

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-0050

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

TEL: +82 31 333 5997 FAX: +82 31 333 0017

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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-0050 |

2. Description of Test Facility

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 LinkAuthentica
	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

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 50Ω/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 ϕ 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

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
General Requirement			
15.203	Antenna Information	Confirmation	Pass
15.207	Power Line Conducted Emission	Variation	Pass
15.209	Radiated Emission	Variation	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure Requirement	1mW/Cm ²	Pass
15.247(a)	6 dB Bandwidth	500 kHz	Pass
15.247(b)	Maximum Peak Output Power	30 dBm	Pass
15.247(e)	Power Spectral Density	8 dBm	Pass
15.247(d)	Unwanted Emissions	20 dBc	Pass

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

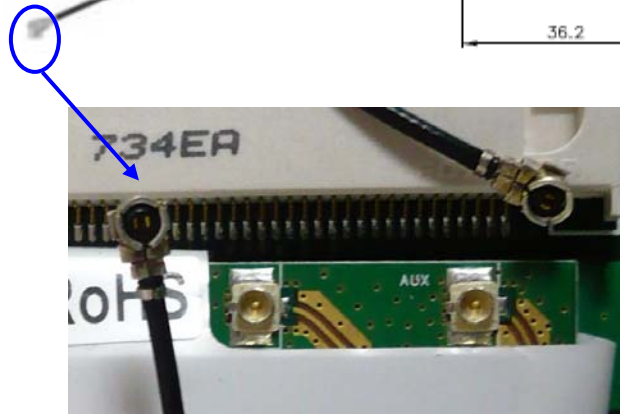
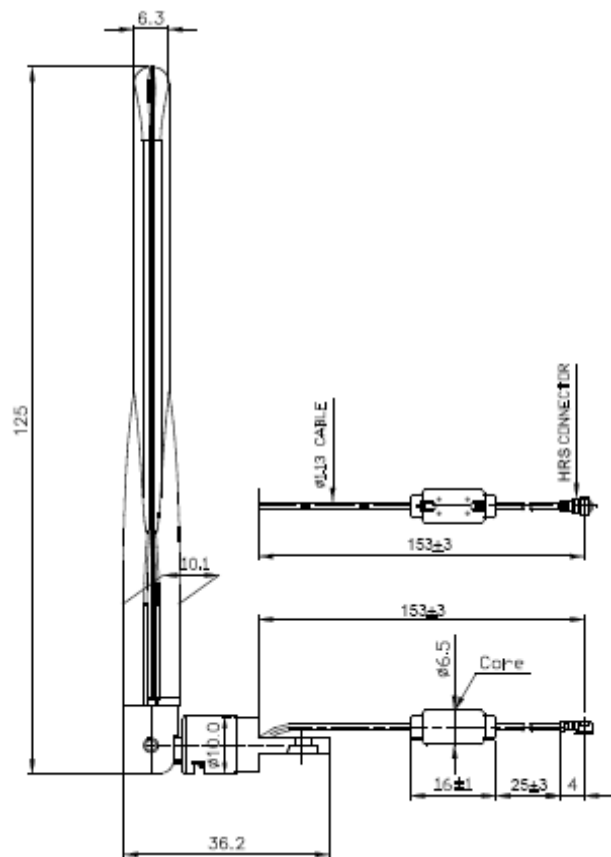
Note : Modification to EUT

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.

7. General Requirement

7.1 Antenna Information

Manufacturer of Antenna	: SmartAnt Telecom Co., Ltd.
Antenna Name	: BDS04-22055D
Antenna Type	: Dual-Band Omni-Directional Antenna
Maximum Antenna Gain	: 2400 MHz - 2500 MHz : 2.5 dBi 4900 MHz - 5875 MHz : 5.0 dBi
VSWR	: 2.0 Max.
Polarization	: Linear, Vertical
Connector type	: HRS



7.2 Power Line Conducted Emission

EUT : DosaLink-540
Limit apply to : FCC Part15 Subpart C Section 15.207
Operation Condition : Normal operation per each channel
Environment Condition : 24 °C/ 46 %
Result : Passed by -14.40 dB

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Tabulated Conducted Emission Test Data

Detector Mode ; CISPR Quasi Peak mode (6dB Bandwidth : 9kHz).

Freq [MHz]	Correction		Phase [H/N]	Quasi-Peak Mode				Average Mode			
	AMN	C.L		Limit	Reading	Emission Level	Margin	Limit	Reading	Emission Level	Margin
				[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.202	0.07	0.10	H	64.60	49.03	49.20	15.40	54.60			
0.266	0.07	0.16	N	62.70	46.15	46.38	16.32	52.70			
0.346	0.08	0.22	N	60.40	41.98	42.28	18.12	50.40			
0.398	0.08	0.24	N	59.00	40.33	40.65	18.35	49.00			
0.458	0.07	0.28	N	57.30	35.25	35.60	21.70	47.30			
0.534	0.07	0.30	N	56.00	37.29	37.66	18.34	46.00			
0.606	0.07	0.30	N		33.29	33.66	22.34				
1.134	0.04	0.42	N		34.28	34.74	21.26				
1.854	0.03	0.53	N		33.77	34.33	21.67				
4.066	0.03	0.77	N		34.53	35.33	20.67				
6.526	0.04	0.93	H	60.00	42.82	43.79	16.21	50.00			
12.870	0.05	1.17	H		36.51	37.73	22.27				

NOTES:

1. H : Hot Line , N :Neutral Line
2. Emission Level = Reading + Correction Factor
3. Margin = Limit - Emission Level
4. Measurements were performed at the AC Power Inlet of the host PC with the EUT plugged in the frequency band of 150kHz ~30MHz
5. Measurement uncertainty estimated at ± 3.56 dB.
The measurement uncertainty is given with a confidence of 95.45 % with the coverage factor, k=2.



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Line

Power Line Conducted Emission

RBW 9 kHz
MT 20 ms
Att 0 dB AUTO PREAMP OFF

dBμV

1 PK
CLRWR

55022_BQ

55022_BV

1 MHz 10 MHz

150 kHz 30 MHz

SGL

TDF

PRN

Hot

Neutral

7.3 Radiated Emission

EUT : DosaLink-540
 Limit apply to : FCC Part15 Subpart C Section 15.209
 FCC Part15 Subpart C Section 15.247
 FCC Part15 Subpart E Section 15.407
 Operation Condition : Normal operation per each channel
 Environment Condition : 8 °C/ 40 %
 Result : Passed by -3.10 dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 120 kHz)
 Measurement Distance : 10 meters

Frequency [MHz]	Reading [dB μ V]	Polarization [*H/**V]	Ant.Factor [dB]	Cable Loss [dB]	Limit [dB μ V/m]	Emission Level [dB μ V/m]	Margin [dB]
125.00	22.50	H	11.96	2.44	43.50	36.90	6.60
200.00	23.83	H	10.12	3.15	43.50	37.10	6.40
250.00	23.46	H	11.83	3.51	46.00	38.80	7.20
300.00	24.91	H	13.41	3.88	46.00	42.20	3.80
360.00	23.13	H	14.84	4.23	46.00	39.50	6.50
500.00	16.73	H	17.68	5.09	46.00	41.30	4.70
520.00	18.05	V	18.06	5.19	46.00	39.30	6.70
566.67	14.84	V	19.04	5.42	46.00	42.90	3.10
600.00	17.43	V	19.89	5.58	46.00	42.20	3.80
766.68	12.38	V	22.35	6.58	46.00	39.70	6.30

NOTES:

- * H : Horizontal polarization , ** V : Vertical polarization
- Emission Level = Reading + Antenna factor + Cable loss
- Margin = Limit - Emission Level
- All other emissions not reported were more than 25dB below the permitted limit.
- Measurement uncertainty estimated at ± 5.52 dB.
 The measurement uncertainty is given with a confidence of 95.45 % with the coverage factor, k=2.



Tested by Jin, Dong-su

7.4 RF Exposure Requirement

7.4.1 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.

7.4.2 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 ²)	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

7.4.3 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 ² at Formula When r=20Cm (mW/cm ²)
2412.00	19.33	2.50	152.41	3.48	0.0303
2437.00	24.31	2.50	479.73	6.18	0.0954
2462.00	17.15	2.50	92.26	2.71	0.0184
5745.00	21.10	5.00	407.38	5.69	0.0810
5785.00	20.66	5.00	368.13	5.41	0.0732
5825.00	21.29	5.00	425.60	5.82	0.0847
5800.00	21.29	5.00	425.60	5.82	0.0847

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/cm²
 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/cm² 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 : 6.18 Cm
4. The power density at a distance of 20Cm calculated from the formula is far below the limit of 1mW/cm².
5. The maximum power density is 0.0954 mW/cm².
6. So it is complied with the limit. SAR report is not required.

