RADIO PERFORMANCE TEST REPORT

Test Report No.	**: OT-217-RWD-068**
Reception No.	**: 2104002916**
Applicant	**: LG Electronics Inc.**
Address	**: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Rep of Korea**
Manufacturer	**: LG Electronics Inc.**
Address	**: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Rep of Korea**
Type of Equipment	**: Premium Magic Remote**
Model Name	**: PM22GN**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 37 pages (including this page)**
Date of Incoming	**: June 24, 2021**
Date of issue	**: July 26, 2021**

SUMMARY

The equipment complies with the standard; EN 300 330 V2.1.1

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Tested by	Reviewed by	Approved by
/ Sieon Lee / Assistant Manager	/ Ha-Ram Lee / Manager	/ Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-217-RWD-068	July 26, 2021	Initial Release	All

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1. APPLICANT AND MANUFACTURER INFORMATION

1.1 Applicant

-. Applicant : LG Electronics Inc.

-. Address : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Rep of Korea

-. Name of Contact : Gyuseog Lee / Senior Engineer

-. E-mail : gyuseog.lee@lge.com

-. Tel no. : +82-10-8291-9774

1.2 Manufacturer

-. Applicant : LG Electronics Inc.

-. Address : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Rep of Korea

1.3 Factory

-. Factory 1 : OH SUNG Electronics Co., Ltd.

-. Address : 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Korea

-. Factory 2 : PT, OHSUNG ELECTRONICS INDONESIA

-. Address : Jalan selayar Blok D7 Kawasan Industri MM2100 Mekarwangi Cikarang Barat, Jawa Barat 17845 INDONESIA

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2. TEST SUMMARY

2.1 Test standards and results: EN 300 330 V2.1.1_NFC

CLAUSE	TEST ITEMS	RESULTS	REMARK
TRANSMITTER PARAMETERS			
4.3.1 4.3.2	Permitted range of operating frequencies & Operating frequency ranges	PASS	
4.3.4	Transmitter H-field requirements	N/A (Note 1)	Product Class 1&2 only
4.3.5	Transmitter RF carrier current	N/A (Note 1)	Product Class 3 only
4.3.6	Transmitter radiated E-field	PASS	
4.3.3	Modulation bandwidth	PASS	
4.3.7	Transmitter conducted spurious emissions	N/A (Note 1)	Product Class 3 only
4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	PASS	
4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz	PASS	
4.3.10	Transmitter Frequency stability	N/A (Note 2)	
RECEIVER PARAMETERS			
4.4.2	Receiver spurious emissions	N/A (Note 3)	
4.4.3	Adjacent channel selectivity	N/A (Note 2)	
4.4.4	Receiver blocking or desensitization	N/A (Note 4)	

Remark: According to above table, the Equipment Under Test(EUT) is compliant to recommendation CEPT/ERC/REC 70-03, Annex 1, Non-specific Short Range Devices.

Note 1: This test is not performed because the equipment under test (EUT) is a Class 4 device.

Note 2: This test is not performed because it applies only for channelized systems in clause 4.4.1

Note 3: This test is not performed because the receiver in the EUT used in combination with permanently co-located transmitter continuously transmitting. Acc. to the standard, the receiver part was tested together with the transmitter in operating mode.

Note 4: This test is not performed because it does not apply for tagging systems in clause 4.4.1

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2.2 Additions, deviations, exclusions from standards

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

2.3 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the standards stated in section 2.1 the provision of Article 3.2 of Directive 1999/5/EC.

2.4 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666 / T-1842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. EUT (Equipment Under Test)

3.1 Identification of EUT

-. Equipment : Premium Magic Remote

-. Model Name : PM22GN

-. Brand Name : N/A

-. Serial number : N/A

-. Manufacturer : LG Electronics Inc.

3.2 Additional information about the EUT

The LG Electronics Inc., Model PM22GN (referred to as the EUT in this report) is a Premium Magic Remote. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Premium Magic Remote	
Temperature Range	0 °C ~ 40 °C	
Operating Frequency	NFC	13.56 MHz
	Bluetooth LE	2 402 MHz ~ 2 480 MHz
RF Output Power	NFC	-
	Bluetooth LE	6.40 dBm
Number of Channel	NFC	1 Channels
	Bluetooth LE	40 Channels
Modulation Type	NFC	ASK
	Bluetooth LE	GFSK
Antenna Type	NFC	Loop Antenna
	Bluetooth LE	Dielectric Chip Antenna
Antenna Gain	NFC	-
	Bluetooth LE	1.81 dBi
Rated Supply Voltage	DC 3.0 V	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz	

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3.3 Alternative type(s)/model(s); also covered by this test report.

-. None

3.4 Mode of operation during the test

-. The EUT has Loop Antenna for 13.56 MHz reading only and has no TX mode. The Mobile Phone (use NFC Function) was used for making continuous transmission mode during the test as supportive equipment.

3.5 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
PM22GN	LG Electronics Inc.	Premium Magic Remote (EUT)	-
SM-G955N	Samsung	Mobile Phone	EUT

4. EUT MODIFICATIONS

-. None

5. PERMITTED RANGE OF OPERATING FREQUENCIES & OPERATING FREQUENCY RANGES

5.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

5.2 Test set-up

EN 300 330 V2.1.1 Clauses 6.2.2

5.3 Measurement uncertainty

Temperature : 1 %

Frequency Error : 1 x 10^{-7}

5.4 Test date

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5.5 Test data

-. Transmitter Classification : Class 4

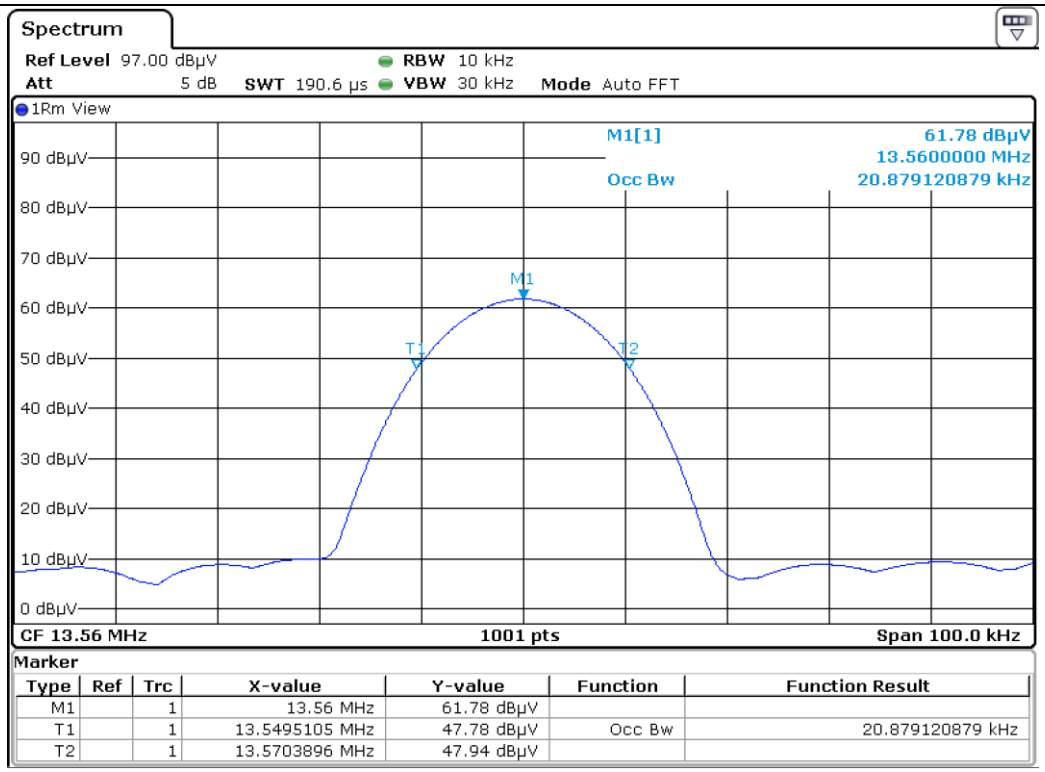
-. Operating condition : Max. RF Output Transmitting Mode

-. Carrier Frequency : 13.56 MHz

-. Antenna Type : Loop Antenna

Declared Carrier Freq. (MHz)	Minimum Freq. (MHz)	Maximum Freq. (MHz)
13.560 000	13.549 510	13.570 389

Plots of measurement data



5.6 Limit

Subclause: 4.3.1.3 & 4.3.2.3 in EN 300 330 V2.1.1.

