# MEASUREMENT REPORT

## FCC PART15.245 / RSS-210 Issue 9

| | |
|---|---|
| **FCC ID:** | JE4RK200DTG3 |
| **IC:** | 6564A-RK200DTG3 |
| **APPLICANT:** | RISCO LTD. |

| | |
|---|---|
| **Application Type:** | Certification |
| **Product:** | Ind. LuNAR DT AM G3 |
| **Model No.:** | RK200DTG3 |
| **Brand Name:** | RISCO |
| **FCC Classification:** | Part 15 Field Disturbance Sensor (FDS) |
| **FCC Rule Part(s):** | FCC PART15.245 |
| **IC Rule(s):** | RSS-210 Issue 9, RSS-Gen Issue 5 |
| **Test Procedure(s):** | ANSI C63.10-2013 |
| **Test Date:** | August 10 ~ 14, 2018 |

Reviewed By : Sunny Sun
(Sunny Sun)

Approved By : Robin Wu
( Robin Wu )

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 1808RSU008-U1 | Rev. 01 | Initial Report | 08-23-2018 | Valid |
| | | | | |

# CONTENTS

## §2.1033 General Information

| | |
|---|---|
| **Applicant:** | RISCO LTD. |
| **Applicant Address:** | 14 Hachoma Street,Rishon Lezion,75655,Israel |
| **Manufacturer:** | RISCO LTD. |
| **Manufacturer Address:** | Sderot Yahalom 6 Kiryat Gat, Israel |
| **Test Site:** | MRT Technology (Suzhou) Co., Ltd |
| **Test Site Address:** | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |
| **FCC Registration No.:** | 893164 |
| **IC Registration No.:** | 11384A |
| **Test Device Serial No.:** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |

### Test Facility / Accreditations

**Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.**

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

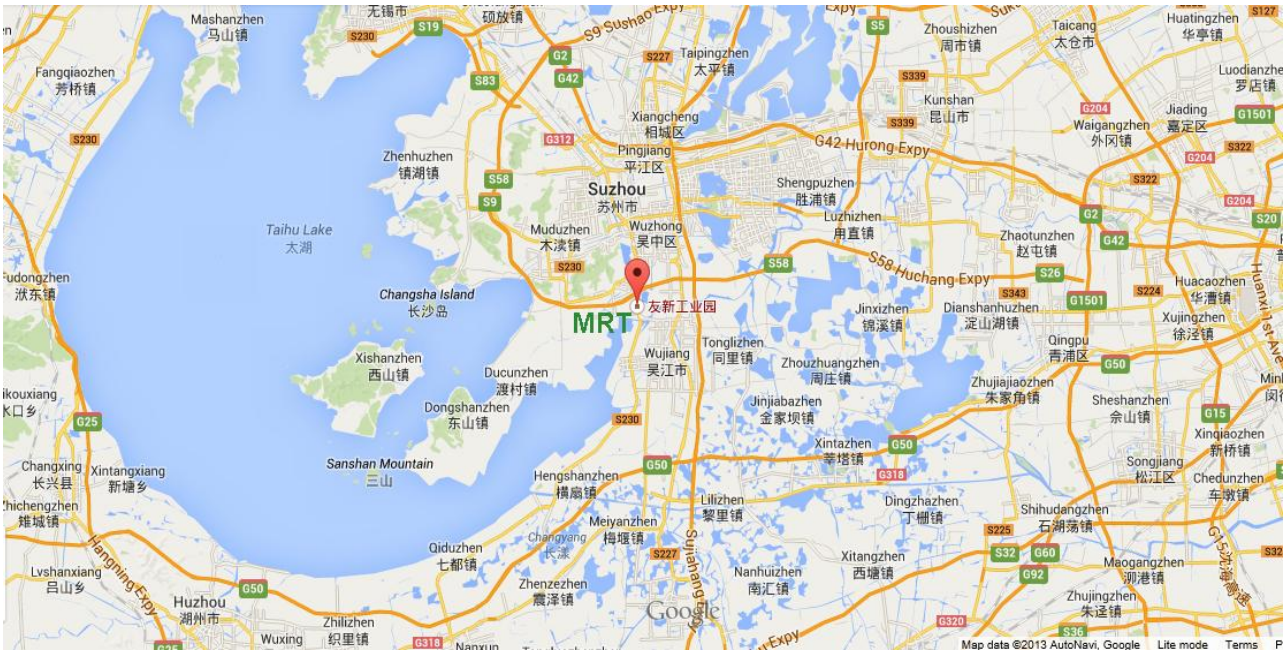
# 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



# 2. PRODUCT INFORMATION

## 2.1. Equipment Description

| | |
|---|---|
| Product Name | Ind. LuNAR DT AM G3 |
| Model No. | RK200DTG3 |
| Transmitting Frequency | 10.525GHz |
| Modulation | CW |
| Operation Voltage | DC 12V |
| PCB P/N | 1PC200DTG300H<br>1PCCAV030000E (MW Module) |
| HW Version | A<br>B(MW Module) |
| SW Version | V28 |
| MW Module | 1CAV006 |
| Antenna Type | Printed Antenna |
| Antenna Gain | 0dBi |

## 2.2. Test Mode

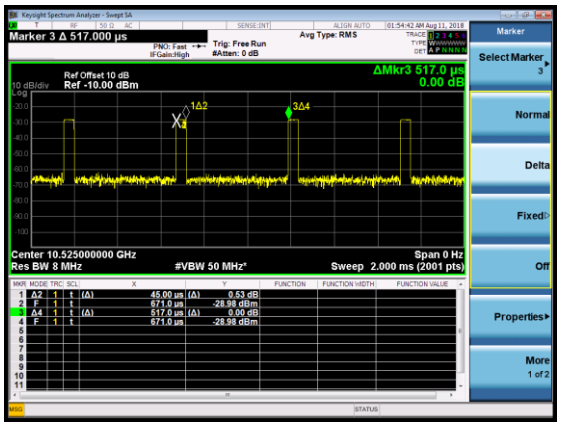
| | |
|---|---|
| Test Mode | Mode 1: Transmit by 10.525GHz |

## 2.3. Description of Test Software

The test utility software used during testing was engineering directive ordered by applicant.

## 2.4. Duty Cycle

| Test Mode | Duty Cycle |
|---|---|
| 10.525GHz | 8.70% |

| 10.525GHz | -- |
|---|---|
|  | -- |

## 2.5. Test Configuration

The device was tested per the guidance of FCC Part 15.245 and ANSI 63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

## 2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.7. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

(i) prior to marketing in Canada, for products manufactured in Canada

(ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014–DRS1003. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

# 3. DESCRIPTION of TEST

## 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the requirement provided in FCC Part 15.245 were used in the measurement of the EUT.

**Deviation from measurement procedure…….....None**

## 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

# 4. ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **Ind. LuNAR DT AM G3** is **permanently attached.**
- There are no provisions for connection to an external antenna.

