Report No. : FR351907-04AA





RADIO TEST REPORT

FCC ID	: MSQ-RTBE6X00
Equipment	: BE30000 Quad Band WiFi Router
Brand Name	: ASUS
Model Name	: BQ16 Pro, BE30000
Applicant	: ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan
Standard	: 47 CFR FCC Part 15.247

The product was received on Mar. 18, 2024, and testing was started from Mar. 27, 2024 and completed on Apr. 18, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Photographs of EUT v01



History of this test report

Report No.	Version	Description	Issued Date
FR351907-04AA	01	Initial issue of report	May 28, 2024



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Conformity Assessment Condition:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen Report Producer: Sandy Chuang



1 General Description

1.1 Information

1.1.1 **RF General Information**

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), VHT20, ax (HEW20), be (EHT20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40), VHT40, ax (HEW40), be (EHT40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	4TX
2.4-2.4835GHz	802.11g	20	4TX
2.4-2.4835GHz	802.11n HT20	20	4TX
2.4-2.4835GHz	802.11n HT20-BF	20	4TX
2.4-2.4835GHz	VHT20	20	4TX
2.4-2.4835GHz	VHT20-BF	20	4TX
2.4-2.4835GHz	802.11ax HEW20	20	4TX
2.4-2.4835GHz	802.11ax HEW20-BF	20	4TX
2.4-2.4835GHz	802.11be EHT20	20	4TX
2.4-2.4835GHz	802.11be EHT20-BF	20	4TX
2.4-2.4835GHz	802.11n HT40	40	4TX
2.4-2.4835GHz	802.11n HT40-BF	40	4TX
2.4-2.4835GHz	VHT40	40	4TX
2.4-2.4835GHz	VHT40-BF	40	4TX
2.4-2.4835GHz	802.11ax HEW40	40	4TX
2.4-2.4835GHz	802.11ax HEW40-BF	40	4TX
2.4-2.4835GHz	802.11be EHT40	40	4TX
2.4-2.4835GHz	802.11be EHT40-BF	40	4TX

Note:

- 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- HEW20, HEW40 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- EHT20, EHT40 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM modulation.
- BWch is the nominal channel bandwidth.



1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Walsin	RFDPA220510IMLB901	Dipole	I-PEX	
2	Walsin	RFDPA220513IMLB901	Dipole	I-PEX	
3	Walsin	RFPCA180916IMLB901	Dipole	I-PEX	
4	Walsin	RFPCA251813IMLB901	Dipole	I-PEX	
5	Walsin	RFDPA100504IM6B901	Dipole	I-PEX	
6	Walsin	RFDPA100514IM6B901	Dipole	I-PEX	
7	Walsin	RFDPA100509IM6B901	Dipole	I-PEX	Note 1
8	Walsin	RFDPA100507IM6B901	Dipole	I-PEX	
9	Walsin	RFDPA100506IM6B901	Dipole	I-PEX	
10	Walsin	RFDPA100506IM6B902	Dipole	I-PEX	
11	Walsin	RFDPA100505IM6B901	Dipole	I-PEX	
12	Walsin	RFDPA100512IM6B901	Dipole	I-PEX]
13	Walsin	RFPCA180915IMLB901	Dipole	I-PEX	

Note 1:

	Port		Port Antenna Gain (dBi)					Bi)	
Ant.	WLAN 2.4GHz WLAN 5GHz		WLAN		WLAN	5GHz			
	WLAN 2.4GHZ	WLAN SONZ	2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3		
1	1	1	2.48	2.10	2.16	2.31	2.30		
2	2	2	2.46	3.09	3.47	2.84	3.65		
3	3	3	2.80	2.67	2.36	2.36	2.39		
4	4	4	2.04	2.15	2.42	2.50	2.01		

	Po	ort	Antenna Gain (dBi)			
Ant.	WLAN 6GHz	WLAN 6GHz	WLAN 6GHz			
	UNII 5	UNII 7~8	UNII 5	UNII 7	UNII 8	
5	3	-	1.72	-	-	
6	2	-	1.68	-	-	
7	1	-	2.77	-	-	
8	4	-	2.08	-	-	
9	-	2	-	2.27	1.82	
10	-	1	-	1.52	1.70	
11	-	3	-	3.71	3.40	
12	-	4	-	2.11	2.23	
13	-	-	-	-	-	

