

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea Tel: 82-31-285-0894 Fax: 82-505-299-8311 www.kctl.co.kr	Report No.: KR20-SEF0082-B Page (2) of (20)	
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REPORT REVISION HISTORY

Date	Revision	Page No
2020-05-20	Originally issued	-
2020-06-15	Added the FCC ID	1, 10
2020-06-24	Added note	12

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General remarks for test reports

1. The report No. KR20-SEF0082-A is the same as The report No. KR20-SEF0082.
2. The report No. KR20-SEF0082-B is the same as The report No. KR20-SEF0082-A.



Contents

1. Applicant information	4
2. Laboratory information.....	5
3. Test system configuration.....	6
3.1 Operation environment.....	6
3.2 Measurement Uncertainty	7
4. Description of EUT	9
4.1 General information.....	9
4.2 Product description.....	10
4.3 Auxiliary equipments	10
4.4 Test configuration	11
4.5 Operating conditions	12
5. Summary of test results	13
5.1 Summary of EMI emission test results.....	13
6. Test results	14
6.1 Conducted Emissions.....	14
6.2 Radiated Emission	17

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1. Applicant information

Applicant: NODE Co., Ltd.
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 Republic of Korea
Telephone: +82-33-766-1018
Fax: +82-504-294-5340
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Contact name: Nara Lee

Manufacturer: NODE Co., Ltd.
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Report No.:
KR20-SEF0082-B
Page (5) of (20)

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2. Laboratory information

Address

KCTL Inc. (Suwon Lab.)

