

**CTC** Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China Tel: +86-755-27521059 Fax: +86-755-27521011 http://www.sz-ctc.org.cn

Г	EST REPORT				
Report No. ·····:	CTC20211659E04				
FCC ID:	2A3QHA5SPRO				
Applicant:	Shenzhen Boruite Technology Co., Ltd.				
Address	B201, Ganghong Complex, building 2, I Xialilang community, South Bend Street				
Manufacturer:	Shenzhen Boruite Technology Co., Ltd.				
Address:	B201, Ganghong Complex, building 2, I Xialilang community, South Bend Street	•••			
Product Name·····:	A5S Pro				
Trade Mark······	sanag				
Model/Type reference······:	A5S Pro				
Listed Model(s) ······:	A1, A2, A3, A4, Z2, A5S, A5X, A5S Mmax, A7S, A7S Pro, A6, A8S, A9S, A10S, A10S Pro, A11S, A11S Pro, A13, A13S, A13S Pro, A15S, A15S Pro, A18S A18S Pro, H7S, H7S Pro, Q1, Q20, W11, W11S				
Standard:	FCC CFR Title 47 Part 15 Subpart C S	Section 15.247			
Date of receipt of test sample:	Oct. 25, 2021				
Date of testing	Oct. 25, 2021 to Nov. 19, 2021				
Date of issue	Nov. 19, 2021				
Result:	PASS				
Compiled by:		Tim Jiang			
(Printed name+signature)	Jim Jiang	Jim ) iong			
Supervised by:		Miller Ma			
(Printed name+signature)	Miller Ma	Nulley Nia			
		. 0			
Approved by:		Jemas			
(Printed name+signature)	Totti Zhao				
Testing Laboratory Name:	CTC Laboratories, Inc.				
Address	1-2/F., Building 2, Jiaquan Building, Gu	anlan High-Tech Park,			
	Shenzhen, Guangdong, China				
This test report may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CTC. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CTC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit. The test report merely					

correspond to the test sample.



## **Table of Contents**

#### Page

1.	TEST	SUMMARY	3
	1.1.	Test Standards	3
	1.2.	REPORT VERSION	3
	1.3.	TEST DESCRIPTION	3
	1.4.	Test Facility	4
	1.5.	MEASUREMENT UNCERTAINTY	4
	1.6.	Environmental Conditions	5
2.	GEN	ERAL INFORMATION	6
	2.1.	CLIENT INFORMATION	6
	2.2.	GENERAL DESCRIPTION OF EUT	6
	2.3.	Accessory Equipment Information	7
	2.4.	OPERATION STATE	8
	2.5.	Measurement Instruments List	9
3.	TEST	ITEM AND RESULTS	11
	3.1.	CONDUCTED EMISSION	11
	3.2.	RADIATED EMISSION	
	3.3.	BAND EDGE EMISSIONS (RADIATED)	37
	3.4.	BAND EDGE AND SPURIOUS EMISSIONS (CONDUCTED)	
	3.5.	Bandwidth	
	3.6.	CHANNEL SEPARATION	72
	3.7.	NUMBER OF HOPPING CHANNEL	
	3.8.	DWELL TIME	
	3.9.	PEAK OUTPUT POWER	
	3.10.	ANTENNA REQUIREMENT	82



# 1. TEST SUMMARY

# 1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

RSS 247 Issue 2: Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

# **1.2. Report Version**

Revised No.	Date of issue	Description
01	Nov. 19, 2021	Original

# **1.3. Test Description**

FCC Part 15 Subpart C (15.247)/ RSS 247 Issue 2					
Test Item	Standard	Decult	Test Engi-		
	FCC	IC	Result	neer	
Antenna Requirement	15.203	/	Pass	Jim Jiang	
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jim Jiang	
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Jim Jiang	
Hopping Channel Separation	15.247(a)(1)	RSS 247 5.1 (b)	Pass	Jim Jiang	
Dwell Time	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Jim Jiang	
Peak Output Power	15.247(b)(1)	RSS 247 5.4 (b)	Pass	Jim Jiang	
Number of Hopping Frequency	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Jim Jiang	
Band Edge Emissions	15.247(d)	RSS 247 5.5	Pass	Jim Jiang	
Radiated Spurious Emission	15.247(d)&15.209	RSS 247 5.5& RSS-Gen 8.9	Pass	Jim Jiang	
20dB Bandwidth	15.247(a)	RSS 247 5.1 (b)	Pass	Jim Jiang	

Note: The measurement uncertainty is not included in the test result.

