

TEST REPORT

Report Number 180200017SEL-TEL4(R2)

Applicant Name / Address Hanwha Techwin Co., Ltd.
1204, Changwon-daero, Seongsan-gu Changwon-si, Gyeongsangnam-do, Korea

Test Sample Description

- Product name 4 Channel Wireless NVR
- Model and/or Brand name SNR-73201W
- FCC ID and/or IC ID NLMSNR73201W and/or 21482-SNR73201W
- Manufacturer Name Zhuhai RaySharp Technology Co., Ltd.
- Manufacturer Address NO.100 OF TECHNOLOGY ROAD 6, NATIONAL HI-TECH ZONE, ZHUHAI, GUANGDONG, P.R.CHINA
- Variant model Name N/A

Date of receipt of sample(s) 06 Feb. 2018

Date of Test 08 Feb. 2018 - 13 Feb. 2018

Test standard(s) CFR 47 Part 2.1091, RSS-102 issue 5

Test Results & uncertainty See Summary

Issue date 14 Mar. 2018

Note 1. The results shown in this test report refer only to the sample(s) tested.

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Tested by

Name : David.Jang
RF Engineer

Approved by

Name : Kangmin.Rhee
RF Technical Manager

Intertek ETL SEMKO Korea Ltd.

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SECTION 2 GENERAL DESCRIPTION

1. Laboratory Information

Name	Intertek ETL SEMKO Korea Ltd.
Address	Intertek building, 3, Gongdan-ro 160beon-gil, Gunpo-si, Gyeonggi-do, 15845, Korea
Phone No.	+82 2 567 7474
Fax No.	+82 31 8069 3876

2. Applicant Information

Name	Hanwha Techwin Co., Ltd.
Address	1204, Changwon-daero, Seongsan-gu Changwon-si, Gyeongsangnam-do, Korea
Contact Person	Jei Soon, Kang
Phone No.	+82 10 2667 4196

3. Factory Information

Name	Zhuhai RaySharp Technology Co., Ltd.
Address	NO.100 OF TECHNOLOGY ROAD 6, NATIONAL HI-TECH ZONE, ZHUHAI, GUANGDONG, P.R.CHINA
Country	China

4. Description of EUT

Product name	4 channel Wireless NVR
Model name	SNR-73201W
Serial No.	N/A
Manufacturer	Zhuhai RaySharp Technology Co., Ltd.
Country of Manufacture	China
Rated Voltage	DC 12 V (input 100 V ~ 240 V Adapter)
Frequency Range	2 412 MHz ~ 2 462 MHz: 802.11b/g/n(HT20) 2 422 MHz ~ 2 452 MHz: 802.11n(HT40)
Modulation Technique	DSSS: 802.11b, OFDM: 802.11g/n(HT20)/n(HT40)
Number of Channel	11 channels: 802.11b/g/n(HT20) 9 channels: 802.11n(HT40)
Antenna Type	Helical Antenna (2x2 MIMO)
Antenna Gain	Ant 1: 5 dBi, Ant 2: 5 dBi
Transmit Power	17.52 dBm(Peak)
H/W Version	SNR-73201W
S/W Version	Rev 1
RF Power Setting Parameter	802.11b: 12(Ant1)/ 10(Ant2), 802.11g: 0A(Ant1)/ 0A(Ant2), 802.11n(HT20): 6(Ant1)/ 6 (Ant2), 802.11n(HT40): 6(Ant1)/ 6(Ant2)

**5. Test Instrument**

Control No.	Equipment	Manufacturer	Model	Serial No.	Cal. Due.
ES1006	SIGNAL & SPECTRUM ANALYZER	Rohde & Schwarz	FSW43	103893	18, Sep. 2018
ES949	EMI Test Receiver	Rohde & Schwarz	ESU40	100478	24, Jan. 2019
ES950	EMI Test Receiver	Rohde & Schwarz	ESU26	100590	23, Jan. 2019
ES951	Open Switch and Control Platform	Rohde & Schwarz	OSP130	101467	N/A
ES957	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100465	20, Jan. 2019
ES972	Biconilog (Type7)	ETS-Lindgren	3142E	00203547	23, Jan. 2019
ES975	DRG Horn (Medium)	ETS-Lindgren	3117	00201915	20, Jan. 2019
ES977	Standard Gain Horn	ETS-Lindgren	3160-09	LM9738	3, May 2018
ES1027	AMP	Rohde & Schwarz	SCU-08	100737	24, Jan. 2019
ES1029	AMP	Rohde & Schwarz	SCU-18D	1952128	20, Jul. 2018
ES1031	AMP	Rohde & Schwarz	SCU-26D	1879069	18, Jul. 2018
ES1004	VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	261569	19, Sep. 2018
ES1005	SIGNAL GENERATOR	Rohde & Schwarz	SMB100A	178493	24, Jan. 2019
ES1038	ATTENUATOR	WEINSCHEL	10dB	TEMPNO.4824	20, Sep. 2018
ES1036	ATTENUATOR	WEINSCHEL	54A-10	69679	19, Sep. 2018
ES1074	Notch RF filter	Micro-Tronics	BRM50702-02	G043	18, Jul. 2018
ES1154	RF Meter	ANRITSU	MA2411B	1648099	2, Feb. 2019
ES1155	RF Sensor	ANRITSU	ML2495A	1531208	18, Sep. 2018
ES1152	System DC Power Supply	KEYSIGHT	N5747A	US16D4132P	18, Sep. 2018
ES955	Two-Line V-Network	Rohde & Schwarz	ENV216	101982	09, Nov. 2018
ES952	EMI Test Receiver	Rohde & Schwarz	ESR7	101560	22, Jan. 2019
ES1109	Digital multi meter	FLUKE	381	34980197WS	22, Jan. 2019
41	Software	Rohde & Schwarz	EMC32	Ver9.21.00	-

