TEST REPORT

Reference No	WTX22X07152581W002
FCC ID	2ASIVPGD798NV
Applicant	PIN GENIE, INC. DBA LOCKLY
Address	676 Transfer Rd., St. Paul, MN 55114
Manufacturer	Smart Electronic Industrial (Dong Guan) Co., Ltd.
Address	Qing Long Road, Long Jian Tian Village, Huang Jiang Town, Dong Guan, Guang Dong, China
Product Name :	Lockly Vision Elite
Model No	PGD798NV
Standards	FCC Part 15.247
Date of Receipt sample :	2022-07-26
Date of Test	2022-07-26 to 2022-08-10
Date of Issue	2022-08-10
Test Report Form No :	WTX_Part 15_247W
Test Result	Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China Tel.: +86-755-33663308 Fax.: +86-755-33663309 Email: sem@waltek.com.cn

Tested by:

Approved by:

Silin Chen

Mike Shi

Silin Chen

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TABLE OF CONTENTS

1. GENERAL INFORMATION	4
1.1 Product Description for Equipment Under Test (EUT) 1.2 Test Standards	5
1.3 Test Methodology 1.4 Test Facility	
1.5 EUT Setup and Test Mode	6
1.6 Measurement Uncertainty 1.7 Test Equipment List and Details	7 8
2. SUMMARY OF TEST RESULTS	10
3 ANTENNA REQUIREMENT	11
3.1 Standard Applicable 3.2 Evaluation Information	11 11
4. FREQUENCY HOPPING SYSTEM REQUIREMENTS	12
5. FIELD STRENGTH OF SPURIOUS EMISSIONS	14
 5.1 Standard Applicable 5.2 Test Procedure 5.3 Corrected Amplitude & Margin Calculation 5.4 Summary of Test Results/Plots	14
APPENDIX PHOTOGRAPHS	20

Report version

Version No.	Date of issue	Description	
Rev.00 2022-08-10		Original	
/ /		/	

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT				
Product Name: Lockly Vision Elite				
Trade Name	LOCKLY			
Model No.:	PGD798NV			
Adding Model(s):	1			
Rated Voltage:	Battery:DC3.7V			
Capacity:	5000mAh*2			
Power Adapter:	1			
Software Version:	V4.00			
Hardware Version:	REV:00			

Note: The test data is gathered from a production sample, provided by the manufacturer.

Technical Characteristics of EUT			
Frequency Range:	2403.01-2471.01MHz		
RF Output Power:	19.27dBm (Conducted)		
Modulation:	GFSK		
Quantity of Channels:	18		
Channel Separation:	4MHz		
Type of Antenna:	Integral Antenna		
Antenna Gain:	2.0dBi		
Note: The Antenna Gain is provided by the customer and can affect the validity of results.			

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under section 15.247 of the Fcc rules.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd. Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintain ed in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List				
Test Mode	Description	Remark		
TM1	Low Channel	2403.01MHz		
TM2	Middle Channel	2439.01MHz		
TM3	High Channel	2471.01MHz		

Test Conditions			
Temperature: 22~25 °C			
Relative Humidity:	45~55 %		
ATM Pressure:	1019 mbar		

EUT Cable List and Details				
Cable Description	With / Without Ferrite			
/ /		/	/	

Special Cable List and Details					
Cable Description Length (m) Shielded/Unshielded With / Without Ferrite					
/ /		/	/		

Auxiliary Equipment List and Details					
Description Manufacturer Model Serial Number					
/	/	/	/		

1.6 Measurement Uncertainty

Measurement uncertainty				
Parameter	Uncertainty			
RF Output Power	Conducted	±0.42dB		
Occupied Bandwidth	Conducted	$\pm 1.5\%$		
Conducted Spurious Emission	Conducted	±2.17dB		
Conducted Emissions	Conducted	9-150kHz ±3.74dB		
Conducted Emissions	Conducted	0.15-30MHz ±3.34dB		
		30-200MHz ±4.52dB		
Transmitter Spurious Emissions	Radiated	0.2-1GHz ±5.56dB		
		1-6GHz ±3.84dB		
		6-26GHz ±3.92dB		

