

# RF MEASUREMENT REPORT

## CERIFICATION OF COMPLIANCE

PRODUCT : Wireless LAN AP

MODEL/TYPE NO : DosaLink-540

FCC ID : VS4-NS5000A

TRADE NAME : **BDS Inc.**  
BDS Inc.

APPLICANT NAME : 4F TaeYoung Bldg., 283-7, Gocheon-Dong, Uiwang-City,  
Gyeonggi-Do, 437-010 Korea  
Attn. : YG(Yeong Gu). Cho / Director

FCC CLASSIFICATION : DTS Digital Transmission System  
NII Unlicensed National Information Infrastructure TX

FCC RULE PART(S) : FCC Part 15 Subpart C Section 15.247  
FCC Part 15 Subpart E Section 15.407

FCC PROCEDURE : Certification

DATES OF TEST : November 05, 2007 ~ November 16, 2007


DATES OF ISSUE : November 22, 2007

TEST REPORT No. : BWS-07-EF-0053

TEST LAB. : BWS TECH Inc. (Registration No. : 553281)

This Digital Transmission System has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 15.247 & 15.407. I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

November 22, 2007  
(Date)

  
Tested by CY, Choi

November 22, 2007  
(Date)

  
Reviewed by TaeHyun, Nam

**BWS TECH Inc.**

www.bws.co.kr

#611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea

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# FCC TEST REPORT

**Scope** – Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)

## 1. General Information

### Applicant

**Company Name** BDS Inc.  
**Company Address** 4F TaeYoung Bldg., 283-7, Gocheon-Dong, Uiwang-City,  
Gyeonggi-Do, 437-010 Korea  
**Phone/Fax** +82-31-451-0400 / +82-31-451-0401

### Manufacturer

**Company Name** BDS Inc.  
**Company Address** 4F TaeYoung Bldg., 283-7, Gocheon-Dong, Uiwang-City,  
Gyeonggi-Do, 437-010 Korea  
**Phone/Fax** +82-31-451-0400 / +82-31-451-0401

- **EUT Type** Wireless LAN AP
- **Model Number** DosaLink-540
- **FCC Identifier** VS4-NS5000A
- **S/N** Prototype
- **Freq. Range** 2412 MHz ~ 2462 MHz (802.11b/g)  
5745 MHz ~ 5725 MHz (802.11a, Band d)  
5180 MHz ~ 5240 MHz (802.11a, Band a)  
11 (802.11b/g)
- **Number of Channels** 5 (802.11a, Band d)  
4 (802.11a, Band a)
- **Modulation Method** DSSS (Direct Sequence Spread Spectrum)  
OFDM (Orthogonal Frequency Division Multiplexing)
- **FCC Rule Part(s)** Part 15 Subpart C Section 15.247  
Part 15 Subpart E Section 15.407
- **Test Procedure** ANSI C63.4-2000
- **Dates of Tests** November 05, 2007 ~ November 16, 2007  
BWS TECH Inc.  
EMC Testing Lab (FCC Registration Number : 553281)
- **Place of Tests** #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si,  
Gyeonggi-Do 449-853, Korea  
TEL: +82 31 333 5997 FAX: +82 31 333 0017
- **Test Report No.** BWS-07-EF-0053

## 2. Description of Test Facility

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The measurement for radiated emission test were practiced at the open area test site of BWS TECH Inc. Measurement for conducted emission test were practiced at the semi EMC Anechoic Chamber test site of BWS TECH Inc. facility located at #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1993 and registered to the Federal Communications Commission (Registration Number : 553281 ).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2003) was used in determining radiated emissions from the BDS Inc. Model : DosaLink-540.

### 3. Product Information

#### 3.1 Equipment Description

DosaLink-540 of nSpace product family is an enterprise class access point supporting 802.11a/b/g. DosaLink-540 supports the latest IEEE802.11 standard technologies and provides various advanced network features.

#### 3.2 General Specification

Item	Specification
WAN Interface	10/100Base-Tx Auto Negotiation 3 Port (RJ-45) Auto MDIX
	IEEE802.3af Power Over Ethernet
LAN Interface	10/100Base-Tx Auto Negotiation 3 Port (RJ-45) Auto MDIX
Wireless LAN Interface	IEEE802.11a/b/g
	Transmit Power 14~18dBm (2.4GHz), 14.5~17.5dBm (5GHz), Auto & Manual Selectable
	Indoor : 70m , Outdoor : 300m
	Transmit Speed 1/2/5.5/6/9/11/12/18/24/36/54Mbps Auto & Manual Selectable
Reset	MDIX Factory Default Value
LED Indicator	PWR, WAN, LAN1, LAN2, LAN3, DIAG, WLAN
Operation Environment	Ambient Operation Temperature: 0°C to 40°C
	Storage Temperature: -10°C to 50°C
	Maximum Altitude: 3000m
	Relative Humidity: 90% Non-Condensing
Power Requirement	DC 5V / 2A
	AC 90 ~ 260 V, 50 ~ 60Hz
Dimensions	W [ 190 ], H [ 30.6 ], D [ 125.3 ]
Protocol	IP, ARP, ICMP, UDP, TCP
	PPPoE, Telnet
	IP Static Routing & DHCP Server/Client/Relay
Security	nESA (256 bits)
	nESA with LinkAuthentic
	WEP (64/128 bits)
	WPA-PSK & WPA (TKIP/AES)
	WPA2-PSK & WPA2 (TKIP/AES)
Authentication	IEEE802.1x (MD5/TLS/TTLS)
Wireless Function	Point to Point/Point to Multipoint Bridge & WDS
Firewall	NAT
	MAC Filtering, IP Filtering
Management	SNMP V1/2, Wireless & Ethernet MIB
	HTTPS(SSL)
	WEB Base Configuration
	Console Base Configuration

