

TEST REPORT

Report No.: SHATBL2410021W01

Applicant	٠.	Rapsodo Pte. Ltd.	
Product Name	Ş	MLM2PRO™	
Brand Name	:	Rapsodo	
Model Name	4	MLM2.0P	
FCC ID	Ŕ	2AH3O-MLM2PRO	
		25	

47 CFR 15.247 **Test Standard**

Date of Test 2024.10.10~2024.10.31

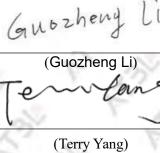
Report Prepared by

XU chris.

(Chris Xu)

Report Approved by

Authorized Signatory



Quality Bette 011

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REVISION HISTORY

Rev.	Issue Date	Revisions	Revised
A0	2024.11.01	Initial Release	Terry Yar
	FB	F B F	S B
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5 \$	NY F	De FB	F F S
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DECLARATION OF REPORT

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1. The device has been tested by ATBL, and the test results show that the equipment under test (EUT) is in compliance with the requirements of 47 CFR 15.247. And it is applicable only to the tested sample identified in the report.

2. This report shall not be reproduced except in full, without the written approval of ATBL, this document only be altered or revised by ATBL, personal only, and shall be noted in the revision of the document.

3. The general information of EUT in this report is provided by the customer or manufacture, ATBL is only responsible for the test data but not for the information provided by the customer or manufacture.

4. The results in this report is only apply to the sample as tested under conditions. The customer or manufacturer is responsible for ensuring that the additional production units of this model have the same electrical and mechanical components.

5. In this report, ' \Box ' indicates that EUT does not support content after ' \Box ', and ' \Box ' indicates that it supports content after ' \Box '

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Report Section	Standard Section	Test Item		Remark	
3.1	47 CFR 15.247(b)(1)	Maximum Peak Conducted Output Power	PASS	B	
3.2	47 CFR 15.247(a)(1)(iii)	Number of Hopping Frequencies	PASS	8-2	
3.3	47 CFR 15.247(a)(1)(iii)	Duty Cycle and Dwell Time	PASS	-7-	
3.4	47 CFR 15.247(a)(1)	20dB Bandwidth	Report only	5-	
3.5	47 CFR 15.247(a)(1)	Carrier Frequency Separation	PASS	5	
3.6	47 CFR 15.247(d)	Conducted Band Edge	PASS	8-	
3.7	47 CFR 15.247(d)	Conducted Spurious Emission	PASS	- 7	
3.8	47 CFR 15.247(d)/15.209(a)/15.205(a)	Radiated Spurious Emission and Restricted Band	PASS	10-	
3.9	47 CFR 15.207(a)	AC Power-Line Conducted Emission	PASS	75	
3.10	47 CFR 15.203	Antenna Requirements	PASS	P	

SUMMARY OF TEST RESULT



1. GENERAL DESCRIPTION

1.1. Applicant

Name : Rapsodo Pte. Ltd.

Address : 20 Ayer Rajah Crescent #08-05 Singapore 139964

1.2. Manufacturer

Name : Rapsodo Pte. Ltd.

Address : 20 Ayer Rajah Crescent #08-05 Singapore 139964

1.3. Factory

Name	. :	Rapsodo Pte. Ltd.	

Address : 20 Ayer Rajah Crescent #08-05 Singapore 139964

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1.4. General Information of EUT

	General Information				
Equipment Name	MLM2PRO™				
Brand Name	Rapsodo				
Model Name	MLM2.0P				
Series Model	N/A				
Model Difference	N/A				
Antenna Type	FPC				
Antenna 0 Gain	5dBi				
Sample No:	202409090006001				
Battery	Rated Voltage: 7.4V Charge Limit Voltage: 8.4V Capacity: 24.42Wh				
Hardware version	G 1.11				
Software version	3.0.0				
Connecting I/O Port(s)	Refer to the remark below.				

Remark:

The above information of EUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.5. Equipment Specification

Equipment Specification					
Frequency Range	2400MHz - 2483.5MHz	N T 2			
Number of Channels	79	S F B			
Carrier Frequency of Each Channel	2402 + n*1 MHz; n = $0 \sim 78$	Po F 1			
E B	☑Bluetooth BR(1Mbps):	7.344dBm (0.005425W)			
Maximum Output Power To Antenna	☑Bluetooth EDR(2Mbps):	10.589dBm (0.011452W)			
2 2	☑Bluetooth EDR(3Mbps):	10.561dBm (0.011378W)			
5 3	☑Bluetooth BR(1Mbps):	GFSK			
Type of Modulation	☑Bluetooth EDR(2Mbps):	π/4-DQPSK			
5 8	☑Bluetooth EDR(3Mbps):	8-DPSK			

1.6. Modification of EUT

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

1.7. Laboratory Information

Company Name :	Shanghai ATBL Technology Co., Ltd.
Address :	Building 8,No.160 Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone :	+86(0)21-51298625

1.8. Applicable Standards

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

47 CFR Part 15 Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

Remark:

All test items were verified and recorded according to the standards and without any deviation during the

test.

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2. TEST CONFIGURATION OF EUT

2.1. Carrier Frequency Channel

Frequency Band	Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
	00	2402	27	2429	54	2456
	01	2403	28	2430	55	2457
	02	2404	29	2431	56	2458
	03	2405	30	2432	57	2459
-	04	2406	31	2433	58	2460
-	05	2407	32	2434	59	2461
-	06	2408	33	2435	60	2462
-	07	2409	34	2436	61	2463
-	08	2410	35	2437	62	2464
-	09	2411	36	2438	63	2465
7	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
2400 - 2483.5 MHz	13	2415	40	2442	67	2469
IVITIZ	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	<u>n</u> - 10	
	26	2428	53	2455	S	

Remark:

Low Channel: CH00_2402 MHz; Middle Channel: CH39_2441 MHz; High Channel: CH78_2480 MHz.



2.2. Test Modes

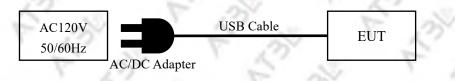
The table below is showing all test modes to demonstrate in compliance with the standard.

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Summary Table of Test Modes						
	Data Rate / Modulation					
Test Item	Bluetooth BR(1Mbps) GFSK	Bluetooth EDR(2Mbps) π/4-DQPSK	Bluetooth EDR(3Mbps) 8-DPSK			
	Mode 1: CH00_2402 MHz	Mode 2: CH00_2402 MHz	Mode 3: CH00_2402 MHz			
For Conducted and Radiated Test	Mode 4: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 6: CH39_2441 MHz			
	Mode 7: CH78_2480 MHz	Mode 8: CH78_2480 MHz	Mode 9: CH78_2480 MHz			
	Mode 10: Hopping	Mode 11: Hopping	Mode 12: Hopping			
For AC Power-line Conducted Emission Mode 13: Keep Bluetooth link under the maximum output power						



- 2.3. Block Diagram of Test System
 - 2.3.1. For AC Power-Line Conducted Emission



2.3.2. For Radiated Spurious Emission



2.3.3. For Conducted Test

SA	RF Cable	EUT	USB Cable	Notebook
1 62			J	8 5

2.4. Description of Support Units

NO.	Unit	Brand	Model	Description	
1	PC	Redmi	Redmi G	/	2 3
2	USB Line	ZL	24AWG		5 8

2.5. Test Software and Power Level

During the test, the channel and power control software provided by the customer is used to control the operation channel and output power level.

2.6. EUT Operating Conditions

For AC power-line conducted emission, the EUT was connected under the large package sizes transmission.

For radiated spurious emission and conducted test, the engineering test program was provided and make the EUT to continuous transmit/receive.



2.7. Equipment List

2.7.1. For AC Power-Line Conducted Emission

Equipment Name	Manufacturer	Model	Serial No.	Equipment No.	Calibration Unti
Test Receiver	R&S	ESPI	101679	SHATBL-E012	2025.05.21
LISN	R&S	ENV216	100300	SHATBL-E013	2025.05.21
LISN	R&S	ENV216	100333	SHATBL-E041	2025.05.21
Thermometer	DeLi	N/A	N/A	SHATBL-E016	2025.09.21
Test Software	FALA	EZ-EMC	N/A	SHATBL-E046	N/A

2.7.2. For Radiated Spurious Emission

Equipment Name	Manufacturer	Model	Serial No.	Equipment No.	Calibration Until
Signal analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2025.05.21
Amplifier	JPT	JPA0118-55-303A	1910001800055000	SHATBL-E006	2025.05.21
Amplifier	JPT	JPA-10M1G32	21010100035001	SHATBL-E005	2025.05.21
Antenna/Turn table Controller	Brilliant	N/A	N/A	SHATBL-E007	N/A
Loop Antenna	Daze	ZN30900C	20077	SHATBL-E042	2025.05.21
Bilog Antenna	SCHWARZBECK	VULB 9168	01174	SHATBL-E008	2025.05.21
Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120D	02334	SHATBL-E009	2025.05.21
Horn Antenna	COM-POWER	AH-1840	10100008	SHATBL-E043	2025.05.21
Thermometer	DeLi	N/A	N/A	SHATBL-E015	2025.09.21
Test Software	FALA	EMC-RI	N/A	SHATBL-E046	N/A

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2.7.3. For Conducted Test

V					
Equipment Name	Manufacturer	Model	Serial No.	Equipment No.	Calibration Until
Power meter	Anritsu	ML2496A	1935001	SHATBL-W030	2025.09.28
Power sensor	Anritsu	MA2411B	1911006	SHATBL-W031	2025.09.28
Power sensor	DARE	RPR3006W	16I00054SN016	SHATBL-W008	2025.09.28
Power sensor	DARE	RPR3006W	RPR6W-2001005	SHATBL-W032	2025.09.28
Power sensor	Rediteq	RPR3006W	RPR6W-2201002	SHATBL-W033	2024.11.15
Power sensor	Rediteq	RPR3006W	RPR6W-2201003	SHATBL-W034	2024.11.15
Power sensor	Keysight	U2021XA	MY59120004	SHATBL-W035	2025.08.13
Adjustable Attenuator	Agilent	8494B	MY42144015	SHATBL-W009	2025.09.28
Adjustable Attenuator	Agilent	8496B	MY42143776	SHATBL-W010	2025.09.28
Environmental Test Chamber	KSON	THS-B6C-150	9159K	SHATBL-W019	2025.01.17
Signal analyzer	Keysight	N9020A	MY50510136	SHATBL-W003	2025.09.28
Vector signal generator	Keysight	N5182B	MY57300196	SHATBL-W005	2025.09.28
Vector signal generator	Agilent	N5182A	MY50143555	SHATBL-W037	2025.07.17
Analog signal generator	Keysight	N5173B	MY60403026	SHATBL-W038	2025.07.17
Wideband radio communication tester	R&S	CMW500	101331	SHATBL-W007	2025.09.28
Spectrum analyzer	R&S	FSV40-N	101761	SHATBL-W036	2025.08.22
Switch Box	N/A	RFSW3003328	RFSW201019	SHATBL-W029	N/A
Thermometer	DeLi	N/A	N/A	SHATBL-W012	2025.09.21
Test Software	FALA	LZ-RF	N/A	SHATBL-W020	N/A

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2.8. Measurement Uncertainty

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
17	RF output power, conducted	±0.958dB
2	Conducted spurious emissions(9KHz~30MHz)	±2.988dB
5	All emissions, radiated 9KHz~30MHz	±0.89dB
3	All emissions, radiated 30MHz-1GHz	±2.50dB
4	All emissions, radiated 1GHz-18GHz	±3.51dB
5	Occupied bandwidth	±23.20Hz
6	Power spectral density	±0.886dB

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3. TEST RESULT

3.1. Maximum Peak Conducted Output Power

3.1.1. Limit

47 CFR 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

3.1.2. Test Procedure

ANSI C63.10-2013 clause 7.8.5: This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

1. Use the following spectrum analyzer settings:

- (1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- (2) RBW > 20 dB bandwidth of the emission being measured.
- 3 VBW \geq RBW.
- (4) Sweep: Auto.
- (5) Detector function: Peak
- (6) Trace: Max hold.
- 2. Allow trace to stabilize.
- 3. Use the marker-to-peak function to set the marker to the peak of the emission.

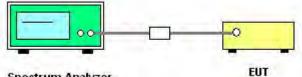
4. The indicated level is the peak output power, after any corrections for external attenuators and cables.

