



KES Co., Ltd.

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Report No.:
KES-EM-21T0970
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EMC TEST REPORT

Test Report No. : KES-EM-21T0970
Date of Issue : Oct. 06, 2021
Product name : TOUCHLESS & WIRELESS SWITCH
Model/Type No. : WPS100
Variant Model : AERWAVE
Applicant : RITS-N CO.,LTD
Applicant Address : 628 ITECO, 150, Jojeong-daero, Hanam-si, Gyeonggi-do,
South Korea 12930
Manufacturer : RITS-N CO.,LTD
Manufacturer Address : 628 ITECO, 150, Jojeong-daero, Hanam-si, Gyeonggi-do,
South Korea 12930
FCC ID : 2A3C4-WPS100
Date of Receipt : Sep. 01, 2021
Test date : Sep. 14, 2021 ~ Sep. 15, 2021
Test Results : **In Compliance** **Not in Compliance**

Tested by

Do Hyun, Ko
EMC Test Engineer

Reviewed by

Dong Hun, Jang
EMC Technical Manager

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REPORT REVISION HISTORY

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1.0 General Product Description

Main Specifications of EUT are:

Item	Details
Operating Frequency	2.4 GHz Band
Power	DC 3 V (Battery x 2 ea)
Size	(95 x 95 x 20) mm
Current Consumption	< 0.5 mWh
Transmitting distance	10 m
Operating Temperature	(-20 ~50) °C

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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

- DC 3 V (Battery x 2 ea)

1.2 Variant Model Differences

Addition of derivative models for place of sale management

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
TOUCHLESS & WIRELESS SWITCH	WPS100	-	RITS-N CO.,LTD	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
WIRELESS TOUCH SWITCH RECEIVER	R24	-	RITS-N CO.,LTD	-
Digital multi tester	DM-1010	-	DONG HWA	-
Motion detector	MS805	-	-	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
TOUCHLESS & WIRELESS SWITCH (EUT)	Wireless	WIRELESS TOUCH SWITCH RECEIVER	Wireless	-	-
WIRELESS TOUCH SWITCH RECEIVER	2 Pin	Digital multi tester	2 Pin	1.6	U
	4 Pin	Motion detector	4 Pin	3.0	U

* Unshielded = U, Shielded = S

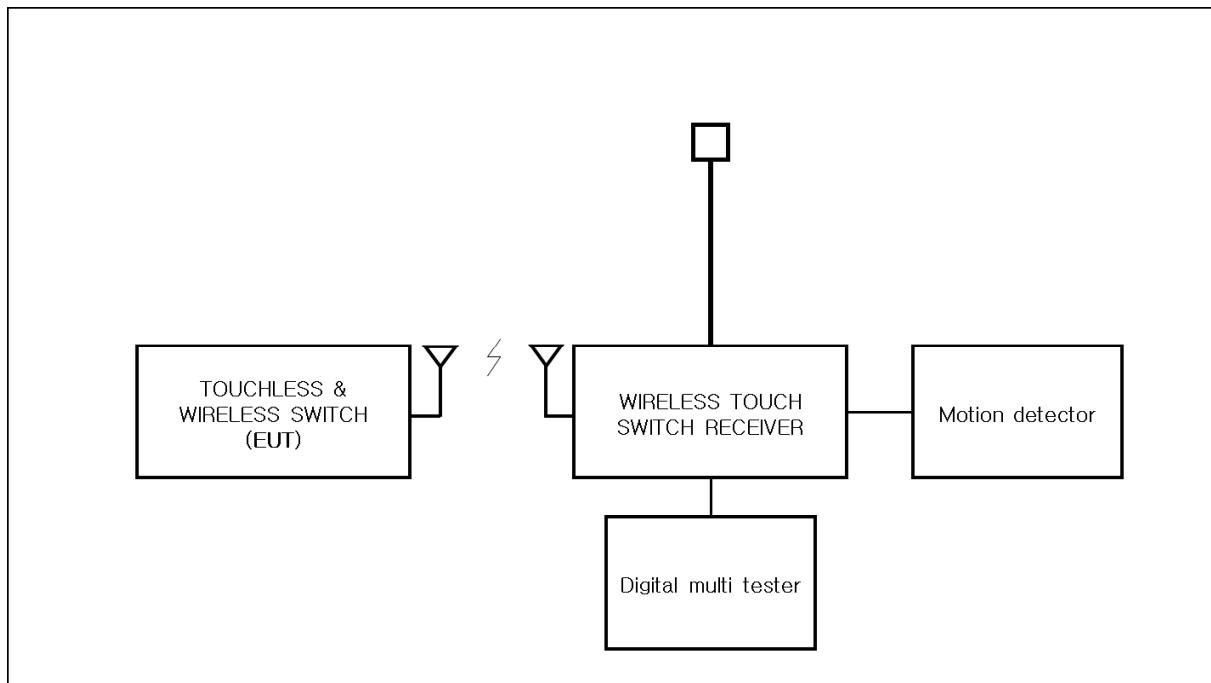
1.7 EUT Operating Mode(s)

