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)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

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

CONTENTS

Description Page

1. INTRODUCTION 6

1.1. Scope 6
1.2. MRT Test Location 6

2. PRODUCT INFORMATION 7

2.1. Equipment Description 7
2.2. Test Mode 7
2.3. Description of Test Software 7
2.4. Duty Cycle 7
2.5. Test Configuration 8
2.6. EMI Suppression Device(s)/Modifications 8
2.7. Labeling Requirements 8

3. DESCRIPTION of TEST 9

3.1. Evaluation Procedure 9
3.2. AC Line Conducted Emissions 9
3.3. Radiated Emissions 10

4. ANTENNA REQUIREMENTS 11

5. TEST EQUIPMENT CALIBRATION DATA 12

6. MEASUREMENT UNCERTAINTY 13

7. TEST RESULT 14

7.1. Summary 14
7.2. 99% Bandwidth Measurement 15
7.2.1. Test Limit 15
7.2.2. Test Procedure used 15
7.2.3. Test Setting 15
7.2.4. Test Setup 15
7.2.5. Test Result 16
7.3. Radiated Emission 17
7.3.1. Test Limit 17
7.3.2. Test Procedure used 18
7.3.3. Test Procedure 18
7.3.4. Test Setup 19
7.3.5. Test Results 21

7.4. Radiated Restricted Band Edge Measurement 25
7.4.1. Test Limit 25
7.4.2. Test Procedure used 27
7.4.3. Test Procedure 27
7.4.4. Test Setup 28
7.4.5. Test Result 29
7.5. AC Conducted Emissions Measurement 33
7.5.1. Test Limit 33
7.5.2. Test Setup 33
7.5.3. Test Result 33
8. CONCLUSION 34
Appendix A – Test Setup Photograph 35
Appendix B – EUT Photograph 36

§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.**

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Presented this 24th day of July 2018.

President and CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

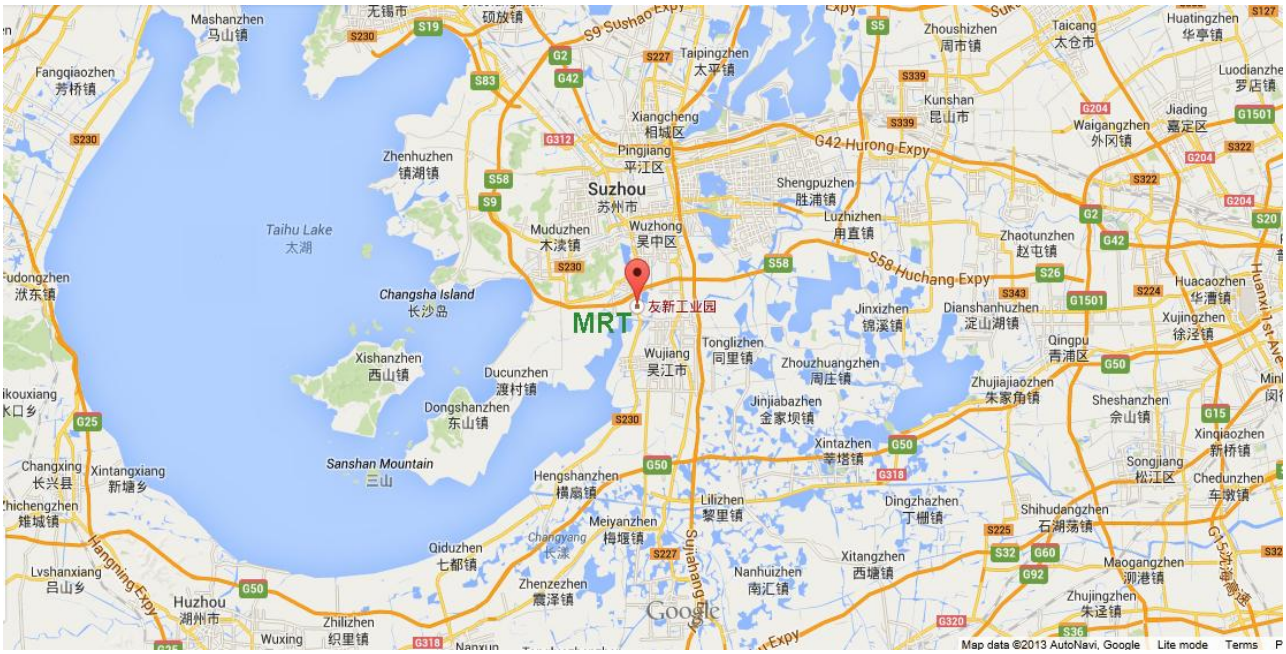
1. INTRODUCTION

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 1PCCAV030000E (MW Module)
HW Version	A B(MW Module)
SW Version	V28
MW Module	1CAV006
Antenna Type	Printed Antenna
Antenna Gain	0dBi

