Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	RADAR DETECTOR
MODEL/TYPE NO	:	RMR-D240
FCC ID	:	QKK-D10
APPLICANT	:	Rocky Mountain Radar 6469 Doniphan Drive EL Paso TX79932 Attn.: Mike Churchman / President
Manufacturer	:	ATTOWAVE 1005, 10F Leader's Tower 60-15, Gasan-dong, Gumchun-gu, Seoul, 153-801, Korea
FCC CLASSIFICATION	:	Part 15 Subpart B Unintentional Radiators Radar Detector – CRD
FCC RULE PART(S)	:	FCC Part 15 Subpart B
FCC PROCEDURE	:	Certification
TRADE NAME	:	Rocky Mountain Radar
TEST REPORT No.	:	E05.1123.FCC.730N
DATES OF TEST	:	November 16 – 23, 2005
DATES OF ISSUE	:	November 23, 2005
TEST LABORATORY	:	ETL Inc. (FCC Registration Number : 95422) #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea Tel : 82-31-885-0072 Fax : 82-31-885-0074

This RADAR DETECTOR, Model RMR-D240 has been tested in accordance with the measurement procedures specified in ANSI C63.4-2001 at the ETL/EMC 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 were performed by me or were made under my supervision and are 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.

Hyung Seok, Lee / Chief Engineer

ETL Inc.

#584 Sangwhal-ri, Kanam-myon, Yoju-kun,
Kyounggi-do, 469-885, Korea

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Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-803, Korea / Tel : 82-2-858-0786, Fax : 82-2-858-0788
EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

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 : Rocky Mountain Radar

Address : 6469 Doniphan Drive EL Paso TX79932

Attention : Mike Churchman / President

- **EUT Type :** RADAR DETECTOR
- **Model Number :** RMR-D240
- **FCC ID :** QKK-D10
- **S/N :** N/A
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-2001
- **FCC Classification :** Part 15 Unintentional Radiators
  Radar Detector (CRD)
- **Dates of Tests :** November 16 – 23, 2005
  ETL Inc.
  EMC Testing Lab (FCC Registration Number : 95422)
- **Place of Tests :** 584, Sangwhal-Ri, Kanam-Myun, Yoju-Kun,
  Kyounggi-Do, Korea
  Tel : 82-31-885-0072 Fax : 82-31-885-0074
- **Test Report No. :** E05.1123.FCC.730N

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1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2001 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-2001 and registered to the Federal Communications Commission(Registration Number : 95422).

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 C.63.4-2001) was used in determining radiated and conducted emissions from the Rocky Mountain Rader Model: RMR-D240

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2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Rocky Mountain Radar, RADAR DETECTOR, RMR-D240

2.2 General Specification

- Chassis Type : Plastic Cover
- List of Each OSC. Or X-Tal. Freq. (>=1MHz) : X-Tal: 8.00 MHz

• General

Operating temperature range: -20°C to +70°C
Storage temperature range: -30°C to +100°C
Power requirements: 12 V to 15 V DC, 80 mA, negative ground
Dimensions: 1.1” H x 2.5” W x 3.6” L
Weight: 2.2 ounces

• Laser Detector

Receiver Type	Pulsed laser signal receiver
Detector Type	Digital signal processor pulse width discriminator
Optical sensor	Dual convex condenser lens and high speed photo diode detector, 800 – 1100 nanometers(nm)

• Radar Detector

Receiver Type	Dual conversion super-heterodyne
Antenna Type	Linear polarized, self-contained
Detector Type	Scanning Frequency Discriminator
Frequency of Operation	X-band, 10.525 GHz ± 50 MHz K-band, 24.150 GHz ± 100 MHz Ka-band(super-wide), 34.700 GHz ± 1.300 MHz

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3. DESCRIPTION OF TESTS

3.1 Radiated Emission Measurement

Radiated emission measurements were in accordance with § 12.2 in ANSI C63.4-2001 "measurement of information technology equipment ". The measurements were performed over the frequency range of 30 MHz to 1 GHz and 11.7 to 12.2 GHz using antenna as the input transducer to a spectrum analyzer or a field intensity meter. The measurements were made with the detector set for "Quasi-peak" within a bandwidth of 120 kHz or 1 MHz.