Tel.: (86)755-27521059 中国国家认证认可监督管理委员会



### **CTC** Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

## Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

## CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

### A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

## FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained inour files. Registration 951311, Aug 26, 2017.

# 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc.



Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth		(1)

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

# **1.6. Environmental Conditions**

During the measurement the environmental conditions were within the listed ranges:

Temperature:	21°C~27°C
Relative Humidity:	40%~60%
Atmospheric Pressure:	101kPa



ΕN

# 2. GENERAL INFORMATION

# 2.1. Client Information

Applicant:	Shenzhen Boruite Technology Co., Ltd.
Address:	B201, Ganghong Complex, building 2, No.7, Xiangye Road, Xialilang com- munity, South Bend Street, Shenzhen China
Manufacturer:	Shenzhen Boruite Technology Co., Ltd.
Address:	B201, Ganghong Complex, building 2, No.7, Xiangye Road, Xialilang com- munity, South Bend Street, Shenzhen China

# 2.2. General Description of EUT

Product Name:	A5S Pro	
Trade Mark:	sanag	
Model/Type reference:	A5S Pro	
Listed Model(s):	A1, A2, A3, A4, Z2, A5S, A5X, A5S Mmax, A7S, A7S Pro, A6, A8S, A9S, A10S, A10S Pro, A11S, A11S Pro, A13, A13S, A13S Pro, A15S, A15S Pro, A18S A18S Pro, H7S, H7S Pro, Q1, Q20, W11, W11S	
Model Difference:All these models are identical in the same PCB, layout and electrical circThe difference is the model name and exterior color.		
D	DC5V 150mA from External adapter	
Power supply:	DC3.7V 120mAh from Battery	
Hardware version:	V0.2	
Software version:	V1.2	
Bluetooth 5.0/EDR		
Modulation:	GFSK, π/4-DQPSK, 8-DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	Chip Antenna	
Antenna gain:	OdBi	



# 2.3. Accessory Equipment Information

Equipment Information					
Name	Model	S/N	Manufacturer		
Notebook	ThinkPad T460s	/	Lenovo		
Cable Information					
Name	Shielded Type	Ferrite Core	Length		
USB Cable	Unshielded	NO	100cm		
Test Software Information					
Name	Version	1	/		
FCC assist	1.0.2.2	/	/		

# 2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

**Operation Frequency List:** 

Channel	Frequency (MHz)
00	2402
01	2403
:	:
38	2440
39	2441
40	2442
:	:
77	2479
78	2480

Note: The display in grey were the channel selected for testing.

#### Test mode

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.



# 2.5. Measurement Instruments List

Tonscei	Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021	
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2022	
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 25, 2021	
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 25, 2021	
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 25, 2021	
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 25, 2021	
7	Simultaneous Sam- pling DAQ	Agilent	U2531A	TW54493510	Dec. 25, 2021	
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 25, 2021	
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 25, 2021	
10	Climate Chamber	ESPEC	MT3065	/	Dec. 25, 2021	
11	300328 v2.2.2 test system	TONSCEND	v2.6	/	/	

Radiated Emission and Transmitter spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 25, 2021
2	High pass filter	micro-tranics	HPM50111	142	Dec. 25, 2021
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 25, 2021
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 25, 2021
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 25, 2021
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 25, 2021
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 25, 2021
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 25, 2021
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 25, 2021
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 25, 2021
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 25, 2021
15	RF Connection Ca- ble	HUBER+SUHNER	RE-7-FL	N/A	Dec. 25, 2021
16	RF Connection Ca- ble	Chengdu E-Microwave			Dec. 25, 2021

CTC Laboratories, Inc.



17	High pass filter	Compliance Direc- tion systems	BSU-6	34202	Dec. 25, 2021
18	Attenuator	Chengdu E-Microwave	EMCAXX-10RNZ-3		Dec. 25, 2021
19	High and low tem- perature box	ESPEC	MT3065	12114019	Dec. 25, 2021

Conduc	ted Emission				
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 25, 2021
2	LISN	R&S	ENV216	101113	Dec. 25, 2021
3	EMI Test Receiver	R&S	ESCI	100658	Dec. 25, 2021

Note:

1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.



# 3.1. Conducted Emission

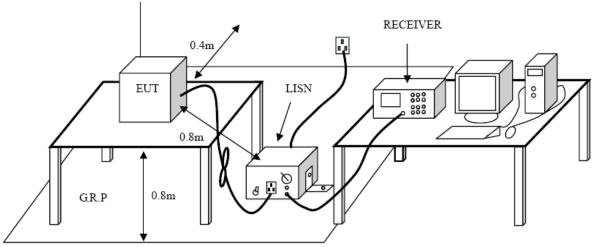
# <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.207/ RSS - Gen 8.8

	Limit (d	lBuV)
Frequency range (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

# Test Configuration



# Test Procedure

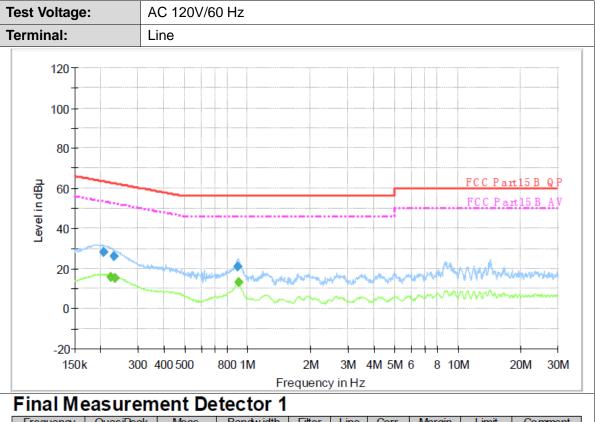
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 7. During the above scans, the emissions were maximized by cable manipulation.

# Test Mode

Please refer to the clause 2.4.