2.2. Test Mode

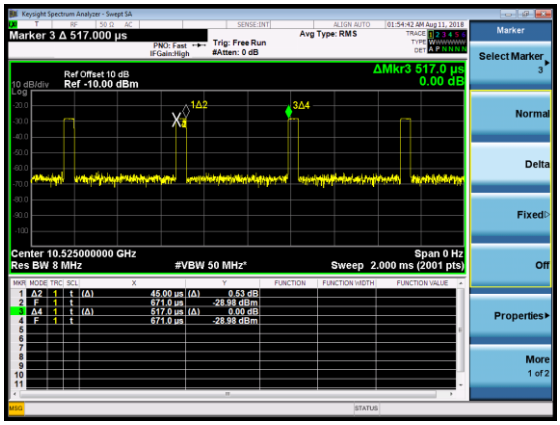
Test Mode	Mode 1: Transmit by 10.525GHz

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)): 9kHz ~ 1GHz: 4.18dB 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 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

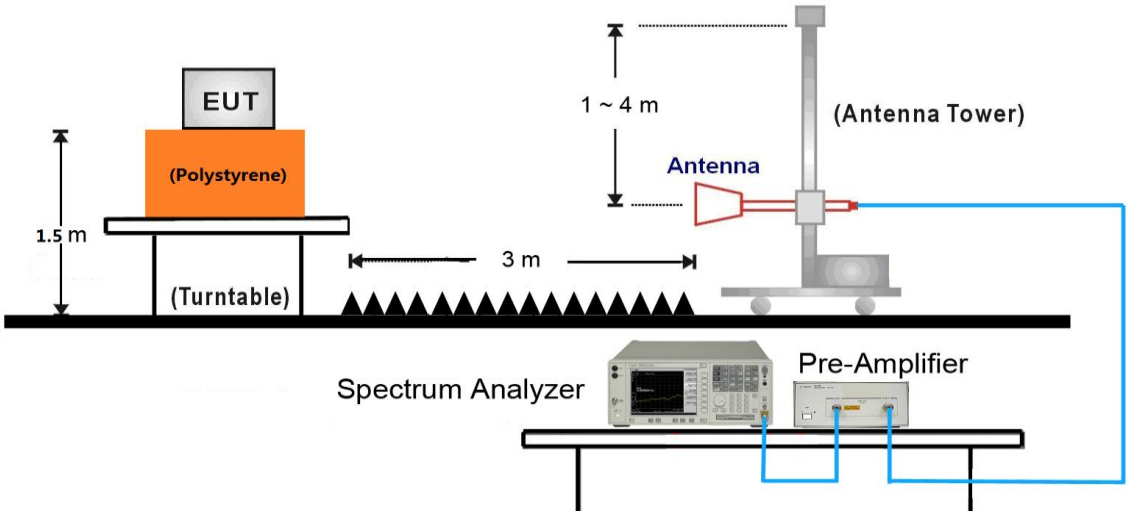
7.2.2. Test Procedure used

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. 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. 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

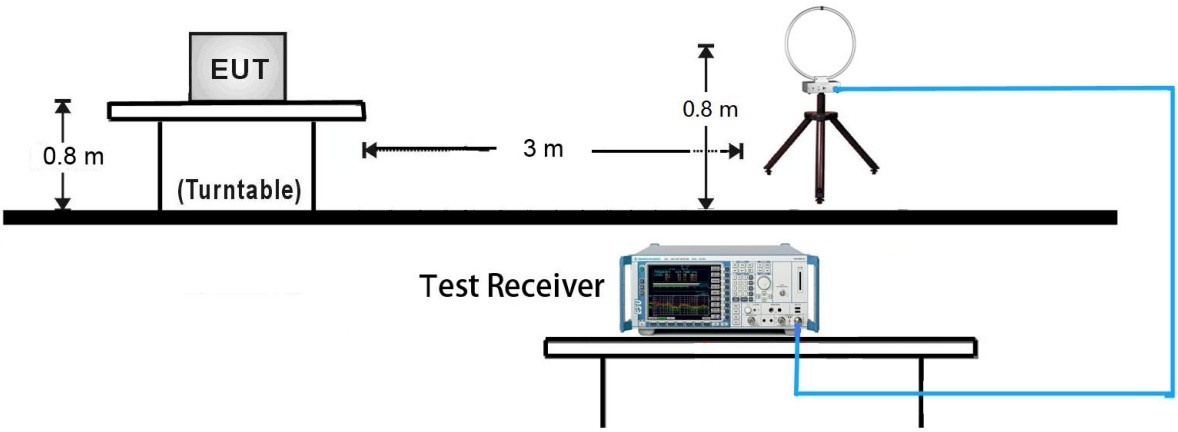
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

