MOTOROLA

MOBILE DEVICES BUSINESS

PRODUCT SAFETY AND COMPLIANCE EMC LABORATORY

EMC TEST REPORT - Addendum

Test Report Number –22302-1WLAN

Report Date – 2008-10-02

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

Technician: Hans K. Name: Hans Kristian Kristensen
Test: 2008-08-26 to 2008-09-02

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature: Per K. Nielsen Name: Per K. Nielsen

Title: Sr. Staff Engineer Date: 2008-09-03

FCC Registration Number: 863448
IC Registration Number: 109AP-1

ADR Testing Service location ADR AL
ISO/IEC-17025:2005 accredited by UKAS

UKAS TESTING
2404

Table of Contents

Test Report Details

Tests Performed By:	Motorola A/S Product Safety and Compliance Group Lindholm Brygge 35 9400 Nr.Sundby Fax (45) 7219-5002 Phone: (45) 7219-5000 Motorola PCS FRN: 0016105769 FCC Registration Number: 863448 Industry Canada Number: 109AP-1
Tests Requested By:	Motorola Inc. Mobile Devices business 600 North US Hwy 45 Libertyville, IL 60048
Product Type:	Cell phone with WLAN (WiFi)
Form factor:	Slider
Signaling Capability:	Quadra band 850/900/1800/1900 GSM with GPRS class 12 and EDGE class 12, Bluetooth class 1, WiFi band b/g, and FM radio.
Serial Numbers:	004401028257315
Battery type:	BC50 with model number SNN5811A
FCC ID:	IHDP56JK1
Project number:	22302-1
Testing Complete Date:	2008-10-02

Applicable Standards

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

__X__Part 15 Subpart C – Intentional Radiators
_____Part 22 Subpart H - Public Mobile Services
_____Part 24 - Personal Communications Services
_____Part 27 - Wireless Communications Service
_____ Part 90 - Private Land Mobile Radio Service

Applicable Standards: ANSI 63.4-2003, RSS-GEN, RSS-210 (WLAN).

DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" published by the Federal Communications Commission was also used in the testing of this product.

The following tests were performed according to the regulations:

- The **spurious radiated emission** requirements of **§ 15.247 and § 15.249 of CFR47 Part 15 2006**, specifically" radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

- Under this project only 30 to 1000MHz, 1 to 25GHz radiated and radiated band-edge measurements were performed.

- For frequencies <= 1 GHz a 100 KHz RBW (6 dB) is used and >1 GHz a 1 MHz RBW (6 dB) is used.

Summary of Testing

Test	Test Name	Pass/Fail
1	Field Strength of Spurious Emissions	Pass
2	Band-edge Compliance of RF Radiated Emissions	Pass (*1), (*2), (*3)

Test	Test Name	Results
1	Field Strength of Spurious Emissions	See plots
2	Band-edge Compliance of RF Radiated Emissions	See plots

(*1) The rules found in CFR47, FCC part 15.247(d) handled in appendix-1 were applied for the low band edge performance verification.
(*2) The Marker-Delta Method rule as per DA 00-705 handled in appendix-2 were applied for the high band edge performance verification.
(*3) The rules found in CFR47, FCC part 15.205(a) and FCC part 15.209(a) for restricted band performance verification.

The margin with respect to the limit is the minimum margin for all modes and bands. ( ) indicates the margin at which the product exceeds the limit.

General and Special Conditions

The 22302-1 sample was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

Special test S/W was used for these tests. In all band (b) tests, the WLAN was transmitting at 11Mbps (DSSS) ~ 16 dBm (Typical 17 dBm) and in all band (g) tests, the WLAN was transmitting at 36 Mbps (OFDM) ~ 15 dBm (Typical 16 dBm).

802.11g Data Rates	
54/48 Mbps	12.0 dBm
36/24 Mbps	15 dBm
18/12 Mbps	15 dBm
9/6 Mbps	15.0 dBm

802.11b Data Rates	
11 Mbps	16.0 dBm

All testing was done in an indoor controlled environment with an average temperature of 20.5º C +- 2º C and relative humidity of 52.2% +-7% over the dates used for testing.

Equipment and Cable Configurations

The EUT was tested in a stand-alone configuration that is representative of typical use.

Measuring Equipment and Calibration Information

Equipment related to the semi-anechoic chamber testing:

Equipment	Model/type	Serial number	Operational range	Date of calibration
EMI analyzers	ESIB 26	100179	20 Hz – 26.5 GHz	26.05.2008
	ESU 40	100040	20 Hz – 40 GHz	07.02.2008
Pre Amplifiers	~~EA PA 02: (JCA12 300 JCA218 4003 JCA48 300 JCA1826 431 JCA1218 500)~~	~~800002~~	~~(1 – 26 GHz) 1 GHz – 2 GHz 2 GHz – 18 GHz 4 GHz – 8 GHz 18 GHz – 26 GHz 12 GHz – 18 GHz~~	~~26.06.2007~~
	Sonoma 310N	185680	9 kHz – 1 GHz	19.06.2007
	AFS4-02001800-35-ULN (Mounted on EMCO 3115)	805815	2 GHz – 18 GHz	13.03.2008
	JSA-18004000-30-5A (Mounted on EMCO 3116)	965195	18 GHz – 40 GHz	06.03.2008
	JCA 1840-4000 (Mounted on EMCO 3116)	101	18 – 40 GHz	06.03.2008
	JCA218-4003	104	1 GHz – 18 GHz	19.05.2008
Radio com. Tester	~~MT8860B~~	~~6K00006368~~	~~WiFi band b/g~~	~~01.05.2007~~
High pass filter	K&L 3DH1-3000/T13000-0/0 (Mounted on EMCO 3115)	8	(2700 - 20000 MHz)	13.03.2008
Attenuator	Weinschel 54A-6 (3dB) (Mounted on EMCO 3116)	T8929	DC – 40 GHz	06.03.2008
	H&S 6603.19AA (3dB) (Mounted on EMCO 3115)	na	DC-18 GHz	13.03.2008
Band reject filters	K&L 4N45-2412/T22-0/0	1	WiFi channel 1 reject (30 MHz – 3 GHz)	15.09.2007
	K&L 4N45-2442/T22-0/0	1	WiFi channel 6 reject (30 MHz – 3 GHz)	14.09.2007
	K&L 4N45-2472/T22-0/0	1	WiFi channel 11 reject (30 MHz – 3 GHz)	17.09.2007
Cable	C-ANT-FP1-4S (SMA)	na	30 MHz – 6 GHz 2.8 GHz – 18 GHz 18 GHz – 28 GHz	19.03.2008, 13.03.2008 19.03.2008
	C-ANT-FP1-10S (SK)	na	18 GHz – 40 GHz	06.03.2008
Filter	F-3S-2S (SK–Bypass)	na	30 MHz – 40 GHz	06.03.2008

Equipment related to carrier spectrum testing:

Equipment	Model/type	Serial number	Operational range	Date of calibration
Spectrum analysers	FSEA	845097/004	20 Hz – 3.5 GHz	23.04.07 (na)
Radio com. Tester	CMU 200	834639/003	GSM 850/900/1800/1900 IS95, UMTS, Bluetooth	14.11.07

The antennas used in the various tests are listed in the below table. All the log-periodic antennas are used as communication and link establishment antennas for (GSM, UMTS, CDMA, FM and/or Bluetooth).

