




FCC PART 15C TEST REPORT

For

DSG Global Inc.

2630 Croydon Dr., Suite 312, Surrey, British Columbia, Canada V3Z6T3

**Tested Model: DSG-121-VT
FCC ID: 2ARPX-DSG121VT**

Report Type: Original Report	Product Name: Embedded Computer
Report Number:	RSC180927003-0E
Date of Report Issue:	2019-04-17
Reviewed By:	Sula Huang 
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65525123 Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	DSG Global Inc.
Product	Embedded Computer
Tested Model	DSG-121-VT
FCC ID	2ARPX-DSG121VT
Voltage Range	DC 7.4V (Rechargeable Li-ion battery) or DC12V-75V from golf vehicle
Measure approximately	238 mm (L) x 323 mm (W) x 36 mm (H)
Frequency	13.56 MHz
Sample serial number	180927003/01 (assigned by the BAACL, Chengdu)
Received date	2018-09-27
Sample/EUT Status	Good condition

Note: The EUT conformed to test requirements and all measurement and test data in this report was gathered from final production sample. It may have deviation from any other sample.

Objective

This Type approval report is prepared on behalf of **DSG Global Inc.** in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communications Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

Related Submittal(s)/Grant(s)

FCC Part 15E NII submissions with FCC ID: 2ARPX-DSG121VT
FCC Part 15C DTS submissions with FCC ID: 2ARPX-DSG121VT
FCC Part 15C DSS submissions with FCC ID: 2ARPX-DSG121VT

Measurement Uncertainty

Item		Uncertainty	
Radiated Emission(Field Strength)	9 kHz-30 MHz	4.24 dB	
	30MHz-200MHz	H	4.63 dB
		V	4.88 dB
	200MHz-1GHz	H	5.02 dB
		V	6.06 dB
Occupied Bandwidth		±5%	
Humidity		±5%	
Temperature		±1°C	

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode.

EUT Exercise Software

No

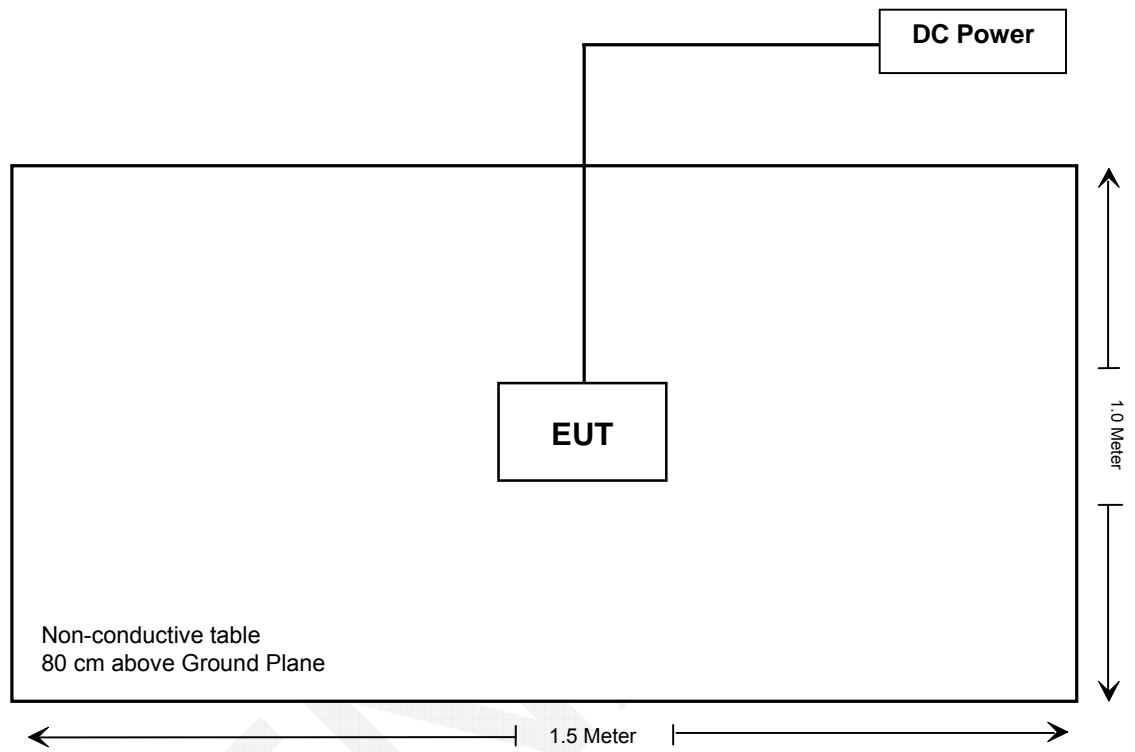
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
-	-	-	-

External I/O Cable

Cable Description	Length (m)	From	To
Power Cable	1.20	EUT	DC Power Source

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207	Conducted Emissions	Not Applicable
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20 dB Emission Bandwidth	Compliance

Not Applicable: The device is battery operated equipment and only for golf vehicle use.

