D&M
D&M Holdings Inc.
Quality Assurance Division
2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569 Japan
Tel : +81-44-670-2665 Fax : +81-44-670-2697

Provision of information on the compliance of combinations of radio equipment and software

General Information:

Report Date:	28-Sep-17	Report No.:	DM-Radio17024
Manufacturer:	D&M Holdings Inc.		
Address:	2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569, Japan		
Factory	ANAM ELECTRONICS VIETNAM CO.,LTD		
Address:	Dong Van II Industrial Zone, Duy Tien District Ha Nam Province, Viet Nam		
Model Tested:	DSB250BT		
Appliance Type	Bluetooth Speaker		
Brand Name:	DENON		
Country of Origin:	Vietnam		

Radio Specification:

Type	Frequency Range	Max.RF Power(Limit)	Test result of RF Power
Bluetooth	2402~2480 MHz	10dBm	9.6dBm

Technical document: Test Report No. NK-17-R-207

Software version information:
MCU: v1.0 or later
BT: v60_20170920 or later

※There is no change in the performance of Safety, EMC and Radio by version update.

Checked by: Akihiro Yoshida

Approved by:

Jun Sakurai, Director
Quality Assurance Dep.
D&M Holdings Inc.

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Test Report for Restriction of Hazardous Substances (RoHS)
EU Directive 2011/65/EU

General Information:

Report Date:	28-Sep-17	Report No.:	DM-RoHS17024
Manufacturer:	D&M Holdings Inc.		
Address:	2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569, Japan		
Factory	ANAM ELECTRONICS VIETNAM CO.,LTD		
Address:	Dong Van II Industrial Zone, Duy Tien District Ha Nam Province, Viet Nam		
Model Tested:	DSB250BT		
Appliance Type	Bluetooth Speaker		
Brand Name:	DENON		
Country of Origin:	Vietnam		
Harmonised Standards:	EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances		

Test Results: For more detail, refer to the attached parts list.

Date Reported:	28-Sep-17		
Substance	Limit (%)	Containing substances	Judgment
Lead	0.1	Yes*1	Pass
Mercury	0.1	ND*2	Pass
Cadmium	0.01	ND*2	Pass
Hexavalent chromium	0.1	ND*2	Pass
Polybrominated biphenyls (PBB)	0.1	ND*2	Pass
Polybrominated diphenyl ethers (PBDE)	0.1	ND*2	Pass

*1: These are included to only those parts defined as exemption in ANNEX Ⅲ.
*2: ND = Not Detected

Checked by: Akihiro Yoshida

Approved by:

Jun Sakurai, Director
Quality Assurance Dep.
D&M Holdings Inc.

DENON

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Phone: +81-44-670-2665 Fax: +81-44-670-2697

DM-CE17024

EU Declaration of Conformity

We, D&M Holdings Inc., declare under our sole responsibility that the product;

Brand name: **DENON**

Product: **Bluetooth Speaker**

Model: **DSB250BT**

following the provisions of EC/EU directives and EC regulation as follows;

RE: ***2014/53/EU***
LV: ***2014/35/EU***
EMC: ***2014/30/EU***
RoHS: ***2011/65/EU***

to which this declaration relates is in conformity with the following standards for

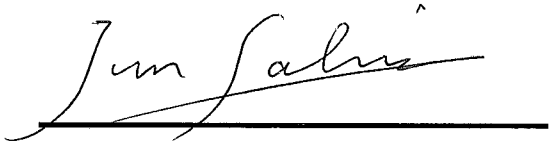
* Standards applied

Safety: ***EN60065:2014***
EMC: ***EN55032:2015 (Class:B)***
EN55020:2007+A11:2011
EN55024:2010
EN61000-3-2:2014
EN61000-3-3:2013
EN301489-1 V2.1.1
EN301489-9 V2.1.1
EN301489-17 V3.1.1
Radio: ***EN300328 V2.1.1***
Health: ***EN62479:2010***
RoHS: ***EN50581:2012***

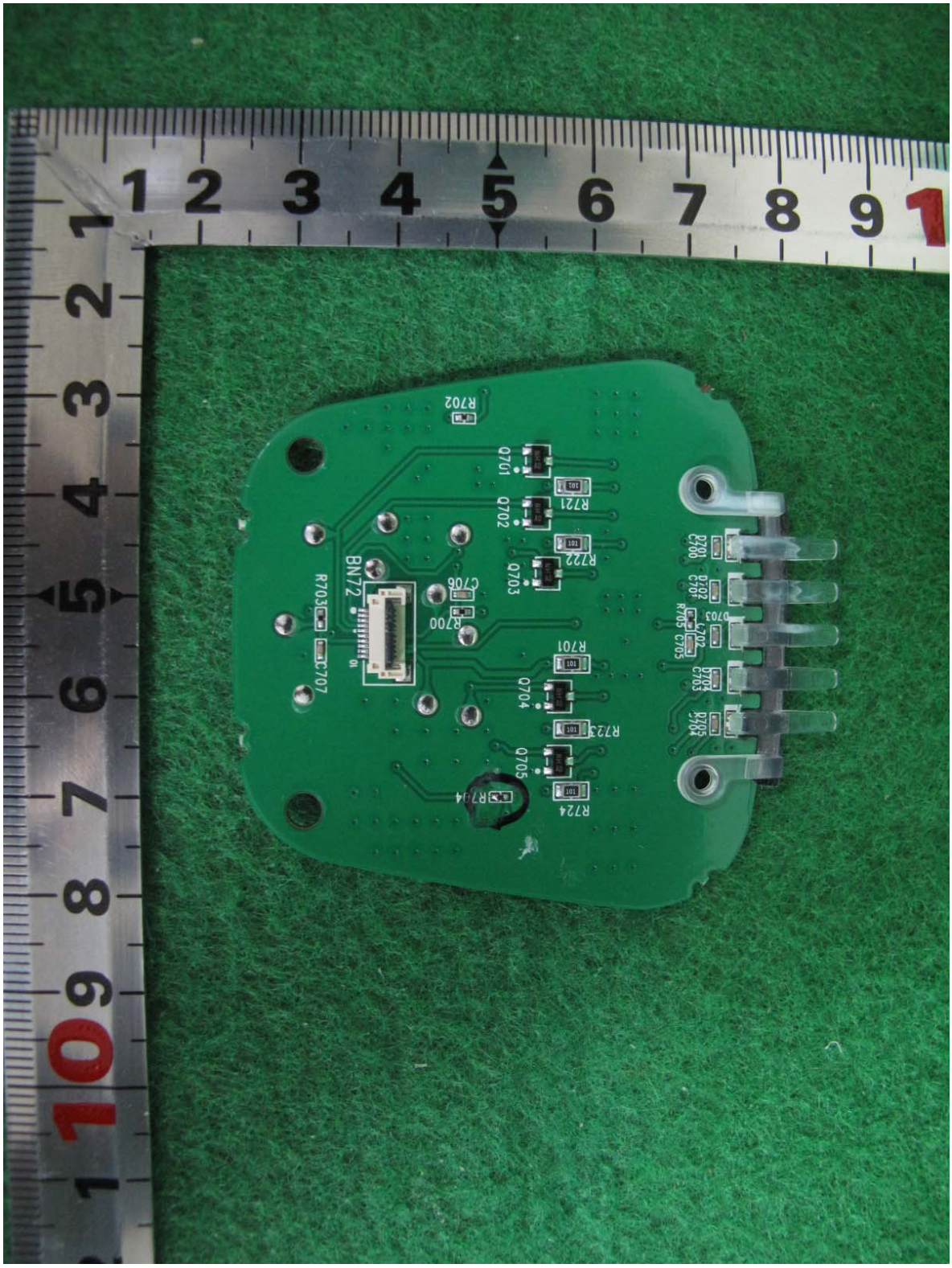
CE Mark first affixed in 2017

Manufacturer: D&M Holdings Inc.
Address : 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569 Japan

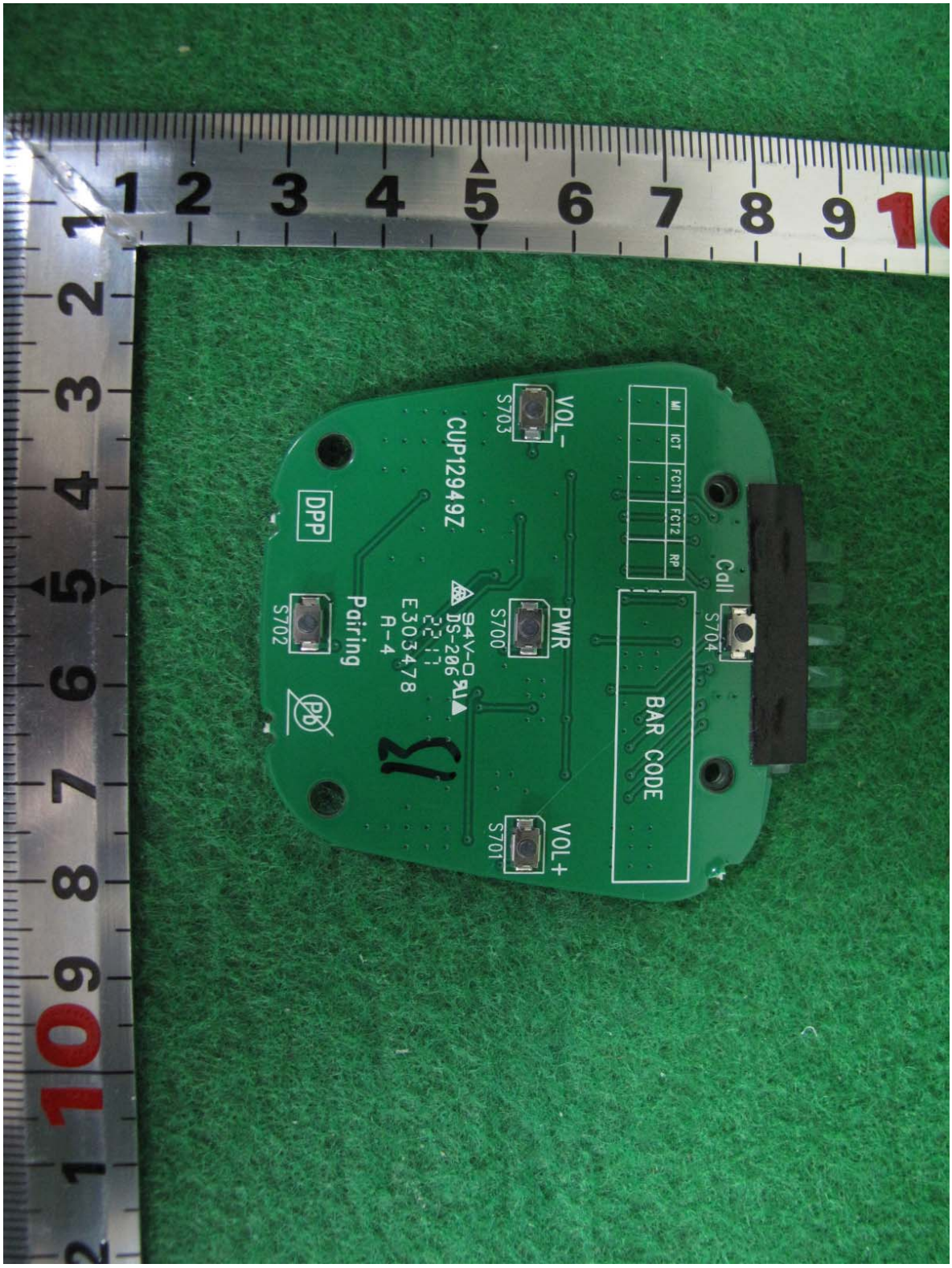
Responsible: Jun Sakurai
Director, Quality Assurance Dep.
Date: 28-September-2017