		Directional gain (dBi)							
Item	WLAN		WLAN 5GHz					<u>-</u>	
	2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 7	UNII 8	
4T1S	4.60	4.94	4.51	4.43	4.70	4.13	4.23	4.84	
4T2S	2.80	3.09	3.47	2.84	3.65	2.77	3.71	3.40	
4T4S	2.80	3.09	3.47	2.84	3.65	2.77	3.71	3.40	

Note 2: The above information (except antenna gain and directional gain) was declared by manufacturer. Note 3: The antenna gain and directional gain are measured which follow the procedure of KDB 662911 D03.

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Note 4: For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax/be (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/n/ac/ax/be (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

For Zero-wait function (1RX):

Only Ant. 13 can be used as receiving antenna.

For 6GHz function:

For IEEE 802.11 ax/be (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

1.1.3 EUT Operational Condition

EUT Power Type	From Power Adapter				
	\boxtimes	With beamforming		Without beamforming	
Beamforming Function	The product has beamforming function for n/VHT/ax/be in 2.4GHz, n/ac/ax/be in 5GHz and ax/be in 6GHz.				
Function	\boxtimes	Point-to-multipoint		Point-to-point	
Support RU	\boxtimes	Full RU		Partial RU	

Note: The above information was declared by manufacturer.

1.1.4 Table for Radio Function

Radio (R)	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz UNII 5	WLAN 6GHz UNII 7~8
R1	V (20/40MHz)	-	-	-
R2	-	V (20/40/80/160MHz)	-	-
R3	-	-	V (20/40/80/160/320MHz)	-
R4	-	-		V (20/40/80/160/320MHz)

Note: The above information was declared by manufacturer.



1.1.5 Table for EUT supports functions

Function
AP Router
Mesh

Note: The above information was declared by manufacturer.

1.1.6 Table for Multiple Listing

Model Name	Description
BQ16 Pro	All the models are identical, the difference model name served as marketing
BE30000	strategy.

Note 1: From the above models, model: BQ16 Pro was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

1.1.7 Table for EUT Information

EUT	H/W version	Barometric pressure sensor (Location: U102)	Integrated circuit packaging (Location: UP1)	X'TAL (Location: Y202)	Components and antenna connector of GPS	
			FCBGA Package			
1	R1.30	Without	Brand : Broadcom	With	With	
			Model : BCM84891L			
			FCFBGA Package			
2			Brand : Broadcom	Without	Without	
	D4 40	10/:41-	Model : BCM84891L			
	3	R1.40	R1.40 With	FCBGA Package		
3			Brand : Broadcom	Without	Without	
			Model : BCM84891L			

Note: The above information was declared by manufacturer.

1.1.8 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR351907AA

Below is the table for the change of the product with respect to the original one.

	Modifications	Performance Checking
1.	Adding the EUT 2~3 (Please refer to section 1.1.7 for	Emissions in Restricted Frequency Bands
	detailed information about the difference with EUT 1).	below 1GHz test
2.	Adding a model name "BE30000".	
3.	Adding the Standard Power Access Point for this	After evaluation, it does not need to re-test.
	device via firmware by factory.	



1.2 Applicable Standards

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

- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 558074 D01 v05r02
- FCC KDB 662911 D03 v01
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information				
Test Lab. : Sporton	n International Inc. Hsinchu Laboratory			
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)			
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085			
	Test site Designation No. TW3787 with FCC.			
Conformity Assessment Body Identifier (CABID) TW3787 with ISED.				