#### **Test Results**



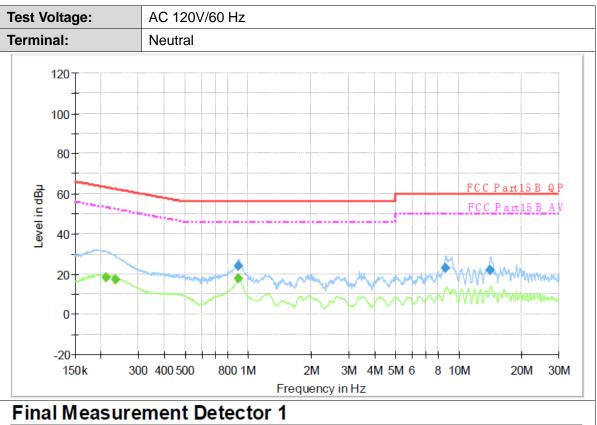
Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.205620	28.2	1000.00	9.000	On	L1	9.7	35.2	63.4	
0.231770	26.0	1000.00	9.000	On	L1	9.7	36.4	62.4	
0.900590	21.1	1000.00	9.000	On	L1	9.7	34.9	56.0	

# **Final Measurement Detector 2**

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.222700	15.9	1000.00	9.000	On	L1	9.7	36.8	52.7	
0.233630	15.1	1000.00	9.000	On	L1	9.7	37.2	52.3	
0.904200	13.1	1000.00	9.000	On	L1	9.7	32.9	46.0	

Emission Level= Read Level+ Correct Factor





	Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
Γ	0.893430	23.9	1000.00	9.000	On	Ν	10.0	32.1	56.0	
Γ	8.695160	22.9	1000.00	9.000	On	Ν	10.0	37.1	60.0	
Γ	14.207710	21.9	1000.00	9.000	On	Ν	10.0	38.1	60.0	

# Final Measurement Detector 2

	Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
Γ	0.212290	18.3	1000.00	9.000	On	Ν	10.0	34.8	53.1	
Γ	0.233630	17.1	1000.00	9.000	On	Ν	10.0	35.2	52.3	
	0.897010	17.8	1000.00	9.000	On	Ν	10.0	28.2	46.0	

Emission Level= Read Level+ Correct Factor



# 3.2. Radiated Emission

<u>Limit</u>

### FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS - Gen 8.9

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

	dB(uV/m)	) (at 3 meters)
Frequency (MHz)	Peak	Average
Above 1000	74	54

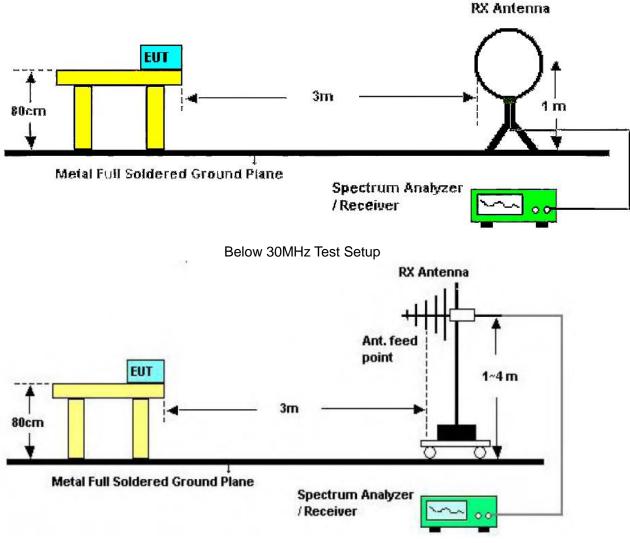
### Note:

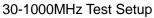
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

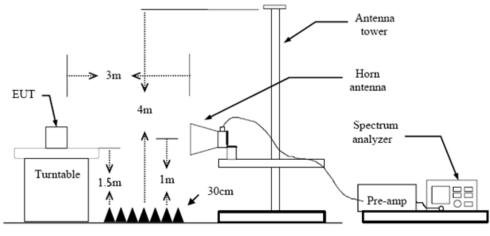
## **Test Configuration**











Above 1GHz Test Setup

## Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

(3) From 1 GHz to  $10^{th}$  harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW=3MHz RMS detector for Average value.

## Test Mode

Please refer to the clause 2.4.

## <u>Test Result</u>

## 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

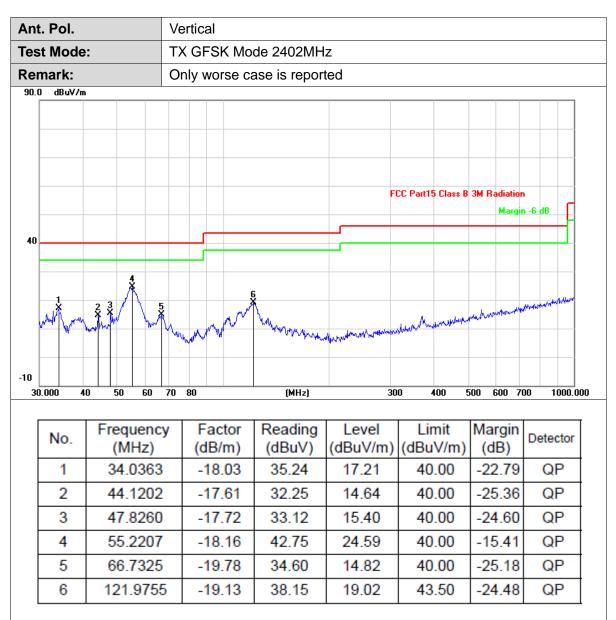
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



