

TEST REPORT

Report No.: HK11081162-1

ALCO Electronics Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: A2HWL0217)

Single Modular Approval
(Transceiver)

Prepared and Checked by:

Approved by:

Signed On File
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Date: October 31, 2011

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GENERAL INFORMATION

ALCO Electronics Ltd.
BRAND NAME: ALCO Electronics Ltd, MODEL: WL0217

FCC ID: A2HWL0217

Grantee:	ALCO Electronics Ltd.
Grantee Address:	5/F & 11/F, Zung Fu Industrial Building, 1067 King's Road, Quarry Bay, Hong Kong.
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Manufacturer:	N/A
Manufacturer Address:	N/A
Brand Name:	ALCO Electronics Ltd
Model:	WL0217
Type of EUT:	Single Modular Approval (Transceiver)
Description of EUT:	WiFi Module
Serial Number:	N/A
FCC ID:	A2HWL0217
Date of Sample Submitted:	August 23, 2011
Date of Test:	October 09, 2011
Report No.:	HK11081162-1
Report Date:	October 31, 2011
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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SUMMARY OF TEST RESULT

ALCO Electronics Ltd.
BRAND NAME: ALCO Electronics Ltd, MODEL: WL0217

FCC ID: A2HWL0217

TEST SPECIFICATION	REFERENCE	RESULTS
Maximum Peak Output Power	15.247(b), (c) / RSS-210 A8.4	N/A
Hopping Channel Carrier Frequencies Separation	15.247(e) / RSS-210 A8.1	N/A
20dB Bandwidth of the Hopping Channel	15.247(a) / RSS-210 A8.1	N/A
Number of Hopping Frequencies	15.247(e) / RSS-210 A8.1	N/A
Average Time of Occupancy of Hopping Frequency	15.247(e) / RSS-210 A8.1	N/A
Antenna Conducted Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
Radiated Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
RF Exposure Compliance	15.247(i) / RSS-Gen 5.6	N/A
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.4	Pass
Transmitter Field Strength	15.227 / RSS-310 3.8	N/A
Transmitter Field Strength	15.229 / RSS-210 A2.7	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(a) / RSS-210 A1.1.1	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(e) / RSS-210 A1.1.5	N/A
Transmitter Field Strength and Bandwidth Requirement	15.239 / RSS-210 A2.8	N/A
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	Pass
Transmitter Field Strength and Bandwidth Requirement	15.235 / RSS-310 3.9	N/A
Receiver / Digital Device Radiated Emissions	15.109 / RSS-210 2.5	N/A
Digital Device Conducted Emissions	15.107 / ICES-003	N/A

- Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a WiFi transceiver operating from 2412MHz to 2462MHz. It is intended to be used as short range radio communication for embedded application. The EUT is powered by USB port.

The EUT has two identical trace antennas.

In 802.11b mode, the EUT employs Direct-Sequence Spread Spectrum (DSSS) modulation with maximum bit rate 11Mbps. Only one antenna is used.

In 802.11g mode, the EUT employs Orthogonal Frequency Division Multiplexing (OFDM) modulation with maximum bit rate 54Mbps. Only one antenna is used.

In 802.11n mode with 20MHz bandwidth, the EUT employs modulation type according to MCSn (Modulation and Coding Scheme) setting where n is 0 to 15, with maximum bit rate 65Mbps at n=7 and 130Mbps at n=15. Only one antenna is used when n=0 to 7. Both antennas are used when n=8 to 15.

In 802.11n mode with 40MHz bandwidth, the EUT employs modulation type according to MCSn (Modulation and Coding Scheme) setting where n is 0 to 15, with maximum bit rate 150Mbps at n=7 and 300Mbps at n=15. Only one antenna is used when n=0 to 7. Both antennas are used when n=8 to 15.

During 802.11b, 802.11g and 802.11n (20MHz bandwidth) mode, the EUT occupies 11 channels (2412MHz to 2462MHz with 5MHz channel spacing).

During 802.11n (40MHz bandwidth) mode, the EUT occupies 7 channels (2422MHz to 2452MHz with 5MHz channel spacing).

This module is only approved for use when installed in devices produced by a specific manufacturer for professional installation.