**Conclusion:**

The unit complies with the requirement of §15.203.

# 5. TEST EQUIPMENT CALIBRATION DATA

Radiated Emission - AC1

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| PXA Signal Analyzer | Keysight | 9030B | MRTSUE06395 | 1 year | 2018/09/13 |
| EMI Test Receiver | R&S | ESR7 | MRTSUE06001 | 1 year | 2018/08/14 |
| | | | | | 2019/08/14 |
| Loop Antenna | Schwarzbeck | FMZB 1519 | MRTSUE06025 | 1 year | 2018/11/20 |
| EXA Signal Analyzer | Agilent | N9020A | MRTSUE06106 | 1 year | 2019/04/20 |
| Microwave System Amplifier | Agilent | 83017A | MRTSUE06076 | 1 year | 2018/11/17 |
| Bilog Period Antenna | Schwarzbeck | VULB 9168 | MRTSUE06172 | 1 year | 2018/11/18 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA9120D | MRTSUE06023 | 1 year | 2018/10/21 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9170 | MRTSUE06024 | 1 year | 2018/12/14 |
| Micro-Wave Antenna | MI-WWAVE | 261U-25 | MRTSUE06273 | 1 year | 2018/12/26 |
| Waveguide Harmonic Mixer | Keysight | M1970V | MRTSUE06271 | 1 year | 2018/12/26 |
| Amplifier | Schwarzbeck | BBV 9721 | MRTSUE06121 | 1 year | 2019/06/13 |
| DC Power Supply | GWINSTEK | DPS-99306D | MRTSUE06063 | 1 year | N/A |
| Hygrothermograph | Testo | 608-H1 | MRTSUE06403 | 1 year | 2018/08/14 |
| | | | | | 2019/08/14 |
| Anechoic Chamber | TDK | Chamber-AC1 | MRTSUE06212 | 1 year | 2019/05/02 |

# 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

| Radiated Emission Measurement - AC1 |
| --- |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>9kHz ~ 1GHz: 4.18dB<br>1GHz ~ 40GHz: 4.76dB |

# 7. TEST RESULT

## 7.1. Summary

**Company Name:** **RISCO LTD.**

**FCC ID:** **JE4RK200DTG3**

**IC:** **6564A-RK200DTG3**

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 15.215(c) | Occupied Bandwidth | N/A | Radiated | Pass | Section 7.2 |
| 15.209<br>15.245 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | | Pass | Section 7.3 & 7.4 |
| 15.207 | AC Conducted Emissions 150kHz - 30MHz | < FCC 15.207 limits | Line Conducted | N/A | Section 7.5 |

| RSS Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| RSS-Gen Clause 6.7 | Occupied Bandwidth | N/A | Radiated | Pass | Section 7.2 |
| RSS-Gen Clause 8.9, RSS-210 Annex F.1 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in clause 8.10 | | Pass | Section 7.3 & 7.4 |
| RSS-Gen Clause 8.8 | AC Conducted Emissions 150kHz - 30MHz | < RSS-Gen Clause 8.8 limits | Line Conducted | N/A | Section 7.5 |

**Notes:**

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 7.2. 99% Bandwidth Measurement

### 7.2.1. Test Limit

N/A

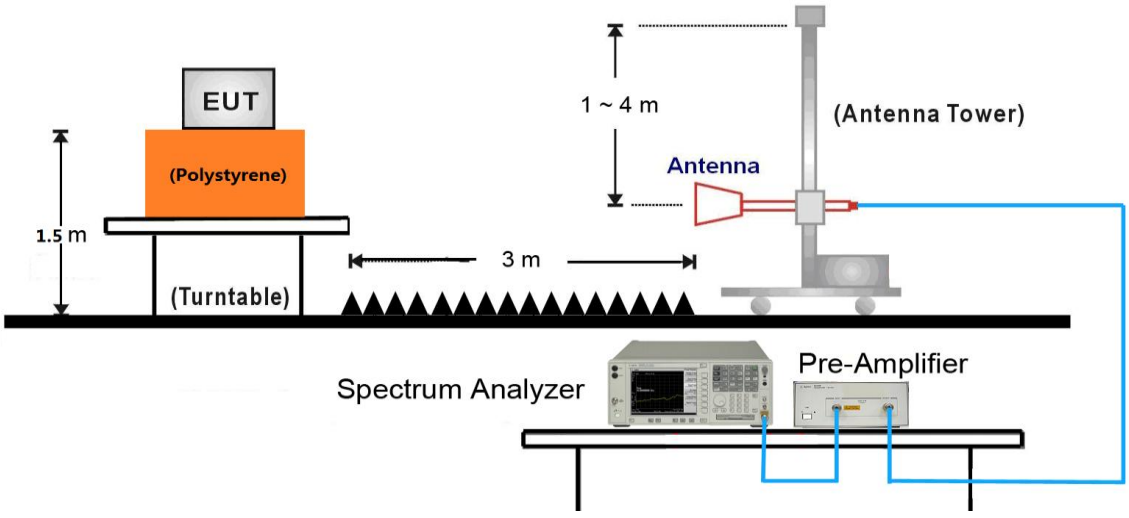
### 7.2.2. Test Procedure used

ANSI C63.10 Section 6.9

### 7.2.3. Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 99% bandwidth measurement. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% to 5% of the OBW.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

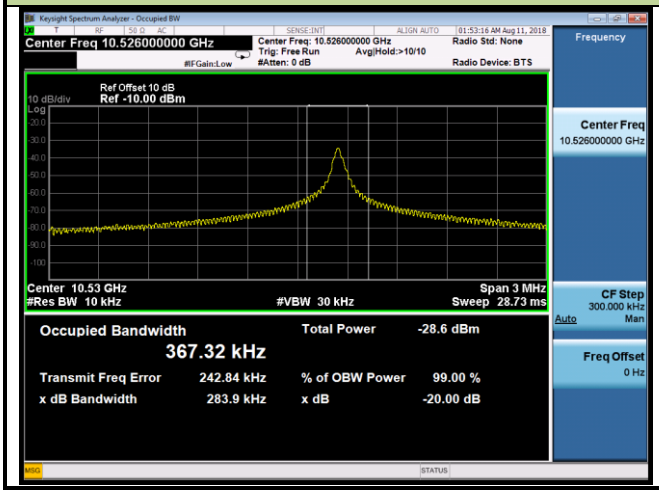
### 7.2.4. Test Setup



### 7.2.5. Test Result

| | | | |
|---|---|---|---|
| Product | Ind. LuNAR DT AM G3 | Temperature | 24°C |
| Test Engineer | Flag Yang | Relative Humidity | 54% |
| Test Site | AC1 | Test Date | 2018/08/11 |

| Frequency (GHz) | 99% Bandwidth (KHz) |
|---|---|
| 10.525 | 367.32 |

| 99% Occupied Bandwidth | |
|---|---|
| 10.525GHz | -- |
|  | -- |

## 7.3. Radiated Emission

### 7.3.1.Test Limit

| FCC Part 15 Subpart C Paragraph 15.245 & RSS 210 | | |
|---|---|---|
| Fundamental frequency (MHz) | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (millivolts/meter) |
| 902 ~ 928 | 500 | 1.6 |
| 2435 ~ 2465 | 500 | 1.6 |
| 5785 ~ 5815 | 500 | 1.6 |
| 10500 ~ 10550 | 2500 | 25.0 |
| 24075 ~ 24175 | 2500 | 25.0 |

Note 1: Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in § 15.209. Harmonic emissions in the restricted bands at and above 17.7GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in § 15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

Note 2: 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 §15.209, whichever is the lesser attenuation.

