



No 3857.01

RF TEST REPORT

ТΑ

- **Applicant** High-Flying Electronics Technology Co., Ltd.
- FCC ID 2ACSVEW40B
- Product UART TO WIFI&BLE
- Brand Elfin; Solar Elf
- **Model** EW40B; EW41B; EW42B;

SEW40B; SEW41B; SEW42B

- Report No. R2307A0857-R1
- Issue Date September 21, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Xu Ying

Approved by: Xu Kai

TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China TEL: +86-021-50791141/2/3 FAX: +86-021-50791141/2/3-8000 RF Test Report

TABLE OF CONTENT

1. Tes	st Laboratory	4
1.1.	Notes of the Test Report	4
1.2.	Test Facility	4
1.3.	Testing Location	4
2. Ger	neral Description of Equipment Under Test	5
2.1.	Applicant and Manufacturer Information	5
2.2.	General Information	5
3. App	blied Standards	6
4. Tes	st Configuration	7
5. Tes	t Case Results	8
5.1.	Maximum output power	8
5.2.	99% Bandwidth and 6dB Bandwidth	11
5.3.	Band Edge	27
5.4.	Power Spectral Density	
5.5.	Spurious RF Conducted Emissions	
5.6.	Unwanted Emission	60
5.7.	Conducted Emission	94
6. Mai	in Test Instruments	99
ANNEX	A: The EUT Appearance	100
ANNEX	B: Test Setup Photos	101

Summary of Measurement Results	3

Number	Test Case	Clause in FCC rules	Verdict	
1	Maximum output power	15.247(b)(3)	PASS	
2	99% Bandwidth and 6dB Bandwidth	15.247(a)(2) C63.10 6.9	PASS	
3	Power spectral density	15.247(e)	PASS	
4	Band Edge	15.247(d)	PASS	
5	Spurious RF Conducted Emissions	15.247(d)	PASS	
6	Unwanted Emissions	15.247(d), 15.205, 15.209	PASS	
7	Conducted Emissions	15.207	PASS	
Date of Testing: August 4, 2023 ~ September 13, 2023				
Date of Sample Received: August 4, 2023				
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology				
(Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement				
Uncertainties were not taken into account and are published for informational purposes only.				

1. Test Laboratory

1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Contact: Telephone:	Xu Kai +86-021-50791141/2/3
Contact: Telephone: Fax:	Xu Kai +86-021-50791141/2/3 +86-021-50791141/2/3-8000
Contact: Telephone: Fax: Website:	Xu Kai +86-021-50791141/2/3 +86-021-50791141/2/3-8000 http://www.ta-shanghai.com

2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

Applicant	High-Flying Electronics Technology Co., Ltd.		
Applicant address	Building 17, No.1500 Zu Chong Zhi Road, Pudong District,		
Applicant address	Shanghai, China		
Manufacturer	High-Flying Electronics Technology Co., Ltd.		
Monufacturar address	Building 17, No.1500 Zu Chong Zhi Road, Pudong District,		
	Shanghai, China		

2.2. General Information

EUT Description			
Model	EW40B; EW41B; EW42B; SEW40B; SEW41B; SEW42B		
ON	Conducted	402A8F2B0001	
SIN	Radiated	402A8F2B8500	
Hardware Version	V3.0		
Software Version	V1.44.3		
Power Supply	External power supp	ly	
Antenna Type	External Antenna		
Antenna Connector	SMA Male Reverse		
Antenna Gain	3.39 dBi		
Additional Beamforming Gain	NA		
Operating Frequency Range(s)	802.11b/g/n(HT20): 2	2412 ~ 2462 MHz	
	Bluetooth LE V5.0: 2402 ~2480 MHz		
	802.11b: DSSS		
Modulation Type	802.11g/n: OFDM		
	Bluetooth LE: GFSK		
May Output Dawer	Wi-Fi 2.4G: 18.47dBm		
Max. Output Power	Bluetooth LE: 10.64 dBm		
Note: The EUT is sent from the applicant to TA and the information of the EUT is declared by the			
applicant.			



3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 15C (2022) Radio Frequency Devices

ANSI C63.10-2013

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

4. Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (vertical), lie-down position (horizontal). The worst emission was found in stand-up position (vertical) and the loop antenna is vertical, the others are vertical and horizontal. and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Preliminary tests have been done on all the configuration for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Test Mode	Data Rate
Bluetooth(Low Energy)	1Mbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0



5. Test Case Results

5.1. Maximum output power

Ambient Condition

Temperature	Relative humidity	
20°C ~ 25°C	45% ~ 50%	

Methods of Measurement

During the process of the testing, The EUT was connected to Power meter with a known loss. The EUT is max power transmission with proper modulation.

Test Setup



Limits

Rule Part 15.247 (b) (3) specifies that "For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz: 1 Watt."



Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U = 0.44 dB.



RF Test Report

Test Results

Power Index					
Channel 802.11b 802.11g 802.11n HT20					
CH1	18	14	13		
CH6	18	14	13		
CH11	18	14	13		

Power Index			
Channel	Bluetooth (Low Energy)		
CH0	10		
CH19	10		
СН39	10		

Test Mode	Duty cycle	Duty cycle correction Factor (dB)	
802.11b	1.00	0.00	
802.11g	1.00	0.00	
802.11n HT20	1.00	0.00	
Bluetooth LE	0.621	2.07	
Note: when Duty cycle \geq 0.98, Duty cycle correction Factor not required.			



