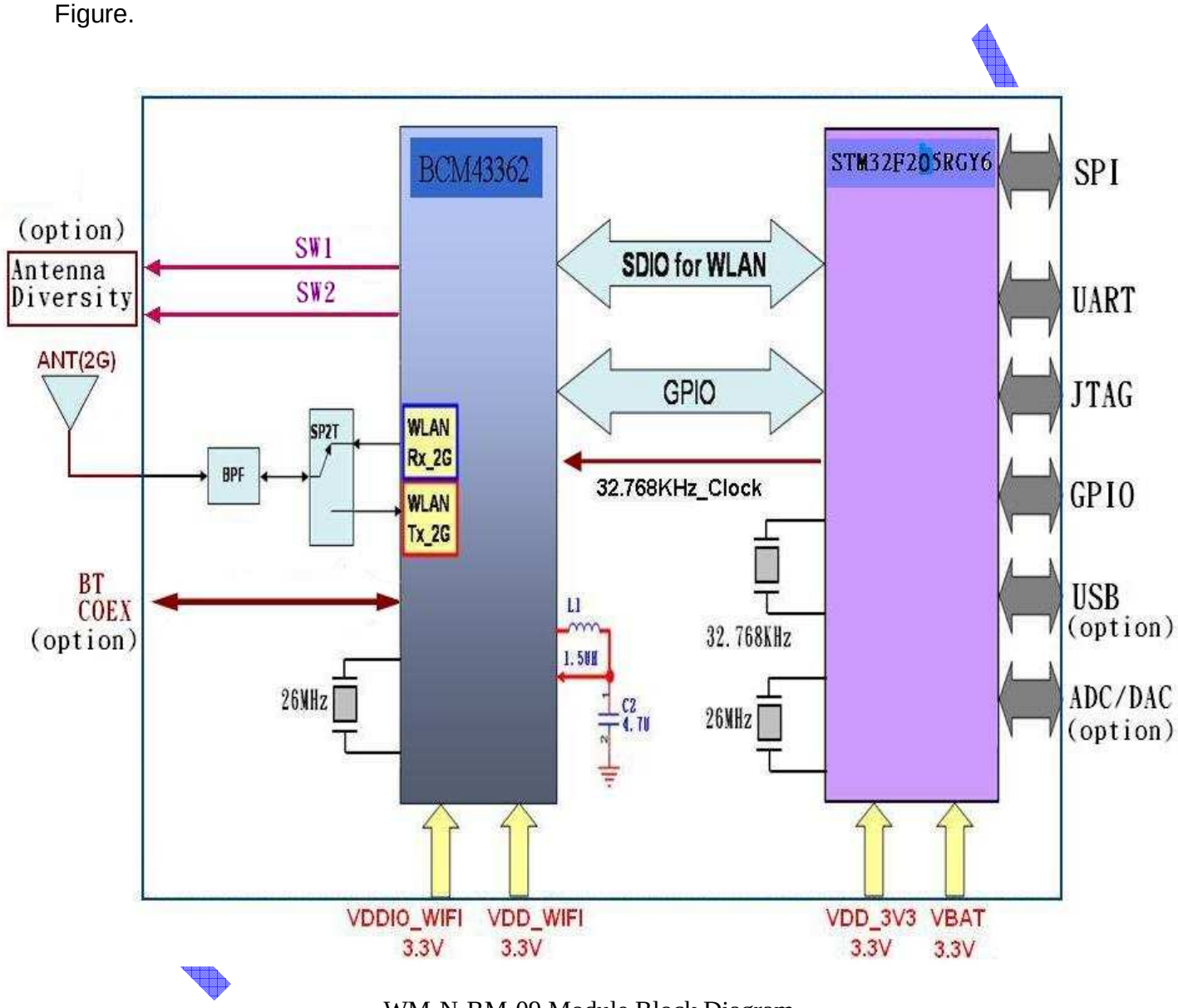
2. BLOCK DIAGRAM

The WM-N-BM-09 module is designed based on Broadcom 43362 chipset and ST MCU solution. It supports generic SPI, UART, USB interface to connect the WLAN to the host processor. A simplified block diagram of the WM-N-BM-09 module is depicted in below Figure.



WM-N-BM-09 Module Block Diagram

3. DELIVERABLES

The following products and software will be part of the product.

- WM-N-BM-09 Module with packaging
- Evaluation kits (with SPI / UART / USB interface)
- Software utility which supporting customer for integration, performance test and homologation. Capable of testing, loading (firmware) and configuring (MAC, CIS) for the WM-N-BM-09 module.
- Unit Test / Qualification report
- Product Specifications.
- Agency certification pre-test report base on adapter boards

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4. REFERENCE DOCUMENTS

C.I.S.P.R. Pub. 22	"Limits and methods of measurement of radio interference characteristics of information technology equipment." International Special Committee on Radio Interference (C.I.S.P.R.), Third Edition, 1997.
CB Bulletin No. 96A	"Adherence to IEC Standards: "Requirements for IEC 950, 2nd Edition and Amendments 1 (1991), 2(1993), 3 (1995) and 4(1996). Product Categories: Meas, Med, Off, Tron." IEC System for Conformity Testing to Standards for Safety of Electrical Equipment (IECEE), April 2000.
CFR 47, Part 15-B	"Unintentional Radiators". Title 47 of the Code of Federal Regulations, Part 15, FCC Rules, Radio Frequency Devices, Subpart B.
CFR 47, Part 15-C	"Intentional Radiators". Title 47 of the Code of Federal Regulations, Part 15, FCC Rules, Subpart C. URL: http://www.access.gpo.gov/nara/cfr/waisidx_98/47cfr15_98.html
CSA C22.2 No. 950-95	"Safety of Information Technology Equipment including Electrical Business Equipment, Third Edition." Canadian Standards Association, 1995, including revised pages through July 1997.
EN 60 950	"Safety of Information Technology Equipment Including Electrical Business Equipment." European Committee for Electrotechnical Standardization (CENELEC), 1996, (IEC 950, Second Edition, including Amendment 1, 2, 3 and 4).
IEC 950	"Safety of Information Technology Equipment Including Electrical Business Equipment." European Committee for Electrotechnical Standardization, Intentional Electrotechnical Commission. 1991, Second Edition, including Amendments 1, 2, 3, and 4.
IEEE 802.11	"Wireless LAN Medium Access Control (MAC) And Physical Layer (PHY) Specifications." Institute of Electrical and Electronics Engineers. 1999.