5. A plot of the test results and setup description shall be included in the test report.

Remark:

A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

3.1.3. Test Setup



Spectrum Analyzer

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3.1.4. Test Result of Maximum Peak Conducted Output Power Please refer to the Appendix A

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3.2. Number of Hopping Frequencies

3.2.1. Limit

<u>47 CFR 15.247(a)(1)(iii)</u>: Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.2.2. Test Procedure

<u>ANSI C63.10-2013 clause 7.8.3</u>: The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

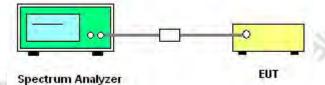
1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.

2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

- 3. VBW \geq RBW.
- 4. Sweep: Auto.
- 5. Detector function: Peak.
- 6. Trace: Max hold.
- 7. Allow the trace to stabilize.

It might prove necessary to break the span up into sub ranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

3.2.3. Test Setup



3.2.4. Test Result of Number of Hopping Frequencies

Please refer to the Appendix A



3.3. Duty Cycle and Dwell Time

3.3.1. Limit

<u>47 CFR 15.247(a)(1)(iii)</u>: The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

3.3.2. Test Procedure

<u>ANSI C63.10-2013 clause 7.8.4</u>: The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.

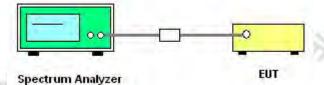
2. RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

- 4. Detector function: Peak.
- 5. Trace: Max hold.
- 6. Use the marker-delta function to determine the transmit time per hop.

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

3.3.3. Test Setup



3.3.4. Test Result of Duty Cycle and Dwell Time

Please refer to the Appendix A



3.4. 20dB Bandwidth

3.4.1. Limit

There is no limit requirement for 20dB Bandwidth.

3.4.2. Test Procedure

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.

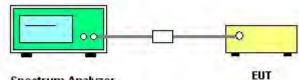
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

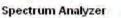
3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; $RBW \ge 1\%$ of the 20 dB bandwidth; $VBW \ge RBW$; Sweep = auto; Detector function = peak; Trace = max hold.

5. Measure and record the results in the test report.

3.4.3. Test Setup





3.4.4. Test Result of 20dB Bandwidth Please refer to the Appendix A



3.5. Carrier Frequency Separation

3.5.1. Limit

<u>47 CFR 15.247(a)(1)</u>: Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.5.2. Test Procedure

<u>ANSI C63.10-2013 clause 7.8.2</u>: The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

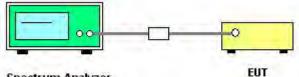
1. Span: Wide enough to capture the peaks of two adjacent channels.

2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

- 3. VBW \geq RBW.
- 4. Sweep: Auto.
- 5. Detector function: Peak.
- 6. Trace: Max hold.
- 7. Allow the trace to stabilize.

8. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. A plot of the data shall be included in the test report.

3.5.3. Test Setup



Spectrum Analyzer

3.5.4. Test Result of Carrier Frequency Separation

Please refer to the Appendix A

3.6. Conducted Band Edge

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3.6.1. Limit

<u>47 CFR 15.247(d)</u>: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

3.6.2. Test Procedure

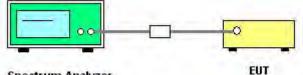
- 1. The testing follows ANSI C63.10-2013 clause 11.13.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.

3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Conducted Band Edge measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the 100 kHz bandwidth within the band that contains the highest level of the desired power when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

4. Measure and record the results in the test report.

5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.6.3. Test Setup



Spectrum Analyzer

3.6.4. Test Result of Conducted Band Edge Please refer to the Appendix A

3.7. Conducted Spurious Emission

3.7.1. Limit

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47 CFR 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

3.7.2. Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

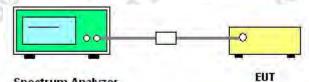
3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

5. Measure and record the results in the test report.

6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.





Spectrum Analyzer

3.7.4. Test Result of Conducted Spurious Emission

Please refer to the Appendix A

AT3

3.8. Radiated Spurious Emission and Restricted Band

3.8.1. Limit

<u>47 CFR 15.247(d)</u>: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

<u>47 CFR 15.205(a)</u>: Only spurious emissions are permitted in any of the frequency bands listed below:

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
0.090-0.110	12.29-12.293	149.9-150.05	1660-1710	8.025-8.5
0.495-0.505	12.51975-12.52025	156.52475-156.52525	1718.8-1722.2	9.0-9.2
2.1735-2.1905	12.57675-12.57725	156.7-156.9	2200-2300	9.3-9.5
4.125-4.128	13.36-13.41	162.0125-167.17	2310-2390	10.6-12.7
4.17725-4.17775	16.42-16.423	167.72-173.2	2483.5-2500	13.25-13.4
4.20725-4.20775	16.69475-16.69525	240-285	2690-2900	14.47-14.5
6.215-6.218	16.80425-16.80475	322-335.4	3260-3267	15.35-16.2
6.26775-6.26825	25.5-25.67	399.9-410	3332-3339	17.7-21.4
6.31175-6.31225	37.5-38.25	608-614	3345.8-3358	22.01-23.12
8.291-8.294	73-74.6	960-1240	3600-4400	23.6-24.0
8.362-8.366	74.8-75.2	1300-1427	4500-5150	31.2-31.8
8.37625-8.38675	108-121.94	1435-1626.5	5350-5460	36.43-36.5
8.41425-8.41475	123-138	1645.5-1646.5	7250-7750	Above 38.6

<u>47 CFR 15.209(a)</u>: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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
Above 960	500	3

AT3

3.8.2. Test Procedure

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.

2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

3. 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.

4. Set to the maximum power setting and enable the EUT transmit continuously.

- 5. Use the following spectrum analyzer settings:
 - 1 Span shall wide enough to fully capture the emission being measured;

② Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak;

(3) For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds

On time = N1*L1+N2*L2+...+Nn-1*LNn-1+Nn*Ln

Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

Average Emission Level = Peak Emission Level + 20*log(Duty cycle)

6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Pre-amp Factor = Level

7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.

8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

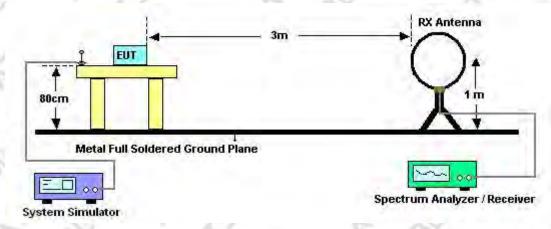
Remark:

The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.70dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

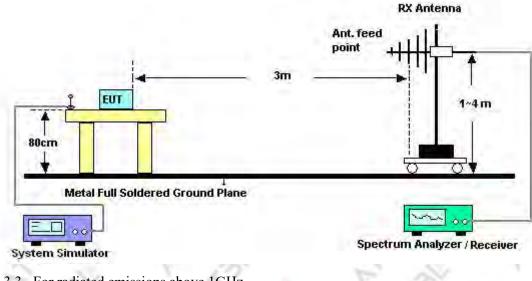


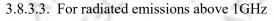
3.8.3. Test Setup

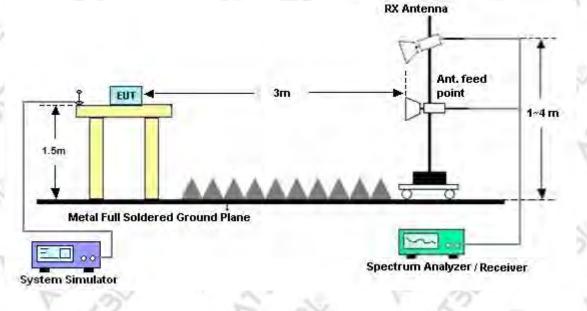
3.8.3.1. For radiated emissions below 30MHz



3.8.3.2. For radiated emissions from 30MHz to 1GHz







AT3

3.8.4. Test Result of Radiated Spurious Emission

For 9 kHz \sim 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

For 30 MHz ~ 1 GHz:

Note:

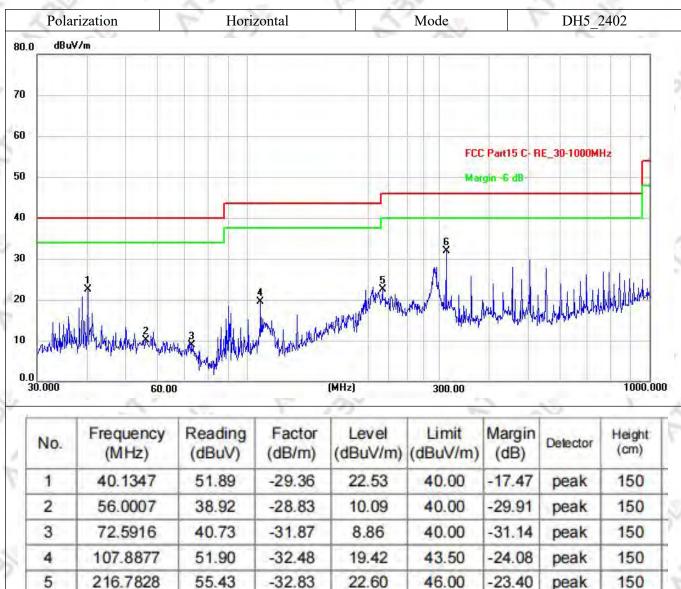
6 *

312.1794

59.98

-28.16

All modes have been tested, only worst case(DH5_2402MHz)mode was recorded in the test report if no any others.



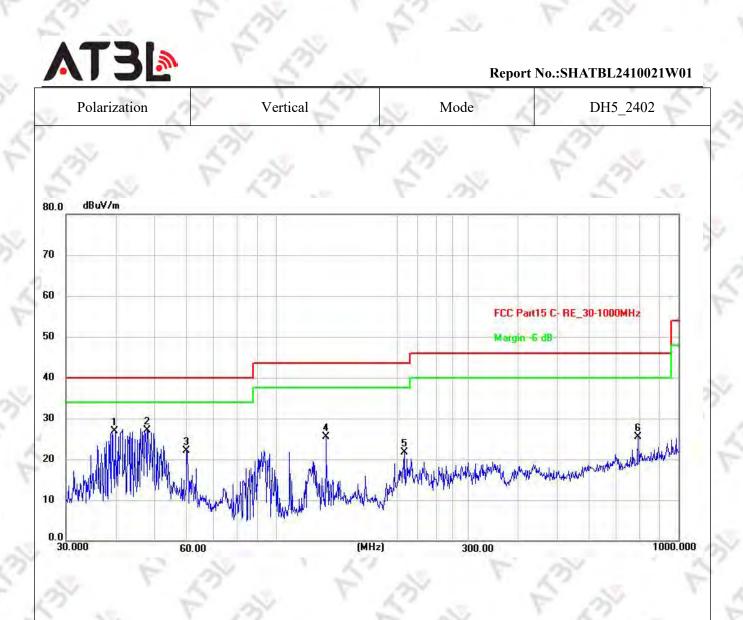
31.82

46.00

-14.18

peak

150



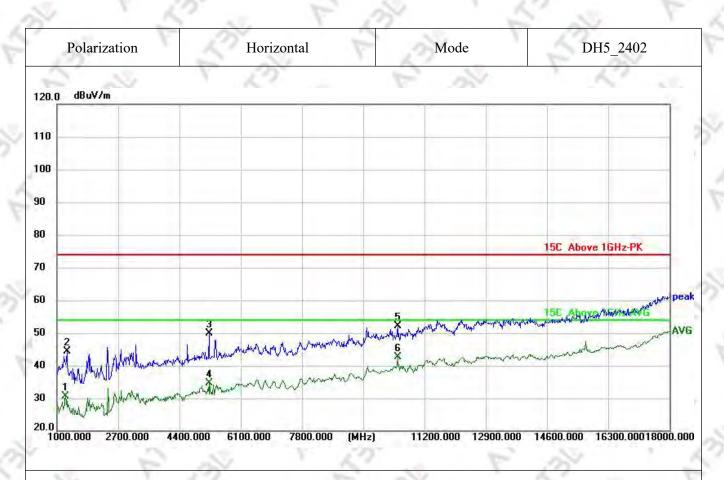
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)
1	39.7146	56.21	-29.40	26.81	40.00	-13.19	peak	150
2 *	47.8260	56.10	-28.99	27.11	40.00	-12.89	peak	150
3	59.8588	51.55	-29.36	22.19	40.00	-17.81	peak	150
4	133.1511	56.10	-30.67	25.43	43.50	-18.07	peak	150
5	208.5803	54.56	-32.84	21.72	43.50	-21.78	peak	150
6	793.3960	43.38	-17.85	25.53	46.00	-20.47	peak	150

For 1 GHz ~ 18GHz:

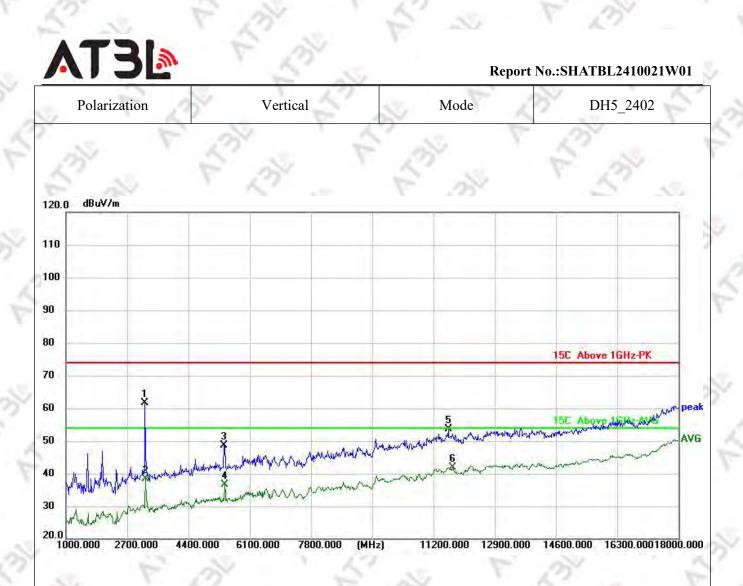
Note:

1.The all data rate modes had been test, but only worse test data was recorded in the test report.
2.In frequency ranges 18 ~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.

