

TEST REPORT

Applicant: Turbo Technologies Corporation
EUT Description: aiTalk Long-Range Off-Network Mobile Companion
Model: ATK-100NA
Brand: aiTalk
FCC ID: 2BTCHATK-100NA
Standards: FCC 47 CFR Part 15 Subpart C
Date of Receipt: 2025/10/13
Date of Test: 2025/10/13 to 2025/12/09
Date of Issue: 2025/12/11

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of the model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.



Jim Huang
Approved By:



Carey Chen
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2025/12/11	Original	Carey Chen

Summary of Test Results

Clause	FCC Part	Test Items	Result
4.1	§15.203/15.247(b)	Antenna Requirement	PASS
4.2	§15.207	AC Power Line Conducted Emission	PASS
4.3	§15.247 (b)(2)	Output Power	PASS
4.4	§15.247 (a)(1)(i)	Occupied Bandwidth	Reporting purposes only
4.5	§15.247 (a)(1)	Hopping Frequency Separation	PASS
4.6	§15.247 (a)(1)(i)	Number Hopping Channels	PASS
4.7	§15.247 (a)(1)(i)	Dwell Time	PASS
4.8	§15.247(d)	Band Edge for Conducted Emissions	PASS
4.9	§15.247(d)	Spurious RF Conducted Emissions	PASS
4.10	§15.205 §15.209	Radiated Spurious emissions and Band Edge	PASS
Test Method: ANSI C63.10:2020, KDB 558074 D01 15.247 Mesa Guidance v05r02.			
Remark: Pass is EUT meets standard requirements.			

Table of Contents

1	General Description	5
1.1	Lab Information	5
1.1.1	Testing Location	5
1.1.2	Test Facility / Accreditations	5
1.2	Client Information	5
1.2.1	Applicant	5
1.2.2	Manufacturer	5
1.3	Product Information	6
2	Test Configuration	7
2.1	Test Channel	7
2.2	Worst-case configuration and Mode	8
2.3	Support Unit used in test	8
2.4	Test Environment	8
2.5	Test RF Cable	8
2.6	Modifications	8
2.7	Test Setup Diagram	9
2.7.1	Conducted Configuration	9
2.7.2	Radiated Configuration	10
3	Equipment and Measurement Uncertainty	11
3.1	Test Equipment List	11
3.2	Measurement Uncertainty	12
4	Test results	13
4.1	Antenna Requirement	13
4.2	AC Power Line Conducted Emissions	14
4.3	Output Power	17
4.4	Occupied Bandwidth	18
4.5	Hopping Frequency Separation	19
4.6	Number of Hopping Channels	20
4.7	Dwell Time	21
4.8	Band Edge for Conducted Emissions	22
4.9	Spurious RF Conducted Emissions	23
4.10	Radiated Spurious Emissions and Band Edge	24
5	Test Setup Photos	26
	Appendix	27

1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014

Tel.: +86-755-27212361

Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1353.

ISED CAB identifier: CN0152

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0152

Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Turbo Technologies Corporation
Address:	Room 1202,Building F1,Future Sci-Tech City,No.999 Gaoxin Avenue,Wuhan,China

1.2.2 Manufacturer

Manufacturer:	Turbo Technologies Corporation
Address:	Room 1202,Building F1,Future Sci-Tech City,No.999 Gaoxin Avenue,Wuhan,China

1.3 Product Information

EUT Description:	aiTalk Long-Range Off-Network Mobile Companion
Model No.:	ATK-100NA
Brand:	aiTalk
Hardware Version:	HW_V3.23.1
Software Version:	BFW_V3.4
Modulation Type:	TurMass
Hopping:	Support
Frequency Range:	902~928MHz
Bandwidth:	500kHz
Antenna Type:	☐ External, ☒ Integrated
Antenna Gain:	Ant (dBi)
	0
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.	

2 Test Configuration

2.1 Test Channel

Operation Frequency of each channel for TurMass							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	14	908.8	27	915.3	40	921.8
2	902.8	15	909.3	28	915.8	41	922.3
3	903.3	16	909.8	29	916.3	42	922.8
4	903.8	17	910.3	30	916.8	43	923.3
5	904.3	18	910.8	31	917.3	44	923.8
6	904.8	19	911.3	32	917.8	45	924.3
7	905.3	20	911.8	33	918.3	46	924.8
8	905.8	21	912.3	34	918.8	47	925.3
9	906.3	22	912.8	35	919.3	48	925.8
10	906.8	23	913.3	36	919.8	49	926.3
11	907.3	24	913.8	37	920.3	50	926.8
12	907.8	25	914.3	38	920.8		
13	908.3	26	914.8	39	921.3		

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test Channel	Test Frequency
The Lowest channel (CH1)	902.3MHz
The Middle channel (CH25)	914.3MHz
The Highest channel (CH50)	926.8MHz

2.2 Worst-case configuration and Mode

Hopping mode	Keep the EUT in hopping mode
No hopping mode	Keep the EUT was programmed to be in continuously transmitting mode

2.3 Support Unit used in test

Description	Manufacturer	Model	Serial Number
Laptop	Lenovo	Thinkbook 14 G4+IAP	YX05AZ13

2.4 Test Environment

Temperature:	Normal: 15°C ~ 35°C
Humidity:	45 ~ 56 % RH Ambient
Voltage:	DC 3.7V
AC Voltage:	AC 120V/60Hz for Conducted Emissions
Remark: The testing environment is within the scope of the EUT user manual and meets the requirements of the standard testing environment.	

2.5 Test RF Cable

For all conducted test items: The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

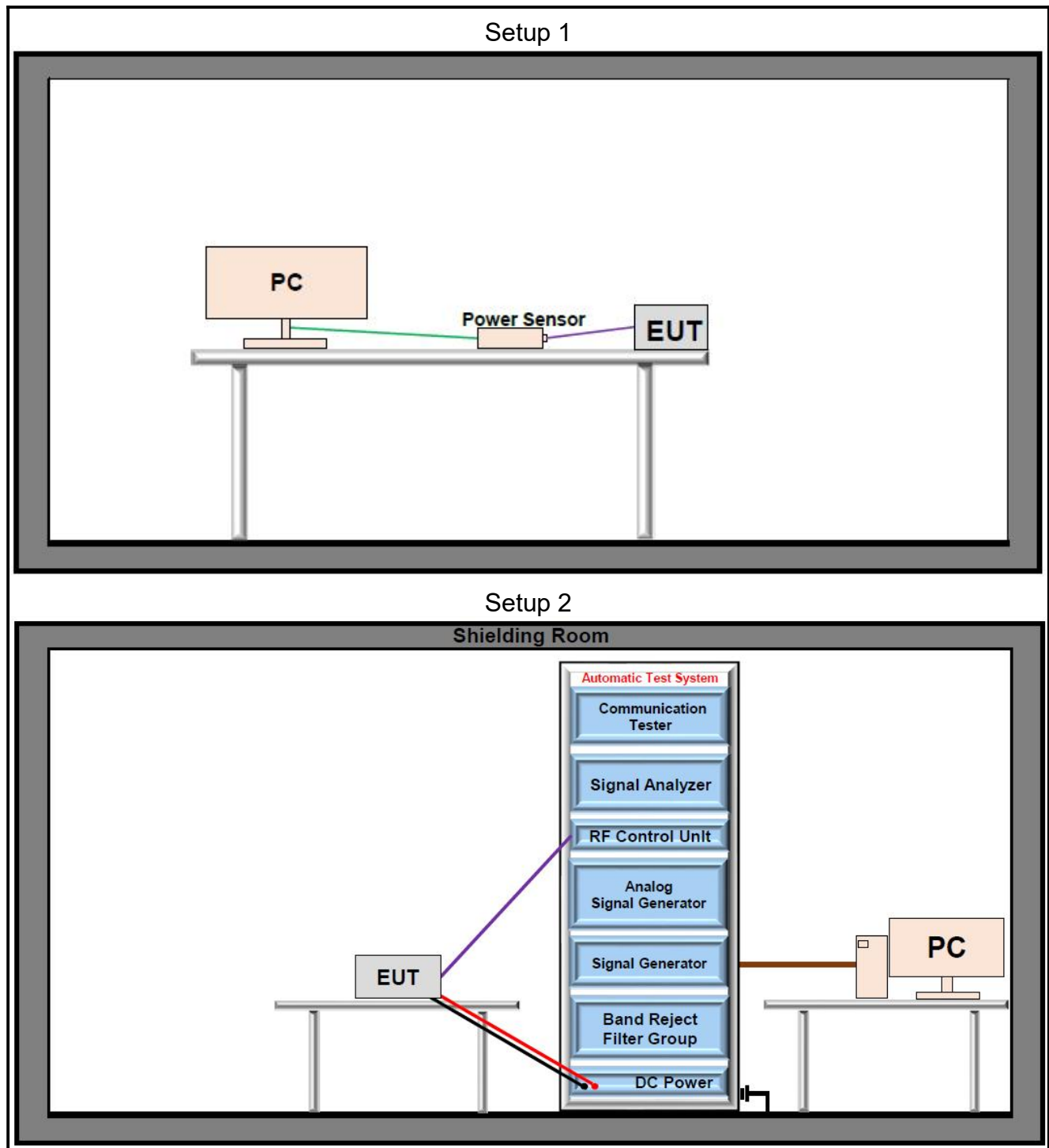
Offset = RF cable loss + attenuator factor.

