TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14016297 001**	**Seite 1 von 16** *Page 1 of 16*
Auftraggeber: *Client:*	**Nasaco Electronics (H.K.) Ltd.** **Unit 6, 11/F** **Eastern Centre** **1065 King's Road** **Quarry Bay, Hong Kong**	
Gegenstand der Prüfung: *Test Item:*	**915 MHz Wireless Audio Transmitter**	
Bezeichnung: *Identification:*	**MGJ7140** **MGJ811S**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**070515008-2**	**Eingangsdatum:** *Date of Receipt:* **15.05.2007**
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 9th Floor, Oriental News Building, 7 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 C**	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 9th Floor, Oriental News Building, 7 Wang Tai Road, Kowloon Bay Kowloon, Hong Kong	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	

geprüft / *tested by:*			**kontrolliert** / *reviewed by:*		
11.06.2007	Hugo Wan Project Engineer		11.06.2007	Thomas Berns Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other Aspects:*

FCC ID: LLP-MGJ811S

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*	

Test Summary

Conducted Disturbance on AC power line

Result: Pass

20dB bandwidth

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Contents

General Remarks

Nil.

List of Test and Measurement Instruments

Hong Kong Productivity Council (Registration number: 90656)

Kind of Equipment	Manufacturer	Type	S/N
Test Receiver	Rohde & Schwarz	ESCS30	100201
LISN	Rohde & Schwarz	ESH3-Z5	100230
Test Receiver	Rohde & Schwarz	ESVP	882402/033
Active Loop Antenna	EMCO	6502	9107-2651
Biconical Antenna	Rohde & Schwarz	HK116	841489/015
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
Double Ridge Horn Antenna	EMCO	3115	9002-3351
Double Ridge Horn Antenna	EMCO	3115	9002-3347
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transmitter of a wireless audio system operating at 915MHz ISM band using FM modulation. The audio input is a 3.5mm stereo mini plug. There are 2 different designs. The differences are only housing change and charging port implementation. The transmitter is always transmitting until the removal of power supply. The transmitter with additional feature of charging port was tested.

FCC ID: LLP-MGJ811S

Model	Product description
MGJ7140	Wireless audio transmitter with charging port
MGJ811S	Wireless audio transmitter without charging port

Ratings and System Details

		Transmitter
Operating Frequencies	:	912, 913, 914 MHz
Number of channels	:	3
Type of antenna	:	Integral antenna
Power supply	:	12V DC power supply from AC/DC adaptor, rated 100mA
Ports	:	i) 3.5mm stereo audio input plug ii) DC charging port

Independent Operation Modes

The basic operation modes are:

- Switching between the 3 channels

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- FCC ID label

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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 is a multi-function button to exercise the device into different modulation frequencies.

Special Accessories and Auxiliary Equipment

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

- Testing board provided by the manufacturer

Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Circuit Diagram or the Technical Construction File. No additional measures were employed to achieve compliance.

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 section 7.1.1 and 7.1.2 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

System Factor = CF + FA – PA.

Where FS = Peak Value of Field Strength in dBuV/m at 3 meters.
R = Peak 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.

Average value of FS = FS –Average factor.

Average Factor = 20 log duty cycle.

Test Results

Conducted Disturbance on AC power line — Section 15.207

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.207
Supply Voltage	:	120V AC input
Channel under test	:	Channel 1
Mode of operation	:	Charging to a headset receiver and transmitting at same time

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak (dBµV)	Average (dBµV)	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.2580	29.6	3.8	66 - 56	56 - 46	Pass
	0.4020	24.9	1.3			Pass
> 0,5 – 5	-	-	-	56	46	Pass
> 5 - 30	-	-	-	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	0.2760	28.0	2.9	66 - 56	56 - 46	Pass
	0.4920	16.0	0.1			Pass
> 0,5 – 5	-	-	-	56	46	Pass
> 5 - 30	-	-	-	60	50	Pass

Limit **Section 15.207**

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

*Decreases with the logarithm of the frequency.

20dB Bandwidth — Section 15.215(c)

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.215(c)
Detector Function	:	Peak
Measurement BW	:	100kHz
Supply Voltage	:	DC 12.0V from AC/DC adaptor
Channel under test	:	Channel 1
Operating band	:	902 - 928MHz
Audio Input	:	Pink Noise

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Frequency at 20dB BW closest to Band Edge (MHz)	Delta to Band Edge (MHz)
1 (Lo)	912.248	0.406	912.046	-10.046
3 (Hi)	914.222	0.364	914.410	-13.590

For test results, please refer to Appendix 5.

Limit **Section 15.215(c)**

Frequency band (MHz)
902 – 928

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Radiated Emission of Carrier Frequency — Section 15.249(a)

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.249(a)
Test Method	:	ANSI 63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Measurement Distance	:	3m
Detector Function	:	Quasi-Peak
Measurement BW	:	120kHz
Supply Voltage	:	DC 12.0V from AC/DC adaptor
Channel under test	:	Channel 1, 3

Polarization: Vertical

Channel	Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit (dBuV/m)	Delta to Limit (dB)
1	912.324	85.0	94.0	-9.0
3	914.384	87.1	94.0	-6.9

Polarization: Horizontal

Channel	Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit (dBuV/m)	Delta to Limit (dB)
1	912.324	82.2	94.0	-11.8
3	914.373	84.8	94.0	-9.2

Limit **Section 15.249(a)**

Frequency band (MHz)	Peak Emission	
	(µV/m)	(dBµV/m)
902 – 928	50,000	94.0

As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Spurious Radiated Emissions — Section 15.249(a)