7.5 6 dB Bandwidth

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

7.5.1 Definition

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.5.2 Method of Measurement

FCC Rules Part 15, Section 15.247(a)(2)

8.1.3 Measurement Set-Up



Fig-1

7.5.4 Test Equipment List

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

7.5.5 Test Procedure

- ① Connect the equipment as Fig-1.
- ② Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level.
- ③ RBW 100 kHz, VBW 100 kHz, Max Hold

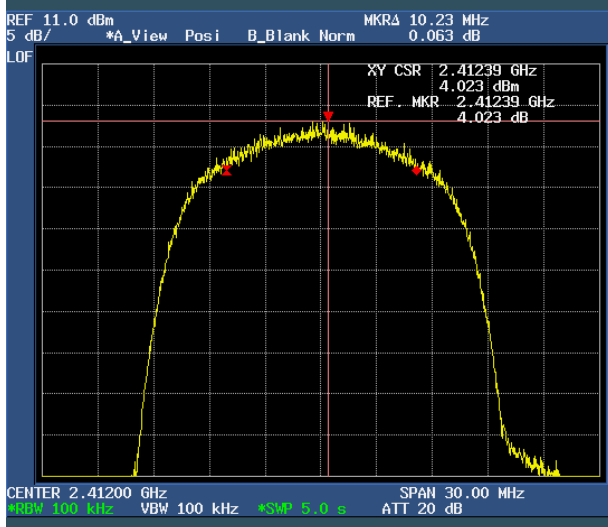
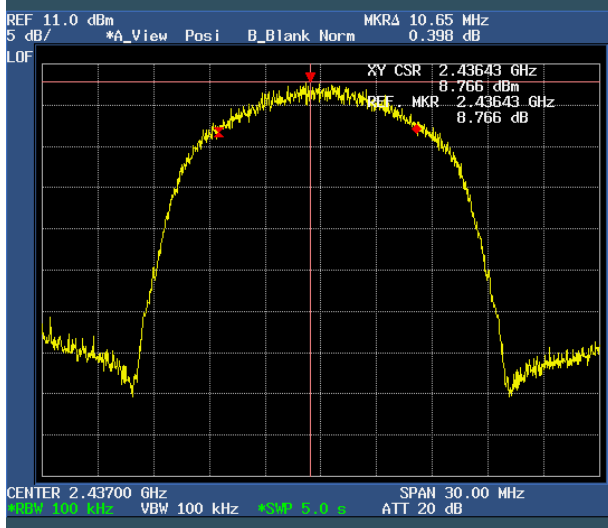
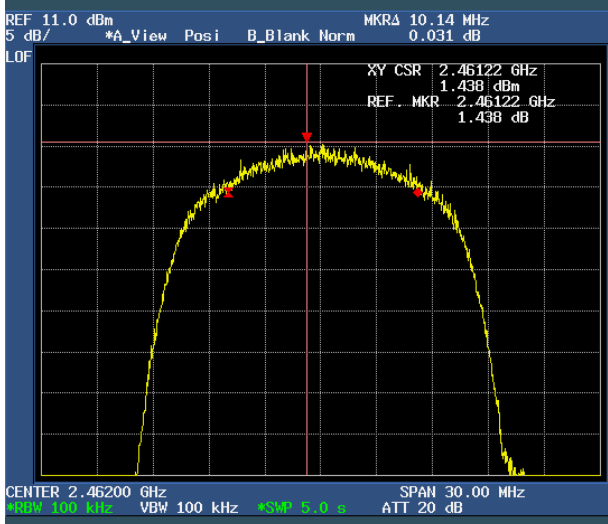
7.5.6 Limit

- ① More than 500 kHz

7.5.7 Test Result

Mode	Frequency	Measured Bandwidth (MHz)	Limit (MHz)
802.11b DSSS	2412 MHz	10.23	0.5
	2437 MHz	10.65	
	2462 MHz	10.14	
802.11g OFDM	2412 MHz	16.23	
	2437 MHz	16.41	
	2462 MHz	16.05	
802.11a OFDM	5745 MHz	16.35	
	5785 MHz	16.38	
	5825 MHz	16.41	

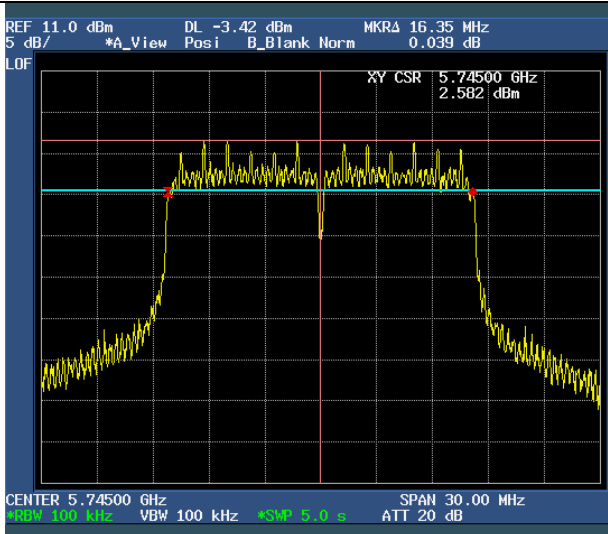
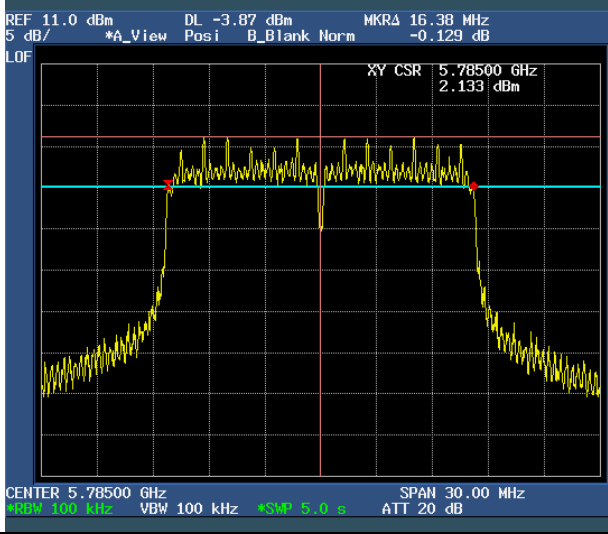
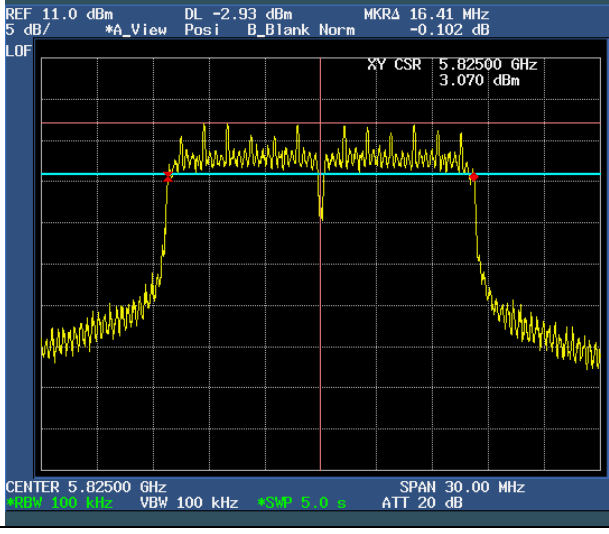
7.5.8 Plot of 6 dB Bandwidth (802.11b)

Frequency	6 dB Bandwidth
2412 MHz 10.23 MHz	
2437 MHz 10.65 MHz	
2462 MHz 10.14 MHz	

7.5.9 Plot of 6 dB Bandwidth (802.11g)

Frequency	6 dB Bandwidth
<p>2412 MHz</p> <p>16.23 MHz</p>	<p>REF 11.0 dBm 5 dB/Hz *A_Write Posi B_Blank Norm MKRΔ 16.23 MHz 0.270 dB</p> <p>XY CSR 2.41200 GHz -4.246 dBm REF. MKR 2.40573 GHz 1.754 dB</p> <p>CENTER 2.41200 GHz SPAN 30.00 MHz *BW 100 kHz *VBW 100 kHz *SMP 5.0 μs *ATT 40 dB</p>
<p>2437 MHz</p> <p>16.41 MHz</p>	<p>REF 11.0 dBm 5 dB/Hz *A_Write Posi B_Blank Norm MKRΔ 16.41 MHz 0.020 dB</p> <p>XY CSR 2.43700 GHz -3.863 dBm REF. MKR 2.43397 GHz 5.570 dB</p> <p>CENTER 2.43700 GHz SPAN 30.00 MHz *BW 100 kHz *VBW 100 kHz *SMP 5.0 μs *ATT 40 dB</p>
<p>2462 MHz</p> <p>16.05 MHz</p>	<p>REF 11.0 dBm 5 dB/Hz *A_Write Posi B_Blank Norm MKRΔ 16.05 MHz -0.398 dB</p> <p>XY CSR 2.46200 GHz -6.563 dBm REF. MKR 2.45696 GHz -0.563 dBm</p> <p>CENTER 2.46200 GHz SPAN 30.00 MHz *BW 100 kHz *VBW 100 kHz *SMP 5.0 μs *ATT 40 dB</p>

7.5.10 Plot of 6 dB Bandwidth (802.11a)

Frequency	6 dB Bandwidth
5745 MHz 16.35 MHz	 <p>REF 11.0 dBm DL -3.42 dBm MKRΔ 16.35 MHz 5 dB/ *A_View Posi B_Blank Norm 0.039 dB LOF XY CSR 5.74500 GHz 2.582 dBm CENTER 5.74500 GHz SPAN 30.00 MHz RBW 100 kHz VBW 100 kHz *SMF 5.0 % ATT 20 dB</p>
5785 MHz 16.38 MHz	 <p>REF 11.0 dBm DL -3.87 dBm MKRΔ 16.38 MHz 5 dB/ *A_View Posi B_Blank Norm -0.129 dB LOF XY CSR 5.78500 GHz 2.133 dBm CENTER 5.78500 GHz SPAN 30.00 MHz RBW 100 kHz VBW 100 kHz *SMF 5.0 % ATT 20 dB</p>
5825 MHz 16.41 MHz	 <p>REF 11.0 dBm DL -2.93 dBm MKRΔ 16.41 MHz 5 dB/ *A_View Posi B_Blank Norm -0.102 dB LOF XY CSR 5.82500 GHz 3.070 dBm CENTER 5.82500 GHz SPAN 30.00 MHz RBW 100 kHz VBW 100 kHz *SMF 5.0 % ATT 20 dB</p>