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

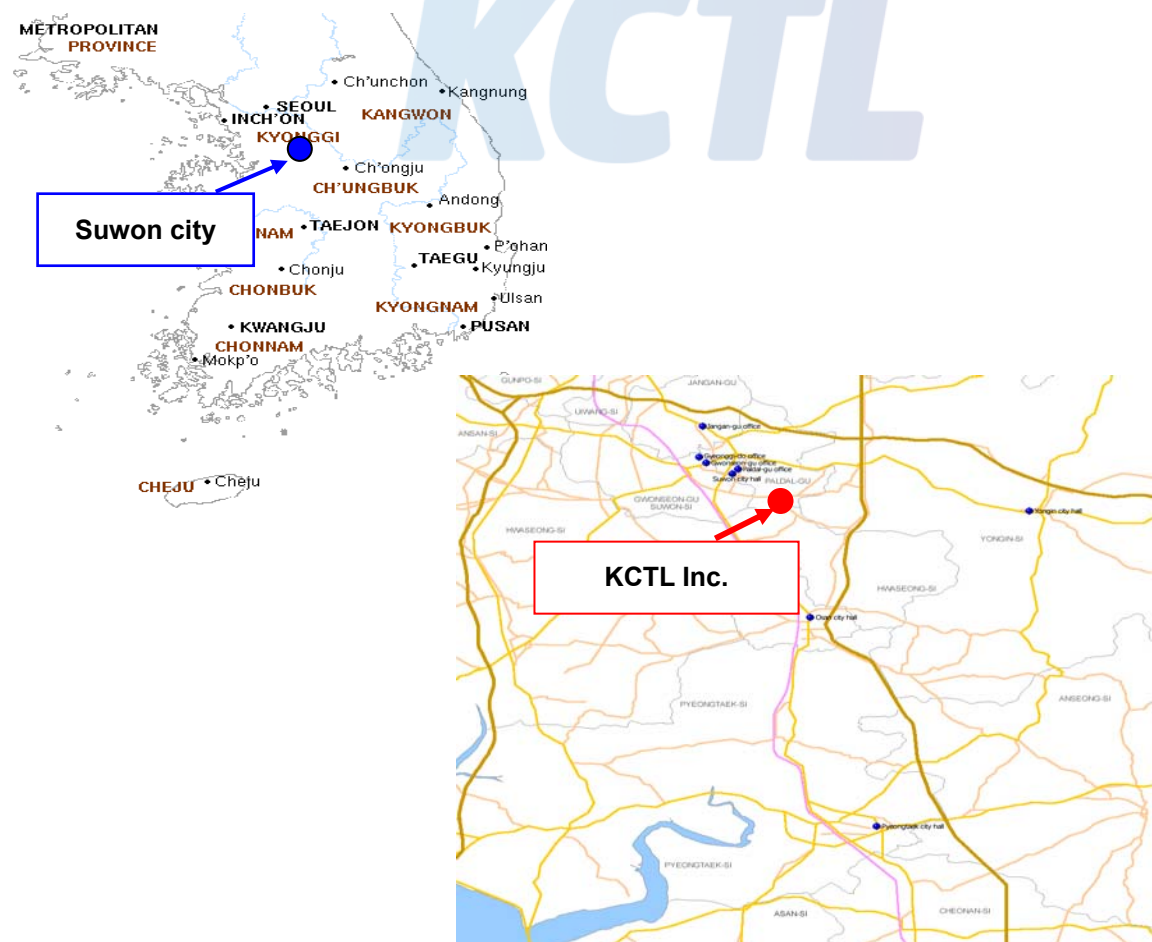
FCC Site Designation No: KR0040

VCCI Registration No.: R-20080, G-20078, C-20059, T-20056

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m (RE)	22.9 °C	38.9 % R.H.	-
Shielded room (CE)	22.7 °C	38.8 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted Emission measurement (Confidence level about 95 %, $k = 2$)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz:	3.7 dB
	150 kHz ~ 30 MHz:	3.3 dB
Shielded Room (CE#2)	9 kHz ~ 150 kHz:	3.5 dB
	150 kHz ~ 30 MHz:	3.1 dB
Radiated Emission measurement (Confidence level about 95 %, $k = 2$)		
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m: 5.4 dB
		10 m: 5.3 dB
	300 MHz ~ 1 000 MHz	3 m: 5.5 dB
		10 m: 5.4 dB
	1 GHz ~ 6 GHz	3 m: 6.4 dB
	6 GHz ~ 18 GHz	3 m: 6.6 dB
	18 GHz ~ 30 GHz	3 m: 6.7 dB
	30 GHz ~ 40 GHz	3 m: 6.2 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 5.0 dB
		10 m: 5.0 dB
	300 MHz ~ 1 000 MHz	3 m: 5.2 dB
		10 m: 5.0 dB
	1 GHz ~ 6 GHz	3 m: 6.4 dB
	6 GHz ~ 18 GHz	3 m: 6.6 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program		Used
Conducted Emission	EP5CE_V 5.4.0(TOYO)		☒
Radiated Emission	2F	EP5RE_V 4.6.0(TOYO)	☒
	4F	EP5RE_V 5.11.10(TOYO)	

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4. Description of EUT

4.1 General information

Size	: approx.100 mm x 50 mm x 30 mm (body) about 70cm (strap)
Weight	: 80 g (including strap)
Maximum Operating Time	: 130 min. when fully charged
Charging Time	: about 3 hours
Rated Output	: 5 V DC, 1.5 A

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4.2 Product description

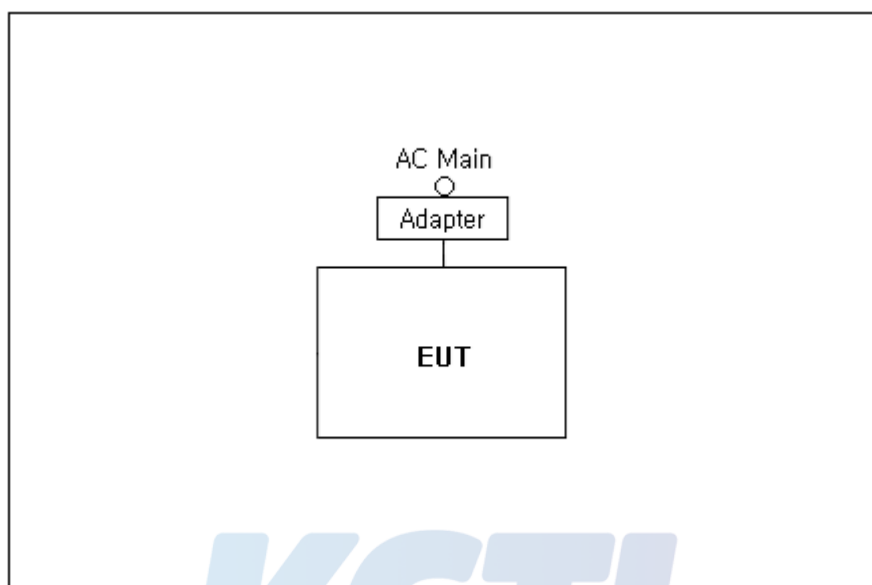
Type of product	Lip Enhancer
Model name (Basic)	NP-L100
Model name (Variant)	-
Difference	-
Serial no	-
Testing voltage	-120 V, 60 Hz (Power supplied from Adapter) -DC 3.7 V (Built in Battery)
Input rating	-DC 5 V -DC 3.7 V
Internal clock frequency	Below 15 MHz
FCC ID	2AWNMNP-L100
Note	-The following accessory was not provided by the manufacturer. 1) Adapter