2.6 Modifications

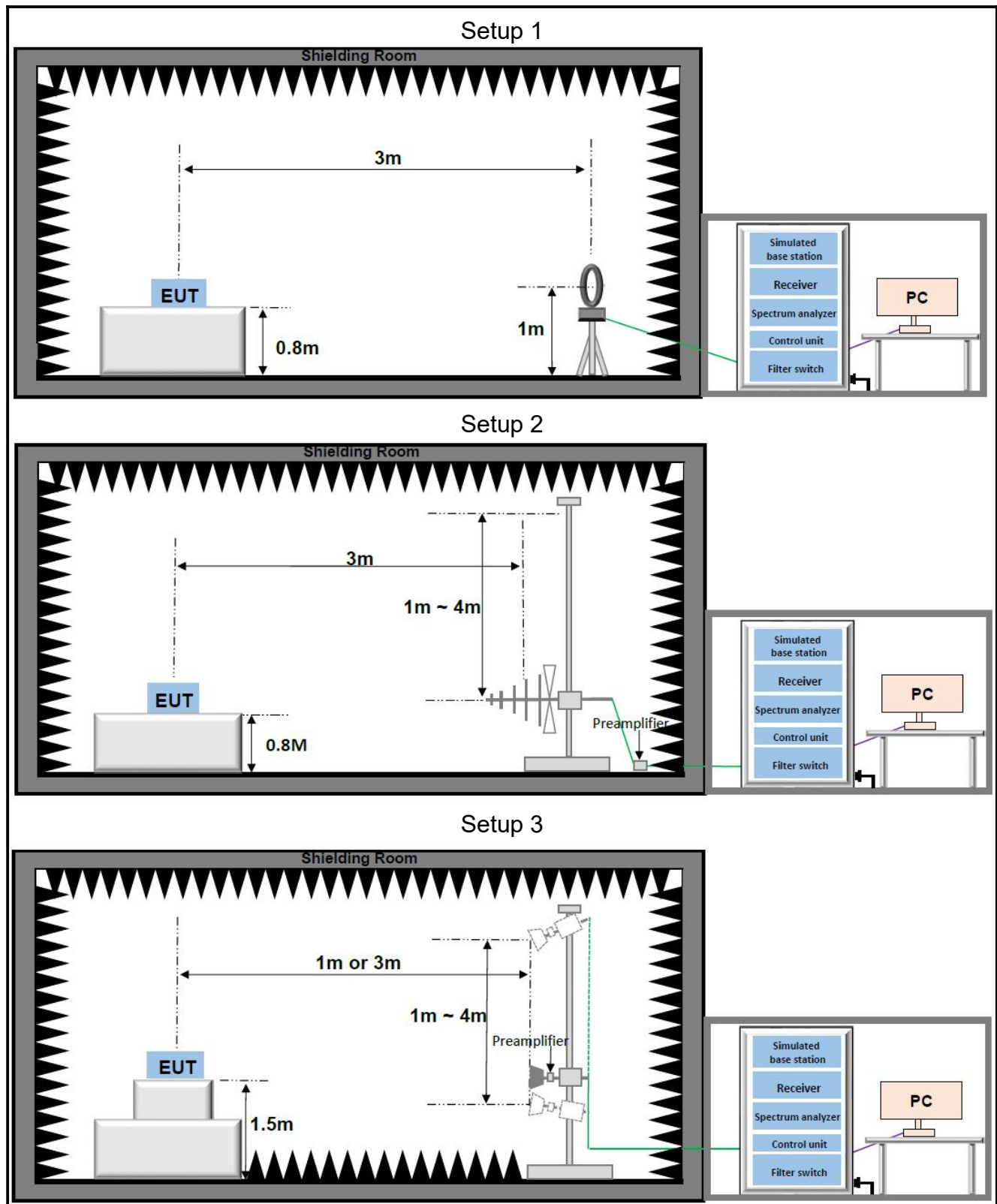
No modifications were made during testing.

2.7 Test Setup Diagram

2.7.1 Conducted Configuration



2.7.2 Radiated Configuration



3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable to recognized national standards.

3.1 Test Equipment List

RF Conducted					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Signal Analyzer	Keysight	N9020A	US46470429	2025/03/14	2026/03/13
Signal Generator	R&S	SMR20	101027	2025/03/11	2026/03/10
Vector Signal Generator	R&S	SMM100A	549353	2025/05/29	2026/05/28
Power Sensor	Anritsu	MA24408A	12520	2025/05/29	2026/05/28
RF Control Unit	Tonscend	JS0806-2	23C80620671	2025/05/29	2026/05/28
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY63440541	2025/05/29	2026/05/28
Attenuator	Yin Saige	SMA-10dBm	N/A	N/A	N/A
Measurement Software	Tonscend	TS1120-3	10659	N/A	N/A

Radiated Emission					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2026/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2026/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2026/06/24
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2026/06/28
Signal Analyzer	Keysight	N9020A	MY49100252	2025/03/11	2026/03/10
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY63440541	2025/05/29	2026/05/28
Wideband Radio Communication Tester	R&S	CMW500	150645	2025/03/11	2026/03/10
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060273	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP01018050	AP22G806258	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP18040048	AP22G806247	2025/03/11	2027/03/10
Hygrometer	BINGYU	HTC-1	N/A	2025/07/25	2026/07/24
Band Reject Filter Group	Townshend	JS0806-F	23A806F0652	N/A	N/A
Test Software	Tonscend	TS+	Version: 5.0.0	N/A	N/A

Conducted Emission					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
EMI Tester Receiver	Rohde & Schwarz	ESR3	103108	2025/05/29	2026/05/28
LISN	Rohde & Schwarz	ENV 216	102836	2025/01/04	2026/01/03
Test software	Rohde & Schwarz	ELEKTRA V4.61	N/A	N/A	N/A

3.2 Measurement Uncertainty

Parameter	U _{lab}
Frequency Error	679.98Hz
Output Power	0.76dB
Conducted Spurious Emissions	2.22dB
Conducted Emissions(150kHz~30MHz)	2.43dB
Radiated Emissions(9kHz~30MHz)	2.40dB
Radiated Emissions(30MHz~1000MHz)	4.66dB
Radiated Emissions(1GHz~18GHz)	5.42dB
Radiated Emissions(18GHz~40GHz)	5.46dB

Uncertainty figures are valid to a confidence level of 95%

4 Test results

4.1 Antenna Requirement

Standard Applicable:	47 CFR Part 15C Section 15.203 /247(b)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
The antenna gain and type as provided by the manufacturer are as follows: The antenna Type is Integrated. With Antenna gain is 0dBi. Antenna Anti-Replacement Construction: An embedded-in antenna design is used.	

4.2 AC Power Line Conducted Emissions

Limits

Frequency range (MHz)	Limit (dBμV)	
	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.

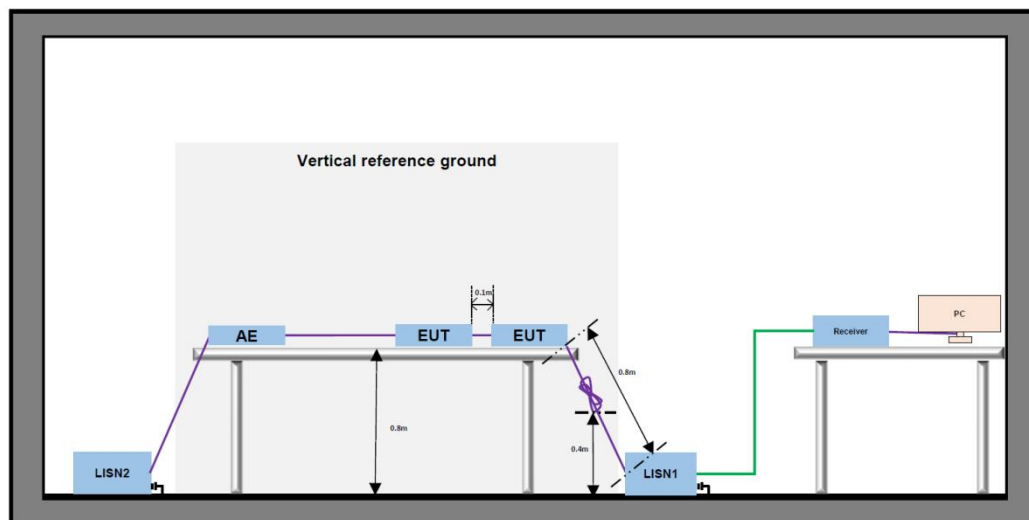
Test Procedure

ANSI C63.10:2020, Section 6.2.

Test Settings

1. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
3. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
4. The receiver is set to a resolution bandwidth of 9kHz. Peak detection is used netless otherwise noted as quasi-peak or average.
5. AC Power Line Conducted Emissions, the channel with the highest output power was tested.
6. Both sides of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

