

243 Jubug-Ri, Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822 Tel: +82-31-323-6008 Fax: +82-31-323-6010 http://www.ltalab.com



Dates of Tests: Mar 10 ~ Mar 23, 2010 Test Report S/N: LR500191003B Test Site: LTA CO., LTD.

# **CERTIFICATION OF COMPLIANCE**

FCC ID.

**XBQ-S10** 

**APPLICANT** 

YUKYUNG TECHNOLOGIES INC.

**Equipment Class** : Digital Transmission System (DTS)

**Manufacturing Description** : **MID(MOBILE INTERNET DEVICE)** 

Manufacturer : YUKYUNG TECHNOLOGIES INC.

Model name : S10

Test Device Serial No.: : Identical prototype

Rule Part(s) : FCC Part 15.247 Subpart C; ANSI C-63.4-2003

Frequency Range : 2412MHz ~ 2462MHz

Max. Output Power : Max 20.83dBm - Conducted (802.11b)

**Max 17.82dBm - Conducted (802.11g)** 

Data of issue : March 23, 2010

This test report is issued under the authority of:

The test was supervised by:

Kyung-Taek LEE, Technical Manager

Hyun-Chae You, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.

NVLAP

NVLAP LAB Code.: 200723-0

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## 1. General information's

# 1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822

Web site : <a href="http://www.ltalab.com">http://www.ltalab.com</a>
E-mail : <a href="mailto:chahn@ltalab.com">chahn@ltalab.com</a>
Telephone : +82-31-323-6008
Facsimile +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

## 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2010-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2010-05-03	IC filing

## 2. Information's about test item

## 2-1 Applicant & Manufacturer

Company name : YUKYUNG TECHNOLOGIES INC.

Address : 200-11, Anyang-Dong, Manan-Ku, Anyang-Si, Kyunggi-Do, Korea

Tel / Fax : TEL No: +82-31-463-6906 / FAX No: +82-31-445-5995

## 2-2 Equipment Under Test (EUT)

Trade name : MID(MOBILE INTERNET DEVICE)

FCC ID : XBQ-S10

Model name : S10

Serial number : Identical prototype

Date of receipt : March 09, 2010

EUT condition : Pre-production, not damaged

Antenna type : PIFA antenna with Max. 4.838dBi gain

Frequency Range : 2412MHz ~ 2462MHz (DSSS)

RF output power : Max 20.83dBm - Conducted (802.11b)

Max 17.82dBm - Conducted (802.11g)

Number of channels : 11

Type of Modulation : CCK, DQPSK, DBPSK for DSSS

64QAM, 16QAM, QPSK, BPSK for OFDM

Transfer Rate : 11/5.5/2/1Mbps for 802.11b

54/48/36/24/18/12/9/6Mbps for 802.11g

Power Source for Batt. : Battery Pack: 7.4V (Li-Ion Polymer RECHARGEABLE BATTERY)

Power Source for Adaptor. : Input: 100-240VAC, 0.4A Output: 9.5VDC, 2.84A

## **2-3 Tested frequency**

	LOW	MID	HIGH
Frequency (MHz) for 802.11b/g	2412	2437	2462

## **2-4 Ancillary Equipment**

Equipment	Model No.	Serial No.	Manufacturer
PC	HP Compaq dx7400	CNG8330J95	HP
MONITOR	HPL1710	CNC816QH92	HP
Keyboard	SK-8115	68A-04Q6	DELL
Mouse	MO56UOA	F0J00NOL	DELL
PRINTER	STYLUS C65	N/A	EPSON
MONITOR	HPL1710	CNC816QHF2	HP
EARPHONE	N/A	N/A	N/A
SD CARD	N/A	N/A	N/A
USB Memories	EUREKA	N/A	SELFIC
Resistance Jig	LTA010	L051201	LTA

# 3. Test Report

## 3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Conditio n	Status (note 1)	
15.247(a)	6 dB Bandwidth	> 500kHz		С	
15.247(b)	Transmitter Peak Output Power	< 1Watt	Conducted	С	
15.247(d)	Transmitter Power Spectral Density	< 8dBm @ 3kHz	Conducted	С	
15.247(d)	Band Edge & Spurious	> 20 dBc		С	
15.209	Field Strength of Harmonics	Emission	Radiated	С	
15.207	AC Conducted Emissions	Emissions	Conducted	С	
15.203	Antenna requirement	-	-	С	
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable					

NC=Not Complies NT=Not Tested

Note 2: The data in this test report are traceable to the national or international standards.

#### → Antenna Requirement

The YUKYUNG TECHNOLOGIES INC. FCC ID: XBQ-S10 unit complies with the requirement of §15.203. The antenna is connected to inside of EUT. And type is PIFA antenna.