## 4. Description of Tests

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### 4.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 $\Omega$ /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1m x 1.5m x 0.8m wooden table, which is placed 40cm away from the vertical wall, and 1.5m away from the sidewall of the chamber room. Two LISNs are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling (serpentine fashion) to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the Spectrum Analyzer to determine the frequency producing the max. Emission from the EUT. The frequency producing the max. Level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.45 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

## 4.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3-meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME.

Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configurations, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using bi-log antenna and above 1000MHz, linearly polarized double ridge horn antennas were used. Above 1GHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies, which were selected as bottom, middle, and top frequency in the operating band. Emission level from the EUT with various configurations was examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconical and log periodic, Horn antenna. The output from the antenna was connected, via a preselector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer (for above 25GHz). The detector function was set to the quasi-peak or peak mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120kHz (1MHz for measurement above 1GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission. The EUT, support equipment and interconnecting cables were configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1m x 1.5 meter table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20dB/decade) as per section 15.31(f).

## 5. Test Condition

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### 5.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner, which tends to maximize its emission level in a typical application.

#### **Radiated Emission Test**

Preliminary radiated emission tests were conducted using the procedure in ANSI C63.4/2003 Clause 8.3.1.1 to determine the worst operating condition. Final radiated emission tests were measured at 3-meter open field test site. To complete the test configuration required by the FCC, the EUT was tested in all three orthogonal planes.

### 5.2 EUT operation

EUT was tested according to the operation modes provided by the specifications given by the manufacturer, and reported the worst emissions.



## 6. TEST RESULTS

### Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule	Description of Test	Limit	Result
<b>General Requirement</b>			
15.407(a)	26 dB Bandwidth	Confirmation	Pass
15.407(a)	Maximum Peak Output Power	17 dBm	Pass
15.407(a)	Power Spectral Density	4 dBm	Pass
15.407(a)	The Ratio of the Peak Excursion	13 dB	Pass
15.407(b)	Unwanted Emissions	-27 dBm/MHz	Pass
15.407(g)	Frequency Stability	-27 dBm/MHz	Pass
15.407(f)	RF Exposure Requirement	1mW/Cm <sup>2</sup>	Pass

The data collected shows that the product complies with technical requirements of the Part 15.247 & 15.407 of the FCC Rules.

Note : Modification to EUT

The device tested is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified.

These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

## 7. General Requirement

### 7.1 26 dB Bandwidth

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

#### 7.1.1 Definition

Measure the frequency difference of two frequencies that were attenuated 26 dB from the reference level.

#### 7.1.2 Method of Measurement

FCC Rules Part 15, Section 15.407(a)(1)

#### 7.1.3 Measurement Set-Up



Fig-1

#### 7.1.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST

#### 7.1.5 Test Procedure

- ① Connect the equipment as Fig-1.
- ② Measure the frequency difference of two frequencies that were attenuated 26 dB from the reference level.
- ③ RBW 100 kHz, VBW 300 kHz, Max Hold
- ④ RBW 300 kHz, VBW 1 MHz, Max Hold

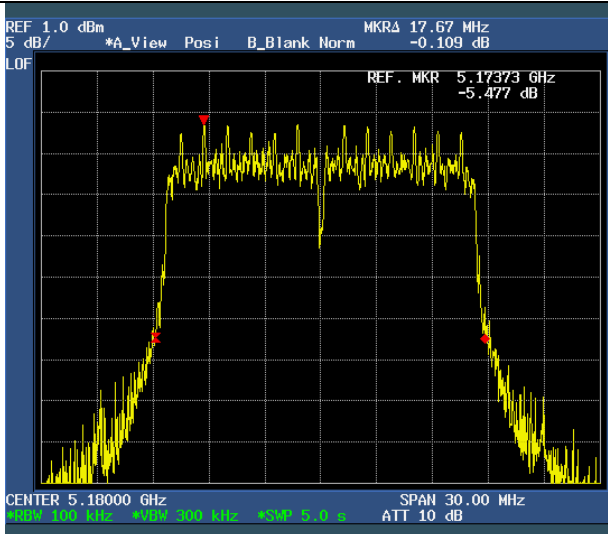
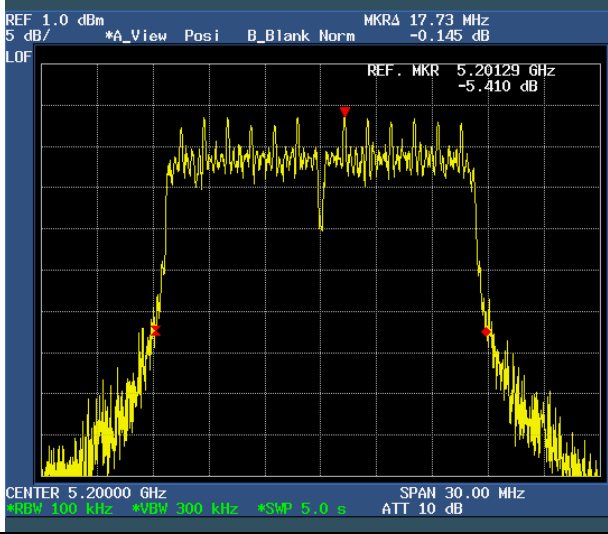
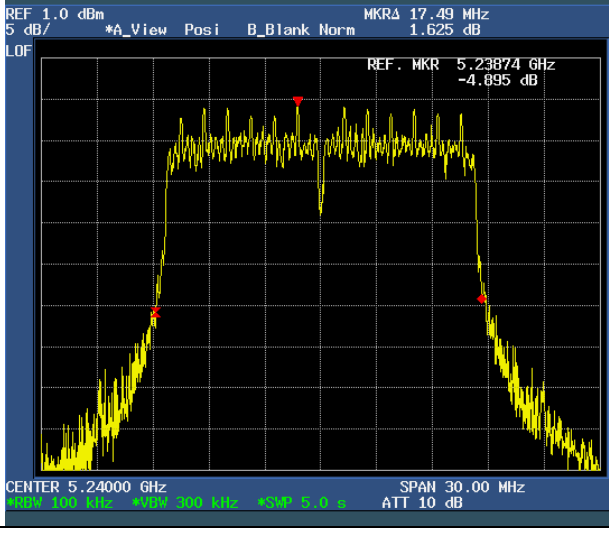
#### 7.1.6 Limit