3.We used the filter to test and the main frequency was filtered out.

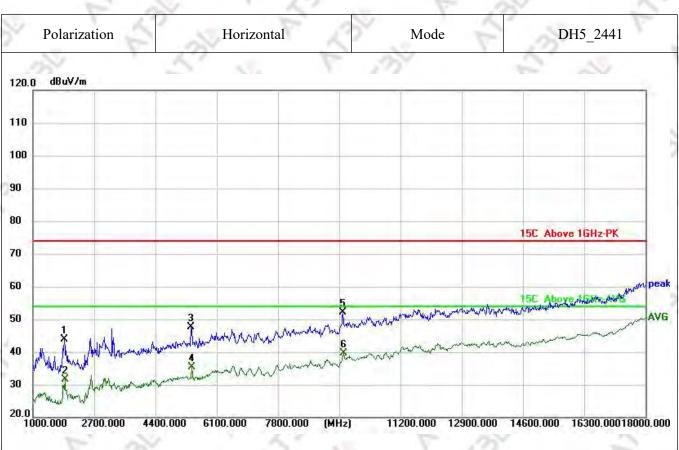


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1238.000	50.97	-20.22	30.75	54.00	-23.25	AVG
2	1272.000	64.44	-20.13	44.31	74.00	-29.69	peak
3	5216.000	54.58	-4.71	49.87	74.00	-24.13	peak
4	5233.000	39.41	-4.67	34.74	54.00	-19.26	AVG
5	10452.000	46.28	5.91	52.19	74.00	-21.81	peak
6 *	10452.000	36.61	5.91	42.52	54.00	-11.48	AVG

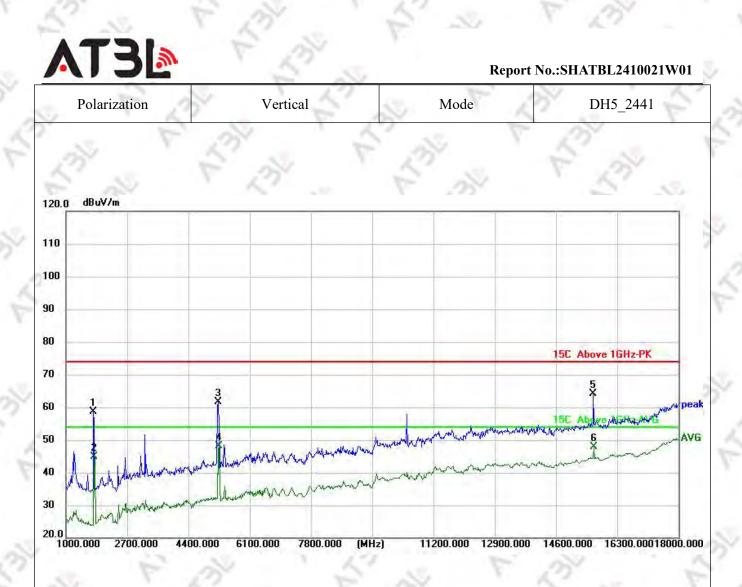


							1.11	
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)
1	3193.000	73.36	-11.78	61.58	74.00	-12.42	peak	150
2	3210.000	50.03	-11.76	38.27	54.00	-15.73	AVG	150
3	5386.000	53.04	-4.41	48.63	74.00	-25.37	peak	150
4	5403.000	41.00	-4.39	36.61	54.00	-17.39	AVG	150
5	11608.000	45.57	8.06	53.63	74.00	-20.37	peak	150
6 *	11727.000	33.83	8.14	41.97	54.00	-12.03	AVG	150





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)
1	1867.000	62.50	-18.71	43.79	74.00	-30.21	peak	150
2	1884.000	50.15	-18.51	31.64	54.00	-22.36	AVG	150
3	5386.000	51.93	-4.41	47.52	74.00	-26.48	peak	150
4	5403.000	39.75	-4.39	35.36	54.00	-18.64	AVG	150
5	9602.000	47.87	4.38	52.25	74.00	-21.75	peak	150
6 *	9619.000	35.26	4.41	39.67	54.00	-14.33	AVG	150



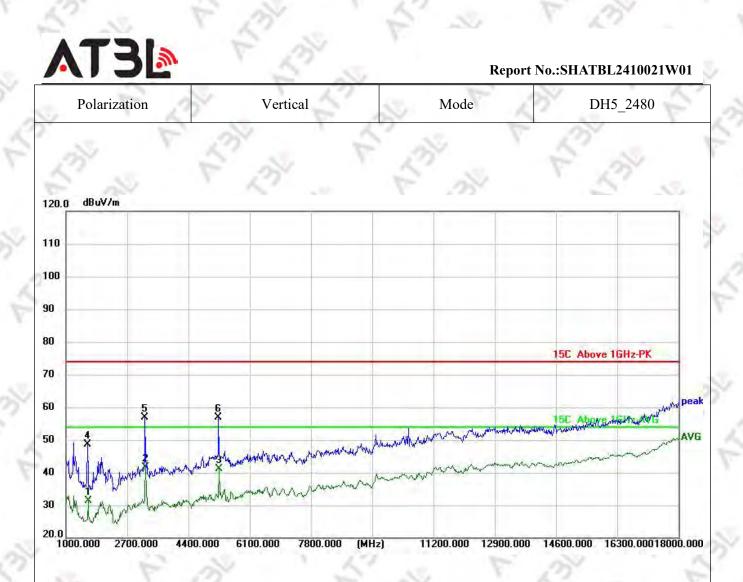
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)
1	1765.000	78.15	-19.51	58.64	74.00	-15.36	peak	150
2	1782.000	64.34	-19.48	44.86	54.00	-9.14	AVG	150
3	5233.000	66.40	-4.67	61.73	74.00	-12.27	peak	150
4 *	5250.000	52.84	-4.64	48.20	54.00	-5.80	AVG	150
5	15637.000	52.36	11.87	64.23	74.00	-9.77	peak	150
6	15654.000	36.05	11.86	47.91	54.00	-6.09	AVG	150

AT3L

Report No.:SHATBL2410021W01

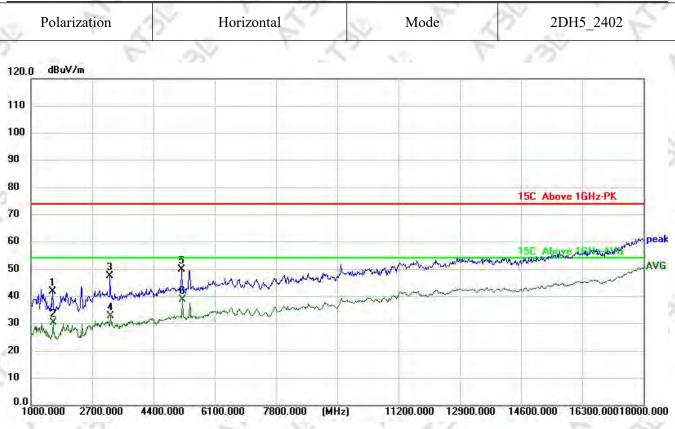
Polarization	Horizontal	S 18	Mode	DH5_2480	
0.0 dBuV/m	221	5	S. V.	105	
					-
(/)				15C Above 1GHz-PK	
-					-
	water marine		5	15C Above Welder-AN	perde p
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.0 1000.000 2700.000 44					

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2768.000	56.71	-14.13	42.58	74.00	-31.42	peak
2	2785.000	45.25	-14.09	31.16	54.00	-22.84	AVG
3	5233.000	54.92	-4.67	50.25	74.00	-23.75	peak
4	5335.000	40.32	-4.49	35.83	54.00	-18.17	AVG
5	11727.000	45.58	8.14	53.72	74.00	-20.28	peak
6 *	11744.000	33.86	8.15	42.01	54.00	-11.99	AVG

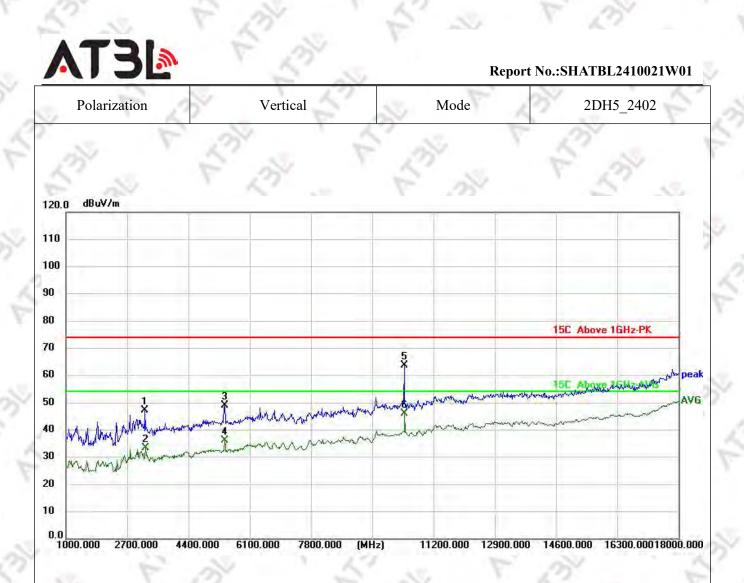


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1612.000	51.06	-19.80	31.26	54.00	-22.74	AVG
2 *	3210.000	53.28	-11.76	41.52	54.00	-12.48	AVG
3	5250.000	45.77	-4.64	41.13	54.00	-12.87	AVG
4	1595.000	68.44	-19.82	48.62	74.00	-25.38	peak
5	3193.000	68.69	-11.78	56.91	74.00	-17.09	peak
6	5233.000	61.61	-4.67	56.94	74.00	-17.06	peak



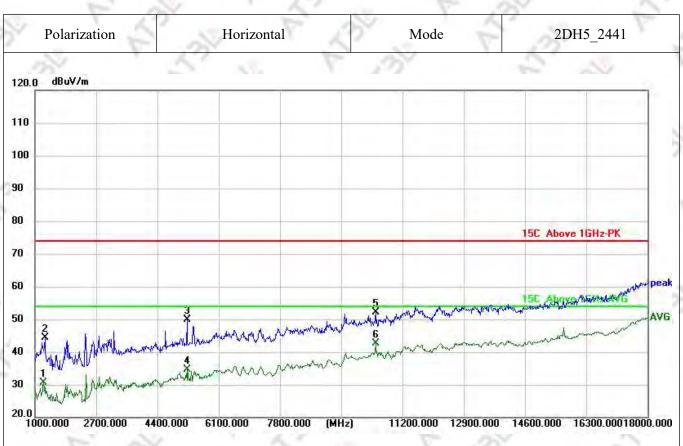


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1595.000	61.77	-19.82	41.95	74.00	-32.05	peak
2	1612.000	50.29	-19.80	30.49	54.00	-23.51	AVG
3	3193.000	59.31	-11.78	47.53	74.00	-26.47	peak
4	3210.000	44.73	-11.76	32.97	54.00	-21.03	AVG
5	5182.000	54.65	-4.78	49.87	74.00	-24.13	peak
6 *	5199.000	43.51	-4.74	38.77	54.00	-15.23	AVG



