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Applicant	:	HORI Co., Ltd. 640 Saedo-Cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-0054, Japan
Supplier / Manufacturer	:	HORI Co., Ltd. 640 Saedo-Cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-0054, Japan
Description of Sample(s)	:	Submitted sample(s) said to beProduct:USB ReceiverBrand Name:HORIModel No.:2160-038JNNFCC ID:RQZSPF-2160B
Date Samples Received	:	2025-01-02
Date Tested	:	2025-01-07 to 2025-01-13
Investigation Requested	:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.10: 2013 for FCC Certification.
Conclusions	:	The submitted product <u>COMPLIED</u> with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
Remarks	:	
Test by		Susu

Dr.CHAN Kwok Hung, Brian Authorized Signatory



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Photograph(s) of Product



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<u>1.0</u> <u>General Details</u>

Brand Name: Model Number: Rating: USB Receiver HORI Co., Ltd. 640 Saedo-Cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-0054, Japan HORI 2160-038JNN DC 5V by host unit

1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a USB Receiver. It is a transceiver operating at 2403Hz~2479MHz and the RF signal was modulated by IC.

1.2 **RF Module Details**

Module Model Number:HJM90021Module FCC ID:N/AModulation:GFSKFrequency Range:2403-2479MHz

1.3 Antenna Details

Antenna Type: Antenna Gain: Chip antenna 3.49dBi

1.4 Date of Order

2025-01-02

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2025-01-07 to 2025-01-13

1.7 Country of Origin

China

1.8 Channel List

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Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2403	20	2443
1	2405	21	2445
2	2407	22	2447
3	2409	23	2449
4	2411	24	2451
5	2413	25	2453
6	2415	26	2455
7	2417	27	2457
8	2419	28	2459
9	2421	29	2461
10	2423	30	2463
11	2425	31	2465
12	2427	32	2467
13	2429	33	2469
14	2431	34	2471
15	2433	35	2473
16	2435	36	2475
17	2437	37	2477
18	2439	38	2479
19	2441		



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2.0 <u>Technical Details</u>

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 Regulations and ANSI C63.10: 2013 for FCC Certification. The device was realized by test software, the power level selected 2.4dBm.

EMI_TEST_v2.0	_ X
8278.ini - SWIRE	- SWB SP
RF PM	
Setting:	Tx Rx
2403 Set_Channel	PA PAO - PAO - Set_Gpio
	Log_Window:
2.4dbm Set_Power	****************
BLE_2M · Set_RF_Mode	@ Send Hopping Channel Setting ************************************
	TC32 EVK: Swire OK
Carrier:	**************************************
	@ Senu Start CamerData Commanu ************************************
Carrier CarrierData	TC32 EVK: Swire OK ************************************
RX:	Set Parameter ***********************************
	TC32 EVK: Swire OK ************************************
RxTest	@ Send CarrierData Command ************************************
	TC32 EVK: Swire OK ************************************

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2.2 Test Standards and Results Summary Tables

EMISSION Results Summary									
Test Condition	Test Requirement	Test Method	Class /	Т	est Result				
			Severity	Pass	Failed	N/A			
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10: 2013	N/A	\boxtimes					
Radiated Emissions	FCC 47CFR 15.209 FCC 47CFR 15.205	ANSI C63.10: 2013	N/A	\boxtimes					
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	\boxtimes					
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	\boxtimes					
20dB Emission bandwith	FCC 47CFR 15.215(c)	ANSI C63.10: 2013	N/A	\boxtimes					

Note: N/A - Not Applicable



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Relative humidity 57%

- 3.0 Test Results
- 3.1 Emission
- 3.1.1 Radiated Emissions

Ambient temperature 25°C

Test Requirement: Test Method: Test Date: Mode of Operation: FCC 47CFR 15.249 & FCC 47CFR 15.209 ANSI C63.10:2013 2025-01-08 to 2025-01-09 Tx mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semianechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

 * Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with Registration Number: HK0001 Test Firm Registration Number: 367672



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Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW: VBW: Sweep: Span: Trace:	10kHz 30kHz Auto Fully capture the emissions being measured Max. hold
30MHz – 1GHz (QP)	RBW: VBW: Sweep: Span: Trace:	120kHz 120kHz Auto Fully capture the emissions being measured Max. hold
Above 1GHz (Pk & Av) (Other than Fundamental Emissions)	RBW: VBW: Sweep:	1MHz 1MHz Auto
	Span: Trace:	Fully capture the emissions being measured Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

