



FCC EMI TEST REPORT

FCC ID : U4GSX5SSD
Equipment : Wireless Power Transmission System
Brand Name : Datalogic
Model Name : SKORPIO X5 SINGLE DOCK WIRELESS CHARGING
Applicant : Datalogic S.r.l.
Via S. Vitalino 13, 40012 Lippo di Calderara di Reno (BO) - Italy
Manufacturer : Datalogic S.r.l.
Via S. Vitalino 13, 40012 Lippo di Calderara di Reno (BO) - Italy
Standard : 47 CFR FCC Rules and Regulations Part 18

The product was received on Jul. 22, 2020, and testing was started from Aug. 01, 2020 and completed on Aug. 21, 2020. 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 FCC MP-5 - 1986 and shown compliance with the applicable technical standards.

The test results in this 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: William Li

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



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Appendix A. Test Results of Conducted Emission at Powerline

Appendix B. Test Results of Radiated Emissions below 1GHz

Appendix C. Test Photos

Photographs of EUT v01



History of this test report

Report No.	Version	Description	Issued Date
FE061224	01	Initial issue of report	Oct. 20, 2020
FE061224	02	The Frequency Range was changed This report is the latest version replacing for the report issued on Oct. 20, 2020	Oct. 21, 2020



Summary of Test Result

Report Clause	Methods of Measurement Clause	Test Items	Result (PASS/FAIL)	Remark
4	18.307(b)	Conducted Emissions of Powerline	PASS	Under limit 9.13 dB at 15.869 MHz
5.1	18.305(b)	Radiated Emissions below 30MHz	PASS	Under limit 17.87 dB at 134.208 kHz
		Radiated Emissions below 1GHz	PASS	Under limit 33.78 dB at 84.32 MHz
-	18.305(b)	Radiated Emissions above 1GHz	Not Applicable	Note 1

Note 1: The highest frequency of the internal sources of the EUT is less than 100MHz, so the measurement shall only be made up to 1GHz.

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:
None

Reviewed by: Andrew Yang

Report Producer: Jenny Yang



1. General Description of Equipment under Test

1.1. Basic Description of Equipment under Test

Equipment : Wireless Power Transmission System
Model No. : SKORPIO X5 SINGLE DOCK WIRELESS CHARGING
Power Supply Type : From Power Adapter
AC Power Cord : Non-Shielded, 1.8 m, 3 pin
DC Power Cable : Shielded, 1.2 m
The maximum operating frequency : 48 MHz
Frequency Range: 112-145kHz

1.2. Feature of Equipment under Test

Accessories				
AC Adapter	Brand Name	EDACPOWER ELEC.	Model Name	EA10681U-120
	Power Rating	I/P: 100- 240Vac, 2A, O/P: 12Vdc, 6A		
	Power Cord	1.2 meter, shielded cable, with ferrite core		

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.3. Modification of EUT

Please refer to the applicant solution information and photographs of EUT.



2. Test Configuration of Equipment under Test

2.1. Details of EUT Test Modes

The equipment under test were performed the following test modes:

Test Items	Description of test modes
Conducted Emission	Mode 1. IrDA communicatio + Battery charging Mode 2. Super fast charge mode for Terminal + Battery charging
Radiated Emissions <below 30MHz>	Mode 1. Super fast charge mode for Terminal + Battery charging + IrDA communication
Radiated Emissions <below 1GHz>	Mode 1. IrDA communicatio + Battery charging Mode 2. Super fast charge mode for Terminal + Battery charging

2.2. Description of Test System

Conducted emission and radiated emission below 1GHz (Mode 1)

No.	Peripheral	Manufacturer	Model Number	FCC ID	Remarks
For Local					
A	Micro SD Card	SanDisk	32GB	DoC	-
B	Mobile computer	SKORPIO X5	HLG2	N/A	Client provided
C	Battery	Gushine	BY-07	N/A	Client provided
D	Battery	Gushine	BY-08	N/A	Client provided

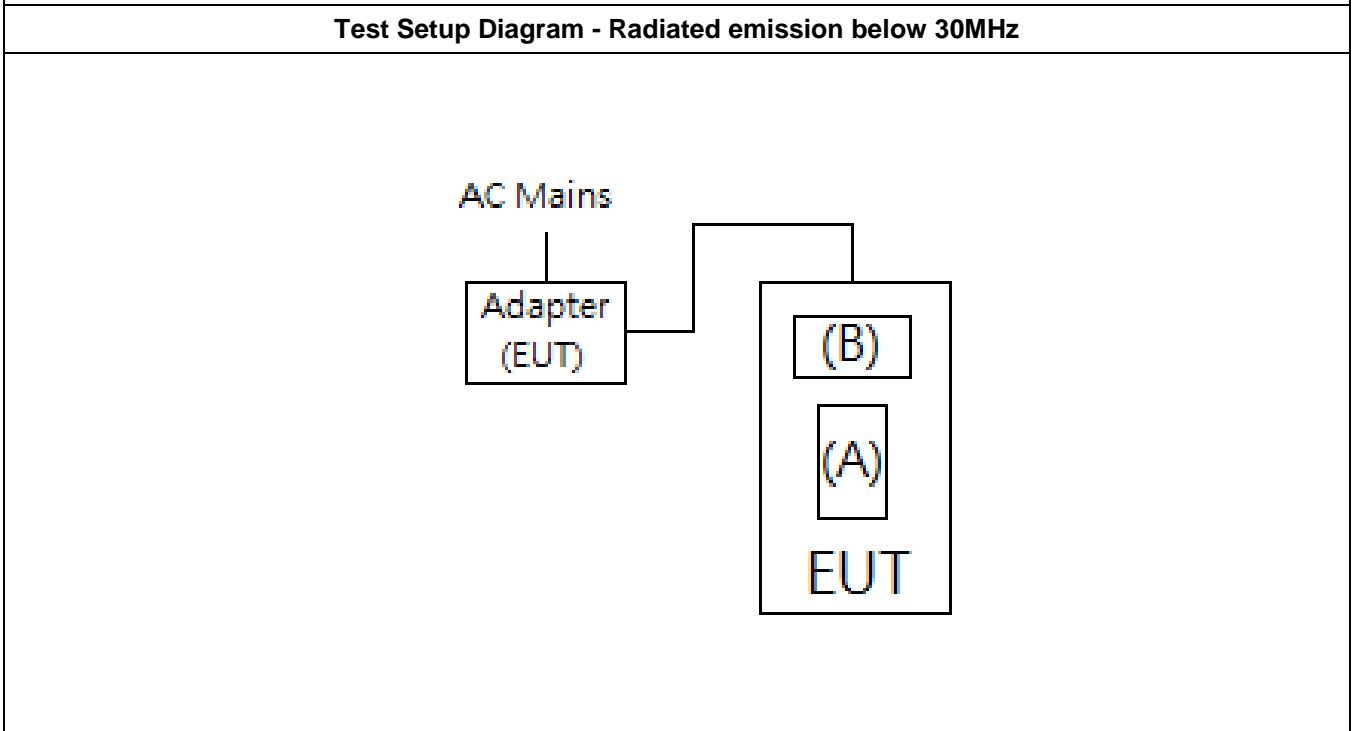
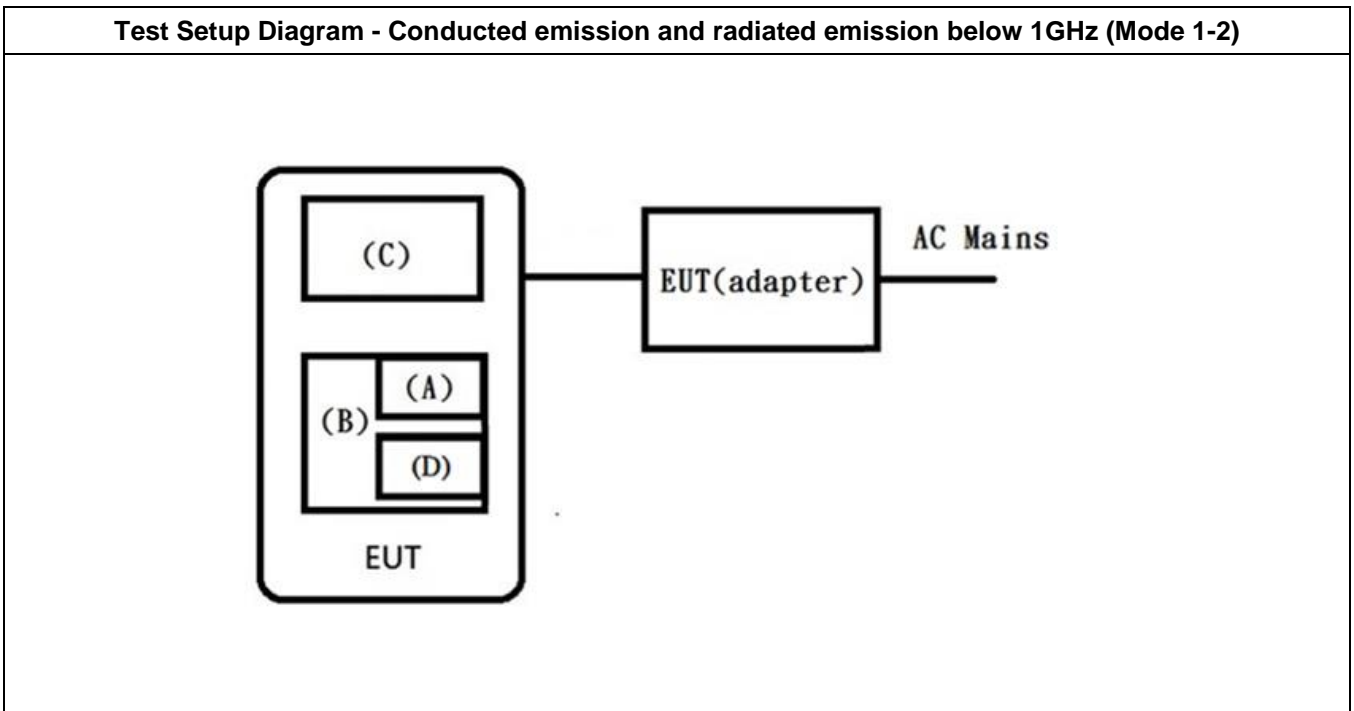
Conducted emission and radiated emission below 1GHz (Mode 2)

