

# FCC RADIO TEST REPORT

Applicant : Feit Electric Compar	ıy
Address : 4901 Gregg Road P	co Rivera, California 90660, United States
Manufacturer: National State Indus	tries Limited
Address : XinXing Group, WuL Province, 523695 Cl	ian Village, FengGang Town, DongGuan City, Guangdong nina
Factory : National State Indus	tries Limited
Address : XinXing Group, WuL Province, 523695 Cl	ian Village, FengGang Town, DongGuan City, Guangdong nina
Product Name : OUTDOOR PLUG	
Brand Name : Feit, Naspil	
Model No : SYNC/PLUG/REM, I NSRM004/ONESYN (For model difference	IC/RF-XXX(X=0-9, A-Z)
FCC ID : SYW-SYNCPLUGRI	ΞM
Measurement Standard: 47 CFR FCC Part 15	5, Subpart C (Section 15.249)
Receipt Date of Samples : November 29, 2022	
Date of Tested: November 29, 2022	to December 14, 2022
Date of Report: March 11, 2023	

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Rose Hu / Project Engineer

Approved by Iori Fan / Authorized Signatory

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# **Revision History**

Report Number	Description	Issued Date
NTC2211576FV00	Initial Issue	2023-03-11



# 1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.207 (a)	AC Power Conducted Emission	PASS	
§15.249(a)/ 15.209	Radiated Emissions	PASS	
§15.249(d)/ 15.205	Band Edge	PASS	
§15.215(c)	20dB Bandwidth	PASS	
§15.203	Antenna Requirement	PASS	



# 2. General Description of EUT

Product Information	
Product name:	OUTDOOR PLUG
Main Model Name:	SYNC/PLUG/REM
Additional Model Name:	NSADAPTER002-XXX, NSRM004/ONESYNC/RF-XXX(X=0-9, A-Z)
Model Difference:	These models have the same circuitry, electrical mechanical, PCB Layout and
	physical construction. The difference is model name due to marketing purpose.
S/N:	2211-6353
Brand Name:	Feit, Naspil
Hardware version:	V1.0
Software version:	V1.0
Rating:	AC 120V 60Hz
Typical arrangement:	Table-top
I/O Port:	N/A
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional information	
Note:	According to the model difference, all the tests performed on model SYNC/PLUG/REM.
Remark:	All the information above are provided by the manufacturer. More detailed feature of
	the EUT please refers to the user manual.



Technical Specification (	(2.4G Function)
Frequency Range:	2402MHz
Modulation Type:	GFSK
Number of Channel:	1
Antenna Type:	PCB antenna
Antenna Gain:	-3.49dBi

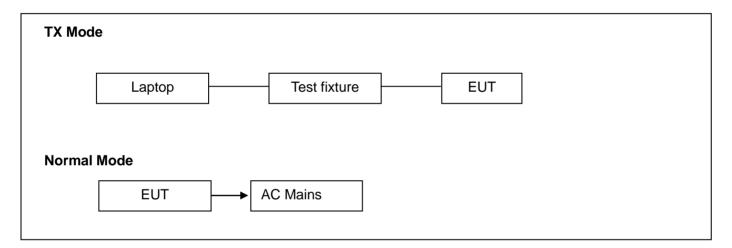


# 3. Test Channels and Modes Detail

	Mode	Channel		Frequency (MHz)	Modulation	Data Rate (Mbps)
1	ТХ		1	2402	GFSK	1
2	Normal Mode					

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

# 4. Configuration of EUT



# 5. Modification of EUT

No modifications are made to the EUT during all test items.