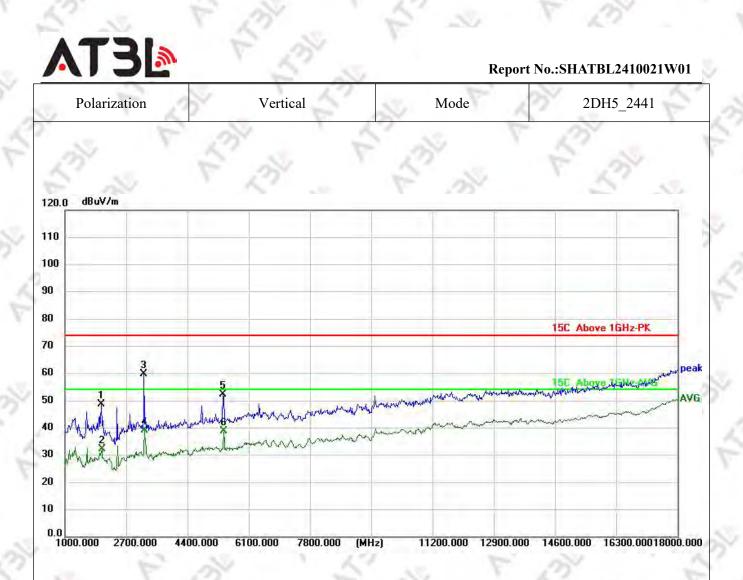
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3193.000	58.98	-11.78	47.20	74.00	-26.80	peak
2	3210.000	45.21	-11.76	33.45	54.00	-20.55	AVG
3	5403.000	53.47	-4.39	49.08	74.00	-24.92	peak
4	5403.000	40.54	-4.39	36.15	54.00	-17.85	AVG
5	10384.000	58.01	5.78	63.79	74.00	-10.21	peak
6 *	10401.000	40.25	5.82	46.07	54.00	-7.93	AVG





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1238.000	50.97	-20.22	30.75	54.00	-23.25	AVG
2	1272.000	64.44	-20.13	44.31	74.00	-29.69	peak
3	5216.000	54.58	-4.71	49.87	74.00	-24.13	peak
4	5233.000	39.41	-4.67	34.74	54.00	-19.26	AVG
5	10452.000	46.28	5.91	52.19	74.00	-21.81	peak
6 .	10452.000	36.61	5.91	42.52	54.00	-11.48	AVG

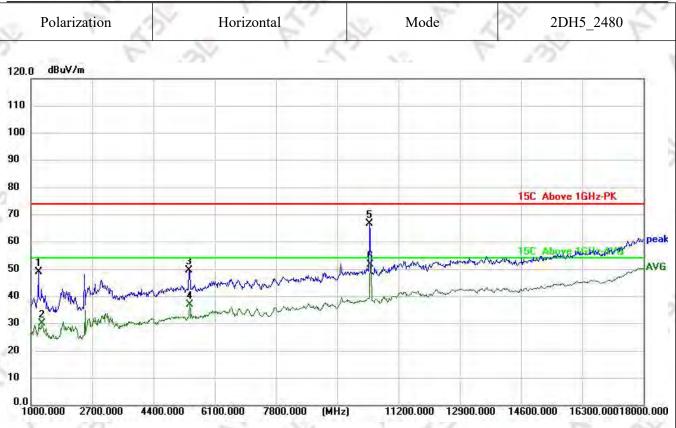
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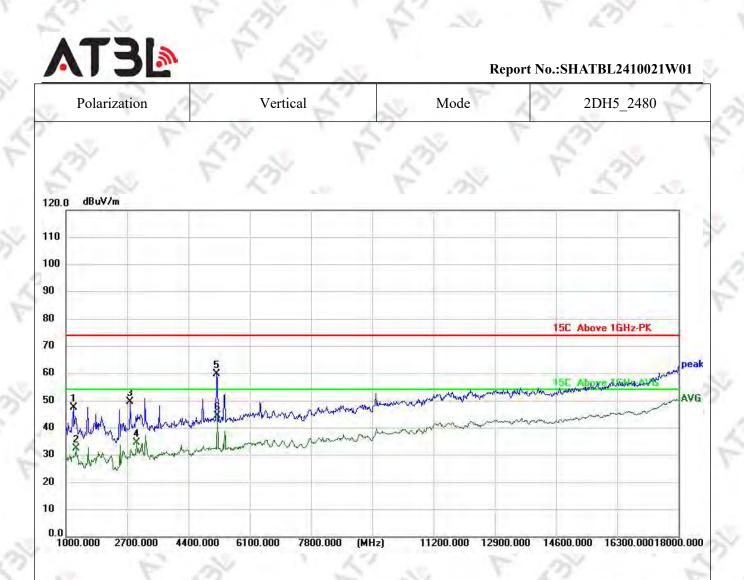
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
2003.000	65.97	-17.21	48.76	74.00	-25.24	peak
2020.000	49.38	-17.15	32.23	54.00	-21.77	AVG
3193.000	71.67	-11.78	59.89	74.00	-14.11	peak
3210.000	50.82	-11.76	39.06	54.00	-14.94	AVG
5386.000	56.74	-4.41	52.33	74.00	-21.67	peak
5403.000	43.09	-4.39	38.70	54.00	-15.30	AVG
	(MHz) 2003.000 2020.000 3193.000 3210.000 5386.000	(MHz)(dBuV)2003.00065.972020.00049.383193.00071.673210.00050.825386.00056.74	(MHz)(dBuV)(dB/m)2003.00065.97-17.212020.00049.38-17.153193.00071.67-11.783210.00050.82-11.765386.00056.74-4.41	(MHz)(dBuV)(dB/m)(dBuV/m)2003.00065.97-17.2148.762020.00049.38-17.1532.233193.00071.67-11.7859.893210.00050.82-11.7639.065386.00056.74-4.4152.33	(MHz)(dBuV)(dB/m)(dBuV/m)(dBuV/m)2003.00065.97-17.2148.7674.002020.00049.38-17.1532.2354.003193.00071.67-11.7859.8974.003210.00050.82-11.7639.0654.005386.00056.74-4.4152.3374.00	(MHz)(dBuV)(dB/m)(dBuV/m)(dBuV/m)(dB)2003.00065.97-17.2148.7674.00-25.242020.00049.38-17.1532.2354.00-21.773193.00071.67-11.7859.8974.00-14.113210.00050.82-11.7639.0654.00-14.945386.00056.74-4.4152.3374.00-21.67



53



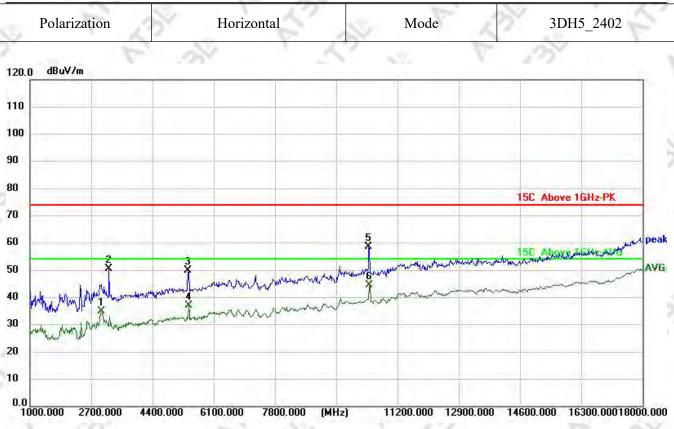
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1204.000	69.42	-20.31	49.11	74.00	-24.89	peak
2	1306.000	50.07	-20.04	30.03	54.00	-23.97	AVG
3	5386.000	53.96	-4.41	49.55	74.00	-24.45	peak
4	5403.000	41.56	-4.39	37.17	54.00	-16.83	AVG
5	10401.000	60.88	5.82	66.70	74.00	-7.30	peak
6 *	10418.000	46.02	5.86	51.88	54.00	-2.12	AVG



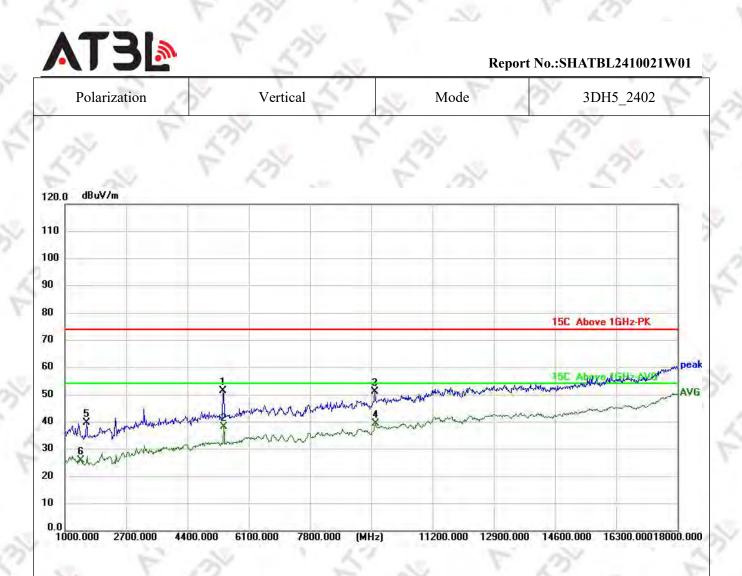
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1204.000	67.84	-20.31	47.53	74.00	-26.47	peak
2	1272.000	52.60	-20.13	32.47	54.00	-21.53	AVG
3	2785.000	63.89	-14.09	49.80	74.00	-24.20	peak
4	2955.000	47.37	-12.80	34.57	54.00	-19.43	AVG
5	5182.000	64.55	-4.78	59.77	74.00	-14.23	peak
6 *	5199.000	49.33	-4.74	44.59	54.00	-9.41	AVG



53



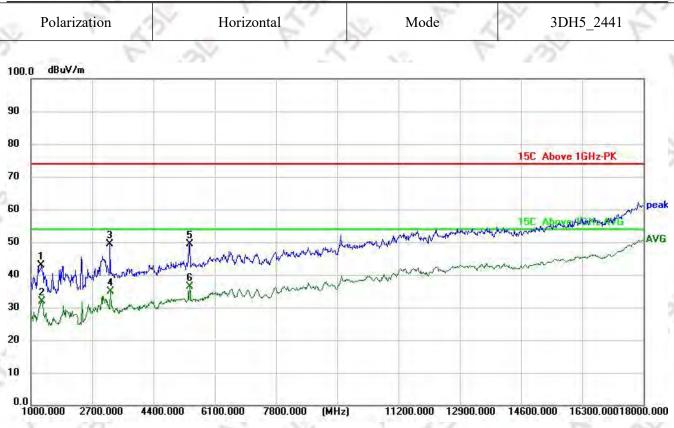
Frequency	-					
(MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
2989.000	47.53	-12.53	35.00	54.00	-19.00	AVG
3193.000	62.21	-11.78	50.43	74.00	-23.57	peak
5386.000	54.40	-4.41	49.99	74.00	-24.01	peak
5403.000	41.48	-4.39	37.09	54.00	-16.91	AVG
10401.000	52.76	5.82	58.58	74.00	-15.42	peak
10418.000	38.67	5.86	44.53	54.00	-9.47	AVG
	2989.000 3193.000 5386.000 5403.000 10401.000	2989.000 47.53 3193.000 62.21 5386.000 54.40 5403.000 41.48 10401.000 52.76	2989.00047.53-12.533193.00062.21-11.785386.00054.40-4.415403.00041.48-4.3910401.00052.765.82	2989.00047.53-12.5335.003193.00062.21-11.7850.435386.00054.40-4.4149.995403.00041.48-4.3937.0910401.00052.765.8258.58	2989.00047.53-12.5335.0054.003193.00062.21-11.7850.4374.005386.00054.40-4.4149.9974.005403.00041.48-4.3937.0954.0010401.00052.765.8258.5874.00	2989.00047.53-12.5335.0054.00-19.003193.00062.21-11.7850.4374.00-23.575386.00054.40-4.4149.9974.00-24.015403.00041.48-4.3937.0954.00-16.9110401.00052.765.8258.5874.00-15.42



