

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (1) of (30)

EMC TEST REPORT

Test Report No. : KES-EM-20T0118
Date of Issue : Feb. 14, 2020
Product name : Integration Station
Model/Type No. : J2001
Variant Mode : -
Applicant : JTECH an HME Company
Applicant Address : 1400 Northbrook Parkway Suite #320 Suwanee ,
GA USA 30024
Manufacturer : Lee Technology Korea Co.,Ltd.
Manufacturer Address : 47, Ojeong-ro, Ojeong-gu, Bucheon-si, Gyeonggi-do, Korea
FCC ID : WDC-J2001
Date of Receipt : Dec. 10, 2019
Test date : Jan. 29, 2020 ~ Feb. 01, 2020
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dong Hyun, Won
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (2) of (30)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Feb. 14, 2020	KES-EM-20T0118	Issued

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document may be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0118
Page (3) of (30)

TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency	5
1.2	Variant Model Differences.....	5
1.3	Device Modifications	5
1.4	Equipment Under Test.....	5
1.5	Support Equipments	5
1.6	External I/O Cabling	6
1.7	EUT Cable Mode(s)	6
1.8	Configuration.....	7
1.9	Remarks when standards applied	8
1.10	Calibration Details of Equipment Used for Measurement.....	8
1.11	Test Facility	8
1.12	Measurement Procedure.....	8
1.13	Laboratory Accreditations and Listings	9
2.0	Test Regulations.....	10
2.1	Conducted Emissions at Mains Power Ports	12
2.2	Radiated Electric Field Emissions(Below 1 GHz)	13
2.3	Radiated Electric Field Emissions(Above 1 GHz)	14
APPENDIX A – TEST DATA.....		15
Conducted Emissions at Mains Power Ports.....		15
Radiated Electric Field Emissions(Below 1 GHz)		20
Radiated Electric Field Emissions(Above 1 GHz).....		23
APPENDIX B - Test Setup Photos and Configuration.....		25
Conducted Voltage Emissions		25
Radiated Electric Field Emissions(Below 1 GHz)		27
Radiated Electric Field Emissions(Above 1 GHz).....		29

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (4) of (30)

1.0 General Product Description

Main Specifications of EUT are:

Item	spec
Operating Frequency	450.3250MHz ~ 469.9875MHz
Power	DC 12V, 5A (Adaptor)
Weight	1577 g
Port	USB x 1, RJ-45 x 1, RS-232 x 1
Size	(23 x 14 x 4) cm

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage ☐ 230 Vac ☒ 120 Vac ☐ 12 Vdc ☐ DC 3.7 V (Battery)

Frequency ☐ 50 Hz ☒ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Integration Station	J2001	-	Lee Technology Korea Co.,Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adaptor	FSP060-DIBAN2	-	FSP GROUP INC.	-
Notebook	NT730U3E	JJRE91CF200065A	Samsung Electronics Co., Ltd.	-
Notebook Adaptor	PA-1600-66	AD-6019P	LITEON	-
Pager	A1432	DQXJWFHDF193	APPLE .Inc	-
Keyboard	BRAIN WK300	WK300B18002000 13	ABKO	-



1.6 External I/O Cabling

■ Wireless Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Integration Station (EUT)	DC IN	Adaptor	DC OUT	1.4	U
	Wireless	Pager	Wireless	-	-

■ Cable Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Integration Station (EUT)	DC IN	Adaptor	DC OUT	1.4	U
	RS-232	Notebook	USB	2.0	U
	RJ-45	Notebook	RJ-45	3.0	U
	USB	Keyboard	USB	1.6	U
	Wireless	Pager	Wireless	-	-

1.7 EUT Cable Mode(s)

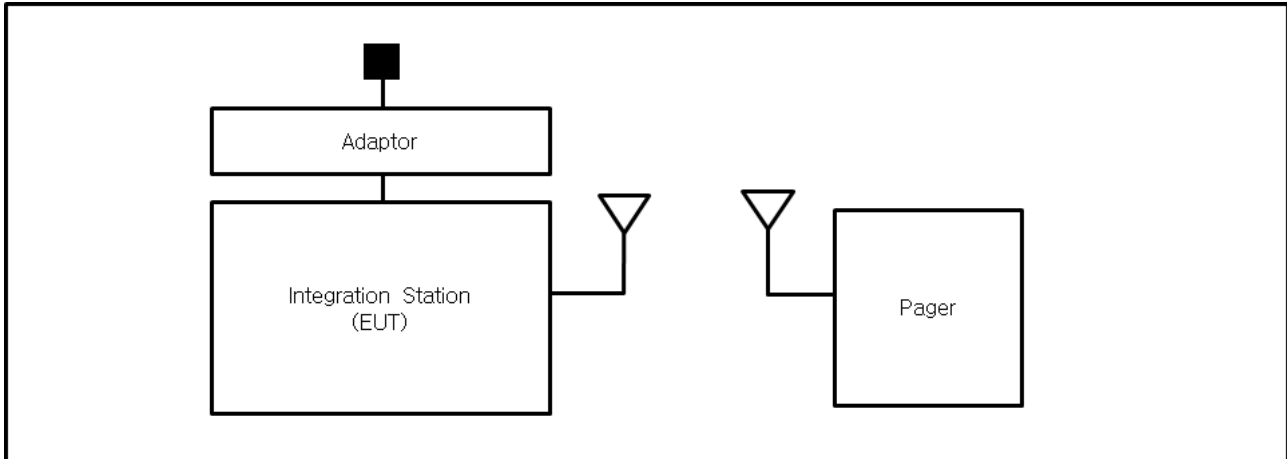
Test mode	operating
Wireless Mode	The communication status was confirmed through the pager LED.
Cable Mode	After wired connecting the EUT to the Notebook, the communication status was confirmed through the notebook program "ComTest"