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated (Test Mode 1)	03CH6-CB	Eason Chen	21.4-22.5 / 55-58	Apr. 18, 2024
Radiated (Test Mode 2)	03CH04-CB	Eason Chen	22.7-23.8 / 56-59	Mar. 27, 2024

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.1 dB	Confidence levels of 95%



2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests				
Tests Item	Emissions in Restricted Frequency Bands			
Test ConditionRadiated measurementIf EUT consist of multiple antenna assembly (multiple antenna are regardless of spatial multiplexing MIMO configuration), the radiated be performed with highest antenna gain of each antenna type.				
	СТХ			
Operating Mode < 1GHz According to the original test report, "EUT in Y axis_2.4GHz + Adapter 2" been evaluated to be the worst case, so the measurement will follow this test configuration				
1	EUT 2 in Y axis + Adapter 2_WLAN 2.4GHz			
2 EUT 3 in Y axis + Adapter 2_WLAN 2.4GHz				
Mode 1 generated the worst test result, so it was recorded in this report.				

The Worst Case Mode for Following Conformance Tests				
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation			
Operating Mode	Operating Mode			
1	WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz UNII 5 + WLAN 6GHz UNII 7			
Refer to Sporton Test Report No.: FA351907-04 for Co-location RF Exposure Evaluation.				

2.2 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



2.3 Accessories

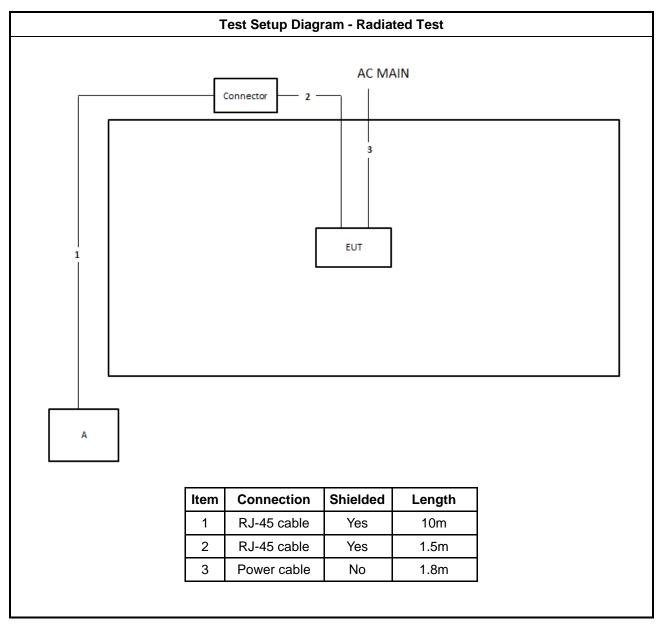
Accessories						
Equipment Name	Brand Name	Model Name	Rating	Remark		
Adapter 1	AcBel	ADD011	Input: 100-240V~, 1.7A, 50-60Hz Output: +19.5V, 3.33A, 65.0W MAX.	DC power cable: Non-shielded, 1.5m		
Adapter 2	LEI	MU60B3120500-A1	Input: 100-240V~50/60Hz, 1.5A Output: 12.0V, 5.0A	-		
	Others					
Power cord*1: Non-shielded, 0.8m (for Adapter 1 use)						
RJ-45 cable*1: Shielded, 1.5m						

2.4 Support Equipment

Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
А	NB	DELL	E4300	N/A		



2.5 Test Setup Diagram





3 Transmitter Test Result

3.1 Emissions in Restricted Frequency Bands

3.1.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit					
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)		
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300		
0.490~1.705	24000/F(kHz)	33.8 - 23	30		
1.705~30.0	30	29	30		
30~88	100	40	3		
88~216	150	43.5	3		
216~960	200	46	3		
Above 960	500	54	3		
Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance					