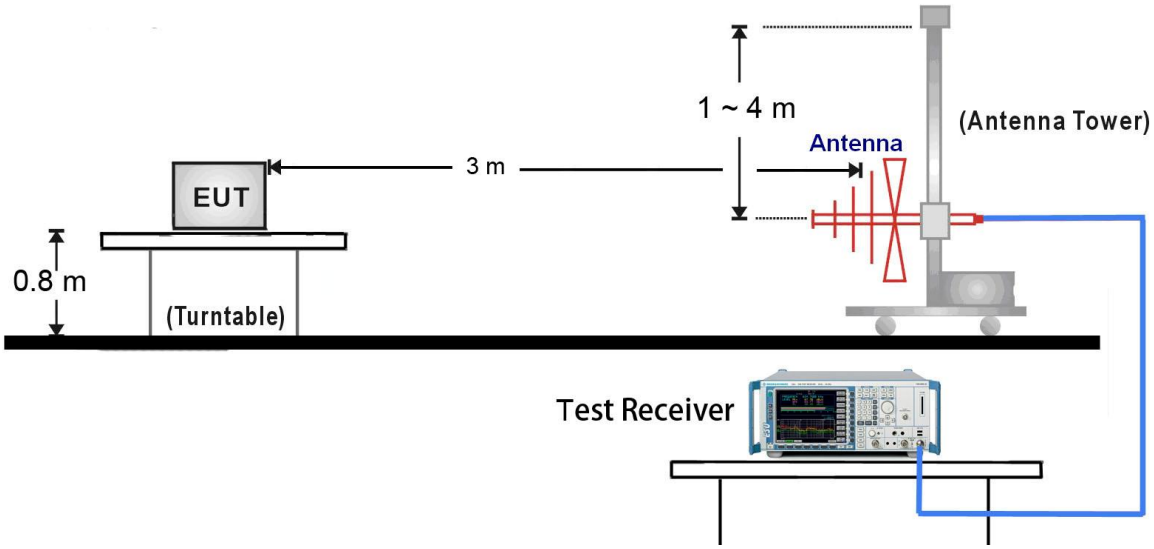
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). 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

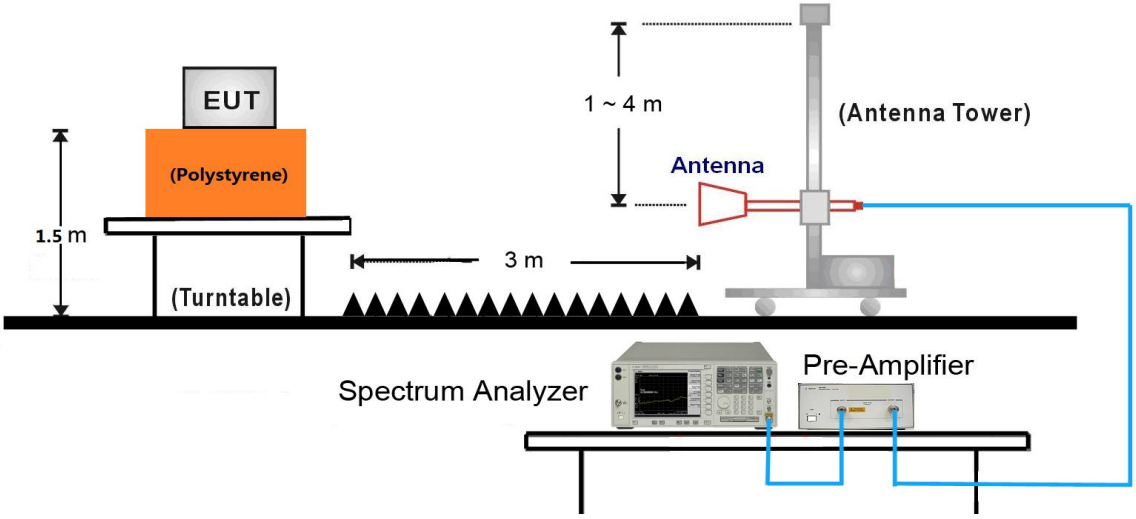
9kHz ~ 30MHz Test Setup:



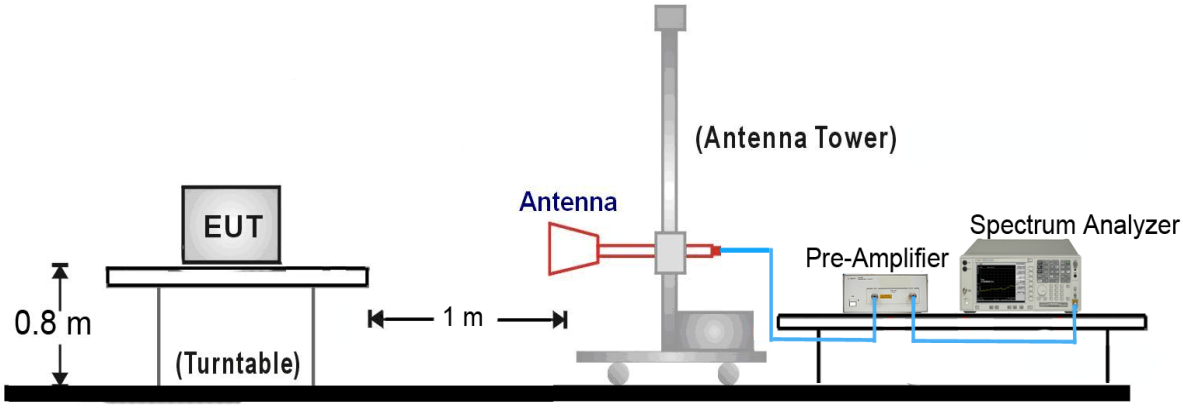
30MHz ~ 1GHz Test Setup:



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) 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

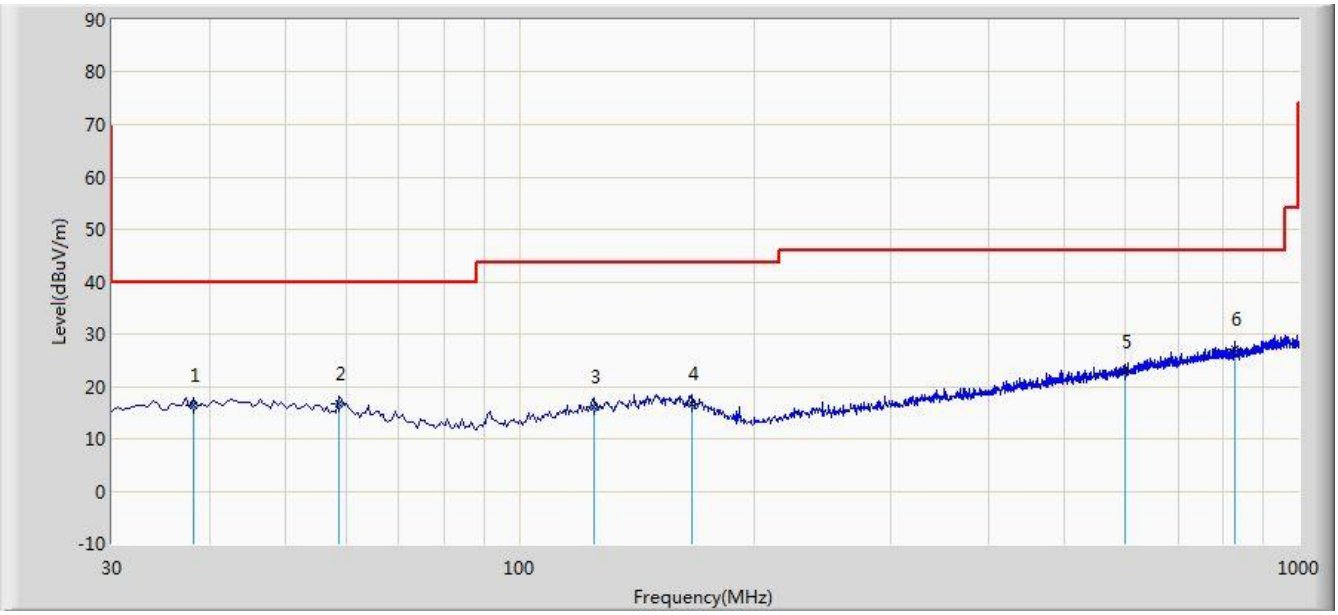
PK Limit (dBuV/m at 3m) = AV Limit (dBuV/m at 3m) + 20dB = 108 dBuV/m