EUT Test operating S/W		
Name	Version	Manufacture Company
ComTest	-	-

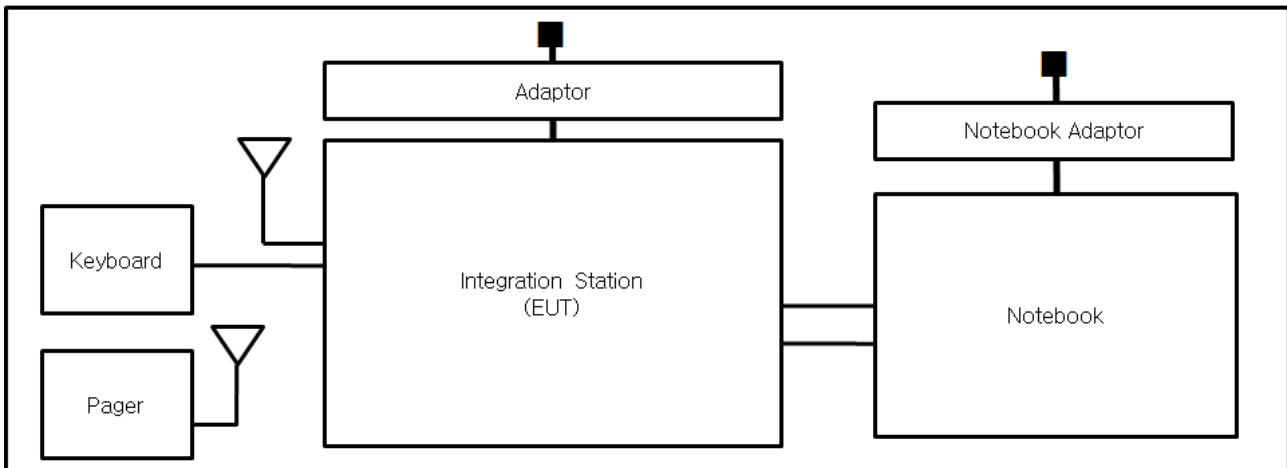
1.8 Configuration

■ AC Main
 □ DC Main

■ Wireless Mode



■ Cable Mode



1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Measurement Procedure

- Conducted Emissions







The conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

- Radiated Electric Field Emissions

The test was done at a SEMI ANECHOIC CHAMBER with quasi-peak detector. The final test data was measured using a Quasi-Peak detector below 1GHz at 10 m or 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Test was proceeded worst case test mode and cable configuration. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Measurement procedures was In accordance with ANSI C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

1.13 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber, and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-20056, C-20036 T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0003



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (11) of (30)

☐ **VCCI V-3 / 2015.04**

☐ Class A

☐ Class B

☐ **AS/NZS:2013**

☐ Class A

☐ Class B

☒ **47 CFR Part 15, Subpart B**

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B

☒ ANSI C63.4-2014

☐ Class A

☒ Class B

☐ **IC Regulation ICES-003 : 2016**

☐ CAN/CSA CISPR 22-10

☐ Class A

☐ Class B

☐ ANSI C63.4-2014

☐ Class A

☐ Class B

☐ **RE- Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

☐ Equipment for fixed use

☐ Equipment for vehicular use

☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (12) of (30)

2.1 Conducted Emissions at Mains Power Ports

Test Date

Feb. 01, 2020

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	01, 20, 2021	1 Year
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	01, 20, 2021	1 Year
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 20, 2021	1 Year

Test Conditions

Temperature: 18,4 °C
Relative Humidity: 39,2 % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (13) of (30)

2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jan. 29, 2020

Test Location☐ OPEN AREA TEST SITE #2☒ SEMI ANECHOIC CHAMBER #4(10 m)**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 09, 2020	1 Year
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2020	1 Year
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020	2 Year
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 11, 2020	1 Year

Test Conditions

Temperature: 22,6 °C

Relative Humidity: 41,1 % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

- See Appendix A for test data.
- The EUT tested three orthogonal (X, Y, Z) axes to determine the orientation that maximum or near-maximum emission level.
- It was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jan. 29, 2020

Test Location

SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 09, 2020	1 Year
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01742	01, 02, 2021	1 Year
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 11, 2020	1 Year
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBEC K	9120D-1802	12, 13, 2020	1 Year

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 41,1 % R.H.

