



User Manual
For
802.11 b/g/n Draft 2.0 Intelligent NIC Card

(Ralink RT3662)

Model Number : WMP-N13

Revision: 1.2

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Revision History

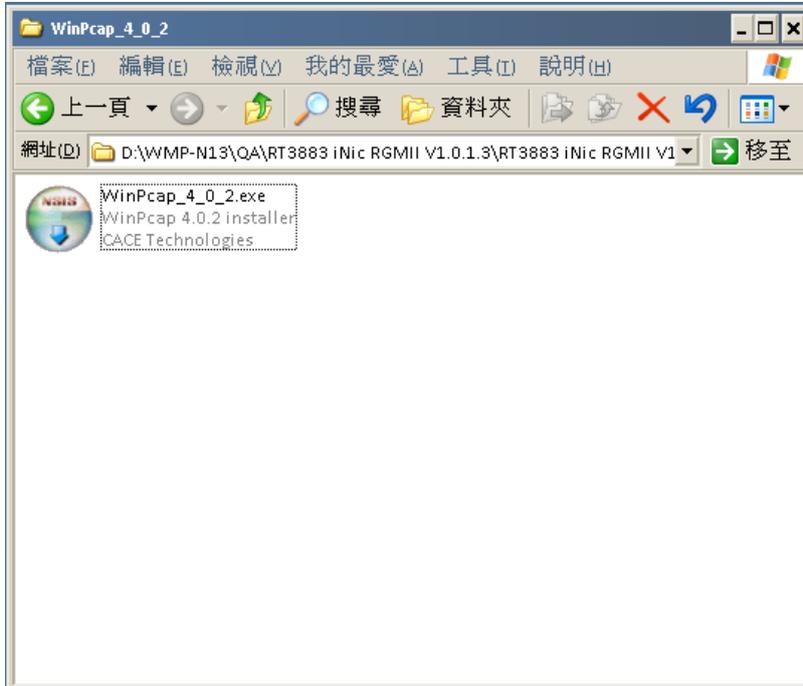
Rev.	Date	Author	Reason for Changes
1.0	2009/12/10	Amanda Wang	<ul style="list-style-type: none">• New released
1.1	2009/12/17	Amanda Wang	<ul style="list-style-type: none">• Revise 11n HT20/40 Receiver Sensitivity
1.2	2010/3/9	Amanda Wang	<ul style="list-style-type: none">• Revise Block Diagram , 11b/g/n Transmitter Output Power and receiver sensitivity numbers• Revise Operating temperature / non-operating temperature

Operation Manual

WMP-G15 Test Manual

I. Install WinPcap

1. Run WinPcap_4_0_2.exe to install the WinPcap tool.



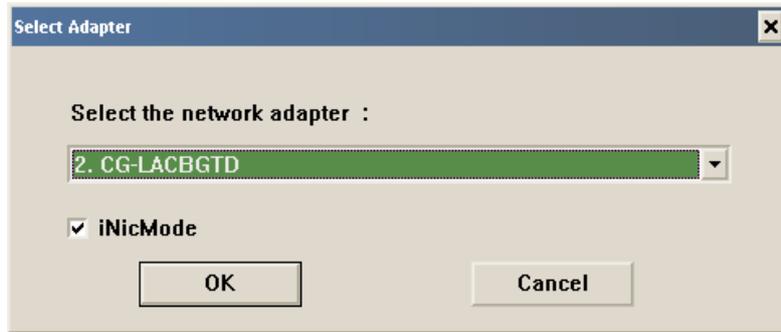
2. Insert the WMP-N13 card and turn on the test board.
3. Confirm the Ethernet link speed is 1000Mbps.