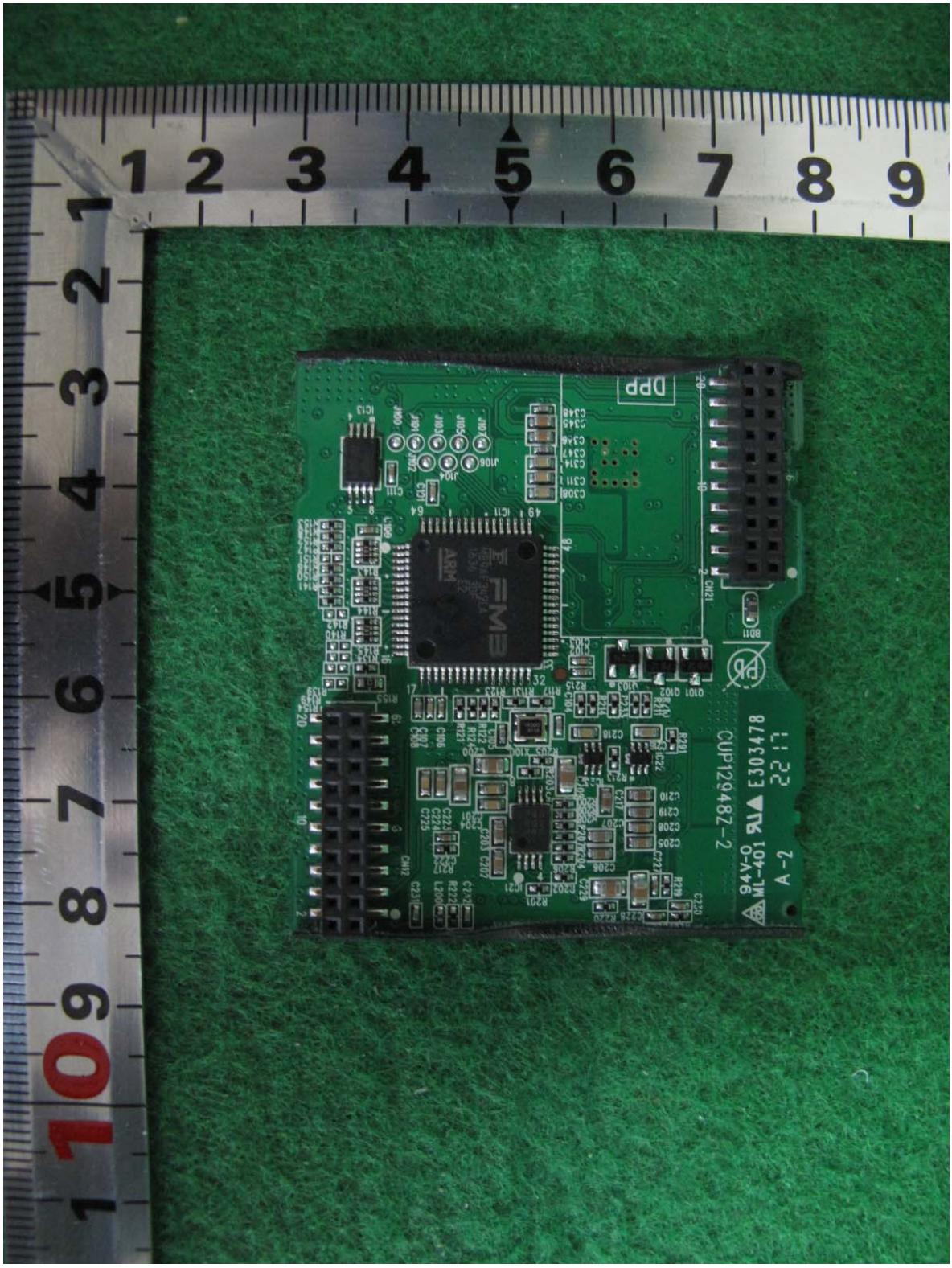
Rear View of Key & LED part



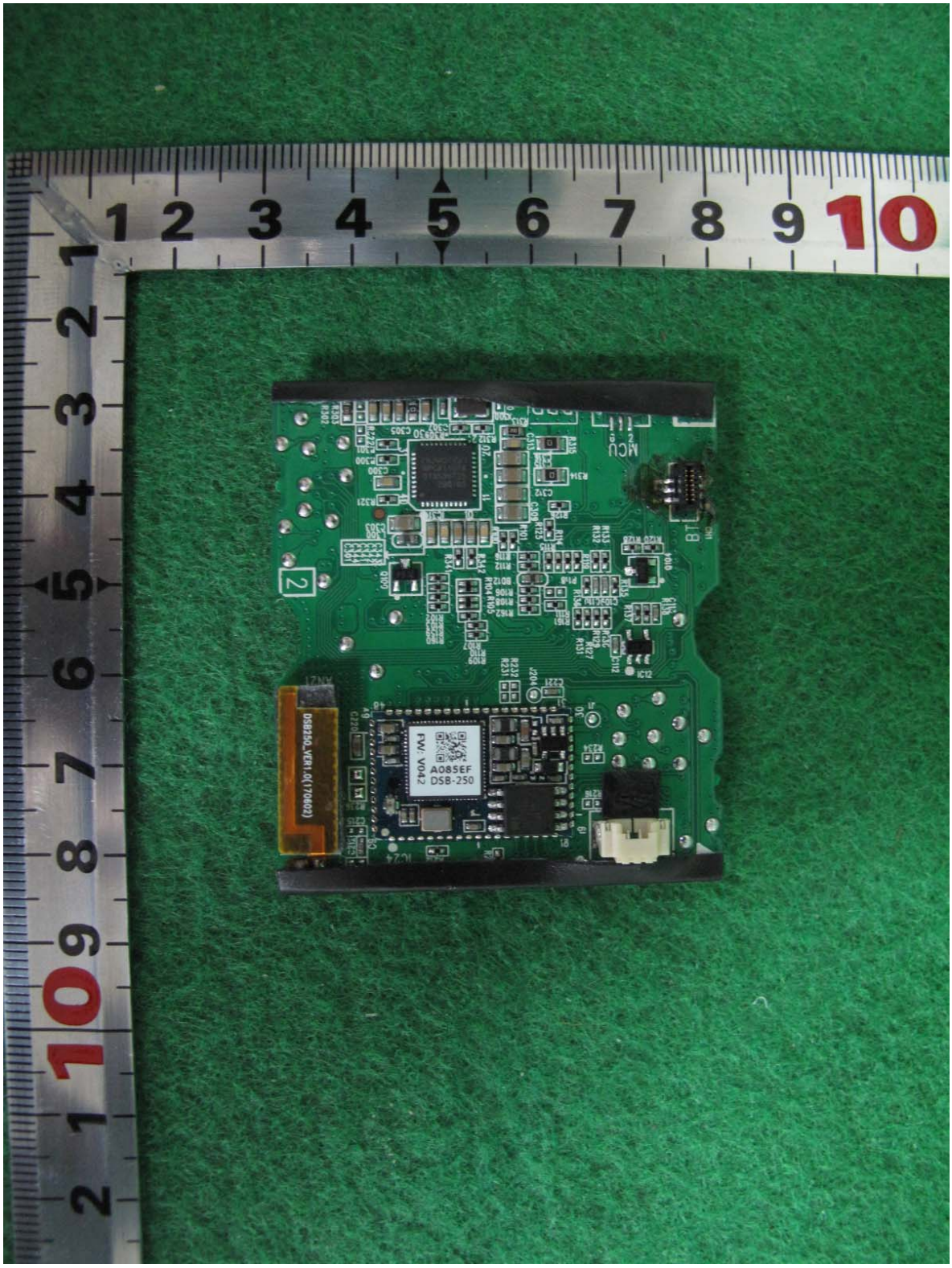
Front View of Key & LED part



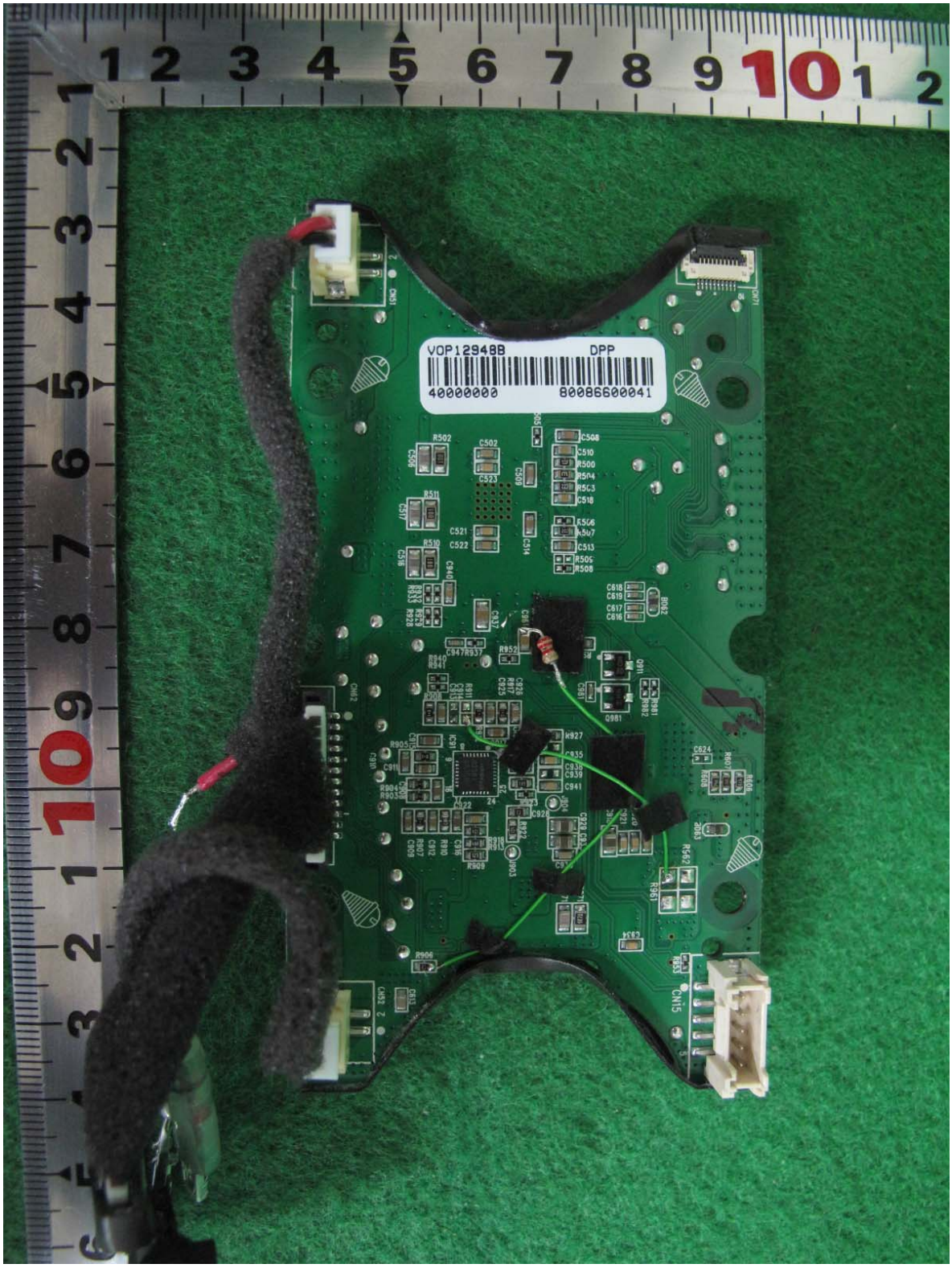
Rear View of RF Board



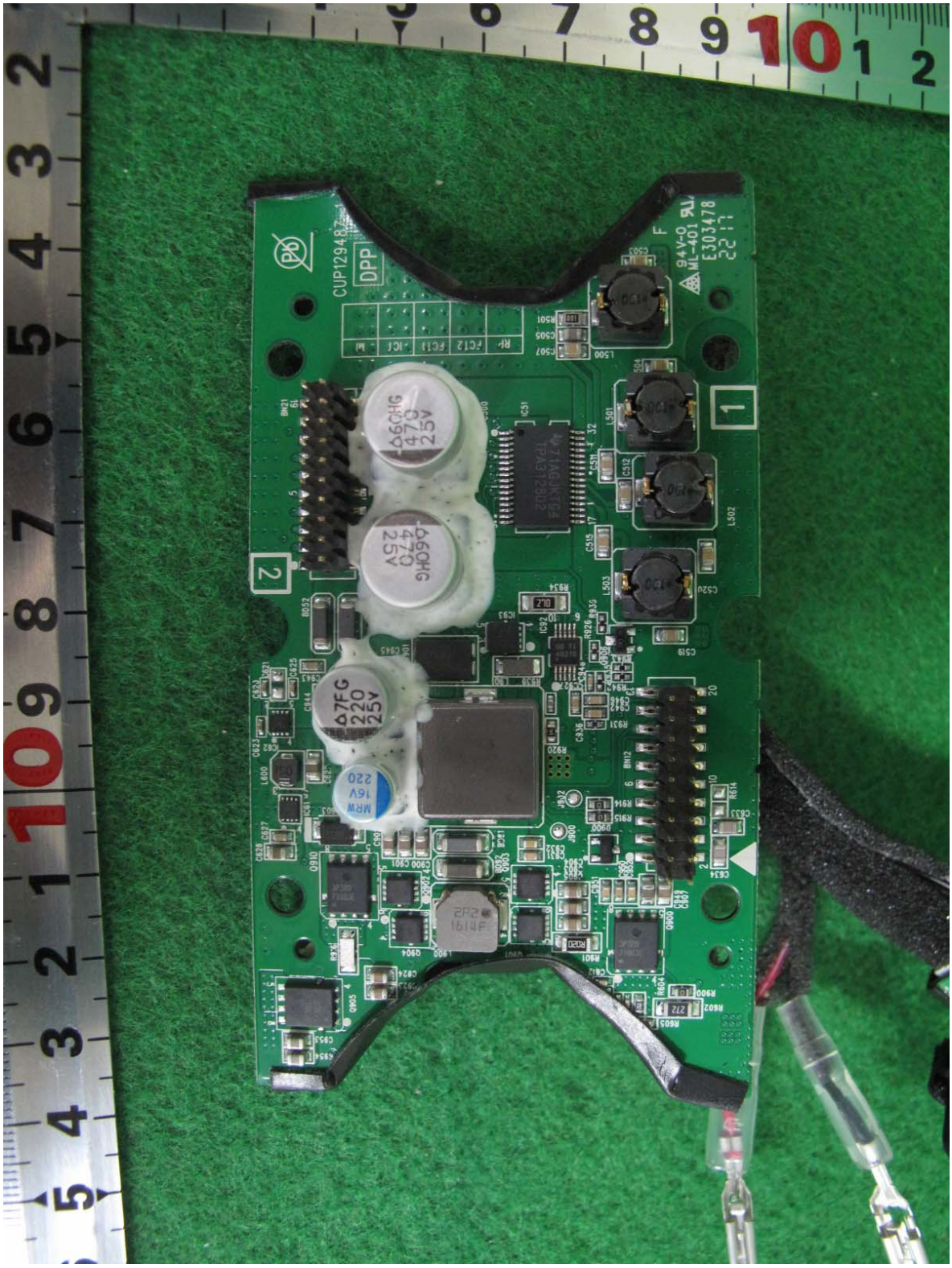
Front View of RF Board



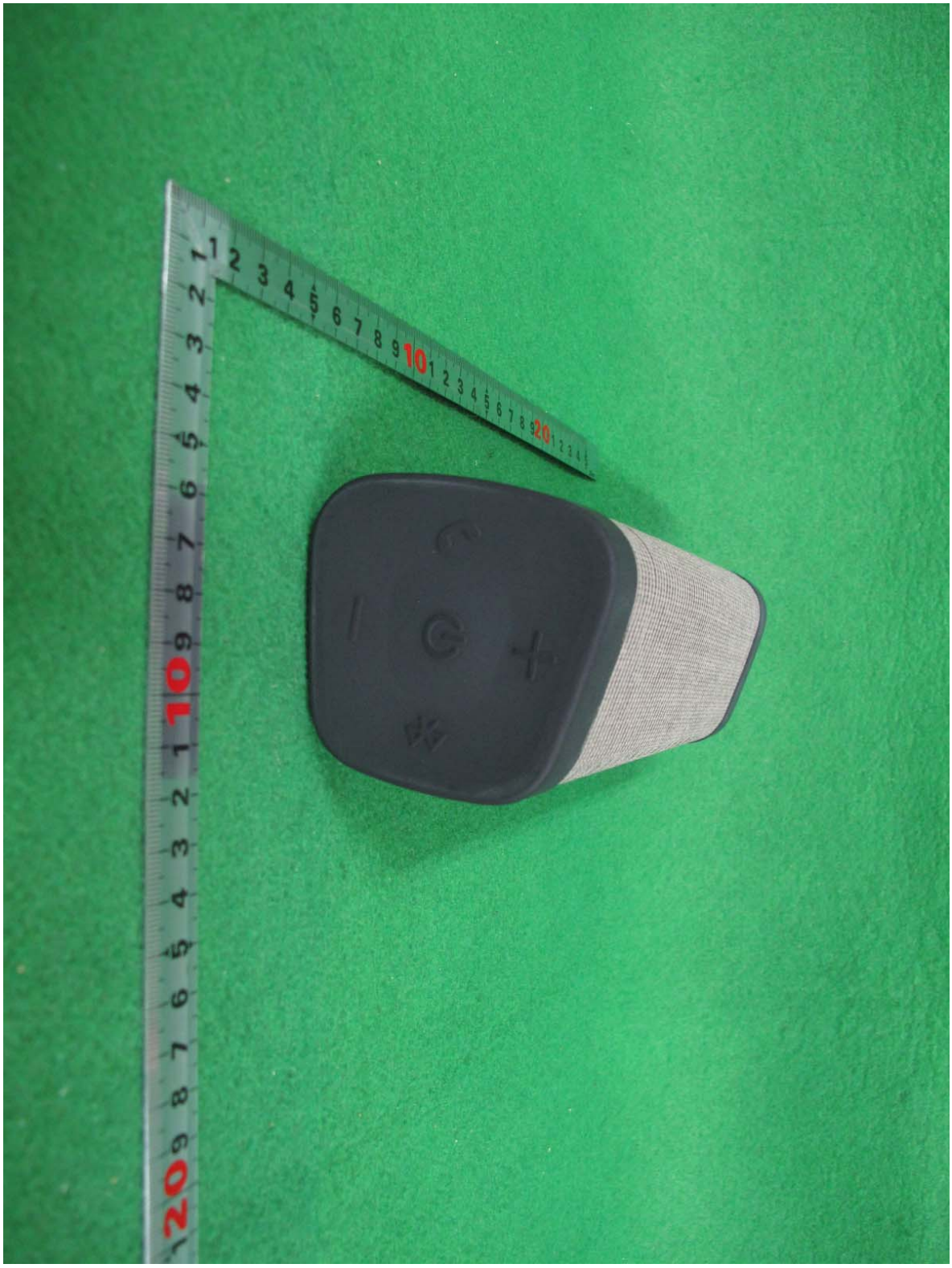
Rear View of Mainboard



Front View of Mainboard

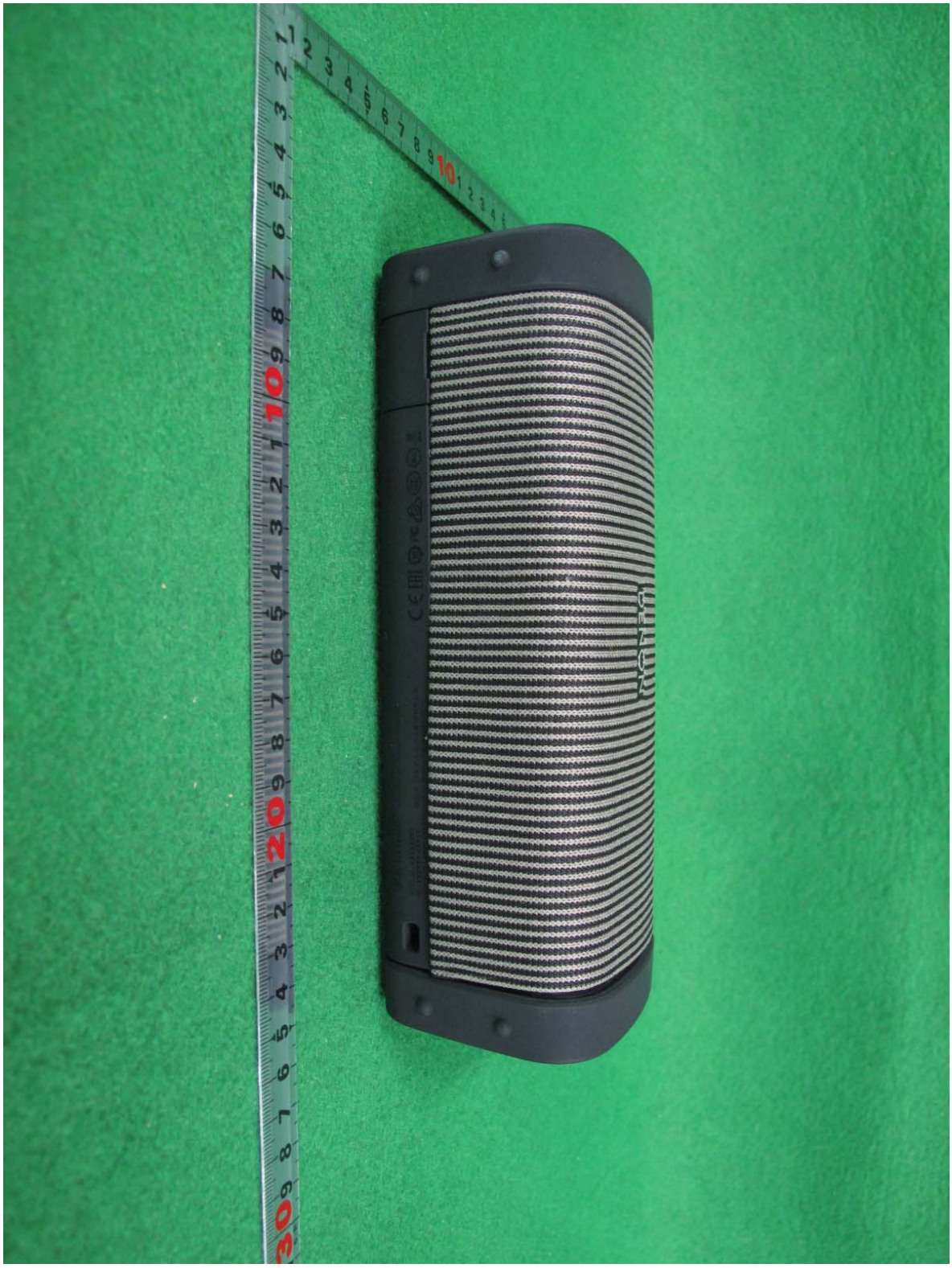


Right View of EUT



Left View of EUT

Bottom View of EUT



Top View of EUT

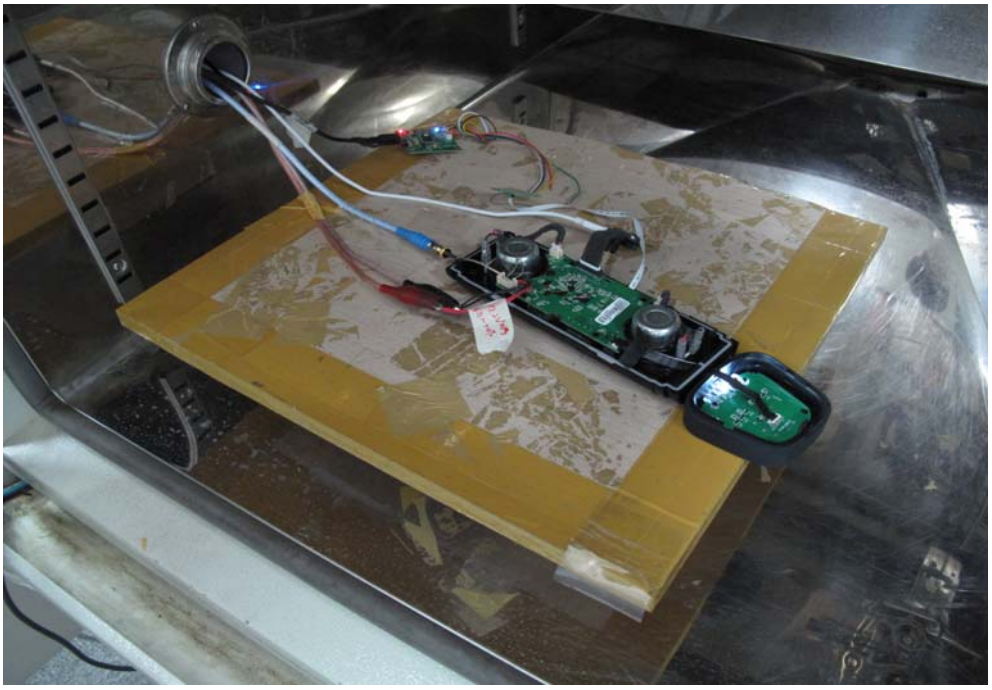
Rear View of EUT

Appendix B Photographs of EUT

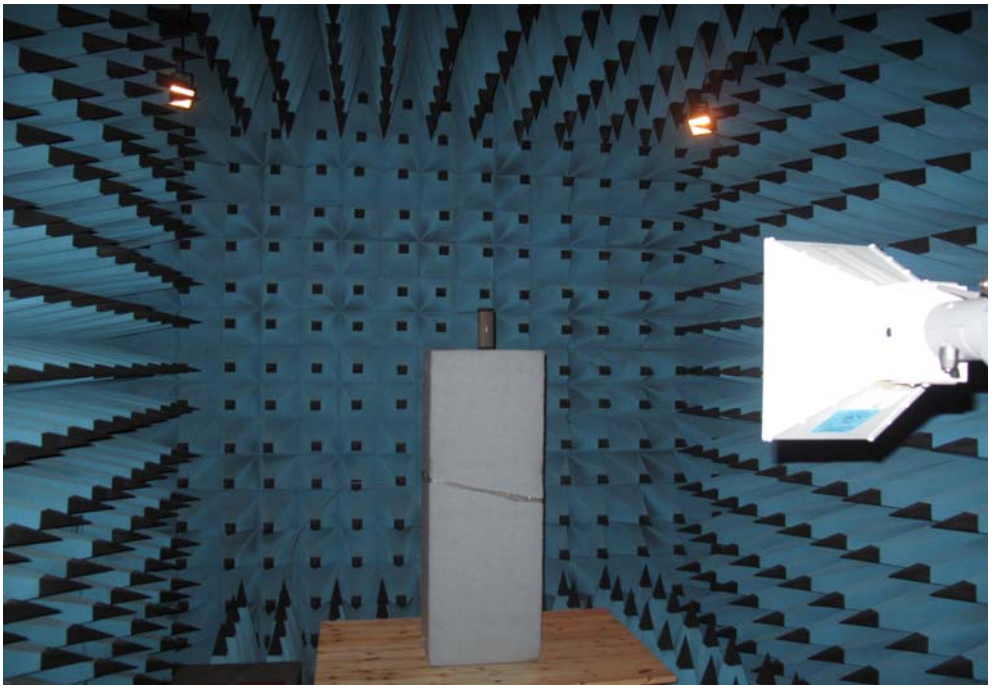
Front View of EUT

Appendix A Photographs of Test Set-up

Conducted Test Picture



Radiated Test Picture



Notes

1. ** Pmin + 6dB. Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.*
2. ***These levels are levels of signal generator and results of being corrected by cable loss and antenna assembly gain (3.74dBi).*
   Blocking signal Power (dBm) = Specified level (dBm) in Limit table below
   + Correctioin factor (dB)
   = Specified level (dBm) in Limit table below + 11.00dB
   Correction factor (dB) = Cable loss (dB) + Ant assembly gain (dBi)
   = 7.26dB + 3.74dBi
   = 11.00dB
3. ****Minimum performance criterion specified in clause 4.3.2.11.3 in EN300328.*
4. *This testing was performed in GFSK modulation of LE mode.*

Limit : ETSI EN 300 328 Sub clause 4.3.2.11.4

Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
Pmin + 6dB	2380 2503.5	-57	CW
Pmin + 6dB	2300 2583.5	-47	CW
NOTE 1: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

7.7 Receiver Blocking

Test Method : ETSI EN 300 328 Sub clause 5.4.11

Result:

Lowest channel

Categorization	Wanted signal mean power from companion device (dBm)*	Blocking signal Frequency (MHz)	Blocking signal Power (dBm)**	PER (%)	PER Limit (%)***
Receiver category 2	-79.22	2380 2503.5	-46.00	4.98 4.59	10
	-79.22	2300 2583.5	-36.00	4.96 5.07	10

Highest channel

Categorization	Wanted signal mean power from companion device (dBm)*	Blocking signal Frequency (MHz)	Blocking signal Power (dBm)**	PER (%)	PER Limit (%)***
Receiver category 2	-79.22	2380 2503.5	-46.00	5.72 5.25	10
	-79.22	2300 2583.5	-36.00	5.72 7.95	10

7.6.2 Radiated Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.10

Result:

RX mode

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Rx mode	55.34	V	PK	-67.2	-57.0	10.2
	61.28	H	PK	-67.4	-57.0	10.4
	300.39	H	PK	-64.0	-57.0	7.0
	383.71	H	PK	-65.8	-57.0	8.8
	1031.67	V	PK	-63.4	-47.0	16.4
	1439.67	H	PK	-64.1	-47.0	17.1
	4626.80	V	PK	-60.4	-47.0	13.4
	11200.85	V	PK	-56.3	-47.0	9.3
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

Notes

*1. *Pol. H = Horizontal V = Vertical*

*2. **Det PK = Peak Detector RMS = RMS Detector*

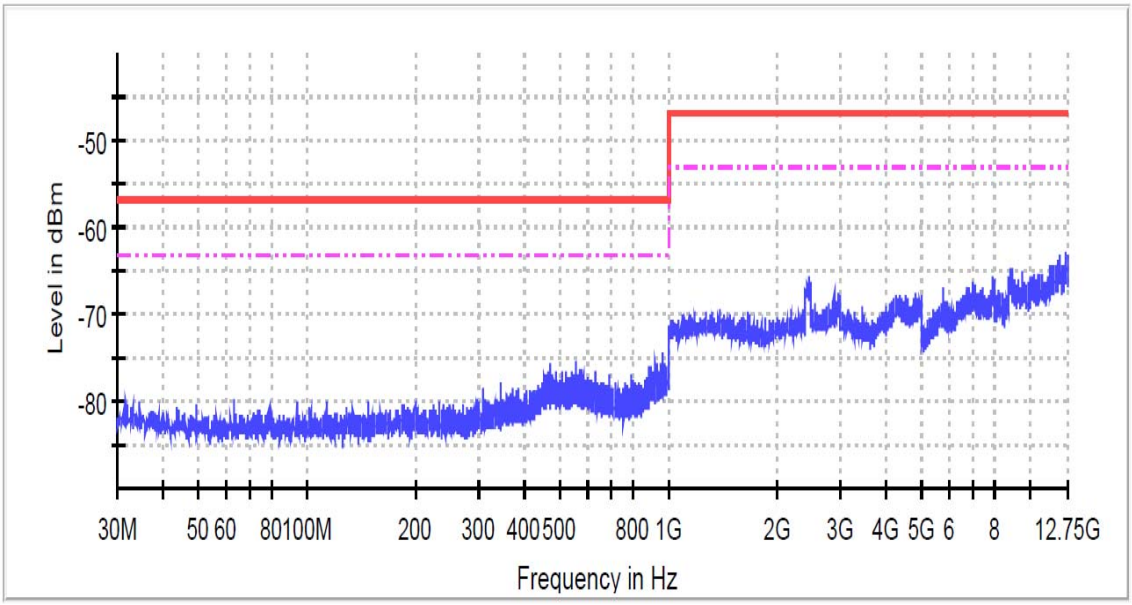
3. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

Limit : ETSI EN 300 328 Sub clause 4.3.2.10.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

7.6.1.1 Test data

Rx mode



7.6. Receiver spurious emissions

7.6.1 Conducted Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.10

Result:

DUT Frequency (MHz)	Frequency (MHz)	Level	Limit (dBm)	Magin (dB)
Rx mode	-	Not detected*	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB			

Notes

1. **Any emssions don't fall within the 6dB range below the applicable limit during testing for pre-scan as specified in 5.4.10.2.1.2.*

Limit : ETSI EN 300 328 Sub clause 4.3.2.10.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

Notes

*1. *Pol. H = Horizontal V = Vertical*

*2. **Det PK = Peak Detector RMS = RMS Detector*

3. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

Limit : ETSI EN 300 328 Sub clause 4.3.2.9.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

7.5.2 Radiated Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.9

Result:

Lowest Channel (2402 MHz)

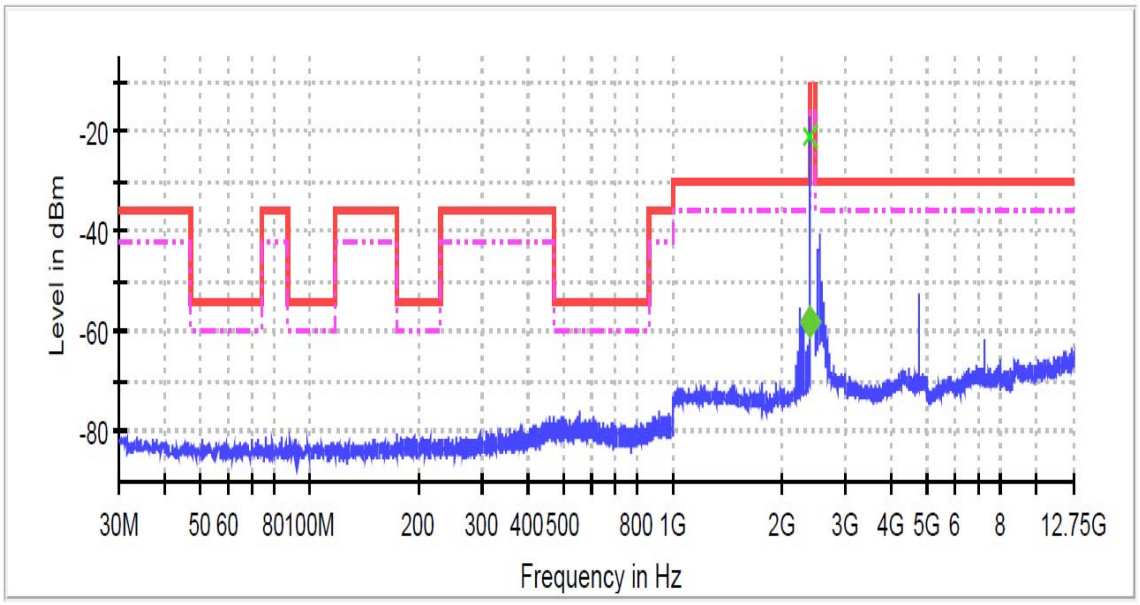
Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Lowest channel (2402)	61.53	V	PK	-64.8	-54.0	10.8
	107.96	V	PK	-70.4	-54.0	16.4
	300.15	H	PK	-63.1	-36.0	27.1
	756.05	V	PK	-60.4	-54.0	6.4
	2531.48	V	PK	-44.5	-30.0	14.5
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

Highest Channel (2480 MHz)

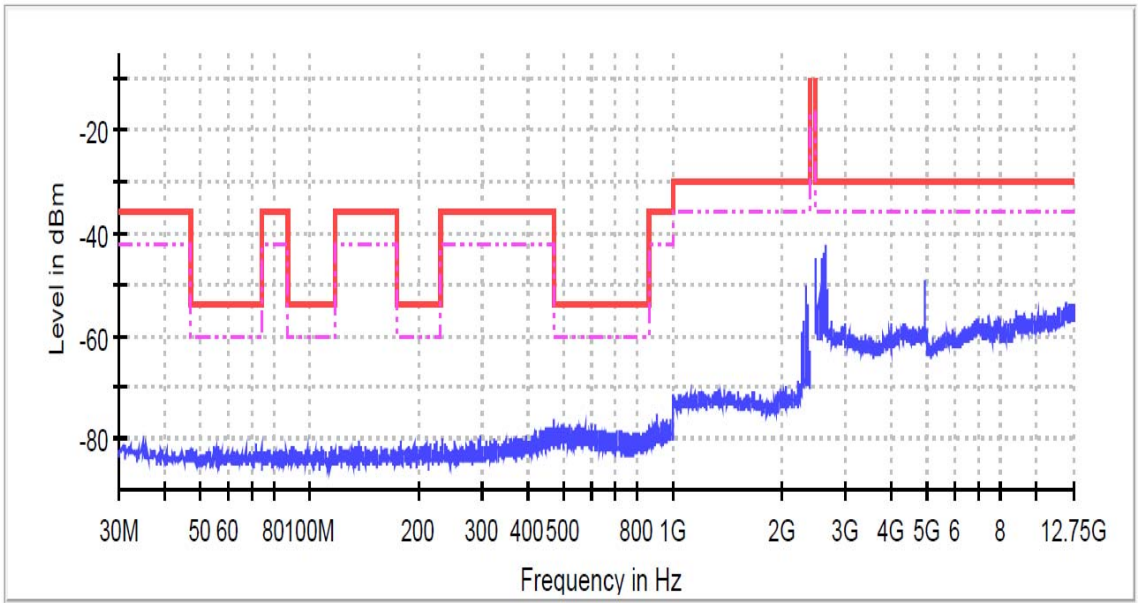
Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Highest channel (2480)	54.49	V	PK	-65.0	-54.0	11.0
	107.96	V	PK	-69.2	-54.0	15.2
	300.27	H	PK	-64.4	-36.0	28.4
	838.37	H	PK	-61.4	-54.0	7.4
	1733.43	H	PK	-45.0	-30.0	15.0
	2609.62	V	PK	-49.9	-30.0	19.9
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

7.5.1.1 Test data

Lowest Channel (2402 MHz)



Highest Channel (2480 MHz)



7.5. Transmitter unwanted emissions in the spurious domain

7.5.1 Conducted Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.9

Result:

DUT Frequency (MHz)	Frequency (MHz)	Level	Limit (dBm)	Magin (dB)
2402	-	Not detected*	-	-
2480	-	Not detected*	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB			

Notes

1. **Any emssions don't fall within the 6dB range below the applicable limit during testing for pre-scan as specified in 5.4.9.2.1.2.*

Limit : ETSI EN 300 328 Sub clause 4.3.2.9.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

7.4. Transmitter unwanted emissions in the out-of-band domain

Test Method : ETSI EN 300 328 Sub clause 5.4.8

Result:

Lowest Channel

Test Conditions	Transmitter unwanted emissions in the out-of-band domain (e.i.r.p) (dBm/MHz)			
	2400 MHz - 2BW to 2400 MHz - BW	2400 MHz - BW to 2400 MHz	2483.5 MHz to 2483.5 MHz + BW	2483.5 MHz + BW to 2483.5 + 2BW
Normal 25 ℃, 7.2 Vdc	-59.8	-54.2	-60.5	-60.6
Limit	-20.00	-10.00	-10.00	-20.00
Measurement Uncertainty	±2.0 dB			

Highest Channel

Test Conditions	Transmitter unwanted emissions in the out-of-band domain (e.i.r.p) (dBm/MHz)			
	2400 MHz - 2BW to 2400 MHz - BW	2400 MHz - BW to 2400 MHz	2483.5 MHz to 2483.5 MHz + BW	2483.5 MHz + BW to 2483.5 + 2BW
Normal 25 ℃, 7.2 Vdc	-61.1	-56.2	-59.5	-60.0
Limit	-20.00	-10.00	-10.00	-20.00
Measurement Uncertainty	±2.0 dB			

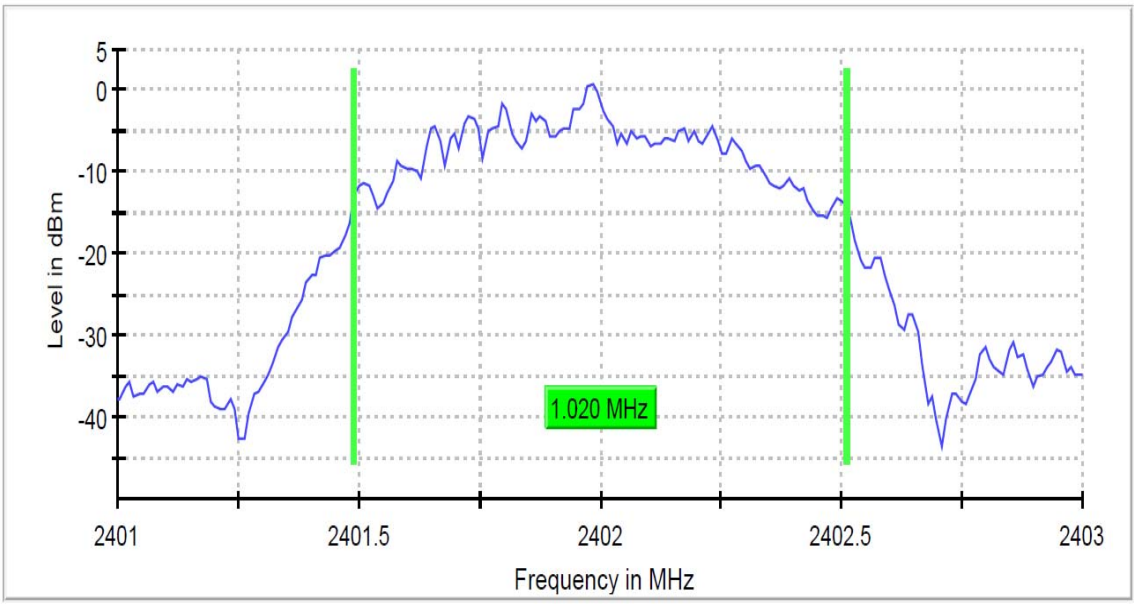
Notes
Antenna Peak Gain = 3.74 dBi

Limit : ETSI EN 300 328 Sub clause 4.3.2.8.3

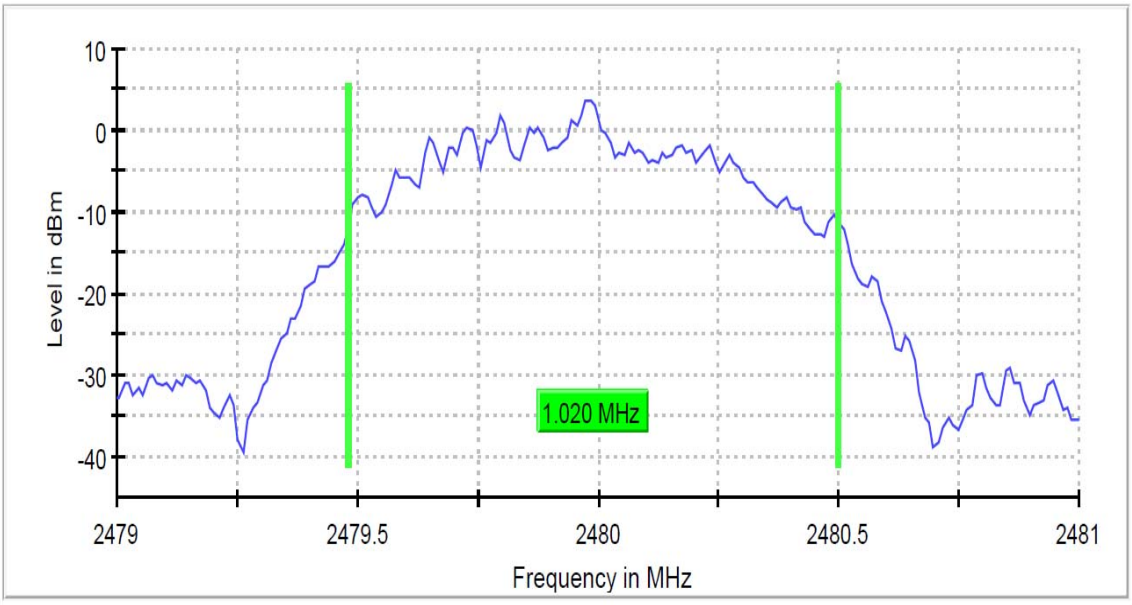
Frequency Range	Limit
2400 MHz - BW to 2400 MHz, 2483.5 MHz to 2483.5 + BW	-10 dBm/MHz e.i.r.p
2400 MHz - 2BW to 2400 MHz – BW, 2483.5 MHz + BW to 2483.5 MHz + 2BW	-20 dBm/MHz e.i.r.p

7.3.1 Test Data

Lowest Channel (2402 MHz)



Highest Channel (2480 MHz)



7.3 Occupied Channel Bandwidth

Test Method : ETSI EN 300 328 Sub clause 5.4.7

Result:

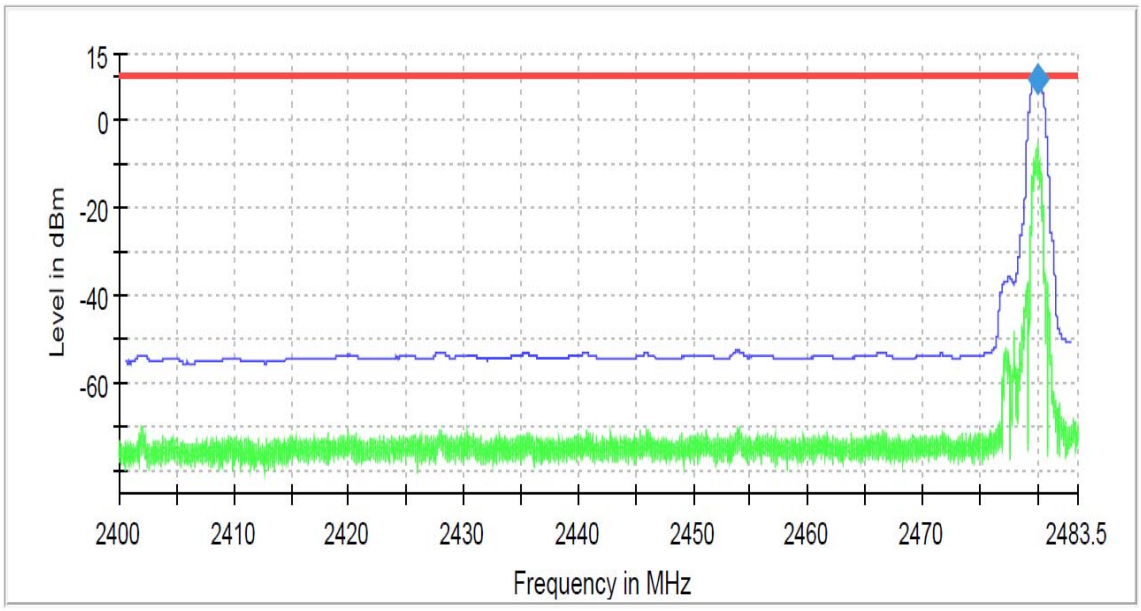
Test Conditions	Frequency range (MHz)	
	Lowest	Highest
Normal 25 ℃, 7.2 Vdc	2401.49	2480.50
Measurement Uncertainty	± 0.23 MHz	

Test Conditions	Occupied channel bandwidth (MHz)	
	Lowest	Highest
Normal 25 ℃, 7.2 Vdc	1.02	1.02
Measurement Uncertainty	± 0.23 MHz	

Limits :

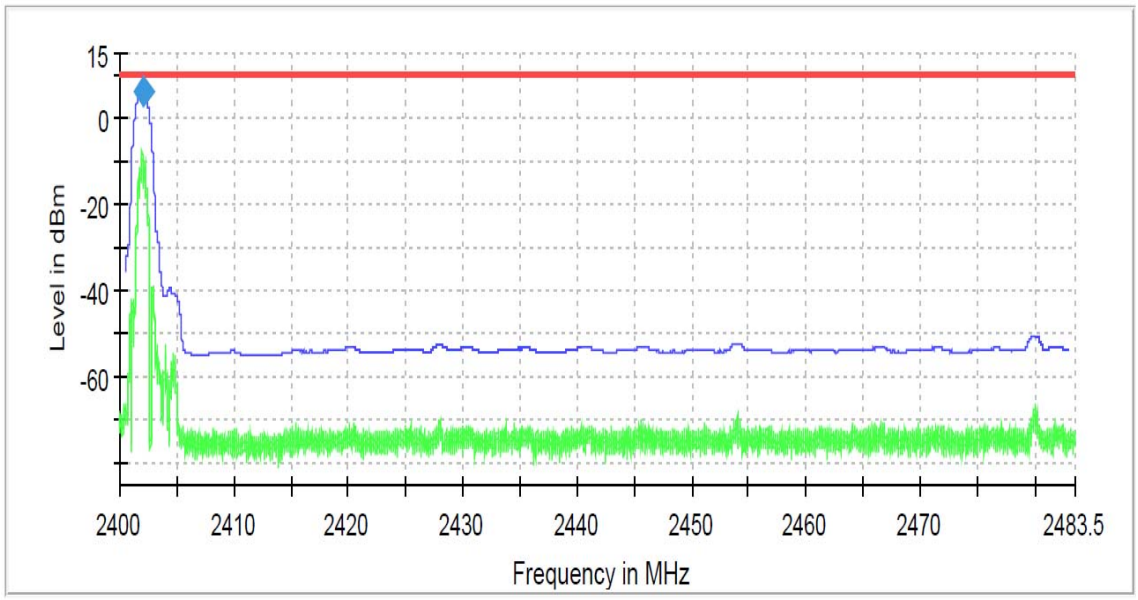
ETSI EN 300 328 Sub clause 4.3.2.7.3	2400 to 2483.5 MHz

Highest Channel (2480 MHz)

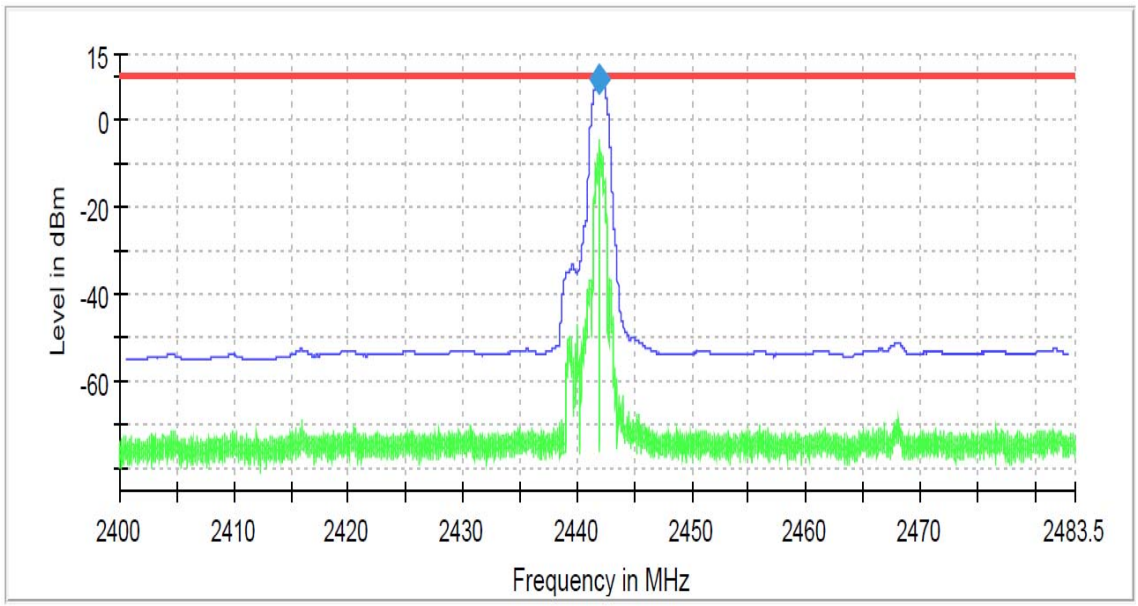


7.2.1 Test data

Lowest Channel (2402 MHz)



Middle Channel (2442 MHz)



7.2 Power Spectral Density

Test Method : ETSI EN 300 328 Sub clause 5.4.3

Result:

Test Conditions	Power spectral density (e.i.r.p) (dBm/MHz)		
	2402 MHz	**2442 MHz**	**2480 MHz**
Normal 25 ℃, 7.2 Vdc	6.3	9.3	9.3
Measurement Uncertainty	± 0.4 dB		

Notes

There are two options for this testing as specified in 5.4.3.2.1 in EN300328 v2.1.1

- Option 1 was used for PSD measurement.