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT 1075	Communication	Rohde &	CMW500	149650	2022 02 22	2022 02 21
SEMT-1075	Tester	Schwarz	CMW500	148650	2022-03-22	2023-03-21
SEMT 1062	GSM Tester	Rohde &	CMU200	114402	2022 02 22	2023-03-21
SEMT-1063	GSM Tester	Schwarz	CMU200	114403	2022-03-22	2023-03-21
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY4144040 0	2022-03-25	2023-03-24
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2022-03-22	2023-03-21
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2022-03-22	2023-03-21
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY4707020 2	2022-03-22	2023-03-21
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2022-03-22	2023-03-21
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5 M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/
Chamber A	A: Below 1GHz	-		-	-	
SEMT-1031	Spectrum	Rohde &	FSP30	836079/035	2022-03-22	2023-03-21
SLW1-1031	Analyzer	Schwarz	15150	830079/033		
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-03-22	2023-03-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2022-01-07	2023-01-06
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2023-03-19
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-20	2023-03-19
Chamber A	A: Above 1GHz					
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2022-03-22	2023-03-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-03-22	2023-03-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2022-03-22	2023-03-21
SEMT-1042	Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91705 82	2021-04-27	2023-04-26
SEMT-1216	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2022-03-25	2023-03-24

1.7 Test Equipment List and Details

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SEMT-1163	Spectrum	Rohde &	FSP40	100612	2022-03-22	2023-03-21			
Analyzer		Schwarz	1.51.10	100012		2020 00 21			
Chamber B:Below 1GHz									
	Trilog								
SEMT-1068	Broadband	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2023-04-08			
	Antenna								
SEMT-1067	Amplifier	Agilent	8447D	2944A10179	2022-03-22	2023-03-21			
SEMT-1066	EMI Test	Rohde &	ECDI	101201	2022 02 22	2022 02 21			
SEM 1-1000	Receiver	Schwarz	ESPI	101391	2022-03-22	2023-03-21			
Chamber C	C:Below 1GHz	·		·					
	EMI Test	Rohde &		100101		2023-01-06			
SEMT-1319	Receiver	Schwarz	ESIB 26	100401	2022-01-07				
	Trilog								
SEMT-1343	Broadband	Schwarz beck	VULB 9168	1194	2021-05-28	2023-05-27			
	Antenna								
SEMT-1333	Amplifier	HP	8447F	2944A03869	2022-03-22	2023-03-21			
Conducted	Room 1#								
	EMI Test	Rohde &	EGDI	101 (11	2022 02 21	2022.02.20			
SEMT-1001	Receiver	Schwarz	ESPI	101611	2022-03-21	2023-03-20			
		Rohde &		100011	2022 02 25				
SEMT-1002	Pulse Limiter	Schwarz	ESH3-Z2	100911	2022-03-25	2023-03-24			
SEMT-1003	AC LISN	Schwarz beck	NSLK8126	8126-224	2022-03-22	2023-03-21			
Conducted	Conducted Room 2#								
SEMT-1334	EMI Test	Rohde &	EGDI	101250	2022 02 22	2022 02 21			
	Receiver	Schwarz	ESPI	101259	2022-03-22	2023-03-21			
OF 1226	LICN	Rohde &		100005		2022.02.01			
SEMT-1336	LISN	Schwarz	ENV 216	100097	2022-03-22	2023-03-21			
		1		1	1	1			

Software List							
Description	Manufacturer	Model	Version				
EMI Test Software	Farad	EZ-EMC	RA-03A1				
(Radiated Emission)*	rarau	EZ-EIVIC					
EMI Test Software	E l		RA-03A1				
(Conducted Emission)*	Farad	EZ-EMC					

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203; §15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	N/A
§15.207(a)	Conducted Emission	N/A
§15.209(a)	Radiated Spurious Emissions	Compliant
§15.247(a)(1)(iii)	Quantity of Hopping Channel	N/A
§15.247(a)(1)	Channel Separation	N/A
§15.247(a)(1)(iii)	Time of Occupancy (Dwell time)	N/A
§15.247(a)	20dB Bandwidth	N/A
§15.247(b)(1)	RF Power Output	N/A
§15.247(d)	Band Edge (Out of Band Emissions)	N/A
§15.247(a)(1)	Frequency Hopping Sequence	N/A
§15.247(g), (h)	Frequency Hopping System	Compliant

N/A: Not applicable.

Note: Report is for C2PC only. The test data includes Antenna Requirement, Radiated Spurious Emissions. Those not tested mark with N/A (not effected by the C2PC).

3 Antenna Requirement

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Evaluation Information

This product has an integral antenna, fulfill the requirement of this section.

4. Frequency Hopping System Requirements

4.1 Standard Applicable

According to FCC Part 15.247(a)(1), the system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

4.2 Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses transmitter radio which operates in 2403.01-2471.01MHz band. It uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 18 bands (4MHz each; centred from 2403.01 to 2471.01MHz) in the range 2,400-2,483.5MHz.