Test mode	Bluetooth
OPERATION	Confirmed the operation of the EUT through of the Digital multi tester and EUT's LED

EUT Test operating S/W		
Name	Version	Manufacture Company
-	-	-

1.8 Configuration

- AC Main
- DC Main



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1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2019

1.12 Measurement Procedure

- Conducted Emissions

The conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

- Radiated Electric Field Emissions

The test was done at a SEMI ANECHOIC CHAMBER with quasi-peak detector. The final test data was measured using a Quasi-Peak detector below 1 GHz at 10 m or 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Test was proceeded worst case test mode and cable configuration.

Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Measurement procedures was In accordance with ANSI C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2



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1.13 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic Chamber ,10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	R-20056, C-20036 T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	CARAT 001633 0004

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2.0 Test Regulations

The emissions tests were performed according to following regulations:

EMC – Directive 2014/30/EU

- EN 61000-6-3:2011
- EN 61000-6-1:2007
- EN 61000-6-4:2007 +A1:2011
- EN 61000-6-2:2005
- EN 55011:2007 +A1:2010
- EN 55014-1:2006 +A2:2011
- EN 55014-2:1997 +A2:2008
- EN 55015:2013
- EN 55032:2015
- EN 55024:2010
- EN 50130-4:2011 +A1:2014
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 61326-1:2013

Group 1
 Class A

Group 2
 Class B

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<input type="checkbox"/> VCCI V-3 / 2015.04	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> AS/NZS:2013	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input checked="" type="checkbox"/> 47 CFR Part 15, Subpart B		
<input type="checkbox"/> CISPR 22:2009 +A1:2010	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input checked="" type="checkbox"/> ANSI C63.4-2014	<input checked="" type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> IC Regulation ICES-003 : 2016		
<input type="checkbox"/> CAN/CSA CISPR 22-10	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> ANSI C63.4-2014	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> RE- Directive 2014/53/EU		
<input type="checkbox"/> EN 301 489-1 V1.9.2		
<input type="checkbox"/> Equipment for fixed use		
<input type="checkbox"/> Equipment for vehicular use		
<input type="checkbox"/> Equipment for portable use		
<input type="checkbox"/> EN 301 489-3 V1.6.1		
<input type="checkbox"/> EN 301 489-17 V2.2.1		
<input type="checkbox"/> EN 60945:2002		

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2.1 Conducted Emissions at Mains Power Ports

Test Date

N/A

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	01, 15, 2022	1 Year
<input type="checkbox"/>	LISN	ENV216	R & S	101787	12, 29, 2021	1 Year
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 29, 2021	1 Year
<input type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021	1 Year

Test Conditions

Temperature: (\pm) °C

Relative Humidity: (\pm) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

It is not applied, because The EUT is powered by Battery



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Sep. 15, 2021

Test Location

OPEN AREA TEST SITE #2 SEMI ANECHOIC CHAMBER #4

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2022	1 Year
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2021	2 Year
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022	1 Year
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 10, 2022	1 Year

Test Conditions

Temperature: (24,2 \pm 0,1) °C

Relative Humidity: (50,3 \pm 0,1) % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

PASS
 NOT PASS
 NOT APPLICABLE

Remarks

- See Appendix A for test data.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z.



2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Sep. 14, 2021

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2022	1 Year
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 14, 2021	1 Year
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022	1 Year

Test Conditions

Temperature: $(25,1 \pm 0,1) ^\circ\text{C}$

Relative Humidity: $(50,5 \pm 0,1) \% \text{ R.H.}$

Frequency Range of Measurement

1 GHz to 18 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

- See Appendix A for test data.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z.



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APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

