

RF EXPOSURE Test Report

Report No. : MTi250829003-0105E7

Date of issue : 2025-12-15

Applicant : Emlid Tech Kft.

Product : All-band RTK GNSS receiver

Model(s) : RRS-4P, RRS-4

FCC ID : 2BAYERCH4

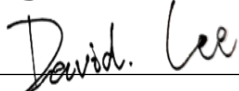
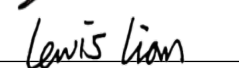
Shenzhen Microtest Co., Ltd.

TEST REPORT

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Test Result Certification		
Applicant	Emlid Tech Kft.	
Applicant Address	Esztergomi way 31-39, HUB 3 building, 5 floor, 1138 Budapest, Hungary	
Manufacturer	NexPCB Limited	
Manufacturer Address	Room 605A,TCL Industrial Centre, 8 Tai Chung Road, Tsuen Wan,Hong Kong	
Factory1	Ningbo High-tech Zone Ladder Science co., Ltd	
Factory Address	No. 4-1, 5-1, 6-1, Building 3, No. 3, Lane 215, Qingyi Road, Ningbo High-tech Zone, Zhejiang Province,China	
Factory2	PT. NEXFACTORY ERA XCELLENCE	
Factory Address	Jalan T ekno 3, Blok A8-K, Kawasan Industri Jababeka Phase 3, Desa/Kelurahan Pasirgombong, Kec. Cikarang Utara, Kab. Bekasi, Provinsi Jawa Barat,Indonesia	
Product description		
Product name	All-band RTK GNSS receiver	
Trademark	EMLID	
Model name	RRS-4P	
Series Model(s)	RRS-4	
Standards	47 CFR Part 2.1091	
Test method	KDB 447498 D01 v06	
Testing Information		
Date of test	2025-11-08 to 2025-12-15	
Test Result	Pass	
Prepared by:	James Qin	
Reviewed by:	David Lee	
Approved by:	Lewis Lian	

1 RF EXPOSURE EVALUATION

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

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) 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
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

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

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

$\pi = 3.1415926$

R = distance between observation point and center of the radiator in cm(30cm)

For the frequency range of 300–1500 MHz, the MPE limit for P_d is $f/1500$ (mW/cm²); for the frequency range of 1500–100000 MHz, the MPE limit for P_d is 1 mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2 Measurement Result

BT&BLE:

Operation Frequency: 2402-2480MHz,

Power density limited: 1mW/ cm²

Antenna Type: Rod-shaped antenna

Antenna gain: 0.59dBi

R=30cm

mW=10^{^(dBm/10)}

Antenna gain Numeric=10^{^(dBi/10)}= 10^{^(0.59/10)}=1.15

BT:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power (dBm)	(mW)	Gain (dBi)	Numeric		
2402	GFSK	0.79	0±1	1	1.259	0.59	1.15	0.00013	1
2441		0.99	0±1	1	1.259	0.59	1.15	0.00013	1
2480		2.28	2±1	3	1.995	0.59	1.15	0.00020	1
2402	π/4-DQPSK	0.19	0±1	1	1.259	0.59	1.15	0.00013	1
2441		0.46	0±1	1	1.259	0.59	1.15	0.00013	1
2480		1.63	1±1	2	1.585	0.59	1.15	0.00016	1
2402	8DPSK	0.42	0±1	1	1.259	0.59	1.15	0.00013	1
2441		-1.47	-1±1	0	1.000	0.59	1.15	0.00010	1
2480		1.83	1±1	2	1.585	0.59	1.15	0.00016	1

The Max MPE ratio is 0.00020.

BLE:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power (dBm)	(mW)	Gain (dBi)	Numeric		
2402	GFSK-1M	2.69	2±1	3	1.995	0.59	1.15	0.00020	1
2440		3.28	3±1	4	2.512	0.59	1.15	0.00025	1
2480		4.37	4±1	5	3.162	0.59	1.15	0.00032	1
2402	GFSK-2M	2.6	2±1	3	1.995	0.59	1.15	0.00020	1
2440		3.28	3±1	4	2.512	0.59	1.15	0.00025	1
2480		4.15	4±1	5	3.162	0.59	1.15	0.00032	1

The Max MPE ratio is 0.00032.

