

Prüfbericht-Nr.: <i>Test report no.:</i>	CN24LTUS 001	Auftrags-Nr.: <i>Order no.:</i>	48243459	Seite 1 von 25 Page 1 of 25												
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024-01-29													
Auftraggeber: <i>Client:</i>	GIPS Technology Co., Ltd. Rm. 2, 6 F., No. 395, Sec. 1, Linsen Rd., East Dist., Tainan City 70151, Taiwan (R.O.C.)															
Prüfgegenstand: <i>Test item:</i>	UWB Tag – Asset Type															
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	GT-440															
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15F Test report															
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart F Section 15.519															
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-05-30															
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003732092-005															
Prüfzeitraum: <i>Testing period:</i>	2024-06-18 - 2024-10-16															
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site															
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories															
Prüfergebnis*: <i>Test result*:</i>	Pass															
überprüft von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>															
Datum: <i>Date:</i>	2024-10-17	Ausstellungsdatum: <i>Issue date:</i>	2024-10-17													
Stellung / Position:	Senior Project Manager	Stellung / Position:	Senior Project Manager													
Sonstiges / Other:																
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>														
<table><tr><td>* Legende:</td><td>1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)</td><td>2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)</td><td>3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)</td><td>4 = ausreichend N/A = nicht anwendbar</td><td>5 = mangelhaft N/T = nicht getestet</td></tr><tr><td>* Legend:</td><td>1 = very good P(ass) = passed a.m. test specification(s)</td><td>2 = good F(ail) = failed a.m. test specification(s)</td><td>3 = satisfactory F(ail) = failed a.m. test specification(s)</td><td>4 = sufficient N/A = not applicable</td><td>5 = poor N/T = not tested</td></tr></table>					* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet	* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
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Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>																

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Anmerkungen
Remarks

- | | |
|----------|--|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.
Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.
Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.
Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.203	Antenna Requirement	Pass
5.1.2	15.519(c)(e),15.521(g)	EIRP	Pass
5.1.3	15.209,15.521(c)(d)(h),15.519(c)(d)	Radiated Spurious Emissions	Pass
5.1.4	15.503,15.521(e)	UWB Bandwidth	Pass
5.1.5	15.519(a)(1)	Cease Transmission Time	Pass
-	15.207	Mains Conducted Emission	N/A

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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APPENDIX A - TEST RESULT OF RADIATED EMISSIONS

APPENDIX SP - PHOTOGRAPHS OF TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

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HISTORY OF THIS TEST REPORT

Revision	Description	Date Issued
R01	Original Release	2024-10-17

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Radiated Emissions

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart F Section 15.519
ANSI C63.10:2013

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 180491
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.30 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.30 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.54 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.52 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a UWB Tag – Asset Type working at 4492.8MHz with UWB function.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	UWB Tag – Asset Type
Type Identification	GT-440
FCC ID	2A6S5-GT440

Technical Specification of EUT

Item	EUT information
Operating Frequency	4492.8 MHz
Operation Voltage	DC 3V
Modulation	BPM with BPSK
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.3

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: The Equipment Under Test (EUT) features a BLE interface, enabling control through an app installed on a cellphone.

It was used to enable the operation modes listed as below.

Test Software	UWB-Tag-BLE-Monitor_V1.0.8_20240423.apk
---------------	---

The samples were used as follows:
A003732092-005

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To				Description
	EIRP	Radiated Spurious Emissions	UWW Bandwidth	Mains Conducted Emission	
-	√	√	√	-	-

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on **X-plane**.
2. "-" means no effect.

EIRP

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)
-	4492.8	4492.8

Radiated Spurious Emission

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)
-	4492.8	4492.8

UWB Bandwidth

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)
-	4492.8	4492.8

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Radiated Spurious Emissions	23.5-25.7 °C	51-53 %	Chuan Chu
Field Strength of Fundamental Emissions	23.5-25.7 °C	51-53 %	Chuan Chu
UWB Bandwidth	20-21.2 °C	56-67 %	Nick Guan

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

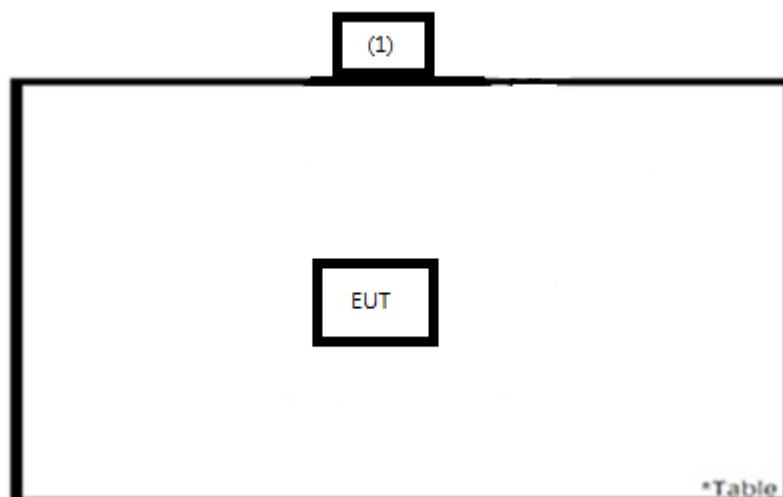
None.

