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# **FCC C2PC Test Report**

FCC ID : RF41539B

**Equipment**: Handheld Terminal

Model No. : DX-A600

Brand Name : KEYENCE

Applicant : KEYENCE CORPORATION

Address : 1-3-14 HIGASHI-NAKAJIMA,

HIGASHI-YODOGAWA-KU, OSAKA, JAPAN

Standard : 47 CFR FCC Part 15.247

Received Date : Jul. 06, 2023

Tested Date : Jul. 15 ~ Jul. 18, 2023

We, International Certification Corporation, 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 shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: Approved by:

Along Cheld/ Assistant Manager Gary

Gary Chang / Manager⊾

Report No.: FR162104-01AD



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## **Release Record**

| Report No.    | Version | Description   | Issued Date   |
|---------------|---------|---------------|---------------|
| FR162104-01AD | Rev. 01 | Initial issue | Aug. 10, 2023 |

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## **Summary of Test Results**

| FCC Rules           | Test Items          | Measured   | Result |
|---------------------|---------------------|--|--------|
| 15.207              | Conducted Emissions | [dBuV]: 0.573MHz<br>39.29 (Margin -16.71dB) - QP         | Pass   |
| 15.247(d)<br>15.209 | Radiated Emissions  | [dBuV/m at 3m]: 50.66MHz<br>22.35 (Margin -17.65dB) - PK | 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.

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## 1 General Description

### 1.1 Information

This is a Class II Permissive Change report (C2PC).

This report is issued as a supplementary report to original ICC report no. FR162104AD. The difference is changing components of LPDDR & eMMC.

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

| RF General Information  |     |           |           |        |  |  |
|---|-----|-----------|-----------|--------|--|--|
| Frequency Range (MHz)  Bluetooth Ch. Frequency Channel Number Data Rate |     |           |           |        |  |  |
| 2400-2483.5   | BR  | 2402-2480 | 0-78 [79] | 1 Mbps |  |  |
| 2400-2483.5   | EDR | 2402-2480 | 0-78 [79] | 2 Mbps |  |  |
| 2400-2483.5   | EDR | 2402-2480 | 0-78 [79] | 3 Mbps |  |  |

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.

Note 2: Bluetooth BR uses a GFSK.

Note 3: Bluetooth EDR uses a combination of  $\pi/4$ -DQPSK and 8DPSK.

#### 1.1.2 Antenna Details

| Ant. No. | Туре | Connector | Gain (dBi) | Remarks |
|----------|------|-----------|------------|---------|
| 1        | PIFA | No        | 2.84       |         |

## 1.1.3 Power Supply Type of Equipment under Test (EUT)

| Power Supply Type | 3.8Vdc   |
|-------------------|----------|
| i ono ouppiy Typo | 0.0 4 40 |

#### 1.1.4 Accessories

|     | Accessories               |   |  |  |  |  |
|-----|---------------------------|---|--|--|--|--|
| No. | No. Equipment Description |   |  |  |  |  |
| 1   | Battery                   | Brand: KEYENCE<br>Model: DX-BQ6<br>Rating: 3.8Vdc (23.02Wh) 6060mAh |  |  |  |  |

