



# FCC RADIO TEST REPORT

**FCC ID** : MSQ-RTAXJ300

**Equipment** : AX3000 Dual Band Wi-Fi Router, AX5400 Dual Band Wi-Fi Router, Dual Band Wi-Fi Router

**Brand Name** : ASUS

**Model Name** : RT-AX58U, RT-AX82U, RT-AX3000, RT-AX5400, TUF-AX3000, GS-AX3000, GS-AX5400

**Applicant** : ASUSTeK COMPUTER INC.  
1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan

**Manufacturer (1)** : Datamax Electronics (DongGuan) Co., Ltd.  
Niu Shan Foreign Economic Industrial Park, Dong Cheng District, Dong Guan City, Guang Dong, China

**Manufacturer (2)** : Compal Networking (KunShan) Co., LTD.  
No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China

**Manufacturer (3)** : ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD.  
Ba Thien Industrial Park, Ba Hien commune, Binh Xuyen district, Vinh Phuc Province

**Standard** : 47 CFR FCC Part 15.407

The product was received on May 06, 2020, and testing was started from May 06, 2020 and completed on Feb. 18, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FR952922-10AB	01	Initial issue of report	Feb. 23, 2021



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(b)	Unwanted Emissions	PASS	-

Note: Reference to Sporton Project No.: 952922-07, 952922-08.

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Sam Chen**

Report Producer: **Wendy Pan**



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a, n (HT20), ac (VHT20), ax (HEW20)	5180-5240	36-48 [4]
5250-5350		5260-5320	52-64 [4]
5470-5725		5500-5720	100-144 [12]
5725-5850		5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40), ax (HEW40)	5190-5230	38-46 [2]
5250-5350		5270-5310	54-62 [2]
5470-5725		5510-5710	102-142 [6]
5725-5850		5755-5795	151-159 [2]
5150-5250	ac (VHT80), ax (HEW80)	5210	42 [1]
5250-5350		5290	58 [1]
5470-5725		5530-5690	106-138 [3]
5725-5850		5775	155 [1]
5150-5350	ac (VHT160), ax (HEW160)	5250	50 [1]
5470-5725		5570	114 [1]

Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	2TX / 4TX
5.15-5.25GHz	802.11n HT20	20	2TX / 4TX
5.15-5.25GHz	802.11n HT20-BF	20	2TX / 4TX
5.15-5.25GHz	802.11ac VHT20	20	2TX / 4TX
5.15-5.25GHz	802.11ac VHT20-BF	20	2TX / 4TX
5.15-5.25GHz	802.11ax HEW20	20	2TX / 4TX
5.15-5.25GHz	802.11ax HEW20-BF	20	2TX / 4TX
5.15-5.25GHz	802.11n HT40	40	2TX / 4TX
5.15-5.25GHz	802.11n HT40-BF	40	2TX / 4TX
5.15-5.25GHz	802.11ac VHT40	40	2TX / 4TX
5.15-5.25GHz	802.11ac VHT40-BF	40	2TX / 4TX
5.15-5.25GHz	802.11ax HEW40	40	2TX / 4TX
5.15-5.25GHz	802.11ax HEW40-BF	40	2TX / 4TX
5.15-5.25GHz	802.11ac VHT80	80	2TX / 4TX
5.15-5.25GHz	802.11ac VHT80-BF	80	2TX / 4TX
5.15-5.25GHz	802.11ax HEW80	80	2TX / 4TX



<b>Band</b>	<b>Mode</b>	<b>BWch (MHz)</b>	<b>Nant</b>
5.15-5.25GHz	802.11ax HEW80-BF	80	2TX / 4TX
5.25-5.35GHz	802.11a	20	2TX / 4TX
5.25-5.35GHz	802.11n HT20	20	2TX / 4TX
5.25-5.35GHz	802.11n HT20-BF	20	2TX / 4TX
5.25-5.35GHz	802.11ac VHT20	20	2TX / 4TX
5.25-5.35GHz	802.11ac VHT20-BF	20	2TX / 4TX
5.25-5.35GHz	802.11ax HEW20	20	2TX / 4TX
5.25-5.35GHz	802.11ax HEW20-BF	20	2TX / 4TX
5.25-5.35GHz	802.11n HT40	40	2TX / 4TX
5.25-5.35GHz	802.11n HT40-BF	40	2TX / 4TX
5.25-5.35GHz	802.11ac VHT40	40	2TX / 4TX
5.25-5.35GHz	802.11ac VHT40-BF	40	2TX / 4TX
5.25-5.35GHz	802.11ax HEW40	40	2TX / 4TX
5.25-5.35GHz	802.11ax HEW40-BF	40	2TX / 4TX
5.25-5.35GHz	802.11ac VHT80	80	2TX / 4TX
5.25-5.35GHz	802.11ac VHT80-BF	80	2TX / 4TX
5.25-5.35GHz	802.11ax HEW80	80	2TX / 4TX
5.25-5.35GHz	802.11ax HEW80-BF	80	2TX / 4TX
5.15-5.35GHz	802.11ac VHT160	160	2TX / 4TX
5.15-5.35GHz	802.11ac VHT160-BF	160	2TX / 4TX
5.15-5.35GHz	802.11ax HEW160	160	2TX / 4TX
5.15-5.35GHz	802.11ax HEW160-BF	160	2TX / 4TX
5.47-5.725GHz	802.11a	20	2TX / 4TX
5.47-5.725GHz	802.11n HT20	20	2TX / 4TX
5.47-5.725GHz	802.11n HT20-BF	20	2TX / 4TX
5.47-5.725GHz	802.11ac VHT20	20	2TX / 4TX
5.47-5.725GHz	802.11ac VHT20-BF	20	2TX / 4TX
5.725-5.85GHz	802.11ax HEW20	20	2TX / 4TX
5.725-5.85GHz	802.11ax HEW20-BF	20	2TX / 4TX
5.725-5.85GHz	802.11n HT40	40	2TX / 4TX
5.725-5.85GHz	802.11n HT40-BF	40	2TX / 4TX
5.47-5.725GHz	802.11ac VHT40	40	2TX / 4TX
5.47-5.725GHz	802.11ac VHT40-BF	40	2TX / 4TX
5.47-5.725GHz	802.11ax HEW40	40	2TX / 4TX
5.47-5.725GHz	802.11ax HEW40-BF	40	2TX / 4TX
5.47-5.725GHz	802.11ac VHT80	80	2TX / 4TX
5.725-5.85GHz	802.11ac VHT80-BF	80	2TX / 4TX
5.725-5.85GHz	802.11ax HEW80	80	2TX / 4TX
5.725-5.85GHz	802.11ax HEW80-BF	80	2TX / 4TX
5.47-5.725GHz	802.11ac VHT160	160	2TX / 4TX





