



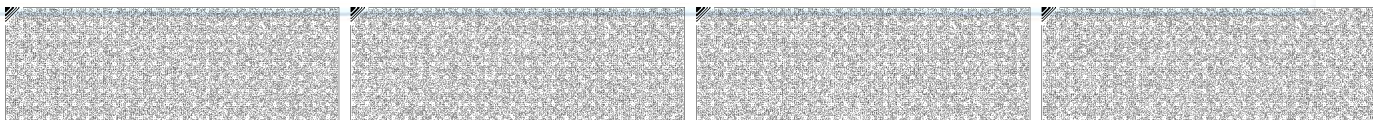
TEST REPORT

	Dt&C Co., Ltd. 42, Yurim-ro, 154 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664				
1. Report No : DREKFCC2508-0093(1) 2. Customer - Name : EMSONIC - Address : 54-8, Cheomdangieop 3-ro, Sandong-eup, Gumi-si, Gyeongsangbuk-do, South Korea 3. Use of Report : Grant of Certification 4. Product Name / Model Name : PORTABLE BLUETOOTH SPEAKER / LUMIO (FCC ID : 2A78WLUMIO / IC : 28870-LUMIO) 5. Test Method Used : ANSI C63.4:2014 FCC Part 15 Subpart B (Other Class B digital devices) ICES-003 Issue 7 CAN/CSA-CISPR 32:17 6. Date of Test : Jul. 01. 2025 ~ Jul. 02. 2025 7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address : Refer to the attached) 8. Testing Environment : Temperature (21) °C , Humidity (43 ~ 48) % R.H. 9. Test Result : Refer to the attached Test Result The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This laboratory is not accredited for the test results marked. " * " <table border="1" data-bbox="245 1464 1362 1570"> <tr> <td data-bbox="245 1503 357 1536">Affirmation</td> <td data-bbox="357 1480 852 1559"> Tested by Name : ChangHo Han </td> <td data-bbox="852 1480 1362 1559"> Technical Manager Name : DaeHwa Eun </td> </tr> </table> The above test report is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA. Dec. 09. 2025 Dt&C Co., Ltd. Accredited by KOLAS, Republic of KOREA			Affirmation	Tested by Name : ChangHo Han	Technical Manager Name : DaeHwa Eun
Affirmation	Tested by Name : ChangHo Han	Technical Manager Name : DaeHwa Eun			

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

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TRF-EM-223(00)220629

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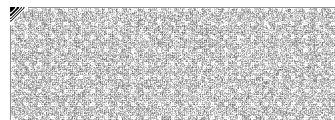


Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



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Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



1. General Remarks

This report contains the result of tests performed by :

Dt&C Co., Ltd.

42, Yurim-ro, 154 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

<http://www.dtcn.net>

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

Address of Laboratory

☐	Branch site-1	46, Yurim-ro 154 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea
☐	Satellite facilities-1	42, Yurim-ro 154 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea
☒	Satellite facilities-3	38, Yurim-ro 154 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea
☐	Satellite facilities-4	28, Baengnyeong-ro 20 beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea

Dt&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Remark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
	South Africa	SABS	0006	ISO/IEC 17025
	Ghana	NCA	NCA agreement 23 rd , Oct, 2018	-
Site Filing	USA	FCC	KR0034	Designation
			704742	Registration No.
	Canada	IC	KR0034	Designation
	Japan	VCCI	C-11427, R-13385, R-14076, R-14180, R-14496, T-11442, G-10338, G-10754, G-10815, G-20051	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 089112 0012 Rev.00	ISO/IEC 17025
	Russia	RMRS	22.03.01.01196.296	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".





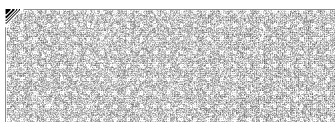
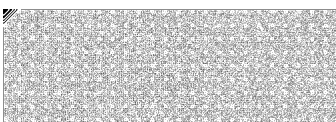
Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



3. General Information of EUT

Applicant	EMSONIC 54-8, Cheomdangieop 3-ro, Sandong-eup, Gumi-si, Gyeongsangbuk-do, South Korea
Manufacturer	EMSONIC 54-8, Cheomdangieop 3-ro, Sandong-eup, Gumi-si, Gyeongsangbuk-do, South Korea
Factory	P.T.EMSONIC Jl. Timor Blok E5, MM2100 Industrial Town, Jatiwangi Cikarang Barat, Bekasi, Jawa Barat, Indonesia
Product Name	PORTABLE BLUETOOTH SPEAKER
Model Name	LUMIO
Add Model Name	None
Add Model Difference	None
Software Version	SW V1.0
Hardware Version	HW V1.0
Maximum Internal Frequency	24 MHz
Classification	☐ Class A ☒ Class B
Rated Power	USB : DC 5 V / Battery 3.7 V
FCC ID	2A78WLUMIO
IC	28870-LUMIO
Remarks	* Wireless Frequency Bluetooth : (2 402 ~ 2 480) MHz

Related Submittal(s) / Grant(s)
Original submittal only



4. EUT Operations and Test Configurations

4.1 Principle of Configuration Selection

Emission :

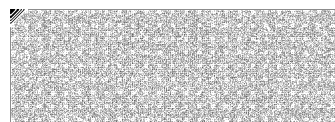
The equipment under test (EUT) was configured to measure its highest possible radiation level.
 The test modes were adapted accordingly in reference to the instructions for use.
 For each testing mode different configurations were used,
 Refer to the individual tests.

4.2 EUT Operation Mode

No.	Mode	Description
1	Bluetooth	The EUT is in a state where its internal battery is being charged through a DC power supply. The EUT is paired with a smartphone via Bluetooth, and a 1 kHz audio signal is continuously played from the smartphone and output through the EUT.

4.3 Test Configuration Mode

No.	Mode	Description
1	Bluetooth	The EUT is connected to a DC adapter via a USB-C port. The DC adapter is connected to the AC mains.



4.4 Supported Equipment

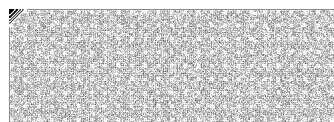
Used*	Product Type	Manufacturer	Model	Remarks
AE	DC adapter	Dongguan Aohai Technology Co.,Ltd.	MCS-V01KA	None
AE	Smartphone	Xiaomi Communications Co., Ltd	M2101K7AG	None
*Abbreviations: AE - Auxiliary/Associated Equipment, or SIM - Simulator				

4.5 EUT In/Output Port

Name	Type*	Cable Max. >3 m	Cable Shielded	Cable Back shell	Remarks
USB-C	DC	0.5	Shielded	Plastic	None
*Abbreviations: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port TP = Telecommunication Ports					

4.6 Test Voltage and Frequency

Case	Voltage (V)	Frequency (Hz)	Phases	Remarks
1	AC 120	60	Single	N/A



5. Test Summary

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4 : 2014	C
Radiated Disturbance	ANSI C63.4 : 2014	C
Antenna Power Conduction	ANSI C63.4 : 2014	N/A (Note 1)
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		
Note 1) Excluded from the test as there is no port for the above test in the EUT.		

The data in this test report are traceable to the national or international standards.