7.6 Maximum Peak Output Power

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

7.6.1 Definition

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

7.6.2 Method of Measurement

FCC Rules Part 15, Section 15.247(b)(3)

7.6.3 Measurement Set-Up

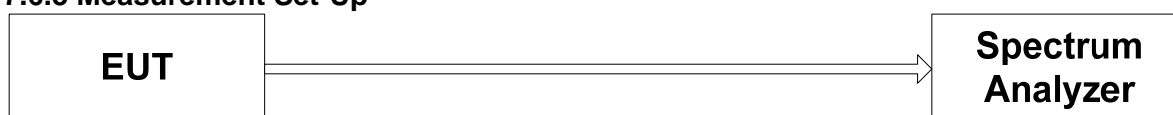


Fig-2

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

7.6.6 Limit

- ① 1 W

7.6.7 Test Result

Mode	Frequency	Output Power (dBm)	Limit (dBm)
802.11b DSSS	2412 MHz	19.21	30.0
	2437 MHz	24.31	
	2462 MHz	16.83	
802.11g OFDM	2412 MHz	19.33	
	2437 MHz	20.58	
	2462 MHz	17.15	
802.11a OFDM	5745 MHz	21.10	
	5785 MHz	20.66	
	5825 MHz	21.29	

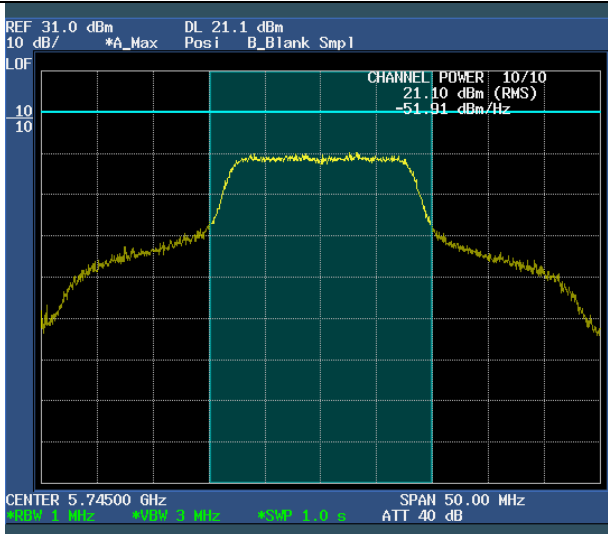
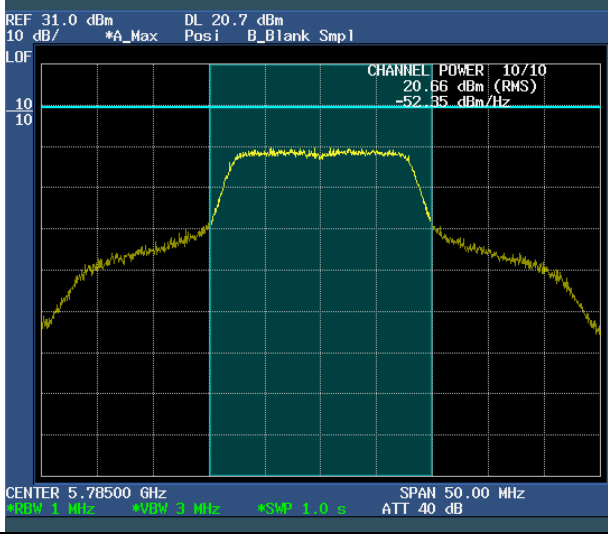
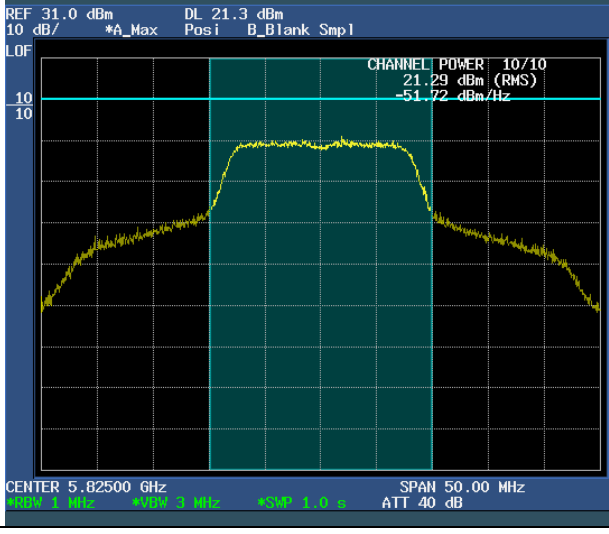
7.6.8 Plot of Maximum Peak Output Power (802.11b)

Frequency	Maximum Peak Output Power
<p>2412 MHz</p> <p>19.21 dBm</p>	<p>REF 31.0 dBm DL 19.2 dBm 10 dB/ *A_Max Posi B_Blank Smp1</p> <p>CHANNEL POWER: 10/10 19.21 dBm (RMS) -53.80 dBm/Hz</p> <p>CENTER 2.41200 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 40 dB</p>
<p>2437 MHz</p> <p>24.31 dBm</p>	<p>REF 31.0 dBm DL 24.3 dBm 10 dB/ *A_Max Posi B_Blank Smp1</p> <p>CHANNEL POWER: 10/10 24.31 dBm (RMS) -48.70 dBm/Hz</p> <p>CENTER 2.43700 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 40 dB</p>
<p>2462 MHz</p> <p>16.83 dBm</p>	<p>REF 31.0 dBm DL 16.8 dBm 10 dB/ *A_Max Posi B_Blank Smp1</p> <p>CHANNEL POWER: 10/10 16.83 dBm (RMS) -56.18 dBm/Hz</p> <p>CENTER 2.46200 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s ATT 40 dB</p>

7.6.9 Plot of Maximum Peak Output Power (802.11g)

Frequency	Maximum Peak Output Power
<p>2412 MHz</p> <p>19.33 dBm</p>	<p>REF 31.0 dBm DL 19.3 dBm 10 dB/ *A_Max Posi B_Blank Smp l</p> <p>CHANNEL POWER: 10/10 19.33 dBm (RMS) -53.68 dBm/Hz</p> <p>CENTER 2.41200 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s *ATT 30 dB</p>
<p>2437 MHz</p> <p>20.58 dBm</p>	<p>REF 31.0 dBm DL 20.6 dBm 10 dB/ *A_Max Posi B_Blank Smp l</p> <p>CHANNEL POWER: 10/10 20.58 dBm (RMS) -52.43 dBm/Hz</p> <p>CENTER 2.43700 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s *ATT 30 dB</p>
<p>2462 MHz</p> <p>17.15 dBm</p>	<p>REF 31.0 dBm DL 17.1 dBm 10 dB/ *A_Max Posi B_Blank Smp l</p> <p>CHANNEL POWER: 10/10 17.15 dBm (RMS) -55.86 dBm/Hz</p> <p>CENTER 2.46200 GHz SPAN 50.00 MHz *RES 1 MHz *POS 3 MHz *SMP 1.0 s *ATT 30 dB</p>

7.6.10 Plot of Maximum Peak Output Power (802.11a)

Frequency	Maximum Peak Output Power
5745 MHz 21.10 dBm	
5785 MHz 20.66 dBm	
5825 MHz 21.29 dBm	

7.7 Power Spectral Density

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

7.7.1 Definition

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.7.2 Method of Measurement

FCC Rules Part 15, Section 15.247(e)

7.7.3 Measurement Set-Up



Fig-3

7.7.4 Test Equipment List

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

7.7.5 Test Procedure

- ① Connect the equipment as Fig-3.
- ② Measure conducted Power Spectral Density of relevant channel using Spectrum analyzer.
- ③ RBW 3 kHz, VBW 10 kHz, Sweep Time 60 s.

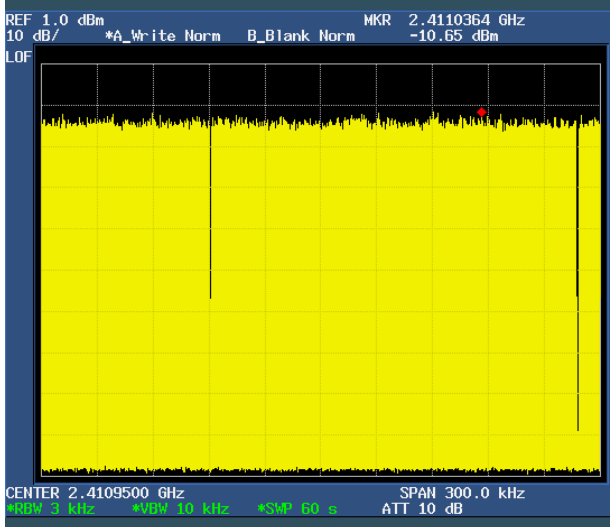
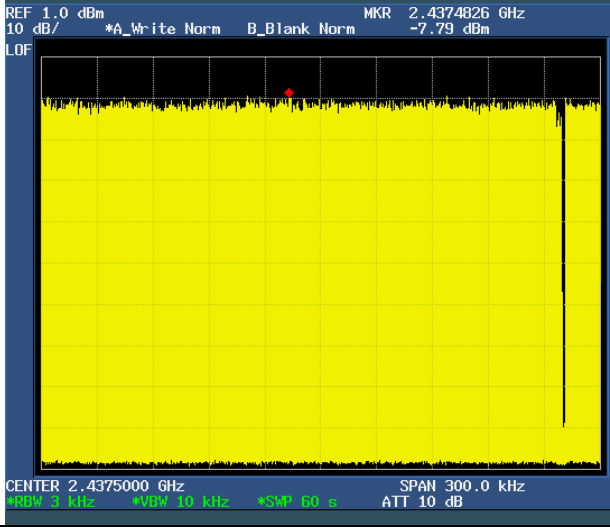
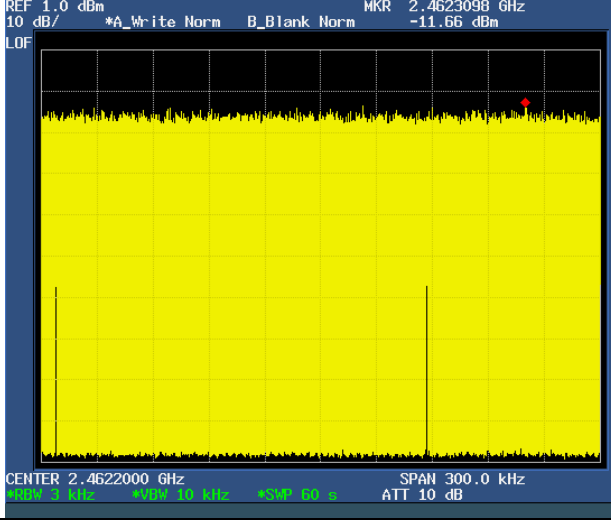
7.7.6 Limit

