



FCC ID: KR5HFM401 Report No.: T190618W04-RP ISED: 7812D-HFM401

Page: 1 / 33 Rev.: 01

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210

TEST REPORT

For

Radio Frequency Transmitter-Receiver

Model: HFM401

Trade Name: Continental

Issued to

FCC	Continental Automotive GmbH Siemensstrasse 12 SV C TS RBG EMC-Laboratory Regensburg, 93055 Germany
IC	Continental Automotive GmbH Siemensstrasse 12 Regensburg 93055 Germany

Issued by

Compliance Certification Services Inc. Wugu Laboratory No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) Issued Date: August 19, 2019

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,不可部分複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful

SGS Compliance Certification Service Inc. 程智科技股份有限公司 No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan / 新北市五股區五工六路 11 號 t:(886-2) 2299-9720 f:(886-2) 2298-1882 www.sgs.tw www.ccsrf.com



Page: 2 / 33 Rev.: 01

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 7, 2019	Initial Issue	ALL	Allison Chen
01	August 19, 2019	See the follow note Rev.(01)	P.21-24	Allison Chen

Rev.(01)

1. Revised limit below 30MHz in section 8.2.



Page: 3 / 33 Rev.: 01

TABLE OF CONTENTS

1.	TES	T RESULT CERTIFICATION4	ļ
2.	EUT	DESCRIPTION6	;
3.	TES	T SUMMARY7	,
4.	TES	T METHODOLOGY8	;
	4.1 4.2 4.3 4.4	EUT CONFIGURATION	;;;))
5.	INST	RUMENT CALIBRATION11	
!	5.1 5.2 5.3	MEASURING INSTRUMENT CALIBRATION	2
6.	FAC	ILITIES AND ACCREDITATIONS13	\$
(5.1 5.2	FACILITIES	;
7.	SET	UP OF EQUIPMENT UNDER TEST14	ŀ
-	7.1 7.2	SETUP CONFIGURATION OF EUT14 SUPPORT EQUIPMENT	
8.	FCC	PART 15.209 & RSS-210 REQUIREMENTS15	,
: : :	3.1 3.2 3.3	OCCUPIED BANDWIDTH(99%) AND 20 dB BANDWIDTH	•
AF	PEND	DIX I PHOTOGRAPHS OF TEST SETUPA-1	

APPENDIX 1 - PHOTOGRAPHS OF EUT



Page: 4 / 33 Rev.: 01

1. TEST RESULT CERTIFICATION

Continental Automotive GmbH Siemensstrasse 12 SV C TS RBG EMC-Laboratory Regensburg, 93055 Germany
Continental Automotive GmbH Siemensstrasse 12 SV C TS RBG EMC-Laboratory Regensburg, 93055 Germany
Continental Automotive GmbH Siemensstrasse 12 Regensburg 93055 Germany
Continental Automotive GmbH Siemensstrasse 12 Regensburg 93055 Germany
 Continental Automotive Guadalajara Mexico, S.A. de C.V. Plant Tijera Camino a la Tijera No. 3, km 3.5 Carretera Guadalajara-Morelia 45640 Tlajomulco de Zuniga, Jalisco, Mexico Continental Automotive Changchun Co., Ltd. Jingyue Branch No. 5800 Shengtai Street, Jingyue Zone, Changchun City, Jilin Province, P. R. China 130000 Continental Automotive France S.A.S. Avenue Paul Ourliac, 31100 Toulouse, France
Radio Frequency Transmitter-Receiver
Continental
HFM401
June 25 ~ July 1, 2019



Page: 5 / 33 Rev.: 01

APPLICABLE STANDARDS		
STANDARD	TEST RESULT	
FCC 47 CFR Part 15 Subpart C INDUSTRY CANADA RSS-210	No non-compliance noted	

Statements of Conformity
Determination of compliance is based on the results of the compliance measuremen
not taking into account measurement instrumentation uncertainty.

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209 and Industry Canada RSS-210.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Tested by:

Komil Ison

Kevin Tsai Deputy Manager Compliance Certification Services Inc.

alty. Hong

Dally Hong Engineer Compliance Certification Services Inc.



Page: 6 / 33 Rev.: 01

2. EUT DESCRIPTION

Product	Radio Frequency Transmitter-Receiver
Trade Name	Continental
Model Number	HFM401
Model Difference	N/A
Received Date	June 18, 2019
Power Supply	Power from power supply. (DC 12V)
Frequency Range	TX: 125kHz, RX: 433.92MHz
Number of Channels	1 Channel
Antenna Requirement	TX: Type: Winded wire coil Gain: 0 dBi RX: Type: PCB printed antenna Gain: -2 dBi
S.W Version	N/A
H.W Version	N/A

Remark:

- 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- This submittal(s) (test report) is intended for <u>FCC ID: KR5HFM401</u> & <u>ISED:</u> <u>7812D-HFM401</u> filing to comply with Section 15.209 of the FCC Part 15, Subpart C Rules.