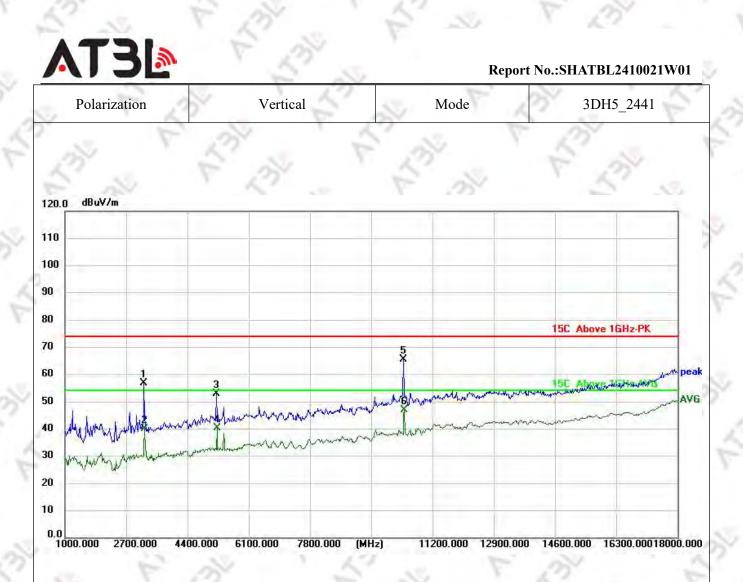
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5386.000	55.73	-4.41	51.32	74.00	-22.68	peak
2	5403.000	42.59	-4.39	38.20	54.00	-15.80	AVG
3	9602.000	46.71	4.38	51.09	74.00	-22.91	peak
4 *	9619.000	35.02	4.41	39.43	54.00	-14.57	AVG
5	1595.000	59.72	-19.82	39.90	74.00	-34.10	peak
6	1442.000	45.67	-19.79	25.88	54.00	-28.12	AVG

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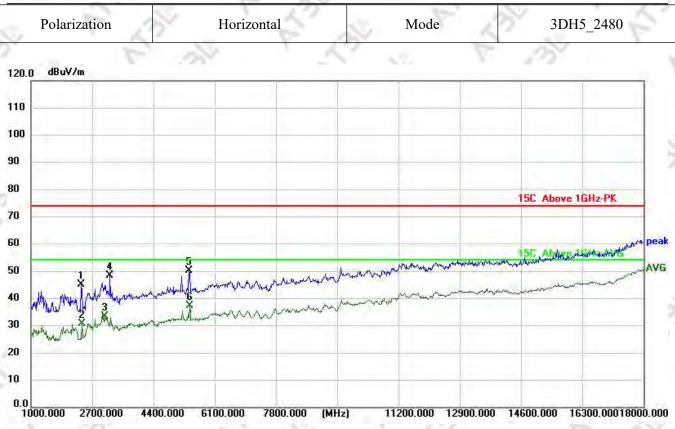
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
1289.000	62.89	-20.09	42.80	74.00	-31.20	peak
1306.000	51.91	-20.04	31.87	54.00	-22.13	AVG
3193.000	61.12	-11.78	49.34	74.00	-24.66	peak
3210.000	46.60	-11.76	34.84	54.00	-19.16	AVG
5403.000	53.73	-4.39	49.34	74.00	-24.66	peak
5403.000	40.69	-4.39	36.30	54.00	-17.70	AVG
	(MHz) 1289.000 1306.000 3193.000 3210.000 5403.000	(MHz) (dBuV) 1289.000 62.89 1306.000 51.91 3193.000 61.12 3210.000 46.60 5403.000 53.73	(MHz) (dBuV) (dB/m) 1289.000 62.89 -20.09 1306.000 51.91 -20.04 3193.000 61.12 -11.78 3210.000 46.60 -11.76 5403.000 53.73 -4.39	(MHz) (dBuV) (dB/m) (dBuV/m) 1289.000 62.89 -20.09 42.80 1306.000 51.91 -20.04 31.87 3193.000 61.12 -11.78 49.34 3210.000 46.60 -11.76 34.84 5403.000 53.73 -4.39 49.34	(MHz) (dBuV) (dB/m) (dBuV/m) (dBuV/m) 1289.000 62.89 -20.09 42.80 74.00 1306.000 51.91 -20.04 31.87 54.00 3193.000 61.12 -11.78 49.34 74.00 3210.000 46.60 -11.76 34.84 54.00 5403.000 53.73 -4.39 49.34 74.00	(MHz) (dBuV) (dB/m) (dBuV/m) (dBuV/m) (dB/m) (dBuV/m) (dB) 1289.000 62.89 -20.09 42.80 74.00 -31.20 1306.000 51.91 -20.04 31.87 54.00 -22.13 3193.000 61.12 -11.78 49.34 74.00 -24.66 3210.000 46.60 -11.76 34.84 54.00 -19.16 5403.000 53.73 -4.39 49.34 74.00 -24.66



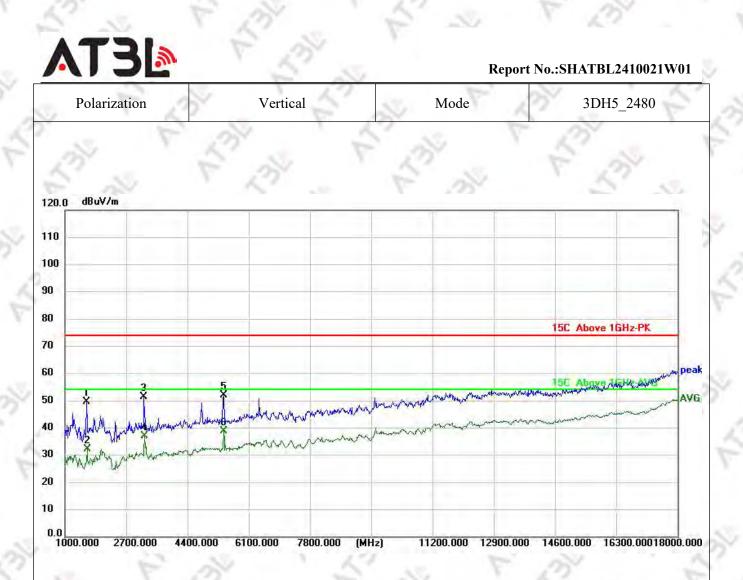
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3193.000	68.53	-11.78	56.75	74.00	-17.25	peak
2	3210.000	51.94	-11.76	40.18	54.00	-13.82	AVG
3	5199.000	57.72	-4.74	52.98	74.00	-21.02	peak
4	5216.000	45.13	-4.71	40.42	54.00	-13.58	AVG
5	10384.000	59.85	5.78	65.63	74.00	-8.37	peak
6 *	10418.000	41.00	5.86	46.86	54.00	-7.14	AVG



53

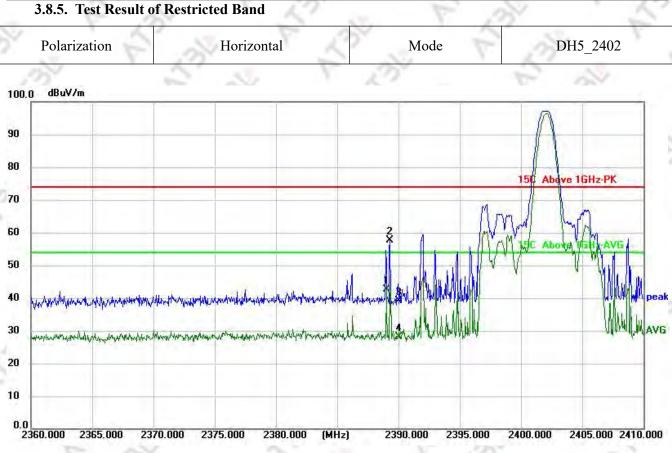


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
1	2394.000	61.06	-15.87	45.19	74.00	-28.81	peak
2	2411.000	46.50	-15.78	30.72	54.00	-23.28	AVG
3	3057.000	45.75	-12.24	33.51	54.00	-20.49	AVG
4	3193.000	60.35	-11.78	48.57	74.00	-25.43	peak
5	5386.000	54.55	-4.41	50.14	74.00	-23.86	peak
6 *	5403.000	41.67	-4.39	37.28	54.00	-16.72	AVG
257		N 10		1 121		1000	-



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1595.000	69.61	-19.82	49.79	74.00	-24.21	peak
2	1612.000	52.10	-19.80	32.30	54.00	-21.70	AVG
3	3193.000	63.30	-11.78	51.52	74.00	-22.48	peak
4	3210.000	48.84	-11.76	37.08	54.00	-16.92	AVG
5	5403.000	56.33	-4.39	51.94	74.00	-22.06	peak
6 *	5403.000	43.14	-4.39	38.75	54.00	-15.25	AVG





No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	2389.000	58.44	-15.88	42.56	54.00	-11.44	AVG
2	2389.300	73.58	-15.88	57.70	74.00	-16.30	peak
3	2390.000	55.13	-15.88	39.25	74.00	-34.75	peak
4	2390.000	43.96	-15.88	28.08	54.00	-25.92	AVG

AT 3 🕑 Report No.:SHATBL2410021W01 Polarization Vertical DH5_2402 Mode 100.0 dBuV/m 90 80 150 ve 1GHz-PK Ab 70 60 15C Above IGHz-AVG 50 W alwala w peal 40 ununder hat when the and war and when and what a day and when the adverter a day that has been a subserve and the opposite AVG 30 her Marthan we out the present the matter and the matter the source of the 20 10 0.0 2360.000 2405.000 2410.000 2365.000 2370.000 2375.000 2380.000 2390.000 2395.000 2400.000 (MHz)

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	59.95	-15.88	44.07	74.00	-29.93	peak
2 *	2390.000	43.01	-15.88	27.13	54.00	-26.87	AVG



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Report No.:SHATBL2410021W01

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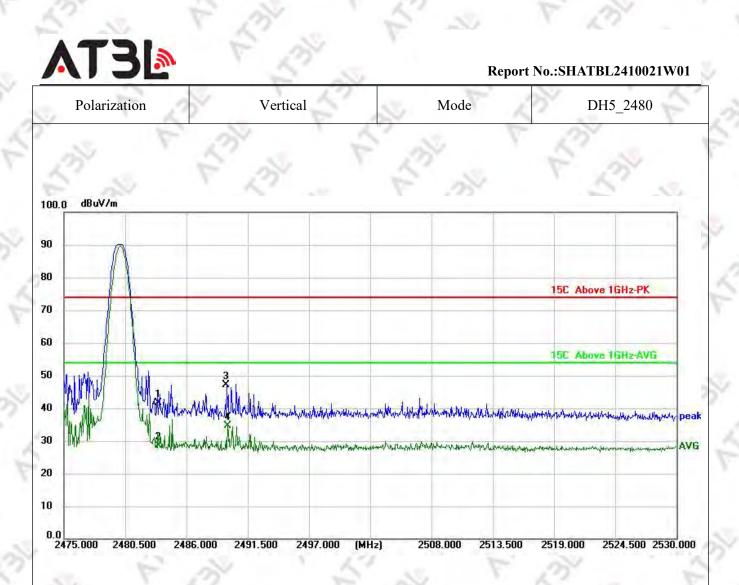
		1	Horizon	u	100	Mode	100	DIIJ	_2480
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}uV/m	_	1		1	1				
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		-			-	-	jac	ADOAG 1	3HZ-FK
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		1						PIDUTO II	ane ava
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0 2480									
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2483.500	55.16	-15.30	39.86	74.00	-34.14	peak
2 *	2483.500	43.46	-15.30	28.16	54.00	-25.84	AVG

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	56.99	-15.30	41.69	74.00	-32.31	peak
2	2483.500	43.83	-15.30	28.53	54.00	-25.47	AVG
3	2489.630	62.33	-15.26	47.07	74.00	-26.93	peak
4 *	2489.685	49.88	-15.26	34.62	54.00	-19.38	AVG