Measurement Uncertainty	
Test Items	$U (k = 2)$
Conducted Disturbance (9 kHz~ 30 MHz)	Mains : 3.6 dB Signal : 6.0 dB
Conducted Disturbance (150 kHz ~ 30 MHz)	Mains : 3.4 dB Signal : 6.0 dB
Radiated Disturbance (3m)	Below 1 GHz : 5.82 dB Above 1 GHz : 7.20 dB
Radiated Disturbance (10m)	Below 1 GHz : 5.8 dB
Antenna Power Conduction	N/A

- Conducted Disturbance

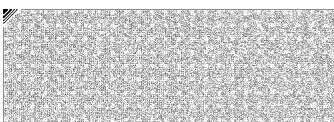
Frequency [MHz]	Pol.	Result [dBμV/m]	Detector	Limit [dBμV/m]	Margin [dB]
0.82803	N	37.30	Quasi-Peak	56.00	18.70

-Radiated Disturbance

Frequency [MHz]	Pol.	Result [dBμV/m]	Detector	Limit [dBμV/m]	Margin [dB]
399.994	V	35.37	Quasi-Peak	46.00	10.63

-Antenna Power Conduction

Frequency [MHz]	Result [dBμV/m]	Detector	Limit [dBμV/m]	Margin [dB]
-	-	-	-	-



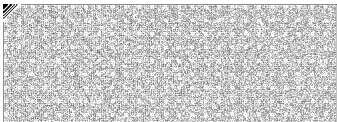


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6. Test Environment

Test Items	Test date (YYYY-MM-DD)	Temp. (℃)	Humidity (% R.H.)	Pressure (kPa)
Conducted Disturbance	2025-07-01	21	48	100.1
Radiated Disturbance	2025-07-02	21	43	-



7. Test Results : Emission

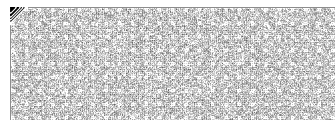
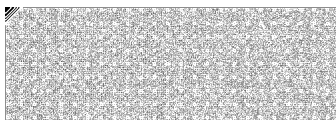
7.1 Conducted Disturbance

ANSI C63.4	Mains terminal disturbance voltage		Result
Method: The AMN placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN. The measuring port of the LISN for EUT was connected to spectrum analyzer. Using conducted emission test software, the emissions were scanned with peak detector mode. After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and CISPR Average detector. For (0.15 ~ 30) MHz frequency range, Quasi-Peak detector with 10 kHz RBW and 30 kHz VBW was used. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.			Comply
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point	
	150 kHz to 30 MHz	Mains	
EUT mode (Refer to clauses 4)	Test configuration mode	1	
	EUT Operation mode	1	
Limits – Class A			
Frequency (MHz)	Limit dBµV		
	Quasi-Peak	Average	
0.15 to 0.50	79	66	
0.50 to 30	73	60	
Limits – Class B			
Frequency (MHz)	Limit dBµV		
	Quasi-Peak	Average	
0.15 to 0.50	66 to 56	56 to 46	
0.50 to 5	56	46	
5 to 30	60	50	

Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0171	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESR7	ROHDE&SCHWARZ	101061	2025.03.27	2026.03.26
TWO-LINE V-NETWORK	ENV216	ROHDE&SCHWARZ	101979	2024.11.29	2025.11.28
PULSE LIMITER	ESHZ-Z2	ROHDE&SCHWARZ	103297	2024.07.23	2025.07.22
CABLE	L-D52V	CANARE	N/A	2025.01.09	2026.01.08

Calculation

N : Neutral phase, L1 : Live phase
C.FACTOR(dB) : Pulse Limiter(dB) + Cable loss(dB) + Insertion loss of LISN(dB)
Result(dBμV) : Reading Value(dBμV) + C.FACTOR(dB)
Margin(dB) : Limit(dBμV) - Result(dBμV)





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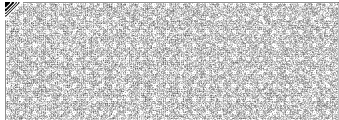
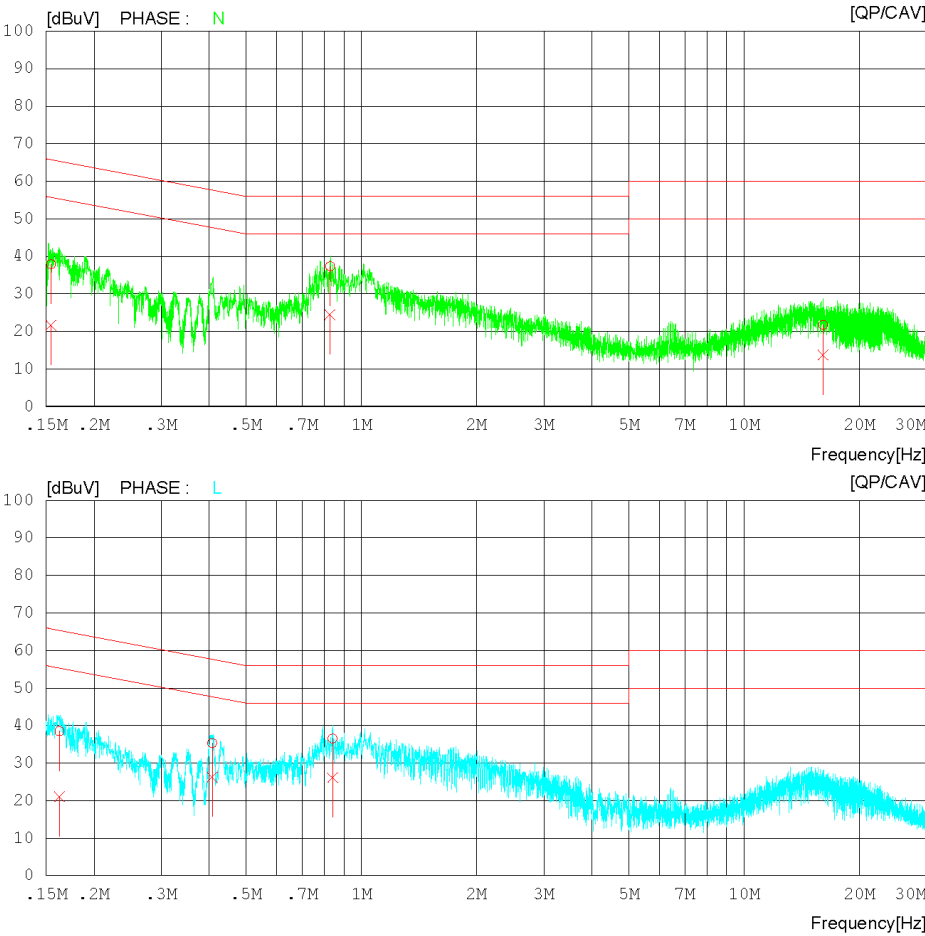
Mains terminal disturbance voltage _Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

Date 2025-07-01

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi/Atm 21 'C 48 % R.H. 100.1 kPa
Test Condition Bluetooth

LIMIT : FCC Part.15 B_CLASS B_AV
FCC Part.15 B_CLASS B_QP

Lish Factor
1. EMC-438_ENV216_101979_2024.11.29_N_150k_ON
2. EMC-438_ENV216_101979_2024.11.29_L_150k_ON
Cable Loss
1. C1_LISN TO RECEIVER_0.009-30MHz_2025-01-09
Pulse Lmitter
1. EMC-667_ESH3-Z2_103297_2024.07.23





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



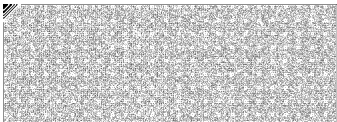
Date 2025-07-01

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi/Atm 21 'C 48 % R.H. 100.1 kPa
Test Condition Bluetooth

LIMIT : FCC Part.15 B_CLASS B_AV
FCC Part.15 B_CLASS B_QP

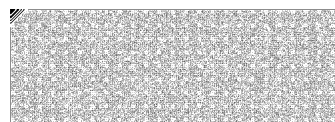
Lisn Factor
1. EMC-438_ENV216_101979_2024.11.29_N_150k_ON
2. EMC-438_ENV216_101979_2024.11.29_L_150k_ON
Cable Loss
1. C1_LISN TO RECEIVER_0.009-30MHz_2025-01-09
Pulse Lmitter
1. EMC-667_ESH3-Z2_103297_2024.07.23