Frequency Range of Measurement

1 GHz to 5 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

- See Appendix A for test data.
- The EUT tested three orthogonals (X, Y, Z) axes to determine the orientation that maximum or near-maximum emission level.
- It was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (15) of (30)

APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ Wireless Mode

HOT LINE

Common Information

Test Description:

Model No.:

Mode

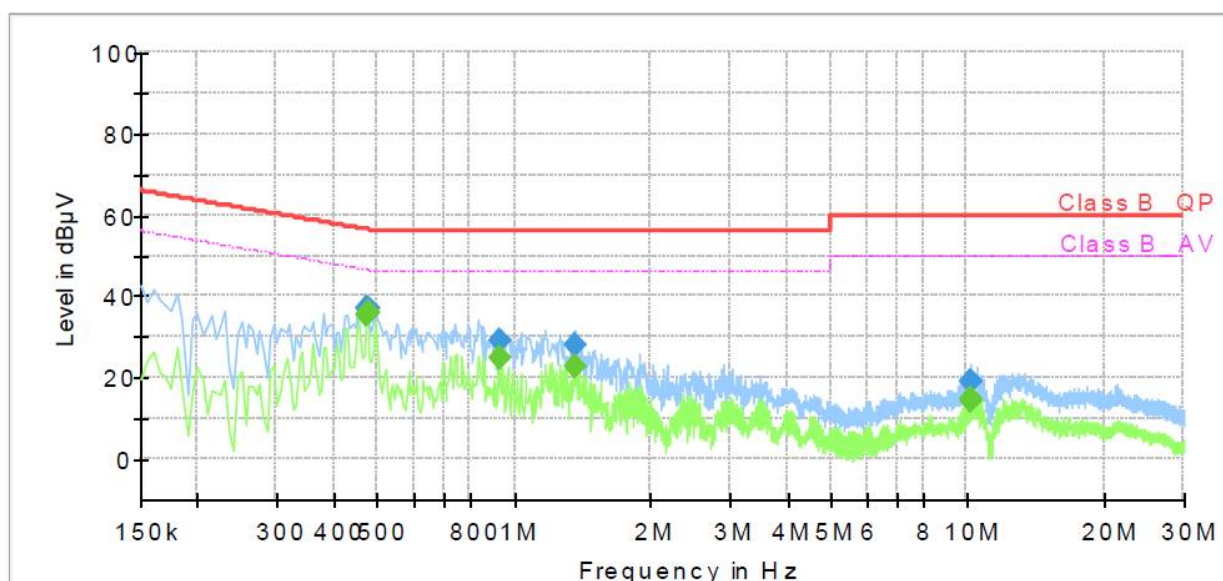
Operator Name:

Conducted Emission

J2001

Wireless_H

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	---	35.29	46.51	11.22	1000.0	9.000	L1	10.9
0.470000	36.84	---	56.51	19.67	1000.0	9.000	L1	10.9
0.475000	---	36.22	46.43	10.21	1000.0	9.000	L1	10.9
0.475000	37.00	---	56.43	19.43	1000.0	9.000	L1	10.9
0.925000	---	24.96	46.00	21.04	1000.0	9.000	L1	11.4
0.925000	29.13	---	56.00	26.87	1000.0	9.000	L1	11.4
1.370000	---	22.90	46.00	23.10	1000.0	9.000	L1	10.6
1.370000	28.25	---	56.00	27.75	1000.0	9.000	L1	10.6
10.160000	---	14.61	50.00	35.39	1000.0	9.000	L1	10.3
10.160000	19.27	---	60.00	40.73	1000.0	9.000	L1	10.3
10.185000	---	14.15	50.00	35.85	1000.0	9.000	L1	10.3
10.185000	18.99	---	60.00	41.01	1000.0	9.000	L1	10.3

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (16) of (30)

NEUTRAL LINE

Common Information

Test Description:

Model No.:

Mode

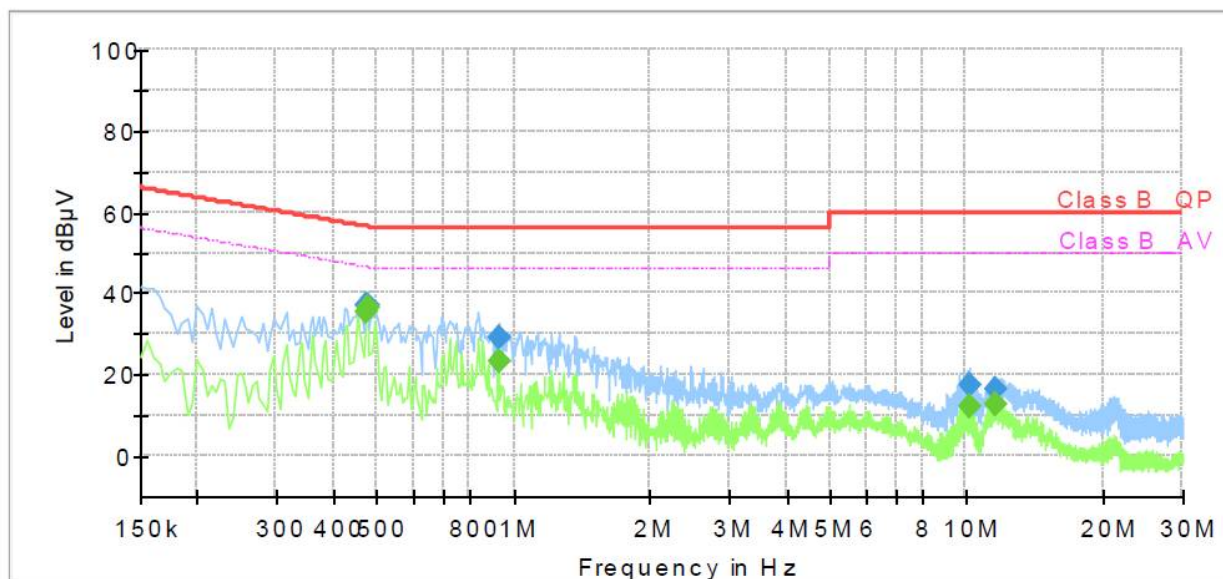
Operator Name:

Conducted Emission

J2001

Wireless_N

KES



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	---	35.38	46.51	11.13	1000.0	9.000	N	10.9
0.470000	36.98	---	56.51	19.53	1000.0	9.000	N	10.9
0.475000	---	36.29	46.43	10.14	1000.0	9.000	N	10.9
0.475000	37.15	---	56.43	19.28	1000.0	9.000	N	10.9
0.925000	---	23.19	46.00	22.81	1000.0	9.000	N	11.4
0.925000	29.10	---	56.00	26.90	1000.0	9.000	N	11.4
10.160000	---	12.15	50.00	37.85	1000.0	9.000	N	10.3
10.160000	17.73	---	60.00	42.27	1000.0	9.000	N	10.3
11.645000	---	12.58	50.00	37.42	1000.0	9.000	N	10.4
11.645000	16.28	---	60.00	43.72	1000.0	9.000	N	10.4

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact shchoi@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (17) of (30)

■ Cable Mode

HOT LINE

Common Information

Test Description:

Model No.:

Mode

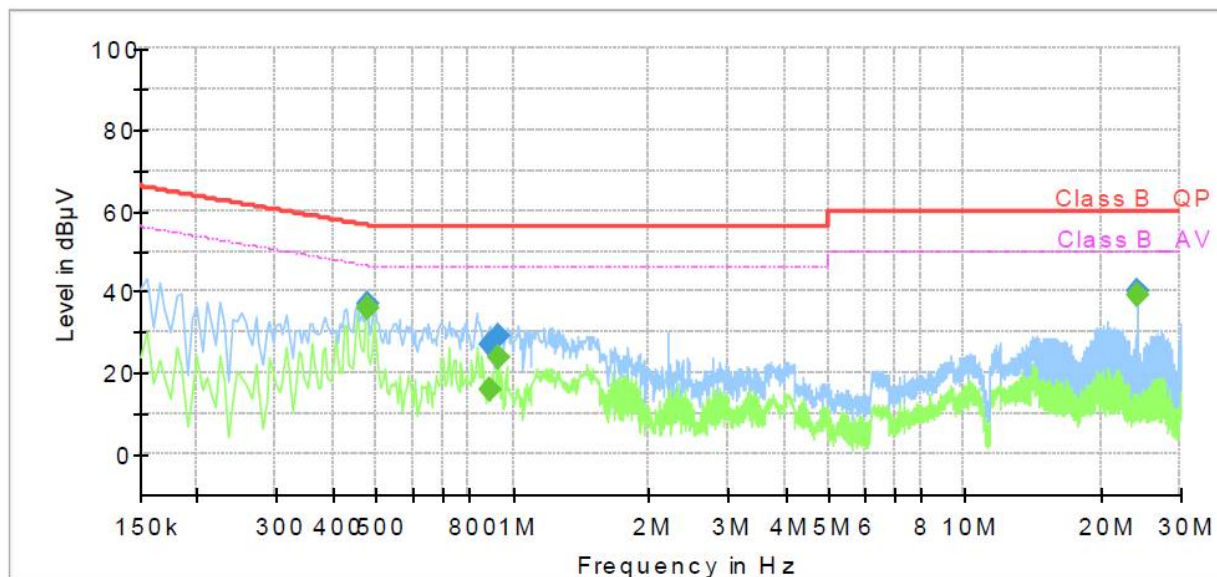
Operator Name:

Conducted Emission

J2001

Cable_H

KES



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.475000	---	36.08	46.43	10.35	1000.0	9.000	L1	10.9
0.475000	37.03	---	56.43	19.40	1000.0	9.000	L1	10.9
0.890000	---	15.80	46.00	30.20	1000.0	9.000	L1	11.4
0.890000	27.00	---	56.00	29.00	1000.0	9.000	L1	11.4
0.925000	---	23.90	46.00	22.10	1000.0	9.000	L1	11.4
0.925000	29.16	---	56.00	26.84	1000.0	9.000	L1	11.4
24.000000	---	38.97	50.00	11.03	1000.0	9.000	L1	11.0
24.000000	40.46	---	60.00	19.54	1000.0	9.000	L1	11.0

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact shchoi@kes.co.kr

NEUTRAL LINE

Common Information

Test Description:

Model No.:

Mode

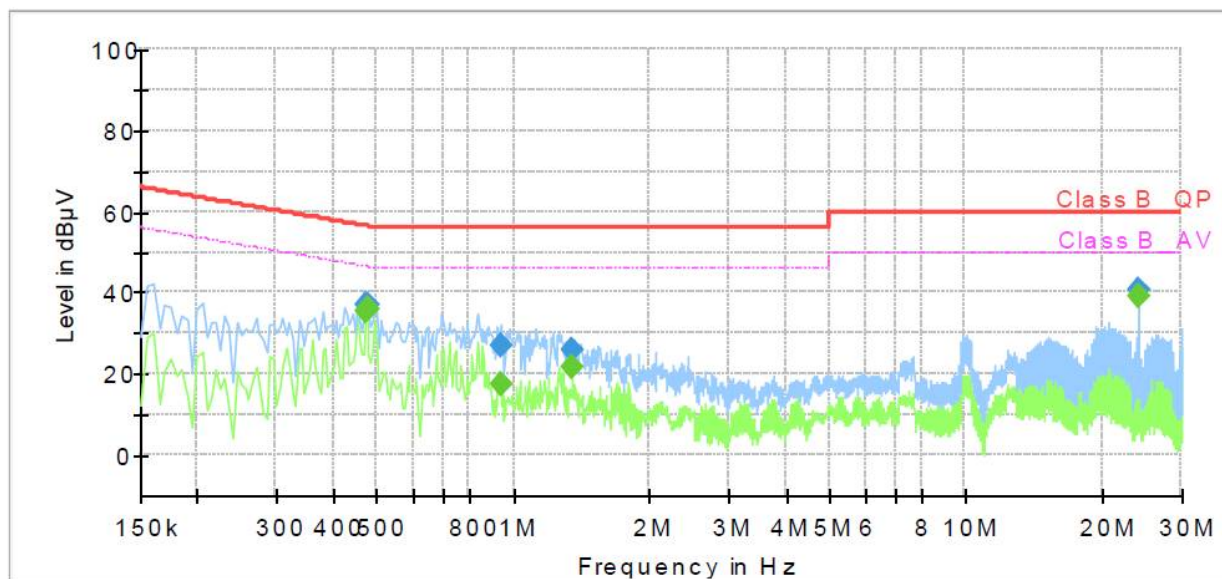
Operator Name:

Conducted Emission

J2001

Cable_ N

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.470000	---	35.29	46.51	11.22	1000.0	9.000	N	10.9
0.470000	36.96	---	56.51	19.55	1000.0	9.000	N	10.9
0.475000	---	36.09	46.43	10.34	1000.0	9.000	N	10.9
0.475000	36.99	---	56.43	19.44	1000.0	9.000	N	10.9
0.935000	---	17.36	46.00	28.64	1000.0	9.000	N	11.4
0.935000	27.25	---	56.00	28.75	1000.0	9.000	N	11.4
1.350000	---	21.84	46.00	24.16	1000.0	9.000	N	10.6
1.350000	26.02	---	56.00	29.98	1000.0	9.000	N	10.6
24.000000	---	39.16	50.00	10.84	1000.0	9.000	N	11.0
24.000000	40.64	---	60.00	19.36	1000.0	9.000	N	11.0

◆ Calculation

$$\text{QuasiPeak [dBμV]} / \text{CAverage [dBμV]} = \text{Reading Value [dBμV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0118

Page (19) of (30)

Uncertainty of measurement

HOT Line : Uncertainty of measurement 2.38 dB

(Confidence level: Approx. 95 %, $k=2$)

Neutral Line : Uncertainty of measurement 2.38 dB

(Confidence level: Approx. 95 %, $k=2$)