- ① 8 dBm

7.7.7 Test Result

Mode	Frequency	Power Density (dBm)	Limit (dBm)
802.11b DSSS	2412 MHz	-10.65	8.0
	2437 MHz	-7.79	
	2462 MHz	-11.66	
802.11g OFDM	2412 MHz	-12.09	
	2437 MHz	-6.48	
	2462 MHz	-15.42	
802.11a OFDM	5745 MHz	-12.46	
	5785 MHz	-12.78	
	5825 MHz	-11.34	

7.7.8 Plot of Power Spectral Density (802.11b)

Frequency	Power Spectral Density
2412 MHz -10.65 dBm	
2437 MHz -7.79 dBm	
2462 MHz -11.66 dBm	

7.7.9 Plot of Power Spectral Density (802.11g)

Frequency	Power Spectral Density
2412 MHz -12.09 dBm	
2437 MHz -6.48 dBm	
2462 MHz -15.42 dBm	

7.7.10 Plot of Power Spectral Density (802.11a)

Frequency	Power Spectral Density
5745 MHz -12.46 dBm	<p>REF 1.0 dBm 10 dB/1 *A_Write Norm B_Blank Norm MKR 5.7459220 GHz -12.46 dBm LOF CENTER 5.7459400 GHz SPAN 300.0 kHz *BW 1 kHz *BW 10 kHz *SMP 60 s ATT 10 dB</p>
5785 MHz -12.78 dBm	<p>REF 1.0 dBm 10 dB/1 *A_Max Norm B_Blank Norm MKR 5.7884600 GHz -12.78 dBm LOF CENTER 5.7884600 GHz SPAN 300.0 kHz *BW 1 kHz *BW 10 kHz *SMP 60 s ATT 10 dB</p>
5825 MHz -11.34 dBm	<p>REF 1.0 dBm 10 dB/1 *A_Max Norm B_Blank Norm MKR 5.8202976 GHz -11.34 dBm LOF CENTER 5.8203600 GHz SPAN 300.0 kHz *BW 1 kHz *BW 10 kHz *SMP 60 s ATT 10 dB</p>

7.8 Unwanted Emission (Conducted)

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

7.8.1 Definition

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.8.2 Method of Measurement

FCC Rules Part 15, Section 15.247(d)

7.8.3 Measurement Set-Up

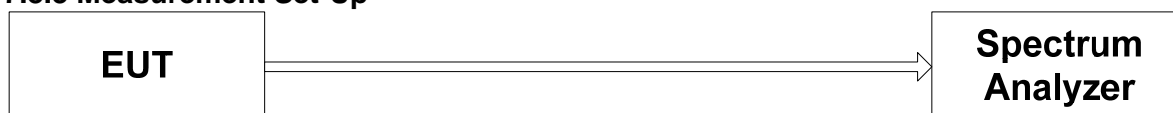


Fig-4

7.8.4 Test Equipment List

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

7.8.5 Test Procedure

- ① Connect the equipment as Fig-4.
- 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 100kHz, VBW 100kHz, Max Hold
- ⑤ The other emissions is not found.

7.8.6 Limit

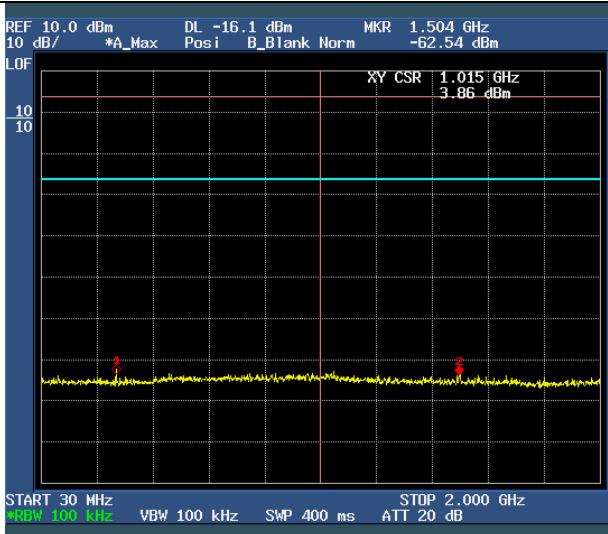
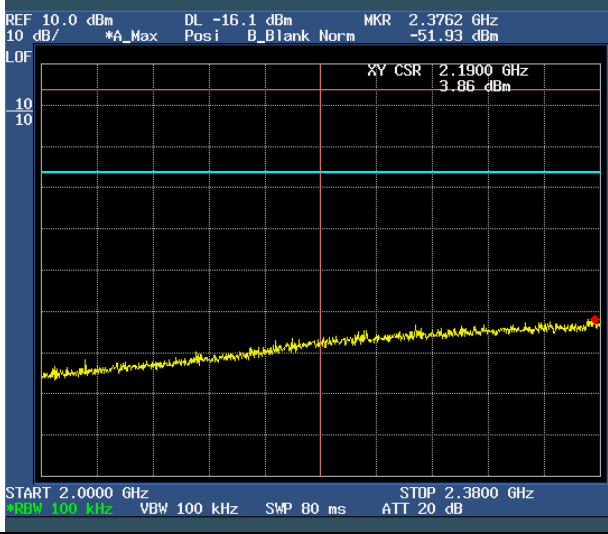
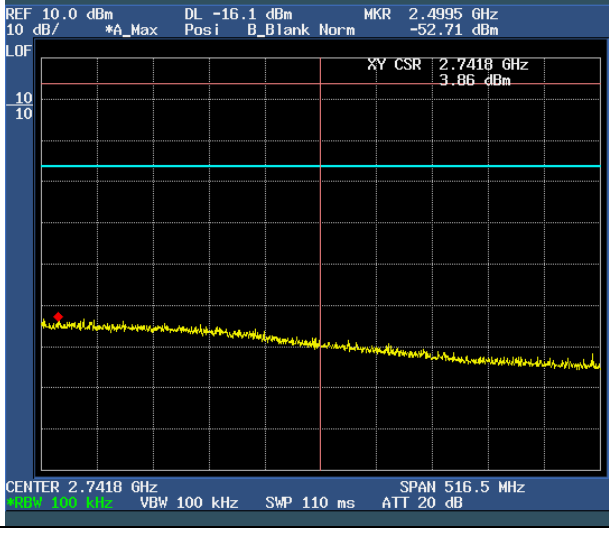
- ① 20 dBc

7.8.7 Test Result

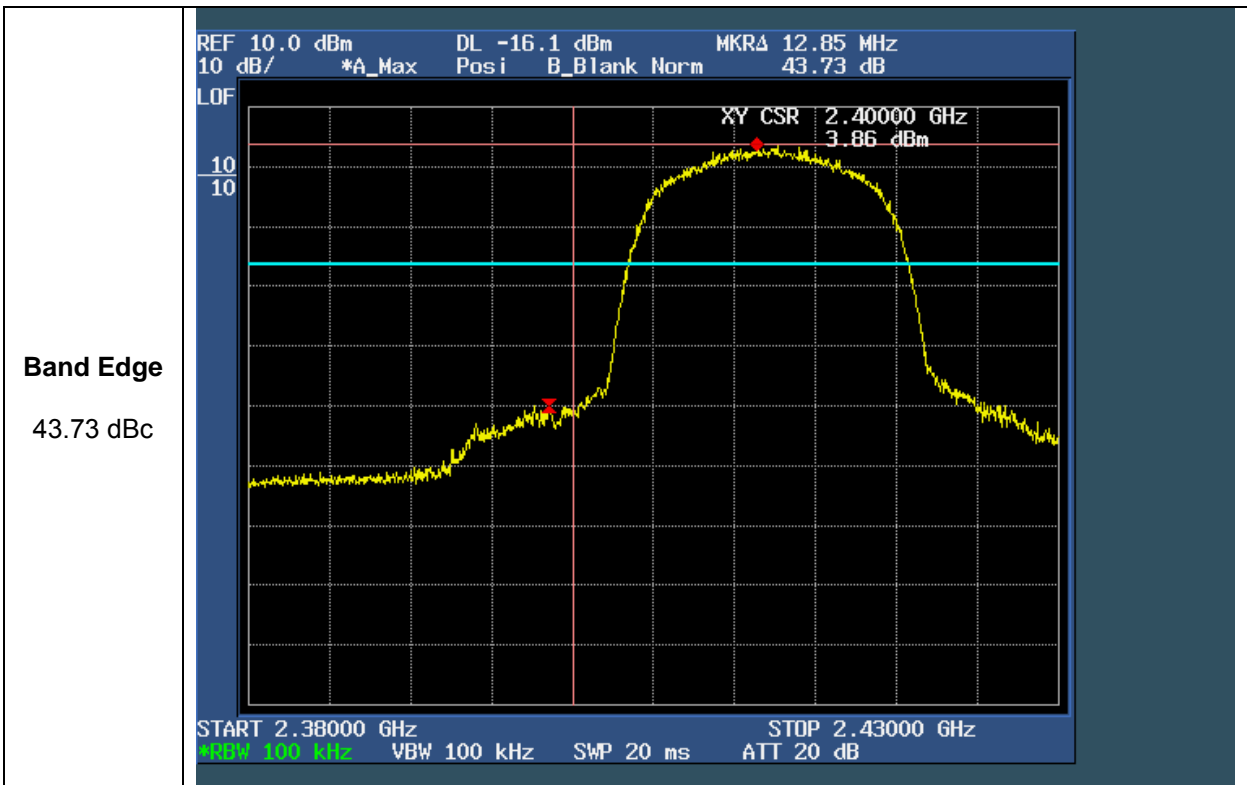
The test was performed to make a direct field strength measurement at the bandedge frequencies.

