TEST REPORT For FCC

Test Report No.	: TK-FR9013
Date of Issue	: 09/08/2009
Description of Product	: Wireless Full HD Sender
Model No.	: HD-W100TB , HD-W100TW
Applicant	: **I DO IT CO.,LTD.** 1308 WOOLIM LIONS 2ND,680, Gasan-dong, Geumcheon-gu,Seoul ,Korea
Manufacturer	: **I DO IT CO.,LTD.** 1308 WOOLIM LIONS 2ND,680, Gasan-ding, Geumcheon-gu,Seoul ,Korea
Standards	: FCC Part 15 Subpart E §15.407
Test Date	: 09/10/2009 ~ 09/22/2009
Test Results	: ☒ PASS ☐ FAIL

The test results relate only to the items tested.

Tested by:
Kyu-Chul Shin
Test Engineer
Date:09/22/2009

Reviewed by:
KT Kang
Technical Manager
Date: 09/22/2009

THRU-KES CO.,LTD.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun Kyunggi-Do,469-803, Korea
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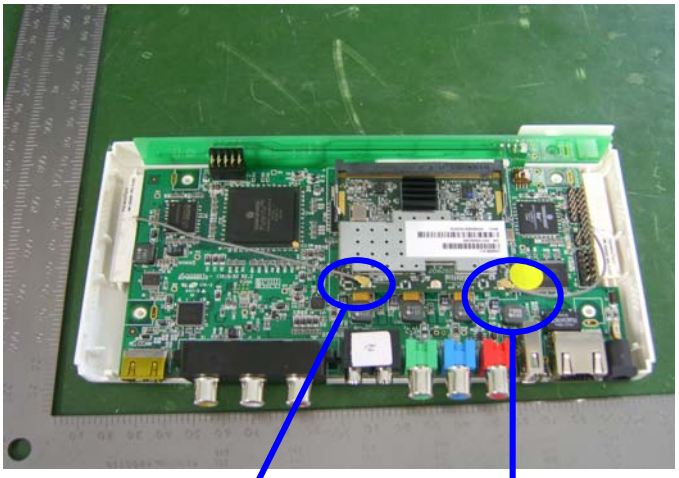
1.0 General Product Description

Equipment model name	: HD-W100TB and HD-W100TW
Serial number	: Prototype
EUT condition	: Pre-production, not damaged
Antenna type	: Dipole antenna Gain 0.667dBi
Frequency Range	: 5150MHz ~ 5250MHz(OFDM)
RF output power	: 13.58 dBm Peak Conducted (40MHz)
Number of channels	: 2
Channel Spacing	: 40 MHz
Transfer Rate	: 270Mbps
Type of Modulation	: 64-QAM for OFDM
Power Source	: DC 12V



1.1 Tested Frequency

	38ch	46ch
Frequency (MHz)	5190	5230

1.2 Model Differences

HD-W100TB and HD-W100TW are equal except color of case.

HD-W100TB : The case of black color

HD-W100TW : The case of white color

1.3 Device Modifications

The following modifications were necessary for compliance:
Not applicable

1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
EUT	I DO IT CO., LTD.	HD-W100TB	-	-
Notebook	F U J I T S U L T D	LIFEBOOK S-5582	434230343466	DoC

1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

THRU-KES Co.,Ltd. (Test Site # : 343818)
477-6, Hager-Ri, Yoju-Up, Yoju-Gun Kyunggi-Do,469-803, Korea

2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Status (note 1)
15.407(a)	26dB Spectrum Bandwidth	-	C
15.407(a)	Maximum Conducted Output Power	< 50mW	C
15.407(a)	Power Spectral Density	> 4 dBm	C
15.407(a)	Peak Excursion	> 13 dB	C
15.407(b)	Radiated Emissions	< -27dBm @ EIRP	C
15.407(g)	Frequency Stability	20ppm	C
15.207	AC Power Line Conducted Emissions	EN 55022	C

The sample was tested according to the following specification:
- FCC Part 15.407

2.1 Technical Characteristic Test

2.1.1 26dB Bandwidth - 15.407(a)

Procedure:

1. The transmitted output (antenna port) was connected to the spectrum analyzer in peak hold mode
2. The resolution bandwidth of 300kHz and the video bandwidth of 1000kHz were used
3. Measured the spectrum width with power higher than 26dB below carrier
4. Measuring multiple antenna, the connector is required to link with spectrum analyzer through a combiner

The spectrum analyzer is set to:

Center frequency = 38ch , 46ch

RBW = 300 kHz

VBW = 1000 kHz

Trace = max hold

Span = >26dB Bandwidth

Sweep = auto

Detector function = peak

-26dB Bandwidth

Configuration Draft n Ant. A-1+A-2

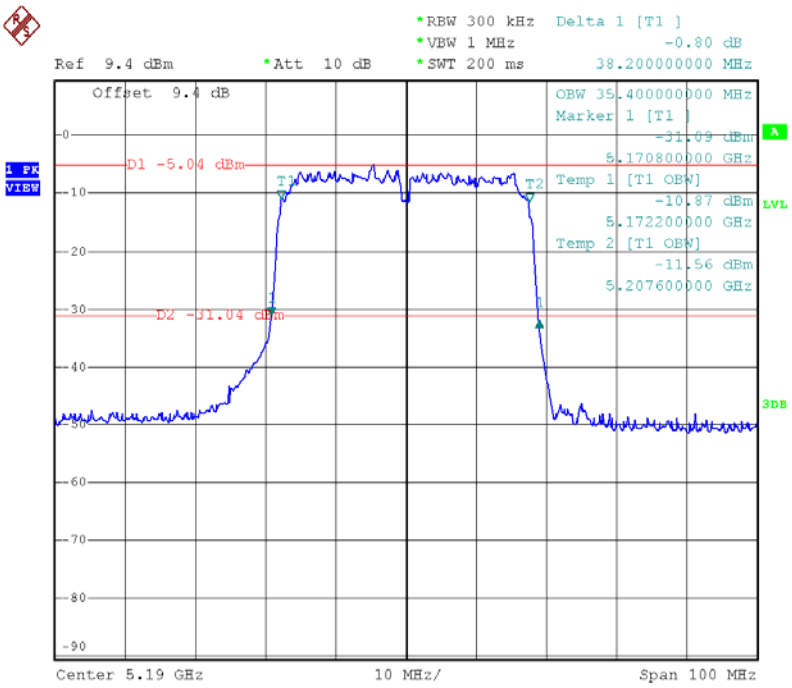
Mode	Frequency (MHz)	Channel No.	Test Results	
			26dB Bandwidth (MHz)	99% Occupied Bandwidth(MHz)
n Mode	5190	38	38.20	35.40
	5230	46	38.20	35.20

- See next pages for actual measured spectrum plots.

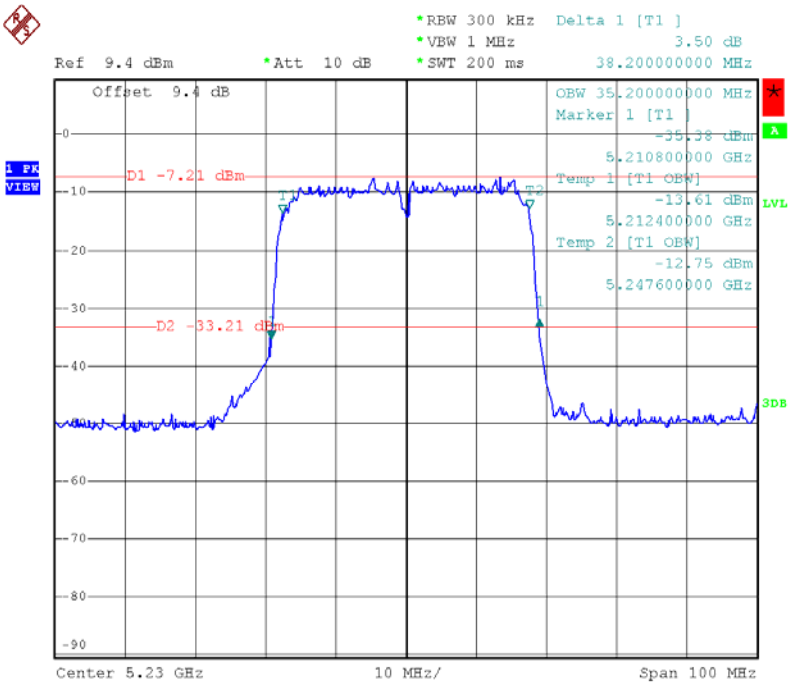
Limit:

No restriction limits.

26dB Bandwidth Plot on Configuration Draft n 40MHz ANT. A-1+A-2/5190MHz



26dB Bandwidth Plot on Configuration Draft n 40MHz ANT. A-1+A-2/5230MHz



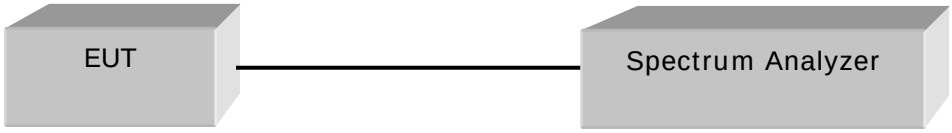
2.1.2 Maximum peak Conducted Output Power-15.407(a)

Test Location

RF Test Room

Procedures

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Test Results

Configuration Draft n 40MHz ANT. A-1

Frequency (MHz)	Channel No.	Peak output power(dBm)	Limit	Result
5190	38	6.99	17dBm(50mW)	Complies
5230	46	5.76	17dBm(50mW)	Complies

Configuration Draft n 40MHz ANT. A-2

Frequency (MHz)	Channel No.	Peak output power(dBm)	Limit	Result
5190	38	7.97	17dBm(50mW)	Complies
5230	46	6.20	17dBm(50mW)	Complies