- ① N/A

#### 7.1.7 Test Result

Mode	Frequency	Measured Bandwidth (MHz)		Limit (MHz)
		RBW 100 kHz	RBW 300 kHz	
802.11a	5180 MHz	17.67	19.92	N/A
	5200 MHz	17.73	20.01	
	5240 MHz	17.49	19.68	

### 7.1.8 Plot of 26 dB Bandwidth

Frequency	26 dB Bandwidth /w 100 kHz
5180 MHz 17.67 MHz	
5200 MHz 17.73 MHz	
5240 MHz 17.49 MHz	

Frequency	26 dB Bandwidth /w 300 kHz
5180 MHz 19.92 MHz	
5200 MHz 20.01 MHz	
5240 MHz 19.68 MHz	

## 7.2 Maximum Peak Output Power

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

### 7.2.1 Definition

For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz.

### 7.2.2 Method of Measurement

FCC Rules Part 15, Section 15.407(a)(1)

### 7.2.3 Measurement Set-Up



Fig-2

### 7.2.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST

### 7.2.5 Test Procedure

- ① Connect the equipment as Fig-2.
- ② Measure conducted Maximum Peak Output Power of relevant channel using Spectrum analyzer.
- ③ RBW 1 MHz, VBW 3 MHz, Channel Power

### 7.2.6 Limit

- ① 17 dBm

### 7.2.7 Test Result

Mode	Frequency	Output Power (dBm)	Limit (dBm)
802.11a	5180 MHz	12.37	17.0
	5200 MHz	12.52	
	5240 MHz	12.13	

## 7.2.8 Plot of Maximum Peak Output Power

Frequency	Maximum Peak Output Power
5180 MHz 12.37 dBm	<p>REF 21.0 dBm DL 12.4 dBm 10 dB/ *A_Max Posi B_Blank Smp1 LOF 10 10 CHANNEL POWER: 10/10 12.37 dBm (RMS) -60.64 dBm/Hz CENTER 5.18000 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 30 dB</p>
5200 MHz 12.52 dBm	<p>REF 21.0 dBm DL 12.5 dBm 10 dB/ *A_Max Posi B_Blank Smp1 LOF 10 10 CHANNEL POWER: 10/10 12.52 dBm (RMS) -60.49 dBm/Hz CENTER 5.20000 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 30 dB</p>
5240 MHz 12.13 dBm	<p>REF 21.0 dBm DL 12.1 dBm 10 dB/ *A_Max Posi B_Blank Smp1 LOF 10 10 CHANNEL POWER: 10/10 12.13 dBm (RMS) -60.88 dBm/Hz CENTER 5.24000 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 30 dB</p>

## 7.3 Power Spectral Density

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

### 7.3.1 Definition

The peak power spectral density shall not exceed 4 dBm in any 1-MHz band.

### 7.3.2 Method of Measurement

FCC Rules Part 15, Section 15.407(a)(1)

### 7.3.3 Measurement Set-Up

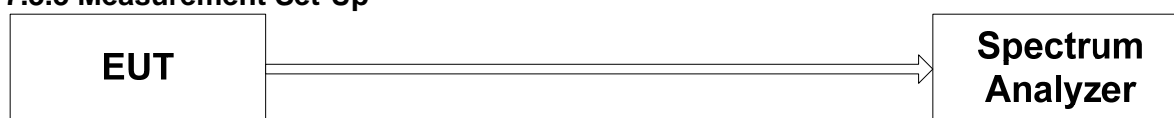


Fig-3

### 7.3.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST

### 7.3.5 Test Procedure

- ① Connect the equipment as Fig-3.
- ② Measure conducted Power Spectral Density of relevant channel using Spectrum analyzer.
- ③ RBW 1 MHz, VBW 3 MHz, Sample Detector.

