EVALUATION REPORT

for Certification of Conformity

Applicant: Summit Technology, Inc.
130, Digitial-ro, Namsung Plaza suite 611,
Geumcheon-gu, Seoul, South Korea
Attn: Mr. Yong-seong Park / Senior Director

Date of Issue: Jul. 20, 2020
Order Number: GETEC-C1-20-408
Test Report Number: GETEC-E3-20-066
Test Site: GUMI UNIVERSITY EMC CENTER
CAB Designation Number: KR0033

FCC ID. : 2AT6QMRX5

Applicant : Summit Technology, Inc.

Rule Part(s)	: FCC Part 15 Subpart B
EUT Type	: BASE-STATION
Equipment Class	: Part 15 Class B Digital Device (JAB)
Type of Authority	: Certification
Model Name	: MRX-5
Trade Mark	: URC

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4 (2014)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Sang Hyun Park, Senior Engineer
GUMI UNIVERSITY EMC CENTER

Reviewed by,

Hyoung Seop Kim, Technical Manager
GUMI UNIVERSITY EMC CENTER

This test report only contains the result of a specific sample supplied by applicant for the testing.
It is not allowed to copy this report even partly without the approval of EMC center

GUMI UNIVERSITY EMC CENTER

Issue list

Test Report No.	Issue Date	Description
GETEC-E3-20-066	Jul. 20, 2020	First Approval Report

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Scope: *Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

1. General Information

Applicant: Summit Technology, Inc.

Applicant Address: 130, Digitial-ro, Namsung Plaza suite 611, Geumcheon-gu, Seoul, South Korea

Contact Person: Mr. Yong-seong Park / Senior Director

Telephone Number: +82-10-5669-8741

Manufacturer: S-Tech Won

Manufacturer Address: Sangha-dong-303, 423, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Korea

Contact Person: Mr. Sang-Tae Kim / CEO

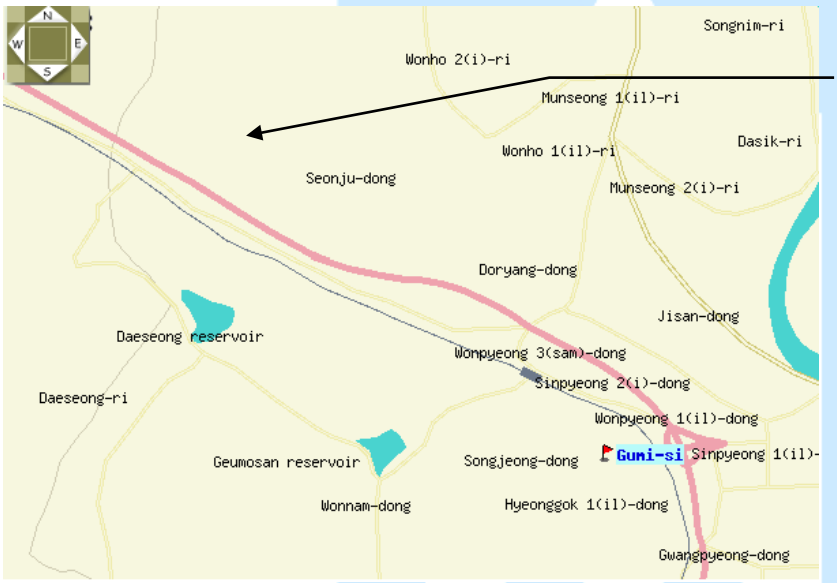
Telephone Number: +82-10-8560-6836

- **FCC ID.** 2AT6QMRX5
- **Equipment Class** Part 15 Class B Digital Device (JAB)
- **EUT Type** BASE-STATION
- **Model Name** MRX-5
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Dates of Test** Jun. 19, 2020 ~ Jun. 22, 2020
- **Place of Test** **GUMI UNIVERSITY EMC CENTER** (FCC Test firm Registration No.: 269701)
  37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Republic of Korea
- **Test Report Number** GETEC-E3-20-066
- **Dates of Issue** Jul. 20, 2020