Antenna	Type	Serial number	Operational range	Date of calibration
Hybrid-log periodic	HLP 3003C	060300	30 MHz – 3 GHz	07.12.2007
Log-periodic (link)	LPDA 8030	090200	800 MHz – 3 GHz	(na)
Log-periodic (link)	LPDA 8030	090100	800 MHz – 3 GHz	(na)
Log-periodic (link)	PLP 3003	021701	300 MHz – 3 GHz	(na)
Horn (link)	AT4002A	28548	800 MHz – 5 GHz	(na)
Horn (link)	AT4002A	28547	800 MHz – 5 GHz	(na)
Double ridged horn (w. 3 GHz HP-filter + 1x 2-18 GHz pre-amp+1x 3dB attenuator.)	EMCO 3115	71502	1 GHz – 18 GHz	21.05.2008
Double rigid horn (w. 2x 18-40 GHz pre-amp + 1x 3dB attenuator.)	EMCO 3116	2637	18 GHz – 40 GHz	20.12.2007

All equipment is on a one-year calibration cycle except for link antennas.

Description of WLAN (WiFi) Transmitter

The 22302-1 cell phone offers WLAN as a feature. The WLAN direct sequence spread-spectrum transceiver is designed to operate between 2400 and 2483 MHz. The WLAN antenna is mounted on the PCB inside of the EUT. The antenna installation is permanent. For a more thorough description of the functionality please refer to Exhibit 12 of this package.

As a WLAN transmitter, it is designed operate with other WLAN devices as defined by industrial standard. In this application, the device is battery-operated.

There is a switch in the Bluetooth/WLAN (BT/WiFi) module that switches between BT and WiFi. They share the same antenna, and you are able to use a BT headset while in a WiFi VoIP call, however, they do not transmit and receive at the same time. There is a 20 ms delay (for switching between the two systems in time domain) using an intelligent multiplexing scheme. Even though they share the same antenna they are **NOT ON** at the same time. The WiFi is therefore tested as a standalone transmitter.

Measurement Procedures and Data

FIELD STRENGTH OF SPURIOUS EMISSIONS

CFR Part 2.1053, 15.249

Measurement Procedure

The Equipment-Under-Test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBµV/m) = EMI Receiver Level (dBµV) + Cable Loss (dB) + Filter Loss (dB) - Amplifier Gain (dB) + Antenna Correction Factor (3/m)

A fully charged battery was used for the supply voltage.

The test sample was operated during the measurements under the following conditions:

- Tests were performed at low, mid and high channels.
- Tests were performed in both horizontal and vertical polarity.
- Tests were performed in both operational WiFi bands (b) and (g)
- Investigation of maximum radiation orientation and position of the product sample to determine test orientations angles.
    - Tests were performed with the sample orientated along X, Y and Z orthogonal axis based on findings.
    - Tests were performed with the test sample placed in worst case position either open or closed based on form factor. Verification tests were performed for the other position.

Measurement Results

Comments:
The band edge measurements crossing the corner for the low channel with respect to the average limit line is acceptable when applying the FCC rule specified in CFR 15.35(b) for the use of peak detector above 1 GHz. The peak detector limit line has been added to the graphical plots.

For peak emissions detected above 1 GHz, only those emissions that are higher than the AVG limit line plus 8 dB are selected for final emission analysis.

This data was taken at ADR Aalborg, see attached below.

Maximum radiating position and orientation

The test sample was placed on top of a none conductive pedestal with slider closed and the WLAN transmitter turned on. The test sample was scanned with a log periodic antenna connected to a spectrum analyzer over the whole sphere and the maximum radiation orientation was determined to be the Y orientation in horizontal polarity of the test antenna.

With the test sample slider open it was determined that the open position caused maximum radiation in the WLAN band.

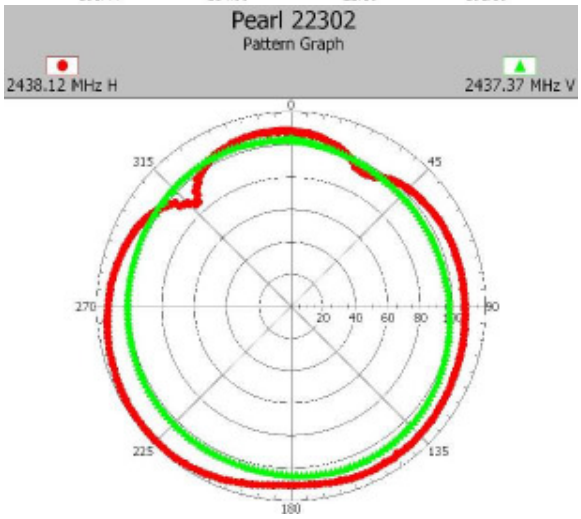
A check of carrier on the WLAN channel 6 was performed to determine the expected maximum radiation of any WLAN harmonics for the test sample with slider closed and placed in orientation Y at vertical and horizontal polarity.

Channel 6 WLAN band (b) - Closed:

Title: FCC 15.247(c) 28-08-2008 12:03:05
File: Pearl 22302 (5.31)(ESIB) FCC15.249 WLAN 2400(b) Tch-mid_Y 2008-08-25 -PK Carrier.set Sequence: Final Measurements
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A. Slider closed
Comments: FCC 15.249/ IEEE 802.11(b) WLAN emission in TCH mode
WLAN ch-6 (2437 MHz) TX mode @ 11MBps/16dBm. Or.=Y
HLP 3003C antenna (30MHz - 3 GHz). Peak detector used.

