FCC RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.231+ IC RSS-210 Issue 9**
Trade name	**GIOBERT SPA**
Product name	**Keyfob F173**
Model No.	**Ferrari Gen4 keyfob**
Operation Freq.	**TX 433.66~433.92MHz; RX 125kHz**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of SGS Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:

Kevin Tsai
Deputy Manager

Revision History

Rev.	Issue Date	Revisions	Effect page	Revised By
00	June 28, 2019	Initial Issue	ALL	Allison Chen
01	November 27, 2019	See the following note Rev.(01)	P.21-22, P.24	Allison Chen
02	April 06, 2020	See the following note Rev.(02)	P.4, P.8, P.11, P.23, P.26-27, P.35-36, P.39-40, A-3	May Lin
03	April 08, 2020	See the following note Rev.(03)	P.6, P.18-19	May Lin

Note:
Rev.(01)
1. Modify test data in section 4.3.4.
2. Modify test limit in section 4.4.1.
Rev.(02)
1. The EUT added the material of the frame, re-test the field strength of fundamental and radiation unwanted emission below 1GHz.
2. Added the part number.
3. Other information, please refer to the T190508W03 and this test report.
Rev.(03)
1. Remove "For A3C0670340000" in section 1.2.
2. Added "For A3C0670340000" in section 4.2.4.

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

<table>
<tr><td>FCC Applicant</td><td>GIOBERT SPA
Via Pavia 82 Rivoli, Torino, 10098 Italy</td></tr>
<tr><td>IC Applicant</td><td>Giobert S.P.A
Via Pavia 82 Rivoli Italy</td></tr>
<tr><td>FCC Manufacturer</td><td>GIOBERT SPA
Via Pavia 82 Rivoli, Torino, 10098 Italy</td></tr>
<tr><td>IC Manufacturer</td><td>Giobert S.P.A
Via Pavia 82 Rivoli Italy</td></tr>
<tr><td>Factory</td><td>GIOBERT SPA
Via Pavia 82
Rivoli, Torino, 10098
Italy</td></tr>
<tr><td>Equipment</td><td>Keyfob F173</td></tr>
<tr><td>Model Name</td><td>Ferrari Gen4 keyfob</td></tr>
<tr><td>Part number</td><td>A3C0670340000, A3C0670370000</td></tr>
<tr><td>Part Number Discrepancy</td><td><table><tr><td>Part number</td><td>Material of the frame</td></tr><tr><td>A3C0670340000</td><td>Metal</td></tr><tr><td>A3C0670370000</td><td>Carbon</td></tr></table></td></tr>
<tr><td>Received Date</td><td>February 10, 2020</td></tr>
<tr><td>Date of Test</td><td>June 3, 2019 ~ February 13, 2020</td></tr>
<tr><td>Periodic operation</td><td>☒ (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation
☐ (3) Periodic transmissions at regular predetermined intervals are not permitted.
☐ (4) Periodic transmissions (lower field strength): each transmission is not greater than 1 sec and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 sec.</td></tr>
<tr><td>Power Operation</td><td>Power from battery: DC 3V</td></tr>
<tr><td>Operation Frequency</td><td>TX 433.66~433.92MHz ; RX 125kHz</td></tr>
<tr><td>S/W Version</td><td>FERRARI_PEPS_GEN4_ID_433_2buttons_Metal</td></tr>
</table>

H/W Version	7.0943.01

1.2 EUT CHANNEL INFORMATION

Frequency Range	ASK: 433.92MHz FSK: 433.66MHz
Modulation Type	ASK & FSK
Bandwidth	ASK: 72.3589kHz FSK: 78.1476kHz
Number of Channels	1 channel

Remark:
Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☒ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☐ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	Internal PCB antenna (433.92MHz) 3D Coil (125kHz)
Antenna Gain	-17.95 dBi
Antenna Connector	N/A

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

***Remark**:*
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	-	Not applicable, because EUT doesn't connect to AC Main Source direct.
Radiation	Dally Hong Jerry Chang	-
RF Conducted	Dally Hong	-

Remark: *The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.*

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019
Software	N/A				

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
High Pass Filter	SOLVANG TECHNOLOGY INC.	STI15	9923	02/26/2019	02/25/2020
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Remark: *Each piece of equipment is scheduled for calibration once a year.*

For test date: February 13, 2020

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Bilog Antenna	Sunol Sciences	JB3	A030105	07/26/2019	07/25/2020
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Coaxial Cable	EMCI	EMC105	190914+25111	09/20/2019	09/19/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/15/2020	01/14/2021
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	10/04/2019	10/03/2020
High Pass Filter	SOLVANG TECHNOLOGY INC.	STI15	9923	02/26/2019	02/25/2020
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Remark:

1. Each piece of equipment is scheduled for calibration once a year.

2. N.C.R. = No Calibration Request.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

There are no accessories and support equipment be used during the test.

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC 15.231, IC RSS-210, IC RSS-Gen Rules.

2. TEST SUMMERY

FCC Standard Sec.	IC Standard Sec.	Chapter	Test Item	Result
15.203	RSS-GEN Sec. 8.3	1.3	Antenna Requirement	Pass
15.207	RSS-GEN Sec. 8.8	4.1	AC Power-line Conducted Emission	Not applicable
15.231(c)	RSS-210 A.1.3	4.2	Emission Bandwidth	Pass
15.231(b)	RSS-210 A.1.2	4.3	Fundamental Emission	Pass
15.209(b)	RSS-GEN Sec. 8.9	4.4	Transmitter Radiated Emission	Pass
15.231(a)(1)	RSS-210 A.1.1(a)	4.5	Operation Restriction	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	433.92MHz & 433.66MHz
RF Field Strength	**For A3C0670340000** **ASK** Peak: 75.60 dBuv/m Average : 70.99 dBuv/m **FSK** Peak: 76.30 dBuv/m Average : 71.69 dBuv/m **For A3C0670370000** **ASK** Peak: 82.58 dBuv/m Average : 77.97 dBuv/m **FSK** Peak: 82.28 dBuv/m Average : 77.67 dBuv/m

Remark: Field strength performed Average level at 3m.

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	**Band edge, Emission for Unwanted and Fundamental**
Power supply Mode	**Mode 1: EUT power by Battery**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Worst Position	☐ **Placed in fixed position.** ☒ **Placed in fixed position at X-Plane (E2-Plane)** ☐ **Placed in fixed position at Y-Plane (E1-Plane)** ☐ **Placed in fixed position at Z-Plane (H-Plane)**
Worst Polarity	☒ **Horizontal** ☐ **Vertical**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Battery**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane and Horizontal) were recorded in this report

3.3 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

According to FCC 15.231(b), 15.231(e),

(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

[1]Linear interpolations.

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

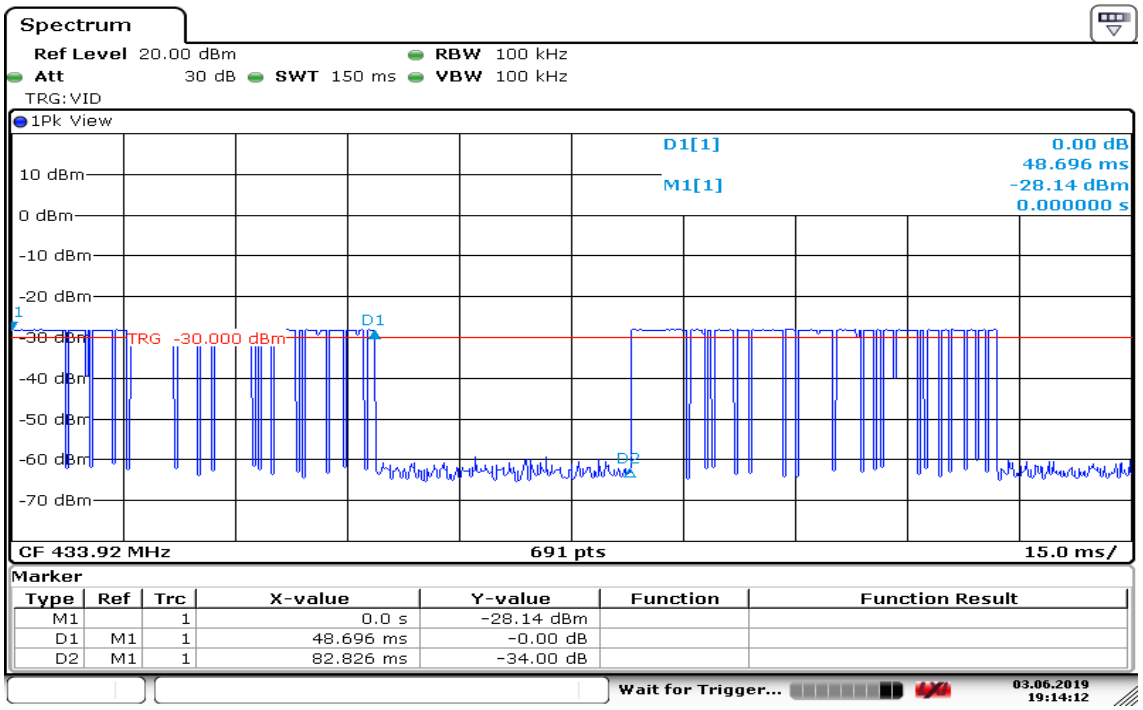
[1]Linear interpolations.

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

3.4 EUT DUTY CYCLE

433.92MHz

Duty Cycle			
TX ON (ms)	TX All(ms)	Duty Cycle	Duty Factor(dB)
48.696	82.826	58.79%	-4.61



Date: 3.JUN.2019 19:14:13

Notes:

1. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by 20 log (Time$_{(on)}$ / [Period or 100 ms whichever is the lesser])
2. The EUT transmits for a Time(on) of 48.696 milliseconds.

   20 log (Time$_{(on)}$ / [Period or 100 ms whichever is the lesser]).