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Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental	Field Strength of Fundamental Emission	Field Strength of Harmonics Emission
[MHz]	[microvolts/meter]	[microvolts/meter]
902-928	50,000 [Quasi-Peak]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

Calculated measurement uncertainty

(9kHz-30MHz): 2.0dB (30MHz -1GHz): 4.9dB (1GHz -6GHz): 4.02dB (6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



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Results of Tx mode (Lowest Frequency Channel-2403 MHz): Pass

Field Strength of Fundamental Emissions						
			Peak Value			
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
2403.00	91.2	-4.8	86.4	20,844.9	500,000	Vertical
2403.00	100.1	-4.7	95.4	59,156.2	500,000	Horizontal

Field Strength of Fundamental Emissions							
		A	Average Valu	e			
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field	
	Level @3m	Factor	Strength	Strength		Polarity	
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m		
2403.00	84.5	-4.8	79.7	9,605.1	50,000	Vertical	
2403.00	93.8	-4.7	89.1	28,641.8	50,000	Horizontal	

Field Strength of Harmonics Emission Peak Value								
Frequency	Frequency Measured Correction Field Field Limit @3m E-Field							
1 5	Level @3m	Factor	Strength	Strength		Polarity		
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	-		
4806.0	56.7	0.8	57.5	746.4	5,000	Vertical		
4806.0	57.6	0.5	58.1	806.3	5,000	Horizontal		
7209.0	49.7	7.0	56.7	683.9	5,000	Vertical		
7209.0	49.2	6.5	55.7	609.5	5,000	Horizontal		
9612.0	46.1	8.5	54.6	537.0	5,000	Vertical		
9612.0	47.1	8.3	55.4	588.8	5,000	Horizontal		
12015.0	45.4	10.9	56.3	653.1	5,000	Vertical		
12015.0	45.3	10.8	56.1	638.3	5,000	Horizontal		

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Field Strength of Harmonics Emission						
		A	Average Valu	e		
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
4806.0	42.6	0.8	43.4	148.4	500	Vertical
4806.0	43.3	0.5	43.8	154.0	500	Horizontal
7209.0	35.4	7.0	42.4	131.8	500	Vertical
7209.0	35.1	6.5	41.6	120.2	500	Horizontal
9612.0	33.3	8.5	41.8	123.0	500	Vertical
9612.0	34.0	8.3	42.3	130.3	500	Horizontal
12015.0	30.5	10.9	41.4	117.5	500	Vertical
12015.0	29.9	10.8	40.7	107.8	500	Horizontal

Results of Tx mode (Middle Frequency Channel- 2441MHz): Pass

Field Strength of Fundamental Emissions						
			Peak Value			
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
2441.00	89.5	-4.8	84.7	17,159.3	500,000	Vertical
2441.00	98.9	-4.7	94.2	51,345.2	500,000	Horizontal

Field Strength of Fundamental Emissions						
	Average Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
2441.00	83.7	-4.8	78.9	8,759.9	50,000	Vertical
2441.00	93.8	-4.7	89.1	28,543.0	50,000	Horizontal

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	Field Strength of Harmonics Emission					
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
4882.0	55.9	0.8	56.7	685.5	5,000	Vertical
4882.0	57.0	0.5	57.5	749.9	5,000	Horizontal
7323.0	48.7	7.0	55.7	609.5	5,000	Vertical
7323.0	49.3	6.5	55.8	616.6	5,000	Horizontal
9764.0	46.5	8.5	55.0	562.3	5,000	Vertical
9764.0	47.0	8.3	55.3	582.1	5,000	Horizontal
12205.0	45.2	10.9	56.1	638.3	5,000	Vertical
12205.0	44.7	10.8	55.5	595.7	5,000	Horizontal

	Field Strength of Harmonics Emission					
	Avarage Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
4882.0	41.6	0.8	42.4	132.1	500	Vertical
4882.0	42.2	0.5	42.7	136.5	500	Horizontal
7323.0	34.5	7.0	41.5	118.9	500	Vertical
7323.0	35.6	6.5	42.1	127.4	500	Horizontal
9764.0	33.2	8.5	41.7	121.6	500	Vertical
9764.0	33.4	8.3	41.7	121.6	500	Horizontal
12205.0	30.1	10.9	41.0	112.2	500	Vertical
12205.0	29.4	10.8	40.2	102.3	500	Horizontal