No.	Peripheral	Manufacturer	Model Number	FCC ID	Remarks
For Local					
A	Micro SD Card	SanDisk	32GB	DoC	-
B	Mobile computer	SKORPIO X5	HLG2	N/A	Client provided
C	Battery	Gushine	BY-08	N/A	Client provided
D	Battery	Gushine	BY-07	N/A	Client provided

Radiated emission below 30MHz

No.	Peripheral	Manufacturer	Model Number	FCC ID	Remarks
For Local					
A	Mobile computer	Gushine	SX5	N/A	Client provided
B	Battery	Gushine	BY-07	N/A	Client provided

2.3. Connection Diagram of Test System





2.4. Test Manner

Conducted emission and radiated emission below 1GHz (Mode 1)

An executive program, under Android 10(Mobile computer) was used as the test software. The program was executed as follows:

- The Mobile computer executed "Screen test APP" to send "H" pattern, and displays "H" patterns on the screen.
- The Mobile computer opened IrDA communication to link with the EUT to maintain the connection by IrDA.
- The EUT charged Local battery.

Conducted emission and radiated emission below 1GHz (Mode 2)

An executive program, under Android 10(Mobile computer) was used as the test software. The program was executed as follows:

- The Mobile computer executed "Screen test APP" to send "H" pattern, and displays "H" patterns on the screen.
- The EUT charged Mobile computer by WLC.
- The EUT charged Local battery.

Radiated emission below 30MHz

An executive program, under Android 10(Mobile computer) was used as the test software. The program was executed as follows:

- The EUT charged Mobile computer by WLC.
- The EUT charged Local battery.
- The Mobile computer opened IrDA communication to link with the EUT to maintain the connection by IrDA.



3. General Information of Test

3.1. Test Facilities

Test Site : SPORTON INTERNATIONAL INC.	
<input checked="" type="checkbox"/> HUA YA	ADD: No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: 886-3-327-3456 FAX: 886-3-318-0055 FCC Designation Number: TW1093
<input type="checkbox"/> DONG HU	ADD: No. 3, Ln. 238, Kangle St., Neihu Dist., Taipei City, Taiwan (R.O.C.) TEL: 886-2-2631-5551 FAX: 886-2-2631-9740 FCC Designation Number: TW1094
<input type="checkbox"/> LIN KOU	ADD: No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan (R.O.C.) TEL: 886-2-2601-1640 FAX: 886-2-2601-1695 FCC Designation Number: TW1095

Test Items	Test Site No.	Test Engineer	Test Environment		Test Date	Remark
			temp °C	hum %		
Conducted Emissions of Powerline	CO01-HY	Howard Chang	25.9~26.2	59.6~59.9	10/Aug/2020	Mode 1
		Howard Chang	25.2~25.5	53~53.3	20/Aug/2020	Mode 2
Radiated Emissions below 30MHz	10CH01-HY	Nigel Wang	26~26.5	63~64	13/Aug/2020	Mode 1
Radiated Emissions below 1GHz	03CH04-HY	Ray Lee	28.2~28.3	60.1~60.2	01/Aug/2020	Mode 1
	03CH04-HY	Alan Chen	28.4~28.5	62~63	21/Aug/2020	Mode 2

3.2. Test Standards

Test items	Test Standards and Test Procedures
Radiated and Conducted Emissions	FCC MP-5 - 1986 with FCC Method 47 CFR Part 18

3.3. Test Voltage/Frequencies

Power Supply Type	Voltage/Frequencies
AC Power Supply	120V / 60Hz

3.4. Test Distance and Frequency Range Investigated

Test Items	Frequency Range	Remark
Powerline Conducted Emissions	150 kHz to 30 MHz	-
Radiated Emissions (below 30MHz)	9kHz to 30 MHz	Measurement distance is 3 m.
Radiated Emissions (below 1GHz)	30MHz to 1GHz	Measurement distance is 10 m.

3.5. Operating Condition

- Customers require this specification for test plan.



4. Conducted Emissions Measurement

4.1. Limit

Limits for All other part 18 consumer devices			
Frequency range MHz	Coupling device	Detector type / bandwidth	limits dB(μV)
0,15 – 0,5	AMN	Quasi-peak / 9 kHz	66 - 56
0,5 – 5			56
5 – 30			60
0,15 – 0,5	AMN	Average / 9 kHz	56 - 46
0,5 – 5			46
5 – 30			50

Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

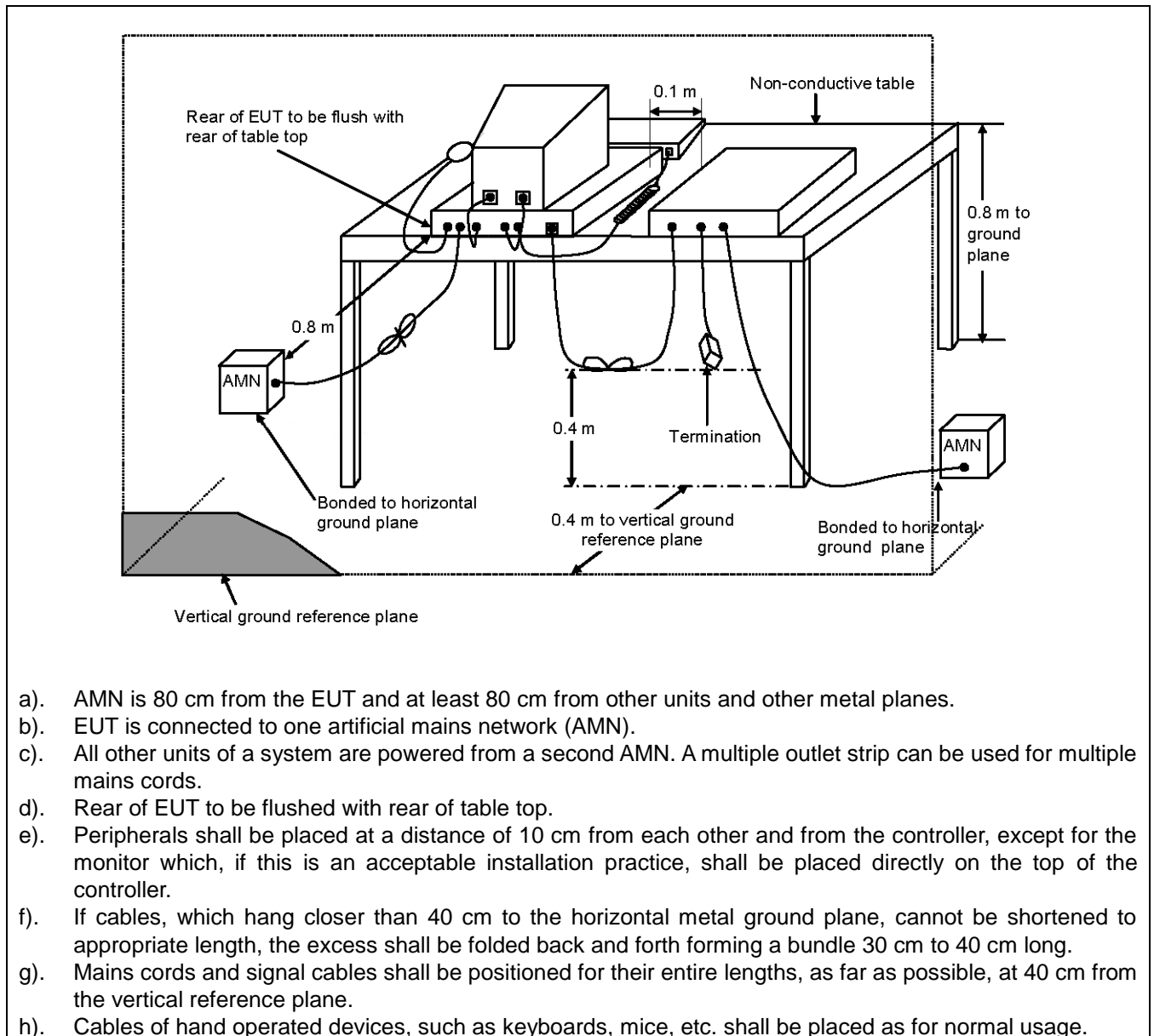
4.2. Test Procedures

- a). The EUT was warmed up for 15 minutes before testing started.
- b). The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.
- c). Connect EUT to the power mains through a line impedance stabilization network (LISN).
- d). All the support units are connect to the other LISN.
- e). The LISN provides 50 ohm, coupling impedance for the measuring instrument.
- f). The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- g). Both sides of AC line were checked for maximum conducted interference.
- h). The frequency range from 150 kHz to 30 MHz was searched.
- i). Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- j). All emissions not reported here are more than 10 dB below the prescribed limit.

4.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBμV) = Raw(Read Level)+(LISN Factor) + CL(Cable Loss) +AT(Attenuator)
For example at 0.3 MHz if the LISN Factor is 10.48 dB, the cable loss is 0.10 dB, the measured voltage is 36.39 dBμV, attenuation 10dB, the signal strength would be calculated:
Corrected Reading (dBμV) = 36.39 dBμV+10.48 dB + 0.10 dB + 10 dB = 56.97 dBμV

4.4. Typical Test Setup Layout



4.5. Test Result

Refer as Appendix A



5. Radiated Emissions Measurement

5.1. Radiated Emission below 1GHz

5.1.1. Limit

Equipment	Operating frequency	Detector type / bandwidth	RF Power generated by equipment (watts)	Field strength limit (uV/m) (Distance at 300 m)	Field strength limit dB(µV/m) (Distance at 10 m)
Any type unless otherwise specified (miscellaneous)	Any non-ISM frequency	150 kHz~30 MHz Average /9 kHz 30~1000 MHz Average /100 kHz	Below 500	25	57.5
			500 or more	25 × SQRT (power/500)	57.5 × SQRT
Equipment	Operating frequency	Detector type / bandwidth	RF Power generated by equipment (watts)	Field strength limit (uV/m) (Distance at 300 m)	Field strength limit dB(µV/m) (Distance at 3 m)
Any type unless otherwise specified (miscellaneous)	Any non-ISM frequency	150 kHz~30 MHz Average /9 kHz 30~1000 MHz Average /100 kHz	Below 500	25	67.96
			500 or more	25 × SQRT (power/500)	67.96 × SQRT
<p>Note 1: $\text{dB}(\mu\text{V}/\text{m}) = 20\log \mu\text{V}/\text{m} + 120 = 28 \text{ dB}(\mu\text{V}/\text{m})$</p> <p>Note 2: It should be noted that the field strength is inversely proportional to distance, so the field strength at 300m is 1/30 the strength at 10m, i.e. $L_{300\text{m}}/L_x = X/300$.</p> <p>Ex. $L_{300\text{m}} \text{ dB} - L_x \text{ dB} = 20\log(300/x)$; $L_{10\text{m}} \text{ dB} = 28 + 20\log(300/10) = 57.5 \text{ dB}(\mu\text{V}/\text{m})$</p> <p>Ex. $L_{300\text{m}} \text{ dB} - L_x \text{ dB} = 20\log(300/x)$; $L_{03\text{m}} \text{ dB} = 28 + 20\log(300/03) = 67.96 \text{ dB}(\mu\text{V}/\text{m})$</p>					