Limits :

ETSI EN 300 328 Sub clause 4.3.2.3.3	10 dBm/MHz

7. Other Types of Wide Band Modulation Test Items

7.1 RF Output Power

Test Method : ETSI EN 300 328 Sub clause 5.4.2

Result:

Test Conditions	RF Output Power (e.i.r.p.) (dBm)		
	2402 MHz	2442 MHz	2480 MHz
Normal 25 ℃, 7.2 Vdc	6.4	9.3	9.4
Extreme -10 ℃, 6.5 Vdc	5.7	8.6	8.7
Extreme -10 ℃, 7.92 Vdc	5.4	8.9	9.1
Extreme 50 ℃, 6.5 Vdc	6.0	8.7	9.0
Extreme 50 ℃, 7.92 Vdc	6.0	8.7	8.9
Measurement Uncertainty	± 0.4 dB		

Notes
Antenna Peak Gain = 3.74 dBi
RF Output Power (e.i.r.p.) = RF output power (dBm) + Antenna Gain (dBi)

Limits :

ETSI EN 300 328 Sub clause 4.3.2.2.3	20 dBm

Limit : ETSI EN 300 328 Sub clause 4.3.1.12.4

Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
Pmin + 6dB	2380 2503.5	-57	CW
Pmin + 6dB	2300 2583.5	-47	CW
NOTE 1: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

6.8. Receiver Blocking

Test Method : ETSI EN 300 328 Sub clause 5.4.11

Result:

Normal operation

Categorization	Wanted signal mean power from companion device (dBm)*	Blocking signal Frequency (MHz)	Blocking signal Power (dBm)**	PER (%)	PER Limit (%)***
Receiver category 2	-83.22	2380 2503.5	-46.00	0.843 0.596	10
	-83.22	2300 2583.5	-36.00	0.695 6.279	10

Notes

1. ** Pmin + 6dB. Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.*
2. ***These levels are levels of signal generator and results of being corrected by cable loss and antenna assembly gain (3.74dBi).*
   Blocking signal Power (dBm) = Specified level (dBm) in Limit table below
   + Correctioin factor (dB)
   = Specified level (dBm) in Limit table below + 11.00dB
   Correction factor (dB) = Cable loss (dB) + Ant assembly gain (dBi)
   = 7.26dB + 3.74dBi
   = 11.00dB
3. ****Minimum performance criterion specified in clause 4.3.1.12.3.*

6.7.2 Radiated Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.10

Result:

Rx mode

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Rx mode	60.80	V	PK	-67.4	-57.0	10.4
	300.15	H	PK	-64.5	-57.0	7.5
	373.87	H	PK	-66.1	-57.0	9.1
	1066.67	V	PK	-56.7	-47.0	9.7
	1104.00	V	PK	-57.9	-47.0	10.9
	1596.67	V	PK	-58.0	-47.0	11.0
	2125.00	V	PK	-53.8	-47.0	6.8
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

Notes

*1. *Pol. H = Horizontal V = Vertical*

*2. **Det PK = Peak Detector RMS = RMS Detector*

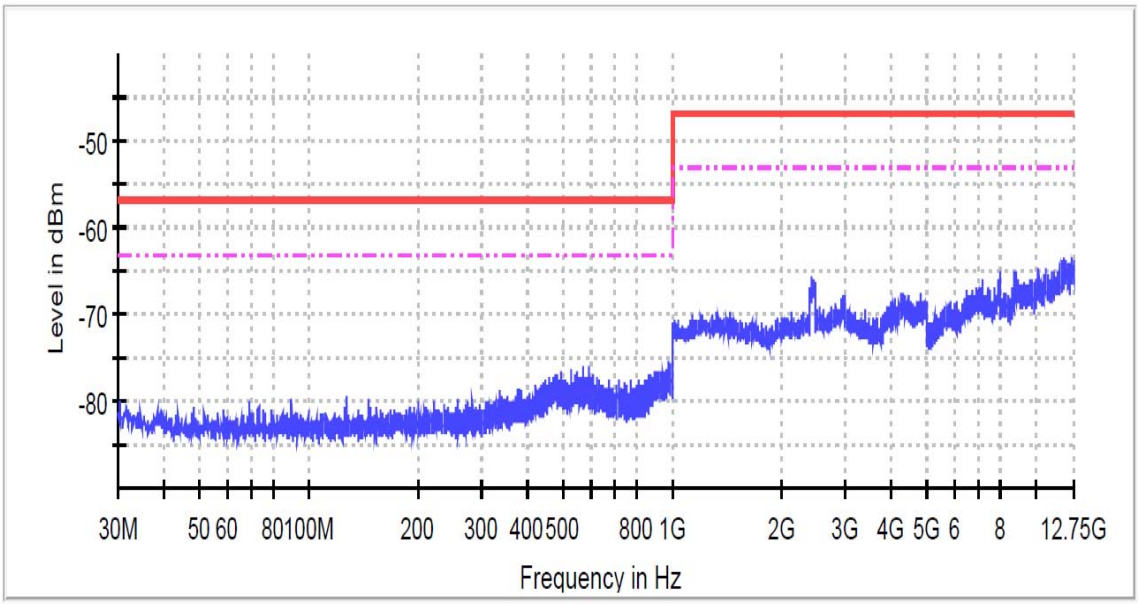
3. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

Limit : ETSI EN 300 328 Sub clause 4.3.1.11.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

6.7.1.1 Test Data

Rx mode



6.7. Receiver spurious emissions

6.7.1 Conducted Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.10

Result:

Rx mode

DUT Frequency (MHz)	Frequency (MHz)	Level	Limit (dBm)	Magin (dB)
Rx mode	-	Not detected*	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB			

Notes

1. **Any emssions don't fall within the 6dB range below the applicable limit during testing for pre-scan as specified in 5.4.10.2.1.2.*

Limit : ETSI EN 300 328 Sub clause 4.3.1.11.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

Notes

*1. *Pol. H = Horizontal V = Vertical*

*2. **Det PK = Peak Detector RMS = RMS Detector*

3. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

Limit : ETSI EN 300 328 Sub clause 4.3.1.10.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

8DPSK Lowest Channel (2402 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Lowest channel (2402)	61.28	V	PK	-65.2	-54.0	11.2
	107.96	V	PK	-67.9	-54.0	13.9
	301.36	H	PK	-64.2	-36.0	28.2
	756.05	V	PK	-60.2	-54.0	6.2
	2558.11	V	PK	-44.1	-30.0	14.1
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

8DPSK Highest Channel (2480 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Highest channel (2480)	60.19	V	PK	-65.0	-54.0	11.0
	107.96	V	PK	-69.0	-54.0	15.0
	299.90	H	PK	-64.0	-36.0	28.0
	539.98	H	PK	-62.1	-54.0	8.1
	756.05	V	PK	-60.2	-54.0	6.2
	2324.08	V	PK	-48.6	-30.0	18.6
	4960.00	H	PK	-47.2	-30.0	17.2
	7439.20	H	PK	-42.2	-30.0	12.2
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

π/4 DQPSK Lowest Channel (2402 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Lowest channel (2402)	60.92	V	PK	-65.9	-54.0	11.9
	107.96	V	PK	-68.3	-54.0	14.3
	300.39	H	PK	-62.6	-36.0	26.6
	756.05	V	PK	-61.2	-54.0	7.2
	2558.11	V	PK	-44.1	-30.0	14.1
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

π/4 DQPSK Highest Channel (2480 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Highest channel (2480)	61.16	V	PK	-65.1	-54.0	11.1
	107.96	V	PK	-68.7	-54.0	14.7
	300.75	H	PK	-64.3	-36.0	28.3
	756.05	V	PK	-60.9	-54.0	6.9
	858.50	H	PK	-60.5	-54.0	6.5
	2324.08	V	PK	-48.6	-30.0	18.6
	4960.00	H	PK	-47.2	-30.0	17.2
	7439.20	H	PK	-42.2	-30.0	12.2
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

6.6.2 Radiated Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.9

Result:

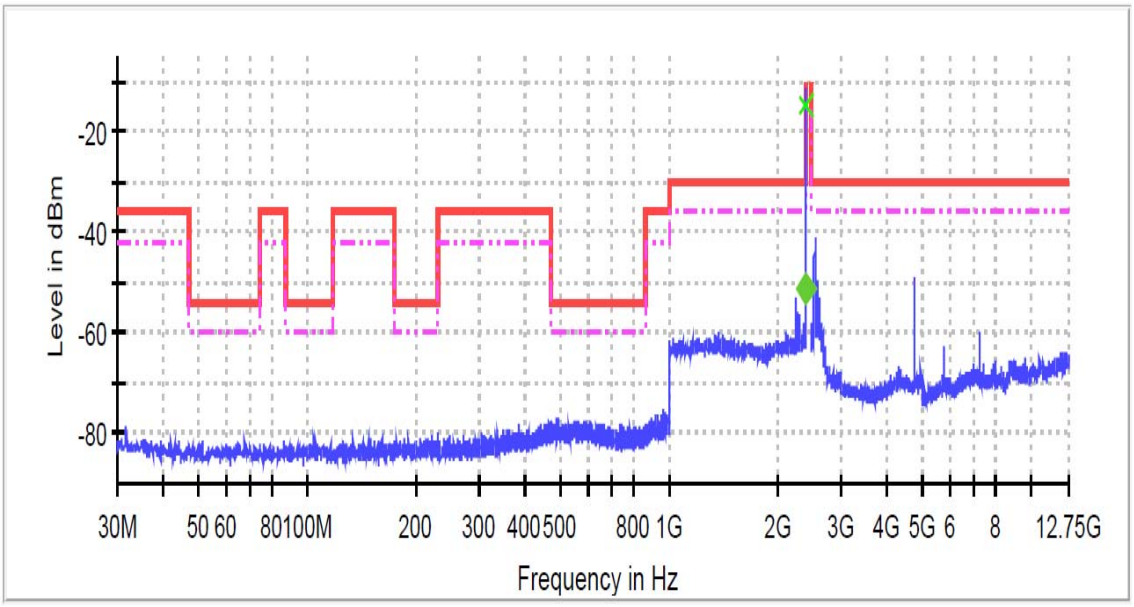
GFSK Lowest Channel (2402 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Lowest channel (2402)	60.92	V	PK	-66.0	-54.0	12.0
	107.96	V	PK	-68.6	-54.0	14.6
	299.90	H	PK	-64.0	-36.0	28.0
	756.05	V	PK	-60.7	-54.0	6.7
	852.92	H	PK	-60.4	-54.0	6.4
	2558.04	H	PK	-44.6	-30.0	14.6
	4804.00	H	PK	-47.8	-30.0	17.8
	7205.20	V	PK	-44.3	-30.0	14.3
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

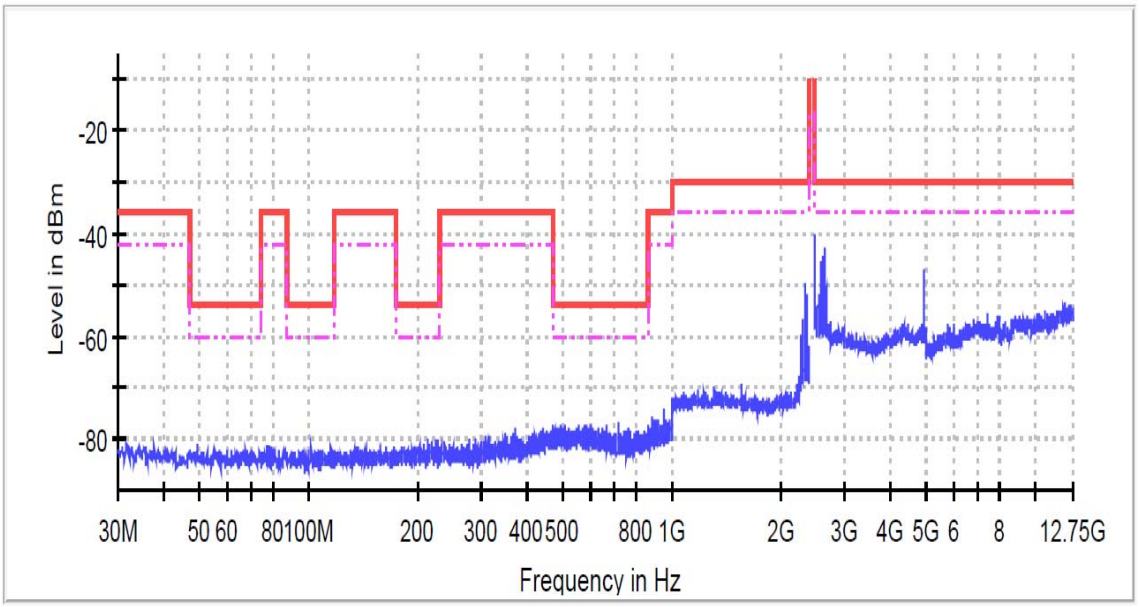
GFSK Highest Channel (2480 MHz)

Channel (MHz)	Frequency (MHz)	*Pol. (H/V)	**Det (PK/RMS)	Maximum power (dBm)	Limit (dBm)	Margin (dB)
Highest channel (2480)	55.10	V	PK	-66.3	-54.0	12.3
	60.31	V	PK	-66.2	-54.0	12.2
	107.96	V	PK	-67.0	-54.0	13.0
	300.02	H	PK	-63.6	-54.0	9.6
	756.05	V	PK	-60.9	-54.0	6.9
	2583.96	H	PK	-47.8	-30.0	17.8
	4960.00	V	PK	-47.6	-30.0	17.6
	7440.00	V	PK	-37.6	-30.0	7.6
Measurement Uncertainty : ± 3.8 dB at < 300 MHz, ± 3.9 dB at > 300 MHz						

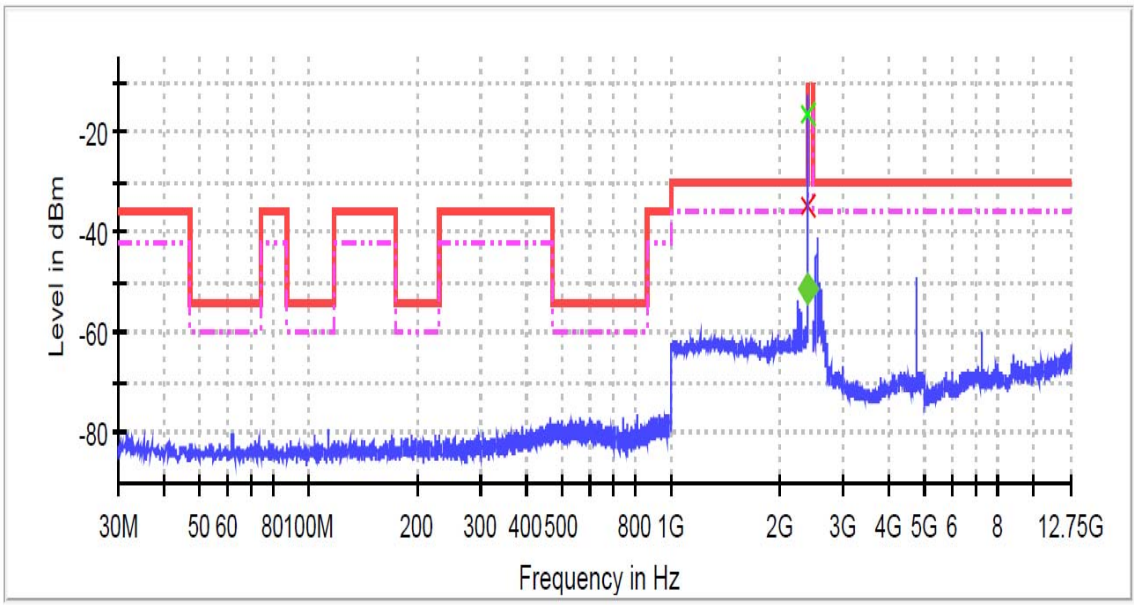
8DPSK Lowest Channel



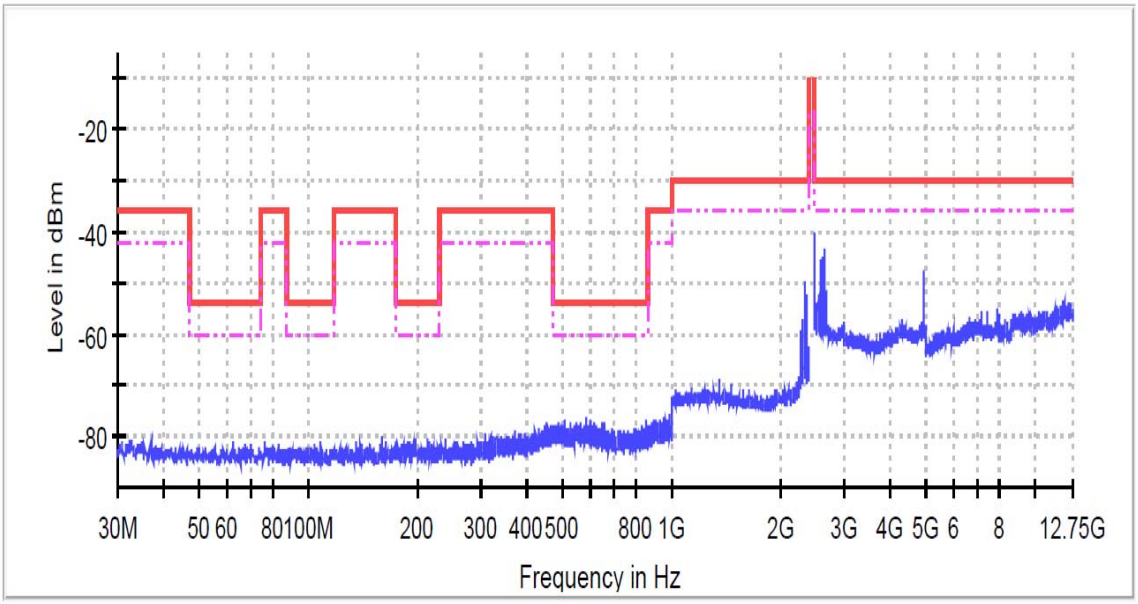
8DPSK Highest Channel



π/4 DQPSK Lowest Channel

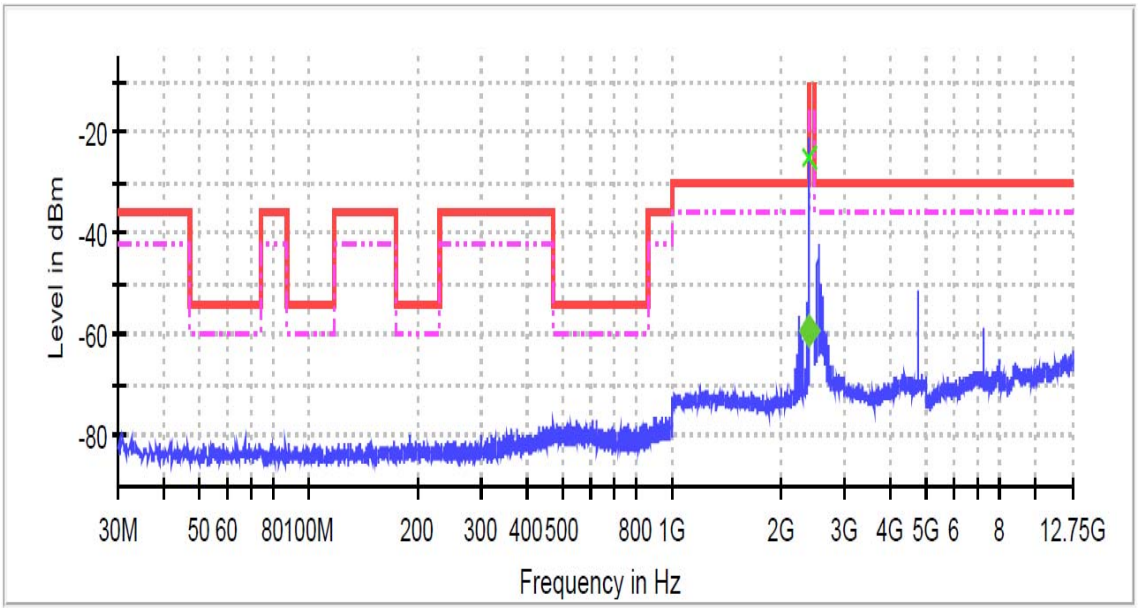


π/4 DQPSK Highest Channel

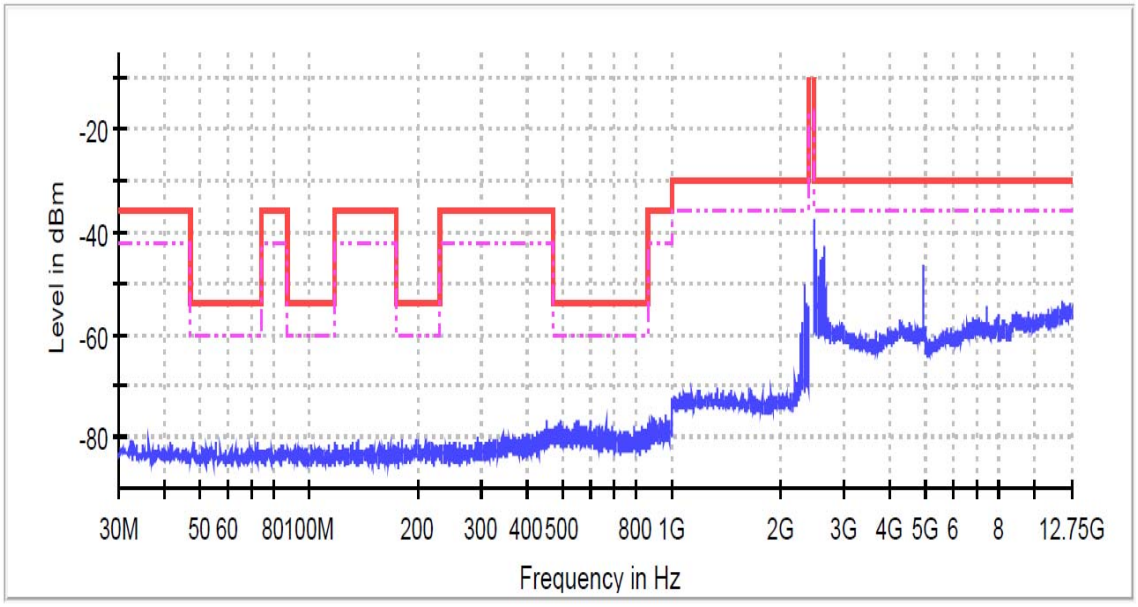


6.6.1.1 Test Data

GFSK Lowest Channel



GFSK Highest Channel



Limit : ETSI EN 300 328 Sub clause 4.3.1.10.3

Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

6.6 Transmitter unwanted emissions in the spurious domain

6.6.1 Conducted Emissions

Test Method : ETSI EN 300 328 Sub clause 5.4.9

Result:

GFSK modulation

DUT Frequency (MHz)	Frequency (MHz)	Level	Detector	Limit (dBm)	Magin (dB)
2402	-	Not detected*	-	-	-
2480	-	Not detected*	-	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB				

π/4 DQPSK modulation

DUT Frequency (MHz)	Frequency (MHz)	Level	Detector	Limit (dBm)	Magin (dB)
2402	-	Not detected*	-	-	-
2480	-	Not detected*	-	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB				

8DPSK modulation

DUT Frequency (MHz)	Frequency (MHz)	Level	Detector	Limit (dBm)	Magin (dB)
2402	-	Not detected*	-	-	-
2480	-	Not detected*	-	-	-
Measurement Uncertainty	+2.37 dB/-2.82 dB				

Notes

1. **Any emssions don't fall within the 6dB range below the applicable limit during testing for pre-scan as specified in 5.4.9.2.1.2.*

8DPSK modulation

Test Conditions	Transmitter unwanted emissions in the out-of-band domain (e.i.r.p) (dBm/MHz)			
	2400 MHz - 2BW to 2400 MHz - BW	**2400 MHz - BW to 2400 MHz**	**2483.5 MHz to 2483.5 MHz + BW**	**2483.5 MHz + BW to 2483.5 + 2BW**
Normal 25 ℃, 7.2 Vdc	-53.7	-41.5	-58.9	-58.1
Limit	-20.0	-10.0	-10.0	-20.0
Measurement Uncertainty	± 2.0 dB			

Notes
Antenna Peak Gain = 3.74 dBi

Limit : ETSI EN 300 328 Sub clause 4.3.1.9.3

Frequency Range	Limit
2400 MHz - BW to 2400 MHz, 2483.5 MHz to 2483.5 + BW	-10 dBm/MHz e.i.r.p
2400 MHz - 2BW to 2400 MHz – BW, 2483.5 MHz + BW to 2483.5 MHz + 2BW	-20 dBm/MHz e.i.r.p

6.5 Transmitter unwanted emissions in the out-of-band domain

Test Method : ETSI EN 300 328 Sub clause 5.4.8

Result:

GFSK modulation

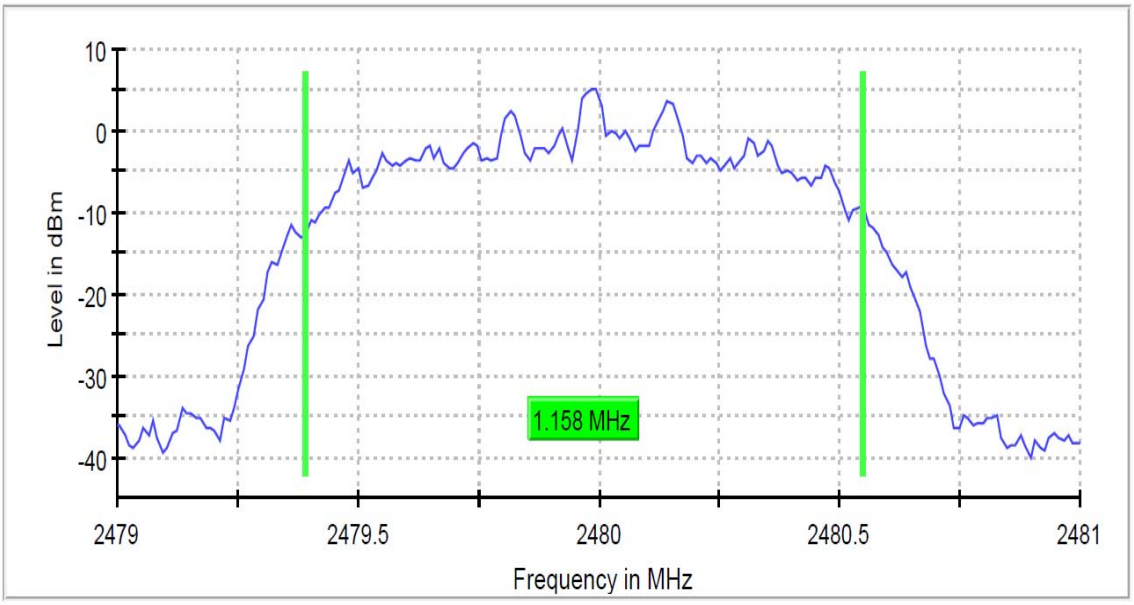
Test Conditions	Transmitter unwanted emissions in the out-of-band domain (e.i.r.p) (dBm/MHz)			
	2400 MHz - 2BW to 2400 MHz - BW	2400 MHz - BW to 2400 MHz	2483.5 MHz to 2483.5 MHz + BW	2483.5 MHz + BW to 2483.5 + 2BW
Normal 25 ℃, 7.2 Vdc	-59.9	-51.5	-59.6	-60.0
Limit	-20.0	-10.0	-10.0	-20.0
Measurement Uncertainty	± 2.0 dB			

π/4 DQPSK modulation

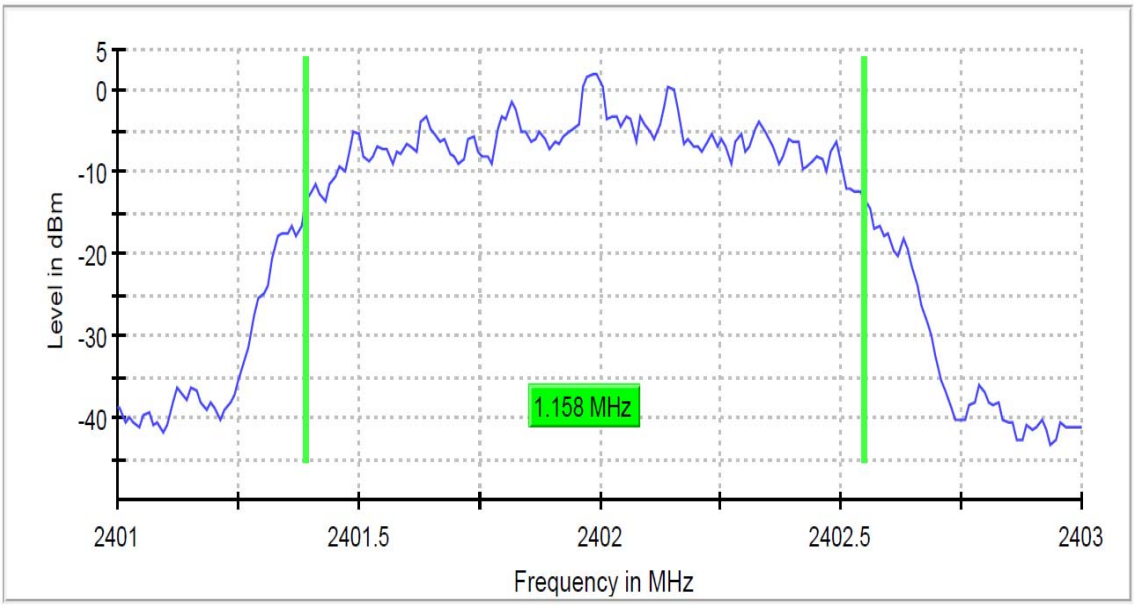
Test Conditions	Transmitter unwanted emissions in the out-of-band domain (e.i.r.p) (dBm/MHz)			
	2400 MHz - 2BW to 2400 MHz - BW	2400 MHz - BW to 2400 MHz	2483.5 MHz to 2483.5 MHz + BW	2483.5 MHz + BW to 2483.5 + 2BW
Normal 25 ℃, 7.2 Vdc	-53.5	-41.3	-58.9	-57.6
Limit	-20.0	-10.0	-10.0	-20.0
Measurement Uncertainty	± 2.0 dB			

8DPSK Lowest Channel (2402 MHz)

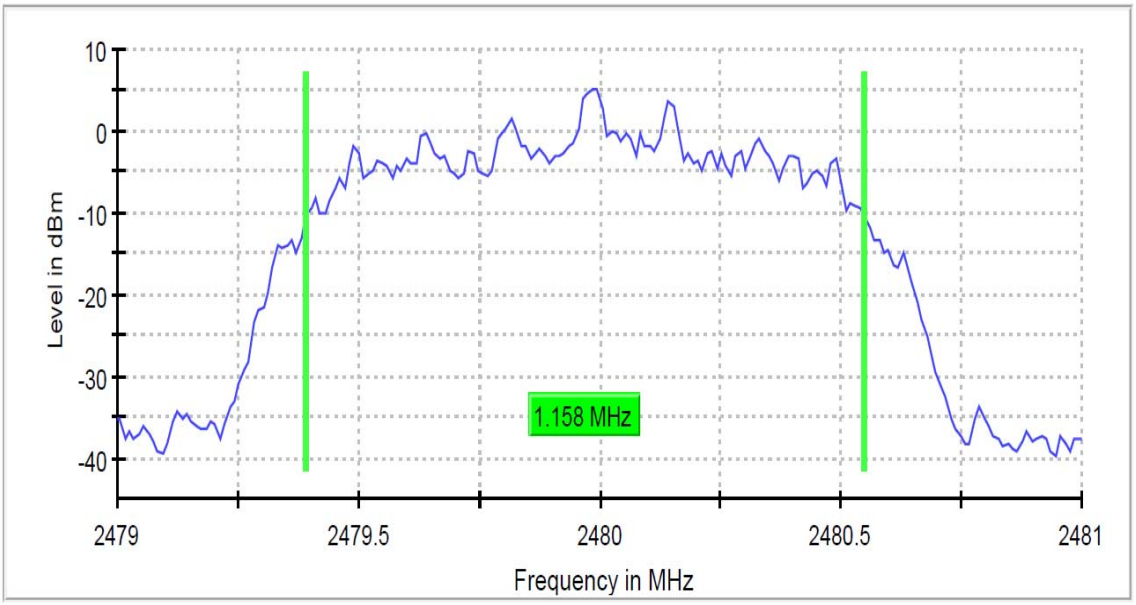
8DPSK Highest Channel (2480 MHz)



π/4 DQPSK Lowest Channel (2402 MHz)