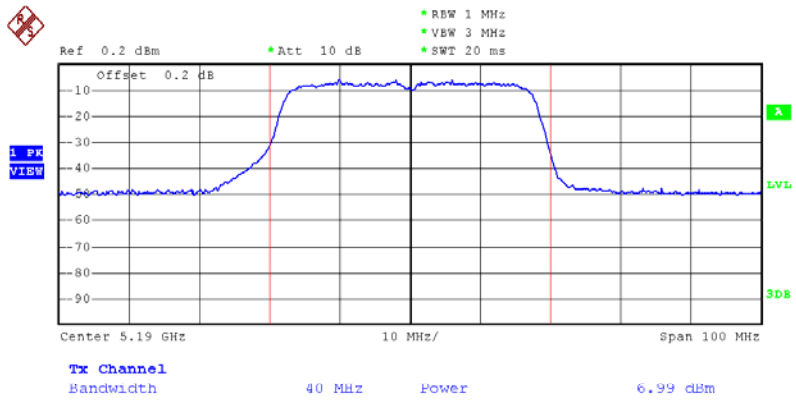
Configuration Draft n 40MHz ANT. A-1+A-2

Frequency (MHz)	Channel No.	Peak output power(dBm)	Limit	Result
5190	38	13.26	17dBm(50mW)	Complies
5230	46	13.58	17dBm(50mW)	Complies

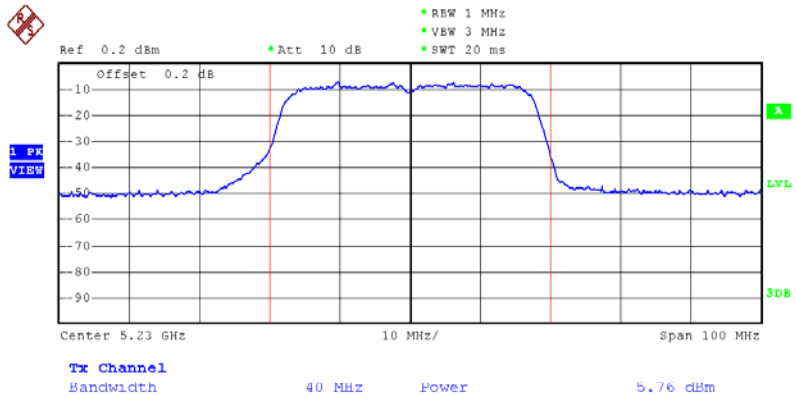
See next pages for actual measured spectrum plots.

Limit : < 17dBm

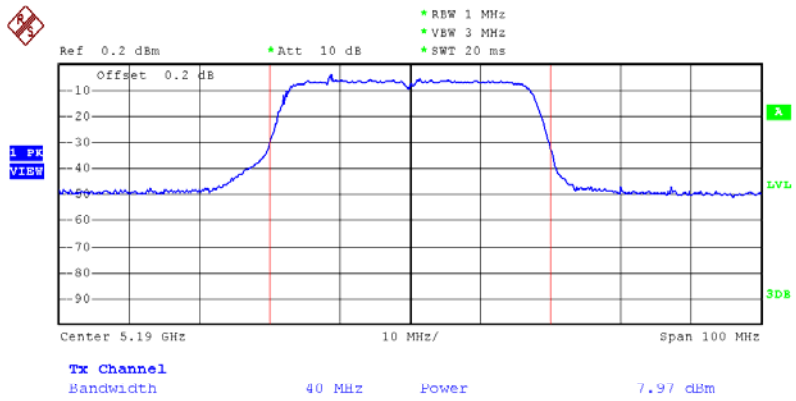
Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-1/5190



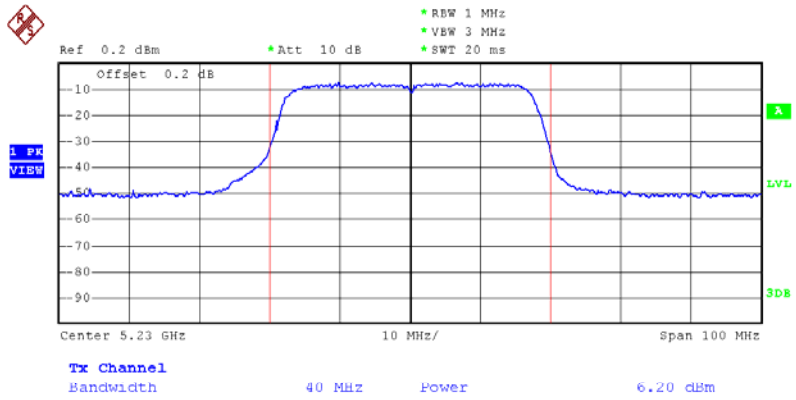
Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-1/5230



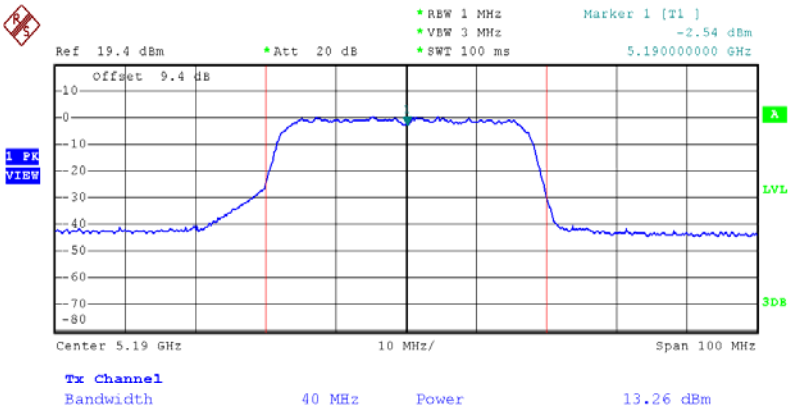
Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-2/5190