Note 3: Field strength limits are specified at a distance of 3 meters.

Note 4: The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

| FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen | | |
|---|---|---|
| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 80 | 100** | 3 |
| 80 ~ 216 | 150** | 3 |
| 216 ~ 960 | 200** | 3 |
| Above 960 | 500 | 3 |
| Note 1: The lower limit shall apply at the transition frequency.<br>Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.<br>Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m). | | |

### 7.3.2.Test Procedure used

ANSI C63.10 Section 6.6

### 7.3.3.Test Procedure

**Peak Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Table 1 - RBW as a function of frequency**

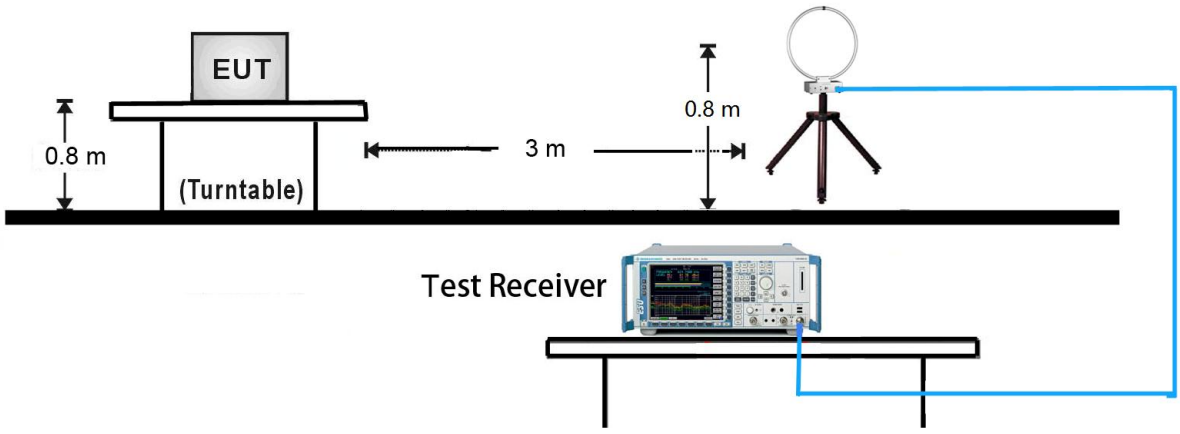
| Frequency | RBW |
|---|---|
| 9 ~ 150 kHz | 200 ~ 300 Hz |
| 0.15 ~ 30 MHz | 9 ~ 10 kHz |
| 30 ~ 1000 MHz | 100 ~ 120 kHz |
| > 1000 MHz | 1 MHz |

**Average Field Strength Measurements**

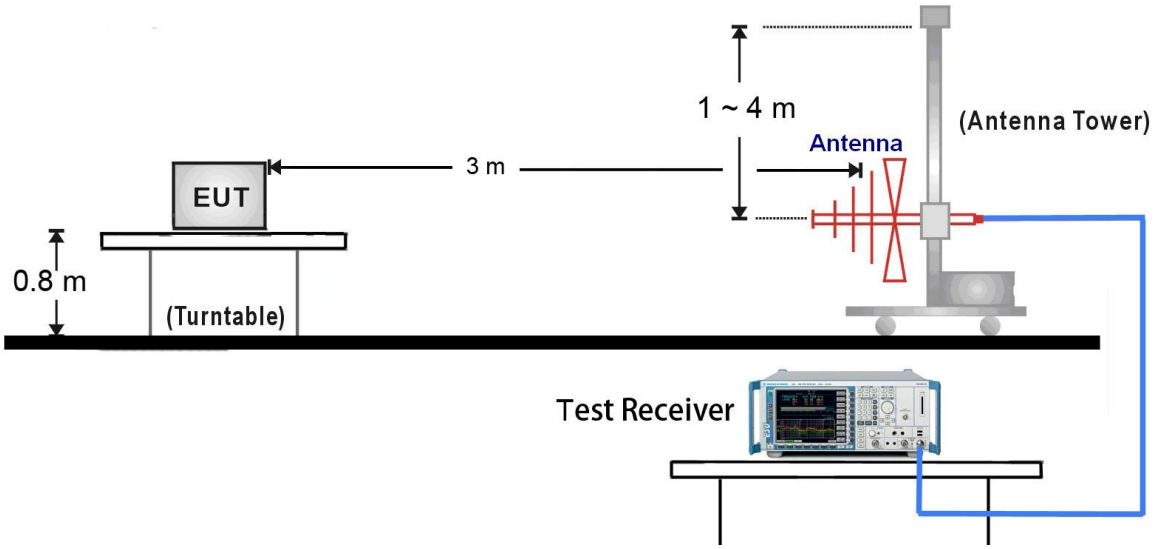
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

### 7.3.4.Test Setup

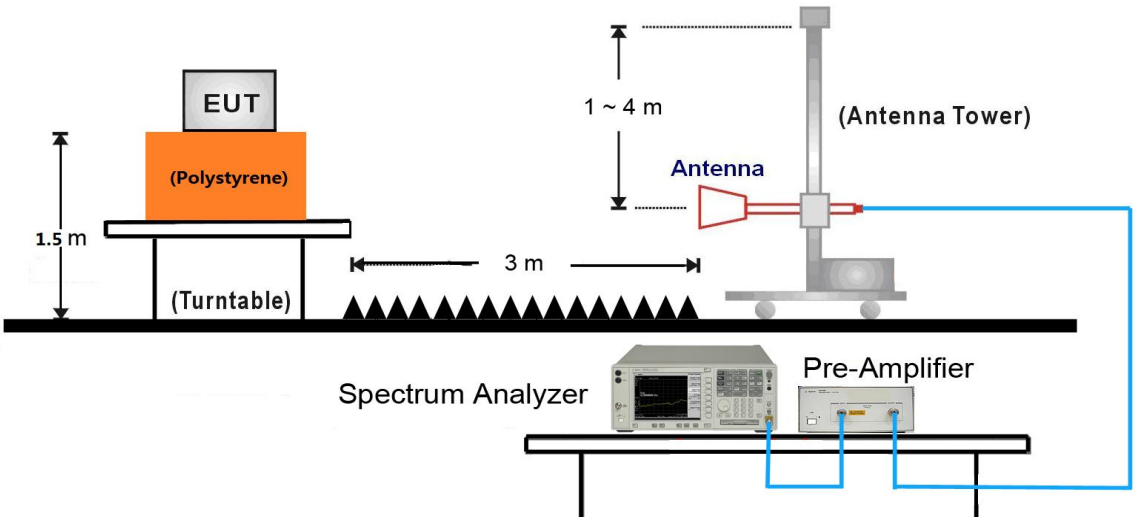
9kHz ~ 30MHz Test Setup:



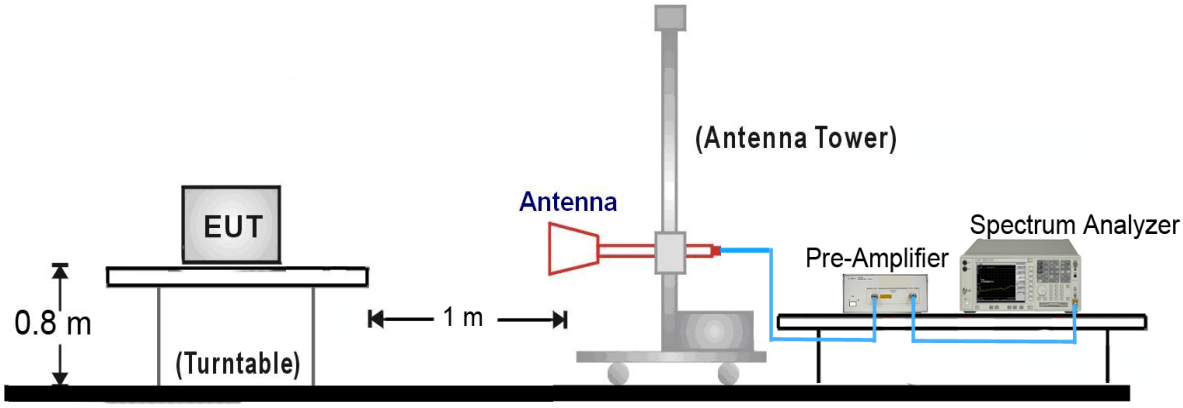
30MHz ~ 1GHz Test Setup:




1GHz ~ 40GHz Test Setup:




40GHz ~ 60GHz Test Setup:



### 7.3.5.Test Results

| Product | Ind. LuNAR DT AM G3 | Temperature | 23°C |
|---|---|---|---|
| Test Engineer | Flag Yang | Relative Humidity | 54% |
| Test Site | AC1 | Test Date | 2018/08/11 |
| Remark: | **Fundamental** Radiated Emission | | |

| Frequency (GHz) | Reading Level (dBμV) | Factor (dB) | Measure Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|
| 10.525 | 78.9 | 17.6 | 96.5 | 148.0 | -51.5 | Peak | Horizontal |
| | 78.5 | 17.6 | 96.1 | 128.0 | -31.9 | Average | Horizontal |
| | 84.8 | 17.6 | 102.4 | 148.0 | -45.6 | Peak | Vertical |
| | 84.1 | 17.6 | 101.7 | 128.0 | -26.3 | Average | Vertical |
| Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)<br>Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) | | | | | | | |

| Product | Ind. LuNAR DT AM G3 | Temperature | 23°C |
|---|---|---|---|
| Test Engineer | Flag Yang | Relative Humidity | 54% |
| Test Site | AC1 | Test Date | 2018/08/11 |
| Remark: | **Harmonics** Radiated Emission | | |

| Mark | Frequency (MHz) | Reading Level (dBμV) | Factor (dB) | Measure Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|
| | 2317.5 | 42.0 | -0.6 | 41.4 | 74.0 | -32.6 | Peak | Horizontal |
| | 2317.5 | 29.4 | -0.6 | 28.8 | 54.0 | -25.2 | Average | Horizontal |
| | 3839.0 | 37.5 | 2.8 | 40.3 | 74.0 | -33.7 | Peak | Horizontal |
| | 3839.0 | 26.7 | 2.8 | 29.5 | 54.0 | -24.5 | Average | Horizontal |
| | 1255.0 | 43.4 | -4.2 | 39.2 | 74.0 | -34.8 | Peak | Vertical |
| | 1255.0 | 28.2 | -4.2 | 24.0 | 54.0 | -30.0 | Average | Vertical |
| | 3201.5 | 39.0 | 1.2 | 40.2 | 74.0 | -33.8 | Peak | Vertical |
| | 3201.5 | 26.4 | 1.2 | 27.6 | 54.0 | -26.4 | Average | Vertical |
| * | 21047.0 | 62.1 | 8.1 | 70.2 | 108.0 | -37.8 | Peak | Horizontal |
| * | 21047.0 | 61.8 | 8.1 | 69.9 | 88.0 | -18.1 | Average | Horizontal |
| * | 31585.0 | 45.8 | 12.7 | 58.5 | 108.0 | -49.5 | Peak | Horizontal |
| * | 31585.0 | 45.0 | 12.7 | 57.7 | 88.0 | -30.3 | Average | Horizontal |
| * | 21047.0 | 58.0 | 8.1 | 66.1 | 108.0 | -41.9 | Peak | Vertical |
| * | 21047.0 | 57.0 | 8.1 | 65.1 | 88.0 | -22.9 | Average | Vertical |
| * | 31585.0 | 50.6 | 12.7 | 63.3 | 108.0 | -44.7 | Peak | Vertical |
| * | 31585.0 | 49.3 | 12.7 | 62.0 | 88.0 | -26.0 | Average | Vertical |

Note 1: "*" is Harmonic emissions in the restricted bands, its limit is 25 mV/m.

