



EMC TEST REPORT

Test Report No. : KES-EM-21T0485
Date of Issue : Jun. 23, 2021
Product name : MATIV Mat
Model/Type No. : OM-C03UB1
Variant Mode : OM-C03SB1, OM-D03UB1, OM-D03SB1, OM-E03UB1,
OM-E03SB1, OM-F03UB1, OM-F03SB1
Applicant : Omolle Inc.
Applicant Address : Rm. 1406, 40, Cheonggyecheon-ro, Jung-gu, Seoul,
Republic of Korea
Manufacturer : Omolle Inc.
Manufacturer Address : Rm. 1406, 40, Cheonggyecheon-ro, Jung-gu, Seoul,
Republic of Korea
FCC ID : 2A2AUOM-C03BU1
Date of Receipt : May. 28, 2021
Test date : Jun. 06, 2021 ~ Jun. 07, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong Hun, Jang
EMC Technical Manager

**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-21T0485
Page (2) of (24)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jun. 23, 2021	KES-EM-21T0485	Issued

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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 Operating 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)		19
Radiated Electric Field Emissions(Above 1 GHz).....		20
APPENDIX B - Test Setup Photos and Configuration.....		22
Radiated Electric Field Emissions(Below 1 GHz)		23
Radiated Electric Field Emissions(Above 1 GHz)		24



1.0 General Product Description

Main Specifications of EUT are:

Item	Spec
Operating Frequency	2.4 GHz (Bluetooth)
Power	DC 5 V (USB)
Size	(1880 x 610 x 30) mm
Weight	2 kg



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.

☒ AC 120 V, 60 Hz

1.2 Variant Model Differences

There is no difference in circuitry between the basic model and the multi-model.
The difference of the third letter is mat & sensor in mat design.
The difference of the sixth letter is supply method.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
MATIV Mat	OM-C03UB1	-	Omolle Inc.	EUT
Adapter	GS-0523	-	Shenzhen GOOD-SHE Technology Co., Ltd.	

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Phone	SM-A720S	-	Samsung Electronics Co., Ltd.	-



1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
MATIV Mat (EUT)	USB C Type	Adapter	USB	1.5	U
	Wireless	Phone	Wireless	-	-

* Unshielded = U, Shielded = S

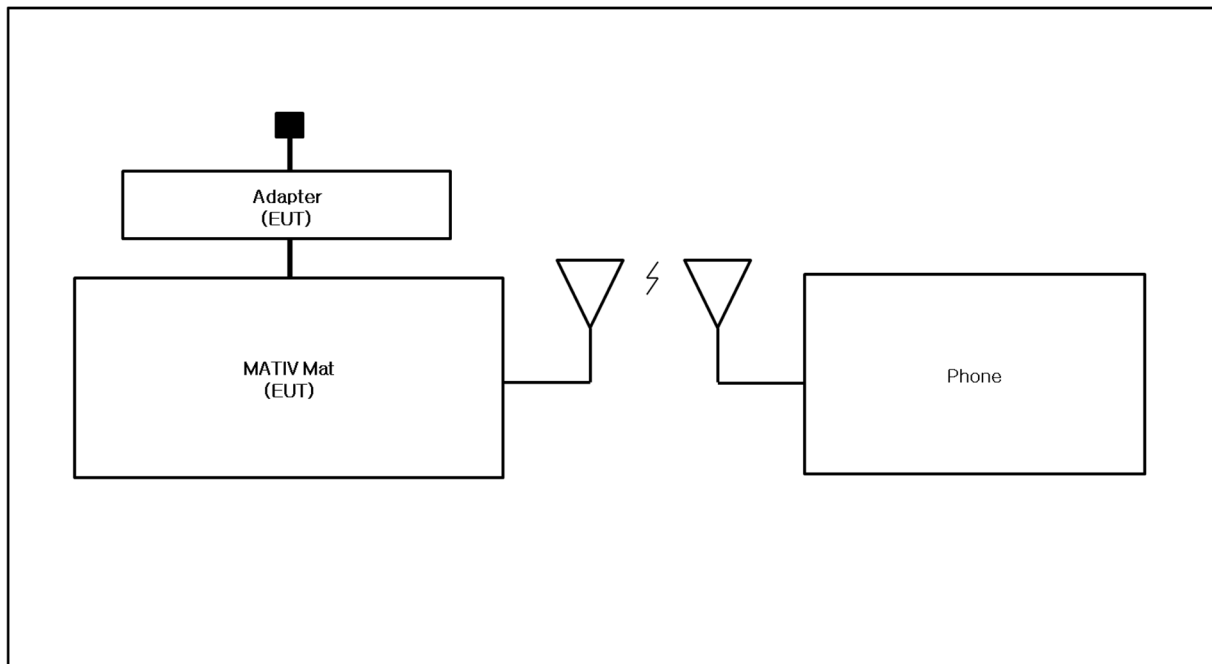
1.7 EUT Operating Mode(s)