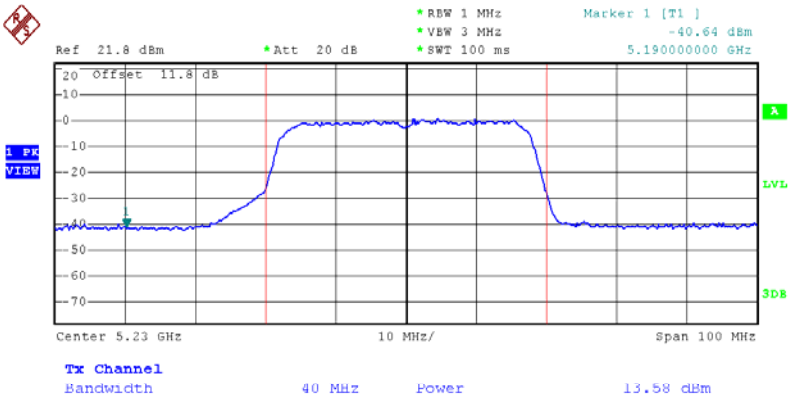
Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-2/5230



Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-1+A2/5190



Peak Conducted Output Power Plot on Configuration Draft n 40MHz ANT. A-1+A2/5230



2.1.3 Power Spectral Density-15.407(a)

Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 1000 kHz VBW = 3000kHz

Sweep = Auto Span = 60 MHz

Detector function = Sample Trace = Average

Measurement Data:

Configuration Draft n 40MHz ANT. A-1+A2

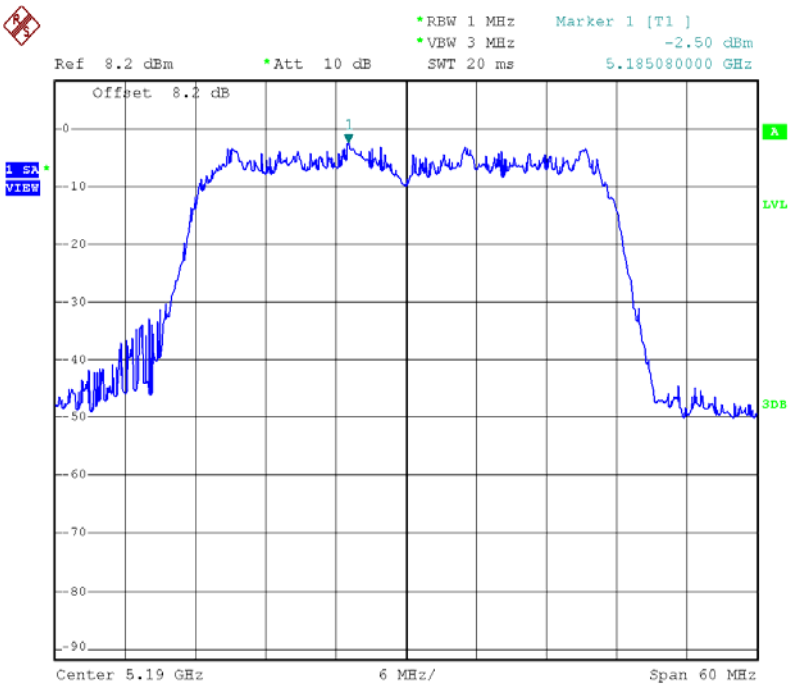
Mode	Frequency (MHz)	Ch.	Test Results	
			dBm	Result
n Mode	5190	38	-2.50	Complies
	5230	46	-5.61	Complies

Limit:

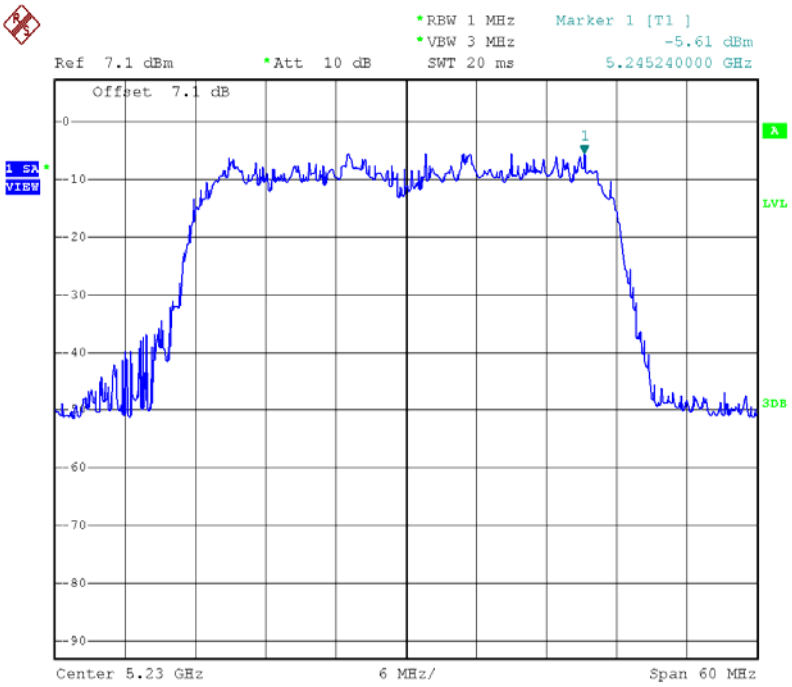
Power Spectral Density	< 4dBm

See next pages for actual measured spectrum plots.