The permitted range of operating frequencies for intentional emissions shall be entirely within the frequency bands in table 1.

The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table 1.

	Frequency Bands/frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 MHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	984 kHz to 7 484 kHz (Note 3, Centre frequency is 4 234 kHz)	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz (Centre frequency is 13,56 MHz)	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 MHz to 27,100 MHz	Inductive devices, Railway applications

NOTE 1: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 9 kHz to 30 MHz.

NOTE 2: On non-harmonised parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.

NOTE 3: Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.

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6. TRANSMITTER E-FIELD REQUIREMENTS

6.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

6.2 Test set-up

EN 300 330 V2.1.1 Clauses 6.2.6

6.3 Measurement uncertainty

Radiated emission electric field intensity, 6 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k = 2.

6.4 Test date

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6.5 Test data

-. Transmitter Classification : Class 4

-. Operating condition : Max. RF Output Transmitting Mode

-. Carrier Frequency : 13.56 MHz

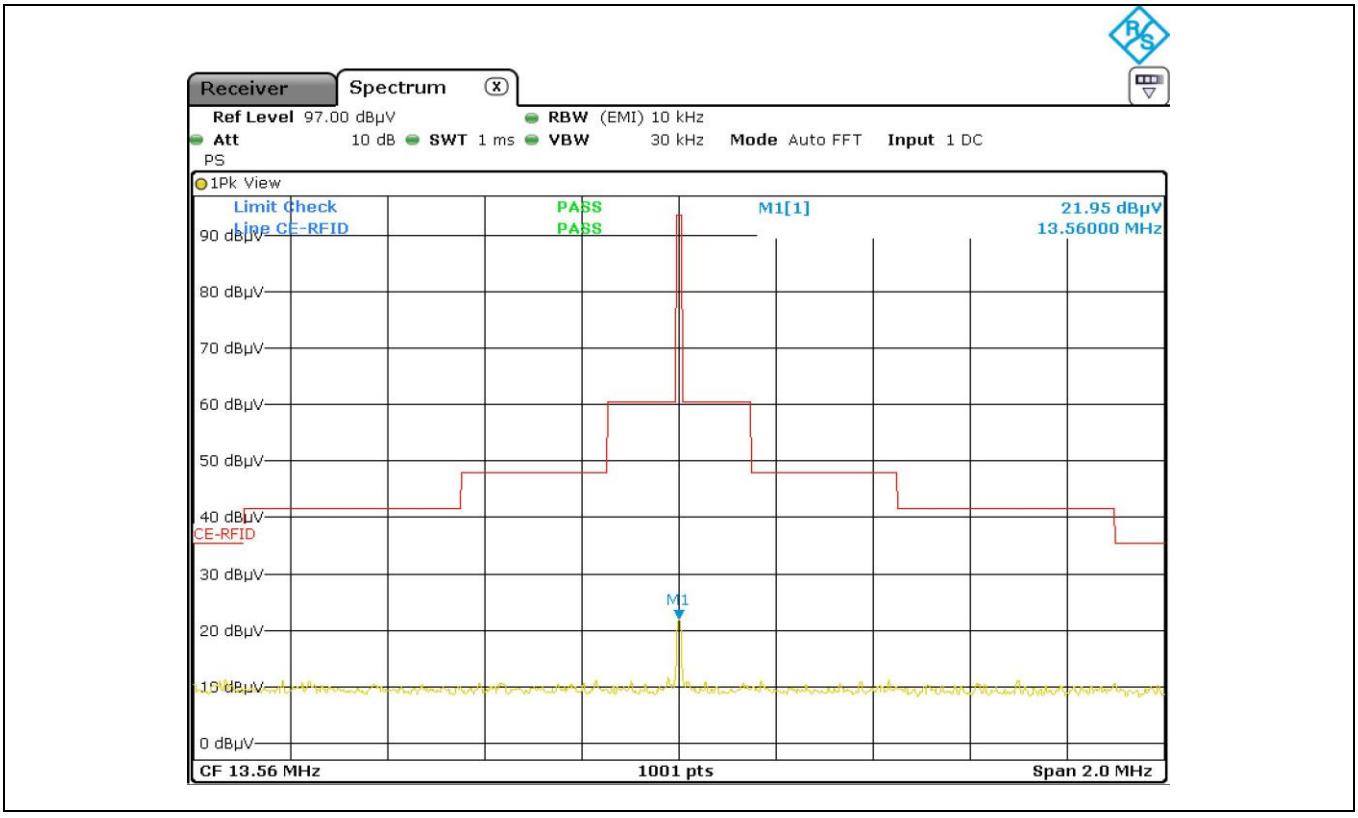
-. Measurement distance : 10 m

-. Antenna Type : Loop Antenna

Frequency (MHz)	Reading (dBμV/m)	Ant. Factor (dB/m)	Ant. Pol. (H/V)	Cable Loss (dB)	Total	Limit	Margin (dB)
					dBuV/m	dBuV/m	
13.56	21.95	19.30	H	0.30	41.55	93.50	51.95

- Total [dBuV/m] = Reading [dBμV/m] + Ant Factor [dB/m] + Cable Loss [dB]

Plot of measurement



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6.6 Limit

Subclause: 4.3.6.3 in the EN 300 330 V2.1.1

In the frequency range 9 kHz to 4,78 MHz, the limits of Hef follow the H-fields limits, Hf , as given in clause 4.3.4.3, table 2 with an additional correction factor C. The factor given below is specific for a 10 m measuring distance. The limit Hef = Hf + C where: C = 20 × log (fc / 4,78 × 106) dB; and where: fc is the carrier frequency in Hz. For a graphical representation of the correction factor C see annex D. In the frequency range 4,78 MHz to 25 MHz limits are identical to the limits in clause 4.3.4.3, table 2, without any correction factor.

[clause 4.3.4.3, table 2]

Frequency range (MHz)	H-field strength limit (Hf) dBµA/m at 10 m or specified in mW e.r.p.
0,009 ≤ f < 0,090	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
0,09 ≤ f < 0,119	42
0,119 ≤ f < 0,135	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
0,135 ≤ f < 0,140	42
0,140 ≤ f < 0,1485	37,7
0,1485 ≤ f < 30	-5 (see note 4)
0,315 ≤ f < 0,600	-5
3,155≤ f < 3,400	13,5
4,234	9 (see note 9)
4,516	7
7,400 ≤ f < 8,800	9
10,2 ≤ f < 11,00	9
12,5 ≤ f ≤ 20 -7	-7
6,765 ≤ f ≤ 6,795	42 (see notes 3 and 7)
26,957 ≤ f ≤ 27,283	42 (see note 3)
13,410 ≤ f ≤13,553, 13,567 ≤ f ≤ 13,710	9 (see note 6)
13,110 ≤ f ≤ 13,410, 13,710 ≤ f ≤ 14,010	-3,5 (see note 6)
12,660 ≤ f ≤ 13,110, 14,010 ≤ f ≤ 14,460	-10 (see note 6)
11,810 ≤ f ≤ 12,660, 14,460 ≤ f ≤ 15,310	-16 (see note 6)
13,460 ≤ f ≤ 13,553, 13,567 ≤ f ≤ 13,660	27 (see note 6)
13,360 ≤ f ≤ 13,460, 13,660 ≤ f ≤ 13,760	Linear transition from 27 to -3,5 (see note 6)
13,110 ≤ f ≤ 13,360, 13,760 ≤ f ≤ 14,010	-3,5 (see note 6)
12,660 ≤ f ≤ 13,110, 14,010 ≤ f ≤ 14,460	-5 (see note 6)
13,553 ≤ f ≤ 13,567	42 (see note 3) or 60 (see notes 2 and 3)
27,095	42

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26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100 mW

NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBµA/m:

- for loop coil antennas with an area ≥ 0,16 m^2 this table and table B.1 with the antenna limitations apply;
- for loop coil antennas with an area between 0,05 m^2 and 0,16 m^2 table B.1 applies with a correction factor. The limit is: table value + 10 × log (area/0,16 m^2);
- for loop coil antennas with an area < 0,05 m^2 the limit is 10 dB below table B.1.