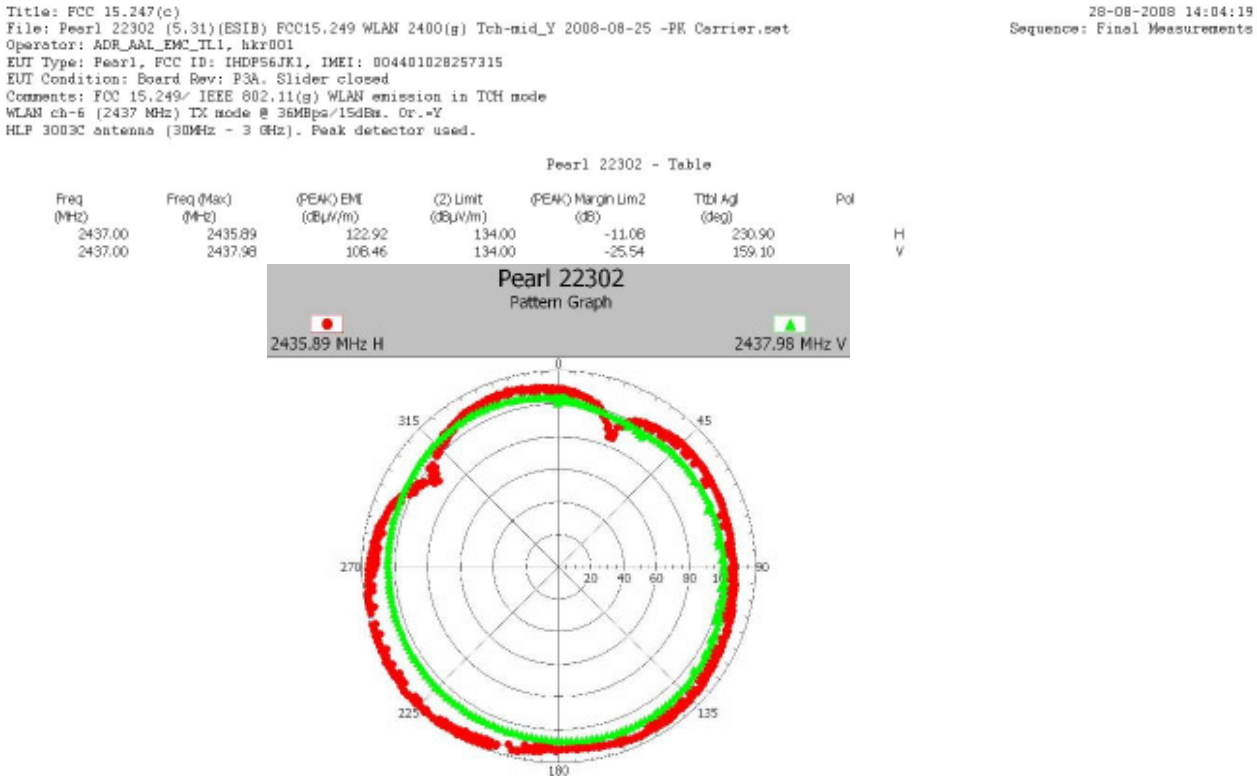
Pearl 22302 - Table

Freq (MHz)	Freq (Max) (MHz)	(PEAK) EMI (dBµV/m)	(2) Limit (dBµV/m)	(PEAK) Margin Lim2 (dB)	Tbl Agl (deg)	Pol
2437.00	2438.12	118.74	134.00	-15.26	217.10	H
2437.00	2437.37	105.44	134.00	-28.56	161.50	V



The WLAN band (b) radiated TX power is measured to 11.34 dBm on channel 6 for RBW = 1 MHz (6 dB).

Channel 6 WLAN band (g) - Closed:



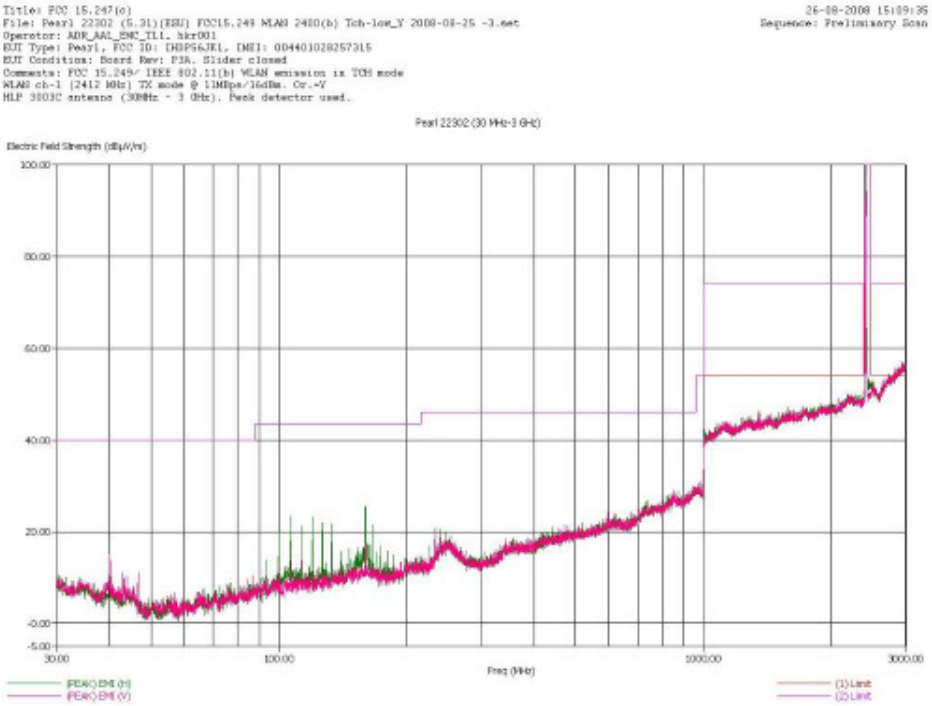
The WLAN band (g) radiated TX power is measured to 15.52 dBm on channel 6 with RBW = 1 MHz (6 dB).

WLAN Band (b):

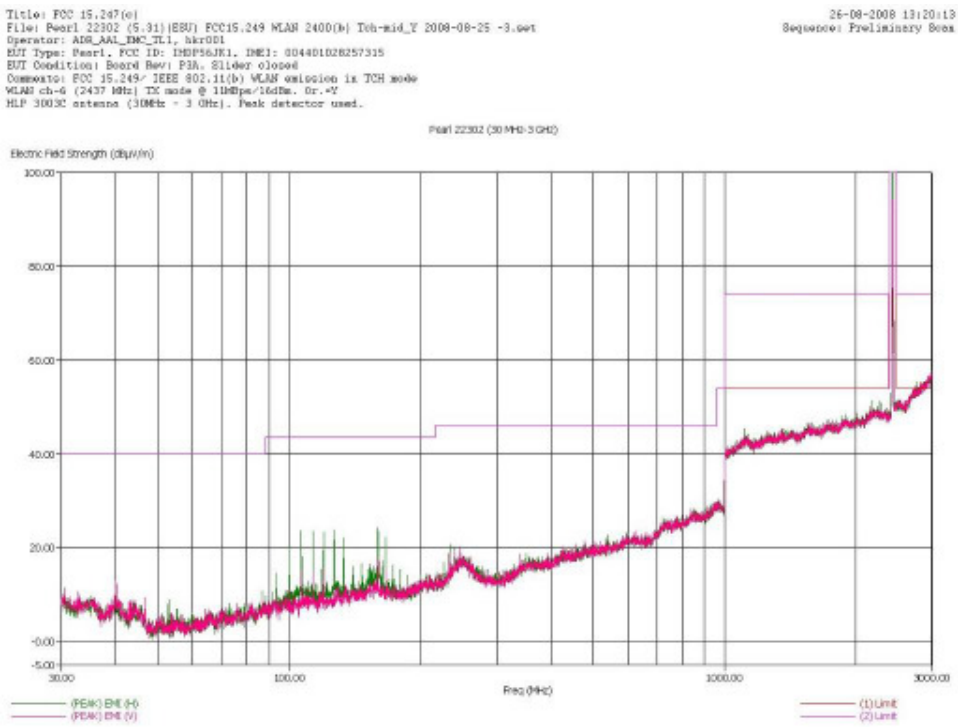
All data measured for WLAN band (b).

