

FCC 15.225 & RSS-210 13.56MHz Test Report

for

HON HAI PRECISION IND. Co., LTD.

**No. 2, Ziyou St., Tucheng Dist.,
New Taipei City 236, Taiwan**

**Product Name : CAC/PIV Smart Card
Reader (Slimline Bay)**

Model Name : DPWC610

Brand : DELL

FCC ID : YE5-DPWC610

IC : 4613B- DPWC610

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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TEST REPORT

Applicant : HON HAI PRECISION IND. Co., LTD.
Manufacturer : HON HAI PRECISION IND. Co., LTD.
EUT Description
(1) Product : CAC/PIV Smart Card Reader (Slimline Bay)
(2) Model : DPWC610
(3) Brand : DELL
(4) Power Rating : DC 5V from Host

Applicable Standards:

47CFR FCC Part 15 Subpart C
ANSI C63.10:2013
RSS-Gen (Issue 5), March 2019
RSS-210 (Issue 10), December 2019

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2020. 12. 23

Reviewed by:

(Tina Huang/Section Manager)

Approved by:

(Johnny Hsueh/Section Manager)



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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2020. 12. 23	Original Report	EM-F200615



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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	PASS
15.225(a)(b)(c)	RSS-210 §B.6 (a)	Radiation Emission (In-Band)	PASS
15.225(d)/15.209	RSS-Gen §8.9 RSS-210 §B.6 (a)	Radiation Emission (Out-Band)	PASS
15.215 (c)	RSS-Gen §6.7	20dB/99% Bandwidth	PASS
15.225(e)	RSS-210 §B.6 (b)	Frequency Stability Tolerance	PASS
Note: The uncertainties value is not used in determining the result.			



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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	HON HAI PRECISION IND. Co., LTD. No. 2, Ziyou St., Tucheng Dist., New Taipei City 236, Taiwan
Manufacturer	HON HAI PRECISION IND. Co., LTD. No. 2, Ziyou St., Tucheng Dist., New Taipei City 236, Taiwan
Product	CAC/PIV Smart Card Reader (Slimline Bay)
Model	DPWC610
Brand	DELL

3.2. Description of EUT

Test Model	DPWC610
Test Sample	#1 for all test items.
Serial Number	N/A
Power Rating	DC 5V from Host
Hardware Version	X01
Firmware/Software Version	Citadel Firmware: 5.6.004.0 CV host software 64 bit: 5.6.00004
RF Features	NFC
Transmit Type	1T1R
Sample Status	Engineering Sample
Date of Receipt	2020. 12. 03
Date of Test	2020. 12. 21 ~ 23
Interface Ports of EUT	Header1X5
Accessories Supplied	None

3.3. Antenna Information

No.	Model	Brand	Antenna Type	Frequency (MHz)	Max Gain(dBi)
1	ANTA0DF14241 NFCA1	YAGEO	Loop Antenna with Matching Circuit	N/A	N/A

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation
NFC	13.56	1	ASK

3.5. Description of Key Components

None.

3.6. Test Configuration

Item		Test Frequency (MHz)
Radiated Test Case	Radiated Spurious Emission (In-Band)	13.56
	Radiated Spurious Emission (Out-Band) ^{Note1}	13.56
Conducted Test Case	20dB Bandwidth	13.56
	Frequency Stability	13.56

Note:

☒ Mobile Device

☐ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☐ Lie ☐ Side ☐ Stand

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

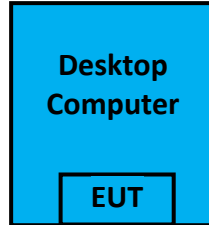
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Desktop Computer	DELL	D15S	N/A	N/A

3.7.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	AC Power Cord : Unshielded, Detachable, 1.8m (3X)

3.8. Setup Configuration

3.8.1. EUT Configuration for AC Conduction and Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

The Desktop Computer was running test program “NFC SPY” is used for enabling EUT NFC function under continues transmitting.