Ant	. Pol.			Ho	rizor	ntal								
Tes	t Mode	:		ТΧ	GF	SK Mo	de 2402MH	Z						
Rer	mark:			On	ly w	orse c	ase is repor	ted						
90.0	) dBuV/m													
40	1 1 1						4 Marina Marina		FCC Part1			argin		- 
-10 30	).000 4	0 50	60	70 8	30		(MHz)	:	300	400 5	00 600	) 70(	) 1	000.00
	No.	Frequ (MI		У		actor 3/m)	Reading (dBuV)	Level (dBuV/m		mit V/m)	Marg (dB		Dete	ctor
	1	31.1	797		-1	8.14	34.45	16.31	40	.00	-23.6	69	Q	P
	2	33.9	9173		-1	8.04	32.23	14.19	40	.00	-25.8	31	Q	P
	3	55.0	)274		-1	8.15	33.32	15.17	40	.00	-24.8	33	Q	P
	4	123.	2655	5	-1	9.02	34.63	15.61	43	.50	-27.8	39	Q	P
	5	369.	4047	7	-1	6.37	37.02	20.65	46	.00	-25.3	35	Q	P
ł	6	932.	074	-	7	7.77	29.84	22.07	46	.00	-23.9		Q	

Remarks:





Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor



III	. Pol.		Hor	izontal					
	t Mode	:			de 2402MH				
len	nark:			report for t bed limit.	he emission	n which mor	e than 20 d	B below 1	the pre-
00.0	dBuV/m			1				, i	
						FCC Pa	rt15 Class C 3M A	bove-16 Pea	k
ł									
ł						FCC	Part15 Class C 3	Above-1G A	v
50		1 X							
		×							
0.0									
L	00.000 35	DO.OO 6000.0	00 8	500.00 1100	0.00 13500.00	) 16000.00	18500.00 2100	0.00	26000.00 M
0.0	00.000 35	00.00 6000.0	00 8	500.00 1100	0.00 13500.00	) 16000.00	18500.00 2100	0.00	26000.0
-					D		Limit	Margin	
ſ	No	Frequen	-	Factor	Reading	Level			Detector
	No.	(MHz)	)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	Detector
	No. 1		)						Detector peak

Remarks:



Ant	. Pol.		V	ertical											
Гes	t Mode	:		T.	X GFS	K Mc	ode 24	02MH	Z						
Rer	nark:				o repo cribed		the e	missio	n whic	h mor	e than	20 d	B below t	the pre-	
100.0 T	) dBu∀/m														
										FCC Pa	rt15 Class	C 3M A	bove-16 Pea	k	
ĺ			•							FCC	Part15 Cla	iss C 3I	Above-1G A	v	
50			2 X												
		,	×												
0.0															
10	00.000 35	00.00	6000	0.00	8500.00	110	)00.00	13500.00	) 1600	)0.00	18500.00	2100	0.00	26000.00 N	MH
ſ	No.		que MHz	-	Fa (dB	ctor /m)		ading BuV)	1	vel V/m)	Lim (dBu\		Margin (dB)	Detector	]
f	1	48	03.8	360	-2	.82	39	).32	36	.50	54.	00	-17.50	AVG	1
f	2	48	04.5	564	-2	.82	52	2.18	49	.36	74.	00	-24.64	peak	1
[	2	48	04.5	564	-2.	.82	52	2.18	49	.36	74.	00	-24.64	peak	]



								ntal	lorizon	Н			Pol.	Ant.
					Z	441MH	de 2	SK Mo	X GFS	T			Mode:	est
e pre-	3 below t	20 dE	e than	h mor	n whic	missio	the e		lo repo cribed				ark:	Rem
						,			1			,	dBu¥/m	00.0
										_				
	bove-1G Peak	C 2M AL	et15 Class	ECC Da										
	JUYE-TU FEAK			гсста										┢
	Above-1G AV	ass C 3M	Part15 Cla	FCC										
											1 X			50
											2 X			
26000.00 MH	n nn	21000	18500.00	0.00 .	1600	13500.00	00.00	0 110	8500.00	0.00	600	0 00	.000 3500	0.0
etector	Margin (dB)		Lim (dBu\		Le (dBu	ading BuV)		actor B/m)	1	ency z)	que MHz		No.	Γ
peak	-25.31	00	74.	69	48.	1.29	5	2.60	-2	302	82.3	48	1	
AVG	-18.95	.00	54.	05	35.	7.64	3	2.59	-2	546	82.	48	2	
p	(dB) -25.31	V/m) .00	(dBu\ 74.	V/m) 69	(dBu 48	3uV) 1.29	(d 5	B/m) 2.60	(dB -2	z) 302	ЙН2 882.3	(  48	1	