   20 log (48.696/82.826) = -4.61dB

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a), RSS-Gen Sec.8.8,

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

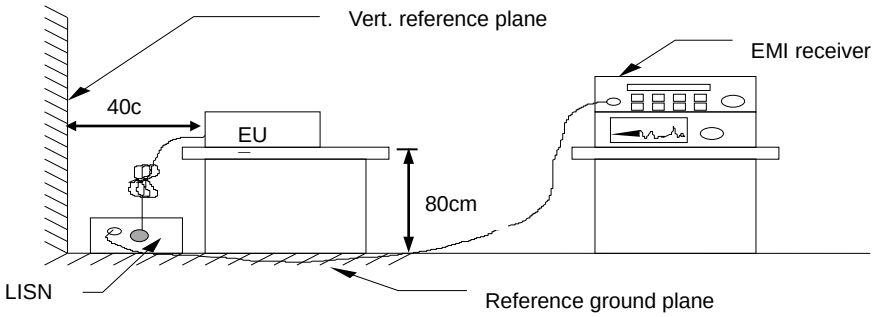
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete

4.1.3 Test Setup



4.1.4 Test Result

Not applicable

4.2 EMISSION BANDWIDTH

4.2.1 Test Limit

According to §15.231(c), RSS-210 A.1.3 ,

Limit	☒ 70 MHz – 900 MHz : Fc * 0.25 % ☐ Above 900 MHz : Fc * 0. 5 %

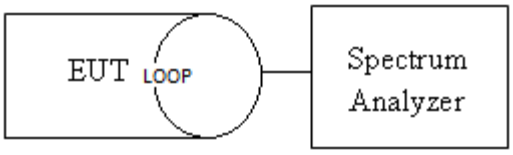
4.2.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.9.2,

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=20KHz, VBW=30KHz, Detector = Peak, Trace mode = Max hold, Sweep = Auto. Measure the maximum width of the emission that is constrained by the frequencies associated with the 20dB Bandwidth.

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, Trace mode = Max hold, Sweep = Auto. Measure the maximum width of the emission that is constrained by the frequencies associated with the Occupied Bandwidth (99%).

4.2.3 Test Setup



4.2.4 Test Result

For A3C0670340000

ASK

Spectrum Bandwidth				
Frequency (MHz)	**20dB Bandwidth (KHz)**	**20dB Bandwidth Limits (MHz)**	**99% Occupied BW (KHz)**	**99% Bandwidth Limits (MHz)**
433.92	85.4	1.0848	72.3589	1.0848

FSK

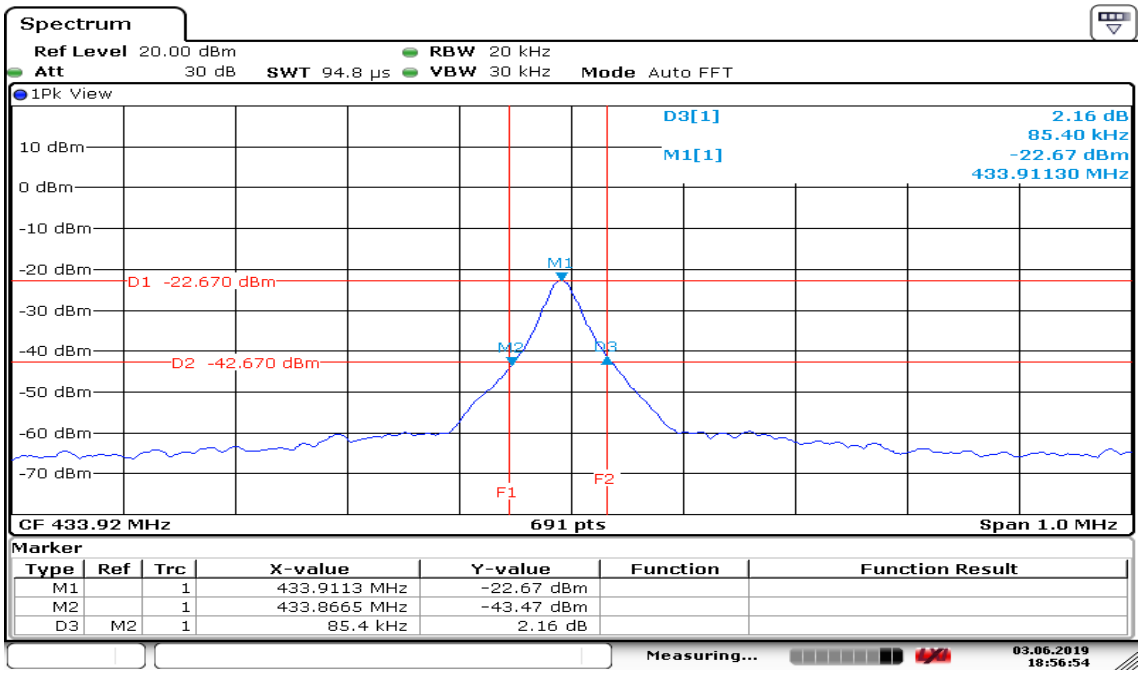
Spectrum Bandwidth				
Frequency (MHz)	**20dB Bandwidth (KHz)**	**20dB Bandwidth Limits (MHz)**	**99% Occupied BW (KHz)**	**99% Bandwidth Limits (MHz)**
433.66	79.6	1.08415	78.1476	1.08415

