

FCC Co-Location 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
47 CFR FCC Part 15.225
47 CFR FCC Part 24 Subpart E
Received Date : Sep. 26, 2023
Tested Date : Oct. 02, 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 Chen / Assistant Manager



Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR162104-02CO	Rev. 01	Initial issue	Nov. 02, 2023

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.209 15.225(d) 24.238(a)	Radiated Emissions	[dBuV/m at 3m]: 34.85MHz 32.96 (Margin -7.04dB) - 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.

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. FR162104-01CO. The modification is concerned with following items:

- ✧ Added components and change specification of resistor for HAC, T-coil function
- ✧ PCB re-layout for above change.

Therefore, radiated emission below 1GHz test was performed.

1.1.1 Specification of the Equipment under Test (EUT)

WLAN	
Operating Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz
Modulation Type	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Bluetooth	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth 5.0 LE: GFSK Bluetooth BR(1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK
LTE	
Operating Frequency	LTE Band 5: 824 MHz ~ 849 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 41: 2496 MHz ~ 2690 MHz
Modulation	QPSK, 16QAM (Uplink)
WCDMA	
Operating Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
Modulation	WCDMA AMR / RMC / HSDPA / HSUPA: BPSK (Uplink)
RFID	
Operating Frequency	13.56 MHz
Modulation	ASK

1.1.2 Antenna Details

LTE

Type	Gain (dBi)	Connector	Remark
PIFA	2.74	No	LTE Band 4
PIFA	2.74	No	LTE Band 2 / WCDMA Band II
PIFA	-2.38	No	LTE Band 5 / WCDMA Band V
PIFA	2.09	No	LTE Band 41

WLAN

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)		
				2400~2483.5	5150~5250	5250~5350
1	Venus 6	PIFA	No	2.84	5.7	5.7

BT

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

RFID

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	Coil	No	---	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.8Vdc
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1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Oct. 02, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
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	Jul. 31, 2023	Jul. 30, 2024
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 W-11000	200801	Oct. 04, 2022	Oct. 03, 2023
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 04, 2022	Oct. 03, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.3 Test Standards

47 CFR FCC Part 15.247
47 CFR FCC Part 15.225
47 CFR FCC Part 24 Subpart E
ANSI C63.10-2013
ANSI C63.26-2015

1.4 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02
FCC KDB 412172 D01 Determining ERP and EIRP v01r01
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
FCC KDB 971168 D02 Misc Rev Approv License Devices v02r01

1.5 Deviation from Test Standard and Measurement Procedure

None

1.6 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
Radiated emission \leq 1GHz	± 3.41 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	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.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Test Mode
Radiated Emissions	NFC + BT GFSK CH39 + LTE B2 (BW 15, CH19125, 1902.5MHz, 1RB offset 37)

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 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

Note 2:
 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.

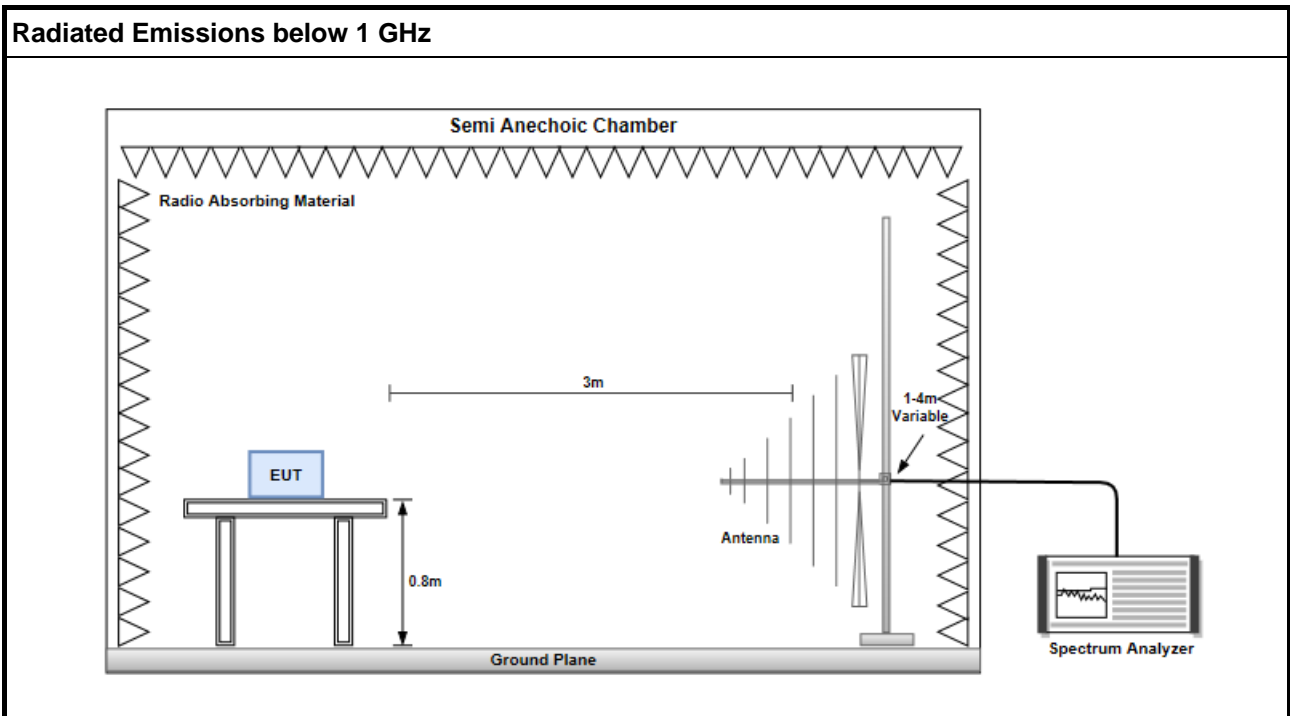
3.1.2 Test Procedures

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.