Antenna Type : Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

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1.2 Related Submittal(s) Grants

The Declaration of the Conformity procedure of PC portion for this transceiver is being processed as the same time of this application.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The device was powered by USB port.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

The EUT exercise program (Broadcom Duck 1.1.7 control software) used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Equipment Modification

Any modifications installed previous to testing by ALCO Electronics Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

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2.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

1. Lenovo Notebook (Model: T61, S/N: L3-CF468)
2. Lenovo Notebook (Model: SL500, S/N: ML-DXMM3)
3. Smart-Drive External 1394 HDD (Model: HD3-SU2FW, S/N: 0800261)
4. 1 x USB cable with length of 0.7 meter long
5. 1 x 1394 cable with length of 0.8 meter long
(Provided by Intertek)
6. Software: Broadcom Duck 1.1.7 control software
(Provided by Applicant)

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3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - AV$$

where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where

- FS = Field Strength in dB μ V/m
- RR = RA - AG - AV in dB μ V
- LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V/m	
AF = 7.4 dB	RR = 18.0 dB μ V
CF = 1.6 dB	LF = 9.0 dB
AG = 29.0 dB	
AV = 5.0 dB	
FS = RR + LF	
FS = 18 + 9 = 27 dB μ V/m	

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 2412.000 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 1.6 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.240 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 10.56 dB

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Applicant: ALCO Electronics Ltd.
Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11b DSSS, 11Mbps, Antenna 0)

Table 1

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	95.8	33	29.4	92.2	94.0	-1.8
V	4824.000	41.3	33	34.9	43.2	54.0	-10.8
H	7236.000	37.7	33	37.9	42.6	54.0	-11.4
H	9648.000	34.7	33	40.4	42.1	54.0	-11.9
H	12060.000	34.1	33	40.5	41.6	54.0	-12.4
H	14472.000	34.2	33	40.0	41.2	54.0	-12.8

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	95.1	33	29.4	91.5	94.0	-2.5
V	4874.000	41.5	33	34.9	43.4	54.0	-10.6
H	7311.000	37.6	33	37.9	42.5	54.0	-11.5
H	9748.000	34.7	33	40.4	42.1	54.0	-11.9
H	12185.000	34.0	33	40.5	41.5	54.0	-12.5
H	14622.000	35.9	33	38.4	41.3	54.0	-12.7

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	94.4	33	29.4	90.8	94.0	-3.2
V	4924.000	41.6	33	34.9	43.5	54.0	-10.5
H	7386.000	37.7	33	37.9	42.6	54.0	-11.4
H	9848.000	34.8	33	40.4	42.2	54.0	-11.8
H	12310.000	34.1	33	40.5	41.6	54.0	-12.4
H	14772.000	35.9	33	38.4	41.3	54.0	-12.7

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11b DSSS, 11Mbps, Antenna 0)

Table 2

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	107.8	33	29.4	104.2	114.0	-9.8
V	4824.000	51.1	33	34.9	53.0	74.0	-21.0
H	7236.000	45.7	33	37.9	50.6	74.0	-23.4
H	9648.000	43.0	33	40.4	50.4	74.0	-23.6
H	12060.000	42.3	33	40.5	49.8	74.0	-24.2
H	14472.000	42.6	33	40.0	49.6	74.0	-24.4

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	106.8	33	29.4	103.2	114.0	-10.8
V	4874.000	49.7	33	34.9	51.6	74.0	-22.4
H	7311.000	45.9	33	37.9	50.8	74.0	-23.2
H	9748.000	42.9	33	40.4	50.3	74.0	-23.7
H	12185.000	42.5	33	40.5	50.0	74.0	-24.0
H	14622.000	44.0	33	38.4	49.4	74.0	-24.6

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	106.2	33	29.4	102.6	114.0	-11.4
V	4924.000	49.7	33	34.9	51.6	74.0	-22.4
H	7386.000	45.5	33	37.9	50.4	74.0	-23.6
H	9848.000	42.9	33	40.4	50.3	74.0	-23.7
H	12310.000	42.4	33	40.5	49.9	74.0	-24.1
H	14772.000	44.2	33	38.4	49.6	74.0	-24.4

- NOTES: 1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11b DSSS, 11Mbps, Antenna 1)