RF Test Report

Test Mode	Carrier frequency (MHz))/ Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
	2412/CH 1	18.47	18.47	30	PASS
802.11b	2437/CH 6	18.25	18.25	30	PASS
	2462/CH11	17.57	17.57	30	PASS
	2412/CH 1	14.12	14.12	30	PASS
802.11g	2437/CH 6	13.99	13.99	30	PASS
	2462/CH11	13.57	13.57	30	PASS
802.11n HT20	2412/CH 1	13.06	13.06	30	PASS
	2437/CH 6	12.95	12.95	30	PASS
	2462/CH11	12.43	12.43	30	PASS
Bluetooth (Low Energy)	2402/CH0	8.57	10.64	30	PASS
	2440/CH19	8.23	10.30	30	PASS
	2480/CH39	7.04	9.11	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					



5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 100 kHz; VBW is set to 300 kHz on spectrum analyzer. Dector=Peak, Trace mode=max hold.

The EUT was connected to the spectrum analyzer through a known loss cable. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.

Test Setup



Limits

Rule Part 15.247 (a) (2) specifies that "Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz."

	minimum 6 dB bandwidth	≥ 500 kHz
--	------------------------	-----------

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.



RF Test Report

Report No.: R2307A0857-R1

Test Results:

Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
	2412	13.286	9.074	500	PASS
802.11b	2437	13.285	8.557	500	PASS
	2462	13.456	9.557	500	PASS
	2412	16.396	16.350	500	PASS
802.11g	2437	16.397	16.371	500	PASS
	2462	16.373	16.343	500	PASS
	2412	17.339	17.046	500	PASS
802.11n HT20	2437	17.375	17.032	500	PASS
	2462	17.367	17.034	500	PASS
	2402	1.031	0.669	500	PASS
Bluetooth (Low Energy)	2440	1.029	0.670	500	PASS
	2480	1.032	0.664	500	PASS



99%bandwidth

RF Test Report

TA

0.014.000



OBW 802.11b 2437MHz





OBW 802.11b 2462MHz



OBW 802.11g 2412MHz





Report No.: R2307A0857-R1

OBW 802.11g 2437MHz



OBW 802.11g 2462MHz





OBW 802.11n(HT20) 2412MHz



OBW 802.11n(HT20) 2437MHz





Report No.: R2307A0857-R1

OBW 802.11n(HT20) 2462MHz





OBW BLE 2402MHz



OBW BLE 2440MHz





Report No.: R2307A0857-R1

OBW BLE 2480MHz





RF Test Report

6 dB bandwidth



-6dB Bandwidth 802.11b 2412MHz

-6dB Bandwidth 802.11b 2437MHz





-6dB Bandwidth 802.11b 2462MHz



-6dB Bandwidth 802.11g 2412MHz





-6dB Bandwidth 802.11g 2437MHz



-6dB Bandwidth 802.11g 2462MHz







-6dB Bandwidth 802.11n(HT20) 2412MHz









-6dB Bandwidth 802.11n(HT20) 2462MHz



-6dB Bandwidth BLE 2402MHz



-6dB Bandwidth BLE 2440MHz





-6dB Bandwidth BLE 2480MHz





5.3. Band Edge

Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 15.247(d) specifies that "In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits." If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB."

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
2GHz-3GHz	1.407 dB



RF Test Report

Report No.: R2307A0857-R1

Test Results: PASS



Band Edge 802.11b 2412MHz Ref

Band Edge 802.11b 2412MHz Emission







Band Edge 802.11b 2462MHz Ref







Band Edge 802.11g 2412MHz Ref









Band Edge 802.11g 2462MHz Ref









Band Edge 802.11n(HT20) 2412MHz Ref









Band Edge 802.11n(HT20) 2462MHz Ref







Band Edge BLE 2402MHz Ref



Band Edge BLE 2402MHz Emission





Band Edge BLE 2480MHz Ref



Band Edge BLE 2480MHz Emission



5.4. Power Spectral Density

Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

During the process of the testing, The EUT was connected to Spectrum Analyzer with a known loss.

The EUT is max power transmission with proper modulation.

Method AVGPSD-1 was used for this test.

- a) Set instrument center frequency to DTS channel center frequency
- b) Set span to at least 1.5 times the OBW
- c) Set RBW to:3kHz≤RBW≤100kHz
- d) Set VBW≥[3x RBW]
- e) Detector=power averaging (rms) or sample detector (when rms not available)
- f) Ensure that the number of measurement points in the sweep ≥ [2 X span/RBW]
- g) Sweep time auto couple
- h) Employ trace averaging (rms) mode over a minimum of 100 traces
- i) Use the peak marker function to determine the maximum amplitude level.
- j) If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

Method AVGPSD-2 was used for this test.

- a) Measure the duty cycle (D)of the transmitter output signal as described in 11.6
- b) Set instrument center frequency to DTS channel center frequency
- c) Set span to at least 1.5 times the OBW
- d) Set RBW to:3kHz≤RBW≤100kHz
- e) Set VBW≥[3x RBW]
- f) Detector= power averaging (rms) or sample detector (when rms not available)
- g) Ensure that the number of measurement points in the sweep \geq [2 X span/RBW]
- h) Sweep time =auto couple
- i) Do not use sweep triggering; allow sweep to "free run"
- j) Employ trace averaging (rms) mode over a minimum of 100 traces
- k) Use the peak marker function to determine the maximum amplitude level

I) Add [10 log(1/ D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time


ТΔ

m) If measured value exceeds requirement specified by regulatory agency then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

Test setup



Limits

Rule Part 15.247(e) specifies that" For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. "

|--|

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.



