



兆 福 科 技

兆福科技股份有限公司

SPECIFICATION

SPEC. NO. : _____ REV : 0.6

DATE : Aug/08/2018

PRODUCT NAME : BNA2174_M2I

	APPROVED	CHECKED	PREPARED	DCC ISSUE
NAME				

GIGAFU

IEEE 802.11 a/b/g/n/ac 2T/2R
Integrated Bluetooth 4.2+EDR
PCI Express M.2 Card Module

Model Number: BNA2174_M2I



Revision History

Date	Revision Content	Revised By	Version
2017/09/01	- Preliminary	ML	0.0
2017/11/22	Change description and add photo	ML	0.1
2017/11/22	Update Package information	ML	0.2
2017/12/11	Modify Mechanical Diagram	ML	0.3
2018/01/18	Modify Block Diagram and thickness	ML	0.4
2018/01/29	Modify Module picture	ML	0.5
2018/08/08	Update Package information	KY	0.6

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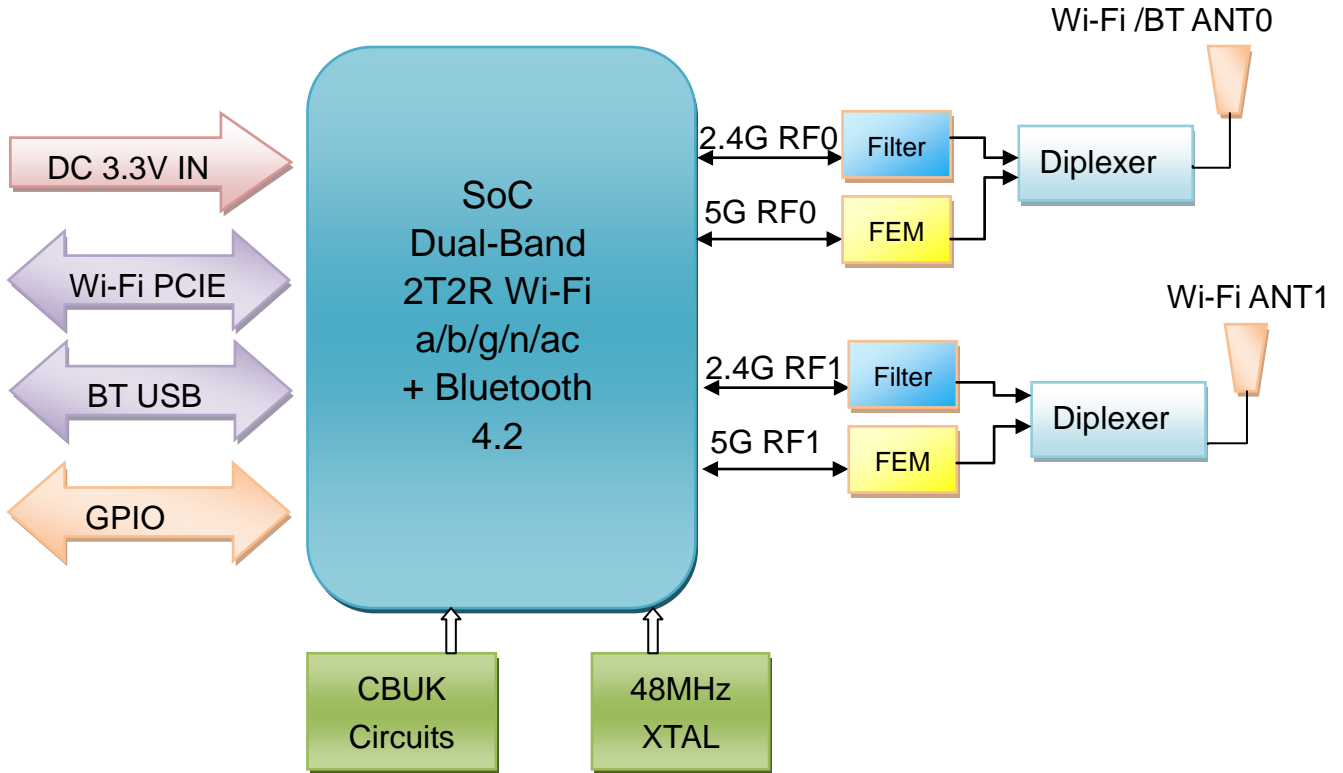
1. Introduction