Support Unit

Support Unit								
No.	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
Radiated Test								
1	Mobile Phone	OPPO	CPH2325	-	-	-	-	-
Conducted Test								
-	Mobile Phone	OPPO	A55	YDOVUCWOCYV8ZTJV	-	-	-	-

4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

According to the manufacturer declaration, the EUT has an antenna with a directional gain of -3.53 dBi. The antenna is a Dielectric Chip Antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 EIRP

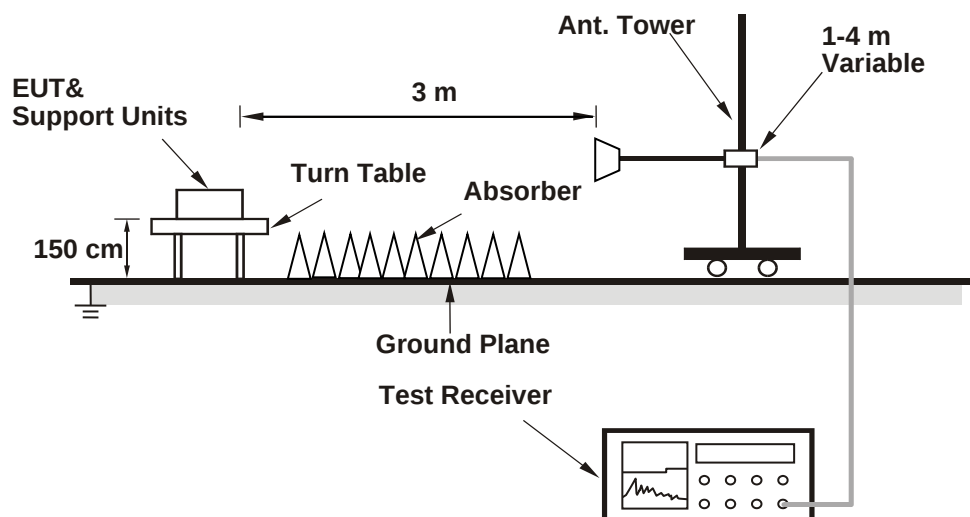
Limit

15.519(c) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.

15.521(g) When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, fM. If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using $E(\text{dBuV/m}) = P(\text{dBm EIRP}) + 95.2$. If RBW is greater than 3 MHz, the application for certification filed with the Commission must contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

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Page 15 of 25**Test Instruments**

Test date: 2024-06-28 ~ 2024-10-16

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Above 1GHz					
Signal Analyzer	R&S	FSV40	101509	2024/4/24	2025/4/23
Horn Antenna	ETS-Lindgren	3117	00218930	2024/2/22	2025/2/20
Amplifier	EM	EM01G18GA	60967	2024/4/2	2025/4/1
HF-AMP + AC source	EMCI	EMC184045SE	980657	2024/1/24	2025/1/22
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2024/5/2	2025/5/1
30MHz ~ 1GHz					
Receiver	R&S	ESR7	102109	2024/2/23	2025/2/21
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2024/3/29	2025/3/28
LF-AMP	Agilent	8447D	2944a107722	2024/3/20	2025/3/19
Below 30MHz					
Receiver	R&S	ESR7	102109	2024/2/23	2025/2/21
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2024/1/4	2025/1/2

Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) or 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 960 MHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 960 MHz.
3. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, fM. If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

Test Results

Channel	Frequency (MHz)	Measured Field Strength (dBuV/m)	Limit (RBW 50MHz) (dBuV/m)	Correction factor (50MHz to 1MHz)	Limit (dBuV/m)	Margin (dB)	Results	Polar(H/V)
3	4492.8	54.31	95.2	-33.98	61.22	-6.91	Pass	H
	4492.8	55.67	95.2	-33.98	61.22	-5.55	Pass	V

Note:

1. BW correction factor = $20 \log (RBW/50MHz)$
2. $E(dBuV/m) = P(dBm \text{ EIRP}) + 95.2$

5.1.3 Radiated Spurious Emissions

Limit

The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in § 15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequencies (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

Frequencies (MHz)	EIRP in dBm	Measurement Distance (meters)
960-1610	-75.3	3
1610-1990	-63.3	3
1990-3100	-61.3	3
3100-10600	-41.3	3
Above 10600	-61.3	3

UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

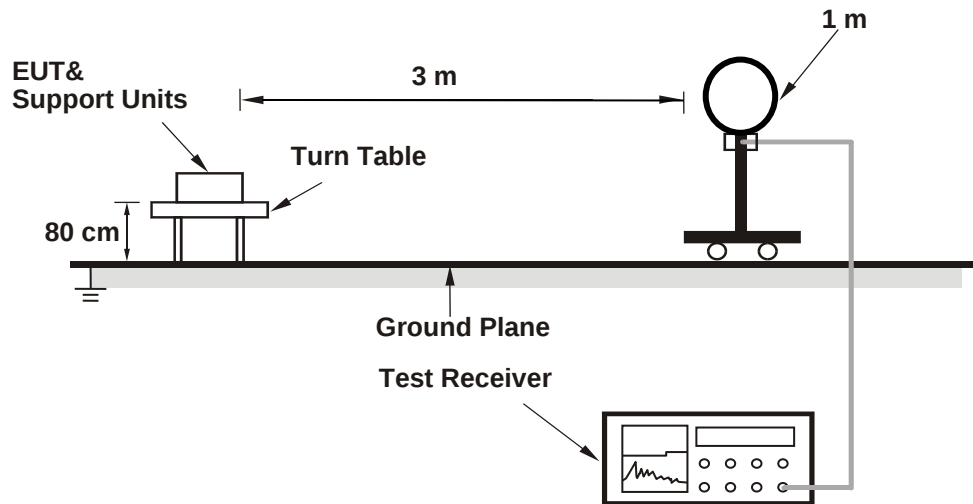
Frequencies (MHz)	EIRP in dBm	Measurement Distance (meters)
1164-1240	-85.3	3
1559-1610	-85.3	3

Kind of Test Site

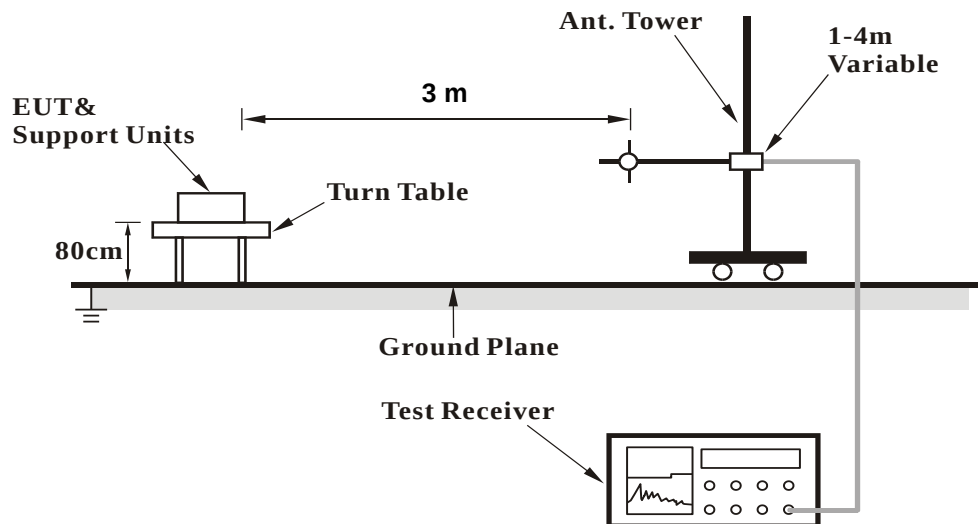
3m Semi-Anechoic Chamber

Test Setup

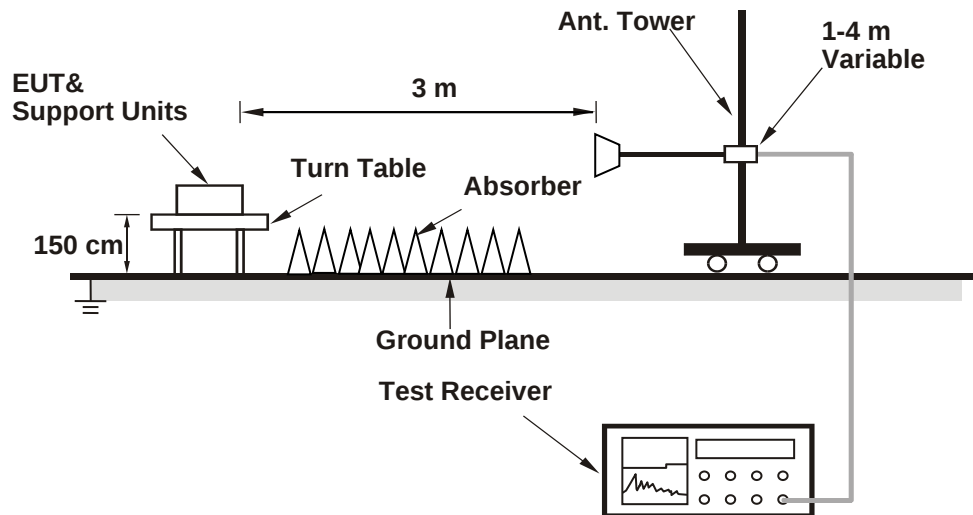
<Radiated Emissions below 30 MHz>



<Radiated Emissions 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Please refer to 5.1.2 Instruments

