





RADIO TEST REPORT FCC ID: WA5WN35BN

Product: Leaf Wetness Sensor

Trade Mark: N/A

Model Name: WN35BN

Family Model: WH51LW, WN35

Report No.: S24041500101001

Prepared for

Shenzhen Fine Offset Electronics Co., Ltd.

A, 4/F, Bldg.C, Dist.A, Minzhu Jiujiu Ind. City, Xihuan Rd., Shajing St., Baoan Dist. Shenzhen, Guangdong, China

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name: Shenzhen Fine Offset Electronics Co., Ltd.

Address : A, 4/F, Bldg.C, Dist.A, Minzhu Jiujiu Ind. City, Xihuan Rd., Shajing

St., Baoan Dist. Shenzhen, Guangdong, China

Manufacturer's Name: Shenzhen Fine Offset Electronics Co., Ltd.

Address : A, 4/F, Bldg.C, Dist.A, Minzhu Jiujiu Ind. City, Xihuan Rd., Shajing

St., Baoan Dist. Shenzhen, Guangdong, China

Product description

Product name: Leaf Wetness Sensor

Model and/or type reference: WN35BN

Family Model WH51LW, WN35

Rating(s) DC1.5V AA from battery

Standards FCC Part15.249

Test procedure ANSI C63.10-2013

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Sample Number....: S240415001001

Date of Test

Date (s) of performance of tests 15 Apr. 2024 ~ 16 May. 2024

Date of Issue...... 16 May. 2024

Test Result...... Pass

Prepared (Project Engineer)

Reviewed By: Aaron Cheng Approved By:

(Supervisor)

(Manager)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249)					
Standard Section	Test Item	Judgment	Remark		
15.207	Conducted Emission	N/A			
15.203	Antenna Requirement	Pass			
15.249 15.209	Radiated Spurious Emission	Pass			
15.249(2)	Frequency Tolerance	N/A			
15.249(a)	Fundamental Measurement	Pass			
15.205	Band Edge Emission	Pass			
15.215	Occupied Bandwidth	Pass			

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1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd

Add.: 1&5/F, Building C, 1&2/F, Building E, Fenda Science Park, Sanwei Community,

Hangcheng Street, Baoan District, Shenzhen, Guangdong, China

FCC FRN Registration No.:463705; FCC FRN Designation Number: CN1184

IC Registration No.:9270A CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $\mathbf{y} \pm \mathbf{U}$, where expended uncertainty \mathbf{U} is based on a standard uncertainty multiplied by a coverage factor of $\mathbf{k=2}$, providing a level of confidence of approximately 95 % $^{\circ}$

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%
8	Occupied bandwidth	±4.7%
9	All emissions, radiated(9KHz~30MHz)	±6dB

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Leaf Wetness Sensor		
Trade Mark	N/A		
Model Name	WN35BN		
Family Model	WH51LW, WN35		
Model Difference	All models are the same the Packaging.	e circuit and RF module, except	
	The EUT is a Leaf Wetr	ness Sensor	
	Operation Frequency:	915MHz	
	Modulation Type:	FSK	
	Antenna Designation:	Spring antenna	
Product Description	Antenna Gain(Peak)	2.15dBi	
	Based on the application, features, or specifical exhibited in User's Manual. More details of EU technical specification, please refer to the User		
Channel List	Please refer to the Note	2.	
Adapter	N/A		
Battery	DC1.5V AA Battery		
Hardware version	WN35_WHP0254B1V04		
Firmware version	N/A		
Software version	Software WN35_0x8510 checksum=0x851C	C_(00.80)_V2.1.2.HPO	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

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2.

Channel	Frequency(MHz)
01	915

3

Table for Filed Antenna

IGDIC	101 1 1104 7 11	itorina				
Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Spring antenna	N/A	2.15	Antenna

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2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH01
Mode 2	Normal link

For Radiated Spurious Emission		
Pretest Mode	Description	
Mode 1	CH01	

For Conducted Emission			
Final Test Mode	Description		
Mode 1	CH01		
Mode 2	Normal link		

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2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED				
Radiated Spurious Emission Test				
EUT				

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2.4 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note

ľ	V	O	tρ
	N	v	ᅜ

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in <code>"Length_"</code> column.