The sample was tested according to the following specification: FCC Parts 15.247; ANSI C-63.4-2003

## 3.2 Technical Characteristics Test (802.11b/g)

#### 3.2.1 6 dB Bandwidth

#### **Procedure:**

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

#### The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz Span = 30 MHz

 $VBW = 300 \text{ kHz} (VBW \ge RBW)$  Sweep = auto

Trace = max hold Detector function = peak

#### **Measurement Data:**

Mode Frequency (MHz)	Frequency	Channel No.	Test Results	
	Chamiei No.	Measured Bandwidth (MHz)	Result	
	2412	1	9.86	Complies
802.11b	2437	6	10.03	Complies
	2462	11	10.03	Complies
	2412	1	16.54	Complies
802.11g	2437	6	16.50	Complies
	2462	11	16.50	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

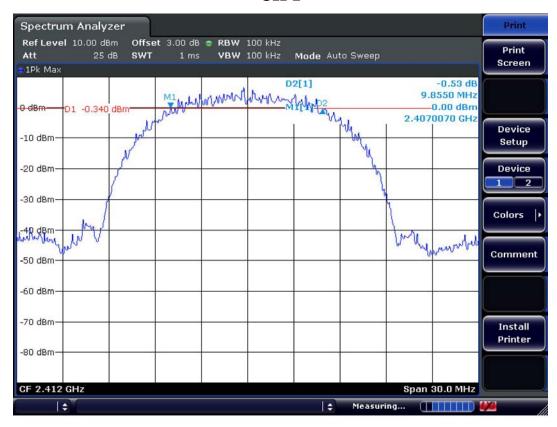
#### **Minimum Standard:**

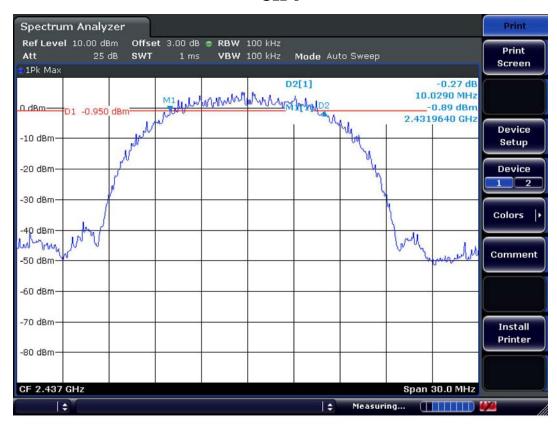
6 dB Bandwidth > 500kHz

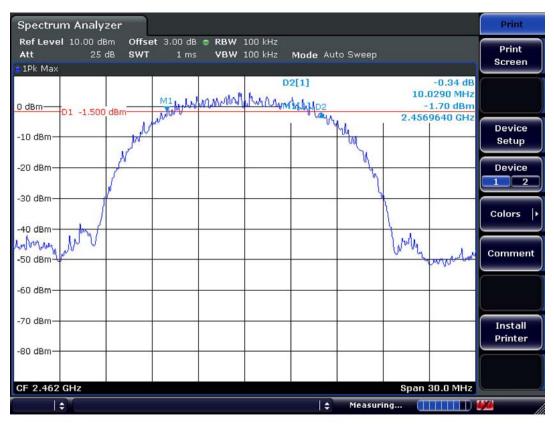
#### **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

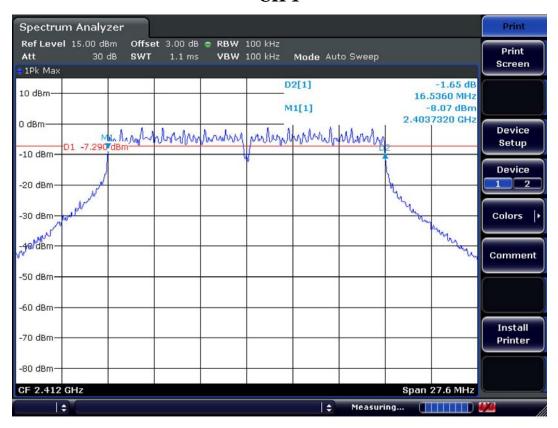
802.11b CH 1

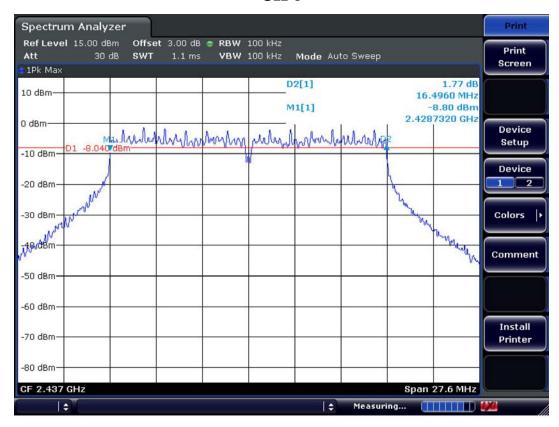


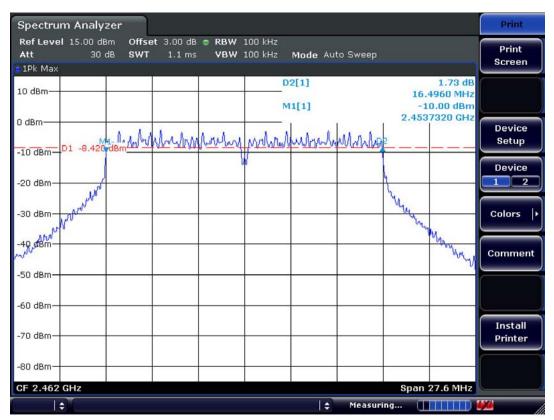




802.11g CH 1







## 3.2.2 Peak Output Power Measurement

#### **Procedure:**

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.