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Report No.:SHATBL2410021W01

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5.	Polarization	Horizontal	Mode	2DH5_2402
	5	201	7 20	25
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1				MASC Above GHZ-AVG
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0.0	60.000 2365.000 2	2370.000 2375.000 2380.000 (M	Hz) 2390.000 2395.000	2400.000 2405.000 2410.00

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	55.41	-15.88	39.53	74.00	-34.47	peak
2 *	2390.000	43.45	-15.88	27.57	54.00	-26.43	AVG

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2	Polariza	tion	Vert	ical	A.	Mode	ANY A	2DH5_24
100.0	dBu∀/m	5	F D		2F	25	F	B
90								<u>A</u>
80								
70							150	Above 1GHz-
60							JIV SC	Above 1GHz-
50								N
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	2390.000	50.89	-15.88	35.01	74.00	-38.99	peak
*	2390.000	41.71	-15.88	25.83	54.00	-28.17	AVG

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Report No.:SHATBL2410021W01

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Pola	rization	25	Horizonta	al	100	Mode	12	2DH5	5_2480
	1	1.0	1	1	1	2.	V .	25	
0 dBu	dBuV/m			r - 1					
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	A								
	1						15	C Above 1	GHz-PK
	11								
		-							
							15	C Above 1	GHz-AVG
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475.000	2480.500	2486.000	2491.500 24	97.000 (MHz		08.000 251	3.500 2519	(a) (a)	24.500 2530

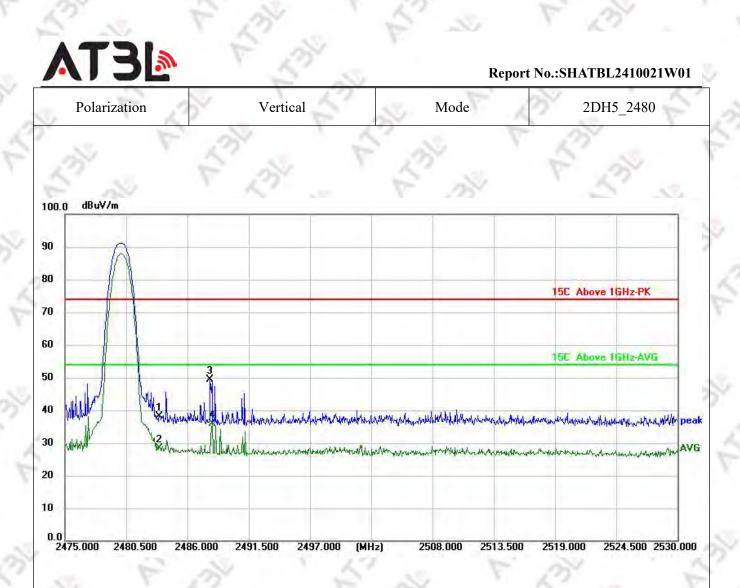
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	53.52	-15.30	38.22	74.00	-35.78	peak
2 *	2483.500	44.03	-15.30	28.73	54.00	-25.27	AVG

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	53.44	-15.30	38.14	74.00	-35.86	peak
2	2483.500	43.63	-15.30	28.33	54.00	-25.67	AVG
3	2488.035	64.68	-15.27	49.41	74.00	-24.59	peak
4 *	2488.255	51.08	-15.27	35.81	54.00	-18.19	AVG



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Report No.:SHATBL2410021W01

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Polarization	Horizontal	Mode	3DH5_2402
00.0 dBuV/m	201	N2 17	125
0			\land
)			15C Above 1GHz-PK
)			WVISE Above 16Hz-AVG
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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	50.89	-15.88	35.01	74.00	-38.99	peak
2 *	2390.000	41.71	-15.88	25.83	54.00	-28.17	AVG

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AT3L Report No.:SHATBL2410021W01 Polarization Vertical Mode 3DH5_2402 100.0 dBuV/m 90 80 15C Above 1GHz-PK 70 60 15C Abo e 16Hz-AVG 50 40 Mahal MA 4 Muthan the peak With Mary mouse person for a la million floored WHALLAN W 30 AVG 20 10 0.0 2360.000 2405.000 2410.000 2365.000 2370.000 2375.000 2380.000 2390.000 2395.000 2400.000 (MHz)

0	No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
1	1	2390.000	50.76	-15.88	34.88	74.00	-39.12	peak	T
	2 *	2390.000	40.98	-15.88	25.10	54.00	-28.90	AVG	



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Report No.:SHATBL2410021W01

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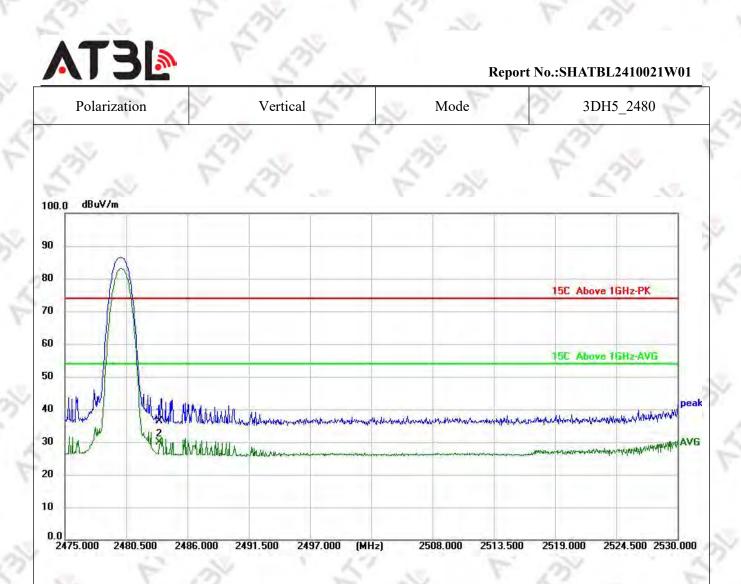
Polariza	ation	Horizontal	2 8	Mode	12 3	3DH5_2480
∩ dBuV/m	F	25	5	47.	V 12	Y I
0 dBuV/m						
- 6	7					
					15C Ab	ove 1GHz-PK
						ove 16Hz-AVG
					IDL AD	ove full2-AVIa
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mand		Mornannennennen				
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475.000 2	480.500 2486.00	0 2491.500 2497	.000 (MHz)	2508.000 2513.	500 2519.000	2524.500 2530.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	53.56	-15.30	38.26	74.00	-35.74	peak
2 *	2483.500	43.27	-15.30	27.97	54.00	-26.03	AVG

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	
1	2483.500	51.56	-15.30	36.26	74.00	-37.74	peak	
2 *	2483.500	45.11	-15.30	29.81	54.00	-24.19	AVG	Γ



3.9. AC Power-Line Conducted Emission

3.9.1. Limit

<u>47 CFR 15.207(a)</u>: For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table:

Enormous of amiggion (MII-	Conducted limit (dBµV)				
Frequency of emission (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.

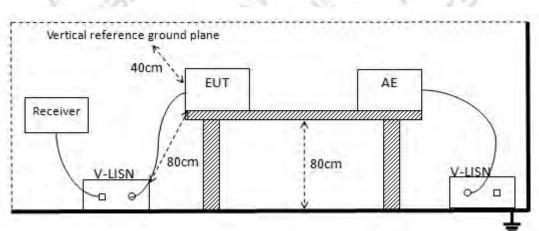
3.9.2. Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.

- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.

8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.9.3. Test Setup





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3.9.4. Test Result of AC Power-Line Conducted Emission

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Please refer to the Appendix A

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3.10. Antenna Requirement

3.10.1. Standard Requirement

According to <u>47 CFR 15.203</u>, 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.

3.10.2. EUT Antenna

The antenna used for the EUT is FPC antenna, which meets the antenna requirements.

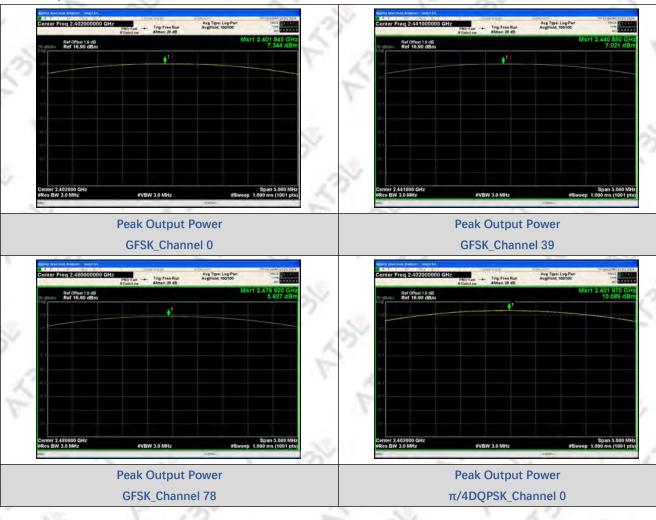


Conducted Output Power

Test Result

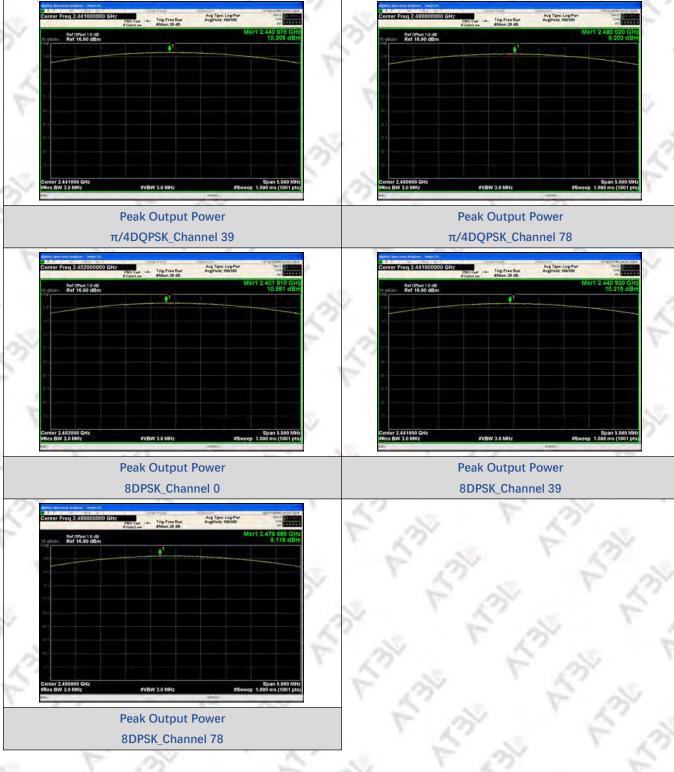
Modulation	Packet Type	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
GFSK DH5	1	0	7.344	5.425	7	PASS
	DH5	39	7.021	5.036	≤30	PASS
	1.2.1	78	5.927	3.915		PASS
N 10	2	0	10.589	11.452	-00.07	PASS
π/4DQPSK	2-DH5	39	10.305	10.728		PASS
	12	78	9.203	8.323		PASS
100	8 2	0	10.561	11.379	≤20.97	PASS
8DPSK	3-DH5	39	10.215	10.508	17	PASS
20		78	9.118	8.162	- C	PASS

Test Graphs



AT3L

Report No.:SHATBL2410021W01



ATSL 99% Bandwidth

Report No.:SHATBL2410021W01

Test Result

Modulation	Channel	Center Frequency (MHz)	99% BW (MHz)
125	0	2402	0.88094
GFSK	39	2441	0.87199
1 12 .	78	2480	0.87521
T D	0	2402	1.1903
π/4DQPSK	39	2441	1.1779
N 1	78	2480	1.1937
2	0	2402	1.1973
8DPSK	39	2441	1.1908
5 5	78	2480	1.1894