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2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kaui	Radiation lest equipment						
	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibrati on period
1	Spectrum Analyzer	Aglient	E4407B	MY45108040	2024.03.12	2025.03.11	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023.05.29	2024.05.28	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2023.05.29	2024.05.28	1 year
4	Test Receiver	R&S	ESPI7	101318	2024.03.12	2025.03.11	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2024.03.11	2025.03.10	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2023.05.06	2026.05.05	3 year
7	Horn Antenna	EM	EM-AH-1018 0	2011071402	2024.03.12	2025.03.11	1 year
8	Broadband Horn Antenna	SCHWARZBE CK	BBHA 9170	803	2023.05.29	2024.05.28	1 year
9	Amplifier	EMC	EMC051835 SE	980246	2023.05.29	2024.05.28	1 year
10	Active Loop Antenna	SCHWARZBE CK	FMZB 1519 B	055	2023.05.29	2024.05.28	1 year
11	Power Meter	DARE	RPR3006W	15I00041SN O84	2023.05.29	2024.05.28	1 year
12	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2023.05.06	2026.05.05	3 year
13	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2023.05.06	2026.05.05	3 year
14	High Test Cable(1G-40G Hz)	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
15	High Test Cable(1G-40G Hz)	N/A	R-04	N/A	2022.06.17	2025.06.16	3 year
16	Filter	TRILTHIC	2400MHz	29	2023.05.29	2024.05.28	3 year
17	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

Note:

We will use the temporary antenna connector (soldered on the PCB board) When conducted test And this temporary antenna connector is listed within the instrument list

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Coı	Conduction Test equipment						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2024.03.12	2025.03.11	1 year
2	LISN	R&S	ENV216	101313	2024.03.12	2025.03.11	1 year
3	LISN	SCHWARZBE CK	NNLK 8129	8129245	2024.03.12	2025.03.11	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2023.05.06	2026.05.05	3 year
5	Test Cable (9KHz-30MH z)	N/A	C01	N/A	2023.05.06	2026.05.05	3 year
6	Test Cable (9KHz-30MH z)	N/A	C02	N/A	2023.05.06	2026.05.05	3 year
7	Test Cable (9KHz-30MH z)	N/A	C03	N/A	2023.05.06	2026.05.05	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable which is scheduled for calibration every 3 years.

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3. ANTENNA REQUIREMENT

3.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

3.2 EUT ANTENNA

The EUT antenna is Spring Antenna	(Gain:2.15dBi). It comply	v with the standard requirement.

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3.3 CONDUCTED EMISSION MEASUREMENT

3.3.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

	Class B	Class B (dBuV)	
FREQUENCY (MHz)	Quasi-peak	Average	Standard
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

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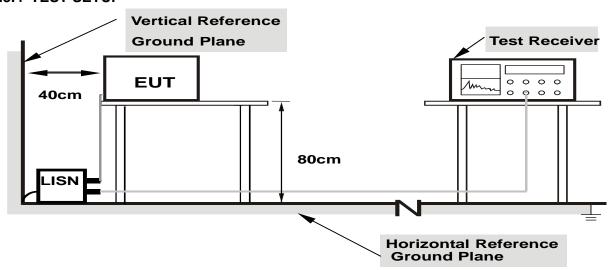
3.3.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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3.2.5 TEST RESULT

EUT:	Leaf Wetness Sensor	Model Name. :	WN35BN
Temperature:	25 ℃	Relative Humidity:	55%
Pressure:	1010hPa	Phase :	N/A
Test Voltage :	N/A	Test Mode:	N/A

Note: Product is battery powered so Not Applicable.

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3.4 RADIATED EMISSION MEASUREMENT

3.4.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/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
Frequency (MHz)	Limit (dBuV)	
30~88	40	3
88~216	43.5	3
216~960	46	3
960 -10000	54.00	3
*902 - 928	94.00	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).
- (3) *Note: This is the limit for the fundamental frequency.