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.15450	18.34	2.01	19.58	37.92	21.59	65.75	55.75	27.83	34.16	N
2	0.82803	17.63	4.79	19.67	37.30	24.46	56.00	46.00	18.70	21.54	N
3	16.09605	1.98	-6.07	19.80	21.78	13.73	60.00	50.00	38.22	36.27	N
4	0.16250	18.89	1.48	19.58	38.47	21.06	65.34	55.34	26.87	34.28	L
5	0.40750	15.54	6.46	19.81	35.35	26.27	57.70	47.70	22.35	21.43	L
6	0.84066	16.86	6.43	19.70	36.56	26.13	56.00	46.00	19.44	19.87	L



7.2 Radiated Disturbance

ANSI C63.4	Radiated disturbance 30 MHz –40 GHz**			Result
<u>Method:</u> Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 or 3 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. For final measurement below 1 GHz frequency range, Quasi-Peak detector with (RBW = 120 kHz Bandwidth) was used. For final measurement above 1 GHz frequency range, Peak detector with (RBW = 1 MHz Bandwidth) and CISPR Average detector with (RBW = 1 MHz Bandwidth) were used.				Comply
EUT mode (Refer to clauses 4)	Test configuration mode		1	
	EUT Operation mode		1	
Radiated Disturbance below 1 000 MHz				
Frequency range (MHz)	Quasi-peak limit dBµV/m			
	Class A		Class B	
	3 m distance	10 m distance	3 m distance	
30 to 88	49.1	39.1	40	
88 to 216	53.5	43.5	43.5	
216 to 960	56.4	46.4	46	
960 to 1 000	59.5	49.5	54	
According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22 shown.				
Frequency range (MHz)	Quasi-peak limit dBµV/m			
	Class A (10 m distance)		Class B (10 m distance)	
30 to 230	40		30	
230 to 1 000	47		37	
Radiated Disturbance for above 1 000 MHz at a measurement distance of 3 m				
Frequency range (GHz)	Peak limit dBµV/m		Average limit dBµV/m	
	Class A	Class B	Class A	Class B
1 to 40	80	74	60	54
The test frequency range of Radiated Disturbance measurements are listed below.				
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)			Upper frequency of measurement range (MHz)	
Below 108			1 000	
108 – 500			2 000	
500 – 1 000			5 000	
Above 1 000			5th harmonic of the highest frequency or 40 GHz, whichever is lower	





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
MEASUREMENT SOFTWARE	EMI-R VER. 2.00.0177	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESW44	ROHDE&SCHWARZ	101645	2024.10.21	2025.10.20
TRILOG BROADBAND TEST-ANTENNA	VULB9160	SCHWARZBECK	9160-3363	2024.10.07	2026.10.06
6 DB ATTENUATOR	2708A	H.P	23831	2024.10.07	2026.10.06
LOW NOISE PRE AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2025.02.12	2026.02.11
BROAD-BAND HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1014	2024.07.31	2025.07.30
PRE AMPLIFIER	8449B	H.P	3008A00887	2024.08.22	2025.08.21
HORN ANTENNA	EM-6969	ELECTRO-METRICS	156	2024.12.18	2025.12.17
PREAMPLIFIER	MLA-0618-B03-34	TSJ	1785642	2024.12.13	2025.12.12
HORN ANTENNA	3116C	ETS-LINDGREN	00240008	2024.07.31	2025.07.30
PRE AMPLIFIER	LNAS-50-18004000-33-5P	L3HARRIS	2210093	2024.07.31	2025.07.30
CABLE	LMR400	TMS	N/A	2024.12.11	2025.12.10
CABLE	LMR400	TMS	N/A	2024.12.11	2025.12.10
CABLE	LMR400	TMS	N/A	2024.12.11	2025.12.10
CALBE	SF104	HUBER+SUHNER	N/A	2025.01.02	2026.01.01
CABLE	SF104	HUBER+SUHNER	N/A	2024.09.15	2025.09.14
CABLE	SF104	HUBER+SUHNER	N/A	2024.09.15	2025.09.14
CABLE	SF102E	HUBER+SUHNER	N/A	2025.06.19	2026.06.18
CABLE	SF102E	HUBER+SUHNER	N/A	2024.08.23	2025.08.22

(NOTE : THE MEASUREMENT ANTENNAS WERE CALIBRATED IN ACCORDANCE TO THE REQUIREMENTS OF C63.5-2017.)

Calculation

Result(dBuV/m) : Reading Value(dBuV) + Cable loss(dB) - Pre amplifier gain(dB) + Ant. Factor(dB)
Margin : Limit(dBuV/m) - Result(dBuV/m)





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (30 ~ 1 000) MHz _Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60
FCC Part 15 Subpart B			

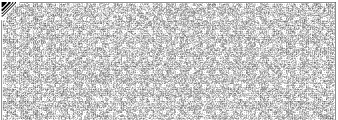
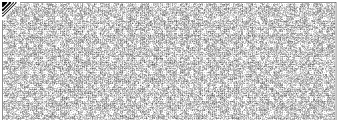
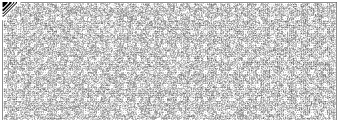
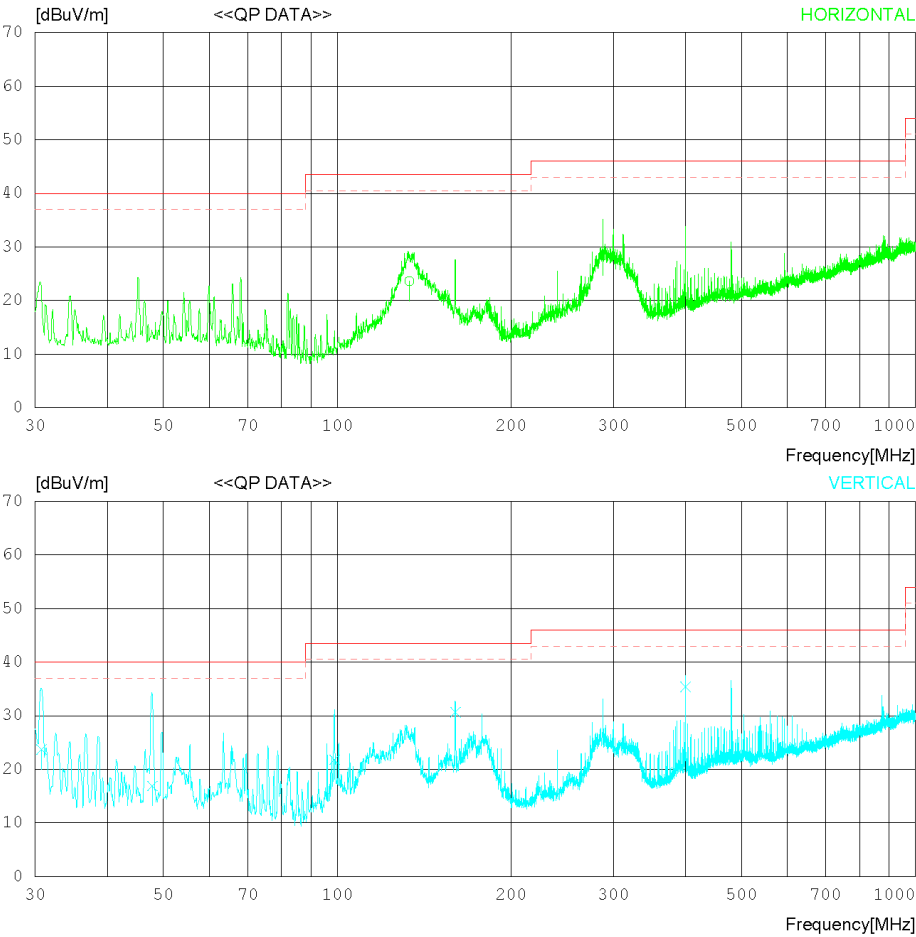
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21'C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB

Antenna Factor
1. ANT_EMC-309_VULB9160_3363_with ATT_2024-10-07
Cable Loss
1. Amp to Receiver #26_C3_2024_12_11
2. Ant to Bottom #24_C1_2024_12_11
3. Bottom to Amp #25_C2_2024_12_11
Pre Amp Gain
1. EMC-110_AMP_MLA-100K01-B01-26_1252741_2025.02.12





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Date 2025-07-02

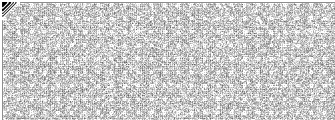
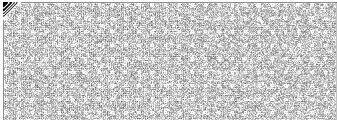
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart B Class B (3m)
MARGIN: 3 dB

Antenna Factor
1. ANT_EMC-309_VULB9160_3363_with ATT_2024-10-07
Cable Loss
1. Amp to Receiver #26_C3_2024_12_11
2. Ant to Bottom #24_C1_2024_12_11
3. Bottom to Amp #25_C2_2024_12_11
Pre Amp Gain
1. EMC-110_AMP_MLA-100K01-B01-26_1252741_2025.02.12

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- HORIZONTAL -----										
1	133.069	31.20	17.91	1.79	27.30	23.60	43.50	19.90	307	353
2	288.002	33.90	18.90	2.64	27.08	28.36	46.00	17.64	243	248
----- VERTICAL -----										
3	30.788	32.90	17.08	0.89	27.20	23.67	40.00	16.33	127	355
4	47.814	25.00	18.08	1.09	27.29	16.88	40.00	23.12	108	357
5	98.842	32.90	14.65	1.55	27.30	21.80	43.50	21.70	114	29
6	160.006	37.20	18.80	1.95	27.30	30.65	43.50	12.85	106	355
7	399.994	37.90	21.30	3.17	27.00	35.37	46.00	10.63	135	354





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (30 ~ 1 000) MHz _Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60
ICES-003 Issue 7			

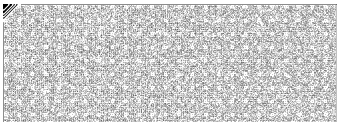
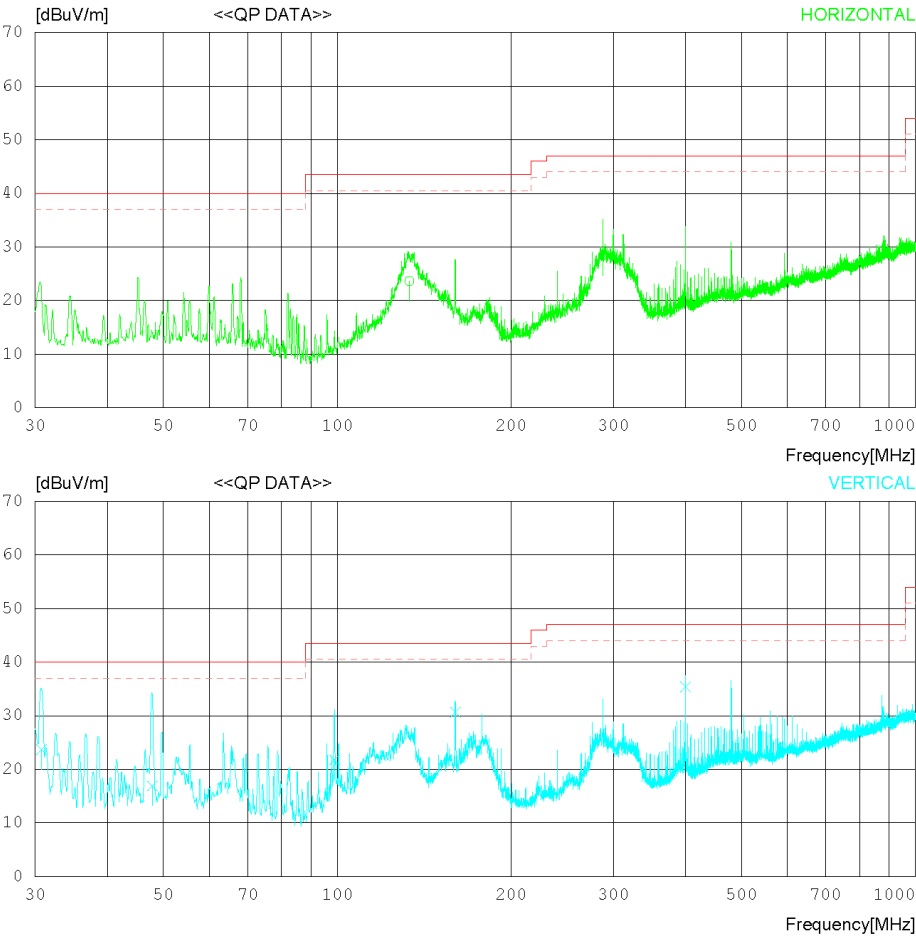
Date 2025-07-02

Order No. DTNC2506-04911
Power Supply AC 120 V 60 Hz
Temp/Humi 21'C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : ICES-003 Issue 7_Class B
MARGIN: 3 dB

- Antenna Factor
1. ANT_EMC-309_VULB9160_3363_with ATT_2024-10-07
Cable Loss
1. Amp to Receiver #26_C3_2024_12_11
2. Ant to Bottom #24_C1_2024_12_11
3. Bottom to Amp #25_C2_2024_12_11
Pre Amp Gain
1. EMC-110_AMP_MLA-100K01-B01-26_1252741_2025.02.12





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

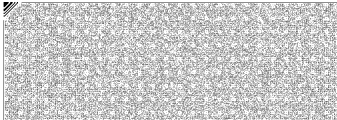
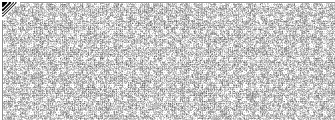
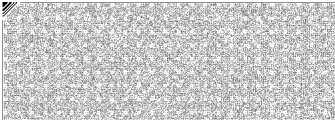
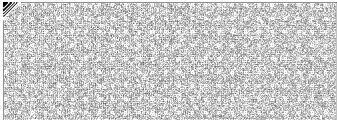
Order No. DTNC2506-04911
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : ICES-003 Issue 7_Class B
MARGIN: 3 dB

Antenna Factor
1. ANT_EMC-309_VULB9160_3363_with ATT_2024-10-07
Cable Loss
1. Amp to Receiver #26_C3_2024_12_11
2. Ant to Bottom #24_C1_2024_12_11
3. Bottom to Amp #25_C2_2024_12_11
Pre Amp Gain
1. EMC-110_AMP_MLA-100K01-B01-26_1252741_2025.02.12

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP	FACTOR							
		[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- HORIZONTAL -----										
1	133.069	31.20	17.91	1.79	27.30	23.60	43.50	19.90	307	353
2	288.002	33.90	18.90	2.64	27.08	28.36	47.00	18.64	243	248
----- VERTICAL -----										
3	30.788	32.90	17.08	0.89	27.20	23.67	40.00	16.33	127	355
4	47.814	25.00	18.08	1.09	27.29	16.88	40.00	23.12	108	357
5	98.842	32.90	14.65	1.55	27.30	21.80	43.50	21.70	114	29
6	160.006	37.20	18.80	1.95	27.30	30.65	43.50	12.85	106	355
7	399.994	37.90	21.30	3.17	27.00	35.37	47.00	11.63	135	354





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (1 ~ 6) GHz _ Peak Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