NOTE 2: For RFID (incl. NFC) and EAS applications only.

NOTE 3: Spectrum mask limit, see annex I.

NOTE 4: For further information see annex G.

NOTE 5: Limit is 42 dBµA/m for the following spot frequencies: 60 kHz ± 250 Hz, 66,6 kHz ± 750 Hz, 75 kHz ± 250 Hz, 77,5 kHz ± 250 Hz, and 129,1 kHz ± 500 Hz.

NOTE 6: Only in conjunction with spectrum mask, see annex I.

NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonised ISM frequency band according article 5.138 of the ITU Radio Regulations [i.13].

NOTE 8: Center frequencies for channelized systems by using ≤ 10 kHz bandwidth.

NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.

For calculation rules for limits at other measurement distances, see annex H.

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7. PERMITTED FREQUENCY RANGE OF THE MODULATION BANDWIDTH

7.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

7.2 Test set-up

EN 300 330 V2.1.1 Clauses 6.2.3

7.3 Measurement uncertainty

Temperature : 1 %

Frequency Error : 1 x 10^{-7}

7.4 Test date

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7.5 Test data

-. Transmitter Classification : Class 4

-. Operating condition : Max. RF Output Transmitting Mode

-. Carrier Frequency : 13.56 MHz

-. Antenna Type : Loop Antenna

TEST CONDITION		Measured Frequency (MHz)	
Temperature (°C)	**Voltage (Vdc)**		
Tnom (20 °C)	Vnom (3.0 V)	FL	13.549 21
		FH	13.570 79
Tmin (0 °C)	Vmax (3.3 V)	FL	13.546 05
		FH	13.567 55
	Vmin (2.7 V)	FL	13.547 77
		FH	13.568 94
Tmax (40 °C)	Vmax (3.3 V)	FL	13.551 16
		FH	13.572 29
	Vmin (2.7 V)	FL	13.553 12
		FH	13.574 39
Measured frequencies (Lowest and Highest)		FL = 13.546 05	FH = 13.574 39

Remark: FL – Lowest frequency at the appropriate spurious emission level

FH – Highest frequency at the appropriate spurious emission level

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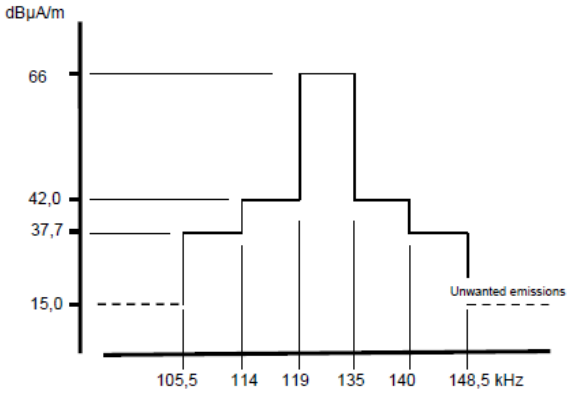
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7.6 Limit

Subclause: 4.3.3.3 in EN 300 330 V2.1.1

The modulation bandwidth shall be within the assigned frequency band see table 1 or ±7,5 % of the carrier frequency
whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4.
For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.



NOTE: The limit at 129,1 kHz ± 500 Hz is maximum 42 dBµA/m at 10 m.

Figure I.1: Emission boundary for LF RFID systems

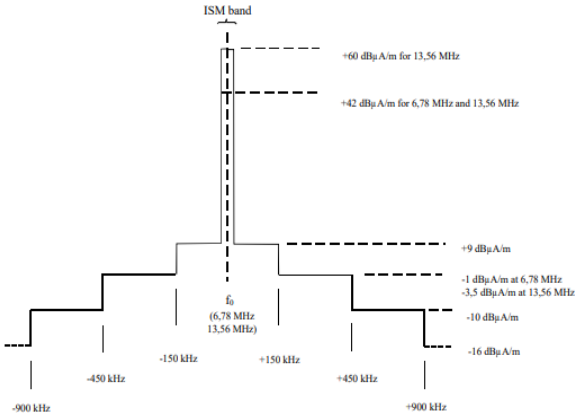


Figure I.2: Spectrum mask limit for RFIDs and EAS in the 6,78 MHz and 13,56 MHz range

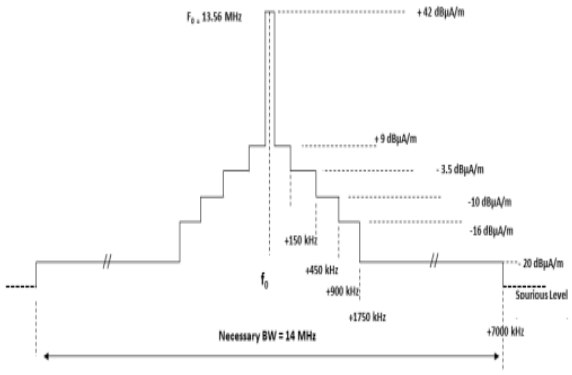


Figure I.3: Spectrum mask limit for wideband RFIDs (incl. NFC application) in the 13,56 MHz range

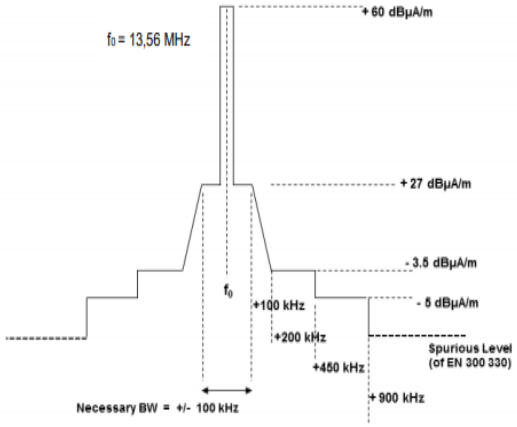


Figure I.4: Spectrum mask limit for narrowband RFIDs (incl. NFC application) in the 13,56 MHz range

8. TRANSMITTER SPURIOUS AND OUT-OF-BAND EMISSIONS < 30 MHZ

8.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

8.2 Test set-up

EN 300 330 V2.1.1 Clauses 6.2.8

8.3 Measurement uncertainty

Radiated emission electric field intensity, 6 dB

8.4 Test date

July 19, 2021 ~ July 20, 2021

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8.5 Test data for Spurious Radiated Emission below 30 MHz