<b>Band</b>	<b>Mode</b>	<b>BWch (MHz)</b>	<b>Nant</b>
5.47-5.725GHz	802.11ac VHT160-BF	160	2TX / 4TX
5.47-5.725GHz	802.11ax HEW160	160	2TX / 4TX
5.47-5.725GHz	802.11ax HEW160-BF	160	2TX / 4TX
5.725-5.85GHz	802.11a	20	2TX / 4TX
5.725-5.85GHz	802.11n HT20	20	2TX / 4TX
5.725-5.85GHz	802.11n HT20-BF	20	2TX / 4TX
5.725-5.85GHz	802.11ac VHT20	20	2TX / 4TX
5.725-5.85GHz	802.11ac VHT20-BF	20	2TX / 4TX
5.725-5.85GHz	802.11ax HEW20	20	2TX / 4TX
5.725-5.85GHz	802.11ax HEW20-BF	20	2TX / 4TX
5.725-5.85GHz	802.11n HT40	40	2TX / 4TX
5.725-5.85GHz	802.11n HT40-BF	40	2TX / 4TX
5.725-5.85GHz	802.11ac VHT40	40	2TX / 4TX
5.725-5.85GHz	802.11ac VHT40-BF	40	2TX / 4TX
5.725-5.85GHz	802.11ax HEW40	40	2TX / 4TX
5.725-5.85GHz	802.11ax HEW40-BF	40	2TX / 4TX
5.725-5.85GHz	802.11ac VHT80	80	2TX / 4TX
5.725-5.85GHz	802.11ac VHT80-BF	80	2TX / 4TX
5.725-5.85GHz	802.11ax HEW80	80	2TX / 4TX
5.725-5.85GHz	802.11ax HEW80-BF	80	2TX / 4TX

**Note:**

- ◆ 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ◆ VHT20, VHT40, VHT80 and VHT160 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- ◆ HEW20, HEW40, HEW80 and HEW160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- ◆ BWch is the nominal channel bandwidth.



1.1.2 Antenna Information

Set	Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	1	PSA	RFDPA161314IMLB701	Dipole Antenna	I-PEX	Note 1
	2	PSA	RFDPA161311IM5B702	Dipole Antenna	I-PEX	
	3	PSA	RFDPA161310IM5B701	Dipole Antenna	I-PEX	
	4	PSA	RFDPA161316IMLB701	Dipole Antenna	I-PEX	
2	1	M.gear	C660-510468-A	Dipole Antenna	I-PEX	
	2	M.gear	C660-510469-A	Dipole Antenna	I-PEX	
	3	M.gear	C660-510470-A	Dipole Antenna	I-PEX	
	4	M.gear	C660-510471-A	Dipole Antenna	I-PEX	
3	1	M.gear	C660-510472-A	Dipole Antenna	I-PEX	
	2	M.gear	C660-510473-A	Dipole Antenna	I-PEX	
	3	M.gear	C660-510474-A	Dipole Antenna	I-PEX	
	4	M.gear	C660-510475-A	Dipole Antenna	I-PEX	
4	1	PSA	RFDPA171314IMLB701	Dipole Antenna	I-PEX	
	2	PSA	RFDPA171311IM5B702	Dipole Antenna	I-PEX	
	3	PSA	RFDPA171310IM5B702	Dipole Antenna	I-PEX	
	4	PSA	RFDPA171316IMLB701	Dipole Antenna	I-PEX	





Note 1:

Set	Ant.	Port			2.4GHz	5GHz Band 1	5GHz Band 2	5GHz Band 3	5GHz Band 4
		2.4G 2TX	5G 2TX	5G 4TX					
1	1	2	-	2	1.71	1.75	1.89	1.88	1.70
	2	-	1	1	-	1.93	1.93	1.92	1.95
	3	-	2	4	-	1.75	1.85	1.83	1.89
	4	1	-	3	1.63	1.92	1.88	1.90	1.87
2	1	2	-	2	1.61	1.74	1.84	1.86	1.67
	2	-	1	1	-	1.76	1.80	1.87	1.87
	3	-	2	4	-	1.66	1.72	1.69	1.84
	4	1	-	3	1.60	1.88	1.82	1.85	1.86
3	1	2	-	2	1.70	1.71	1.85	1.85	1.68
	2	-	1	1	-	1.68	1.73	1.80	1.85
	3	-	2	4	-	1.63	1.74	1.76	1.77
	4	1	-	3	1.62	1.67	1.74	1.79	1.85
4	1	2	-	2	1.7	1.74	1.74	1.82	1.68
	2	-	1	1	-	1.86	1.90	1.64	1.90
	3	-	2	4	-	1.48	1.60	1.46	1.88
	4	1	-	3	1.61	1.63	1.71	1.81	1.86

Note 2: The above information was declared by manufacturer.

Note 3: The EUT has four sets of antennas and there are four antennas for each set.

Set 1~4 are the same type antenna. Only the highest gain Set 1 antenna was selected to test and record in this report.

**For 2.4GHz WLAN function**

**IEEE 802.11b/g/n/VHT/ax mode (2TX/2RX):**

Port 1 and port 2 can be used as transmitting/receiving antenna.

Port 1 and port 2 could transmit/receive simultaneously.

**For 5GHz WLAN function**

**IEEE 802.11a/n/ac/ax mode (2TX, 4TX/4RX):**

For 2TX

Port 1 and port 2 can be used as transmitting antenna.

Port 1 and port 2 could transmit simultaneously.

For 4TX, 4RX

Port 1, port 2, port 3 and port 4 can be used as transmitting/receiving antenna.

Port 1, port 2, port 3 and port 4 could transmit/receive simultaneously.