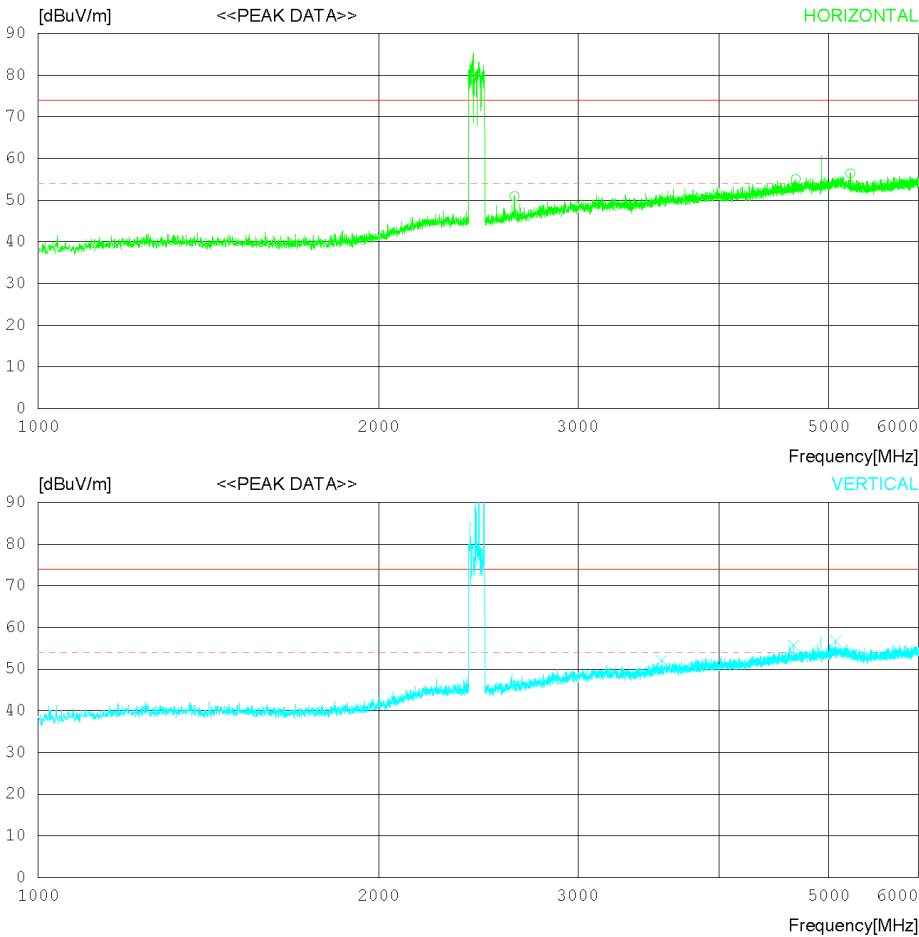
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

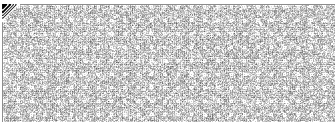
Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. ANT_9120D_1014_24.07.31
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
3. #29_C3_Amp to Receiver_3m_1-18G_2024-09-15
Pre Amp Gain
1. AMP_8449B_3008A00887_2024.08.22



* Remark : (2,402 ~ 2,480) MHz is Bluetooth frequency.
(4,804 ~ 4,960) MHz is harmonics of fundamental of Bluetooth frequency.





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. ANT_9120D_1014_24.07.31
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
3. #29_C3_Amp to Receiver_3m_1-18G_2024-09-15
Pre Amp Gain
1. AMP_8449B_3008A00887_2024.08.22

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	2636.250	45.50	27.77	12.75	35.07	50.95	74.0	23.05	152	2
2	4673.125	41.90	31.05	16.93	34.83	55.05	74.0	18.95	143	0
3	5221.875	42.40	31.51	17.33	34.78	56.46	74.0	17.54	207	0
----- VERTICAL -----										
4	3560.000	42.40	29.12	15.45	34.94	52.03	74.0	21.97	104	9
5	4655.625	42.60	31.01	16.91	34.83	55.69	74.0	18.31	326	4
6	5071.250	42.40	31.84	17.26	34.79	56.71	74.0	17.29	175	359





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (1 ~ 6) GHz _ Average Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

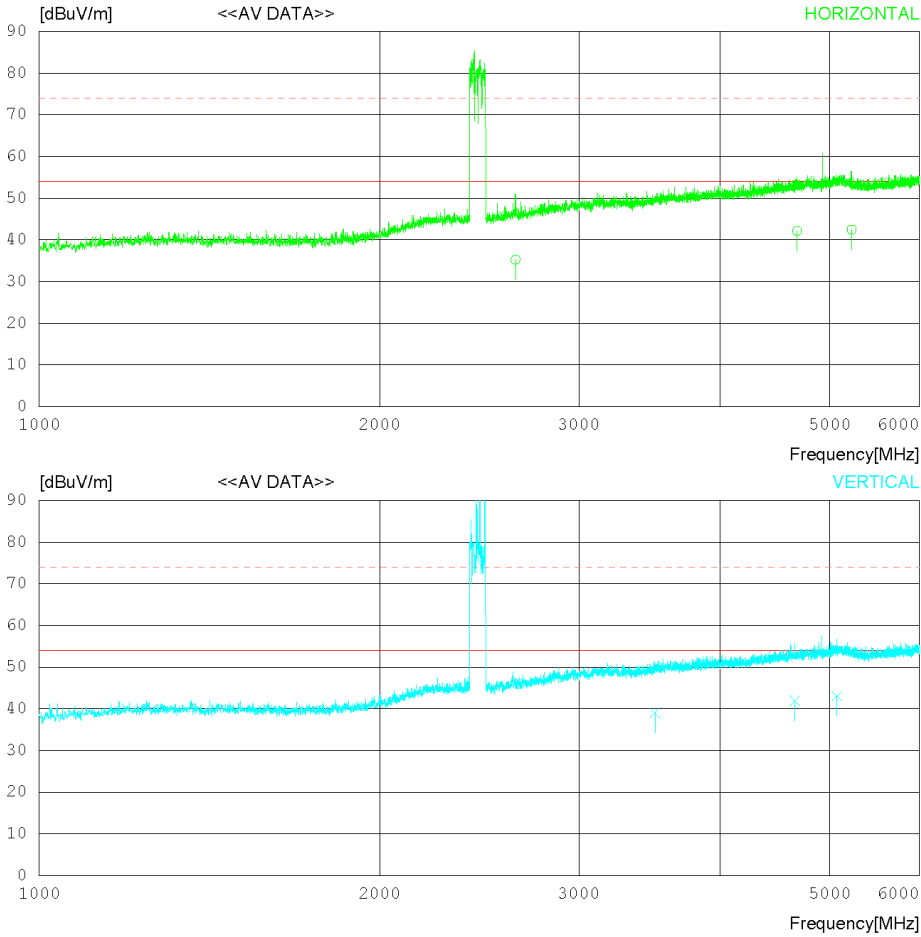
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. ANT_9120D_1014_24.07.31
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
3. #29_C3_Amp to Receiver_3m_1-18G_2024-09-15
Pre Amp Gain
1. AMP_8449B_3008A00887_2024.08.22



* Remark : (2,402 ~ 2,480) MHz is Bluetooth frequency.
(4,804 ~ 4,960) MHz is harmonics of fundamental of Bluetooth frequency.