### 7.3.6 Limit

- ① 4 dBm

### 7.3.7 Test Result

Mode	Frequency	Power Density (dBm)	Limit (dBm)
802.11a	5180 MHz	1.99	4.0
	5200 MHz	2.13	
	5240 MHz	1.66	

### 7.3.8 Plot of Power Spectral Density (802.11b)

Frequency	Power Spectral Density
5180 MHz 1.99 dBm	
5200 MHz 2.13 dBm	
5240 MHz 1.66 dBm	



## 7.4 The Ratio of the Peak Excursion

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

### 7.4.1 Definition

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### 7.4.2 Method of Measurement

FCC Rules Part 15, Section 15.407(a)(6)

### 7.4.3 Measurement Set-Up



Fig-4

### 7.4.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST

### 7.4.5 Test Procedure

- ① Connect the equipment as Fig-4.
- ② Measure conducted Ratio of the Peak Excursion of relevant channel using Spectrum analyzer.
- ③ Trace 1 : RBW 1 MHz, VBW 3 MHz, Peak Detector, Max Hold.
- ④ Trace 2 : RBW 1 MHz, VBW 3 MHz, Average 100 traces in power averaging mode.
- ⑤ The difference between Trace 1 and Trace 2 was recorded.

### 7.4.6 Limit

- ① 13 dB

### 7.4.7 Test Result

Mode	Frequency	Ratio of the Peak Excursion (dB)	Limit (dB)
802.11a	5180 MHz	7.7	13.0
	5200 MHz	7.6	
	5240 MHz	7.7	

### 7.4.8 Plot of Ratio of Peak Excursion

Frequency	Ratio of Peak Excursion
5180 MHz 7.7 dB	<p>REF 6.0 dBm 5 dB/Hz *A_Max Posi B_PwAvg Norm MKRΔ -4.85 MHz -7.656 dB</p> <p>CENTER 5.18000 GHz SPAN 25.00 MHz *BW 1 MHz *VBW 3 MHz *SMP 1.0 s ATT 20 dB</p>
5200 MHz 7.6 dB	<p>REF 6.0 dBm 5 dB/Hz *A_Max Posi B_PwAvg Norm MKRΔ -3.90 MHz -7.570 dB</p> <p>CENTER 5.20000 GHz SPAN 25.00 MHz *BW 1 MHz *VBW 3 MHz *SMP 1.0 s ATT 20 dB</p>
5240 MHz 7.7 dB	<p>REF 6.0 dBm 5 dB/Hz *A_Max Posi B_PwAvg Norm MKRΔ 2.63 MHz -7.695 dB</p> <p>CENTER 5.24000 GHz SPAN 25.00 MHz *BW 1 MHz *VBW 3 MHz *SMP 1.0 s ATT 20 dB</p>

## 7.5 Frequency Stability

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

### 7.5.1 Definition

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

### 7.5.2 Method of Measurement

FCC Rules Part 15, Section 15.407(g)

### 7.5.3 Measurement Set-Up

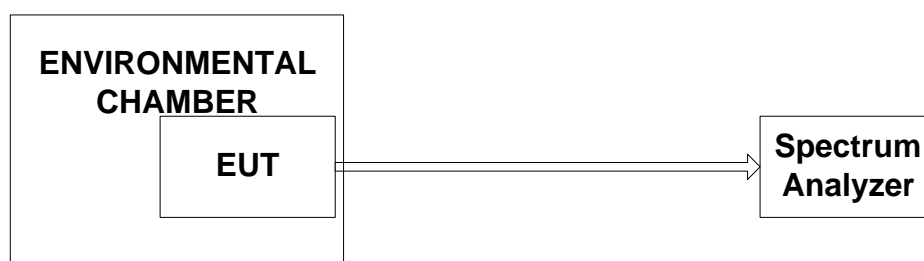


Fig-5

### 7.5.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST
Environmental Chamber	EN-GLMP-54	ENEX

### 7.5.5 Test Procedure

- ① Connect the equipment as Fig-5.
- ② Operate the equipment in standby conditions for 15 minutes before proceeding.
- ③ Record the carrier frequency of the transmitter as *MCF* MHz.
- ④ Calculate the ppm frequency error.

