



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

RF Exposure MPE

Report Reference No.....: CTA25081101719

FCC ID.....: 2BDDS-AGRONAVE12W

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Date of issue.....: Sep. 29, 2025

Testing Laboratory Name.....: Shenzhen CTA Testing Technology Co., Ltd.

Address.....: Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name.....: AGRES SISTEMAS ELETRONICOS S.A.

Address.....: Av. Com. Franco, 6720 - Uberaba Curitiba - PR -Brazil 81560-000

Standard.....: 47CFR §1.1310

47CFR §2.1091

KDB447498 D01 General RF Exposure Guidance v06

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Test item description.....: 12.3-inch Rugged Embedded Computer

Trade Mark.....: N/A

Manufacturer.....: AGRES SISTEMAS ELETRONICOS S.A.

Model/Type reference.....: agroNave 12W

Listed Models.....: N/A

Rating.....: Input: 9-36V---, 18W

Result.....: PASS

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TEST REPORT

Equipment under Test : 12.3-inch Rugged Embedded Computer

Model /Type : agroNave 12W

Listed Models : N/A

Applicant : **AGRES SISTEMAS ELETRONICOS S.A.**

Address : Av. Com. Franco, 6720 - Uberaba Curitiba - PR -Brazil 81560-000

Manufacturer : **AGRES SISTEMAS ELETRONICOS S.A.**

Address : Av. Com. Franco, 6720 - Uberaba Curitiba - PR -Brazil 81560-000

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.

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1 TEST STANDARDS

The tests were performed according to following standards:

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures.

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

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

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Aug. 11, 2025
Testing commenced on	:	Aug. 11, 2025
Testing concluded on	:	Sep. 29, 2025

2.2 Product Description

EUT	:	12.3-inch Rugged Embedded Computer
Test Model	:	agroNave 12W
Ratings	:	Input: 9-36V—, 18W
Hardware Version	:	AN-UW_V002
Software Version	:	V5.1.0
Bluetooth	:	
Frequency Range	:	2402MHz~2480MHz
Channel Number	:	79 channels for Bluetooth V5.0 (DSS) 40 channels for Bluetooth V5.0 (DTS)
Channel Spacing	:	1MHz for Bluetooth V5.0 (DSS) 2MHz for Bluetooth V5.0 (DTS)
Modulation Type	:	GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.0 (DSS) GFSK for Bluetooth V5.0 (DTS)
Bluetooth Version	:	V5.0
Antenna Description	:	PIFA Antenna, 2.73dBi(Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412MHz~2462MHz
Channel Number	:	11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Channel Spacing	:	5MHz
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	:	PIFA Antenna, 2.73dBi(Max.)
WIFI(5.2G Band)	:	
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	:	PIFA Antenna, 1.37dBi(Max.)
WIFI(5.8G Band)	:	
Frequency Range	:	5745MHz~5825MHz

