

# **FCC Test Report**

FCC ID : R3USCBT20

**Product Description: True Wireless Gaming Earbuds** 

Model No. : SCBT20

Brand Name : EPOS

Applicant : DSEA A/S

Address : Kongebakken 9, DK-2765 Smoerum, Denmark

Standard : 47 CFR FCC Part 15.209

Received Date : Jun. 05, 2020

Tested Date : Jun. 19 ~ Jul. 14, 2020

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: Approved by:

Along Chen / Assistant Manager Gary Chang / Manager

RA

Page: 1 of 24

Testing Laboratory 2732

Report No.: FR060501NF

Report Version: Rev. 03



## **Table of Contents**

1	GENERAL DESCRIPTION	5
1.1	Information	
1.2	Local Support Equipment List	
1.3	Test Setup Chart	
1.4	The Equipment List	
1.5	Test Standards	
1.6	Deviation from Test Standard and Measurement Procedure	8
1.7	Measurement Uncertainty	8
2	TEST CONFIGURATION	g
2.1	Testing Facility	g
2.2	The Worst Test Modes and Channel Details	g
3	TRANSMITTER TEST RESULTS	10
3.1	Conducted Emissions	1C
3.2	20dB and Occupied Bandwidth	13
3.3	Radiated Emissions	15
4	PHOTOGRAPHS OF EUT	23
5	TEST LABORATORY INFORMATION	24



## **Release Record**

Report No.	Version	Description	Issued Date
FR060501NF	Rev. 01	Initial issue	Aug. 20, 2020
FR060501NF	Rev. 02	Updating applicant's information.	Nov. 06, 2020
FR060501NF	Rev. 03	<ol> <li>Adding antenna brand &amp; model.</li> <li>Updating charging box rating.</li> <li>Adding limit extrapolation for frequency below 30 MHz</li> </ol>	Dec. 07, 2020

Report No.: FR060501NF Page: 3 of 24



## **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	Meet the requirement of limit	Pass
15.209	Radiated Emissions	Meet the requirement of limit	Pass
15.215 (c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

#### **Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

#### **Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Report No.: FR060501NF Page: 4 of 24

Report Version: Rev. 03



## 1 General Description

### 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information						
Modulation Ch. Frequency (MHz) Channel Number						
8-DPSK	10.579	1				

#### 1.1.2 Antenna Details

Ant. No.	Brand	Model	Туре	Connector	Antenna Gain (dBi)
1	PulseGM	GF5520-72XJLC(3.7uH)	coil antenna	-	-

### 1.1.3 EUT Operational Condition

	Battery 3.7Vdc			
Power Supply Type	Master earbud: Max charge current: 60mA, Max discharge current: 14mA			
Tower supply Type	Slave earbud: Max charge current: 60mA, Max discharge current: 4mA			
	Chargebox: Max charge current: 560mA, Max discharge current: 200mA			
Operational Voltage				
Operational Climatic	☐ Tnom (20°C)		☐ Tmin (5°C)	

#### 1.1.4 Accessories

No.	Equipment	Description
1	Battery	Brand: Guangdong Mic Power New Energy Co. Ltd. Model: M1254S2 Rating: 3.7Vdc, 60mAh
2	USB cable	Brand: EPOS Model: EPUL57 Line: 0.57m shielded without core
3	Charging box	Brand: EPOS Model: SCBT20 Rating: 5V = 600mA
4	Bluetooth dongle	Brand: EPOS Model: SCBT16
5	USB-C to USB-A extension cable	Brand: SENNHEISER Model: TB011 Line:1.35m shielded without core

Report No.: FR060501NF

Report Version: Rev. 03



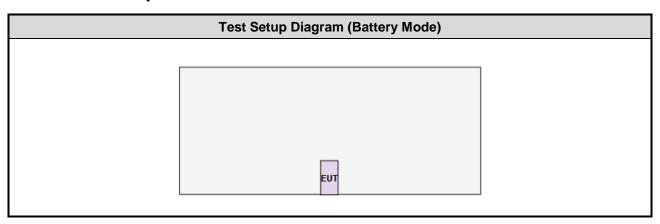
### 1.1.5 Test Tool and Power Setting

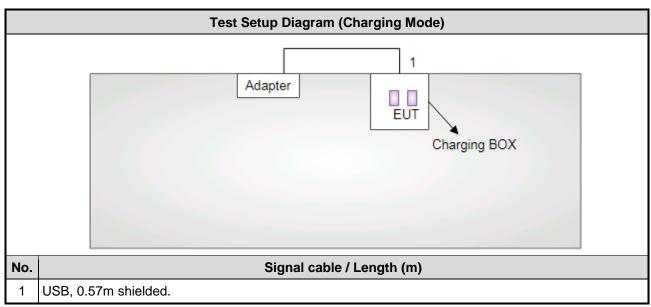
Test tool	NvsApp, Version:: 3.2.2
Setting	Default

