

EMF TEST REPORT

Test Report No. : OT-223-RWD-040

Reception No. : 2112005097

Applicant : LG Innotek Co., Ltd.

Address : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea

Manufacturer : LG Innotek Co., Ltd.

Address : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea

Type of Equipment : RF Module

FCC ID. : YZP-ATC6NPL002

Model Name : ATC6NPL002

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 39 pages (including this page)

Date of Incoming : December 01, 2021

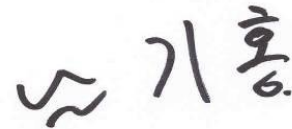
Date of issue : March 21, 2022

SUMMARY

The equipment complies with the regulation; *FCC CFR 47 PART 1.1310*

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.



Tested by
Youngyong Kim/ Manager
ONETECH Corp.

Reviewed by
Tae-Ho, Kim / Senior Manager
ONETECH Corp.

Approved by
Ki-Hong, Nam / General Manager
ONETECH Corp.

This Report is not correlated with the authentication of KOLAS

It should not be reproduced except in full, without the written approval of ONETECH Corp.

OTC-TRF-RF-001(0)


CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE	4
2. GENERAL INFORMATION	5
2.1 PRODUCT DESCRIPTION.....	5
3. EUT MODIFICATIONS.....	27
4. MAXIMUM PERMISSIBLE EXPOSURE	28
4.1 RF EXPOSURE CALCULATION	28
4.2 EUT DESCRIPTION.....	28
4.3 CALCULATED MPE SAFE DISTANCE FOR WLAN	29
4.3.1 DATA for Antenna 0.....	29
4.3.2 DATA for Antenna 1.....	31
4.3.3 DATA for Multiple Transmit.....	33
4.4 CALCULATED MPE SAFE DISTANCE FOR BLUETOOTH LE	36
4.5 CALCULATED MPE SAFE DISTANCE FOR BLUETOOTH	37
4.6 DATA FOR INTERMODULATION TRANSMIT	38

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-223-RWD-040	March 21, 2022	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LG Innotek Co., Ltd.
 Address : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea
 Contact Person : Jeong Inchang / Senior Research Engineer
 Telephone No. : +82-62-950-0332
 FCC ID : YZP-ATC6NPL002
 Model Name : ATC6NPL002
 Brand Name :  **LG Innotek**
 Serial Number : N/A
 Date : March 21, 2022

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER DTS – DIGITAL TRNSMISSION SYSTEM Unlicensed National Information infrastructure(UNII)
E.U.T. DESCRIPTION	RF Module
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2020
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 FCC PART 15 SUBPART E Section 15.407 789033 D02 General UNII Test Procedures New Rules v02r01
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The LG Innotek Co., Ltd., Model ATC6NPL002 (referred to as the EUT in this report) is a RF Module. The product specification described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	RF Module		
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz	
	Bluetooth	2 402 MHz ~ 2 480 MHz	
	WLAN 2.4 GHz	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20)/ax(HE20))	
		2 422 MHz ~ 2 452 MHz (802.11n(HT40)/ax(HE40))	
	WLAN 5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))	
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))	
		5 210 MHz (802.11ac(VHT80)/ax(HE80))	
	WLAN 5 250 MHz ~ 5 350 MHz Band	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))	
		5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))	
		5 290 MHz (802.11ac(VHT80)/ax(HE80))	
	WLAN 5 470 MHz ~ 5 725 MHz Band	5 500 MHz ~ 5 720 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))	
		5 510 MHz ~ 5 710 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))	
		5 530 MHz ~ 5 690 MHz (802.11ac(VHT80)/ax(HE80))	
	WLAN 5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))	
5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))			
5 775 MHz (802.11ac(VHT80)/ax(HE80))			
MODULATION TYPE	Bluetooth LE	GFSK for 1 Mbps / 2 Mbps / 125 kbps / 500 kbps	
	Bluetooth	GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8-DPSK for 3Mbps	
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK)	
		802.11g/n(HT20)/n(HT40)/ax(HE20)/ax(HE40): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80)/ax(HE20)/ax(HE40)/ax(HE80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)		

RF OUTPUT POWER	Bluetooth LE	1 Mbps	1.21 dBm
		2 Mbps	1.17 dBm
		125 kbps	1.22 dBm
		500 kbps	1.24 dBm
	Bluetooth	1 Mbps	0.67 dBm
		2 Mbps	-0.27 dBm
		3 Mbps	0.09 dBm
	WLAN 2.4 GHz	Antenna 0	15.57 dBm(802.11b)
			11.80 dBm(802.11g)
			11.67 dBm(802.11n_HT20)
			13.27 dBm(802.11ax_HE20)_26 Tone
			13.06 dBm(802.11ax_HE20)_52 Tone
			12.66 dBm(802.11ax_HE20)_106 Tone
11.85 dBm(802.11ax_HE20)_242 Tone			
11.47 dBm(802.11ax_HE20)_Single User			
11.31 dBm(802.11n_HT40)			
12.02 dBm(802.11ax_HE40)_26 Tone			
12.93 dBm(802.11ax_HE40)_52 Tone			
13.04 dBm(802.11ax_HE40)_106 Tone			
12.44 dBm(802.11ax_HE40)_242 Tone			
11.52 dBm(802.11ax_HE40)_484 Tone			
11.50 dBm(802.11ax_HE40)_Single User			