GIGAFU Technology would like to Release a Dual Band 2T2R Wi-Fi + BT Dual Mode module which has all of the WiFi and Bluetooth functionalities. The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 MIMO..The Bluetooth Supports BT 4.2 + HS, BLE and is backwards compatible with BT 1.X, 2.X Enhanced Data Rate. The integrated module provides PCIE Interface for Wi-Fi and USB interface for Bluetooth.

2. Features

- Supports low power PCIe (w/L1 substate) interfaces for WLAN and USB1.1 interface for Bluetooth.
- Highly integrated wireless local area network (WLAN)
- Compatible for 5 GHz 802.11ac, or 2.4/5 GHz 802.11n WLAN applications.
- Support Bluetooth 4.2 + HS, BLE, ANT+ and be backwards compatible with Bluetooth 1.2, 2.X + enhanced data rate.
- Supports 20/40 MHz at 2.4 GHz and supports 20/40/80 MHz at 5 GHz (SW PL determines 2.4 GHz HT40/VHT40 support)
- Support Bluetooth for class 1 and class 2 power-level transmissions without requiring an external PA
- NGFF(M.2) Form factor which is compliant with ROHS requirements.

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



3. General Specification

3.1 General Specification

Model Name	BNA2174_M2I
Product Description	Support WiFi/Bluetooth
Dimension	L x W x H: 30(\pm 0.15) x 22(\pm 0.15) x 1.95(\pm 0.2) mm
WiFi Interface	PCI-e with NGFF(M.2) Type
BT Interface	USB with Half-Mini Card
Operating temperature	-40°C to 85°C
Storage temperature	-40°C to 85°C
Humidity	Operating Humidity 10% to 95% Non-Condensing

3.2 Voltages

Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	-10	25	65	deg.C
VDD33	3.2	3.3	3.6	V

4. WiFi RF Specification

4.1 2.4GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/b/g/n/ac WiFi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch14
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK
Output Power	802.11b /11Mbps : 18 dBm±2dB @ EVM ≤ -9dB
	802.11g /54Mbps : 15 dBm ±2dB @ EVM ≤ -25dB
	802.11n20 /MCS7 : 14 dBm±2dB @ EVM ≤ -28dB
	802.11n40 /MCS7 : 14dBm±2dB @ EVM ≤ -28dB
Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm, typical
	- 11Mbps PER @ -91 dBm, typical
Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -90 dBm, typical
	- 54Mbps PER @ -75 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=7 PER @ -71 dBm, typical
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=8 PER @ -91dBm, typical
	- MCS=15 PER @ -72 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -86 dBm, typical
	- MCS=7 PER @ -69 dBm, typical
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=8 PER @ -87 dBm, typical
	- MCS=15 PER @ -70dBm, typical
Receive Sensitivity (VHT,20MHz) @10% PER	- MCS=0 PER @ -89 dBm, typical
	- MCS=8 PER @ -68 dBm, typical
MIMO Receive Sensitivity (VHT,20MHz) @10% PER	- MCS=10, NSS1 PER @ -90 dBm, typical
	- MCS=18, NSS1 PER @ -69 dBm, typical
Receive Sensitivity (VHT,40MHz) @10% PER	- MCS=0, NSS1 PER @ -86 dBm, typical
	- MCS=9, NSS1 PER @ -63 dBm, typical
MIMO Receive	- MCS=10, NSS1 PER @ -87 dBm, typical