TA

Report No.: R2307A0857-R1

RF Test Report

Test Results:					
Test Mode	Carrier frequency (MHz) / Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
	2412/CH 1	-3.31	-13.31	8	PASS
802.11b	2437/CH 6	-3.72	-13.72 8		PASS
	2462/CH11	-4.42	-14.42	8	PASS
802.11g	2412/CH 1	-9.20	-19.20	8	PASS
	2437/CH 6	-9.32	-19.32	8	PASS
	2462/CH11	-9.94	-19.94	8	PASS
802.11n HT20	2412/CH 1	-10.54	-20.54	8	PASS
	2437/CH 6 -10.93		-20.93	8	PASS
	2462/CH11	-11.47	-21.47	8	PASS
Note: Power Spe	ectral Density (dBm/3k	Hz) =Read Value	+Duty cycle correc	tion factor + 10	*log10(3/30)

Test Mode	Carrier frequency (MHz) / Channel	Read Value (dBm / 3kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion		
Bluetooth (Low Energy)	2402/CH0	-7.95	-5.88	8	PASS		
	2440/CH19	-8.43	-6.36	8	PASS		
	2480/CH39	-9.27	-7.20	8	PASS		
Note: Power Spectral Density =Read Value+Duty cycle correction factor							





PSD 802.11b 2412MHz



PSD 802.11b 2437MHz





PSD 802.11b 2462MHz



PSD 802.11g 2412MHz







PSD 802.11g 2437MHz



PSD 802.11g 2462MHz







PSD 802.11n(HT20) 2412MHz



PSD 802.11n(HT20) 2437MHz





PSD 802.11n(HT20) 2462MHz







PSD BLE 2402MHz



PSD BLE 2440MHz





PSD BLE 2480MHz





5.5. Spurious RF Conducted Emissions

Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW to 100 kHz and VBW to 300 kHz, Sweep is set to ATUO.

The test is in transmitting mode.

Test Setup



Limits

Rule Part 15.247(d) pacifies that "In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB."

Test Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit	
	2412	9.87	-20.13	
802.11b	2437	9.45	-20.55	
	2462	8.22	-21.78	
802.11g	2412	0.69	-29.31	
	2437	0.96	-29.04	
	2462	-0.03	-30.03	
802.11n HT20	2412	-0.17	-30.17	
	2437	-0.53	-30.53	
	2462	-0.96	-30.96	
Diveteeth	2402	10.24	-19.76	
	2440	9.64	-20.36	
(Low Energy)	2480	8.46	-21.54	



Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB



Test Results:



Tx. Spurious 802.11b 2412MHz Ref

Tx. Spurious 802.11b 2412MHz Emission





Tx. Spurious 802.11b 2437MHz Ref









Tx. Spurious 802.11b 2462MHz Ref







Tx. Spurious 802.11g 2412MHz Ref

Tx. Spurious 802.11g 2412MHz Emission





Tx. Spurious 802.11g 2437MHz Ref

Tx. Spurious 802.11g 2437MHz Emission





Tx. Spurious 802.11g 2462MHz Ref

Tx. Spurious 802.11g 2462MHz Emission







Tx. Spurious 802.11n(HT20) 2412MHz Ref









Tx. Spurious 802.11n(HT20) 2437MHz Ref









Tx. Spurious 802.11n(HT20) 2462MHz Ref







Tx. Spurious BLE 2402MHz Ref

Tx. Spurious BLE 2402MHz Emission





Tx. Spurious BLE 2440MHz Ref

Tx. Spurious BLE 2440MHz Emission





Tx. Spurious BLE 2480MHz Ref

Tx. Spurious BLE 2480MHz Emission



5.6. Unwanted Emission

Ambient Condition

Temperature	Relative humidity		
20°C ~ 25°C	45% ~ 50%		

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. Sweep the Restricted Band and the emissions less than 20 dB below the permissible value are reported.

The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

This method refer to ANSI C63.10. The procedure for peak unwanted emissions measurements above 1000 MHz is as follows: Set the spectrum analyzer in the following: 9kHz~150 kHz RBW=200Hz, VBW=1kHz/ Sweep=AUTO 150 kHz~30MHz RBW=9KHz, VBW=30KHz,/ Sweep=AUTO Below 1GHz RBW=100kHz / VBW=300kHz / Sweep=AUTO a) Peak emission levels are measured by setting the instrument as follows: Above 1GHz PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO b) Average emission levels are measured by setting the instrument as follows: Above 1GHz AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO c) Detector: The measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage



averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 $\log (1 / D)$], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

The test is in transmitting mode.



Test Setup









Above 1GHz



Note: Area side:2.4mX3.6m



Limits

Rule Part 15.247(d) specifies that "In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c))."