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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	: PIFA Antenna, 1.37dBi(Max.)
2G	:
Support Band	: ☒ GSM 850 (U.S.-Band) ☒ PCS 1900 (U.S.-Band)
Release Version	: R99
GPRS Class	: Class 12
EGPRS Class	: Class 12
Type Of Modulation	: GMSK for GSM/GPRS; GMSK/8PSK for EGPRS
Antenna Description	: PIFA Antenna 0.32dBi (max.) For GSM 850 1.33dBi (max.) For PCS 1900
3G	:
Support Band	: ☒ WCDMA Band II (U.S.-Band) ☒ WCDMA Band IV (U.S.-Band) ☒ WCDMA Band V (U.S.-Band)
Release Version	: R8
Type Of Modulation	: QPSK,16QAM
Antenna Description	: PIFA Antenna 1.33dBi (max.) For WCDMA Band II 1.85dBi (max.) For WCDMA Band IV 0.32dBi (max.) For WCDMA Band V
LTE	:
Support Band	: ☒ E-UTRA Band 2(U.S.-Band) ☒ E-UTRA Band 4(U.S.-Band) ☒ E-UTRA Band 5(U.S.-Band) ☒ E-UTRA Band 7(U.S.-Band) ☒ E-UTRA Band 12(U.S.-Band) ☒ E-UTRA Band 13(U.S.-Band) ☒ E-UTRA Band 17(U.S.-Band) ☒ E-UTRA Band 25(U.S.-Band) ☒ E-UTRA Band 26(U.S.-Band) ☒ E-UTRA Band 38(U.S.-Band) ☒ E-UTRA Band 41(U.S.-Band)
LTE Release Version	: R8
Type Of Modulation	: QPSK/16QAM
Antenna Description	: PIFA Antenna 1.33dBi (max.) For E-UTRA Band 2 1.85dBi (max.) For E-UTRA Band 4 0.32dBi (max.) For E-UTRA Band 5 1.81dBi (max.) For E-UTRA Band 7 0.23dBi (max.) For E-UTRA Band 12 -0.46dBi (max.) For E-UTRA Band 13 0.23dBi (max.) For E-UTRA Band 17 1.41dBi (max.) For E-UTRA Band 25 0.32dBi (max.) For E-UTRA Band 26 1.81dBi (max.) For E-UTRA Band 38 1.81dBi (max.) For E-UTRA Band 41
Power Class	: Class 3

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Extreme temp. Tolerance	: -30°C to +50°C
Extreme vol. Limits	: 10.2VDC to 13.8VDC (nominal: 12VDC)
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.	

2.3 Special Accessories

The following is the EUT test of the auxiliary equipment provided by the laboratory:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
/	/	/	/	/	/

2.4 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community,
Fuhai Street, Bao'an District, Shenzhen, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

ISED#: 27890 CAB identifier: CN0127

Shenzhen CTA Testing Technology Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

3.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	9KHz~30MHz	3.02 dB	(1)
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)
Output Peak power	30MHz~18GHz	0.55 dB	(1)
Power spectral density	/	0.57 dB	(1)
Spectrum bandwidth	/	1.1%	(1)
Radiated spurious emission (30MHz-1GHz)	30~1000MHz	4.10 dB	(1)
Radiated spurious emission (1GHz-18GHz)	1~18GHz	4.32 dB	(1)
Radiated spurious emission (18GHz-40GHz)	18-40GHz	5.54 dB	(1)
Time	/	±2%	(1)

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4 Test limit

4.1 Requirement

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/Controlled 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

4.2 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

4.3 Conducted Power Results and Manufacturing tolerance

[BT]

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	ANT Max. Tune Up Power (dBm)
GFSK	0	2402	-1.25	-1.0±1.0
	39	2441	-1.25	-1.0±1.0
	78	2480	-2.03	-2.0±1.0
π/4DQPSK	0	2402	0.61	0±1.0
	39	2441	0.87	0±1.0
	78	2480	-0.21	0±1.0
8DPSK	0	2402	1.01	1.0±1.0
	19	2441	1.24	1.0±1.0
	39	2480	0.16	0±1.0

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[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)	ANT Max. Tune Up Power (dBm)
BLE 1M	0	2402	0.5	0±1.0
	19	2440	1.33	1.0±1.0
	39	2480	0.35	0±1.0

[2.4G WIFI]

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	ANT Max. Tune Up Power (dBm)
IEEE 802.11b	1	2412	15.01	15.0±1.0
	6	2437	14.15	14.0±1.0
	11	2462	14.32	14.0±1.0
IEEE 802.11g	1	2412	14.21	14.0±1.0
	6	2437	14.58	14.0±1.0
	11	2462	14.75	14.0±1.0
IEEE 802.11n HT20	1	2412	13.66	13.0±1.0
	6	2437	13.82	13.0±1.0
	11	2462	13.08	13.0±1.0
IEEE 802.11n HT40	3	2422	13.27	13.0±1.0
	6	2437	13.14	13.0±1.0
	9	2452	12.91	12.0±1.0