## The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1MHz Span = auto

 $VBW = 3MHz (VBW \ge RBW)$  Sweep = auto

Detector function = peak

#### **Measurement Data:**

Mode Freq	Frequency		Test Results	
Mode	(MHz)		Measured Data (dBm)	Result
	2412	1	20.83	Complies
802.11b	2437	6	20.54	Complies
	2462	11	18.62	Complies
	2412	1	17.82	Complies
802.11g	2437	6	16.94	Complies
	2462	11	16.06	Complies

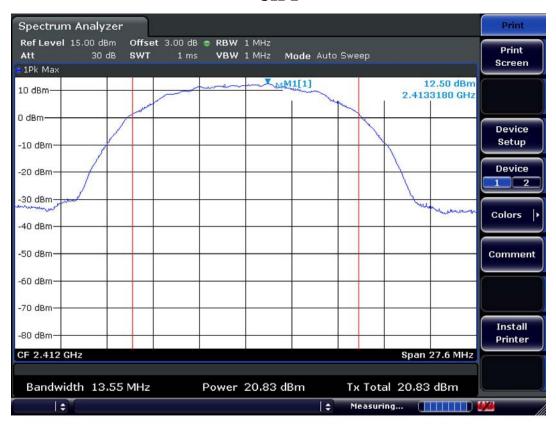
-

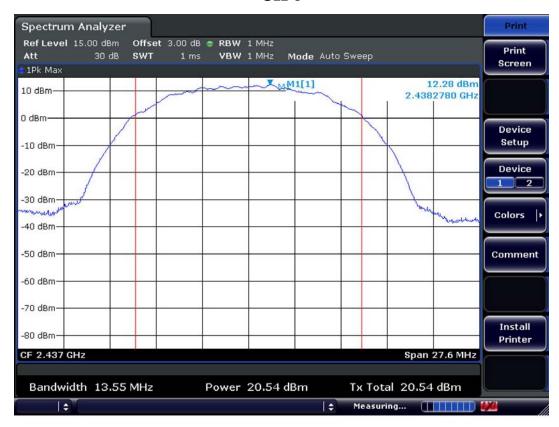
#### **Minimum Standard:**

Peak output power	< 1W
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<sup>-</sup> See next pages for actual measured spectrum plots.

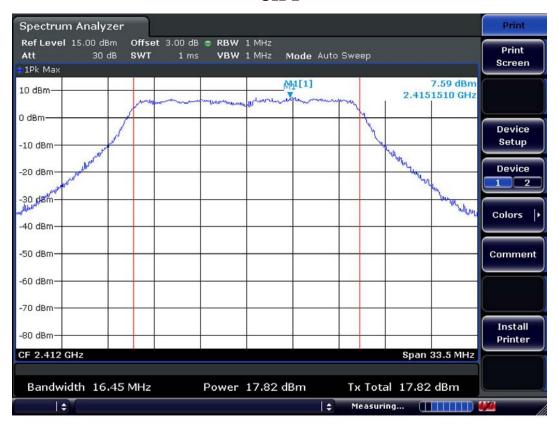
802.11b CH 1

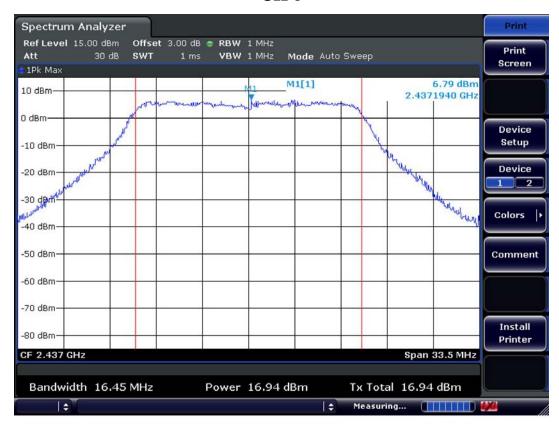


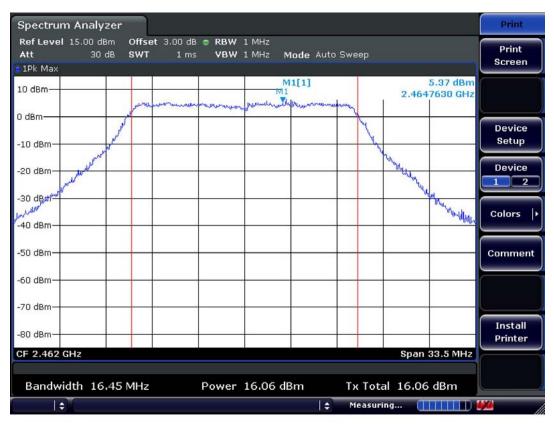




802.11g CH 1







# 3.2.3 Power Spectral Density

#### **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 = 3 kHz Span = 300 kHz VBW = 10 kHz Sweep = 1000 sec Detector function = peak Trace = max hold