This device was tested with a system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for 558074 D01 15.247 Meas Guidance v05r02 and FCC Part 15.247 rule.

4.3 EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below: Channel: 4, 10, 14, 15, 16, 14, 11, 15, 6, 8, 4, 1, 3, 13, 14, 17, 6, 14, 7, 18, 11, 6, 13, 12, 2, 11, 5, 3, 17, 11, 12, 18, 13, 7, 5, 2, 7, 6, 13, 14, 8, 10, 14, 15, 17, 4, 1, 11, 10, 11, 18, 6, 17, 11, 1, 4, 18, 5, 11, 12, 16, 15, 2, 17, 13, 9, 10, 15, 5, 1, 18, 12, 1, 6 etc.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

5. Field Strength of Spurious Emissions

5.1 Standard Applicable

According to §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

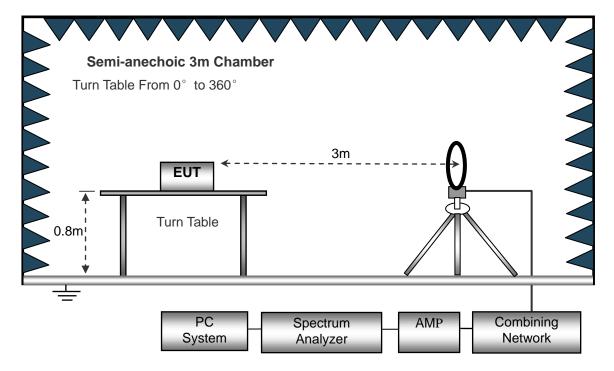
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

5.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

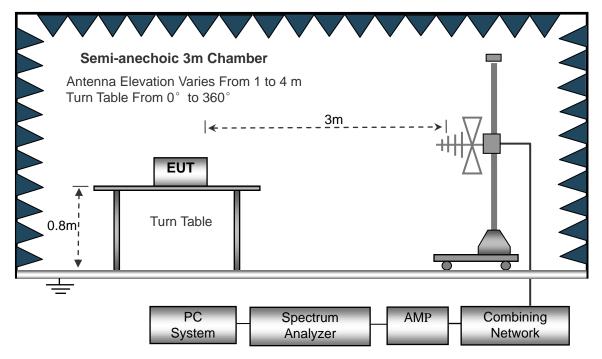
The test setup for emission measurement below 30MHz.



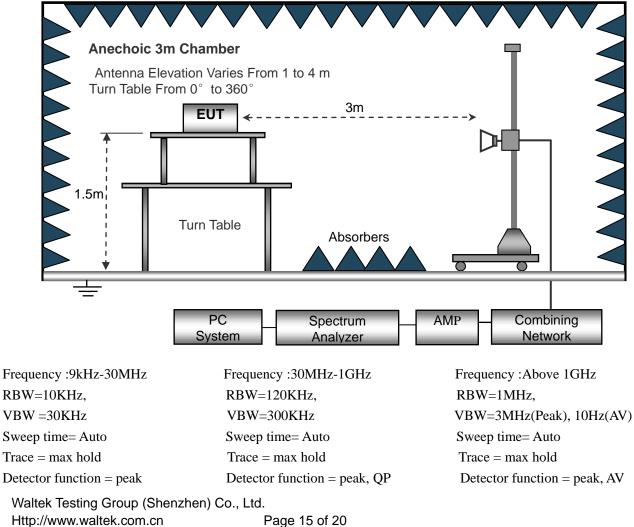
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Page 14 of 20

The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



5.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

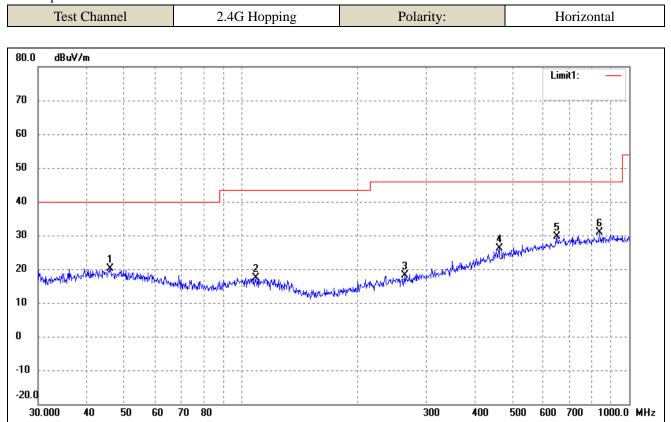
Corr. Ampl. = Indicated Reading + Correct Correct = Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of $-6dB\mu V$ means the emission is $6dB\mu V$ below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - FCC Part 15 Limit