FEMVA

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (9 kHz-30 MHz)					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
Rohde & Schwarz	EMI Test Receiver	ESR 3	102456	2018-06-22	2019-06-21
EMCO	Active Loop Antenna	6507	9506-1345	2017-05-20	2020-05-21
N/A	RF Cable (below 1GHz)	T-E128	000128	2018-11-27	2019-11-26
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR
Radiated Emission Test (30 MHz-1 GHz)					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
Rohde & Schwarz	EMI Test Receiver	ESR 3	102456	2018-06-22	2019-06-21
SONOMA INSTRUMENT	Amplifier	310 N	186684	2018-08-24	2019-08-23
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2017-05-19	2020-05-18
INMET	Attenuator	18N-6dB	64671	2018-11-27	2019-11-26
N/A	RF Cable (below 1GHz)	L-E005	000005	2018.11.27	2019.11.26
N/A	RF Cable (below 1GHz)	T-E128	000128	2018-11-27	2019-11-26
N/A	RF Cable (below 1GHz)	T-E129	000129	2018-11-27	2019-11-26
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR
Frequency Stability Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2018-05-09	2019-05-08
E-Microwave	DC Block	EMDCB-00036	OE01304225	2018-10-27	2019-10-26
ZhaoXin	DC Power supply	RXN-305D	20141218916	2018-05-18	2019-05-17
EMCO	Active Loop Antenna	6507	9506-1345	2017-05-20	2020-05-21
Shenzhen BACL	High Temperature Test Chamber	BTH-150	30024	2018-05-09	2019-05-08
FLUKE	Digital Multimeter	FLUKE 1587	27870099	2018-05-08	2019-05-07

* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

Antenna Connector Construction

The EUT has one Wi-Fi/BT antenna, one Wi-Fi antenna, one NFC antenna, one LTE main antenna and one LTE diversity antenna which are permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

RF Mode	Manufacturer	Antenna Model	Max. Antenna Gain	Antenna Type
2.4G WLAN	Asian Creation Communication Co., Ltd.	Chain 0 AC-Q2458N17-20MHF4	3dBi	PCB Antenna
5G WLAN				
Bluetooth				
2.4G WLAN	Asian Creation Communication Co., Ltd.	Chain 1 AC-Q2458N17-20MHF4	3dBi	PCB Antenna
5G WLAN				
NFC	SHENZHEN SUNSHINE GOOD ELECTRONICS CO.,LTD	P134FQ2137A0	0dBi	FPC Antenna
4G (Main)	ShenZhen Master Wireless Technology Co.,Ltd.	JZC-4G-MP-V01	3dBi	PCB Antenna
4G (Diversity)	ShenZhen Master Wireless Technology Co.,Ltd.	JZC-4G-MP-V01	3dBi	PCB Antenna

Result: Compliance.

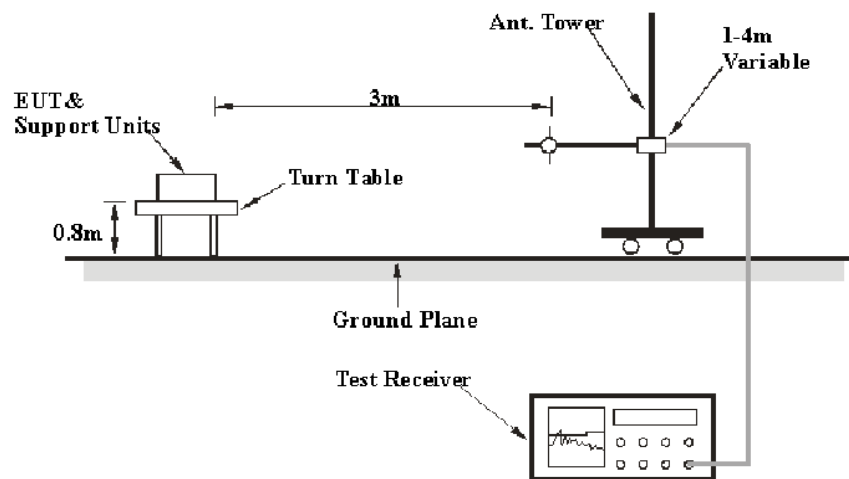
FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup



All measurements contained in this report were conducted with ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 1 GHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

If the maximizes peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

or

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna factor} + \text{Cable Loss}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209; 15.225.

