

Electromagnetic Emission

FCC MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT : RADAR DETECTOR
MODEL/Serial No. : Radar Receiver 44707 / NONE
FCC ID : W75-M2K-Y24
BRAND NAME : K40
APPLICANT : ATTOWAVE CO., LTD.
1005, 10F Leader's Tower, 60-15 Gasan-dong,
Gumchun-gu, Seoul, 153-801 Korea
Attn. : Hyun Joo, Cho / Director
MANUFACTURER : ATTOWAVE CO., LTD.
1005, 10F Leader's Tower, 60-15 Gasan-dong,
Gumchun-gu, Seoul, 153-801 Korea
FCC CLASSIFICATION : Unintentional Radiators
Radar Detector – CRD
RULE PART(S) : FCC Part 15 Subpart B
FCC PROCEDURE : ANSI C63.4-2003
TEST REPORT No. : ETLE090317.03
DATES OF TEST : March 20, 2009
REPORT ISSUE DATE : March 26, 2009
TEST LABORATORY : ETL Inc. (FCC Designation Number : KR0022)

This RADAR DETECTOR, Model Radar Receiver 44707 has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the ETL Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart B:
I attest to the accuracy of data. All measurement herein was performed by me or was made under my supervision and is correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



Yo Han, Park / Chief Engineer

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FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name	: ATTOWAVE CO., LTD.
Address	: 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801 Korea
Attention	: Hyun Joo, Cho / Director

- **EUT Type :** RADAR DETECTOR
- **Model Number :** Radar Receiver 44707
- **FCC ID :** W75-M2K-Y24
- **S/N :** NONE
- **Frequency Range :** X Band → 10.525 GHz; K Band → 24.150 GHz;
Ka Band → 33.800 GHz ~ 36.000 GHz
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-2003
- **FCC Classification :** Unintentional Radiators
Radar Detector (CRD)
- **Dates of Tests :** March 20, 2009
- **Place of Tests :** ETL Inc. Testing Lab.

Radiated Emission test;
#499-1, Sagot-ri, Seosin-myeon, Hwaseong-si,
Gyeonggi-do, 445-882, Korea
- **Conducted Emission test;**
ETL Inc. Testing Lab.
371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
- **Test Report No. :** ETLE090317.03

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1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the ETL Inc. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 m and 10 m site configurations. Detailed description of test facility was found to be in compliance with FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (FCC Designation Number : KR0022).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions from the ATTOWAVE CO., LTD. Model: Radar Receiver 44707

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the ATTOWAVE CO., LTD. (model: Radar Receiver 44707)

2.2 General Specification

General	
Operating Temperature Range	-10 °C to +75 °C
Storage Temperature Range	-30 °C to +100 °C
Power requirements	12 V to 15 V DC, 300 mA, negative ground
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 K Band: 24.150 GHz Ka Band (Super-wide): 33.800 GHz – 36.000 GHz

3. DESCRIPTION OF TESTS

3.1 Radiated Emission Measurement

Radiated emission measurements were made in accordance with section 12, "Measurement of unintentional radiators other than ITE" of ANSI C63.4-2003. The measurements were performed over the frequency range of 11.7 GHz to 12.2 GHz using antenna as the input transducer to a spectrum analyzer. The measurements were made with the detector set for "peak" within a bandwidth of 1 MHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determined the frequency producing the maximum emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from Above 1 GHz; linearly polarized double ridge horn antennas were used. Final measurements were made open site at 3 m. A search was made of spectrum from 11.7 GHz to 12.2 GHz the measurements indicate that the unit meets the FCC requirements. Measurements in the 11.7 GHz to 12.2 GHz band were made with a Standard Gain Horn. The measurements in the 11.7 GHz to 12.2 GHz band represent the ambient noise levels. The attached plots were made with peak detector with the analyzer in a maximum hold for 2 minutes. The test equipment was laced on a wooden turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8 m high nonmetallic 1 m x 1.5 m table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner and which tends to maximize its emission level in a typical application.