II. Run Test Utility

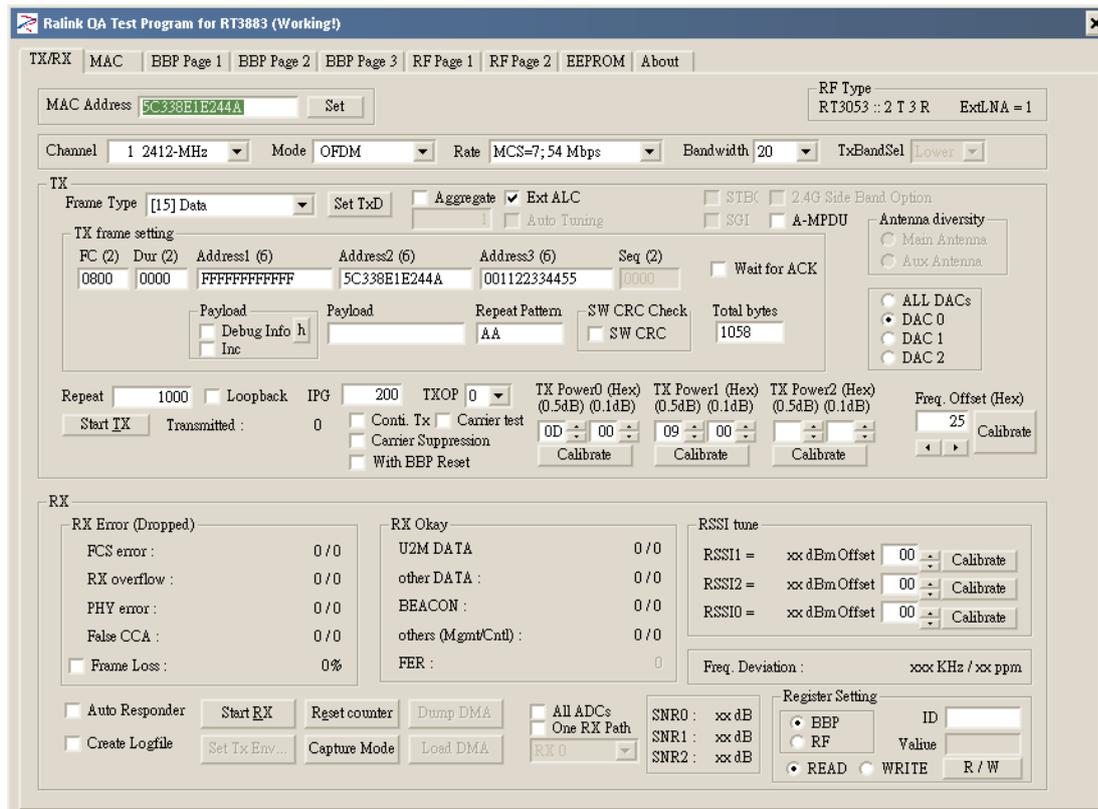
1. Run "RT3882QA.exe" to start test tool.



2. Select your Giga Ethernet adapter.



3. Start to TX/RX signal testing.



- Select channel.
 - Select mode.
 - Select data rate.
 - Select bandwidth.
 - Select TX/RX path.
- Start to transmit signal.

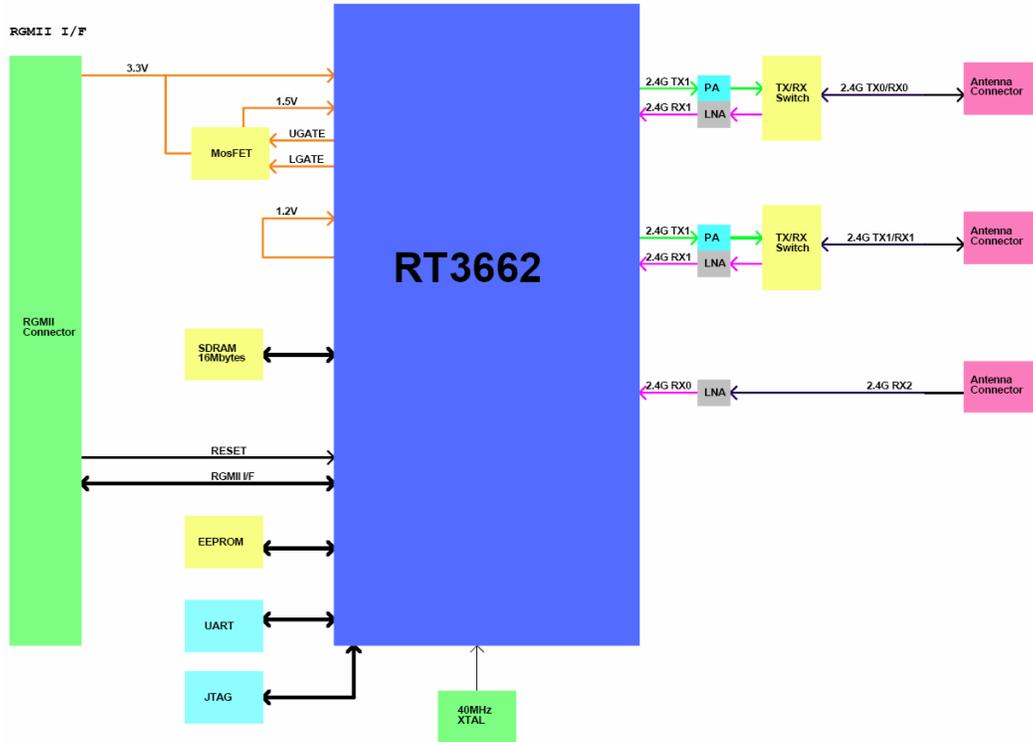
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APPENDIX I:	錯誤! 尚未定義書籤。