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. There is a restricted band starting at 2483.5 MHz and another restricted band from 2310 - 2390 MHz.

7.8.8 Plot of Unwanted Emission (802.11b / Channel 1)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	 <p>REF 10.0 dBm DL -16.1 dBm MKR 1.504 GHz 10 dB/ *A_Max Posi B_Blank Norm -62.54 dBm LOF XY CSR 1.015 GHz 3.86 dBm START 30 MHz STOP 2.000 GHz VBW 100 kHz SWP 400 ms ATT 20 dB</p>
2 GHz ~ 2.38 GHz	 <p>REF 10.0 dBm DL -16.1 dBm MKR 2.3762 GHz 10 dB/ *A_Max Posi B_Blank Norm -51.93 dBm LOF XY CSR 2.1900 GHz 3.86 dBm START 2.0000 GHz STOP 2.3800 GHz VBW 100 kHz SWP 80 ms ATT 20 dB</p>
2.4835 GHz ~ 3 GHz	 <p>REF 10.0 dBm DL -16.1 dBm MKR 2.4995 GHz 10 dB/ *A_Max Posi B_Blank Norm -52.71 dBm LOF XY CSR 2.7418 GHz 3.86 dBm CENTER 2.7418 GHz SPAN 516.5 MHz VBW 100 kHz SWP 110 ms ATT 20 dB</p>

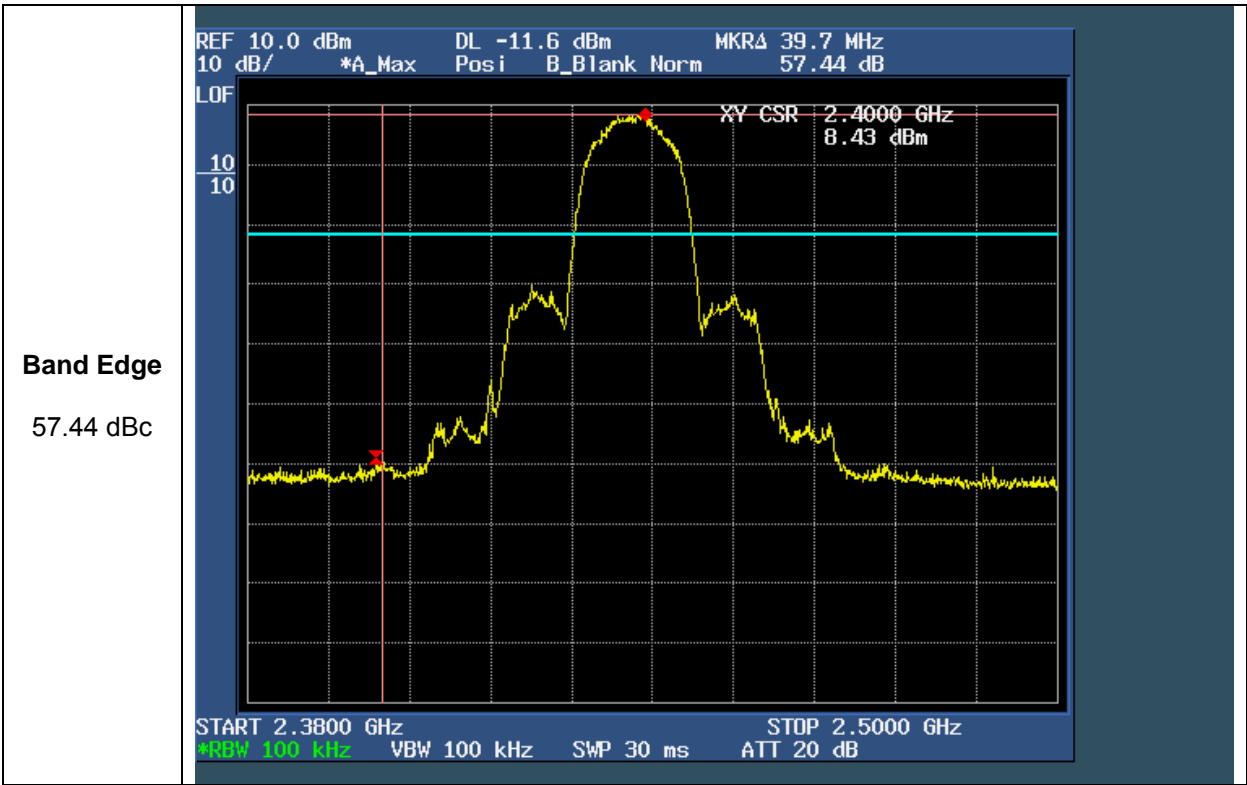
<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>296.3 MHz</div> <div>63.26 dBc</div> </div>	
<div> <div>1.502 GHz</div> <div>65.62 dBc</div> </div>	



7.8.9 Plot of Unwanted Emission (802.11b / Channel 6)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	
2 GHz ~ 2.38 GHz	
2.4835 GHz ~ 3 GHz	

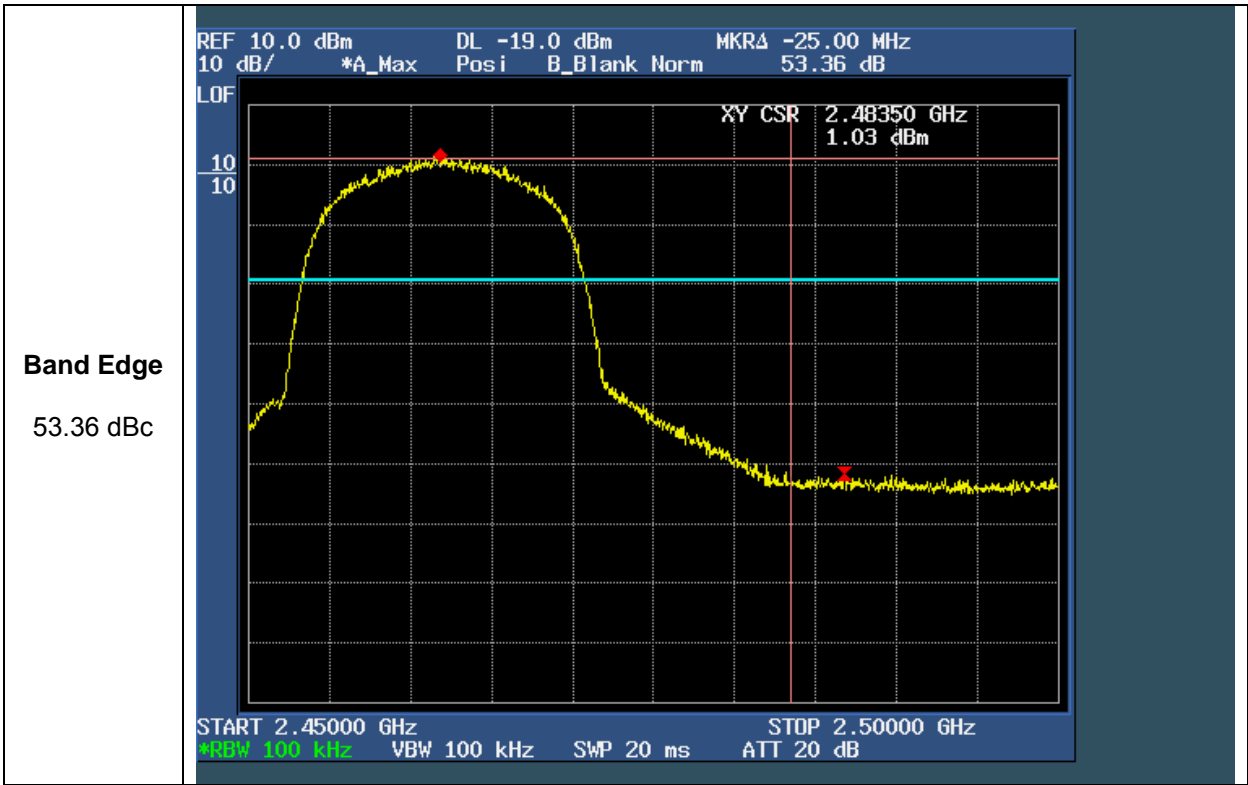
<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>321.3 MHz</div> <div>58.96 dBc</div> </div>	
<div> <div>1.502 GHz</div> <div>56.13 dBc</div> </div>	