There were no discernible emissions above the noise floor for 30-3000MHz for Low, Mid and High Channels and all polarizations in WLAN band (b)

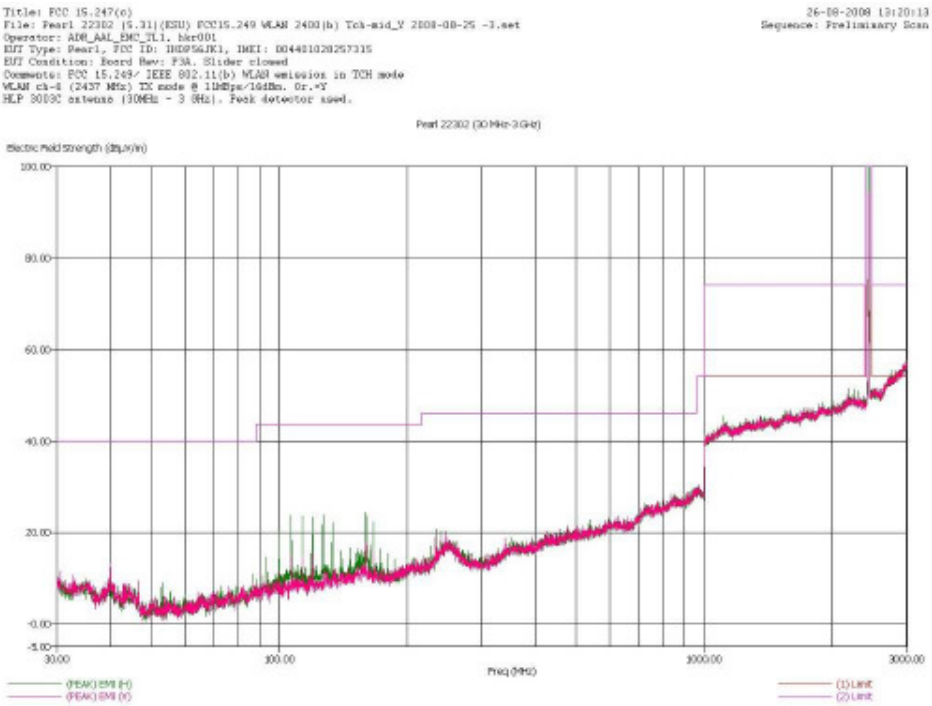
Only one worst case plot for each test frequency are shown in the below plots in the range from 30 MHz – 3000 MHz.



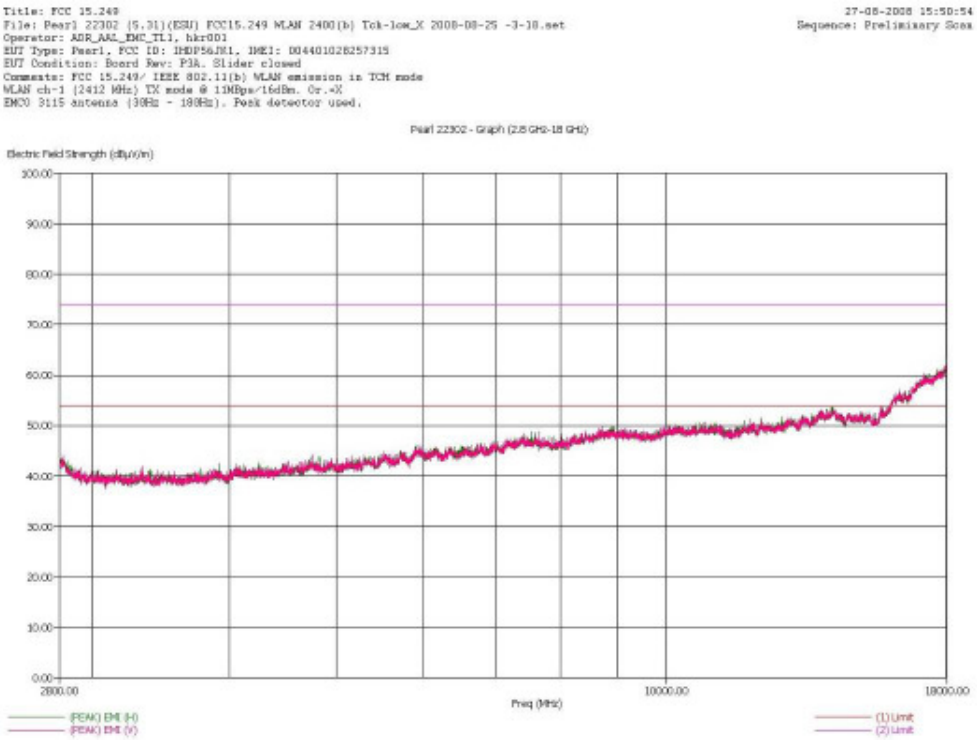
30 – 3000 MHz Low Channel Dual Polarization Y



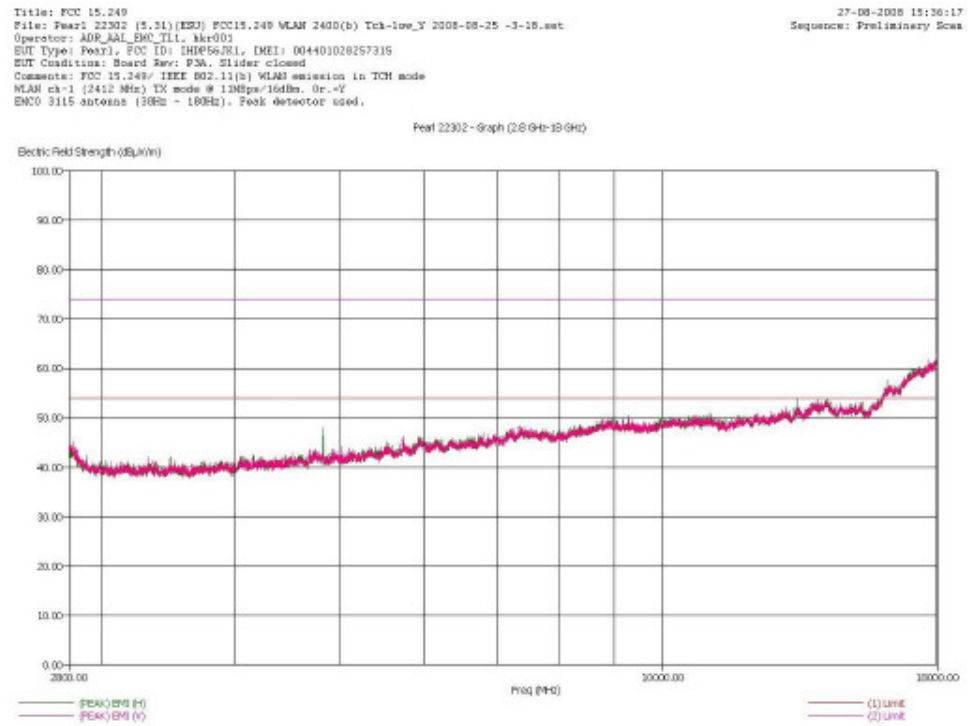
30 – 3000 MHz Middle Channel Dual Polarization Y