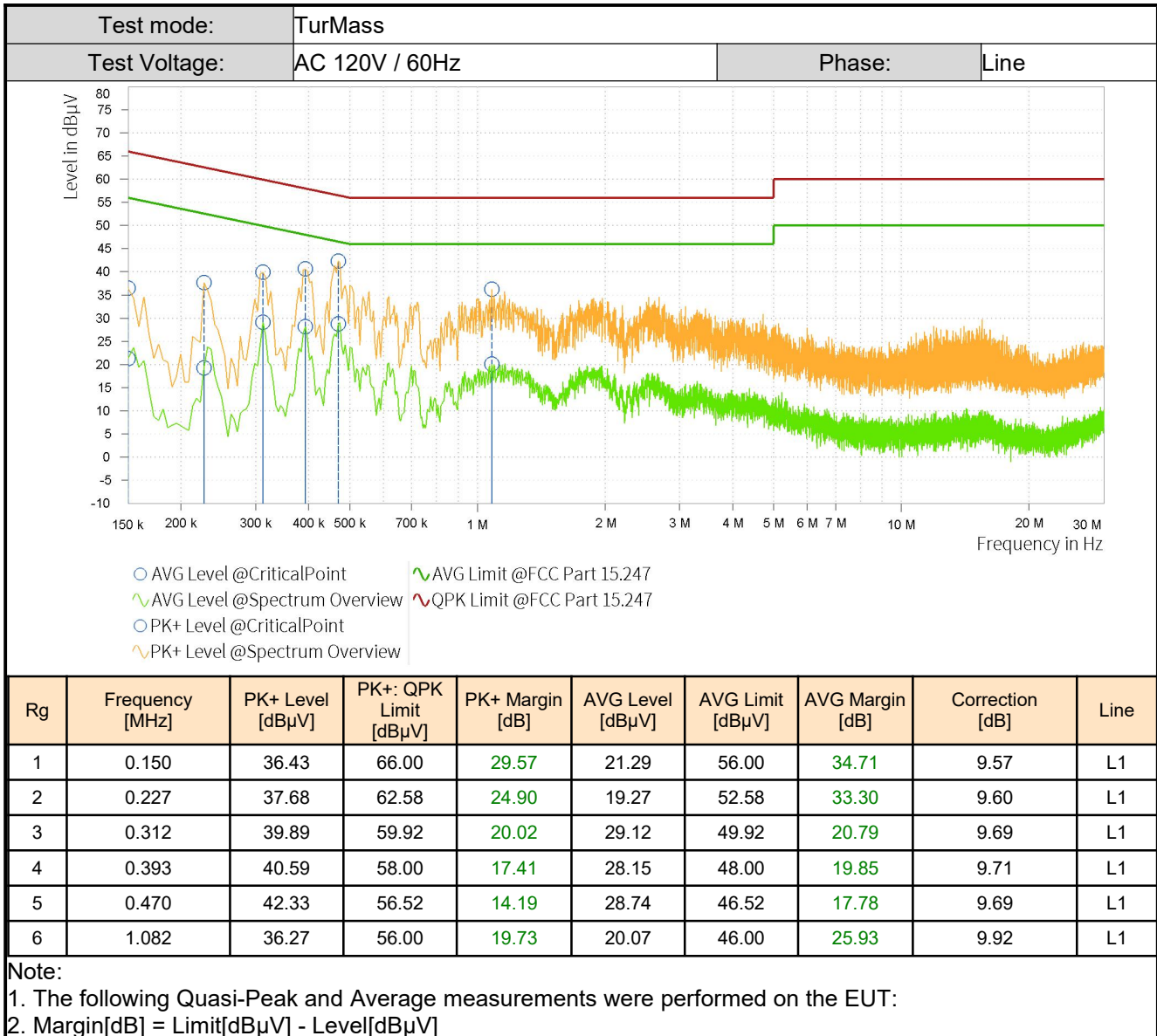
Test Setup

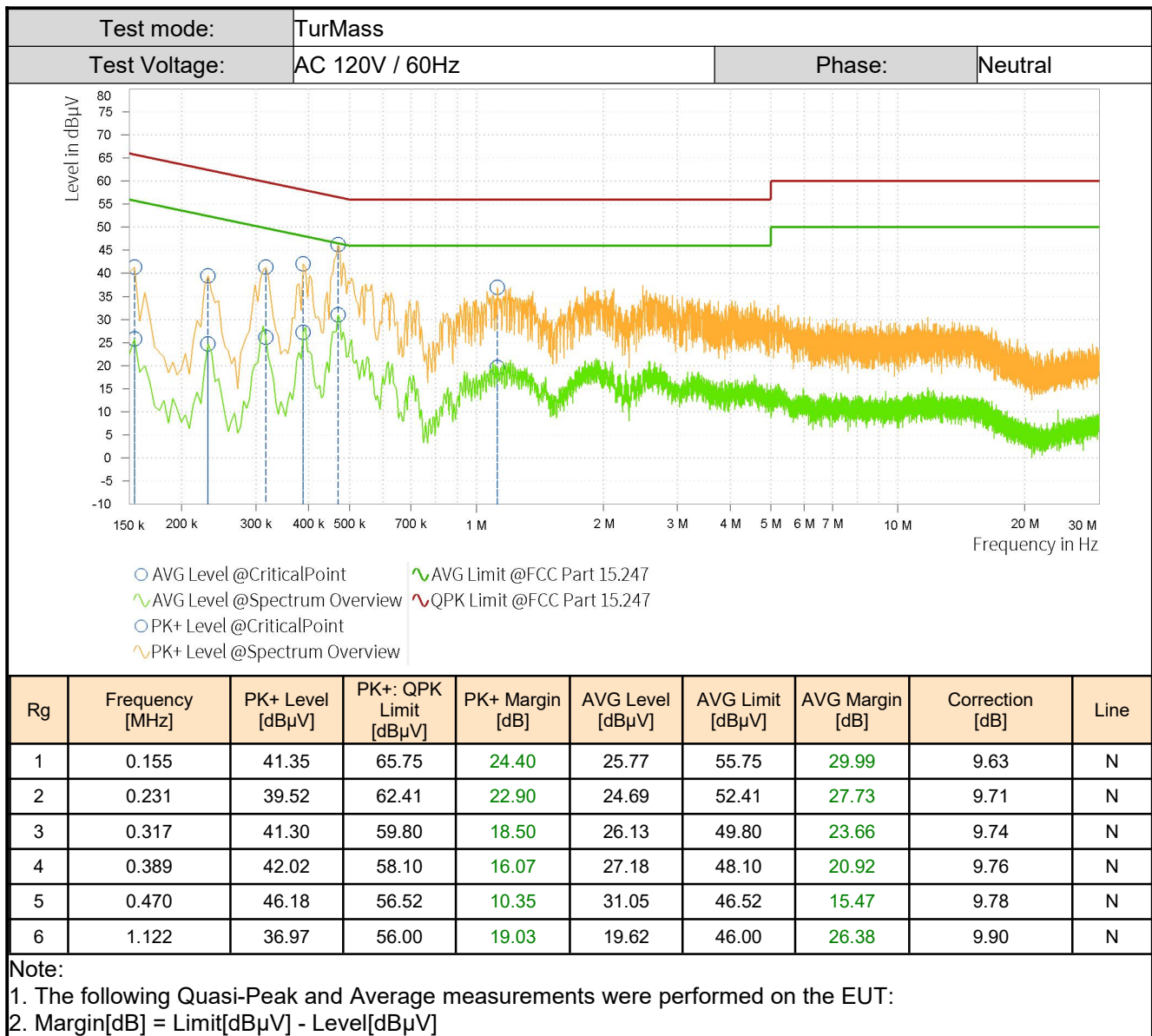


Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result:





4.3 Output Power

Limits

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels.

Test Procedure

ANSI C63.10:2020 Section 7.8.5

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The power output was measured on the EUT antenna port using RF Cable with an attenuator connected to a power sensor. Output power was read directly from the power sensor.
3. Measure and record the results in the test report.

Test Setup

Refer to section 2.7.1- Setup 1 for details.

Measuring Instruments

The measuring equipment is listed in section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.4 Occupied Bandwidth

Limits

EBW: For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz,

OBW: None, for reporting purposes only.

Test Procedure

ANSI C63.10:2020 Section 6.9.2 and 6.9.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The transmitter output is connected to a spectrum analyzer.
3. RBW = 100kHz (DTS)
4. RBW = 1% - 5% (OBW)
5. VBW = 3 times the RBW
6. Span = Approximately 2 to 5times the 20dB bandwidth
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold.
10. The trace was allowed to stabilize
11. Measure and record the results in the test report.

Test Notes

The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 20dB bandwidth measurement. The "X" dB bandwidth parameter was set to X= 20. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.5 Hopping Frequency Separation

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Procedure

ANSI C63.10:2020 Section 7.8.2

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. RBW = 30% of channel spacing. Adjust as necessary to best identify center of each individual channel
5. VBW $\geq$ RBW
6. Span = Wide enough to capture the peaks of two adjacent channels
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.6 Number of Hopping Channels

Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

Test Procedure

ANSI C63.10:2020 Section 7.8.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. RBW < 30% of channel spacing or 20dB bandwidth, whichever is smaller.
5. VBW ≥ RBW
6. Span = The frequency band of operation
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report.

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.7 Dwell Time

Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Test Procedure

ANSI C63.10:2020 Section 7.8.4

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. $RBW \leq \text{channel spacing and } \gg 1/T$, where T is expected dwell time per channel
5. $VBW \geq RBW$
6. Span = Zero span, centered on a hopping channel
7. Sweep = As necessary to capture the entire dwell time per hopping channel
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.8 Band Edge for Conducted Emissions

Limits

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.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2020 Section 7.8.7.2

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Activate frequency hopping function if necessary
3. The transmitter output is connected to a spectrum analyzer
4. RBW = 100kHz
5. VBW = 300kHz
6. Point $\geq 2 \times \text{span/RBW}$
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.9 Spurious RF Conducted Emissions

Limits

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.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2020 Section 7.8.7

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. Activate frequency hopping function if necessary.
3. The transmitter output is connected to a spectrum analyzer
4. The spectrum from 30MHz - 26.5GHz
5. RBW = 100kHz
6. VBW = 300kHz
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.7.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.10 Radiated Spurious Emissions and Band Edge

Limits

Spurious emissions are permitted in an of the frequency bands:

MHz	MHz	MHz	MHz	GHz	GHz
0.090 - 0.110	12.29 - 12.293	149.9 - 150.05	1660 - 1710	4.5 - 5.15	14.47 - 14.5
0.495 - 0.505	12.51975 - 12.52025	156.52475 - 156.52525	1718.8 - 1722.2	5.35 - 5.46	15.35 - 16.2
2.1735 - 2.1905	12.5767 - 12.57725	156.7 - 156.9	2200 - 2300	7.25 - 7.75	17.7 - 21.4
4.125 - 128	13.36 - 13.41	162.0125 - 167.17	2310 - 2390	8.025 - 8.5	22.01 - 23.12
4.17725 - 4.17775	16.42 - 16.423	167.72 - 173.2	2483.5 - 2500	9.0 - 9.2	23.6 - 24.0
4.20725 - 4.20775	16.69475 - 16.69525	240 - 285	2655 - 2900	9.3 - 9.5	31.2 - 31.8
6.215 - 6.218	1680425 - 1680475	322 - 335.4	3260 - 3267	10.6 - 12.7	36.43 - 36.5
6.26775 - 6.26825	25.5 - 25.67	399.9 - 410	3332 - 3339	13.25 - 13.4	
6.31175 - 6.31225	37.5 - 38.25	608 - 614	3345.8 - 3358		
8.291 - 8.294	73 - 74.6	960 - 1240	3600 - 4400		
8.362 - 8.366	74.8 - 75.2	1300 - 1427			
8.37625 - 8.38675	108 - 121.94	1435 - 1626.5			
8.41425 - 8.41475	123 - 138	1645.5 - 1646.5			

Radiated disturbance of an intentional radiator:

Frequency	Field strength (μV/m)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	74.0	Peak	3
		54.0	Average	

Test Procedure

ANSI C63.10:2020 Section 6.4 & 6.5 & 6.6

Test Settings

- For radiated emissions measurements performed at frequencies less than or equal to 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the reference ground plane.
- For radiated emissions measurements performed at frequencies above 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the ground plane.
- Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1m to 4m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e, field strength or received power), when orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25cm.
- For each suspected emission, the EUT was ranged its worst case and then tune the antenna tower(from 1~4m) and turntable(from 0~360°) find the maximum reading. Preamplifier and a high pass filter are used for the test in order get better signal level comply with the guidelines.
- Set to the maximum power setting and enable the EUT transmit continuously.
- The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
- spectrum analyzer setting:
Measurements Below 1000MHz: RBW = 120 kHz; VBW ≥ 300 kHz; Detector = Peak
Measurements Above 1000MHz: RBW = 1 MHz; VBW ≥ 3 MHz; Detector = Peak

Average Measurements Above 1000MHz:

RBW = 1 MHz, VBW $\geq$ 1/T, with peak detector for average measurements.

8. The field strength is calculated by adding the Antenna Factor, Cable Factor. The basic equation with a sample calculation is as follows:

Level = Reading(dB μ V) + Factor(dB):

Factor = Cable Factor(dB) + AF(dB/m) - Preamplifier gain(dB)

AF = Antenna Factor(dB/m)

Margin = Limit(dB μ V/m) – Level(dB μ V/m)

9. Repeat above procedures until all frequencies measured was complete.
10. Measure and record the results in the test report.

Test Notes

1. Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.
2. Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. the disturbance between 9kHz to 30MHz and 18GHz to 40GHz was very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded, so only the harmonics had been displayed.
3. These frequencies which near "-" should be ignored because they are Fundamental frequency.

