



FCC/ISED Canada

CERTIFICATION TEST REPORT

For the

Applicant : Sindoh Co., Ltd.
Product : USB Memory Stick
FCC ID : 2AB83-32GBMB032
Model : 32GB-MB032
Multiple Model : N/A
FCC Rule : CFR 47 Part 15 Subpart B Section 15.101
ISED Canada Rule : ICES-003 Issue 7 October 2020

We hereby certify that the above product has been tested by us with the listed rules and found in compliance with the regulation. The test data and results are issued on the test report no. **TR-W2108-003**

Signature


Choi, Young-min / Technical Manager

Date: 2021-08-18

Test Laboratory: ENG Co., Ltd.

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Report No.: TR-W2108-003

ENG Co., Ltd. 135-60 Gyeongchung-daero, Gonjam-eup, Gwangju-si, Gyeonggi-do, Korea 12813


Report Form_18 (Rev.0)

FCC & ISED Canada TEST REPORT

Project Number : EA2108C-022
Test Report Number : TR-W2108-003
Type of Equipment : USB Memory Stick
FCC ID : 2AB83-32GBMB032
Model Name : 32GB-MB032
Multiple Model Name : N/A
Applicant : Sindoh Co., Ltd.
Address : 3, Seongsu-ro24(isipsa)-gil, Seongdong-gu, Seoul 04797,
Republic of Korea
Manufacturer : Shenzhen Cheng Electronics Co.,Ltd.
Address : NO. 402, 4th Floor, Building A, Yiyuantong Industrial Park,
No.6 Zhonghao Avenue, Xiangjiaotang Community, Bantian Street,
Longgang District, Shenzhen, China
FCC Rule : FCC CFR 47 Part 15 Subpart B §15.101 Class B
ISED Canada Rule : ICES-003 Issue 7 October 2020
Total page of Report : 23 pages
Date of Receipt : 2021-08-10
Date of Issue : 2021-08-18
Test Result : Pass

This test report only contains the result of a single test of the sample supplied for the examination.
It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by Chu, Woo-sik / Senior Engineer

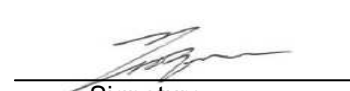


Signature

2021-08-18

Date

Reviewed by Choi, Young-min / Technical Manager



Signature

2021-08-18

Date

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Release Control Record

Issue Report No.	Issued Date	Details/Revisions
TR-W2108-003	2021-08-18	Initial Release

1. TEST SUMMARY

1.1 Test standards and results

The sample submitted for evaluation (Hereafter refer to as the EUT) has been tested in accordance with the following regulations or standards:

Agency	APPLICABLE SECTION	TEST DESCRIPTION	RESULTS
FCC	Part 15 Subpart B Section 15.107 (a)	AC Power Line Conducted Emission	PASS
	Part 15 Subpart B Section 15.109 (a)	Radiated Emission	PASS
ISED	ICES-003 Section 3.2.1 Table 1	AC Power Line Conducted Emission	PASS
	ICES-003 Section 3.2.2 Table 2, Table 4	Radiated Emission	PASS

1.2 Test Methodology

FCC: ANSI C 63.4:2014, FCC CFR 47 Part 2, and Part 15

ISED Canada: CAN/CSA-CISPR 32: 17, ANSI C63.4-2014 amended as per ANSI C63.4a-2017, ICES-Gen

1.3 Additions, deviations, exclusions from standards






No additions, deviations or exclusions have been made from standard.

1.4 Purpose of the test

To determine whether the equipment under test fulfills the FCC and ISED Canada Rules, Regulation and standards stated in section 1.1 and 1.2.