Power Density Plot on Configuration Draft n 40MHz ANT. A-1+A2/5190



Power Density Plot on Configuration Draft n 40MHz ANT. A-1+A2/5230



2.1.4 Peak Excursion Measurement -15.407(a)

Procedure:

1. The transmitter Output(antenna port) was connected to the spectrum analyzer
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace : Set RBW=1MHz, VBW≥3MHz with peak detector and max-hold settings
4. Average Trace: Method #3-vido averaging with max hold and sum power across the band. Set span to encompass the entire emissions bandwidth[EBW] of the signal. Set sweep trigger to 'free run'. Set RBW=1MHz. Set VBW ≥ 1/T(Draft n VBW=300kHz ≥1/4㎲). Use sample detector mode if bin width(i.e.,span/number of points in spectrum) <0.5RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.
5. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner

The spectrum analyzer is set to:

RBW = 1000 kHz(Peak Trace) / 1000kHz(Average Trace)

VBW = 3000 kHz(Peak Trace) / 300kHz(Average Trace)

Detector function = Peak (Peak Trace) / Sample (Average Trace)

Trace = Max hold

Sweep = 60s

Span Frequency = Encompass the entire emissions bandwidth (EBW) of the signal

Measurement Data:

Configuration Draft n 40MHz ANT. A-1+A2

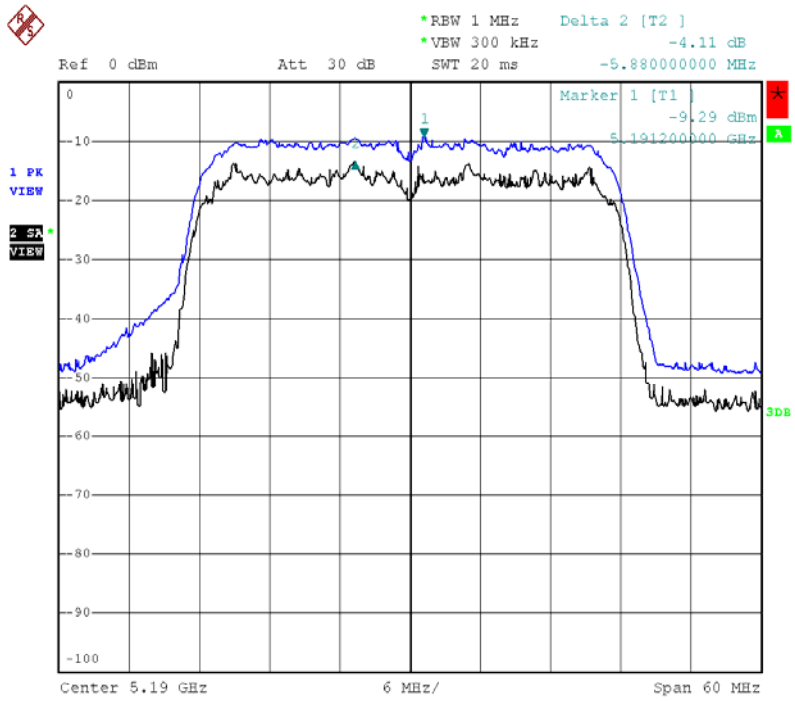
Mode	Frequency (MHz)	Ch.	Test Results	
			dB	Result
n Mode	5190	38	5.18	Complies
	5230	46	6.93	Complies

Limit

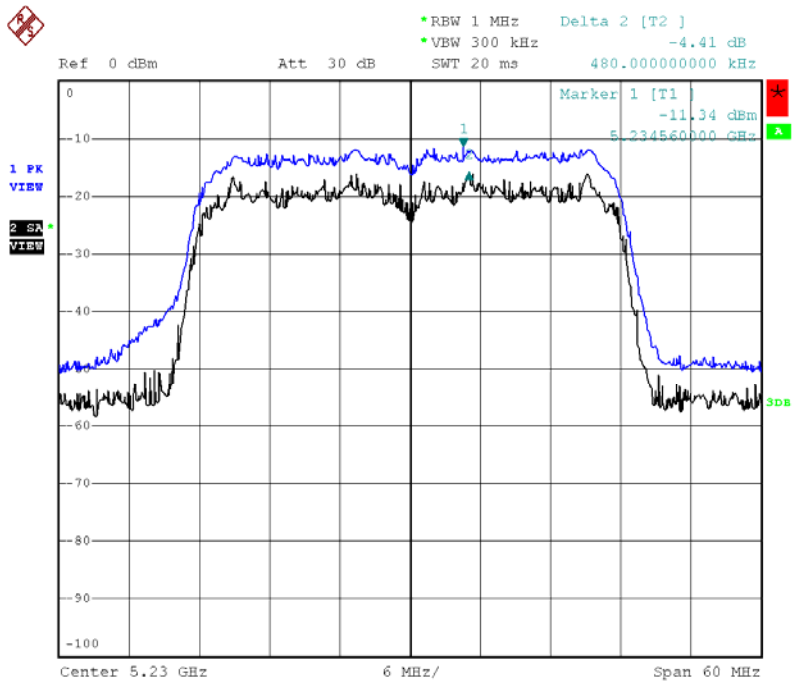
Peak Excursion:	13dB

See next pages for actual measured spectrum plots.