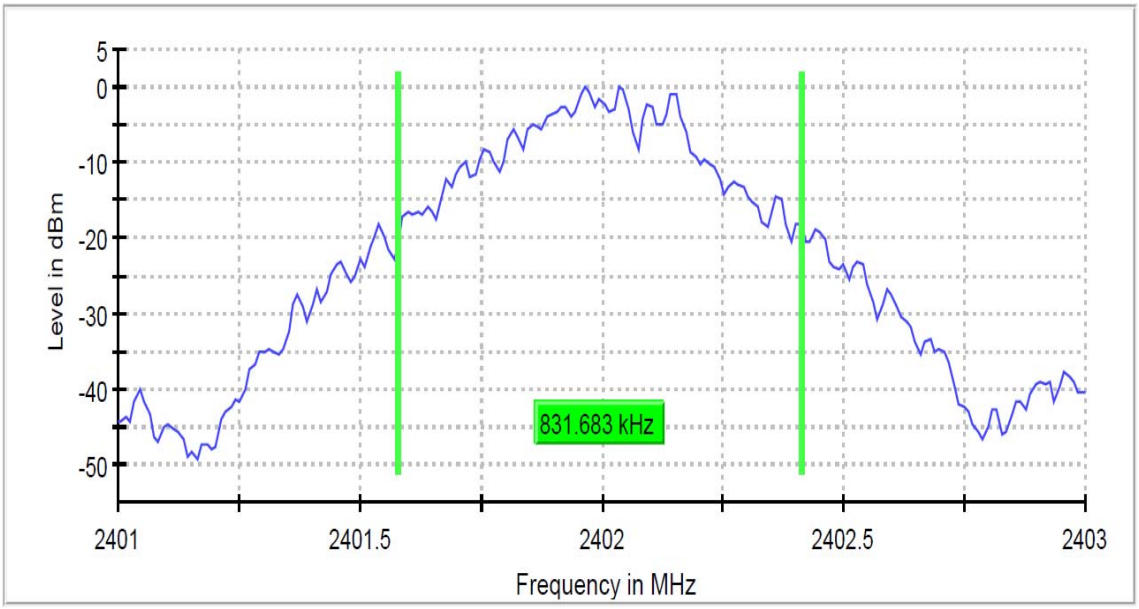


π/4 DQPSK Highest Channel (2480 MHz)

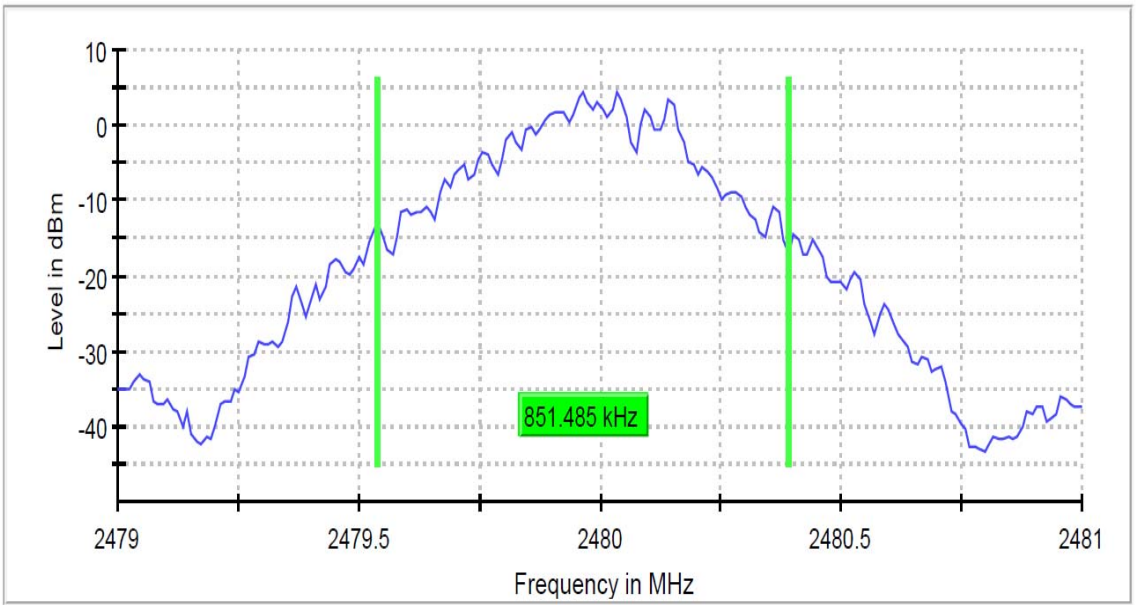


6.4.1 Test Data

GFSK Lowest Channel (2402 MHz)



GFSK Highest Channel (2480 MHz)



6.4. Occupied Channel Bandwidth

Test Method : ETSI EN 300 328 Sub clause 5.4.7

Result:

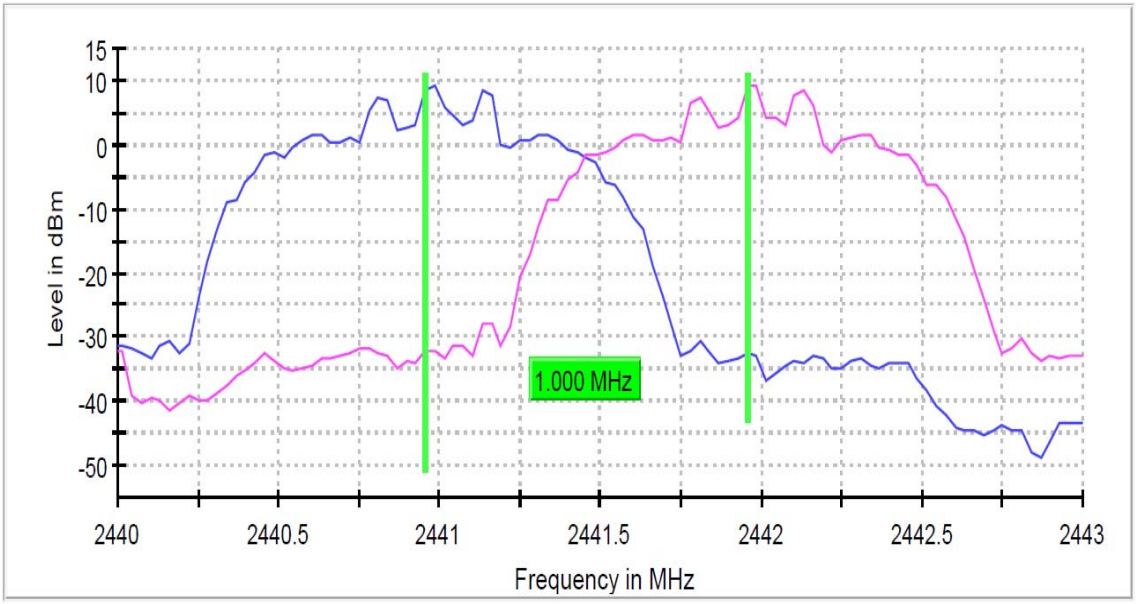
Modulation	Frequency range (MHz)	
	Lowest	Highest
GPSK	2401.579	2480.391
π/4 DQPSK	2401.391	2480.550
8DPSK	2401.391	2480.550
Measurement Uncertainty	± 0.23 MHz	

Modulation	Occupied channel bandwidth (MHz)	
	Lowest	Highest
GPSK	0.832	0.851
π/4 DQPSK	1.158	1.158
8DPSK	1.168	1.158
Measurement Uncertainty	± 0.23 MHz	

Limits :

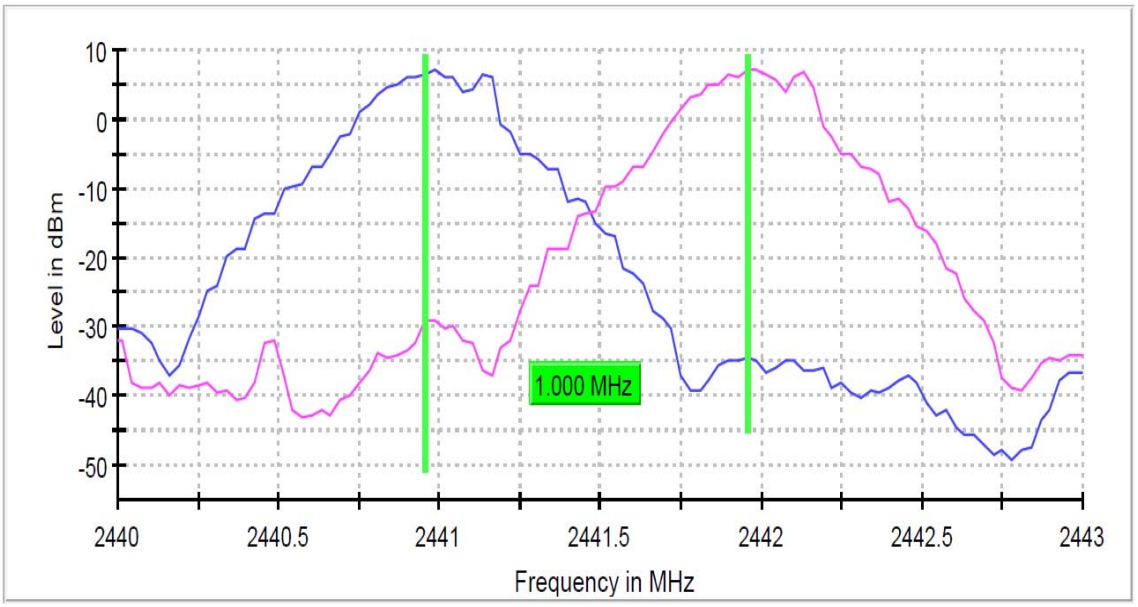
ETSI EN 300 328 Sub clause 4.3.1.8.3	2400 to 2483.5 MHz

8DPSK modulation

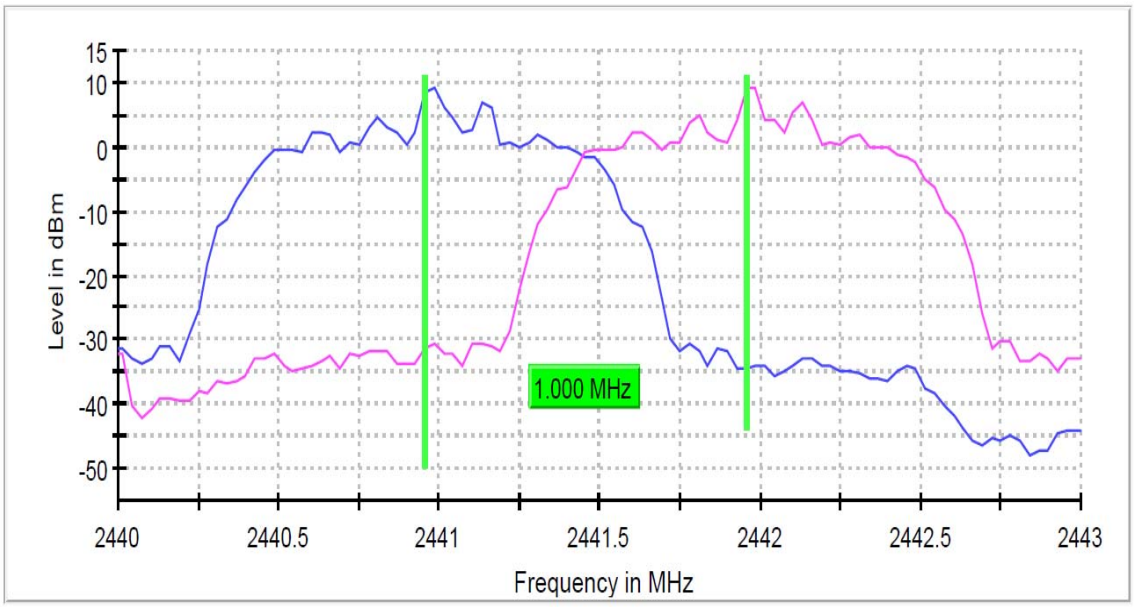


6.3.1 Test Data

GFSK modulation



π/4 DQPSK modulation



6.3. Hopping Frequency Separation

Test Method : ETSI EN 300 328 Sub clause 5.4.5

Result:

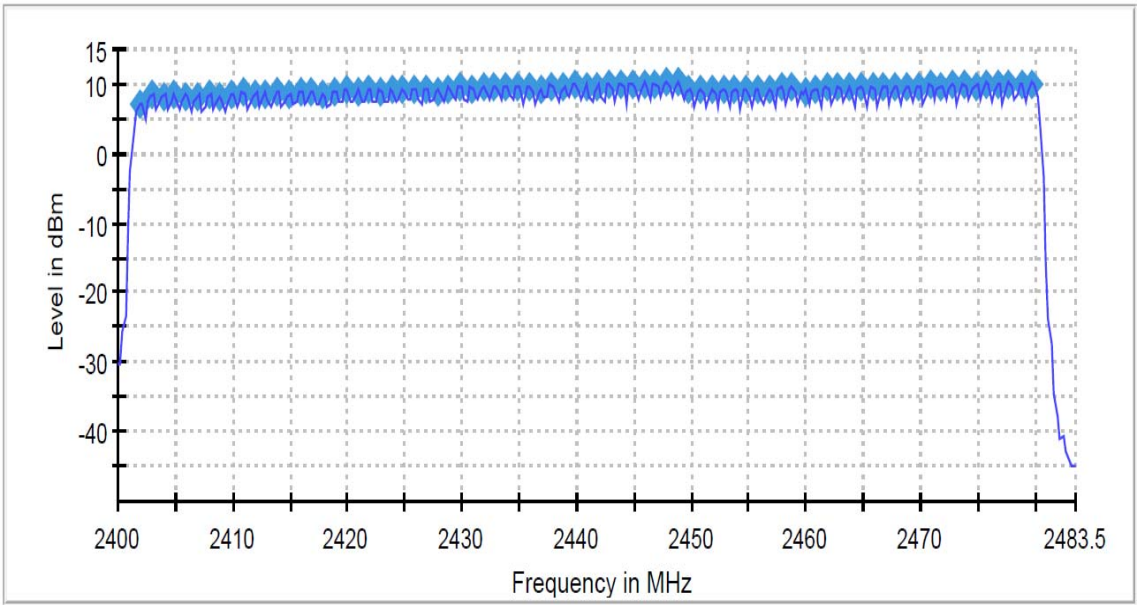
Modulation	Channel Separation (MHz)
GFSK	1.000
π/4 DQPSK	1.000
8DPSK	1.000

Notes
This Equipment is Adaptive frequency hopping systems.
There are two options for this testing as specified in 5.4.5.2.1 in EN300328 v2.1.1.
- Option 1 was used for these measurements to identify the centre of the power envelope for the two adjacent signals exactly.

Limits :

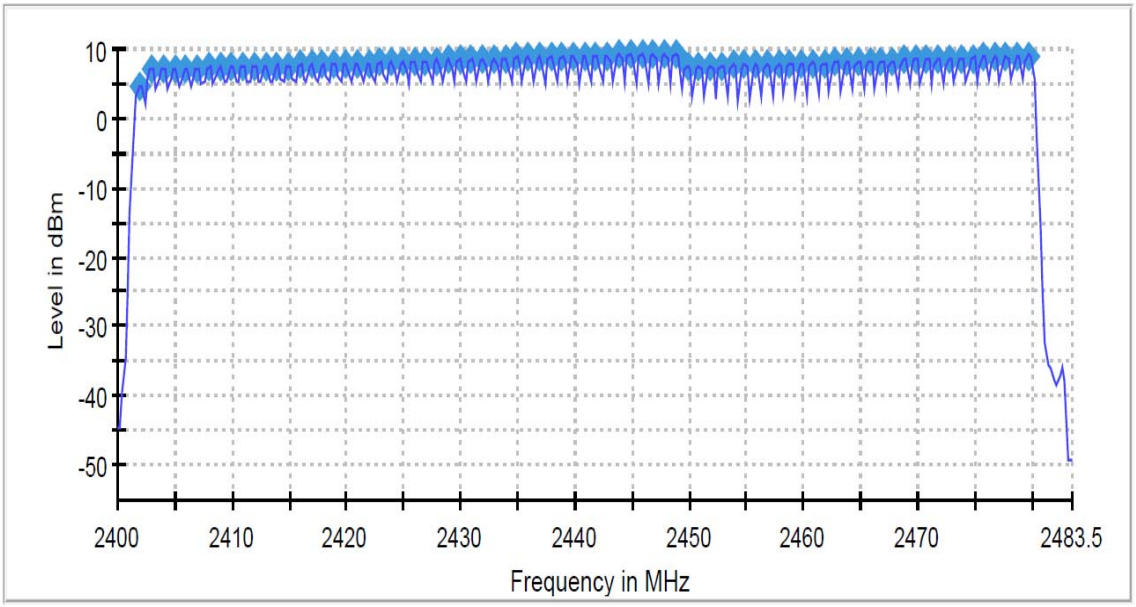
ETSI EN 300 328 Sub clause 4.3.1.5.3	≥ 100 kHz

8DPSK modulation

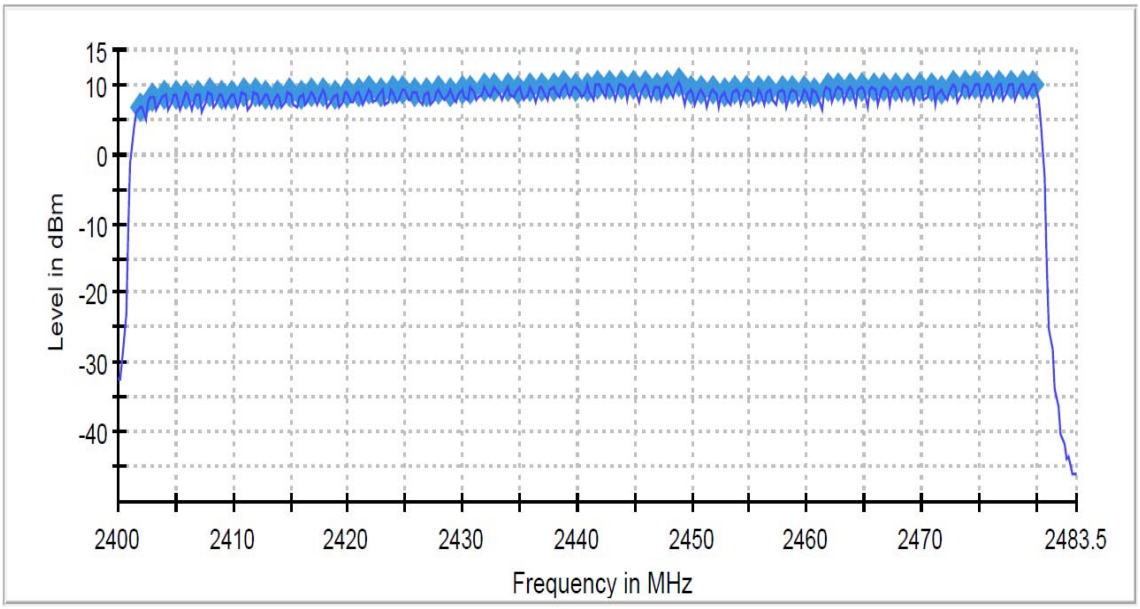


6.2.4 Test Data

GFSK modulation



π/4 DQPSK modulation



Notes

*1. * Limit : One dwell time = 2.896 ms (GFSK), 2.900 ms (π/4 DQPSK), 2.900 ms (8DPSK)*
Frequency Occupation comply with Option 1 limit as specified below.
*2. ** Limit : 70% of 2400 ~ 2483.5 MHz = 58.45 MHz*
3. This Equipment is Adaptive frequency hopping systems.

Limits :

ETSI EN 300 328 Sub clause 4.3.1.4.3.2	The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options: Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use. Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. Adaptive Frequency Hopping systems shall be capable of operating over a minimum of 70 % of 2400 ~ 2483.5 MHz

6.2 Accumulated Transmit time, Frequency Occupation & Hopping Sequence

Test Method : ETSI EN 300 328 Sub clause 5.4.4

Result:

6.2.1 Accumulated Transmit time

Modulation	Frequency (MHz)	Maximum Accumulated Dwell Time (ms)	Limit (ms)
GFSK	2402	270.707	≤ 400
	2480	292.827	
π/4 DQPSK	2402	251.747	
	2480	228.573	
8DPSK	2402	221.200	
	2480	265.440	

6.2.2 Frequency Occupation

Modulation	Frequency (MHz)	Minimum Accumulated Dwell Time (ms)	*Limit (ms)
GFSK	2402	8.828	≥ One dwell time
	2480	2.932	
π/4 DQPSK	2402	2.932	
	2480	11.791	
8DPSK	2402	11.760	
	2480	5.896	

6.2.3 Hopping Sequence

Modulation	Frequency Band (MHz)	Number of Hopping Frequency		-20dB Points Occupied Bandwidth	
		Result Data (N)	Limit (N)	Result Data (MHz)	**Limit (MHz)
GFSK	2400~2483.5	79	≥ 15	79.027	≥ 58.45
π/4 DQPSK	2400~2483.5	79	≥ 15	79.524	≥ 58.45
8DPSK	2400~2483.5	79	≥ 15	79.524	≥ 58.45

8DPSK modulation

Test Conditions	RF Output Power (e.i.r.p.) (dBm)
Normal 25 ℃, 7.2 Vdc	9.5
Extreme -10 ℃, 6.5 Vdc	9.6
Extreme -10 ℃, 7.92 Vdc	9.5
Extreme 50 ℃, 6.5 Vdc	8.5
Extreme 50 ℃, 7.92 Vdc	8.8
Measurement Uncertainty	± 0.4 dB

Notes
Antenna Peak Gain = 3.74 dBi
RF Output Power (e.i.r.p.) : RF output power (dBm) + Antenna Gain (dBi)

Limits :

ETSI EN 300 328 Sub clause 4.3.1.2.3	20 dBm

6. Frequency Hopping Equipment Test Items

6.1 RF Output Power

Test Method: ETSI EN 300 328 Sub clause 5.4.2

Result:

GFSK modulation

Test Conditions	RF Output Power (e.i.r.p.) (dBm)
Normal 25 ℃, 7.2 Vdc	9.3
Extreme -10 ℃, 6.5 Vdc	9.2
Extreme -10 ℃, 7.92 Vdc	9.2
Extreme 50 ℃, 6.5 Vdc	8.5
Extreme 50 ℃, 7.92 Vdc	8.4
Measurement Uncertainty	± 0.4 dB

π/4 DQPSK modulation

Test Conditions	RF Output Power (e.i.r.p.) (dBm)
Normal 25 ℃, 7.2 Vdc	9.3
Extreme -10 ℃, 6.5 Vdc	9.6
Extreme -10 ℃, 7.92 Vdc	9.6
Extreme 50 ℃, 6.5 Vdc	8.5
Extreme 50 ℃, 7.92 Vdc	8.8
Measurement Uncertainty	± 0.4 dB

Wide band modulations other than FHSS (ETSI EN 300 328)

Test Result	C	NC	NT	NA	Remarks
RF Output Power	■				
Power Spectral Density	■				
Duty Cycle, Tx-Sequence, Tx-gap				■	Only for non-adaptive equipment
Accumulated Transmit time, Frequency Occupation & Hopping Sequence				■	Only for FHSS equipment
Hopping Frequency Separation				■	Only for FHSS equipment
Medium Utilisation				■	Only for non-adaptive equipment
Adaptivity				■	RF Output power less than 10 dBm e.i.r.p.
Occupied Channel Bandwidth	■				
Transmitter unwanted emissions in the OOB domain	■				
Transmitter unwanted emissions in the spurious domain	■				
Receiver spurious emissions	■				
Receiver Blocking	■				
Geo-location capability				■	Only for equipment with geo-location capability

Note) C : Compliant
NC : Non- Compliant
NT : Not Tested
NA : Not Applicable

5. Test method

All test were performed in accordance with the procedures documented in ETSI EN 300 328 v2.1.1 (2016-11). The average power of this product is less than 20 mW therefore, it comply with the EN 62479:2010 and EN 62311: 2008 without testing.

4. List of Measurements

FHSS modulation (ETSI EN 300 328)

Test Result	C	NC	NT	NA	Remarks
RF Output Power	■				
Power Spectral Density				■	Only for equipment using wide band modulations other than FHSS
Duty Cycle, Tx-Sequence, Tx-gap				■	Only for non-adaptive equipment
Accumulated Transmit time, Frequency Occupation & Hopping Sequence	■				
Hopping Frequency Separation	■				
Medium Utilisation				■	Only for non-adaptive equipment
Adaptivity				■	RF Output power less than 10 dBm e.i.r.p.
Occupied Channel Bandwidth	■				
Transmitter unwanted emissions in the OOB domain	■				
Transmitter unwanted emissions in the spurious domain	■				
Receiver spurious emissions	■				
Receiver Blocking	■				
Geo-location capability				■	Only for equipment with geo-location capability

Note) C : Compliant
NC : Non- Compliant
NT : Not Tested
NA : Not Applicable

3.5. Test Equipment

Instruments	Manufacturer	Model	Serial number	Calibration Date	Calibration Interval
Spectrum Analyzer	R & S	FSW43	100732	Apr.11, 2017	1 Year
Spectrum Analyzer	R & S	FSW43	104084	Apr.04, 2017	1 Year
Signal Generator	R & S	SMB100A	175861	Jul.14, 2017	1 Year
Vector Signal Generator	R & S	SMBV100A	257152	Oct.07, 2016	1 Year
Trilog-Broadband antenna	Schwarzbeck	VULB9163	946	May.18, 2017	2 Year
Horn antenna	Schwarzbeck	BBHA9120D	01615	May.18, 2017	2 Year
Signal Conditioning Unit	R & S	SCU-03	100358	Apr.11, 2017	1 Year
Signal Conditioning Unit	R & S	SCU-18F	180025	Apr.03. 2017	1 Year
Temp./Humi. Chamber	Kun Poong	FX1077B	20011223	Oct.07, 2016	1 Year
10 dB Attenuator	WEINSCHEL	56-10	58765	Oct. 09, 2016	1 Year
10 dB Attenuator	PASTERNACK	PE7395-10	1441-1	Jul. 13, 2017	1 Year
Power Diveider	WEINSCHEL	1580-1	SB530	Oct.09, 2016	1 Year
11dB Step Attenuator	H.P	8494B	3308A32753	Jan. 09, 2017	1 Year
WIDEBAND RADIO COMMUNICATION TESTER	R & S	CMW500	145181	Apr. 11, 2017	1 Year
UNIVERSAL RADIO COMMUNICATION TESTER	R & S	CMU200	106332	Jan. 09, 2017	1 Year
Position Controller	Inn-co	CO2000	1480406/L	N/A	N/A
Turn Table	Inn-co	DS1200S	N/A	N/A	N/A
Antenna Mast	Inn-co	MA4000	N/A	N/A	N/A
Anechoic Chamber	Seo-Young	N/A	N/A	N/A	N/A
Open Switch And Control Platform	R & S	OSP-120	100081	N/A	N/A
Open Switch And Control Platform	R & S	OSP-120	100857	Apr. 11, 2017	1 Year
WiFi Filter Bank	R & S	U083	N/A	N/A	N/A

3. General Test Conditions

3.1. Location

Nemko Korea Co.,Ltd
159, Osan-ro, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 16885, Republic of Korea.
Phone : 82-31-330-1700 Fax : 82-31-322-2332

3.2. Operating Environment

Parameters	Recording during test	Accepted deviation
Ambient temperature	(24 ~ 26)℃	(15 ~ 35)℃
Relative humidity	(36 ~ 45) %	(20 ~ 75) %

3.3. Test Frequency

Channel	Frequency (MHz)	
	BDR/EDR	LE
Low	2402	2402
Middle	2441	2442
High	2480	2480

3.4. Support Equipment

Equipment	Manufacturer	Model Name	Serial Number
Laptop Computer	HP	G62-355TU	CNF0489WDT
AC/DC Adapter	HP	PPP009D	WBGSV0ACXZH162

2.4. Additional Information Related to Testing

- For BDR/EDR mode, Tests have been performed GFSK, π /4DQPSK and 8DPSK modulation with DH5 packet.
- For LE mode, Tests have been performed GFSK modulation with 37 packet length.
- The Laptop was used to control the EUT to transmit the wanted TX channel and modulation by the program (CSR Bluetest 3) which manufacturer supported.
- The cable and attenuator loss from 30MHz to 12.75GHz was reflected in spectrum analyzer with correction factor for all conducted testing.
- The EUT supports the Adaptive Frequency Hopping systems.

Type of Adaptivity function	■ Adaptive Frequency Hopping using LBT based DAA
	☐ Adaptive Frequency Hopping using other forms of DAA (non-LBT based)
	☐ Short Control Signaling Transmissions

- The EUT was programmed with the following output power setting that was used during testing:

Test frequency	2402 MHz	2441 MHz	2480 MHz
BDR (GFSK)	Ext. 255, Int. 14		
EDR (π/4 DQPSK / 8DPSK)	Ext. 255, Int. 50		
Test frequency	2402 MHz	2442 MHz	2480 MHz
LE(GFSK)	Default		

- Receiver category

Categorization	C	NA	Remarks
Receiver category 1		■	
Receiver category 2	■		Adaptive equipment with a maximum RF Output power of 10 dBm e.i.r.p..
Receiver category 3		■	
Note) C : Compliant NA : Not Applicable			

2. Equipment Under Test (EUT)

2.1. Identification of EUT

Category	BT SPEAKER			
Model Name	DSB250BT			
Brand Name	DENON			
Frequency of Operation	2402 MHz ~ 2480 MHz			
Modulation Technique	Frequency Hopping Spread Spectrum(FHSS)			Wideband modulation
Modulation type:	BDR	EDR	EDR	LE
	GFSK	π/4 DQPSK	8DPSK	GFSK
Power output (EIRP)	9.3 dBm	9.6 dBm	9.6 dBm	9.4 dBm
Channels	79 ch			40 ch
Antenna Gain (peak)	3.74 dBi			
Antenna Setup	1TX / 1RX			
Temperature Range:	-10 ℃ ~ +50 ℃			
Voltage	Operating voltage : 7.2 Vdc (battery) Test voltage : 6.7 ~ 7.92 Vdc			
Size (W x H x D)	About 80.0 mm x 209.0 mm x 70.0 mm			
Weight	About 756 g			
Remarks	-			

2.2. Description of change

- No Comment

2.3. Modifications

- No Comment

1. Client Information

1.1. Applicant

Company Name:	ANAM ELECTRONICS CO., LTD.
Company Address:	27, Digital-ro 27ga-gil, Guro-gu, Seoul, Korea
Phone:	+82-2-6424-4881
Contact Name:	Byeong-Seob, Lee

1.2. Manufacturer

Company Name:	D&M HOLDINGS INC.
Company Address:	D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa-ken, 210-8569, JAPAN

1.3. Factory

Company Name:	Anam Electronics Vietnam Co.,Ltd.
Company Address:	Dong Van II Industrial Zone, Duy Tien District, Ha Nam Province, Vietnam

1.4. Other Information

- No Comment

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	September.13,2017	Initial issue	

Test Report

Test Report	
Project Reference No.	NK-17-R-207
Product	BT SPEAKER
Brand Name	DENON
Model	DSB250BT
Tested according to	ETSI EN 300 328 V2.1.1 ETSI EN 62479

Tested in period	August 01, 2017 ~ September 09, 2017
Issued date	September 13, 2017
Name and address of the Test House	Nemko 159, Osan-ro, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 16885, Republic of Korea. Phone : 82-31-330-1700 Fax : 82-31-322-2332
Tested by	Seungyong Shin Sep. 13. 2017 *September 13, 2017*
Verified by	Deokha Ryu Deokha Ryu sep 13. 2017 *September 13, 2017*

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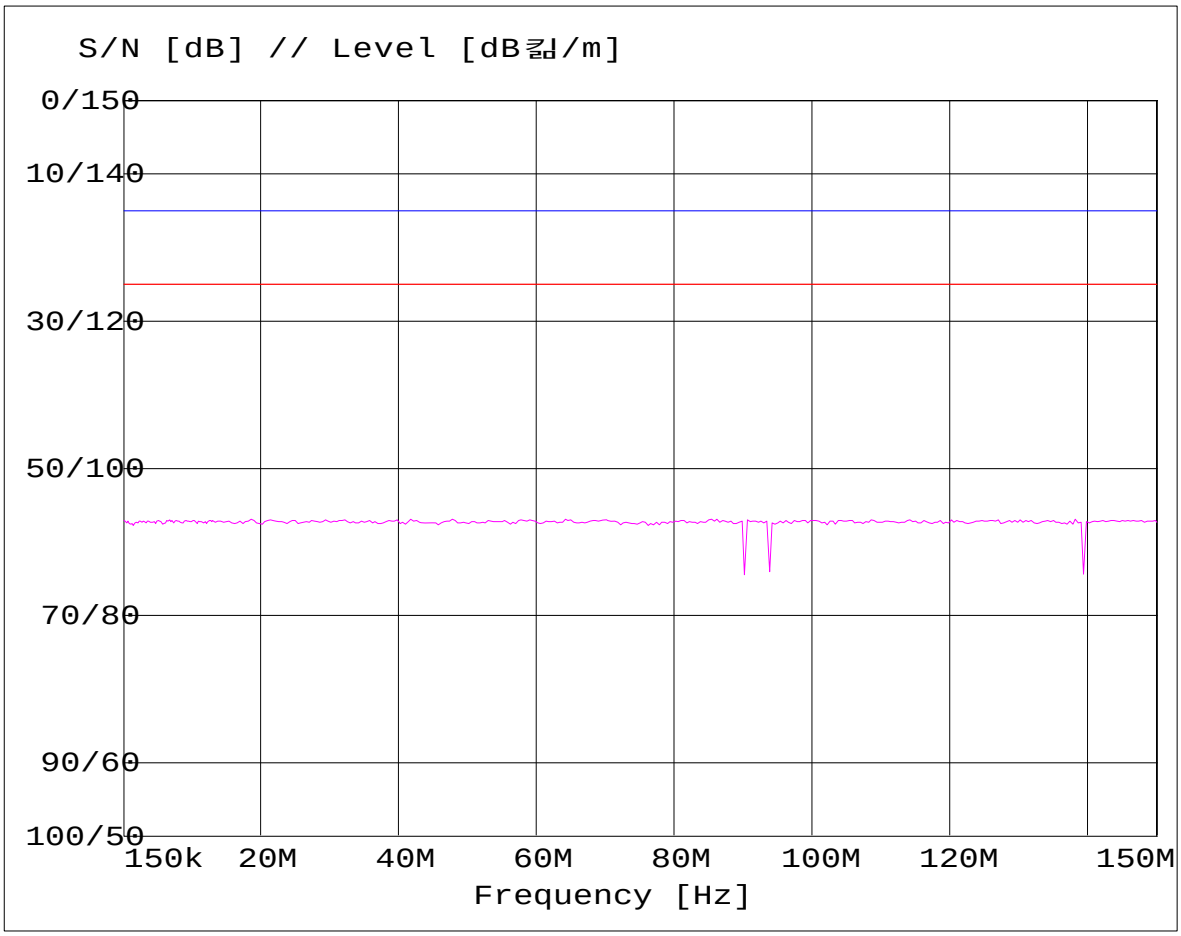
This report apply only to the sample(s) tested. It is the manufacturer's responsibility to assure the additional production units of this product are manufactured with identical electrical and mechanical components. The manufacturer is responsible to the Competent Authorities in Europe for any modifications made to the product which results in non-compliance to the relevant regulation.

