Prüfbericht-Nr.: *Test report no.:*	CN2477B9 001	**Auftrags-Nr.:** *Order no.:*	48226558	Seite 1 von 26 *Page 1 of 26*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2023-11-23	
Auftraggeber: *Client:*	VAIO Corporation 5432 TOYOSHINA AZUMINO-SHI NAGANO 399-8282 JAPAN			
Prüfgegenstand: *Test item:*	Dongle			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	VJ8RX1A			
Auftrags-Inhalt: *Order content:*	FCC Part 15C Test report			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.249			
Wareneingangsdatum: *Date of sample receipt:*	2023-11-27			
Prüfmuster-Nr.: *Test sample no:*	A003610998-004 A003610998-005			
Prüfzeitraum: *Testing period:*	2023-12-12 - 2023-12-18			
Ort der Prüfung: *Place of testing:*	EMC/RF Taipei Testing Site			
Prüflaboratorium: *Testing laboratory:*	Taipei Testing Laboratories			
Prüfergebnis*: *Test result*:*	Pass			
überprüft von: *compiled by:*	Anderson Chiu	**genehmigt von:** authorized by:	Brenda Chen	
Datum: *Date:* 2024-01-30		**Ausstellungsdatum:** *Issue date:* 2024-01-30		
Stellung / *Position:*	Senior Project Manager	**Stellung** / *Position:*	Senior Project Manager	
Sonstiges / *Other:*				
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*			

* Legende:	1 = sehr gut	2 = 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 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(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.

Anmerkungen
Remarks

1	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. *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.*
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3	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. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted 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.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen 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 bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *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.*

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.203	Antenna Requirement	Pass
5.1.2	15.249 (a)	Field Strength of Fundamental Emissions	Pass
5.1.3	15.249 (d)	Radiated Spurious Emissions	Pass
5.1.4	15.215 (c)	20 dB Bandwidth	Pass
5.2.1	15.207	Mains Conducted Emission	Pass

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 & MAINS CONDUCTED EMISSION

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APPENDIX EP - PHOTOGRAPHS OF EUT

HISTORY OF THIS TEST REPORT

Revision	Description	Date Issued
R01	Original Release	2024-01-30

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 & Mains Conducted Emission
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.

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 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
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Dongle working at 2.4 GHz with RFID 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	Dongle
Type Identification	VJ8RX1A
FCC ID	2AL4MVJ8RX1A

Technical Specification of EUT

Item	EUT information
Operating Frequency	2402 ~ 2480 MHz
Operation Voltage	5 Vdc
Modulation	GFSK
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: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.
This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	Homer Tech

The samples were used as follows:
A003610998-004
A003610998-005
Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To			Description
	Field Strength of Fundamental Emissions	Radiated Spurious Emissions	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.

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 (MHz)	Tested Frequency (MHz)
-	2402 ~ 2480	2402, 2440, 2480

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)
-	2402 ~ 2480	2402, 2440, 2480

Mains Conducted 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)
-	2402 ~ 2480	2402

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Radiated Spurious Emissions	23.7-24.6 °C	52-55 %	Ray Huang
Field Strength of Fundamental Emissions	23.7-24.6 °C	52-55 %	Ray Huang
Mains Conducted Emission	21.1-24.9 °C	51.7-54.9 %	Chuan Chu

4.3 Special Accessories and Auxiliary Equipment

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

Accessory of EUT

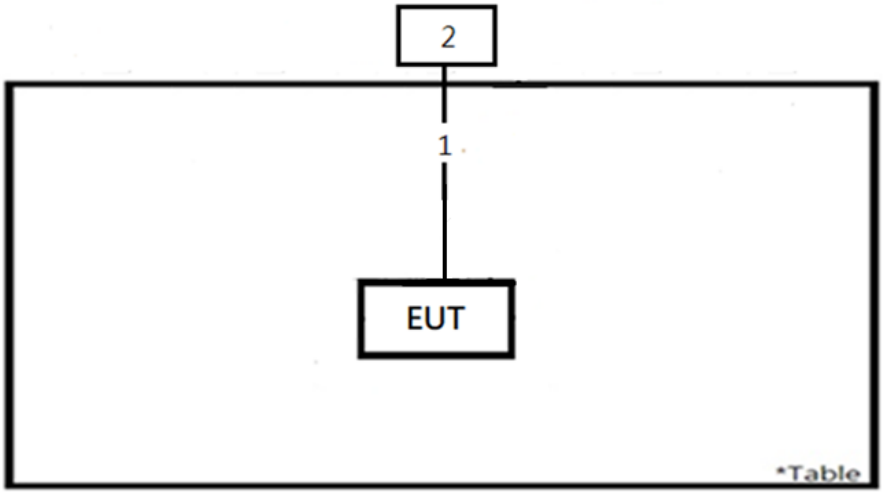
None.

Support Unit

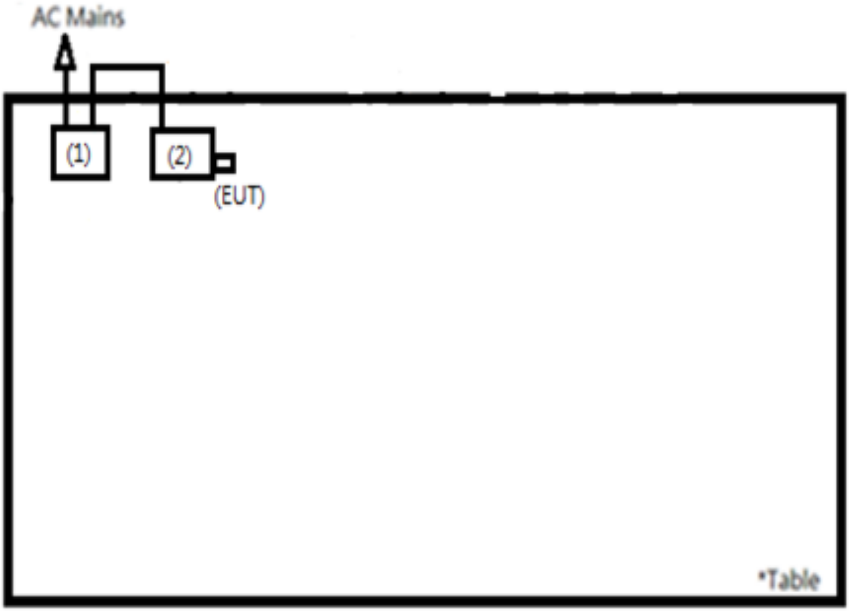
Support Unit								
No.	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
Radiated Test								
1	USB to USB	TUV	TUV-01	N/A	NO	NO	300	-
2	Notebook	Lenovo	E480	SL10Q37402	-	-	-	-
Mains Conducted Test								
1	Adapter	HP	TPN-DA17	-	-	-	188	-
2	Notebook	HP	15s-du1046TX	CND911RJB	-	-	-	-