5. TECHNICAL SPECIFICATION

5.1 ABSOLUTE MAXIMUM RATING

Supply Power	Max +3.6 Volt	
Non Operating Temperature	- 40° to 85° Celsius	
Voltage ripple	+/- 2%	Max. Values not exceeding Operating voltage

5.2 RECOMMEND OPERATION CONDITION

TEMPERATURE, HUMIDITY

The WM-N-BM-09 module has to withstand the operational requirements as listed in the table below.

Operating Temperature	-20° to 85° Celsius	
Humidity range	Max 95%	Non condensing, relative humidity

The maximum operating ambient temperature range can up to 85degC, but exposure to absolute-maximum-rated conditions may cause performance degradation and affect device reliability.

VOLTAGE

Power supply for the WM-N-BM-09 module will be provided by the host via the power pins

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD_WIFI	Power Supply for BCM43362	3.0	3.3	3.6	V
VDDIO_WIFI	Host Interface Power Supply	3.0	3.3	3.6	V
VBAT	Backup operating voltage	3.0	3.3	3.6	V
VDD_3V3	Power Supply for MCU	3.0	3.3	3.6	V

CURRENT CONSUMPTION

The WM-N-BM-09 on TX mode Output current Consumption :
(Typical spec is defined @3.3V 25℃ ; MAX. spec is defined @3.0V 60℃)

Current Consumption	TYP.	MAX.
Tx output power @16.5 dBm on 11b 1M	365 mA	430 mA
Tx output power @ 16.5 dBm on 11b 11M	360 mA	430 mA
Tx output power @ 15 dBm on 11g 6M	330 mA	380 mA
Tx output power @ 13 dBm on 11g 54M	270 mA	320 mA
Tx output power @ 14.5 dBm on 11n MCS0	310 mA	360 mA
Tx output power @ 12 dBm on 11n MCS7	235 mA	280 mA

The WM-N-BM-09 on RX mode current Consumption :

(Typical spec is defined @3.3V 25℃ ; MAX. spec is defined @3.0V 60℃)

Current Consumption	TYP.	MAX.
Rx @ 11b 1M	120 mA	150 mA
Rx @ 11b 11M	120 mA	150 mA
Rx @ 11g 6M	120 mA	150 mA
Rx @ 11g 54M	120 mA	150 mA
Rx @ 11n MCS0	120 mA	150 mA
Rx @ 11n MCS7	120 mA	150 mA

5.3 WIRELESS SPECIFICATIONS

The WM-N-BM-09 module complies with the following features and standards;

Features	Description
WLAN Standards	IEEE 802 11b/g/n
Antenna Port	Single Antenna
Frequency Band	2.400 GHz – 2.484 GHz
Number of Sub Channels	1~ 14 Channels
Modulation	DSSS, CCK, OFDM, BPSK, QPSK,16QAM, 64QAM
Supported data rates	1, 2, 5.5, 11 (Mbps) 6, 9, 12, 18, 24, 36, 48, 54 (Mbps) HT20_MCS0(6.5Mbps) ~ HT20_MCS7(65Mbps)

5.4 SPECIFICATIONS OF WIFI'S OUTPUT POWER、 EVM 、SENSITIVITY

The WM-N-BM-09 module WiFi output power as list in the table below:

Characteristics		TYP.	Criteria	Unit
RF Average Output Power, 802.11b CCK Mode	1M	16.5	+/- 1.5	dBm
	11M	16.5	+/- 1.5	dBm
RF Average Output Power, 802.11g OFDM Mode	6M	15	+/- 1.5	dBm
	54M	13	+/- 1.5	dBm
RF Average Output Power, 802.11n OFDM Mode	MCS0	14.5	+/- 1.5	dBm
	MCS7	12	+/- 1.5	dBm

WiFi TX EVM follow the IEEE spec that as list in the table below:

Characteristics		IEEE Spec	Unit
RF Average Output EVM (11b)	@1 Mbps	-10	dB
	@11 Mbps	-10	dB
RF Average Output EVM (11g)	@6 Mbps	-5	dB
	@54 Mbps	-25	dB
RF Average Output EVM (11n)	@ MCS0	-5	dB
	@ MCS7	-28	dB

The WM-N-BM-09 module WiFi Sensitivity as list in the table below:

Receiver Characteristics	TYP.	MAX.	Unit
PER <8%, Rx Sensitivity @ 1 Mbps	-96	-89	dBm
PER <8%, Rx Sensitivity @ 11 Mbps	-88	-84	dBm
PER <10% Rx Sensitivity @ 6 Mbps	-90	-83	dBm
PER <10%, Rx Sensitivity @ 54 Mbps	-74	-70	dBm
PER <10%, Rx Sensitivity @ MCS0	-89	-83	dBm
PER <10%, Rx Sensitivity @ MCS7	-71	-67	dBm

6. FLASH MEMORY

6.1 MCU EMBEDDED FLASH MEMORY

The STM32F205RG devices embed a 128-bit wide Flash memory of 1 Mbytes available for storing programs and data. It also features 512 bytes of OTP memory that can be used to store critical user data such as Ethernet MAC addresses or cryptographic keys.