- Procedure of Test

Preliminary measurements were made at 3 meter using broadband antennas, and spectrum analyzer to determined the frequency producing the max 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 30 to 1000 MHz using SchwarzBeck Log-Bicon antenna. Above 1 GHz, linearly polarized double Schwarz Beck broad-band horn antennas were used. Final measurements were made open site at 3-meters. A search was made of spectrum from 30 to 1000MHz and from 11.7 to 12.2 GHz the measurements indicate that the unit meets the FCC requirements. Measurements in the 11.7 to 12.2 GHz band were made with a Standard Gain Horn. The measurements in the 11.7 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 placed 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 1MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the max. Emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter 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 to 4 meters and stopped at the azimuth or height producing the max 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.

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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 following conditions and configurations were used.

4.2 EUT operation

The EUT was connected as user`s guide. And during the test executed EUT is operating on the following Bands: 10.525 GHz ± 50 MHz (X-Band), 24.150 GHz ± 100 MHz (K-Band),
34.700 GHz ± 1.300 MHz (Ka-Band(super-wide))

Operating Mode	The worst operating condition
Stand-by mode	X
10.525 GHz ± 50 MHz (X-Band),	X
24.150 GHz ± 100 MHz (K-Band)	◎
34.700 GHz ± 1.300 MHz (Ka-Band(super-wide))	X

◎: Worst case investigated during the test.

4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT – RADAR DETECTOR

FCC ID	: QKK-D10
Model Name	: RMR-D240
Serial No.	: N/A
Manufacturer	: ATTOWAVE
Power Supply Type	: Supplied from vehicle cigarette lighter
Power Cord	: Non-shielded, Detachable: 0.5m of Light Jack
Data Cable	: External

Support unit 1 – DC Power Supply (HANYOUNG)

FCC ID	: N/A
Model Name	: HYP-3030
Serial No.	: N/A
Manufacturer	: HANYOUNG
Power Supply Type	: Linear
Power Cord	: Non-Shielded, Detachable, 1.2m
Data Port	: N/A

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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.

Test Rule Parts	Measurement Required	Result
15.109(h)	Radiated emissions measurement	**No Signal Detected**

The data collected shows that the **Rocky Mountain Radar / RADAR DETECTOR / RMR-D240** complies with technical requirements of above rules part 15.109(h).

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement.
No EMI suppression device(s) was added and/or modified during testing.

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5. TEST RESULTS

5.2 Radiated Emissions Measurement of 11.7 - 12.2 GHz

EUT	RADAR DETECTOR / RMR-D240 (SN: N/A)
Limit apply to	FCC Part 15. 109(h)
Test Date	November 17, 2005
Operating Condition	Operating on the following Bands (X,K & Ka bands)
Environment Condition	Humidity Level: 32 %RH, Temperature: 11 ℃
Result	No signal detected

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (6dB Bandwidth : 1 MHz)

Frequency [MHz]	Reading [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]
		No signal detected					