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	



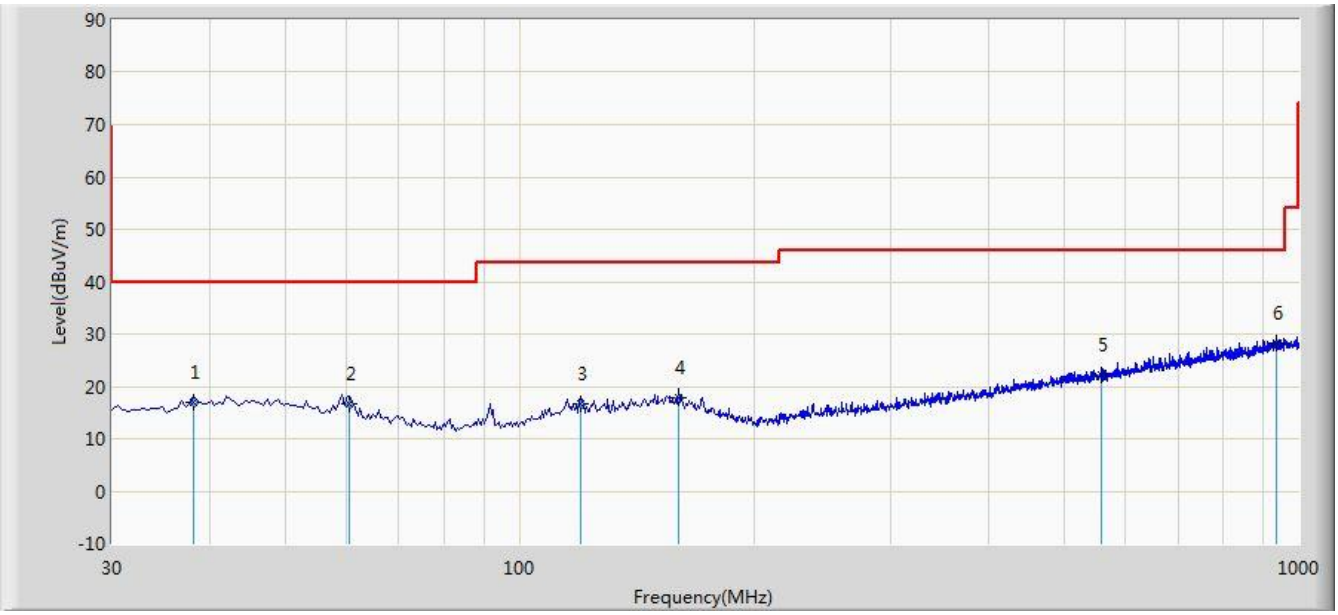
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			38.245	16.268	1.860	-23.732	40.000	14.408	QP
2			58.615	16.625	3.060	-23.375	40.000	13.565	QP
3			124.575	16.152	2.640	-27.348	43.500	13.512	QP
4			166.285	16.785	2.060	-26.715	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

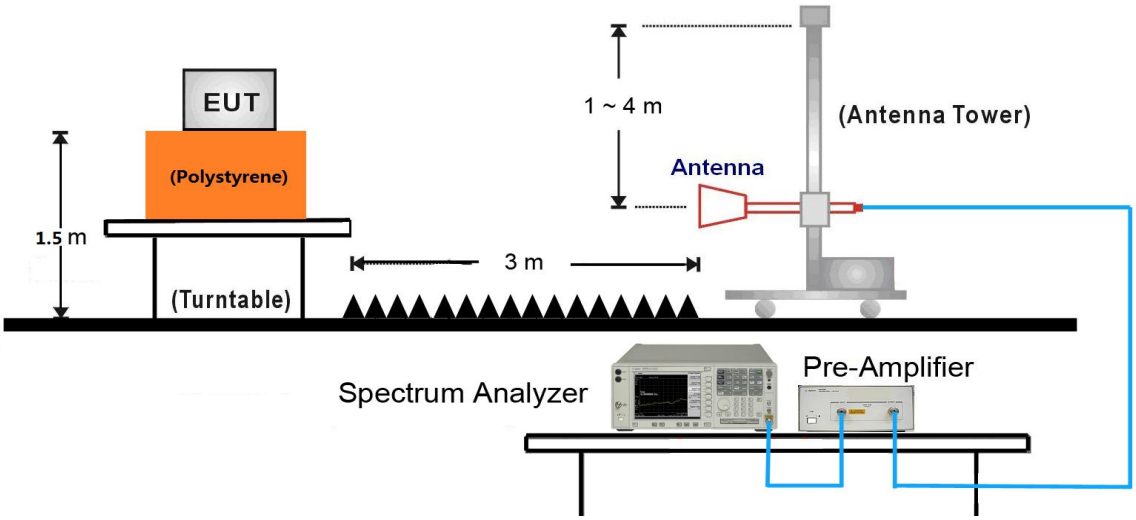
6. Trace mode = max hold
7. Trace was allowed to stabilize