Test Graphs





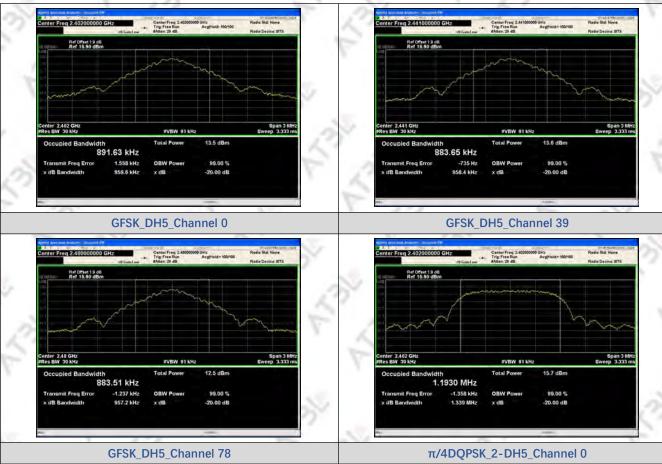
20dB Bandwidth

Report No.:SHATBL2410021W01

Test Result

Modulation	Channel	Center Frequency (MHz)	20 dB Bandwidth (MHz)
13	0	2402 MHz	0.9596
GFSK	39	2441 MHz	0.9584
1 12	78	2480 MHz	0.9572
E D	0	2402 MHz	1.339
π/4DQPSK	39	2441 MHz	1.352
Nº Y	78	2480 MHz	1.358
2	0	2402 MHz	1.342
8DPSK	39	2441 MHz	1.355
51.55	78	2480 MHz	1.347

Test Graphs



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Report No.:SHATBL2410021W01

Carrier Frequencies Separation

Test Result

Modulation	Packet	Left Center frequency (MHz)	Right Center frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	DH5	2439.9823	2440.8452	1	0.64	PASS
π/4DQPSK	2-DH5	2439.8248	2440.9955	1.1707	0.893	PASS
8DPSK	3-DH5	2439.8386	2441.0045	1.1659	0.895	PASS

Test Graphs



T3

Conducted Out Of Band Emission

Test Result

Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
× .		- 255	2400.00	-44.919	-13.67	-31.249	PASS
1 24	12	4803.64	-62.999	-13.67	-49.329	PASS	
122		0	7205.75	-65.848	-13.67	-52.178	PASS
20	2	F	9607.87	-64.478	-13.67	-50.808	PASS
CESK	DH5		24911.4	-49.936	-13.67	-36.266	PASS
GFSK	DHO		2483.50	-57.975	-14.81	-43.165	PASS
	8.	S-	4960.33	-63.858	-14.81	-49.048	PASS
50		78	7440.47	-64.549	-14.81	-49.739	PASS
Nº T	12	9920.62	-63.539	-14.81	-48.729	PASS	
	2 .	24918.8	-49.561	-14.81	-34.751	PASS	
F F B	1 6	2400.00	-46.268	-13.57	-32.698	PASS	
	2	1	4804.26	-61.742	-13.57	-48.172	PASS
		0	7205.13	-64.365	-13.57	-50.795	PASS
	25	250	9607.87	-62.952	-13.57	-49.382	PASS
		2	24896.4	-49.705	-13.57	-36.135	PASS
τ/4DQPSK	2-DH5	78	2483.50	-58.611	-14.83	-43.781	PASS
25			4959.70	-63.771	-14.83	-48.941	PASS
5	100		5235.62	-45.248	-14.83	-30.418	PASS
5	25		7439.85	-63.750	-14.83	-48.920	PASS
6	1 2	- T	9919.37	-64.913	-14.83	-50.083	PASS
	1.2	100	2400.00	-45.815	-13.37	-32.445	PASS
100	1	15	4803.02	-63.794	-13.37	-50.425	PASS
25		0	7206.38	-63.703	-13.37	-50.333	PASS
1 5	, Y	12	9607.87	-63.639	-13.37	-50.270	PASS
		5	24842.1	-49.600	-13.37	-36.230	PASS
8DPSK	3-DH5	2	2483.50	-58.651	-15.23	-43.421	PASS
		. V	4960.33	-63.715	-15.23	-48.485	PASS
	- R	78	7439.85	-62.753	-15.23	-47.523	PASS
	5	201	9920.62	-64.229	-15.23	-48.999	PASS
201		51.00	24810.8	-49.457	-15.23	-34.227	PASS

Hopping

			OOB	ООВ			
Madulation	Doolvot	akat Channal	Emission	Emission	Limit	Over Limit	Decult
Modulation	Packet	Channel	Frequency	Level	(dBm)	(dB)	Result
			(MHz)	(dBm)			



	2 N	2400.00	-44.027	-11.07	-32.957	PASS	
GFSK	DH5	- A	2483.50	-60.351	-12.39	-47.961	PASS
	π/4DQPSK 2-DH5 H	Hopping	2400.00	-45.632	-10.03	-35.602	PASS
N/4DQP5K			2483.50	-58.607	-11.31	-47.297	PASS
	12	2400.00	-44.813	-11.05	-33.763	PASS	
8DPSK	3-DH5	V.	2483.50	-60.195	-12.3	-47.895	PASS

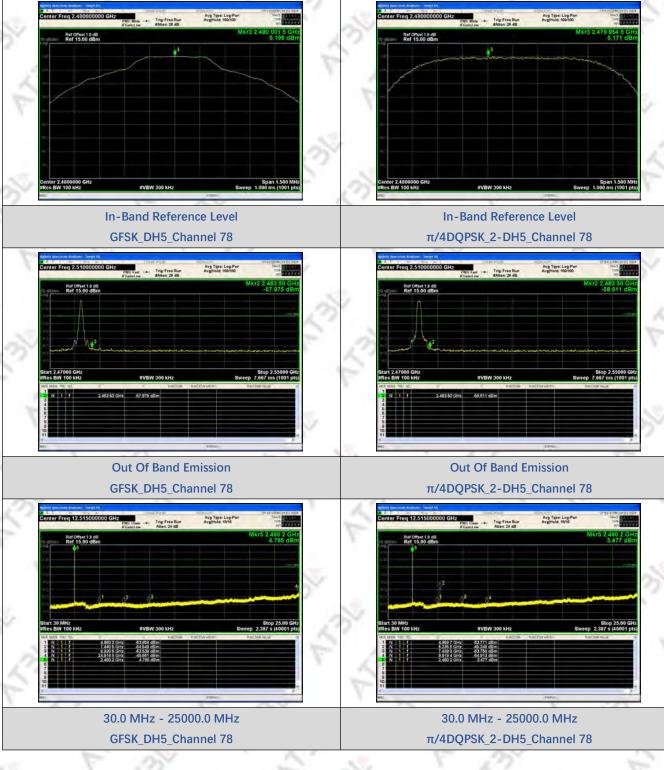
Test Graphs



SHATBL-W-117/A0

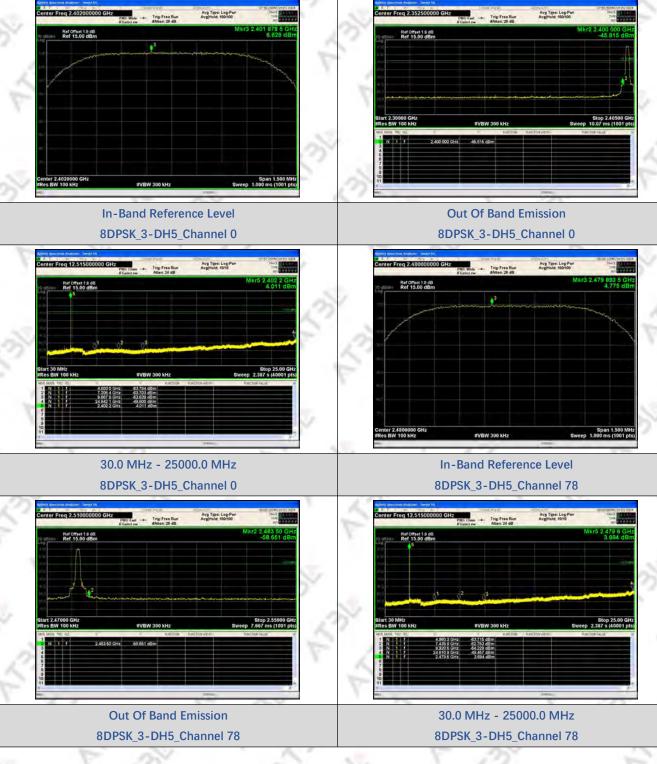
ATE

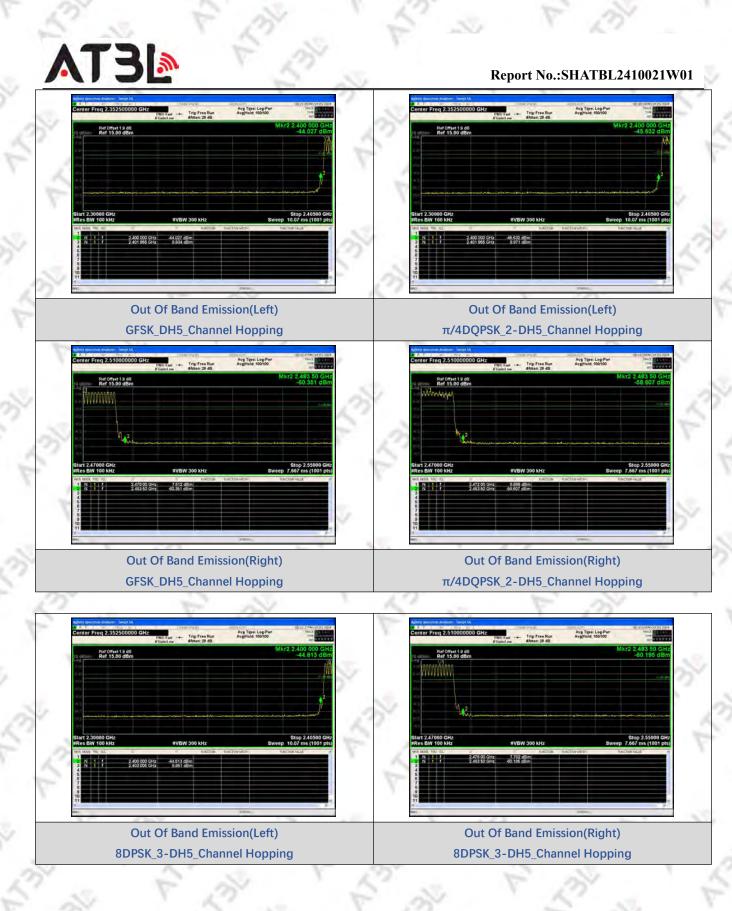
Report No.:SHATBL2410021W01



Arg Type Leg Dur Marce 12-00 Ref Orger 13-00 Micro 2-00 Micro

Report No.:SHATBL2410021W01





AT3L Duty Cycle

Report No.:SHATBL2410021W01

10

Test Result

Modulation	Packets	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)
GFSK	251	0	20.000	20.000	100
	DH5	39	20.000	20.000	100
	F B	78	20.000	20.000	100
5	2	0	20.000	20.000	100
π/4DQPSK	2-DH5	39	20.000	20.000	100
10		78	20.000	20.000	100
F 2	20	0	20.000	20.000	100
8DPSK	3-DH5	39	20.000	20.000	100
	13	78	20.000	20.000	100

Test Graphs

R T RF 50 Q AC nter Freq 2.402000000	GHz PNO: Fast IFGain:Low FAtten:	ALIGNAUTO Avg Type: I ree Run : 26 dB		7:33:05 PM Oct 23, 2024 TRACE 1 2 3 4 5 TYPE W DET A A A A A A
Ref Offset 1.9 dB dB/div Ref 17.90 dBm				
0				
0				
1				
1				
1				
1				
1				
1				
nter 2.402000000 GHz				Snan () Hz
s BW 8 MHz	#VBW 8.0 M		Sweep 20.00	Span 0 Hz ms (10001 pts)
		STATUS		

BL2410021W01

Agilent Spectrum Analyze	r - Swept SA 50 Ω - AC		SE:PULSE	ALIGNAUTO	07	41:25 PM Oct 23, 2024
Center Freq 2.44			Trig: Free Run #Atten: 26 dB	Avg Type: RM		TRACE 1 2 3 4 5 TYPE WWWWWW DET A A A A A A
Ref Offs 10 dB/div Ref 17	et 1.9 dB .90 dBm					
7.90						
-2.10						
-12.1						
-22.1						
-32.1						
-42.1						
-52.1						
-62.1						
-72.1						
Center 2.4410000 Res BW 8 MHz	00 GHz	#VBV	V 8.0 MHz*		Sweep 20.001	Span 0 Hz ms (10001 pts
MSG				STATUS		

GFSK(DH5)_Channel 39

R T RF 50Ω AC Center Freq 2.480000000 0	SENSE: PULSE SHZ PNO: Fast +++ Trig: Free Run	ALIGNAUTO Avg Type: RMS	07:42:45 PM Oct 23, 2024 TRACE 1 2 3 4 5 TYPE WHMAAMAA DET A A A A A A
	IFGain:Low #Atten: 26 dB		DET A A A A A A
Ref Offset 1.9 dB dB/div Ref 17.90 dBm			
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enter 2.480000000 GHz es BW 8 MHz	#VBW 8.0 MHz*	Sween	Span 0 Hz 20.00 ms (10001 pts)