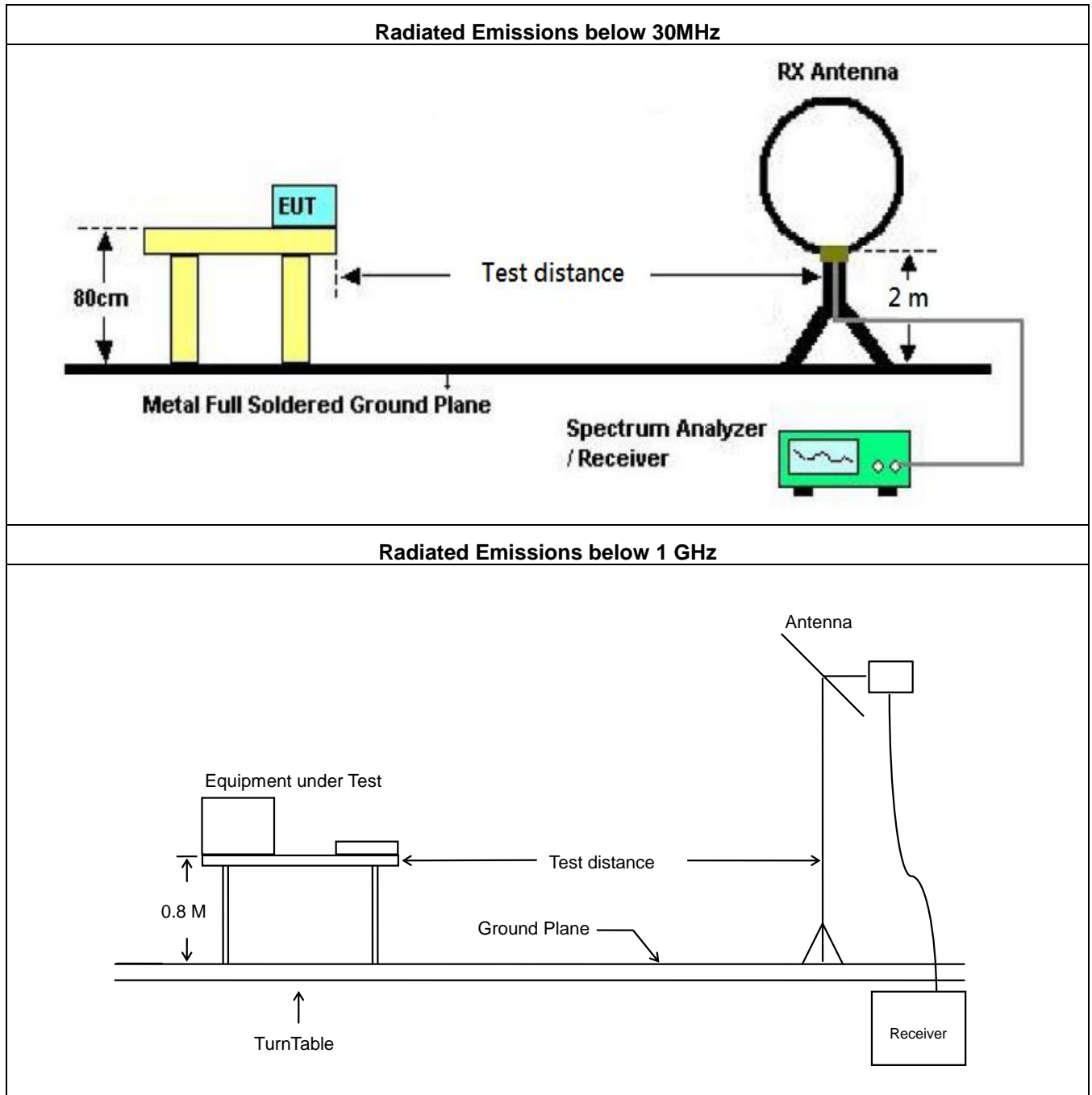
5.1.2. Test Procedures

- a). The EUT was placed on a rotatable table top 0.8 meter above ground.
- b). The EUT was set 10 meters / 3 meters from the interference-receiving antenna (Loop) / (Bi-log) which was mounted on the top of a variable height antenna tower.
- c). The table was rotated 360 degrees to determine the position of the highest radiation.
- d). For a loop antenna. The antenna height shall be set at around 2 meters. Care should be taken to assure that readings are no taken in nulls.
- e). The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- f). For each suspected emission the EUT was arranged to its worst case and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- g). Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- h). If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the Average method and reported.

5.1.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBµV/m) = Raw(Read Level)+AF(Antenna Factor)+CL(Cable Loss)-PA(Preamp Factor)
For example at 125 MHz if the Antenna Factor is 17.24 dB/m, the cable loss is 1.20 dB, the measured voltage is 35.80 dBµV and the Preamp Factor is 27.18 dB, the signal strength would be calculated:
Corrected Reading (dBµV/m) = 35.80 dBµV + 17.24 dB/m + 1.20 dB - 27.18 dB = 27.06 dBµV/m
Note: If a hybrid antenna is used, the antenna factor shall be the sum of the Antenna Factor + Attenuator Factor.

5.1.4. Typical Test Setup Layout



5.1.5. Test Result

Refer as Appendix B



6. Uncertainty of Test Site

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)).

6.1. Emission Test Measurement Uncertainty

Test Items	Test Site No.	U_{LAB}
Conducted Emissions	CO01-HY	1.95 dB
Radiated Emissions below 30MHz	10CH01-HY	4.72 dB
Radiated Emissions below 1GHz	03CH04-HY	4.86 dB



7. List of Measuring Equipment Used

Conducted Emission - Test Date: 10/Aug/2020~20/Aug/2020

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2020	08/Apr/2021	Conduction (CO01-HY)
Two-Line V Network (LISN)	R&S	ENV 216	101274	9kHz ~ 30MHz	10/Jun/2020	09/Jun/2021	Conduction (CO01-HY)
Cable	MTJ	RG 142	CO01-cable-01	100kHz ~ 1GHz	13/Jul/2020	12/Jul/2021	Conduction (CO01-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561F	9495	9kHz ~ 30MHz	24/Sep/2019	23/Sep/2020	Conduction (CO01-HY)
Software	Sporton	SENSE-EMI	V5.10.7	-	NCR	NCR	Conduction (CO01-HY)

Radiated Emission below 30MHz - Test Date: 13/Aug/2020

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
N.S.A. Measurement	SIDT FRANKONIA	SAC-10M	10CH01-HY	30MHz ~ 1GHz	19/Apr/2020	18/Apr/2021	Radiation (10CH01-HY)
Receiver	KEYSIGHT	N9038A	MY54130031	20Hz ~ 8.4GHz	08/Nov/2019	07/Nov/2020	Radiation (10CH01-HY)
Turn Table	HD	DT 60 RPS	1513/004/00	0 ~ 360 degree	NCR	NCR	Radiation (10CH01-HY)
RF Cable	Suhner Switzerland + Rosenberger	RG223/U+UAA220 A- 0+RG142BU/2	CB024-CAR	9kHz ~ 1GHz	05/Nov/2019	04/Nov/2020	Radiation (10CH01-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	16/Mar/2020	15/Mar/2021	Radiation (10CH01-HY)
Software	Sporton	SENSE-EMI	V5.10.7	-	NCR	NCR	Radiation (10CH01-HY)

NCR: No Calibration Request.

