



TECHNICAL COMPLIANCE STATEMENT

For the

Product : S-DAQ
Model : SRC-BAMVC2
FCC ID : 2AN5BSRC-BAMVC2
Multiple Model : SRC-BAMVE2
Applicant : SEMES CO., LTD.
FCC Rule : CFR 47 Part 15 Subpart B

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-W1711-024**

Signature

A handwritten signature in black ink, appearing to read "Choi, Young-min".

Choi, Young-min / Technical Manager

Date: 2017-11-28

Test Laboratory: ENG Co., Ltd.

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FC TEST REPORT

Project Number : EA1710C-008
Test Report Number : TR-W1711-024
Type of Equipment : S-DAQ
Model Name : SRC-BAMVC2
FCC ID : 2AN5BSRC-BAMVC2
Multiple Model Name : SRC-BAMVE2
Kind of Authorization : Supplier's Declaration of Conformity
Applicant : SEMES CO., LTD.
Address : 77, 4sandan 5-gil, Jiksan-eup Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Manufacturer : SEMES CO., LTD.
Address : 77, 4sandan 5-gil, Jiksan-eup Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
FCC Rule : FCC CFR 47 Part 15 Subpart B Class B
Total page of Report : 36 pages
Date of Receipt : 2017-10-11
Date of Issue : 2017-11-28
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

2017-11-28

Date

Reviewed by Choi, Young-min / Technical Manager

Signature

2017-11-28

Date

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Release Control Record

Issue Report No.	Issued Date	Revisions	Effect Section
TR-W1711-024	2017-11-28	Initial Release	All

1. TEST SUMMARY

1.1 Test standards and results

The Equipment Under Test (referred to as the EUT in this report) has been tested according to the following specifications:

Equipment Authorization Procedure		Supplier's Declaration of Conformity
Type of Device		Class B Personal computers and peripherals
APPLICABLE SECTION	TEST DESCRIPTION	RESULTS
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

1.2. Test Methodology

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

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 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. Description details of test facilities were submitted to the ISED, Canada, accredited as a Conformity Assessment Body (CAB) by the FCC, designated by the RRA (Radio Research Agency), and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea and approved by TUV Rheinland and TUV SÜD according to the requirement of ISO 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED (Canada)	IC 12721A-1	
RRA	KR0160	
TUV Rheinland	UA 50314109-0002	
TUV SÜD	CARAT 15 12 94465 002	
Korean Agency for Technology and Standards	KT733	

2. EUT (Equipment Under Test) Description

The SEMES CO., LTD., Model SRC-BAMVC2 (referred to as the EUT in this report) is a S-DAQ. The product specification described herein was obtained from product data sheet or user's manual.

Sensor Type	ADC & Serial Interface
Function	Voltage Measurement & RS-232
Measurement Range	± 10 V
DAQ SNR	89 dB
Channel	ADC: 40Channel, RS-232: 9Channel
Resolution	0.378 μ V / LSB
DAQ Data Rate	1 / 2 / 4 / 8 kHz
Baud-Rate	9600 / 19200 / 38400 / 57600 / 115200
Operation Temperature	5 $^{\circ}$ C ~ 50 $^{\circ}$ C
Wireless Function	IEEE 802.11 a/b/g
Rated Input Power	24 Vdc (± 2.4 V), 500 mA

2.1 Additional Model

Model Name	Model Difference
SRC-BAMVC2	Basic Model
SRC-BAMVE2	SRC-BAMVE2 is identical to SRC-BAMVC2 except for model designation and without RS232 Board
NOTE: The Manufacturer has declared to all the additional model names into basic model name without any further evaluation by ENG Co., Ltd.	

2.2 Mode of operation during the test

For finding worse case configuration and operating mode, the EUT was operated as following test mode.

Test Mode	Description
# 1	The battery was connected to the EUT, basic model: SRC-BAMVC2 and then battery voltage information was transferred to the notebook PC and communication status between the EUT and a notebook PC was monitored using software, Comport Master program supplied by an applicant..
# 2	The battery was connected to the EUT, basic model: SRC-BAMVE2 and then battery voltage information was transferred to the notebook PC and communication status between the EUT and a notebook PC was monitored using software, Comport Master program supplied by an applicant.

2.3 Description of supported units

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

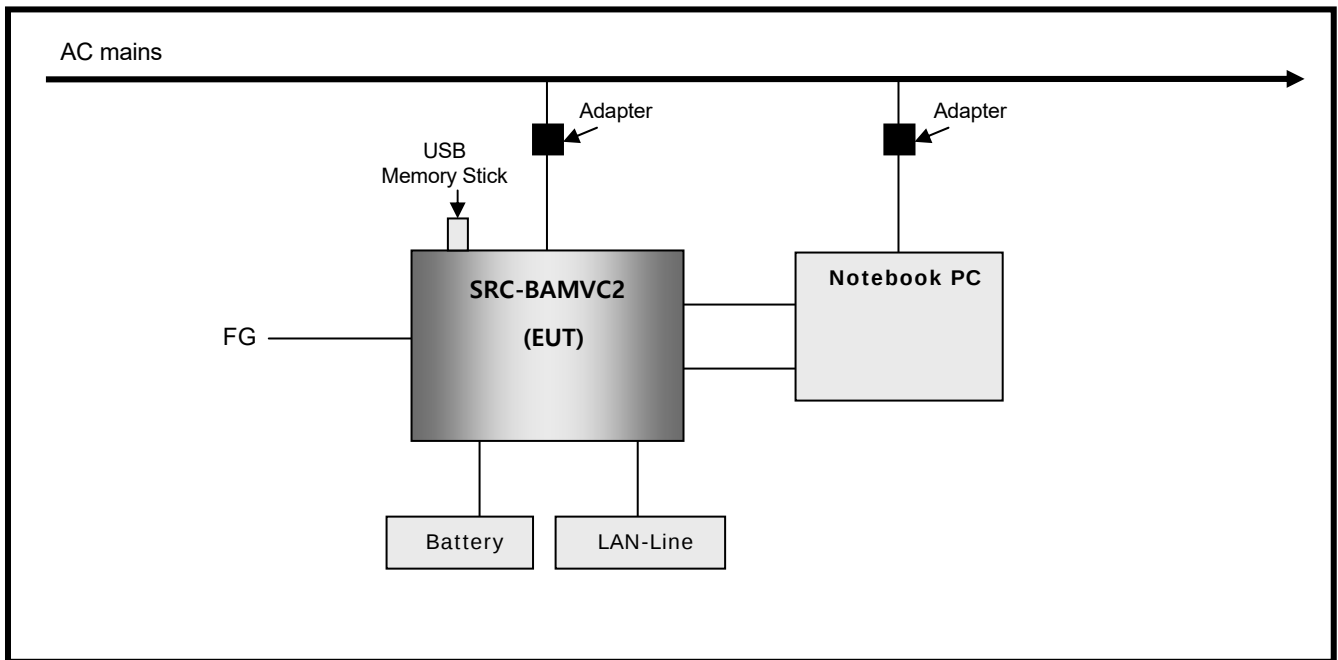
Description	Model No.	Serial No.	Manufacturer.
S-DAQ (EUT)	SRC-BAMVC2	N/A	SEMES CO., LTD.
Adapter for EUT	TY-800	N/A	Taeyoung Electronics
Battery	N/A	N/A	N/A
Notebook PC	LG15U34	411NZLL052440	LG Electronics Inc.
Adapter for Notebook PC	ADS-40MSG-19	N/A	Shenzhen Honor Electronic Co., Ltd.
USB Memory Stick	SDCZ250	N/A	SanDisk