-. Measured frequency Range : 9 kHz ~ 30 MHz

-. Transmitter Classification : Class 4

-. Operating condition : Max. RF Output Transmitting Mode

-. Carrier Frequency : 13.56 MHz

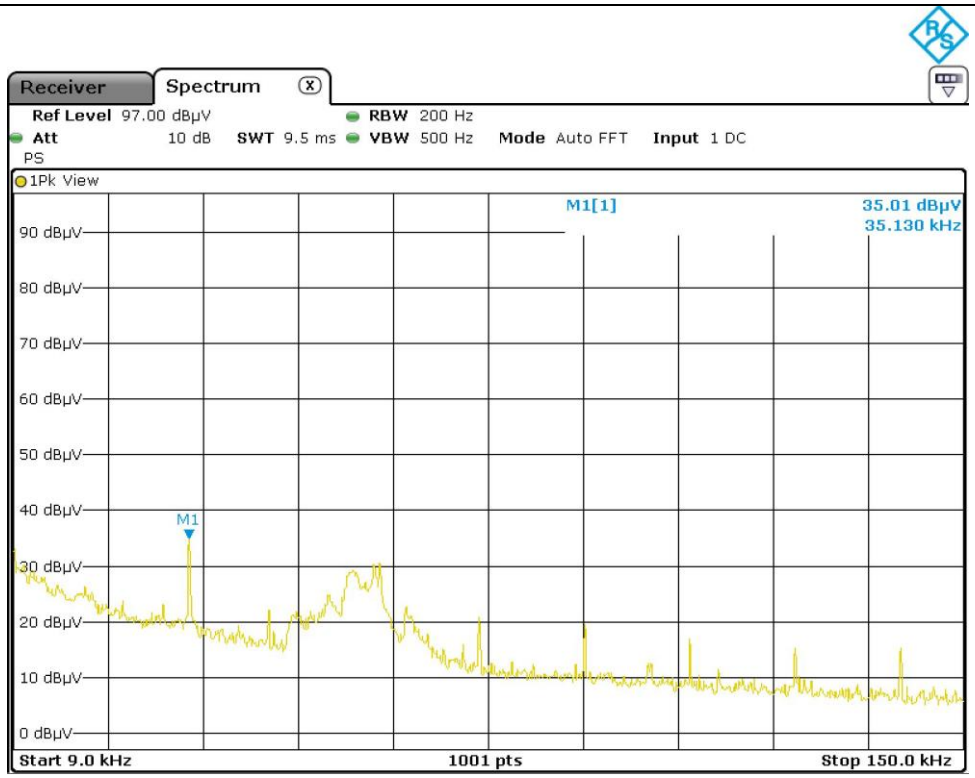
-. Measurement distance : 10 m

-. Antenna Type : Loop Antenna

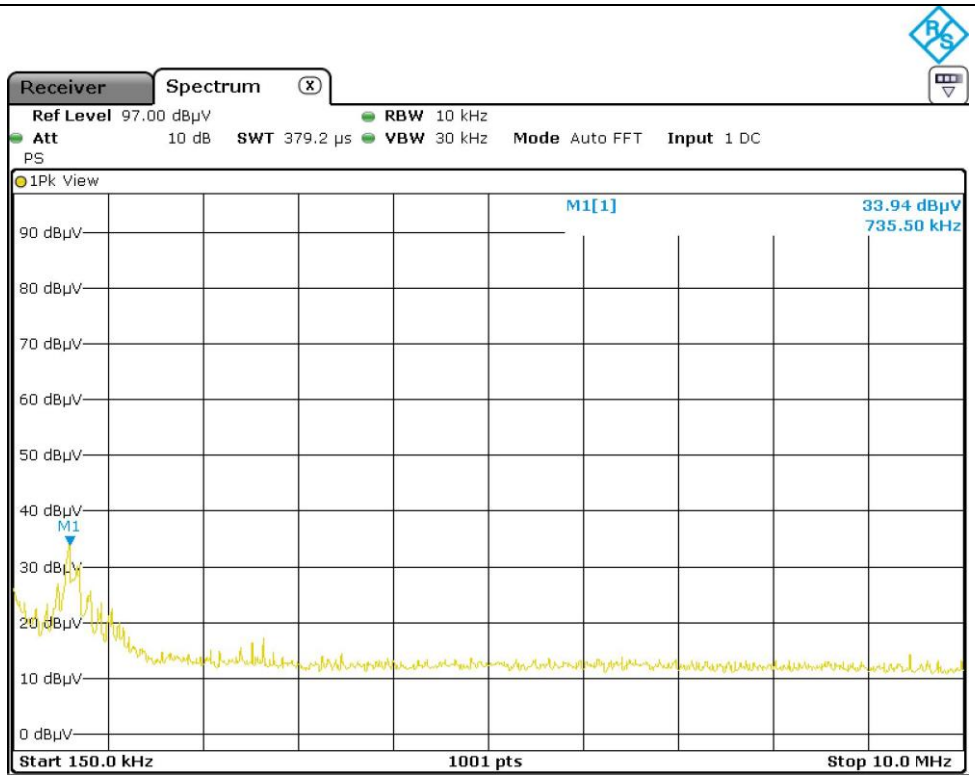
-. Operating condition : Operating Mode & Standby Mode

Frequency (MHz)	Reading (dBμV)	Ant. Factor (dB/m)	Ant. Pol. (H/V)	Cable Loss (dB)	Total	Limit	Margin (dB)
					dBuV/m		
0.035	35.01	18.90	V	0.30	54.21	76.32	22.11
0.735	33.94	18.80	V	0.30	53.04	66.27	13.23
10.346	13.62	19.30	H	0.30	33.22	48.00	14.78
29.746	13.95	20.40	V	0.30	34.65	48.00	13.35

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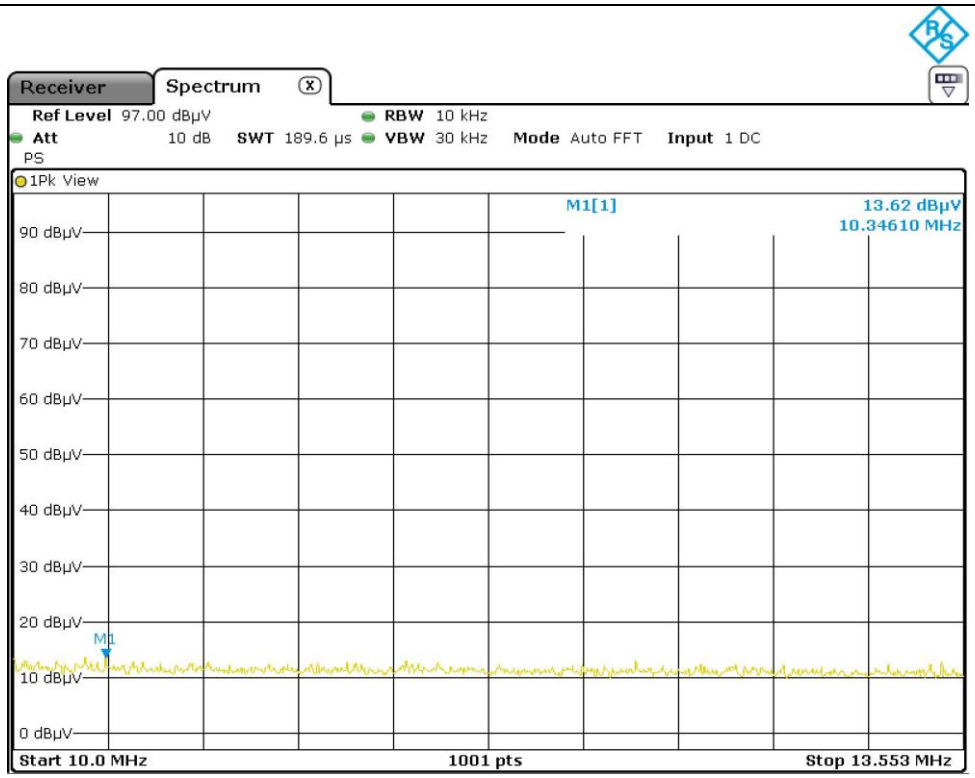
9 kHz ~ 150 kHz



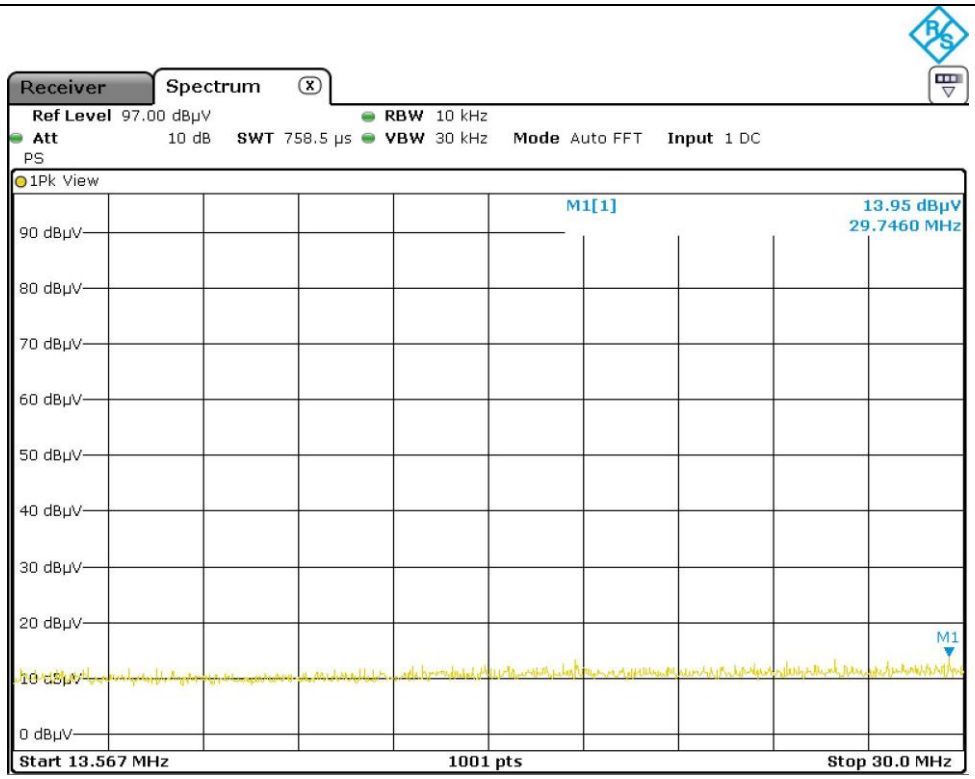
150 kHz ~ 10 MHz

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10 MHz ~ 13.553 MHz



13.567 MHz ~ 30 MHz

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8.6 Limit

Subclause: 4.3.8.3 Table 5 in EN 300 330 V2.1.1

The radiated field strength of the spurious domain emissions below 30 MHz shall not exceed the generated H-field dBµA/m at 10 m given in table 5.

