

TEST REPORT

Report No.	CISRR24051304202
Project No.	CISR240513042
FCC ID	2BFQI-V98PRO
Applicant	Jiangxi Jichi Technology Co., Ltd
Address	Plant No.3,Block B13-1-2, B14-1, Jinggangshan Economic and Development Zone,Ji 'an,Jiangxi,China
Manufacturer	Jiangxi Jichi Technology Co., Ltd
Address	Plant No.3,Block B13-1-2, B14-1, Jinggangshan Economic and Development Zone,Ji 'an,Jiangxi,China
Product Name	keyboard
Trade Mark	
Model/Type reference	V98Pro
Listed Model(s)	-
Standard	Part 15 Subpart C Section 15.247
Test date	May 13, 2024 ~ July 16, 2024
Issue date	July 16, 2024
Test result	Complied

Kory Augung

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GenryLong

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The test results relate only to the tested samples.

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1. <u>REPORT VERSION</u>

Version No.	Issue date	Description
00	July 16, 2024	Original



2. SUMMARY OF TEST RESULT

Report clause	Test Item	Standard Requirement	Result
5.1	Antenna Requirement	15.203/15.247 (c)	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	20 dB Bandwidth	15.215 (c)	PASS
5.4	Radiated Band Edge Emission	15.205/15.209	PASS
5.5	Radiated Spurious Emission	15.249(a)(c)/15.205/15.209	PASS

Note:

- The measurement uncertainty is not included in the test result.



3. <u>SUMMARY</u>

3.1. Product Description

Main unit information:	
Product Name:	keyboard
Trade Mark:	
Model No.:	V98Pro
Listed Model(s):	
Power supply:	Input:DC 5V DC 3.7V from Battery
Hardware version:	2023-10-27
Software version:	V1.5

3.2. Radio Specification Description

Technology:	2.4G
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	16
Antenna type:	PCB Antenna
Antenna gain:	2.24dBi

Channel list:

1CH	2402 MHz	9CH	2414 MHz
2CH	2426 MHz	10CH	2436 MHz
3CH	2440MHz	11CH	2459 MHz
4CH	2463 MHz	12CH	2473 MHz
5CH	2407 MHz	13CH	2419 MHz
6CH	2422 MHz	14CH	2439 MHz
7CH	2445 MHz	15CH	2453 MHz
8CH	2466 MHz	16CH	2480 MHz



3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen, Guangdong, China
FCC registration number	736346

3.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) - AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

3.6. DISTURBANCE Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4. TEST CONFIGURATION

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

4.1. Test frequency list

Channel	Frequency (MHz)
CH-L	2402
CH-M	2440
СН-Н	2480

4.2. Test mode

gineering prototype is provided ssionPower setting Default.	with key switching channel to realize	ze EUT continuous
Test Item	Test Mode	Modulation
	TX CH-L	GFSK
	TX CH-M	GFSK
Conducted test item	TX CH-H	GFSK
	Normal link	
	TX CH-L	GFSK
	TX CH-M	GFSK
Radiated test item	TX CH-H	GFSK
	Normal link	

Remark:

 The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.All patterns have predictions, and the report only shows the worst pattern data.

4.3. Support unit used in test configuration and system

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

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name Trade Name		Model No.	
1	Adapter	Huawei	HW-05002000C	
2	Notebook	ASUS	4D8A76B96FC2	

4.4. Test sample information

Туре	sample no.
Engineer sample	CISR240513042S01
Normal sample	CISR240513042S01



4.5. Testing environmental condition

Туре	Requirement	Actual		
Temperature:	15~35°C	25°C		
Relative Humidity:	25~75%	50%		
Air Pressure:	860~1060mbar	1000mbar		

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty		
1	AC Conducted Emission	1.63dB		
2	Peak Output Power	1.34dB		
3	Power Spectral Density	1.34dB		
4	6dB Bandwidth	0.002%		
5	99% Occupied Bandwidth	0.002%		
6	Duty cycle	-		
7	Conducted Band Edge and Spurious Emission	1.93dB		
8	Radiated Band Edge Emission	3.76dB for 30MHz-1GHz		
0		3.80dB for above 1GHz		
9	Dedicted Spurious Emission	3.76dB for 30MHz-1GHz		
9	Radiated Spurious Emission	3.80dB for above 1GHz		

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.