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **Summit Technology, Inc. BASE-STATION (Model name: MRX-5)**

These measurement tests were conducted at **GUMI UNIVERSITY EMC CENTER**.
The site address is 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Republic of Korea
This test site is one of the highest point of GUMI UNIVERSITY at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2014)



GUMI UNIVERSITY EMC CENTER
37 Yaeun-ro, Gumi-si,
Gyeongsangbuk-do, 730-711,
Republic of Korea
Tel: +82-54-440-1195
Fax: +82-54-440-1199

Fig 1. The map above shows the Gumi University in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **Summit Technology, Inc.**
BASE-STATION (Model Name: MRX-5) FCC ID.: 2AT6QMRX5

Specifications

1. Product power : DC12V Adaptor
2. Product Current : 150mA ↓
3. Network: One (1) 10/100 RJ45 Ethernet port (two LED indicators)
4. Processor: ARM9 Thumb Processor 400 MHz
5. RAM: DDR2 256 MB
6. Storage: e.MMC NAND 4GB
7. Weight: 6 oz
8. Power: DC 12V/1.0A
9. IR Outputs: Four (4) IR outputs (IR attenuator on output 4)
10. RS-232: One (1) RS-232 port
11. USB Port: For Future Use

3.2 Definition of models

-None.

3.3 Support Equipment / Cables used

3.3.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
Notebook Computer	SAMSUNG	NT740U5L	S/N: 0NT791HJB00605E FCC ID.: N/A
USB memory stick	Transcend Information Inc	jetFlash700	S/N: B01963 8059 FCC ID.: DoC
Wireless router	EFM networks	ipTIME A1004	S/N: A1004NS6AH03830 FCC ID.: Verification

3.3.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
AC/DC Adaptor[1)]	SHENZHEN MLF TECH. Co.,LTD	MLF-A00121201000U0075	S/N: N/A FCC ID.: N/A

1) 1) Input: 100-240 V, 50/60 Hz, 0.4 A
Output: 12 V, 1 A

3.3.3 Used Cable(s)

Cable Name	Condition	Description
Multi-tap	Connected to the AC/DC Adaptor and AC power source	1.50 m Unshielded.
AC/DC Adaptor	Connected to the EUT and Multi-tap	1.80 m Unshielded with a ferrite core
IR Emitter #1	Connected to the EUT and IR Emitter	3.00 m Unshielded.
IR Emitter #2	Connected to the EUT and IR Emitter	3.00 m Unshielded
IR Emitter #3	Connected to the EUT and IR Emitter	3.00 m Unshielded
IR Emitter #4	Connected to the EUT and IR Emitter	3.00 m Unshielded
RS232	Connected to the EUT and Notebook Computer	5.00 m Shielded with a ferrite core
LAN	Connected to the EUT and Network	10.00 m Unshielded

3.4 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency: 12 V / DC
- Test Mode(s)

☒ A	☒ 1	Normal operating mode ☒ Continuous operating to transmitting IR, and communication Network.

5. Summary of Test Results

FCC Part Section(s)	Test Description	Test Result
§15.107	Conducted Emission	Pass
§15.109	Radiated Emission	Pass

6. Conducted Emission

The AMN placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN. The measuring port of the LISN for EUT was connected to spectrum analyzer. Using conducted emission test software, the emissions were scanned with peak detector mode. After scanning over the frequency range, suspected emissions were selected to perform final measurement.

When performing final measurement, the receiver was used which has Quasi-Peak detector and CISPR Average detector. For (0.15 ~ 30) MHz frequency range, Quasi-Peak detector with 10 kHz RBW and 30 kHz VBW was used. By varying the configuration of the test sample and the cable, routing it was attempted to maximize the emission.

