



RF Exposure Evaluation

For

Swann Communications U.S.A. Inc.

MaxRanger4K Base Station

Test Model: NVW-MR4KSTN

Prepared for : Swann Communications U.S.A. Inc.
Address : 12110 E. Slauson Avenue, Suite 4 Santa Fe Springs California 90670
United States

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : March 24, 2025
Number of tested samples : 2
Sample No. : A250310120-1, A250310120-2
Serial number : Prototype
Date of Test : March 24, 2025 ~ May 29, 2025
Date of Report : May 29, 2025



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RF Exposure Evaluation	
Report Reference No.	LCSA03125008EG
Date of Issue	May 29, 2025
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	Swann Communications U.S.A. Inc.
Address	12110 E. Slauson Avenue, Suite 4 Santa Fe Springs California 90670 United States
Test Specification	
Standard	FCC KDB publication 447498 D01 General RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
Test Report Form No.	TRF-4-E-215 A/0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description.	
Trade Mark	SWANN
Test Model	NVW-MR4KSTN
Ratings	Please Refer to Page 6
Result	Pass

Compiled by:

Nadia Zhou

Nadia Zhou/ Administrator

Supervised by:

Jack Liu

Jack Liu / Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager



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RF Exposure Evaluation

Test Report No. : LCSA03125008EG	<u>May 29, 2025</u> Date of issue
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EUT.....	: MaxRanger4K Base Station
Test Model.....	: NVW-MR4KSTN
Applicant.....	: Swann Communications U.S.A. Inc.
Address.....	: 12110 E. Slauson Avenue, Suite 4 Santa Fe Springs California 90670 United States
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: DONGGUAN JUYANG ELECTRONIC COMPANY LIMITED
Address.....	: Room101, Building2, No.46, HuangTang Road, Xinsi District, HengLi Town, DongGuan City, GuangDong Province, China
Telephone.....	: /
Fax.....	: /
Factory.....	: Neo-Neon (Viet Nam) Development Co., Ltd.
Address.....	: Gia Le Industrial Zone, DongXuan Communal, DongHuang District, ThaiBinh Province
Telephone.....	: /
Fax.....	: /

Test Result	Pass
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	May 29, 2025	Initial Issue	---





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**1. Product Information**

EUT	: MaxRanger4K Base Station
Test Model	: NVW-MR4KSTN
Ratings	: Input: 12V $\overline{\text{---}}$ 2A For AC Adapter Input: 100-240V~, 50/60Hz, 1.5A Max Adapter Output: 12V $\overline{\text{---}}$ 2A DC 3.7V by Battery, 8700mAh
Hardware Version	: V1.2
Software Version	: V4.1
Bluetooth	:
Frequency Range	: 2402MHz~2480MHz
Channel Number	: 79 channels for Bluetooth V4.1 (DSS) 40 channels for Bluetooth V4.1 (DTS)
Channel Spacing	: 1MHz for Bluetooth V4.1 (DSS) 2MHz for Bluetooth V4.1 (DTS)
Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V4.1 (DSS) GFSK for Bluetooth V4.1 (DTS)
Bluetooth Version	: V4.1
Antenna Description	: FPC Antenna, 4.40dBi(Max.)
2.4GWIFI	:
Frequency Range	: 2412MHz~2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: FPC Antenna, 4.40dBi(Max.)
5.2GWIFI	:
Frequency Range	: 5180MHz~5240MHz
Channel Number	: 4 Channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: FPC Antenna, 8.81dBi(Max.)
5.8GWIFI	:
Frequency Range	: 5745MHz~5825MHz
Channel Number	: 5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)





Modulation Type	: IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: FPC Antenna, 8.81dBi(Max.)
HaLow	:
Frequency Range	: 906MHz~926MHz
Channel Number	: 6 Channels
Modulation Type	: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: External Antenna, 2.92dBi(Max.)
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Mobile Device
Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.	