Test Data

For A3C0670340000

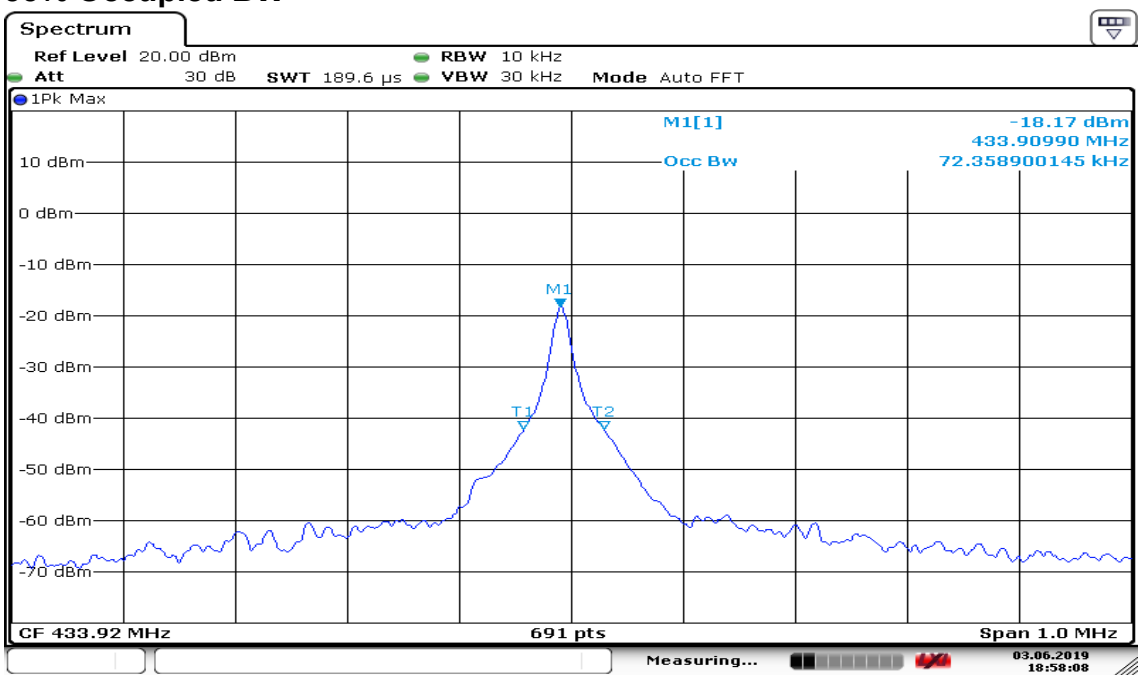
ASK

20dB Bandwidth



Date: 3.JUN.2019 18:56:55

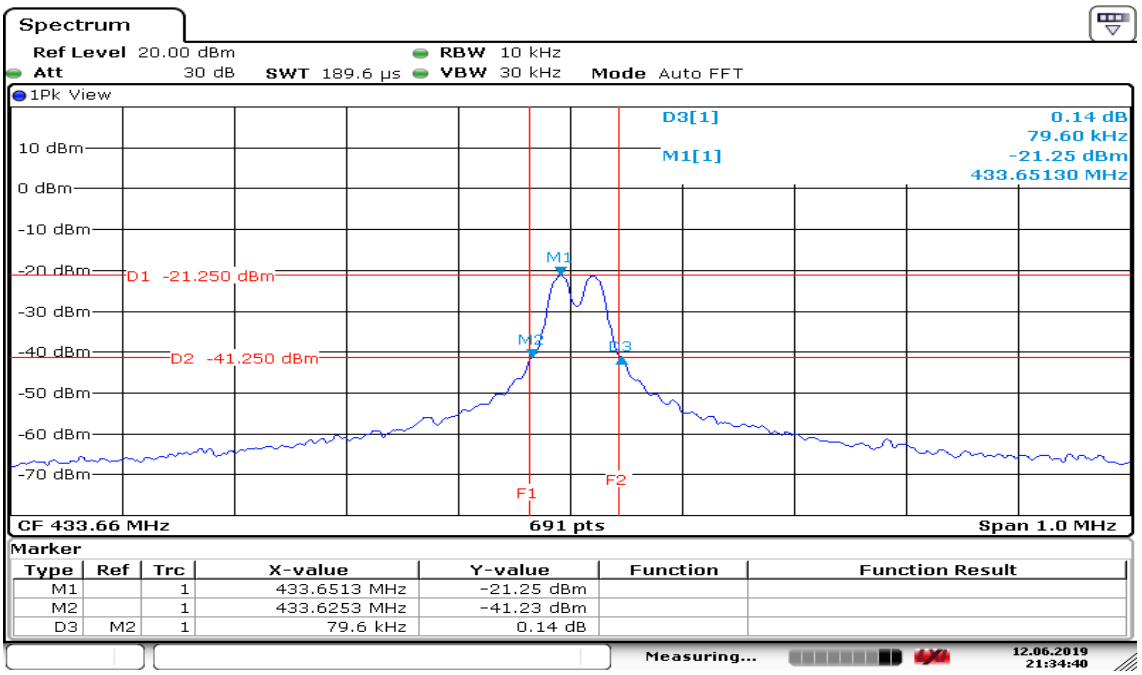
99% Occupied BW



Date: 3.JUN.2019 18:58:09

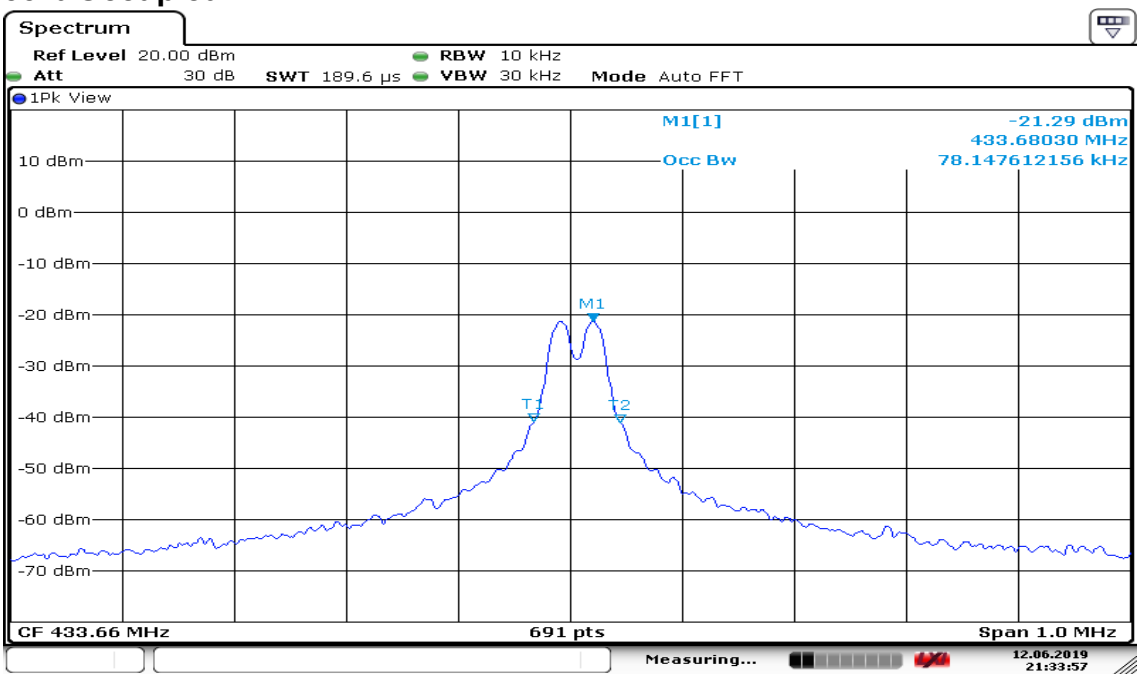
FSK

20dB Bandwidth



Date: 12.JUN.2019 21:34:40

99% Occupied BW



Date: 12.JUN.2019 21:33:57

4.3 FIELD STRENGTH OF FUNDAMENTAL

4.3.1 Test Limit

According to §15.231(b)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of fundamental (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

According to RSS-210 A.1.2

Table A1— Permissible Field Strength Limits for Momentarily Operated Devices	
Fundamental Frequency (MHz), Excluding Restricted Frequency Bands Specified in RSS-Gen	**Field Strength of the Fundamental Emissions (µV/m at 3 m)**
70-130	1,250
130-174	1,250 to 3,750*
174-260 (Note 1)	3,750
260-470 (Note 1)	3,750 to 12,500*
Above 470	12,500

* Linear interpolation with frequency, f, in MHz:
For 130-174 MHz: Field Strength (µV/m) = (56.82 × f)−6136
For 260-470 MHz: Field Strength (µV/m) = (41.67 × f)−7083

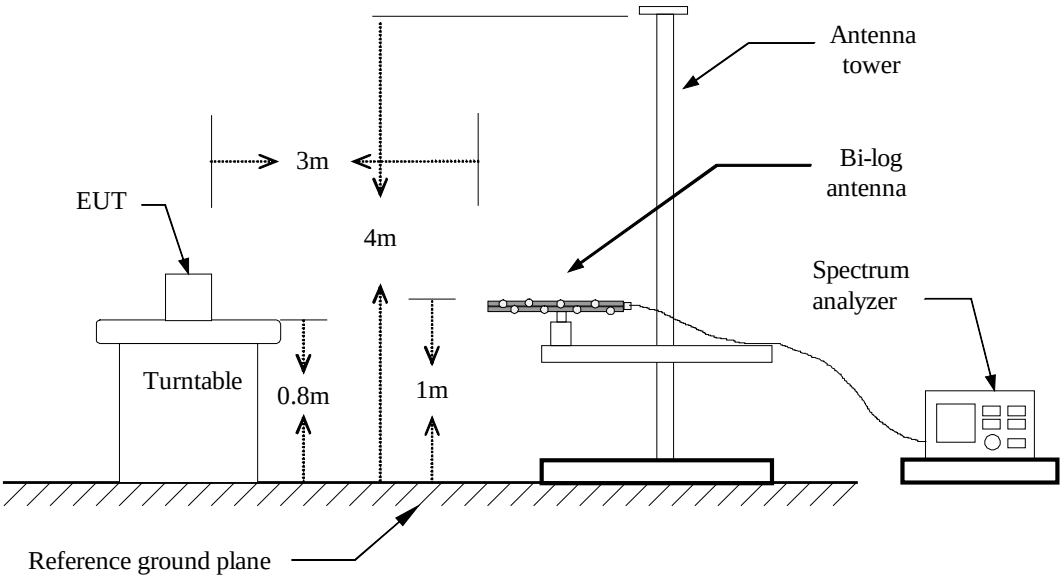
***Note 1**: Frequency bands 225-328.6 MHz and 335.4-399.9 MHz are designated for the exclusive use of the Government of Canada. Manufacturers should be aware of possible harmful interference and degradation of their licence-exempt radio equipment in these frequency bands.*

4.3.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 4.1.4 and clause 6.5

clause 4.1.4	☒ 4.1.4.2.2: Measurement Peak value. ☐ 4.1.4.2.3: Duty cycle ≥ 100%. ☒ 4.1.4.2.4: Measurement Average value.

4.3.3 Test Setup



4.3.4 Test Result

For A3C0670340000
ASK

Field Strength					
Frequency (MHz)	**Fundamental (dBuV/m) at 3m**	**Limit (dBuV/m) at 3m**	**Margin (dB)**	**Axis/Pol.**	**Remark**
433.92	70.99	80.82	-9.83	X/H	AVG

Remark:
1. Fundamental measured method setting on spectrum, RBW=100 kHz, VBW=100kHz and Detector=Peak.
2. Average result = Peak result + Duty factor = 75.60 dBuV/m –4.61= 70.99dBuV/m
*3. 260MHz ~ 470MHz limit is 41.6667 * (Frequency, MHz) – 7083.3333*
*Limit = 41.6667 * (433.92 MHz) – 7083.3333*
=10996.68116 (uV/m)
dBuv/m = 20 Log(uV/m) = 20 Log (10996.68116 uV/m)= 80.82dBuV/m

FSK

Field Strength					
Frequency (MHz)	**Fundamental (dBuV/m) at 3m**	**Limit (dBuV/m) at 3m**	**Margin (dB)**	**Axis/Pol.**	**Remark**
433.66	71.69	80.82	-9.13	X/H	AVG

Remark:
1. Fundamental measured method setting on spectrum, RBW=100 kHz, VBW=100kHz and Detector=Peak.
2. Average result = Peak result + Duty factor = 76.30 dBuV/m –4.61= 71.69dBuV/m
*3. 260MHz ~ 470MHz limit is 41.6667 * (Frequency, MHz) – 7083.3333*
*Limit = 41.6667 * (433.66 MHz) – 7083.3333*
=10985.84782 (uV/m)
dBuv/m = 20 Log(uV/m) = 20 Log (10985.84782 uV/m)= 80.82dBuV/m

For A3C0670370000

ASK

Field Strength					
Frequency (MHz)	**Fundamental (dBuV/m) at 3m**	**Limit (dBuV/m) at 3m**	**Margin (dB)**	**Axis/Pol.**	**Remark**
433.92	77.97	80.82	-2.85	X/H	AVG

Remark:

1. Fundamental measured method setting on spectrum, RBW=100 kHz, VBW=100kHz and Detector=Peak.

2. Average result = Peak result + Duty factor = 82.58 dBuV/m –4.61= 77.97dBuV/m

*3. 260MHz ~ 470MHz limit is 41.6667 * (Frequency, MHz) – 7083.3333*

*Limit = 41.6667 * (433.92 MHz) – 7083.3333*

=10996.68116 (uV/m)

dBuv/m = 20 Log(uV/m) = 20 Log (10996.68116 uV/m)= 80.82dBuV/m

FSK

Field Strength					
Frequency (MHz)	**Fundamental (dBuV/m) at 3m**	**Limit (dBuV/m) at 3m**	**Margin (dB)**	**Axis/Pol.**	**Remark**
433.66	77.67	80.81	-3.14	X/H	AVG

Remark:

1. Fundamental measured method setting on spectrum, RBW=100 kHz, VBW=100kHz and Detector=Peak.

2. Average result = Peak result + Duty factor = 82.28 dBuV/m –4.61= 77.67dBuV/m

*3. 260MHz ~ 470MHz limit is 41.6667 * (Frequency, MHz) – 7083.3333*

*Limit = 41.6667 * (433.66 MHz) – 7083.3333*

=10985.84782 (uV/m)

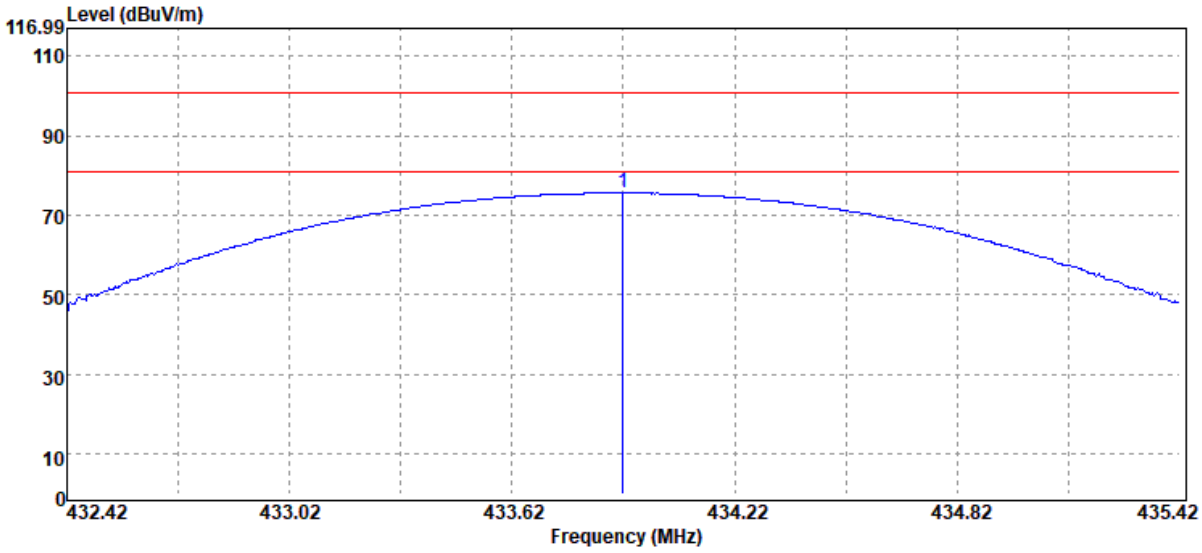
dBuv/m = 20 Log(uV/m) = 20 Log (10985.84782 uV/m)= 80.82dBuV/m