Test: Immunity Radiated Fields S3 <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker R
Operating Mode:	AUX	S/N:	57.2 dB
Frequency:	-	AF Level:	64.8 mW

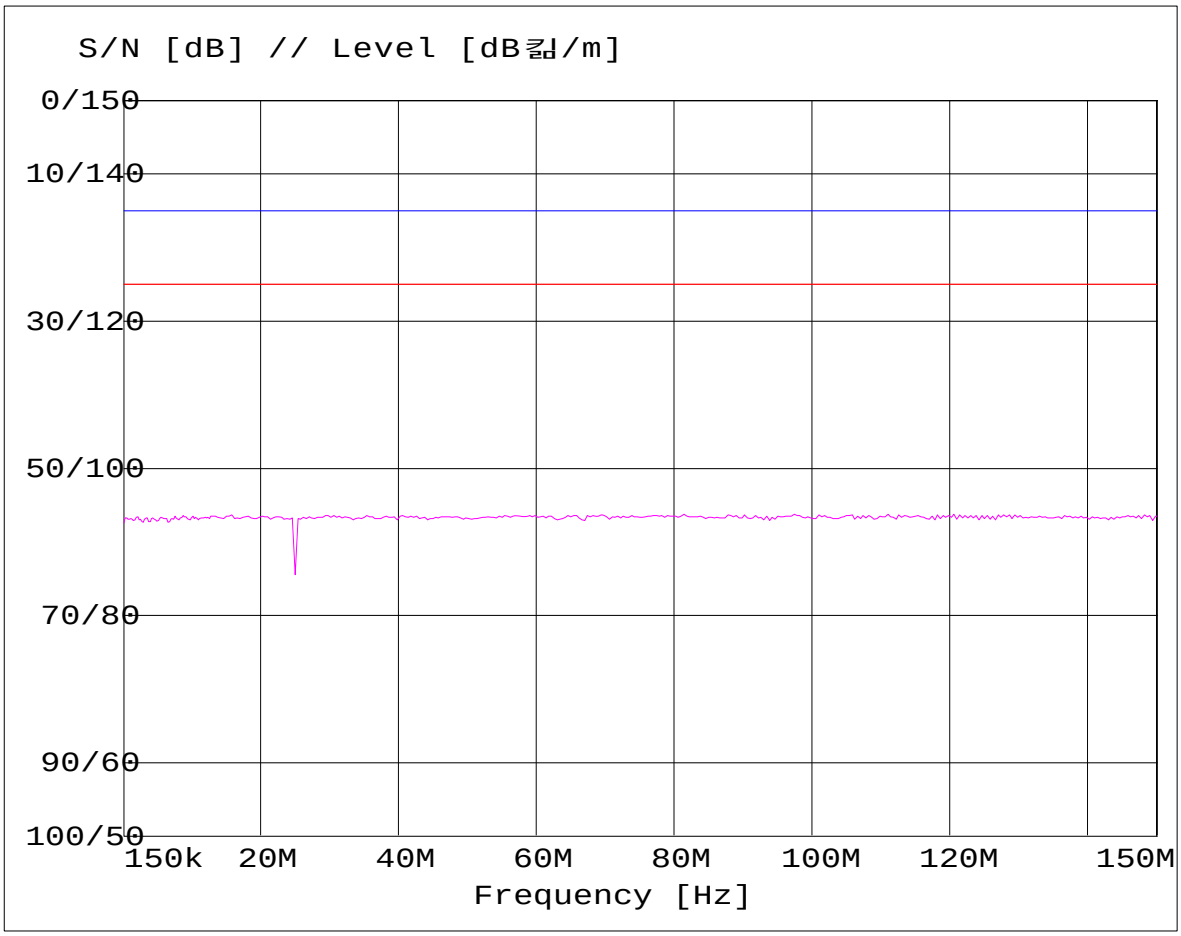
Interf. Signal: Scan, 280817-00041-002, 8/28/2017, 6:01:14PM K2 = 1.6 dB



Test: Immunity Radiated Fields S3 <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker L
Operating Mode:	AUX	S/N:	56.7 dB
Frequency:	-	AF Level:	64.0 mW

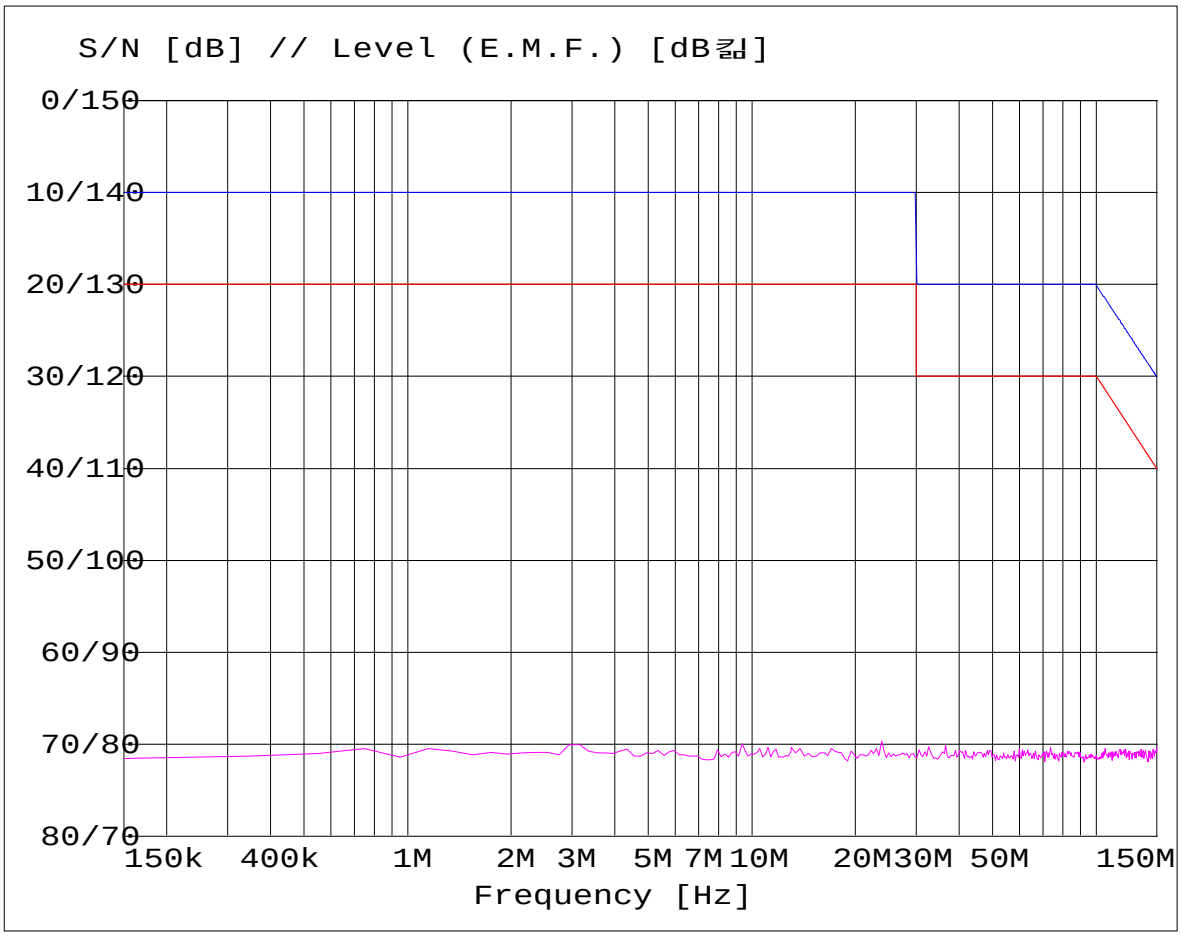
Interf. Signal: Scan, 280817-00041-001, 8/28/2017, 5:55:03PM K2 = 1.6 dB



Test: Immunity Conducted Voltages S2a <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker R
Operating Mode:	AUX	S/N:	71.0 dB
Frequency:	-	AF Level:	61.6 mW

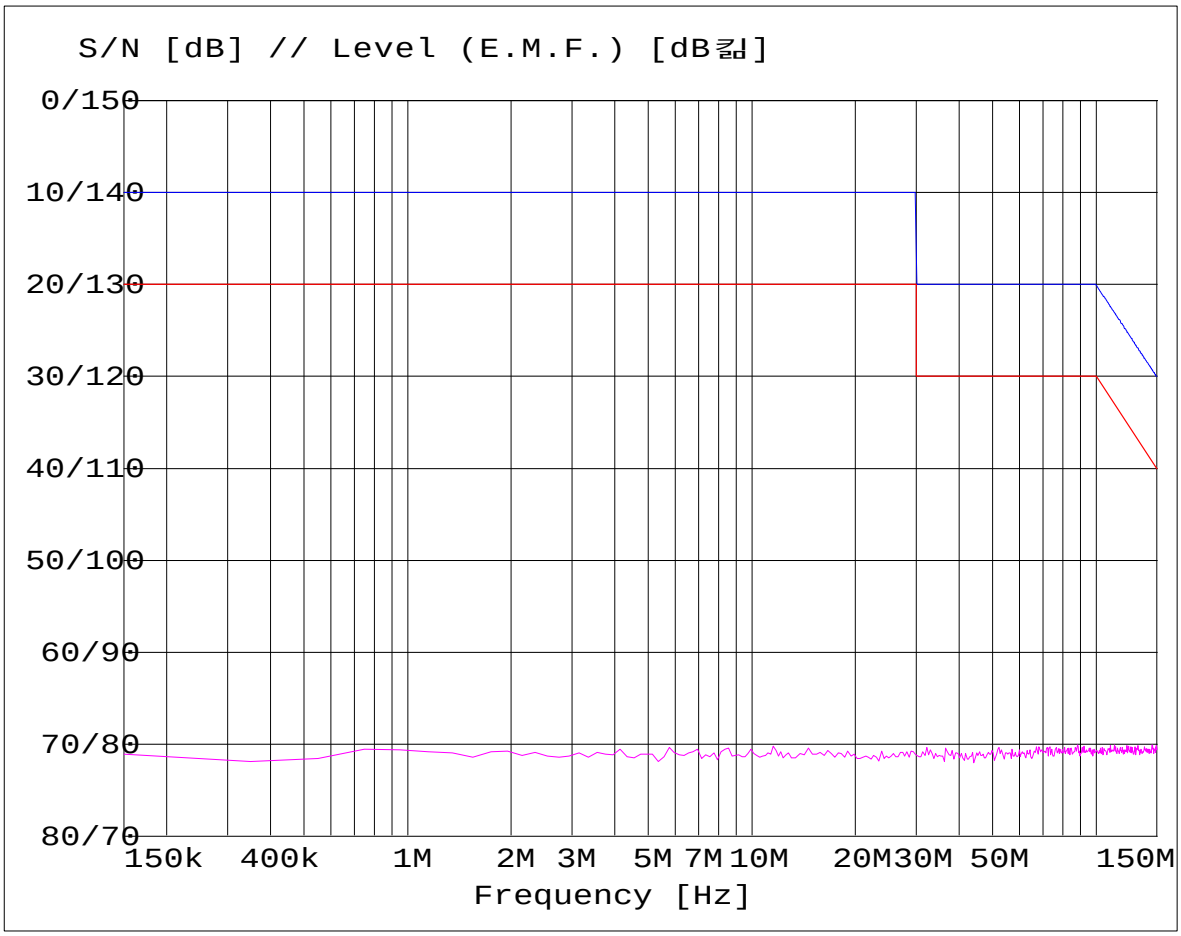
Interf. Signal: Speaker R, 280817-00038-001, 8/28/2017, 5:25:40PM



Test: Immunity Conducted Voltages S2a <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker L
Operating Mode:	AUX	S/N:	71.2 dB
Frequency:	-	AF Level:	55.7 mW

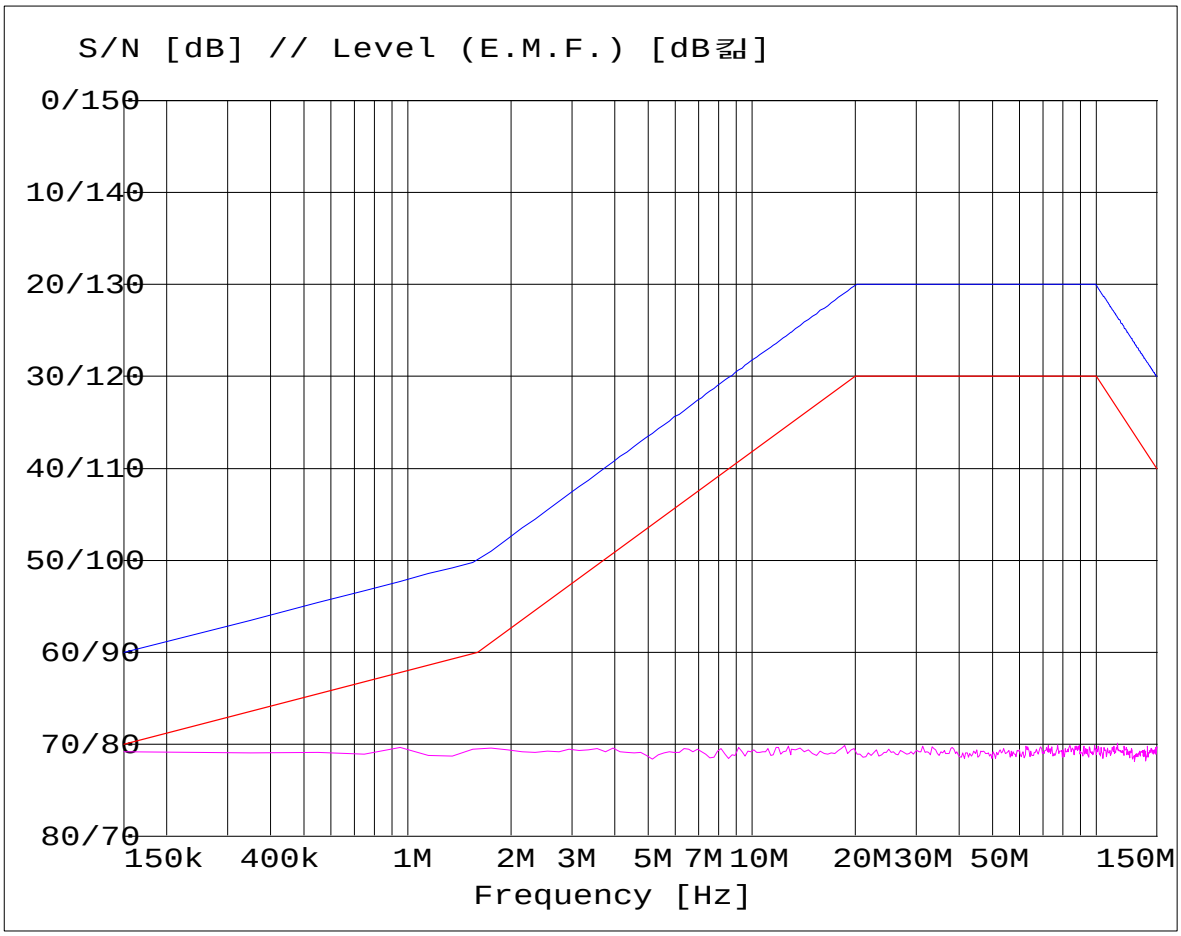
Interf. Signal: Speaker L, 280817-00037-001, 8/28/2017, 5:21:17PM



Test: Immunity Conducted Voltages S2a <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker R
Operating Mode:	AUX	S/N:	71.2 dB
Frequency:	-	AF Level:	62.8 mW

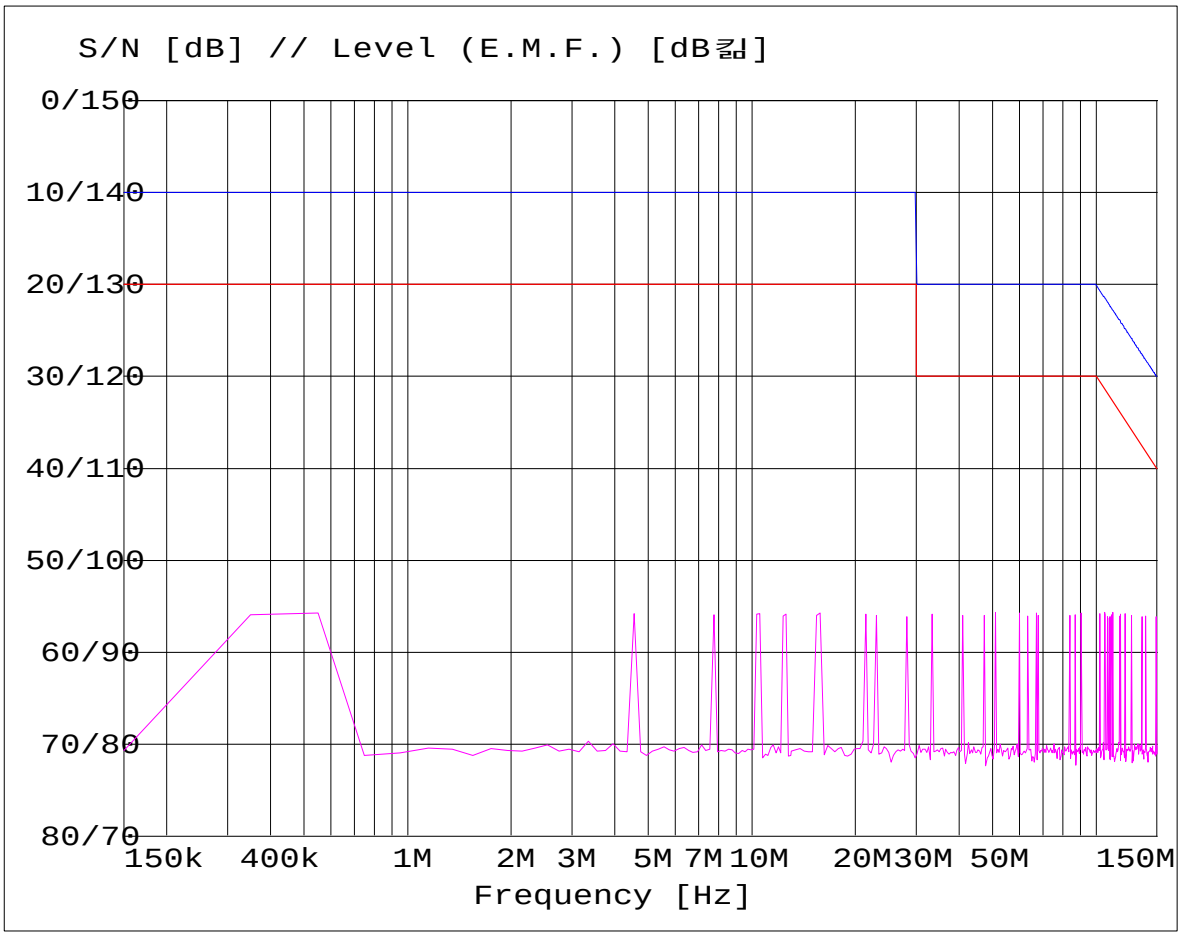
Interf. Signal: AUX, 280817-00040-001, 8/28/2017, 5:44:03PM



Test: Immunity Conducted Voltages S2a <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker R
Operating Mode:	AUX	S/N:	70.5 dB
Frequency:	-	AF Level:	63.6 mW

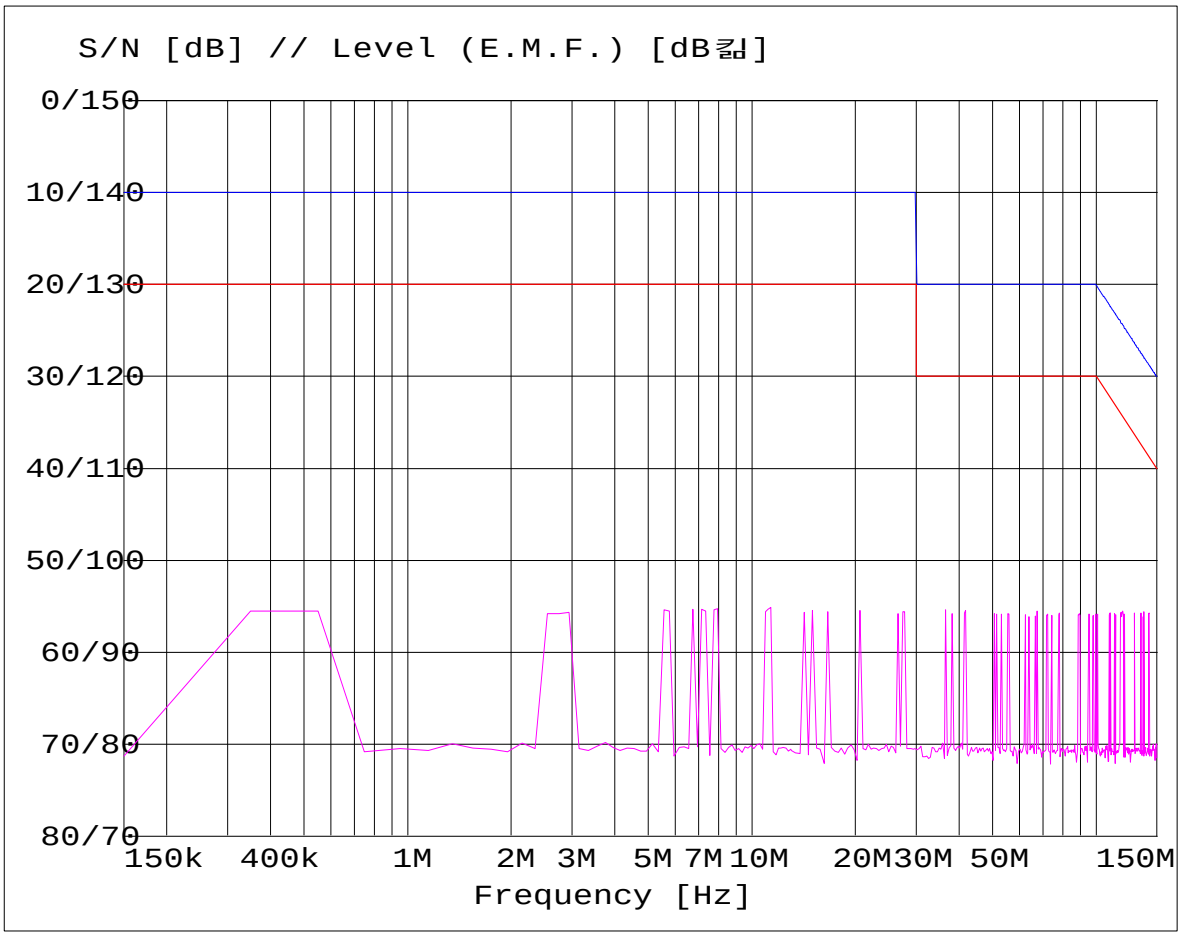
Interf. Signal: Mains, 280817-00039-002, 8/28/2017, 5:39:08PM



Test: Immunity Conducted Voltages S2a <DSB250BT>

Test Mode:	Amplifier -	Monitor:	Speaker L
Operating Mode:	AUX	S/N:	70.5 dB
Frequency:	-	AF Level:	62.4 mW

Interf. Signal: Mains, 280817-00039-001, 8/28/2017, 5:32:37PM



7. Test instrumentation

Equipment and Type	Manufacturer	Serial NO.
POWER METER(NRVD)	Rohde & Schwarz	102321
RF System Panel(TS-RSP)	Rohde & Schwarz	100439
Power Sensor(URV-Z4)	Rohde & Schwarz	100243
POWER SENSOR(URV5-Z4)	Rohde & Schwarz	100116
Signal Generator(SMG)	Rohde & Schwarz	835793/023
Signal Generator(SMG)	Rohde & Schwarz	835793/024
Audio Analyzer(UPA)	Rohde & Schwarz	836798/010
Bandpass filter(0.5-3kHz)(BP)	Erika Fiedler	6229
Isolation Transformer(TS-TT.3)	Volrio Star	94/109738
RC Net Work(8,300ohm/RCo)	Erika Fiedler	
Mains Filter(MSF)	Erika Fiedler	
Coupling Unit(A,M,L,SR)	Erika Fiedler	
Matching Net Work(MN)	Erika Fiedler	
Mains Filter(M)	Erika Fiedler	
Loudspeaker Filter(BS)	Erika Fiedler	
RC Net Work(RCi,RCo)	Erika Fiedler	
RF Power AMP(1347F/325LA)	ENI	
USB Stick	Transcend	
SD Memory	SanDisk	
iPhone 4S	Apple	

6. Immunity to ambient electromagnetic fields (S3)

6.1 Test criteria and test procedure

Operating environment;
Temperature : 24 ℃
Relative Humidity : 42 %

The EUT was placed on a non-metallic support by 0.1m above the lower conductor in the center of the stripline.
The wanted signal was fed to all input terminals respectively .The unwanted signal is fed to a matching network of the stripline.
The ground connection of the mains filter(M) was directly connected to the jacky.
All unused input/output connections on the EUT were terminated and shielded with the proper resistance.
The power supply to the mains of the EUT was attached to the mains filter(M).
Ferrite rings for this test was required on all test cables inside the shielded room.

The measurement are performed with TS9980 T80-K1 V2.22

6.2 Measurement uncertainty

Radiated fields : ± 2dB

6.3 Test result immunity from radiated fields.

The equipment does comply with the requirements.

For the measurement data, see annex B.

5. Immunity to RF voltages(S2a)

5.1 Test criteria and test procedure

Operating environment;
Temperature : 24 ℃
Relative Humidity : 42 %

The EUT was placed 0.1m above a metallic ground plane of dimensions 2 x1m. The wanted signal was fed to all input terminals respectively and the unwanted signal was fed to mains input, audio output and input terminals respectively.

The criterion concerning acceptable sound interference is a wanted to unwanted audio signal ratio of ≥40dB at a wanted signal level of 50mW.

The audio output power was measured with a 0.5 - 3kHz band-pass filter.
The audio analyzer was applied without a weighting filter.
The ground connection of the input matching network(Rci), output matching network(Rco), and mains filter(MSF) were directly connected to the metal table.
The mains filter(MSF) was connected to ground while the other matching networks are only connected to ground when they are being used as injection ports.

The measurement are performed with TS9980 T80-K1 V2.22

5.2 Measurement uncertainty

Immunity to conducted voltage : ± 2dB.

5.3 Test result immunity to conducted voltage.

The equipment does comply with the requirements.

For the measurement data, see annex A.

3. TEST SPECIFICATIONS

3.1 Standards

EN55020(2007) & +A11(2011)
Sound and television broadcast receivers and associated equipment
- Immunity characteristics - Limits and methods of measurement

3.2 Additions,deviations and exclusions from standards

No additions,deviations or exclusions have been made from standard.

3.3 Purpose of the test

Purpose of test: To determine whether the equipment under test fulfils the EMC immunity requirements of the standard stated in section 3.1

4. TEST SUMMARY

The results in this report apply only to sample tested:

	Passed	Note
(S1)Input immunity to RF voltages	N.A.	*)
(S2a)Immunity to RF voltages	Yes	
(S2b)Immunity to RF voltages(in common mode)	N.A.	*)
(S3)Immunity to ambient electromagnetic fields	Yes	
(S4)Screening effectiveness	N.A.	*)

Note : * N.A. = Not Applicable

The equipment does comply with the requirements

Measurement data see annex A and B.

1. CLIENT INFORMATION

The EUT has been test by request of:

* Company : D&M Holdings Inc.
D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa-ken, 210-8569, JAPAN

2. EQUIPMENT UNDER TEST(EUT)

2.1 Identification of the EUT

*Equipment : Bluetooth Speaker

*Model No. : DSB250BT

*Brand Name : DENON

*Serial No. : N/A

*Manufacturer : D&M Holding Inc.
D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa-ken, 210-8569, JAPAN

*Power Rating : INPUT 5V, 2.1A

*In/Out terminal : AUX, CHARGE

*Tuner Section : N/A

2.2 Additional information about the EUT

The EUT consists of the following subsystems/modules/parts; none
The tests have been performed on the EUT provided with the following modifications; none

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2. Equipment under test (EUT) **3**
2.1 Identification of the EUT
2.2 Additional information about the EUT

3. Test specifications **4**
3.1 Standards
3.2 Additions,deviations and exclusions from standards
3.3 Purpose of the test

4. Test summary **4**

5. Immunity to RF voltages:S2a **5**
5.1 Test criteria and test procedure
5.2 Measurement uncertainty
5.3 Test result

6. Immunity to ambient electromagnetic fields:S3 **6**
6.1 Test criteria and test procedure
6.2 Measurement uncertainty
6.3 Test result

7. Test instrumentation **7**

Annex-Measurement Data;
Annex A : Immunity to RF voltage **8**
Annex B : Immunity to ambient electromagnetic fields **13**

ANAM ELECTRONICS CO.,LTD.
27, Digital-ro 27ga-gil, Guro-gu, Seoul, Korea
TEL. : 82-2-6424-4894

EMS TEST REPORT

Reference No. 54121708D

Immunity to electromagnetic disturbances

Equipment Under Test

Equipment : Bluetooth Speaker

Type/model : DSB250BT

Brand Name : DENON

Manufacturer : D&M Holdings Inc.

Total Page of this report : 14(including this page)

SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report the equipment does comply with the requirements according to EN55020(2007)&+A11(2011). The test results in this report apply only to the sample tested.