Limit in restricted band

Frequency of emission (MHz)	Field strength(µV/m)	Field strength(dBµV/m)
0.009–0.490	2400/F(kHz)	1
0.490–1.705	24000/F(kHz)	1
1.705–30.0	30	1
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. Peak Limit=74 dB μ V/m

Average Limit=54 dBµV/m



TA

Report No.: R2307A0857-R1

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.17 dB
200MHz-1GHz	4.84 dB
1-18GHz	4.35 dB
18-26.5GHz	5.90 dB
26.5GHz~40GHz	5.92 dB



Test Results:

A symbol (dB V/) in the test plot below means (dBµV/m)





ТΔ

Result of RE

Test result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz is more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software. For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

Continuous TX mode:

20

0 | 30M

Wi-Fi 2.4G

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels, 802.11g, Channel 6 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

 100

 80

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60

 60
</t

A symbol (dB V/) in the test plot below means ($dB\mu V/m$)

Jullus

50 60

80

100M

Radiates Emission from 30MHz to 1GHz

200

Frequency in Hz

300

400

500

800

1G

Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
49.237500	29.32	40.00	10.68	100.0	V	319.0	20.6
113.783750	25.10	43.50	18.40	225.0	Н	144.0	17.5
182.693750	27.10	43.50	16.40	100.0	V	4.0	16.6
256.010000	38.70	46.00	7.30	100.0	Н	59.0	19.8
308.511250	43.85	46.00	2.15	125.0	Н	263.0	20.5
495.558750	37.12	46.00	8.88	100.0	Н	34.0	24.7

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain) 2. Margin = Limit – Quasi-Peak



TA

802.11b CH1

🛟 eurofins







Radiates Emission from 3GHz to 18GHz

Report No.: R2307A0857-R1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1147.250000	45.82		74.00	28.18	500.0	200.0	V	0.0	-7.3
1187.000000		34.40	54.00	19.60	500.0	200.0	V	35.0	-7.1
1408.750000		35.93	54.00	18.07	500.0	200.0	V	3.0	-5.5
1417.750000	46.80		74.00	27.20	500.0	200.0	V	44.0	-5.5
1706.500000		37.44	54.00	16.56	500.0	200.0	V	17.0	-3.8
1713.000000	48.99		74.00	25.01	500.0	200.0	V	8.0	-3.8
1918.500000	50.16		74.00	23.84	500.0	200.0	V	21.0	-2.7
2074.000000		39.01	54.00	14.99	500.0	200.0	V	40.0	-2.1
2238.000000	49.65		74.00	24.35	500.0	200.0	V	21.0	-1.4
2254.500000		39.56	54.00	14.44	500.0	200.0	V	49.0	-1.5
2904.250000	54.34		74.00	19.66	500.0	200.0	V	35.0	1.3
2984.000000		42.61	54.00	11.39	500.0	200.0	V	77.0	1.7
4824.133622		48.80	54.00	5.20	500.0	100.0	V	97.0	-2.3

🛟 eurofins

TA

RF Test Report

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain) 2. Margin = Limit –MAX Peak/ Average





🛟 eurofins

TA







Radiates Emission from 3GHz to 18GHz

Report No.: R2307A0857-R1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1167.500000	45.44		74.00	28.56	500.0	200.0	V	13.0	-7.2
1176.000000		34.32	54.00	19.68	500.0	200.0	V	0.0	-7.1
1433.250000	47.62		74.00	26.38	500.0	200.0	V	102.0	-5.4
1440.000000		35.97	54.00	18.03	500.0	200.0	V	36.0	-5.4
1698.750000		37.45	54.00	16.55	500.0	200.0	V	83.0	-3.8
1706.250000	49.29		74.00	24.71	500.0	200.0	V	22.0	-3.8
1975.000000	49.79		74.00	24.21	500.0	200.0	V	67.0	-2.7
2067.750000		38.91	54.00	15.09	500.0	200.0	V	44.0	-2.1
2258.500000	50.29		74.00	23.71	500.0	200.0	V	73.0	-1.5
2293.250000		39.34	54.00	14.66	500.0	200.0	V	8.0	-1.2
2815.250000		42.04	54.00	11.96	500.0	200.0	V	22.0	1.3
2851.750000	53.98		74.00	20.02	500.0	200.0	V	8.0	1.2
4874.008249		49.03	54.00	4.97	500.0	100.0	V	98.0	-2.0

🛟 eurofins

TA

RF Test Report

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain) 2. Margin = Limit –MAX Peak/ Average



TA



🛟 eurofins







Radiates Emission from 3GHz to 18GHz

Report No.: R2307A0857-R1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1152.250000	45.75		74.00	28.25	500.0	200.0	V	45.0	-7.2
1175.250000		34.49	54.00	19.51	500.0	200.0	V	130.0	-7.1
1432.250000	47.97		74.00	26.03	500.0	200.0	V	8.0	-5.4
1440.250000		35.67	54.00	18.33	500.0	200.0	V	111.0	-5.4
1701.000000	48.56		74.00	25.44	500.0	200.0	V	68.0	-3.8
1717.250000		37.32	54.00	16.68	500.0	200.0	V	84.0	-3.8
1949.750000	53.64		74.00	20.36	500.0	100.0	Н	24.0	-2.8
2078.750000		38.73	54.00	15.27	500.0	200.0	V	22.0	-2.2
2247.000000	50.42		74.00	23.58	500.0	200.0	V	13.0	-1.4
2270.250000		39.31	54.00	14.69	500.0	200.0	V	88.0	-1.4
2929.000000	54.04		74.00	19.96	500.0	200.0	V	36.0	1.9
2980.500000		42.75	54.00	11.25	500.0	200.0	V	59.0	1.7
4924.020809		47.51	54.00	6.49	500.0	100.0	V	95.0	-2.3

🛟 eurofins

TA

RF Test Report

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain) 2. Margin = Limit –MAX Peak/ Average










