家程科技股份有限公司

SPECIFICATION

SPEC. NO.： SPE-W-003 **REV：** B (2.6)

DATE： April 13th, 2009

PRODUCT NAME： GM9601

	APPROVED	CHECKED	PREPARED	DCC ISSUE
NAME	莊行禹	范文松	姚明輝	AMPAK 2009.04.14 DCC PUBLISH

GM9601
802.11 b/g Wireless LAN module

Datasheet

Revision 2.6

April 2009

Contents

1. Introduction

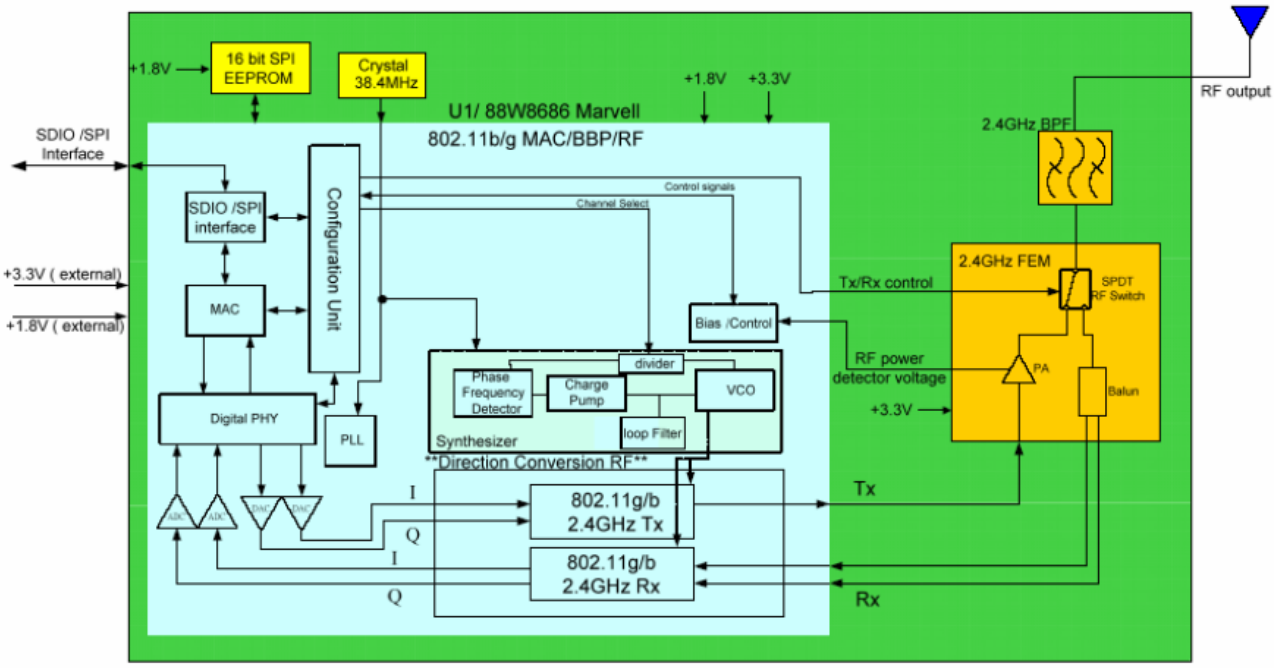
AMPAK Technology Co., Ltd. introduces a low-cost and low-power consumption module which combines WiFi functions. The highly integrated module allows the usage of web browsing, VoIP, and headset applications.

The wireless SiP supports IEEE 802.11 b/g standard and it can provide up to 54Mbps for IEEE 802.11g , or 11Mbps for IEEE 802.11b to connect your wireless LAN. WLAN interfaces to the host system via the SDIO interface.

2. Features

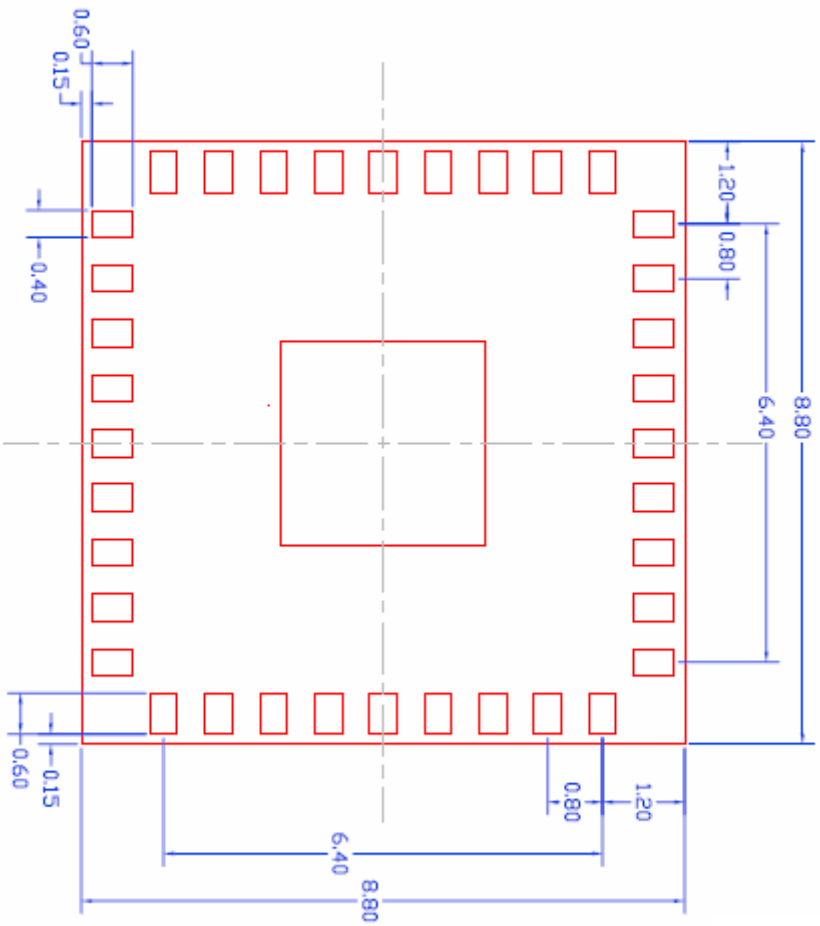
- Small Form Factor: 8.8mm x 8.8mm x 1.45mm
- 802.11i (AES, TKIP, 802.1X) compliant and WEP (64/128 bits)
- Windows CE/Linux driver support
- No external clock source required
- SDIO (1bit/4bit) / SPI interface
- RoHS complaint / Lead free