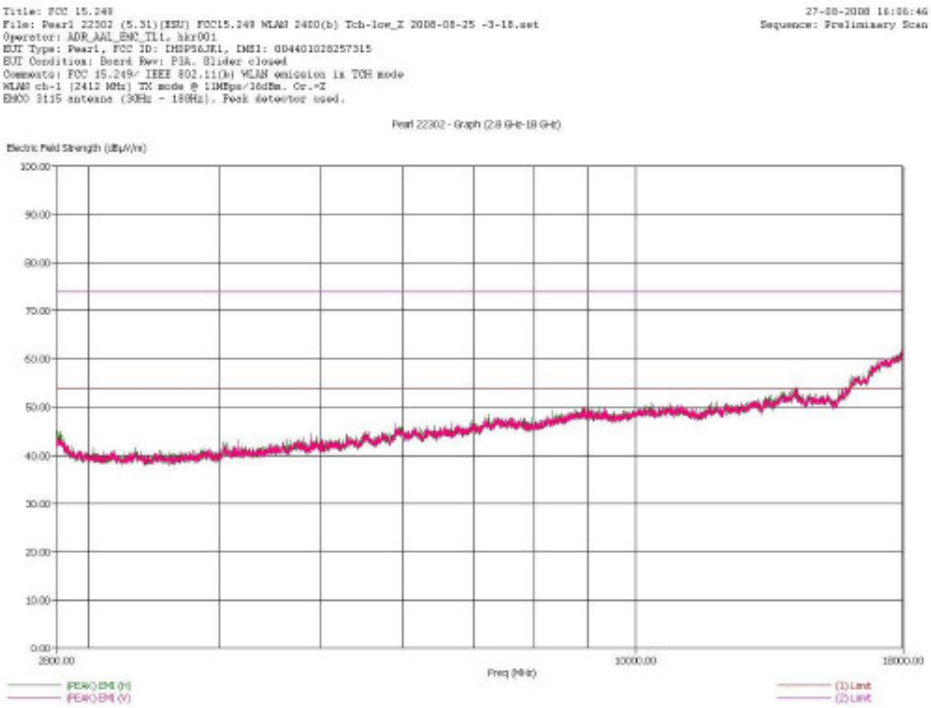
30 – 3000 MHz High Channel Dual Polarization Y



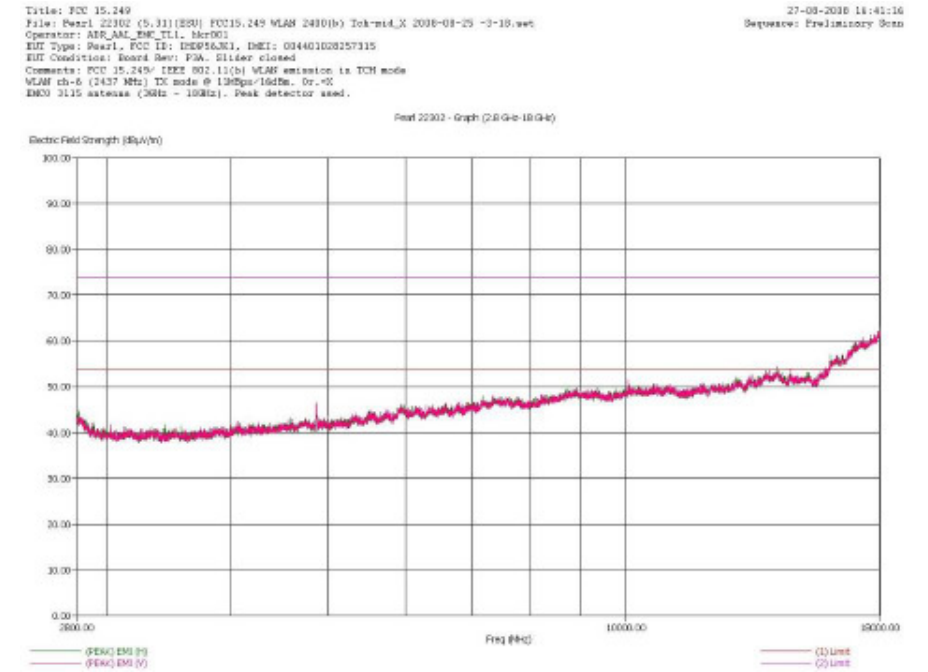
3-18GHz Low Channel Dual Polarization X-Orientation



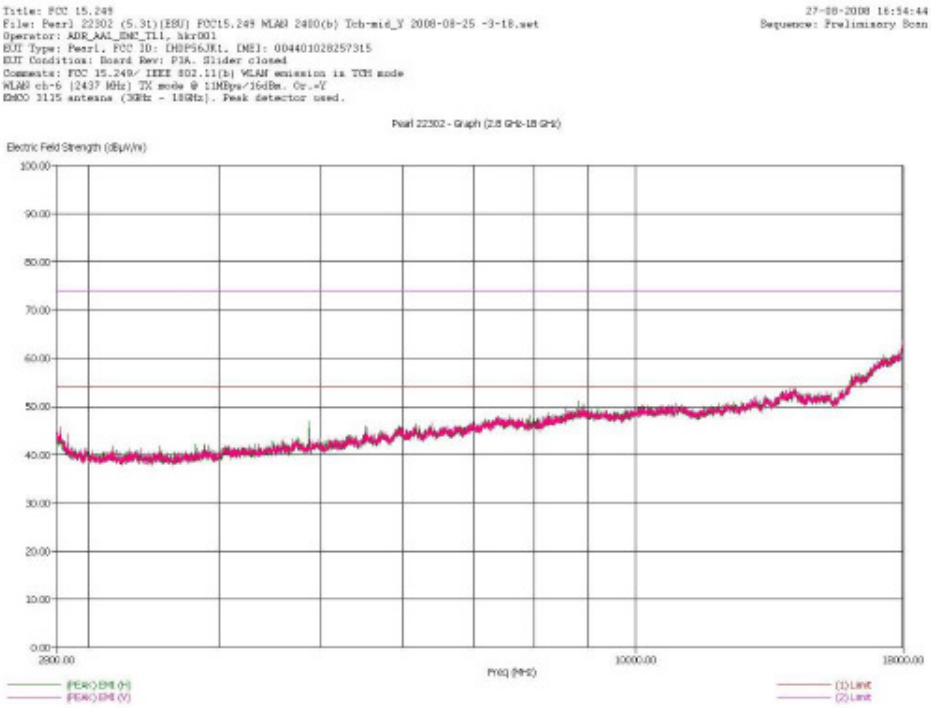
3-18GHz Low Channel Dual Polarization Y-Orientation