Test Procedures**For Radiated Emissions below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 960MHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS average (Peak detection (PK) is the worst) at frequency above 960MHz.
3. All modes of operation were investigated and the worst-case emissions are reported.
4. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.
5. The emission levels of other frequencies (including the 10th harmonic of the highest fundamental frequency) are very lower than the limit and are not shown in the test report.

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Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier (dB)

Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

E(dBuV/m) = P(dBm EIRP) + 95.2

Please refer to Appendix A.

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Test Report No.

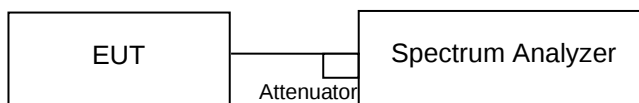
Seite 22 von 25
Page 22 of 25

5.1.4 UWB Bandwidth

Limit The frequency at which the highest radiated emission occurs, f_M , must be contained within the UWB bandwidth.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/20	2024/6/18	2024/9/19

Test Procedure

The frequency at which the maximum power level is measured with the peak detector is designated f_M . The peak power measurements shall be made using a spectrum analyzer or EMI receiver with a 1 MHz resolution bandwidth and a video bandwidth of 1 MHz or greater. The instrument shall be set to peak detection using the maximum-hold trace mode. The outermost 1 MHz segments above and below f_M , where the peak power falls by 10 dB relative to the level at f_M , are designated as f_H and f_L , respectively:

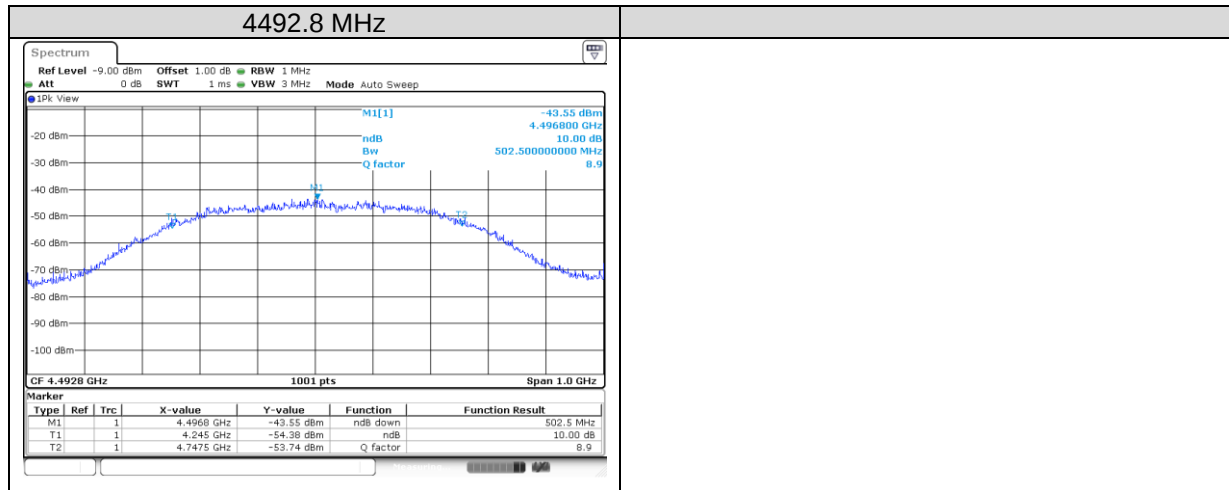
- For the lowest frequency bound f_L , the emission is searched from a frequency lower than f_M that has, by inspection, a peak power much lower than 10 dB less than the power at f_M and increased toward f_M until the peak power indicates 10 dB less than the power at f_M . The frequency of that segment is recorded.
- This process is repeated for the highest frequency bound f_H , beginning at a frequency higher than f_M that has, by inspection, a peak power much lower than 10 dB below the power at f_M . The frequency of that segment is recorded.
- The two recorded frequencies represent the highest f_H and lowest f_L bounds of the UWB transmission, and the -10 dB bandwidth ($B - 10$) is defined as $(f_H - f_L)$.⁸² The center frequency (f_c) is mathematically determined from $(f_H - f_L) / 2$.
- The fractional bandwidth is defined as $2(f_H - f_L) / (f_H + f_L)$.
- Determine whether the -10 dB bandwidth $(f_H - f_L)$ is ≥ 500 MHz, or whether the fractional bandwidth $2(f_H - f_L) / (f_H + f_L)$ is ≥ 0.2 .