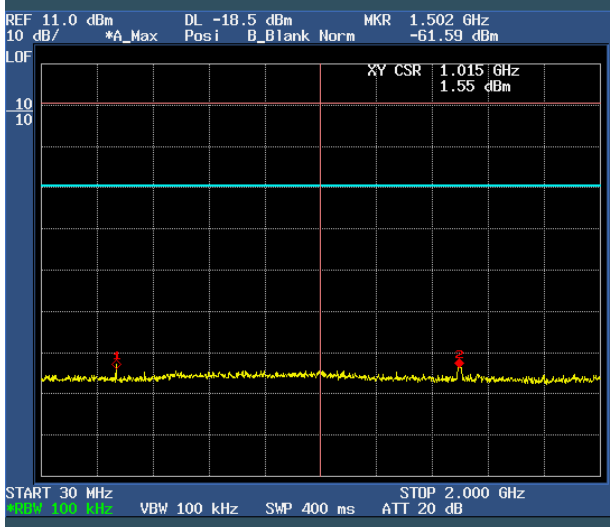
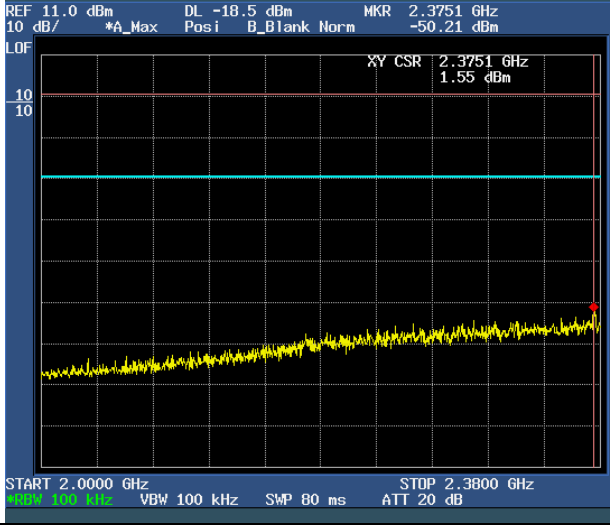
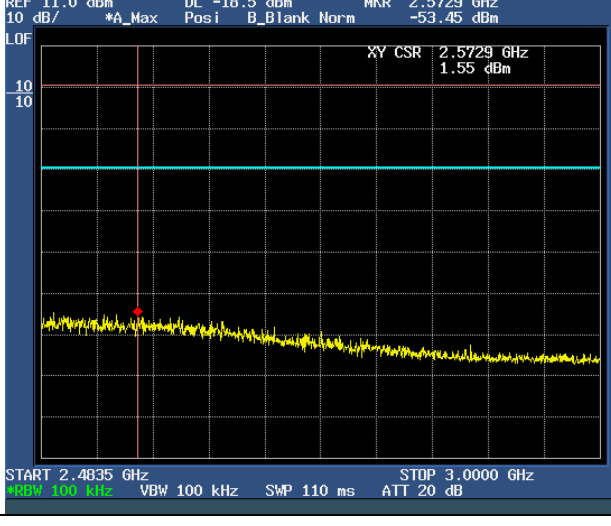
7.8.10 Plot of Unwanted Emission (802.11b / Channel 11)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	<p>REF 10.0 dBm DL -19.0 dBm *A_Max Posi B_Blank Norm</p> <p>XY CSR 1.015 GHz 1.03 dBm</p> <p>START 30 MHz STOP 2.000 GHz</p> <p>VBW 100 kHz SWP 400 ms ATT 20 dB</p>
2 GHz ~ 2.38 GHz	<p>REF 10.0 dBm DL -19.0 dBm MKR 2.3760 GHz -52.52 dBm</p> <p>XY CSR 2.3760 GHz -52.52 dBm</p> <p>START 2.0000 GHz STOP 2.4000 GHz</p> <p>VBW 100 kHz SWP 80 ms ATT 20 dB</p>
2.4835 GHz ~ 3 GHz	<p>REF 10.0 dBm DL -19.0 dBm MKR 2.5675 GHz -53.70 dBm</p> <p>XY CSR 2.5675 GHz -53.70 dBm</p> <p>CENTER 2.7500 GHz SPAN 500.000 MHz</p> <p>VBW 100 kHz SWP 100 ms ATT 20 dB</p>

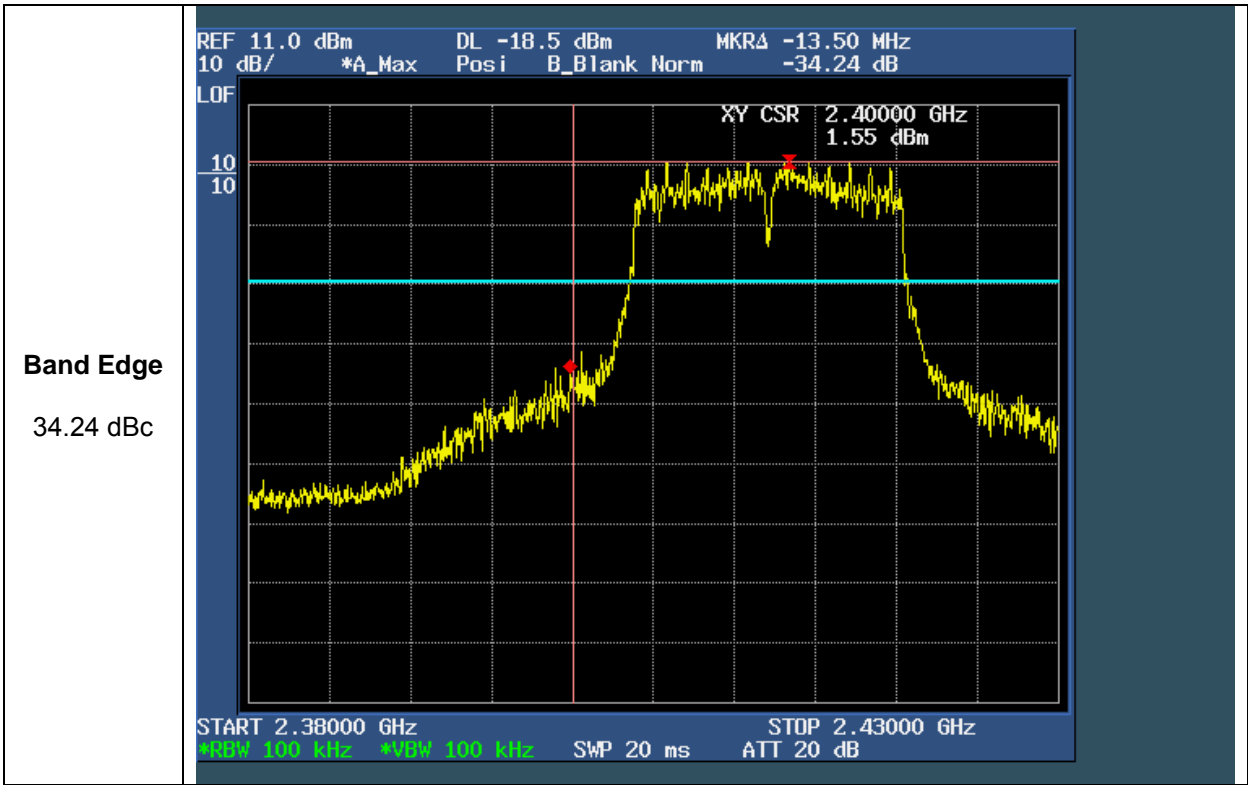
<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>346.3 MHz</div> <div>62.83 dBc</div> </div>	
<div> <div>1.576 GHz</div> <div>63.86 dBc</div> </div>	



7.8.11 Plot of Unwanted Emission (802.11g / Channel 1)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	 <p>REF 11.0 dBm DL -18.5 dBm MKR 1.502 GHz -61.59 dBm 10 dB/ *A_Max Posi B_Blank Norm LOF XY CSR 1.015 GHz 1.55 dBm START 30 MHz STOP 2.000 GHz VBW 100 kHz SWP 400 ms ATT 20 dB</p>
2 GHz ~ 2.38 GHz	 <p>REF 11.0 dBm DL -18.5 dBm MKR 2.3751 GHz -50.21 dBm 10 dB/ *A_Max Posi B_Blank Norm LOF XY CSR 2.3751 GHz 1.55 dBm START 2.0000 GHz STOP 2.3800 GHz VBW 100 kHz SWP 80 ms ATT 20 dB</p>
2.4835 GHz ~ 3 GHz	 <p>REF 11.0 dBm DL -18.5 dBm MKR 2.5729 GHz -53.45 dBm 10 dB/ *A_Max Posi B_Blank Norm LOF XY CSR 2.5729 GHz 1.55 dBm START 2.4835 GHz STOP 3.0000 GHz VBW 100 kHz SWP 110 ms ATT 20 dB</p>

