TEST REPORT

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
Tel: 82-31-285-0894 Fax: 82-505-299-8311
www.kctl.co.kr

1. Client

- Name : Uniden America Corporation
- Address : 6225 N. State highway 161, Suite 300, Irving Texas 75038
- Date of Receipt : 2021-09-10

2. Use of Report : -

3. Name of Product / Model : RADAR DETECTOR / R3

4. Manufacturer / Country of Origin : ATTOWAVE Co., Ltd. / Korea

5. Date of Test : 2021-09-14

6. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

7. Test method used : ANSI C63.4:2014, FCC02-211, Class B

8. FCC ID : AMWUA1702

9. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Byunghwan Min (Signature)	Technical Manager Name : Gunsu Park (Signature)

2021-09-30

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2021-09-30	Originally issued	-

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

Contents

1. Applicant information

Applicant: Uniden America Corporation
Address: 6225 N. State highway 161, Suite 300, Irving Texas 75038

Manufacturer: ATTOWAVE Co., Ltd.
Address: 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801 Korea

2. Laboratory information

Address

KCTL Inc. (Suwon Lab.)

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040

VCCI Registration No.: R-20080, G-20078, C-20059, T-20056

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP

3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m (RE)	21.5 °C	48.0 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted Emission measurement (Confidence level about 95 %, k = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: 3.50 dB	
	150 kHz ~ 30 MHz: 3.06 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: 3.05 dB	
	150 kHz ~ 30 MHz: 3.06 dB	
Radiated Emission measurement (Confidence level about 95 %, k = 2)		
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m: 5.36 dB
		10 m: 5.34 dB
	300 MHz ~ 1 000 MHz	3 m: 5.46 dB
		10 m: 5.44 dB
	1 GHz ~ 6 GHz	3 m: 6.24 dB
	6 GHz ~ 18 GHz	3 m: 6.60 dB
	18 GHz ~ 30 GHz	3 m: 6.72 dB
	30 GHz ~ 40 GHz	3 m: 6.14 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 4.88 dB
		10 m: 4.86 dB
	300 MHz ~ 1 000 MHz	3 m: 4.94 dB
		10 m: 4.94 dB
	1 GHz ~ 6 GHz	3 m: 6.28 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program		Used
Conducted Emission	EP5CE_V 5.4.0(TOYO)		☐
Radiated Emission	2F	EP10/RE_Ver 2021.01.000 (TOYO)	☒
	4F	EP5RE_V 5.11.10(TOYO)	

4. Description of EUT

4.1 General information

Radar

Receiver type : Dual conversion super-heterodyne
Antenna type : Linear polarized, self-contained
Detector type : Scanning frequency discriminator
Frequency operation : X-band; 10.525 GHz ± 0.025 GHz
K-band; 24.150 GHz ± 0.100 GHz
Ka-band (super-wide); 34.700 GHz ± 1.300 GHz

Laser

Receiver type : Pulsed laser signal receiver
Detector type : Digital signal processor pulse width discrimi nator
Optical sensor : Dual convex condenser lens and high speed photo diode detector,
950nm ± 150 nm (nanometers)

General

Operating Temperature Range : -20° C to +85° C
Storage Temperature Range : -30° C to +95° C
Power requirements : 11V to 16V DC, 350 mA, negative ground
Dimensions HxWxL : 110.00 mm x 69.00 mm x 29.50 mm

