RF Exposure Evaluation declaration

Product Name : 5G CPE

Model No. : FWAR

FCC ID : NKR-LAA2

Applicant : Wistron Neweb Corporation

Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan

Date of Receipt : Nov. 12, 2020

Date of Declaration : Dec. 03, 2020

Report No. : 20B0401R-E3082100013-E

Report Version : V1.0

Testing Laboratory
3023

Issued Date: Dec. 03, 2020
Report No.: 20B0401R-E3082100013-E

Product Name	5G CPE	
Applicant	Wistron Neweb Corporation	
Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan	
Manufacturer	Wistron Neweb Corporation	
Model No.	FWAR	
FCC ID.	NKR-LAA2	
Trade Name	WNC	
Applicable Standard	KDB 447498 D01 v06	☒ Minimum test separation distance ≥ 20 cm ☐ For low power devices
Test Result	Complied	

Documented By : Joanne Lin
(Senior Adm. Specialist / Joanne Lin)

Tested By : wen Lee
(Supervisor / Wen Lee)

Approved By :
(Director / Vincent Lin)

Revision History

Report No.	Version	Description	Issued Date
20B0401R-E3082100013-E	V1.0	Initial issue of report.	2020-12-03

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	5G CPE
Model No.	FWAR
Trade Name	WNC
FCC ID	NKR-LAA2
WLAN/BT TX Frequency	802.11b/g/n/ax-20MHz: 2412-2462MHz 802.11n/ax-40MHz:2422-2452MHz 802.11a/n/ac/ax-20MHz: 5180-5240MHz, 5260-5320MHz, 5500-5700MHz, 5720MHz, 5745-5825MHz 802.11n/ac/ax-40MHz: 5190-5230MHz, 5270-5310MHz, 5510-5670MHz, 5710MHz, 5755-5795MHz 802.11ac/ax-80MHz: 5210MHz, 5290MHz, 5530-5690MHz, 5775MHz
WWAN TX Frequency	LTE Band 2/ NR ENDC n2: 1850~1910MHz LTE Band 5/ NR ENDC n5: 824MHz ~849MHz LTE Band 66/ NR ENDC n66:1710MHz~1780MHz LTE Band 4: 1710~1755MHz LTE Band 12: 699~716MHz LTE Band 14: 788~798MHz LTE Band 48: 3550~3700MHz NR ENDC n260:37GHz~40GHz
HW Version	0.3.3
SW Version	0.16.06.1dbg
Antenna Type	Dipole Antenna (WLAN) Monopole Antenna (WWAN)

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*Pi*R^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0

2.2. Test Result of RF Exposure Evaluation

Product : 5G CPE
Test Item : RF Exposure Evaluation
Test Site : N/A

Simultaneous Transmission Configurations 1:

Type	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power (mW)	Duty cycle (%)	Distance (cm)	Power Density (mW/cm2)	Total Power Density (mW/cm2)	Limit (mW/cm2)
5G FR1	24.54	3.28	27.82	605.34	100	20	0.1204285	0.7435	1
LTE	23.76	3.28	27.04	505.82	100	20	0.1006304		
WiFi 2.4GHz	24.64	3.36	28	630.96	100	20	0.1255247		
WiFi 5GHz	27.78	5.22	33	1995.26	100	20	0.3969439		

Simultaneous Transmission Configurations 2:

Type	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power (mW)	Duty cycle (%)	Distance (cm)	Power Density (mW/cm2)	Total Power Density (mW/cm2)	Limit (mW/cm2)
5G FR2	N/A	N/A	50.2	26178.2	25	49	0.8676376	0.9714	1
LTE (Standalone)	23.76	3.28	27.04	505.82	100	49	0.0167648		
WiFi 2.4GHz	24.64	3.36	28	630.96	100	49	0.0209121		
WiFi 5GHz	27.78	5.22	33	1995.26	100	49	0.0661300		

Simultaneous Transmission Configurations 3:

Type	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power (mW)	Duty cycle (%)	Distance (cm)	Power Density (mW/cm2)	Total Power Density (mW/cm2)	Limit (mW/cm2)
5G FR2	N/A	N/A	50.2	26178.2	25	49	0.8676376	0.9696	1
LTE (CA_PCC)	21.92	1.56	23.48	222.84	100	49	0.0073858		
LTE (CA_SCC)	21.43	2.15	23.58	228.03	100	49	0.0075579		
WiFi 2.4GHz	24.64	3.36	28	630.96	100	49	0.0209121		
WiFi 5GHz	27.78	5.22	33	1995.26	100	49	0.0661300		

Note:

1. The EIRP power is refer to report No.: 20B0401R-E3032110113, 20B0401R-E3032110126, 20B0401R-E304221006, 20B0401R-E3042110012, 20B0401R-E3032110108-A, 20B0401R-E3032160657 from the DEKRA.
2. Per the 5GTF specification, the 5G mmWave operates with a radio frame length of 10ms (50 subframes per 10ms frame) and this device operates using a 3:1 ratio for DL/UL, where the UL is from the CPE device. The 3:1 ratio for DL/UL operation is fixed and cannot be changed by the end user. Within each 10ms frame there are 700 symbols, of which 533 symbols are downlink and the remaining 167 symbols are uplink. Thus, 167/700= 23.86% duty cycle for the CPE and set the duty cycle as 25% for 5G FR2 MPE.