A simplified block diagram of the module is depicted in the figure below.



3. Interface

3-1 Form factor



Unit: mm

Tolerance: +/- 0.1mm

Component Lead Element: Immersion Gold

3-2 Pin Definition

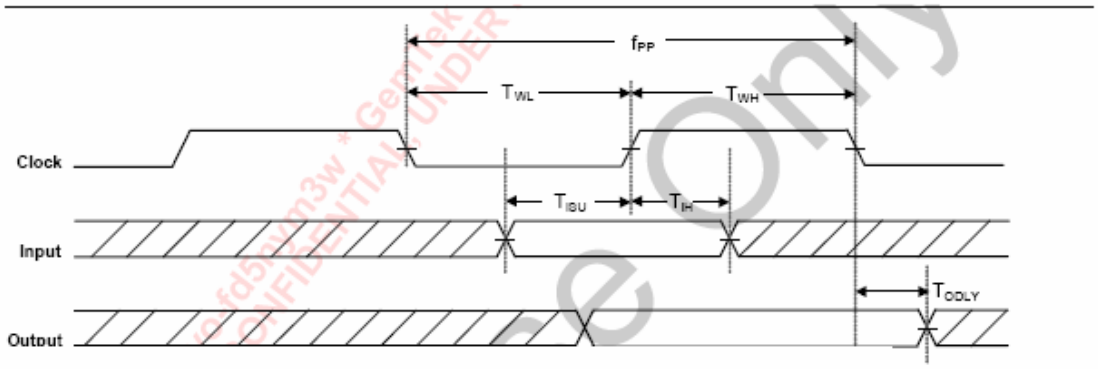
No.	Terminal Name	Pin type	I/O type	Description
1	SD_DAT [1]	SDIO	I/O	SDIO 4-bit Mode: Data Line Bit [1] SDIO 1-bit Mode: Interrupt(active low) SDIO SPI mode : Interrupt(active low)
2	SD_DAT [3]	SDIO	I/O	SDIO 4-bit Mode: Data Line Bit [3] SDIO SPI mode : Card select (active low)
3	RESETn	Config	I	Reset (Active Low)
4	VDD_HOST_IO	VDD3.3	Power	Host I/F Voltage: 3.3VConnect to 3.3V power supply need 1uF decoupling capacitor
5	SD_DAT [2]	SDIO	I/O	SDIO 4-bit Mode: Data Line Bit [2] SDIO 1-bit Mode :Read Wait
6	SD_DAT [0]	SDIO	I/O	SDIO 4-bit Mode: Data Line Bit [0] SDIO 1-bit Mode: Data Line SDIO SPI Mode :Data output
7	SD_CLK	SDIO	I/O	SDIO 4-bit Mode: Clock Input SDIO 1-bit Mode: Clock Input SDIO SPI Mode: Clock Input
8	SD_CMD	SDIO	I/O	SDIO 4-bit Mode: Command / Response SDIO 1-bit Mode: Command line SDIO SPI Mode: Data input
9	GPIO [4]	GPIO	I/O	General I/O Port
10	VDD1.8	VDD1.8	Power	1.8V terminal, need 1uF decoupling capacitor
11	VDD1.2	VDD	O	For internal 1.2V power supply; need 1uF decoupling capacitor
12	IF_SEL_1	Config	O	Select Interface Mode : SDIO Mode: No Connect *Reserved one off-SIP 100Kohm resister to ground is needed for G-SPI interface selection based on Marvell 8686 B2 silicon

13	IF_SEL_2	Config	O	Select Interface Mode : SDIO Mode: No Connect *Reserved one off-SIP 100Kohm resister to ground is needed for G-SPI interface selection based on Marvell 8686 B2 silicon
14	VDD1.8	VDD1.8	Power	1.8V terminal, need 1uF decoupling capacitor
15	GND	GND	Ground	Connect to GND
16	VDD3.3	VDD3.3	Power	Connect to 3.3V Power
17	ECSn	Config	I	No Connect for Host interface bus (default) *SW Options after Boot ROM Reserved one off-SIP 100Kohm resister ground is needed for booting interface selection.
18	VDD1.8	VDD1.8	Power	1.8V terminal, need 1uF decoupling capacitor
19	SCLK	Config	I	No Connect for Host interface bus (default) *SW Options after Boot ROM. Reserved one off-SIP 100Kohm resister ground is needed for booting interface selection.
20	GND	GND	Ground	Connect to GND
21	GND	GND	Ground	Connect to GND
22	VDD_3.3V_PA	VDD3.3	Power	Connect to 3.3V Power need 1uF decoupling capacitor
23	GND	GND	Ground	Connect to GND
24	VDD_3.3V_PA	VDD3.3	Power	Connect to 3.3V Power need 1uF decoupling capacitor
25	GND	GND	Ground	Connect to GND
26	VDD_3.3V_PA	VDD3.3	Power	Connect to 3.3V Power need 1uF decoupling capacitor
27	GND	GND	Ground	Connect to GND
28	VDD_3.3V_PA	VDD3.3	Power	Connect to 3.3V Power need 1uF decoupling capacitor