Note 2: AV Limit (dBuV/m at 3m) = {20*log[(25/1000)] + 120}dBuV/m = 88 dBuV/m

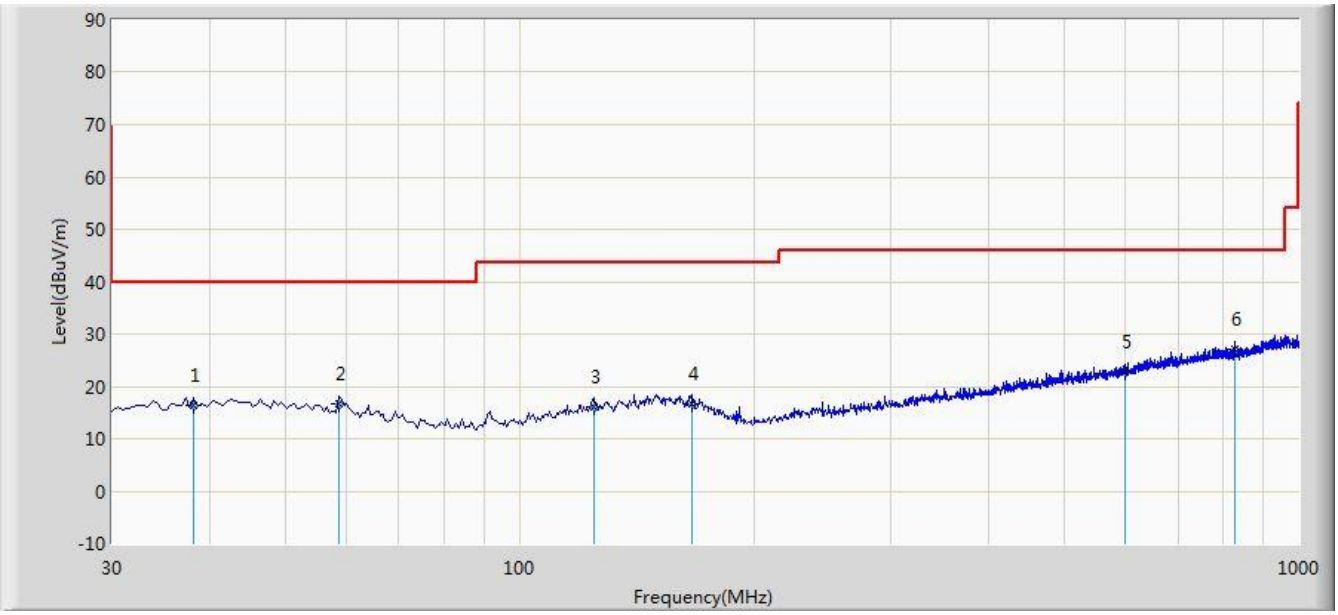
PK Limit (dBuV/m at 3m) = AV Limit (dBuV/m at 3m) + 20dB = 108 dBuV/m

Note 3: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

**Radiated Emission below 1GHz:**

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 00:27 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: VULB 9168 _20-2000MHz | Polarity: Horizontal |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at Channel 10.525GHz | |



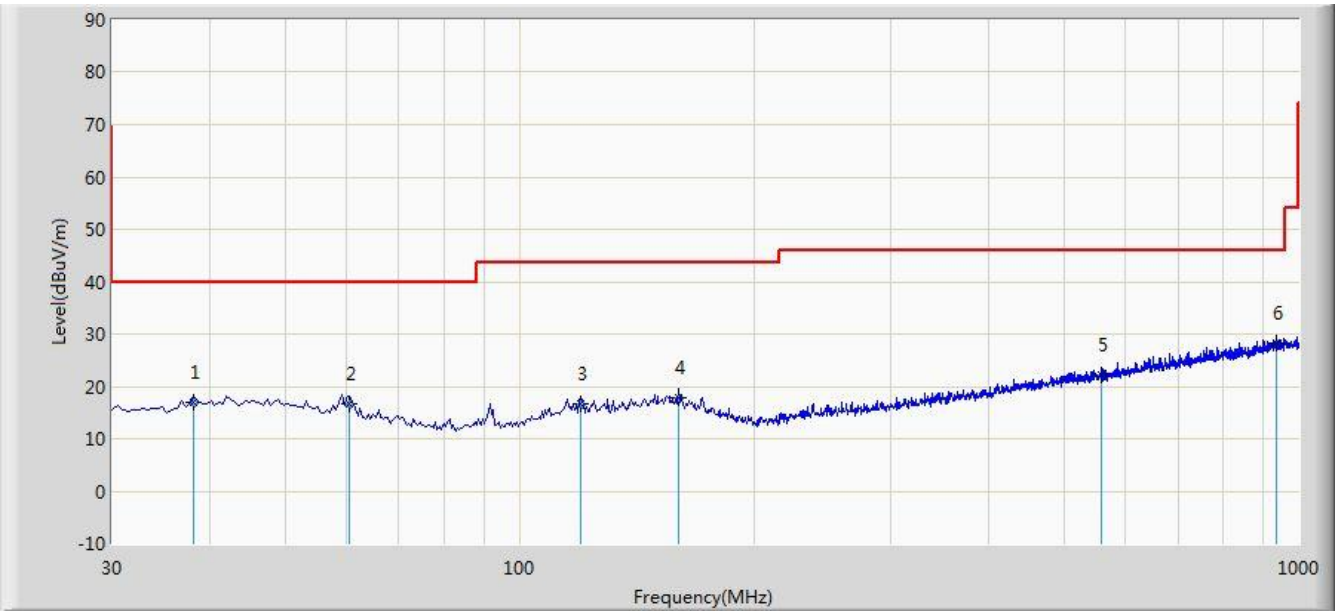

| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 38.245 | 16.268 | 1.860 | -23.732 | 40.000 | 14.408 | QP |
| 2 | | | 58.615 | 16.625 | 3.060 | -23.375 | 40.000 | 13.565 | QP |
| 3 | | | 124.575 | 16.152 | 2.640 | -27.348 | 43.500 | 13.512 | QP |
| 4 | | | 166.285 | 16.785 | 2.060 | -26.715 | 43.500 | 14.725 | QP |
| 5 | | | 598.905 | 22.668 | 2.110 | -23.332 | 46.000 | 20.558 | QP |
| 6 | | * | 827.802 | 27.148 | 3.590 | -18.852 | 46.000 | 23.559 | QP |

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 40GHz ~ 60GHz), therefore no data appear in the report.

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 00:29 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: VULB 9168 _20-2000MHz | Polarity: Vertical |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at Channel 10.525GHz | |




| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 38.245 | 16.998 | 2.590 | -23.002 | 40.000 | 14.408 | QP |
| 2 | | | 60.555 | 16.544 | 3.210 | -23.456 | 40.000 | 13.333 | QP |
| 3 | | | 119.725 | 16.790 | 3.600 | -26.710 | 43.500 | 13.190 | QP |
| 4 | | | 159.980 | 17.849 | 2.580 | -25.651 | 43.500 | 15.269 | QP |
| 5 | | | 558.165 | 22.292 | 2.590 | -23.708 | 46.000 | 19.702 | QP |
| 6 | | * | 937.920 | 28.230 | 3.330 | -17.770 | 46.000 | 24.900 | QP |

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 40GHz ~ 60GHz), therefore no data appear in the report.