4.7. Equipment Used during the Test

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2021.10.15	3Year
Spectrum analyzer	Agilent	N9020A	MY50530263	2024.01.08	1Year
Receiver	ROHDE&SCHWARZ	ESCI	100853	2024.01.08	1Year
Spectrum analyzer	R&S	FSV-40N	/	2024.01.08	1Year
Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023.01.09	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023.01.09	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023.01.09	2Year
RF Cable	Tonscend	Cable 1	/	2024.01.08	1Year
RF Cable	Tonscend	Cable 2	/	2024.01.08	1Year
RF Cable	SKET	Cable 3	/	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP9K3G32	AP21G806153	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP01018050	AP22E806229	2024.01.08	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2024.01.08	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	1	2024.01.08	1Year
Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023.01.09	2 Year
Preamplifier	Tonscend	TAP18040048	AP21C806126	2024.01.08	1Year
variable-frequency power source	Pinhong	PH1110	/	2024.01.08	1Year
6dB Attenuator	SKET	DC-6G	/	N/A	N/A
Artificial power network	Schwarzbeck	NSLK8127	8127-01096	2024.01.08	1Year
EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024.01.08	1Year
8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	8158-00337	2024.01.08	1Year
Artificial power network			/	2024.01.08	1Year
Antenna tower	SKET	Bk-4AT-BS	AT2021040101- V1	N/A	N/A



5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Standard Applicable	FCC CFR Title 47 Part 15 Subpart C Section 15.203:
	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the response-ble party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
	FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):
	(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively
	for fixed. Point-to-point operations may employ transmitting antennas with
	directional gain greater than 6dBi provided the maximum conducted output
	power of the intentional radiator is reduced by 1 dB for every 3 dB that the
	directional gain of the antenna exceeds 6dBi.
<u>Description</u>	The EUT antenna is PCB antenna (2.24dBi), the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.Antenna structure please refer to the EUT internal photographs antenna photo.

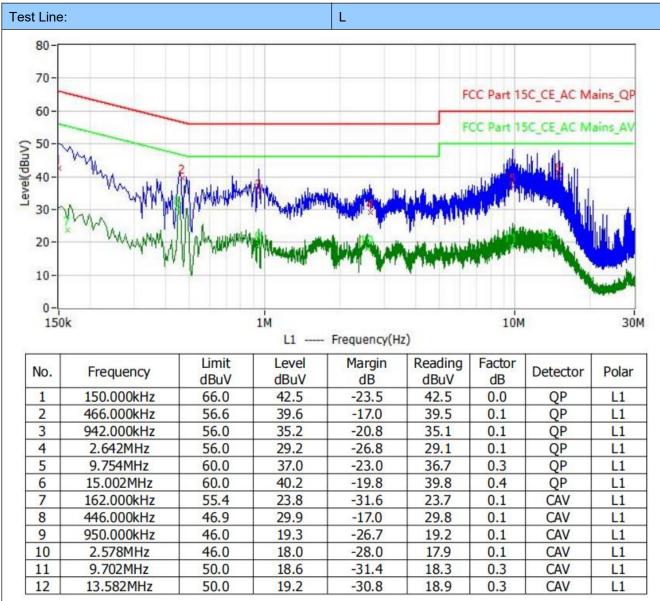
Remark: The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen Bangce Testing Technology Co., Ltd. does not assume any responsibility.