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Test Results

Frequency (MHz)	FL (GHz)	FH (GHz)	10 dB Bandwidth (MHz)	Limit (MHz)	Result
4492.8	4.245	4.7475	502.5	≥500	Pass



5.1.5 Cease Transmission Time

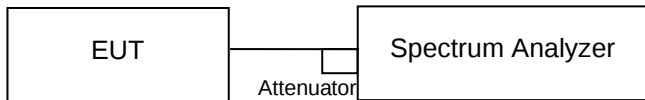
Limit

15.519(a)(1) UWB devices operating under the provisions of this section must be hand held, i.e., they are relatively small devices that are primarily hand held while being operated and do not employ a fixed infrastructure.

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

Kind of Test Site Shielded room

Test Setup



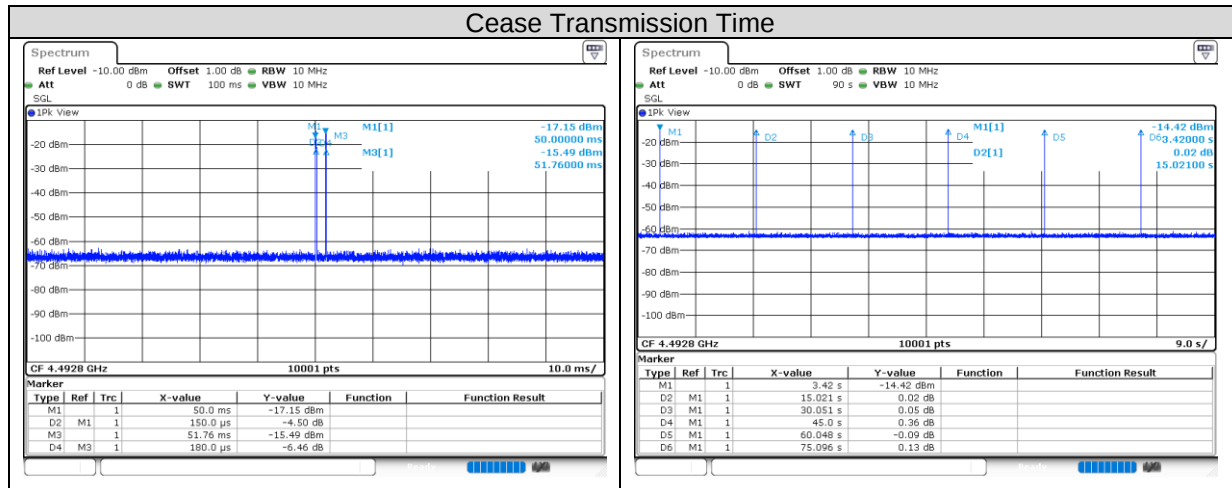
Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/20	2024/6/18	2024/9/19

Test Procedures

Transmission is monitored when the EUT initiates the UWB link with the accessory.

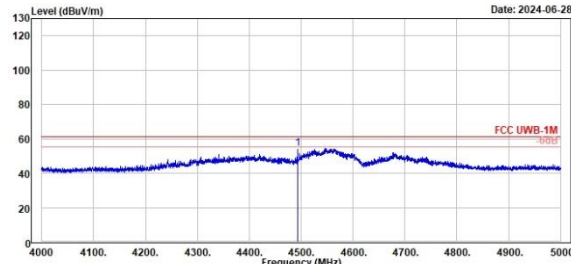
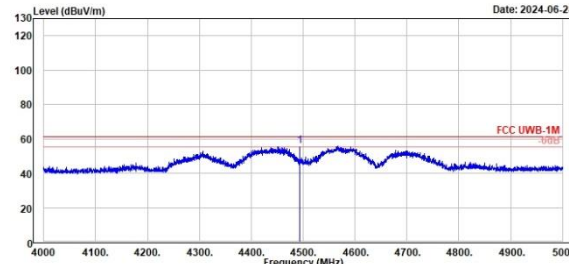
Test Results



Note: According to KDB 393764 D01 Q4, an acknowledgement of reception must continue to be received by the UWB device at least once every 10 seconds, or else the device shall cease transmission of any information other than periodic signals for use in the establishment or re-establishment of a communications link with an associated receiver.