Page: 7 / 33 Rev.: 01

3. TEST SUMMARY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
15.203	RSS-GEN Sec. 8.3	2	Antenna Requirement	Pass
15.209	RSS-210 A.1.3	8.1	Emission Bandwidth	Pass
15.209(a)	RSS-210 4.4 RSS-GEN 8.9	8.2	Fundamental Emission	Pass
15.209(a)	RSS-210 4.4 RSS-GEN 8.9	8.2	Transmitter Radiated Emission	Pass
15.207(a)	RSS-GEN Sec. 8.8	8.3	AC Power-line Conducted Emission	Not applicable



4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 2, 15.207, 15.209, RSS-210 and RSS-Gen.

4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(2)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

- ² Above 38.6
- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR guasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



Page: 9 / 33 Rev.: 01

4.3 RSS-GEN 8.10 RESTRICTED BANDS

(a) Except as shown in other rules, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	13.36 - 13.41	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.42 - 16.423	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.69475 - 16.69525	960 - 1240	7.25 - 7.75
3.020 - 3.026	16.80425 - 16.80475	1300 - 1427	8.025 - 8.5
4.125 - 4.128	25.5 - 25.67	1435 - 1626.5	9.0 - 9.2
$\begin{array}{c} 4.17725 - 4.17775 \\ 4.20725 - 4.20775 \\ 5.677 - 5.683 \\ 6.215 - 6.218 \\ 6.26775 - 6.26825 \\ 6.31175 - 6.31225 \\ 8.291 - 8.294 \\ 0.000 \end{array}$	37.5 - 38.25	1645.5 - 1646.5	9.3 - 9.5
	73 - 74.6	1660 - 1710	10.6 - 12.7
	74.8 - 75.2	1718.8 - 1722.2	13.25 - 13.4
	108 - 121.94	2200 - 2300	14.47 - 14.5
	123 - 138	2310 - 2390	15.35 - 16.2
	149.9 - 150.05	2483.5 - 2500	17.7 - 21.4
	156.52475 -	2655 - 2900	22.01 - 23.12
8.362 - 8.366 8.37625 - 8.38675 8.41425 - 8.41475 12.29 - 12.293 12.51975 - 12.52025 12.57675 - 12.57725	156.52525 156.7 - 156.9 162.0125 - 167.17 167.72 - 173.2 240 - 285 322 - 335.4	3260 - 3267 3332 - 3339 3345.8 - 3358 3500 - 4400	23.6 - 24.0 31.2 - 31.8 36.43 - 36.5 (²)

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

(b) Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in RSS-GEN clause 8.9. Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.



Page: 10 / 33 Rev.: 01

4.4 DESCRIPTION OF TEST MODES

The EUT (model: HFM401) had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

4.4.1 The worst mode of measurement

Radiated Emission Measurement Above 1G			
Test Condition	Radiated Emission Above 1G		
Power supply Mode Mode 1: EUT power by Battery (DC 12V)			
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 Power supply (DC 12V)	
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(Z-Plane and Horizontal) were recorded in this report

3. For below 1G, radiation emission were performed the EUT transmit at the highest output power channel as worse case.



Page: 11 / 33 Rev.: 01

5. INSTRUMENT CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

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

Conducted Emissions Test Site							
Name of Equipment	ame of Equipment Manufacturer Model Serial Number Calibration Date Calibration						
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019		
Software	N/A						

Wugu 966 Chamber A								
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration 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 TECHNOLOG Y 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 6.11-201804	419c				

Remark:

- 1. Each piece of equipment is scheduled for calibration once a year.
- 2. N.C.R. = No Calibration Request.



Page: 12 / 33 Rev.: 01

5.3 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: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



Page: 13 / 33 Rev.: 01

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

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

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
 Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
 Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, horn and/or Loop. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



Page: 14 / 33 Rev.: 01

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



Page: 15 / 33 Rev.: 01

8. FCC PART 15.209 & RSS-210 REQUIREMENTS 8.1 OCCUPIED BANDWIDTH(99%) AND 20 dB BANDWIDTH TEST CONFIGURATION



TEST PROCEDURE

- 1. Place the EUT on the table and set it in the transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW=10KHz, VBW=30KHz, Span=100KHz, Sweep = auto.
- 4. Record the max. reading.