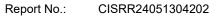
5.2. AC Conducted Emission

Limit:	FCC CFR Title 47 Part 15 Subpart C Section 15.207						
		Limit (dBuV)				
	Frequency range (MHz)	Quasi-peak	Average				
	0.15-0.5	66 to 56*	56 to 46*]			
	0.5-5	56	46	1			
	5-30	60	50				
	* Decreases with the logarith	m of the frequency.					
Test configuration:	CR.P 0.8m						
Test procedure:	 The EUT was setup accords. The EUT was placed on raised 80 cm above the order conducting plane was lood surfaces of EUT were at conducting surface. The EUT and simulators line impedances stabilization of the four coupling impedances stabilization /50uH coupling impedances at LISN. (Refer to the block for the input power source) Each current-carrying condition of the receptacle were folded bio bundle not exceeding 40 Conducted emissions were 0.15MHz to 30MHz using During the above scan manipulation. 	a platform of nomina conducting ground pla cated 40 cm to the re- least 80 cm from any are connected to the ation network (LISN). edance for the measu- re also connected to k diagram of the test nductor of the EUT p or, was individually co e. power cord between ack and forth at the co cm in length. ere investigated over g a receiver bandwidt	I size, 1 m by 1.5 m, ane. The vertical ar of the EUT. All other other grounded main power through The LISN provides a uring equipment. the main power throus setup and photograph ower cord, except the onnected through a LI the EUT and the LIS enter of the lead to for the frequency range the of 9 kHz.	a 50 ugh a hs) e ISN SN orm a from			
<u>Test mode:</u>	Refer to the clause 4.2						
<u>Result:</u>	Passed						

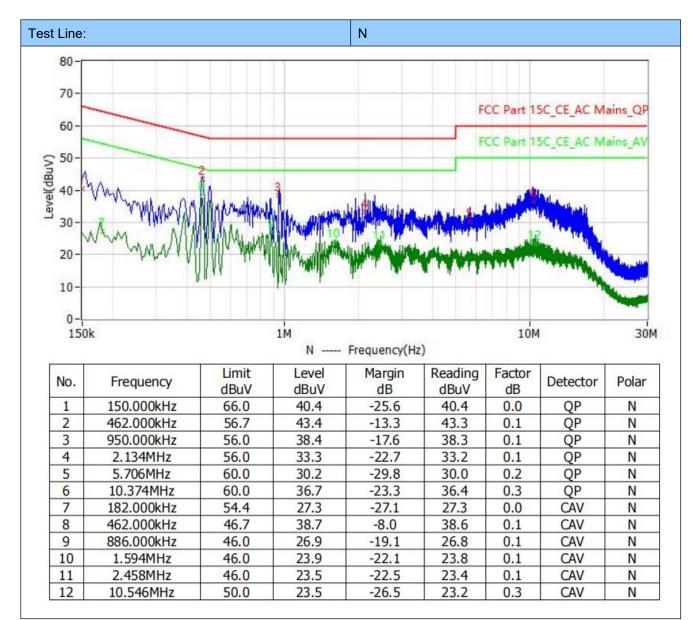


Have pre-scan all test channel, found CH01 which it was worst case, so only show the worst case's data on this report.









Note:

1. Factor = LISN Factor + Cable Factor

2. Level= Reading + Factor

3. Margin= Level – Limit



5.3. 20 dB Bandwidth

Limit:	-
Test configuration:	Spectrum Analyzer
	EUT Non-Conducted Table
	Ground Reference Plane
Test procedure:	 The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
	Set to the maximum power setting and enable the EUT transmit continuously
	3. Use the following spectrum analyzer settings:
	Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
	RBW \ge 1% to 5% of the 20 dB bandwidth, VBW \ge RBW
	Sweep = auto, Detector function = peak, Trace = max hold
	4. Measure and record the results in the test report.
<u>Test mode:</u>	Refer to the clause 4.2
<u>Result:</u>	Passed