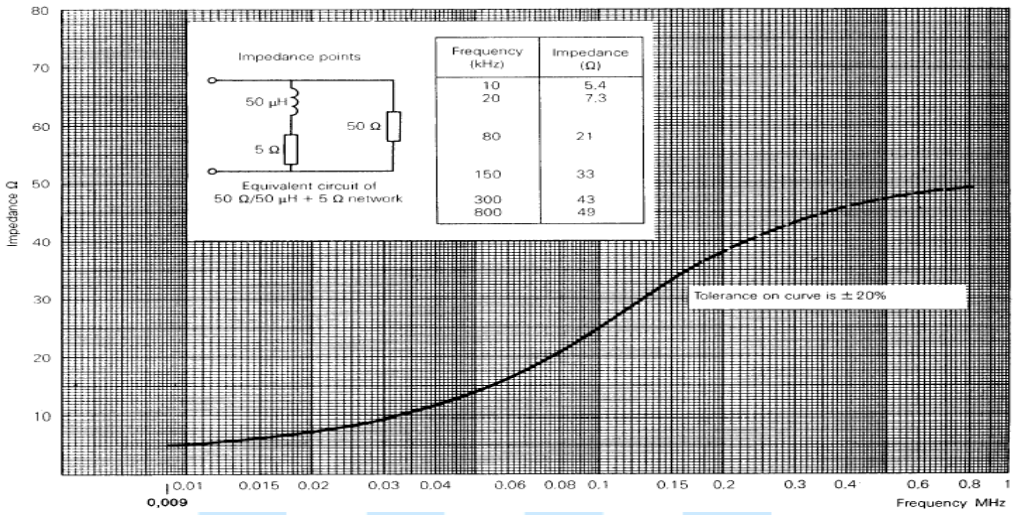


Fig 2. Impedance of LISN

6.1 Operating Environment

Temperature	:	22.7 ℃
Relative Humidity	:	48.3 % R.H.
Air Pressure	:	99.6 kPa

6.2 Test Set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN & ISN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO "Guide to the expression of uncertainty in measurement."
The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	3.78 dB	Confidence level of approximately 95 % (k = 2)
Conducted emission (150 kHz ~ 30 MHz)	3.31 dB	Confidence level of approximately 95 % (k = 2)

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.
The listed uncertainties are the worst case uncertainty for the entire range of measurement. please note that the uncertainty values are provided for informational purposes only are not used in determining the PASS/FAIL results

6.4 Limit

RFI Conducted	FCC Limit(dBμV/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