٩nt	. Pol.			V	ertical									
es	t Mode	:		T	X GFS	К Мо	de 24	41MH	Z					
Rer	nark:				o repo cribed		the en	nissior	n whic	h mor	e than 2	20 d	B below t	the pre-
00.0	) dBu¥/m													
										FCC Pa	rt15 Class (	: 3M A	bove-1G Pea	k
										FCC	Part15 Cla	s C 3	Above-1G A	N .
50			1 X											
			,											
		:	X											
0.0														
10	00.000 35	00.00	6000	).00	8500.00	110	00.00	13500.00	) 160	)0.00	18500.00	2100	0.00	26000.00 MI
Γ	No.		que MHz	-	Fac (dB	ctor		ding	1	vel V/m)	Lim (dBuV		Margin (dB)	Detector
			81.4			60		.84		.24	74.0		-24.76	neak
	1	10				00	51	.04	43	.24	L		-17.87	peak
	1		82.6		0	59	20	.72	20	.13	54.0		4707	AVG



Ant	. Pol.			H	lorizon	ntal								
Гes	t Mode	:		Т	X GFS	SK Mo	ode 24	180M⊦	z					
Rer	nark:				lo repo cribed			missio	n whic	h moi	re than	20 d	B below	the pre-
100.0	) dBu¥/m													
										FCC Pa	art15 Class	C 3M A	bove-1G Pea	lk l
										FCC	Part15 Cla	ss C 3	A Above-1G A	v
50			2 7											
		:	Ť											
0.0														
10	00.000 35	00.00	6000	).00	8500.00	11	000.00	13500.0	0 160	00.00	18500.00	2100	00.00	26000.00 M
ſ	No.	Fre				ctor		ading	1	vel	Lim		Margin	Detector
		(	MHz	:)	(dB	3/m)	(dE	BuV)	(dBu	V/m)	(dBu\	//m)	(dB)	
	No.	(I 49		:) 956	(dB -2		(dE 37	<u> </u>	(dBu 35		1	//m) 00		Detector AVG peak



	Pol.			Ver	tical									
esi	t Mode	:		ТХ	GFSk	< Mo	de 24	80MH	z					
en	nark:				report ibed li		the er	nissior	n whic	h mor	e than 2	0 d	B below t	the pre-
00.0	dBuV/m													
										FCC Pa	rt15 Class C	3M A	bove-16 Pea	k
										FCC	Part15 Class	s C 3	Above-1G A	×
50		2	č											
0.0	00.000 350	ח חח	6000.0	0 8	500.00	110	00.00	13500.00	1600	)0.00 ·	18500.00	2100	0.00	26000.00 MI
ſ	No.		queno //Hz)	cy	Fact (dB/r			ading BuV)		vel V/m)	Limi (dBuV/		Margin (dB)	Detector
	No.	(N				m)	(dE		(dBu			m)	_	Detector AVG



	Pol.				zontal							
	Mode	:				SK Mod						
en	hark:				eport for bed limit.	the emis	ssio	n whic	h mor	e than 20 d	B below	the pre-
0.0	dBuV/m											
									FCC D-	rt15 Class C 3M A	have 10 Day	L.
┢									FLL Fa	III D CIGSS C OM P	DOVE-TO FEA	K
┟									FCC	Part15 Class C 3	4 Above-1G A	v
;0		,	<									
		Ś										
-												
.0 100	0.000 35	00.00	6000.00	0 850	0.00 11	000.00 13	500.00	D 1600	0.00	18500.00 2100	0.00	26000.00 M
Г		<b>-------------</b>			Fastar	Deed				1::4	Manaia	
	No.		queno MHz)		Factor (dB/m)	Readi (dBu)	-	Lev (dBu		Limit (dBuV/m)	Margin (dB)	Detector
	1	48	04.42	1	-2.82	51.7	2	48.	90	74.00	-25.10	peak
Γ	2	48	04.74	5	-2.82	38.3	3	35.	51	54.00	-18.49	AVG



nt.	Pol.			Vert	ical									
	t Mode	:					SK Mo							
en	nark:				eport		the en	nissior	n whic	h mor	e than 20	) dE	B below 1	he pre-
0.0	dBu¥/m	1												
										FCC Pa	rt15 Class C :	3M AL	ove-16 Pea	k
										FCC	Part15 Class	С ЗМ	Above-1G A	v
50		Ś	2											
		>	¥ 🛛											
		_												
.0														
100	00.000 35	00.00	6000.00	) 85	00.00	110	00.00	13500.00	1600	0.00	18500.00	21000	).00	26000.00 MI
Γ	No.		quenc MHz)		Fact (dB/r			ding uV)	Le (dBu		Limit (dBuV/r		Margin (dB)	Detector
	1	48	03.35	4	-2.8	2	38.	.19	35	.37	54.00	)	-18.63	AVG
	2	48	04.10	3	-2.8	2	51.	.70	48	.88	74.00	)	-25.12	peak