Table 3

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	96.0	33	29.4	92.4	94.0	-1.6
V	4824.000	41.5	33	34.9	43.4	54.0	-10.6
H	7236.000	37.3	33	37.9	42.2	54.0	-11.8
H	9648.000	35.0	33	40.4	42.4	54.0	-11.6
H	12060.000	33.7	33	40.5	41.2	54.0	-12.8
H	14472.000	34.5	33	40.0	41.5	54.0	-12.5

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	95.2	33	29.4	91.6	94.0	-2.4
V	4874.000	41.7	33	34.9	43.6	54.0	-10.4
H	7311.000	37.2	33	37.9	42.1	54.0	-11.9
H	9748.000	32.6	33	40.4	40.0	54.0	-14.0
H	12185.000	34.1	33	40.5	41.6	54.0	-12.4
H	14622.000	35.7	33	38.4	41.1	54.0	-12.9

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	94.7	33	29.4	91.1	94.0	-2.9
V	4924.000	41.8	33	34.9	43.7	54.0	-10.3
H	7386.000	37.5	33	37.9	42.4	54.0	-11.6
H	9848.000	34.6	33	40.4	42.0	54.0	-12.0
H	12310.000	33.7	33	40.5	41.2	54.0	-12.8
H	14772.000	35.6	33	38.4	41.0	54.0	-13.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11b DSSS, 11Mbps, Antenna 1)

Table 4

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	108.0	33	29.4	104.4	114.0	-9.6
V	4824.000	50.2	33	34.9	52.1	74.0	-21.9
H	7236.000	45.5	33	37.9	50.4	74.0	-23.6
H	9648.000	43.0	33	40.4	50.4	74.0	-23.6
H	12060.000	41.8	33	40.5	49.3	74.0	-24.7
H	14472.000	42.1	33	40.0	49.1	74.0	-24.9

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	107.1	33	29.4	103.5	114.0	-10.5
V	4874.000	49.9	33	34.9	51.8	74.0	-22.2
H	7311.000	45.5	33	37.9	50.4	74.0	-23.6
H	9748.000	42.7	33	40.4	50.1	74.0	-23.9
H	12185.000	42.8	33	40.5	50.3	74.0	-23.7
H	14622.000	43.7	33	38.4	49.1	74.0	-24.9

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	106.5	33	29.4	102.9	114.0	-11.1
V	4924.000	50.0	33	34.9	51.9	74.0	-22.1
H	7386.000	45.3	33	37.9	50.2	74.0	-23.8
H	9848.000	42.7	33	40.4	50.1	74.0	-23.9
H	12310.000	42.2	33	40.5	49.7	74.0	-24.3
H	14772.000	44.0	33	38.4	49.4	74.0	-24.6

- NOTES: 1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11g OFDM, 54Mbps, Antenna 0)

Table 5

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	91.0	33	29.4	87.4	94.0	-6.6
V	4824.000	43.5	33	34.9	45.4	54.0	-8.6
H	7236.000	38.3	33	37.9	43.2	54.0	-10.8
H	9648.000	36.2	33	40.4	43.6	54.0	-10.4
H	12060.000	34.1	33	40.5	41.6	54.0	-12.4
H	14472.000	34.2	33	40.0	41.2	54.0	-12.8

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	90.8	33	29.4	87.2	94.0	-6.8
V	4874.000	43.1	33	34.9	45.0	54.0	-9.0
H	7311.000	38.6	33	37.9	43.5	54.0	-10.5
H	9748.000	35.8	33	40.4	43.2	54.0	-10.8
H	12185.000	34.0	33	40.5	41.5	54.0	-12.5
H	14622.000	36.1	33	38.4	41.5	54.0	-12.5

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	90.5	33	29.4	86.9	94.0	-7.1
V	4924.000	43.2	33	34.9	45.1	54.0	-8.9
H	7386.000	38.7	33	37.9	43.6	54.0	-10.4
H	9848.000	35.8	33	40.4	43.2	54.0	-10.8
H	12310.000	34.1	33	40.5	41.6	54.0	-12.4
H	14772.000	35.8	33	38.4	41.2	54.0	-12.8

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11g OFDM, 54Mbps, Antenna 0)