Test mode	operating
Operating	- Tested while checking the normal operation status on the Phone application. - Tested while checking the normal state of charge.

EUT Test operating S/W		
Name	Version	Manufacture Company
BLE DevTool	1.0	-

1.8 Configuration

■ AC Main
□ DC Main



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 16-1-4:2019

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 0004



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
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Report No.:
KES-EM-21T0485
Page (11) of (24)

- | | | |
|--|----------------------------------|---|
| ☐ 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 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Jun. 06, 2021

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EMC32	R & S	9.12.00	-	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	01, 15, 2022	1 Year
☒	LISN	ENV216	R & S	101787	12, 29, 2021	1 Year
☐	LISN	ESH2-Z5	R & S	100450	12, 29, 2021	1 Year
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021	1 Year

Test Conditions

Temperature: (24,4 ± 0,1) °C
Relative Humidity: (45,3 ± 0,1) % 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

Remarks

See Appendix A for test data.



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jun. 06, 2021

Test Location

☐ OPEN AREA TEST SITE #2

☒ SEMI ANECHOIC CHAMBER #4

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2022	1 Year
☒	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2021	2 Year
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022	1 Year
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2022	1 Year

Test Conditions

Temperature: (23,8 ± 0,2) °C

Relative Humidity: (46,8 ± 0,2) % 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.

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:
KES-EM-21T0485
Page (14) of (24)

2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jun. 07, 2021

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2021	1 Year
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 14, 2021	1 Year
☒	PREAMPLIFIER	8449B	AGILENT	8008A01640	04, 05, 2022	1 Year

Test Conditions

Temperature: (23,6 ± 0,2) °C
Relative Humidity: (46,2 ± 0,3) % R.H.

Frequency Range of Measurement

1 GHz to 12,4 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.

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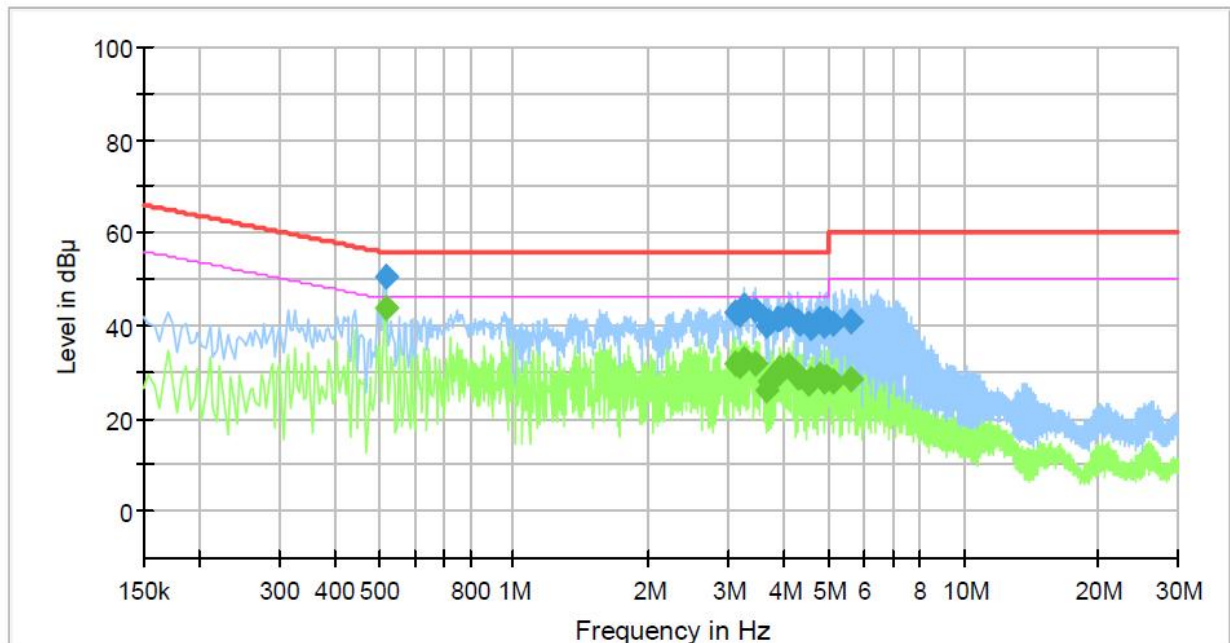
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	OM-C03UB1
Phase:	H
Mode:	
Operator Name:	KES