1.5 Test Facility

The measurement facilities are located at 135-60 Gyeongchung-daero, Gonjam-eup, Gwangju-si, Gyeonggi-do 12813, Korea. Our test facilities are accredited as a Conformity Assessment Body (CAB) by the FCC and ISED Canada, designated by the RRA (National Radio Research Agency), and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea and approved by TUV Rheinland, TUV SÜD and Korean Register of Shipping according to the requirement of ISO/IEC 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED Canada	12721A	
RRA	KR0160	
TUV Rheinland	UA 50314109-0002	
TUV SÜD	CARAT 094465 0004 Rev.00	
Korean Agency for Technology and Standards	KT733	
KOREAN REGISTER OF SHIPPING	PCT40841-TL001	

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2. EUT (Equipment Under Test) Description

The Sindoh Co., Ltd., Model 32GB-MB032 (referred to as the EUT in this report) is an USB Memory Stick, which shall be supplied with 3D printer by manufactured by an applicant. The product specification described herein was obtained from product data sheet or user's manual.

Brand name	fabWeaver
Kind of Device	USB Memory Stick (USB 3.0 Type)
Used Operating Freq. (MHz) in the EUT	(13.56, 31.868, 32.768, 160, 315) MHz
Memory size	32 G Byte
Transfer speed	Up to 5 Gbit/s
Remark. The transfer speed is 5 Gbit/s, so the test was performed up to 26.5 GHz.	

2.1 Additional Model

- None.

3. TEST CONDITION

3.1 Equipment Used During Test

The following peripheral devices and/or interface cables were connected during the measurement:

Description	Model No.	FCC ID	Serial No.	Manufacturer.
USB Memory Stick (EUT)	32GB-MB032	2AB83-32GBMB032	N/A	Shenzhen Change Electronics Co.,Ltd.
Notebook PC	Ideapad L3	DoC	N/A	Lenovo
Adapter for Notebook PC	ADL45WCE	DoC	N/A	CHICONY POWER TECHNOLOGY(SUZHOUCO.,LTD
Mouse	AA-SM7PCP	DoC	N/A	Acrox Technologies Co.,ltd

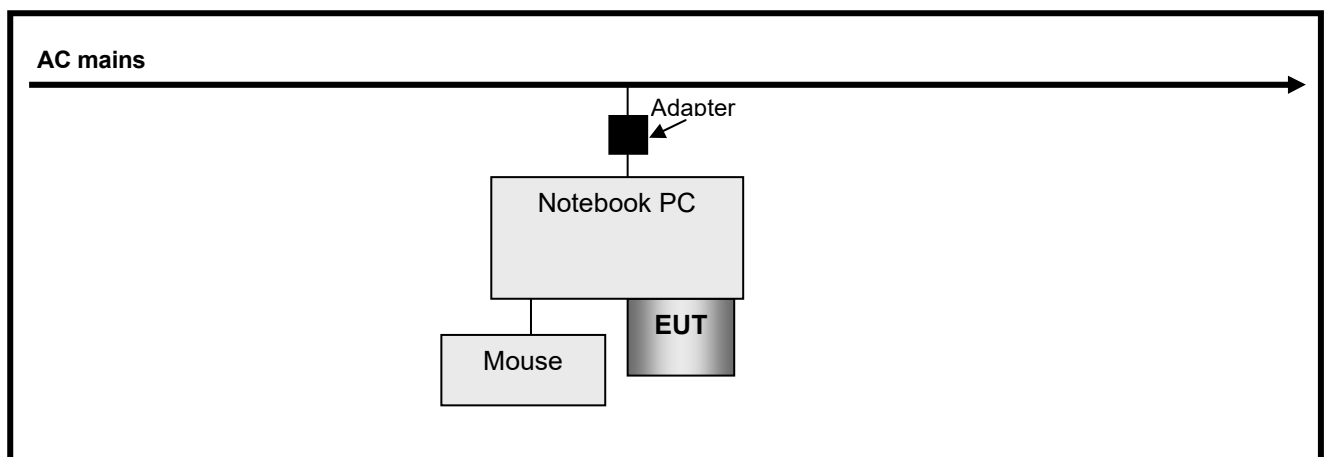
3.2 Cable Description

Description	Ports Name	Shielded (Y/N)	Ferrite Bead (Y/N)	Length (m)	Connected to
EUT	USB	-	-	-	Notebook PC

3.3 Mode of operation during the test

Test Mode	Description
# 1	The EUT was inserted into the USB port of the Notebook PC and then data read/write between the EUT and a Notebook PC was continuously operated during the test.