Table 6

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	103.0	33	29.4	99.4	114.0	-14.6
V	4824.000	49.7	33	34.9	51.6	74.0	-22.4
H	7236.000	45.5	33	37.9	50.4	74.0	-23.6
H	9648.000	42.8	33	40.4	50.2	74.0	-23.8
H	12060.000	42.4	33	40.5	49.9	74.0	-24.1
H	14472.000	42.8	33	40.0	49.8	74.0	-24.2

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	102.5	33	29.4	98.9	114.0	-15.1
V	4874.000	49.9	33	34.9	51.8	74.0	-22.2
H	7311.000	45.7	33	37.9	50.6	74.0	-23.4
H	9748.000	42.8	33	40.4	50.2	74.0	-23.8
H	12185.000	42.1	33	40.5	49.6	74.0	-24.4
H	14622.000	44.0	33	38.4	49.4	74.0	-24.6

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	101.8	33	29.4	98.2	114.0	-15.8
V	4924.000	49.5	33	34.9	51.4	74.0	-22.6
H	7386.000	45.5	33	37.9	50.4	74.0	-23.6
H	9848.000	43.0	33	40.4	50.4	74.0	-23.6
H	12310.000	42.5	33	40.5	50.0	74.0	-24.0
H	14772.000	44.0	33	38.4	49.4	74.0	-24.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11g OFDM, 54Mbps, Antenna 1)

Table 7

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	91.2	33	29.4	87.6	94.0	-6.4
V	4824.000	43.7	33	34.9	45.6	54.0	-8.4
H	7236.000	38.1	33	37.9	43.0	54.0	-11.0
H	9648.000	36.3	33	40.4	43.7	54.0	-10.3
H	12060.000	33.8	33	40.5	41.3	54.0	-12.7
H	14472.000	34.0	33	40.0	41.0	54.0	-13.0

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	91.1	33	29.4	87.5	94.0	-6.5
V	4874.000	42.9	33	34.9	44.8	54.0	-9.2
H	7311.000	38.3	33	37.9	43.2	54.0	-10.8
H	9748.000	36.0	33	40.4	43.4	54.0	-10.6
H	12185.000	33.9	33	40.5	41.4	54.0	-12.6
H	14622.000	35.7	33	38.4	41.1	54.0	-12.9

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	90.7	33	29.4	87.1	94.0	-6.9
V	4924.000	42.9	33	34.9	44.8	54.0	-9.2
H	7386.000	38.3	33	37.9	43.2	54.0	-10.8
H	9848.000	35.7	33	40.4	43.1	54.0	-10.9
H	12310.000	33.7	33	40.5	41.2	54.0	-12.8
H	14772.000	35.6	33	38.4	41.0	54.0	-13.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11g OFDM, 54Mbps, Antenna 1)

Table 8

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	103.2	33	29.4	99.6	114.0	-14.4
V	4824.000	49.9	33	34.9	51.8	74.0	-22.2
H	7236.000	45.3	33	37.9	50.2	74.0	-23.8
H	9648.000	43.0	33	40.4	50.4	74.0	-23.6
H	12060.000	42.2	33	40.5	49.7	74.0	-24.3
H	14472.000	42.6	33	40.0	49.6	74.0	-24.4

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	102.7	33	29.4	99.1	114.0	-14.9
V	4874.000	49.7	33	34.9	51.6	74.0	-22.4
H	7311.000	45.5	33	37.9	50.4	74.0	-23.6
H	9748.000	43.0	33	40.4	50.4	74.0	-23.6
H	12185.000	42.0	33	40.5	49.5	74.0	-24.5
H	14622.000	43.7	33	38.4	49.1	74.0	-24.9

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	102.0	33	29.4	98.4	114.0	-15.6
V	4924.000	49.3	33	34.9	51.2	74.0	-22.8
H	7386.000	45.2	33	37.9	50.1	74.0	-23.9
H	9848.000	42.6	33	40.4	50.0	74.0	-24.0
H	12310.000	42.2	33	40.5	49.7	74.0	-24.3
H	14772.000	43.7	33	38.4	49.1	74.0	-24.9

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 0)