2.0 Requirements

The following sections identify the detailed requirements of the **802.11n Draft 2.0 mPCI**.

2.1 Functional Block Diagram



2.2 General Requirements

2.2.1 IEEE 802.11b Section

#	Feature	Detailed Description
2.2.2.1	Standard	<ul style="list-style-type: none"> IEEE 802.11b
2.2.2.2	Radio and Modulation Schemes	<ul style="list-style-type: none"> DQPSK, DBPSK, DSSS, and CCK
2.2.2.3	Operating Frequency	<ul style="list-style-type: none"> 2400 ~ 2497MHz ISM band
2.2.2.4	Channel Numbers	<ul style="list-style-type: none"> 11 channels for United States 13 channels for Europe Countries 14 channels for Japan
2.2.2.5	Data Rate	<ul style="list-style-type: none"> 11, 5.5, 2, and 1Mbps
2.2.2.6	Media Access Protocol	<ul style="list-style-type: none"> CSMA/CA with ACK
2.2.2.7	Transmitter Output Power	<ul style="list-style-type: none"> Typical RF Output Power (Tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C 18(±2dBm at 1,2,5.5,11Mbps
2.2.2.8	Receiver Sensitivity	<ul style="list-style-type: none"> Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 8% -80 dBm at 1Mbps -80 dBm at 2Mbps -76 dBm at 5.5Mbps -76 dBm for 11Mbps

2.2.2 IEEE 802.11g Section

#	Feature	Detailed Description
2.2.3.1	Standard	<ul style="list-style-type: none"> IEEE 802.11g
2.2.3.2	Radio and Modulation Type	<ul style="list-style-type: none"> BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.3.3	Operating Frequency	<ul style="list-style-type: none"> 2400 ~ 2483.5MHz ISM band
2.2.3.4	Channel Numbers	<ul style="list-style-type: none"> 11 channels for United States 13 channels for Europe Countries 13 channels for Japan
2.2.3.5	Data Rate	<ul style="list-style-type: none"> 6,9,12,18,24,36,48,54Mbps
2.2.3.6	Media Access Protocol	<ul style="list-style-type: none"> CSMA/CA with ACK
2.2.3.7	Transmitter Output Power	<ul style="list-style-type: none"> Typical RF Output Power (tolerance +-2dB) at each RF chain, Data Rate and at room Temp. 25degree C + 18 dBm at 6, 9Mbps + 18 dBm at 12, 18Mbps + 17 dBm at 24, 36Mbps + 15 dBm at 48, 54 Mbps
2.2.3.8	Receiver Sensitivity	<ul style="list-style-type: none"> Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% -82 dBm at 6Mbps -81 dBm at 9Mbps -79 dBm at 12Mbps -77 dBm at 18Mbps -74 dBm at 24Mbps -70 dBm at 36Mbps -66 dBm at 48Mbps -65 dBm at 54Mbps