3.4 Test Setup Drawing



4. EUT Modifications

- No EMC Relevant Modifications were performed by this test laboratory.

5. EMISSION TESTS

5.1 AC Power Line Conducted Emission

5.1.1 Test setup

The EUT and all supporting equipments were placed on a non-metallic table approximately 0.8 m above the ground plane.

Power was fed to the EUT through a 50 Ω/50 μH + 5 Ω Line Impedance Stabilization Network (LISN) and all supporting equipments were connected to another LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient noise. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4:2014 7.3.3 to determine the worse operating conditions.

The test set-up photos are included in appendix I.


Used Software for measurement is EMC 32 supplied by Rohde&Schwarz.

5.1.2 Measurement uncertainty

Frequency range	Uncertainty
150 kHz ~ 30 MHz	2.17 dB

The measurement uncertainties are given with 95 % confidence.

5.1.3 Test Result

Date of Test	2021-08-10		
Temperature	(23.25 ± 0.05) °C	Relative humidity	(44.35 ± 0.05) % R.H.
Operating Input Voltage	120 Vac	Input Frequency	60 Hz
Frequency range	RBW	VBW	Detector Mode
0.15 MHz ~ 30 MHz	9 kHz	30 kHz	Peak , Q.P and/or Average
Test Mode	Mode #1		
Test Result	Pass	Tested By	Im, Jin-young 

5.1.4 Sample Calculated Example

At 8.31 MHz

QP Limit = 60.0 dBμV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 8.31 MHz = 9.7 dB

Q.P Reading from the Test receiver = 40.8 dBμV

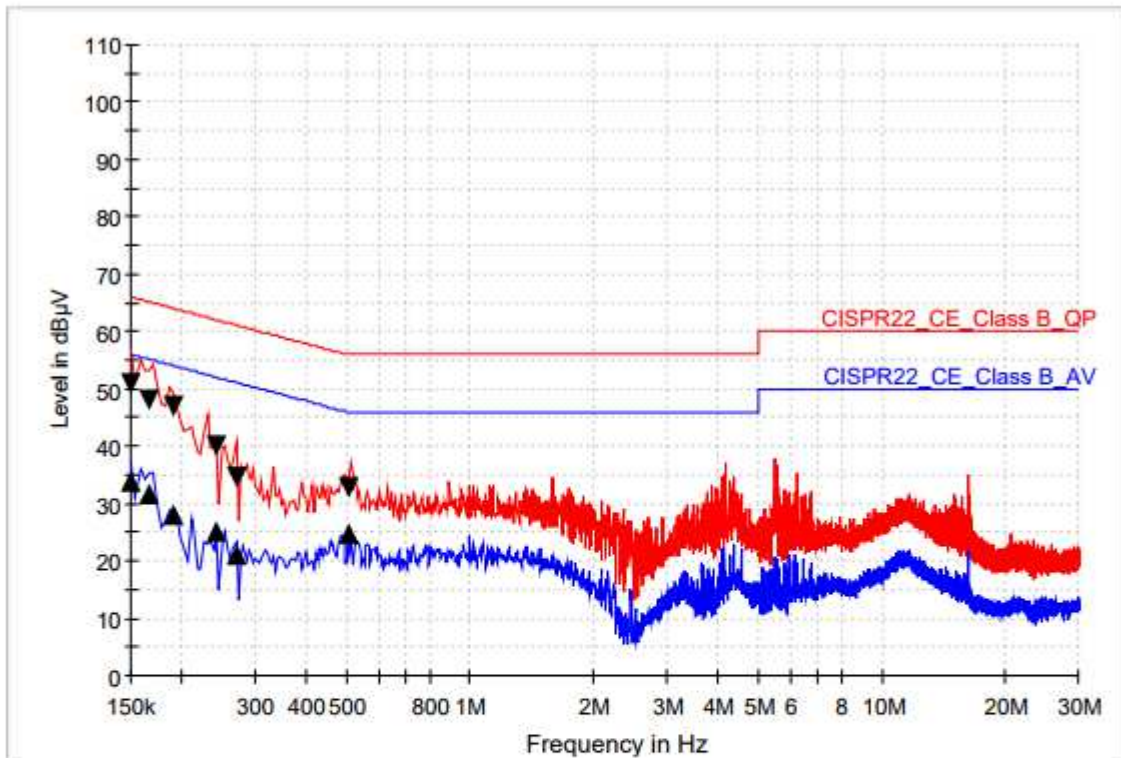
(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 60.0 - 40.8 = 19.2