For information on programming, erasing and protection of the internal Flash memory, please refer to the STM32F205RG Flash programming manual. The reference and Flash programming manuals are both available from the STMicroelectronics website *www.st.com*.

6.2 EXTERNAL FLASH MEMORY

WM-N-BM-09 provide the option that user can external flash. SPI interface pin via to flash. The STM32F205RG software is feature compatible. It allow user to run different memory densities and peripherals for a greater degree of freedom during the development cycle.

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7. I/O PORT CHARACTERISTICS

Unless otherwise specified, the parameters given as below *table*.

For detail information of I/O injection parameters and conditions, please refer to STM32F205RG I/0 manual.

Table7.1 I/O static characteristics

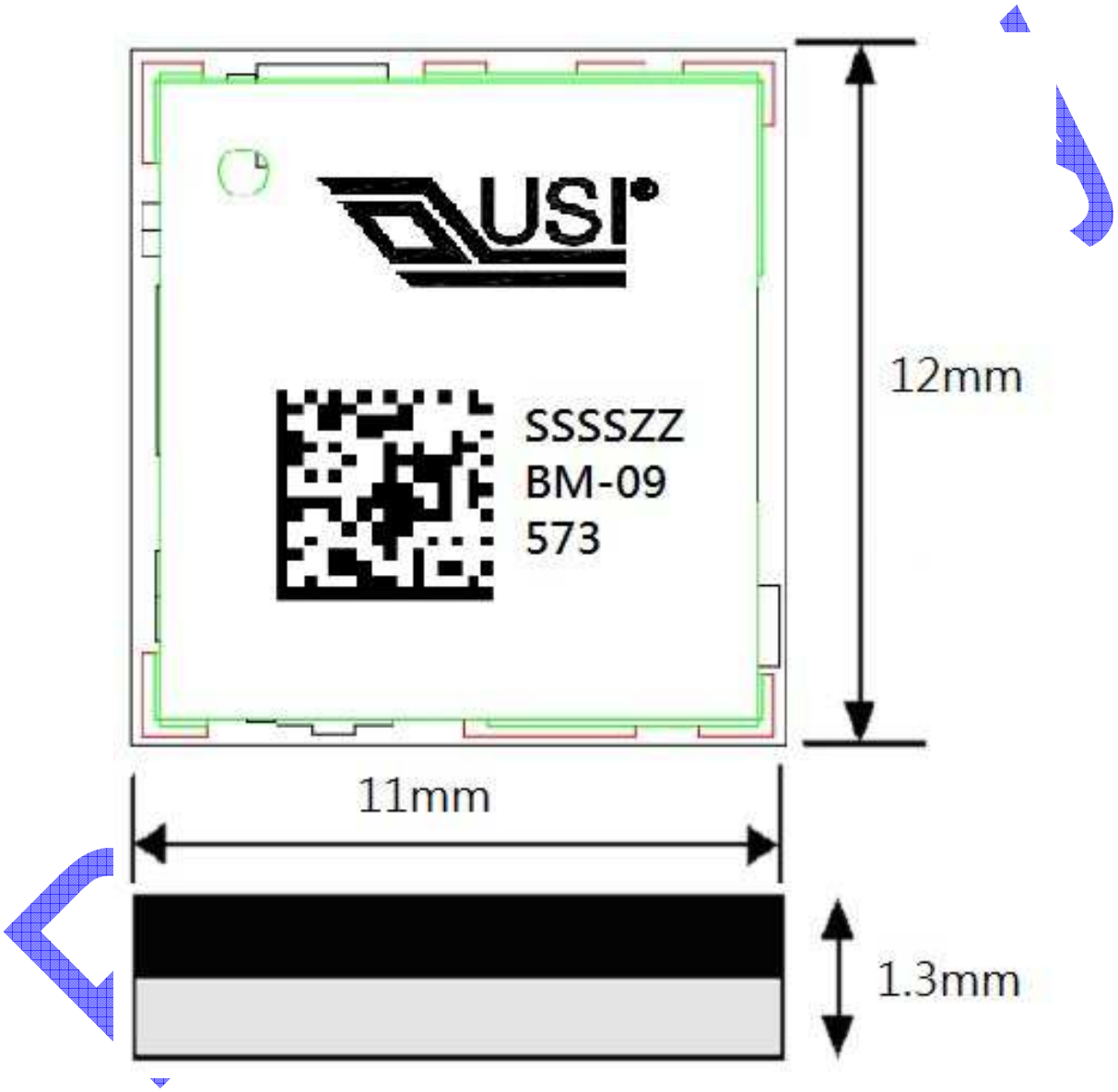
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IL}	Standard IO input low level voltage		–0.3		0.28*(V_{DD}-2 V)+0.8 V	V
	IO FT(1) input low level voltage		–0.3		0.32*(V_{DD}-2 V)+0.75 V	V
V_{IH}	Standard IO input high level voltage		0.41*(V_{DD}-2 V)+1.3 V		V_{DD}+0.3	V
	IO FT(1) input high level voltage	V_{DD} > 2 V	0.42*(V_{DD}-2 V)+1 V		5.5	V
		V_{DD} ≤ 2 V			5.2	
V_{hys}	Standard IO Schmitt trigger voltage hysteresis(2)		200			mV
	IO FT Schmitt trigger voltage hysteresis(2)		5% V_{DD}(3)			mV
I_{lkg}	Input leakage current (4)	V_{SS} ≤ V_{IN} ≤ V_{DD} Standard I/Os			±1	µA
		V_{IN}= 5 V, I/O FT			3	
R_{PU}	Weak pull-up equivalent resistor(5)	V_{IN} = V_{SS}	30	40	50	kΩ
R_{PD}	Weak pull-down equivalent resistor(5)	V_{IN} = V_{DD}	30	40	50	kΩ
C_{IO}	I/O pin capacitance			5		pF