3.10. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No. 8 Shielding Room (2) No.1 3m Semi Anechoic Chamber (3) RF Test Room

3.11.Measurement Uncertainty

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test			9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.5dB
Radiation Test	☒	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.1dB
			200MHz-1000MHz, 3m, Horizontal	±3.9dB
			30MHz-200MHz, 3m, Vertical	±4.2dB
			200MHz-1000MHz, 3m, Vertical	±4.1dB
			1GHz-6GHz, 3m	±4.2dB
			6GHz-18GHz, 3m	±4.6dB
	☐	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±3.9dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.1dB
	☐	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.3dB
			200MHz-1000MHz, 3m, Horizontal	±4.0dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.4dB
			1GHz-6GHz, 3m	±4.5dB
			6GHz-18GHz, 3m	±4.6dB
	☐	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.0dB
			200MHz-1000MHz, 3m, Horizontal	±3.9dB
			30MHz-200MHz, 3m, Vertical	±4.2dB
			200MHz-1000MHz, 3m, Vertical	±4.3dB
			1GHz-6GHz, 3m	±4.3dB
			6GHz-18GHz, 3m	±4.7dB
	☐	Fully Anechoic Chamber	30MHz~1000MHz	±4.6dB
			1GHz~18GHz	±5.4dB
			18GHz~40GHz	±3.52dB
			40GHz~260GHz	±3.56dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz
99% Bandwidth	± 0.38%
Frequency Stability	±0.78ppm

4. MEASUREMENT EQUIPMENTLIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1.	Test Receiver	R&S	ESR3	101774	2020.02.04	1 Year
2.	A.M.N.	R&S	ENV432	101567	2020.04.20	1 Year
3.	Pulse Limiter	R&S	ESH3-Z2	100354	2020.01.05	1 Year
4.	Cable	Yeida	RG/58AU	CE-08	2020.09.19	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2020.04.17	N.C.R.
6	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2020. 09. 16	1 Year
2.	Test Receiver	R & S	ESCS30	100039	2020. 06. 05	1 Year
3.	Amplifier	HP	8447D	2944A06305	2020. 01. 16	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2020. 01. 17	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2019.12. 26	2 Years
6.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2020. 01. 31	1 Year
7.	Coaxial Cable	MIYAZAKI	5D2W	CLAMP-01	2020. 09. 19	1 Year
8.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2020. 04. 17	1 Year
9.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.3. RF Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9020B-544	MY57120357	2020.01.10	1 Year
2.	Probe Antenna	EMCO	7405	9011-1836	N.C.R.	N.C.R.
3.	Programmable Temperature & Humidity Chamber	GIANT	GTH-150-40-CP-AR	MAA1505-008	2020.05.19	1 Year
4.	Transformer	TAILI	TL-220	N/A	N.C.R.	N.C.R.
5.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2020.04.17	1 Year

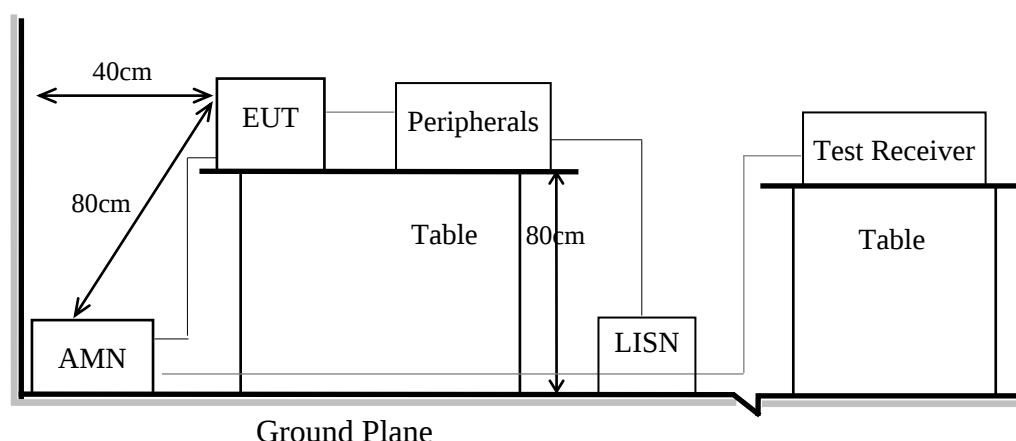
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.8.1

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.



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5.4. Test Results

Please refer to Appendix A.