4.2 EUT operation

- The EUT was connected as user's guide. And during the test executed EUT is operating on the following:
Band: 10.525 GHz (X Band); 24.150 GHz (K Band); 33.800 GHz – 36.000 GHz (Ka Band)

Operating Mode
Stand-by mode
10.525 GHz (X Band)
24.150 GHz (K Band)
33.800 GHz – 36.000 GHz (Ka Band)

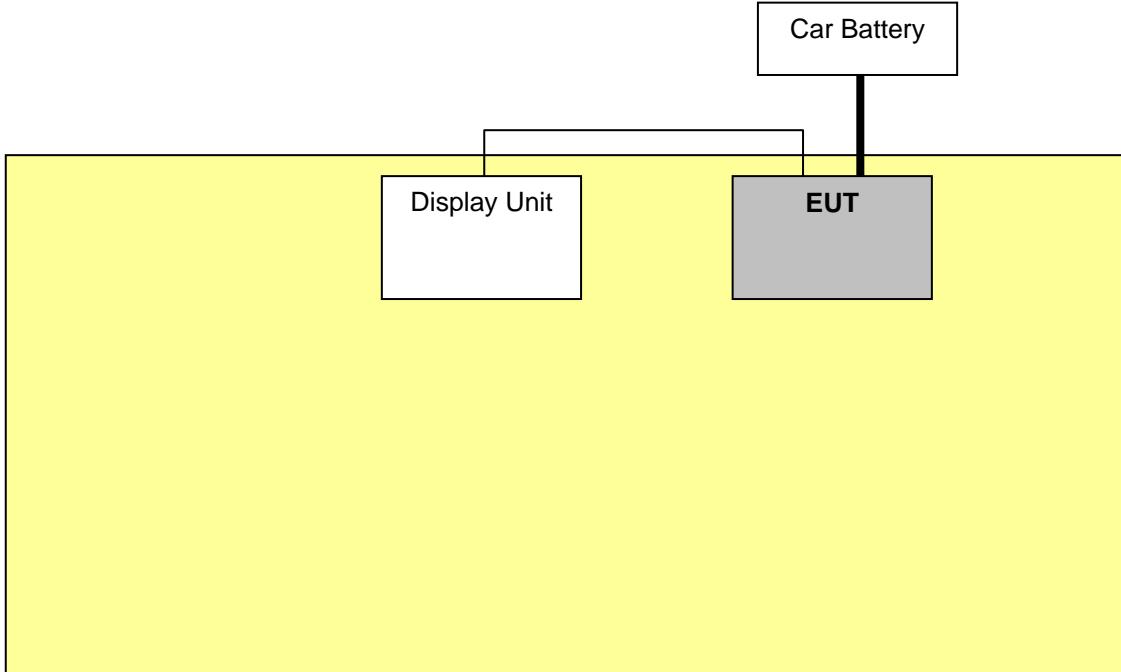
4.3 Support Equipment Used

Description	Model Name	Serial No.	Manufacturer
Display Unit	NONE	NONE	ATTOWAVE CO., LTD.

4.4 Type of Cables Used

Device from	Device to	Type of I/O port	Length(m)	Type of shield
EUT	Display Unit	Line	1.5	Unshielded
EUT	Car Battery	DC Input	2.0	Unshielded

4.5 The setup drawing(s)



_____ : Data Line

_____ : Power Line(DC Power Line)

5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule	Measurement Required	Result
15.109(h)	Radiated Emission Measurement	No Signal Detected

The data collected shows that the **ATTOWAVE CO., LTD. / RADAR DETECTOR / Radar Receiver 44707** complied with technical requirements of above rules part 15.109(h).

The equipment is modified anything, mechanical or circuits to improve EMI status during a measurement. EMI suppression device(s) was added and/or modified during testing.