NOTES :*** H : Horizontal polarization , ** V : Vertical polarization**

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

Jae Young. Kwon

Test Engineer: Jae Young, Kwon

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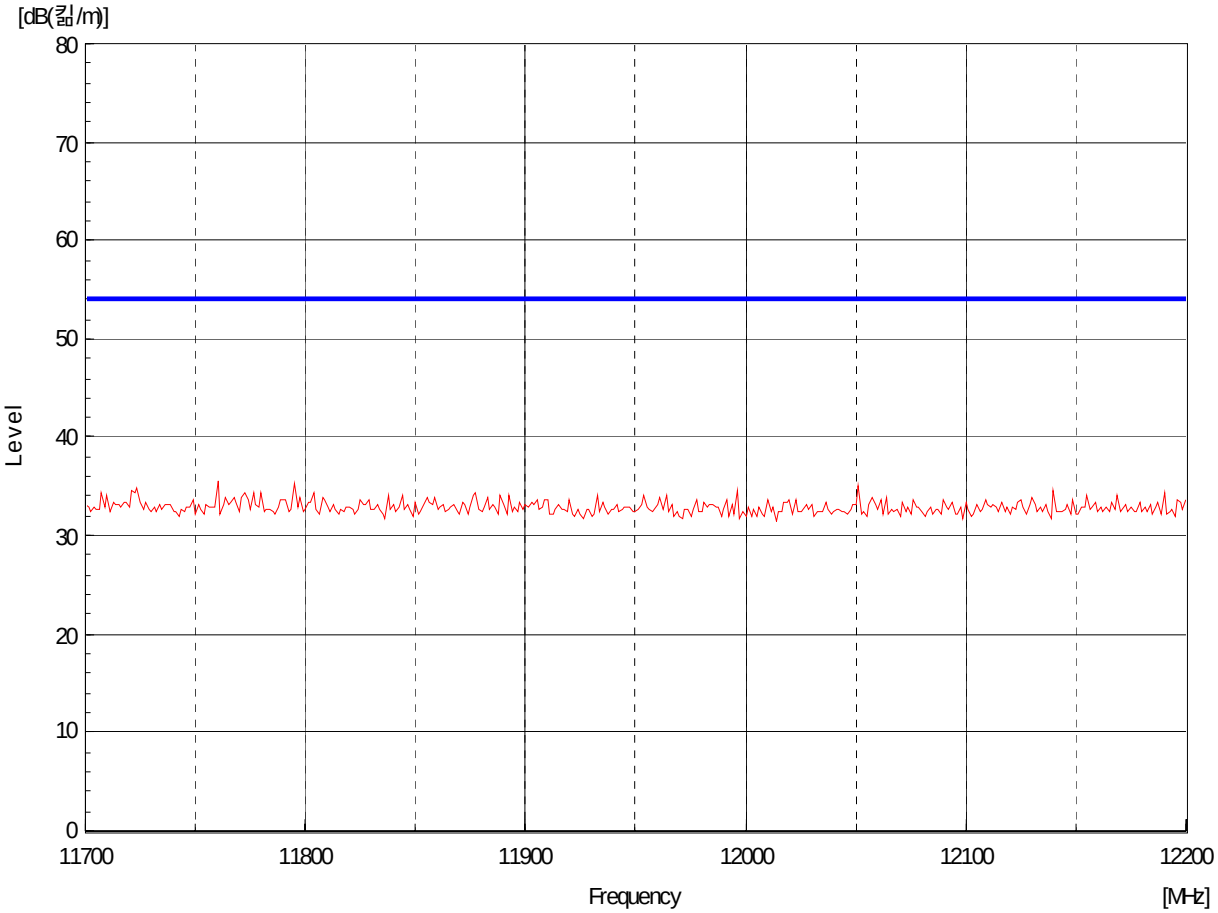
Plot data (Radiated Emissions Measurement of 11.7 ~ 12.2 GHz)



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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

$dB(\mu V/m) = 20 \log_{10} (\mu V /m)$: Equation 1
$dB\mu V = dBm + 107$: Equation 2

(No signal detected of 11.7 GHz - 12.2 GHz, Refer to plot data)

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7. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
☒	Spectrum Analyzer	E7405A	H.P	US41160290	06-10-18
☐	Spectrum Analyzer	R3261A	Advantest	21720033	06-10-18
☐	Receiver	ESVS 10	R & S	835165/001	06-04-07
☐	EMI TEST Receiver	ESHS30	Rohde & Schwarz	0401901/002	06-07-01
☐	Preamplifier	HP 8347A	HP	2834A00544	06-04-07
☐	LISN	3825/2	EMCO	9006-1669	06-04-06
☐	LISN	3825/2	EMCO	9208-1995	06-04-07
☐	TriLog Antenna	VULB9160	Schwarz Beck	3082	06-07-27
☐	LogBicon	VULB9165	Schwarz Beck	2023	06-07-05
☐	Dipole Antenna	VHAP	Schwarz Beck	964	06-06-24
☐	Dipole Antenna	VHAP	Schwarz Beck	965	06-07-05
☐	Dipole Antenna	UHAP	Schwarz Beck	949	06-06-24
☐	Dipole Antenna	UHAP	Schwarz Beck	950	06-07-05
☒	Broad-band Horn Antenna	BBHA 9120D	Schwarz Beck	227	06-04-04
☒	Turn-Table	DETT-03	Daeil EMC	-	N/A
☒	Antenna Master	DEAM-03	Daeil EMC	-	N/A
☐	Plotter	7440A	H.P	2725A 75722	N/A
☐	Chamber	DTEC01	DAETONG	-	N/A
☒	Thermo Hygrograph	3-3122	ISUZU	3312201	06-04-13
☐	BaroMeter	-	Regulus	-	06-03-15

End of test report

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