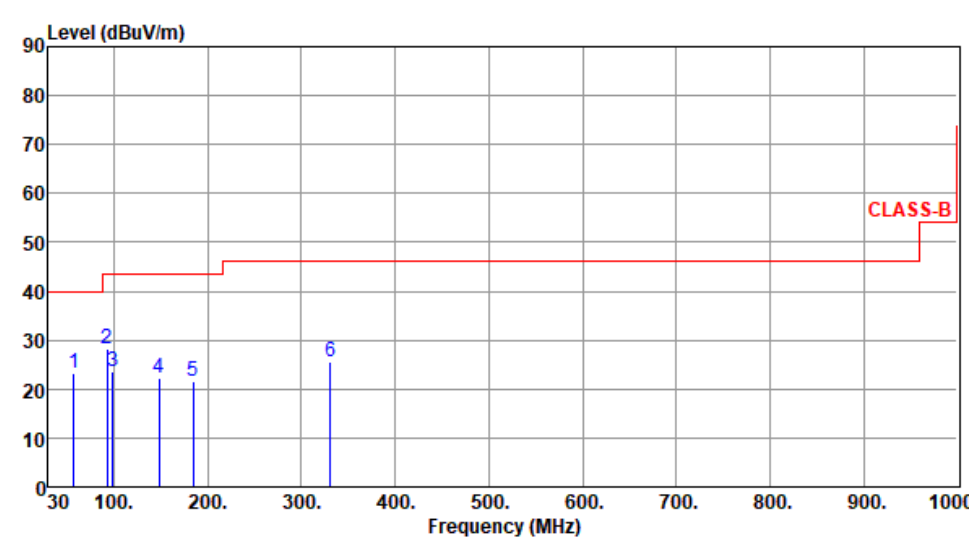
Note:

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

3.1.3 Test Setup

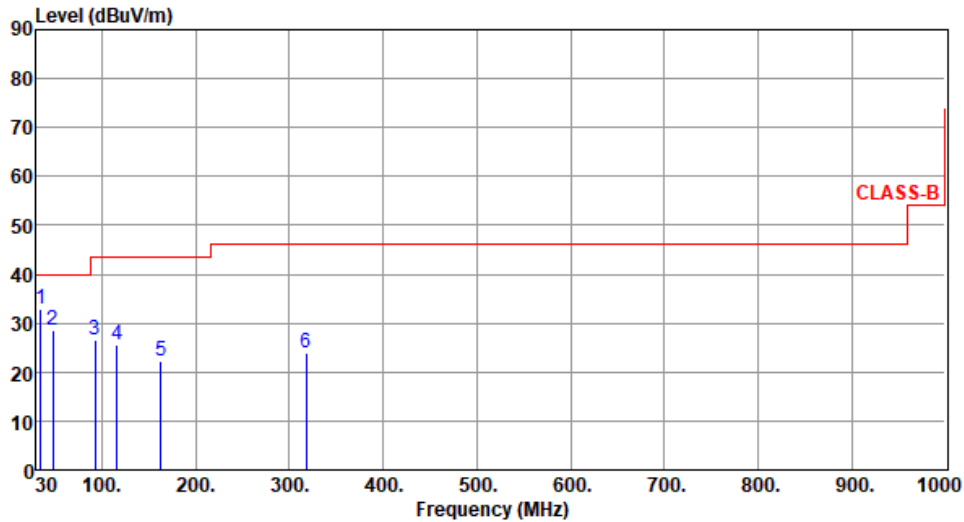


3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Test Mode	NFC + BT GFSK CH39 + LTE B2 (BW 15, CH19125, 1902.5MHz, 1RB offset 37)									
Polarization	Horizontal									
Test By :Pau Lin			Temperature(°C):25			Humidity(%):63				
										
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table	
					dBuV			cm	deg	
1	57.16	23.09	40.00	-16.91	31.41	-8.32	Peak	---	---	
2	93.05	28.32	43.50	-15.18	42.35	-14.03	Peak	---	---	
3	98.87	23.71	43.50	-19.79	37.17	-13.46	Peak	---	---	
4	148.34	22.25	43.50	-21.25	31.19	-8.94	Peak	---	---	
5	184.23	21.75	43.50	-21.75	32.49	-10.74	Peak	---	---	
6	330.70	25.48	46.00	-20.52	32.72	-7.24	Peak	---	---	
<p>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.</p>										

Test Mode	NFC + BT GFSK CH39 + LTE B2 (BW 15, CH19125, 1902.5MHz, 1RB offset 37)
Polarization	Vertical

Test By :Pau Lin Temperature(°C):25 Humidity(%):63



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	34.85	32.96	40.00	-7.04	42.39	-9.43	Peak	---	---
2	47.46	28.56	40.00	-11.44	36.46	-7.90	Peak	---	---
3	93.05	26.65	43.50	-16.85	40.68	-14.03	Peak	---	---
4	116.33	25.49	43.50	-18.01	36.90	-11.41	Peak	---	---
5	162.89	22.30	43.50	-21.20	31.21	-8.91	Peak	---	---
6	318.09	23.86	46.00	-22.14	31.38	-7.52	Peak	---	---

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.

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 <http://www.icertifi.com.tw>.

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

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