Radiates Emission from 3GHz to 18GHz



TA

RF Test Report

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1164.696975	43.06		74.00	30.94	500.0	200.0	V	78.0	-7.2
1190.266076		32.27	54.00	21.73	500.0	200.0	V	236.0	-7.1
1377.806045	43.89		74.00	30.11	500.0	200.0	V	333.0	-5.8
1430.305376		33.32	54.00	20.68	500.0	200.0	V	191.0	-5.4
1653.178906	44.58		74.00	29.42	500.0	200.0	V	139.0	-4.4
1661.879865		33.96	54.00	20.04	500.0	200.0	V	200.0	-4.4
1996.584634	46.03		74.00	27.97	500.0	200.0	V	223.0	-2.5
2009.021720		35.10	54.00	18.90	500.0	200.0	V	329.0	-2.5
2280.928306		36.37	54.00	17.63	500.0	200.0	V	329.0	-1.4
2288.129187	48.43		74.00	25.57	500.0	200.0	V	296.0	-1.4
2756.455285	48.20		74.00	25.80	500.0	200.0	Н	63.0	0.6
2767.843472		36.72	54.00	17.28	500.0	200.0	V	172.0	0.8
4822.500000		48.70	54.00	5.30	500.0	200.0	V	290.0	-2.3

🛟 eurofins

TA

RF Test Report





🛟 eurofins

TA

RF Test Report







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1168.750000	46.54		74.00	27.46	500.0	200.0	V	33.0	-7.2
1180.750000		34.82	54.00	19.18	500.0	200.0	V	47.0	-7.1
1421.500000	47.57		74.00	26.43	500.0	200.0	V	51.0	-5.5
1440.000000		35.95	54.00	18.05	500.0	200.0	V	73.0	-5.4
1680.750000	48.61		74.00	25.39	500.0	200.0	V	168.0	-4.0
1703.250000		37.89	54.00	16.11	500.0	200.0	V	227.0	-3.8
2069.750000	50.25		74.00	23.75	500.0	100.0	V	275.0	-2.1
2079.500000		39.07	54.00	14.93	500.0	200.0	V	19.0	-2.2
2315.500000	51.91		74.00	22.09	500.0	100.0	V	314.0	-1.0
2315.750000		40.09	54.00	13.91	500.0	200.0	V	245.0	-1.0
2952.250000	54.80		74.00	19.20	500.0	200.0	V	91.0	1.6
2975.750000		43.04	54.00	10.96	500.0	200.0	V	65.0	1.6
4873.125000		49.56	54.00	4.44	500.0	100.0	V	13.0	-2.0

🛟 eurofins

TA

RF Test Report



RF Test Report 802.11g CH11

TA

🛟 eurofins







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1094.250000		33.65	54.00	20.35	500.0	200.0	V	106.0	-7.6
1098.000000	44.82		74.00	29.18	500.0	200.0	V	207.0	-7.7
1318.000000	45.30		74.00	28.70	500.0	200.0	V	9.0	-6.3
1326.000000		34.68	54.00	19.32	500.0	200.0	V	166.0	-6.3
1548.500000	47.43		74.00	26.57	500.0	200.0	V	74.0	-4.8
1560.500000		36.16	54.00	17.84	500.0	200.0	V	74.0	-4.8
1854.000000		37.76	54.00	16.24	500.0	200.0	V	207.0	-3.2
1857.750000	48.75		74.00	25.25	500.0	200.0	V	138.0	-3.2
2200.000000		39.28	54.00	14.72	500.0	200.0	V	211.0	-1.6
2205.000000	50.57		74.00	23.43	500.0	200.0	V	9.0	-1.6
2898.000000		42.11	54.00	11.89	500.0	100.0	V	170.0	1.2
2936.500000	54.35		74.00	19.65	500.0	200.0	V	9.0	1.8
4921.875000		45.64	54.00	8.36	500.0	200.0	V	288.0	-2.3

🛟 eurofins

TA

RF Test Report



RF Test Report 802.11n (HT20) CH1

TA

🛟 eurofins







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1153.500000	44.46		74.00	29.54	500.0	200.0	V	324.0	-7.2
1198.250000		33.36	54.00	20.64	500.0	200.0	V	248.0	-7.0
1391.250000		34.27	54.00	19.73	500.0	100.0	V	35.0	-5.7
1408.500000	45.70		74.00	28.30	500.0	200.0	V	275.0	-5.5
1596.750000	46.51		74.00	27.49	500.0	200.0	V	129.0	-4.6
1701.750000		35.22	54.00	18.78	500.0	200.0	V	315.0	-3.8
1997.000000	47.95		74.00	26.05	500.0	200.0	V	306.0	-2.6
2069.000000		36.24	54.00	17.76	500.0	200.0	V	306.0	-2.1
2253.000000		36.26	54.00	17.74	500.0	200.0	V	319.0	-1.5
2258.500000	47.90		74.00	26.10	500.0	200.0	V	297.0	-1.5
2686.250000	49.29		74.00	24.72	500.0	100.0	V	191.0	0.8
2941.750000		38.81	54.00	15.19	500.0	200.0	V	0.0	1.7