۱nt	. Pol.			Н	orizor	ntal								
	t Mode	):						lode 24						
Ren	nark:				o repo cribed		the e	missio	n whic	h mor	re than :	20 d	B below	the pre-
00.0	) dBuV/m	1									Î			
										FCC Pa	art15 Class	C 3M A	bove-1G Pea	k
										FCC	Part15 Cla	ss C 31	4 Above-1G A	V
50		-												
			2											
		:	ŧ											
0.0														
					8500.00	111	000.00	13500.0			18500.00	2100	0.00	26000.00 MI
10	00.000 35	00.00	6000.	00	0000.00		000.00	10000.0	0 160	JU.UU	10000.00	2100		
10	00.000 35 No.	Fre	quen	су	Fa	ctor	Rea	ading	Le	vel	Lim	it	Margin	Detector
	No.	Free (1	quen MHz)	icy	Fa (dE	ctor 3/m)	Rea (dl	ading 3uV)	Le (dBu	vel V/m)	Lim (dBuV	it /m)	(dB)	
		Free (1 48	quen	icy 26	Fa (dE -2	ctor	Rea (dE	ading	Le (dBu 49	vel V/m)	Lim	it /m) )0	_	Detector peak AVG



	Pol.				tical							
	Mode	:			π/4-DC							
em	nark:				report fo bed limi		emissio	n whic	h mor	e than 20 d	B below t	he pre-
0.0	dBu¥/m											
		_										
									FCC D-	rt15 Class C 3M A	Laura 10 Bar	
┝									FLL Pa	ITTO LIASS LI 3M A	bove-lu Pea	ĸ
									FCC	Part15 Class C 3	Above-1G A	v
0		ś	2									
		>	<									
╞												
	0.000 35	00.00	6000.0	0 0	500.00 ·	1000.00	13500.0	D 1600	0.00	18500.00 2100	0.00	
100	0.000 33	UU.UU	6000.0	0 8:	000.00	11000.00	13000.0	0 1600	0.00	18300.00 2100	0.00	26000.00 M
	No.		queno MHz)	cy	Facto (dB/m)		eading IBuV)	Lev (dBu		Limit (dBuV/m)	Margin (dB)	Detector
Γ	1	48	82.25	1	-2.60	3	38.38	35.	78	54.00	-18.22	AVG
	2	48	82.74	5	-2.59	5	51.60	49.	01	74.00	-24.99	peak
L				1		I				I	1	-



	Pol.				zontal						
	Mode	:				SK Mode					
em	nark:				eport for bed limit.	the emiss	ion whi	ich mor	e than 20 d	B below	the pre-
)0.O	dBuV/m				1					1	
								FCC Pa	ut15 Class C 3M A	bove-16 Pea	k
											<b>~</b>
								FCC	Part15 Class C 3	Above-1G A	v
50			1 *								
		:	2								
┟											
.0											
_ L	0.000 35	00.00	6000.00	D 85	00.00 110	00.00 1350	0.00 16	000.00	18500.00 2100	0.00	26000.00 M
Γ	No.		queno		Factor	Readin	<u> </u>	evel	Limit	Margin	Detector
		()	MHz)		(dB/m)	(dBuV	) (dB	uV/m)	(dBuV/m)	(dB)	
	No. 1 2	(1 49		7		1	) (dB 4			_	



	Pol.				tical								
	Mode Mark:	:		No		t for		ode 24 nissior			e than 20 d	B below 1	he pre-
0.0	dBu¥/m												
										FCC Pa	rt15 Class C 3M 4	vbove-16 Pea	
þ													
_										FCC	Part15 Class C 3	A Above-1G A	v
o			1 X										
			ſ										
			2										
$\left  \right $													
0													
_	0.000 350	DO.OO	6000.0	0 8	500.00	110	00.00	13500.00	1600	0.00	18500.00 2100	)0.00	26000.00 M
Γ	No.		quen MHz)		Fac (dB/			ding uV)	Le (dBu		Limit (dBuV/m)	Margin (dB)	Detector
F	1		, 60.22		-2.3			.05	48		74.00	-25.33	peak
F	2	49	60.65	58	-2.3	38	37	.92	35	.54	54.00	-18.46	AVG
	2	49	60.65	58	-2.3	38	37	.92	35.	.54	54.00	-18.46	AVG



AUT	. Pol.			H	orizont	al								
ſes	t Mode	:		T	X 8-DP	SKI	/lode 2	2402N	lHz					
Rer	nark:				o repoi cribed l		the er	nissio	n whic	h mor	e than	20 d	B below	the pre-
100.0	) dBuV/m	•												
		_												
										FCC Pa	rt15 Class	C 3M A	bove-1G Pea	k
										FCC	Part15 Cla	ss C 31	Above-1G A	v
50		Ś	2											
		>	<											
		_												
0.0														
	100.000 35	00.00	6000	.00	8500.00	110	00.00	13500.00	) 1600	00.00	18500.00	2100	)0.00	26000.00 M
Г		Fre	quer		Fac	tor	Rea	ding	Le	vel	Lim	it	Margin	
	No.		ЧНz		(dB/			luV)			(dBuV		(dB)	Detector
		()	VINZ,				20	.62	35.	00	<b>FA</b>	0	-18.20	AVG
	1		04.1	70	-2.	82	- 38	.02	30.	.00	54.0	0	10.20	~~~