so the EUT has 19.2 dB margin at 8.31 MHz

5.1.5 Test Data

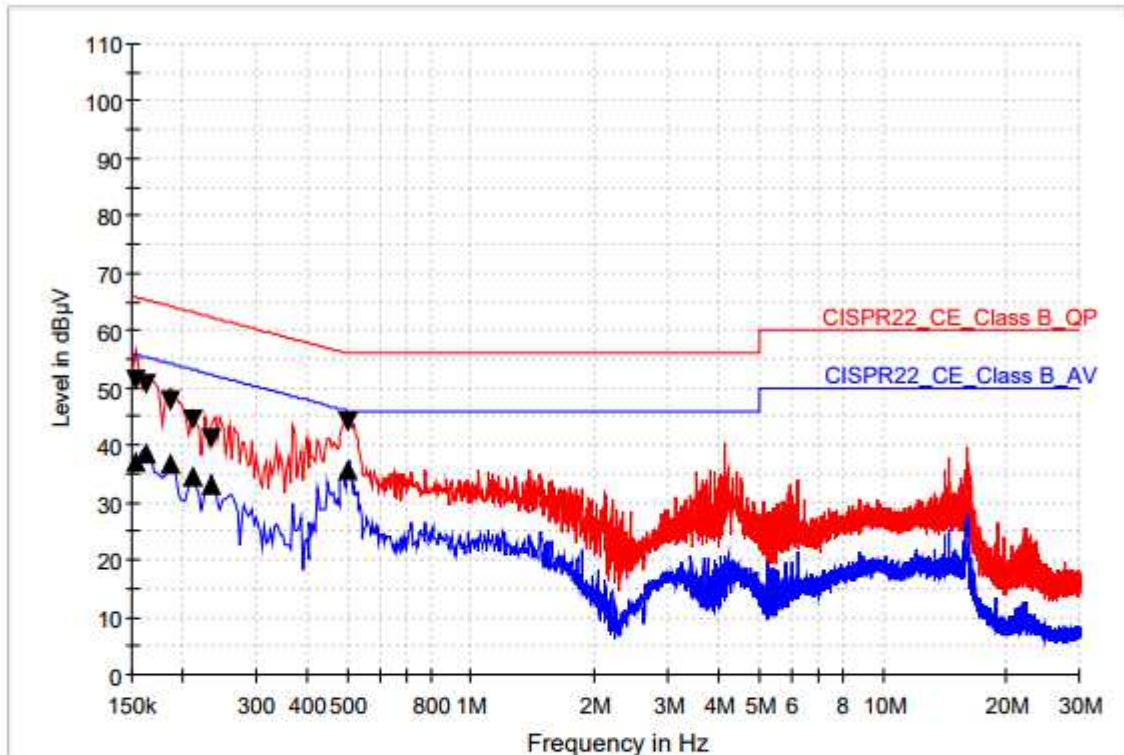
HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.150000	51.1	33.7	9.000	L1	9.6	14.9	66.0	22.3	56.0
0.166000	48.2	31.7	9.000	L1	9.6	16.9	65.2	23.5	55.2
0.190000	46.8	28.2	9.000	L1	9.6	17.2	64.0	25.9	54.0
0.242000	40.2	25.0	9.000	L1	9.6	21.8	62.0	27.1	52.0
0.270000	34.8	21.1	9.000	L1	9.6	26.3	61.1	30.0	51.1
0.506000	32.7	24.6	9.000	L1	9.6	23.3	56.0	21.4	46.0

NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.154000	51.5	37.3	9.000	N	9.6	14.3	65.8	18.5	55.8
0.162000	50.7	38.6	9.000	N	9.6	14.7	65.4	16.7	55.4
0.186000	47.6	36.8	9.000	N	9.6	16.7	64.2	17.4	54.2
0.210000	44.4	34.8	9.000	N	9.6	18.8	63.2	18.4	53.2
0.234000	41.1	33.3	9.000	N	9.6	21.2	62.3	19.0	52.3
0.502000	44.1	35.8	9.000	N	9.6	11.9	56.0	10.2	46.0

5.2 Radiated Emission

5.2.1 Test setup

The radiated emissions measurements were in the 3/10 m, Semi Anechoic Chamber. The EUT and all local supporting equipments were placed on a non-conductive table approximately 0.8 m above the ground plane.

The frequency spectrum from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33 was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2014 8.3.1.1 below 1 000 MHz, 8.3.1.2 above 1 GHz to determine the worse operating conditions

Measurement distance between the EUT and an antenna was as below table.

Frequency range (MHz)	Measurement Distance	
	Class B Device	Class A Device
Below 1 000 MHz	3 m	10 m
Above 1 000 MHz	3 m	3 m

The test set-up photos are included in appendix II.

Used Software for measurement is manufactured by TSJ.

5.2.2 Measurement frequency range

Highest frequency generated or used in the device or on which the device operates or tunes	Upper Frequency of Measurement range (MHz)
Below 1.705 MHz	30
(1.705 ~ 108) MHz	1 000
(108 ~ 500) MHz	2 000
(500 ~ 1 000) MHz	5 000
Above 1 000 MHz	5th harmonic of the highest freq. or 40 GHz, whichever is lower


The measurement uncertainties are given with 95 % confidence.

5.2.3 Measurement uncertainty

Frequency range	Uncertainty
Below 1 000 MHz	4.30 dB
Above 1 000 MHz	4.67 dB

The measurement uncertainties are given with 95 % confidence.

5.2.4 Test result

Date of Test	2021-08-10		
Temperature	(24.35 ± 0.05) °C	Relative humidity	(46.35 ± 0.05) % R.H.
Operating Input Voltage	120 Vac	Input Frequency	60 Hz
Frequency range	RBW	VBW	Detector Mode
Below 1 000 MHz	120 kHz	300 kHz	Peak or Q.P.
Date of Test	2021-08-10		
Temperature	(24.1 ± 0.1) °C	Relative humidity	(46.05 ± 0.05) % R.H.
Frequency range	RBW	VBW	Detector Mode
Above 1 000 MHz	1 MHz	1 MHz or 10 Hz	Peak or Average
Measurement distance	3 m		
Test Mode	Mode #1		
Test Result	Pass	Tested By	Im, Jin-young 