2.4G WIFI:

Operation Frequency: 802.11b/g/n20:2412~2462 MHz, 802.11n40:2422~2452 MHz,
Power density limited: 1mW/ cm²

Antenna Type: Rod-shaped antenna

Antenna gain: 0.58dBi

R=30cm

$mW=10^{(dBm/10)}$

Antenna gain Numeric= $10^{(dBi/10)}=10^{(0.58/10)}=1.14$

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 30cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
2412	802.11b	14.16	14±1	15	31.623	1.14	0.00320	1
2437		14.37	14±1	15	31.623	1.14	0.00320	1
2462		13.89	13±1	14	25.119	1.14	0.00254	1
2412	802.11g	17.58	17±1	18	63.096	1.14	0.00638	1
2437		17.89	17±1	18	63.096	1.14	0.00638	1
2462		17.42	17±1	18	63.096	1.14	0.00638	1
2412	802.11n H20	17.74	17±1	18	63.096	1.14	0.00638	1
2437		18.05	18±1	19	79.433	1.14	0.00803	1
2462		17.62	17±1	18	63.096	1.14	0.00638	1
2422	802.11n H40	18.05	18±1	19	79.433	1.14	0.00803	1
2437		17.86	17±1	18	63.096	1.14	0.00638	1
2452		17.32	17±1	18	63.096	1.14	0.00638	1

The Max MPE ratio is 0.00803.

5G WIFI:

802.11a/n (HT20):

U-NII-1: 5180MHz to 5240MHz;

U-NII-3: 5745MHz to 5825MHz;

802.11n (HT40):

U-NII-1: 5190MHz to 5230MHz;

U-NII-3: 5755MHz to 5795MHz;

ANT Gain: U-NII-1: -0.91dBi; U-NII-3: -1.84dBi;

Power density limited: 1mW/ cm2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna		Evaluation result at 30cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric			
5180	11A	2.83	2±1	3	1.995	0.81		0.00014	1
5200		2.75	2±1	3	1.995	0.65		0.00012	1
5240		2.78	2±1	3	1.995	0.81		0.00014	1
5745		-2.71	-2±1	-1	0.794	0.65		0.00005	1
5785		-2.75	-2±1	-1	0.794	0.81		0.00006	1
5825		-2.14	-2±1	-1	0.794	0.65		0.00005	1
5180	11N20SISO	2.42	2±1	3	1.995	0.81		0.00014	1
5200		2.84	2±1	3	1.995	0.65		0.00012	1
5240		2.87	2±1	3	1.995	0.81		0.00014	1
5745		-2.38	-2±1	-1	0.794	0.65		0.00005	1
5785		-2.38	-2±1	-1	0.794	0.81		0.00006	1
5825		-1.82	-1±1	0	1.000	0.65		0.00006	1
5190	11N40SISO	2.31	2±1	3	1.995	0.81		0.00014	1
5230		2.99	2±1	3	1.995	0.65		0.00012	1
5755		-2.03	-2±1	-1	0.794	0.81		0.00006	1
5795		-2.94	-2±1	-1	0.794	0.65		0.00005	1

The Max MPE ratio is 0.00014.

LoRa(Rated Power 100mW):

LoRa: 902.9 - 927.5MHz

Antenna(s) gain: -1dBi

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna		Evaluation result at 30cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
902.9	LoRa	18.15	18±1	19	79.433	-1	0.79	0.00558	0.60
914.9		17.824	17±1	18	63.096	-1	0.79	0.00443	0.61
927.5		18.128	18±1	19	79.433	-1	0.79	0.00558	0.62

The Max MPE ratio is 0.0093.