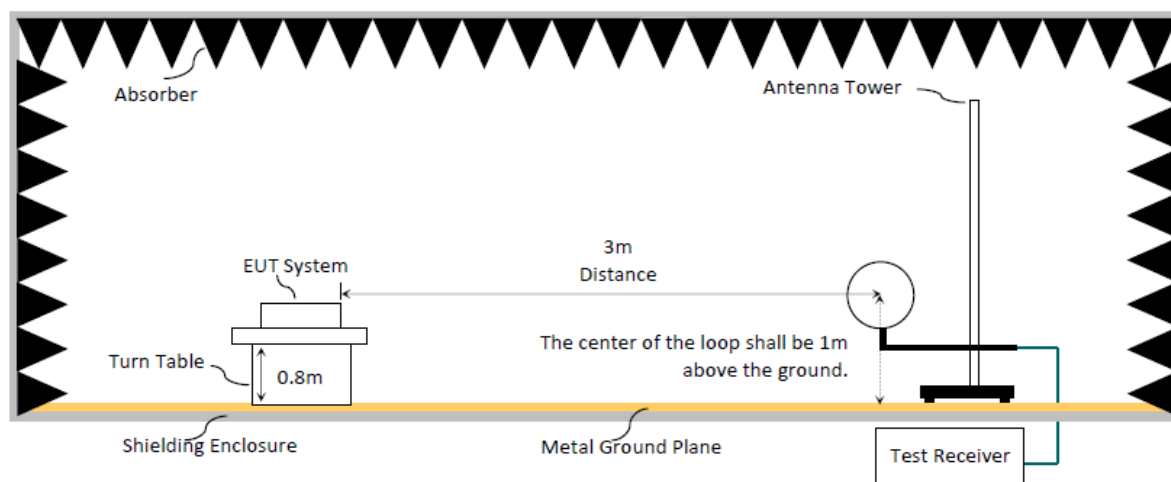
6. RADIATED EMISSION (IN-BAND)

6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of EUT

Indicated as section 3.8.1

6.1.2. Setup Diagram for 9kHz-30MHz



6.2. Radiated Emission Limits

Frequency (MHz)	Distance(m)	Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
13.553-13.567	30	15848	84
	3	1584893	124
13.410 -13.553 and 13.567-13.710	30	334	50.50
	3	33381	90.50
13.110 -13.410 and 13.710-14.010	30	106	40.5
	3	10592	80.50

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

(2) $15848\mu\text{V/m} = 84\text{dB}\mu\text{V/m} = 84 + 40\log(30\text{m}/3\text{m}) = 124\text{dB}\mu\text{V/m}$

$334\mu\text{V/m} = 50.5\text{dB}\mu\text{V/m} = 50.5 + 40\log(30\text{m}/3\text{m}) = 90.5\text{dB}\mu\text{V/m}$

$106\mu\text{V/m} = 40.5\text{dB}\mu\text{V/m} = 40.5 + 40\log(30\text{m}/3\text{m}) = 80.5\text{dB}\mu\text{V/m}$

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.

In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 and RSS-210 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (10kHz-490kHz)

Q.P. (490kHz-30MHz)

6.4. Test Results

Please refer to Appendix A.

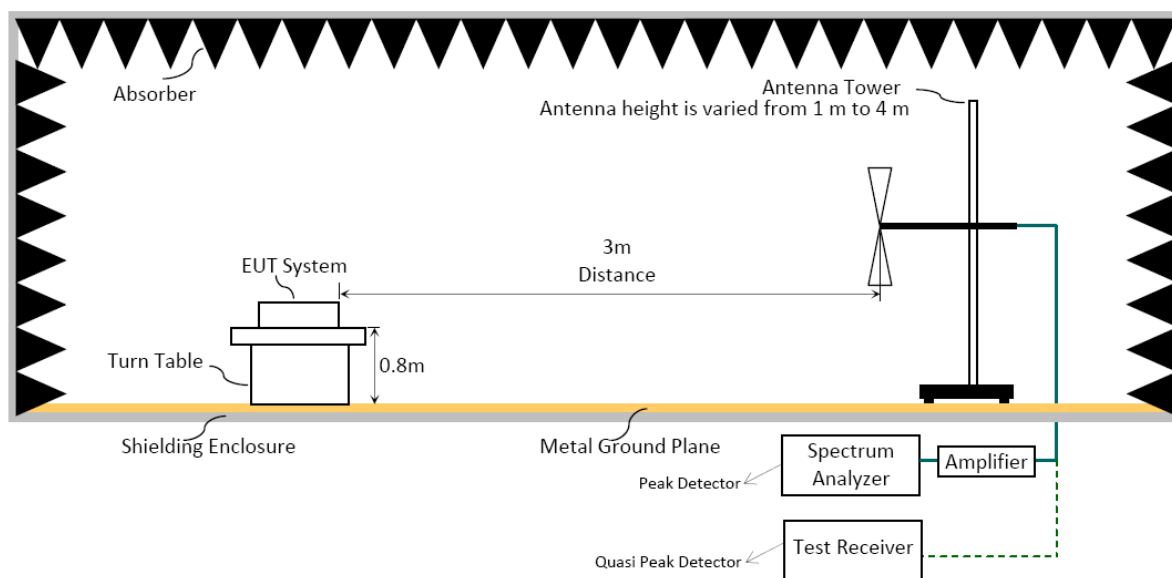
7. RADIATED EMISSION (OUT-BAND)

7.1. Block Diagram of Test Setup

7.1.1. Block Diagram of EUT

Indicated as section 3.8

7.1.2. Setup Diagram for 30-1000MHz



7.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6 must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

7.4. Test Procedure

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 regulation.

