

TEST REPORT

Verified code: 731304

Report No.:	E202002244903-5	Application No.:	E202002244903
Client:	Winstars Technology Limited		
Address:	1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen China		
Sample Description:	Wireless AC750 Dual-Band Range Extender		
Model:	WS-WN576A2		
Serial Model NO.:	WL-WN576A2, SWV 733 B3 (IAN: 324886)		
Test Location:	Guangzhou GRG Metrology & Test Co., Ltd.		
Test Specification:	EN 50385: 2017 Product standard to demonstrate the compliance of base station equipment with radiofrequency electromagnetic field exposure limits (110MHz-100GHz), when placed on the market		
Issue Date:	2020/05/26		
Test Result:	Pass		
Prepared By: Test Engineer <i>Wu Haoming</i>	Reviewed By: Technical Manager <i>Wu Chengrong</i>	Approved By: Manager <i>Zhu Yan</i>	
Other Aspects:			
Note: /			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			



DIRECTIONS OF TEST

- 1. This company carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. 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.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Winstars Technology Limited
Address: 1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen, China

1.2 MANUFACTURER

Name: Winstars Technology Limited /
Address: 1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen, China /

1.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Wireless AC750 Dual-Band Range Extender
Model No.: WS-WN576A2
Adding Model: WL-WN576A2, SWV 733 B3 (IAN: 324886)
Trade Name: /
Power Supply: AC 100-240V;50/60Hz;0.3A
Frequency Range: **2.4GHz:**
2412MHz~2472MHz: 802.11b; 802.11g; 802.11n(HT20)
2422MHz~2462MHz: 802.11n(HT40);
5GHz:
5150 ~ 5350 MHz / 5470 ~ 5725 MHz: 802.11a, 802.11n HT20
5150 ~ 5350 MHz / 5470 ~ 5725 MHz: 802.11n HT40
5150 ~ 5350 MHz / 5470 ~ 5725 MHz: 802.11ac 80:
Transmit Power: **2.4GHz:**
antenna 0:
17.71dBm for 802.11b mode
18.06dBm for 802.11g mode
antenna 1:
18.29dBm for 802.11b mode
17.94dBm for 802.11g mode
combine with antenna 0 and antenna 1:
17.74dBm for 802.11n HT20 mode
17.34dBm for 802.11n HT40 mode

5GHz:

20.68dBm for 802.11a mode

19.06dBm for 802.11n HT20 mode

20.62dBm for 802.11n HT40 mode

19.57dBm for 802.11ac 80 mode

Modulation
type:**2.4GHz:**

DSSS for 802.11b mode;

OFDM for 802.11g mode;

OFDM for 802.11n mode.

5GHz:

OFDM

Channel space:

2.4GHz: 5MHz

5GHz:

20MHz for 802.11a , 802.11n HT20

40MHz for 802.11n HT40

80MHz for 802.11 ac 80

Antenna
Specification:

Internal Antenna with 3dBi gain (Max)

Temperature
Range:

0 ℃ ~ +40 ℃

Hardware
Version:

WS-WN578A2-A-V1.2

Software
Version:

RT76A2.V4330.200519-EU

Note:

/

2. LABORATORY AND ACCREDITATIONS

2.1 LABORATORY

The tests and measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China

P.C. : 518000

Tel : 0755-61180008

Fax : 0755-61180008

2.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies.

A2LA	Certificate Number 2861.01
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2.3 HUMAN EXPOSURE TO THE ELECTROMAGNETIC FIELDS

LIMIT

For the assessment of general public exposure from the product, the relevant limits specified as basic restrictions, in Council Recommendation 1999/519/EC Annex II Table 1, or reference levels, in Council Recommendation 1999/519/EC Annex III Table 2, and the accompanying notes to these tables, shall be applied.

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,7\,3/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,7\,3/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\, f^{1/2}$	$0,0037\, f^{1/2}$	$0,0046\, f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Notes:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{1.05}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

For the assessment of worker exposure from the product, the relevant limits specified as exposure limit values, in Directive 2013/35/EU Annex III Tables A.1 and A.3, or action levels in Directive 2013/35/EU Annex III Table B1, and the accompanying notes to these tables, shall be applied.

Table B1

ALs for exposure to electric and magnetic fields from 100 kHz to 300 GHz

Frequency range	Electric field strength ALs(E) [V m ⁻¹] (RMS)	Magnetic flux density ALs(B) [μT] (RMS)	Power density ALs(S) [W m ⁻²]
100 kHz ≤ f < 1 MHz	6,1 × 10 ²	2,0 × 10 ⁶ /f	—
1 ≤ f < 10 MHz	6,1 × 10 ⁸ /f	2,0 × 10 ⁶ /f	—
10 ≤ f < 400 MHz	61	0,2	—
400 MHz ≤ f < 2 GHz	3 × 10 ⁻³ f ^{1/2}	1,0 × 10 ⁻⁵ f ^{1/2}	—
2 ≤ f < 6 GHz	1,4 × 10 ²	4,5 × 10 ⁻¹	—
6 ≤ f ≤ 300 GHz	1,4 × 10 ²	4,5 × 10 ⁻¹	50

Note B1-1: f is the frequency expressed in hertz (Hz).

Note B1-2: [ALs(E)]² and [ALs(B)]² are to be averaged over a six-minute period. For RF pulses, the peak power density averaged over the pulse width shall not exceed 1 000 times the respective ALs(S) value. For multi-frequency fields, the analysis shall be based on summation, as explained in the practical guides referred to in Article 14.