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Adapter	MCS-01KT	-	Ten Pao Electronics(Huizhou) Co.,Ltd

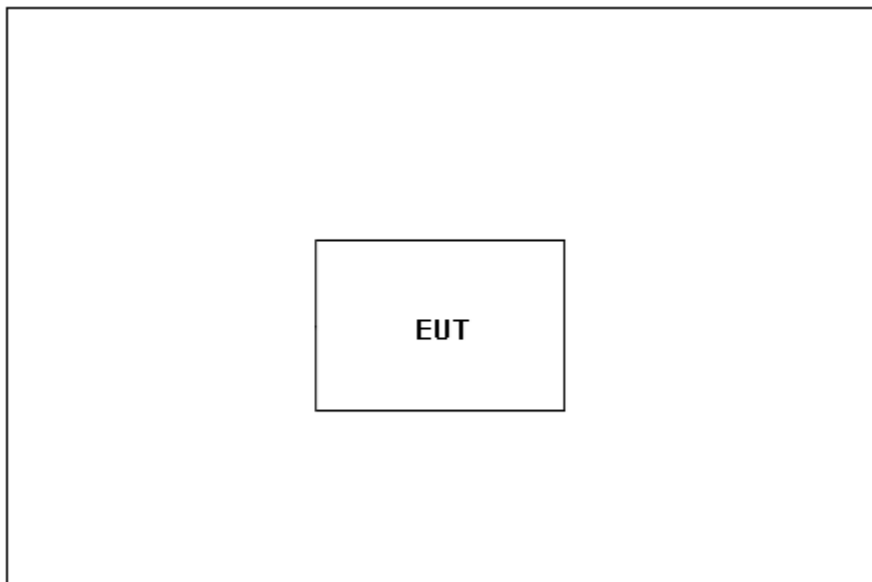
4.4 Test configuration

[Test #1]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	Power(USB)	Adapter	USB	1.0	Shield

[Test #2]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
-	EUT	-	-	-	-	-

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1 [Adapter]	The charge status of the EUT is checked by the LED and tested.
Test #2 [Battery]	Check the operation status of the EUT and test it through LED and vibration conditions.

Note. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B ICES-003 Issue 6	Pass
☒	Radiated Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B ICES-003 Issue 6	Pass

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.



6. Test results

6.1 Conducted Emissions

Test specification	ANSI C63.4:2014, Class B FCC Part 15 Subpart B ICES-003 Issue 6		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#2)		
Date	2020-05-18		
Temperature (°C)	22.7 °C	Humidity (% R.H.)	38.8 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emissions measurement

Frequency [MHz]	Class A (dB(μ V))		Class B (dB(μ V))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 ¹⁾	56 ~ 46 ¹⁾
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

¹⁾ The limit decreases linearly with the logarithm of frequency

6.1.2 Measurement procedure

The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.

6.1.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESCI	100710	R&S	2020.08.22	☒
TWO-LINE V-NETWORK	ENV216	101584	R&S	2021.04.06	☒
TWO-LINE V-NETWORK	NNLK8121	8121-472	SCHWARZBECK	2020.08.23	☐