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

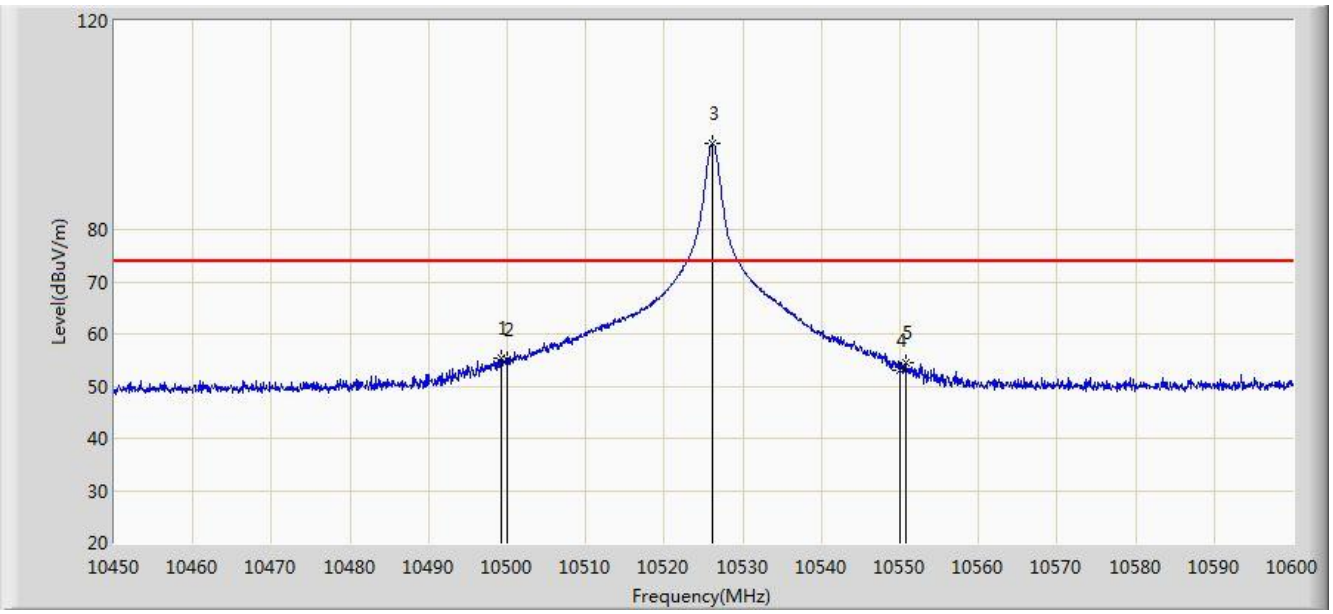
7.4.4.Test Setup

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	

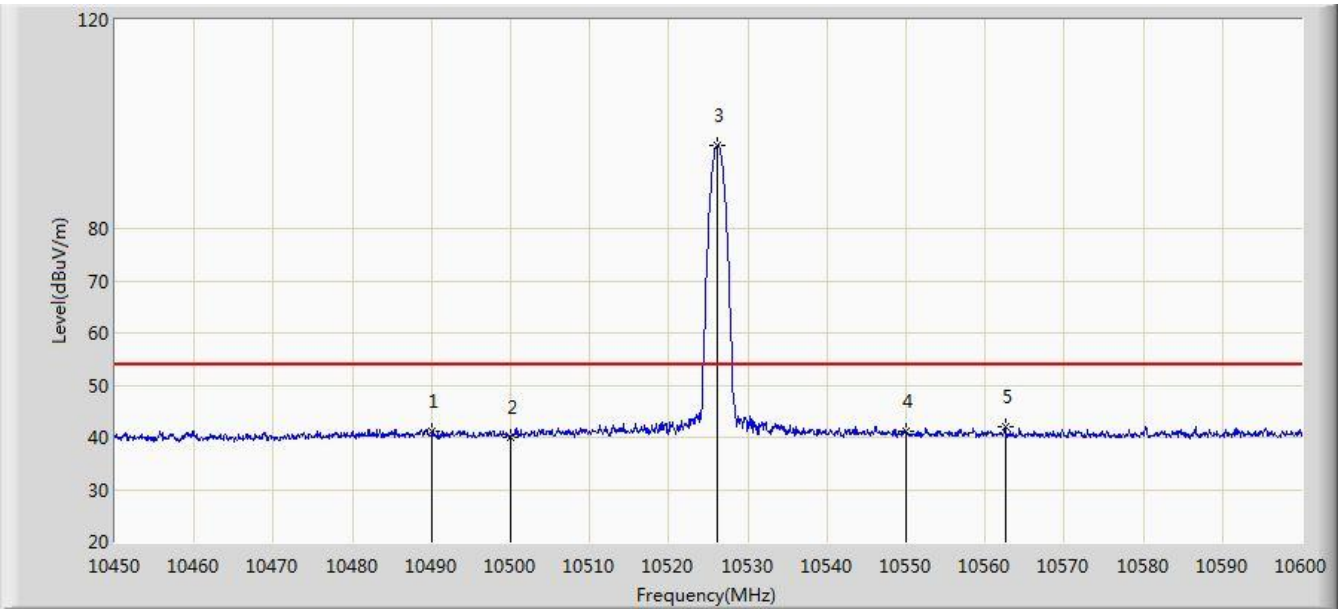


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			10499.275	55.315	37.724	-18.685	74.000	17.591	PK
2			10500.000	54.976	37.381	-19.024	74.000	17.595	PK
3		*	10526.125	96.453	78.851	N/A	N/A	17.602	PK