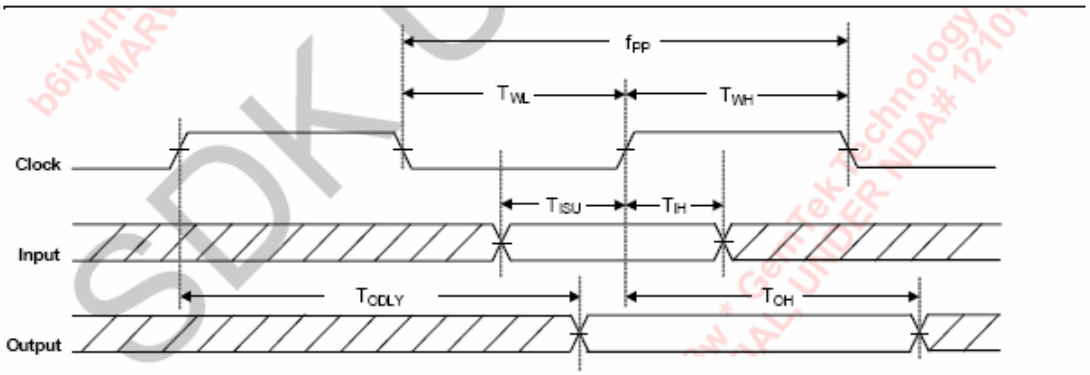
29	GND	GND	Ground	Connect to GND
30	GND	GND	Ground	Connect to GND
31	GND	GND	Ground	Connect to GND
32	GND	GND	Ground	Connect to GND
33	ANT	ANT	O (RF)	ANT Port (50ohm)
34	GND	GND	Ground	Connect to GND
35	GND	GND	Ground	Connect to GND
36	VDD1.8	VDD1.8	Power	1.8V terminal, need 1uF decoupling capacitor

3-3 SDIO Protocol Timing

SDIO Protocol Timing Diagram*



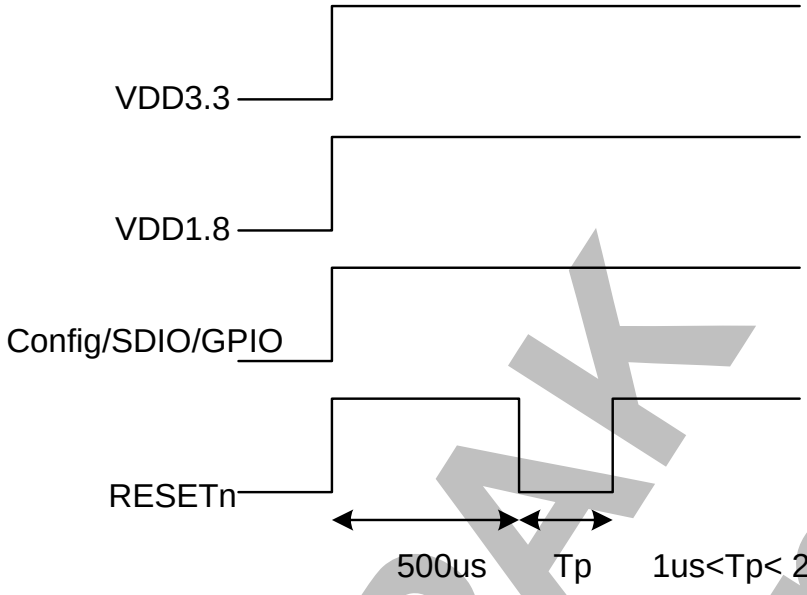
SDIO Protocol Timing Diagram- High Speed Mode*



* Reference from the Marvell 88W8686 datasheet

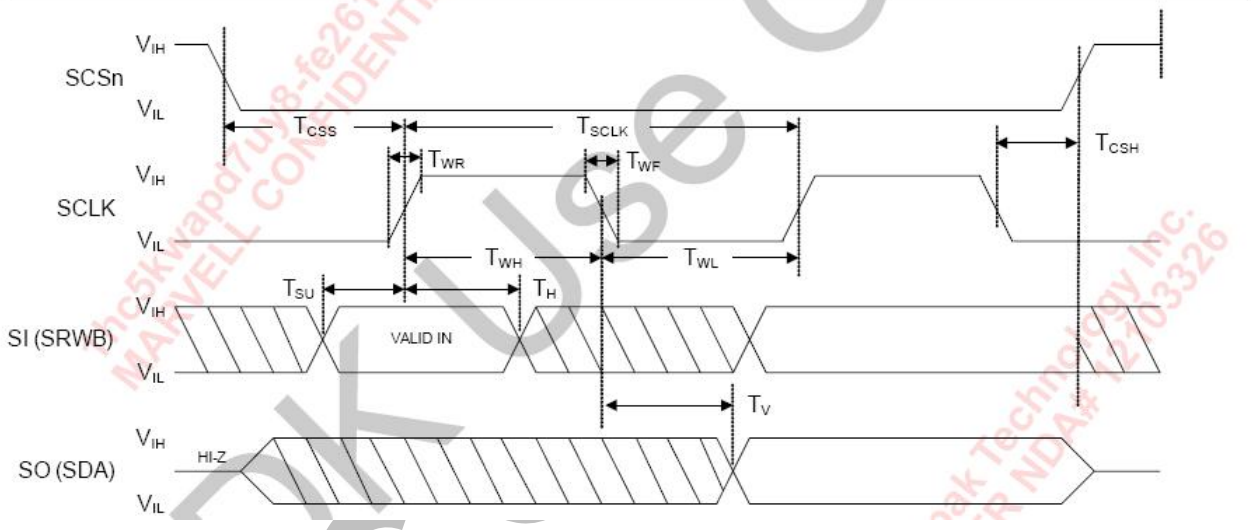
3-4 Reset and Configuration Timing

External timing requirements (RESETn)