Peak Excursion Plot on Configuration Draft n 40MHz ANT. A-1+A2/5190



Peak Excursion Plot on Configuration Draft n 40MHz ANT. A-1+A2/5230



2.1.5 Radiated Emissions Measurement

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Below 1GHz :

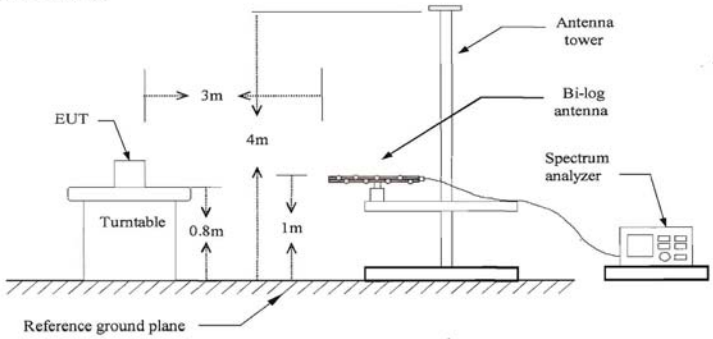
RBW=100KHz/VBW=300KHz/Sweep=AUTO

Above 1GHz:

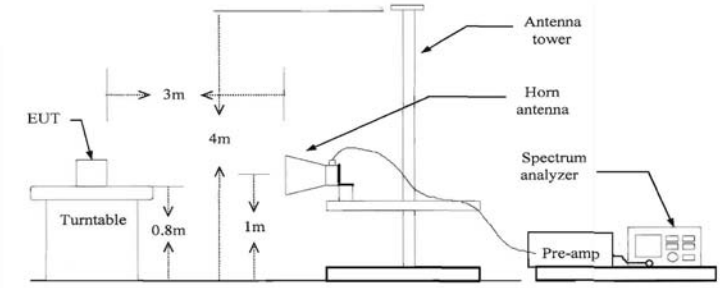
(a) PEAK:RBW=VBW=1MHz/Sweep=AUTO

(b) AVERAGE:RBW=1MHz/VBW=10Hz/Sweep=AUTO

Below 1 GHz



Above 1 GHz



Note : The amplitudes of spurious emissions that are attenuated more than 20dB below the limit have not been reported

Limit

-15.407(b) (1)

For transmitters operating in the 5.15~5.35 GHz band: all emissions outside of the 5.15 ~ 5.35GHz band shall not exceed an EIRP of -27dBm/MHz [80 dBuV/m@3m]

- **15.209(a),15.205**

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Test Results

EUT	Wireless Full HD Sender	Measurement Detail	
Model	HD-W100TB	Frequency Range	Below 1000MHz
Channel	-	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
467.2	44.3	-1.7	Quasi-Peak

Test Data

No	Emission Frequency (MHz)	Meter Reading dBuV/m	Ant. Polaritr y	Correction Factor dB	Cable Loss dB	Field Strengt h (dBuv/m	Margin (dBuv)	Limit (dBuv/m)
1	47.80	20.6	V	13.4	3.6	37.6	-2.4	40.0
2	125.00	25.0	V	12.5	2.4	40.0	-3.5	43.5
3	200.10	24.6	H	9.9	2.9	37.4	-6.1	43.5
4	467.20	24.1	H	16.1	4.1	44.3	-1.7	46.0
5	480.60	23.1	H	16.3	4.1	43.5	-2.5	46.0
6	500.60	20.2	V	16.5	4.1	40.8	-5.2	46.0
7	528.60	14.8	H	17.0	4.2	35.9	-10.1	46.0
8	743.40	19.0	H	20.2	5.0	44.2	-1.8	46.0
9	751.00	18.2	V	20.3	5.0	43.5	-2.5	46.0
10	793.00	12.2	H	20.7	5.2	38.1	-7.9	46.0
11	867.80	17.2	V	21.3	5.5	43.9	-2.1	46.0
12	892.10	12.7	V	21.6	5.6	39.8	-6.2	46.0
13	921.40	9.6	V	21.9	5.6	37.1	-8.9	46.0
14	921.80	10.9	V	21.9	5.6	38.4	-7.6	46.0

Test Results

EUT	Wireless Full HD Sender	Measurement Detail	
Model	HD-W100TB	Frequency Range	1-40GHz
Channel	36	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data – Configuration Draft n 40MHz ANT. A-1

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Test Data – Configuration Draft n 40MHz ANT. A-2

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Restricted band edge test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]
				Antenna	Amp. Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Test Results