Test Result of 20dB Bandwidth Measurement							
Test Frequency(MHz)	Test Frequency(MHz) 20dB Bandwidth(MHz) Limit(MHz)						
2402	1.306	Non-Specified					
2440	1.305	Non-Specified					
2480							





5.4. Radiated Band edge Emission

Limit:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):				
	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).				
Test configuration:	EUT 1 ~ 4m Spectrum analyzer 1.5m 30cm Pre-amp 0 0 0 0 0 0 0 0 0 0 0 0 0				
Test procedure:	 The EUT was setup and tested according to ANSI C63.10 . The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement. Use the following spectrum analyzer settings: a) Span shall wide enough to fully capture the emission being measured b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement d) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=Average, Trace=RMS for Average measurement 				
<u>Test mode:</u>	Refer to the clause 4.2				
Result:	Passed				

Note:

- 1) Level= Reading + Factor; Factor = Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit Level
- 3) Average measurement was not performed if peak level is lower than average limit
- 4) The other emission levels were very low against the limit.



Test char	Test channel:CH01									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correc tion Factor (dB/m)	Level (dBuv)	Limit (dBu V/m)	Margin (dB)	Remark	Polarity
2390.00	70.64	28.62	4.08	38.62	-5.92	64.72	74	9.28	Peak	Horizontal
2390.00	51.01	28.62	4.08	38.62	-5.92	45.09	54	8.91	Average	Horizontal
2390.00	68.98	28.62	4.08	38.62	-5.92	63.06	74	10.94	Peak	Vertical
2390.00	50.11	28.62	4.08	38.62	-5.92	44.19	54	9.81	Average	Vertical

Test char	Test channel:CH16									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correc tion Factor (dB/m)	Level (dBuv)	Limit (dBu V/m)	Margin (dB)	Remark	Polarity
2483.50	69.72	29.45	3.91	40.17	-6.81	62.91	74	11.09	Peak	Horizontal
2483.50	49.63	29.45	3.91	40.17	-6.81	42.82	54	11.18	Average	Horizontal
2483.50	67.78	29.45	3.91	40.17	-6.81	60.97	74	13.03	Peak	Vertical
2483.50	51.27	29.45	3.91	40.17	-6.81	44.46	54	9.54	Average	Vertical



5.5. Radiated Spurious Emission

Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

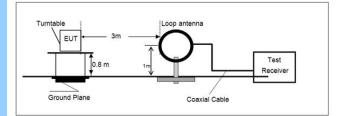
Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)

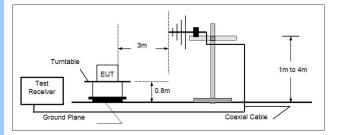
Frequency	Limit (dBuV/m @3m)	Value		
30MHz~88MHz	40.00	Quasi-peak		
88MHz~216MHz	43.50	Quasi-peak		
216MHz~960MHz	46.00	Quasi-peak		
960MHz~1GHz	54.00	Quasi-peak		
Above 1GHz	54.00	Average		
ADOVE IGHZ	74.00	Peak		

Test configuration:

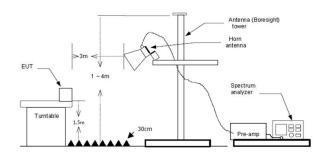
9kHz~30MHz



30 MHz ~ 1 GHz



Above 1 GHz





Test procedure:	1. The EUT was setup and tested according to ANSI C63.10.
	2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
	 The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
	4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
	5. Set to the maximum power setting and enable the EUT transmit continuously.
	6. Use the following spectrum analyzer settings
	 a) Span shall wide enough to fully capture the emission being measured;
	b) Below 1 GHz:
	RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
	If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
	 c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
	 d) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=Average, Trace=RMS for Average measurement
T () (Defende the element 4.2
Test mode:	Refer to the clause 4.2

Result:

Passed

Note:

- Level= Reading + Factor/Transd; Factor/Transd = Antenna Factor+ Cable Loss- Preamp Factor 1)
- Margin = Limit Level 2)
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.
- The other emission levels were very low against the limit. 4)
- This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X 5) position.