# 6. Description of Support Device

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	Laptop	Lenovo	02213DC	0A33012	Power cord, 1.8m, unshielded	
2.	Power supply (Laptop)	Taida	92P1154	N/A		

No.	Test Software	Modulation	Power Setting
1.	fcc_test_tool	GFSK	default



# 7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and	:	The Laboratory has been assessed and proved to be in compliance with
Authorizations		CNAS/CL01
		Listed by CNAS, August 13, 2018
		The Certificate Registration Number is L5795.
		The Certificate is valid until August 13, 2024
		The Laboratory has been assessed and proved to be in compliance with
		ISO17025
		Listed by A2LA, November 01, 2017
		The Certificate Registration Number is 4429.01
		The Certificate is valid until December 31, 2023
		Listed by FCC, November 06, 2017
		Test Firm Registration Number: 907417
		Listed by Industry Canada, June 08, 2017
		The Certificate Registration Number. Is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng
		District, Dongguan City, Guangdong Province, China



# 8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

## Test Standards:

47 CFR Part 15, Subpart C, 15.249 ANSI C63.10-2013

## **References Test Guidance:**

N/A

# 9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

# **10. Test Conditions**

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks		
1.	AC Power Conducted Emission	2	AC 120V 60Hz	Sean	See note 1		
2.	Radiated Emissions	1-2	AC 120V 60Hz	Sean	See note 1		
3.	Band Edge	1	AC 120V 60Hz	Sean	See note 1		
4.	20dB Bandwidth	1	AC 120V 60Hz	Sean	See note 1		
5.  Antenna Requirement							
Note: 4. The testing elimetic conditions for temperature, humidity, and etmospheric pressure are within $45, 25\%$ , 20, 70%							

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35 °C, 30~70%, 86~106kPa.



# **11. Measurement Uncertainty**

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	
		9kHz ~ 30MHz	±2.60 dB	
2.	Radiated Emission Test	30MHz ~ 1GHz	±4.68 dB	
2.		1GHz ~ 18GHz	±5.14 dB	
		18GHz ~ 40GHz	±5.14 dB	
3.	Conducted Spurious Emissions	10Hz ~ 40GHz	±0.78 dB	
4.	RF Output Power	10Hz ~ 40GHz	±0.86 dB	
5.	Power Spectral Density	10Hz ~ 40GHz	±1.06 dB	
6.	Occupied Channel Bandwidth		±1.42 x10-4% MHz	
Note:		1		

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. The measurement uncertainly levels above are estimated and calculated according to CISPR 16-4-2.

3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.



# **12. Sample Calculations**

	Conducted Emission											
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector						
0.1700	14.60	20.60	35.20	64.96	-29.76	QP						
Where,												
Freq.	Freq. = Emission frequency in MHz											
Reading Lev	el = Spect	rum Analyzer/Recei	ver Reading									
Corrector Fa	ictor = Inserti	ion loss of LISN + C	able Loss + RF Sv	vitching Unit	attenuation							
Measuremer	nt = Readi	ng + Corrector Factor	or									
Limit	= Limit s	stated in standard										
Margin	= Measu	urement - Limit										
Detector	= Readi	ng for Quasi-Peak /	Average / Peak									

	Radiated Spurious Emissions and Restricted Bands											
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Limit (dBuV/m)	Over (dB)	Detector							
175.5000	36.47	-9.61	26.86	43.50	-16.64	QP						
Where,												
Freq.	= Emiss	ion frequency in MH	lz									
Reading Lev	el = Spect	rum Analyzer/Recei	ver Reading									
Corrector Fa	ctor = Anten	na Factor + Cable L	oss - Pre-amplifier									
Measuremer	nt = Readi	ng + Corrector Factor	or									
Limit	= Limit s	stated in standard										
Over	= Margii	n, which calculated l	by Measurement -	Limit								
Detector	= Readi	ng for Quasi-Peak /	Average / Peak									

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.



# 13. Test Items and Results

## **13.1 Conducted Emissions Measurement**

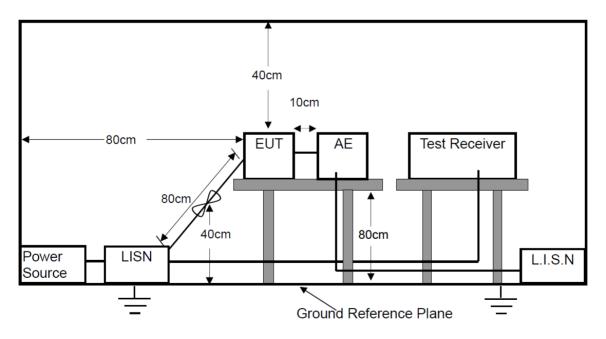
## LIMIT

According to the requirements of FCC PART 15.207, the limits are as follows:

Frequency (MHz)	Quasi-peak	Average							
0.15 to 0.5	66 to 56	56 to 46							
0.5 to 5	56	46							
5 to 30	60	50							
Note: 1. If the	limits for the average detector are met whe	en using the quasi-peak detector, then the limits							
for the	e measurements with the average detector	are considered to be met.							
2. The lo									

3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

## **BLOCK DIAGRAM OF TEST SETUP**





#### **TEST PROCEDURES**

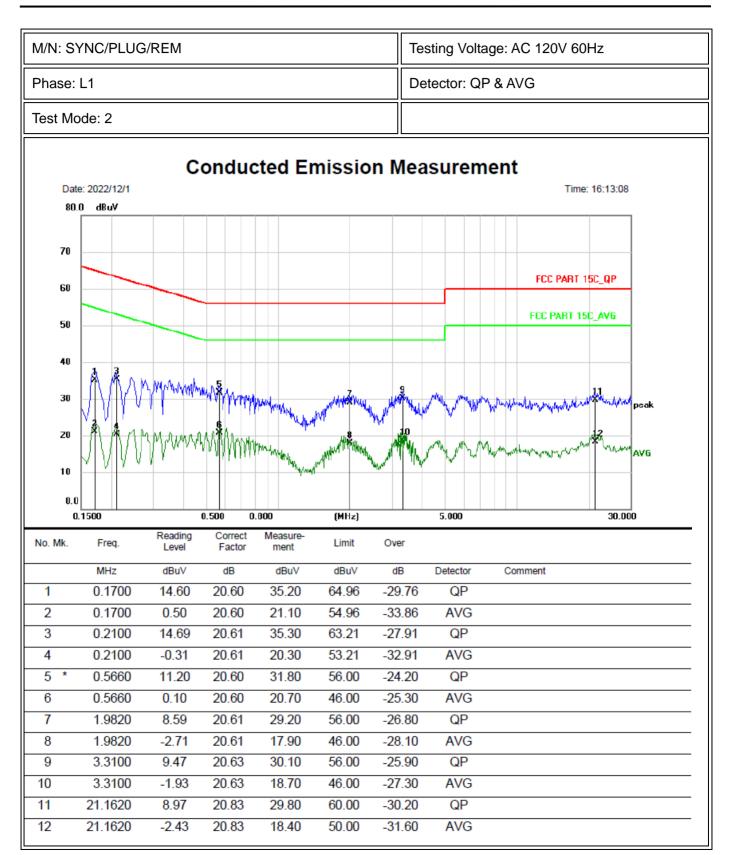
- a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.
- b. All I/O cables and support devices were positioned as per ANSI C63.10.
- c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).
- d. Connect all support devices to the other LISN and AAN, if needed.
- e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

#### **TEST RESULTS**

PASS

Please refer to the following pages.







M/N: SY	NC/PLUG	/REM				Tes	ting Voltag	ge: AC 120V 60Hz			
Phase: N	N					Det	Detector: QP & AVG				
Test Mod	de: 2										
	e: 2022/12/1 D dBuV	С	onduc	ted Er	nissio	n Mea	surem	ent Time: 16:18:19			
70 60								FCC PART 15C_QP			
50 50 40	X, my		9					FCC PART 15C_AVG			
30 20 \$ 10		np worden Np knoweder		And a start of the	Marrie Straight			Warman - War Warman - Concern AVG			
0.0 0.	1500		0.500 0	.800	(MHz)		5.000	30.000			
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over					
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment			
1 *	0.1500	31.85	20.55	52.40	66.00	-13.60	QP				
2	0.1500	-1.25	20.55	19.30	56.00	-36.70	AVG				
3	0.2380	27.54 0.24	20.56 20.56	48.10 20.80	62.17 52.17	-14.07 -31.37	QP AVG				
5	0.2380	23.62	20.50	44.20	59.66	-31.37	QP				
6	0.3220	-1.18	20.58	19.40	49.66	-30.26	AVG				
7	0.4420	21.93	20.57	42.50	57.02	-14.52	QP				
8	0.4420	-0.97	20.57	19.60	47.02	-27.42	AVG				
9	0.5380	16.23	20.57	36.80	56.00	-19.20	QP				
10	0.5380	1.23	20.57	21.80	46.00	-24.20	AVG				
11	1.9860	11.03	20.57	31.60	56.00	-24.40	QP				
					46.00	-26.10	AVG				