TEST RESULTS

No non-compliance noted

Test Condition	Frequency(kHz)	Occupied Bandwidth 99% (kHz)	20 dB Bandwidth (kHz)
125kHz	125kHz	12.0694	11.404



Page: 16 / 33 Rev.: 01

Test Plot

Spect	rum												
Ref L	evel	-10.00) dBm	(RBW	1 kHz							
👄 Att			0 dB 👄 SWT	500 ms (🔵 VBW	З kHz	Moe	de Aut	to FFT				
😑 1Pk Vi	iew												
								M	1[1]				-37.48 dBm
-20 dBn	n											1:	25.0000 kHz
20 001								0	cc Bw			12.069	9464544 kHz
-30 dBn	n							M	2[1]				-57.40 dBm
						M	1					_ 1	18.8350 kHz
-40 dBn		1 -37.	.480 aBm										
				h .				\ _					
-50 dBn			Ma		_			- <u>~</u> ~		~1	- 52		
60 d0a	_		1-57.480 dBm-								-1£		
-во авп		3	V I										
-70 dBn	n												
	.												
-80 dBn	n												
-90 dBn	∩———												
100 10													
-100 dB			F1								F2		
			Î										
CF 125	5.0 kH	z				691	pts					Spa	an 20.0 kHz
Marker													
Туре	Ref	Trc	X-valu	e 🛛	Y-	value		Func	tion		Fune	ction Resu	lt
M1		1	12	5.0 kHz	-:	37.48 dB	m						
T1		1	118.3	314 kHz	- (52.88 dB	m	0	CC BW			12.069	9464544 kHz
T2		1	130.38	335 kHz		58.88 dB	m						
M2		1	118.8	335 KHZ		57.40 dB	-mi -m						
	M2		11.,	+U+ KHZ		-0.20 0							
							11	Mea	suring			444	25.06.2019

Date: 25.JUN.2019 14:09:26



Page: 17 / 33 Rev.: 01

8.2 RADIATED EMISSIONS

<u>LIMIT</u>

FCC according to §15.209(a)

IC according to RSS-Gen, section 8.9 and 8.10.

FCC:

According to FCC PART 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: Except as provided in other rules, fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

In the above emission table, the tighter limit applies at the band edges.

Below 30MHz

Frequency	Field S	trength	Measurement	Field Strength	Measurement
(MHz)	(µV/m)	(dBµV/m)	(meter)	(dBµV/m)	(meter)
0.009 - 0.490	2400/F(kHz)	48.52 - 13.80	300	128.52–93.80	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

Remark: According to Part 15.31(f)(2),the transfer formula as below: Limit@3m= 20log(Limit@300m) + 40log (Limit define distance(300m)/ (Measurement distance(3m)))

Above 30MHz

Frequency		Field 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



IC:

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

Frequency	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)					
(MHZ)	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.

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

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.



Test Configuration

9kHz ~ 30MHz











Page: 20 / 33 Rev.: 01

TEST PROCEDURE

For 9KHz ~ 30MHz

- 1. The EUT is placed on a turntable, which is 0.8m 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 face off.
- 6. Set the spectrum analyzer in the following setting as:

9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO 490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO

For 30MHz ~ 1GHz

- 1. The EUT is placed on a turntable, which is 0.8m 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 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:

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

7. Repeat above procedures until the measurements for all frequencies are complete.

Remark:

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, and RSS-Gen Clause 6.5.

1) Limit @ 3m(dBuV/m) = limit @ 300m or 30m (dBuV/m) + 40 log (Specific distance/measurement distance)

2) Correction factor= Antenna factor + cable loss - Amp Gain



Page: 21 / 33 Rev.: 01

<u>100kHz ~ 150kHz</u>

Operation Mode:	TX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
0.13	86.35	13.51	99.86	105.65	-5.79	Average



Page: 22 / 33 Rev.: 01

Operation Mode:	TX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Horizontal



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
0.13	88.12	13.51	101.63	105.65	-4.02	Average



Page: 23 / 33 Rev.: 01

<u>9kHz ~ 30MHz</u>

Operation Mode:	TX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
0.25	46.22	14.13	60.35	99.65	-39.30	peak
7.12	22.29	15.77	38.06	69.54	-31.48	peak
8.56	22.80	15.98	38.78	69.54	-30.76	peak
15.69	13.81	15.78	29.59	69.54	-39.95	peak
24.15	16.54	14.70	31.24	69.54	-38.30	peak
29.31	13.23	13.79	27.02	69.54	-42.52	peak



Page: 24 / 33 Rev.: 01

Operation Mode:	TX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
0.25	47.56	14.13	61.69	99.65	-37.96	peak
7.15	22.67	15.77	38.44	69.54	-31.10	peak
8.41	23.02	15.96	38.98	69.54	-30.56	peak
19.80	17.21	15.59	32.80	69.54	-36.74	peak
21.81	17.64	15.17	32.81	69.54	-36.73	peak
24.54	21.62	14.62	36.24	69.54	-33.30	peak

This document cannot be reproduced except in full, without prior written approval of the Company. 本報告未經本公司書面許可,不可部份複製。