4			10550.000	52.929	35.247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

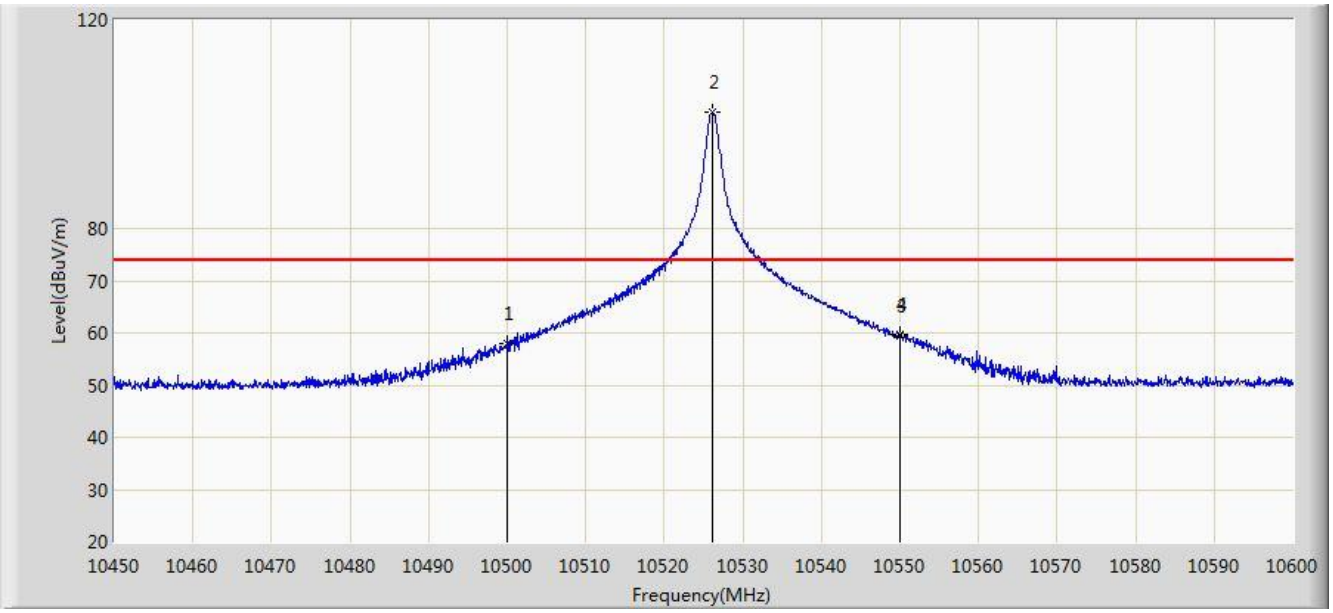


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			10490.050	41.298	23.803	-12.702	54.000	17.495	AV
2			10500.000	40.139	22.544	-13.861	54.000	17.595	AV
3		*	10526.125	96.085	78.483	N/A	N/A	17.602	AV
4			10550.000	41.041	23.359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