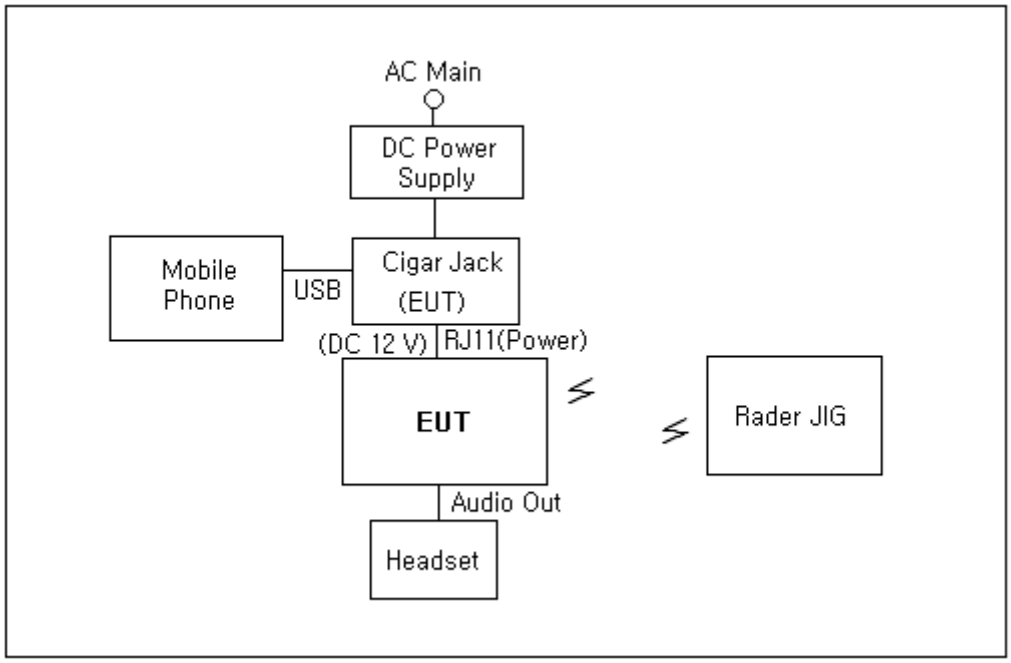
4.2 Product description

Type of product	RADAR DETECTOR
Model name (Basic)	R3
Model name (Variant)	-
Difference	-
Serial no	-
Testing voltage	DC 12 V
Input rating	DC 11 V ~ DC 16 V
Internal clock frequency	22 MHz
Note	-The following accessory was provided by the manufacturer. 1) Cigar Jack

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer	SDoC & FCC ID
Mobile Phone	SM-N935S	-	SAMSUNG	A3LSMN935 KOR
DC Power Supply	E3632A	MY40004393	Agilent	-
Headset	Jlab Bombora Over-Ear Headphones with Universal Mic	-	JLAB	-
Rader JIG	-	-	-	-

4.4 Test configuration



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT**	RJ11(Power)	Cigar Jack (EUT)	-	1.5	Unshield
2		Audio Out	Headset	-	2.0	Unshield
3	Cigar Jack (EUT)	Power	DC Power Supply	-	2.0	Unshield
4		USB	Mobile Phone	USB	1.5	Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1	The EUT is linked to user guidance. During the test run, the EUT operates on the following: Stand-by mode X Band: (10.500 ~ 10.550) GHz K Band: (23.900 ~ 24.250) GHz Ka Band(Super-wide band): (33.400 ~ 35.700) GHz Laser:(950 ± 50) nm

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☐	Conducted Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B	N/A (Note1))
☒	Radiated Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B	Pass

The data collected shows that EUT the complied with technical requirements of above rules part 15.109(h).

Note1): Report Number: (KR21-SEF0143) for AC line conducted Emissions results of the system

6. Test results

6.1 Radiated Emission

Testing voltage	DC 12 V		
Test facility	10 m Chamber (4F)		
Test distance	3 m		
Date	2021-09-14		
Temperature (°C)	21.5 °C	Humidity (% R.H.)	48.0 % R.H.
Remarks	Pass		

6.1.1 Limits of radiated emission measurement

	Class A at 10 m QP(dB(μV/m))		Class B at 3 m QP(dB(μV/m))	
Frequency [MHz]	FCC[1)]	ISED (ICES Issue 7)	FCC[1)]	ISED (ICES Issue 7)
30-88	39.1	40.0	40.0	40.0
88-216	43.5	43.5	43.5	43.5
216-230	46.4	46.4	46.0	46.0
230-960	46.4	47.0	46.0	47.0
Above 960	49.5	49.5	54.0	54.0

- [1)]: Alternative standard: CISPR, Pub. 22

- Test data in this section has been taken against the FCC 15.109(a) or (B) Limit as it is the most stringent limit.

By complying with more restrictive FCC 15.109 Limit compliance with the ICES-003 Issue 7 limit also demonstrated.