Frequency Range 30MHz~1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

7.5. Measurement Result Explanation

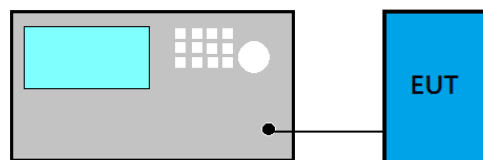
Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading

7.6. Test Results

Please refer to Appendix A.

8. 20dB/99% BANDWIDTH

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The bandwidth shall be specified in operating frequency band.

8.3. Test Procedure

20dB

Following measurement procedure is reference to ANSI C63.10:2013:

- (1) Set Span range 2~5 times the OBW
- (2) Set VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Trace mode = Max hold.
- (5) Sweep = Auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

99%

Following measurement procedure is reference to ANSI C63.10:2013:

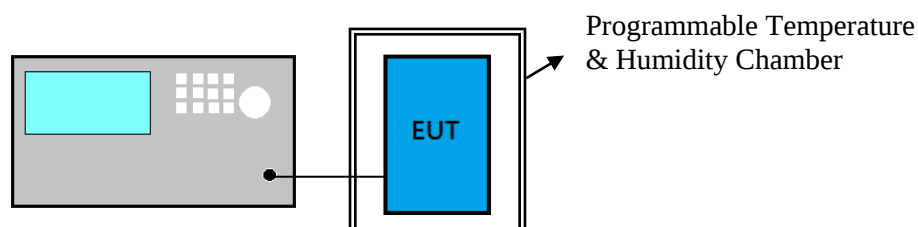
- (1) Set Span range 1.5~5 times the OBW
- (2) Set RBW close to 1% to 5% of OBW.
- (3) Set VBW $\geq 3 \times$ RBW.
- (4) Detector = Peak.
- (5) Trace mode = Max hold.
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.

8.4. Test Results

Please refer to Appendix A

9. FREQUENCY STABILITY

9.1. Block Diagram of Test Setup



9.2. Specification Limits

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20°C to 50°C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C .

9.3. Test Procedure

The device operating in the 13.553-13.567MHz shall maintain the carrier frequency within $\pm 0.01\%$ ($\pm 100\text{ppm}$) of the operating frequency over the temperature variation of -20°C to $+50^{\circ}\text{C}$ at normal supply voltage.

9.4. Test Results

Please refer to Appendix A



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10.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

TEST DATA AND PLOTS

(Model: DPWC610)

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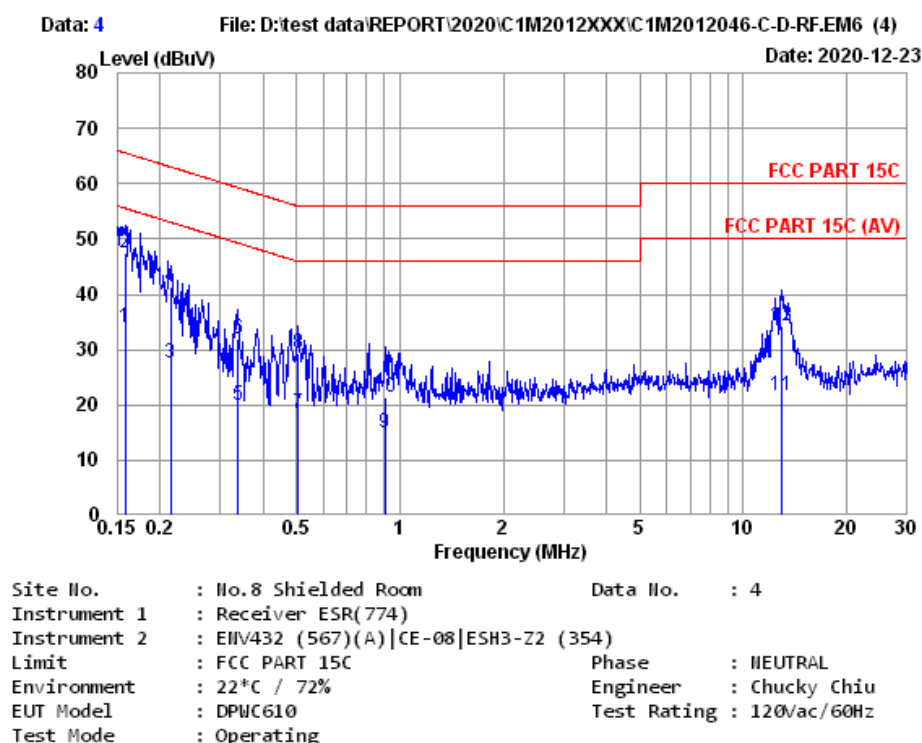
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A.1 CONDUCTED EMISSION