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

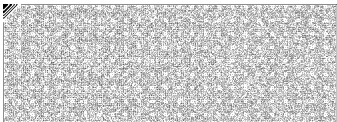
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. ANT_9120D_1014_24.07.31
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
3. #29_C3_Amp to Receiver_3m_1-18G_2024-09-15
Pre Amp Gain
1. AMP_8449B_3008A00887_2024.08.22

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	2636.498	29.80	27.77	12.75	35.07	35.25	54.00	18.75	154	5
2	4675.580	29.00	31.05	16.93	34.83	42.15	54.00	11.85	146	3
3	5224.224	28.40	31.50	17.32	34.78	42.44	54.00	11.56	209	2
----- VERTICAL -----										
4	3501.672	29.90	28.91	15.18	34.95	39.04	54.00	14.96	101	8
5	4656.803	28.80	31.01	16.91	34.83	41.89	54.00	12.11	328	6
6	5073.488	28.70	31.85	17.26	34.79	43.02	54.00	10.98	171	356





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (6 ~ 18) GHz _ Peak Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

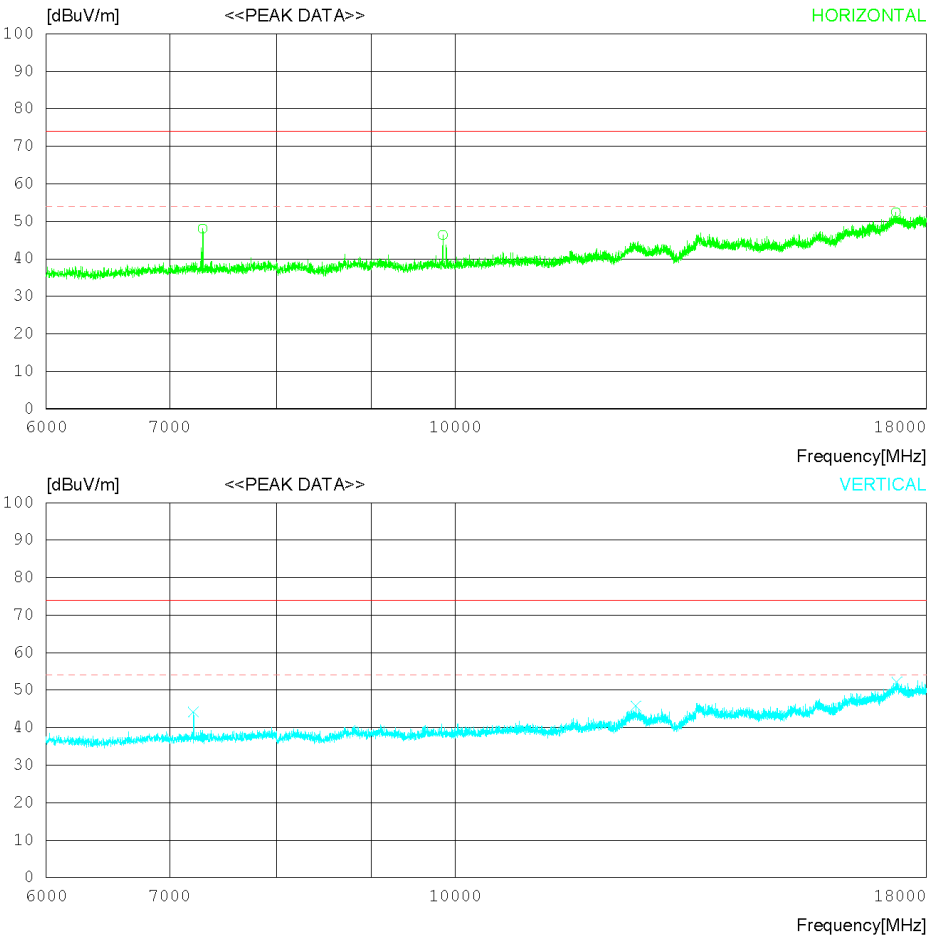
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. EMC-233-A_EM-6969_156_2024.12.18
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
Pre Amp Gain
1. EMC-233-M_MLA-0618-B03-34_2024.12.13





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

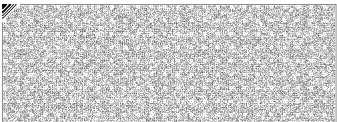
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. EMC-233-A_EM-6969_156_2024.12.18
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
Pre Amp Gain
1. EMC-233-M_MLA-0618-B03-34_2024.12.13

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	7294.500	38.40	30.80	16.91	38.04	48.07	74.0	25.93	169	353
2	9841.500	35.20	31.50	17.49	37.86	46.33	74.0	27.67	209	357
3	17323.500	29.90	37.10	21.85	36.45	52.40	74.0	21.6	109	352
----- VERTICAL -----										
4	7210.500	34.40	30.80	17.00	38.02	44.18	74.0	29.82	270	355
5	12523.500	31.60	32.70	19.17	37.66	45.81	74.0	28.19	121	330
6	17344.500	29.70	37.10	21.92	36.48	52.24	74.0	21.76	175	3





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (6 ~ 18) GHz _ Average Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

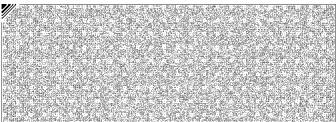
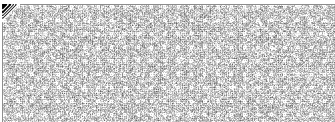
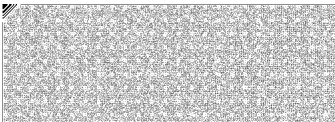
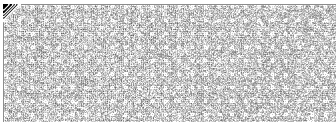
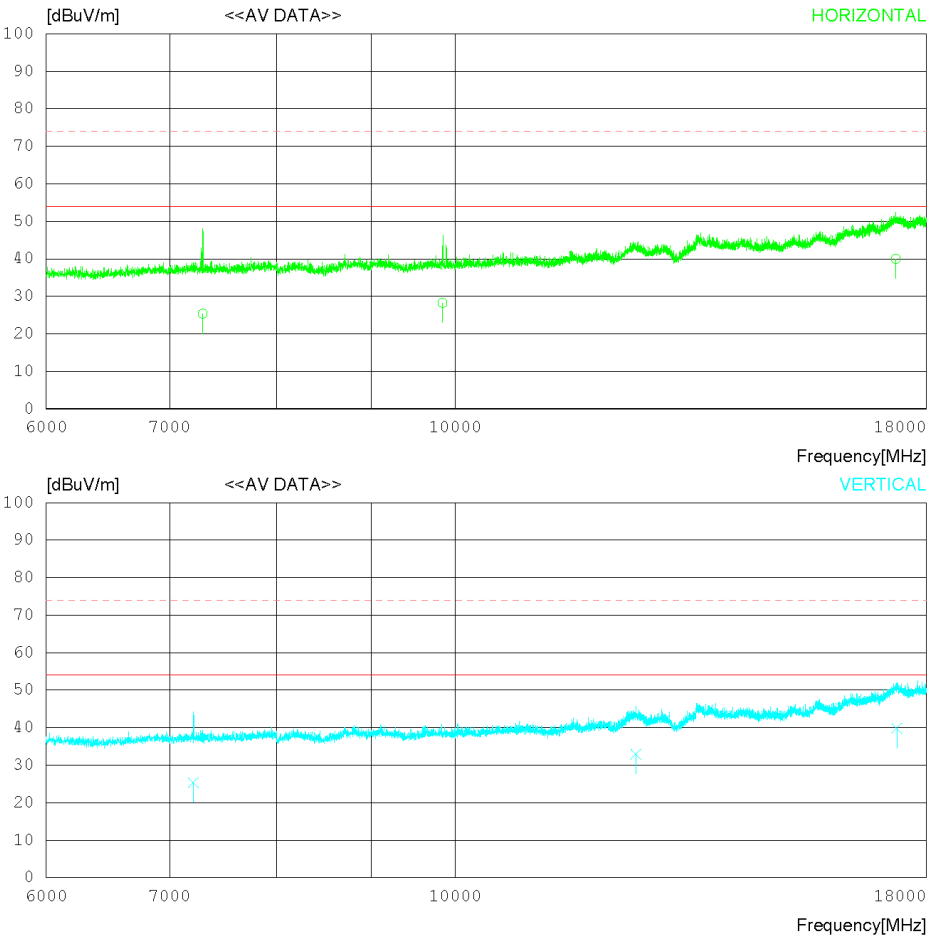
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. EMC-233-A_EM-6969_156_2024.12.18
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
Pre Amp Gain
1. EMC-233-M_MLA-0618-B03-34_2024.12.13