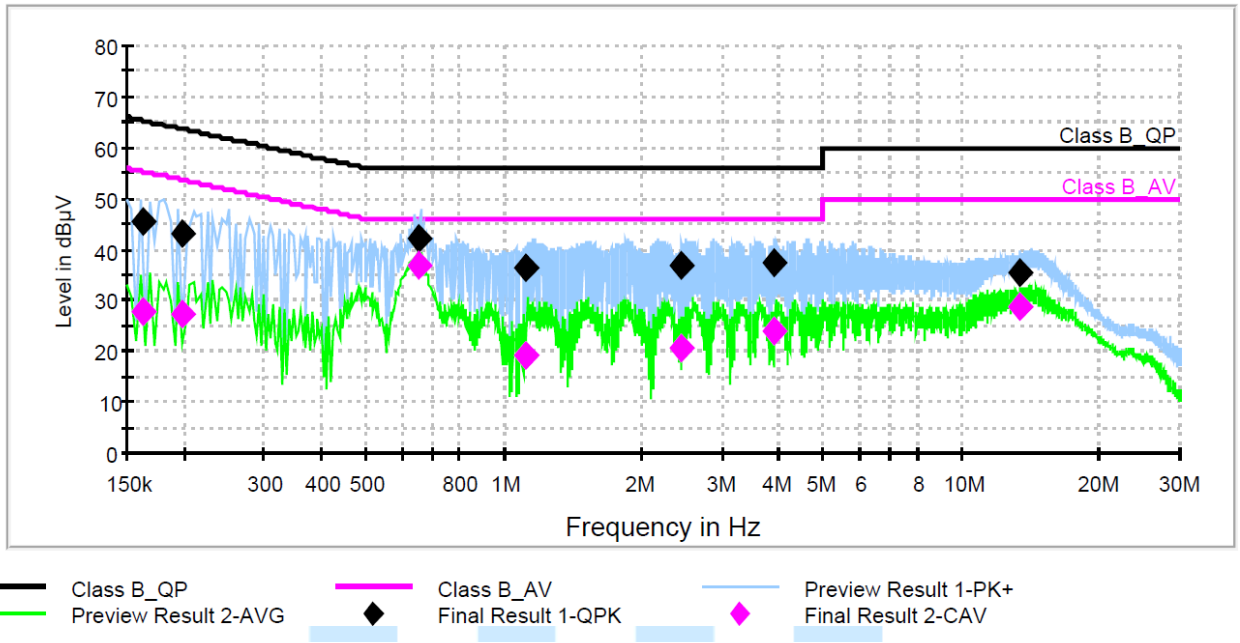
6.5 Test Equipment used

	Model Name	Manufacturer	Description	Serial Number	Calibration Date
■ -	ESCI	Rohde & Schwarz	EMI Test Receiver	100237	Apr. 08, 2020
■ -	ENV216	Rohde & Schwarz	LISN	100173	Apr. 07, 2020
■ -	ENV216	Rohde & Schwarz	LISN	100172	Apr. 07, 2020
☐ -	ESH2-Z5	Rohde & Schwarz	LISN	829991/009	Apr. 07, 2020
☐ -	VTSD 9561-D	SCHWARZBECK	Pulse Limiter	32	Apr. 07, 2020
■ -	EMC 32	Rohde & Schwarz	Software	Ver.8.53	N/A

6.6 Test data for Conducted Emission

-. Test Date : Jun. 19,2020
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz
-. Line : L1: Live, N: Neutral
-. Comment : None

▪ Test Mode: A



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.162000	45.4	1000.0	9.000	Off	N	9.7	20.0	65.4	
0.198862	43.4	1000.0	9.000	Off	N	9.7	20.3	63.7	
0.655450	42.2	1000.0	9.000	Off	N	9.7	13.8	56.0	
1.110631	36.2	1000.0	9.000	Off	N	9.7	19.8	56.0	
2.449344	37.1	1000.0	9.000	Off	N	9.8	18.9	56.0	
3.913369	37.4	1000.0	9.000	Off	N	9.9	18.6	56.0	
13.410206	35.6	1000.0	9.000	Off	N	10.6	24.4	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.162000	28.0	1000.0	9.000	Off	N	9.7	27.4	55.4	
0.198862	27.4	1000.0	9.000	Off	N	9.7	26.3	53.7	
0.655450	36.7	1000.0	9.000	Off	N	9.7	9.3	46.0	
1.110631	19.3	1000.0	9.000	Off	N	9.7	26.7	46.0	
2.449344	20.6	1000.0	9.000	Off	N	9.8	25.4	46.0	
3.913369	23.7	1000.0	9.000	Off	N	9.9	22.3	46.0	
13.410206	28.6	1000.0	9.000	Off	N	10.6	21.4	50.0	

7. Radiated Emission

Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 or 3 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1m to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

For final measurement below 1 GHz frequency range, Quasi-Peak detector with (RBW = 120 kHz Bandwidth) was used. For final measurement above 1 GHz frequency range, Peak detector with (RBW = 1 MHz Bandwidth) and CISPR Average detector with (RBW = 1 MHz Bandwidth) were used.