2.4 Cable Description

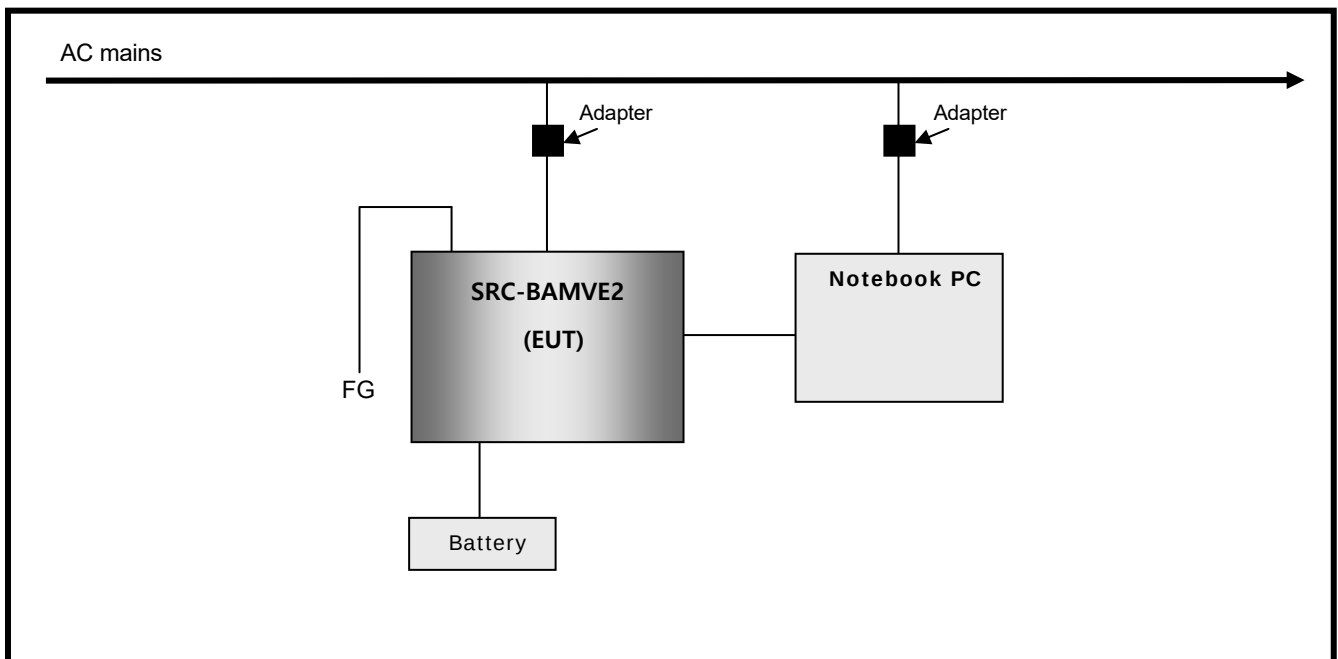
Test Mode	Ports Name	Shielded (Y/N)	Ferrite Bead (Y/N)	Length (m)	Connected to
Mode #1	DC IN	N	Y	1.8	Adapter
	RS-232	Y	Y	2.0	Notebook PC
	ADC	Y	N	1.5	Battery
	USB	-	-	-	USB Memory stick
	LAN1	Y	Y	2.0	Notebook PC
	LAN2	Y	N	3.0	Line
	Flame Ground	N	Y	2.5	Ground plane
Mode #2	DC IN	N	Y	1.8	Adapter
	ADC	Y	N	1.5	Battery
	LAN1	Y	Y	2.0	Notebook PC
	Flame Ground	N	Y	2.5	Ground plane

2.5 Test Setup Drawing

[Mode #1]



[Mode #2]



3. EMISSION TESTS

3.1 AC Power Line Conducted Emission

3.1.1 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 $50\ \Omega/50\ \mu\text{H} + 5\ \Omega$ 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.

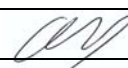
Used Software for measurement is EMC 32 supplied by Rohde&Schwarz.

3.1.2 Measurement uncertainty

Frequency range	Val. acc. CISPR 16-4-2
150 kHz ~ 30 MHz	$\pm 2.07\ \text{dB}$

The measurement uncertainties are given with 95 % confidence.

3.1.3 Test Result

Date of Test	2017-11-02		
Temperature	23.4 °C	Relative humidity	43.1 % R.H.
Operating Input Voltage	120 Vac	Input Frequency	60 Hz
Frequency range	Resolution Bandwidth	Video Bandwidth	Detector Mode
0.15 MHz ~ 30 MHz	9 kHz	30 kHz	Peak , Q.P and/or Average
Test Mode	Mode #1, Mode #2		
Test Result	Pass	Tested By	Shin, Jae-young 

3.1.4 Sample Calculated Example

At 5.31 MHz

QP Limit = 60.0 dBuV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 5.31 MHz = 9.7 dB