1.1.3 EUT Operational Condition

<b>EUT Power Type</b>	From power adapter		
<b>Beamforming Function</b>	<input checked="" type="checkbox"/> With beamforming	<input type="checkbox"/> Without beamforming	
<b>Weather Band</b>	<input checked="" type="checkbox"/> With 5600~5650MHz	<input type="checkbox"/> Without 5600~5650MHz	
	For IEEE 802.11n/ax/VHT in 2.4GHz and IEEE 802.11n/ac/ax in 5GHz.		
<b>Function</b>	<input type="checkbox"/> Outdoor P2M	<input checked="" type="checkbox"/> Indoor P2M	
	<input type="checkbox"/> Fixed P2P	<input type="checkbox"/> Client	
<b>TPC Function</b>	<input checked="" type="checkbox"/> With TPC	<input type="checkbox"/> Without TPC	
<b>Test Software Version</b>	Mtool V3.1.0.3		

Note: The above information was declared by manufacturer.

1.1.4 Table for Multiple Listing

The Equipment and model names in the following table are all refer to the identical product.

Equipment	Model Name	Description
AX3000 Dual Band Wi-Fi Router, AX5400 Dual Band Wi-Fi Router, Dual Band Wi-Fi Router	RT-AX58U, RT-AX82U, RT-AX3000, RT-AX5400, TUF-AX3000, GS-AX3000, GS-AX5400	All the equipment and model names are identical, the different equipment and model names served as marketing strategy.

Note 1: From the above table, equipment: AX3000 Dual Band Wi-Fi Router and model: RT-AX82U was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

**1.1.5 Table for SKU information**

SKU	Material	5G PA	2G PA	Housing Size	Adapter
SKU 1	RJ-45 port was covered by plastic.	SKY85743	SKY85331	223.62mm x 129.48mm x 32.9mm	1 ~ 8
SKU 2	RJ-45 port was covered by metal.	SKY85743	SKY85331	264.82mm x 156.11mm x 54.97mm	1 ~ 8
SKU 3	RJ-45 port was covered by metal.	SKY85743	SKY85331	265.00mm x 158.39mm x 54.99mm	1 ~ 8
SKU 4	RJ-45 port was covered by metal.	SKY85743	SKY85331	275.50mm x 170.40mm x 65.00mm	1 ~ 8
SKU 5	RJ-45 port was covered by plastic.	QPF4516B	SKY85331	223.62mm x 129.48mm x 32.9mm	1 ~ 8
SKU 6	RJ-45 port was covered by plastic.	SKY85743	SKY85331	223.62mm x 129.48mm x 32.9mm	9
SKU 7	RJ-45 port was covered by plastic.	QPF4516B	SKY85331	223.62mm x 129.48mm x 32.9mm	9
SKU 8	RJ-45 port was covered by metal.	SKY85743	QPF4216B	275.50mm x 170.40mm x 65.00mm	1 ~ 8
SKU 9	RJ-45 port was covered by metal.	QPF4516B	QPF4216B	275.50mm x 170.40mm x 65.00mm	1 ~ 8
SKU 10	RJ-45 port was covered by plastic.	QPF4516B	QPF4216B	223.62mm x 129.48mm x 32.9mm	9

Note1: The SKU 3 is same as SKU 2 except for the logo of housing, housing size and antenna appearance,

Note2: The SKU 4 is same as SKU 2 except for the logo of housing, housing size, antenna appearance and design of light board.

Note3: The SKU 5 is same as SKU 1 except for 5G PA.

Note4: The SKU 6 is same as SKU 1 except for size of DC jack port and only equip with adapter 9.

Note5: The SKU 7 is same as SKU 5 except for size of DC jack port and only equip with adapter 9.

Note6: The SKU 8 is same as SKU 4 except for 2G PA.

Note7: The SKU 9 is same as SKU 4 except for 2G PA and 5G PA.

Note8: The SKU 10 is same as SKU 6 except for 2G PA and 5G PA.



1.1.6 Table for EUT supports functions

Function	Support Type
AP Router	Master
Bridge	Slave without radar detection
Repeater	Master
Mesh	Master

1.1.7 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR952922-06AB

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding four adapters (adapter 6~adapter 9). Note: Adapter 6~8 are matched with SKU 1~5 and SKU 8~9. Adapter 9 is matched with SKU 6, SKU 7 and SKU 10.(Refer to section 1.1.5 for detail information).	1. Conducted Emissions. 2. Unwanted Emissions below 1GHz.
2. Adding the SKU 6~SKU 7. 3. Adding the SKU 8~SKU 10 are matched with second source 2G PA (QPF4216B). (Refer to section 1.1.5 for detail information).	3. Unwanted Emissions below 1GHz.
4. Adding model name: GS-AX3000, GS-AX5400. (Refer to section 1.1.4 for detail information)	After evaluating, it is not necessary to re-test all test items.



## 1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2013
- ◆ FCC KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- ◆ FCC KDB 662911 D01 v02r01
- ◆ FCC KDB 412172 D01 v01r01
- ◆ FCC KDB 414788 D01 v01r01

## 1.3 Testing Location Information

Testing Location		
<input type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973
<input checked="" type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302, Taiwan (R.O.C.) TEL : 886-3-656-9065 FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated<1GHz	03CH05-CB	Stim Sung	16.5-17.2 / 58-60	Jan. 13, 2021 ~ Feb. 18, 2021
AC Conduction (Test Mode: Mode 1 ~ Mode 3)	CO01-CB	Ryo Fan	21~22 / 59~60	May 06, 2020
AC Conduction (Test Mode: Mode 4)	CO01-CB	Ryo Fan	22~23 / 62~63	Jun. 30, 2020

Test site Designation No. TW0006 with FCC

Test site registered number IC 4086D with Industry Canada.

## 1.4 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))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.8 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%



## 2 Test Configuration of EUT

### 2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral
<b>Operating Mode</b>	Normal Link
For mode 1~4: The EUT performed testing at AP Router, Bridge mode 2.4GHz, and Bridge mode 5GHz mode. For mode 1~3: The testing performed at SKU 1 and SKU 2. The SKU 2 + bridge (5GHz) mode has been evaluated to be the worst case. So the measurement will follow this same test configuration.	
1	Bridge mode 5GHz - SKU 2 + adapter 6
2	Bridge mode 5GHz - SKU 2 + adapter 7
3	Bridge mode 5GHz - SKU 2 + adapter 8
4	Bridge mode 5GHz - SKU 6 + adapter 9
For operating mode 2 is the worst case and it was record in this test report.	