5.2.5 Sample Calculated Example

At 80 MHz

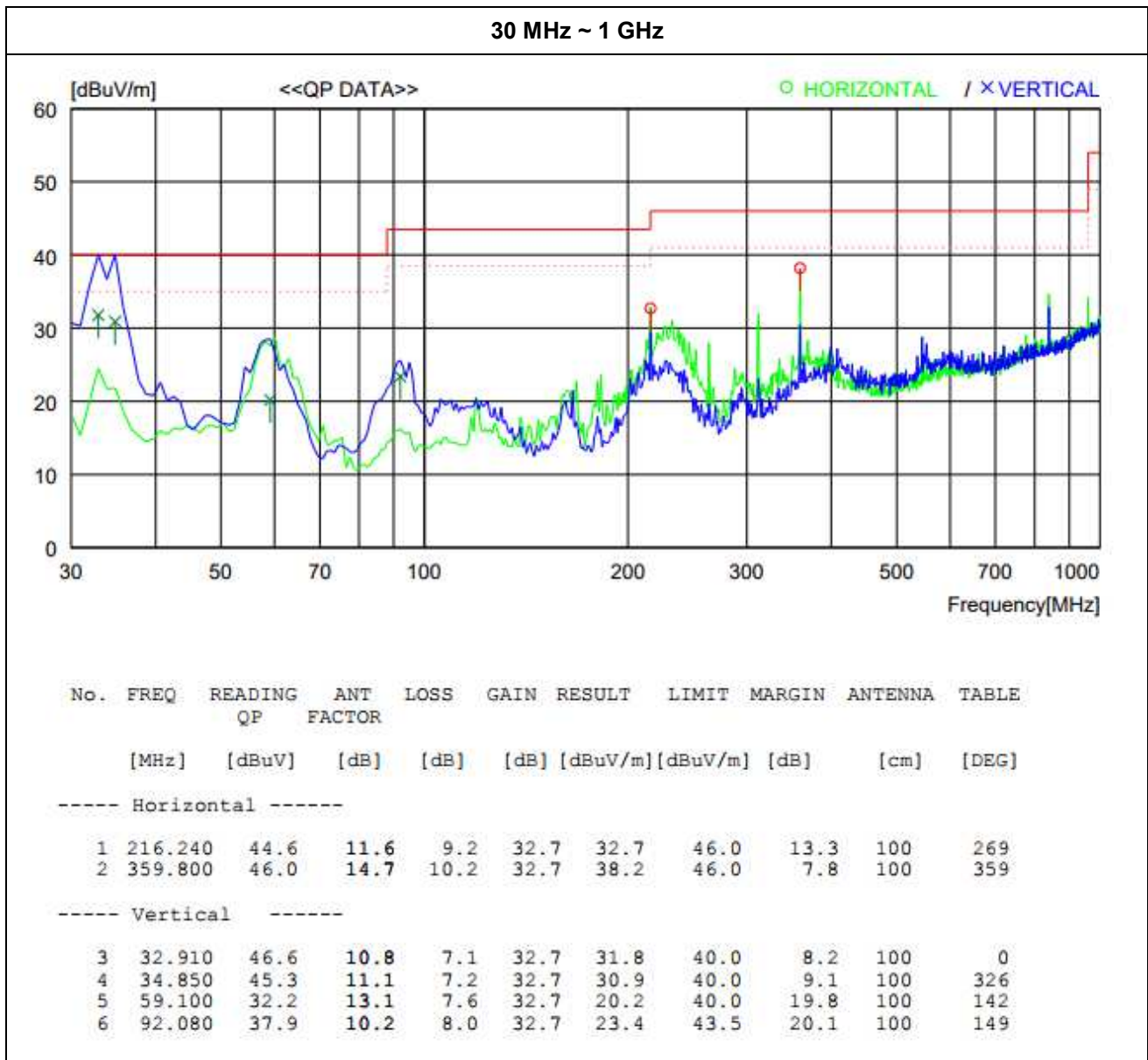
Limit = 40.0dB μ V/m

Result = Receiver reading value + Antenna Factor + Cable Loss - Pre-amplifier gain = 30.0 dB μ V/m

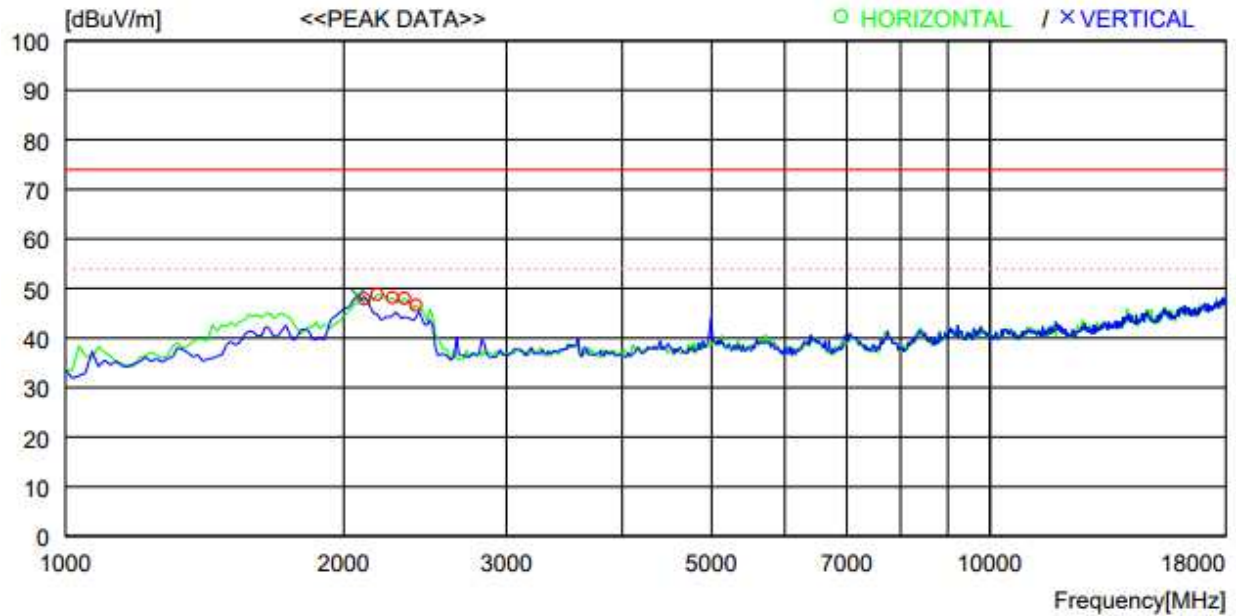
Margin = Limit - Result = 40.0 – 30.0 = 10.0