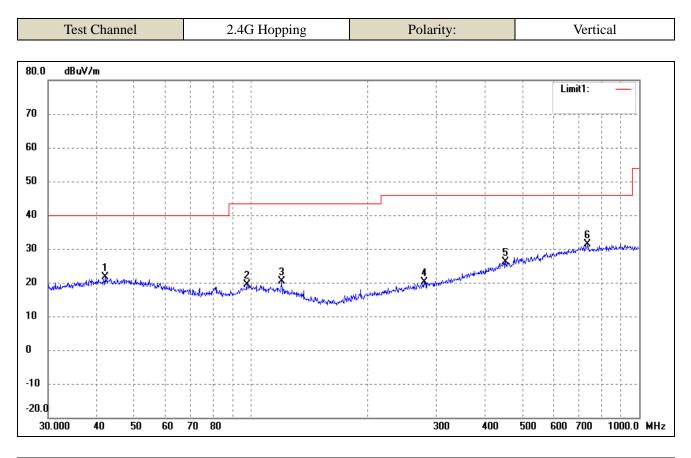
5.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported. All test modes (different data rate and different modulation) are performed, but only the worst case (GFSK) is recorded in this report.



Spurious Emissions Below 1GHz

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	46.0164	27.10	-6.98	20.12	40.00	-19.88	-	-	peak
2	109.4116	26.31	-8.86	17.45	43.50	-26.05	-	-	peak
3	264.7457	25.98	-7.91	18.07	46.00	-27.93	-	-	peak
4	462.3455	28.33	-2.25	26.08	46.00	-19.92	-	-	peak
5	651.9417	28.63	0.94	29.57	46.00	-16.43	-	-	peak
6	839.1818	28.64	2.32	30.96	46.00	-15.04	-	-	peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	42.0066	28.63	-6.99	21.64	40.00	-18.36	-	-	peak
2	97.4560	28.56	-9.20	19.36	43.50	-24.14	-	-	peak
3	119.8556	29.85	-9.59	20.26	43.50	-23.24	-	-	peak
4	279.0436	27.77	-7.52	20.25	46.00	-25.75	-	-	peak
5	452.7197	28.71	-2.49	26.22	46.00	-19.78	-	-	peak
6	737.0714	29.80	1.67	31.47	46.00	-14.53	-	-	peak

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
			Low Channel	-2403.01MHz			
4806.02	61.14	-4.52	56.62	74	-17.38	Н	РК
4806.02	51.27	-4.52	46.75	54	-7.25	Н	AV
7209.03	57.62	-2.20	55.42	74	-18.58	Н	РК
7209.03	46.55	-2.20	44.35	54	-9.65	Н	AV
4806.02	56.62	-4.52	52.10	74	-21.90	V	РК
4806.02	50.33	-4.52	45.81	54	-8.19	V	AV
7209.03	55.00	-2.20	52.80	74	-21.20	V	РК
7209.03	44.31	-2.20	42.11	54	-11.89	V	AV
	•		Middle Channe	el-2439.01MHz			
4878.02	58.60	-4.47	54.13	74	-19.87	Н	РК
4878.02	51.29	-4.47	46.82	54	-7.18	Н	AV
7317.03	58.09	-2.17	55.92	74	-18.08	Н	РК
7317.03	49.25	-2.17	47.08	54	-6.92	Н	AV
4878.02	55.63	-4.47	51.16	74	-22.84	V	РК
4878.02	50.12	-4.47	45.65	54	-8.35	V	AV
7317.03	56.30	-2.17	54.13	74	-19.87	V	РК
7317.03	45.36	-2.17	43.19	54	-10.81	V	AV
			High Channel	-2471.01MHz			
4942.02	59.49	-4.42	55.07	74	-18.93	Н	РК
4942.02	50.69	-4.42	46.27	54	-7.73	Н	AV
7413.03	57.29	-2.14	55.15	74	-18.85	Н	РК
7413.03	48.13	-2.14	45.99	54	-8.01	Н	AV
4942.02	54.89	-4.42	50.47	74	-23.53	V	РК
4942.02	49.82	-4.42	45.40	54	-8.60	V	AV
7413.03	53.61	-2.14	51.47	74	-22.53	V	РК
7413.03	46.09	-2.14	43.95	54	-10.05	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

APPENDIX PHOTOGRAPHS

Please refer to "ANNEX"

***** END OF REPORT *****