


# RF TEST REPORT

**FCC ID: PJZ2428GN**

Test Report No.....: RF240730013-01-001

Product(s) Name.....: GPON ONT

Model(s).....: 2428GN, 2428TE

Trade Mark.....: 

Applicant.....: DZS Inc.

Address.....: 5700 Tennyson Parkway, Plano, TX 75024 USA


Receipt Date.....: 2024.07.31

Test Date.....: 2024.08.01~2024.08.06

Issued Date.....: 2024.08.07

Standards.....: 47 CFR FCC Part 15, Subpart E(Section 15.407);  
ANSI C63.10:2013

Testing Laboratory.....: Shenzhen Haiyun Standard Technical Co., Ltd.

Prepared By:	Checked By:	Approved By:	
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## History of this test report

Amendment Report Issue Date: 2024.08.07

☐ No additional attachment

☒ Additional attachments were issued following record

Attachment No.	Issue Date	Description
FR332121B	2023.05.17	Original report
FR332121-01	2023.07.25	Original report
RF240730013-01-002	2024.08.07	<p>Compared with original report (FR332121-01 and FR332121B), reduce one heat sink, change size of remaining two heat sinks and appearance of product.</p> <p>Please see the following table for details.</p> <p>The radiated emissions the worst case have been re-evaluated.</p> <p>In this report only updated the test results for radiated emissions and ac power conducted emissions, other are kept the same</p>

## 1. General Information

### 1.1 Applicant

**DZS Inc.**


5700 Tennyson Parkway, Plano, TX 75024 USA

### 1.2 Manufacturer

**DZS Inc.**

5700 Tennyson Parkway, Plano, TX 75024 USA

### 1.3 Basic Description of Equipment Under Test

Product No.	POC240730013-S001, POC240730013-S002																							
Equipment Name	GPON ONT																							
Model Name	2428GN, 2428TE																							
Model differences	Only 2.5G WAN port and optical fiber port part of the circuit are different 2428GN: with optical fiber port, without 2.5G WAN port 2428TE: without optical fiber port, with 2.5G WAN port																							
Trade Mark																								
Power Supply	DC 12V from adapter or DC 12V from 8 pin PSU																							
Adapter Information	Model: SOY-1200250US-459 Input: 100-240V~ 50/60Hz 0.9A Max Output: 12V== 2.5A 30.0W																							
Operating Temperature	0℃-45℃																							
EUT Stage	○ Product Unit		● Final-Sample																					
Operating Band & Max Conducted Output Power	5150MHz ~5250MHz		802.11ax40: 25.01dBm(0.3170W)																					
	5250MHz ~5350MHz		802.11aX40: 21.48dBm(0.1406W)																					
	5470MHz ~5725MHz		802.11ax80: 23.65dBm(0.2317W)																					
	5725MHz ~5850MHz		802.11ax80: 21.90dBm(0.1549W)																					
Antenna Function Description	<table><tr><td></td><td>Ant. 0</td><td>Ant. 1</td><td>Ant. 2</td><td>Ant. 3</td></tr><tr><td>802.11 a/n/ac/ax SISO</td><td>V</td><td>V</td><td>V</td><td>V</td></tr><tr><td>802.11 a/n/ac/ax CDD 1S4T</td><td>V</td><td>V</td><td>V</td><td>V</td></tr><tr><td>802.11 n/ac/ax Tx Beamforming 1S4T</td><td>V</td><td>V</td><td>V</td><td>V</td></tr></table>					Ant. 0	Ant. 1	Ant. 2	Ant. 3	802.11 a/n/ac/ax SISO	V	V	V	V	802.11 a/n/ac/ax CDD 1S4T	V	V	V	V	802.11 n/ac/ax Tx Beamforming 1S4T	V	V	V	V
	Ant. 0	Ant. 1	Ant. 2	Ant. 3																				
802.11 a/n/ac/ax SISO	V	V	V	V																				
802.11 a/n/ac/ax CDD 1S4T	V	V	V	V																				
802.11 n/ac/ax Tx Beamforming 1S4T	V	V	V	V																				
Nominal Bandwidth	20MHz / 40MHz / 80MHz / 160MHz																							
Modulation	OFDM, OFDMA																							
DFS Function	●	5250MHz ~5350MHz																						
	●	5470MHz ~5725MHz																						

Channel Information			
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	802.11a /n /ac /ax (20MHz)	5180-5240	36-48
5250-5350		5260-5320	52-64
5470-5725		5500-5720	100-144
5725-5850		5745-5825	149-165
5150-5250	802.11n /ac /ax (40MHz)	5190-5230	38-46
5250-5350		5270-5310	54-62
5470-5725		5510-5670	102-134
5725-5850		5755-5795	151-159
5150-5250	802.11ac /ax (80MHz)	5210	42
5250-5350		5290	58
5470-5725		5530-5610	106-122
5725-5850		5775	155
5150-5350	802.11 ac /ax (160MHz)	5250	50

#### Antenna information

##### 5150-5250MHz

Antenna gain				Antenna Type
Ant0: 4.61dBi	Ant1: 4.67dBi	Ant2: 4.55dBi	Ant3: 4.57dBi	PCB antenna

##### 5250-5350MHz

Antenna gain				Antenna Type
Ant0: 4.67dBi	Ant1: 4.67dBi	Ant2: 4.58dBi	Ant3: 4.57dBi	PCB antenna

##### 5470-5725MHz

Antenna gain				Antenna Type
Ant0: 4.70dBi	Ant1: 4.69dBi	Ant2: 4.67dBi	Ant3: 4.67dBi	PCB antenna

##### 5725-5850MHz

Antenna gain				Antenna Type
Ant0: 4.60dBi	Ant1: 4.58dBi	Ant2: 4.55dBi	Ant3: 4.52dBi	PCB antenna

#### Note:

1. WLAN operation in 5600 MHz ~ 5650 MHz is notched.
2. For SISO&MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power.

3. For 802.11n 20/40MHz and 802.11 ac/ax 20/40/80/160 MHz mode, the power setting of 802.11n 20/40MHz, 802.11ac 20/40/80/160MHz mode are the same or lower than 802.11ax 20/40/80MHz mode. Therefore, the whole testing have assessed only 802.11ax HE20/HE40/HE80/160 mode.
4. The device does not support partial RU tone for 802.11ax mode
5. 802.11ax support Tx Beamforming mode, and the Tx Beamforming power/EIRP is not greater than CDD mode, so we only evaluate CDD mode by referring to their maximum conducted power.
6. The device supports 1S4T(CDD&TXBF) mode; 1S4T: NSS=1, MIMO 4Tx.

## 1.4 Transmit Operating Mode

Please refer to original report(FR332121-01 and FR332121B)

## 2. Summary of Test Results

### 2.1 Summary of Test Items

47 CFR FCC Part 15, Subpart E (Section 15.407)			
Test item	Standard	Results	Remarks
AC Power Conducted Emission	15.207 15.407(b)	Pass	/
Radiated Emission	15.205(a) 15.209(a) 15.407(b)	Pass	Note3
Antenna Requirements	15.203	Compliance	Note1
Spectrum Bandwidth	15.407(a) 15.407(e)	Pass	Note2
Conducted Output Power	15.407(a)	Pass	Note2
Power Spectral Density	15.407(a)	Pass	Note2
Dynamic Frequency Selection (DFS)	15.407(h)	Pass	See the report FZ332121-01 for details
<p>Note:</p> <ol style="list-style-type: none"> <li>The EUT has 4 PCB antennas arrangement which was permanently attached.</li> <li>For test item: Spectrum Bandwidth, Conducted Output Power and Power Spectral Density, Please refer to original report(FR332121-01 and FR332121B)</li> <li>Worst case for Radiated Emission and Band Edge were recorded.</li> </ol>			

### 2.2 Application of Standard

47 CFR FCC Part 15, Subpart E

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

ANSI C63.10:2013



## 2.3 Test Instruments

Radiated Emissions							
No.	Equipment	Manufacturer	Type No.	Serial No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal. Due date (yyyy/mm/dd)
1	Test receiver	Rohde&Schwarz	ESU	100184	JLE011	2024/4/24	2025/4/23
2	Log periodic antenna	Schwarzbeck	VULB 9168	1151	JLE012	2024/4/20	2025/4/19
3	Low frequency amplifier	/	LNA 0920N	2014	JLE023	2024/4/24	2025/4/23
4	High frequency amplifier	Schwarzbeck	BBV 9718	284	JLE024	2024/4/24	2025/4/23
5	Horn Antenna	SCHWARZBEC K	BBHA 9120 D	9120D-1273	JLE028	2024/4/20	2025/4/19
6	Temp&Humidity Recorder	Meideshi	JR900	/	JLE021	2024/4/24	2025/4/23
7	Horn Antenna	SCHWARZBEC K	BBHA 9170	9170#685	JLE029	2024/7/15	2025/7/14
8	Loop Antenna	SCHWARZBEC K	FMZB15 19B	00029	JLE030	2024/7/15	2025/7/14
9	Broadband preamplifier	Schwarzbeck	BBV9721	9721-019	JLE025	2024/4/24	2025/4/23
10	MXA Signal Analyzer	Keysight	N9010A	MY51440 158	JLE076	2024/4/20	2025/4/19
11	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				
Conducted Emission							
1	LISN	Rohde&Schwarz	ENV216	100075	JLE002	2024/4/24	2025/4/23
2	ISN	Schwarzbeck	CATE 5 8158	#171	JLE003	2024/4/24	2025/4/23
3	Test receiver	Rohde&Schwarz	ESCI	100718	JLE010	2024/4/24	2025/4/23
4	Pulse limiter	Rohde&Schwarz	ESH3-Z2	102299	JLE047	2024/4/24	2025/4/23
5	Temp&Humidity Recorder	Meideshi	JR900	/	JLE020	2024/4/24	2025/4/23
6	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				

## 2.4 Operation Mode

Please refer to original report(FR332121-01 and FR332121B)

## 2.5 Test Condition

Test Item	Environmental conditions	Input Power	Tested by
AC Power Conducted Emission	23.3°C, 51% RH	AC 120V/60Hz	Albert Fan
Radiated Emission	23.4°C, 55% RH	AC 120V/60Hz	Albert Fan

Note: Adapter supply voltage AC 120V/60Hz.