## 7.4. Radiated Restricted Band Edge Measurement

### 7.4.1.Test Limit

**For 15.205 requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

| Frequency (MHz) | Frequency (MHz) | Frequency (MHz) | Frequency (GHz) |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1] 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 – 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | -- | -- | -- |

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

| FCC Part 15 Subpart C Paragraph 15.209 | | |
|---|---|---|
| Frequency [MHz] | Field Strength [uV/m] | Measured Distance [Meters] |
| 0.009 ~ 0.490 | 2400/F (kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F (kHz) | 30 |
| 1.705 ~ 30 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

**For RSS-Gen Section 8.10 Requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

| Frequency (MHz) | Frequency (MHz) | Frequency (MHz) | Frequency (GHz) |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 1645.5 - 1646.5 | 9.0 - 9.2 |
| 0.495 - 0.505 | 16.69475 - 16.69525 | 1660 - 1710 | 9.3 - 9.5 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 1718.8-1722.2 | 10.6 - 12.7 |
| 3.020 - 3.026 | 25.5 - 25.67 | 2200 - 2300 | 13.25 - 13.4 |
| 4.125 - 4.128 | 37.5 - 38.25 | 2310–2390 | 14.47 - 14.5 |
| 4.17725 - 4.17775 | 73 - 74.6 | 2483.5 - 2500 | 15.35 - 16.2 |
| 4.20725 - 4.20775 | 74.8 - 75.2 | 2655 - 2900 | 17.7 - 21.4 |
| 5.677 - 5.683 | 108 - 138 | 3260 - 3267 | 22.01 - 23.12 |
| 6.215 - 6.218 | 149.9 - 150.05 | 3332 - 3339 | 23.6 - 24.0 |
| 6.26775 - 6.26825 | 156.52475 - 156.52525 | 3345.8 - 3358 | 31.2 - 31.8 |
| 6.31175 - 6.31225 | 156.7 - 156.9 | 3500 - 4400 | 36.43 - 36.5 |
| 8.291 - 8.294 | 162.0125 - 167.17 | 4500 - 5150 | Above 38.6 |
| 8.362 - 8.366 | 167.72 - 173.2 | 5350 - 5460 | -- |
| 8.37625 - 8.38675 | 240 - 285 | 7250 - 7750 | -- |
| 8.41425 - 8.41475 | 322 - 335.4 | 8025 - 8500 | -- |
| 12.29 - 12.293 | 399.9 - 410 | -- | -- |
| 12.51975 - 12.52025 | 608 - 614 | -- | -- |
| 12.57675 - 12.57725 | 960 - 1427 | -- | -- |
| 13.36 -13.41 | 1435 - 1626.5 | -- | -- |

### 7.4.2.Test Procedure used

ANSI C63.10 Section 6.6

### 7.4.3.Test Procedure

**Peak Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple

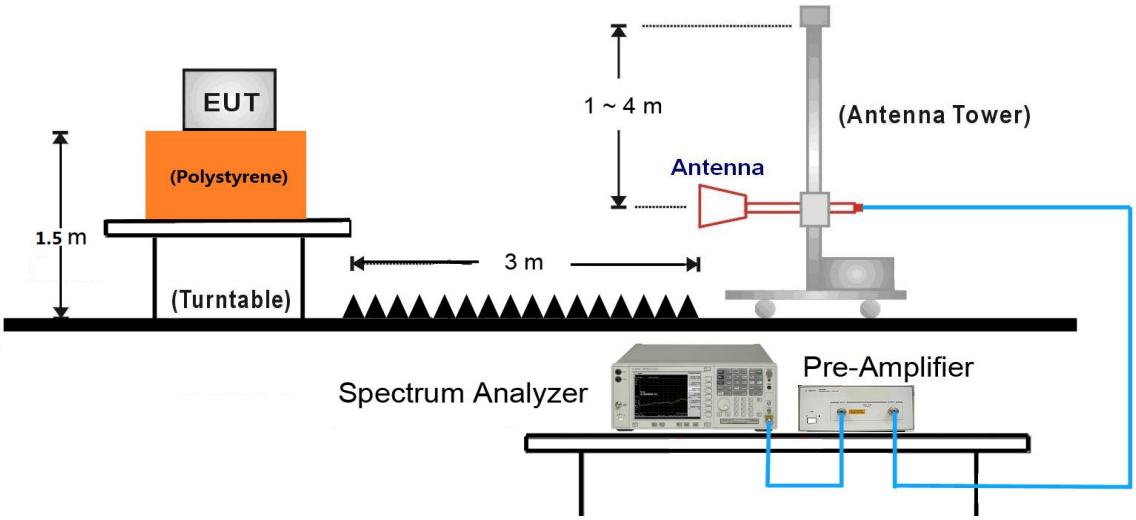
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Average Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

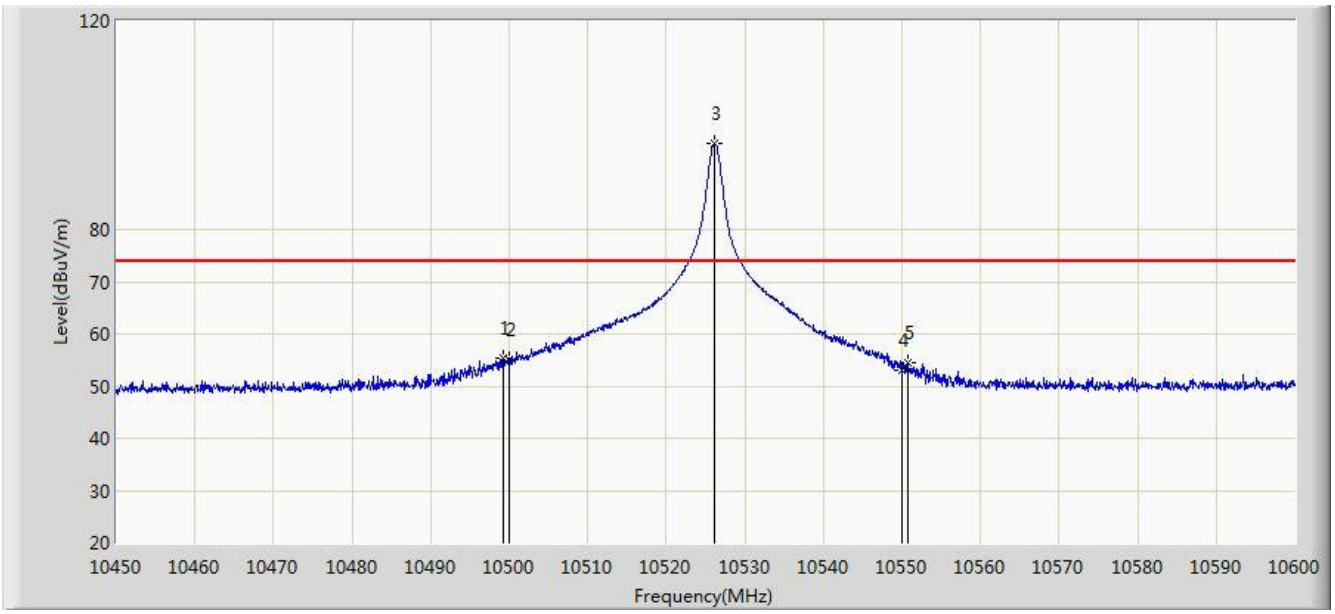
### 7.4.4.Test Setup

1GHz ~ 18GHz Test Setup:



### 7.4.5.Test Result

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 01:39 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at channel 10.525GHz | |