<b>The Worst Case Mode for Following Conformance Tests</b>	
<b>Tests Item</b>	Unwanted Emissions
<b>Test Condition</b>	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
<b>Operating Mode &lt; 1GHz</b>	CTX
For test mode 4~5: The EUT performed testing at Adapter 1~5. Adapter 1 has been evaluated to be the worst case. So the measurement will follow this same test configuration.	
1	SKU 6 (2.4GHz) + adapter 9
2	SKU 7 (2.4GHz) + adapter 9
3	SKU 10 (2.4GHz) + adapter 9
4	SKU 8 (2.4GHz) + adapter 1
5	SKU 9 (2.4GHz) + adapter 1
For test mode 6~8: The testing performed at SKU 1, 2, 4, 5, 8, 9. The SKU 2 has been evaluated to be the worst case. So the measurement will follow this same test configuration.	
6	SKU 2 (2.4GHz) + adapter 6
7	SKU 2 (2.4GHz) + adapter 7
8	SKU 2 (2.4GHz) + adapter 8
Mode 3 has been evaluated to be the worst case among Mode 1~8, thus measurement for Mode 9 will follow this same test mode.	
9	SKU 10 (5GHz) + adapter 9
For operating mode 3 is the worst case and it was record in this test report.	
<b>Operating Mode &gt; 1GHz</b>	CTX
1	SKU 8

<b>The Worst Case Mode for Following Conformance Tests</b>	
<b>Tests Item</b>	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
<b>Operating Mode</b>	
1	SKU 1: WLAN 2.4GHz + SKU 1: WLAN 5GHz
2	SKU 1: WLAN 2.4GHz + SKU 5: WLAN 5GHz
3	SKU 8: WLAN 2.4GHz + SKU 1: WLAN 5GHz
4	SKU 8: WLAN 2.4GHz + SKU 5: WLAN 5GHz
Refer to Sporton Test Report No.: FA952922-10 for Co-location RF Exposure Evaluation.	

Note: The EUT only use in Z axis.





## 2.2 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

## 2.3 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter 1	PI	AD2088320	INPUT: 100-240V ~ 50/60Hz, 0.8A OUTPUT: 19V, 1.75A
Adapter 2	PI	AD2088320	INPUT: 100-240V ~ 50/60Hz, 0.8A OUTPUT: 19V, 1.75A
Adapter 3	Delta	ADP-33AW B	INPUT: 100-240V ~ 1A, 50-60Hz OUTPUT: 19V, 1.75A
Adapter 4	Delta	ADP-33AW B	INPUT: 100-240V ~ 1A, 50-60Hz OUTPUT: 19V, 1.75A
Adapter 5	Delta	ADP-33AW Y	INPUT: 100-240V ~ 1A, 50-60Hz OUTPUT: 19V, 1.75A
Adapter 6 (Fixed plug)	Delta	ADP-33AW Y	INPUT: 100-240V ~ 1.0A, 50-60Hz OUTPUT: 19V, 1.75A, 33.0W
Adapter 7 (Interchangeable plug)	PI	AD2131M20	INPUT: 100-240V~50/60Hz, 0.8A OUTPUT: 19V, 1.75A, 33.0W
Adapter 8 (Fixed plug)	PI	AD2131320	INPUT: 100-240V ~ 50/60Hz, 0.8A OUTPUT: 19V, 1.75A, 33.0W
Adapter 9 (Fixed plug)	LEI	MU24B1120200-A1	INPUT: 100-240V ~ 50/60Hz, 0.7A OUTPUT: 12V, 2A
Other			
RJ-45 cable*1, Non-shielded, 1.5m			

Note: 1.The difference between adapter 1 ~ adapter 2 are only different type.

2.The difference between adapter 3 ~ adapter 4 are only different country code.

3.Adapter 7 with EU plug performed the testing by manufacturer request.



## 2.4 Support Equipment

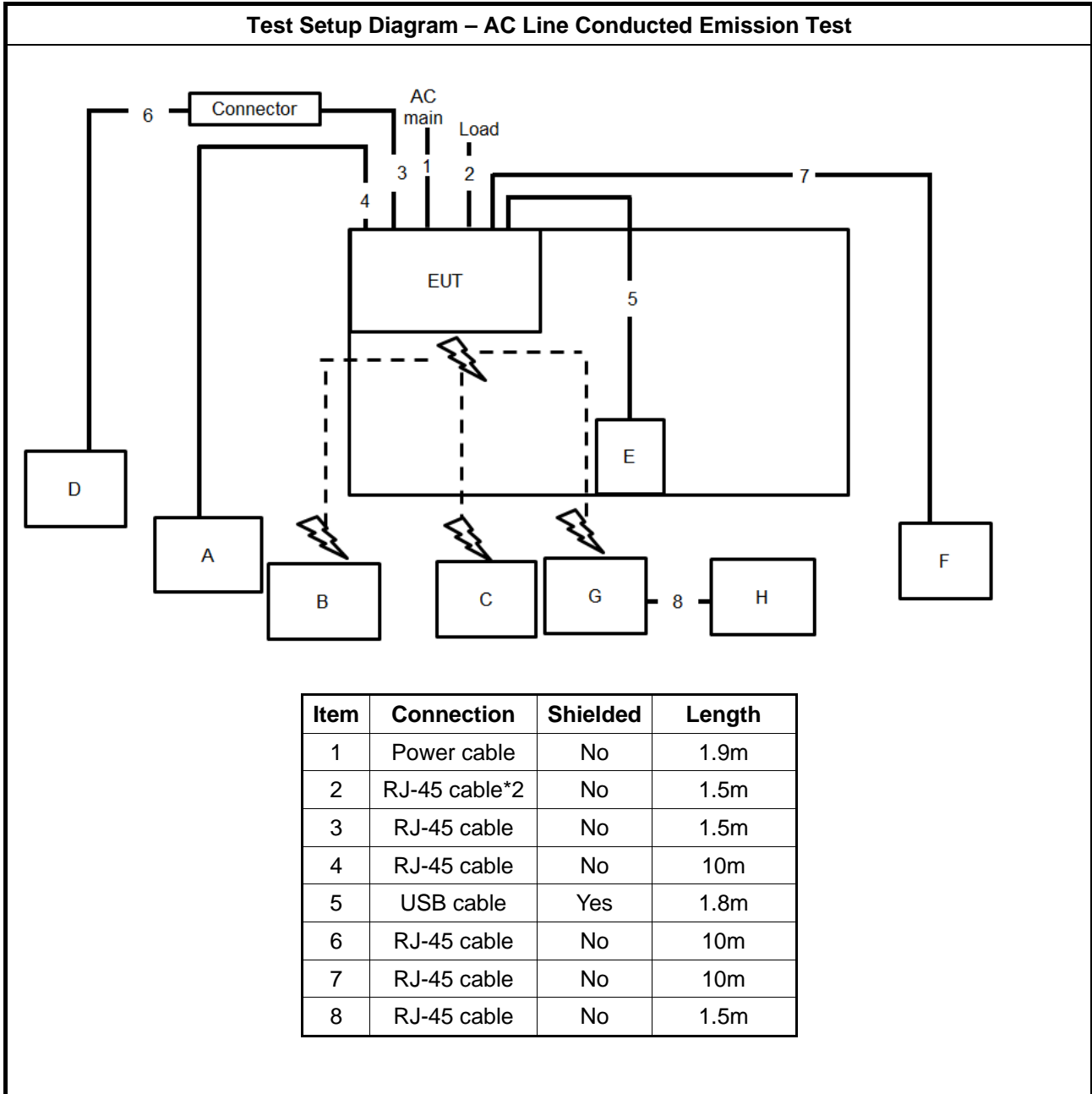
For AC Conduction:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	LAN1 NB	DELL	E6430	N/A
B	2.4G NB	DELL	E6430	N/A
C	5G NB	DELL	E6430	N/A
D	WAN NB	DELL	E6430	N/A
E	HDD3.0	WD	WDBACY5000AWT	N/A
F	LAN4 NB	DELL	E6430	N/A
G	Devcie	AUSU	RT-AX82U	MSQ-RTAXJ300
H	Device NB	DELL	E6430	N/A