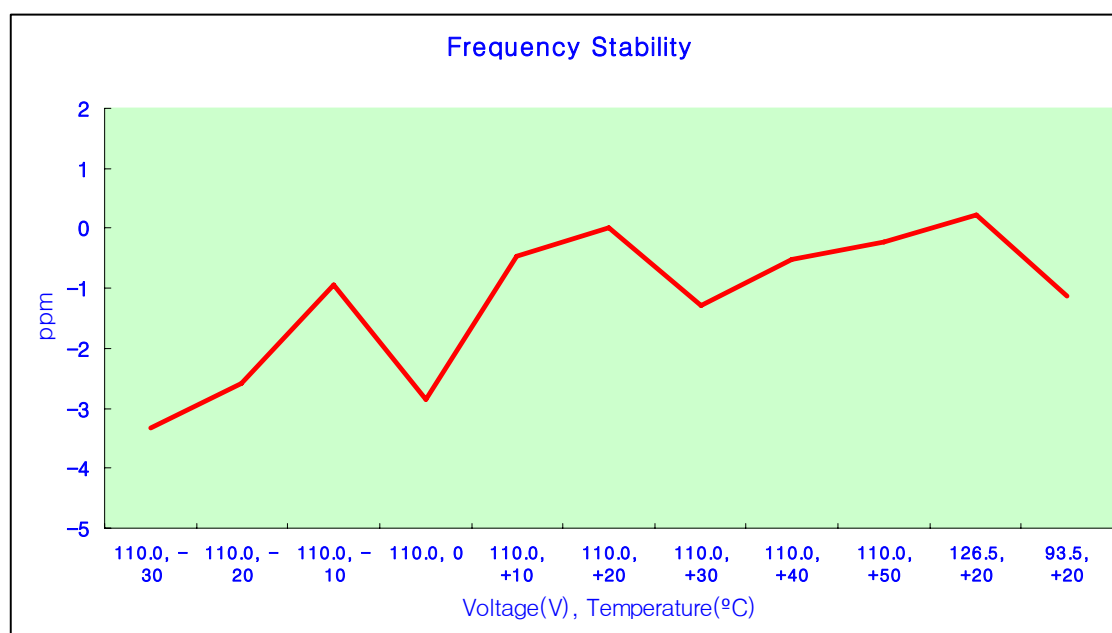
### 7.5.6 Limit

- ① 50 ppm

### 7.5.7 Test Result (Channel 36)

Voltage (%)	Power Supply (Vdc)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100%	110	-30	5,179,991,323	-3.3	50.00
100%	110	-20	5,179,995,102	-2.6	
100%	110	-10	5,179,993,603	-0.9	
100%	110	0	5,179,993,712	-2.9	
100%	110	+10	5,179,996,083	-0.5	
100%	110	+20 (Ref.)	5,179,998,505	0	
100%	110	+30	5,179,998,902	-1.3	
100%	110	+40	5,179,998,763	-0.5	
100%	110	+50	5,179,999,316	-0.2	
115%	126.5	+20	5,179,998,605	+0.2	
85%	93.5	+20	5,179,998,595	-1.1	

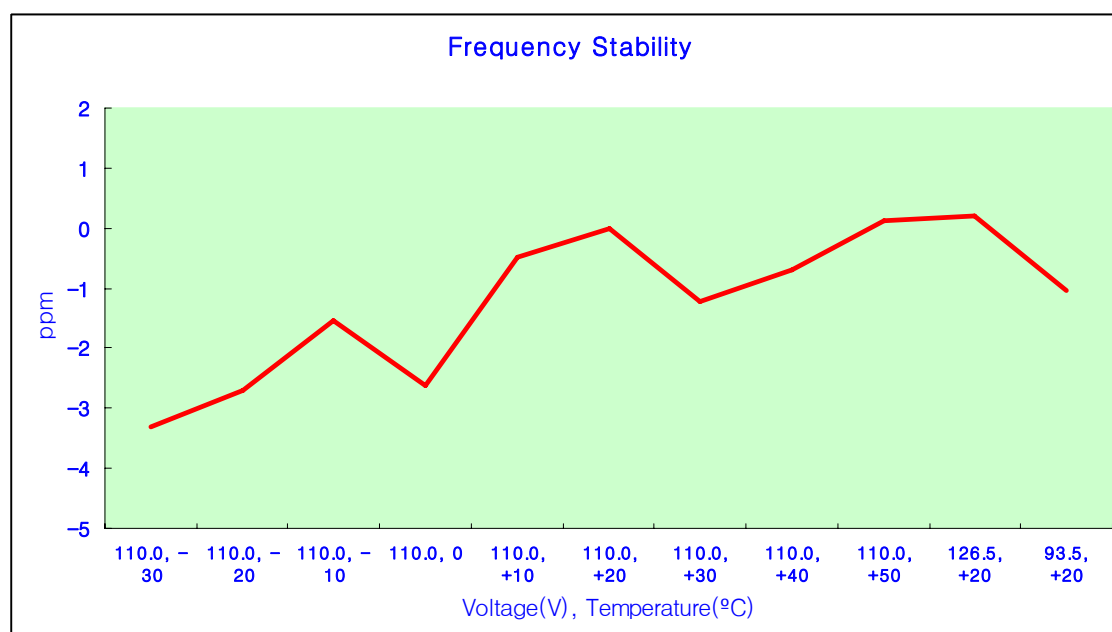
### 7.5.8 Graph



### 7.5.9 Test Result (Channel 40)

Voltage (%)	Power Supply (Vdc)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100%	110	-30	5,199,981,213	-3.4	50.00
100%	110	-20	5,199,984,516	-2.74	
100%	110	-10	5,199,990,619	-1.6	
100%	110	0	5,199,984,936	-2.7	
100%	110	+10	5,199,996,216	-0.5	
100%	110	+20 (Ref.)	5,199,998,796	0	
100%	110	+30	5,199,992,301	-1.2	
100%	110	+40	5,199,995,069	-0.7	
100%	110	+50	5,199,999,481	+0.1	
115%	126.5	+20	5,199,999,830	+0.2	
85%	93.5	+20	5,199,993,312	-1.1	