Test Data

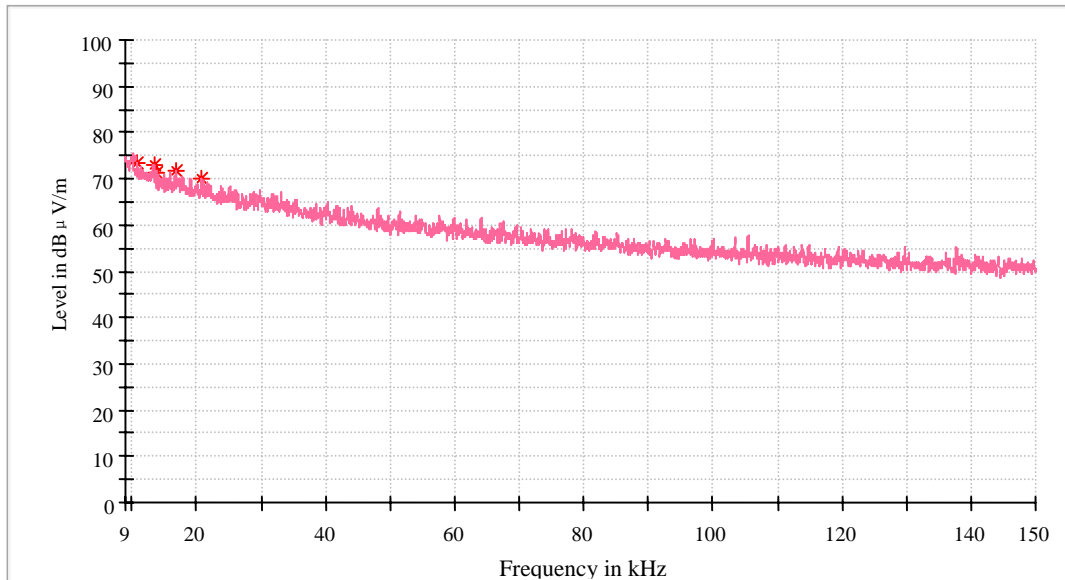
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	65 %
ATM Pressure:	95.3 kPa

The testing was performed by Tom Tang on 2019-04-09.

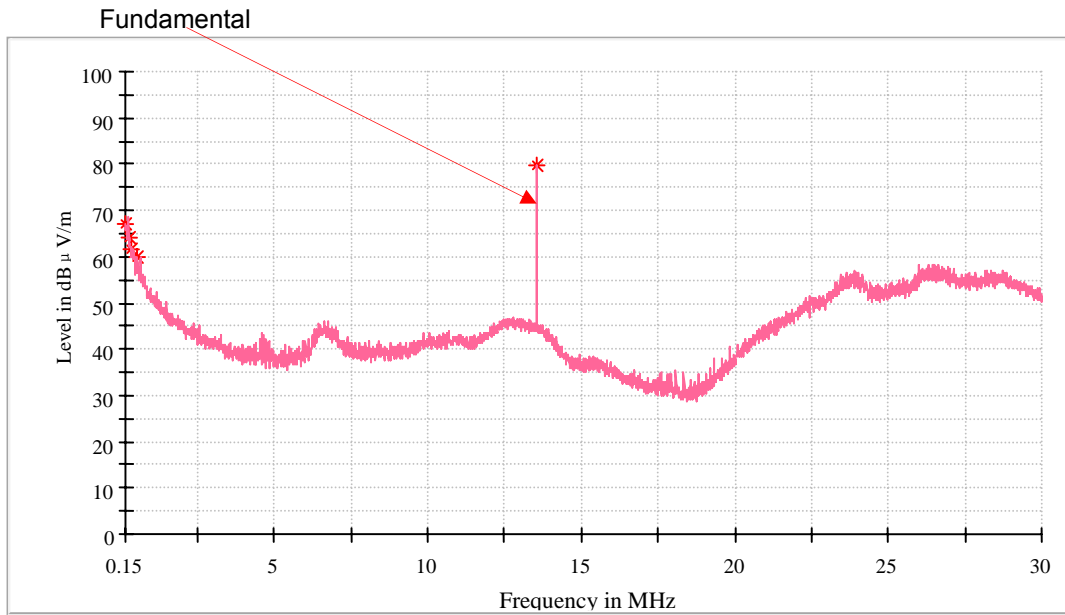
Test mode: Transmitting

1) Radiated Emissions (9 kHz ~150 kHz):