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna



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**5. Conducted Power**

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
1-DH5	0	2402	2.67
	39	2441	4.25
	78	2480	3.7
2-DH5	0	2402	4.45
	39	2441	5.69
	78	2480	5.04
3-DH5	0	2402	4.74
	19	2441	6.01
	39	2480	5.26

[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	-1.17
	19	2440	1.43
	39	2480	0.35
BLE 2M	0	2402	-1.25
	19	2440	1.23
	39	2480	0.19

[2.4G WIFI]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
IEEE 802.11b	1	2412	15.07
	6	2437	14.67
	11	2462	14.21
IEEE 802.11g	1	2412	14.28
	6	2437	13.63
	11	2462	14.71
IEEE 802.11n HT20	1	2412	13.85
	6	2437	13.12
	11	2462	13.04
IEEE 802.11n HT40	3	2422	13.33
	6	2437	13.38
	9	2452	13.1





[5.2G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	36	5180	12.98
	40	5200	13.25
	48	5240	11.5
11N20 SISO	36	5180	11.76
	40	5200	11.68
	48	5240	11.06
11N40 SISO	38	5190	11.47
	46	5230	10.23
11AC20 SISO	36	5180	11.75
	40	5200	11.6
	48	5240	11.52
11AC40 SISO	38	5190	11.54
	46	5230	11.71
11AC80 SISO	42	5210	10.81

[5.8G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	149	5745	13.05
	157	5785	12.21
	165	5825	12.68
11N20 SISO	149	5745	11.25
	157	5785	11.45
	165	5825	11.98
11N40 SISO	151	5755	11.85
	159	5795	11.26
11AC20 SISO	149	5745	11.19
	157	5785	10.41
	165	5825	11.98
11AC40 SISO	151	5755	11.84
	159	5795	11.19
11AC80 SISO	155	5775	11.19

[HaLow]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
HaLow	1	906	20.75
	3	914	22.51
	6	926	20.91





6. Manufacturing Tolerance

[BT]

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	4.0	3.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ -DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	4.0	5.0	5.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	4.0	6.0	5.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE 1M]

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE 2M]

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[2.4G WIFI]

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	13.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0





[5.2G WIFI]

11A (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	13.0	11.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	11.0	10.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11AC40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	11.0	11.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC80 (Average)			
Channel	Channel 42		
Target (dBm)	10.0		
Tolerance $\pm$ (dB)	1.0		





[5.8G WIFI]

11A (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	12.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	11.0	11.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	11.0	11.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	10.0	11.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11AC40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	11.0	11.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC80 (Average)			
Channel	Channel 155		
Target (dBm)	11.0		
Tolerance $\pm$ (dB)	1.0		

[HaLow]

OFDM (Peak)			
Channel	Channel 1	Channel 3	Channel 6
Target (dBm)	20.0	22.0	20.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0





7. Measurement Results

7.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	5.0	3.1623	4.40	2.7542	0.0017	1.0000
$\pi/4$ -DQPSK	6.0	3.9811	4.40	2.7542	0.0022	1.0000
8-DPSK	7.0	5.0119	4.40	2.7542	0.0027	1.0000

[BLE 1M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	2.0	1.5849	4.40	2.7542	0.0009	1.0000

[BLE 2M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	2.0	1.5849	4.40	2.7542	0.0009	1.0000

[2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	16.0	39.8107	4.40	2.7542	0.0218	1.0000
IEEE 802.11g	15.0	31.6228	4.40	2.7542	0.0173	1.0000
IEEE 802.11n HT20	14.0	25.1189	4.40	2.7542	0.0138	1.0000
IEEE 802.11n HT40	14.0	25.1189	4.40	2.7542	0.0138	1.0000

[5.2G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	14.0	25.1189	8.81	7.6033	0.0380	1.0000
IEEE 802.11n HT20	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11n HT40	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT20	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT40	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT80	11.0	12.5893	8.81	7.6033	0.0190	1.0000





[5.8G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	14.0	25.1189	8.81	7.6033	0.0380	1.0000
IEEE 802.11n HT20	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11n HT40	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT20	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT40	12.0	15.8489	8.81	7.6033	0.0240	1.0000
IEEE 802.11ac VHT80	12.0	15.8489	8.81	7.6033	0.0240	1.0000

[HaLow]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
OFDM	23.0	199.5262	2.92	1.9588	0.0778	0.6040

Remark:

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.





7.2 Simultaneous Transmission MPE Evaluation

The EUT equipped with one Bluetooth/WIFI antenna, one HaLow antenna. so need consider simultaneous transmission;
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Simultaneous Transmission				
WIFI Antenna Max MPE ratios	HaLow Antenna Max MPE ratios	Σ MPE ratios	Limit	Results
0.0380	0.0778	0.1158	1.0	Pass

8. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

9. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

10. Measurement Uncertainty

BT/BLE/2.4GWIFI/5GWIFI/HaLow:

Test Item		Frequency Range	Uncertainty	Note
Output power	:	1GHz-40GHz	$\pm 0.57\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

-----THE END OF REPORT-----