Results of Tx mode (Highest Frequency Channel - 2479MHz): Pass

Field Strength of Fundamental Emissions						
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	MHz $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$					
2479.00	90.3	-4.8	85.5	18,836.5	500,000	Vertical
2479.00	99.2	-4.7	94.5	52,808.0	500,000	Horizontal

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Field Strength of Fundamental Emissions						
	Average Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
2479.00	84.0	-4.8	79.2	9,130.6	50,000	Vertical
2479.00	94.1	-4.7	89.4	29,376.5	50,000	Horizontal

	Field Strength of Harmonics Emission					
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
4958.0	55.7	0.8	56.5	669.9	5,000	Vertical
4958.0	57.4	0.5	57.9	785.2	5,000	Horizontal
7437.0	49.1	7.0	56.1	638.3	5,000	Vertical
7437.0	51.2	6.5	57.7	767.4	5,000	Horizontal
9916.0	46.2	8.5	54.7	543.3	5,000	Vertical
9916.0	47.7	8.3	56.0	631.0	5,000	Horizontal
12395.0	45.2	10.9	56.1	638.3	5,000	Vertical
12395.0	45.0	10.8	55.8	616.6	5,000	Horizontal

	Field Strength of Harmonics Emission					
	Avarage Value					
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field
	Level @3m	Factor	Strength	Strength		Polarity
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	
4958.0	41.2	0.8	42.0	126.2	500	Vertical
4958.0	42.6	0.5	43.1	142.9	500	Horizontal
7437.0	34.4	7.0	41.4	117.5	500	Vertical
7437.0	35.3	6.5	41.8	123.0	500	Horizontal
9916.0	33.1	8.5	41.6	120.2	500	Vertical
9916.0	34.0	8.3	42.3	130.3	500	Horizontal
12395.0	29.5	10.9	40.4	104.7	500	Vertical
12395.0	29.9	10.8	40.7	108.4	500	Horizontal

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Radiated Emissions Measurement:

Limit :

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Result: RF Radiated Emissions (1GHz-26GHz) (Lowest)

Field Strength of Band-edge Compliance						
	Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m	
2400.0	53.1	-4.8	48.3	74.0	25.8	Vertical
2400.0	57.3	-4.7	52.6	74.0	21.5	Horizontal

Field Strength of Band-edge Compliance						
Average Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m	
2400.0	43.1	-4.8	38.3	54.0	15.7	Vertical
2400.0	46.7	-4.7	42.0	54.0	12.1	Horizontal

Result: RF Radiated Emissions (1GHz-26GHz) (Highest)

Field Strength of Band-edge Compliance						
	Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m	
2483.5	51.6	-4.8	46.8	74.0	27.2	Vertical
2483.5	52.2	-4.7	47.5	74.0	26.5	Horizontal

Field Strength of Band-edge Compliance						
	Average Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m	
2483.5	41.6	-4.8	36.8	54.0	17.2	Vertical
2483.5	41.4	-4.7	36.7	54.0	17.3	Horizontal

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Emissions radiated outside of the specified frequency bands (Lowest) Horizontal



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Emissions radiated outside of the specified frequency bands (Highest) Horizontal





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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Remarks:

Calculated measurement uncertainty (9kHz-30MHz): 2.0dB /(30MHz - 1GHz): 4.9dB Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

Results of TX mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits



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Results of TX mode (30MHz – 1GHz)(2403MHz worst case): PASS Horizontal



	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		·
1	30.638	29.36	40.00	-10.64	QP	Horizontal
2	46.666	22.74	40.00	-17.26	QP	Horizontal
3	295.147	26.82	46.00	-19.18	QP	Horizontal
4	465.599	32.36	46.00	-13.64	QP	Horizontal
5	633.907	34.78	46.00	-11.22	QP	Horizontal
6	893.857	39.03	46.00	-6.97	QP	Horizontal

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Results of TX mode (30MHz – 1GHz) (2403MHz worst case): PASS Vertical