State	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz
Operating	27 dBµA/m at 9 kHz descending 3 dB/oct	-3.5 dBµA/m
Standby	5.5 dBµA/m at 9 kHz descending 3 dB/oct	-25 dBµA/m

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9. TRANSMITTER SPURIOUS AND OUT-OF-BAND EMISSIONS > 30 MHZ

9.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

9.2 Test set-up

EN 300 330 V2.1.1 Clauses 6.2.9

9.3 Measurement uncertainty

Radiated emission electric field intensity, 6 dB

9.4 Test date

July 19, 2021 ~ July 20, 2021

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9.5 Spurious Radiated Emission below 1 GHz

-. Measured frequency Range : 30 MHz ~ 1 GHz

-. Transmitter Classification : Class 4

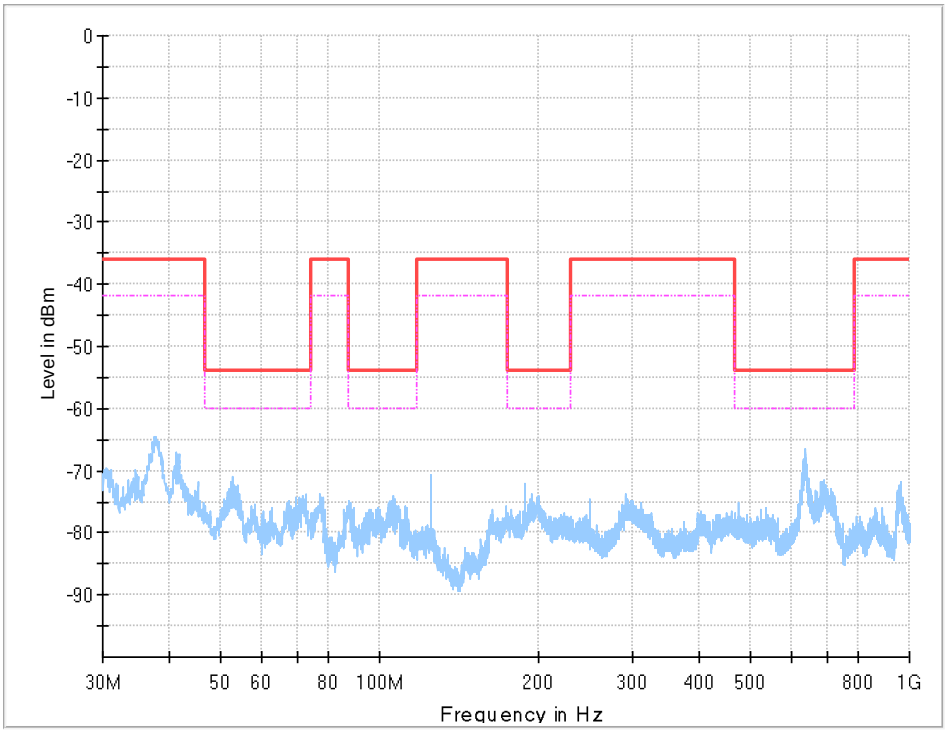
-. Operating condition : Max. RF Output Transmitting Mode

-. Carrier Frequency : 13.56 MHz

-. Antenna Type : Loop Antenna

-. Operating condition : Operating Mode & Standby Mode

Frequency (MHz)	Max Peak (dBm)	Pol	Limit (dBm)	Margin (dB)
Measurements are 6 dB below these limits, the measurements are not reported.				



9.6 Limit

Subclause: 4.3.9.3 Table 6 in EN 300 330 V2.1.1

The power of any radiated emission shall not exceed the values given in table 6.

State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW
Standby	2 nW	2 nW

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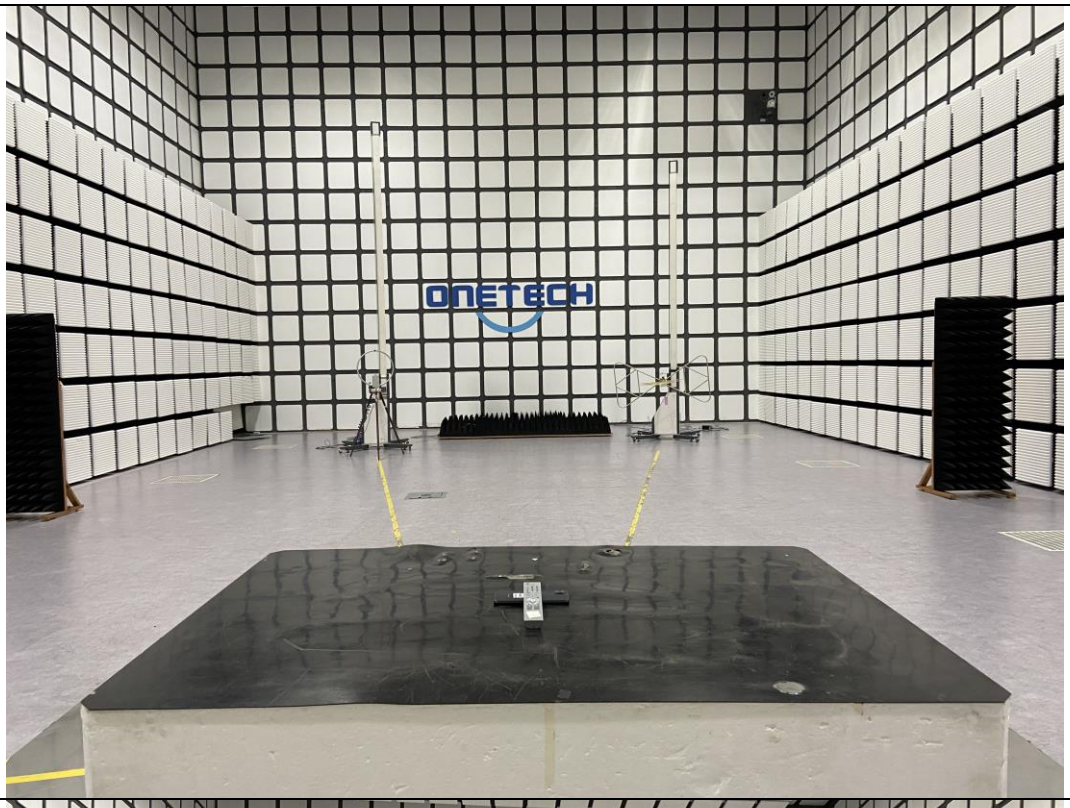
10. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
FSV30	R/S	Spectrum analyzer	101199	Feb. 08, 2021 (1Y)
FSV40	R/S	Spectrum analyzer	101009	Feb. 09, 2021 (1Y)
ESR	R/S	Test receiver	101470	Oct. 20, 2020 (1Y)
310N	Sonoma Instrument	Amplifier	312545	Mar. 15, 2021 (1Y)
CO3000	Innco Systems GmbH	Controller	N/A	N/A
DT5000	Innco Systems GmbH	Turn Table	N/A	N/A
MA-4640-XPET	Innco Systems GmbH	Antenna Master	MA4640/652/43100318/P	N/A
PSL-2KP	ESPEC	Environmental Test Chamber	14009407	Feb. 16, 2021 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar 24, 2020 (2Y)
OSP120	Rohde & Schwarz	Open Switch and Control Unit	1505.3009K12	N/A
OSP150	Rohde & Schwarz	Open Switch and Control Unit	1505.3009K15	N/A
Controller CO 2000	Innco systems GmbH	Digital Controller	N/A	N/A
VULB9163	Schwarzbeck	TRILOG Broadband Antenna	777	Apr. 08, 2020 (2Y)
MA2000	Innco systems GmbH	Antenna master	N/A	N/A
DS 1200 S	Innco systems GmbH	Turn table	N/A	N/A