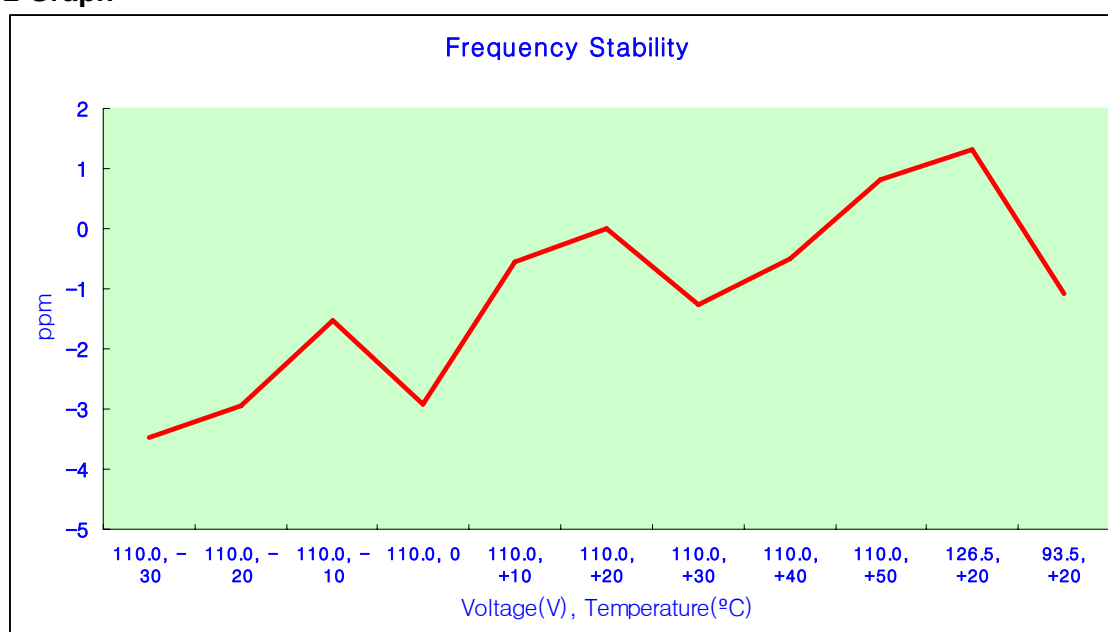
### 7.5.10 Graph



### 7.5.11 Test Result (Channel 48)

Voltage (%)	Power Supply (Vdc)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100%	110	-30	5,239,981,008	-3.5	50.00
100%	110	-20	5,239,983,699	-3.0	
100%	110	-10	5,239,991,236	-1.5	
100%	110	0	5,239,983,891	-2.9	
100%	110	+10	5,239,996,330	-0.5	
100%	110	+20 (Ref.)	5,239,999,200	0	
100%	110	+30	5,239,992,621	-1.3	
100%	110	+40	5,239,996,613	-0.5	
100%	110	+50	5,240,003,511	+0.8	
115%	126.5	+20	5,240,006,160	+1.3	
85%	93.5	+20	5,239,993,548	-1.1	

### 7.5.12 Graph



### 7.4.13 Plot of Frequency Stability

Frequency	Frequency Stability
5180 MHz -1495 Hz	
5200 MHz -1204 Hz	
5240 MHz -800 Hz	

## 7.6 Unwanted Emission (Conducted)

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 23 °C/ 50 %  
Result : Pass

### 7.6.1 Definition

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

### 7.6.2 Method of Measurement

FCC Rules Part 15, Section 15.407(b)(1)

### 7.6.3 Measurement Set-Up

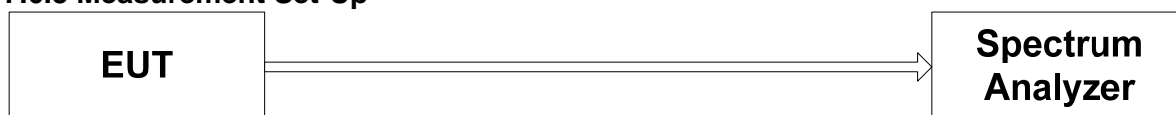


Fig-6

### 7.6.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST

### 7.6.5 Test Procedure

- ① Connect the equipment as Fig-10.
- ② Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
- ③ Measure the spurious emission.
- ④ RBW 1 MHz, VBW 1 MHz, Max Hold
- ⑤ The other emissions is not found.

### 7.6.6 Limit

- ① -27 dBm/MHz

### 7.6.7 Test Result

The test was performed to make a direct field strength measurement at the bandedge frequencies.

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



7.6.8 Plot of Unwanted Emission (802.11a / Channel 36)

Frequency	Unwanted Emission
<div>30 MHz</div> <div>~</div> <div>5.15 MHz</div>	
<div>5.35 MHz</div> <div>~</div> <div>26.5 GHz</div>	
<div>Band Edge</div> <div>44.49 dBm/MHz</div>	

7.6.9 Plot of Unwanted Emission (802.11a / Channel 40)

Frequency	Unwanted Emission
<div>30 MHz</div> <div>~</div> <div>5.15 MHz</div>	
<div>5.35 MHz</div> <div>~</div> <div>26.5 GHz</div>	

7.6.10 Plot of Unwanted Emission (802.11a / Channel 48)

Frequency	Unwanted Emission
<div>30 MHz</div> <div>~</div> <div>5.15 MHz</div>	
<div>5.35 MHz</div> <div>~</div> <div>26.5 GHz</div>	
<div>Band Edge</div> <div>44.49 dBm/MHz</div>	