Page: 25 / 33 Rev.: 01

Operation Mode:RX modeTest Date:July 01, 2019Temperature:25°CTested by:Dally HongHumidity:55 % RHPolarity:Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
7.12	23.92	15.77	39.69	69.54	-29.85	peak
8.17	21.95	15.93	37.88	69.54	-31.66	peak
8.47	21.89	15.97	37.86	69.54	-31.68	peak
24.21	15.60	14.69	30.29	69.54	-39.25	peak
25.35	15.52	14.47	29.99	69.54	-39.55	peak
26.40	14.56	14.28	28.84	69.54	-40.70	peak

This document cannot be reproduced except in full, without prior written approval of the Company. 本報告未經本公司書面許可,不可部份複製。



Page: 26 / 33 Rev.: 01

Operation Mode:	RX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
0.76	38.78	14.56	53.34	70.00	-16.66	peak
7.12	22.17	15.77	37.94	69.54	-31.60	peak
8.32	22.62	15.95	38.57	69.54	-30.97	peak
13.51	14.90	15.91	30.81	69.54	-38.73	peak
21.60	19.02	15.22	34.24	69.54	-35.30	peak
24.51	22.85	14.63	37.48	69.54	-32.06	peak



Page: 27 / 33 Rev.: 01

<u>30MHz ~ 1000MHz</u>

Operation Mode:	TX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical / Horizontal

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
47.46	46.77	-14.26	32.51	40.00	-7.49	peak
107.60	44.69	-10.67	34.02	43.50	-9.48	peak
342.34	36.88	-7.19	29.69	46.00	-16.31	peak
449.04	35.45	-3.88	31.57	46.00	-14.43	peak
896.21	27.63	4.05	31.68	46.00	-14.32	peak
972.84	26.96	5.56	32.52	54.00	-21.48	peak
	50.05	40.05	00.40	40.50	7.40	
95.96	50.35	-13.95	36.40	43.50	-7.10	peak
159.01	44.82	-9.95	34.87	43.50	-8.63	peak
217.21	47.22	-11.43	35.79	46.00	-10.21	peak
330.70	37.19	-7.08	30.11	46.00	-15.89	peak
745.86	28.50	1.96	30.46	46.00	-15.54	peak
970.90	26.00	5.37	31.37	54.00	-22.63	peak



Page: 28 / 33 Rev.: 01

Vertical



Horizontal



This document cannot be reproduced except in full, without prior written approval of the Company. 本報告未經本公司書面許可,不可部份複製。



Page: 29 / 33 Rev.: 01

Operation Mode:	RX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical / Horizontal

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
47.46	46.97	-14.26	32.71	40.00	-7.29	peak
107.60	45.51	-10.67	34.84	43.50	-8.66	peak
342.34	37.11	-7.19	29.92	46.00	-16.08	peak
448.07	35.40	-3.86	31.54	46.00	-14.46	peak
883.60	28.31	3.65	31.96	46.00	-14.04	peak
973.81	27.13	5.63	32.76	54.00	-21.24	peak
95.96	49.54	-13.95	35.59	43.50	-7.91	peak
138.64	44.70	-9.70	35.00	43.50	-8.50	peak
342.34	37.01	-7.19	29.82	46.00	-16.18	peak
449.04	33.40	-3.88	29.52	46.00	-16.48	peak
745.86	30.21	1.96	32.17	46.00	-13.83	peak
970.90	25.59	5.37	30.96	54.00	-23.04	peak



Page: 30 / 33 Rev.: 01

Vertical



Horizontal





Page: 31 / 33 Rev.: 01

Above 1GHz

Operation Mode:	RX mode	Test Date:	July 01, 2019
Temperature:	25°C	Tested by:	Dally Hong
Humidity:	55 % RH	Polarity:	Vertical



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
2392.00	49.08	-3.39	45.69	74.00	-28.31	peak



Page: 32 / 33 Rev.: 01

Operatio	on Mode:	RX mode		Test Date: Tested by: Polarity:		July 01, 2019 Dally Hong Vertical	
Tempera	ature:	25°C					
Humidit	y :	55 % RH					
130	Level (dBuV/m)						
120)				·		
100							
80							
60							
40)			1			
20)						
C	1000	1800.	2600.	3400.	4200	. 5000	

	Frequency (MHz)	
	incquency (minz)	

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (PK/QP/AVG)
3220.00	41.29	-1.09	40.20	74.00	-33.80	peak



Page: 33 / 33 Rev.: 01

Report No.: T190618W04-RP

8.3 POWERLINE CONDUCTED EMISSIONS

<u>LIMIT</u>

According to §15.207(a) & RSS-Gen §8.8, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range	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.

TEST PROCEDURE

- 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.

TEST RESULTS

Not applicable, because EUT not connect to AC Main Source direct.

- End of Test Report -