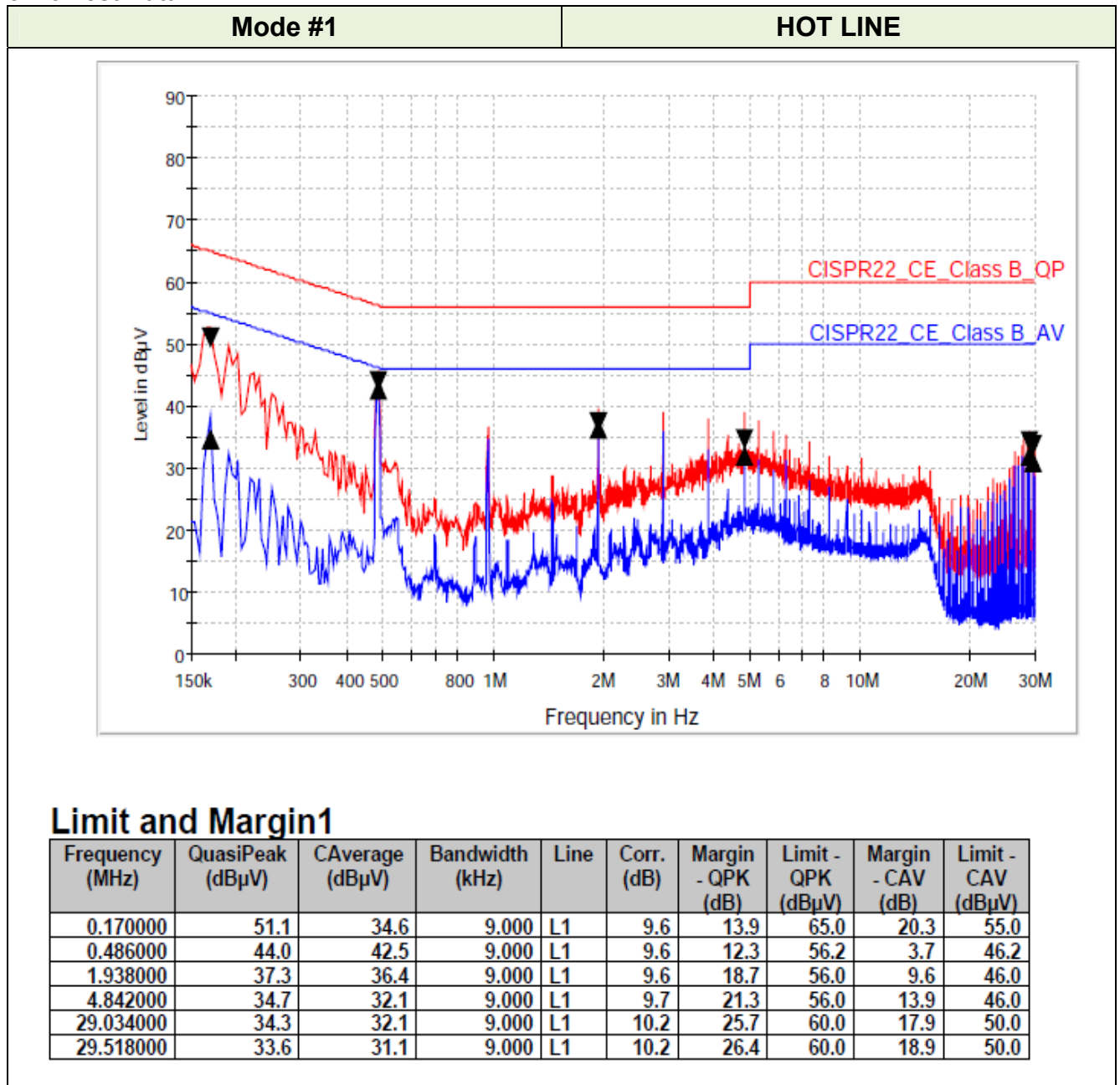
Q.P Reading from the Test receiver = 20.8 dBuV

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

Therefore Q.P Margin = $60 - 20.8 = 39.2$

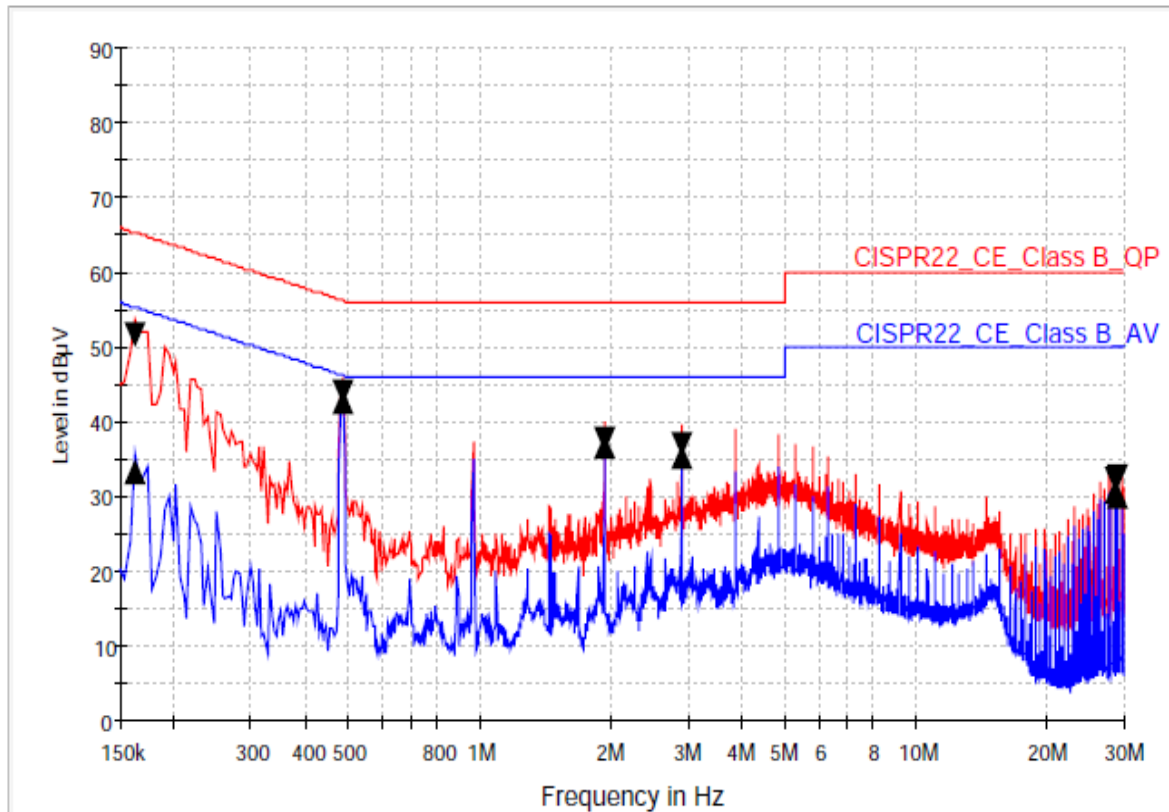
so the EUT has 39.2 dB margin at 5.31 MHz

3.1.5 Test Data



Mode #1

NEUTRAL LINE

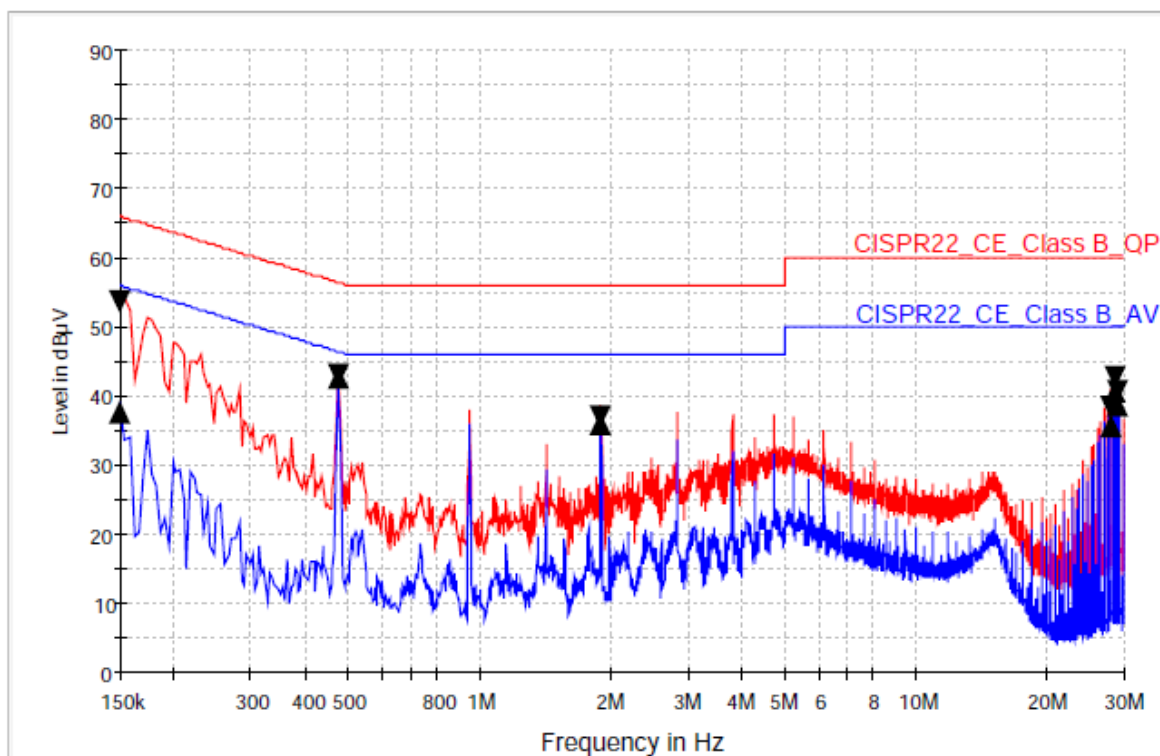


Limit and Margin1

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)	Margin - CAV (dB)	Limit - CAV (dBμV)
0.162000	51.7	33.4	9.000	N	9.6	13.7	65.4	22.0	55.4
0.486000	44.0	42.8	9.000	N	9.6	12.3	56.2	3.4	46.2
1.938000	37.5	36.6	9.000	N	9.6	18.5	56.0	9.4	46.0
2.906000	37.0	35.4	9.000	N	9.7	19.0	56.0	10.6	46.0
28.554000	32.5	30.8	9.000	N	10.2	27.5	60.0	19.2	50.0
29.034000	32.6	30.0	9.000	N	10.2	27.4	60.0	20.0	50.0

Mode #2

HOT LINE

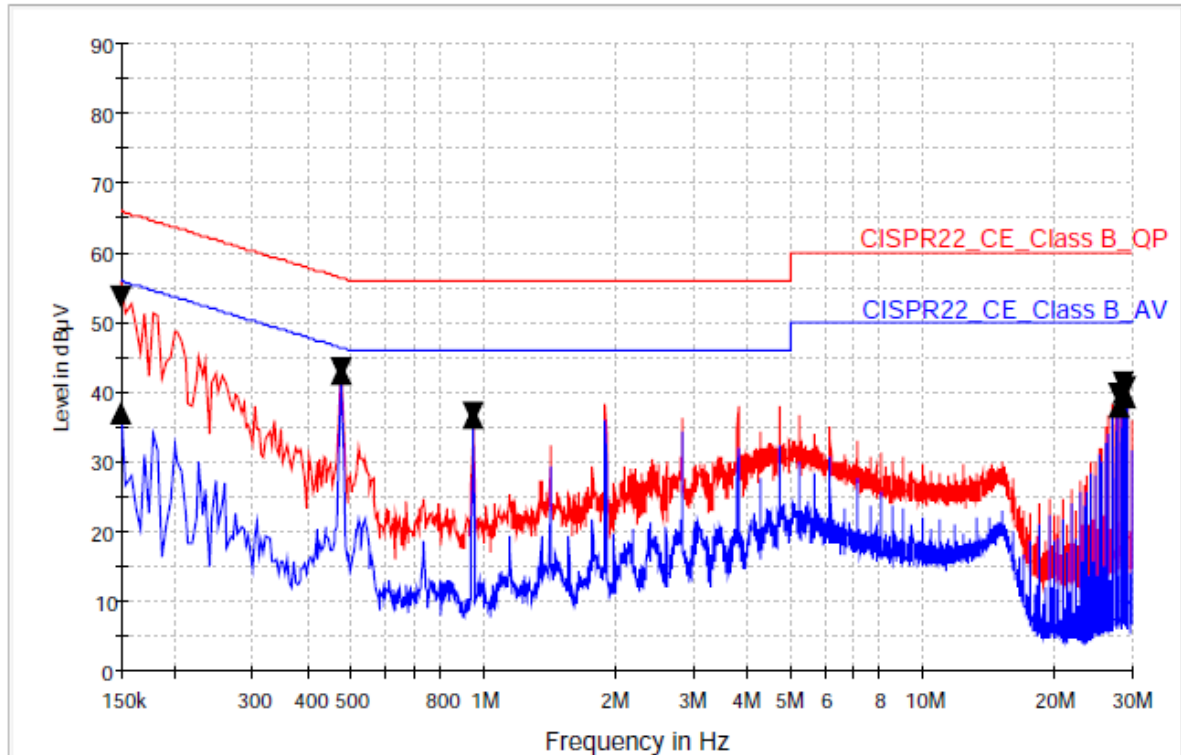


Limit and Margin1

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	53.6	37.8	9.000	L1	9.6	12.4	66.0	18.2	56.0
0.474000	43.0	42.6	9.000	L1	9.6	13.5	56.4	3.8	46.4
1.902000	36.9	36.0	9.000	L1	9.6	19.1	56.0	10.0	46.0
28.038000	38.3	35.7	9.000	L1	10.2	21.7	60.0	14.3	50.0
28.510000	42.7	40.8	9.000	L1	10.2	17.3	60.0	9.2	50.0
28.986000	40.6	38.7	9.000	L1	10.2	19.4	60.0	11.3	50.0

Mode #2

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)
0.150000	53.8	37.0	9.000	N	9.6	12.2	66.0	19.0	56.0
0.474000	43.3	42.8	9.000	N	9.6	13.2	56.4	3.7	46.4
0.950000	37.1	36.4	9.000	N	9.6	18.9	56.0	9.6	46.0
28.034000	39.6	38.0	9.000	N	10.2	20.4	60.0	12.0	50.0
28.510000	41.4	39.9	9.000	N	10.2	18.6	60.0	10.1	50.0
28.510000	41.4	40.0	9.000	N	10.2	18.6	60.0	10.0	50.0
28.986000	40.8	39.4	9.000	N	10.2	19.2	60.0	10.6	50.0

3.2 RADIATED EMISSION

3.2.1 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 3 m..

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

Used Software for measurement is manufactured by TSJ.

3.2.2 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

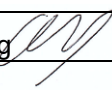
The measurement uncertainties are given with 95 % confidence.

3.2.3 Measurement uncertainty

Frequency range	Val. acc. CISPR 16-4-2
Below 1 000 MHz	± 4.66 dB
Above 1 000 MHz	± 4.75 dB

The measurement uncertainties are given with 95 % confidence.

3.2.4 Test result

Date of Test	2017-11-03, 11-16			
Temperature	(17.4, 23.7) °C	Relative humidity	(52.6, 38.9) % R.H.	
Operating Input Voltage	120 Vac	Input Frequency	60 Hz	
Frequency range	Resolution Bandwidth	Video Bandwidth	Detector Mode	Measurement distance
Below 1 000 MHz	100 kHz or 120 kHz	300 kHz	Peak or Q.P.	3 m
Above 1 000 MHz	1 MHz	1 MHz or 10 Hz	Peak or Average	3 m
Test Mode	Mode #1, Mode #2			
Test Result	Pass	Tested By	Shin, Jae-young 	

3.2.5 Sample Calculated Example

At 80 MHz

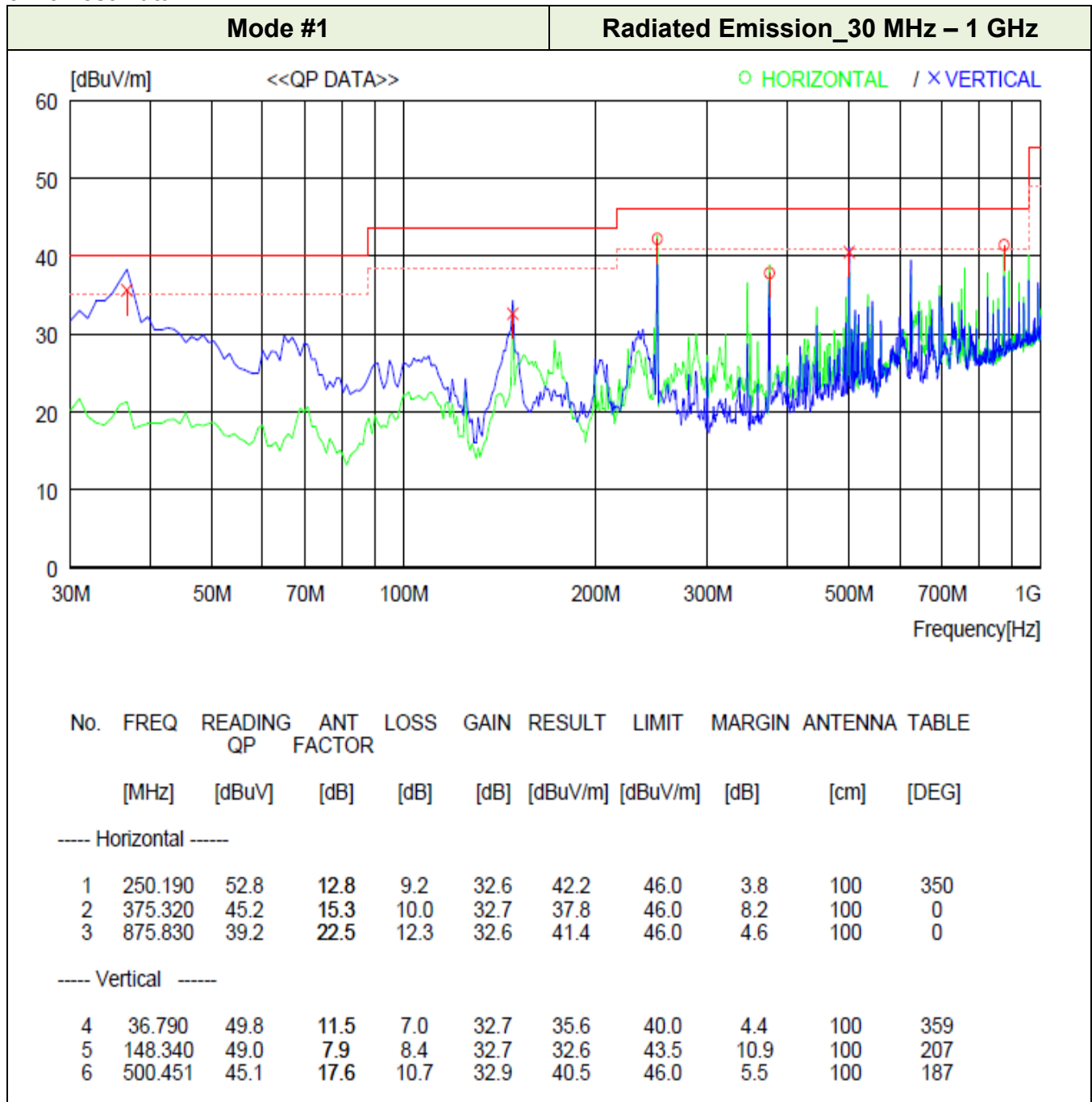
Limit = 40.0 dBuV/m

Result = Receiver reading value + Antenna Factor + Cable Loss - Pre-amplifier gain = 30 dBuV/m

Margin = Limit - Result = 40 - 30 = 10

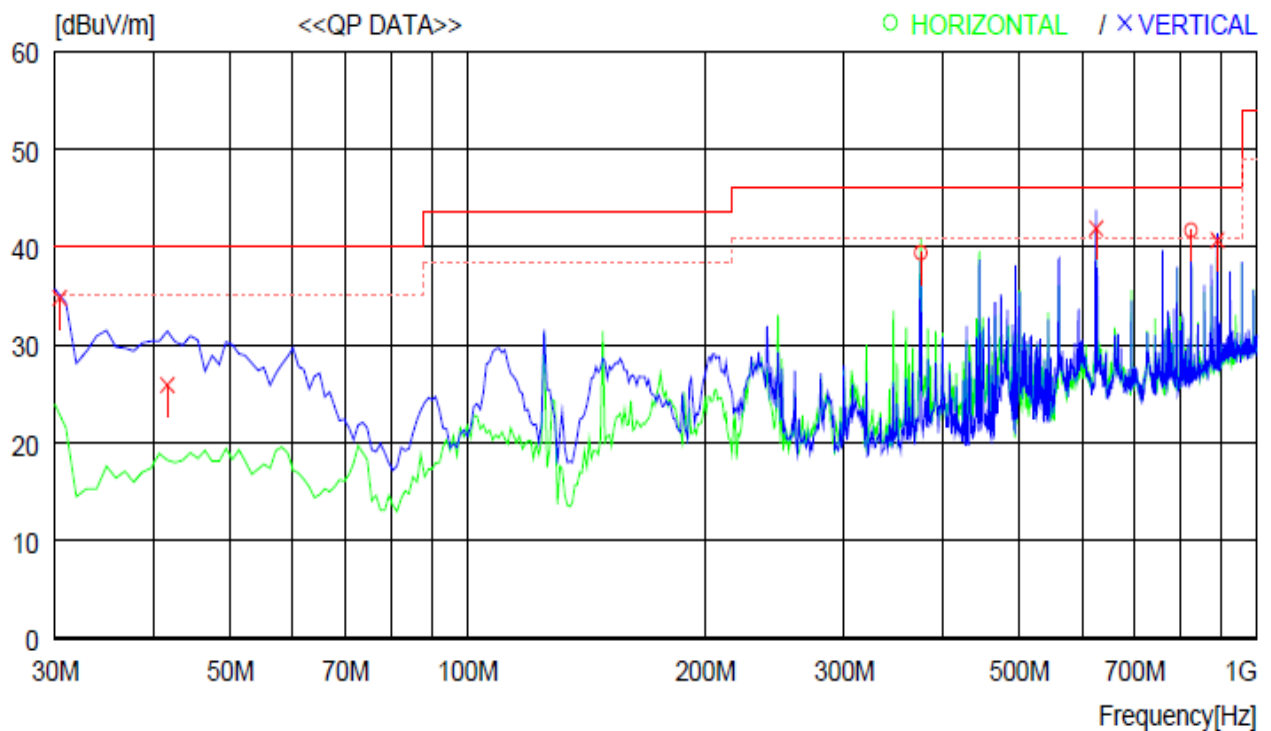
so the EUT has 10.0 dB margin at 80 MHz

3.2.6 Test Data

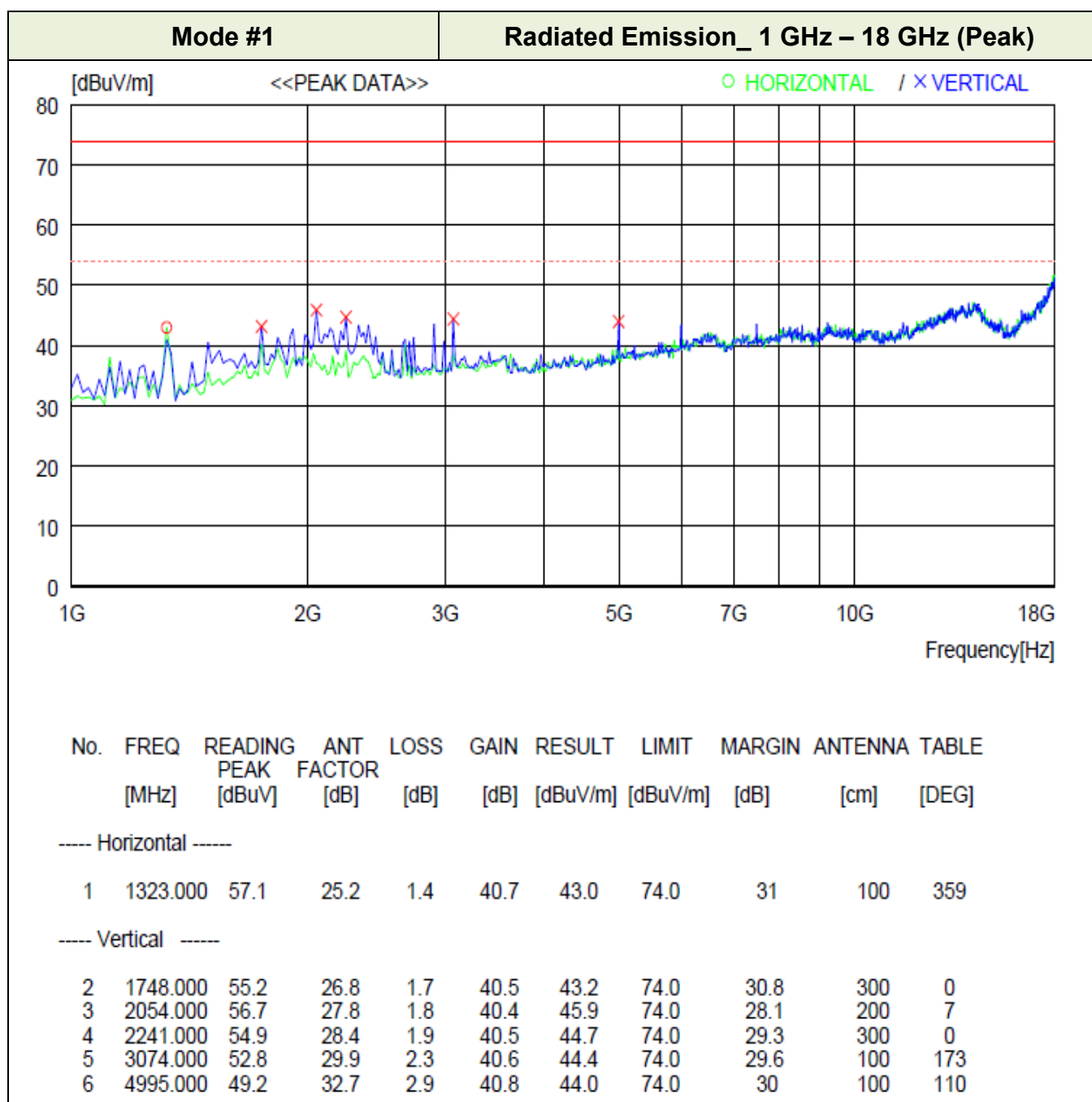


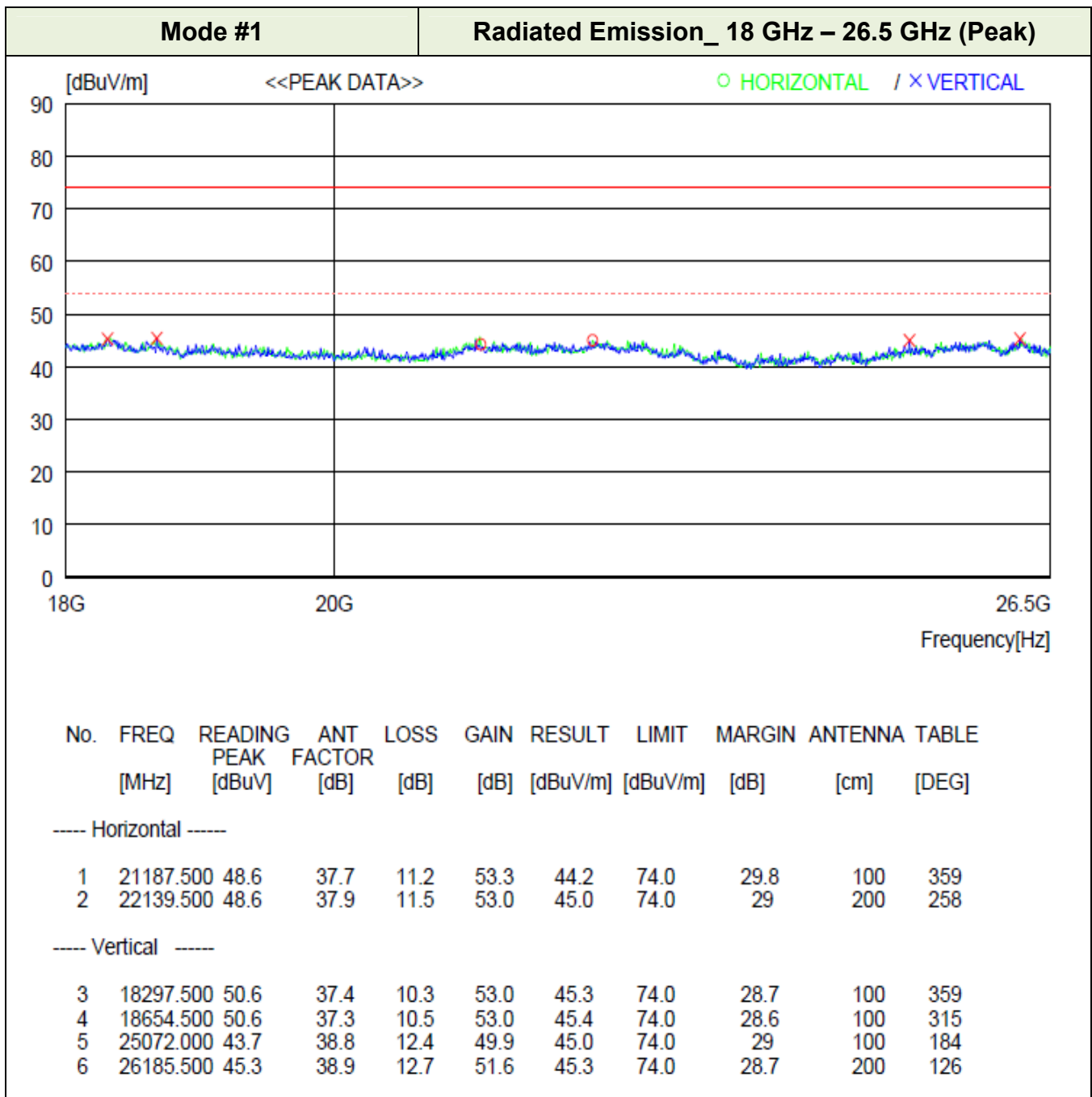
Mode #2

Radiated Emission_30 MHz – 1 GHz

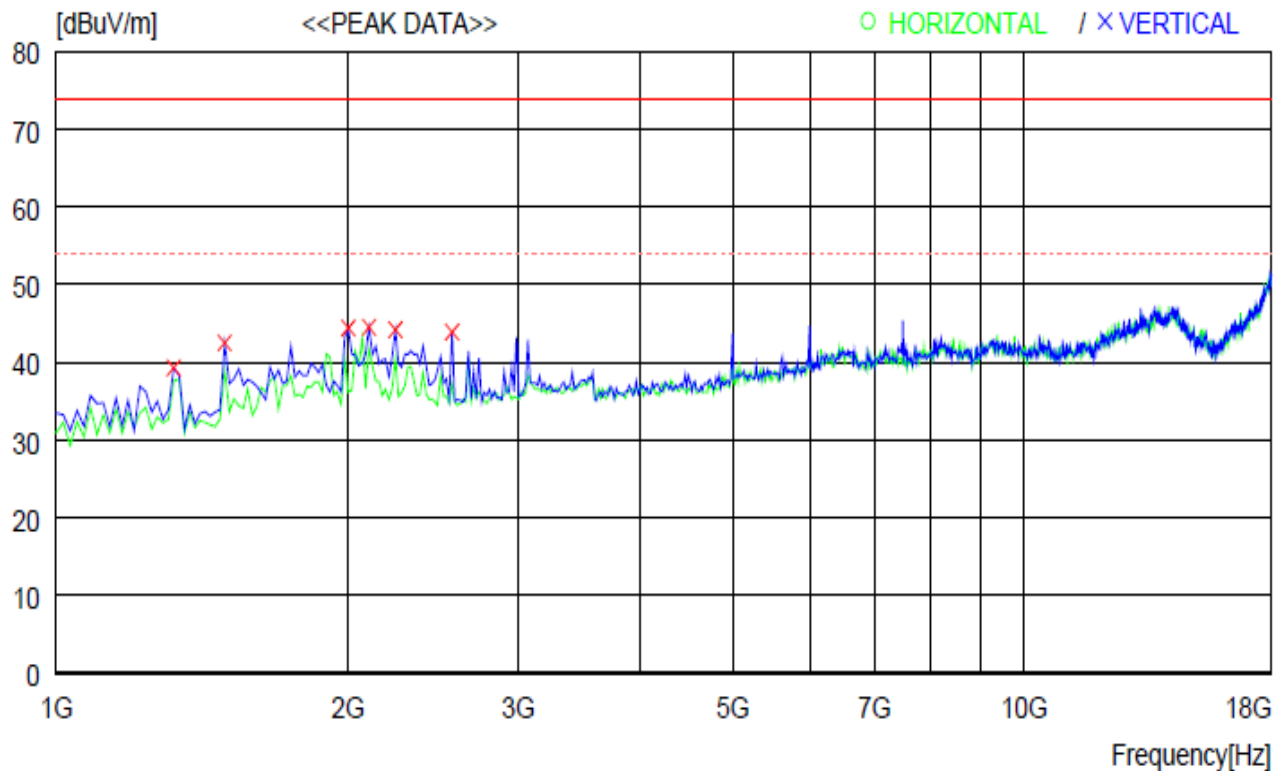


No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
---- Horizontal ----										
1	375.320	46.8	15.3	10.0	32.7	39.4	46.0	6.6	100	0
2	825.391	40.8	21.6	12.2	32.9	41.7	46.0	4.3	100	174
---- Vertical ----										
3	625.577	44.0	19.8	11.2	33.1	41.9	46.0	4.1	100	0
4	30.425	51.2	9.4	6.9	32.7	34.8	40.0	5.2	100	7
5	41.640	38.4	13.1	7.1	32.7	25.9	40.0	14.1	100	64
6	891.349	38.0	22.8	12.4	32.5	40.7	46.0	5.3	100	0

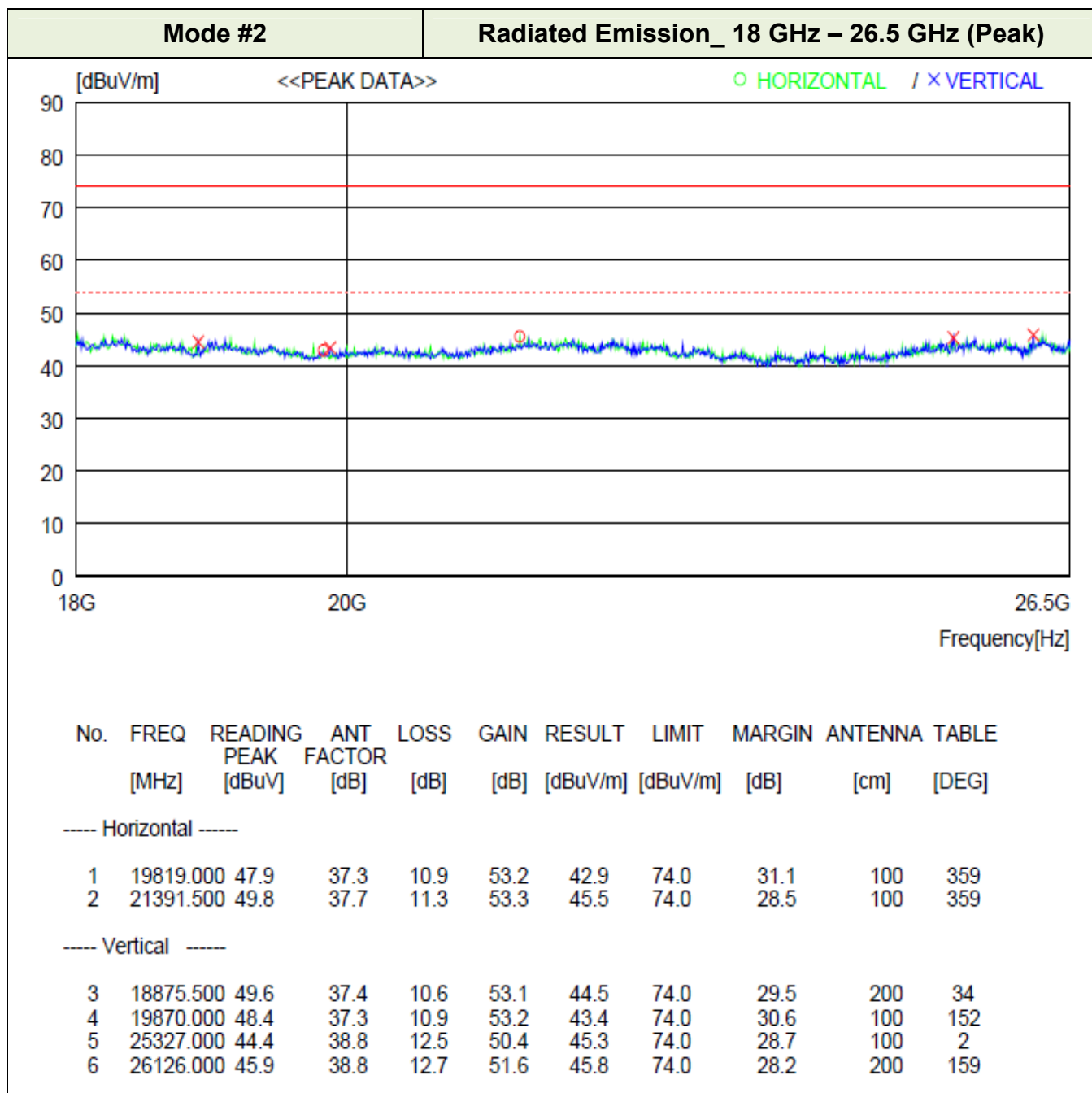




NOTE: 26.5 GHz to 30 GHz band was measured but no noise component was detected.

Mode #2
Radiated Emission_ 1 GHz – 18 GHz (Peak)


No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical -----										
1	1323.000	53.4	25.2	1.4	40.7	39.3	74.0	34.7	200	122
2	1493.000	55.9	25.8	1.5	40.7	42.5	74.0	31.5	300	0
3	2003.000	55.3	27.7	1.8	40.4	44.4	74.0	29.6	100	0
4	2105.000	55.1	28.0	1.8	40.4	44.5	74.0	29.5	300	0
5	2241.000	54.4	28.4	1.9	40.5	44.2	74.0	29.8	100	170
6	2564.000	53.1	29.3	2.0	40.5	43.9	74.0	30.1	100	13



NOTE: 26.5 GHz to 30 GHz band was measured but no noise component was detected.

Appendix I - Test Instrumentation

Name of Equipment	Model Number	Manufacturer	Serial Number	Next Cal. (Interval)	USE
For EMISSION					
EMI Test Receiver	ESCI 7	Rohde & Schwarz	100722	2018-01-19(1Y)	☐
Test Receiver	ESIB 26	Rohde & Schwarz	100298	2018-02-09(1Y)	☐
LISN	ENV4200	Rohde & Schwarz	100203	2018-01-19(1Y)	☐
LISN	ENV216	Rohde & Schwarz	100110	2018-07-28(1Y)	☐
LISN	LS16C	AFJ	16011403310	2018-07-28(1Y)	☐
LISN	NNLK8121	Schwarzbeck	8121-163	2018-08-04(1Y)	☐
Voltage Probe	TK9420	Schwarzbeck	9420-165	2018-01-20(1Y)	☐
Loop Antenna	HFH2-Z2	Rohde & Schwarz	100341	2019-06-15(2Y)	☐
8-Wire ISN CAT 3	CAT3 8158	Schwarzbeck	CAT3 8158 #70	2018-01-24(1Y)	☐
8-Wire ISN CAT 5	CAT5 8158	Schwarzbeck	CAT5 8158 #126	2018-01-24(1Y)	☐
8-Wire ISN CAT 6	NTFM 8158	Schwarzbeck	NTFM 8158 #95	2018-01-24(1Y)	☐
Test Receiver	ESU	Rohde & Schwarz	100303	2018-01-19(1Y)	☒
TRILog Broadband Antenna	VULB9163	Schwarzbeck	9163-799	2019-10-30(2Y)	☒
DOPPEL STEG HORN Antenna	HF 907	Rohde & Schwarz	102426	2019-01-06(2Y)	☒
Preamp (1-18) GHz	SCU 18D	Rohde & Schwarz	19006450	2018-04-24(1Y)	☒
Preamp 9 kHz-1 GHz	310N	Sonoma Instrument	344015	2018-01-19(1Y)	☒
Attenuators	6 dB	Rohde & Schwarz	272.4110.50	2018-01-19(1Y)	☒
Antenna Master(Below 1 GHz)	MA4000-EP	INNCO SYSTEM	4600814	N/A	☒
Antenna Master(Above 1 GHz)	MA4000-XP-ET	INNCO SYSTEM	N/A	N/A	☒
Turn Table	DT3000-3t	INNCO SYSTEM	1310814	N/A	☒
CO3000 Controller (Below 1 GHz)	CO3000-4PORT	INNCO SYSTEM	CO3000/806/34130 814/L	N/A	☒
CO3000 Controller (Above 1 GHz)	CO3000-4PORT	INNCO SYSTEM	CO3000/807/34130 814/L	N/A	☒
Horn Antenna	BBHA 9170	Schwarzbeck	BBHA 9170 #783	2018-11-28(1Y)	☒
PRE AMPLIFIER	CBL 18265035	CERNEX	28706	2018-03-29(1Y)	☒
PRE AMPLIFIER	CBL 26405040	CERNEX	28707	2018-03-29(1Y)	☒
Spectrum Analyzer	FSW43	Rohde & Schwarz	100578	2018-05-04(1Y)	☒
Digital Power Analyzer For Harmonic & Flicker	DPA 500	EM Test	V0713102356	2018-01-20(1Y)	☐
AC Power Source	ACS 500	EM Test	V0713102357	N/A	☐

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.