USER MANUAL

802.11n, Dual Band 1T1R Wireless Lan SDIO Module

WN3501M

Marvell 88w8782

Version 1.2

Change History

Revision	Date	Author	Change List
Version 1.0	2014/04/30	Kaysa Lee	Preliminary
Version 1.1	2014/09/15	Kaysa Lee	Update Product Picture
Version 1.2	2016/06/20	Kaysa Lee	Update: 1.Product Picture Add: 2. 2D drawing 3. Packing drawing 4. FFC Cable Drawing 5. Shielding Drawing 6. MAC Label Drawing

CONTENT

PRODUCT FEATURES

WI-FI FEATURE:

- Operate at ISM frequency Band (2.4/5GHz)
- IEEE Standards Support, 802.11a,802.11b, 802.11g and 802.11n
- Support SDIO, G-SPI, high-speed UART interface
- Enterprise level security supporting: WPA, WPA2, WAPI
- Support 1 transmission and 1 receiving, transmission rate can up to 150Mbps (Physical Rate) in downstream and upstream
- Low power consumption
- Support Linux OS based and kernel up to 2.6.x , Android 2.2/3.0
- Support BT Coexistence interface
- RoHS compliance
- Low Halogen compliance

PRODUCT SPECIFICATIONS

MAIN CHIPSET

Marvell 88w8782

FUNCTIONAL SPECIFICATIONS

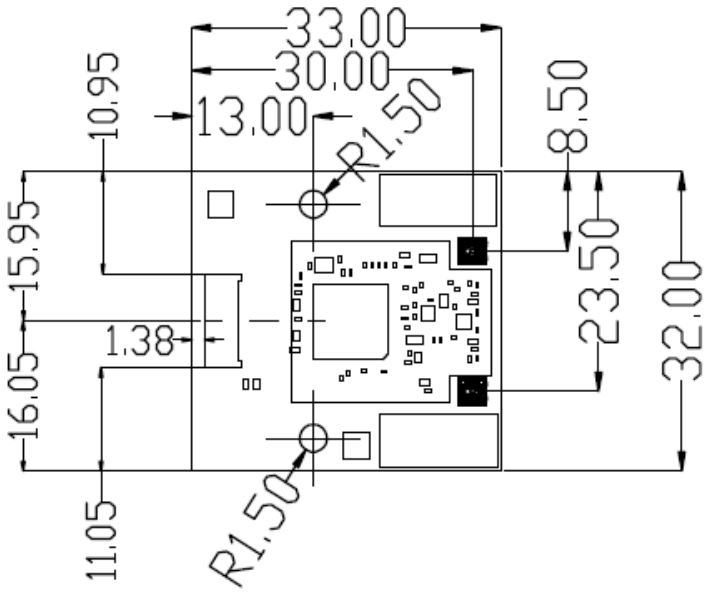
<table>
<tr><th colspan="2">Wi-Fi Function</th></tr>
<tr><td>Standard</td><td>IEEE802.11a; IEEE802.11b; IEEE 802.11g; IEEE 802.11n</td></tr>
<tr><td>Bus Interface</td><td>SDIO</td></tr>
<tr><td>Data Rate</td><td>802.11b:
11, 5.5, 2, 1 Mbps
802.11a/g:
54, 48, 36, 24, 18, 12, 9, 6 Mbps
802.11n:
MCS 0 to 7 for HT20MHz
MCS 0 to 7 for HT40MHz</td></tr>
<tr><td>Media Access Control</td><td>CSMA/CA with ACK</td></tr>
<tr><td>Modulation Techniques</td><td>802.11b:
CCK, DQPSK, DBPSK
802.11a/g:
64QAM, 16QAM, QPSK, BPSK
802.11n:
BPSK, QPSK, 16QAM, 64QAM</td></tr>
<tr><td>Network Architecture</td><td>Ad-hoc mode (Peer-to-Peer)
Infrastructure mode</td></tr>
<tr><td>Security</td><td>WEP 64/128 bit, WPA, WPA2, WAPI, IEEE 802.1x, IEEE 802.11i</td></tr>
<tr><td>Operating Voltage</td><td>3.3 V ±10% I/O supply voltage</td></tr>
<tr><td>OS Supported</td><td>Linux Based</td></tr>
<tr><td>Power Consumption</td><td>TX Mode:
<table><tr><th></th><th>2.4GHz</th><th>5GHz</th></tr><tr><td>11a</td><td>-</td><td>272 mA</td></tr><tr><td>11b</td><td>362 mA</td><td>-</td></tr><tr><td>11g</td><td>264 mA</td><td>-</td></tr><tr><td>11n_HT20</td><td>306 mA</td><td>317 mA</td></tr><tr><td>11n_HT40</td><td>280 mA</td><td>301 mA</td></tr></table>RX Mode:
<table><tr><th></th><th>2.4GHz</th><th>5GHz</th></tr><tr><td>11a</td><td>-</td><td>183 mA</td></tr><tr><td>11b</td><td>175 mA</td><td>-</td></tr><tr><td>11g</td><td>163 mA</td><td>-</td></tr><tr><td>11n_HT20</td><td>181 mA</td><td>205 mA</td></tr><tr><td>11n_HT40</td><td>203 mA</td><td>228 mA</td></tr></table>Associated Mode:
2 mA
Un-associated Mode:</td></tr>
</table>