RF OUTPUT POWER	WLAN 2.4 GHz	Antenna 1	16.19 dBm(802.11b) 12.88 dBm(802.11g) 13.11 dBm(802.11n_HT20) 13.35 dBm(802.11ax_HE20)_26 Tone 13.57 dBm(802.11ax_HE20)_52 Tone 13.47 dBm(802.11ax_HE20)_106 Tone 13.33 dBm(802.11ax_HE20)_242 Tone 13.65 dBm(802.11ax_HE20)_Single User 12.11 dBm(802.11n_HT40) 12.31 dBm(802.11ax_HE40)_26 Tone 12.67 dBm(802.11ax_HE40)_52 Tone 12.70 dBm(802.11ax_HE40)_106 Tone 12.68 dBm(802.11ax_HE40)_242 Tone 12.48 dBm(802.11ax_HE40)_484 Tone 12.69 dBm(802.11ax_HE40)_Single User
		Multiple Antenna	15.46 dBm(802.11n_HT20) 16.32 dBm(802.11ax_HE20)_26 Tone 16.22 dBm(802.11ax_HE20)_52 Tone 16.09 dBm(802.11ax_HE20)_106 Tone 15.66 dBm(802.11ax_HE20)_242 Tone 15.70 dBm(802.11ax_HE20)_Single User 14.74 dBm(802.11n_HT40) 14.90 dBm(802.11ax_HE40)_26 Tone 15.78 dBm(802.11ax_HE40)_52 Tone 15.83 dBm(802.11ax_HE40)_106 Tone 15.57 dBm(802.11ax_HE40)_242 Tone 15.04 dBm(802.11ax_HE40)_484 Tone 15.15 dBm(802.11ax_HE40)_Single User