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Report No.:
KES-EM-21T0485
Page (16) of (24)

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.518000	50.33	---	56.00	5.67	1000.0	9.000	L1	20.1
0.518000	---	43.82	46.00	2.18	1000.0	9.000	L1	20.1
3.098000	42.88	---	56.00	13.12	1000.0	9.000	L1	20.5
3.098000	---	31.74	46.00	14.26	1000.0	9.000	L1	20.5
3.186000	---	31.46	46.00	14.54	1000.0	9.000	L1	20.5
3.186000	42.43	---	56.00	13.57	1000.0	9.000	L1	20.5
3.246000	44.15	---	56.00	11.85	1000.0	9.000	L1	20.5
3.246000	---	32.88	46.00	13.12	1000.0	9.000	L1	20.5
3.454000	---	31.68	46.00	14.32	1000.0	9.000	L1	20.4
3.454000	43.48	---	56.00	12.52	1000.0	9.000	L1	20.4
3.654000	40.06	---	56.00	15.94	1000.0	9.000	L1	20.4
3.654000	---	25.95	46.00	20.05	1000.0	9.000	L1	20.4
3.686000	40.84	---	56.00	15.16	1000.0	9.000	L1	20.4
3.686000	---	27.99	46.00	18.01	1000.0	9.000	L1	20.4
3.870000	---	29.52	46.00	16.48	1000.0	9.000	L1	20.3
3.870000	41.40	---	56.00	14.60	1000.0	9.000	L1	20.3
3.910000	---	30.74	46.00	15.26	1000.0	9.000	L1	20.3
3.910000	41.60	---	56.00	14.40	1000.0	9.000	L1	20.3
4.102000	---	31.28	46.00	14.72	1000.0	9.000	L1	20.3
4.102000	42.24	---	56.00	13.76	1000.0	9.000	L1	20.3
4.286000	---	28.83	46.00	17.17	1000.0	9.000	L1	20.2
4.286000	40.84	---	56.00	15.16	1000.0	9.000	L1	20.2
4.342000	---	28.98	46.00	17.02	1000.0	9.000	L1	20.2
4.342000	40.40	---	56.00	15.60	1000.0	9.000	L1	20.2
4.526000	---	27.35	46.00	18.65	1000.0	9.000	L1	20.2
4.526000	40.52	---	56.00	15.48	1000.0	9.000	L1	20.2
4.578000	---	28.42	46.00	17.58	1000.0	9.000	L1	20.2
4.578000	39.25	---	56.00	16.75	1000.0	9.000	L1	20.2
4.766000	41.31	---	56.00	14.69	1000.0	9.000	L1	20.1
4.766000	---	29.23	46.00	16.77	1000.0	9.000	L1	20.1
4.926000	39.90	---	56.00	16.10	1000.0	9.000	L1	20.1
4.926000	---	27.92	46.00	18.08	1000.0	9.000	L1	20.1
4.978000	41.23	---	56.00	14.77	1000.0	9.000	L1	20.1
4.978000	---	28.84	46.00	17.16	1000.0	9.000	L1	20.1
5.154000	40.47	---	60.00	19.53	1000.0	9.000	L1	20.1
5.154000	---	27.91	50.00	22.09	1000.0	9.000	L1	20.1
5.618000	---	28.24	50.00	21.76	1000.0	9.000	L1	20.0
5.618000	41.12	---	60.00	18.88	1000.0	9.000	L1	20.0