### 1.2 Local Support Equipment List

	Support Equipment List							
No.	No. Equipment Brand Model FCC ID Remarks							
1	Notebook	DELL	Latitude E5470	DoC				
2								

### 1.3 Test Setup Chart





Note: The notebook is disconnected from EUT and removed from test table when EUT is set to transmit continuously.

Report No.: FR060501NF Page: 6 of 24

Report Version: Rev. 03



#### **The Equipment List** 1.4

Test Item	Conducted Emission							
Test Site	Conduction room 1 /	Conduction room 1 / (CO01-WS)						
Instrument	Brand	Brand Model No. Serial No. Calibration Date Calibration Until						
Receiver	R&S	ESR3	101658	Dec. 12, 2019	Dec. 11, 2020			
LISN	R&S	ENV216	101579	Mar. 12, 2020	Mar. 11, 2021			
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 22, 2019	Oct. 21, 2020			
Measurement Software AUDIX e3 6.120210k NA NA								
Note: Calibration Int	erval of instruments lis	ted above is one year.		1	1			

Test Item	Radiated Emission						
Test Site	966 chamber1 / (03CH01-WS)						
Instrument	Brand Model No. Serial No. Calibration Date Calibrati						
Spectrum Analyzer	R&S	FSV40	101498	Dec. 17, 2019	Dec. 16, 2020		
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Dec. 26, 2019	Dec. 25, 2020		
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 12, 2019	Dec. 11, 2020		
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2019	Nov. 14, 2020		
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020		
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020		
Preamplifier	EMC	EMC02325	980194	Sep. 18, 2019	Sep. 17, 2020		
Preamplifier	Agilent	83017A	MY39501308	Oct. 08, 2019	Oct. 07, 2020		
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020		
RF Cable	EMC	EMC104-SM-SM-80 00	181106	Oct. 07, 2019	Oct. 06, 2020		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 07, 2019	Oct. 06, 2020		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 07, 2019	Oct. 06, 2020		
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 07, 2019	Oct. 06, 2020		
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 07, 2019	Oct. 06, 2020		
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 07, 2019	Oct. 06, 2020		
Measurement Software	AUDIX	e3	6.120210g	NA	NA		
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.						

Report No.: FR060501NF Report Version: Rev. 03

Page: 7 of 24



Test Item	Test Item RF Conducted							
Test Site	(TH01-WS)							
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101499	Jan. 09, 2020	Jan. 08, 2021			
Power Meter	Anritsu	ML2495A	1241002	Oct. 23, 2019	Oct. 22, 2020			
Power Sensor	Anritsu	MA2411B	1207366	Oct. 23, 2019	Oct. 22, 2020			
AC POWER SOURCE	APC	AFC-500W	F312060012	Dec. 02, 2019	Dec. 01, 2020			
Measurement Software		SENSE-15247_FS	V5.10.1	NA	NA			
Note: Calibration Inter	rval of instruments liste	d above is one year.						

### 1.5 Test Standards

47 CFR FCC Part 15.209 ANSI C63.10-2013

### 1.6 Deviation from Test Standard and Measurement Procedure

None

### 1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty					
Parameters Uncertain					
Bandwidth	±34.130 Hz				
Conducted power	±0.808 dB				
Conducted emission	±2.715 dB				
AC conducted emission	±2.92 dB				
Radiated emission ≤ 1GHz	±3.41 dB				
Radiated emission > 1GHz	±4.59 dB				

Page: 8 of 24

Report No.: FR060501NF

Report Version: Rev. 03



#### **Test Configuration** 2

#### 2.1 **Testing Facility**

Test Laboratory	International Certification Corp.
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

➤ FCC Designation No.: TW2732 > FCC site registration No.: 181692

➤ ISED#: 10807A

➤ CAB identifier: TW2732

#### 2.2 The Worst Test Modes and Channel Details

Test item	Test item Mode Test Frequency (MHz		Test Configuration
AC Conducted Emissions	d Emissions Charging		2
Radiated Emissions	8-DPSK	10.579	1
Radiated Emissions	Charging		2
20dB bandwidth	8-DPSK	10.579	1

#### NOTE:

The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** results were found as the worst case and were shown in this report.