<p>RF OUTPUT POWER</p>	<p>WLAN 5 150 MHz ~ 5 250 MHz Band</p>	<p>Antenna 0</p>	<p>12.59 dBm(802.11a) 12.15 dBm(802.11n_HT20) 2.53 dBm(802.11ax_HE20)_26 Tone 4.65 dBm(802.11ax_HE20)_52 Tone 7.54 dBm(802.11ax_HE20)_106 Tone 10.29 dBm(802.11ax_HE20)_242 Tone 12.19 dBm(802.11ax_HE20)_Single User 9.02 dBm(802.11n_HT40) 3.32 dBm(802.11ax_HE40)_26 Tone 5.26 dBm(802.11ax_HE40)_52 Tone 7.72 dBm(802.11ax_HE40)_106 Tone 7.54 dBm(802.11ax_HE40)_242 Tone 7.43 dBm(802.11ax_HE40)_484 Tone 9.15 dBm(802.11ax_HE40)_Single User 8.33 dBm(802.11ac_VHT80) 3.10 dBm(802.11ax_HE40)_26 Tone 5.03 dBm(802.11ax_HE40)_52 Tone 4.87 dBm(802.11ax_HE40)_106 Tone 4.76 dBm(802.11ax_HE40)_242 Tone 4.72 dBm(802.11ax_HE40)_484 Tone 4.33 dBm(802.11ax_HE40)_996 Tone 8.55 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 150 MHz ~ 5 250 MHz Band</p>	<p>Antenna 1</p>	<p>12.45 dBm(802.11a) 12.01 dBm(802.11n_HT20) 3.45 dBm(802.11ax_HE20)_26 Tone 5.63 dBm(802.11ax_HE20)_52 Tone 8.30 dBm(802.11ax_HE20)_106 Tone 10.77 dBm(802.11ax_HE20)_242 Tone 12.02 dBm(802.11ax_HE20)_Single User 8.87 dBm(802.11n_HT40) 4.18 dBm(802.11ax_HE40)_26 Tone 6.25 dBm(802.11ax_HE40)_52 Tone 8.44 dBm(802.11ax_HE40)_106 Tone 8.29 dBm(802.11ax_HE40)_242 Tone 8.20 dBm(802.11ax_HE40)_484 Tone 9.21 dBm(802.11ax_HE40)_Single User 8.11 dBm(802.11ac_VHT80) 4.10 dBm(802.11ax_HE40)_26 Tone 6.10 dBm(802.11ax_HE40)_52 Tone 5.90 dBm(802.11ax_HE40)_106 Tone 5.81 dBm(802.11ax_HE40)_242 Tone 5.75 dBm(802.11ax_HE40)_484 Tone 5.50 dBm(802.11ax_HE40)_996 Tone 8.27 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 150 MHz ~ 5 250 MHz Band</p>	<p>Multiple Antenna</p>	<p>15.09 dBm(802.11n_HT20) 6.03 dBm(802.11ax_HE20)_26 Tone 8.18 dBm(802.11ax_HE20)_52 Tone 10.95 dBm(802.11ax_HE20)_106 Tone 13.55 dBm(802.11ax_HE20)_242 Tone 15.11 dBm(802.11ax_HE20)_Single User 11.95 dBm(802.11n_HT40) 6.78 dBm(802.11ax_HE40)_26 Tone 8.80 dBm(802.11ax_HE40)_52 Tone 11.11 dBm(802.11ax_HE40)_106 Tone 10.94 dBm(802.11ax_HE40)_242 Tone 10.84 dBm(802.11ax_HE40)_484 Tone 12.19 dBm(802.11ax_HE40)_Single User 11.24 dBm(802.11ac_VHT80) 6.64 dBm(802.11ax_HE40)_26 Tone 8.61 dBm(802.11ax_HE40)_52 Tone 8.42 dBm(802.11ax_HE40)_106 Tone 8.32 dBm(802.11ax_HE40)_242 Tone 8.27 dBm(802.11ax_HE40)_484 Tone 7.96 dBm(802.11ax_HE40)_996 Tone 11.42 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	-------------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 250 MHz ~ 5 350 MHz Band</p>	<p>Antenna 0</p>	<p>12.38 dBm(802.11a) 11.90 dBm(802.11n_HT20) 2.66 dBm(802.11ax_HE20)_26 Tone 4.79 dBm(802.11ax_HE20)_52 Tone 7.63 dBm(802.11ax_HE20)_106 Tone 10.35 dBm(802.11ax_HE20)_242 Tone 11.97 dBm(802.11ax_HE20)_Single User 8.28 dBm(802.11n_HT40) 3.52 dBm(802.11ax_HE40)_26 Tone 5.62 dBm(802.11ax_HE40)_52 Tone 7.88 dBm(802.11ax_HE40)_106 Tone 5.55 dBm(802.11ax_HE40)_242 Tone 7.49 dBm(802.11ax_HE40)_484 Tone 8.44 dBm(802.11ax_HE40)_Single User 6.35 dBm(802.11ac_VHT80) 3.18 dBm(802.11ax_HE40)_26 Tone 5.13 dBm(802.11ax_HE40)_52 Tone 4.96 dBm(802.11ax_HE40)_106 Tone 4.88 dBm(802.11ax_HE40)_242 Tone 4.86 dBm(802.11ax_HE40)_484 Tone 4.82 dBm(802.11ax_HE40)_996 Tone 6.54 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 250 MHz ~ 5 350 MHz Band</p>	<p>Antenna 1</p>	<p>12.39 dBm(802.11a) 11.94 dBm(802.11n_HT20) 3.67 dBm(802.11ax_HE20)_26 Tone 5.73 dBm(802.11ax_HE20)_52 Tone 8.46 dBm(802.11ax_HE20)_106 Tone 10.87 dBm(802.11ax_HE20)_242 Tone 12.03 dBm(802.11ax_HE20)_Single User 8.21 dBm(802.11n_HT40) 4.43 dBm(802.11ax_HE40)_26 Tone 6.58 dBm(802.11ax_HE40)_52 Tone 8.63 dBm(802.11ax_HE40)_106 Tone 6.48 dBm(802.11ax_HE40)_242 Tone 8.39 dBm(802.11ax_HE40)_484 Tone 8.48 dBm(802.11ax_HE40)_Single User 6.23 dBm(802.11ac_VHT80) 4.28 dBm(802.11ax_HE40)_26 Tone 6.24 dBm(802.11ax_HE40)_52 Tone 6.07 dBm(802.11ax_HE40)_106 Tone 5.88 dBm(802.11ax_HE40)_242 Tone 5.90 dBm(802.11ax_HE40)_484 Tone 5.86 dBm(802.11ax_HE40)_996 Tone 6.54 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 250 MHz ~ 5 350 MHz Band</p>	<p>Multiple Antenna</p>	<p>14.89 dBm(802.11n_HT20) 6.21 dBm(802.11ax_HE20)_26 Tone 8.29 dBm(802.11ax_HE20)_52 Tone 11.07 dBm(802.11ax_HE20)_106 Tone 13.58 dBm(802.11ax_HE20)_242 Tone 15.01 dBm(802.11ax_HE20)_Single User 11.23 dBm(802.11n_HT40) 6.98 dBm(802.11ax_HE40)_26 Tone 9.14 dBm(802.11ax_HE40)_52 Tone 11.28 dBm(802.11ax_HE40)_106 Tone 9.05 dBm(802.11ax_HE40)_242 Tone 10.97 dBm(802.11ax_HE40)_484 Tone 11.47 dBm(802.11ax_HE40)_Single User 9.30 dBm(802.11ac_VHT80) 6.77 dBm(802.11ax_HE40)_26 Tone 8.73 dBm(802.11ax_HE40)_52 Tone 8.56 dBm(802.11ax_HE40)_106 Tone 8.41 dBm(802.11ax_HE40)_242 Tone 8.42 dBm(802.11ax_HE40)_484 Tone 8.38 dBm(802.11ax_HE40)_996 Tone 9.55 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	-------------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Antenna 0</p>	<p>12.24 dBm(802.11a) 11.76 dBm(802.11n_HT20) 2.82 dBm(802.11ax_HE20)_26 Tone 4.98 dBm(802.11ax_HE20)_52 Tone 7.90 dBm(802.11ax_HE20)_106 Tone 10.64 dBm(802.11ax_HE20)_242 Tone 12.03 dBm(802.11ax_HE20)_Single User 9.62 dBm(802.11n_HT40) 3.69 dBm(802.11ax_HE40)_26 Tone 5.92 dBm(802.11ax_HE40)_52 Tone 8.02 dBm(802.11ax_HE40)_106 Tone 7.72 dBm(802.11ax_HE40)_242 Tone 7.76 dBm(802.11ax_HE40)_484 Tone 9.99 dBm(802.11ax_HE40)_Single User 5.91 dBm(802.11ac_VHT80) 3.20 dBm(802.11ax_HE40)_26 Tone 5.21 dBm(802.11ax_HE40)_52 Tone 4.98 dBm(802.11ax_HE40)_106 Tone 4.80 dBm(802.11ax_HE40)_242 Tone 4.78 dBm(802.11ax_HE40)_484 Tone 4.46 dBm(802.11ax_HE40)_996 Tone 6.27 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Antenna 0_Straddle</p>	<p>9.32 dBm(802.11a) 9.20 dBm(802.11n_HT20) 2.00 dBm(802.11ax_HE20)_26 Tone 4.19 dBm(802.11ax_HE20)_52 Tone 6.86 dBm(802.11ax_HE20)_106 Tone 8.57 dBm(802.11ax_HE20)_242 Tone 9.31 dBm(802.11ax_HE20)_Single User 7.36 dBm(802.11n_HT40) -14.30 dBm(802.11ax_HE40)_26 Tone -6.24 dBm(802.11ax_HE40)_52 Tone 3.73 dBm(802.11ax_HE40)_106 Tone 5.66 dBm(802.11ax_HE40)_242 Tone 6.45 dBm(802.11ax_HE40)_484 Tone 7.74 dBm(802.11ax_HE40)_Single User 4.72 dBm(802.11ac_VHT80) -15.24 dBm(802.11ax_HE40)_26 Tone -7.11 dBm(802.11ax_HE40)_52 Tone 1.12 dBm(802.11ax_HE40)_106 Tone 2.80 dBm(802.11ax_HE40)_242 Tone 3.65 dBm(802.11ax_HE40)_484 