Report Issued : August 29, 2017

EUT Received : August 28, 2017

Tested by :

H. K. Jung / Assistant Engineer

Approved by :

B. S. Lee / Researching Engineer

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Appendix B Photographs of EUT

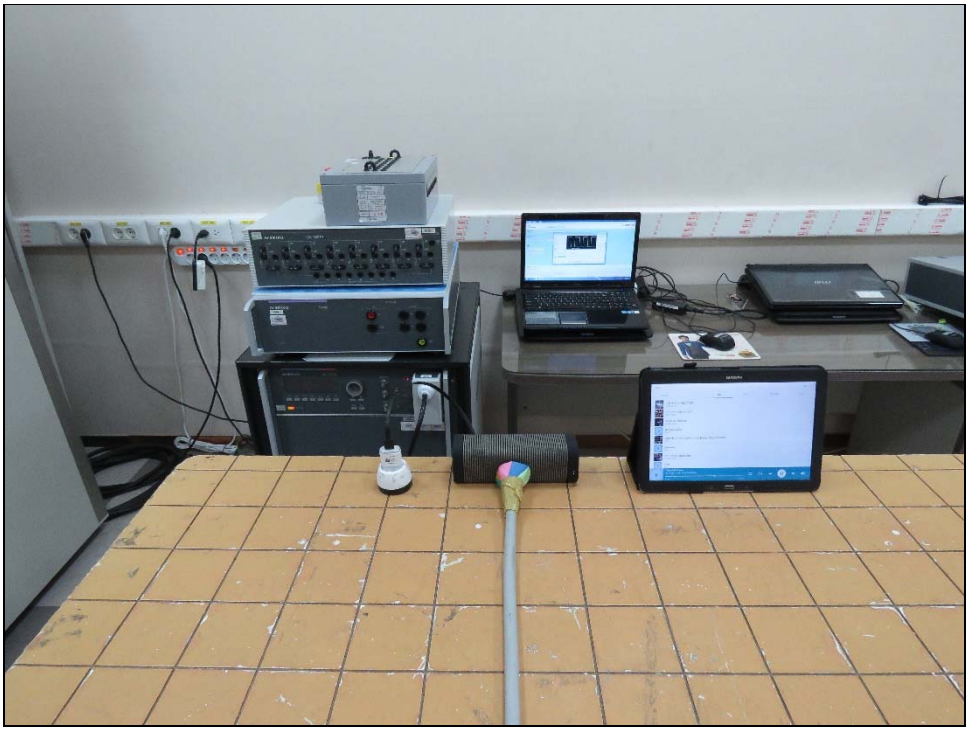
1. Front View of EUT

2. Rear View of EUT

9. Fluctuating Harmonics & Flicker

8. Voltage dips and Interruptions

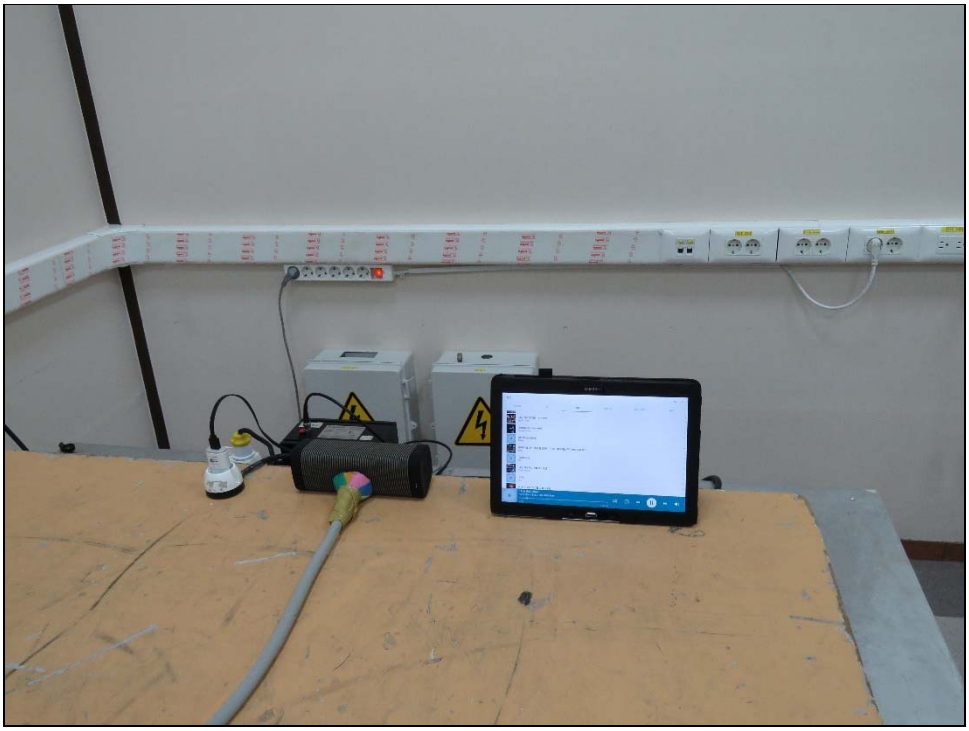
▶**BT mode**



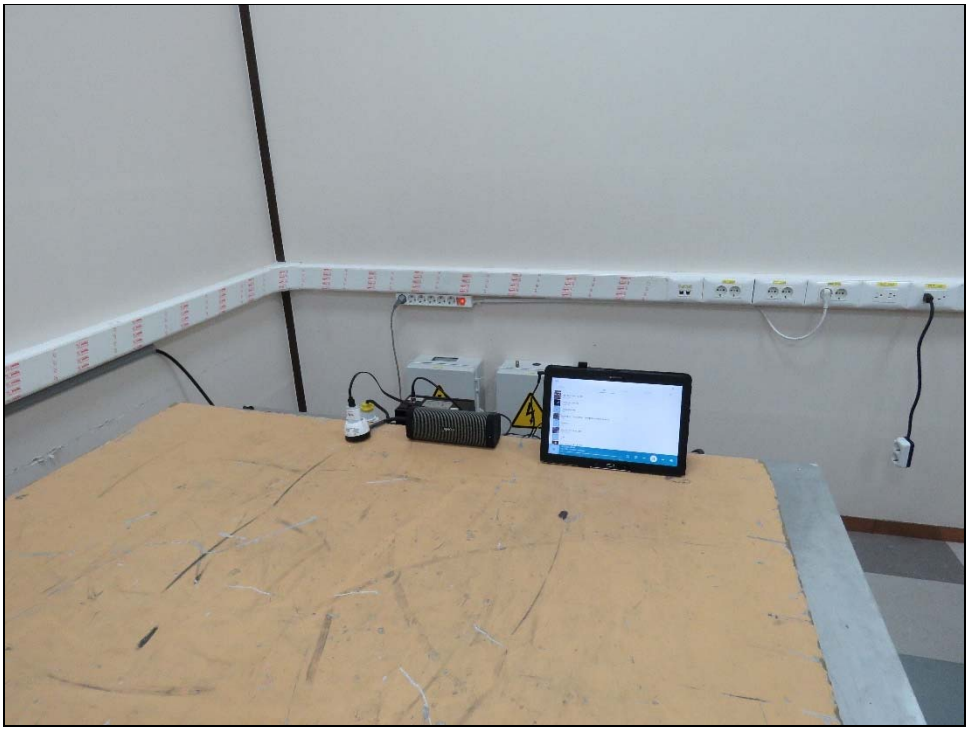
▶**AUX mode**

7. Continuous conducted disturbances

▶**BT mode**

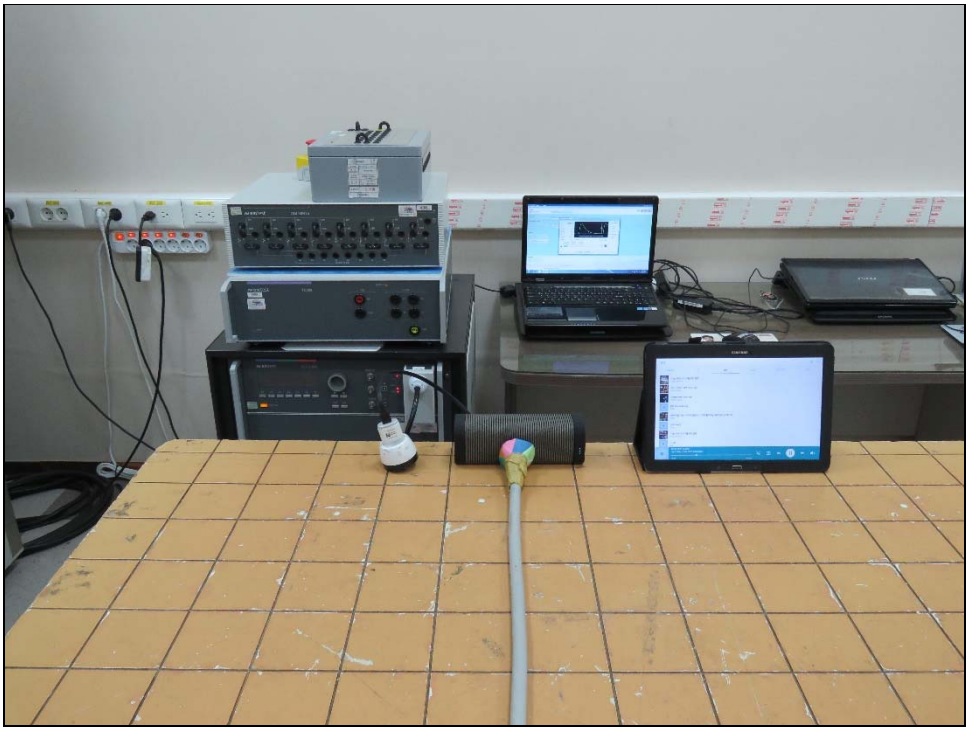


▶**AUX mode**

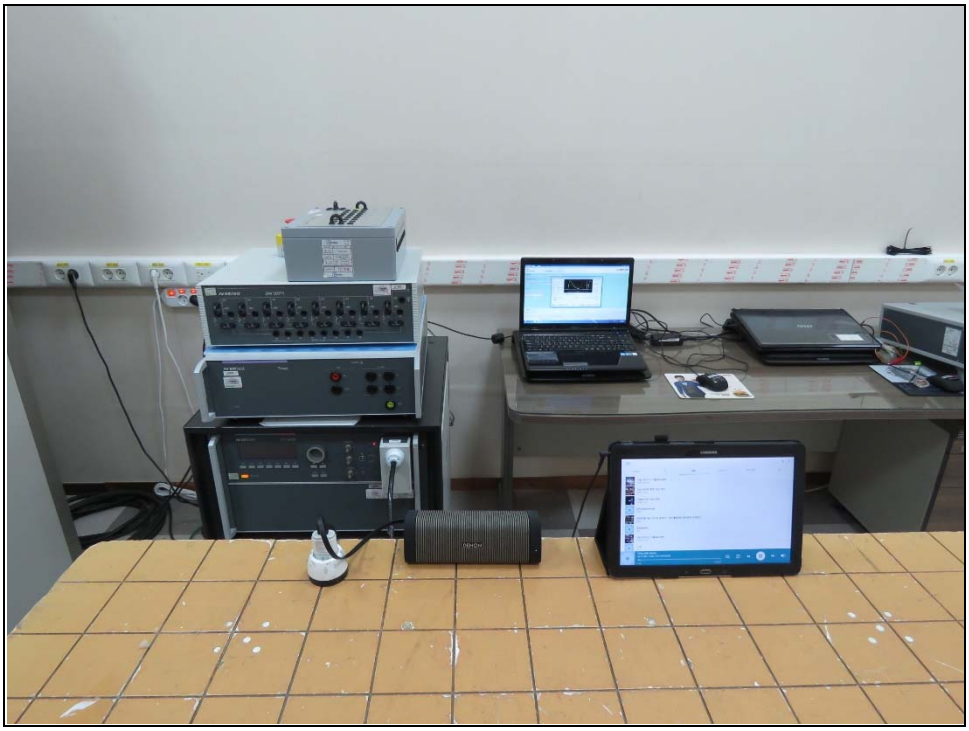


6. Surges

▶**BT mode**

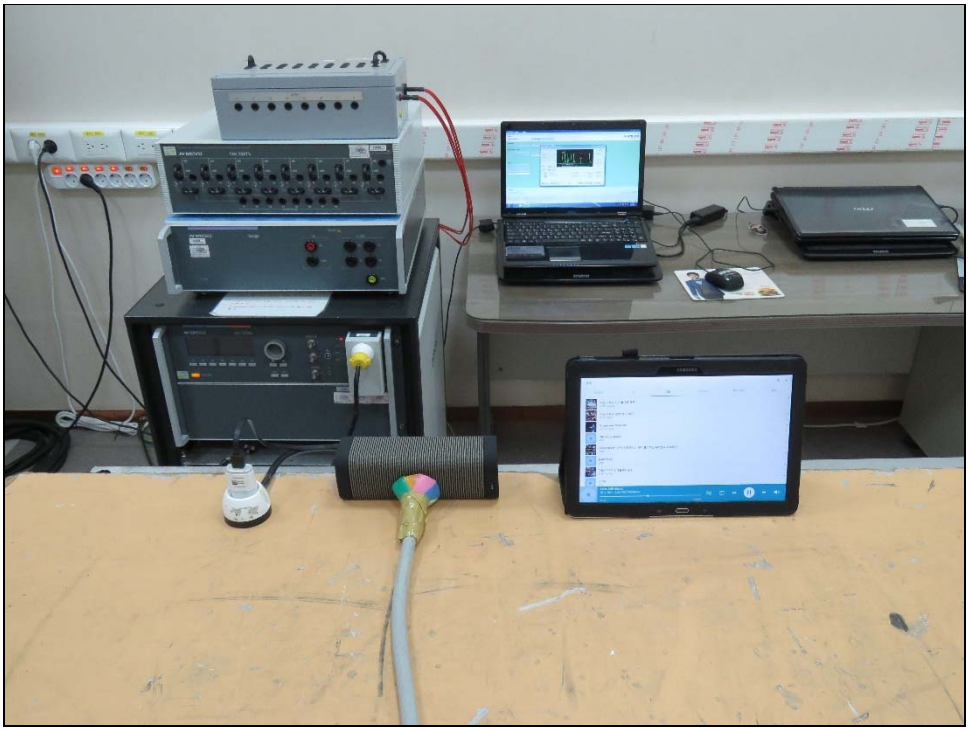


▶**AUX mode**

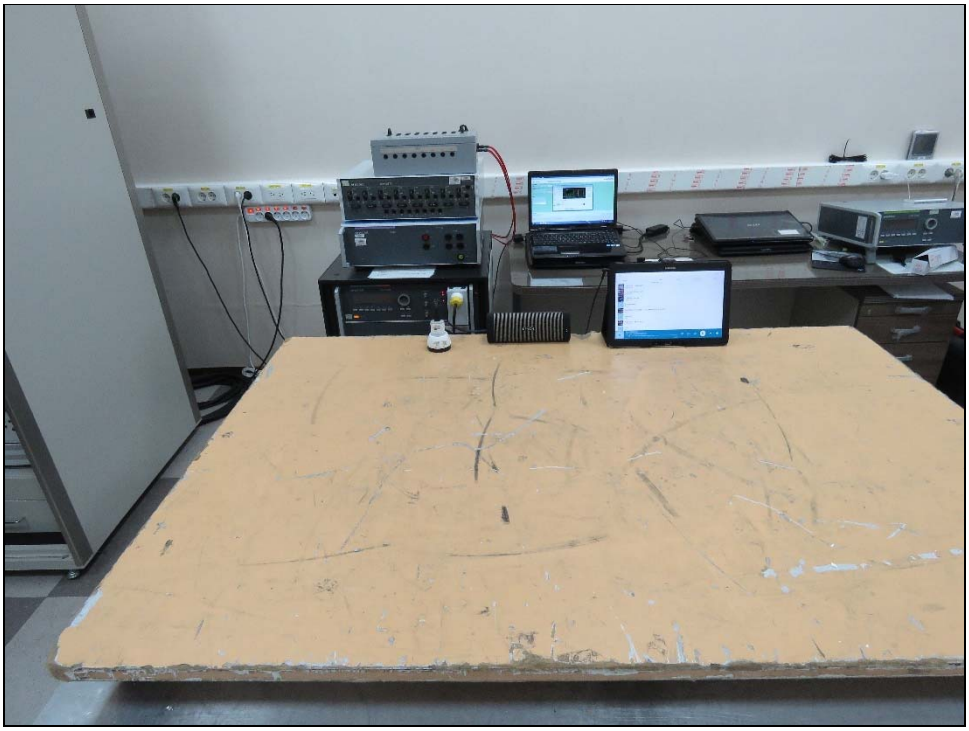


5. Electrical fast transients (EFT)

▶**BT mode**

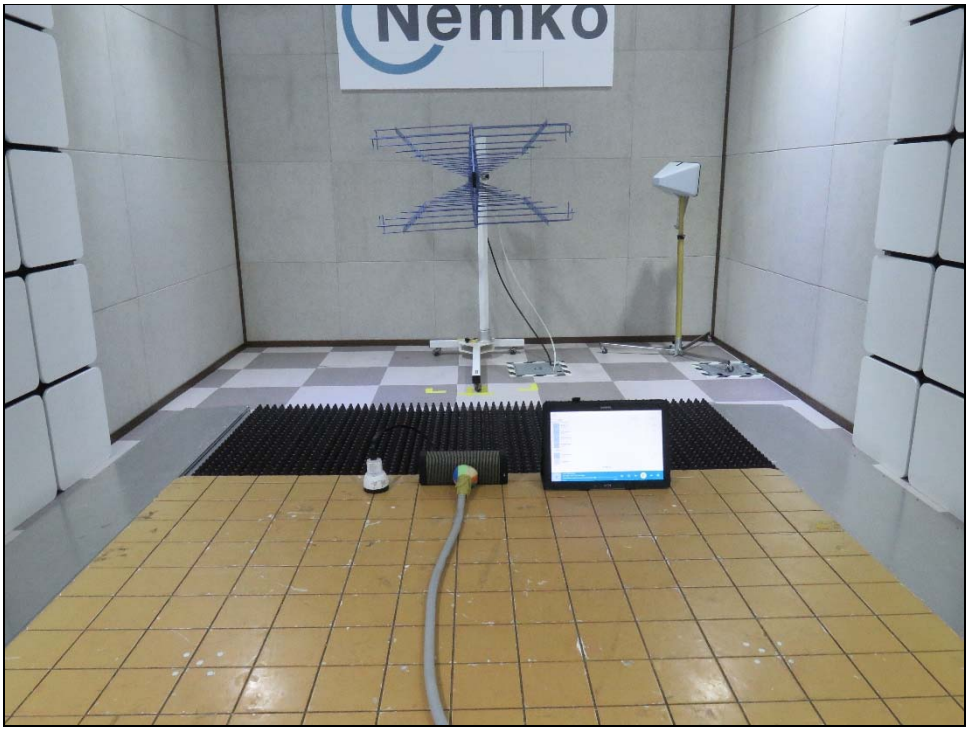


▶**AUX mode**

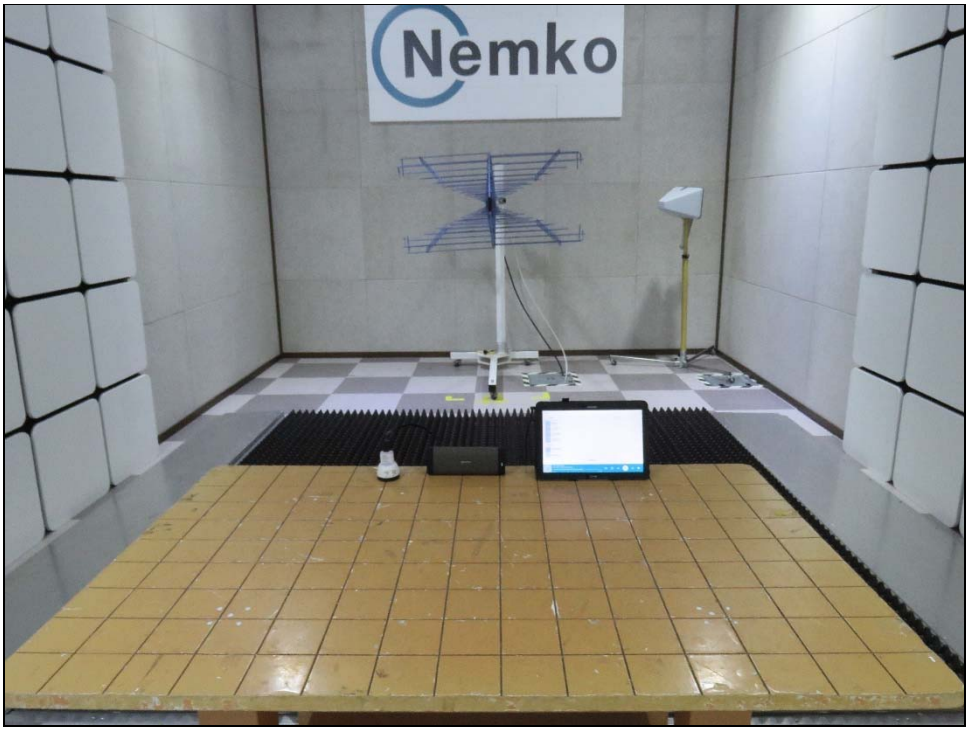


4. Continuous radio frequency disturbances

▶**BT mode**

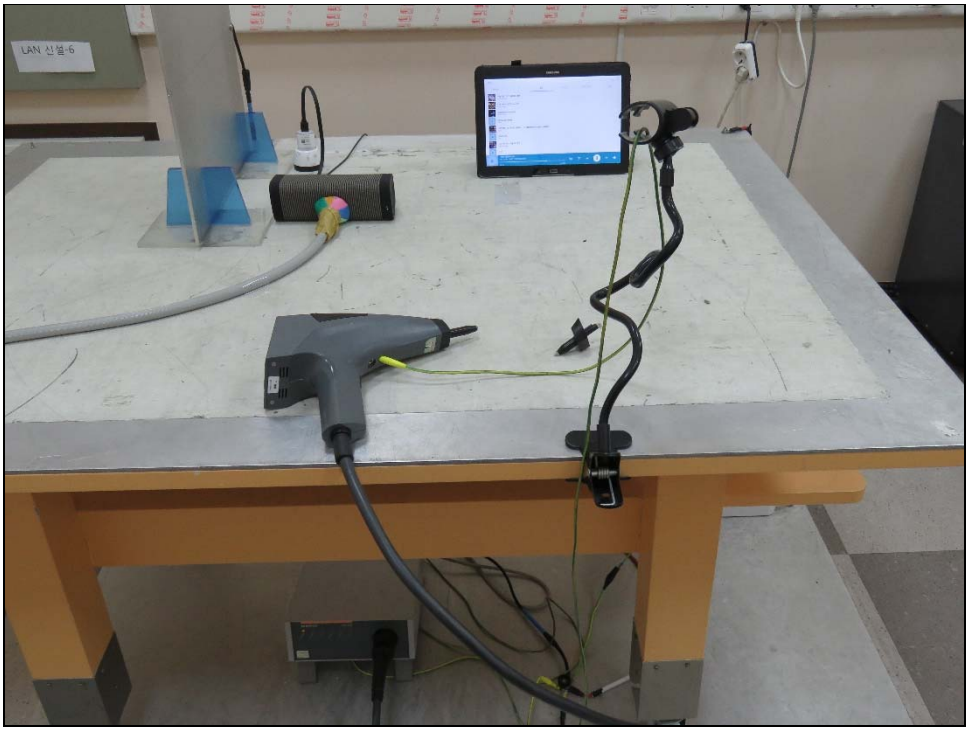


▶**AUX mode**



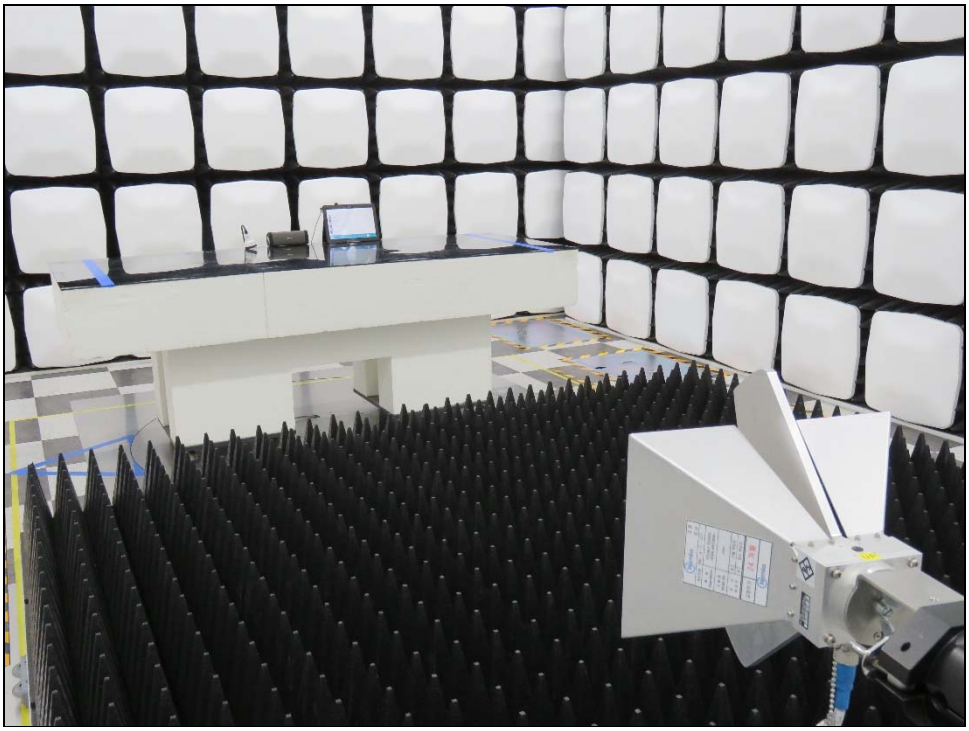
3. Electrostatic discharges (ESD)

▶BT mode

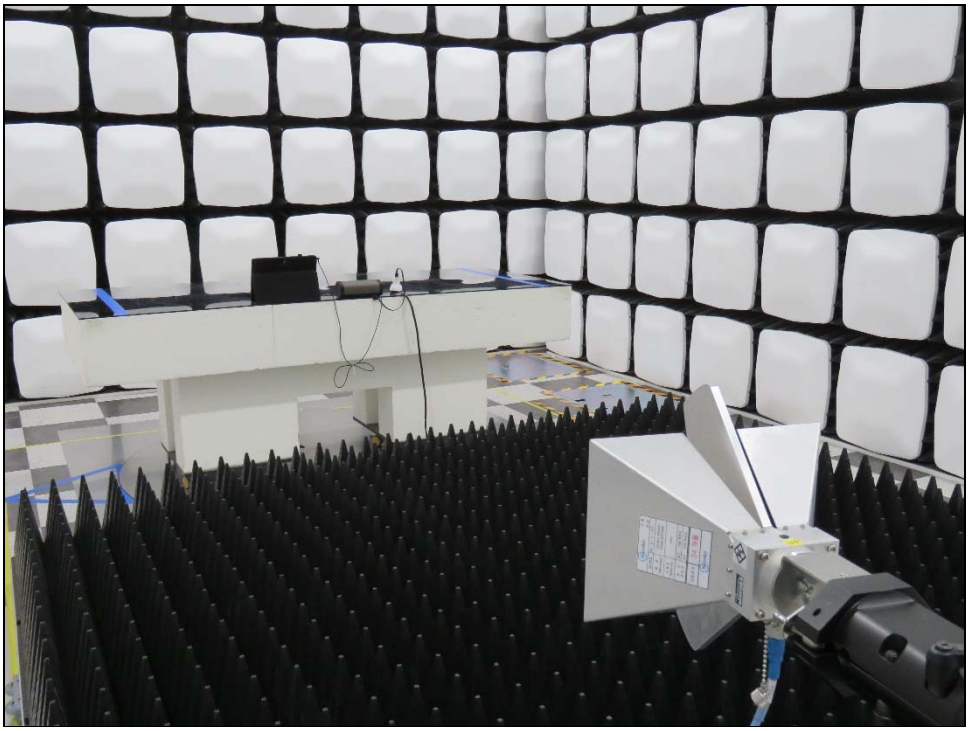


▶AUX mode

▶ **AUX mode**

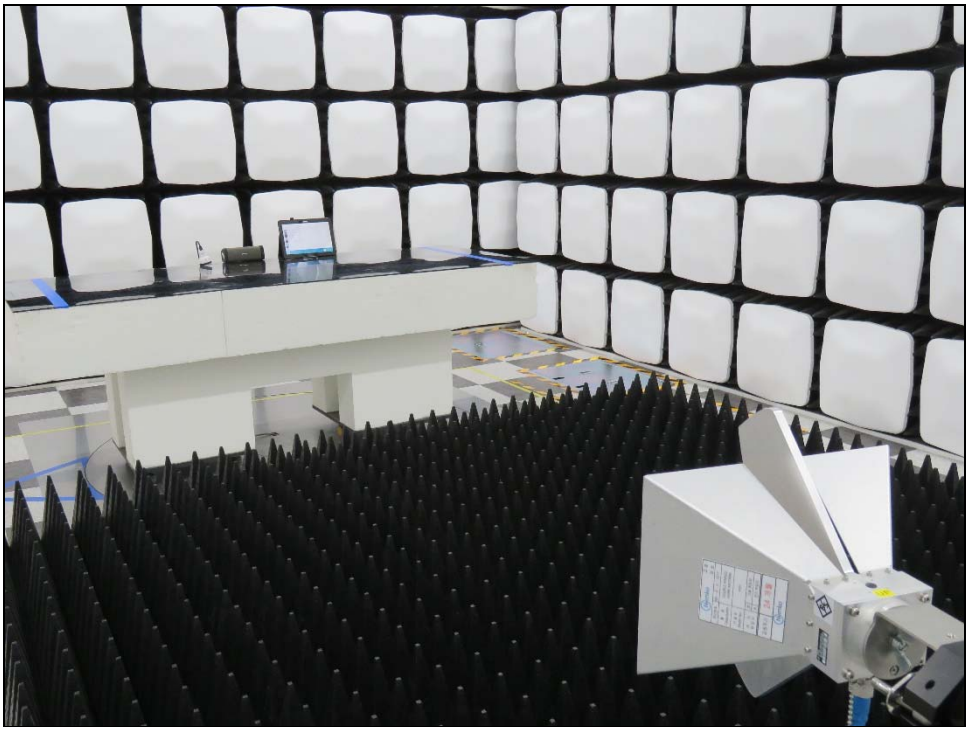


[Above 1 ㎓, Front]

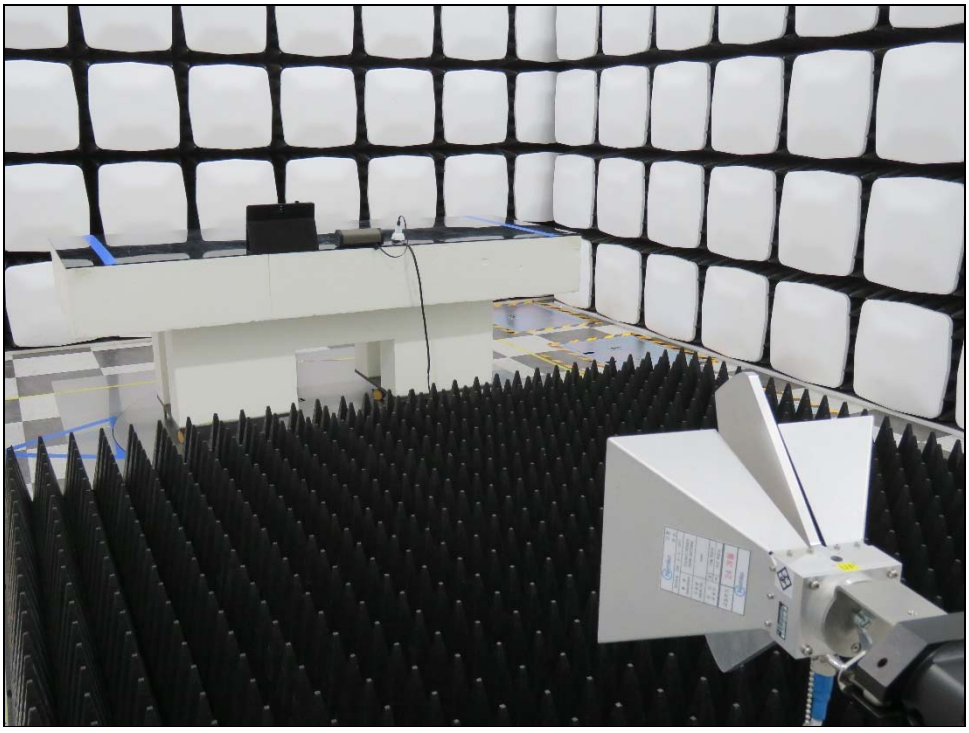


[Above 1 ㎓, Rear]