Sensitivity (VHT,40MHz) @10% PER	- MCS=19, NSS1 PER @ -64dBm, typical
Maximum Input Level	802.11b : -10 dBm
	802.11g/n : -20 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

4.2 5GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac 2x2, WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	5.0GHz : Please see the table ¹
Modulation	802.11a : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11ac : OFDM /256-QAM
Output Power	802.11a /54Mbps : 13dBm±2dB @ EVM ≤ -25dB
	802.11n20 /MCS7 : 12.5 dBm ±2dB @ EVM ≤ -28dB
	802.11n40 /MCS7 : 12.5 dBm ±2dB @ EVM ≤ -28dB
	802.11ac20/MCS 8:11.5 dBm ±2dB @ EVM ≤ -30dB
	802.11ac40/MCS9 : 10 dBm ±2dB @ EVM ≤ -32dB
	802.11ac80 /MCS9 : 10 dBm ±2dB @ EVM ≤ -32dB
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -90 dBm, typical
	- 54Mbps PER @ -78 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=7 PER @ -74 dBm, typical
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=8 PER @ -91 dBm, typical
	- MCS=15 PER @ -75 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm, typical
	- MCS=7 PER @ -71 dBm, typical
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=8 PER @ -88 dBm, typical
	- MCS=15 PER @ -72 dBm, typical
Receive Sensitivity (VHT,20MHz) @10% PER	- MCS=0, NSS1 PER @ -90 dBm, typical
	- MCS=8, NSS1 PER @ -70 dBm, typical
MIMO Receive Sensitivity (VHT,20MHz) @10% PER	- MCS=10, NSS1 PER @ -91 dBm, typical
	- MCS=18, NSS1 PER @ -71 dBm, typical
Receive Sensitivity (VHT,40MHz) @10% PER	- MCS=0, NSS1 PER @ -87 dBm, typical
	- MCS=9, NSS1 PER @ -65 dBm, typical
MIMO Receive Sensitivity (VHT,40MHz) @10% PER	- MCS=10, NSS1 PER @ -88 dBm, typical
	- MCS=19, NSS2 PER @ -66 dBm, typical
Receive Sensitivity (VHT,80MHz) @10% PER	- MCS=0, NSS1 PER @ -84 dBm, typical
	- MCS=9, NSS1 PER @ -62 dBm, typical

MIMO Receive Sensitivity (VHT,80MHz) @10% PER	- MCS=10, NSS1 PER @ -85 dBm, typical
	- MCS=9, NSS1 PER @ -63 dBm, typical
Maximum Input Level	802.11a/n : -30 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

5GHz(20MHz) Channel table

Band (GHz)	Operating Channel Numbers	Channel center frequencies(MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
5.725GHz~5.825GHz	140	5700
	149	5745
	153	5765
	157	5785
	161	5805

5. Bluetooth Specification

5.1 Bluetooth Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature		Description		
General Specification				
Bluetooth Standard		BT 4.2 + HS, BLE, ANT+		
Host Interface		USB 1.1		
Frequency Band		2402 MHz ~ 2480 MHz		
Number of Channels		79 channels		
Modulation		FHSS, GFSK, DPSK, DQPSK		
Characteristics	Condition	TYP	BT Spec.	UNIT
Modulation GFSK	dF1 avg	154	140~ 175	KHz
	dF2 max	167	>115	KHz
	dF2 _{avg} /dF1 _{avg}	1.14	>0.8	
Modulation EDR @8DPSK	RMS DEVM	0.12	<0.13	
	99% DEVM	100	>99	%
	Peak DEVM	21.5	<25	%
RF Specification				
		Min.	Typical.	Max.
Output Power (Class 1.5)			6 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)			-91 dBm	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)			-90 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)			-83 dBm	
Maximum Input Level		GFSK (1Mbps):-20dBm		
		π/4-DQPSK (2Mbps) :-20dBm		
		8DPSK (3Mbps) :-20dBm		

NOTE: The Bluetooth Power could be adjusted by FW.

