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Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14028138 001**	**Seite 1 von 13** *Page 1 of 13*

Auftraggeber: *Client:*	**Scapequest Pty. Ltd.** **Tradingas Battlefield Sports** **Unit 1, 6 Graham Street** **Underwood, Brisbane** **QUEENSLAND** **AUSTRALIA**		
Gegenstand der Prüfung: *Test Item:*	**433MHz Wireless Gaming Gun (Transceiver)**		
Bezeichnung: *Identification:*	**COBRA-001**	**Serien-Nr.:** *Serial No.:*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**00111111076-001**	**Eingangsdatum:** *Date of Receipt:*	**11.11.2011**
Prüfort: *Testing Location:*	**Hong Kong Productivity Council** HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong		
Prüfgrundlage: *Test Specification:*	**FCC Part 15, Subpart C**		
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:*

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*	Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*
15.12.2011	Mika Chan Senior Project Engineer		15.12.2011	Sharon Li Assistant Manager	

Sonstiges: **FCCID: Z93BFS**
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*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

Test Summary

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

Contents

List of Test and Measurement Instruments

	Equipment used	Manufacturer	Model No.	S/N	Due Date
☒	Semi-anechoic Chamber	Frankonia	Nil	Nil	25-May-12
☒	Test Receiver	R & S	ESU40	100190	26-May-12
☒	Bi-conical Antenna	R & S	HK116	100241	05-May-13
☒	Log Periodic Antenna	R & S	HL223	841516/020	06-May-13
☒	Coaxial cable 50ohm	Rosenberger	RTK081-05S-05S-10m	LA2-001-10M / 001	08-Dec-11
☒	Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	03-Oct-13
☒	High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	30-Oct-13
☒	Horn Antenna	EMCO	3115	9002-3351	11-May-13
☒	Active Loop Antenna	EMCO	6502	9107-2651	19-Apr-12
☒	FSP 30 Spectrum Analyser	R & S	FSP 30	100007	17-Sep-12
☒	LISN	R & S	ESH3-Z5	849876/026	21-Dec-12

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transceiver for battle gaming operating at 433.30MHz. The EUT sense hit then transmits a very short packet by radio back to the shooting gaming gun.

Ratings and System Details

		Transceiver
FCCID	:	Z93BFS
Operated Frequency	:	433.30 MHz
Type of antenna	:	Integral antenna
Power supply	:	Battery operated 7.2V (NiMH)
Ports	:	none

Remark

Since the EUT is transceiver, the verification test report for receiver portion has been issued separately.

Independent Operation Modes

The basic operation modes are:

- The radio transmissions are manually trigged and are for very short duration. The system will not transmit if there is anything else on the channel, it is very friendly to other devices. The most common trigger is when a gaming gun is hit and it transmits a very short packet by radio back to the shooting gaming gun. Typically a unit only gets hit around 15 times every 30 minutes. The other trigger is a start/end radio signal from the master controller to start a game and end a game.

For further information refer to User Manual

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 was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

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

- none

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.

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

Disturbance Voltage on AC Mains — Section 15.207

RESULT: **Pass**

The EUT does not operate during battery charging.

Radiated Emission of Carrier Frequency — Section 15.231(b)

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.231(b1 and b2)
Test Method	:	ANSI 63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Measurement Distance	:	3m
Measurement BW	:	120 kHz
Supply Voltage	:	DC 7.2V

Polarization: Vertical

Value	Frequency (MHz)	Measured Field Strength at 3m (PK) (dBµV/m)	Average Factor (dB)	Net Field Strength at 3m (dBµV/m)	Limit (dBµV/m)	Delta to Limit (dB)
Peak	433.274	96.60	-	96.60	100.80	-4.20
Average	433.274	66.4	-20.92	45.48	80.80	-35.00

Polarization: Horizontal

Value	Frequency (MHz)	Measured Field Strength at 3m (PK) (dBµV/m)	Average Factor (dB)	Net Field Strength at 3m (dBµV/m)	Limit (dBµV/m)	Delta to Limit (dB)
Peak	433.274	94.4	-	94.4	100.80	-6.40
Average	433.274	63.4	-20.92	42.48	80.80	-38.32

Remark; The calculation of average factor is shown in appendix 1 page 3-4.

Limit **Section 15.231(b)**

Frequency within the band (MHz)	Peak Emission		Average Emission	
	(microvolt/meter)	dBµV/m	(microvolt/meter)	dBµV/m
433.274	109697.64	100.80	10969.76	80.80

According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

Spurious Radiated Emissions — Section 15.231(b)

RESULT: **Pass**

Test Specification	:	FCC Part 15 Section 15.231(b1 and b3)
Test Method	:	ANSI 63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Detector Function	:	Average
Measurement BW	:	120 kHz for frequency range of 30M-1GHz 1MHz for frequency>1GHz
Supply Voltage	:	DC 7.2V
Measuring Frequency Range	:	30-5000MHz

Frequency (MHz)	Antenna Polarization	Field Strength at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Delta to Limit (dB)
120.026*	Vertical	28.6	60.80	-32.2
130.002*	Vertical	23.4	60.80	-37.4
381.274	Vertical	19.9	60.80	-40.9
485.276	Vertical	19.9	60.80	-40.9
866.550	Vertical	25.9	60.80	-34.9
1300.048*	Vertical	32.3	60.80	-28.5
2166.667	Vertical	37.0	60.80	-23.8
2600.000	Vertical	32.8	60.80	-28.0
3899.50*	Vertical	36.8	60.80	-24.0
80.020	Horizontal	24.6	60.80	-36.2
120.030*	Horizontal	33.5	60.80	-27.3
866.552	Horizontal	27.0	60.80	-33.8
1300.048*	Horizontal	34.4	60.80	-26.4
2166.77	Horizontal	35.4	60.80	-25.4
3033.49	Horizontal	32.8	60.80	-28.0

Remark: (1) ' * ' indicates the frequency of the emissions fall into the restricted band as defined in Section 15.205(a).
(2) There is no spurious emission found between lowest oscillating frequency to 30 MHz.

Limit **Section 15.231(b)**

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBµV/m)	Measurement distance (meters)
433.274	1096.98	20*log(1096.98) = 60.80	3

Section 15.209

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

Frequency (MHz)	Antenna Polarization	Field Strength at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Delta to Limit (dB)
120.026*	Vertical	29.0	46 / QP	-17
130.002*	Vertical	24.4	46 / QP	-21.6
1300.048*	Vertical	32.3	54 / AV	-21.7
1300.048*	Vertical	67.4	74 / PK	-6.6
3899.50*	Vertical	36.8	54 / AV	-17.2
3899.50*	Vertical	61.6	74 / PK	-12.4
120.030*	Horizontal	33.6	46 / QP	-12.4
1300.048*	Horizontal	34.4	54 / AV	-19.6
1300.048*	Horizontal	67.7	74 / PK	-6.3

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBµV/m)	Measurement distance (meters)
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 are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Bandwidth Measurement — Section 15.231(c)

RESULT: **Pass**

Test Specification : FCC Part 15 section 15.231(c)
Detector Function : Peak
Supply Voltage : DC 7.2V

Centre Frequency (MHz)	20dB Bandwidth (KHz)	FCC Limits * (KHz)
433.28	576	1083.2

* FCC Limit of 20dB bandwidth measurement = (0.25%) (Centre Frequency)
= (0.25%) (433.28x10^6)
= 1083.2 KHz

For test results refer to Appendix 1, page 2.

Limit **Section 15.231(c)**

The bandwidth of the emission shall be no wider than 0.25% if the center frequency for devices operating above 70MHz and below 900MHz.