Page: 9 of 24

The EUT had been tested by following test configurations.

Configuration 1 : Battery mode

Configuration 2: Charging mode

Report Version: Rev. 03



### 3 Transmitter Test Results

#### 3.1 Conducted Emissions

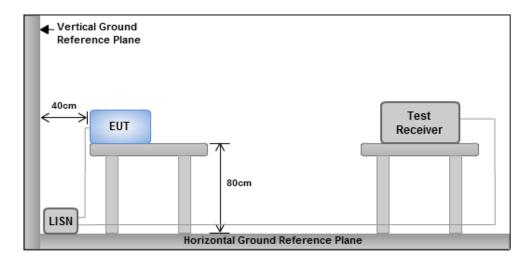
#### 3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit					
Frequency Emission (MHz) Quasi-Peak Average					
0.15-0.5	66 - 56 *	56 - 46 *			
0.5-5	56	46			
5-30	60	50			
Note 1: * Decreases with the logarithm of the frequency.					

#### 3.1.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

#### 3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.

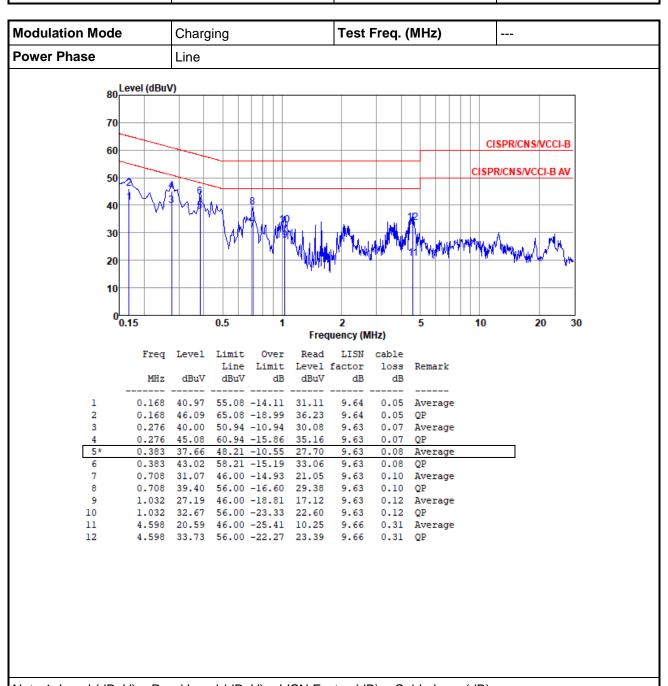
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

Report No.: FR060501NF Page: 10 of 24



#### 3.1.4 Test Result of Conducted Emissions

Ambient Condition	24°C / 59%	Tested By	Alex Tsai
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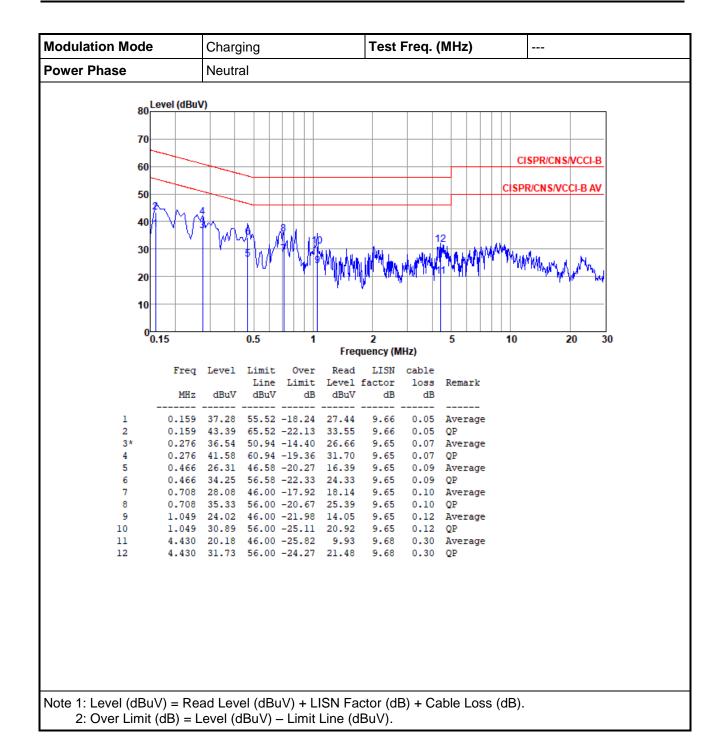
Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Report Version: Rev. 03