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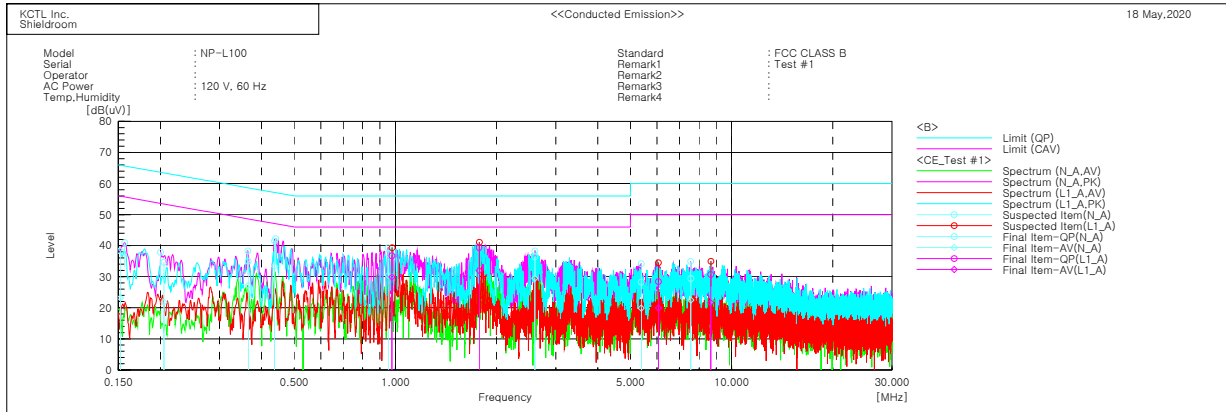
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Report No.:
KR20-SEF0082-B
Page (16) of (20)



6.1.4 Conducted emissions measurement result

AC Main



Final Result

--- N_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15212	28.2	13.2	10.0	38.2	23.2	65.9	55.9	27.7	32.7
2	0.20515	24.5	11.7	10.1	34.6	21.8	63.4	53.4	28.8	31.6
3	0.36485	24.9	17.1	10.1	35.0	27.2	58.6	48.6	23.6	21.4
4	0.43736	31.3	23.2	10.2	41.5	33.4	57.1	47.1	15.6	13.7
5	0.9513	27.3	20.3	10.1	37.4	30.4	56.0	46.0	18.6	15.6
6	2.59928	26.3	19.4	10.1	36.4	29.5	56.0	46.0	19.6	16.5
7	5.38779	18.2	9.8	10.1	28.3	19.9	60.0	50.0	31.7	30.1
8	7.56022	19.2	12.3	10.2	29.4	22.5	60.0	50.0	30.6	27.5

--- L1_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.97648	26.9	20.0	9.9	36.8	29.9	56.0	46.0	19.2	16.1
2	1.77489	29.5	22.0	9.9	39.4	31.9	56.0	46.0	16.6	14.1
3	6.05821	18.4	10.0	10.0	28.4	20.0	60.0	50.0	31.6	30.0
4	8.67543	20.7	11.5	10.1	30.8	21.6	60.0	50.0	29.2	28.4

6.2 Radiated Emission

Test specification	ANSI C63.4:2014, Class B FCC Part 15 Subpart B ICES-003 Issue 6		
Testing voltage	120 V, 60 Hz / DC 3.7 V		
Test facility	10 m Chamber (4F)		
Test distance	3 m		
Date	2020-05-18		
Temperature (°C)	22.9 °C	Humidity (% R.H.)	38.9 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μ V/m)) @ 10 m	Class B (dB(μ V/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

Note- Alternative standard: CISPR, Pub. 22

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESR7	101078	R&S	2020.08.22	☒
Bilog Antenna	CBL 6112D	55545	TESEQ	2022.04.24	☒
AMPLIFIER	310N	293004	SONOMA	2020.08.22	☒
ATTENUATOR	8491B-6dB	MY39271060	KEYSIGHT	-	☒
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
Turn Table	TT 3.0-3t	-	MATURO	-	☒
PREAMPLIFIER	8449B	3008A01802	AGILENT	2021.04.03	☐
DOUBLE RIDGED HORN ANTENNA	3115	00086706	ETS-LINDGREN	2020.08.27	☐
Spectrum Analyzer	FSV40	100988	R&S	2021.01.03	☐

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 6 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

The result is $30 + 12 + 5 + 6 - 35 = 18 \text{ dB } (\mu\text{V/m})$

Bilog Antenna and ATTENUATOR (6 dB) were calibrated together.