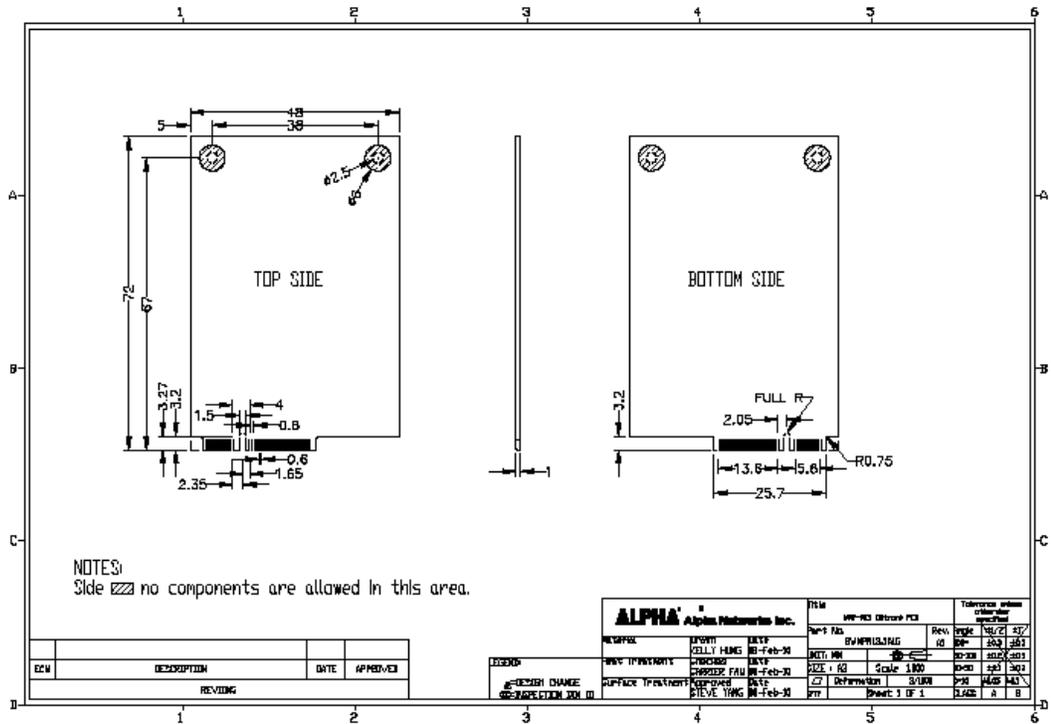
2.2.3 IEEE 802.11n Section for 2.4G Band

#	Feature	Detailed Description				
2.2.3.1	Standard	<ul style="list-style-type: none"> Draft n 				
2.2.3.2	Radio and Modulation Type	<ul style="list-style-type: none"> BPSK, QPSK, 16QAM, 64QAM with OFDM 				
2.2.3.3	Operating Frequency	<ul style="list-style-type: none"> 2.4GHz band: 2400 ~ 2483.5MHz 				
2.2.3.4	MIMO	<ul style="list-style-type: none"> 2T3R 				
2.2.3.5	Data Rate	MCS	GI=800ns		GI=400ns	
			20MHz	40MHz	20MHz	40MHz
		0	6.5	13.5	7.2	15
		1	13	27	14.4	30
		2	19.5	40.5	21.7	45
		3	26	54	28.9	60
		4	39	81	43.3	90
		5	52	108	57.8	120
		6	58.5	121.5	65.0	135
		7	65	135	72.2	150
		8	13	27	14.444	30
		9	26	54	28.889	60
		10	39	81	43.333	90
		11	52	108	57.778	120
		12	78	162	86.667	180
		13	104	216	115.556	240
		14	117	243	130.000	170
		15	130	270	144.444	300
16	19.5	40.5	21.7	45		
17	39	81	43.3	90		
18	58.5	121.5	65	135		