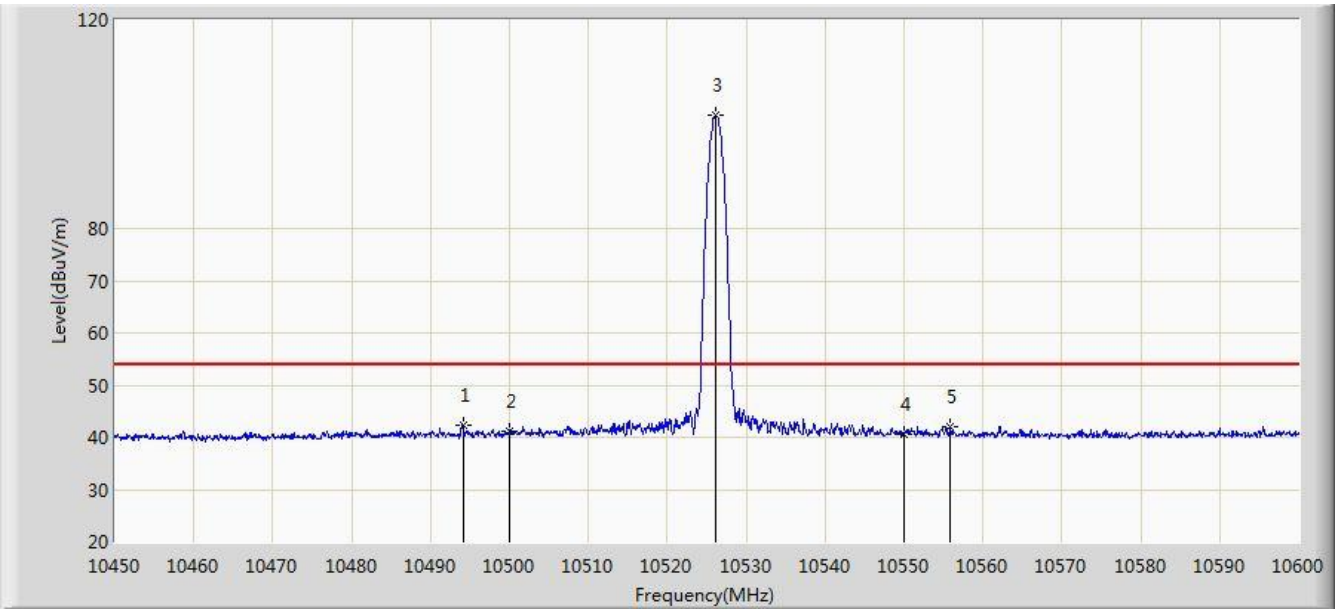


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			10500.000	58.068	40.473	-15.932	74.000	17.595	PK
2		*	10526.050	102.390	84.789	N/A	N/A	17.602	PK
3			10550.000	59.435	41.753	-14.565	74.000	17.681	PK
4			10550.050	59.834	42.152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

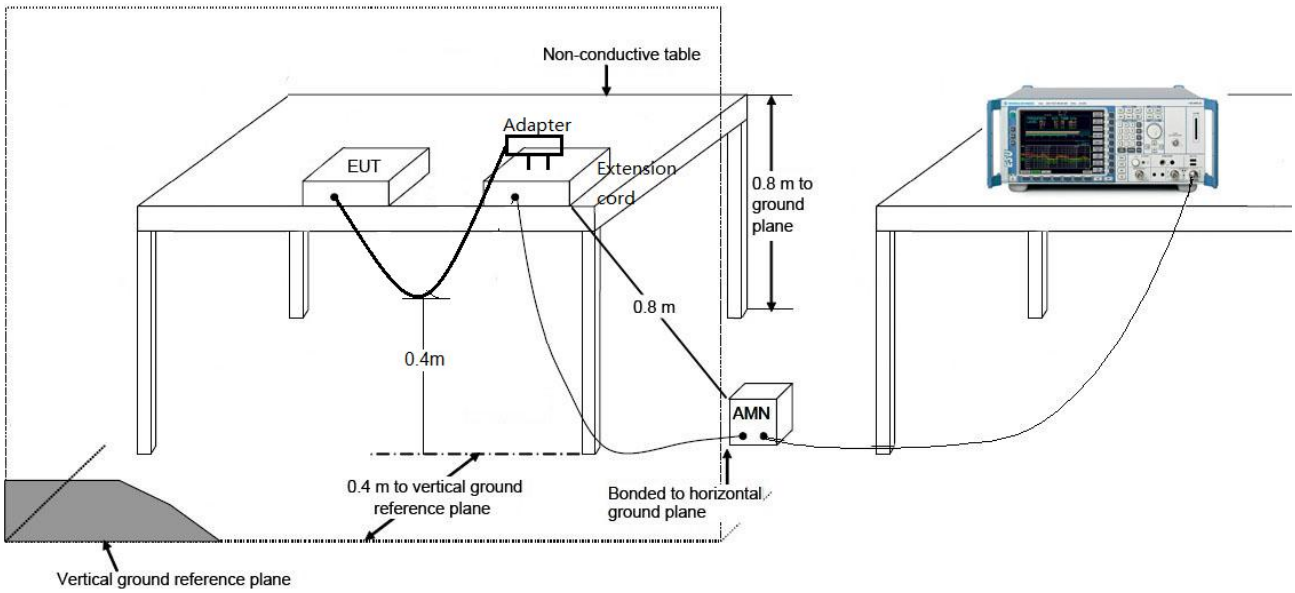
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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. 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.