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APPENDIX I - TEST SET-UP PHOTO

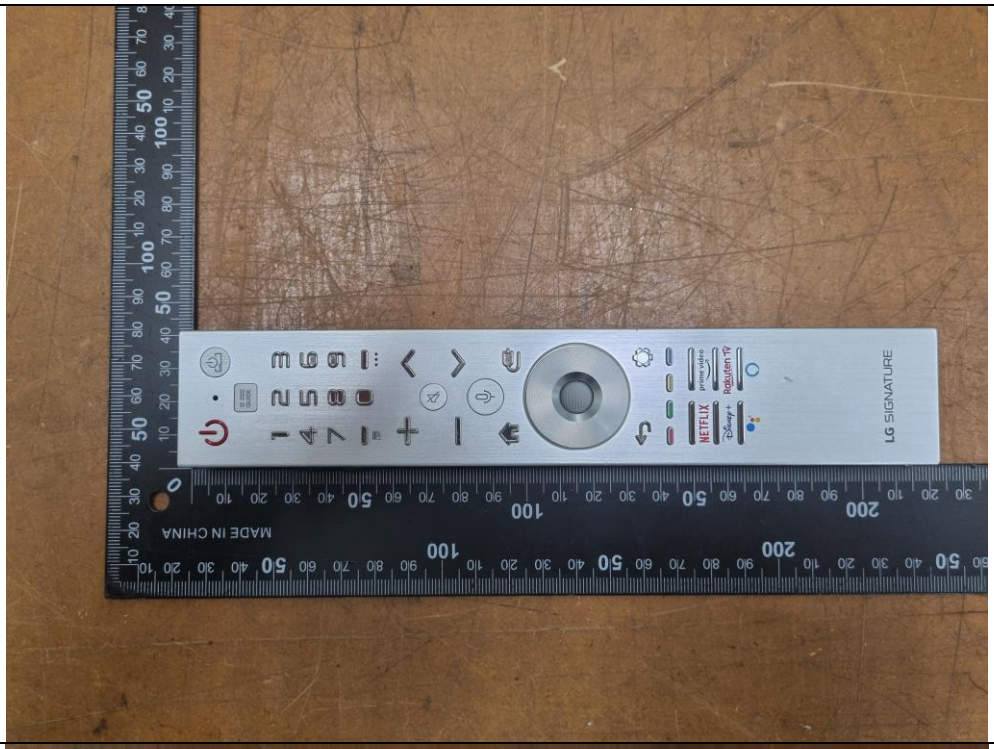




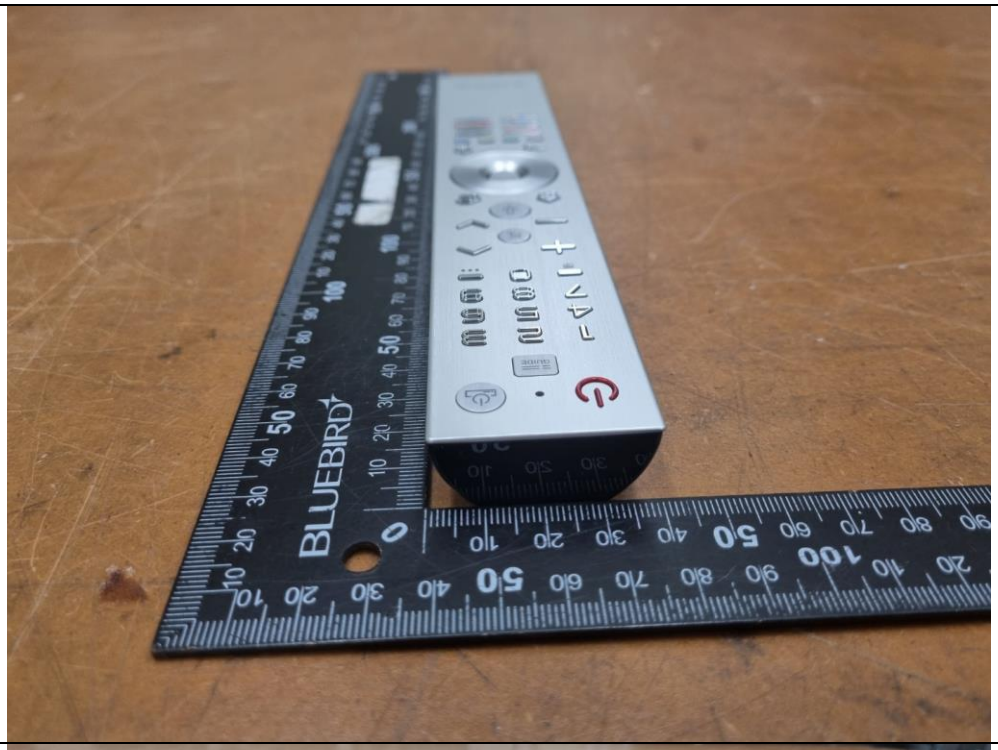
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APPENDIX II - PHOTOGRAPHS OF THE PRODUCT