Report No.: FR060501NF Page: 11 of 24





Report No.: FR060501NF Page : 12 of 24

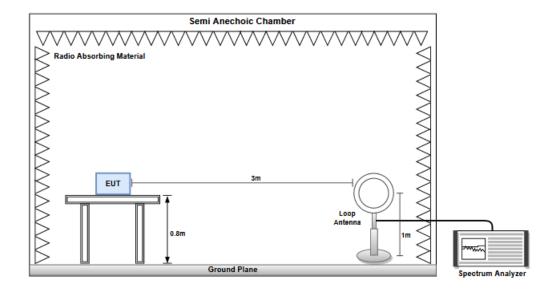


### 3.2 20dB and Occupied Bandwidth

#### 3.2.1 Test Procedures

- 1. Set resolution bandwidth (RBW) = 10 kHz, Video bandwidth = 30 kHz.
- 2. Detector = Peak, Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.

### 3.2.2 Test Setup



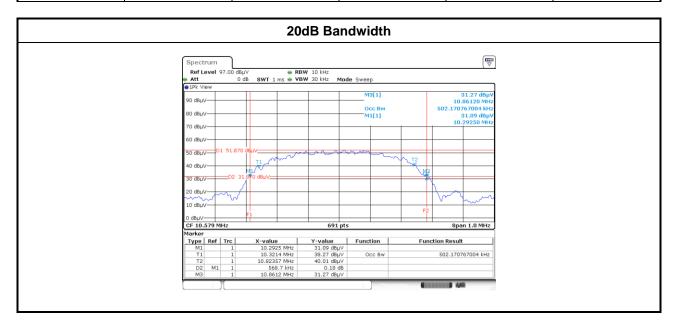
Report No.: FR060501NF Page: 13 of 24



### 3.2.3 Test Result of 20dB and Occupied Bandwidth

Ambient Condition	24°C / 64%	Tested By	Akun Chung
		•	_

Modulation Mode	Freq. (MHz)	20dB Bandwidth (kHz)	F <sub>L</sub> at 20dB BW (MHz)	F <sub>H</sub> at 20dBBW (MHz)	99% Bandwidth (kHz)
8-DPSK	10.579	568.7	10.2925	10.8612	502.170767



Page: 14 of 24



#### 3.3 Radiated Emissions

#### 3.3.1 Limit of Radiated Emissions

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	29.54	30			
30~88	100	40	3			
88~216	150	43.5	3			
216~960	200	46	3			
Above 960	500	54	3			

#### Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Limit Extrapolation

Measurement distance below 30 MHz is not at 30 meters thus the limit is extrapolated as below formula

$$FS_{\text{limit}} = FS_{\text{max}} - 40\log\left(\frac{d_{\text{near field}}}{d_{\text{measure}}}\right) - 20\log\left(\frac{d_{\text{limit}}}{d_{\text{near field}}}\right)$$

FSlimit is the calculation of field strength at the limit distance, expressed in dBµV/m

FS<sub>max</sub> is the measured field strength, expressed in dBµV/m

 $d_{\text{near field}}$  is the  $\lambda/2\pi$  distance

d<sub>measure</sub> is the distance of the measurement point from the EUT

 $d_{limit}$  is the reference limit distance

Report Version: Rev. 03

Report No.: FR060501NF Page: 15 of 24



#### 3.3.2 Test Procedures

- Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

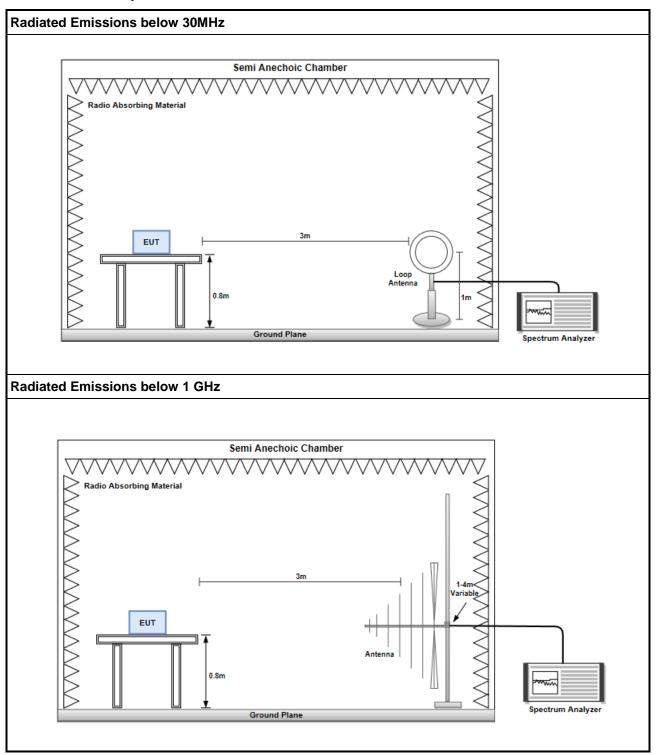
#### Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