**Radiated Emission below 1GHz - Test Date: 01/Aug/2020~21/Aug/2020**

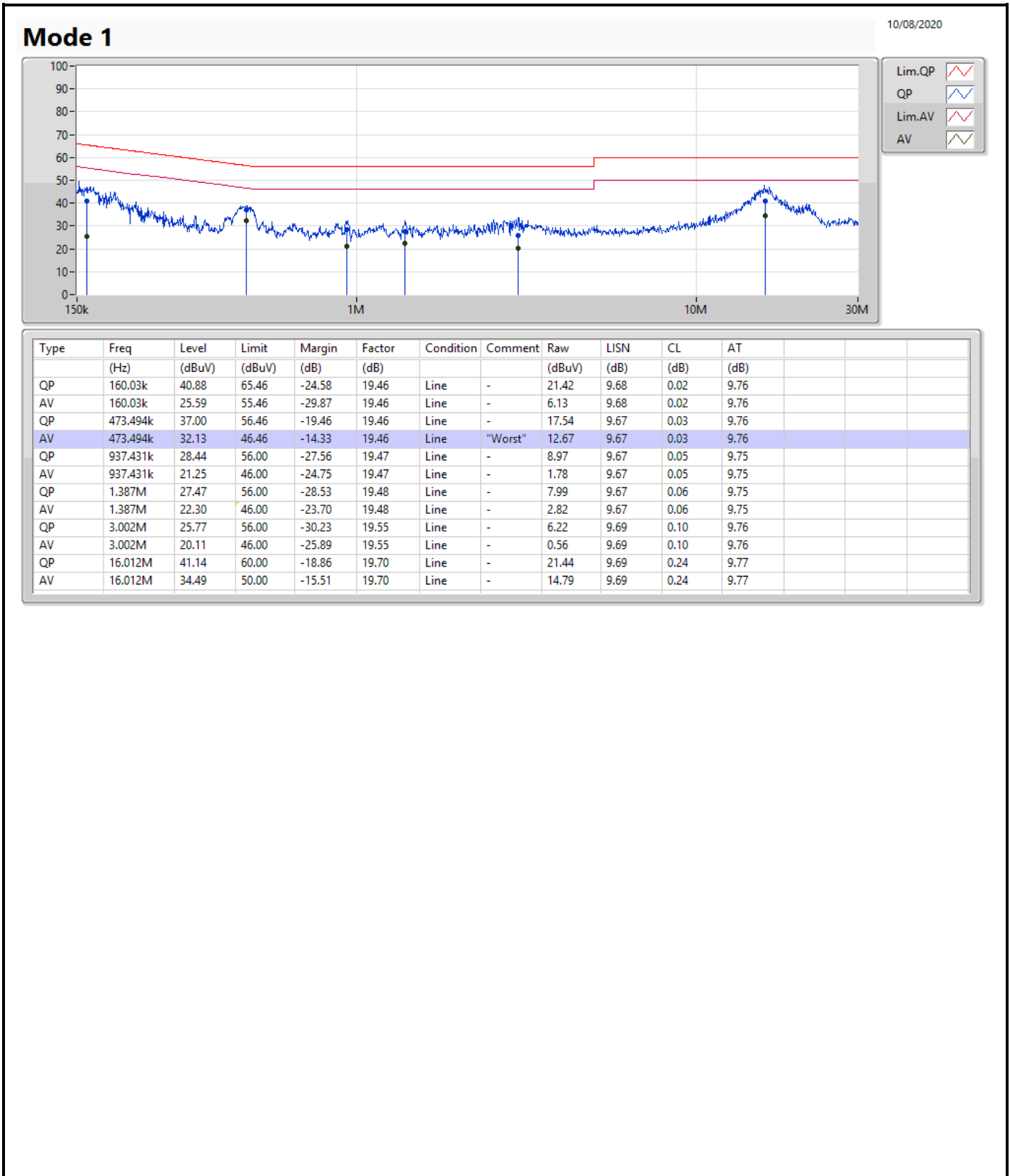
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
N.S.A. Measurement	Riken	SAC-3M	03CH04-HY	30 MHz ~ 1 GHz 3m	26/Sep/2019	25/Sep/2020	Radiation (03CH04-HY)
Amplifier	Agilent	8447D	2944A09073	0.1 MHz ~ 1.3 GHz	04/Dec/2019	03/Dec/2020	Radiation (03CH04-HY)
EMI Test Receiver	R&S	ESU-26	100422	20Hz ~ 26.5GHz	23/Oct/2019	22/Oct/2020	Radiation (03CH04-HY)
Bilog Antenna with 6dB Attenuator	SCHAFFNER & Yi Chang	CBL6111C & MTJ61202	2724 / MTJ61202-06	30 MHz ~ 1 GHz	05/Jul/2020	04/Jul/2021	Radiation (03CH04-HY)
Turn Table	Chaintek	3000	TT9664	0 ~ 360 degree	NCR	NCR	Radiation (03CH04-HY)
Antenna Mast	MF	MFA-515BSN	MFA-515BSN08193	1 m ~ 4 m	NCR	NCR	Radiation (03CH04-HY)
RF Cable	Jye Bao	RG142	03CH04-cable-01	30 MHz ~ 1 GHz	08/Jun/2020	07/Jun/2021	Radiation (03CH04-HY)
Software	Sporton	SENSE-EMI	V5.10.7.4	-	NCR	NCR	Radiation (03CH04-HY)

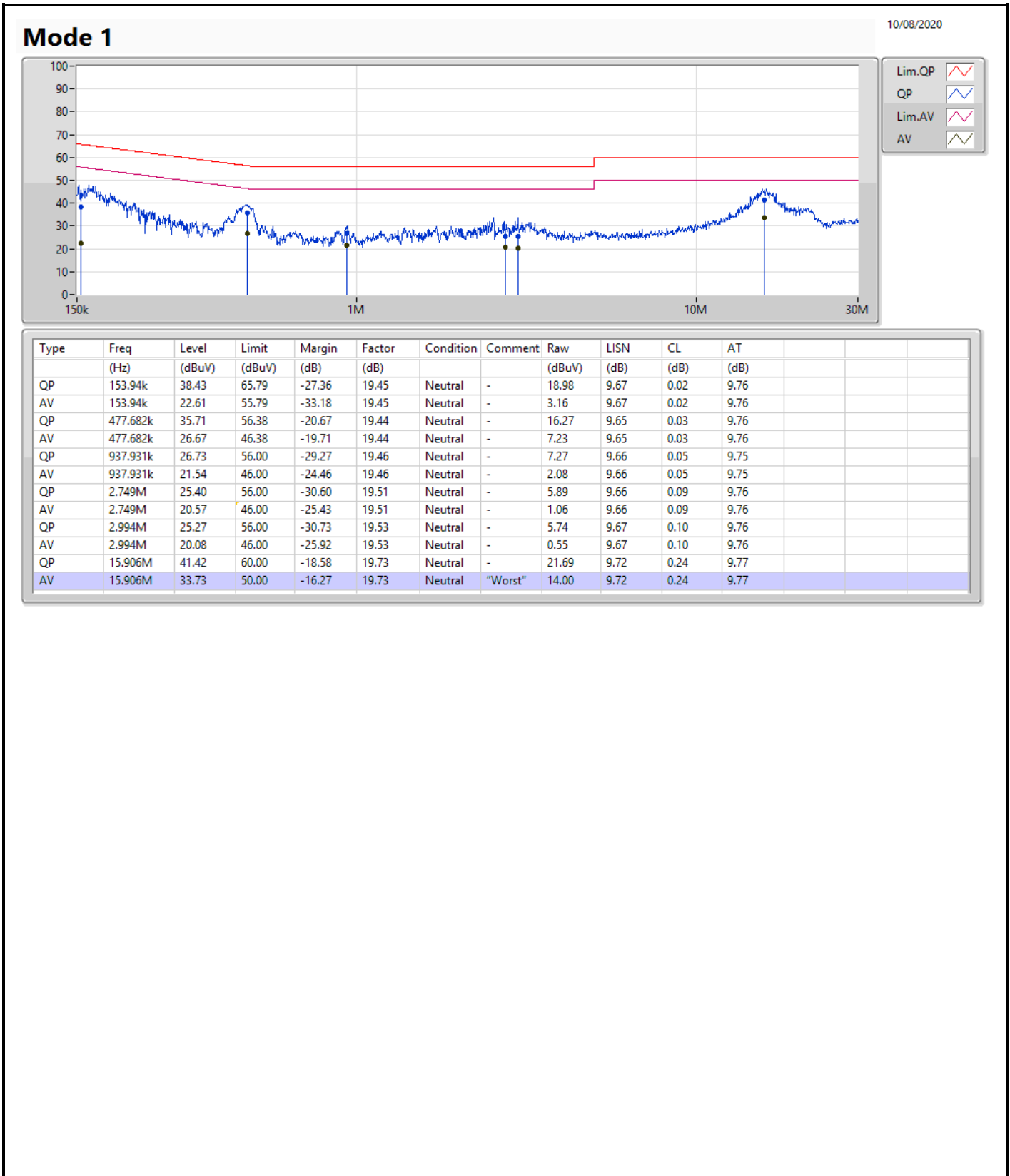
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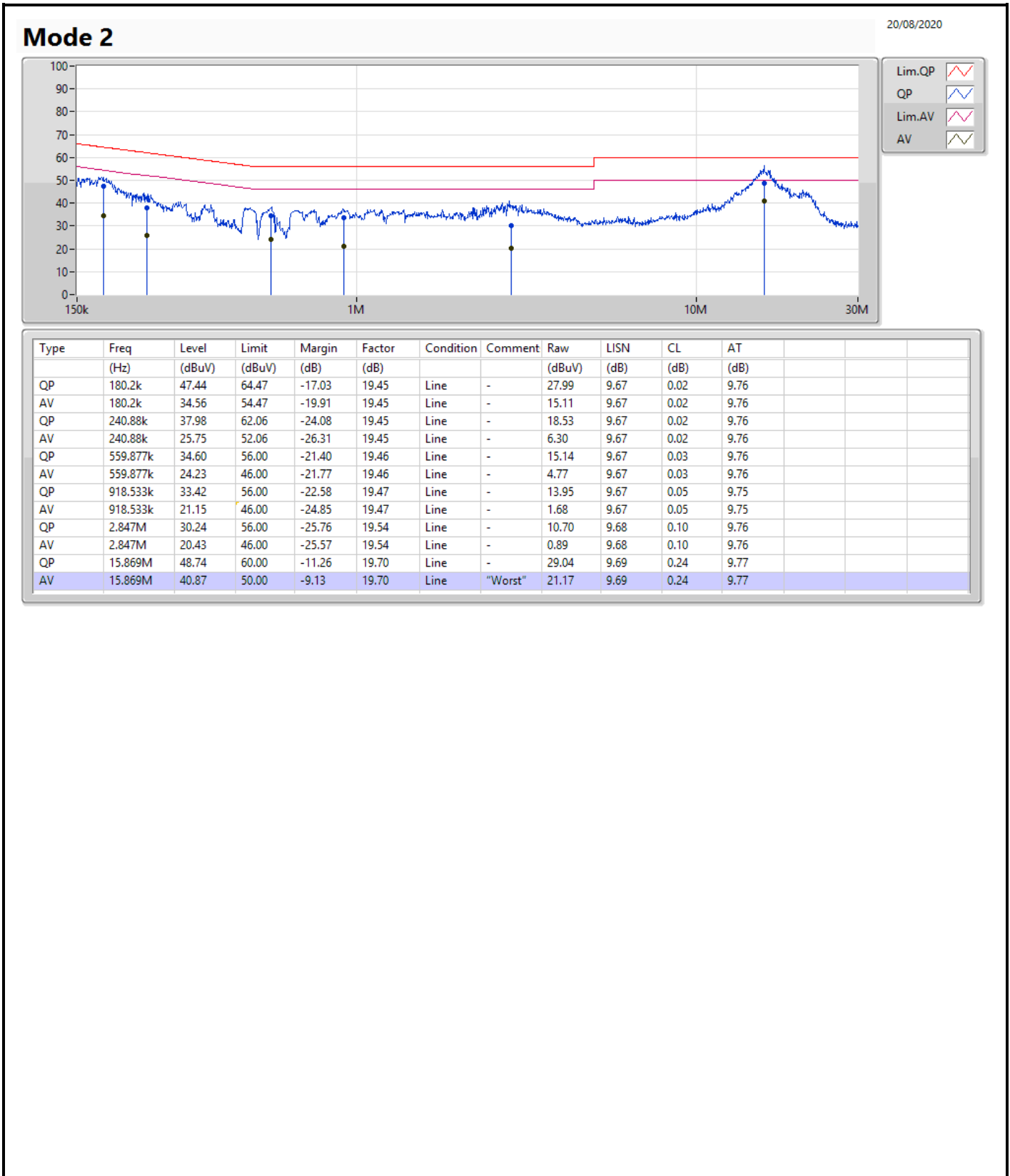