1. FT = Five-volt tolerant. In order to sustain a voltage higher than VDD+0.3 the internal pull-up/pull-down resistors must be disabled.
2. Hysteresis voltage between Schmitt trigger switching levels. Based on characterization, not tested in production.
3. With a minimum of 100 mV.
4. Leakage could be higher than max. if negative current is injected on adjacent pins.
5. Pull-up and pull-down resistors are designed with a true resistance in series with a switchable PMOS/NMOS. This MOS/NMOS contribution to the series resistance is minimum (~10% order).

8. MODULE DIMENSIONS

The WM-N-BM-09 module size and thickness is “12 mm (W) x 11 mm (L) x 1.3 mm (H)

+/-0.1mm “(Including metal shielding)



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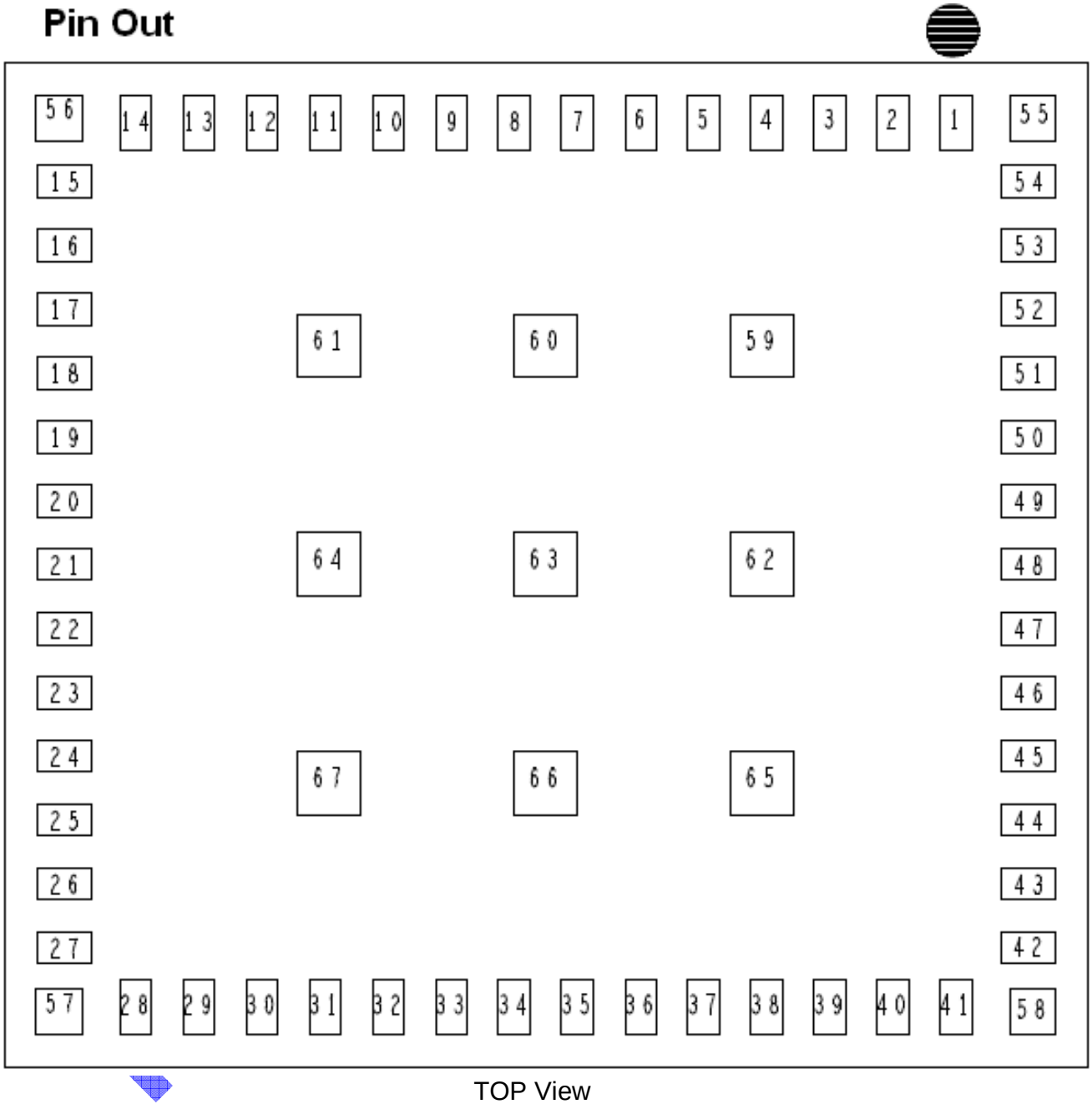
9. PIN DESCRIPTION