Appendix A: Test Results of Radiated Spurious Emissions

Fundamental

UWB																																																																																									
(Horizontal)						(Vertical)																																																																																			
 TUV Rheinland Taiwan Ltd. No. 438-18, Sec 2, Fenliiao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.) Tel: +886-2172-1000 Fax: +886-2172-1322						 TUV Rheinland Taiwan Ltd. No. 438-18, Sec 2, Fenliiao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.) Tel: +886-2172-1000 Fax: +886-2172-1322																																																																																			
Level (dBuV/m) Date: 2024-06-28  <table><tr><th>Freq</th><th>Level</th><th>Read</th><th>Level</th><th>Factor</th><th>Limit</th><th>Over</th><th>APos</th><th>TPos</th><th>Remark</th><th>Pol/Phase</th><th>Note</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dBuV/m</th><th>dB</th><th>cm</th><th>deg</th><th></th><th></th><th></th><th></th></tr><tr><td>1</td><td>4492.80</td><td>54.31</td><td>46.07</td><td>8.24</td><td>61.22</td><td>-6.91</td><td>238</td><td>180</td><td>Peak</td><td>Horizontal</td><td></td></tr></table>												Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg					1	4492.80	54.31	46.07	8.24	61.22	-6.91	238	180	Peak	Horizontal		Level (dBuV/m) Date: 2024-06-28  <table><tr><th>Freq</th><th>Level</th><th>Read</th><th>Level</th><th>Factor</th><th>Limit</th><th>Over</th><th>APos</th><th>TPos</th><th>Remark</th><th>Pol/Phase</th><th>Note</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dBuV/m</th><th>dB</th><th>cm</th><th>deg</th><th></th><th></th><th></th><th></th></tr><tr><td>1</td><td>4492.80</td><td>55.67</td><td>47.43</td><td>8.24</td><td>61.22</td><td>-5.55</td><td>324</td><td>270</td><td>Peak</td><td>Vertical</td><td></td></tr></table>						Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg					1	4492.80	55.67	47.43	8.24	61.22	-5.55	324	270	Peak	Vertical	
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note																																																																														
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1	4492.80	55.67	47.43	8.24	61.22	-5.55	324	270	Peak	Vertical																																																																															

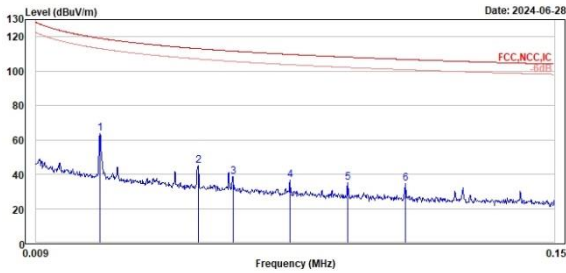
Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

UWB

(Open) 9kHz~150kHz



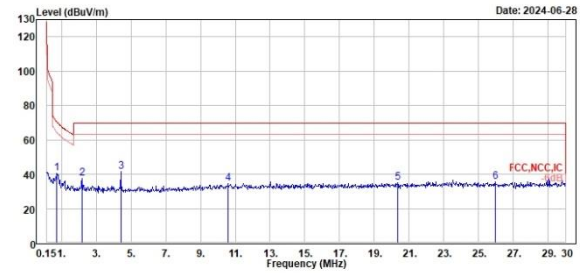
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	Freq	Level	Read	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.03	63.61	44.06	19.55	119.13	-55.52	100	249	Peak	Open	
2	0.05	44.89	25.44	19.45	113.09	-68.20	100	0	Peak	Open	
3	0.06	38.66	19.39	19.27	111.67	-73.01	100	356	Peak	Open	
4	0.08	36.59	17.63	18.96	109.74	-73.15	100	227	Peak	Open	
5	0.09	35.27	16.62	18.65	108.16	-72.89	100	224	Peak	Open	
6	0.11	34.69	16.15	18.54	106.62	-72.13	100	84	Peak	Open	



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	Freq	Level	Read	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.75	40.65	21.60	19.05	70.14	-29.49	100	228	Peak	Open	
2	2.18	37.65	18.65	19.00	69.50	-31.85	100	299	Peak	Open	
3	4.42	41.49	22.14	19.35	69.50	-28.01	100	253	Peak	Open	
4	10.60	34.49	13.42	21.07	69.50	-35.01	100	24	Peak	Open	
5	20.36	34.89	12.68	22.21	69.50	-34.61	100	350	Peak	Open	
6	25.94	35.59	13.21	22.38	69.50	-33.91	100	85	Peak	Open	