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3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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KES-EM-21T0485

Page (17) of (24)

NEUTRAL LINE

Common Information

Test Description:

Model No.:

Phase:

Mode:

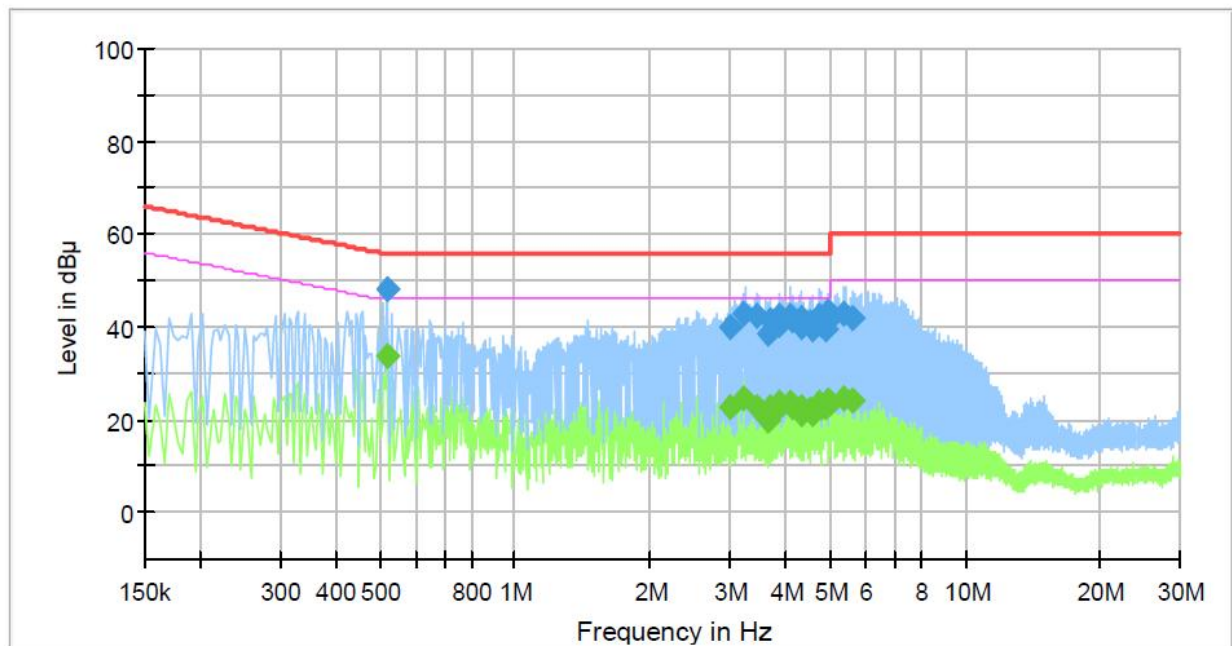
Operator Name:

Conducted Emission

OM-C03UB1

N

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Report No.:
KES-EM-21T0485
Page (18) of (24)