Tone 4.16 dBm(802.11ax_HE40)_996 Tone 5.03 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Antenna 1</p>	<p>12.50 dBm(802.11a) 11.89 dBm(802.11n_HT20) 3.90 dBm(802.11ax_HE20)_26 Tone 8.53 dBm(802.11ax_HE20)_52 Tone 8.55 dBm(802.11ax_HE20)_106 Tone 11.07 dBm(802.11ax_HE20)_242 Tone 12.15 dBm(802.11ax_HE20)_Single User 9.93 dBm(802.11n_HT40) 5.05 dBm(802.11ax_HE40)_26 Tone 7.13 dBm(802.11ax_HE40)_52 Tone 9.13 dBm(802.11ax_HE40)_106 Tone 8.84 dBm(802.11ax_HE40)_242 Tone 8.81 dBm(802.11ax_HE40)_484 Tone 10.15 dBm(802.11ax_HE40)_Single User 5.90 dBm(802.11ac_VHT80) 4.26 dBm(802.11ax_HE40)_26 Tone 6.28 dBm(802.11ax_HE40)_52 Tone 6.15 dBm(802.11ax_HE40)_106 Tone 6.02 dBm(802.11ax_HE40)_242 Tone 5.96 dBm(802.11ax_HE40)_484 Tone 5.71 dBm(802.11ax_HE40)_996 Tone 6.27 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Antenna 1_Straddle</p>	<p>9.42 dBm(802.11a) 9.23 dBm(802.11n_HT20) 3.92 dBm(802.11ax_HE20)_26 Tone 5.88 dBm(802.11ax_HE20)_52 Tone 8.59 dBm(802.11ax_HE20)_106 Tone 9.80 dBm(802.11ax_HE20)_242 Tone 9.35 dBm(802.11ax_HE20)_Single User 7.45 dBm(802.11n_HT40) -12.01 dBm(802.11ax_HE40)_26 Tone -4.37 dBm(802.11ax_HE40)_52 Tone 5.52 dBm(802.11ax_HE40)_106 Tone 7.38 dBm(802.11ax_HE40)_242 Tone 7.74 dBm(802.11ax_HE40)_484 Tone 7.79 dBm(802.11ax_HE40)_Single User 4.37 dBm(802.11ac_VHT80) -13.11 dBm(802.11ax_HE40)_26 Tone -5.17 dBm(802.11ax_HE40)_52 Tone 2.86 dBm(802.11ax_HE40)_106 Tone 4.42 dBm(802.11ax_HE40)_242 Tone 5.11 dBm(802.11ax_HE40)_484 Tone 5.32 dBm(802.11ax_HE40)_996 Tone 4.66 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Multiple Antenna</p>	<p>14.89 dBm(802.11n_HT20) 6.33 dBm(802.11ax_HE20)_26 Tone 9.99 dBm(802.11ax_HE20)_52 Tone 11.21 dBm(802.11ax_HE20)_106 Tone 13.87 dBm(802.11ax_HE20)_242 Tone 15.10 dBm(802.11ax_HE20)_Single User 12.79 dBm(802.11n_HT40) 7.44 dBm(802.11ax_HE40)_26 Tone 9.58 dBm(802.11ax_HE40)_52 Tone 11.62 dBm(802.11ax_HE40)_106 Tone 11.31 dBm(802.11ax_HE40)_242 Tone 11.33 dBm(802.11ax_HE40)_484 Tone 13.09 dBm(802.11ax_HE40)_Single User 8.92 dBm(802.11ac_VHT80) 6.77 dBm(802.11ax_HE40)_26 Tone 8.79 dBm(802.11ax_HE40)_52 Tone 8.61 dBm(802.11ax_HE40)_106 Tone 8.46 dBm(802.11ax_HE40)_242 Tone 8.42 dBm(802.11ax_HE40)_484 Tone 8.14 dBm(802.11ax_HE40)_996 Tone 9.28 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	-------------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 470 MHz ~ 5 725 MHz Band</p>	<p>Multiple Antenna _Straddle</p>	<p>12.22 dBm(802.11n_HT20) 5.99 dBm(802.11ax_HE20)_26 Tone 8.12 dBm(802.11ax_HE20)_52 Tone 10.82 dBm(802.11ax_HE20)_106 Tone 12.24 dBm(802.11ax_HE20)_242 Tone 12.34 dBm(802.11ax_HE20)_Single User 10.41 dBm(802.11n_HT40) -9.99 dBm(802.11ax_HE40)_26 Tone -2.19 dBm(802.11ax_HE40)_52 Tone 7.73 dBm(802.11ax_HE40)_106 Tone 9.62 dBm(802.11ax_HE40)_242 Tone 10.15 dBm(802.11ax_HE40)_484 Tone 10.78 dBm(802.11ax_HE40)_Single User 7.56 dBm(802.11ac_VHT80) -11.04 dBm(802.11ax_HE40)_26 Tone -3.02 dBm(802.11ax_HE40)_52 Tone 5.08 dBm(802.11ax_HE40)_106 Tone 6.69 dBm(802.11ax_HE40)_242 Tone 7.45 dBm(802.11ax_HE40)_484 Tone 7.79 dBm(802.11ax_HE40)_996 Tone 7.86 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Antenna 0</p>	<p>11.47 dBm(802.11a) 11.43 dBm(802.11n_HT20) 10.25 dBm(802.11ax_HE20)_26 Tone 10.40 dBm(802.11ax_HE20)_52 Tone 10.13 dBm(802.11ax_HE20)_106 Tone 10.13 dBm(802.11ax_HE20)_242 Tone 11.28 dBm(802.11ax_HE20)_Single User 10.37 dBm(802.11n_HT40) 7.10 dBm(802.11ax_HE40)_26 Tone 7.39 dBm(802.11ax_HE40)_52 Tone 7.69 dBm(802.11ax_HE40)_106 Tone 7.32 dBm(802.11ax_HE40)_242 Tone 7.16 dBm(802.11ax_HE40)_484 Tone 10.38 dBm(802.11ax_HE40)_Single User 8.02 dBm(802.11ac_VHT80) 4.77 dBm(802.11ax_HE40)_26 Tone 4.91 dBm(802.11ax_HE40)_52 Tone 4.76 dBm(802.11ax_HE40)_106 Tone 4.66 dBm(802.11ax_HE40)_242 Tone 4.57 dBm(802.11ax_HE40)_484 Tone 4.48 dBm(802.11ax_HE40)_996 Tone 8.01 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Antenna 0_Straddle</p>	<p>3.14 dBm(802.11a) 3.50 dBm(802.11n_HT20) 1.68 dBm(802.11ax_HE20)_26 Tone 3.49 dBm(802.11ax_HE20)_52 Tone 3.76 dBm(802.11ax_HE20)_106 Tone 3.11 dBm(802.11ax_HE20)_242 Tone 3.94 dBm(802.11ax_HE20)_Single User -2.90 dBm(802.11n_HT40) 1.45 dBm(802.11ax_HE40)_26 Tone 4.04 dBm(802.11ax_HE40)_52 Tone 3.01 dBm(802.11ax_HE40)_106 Tone -0.30 dBm(802.11ax_HE40)_242 Tone -3.47 dBm(802.11ax_HE40)_484 Tone -2.02 dBm(802.11ax_HE40)_Single User -9.20 dBm(802.11ac_VHT80) 2.00 dBm(802.11ax_HE40)_26 Tone 3.63 dBm(802.11ax_HE40)_52 Tone 0.73 dBm(802.11ax_HE40)_106 Tone -2.85 dBm(802.11ax_HE40)_242 Tone -5.78 dBm(802.11ax_HE40)_484 Tone -8.89 dBm(802.11ax_HE40)_996 Tone -8.06 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Antenna 1</p>	<p>11.78 dBm(802.11a) 11.49 dBm(802.11n_HT20) 11.36 dBm(802.11ax_HE20)_26 Tone 11.55 dBm(802.11ax_HE20)_52 Tone 11.29 dBm(802.11ax_HE20)_106 Tone 11.21 dBm(802.11ax_HE20)_242 Tone 11.16 dBm(802.11ax_HE20)_Single User 10.47 dBm(802.11n_HT40) 8.73 dBm(802.11ax_HE40)_26 Tone 9.01 dBm(802.11ax_HE40)_52 Tone 9.13 dBm(802.11ax_HE40)_106 Tone 8.83 dBm(802.11ax_HE40)_242 Tone 8.72 dBm(802.11ax_HE40)_484 Tone 10.31 dBm(802.11ax_HE40)_Single User 7.69 dBm(802.11ac_VHT80) 6.50 dBm(802.11ax_HE40)_26 Tone 6.53 dBm(802.11ax_HE40)_52 Tone 6.39 dBm(802.11ax_HE40)_106 Tone 6.26 dBm(802.11ax_HE40)_242 Tone 6.26 dBm(802.11ax_HE40)_484 Tone 5.91 dBm(802.11ax_HE40)_996 Tone 7.47 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Antenna 1_Straddle</p>	<p>3.33 dBm(802.11a) 3.62 dBm(802.11n_HT20) 3.83 dBm(802.11ax_HE20)_26 Tone 5.36 dBm(802.11ax_HE20)_52 Tone 5.47 dBm(802.11ax_HE20)_106 Tone 4.50 dBm(802.11ax_HE20)_242 Tone 4.12 dBm(802.11ax_HE20)_Single User -2.38 dBm(802.11n_HT40) 3.33 dBm(802.11ax_HE40)_26 Tone 5.93 dBm(802.11ax_HE40)_52 Tone 4.85 dBm(802.11ax_HE40)_106 Tone 1.50 dBm(802.11ax_HE40)_242 Tone -1.68 dBm(802.11ax_HE40)_484 Tone -1.56 dBm(802.11ax_HE40)_Single User -8.90 dBm(802.11ac_VHT80) 3.96 dBm(802.11ax_HE40)_26 Tone 5.51 dBm(802.11ax_HE40)_52 Tone 2.53 dBm(802.11ax_HE40)_106 Tone -0.93 dBm(802.11ax_HE40)_242 Tone -3.96 dBm(802.11ax_HE40)_484 Tone -7.03 dBm(802.11ax_HE40)_996 Tone -7.70 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------	--