Table 9

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	87.9	33	29.4	84.3	94.0	-9.7
V	4824.000	41.5	33	34.9	43.4	54.0	-10.6
H	7236.000	38.2	33	37.9	43.1	54.0	-10.9
H	9648.000	35.2	33	40.4	42.6	54.0	-11.4
H	12060.000	34.7	33	40.5	42.2	54.0	-11.8
H	14472.000	33.2	33	40.0	40.2	54.0	-13.8

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	87.7	33	29.4	84.1	94.0	-9.9
V	4874.000	41.3	33	34.9	43.2	54.0	-10.8
H	7311.000	38.2	33	37.9	43.1	54.0	-10.9
H	9748.000	33.5	33	40.4	40.9	54.0	-13.1
H	12185.000	32.7	33	40.5	40.2	54.0	-13.8
H	14622.000	34.7	33	38.4	40.1	54.0	-13.9

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	86.9	33	29.4	83.3	94.0	-10.7
V	4924.000	41.2	33	34.9	43.1	54.0	-10.9
H	7386.000	38.0	33	37.9	42.9	54.0	-11.1
H	9848.000	33.4	33	40.4	40.8	54.0	-13.2
H	12310.000	32.7	33	40.5	40.2	54.0	-13.8
H	14772.000	34.6	33	38.4	40.0	54.0	-14.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 0)

Table 10

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	100.0	33	29.4	96.4	114.0	-17.6
V	4824.000	49.5	33	34.9	51.4	74.0	-22.6
H	7236.000	45.7	33	37.9	50.6	74.0	-23.4
H	9648.000	43.0	33	40.4	50.4	74.0	-23.6
H	12060.000	42.5	33	40.5	50.0	74.0	-24.0
H	14472.000	42.9	33	40.0	49.9	74.0	-24.1

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	100.1	33	29.4	96.5	114.0	-17.5
V	4874.000	49.3	33	34.9	51.2	74.0	-22.8
H	7311.000	45.9	33	37.9	50.8	74.0	-23.2
H	9748.000	42.9	33	40.4	50.3	74.0	-23.7
H	12185.000	42.7	33	40.5	50.2	74.0	-23.8
H	14622.000	44.4	33	38.4	49.8	74.0	-24.2

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	99.4	33	29.4	95.8	114.0	-18.2
V	4924.000	49.5	33	34.9	51.4	74.0	-22.6
H	7386.000	45.7	33	37.9	50.6	74.0	-23.4
H	9848.000	43.0	33	40.4	50.4	74.0	-23.6
H	12310.000	42.5	33	40.5	50.0	74.0	-24.0
H	14772.000	44.2	33	38.4	49.6	74.0	-24.4

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 1)

Table 11

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	88.1	33	29.4	84.5	94.0	-9.5
V	4824.000	41.8	33	34.9	43.7	54.0	-10.3
H	7236.000	38.1	33	37.9	43.0	54.0	-11.0
H	9648.000	35.0	33	40.4	42.4	54.0	-11.6
H	12060.000	34.6	33	40.5	42.1	54.0	-11.9
H	14472.000	33.0	33	40.0	40.0	54.0	-14.0

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	87.9	33	29.4	84.3	94.0	-9.7
V	4874.000	41.6	33	34.9	43.5	54.0	-10.5
H	7311.000	38.1	33	37.9	43.0	54.0	-11.0
H	9748.000	33.2	33	40.4	40.6	54.0	-13.4
H	12185.000	32.9	33	40.5	40.4	54.0	-13.6
H	14622.000	34.6	33	38.4	40.0	54.0	-14.0

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	87.2	33	29.4	83.6	94.0	-10.4
V	4924.000	41.3	33	34.9	43.2	54.0	-10.8
H	7386.000	37.7	33	37.9	42.6	54.0	-11.4
H	9848.000	33.2	33	40.4	40.6	54.0	-13.4
H	12310.000	32.6	33	40.5	40.1	54.0	-13.9
H	14772.000	34.7	33	38.4	40.1	54.0	-13.9

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 1)

Table 12

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2412.000	100.2	33	29.4	96.6	114.0	-17.4
V	4824.000	49.8	33	34.9	51.7	74.0	-22.3
H	7236.000	45.5	33	37.9	50.4	74.0	-23.6
H	9648.000	42.8	33	40.4	50.2	74.0	-23.8
H	12060.000	42.6	33	40.5	50.1	74.0	-23.9
H	14472.000	42.7	33	40.0	49.7	74.0	-24.3