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.518000	48.20	---	56.00	7.80	1000.0	9.000	N	20.0
0.518000	---	33.48	46.00	12.52	1000.0	9.000	N	20.0
3.006000	---	22.53	46.00	23.47	1000.0	9.000	N	20.5
3.006000	40.12	---	56.00	15.88	1000.0	9.000	N	20.5
3.214000	---	24.61	46.00	21.39	1000.0	9.000	N	20.5
3.214000	43.02	---	56.00	12.98	1000.0	9.000	N	20.5
3.430000	42.15	---	56.00	13.85	1000.0	9.000	N	20.4
3.430000	---	22.65	46.00	23.35	1000.0	9.000	N	20.4
3.638000	38.73	---	56.00	17.27	1000.0	9.000	N	20.4
3.638000	---	19.87	46.00	26.13	1000.0	9.000	N	20.4
3.690000	---	22.74	46.00	23.26	1000.0	9.000	N	20.3
3.690000	41.52	---	56.00	14.48	1000.0	9.000	N	20.3
3.842000	---	22.49	46.00	23.51	1000.0	9.000	N	20.3
3.842000	40.38	---	56.00	15.62	1000.0	9.000	N	20.3
3.874000	---	23.77	46.00	22.23	1000.0	9.000	N	20.3
3.874000	42.42	---	56.00	13.58	1000.0	9.000	N	20.3
4.078000	42.58	---	56.00	13.42	1000.0	9.000	N	20.3
4.078000	---	23.74	46.00	22.26	1000.0	9.000	N	20.3
4.134000	---	22.47	46.00	23.53	1000.0	9.000	N	20.2
4.134000	41.54	---	56.00	14.46	1000.0	9.000	N	20.2
4.302000	---	22.83	46.00	23.17	1000.0	9.000	N	20.2
4.302000	42.07	---	56.00	13.93	1000.0	9.000	N	20.2
4.342000	---	21.40	46.00	24.60	1000.0	9.000	N	20.2
4.342000	39.96	---	56.00	16.04	1000.0	9.000	N	20.2
4.502000	---	22.33	46.00	23.67	1000.0	9.000	N	20.2
4.502000	40.68	---	56.00	15.32	1000.0	9.000	N	20.2
4.582000	---	21.23	46.00	24.77	1000.0	9.000	N	20.1
4.582000	39.26	---	56.00	16.74	1000.0	9.000	N	20.1
4.742000	42.56	---	56.00	13.44	1000.0	9.000	N	20.1
4.742000	---	23.56	46.00	22.44	1000.0	9.000	N	20.1
4.782000	40.63	---	56.00	15.37	1000.0	9.000	N	20.1
4.782000	---	22.61	46.00	23.39	1000.0	9.000	N	20.1
4.890000	39.38	---	56.00	16.62	1000.0	9.000	N	20.1
4.890000	---	22.65	46.00	23.35	1000.0	9.000	N	20.1
4.938000	---	23.63	46.00	22.37	1000.0	9.000	N	20.1
4.938000	42.04	---	56.00	13.96	1000.0	9.000	N	20.1
4.978000	---	24.19	46.00	21.81	1000.0	9.000	N	20.1
4.978000	43.22	---	56.00	12.78	1000.0	9.000	N	20.1
4.994000	41.94	---	56.00	14.06	1000.0	9.000	N	20.1
4.994000	---	23.80	46.00	22.20	1000.0	9.000	N	20.1
5.390000	---	24.41	50.00	25.59	1000.0	9.000	N	20.0
5.390000	42.68	---	60.00	17.32	1000.0	9.000	N	20.0
5.594000	41.69	---	60.00	18.31	1000.0	9.000	N	20.0
5.594000	---	24.20	50.00	25.80	1000.0	9.000	N	20.0

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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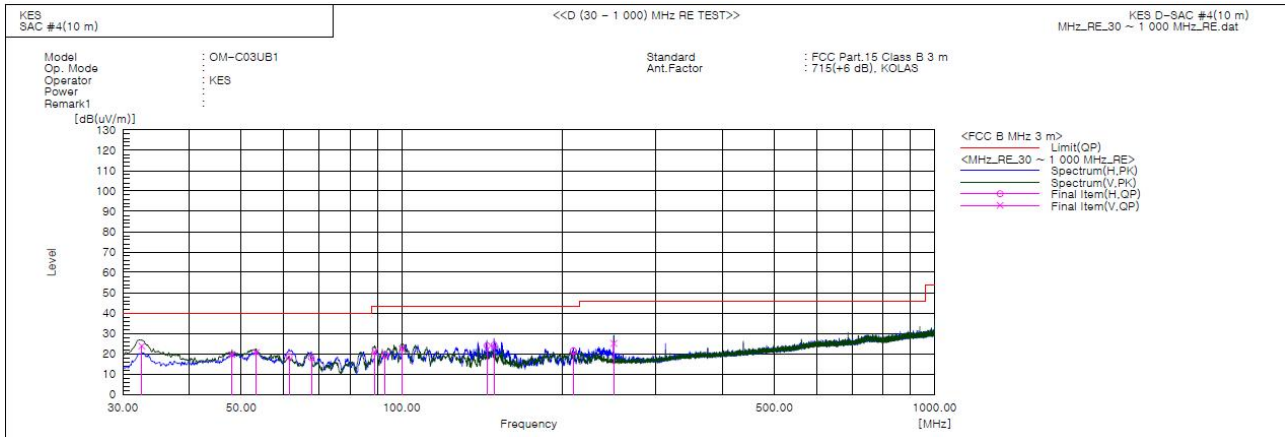


KES Co., Ltd.