# **13.2 Radiated Spurious Emissions and Restricted Bands Measurement**

## LIMIT

Frequency range	Distance Meters	Field Strengths	: Limit (15.209)			
MHz		μV	/m			
0.009 ~ 0.490	300	2400/F(kHz)				
0.490 ~ 1.705	30	24000/	F(kHz)			
1.705 ~ 30	30	3	0			
30 ~ 88	3	10	00			
88 ~ 216	3	150				
216 ~ 960	3	200				
Above 960	3	500				
Frequency range	Distance Meters	Field Strengths	: Limit (15.249)			
MHz		mV/m (Field strength of fundamental)	μV/m (Field strength of Harmonics)			
902 ~ 928	3	50	500			
2400 ~ 2483.5	3	50	500			
5725 ~ 5875	3	50 500				
24000 ~ 2425000	3	250	2500			

Remark: (1) Emission level (dB) $\mu$ V = 20 log Emission level  $\mu$ V/m

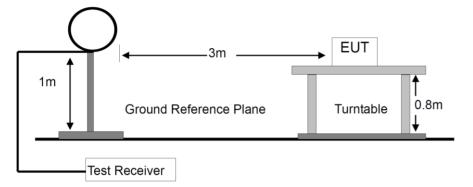
(2) The smaller limit shall apply at the cross point between two frequency bands.

- (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
- (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
- (5) §15.249(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

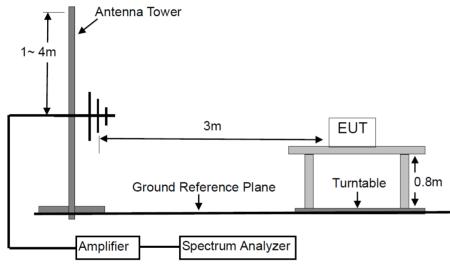


## **BLOCK DIAGRAM OF TEST SETUP**

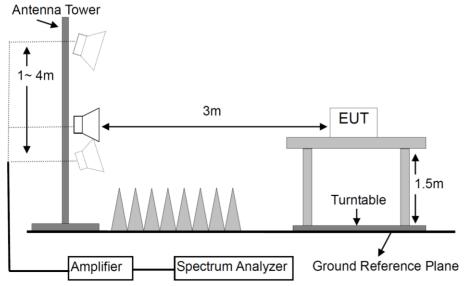
For Radiated Emission below 30MHz



#### For Radiated Emission 30-1000MHz



## For Radiated Emission Above 1000MHz.





#### **TEST PROCEDURES**

- a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- b. For the radiated emission test above 1GHz:

The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
Above 1000	Average	1 MHz	10 Hz