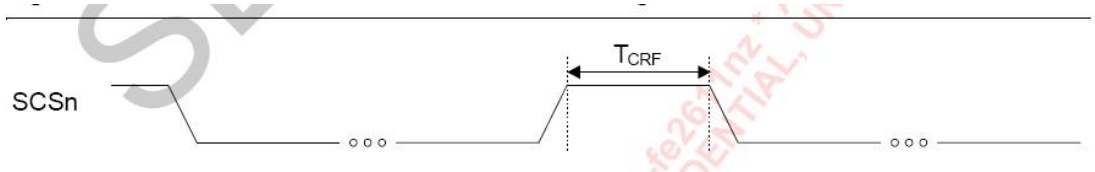


* Reference from the Marvell 88W8686 application note.

3-5 SPI Host Interface Transaction Timing



SPI Host Interface Inter-Transaction Timing



4. Product Specification

4-1 General Specification

Product Name	802.11b/g Wireless LAN Module
Dimensions	8.8 x 8.8 x 1.45 mm (Tolerance: +/- 0.1mm)
Host Interface	SDIO 4-bit/1-bit / SPI
Modulation connection	36 pin LGA
Frequency Band	802.11b ISM band 2.400 ~ 2.484GHz (subject to local regulations) 802.11g ISM band 2.400 ~ 2.484GHz (subject to local regulations)
Number of Channel	802.11b USA and Canada – 11 Most European countries – 13 Japan – 14 France – 4 802.11g USA and Canada – 13 Most European countries – 13 Japan – 13
Operating Voltage	3.3V +/- 10 % 1.8V+/- 5%
Spreading	802.11b Direct Sequence Spread Spectrum (DSSS) 802.11g Orthogonal Frequency Division Multiplexing (OFDM)
Modulation	802.11g：64 QAM, 16 QAM,QPSK, BPSK 802.11b：CCK,DQPSK,DBPSK
Data Rate	802.11b 11,5.5, 2, 1 Mbps per channel, auto fallback for extended range 802.11g 54, 48, 36,24,18,12, 9, 6 Mbps per channel, auto fallback for extended range
Transmitted RF power	802.11b please see the output power table for detail. tolerance: +/-1.5dBm 802.11g please see the output power table for detail. tolerance: +/-1.5dBm

Receive Sensitivity	802.11g Nominal Temp Range: - 6Mbps PER<10% @ -82 dBm, +/- 2 dBm - 9Mbps PER<10% @ -81 dBm, +/- 2 dBm - 12Mbps PER<10% @ -80 dBm, +/- 2 dBm - 18Mbps PER<10% @ -79 dBm, +/- 2 dBm - 24Mbps PER<10% @ -77 dBm, +/- 2 dBm - 36Mbps PER<10% @ -74 dBm, +/- 2 dBm - 48Mbps PER<10% @ -72 dBm, +/- 2 dBm - 54Mbps PER<10% @ -70 dBm, +/- 2 dBm 802.11b - 11Mbps PER<8% @ –85 dBm +/- 2 dBm - 5.5Mbps PER<8% @ –87 dBm +/- 2 dBm - 2Mbps PER<8% @ –88 dBm +/- 2 dBm - 1Mbps PER<8% @ –89 dBm +/- 2 dBm
Maximum receive level	- 10dBm
Supplied Driver	Windows XP/Vista, Win CE 5.0, Linux 2.6
Standards	IEEE 802.11b, IEEE 802.11g standard, Wi-Fi compliant
Temperature Range	-10 ~ 65°C (Operating); -40 ~ 85°C (Storage)
Humidity	Operating Humidity 10% to 95% Non-Condensing Storage Humidity 5% to 95% Non-Condensing

RF Output power table [dBm] setting in 802.11g

CH	2412 MHz	2417~2467MHz	2472 MHz	Remark
6~24 Mbps	13	13	13	
36 Mbps	13	13	13	
48 Mbps	13	13	13	
54Mbps	13	13	13	

RF Output power table [dBm] setting in 802.11b

CH	2412 MHz	2417~2467MHz	2472 MHz	Remark
1 Mbps	13	13	13	
2Mbps	13	13	13	
5.5Mbps	13	13	13	
11Mbps	13	13	13	

4-2 Power Consumption

The Power Consumption is typically measured at Ta =25°C.

Test Mode	3.3V rail	1.8V rail	Remark
802.11g Continue Tx@54Mbps,13dBm	185 mA	152 mA	99% duty cycle
802.11b Continue Tx@11Mbps,13 dBm	185 mA	145 mA	99% duty cycle
802.11g RX@54Mbps	0.2 mA	192 mA	
802.11b RX@11Mbps	0.2 mA	164 mA	
802.11b/g RX Idle	0.2 mA	130 mA	
Deep sleep mode		0.4 mA	

4-3 Supply voltage

Symbol	Parameter	Min	Typ	Max	Unit
VDD3.3	PA , I/O analog power supply	3.0	3.3	3.6	V
VDD1.8	1.8V analog power supply , Internal 1.2V_LDO	1.7	1.8	1.9	V
Config	RESETn,IF_SEL_1,IF_SEL_2,ECSn,SCLK	2.97	3.3	3.63	V
SDIO	SDIO host interface	2.97	3.3	3.63	V
GPIO	General purpose I/O	2.97	3.3	3.63	V

Note : Power supply voltage with respect to Ground.