#### **Measurement Data:**

Mode	Frequency	Ch.	Test Results	
Wioue	(MHz)	CII.	dBm	Result
	2412	1	4.30	Complies
802.11b	2437	6	2.52	Complies
	2462	11	1.98	Complies
802.11b	2412	1	-19.59	Complies
	2437	6	-20.61	Complies
	2462	11	-20.97	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

#### **Minimum Standard:**

Power Spectral Density
------------------------

#### **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

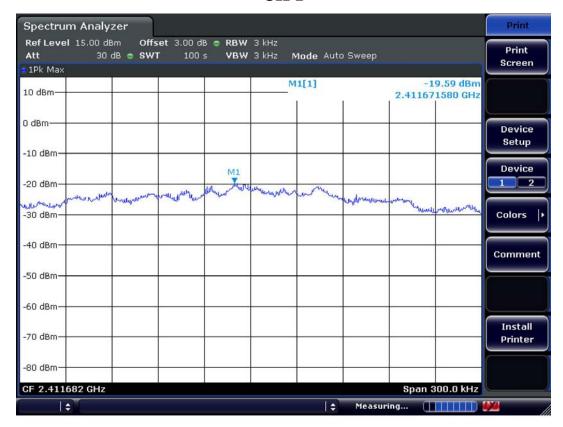
# 802.11b Power Density Measurement CH 1

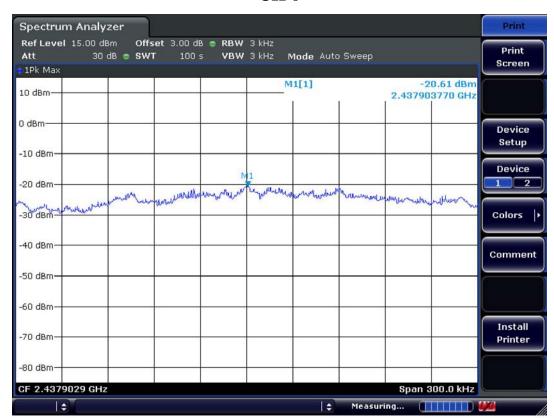


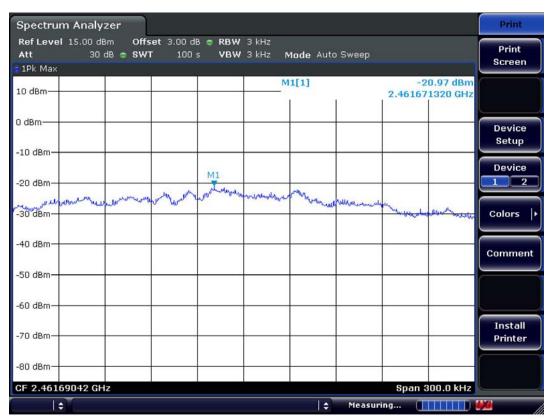




# 802.11g Power Density Measurement CH 1







## 3.2.4 Band - edge

#### **Procedure:**

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz VBW = 100 kHz

Span = 40 MHz Detector function = peak

Trace =  $\max$  hold Sweep = auto

Radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

The spectrum analyzer is set to:

Center frequency = the highest, the lowest channels

PEAK: RBW = VBW = 1MHz, Sweep=Auto

Average: RBW = 1MHz, VBW=10Hz, Sweep=Auto

Measurement Distance: 3m

Polarization: Horizontal / Vertical

#### **Measurement Data: Complies**

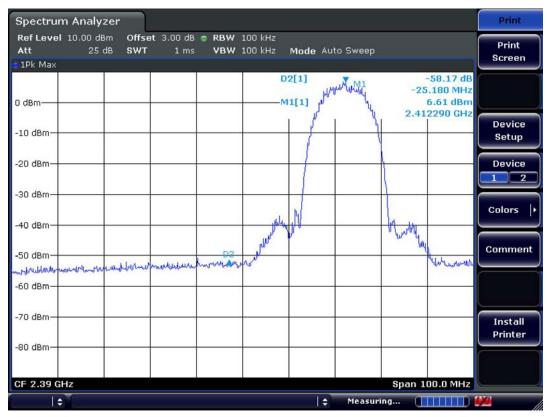
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

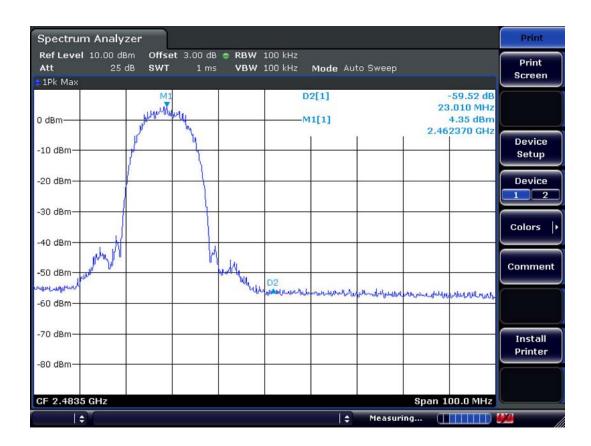
Minimum Standard:	> 20 dBc
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#### Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500