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



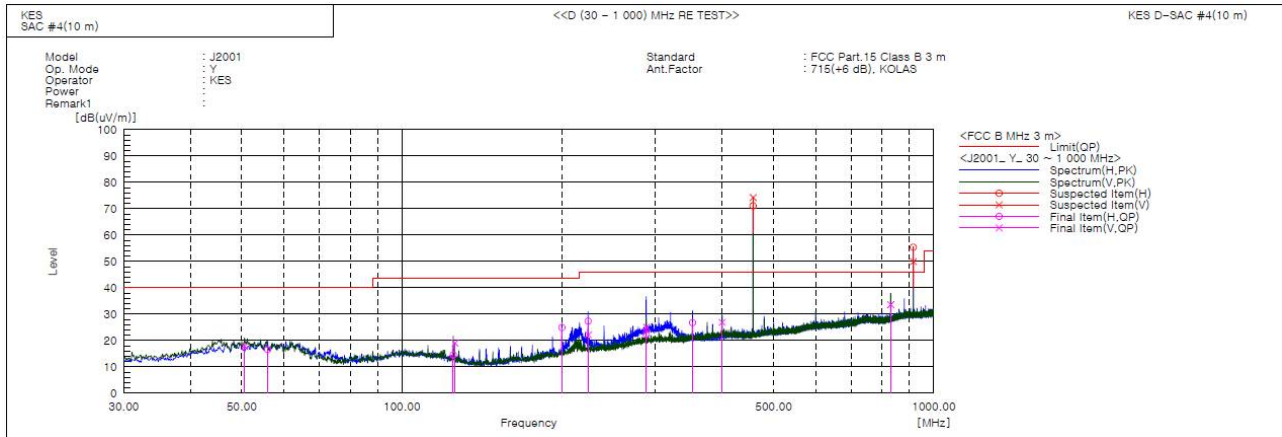
KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0118
Page (20) of (30)

Radiated Electric Field Emissions(Below 1 GHz)

■ Wireless Mode



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]	Remark
1	50.613	V	39.6	-21.8	17.8	40.0	22.2	118.0	19.0	
2	55.948	H	38.9	-22.3	16.6	40.0	23.4	346.0	76.0	
3	124.939	H	40.1	-25.5	14.6	43.5	28.9	364.0	59.0	
4	125.896	V	44.6	-25.6	19.0	43.5	24.5	210.0	81.0	
5	199.993	H	47.5	-22.6	24.9	43.5	18.6	269.0	147.0	
6	223.978	H	48.7	-21.3	27.4	46.0	18.6	127.0	132.0	
7	224.235	V	43.5	-21.3	22.2	46.0	23.8	150.0	229.0	
8	288.020	H	42.6	-20.2	22.4	46.0	23.6	395.0	120.0	
9	288.356	V	45.3	-20.2	25.1	46.0	20.9	148.0	356.0	
10	352.040	H	44.1	-17.3	26.8	46.0	19.2	389.0	227.0	
11	400.055	V	43.2	-16.3	26.9	46.0	19.1	149.0	268.0	
12	830.129	V	42.3	-8.7	33.6	46.0	12.4	114.0	59.0	
13	457.528	V	-----	-15.5	-----	46.0	-----	100.0	199.0	
14	457.528	H	-----	-15.5	-----	46.0	-----	200.0	350.0	
15	915.246	V	-----	-7.2	-----	46.0	-----	100.0	171.0	
16	915.246	H	-----	-7.2	-----	46.0	-----	100.0	180.0	

* Wireless Mode Exclusion Bands

- Fundamental Frequency: 457 MHz
- Harmonic Frequency : 915 MHz

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

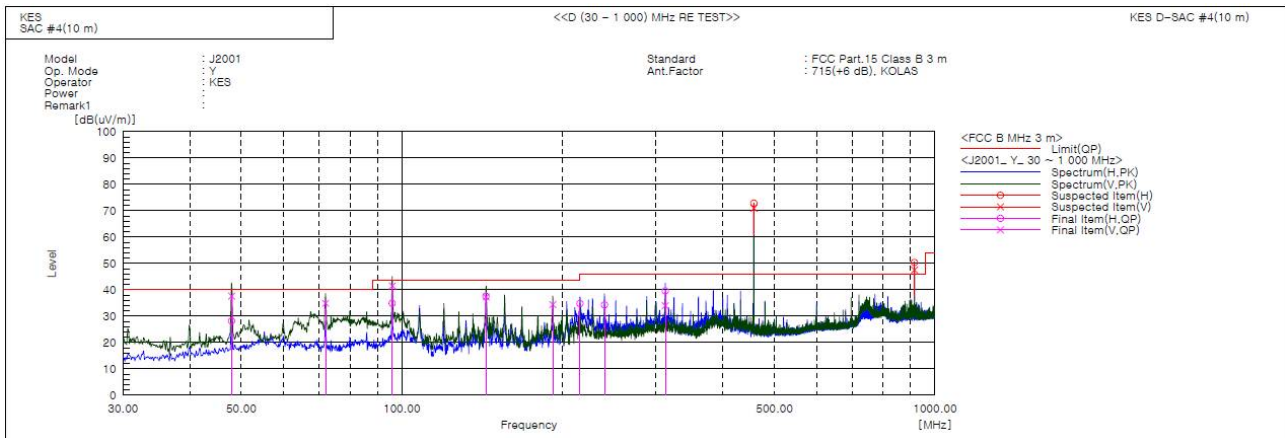


KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0118
Page (21) of (30)