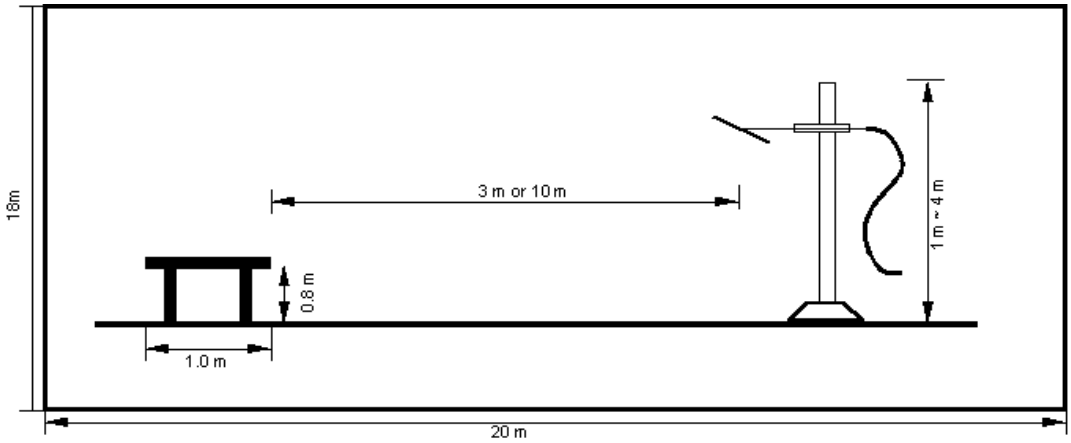


Fig 3. Dimensions of test site (Below 1 GHz)

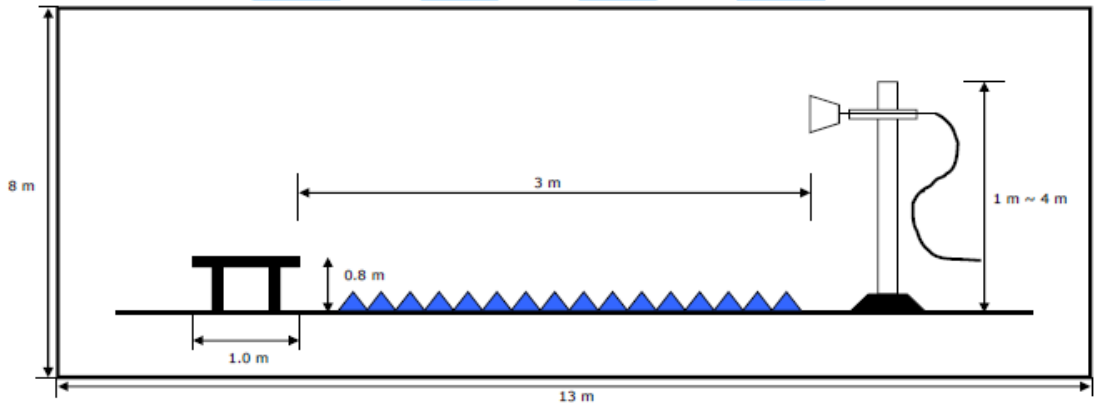


Fig 4. Dimensions of test site (Above 1 GHz)

7.1 Operating Environment

Temperature	:	21.2 ℃
Relative Humidity	:	48.3 % R.H.
Air pressure	:	99.9 kPa

7.2 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO "Guide to the expression of uncertainty in measurement". The measurement uncertainty was given with a confidence of 95 %.