6.1.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.
Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

-When measuring 30 MHz to 1000 MHz, RBW 120 KHz and VBW 300 MHz are applied.
-When measuring 1 GHz to 40 GHz, apply RBW 1 MHz and VBW 3 MHz.

6.1.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
DOUBLE RIDGED HORN ANTENNA	3117	00161083	ETS-LINDGREN	2021.09.23	☒
Broadband Preamplifier	BBV9718	9718-233	SCHWARZBECK	2022.08.19	☒
SIGNAL ANALYZER	FSV40	100988	R&S	2021.12.23	☒

6.1.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

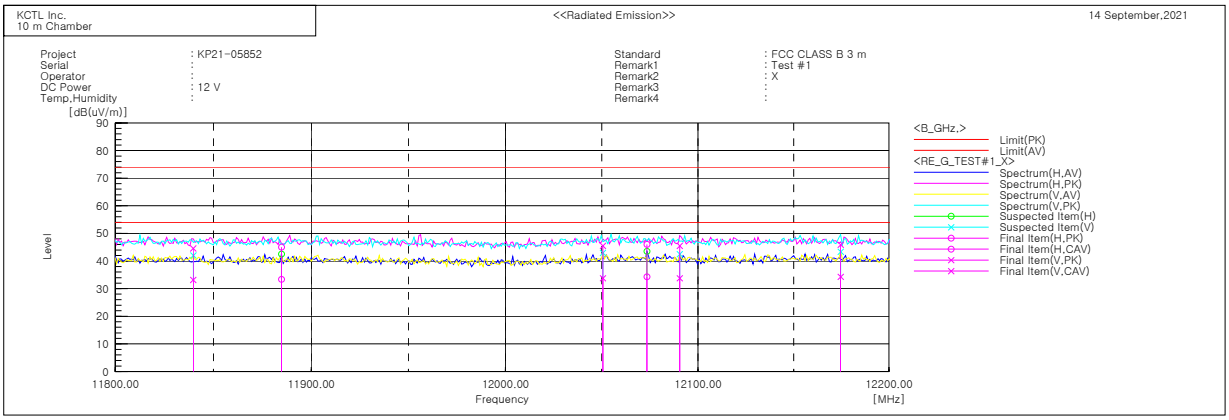
The result is 30 + 12 + 5 + 6 – 35 = 18 dB (μN/m)

Bilog Antenna and ATTENUATOR (6 dB) were calibrated together.

AV = CAV : Abbreviation of CISPR Average

6.1.5 Radiated emission measurement result

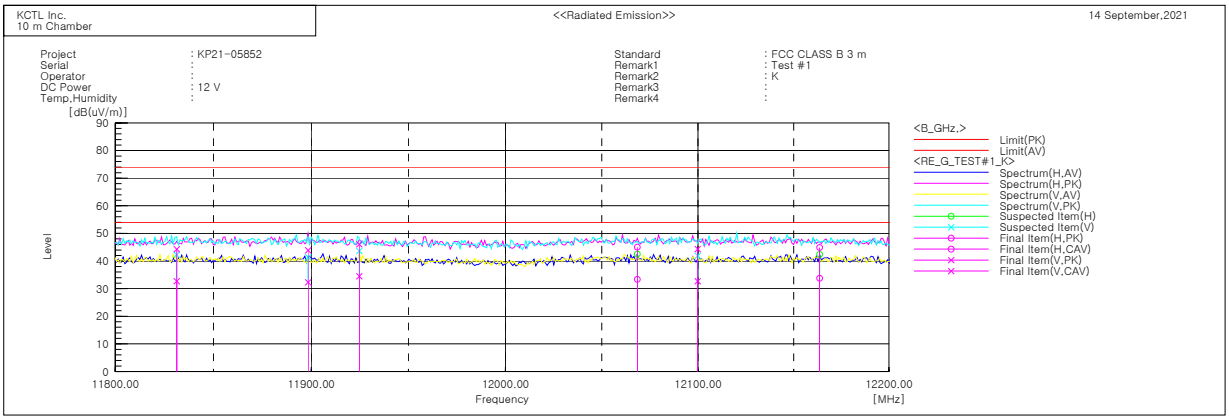
11.7 GHz ~ 12.2 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	11839.710	V	33.3	21.9	11.3	44.6	33.2	74.0	54.0	29.4	20.8	228.0	193.0
2	11884.790	H	33.8	22.2	11.2	45.0	33.4	74.0	54.0	29.0	20.6	101.0	9.0
3	12050.550	V	33.7	22.0	11.8	45.5	33.8	74.0	54.0	28.5	20.2	123.0	38.0
4	12073.500	H	34.0	22.3	12.0	46.0	34.3	74.0	54.0	28.0	19.7	172.0	242.0
5	12090.500	V	33.4	21.7	12.1	45.5	33.8	74.0	54.0	28.5	20.2	295.0	114.0
6	12174.660	V	34.2	22.6	11.7	45.9	34.3	74.0	54.0	28.1	19.7	137.0	340.0