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Multiple Antenna</p>	<p>14.34 dBm(802.11n_HT20) 13.70 dBm(802.11ax_HE20)_26 Tone 13.90 dBm(802.11ax_HE20)_52 Tone 13.63 dBm(802.11ax_HE20)_106 Tone 13.54 dBm(802.11ax_HE20)_242 Tone 14.17 dBm(802.11ax_HE20)_Single User 13.43 dBm(802.11n_HT40) 10.97 dBm(802.11ax_HE40)_26 Tone 11.25 dBm(802.11ax_HE40)_52 Tone 11.33 dBm(802.11ax_HE40)_106 Tone 11.04 dBm(802.11ax_HE40)_242 Tone 11.02 dBm(802.11ax_HE40)_484 Tone 13.34 dBm(802.11ax_HE40)_Single User 10.87 dBm(802.11ac_VHT80) 8.60 dBm(802.11ax_HE40)_26 Tone 8.61 dBm(802.11ax_HE40)_52 Tone 8.50 dBm(802.11ax_HE40)_106 Tone 8.50 dBm(802.11ax_HE40)_242 Tone 8.48 dBm(802.11ax_HE40)_484 Tone 8.26 dBm(802.11ax_HE40)_996 Tone 10.76 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	-------------------------	---

<p>RF OUTPUT POWER</p>	<p>WLAN 5 725 MHz ~ 5 850 MHz Band</p>	<p>Multiple Antenna _Straddle</p>	<p>6.57 dBm(802.11n_HT20) 5.90 dBm(802.11ax_HE20)_26 Tone 7.53 dBm(802.11ax_HE20)_52 Tone 7.71 dBm(802.11ax_HE20)_106 Tone 6.87 dBm(802.11ax_HE20)_242 Tone 7.04 dBm(802.11ax_HE20)_Single User 0.38 dBm(802.11n_HT40) 5.50 dBm(802.11ax_HE40)_26 Tone 8.10 dBm(802.11ax_HE40)_52 Tone 7.05 dBm(802.11ax_HE40)_106 Tone 3.70 dBm(802.11ax_HE40)_242 Tone 0.53 dBm(802.11ax_HE40)_484 Tone 1.23 dBm(802.11ax_HE40)_Single User -6.03 dBm(802.11ac_VHT80) 6.10 dBm(802.11ax_HE40)_26 Tone 7.68 dBm(802.11ax_HE40)_52 Tone 4.73 dBm(802.11ax_HE40)_106 Tone 1.23 dBm(802.11ax_HE40)_242 Tone -1.76 dBm(802.11ax_HE40)_484 Tone -4.85 dBm(802.11ax_HE40)_996 Tone -4.87 dBm(802.11ax_HE40)_Single User</p>
----------------------------	--	---------------------------------------	--