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

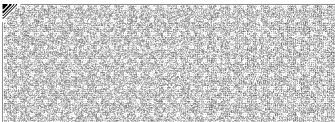
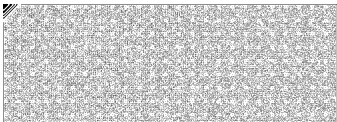
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. EMC-233-A_EM-6969_156_2024.12.18
Cable Loss
1. #27_C1_Ant to Bottom_3m_1-18G_2025-01-02
2. #28_C2_Bottom to Amp(Filter,Receiver)_3m_1-18G_2024-09-15
Pre Amp Gain
1. EMC-233-M_MLA-0618-B03-34_2024.12.13

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	7295.261	15.70	30.80	16.91	38.04	25.37	54.00	28.63	167	351
2	9839.217	17.10	31.50	17.49	37.86	28.23	54.00	25.77	202	355
3	17321.400	17.50	37.10	21.84	36.45	39.99	54.00	14.01	106	351
----- VERTICAL -----										
4	7211.509	15.60	30.80	17.00	38.02	25.38	54.00	28.62	272	356
5	12524.140	18.70	32.70	19.18	37.66	32.92	54.00	21.08	126	332
6	17346.890	17.30	37.10	21.93	36.48	39.85	54.00	14.15	178	4





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Radiated disturbance at (18 ~ 40) GHz _ Peak Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

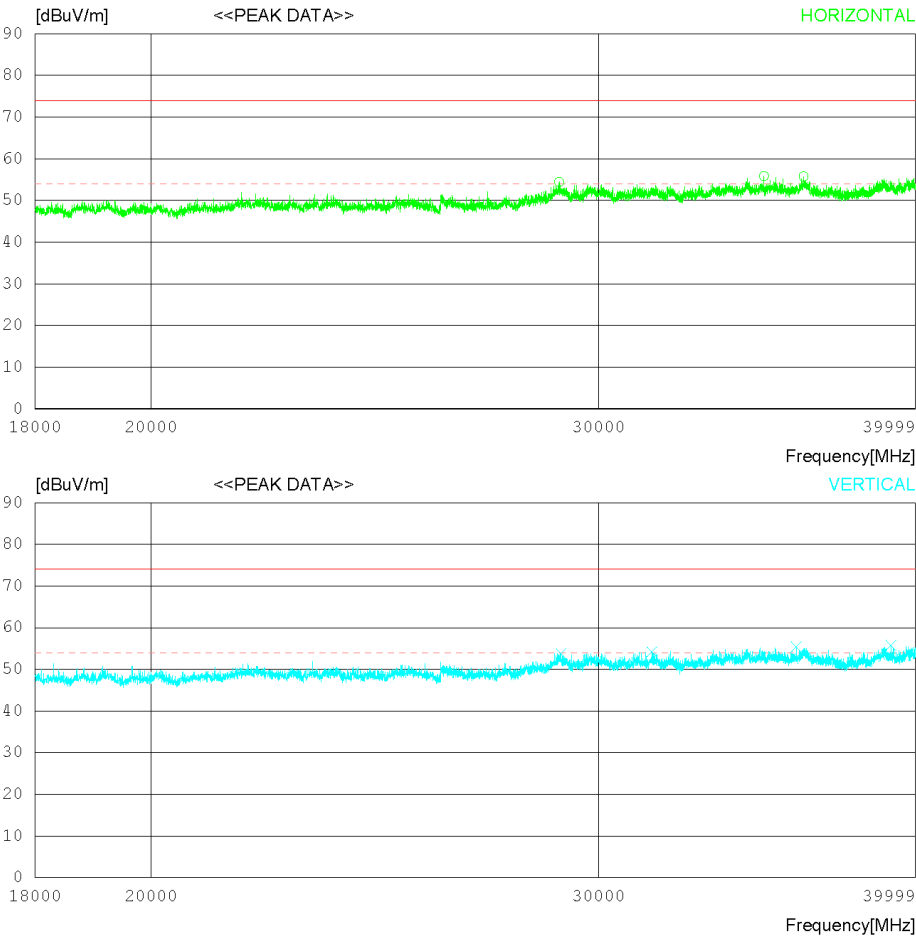
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. ANT_3116C_00240008_2024.07.31
Cable Loss
1. #32_C1_Ant to Amp_0.2m_18-40G_2025-06-19
2. #33_C2_Amp to Receiver_10m_18-40G_2024-08-23
Pre Amp Gain
1. AMP_LNAS-5018004000-33-5P_2024.07.31





Report No.: DREKFCC2508-0093(1)
(FCC ID : 2A78WLUMIO / IC : 28870-LUMIO)



Date 2025-07-02

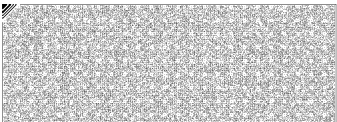
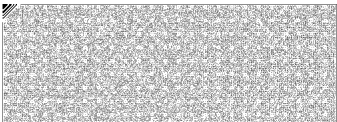
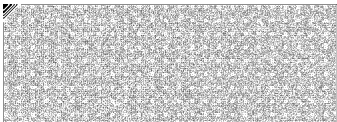
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

Antenna Factor
1. ANT_3116C_00240008_2024.07.31
Cable Loss
1. #32_C1_Ant to Amp_0.2m_18-40G_2025-06-19
2. #33_C2_Amp to Receiver_10m_18-40G_2024-08-23
Pre Amp Gain
1. AMP_LNAS-5018004000-33-5P_2024.07.31

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	28950.500	38.40	46.05	24.71	54.73	54.43	74.0	19.57	240	276
2	34863.000	39.20	47.20	27.42	57.94	55.88	74.0	18.12	109	5
3	36139.000	40.60	46.66	27.69	59.18	55.77	74.0	18.23	105	0
----- VERTICAL -----										
4	29005.500	37.50	46.10	24.74	54.51	53.83	74.0	20.17	136	358
5	31499.750	38.00	46.90	25.82	56.50	54.22	74.0	19.78	367	133
6	35902.500	40.00	46.80	27.61	59.00	55.41	74.0	18.59	256	72
7	39128.250	38.50	46.30	28.90	57.95	55.75	74.0	18.25	116	358





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Radiated disturbance at (18 ~ 40) GHz _ Average Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	AC 120	Test Frequency (Hz)	60