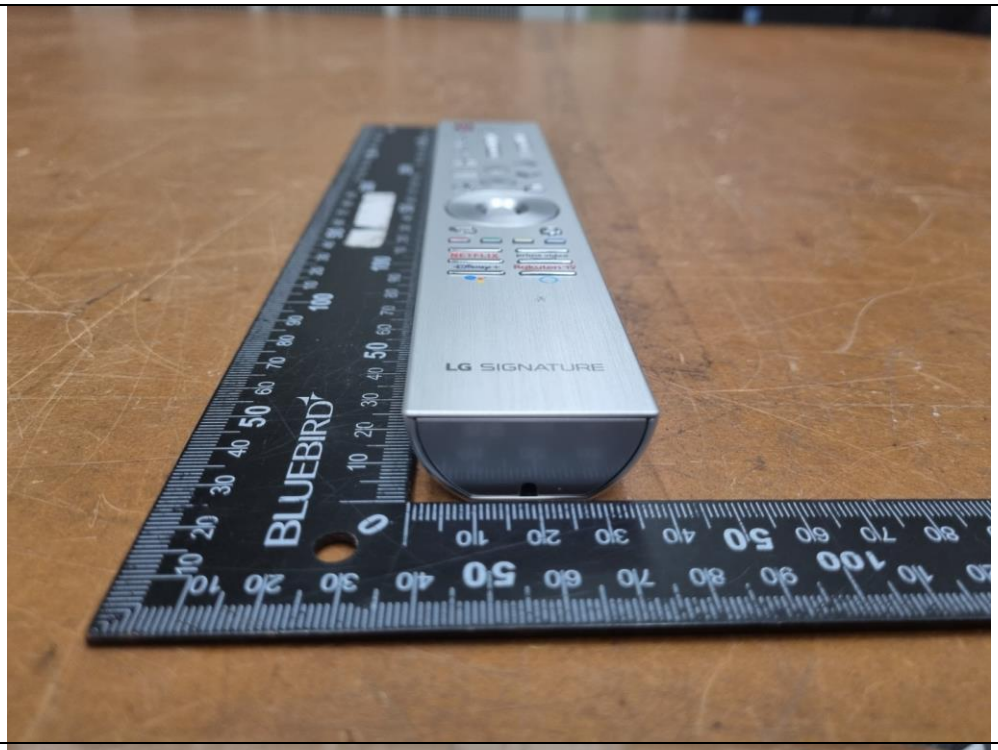






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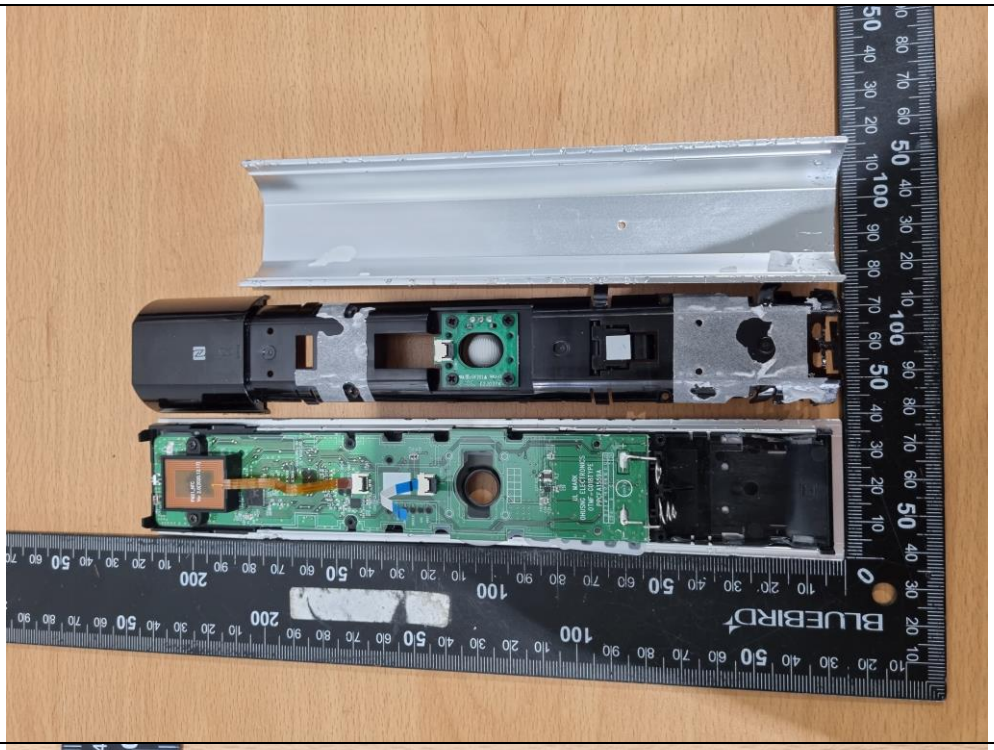
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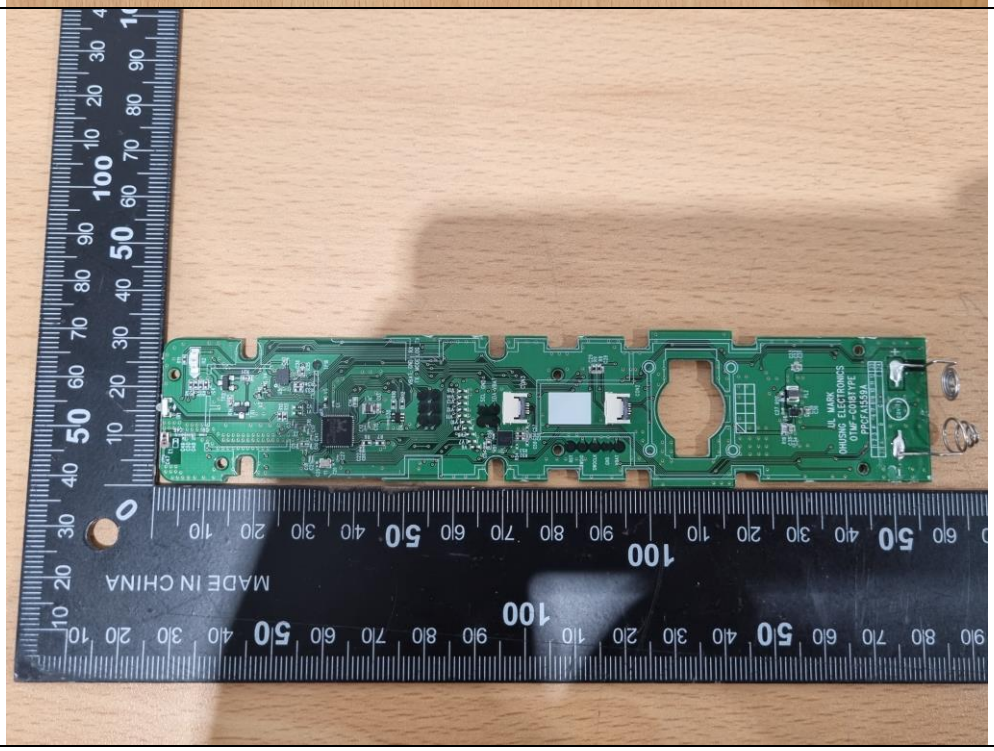




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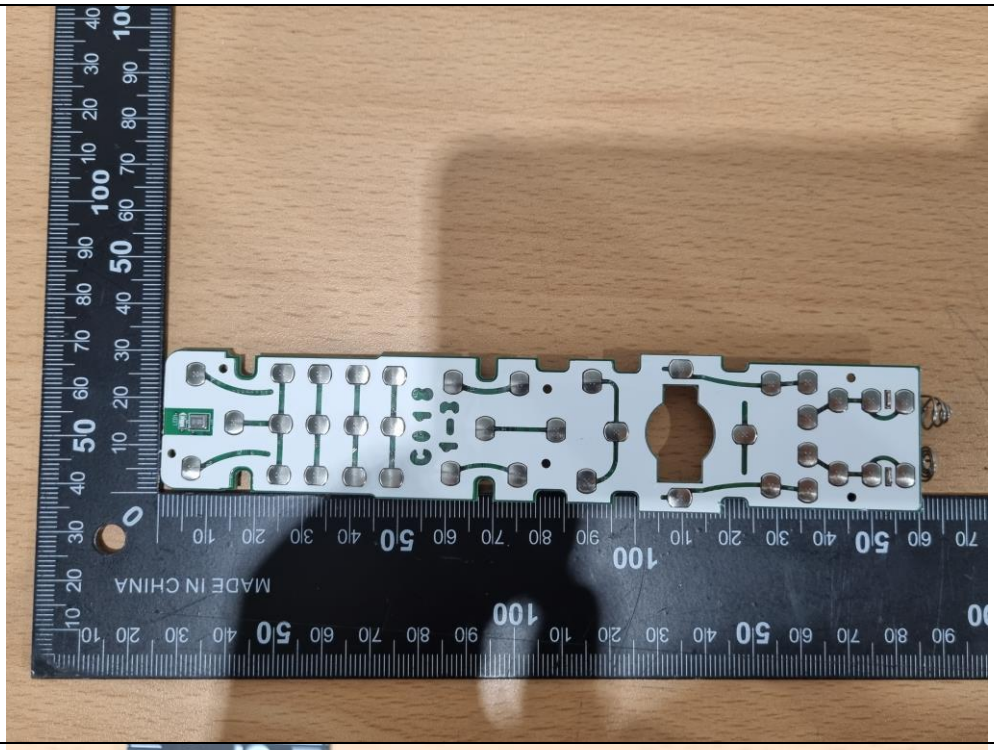
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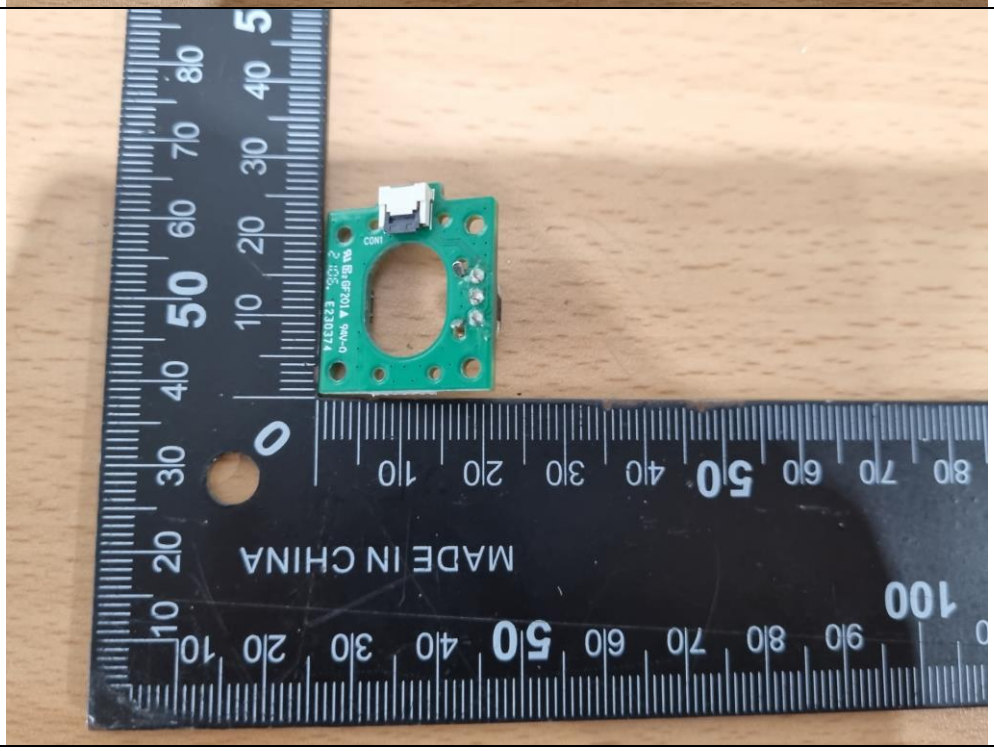