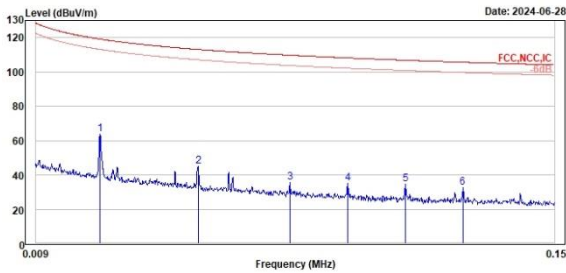
UWB

(Close) 9kHz~150kHz

(Close) 150kHz~30MHz



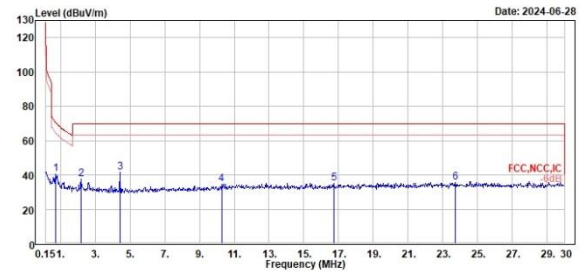
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Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	0.03	63.55	44.00	19.55	119.13	-55.58	100	99	Peak	Close	
2	0.05	44.99	25.54	19.45	113.09	-68.10	100	141	Peak	Close	
3	0.08	35.69	16.73	18.96	109.74	-74.05	100	153	Peak	Close	
4	0.09	35.34	16.69	18.65	108.16	-72.82	100	159	Peak	Close	
5	0.11	34.56	16.02	18.54	106.82	-72.26	100	88	Peak	Close	
6	0.13	32.50	13.91	18.59	105.66	-73.16	100	256	Peak	Close	



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Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	0.75	40.37	21.32	19.05	70.14	-29.77	100	228	Peak	Close	
2	2.18	37.65	18.65	19.00	69.50	-31.85	100	265	Peak	Close	
3	4.42	41.61	22.26	19.35	69.50	-27.89	100	184	Peak	Close	
4	10.27	34.73	13.70	21.03	69.50	-34.77	100	50	Peak	Close	
5	16.72	35.27	13.46	21.81	69.50	-34.23	100	82	Peak	Close	
6	23.73	35.53	13.22	22.31	69.50	-33.97	100	246	Peak	Close	

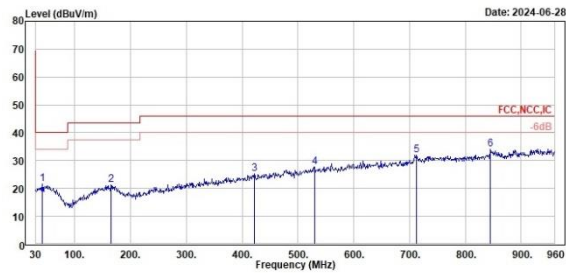
Spurious Emissions, Tx Mode, 30MHz ~ 960MHz

UWB

(Horizontal)



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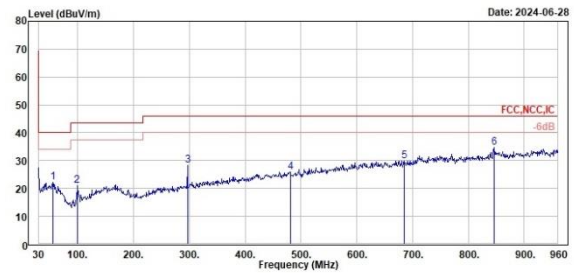


	Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	41.64	21.47	29.16	-7.69	40.00	-18.53	258	0 Peak	Horizontal	
2	164.83	21.35	28.12	-6.77	43.50	-22.15	218	0 Peak	Horizontal	
3	421.88	25.26	28.74	-3.48	46.00	-20.74	100	292 Peak	Horizontal	
4	530.52	27.74	28.93	-1.19	46.00	-18.26	300	255 Peak	Horizontal	
5	712.88	32.06	29.88	2.18	46.00	-13.94	100	280 Peak	Horizontal	
6	844.80	33.97	29.76	4.21	46.00	-12.03	163	360 Peak	Horizontal	

(Vertical)



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	Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	56.19	22.29	29.31	-7.02	40.00	-17.71	200	46 Peak	Vertical	
2	98.87	20.90	33.11	-12.21	43.50	-22.60	300	255 Peak	Vertical	
3	296.75	28.30	34.61	-6.31	46.00	-17.70	100	328 Peak	Vertical	
4	481.05	25.86	28.21	-2.35	46.00	-20.14	293	0 Peak	Vertical	
5	684.75	29.83	28.35	1.48	46.00	-16.17	200	359 Peak	Vertical	
6	846.74	34.83	30.56	4.25	46.00	-11.17	300	126 Peak	Vertical	
7	984.48	32.53	26.61	5.92	54.00	-21.47	300	312 Peak	Vertical	

Spurious Emissions, Tx Mode, 960MHz ~ 40GHz

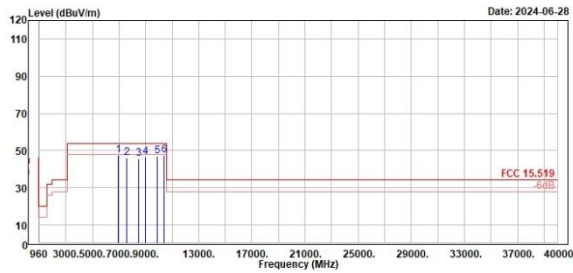
UWB

(Horizontal)