5.2 BLE Specification

1 Mbps GFSK (Bluetooth low energy)

Conditions : VDD=3.3V ; Temp:25°C. Using Anisu MT8852B

Feature		Description		
General Specification				
Bluetooth Standard		Bluetooth 4.2		
Host Interface		USB		
Antenna Reference		Small antennas with 0~2 dBi peak gain		
Frequency Band		2402 MHz ~ 2480 MHz		
Number of Channels		79 channels		
Modulation		1M GFSK		
RF Specification				
Output Avg Power		Typical	Spec	
2402		0	-2~+2	[dBm]
2441		0	-2~+2	[dBm]
2480		0	-2~+2	[dBm]
Carrier Freq. Offset and Drift	Min	Typical	Max	
Freq. Accuracy	-150	3.7	150	[kHz]
Freq. Offset	-150	2.2	150	[kHz]
Freq. Drift	-50	2	50	[kHz]
Drift Rate		2.2	±20kHz/50us	[kHz]
Modulation Char	Min	Typical	Max	
F1avg	225	254.1	275	[kHz]
F1max		256.3		[kHz]
F2avg	185	244.6		[kHz]
F2max		238.9		[kHz]
F1/F2 Ratio	0.8	0.94		
Sensitivity	2402	2441	2480	

LE (PER=30.8%)		-91	<-89	[dBm]
Max. Input Level (PER = 30.8%)	>=-10dBm	0		[dBm]
PER report integrity (PER = 50~65.4%)	50% at -30Bm	50.66%	65.4% at -30Bm	

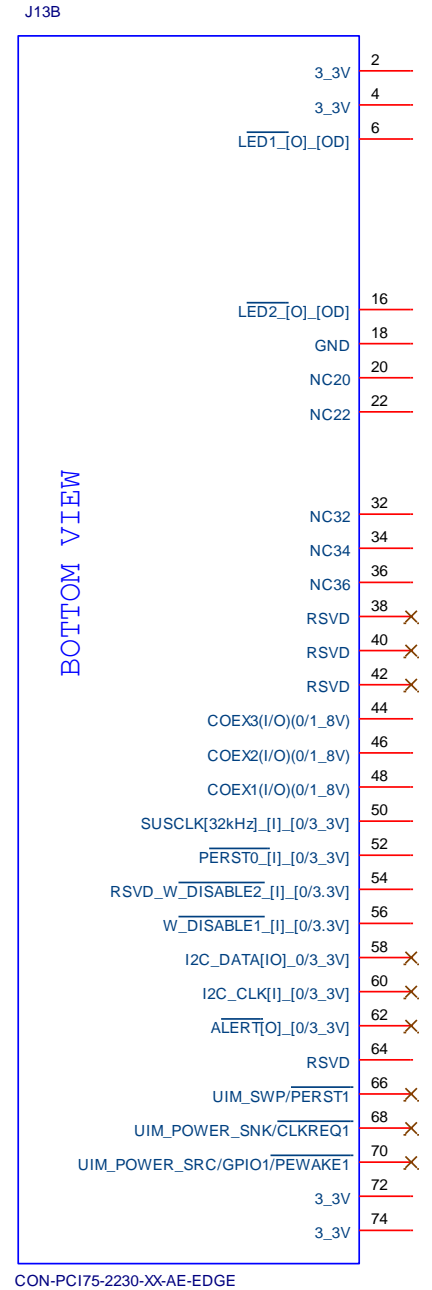
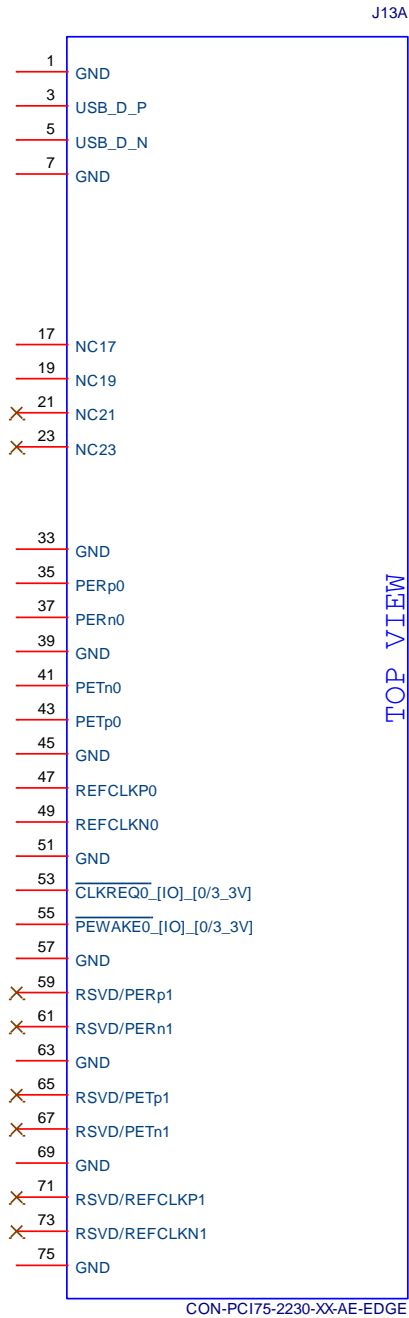
6. Pin Assignments