Ambient Temperature: 26.7C Relative Humidity : 53.8% Air Pressure : 100.9kPa

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
_	MHz	dBuV/m	dBuV/m	dB		
1	35.749	25.74	40.00	-14.26	QP	Vertical
2	57.191	21.73	40.00	-18.27	QP	Vertical
3	299.316	25.77	46.00	-20.23	QP	Vertical
4	510.044	31.20	46.00	-14.80	QP	Vertical
5	724.261	35.25	46.00	-10.75	QP	Vertical
6	932.272	38.19	46.00	-7.81	QP	Vertical

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3.1.2 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2025-01-13
Mode of Operation:	TX mode
Test Voltage:	120Va.c. 60Hz

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Test Method:

The test was performed in accordance with ANSI ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Receiver Setting:

Bandw. = 9 kHz, Meas. Time= 10.0 ms, Step Width = 5.0kHz Detector = MaxPeak and CISPR AV

Test Setup:



Limits for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Remarks:

Calculated measurement uncertainty (0.15MHz - 30MHz): 3.25dB

-*- Emission(s) that is far below the corresponding limit line.

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Results of TX mode (L): PASS

Please refer to the following diagram for individual results.



MEASUREMENT	RESULT: "N	ro1_0001_	fin QP"			
Frequency	/ Level	Transd	Limit	Margin	Line	PE
MHz	: dBµV	dB	dBµV	dB		
0.245000	49.50	9.6	61.90	12.40	L1	GND
0.800000	49.30	9.6	56.00	6.70	L1	GND
0.920000	46.30	9.6	56.00	9.70	L1	GND
4.305000	34.40	9.6	56.00	21.60	L1	GND
10.250000	25.60	9.8	60.00	34.40	L1	GND
14.285000	29.40	9.8	60.00	30.60	L1	GND
MEASUREMENT	RESULT: "	rol 0001	fin AV"			
MEASUREMENT Frequency	<i>RESULT:</i> "W	vol_0001_ Transd	fin AV" Limit	Margin	Line	PE
MEASUREMENT Frequency MH2	<i>RESULT:</i> "w v Level c dBuV	rol_0001_ Transd dB	fin AV" Limit dBuV	Margin dB	Line	PE
MEASUREMENT Frequency MHz	<i>RESULT: "T</i> / Level : dBµV	/ol_0001_ Transd dB	fin AV" Limit dBµV	Margin dB	Line	PE
MEASUREMENT Frequency MH2 0.240000	RESULT: " Level dBµV 35.80	rol_0001_ Transd dB 9.6	fin AV" Limit dBµV 52.10	Margin dB 16.30	Line L1	PE
MEASUREMENT Frequency MH2 0.240000 0.800000	RESULT: " Level dBµV 35.80 36.80	rol_0001_ Transd dB 9.6 9.6	fin AV" Limit dBµV 52.10 46.00	Margin dB 16.30 9.20	Line L1 L1	PE GND GND
MEASUREMENT Frequency MH2 0.240000 0.800000 0.920000	RESULT: "7 7 Level 2 dBµV 0 35.80 0 36.80 0 33.70	rol_0001_ Transd dB 9.6 9.6 9.6	fin AV" Limit dBµV 52.10 46.00 46.00	Margin dB 16.30 9.20 12.30	Line L1 L1 L1	PE GND GND GND
MEASUREMENT Frequency MHZ 0.240000 0.800000 0.920000 4.300000	RESULT: "Y Level dBµV 35.80 36.80 33.70 27.60	rol_0001_ Transd dB 9.6 9.6 9.6 9.6 9.6	fin AV" Limit dBµV 52.10 46.00 46.00 46.00	Margin dB 16.30 9.20 12.30 18.40	Line L1 L1 L1 L1	PE GND GND GND GND
MEASUREMENT Frequency MHZ 0.240000 0.800000 0.920000 4.300000 8.640000	RESULT: "Y Level dBµV 35.80 36.80 33.70 27.60 20.40	rol_0001_ Transd dB 9.6 9.6 9.6 9.6 9.7	fin AV" Limit dBµV 52.10 46.00 46.00 46.00 50.00	Margin dB 16.30 9.20 12.30 18.40 29.60	Line L1 L1 L1 L1 L1 L1	PE GND GND GND GND GND

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Results of TX mode (N): PASS

Please refer to the following diagram for individual results.



