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Report No.: T210712W01-RP Ref. No.: T210406W05-RP Rev.:

FCC RADIO TEST REPORT FCC 47 CFR PART 15 SUBPART C

Test Standard	FCC Part 15.231+ IC RSS-210 Issue 10
Trade name	Continental
Product name	Tire Pressure Monitor Sensor
Model No.	TIS-10DL
Operation Freq.	315 MHz
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:

Komil Ismi

Kevin Tsai Deputy Manager

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect page	Revised By
00	May 21, 2021	Initial Issue Note (01)	ALL	Doris Chu
01	August 17, 2021	See the following Note Rev. (01)	ALL	Doris Chu

Note (01)

1. Applicant change LF coil pad size, Battery hole enlargement, as per customer requested to verify radiated test data below 1GHz, above 1GHz.

Rev. (01)

1. SW change of data rate & change the averaging factor to -13.5dB, and only re-test duty cycle and radiation.

2.Other information, please refer to the T210406W05 and this test report.



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

FCC Applicant / Manufacturer	Continental Automotive GmbH Siemensstrasse 12 SV C TS RBG EMC-Laboratory Regensburg, 93055 Germany
IC Applicant / Manufacturer	Continental Automotive GmbH Siemensstrasse 12 Regensburg 93055 Germany (Federal Republic Of)
Equipment	Tire Pressure Monitor Sensor
Model Name	TIS-10DL
Model Discrepancy	N/A
Original EUT Receive Date	April 6, 2021
1st Update Received Date	July 12, 2021
Original Date of Test	April 20 ~ May 7, 2021
1st Update Date of Test	August 5, 2021
Periodic operation	 (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.
Power Operation	DC 3V (Power by Battery)
Operation Frequency	315 MHz
S/W Version	N/A
H/W Version	N/A
EUT serial #	0001
Remark:	·

Remark:

1. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.



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1.2 EUT CHANNEL INFORMATION

Frequency Range	315 MHz
Modulation Type	FSK & ASK
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	Integral antenna
Antenna Gain	-22 dBi
Antenna Connector	N/A



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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.



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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, Taiwan. (R.O.C.) CABID: TW1309

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

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

Original:

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2021	02/24/2022
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
High Pass Filter	SOLVANG TECHNOLOGY INC.	STI15	9923	02/25/2021	02/24/2022
Loop Ant	COM-POWER	AL-130	121051	04/07/2021	04/06/2022
Pre-Amplifier	EMEC	EM330	060609	02/25/2021	02/24/2022
Pre-Amplifier	HP	8449B	3008A00965	02/25/2021	02/24/2022
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	07/23/2021
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.



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Update:

RF Conducted Test Site						
Name of Equipment	Name of Equipment Manufacturer Model Serial Number Calibration Calibration					
Signal Analyzer	R&S	FSV 40	101073	09/16/2020	09/15/2021	
Software			N/A			

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Bilog Antenna	Sunol Sciences	JB3	A030105	07/19/2021	07/18/2022
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2021	02/24/2022
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
High Pass Filter	SOLVANG TECHNOLOGY INC.	STI15	9923	02/25/2021	02/24/2022
Loop Ant	COM-POWER	AL-130	121051	04/07/2021	04/06/2022
Pre-Amplifier	EMEC	EM330	060609	02/25/2021	02/24/2022
Pre-Amplifier	HP	8449B	3008A00965	02/25/2021	02/24/2022
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021
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.



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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.



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2. TEST SUMMARY

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	Not applicable
15.231(b)	RSS-210 A.1.4	4.3	Field Strength of Fundamental	Pass
15.209(b)	RSS-GEN Sec. 8.9	4.4	Transmitter Radiated Emission	Pass
15.231(a)(1)	RSS-210 A.1.2	4.5	Operation Restriction	Not applicable



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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	315 MHz
RF Filed strength	Original: FSK <u>Peak: 75.16 dBuv/m</u> <u>Average : 56.08 dBuv/m</u> Update: FSK <u>Peak: 75.39 dBuv/m</u> <u>Average : 62.12 dBuv/m</u> <u>ASK</u> <u>Peak: 75.34 dBuv/m</u> <u>Average : 62.07 dBuv/m</u>

Remark: Field strength performed Average level at 3m.

3.2 THE WORST MODE OF MEASUREMENT

Original:

Radiated Emission Measurement Above 1G				
Test Condition	Test Condition Radiated Emission Above 1G			
Power supply Mode	Mode 1: EUT power by Battery			
Worst Mode	Worst Mode 🛛 🖄 Mode 1 🗌 Mode 2 🗌 Mode 3 🗌 Mode 4			
Worst Position Image: Construct of the second state of the s				

Radiated Emission Measurement Below 1G					
Test Condition	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, for radiated measurement. The worst case(X-Plane) were recorded in this report



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Update:

Radiated Emission Measurement Above 1G				
Test Condition	Test Condition Radiated Emission Above 1G			
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) 			

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, for radiated measurement. The worst case(X-Plane) were recorded in this report



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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

¹Linear 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 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.



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(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

¹Linear 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.

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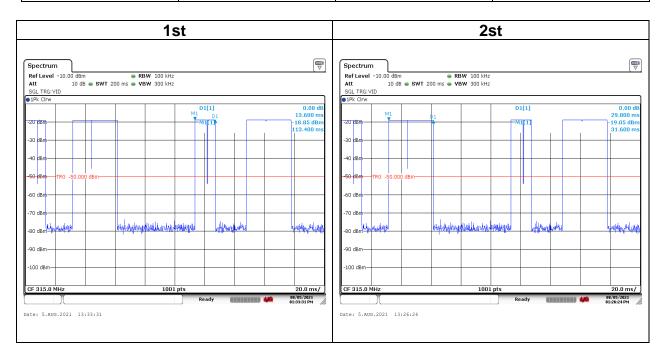
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3.4 EUT DUTY CYCLE

Update:

Temperature:	20.8 ~ 25.6°C	Test date:	August 5, 2021
Humidity:	43 ~ 56% RH	Tested by:	Jerry Chang

Duty Cycle				
TX ON (ms)	TX All(ms)	Duty Cycle	Duty Factor(dB)	
21.70	100.00	21.70%	-13.27	



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])
- ASK duty cycle = 50%
 1st frame
 Frame duration(max) =13.6*0.5=6.8 ms

2nd Frame duration(max) =29.8*0.5=14.9 ms

Total frames duration in a 100ms window =6.8+14.9=21.7 ms Averaging Factor = 20*log(Frame duration/100ms) Averaging Factor =-13.27



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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	Limits(dB	μV)
(MHz)	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

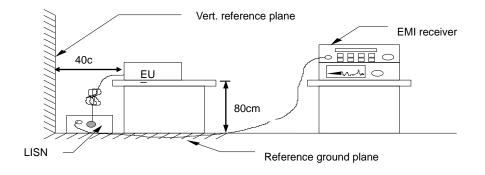
* Decreases with the logarithm of the frequency.

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, because EUT doesn't connect to AC Main Source direct.



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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 %

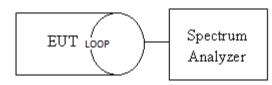
4.2.2 Test Procedure

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 = $1\% \sim 5\%$ 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

Not applicable. The EUT only verify radiation emission test data.



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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 spurious emission (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.1.4

Table A2 — Reduced 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	500				
130-174	500 to 1,500*				
174-260**	1,500				
260-470**	1,500 to 5,000*				
Above 470	5,000				

Note:

* Linear interpolation with frequency, f, in MHz:

For 130-174 MHz: Field Strength (μ V/m) = (22.73 x f)-2454.55

For 260-470 MHz: Field Strength (μ V/m) = (16.67 x f)-2833.33

**: 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

	4.1.4.2.2: Measurement Peak value.
clause 4.1.4	4.1.4.2.3: Duty cycle ≥ 100%.
	A.1.4.2.4: Measurement Average value.

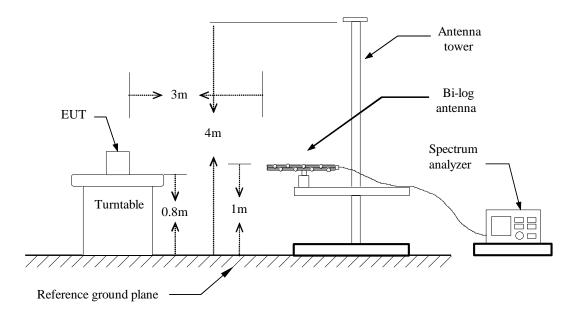


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4.3.3 Test Setup





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4.3.4 Test Result

-				
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U	п	411	۱a	
_				

Temperature:	22.6 ℃	Test date:	May 7, 2021
Humidity:	59% RH	Tested by:	Ray Li

FSK

		Field Strength			
Frequency (MHz)	Fundamental (dBuV/m) at 3m	Limit (dBuV/m) at 3m	Margin (dB)	Axis/Pol.	Remark
314.96	56.08	67.66	-11.58	X/V	AVG

Remark:

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

2. Average result = Peak result + Duty factor = 75.16 dBuV/m - 19.08= 56.08dBuV/m

3. 260MHz ~ 470MHz limit is 16.67 * (Frequency, MHz) – 2833.33

Limit = 16.67 * (314.96 MHz) - 2833.33 = 2417.0532 (uV/m)

dBuv/m = 20 Log(uV/m) = 20 Log (2417.0532 uV/m)= 67.66dBuV/m



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Update:				
Temperature:	23.9 °C	Test date:	August 5, 2021	
Humidity:	66% RH	Tested by:	Jerry Chang	

FSK

		Field Strength			
Frequency (MHz)	Fundamental (dBuV/m) at 3m	Limit (dBuV/m) at 3m	Margin (dB)	Axis/Pol.	Remark
314.96	62.12	67.66	-5.54	X/V	AVG

Remark:

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

2. Average result = Peak result + Duty factor = 75.39 dBuV/m - 13.27= 62.12dBuV/m

3. 260MHz ~ 470MHz limit is 16.67 * (Frequency, MHz) - 2833.33

Limit = 16.67 * (314.96 MHz) – 2833.33

= 2417.0532 (uV/m)

dBuv/m = 20 Log(uV/m) = 20 Log (2417.0532 uV/m)= 67.66dBuV/m

ASK

		Field Strength			
Frequency (MHz)	Fundamental (dBuV/m) at 3m	Limit (dBuV/m) at 3m	Margin (dB)	Axis/Pol.	Remark
314.96	62.07	67.66	-5.59	X/V	AVG

Remark:

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

2. Average result = Peak result + Duty factor = 75.34 dBuV/m - 13.27= 62.07dBuV/m

3. 260MHz ~ 470MHz limit is 16.67 * (Frequency, MHz) – 2833.33

Limit = 16.67 * (314.96 MHz) - 2833.33= 2417.0532 (uV/m)

dBuv/m = 20 Log(uV/m) = 20 Log (2417.0532 uV/m)= 67.66dBuV/m



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Test Data

Original: FSK

Test Mode:			315MHz		np/Hum	22.6(°C)/		
	Test Item		Fundamental		Test Date May 7, 2			
	Axis/Polarize	e X-Plane/Ver. Test Engineer		Ray	' Li			
	Detector		Peak & AVG					
440	Level (dBuV/m)							
100			·					
80								
60	Mm					AM	0.00	
	N YWW					1	ull u	
40								
20								
0	314.8	314.88	314.96 Frequency (315.04 MHz)	3	315.12	315.2	
0	314.8	314.88			3	115.12	315.2	
0 No	314.8 Frequency (MHz)	314.88 Detector Mode (PK/QP/AV)			Actual FS (dBuV/m)	Limit @3m (dBuV/m)	315.2 Margir (dB)	

*Note:

2

314.96

Average

No.2 Average result = Peak result + Duty factor = 75.16 dBuV/m -19.08= 56.08 dBuV/m

-

-19.08

56.08

67.66

-11.58



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Report No.: T210712W01-RP Ref. No.: T210406W05-RP

Rev.: 01

Test Mode: Test Item			315MHz Fundamental		mp/Hum est Date	22.6(℃)/ May 7,	
	Axis/Polarize		X-Plane/Hoz.		Engineer	Ray	
	Detector			Linginoon	i	<u> </u>	
110 100 80 60 40			1				MM
20 0	314.8	314.88	314.96 Frequency	315.04 (MHz)	3	15.12	315.2
	Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
No		Delector		1 actor			wa gin
No	(MHz)	Mode (PK/QP/AV)	Reading Level (dBuV)	(dB)	FS (dBuV/m)	@3m (dBuV/m)	(dB)
No 1				(dB) -7.59	-	-	(dB) -19.03



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Report No.: T210712W01-RP Ref. No.: T210406W05-RP

Rev.: 01

Update: FSK

<u> </u>	·						
	Test Mode:		315MHz	Te	mp/Hum	23.9(°C)/	66%RH
	Test Item		Fundamental		est Date	August 5, 2021	
	Axis/Polarize	Э	X-Plane/Ver.	Test	t Engineer	Jerry C	
	Detector		Peak & AVG				
	Level (dBuV/m)						
100				· · · · · · · · · · · · · · · · · · ·			
80							
			2				
60	and the second s						
							m
40			·				
20							
0	314.8	314.88	314.96	315.04	:	315.12	315.2
			Frequency				
No	Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
NU	requeitcy	Mode	Reading Level	racion	FS	@3m	wargin
	(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
1	314.96	Peak	83.33	-7.94	75.39	87.66	-12.27
2	314.96	Average	-	-13.27	62.12	67.66	-5.54

*Note:

No.2 Average result = Peak result + Duty factor = 75.39 dBuV/m -13.27= 62.12 dBuV/m



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Rev.: 01

	Test Mode:		315MHz		mp/Hum	23.9(°C)/ 66%R	
	Test Item		Fundamental	Te	est Date	August 5, 202	
	Axis/Polarize	е	X-Plane/Hoz.		Engineer	Jerry C	Chang
	Detector		Peak & AVG				
110	Level (dBuV/m)						
100)						
80)						
60			2		~~~~~		
40)				·····	marrie and	in the second
20)						
0	0 314.8	314.88	314.96 Frequency	315.04 (MHz)	3	315.12	315.2
C	314.8	314.88			3	315.12	315.2
	Frequency	Detector Mode	Frequency Spectrum Reading Level	(MHz) Factor	Actual FS (dBuV/m)	Limit @3m	Margir
No	314.8	Detector	Frequency Spectrum	(MHz)	Actual FS	Limit	315.2 Margir (dB) -21.08



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VCK

0	Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margir (dB)
0	314.8	314.88	314.96 Frequency	315.04 (MHz)	. 3	15.12	315.2
20							
20							
40						· - 1 · - 1 · - 1 ·	
00	www.www.						a march
60		~~~~		2			A
80							
100							
	Level (dBuV/m)						
	Detector		Peak & AVG				
	Axis/Polarize		X-Plane/Ver.		Engineer	Jerry C	
	Test Mode: Test Item		315MHz Fundamental		mp/Hum st Date	23.9(°C)/ 66%R August 5, 202	

*Note:

No.2 Average result = Peak result + Duty factor = 75.34 dBuV/m -13.27= 62.07dBuV/m



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est Item s/Polarize etector (dBuV/m)		Fundamental X-Plane/Hoz. Peak & AVG		est Date Engineer	August & Jerry C	
etector			Test	Engineer	Jerry C	hang
		Peak & AVG				
(dBuV/m)						
		i				
word	~~~~	2				
mum					and the second	rma
			· · · · · · · · · · · · · · · · · · ·			
	314.88	314.96	315.04	3	15.12	315.2
		Frequenc	y (MHz)			
	-					
equency			Factor			Margir
(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
314.98	Peak	74.25	-7.94	66.31	87.66	-21.35
314.98	Average	-	-13.27	53.04	67.66	-14.62
	equency (MHz) 314.98 314.98	equency Detector Mode (MHz) (PK/QP/AV) 314.98 Peak	FrequencyDetectorSpectrumModeReading Level(MHz)(PK/QP/AV)314.98Peak74.25	Frequency (MHz)equencyDetector Mode (PK/QP/AV)Spectrum Reading Level (dBuV)Factor (dB)314.98Peak74.25-7.94	Frequency (MHz)equencyDetectorSpectrum Reading Level (dBuV)FactorActual FS (dB)(MHz)(PK/QP/AV)(dBuV)(dB)(dBuV/m)314.98Peak74.25-7.9466.31	Frequency (MHz)equencyDetectorSpectrumFactorActualLimitModeReading Level(dB)(dBuV/m)@3m(MHz)(PK/QP/AV)(dBuV)(dB)(dBuV/m)(dBuV/m)314.98Peak74.25-7.9466.3187.66



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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 A1.4 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.

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (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 §15.231(b)

¹Linear interpolations.

Below 30MHz

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



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Ref. No.: T210406W05-RP Rev.:

4.4.2 Test Procedure

Test method Refer as ANSI 63.10:2013

☑ Unwanted Emission
☑ Unwanted 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.
= S

- 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.

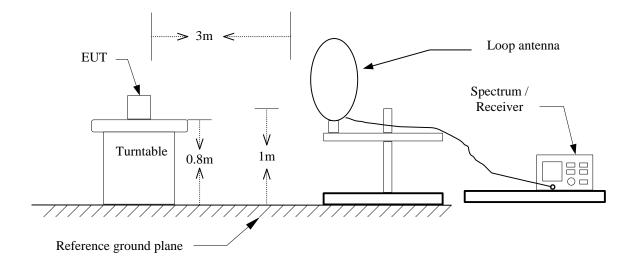
1. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

2. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

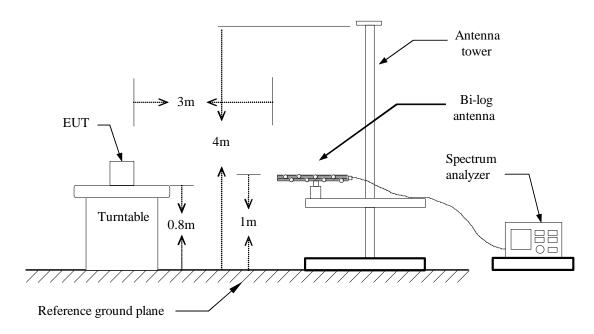


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4.4.3 Test Setup <u>9kHz ~ 30MHz</u>



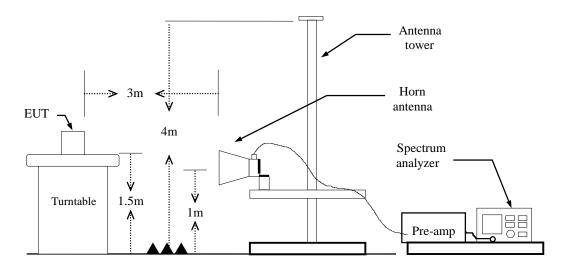






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<u>Above 1 GHz</u>



4.4.4 Test Result

<u>Pass.</u>



Test Data

Original:

Below 1GHz

Test Moo Test Ite		FSK_315MHz Below 1GHz	Temp/Hu Test Dat		<u>)/ 51%RF</u> 20, 2021
Polariz		Vertical	Test Engir		20, 2021 Ray Li
Detecto		Peak	root Erigi		
120 Level (dBuV/i	m)				
110					
90					
70					
50			5		6
30	2 3	4			
10					
0 <mark></mark> 30	224.	418. Freque	612. ncy (MHz)	806.	1000

Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
112.45	Peak	43.34	-10.02	33.32	43.50	-10.18
170.65	Peak	43.67	-10.99	32.68	43.50	-10.82
279.29	Peak	36.12	-8.68	27.44	46.00	-18.56
453.89	Peak	33.94	-4.20	29.74	46.00	-16.26
629.46	Peak	36.36	0.20	36.56	46.00	-9.44
963.14	Peak	33.56	4.11	37.67	54.00	-16.33



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Test Mod	de:	FSK_315MHz	Te	emp/Hum	21.9(°C)/ 51%R⊦		
Test Ite	m	Below 1GHz		Test Date	April 20, 2021		
Polariz	е	Horizontal	Tes	st Engineer	Ray	/ Li	
Detecto	or	Peak					
120 Level (dBuV)	(m)						
90							
70							
50	J					6	
30		3	4	5			
10		· · · · · · · · · · · · · · · · · · ·					
0 <mark></mark>	224.	418. Frequ	61. Jency (MHz)	2.	806.	1000	
Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margir (dB)	
78.50	Peak	33.37	-15.33	18.04	40.00	-21.96	
112.45	Peak	33.34	-10.02	23.32	43.50	-20.18	
390.84	Peak	28.25	-6.30	21.95	46.00	-24.05	
390.04		27.87	-3.28	24.59	46.00	-21.41	
502.39	Peak	21.01				1	
	Peak Peak	29.56	0.20	29.76	46.00	-16.24	



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Above 1GHz

Frequency	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
1000	1000.		uency <mark>(MHz)</mark>		12001	3000
01000	1800.	2600.		3400.	4200.	5000
10						
50						
30	2	Ĭ				
50		3				
			4			
70						
90						
110						
120 Level (dBuV/	m)					
Detecto		Peak		<u> </u>		.,
Polariz		Vertical		Test Engineer	Ray Li	
Test Ite		Above 1GHz		Test Date	April 21, 2021	
Test Mo	de.	FSK_315MHz		Temp/Hum	21.9(°C)/ 51%R	

Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
1260.00	Peak	44.45	-6.03	38.42	74.00	-35.58
1575.00	Peak	41.72	-4.83	36.89	74.00	-37.11
2835.00	Peak	38.86	0.59	39.45	74.00	-34.55
3150.00	Peak	49.06	1.58	50.64	74.00	-23.36
N/A						



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Above 1C Horizont Peak	tal 4	Test Date Test Enginee		21, 2021 Ray Li
Peak		3400.	er R	Ray Li
	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260	0.		4200.	5000
0. 260			4200.	5000
00. 2600			4200.	5000
00. 2600			4200.	5000
	Frequency (MH)	Z)		
tor Spectrur le Reading Le 2/AV) (dBuV)	evel	FS	@3m	Margir
k 43.89	-6.0		74.00	-36.14
k 41.40	-4.8		74.00	-37.43
k 36.14	0.59		74.00	-37.27
k 47.85			74.00	-24.57
	k 47.85	k 47.85 1.58	k 47.85 1.58 49.43	k 47.85 1.58 49.43 74.00



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Update:

Below 1GHz

391.81

547.01

808.91

975.75

Peak

Peak

Peak

Peak

26.40

25.65

25.71

25.18

	-						
Test Mo	ode:	FSK_315MHz		Temp/Hum	23.9(°C)/	′ 66%RF	
Test Ite	em	Below 1GHz		z Test Date Au		August 5, 2021	
Polariz		Vertical	Vertical Test Engineer Je			Jerry Chang	
Detect	tor	Peak					
120 Level (dBu)	//m)						
110							
90							
70							
50		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
30	0		4		5	6	
1	2	3					
10				- 4			
0	224.	418.		612.	806.	1000	
	ELT.		uency (MHz)		0001	.500	
Frequency	Detector	Spectrum	Factor	Actual	Limit	Margir	
	Mode	Reading Level		FS	@3m		
(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
109.54	Peak	30.48	-10.52	19.96	43.50	-23.54	
133.79	Peak	31.33	-9.36	21.97	43.50	-21.53	

-6.27

-1.87

1.87

4.61

20.13

23.78

27.58

29.79

46.00

46.00

46.00

54.00

-25.87

-22.22

-18.42

-24.21



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Test Mo	de:	FSK_315MHz		emp/Hum	23.9(°C)/ 66%Rŀ		
Test Ite	m	Below 1GHz	-	Fest Date	August	ust 5, 2021	
Polariz	e	Horizontal	Tes	st Engineer	Jerry (hang	
Detecto	or	Peak					
120 Level (dBuV	/m)						
110							
90							
70							
50	J						
30	2	3	4		5	6	
10							
0 <mark>30</mark>	224.	418. Frea	i 61 Jency (MHz)	2.	806.	1000	
Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	
42.61	Peak	31.90	-11.59	20.31	40.00	-19.69	
	Peak	26.96	-9.06	17.90	43.50	-25.60	
124.09			-6.55	19.77	46.00	-26.23	
124.09 379.20	Peak	26.32			1	-	
124.09 379.20 531.49	Peak Peak	26.32 27.00	-2.37	24.63	46.00	-21.37	
379.20				24.63 28.62	46.00 46.00	-21.37 -17.38	



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Above 1GHz

N/A

Test Mo		FSK_315MHz		Temp/Hum	23.9(°C)/ 66%R⊦	
Test Ite		Above 1GHz		Test Date	August 5, 2021	
Polariz		Vertical	Te	est Engineer	Jerry (Chang
Detect	or	Peak				
120 <mark>Level (dBuV</mark>	/m)					
110						
110			1			
90						
70						
50			2	3	4	5
30						
10				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
01000	1800.	2600.	34	: I: 400.	4200.	5000
		-	uency (MHz)			
Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
(8411_)	Mode	Reading Level		FS	@3m	(
(MHz) 1260.00	(PK/QP/AV) Peak	(dBuV) 41.47	(dB)	(dBuV/m) 35.44	(dBuV/m) 74.00	(dB) -38.56
3148.00	Peak		-6.03	45.49	74.00	
3780.00	Peak	43.92 40.45	1.57 8.81	45.49	74.00	-28.51 -24.74
4408.00	Peak	39.69	5.41	49.26	74.00	-24.74
4728.00	Peak	44.66	6.33	50.99	74.00	-28.90
4120.00	reak	44.00	0.33	50.99	74.00	-23.01



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Test Mode:		FSK_315MHz		emp/Hum	23.9(℃)/ 66%RH	
Test Ite		Above 1GHz		Test Date	August 5, 2021	
Polariz	е	Horizontal		st Engineer	Jerry C	Chang
Detecto	or	Peak				
120	(m)					
110						
90						
70						
50			2	3	5	6
30						
10						
0 <mark></mark> 1000	1800.	2600. Frequ	34 Jency (MHz)	00.	4200.	5000
Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
(MHz)	Mode (PK/QP/AV)	Reading Level (dBuV)	(dB)	FS (dBuV/m)	@3m (dBuV/m)	(dB)
1260.00	Peak	41.08	-6.03	35.05	74.00	-38.95
	Peak	42.53	1.57	44.10	74.00	-29.90
3148.00			2.68	40.40	74.00	-33.60
3148.00 3468.00	Peak	37.72	2.00			
	Peak Peak	37.72 40.09	8.81	48.90	74.00	-25.10
3468.00	-					-25.10 -28.66



Peak

948.59

25.84

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-15.33

46.00

Below 1GHz

1 - 0004	
August 5, 2021	
Chang	
6	
6	
6	
6 1000	
1000	
1000	
1000 Margir	
1000 Margir (dB)	
1000 Margir (dB) -24.57	
1000 Margir (dB) -24.57 -23.19	

4.83

30.67



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Test Mod	de:	ASK_315MHz		emp/Hum	23.9(°C)/ 66%RH		
Test Ite	m	Below 1GHz		Test Date	August 5, 2021		
Polariz	e	Horizontal	Tes	st Engineer	Jerry Chang		
Detecto	or	Peak					
120 Level (dBuV	/m)						
90							
70							
50	I						
30		3	4		5	6	
10							
0 <mark>_1</mark> 30	224.	418. Frequ	61 Jency (MHz)	2.	806.	1000	
Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin	
(MHz)	Mode (PK/QP/AV)	Reading Level (dBuV)	(dB)	FS (dBuV/m)	@3m (dBuV/m)	(dB)	
42.61	Peak	31.46	-11.59	19.87	40.00	-20.13	
12.01			-9.11	19.09	43.50	-24.41	
120.21	Peak	28.20	-9.11				
	Peak Peak	28.20 26.52	-6.48	20.04	46.00	-25.96	
120.21					46.00 46.00	-25.96 -22.27	
120.21 382.11	Peak	26.52	-6.48	20.04			



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74.00

-22.81

Above 1GHz

4728.00

Peak

44.86

Test Mo	ode:	ASK_315MHz			23.9(°C)/ 66%R⊦					
Test Ite	em			Above 1GHz Test Date		Above 1GHz		Test Date Augus		5, 2021
Polariz	ze	Vertical	Te	st Engineer	Jerry Chang					
Detect	tor	Peak								
120 Level (dBu\	//m)									
110										
90										
70										
50			2	3	5	6				
30										
10										
0	1800.	2600.	34(00.	4200.	5000				
Frequency	Detector	Freq Spectrum	uency (MHz) Factor	Actual	Limit	Margir				
requeitcy	Mode	Reading Level	racior	FS	@3m	inai gii				
(MHz)	(PK/QP/AV)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)				
1260.00	Peak	41.48	-6.03	35.45	74.00	-38.55				
3148.00	Peak	44.76	1.57	46.33	74.00	-27.67				
3468.00	Peak	41.36	2.68	44.04	74.00	-29.96				
3780.00	Peak	43.88	8.81	52.69	74.00	-21.31				
4412.00	Peak	43.59	5.43	49.02	74.00	-24.98				
	· our	10.00	0.10	10102						

6.33

51.19



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Test Mode:		ASK_315MHz		emp/Hum	23.9(°C)/ 66%R⊦	
Test Ite	m	Above 1GHz	Т	Test Date		5, 2021
Polariz	e	Horizontal	Tes	st Engineer	Jerry C	Chang
Detecto	or	Peak				
120 <mark>Level (dBuV</mark>	/m)					
110				 		
90						
70						
50			2	3	5	6
30						
10						
0 <mark></mark> 1000	1800.	2600. Frequ	34(iency (MHz)	00.	4200.	5000
_				1		
Frequency	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
Frequency (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)
	Mode	Reading Level		FS	@3m	_
	Mode (PK/QP/AV)	Reading Level (dBuV)	(dB)	FS (dBuV/m)	@3m (dBuV/m)	
(MHz) 1260.00	Mode (PK/QP/AV) Peak	Reading Level (dBuV) 42.07	(dB) -6.03	FS (dBuV/m) 36.04	@3m (dBuV/m) 74.00	(dB) -37.96
(MHz) 1260.00 3152.00	Mode (PK/QP/AV) Peak Peak	Reading Level (dBuV) 42.07 43.00	(dB) -6.03 1.57	FS (dBuV/m) 36.04 44.57	@ 3m (dBuV/m) 74.00 74.00	(dB) -37.96 -29.43
(MHz) 1260.00 3152.00 3468.00	Mode (PK/QP/AV) Peak Peak Peak	Reading Level (dBuV) 42.07 43.00 37.83	(dB) -6.03 1.57 2.68	FS (dBuV/m) 36.04 44.57 40.51	@3m (dBuV/m) 74.00 74.00 74.00	(dB) -37.96 -29.43 -33.49



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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,

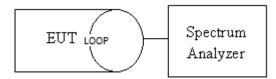
However, devices that are designed for limited use for thepurpose of initial programming, reprogramming or installing, and not forregular operations, may operate for up to 5 seconds, provided such devices are used only occasionally in connection with each unit being programmed or installed.

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

Not applicable. The EUT only verify radiation emission test data.

- End of Test Report -