## 7.7 Unwanted Emission (Radiated)

EUT : DosaLink-540  
Operating Condition : Continues TX  
Environment Condition : 17 °C/ 41 %  
Result : Pass

### 7.7.1 Definition

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

### 7.7.2 Method of Measurement

FCC Rules Part 15, Section 15.407(b)(1)

### 7.7.3 Measurement Set-Up

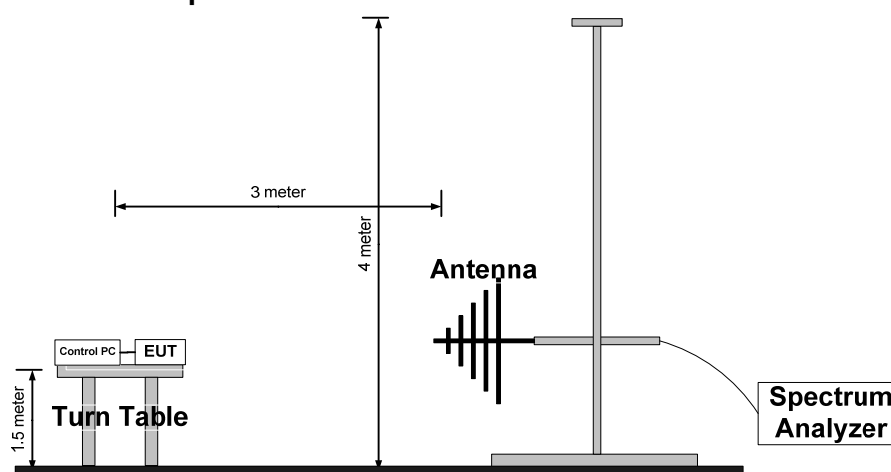


Fig-7

### 7.7.4 Test Equipment List

Equipment	Model Name	Manufacture
EUT	DosaLink-540	BDS
Spectrum Analyzer	R3273	ADVANTEST
Bilog Antenna	VULB9161	SCHWARZBECK
Horn Antenna	BBHA 9120 D	SCHWARZBECK

### 7.7.5 Test Procedure

- ① Connect the equipment as Fig-7.
- ② Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
- ③ Radiated emissions measured in frequency above 1GHz were made with an instrument using Peak detector mode and Average detector mode.
- ④ Mode Setting
  - Peak Mode      RBW: 1MHz, VBW: 1MHz
  - Average Mode   RBW: 1MHz, VBW: 300Hz

### 7.7.6 Limit

① -27dBm/MHz (= 68.3 dBuV/m)

$$E = \frac{1000000 \times \sqrt{30P}}{3} \text{ uV/m, where P is the EIRP in Watts}$$

Therefore: -27 dBm/MHz = 68.23 dBuV/m at 3meters.