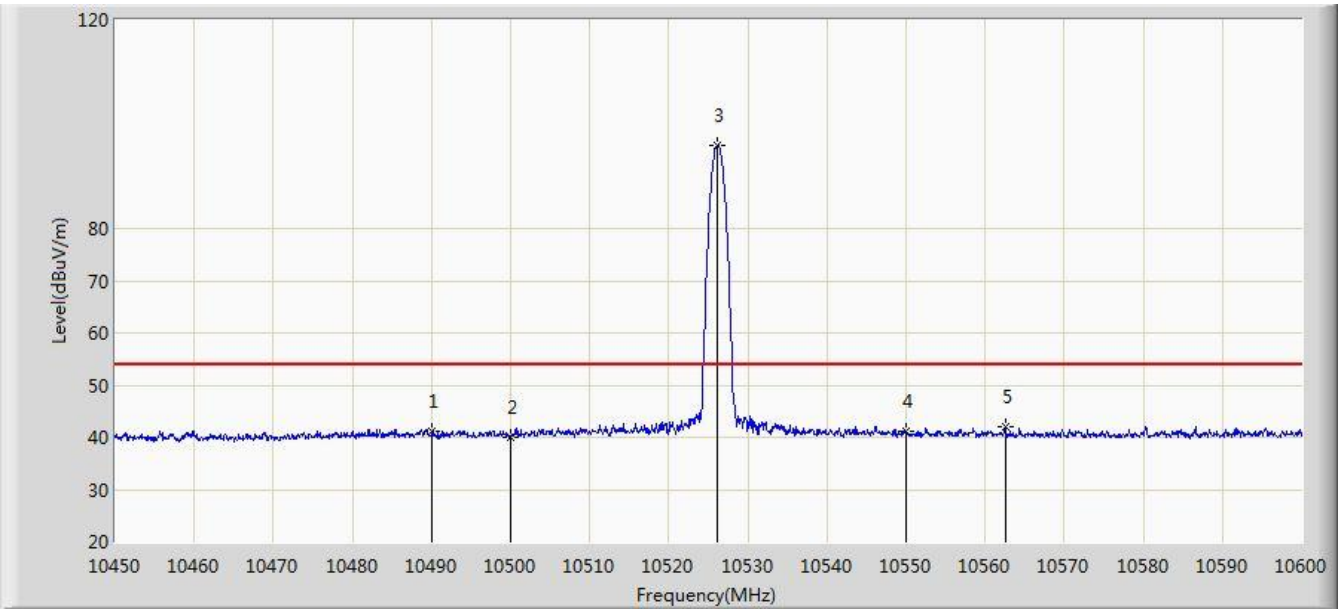



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 10499.275 | 55.315 | 37.724 | -18.685 | 74.000 | 17.591 | PK |
| 2 | | | 10500.000 | 54.976 | 37.381 | -19.024 | 74.000 | 17.595 | PK |
| 3 | | * | 10526.125 | 96.453 | 78.851 | N/A | N/A | 17.602 | PK |
| 4 | | | 10550.000 | 52.929 | 35.247 | -21.071 | 74.000 | 17.681 | PK |
| 5 | | | 10550.725 | 54.536 | 36.853 | -19.464 | 74.000 | 17.682 | PK |

Note: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 01:40 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at channel 10.525GHz | |

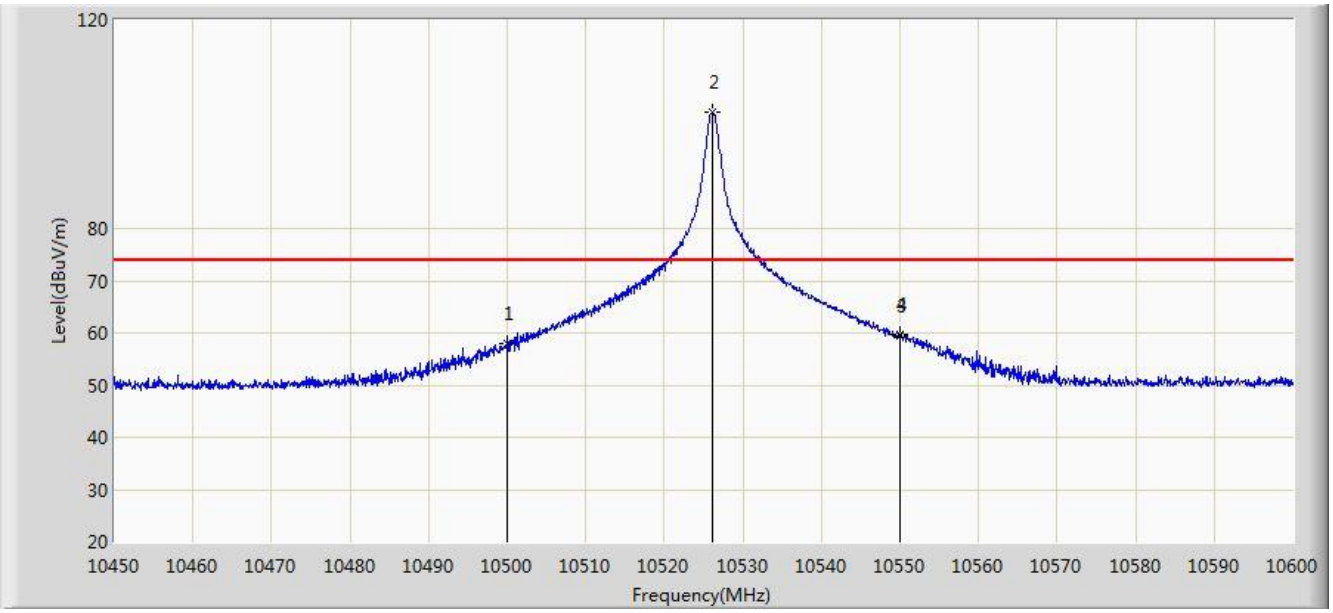



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 10490.050 | 41.298 | 23.803 | -12.702 | 54.000 | 17.495 | AV |
| 2 | | | 10500.000 | 40.139 | 22.544 | -13.861 | 54.000 | 17.595 | AV |
| 3 | | * | 10526.125 | 96.085 | 78.483 | N/A | N/A | 17.602 | AV |
| 4 | | | 10550.000 | 41.041 | 23.359 | -12.959 | 54.000 | 17.681 | AV |
| 5 | | | 10562.575 | 41.961 | 24.273 | -12.039 | 54.000 | 17.688 | AV |

Note: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 01:41 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at channel 10.525GHz | |