#	Feature	Detailed Description						
		19	78	162	86.7	180		
		20	117	243	130	270		
		21	156	324	173.3	360		
		22	175.5	364.5	195	405		
		23	195	405	216.7	450		
2.2.3.6	Media Access Protocol	<ul style="list-style-type: none"> CSMA/CA with ACK 						
2.2.3.7	Transmitter Output Power at Antenna Connector	<ul style="list-style-type: none"> Typical RF Output Power (tolerance +/-2dB) at each RF chain, Data Rate and at room Temp. 25degree C <p>Note: The maximum power setting will vary according to individual country regulations.</p> <table border="0"> <tr> <td> <ul style="list-style-type: none"> 2.4GHz Band/HT-20 + 17dBm at MCS 0/1 + 17dBm at MCS 2/3 + 16dBm at MCS 4/5 + 14dBm at MCS 6/7 </td> <td> <ul style="list-style-type: none"> 2.4GHz Band/HT-40 + 15dBm at MCS 0/1 + 15dBm at MCS 2/3 + 14dBm at MCS 4/5 + 12dBm at MCS 6/7 </td> </tr> </table>					<ul style="list-style-type: none"> 2.4GHz Band/HT-20 + 17dBm at MCS 0/1 + 17dBm at MCS 2/3 + 16dBm at MCS 4/5 + 14dBm at MCS 6/7 	<ul style="list-style-type: none"> 2.4GHz Band/HT-40 + 15dBm at MCS 0/1 + 15dBm at MCS 2/3 + 14dBm at MCS 4/5 + 12dBm at MCS 6/7
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2.2.3.8	Receiver Sensitivity at Antenna Connector	<ul style="list-style-type: none"> Maximum Sensitivity at each RF chain at Which Frame (1000-byte PDUs) Error Rate = 10% and at room Temp. 25degree C <table border="0"> <tr> <td> <ul style="list-style-type: none"> 2.4GHz Band/HT-20 -82 dBm at MCS0 -79 dBm at MCS1 -77 dBm at MCS2 -74 dBm at MCS3 -70 dBm at MCS4 -66 dBm at MCS5 -65 dBm at MCS6 -64 dBm at MCS7 </td> <td> <ul style="list-style-type: none"> 2.4GHz Band/HT-40 -79 dBm at MCS0 -76 dBm at MCS1 -74 dBm at MCS2 -71 dBm at MCS3 -67 dBm at MCS4 -63 dBm at MCS5 -62 dBm at MCS6 -61 dBm at MCS7 </td> </tr> </table>					<ul style="list-style-type: none"> 2.4GHz Band/HT-20 -82 dBm at MCS0 -79 dBm at MCS1 -77 dBm at MCS2 -74 dBm at MCS3 -70 dBm at MCS4 -66 dBm at MCS5 -65 dBm at MCS6 -64 dBm at MCS7 	<ul style="list-style-type: none"> 2.4GHz Band/HT-40 -79 dBm at MCS0 -76 dBm at MCS1 -74 dBm at MCS2 -71 dBm at MCS3 -67 dBm at MCS4 -63 dBm at MCS5 -62 dBm at MCS6 -61 dBm at MCS7
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2.3 General Section

#	Feature	Detailed Description
2.2.4.1	Antenna Connector	<ul style="list-style-type: none"> Three UFL compatible antenna connectors
2.2.4.2	Operating Voltage	<ul style="list-style-type: none"> 3.3VDC +/- 10%
2.2.4.3	Current Consumption	<ul style="list-style-type: none"> 1.2 A
2.2.4.4	Form Factor and Interface	<ul style="list-style-type: none"> PCI-E connector with RGMII signal
2.2.4.5	PCB Outline	<ul style="list-style-type: none"> See below
2.2.4.6	Pin Assignment	<ul style="list-style-type: none"> See below



Pin	Name	Type	Pin	Name	Type
1	GND	P	2	NC	
3	GE_RXD3	I	4	NC	
5	3.3V	P	6	GND	P
7	GE_RXD1	I	8	GND	P
9	GND	P	10	GND	P
11	GE_RXD2	I	12	GND	P
13	3.3V	P	14	GE_MDC	O
15	GE_RXDV	I	16	GE_MDIO	I/O
Mechanical Key					
17	GND	P	18	GND	P
19	GE_RXD0	I	20	GND	P
21	GND	P	22	GND	P
23	GE_RXCLK	I	24	GND	P
25	GND	P	26	GND	P
27	GND	P	28	GND	P
29	GE_TXD2	O	30	GND	P
31	GND	P	32	GND	P
33	GE_TXD1	O	34	GND	P

35	3.3V	P	36	GND	P
37	GE_TXD0	O	38	GND	P
39	GND	P	40	NC	
41	GE_TXCLK	O	42	GND	P
43	GND	P	44	NC	
45	GE_TXD3	O	46	GND	P
47	3.3V	P	48	NIC_WLED	O
49	GE_TXEN	O	50	GND	P
51	GND	P	52	NIC_RST#	I

2.4 Software Requirements

The Configuration Software supports Linux2.6. This configuration software includes the following functions:

- **Information**
Information allows you to monitor network status.
- **Configuration**
Configuration allows you to configure parameters for wireless networking.
- **Security**
Supports enhanced security WEP, 802.1x, WPA and WPA2.

2.4.1 Information

#	Feature	Detailed Description
2.4.1.1	General Information	<ul style="list-style-type: none"> • General Information shows the name of Wireless Adapter, Adapter MAC Address, Regulatory Domain, Firmware Version, and Utility Version.
2.4.1.2	Current Link Information	<ul style="list-style-type: none"> • Current Link Information shows the Current Setting ESSID, Channel Number, Associated BSSID, Network Type, Security Status, Link Status, Transmit Speed, Signal Strength, and Link Quality.
2.4.1.3	Site survey	<ul style="list-style-type: none"> • To search the neighboring access points and display the information of all access points.