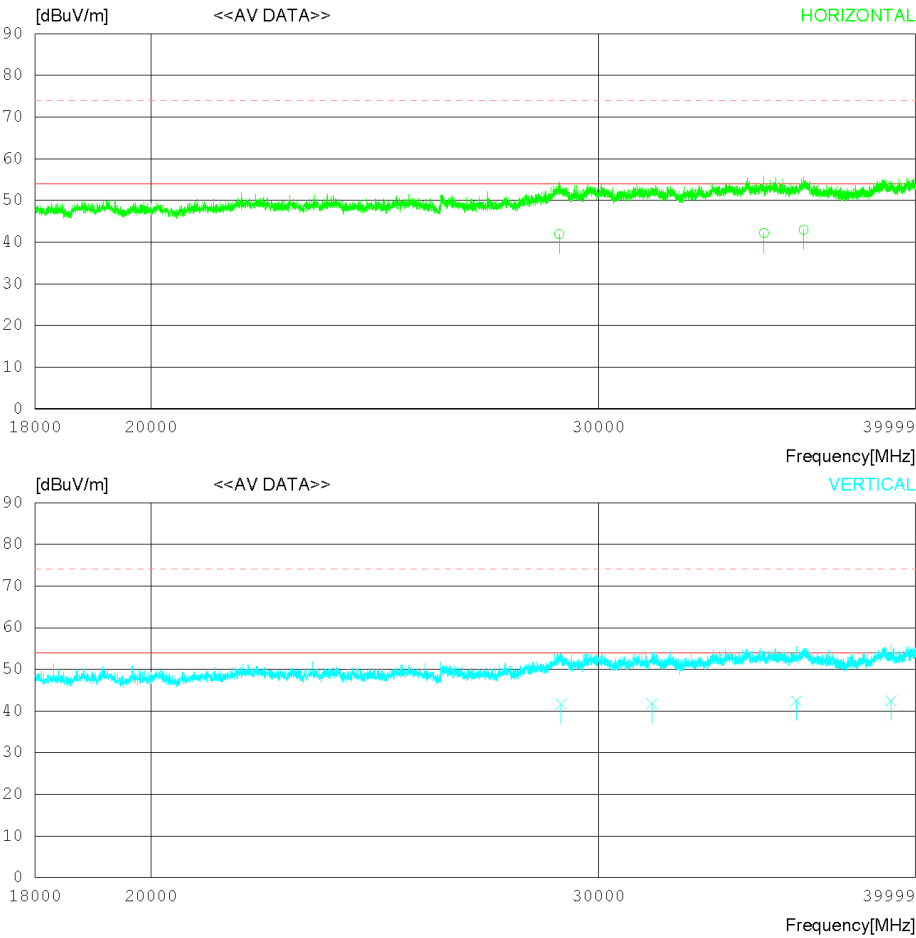
Date 2025-07-02

Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. ANT_3116C_00240008_2024.07.31
Cable Loss
1. #32_C1_Ant to Amp_0.2m_18-40G_2025-06-19
2. #33_C2_Amp to Receiver_10m_18-40G_2024-08-23
Pre Amp Gain
1. AMP_LNAS-5018004000-33-5P_2024.07.31





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Date 2025-07-02

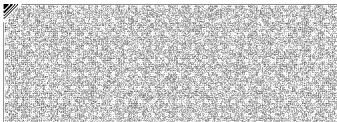
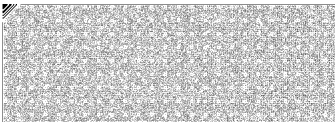
Order No. DTNC2506-04910
Power Supply AC 120 V 60 Hz
Temp/Humi 21°C 43 % R.H.
Test Condition Bluetooth

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

Antenna Factor
1. ANT_3116C_00240008_2024.07.31
Cable Loss
1. #32_C1_Ant to Amp_0.2m_18-40G_2025-06-19
2. #33_C2_Amp to Receiver_10m_18-40G_2024-08-23
Pre Amp Gain
1. AMP_LNAS-5018004000-33-5P_2024.07.31

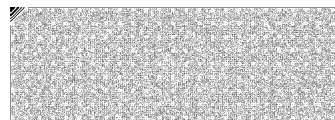
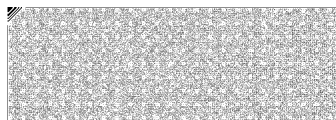
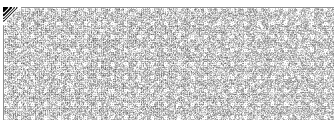
No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- HORIZONTAL -----										
1	28951.110	25.90	46.05	24.71	54.72	41.94	54.00	12.06	244	273
2	34862.910	25.50	47.20	27.42	57.94	42.18	54.00	11.82	106	2
3	36139.760	27.80	46.66	27.69	59.18	42.97	54.00	11.03	102	6
----- VERTICAL -----										
4	29003.720	25.40	46.10	24.74	54.51	41.73	54.00	12.27	133	355
5	31499.490	25.50	46.90	25.82	56.50	41.72	54.00	12.28	364	131
6	35903.060	27.00	46.80	27.61	59.00	42.41	54.00	11.59	253	74
7	39127.020	25.20	46.30	28.91	57.95	42.46	54.00	11.54	119	354



7.3 Antenna Power Conduction

ANSI C63.4	Antenna power conduction		Result
<u>Method:</u> Power on the receive antenna terminals was to be determined by measurement of the voltage present at these terminals. Antenna conducted power measurements was performed with the EUT antenna terminals connected directly to measuring instrument using a impedance-Matching network to connect the measurement Instrument to the antenna terminals of the EUT. The losses in decibels in impedance-matching network and cables was added to the measured values in dBμV. The measurements were repeated with the receiver tuned to a frequency until all of frequencies had been successively measured. Power in the receive antenna terminals in the ratio of V ² /R, where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument			Not Applicable
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Limit	
	30 MHz to 1 000 MHz	2 nW (50 dBμV)	
	54 MHz to 300 MHz 300 MHz to 450 MHz 450 MHz to 804 MHz	-26 dBmV (34 dBμV) -20 dBmV (40 dBμV) -15 dBmV (45 dBμV)	
	Measurement Point	Tuner port	
EUT mode (Refer to clauses 4)	Test configuration mode	N/A	
	EUT Operation mode	N/A	

Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
-	-	-	-	-	-



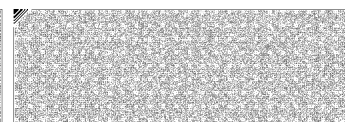
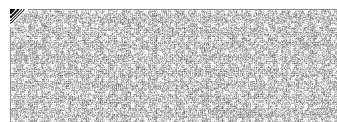


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Antenna Power Conduction _Measurement data graph _ Low			
Test configuration mode	N/A	EUT Operation mode	N/A
Test voltage (V)	N/A	Test Frequency (Hz)	N/A
N/A			
* Remark : 98 MHz is Rx Frequency of FM.			

Conducted differential voltage disturbance _Measurement data list					
Test configuration mode		N/A	EUT Operation mode		N/A
Source (MHz)	Frequency (MHz)	Limit (dBμV)	Result (dBμV)	Margin (dB)	
Fundamental (≤ 1 000)	-	50	-	-	
Harmonics (30 ~ 300)	-		-	-	
Harmonics (300 ~ 1 000)	-		-	-	
Other (30 ~ 1 000)	-		-	-	





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Antenna Power Conduction _Measurement data graph _ Middle			
Test configuration mode	N/A	EUT Operation mode	N/A
Test voltage (V)	N/A	Test Frequency (Hz)	N/A
N/A			
* Remark : 98 MHz is Rx Frequency of FM.			

Conducted differential voltage disturbance _Measurement data list					
Test configuration mode		N/A	EUT Operation mode		N/A
Source (MHz)	Frequency (MHz)	Limit (dBμV)	Result (dBμV)	Margin (dB)	
Fundamental (≤ 1 000)	-	50	-	-	
Harmonics (30 ~ 300)	-		-	-	
Harmonics (300 ~ 1 000)	-		-	-	
Other (30 ~ 1 000)	-		-	-	



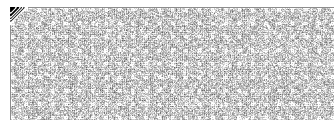
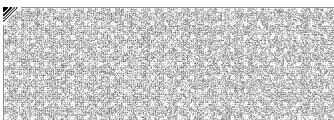


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Antenna Power Conduction _Measurement data graph _ High			
Test configuration mode	N/A	EUT Operation mode	N/A
Test voltage (V)	N/A	Test Frequency (Hz)	N/A
N/A			
* Remark : 98 MHz is Rx Frequency of FM.			

Conducted differential voltage disturbance _Measurement data list					
Test configuration mode		N/A	EUT Operation mode		N/A
Source (MHz)	Frequency (MHz)	Limit (dBμV)	Result (dBμV)	Margin (dB)	
Fundamental (≤ 1 000)	-	50	-	-	
Harmonics (30 ~ 300)	-		-	-	
Harmonics (300 ~ 1 000)	-		-	-	
Other (30 ~ 1 000)	-		-	-	





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8. Revision History

Date	Report No. (Order No.)	Description	Revised By	Reviewed By
Aug. 29. 2025	DREKFCC2508-0093 (DTNC2506-04910, DTNC2506-04911)	Initial report	ChangHo Han	DaeHwa Eun
Dec. 09. 2025	DREKFCC2508-0093(1) (DTNC2506-04910, DTNC2506-04911)	Add Measurement Instrument List (9 page, 13 page)	ChangHo Han	DaeHwa Eun

-End of test report-