Test Setup

Refer to section 2.7.2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

5 Test Setup Photos

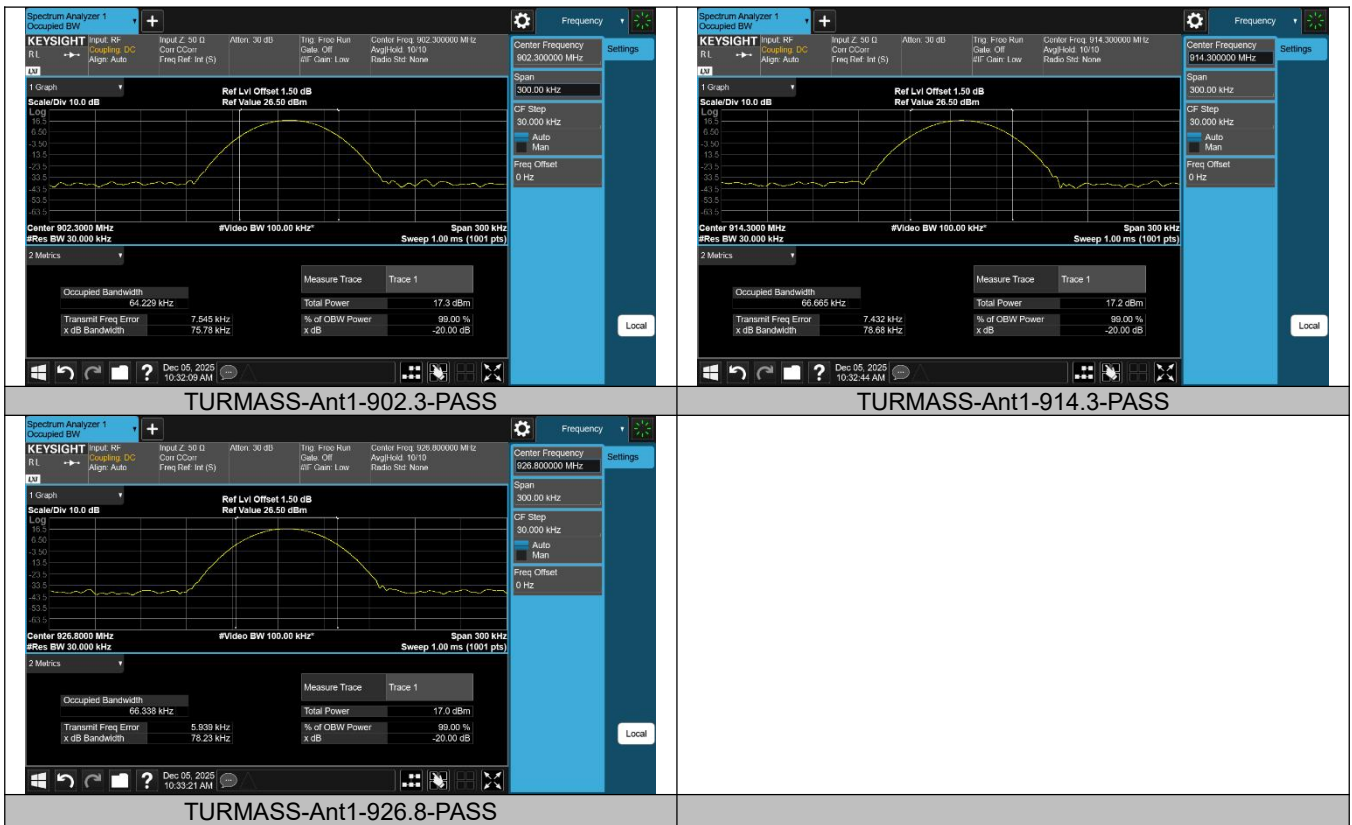
The detailed test data see: **Appendix A - BLE&TurMass Setup Photos**

Appendix

20dB Emission Bandwidth Test Result

TestMode	Antenna	Frequency[MHz]	20dB EBW[MHz]	Limit[MHz]	Verdict
TURMASS	Ant1	902.3	0.07578	≤0.25	PASS
TURMASS	Ant1	914.3	0.07868	≤0.25	PASS
TURMASS	Ant1	926.8	0.07823	≤0.25	PASS

Test Graphs

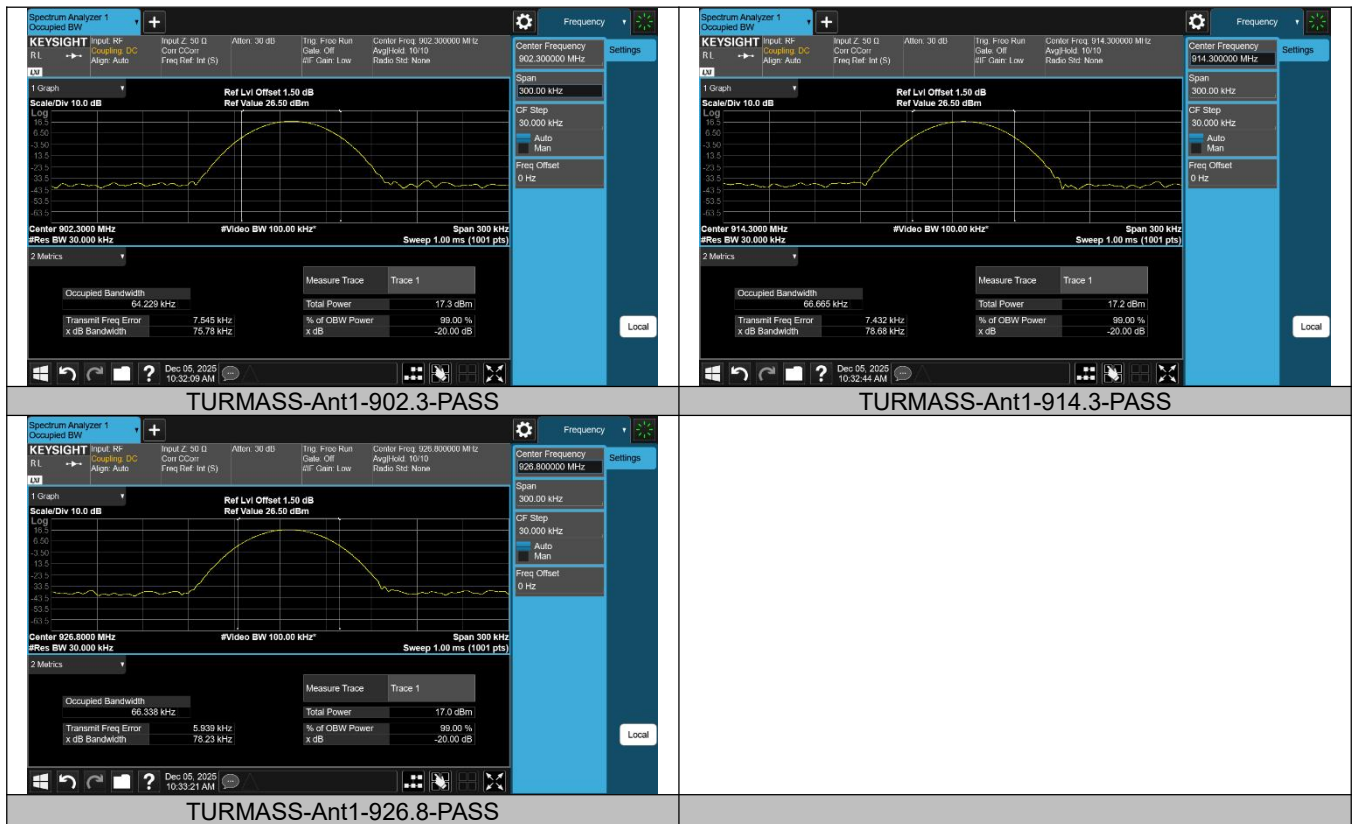


Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	Limit[MHz]	Verdict
TURMASS	Ant1	902.3	0.064229	---	PASS
TURMASS	Ant1	914.3	0.066665	---	PASS
TURMASS	Ant1	926.8	0.066338	---	PASS

Test Graphs



Maximum conducted output power**Test Result**

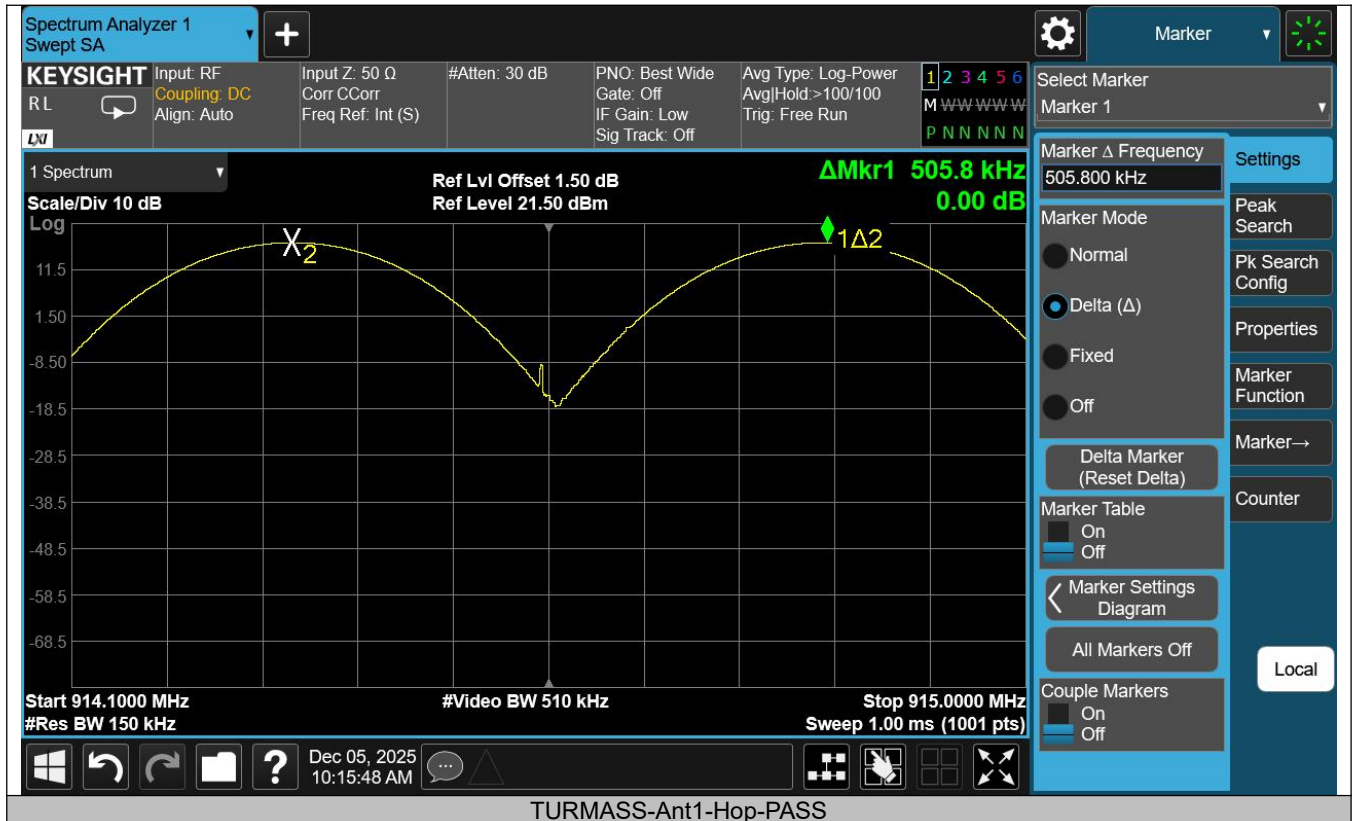
TestMode	Antenna	Frequency[MHz]	Avg.Power [dBm]	Pwak Power [dBm]	Limit[dBm]	Verdict
TURMASS	Ant1	902.3	16.881	17.082	≤30	PASS
TURMASS	Ant1	914.3	16.759	16.957	≤30	PASS
TURMASS	Ant1	926.8	16.645	16.836	≤30	PASS

Carrier frequency separation

Test Result

TestMode	Antenna	Hop/Non-Hop	Result[MHz]	Limit[MHz]	Verdict
TURMASS	Ant1	Hop	0.5058	≥0.07868	PASS