# Band-edges in the restricted band 2310-2390 MHz measurement

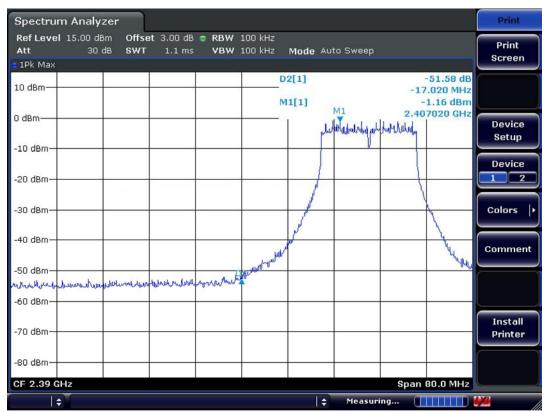
F=====================================	Reading		Correction		Limits	Result	Margin	
Frequency	[dBuV/m]	Pol.	Factor		[dBuV/m] [dBuV/m]		[dB]	
[MHz]	AV / Peak	POI.	Antenna	Amp. Gain	Cable	AV / Peak	AV / Peak	AV / Peak
2389.00	51.3 59.1	V	26.0	36.5	8.2	54.0 74.0	49.0 56.8	5.0 17.2

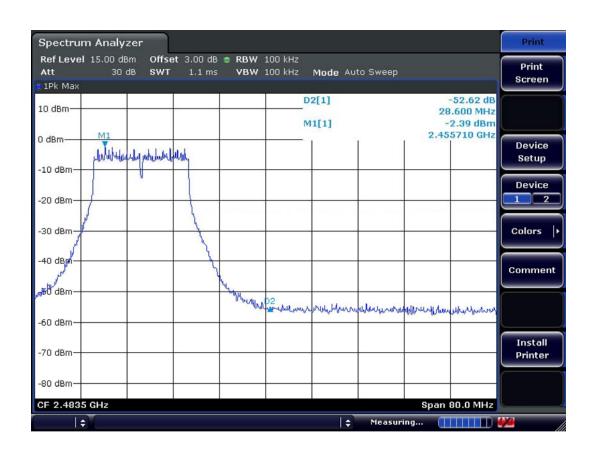
# Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency	Reading		Correction		Limits		Result	Margin
	[dBuV/m]	Pol.		Factor		[dBuV/m]	[dBuV/m]	[dB]
[MHz]	AV / Peak	POI.	Antenna	Amp. Gain	Cable	AV / Peak	AV / Peak	AV / Peak
2483.50	45.7 53.8	V	26.0	36.5	8.2	54.0 74.0	43.4 51.5	10.6 22.5

Note: This EUT was tested in 3 orthogonal positions and the worst-case data was presented







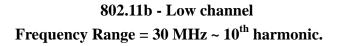
# Band-edges in the restricted band 2310-2390 MHz measurement

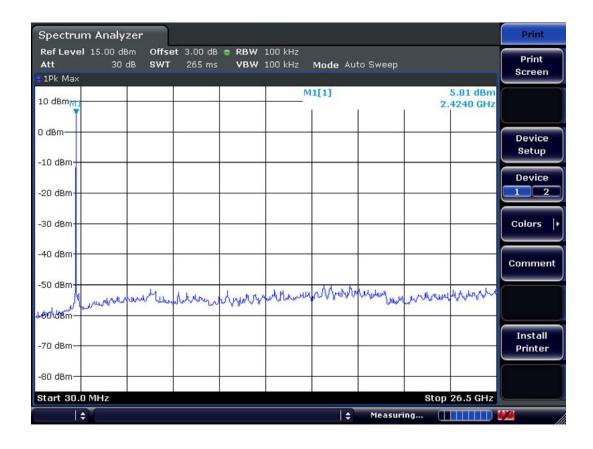
F=====================================	Reading		Correction		Limits	Result	Margin	
Frequency	[dBuV/m]	Pol.	Factor		[dBuV/m] [dBuV/m]		[dB]	
[MHz]	AV / Peak	POI.	Antenna	Amp. Gain	Cable	AV / Peak	AV / Peak	AV / Peak
2389.00	48.1 56.9	V	26.0	36.5	8.2	54.0 74.0	45.8 54.6	8.2 19.4