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	100.3	33	29.4	96.7	114.0	-17.3
V	4874.000	49.4	33	34.9	51.3	74.0	-22.7
H	7311.000	45.7	33	37.9	50.6	74.0	-23.4
H	9748.000	42.7	33	40.4	50.1	74.0	-23.9
H	12185.000	42.9	33	40.5	50.4	74.0	-23.6
H	14622.000	44.2	33	38.4	49.6	74.0	-24.4

Channel 11

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2462.000	99.7	33	29.4	96.1	114.0	-17.9
V	4924.000	49.7	33	34.9	51.6	74.0	-22.4
H	7386.000	45.5	33	37.9	50.4	74.0	-23.6
H	9848.000	42.8	33	40.4	50.2	74.0	-23.8
H	12310.000	42.6	33	40.5	50.1	74.0	-23.9
H	14772.000	44.0	33	38.4	49.4	74.0	-24.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 0)

Table 13

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 03

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2422.000	68.4	33	29.4	64.8	94.0	-29.2
H	4844.000	30.2	33	34.9	32.1	54.0	-21.9
H	7266.000	30.5	33	37.9	35.4	54.0	-18.6
H	9688.000	32.6	33	40.4	40.0	54.0	-14.0
H	12110.000	33.6	33	40.5	41.1	54.0	-12.9
H	14532.000	36.6	33	38.4	42.0	54.0	-12.0

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	71.4	33	29.4	67.8	94.0	-26.2
H	4874.000	30.1	33	34.9	32.0	54.0	-22.0
H	7311.000	30.9	33	37.9	35.8	54.0	-18.2
H	9748.000	32.9	33	40.4	40.3	54.0	-13.7
H	12185.000	33.8	33	40.5	41.3	54.0	-12.7
H	14622.000	36.1	33	38.4	41.5	54.0	-12.5

Channel 09

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2452.000	70.4	33	29.4	66.8	94.0	-27.2
H	4904.000	30.6	33	34.9	32.5	54.0	-21.5
H	7356.000	30.7	33	37.9	35.6	54.0	-18.4
H	9808.000	33.2	33	40.4	40.6	54.0	-13.4
H	12260.000	34.1	33	40.5	41.6	54.0	-12.4
H	14712.000	36.0	33	38.4	41.4	54.0	-12.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 0)

Table 14

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 03

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2422.000	95.2	33	29.4	91.6	114.0	-22.4
H	4844.000	42.4	33	34.9	44.3	74.0	-29.7
H	7266.000	43.7	33	37.9	48.6	74.0	-25.4
H	9688.000	43.5	33	40.4	50.9	74.0	-23.1
H	12110.000	44.1	33	40.5	51.6	74.0	-22.4
H	14532.000	46.6	33	38.4	52.0	74.0	-22.0

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	97.8	33	29.4	94.2	114.0	-19.8
H	4874.000	43.0	33	34.9	44.9	74.0	-29.1
H	7311.000	43.4	33	37.9	48.3	74.0	-25.7
H	9748.000	43.1	33	40.4	50.5	74.0	-23.5
H	12185.000	44.4	33	40.5	51.9	74.0	-22.1
H	14622.000	46.6	33	38.4	52.0	74.0	-22.0

Channel 09

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2452.000	98.4	33	29.4	94.8	114.0	-19.2
H	4904.000	42.9	33	34.9	44.8	74.0	-29.2
H	7356.000	43.2	33	37.9	48.1	74.0	-25.9
H	9808.000	43.4	33	40.4	50.8	74.0	-23.2
H	12260.000	43.6	33	40.5	51.1	74.0	-22.9
H	14712.000	46.9	33	38.4	52.3	74.0	-21.7

- NOTES: 1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 1)

Table 15

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 03

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2422.000	68.6	33	29.4	65.0	94.0	-29.0
H	4844.000	31.3	33	34.9	33.2	54.0	-20.8
H	7266.000	31.3	33	37.9	36.2	54.0	-17.8
H	9688.000	32.0	33	40.4	39.4	54.0	-14.6
H	12110.000	32.1	33	40.5	39.6	54.0	-14.4
H	14532.000	34.7	33	38.4	40.1	54.0	-13.9