Test Graphs

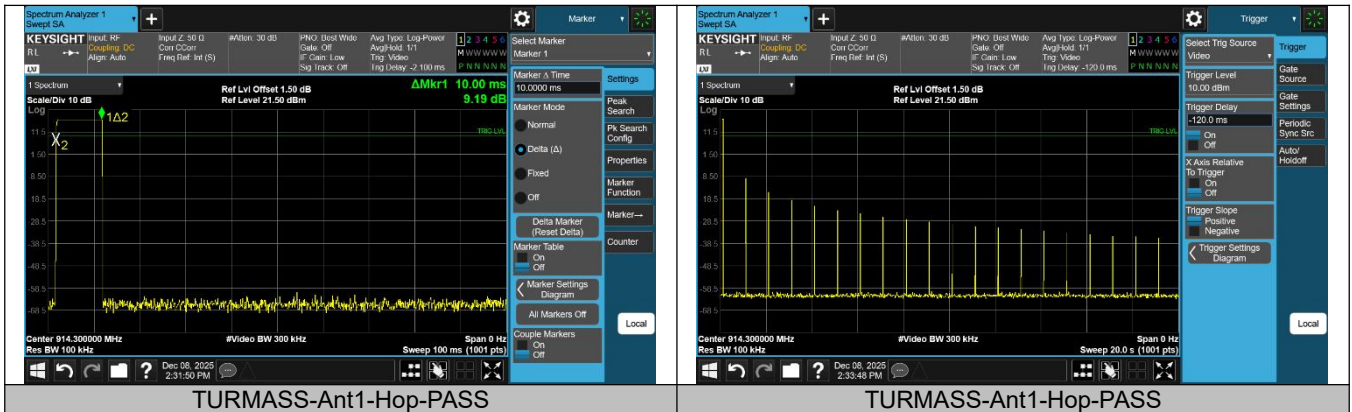


Time of occupancy

Test Result

TestMode	Antenna	Hop/Non-Hop	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
TURMASS	Ant1	Hop	10	20	0.2	≤0.4	PASS

Test Graphs

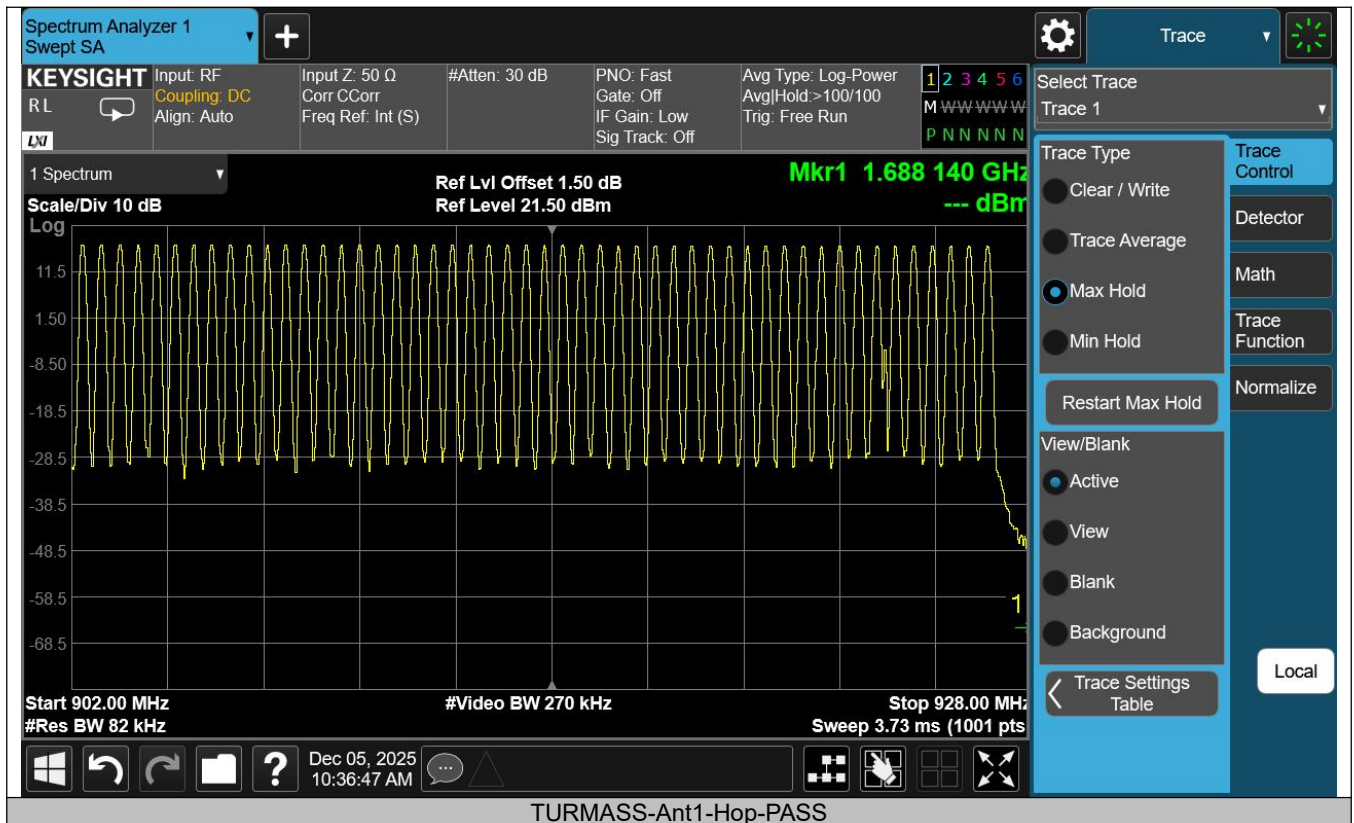


Number of hopping channels

Test Result

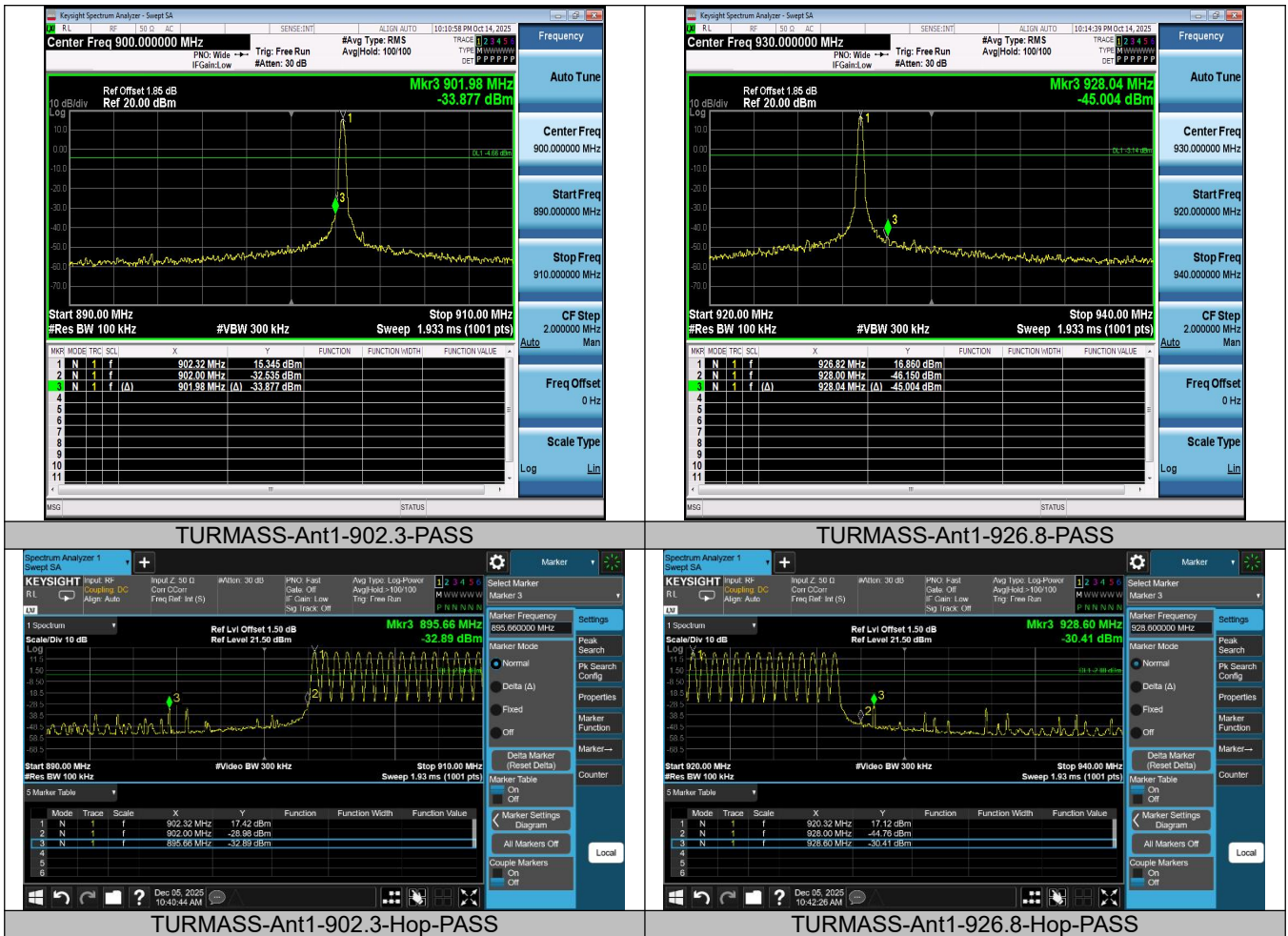
TestMode	Antenna	Hop/Non-Hop	Result[Num]	Limit[Num]	Verdict
TURMASS	Ant1	Hop	50	≥50	PASS