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## 1.1.5 Channel List

|         | Frequency band (MHz) |         |                    |         | 2400~              | 2483.5  |                    |
|---------|----------------------|---------|--------------------|---------|--------------------|---------|--------------------|
| Channel | Frequency<br>(MHz)   | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) |
| 0       | 2402                 | 20      | 2422               | 40      | 2442               | 60      | 2462               |
| 1       | 2403                 | 21      | 2423               | 41      | 2443               | 61      | 2463               |
| 2       | 2404                 | 22      | 2424               | 42      | 2444               | 62      | 2464               |
| 3       | 2405                 | 23      | 2425               | 43      | 2445               | 63      | 2465               |
| 4       | 2406                 | 24      | 2426               | 44      | 2446               | 64      | 2466               |
| 5       | 2407                 | 25      | 2427               | 45      | 2447               | 65      | 2467               |
| 6       | 2408                 | 26      | 2428               | 46      | 2448               | 66      | 2468               |
| 7       | 2409                 | 27      | 2429               | 47      | 2449               | 67      | 2469               |
| 8       | 2410                 | 28      | 2430               | 48      | 2450               | 68      | 2470               |
| 9       | 2411                 | 29      | 2431               | 49      | 2451               | 69      | 2471               |
| 10      | 2412                 | 30      | 2432               | 50      | 2452               | 70      | 2472               |
| 11      | 2413                 | 31      | 2433               | 51      | 2453               | 71      | 2473               |
| 12      | 2414                 | 32      | 2434               | 52      | 2454               | 72      | 2474               |
| 13      | 2415                 | 33      | 2435               | 53      | 2455               | 73      | 2475               |
| 14      | 2416                 | 34      | 2436               | 54      | 2456               | 74      | 2476               |
| 15      | 2417                 | 35      | 2437               | 55      | 2457               | 75      | 2477               |
| 16      | 2418                 | 36      | 2438               | 56      | 2458               | 76      | 2478               |
| 17      | 2419                 | 37      | 2439               | 57      | 2459               | 77      | 2479               |
| 18      | 2420                 | 38      | 2440               | 58      | 2460               | 78      | 2480               |
| 19      | 2421                 | 39      | 2441               | 59      | 2461               |         |                    |

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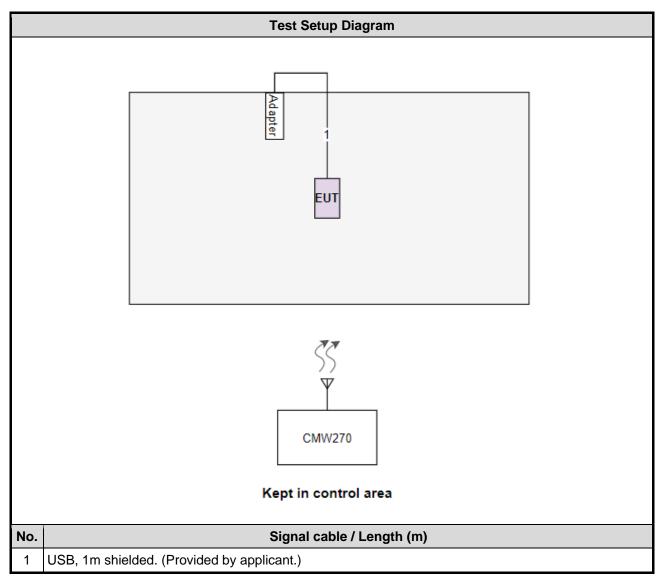


## 1.2 Local Support Equipment List

|                                  | Support Equipment List |         |             |         |   |  |
|----------------------------------|------------------------|---------|-------------|---------|---|--|
| No. Equipment Brand Model FCC ID |                        |         |             | Remarks |   |  |
| 1                                | Adapter                | PHIHONG | PSA10F-050Q |         | Provided by applicant.<br>Input: 100-240V~ 50/60Hz, 0.35A<br>Output: 5.0V=2.0A, 10.0W |  |

Note: Adapter is used for charging only.

## 1.3 Test Setup Chart



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## 1.4 The Equipment List

| Test Item                         | Conducted Emission  | Conducted Emission |               |                  |                   |  |  |  |  |
|-----------------------------------|---|--------------------|---------------|------------------|-------------------|--|--|--|--|
| Test Site                         | Conduction room 1 / (CO01-WS)                                       |                    |               |                  |                   |  |  |  |  |
| Tested Date                       | Jul. 18, 2023   | Jul. 18, 2023      |               |                  |                   |  |  |  |  |
| Instrument                        | Brand   | Model No.          | Serial No.    | Calibration Date | Calibration Until |  |  |  |  |
| Receiver                          | R&S   | ESR3               | 101658        | Feb. 17, 2023    | Feb. 16, 2024     |  |  |  |  |
| LISN                              | R&S   | ENV216             | 101579        | May 09, 2023     | May 08, 2024      |  |  |  |  |
| LISN (Support Unit)               | SCHWARZBECK   | Schwarzbeck 8127   | 8127667       | Jan .03, 2023    | Jan .02, 2024     |  |  |  |  |
| RF Cable-CON                      | Woken   | CFD200-NL          | CFD200-NL-001 | Oct. 17, 2022    | Oct. 16, 2023     |  |  |  |  |
| 50 ohm terminal<br>(Support Unit) | NA  | 50                 | 01            | Jun. 14, 2023    | Jun. 13, 2024     |  |  |  |  |
| Measurement<br>Software           | AUDIX   | e3                 | 6.120210k     | NA               | NA                |  |  |  |  |
| Note: Calibration Inter           | Note: Calibration Interval of instruments listed above is one year. |                    |               |                  |                   |  |  |  |  |