## 2.6 Duty Cycle of Test Signal

Please refer to original report(FR332121-01 and FR332121B)

## 2.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±102kHz
Power Spectral Density	±0.377dB
Conducted Spurious Emission	±0.743dB
RF power conducted	±1.328dB
Conducted emission(9kHz~30MHz) AC main	±2.68dB
Radiated emission(9kHz~30MHz)	±2.74dB
Radiated emission (30MHz~1GHz)	±4.22dB
Radiated emission (1GHz~18GHz)	±5.06dB
Radiated emission (18GHz~40GHz)	±4.98dB

## 2.8 Test Location

Company:	Shenzhen Haiyun Standard Technical CO., Ltd.
Address:	No. 110-113, 115, 116, Block B, Jinyuan Business Building, Bao'an District, Shenzhen, China
CNAS Registration Number:	CNAS L18252
CAB identifier:	CN0145
A2LA Certificate Number:	6823.01
Telephone:	0755-26024411

## 2.9 SUPPORT UNITS

No.	Equipment	Model Name	Manufacturer	Remarks
1	Telephone 1	/	/	/
2	Telephone 2	/	/	/
3	Microcomputer	TY510S-07IAB	LENOVO	YLX2QPQJ
4	Microcomputer	TY510S-07IAB	LENOVO	YLX2QPM7
5	Microcomputer	M4600t-N000	LENOVO	M703V3VF
6	Notebook	L450	Think	/
7	Notebook	L450	Think	/
8	USB Disk	/	Kingston	/
9	Optical local terminal	C300	/	/
10	8 pin PSU	/	/	/

### 3. Test Procedure And Results

#### 3.1 AC Power Line Conducted Emission

##### 3.1.1 Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB( $\mu$ V)	Average Level dB( $\mu$ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.

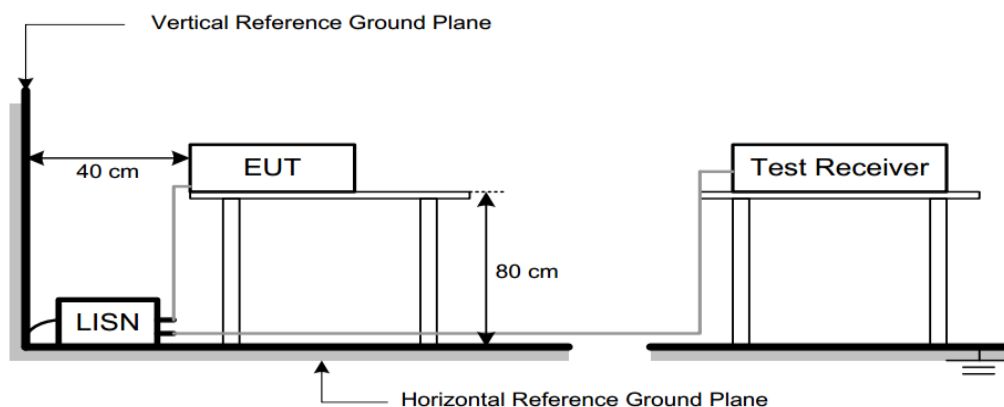
2. The lower limit shall apply at the transition frequencies.

##### 3.1.2 Test Procedure

Test Method	
●Conducted Measurement	○Radiated Measurement
Test Channels	
○ Lowest, Middle and Highest Channel	○ Lowest and Highest Channel
Environmental conditions	
●Normal	○Normal and Extreme
Note: ●:Test    ○:No Test	

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

##### 3.1.3 Test Setup



### 3.1.4 Test Result

#### Note:

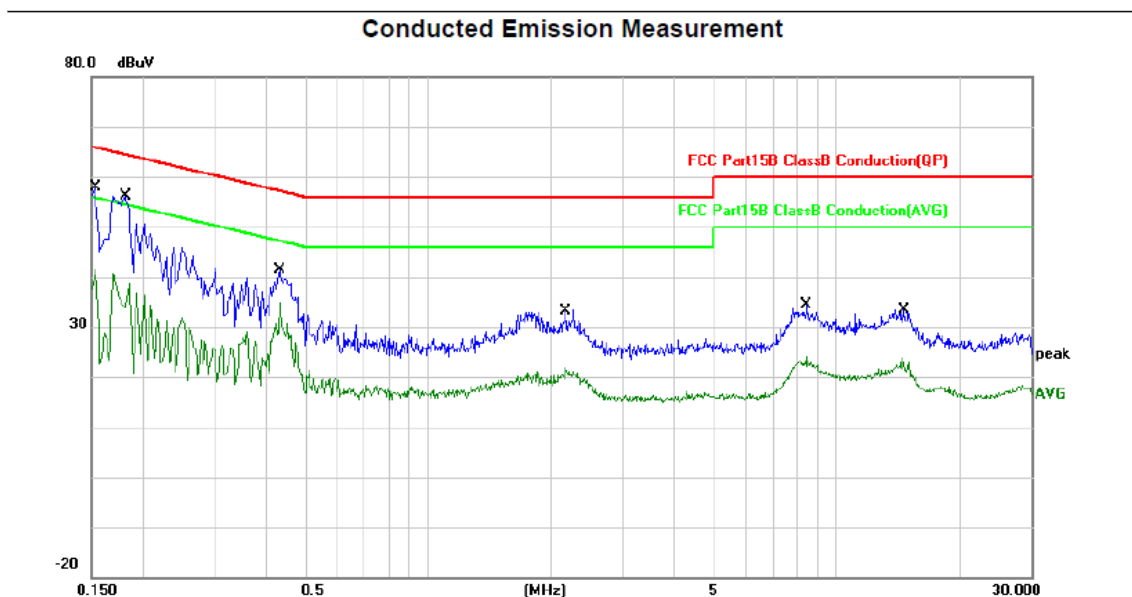
1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Measurement = Reading + Correct Factor.
3. Over = Measurement – Limit
4. We only recorded the data of the worst mode. Please see the following:

2428GN:

For adapter

150kHz~30MHz	AX40MIMO Channel 54
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Line



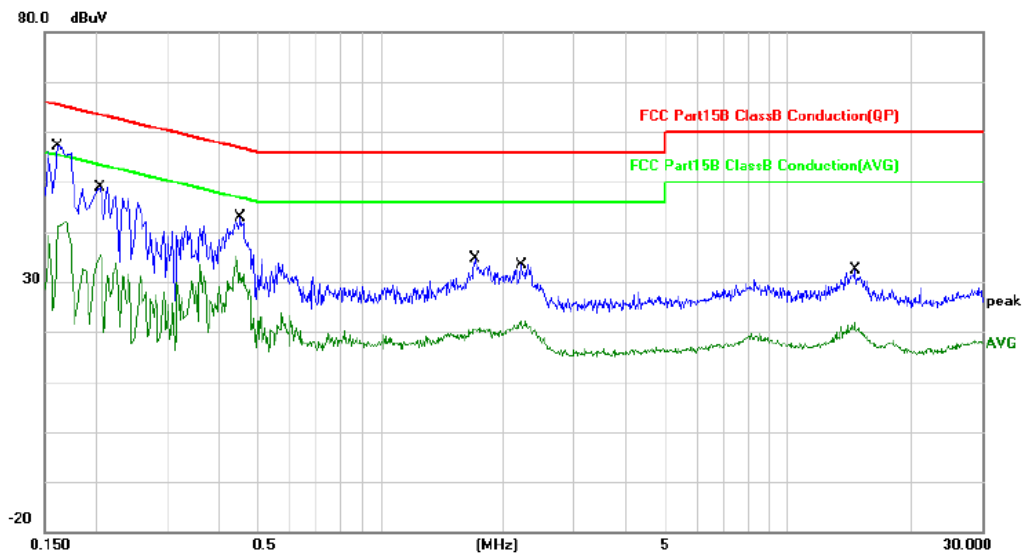
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1540	29.46	20.10	49.56	65.78	-16.22	QP	
2		0.1540	4.36	20.10	24.46	55.78	-31.32	AVG	
3	*	0.1835	29.31	20.11	49.42	64.33	-14.91	QP	
4		0.1835	6.21	20.11	26.32	54.33	-28.01	AVG	
5		0.4340	16.55	20.32	36.87	57.18	-20.31	QP	
6		0.4340	8.17	20.32	28.49	47.18	-18.69	AVG	
7		2.1860	6.24	20.17	26.41	56.00	-29.59	QP	
8		2.1860	0.64	20.17	20.81	46.00	-25.19	AVG	
9		8.4940	7.03	20.11	27.14	60.00	-32.86	QP	
10		8.4940	1.17	20.11	21.28	50.00	-28.72	AVG	
11		14.6900	5.97	20.19	26.16	60.00	-33.84	QP	
12		14.6900	0.28	20.19	20.47	50.00	-29.53	AVG	

150kHz~30MHz

AX40MIMO Channel 54

Neutral

### Conducted Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1620	34.76	20.30	55.06	65.36	-10.30	QP	
2		0.1620	17.48	20.30	37.78	55.36	-17.58	AVG	
3		0.2060	26.83	20.34	47.17	63.37	-16.20	QP	
4		0.2060	10.92	20.34	31.26	53.37	-22.11	AVG	
5		0.4540	19.47	20.12	39.59	56.80	-17.21	QP	
6		0.4540	10.02	20.12	30.14	46.80	-16.66	AVG	
7		1.7140	6.89	20.35	27.24	56.00	-28.76	QP	
8		1.7140	-1.15	20.35	19.20	46.00	-26.80	AVG	
9		2.2180	6.76	20.31	27.07	56.00	-28.93	QP	
10		2.2180	1.01	20.31	21.32	46.00	-24.68	AVG	
11		14.6620	5.09	20.34	25.43	60.00	-34.57	QP	
12		14.6620	-0.40	20.34	19.94	50.00	-30.06	AVG	

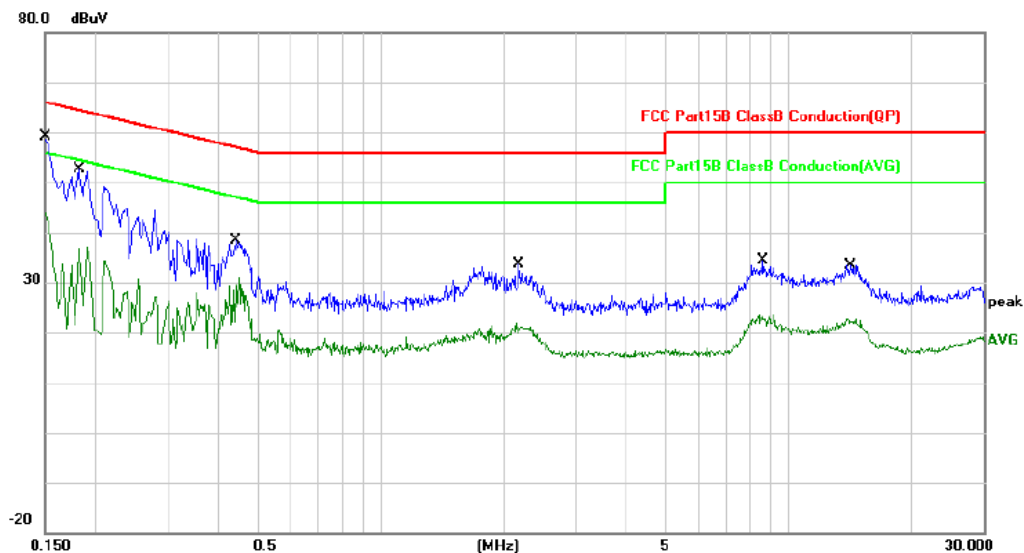
For 8 pin PSU

150kHz~30MHz

AX40MIMO Channel 54

Line

### Conducted Emission Measurement



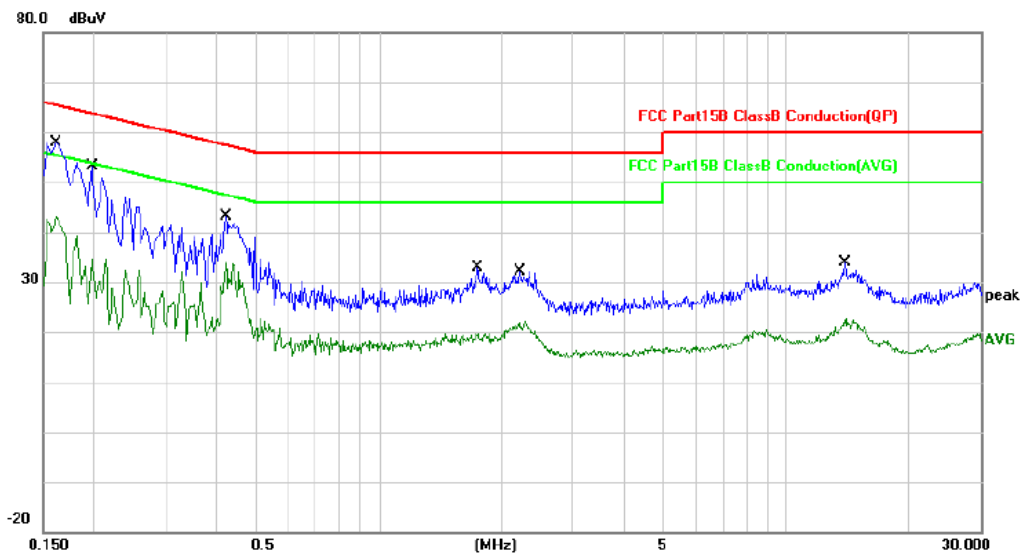
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	36.73	20.08	56.81	66.00	-9.19	QP	
2		0.1500	16.41	20.08	36.49	56.00	-19.51	AVG	
3		0.1820	31.03	20.11	51.14	64.39	-13.25	QP	
4		0.1820	11.43	20.11	31.54	54.39	-22.85	AVG	
5		0.4420	15.44	20.30	35.74	57.02	-21.28	QP	
6		0.4420	5.66	20.30	25.96	47.02	-21.06	AVG	
7		2.1860	6.34	20.17	26.51	56.00	-29.49	QP	
8		2.1860	1.09	20.17	21.26	46.00	-24.74	AVG	
9		8.6420	7.65	20.13	27.78	60.00	-32.22	QP	
10		8.6420	1.60	20.13	21.73	50.00	-28.27	AVG	
11		14.1660	6.81	20.19	27.00	60.00	-33.00	QP	
12		14.1660	1.20	20.19	21.39	50.00	-28.61	AVG	

150kHz~30MHz

AX40MIMO Channel 54

Neutral

### Conducted Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1620	34.04	20.30	54.34	65.36	-11.02	QP	
2		0.1620	14.55	20.30	34.85	55.36	-20.51	AVG	
3		0.1980	26.98	20.36	47.34	63.69	-16.35	QP	
4		0.1980	6.71	20.36	27.07	53.69	-26.62	AVG	
5		0.4220	16.72	20.19	36.91	57.41	-20.50	QP	
6		0.4220	7.97	20.19	28.16	47.41	-19.25	AVG	
7		1.7500	3.53	20.36	23.89	56.00	-32.11	QP	
8		1.7500	-1.75	20.36	18.61	46.00	-27.39	AVG	
9		2.2180	7.52	20.31	27.83	56.00	-28.17	QP	
10		2.2180	1.97	20.31	22.28	46.00	-23.72	AVG	
11		13.9860	5.37	20.30	25.67	60.00	-34.33	QP	
12		13.9860	-0.02	20.30	20.28	50.00	-29.72	AVG	

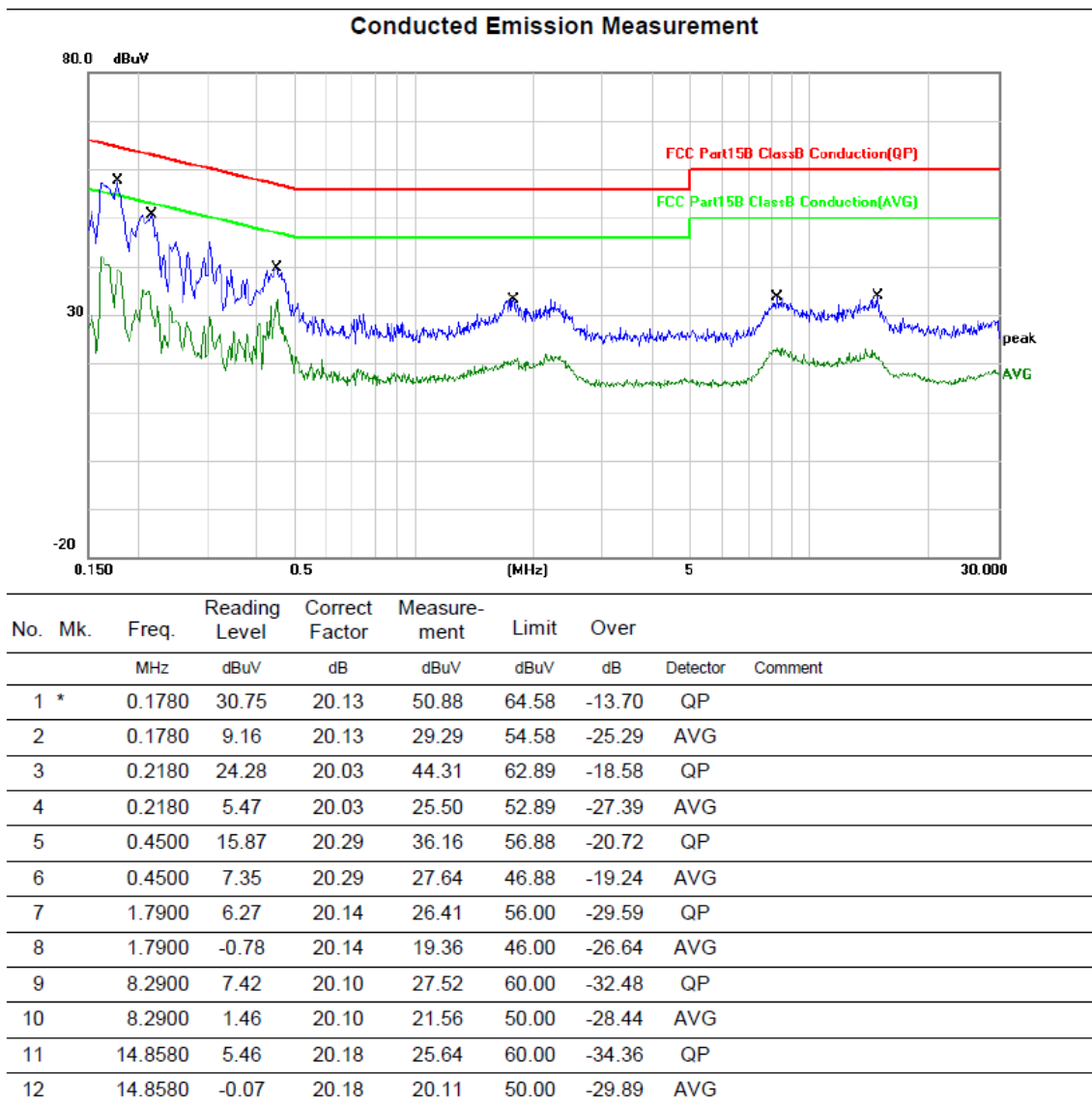
2428TE:

For adapter

150kHz~30MHz

AX40MIMO Channel 54

Line



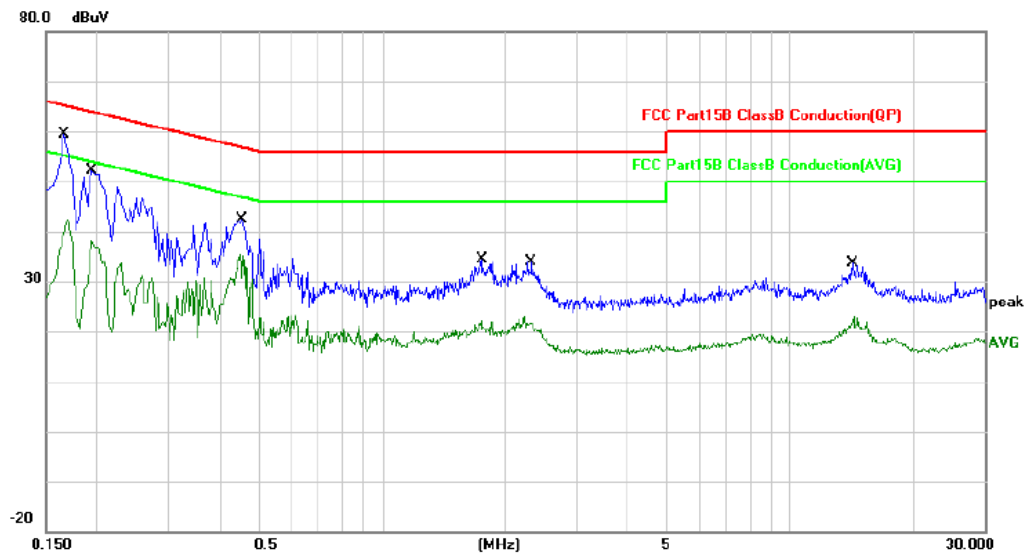


150kHz~30MHz

AX40MIMO Channel 54

Neutral

### Conducted Emission Measurement



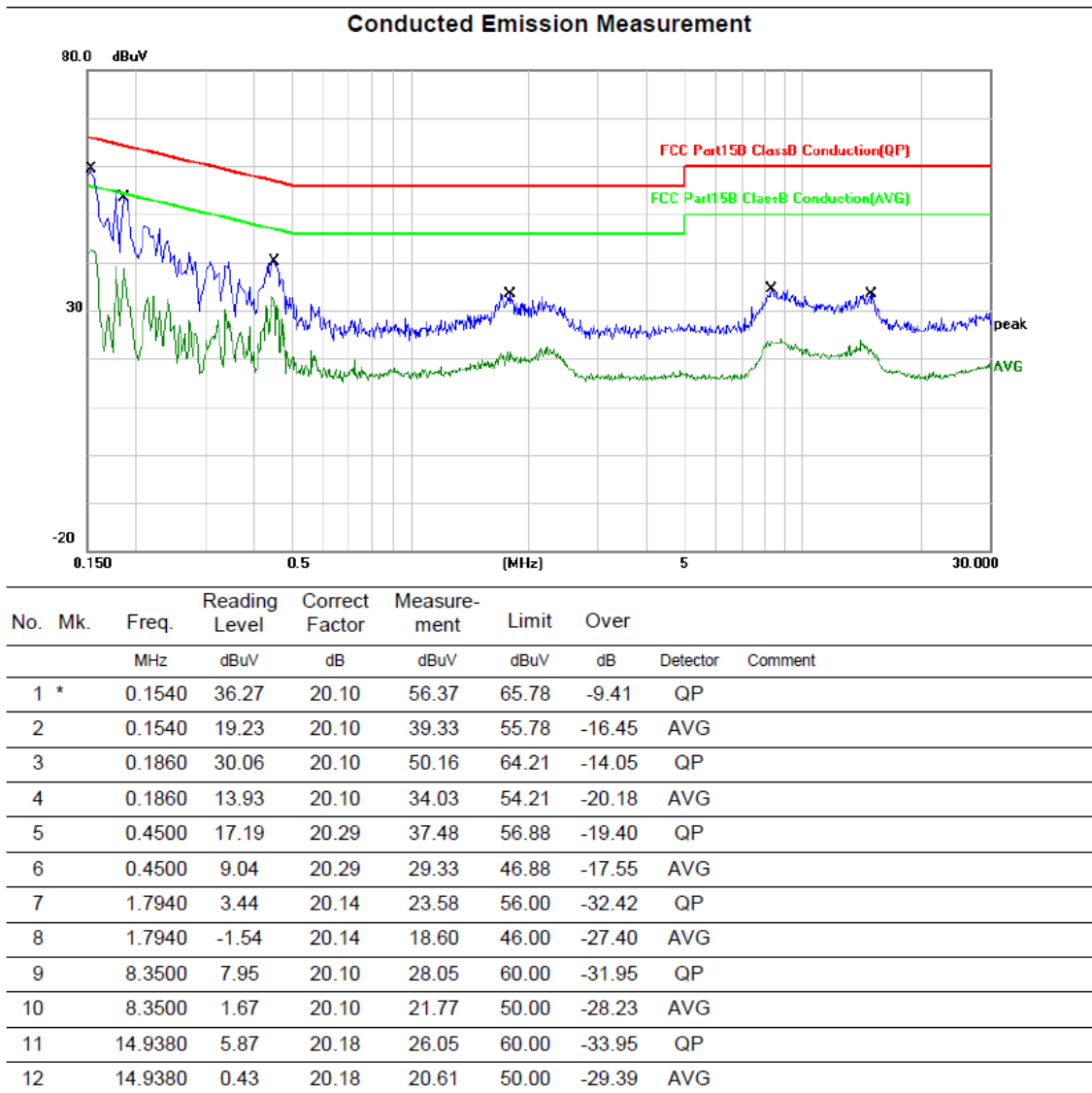
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1660	34.38	20.29	54.67	65.16	-10.49	QP	
2		0.1660	17.56	20.29	37.85	55.16	-17.31	AVG	
3		0.1940	28.44	20.35	48.79	63.86	-15.07	QP	
4		0.1940	12.41	20.35	32.76	53.86	-21.10	AVG	
5		0.4540	19.33	20.12	39.45	56.80	-17.35	QP	
6		0.4540	10.29	20.12	30.41	46.80	-16.39	AVG	
7		1.7620	4.72	20.36	25.08	56.00	-30.92	QP	
8		1.7620	-1.00	20.36	19.36	46.00	-26.64	AVG	
9		2.3220	6.81	20.29	27.10	56.00	-28.90	QP	
10		2.3220	0.69	20.29	20.98	46.00	-25.02	AVG	
11		14.2420	5.07	20.31	25.38	60.00	-34.62	QP	
12		14.2420	-0.62	20.31	19.69	50.00	-30.31	AVG	

For 8 pin PSU

150kHz~30MHz

AX40MIMO Channel 54

Line

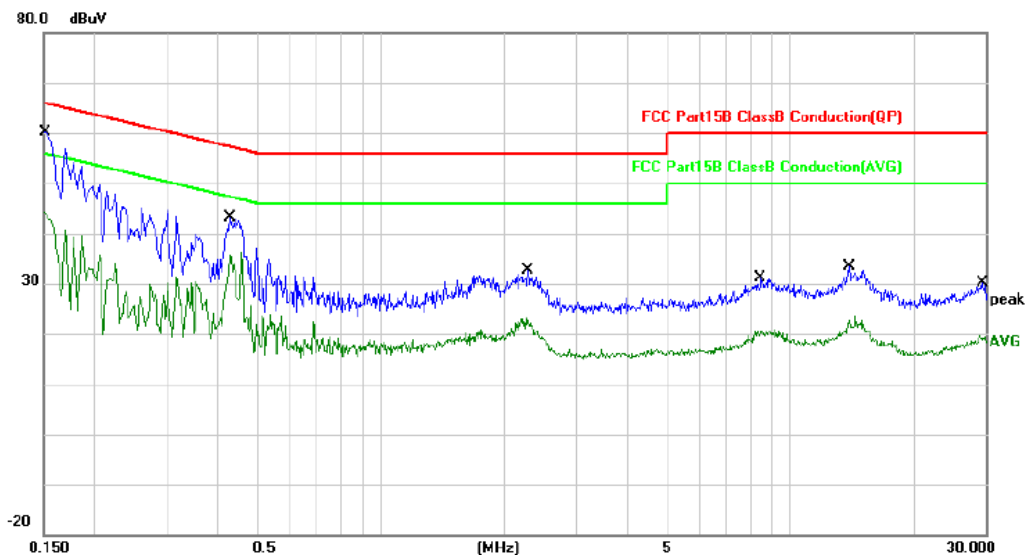


150kHz~30MHz

AX40MIMO Channel 54

Neutral

### Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1540	36.71	20.33	57.04	65.78	-8.74	QP	
2		0.1540	20.37	20.33	40.70	55.78	-15.08	AVG	
3		0.4300	18.58	20.17	38.75	57.25	-18.50	QP	
4		0.4300	9.05	20.17	29.22	47.25	-18.03	AVG	
5		2.2940	7.23	20.29	27.52	56.00	-28.48	QP	
6		2.2940	1.05	20.29	21.34	46.00	-24.66	AVG	
7		8.4660	4.23	20.22	24.45	60.00	-35.55	QP	
8		8.4660	-1.45	20.22	18.77	50.00	-31.23	AVG	
9		13.9180	5.02	20.30	25.32	60.00	-34.68	QP	
10		13.9180	-0.42	20.30	19.88	50.00	-30.12	AVG	
11		29.4020	2.47	20.39	22.86	60.00	-37.14	QP	
12		29.4020	-2.36	20.39	18.03	50.00	-31.97	AVG	

## 3.2 Radiated Emission

### 3.2.1 Limit

#### 1) Limit of radiated emission measurement:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency (MHz)	Distance Meters(m)	Field Strength Limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 – 0.49	300	$2400/F(\text{kHz})$	-
0.490 – 1.705	30	$24000/F(\text{kHz})$	-
1.705 – 30	30	30	-
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Note: (1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

#### 2) Limit of unwanted emission out of the restricted bands:

Frequency(MHz)	EIRP Limit( $\text{dBm}/\text{MHz}$ )	Equivalent Field Strength at 3m( $\text{dB}\mu\text{V}/\text{m}$ )
5150-5250	-27	68.2
5250-5350	-27	68.2
5470-5725	-27	68.2
5725-5850	-27 NOTE (2)	68.2
	10 NOTE (2)	105.2
	15.6 NOTE (2)	110.8
	27 NOTE (2)	122.2

Note: (1) The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:  $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$ , for  $d=3\text{m}$

(2) According to 15.407(b)(4)(i), all emissions shall be limited to a level of -27  $\text{dBm}/\text{MHz}$  at 75 MHz or more above or below the band edge increasing linearly to 10  $\text{dBm}/\text{MHz}$  at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6  $\text{dBm}/\text{MHz}$  at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27  $\text{dBm}/\text{MHz}$  at the band edge.

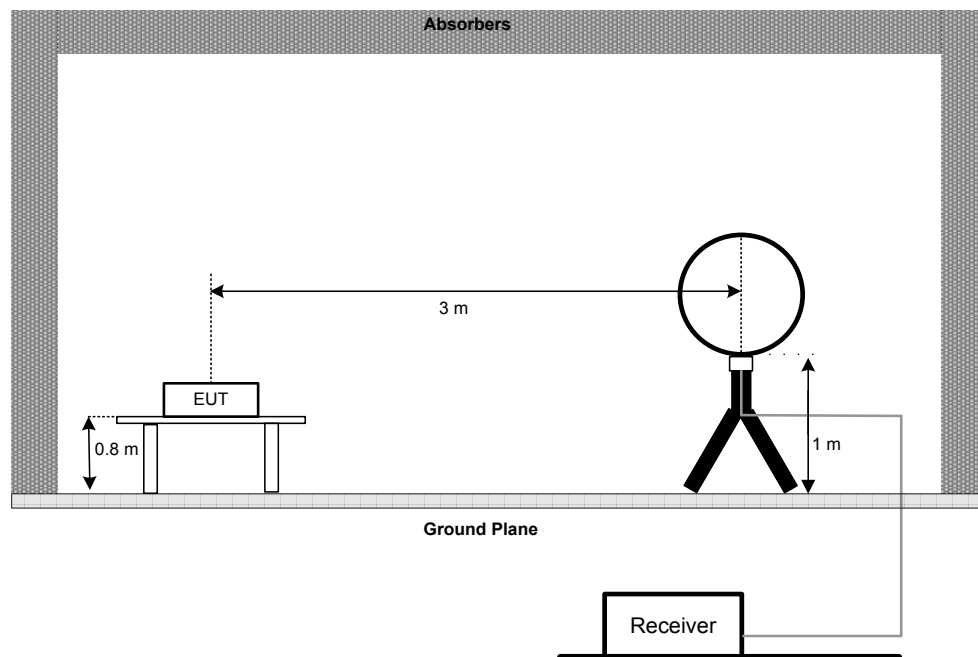
### 3.2.2 Test Procedure

Test Method	
○Conducted Measurement	●Radiated Measurement
Test Channels	
●Lowest, Middle and Highest Channel	○ Lowest and Highest Channel
Environmental conditions	
●Normal	○Normal and Extreme
Note:●:Test    ○:No Test	

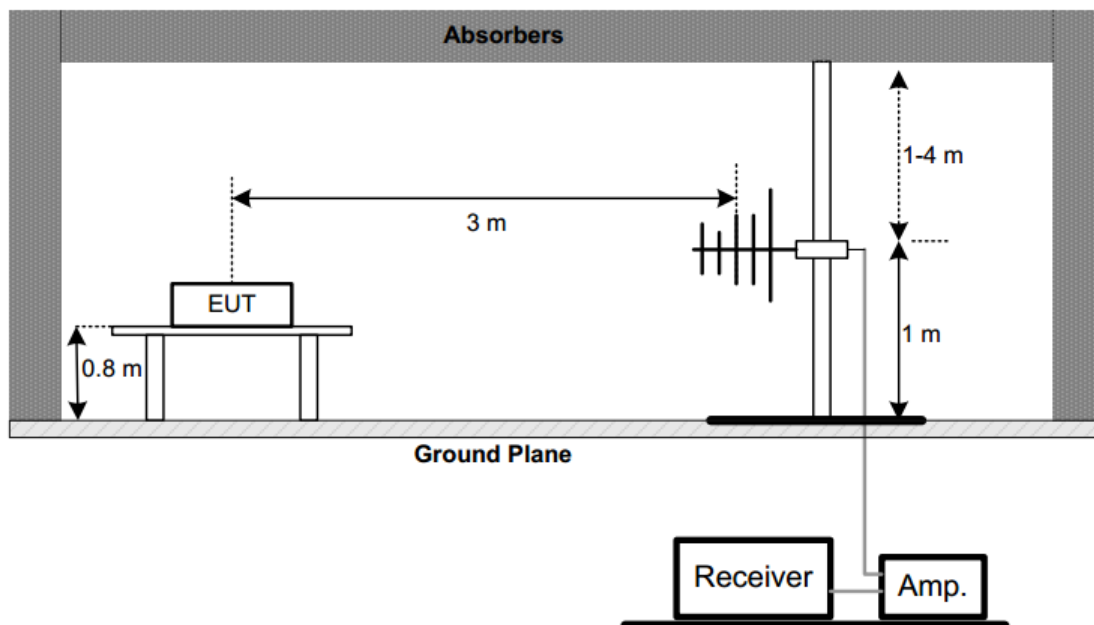
- a) The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b) The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c) The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e) The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f) The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g) All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h) All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i) For the actual test configuration, please refer to the related Item -EUT Test Photos.

### 3.2.3 Test Setup

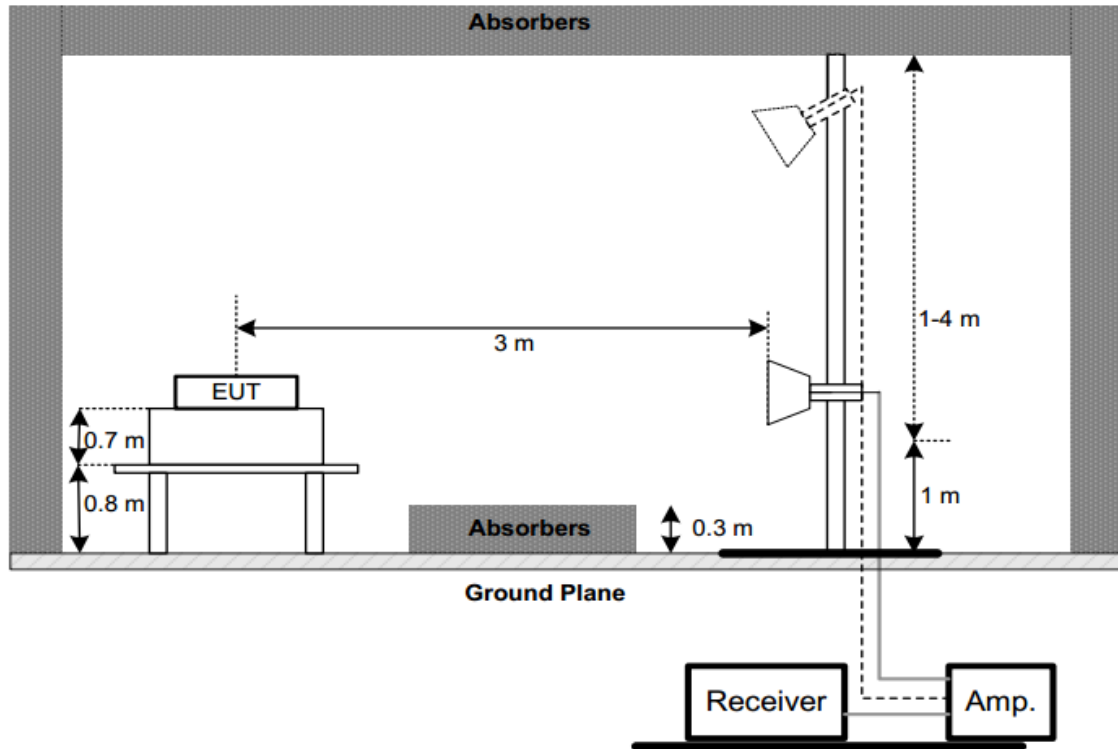
#### (A) Radiated Emission Test Set-Up Frequency Below 30 MHz



#### (B) Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz



(C) Radiated Emission Test Set-Up Frequency Above 1 GHz



### 3.2.4 Test Result

#### 1) Radiated emission: 9kHz-30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not recorded in this report.

#### 2) Radiated emission: 30MHz-1G

**Note:**

1. Measurement = Reading + Correct Factor.
2. Over = Measurement – Limit
3. We only recorded the data of the worst mode. Please see the following:

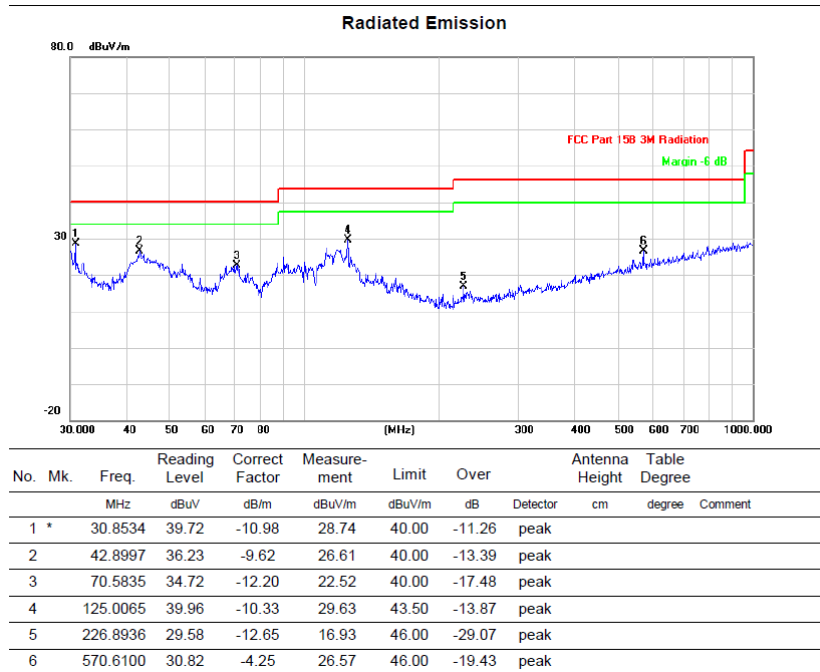
2428GN:

For adapter

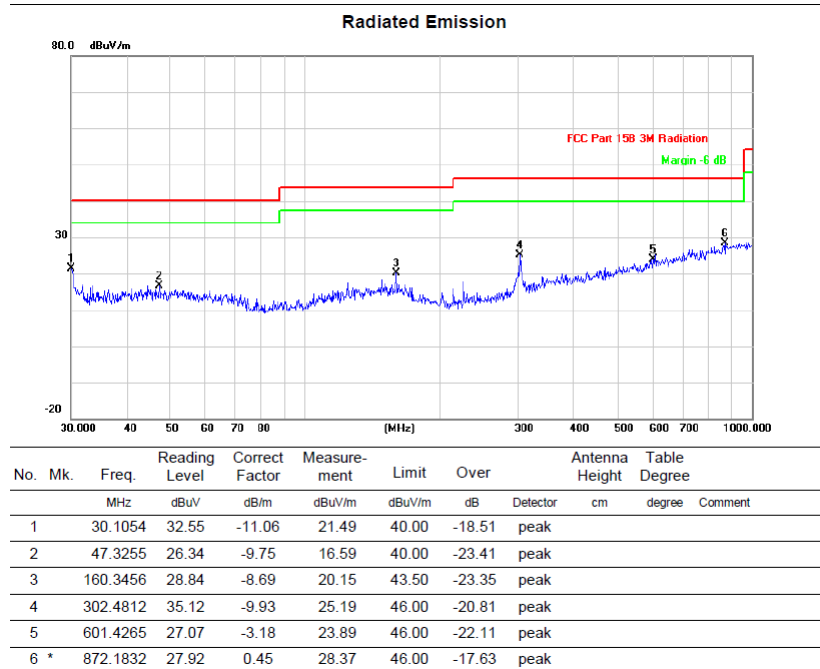
Below 1G (30MHz~1GHz)

AX40MIMO Channel 54

## VERTICAL



## HORIZONTAL



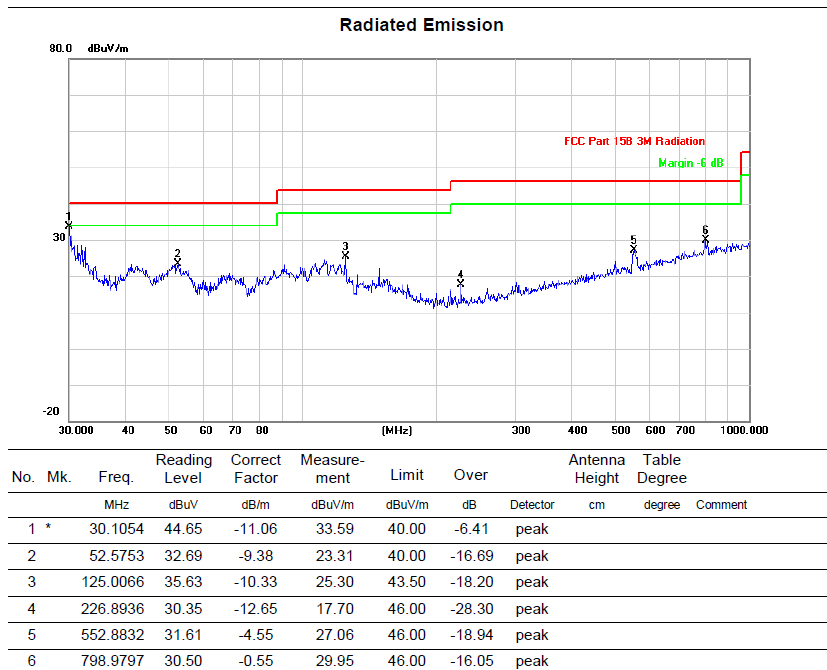


For 8 pin PSU

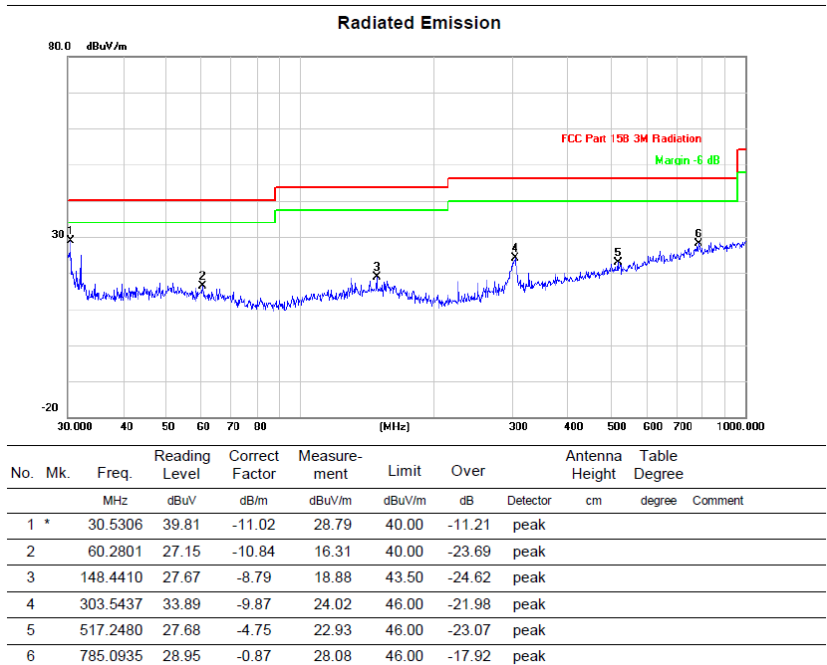
Below 1G (30MHz~1GHz)

AX40MIMO Channel 54

## VERTICAL



## HORIZONTAL



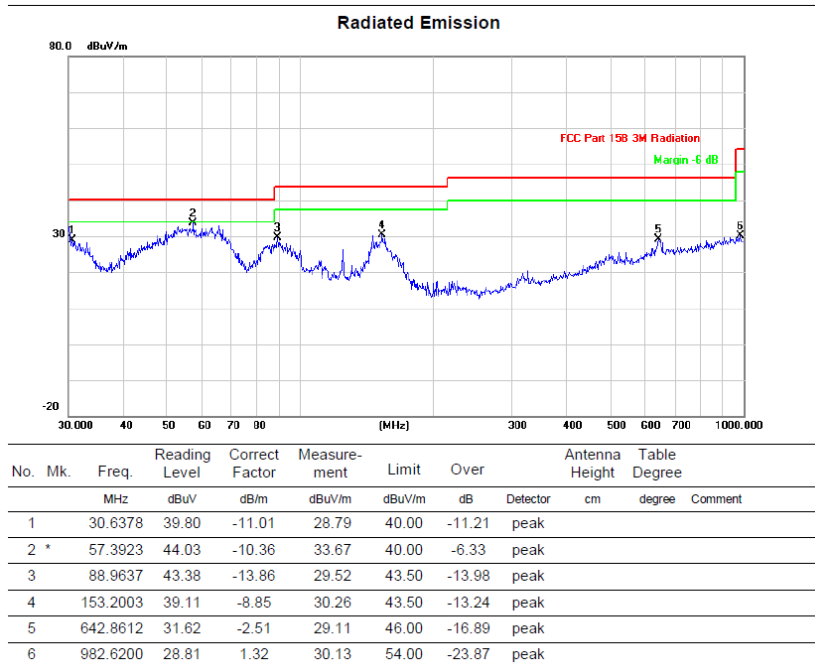
2428TE:

For adapter

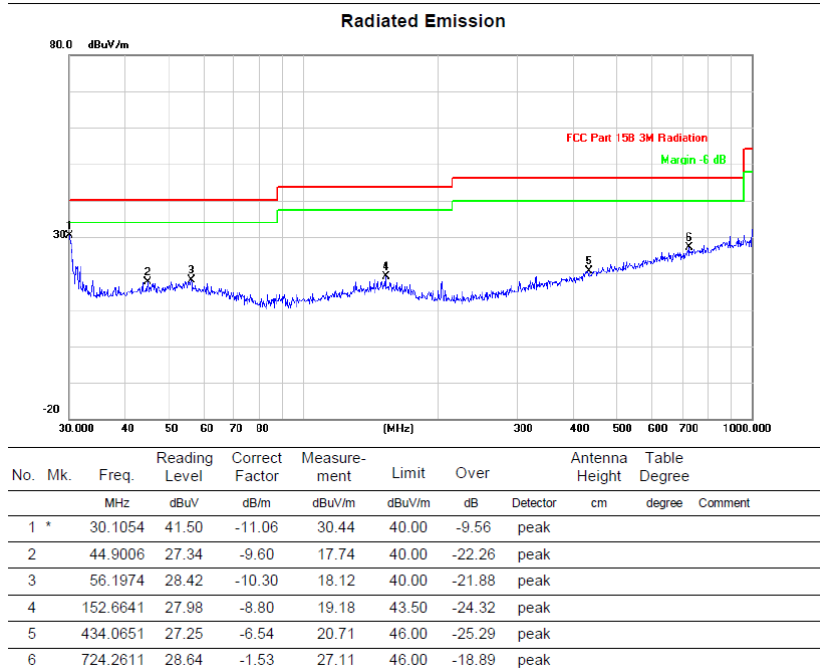
Below 1G (30MHz~1GHz)

AX40MIMO Channel 54

## VERTICAL



## HORIZONTAL

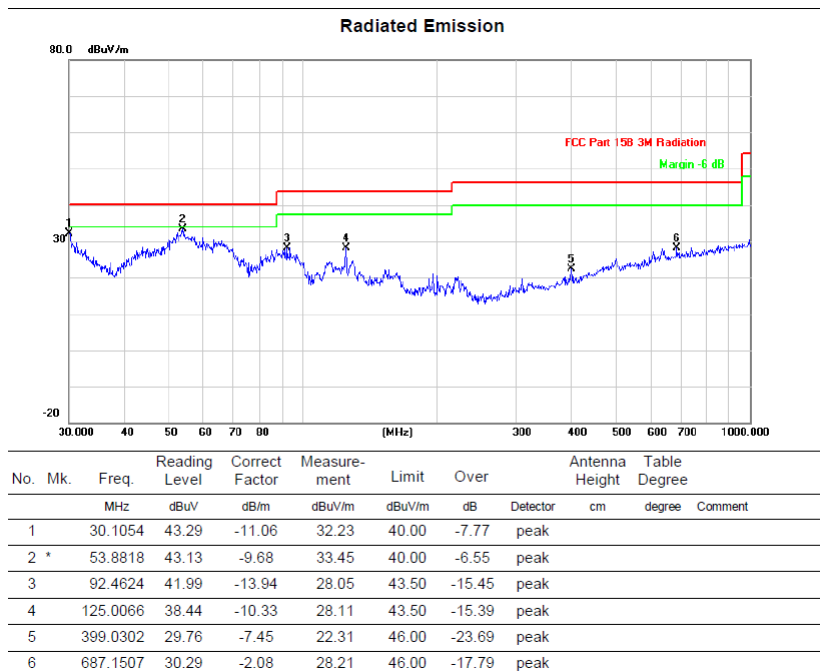


For 8 pin PSU

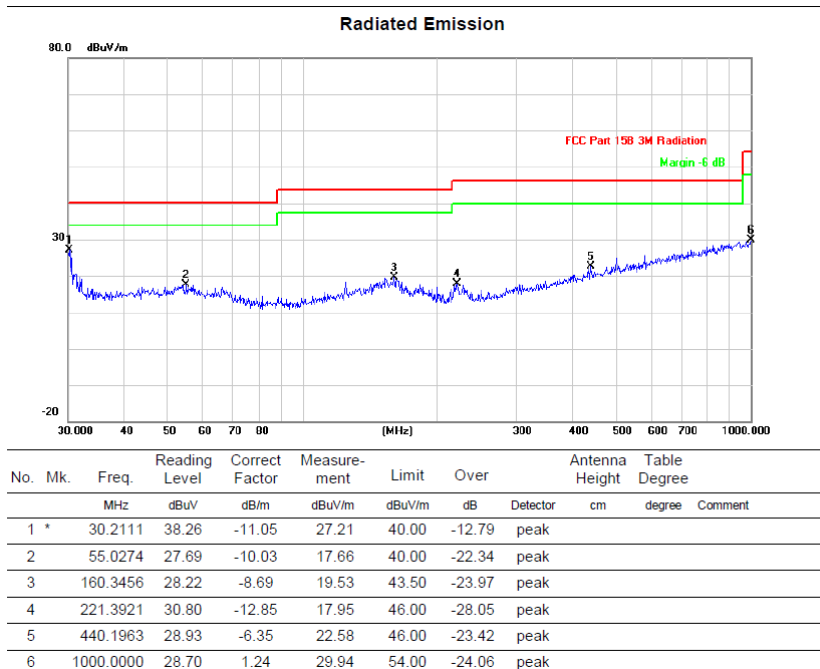
Below 1G (30MHz~1GHz)

AX40MIMO Channel 54

## VERTICAL



## HORIZONTAL



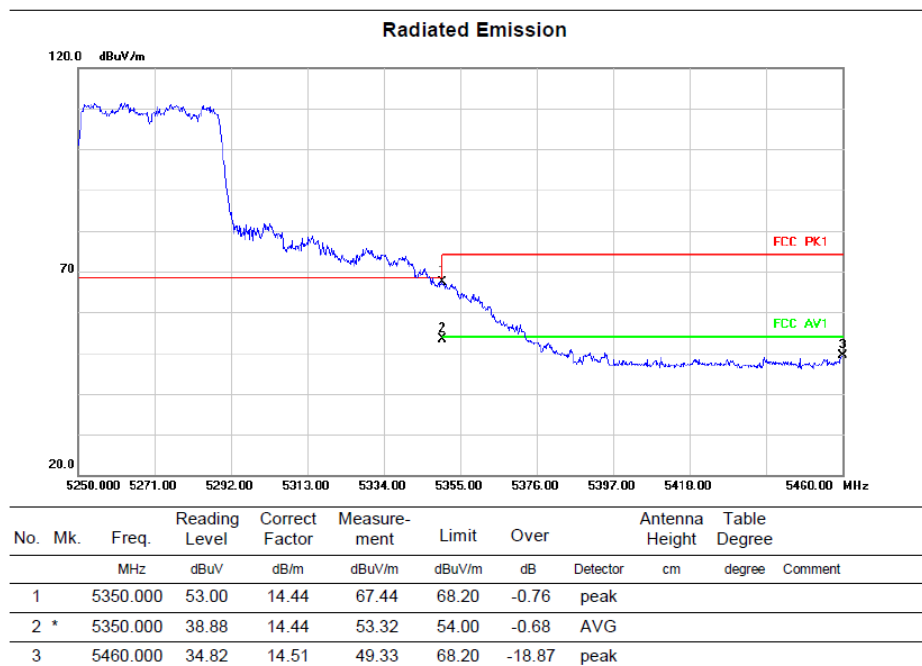
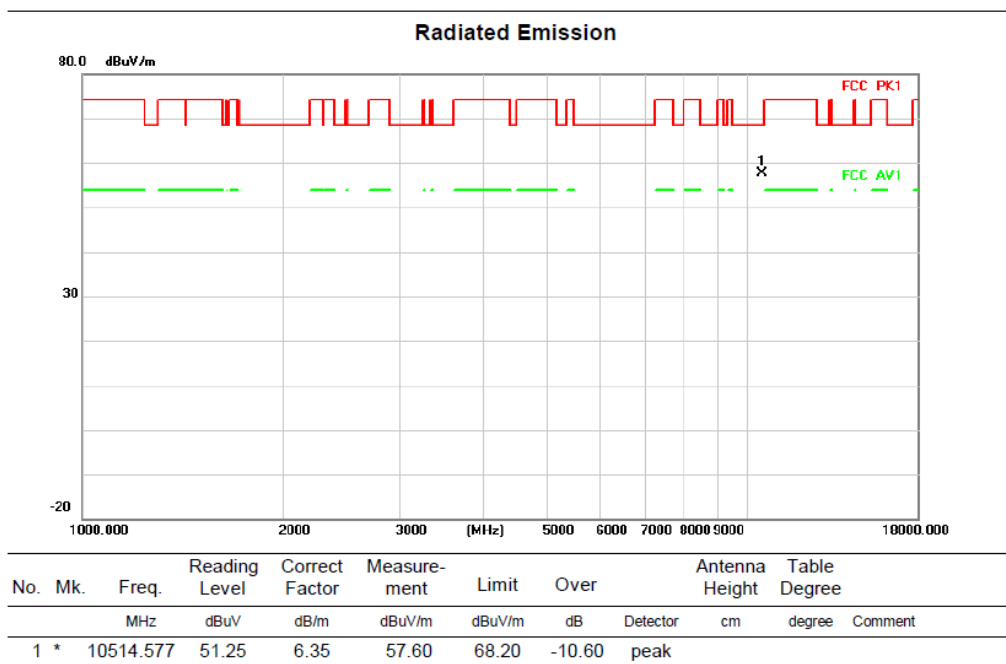
### 3) Radiated emission: Above 1G

**Note:**

1. Measurement = Reading + Correct Factor.
2. Over = Measurement – Limit
3. We only recorded the data of the worst mode. Please see the following:

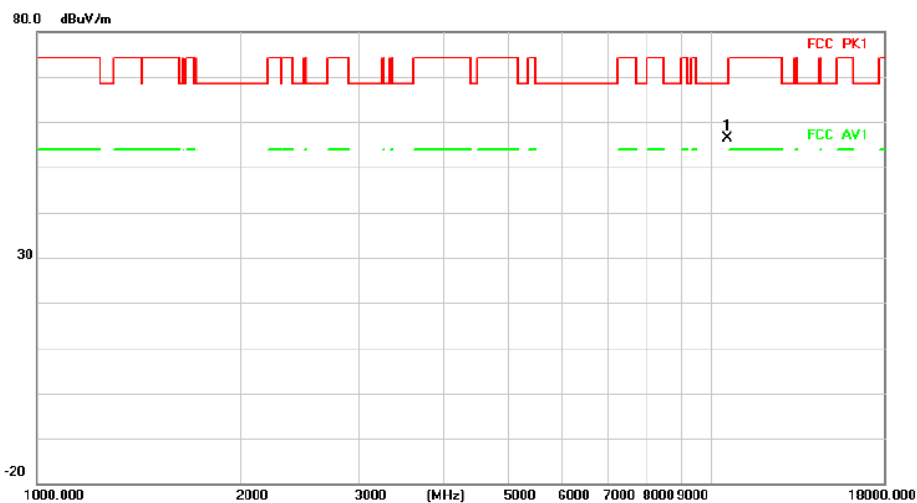
Above 1G (1GHz~18GHz)	Test mode: AX40MIMO	Test Channel:54
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#### VERTICAL



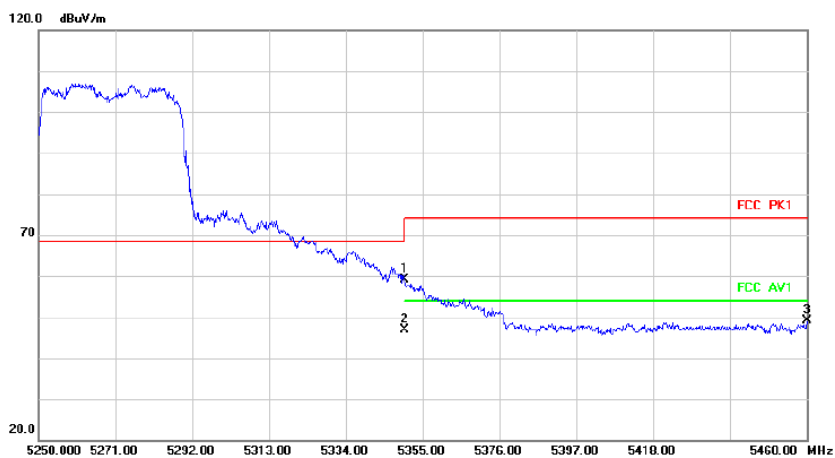
## HORIZONTAL

### Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	10545.012	50.25	6.10	56.35	68.20	-11.85	peak		Comment

### Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		5350.000	44.78	14.44	59.22	68.20	-8.98	peak		
2	*	5350.000	32.45	14.44	46.89	54.00	-7.11	AVG		
3		5460.000	34.73	14.51	49.24	68.20	-18.96	peak		

Note: The high frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit line was not recorded in this report.

### 3.3 Spectrum Bandwidth

#### 3.3.1 Limit

FCC Part15, Subpart E (15.407)			
Section	Test Item	Limit	Frequency Range (MHz)
15.407(a)	26 dB Bandwidth	-	5150-5250
	26 dB Bandwidth	-	5250-5350
15.407(e)	26 dB Bandwidth	-	5470-5725
	26 dB Bandwidth	-	5725-5850
	6 dB Bandwidth	Minimum 500 kHz	5725-5850

#### 3.3.2 Test Procedure

Test Method	
●Conducted Measurement	○Radiated Measurement
Test Channels	
●Lowest, Middle and Highest Channel	○ Lowest and Highest Channel
Environmental conditions	
●Normal	○Normal and Extreme
Note:●:Test    ○:No Test	

a) The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below.

b) the spectrum analyser is set as follow:

For 26 dB Bandwidth

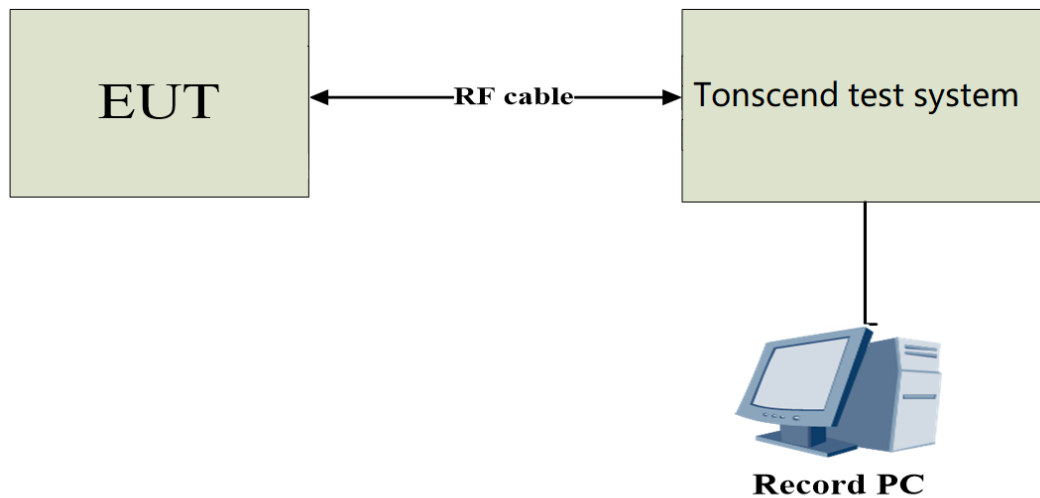
Centre Frequency	The centre frequency of the channel under test
RBW	$\geq 1\% \times \text{Nominal Channel Bandwidth}$
VBW	$\geq 3 \times \text{RBW}$
Frequency span	$2 \times \text{Nominal Channel Bandwidth}$
Detector Mode	Peak
Trace Mode	Max Hold
Sweep Time	Auto Couple

For 6 dB Bandwidth

Centre Frequency	The centre frequency of the channel under test
RBW	100 kHz
VBW	300 kHz
Frequency span	$2 \times \text{Nominal Channel Bandwidth}$
Detector Mode	Peak
Trace Mode	Max Hold
Sweep Time	Auto Couple

- c) Wait for the trace to stabilize then find the peak value of the trace and place the analyser marker on this peak.
- d) Use the -26/-6dB bandwidth function of the spectrum analyser to measure the -26/-6dB Bandwidth of the EUT. This value shall be recorded.
- e) Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

### 3.3.3 Test Setup



### 3.3.4 Test Result

Test result: PASS

Note: For test data, please refer to original report(FR332121-01 and FR332121B).

### 3.4 Conducted Output Power

#### 3.4.1 Limit

FCC Part15, Subpart E (15.407)			
Section	Test Item	Limit	Frequency Range (MHz)
15.407(a)	Conducted Output Power	Master device: 1 Watt (30 dBm) Client device: 250 mW (23.98 dBm)	5150-5250
		250 mW (23.98 dBm)	5250-5350
		250 mW (23.98 dBm)	5470-5725
		1 Watt (30dBm)	5725-5850

Note:

- For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26dB Bandwidth in megahertz.

#### 3.4.2 Test Procedure

Test Method	
●Conducted Measurement	○Radiated Measurement
Test Channels	
●Lowest, Middle and Highest Channel	○ Lowest and Highest Channel
Environmental conditions	
●Normal	○Normal and Extreme
Note:●:Test    ○:No Test	

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- Test was performed in accordance with method of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

#### 3.4.3 Test Setup







#### 3.4.4 The Result

Test result: PASS

Note: For test data, please refer to original report(FR332121-01 and FR332121B).

### 3.5 Power Spectral Density

#### 3.5.1 Limit

FCC Part15, Subpart E (15.407)			
Section	Test Item	Limit	Frequency Range (MHz)
15.407(a)	Power Spectral Density	Master device: 17 dBm/MHz Client device: 11 dBm/MHz	5150-5250
		11 dBm/MHz	5250-5350
		11 dBm/MHz	5470-5725
		30 dBm/500 kHz	5725-5850

Note:

- For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v02r01, section II.F.5., it is acceptable to set RBW at 300kHz and VBW at 1500kHz if the spectrum analyzer does not have 500 kHz RBW. Then, add 10 log (500 kHz/300 kHz) to the measured result, i.e. 2.22 dB.
- During the test of U-NII 3 PSD, the measurement result with RBW=300kHz has been added 2.22 dB by compensating offset, offset=cable loss+duty factor+10log(500kHz/300kHz).

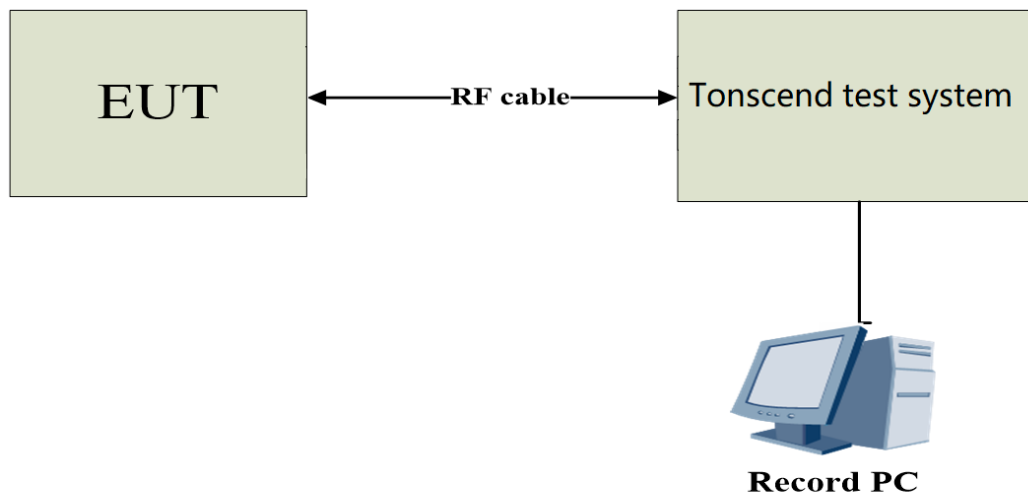
#### 3.5.2 Test Procedure

Test Method	
●Conducted Measurement	○Radiated Measurement
Test Channels	
●Lowest, Middle and Highest Channel	○ Lowest and Highest Channel
Environmental conditions	
●Normal	○Normal and Extreme
Note:●:Test ○:No Test	

a) The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below. Spectrum analyser settings as following:

Centre Frequency	The centre frequency of the channel under test
RBW	= 1 MHz (Band1/2/3); = 500kHz (Band4)
VBW	≥3 x RBW
Frequency span	2 x Nominal Channel Bandwidth
Detector Mode	RMS
Trace Mode	Max Hold
Sweep Time	Auto Couple

### 3.5.3 Test Setup



### 3.5.4 The Result

Test result: PASS

Note: For test data, please refer to original report(FR332121-01 and FR332121B).

## Statement

1. The report is invalid without the official seal or special seal of Shenzhen Haiyun Standard Technology Co., Ltd. (hereinafter referred to as the unit).
2. The report is invalid without the signature of the approver.
3. The report is invalid if altered arbitrarily.
4. The report shall not be partially copied without the written approval of the unit.
5. The reported test results are only valid for the tested samples.
6. If there is any objection to the test report, it shall be submitted to the test unit within 15 days from the date of receiving the report, and the overdue shall not be accepted.

## Shenzhen Haiyun Standard Technology Co., Ltd.

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Email: service@hy-lab.cn

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(END OF REPORT)