





Prüfbericht-Nr.: Auftrags-Nr.: CN2245H1 (P15C-24GHz) Seite 1 von 22 238523230 Order no.: Page 1 of 22 001 Test report no.: Kunden-Referenz-Nr.: N/A Auftragsdatum: 2021-12-03 Order date: Client reference no.: SZ DJI TECHNOLOGY CO.,LTD. Auftraggeber: 14th floor, West Wing, Skyworth Semiconductor Design Building NO.18 Gaoxin South Client: 4th Ave, Nanshan, Shenzhen, Guangdong, China Prüfgegenstand: TF&RV Radar Test item: Bezeichnung / Typ-Nr.: RD2484B Identification / Type no.: Auftrags-Inhalt: FCC Part 15C Test report Order content: Prüfgrundlage: Test specification: FCC 47CFR Part 15: Subpart C Section 15.249 Wareneingangsdatum: 2021-12-27 Date of sample receipt: Prüfmuster-Nr.: A003190968-001 Test sample no: Prüfzeitraum: 2022-01-02 - 2022-01-21 Testing period: Ort der Prüfung: EMC/RF Taipei Testing Site Place of testing: Prüflaboratorium: Taipei Testing Laboratories Testing laboratory: Prüfergebnis\*: **Pass** Test result\*: überprüft von: genehmigt von: compiled by: authorized by: Ausstellungsdatum: Datum: Date: 2022-01-22 Issue date: 2022-01-22 Brenda Chen Jack Wang Stellung / Position: Senior Project Engineer Stellung / Position: Senior Project Manager Sonstiges / Other: Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt Condition of the test item at delivery: Test item complete and undamaged \* Legende: 1 = sehr gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet \* Legend: 1 = verv good2 = good3 = satisfactory 4 = sufficient 5 = poorP(ass) = passed a.m. test specification(s)F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested

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.

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.



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# **TEST SUMMARY**

Report Section	FCC Clause	Test Item	Result
5.1.1	15.203	Antenna Requirement	Pass
5.1.2	15.215	20 dB Bandwidth	Pass
5.1.2	2.1049	99% Occupied Bandwidth	Pass
5.1.3	15.249 (a)	Field Strength of Fundamental Emissions	Pass
5.1.4	15.249 (d)	Radiated Spurious Emissions	Pass
-	15.207	Mains Conducted Emission	Not Applicable

**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**

Report No.	Description	Date Issued
CN2245H1 (P15C- 24GHz) 001	Original Release	2022-01-22



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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 C Section 15.249 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.



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### 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.: 226631 ISED Registration No.: 25563



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### 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 basics 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)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.53 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.50 dB
Radiated Emission (40 GHz ~ 100 GHz)	±1.78 dB
Mains Conducted Emission	± 1.65 dB



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### 3. General Product Information

### 3.1 Product Function and Intended Use

The EUT is TF&RV Radar. It contains a 24GHz compatible module enabling the user to detect the object from the blindside through a radar detector.

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	TF&RV Radar
Type Identification	RD2484B
FCC ID	SS3-RD2484B2111

### **Technical Specification of EUT**

Item	EUT information	
Operating Frequency	24.05-24.25GHz	
Operation Voltage	32Vdc	
Modulation	FMCW	
Antenna Information	Refer to 5.1.1	
Accessory Device	Refer to 4.3	



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# 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



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### 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 EUT is tested after the power is on.

Test Software	None.
1 Cot Contware	140110.

The samples were used as follows:

A003190968-001

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

EUT					
Configure Mode	20 dB Bandwidth and Occupied Bandwidth	Field Strength of Fundamental Emissions	Radiated Spurious Emissions	Mains Conducted Emission	Description
-	V	V	$\sqrt{}$	-	-

#### Note:

#### 20 dB Bandwidth and Occupied 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 (GHz)	Tested Frequency (GHz)	
-	24.05 to 24.25	24.05-24.25	

#### **Field Strength of Fundamental Emissions**

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 (GHz)	Tested Frequency (GHz)
-	24.05 to 24.25	24.05-24.25

#### **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 (GHz)		Tested Frequency (GHz)	
-	24.05 to 24.25	24.05-24.25	

<sup>1.</sup> The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on Y-plane.