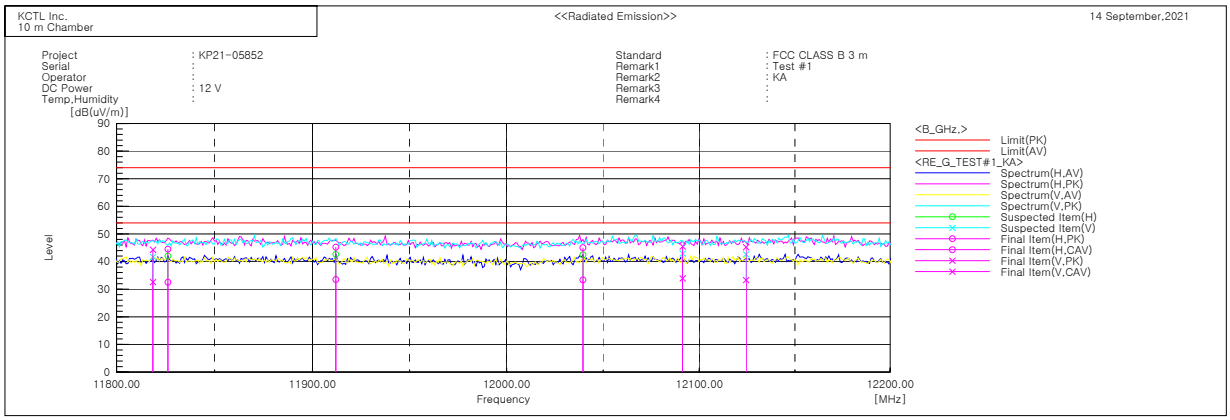
11.7 GHz ~ 12.2 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	11831.260	V	33.0	21.4	11.3	44.3	32.7	74.0	54.0	29.7	21.3	126.0	45.0
2	11898.390	V	32.8	21.2	11.1	43.9	32.3	74.0	54.0	30.1	21.7	267.0	152.0
3	11924.750	V	35.3	23.7	10.8	46.1	34.5	74.0	54.0	27.9	19.5	279.0	73.0
4	12068.400	H	33.1	21.5	11.9	45.0	33.4	74.0	54.0	29.0	20.6	138.0	16.0
5	12099.850	V	32.2	20.5	12.2	44.4	32.7	74.0	54.0	29.6	21.3	160.0	252.0
6	12163.610	H	33.0	21.9	11.9	44.9	33.8	74.0	54.0	29.1	20.2	156.0	274.0

11.7 GHz ~ 12.2 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	11818.490	V	33.0	21.3	11.3	44.3	32.6	74.0	54.0	29.7	21.4	363.0	83.0
2	11826.140	H	33.2	21.2	11.3	44.5	32.5	74.0	54.0	29.5	21.5	119.0	252.0
3	11911.990	H	34.2	22.5	11.0	45.2	33.5	74.0	54.0	28.8	20.5	195.0	354.0
4	12039.500	H	33.3	21.7	11.7	45.0	33.4	74.0	54.0	29.0	20.6	200.0	123.0
5	12091.350	V	33.4	21.8	12.1	45.5	33.9	74.0	54.0	28.5	20.1	285.0	132.0
6	12124.500	V	33.1	21.2	12.1	45.2	33.3	74.0	54.0	28.8	20.7	256.0	193.0