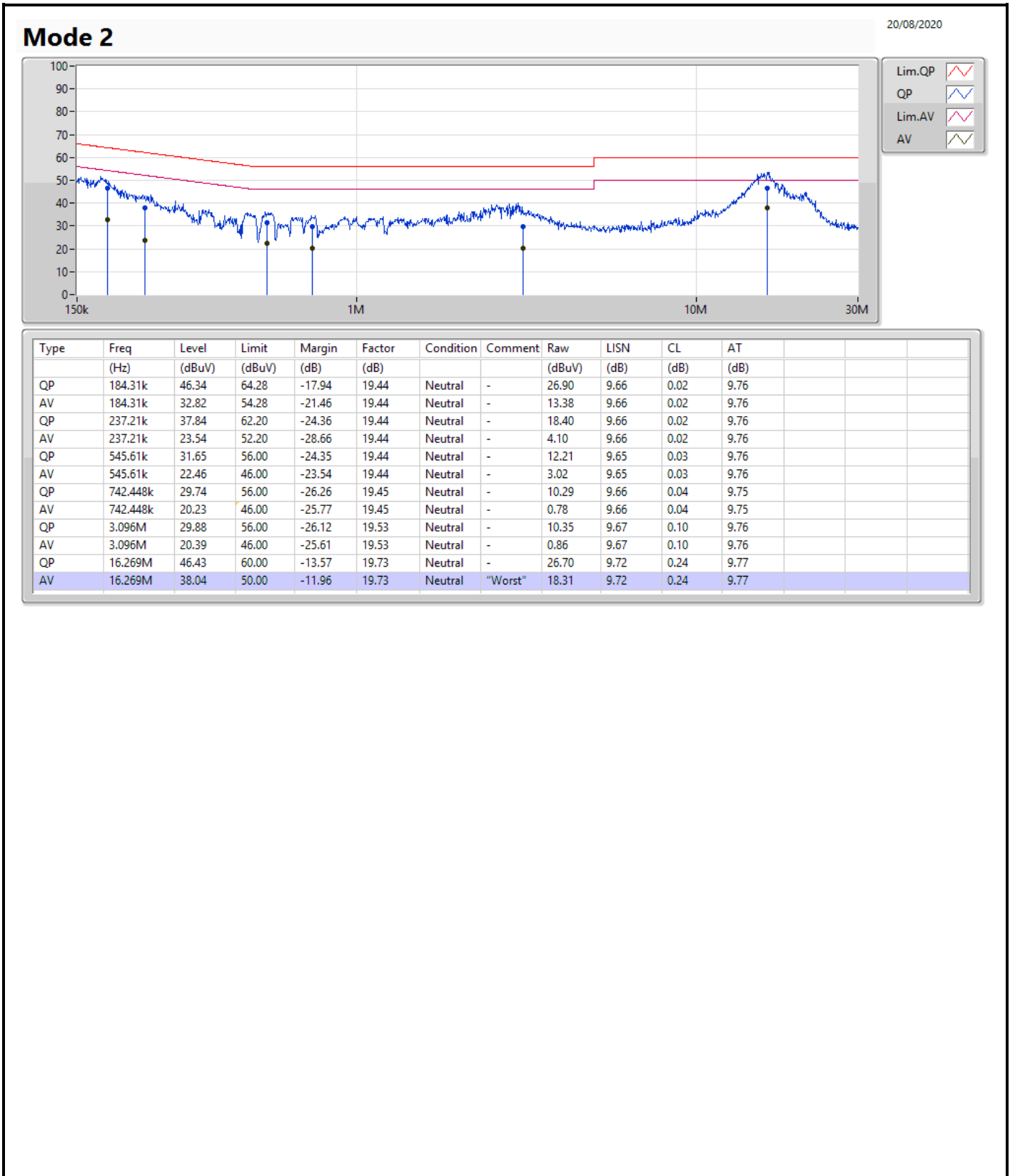
Summary

Mode	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition
Mode 1	AV	473.494k	32.13	46.46	-14.33	19.46	Line
Mode 2	AV	15.869M	40.87	50.00	-9.13	19.70	Line