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.249(a, c, d and e)
Test Method	:	ANSI 63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Measurement Distance	:	3m
Detector Function	:	<1000MHz, Quasi-Peak >=1000MHz, Peak and Average
Measurement BW	:	<1000MHz, 120kHz >=1000MHz, 1MHz
Supply Voltage	:	DC 12.0V from AC/DC adaptor
Channel under test	:	Channel 1, 3

Polarization: Vertical

Channel	Frequency (MHz)	Field strength at 3m (dBuV/m)	Detector (PK / AV)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
1	1824.768	33.12	PK	73.98	-40.86
	1824.648	28.08	AV	53.98	-25.90
	*2736.992	32.55	PK	73.98	-41.43
	*2736.992	26.34	AV	53.98	-27.64
	*3649.416	43.72	PK	73.98	-30.26
	*3649.296	33.13	AV	53.98	-20.85
	*4561.720	44.01	PK	73.98	-29.97
	*4561.640	33.48	AV	53.98	-20.50
	5473.904	43.65	PK	73.98	-30.33
	5473.984	34.37	AV	53.98	-19.61
	6386.208	43.42	PK	73.98	-30.56
	6386.248	33.92	AV	53.98	-20.06
	*7298.652	46.82	PK	73.98	-27.16
	*7298.672	37.01	AV	53.98	-16.97
	*8210.936	48.56	PK	73.98	-25.42
	*8210.936	40.11	AV	53.98	-13.87
	*9123.340	50.19	PK	73.98	-23.79
	*9123.260	39.44	AV	53.98	-14.54
3	1828.498	33.59	PK	73.98	-40.39
	1828.678	28.02	AV	53.98	-25.96
	*2742.677	34.79	PK	73.98	-39.19
	*2746.657	27.63	AV	53.98	-26.35
	*3658.736	43.77	PK	73.98	-30.21
	*3654.856	33.75	AV	53.98	-20.23
	*4576.755	44.61	PK	73.98	-29.37
	*4567.135	33.93	AV	53.98	-20.05
	5488.554	45.55	PK	73.98	-28.43
	5484.074	35.09	AV	53.98	-18.89
	6403.213	45.16	PK	73.98	-28.82
	6396.953	34.02	AV	53.98	-19.96
	*7319.872	49.21	PK	73.98	-24.77
	*7310.552	37.63	AV	53.98	-16.35
	*8225.171	50.84	PK	73.98	-23.14
	*8227.371	40.30	AV	53.98	-13.68
	*9145.650	50.55	PK	73.98	-23.43
	*9147.950	39.51	AV	53.98	-14.47

Polarization: Horizontal

Channel	Frequency (MHz)	Field strength at 3m (dBuV/m)	Detector (PK / AV)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
1	1824.328	33.70	PK	73.98	-40.28
	1824.688	28.82	AV	53.98	-25.16
	*2736.992	31.23	PK	73.98	-42.75
	*2736.932	27.56	AV	53.98	-26.42
	*3649.296	42.59	PK	73.98	-31.39
	*3649.296	33.19	AV	53.98	-20.79
	*4561.700	44.29	PK	73.98	-29.69
	*4561.700	33.73	AV	53.98	-20.25
	5474.004	43.69	PK	73.98	-30.29
	5473.944	34.51	AV	53.98	-19.47
	6386.228	43.39	PK	73.98	-30.59
	6386.308	33.55	AV	53.98	-20.43
	*7298.692	47.08	PK	73.98	-26.90
	*7298.632	37.07	AV	53.98	-16.91
	*8211.036	49.78	PK	73.98	-24.20
	*8211.036	40.27	AV	53.98	-13.71
	*9123.320	49.03	PK	73.98	-24.95
	*9123.300	39.54	AV	53.98	-14.44
3	1828.558	33.91	PK	73.98	-40.07
	1828.598	29.48	AV	53.98	-24.50
	*2743.557	34.78	PK	73.98	-39.20
	*2742.277	27.50	AV	53.98	-26.48
	*3659.916	44.75	PK	73.98	-29.23
	*3658.716	32.79	AV	53.98	-21.19
	*4570.215	44.46	PK	73.98	-29.52
	*4569.435	33.63	AV	53.98	-20.35
	5484.914	45.54	PK	73.98	-28.44
	5489.034	34.70	AV	53.98	-19.28
	6397.593	45.23	PK	73.98	-28.75
	6400.933	33.96	AV	53.98	-20.02
	*7311.052	48.27	PK	73.98	-25.71
	*7315.092	37.51	AV	53.98	-16.47
	*8234.351	51.08	PK	73.98	-22.90
	*8231.231	40.07	AV	53.98	-13.91
	*9148.410	51.07	PK	73.98	-22.91
	*9139.890	39.46	AV	53.98	-14.52

Remark: (1) ' * ' indicates the frequency of the emissions fall into the restricted band as defined in Section 15.205(a). They comply with the radiated emission limits specified in Section 15.209.
(2) There is no other spurious emission found from 30MHz to 1000MHz.
(3) From the lowest oscillator frequency 38kHz to 30MHz, there is no spurious emission found.

Limit **Section 15.249(a)**

Fundamental Frequency (MHz)	Field strength (AV) (µV/m)	Field strength (AV) (dBµV/m)	Measurement distance (m)
902-928 MHz	500	20*log(500) = 53.98	3

The radiated spurious emission measurement results were well below the limit as stated in 15.209 and 15.205.

Limit **Section 15.209**

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
30-88	100	20*log(100) = 40.00	3
88-216	150	20*log(150) = 43.52	3
216-960	200	20*log(200) = 46.02	3
960-2500	500	20*log(500) = 53.98	3

The emission limits shown in the above table below 1000MHz are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing average and peak detectors.