| Test Item                    | Radiated Emission   | Radiated Emission          |              |               |               |  |  |  |  |
|------------------------------|---|----------------------------|--------------|---------------|---------------|--|--|--|--|
| Test Site                    | 966 chamber1 / (03Cl                                      | 966 chamber1 / (03CH01-WS) |              |               |               |  |  |  |  |
| Tested Date                  | Jul. 15, 2023   |                            |              |               |               |  |  |  |  |
| Instrument                   | Brand Model No. Serial No. Calibration Date Calibration U |                            |              |               |               |  |  |  |  |
| Receiver                     | R&S   | ESR3                       | 101657       | Mar. 03, 2023 | Mar. 02, 2024 |  |  |  |  |
| Loop Antenna                 | R&S   | HFH2-Z2                    | 100330       | Nov. 01, 2022 | Oct. 31, 2023 |  |  |  |  |
| Bilog Antenna                | SCHWARZBECK   | VULB9168                   | VULB9168-522 | Aug. 03, 2022 | Aug. 02, 2023 |  |  |  |  |
| Preamplifier                 | EMC   | EMC02325                   | 980225       | Jun. 28, 2023 | Jun. 27, 2024 |  |  |  |  |
| Loop Antenna Cable           | KOAX KABEL  | 101354-BW                  | 101354-BW    | Oct. 04, 2022 | Oct. 03, 2023 |  |  |  |  |
| LF cable 3M                  | Woken   | CFD400NL-LW                | CFD400NL-001 | Oct. 04, 2022 | Oct. 03, 2023 |  |  |  |  |
| LF cable 11M                 | EMC   | EMCCFD400-NW-N<br>W-11000  | 200801       | Oct. 04, 2022 | Oct. 03, 2023 |  |  |  |  |
| LF cable 1M                  | EMC   | EMCCFD400-NM-N<br>M-1000   | 160502       | Oct. 04, 2022 | Oct. 03, 2023 |  |  |  |  |
| Measurement<br>Software      | AUDIX   | e3                         | 6.120210g    | NA            | NA            |  |  |  |  |
| Wireless connectivity tester | R&S   | CMW270                     | 100856       | Nov. 16, 2022 | Nov. 15, 2023 |  |  |  |  |
| Note: Calibration Inter      | rval of instruments liste                                 | d above is one year.       |              |               |               |  |  |  |  |

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## 1.5 Test Standards

47 CFR FCC Part 15.247 ANSI C63.10-2013

### 1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

## 1.7 Deviation from Test Standard and Measurement Procedure

None

## 1.8 Measurement Uncertainty

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

| Measurement Uncertainty  |          |  |  |
|--------------------------|----------|--|--|
| Parameters Uncertainty   |          |  |  |
| AC conducted emission    | ±2.92 dB |  |  |
| Radiated emission ≤ 1GHz | ±3.41 dB |  |  |

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## 2 Test Configuration

## 2.1 Testing Facility

| Test Laboratory      | International Certification Corporation  |
|----------------------|--|
| Test Site            | CO01-WS, 03CH01-WS   |
| Address of Test Site | No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.) |

FCC Designation No.: TW2732FCC site registration No.: 181692

➤ ISED#: 10807A

➤ CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

| Test item  | Mode | Test Frequency<br>(MHz) | Data Rate (Mbps) | Test Configuration |
|--|------|-------------------------|------------------|--------------------|
| Conducted Emissions<br>Radiated Emissions ≤ 1GHz | GFSK | 2441                    | 1Mbps            |                    |

#### NOTE:

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<sup>1.</sup> The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **X-plane** results were found as the worst case and were shown in this report.