<sup>2. &</sup>quot;-" means no effect.



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Test Condition

- Cot Containen				
Test Item	Ambient Temperature	Relative Humidity	Tested by	
20 dB Bandwidth & 99% Occupied Bandwidth	21.6-23.1 °C	50-55 %	Hunter Wang	
Radiated Spurious Emissions	21.6-23.1 °C	50-55 %	Hunter Wang	
Field Strength of Fundamental	21.6-23.1 °C	50-55 %	Hunter Wang	

# 4.3 Special Accessories and Auxiliary Equipment

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

#### **Accessory of EUT**

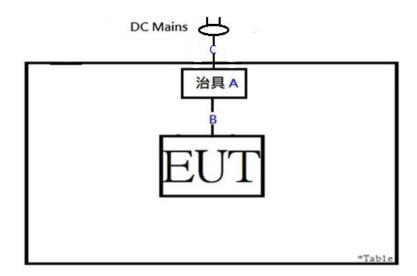
None.

### **Support Unit**

	Support Unit							
No	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
Α	Fixture	TUV SZ	TUV SZ	N/A	-	1	-	
В	Type-C Cable	TUV SZ	TUV SZ 001	N/A	YES	0	123	
С	DC Cable	TUV SZ	TUV SZ 003	N/A	NO	0	195	

### 4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>





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### 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 antennas with directional gain of 8.5 dBi (8T4R) and 13 dBi (1T1R). The antenna is a linear 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.



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### 5.1.2 20 dB Bandwidth and 99% Occupied Bandwidth

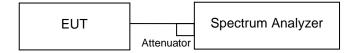
#### Limit

The occupied bandwidth shall be specified in operating frequency band.

**Kind of Test Site** 

Shielded room

**Test Setup** 



#### **Test Instruments**

Kind of	Manufacturer	Туре	S/N	Calibration	Calibration	Test Date	
Equipment				Date	Due Date	From	Until
Signal Analyzer	Agilent	N9010A	MY52221334	2021/3/4	2024/3/3	2022/1/3	2022/1/18

#### **Test Procedure**

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.
- e. The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to Sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.



Prüfbericht - Produkte

Test Report - Products

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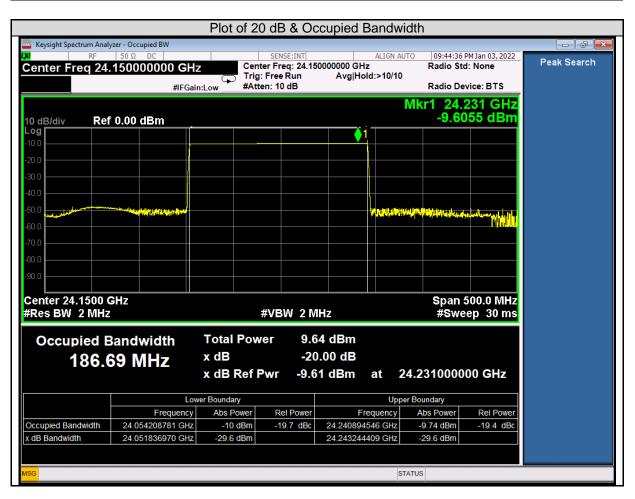
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#### **Test Results**

#### <8T4R>

Frequency (GHz)	20 dB Ba	99% Occupied Bandwidth	
(GF12)	F <sub>L</sub> (GHz)	F <sub>H</sub> (GHz)	(MHz)
24.05-24.25	24.052	24.243	186.69
Limit	24.05-24.25		-





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#### <1T1R>

Frequency (GHz)	20 dB Ba	99% Occupied Bandwidth	
(G112)	F <sub>L</sub> (GHz)	F <sub>H</sub> (GHz)	(MHz)
24.05-24.25	24.069	24.233	161.43
Limit	24.05-24.25		-





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### 5.1.3 Field Strength of Fundamental Emissions