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-21T0485
Page (19) of (24)

Radiated Electric Field Emissions(Below 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]	Remark
1	32.546	V	49.2	-25.4	23.8	40.0	16.2	100.0	87.0	
2	48.066	V	41.2	-21.6	19.6	40.0	20.4	110.0	256.0	
3	53.401	V	42.4	-21.7	20.7	40.0	19.3	100.0	69.0	
4	61.525	H	41.4	-22.8	18.6	40.0	21.4	400.0	179.0	
5	67.709	H	42.5	-24.5	18.0	40.0	22.0	390.0	178.0	
6	89.049	V	46.0	-25.0	21.0	43.5	22.5	150.0	129.0	
7	93.171	H	43.7	-24.3	19.4	43.5	24.1	250.0	292.0	
8	100.204	V	45.5	-23.1	22.4	43.5	21.1	100.0	95.0	
9	144.581	H	49.9	-26.0	23.9	43.5	19.6	400.0	299.0	
10	149.068	H	50.1	-25.8	24.3	43.5	19.2	390.0	299.0	
11	210.056	H	42.8	-21.4	21.4	43.5	22.1	400.0	92.0	
12	249.948	V	45.1	-20.0	25.1	46.0	20.9	100.0	114.0	

◆ Calculation – SAC #4(10 m)

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

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



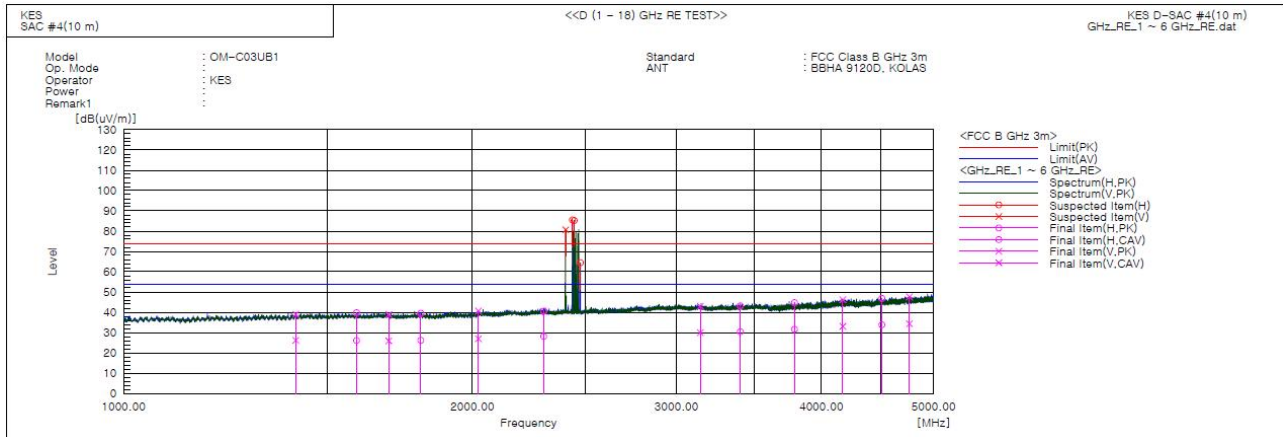
KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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KES-EM-21T0485
Page (20) of (24)

Radiated Electric Field Emissions(Above 1 GHz)