Pin Out



TOP View

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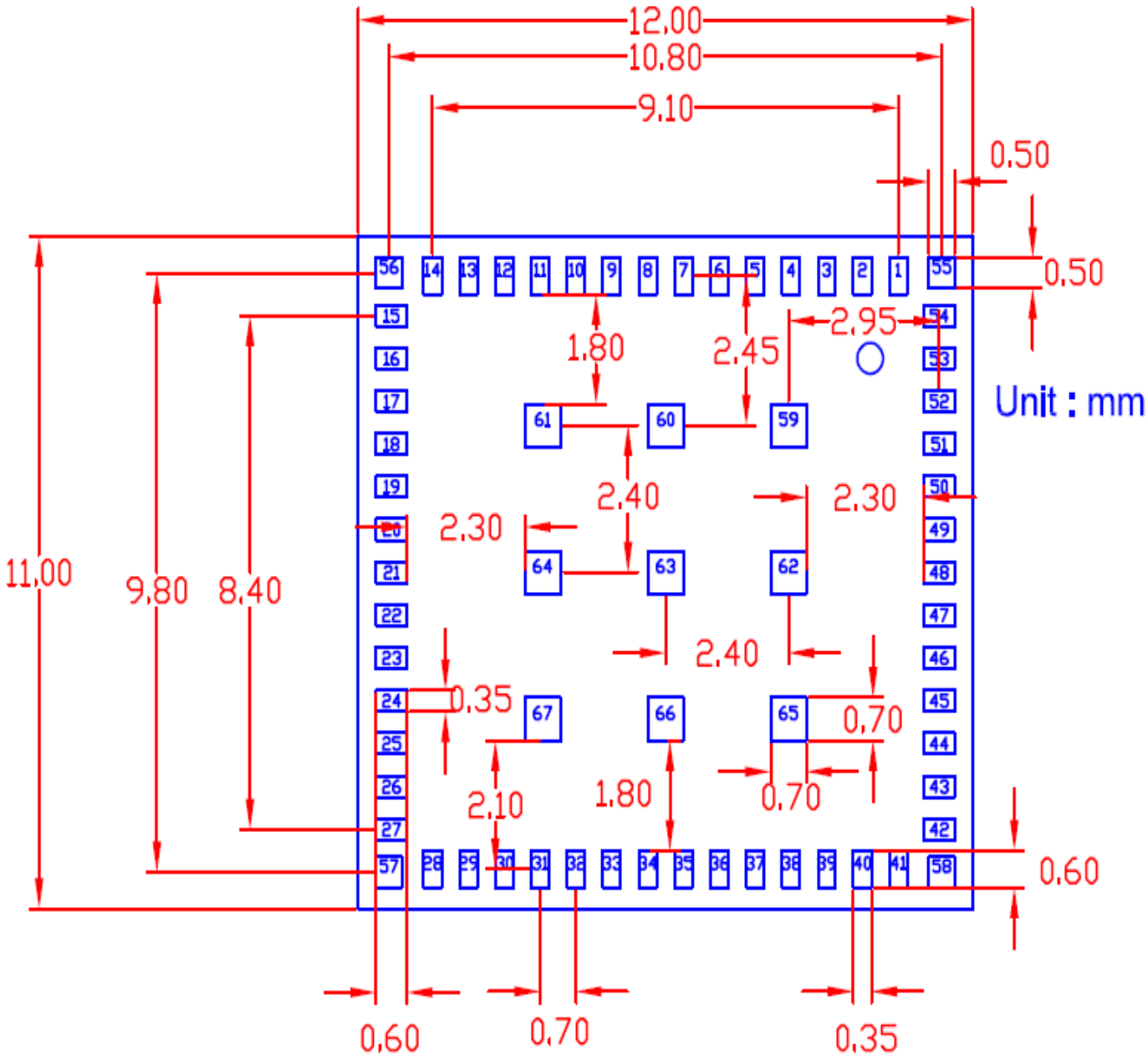
Pin Description

Pin-Number	Pin-Define	Type	Description
1	MICRO_GPIO_7	I/O	GPIO pin
2	MICRO_GPIO_6	I/O	GPIO pin
3	MICRO_GPIO_5	I/O	GPIO pin
4	MICRO_GPIO_4	I/O	GPIO pin
5	MICRO_GPIO_3	I/O	GPIO pin
6	MICRO_GPIO_2	I/O	GPIO pin
7	MICRO_GPIO_1	I/O	GPIO pin
8	MICRO_GPIO_0	I/O	GPIO pin
9	BTCX_RF_ACTIVE	I	Coexistence signal indicating that Bluetooth is active.
10	BTCX_STATUS	I	Coexistence signal indicating Bluetooth priority status and TX/RX direction.
11	BTCX_TXCONF	O	Coexistence output giving Bluetooth permission to transmit.
12	RF_SW_CTRL3_ANT1	O	RF switch control line. Default at this pin is low.
13	RF_SW_CTRL0_ANT0	O	RF switch control line. Default at this pin is high..
14	GND	--	Ground
15	ANT	I/O	Antenna port for WLAN
16	GND	--	Ground
17	GND	--	Ground
18	GND	--	Ground
19	VDD_WIFI	I	Battery voltage input for CBUCK
20	VDD_WIFI	I	Battery voltage input for CBUCK
21	GND	--	Ground
22	MICRO_SPI_SSN	I/O	SPI_SS
23	MICRI_SPI_MOSI	I/O	SPI_MOSI
24	MICRO_SPI_SCK	I/O	SPI_SCK
25	MICRO_SPI_MISO	I/O	SPI_MISO
26	MICRO_RST_N	I/O	MCU Reset
27	MICRO_WKUP	I/O	MCU-Wake UP