6.1 Pin Out

NO	Name	Type	Description
TOP			
1	GND	—	Ground connections
3	USB_D_P	I/O	USB serial differential data Positive
5	USB_D_N	I/O	USB serial differential data Negative
7	GND	—	Ground connections
17	NC	-	No connect
19	NC	-	No connect
21	NC	-	No connect
23	NC	-	No connect
33	GND	—	Ground connections
35	PCIE_RX_P	I	PCI Express receive data-Positive
37	PCIE_RX_N	I	PCI Express receive data-Negative
39	GND	—	Ground connections
41	PCIE_TX_N	O	PCI Express transmit data- Negative
43	PCIE_TX_P	O	PCI Express transmit data- Positive
45	GND	—	Ground connections
47	PCIE_RCLK_P	I	PCI Express differential clock input- Positive
49	PCIE_RCLK_N	I	PCI Express differential clock input- Negative
51	GND	—	Ground connections
53	PCIE_CLKREQ_L	I/O	PCIe clock request
55	PCIE_WAKE_L	O	PCIe wake signal
57	GND	—	Ground connections
59	NC	—	No connect
61	NC	—	No connect
63	GND	—	Ground connections
65	NC	—	No connect
67	NC	—	No connect
69	GND	—	Ground connections
71	NC	—	No connect
73	NC	—	No connect
75	GND	—	Ground connections

BOT			
2	VDD_3V3	I	VDD system power supply input
4	VDD_3V3	I	VDD system power supply input
6	WLAN_LED	OD	WLAN LED
16	BT_LED	OD	Bluetooth LED
18	GND	—	Ground connections
20	NC	—	No connect
22	NC	—	No connect
32	NC	—	No connect
34	NC	—	No connect
36	NC	—	No connect
38	NC	—	No connect
40	NC	—	No connect
42	NC	—	No connect
44	NC	—	No connect
46	NC	—	No connect
48	NC	—	No connect
50	32KHz_CLK_IN	I	32.768KHz CLOCK INPUT
52	PCIE_PERST_L	I	PCIe host indication to reset the device Active low.
54	BT_RF_KILL_L	I	Turn off BT RF analog and front-end. Active low.
56	WLAN_RF_KILL_L	I	Turn off WLAN RF analog and front-end. Active low.
58	NC	—	No connect
60	NC	—	No connect
62	NC	—	No connect
64	NC	—	No connect
66	NC	—	No connect
68	NC	—	No connect
70	NC	—	No connect
72	VDD_3V3	I	VDD system power supply input
74	VDD_3V3	I	VDD system power supply input