5.Reliability Test

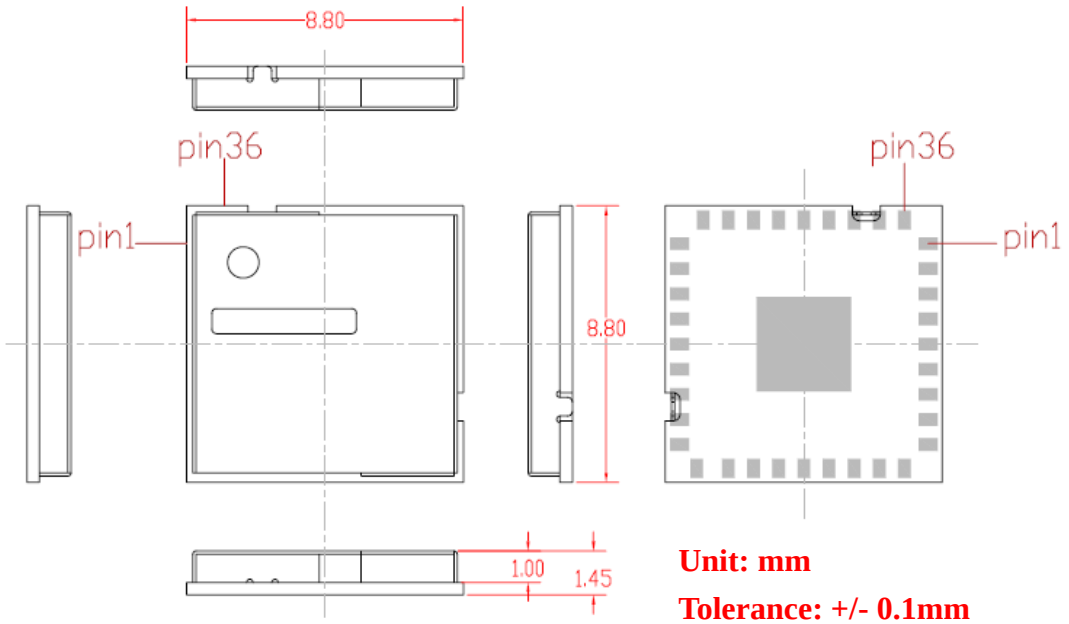
No	Item	Test condition.	Characteristics
1	Thermal Shock Test	-25℃ for 10mins 100℃ for 10mins Check point:150/250/500cycle	No electrical problem
2	Temperature Cycle Test	-40℃ for 15mins 100℃ for 15mins Transfer rate: 15℃ per min check point: 158/263/421/526cycle	No electrical problem
3	High /Low temperature Storage test	power off 80℃for 10hr;-40℃ for 10hr; room temperature for 6h	No electrical problem
4	High/Low Temperature Operation Test	power on, -20℃, for 10hr; 80℃for 10hr， room temperature for 6hr	No electrical problem
5	Temperature Humidity Biased/ Operation test	power on 25℃/50%/30min; 80℃/85%/200hr;25℃/50%/30min	No electrical problem
6	Operation & Voltage Test	Voltage:3.0V,3.3V,3.6V Temperature:0℃, 45℃, 80℃, Retention time:15min	No electrical problem
7	Random Vibration Test	Power on, 3.5G RMS, 10 mins 5HZ @ 0.01g2/HZ to 20 HZ @ 0.025g2/HZ 20 HZ @ 0.025g2/HZ to 500 HZ@ 0.025g2/HZ	No electrical problem
8	ESD	ESD-MM:JEDEC EIA/JESD22-A115-A ESD-HBM:MIL-STD-883G	No electrical problem
9	Mechanical Shock Test	1. Sine wave 230G, 3msec 2. Test: +/- x,y,z axis	No electrical problem

6. Regulatory

This module is pre-scanned on module level to comply with following standards:

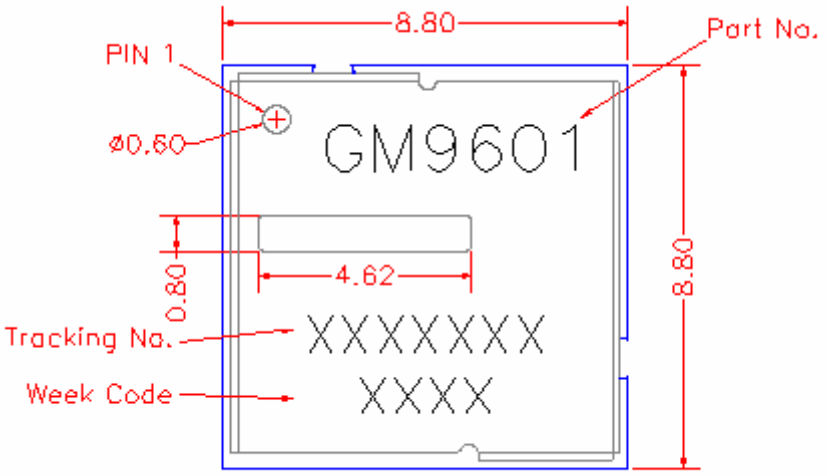
- US/CAN: FCC CFR47 Part 15.247
- Japan: TELEC
- Europe: ETS 300-328 V1.6.1