#### Limit

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

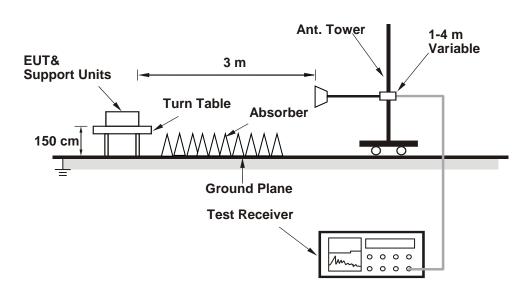
Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meters)	
902 ~ 928 MHz	50	500	
2400 ~ 2483.5 MHz	50	500	
5725 ~ 5875 MHz	50	500	
24 ~ 24.25 GHz	250	2500	

**Kind of Test Site** 

3m Semi-Anechoic Chamber

**Test Setup** 

3 m



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



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#### **Test Instruments**

Kind of				Calibration	Calibration
Equipment	Manufacturer	Туре	S/N	Date	Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Signal Analyzer	R&S	FSV40	101508	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2021/2/18	2022/2/17
Horn Antenna	ETS-Lindgren	3117	00218930	2021/12/20	2022/12/19
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
LF-AMP	Agilent	8447D	2944A10772	2021/2/18	2022/2/17
HF-AMP + AC source	EMCI	EMC051845SE	980633	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15
Coincal Horn Antenna	VDI	WR15CH	1-15	2021/4/12	2024/4/11
Coincal Horn Antenna	VDI	WR12CH	RCH012RL	2021/4/15	2024/4/14
Coincal Horn Antenna	VDI	WR10CH	1-10	2021/2/19	2024/2/19
Coincal Horn Antenna	VDI	WR8.0CH	1-8.0	2021/4/8	2024/4/7
Coincal Horn Antenna	OML	M19RH	16070501	2021/4/8	2024/4/7
Mixer SA	VDI	N9029AV15	SAX 039	2019/7/1	2022/6/30
Mixer SA	VDI	N9029AV12	SAX 243	2019/7/1	2022/6/30
Mixer SA	VDI	N9029AV10	SAX 047	2019/7/1	2022/6/30
Mixer SA	VDI	N9029AV08	SAX 045	2019/7/1	2022/6/30
Harmonic Mixer	Keysight	M1971W	MY56390137	2019/7/1	2022/6/30
Harmonic Mixer	Keysight	M19HWDX	160118-1	2020/12/8	2023/12/7
Signal Analyzer	Agilent	N9010A	MY52221334	2021/3/4	2024/3/3
Loop Antenna	SCHWARZBECK	FMZB1519B	00215	2021/12/8	2022/12/7



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#### **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 1 GHz.
- 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 1 GHz.
- 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.

#### **Test Results**

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.



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### **5.1.4 Radiated Spurious Emissions**

#### Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation.

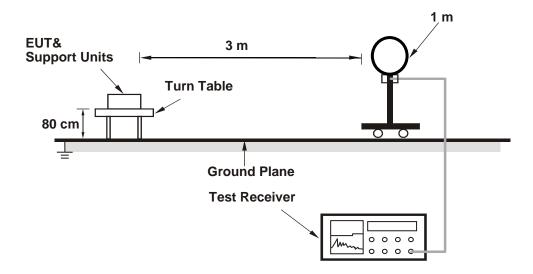
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)	
0.009 ~ 0.490	2400/F (kHz)	300	
0.490 ~ 1.705	24000/F (kHz)	30	
1.705 ~ 30.0	30	30	
30 ~ 88	100	3	
88 ~ 216	150	3	
216 ~ 960	200	3	
Above 960	500	3	