N/A

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NEUTRAL LINE

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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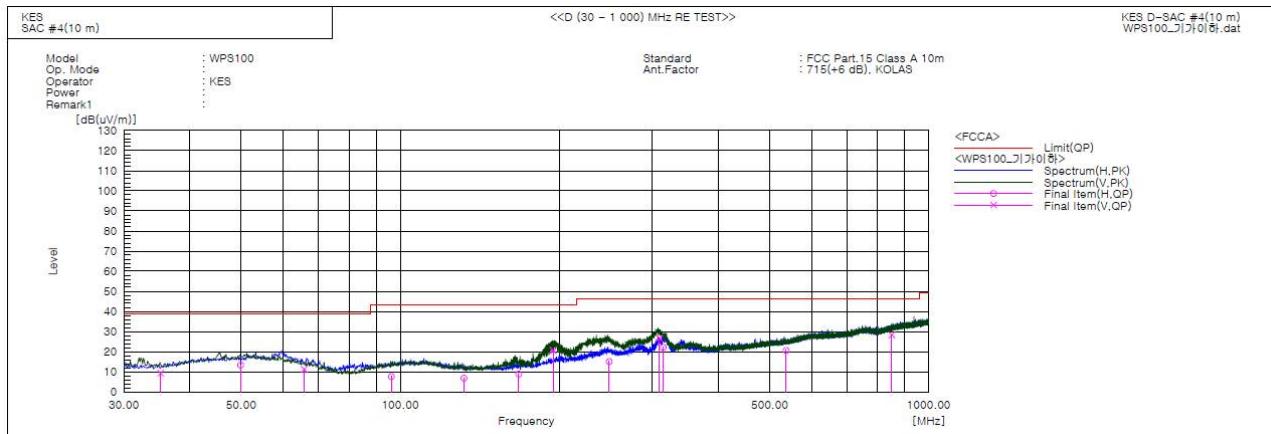


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Radiated Electric Field Emissions(Below 1 GHz)



Final Result

No.	Frequency [MHz]	(P) [dB(uV)]	Reading QP [dB(1/m)]	c.f [dB(uV/m)]	Result QP [dB(uV/m)]	Limit QP [dB]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	35.213	V	33.8	-24.4	9.4	39.0	29.6	100.0	352.0	
2	49.885	H	33.7	-20.4	13.3	39.0	25.7	189.0	20.0	
3	65.769	V	33.9	-22.7	11.2	39.0	27.8	100.0	22.0	
4	96.203	H	29.9	-22.3	7.6	43.5	35.9	291.0	110.0	
5	131.971	H	30.8	-24.0	6.8	43.5	36.7	400.0	350.0	
6	167.619	H	31.5	-22.7	8.8	43.5	34.7	251.0	353.0	
7	194.658	V	40.2	-19.6	20.6	43.5	22.9	100.0	295.0	
8	248.493	H	32.3	-17.2	15.1	46.5	31.4	400.0	24.0	
9	309.239	V	41.8	-15.1	26.7	46.5	19.8	100.0	147.0	
10	314.574	H	37.0	-14.8	22.2	46.5	24.3	400.0	12.0	
11	537.189	H	28.2	-7.6	20.6	46.5	25.9	400.0	352.0	
12	851.226	V	28.8	-0.5	28.3	46.5	18.2	143.0	58.0	

it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

♦ Calculation – SAC #4(10 m)

$$\text{Result(QP)} [\text{dB}(\mu\text{V}/\text{m})] = (\text{Reading(QP)} [\text{dB}(\mu\text{V})] + \text{c.f} [\text{dB}(1/\text{m})])$$

$$\text{Margin(QP)} [\text{dB}] = \text{Limit} [\text{dB}(\mu\text{V}/\text{m})] - \text{Result(QP)} [\text{dB}(\mu\text{V}/\text{m})]$$

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



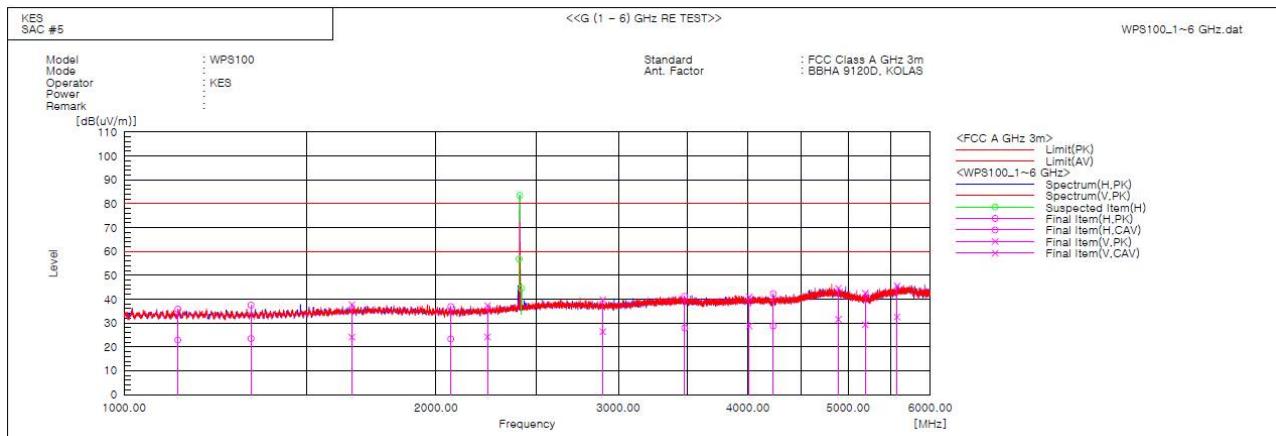
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Radiated Electric Field Emissions(Above 1 GHz)