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	71.6	33	29.4	68.0	94.0	-26.0
H	4874.000	30.3	33	34.9	32.2	54.0	-21.8
H	7311.000	29.8	33	37.9	34.7	54.0	-19.3
H	9748.000	31.5	33	40.4	38.9	54.0	-15.1
H	12185.000	32.7	33	40.5	40.2	54.0	-13.8
H	14622.000	35.7	33	38.4	41.1	54.0	-12.9

Channel 09

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2452.000	70.6	33	29.4	67.0	94.0	-27.0
H	4904.000	31.2	33	34.9	33.1	54.0	-20.9
H	7356.000	29.3	33	37.9	34.2	54.0	-19.8
H	9808.000	32.3	33	40.4	39.7	54.0	-14.3
H	12260.000	32.4	33	40.5	39.9	54.0	-14.1
H	14712.000	35.2	33	38.4	40.6	54.0	-13.4

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

Applicant: ALCO Electronics Ltd.
 Model: WL0217

Date of Test: October 09, 2011

Worst-Case Operating Mode: Tx (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 1)

Table 16

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Channel 03

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2422.000	95.0	33	29.4	91.4	114.0	-22.6
H	4844.000	42.5	33	34.9	44.4	74.0	-29.6
H	7266.000	43.1	33	37.9	48.0	74.0	-26.0
H	9688.000	43.5	33	40.4	50.9	74.0	-23.1
H	12110.000	43.9	33	40.5	51.4	74.0	-22.6
H	14532.000	47.5	33	38.4	52.9	74.0	-21.1

Channel 06

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2437.000	98.6	33	29.4	95.0	114.0	-19.0
H	4874.000	42.9	33	34.9	44.8	74.0	-29.2
H	7311.000	43.9	33	37.9	48.8	74.0	-25.2
H	9748.000	43.5	33	40.4	50.9	74.0	-23.1
H	12185.000	44.1	33	40.5	51.6	74.0	-22.4
H	14622.000	47.4	33	38.4	52.8	74.0	-21.2

Channel 09

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2452.000	97.7	33	29.4	94.1	114.0	-19.9
H	4904.000	43.0	33	34.9	44.9	74.0	-29.1
H	7356.000	43.7	33	37.9	48.6	74.0	-25.4
H	9808.000	43.6	33	40.4	51.0	74.0	-23.0
H	12260.000	43.9	33	40.5	51.4	74.0	-22.6
H	14712.000	47.3	33	38.4	52.7	74.0	-21.3

- NOTES: 1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

INTERTEK TESTING SERVICES

4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 **Technical Specifications**

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

8.0 **Miscellaneous Information**

The miscellaneous information includes details of the test procedure and measured bandwidth.

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2003) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

Peak Measurement (802.11b DSSS, 11Mbps, Antenna 0)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 104.20 \text{ dB}\mu\text{V/m} - 41.14 \text{ dB} \\ &= 63.06 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 92.20 \text{ dB}\mu\text{V/m} - 41.14 \text{ dB} \\ &= 51.06 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 102.60 \text{ dB}\mu\text{V/m} - 49.64 \text{ dB} \\ &= 52.96 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 90.80 \text{ dB}\mu\text{V/m} - 49.64 \text{ dB} \\ &= 41.16 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11b DSSS, 11Mbps, Antenna 1)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=104.40 \text{ dB}\mu\text{V/m} - 41.29 \text{ dB}$$

$$=63.11 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=92.40 \text{ dB}\mu\text{V/m} - 41.29 \text{ dB}$$

$$=51.11 \text{ dB}\mu\text{V/m}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=102.90 \text{ dB}\mu\text{V/m} - 49.96 \text{ dB}$$

$$=52.94 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=91.10 \text{ dB}\mu\text{V/m} - 49.96 \text{ dB}$$

$$=41.14 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11g OFDM, 54Mbps, Antenna 0)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=99.40 \text{ dB}\mu\text{V/m} - 37.70 \text{ dB}$$

$$=61.70 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=87.40 \text{ dB}\mu\text{V/m} - 37.70 \text{ dB}$$