**Kind of Test Site** 

3m Semi-Anechoic Chamber

#### **Test Setup**

<Radiated Emissions below 30 MHz>

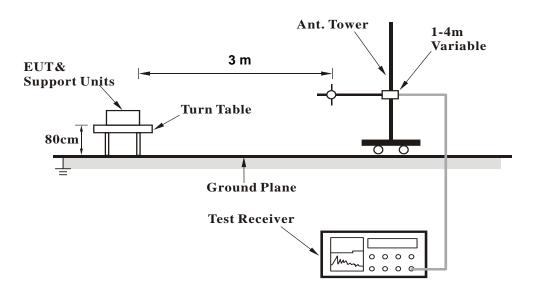




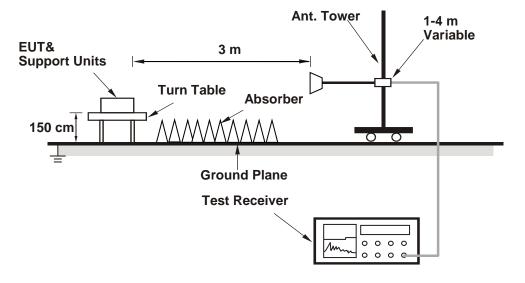
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<Radiated Emissions 30 MHz to 1 GHz>



#### <Radiated Emission above 1 GHz>



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

#### **Test Instruments**

Please refer to 5.1.3 Instruments



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#### **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 1 GHz.
- 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 1 GHz.
- 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.



### Prüfbericht - Produkte

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	Factor (dB/m) + Cable Loss (dB) g (dBuV) + Factor (dB/m)	
Please refer to Appendix	A.	
1		

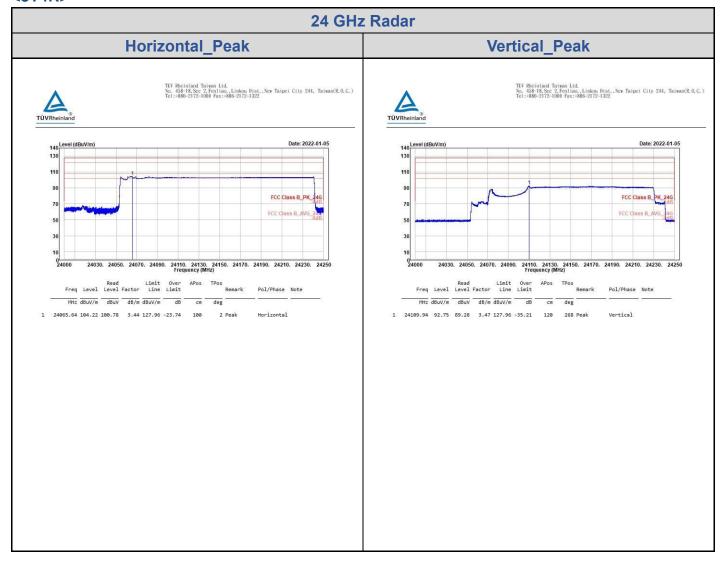
# CN2245H1 (P15C-24GHz) 001

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## **Appendix A: Test Results of Radiated Emissions**