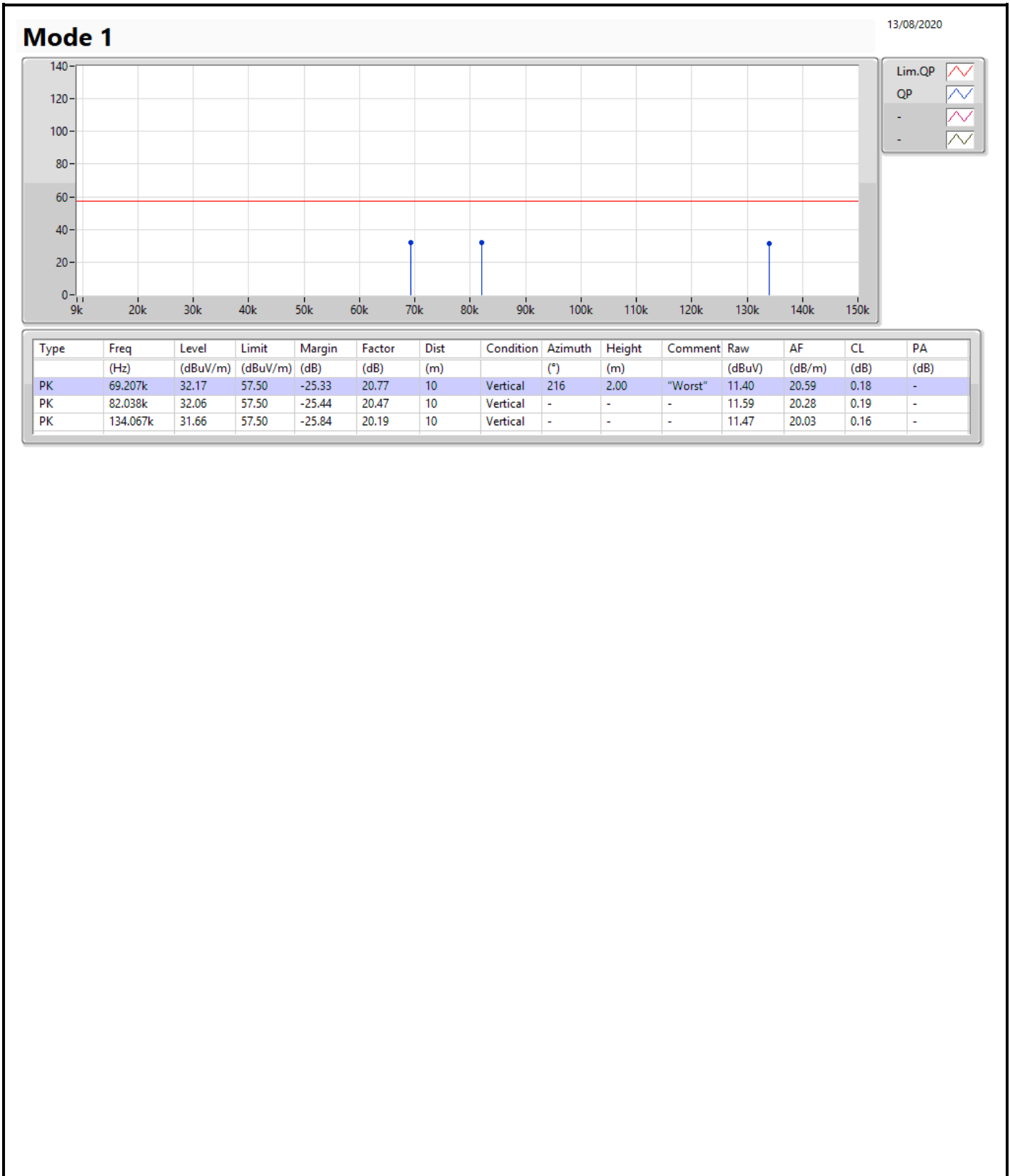


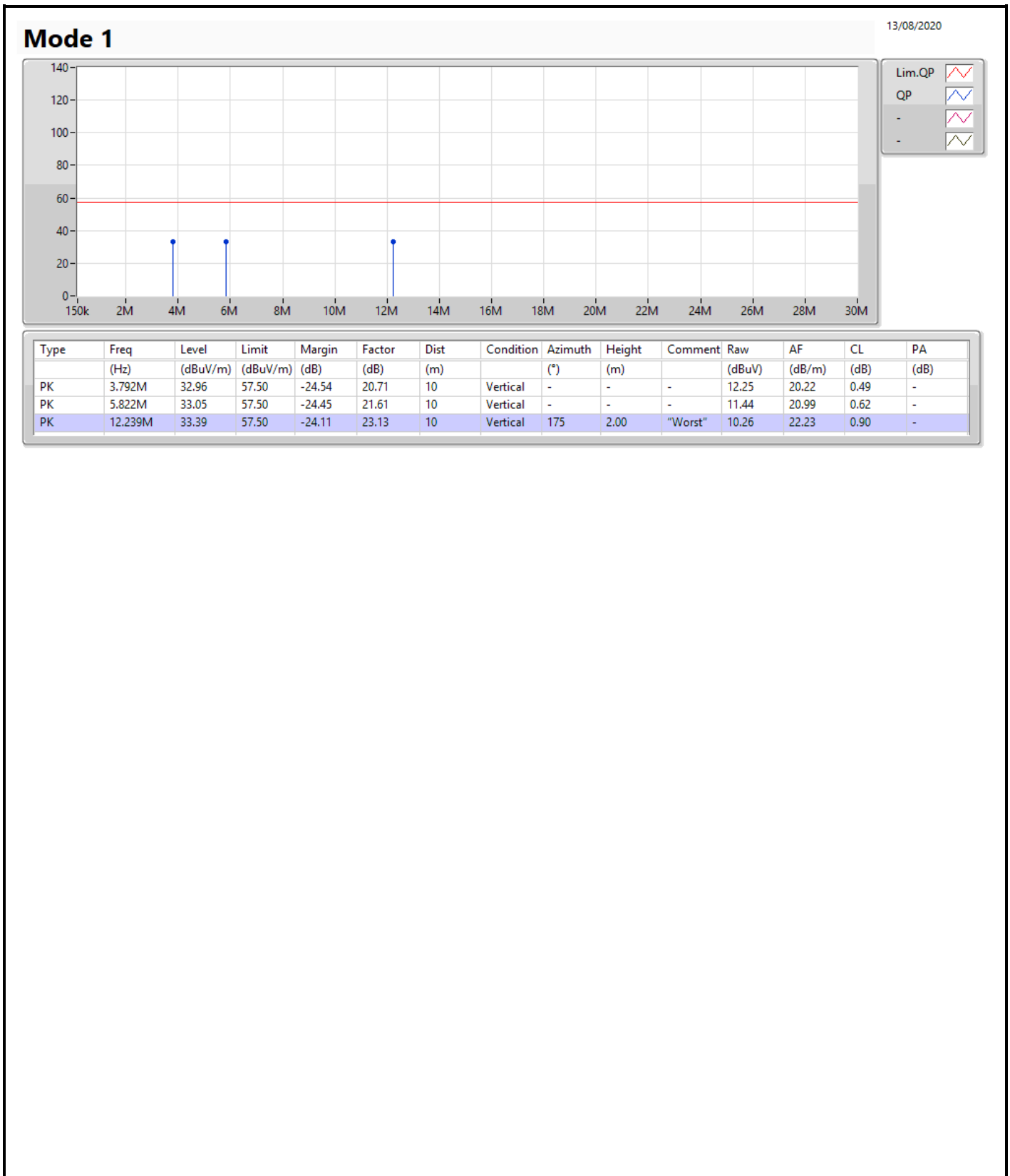


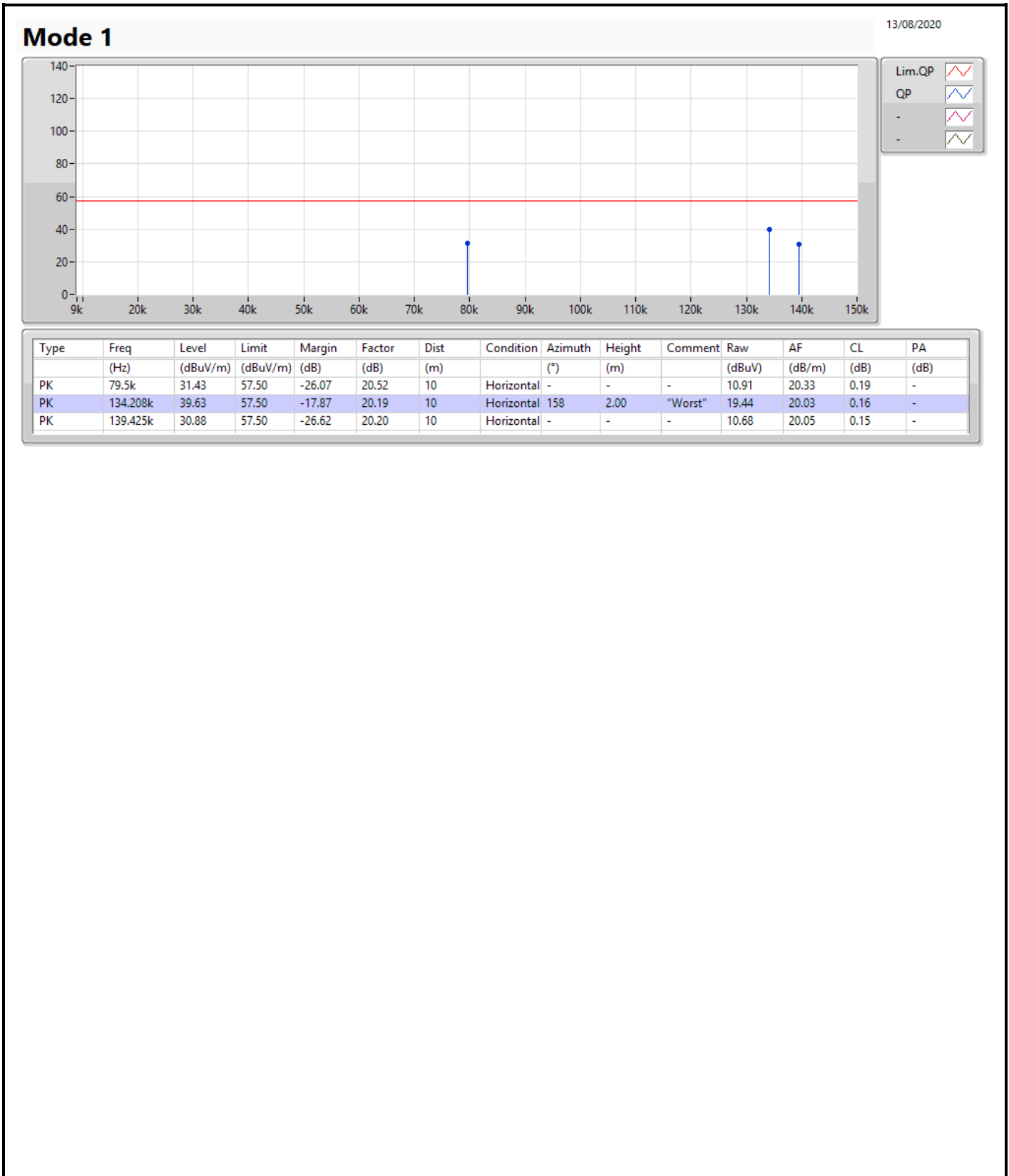


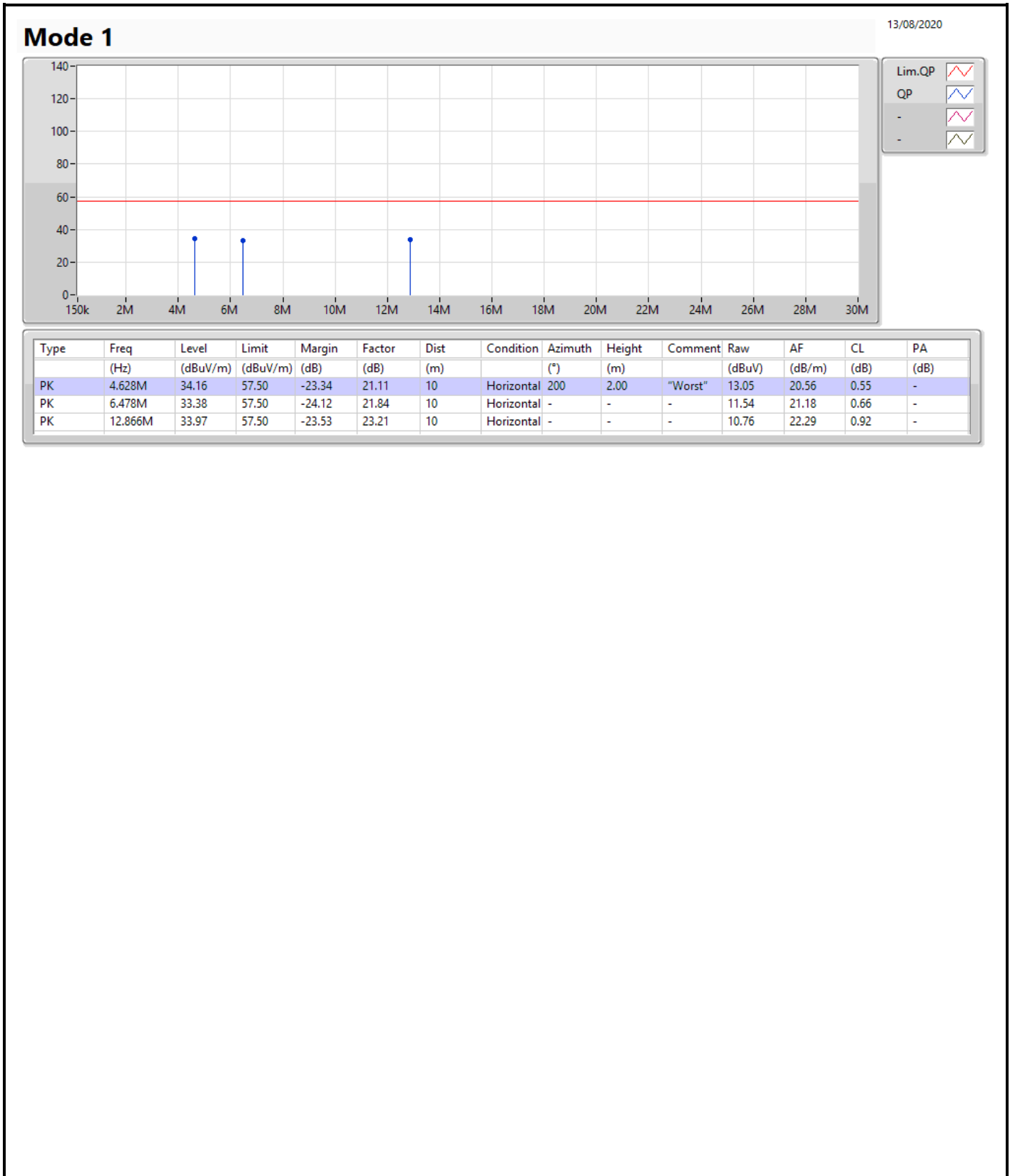
Summary

Mode	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Condition	Azimuth (°)	Height (m)
Mode 1	PK	134.208k	39.63	57.50	-17.87	20.19	Horizontal	158	2.00











Summary

Mode	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Condition	Azimuth (°)	Height (m)
Mode 1	PK	88.2M	32.17	67.96	-35.79	-15.42	Vertical	152	1.00
Mode 2	PK	84.32M	34.18	67.96	-33.78	-16.12	Vertical	177	1