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LoRa(Rated Power 500mW):

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna		Evaluation result at 30cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
902.9	LoRa	25.574	25±1	26	398.107	-1	0.79	0.02796	0.60
914.9		25.433	25±1	26	398.107	-1	0.79	0.02796	0.61
927.5		25.922	25±1	26	398.107	-1	0.79	0.02796	0.62

The Max MPE ratio is 0.04645.

UHF(Channel Separation 25kHz):

modulation	Frequency (MHz)	Power Level	conducted power	Tune-up power	Max		Antenna		Evaluation result at 30cm	Power density Limits
			(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
					(dBm)	(mW)	(dBi)	Numeric		
GMSK	410.125	Low	26.442	26±1	27	501.187	-1	0.79	0.03520	0.27
		Middle	29.125	29±1	30	1000.000	-1	0.79	0.07023	0.27
		High	33.494	33±1	34	2511.886	-1	0.79	0.17642	0.27
	450.125	Low	26.692	26±1	27	501.187	-1	0.79	0.03520	0.30
		Middle	30.401	30±1	31	1258.925	-1	0.79	0.08842	0.30
		High	33.063	33±1	34	2511.886	-1	0.79	0.17642	0.30
	456.125	Low	26.873	26±1	27	501.187	-1	0.79	0.03520	0.30
		Middle	29.678	29±1	30	1000.000	-1	0.79	0.07023	0.30
		High	33.019	33±1	34	2511.886	-1	0.79	0.17642	0.30
	469.125	Low	27.115	27±1	28	630.957	-1	0.79	0.04431	0.31
		Middle	30.663	30±1	31	1258.925	-1	0.79	0.08842	0.31
		High	33.147	33±1	34	2511.886	-1	0.79	0.17642	0.31

The Max MPE ratio is 0.64524.

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UHF(Channel Separation 12.5kHz):

modulation	Frequency (MHz)	Power Level	conducted power	Tune-up power	Max		Antenna		Evaluation result at 30cm	Power density Limits
			(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
					(dBm)	(mW)	(dBi)	Numerical		
GMSK	410.125	Low	26.372	26±1	27	501.187	-1	0.79	0.03520	0.27
		Middle	29.053	29±1	30	1000.000	-1	0.79	0.07023	0.27
		High	32.583	32±1	33	1995.262	-1	0.79	0.14014	0.27
	450.125	Low	26.663	26±1	28	630.957	-1	0.79	0.04431	0.30
		Middle	30.401	30±1	31	1258.925	-1	0.79	0.08842	0.30
		High	33.036	33±1	34	2511.886	-1	0.79	0.17642	0.30
	456.125	Low	26.785	26±1	27	501.187	-1	0.79	0.03520	0.30
		Middle	29.862	29±1	30	1000.000	-1	0.79	0.07023	0.30
		High	33.006	33±1	34	2511.886	-1	0.79	0.17642	0.30
	469.125	Low	27.040	27±1	28	630.957	-1	0.79	0.04431	0.31
		Middle	30.679	30±1	31	1258.925	-1	0.79	0.08842	0.31
		High	33.123	33±1	34	2511.886	-1	0.79	0.17642	0.31

The Max MPE ratio is 0.58790.

GPRS&EGPRS 850: 824.2MHz~848.8MHz

GPRS&EGPRS 1900: 1850.2MHz~1909.8MHz

GPRS&EGPRS 850: -7.56dBi

GPRS&EGPRS1900: -1.89dBi

Channel	Frequency (MHz)	modulation	conduct ed power	Tune-up power	Max		Antenna		Evaluation result	Power density Limits
			(dBm)	(dBm)	tune-up power		Gain		(mW/cm ²)	(mW/cm ²)
					(dBm)	(mW)	(dBi)	Numerical		
251	848.8	GPRS850	30.76	30±1	31	1258.925	-7.56	0.18	0.01952	0.57
512	1850.2	GPRS1900	31.02	31±1	32	1584.893	-1.89	0.65	0.09069	1
251	848.8	EGPRS850	25.41	25±1	26	398.107	-7.56	0.18	0.00617	0.57
512	1850.2	EGPRS1900	28.61	28±1	29	794.328	-1.89	0.65	0.04545	1

The Max MPE ratio is 0.09069.