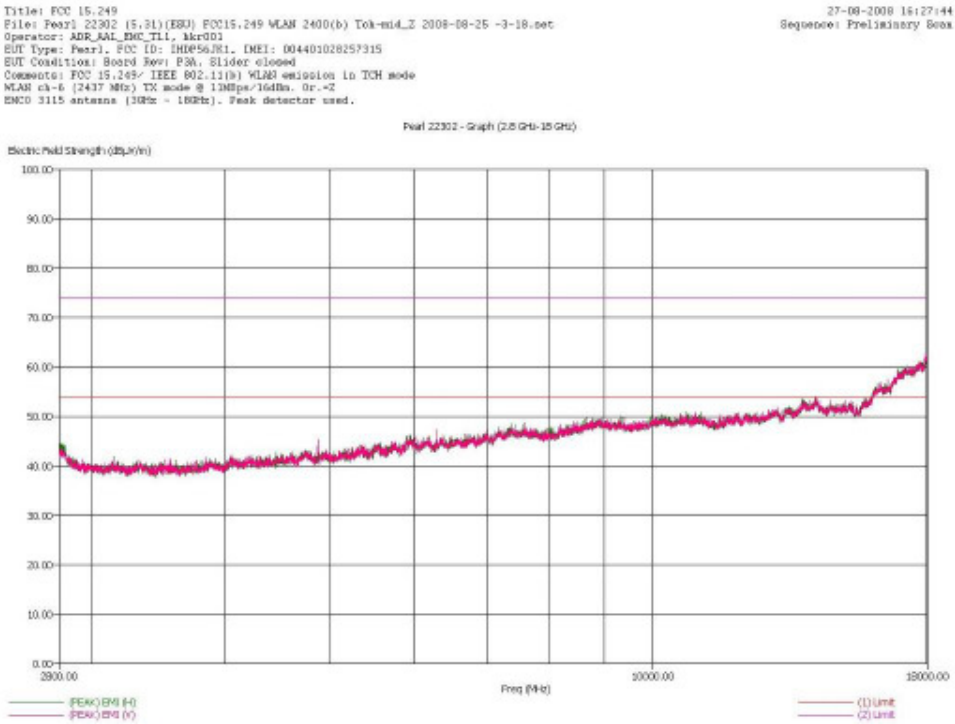
3-18GHz Low Channel Dual Polarization Z-Orientation



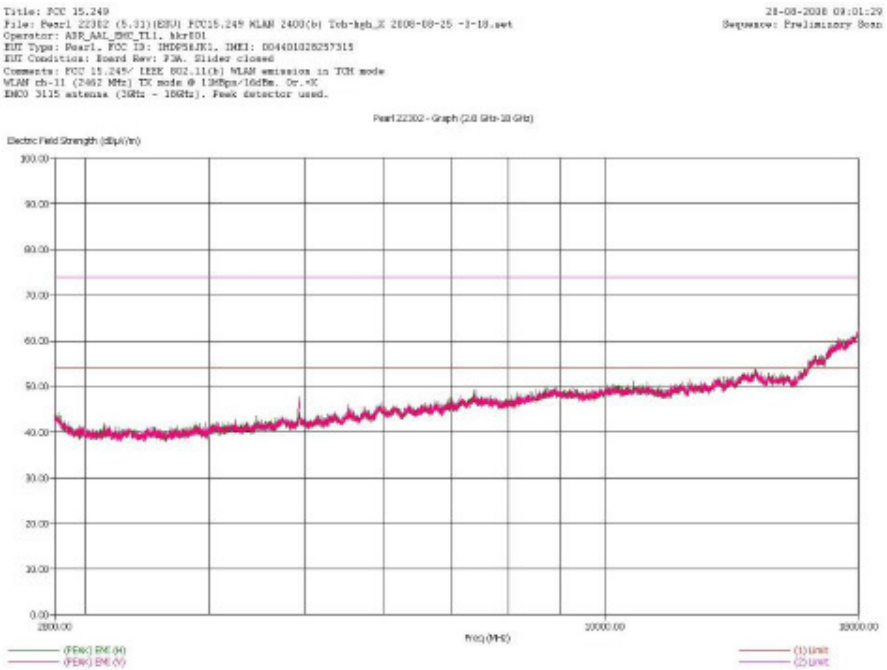
3-18GHz Middle Channel Dual Polarization X-Orientation



3-18GHz Middle Channel Dual Polarization Y-Orientation



3-18GHz Middle Channel Dual Polarization Z-Orientation



Title: FCC 15.247(c)
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(b) Tch-hgh_X 2008-08-25 -AV -2.har.set
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A. Slider closed
Comments: FCC 15.249/ IEEE 802.11(b) WLAN emission in TCH mode
WLAN ch-11 (2462 MHz) TX mode @ 11MBps/16dBm. Or.=X
EMCO 3115 antenna (3GHz - 18GHz). AV detector used.

28-08-2008 09:45:32
Sequence: Final Measurements

Pearl 22302 - Table

Freq (MHz)	Freq (Max) (MHz)	(AVG) EMI (dBµV/m)	(1) Limit (dBµV/m)	(AVG) Margin Lim1 (dB)	Ttbl Agl (deg)	Pol
4924.50	4922.84	34.34	54.00	-19.66	220.50	H
4924.50	4924.21	35.54	54.00	-18.46	257.60	V

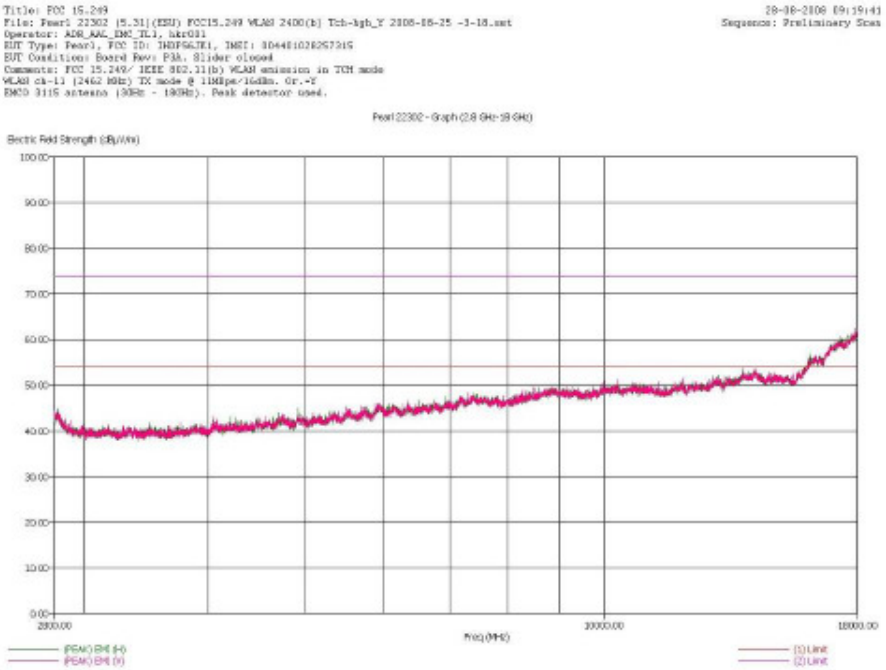
Title: FCC 15.247(c)
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(b) Tch-hgh_X 2008-08-25 -AV -17.975GHz.set
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A. Slider closed
Comments: FCC 15.249/ IEEE 802.11(b) WLAN emission in TCH mode
WLAN ch-11 (2462 MHz) TX mode @ 11MBps/16dBm. Or.=X
EMCO 3115 antenna (3GHz - 18GHz). AV detector used.