### **Fundamental Emissions**

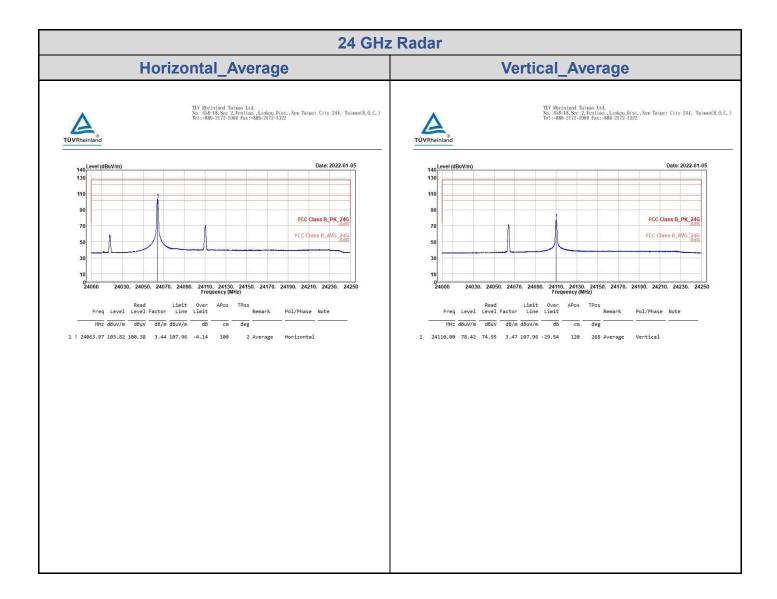
#### <8T4R>





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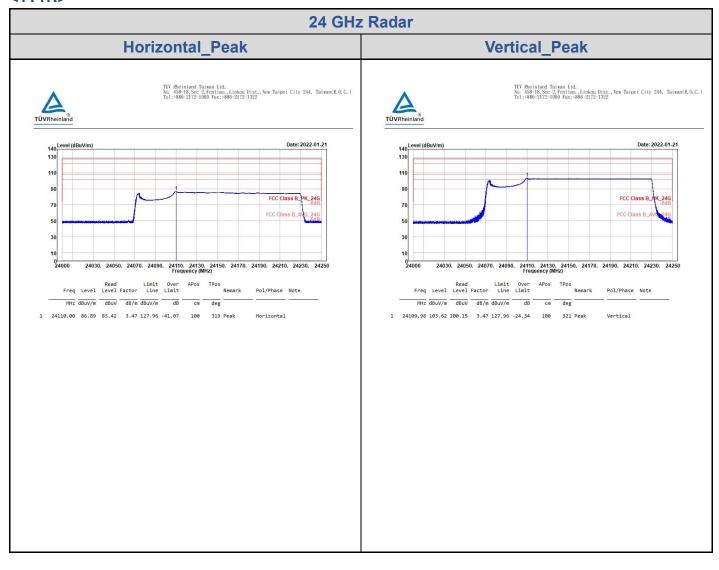
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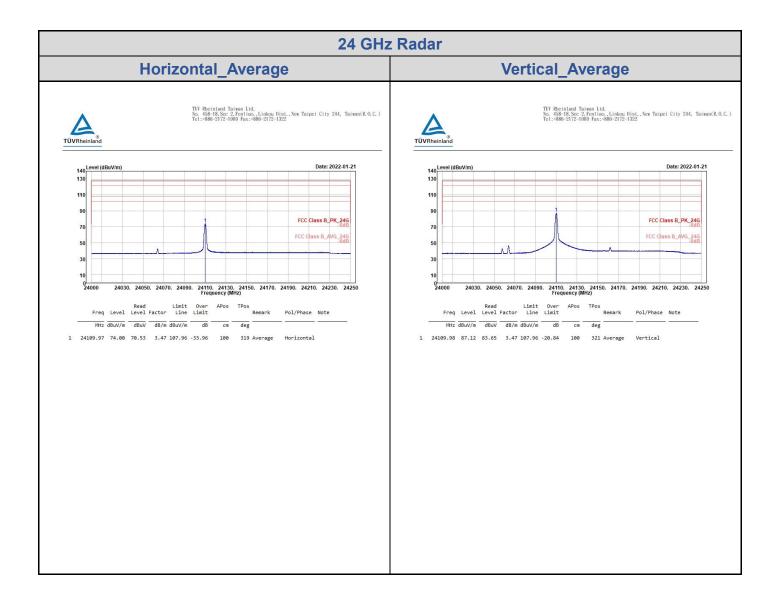
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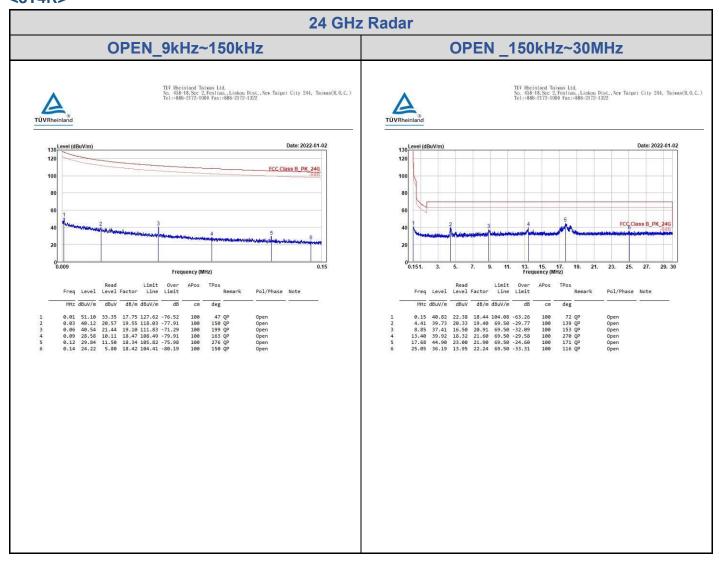