7. Mechanical Specification



Unit: mm

Tolerance: +/- 0.1mm



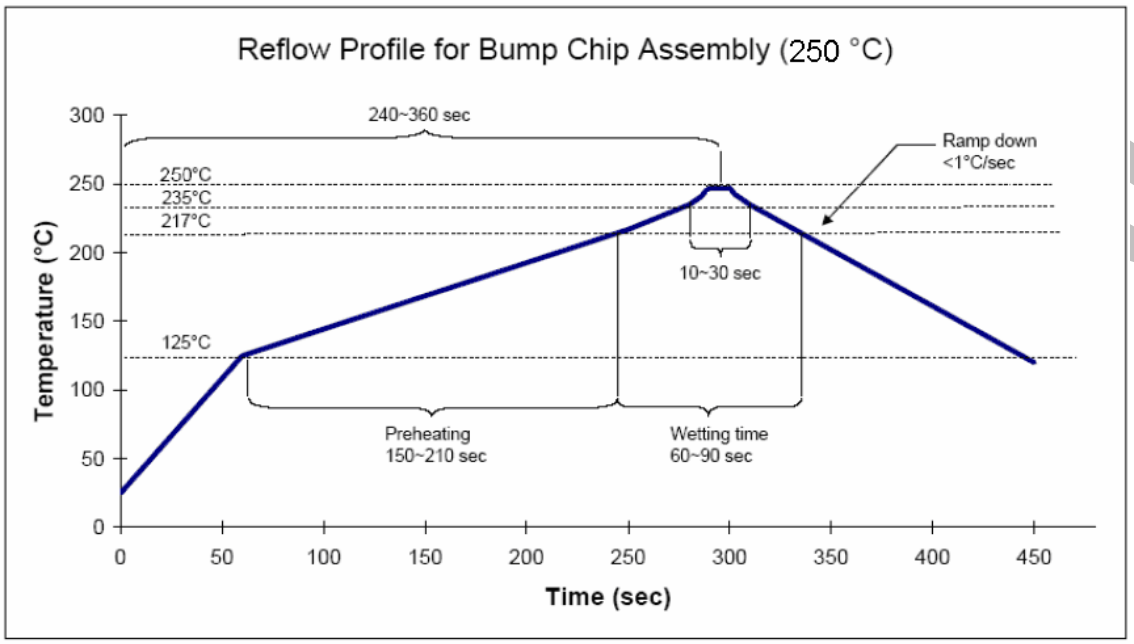
(Sample figure)

8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

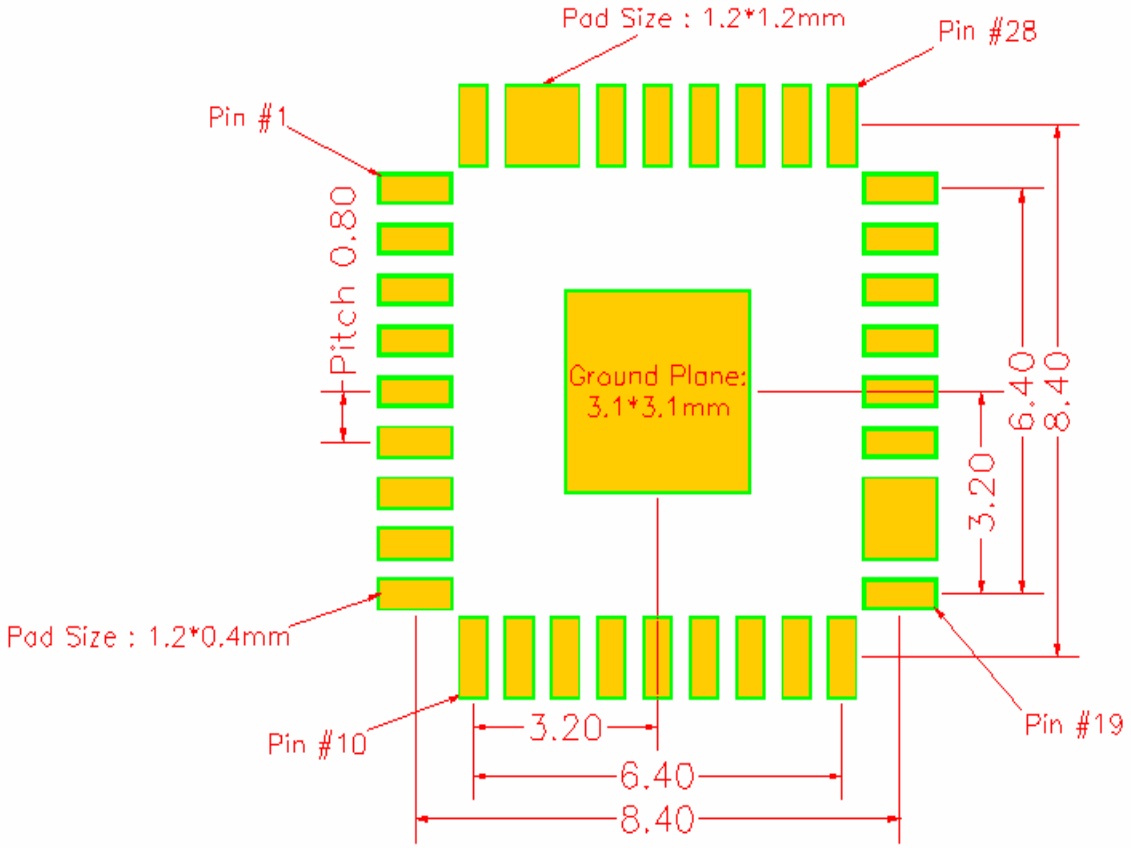
Peak Temperature : < 250℃

Max reflow times : 2



Preheat Ramp-up Rate	125°C to 217°C < 1°C / sec
Time at T > 217°C	60 sec to 90 sec
Peak Temperature	245°C ~ 250°C
Cooling Ramp-down Rate	< 1°C / sec
Time From 25°C to peak	240s to 360 sec

