

FCC RF EXPOSURE EVALUATION REPORT

Product Name: 4K Android TV OTT Box
 Trade Mark: Entel
 Model No.: DIW585 UHD Entel
 Add. Model No.: N/A
 Report Number: 191023001RFC-5
 Test Standards: FCC 47 CFR Part 1 Subpart I
 FCC ID: 2AUWA-DV8235M3
 Test Result: PASS
 Date of Issue: December 4, 2019

Prepared for:

Shenzhen SDMC Technology Co.,Ltd.
 7/F, W2-A, Hi-Tech, Industrial Park, Nanshan District, Shenzhen,
 China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
 16/F, Block A, Building 6, Baoneng Science and Technology Park,
 Qingxiang Road No.1, Longhua New District, Shenzhen, China
 TEL: +86-755-2823 0888
 FAX: +86-755-2823 0886

Prepared by:

Eric Yu



Eric Yu
Team Leader

Reviewed by:

Kevin Liang

Kevin Liang
Assistant Manager

Approved by:

Billy Li

Billy Li
Technical Director

Date:

December 4, 2019

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

Version

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**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Shenzhen SDMC Technology Co.,Ltd.
Address of Applicant:	7/F, W2-A, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen SDMC Technology Co.,Ltd.
Address of Manufacturer:	7/F, W2-A, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, China

1.2 EUT INFORMATION

Product Name:	4K Android TV OTT Box		
Model No.:	DIW585 UHD Entel		
Add. Model No.:	N/A		
Trade Mark:	Entel		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V4.2	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
	5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac	
Sample Received Date:	October 25, 2019		
Sample Tested Date:	October 25, 2019 to November 22, 2019		

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For BT_LE	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth LE
Type of Modulation:	GFSK
Number of Channels:	40
Channel Separation:	2 MHz
Antenna Type:	FPC Antenna
Antenna Gain:	3.55 dBi
Maximum Peak Power:	6.71 dBm

For BT_EDR	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth BR + EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Channel Separation:	1 MHz
Antenna Type:	FPC Antenna
Antenna Gain:	3.55 dBi
Maximum Peak Power:	6.12 dBm

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Fax: +86-755-28230886

E-mail: info@uttlab.com

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For 2.4 GHz ISM Band of Wi-Fi	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2462 MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20: 11
Channel Separation:	5 MHz
Antenna Type:	Chain 0 FPC Antenna
	Chain 1 FPC Antenna
Antenna Gain:	Chain 0 3.03 dBi
	Chain 1 3.55 dBi
Directional gain:	6.30 dBi
Maximum Peak Power:	SISO_ Chain 0 IEEE 802.11b: 16.53 dBm IEEE 802.11g: 20.44 dBm IEEE 802.11n-HT20: 19.95 dBm
	SISO_ Chain 1 IEEE 802.11b: 17.68 dBm IEEE 802.11g: 21.38 dBm IEEE 802.11n-HT20: 21.75 dBm
	MIMO_ Chain 0+1 IEEE 802.11n-HT20: 23.50 dBm

For 5 GHz U-NII Bands of Wi-Fi	
Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)
	5250 MHz to 5350 MHz (U-NII-2A)
	5470 MHz to 5725 MHz (U-NII-2C)
	5 725 MHz to 5 850 MHz (U-NII-3)
Frequency Ranges:	5180 MHz to 5240 MHz
	5260 MHz to 5320 MHz
	5500 MHz to 5700 MHz
	5 745 MHz to 5 825 MHz
Support Standards:	IEEE 802.11a/n/ac
TPC Function:	Not Support
DFS Operational mode:	Slave without radar Interference detection function
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz
	IEEE 802.11n-HT40/ac-VHT40: 40 MHz
	IEEE 802.11ac-VHT80: 80 MHz
Data Rate:	IEEE 802.11a: Up to 54 Mbps
	IEEE 802.11n-HT20: Up to MCS15
	IEEE 802.11n-HT40: Up to MCS15
	IEEE 802.11ac-VHT20: Up to MCS8