4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>

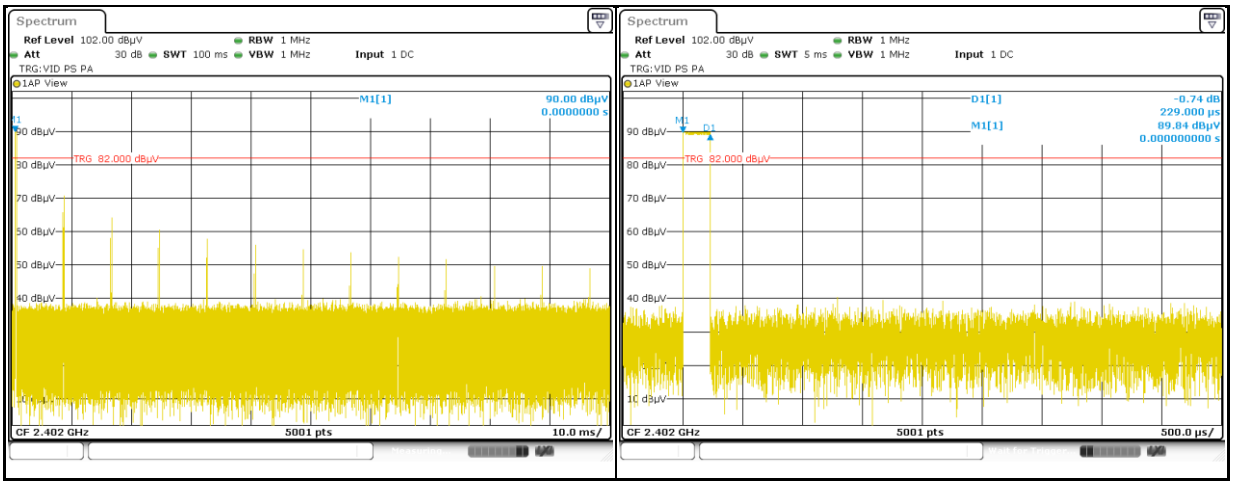


<Mains Conducted Emission mode>



4.5 Duty Cycle of Test Signal

Duty cycle correction factor = 20 log(Duty cycle) = 20 log(0.229*13/100) = -30.52



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 3.36 dBi. The antenna is a PCB 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 Field Strength of Fundamental Emissions

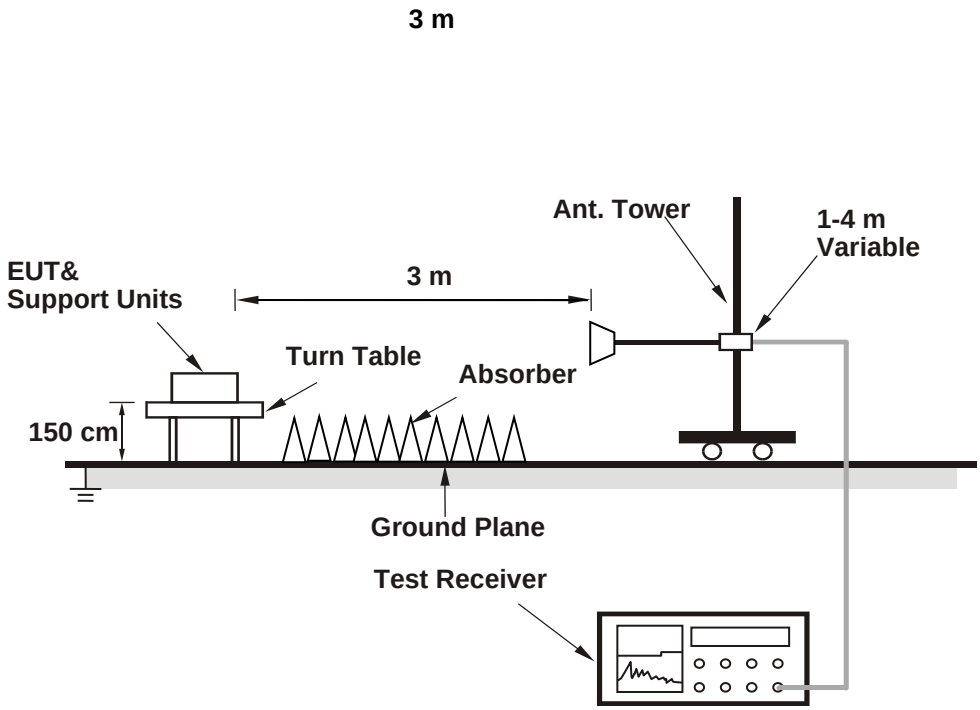
Limit

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



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

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Above 1GHz					
Signal Analyzer	R&S	FSV40	101509	2023/4/26	2024/4/24
Horn Antenna	ETS-Lindgren	3117	00218929	2023/11/17	2024/11/15
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2023/5/4	2024/5/2
HF-AMP + AC source	EMCI	EMC051845SE	980635	2023/2/16	2024/2/15
HF-AMP + AC source	EMCI	EMC051845SE	980656	2023/1/16	2024/1/15
30MHz ~ 1GHz					
Receiver	R&S	ESR7	102109	2023/2/24	2024/2/23
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2023/3/31	2024/3/29
LF-AMP	Agilent	8447D	2944A107722	2023/3/22	2024/3/20
Below 30MHz					
Receiver	R&S	ESR7	102109	2023/2/24	2024/2/23
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2023/1/4	2024/1/3

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)

Fundamental Frequency	Antenna Orientation	Detector Mode	Peak Power Level (dBuV/m)	Limit (dBuV/m)	Result
2402	Horizontal	Average	83.71	94.00	Pass
		Peak	85.33	114.00	Pass
	Vertical	Average	82.88	94.00	Pass
		Peak	84.41	114.00	Pass
2440	Horizontal	Average	84.79	94.00	Pass
		Peak	86.19	114.00	Pass
	Vertical	Average	84.26	94.00	Pass
		Peak	85.66	114.00	Pass
2480	Horizontal	Average	84.46	94.00	Pass
		Peak	85.98	114.00	Pass
	Vertical	Average	84.77	94.00	Pass
		Peak	86.29	114.00	Pass

Please refer to Appendix A.