🛟 eurofins

TA

RF Test Report



RF Test Report 802.11n (HT20) CH6

TA

🛟 eurofins







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1092.500000	46.01		74.00	28.00	500.0	100.0	V	260.0	-7.6
1194.750000		34.69	54.00	19.31	500.0	200.0	V	86.0	-7.1
1411.000000	47.33		74.00	26.67	500.0	100.0	V	193.0	-5.5
1414.500000		35.94	54.00	18.06	500.0	200.0	V	109.0	-5.5
1615.750000	48.90		74.00	25.10	500.0	200.0	V	42.0	-4.4
1697.000000		37.70	54.00	16.30	500.0	100.0	V	355.0	-3.8
2069.000000		39.19	54.00	14.81	500.0	200.0	V	60.0	-2.1
2079.000000	50.10		74.00	23.90	500.0	200.0	V	219.0	-2.2
2300.500000	51.23		74.00	22.77	500.0	100.0	V	284.0	-1.1
2305.500000		39.68	54.00	14.32	500.0	200.0	V	19.0	-1.0
2801.500000	53.54		74.00	20.46	500.0	200.0	V	233.0	1.1
2832.500000		41.99	54.00	12.01	500.0	100.0	V	333.0	1.3
4874.818154		49.05	54.00	4.95	500.0	100.0	V	29.0	-2.0

🛟 eurofins

TA

RF Test Report



RF Test Report 802.11n (HT20) CH11

TA

🛟 eurofins







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1183.250000	45.75		74.00	28.25	500.0	200.0	V	79.0	-7.1
1198.000000		34.07	54.00	19.93	500.0	200.0	V	168.0	-7.0
1402.500000	46.44		74.00	27.56	500.0	200.0	V	225.0	-5.6
1416.250000		35.72	54.00	18.28	500.0	200.0	V	150.0	-5.5
1707.750000		37.13	54.00	16.87	500.0	200.0	V	164.0	-3.8
1726.500000	48.80		74.00	25.20	500.0	200.0	V	294.0	-3.8
1995.750000	56.12		74.00	17.88	500.0	200.0	V	155.0	-2.6
2055.500000		38.79	54.00	15.21	500.0	200.0	V	243.0	-2.3
2296.750000		39.12	54.00	14.88	500.0	200.0	V	284.0	-1.2
2299.250000	51.21		74.00	22.79	500.0	200.0	V	37.0	-1.1
2876.750000		41.28	54.00	12.72	500.0	200.0	V	14.0	1.2
2876.750000	52.93		74.00	21.07	500.0	200.0	V	14.0	1.2
4920.000000		44.28	54.00	9.72	500.0	200.0	V	301.0	-2.3
5979.375000	64.43		74.00	9.57	500.0	100.0	V	252.0	-0.6

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain) 2. Margin = Limit –MAX Peak/ Average



RF Test Report



TA

During the test, the Radiates Emission from 18GHz to 26.5GHz was performed in all modes with all channels, 802.11g, Channel 6 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18638.562500	48.34		74.00	25.66	500.0	100.0	V	57.0	-5.6
18648.125000		36.91	54.00	17.09	500.0	200.0	Н	69.0	-5.6
20101.625000		36.87	54.00	17.13	500.0	100.0	V	294.0	-5.2
20116.500000	47.75		74.00	26.25	500.0	200.0	Н	293.0	-5.2
21571.062500	46.83		74.00	27.17	500.0	200.0	V	59.0	-5.2
21600.812500		34.92	54.00	19.08	500.0	200.0	V	99.0	-5.1
23001.187500		35.69	54.00	18.31	500.0	100.0	V	52.0	-3.9
23045.812500	47.94		74.00	26.06	500.0	100.0	Н	60.0	-3.8
24498.250000		36.85	54.00	17.15	500.0	200.0	Н	106.0	-2.6
24531.187500	48.77		74.00	25.23	500.0	100.0	V	193.0	-2.5
25924.125000		36.24	54.00	17.76	500.0	200.0	V	0.0	-2.5
25949.625000	48.21		74.00	25.79	500.0	100.0	Н	234.0	-2.5

Radiates Emission from 18GHz to 26.5GHz



TA

Bluetooth LE

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels, Bluetooth LE-Channel 19 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

A symbol (dB V/) in the test plot below means ($^{dB}\mu$ V/m)



Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
48.146250	29.78	40.00	10.22	100.0	V	356.0	20.5
109.418750	25.15	43.50	18.35	225.0	Н	134.0	18.2
182.693750	27.28	43.50	16.22	100.0	V	16.0	16.6
254.918750	39.28	46.00	6.72	101.0	Н	63.0	19.8
312.876250	44.17	46.00	1.83	102.0	Н	260.0	20.7
492.247500	37.49	46.00	8.51	102.0	Н	35.0	24.7



🛟 eurofins

Bluetooth LE-Channel 0

TA







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1140.250000	44.80		74.00	29.20	500.0	200.0	V	128.0	-7.5
1199.750000		33.15	54.00	20.85	500.0	200.0	V	2.0	-7.0
1406.500000	45.38		74.00	28.62	500.0	100.0	V	76.0	-5.5
1440.000000		33.83	54.00	20.17	500.0	100.0	V	161.0	-5.4
1697.250000	46.89		74.00	27.11	500.0	100.0	V	0.0	-3.8
1702.250000		35.17	54.00	18.83	500.0	200.0	V	55.0	-3.8
1920.250000		36.35	54.00	17.65	500.0	100.0	Н	145.0	-2.7
2033.750000	47.87		74.00	26.13	500.0	100.0	V	356.0	-2.4
2213.250000	47.89		74.00	26.11	500.0	100.0	Н	83.0	-1.4
2222.000000		36.31	54.00	17.69	500.0	100.0	Н	43.0	-1.4
2891.000000	50.13		74.00	23.87	500.0	100.0	V	352.0	1.2
2945.000000		38.56	54.00	15.44	500.0	100.0	V	179.0	1.7
4803.930143		51.44	54.00	2.56	500.0	100.0	V	335.0	-2.4