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# Spurious Emissions, Tx Mode, 9kHz ~ 30MHz <8T4R>





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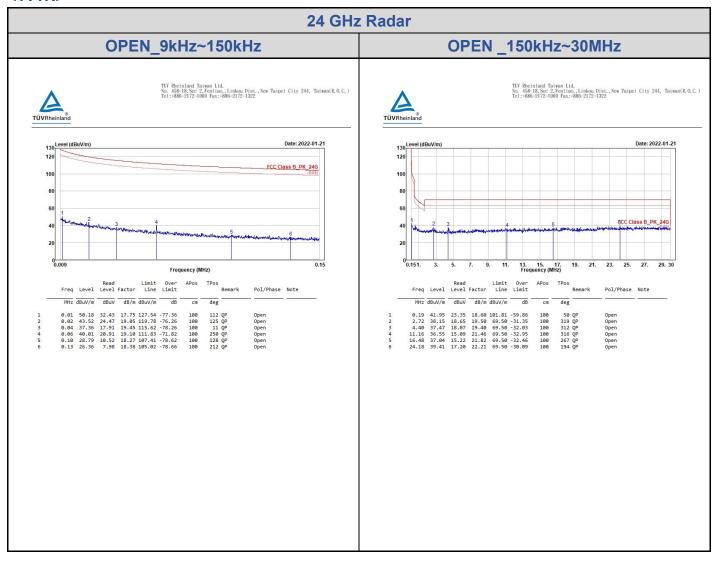
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#### <1T1R>





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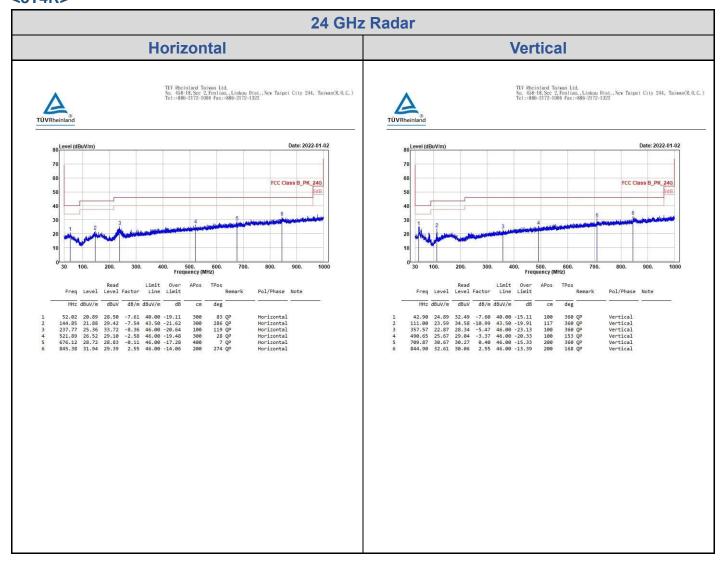




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# Spurious Emissions, Tx Mode, 30MHz ~ 1GHz <8T4R>