5.1.3 Radiated Spurious Emissions

Limit

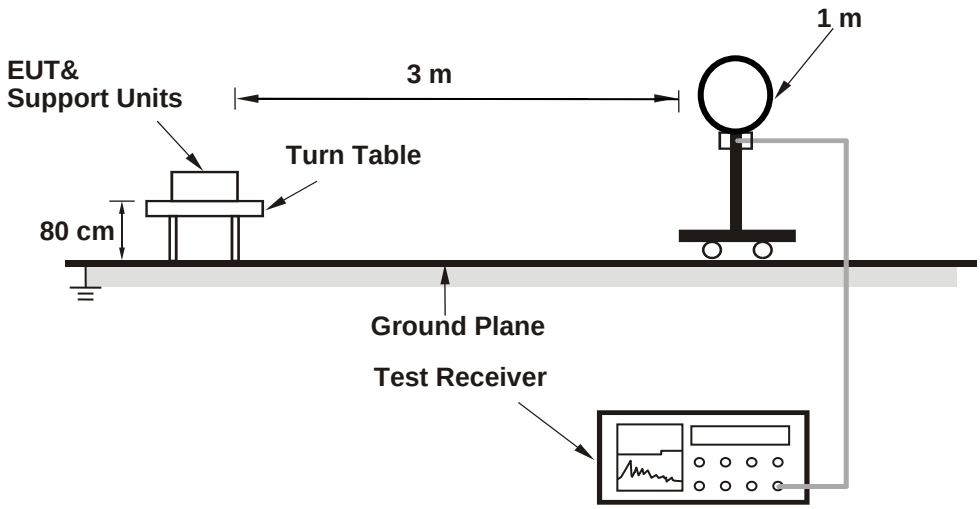
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation.

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

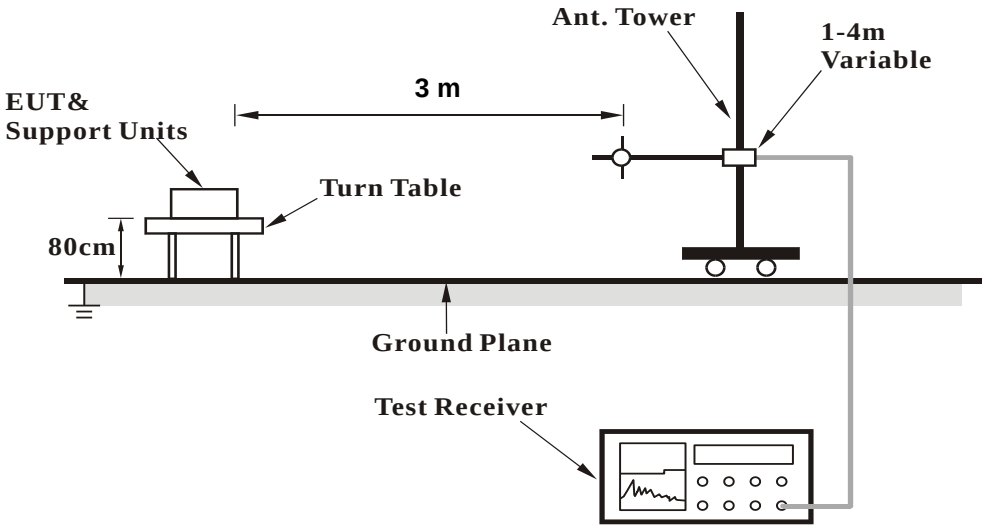
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

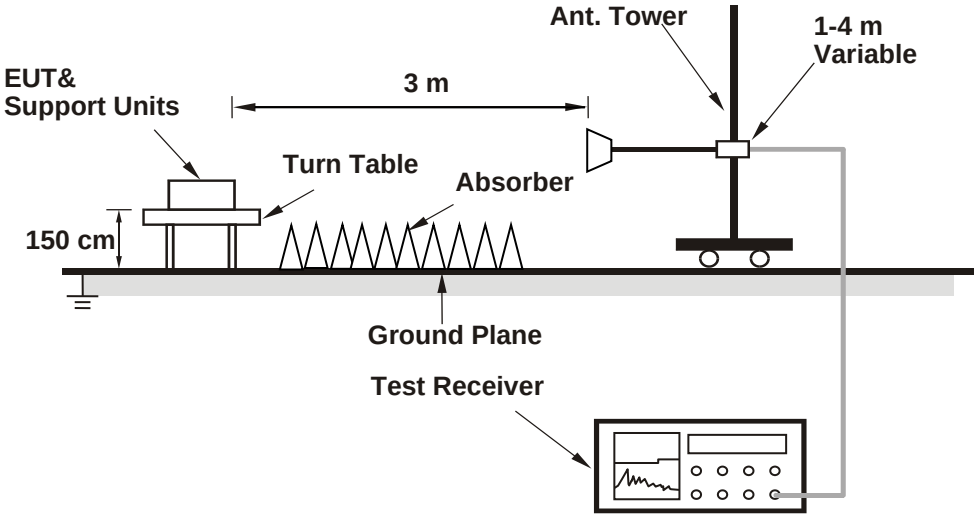
<Radiated Emissions below 30 MHz>



<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 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.
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.
6. The average value of harmonic frequency is: Average value = Peak value + 20 log(Duty cycle)
   Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.02977) = -30.52 dB

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.

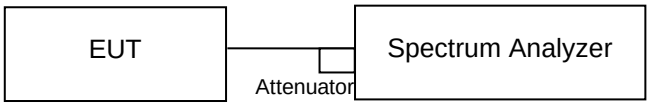
5.1.4 20 dB Bandwidth

Limit

The 20 dB bandwidth shall be specified in operating frequency band.