2.4.2 Configuration

#	Feature	Detailed Description
2.4.2.1	ESS ID	<ul style="list-style-type: none"> • Input an SSID number if the roaming feature is enabled • Supports for ASCII printable characters.
2.4.2.2	Network Type	<ul style="list-style-type: none"> • Ad-hoc Mode and 802.11 Ad-hoc Mode for network configurations that do not have any access points • Infrastructure Mode for network configurations with access points
2.4.2.3	Power Save	<ul style="list-style-type: none"> • Extend the battery life of clients by allowing the client to sleep for short periods of time while the Access Point buffers the messages.
2.4.2.4	RTS Threshold	<ul style="list-style-type: none"> • Set the number of bytes used for fragmentation boundary for messages
2.4.2.5	Fragment Threshold	<ul style="list-style-type: none"> • Set the number of bytes used for RTS/CTS boundary
2.4.2.6	Transmission Speed	<ul style="list-style-type: none"> • This indicates the communication rates. Select appropriate transmission speed to match your wireless LAN settings
2.4.2.7	Roaming	<ul style="list-style-type: none"> • Support Automatic or Manual Rescan to associate with access point.

2.4.3 Security

#	Feature	Detailed Description
2.4.3.1	Encryption	<ul style="list-style-type: none">RC4 encryption algorithmSupport 64-bit and 128-bit WEP encryptionSupport open system (OSA) and shared key authentication (SKA)
2.4.3.2	WEP Management	<ul style="list-style-type: none">Four WEP keys can be selectedSTA with WEP off will never associate any AP with WEP enabledWEP Key Format: Option for Hex format
2.4.3.3	802.1x	<ul style="list-style-type: none">Support EAP-TLS, EAP-TTLS, and EAP-PEAP
2.4.3.4	WPA/WPA2	<ul style="list-style-type: none">Support WPA/WPA2-PSK and WPA/WPA2-EAPSupport Cipher Mode AES and TKIP

2.5 Mechanical Requirements

#	Feature	Detailed Description
2.5.1	Length	<ul style="list-style-type: none">72mm(max)
2.5.2	Width	<ul style="list-style-type: none">48mm (+-0.25)
2.5.3	Height	<ul style="list-style-type: none">1 mm (+-0.1)

2.6 Compatibility Requirements

This device passes the following compatibility requirements.

#	Feature	Detailed Description
2.6.1	Wi-Fi	<ul style="list-style-type: none">Meet Wi-Fi certification for IEEE 802.11b/g/n product
2.6.2	WHQL	<ul style="list-style-type: none">Meet applicable WHQL certification requirements
2.6.3	Physical Layer and Functionality	<ul style="list-style-type: none">Meet ALPHA Engineering Test Plan and Test Report

2.7 Requirements of Reliability, Maintainability and Quality

#	Feature	Detailed Description
2.7.1	MTBF	<ul style="list-style-type: none">Mean Time Between Failure > 30,000 hours
2.7.2	Maintainability	<ul style="list-style-type: none">There is no scheduled preventive maintenance required
2.7.3	Quality	<ul style="list-style-type: none">The product quality is followed-up by ALPHA factory quality control system

2.8 Environmental Requirements

#	Feature	Detailed Description
2.8.1	Operating Temperature Conditions	<ul style="list-style-type: none">The product is capable of continuous reliable operation when operating in ambient temperature of 0°C to +50°C.
2.8.2	Non-Operating Temperature Conditions	<ul style="list-style-type: none">Neither subassemblies is damaged nor the operational performance is degraded when restored to the operating temperature after exposing to storage temperature in the range of -20 °C to +75 °C.
2.8.3	Operating Humidity conditions	<ul style="list-style-type: none">The product is capable of continuous reliable operation when subjected to relative humidity in the range of 10% and 90% non-condensing.
2.8.4	Non-Operating Humidity Conditions	<ul style="list-style-type: none">The product is not damaged nor the performance is degraded after exposure to relative humidity ranging from 5% to 95% non-condensing

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

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.

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 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna,
- 3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: RRK-WMPN13A1".

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.