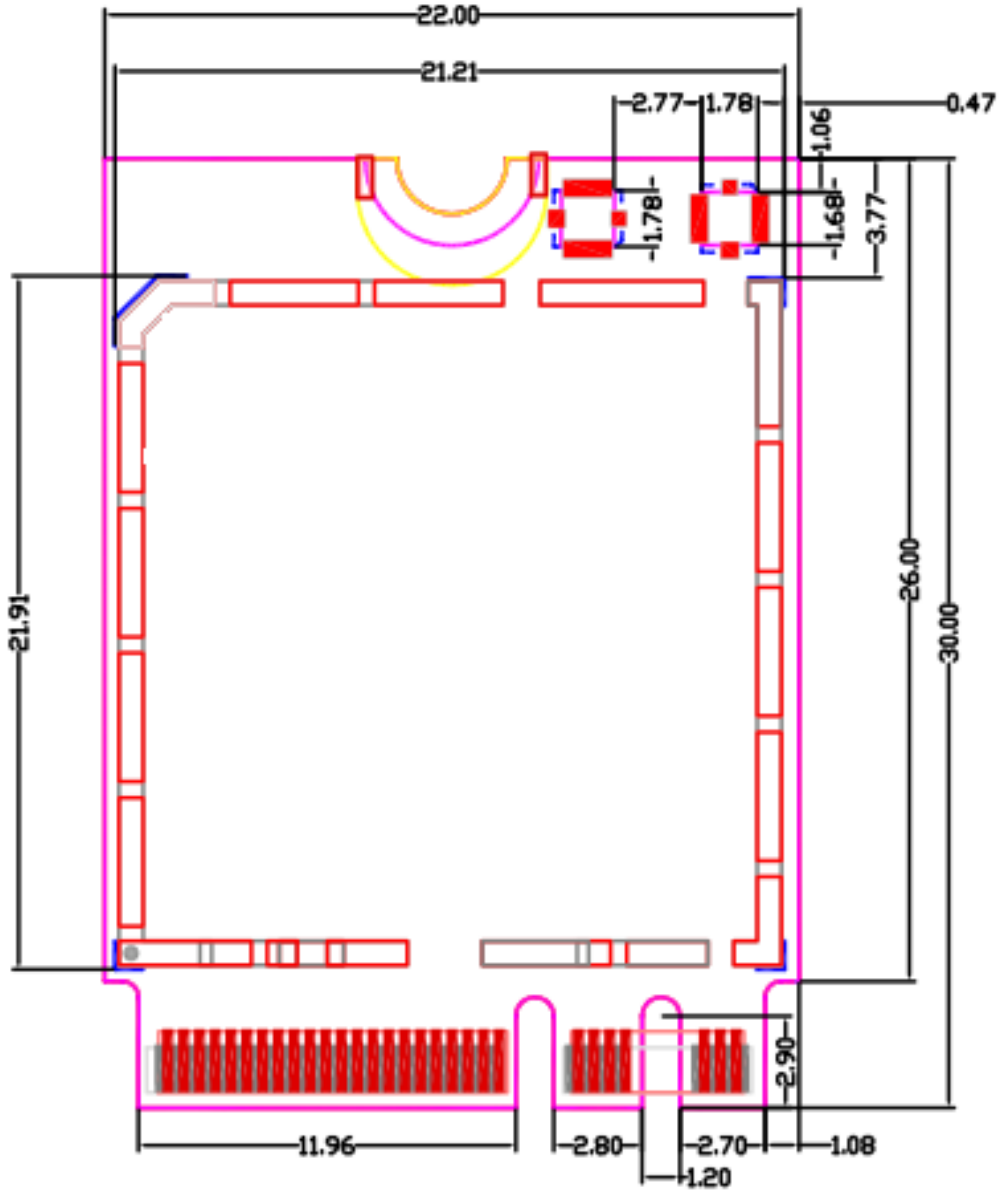
6.2 Pin Out Diagram

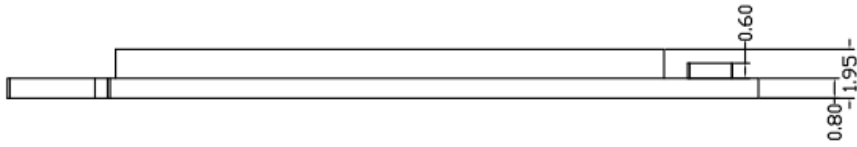
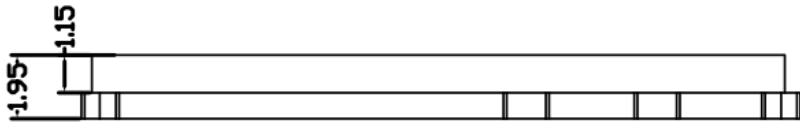
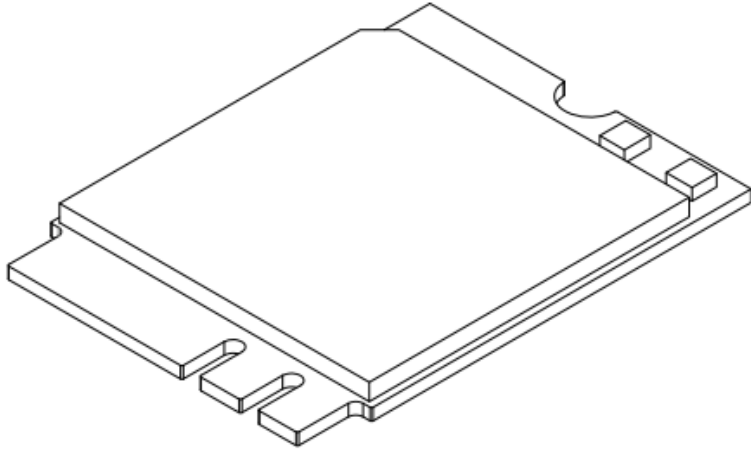


7. Dimensions

7.1 Physical Dimensions