Kind of Test Site 3m Semi-Anechoic Chamber

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	2023/02/23	2024/02/22	2023/12/18	2023/12/18

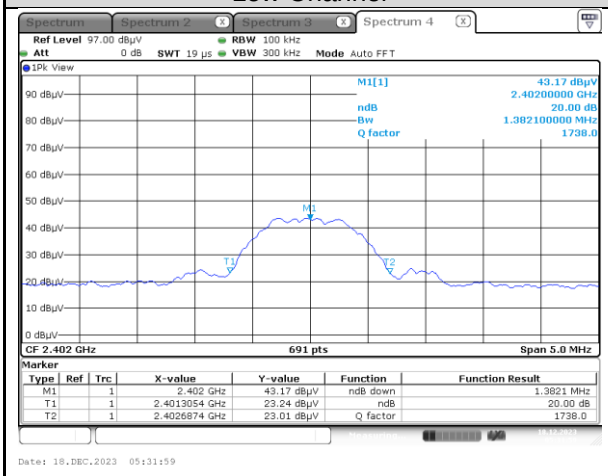
Test Procedures

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.

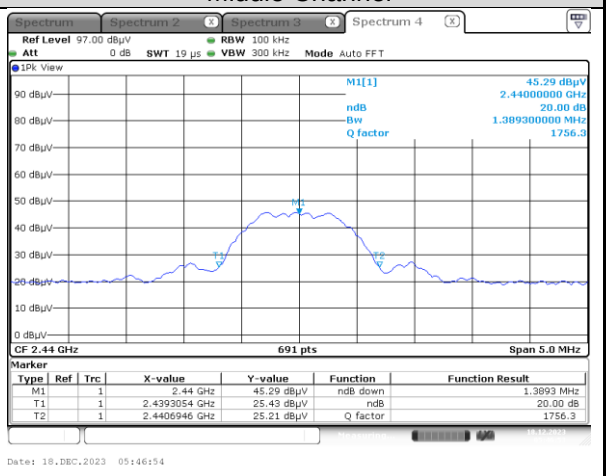
Test Results

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)
Low Channel	2402	1.382
Middle Channel	2440	1.389
High Channel	2480	1.426

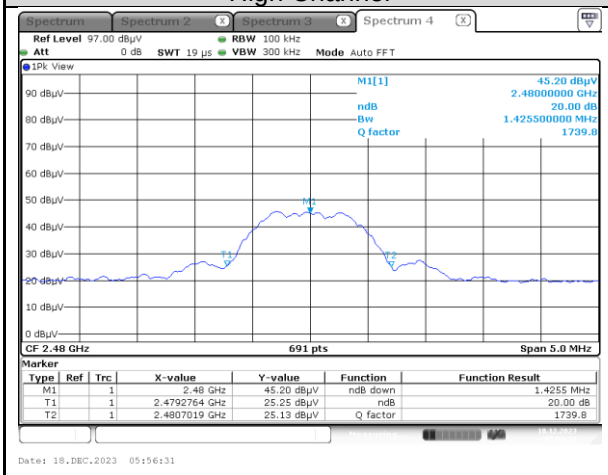
Low Channel



Middle Channel



High Channel



5.2 Mains Emission

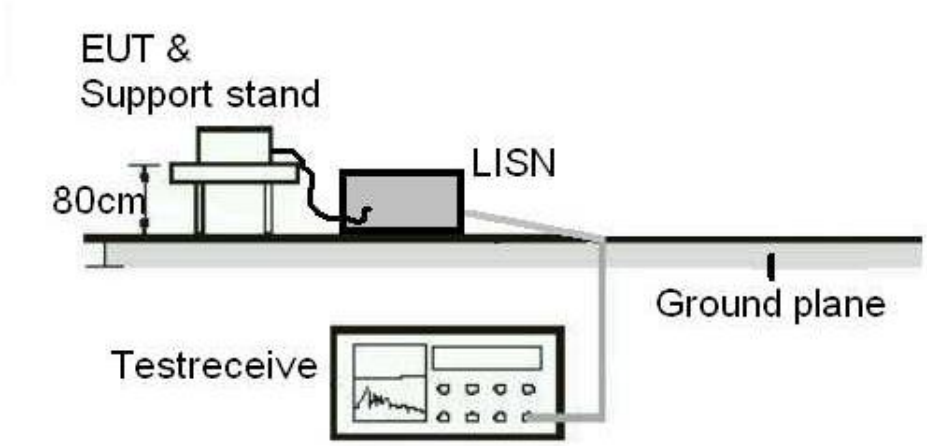
5.2.1 Mains Conducted Emission

Limit

Mains Conducted emissions as defined in §15.207 must comply with the mains conducted emission limits.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Two-Line V-Network	Rohde & Schwarz	ENV216	101938	2023/10/23	2024/10/21
EMI Test Receiver	R&S	ESCI	100797	2023/7/21	2024/7/19

Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

Test Results

Please refer to Appendix A.

Appendix A: Test Results of Radiated Spurious Emissions & Mains

Conducted Emission Test

Band Edges, 2.31GHz ~ 2.9GHz

SRD 2.4G

Low Channel (Horizontal) Peak

TÜVRheinland

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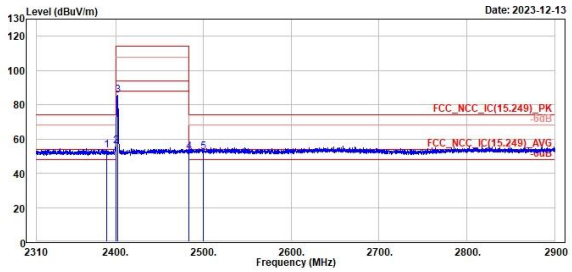

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	53.19	15.13	38.06	74.00	-20.81	203	191	Peak	Horizontal	
2	2400.03	56.08	17.99	38.09	114.00	-57.92	203	191	Peak	Horizontal	
3	2402.00	85.33	47.23	38.10	114.00	-28.67	203	191	Peak	Horizontal	
4	2483.50	52.33	14.01	38.32	74.00	-21.67	203	191	Peak	Horizontal	
5	2499.98	52.24	13.93	38.31	74.00	-21.76	203	191	Peak	Horizontal	