MEASUREMENT	RESULT: "1	rol_0001_	fin QP"			
Frequency	/ Level	Transd	Limit	Margin	Line	PE
MH2	dBµV	dB	dBµV	dB		
0.245000	52.60	9.6	61.90	9.30	N	GND
0.790000	48.40	9.6	56.00	7.60	N	GND
0.910000	44.40	9.6	56.00	11.60	N	GND
4.215000	34.50	9.6	56.00	21.50	N	GND
7.260000	27.70	9.7	60.00	32.30	N	GND
13.815000	27.10	9.8	60.00	32.90	N	GND
MEASUREMENT	RESULT: "	vol 0001	fin AV"			
MEASUREMENT Frequency	<i>RESULT: "</i> Level	vol_0001_ Transd	<i>fin AV"</i> Limit	Margin	Line	PE
MEASUREMENT Frequency MH2	<i>RESULT:</i> "v Level dBuV	rol_0001_ Transd dB	<i>fin AV"</i> Limit dBµV	Margin dB	Line	PE
MEASUREMENT Frequency MH2	<i>RESULT: "</i> Level dBµV	vol_0001_ Transd dB	fin AV" Limit dBµV	Margin dB	Line	PE
MEASUREMENT Frequency MH2 0.245000	RESULT: " γ Level 2 dBμV) 42.70	rol_0001_ Transd dB 9.6	fin AV" Limit dBµV 51.90	Margin dB 9.30	Line N	PE GND
MEASUREMENT Frequency MH2 0.245000 0.790000	RESULT: "1 Level dBuV 42.70 37.10	vol_0001_ Transd dB 9.6 9.6	fin AV" Limit dBµV 51.90 46.00	Margin dB 9.30 8.90	Line N N	PE GND GND
MEASUREMENT Frequency MH2 0.245000 0.790000 0.910000	RESULT: "7 7 Level 2 dBµV 0 42.70 0 37.10 0 31.50	vol_0001_ Transd dB 9.6 9.6 9.6	fin AV" Limit dBµV 51.90 46.00 46.00	Margin dB 9.30 8.90 14.50	Line N N N	PE GND GND GND
MEASUREMENT Frequency MH2 0.245000 0.790000 0.910000 4.240000	RESULT: " v Level c dBµV) 42.70) 37.10) 31.50) 27.90	rol_0001_ Transd dB 9.6 9.6 9.6 9.6 9.6	fin AV" Limit dBµV 51.90 46.00 46.00 46.00	Margin dB 9.30 8.90 14.50 18.10	Line N N N N	PE GND GND GND GND
MEASUREMENT Frequency MH2 0.245000 0.790000 0.910000 4.240000 8.420000	RESULT: " Level dBµV 42.70 37.10 31.50 27.90 21.80	rol_0001_ Transd dB 9.6 9.6 9.6 9.6 9.7	fin AV" Limit dBµV 51.90 46.00 46.00 46.00 50.00	Margin dB 9.30 8.90 14.50 18.10 28.20	Line N N N N N	PE GND GND GND GND GND

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Relative humidity 57%

3.1.3 Antenna Requirement

Ambient temperature 25°C

Test Requirements: § 15.203

Test Specification:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

This is Chip antenna. There is no external antenna, the antenna gain =3.49dBi. User is unable to remove or changed the Antenna.



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3.1.4 20dB Bandwidth of Fundamental Emission

Ambient temperature 25°C

Relative humidity 57%

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Test Requirement:	FCC 47 CFR 15.249
Test Method:	ANSI C63.10:2013
Test Date:	2025-01-09
Mode of Operation:	Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

The measurement handwidth settings are	RBW = 30 kHz
The measurement bandwidth settings are	VBW = 100 kHz

Test Setup:

As Test Setup of clause 3.1.1 in this test report.