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Fax: +86-755-28230886

E-mail: info@uttlab.com

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	IEEE 802.11ac-VHT40: Up to MCS9				
	IEEE 802.11ac-VHT80: Up to MCS9				
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11acVHT80				
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11acVHT80				
	5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20 5 for IEEE 802.11n-HT40/ac-VHT40 2 for IEEE 802.11ac-VHT80				
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80				
Antenna Type:	Chain 0	FPC Antenna			
	Chain 1	FPC Antenna			
Antenna Gain:	Chain 0	5150 MHz to 5250 MHz: 3.05 dBi			
		5250 MHz to 5350 MHz: 3.05 dBi			
		5470 MHz to 5725 MHz: 3.21 dBi			
		5725 MHz to 5850 MHz: 3.37 dBi			
	Chain 1	5150 MHz to 5250 MHz: 3.04 dBi			
		5250 MHz to 5350 MHz: 3.04 dBi			
5470 MHz to 5725 MHz: 2.92 dBi					
5725 MHz to 5850 MHz: 2.93 dBi					
Maximum conducted output power (dBm):	SISO_Chain 0	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	11.92	11.50	13.52	11.08
	SISO_Chain 1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	14.03	13.03	12.06	12.81
	MIMO_Chain 0+1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11n-HT20:	15.91	15.22	15.62	14.56
	IEEE 802.11n-HT40:	15.33	15.76	15.67	14.74
	IEEE 802.11ac-VHT20:	15.86	15.28	15.55	14.57
	IEEE 802.11ac-VHT40:	15.38	15.76	15.84	14.77
	IEEE 802.11ac-VHT80:	14.59	15.04	15.04	14.12

1.4 OTHER INFORMATION

Test channels for BT_LE				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
GFSK	2402 MHz to 2480 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 0	Channel 19	Channel 39
		2402 MHz	2440 MHz	2480 MHz

Test channels for BT_EDR				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 68
		2402 MHz	2441 MHz	2480 MHz
π /4DQPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 68
		2402 MHz	2441 MHz	2480 MHz
8DPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 68
		2402 MHz	2441 MHz	2480 MHz

Mode	2Tx/2Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz

Test channels for 5 GHz U-NII Bands of Wi-Fi				
Mode	2Tx/2Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 120	Channel 140
		5500 MHz	5600 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 161
		5745 MHz	5785 MHz	5805 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 118	Channel 134
		5510 MHz	5590 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-HT80	5150 MHz to 5250 MHz	--	Channel 42	--

		--	5210 MHz	--
	5250 MHz to 5350 MHz	--	Channel 58	--
		--	5290 MHz	--
	5470 MHz to 5725 MHz	Channel 106	--	Channel 122
		5530 MHz	--	5610 MHz
	5725 MHz to 5850 MHz	--	Channel 155	--
		--	5775 MHz	--

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I

All test items have been performed and recorded as per the above standards

1.6 TEST LOCATION

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109

Telephone: +86 (0) 755 2823 0888

Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

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1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.

A large, stylized graphic consisting of multiple overlapping, wavy, light blue bands that curve across the page, resembling a globe or a signal wave. It is positioned behind the 'EQUIPMENT LIST' section and extends across most of the page width.

3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density.

3.2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3.3 MPE CALCULATION METHOD

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.4.1 For WLAN

For Wi-Fi function, operating at 2412MHz to 2472 MHz for IEEE802.11b/g/n and operating at 5150 MHz to 5250 MHz for IEEE802.11a/n/ac and operating at 5250 MHz to 5350 MHz for IEEE802.11a/n/ac and operating at 5470 MHz to 5725 MHz for IEEE802.11a/n/ac and operating at 5725 MHz to 5850 MHz for IEEE802.11a/n/ac.

3.4.1.1 Antenna Type:

Chain 0: FPC Antenna

Chain 1: FPC Antenna

3.4.1.2 Antenna Gain:

Chain 0: 2412MHz to 2472 MHz: 3.03 dBi
 5150 MHz to 5250 MHz: 3.05 dBi
 5250 MHz to 5350 MHz: 3.05 dBi
 5470 MHz to 5725 MHz: 3.21 dBi
 5725 MHz to 5850 MHz: 3.37 dBi

Chain 1: 2412MHz to 2472 MHz: 3.55 dBi
 5150 MHz to 5250 MHz: 3.04 dBi
 5250 MHz to 5350 MHz: 3.04 dBi
 5470 MHz to 5725 MHz: 2.92 dBi
 5725 MHz to 5850 MHz: 2.93 dBi

For MIMO mode (2Tx/2Rx), there are two transmission antennas. Both Chain 0 and Chain 1 used at the same time and antenna ports have uniform output powers. The Chain 0 and Chain 1 antenna ports can be used alone. The transmit signals are correlated with each other.

The Directional gain = $10 \log[(10^{G1} / 20 + 10^{G2} / 20 + \dots + 10^{GN} / 20)^2 / NANT]$ dBi = 6.26 dBi (2.4GHz)

The Directional gain = $10 \log[(10^{G1} / 20 + 10^{G2} / 20 + \dots + 10^{GN} / 20)^2 / NANT]$ dBi = 6.52 dBi (5GHz)

3.4.1.3 Results for WLAN

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)								(dBm)
SISO Ant. 0	IEEE 802.11b	2412-2462	16	2	3.03	21.03	126.7652	1	0.0252
	IEEE 802.11g	2412-2462	20	2	3.03	25.03	318.4198	1	0.0633
	IEEE 802.11a	5180-5240	11	2	3.05	16.05	40.2717	1	0.0080
		5260-5320	11	2	3.05	16.05	40.2717	1	0.0080
		5500-5700	12	2	3.21	17.21	52.6017	1	0.0105
		5745-5825	10	2	3.37	15.37	34.4350	1	0.0069