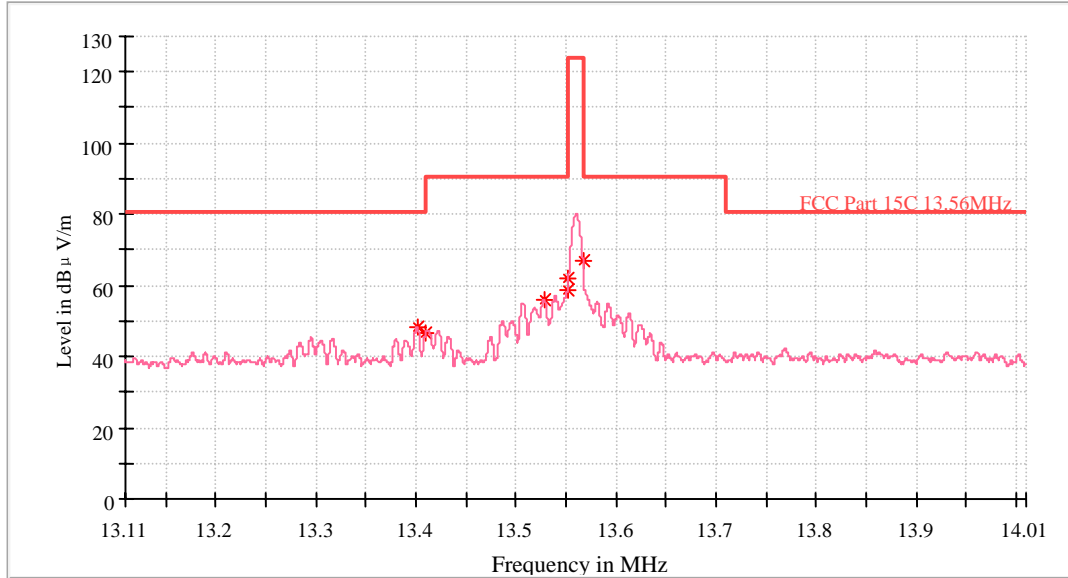
Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.010040	75.40	127.57	52.17	100.0	105.0	24.6
0.010868	73.37	126.88	53.51	100.0	278.0	24.0
0.013389	73.11	125.07	51.96	100.0	140.0	22.6
0.013741	71.28	124.84	53.56	100.0	103.0	22.4
0.016737	71.60	123.13	51.53	100.0	298.0	21.1
0.020826	70.02	121.23	51.21	100.0	236.0	19.8

2) Radiated Emissions (150 kHz ~30 MHz):



Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.150000	67.11	104.08	36.97	100.0	194.0	16.4
0.245520	70.72	99.80	29.08	100.0	190.0	16.6
0.263430	64.29	99.19	34.9	100.0	0.0	16.6
0.335070	61.51	97.10	35.59	100.0	133.0	16.6
0.502230	60.07	73.59	13.52	100.0	208.0	16.6
26.829930	57.55	69.54	11.99	100.0	178.0	17.9

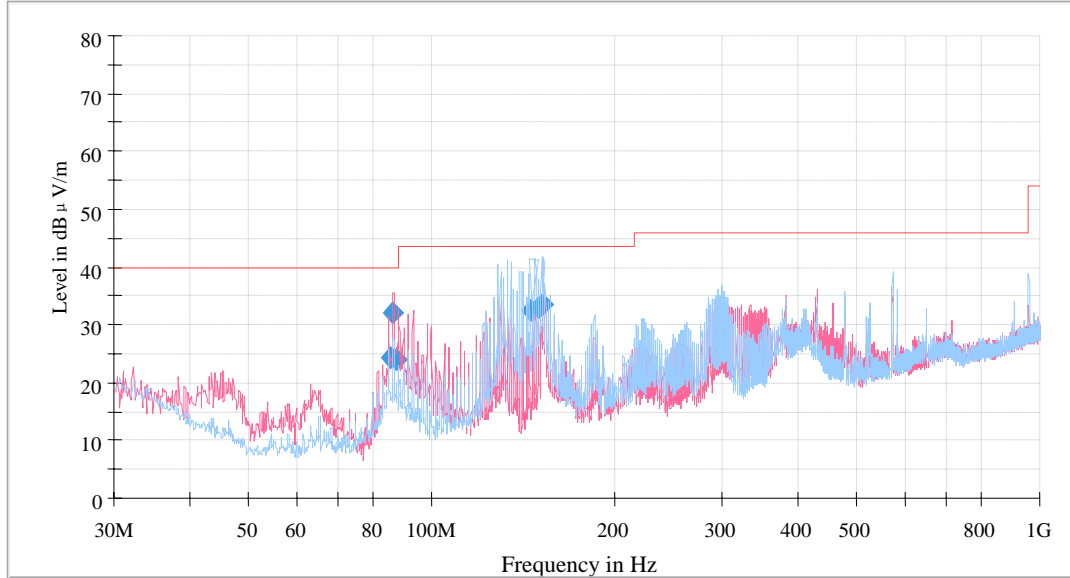
3) Radiated Emissions (13.11 MHz ~14.01 MHz):



Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
13.401420	48.45	80.50	32.05	100.0	132.0	17.7
13.409880	46.39	80.50	34.11	100.0	132.0	17.7
13.528320	56.18	90.47	34.29	100.0	132.0	17.7
13.552440	58.96	90.47	31.51	100.0	151.0	17.7
13.552980	61.92	90.47	28.55	100.0	166.0	17.7
13.567020	66.76	90.47	23.71	100.0	166.0	17.7
13.560000※	79.35	124.00	44.65	100.0	166.0	17.7

※Fundamental

4) Radiated Emissions (30 MHz ~1 GHz):



Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB/m)
85.896250	24.33	40.00	15.67	100.0	V	169.0	-16.8
86.017500	32.13	40.00	7.87	105.0	V	182.0	-16.8
87.593750	24.11	40.00	15.89	102.0	V	199.0	-16.9
145.430000	19.78	43.50	23.72	186.0	H	310.0	-10.8
150.401250	22.54	43.50	20.96	183.0	H	282.0	-11.2
152.098750	24.95	43.50	18.55	165.0	H	95.0	-11.3

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corrected Amplitude

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to DC power supply source which connected to an external AC power supply and loop antenna was connected to a Spectrum Analyzer.

The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Test Data

Environmental Conditions

Temperature:	29 °C
Relative Humidity:	50 %
ATM Pressure:	95.1 kPa

The testing was performed by Tom Tang on 2019-04-09.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the below table.

Temperature	Voltage	Measure Frequency	Frequency Error	Limit
°C	Vdc	MHz		
-20	7.4	13.56052	0.0038%	±0.01%
-10		13.56043	0.0032%	
0		13.56062	0.0046%	
10		13.56059	0.0044%	
20		13.56058	0.0043%	
30		13.56027	0.0020%	
40		13.56044	0.0032%	
50		13.56031	0.0023%	
20		6.3	13.56053	
	8.5	13.56049	0.0036%	

Note: The extreme temperature and voltage condition was declared by manufacturer.

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Per FCC §15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through § 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or one known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Test Data

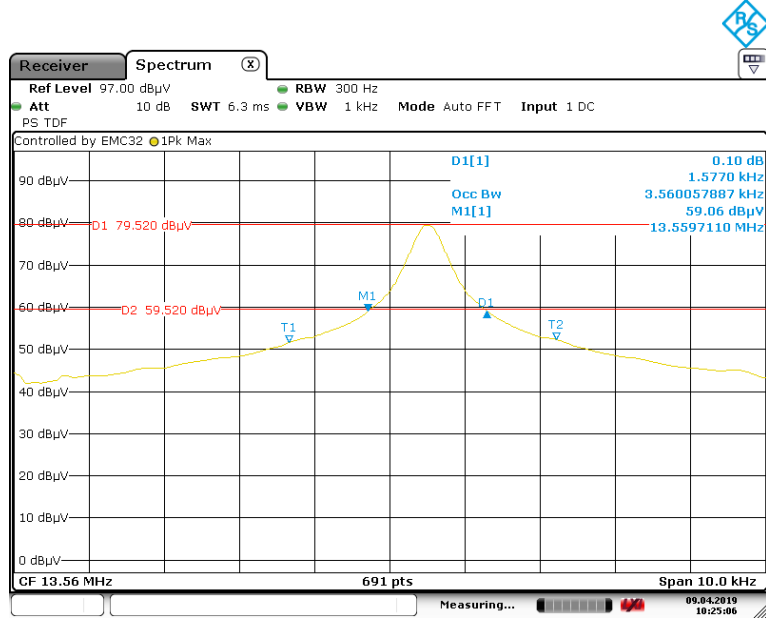
Environmental Conditions

Temperature:	29 °C
Relative Humidity:	50 %
ATM Pressure:	95.1 kPa

The testing was performed by Tom Tang on 2019-04-09.

Test Mode: Transmitting

20 dB Emission Bandwidth



Date: 9.APR.2019 10:25:06

END OF REPORT