🛟 eurofins

TA

RF Test Report



TA

Bluetooth LE-Channel 19







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1170.500000	44.56		74.00	29.44	500.0	100.0	V	344.0	-7.2
1188.000000		33.16	54.00	20.84	500.0	200.0	V	94.0	-7.1
1373.750000	45.47		74.00	28.53	500.0	200.0	V	22.0	-5.9
1409.750000		33.99	54.00	20.01	500.0	200.0	V	112.0	-5.5
1705.000000	47.20		74.00	26.80	500.0	200.0	Н	356.0	-3.8
1714.500000		35.29	54.00	18.71	500.0	200.0	V	218.0	-3.8
2062.250000	48.65		74.00	25.35	500.0	200.0	V	98.0	-2.2
2069.500000		36.39	54.00	17.61	500.0	100.0	V	219.0	-2.1
2250.250000		36.26	54.00	17.74	500.0	100.0	V	273.0	-1.5
2281.000000	48.58		74.00	25.42	500.0	100.0	V	324.0	-1.4
2673.500000	56.34		74.00	17.66	500.0	100.0	Н	278.0	0.8
2808.250000		38.69	54.00	15.31	500.0	200.0	V	214.0	1.2
4879.853829		53.55	54.00	0.45	500.0	100.0	V	271.0	-2.1

🛟 eurofins

TA

RF Test Report



TA

Bluetooth LE-Channel 39







Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1074.750000	44.58		74.00	29.42	500.0	200.0	V	32.0	-7.9
1174.500000		32.87	54.00	21.13	500.0	100.0	V	265.0	-7.1
1433.750000		34.29	54.00	19.71	500.0	100.0	V	183.0	-5.4
1434.250000	45.46		74.00	28.54	500.0	200.0	Н	72.0	-5.4
1653.500000		35.69	54.00	18.31	500.0	100.0	V	249.0	-4.4
1725.250000	46.53		74.00	27.47	500.0	100.0	V	196.0	-3.8
1920.250000		36.38	54.00	17.62	500.0	200.0	Н	320.0	-2.7
2062.750000	48.06		74.00	25.94	500.0	200.0	V	317.0	-2.2
2269.500000	47.39		74.00	26.61	500.0	200.0	V	110.0	-1.4
2290.000000		36.26	54.00	17.74	500.0	200.0	V	124.0	-1.3
2869.750000	49.66		74.00	24.34	500.0	200.0	V	106.0	1.3
2938.000000		38.77	54.00	15.23	500.0	200.0	V	45.0	1.8
4959.870940		50.61	54.00	3.39	500.0	100.0	V	276.0	-2.4

🛟 eurofins

TA

RF Test Report



TA

During the test, the Radiates Emission from 18GHz to 26.5GHz was performed in all modes with all channels, Bluetooth LE-Channel 19 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18740.562500	47.56		74.00	26.44	500.0	100.0	V	55.0	-5.5
18751.187500		36.49	54.00	17.51	500.0	200.0	V	43.0	-5.5
20058.062500		36.17	54.00	17.83	500.0	200.0	V	249.0	-5.2
20061.250000	47.54		74.00	26.46	500.0	200.0	V	288.0	-5.2
21420.187500	46.98		74.00	27.02	500.0	100.0	Н	85.0	-5.3
21426.562500		35.82	54.00	18.18	500.0	200.0	Н	189.0	-5.3
22717.500000	47.86		74.00	26.14	500.0	200.0	V	93.0	-4.0
22724.937500		37.02	54.00	16.98	500.0	200.0	V	338.0	-4.0
24015.875000	48.92		74.00	25.08	500.0	100.0	Н	35.0	-3.0
24035.000000		36.86	54.00	17.14	500.0	100.0	V	101.0	-3.1
25387.562500		36.78	54.00	17.22	500.0	100.0	V	16.0	-2.6
25421.562500	48.63		74.00	25.37	500.0	100.0	Н	310.0	-2.6

Radiates Emission from 18GHz to 26.5GHz



5.7. Conducted Emission

Ambient Condition

Temperature	Relative humidity		
20°C ~ 25°C	45% ~ 50%		

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.10. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

Test Setup



Note: AC Power source is used to change the voltage 110V/60Hz.

Limits

Frequency	Conducted Limits(dBµV)					
(MHz)	Quasi-peak	Average				
0.15 - 0.5	66 to 56 [*]	56 to 46 [*]				
0.5 - 5	56	46				
5 - 30	60 50					
* Decreases with the logarithm of the frequency.						

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U= 2.69 dB.



Test Results:

Following plots, Blue trace uses the peak detection and Green trace uses the average detection.