28-08-2008 09:40:19
Sequence: Final Measurements

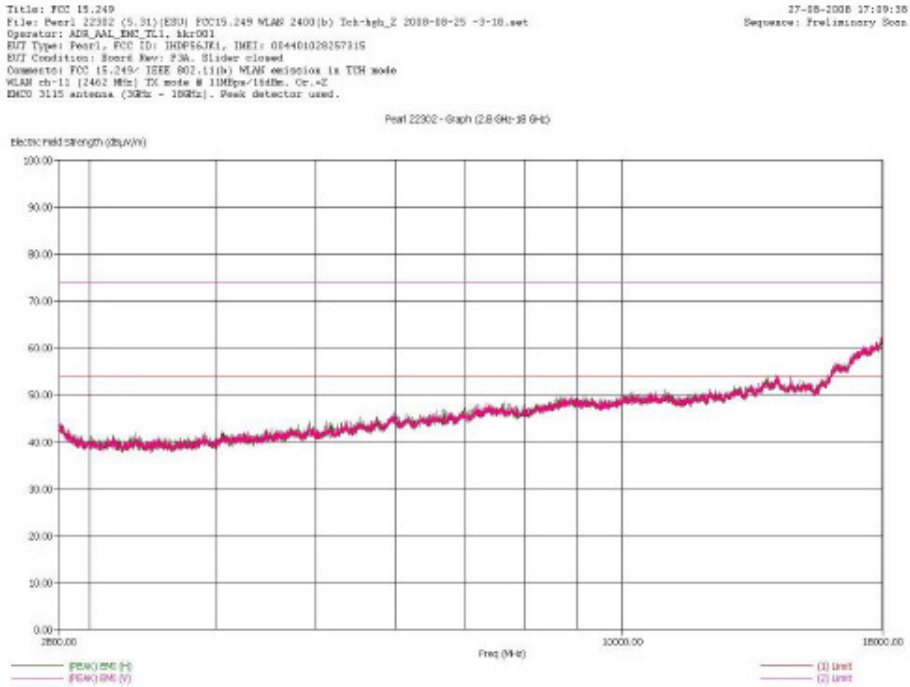
Pearl 22302 - Table

Freq (MHz)	Freq (Max) (MHz)	(AVG) EMI (dBµV/m)	(1) Limit (dBµV/m)	(AVG) Margin Lim1 (dB)	Ttbl Agl (deg)	Pol
17975.00	17977.13	49.42	54.00	-4.58	78.40	H
17975.00	17973.27	49.40	54.00	-4.60	357.90	V

3-18GHz High Channel Dual Polarization X-Orientation



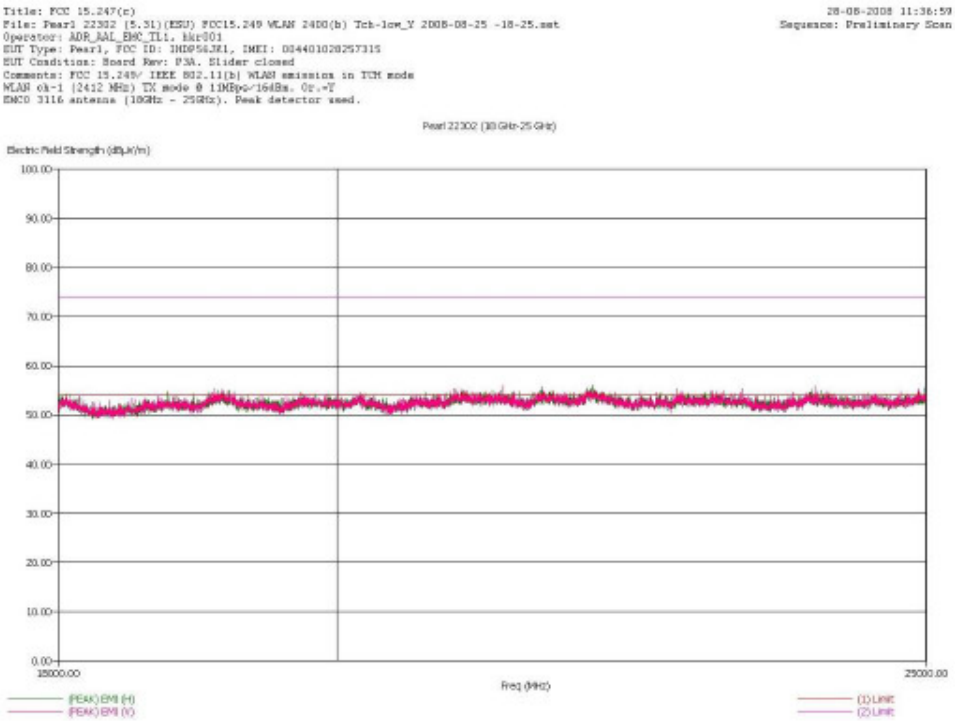
3-18GHz High Channel Dual Polarization Y-Orientation



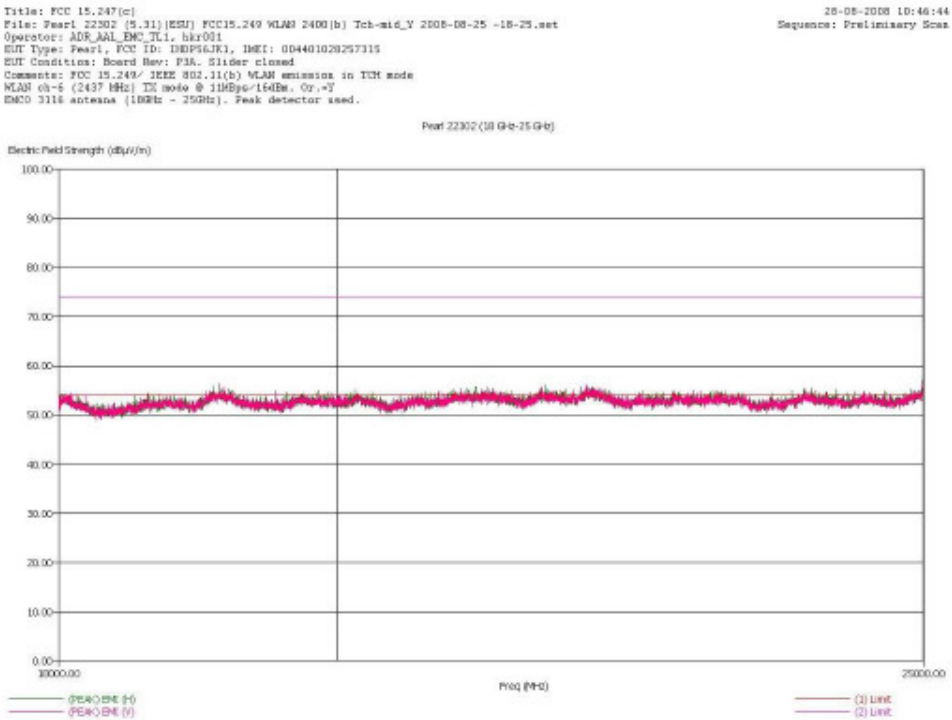
3-18GHz High Channel Dual Polarization Z-Orientation