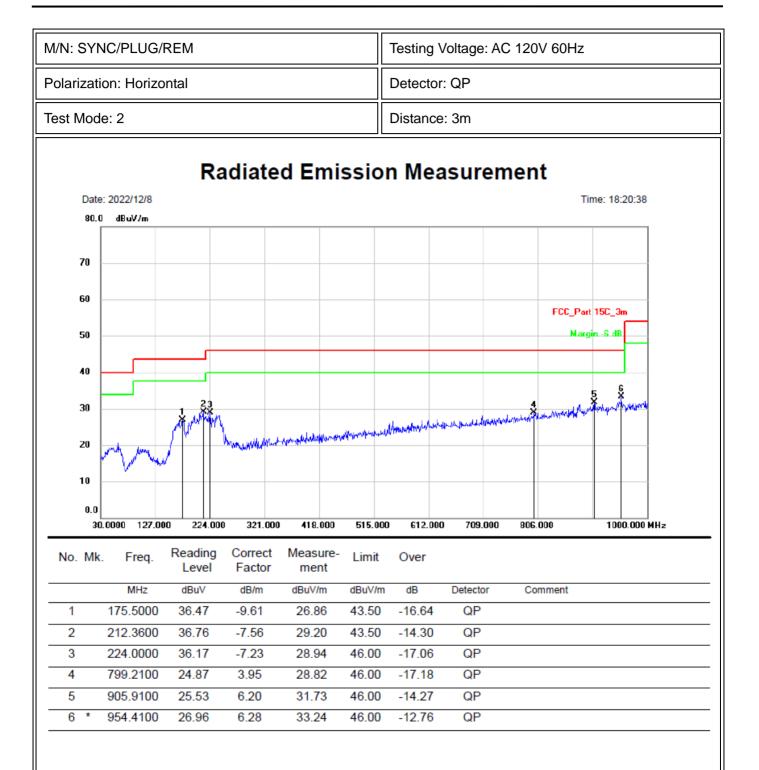


## **TEST RESULTS**

PASS

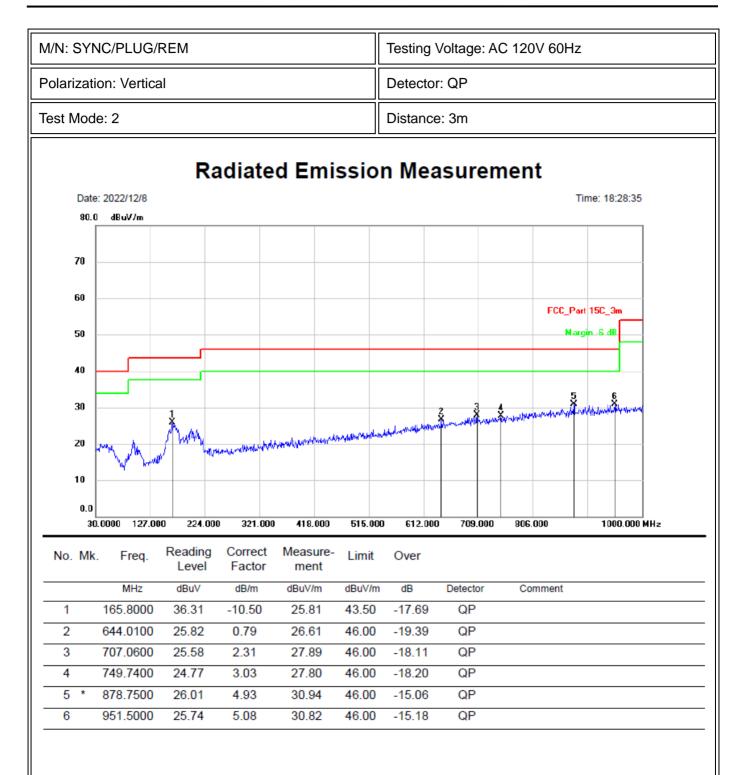
Please refer to the following pages.





Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.





Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



Modulation	GFSK		Test Re	esult: PAS	S		Test frequency range: 1-25GHz			
Freq.	Ant. Pol.	Read Level(d	•	Factor		Emission Level (dBuV/m)		t 3m V/m)	Margin (dB)	
(MHz)	(H/V)	PK	AV	(dB/m)	PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode										
2402	V	90.32	67.09	0.13	90.45	67.22	114.00	94.00	-23.55	-26.78
4804	V	60.82	45.35	6.30	67.12	51.65	74.00	54.00	-6.88	-2.35
7206	V	45.69	36.37	10.44	56.13	46.81	74.00	54.00	-17.87	-7.19
2402	Н	94.44	68.70	0.13	94.57	68.83	114.00	94.00	-19.43	-25.17
4804	Н	60.71	45.44	6.30	67.01	51.74	74.00	54.00	-6.99	-2.26
7206	Н	45.75	36.38	10.44	56.19	46.82	74.00	54.00	-17.81	-7.18
Remark:					equency rar	-				eans the

Band edge										
2390	V	55.15	34.29	0.09	55.24	34.38	74.00	54.00	-18.76	-19.62
2390	Н	55.19	35.51	0.09	55.28	35.60	74.00	54.00	-18.72	-18.40

Note: Other band edge, the emissions are lower than 20dB below the allowable limit.