ANTENNA TYPE	Dipole Antenna			
ANTENNA GAIN	Bluetooth LE	7 dBi		
	Bluetooth	7 dBi		
	WLAN 2.4 GHz	Antenna 0	7 dBi	
		Antenna 1	7 dBi	
		Multiple Antenna	10.01 dBi	
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	9 dBi	
		Antenna 1	9 dBi	
		Multiple Antenna	12.01 dBi	
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	9 dBi	
		Antenna 1	9 dBi	
		Multiple Antenna	12.01 dBi	
	5 470 MHz ~ 5 725 MHz Band	Antenna 0	9 dBi	
		Antenna 1	9 dBi	
		Multiple Antenna	12.01 dBi	
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	9 dBi	
		Antenna 1	9 dBi	
		Multiple Antenna	12.01 dBi	
	List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz		

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are $f/1500$ mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G)} / d, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

4.2 EUT Description

Kind of EUT	RF Module
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others
Exposure Evaluation Applied	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR <input type="checkbox"/> N/A

4.3 Calculated MPE Safe Distance for WLAN

4.3.1 DATA for Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	15.57 ± 0.5	16.07	40.46	7.00	5.01	4.02	0.040 3	1
	802.11g	11.80 ± 0.5	12.30	16.98			2.60	0.016 9	1
	802.11n_HT20	11.67 ± 0.5	12.17	16.48			2.56	0.016 4	1
	802.11n_HT40	11.31 ± 0.5	11.81	15.17			2.46	0.015 1	1
	802.11ax_HE20	13.27 ± 0.5	13.77	23.82			3.08	0.023 8	1
	802.11ax_HE40	13.04 ± 0.5	13.54	22.59			3.00	0.022 5	1
5 150 ~ 5 250	802.11a	12.59 ± 0.5	13.09	20.37	9.00	7.94	3.59	0.032 2	1
	802.11n HT20	12.15 ± 0.5	12.65	18.41			3.41	0.029 1	1
	802.11n HT40	9.02 ± 0.5	9.52	8.95			2.38	0.014 1	1
	802.11ac80	8.33 ± 0.5	8.83	7.64			2.20	0.012 1	1
	802.11ax HE20	12.19 ± 0.5	12.69	18.58			3.43	0.029 4	1
	802.11ax HE40	9.15 ± 0.5	9.65	9.23			2.41	0.014 6	1
	802.11ax HE80	8.55 ± 0.5	9.05	8.04			2.25	0.012 7	1
5 250 ~ 5 350	802.11a	12.38 ± 0.5	12.88	19.41	9.00	7.94	3.50	0.030 7	1
	802.11n HT20	11.90 ± 0.5	12.40	17.38			3.31	0.027 5	1
	802.11n HT40	8.28 ± 0.5	8.78	7.55			2.18	0.011 9	1
	802.11ac80	6.35 ± 0.5	6.85	4.84			1.75	0.007 7	1
	802.11ax HE20	11.97 ± 0.5	12.47	17.66			3.34	0.027 9	1
	802.11ax HE40	8.44 ± 0.5	8.94	7.83			2.22	0.012 4	1
	802.11ax HE80	6.54 ± 0.5	7.04	5.06			1.79	0.008 0	1
5 470 ~ 5 725	802.11a	12.24 ± 0.5	12.74	18.79	9.00	7.94	3.45	0.029 7	1
	802.11n HT20	11.76 ± 0.5	12.26	16.83			3.26	0.026 6	1
	802.11n HT40	9.62 ± 0.5	10.12	10.28			2.55	0.016 2	1
	802.11ac80	5.91 ± 0.5	6.41	4.38			1.66	0.006 9	1
	802.11ax HE20	12.03 ± 0.5	12.53	17.91			3.36	0.028 3	1
	802.11ax HE40	9.99 ± 0.5	10.49	11.19			2.66	0.017 7	1
	802.11ax HE80	6.27 ± 0.5	6.77	4.75			1.73	0.007 5	1

This Report is not correlated with the authentication of KOLAS

It should not be reproduced except in full, without the written approval of ONETECH Corp.

OTC-TRF-RF-001(0)

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
5 725 ~ 5 850	802.11a	11.47 ± 0.5	11.97	15.74	9.00	7.94	3.15	0.024 9	1
	802.11n HT20	11.43 ± 0.5	11.93	15.60			3.14	0.024 6	1
	802.11n HT40	10.37 ± 0.5	10.87	12.22			2.78	0.019 3	1
	802.11ac80	8.02 ± 0.5	8.52	7.11			2.12	0.011 2	1
	802.11ax HE20	11.28 ± 0.5	11.78	15.07			3.08	0.023 8	1
	802.11ax HE40	10.38 ± 0.5	10.88	12.25			2.78	0.019 4	1
	802.11ax HE80	8.01 ± 0.5	8.51	7.10			2.12	0.011 2	1

According to above table, for 2 400 ~ 2483.5 MHz Band(802.11 b), safe distance,

$$D = 0.282 * \sqrt{(65.46 * 1.55)/1.00} = 2.84 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 65.46 * 1.55 / (4 * \pi * 20^2) = 0.020 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