EUT	Wireless Full HD Sender	Measurement Detail	
Model	HD-W100TB	Frequency Range	1-40GHz
Channel	48	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data – Configuration Draft n 40MHz ANT. A-1

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Test Data – Configuration Draft n 40MHz ANT. A-2

Frequency [MHz]	Reading A/P [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits/ Detector A/P [dBuV/m]	Result A/P [dBuV/m]
				Antenna	Amp.Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Restricted band edge test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]
				Antenna	Amp. Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

2.1.6 Frequency Stability Measurement 15.407(g)

Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and max hold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (Draft n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -30°C~50°C. 8. Measuring multiple antennas, the connector is required to link with spectrum analyser through a combiner

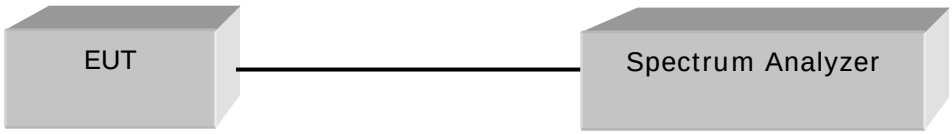
The spectrum analyzer is set to:

RBW /VBW= 10kHz

Span = Entire absence of modulation emissions bandwidth

Sweep = auto

Test Setup Layout



Measurement Data:

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(℃)	5190
-10	5189.997205
0	5189.989194
10	5189.981445
20	5189.963505
30	5189.945000
40	5189.933096
50	5189.929886
+15% voltage	5189.932870
-15% voltage	5189.932423
Max. Deviation (MHz)	0.070114
Max. Deviation (ppm)	13.51

Limit : 20ppm

2.1.8 AC Conducted Emissions 15.207

Test Location
Shielded Room

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- **15.207(a)**

Frequency (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.

Test Results
The requirements are:

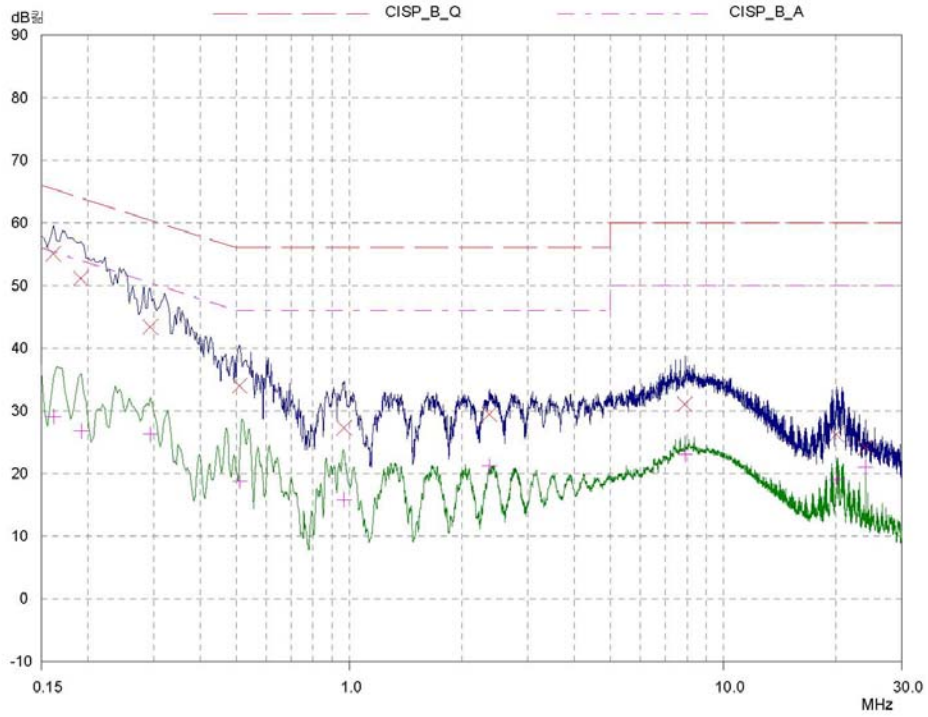
☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.162	55.26	9.74	Quasi-peak