Test Items(3 m Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	5.14 dB	Confidence level of approximately 95 % (*k* = 2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	5.10 dB	Confidence level of approximately 95 % (*k* = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	6.05 dB	Confidence level of approximately 95 % (*k* = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	5.19 dB	Confidence level of approximately 95 % (*k* = 2)
Radiated emission (1 000 MHz ~ 6 000 MHz, 3 m)	5.20 dB	Confidence level of approximately 95 % (*k* = 2)
Radiated emission (6 000 MHz ~ 18 000 MHz, 3 m)	5.20 dB	Confidence level of approximately 95 % (*k* = 2)
Test Items(10 m Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	4.72 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	4.72 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz,10 m, Vertical)	4.79 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	4.79 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (1 000 MHz ~ 6 000 MHz, 3 m)	5.16 dB	Confidence level of approximately 95 % (*k* = 2)

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only are not used in determining the PASS/FAIL results

7.3 Limit

Frequency (MHz)	FCC Limit @ 3 m. dBμV/m	FCC Limit @ 10 m. dBμV/m	CISPR Limit @ 10 m. dBμV/m
30 ~ 88	40.0	29.5	30.0
88 ~ 216	43.5	33.0	30.0
216 ~ 230	46.0	35.6	30.0
230 ~ 960	46.0	35.6	37.0
960 ~ 1 000	54.0	43.5	37.0

Frequency (MHz)	FCC Class B Peak Limit @ 3 m dBμV/m	FCC Class B Average Limit@ 3 m dBμV/m
> 1 000	70.0 ~74.0*	50.0 ~54.0*
*Limits decreases linearly with the logarithm of frequency.		

Frequency range	30 MHz ~ 1 GHz	Above 1 GHz
Detector mode	Quasi peak	Peak / Average
Resolution bandwidth	120 kHz	1 MHz