Low Channel (Vertical) Peak

TÜVRheinland

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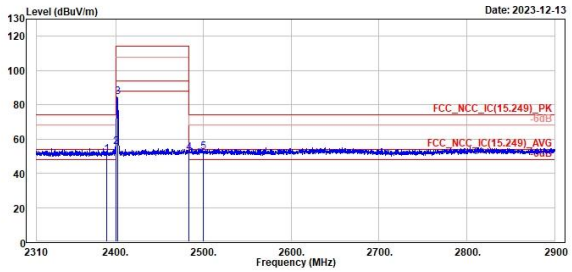
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	51.05	12.99	38.06	74.00	-22.95	100	155	Peak	Vertical	
2	2400.03	55.44	17.35	38.09	114.00	-58.56	100	155	Peak	Vertical	
3	2402.00	84.41	46.31	38.10	114.00	-29.59	100	155	Peak	Vertical	
4	2483.50	52.09	13.77	38.32	74.00	-21.91	100	155	Peak	Vertical	
5	2499.98	52.45	14.14	38.31	74.00	-21.55	100	155	Peak	Vertical	

SRD 2.4G

Low Channel (Horizontal) Average

TÜVRheinland

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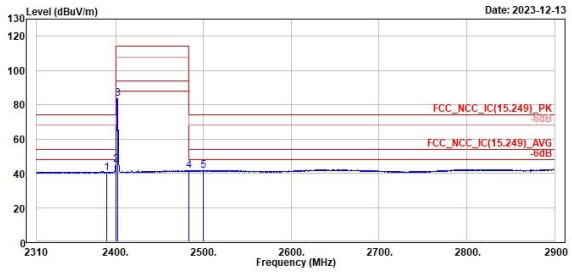
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.03	1.97	38.06	54.00	-13.97	203	191	Average	Horizontal	
2	2400.03	44.99	6.90	38.09	94.00	-49.01	203	191	Average	Horizontal	
3	2402.00	83.71	45.61	38.10	94.00	-10.29	203	191	Average	Horizontal	
4	2483.50	41.40	3.08	38.32	54.00	-12.60	203	191	Average	Horizontal	
5	2499.98	41.38	3.07	38.31	54.00	-12.62	203	191	Average	Horizontal	

Low Channel (Vertical) Average

TÜVRheinland

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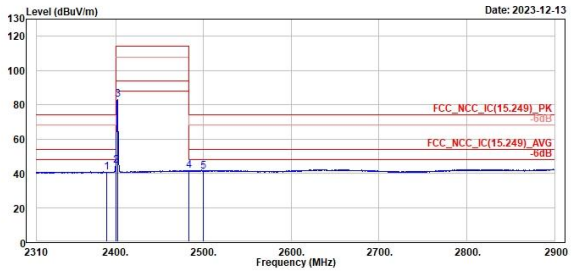

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.35	2.29	38.06	54.00	-13.65	100	155	Average	Vertical	
2	2400.03	44.48	6.39	38.09	94.00	-49.52	100	155	Average	Vertical	
3	2402.00	82.88	44.78	38.10	94.00	-11.12	100	155	Average	Vertical	
4	2483.50	41.29	2.97	38.32	54.00	-12.71	100	155	Average	Vertical	
5	2499.98	41.27	2.96	38.31	54.00	-12.73	100	155	Average	Vertical	

SRD 2.4G

Middle Channel (Horizontal) Peak

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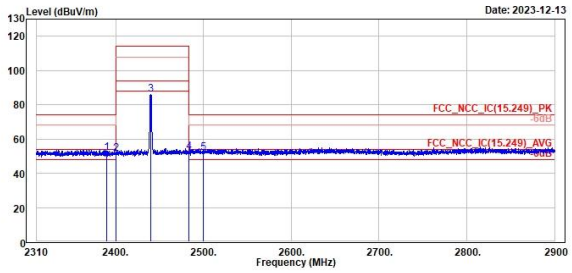
No. 458-18, Sec 2, Fenliao, , Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	51.75	13.69	38.06	74.00	-22.25	162	157	Peak	Horizontal	
2	2400.03	51.43	13.34	38.09	114.00	-62.57	162	157	Peak	Horizontal	
3	2440.00	86.19	47.89	38.30	114.00	-27.81	162	157	Peak	Horizontal	
4	2483.50	52.50	14.18	38.32	74.00	-21.50	162	157	Peak	Horizontal	
5	2499.98	52.13	13.82	38.31	74.00	-21.87	162	157	Peak	Horizontal	

Middle Channel (Vertical) Peak

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No. 458-18, Sec 2, Fenliao, , Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
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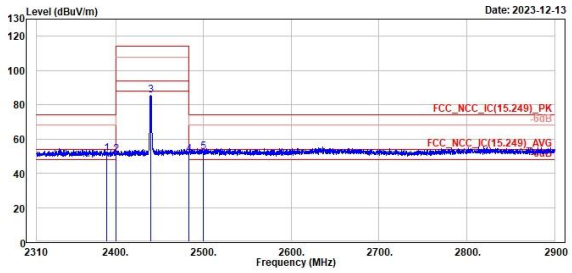

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	51.37	13.31	38.06	74.00	-22.63	106	155	Peak	Vertical	
2	2400.03	50.95	12.86	38.09	114.00	-63.05	106	155	Peak	Vertical	
3	2440.00	85.66	47.36	38.30	114.00	-28.34	106	155	Peak	Vertical	
4	2483.50	50.79	12.47	38.32	74.00	-23.21	106	155	Peak	Vertical	
5	2499.98	52.50	14.19	38.31	74.00	-21.50	106	155	Peak	Vertical	

SRD 2.4G

Middle Channel (Horizontal) Average

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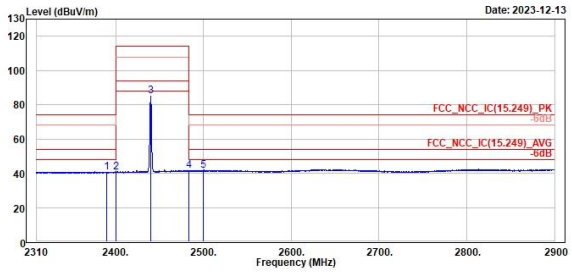
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.44	2.38	38.06	54.00	-13.56	162	157	Average	Horizontal	
2	2400.03	40.59	2.50	38.09	94.00	-53.41	162	157	Average	Horizontal	
3	2440.00	84.79	46.49	38.30	94.00	-9.21	162	157	Average	Horizontal	
4	2483.50	41.48	3.16	38.32	54.00	-12.52	162	157	Average	Horizontal	
5	2499.98	41.39	3.08	38.31	54.00	-12.61	162	157	Average	Horizontal	