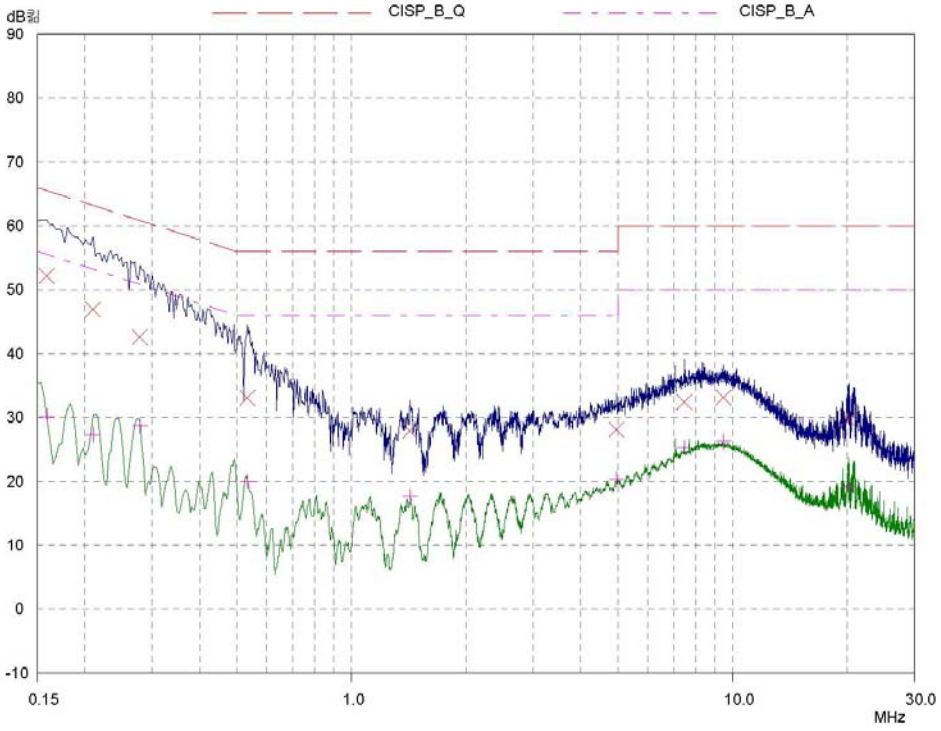
Test Data

측정주파수	보정 계수		극성	준첨두값			평균값		
[MHz]	LISN	케이블		제한값	측정값	결과값	제한값	측정값	결과값
0.159	0.11	0.14	N	66	52.19	52.45	56	30.20	30.46
0.162	0.07	0.15	H	65	55.04	55.26	55	29.10	29.32
0.192	0.05	0.19	H	64	51.11	51.36	54	26.83	27.08
0.210	0.09	0.17	N	63	46.91	47.17	53	27.30	27.56
0.279	0.07	0.11	N	61	42.59	42.78	51	28.67	28.86
0.294	0.06	0.10	H	60	43.41	43.57	50	26.27	26.43
0.510	0.05	0.10	H	56	33.94	34.09	46	18.75	18.90
0.534	0.05	0.10	N	56	30.09	30.24	46	19.97	20.12
0.969	0.06	0.08	H	56	27.27	27.41	46	15.79	15.93
1.425	0.06	0.03	N	56	27.89	27.99	46	17.59	17.69
2.370	0.07	0.06	H	56	29.46	29.59	46	21.19	21.32
4.962	0.12	0.10	N	56	28.11	28.33	46	20.31	20.53
7.473	0.20	0.10	N	60	32.39	32.69	50	25.28	25.58
7.905	0.21	0.10	H	60	31.06	31.37	50	23.03	23.34
9.471	0.33	0.07	N	60	33.09	33.49	50	26.23	26.63
20.100	0.85	0.17	H	60	26.24	27.26	50	18.94	19.96
20.190	0.87	0.16	N	60	29.67	30.70	50	19.20	20.23
24.006	1.01	0.12	H	60	24.12	25.25	50	21.01	22.14

[HOT]



[NEUTRAL]



APPENDIX A – Test Equipment Used For Tests

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.
1	Test Receiver	Rohde &	ESHS 10	862970/018	2010.06.11
2	Test Receiver	Rohde &	ESVS 10	826008/014	2010.05.20
3	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2010.05.15
4	Spectrum Analyzer	Rohde &	FSP13	100130	2010.05.15
5	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2010.05.15
6	Audio analyzer	Hewlett Packard	8903B	3011A12915	2010.05.15
7	Preamplifer	Hewlett Packard	8447F	2805A02570	2010.05.15
8	Preamplifer	A.H. Systems	PAM-0118	164	2010.04.17
9	Signal Generator	Hewlett Packard	8673D	2708A00448	2010.05.15
10	Power Meter	Hewlett Packard	437B	312U24787	2010.04.21
11	Power Sensor	Hewlett Packard	8482B	3318A06943	2010.05.15
12	Loop Antenna	Rohde &	HFH2-Z2.335.4711.52	826532/006	2011.02.06
13	Dipole Antenna	Rohde &	VHAP	574	2010.07.07
14	Dipole Antenna	Rohde &	VHAP	575	2010.07.17
15	Dipole Antenna	Rohde &	UHAP	545	2010.07.17
16	Dipole Antenna	Rohde &	UHAP	546	2010.07.07
17	Biconical Antenna	Eaton Corp.	94455-1	0977	2010.07.03
18	Biconical Antenna	EMCO	3104C	9111-2468	2010.07.03
19	Log Periodic Antenna	EMCO	3146	2051	2010.06.05
20	Log Periodic Antenna	EMCO	3146	8901-2320	2010.07.03
21	Horn Antenna	A.H. Systems	SAS-571	414	2011.03.16
22	LISN	EMCO	3810/2	2228	2010.05.15
23	Waveform Generator	Hewlett Packard	33120A	US34001190	2010.05.15
24	Digital Oscilloscope	Tektronix	TDS 340A	B012287	2010.05.15
25	Dummy Load	Bird Electronics	8251	11511	2010.04.17
26	Spectrum Analyzer	Rohde &	FSP40	-	2009.10.30
27	Double Ridged Guide Antenna	ETS-Lindgren	3116	00062916	200912.19
28	Double Ridged Guide Antenna	ETS-Lindgren	3116	00062504	200912.19