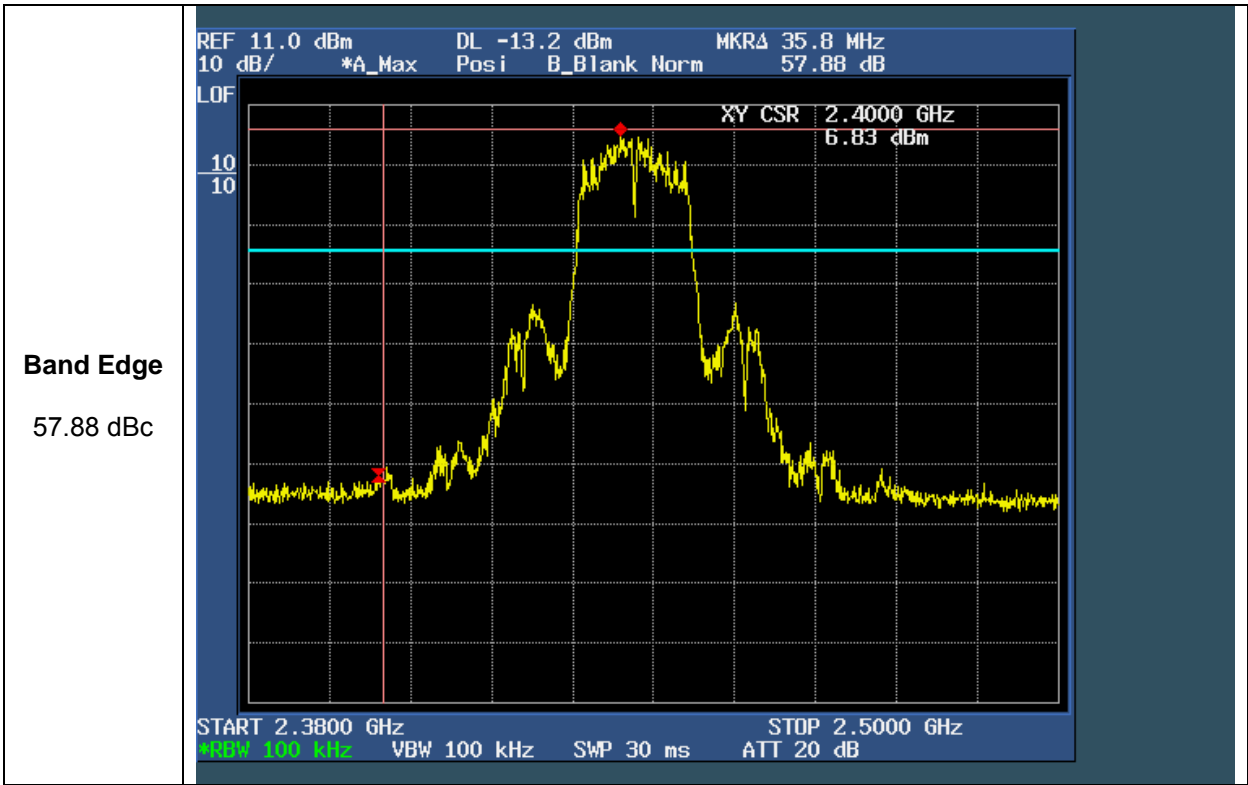
<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>296.3 MHz</div> <div>61.14 dBc</div> </div>	
<div> <div>1.502 GHz</div> <div>61.48 dBc</div> </div>	



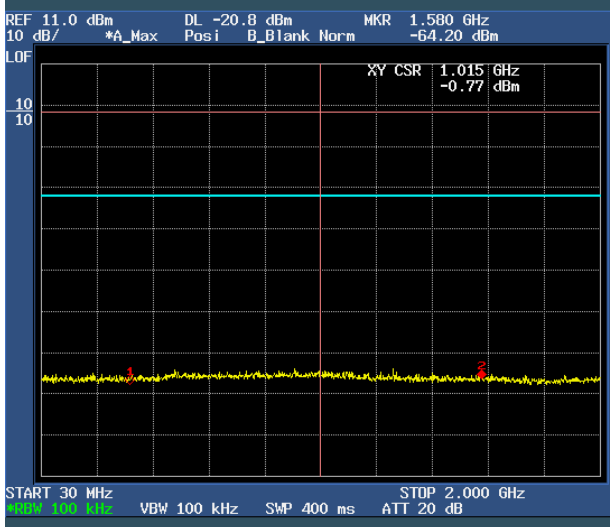
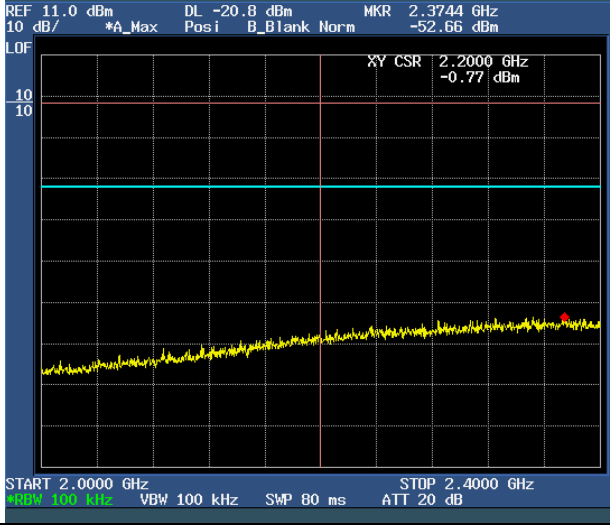
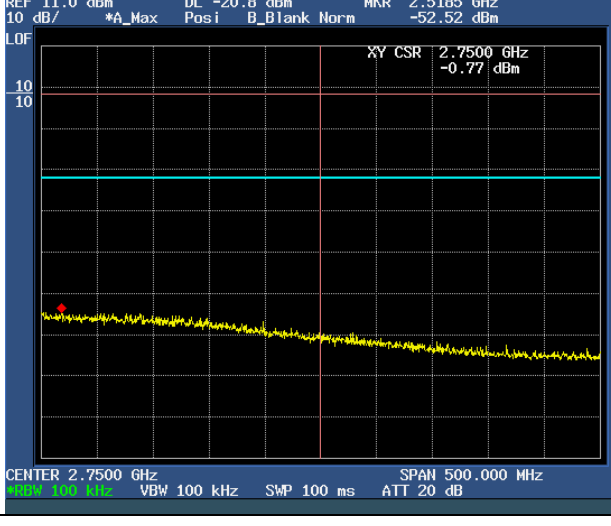
7.8.12 Plot of Unwanted Emission (802.11g / Channel 6)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	
2 GHz ~ 2.38 GHz	
2.4835 GHz ~ 3 GHz	

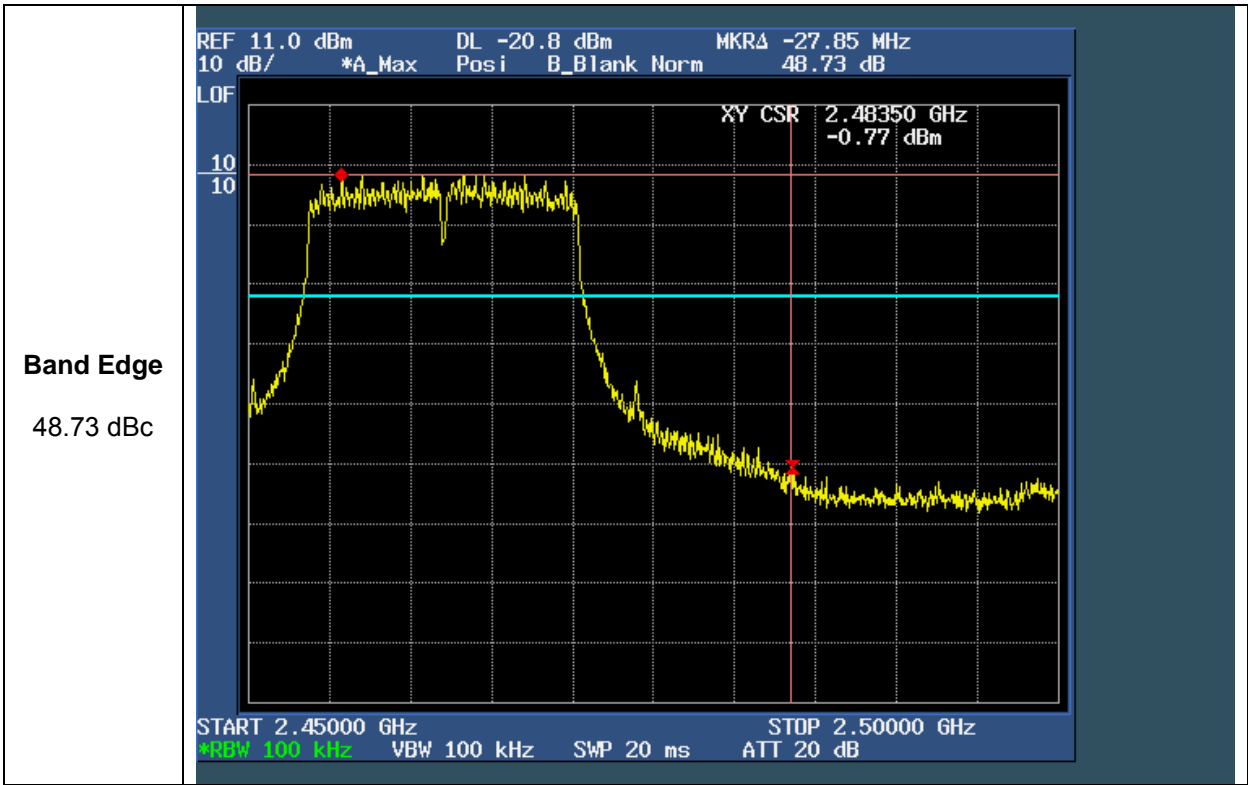
<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>321.3 MHz</div> <div>57.97 dBc</div> </div>	
<div> <div>1.502 GHz</div> <div>54.81 dBc</div> </div>	