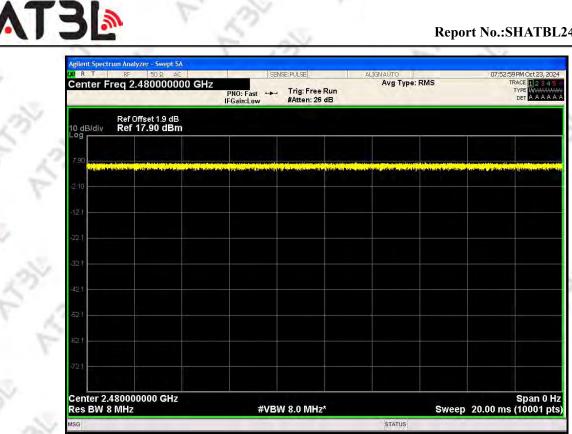
GFSK(DH5)_Channel 78

	um Analyzer - Swept SA				
<mark>x)</mark> R T Center Fr	RF 50 Ω AC req 2.402000000 GF		SE:PULSE Trig: Free Run Atten: 28 dB	ALIGNAUTO Avg Type: RMS	07:45:33 PM Oct 23, 20 TRACE 2 3 4 TYPE WWWW DET A A A A
10 dB/div Log	Ref Offset 1.9 dB Ref 18.00 dBm				
8.00					
-2.00					
-12.0					
-22.0					
-32.0					
-42:0					
-52.0					
-62.0					
-72.0					
Center 2.4 Res BW 8	02000000 GHz MHz	#VBV	V 8.0 MHz*	Swee	Span 0 H p 20.00 ms (10001 pt

π/4DQPSK(2-DH5)_Channel 0

8 T RF 500 AC Center Freq 2.441000000 G	SENSE:PULSE PNO: Fast IFGain:Low Atten: 28 dB	ALIGNAUTO Avg Type: RMS	07:48:12 PM Oct 23, 2024 TRACE 1 2 3 4 5 TYPE WWWWWW DET A A A A A A
Ref Offset 1.9 dB			
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-2.00	ne Nienne al de Longen en Allynde All Alexandro Lange de Lines et de la begré sets a l'activitation de La de	inter of the set of a distance of the set in the set of	
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-22.0			
32.0			
42:0			
52.0			
62,0			
72.0			
Center 2.441000000 GHz Res BW 8 MHz	#VBW 8.0 MHz*	Sweep	Span 0 Hz 20.00 ms (10001 pts)

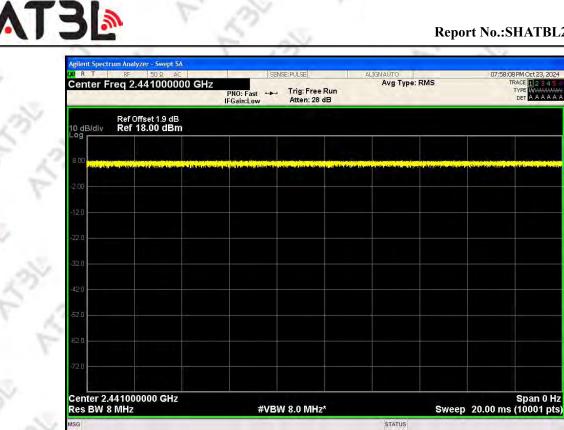
π/4DQPSK(2-DH5)_Channel 39



π/4DQPSK(2-DH5)_Channel 78

0 R T _ RF 50 Ω AC Center Freq 2.402000000 GHz	SENSE: PULSE PNO: Fast +++ Trig: Free Run IFGain:Low Atten: 28 dB	ALIGNAUTO Avg Type: RMS	07:55:37 PM Oct 23, 2024 TRACE 1 2 3 4 5 TYPE WWWWWW DET A A A A A A
Ref Offset 1.9 dB 0 dB/div Ref 18.00 dBm			
8 00	en help ben in selecting meaning of programmer and ben meaning in the set page		
2.00			
12.0			
22.0			
32.0			
42:0			
52.0			
72.0			
Center 2.402000000 GHz Res BW 8 MHz	#VBW 8.0 MHz*	Swaan	Span 0 Hz 20.00 ms (10001 pts)

8DPSK(3-DH5)_Channel 0



8DPSK(3-DH5)_Channel 39

R T RF 50 Ω AC Center Freq 2.480000000 GHz	PNO: Fast Trig: Free Run IFGain:Low #Atten: 26 dB	ALIGNAUTO Avg Type: RMS	08:07:19PM Oct 23, 2024 TRACE 1 2 3 4 5 TYPE WWWWWW DET A A A A A A
Ref Offset 1.9 dB 10 dB/div Ref 17.90 dBm			
7.90			
-2.10			
-12.1			
-22.1			
32.1			
-42.1			
-52.1			
-62.1			
-72.1			
Center 2.480000000 GHz Res BW 8 MHz	#VBW 8.0 MHz*	Sweep	Span 0 Hz 20.00 ms (10001 pts)

8DPSK(3-DH5)_Channel 78

AT3

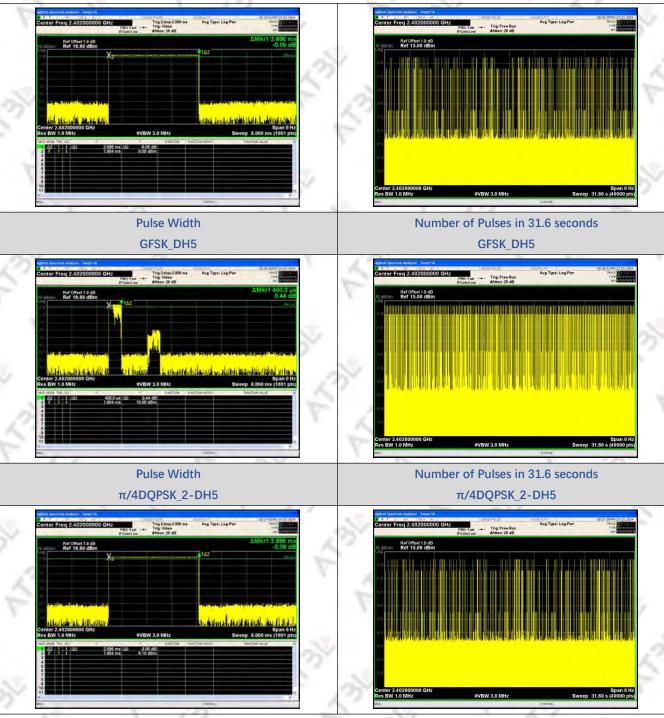
Report No.:SHATBL2410021W01

Dwell Time

Test Result

Modulation	Packet	Channel	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Limit (ms)	Result
GFSK	DH5	СНО	2.896	103	298.29	100	PASS
π/4DQPSK	2-DH5	V	0.4000	320	128.00	< 400	PASS
8DPSK	3-DH5	(2402MHz)	2.896	101	292.50	201	PASS

Test Graphs





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Report No.:SHATBL2410021W01

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Number of Pulses in 31.6 seconds 8DPSK_3-DH5 100 K P

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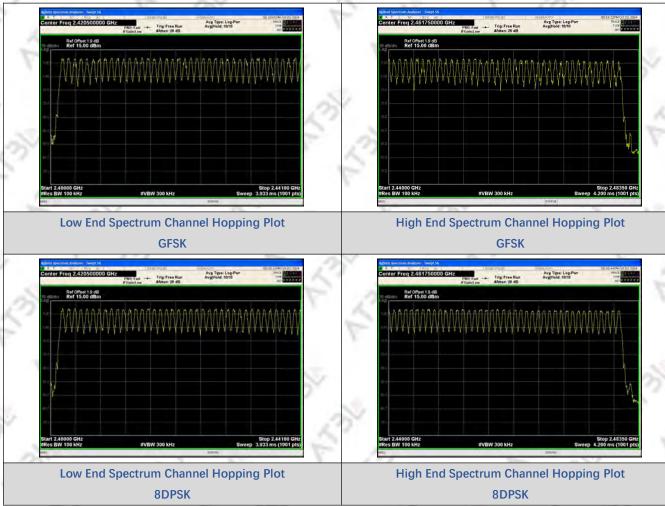
AT3L

Number Of Hopping Channel

Test Result

Modulation	Packet	Number of Hopping Channel	Limit	Result
GFSK	DH5	79	15	PASS
8DPSK	3-DH5	79	15	PASS

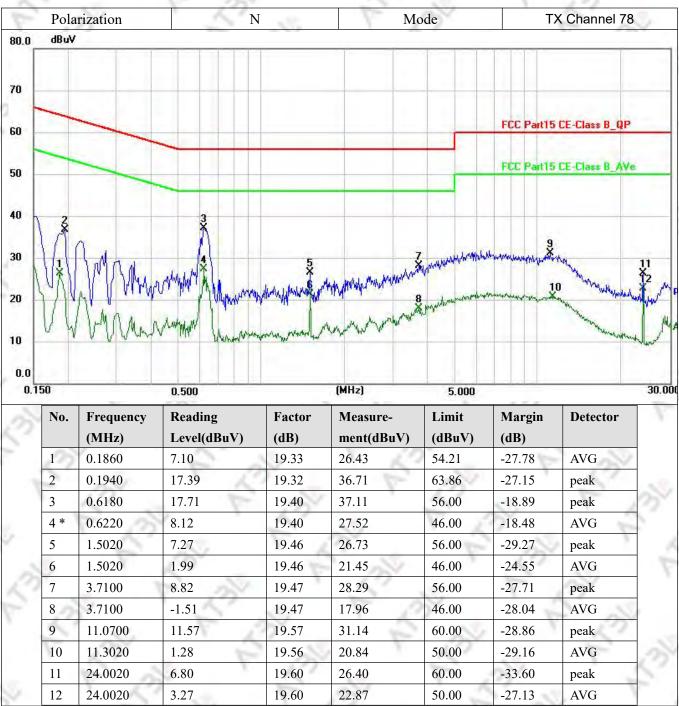
Test Graphs



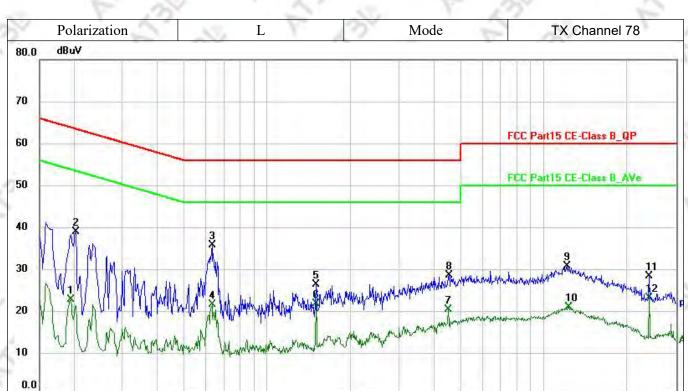


AC Power-Line Conducted Emission

only worst case (DH5) mode was recorded in the test report if no any others.







)		0.500		(MHz)	5.000		
No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure- ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1940	3.44	19.32	22.76	53.86	-31.10	AVG
2	0.2020	19.66	19.32	38.98	63.53	-24.55	peak
3 *	0.6300	16.43	19.40	35.83	56.00	-20.17	peak
4	0.6300	2.27	19.40	21.67	46.00	-24.33	AVG
5	1.5020	6.94	19.40	26.34	56.00	-29.66	peak
6	1.5020	2.38	19.40	21.78	46.00	-24.22	AVG
7	4.5020	0.93	19.49	20.42	46.00	-25.58	AVG
8	4.5300	9.15	19.50	28.65	56.00	-27.35	peak
9	12.1540	11.17	19.60	30.77	60.00	-29.23	peak
10	12.3060	1.43	19.59	21.02	50.00	-28.98	AVG
11	24.0020	8.71	19.63	28.34	60.00	-31.66	peak
12	24.0020	3.69	19.63	23.32	50.00	-26.68	AVG



5.TEST SETUP PHOTOGRAPHS

Please refer to the Appendix F.

6.EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Please refer to the Appendix G.

*****END OF THE REPORT****