Test Graphs



Band edge measurements

Test Graphs

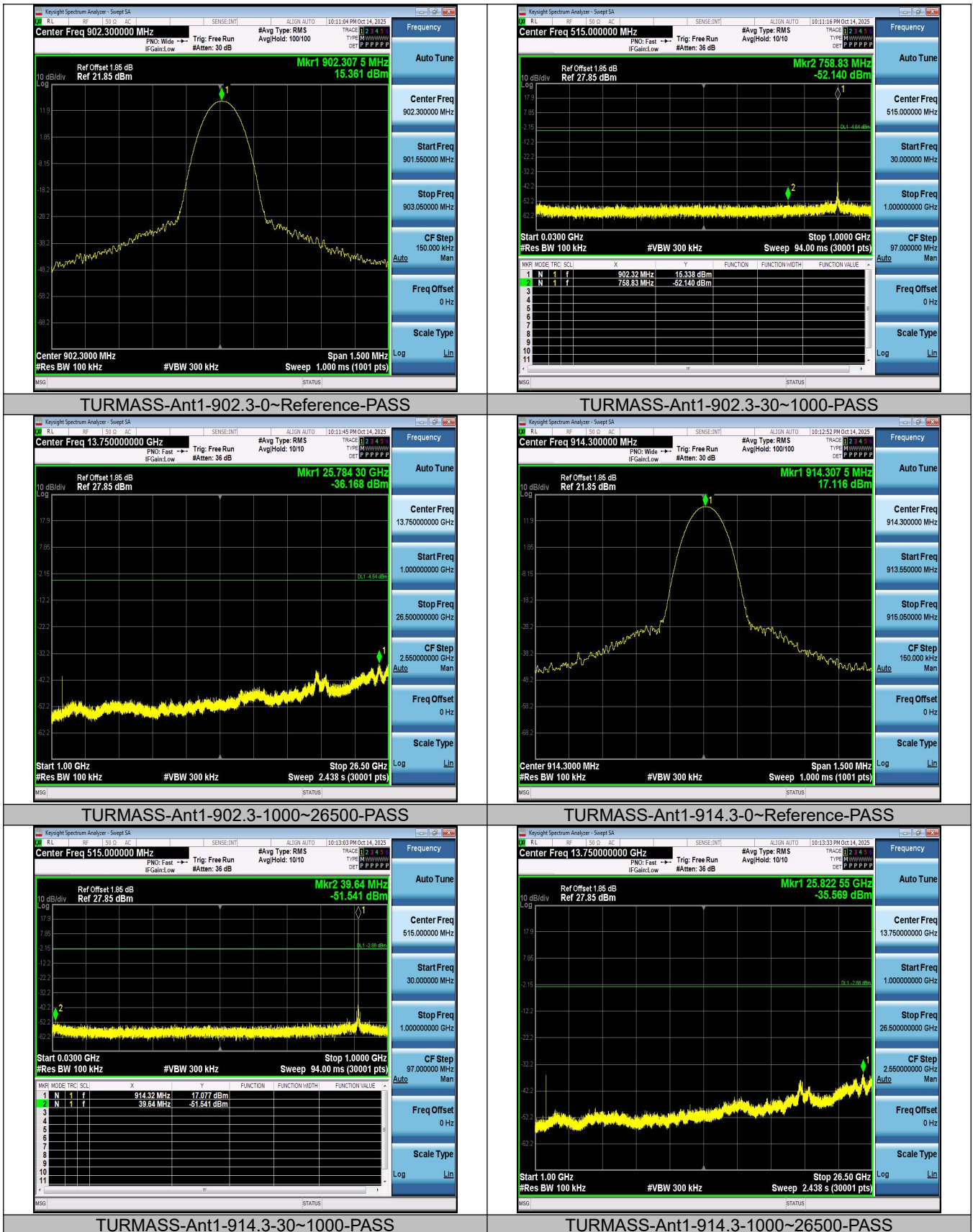


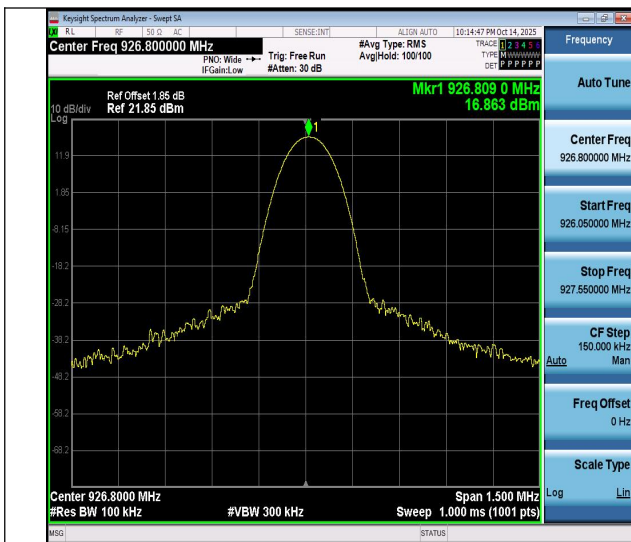
Conducted Spurious Emission

Test Result

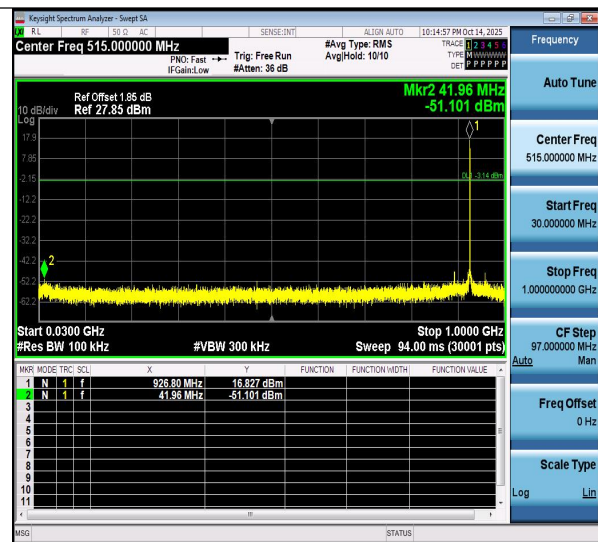
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
TURMASS	Ant1	902.3	0~Reference	15.36	15.36	---	PASS
TURMASS	Ant1	902.3	30~1000	15.36	-52.14	≤-4.64	PASS
TURMASS	Ant1	902.3	1000~26500	15.36	-36.17	≤-4.64	PASS
TURMASS	Ant1	914.3	0~Reference	17.12	17.12	---	PASS
TURMASS	Ant1	914.3	30~1000	17.12	-51.54	≤-2.88	PASS
TURMASS	Ant1	914.3	1000~26500	17.12	-35.57	≤-2.88	PASS
TURMASS	Ant1	926.8	0~Reference	16.86	16.86	---	PASS
TURMASS	Ant1	926.8	30~1000	16.86	-51.1	≤-3.14	PASS
TURMASS	Ant1	926.8	1000~26500	16.86	-35.12	≤-3.14	PASS

Test Graphs





TURMASS-Ant1-926.8-0~Reference-PASS



TURMASS-Ant1-926.8-30~1000-PASS



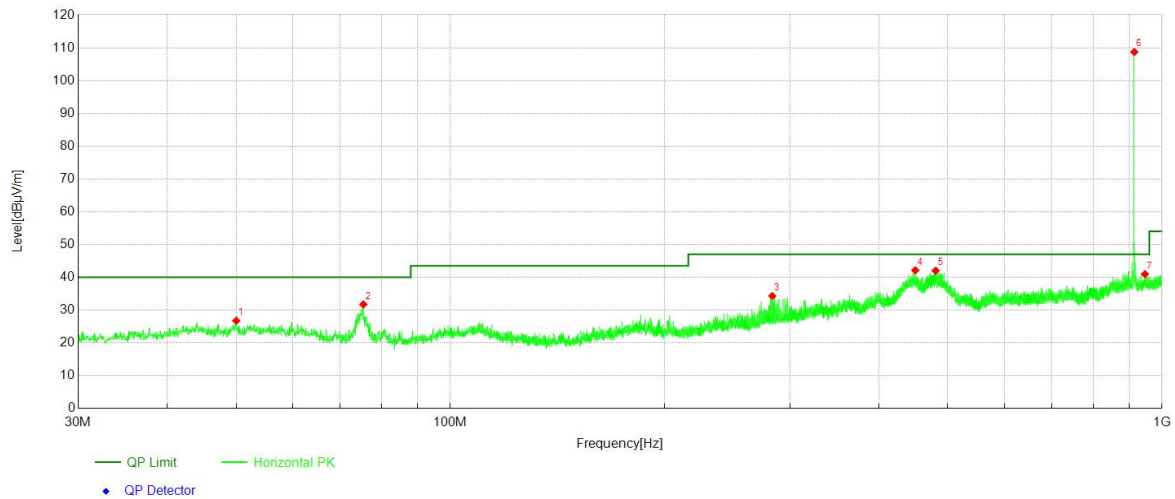
TURMASS-Ant1-926.8-1000~26500-PASS

Radiated Spurious Emissions

Test Result Below 1GHz

Project Information			
Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Mid
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph

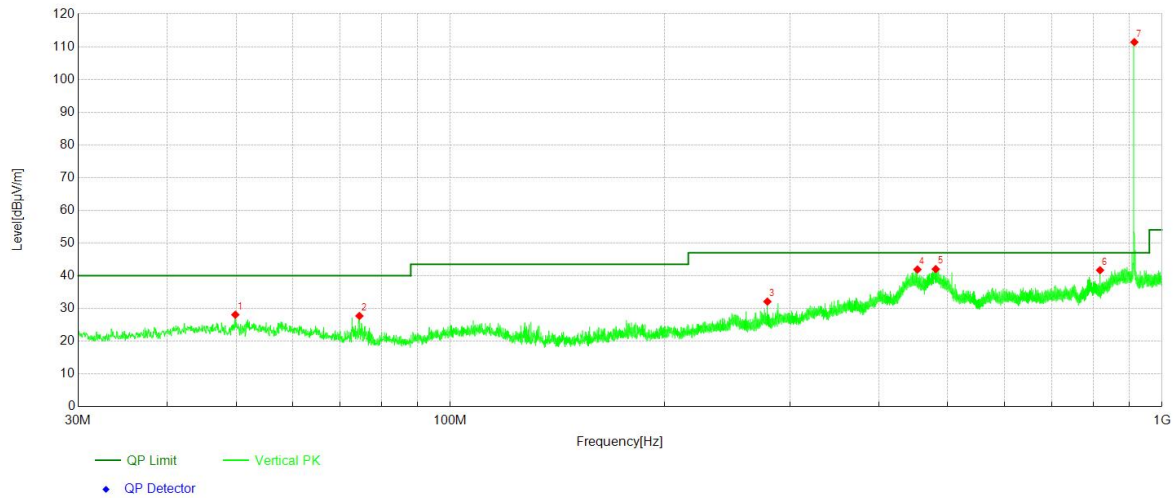


Data List								
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	50.03	38.50	-11.73	26.77	40.00	13.23	Horizontal	PASS
2	75.50	48.66	-16.92	31.74	40.00	8.26	Horizontal	PASS
3	283.38	44.18	-9.87	34.31	47.00	12.69	Horizontal	PASS
4	450.18	40.77	1.37	42.14	47.00	4.86	Horizontal	PASS
5	480.73	40.34	1.67	42.01	47.00	4.99	Horizontal	PASS
6	914.34	106.06	2.67	108.73	-	-	Horizontal	NA
7	946.36	37.40	3.58	40.98	47.00	6.02	Horizontal	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Mid
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph



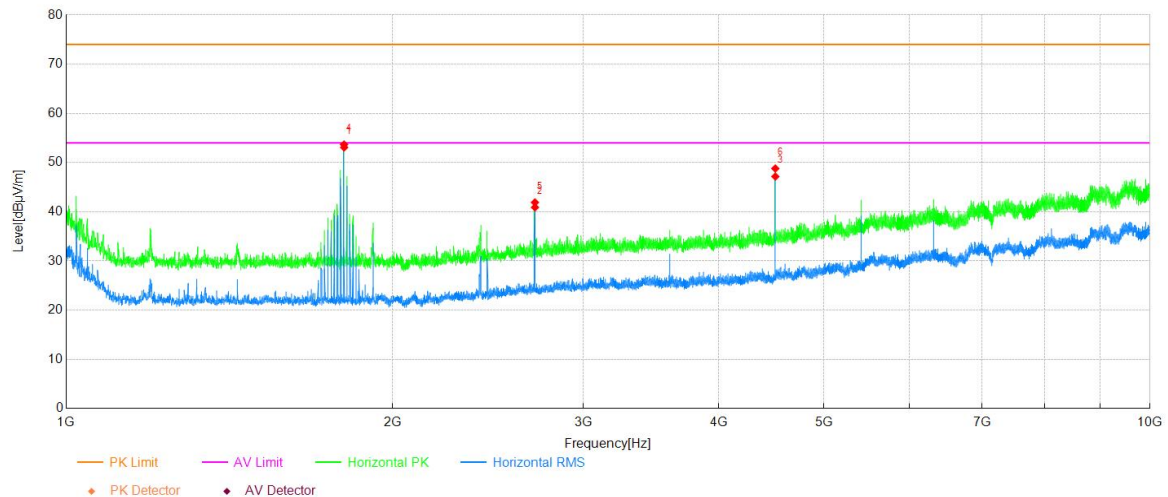
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	49.89	40.18	-12.09	28.09	40.00	11.91	Vertical	PASS
2	74.53	44.84	-17.11	27.73	40.00	12.27	Vertical	PASS
3	278.96	42.57	-10.46	32.11	47.00	14.89	Vertical	PASS
4	453.28	41.56	0.36	41.92	47.00	5.08	Vertical	PASS
5	480.88	40.36	1.67	42.03	47.00	4.97	Vertical	PASS
6	818.31	42.45	-0.75	41.70	47.00	5.30	Vertical	PASS
7	914.34	108.87	2.53	111.40	-	-	Vertical	NA