so the EUT has 10.0 dB margin at 80 MHz

5.2.6 Test Data



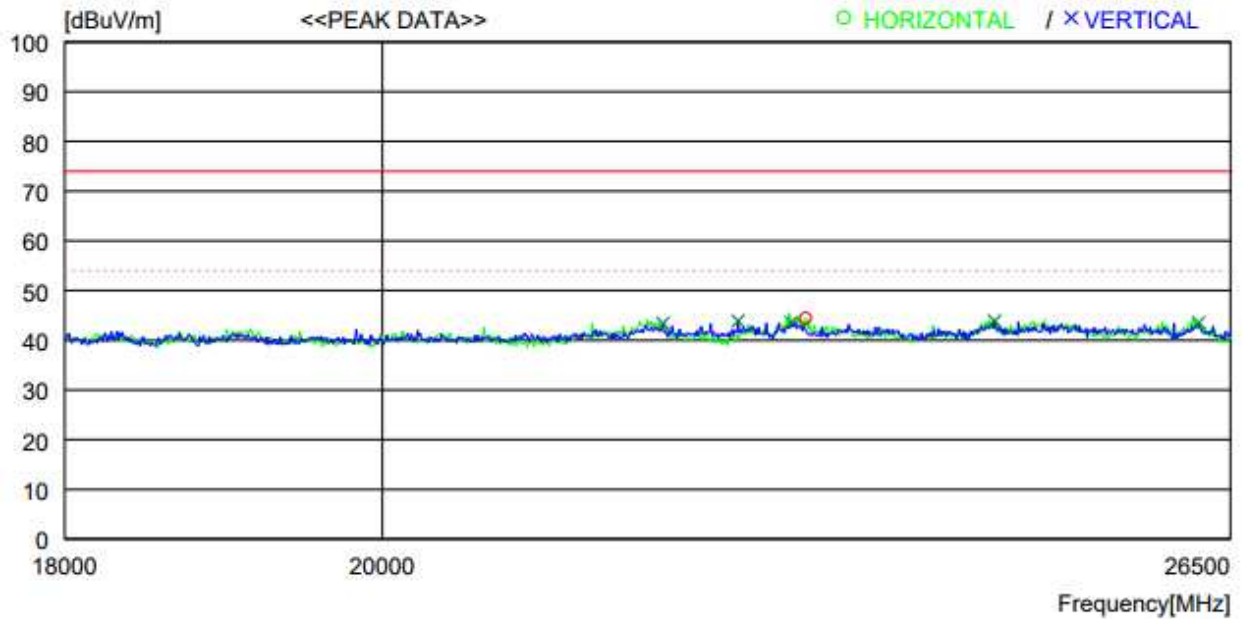
1 GHz - 18 GHz



No.	FREQ [MHz]	READING [dBuV]	ANT PEAK FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	2105.000	56.6	28.6	2.4	39.7	47.9	74.0	26.1	100	58
2	2173.000	57.4	28.7	2.4	39.7	48.8	74.0	25.2	100	73
3	2258.000	56.4	28.9	2.5	39.7	48.1	74.0	25.9	100	359
4	2326.000	56.2	29.0	2.5	39.7	48.0	74.0	26	100	359
5	2394.000	54.7	29.1	2.5	39.7	46.6	74.0	27.4	100	65
----- Vertical -----										
6	2071.000	57.3	28.5	2.4	39.7	48.5	74.0	25.5	300	287

NOTE: Average mode was not measured, because Peak values were under the Average limit.