5.2 Radiated Emissions Measurement

EUT	RADAR DETECTOR / Radar Receiver 44707 (S/N: N/A)						
Limit apply to	FCC Part 15.109(h)						
Test Date	March 20, 2009						
Operating Condition	Operating on the following Bands (X, K, Ka bands)						
Result	Passed						

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical. Detector mode: Peak mode (Bandwidth: 1 MHz)

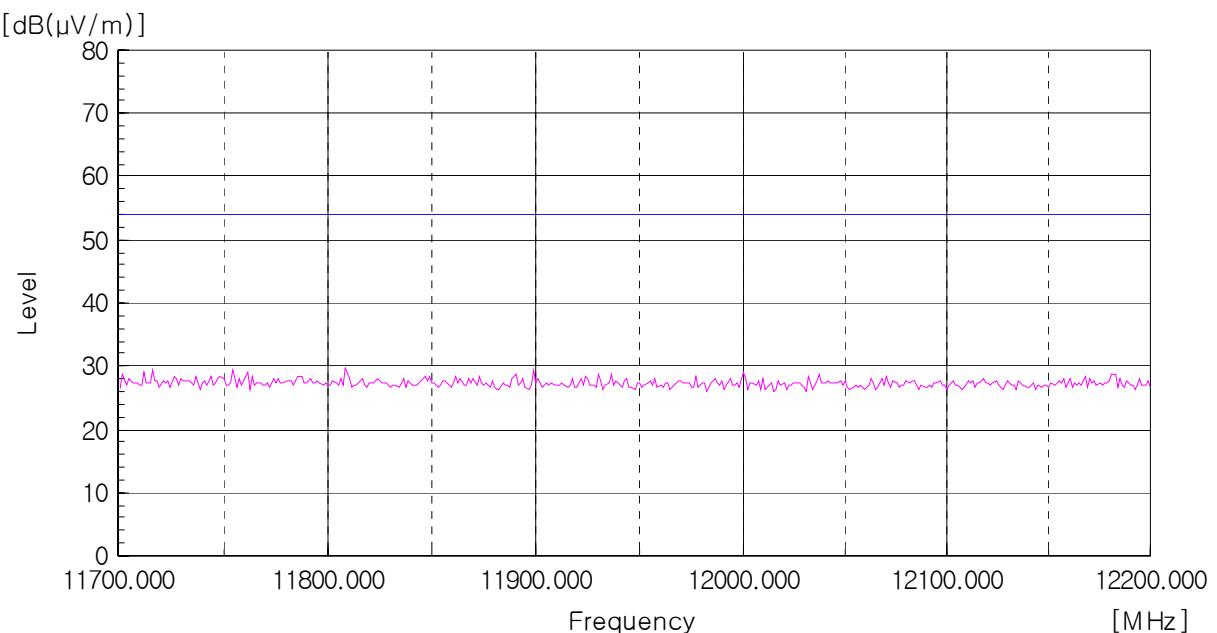
Frequency [MHz]	Reading [dB μ V]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
	No Signal Detected						

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin value = Limit – Result
4. The measurement was performed for the frequency range 11.7 GHz – 12.2 GHz according to FCC Part 15.109(h).
5. No signal detected of 11.7 GHz – 12.2 GHz, Refer to plot data



Test Engineer: Kug Kyoung, Yoon

Plot data (Radiated Emissions Measurement of 11.7 GHz – 12.2 GHz)

6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

$$dB(\mu V) = 20 \log_{10} (uV) : \text{Equation}$$

Example : @ MHz

$$\text{Class B Limit} = \text{dBuV/m}$$

$$\text{Reading} = \text{dBuV}$$

$$\text{Antenna Factor + Cable Loss} = + = \text{dBuV/m}$$

$$\text{Total} = \text{dBuV/m}$$

$$\text{Margin} = - = \text{dB}$$

$$= \text{dB below Limit}$$



FCC TEST REPORT

7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
<input checked="" type="checkbox"/>	Spectrum Analyzer	E7405A	H.P	US41160290	09.10.02
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	Schwarzbeck	227	11.03.15
<input checked="" type="checkbox"/>	Turn-Table	MFT-120S	Max-Full Antenna Corp	-	N/A
<input checked="" type="checkbox"/>	Antenna Master	MFA-440E	Max-Full Antenna Corp	-	N/A