Cable Mode



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]	Remark
1	47.945	H	50.1	-21.9	28.2	40.0	11.8	386.0	158.0	
2	47.988	V	59.5	-21.9	37.6	40.0	2.4	110.0	63.0	
3	71.953	V	61.2	-26.3	34.9	40.0	5.1	126.0	16.0	
4	95.960	H	58.6	-23.7	34.9	43.5	8.6	284.0	190.0	
5	95.976	V	65.2	-23.7	41.5	43.5	2.0	125.0	1.0	
6	143.856	H	64.3	-26.8	37.5	43.5	6.0	294.0	298.0	
7	143.975	V	64.1	-26.8	37.3	43.5	6.2	109.0	143.0	
8	191.990	V	57.8	-23.4	34.4	43.5	9.1	148.0	143.0	
9	215.876	H	56.4	-21.6	34.8	43.5	8.7	345.0	183.0	
10	240.005	H	55.3	-21.0	34.3	46.0	11.7	267.0	211.0	
11	312.028	H	58.7	-19.1	39.6	46.0	6.4	398.0	330.0	
12	312.028	V	53.1	-19.1	34.0	46.0	12.0	150.0	119.0	
13	457.528	H	-----	-15.5	-----	46.0	-----	100.0	112.0	
14	457.528	V	-----	-15.5	-----	46.0	-----	100.0	28.0	
15	915.246	H	-----	-7.2	-----	46.0	-----	100.0	354.0	
16	915.246	V	-----	-7.2	-----	46.0	-----	100.0	28.0	

* Wireless Mode Exclusion Bands

- Fundamental Frequency: 457 MHz
- Harmonic Frequency : 915 MHz

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



◆ Calculation – SAC #4(10 m)

Result(QP) [dB(μ V/m)] = (Reading(QP)[dB(μ V)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μ V/m)] - Result(QP) [dB(μ V/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

Uncertainty of measurement

Horizontal : Uncertainty of measurement 4.16 dB

(Confidence level: Approx. 95 %, $k=2$)

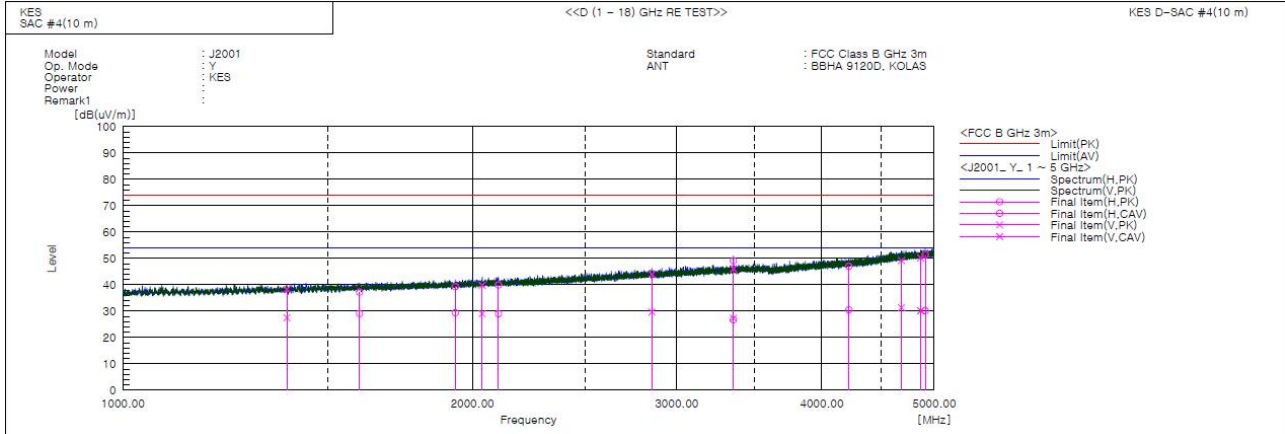
Vertical : Uncertainty of measurement 4.24 dB

(Confidence level: Approx. 95 %, $k=2$)



Radiated Electric Field Emissions(Above 1 GHz)