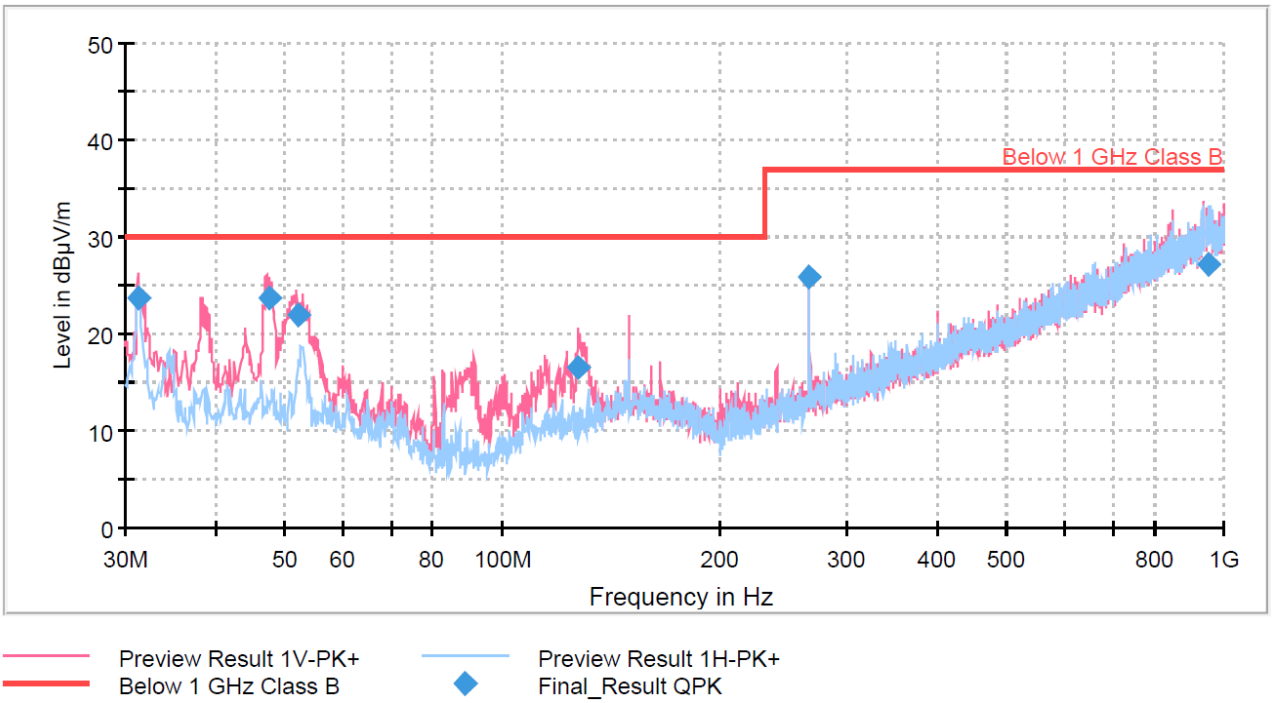
7.4 Test Equipment used

	Model Name	Manufacturer	Description	Serial Number	Calibration Date
■ -	ESR7	Rohde & Schwarz	EMI Test Receiver	101382	Apr. 10, 2020
■ -	VULB9160	Rohde & Schwarz	Biconical Antenna	3099	Oct. 10, 2019
■ -	BBHA 9120D	Rohde & Schwarz	Horn Antenna	597	Apr. 13, 2020
■ -	CO3000	Innco system GmbH	Position Controller	CO3000/779/33050314/L	N/A
■ -	DT3000	Innco system GmbH	Turntable	1280314	N/A
■ -	MA4000-EP	Innco system GmbH	Antenna Mast	4420314	N/A
■ -	TK-PA06S	Testek	Low Noise Amplifier	170038-L	Apr. 09, 2020
■	8449B	Agilent	Microwave Preamplifier	3008A01828	Apr. 09, 2020
■	HD100	HD GmbH	Position Controller	100/628	N/A
■	MA240	HD GmbH	Antenna Mast	240/565/01	N/A
■ -	EMC 32	Rohde & Schwarz	Software	Ver. 10.40.10	N/A

7.5 Test data for Radiated Emission

-. Test Date : Jun. 22, 2020
-. Measurement Distance : 10 m (30 MHz ~1 GHz) / 3 m (1 GHz ~ 6 GHz)
-. Note : Tested up to 6 GHz at customer request.
-. Test Mode : A

