TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14035815 001**	**Seite 1 von 12** *Page 1 of 12*
Auftraggeber: *Client:*	**AAMP of America** **13190 56th Court, Suite 401,** **33760 Clearwater, Fl, USA**	
Gegenstand der Prüfung: *Test Item:*	**Bluetooth Car Kit Gateway**	
Bezeichnung: *Identification:*	**ISFM-2202**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000087283-001,** **A000076797-001**	**Eingangsdatum:** *Date of Receipt:* **19.07.2014, 23.06.2014**
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test sample(s) is/are not damaged and suitable for testing.	
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 8/F., First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong **Hong Kong Productivity Council** HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong	
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart B** **ANSI C63.4-2003**	
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong	

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
22.08.2014	Benny Lau Project Manager	Bennylau	22.08.2014	Sharon Li Section Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: **FCC ID: XBD-ISFM2202**
Other Aspects

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

Table of Content

Page

Test Summary

Conducted Emissions

Result: Pass

Radiated Emissions

Result: Pass

Product information

Manufacturers declarations

Nominal voltage	V_{nor}: 5.0 Vdc (USB) and/ or 12 Vdc (Vehicle power)
Classification	Class B Personal Computers peripherals/ Unintentional Radiators

Product function and intended use

The equipment under test (EUT) is a Bluetooth Car kit Gateway which integrates with the steering wheel control to access music, calls, texts from the mobile phone at the car. It receives the audio information from the paired Bluetooth device, modulate the audio signal into FM signal and streaming music to the vehicle's FM radio by conduction. The frequency of the conducted FM signal is from 88MHz to 107.9MHz. It can be connected to PC in which the application software assigns steering wheel control button functionality. It is powered by 5.0 Vdc (USB) and/ or 12Vdc (Vehicle power).

FCC ID: XBD-ISFM2202

Models	**Product description**
ISFM-2202	Bluetooth Car kit Gateway

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Rating Label

Independent Operation Modes

The basic operation modes are:

- Connected to PC in which the application software assigns steering wheel control button functionality.
- Streaming music to the vehicle's radio by conduction.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the Class B Personal Computers peripherals function.
The Bluetooth portion is authorized under the certification procedure (refer test report 14035812 001).

Remark

- None.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- A shielded USB cable with one ferrite bead (provided by the applicant).

Supporting equipment:
- Car Radio (provided by the applicant)
- Car FM Antenna (provided by TUV)

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

List of Test and Measurement Instruments

Hong Kong Productivity Council (Registration number: 90656)

Radiated Emission				
Equipment	**Manufacturer**	**Type**	**S/N**	**Cal. Due Date**
Semi-anechoic Chamber	Frankonia	Nil	Nil	14-Apr-15
Cable	Hubersuhner	SUCOFLEX 104	72799 /6	31-Mar-16
Test Receiver	R & S	ESU40	100190	20-Jun-15
Bi-conical Antenna	R & S	HK116	100241	11-Jun-15
Log Periodic Antenna	R & S	HL223	841516/017	10-Jun-15
Coaxial cable	Harbour	LL335	N/A	10-Jun-16
Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	17-Jul-16
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	28-Oct-15
Horn Antenna	EMCO	3115	9002-3347	11-Jun-15
Active Loop Antenna	EMCO	6502	9107-2651	17-May-15

TÜV Rheinland Hong Kong Ltd (Registration number: 250690)

Conducted Emission				
Equipment	**Manufacturer**	**Type**	**S/N**	**Cal. Due date**
Test Receiver	R&S	ESCS30	100201	28-Feb-15
LISN	R&S	ENV216	100273	26-Feb-15
EMC32	R&S	v9.12	N/A	N/A

Results FCC Part 15 – Subpart B

Subclause 15.107 – Conducted Emission on AC Mains **Pass**

Test Specification : ANSI C63.4 – 2003
Mode of operation : PC linked mode
Port of testing : AC Mains input port of the PC
Detector : Quasi-peak and Average
RBW : 9 kHz
Supply voltage : 120Vac 60Hz
Temperature : 21.4ºC
Humidity : 52.6%

Requirement: 15.107(a)

Results: Pass

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.15	63.2	45.3	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found	---	---	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.16	62.4	46.0	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found	---	---	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2-3.

Subclause 15.109 – Radiated Emissions		**Pass**
Test Specification : ANSI C63.4 - 2003 Mode of operation : PC linked mode Port of testing : Enclosure Detector : Peak RBW/VBW : 120 kHz for f < 1 GHz Supply voltage : 5VDC (USB) Temperature : 24ºC Humidity : 50%		
Requirement: 15.109(a)		
Results: Pass		
Vertical Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
53.799	25.7	40.0 / QP
95.499	34.4	43.5 / QP
307.998	37.8	46.0 / QP
Horizontal Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
95.501	34.2	43.5 / QP
212.000	35.5	43.5 / QP
293.999	42.5	46.0 / QP

Subclause 15.109 – Radiated Emissions		**Pass**
Test Specification : ANSI C63.4 - 2003 Mode of operation : Streaming music mode (88MHz FM) Port of testing : Enclosure Detector : Peak RBW/VBW : 120 kHz for f < 1 GHz Supply voltage : 12VDC (Vehicle's power) Temperature : 23ºC Humidity : 52%		
Requirement: 15.109(a)		
Results: Pass		
Vertical Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
87.986	27.1	40.0 / QP
95.561	32.9	43.5 / QP
236.000	36.4	46.0 / QP
Horizontal Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
211.818	39.2	43.5 / QP
275.999	33.4	46.0 / QP
408.001	35.2	46.0 / QP

Subclause 15.109 – Radiated Emissions Pass

Test Specification : ANSI C63.4 - 2003
Mode of operation : Streaming music mode (98MHz FM)
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 120 kHz for f < 1 GHz
Supply voltage : 12VDC (Vehicle's power)
Temperature : 23ºC
Humidity : 52%

Requirement: 15.109(a)

Results: Pass

Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
95.563	32.4	43.5 / QP
239.999	35.5	46.0 / QP
416.000	33.9	46.0 / QP

Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
212.001	42.5*	43.5 / QP
284.000	36.6	46.0 / QP
317.999	39.3	46.0 / QP

* **Marginal Pass**

Subclause 15.109 – Radiated Emissions Pass

Test Specification : ANSI C63.4 - 2003
Mode of operation : Streaming music mode (107.9MHz FM)
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 120 kHz for f < 1 GHz
Supply voltage : 12VDC (Vehicle's power)
Temperature : 23ºC
Humidity : 52%

Requirement: 15.109(a)

Results: Pass

Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
95.563	32.3	43.5 / QP
236.000	36.4	46.0 / QP
256.000	32.3	46.0 / QP

Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
211.820	39.0	43.5 / QP
284.000	38.2	46.0 / QP
407.999	34.7	46.0 / QP