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Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[MHz]
2403.0	2.352

Ref Value 22.0	20dE 00 dBm	B Bandwidth of	Fundamental enter Freg: 2.4030 ig: Free Run	Emission 00000 GHz AvalHold	n (2403M :>10/10	[Hz) Radio Std	: None
		#IFGain:Low 🔭 #A	tten: 22 dB	0.		Radio Dev	/ice: BTS
10 dB/div R	ef 22.00 dBm	 			ń		
12.0							
2.00							
-8.00			wanter and a ware on				
-18.0		montenter		- Ward hard	h		
-28.0		and the second			(WWW		
-38.0	worker and				1 Vy		
-48.0	- my				\	~~···	Trong and the second
-58.0							~
-68.0							
Center 2.403 0 #Res BW 30 k	GHZ Hz		#VBW 100	kHz		Sp Sweep	an 5 MHz 6.867 ms
Occupied	Bandwidth	า	Total F	ower	8.25	dBm	
	2.0	0478 MHz					
Transmit Fi	req Error	9.921 kHz	OBW F	ower	99	.00 %	
x dB Bandv	vidth	2.352 MHz	x dB		-20.	00 dB	

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Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[MHz]
2441.0	2.349

20dB Ba Center Freq 2.441000000	GHz GHz GHz GHz GHz Genter Trig: F #Atten	nental Emission (24 r Freq: 2.441000000 GHz ree Run Avg Hold : 22 dB	41MHz) Radio S >10/10 Radio D	itd: None Vevice: BTS
	1			
.og 12.0				
2.00				
3.00	- A - WAY - A - A - A - A - A - A - A - A - A -	and and the second of the seco		
28.0	Martin Carl	````	A Vrode and	
38.0 10.0			When we we have	
18.0 mm			have the second	- Vardynage
8.0				- ⁻ ~~
8.0				
senter 2.441 GHz Res BW 30 kHz	#	VBW 100 kHz	Sweej	Span 5 MH p 6.867 m
Occupied Bandwidt	h	Total Power	8.71 dBm	
2.	0554 MHz			
Transmit Freq Error	10.230 kHz	OBW Power	99.00 %	
x dB Bandwidth	2.349 MHz	x dB	-20.00 dB	

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Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[MHz]
2479.0	2.353

Center Freq 2.47900000	GHz Center Trig: F	r Freq: 2.479000000 GHz ree Run AvalHold	Radio St >10/10	d: None
	#IFGain:Low #Atten	: 22 dB	Radio De	evice: BTS
10 dB/div Ref 22.00 dBn	n _			
Log 12.0				
2.00				
-8.00	how	the man way of the second		_
-18.0	atter and a start and a start a			
-28.0	www		1 Martin Martin	
-38.0			h h	www.
-48.0			<u>н</u>	
-58.0				,
68.0				
Center 2.479 GHz #Res BW 30 kHz	#	VBW 100 kHz	S Sweep	pan 5 MHz 6.867 ms
Occupied Bandwidt	h	Total Power	8.62 dBm	
2.	0515 MHz			
Transmit Freq Error	13.015 kHz	OBW Power	99.00 %	
x dB Bandwidth	2.353 MHz	x dB	-20.00 dB	

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Appendix A

List of Measurement Equipment

Radiated Emission							
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL	
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A	
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A	
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2024-04-18	2029-04-18	
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A	
EM293	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	N9020A	MY50510152	2023-03-21	2025-03-21	
EM363	SIGNAL ANALYZER(10HZ- 40GHZ)	R & S	FSV40	101231	2024-01-17	2026-01-17	
EM299	BROADBAND HORN ANTENNA	ETS-LINDGREN	3115	00114120	2023-01-25	2025-01-25	
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2023-01-16	2025-01-16	
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2023-02-15	2025-02-15	
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2022-09-26	2025-09-26	
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00094856	2022-08-26	2025-08-26	
EM200	DUAL CHANNEL POWER METER	R & S	NRVD	100592	2023-08-02	2025-08-02	

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM232	LISN	SCHAFFNER	NNB41	04/100082	2023-05-30	2025-05-30
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	2024-04-18	2025-04-18
EM179	IMPULSE LIMITER	R & S	ESH3-Z2	357.8810.52/54	2023-03-17	2025-03-17
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2022-02-06	2027-02-06
N/A	MEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	BSIB-K1	V1.20	N/A	N/A

Remarks:-

N/A Not Applicable or Not Available

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Appendix B

Photographs of EUT



View of the product



Inside View of the product





View of the product

View of the product





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Photographs of EUT



Measurement of Radiated Emission Test Set Up(30MHz to 1000MHz)





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Photographs of EUT

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Measurement of Conducted Emission Test Set Up



***** End of Test Report *****

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