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

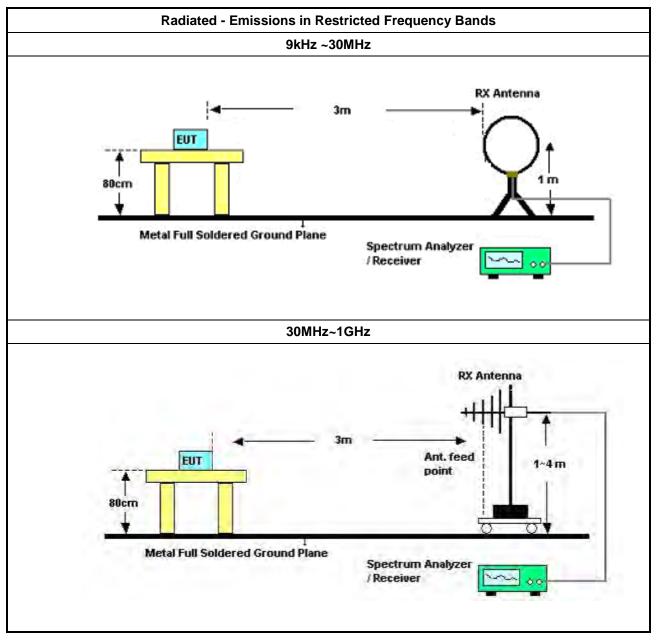


3.1.3 Test Procedures

	Test Method										
•	 The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor]. 										
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.										
•	For the transmitter unwanted emissions shall be measured using following options below:										
 Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands. 											
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).										
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).										
	☑ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).										
	□ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW \ge 1/T, where T is pulse time.										
	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.										
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.										
•	For the transmitter band-edge emissions shall be measured using following options below:										
	 Refer as FCC KDB 558074 clause 8.7 & C63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below. 										
	 Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements. 										
	 Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz). 										
	 For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB 										
	 For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred. 										



3.1.4 Test Setup





3.1.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.1.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.1.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix A



4 Test Equipment and Calibration Data

Instrument	strument Brand Model No. Serial		Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6121	65417	9kHz - 30 MHz Oct. 13, 2023		Oct. 12, 2024	Radiation (03CH04-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH04-CB	30 MHz ~ 1 GHz	Aug. 01, 2023	Jul. 31, 2024	Radiation (03CH04-CB)
BILOG ANTENNA with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	22021&AT-N06 07	30MHz ~ 1GHz	Oct. 07, 2023	Oct. 06, 2024	Radiation (03CH04-CB)
Pre-Amplifier	EMCI	EMC330N	980391	20MHz ~ 3GHz	May 23, 2023	May 22, 2024	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Mar. 19, 2024	Mar. 18, 2025	Radiation (03CH04-CB
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH04-CB)
RF Cable-low	Woken	RG402	Low Cable-03+67	30MHz – 1GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH04-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH04-CB)
Loop Antenna	Teseq	HLA 6121	65417	9kHz - 30 MHz	Oct. 13, 2023	Oct. 12, 2024	Radiation (03CH06-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 03, 2023	Aug. 02, 2024	Radiation (03CH06-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Jul. 30, 2023	Jul. 29, 2024	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 03, 2023	Nov. 02, 2024	Radiation (03CH06-CB)
Signal Analyzer	R&S	FSV40	101904	9kHz ~ 40GHz	Apr. 21, 2023	Apr. 20, 2024	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-24+68	30MHz~1GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)

Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



Radiated Emissions below 1GHz

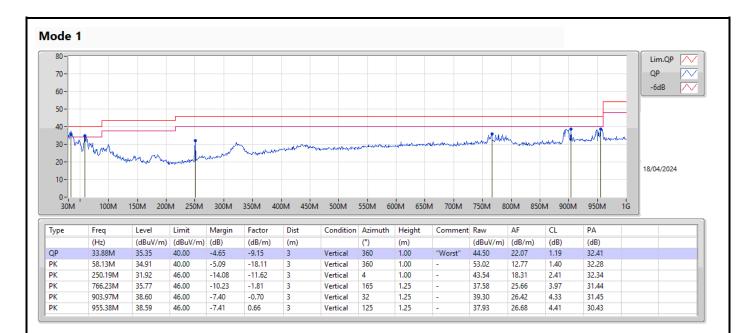
Appendix A

Summary												
Mode	Result	Туре	Freq	Level	Limit	Margin	Condition					
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)						
Mode 1	Pass	QP	33.88M	35.35	40.00	-4.65	Vertical					



Radiated Emissions below 1GHz

Appendix A





Radiated Emissions below 1GHz

Appendix A