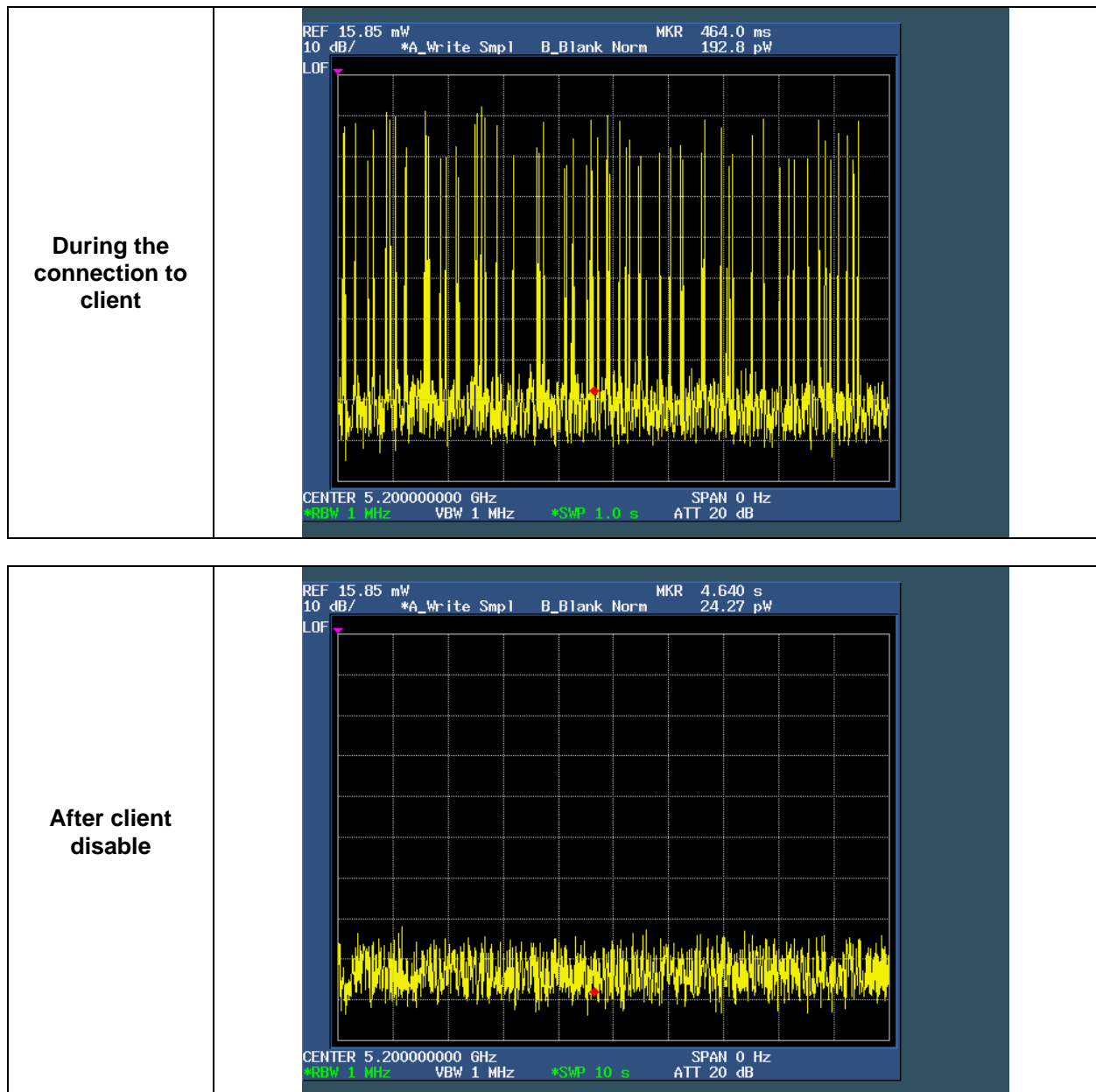
### 7.7.7 Test Result

Operation Frequency (MHz)	Frequency (MHz)	Field Strength (dBuV/m)	Limit (dBuV/m)
5180	5180.2	87.9	-
	-	-	68.23
5240	5239.6	88.1	-
	-	-	68.23

The emission emitted by the EUT is too low to be measured except the emission listed above

## 7.8 DISCONTINUE TRANSMISSION

Data Transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, finally to the RF chip. Several special packets (ACKs, CTS, PSpoll, etc) are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which then turns off at the end of the packet. Therefore, the transmitter will be ON only while one of the four mentioned packets is being transmitted.



## 7.9 RF Exposure Requirement

### 7.9.1 Method of Measurement

These devices are not exempted from compliance does not exceed the Commission's RF exposure guidelines. Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:

Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.

Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits Any other RF exposure related issues that may affect MPE compliance.

### 7.9.2 Limits

FCC 1.1310:- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
1500 - 100000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
1500 - 100000	-	-	1.0	30

### 7.9.3 Result

Frequency [MHz]	Conducted Power [dBm]	Antenna Gain [dBi]	Calculated EIRP [mW]	Laboratory's Recommended Minimum RF Safety Distance r (Cm)	Power Density in mW/cm <sup>2</sup> at Formula When r=20Cm (mW/cm <sup>2</sup> )
5180.00	12.37	5.00	54.58	2.08	0.0109
5200.00	12.52	5.00	56.49	2.12	0.0112
5240.00	12.13	5.00	51.64	2.03	0.0103

#### Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

- P : power input to the antenna in mW  
EIRP : Equivalent (effective) isotropic radiated power.  
S : power density mW/cm<sup>2</sup>  
G : numeric gain of antenna relative to isotropic radiator  
R : distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{EIRP}{4\pi S}}$$

#### Note :

1. S = 1.0 mW/cm<sup>2</sup> for Limits for General Population/Uncontrolled Exposures.
2. The time averaged power over 30 minutes will be equaled Output Power.
3. Minimum calculated separation distance between antenna and persons required : 2.12 Cm
4. The power density at a distance of 20Cm calculated from the formula is far below the limit of 1mW/cm<sup>2</sup>.
5. The maximum power density is 0.0112 mW/cm<sup>2</sup>.
6. So it is complied with the limit. SAR report is not required.



## 8. TEST EQUIPMENTS LIST

The listing below denotes the test equipments utilized for the test(s).

	EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date
1	Receiver	ESVS30	ROHDE & SCHWARZ	832854/010	06/22/08
2	Receiver	ESPI	ROHDE & SCHWARZ	100012	11/02/08
3	Spectrum analyzer	R3273	ADVANTEST	150100195	06/25/08
4	Signal Generator	GT9000	GIGATRONICS	9604010	02/22/08
5	Frequency Counter	R5372	ADVANTEST	41855204	02/22/08
6	Shield Room (7m x 4m x 3m)	N/A	SJEMC	0004	N/A
7	Turn Table	OSC-30	N/A	BWS-01	N/A
8	Antenna Mast	JAC-3	DAIL EMC	N/A	N/A
9	Temperature & Humidity chanber	EN-GLMP-54	ENEX	N/A	03/23/08
10	Bilog Antenna	VULB9160	SCHWARZBECK	VULB9160-3122	12/29/07
11	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4067	12/23/07
12	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4068	12/23/07
13	Horn Antenna	3115	ETS-LINDGREN	00055005	02/07/08
14	Horn Antenna	BBHA 9120 D	SCHWARZBECK	BBHA 9120 D 234	02/07/08
15	Horn Antenna	BBHA 9170	SCHWARZBECK	BBHA9170157	02/07/08
16	Power Meter	E4418A	HP	GB38272621	02/22/08
17	Power Sensor	E9301B	HP	US40010238	11/07/08
18	Power supply	IPS-30B03DD	INTERACT	42052	02/22/08