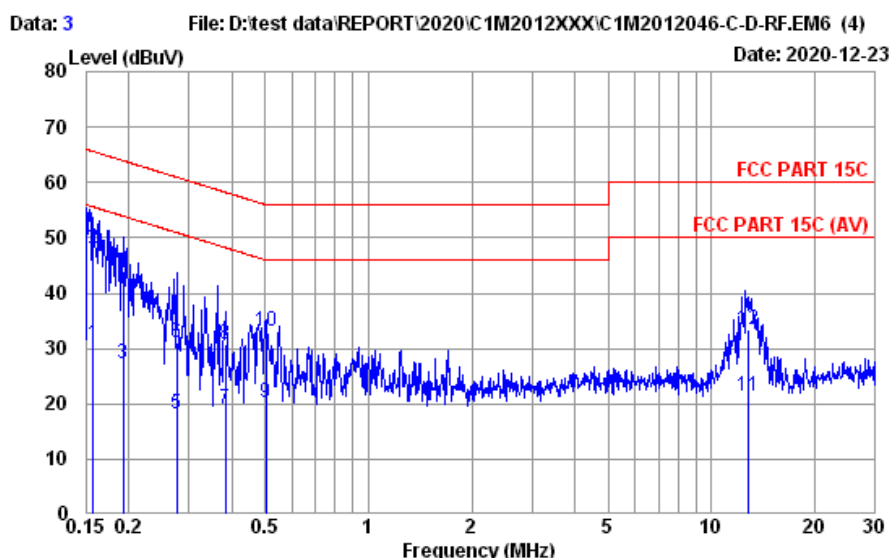
Test Date	2020/12/23	Temp./Hum.	22°C/72%
Test Voltage	AC 120V 60Hz (Via Desktop Computer)	Tested By	Chucky Chiu



	Freq. (MHz)	AMM Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.158	10.20	0.03	9.85	13.97	34.05	55.56	21.51	Average
2	0.158	10.20	0.03	9.85	27.31	47.39	65.56	18.17	QP
3	0.215	10.20	0.03	9.85	7.45	27.53	53.01	25.48	Average
4	0.215	10.20	0.03	9.85	21.33	41.41	63.01	21.60	QP
5	0.337	10.20	0.03	9.85	-0.20	19.88	49.27	29.39	Average
6	0.337	10.20	0.03	9.85	11.99	32.07	59.27	27.20	QP
7	0.505	10.20	0.03	9.86	-1.76	18.33	46.00	27.67	Average
8	0.505	10.20	0.03	9.86	9.17	29.26	56.00	26.74	QP
9	0.904	10.20	0.04	9.86	-5.19	14.91	46.00	31.09	Average
10	0.904	10.20	0.04	9.86	1.34	21.44	56.00	34.56	QP
11	12.988	10.63	0.16	9.93	1.05	21.77	50.00	28.23	Average
12	12.988	10.63	0.16	9.93	13.70	34.42	60.00	25.58	QP

Remarks: 1. Emission Level= AMM Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Test Date	2020/12/23	Temp./Hum.	22°C/72%
Test Voltage	AC 120V 60Hz (Via Desktop Computer)	Tested By	Chucky Chiu



Site No. : No.8 Shielded Room Data No. : 3
Instrument 1 : Receiver ESR(774)
Instrument 2 : EHV432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : LIIE
Environment : 22°C / 72% Engineer : Chucky Chiu
EUT Model : DPWC610 Test Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMF Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.157	10.20	0.03	9.85	10.56	30.64	55.60	24.96	Average
2	0.157	10.20	0.03	9.85	28.02	48.10	65.60	17.50	QP
3	0.192	10.20	0.03	9.85	7.24	27.32	53.93	26.61	Average
4	0.192	10.20	0.03	9.85	23.92	44.00	63.93	19.93	QP
5	0.276	10.20	0.03	9.85	-1.93	18.15	50.94	32.79	Average
6	0.276	10.20	0.03	9.85	10.98	31.06	60.94	29.88	QP
7	0.383	10.20	0.03	9.85	-1.08	19.00	48.21	29.21	Average
8	0.383	10.20	0.03	9.85	10.68	30.76	58.21	27.45	QP
9	0.502	10.20	0.03	9.86	0.16	20.25	46.00	25.75	Average
10	0.502	10.20	0.03	9.86	12.99	33.08	56.00	22.92	QP
11	12.852	10.46	0.16	9.93	0.95	21.50	50.00	28.50	Average
12	12.852	10.46	0.16	9.93	12.91	33.46	60.00	26.54	QP

Remarks: 1. Emission Level= AMF Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

A.2 RADIATED EMISSION (IN-BAND)

Test Date	2020/12/23	Temp./Hum.	20°C /67%
Test Voltage	AC 120V 60Hz (Via Desktop Computer)	Tested by	Kuper Hsu

Antenna at 0 Degree

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
13.56	20.74	0.38	32.58	53.70	124.00	70.30	QP

Antenna at 90 Degree

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
13.56	20.74	0.38	29.18	50.30	124.00	73.70	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.

2. Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

A.3 RADIATED EMISSION (OUT-BAND)

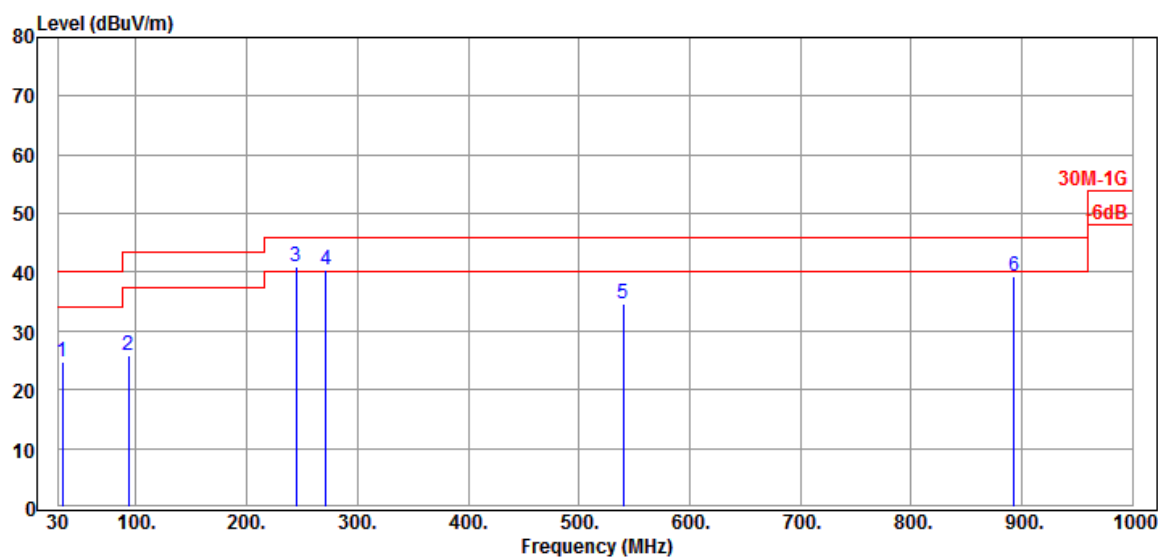
Test Date	2020/12/23	Temp./Hum.	20°C /67%
Test Voltage	AC 120V 60Hz (Via Desktop Computer)	Tested by	Kuper Hsu

A.3.1 Emissions within Restricted Frequency Bands

A.3.1.1 Frequency 9kHz~30MHz

All emissions are lower than the ambient level cannot be measured.

A.3.1.2 Frequency 30MHz ~ 1000MHz

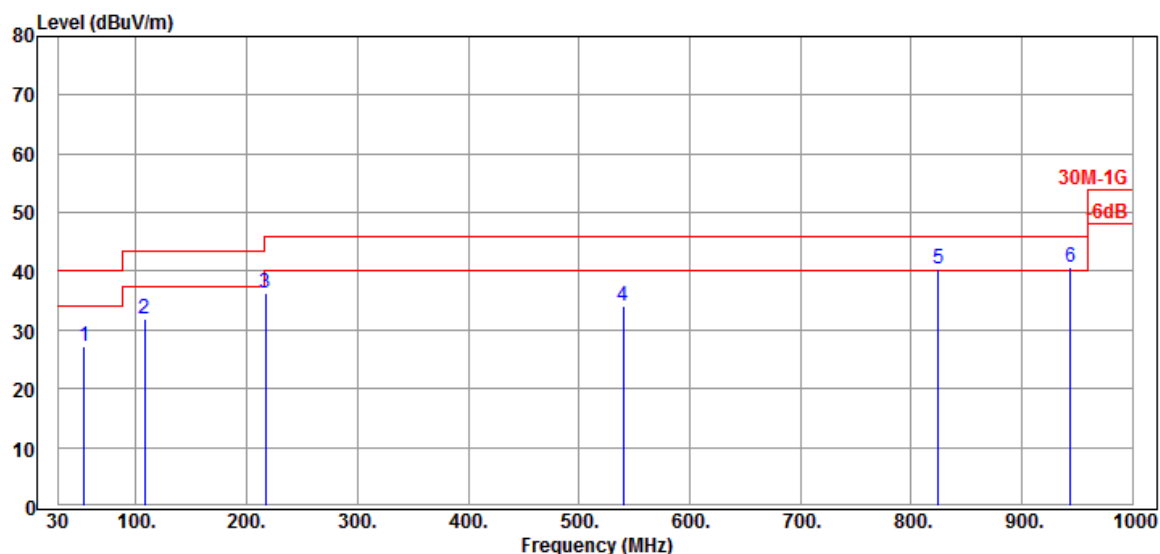


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
33.880	22.55	1.32	26.52	27.49	24.84	40.00	15.16	Peak
93.050	15.32	2.34	26.34	34.48	25.80	43.50	17.70	Peak
244.370	18.33	3.97	25.78	44.55	41.07	46.00	4.93	Peak
271.530	18.95	4.25	25.74	42.97	40.43	46.00	5.57	Peak
540.220	24.04	6.97	27.33	30.92	34.60	46.00	11.40	Peak
893.300	26.78	8.68	27.17	30.99	39.28	46.00	6.72	Peak

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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
53.280	13.89	1.70	26.48	38.00	27.11	40.00	12.89	Peak
107.600	17.53	2.53	26.27	37.97	31.76	43.50	11.74	Peak
217.210	16.59	3.71	25.83	41.78	36.25	46.00	9.75	Peak
540.220	24.04	6.97	27.33	30.50	34.18	46.00	11.82	Peak
824.430	26.29	8.27	27.34	33.25	40.47	46.00	5.53	Peak
943.740	27.07	8.91	27.01	31.78	40.75	46.00	5.25	Peak

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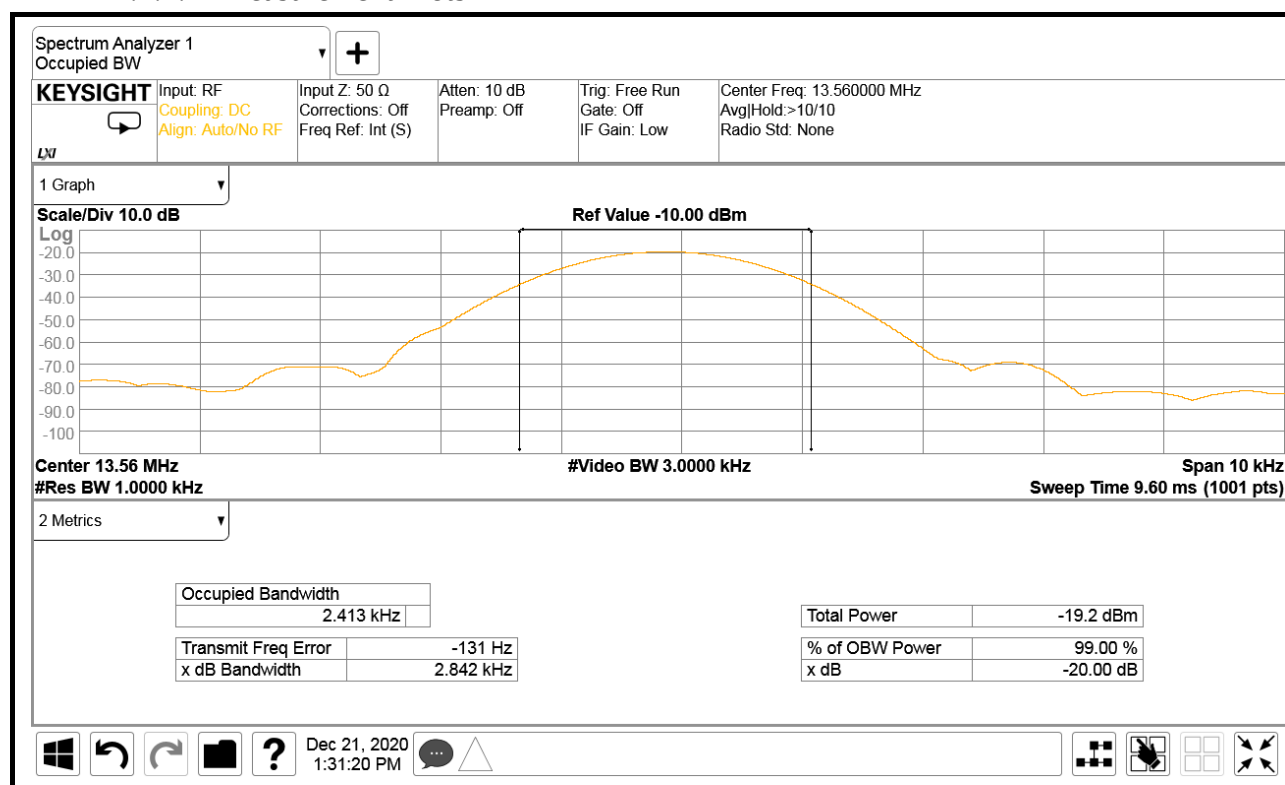
A.4 20dB/99% BANDWIDTH

Test Date	2020/12/21	Temp./Hum.	19°C /66%
Cable Loss	N/A	Tested by	Kuper Hsu
Test Voltage	AC 120V 60Hz (Via Desktop Computer)		

A.4.1.1 20dB/99% Bandwidth Result

Centre Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
13.56	2.842kHz	2.413

A.4.1.2 Measurement Plots



A.5 FREQUENCY STABILITY

Test Date	2020/12/21	Temp./Hum.	19°C/66%
Test Normal Voltage	AC 120V 60Hz (Via Desktop Computer)	Tested by	Kuper Hsu

Mode: 0 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 138V/60Hz
Frequency(MHz)	13.55998	13.56028	13.56011	13.56080	13.56027
Error (%)	-0.00015	0.00206	0.00081	0.00590	0.00199
Error (ppm)	-1.5	20.6	8.1	59.0	19.9
Temperature(°C)	20	30	40	50	20
Voltage	AC 102V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
Frequency(MHz)	13.56092	13.56082	13.55982	13.55986	13.56093
Error (%)	0.00678	0.00605	-0.00133	-0.00103	0.00686
Error (ppm)	67.8	60.5	-13.3	-10.3	68.6

Mode: 2 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 138V/60Hz
Frequency(MHz)	13.55981	13.56050	13.56092	13.56078	13.56042
Error (%)	-0.00140	0.00369	0.00678	0.00575	0.00310
Error (ppm)	-14.0	36.9	67.8	57.5	31.0
Temperature(°C)	20	30	40	50	20
Voltage	AC 102V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
Frequency(MHz)	13.56081	13.56027	13.56047	13.56095	13.55972
Error (%)	0.00597	0.00199	0.00347	0.00701	-0.00206
Error (ppm)	59.7	19.9	34.7	70.1	-20.6

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Mode: 5 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 138V/60Hz
Frequency(MHz)	13.56093	13.55967	13.55912	13.55996	13.56026
Error (%)	0.00686	-0.00243	-0.00649	-0.00029	0.00192
Error (ppm)	68.6	-24.3	-64.9	-2.9	19.2
Temperature(°C)	20	30	40	50	20
Voltage	AC 102V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
Frequency(MHz)	13.55978	13.55996	13.56011	13.55986	13.56050
Error (%)	-0.00162	-0.00027	0.00081	-0.00103	0.00369
Error (ppm)	-16.2	-2.7	8.1	-10.3	36.9

Mode: 10 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 138V/60Hz
Frequency(MHz)	13.56026	13.55989	13.56042	13.55907	13.56080
Error (%)	0.00192	-0.00081	0.00310	-0.00686	0.00590
Error (ppm)	19.2	-8.1	31.0	-68.6	59.0
Temperature(°C)	20	30	40	50	20
Voltage	AC 102V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
Frequency(MHz)	13.56033	13.55978	13.56059	13.55905	13.55938
Error (%)	0.00243	-0.00162	0.00435	-0.00701	-0.00457
Error (ppm)	24.3	-16.2	43.5	-70.1	-45.7



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APPENDIX B

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: DPWC610)