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.249)

Frequency of Emission (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
902-928	50	500

Notes:

(1) 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 in Section 15.209, whichever is the lesser attenuation.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

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3.4.2 TEST PROCEDURE

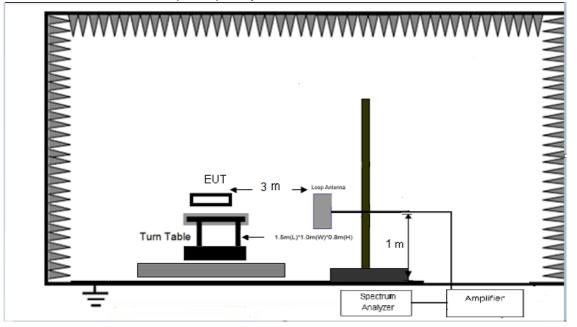
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos. Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

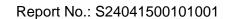
3.4.3 DEVIATION FROM TEST STANDARD

No deviation

(A) Radiated Emission Test-Up Frequency Below 30MHz



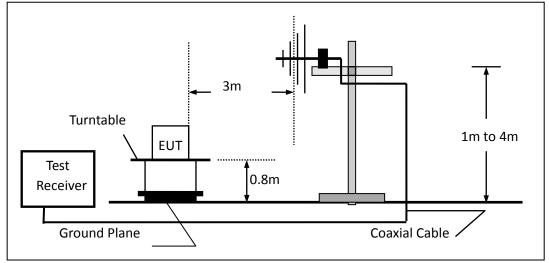
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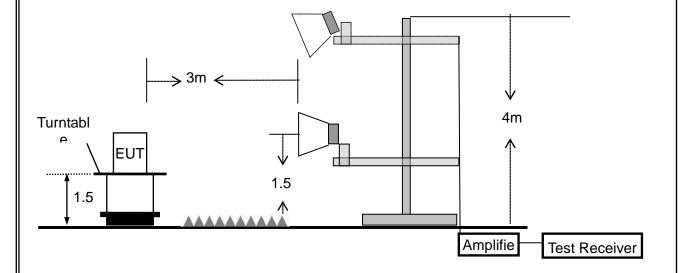




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



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3.4.4 TEST RESULTS (BELOW 30MHz)

EUT:	Leaf Wetness Sensor	Model Name. :	WN35BN
Temperature :	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	TX	Polarization :	

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
				PASS
				PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Remark :1. Emission level in dBuV/m=20 log (uV/m)

- 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
- 3. For Frequency 9kHz~30MHz:

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

For Frequency above 30MHz:

Distance extrapolation factor =20log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

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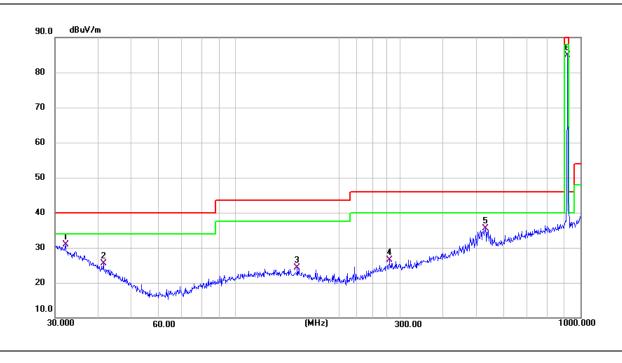
3.4.5 TEST RESULTS (BELOW 1000 MHz)

EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	25 ℃	Relative Humidity:	51%
Pressure:	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	Mode 1	Polarization:	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Dotootor Typo
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
32.1794	5.77	25.13	30.90	40.00	-9.10	QP
41.4215	5.37	20.08	25.45	40.00	-14.55	QP
151.0664	5.88	18.34	24.22	43.50	-19.28	QP
279.0436	6.63	19.87	26.50	46.00	-19.50	QP
530.1013	10.09	25.32	35.41	46.00	-10.59	QP
916.0687	54.03	30.91	84.94	94.00	-9.06	QP

Remark:

1. Factor = Antenna Factor + Cable Loss - Pre-amplifier.



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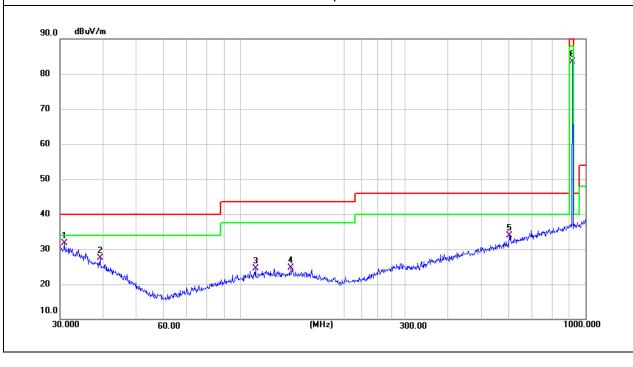


EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	25 ℃	Relative Humidity:	51%
Pressure:	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	Mode 1	Polarization:	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Dotootor Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
30.8534	5.85	25.86	31.71	40.00	-8.29	QP
39.1615	6.07	21.34	27.41	40.00	-12.59	QP
110.5686	6.28	18.21	24.49	43.50	-19.01	QP
139.8508	6.13	18.55	24.68	43.50	-18.82	QP
601.4265	7.53	26.44	33.97	46.00	-12.03	QP
916.0687	52.54	30.91	83.45	94.00	-10.55	QP

Remark:

1. Factor = Antenna Factor + Cable Loss - Pre-amplifier.



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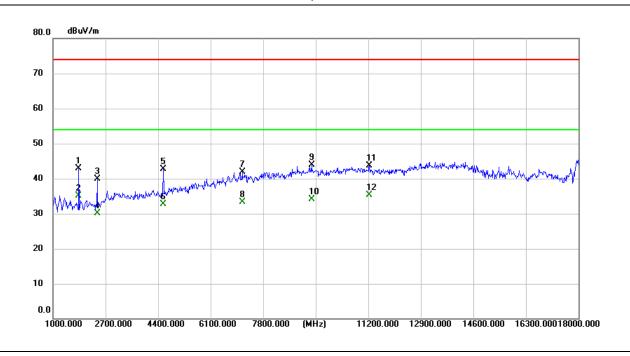
3.4.6 TEST RESULTS (ABOVE 1000 MHZ)

EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	25 ℃	Relative Humidity:	51%
Pressure:	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	Mode 1	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Datastar Tuna
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
1833.000	64.47	-21.54	42.93	74.00	-31.07	peak
1833.000	56.56	-21.54	35.02	54.00	-18.98	AVG
2428.000	58.57	-18.57	40.00	74.00	-34.00	peak
2428.000	48.77	-18.57	30.20	54.00	-23.80	AVG
4570.000	56.71	-14.08	42.63	74.00	-31.37	peak
4570.000	46.73	-14.08	32.65	54.00	-21.35	AVG
7120.000	50.53	-8.63	41.90	74.00	-32.10	peak
7120.000	41.85	-8.63	33.22	54.00	-20.78	AVG
9364.000	49.16	-5.35	43.81	74.00	-30.19	peak
9364.000	39.40	-5.35	34.05	54.00	-19.95	AVG
11234.000	46.62	-2.92	43.70	74.00	-30.30	peak
11234.000	38.28	-2.92	35.36	54.00	-18.64	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.



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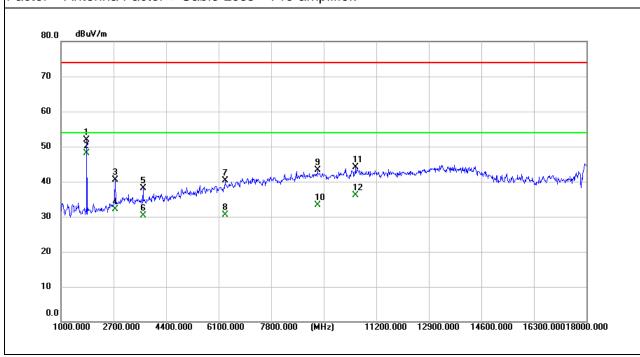


EUT:	Leaf Wetness Sensor	Model Name :	WN34BL
Temperature:	25 ℃	Relative Humidity:	51%
Pressure:	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	Mode 1	Polarization :	Vertical

	1		1			1
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
1833.000	73.45	-21.54	51.91	74.00	-22.09	peak
1833.000	69.70	-21.54	48.16	54.00	-5.84	AVG
2751.000	57.49	-17.07	40.42	74.00	-33.58	peak
2751.000	49.09	-17.07	32.02	54.00	-21.98	AVG
3652.000	53.58	-15.53	38.05	74.00	-35.95	peak
3652.000	45.83	-15.53	30.30	54.00	-23.70	AVG
6304.000	51.26	-10.93	40.33	74.00	-33.67	peak
6304.000	41.38	-10.93	30.45	54.00	-23.55	AVG
9296.000	48.73	-5.45	43.28	74.00	-30.72	peak
9296.000	38.70	-5.45	33.25	54.00	-20.75	AVG
10537.000	48.01	-3.84	44.17	74.00	-29.83	peak
10537.000	39.86	-3.84	36.02	54.00	-17.98	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.