9. Recommended Footprint



Unit: mm

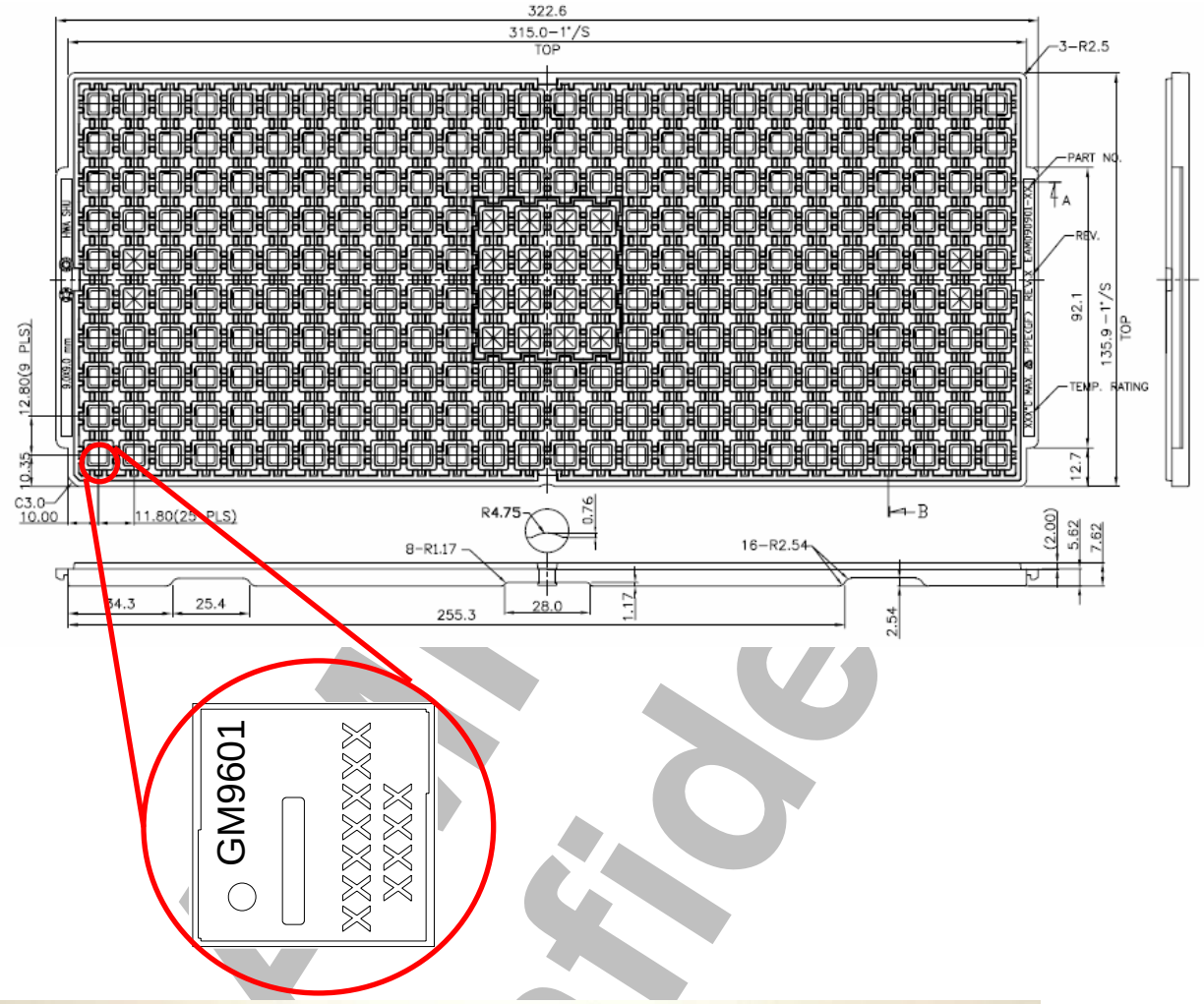
Tolerance: +/- 0.1mm

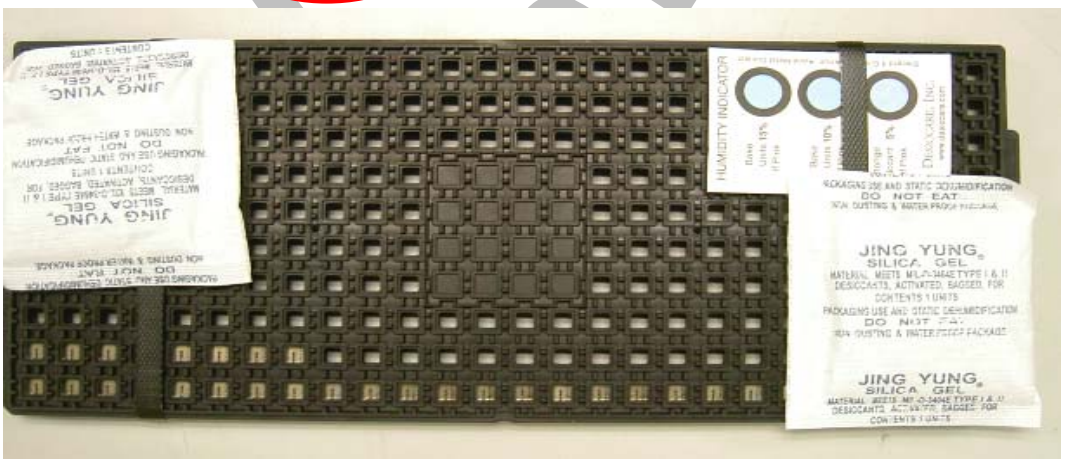
ESD Level of Module:

1. **ESD-MM: JEDEC EIA/JESD22-A115-A Class A**
2. **ESD-HBM: MIL-STD-833G Method 3015.7 Class1C**

10. Package Information

10-1 Tray Dimension





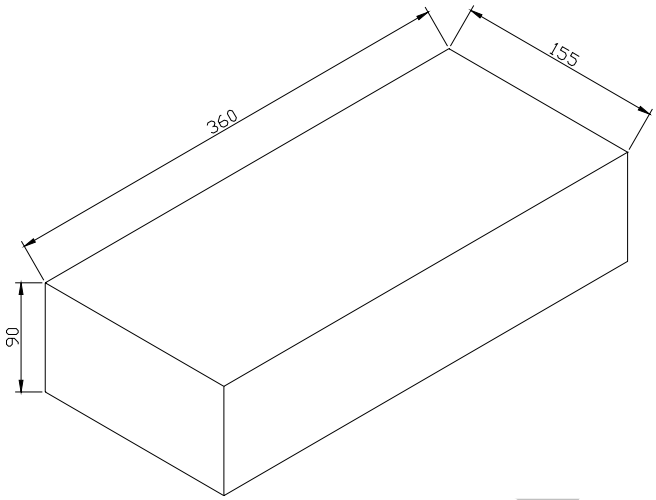
10-2 Packing Information

Customization Label
For Customer Request

ESD Level of bag:

1. Surface Resistivity:
   Interior : 10^{9}~$10^{11}\Omega$ / Square
   Exterior : 10^{8}~$10^{12}\Omega$ / Square
2. Dimension : 430 x 480mm
3. Tolerance : ± 5.0mm

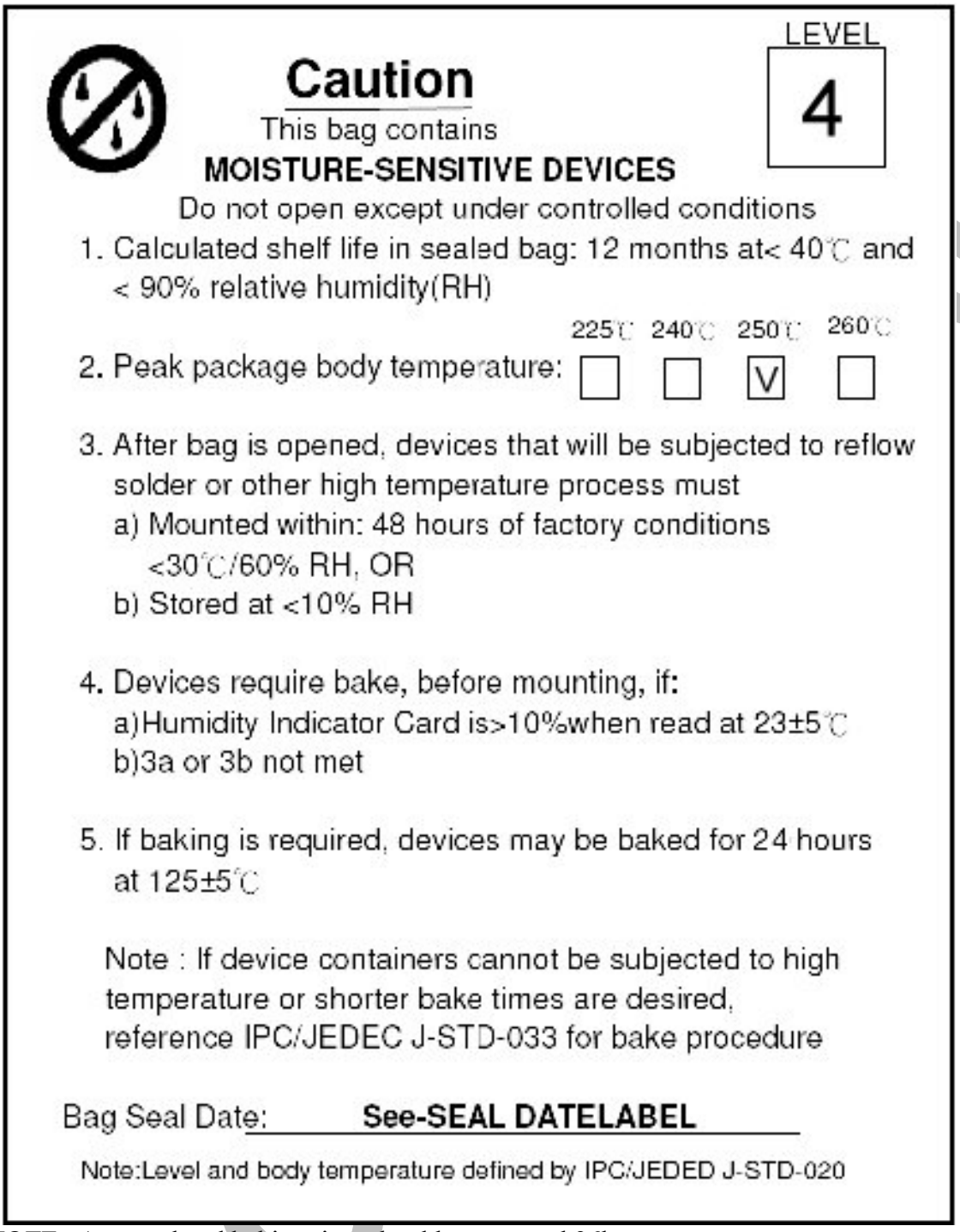
10-3 Inner Box



unit : mm

Customization Label for Customer request

10-4 MSL Level / Storage Condition



NOTE : Accumulated baking time should not exceed 96hrs

· 10-5 **Manufacture Site:** Taiwan