**6. Channel List**

Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
802.11b/g/n(HT20)		802.11n(HT40)	
1	2 412	3	2 422
2	2 417	4	2 427
3	2 422	5	2 432
4	2 427	6	2 437
5	2 432	7	2 442
6	2 437	8	2 447
7	2 442	9	2 452
8	2 447		
9	2 452		
10	2 457		
11	2 462		

7. Test Condition

Mode	Test Frequency(MHz)		
	Lowest	Middle	Highest
802.11b – <u>1 Mbps</u>	2 412	2 437	2 462
802.11g – <u>6 Mbps</u>	2 412	2 437	2 462
802.11n(HT20) – <u>MCS0</u>	2 412	2 437	2 462
802.11n(HT40) – <u>MCS0</u>	2 422	2 437	2 452
802.11n(HT20) – MIMO – <u>MCS8</u>	2 412	2 437	2 462
802.11n(HT40) – MIMO – <u>MCS8</u>	2 422	2 437	2 452

Note)

The EUT is tested by worst case data rate transmission based on highest output power.



SECTION 3 SUMMARY

1. Summary of test results

Requirements	FCC Rule	IC Rule	Compliance
RF Exposure evaluation	1.1310 2.1091	RSS-102 Issue5	Complied

2. Measurement Uncertainty

Parameters	Uncertainty ($k = 2$)	
Maximum Peak Conducted Output Power	1.66 dB	
Power Spectral Density	1.32 dB	
Channel Bandwidth	4.69 kHz	
Spurious Emissions (Conducted)	1.32 dB	
Spurious Emissions (Radiated)	9 kHz to 30 MHz	4.2 dB
	30 MHz to 1 GHz	3.9 dB
	1 GHz to 6 GHz	5.9 dB
	6 GHz to 18 GHz	5.1 dB
	18 GHz to 26 GHz	4.5 dB



SECTION 4 TEST RESULT

1. MPE Evaluation of Mobile Device

1.1 Rule

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure		
300-1,500	$f/300$	6
1,500-100,000	5	6
(B) Limits for General Population/Uncontrolled Exposure		
300-1,500	$f/1500$	30
1,500-100,000	1.0	30

Note) f = Frequency in MHz

IC RSS-102 Issue5 Limit

Frequency range (MHz)	Power density (W)
Below 20 MHz	1
20 - 48	$4.49/f^{0.5}$
48 - 300	0.6
300 – 6,000	$(1.31 \times 10^{-2}) \times f^{0.6834}$
Above 6,000	5

Note) f = Frequency in MHz



Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, $1 mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

1.2 Average Power

Test Mode	Test Frequency	Average Output Power (dBm)			
802.11b_Ant1	2 412 MHz	P	=	10.94	dBm
	2 437 MHz	P	=	10.81	dBm
	2 462 MHz	P	=	10.96	dBm
802.11g_Ant2	2 412 MHz	P	=	6.76	dBm
	2 437 MHz	P	=	7.27	dBm
	2 462 MHz	P	=	7.02	dBm
802.11n(HT20)_MIMO	2 412 MHz	P	=	8.24	dBm
	2 437 MHz	P	=	8.24	dBm
	2 462 MHz	P	=	7.84	dBm
802.11n(HT40)_MIMO	2 422 MHz	P	=	6.71	dBm
	2 437 MHz	P	=	6.76	dBm
	2 452 MHz	P	=	6.71	dBm

Note)

Test mode is reported by worst case based on highest output power of each antenna port.



1.3 Test Results - Complied

-FCC

Frequency Band (MHz)	Maximum Power (mW)	Antenna Gain (mW)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2 402 ~ 2 480 (802.11b)	12.59	3.16	20	0.007 920	1

Note: Max Target Power = 10 dBm, Tolerance = ± 1 dB, Maximum Power = 11 dBm.
Antenna Gain = 5 dBi.

-IC

Frequency Band (MHz)	Maximum Power (mW)	Antenna Gain (mW)	Maximum e.i.r.p (W)	Limit (W)
2 402 ~ 2 480 (802.11b)	12.59	3.16	0.039 811	2.721 934

Note: Target Power = 10 dBm, Tolerance = ± 1 dB, Maximum Power = 11 dBm.
Antenna Gain = 5 dBi.
Limit = $(1.31 \times 10^{-2}) \times f^{0.6834}$, $f = 2\,462$ (MHz)

Mode	Frequency (MHz)	Target Power (dBm)	Tolerance (dB)	Max Tune up Power (dBm)	Measured Power (dBm)
802.11b_Ant1	2 412	10	1	11	10.94
	2 437	10	1	11	10.81
	2 462	10	1	11	10.96
802.11g_Ant2	2 412	7	1	8	6.76
	2 437	7	1	8	7.27
	2 462	7	1	8	7.02
802.11n(HT20)_MIMO	2 412	8	1	9	8.24
	2 437	8	1	9	8.24
	2 462	8	1	9	7.84
802.11n(HT40)_MIMO	2 422	6	1	7	6.71
	2 437	6	1	7	6.76
	2 452	6	1	7	6.71

Note)

Test mode is reported by worst case based on highest output power of each antenna port.



SECTION 5 REVISION HISTORY

REVISION HISTORY			
Revision	Report No.	Issue Date	Description
0	180200017SEL-TEL4	20, Feb. 2018	Initial
1	180200017SEL-TEL4(R1)	08, Mar.2018	Revise RSS-102 Limit & e.i.r.p
2	180200017SEL-TEL4(R2)	14, Mar. 2018	Revise Maximum e.i.r.p.

- End -