[5.2G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	ANT Max. Tune Up Power (dBm)
11A	36	5180	13.15	13.0±1.0
	40	5200	13.28	13.0±1.0
	48	5240	12.21	12.0±1.0
11N20 SISO	36	5180	11.9	11.0±1.0
	40	5200	11.74	11.0±1.0
	48	5240	11.66	11.0±1.0
11N40 SISO	38	5190	11.59	11.0±1.0
	46	5230	10.71	10.0±1.0
11AC20 SISO	36	5180	11.91	11.0±1.0
	40	5200	11.72	11.0±1.0
	48	5240	11.81	11.0±1.0
11AC40 SISO	38	5190	11.57	11.0±1.0
	46	5230	10.75	10.0±1.0
11AC80 SISO	42	5210	12.38	12.0±1.0

[5.8G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	ANT Max. Tune Up Power (dBm)
11A	149	5745	13.99	13.0±1.0
	157	5785	13.43	13.0±1.0
	165	5825	13.55	13.0±1.0
11N20 SISO	149	5745	11.35	11.0±1.0
	157	5785	11.8	11.0±1.0
	165	5825	11.87	11.0±1.0
11N40 SISO	151	5755	12.06	12.0±1.0
	159	5795	11.36	11.0±1.0
11AC20 SISO	149	5745	11.36	11.0±1.0
	157	5785	11.87	11.0±1.0

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	165	5825	11.91	11.0±1.0
11AC40 SISO	151	5755	10.99	10.0±1.0
	159	5795	11.33	11.0±1.0
11AC80 SISO	155	5775	11.37	11.0±1.0

[GSM Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
GSM 850	Low	824.2	30.68	30.0±1.0
	Middle	836.6	30.67	30.0±1.0
	High	848.8	30.65	30.0±1.0
GSM 1900	Low	1850.2	29.64	29.0±1.0
	Middle	1880.0	29.68	29.0±1.0
	High	1909.8	29.60	29.0±1.0

[WCDMA Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
WCDMA Band II	Low	1852.4	23.31	23.0±1.0
	Middle	1880	23.23	23.0±1.0
	High	1907.6	23.28	23.0±1.0
WCDMA Band IV	Low	1712.4	23.02	23.0±1.0
	Middle	1732.6	23.27	23.0±1.0
	High	1752.6	23.37	23.0±1.0
WCDMA Band V	Low	826.4	22.71	22.0±1.0
	Middle	836.4	22.96	22.0±1.0
	High	846.6	22.68	22.0±1.0

[LTE Max Average Power]

Test Mode		Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
LTE	Band 2	LCH	24.23	24.0±1.0
		MCH	23.69	23.0±1.0
		HCH	23.96	23.0±1.0
	Band 4	LCH	22.62	22.0±1.0
		MCH	22.39	22.0±1.0
		HCH	22.76	22.0±1.0
	Band 5	LCH	22.90	22.0±1.0
		MCH	22.67	22.0±1.0
		HCH	23.19	23.0±1.0
	Band 7	LCH	22.94	22.0±1.0
		MCH	22.99	22.0±1.0
		HCH	22.92	22.0±1.0
	Band 12	LCH	22.99	22.0±1.0
		MCH	22.97	22.0±1.0
		HCH	22.95	22.0±1.0
	Band 13	LCH	22.36	22.0±1.0
		MCH	22.39	22.0±1.0
		HCH	22.38	22.0±1.0
	Band 17	LCH	22.79	22.0±1.0
		MCH	22.51	22.0±1.0
		HCH	22.80	22.0±1.0
	Band 25	LCH	22.96	22.0±1.0
		MCH	22.99	22.0±1.0
		HCH	22.66	22.0±1.0

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	Band 26	LCH	23.24	23.0±1.0
		MCH	23.14	23.0±1.0
		HCH	23.27	23.0±1.0
	Band 38	LCH	22.97	22.0±1.0
		MCH	23.14	23.0±1.0
		HCH	22.53	22.0±1.0
	Band 41	LCH	22.69	22.0±1.0
		MCH	22.70	22.0±1.0
		HCH	22.04	22.0±1.0