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)								(dBm)
SISO Ant. 1	IEEE 802.11b	2412-2462	17	2	3.55	22.55	179.8871	1	0.0358
	IEEE 802.11g	2412-2462	20	2	3.55	25.55	358.9219	1	0.0714
	IEEE 802.11a	5180-5240	13	2	3.04	18.04	63.6796	1	0.0127
		5260-5320	12	2	3.04	17.04	50.5825	1	0.0101
		5500-5700	11	2	2.92	15.92	39.0841	1	0.0078
		5745-5825	12	2	2.93	16.93	49.3174	1	0.0098

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)								(dBm)
MIMO Ant. 0 + Ant. 1	IEEE 802.11n-HT20	2412-2462	23	2	6.30	31.3	1348.9629	1	0.2684
		5180-5240	15	2	6.06	23.06	202.3019	1	0.0402
		5260-5320	15	2	6.06	23.06	202.3019	1	0.0402
		5500-5700	14	2	6.08	22.08	161.4359	1	0.0321
		5745-5825	14	2	6.16	22.16	164.4372	1	0.0327
	IEEE 802.11n-HT40	5190-5230	15	2	6.06	23.06	202.3019	1	0.0402
		5270-5310	15	2	6.06	23.06	202.3019	1	0.0402
		5510-5670	15	2	6.08	23.08	203.2357	1	0.0404
	IEEE 802.11ac-VHT20	5755-5795	14	2	6.16	22.16	164.4372	1	0.0327
		5180-5240	15	2	6.06	23.06	202.3019	1	0.0402
		5260-5320	15	2	6.06	23.06	202.3019	1	0.0402
	IEEE 802.11ac-VHT40	5500-5700	15	2	6.08	23.08	203.2357	1	0.0404
		5745-5825	14	2	6.16	22.16	164.4372	1	0.0327
		5190-5230	15	2	6.06	23.06	202.3019	1	0.0402
		5270-5310	15	2	6.06	23.06	202.3019	1	0.0402
	IEEE 802.11ac-VHT80	5510-5670	15	2	6.08	23.08	203.2357	1	0.0404
		5755-5795	14	2	6.16	22.16	164.4372	1	0.0327
		5210	14	2	6.06	22.06	160.6941	1	0.0320
		5290	14	2	6.06	22.06	160.6941	1	0.0320
		5530-5610	14	2	6.08	22.08	161.4359	1	0.0321
5775	13	2	6.16	21.16	130.6171	1	0.0260		

3.4.2 For BT

For BT_LE function, operating at 2402MHz to 2480 MHz for GFSK and

For BT_EDR function, operating at 2402MHz to 2480 MHz for GFSK, $\pi/4$ DQPSK, 8DPSK

3.4.2.1 Antenna Type:

Chain 0: on-board Antenna

3.4.2.2 Antenna Gain:

Chain 0: 2402MHz to 2480 MHz: 3.55 dBi

3.4.2.3 Results for BT

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(mW)	(mw/cm ²)	
LE	2402	6	1	3.55	10.55	11.3501	1	0.0023
	2440	6	1	3.55	10.55	11.3501	1	0.0023
	2480	6	1	3.55	10.55	11.3501	1	0.0023
EDR	2402	5	2	3.55	10.55	11.3501	1	0.0023
	2441	5	2	3.55	10.55	11.3501	1	0.0023
	2480	5	2	3.55	10.55	11.3501	1	0.0023

3.4.3 Simultaneous Multi-band Transmission MPE Analysis

3.4.4.1 List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Support/Not Support
1	2.4G_WLAN_SISO + BT	Support
3	2.4G_WLAN_MIMO + BT	Support
4	5G_WLAN_SISO + BT	Support
5	5G_WLAN_MIMO + BT	Support
10	2.4G_WLAN_SISO + 5G_WLAN_SISO	Not Support
11	2.4G_WLAN_MIMO + 5G_WLAN_MIMO	Not Support

3.4.4.2 Results for transmit simultaneously

No.	Configurations	Maximum MPE Value (mw/cm ²)			Limits (mw/cm ²)
		WLAN	BT	Transmit simultaneously	
1	2.4G_WLAN_SISO + BT	0.0315	0.0011	0.0326	1
2	2.4G_WLAN_MIMO + BT	0.0168	0.0011	0.0179	1
3	5G_WLAN_SISO + BT	0.0282	0.0011	0.0293	1
4	5G_WLAN_MIMO + BT	0.0282	0.0011	0.0293	1

Note 1: According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

$$\text{Transmit simultaneously MPE} = \Sigma \text{ of MPE ratios}$$

$$\text{MPE ratios} = \text{Field strengths or power density} / \text{MPE limit at the test frequency}$$

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

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