	1 *mA*
Antenna Type	Dual Antenna connectors

PIN ASSIGNMENT

Pin.	*Pin Define*	*Type*	*Description*
1	*GND*		*Ground*
2	*RESETTn*	*I*	*Reset (active low) (internal pull-high)* *Please keep this pin floating if host don't need to control it.*
3	*WLAN_LED*	*O*	*WLAN LED*
4	*WAKEUP*	*I*	*Host Wakeup: Host-to-SoC Wakeup (input)* *Please keep this pin floating if host don't need to control it.*
5	*SLP_CLK_In*	*I*	*Sleep Clock Input* *Please keep this pin floating if host don't need to control it.*
6	*SD_CMD*	*I/O*	*SDIO Command*
7	*SD_D0*	*I/O*	*SDIO Data0*
8	*SD_D1*	*I/O*	*SDIO Data1*
9	*SD_D2*	*I/O*	*SDIO Data2*
10	*SD_D3*	*I/O*	*SDIO Data3*
11	*GND*		*Ground*
12	*SD_CLK*	*I*	*SDIO clock input*
13	*GND*		*Ground*
14	*3.3V*		*3.3V*
15	*PDn*	*I*	*Full Power Down (active low)* *0 = full power down mode* *1 = normal mode*
16	*SOC-to-Host*	*O*	*Wake on WLAN (GPIO2) (internal pull-high) (active low)*

MECHANICAL



PRODUCT PICTURE

EEPROM INFORMATION

Reg Domain	FCC Channels 1-11 with active scan
Vendor ID	0x02DF
Device ID	0x9121

ENVIRONMENTAL

OPERATING

Operating Temperature: 0 to 70 °C (32 to 158°F)