For Radiated (below 1GHz):

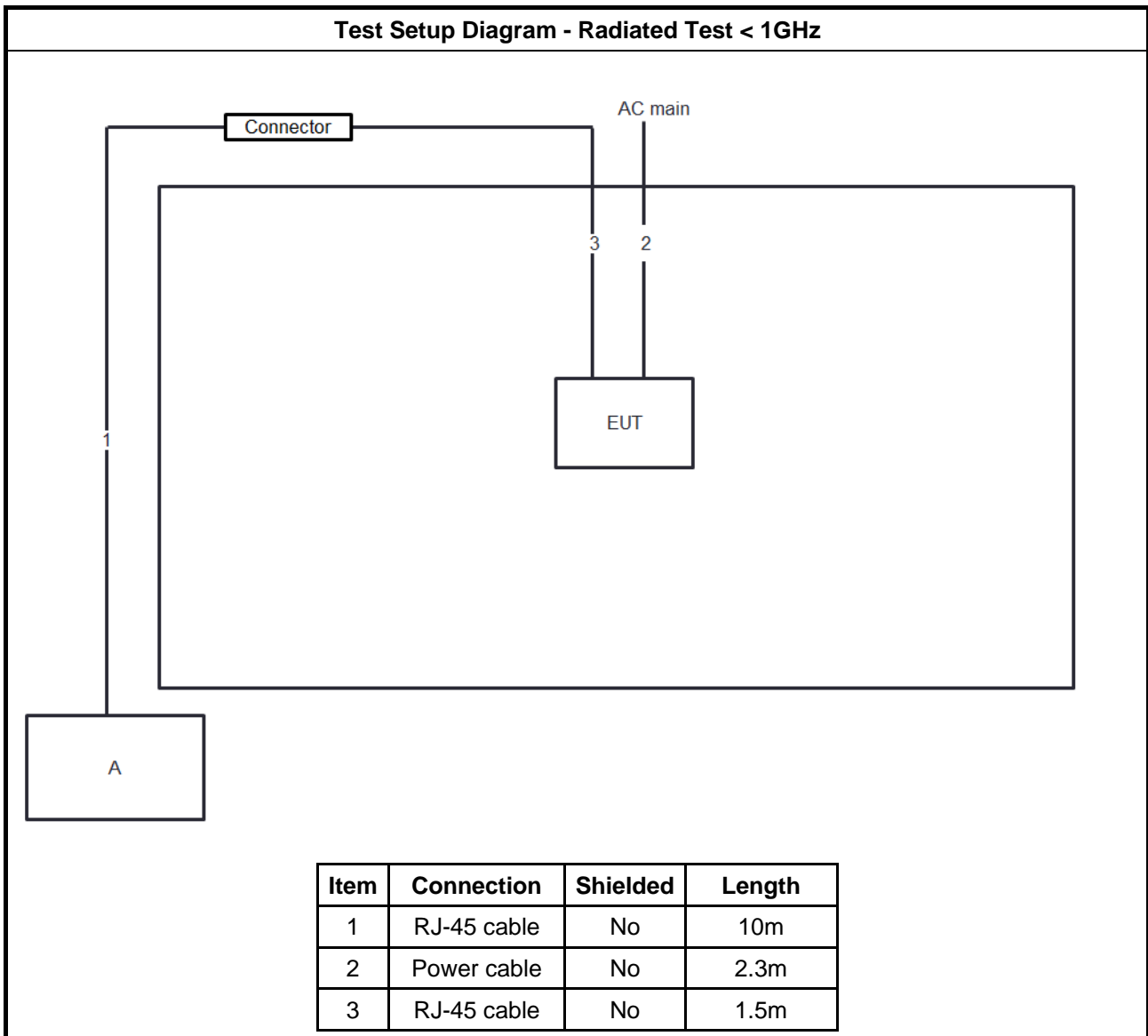
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	NB	DELL	E4300	N/A