4.4 Standalone MPE Result

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 is refer to section 2.2, 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)	MPE ratios
	dBm	mW					
GFSK	0	1.0000	2.73	1.8750	0.0004	1.0000	0.0004
$\pi/4$ -DQPSK	1.0	1.2589	2.73	1.8750	0.0005	1.0000	0.0005
8-DPSK	2.0	1.5849	2.73	1.8750	0.0006	1.0000	0.0006

[BT LE]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE ratios
	dBm	mW					
GFSK	2.0	1.5849	2.73	1.8750	0.0006	1.0000	0.0006

[2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE ratios
	dBm	mW					
IEEE 802.11b	16.0	39.8107	2.73	1.8750	0.0149	1.0000	0.0149
IEEE 802.11g	15.0	31.6228	2.73	1.8750	0.0118	1.0000	0.0118
IEEE 802.11n HT20	14.0	25.1189	2.73	1.8750	0.0094	1.0000	0.0094
IEEE 802.11n HT40	14.0	25.1189	2.73	1.8750	0.0094	1.0000	0.0094

[5.2G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE ratios
	dBm	mW					
IEEE 802.11a	14.0	25.1189	1.37	1.3709	0.0069	1.0000	0.0069
IEEE 802.11n HT20	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11n HT40	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11ac VHT20	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11ac VHT40	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11ac VHT80	13.0	19.9526	1.37	1.3709	0.0054	1.0000	0.0054

[5.8G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE ratios
	dBm	mW					
IEEE 802.11a	14.0	25.1189	1.37	1.3709	0.0069	1.0000	0.0069
IEEE 802.11n HT20	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11n HT40	13.0	19.9526	1.37	1.3709	0.0054	1.0000	0.0054
IEEE 802.11ac VHT20	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11ac VHT40	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043
IEEE 802.11ac VHT80	12.0	15.8489	1.37	1.3709	0.0043	1.0000	0.0043

[GSM/WCDMA/LTE]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE ratios
	dBm	mW					
GSM 850	31.0	1258.9254	0.32	1.0765	0.2696	0.5493	0.4908
GSM 1900	30.0	1000.0000	1.33	1.3583	0.5392	1.0000	0.5392
WCDMA Band II	24.0	251.1886	1.33	1.3583	0.2702	1.0000	0.2702
WCDMA Band IV	24.0	251.1886	1.85	1.5311	0.0765	0.5493	0.1393
WCDMA Band V	23.0	199.5262	0.32	1.0765	0.0427	0.5493	0.0777
Band 2	25.0	316.2278	1.33	1.3583	0.0855	1.0000	0.0855
Band 4	23.0	251.1886	1.85	1.5311	0.0765	1.0000	0.0765
Band 5	24.0	251.1886	0.32	1.0765	0.0538	0.5493	0.0979
Band 7	23.0	199.5262	1.81	1.5171	0.0602	1.0000	0.0602
Band 12	23.0	199.5262	0.23	1.0544	0.0419	0.4660	0.0899
Band 13	23.0	199.5262	-0.46	0.8995	0.0357	0.4973	0.0718
Band 17	23.0	199.5262	0.23	1.0544	0.0419	0.4693	0.0893
Band 25	23.0	199.5262	1.41	1.3836	0.0549	0.5427	0.1012
Band 26	24.0	251.1886	0.32	1.0765	0.0538	0.5427	0.0991
Band 38	24.0	251.1886	1.81	1.5171	0.0758	1.0000	0.0758
Band 41	23.0	199.5262	1.81	1.5171	0.0602	1.0000	0.0602

Remark:

1. Output power (Peak) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

4.5 Simultaneous Transmission for MPE Result

WIFI Antenna Max MPE ratios	GSM Antenna Max MPE ratios	Σ MPE ratios	Limit	Results
0.0149	0.5392	0.5541	1.0	Pass

5 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device Threshold per KDB 447498 D01v06

***** End of Report *****

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