Pin-Number	Pin-Define	Type	Description
28	VBAT	I	MCU operating voltage input (power supply for RTC, external clock, 32 kHz oscillator and backup registers (through power switch) when VDD is not present.)
29	GND	--	Ground
30	GND	--	Ground
31 ~ 36	NC	--	NC
37	GND	--	Ground
38	MICRO_UART_RX	I/O	UART_RX
39	MICRO_UART_TX	I/O	UART_TX
40	MICRO_JTAG_TCK	I/O	JTAG_TCK
41	MICRO_JTAG_TDO	I/O	JTAG_TDO
42	MICRO_JTAG_TRSTN	I/O	JTAG_TRSTN
43	MICRO_JTAG_TDI	I/O	JTAG_TDI
44	MICRO_JTAG_TMS	I/O	JTAG_TMS
45	GND	--	Ground
46	VDD_3V3	I	MCU operating voltage input
47	VDD_3V3	I	MCU operating voltage input
48	GND	--	Ground
49	VDDIO_WIFI	I	Battery voltage input for band-gap and LDOP3
50	GND	--	Ground
51	MICRO_USB_HS_DP	I/O	USB_HS_DP
52	MICRO_USB_HS_DN	I/O	USB_HS_DN
53	MICRO_GPIO_9	I/O	GPIO pin
54	MICRO_GPIO_8	I/O	GPIO pin
55	GND	--	Ground
56	GND	--	Ground
57	GND	--	Ground
58	GND	--	Ground
59 ~ 67	GND	--	Ground

10. MODULE DIMENSION



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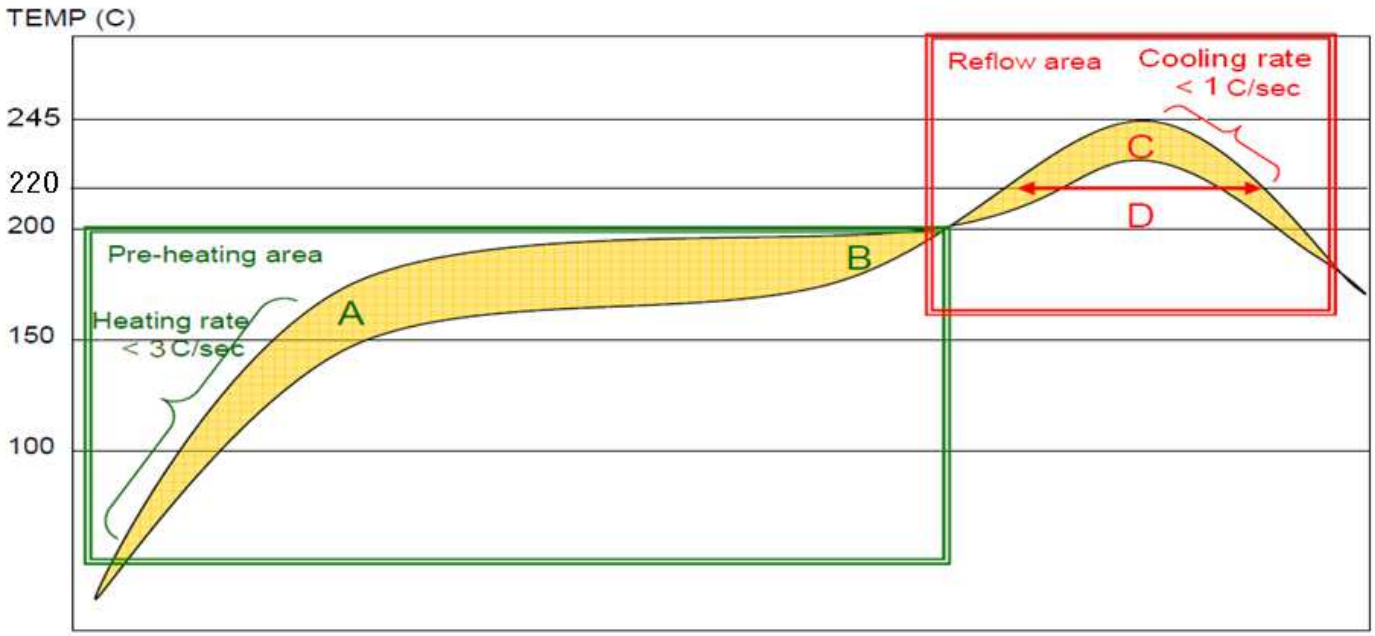
11. RECOMMEND REFLOW PROFILE



A-B. Temp.: 150~200℃; soak time:60~120sec.
C. Peak temp: 235~245℃
D. Time above 220 ℃: 40~90sec.
Suggestion: Optimal cooling rate is <1℃/sec. from peak to 220 ℃.

12. PACKAGE AND STORAGE CONDITION

Universal Scientific Industrial Co., Ltd.

WM-N-BM-09	PACKAGING SPECIFICATION	COMPANY CONFIDENTIAL

Project Name:	WM-N-BM-09		Description:		43362 WICED Metal SIP module 11	
适用之产品：	8501-600573-01		Tape Carrier 之单元格尺寸 ：		长 11.4*宽 12.4*高 1.7*PITCH 16(mm)	
MSL information：	LEVEL:	3	温度(℃):	250	时间(hour):	168

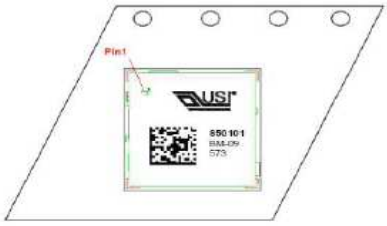
使用之包装材料：

NO	品名	P/N	用量(以大箱计)	用量/pcs
1	大 箱[360*140*360MM]	59-012485-11	1	0.000223
2	Pizza 盒[340x336x40MM]	59-154014-12	3	0.000667
3	产 品 标 签(Reel/Bag/Box)	59-456702-01	9	0.002
4	CARRIER TAPE(载带)[100M/REEL]	59-306474-01	总长 100M	0.01666M
5	COVER TAPE (透明带)[300M/Reel]	59-730566-01	105M	0.0175M
6	REEL (载带滚动条)	59-303164-01	3	0.000667
7	Protective band(保 护 带)[1 EA=1.09m]	59-732267-01	3	0.000667
8	铝 箔 密 封 袋	59-350332-01	3	0.000667
9	干 燥 剂 (66g)(CoCl2 Free)	59-393005-00	3	0.000667
10	大 箱 标 签	59-456703-01	2	0.000445
11	湿 度 指 示 卡(CoCl2 Free)	59-201004-01	3	0.000667
12	MSL LABEL(湿度敏感等级卷标)	59-525934-11	3	0.000667