# Band-edges in the restricted band 2483.5-2500 MHz measurement

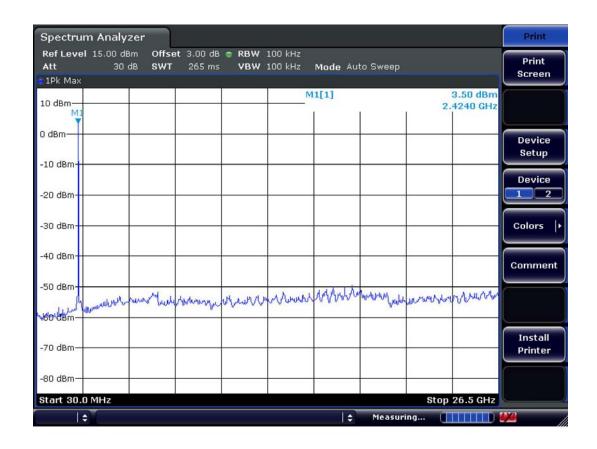
Frequency	Reading	Reading		Correction		Limits	Result	Margin
'	[dBuV/m]	Pol.		Factor		[dBuV/m]	[dBuV/m]	[dB]
[MHz]	AV / Peak	POI.	Antenna	Amp. Gain	Cable	AV / Peak	AV / Peak	AV / Peak
2483.50	53.4 61.6	V	26.0	36.5	8.2	54.0 74.0	51.1 59.3	2.9 14.7

Note: This EUT was tested in 3 orthogonal positions and the worst-case data was presented

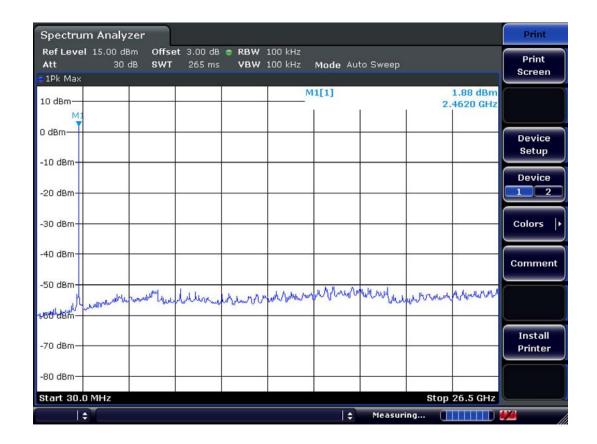


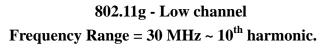


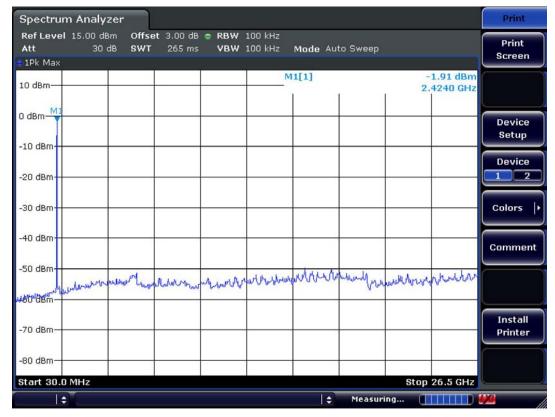
# $802.11b - Mid \ channel$ $Frequency \ Range = 30 \ MHz \sim 10^{th} \ harmonic.$



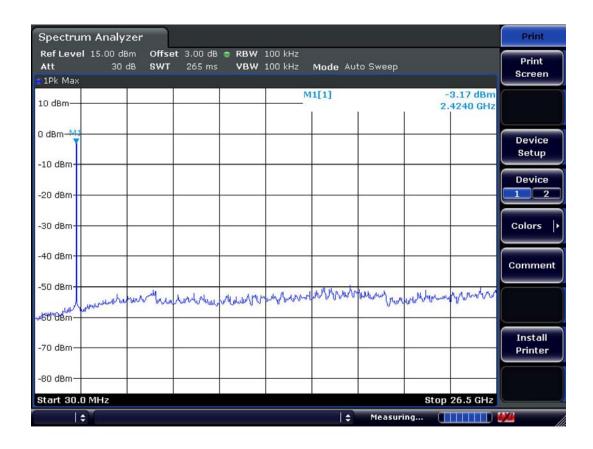
# 802.11b – High channel Frequency Range = $30 \text{ MHz} \sim 10^{th}$ harmonic.



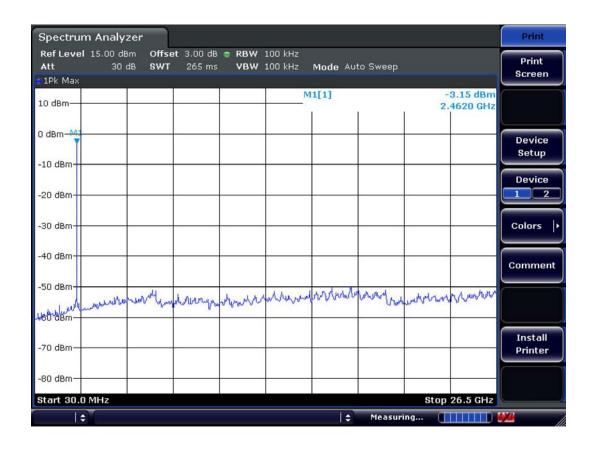




# 802.11g - Mid channel Frequency Range = 30 MHz $\sim 10^{th}$ harmonic.



# 802.11g - High channel Frequency Range = $30 \text{ MHz} \sim 10^{th} \text{ harmonic.}$



## 3.2.5 Field Strength of Harmonics

#### **Procedure:**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

#### The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range =  $30 \text{ MHz} \sim 10^{\text{th}}$  harmonic.

 $RBW = 100 \text{ kHz} (30 \text{MHz} \sim 1 \text{ GHz})$   $VBW \geq RBW$ 

= 1 MHz  $(1 \text{ GHz} \sim 10^{\text{th}} \text{ harmonic})$ 

Span = 100 MHz Detector function = peak

Trace =  $\max$  hold Sweep = auto

## **Measurement Data: Complies**

- See next pages for actual measured data.

#### Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

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

## **Minimum Standard: FCC Part 15.109**

Frequency (MHz)	Limit (uV/m) @ 10m
30 ~ 88	90
88 ~ 216	150
216 ~ 960	210
Above 960	300

# **802.11b Measurement Data:**

Low c	hannel	Mid cl	hannel	High channel		
Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)	
-	-	-	-	-	-	
-	-	-	-	-	-	
	No emissions v	were detected at a le	vel greater than 20d	dB below limit.		
-	-	-	-	-	-	
-	-	-	-	-	-	
Measuremen	t uncertainty	± 6 dB				

# **802.11g Measurement Data:**

Low c	hannel	Mid c	hannel	High channel		
Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)	Frequency (MHz)	Level (dBuV)	
-	-	-	-	-	-	
-	-	-	-	-	-	
	No emissions v	were detected at a le	evel greater than 20c	dB below limit.		
-	-	-	-	-	-	
-	-	-	-	-	-	
Measuremen	t uncertainty	± 6 dB				

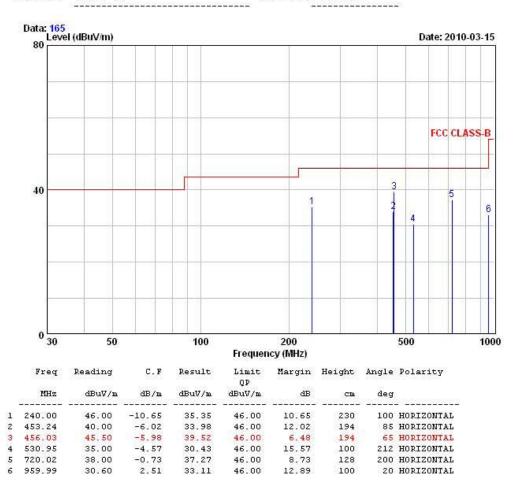
## Radiated Emissions - PC Mode



243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

EUT/Model No.: S10 TEST MODE: PC mode

Temp Humi : 18 / 60 Tested by: KIM.K.I



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

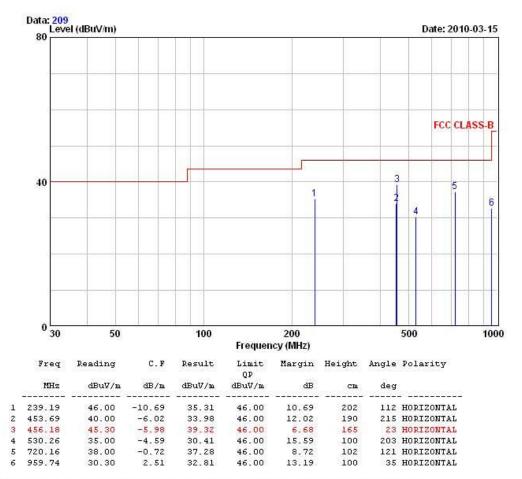
## Radiated Emissions - WI-FI Mode



243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

EUT/Model No.: S10 TEST MODE: WIFI mode

Temp Humi : 18 / 60 Tested by: KIM.K.I



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

## 3.2.8 AC Conducted Emissions

#### **Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

#### **Measurement Data: Complies**

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

## Minimum Standard: FCC Part 15.207(a)/EN 55022

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

<sup>\*</sup> Decreases with the logarithm of the frequency

## AC Conducted Emissions - PC - Line

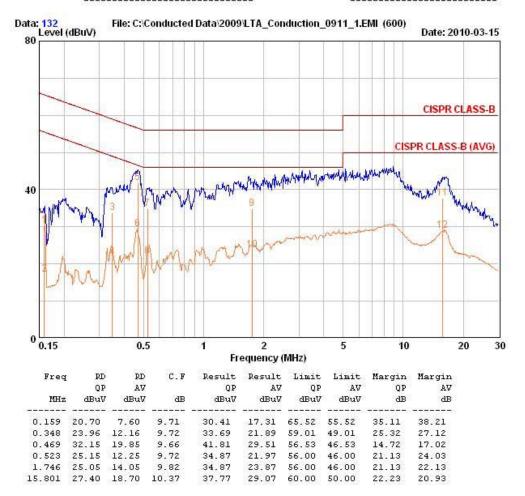


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 EUT / Model No. : S10
 Phase : LINE

 Test Mode : PC mode : PC mode : Test Power : 120 / 60

 Temp./Humi. : 21 / 60
 Test Engineer : KIM.K.I



## **AC Conducted Emissions – PC – Neutral**

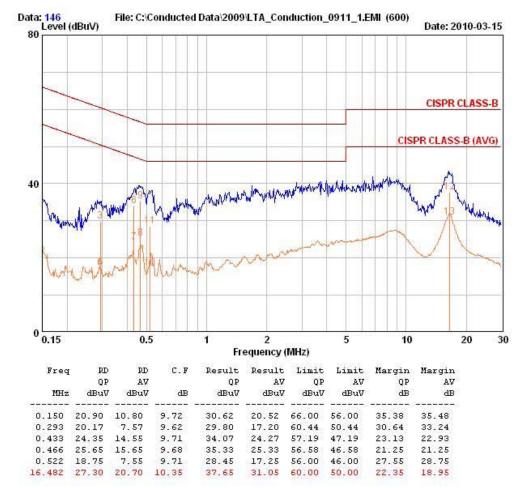


: 21 / 60

Temp./Humi.