## 3 Transmitter Test Results

### 3.1 Conducted Emissions

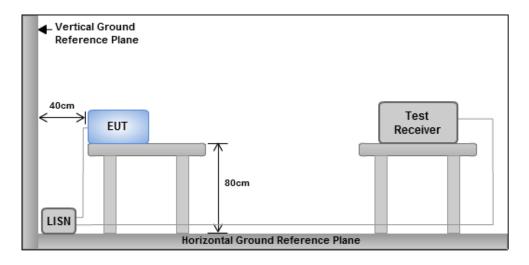
#### 3.1.1 Limit of Conducted Emissions

| 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



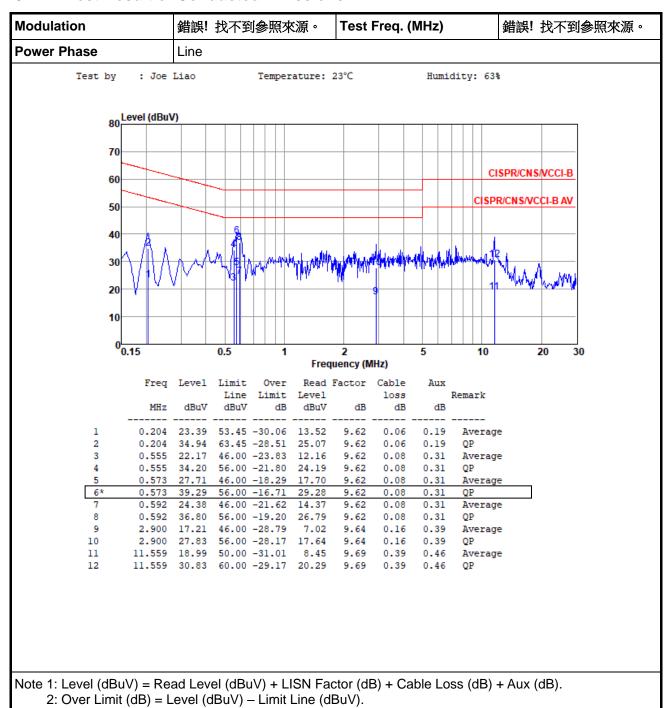
Note: 1. Support units were connected to second LISN.

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

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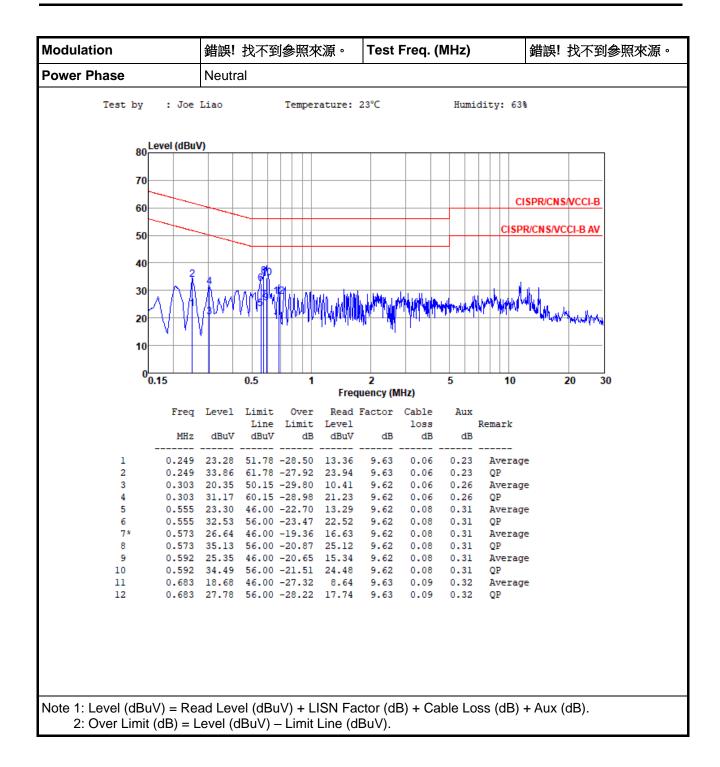


#### 3.1.4 Test Result of Conducted Emissions



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## 3.2 Unwanted Emissions into Restricted Frequency Bands

### 3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

| 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:

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.

