

SAR TEST EXCLUSION EVALUATION REPORT

Product Name: DECT IP Phone
Trade Mark: YEALINK
Model No. / HVIN: W59R
Add. Model No. / HVIN: N/A
Report Number: 200518021RFC-4
Test Standards: FCC 47 CFR Part 2.1093
RSS-102 Issue 5
FCC ID: T2C-W59R
IC: 10741A-W59R
Test Result: PASS
Date of Issue: June 18, 2020

Prepared for:

YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
309, 3rd Floor, No.16, Yun Ding North Road, Huli District, Xiamen
City, Fujian, P.R. China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F, Block A, Building 6, Baoneng Science and Technology Park,
Qingxiang Road No.1, Longhua New District, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by: _____


Henry Lu
Team Leader


Reviewed by: _____


Kevin Liang
Assistant Manager

Approved by: _____

Billy Li
Technical Director

Date: _____

June 18, 2020

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com<http://www.uttlab.com>UTTR-RF-RSS102-V1.0

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
Address of Applicant:	309, 3rd Floor, No.16, Yun Ding North Road, Huli District, Xiamen City, Fujian, P.R. China
Manufacturer:	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
Address of Manufacturer:	309, 3rd Floor, No.16, Yun Ding North Road, Huli District, Xiamen City, Fujian, P.R. China

1.2 EUT INFORMATION

Product Name:	DECT IP Phone	
Model No. / HVIN:	W59R	
Add. Model No. / HVIN:	N/A	
Trade Mark:	YEALINK	
DUT Stage:	Production Unit	
EUT Supports Function:	2.4 GHz ISM Band:	Bluetooth V5.0 (Not support 2LE and LE Code mode)
	DECT 6.0:	1 920 MHz to 1 930 MHz
Sample Received Date:	May 25, 2020	
Sample Tested Date:	May 28, 2020 to June 17, 2020	

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For BT_LE	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth LE
Type of Modulation:	GFSK
Number of Channels:	40
Channel Separation:	2 MHz
Antenna Type:	Integral Antenna
Antenna Gain:	3.0 dBi
Maximum Peak Power:	6.46 dBm

For BT_EDR	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth BR + EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Channel Separation:	1 MHz
Antenna Type:	Integral Antenna
Antenna Gain:	3.0 dBi
Maximum Peak Power:	5.58 dBm

For DECT		
Frequency Band:	1920 MHz to 1930 MHz	
Frequency Range:	1921.536 MHz to 1928.448 MHz	
Equipment Type:	Portable Part (PP)	
Type of Modulation:	Digital: GFSK	
Number of Channels:	5	
Channel Spacing:	1728 kHz	
Antenna Type:	Antenna 1:	Integral Antenna
	Antenna 2:	Integral Antenna
Antenna Gain:	Antenna 1:	0 dBi
	Antenna 2:	0 dBi
Maximum Peak Power:	19.99 dBm	

1.4 OTHER INFORMATION

Test channels for BT_LE				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK	2402 MHz to 2480 MHz	Channel 0	Channel 19	Channel 39
		2402 MHz	2440 MHz	2480 MHz

Test channels for BT_EDR				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
$\pi/4$ DQPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
8DPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz

Test channels for DECT				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK	1920 MHz to 1930 MHz	Channel 4	Channel 2	Channel 0
		1921.536 MHz	1924.992 MHz	1928.448 MHz

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 2.1093
RSS-102 Issue 5

All test items have been performed and recorded as per the above standards

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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 Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com <http://www.uttlab.com>
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1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.

3. SAR TEST EXCLUSION EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices.
2	RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
3	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 EXEMPTION LIMITS FOR ROUTINE EVALUATION – SAR EVALUATION

3.2.1 SAR Test Exclusion Threshold

3.2.1.1 KDB 447498 D01 v06

Appendix A

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	<i>SAR Test Exclusion Threshold (mW)</i>
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

3.2.1.2 RSS-102 Issue 5

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

4 The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

5 Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

3.2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3.3 MPE CALCULATION RESULTS

For BT_BR & EDR function, operating at 2402MHz to 2480 MHz for GFSK, π/4 DQPSK, 8DPSK.

For BT_BLE function, operating at 2402MHz to 2480 MHz for GFSK.

For DECT function, operating at 1920MHz to 1930 MHz for GFSK.

3.3.1 Antenna Type:

BT/ DECT: Integral Antenna

3.3.2 Antenna Gain:

BT: 2402MHz to 2480 MHz: 3 dBi;

DECT: 1920MHz to 1930 MHz: 0 dBi

3.3.3 Standalone SAR Test Exclusion Considerations

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The 1-g and 10-g SAR test exclusion thresholds are determined by the following:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm:

$$\frac{Max. Tune up Power_{(mW)}}{Min. Test Separation Distance_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0 \text{ for SAR-1g, } \leq 7.5 \text{ for SAR-10g}$$

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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For 100 MHz to 1500 MHz and test separation distances > 50 mm:
 $\{[\text{Threshold for 50 mm in step a}]\} + \{[(\text{test separation distance} - 50 \text{ mm}) \cdot (f_{(\text{MHz})}/150)]\}$ mW

For > 1500 MHz and ≤ 6 GHz and test separation distances > 50 mm:
 $\{[\text{Threshold for 50 mm in step a}]\} + \{[(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW

When the calculated result in step a) is ≤ 3.0 for SAR-1g exposure condition, or ≤ 7.5 for SAR-10g exposure condition, the SAR testing exclusion is applied.

When the device output power is less than the calculated result (power threshold, mW) shown in in step b) and c), the SAR testing exclusion is applied.

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Head		
			Ant. To Surface (mm)	Calculated Result	Require SAR Testing?
BT	6 (Note 1)	3.9811	5	1.3	No
DECT	8 (Note 1, 2)	6.3096	5	2.0	No
Note 1. Max. Tune-up Power = Tune-up Power + Tolerance; 2. Tune-up Power = Maximum + Duty Cycle Factor = 19.9 dBm + (-14.03 dB) = 5.87 dBm;					

3.3.4 Estimated SAR Calculation

According to KDB 447498 D01, when an antenna qualifies for the standalone SAR test exclusion and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

For test separation distances ≤ 50 mm:

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(mW)}}{\text{Min. Test Separation Distance}_{(mm)}} \times \frac{\sqrt{f(\text{GHz})}}{x}$$

Where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

For test separation distances > 50 mm, 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR.

Mode	Frequency (GHz)	Max. Tune-up Power (dBm)	Test Position	Separation Distance (mm)	Estimated SAR (W/kg)
BT	2.48	6.0	Head	5	0.17
DECT	1.93	8.0	Head	5	0.23

3.3.5 Simultaneous Multi-band Transmission Evaluation

3.3.5.1 Simultaneous Transmission Possibilities

The simultaneous transmission possibilities for this device are listed as below.

No.	Simultaneous Transmission Configurations	Support/ Not Support
1	DECT + BT	Support

3.3.5.2 Results for transmit simultaneously

Position	Highest Simultaneous Transmission SAR (1-g SAR)	BT	DECT
Head	0.40 W/kg	0.17 W/kg	0.23 W/kg

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 1 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal Photos.

*** End of Report ***

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