Middle Channel (Vertical) Average

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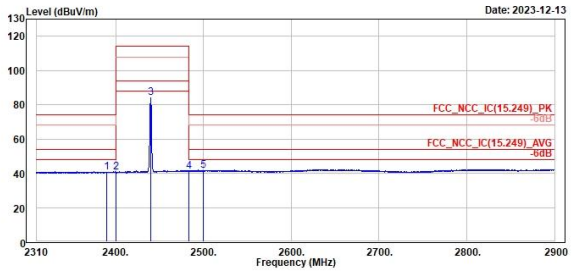
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322

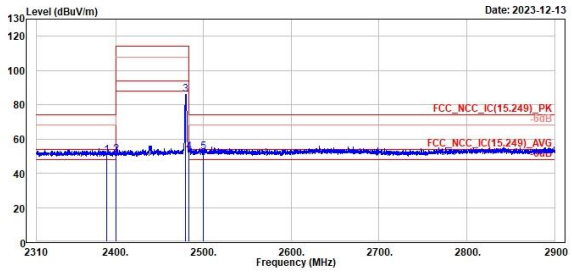


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.54	2.48	38.06	54.00	-13.46	106	155	Average	Vertical	
2	2400.03	40.58	2.49	38.09	94.00	-53.42	106	155	Average	Vertical	
3	2440.00	84.26	45.96	38.30	94.00	-9.74	106	155	Average	Vertical	
4	2483.50	41.07	2.75	38.32	54.00	-12.93	106	155	Average	Vertical	
5	2499.98	41.41	3.10	38.31	54.00	-12.59	106	155	Average	Vertical	

SRD 2.4G

High Channel (Horizontal) Peak

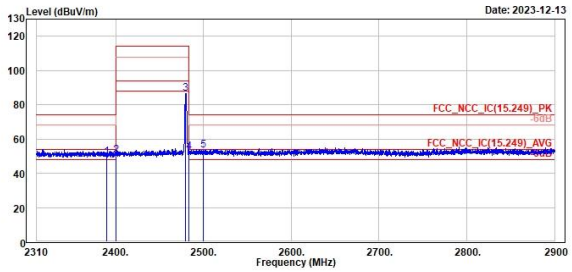
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	50.36	12.30	38.06	74.00	-23.64	158	157	Peak	Horizontal	
2	2400.03	51.12	13.03	38.09	114.00	-62.88	158	157	Peak	Horizontal	
3	2480.00	85.98	47.65	38.33	114.00	-28.02	158	157	Peak	Horizontal	
4	2483.50	52.52	14.20	38.32	74.00	-21.48	158	157	Peak	Horizontal	
5	2499.98	52.37	14.06	38.31	74.00	-21.63	158	157	Peak	Horizontal	

High Channel (Vertical) Peak

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322

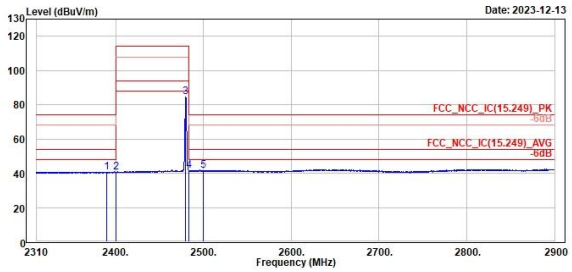


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	49.68	11.62	38.06	74.00	-24.32	100	157	Peak	Vertical	
2	2400.03	50.64	12.55	38.09	114.00	-63.36	100	157	Peak	Vertical	
3	2480.00	86.29	47.96	38.33	114.00	-27.71	100	157	Peak	Vertical	
4	2483.50	52.16	13.84	38.32	74.00	-21.84	100	157	Peak	Vertical	
5	2499.98	53.32	15.01	38.31	74.00	-20.68	100	157	Peak	Vertical	

SRD 2.4G

High Channel (Horizontal) Average

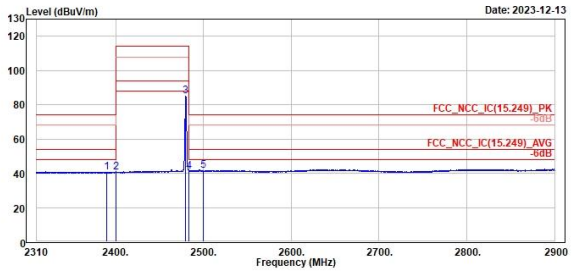
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.50	2.44	38.06	54.00	-13.50	158	157	Average	Horizontal	
2	2400.03	40.76	2.67	38.09	94.00	-53.24	158	157	Average	Horizontal	
3	2480.00	84.46	46.13	38.33	94.00	-9.54	158	157	Average	Horizontal	
4	2483.50	41.50	3.18	38.32	54.00	-12.50	158	157	Average	Horizontal	
5	2499.98	41.36	3.05	38.31	54.00	-12.64	158	157	Average	Horizontal	

High Channel (Vertical) Average

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



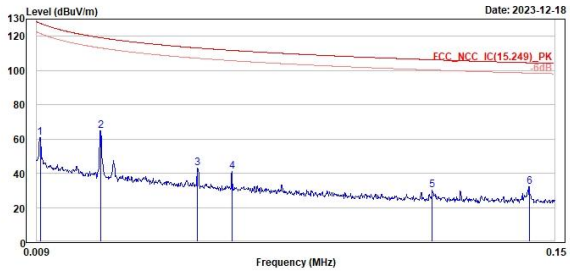
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	2390.00	40.41	2.35	38.06	54.00	-13.59	100	157	Average	Vertical	
2	2400.03	40.56	2.47	38.09	94.00	-53.44	100	157	Average	Vertical	
3	2480.00	84.77	46.44	38.33	94.00	-9.23	100	157	Average	Vertical	
4	2483.50	41.27	2.95	38.32	54.00	-12.73	100	157	Average	Vertical	
5	2499.98	41.46	3.15	38.31	54.00	-12.54	100	157	Average	Vertical	

Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

SRD 2.4G

Low Channel(Open) 9kHz~150kHz

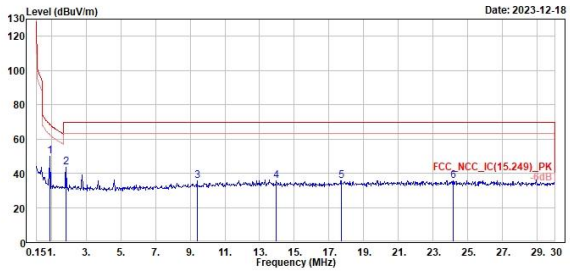
TUV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.01	60.81	43.09	17.72	127.60	-66.79	100	43	Peak	Open	
2	0.03	64.62	45.67	18.95	119.13	-54.51	100	52	Peak	Open	
3	0.05	42.82	23.78	19.04	113.13	-70.31	100	179	Peak	Open	
4	0.06	41.24	22.42	18.82	111.72	-70.48	100	125	Peak	Open	
5	0.12	29.91	11.92	17.99	106.25	-76.34	100	132	Peak	Open	
6	0.14	32.02	13.93	18.09	104.49	-72.47	100	169	Peak	Open	

Low Channel(Open) 150kHz~30MHz

TUV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.93	49.79	30.75	19.04	68.27	-18.48	100	165	Peak	Open	
2	1.85	43.51	24.19	19.32	69.50	-25.99	100	165	Peak	Open	
3	9.40	35.44	14.11	21.33	69.50	-34.06	100	264	Peak	Open	
4	13.97	35.42	13.55	21.87	69.50	-34.08	100	35	Peak	Open	
5	17.70	35.52	13.39	22.13	69.50	-33.98	100	218	Peak	Open	
6	24.15	35.55	13.22	22.33	69.50	-33.95	100	193	Peak	Open	

Spurious Emissions, Tx Mode, 30MHz ~ 1GHz

SRD 2.4G

Low Channel (Horizontal)

TÜVRheinland

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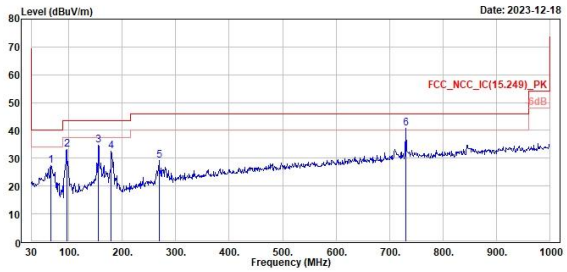
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	66.86	27.43	35.36	-7.93	40.00	-12.57	200	57	Peak	Horizontal	
2	95.96	33.19	44.52	-11.33	43.50	-10.31	200	93	Peak	Horizontal	
3	155.13	34.55	40.40	-5.85	43.50	-8.95	100	58	Peak	Horizontal	
4	179.38	32.63	39.32	-6.69	43.50	-10.87	100	234	Peak	Horizontal	
5	268.62	29.17	35.08	-5.91	46.00	-16.83	100	187	Peak	Horizontal	
6 !	731.31	40.75	38.54	2.21	46.00	-5.25	200	0	Peak	Horizontal	

Low Channel (Vertical)

TÜVRheinland

TUV Rheinland Taiwan Ltd.
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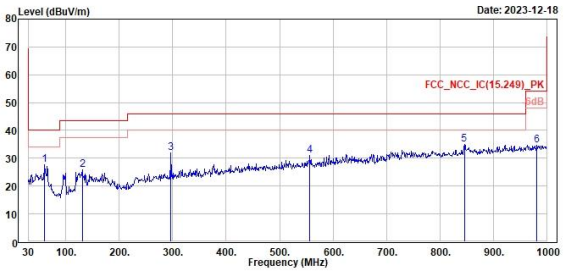

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	60.07	27.76	34.19	-6.43	40.00	-12.24	100	142	Peak	Vertical	
2	130.88	25.90	33.66	-7.76	43.50	-17.60	100	243	Peak	Vertical	
3	296.75	31.89	36.78	-4.89	46.00	-14.11	100	220	Peak	Vertical	
4	556.71	31.07	31.13	-0.06	46.00	-14.93	200	109	Peak	Vertical	
5	845.77	35.12	31.02	4.10	46.00	-10.88	100	353	Peak	Vertical	
6	981.57	34.76	28.95	5.81	54.00	-19.24	100	50	Peak	Vertical	

Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

SRD 2.4G

Low Channel (Horizontal)

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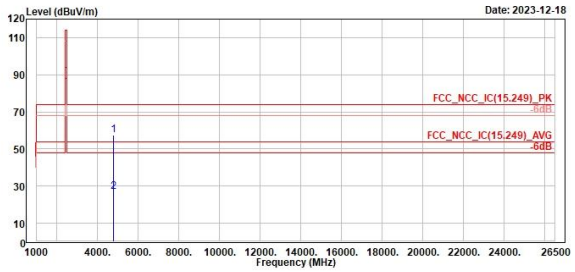

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4804.00	57.31	65.32	-8.01	74.00	-16.69	100	77	Peak	Horizontal	
2	4804.00	26.79	34.80	-8.01	54.00	-27.21	100	77	Average	Horizontal	CF

Low Channel (Vertical)

TÜVRheinland

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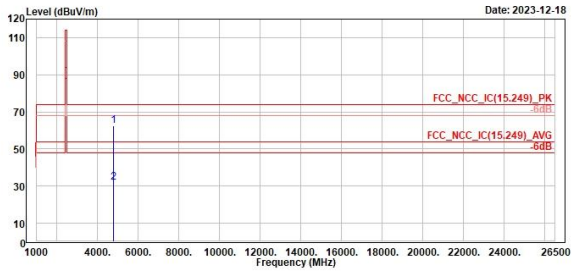

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4804.00	62.35	70.36	-8.01	74.00	-11.65	100	177	Peak	Vertical	
2	4804.00	31.83	39.84	-8.01	54.00	-22.17	100	177	Average	Vertical	CF

SRD 2.4G

Middle Channel (Horizontal)