$$=49.70 \text{ dB}\mu\text{V/m}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=98.20 \text{ dB}\mu\text{V/m} - 43.27 \text{ dB}$$

$$=54.93 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=86.90 \text{ dB}\mu\text{V/m} - 43.27 \text{ dB}$$

$$=43.63 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11g OFDM, 54Mbps, Antenna 1)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &=99.60 \text{ dB}\mu\text{V/m} - 37.93 \text{ dB} \\ &=61.70 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &=87.60 \text{ dB}\mu\text{V/m} - 37.93 \text{ dB} \\ &=49.67 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &=98.40 \text{ dB}\mu\text{V/m} - 44.48 \text{ dB} \\ &=53.92 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &=87.10 \text{ dB}\mu\text{V/m} - 44.48 \text{ dB} \\ &=42.62 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 0)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=96.40 \text{ dB}\mu\text{V/m} - 38.31 \text{ dB}$$

$$=58.09 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=84.30 \text{ dB}\mu\text{V/m} - 38.31 \text{ dB}$$

$$=45.99 \text{ dB}\mu\text{V/m}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=95.80 \text{ dB}\mu\text{V/m} - 40.70 \text{ dB}$$

$$=55.10 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=83.30 \text{ dB}\mu\text{V/m} - 40.70 \text{ dB}$$

$$=42.60 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11n OFDM, 65Mbps, 20MHz bandwidth, Antenna 1)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=96.60 \text{ dB}\mu\text{V/m} - 37.83 \text{ dB}$$

$$=58.77 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=84.50 \text{ dB}\mu\text{V/m} - 37.83 \text{ dB}$$

$$=46.67 \text{ dB}\mu\text{V/m}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=96.10 \text{ dB}\mu\text{V/m} - 42.90 \text{ dB}$$

$$=53.20 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=83.60 \text{ dB}\mu\text{V/m} - 42.90 \text{ dB}$$

$$=40.70 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 0)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 91.60 \text{ dB}\mu\text{V/m} - 31.33 \text{ dB} \\ &= 60.27 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 64.80 \text{ dB}\mu\text{V/m} - 31.33 \text{ dB} \\ &= 33.47 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 94.80 \text{ dB}\mu\text{V/m} - 40.22 \text{ dB} \\ &= 54.58 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 66.80 \text{ dB}\mu\text{V/m} - 40.22 \text{ dB} \\ &= 26.58 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Measured Bandwidth (cont'd)

Peak Measurement (802.11n OFDM, 150Mbps, 40MHz bandwidth, Antenna 1)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=91.40 \text{ dB}\mu\text{V/m} - 30.36 \text{ dB}$$

$$=61.04 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=65.00 \text{ dB}\mu\text{V/m} - 30.36 \text{ dB}$$

$$=34.64 \text{ dB}\mu\text{V/m}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$=94.10 \text{ dB}\mu\text{V/m} - 39.35 \text{ dB}$$

$$=54.75 \text{ dB}\mu\text{V/m}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$=67.00 \text{ dB}\mu\text{V/m} - 39.35 \text{ dB}$$

$$=27.65 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.2 Discussion Pulse Desensitvity

Pulse desensitvity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

8.3 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003. A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

INTERTEK TESTING SERVICES

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

INTERTEK TESTING SERVICES

9.0 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2500	EW-0954	EW-0446
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI	3104C	3146
Calibration Date	Jan. 25, 2011	Apr. 14, 2010	Apr. 26, 2010
Calibration Due Date	Jan. 25, 2012	Oct. 14, 2011	Oct. 26, 2011

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-1133
Manufacturer	R&S	EMCO
Model No.	FSP40	3115
Calibration Date	Nov. 23, 2010	Mar. 02, 2011
Calibration Due Date	Nov. 23, 2011	Sep. 02, 2012

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN	Pulse Limiter
Registration No.	EW-2251	EW-0192	EW-0698
Manufacturer	R&S	R&S	R&S
Model No.	ESCI	ESH3-Z5	ESH3-Z2
Calibration Date	May 06, 2011	Nov. 30, 2010	Mar. 11, 2011
Calibration Due Date	May 06, 2012	Nov. 30, 2011	Mar. 11, 2012

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 22, 2010
Calibration Due Date	Oct. 22, 2011