Ant	. Pol.			V	ertical									
ſes	t Mode	:		T	X 8-DP	SKI	/lode 2	2402M	lHz					
Rer	nark:				o repo cribed l		the er	nissior	n whic	h mor	e than	20 d	B below t	the pre-
100.0	) dBu¥/m													
										FCC Pa	ırt15 Class	C 3M A	bove-1G Pea	k
										FCC	Part15 Cl	ass C 3	Above-1G A	v
50		,	Ĭ											
		,	K											
0.0														
10	00.000 35	00.00	6000	.00	8500.00	110	00.00	13500.00	) 1600	0.00	18500.00	2100	0.00	26000.00 MI
[	No.		quer	-	Fac			ding		vel	Lin		Margin	Detector
		(	ЙНz	)	(dB/	/m)	(dE	3uV)	(dBu	V/m)	(dBu\	//m)	(dB)	
	No.	(I 48	-	) 77	1	'm) 82	(dE 51	-	(dBu 49		1	//m) 00		Detector peak AVG



Ant	. Pol.			Н	Horizontal											
Гes	t Mode	:		T	X 8-DF	SK N	/lode	2441N	lHz							
Rer	nark:				No report for the emission which more than 20 dB below the pre- scribed limit.											
100.0	dBu¥/m															
										FCC Pa	art15 Class	C 3M A	bove-16 Pea	k		
										FCC	Part15 Cla	ss C 3I	Above-1G A	N .		
50			2 ¥													
		:	×													
0.0																
I	00.000 35	00.00	6000	.00	8500.00	110	00.00	13500.00	) 160	DO.OO	18500.00	2100	0.00	26000.00 Mł		
ſ	No.		quer MHz		1	ctor /m)	1	ading BuV)	1	vel V/m)	Lim (dBu\		Margin (dB)	Detector		
		(	ЙΗz	)	(dB	/m)	(dE	BuV)	(dBu	V/m)	(dBu\	//m)	(dB)			
	No. 1 2	(I 48		) 65	(dB -2		(dE 38	<u> </u>	(dBu 36		1	//m) 00	_	Detector AVG peak		



Ant. Pol.				Ve	Vertical											
es	t Mode	:			X 8-DP	-										
Ren	nark:				No report for the emission which more than 20 dB below the pre- scribed limit.											
100.0	dBu¥/m												1			
										FCC Pa	rt15 Class (	: 3M A	bove-1G Pea	k		
										FCC	Part15 Clas	s C 3	l Above-1G A	v		
50		-	ļ K													
		1	ŧ													
0.0																
. L	00.000 350	DO.00	6000.	.00	8500.00	1100	DO.OO	13500.00	1600	0.00	18500.00	2100	0.00	26000.00 M		
Γ	No	Fre	quen	ю	Fac	tor	Rea	ding	Le	vel	Limi	it	Margin	Detector		
	No.		quen MHz)	-	Fact (dB/i			ding uV)		vel V/m)	Limi (dBuV		Margin (dB)	Detector		
	No. 1	(	-	)		m)	(dB	-		V/m)	1	/m)	-	Detector peak		



Ant	. Pol.			Horizontal												
es	t Mode	:		ТХ	8-DPS	SK N	lode 2	2480M	Hz							
Ren	nark:				No report for the emission which more than 20 dB below the pre- scribed limit.											
100.0	dBuV/m															
										FCC Pa	rt15 Class	C 3M A	bove-1G Pea	k		
										FCC	Part15 Cla	ss C 3I	Above-1G A	v		
50		2														
		×	:													
0.0																
10	00.000 350	00.00	6000.0	08	500.00	1100	00.00	13500.00	) 1600	0.00 1	8500.00	2100	0.00	26000.00 M		
ſ	No.		luen	-	Fact		1	ding		vel	Lim		Margin	Detector		
		(N	1Hz)	-	(dB/r	m)	(dB	3uV)	(dBu	V/m)	(dBuV	//m)	(dB)			
	No.	(N 495		)6		m) 38	(dB 38	-	(dBu 35			//m) 00		Detector AVG peak		



Ant	. Pol.			V	Vertical											
ſes	t Mode	:		Т	X 8-D	PSK I	Node	2480	1Hz							
Rer	nark:				lo repo cribed		the e	missio	n whic	:h mor	re than	20 d	B below	the pre-		
00.0	) dBuV/m															
										FCC Pa	art15 Class	C 3M A	bove-16 Pea	ık		
										FCC	Part15 Cl	ass C 3	Above-1G A	v		
50																
			2													
			×													
0.0	00.000.00	00.00			0500.00		100.00	10500.0	0 100	0.00	10500.00	2100	0.00	20000.00.1		
10	100.000 35	00.00	6000	.00	8500.00		00.00	13500.0	0 160	0.00	18500.00	2100	0.00	26000.00 M		
ſ	No.	Free			1	ctor 3/m)		ading BuV)		vel V/m)	Lin (dBu)		Margin (dB)	Detector		
		()	ИНz	)	(dB	8/m)	(dE	3uV)	(dBu	V/m)	(dBu\	//m)	(dB)			
	No. 1 2	(N 49		) 13	(dE -2		(dE 51	-	(dBu 49		1	//m) 00	-	Detector peak AVG		



# 3.3. Band Edge Emissions (Radiated)

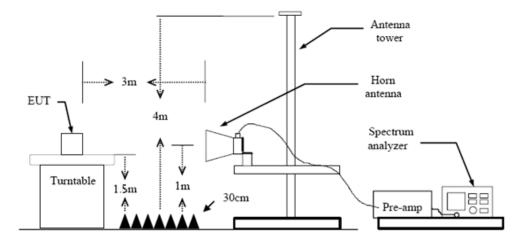
<u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

Restricted Frequency Band	(dBuV/n	n)(at 3m)
(MHz)	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Conducted band edge limit: The highest point of the operating frequency waveform down 20dB

## Test Configuration



## Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1MHz, VBW=3MHz Peak detector for Peak value. RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.9 Duty Cycle.