Wireless Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1384.500	V	41.3	30.5	-3.0	38.3	27.5	74.0	54.0	35.7	26.5	105.0	285.0	
2	1599.000	H	39.1	31.0	-1.9	37.2	29.1	74.0	54.0	36.8	24.9	384.0	61.0	
3	1933.500	H	39.7	29.8	-0.4	39.3	29.4	74.0	54.0	34.7	24.6	297.0	136.0	
4	2040.000	V	39.7	28.9	0.1	39.8	29.0	74.0	54.0	34.2	25.0	116.0	103.0	
5	2106.500	H	39.5	28.6	0.4	39.9	29.0	74.0	54.0	34.1	25.0	395.0	153.0	
6	2856.000	V	39.9	25.6	4.1	44.0	29.7	74.0	54.0	30.0	24.3	128.0	48.0	
7	3357.000	V	40.2	21.5	5.9	46.1	27.4	74.0	54.0	27.9	26.6	149.0	64.0	
8	3357.000	H	43.2	20.8	5.9	49.1	26.7	74.0	54.0	24.9	27.3	348.0	85.0	
9	4221.000	H	37.8	21.3	9.2	47.0	30.5	74.0	54.0	27.0	23.5	285.0	247.0	
10	4686.000	V	37.4	19.5	11.8	49.2	31.3	74.0	54.0	24.8	22.7	213.0	357.0	
11	4866.500	V	37.6	17.6	12.6	50.2	30.2	74.0	54.0	23.8	23.8	152.0	36.0	
12	4912.000	H	38.6	17.4	12.8	51.4	30.2	74.0	54.0	22.6	23.8	239.0	160.0	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

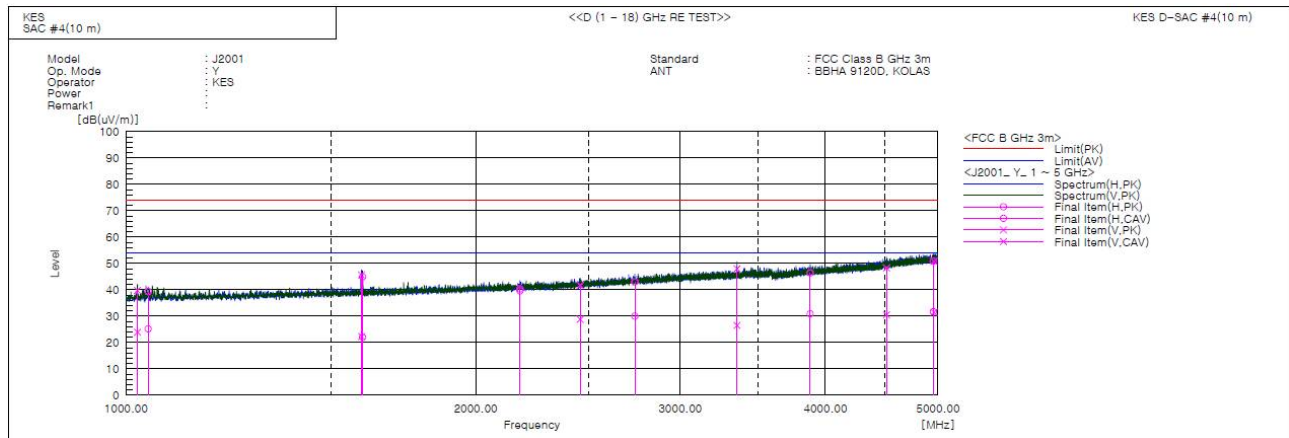


KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0118
Page (24) of (30)

Cable Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1023.000	V	44.8	28.9	-5.0	39.8	23.9	74.0	54.0	34.2	30.1	124.0	126.0	
2	1045.000	H	44.3	30.1	-4.9	39.4	25.2	74.0	54.0	34.6	28.8	249.0	123.0	
3	1595.000	V	47.6	24.2	-1.9	45.7	22.3	74.0	54.0	28.3	31.7	108.0	27.0	
4	1598.500	H	46.8	23.9	-1.9	44.9	22.0	74.0	54.0	29.1	32.0	298.0	36.0	
5	2184.000	H	38.9	39.6	0.7	39.6	40.3	74.0	54.0	34.4	13.7	326.0	68.0	
6	2460.500	V	39.7	26.8	2.0	41.7	28.8	74.0	54.0	32.3	25.2	121.0	212.0	
7	2742.000	H	39.5	26.5	3.5	43.0	30.0	74.0	54.0	31.0	24.0	238.0	274.0	
8	3357.000	V	42.1	20.6	5.9	48.0	26.5	74.0	54.0	26.0	27.5	104.0	118.0	
9	3882.000	H	38.6	23.1	7.8	46.4	30.9	74.0	54.0	27.6	23.1	354.0	183.0	
10	4515.000	V	37.6	19.8	10.7	48.3	30.5	74.0	54.0	25.7	23.5	118.0	161.0	
11	4955.500	H	37.9	18.7	13.0	50.9	31.7	74.0	54.0	23.1	22.3	325.0	72.0	
12	4960.500	V	37.8	18.5	13.0	50.8	31.5	74.0	54.0	23.2	22.5	146.0	228.0	

Calculation

Result(PK/CAV) [dB(μ V/m)] = (Reading(PK/CAV)[dB(μ V)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μ V/m)] - Result(PK/CAV) [dB(μ V/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

Uncertainty of measurement

Uncertainty of measurement 5.76 dB

(Confidence level: Approx. 95 %, $k=2$)

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr