

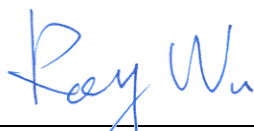
Variant FCC RF Test Report

APPLICANT : DENSO WAVE INCORPORATED
EQUIPMENT : Bar Code Handy Terminal
BRAND NAME : DENSO
MODEL NAME : BHT-710BWB-CE
FCC ID : PZWBHT710BWB
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Transmission System (DTS)

This is a variant report which is only valid combined with the original report. The product was received on Jan. 27, 2010 and completely tested on Mar. 01, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Roy Wu / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR912101-03A	Rev. 01	This is a variant report which can be referred to appendix C for change note. And this report is added test results of 802.11a (5725~5850MHz). The test results of 802.11b/g were performed on original report which can be referred to Sporton Report Number FR912101A as appendix D.	Mar. 11, 2010

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)	A8.4	Output Power Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.4	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 10.1 dB at 0.51 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.53 dB at 5028.00 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

DENSO WAVE INCORPORATED

1 aza-Yoshiike, ooaza-Kusaki, agui-cho, Chita-gun, Aichi, japan, 470-2297

1.2 Manufacturer

Universal Scientific Industrial CO., LTD.

No. 141, Lane 351, Taiping Road, Sec. 1, Tsao Tuen, Nan-Tou, Taiwan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Bar Code Handy Terminal
Brand Name	DENSO
Model Name	BHT-710BWB-CE
FCC ID	PZWBHT710BWB
Tx/Rx Frequency Range	5725 MHz ~ 5850 MHz
Channel Spacing	20 MHz
Maximum Output Power to Antenna	20.14 dBm (103.28 mW)
Antenna Type	PIFA Antenna with gain 5.26 dBi
HW Version	V3.4
SW Version	1.16a
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH07HY	TW1022/4086B-1

1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ANSI C63.4-2003
- IC RSS-210 Issue 7 Annex 8

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2 Test Configuration of Equipment Under Test

2.1 RF Power

Preliminary tests were performed in different data rate and recorded the RF Output Power in the following table:

Channel	Frequency	5GHz 802.11a RF Power (dBm)							
		At OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH149	5745 MHz	20.03	19.76	20.09	19.98	19.97	19.12	16.75	16.14
CH157	5785 MHz	20.04	19.51	20.01	19.83	20.14	19.28	16.38	16.50
CH165	5825 MHz	20.07	19.45	19.75	19.63	19.64	18.67	16.47	15.88

Remark:

1. The data rates of WLAN 802.11a was set in 24Mbps for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signal continuously for all testing.

2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

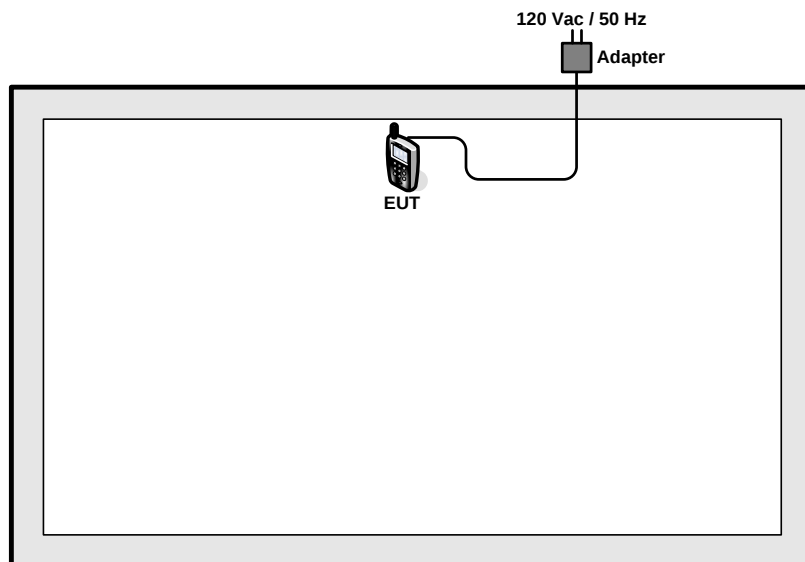
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases and recorded in this report.

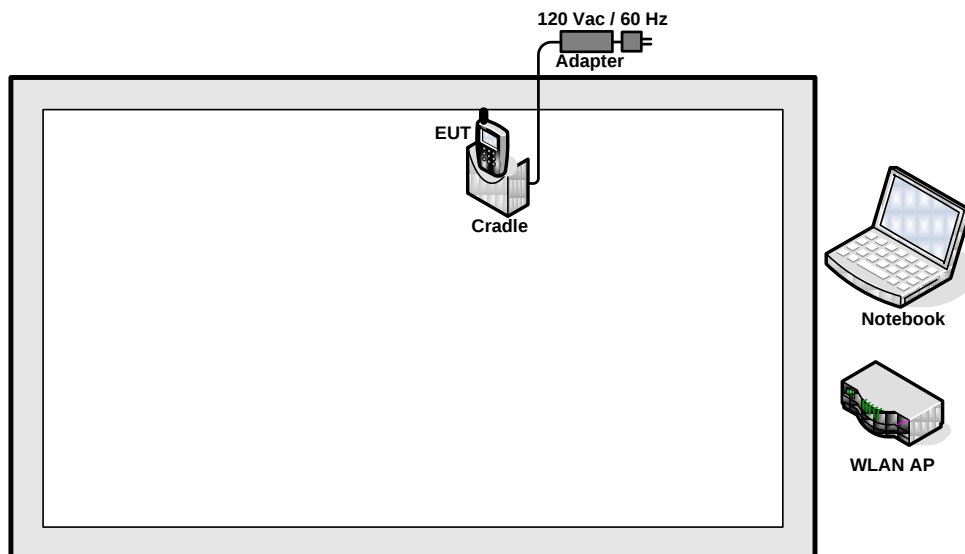
Test Cases	
Test Item	802.11a (Modulation : OFDM)
Conducted TCs	Mode 1: 802.11a_CH149_5745 MHz Mode 2: 802.11a_CH157_5785 MHz Mode 3: 802.11a_CH165_5825 MHz
Radiated TCs	Mode 1: 802.11a_CH149_5745 MHz Mode 2: 802.11a_CH157_5785 MHz Mode 3: 802.11a_CH165_5825 MHz
AC Conducted Emission	Mode 1 :WLAN Link (5G) + Cradle + Adapter 1

2.3 Connection Diagram of Test System

<Radiation Test>



<Conduction Test>



2.4 RF Utility

The programmed RF utility "FCC TEST" is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

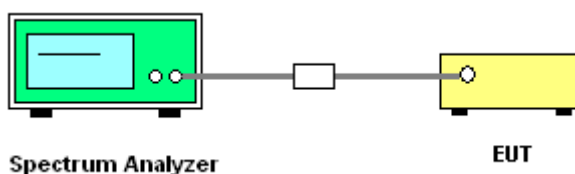
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

3.1.4 Test Setup

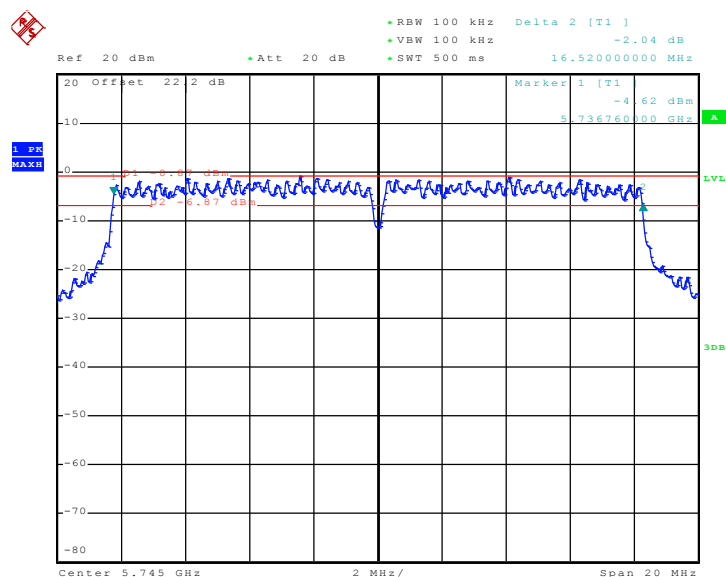


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	26~28℃
Test Engineer :	Ken Hsu	Relative Humidity :	51~54%

Channel	Frequency (MHz)	802.11a 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
149	5745	16.52	0.5	Pass
157	5785	16.48	0.5	Pass
165	5825	16.48	0.5	Pass

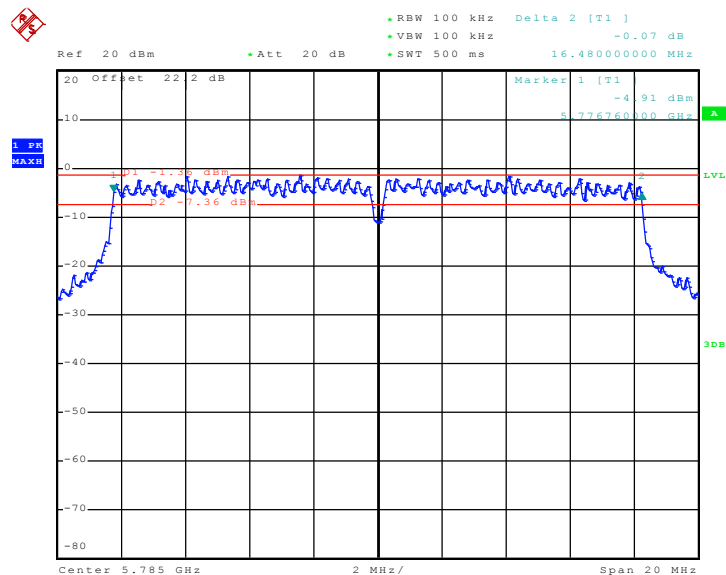
Mode 1: 6 dB Bandwidth Plot on 802.11a Channel 149



Date: 28.FEB.2010 19:18:30

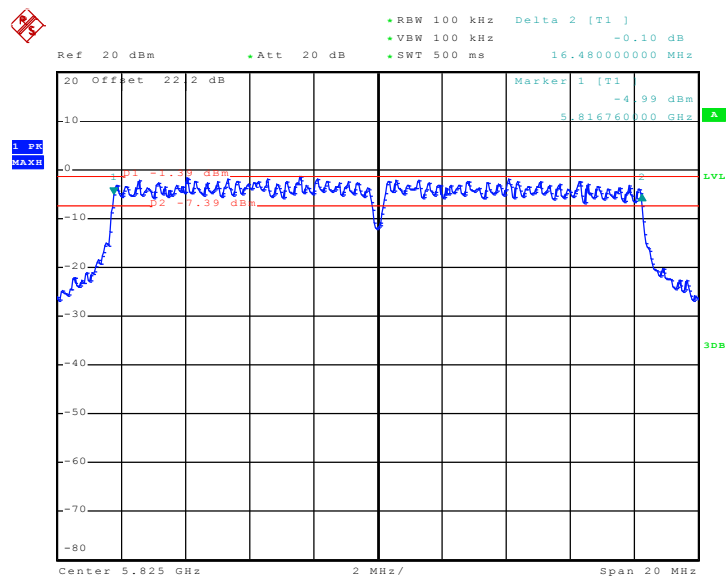


Mode 2: 6 dB Bandwidth Plot on 802.11a Channel 157



Date: 28.FEB.2010 19:19:33

Mode 3: 6 dB Bandwidth Plot on 802.11a Channel 165



Date: 28.FEB.2010 19:20:14

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz and 5725-5850MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

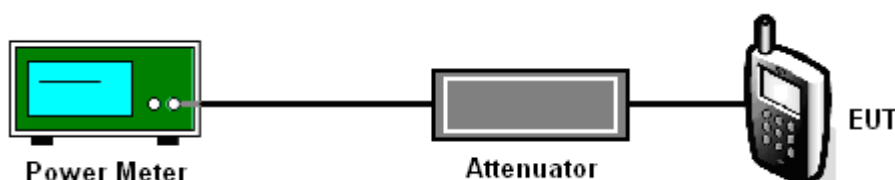
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the power meter by a low loss cable.
3. Measure the power by power meter.

3.2.4 Test Setup



3.2.5 Test Result of Output Power

Test Mode :	Mode 1, 2, 3	Temperature :	26~28°C
Test Engineer :	Ken Hsu	Relative Humidity :	51~54%

Channel	Frequency (MHz)	802.11a Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
149	5745	19.97	30	Pass
157	5785	20.14	30	Pass
165	5825	19.64	30	Pass

3.3 Band Edges Measurement

3.3.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB.

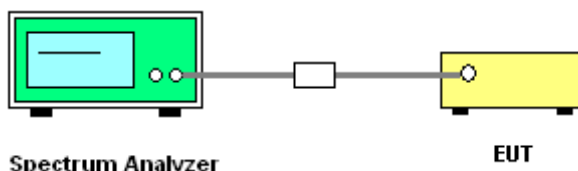
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) > RBW. Band edge emissions must be at least 20 dB below the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the output power of this device was measured by power meter, the attenuation under this paragraph shall be 30 dB instead of 20 dB.

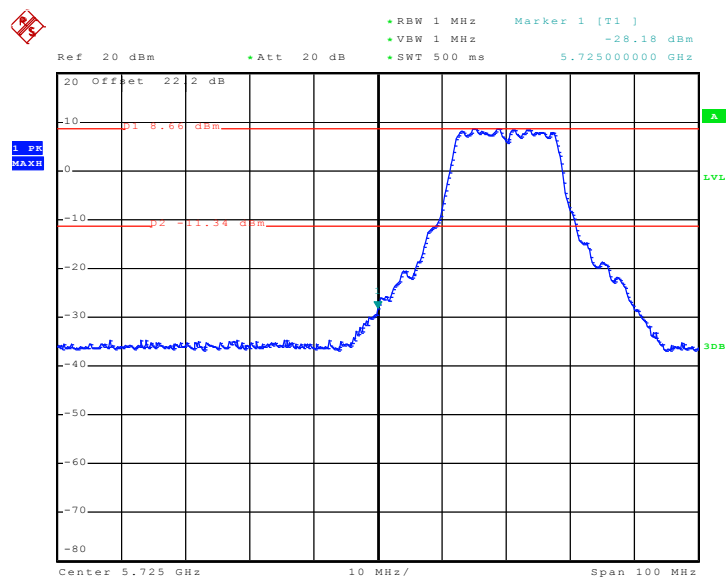
3.3.4 Test Setup



3.3.5 Test Result of Conducted Band Edges

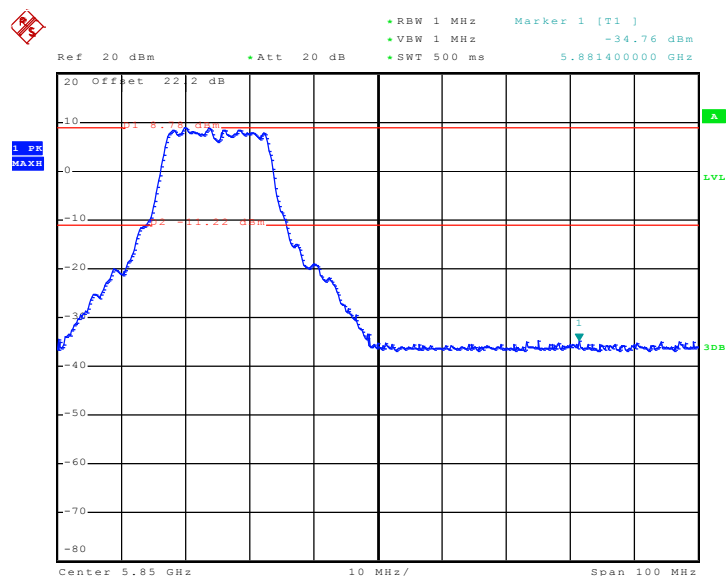
Test Mode :	Mode 1 and 3	Temperature :	26~28°C
Test Band :	802.11a	Relative Humidity :	51~54%
Test Channel :	149 and 165	Test Engineer :	Ken Hsu

Low Band Edge Plot on 802.11a Channel 149



Date: 28.FEB.2010 19:23:15

High Band Edge Plot on 802.11a Channel 165



Date: 28.FEB.2010 19:21:38

3.4 Spurious Emission Measurement

3.4.1 Limit of Spurious Emission Measurement

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

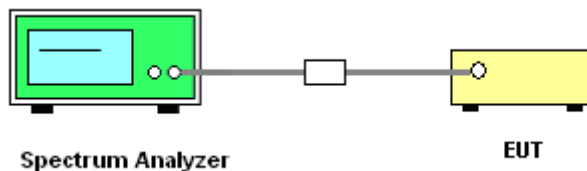
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) $\geq$ RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

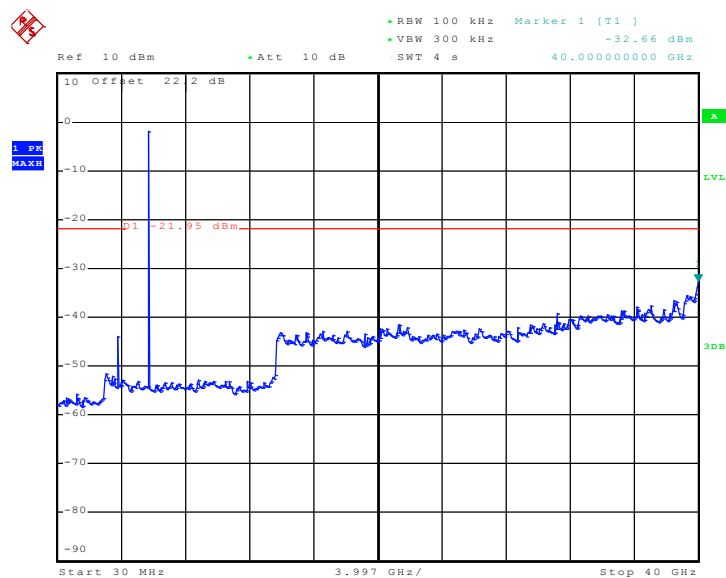
3.4.4 Test Setup



3.4.5 Test Result

Test Mode :	Mode 1	Temperature :	26~28°C
Test Band :	802.11a	Relative Humidity :	51~54%
Test Channel :	149	Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 30 MHz ~ 40 GHz

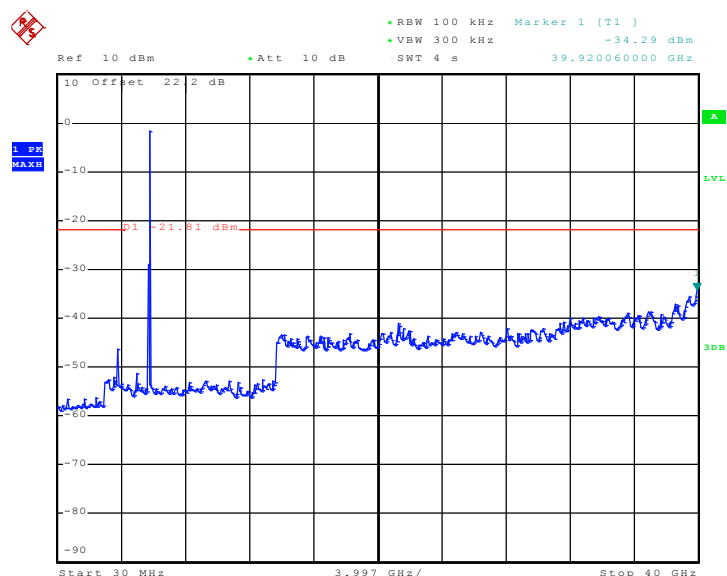


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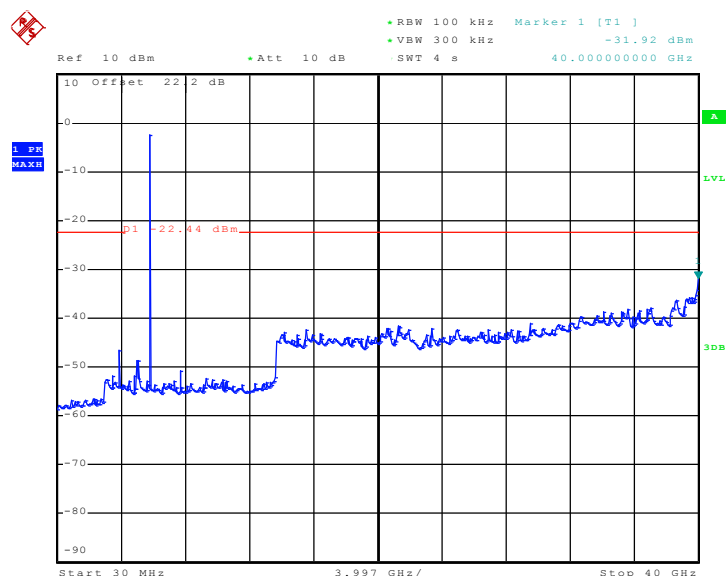
Test Mode :	Mode 2	Temperature :	26~28℃
Test Band :	802.11a	Relative Humidity :	51~54%
Test Channel :	157	Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 30 MHz ~ 40 GHz



Date: 28.FEB.2010 19:31:22

Test Mode :	Mode 3	Temperature :	26~28°C
Test Band :	802.11a	Relative Humidity :	51~54%
Test Channel :	165	Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 30 MHz ~ 40 GHz


Date: 28.FEB.2010 19:32:15

3.5 Power Spectral Density Measurement

3.5.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3 kHz band at any time interval of continuous transmission.

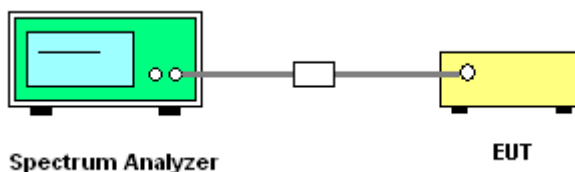
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The test follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Take the measured data from spectrum analyzer.

3.5.4 Test Setup

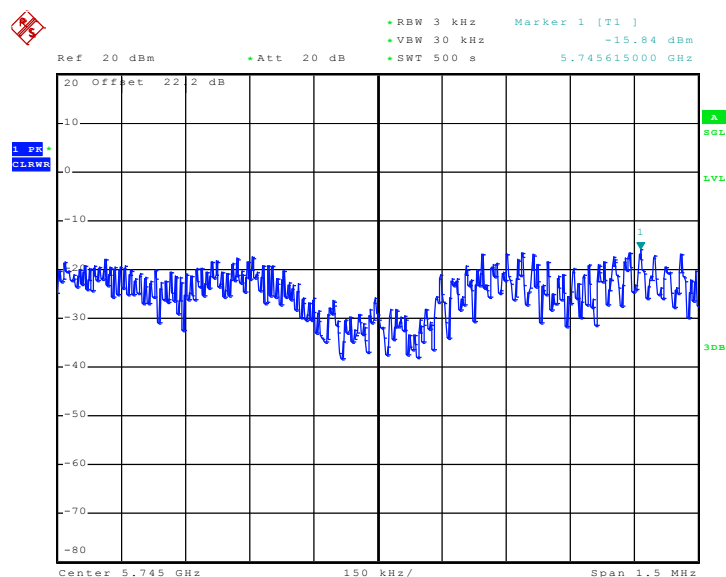


3.5.5 Test Result of Power Spectral Density

Test Mode :	Mode 1, 2, 3	Temperature :	26~28℃
Test Engineer :	Ken Hsu	Relative Humidity :	51~54%

Channel	Frequency (MHz)	802.11a Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
149	5745	-15.84	8	Pass
157	5785	-17.00	8	Pass
165	5825	-17.00	8	Pass

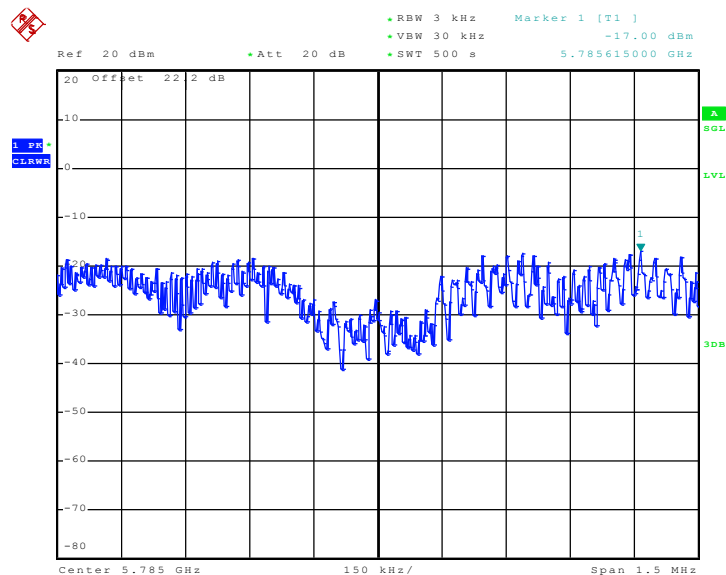
Mode 1 : PSD Plot on 802.11a Channel 149



Date: 28.FEB.2010 20:11:01

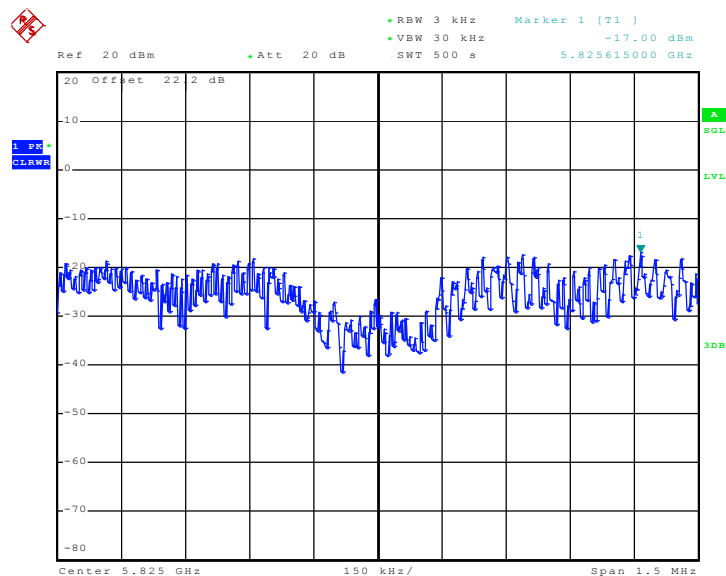


Mode 2 : PSD Plot on 802.11a Channel 157



Date: 28.FEB.2010 20:02:08

Mode 3 : PSD Plot on 802.11a Channel 165



Date: 28.FEB.2010 19:42:31

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

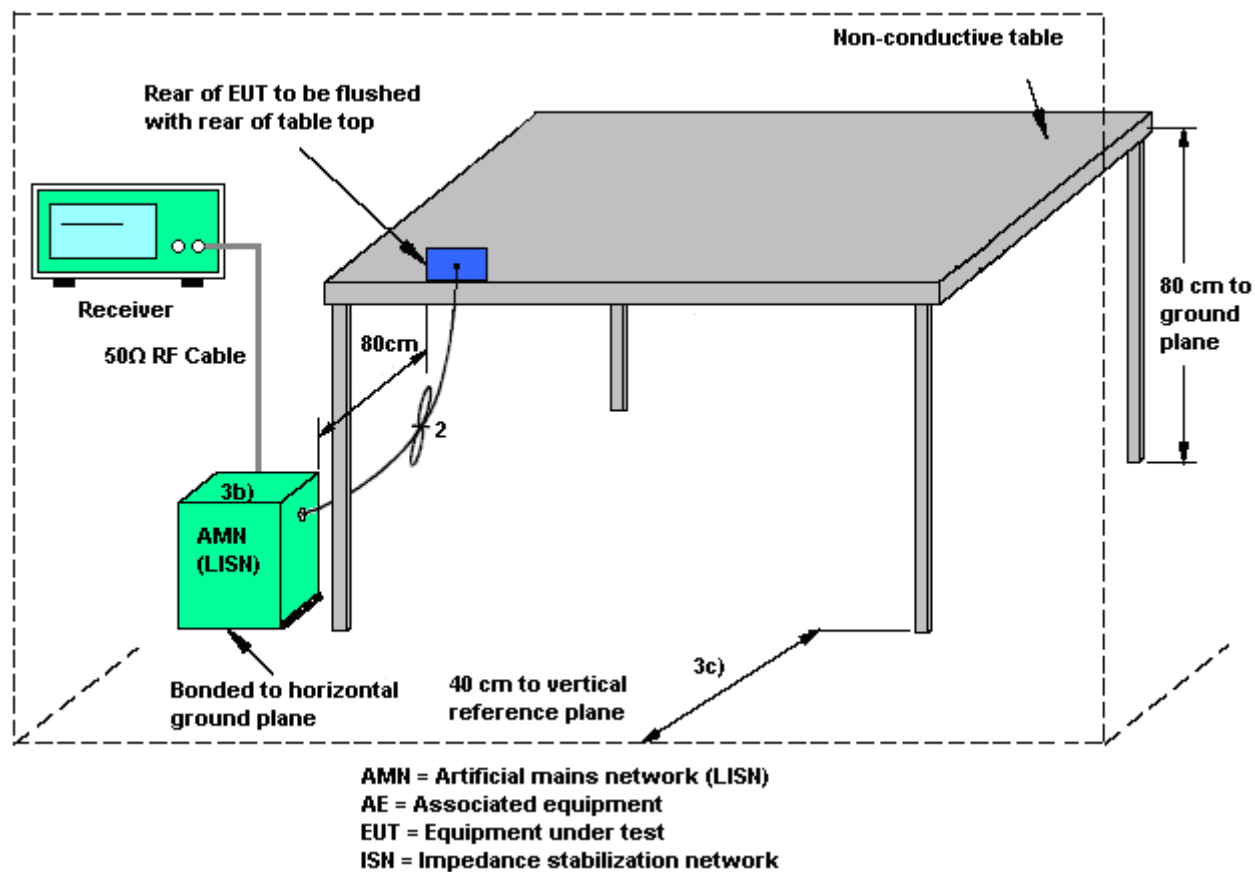
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

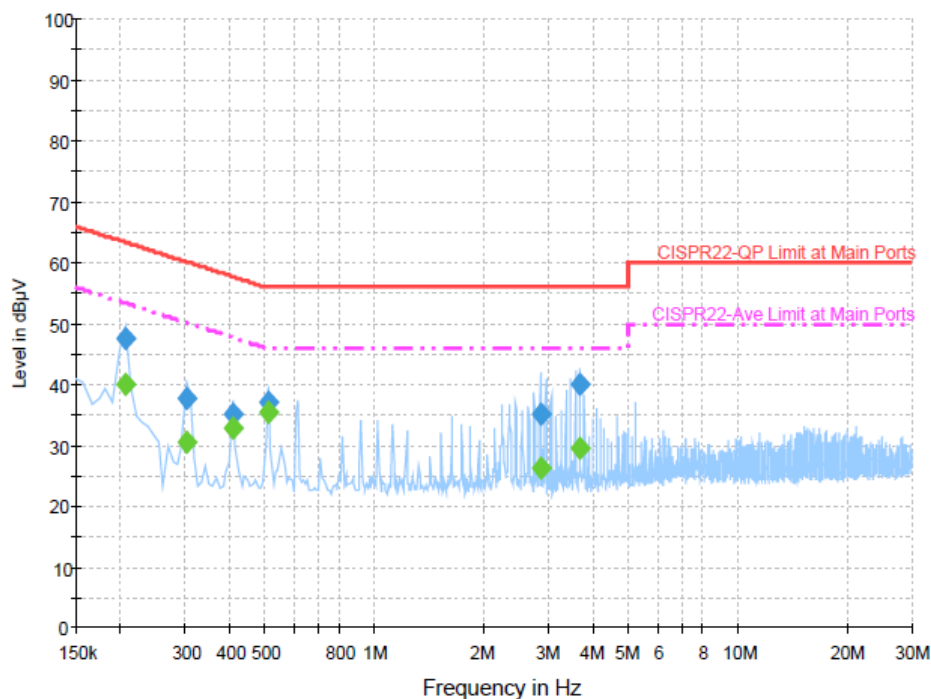
1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link (5G) + Cradle + Adapter 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



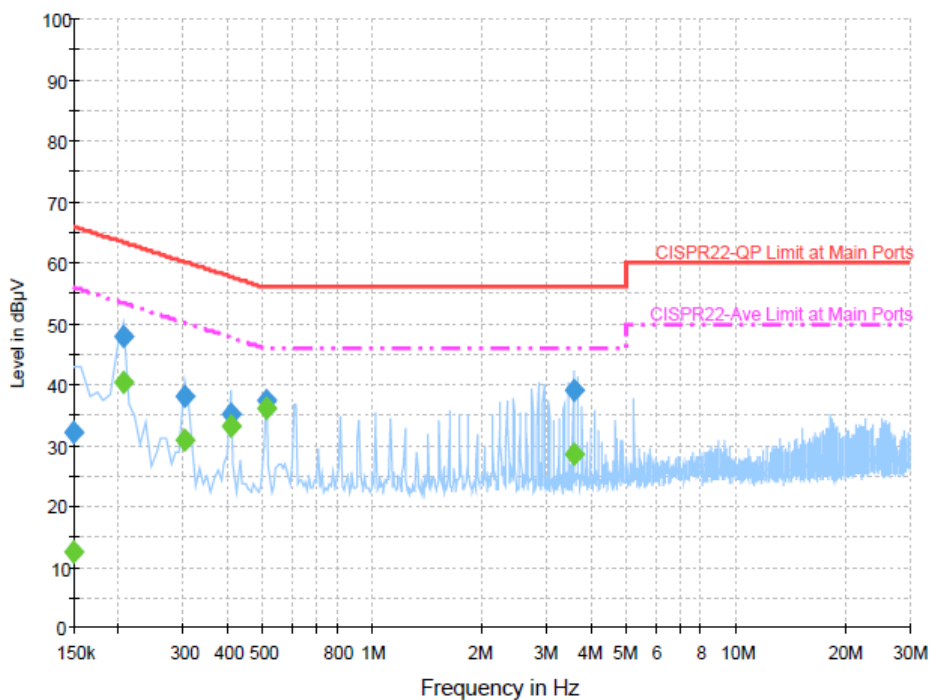
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.206000	47.7	Off	L1	19.6	15.7	63.4
0.302000	37.7	Off	L1	19.5	22.5	60.2
0.406000	35.2	Off	L1	19.4	22.5	57.7
0.510000	37.0	Off	L1	19.4	19.0	56.0
2.846000	35.0	Off	L1	19.5	21.0	56.0
3.662000	39.9	Off	L1	19.5	16.1	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.206000	40.2	Off	L1	19.6	13.2	53.4
0.302000	30.4	Off	L1	19.5	19.8	50.2
0.406000	32.7	Off	L1	19.4	15.0	47.7
0.510000	35.3	Off	L1	19.4	10.7	46.0
2.846000	26.2	Off	L1	19.5	19.8	46.0
3.662000	29.6	Off	L1	19.5	16.4	46.0

Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link (5G) + Cradle + Adapter 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	32.0	Off	N	19.5	34.0	66.0
0.206000	47.8	Off	N	19.5	15.6	63.4
0.302000	37.9	Off	N	19.4	22.3	60.2
0.406000	35.1	Off	N	19.4	22.6	57.7
0.510000	37.5	Off	N	19.4	18.5	56.0
3.558000	39.0	Off	N	19.5	17.0	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	12.5	Off	N	19.5	43.5	56.0
0.206000	40.5	Off	N	19.5	12.9	53.4
0.302000	30.7	Off	N	19.4	19.5	50.2
0.406000	33.2	Off	N	19.4	14.5	47.7
0.510000	35.9	Off	N	19.4	10.1	46.0
3.558000	28.4	Off	N	19.5	17.6	46.0

3.7 Radiated Emission Measurement

3.7.1 Limit of Radiated Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.7.2 Measuring Instruments

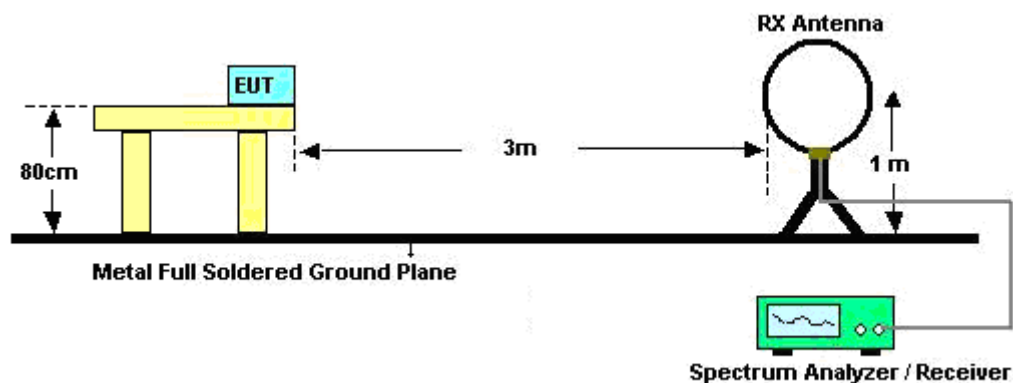
See list of measuring instruments of this test report.

3.7.3 Test Procedures

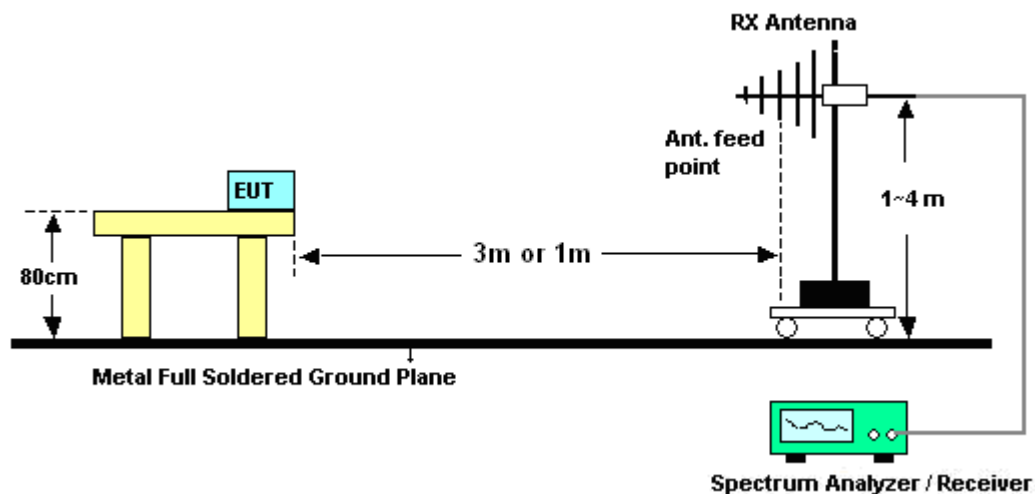
- The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
 - Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB)
- Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.7.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.7.5 Test Results of Radiated Emissions (9kHz ~ 30MHz)

Test Engineer :	Kay Wu	Temperature :	21~22℃	
		Relative Humidity :	42~43%	

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

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

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

3.7.6 Test Result of Radiated Emission (30MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	21~22℃
Test Channel :	149	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	1. 5745 MHz is Fundamental Signals which can be ignored. 2. 17235 MHz is not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
139.89	24.84	-18.66	43.5	43.4	11.7	1.4	31.66	-	-	Peak
162.3	24.77	-18.73	43.5	44.65	10.24	1.52	31.64	-	-	Peak
292.98	32.54	-13.46	46	48.49	13.37	2.09	31.41	100	41	Peak
330.1	29.67	-16.33	46	44.49	14.26	2.26	31.34	-	-	Peak
416.2	31.68	-14.32	46	43.77	16.45	2.64	31.18	-	-	Peak
956.6	27.46	-18.54	46	29.79	24.03	4.28	30.64	-	-	Peak
5745	101.98	-	-	93.03	35.04	8.41	34.5	100	251	Peak
5745	91.98	-	-	83.03	35.04	8.41	34.5	100	251	Average
8398	52.63	-21.37	74	41.62	36	10.11	35.1	100	114	Peak
8398	40.45	-13.55	54	29.44	36	10.11	35.1	100	114	Average
11490	41.26	-32.74	74	75.94	-11.73	11.65	34.6	100	0	Peak
17235	37.87	-44.11	81.98	68.4	-11.11	14.83	34.25	100	0	Peak

Test Mode :	Mode 1	Temperature :	21~22°C
Test Channel :	149	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	1. 5745 MHz is Fundamental Signals which can be ignored. 2. 3478 MHz and 17235 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
86.7	23.79	-16.21	40	46.06	8.36	1.07	31.7	-	-	Peak
136.38	26.84	-16.66	43.5	45.39	11.72	1.39	31.66	-	-	Peak
292.98	32.96	-13.04	46	48.91	13.37	2.09	31.41	100	337	Peak
330.1	31.57	-14.43	46	46.39	14.26	2.26	31.34	-	-	Peak
603.8	31.43	-14.57	46	39.07	20.1	3.26	31	-	-	Peak
956.6	26.93	-19.07	46	29.26	24.03	4.28	30.64	-	-	Peak
3478	55.41	-28.45	83.86	50.59	33	6.41	34.59	100	0	Peak
5028	59.42	-14.58	74	51.51	34.42	7.98	34.49	100	309	Peak
5028	46.08	-7.92	54	38.17	34.42	7.98	34.49	100	309	Average
5745	103.86	-	-	94.91	35.04	8.41	34.5	100	273	Peak
5745	93.02	-	-	84.07	35.04	8.41	34.5	100	273	Average
8340	52.84	-21.16	74	41.87	36	10.07	35.1	100	195	Peak
8340	40.63	-13.37	54	29.66	36	10.07	35.1	100	195	Average
11490	38.14	-35.86	74	72.82	-11.73	11.65	34.6	100	0	Peak
17235	41.93	-41.93	83.86	72.46	-11.11	14.83	34.25	100	0	Peak

Test Mode :	Mode 2	Temperature :	21~22°C
Test Channel :	157	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	1. 5785 MHz is Fundamental Signals which can be ignored. 2. 17355 MHz is not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
140.97	25.04	-18.46	43.5	43.64	11.65	1.41	31.66	-	-	Peak
160.41	25.06	-18.44	43.5	44.81	10.38	1.51	31.64	-	-	Peak
292.98	31.79	-14.21	46	47.74	13.37	2.09	31.41	-	-	Peak
330.1	29.94	-16.06	46	44.76	14.26	2.26	31.34	-	-	Peak
416.2	34.46	-11.54	46	46.55	16.45	2.64	31.18	100	199	Peak
953.8	26.48	-19.52	46	28.87	23.99	4.27	30.65	-	-	Peak
5785	101.49	-	-	92.5	35.09	8.42	34.52	100	241	Peak
5785	92.25	-	-	83.26	35.09	8.42	34.52	100	241	Average
8404	53.06	-20.94	74	42.04	36	10.12	35.1	100	114	Peak
8404	40.46	-13.54	54	29.44	36	10.12	35.1	100	114	Average
11570	39.51	-34.49	74	73.99	-11.54	11.68	34.62	100	0	Peak
17355	37.23	-44.26	81.49	68.03	-11.57	15	34.23	100	0	Peak

Test Mode :	Mode 2	Temperature :	21~22℃
Test Channel :	157	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	1. 5785 MHz is Fundamental Signals which can be ignored. 2. 3478 MHz and 17355 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
53.22	23.55	-16.45	40	47.04	7.36	0.85	31.7	-	-	Peak
137.73	26.8	-16.7	43.5	45.36	11.71	1.39	31.66	-	-	Peak
292.98	33.38	-12.62	46	49.33	13.37	2.09	31.41	100	285	Peak
330.1	32.67	-13.33	46	47.49	14.26	2.26	31.34	-	-	Peak
603.8	31.71	-14.29	46	39.35	20.1	3.26	31	-	-	Peak
887.3	26.15	-19.85	46	29.68	23.06	4.11	30.7	-	-	Peak
3478	60.89	-21.74	82.63	56.07	33	6.41	34.59	100	0	Peak
5060	55.49	-18.51	74	47.54	34.44	8	34.49	100	133	Peak
5060	44.29	-9.71	54	36.34	34.44	8	34.49	100	133	Average
5785	102.63	-	-	93.64	35.09	8.42	34.52	100	133	Peak
5785	92.68	-	-	83.69	35.09	8.42	34.52	100	133	Average
8438	52.52	-21.48	74	41.48	36	10.14	35.1	100	176	Peak
8438	40.15	-13.85	54	29.11	36	10.14	35.1	100	176	Average
11570	37.88	-36.12	74	72.27	-11.45	11.69	34.63	100	0	Peak
17355	43.1	-39.53	82.63	73.9	-11.57	15	34.23	100	0	Peak

Test Mode :	Mode 3	Temperature :	21~22°C
Test Channel :	165	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	1. 5825 MHz is Fundamental Signals which can be ignored. 2. 17475 MHz is not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
138.81	24.32	-19.18	43.5	42.87	11.71	1.4	31.66	-	-	Peak
161.22	24.65	-18.85	43.5	44.47	10.31	1.51	31.64	-	-	Peak
292.98	32.54	-13.46	46	48.49	13.37	2.09	31.41	-	-	Peak
330.1	29.99	-16.01	46	44.81	14.26	2.26	31.34	-	-	Peak
416.2	32.94	-13.06	46	45.03	16.45	2.64	31.18	100	337	Peak
623.4	25.78	-20.22	46	33.18	20.25	3.33	30.98	-	-	Peak
5825	102.41	-	-	93.35	35.16	8.43	34.53	102	240	Peak
5825	91.85	-	-	82.79	35.16	8.43	34.53	102	240	Average
8316	52.46	-21.54	74	41.51	36	10.05	35.1	100	99	Peak
8316	40.39	-13.61	54	29.44	36	10.05	35.1	100	99	Average
11650	40	-34	74	74.06	-11.14	11.74	34.66	100	0	Peak
17475	37.12	-45.29	82.41	68.23	-12.07	15.17	34.21	100	0	Peak

Test Mode :	Mode 3	Temperature :	21~22
Test Channel :	165	Relative Humidity :	42~43
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	1. 5825 MHz is Fundamental Signals which can be ignored. 2. 3478 MHz and 17475 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
86.7	24.13	-15.87	40	46.4	8.36	1.07	31.7	-	-	Peak
143.13	26.63	-16.87	43.5	45.34	11.52	1.43	31.66	-	-	Peak
292.98	32.86	-13.14	46	48.81	13.37	2.09	31.41	100	196	Peak
330.1	31.94	-14.06	46	46.76	14.26	2.26	31.34	-	-	Peak
603.8	31.65	-14.35	46	39.29	20.1	3.26	31	-	-	Peak
623.4	31.81	-14.19	46	39.21	20.25	3.33	30.98	-	-	Peak
3478	55.26	-28.04	83.3	50.44	33	6.41	34.59	100	0	Peak
5028	57.2	-16.8	74	49.29	34.42	7.98	34.49	100	59	Peak
5028	47.47	-6.53	54	39.56	34.42	7.98	34.49	100	59	Average
5825	103.3	-	-	94.24	35.16	8.43	34.53	102	335	Peak
5825	93.95	-	-	84.89	35.16	8.43	34.53	102	335	Average
8462	52.8	-21.2	74	41.74	36	10.16	35.1	100	87	Peak
8462	40.22	-13.78	54	29.16	36	10.16	35.1	100	87	Average
11650	38.66	-35.34	74	72.72	-11.14	11.74	34.66	100	0	Peak
17475	41.71	-41.59	83.3	72.82	-12.07	15.17	34.21	100	0	Peak

3.8 Antenna Requirements

3.8.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.8.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.8.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 23, 2009	Jun. 22, 2010	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 17, 2009	Sep. 16, 2010	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 10, 2009	Sep. 09, 2010	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Aug. 05, 2009	Aug. 04, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 04, 2009	Dec. 03, 2010	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 20, 2009	Aug. 19, 2010	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec.09,2009	Dec. 08, 2010	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2009	Mar. 26, 2010	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 KHz~30 MHz	May 22, 2008	May 21, 2010	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54		

Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

Please refer to Sporton report number EP912101-03 as below.

Appendix C. Change Note

Denso Wave Incorporated

1, Yoshiike, Kusaki, Agui-cho, Chita-gun, Aichi, 470-2297 Japan
Tel: 81 569 49 5246 ; Fax: 81 569 49 5488

Federal Communications Commission
Authorization and Evaluation Division
1435 Oakland Mills Road
Columbia, MD 21046

SUBJECT: Class II Permissive Change for FCC ID: PZWBHT710BWB

The product, Bar Code Handy Terminal, has been granted by FCC dated 03/31/2009,
FCC ID: PZWBHT710BWB.

Now we, Denso Wave Incorporated, would like to modify the authorized equipment
for enabling frequency bands by software control, which could be refer to below
information:

1. 5150 MHz ~ 5250 MHz
2. 5250 MHz ~ 5350 MHz
3. 5470 MHz ~ 5725 MHz
4. 5725 MHz ~ 5850 MHz

We would like to certify the additional of certified FCC ID: PZWBHT710BWB as a
Class II Permissive Change in this device.



Contact Person: Toshiaki Hotta



Appendix D. Original Report

Please refer to Sporton report number FR912101A as below.