- (1 ~ 6) GHz



Final Result

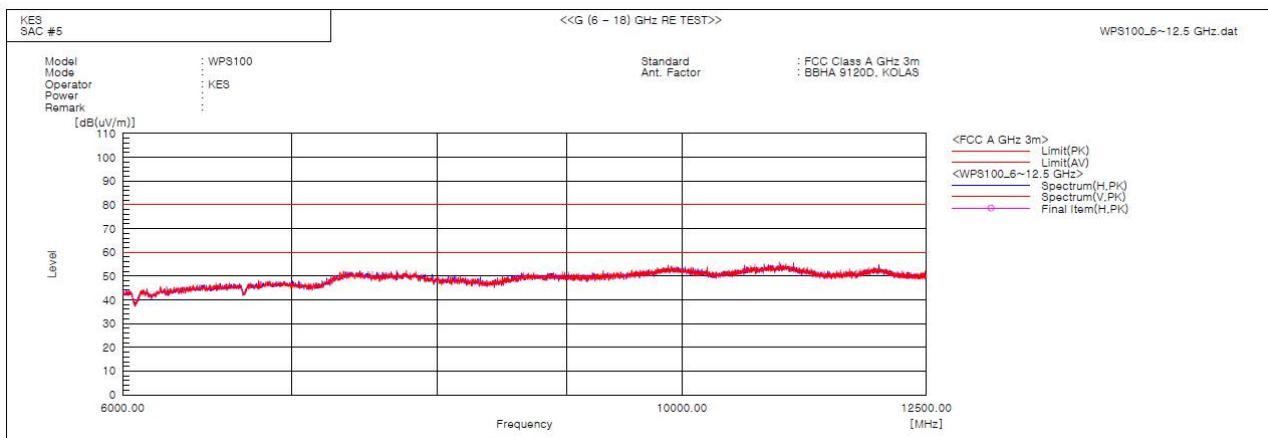
No.	Frequency [MHz]	(P) PK	Reading [dB(uV)]	Reading CAV [dB(uV)]	c.f. [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1126.875	H	43.0	30.1	-7.2	35.8	22.9	80.0	60.0	44.2	37.1	100.0	113.1	
2	1326.250	H	43.7	29.7	-6.2	37.5	23.5	80.0	60.0	42.5	36.5	100.0	187.5	
3	1658.774	V	42.4	28.8	-4.7	37.7	24.1	80.0	60.0	42.3	35.9	241.0	213.2	
4	2066.876	H	40.1	26.5	-3.2	36.9	23.3	80.0	60.0	43.1	36.7	400.0	197.8	
5	2243.116	V	40.0	26.8	-2.6	37.4	24.2	80.0	60.0	42.6	35.8	100.0	219.5	
6	2898.157	V	39.8	26.4	0.0	39.8	26.4	80.0	60.0	40.2	33.6	109.0	313.7	
7	3477.074	H	40.4	27.1	0.8	41.2	27.9	80.0	60.0	38.8	32.1	349.0	304.5	
8	4012.719	V	38.7	26.6	2.2	40.9	28.8	80.0	60.0	39.1	31.2	100.0	158.1	
9	4232.121	H	39.3	25.8	3.0	42.3	28.8	80.0	60.0	37.7	31.2	400.0	213.6	
10	4891.207	V	38.9	25.9	5.7	44.6	31.6	80.0	60.0	35.4	28.4	100.0	289.6	
11	5192.511	V	36.4	23.2	6.1	42.5	29.3	80.0	60.0	37.5	30.7	119.0	115.5	
12	5572.714	V	38.7	25.6	6.9	45.6	32.5	80.0	60.0	34.4	27.5	100.0	310.7	
13	2406.875	H	-----	-----	-2.0	-----	-----	80.0	60.0	-----	-----	400.0	254.6	
14	2409.375	H	-----	-----	-2.0	-----	-----	80.0	60.0	-----	-----	400.0	99.1	
15	2419.375	H	-----	-----	-2.0	-----	-----	80.0	60.0	-----	-----	400.0	316.1	

* Exclusion bands

- Fundamental Frequency : 2.4 GHz Band

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- (6 ~ 12.5) GHz



-The fundamental of the EUT was investigated in three orthogonal orientations X,Y and Z

- it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation

♦ Calculation

$$\text{Result(PK/CAV)} [\text{dB}(\mu\text{V}/\text{m})] = (\text{Reading(PK/CAV)} [\text{dB}(\mu\text{V})] + \text{c.f}[\text{dB}(1/\text{m})]$$

$$\text{Margin(PK/CAV)} [\text{dB}] = \text{Limit}[\text{dB}(\mu\text{V}/\text{m})] - \text{Result(PK/CAV)} [\text{dB}(\mu\text{V}/\text{m})]$$

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value