7.8.13 Plot of Unwanted Emission (802.11g / Channel 11)

Frequency	Unwanted Emission
30 MHz ~ 2 GHz	 <p>REF 11.0 dBm DL -20.8 dBm MKR 1.580 GHz 10 dB/ *A_Max Posi B_Blank Norm -64.20 dBm LOF XY CSR 1.015 GHz -0.77 dBm START 30 MHz STOP 2.000 GHz VBW 100 kHz SWP 400 ms ATT 20 dB</p>
2 GHz ~ 2.38 GHz	 <p>REF 11.0 dBm DL -20.8 dBm MKR 2.3744 GHz 10 dB/ *A_Max Posi B_Blank Norm -52.66 dBm LOF XY CSR 2.2000 GHz -0.77 dBm START 2.0000 GHz STOP 2.4000 GHz VBW 100 kHz SWP 80 ms ATT 20 dB</p>
2.4835 GHz ~ 3 GHz	 <p>REF 11.0 dBm DL -20.8 dBm MKR 2.5185 GHz 10 dB/ *A_Max Posi B_Blank Norm -52.52 dBm LOF XY CSR 2.7500 GHz -0.77 dBm CENTER 2.7500 GHz SPAN 500.000 MHz VBW 100 kHz SWP 100 ms ATT 20 dB</p>

<div> <div>3 GHz</div> <div>~</div> <div>26.5 GHz</div> </div>	
<div> <div>346.3 MHz</div> <div>63.50 dBc</div> </div>	
<div> <div>1.576 GHz</div> <div>62.86 dBc</div> </div>	



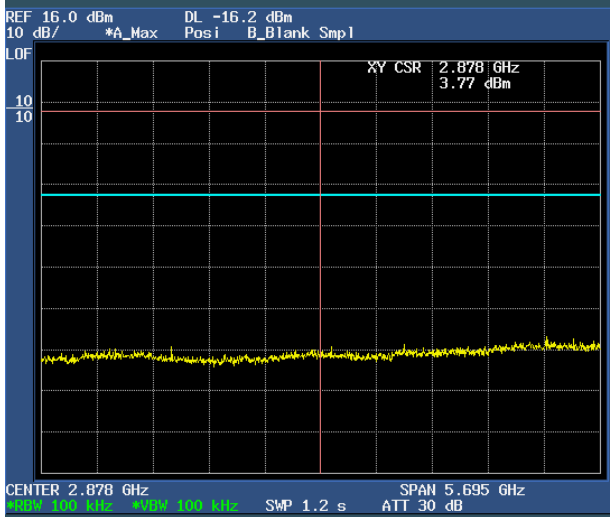
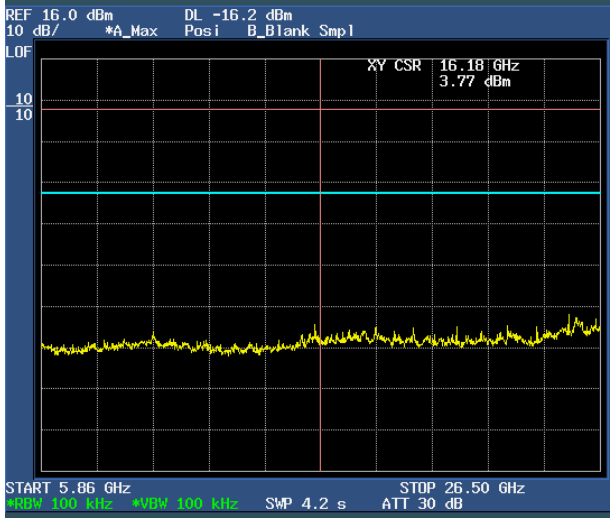
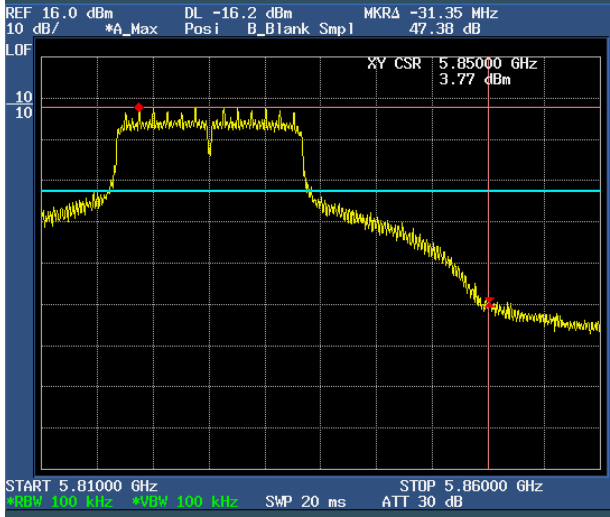
7.8.14 Plot of Unwanted Emission (802.11a / Channel 149)

Frequency	Unwanted Emission
<div>30 MHz</div> <div>~</div> <div>5.725 MHz</div>	
<div>5.85 MHz</div> <div>~</div> <div>26.5 GHz</div>	
<div>Band Edge</div> <div>33.49 dBc</div>	

7.8.15 Plot of Unwanted Emission (802.11ab / Channel 157)

Frequency	Unwanted Emission
<div>30 MHz ~ 5.725 MHz</div>	
<div>5.85 MHz ~ 26.5 GHz</div>	
<div>Band Edge</div> <div>54.05 dBc</div>	

7.8.16 Plot of Unwanted Emission (802.11a / Channel 165)

Frequency	Unwanted Emission
30 MHz ~ 5.725 MHz	 <p>REF 16.0 dBm DL -16.2 dBm *A_Max Posi B_Blank Smp1</p> <p>XY CSR 2.878 GHz 3.77 dBm</p> <p>CENTER 2.878 GHz SPAN 5.695 GHz</p> <p>*RBW 100 kHz *VBW 100 kHz SWP 1.2 s ATT 30 dB</p>
5.85 MHz ~ 26.5 GHz	 <p>REF 16.0 dBm DL -16.2 dBm *A_Max Posi B_Blank Smp1</p> <p>XY CSR 16.18 GHz 3.77 dBm</p> <p>START 5.86 GHz STOP 26.50 GHz</p> <p>*RBW 100 kHz *VBW 100 kHz SWP 4.2 s ATT 30 dB</p>
Band Edge 47.38 dBc	 <p>REF 16.0 dBm DL -16.2 dBm MKRΔ -31.35 MHz 47.38 dB</p> <p>XY CSR 5.85000 GHz 3.77 dBm</p> <p>START 5.81000 GHz STOP 5.86000 GHz</p> <p>*RBW 100 kHz *VBW 100 kHz SWP 20 ms ATT 30 dB</p>

7.9 Unwanted Emission (Radiated / Band Edge)

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

7.9.1 Definition

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.9.2 Method of Measurement

FCC Rules Part 15, Section 15.247(d)
FCC Rules Part 15, Section 15.205
FCC Rules Part 15, Section 15.207

7.9.3 Measurement Set-Up

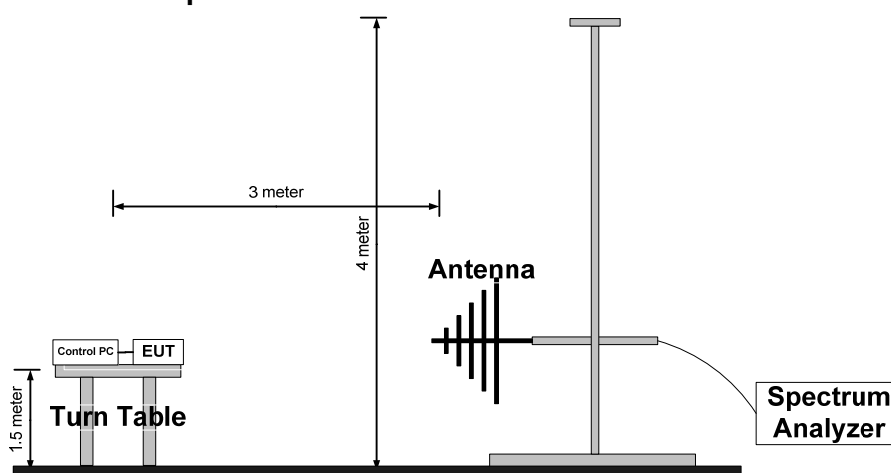


Fig-5

7.9.4 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

7.9.5 Test Procedure

- ① Connect the equipment as Fig-5.
- 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

7.9.6 Limit

- ① Peak Detector : 74 dBuV/m
Average Detector : 54 dBuV/m

7.9.7 Test Result

Mode	Operation Frequency (MHz)	Frequency (MHz)	Detector	Field Strength (dBuV/m)	Limit (dBuV/m)
802.11b	2412	2411.8	Peak	107.3	-
			Average	100.6	-
		2390.0	Peak	54.6	74.0
			Average	47.9	54.0
	2462	2462.1	Peak	105.0	-
			Average	97.8	-
		2483.5	Peak	44.1	74.0
			Average	-	54.0
802.11g	2412	2412.3	Peak	105.5	-
			Average	95.8	-
		2390.0	Peak	61.3	74.0
			Average	50.8	54.0
	2462	2461.7	Peak	103.5	-
			Average	93.8	-
		2483.5	Peak	53.6	74.0
			Average	-	54.0
802.11a	5745	5745.0	Peak	107.4	-
			Average	97.9	-
		5725.0	Peak	63.0	74.0
			Average	52.7	54.0
	5825	5825.1	Peak	107.4	-
			Average	97.9	-
		5850.0	Peak	50.6	74.0
			Average	-	54.0

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

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