4.3.2 DATA for Antenna 1

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	16.19 ± 0.5	16.69	46.67	7.00	5.01	4.31	0.046 5	1
	802.11g	12.88 ± 0.5	13.38	21.78			2.95	0.021 7	1
	802.11n_HT20	13.11 ± 0.5	13.61	22.96			3.03	0.022 9	1
	802.11n_HT40	12.11 ± 0.5	12.61	18.24			2.70	0.018 2	1
	802.11ax HE20	13.65 ± 0.5	14.15	26.00			3.22	0.025 9	1
	802.11ax HE40	12.70 ± 0.5	13.20	20.89			2.89	0.020 8	1
5 150 ~ 5 250	802.11a	12.40 ± 0.5	12.90	19.50	9.00	7.94	3.51	0.030 8	1
	802.11n HT20	11.95 ± 0.5	12.45	17.58			3.33	0.027 8	1
	802.11n HT40	8.87 ± 0.5	9.37	8.65			2.34	0.013 7	1
	802.11ac80	8.11 ± 0.5	8.61	7.26			2.14	0.011 5	1
	802.11ax HE20	12.02 ± 0.5	12.52	17.86			3.36	0.028 2	1
	802.11ax HE40	9.21 ± 0.5	9.71	9.35			2.43	0.014 8	1
	802.11ax HE80	8.27 ± 0.5	8.77	7.53			2.18	0.011 9	1
5 250 ~ 5 350	802.11a	12.34 ± 0.5	12.84	19.23	9.00	7.94	3.49	0.030 4	1
	802.11n HT20	11.88 ± 0.5	12.38	17.30			3.31	0.027 3	1
	802.11n HT40	8.21 ± 0.5	8.71	7.43			2.17	0.011 7	1
	802.11ac80	6.23 ± 0.5	6.73	4.71			1.72	0.007 4	1
	802.11ax HE20	12.03 ± 0.5	12.53	17.91			3.36	0.028 3	1
	802.11ax HE40	8.63 ± 0.5	9.13	8.18			2.27	0.012 9	1
	802.11ax HE80	6.54 ± 0.5	7.04	5.06			1.79	0.008 0	1
5 470 ~ 5 725	802.11a	12.45 ± 0.5	12.95	19.72	9.00	7.94	3.53	0.031 2	1
	802.11n HT20	11.83 ± 0.5	12.33	17.10			3.29	0.027 0	1
	802.11n HT40	9.93 ± 0.5	10.43	11.04			2.64	0.017 4	1
	802.11ac80	5.90 ± 0.5	6.40	4.37			1.66	0.006 9	1
	802.11ax HE20	12.15 ± 0.5	12.65	18.41			3.41	0.029 1	1
	802.11ax HE40	10.15 ± 0.5	10.65	11.61			2.71	0.018 4	1
	802.11ax HE80	6.28 ± 0.5	6.78	4.76			1.73	0.007 5	1

This Report is not correlated with the authentication of KOLAS

It should not be reproduced except in full, without the written approval of ONETECH Corp.

OTC-TRF-RF-001(0)

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
5 725 ~ 5 850	802.11a	11.73 ± 0.5	12.23	16.71	9.00	7.94	3.25	0.026 4	1
	802.11n HT20	11.43 ± 0.5	11.93	15.60			3.14	0.024 6	1
	802.11n HT40	10.47 ± 0.5	10.97	12.50			2.81	0.019 8	1
	802.11ac80	7.69 ± 0.5	8.19	6.59			2.04	0.010 4	1
	802.11ax HE20	11.55 ± 0.5	12.05	16.03			3.18	0.025 3	1
	802.11ax HE40	10.31 ± 0.5	10.81	12.05			2.76	0.019 0	1
	802.11ax HE80	7.47 ± 0.5	7.97	6.27			1.99	0.009 9	1

According to above equation, the following result was obtained.

According to above table, for 2 400 ~ 2483.5 MHz Band(802.11 b), safe distance,

$$D = 0.282 * \sqrt{(70.31 * 0.73)/1.00} = 2.02 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 70.31 * 0.73 / (4 * \pi * 20^2) = 0.010 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

4.3.3 DATA for Multiple Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)			
2 400 ~ 2 483.5	802.11n HT20	11.67 ± 0.5	12.17	16.48	0.016 4	0.039 3	1.00
		13.11 ± 0.5	13.61	22.96	0.022 9		
	802.11n HT40	11.31 ± 0.5	11.81	15.17	0.015 1	0.033 3	1.00
		12.11 ± 0.5	12.61	18.24	0.018 2		
	802.11ax HE20	13.27 ± 0.5	13.77	23.82	0.023 8	0.049 7	1.00
		13.65 ± 0.5	14.15	26.00	0.025 9		
	802.11ax HE40	13.04 ± 0.5	13.54	22.59	0.022 5	0.043 3	1.00
		12.70 ± 0.5	13.20	20.89	0.020 8		
5 150 ~ 5 250	802.11n HT20	12.15 ± 0.5	12.65	18.41	0.029 1	0.056 9	1.00
		11.95 ± 0.5	12.45	17.58	0.027 8		
	802.11n HT40	9.02 ± 0.5	9.52	8.95	0.014 1	0.027 8	1.00
		8.87 ± 0.5	9.37	8.65	0.013 7		
	802.11ac80	8.33 ± 0.5	8.83	7.64	0.012 1	0.023 6	1.00
		8.11 ± 0.5	8.61	7.26	0.011 5		
	802.11ax HE20	12.19 ± 0.5	12.69	18.58	0.029 4	0.057 6	1.00
		12.02 ± 0.5	12.52	17.86	0.028 2		
	802.11ax HE40	9.15 ± 0.5	9.65	9.23	0.014 6	0.029 4	1.00
		9.21 ± 0.5	9.71	9.35	0.014 8		
	802.11ax HE80	8.55 ± 0.5	9.05	8.04	0.012 7	0.024 6	1.00
		8.27 ± 0.5	8.77	7.53	0.011 9		