Report No.: FR060501NF Page: 16 of 24



### 3.3.3 Test Setup





#### Test Configuration 1: Battery mode

### 3.3.4 Transmitter Radiated Unwanted Emissions (9kHz ~ 30MHz)

Ambient Condition	24°C / 64%	Tested By	Akun Chung
	2.070170		/ intain Onlaing

Polari	zation	Loop Open					
Frequ	uency (MHz)	Emission Level dBuV/m	Limit (dBuV/m)	Margin (dB)	SA Reading (dBuV/m)	Factor	Remark
1	7.26	34.88	56.36	-21.48	12.93	21.95	QP
2	10.579	41.20	53.09	-11.89	18.21	22.99	QP
3	21.05	33.15	49.54	-16.39	11.50	21.65	QP

Polaria	zation	Loop Close					
Frequ	uency (MHz)	Emission Level dBuV/m	Limit (dBuV/m)	Margin (dB)	SA Reading (dBuV/m)	Factor	Remark
1	7.23	34.58	56.40	-21.82	12.64	21.94	QP
2	10.579	37.67	53.09	-15.42	14.68	22.99	QP
3	21.22	33.44	49.54	-16.10	11.84	21.60	QP

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB).

Report No.: FR060501NF Report Version: Rev. 03 Page: 18 of 24

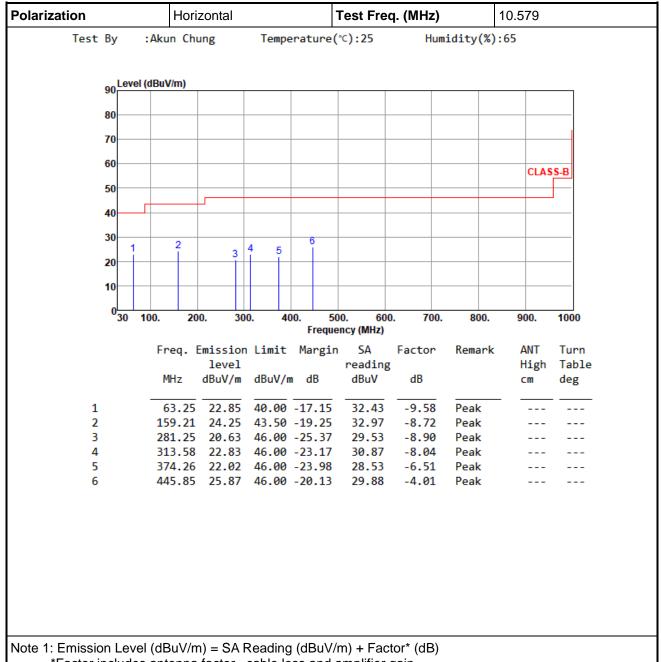
<sup>\*</sup>Factor includes antenna factor and cable loss.

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



#### Test Configuration 1: Battery mode

### 3.3.5 Transmitter Radiated Unwanted Emissions (Above 30MHz)



Page: 19 of 24

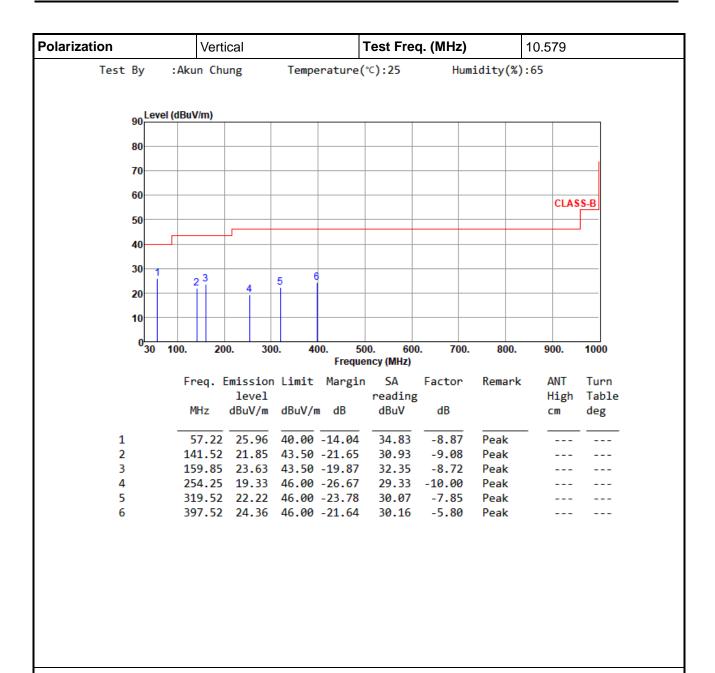
\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m)