	Horizontal									,	Vertical				
6.0 dBuV/m								106.0	BuV/m						
								96							
1								86	*						
					FI	CC_15.249_2.4G	_3m_Peak	76					FCC_15	5.249_2.4G_3n	n_Peak
	5 X							66	*	5 X					
		ž				FCC_15.249_2.40	i_3m_AVG	56			ž		FCC_1	5.249_2.46_3	3m_AVG
1	8							46	×	×	\$				
								36							
8								26	*						
								16							
								6							
								-4							
								-14							

Remark: The emissions for frequency above 18GHz are attenuated 20dB below the limit, it does not record in report.

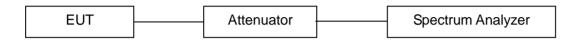


## 13.3 20dB Bandwidth Measurement

## LIMIT

There is no limit.

## **BLOCK DIAGRAM OF TEST SETUP**



#### TEST PROCEDURES

The 20dB bandwidth of the emission was contained within the frequency band designated which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered, FCC Rule 15.215(c):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

#### **TEST RESULTS**

PASS

Please refer to the following table.



		GFSK		
Channel	Frequency (MHz)	Data Rate (Mbps)	20dB Bandwidth (MHz)	Result
1	2402	1	0.9451	PASS
		2402MHz		
Spectrum Analyzer 1 Swept SA	Swept SA Occu	trum Analyzer 3	<b>\$</b>	Meas Setup 🔻 👯
KEYSIGHT Input: RF Coupling: Du Align: Auto	C Input Z: 50 Ω Atten: 10 dB C Corr CCorr Freq Ref: Int (S)	Trig: Free Run Center Freq Gate: Off Avg Hold:>1 #IF Gain: Low Radio Std: 1	None 10	old Number Settings
1 Graph v Scale/Div 15.0 dB	Ref LvI Offse Ref Value 10			ging Limits on Off Meas Standard
Log -5.00 -20.0 -35.0			Expor	ge Mode nential Advanced
-53.0 -50.0 -65.0 -80.0			99.00	·······
-95.0 -110 -125			Power Total I x dB	Power v
Center 2.402000 GHz #Res BW 30.000 kHz	#Video BW 1		Span 3 MHz -20.00	) dB
2 Metrics v		Measure Trace Trace	Metho Norma	d al v
Occupied Bandwi	idth 881.96 kHz	Total Power	6.65 dBm	leas Setup mmary Table
Transmit Freq Err x dB Bandwidth	ror 33.422 kHz 945.1 kHz	% of OBW Power x dB	-20.00 dB	Auto Couple
	<b>Nov 25, 2022</b>			



# **13.4 Antenna Requirement**

#### STANDARD APPLICABLE

According to of FCC part 15C section 15.203 and 15.204:

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, 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.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

#### ANTENNA CONNECTED CONSTRUCTION

The antenna is PCB antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is -3.49 dBi, Therefore, the antenna is consider meet the requirement.



# 14. Test Equipment List

ltem	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2022	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2022	2 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2022	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2022	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2022	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 23, 2022	2 Year
7.	Power Sensor	DARE	RPR3006W	15l00041SNO 64	Mar. 13, 2022	1 Year
8.	Communication Tester	Rohde & Schwarz	CMW500	149004	Mar. 13, 2022	1 Year
9.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2022	2 Year
10.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2022	1 Year
11.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2022	1 Year
12.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2022	2 Year
13.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2022	1 Year
14.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2022	1 Year
15.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606/014	Mar. 13, 2022	1 Year
16.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 13, 2022	1 Year
17.	Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	Mar. 13, 2022	1 Year
18.	DC Source	Maynuo	MY8811	N/A	Mar. 13, 2022	1 Year
19.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
20.	Chamber	SAEMC	9*7*7m	N/A	Apr. 21, 2021	2 Year
21.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.