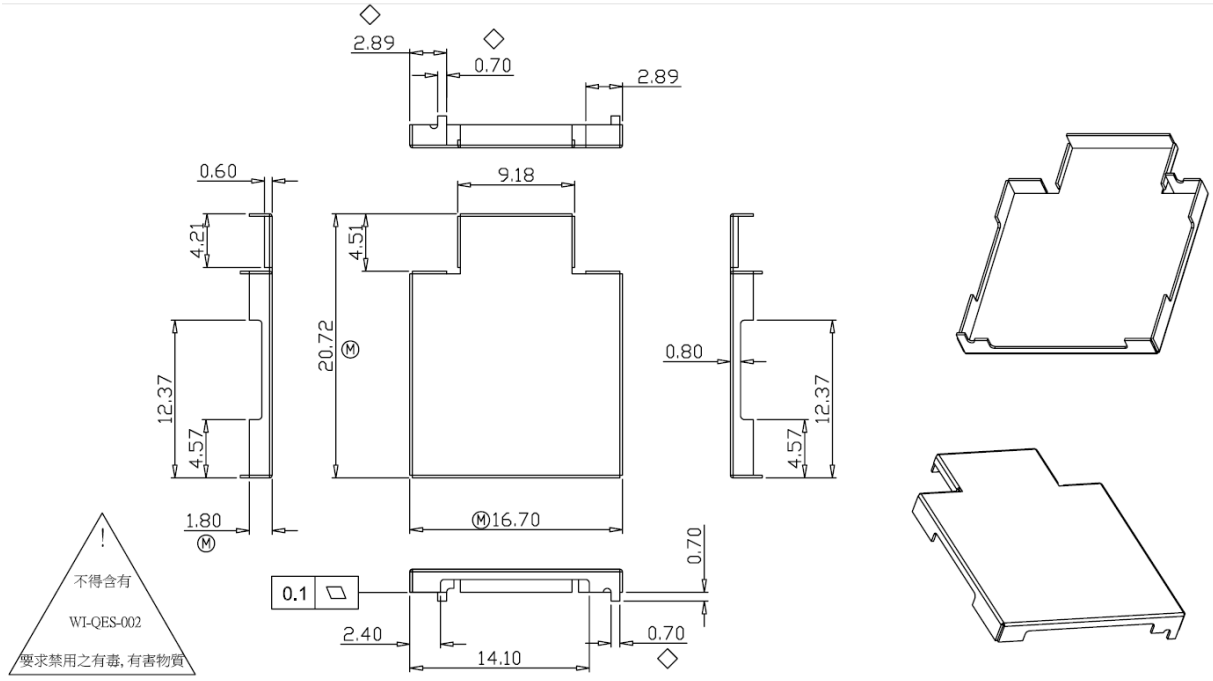
Relative Humidity: 5-90% (non-condensing)

STORAGE

Temperature: -40 to 80 °C (-40 to 176 °F)

Relative Humidity: 5-95% (non-condensing)

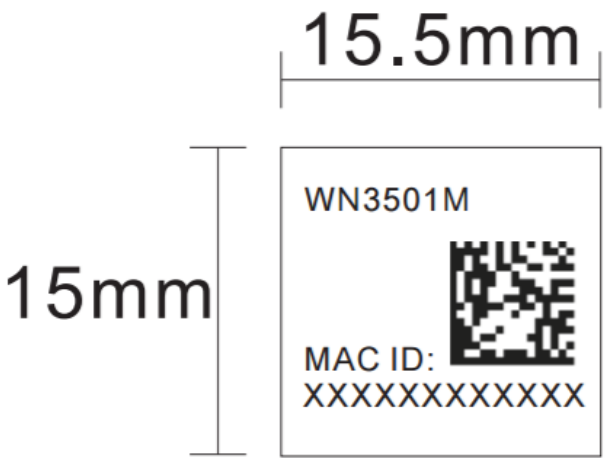
SHIELDING DRAWING



NOTE: 1 :MATERIAL:SPTE T= 0.2 MM / 0.008 INCH
2:MARK '◇ ' : MEANS PROCESS CONTROL DIMENSIONS AND CTF (CRITICAL TO FUNCTION) ITEMS.
3:MARK Ⓜ PROVIDES CPK VALUES.