Note B1-3: ALs(E) and ALs(B) represent maximum calculated or measured values at the workers' body position. This results in a conservative exposure assessment and automatic compliance with ELVs in all non-uniform exposure conditions. In order to simplify the assessment of compliance with ELVs, carried out in accordance with Article 4, in specific non-uniform conditions, criteria for the spatial averaging of measured fields based on established dosimetry will be laid down in the practical guides referred to in Article 14. In the case of a very localised source within a distance of a few centimetres from the body, compliance with ELVs shall be determined dosimetrically, case by case.

Note B1-4: The power density shall be averaged over any 20 cm² of exposed area. Spatial maximum power densities averaged over 1 cm² should not exceed 20 times the value of 50 W m⁻². Power densities from 6 to 10 GHz are to be averaged over any six-minute period. Above 10 GHz, the power density shall be averaged over any 68/f^{1,05}-minute period (where f is the frequency in GHz) to compensate for progressively shorter penetration depth as the frequency increases.

2.4GHZ TEST RESULTS

No non-compliance noted

Since average output power at wireless is **15.29dBm (0.0338W)** which exceed the exempt condition in EN50385. RF exposure assessment has been performed below to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

2.4 HUMAN EXPOSURE ASSESSMENT

<i>EUT parameter (data from the separate report))</i>	
Max average output power in Watt (TP)	15.29dBm (0.0338W)
Antenna gain (G)	3dBi (Numeric gain: 2)
Minimum distance in meter (D) (from transmitting structure to the human body)	0.2m

<i>Exposure evaluation</i>	
<p><i>Given</i></p> $E = \frac{\sqrt{30 \times G \times TP}}{D}$ <p>Yield $E = \frac{\sqrt{30 \times 2 \times 0.0338}}{0.2} = 7.12V/m$</p>	<p><i>Where</i></p> <p><i>G: numerical gain of transmitting antenna;</i></p> <p><i>TP: Transmitted power in watt;</i></p> <p><i>D: distance from the transmitting antenna in meter</i></p>
<p>Conclusion:</p> <p>→ $E=7.12V/m$ is significant lower than the 61V/m as required in Annex III table 2 of EC Council Recommendation (1999/519/EC). This proves that the unit complies with the EN 50385 for RF exposure requirement.</p>	

5GHZ TEST RESULTS

No non-compliance noted

Since average output power at wireless is

IEEE802.11a:	17.68 dBm	0.0586	W
IEEE802.11n HT20:	16.06 dBm	0.0404	W
IEEE802.11n HT40:	17.62 dBm	0.0578	W
IEEE802.11ac VHT80:	16.57 dBm	0.0454	W

which higher than 0.02W, which is the exempt condition as specified in EN 50385. Therefore a exposure evaluation at a safety distance of 20 cm has been performed and the resulting electrical field strength E proves that this device will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

2.5 HUMAN EXPOSURE ASSESSMENT

<i>EUT parameter (data from the separate report)</i>			
Max average output power in Watt (TP)	IEEE802.11a:	17.68dBm	0.0586W
	IEEE802.11n HT20:	16.06dBm	0.0404W
	IEEE802.11n HT40:	17.62dBm	0.0576W
	IEEE802.11ac VHT80:	16.57dBm	0.0454W
Antenna gain (G)	3dBi (Numeric gain: 2)		
Minimum distance in meter (D) (from transmitting structure to the human body)	0.2m		

<i>Exposure evaluation</i>	
<p><i>Given</i></p> $E = \frac{\sqrt{30 \times G \times TP}}{D}$ <p>For IEEE802.11a:</p> $E = \frac{\sqrt{30 \times 2 \times 0.0586}}{0.2} = 9.38V/m$ <p>For IEEE802.11n HT20:</p> $E = \frac{\sqrt{30 \times 2 \times 0.0404}}{0.2} = 7.78V/m$ <p>For IEEE802.11n HT40:</p> $E = \frac{\sqrt{30 \times 2 \times 0.0576}}{0.2} = 9.30V/m$ <p>For IEEE802.11ac VHT80:</p> $E = \frac{\sqrt{30 \times 2 \times 0.0454}}{0.2} = 8.25V/m$	<p><i>Where</i></p> <p><i>G: numerical gain of transmitting antenna;</i></p> <p><i>TP: Transmitted power in watt;</i></p> <p><i>D: distance from the transmitting antenna in meter</i></p>
<p>Conclusion:</p> <p>→ $E=9.38V/m$ is significant lower than the 61V/m as required in Annex III table 2 of EC Council Recommendation (1999/519/EC). This proves that the unit complies with the EN 50385 for RF exposure requirement.</p>	

Frequency Band	Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
2.4G	18.29	67.5	7.12	61	Pass
5G	20.68	116.9	9.38	61	Pass

Conclusion:

the formula of calculated the exposure is :

$$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \dots \text{etc.} < 1$$

CEF = Calculation E-Field Strength

LEF = Limit of E-Field Strength

Therefore, the calculation of this situation is $(7.12/61)^2 + (9.38/61)^2 = 0.024$

Which is less than the "1" limit.

Frequency Band	Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
2.4G	18.29	67.5	7.12	140	Pass
5G	20.68	116.9	9.38	140	Pass

Conclusion:

the formula of calculated the exposure is :

$$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \dots \text{etc.} < 1$$

CEF = Calculation E-Field Strength

LEF = Limit of E-Field Strength

Therefore, the calculation of this situation is $(7.12/140)^2 + (9.38/140)^2 = 0.0045$

Which is less than the "1" limit.

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