UNIT: mm





7.2 Sample Picture (Label Diagram)

< TOP VIEW >



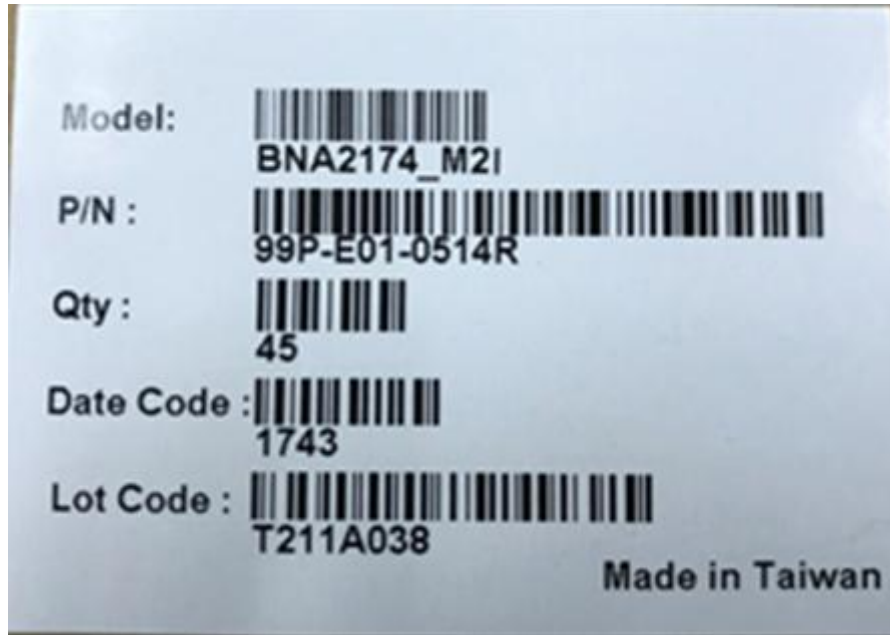
< BOT VIEW >



8. Package Information

8.1 Label

Label A Inner box label



Lot Code(Tracking No.):