#### 3.2.2 Test Procedures

- 1. 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 test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference 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.

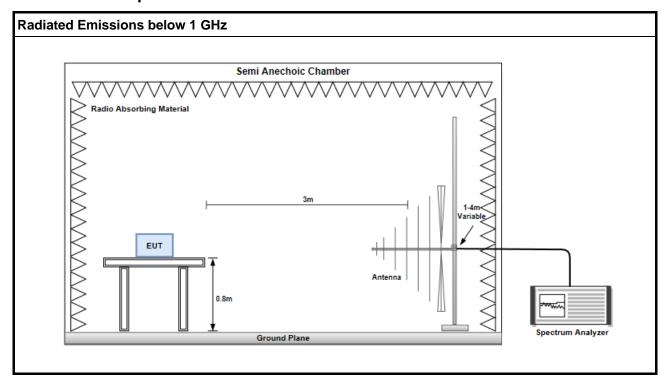
#### Note:

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

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## 3.2.3 Test Setup

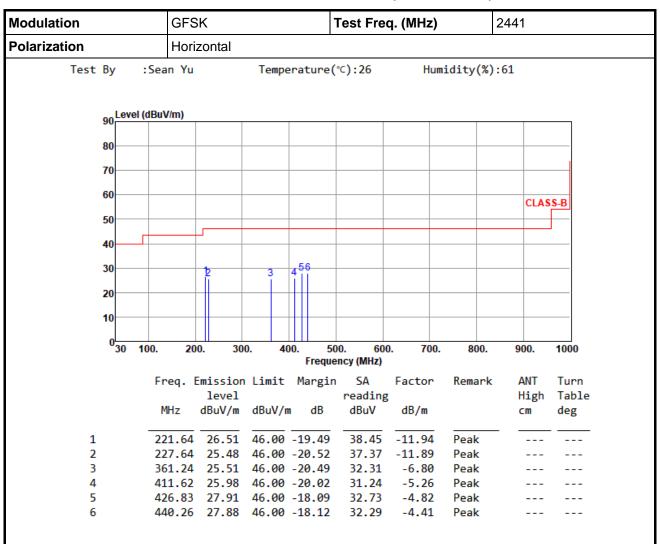


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### 3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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

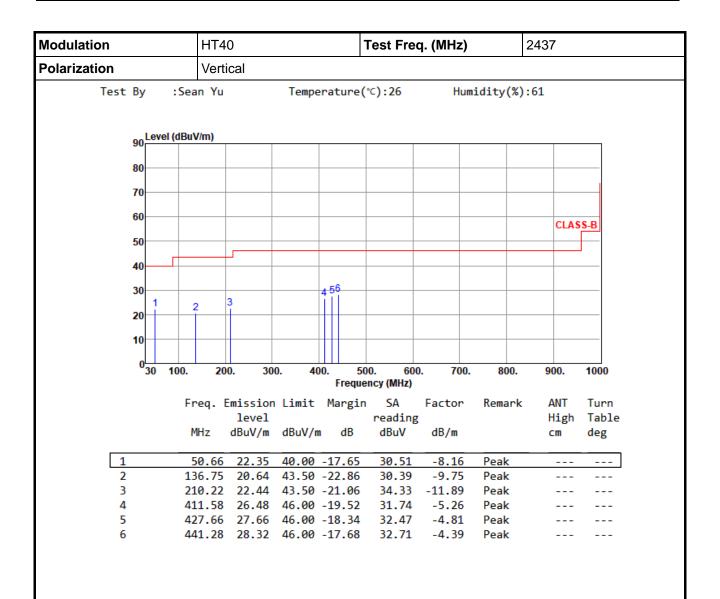
\*Factor includes antenna factor , cable loss and amplifier gain

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.

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

\*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.

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## 4 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 Corporation (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 Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

#### Kwei Shan Site II

Tel: 886-3-271-8640 No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

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

Tel: 886-3-271-8666 Fax: 886-3-318-0345

Email: ICC Service@icertifi.com.tw

==END==

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