18 GHz - 26.5 GHz



No.	FREQ [MHz]	READING [dBuV]	ANT PEAK FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	23015.000	46.9	38.9	12.6	54.0	44.4	74.0	29.6	100	2
----- Vertical -----										
2	21952.500	49.2	38.2	12.4	56.4	43.4	74.0	30.6	100	344
3	22505.000	48.5	38.5	12.4	55.5	43.9	74.0	30.1	100	321
4	22904.500	46.5	38.8	12.5	54.3	43.5	74.0	30.5	100	359
5	24502.500	42.7	38.9	13.0	50.7	43.9	74.0	30.1	100	350
6	26219.500	44.4	39.1	13.3	53.3	43.5	74.0	30.5	100	280

NOTE: Average mode was not measured, because Peak values were under the Average limit.

Appendix I - Test Instrumentation

Name of Equipment	Model Number	Manufacturer	Serial Number	Last Cal. (Interval)	USE
For EMISSION					
Test Receiver	ESR 7	Rohde & Schwarz	101543	2021-07-16 (1Y)	■
LISN	ENV4200	Rohde & Schwarz	100203	2021-01-15 (1Y)	□
LISN	ENV216	Rohde & Schwarz	100110	2021-01-14 (1Y)	■
LISN	LS16C	AFJ	16011403310	2021-07-16 (1Y)	□
8-Wire ISN CAT 3	CAT3 8158	Schwarzbeck	CAT3 8158 #70	2021-01-18(1Y)	□
8-Wire ISN CAT 5	CAT5 8158	Schwarzbeck	CAT5 8158 #126	2021-01-18(1Y)	□
8-Wire ISN CAT 6	NTFM 8158	Schwarzbeck	NTFM 8158 #95	2021-01-18(1Y)	□
Test Receiver	ESU	Rohde & Schwarz	100303	2021-01-14 (1Y)	■
TRILog Broadband Antenna	VULB9163	Schwarzbeck	9163-799	2019-11-12(2Y)	■
DOPPEL STEG HORN Antenna	HF 907	Rohde & Schwarz	102426	2020-10-29(1Y)	■
Preamp (1-18) GHz	SCU 18D	Rohde & Schwarz	19006450	2021-04-15(1Y)	■
Preamp 9 kHz-1 GHz	310N	Sonoma Instrument	344015	2021-01-14(1Y)	■
Attenuators	6 dB	Rohde & Schwarz	272.4110.50	2021-01-14(1Y)	■
Antenna Master	MA4000-EP	INNCO SYSTEM	4600814	N/A	■
Antenna Master	MA4000-XP-ET	INNCO SYSTEM	N/A	N/A	■
Turn Table	DT3000-3t	INNCO SYSTEM	1310814	N/A	■
CO3000 Controller	CO3000-4PORT	INNCO SYSTEM	CO3000/806/34130 814/L	N/A	■
CO3000 Controller	CO3000-4PORT	INNCO SYSTEM	CO3000/807/34130 814/L	N/A	■
Horn Antenna	BBHA 9170	Schwarzbeck	BBHA 9170 #783	2020-10-29(1Y)	■
PRE AMPLIFIER	CBL18265035	CERNEX	28706	2021-03-09(1Y)	■
Digital Power Analyzer For Harmonic & Flicker	DPA 500	EM Test	V0713102356	2021-01-19 (1Y)	□
AC Power Source	ACS 500	EM Test	V0713102357	2021-07-16 (1Y)	□

The above measuring equipments have been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.