Note:

- 1) EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(X orientation).
- 2) Since the PEAK test results are below the AV limit, according to 15.31, the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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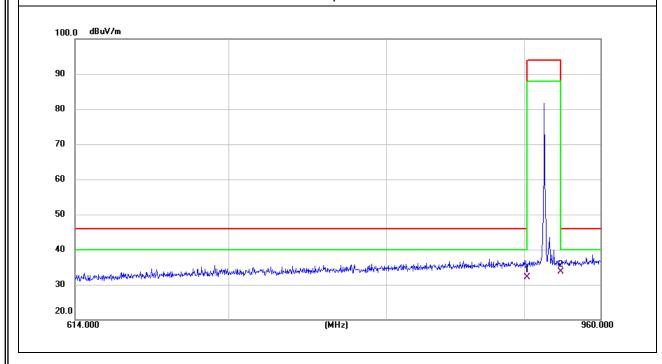
3.4.7 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	25 ℃	Relative Humidity:	51%
Pressure :	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	TX-915MHz	Polarization :	Horizontal

Frequenc	y Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
902.000	0 1.26	30.76	32.02	46.00	-13.98	QP
928.000	0 2.60	31.05	33.65	46.00	-12.35	QP

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.



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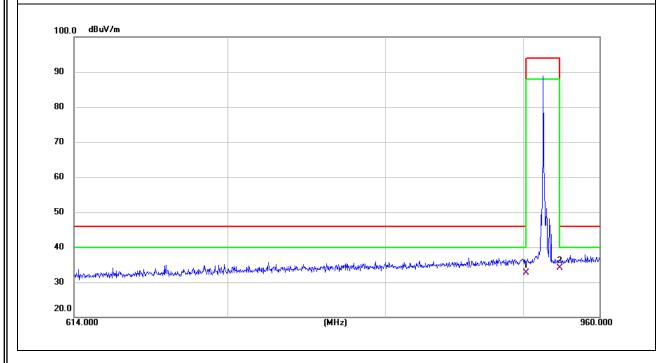


EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	25 ℃	Relative Humidity:	51%
Pressure:	1010 hPa	Test Voltage :	DC 1.5V
Test Mode :	TX-915MHz	Polarization:	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Dotostor Typo
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
902.0000	1.89	30.76	32.65	46.00	-13.35	QP
928.0000	3.07	31.05	34.12	46.00	-11.88	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



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4. BANDWIDTH TEST

4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value., Sweep time = Auto.

4.2 DEVIATION FROM STANDARD

No deviation.

4.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

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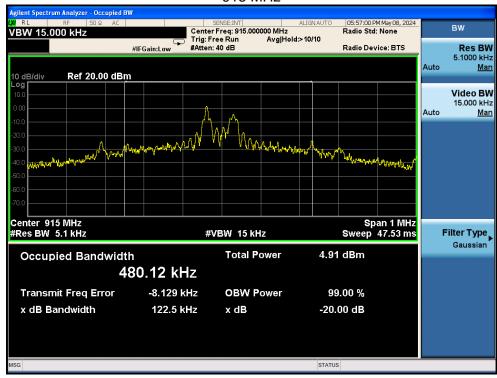


6. TEST RESULTS

EUT:	Leaf Wetness Sensor	Model Name :	WN35BN
Temperature:	26 ℃	Relative Humidity:	53%
Pressure :	1020 hPa	Test Power :	DC 1.5V
Test Mode :	Mode 1		

Test Channel	Frequency	20 dBc Bandwidth	
Test Orianner	(MHz)	(MHz)	
CH01	915	0.1225	

915 MHz



END OF REPORT

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