- (1 ~ 6) GHz



Final Result

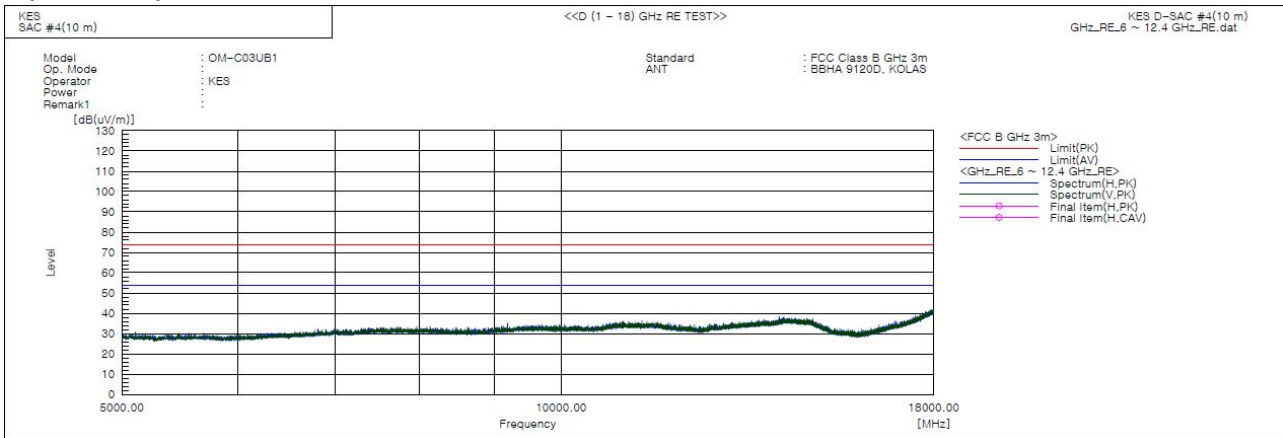
No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1407.635	V	42.1	29.2	-3.0	39.1	26.2	74.0	54.0	34.9	27.8	120.0	323.0	
2	1588.754	H	41.9	28.2	-2.1	39.8	26.1	74.0	54.0	34.2	27.9	360.0	326.0	
3	1693.315	V	40.6	27.5	-1.6	39.0	25.9	74.0	54.0	35.0	28.1	100.0	294.0	
4	1805.162	H	40.6	27.3	-1.1	39.5	26.2	74.0	54.0	34.5	27.8	100.0	170.0	
5	2023.455	V	40.8	27.0	-0.1	40.7	26.9	74.0	54.0	33.3	27.1	150.0	240.0	
6	2304.203	H	39.2	26.8	1.3	40.5	28.1	74.0	54.0	33.5	25.9	400.0	241.0	
7	3144.790	V	38.1	25.2	4.9	43.0	30.1	74.0	54.0	31.0	23.9	130.0	192.0	
8	3405.833	H	37.6	24.8	5.6	43.2	30.4	74.0	54.0	30.8	23.6	270.0	218.0	
9	3793.202	H	37.4	24.2	7.4	44.8	31.6	74.0	54.0	29.2	22.4	350.0	22.0	
10	4174.735	V	36.9	23.8	9.3	46.2	33.1	74.0	54.0	27.8	20.9	100.0	18.0	
11	4512.105	H	36.6	23.5	10.3	46.9	33.8	74.0	54.0	27.1	20.2	400.0	357.0	
12	4765.880	V	36.3	23.0	11.4	47.7	34.4	74.0	54.0	26.3	19.6	100.0	156.0	
13	2406.500	V	-----	-----	1.9	-----	-----	74.0	54.0	-----	-----	150.0	102.0	
14	2439.500	H	-----	-----	2.0	-----	-----	74.0	54.0	-----	-----	200.0	346.0	
15	2448.000	H	-----	-----	2.1	-----	-----	74.0	54.0	-----	-----	100.0	214.0	
16	2478.500	H	-----	-----	2.2	-----	-----	74.0	54.0	-----	-----	100.0	135.0	

- Fundamental Frequency: 2.4 GHz

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- (6 ~ 12,4) GHz



* No spurious emission were detected above 6 GHz.

◆ Calculation

$$\text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})] = (\text{Reading(PK/CAV)}[\text{dB}(\mu\text{V})] + \text{c.f}[\text{dB}(1/\text{m})])$$

$$\text{Margin(PK/CAV)}[\text{dB}] = \text{Limit}[\text{dB}(\mu\text{V/m})] - \text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})]$$

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: Marjin value