## 2.5 Test Setup Diagram





Test Setup Diagram - Radiated Test < 1GHz





### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

##### 3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: \* Decreases with the logarithm of the frequency.

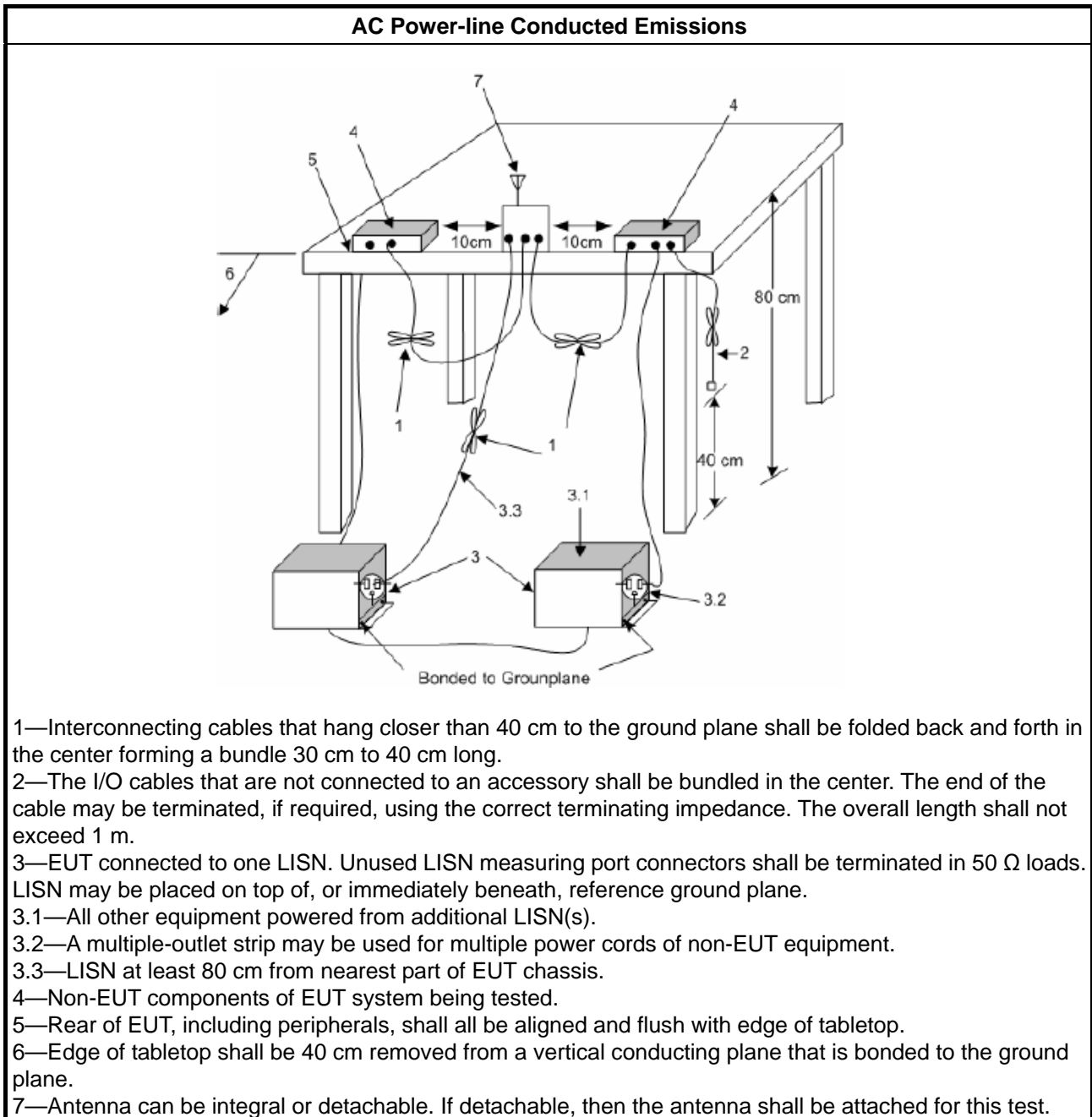
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

### 3.1.4 Test Setup



### 3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

### 3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A



### 3.2 Unwanted Emissions

#### 3.2.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.





Un-restricted band emissions above 1GHz Limit	
Operating Band	Limit
<input checked="" type="checkbox"/> 5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input checked="" type="checkbox"/> 5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input checked="" type="checkbox"/> 5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input checked="" type="checkbox"/> 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/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 dBm/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 dBm/MHz at the band edge.

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

### 3.2.2 Measuring Instruments

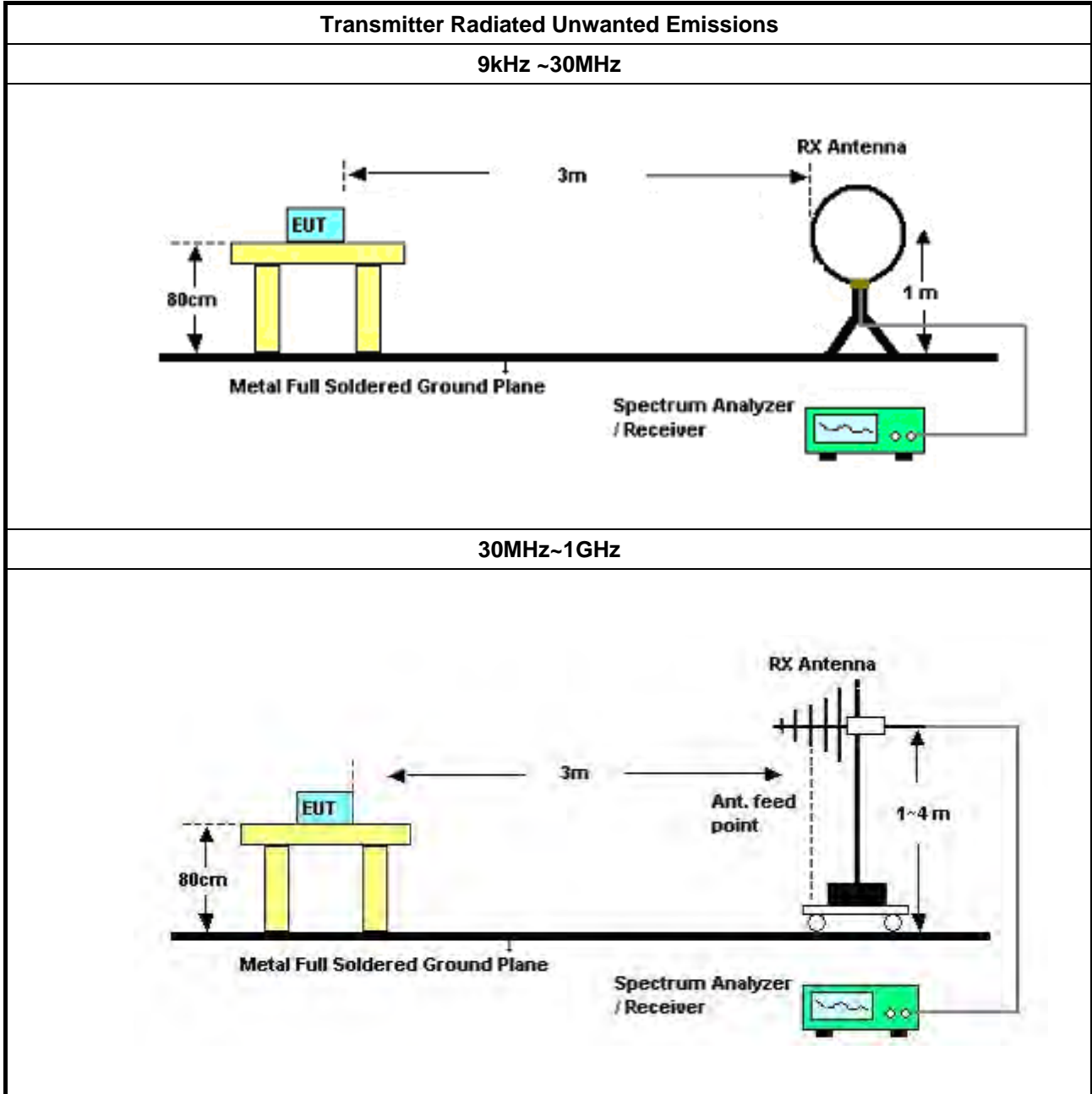
Refer a test equipment and calibration data table in this test report.



3.2.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).</li> </ul>	
<ul style="list-style-type: none"> <li>▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For the transmitter unwanted emissions shall be measured using following options below:</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.</li> </ul>
<input type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
<ul style="list-style-type: none"> <li>▪ For radiated measurement.</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.</li> </ul>
<ul style="list-style-type: none"> <li>▪ The any unwanted emissions level shall not exceed the fundamental emission level.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.</li> </ul>	

### 3.2.4 Test Setup



### 3.2.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.



### **3.2.6 Transmitter Unwanted Emissions (Below 30MHz)**

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

### **3.2.7 Test Result of Transmitter Unwanted Emissions**

Refer as Appendix B



## 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Feb. 26, 2020	Feb. 25, 2021	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 25, 2019	Dec. 24, 2020	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Feb. 25, 2020	Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 31, 2020	Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 20, 2020	May 19, 2021	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 10, 2020	Aug. 09, 2021	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 27, 2020	Mar. 26, 2021	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 28, 2020	Apr. 27, 2021	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Nov. 10, 2020	Nov. 09, 2021	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)

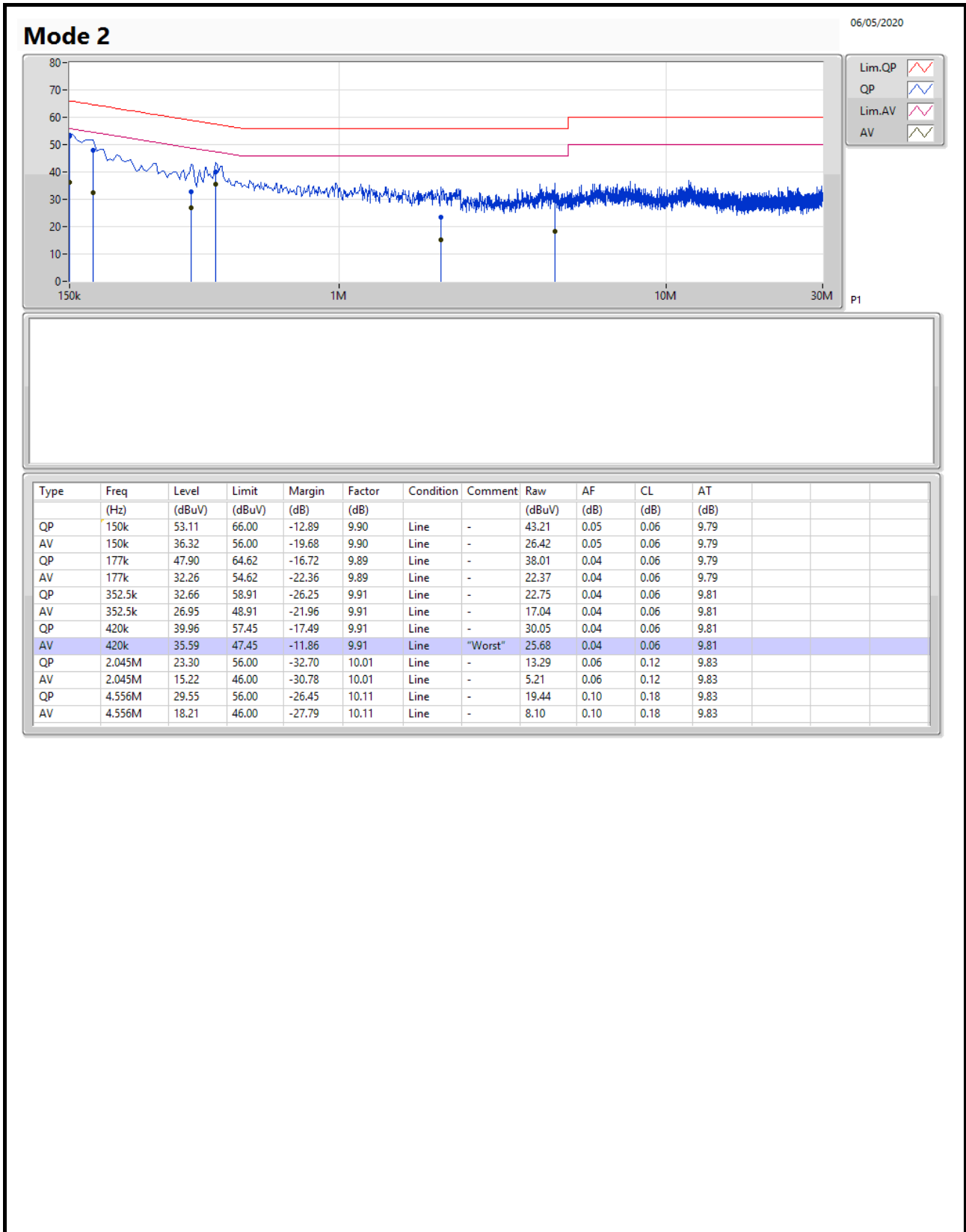
Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