#### Test Mode

Please refer to the clause 2.4.



#### (1) Radiation Test

	GES		Horizontal												
-	GFSK Mode 2402MHz														
							A								
				FCC	Part15 RE-Class	3 Above 1G P									
				FCC	Devite DE Class		<u> </u>								
				ru		S ADOVE TO A	*								
manstructure	-		amangana	and the second second second	been derender open white	****	more the								
.60 2309.60	0 232	1.60 2333	3.60 2345.60	2357.60	2369.60 2381	.60	2405.60 M								
	-		Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector								
		30.84	29.42	60.26	74.00	-13.74	peak								
2390.00	0	30.84	15.19	46.03	54.00	-7.97	AVG								
	Frequence (MHz) 2390.00	Frequency	Frequency (MHz)   Factor (dB/m)     2390.000   30.84	Frequency (MHz)   Factor (dB/m)   Reading (dBuV)     2390.000   30.84   29.42	Frequency (MHz) Factor (dB/m) Reading (dBuV) Level (dBuV/m)   2390.000 30.84 29.42 60.26	Frequency (MHz) Factor (dB/m) Reading (dBuV) Level (dBuV/m) Limit (dBuV/m)   2390.000 30.84 29.42 60.26 74.00	Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)     2390.000   30.84   29.42   60.26   74.00   -13.74								



nt	. Pol.		Ve	Vertical												
est	t Mode	:	G	FSK Mo	de 2	2402MHz	2									
0.0	dBu¥/m	1														
														]		
									FCC	Part15 R	E-Class	B Above	1G P	К		
												1	,			
									FCC	Part15 R	E-Class	B Abové	1G A	<u>v</u>		
50				and the adam		n site with the second		the second second second	-	hander	un des contra contra			menned	L	
ſ																
Ì																
0.0 229	86.800 22	90 00	2310.80	2322.80	222	4.80 2340	: 90	235	2 00	2370.80	2382	9 90		2406	00	
	No.		uency	Facto		Readin			vel	Lin		Mar		Dete	ctor	
			IHz)	(dB/m	1)	(dBuV	*	(dBu	V/m)	(dBu	V/m)	(dE	3)			
	1	239	0.000	30.8	4	27.35		58	.19	74	.00	-15.	.81	pe	ak	
Γ	2	239	0.000	30.8	4	14.66		45	.50	54	.00	-8.	5 <b>0</b>	A٧	′G	
-																



nt. Pol.		Horizontal												
est Mod	e:	GF	GFSK Mode 2480 MHz											
0.0 dBuV	/m													
) L														
						500								
						FLL	Part15 RE-Class	S ADOVE IG P	<u>к</u>					
	1 X					FCC	Part15 RE-Class	B Above 1G A	v					
50														
mondered	and and the second second	herdenne	all and a second se	werthounder man	terestand and the second s	nadas Merenanda an eta an e	have an attached and an and a de	***************************************	ollowed a second a s					
.0 2472.200 (	2484.20 2496.	20 25	08.20 252	0.20 2532.	20 2544	20 2	2556.20 2568	1.20	2592.20					
No.	Frequen		Factor	Reading		vel	Limit	Margin	Detector					
	(MHz)		(dB/m)	(dBuV)			(dBuV/m)							
1	2483.5	00	31.24	27.50	58	.74	74.00	-15.26	peak					
2	2483.5	00	31.24	14.38	45	.62	54.00	-8.38	AVG					



Ant. Pol.				V	Vertical													
es	t Mo	de:			Ģ	FSI	< Mo	de	2480	MHz								
00.0	dBu\	//m																
	٨																	
	- 11																	
ĺ													FCC	Part1	5 RE-Cla	<b>ss</b>	8 Above 1G F	γК
	-++																	
		1 X																
		Î											FCC	Part1	5 RE-Cla	ss	8 Above 1G /	w
50	-++	2																mannaharah
ľ	may h	walnut	nan	en fin se	dad-ad	*****		n-men	And the second		ed and a	ular nahin sebagai k		, tei-eile	~1~1.~1~1	where i	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~
		_																
		_																
). O																		
24	74.600	248	6.60	249	8.60	2510	.60	252	2.60	2534.	60	2546	6.60	2558.	60 2	570	.60	2594.60
ſ	No.	Т		que MHz	-		Fact			ading 3uV)		Lev (dBu)		1	_imit 3uV/m	1)	Margin (dB)	Detector
┢	1	+	,	83.5			31.2			7.77		59.			4.00		-14.99	peak
┢	2	+		83.5		-	31.2			1.76		46.			54.00		-8.00	AVG
L								-										
₹en	narks					_		( IE		<u> </u>			( 15 )	_			er Factor	
								าสก	/									