Wi-Fi 2.4G

During the test, the Conducted Emission was performed in all modes with all channels, 802.11g, Channel 6 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dΒμV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.15	43.28		65.88	22.60	1000.0	9.000	L1	ON	21.0
0.35		17.84	48.85	31.01	1000.0	9.000	L1	ON	21.0
0.45		22.12	46.93	24.81	1000.0	9.000	L1	ON	20.9
0.45	30.22		56.93	26.71	1000.0	9.000	L1	ON	20.9
1.45		12.73	46.00	33.27	1000.0	9.000	L1	ON	19.9
1.76	13.96		56.00	42.04	1000.0	9.000	L1	ON	19.8
4.22	15.37		56.00	40.63	1000.0	9.000	L1	ON	19.5
4.94		15.17	46.00	30.83	1000.0	9.000	L1	ON	19.5
6.05		16.27	50.00	33.73	1000.0	9.000	L1	ON	19.5
6.34	18.10		60.00	41.90	1000.0	9.000	L1	ON	19.5
28.48		20.46	50.00	29.54	1000.0	9.000	L1	ON	19.7
28.48	28.24		60.00	31.76	1000.0	9.000	L1	ON	19.7

Remark: Correct factor=cable loss + LISN factor

L line Conducted Emission from 150 KHz to 30 MHz





Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.24	34.58		62.17	27.59	1000.0	9.000	Ν	ON	21.1
0.36		20.25	48.69	28.44	1000.0	9.000	Ν	ON	21.0
0.45	35.01		56.93	21.92	1000.0	9.000	Ν	ON	20.9
0.45		26.01	46.85	20.84	1000.0	9.000	Ν	ON	20.9
1.25	19.68		56.00	36.32	1000.0	9.000	Ν	ON	20.1
1.31		14.52	46.00	31.48	1000.0	9.000	Ν	ON	20.0
3.62	15.08		56.00	40.92	1000.0	9.000	Ν	ON	19.5
4.99		15.64	46.00	30.36	1000.0	9.000	Ν	ON	19.5
6.80		17.12	50.00	32.88	1000.0	9.000	Ν	ON	19.5
6.86	19.63		60.00	40.37	1000.0	9.000	Ν	ON	19.5
28.49	29.59		60.00	30.41	1000.0	9.000	Ν	ON	19.8
28.50		18.84	50.00	31.16	1000.0	9.000	Ν	ON	19.8

Remark: Correct factor=cable loss + LISN factor

N line Conducted Emission from 150 KHz to 30 MHz



TA

Bluetooth LE

During the test, the Conducted Emission was performed in all modes with all channels, Bluetooth LE-Channel 19 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.17	41.06		65.06	24.00	1000.0	9.000	L1	ON	21.0
0.36		17.87	48.69	30.82	1000.0	9.000	L1	ON	21.0
0.37	29.37		58.49	29.12	1000.0	9.000	L1	ON	21.0
0.45		21.92	46.89	24.97	1000.0	9.000	L1	ON	20.9
1.30		13.55	46.00	32.45	1000.0	9.000	L1	ON	20.0
1.89	14.32		56.00	41.68	1000.0	9.000	L1	ON	19.7
3.80	15.05		56.00	40.95	1000.0	9.000	L1	ON	19.5
4.84		14.97	46.00	31.03	1000.0	9.000	L1	ON	19.5
5.55	17.43		60.00	42.57	1000.0	9.000	L1	ON	19.5
6.14		16.35	50.00	33.65	1000.0	9.000	L1	ON	19.5
26.36	28.10		60.00	31.90	1000.0	9.000	L1	ON	19.7
27.42		24.44	50.00	25.56	1000.0	9.000	L1	ON	19.7

Remark: Correct factor=cable loss + LISN factor

L line Conducted Emission from 150 KHz to 30 MHz





Frequency (MHz)	QuasiPeak (dBµV)	Average (dΒμV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.16	40.71		65.28	24.57	1000.0	9.000	Ν	ON	21.0
0.17		27.72	55.06	27.34	1000.0	9.000	Ν	ON	21.0
0.45		26.67	46.93	20.26	1000.0	9.000	Ν	ON	20.9
0.45	34.72		56.85	22.13	1000.0	9.000	Ν	ON	20.9
1.25	19.85		56.00	36.15	1000.0	9.000	Ν	ON	20.1
1.28		15.97	46.00	30.03	1000.0	9.000	Ν	ON	20.0
2.88	16.51		56.00	39.49	1000.0	9.000	Ν	ON	19.6
4.96		16.11	46.00	29.89	1000.0	9.000	Ν	ON	19.5
6.05		17.54	50.00	32.46	1000.0	9.000	Ν	ON	19.5
6.96	19.43		60.00	40.57	1000.0	9.000	Ν	ON	19.5
27.42		23.27	50.00	26.73	1000.0	9.000	Ν	ON	19.8
28.47	31.16		60.00	28.84	1000.0	9.000	Ν	ON	19.8

Remark: Correct factor=cable loss + LISN factor

N line Conducted Emission from 150 KHz to 30 MHz



6. Main Test Instruments

Name	Manufacturer	Туре	Serial Number	Calibration Date	Expiration Date			
Power Sensor	R&S	NRP18S	101954	2023-05-12	2024-05-11			
Spectrum Analyzer	KEYSIGHT	N9020A	MY51330870	2023-05-12	2024-05-11			
	ι	Jnwanted Emi	ssion					
Spectrum Analyzer	R&S	FSV40	101186	2023-05-12	2024-05-11			
EMI Test Receiver	R&S	ESR	102389	2023-05-12	2024-05-11			
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2023-04-16	2026-04-15			
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	1023	2023-07-14	2026-07-13			
Horn Antenna	R&S	HF907	102723	2021-07-24	2024-07-23			
Horn Antenna	ETS-Lindgren	3160-09	00102643	2021-10-10	2024-10-09			
Software	R&S	EMC32	9.26.01	/	/			
Conducted Emission								
LISN	R&S	ENV216	102191	2022-12-13	2024-12-09			
EMI Test Receiver	R&S	ESR	101667	2023-05-12	2024-05-11			
Software	R&S	EMC32	10.35.10	/	/			



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

****** END OF REPORT ******