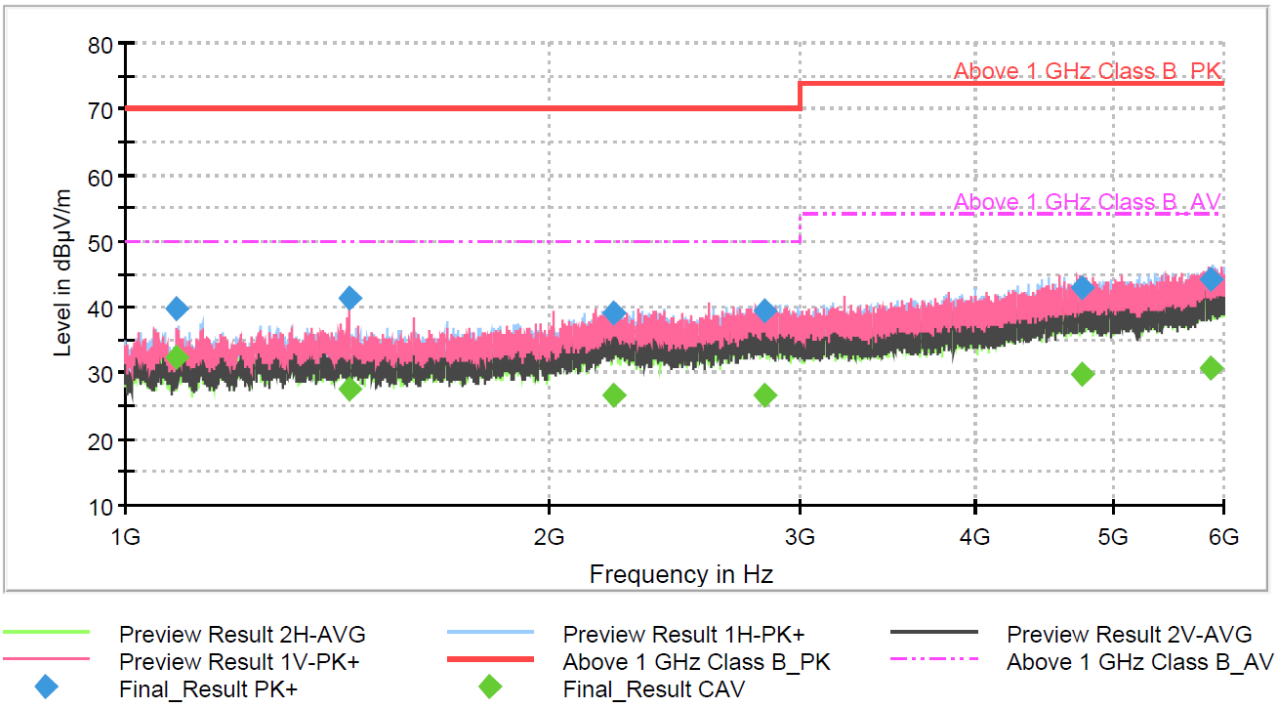
▪ Test Mode: A



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.291	23.64	30.00	6.36	100.0	120.000	125.0	H	23.0	-28
47.483	23.68	30.00	6.32	100.0	120.000	100.0	V	129.0	-28
52.018	21.96	30.00	8.04	100.0	120.000	282.0	V	211.0	-28
127.645	16.55	30.00	13.45	100.0	120.000	200.0	V	215.0	-28
266.668	25.89	37.00	11.11	100.0	120.000	106.0	V	122.0	-25
949.078	27.24	37.00	9.76	100.0	120.000	397.0	H	-25.0	-5

▪ Test Mode: A



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1088.733	39.83	---	70.00	30.17	1000.0	1000.000	106.0	H	201.0	-6
1088.733	---	32.29	50.00	17.71	1000.0	1000.000	106.0	H	201.0	-6
1439.833	---	27.69	50.00	22.31	1000.0	1000.000	187.0	V	177.0	-3
1439.833	41.46	---	70.00	28.54	1000.0	1000.000	187.0	V	177.0	-3
2217.367	---	26.74	50.00	23.26	1000.0	1000.000	120.0	V	154.0	3
2217.367	39.22	---	70.00	30.78	1000.0	1000.000	120.0	V	154.0	3
2840.767	---	26.76	50.00	23.24	1000.0	1000.000	181.0	V	46.0	5
2840.767	39.56	---	70.00	30.44	1000.0	1000.000	181.0	V	46.0	5
4755.900	---	29.67	54.00	24.33	1000.0	1000.000	200.0	V	169.0	12
4755.900	42.93	---	74.00	31.07	1000.0	1000.000	200.0	V	169.0	12
5880.967	44.16	---	74.00	29.84	1000.0	1000.000	100.0	H	14.0	16
5880.967	---	30.92	54.00	23.08	1000.0	1000.000	100.0	H	14.0	16

8. Sample Calculations

$dB\mu V = 20 \text{ Log}_{10}(\mu V/m)$
$dB\mu V = dBm + 107$
$\mu V = 10^{(dB\mu V/20)}$

8.1 Example 1 :

■ **20.3 MHz**

Class B Limit = 250 µV = 48 dBµV

Reading = 39.2 dBµV

$10^{(39.2dB\mu V/20)}$ = 91.2 µV

Margin = 48 dBµV - 39.2 dBµV

= 8.8 dB

8.2 Example 2 :

■ **66.7 MHz**

Class B Limit = 100 µV/m = 40.0 dBµV/m

Reading = 31.0 dBµV

Antenna Factor + Cable Loss = 5.8 dB

Total = 36.8 dBµV/m

Margin = 40.0 dBµV/m – 36.8 dBµV/m

= 3.2 dB

9. Recommendation & Conclusion

The data collected shows that the **Summit Technology, Inc.**
BASE-STATION (Model Name: MRX-5) was complies with §15.107 and 15.109 of the FCC Rules.

- The end -