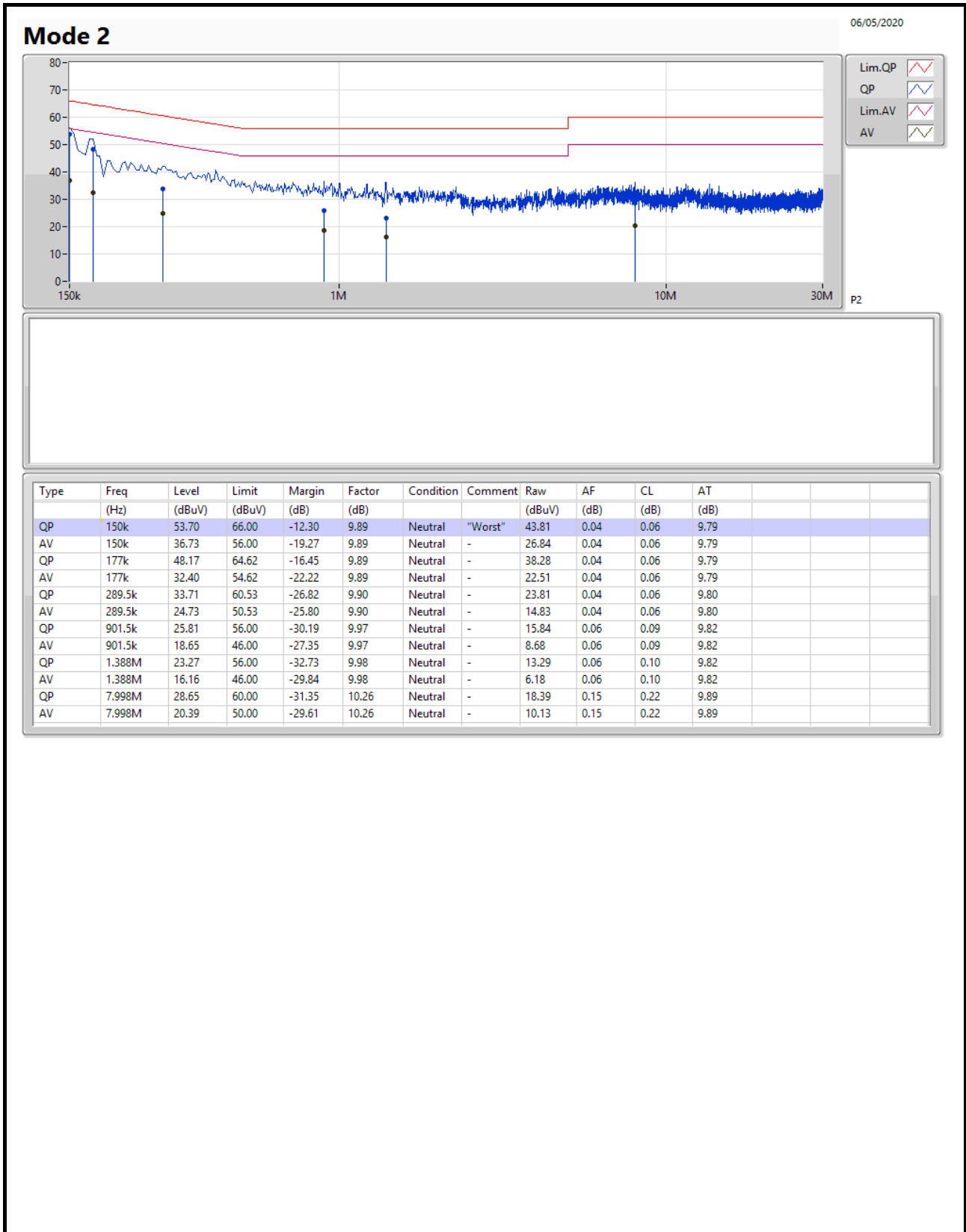


**Summary**

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition
Mode 2	Pass	AV	420k	35.59	47.45	-11.86	9.91	Line







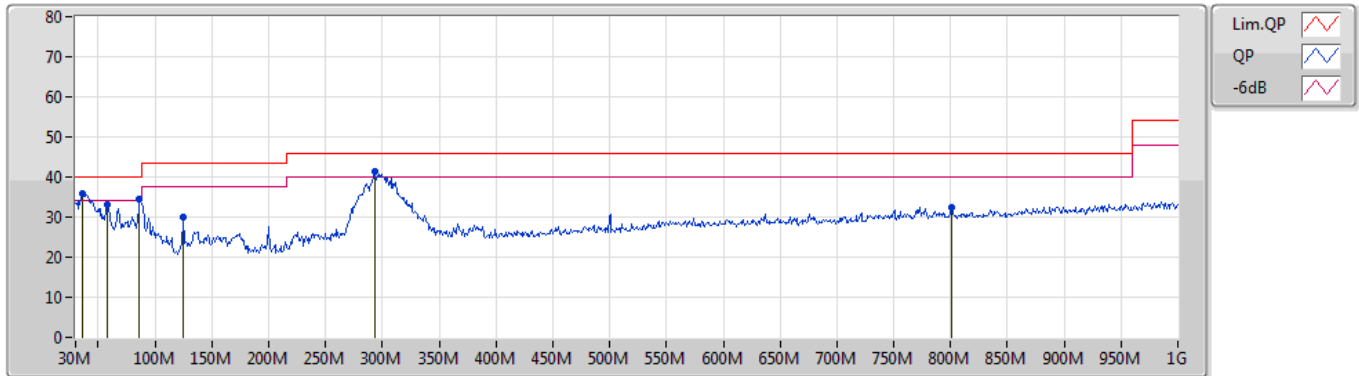


**Summary**

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 3	Pass	QP	297.72M	41.93	46.00	-4.07	Horizontal

Mode 3

18/02/2021



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)
PK	35.82M	35.76	40.00	-4.24	-9.70	3	Vertical	276	1.00	"Worst"	45.46	21.25	0.52	31.47
PK	58.13M	33.15	40.00	-6.85	-18.23	3	Vertical	0	1.00	-	51.38	12.80	0.76	31.79
PK	86.26M	34.37	40.00	-5.63	-16.89	3	Vertical	91	1.50	-	51.26	13.91	1.00	31.80
PK	125.06M	29.96	43.50	-13.54	-12.41	3	Vertical	58	1.00	-	42.37	18.06	1.30	31.77
PK	293.84M	41.33	46.00	-4.67	-11.37	3	Vertical	360	1.25	-	52.70	18.48	2.16	32.01
PK	801.15M	32.49	46.00	-13.51	-3.19	3	Vertical	166	3.00	-	35.68	25.29	3.80	32.28