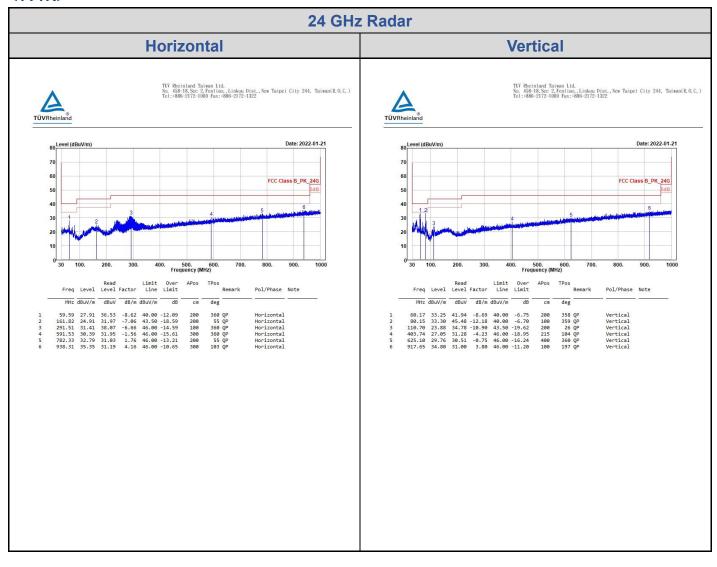
### Prüfbericht - Nr.:

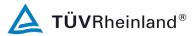
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#### <1T1R>

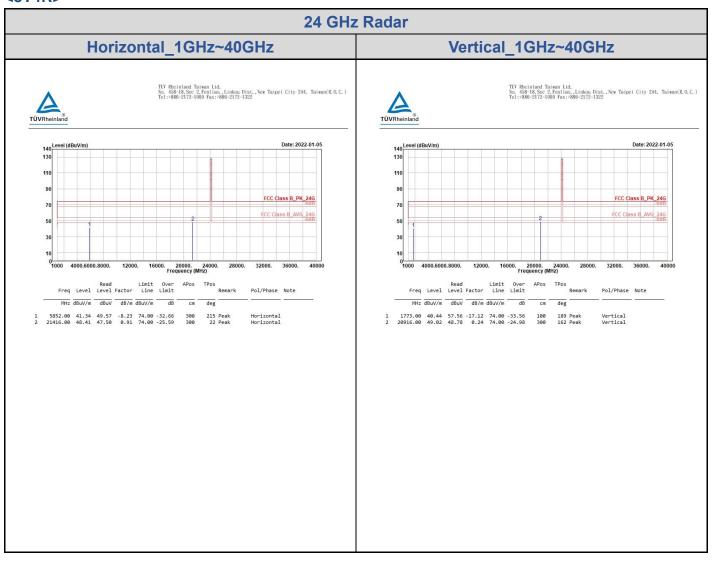




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# Spurious Emissions, Tx Mode, 1GHz ~ 100GHz <8T4R>





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# 24 GHz Radar Horizontal\_40GHz~100GHz Vertical\_40GHz~100GHz TUV Rheinland Taiwan Ltd. No. 458-18. Sec 2. Fenliao. Linkou Dist. New Taipei City 244. Taiwan(R.O.C.) Tel:+886-2172-1302 TUV Rheinland Taiwan Ltd. No. 458-18. Sec 2. Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.) Tel:+886-2172-1302 140 Level (dBuV/m) 140 Level (dBuV/m) Date: 2022-01-05 Date: 2022-01-05 FCC Class B\_AVG\_24G FCC Class B\_AVG\_24G Read Limit Over APos TPos Freq Level Level Factor Line Limit Remark Read Limit Over APos TPos Freq Level Level Factor Line Limit Remark Pol/Phase Note Pol/Phase Note MHz dBuV/m dBuV dB/m dBuV/m MHz dBuV/m dBuV dB/m dBuV/m 45547,00 56.21 4.55 51.66 67,96 -11.75 45547,00 67.21 15.55 51.66 87,96 -20.75 74192,59 66.45 1.87 58.58 67,96 -20.75 74192,59 71.10 12.52 58.58 87,96 -16.66 92517,59 60.52 1.93 58.59 67,96 -7.44 92517,57 73.13 14.54 58.59 67,96 -44.83 44756.00 54.55 4.72 49.83 67.96 -13.41 44756.00 65.95 16.12 49.83 87.96 -22.01 74205.00 60.38 1.80 58.58 67.96 -22.01 74205.00 60.38 1.80 58.58 67.96 -72.05 74205.00 70.67 12.09 58.58 87.96 -17.29 98552.50 61.90 1.76 60.14 67.96 -6.06 98552.50 73.31 13.17 60.14 67.96 -44.65



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#### <1T1R>





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