包装方式：(1 卷共 1500PCS)

1. 将 59-306474-01 (Tape Carrier)、59-303164-01 (Reel)、59-730566-01 (Cover Tape)装上 tape reel 包装机，CARRIER TAPE 先预留 10 格空格后开始放产品,每格放 1PCS。
2. 包装时产品的铁盖朝上放入 carrier，定位符号朝向 carrier 定位孔(图一)，每卷 REEL 装 1500PCS。
3. 在 1500PCS 后请预留 10 格空格，产品卷装后用 COVER TAPE 再多绕一圈，最后用美纹胶带固定。
4. 在卷带后，再将保护带 59-732090-01 圈于 Reel 之外围，并以美纹胶黏贴固定。
5. 在 REEL、铝箔袋及纸盒各贴上一张 59-456702-01（空白标签 PN：59-514157-01）产品标签（图二）。
6. 每一铝箔密封袋(59-350332-01)放入一卷产品、一包干燥剂(P/N 59-393005-00),及一片 6 格湿度指示卡(P/N 59-201004-01)，以真空包装机将袋口密封，如(图二)。
7. 每一个铝箔密封袋上须加贴一张 MSL 标签(P/N:59-525934-11)在 ATTENTION 下面，填写内容如(图四)所示。
8. 将已真空包装 Reel 放入(59-154014-12) PIZZA BOX 内，每大箱放 3 盒产品，如图五所示。
9. 大箱（59-012485-11）前后各贴一张 59-456703-01（空白标签 PN：59-510010-00）的大箱标签，其填写格式：如（图五）。

图一、产品放置方向



User Feed Direction

TITLE	Packaging Spec for WM-N-BM-09	DOC NO.			
		SHEET	1/3	REV.	A1

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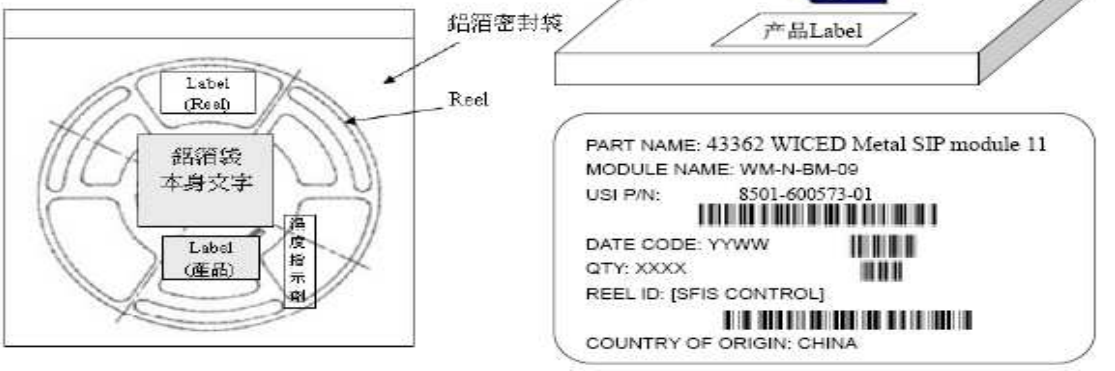
WM-N-BM-09	PACKAGING SPECIFICATION	COMPANY CONFIDENTIAL

10. 包装数量：
每卷 REEL：2000PCS；
每大箱 3 盒：6000PCS。



图二、鋁箔袋內容物 與 Label 要求

图三、產品 Label 內容

图四、MSL Label 黏貼位置及內容

TITLE	Packaging Spec for WM-N-BM-09	DOC NO.			
		SHEET	2/3	REV.	A1

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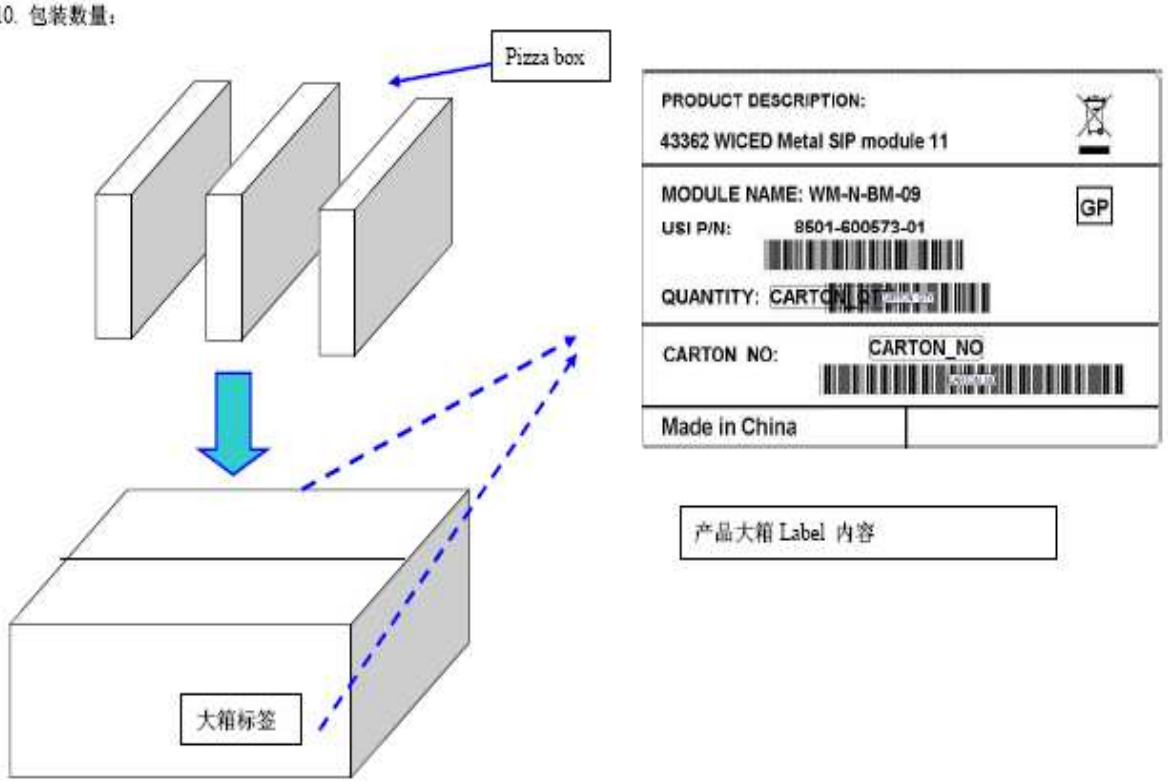
Universal Scientific Industrial Co., Ltd.