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)			
5 250 ~ 5 350	802.11n HT20	11.90 ± 0.5	12.40	17.38	0.027 5	0.054 8	1.00
		11.88 ± 0.5	12.38	17.30	0.027 3		
	802.11n HT40	8.28 ± 0.5	8.78	7.55	0.011 9	0.023 6	1.00
		8.21 ± 0.5	8.71	7.43	0.011 7		
	802.11ac80	6.35 ± 0.5	6.85	4.84	0.007 7	0.015 1	1.00
		6.23 ± 0.5	6.73	4.71	0.007 4		
	802.11ax HE20	11.97 ± 0.5	12.47	17.66	0.027 9	0.056 2	1.00
		12.03 ± 0.5	12.53	17.91	0.028 3		
	802.11ax HE40	8.44 ± 0.5	8.94	7.83	0.012 4	0.025 3	1.00
		8.63 ± 0.5	9.13	8.18	0.012 9		
	802.11ax HE80	6.54 ± 0.5	7.04	5.06	0.008 0	0.016 0	1.00
		6.54 ± 0.5	7.04	5.06	0.008 0		
5 470 ~ 5 725	802.11n HT20	11.76 ± 0.5	12.26	16.83	0.026 6	0.053 6	1.00
		11.83 ± 0.5	12.33	17.10	0.027 0		
	802.11n HT40	9.62 ± 0.5	10.12	10.28	0.016 2	0.033 6	1.00
		9.93 ± 0.5	10.43	11.04	0.017 4		
	802.11ac80	5.91 ± 0.5	6.41	4.38	0.006 9	0.013 8	1.00
		5.90 ± 0.5	6.40	4.37	0.006 9		
	802.11ax HE20	12.03 ± 0.5	12.53	17.91	0.028 3	0.057 4	1.00
		12.15 ± 0.5	12.65	18.41	0.029 1		
	802.11ax HE40	9.99 ± 0.5	10.49	11.19	0.017 7	0.036 1	1.00
		10.15 ± 0.5	10.65	11.61	0.018 4		
	802.11ax HE80	6.27 ± 0.5	6.77	4.75	0.007 5	0.015 0	1.00
		6.28 ± 0.5	6.78	4.76	0.007 5		

This Report is not correlated with the authentication of KOLAS

It should not be reproduced except in full, without the written approval of ONETECH Corp.

OTC-TRF-RF-001(0)

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)			
5 725 ~ 5 850	802.11n HT20	11.43 ± 0.5	11.93	15.60	0.024 6	0.049 2	1.00
		11.43 ± 0.5	11.93	15.60	0.024 6		
	802.11n HT40	10.37 ± 0.5	10.87	12.22	0.019 3	0.039 1	1.00
		10.47 ± 0.5	10.97	12.50	0.019 8		
	802.11ac80	8.02 ± 0.5	8.52	7.11	0.011 2	0.021 6	1.00
		7.69 ± 0.5	8.19	6.59	0.010 4		
	802.11ax HE20	11.28 ± 0.5	11.78	15.07	0.023 8	0.049 1	1.00
		11.55 ± 0.5	12.05	16.03	0.025 3		
	802.11ax HE40	10.38 ± 0.5	10.88	12.25	0.019 4	0.038 4	1.00
		10.31 ± 0.5	10.81	12.05	0.019 0		
	802.11ax HE80	8.01 ± 0.5	8.51	7.10	0.011 2	0.021 1	1.00
		7.47 ± 0.5	7.97	6.27	0.009 9		

WLAN 2 GHz(802.11ax HE20) = (0.023 8/1) + (0.025 9/1) = 0.049 7

WLAN 5 GHz(802.11ax HE20) = (0.029 4/1) + (0.028 2/1) = 0.057 6

4.4 Calculated MPE Safe Distance for Bluetooth LE

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	1 Mbps	1.21 ± 0.5	1.71	1.48	7.0	5.01	0.77	0.001 5	1
	2 Mbps	1.17 ± 0.5	1.67	1.47			0.77	0.001 5	1
	125 kbps	1.22 ± 0.5	1.72	1.49			0.77	0.001 5	1
	500 kbps	1.24 ± 0.5	1.74	1.49			0.77	0.001 5	1

According to above table, for 2 402 ~ 2480 MHz Band(1 Mbps), safe distance,

$$D = 0.282 * \sqrt{(1.49 * 5.01)/1.00} = 0.77 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 1.49 * 5.01 / (4 * \pi * 20^2) = 0.001 5$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

4.5 Calculated MPE Safe Distance for Bluetooth

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	1 Mbps	0.67 ± 0.5	1.17	1.31	7.0	5.01	0.72	0.001 3	1
	2 Mbps	-0.27 ± 0.5	0.23	1.05			0.65	0.001 1	1
	3 Mbps	0.09 ± 0.5	0.59	1.15			0.68	0.001 1	1

According to above table, for 2 402 ~ 2480 MHz Band(1 Mbps), safe distance,

$$D = 0.282 * \sqrt{(1.31 * 5.01)/1.00} = 0.72 \text{ cm.}$$

sFor getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 1.31 * 501 / (4 * \pi * 20^2) = 0.001 3$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

4.6 DATA for Intermodulation Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit
			(dBm)	(mW)			
Bluetooth + WLAN 2 G + WLAN 5 G	Bluetooth (1 Mbps)	0.67 ± 0.5	1.17	1.31	0.001 3	0.080 0	1.00
	WLAN 2 G (802.11 b_Ant 1)	16.19 ± 0.5	16.69	46.67	0.046 5		
	WLAN 5 G (UNII 1 802.11a Ant 0)	12.59 ± 0.5	13.09	20.37	0.032 2		
Bluetooth LE + WLAN 2 G + WLAN 5 G	Bluetooth LE (500 kbps)	1.24 ± 0.5	1.74	1.49	0.001 5	0.080 2	1.00
	WLAN 2 G (802.11 b_Ant 1)	16.19 ± 0.5	16.69	46.67	0.046 5		
	WLAN 5 G (UNII 1 802.11a Ant 0)	12.59 ± 0.5	13.09	20.37	0.032 2		

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit
			(dBm)	(mW)			
Bluetooth + WLAN 2 G + WLAN 5 G	Bluetooth (1 Mbps)	0.67 ± 0.5	1.17	1.31	0.001 3	0.056 6	1.00
	WLAN 2 G (802.11ax HE20_Ant 1)	13.65 ± 0.5	14.15	26.00	0.025 9		
	WLAN 5 G (UNII 1 802.11ax HE20_Ant 0)	12.19 ± 0.5	12.69	18.58	0.029 4		
Bluetooth LE + WLAN 2 G + WLAN 5 G	Bluetooth LE (500 kbps)	1.24 ± 0.5	1.74	1.49	0.001 5	0.056 8	1.00
	WLAN 2 G (802.11ax HE20_Ant 1)	13.65 ± 0.5	14.15	26.00	0.025 9		
	WLAN 5 G (UNII 1 802.11ax HE20_Ant 0)	12.19 ± 0.5	12.69	18.58	0.029 4		