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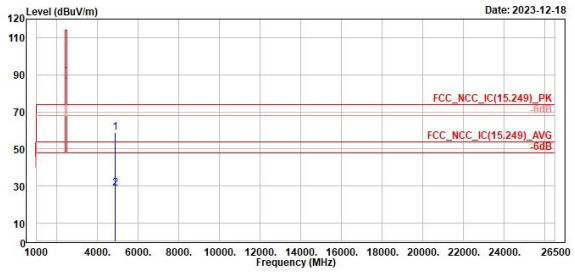

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4880.00	59.08	67.00	-7.92	74.00	-14.92	100	204	Peak	Horizontal	
2	4880.00	28.56	36.48	-7.92	54.00	-25.44	100	204	Average	Horizontal	CF

Middle Channel (Vertical)

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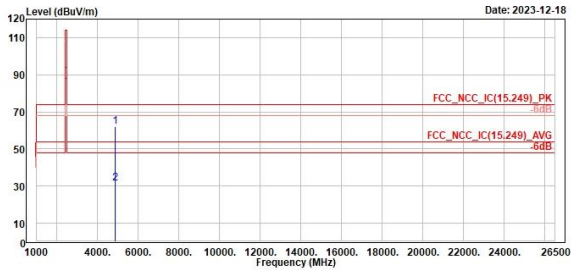

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4880.00	61.86	69.78	-7.92	74.00	-12.14	124	75	Peak	Vertical	
2	4880.00	31.34	39.26	-7.92	54.00	-22.66	124	75	Average	Vertical	CF

SRD 2.4G

High Channel (Horizontal)

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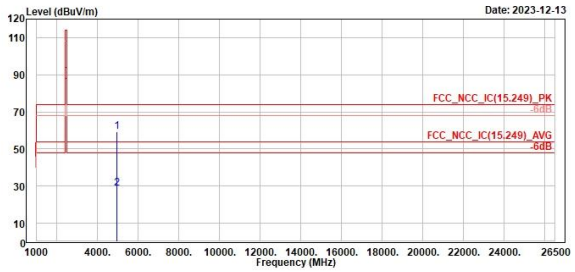

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4960.00	59.22	67.01	-7.79	74.00	-14.78	100	197	Peak	Horizontal	
2	4960.00	28.70	36.49	-7.79	54.00	-25.30	100	197	Average	Horizontal	CF

High Channel (Vertical)

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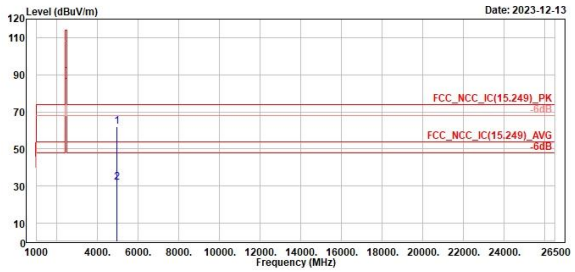

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4960.00	62.26	70.05	-7.79	74.00	-11.74	100	181	Peak	Vertical	
2	4960.00	31.74	39.53	-7.79	54.00	-22.26	100	181	Average	Vertical	CF

Mains Conducted Emission, 150kHz ~ 30MHz

Worst Band

(Line)

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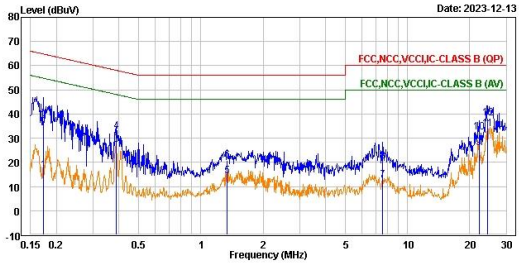

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Pol/Phase	Note
	MHz	dBuV	dBuV	dB	dBuV	dB			
1	0.17	16.85	7.23	9.62	54.84	-37.99	Average	line1	
2	0.17	37.13	27.51	9.62	64.84	-27.71	QP	line1	
3	0.39	27.19	17.56	9.63	48.09	-20.90	Average	line1	
4	0.39	32.89	23.26	9.63	58.09	-25.20	QP	line1	
5	1.34	14.20	4.56	9.64	46.00	-31.80	Average	line1	
6	1.34	20.97	11.33	9.64	56.00	-35.03	QP	line1	
7	7.58	12.43	2.69	9.74	50.00	-37.57	Average	line1	
8	7.58	20.40	10.66	9.74	60.00	-39.60	QP	line1	
9	22.13	26.06	16.31	9.75	50.00	-23.94	Average	line1	
10	22.13	32.37	22.62	9.75	60.00	-27.63	QP	line1	
11	24.33	33.89	24.14	9.75	50.00	-16.11	Average	line1	
12	24.33	38.26	28.51	9.75	60.00	-21.74	QP	line1	

(Neutral)

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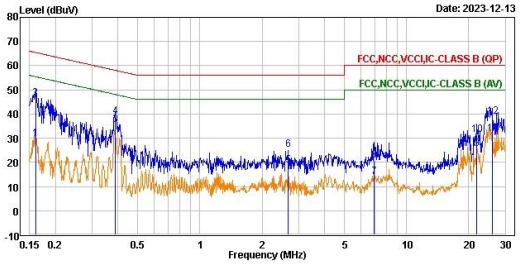

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Remark	Pol/Phase	Note
	MHz	dBuV	dBuV	dB	dBuV	dB			
1	0.16	29.76	20.09	9.67	55.46	-25.70	Average	neutral	
2	0.16	46.44	36.77	9.67	65.46	-19.02	QP	neutral	
3	0.39	35.35	25.69	9.66	48.09	-12.74	Average	neutral	
4	0.39	38.96	29.30	9.66	58.09	-19.13	QP	neutral	
5	2.66	18.90	9.20	9.70	46.00	-27.10	Average	neutral	
6	2.66	25.12	15.42	9.70	56.00	-30.88	QP	neutral	
7	6.96	14.09	4.33	9.76	50.00	-35.91	Average	neutral	
8	6.96	20.97	11.21	9.76	60.00	-39.03	QP	neutral	
9	21.92	25.45	15.58	9.87	50.00	-24.55	Average	neutral	
10	21.92	31.43	21.56	9.87	60.00	-28.57	QP	neutral	
11	25.96	31.63	21.76	9.87	50.00	-18.37	Average	neutral	
12	25.96	39.00	29.13	9.87	60.00	-21.00	QP	neutral	