(Vertical)



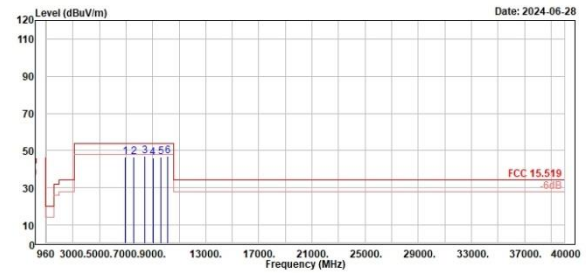
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	6964.00	47.28	37.39	9.89	54.00	-6.72	300	163	Peak	Horizontal		
2	7563.00	46.25	36.39	9.86	54.00	-7.75	100	254	Peak	Horizontal		
3	8500.00	45.51	35.96	9.55	54.00	-8.49	300	336	Peak	Horizontal		
4	8998.00	46.37	36.85	9.52	54.00	-7.63	111	360	Peak	Horizontal		
5	9906.00	47.17	37.21	9.96	54.00	-6.83	300	360	Peak	Horizontal		
6	10368.00	47.53	37.40	10.13	54.00	-6.47	200	263	Peak	Horizontal		

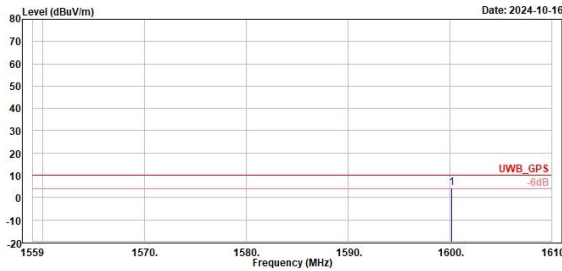
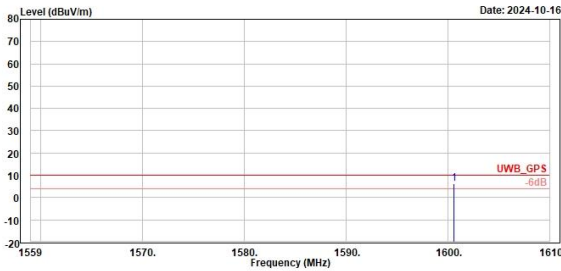


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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	6978.00	46.50	36.59	9.91	54.00	-7.50	300	255	Peak	Vertical		
2	7573.00	46.49	36.66	9.83	54.00	-7.51	300	178	Peak	Vertical		
3	8436.00	47.01	37.51	9.50	54.00	-6.99	400	150	Peak	Vertical		
4	9021.00	46.13	36.58	9.55	54.00	-7.87	200	304	Peak	Vertical		
5	9600.00	46.57	36.64	9.93	54.00	-7.43	400	360	Peak	Vertical		
6	10122.00	47.21	37.09	10.12	54.00	-6.79	300	283	Peak	Vertical		

GPS band, Tx Mode, 1559 ~ 1610MHz

UWB																																															
(Horizontal)						(Vertical)																																									
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Level (dBuV/m) Date: 2024-10-16  <table><tr><th>Freq</th><th>Level</th><th>Read</th><th>Level</th><th>Factor</th><th>Limit</th><th>Over</th><th>APos</th><th>TPos</th><th>Remark</th><th>Pol/Phase</th><th>Note</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dBuV/m</th><th>dB</th><th>cm</th><th>deg</th><th></th><th></th><th></th><th></th></tr><tr><td>1 ! 1600.21</td><td>4.36</td><td>3.56</td><td>0.80</td><td>9.90</td><td>-5.54</td><td>211</td><td>297</td><td>Average</td><td>Horizontal</td><td></td><td></td></tr></table>												Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg					1 ! 1600.21	4.36	3.56	0.80	9.90	-5.54	211	297	Average	Horizontal		
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Level (dBuV/m) Date: 2024-10-16  <table><tr><th>Freq</th><th>Level</th><th>Read</th><th>Level</th><th>Factor</th><th>Limit</th><th>Over</th><th>APos</th><th>TPos</th><th>Remark</th><th>Pol/Phase</th><th>Note</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dBuV/m</th><th>dB</th><th>cm</th><th>deg</th><th></th><th></th><th></th><th></th></tr><tr><td>1 ! 1600.57</td><td>6.33</td><td>5.52</td><td>0.81</td><td>9.90</td><td>-3.57</td><td>160</td><td>243</td><td>Average</td><td>Vertical</td><td></td><td></td></tr></table>												Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg					1 ! 1600.57	6.33	5.52	0.81	9.90	-3.57	160	243	Average	Vertical		
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note																																				
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg																																								
1 ! 1600.57	6.33	5.52	0.81	9.90	-3.57	160	243	Average	Vertical																																						