243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

Test Engineer : KIM.K.I



## AC Conducted Emissions - WI-FI - Line

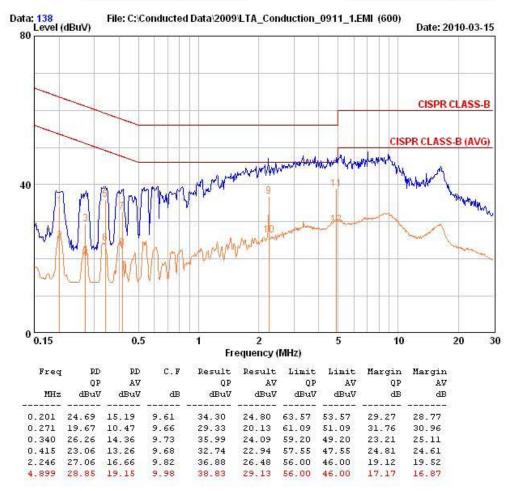


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

EUT / Model No. : S10 Phase : LINE

Test Mode : wifi mode Test Power : 120 / 60

Temp./Humi. : 21 / 60 Test Engineer : KIM.K.I

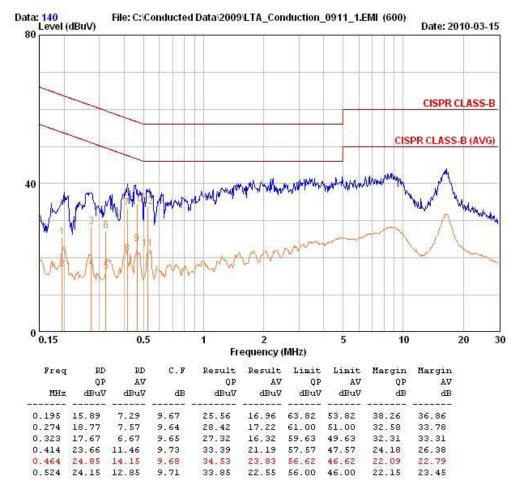


## AC Conducted Emissions - WI-FI - Neutral



243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-3236008,9 Fax:+82-31-3236010

Temp./Humi. : 21 / 60 Test Engineer : KIM.K.I



# **APPENDIX**

# TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	Feb-10
2	Spectrum Analyzer	8563E	3425A02505	НР	Apr-10
3	Spectrum Analyzer	8594E	3710A04074	HP	Oct-10
4	Signal Generator	8648C	3623A02597	HP	Apr-10
5	Signal Generator	83711B	US34490456	НР	Apr-10
6	Attenuator (3dB)	8491A	37822	НР	Oct-10
7	Attenuator (10dB)	8491A	63196	НР	Oct-10
8	Attenuator (30dB)	8498A	1801A06689	НР	Oct-10
9	EMI Test Receiver	ESVD	843748/001	R&S	Apr-10
10	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	Nov-10
11	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	Nov-10
12	RF Amplifier	8447D	2949A02670	НР	Oct-10
13	RF Amplifier	8449B	3008A02126	НР	Apr-10
14	Test Receiver	ESHS10	828404/009	R&S	Apr-10
15	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Apr-11
16	LogPer. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-11
17	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-11
18	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-11
19	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	Dec-11
20	Dipole Antenna	VHA9103	2116	SCHWARZBECK	Nov-10
21	Dipole Antenna	VHA9103	2117	SCHWARZBECK	Nov-10
22	Dipole Antenna	VHA9105	2261	SCHWARZBECK	Nov-10
23	Dipole Antenna	VHA9105	2262	SCHWARZBECK	Nov-10
24	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Apr-10
25	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-
26	RF Switch	MP59B	6200414971	ANRITSU	-
27	Power Divider	11636A	6243	HP	Oct-10
28	DC Power Supply	6622A	3448A03079	HP	Oct-10
29	Frequency Counter	5342A	2826A12411	HP	Apr-10
30	Power Meter	EPM-441A	GB32481702	HP	Apr-10
31	Power Sensor	8481A	2702A64048	HP	Apr-10
32	Audio Analyzer	8903B	3729A18901	HP	Oct-10
33	Modulation Analyzer	8901B	3749A05878	HP	Oct-10
34	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	Oct-10
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-11
36	Stop Watch	HS-3	601Q09R	CASIO	Apr-10
37	LISN	ENV216	100408	R&S	Oct-10