<u>For 9 kHz ~ 30 MHz</u>

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.



For 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH1 which it was worst case, so only show the worst case's data on this report.







Report No.: CISRR24051304202



<u> For 1 GHz ~ 25 GHz</u>

Test channel:2402MHz										
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correc tion Factor (dB/m)	Level (dBuv)	Limit (dBu V/m)	Margin (dB)	Remark	Polarity
2402.00	92.27	29.18	4.02	38.35	-5.15	87.12	114	26.88	Peak	Horizontal
2402.00	80.95	29.18	4.02	38.35	-5.15	75.80	94	18.20	Average	Horizontal
2402.00	81.26	29.18	4.02	38.35	-5.15	76.11	114	37.89	Peak	Vertical
2402.00	67.16	29.18	4.02	38.35	-5.15	62.01	94	31.99	Average	Vertical
4804.00	69.25	31.33	4.23	38.62	-3.06	66.19	74	7.81	Peak	Horizontal
4804.00	50.89	31.33	4.23	38.62	-3.06	47.83	54	6.17	Average	Horizontal
4804.00	65.92	31.33	4.23	38.62	-3.06	62.86	74	11.14	Peak	Vertical
4804.00	51.12	31.33	4.23	38.62	-3.06	48.06	54	5.94	Average	Vertical

Test char	nnel:2440Ml	Hz								
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correc tion Factor (dB/m)	Level (dBuv)	Limit (dBu V/m)	Margin (dB)	Remark	Polarity
2440.00	92.87	29.23	4.02	38.2	-4.95	87.92	114	26.08	Peak	Horizontal
2440.00	80.69	29.23	4.02	38.2	-4.95	75.74	94	18.26	Average	Horizontal
2440.00	82.21	29.23	4.02	38.2	-4.95	77.26	114	36.74	Peak	Vertical
2440.00	69.06	29.23	4.02	38.2	-4.95	64.11	94	29.89	Average	Vertical
4880.00	70.20	30.26	4.09	38.29	-3.94	66.26	74	7.74	Peak	Horizontal
4880.00	51.74	30.26	4.09	38.29	-3.94	47.80	54	6.20	Average	Horizontal
4880.00	66.78	30.26	4.09	38.29	-3.94	62.84	74	11.16	Peak	Vertical
4880.00	52.39	30.26	4.09	38.29	-3.94	48.45	54	5.55	Average	Vertical

Test channel:2480MHz										
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correc tion Factor (dB/m)	Level (dBuv)	Limit (dBu V/m)	Margin (dB)	Remark	Polarity
2480.00	94.46	29.2	4.02	38.3	-5.08	89.38	114	24.62	Peak	Horizontal
2480.00	81.02	29.2	4.02	38.3	-5.08	75.94	94	18.06	Average	Horizontal
2480.00	82.83	29.2	4.02	38.3	-5.08	77.75	114	36.25	Peak	Vertical
2480.00	67.48	29.2	4.02	38.3	-5.08	62.40	94	31.60	Average	Vertical
4960.00	63.19	31.97	4.11	38.47	-2.39	60.80	74	13.20	Peak	Horizontal
4960.00	52.10	31.97	4.11	38.47	-2.39	49.71	54	4.29	Average	Horizontal
4960.00	66.08	31.97	4.11	38.47	-2.39	63.69	74	10.31	Peak	Vertical
4960.00	49.22	31.97	4.11	38.47	-2.39	46.83	54	7.17	Average	Vertical



6. <u>TEST SETUP PHOTOS</u>

Please refer to separated files for Test Setup Photos of the EUT.

7. EXTERNAL AND INTERNAL PHOTOS

7.1 External photos

Please refer to separated files for External Photos of the EUT.

7.2 Internal photos

Please refer to separated files for Internal Photos of the EUT.

-----End of the report-----