WM-N-BM-09	PACKAGING SPECIFICATION	COMPANY CONFIDENTIAL

10. 包装数量：



图五、大箱内容物与标签格式

TITLE	Packaging Spec for WM-N-BM-09	DOC NO.			
		SHEET	3/3	REV.	A1

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13. ESD LEVEL

Note:

1. Surface Resistivity:
   Interior:10^{9}~$10^{11}\Omega$/SQUARE
   EXTERIOR:10^{8}~$10^{12}\Omega$/SQUARE
2. Dimension:475*420mm
3. Tolerance:+5,0mm
4. Color:
   Background: Gray
   Text: Red

Length leader / trailer tape:

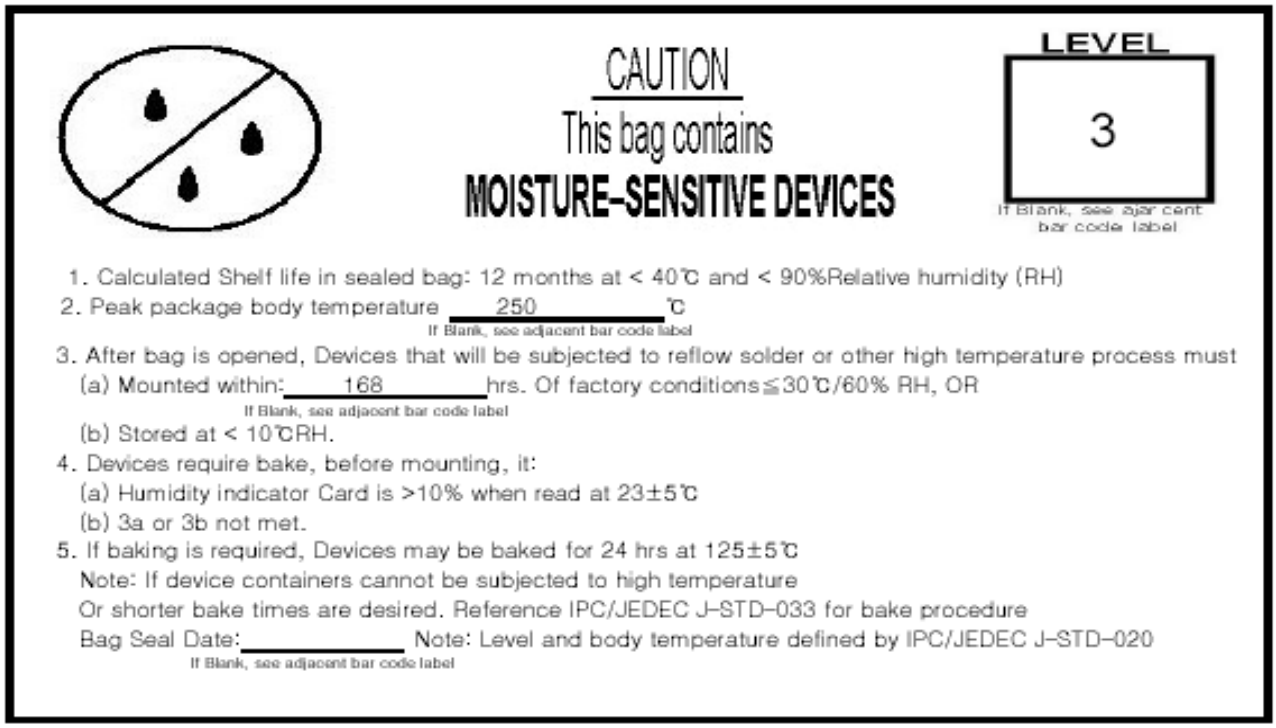
Leader tape: ≥550mm which includes ≥100mm of carrier tape with empty compartments and covered with tape; remaining part might be of cover tape only.

Trailer tape: ≥160mm with empty compartments and covered with tape.

NOTES:

1. **Material: Conductive Polystyrene (Recycle)**
2. **Color: Black**
3. **Surface reslstance: 10^{6} Ohms/square 以下.**
   Cumulative tolerance per 10 pictches(P_0) is ±0.2mm.
   A_0 & B_0 are measured on the plane by 0.3mm above the bottom of the pocket.
4. **K_0 is measured from the lnside bottom of the pocket to the top surface of the carrier.**
5. **Pocket position relative to sprocket hold is measured as true position of pocket, not sprocket hold.**

14. MSL LEVEL / STORAGE CONDITION



Life cycle: 2 years
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