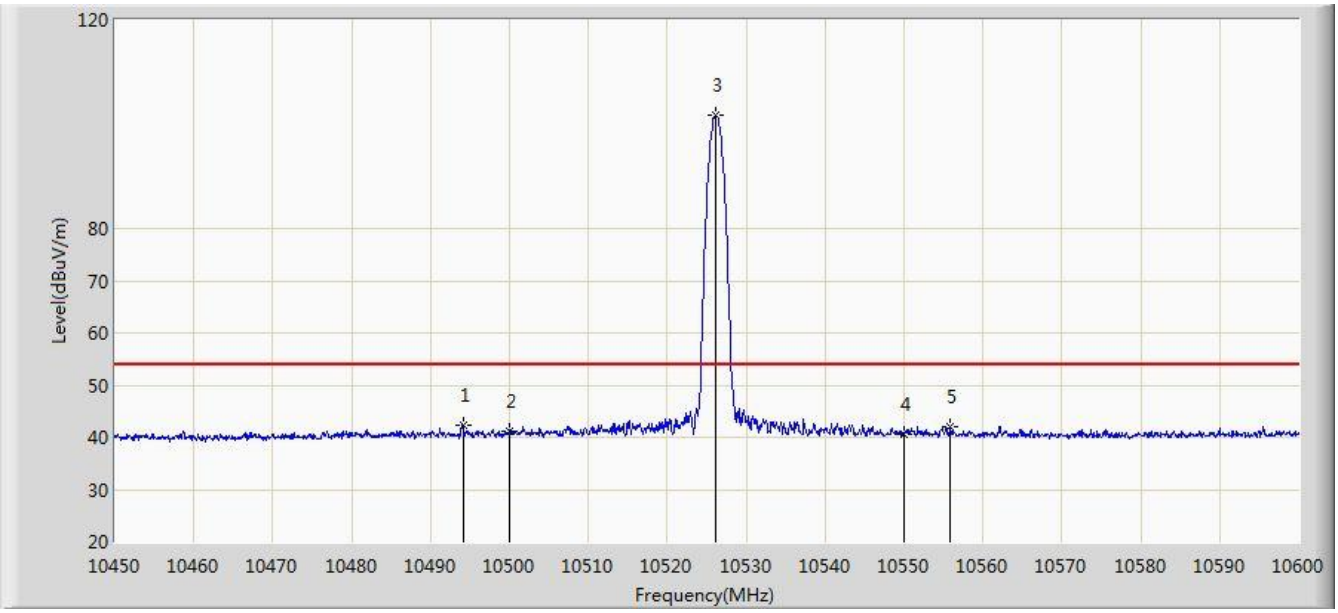



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 10500.000 | 58.068 | 40.473 | -15.932 | 74.000 | 17.595 | PK |
| 2 | | * | 10526.050 | 102.390 | 84.789 | N/A | N/A | 17.602 | PK |
| 3 | | | 10550.000 | 59.435 | 41.753 | -14.565 | 74.000 | 17.681 | PK |
| 4 | | | 10550.050 | 59.834 | 42.152 | -14.166 | 74.000 | 17.682 | PK |

Note: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

| | |
|---|---|
| Site: AC1 | Time: 2018/08/11 - 01:44 |
| Limit: FCC_Part15.209_RE(3m) | Engineer: Flag Yang |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Ind. LuNAR DT AM G3 | Power: DC 12V |
| Test Mode: Transmit at channel 10.525GHz | |




| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 10494.100 | 42.205 | 24.668 | -11.795 | 54.000 | 17.538 | AV |
| 2 | | | 10500.000 | 41.275 | 23.680 | -12.725 | 54.000 | 17.595 | AV |
| 3 | | * | 10526.125 | 101.697 | 84.095 | N/A | N/A | 17.602 | AV |
| 4 | | | 10550.000 | 40.666 | 22.984 | -13.334 | 54.000 | 17.681 | AV |
| 5 | | | 10555.825 | 41.954 | 24.266 | -12.046 | 54.000 | 17.688 | AV |

Note: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

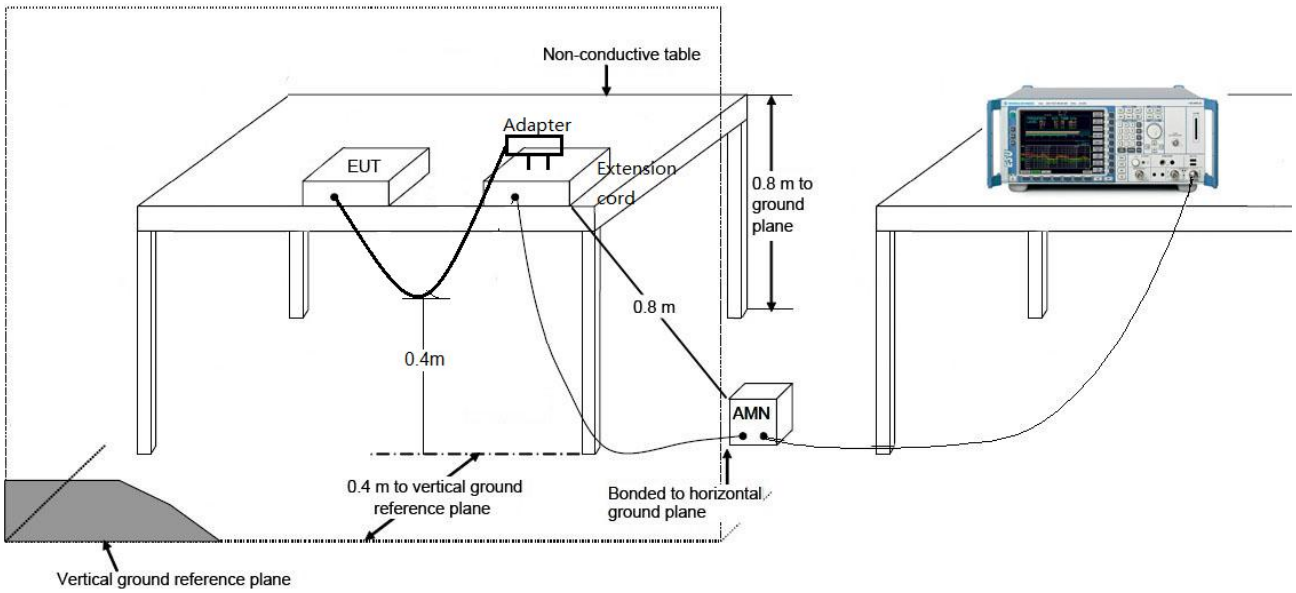
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

## 7.5. AC Conducted Emissions Measurement

### 7.5.1.Test Limit

| FCC 15.207 & RSS-Gen Limits | | |
|---|---|---|
| Frequency (MHz) | QP (dBuV) | AV (dBuV) |
| 0.15 ~ 0.50 | 66 ~ 56 | 56 ~ 46 |
| 0.50 ~ 5.0 | 56 | 46 |
| 5.0 ~ 30 | 60 | 50 |
| Note 1: The lower limit shall apply at the transition frequencies.<br>Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz. | | |

### 7.5.2.Test Setup




### 7.5.3.Test Result

The EUT is powered by DC source, so this requirement does not apply.

# 8. CONCLUSION

The data collected relate only the item(s) tested and show that the **Ind. LuNAR DT AM G3** is in compliance with Part 15C of the FCC Rules and ISED Rules.

The End

# Appendix A – Test Setup Photograph

Refer to “1808RSU008-UT” file.

# Appendix B – EUT Photograph

Refer to “1808RSU008-UE” file.