AV = CAV : Abbreviation of CISPR Average

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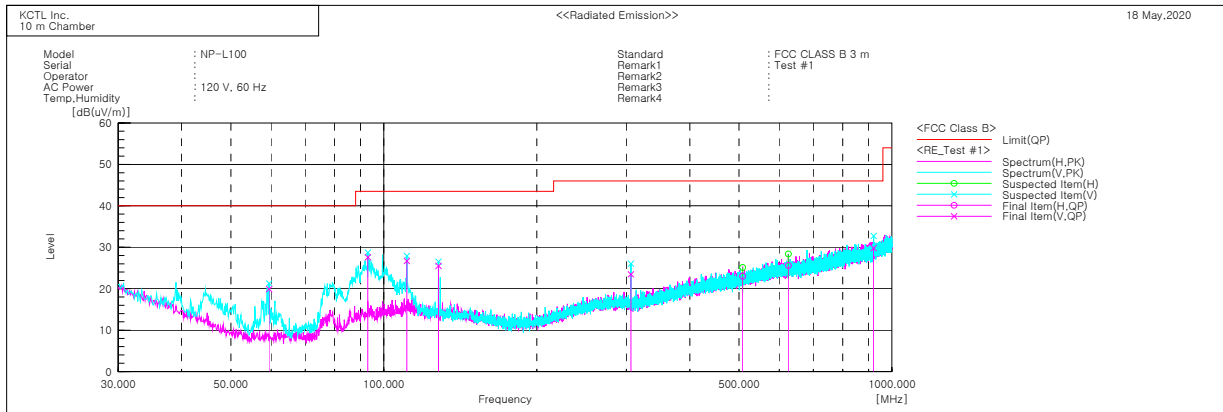
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Report No.:
KR20-SEF0082-B
Page (19) of (20)

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6.2.5 Radiated emission measurement result

30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	59.464	V	36.7	-16.8	19.9	40.0	20.1	162.0	128.0
2	93.050	V	40.4	-12.8	27.6	43.5	15.9	290.0	258.0
3	110.995	V	36.9	-10.2	26.7	43.5	16.8	118.0	42.0
4	128.091	V	35.3	-9.8	25.5	43.5	18.0	242.0	240.0
5	306.329	V	29.1	-5.6	23.5	46.0	22.5	168.0	87.0
6	508.331	H	22.1	0.9	23.0	46.0	23.0	317.0	55.0
7	625.701	H	21.9	3.7	25.6	46.0	20.4	348.0	203.0
8	920.460	V	21.0	8.8	29.8	46.0	16.2	201.0	59.0

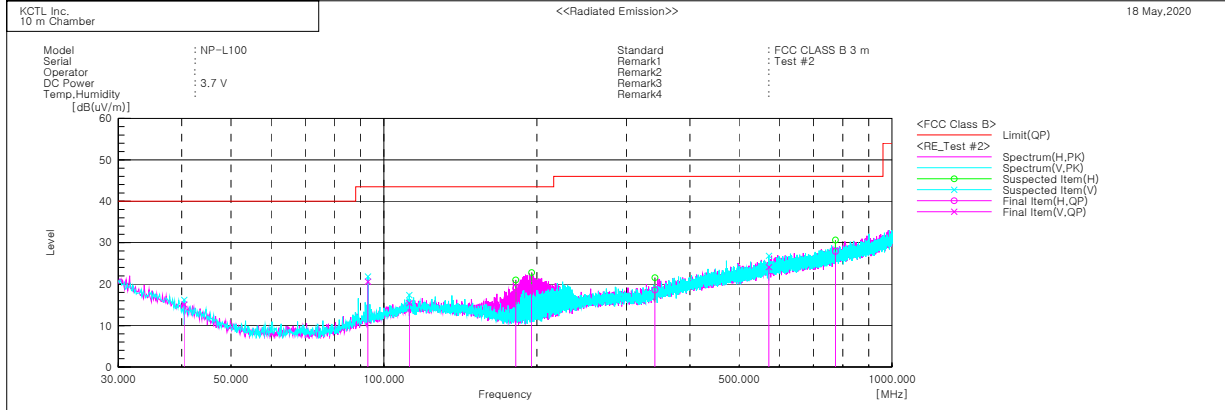
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Report No.:
KR20-SEF0082-B
Page (20) of (20)

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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	40.428	V	26.0	-10.9	15.1	40.0	24.9	192.0	96.0
2	93.050	V	33.4	-12.8	20.6	43.5	22.9	116.0	193.0
3	112.208	V	25.5	-10.1	15.4	43.5	28.1	274.0	43.0
4	181.684	H	30.8	-11.8	19.0	43.5	24.5	336.0	50.0
5	195.264	H	31.3	-11.3	20.0	43.5	23.5	377.0	50.0
6	341.491	H	22.9	-4.3	18.6	46.0	27.4	328.0	92.0
7	572.230	V	21.4	2.7	24.1	46.0	21.9	290.0	359.0
8	774.111	H	21.8	6.1	27.9	46.0	18.1	350.0	38.0

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