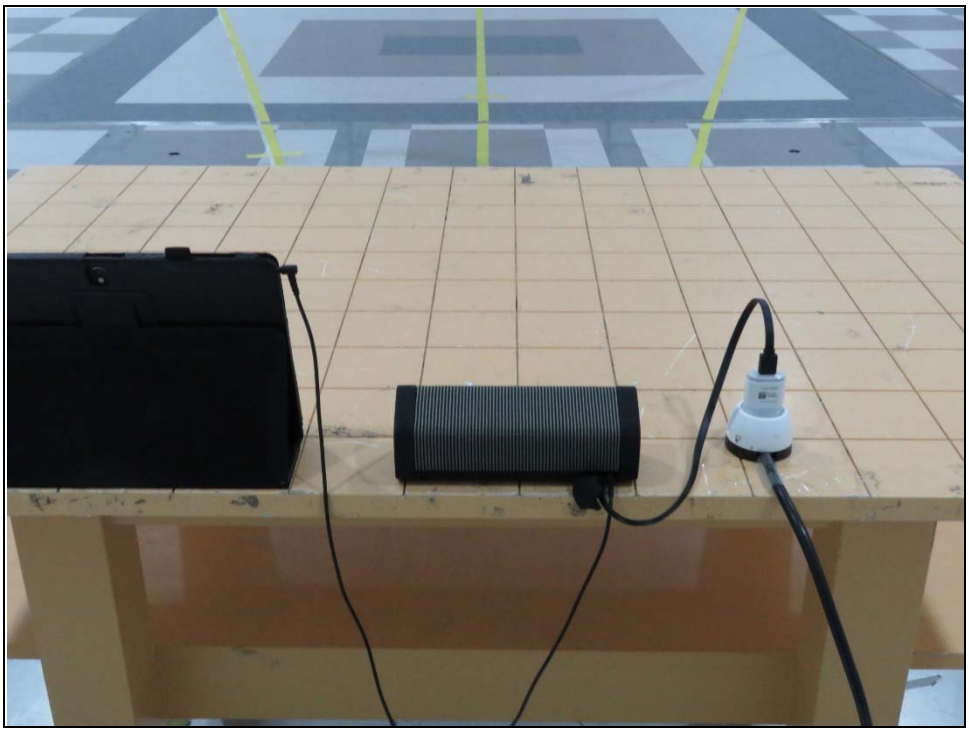
▶ **BT mode**



[Above 1 ㎓, Front]

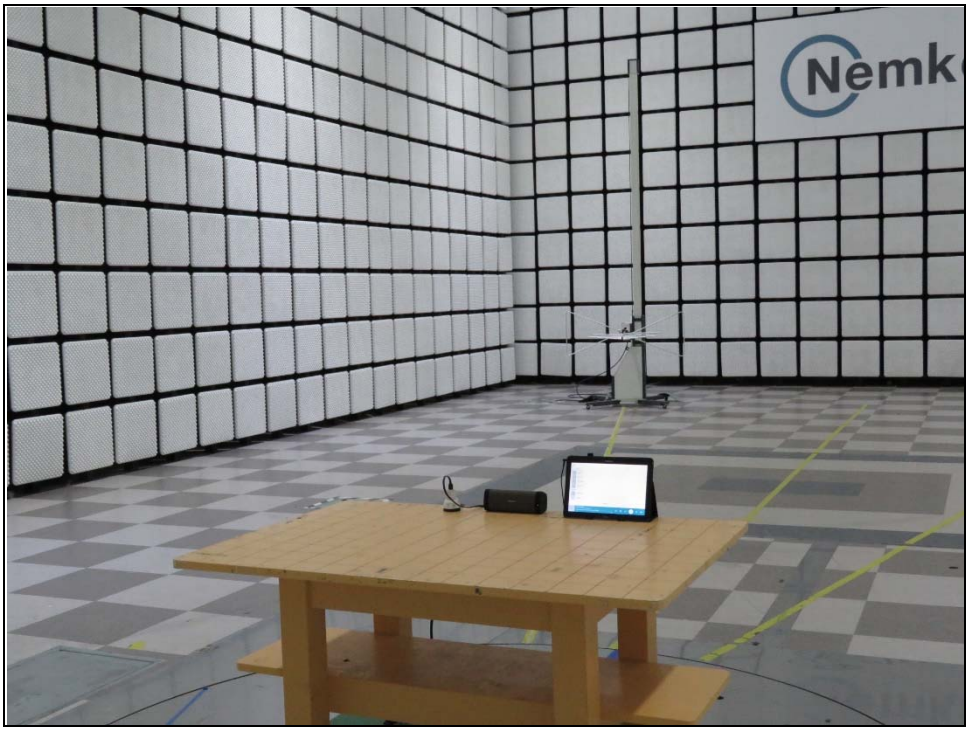


[Above 1 ㎓, Rear]



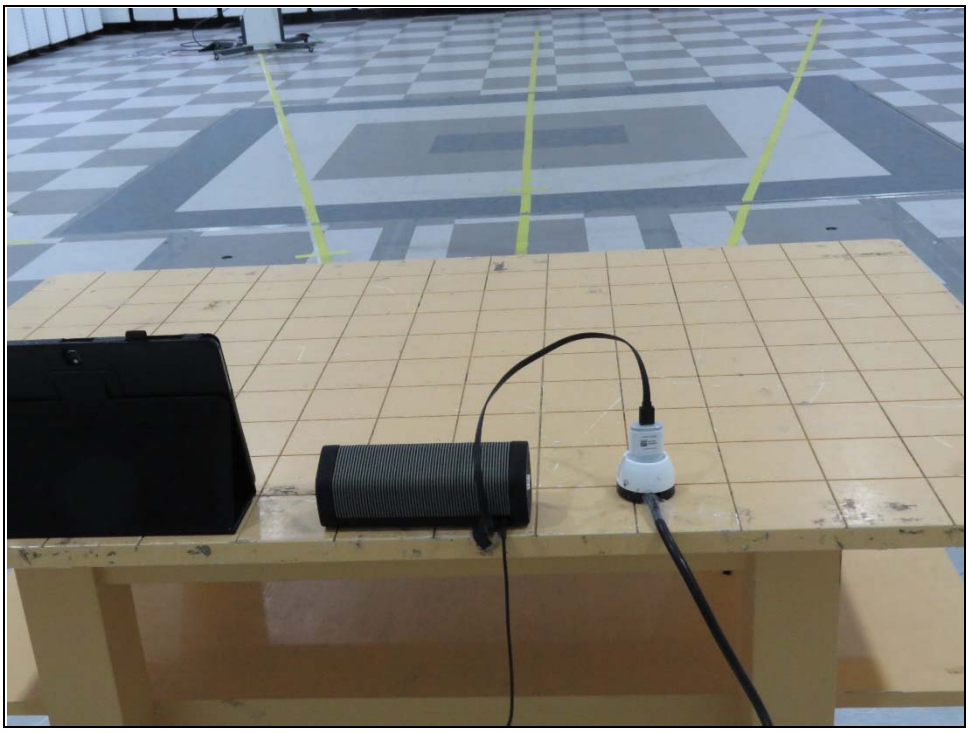
[Below 1 ㎓, Port]

▶AUX mode



[Below 1 ㎓, Front]

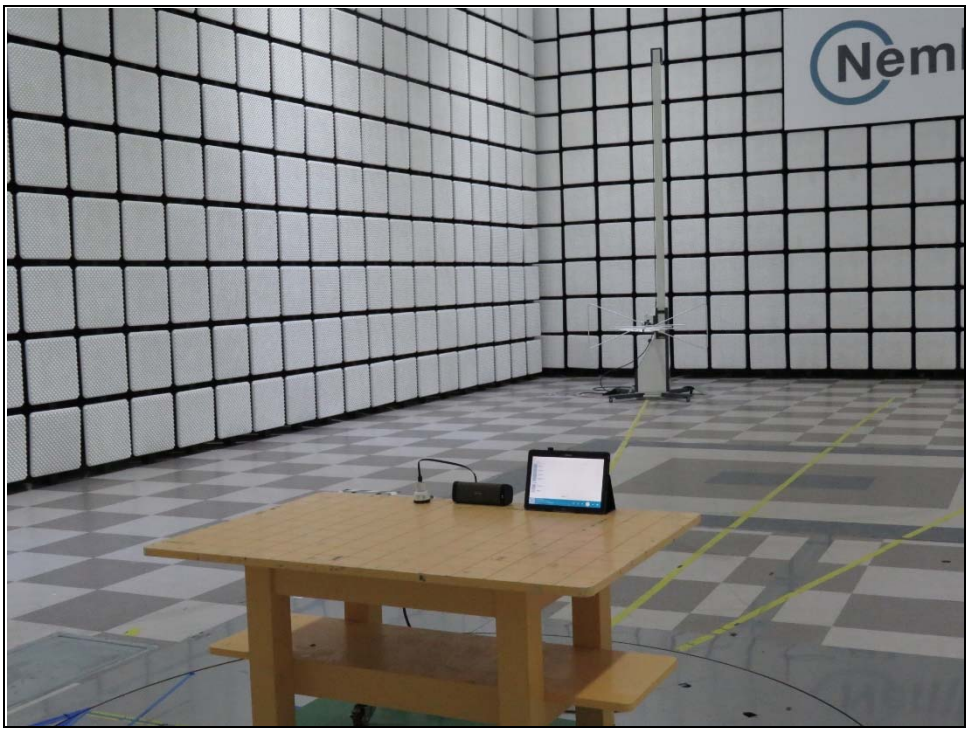
[Below 1 ㎓, Rear]



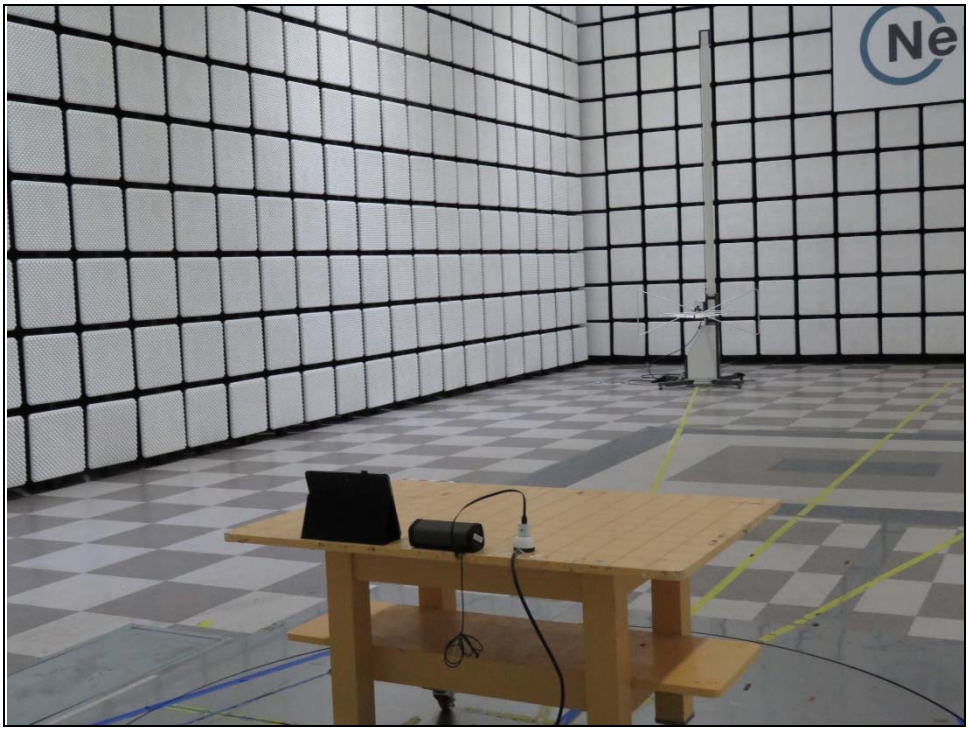
[Below 1 ㎓, Port]

2. Radiated emissions

▶ **BT mode**



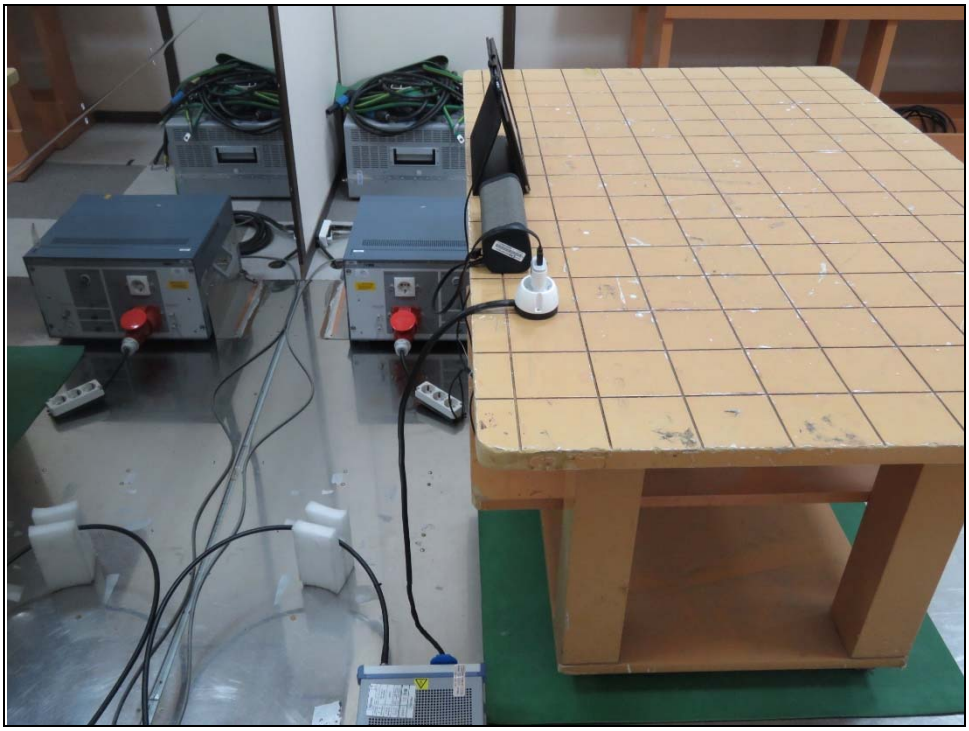
[Below 1 ㎓, Front]



[Below 1 ㎓, Rear]

▶ **AUX mode**

[Front]



[Side]

Appendix A Photographs of Test

1. Conducted emissions from the AC mains power ports

▶ **BT mode**

[Front]

[Side]

Appendixes

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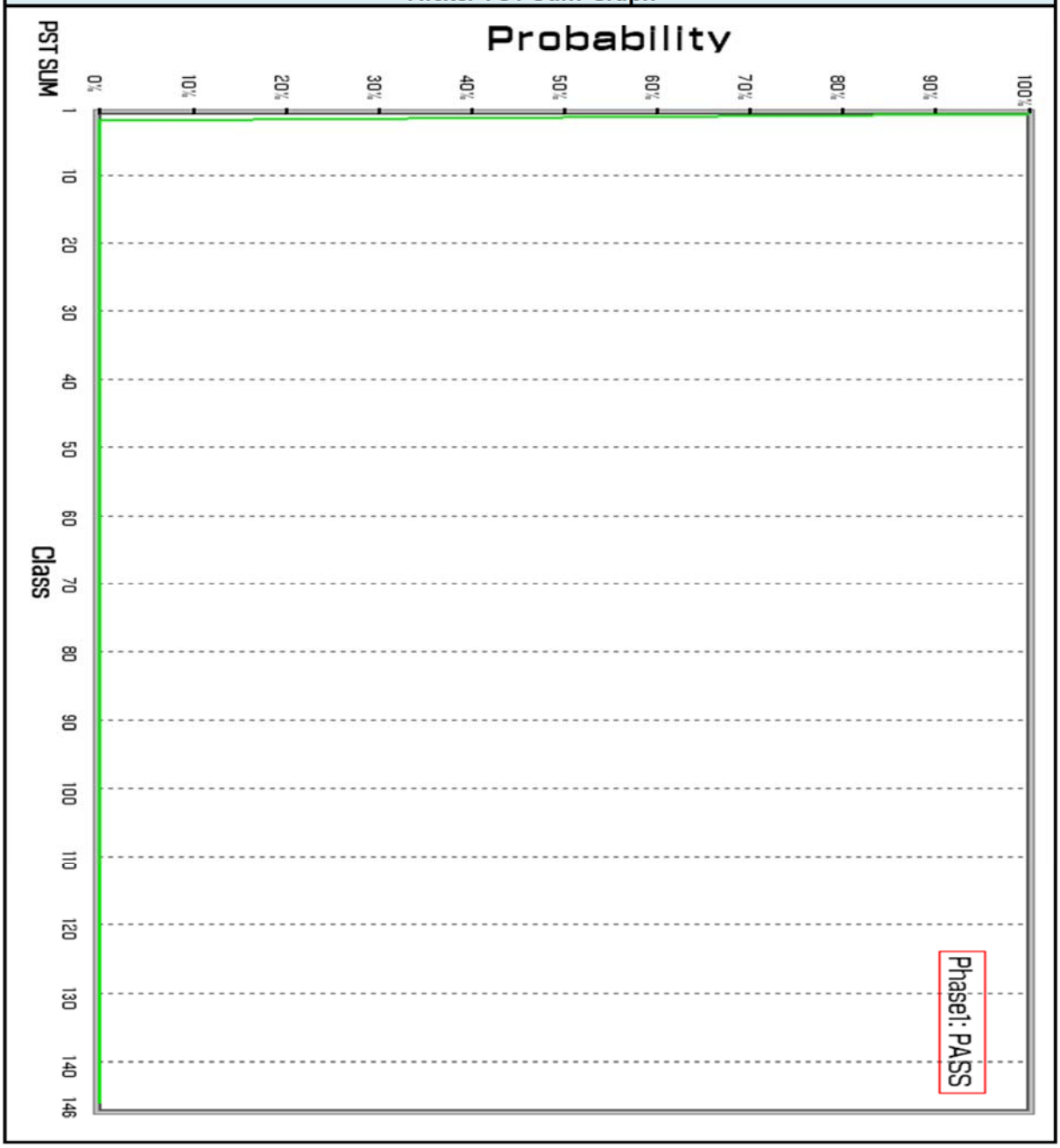
IEC61000-3-3:2013 Ed.3.0 Flickermeter		
Instrument Details		
Instrument Model	PPA5511	
Instrument Serial	162-04585	
Instrument Firmware	2.149	
Equipment Under Test		
Brand	N/A	
Model	N/A	
Serial	N/A	
Flicker PST Sum Graph		



Tested by : Doseung Shin

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IEC61000-3-3:2013 Ed.3.0 Flickermeter

Instrument Details

Instrument Model	PPA5511
Instrument Serial	162-04585
Instrument Firmware	2.149

Equipment Under Test

Brand	N/A
Model	N/A
Serial	N/A

Flicker Test Results

PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: PASS	0.031	0.04638	0	0.082	1.00	0.082	N/A
2	Phase1: PASS	0.031	0.04853	0	0.082	1.00	0.082	N/A
3	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
4	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
5	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
6	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
7	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
8	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
9	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
10	Phase1: PASS	0.031	0.05014	0	0.082	1.00	0.082	N/A
11	Phase1: PASS	0.031	0.05114	0	0.082	1.00	0.082	N/A
12	Phase1: PASS	0.031	0.05114	0	0.082	1.00	0.082	0.65

Tested by : Doseung Shin

Flicker Probability, Value Presentation

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IEC61000-3-3:2013 Ed.3.0
Flickermeter

Instrument Details	
Instrument Model	PPA5511
Serial Number	162-04585
Firmware Version	2.149
N4L Calibration Date	03rd February 2016
Instrument Version	Standard
Source Details	
Source Model	N4A06
Source Serial	91J-11432
Source Frequency	50.000Hz
Source Voltage RMS	230.000V
Source Settling Time	
Test Settings	
Class	Voltage
Mode	Normal (4%)
Minimum Current	300mA
PST	10.00 minutes
PLT	12 PSTs
Equipment Under Test	
Brand	N/A
Model	N/A
Serial	N/A
Impedance Network ID	N/A

Test Conditions		
	User Entered	**Measured**
Rated Voltage	N/A	230.168V
Rated Current	N/A	N/A
Rated Frequency	N/A	49.999Hz
Rated Power	N/A	N/A
D max	0.051% (Limit: 4.0%)	
T max	0.000 s (Limit: 0.5 s)	
DC max	0.031% (Limit: 3.3%)	
Additional Test Details		
Operator	Doseung shin	
Lab Name	N/A	
Location	N/A	
Notes	NK-17-E-0601	
Signature		
Results	**Phase1: PASS**	

Tested by : Doseung Shin

16. Flicker

16.1 Test Procedure

EUT was connected to the Power Analyzer system. Measurements were conducted to obtain the desired flicker parameters. The measuring time depends on which parameters are to be measured:

- 2 hours for Long Time Flicker assessment (Plt)
- 10 minutes for Short Time Flicker assessment (Pst)
- (1-10) minutes for dmax, dc and dt assessment (depending on EUT switch-rate)

A pure a.c. mains was supplied to the system from two power supply units. The units supply an a.c. mains, free of harmonics, fluctuations or distortion of any kind. A defined impedance was located between the supply unit and the EUT.

A measurement table and a graphic presentation of the “Worst Case” probability function of Short Time Flicker during this session(if measured) are presented in the report.

For voltage changes caused by manual switching, equipment is deemed to comply without further testing if the maximum r.m.s. input current (including inRush current) evaluated over each 10 ms half-period between zero-crossings does not exceed 20 A, and the supply current after inRush is within a variation band of 1.5 A.

If measurement methods are used, the maximum relative voltage change dmax caused by manual switching. The final test result shall be calculated by deleting the highest and lowest results and take the arithmetical average of the remaining 22 values.

Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
Precision Power Analyzer	Newtons4th Ltd	PPA5511	162-04585	2018.03.09
Impedance Network	Newtons4th Ltd	IMP161	91G-11334	2018.01.20
PROGRAMMABLE AC POWER SOURCE	Newtons4th Ltd	N4A06-M	91J-11432	2017.04.05

16.2 Test Parameters

Port: a.c. mains
Applied Standard: EN 61000-3-3:2013
Measured: dmax, dc, dt, Pst, Plt
Test Engineer: Doseung Shin

16.3 Flicker Probability, Value Presentation

Measurement results can be found in the following page.

Result

Compliant

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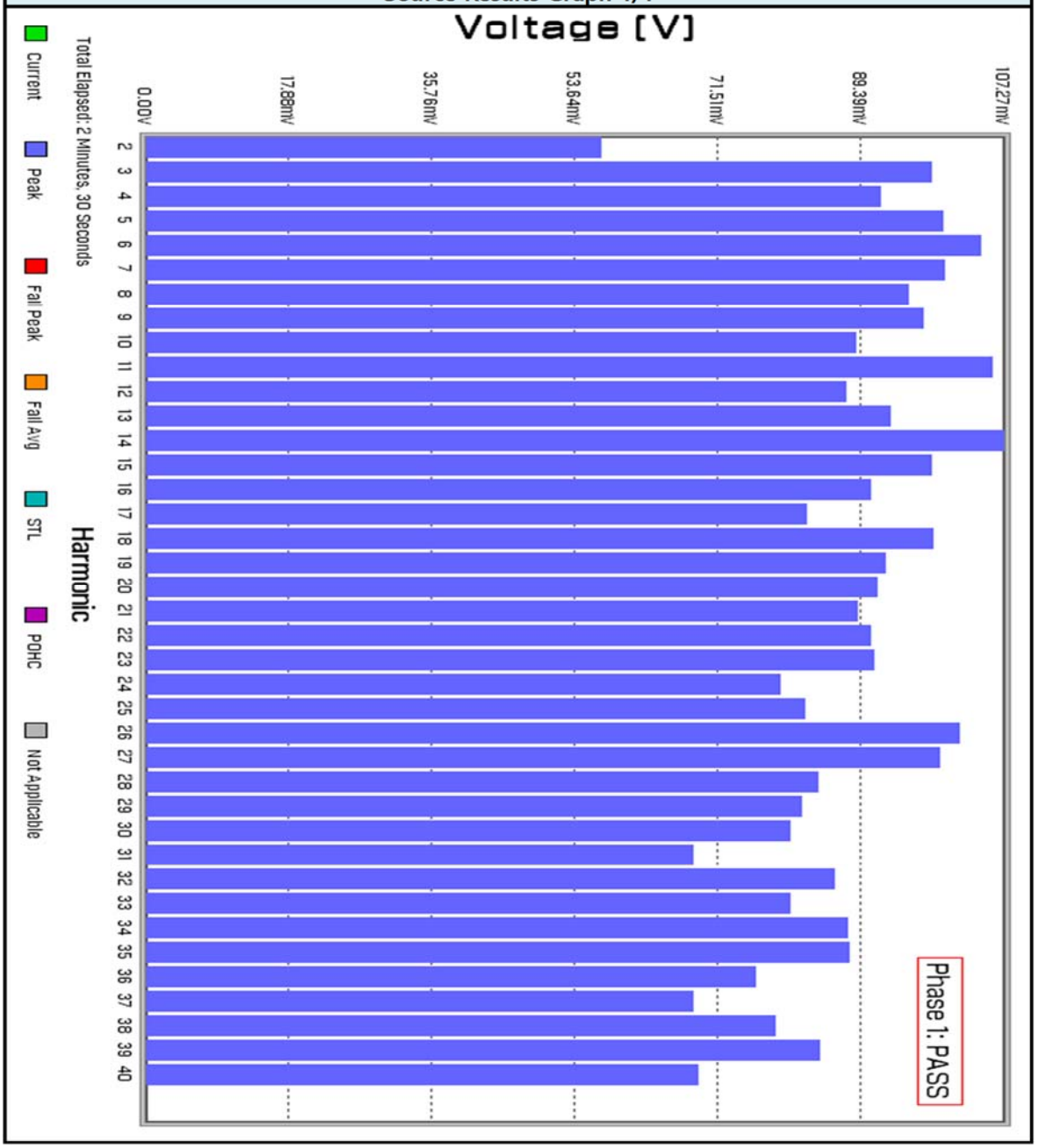
IEC61000-3-2:2014 Fluctuating Harmonics		
Instrument Details		
Instrument Model	PPA5511	
Instrument Serial	162-04585	
Instrument Firmware	2.149	
Equipment Under Test		
Brand	N/A	
Model	N/A	
Serial	N/A	
Source Results Graph 1/1		



Tested by : Doseung Shin

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IEC61000-3-2:2014 Fluctuating Harmonics

Instrument Details

Instrument Model	PPA5511
Instrument Serial	162-04585
Instrument Firmware	2.149

Equipment Under Test

Brand	N/A
Model	N/A
Serial	N/A

Source Results 1/1

Harmonic	Status	Peak (V)	Average (V)	Limit (V)
1	PASS	230.12	230.1	No Limit
2	PASS	0.05704	0.0165	0.46038
3	PASS	0.09832	0.07777	2.0717
4	PASS	0.09205	0.0505	0.46038
5	PASS	0.09967	0.0744	0.92075
6	PASS	0.10445	0.06792	0.46038
7	PASS	0.09996	0.07344	0.69056
8	PASS	0.09555	0.06552	0.46038
9	PASS	0.09724	0.05504	0.46038
10	PASS	0.08885	0.05816	0.46038
11	PASS	0.10589	0.08987	0.23019
12	PASS	0.08768	0.04921	0.23019
13	PASS	0.09322	0.06142	0.23019
14	PASS	0.10727	0.09489	0.23019
15	PASS	0.09836	0.07343	0.23019
16	PASS	0.09073	0.05441	0.23019
17	PASS	0.08263	0.03816	0.23019
18	PASS	0.09858	0.06471	0.23019
19	PASS	0.09264	0.05464	0.23019
20	PASS	0.09154	0.05275	0.23019
21	PASS	0.08912	0.05075	0.23019
22	PASS	0.09066	0.05199	0.23019
23	PASS	0.09123	0.05612	0.23019
24	PASS	0.07941	0.03954	0.23019
25	PASS	0.08247	0.03707	0.23019
26	PASS	0.10175	0.06809	0.23019
27	PASS	0.09931	0.07342	0.23019
28	PASS	0.08406	0.04294	0.23019
29	PASS	0.08209	0.03986	0.23019
30	PASS	0.08069	0.037	0.23019
31	PASS	0.06864	0.02304	0.23019
32	PASS	0.08631	0.04092	0.23019
33	PASS	0.08064	0.0375	0.23019
34	PASS	0.08781	0.03943	0.23019
35	PASS	0.08797	0.03589	0.23019
36	PASS	0.07629	0.03374	0.23019
37	PASS	0.06848	0.02349	0.23019
38	PASS	0.07884	0.03012	0.23019
39	PASS	0.08441	0.03477	0.23019
40	PASS	0.06913	0.01897	0.23019

Tested by : Doseung Shin

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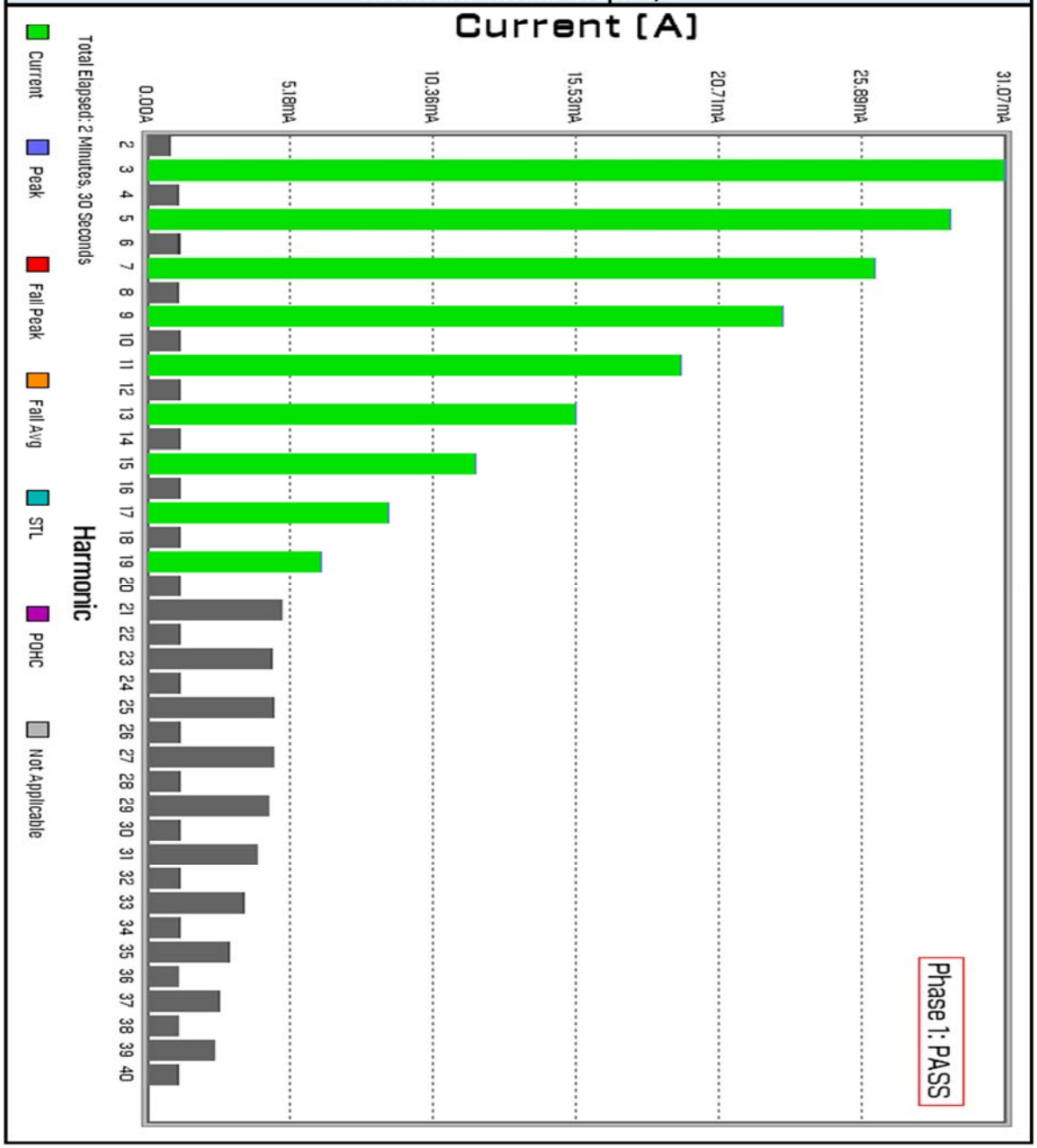
IEC61000-3-2:2014 Fluctuating Harmonics		
Instrument Details		
Instrument Model	PPA5511	
Instrument Serial	162-04585	
Instrument Firmware	2.149	
Equipment Under Test		
Brand	N/A	
Model	N/A	
Serial	N/A	
Harmonics Results Graph 1/1		



Tested by : Doseung Shin

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IEC61000-3-2:2014 Fluctuating Harmonics

Instrument Details

Instrument Model	PPA5511
Instrument Serial	162-04585
Instrument Firmware	2.149

Equipment Under Test

Brand	N/A
Model	N/A
Serial	N/A

Extra Test Information

	Average	Peak	Limit
THC	63.914mA	64.042mA	N/A
POHC	12.475mA	12.531mA	251.375mA
Voltage Crest Factor	1.41041	1.41181	1.40 to 1.42
Current Crest Factor	4.084	4.122	N/A

Harmonics Results 1/1

Harmonic	Status	Avg (A)	Avg L(A)	Avg %ofL	Peak (A)	Peak L(A	Peak %ofL
1	N/A	0.03223	N/A	N/A	0.03228	N/A	N/A
2	N/A	0.0008	N/A	N/A	0.00088	N/A	N/A
3	N/A	0.03102	N/A	N/A	0.03107	N/A	N/A
4	N/A	0.00112	N/A	N/A	0.00118	N/A	N/A
5	N/A	0.02909	N/A	N/A	0.02914	N/A	N/A
6	N/A	0.00113	N/A	N/A	0.00119	N/A	N/A
7	N/A	0.02635	N/A	N/A	0.02641	N/A	N/A
8	N/A	0.00112	N/A	N/A	0.00118	N/A	N/A
9	N/A	0.02302	N/A	N/A	0.02307	N/A	N/A
10	N/A	0.00114	N/A	N/A	0.00121	N/A	N/A
11	N/A	0.01933	N/A	N/A	0.0194	N/A	N/A
12	N/A	0.00114	N/A	N/A	0.0012	N/A	N/A
13	N/A	0.01551	N/A	N/A	0.01558	N/A	N/A
14	N/A	0.00114	N/A	N/A	0.0012	N/A	N/A
15	N/A	0.01189	N/A	N/A	0.01195	N/A	N/A
16	N/A	0.00117	N/A	N/A	0.00122	N/A	N/A
17	N/A	0.00871	N/A	N/A	0.00877	N/A	N/A
18	N/A	0.00115	N/A	N/A	0.00119	N/A	N/A
19	N/A	0.00628	N/A	N/A	0.00634	N/A	N/A
20	N/A	0.00117	N/A	N/A	0.00121	N/A	N/A
21	N/A	0.0049	N/A	N/A	0.00494	N/A	N/A
22	N/A	0.00117	N/A	N/A	0.00123	N/A	N/A
23	N/A	0.0045	N/A	N/A	0.00454	N/A	N/A
24	N/A	0.00117	N/A	N/A	0.00121	N/A	N/A
25	N/A	0.00457	N/A	N/A	0.0046	N/A	N/A
26	N/A	0.00119	N/A	N/A	0.00125	N/A	N/A
27	N/A	0.00461	N/A	N/A	0.00464	N/A	N/A
28	N/A	0.00117	N/A	N/A	0.00123	N/A	N/A
29	N/A	0.00443	N/A	N/A	0.00446	N/A	N/A
30	N/A	0.00117	N/A	N/A	0.00122	N/A	N/A
31	N/A	0.00401	N/A	N/A	0.00404	N/A	N/A
32	N/A	0.00117	N/A	N/A	0.00123	N/A	N/A
33	N/A	0.00348	N/A	N/A	0.00352	N/A	N/A
34	N/A	0.00115	N/A	N/A	0.0012	N/A	N/A
35	N/A	0.00297	N/A	N/A	0.003	N/A	N/A
36	N/A	0.00115	N/A	N/A	0.00119	N/A	N/A
37	N/A	0.00259	N/A	N/A	0.00262	N/A	N/A
38	N/A	0.00114	N/A	N/A	0.00118	N/A	N/A
39	N/A	0.00245	N/A	N/A	0.00249	N/A	N/A
40	N/A	0.00112	N/A	N/A	0.00115	N/A	N/A

Tested by : Doseung Shin

Fluctuating Harmonics, Value Presentation

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IEC61000-3-2:2014
Fluctuating Harmonics

Instrument Details	
Instrument Model	PPA5511
Serial Number	162-04585
Firmware Version	2.149
N4L Calibration Date	03rd February 2016
Instrument Version	Standard
Source Details	
Source Model	N4A06
Source Serial	91J-11432
Source Frequency	50.000Hz
Source Voltage RMS	230.000V
Source Settling Time	10.0 s
Test Settings	
Class	Class A
Mode	Measured
Equipment Under Test	
Brand	N/A
Model	N/A
Serial	N/A
Impedance Network ID	N/A

Test Conditions		
	User Entered	Measured
Rated Voltage	N/A	230.186V
Rated Current	N/A	72.492mA
Rated Frequency	N/A	49.999Hz
Rated Power	N/A	7.412W

Additional Test Information	
Measured Power Factor	0.444
Max Current THD	198.721W
Max THC	64.042mW
Max Power	7.423W
Max F.Current	32.282mA
Average F.Current	32.235mA
Minimum Current	3A
Test Duration	2.5 minutes
Additional Test Details	
Operator	Doseung shin
Lab Name	N/A
Location	N/A
Notes	NK-17-E-0601
Signature	
Results	**Test - N/A. Rated Power < 75W**

Tested by : Doseung Shin

15. Fluctuating Harmonics

15.1 Test Procedure

EUT was connected to the Power Analyzer system. Measurements were conducted on all active phases, for harmonics 1st to 40th of the mains frequency (50 ㎐). A pure a.c. mains was supplied to the system from two power supply units. The units supply an a.c. mains, free of harmonics or distortion of any kind. An overview of the harmonic emission is presented as numeric and as graphics.

Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
Precision Power Analyzer	Newtons4th Ltd	PPA5511	162-04585	2018.03.08
Impedance Network	Newtons4th Ltd	IMP161	91G-11334	2018.01.20
PROGRAMMABLE AC POWER SOURCE	Newtons4th Ltd	N4A06-M	91J-11432	2018.04.03

15.2 Test Parameters

Port: a.c. mains
Applied Standard: EN 61000-3-2:2014
Class: A
Test Engineer: Doseung Shin

15.3 Fluctuating Harmonics, Value Presentation

Measurement results can be found in the following pages.

Comment

The following pages inform the harmonic current emissions.

Result

Compliant

14.3 Test Log

[Testing in accordance with EN 55024]

Voltage Dip/Int. %U_T	Duration Period of the rated frequency	Phase (˚)	Count	Result (Pass/Fail)
30 %	25 period	0	3 T	Pass Note 1)
> 95 %	0.5 period	0	3 T	Pass Note 1)
> 95 %	250 period	0	3 T	Pass Note 2)

[Testing in accordance with EN 301 489-1, EN 301 489-17]

Voltage Dip/Int. %U_T	Duration Period of the rated frequency	Phase (˚)	Count	Result (Pass/Fail)
100 %	0.5 cycle	0	3 T	Pass Note 1)
100 %	1 cycle	0	3 T	Pass Note 1)
30 %	25 cycles	0	3 T	Pass Note 1)
100 %	250 cycles	0	3 T	Pass Note 2)

Comment/Performance

Note 1) No operation errors were detected during and after the dips.

Note 2) During the dip (250 cycles at 95 % and 100 %), the performance of EUT was degraded.
But after the test, the EUT was recovered with intended operation of itself.

Result

Compliant

14. Voltage dips and Interruptions

14.1 Test Procedure

The dips/interruption test is only applicable to a.c. mains power port. The dips/interruptions were applied at zero crossing.

The dips were applied with a 0 % residual voltage and a 70 % residual voltage.

EUT was given a 10 s interval between each dip to recover.

Three-phase dips were applied at each individual voltage with one at a time (phase to neutral and phase to phase).

The interruptions are > 95 % dip-type. EUT was given a 10 s internal between each interruption to recover. Three-phase interruptions were applied at all the three phases simultaneously.

Instrumentation used during this session:

Instruments	Manufacture	Model	Serial number	Due to Calibration
Ultra Compact Simulator	emtest	UCS 500 N7	V0952105684	2018.04.03

14.2 Test Parameters

Port: a.c. mains **Test Engineer:** Doseung Shin
Test Standard: EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010
Basic Standard: EN 61000-4-11:2004

▶ EN55024

	Voltage Reduction	Duration	Performance Criteria	Performance Results
Test Level:	30 % (dip)	25 period	C	A
	> 95 % (dip)	0.5 period	B	A
	> 95 % (interruption)	250 period	C	C

▶ EN 301 489-1, EN 301 489-9, EN 301 489-17

	Voltage Reduction	Duration	Performance Criteria	Performance Results
Test Level:	100 % (dip)	0.5 cycle	B	A
	100 % (dip)	1 cycle	B	A
	30 % (dip)	25 cycles	C	A
	100 % (interruption)	250 cycles	C	C

13. Continuous conducted disturbances

13.1 Test Procedure

The tests were performed on a 2 x 2 m ground reference plane. The EUT was located on a 10 cm isolating support. The current was injected to each single port separately.
For a.c. ports, d.c. ports, coaxial lines and 2 wires or 4 wires balanced communication lines a coupling/decoupling network was used to inject. On other multiple signal cables a capacitive coupling clamp (EM Clamp) was used for injection.
Each signal level of 3 V, 80 % AM modulated with a 1 ㎑ sine wave was applied in the frequency range 150 ㎑ to 80 ㎒.
Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
Continuous Wave Simulator	EM TEST	CWS 500N1	V0952105687	2018.04.03
6 dB Attenuator	EM TEST	ATT6 / 75	1009 - 11	N/A
CDN	EM TEST	CDN M2/M3N	0110 - 18	2018.01.09

13.2 Test Parameters

Port:	a.c. mains	**Test Engineer:**	Doseung Shin
Applied Standard :	EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010		
Basic Standard:	EN 61000-4-6:2014		
Performance Criteria:	A	**Performance Results :**	A
Frequency Step:	1 %		
Frequency Range:	150 ㎑ to 80 ㎒	**Dwell Time:**	3 s
Test Level:	3 V rms	**Modulation:**	80 % AM, 1 ㎑

13.3 Test Log

Frequency (㎒)	Point	Coupling	Field Strength (rms)	Modulation	Result (Pass/Fail)
150 ㎑ to 80 ㎒	a.c. Main	CDN(M2)	3 V	80 % AM, 1 ㎑	Pass

Comment/Performance

No operation errors were detected during and after the injection.

Result

Compliant

12. Surges

12.1 Test Procedure

The surges generator was connected to earth via a low impedance connection. No presences of an earth/reference plane is necessary.
The surges testing was applied to input a.c. power ports.
For each level and line surges were applied at stepped phase angles with 90º steps for a.c. power ports.
Line to Line surges were applied at ±1 kV for power ports.
The test level for telecommunications ports, intended to be directly connected to the telecommunications network via outdoor cables, shall be 1 kV line to ground as given in EN 61000-4-5 [5], however, in telecommunications centres 0,5 kV line to ground shall be used. The test generator shall provide the 1,2/50 µs pulse as defined in EN 61000-4-5 [5].
The test level for telecommunication ports, intended to be connected to indoor cables (longer than 10 m) shall be 0,5 kV line to ground. The test generator shall provide the 1,2/50 µs pulse as defined in EN 61000-4-5 [5].
The surges were applied with 1 min or faster intervals.
Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
Ultra Compact Simulator	EM TEST	UCS 500 N7	V0952105684	2018.04.03

12.2 Test Parameters

Port: a.c. mains **Test Engineer:** Doseung Shin
Applied Standard : EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010
Basic Standard: EN 61000-4-5:2014
Performance Criteria: B (a.c. power) **Performance Results :** A
Test Data Line(s) to Line(s)

12.3 Test Log

Line	Voltage	Coupling	Phase	Inject (count)	Result (Pass/Fail)
L1-L2	±0.5 ㎸, ±1 ㎸	CDN	0º, 90º, 180º, 270º	5	Pass
L2-L1	±0.5 ㎸, ±1 ㎸	CDN	0º, 90º, 180º, 270º	5	Pass

Comment/Performance

No operation errors were detected during and after the surges.

Result

Compliant

11. Electrical fast transients (EFT)

11.1 Test Procedure

The minimum area of the ground reference plane is 1 m x 1 m, and connected to earth via a low impedance connection.

The EFT/Burst generator was located on the ground reference plane.

The EUT was located 0,1 m above the ground reference plane and the length of the signal or power lines between the EUT and the coupling device shall be as short as possible in the range 0,5 m to 3,0 m.

The minimum distance between the EUT and all other conductive structures, except the ground reference plane is more than 0,5 m.

The test voltage was applied simultaneously between each of the power supply conductors and the protective earth at the power supply.

Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
Ultra Compact Simulator	emtest	UCS 500 N7	V0952105684	2018.04.03

11.2 Test Parameters

Port:	a.c. mains	**Test Engineer:**	Doseung Shin
Applied Standard :	EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010, EN 55020:2007+A11:2011		
Basic Standard:	EN 61000-4-4:2012		
Performance Criteria:	B	**Performance Results :**	B
Duration:	120 s		
Test Data	**Tr/Td** 5/50 ns	**Fburst** 5 ㎑	**Trep** 300 ms

11.3 Test Log

[Testing in accordance with EN 55020, EN 55024, EN 301 489-1, EN 301 489-9, EN 301 489-17]

Line	Voltage	Coupling	Inject Time (s)	Result (Pass/Fail)
L1	±1 kV	CDN	120	Pass Note 2)
L2	±1 kV	CDN	120	Pass Note 2)
L1-L2	±1 kV	CDN	120	Pass Note 2)

Comment/Performance

Note 2) During the Burst, the performance of EUT was degraded.

But after the test, the EUT was recovered with intended operation of itself.

Result

Compliant

10.3 Test Log

Frequency Range (㎒)	Position (Angle)	Polarity (H/V)	Field Strength (V/m)	Modulation	Result (Pass/Fail)
900	Front	H	3	Duty Cycle 1/8, 217 ㎐ repetition frequency	Pass
900	Rear	H	3		Pass
900	Right	H	3		Pass
900	Left	H	3		Pass
900	Front	V	3		Pass
900	Rear	V	3		Pass
900	Right	V	3		Pass
900	Left	V	3		Pass

Comment/Performance

No operation errors were detected during and after the exposures.

Result

Compliant

10. RF e.m. field keyed carrier : S5

10.1 Test Procedure

The tests were performed at 3 m distance in an anechoic chamber.
For floor-standing equipment, the EUT was mounted a non-conducting support 0.05 m to 0.15 m above the supporting plane. For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.
The EUT was exposed to the field from different angles, normally 0º, 90º, 180º, 270º and at both horizontal and vertical polarization (antenna height 1.55 m)
A signal level of 3 V/m with duty cycle 1/8, 217 ㎐ repetition frequency was applied in the frequency range 900 ㎒. During the test the 1 ㎑ unwanted noise level comes from the speaker was detected using microphone and selected level meter.
Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
POWER METER	ROHDE & SCHWARZ	NRP	102491	2018.04.03
SIGNAL GENERATOR	ROHDE & SCHWARZ	SMB 100A	103440	2018.04.03
Power Amplifier	BONN Elektronik	BLMA 1060-100/50D	107808B	-
Power Amplifier	BONN Elektronik	BLWA 0810-160/100D	107808A	-
TRIPOD MOBILE	ROHDE & SCHWARZ	HL046Z1	100112	-
EMS- ANTENNA	ROHDE & SCHWARZ	HL046	100054	-
AUTO POLARISATION SWITCH	ROHDE & SCHWARZ	-	N/A	-
AVG POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	100966	2018.04.03
AVG POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	100965	2018.04.03

10.2 Test Parameters

Port:	Enclosure	**Test Engineer:**	Doseung Shin
Applied Standard:	EN 55020:2007+A11:2011		
Basic Standard:	EN 61000-4-3:2006+A1:2008+A2:2010		
Performance Criteria:	A	**Performance Results :**	A
Test Level:	3 V/m	**Dwell Time:**	3 s
Frequency Step:	1 %	**Modulation:**	Duty Cycle 1/8,
Frequency Range:	900 ㎒		217 ㎐ repetition frequency

9.3 Test Log

Frequency Range	Position	Polarity (H or V)	Field Strength (V/m)	Modulation	Result (Pass/Fail)
80 ㎒ to 6 ㎓	Front	H	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Rear	H	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Right	H	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Left	H	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Front	V	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Rear	V	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Right	V	3	80 % AM (1 ㎑)	Pass
80 ㎒ to 6 ㎓	Left	V	3	80 % AM (1 ㎑)	Pass

Comment/Performance

No operation errors were detected during and after the exposures.

Result

Compliant

9. Continuous radio frequency disturbances

9.1 Test Procedure

The tests were performed at 3 m distance in an anechoic chamber.
For floor-standing equipment, the EUT was mounted a non-conducting support 0.05 m to 0.15 m above the supporting plane. For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.
The EUT was exposed to the field from different angles, normally 0º, 90º, 180º, 270º and at both horizontal and vertical polarization (antenna height 1.55 m)
A signal level of 3 V/m, 80 % AM modulated with a 1 ㎑ sine wave was applied in the frequency range 80 ㎒ to 6 000 ㎒.
Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
POWER METER	Rohde & Schwarz	NRP	102491	2018.04.03
SIGNAL GENERATOR	Rohde & Schwarz	SMB 100A	103440	2018.04.03
Power Amplifier	BONN Elektronik	BLMA 1060-100/50D	107808B	-
Power Amplifier	BONN Elektronik	BLWA 0810-160/100D	107808A	-
TRIPOD MOBILE	Rohde & Schwarz	HL046Z1	100112	-
EMS- ANTENNA	ROHDE & SCHWARZ	HL046	100054	-
Stacked Double Log - per Antenna	SCHWARZBECK	STLP 9149	9149-064	-
AUTO POLARISATION SWITCH	Rohde & Schwarz	-	N/A	-
AVG POWER SENSOR	Rohde & Schwarz	NRP-Z91	100966	2018.04.03
AVG POWER SENSOR	Rohde & Schwarz	NRP-Z91	100965	2018.04.03

9.2 Test Parameters

Port:	Enclosure	**Test Engineer:**	Doseung Shin
Applied Standard :	EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010		
Basic Standard:	EN 61000-4-3:2006/A1:2008/A2:2010		
Performance Criteria:	A	**Performance Results :**	A
Dwell Time:	3 s		
Frequency Step:	1 %	**Modulation:**	80 % AM, 1 ㎑
Frequency Range:	80 ㎒ to 6 000 ㎒	**Test Level:**	3 V/m

8.4 Discharges Points

Air discharge

Contact discharge

[Front]

[Rear]

8.3 Test Log

▶ **BT mode, AUX mode**

Point		Voltage	Coupling	Result (Pass/Fail)
-	HCP, VCP	±4 ㎸	Contact Discharge	Pass
1	Enclosure (Non-Conductive surface)	±2 ㎸, ±4 ㎸, ±8 ㎸	Air Discharge	Pass
2	Button	±2 ㎸, ±4 ㎸, ±8 ㎸	Air Discharge	Pass
3	LED	±2 ㎸, ±4 ㎸, ±8 ㎸	Air Discharge	Pass
4	Port	±2 ㎸, ±4 ㎸, ±8 ㎸	Air Discharge	Pass
5	Cable	±2 ㎸, ±4 ㎸, ±8 ㎸	Air Discharge	Pass

Comment/Performance

No operation errors were detected during and after the discharges.

Result

Compliant

8. Electrostatic discharges (ESD)

8.1 Test Procedure

A ground reference plane was located on the floor, and connected to earth via a low impedance connection. The return cable of the ESD generator was connected to the reference plane.
In case of a floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating support.
In case of table-top equipment, EUT was placed on a wooden table 0.8 m above the reference plane.
A horizontal coupling plane (HCP) of 1.6 m x 0.8 m was placed on the table, and connected to the reference plane via a cable with a 470 ㏀ resistor located in each end (0.5 mm insulating support between EUT and HCP).
In both cases a vertical coupling plane (VCP) of 0.5 m x 0.5 m was located 0.1 m from each sides of the EUT. The VCP was connected to the reference plane in the same matter as the HCP. The test was done by applying contact and air discharges to the EUT itself, and contact discharges to the HCP and VCP. When applying the discharges to the HCP, the tip of the generator was located at the front edge of each HCP opposite the center point of the EUT, at 0.1m distance. When applying the discharges to the VCP the tip of the generator was located at the middle edge of the VCP. The VCP was located 0.1 m from each side of the EUT. Contact discharges up to ±4 ㎸ were applied to various points of the EUT at conductive surfaces, and to the HCP/VCP. Air discharges up to ±2 ㎸, ±4 ㎸, ±8 ㎸ were applied to various points of the EUT at non-conductive surfaces.
Ungrounded equipment, or ungrounded part(s) of equipment, cannot discharge itself similarly to class I mains-supplied equipment. If the charge is not removed before the next ESD pulse is applied, it is possible that the EUT or part(s) of the EUT be stressed up to twice the intended test voltage. Therefore, double-insulated equipment could be charged at an unrealistically high charge, by accumulating several ESD discharges on the capacitance of the class II insulation, and then discharge at the breakdown voltage of the insulation with a much higher energy.
In the case of the ungrounded metallic parts shall be tested following 7.2.4 in EN 61000-4-2:2009 and the cable with the bleeder resistors shall be connected to the GRP close to the EUT.
Instrumentation used during this session:

Instruments	Manufacturer	Model	Serial number	Due to Calibration
ESD SIMULATOR	EM TEST	ESD 30N	V0952105682	2018.04.03

8.2 Test Parameters

Port:	Enclosure	**Test Engineer:**	Doseung Shin
Applied Standard :	EN 301 489-1 V2.1.1:2017, EN 301 489-9 V2.1.1:2017, EN 301 489-17 V3.1.1:2017, EN 55024:2010, EN 55020:2007+A11:2011		
Basic Standard:	EN 61000-4-2:2009		
Performance Criteria:	B	**Performance Results :**	A
Test Level	Air Discharge:	±2 ㎸, ±4 ㎸, ±8 ㎸	
	Contact Discharge:	±4 ㎸	

Test 2 / 2

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
1060.000000	---	19.35	50.00	30.65	15000.0	1000.000	100.0	V
1060.000000	32.89	---	70.00	37.11	15000.0	1000.000	100.0	V
1314.500000	---	19.81	50.00	30.19	15000.0	1000.000	100.0	V
1314.500000	33.19	---	70.00	36.81	15000.0	1000.000	100.0	V
2081.666667	37.37	---	70.00	32.63	15000.0	1000.000	100.0	V
2081.666667	---	23.87	50.00	26.13	15000.0	1000.000	100.0	V
2874.833333	---	26.53	50.00	23.47	15000.0	1000.000	100.0	V
2874.833333	40.30	---	70.00	29.70	15000.0	1000.000	100.0	V
3813.333333	43.33	---	74.00	30.67	15000.0	1000.000	100.0	V
3813.333333	---	29.90	54.00	24.10	15000.0	1000.000	100.0	V
4457.500000	---	32.26	54.00	21.74	15000.0	1000.000	100.0	V
4457.500000	45.78	---	74.00	28.22	15000.0	1000.000	100.0	V
5701.333333	---	33.59	54.00	20.41	15000.0	1000.000	100.0	V
5701.333333	46.91	---	74.00	27.09	15000.0	1000.000	100.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB)	Comment
1060.000000	0.0	-19.0	
1060.000000	0.0	-19.0	
1314.500000	270.0	-18.2	
1314.500000	270.0	-18.2	
2081.666667	0.0	-13.2	
2081.666667	0.0	-13.2	
2874.833333	180.0	-10.3	
2874.833333	180.0	-10.3	
3813.333333	330.0	-6.1	
3813.333333	330.0	-6.1	
4457.500000	300.0	-3.6	
4457.500000	300.0	-3.6	
5701.333333	60.0	-1.4	
5701.333333	60.0	-1.4	

23/8/2017

Tested by: Doseung Shin

[AUX mode]

Test 1 / 2

Test Report

Common Information

Test Description:	Radiated Emission(NK-17-E-0601)
Test Site:	Nemko 3m Chamber
Test Standard:	EN 55032
Environment Conditions:	a.c. 230 V, 50 Hz
Operator Name:	Doseung Shin
	Charging & AUX mode

Full Spectrum

Full Spectrum

23/8/2017

Test 2 / 2

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
1223.833333	---	19.33	50.00	30.67	15000.0	1000.000	100.0	H
1223.833333	32.49	---	70.00	37.51	15000.0	1000.000	100.0	H
1647.666667	34.24	---	70.00	35.76	15000.0	1000.000	100.0	H
1647.666667	---	21.32	50.00	28.68	15000.0	1000.000	100.0	H
2175.833333	---	23.52	50.00	26.48	15000.0	1000.000	100.0	V
2175.833333	36.82	---	70.00	33.18	15000.0	1000.000	100.0	V
2759.833333	39.06	---	70.00	30.94	15000.0	1000.000	100.0	V
2759.833333	---	25.52	50.00	24.48	15000.0	1000.000	100.0	V
3406.166667	---	27.62	54.00	26.38	15000.0	1000.000	100.0	V
3406.166667	41.38	---	74.00	32.62	15000.0	1000.000	100.0	V
4479.333333	45.66	---	74.00	28.34	15000.0	1000.000	100.0	H
4479.333333	---	31.97	54.00	22.03	15000.0	1000.000	100.0	H
5564.333333	47.09	---	74.00	26.91	15000.0	1000.000	100.0	H
5564.333333	---	33.23	54.00	20.77	15000.0	1000.000	100.0	H

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB)	Comment
1223.833333	60.0	-18.9	
1223.833333	60.0	-18.9	
1647.666667	240.0	-15.9	
1647.666667	240.0	-15.9	
2175.833333	30.0	-13.7	
2175.833333	30.0	-13.7	
2759.833333	240.0	-10.9	
2759.833333	240.0	-10.9	
3406.166667	120.0	-8.4	
3406.166667	120.0	-8.4	
4479.333333	300.0	-3.6	
4479.333333	300.0	-3.6	
5564.333333	120.0	-1.8	
5564.333333	120.0	-1.8	

23/8/2017

Tested by: Doseung Shin

7.5 Test Data (Above 1 ㎓)

[BT mode]

Test 1 / 2

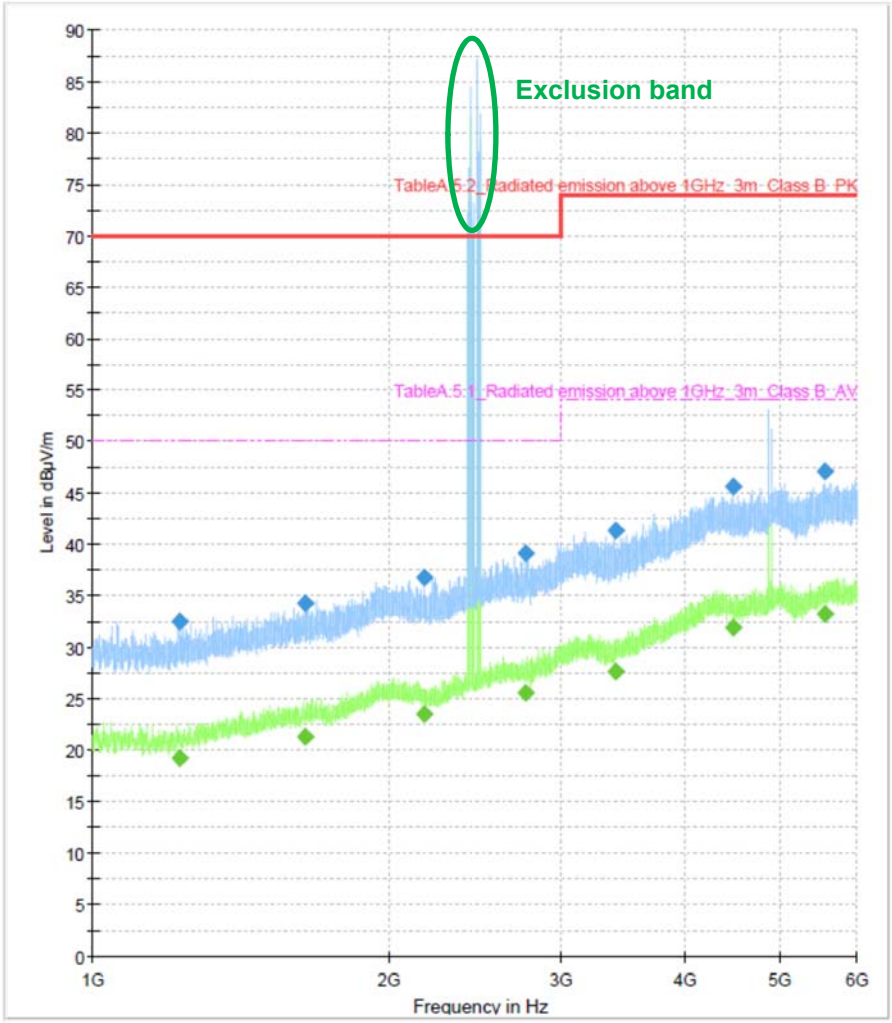
Test Report

Common Information

Test Description:	Radiated Emission(NK-17-E-0601)
Test Site:	Nemko 3m Chamber
Test Standard:	EN 55032, EN 301 489-1
Environment Conditions:	a.c. 230 V, 50 Hz
Operator Name:	Doseung Shin
	Charging & BT mode

Full Spectrum

Full Spectrum



23/8/2017

EMI Auto Test(1) 2 / 2

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
61.383293	18.94	30.00	11.06	15000.0	120.000	270.0	V	31.0	-22.6
92.754567	23.84	30.00	6.16	15000.0	120.000	197.0	V	315.0	-23.5
115.934913	16.58	30.00	13.42	15000.0	120.000	130.0	V	32.0	-23.3
230.098520	23.23	37.00	13.77	15000.0	120.000	376.0	H	328.0	-20.5
238.845033	24.94	37.00	12.06	15000.0	120.000	400.0	H	149.0	-20.1
490.914373	23.80	37.00	13.20	15000.0	120.000	100.0	V	32.0	-11.9
600.725873	18.84	37.00	18.16	15000.0	120.000	330.0	H	12.0	-8.7
997.161500	25.53	37.00	11.47	15000.0	120.000	370.0	V	206.0	-3.6

8/2/2017

Tested by: Doseung Shin

[AUX mode]

EMI Auto Test(1) 1 / 2

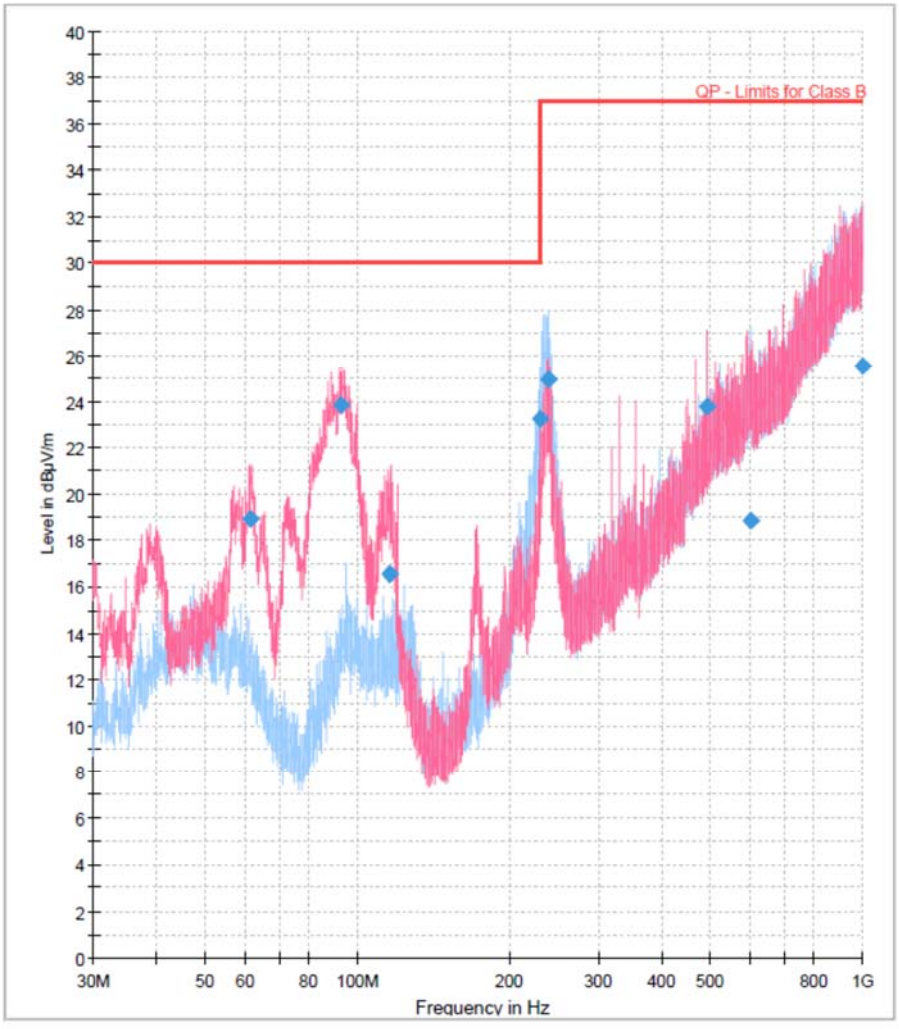
Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0601)
Test Site :	Nemko 10 m Chamber
Test Standard :	EN 55032
Environment Conditions :	a.c. 230 V, 50 Hz
Operator Name :	Doseung Shin
	Charging & AUX mode

Full Spectrum

Full Spectrum



8/2/2017