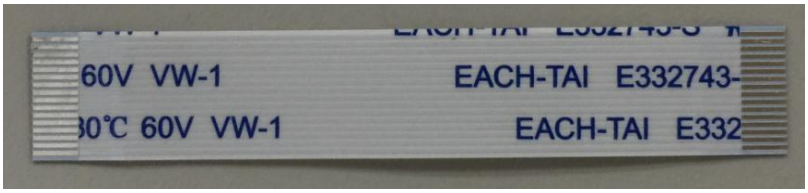
HUNPAI P/N:3500M-S0001

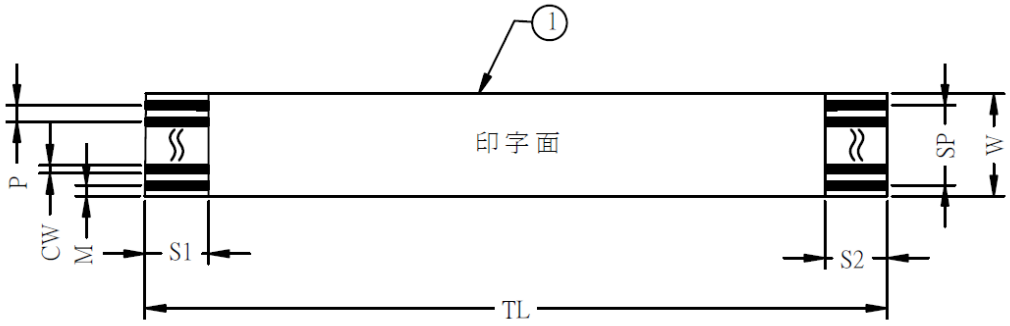
MAC LABEL

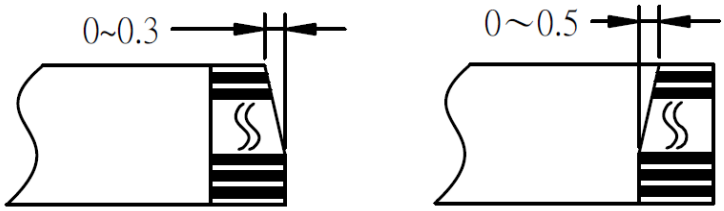


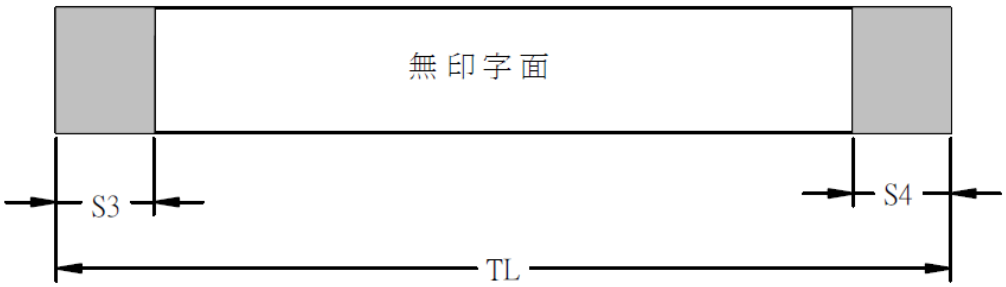
條碼使用二維碼ECC200,等級為B級
顯示內容為XXXXXXXXXXXX(由業務提供)

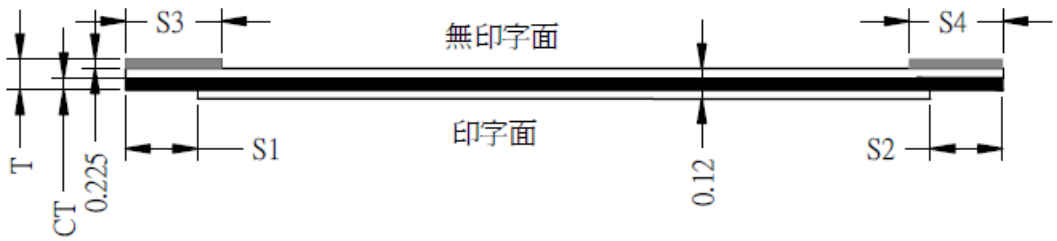
FFC CABLE DRAWING





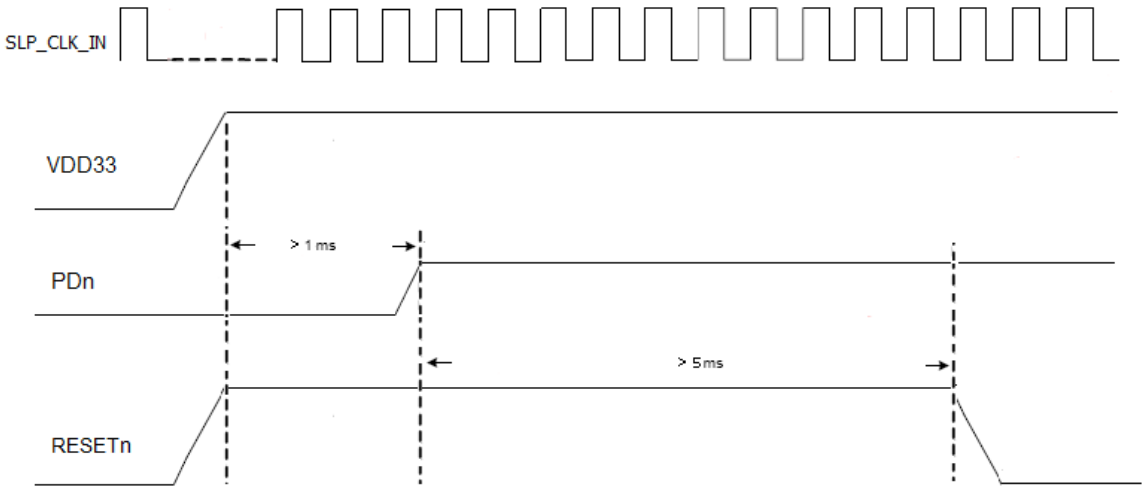






公差	±2	±0.05	±0.08	±0.08	±0.05	0.03	±0.005	±0.05	±0.5	±0.5	±1	±1
尺寸	50	0.5	0.5	8.5	7.5	0.30	0.035	0.3	3	3	5.5	5.5
名稱代碼	TL	P	M	W	SP	CW	CT	T	S1	S2	S3	S4
名稱	總長度	間距	邊緣寬度	總寬度	總間距	導體寬度	導體厚度	端子厚度	剝線(裸銅)長度		補強版長度	

Power UP Sequence



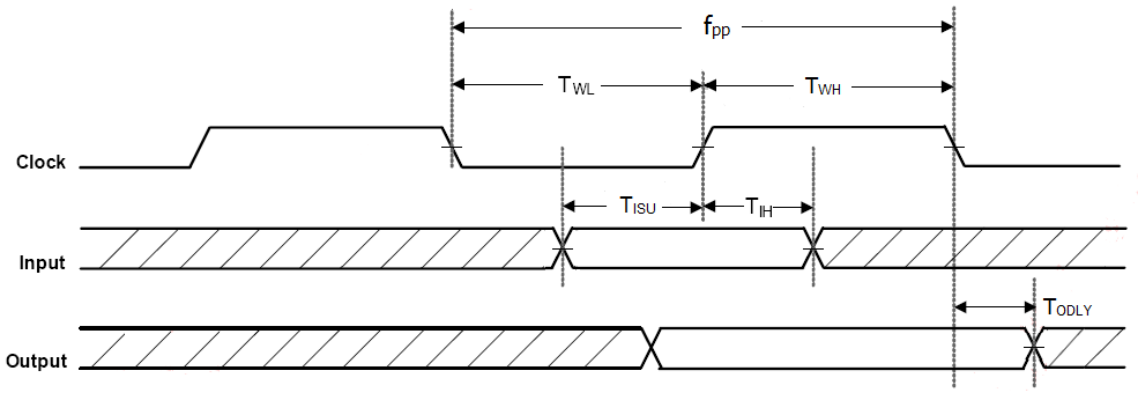
- PDn must remain asserted for a minimum of 1 ms after VDD33 is stable
- For auto reference clock detection, the sleep clock (32.768 KHz) must be used and must be stable before PDn is de-asserted
- RESETn should be inactive value (asserted high)

Power Down Sequence

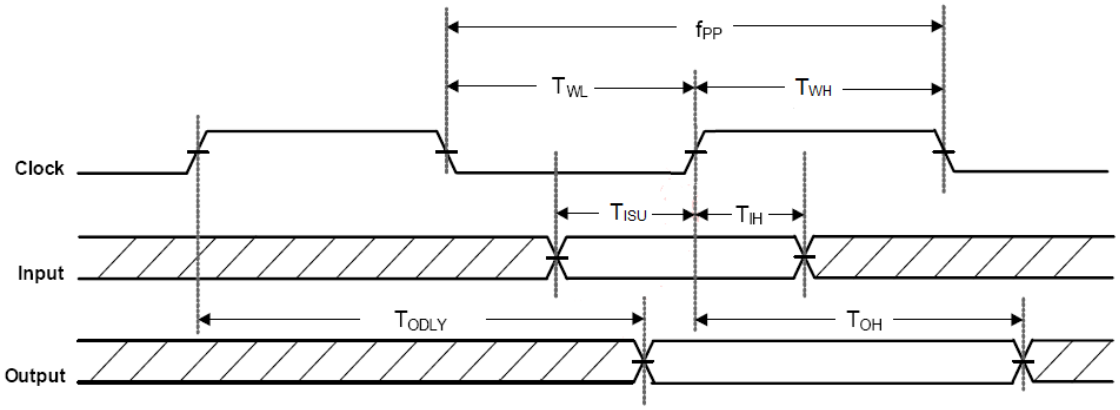
- PDn must be turned off simultaneously with or before VDD33

SDIO INTERFACE

SDIO Protocol Timing Diagram—Normal Mode



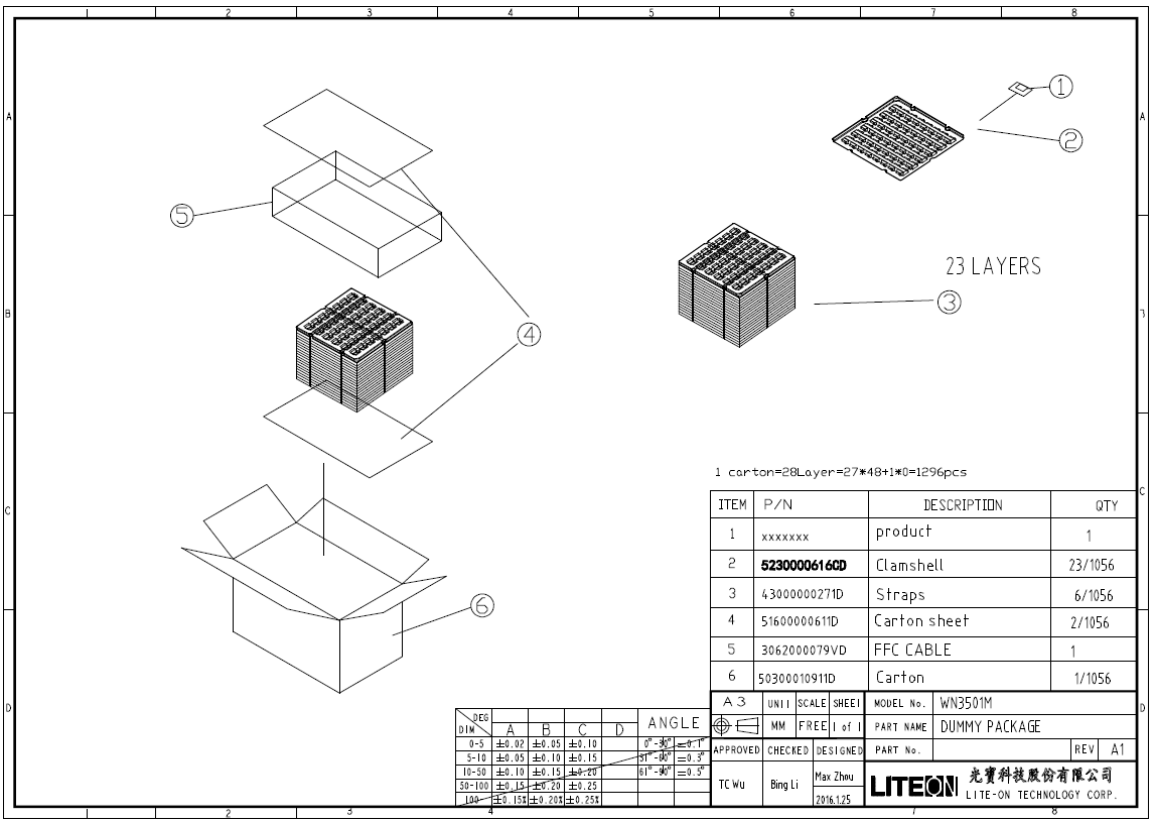
SDIO Protocol Timing Diagram—High Speed Mode



SDIO Timing Data

Symbol	Parameter	Condition	Min	Typ	Max	Units
F_{PP}	Clock Frequency	Normal	0	-	25	MHz
		High Speed	0	-	50	MHz
T_{WL}	Clock Low Time	Normal	10	-	-	ns
		High Speed	7	-	-	ns
T_{WH}	Clock High Time	Normal	10	-	-	ns
		High Speed	7	-	-	ns
T_{ISU}	Input Setup Time	Normal	5	-	-	ns
		High Speed	6	-	-	ns
T_{IH}	Input Hold Time	Normal	5	-	-	ns
		High Speed	2	-	-	ns
T_{ODLY}	Output Delay Time	-	-	-	7.33	ns
T_{OH}	Output Hold Time	High Speed	2.5	-	-	ns

PACKING DRAWING (MODULE + FFC CABLE)



ITEM	P/N	DESCRIPTION	QTY
1	xxxxxxx	product	1
2	**5230000616GD**	Clamshell	23/1056
3	43000000271D	Straps	6/1056
4	51600000611D	Carton sheet	2/1056
5	3062000079VD	FFC CABLE	1
6	50300010911D	Carton	1/1056

DEG DIM	A	B	C	D	ANGLE
0-5	±0.02	±0.05	±0.10		0°~30" =0.1°
5-10	±0.05	±0.10	±0.15		31°~60° =0.3°
10-50	±0.10	±0.15	±0.20		61°~90° =0.5°
50-100	±0.15	±0.20	±0.25		
100~	±0.15%	±0.20%	±0.25%		

A3	UNIT	SCALE	SHEET	MODEL No.	WN3501M
	MM	FREE	1 of 1	PART NAME	DUMMY PACKAGE
APPROVED	CHECKED	DESIGNED		PART No.	REV A1
TC Wu	Bing Li	Max Zhou 2016.1.25		LITEON 光寶科技股份有限公司 LITE-ON TECHNOLOGY CORP.	

FCC Statement:

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.
Additional testing and certification may be necessary when multiple modules are used.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20 cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the labelling area is small than the palm of the hand, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: PPQ-WN3501M ".

If the labelling area is larger than the palm of the hand, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

IC Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.
Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.
Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.
Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.
les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

Dynamic Frequency Selection (DFS) for devices operating in the bands 5250- 5350 MHz, 5470-5600 MHz and 5650-5725 MHz.
Sélection dynamique de fréquences (DFS) pour les dispositifs fonctionnant dans les bandes 5250-5350 MHz, 5470-5600 MHz et 5650-5725 MHz.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

For indoor use only.

Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Antenna list:

Ant.	Antenna Type	Gain (dBi)	
		2.4GHz	5GHz
Ant. R	Printed Antenna	0.6	3.1
Ant. L	Printed Antenna	0.95	3.22

IMPORTANT NOTE:
This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.
Additional testing and certification may be necessary when multiple modules are used.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:
In the users manual of the end product, the end user has to be informed to keep at least 20 cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following " Contains IC: 4491A-WN3501M ".
The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

Japan Statement:

5GHz band (W52, W53): Indoor use only

NCC Statement:

(1) 「經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能」。

(2) 「低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾」。

(3) 無線資訊傳輸設備必須具備安全功能，以保護未經授權之一方任意更改軟體進而避免發射機操作於非經認證之頻率、輸出功率、調變形式或其他射頻參數設定。

(4) 無線資訊傳輸設備避免影響附近雷達系統之操作。

(5) 「本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組  CC XX xx LP yyy Z z」。

Korea Statement:

B 급기기 (가정용 방송통신기자재)

이 기기는 가정용(B 급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.