Report No.: FR060501NF

Report Version: Rev. 03





Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

The previous version of the test report has been cancelled and replaced by new version.

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

Report No.: FR060501NF

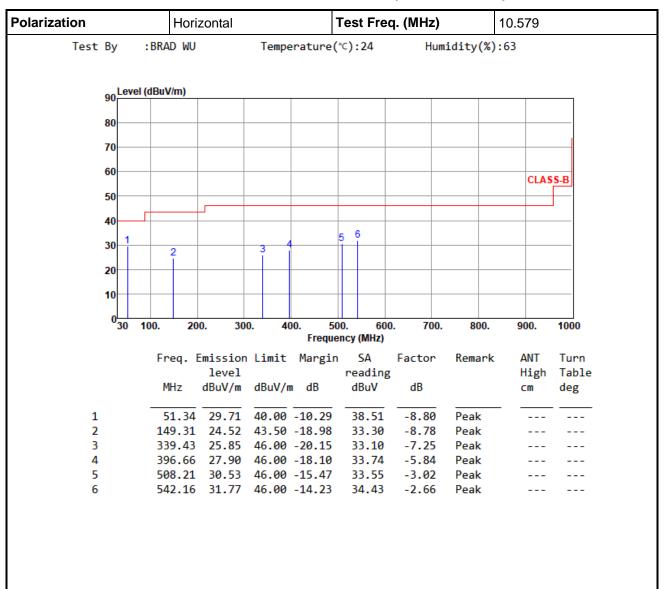
Report Version: Rev. 03

Page: 20 of 24



#### Test Configuration 2: Charging mode

#### 3.3.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

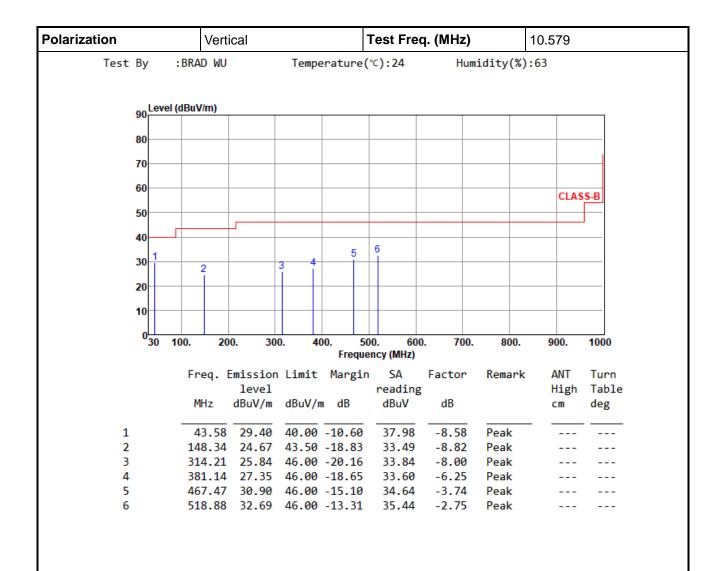
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Report No.: FR060501NF Page: 21 of 24

<sup>\*</sup>Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).





Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Report No.: FR060501NF

Report Version: Rev. 03

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Page: 22 of 24



## 4 Photographs of EUT

Please refer to Photographs of EUT, reference No. EP060501.

Report No.: FR060501NF Page: 23 of 24

Report Version: Rev. 03



### 5 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <a href="http://www.icertifi.com.tw">http://www.icertifi.com.tw</a>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City,

Taiwan, R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City

333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

Page: 24 of 24

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666 Fax: 886-3-318-0155

Email: ICC\_Service@icertifi.com.tw

\_\_END\_\_

Report No.: FR060501NF