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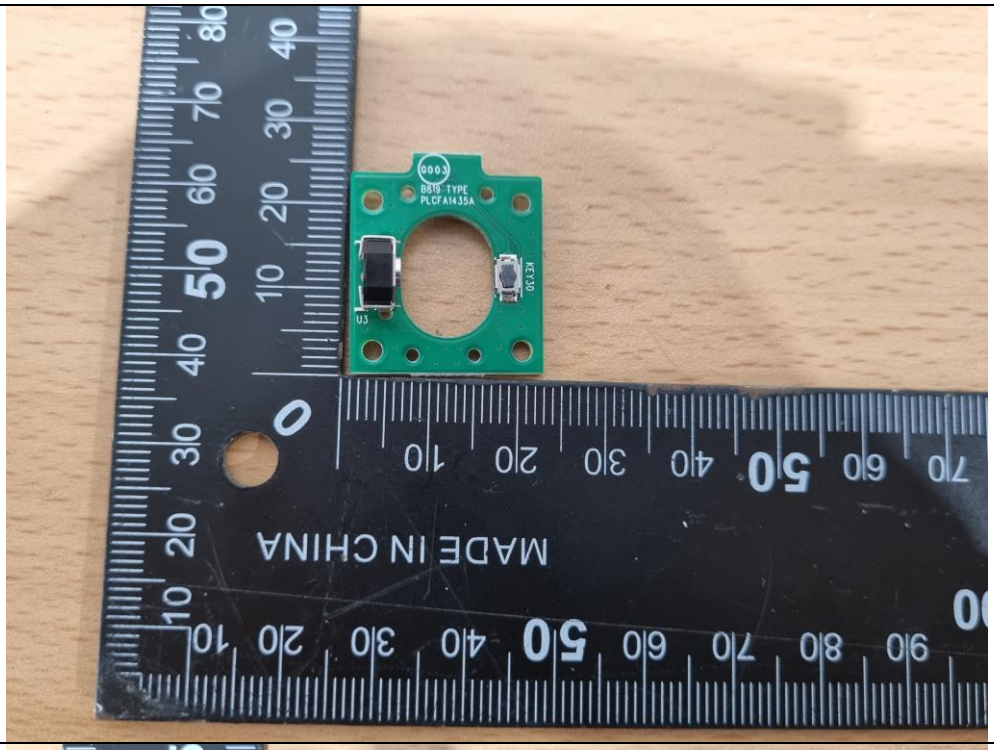
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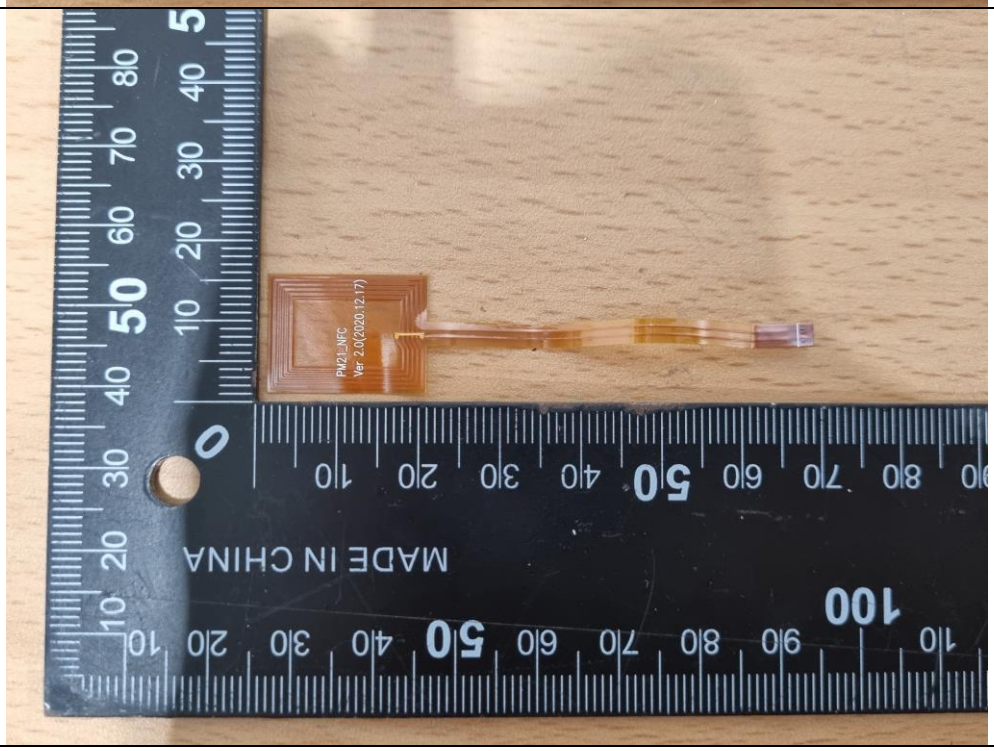




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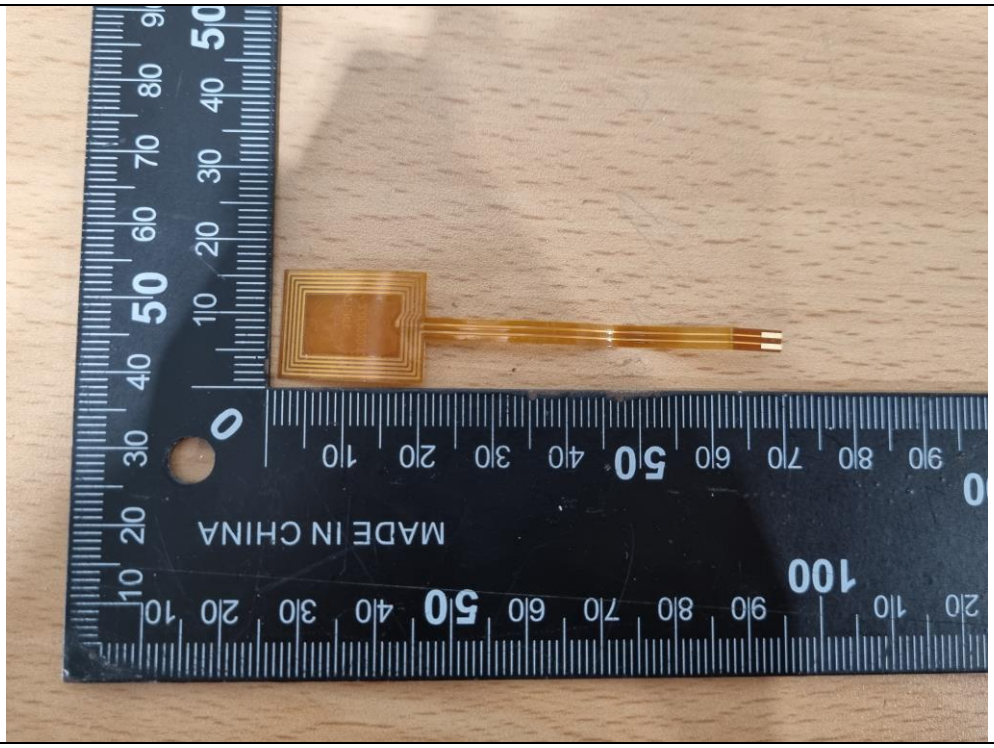
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