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WCDMA Band II: 1852.4MHz~1907.6MHz

WCDMA Band V: 826.4MHz~846.6MHz

WCDMA Band II: -1.89dBi

WCDMA Band V: -7.56dBi

Channel	Frequency (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric		
9262	1852.4	Band2	26.69	26±1	27	501.187	-1.89	0.65	0.02868	1.00
4183	836.6	Band5	24.00	24±1	25	316.228	-7.56	0.18	0.00490	0.56

The Max MPE ratio is 0.02868.

LTE FDD Band 2: 1850.7 – 1909.3MHz

LTE FDD Band 4: 1710.7 – 1754.3MHz

LTE FDD Band 5: 824.7 – 848.3MHz

LTE FDD Band 7: 2502.5 – 2567.5MHz

LTE FDD Band 12: 699.7 – 715.3MHz

LTE FDD Band 13: 779.5 – 784.5MHz

LTE FDD Band 26(90): 814.7 – 823.3 MHz

LTE FDD Band 26(22H): 824.7 – 848.3 MHz

LTE TDD Band 38: 2572.5 - 2610MHz

LTE TDD Band 41: 2537.5 – 2645MHz

LTE FDD Band 2: -1.89dBi

LTE FDD Band 4: -3.82dBi

LTE FDD Band 5: -7.74dBi

LTE FDD Band 7: -3.66dBi

LTE FDD Band 12: -12.51dBi

LTE FDD Band 13: -3.5dBi

LTE FDD Band 26: -7.56dBi

LTE FDD Band 38: -2.3dBi

LTE TDD Band 41: 0.07dBi

Channel	Frequency (MHz)	modulation	conduct ed power	Tune-up power (dBm)	Max		Antenna		Evaluati on result	Power density Limits
			(dBm)		tune-up power	Gain		(mW/cm ²)	(mW/cm ²)	
						(dBm)	(mW)			(dBi)
18700	1860	Band 2	25.34	25±1	26	398.107	-1.89	0.65	0.02278	1
20375	1752.5	Band 4	24.42	24±1	25	316.228	-3.82	0.41	0.01160	1
20635	847.5	Band 5	24.27	24±1	25	316.228	-7.74	0.17	0.00470	0.57
21100	2535	Band 7	23.48	23±1	24	251.189	-3.66	0.43	0.00956	1
23173	715.3	Band 12	22.64	22±1	23	199.526	-12.51	0.06	0.00099	0.48
23230	782	Band 13	22.45	22±1	23	199.526	-3.5	0.45	0.00788	0.52
26740	819	Band 26	23.2	23±1	24	251.189	-7.56	0.18	0.00390	0.55
38000	2595	Band 38	21.85	22±1	23	199.526	-2.3	0.59	0.01039	1
39725	2503.5	Band 41	24.09	24±1	25	316.228	0.07	1.02	0.02841	1

The Max MPE ratio is 0.02841.

Conclusion:**SIMULTANEOUS TRANSMISSIONS**

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

Simultaneous transmit:

Operating Band	The MPE ratio
BR&EDR	0.00020
BLE	0.00032
2.4G WIFI	0.00803
5G WIFI	0.00014
LoRa	0.04645
UHF	0.64524
2G	0.09069
3G	0.02868
4G	0.02841

So the simultaneous transmitting antenna pairs as below:

BLE +2.4G WIFI + 5G WIFI + UHF+2G = 0.00032+0.00803+0.00014+0.64524+0.09069=0.74442

For the max result: $0.74442 \leq 1.0$, No SAR is required.

Statement

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2. The test results of this report are only responsible for the samples submitted. Client shall be responsible for representativeness of the sample and authenticity of the material.
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***** END OF REPORT *****