Test Data

For A3C0670340000

ASK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Fundamental	Test Date	2019/06/06
Axis/Polarize	X-Plane/Hor.	Test Engineer	Dally Hong
Detector	Peak & AVG	Test Voltage:	3Vdc

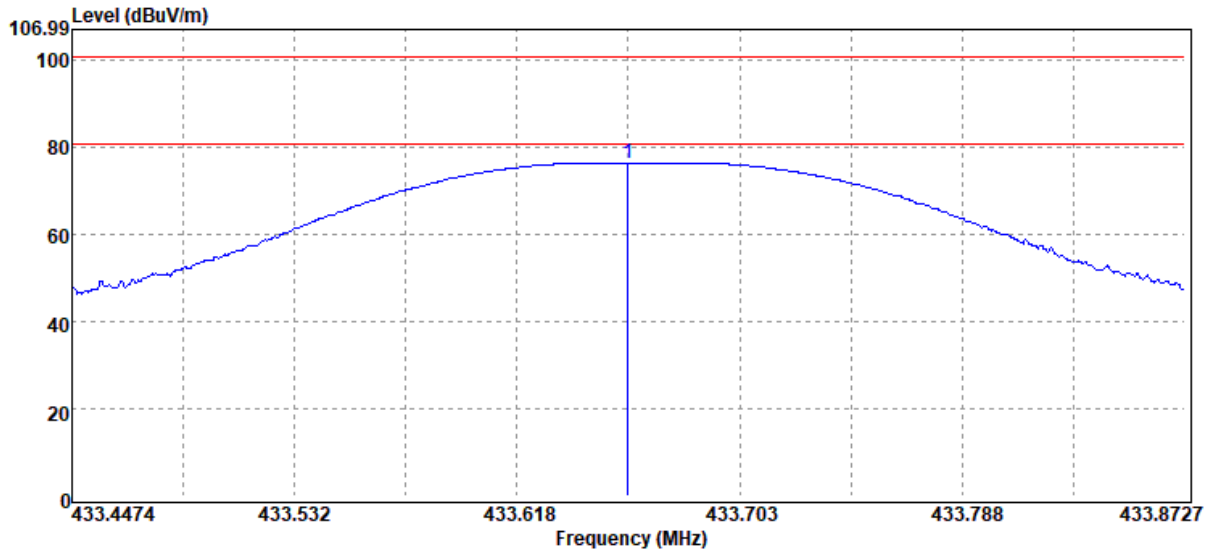


No	Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1	433.92	Peak	79.83	-4.23	75.60	100.82	-25.22
*	433.92	Average	-	-	70.99	80.82	-9.83

Note:
* Average result = Peak result + Duty Factor = 75.60 dBuV/m -4.61 = 70.99 dBuV/m

FSK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Fundamental	Test Date	2019/06/06
Axis/Polarize	X-Plane/Hor.	Test Engineer	Dally Hong
Detector	Peak & AVG	Test Voltage:	3Vdc



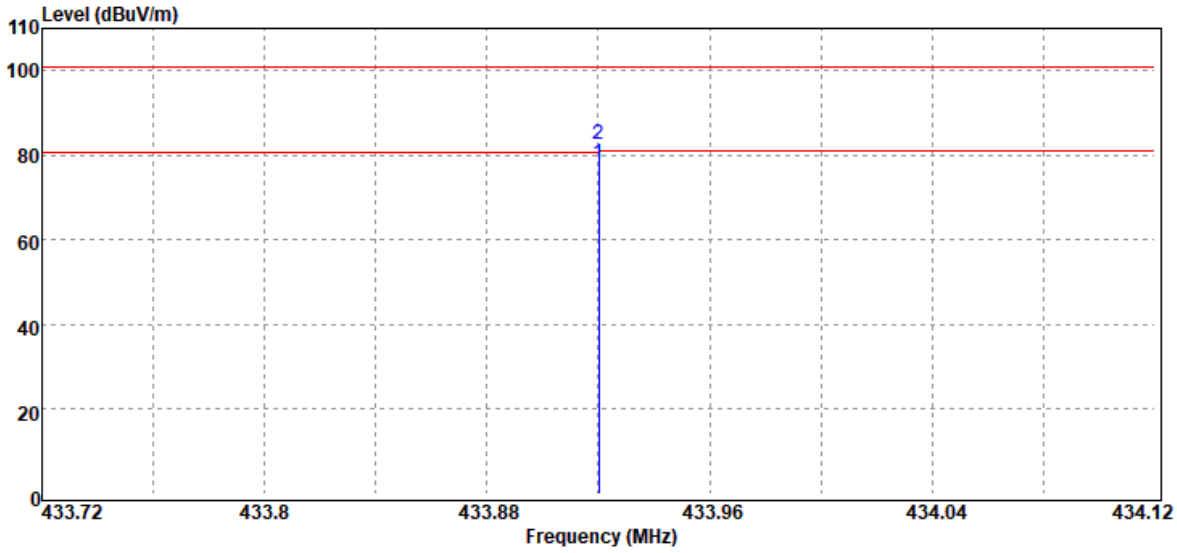
No	Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1	433.66	Peak	80.54	-4.24	76.30	100.82	-24.52
*	433.66	Average	-	-	71.69	80.82	-9.13

Note:
* Average result = Peak result + Duty Factor = 76.30 dBuV/m -4.61 = 71.69 dBuV/m

For A3C0670370000

ASK

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Fundamental	Test Date	2020/02/13
Axis/Polarize	X-Plane/Hor.	Test Engineer	Jerry Chang
Detector	Peak & AVG		

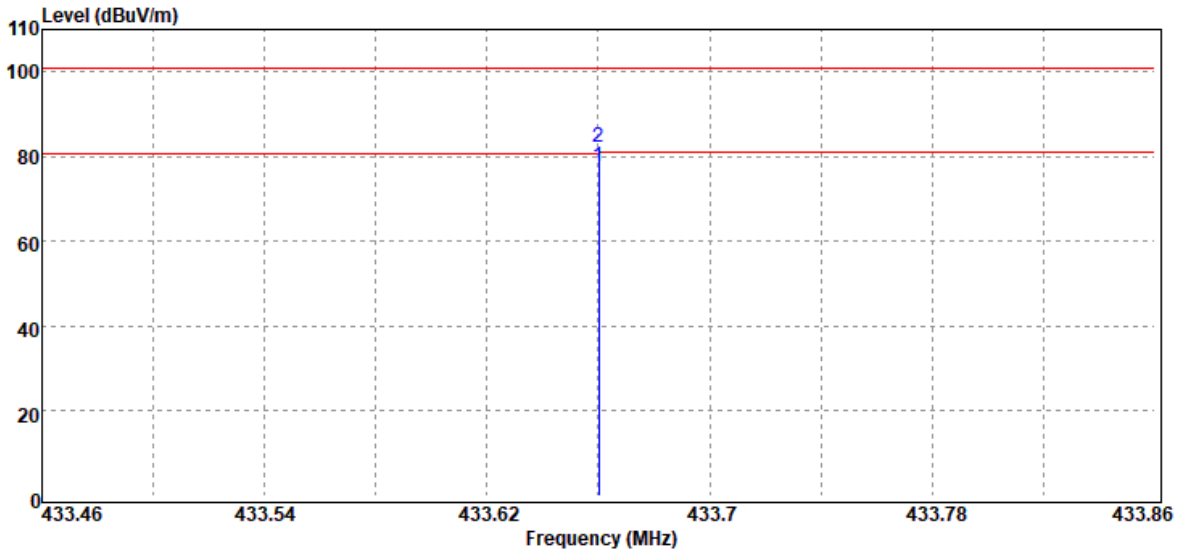


No	Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1	433.92	Peak	86.81	-4.23	82.58	100.82	-18.24
*	433.92	Average	-	-	77.97	80.82	-2.85

Note:
* Average result = Peak result + Duty Factor = 82.58 dBuV/m -4.61 = 77.97 dBuV/m

FSK

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Fundamental	Test Date	2020/02/13
Axis/Polarize	X-Plane/Hor.	Test Engineer	Jerry Chang
Detector	Peak & AVG		



No	Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1	433.66	Peak	86.52	-4.24	82.28	100.81	-18.53
*	433.66	Average	-	-	77.67	80.81	-3.14

Note:
* Average result = Peak result + Duty Factor = 82.28 dBuV/m -4.61 = 77.67 dBuV/m

4.4 RADIATION UNWANTED EMISSION

4.4.1 Test Limit

According to §15.231(b) and §15.209, §15.205
Unwanted emissions limit follow the table or the FCC Part 15.209, whichever limit permits higher field strength.

According to RSS-210 A1.2 and RSS-GEN Sec. 8.9
Unwanted emissions shall comply with the general field strength limits specified in RSS-Gen or 10 times below the fundamental emissions field strength limit in table as below, whichever is less stringent.

According to §15.231(b)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of fundamental (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

[1]Linear interpolations.

Below 30MHz

Frequency (MHz)	Field Strength				
	(μV/m)	(dBμV/m)	Measurement Distance (meter)	(dBμV/m)	Measurement Distance (meter)
0.009 - 0.490	2400/F(kHz)	48.52 – 13.80	300	128.52–104.84	3
0.490 - 1.705	24000/F(kHz)	33.80 – 22.97	30	73.80– 62.97	3
1.705 – 30.0	30	29.54	30	69.54	3

Above 30MHz

Frequency (MHz)	Field Strength		Measurement Distance (meter)
	(μV/m)	(dBμV/m)	
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

According to RSS-Gen, Section 8.9 and 8.10.

RSS-Gen Table 3 and Table 5 – General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz (Note)

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with Section 6.6.

RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (m)
9-490 kHz Note	6.37/F (F in kHz)	300
490-1,705 kHz	63.7/F (F in kHz)	30
1.705-30 MHz	0.08	30

Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector..

4.4.2 Test Procedure

Test method Refer as ANSI 63.10:2013

☒ Unwanted Emission	☒ clause 4.1.4.2.2: Measurement Peak value. ☐ clause 4.1.4.2.3: Duty cycle ≥ 100%. ☒ clause 4.1.4.2.4: Measurement Average value.

☒ Radiated Emission	☒ clause 6.4: below 30 MHz and test distance is 3m. ☒ clause 6.5: below 30 MHz -1 GHz and test distance is 3m. ☒ clause 6.6: Above 30 MHz and test distance is 3m.

1. The EUT is placed on a turntable, which is 0.8m for test below 1GHz and 1.5m for test above 1GHz, above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

   Above 1GHz:

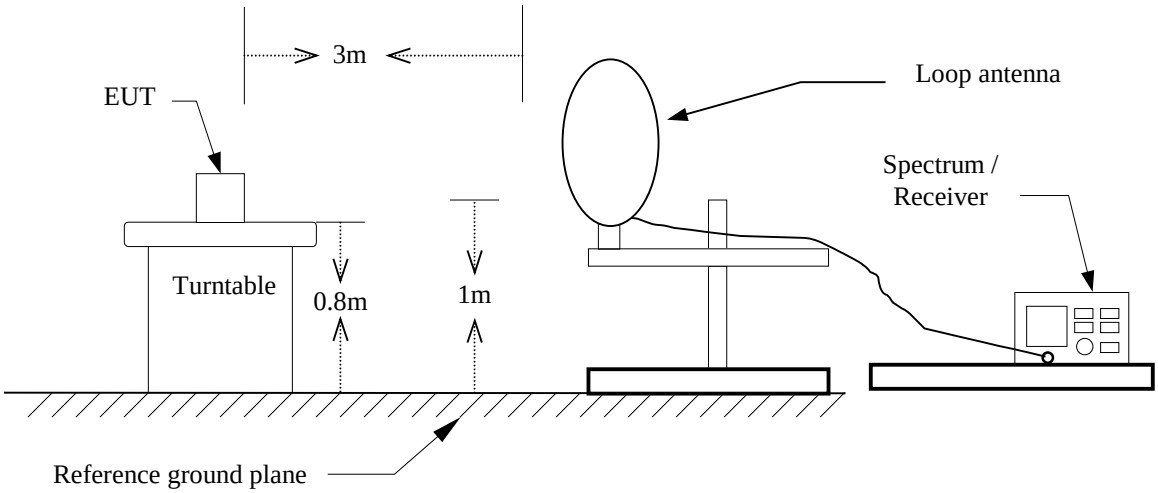
   (a)PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

   (b)AVERAGE: RBW=1MHz,
7. Repeat above procedures until the measurements for all frequencies are complete.

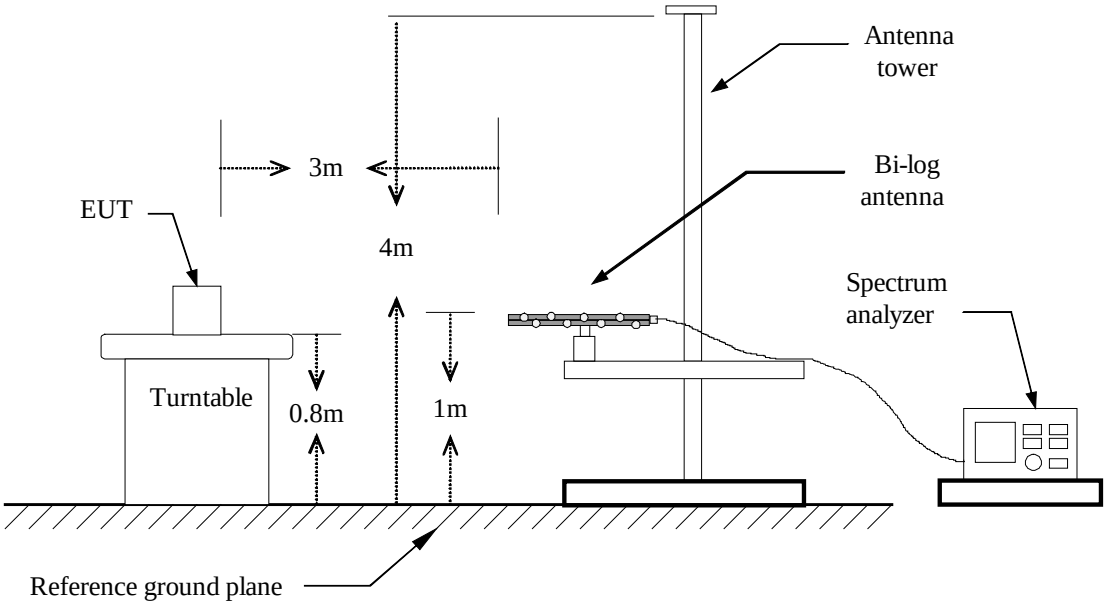
Remark.
1. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
*3. Note ***** : Duty factor reference to section 3.4 EUT DUTY CYCLE.*
Average result = Peak result + Duty factor

4.4.3 Test Setup

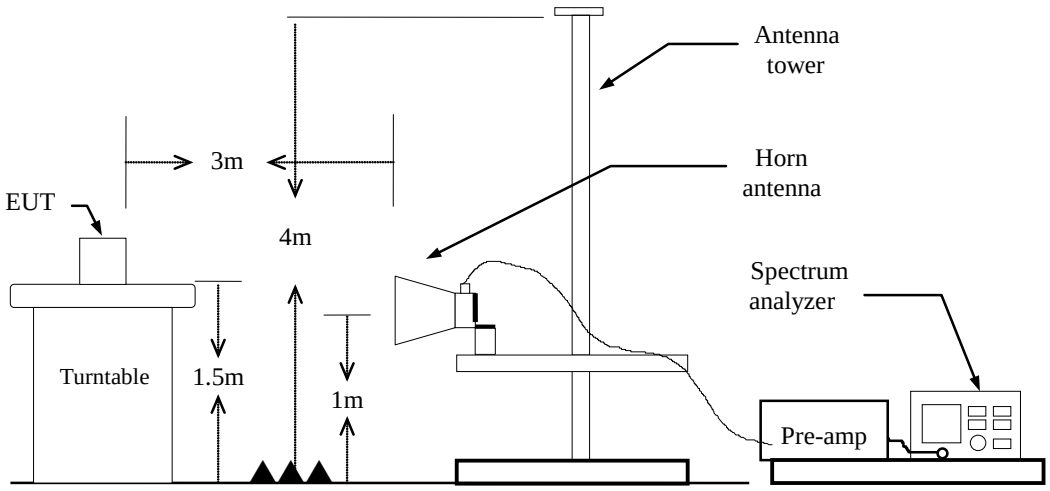
9kHz ~ 30MHz



30MHz ~ 1 GHz



Above 1 GHz



4.4.4 Test Result

Pass.

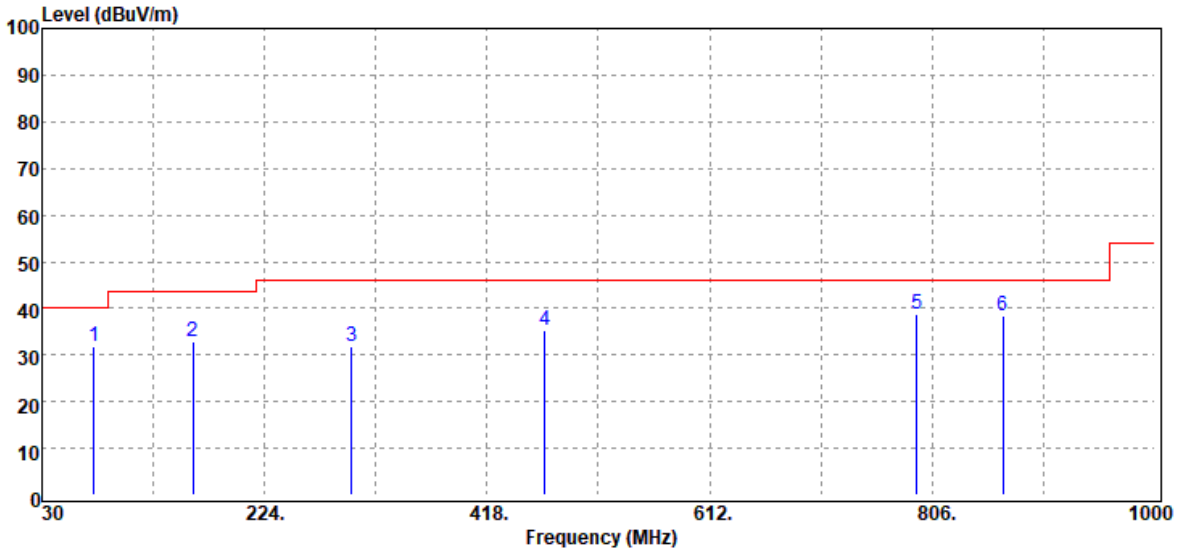
Test Data

For A3C0670340000

Below 1GHz

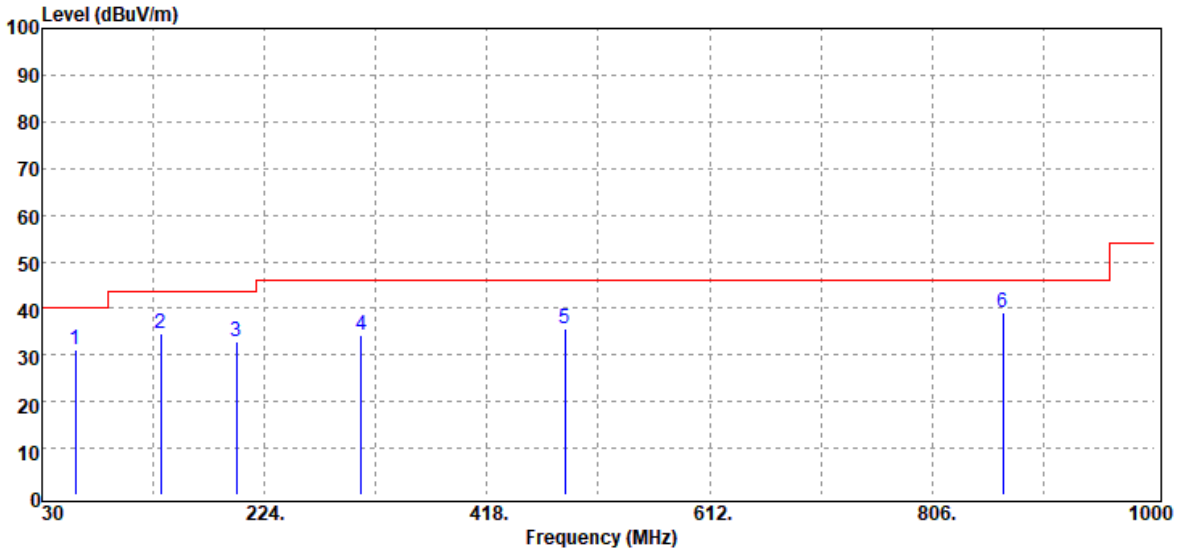
ASK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Below 1GHz	Test Date	2019/06/06
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
75.59	Peak	46.75	-14.79	31.96	40.00	-8.04
161.92	Peak	42.98	-10.23	32.75	43.50	-10.75
299.66	Peak	40.24	-8.25	31.99	46.00	-14.01
468.44	Peak	38.87	-3.44	35.43	46.00	-10.57
792.42	Peak	37.82	1.03	38.85	46.00	-7.15
867.84	Peak	35.32	2.92	38.24	46.00	-7.76

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Below 1GHz	Test Date	2019/06/06
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak		



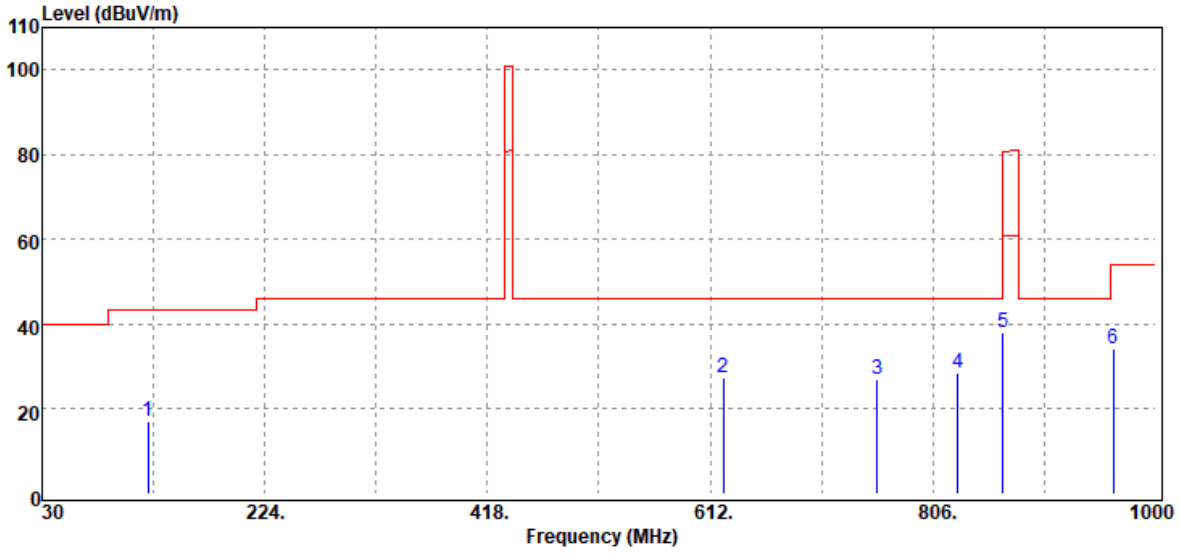
Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
59.10	Peak	47.18	-15.96	31.22	40.00	-8.78
133.79	Peak	43.85	-9.31	34.54	43.50	-8.96
199.75	Peak	42.05	-9.29	32.76	43.50	-10.74
308.39	Peak	42.31	-7.97	34.34	46.00	-11.66
485.90	Peak	38.48	-2.90	35.58	46.00	-10.42
867.84	Peak	36.19	2.92	39.11	46.00	-6.89

For A3C0670370000

Below 1GHz

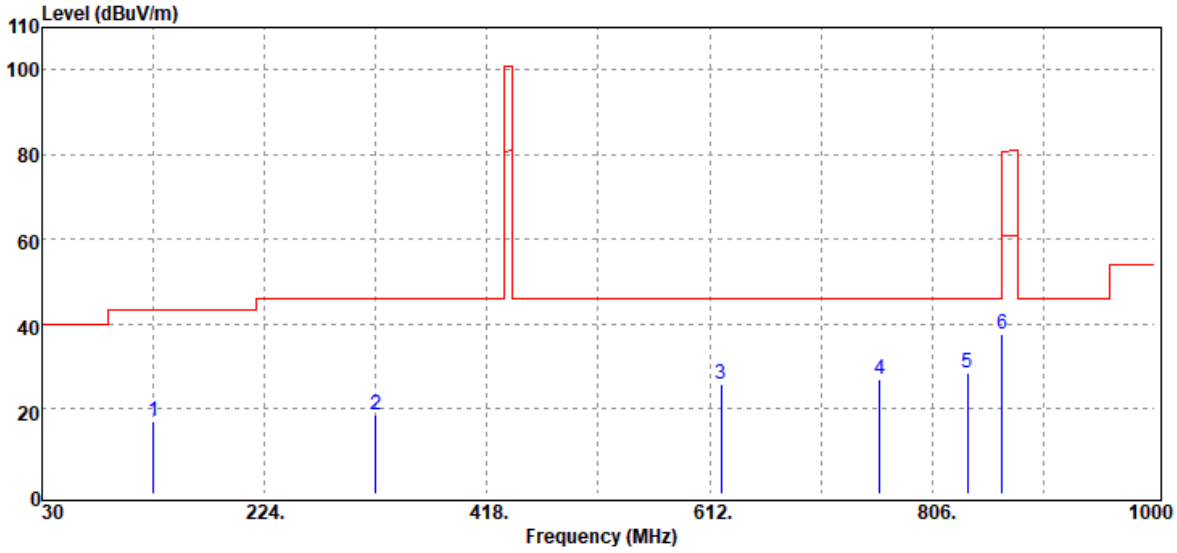
ASK

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Below 1GHz	Test Date	2020/02/13
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
122.15	Peak	25.92	-8.78	17.14	43.50	-26.36
623.64	Peak	28.05	-0.66	27.39	46.00	-18.61
757.50	Peak	24.82	2.04	26.86	46.00	-19.14
827.34	Peak	25.21	3.25	28.46	46.00	-17.54
867.11	Peak	35.37	2.87	38.24	80.81	-42.57
963.14	Peak	29.70	4.62	34.32	54.00	-19.68

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Below 1GHz	Test Date	2020/02/13
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



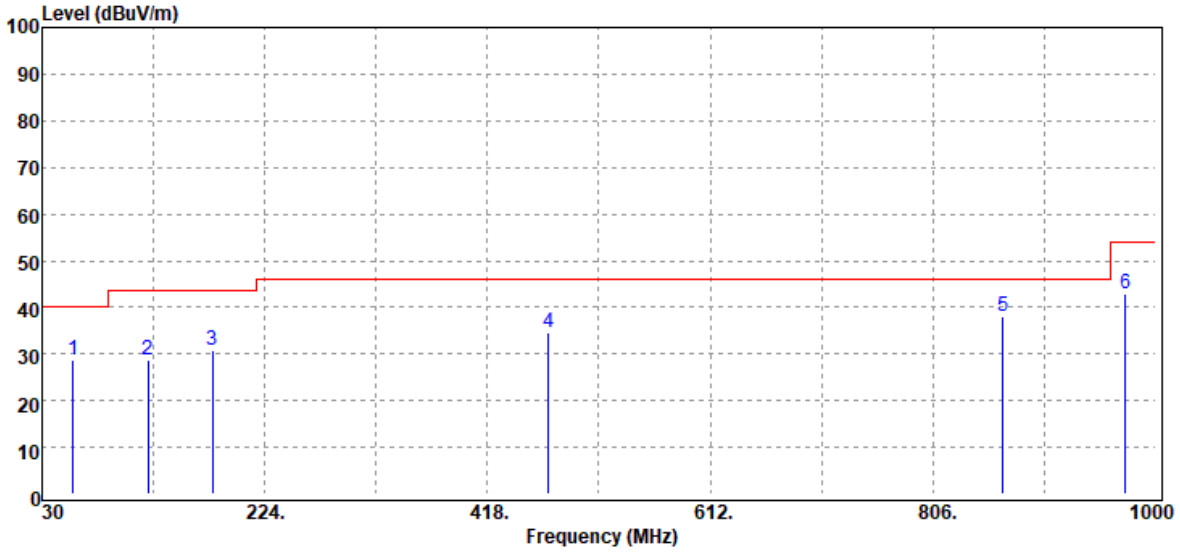
Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
127.00	Peak	25.85	-8.85	17.00	43.50	-26.50
321.00	Peak	26.16	-7.47	18.69	46.00	-27.31
621.70	Peak	26.79	-0.81	25.98	46.00	-20.02
760.41	Peak	25.16	2.03	27.19	46.00	-18.81
837.04	Peak	25.10	3.38	28.48	46.00	-17.52
867.11	Peak	34.65	2.87	37.52	80.81	-43.29

For A3C0670340000

Below 1GHz

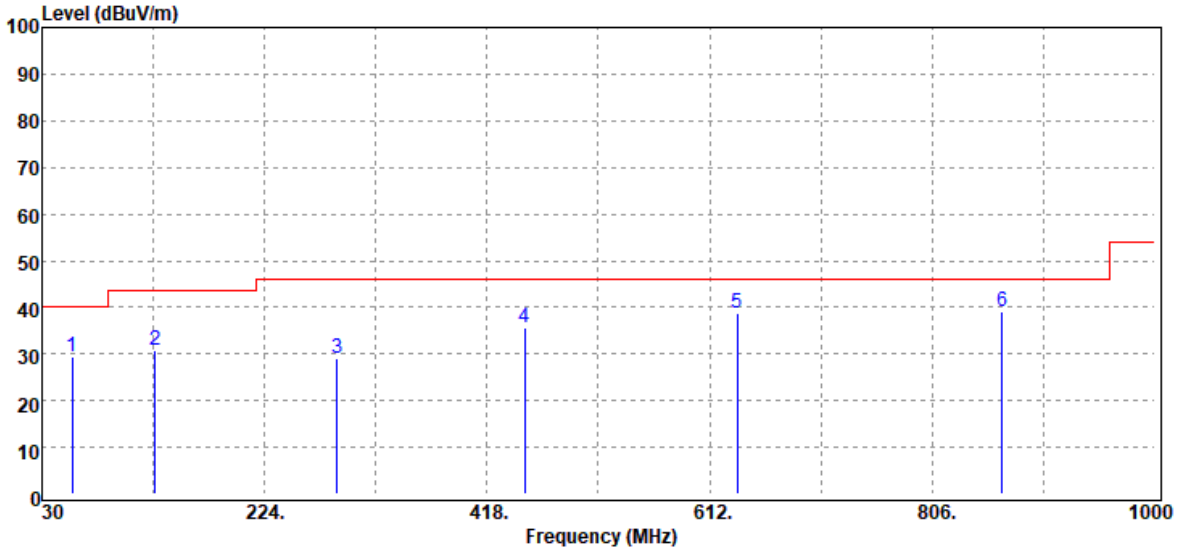
FSK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 52%RH
Test Item	Below 1GHz	Test Date	2019/06/06
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
57.16	Peak	44.71	-15.91	28.80	40.00	-11.20
122.15	Peak	37.67	-8.78	28.89	43.50	-14.61
178.41	Peak	42.02	-11.17	30.85	43.50	-12.65
471.35	Peak	37.92	-3.24	34.68	46.00	-11.32
867.32	Peak	35.15	2.88	38.03	46.00	-7.97
973.81	Peak	37.24	5.63	42.87	54.00	-11.13

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 52%RH
Test Item	Below 1GHz	Test Date	2019/06/06
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak		



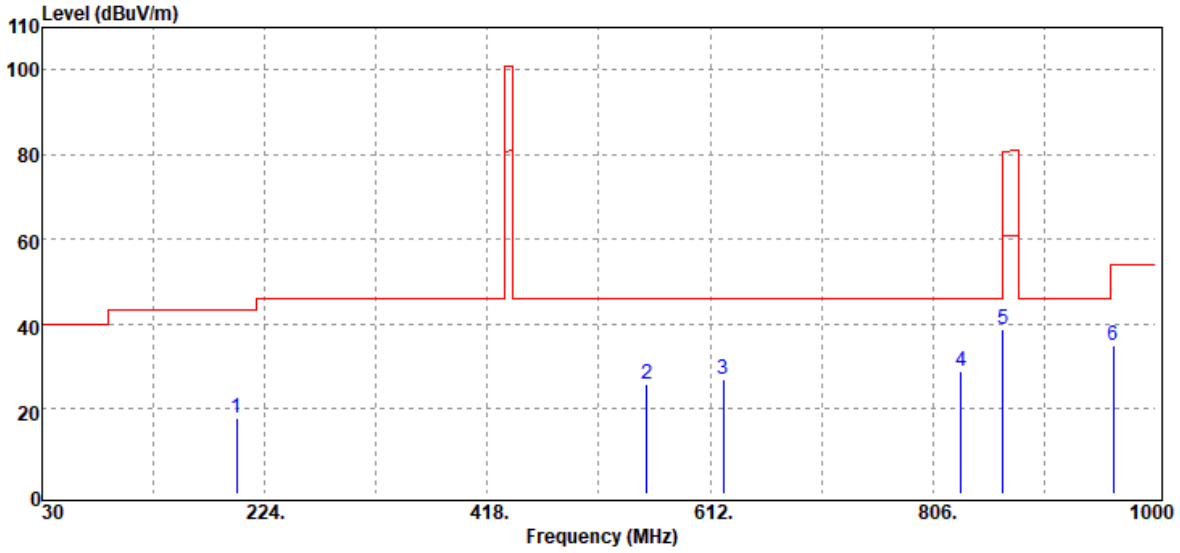
Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
56.19	Peak	45.45	-15.96	29.49	40.00	-10.51
128.94	Peak	39.69	-8.95	30.74	43.50	-12.76
287.05	Peak	37.32	-8.41	28.91	46.00	-17.09
450.98	Peak	39.70	-3.92	35.78	46.00	-10.22
636.25	Peak	39.22	-0.30	38.92	46.00	-7.08
867.32	Peak	36.14	2.88	39.02	46.00	-6.98

For A3C0670370000

Below 1GHz

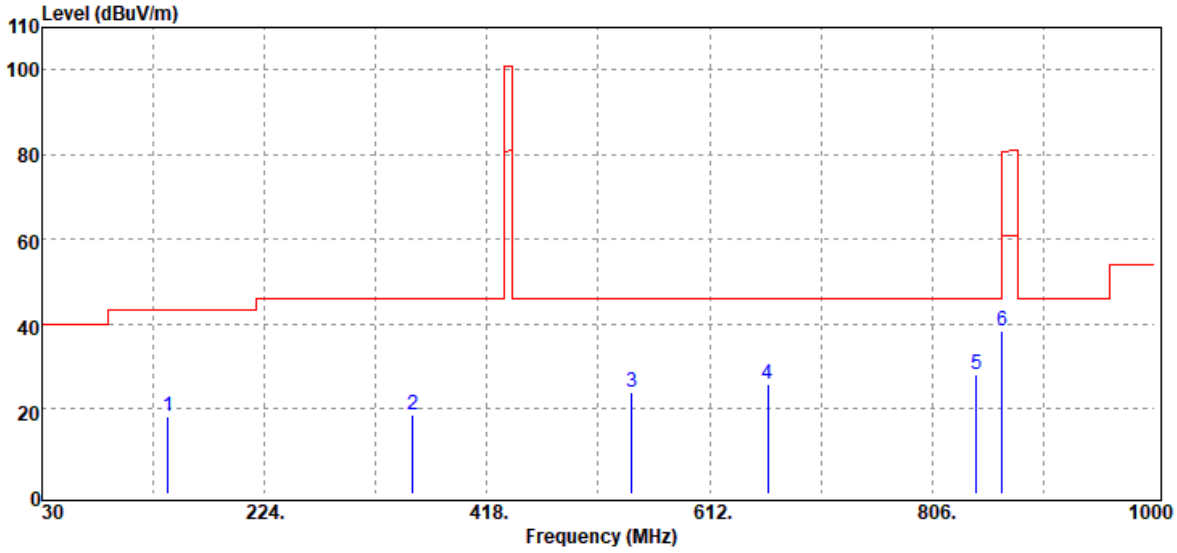
FSK

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Below 1GHz	Test Date	2020/02/13
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
199.75	Peak	27.35	-9.29	18.06	43.50	-25.44
556.71	Peak	28.23	-2.34	25.89	46.00	-20.11
623.64	Peak	27.59	-0.66	26.93	46.00	-19.07
830.25	Peak	25.61	3.28	28.89	46.00	-17.11
867.11	Peak	35.92	2.87	38.79	80.81	-42.02
963.14	Peak	30.50	4.62	35.12	54.00	-18.88

Test Mode:	TX-433MHz	Temp/Hum	21.6(℃)/ 53%RH
Test Item	Below 1GHz	Test Date	2020/02/13
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



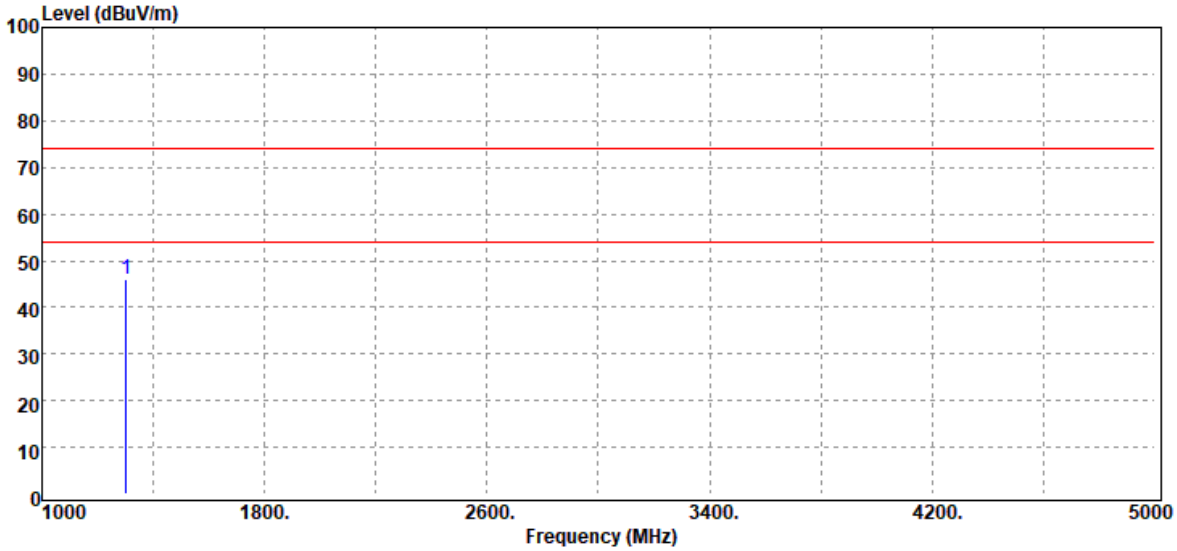
Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
139.61	Peak	27.95	-9.82	18.13	43.50	-25.37
353.01	Peak	25.68	-6.85	18.83	46.00	-27.17
544.10	Peak	26.00	-2.14	23.86	46.00	-22.14
662.44	Peak	25.98	0.01	25.99	46.00	-20.01
844.80	Peak	24.95	3.12	28.07	46.00	-17.93
867.11	Peak	35.50	2.87	38.37	80.81	-42.44

For A3C0670340000

Above 1GHz

ASK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Above 1GHz	Test Date	2019/06/06
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak		

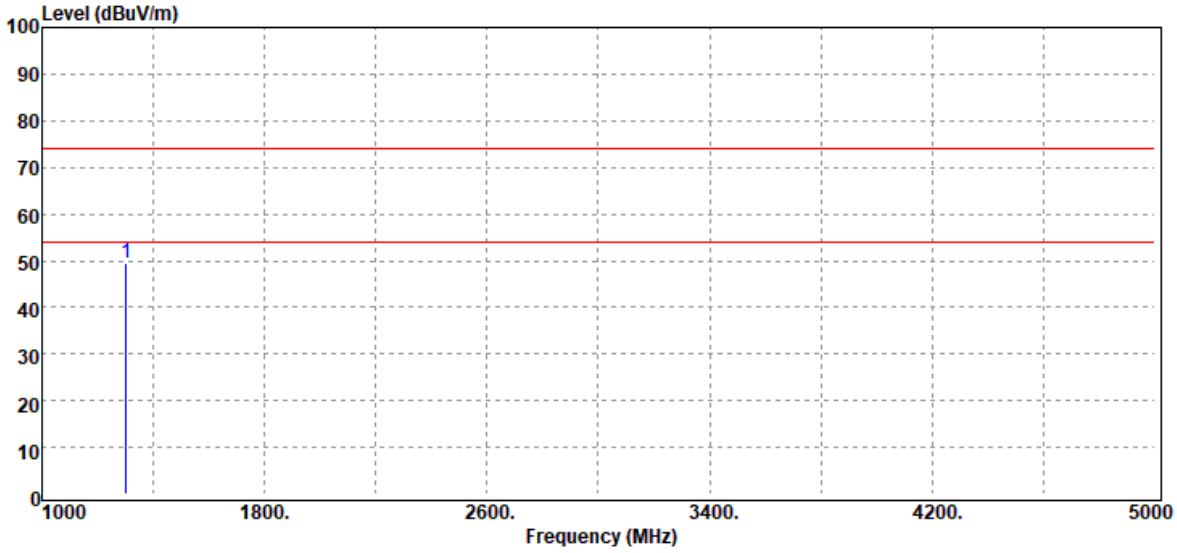


Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1301.76	Peak	54.03	-8.11	45.92	74.00	-28.08
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 51%RH
Test Item	Above 1GHz	Test Date	2019/06/06
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1301.76	Peak	57.72	-8.11	49.61	74.00	-24.39
N/A						

Remark:

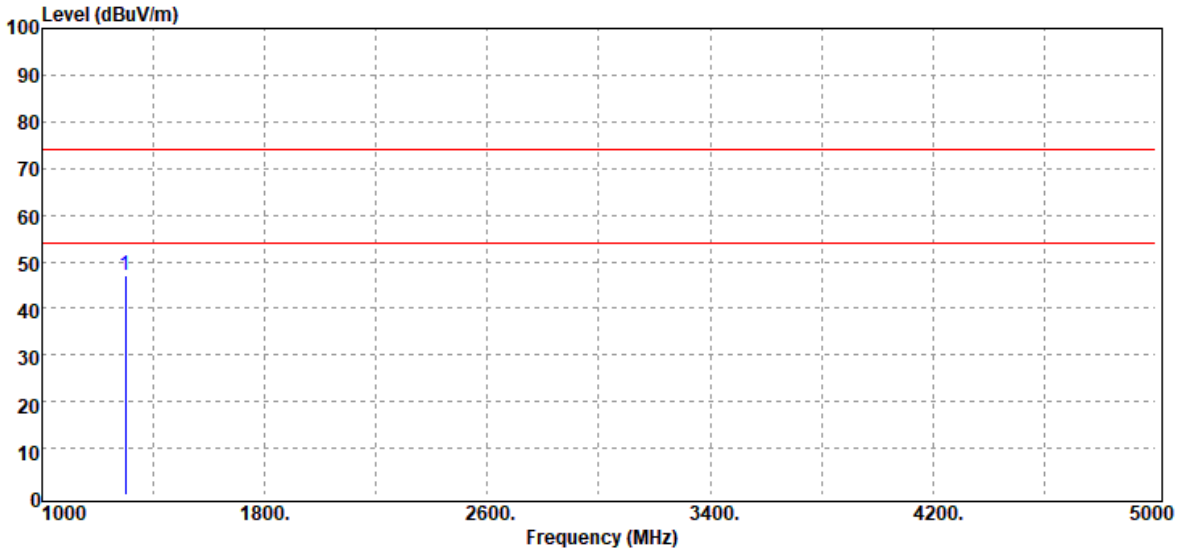
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

For A3C0670340000

Above 1GHz

FSK

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 52%RH
Test Item	Above 1GHz	Test Date	2019/06/06
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak		

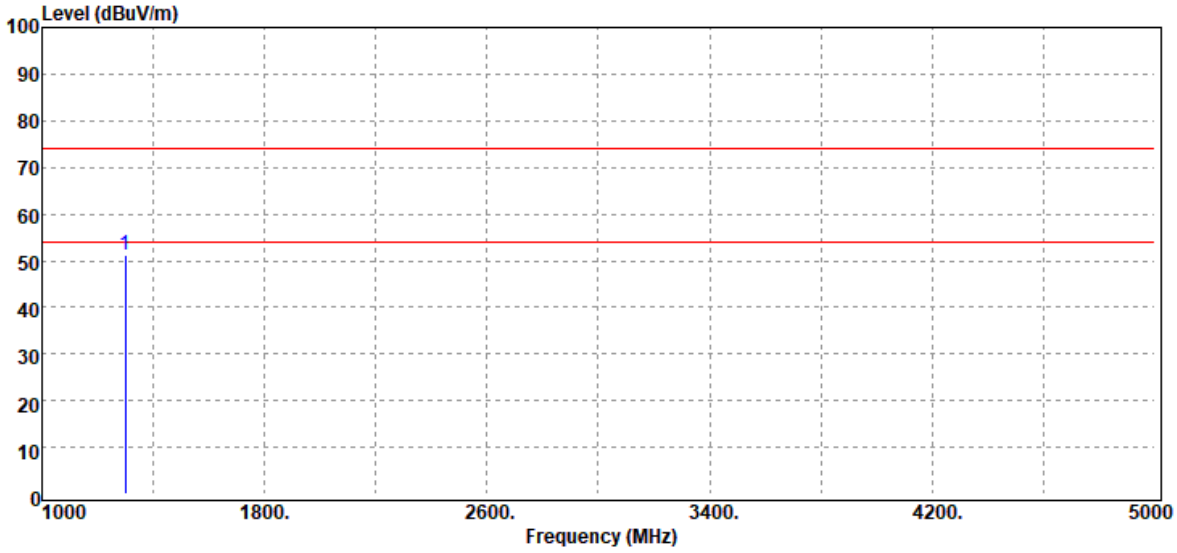


Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1300.98	Peak	55.15	-8.11	47.04	74.00	-26.96
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	TX-433MHz	Temp/Hum	24(℃)/ 52%RH
Test Item	Above 1GHz	Test Date	2019/06/06
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak		



Frequency (MHz)	Detector Mode PK/QP/AV	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
1300.98	Peak	59.15	-8.11	51.04	74.00	-22.96
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

4.5 OPERATION RESTRICTION

4.5.1 Test Limit

15.231(a)(1),

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

RSS-210 A1.2,

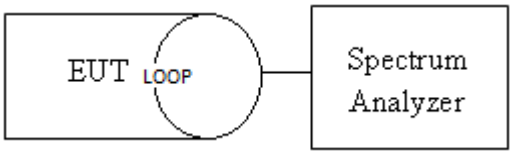
However, devices that are designed for limited use for thepurpose of initial programming, reprogramming or installing, and not forregular operations, may operate for up to 5 seconds, provided such devicesare used only occasionally in connection with each unit being programmed orinstalled.

4.5.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 7.4

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=1MHz, VBW=1MHz, Detector = Peak, Trace mode = Max hold, Sweep = 1s. Measure

4.5.3 Test Setup

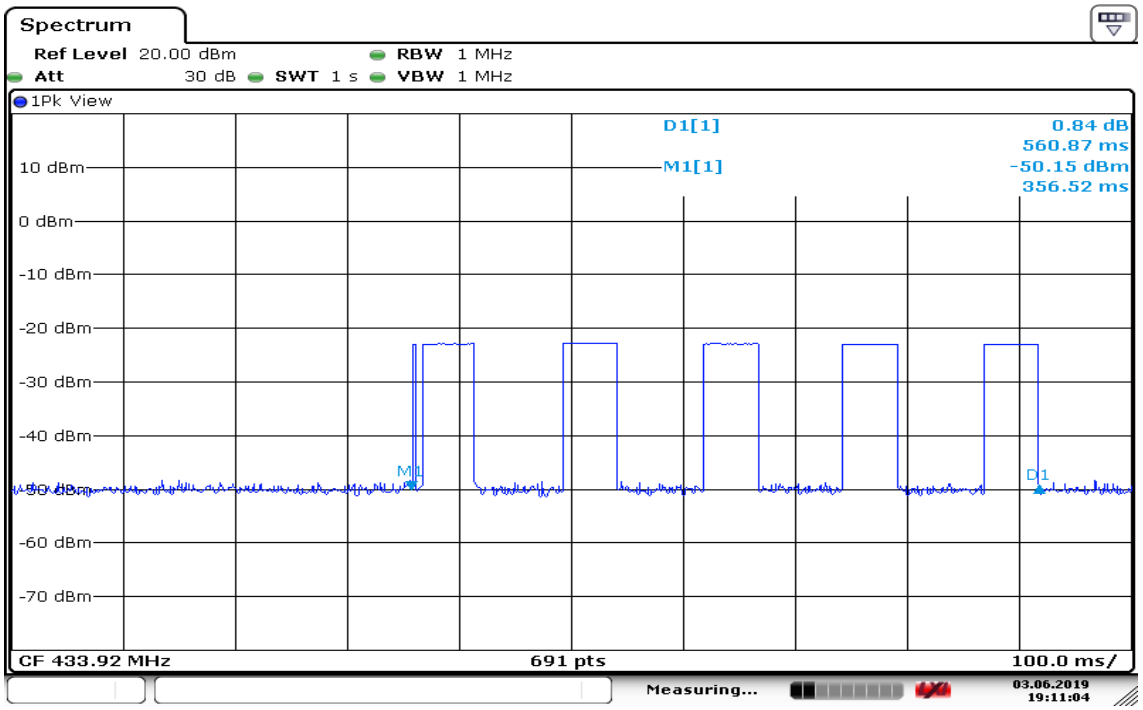


4.5.4 Test Result

Dwell Time			
Operation condition	**Pulse On Time (ms)**	**Limits**	**Result**
manually operated	560.87	5 sec	PASS

Test Data

Operation Restriction



Date: 3.JUN.2019 19:11:04

- End of Test Report -