Test Result Above 1GHz

Project Information			
Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Low
SN:		Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph

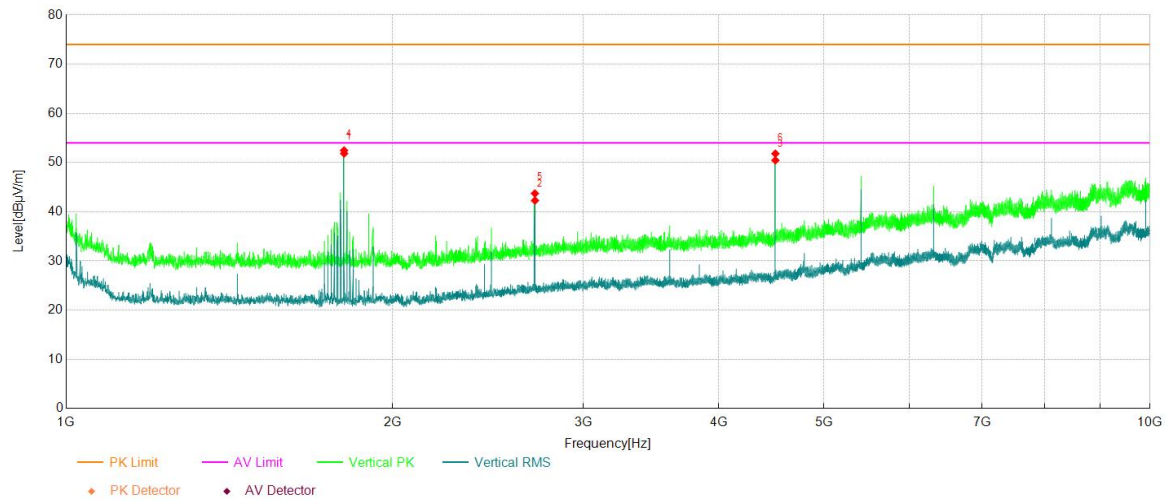


Data List								
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1805.05	71.80	-18.72	53.08	54.00	0.92	Horizontal	PASS
2	2707.30	56.06	-15.16	40.90	54.00	13.10	Horizontal	PASS
3	4511.80	56.39	-9.23	47.16	54.00	6.84	Horizontal	PASS
4	1804.60	72.39	-18.72	53.67	74.00	20.33	Horizontal	PASS
5	2706.85	57.06	-15.16	41.90	74.00	32.10	Horizontal	PASS
6	4511.35	58.03	-9.24	48.79	74.00	25.21	Horizontal	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Low
IMEI:	-	Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph



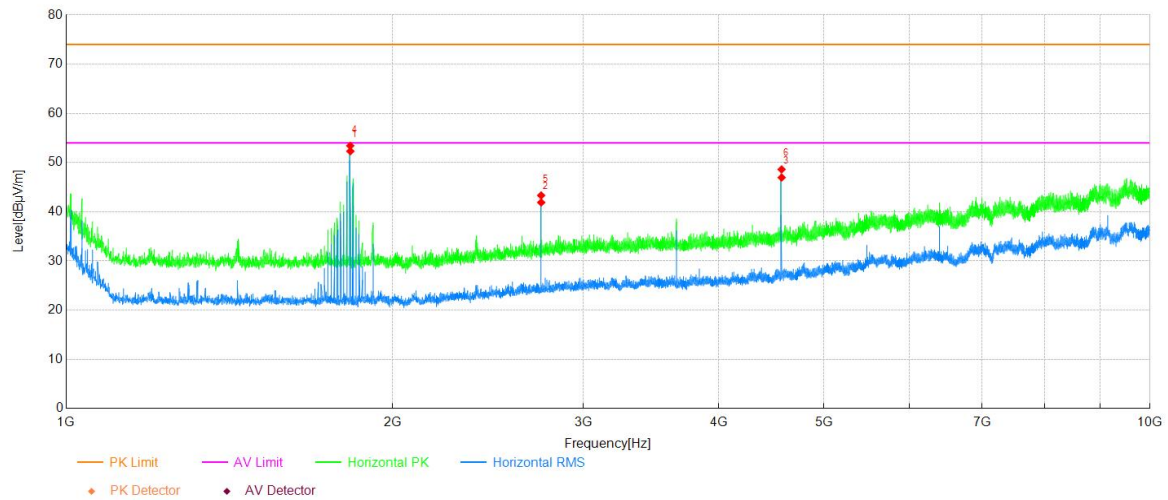
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1805.05	70.56	-18.72	51.84	54.00	2.16	Vertical	PASS
2	2707.30	57.44	-15.16	42.28	54.00	11.72	Vertical	PASS
3	4511.80	59.68	-9.23	50.45	54.00	3.55	Vertical	PASS
4	1804.60	71.19	-18.72	52.47	74.00	21.53	Vertical	PASS
5	2706.85	58.88	-15.16	43.72	74.00	30.28	Vertical	PASS
6	4511.80	61.05	-9.23	51.82	74.00	22.18	Vertical	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Mid
SN:		Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph



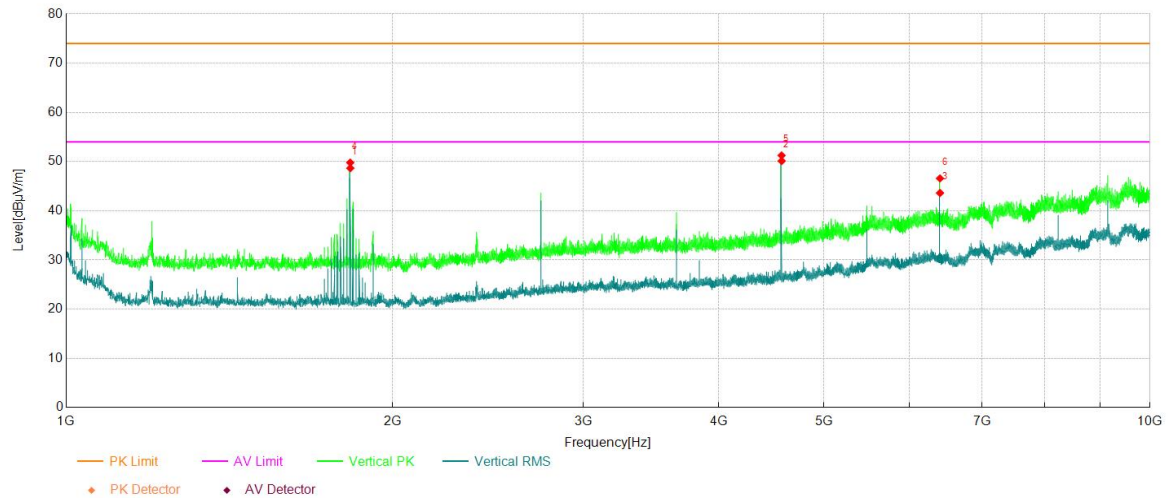
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1828.90	71.00	-18.69	52.31	54.00	1.69	Horizontal	PASS
2	2743.30	56.70	-14.81	41.89	54.00	12.11	Horizontal	PASS
3	4572.10	55.80	-8.84	46.96	54.00	7.04	Horizontal	PASS
4	1828.45	72.10	-18.69	53.41	74.00	20.59	Horizontal	PASS
5	2742.85	58.13	-14.81	43.32	74.00	30.68	Horizontal	PASS
6	4571.65	57.45	-8.84	48.61	74.00	25.39	Horizontal	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Mid
SN:		Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph



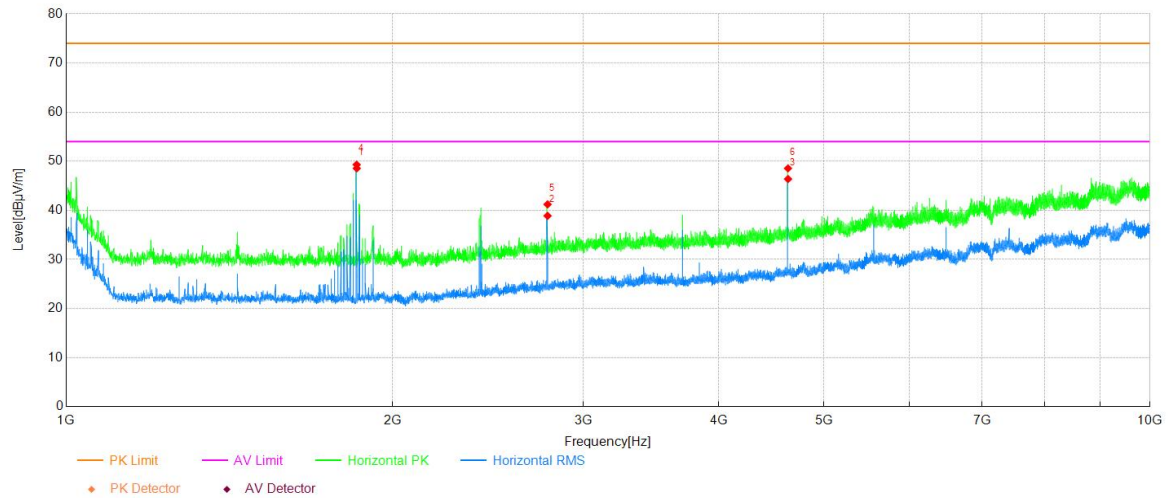
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1828.90	67.35	-18.69	48.66	54.00	5.34	Vertical	PASS
2	4572.10	58.96	-8.84	50.12	54.00	3.88	Vertical	PASS
3	6400.45	47.89	-4.28	43.61	54.00	10.39	Vertical	PASS
4	1828.45	68.48	-18.69	49.79	74.00	24.21	Vertical	PASS
5	4571.65	60.08	-8.84	51.24	74.00	22.76	Vertical	PASS
6	6400.00	50.86	-4.28	46.58	74.00	27.42	Vertical	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	High
SN:		Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph



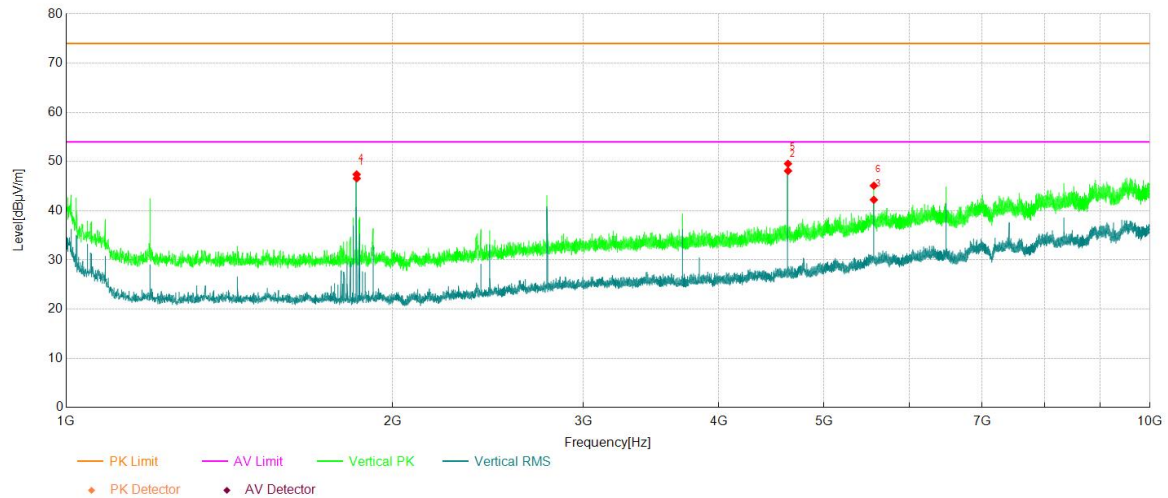
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1854.10	67.18	-18.63	48.55	54.00	5.45	Horizontal	PASS
2	2780.65	53.58	-14.70	38.88	54.00	15.12	Horizontal	PASS
3	4634.65	54.86	-8.48	46.38	54.00	7.62	Horizontal	PASS
4	1853.65	67.93	-18.63	49.30	74.00	24.70	Horizontal	PASS
5	2780.65	55.91	-14.70	41.21	74.00	32.79	Horizontal	PASS
6	4634.20	57.03	-8.48	48.55	74.00	25.45	Horizontal	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	High
SN:		Engineer:	Tian Shuo
Remark:	power setting 14		

Test Graph



Data List

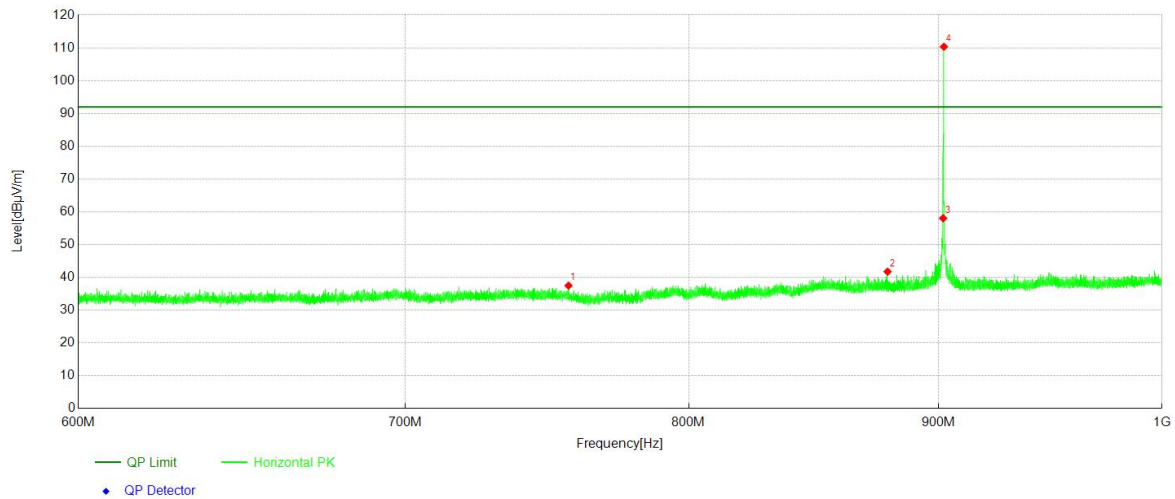
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1854.10	65.21	-18.63	46.58	54.00	7.42	Vertical	PASS
2	4634.65	56.58	-8.48	48.10	54.00	5.90	Vertical	PASS
3	5561.20	47.42	-5.19	42.23	54.00	11.77	Vertical	PASS
4	1853.65	66.02	-18.63	47.39	74.00	26.61	Vertical	PASS
5	4634.20	58.04	-8.48	49.56	74.00	24.44	Vertical	PASS
6	5561.20	50.29	-5.19	45.10	74.00	28.90	Vertical	PASS

Radiated Band Edge

Test Result

Project Information			
Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Low
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph

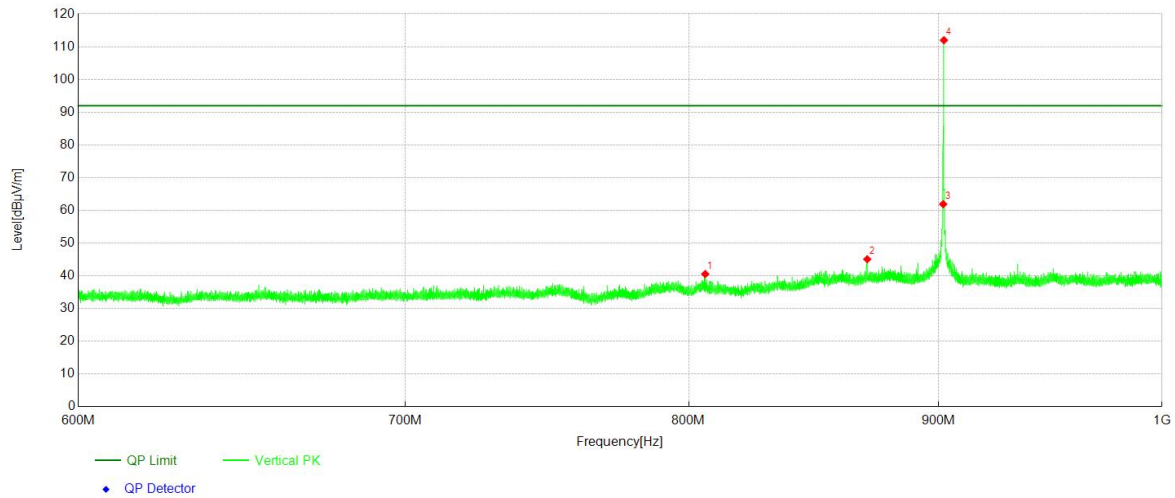


Data List								
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	755.99	38.44	-0.97	37.47	91.98	54.51	Horizontal	PASS
2	878.67	40.00	1.74	41.74	91.98	50.24	Horizontal	PASS
3	901.98	55.29	2.74	58.03	91.98	33.95	Horizontal	PASS
4	902.32	107.62	2.72	110.34	-	-	Horizontal	NA

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	Low
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph



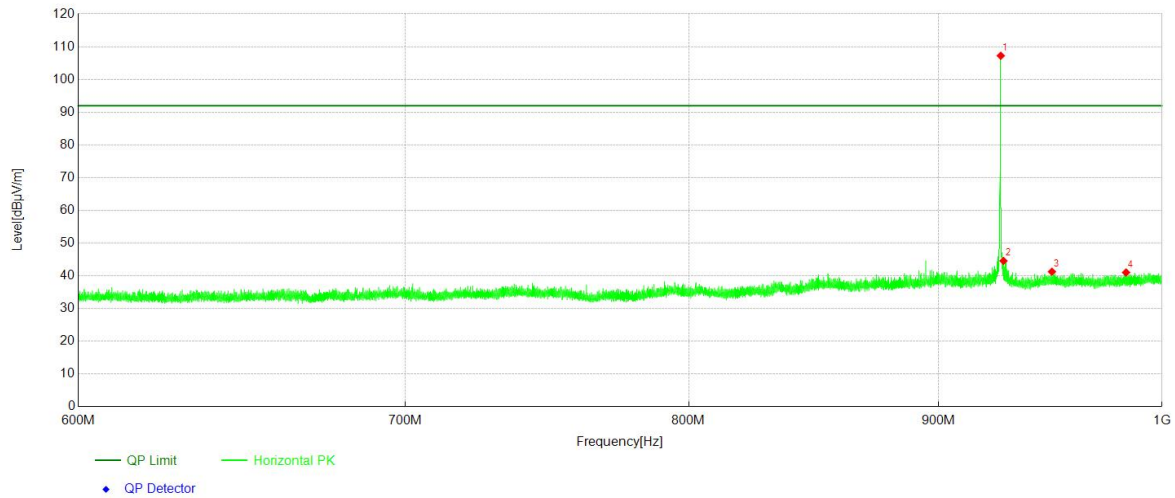
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	806.31	40.10	0.43	40.53	91.98	51.45	Vertical	PASS
2	870.29	43.30	1.75	45.05	91.98	46.93	Vertical	PASS
3	902.00	59.31	2.56	61.87	91.98	30.11	Vertical	PASS
4	902.32	109.48	2.50	111.98	-	-	Vertical	NA

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	High
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph



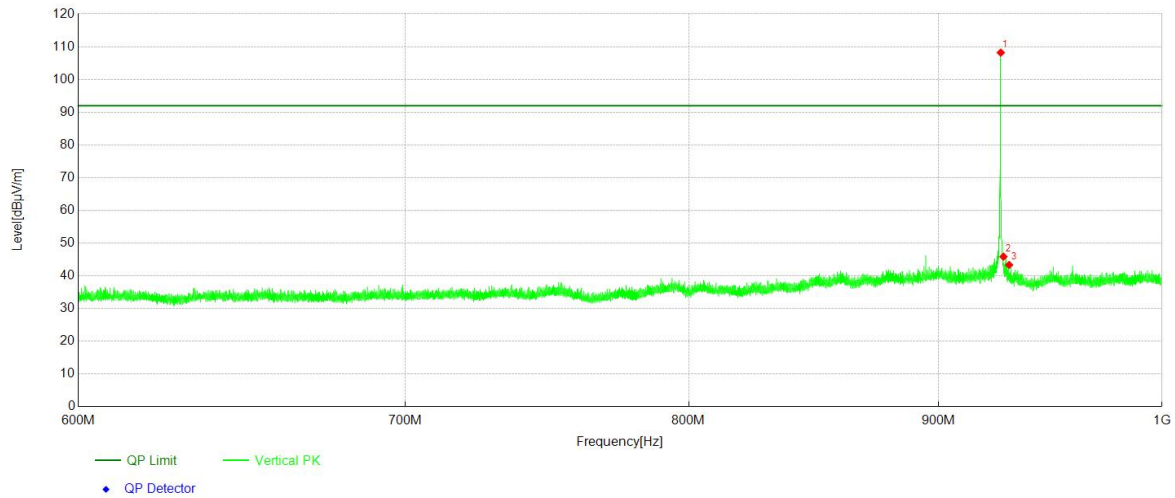
Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	926.82	104.69	2.54	107.23	-	-	Horizontal	NA
2	928.00	41.94	2.61	44.55	91.98	47.43	Horizontal	PASS
3	949.42	37.47	3.77	41.24	91.98	50.74	Horizontal	PASS
4	983.20	37.43	3.58	41.01	91.98	50.97	Horizontal	PASS

Project Information

Mode:	TurMass	Band:	-
Bandwidth	-	Channel	High
SN:		Engineer:	Tian Shuo
Remark:			

Test Graph



Data List

NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	926.82	105.78	2.40	108.18	-	-	Vertical	NA
2	928.00	43.48	2.37	45.85	91.98	46.13	Vertical	PASS
3	930.46	40.92	2.39	43.31	91.98	48.67	Vertical	PASS

~The End~