依生產工單碼 10070028(8 碼),進行編碼

第 1 碼 = 生產地區別 ,ex: Ampak = T , SPIL = S,
ASE = A , CS = C

第 2 碼 = 製令型態碼 ,ex:2 = 試產

第 3~4 碼 = 西元年後二碼(16 進制) ,ex:2010 年 = 0A

第 5 碼 = 西元月(16 進制) ,ex:7 月 = 7

後 6~8 碼 = 流程卡子批號 ,後三碼 001~999

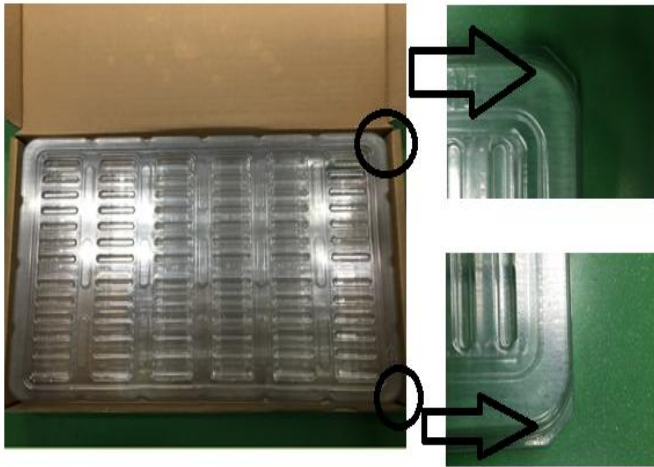
028 = 流程卡子批號(16 進制) ,ex:028 = IC

ex : T20A701C

8.2 Package Manner

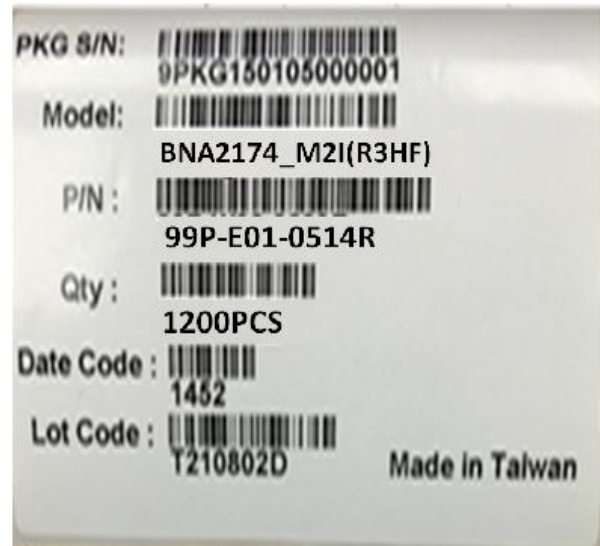
8.2.1 Tray Box

Tray (100pcs / tray) 333*214*28mm , BOX(200pcs / box)352*222*58mm



8.2.2 Carton

Box*4 / Carton (800pcs/ Carton), 370*240*264mm



8.3 Packing materials

NO	TITLE	P/N
1.	Box Label (A) 70mmX 50mm	42P-200-0001R
2.	CTN. (G) WSDB-101G129J100 370*240*264mm	410-120-0030G
3.	BOX (G) WSDB-101G129J100 352*219*58mm	410-130-0051G
4.	TRAY PLATE (R3HF) BNA2174_PI V00 333*214*28mm PET SHENGMEI	41P-140-1007R