There were no discernible emissions above the noise floor for 18-26 GHz for Low, Mid and High Channels and all polarizations in Bluetooth band

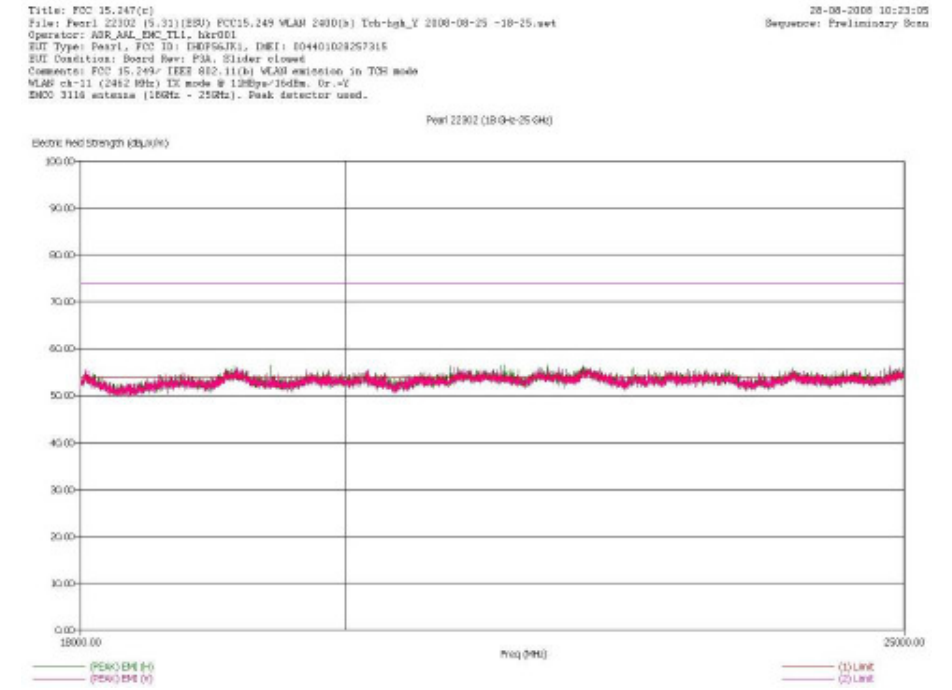
Only one worst case plot for each test frequency are shown in the below plots in the range from 18 GHz – 26 GHz.



18-25GHz Low Channel Dual Polarization Y-Orientation



18-25GHz Middle Channel Dual Polarization Y-Orientation

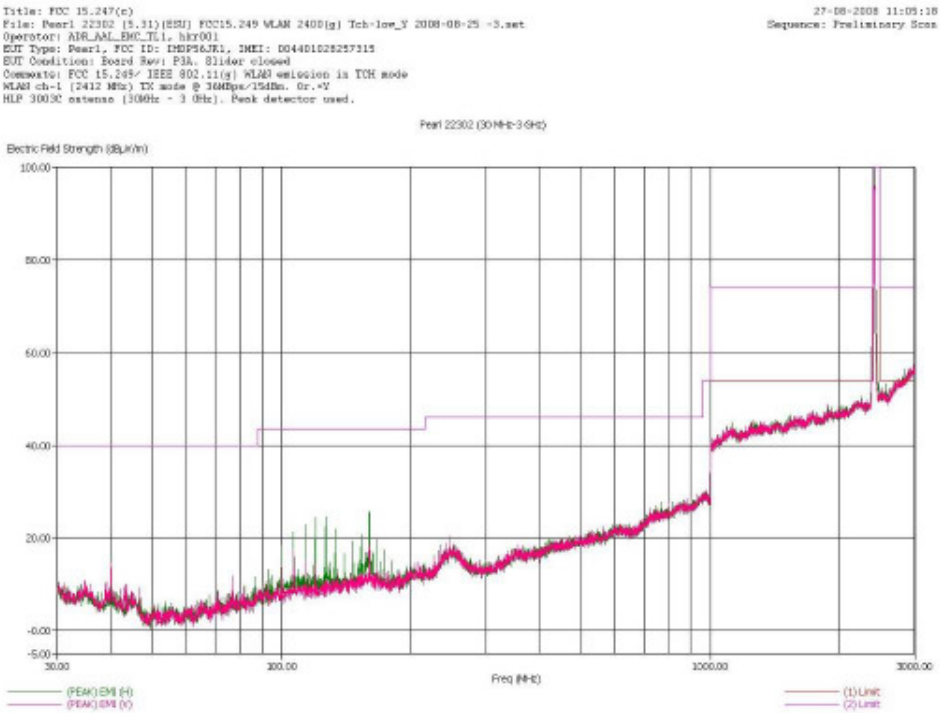


18-25GHz High Channel Dual Polarization Y-Orientation

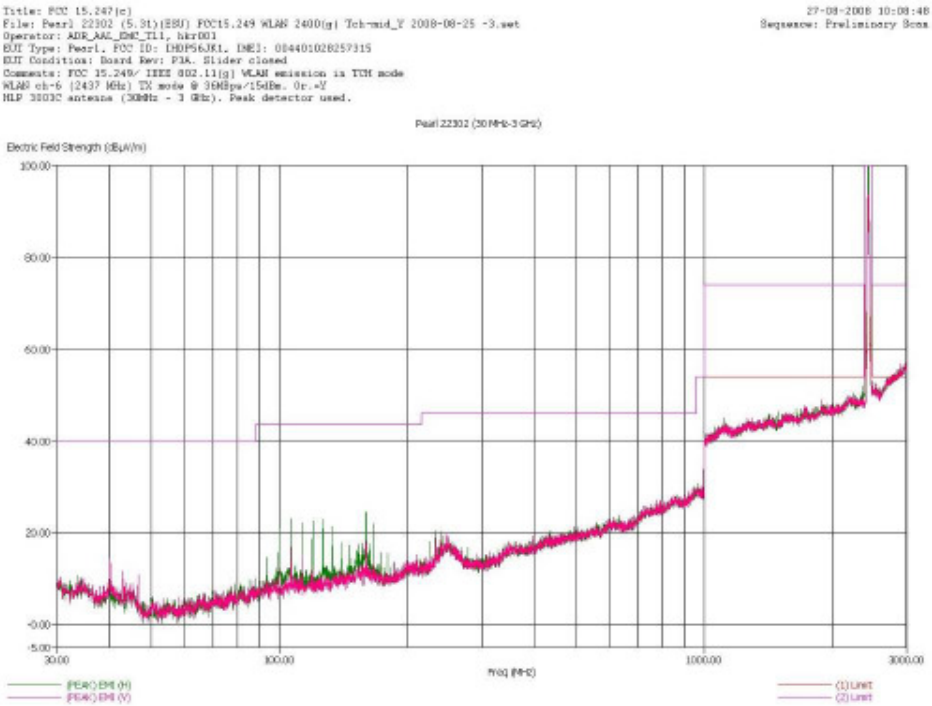
WLAN Band (g)

There were no discernible emissions above the noise floor for 30-3000MHz for Low, Mid and High Channels and all polarizations in WLAN band (g).

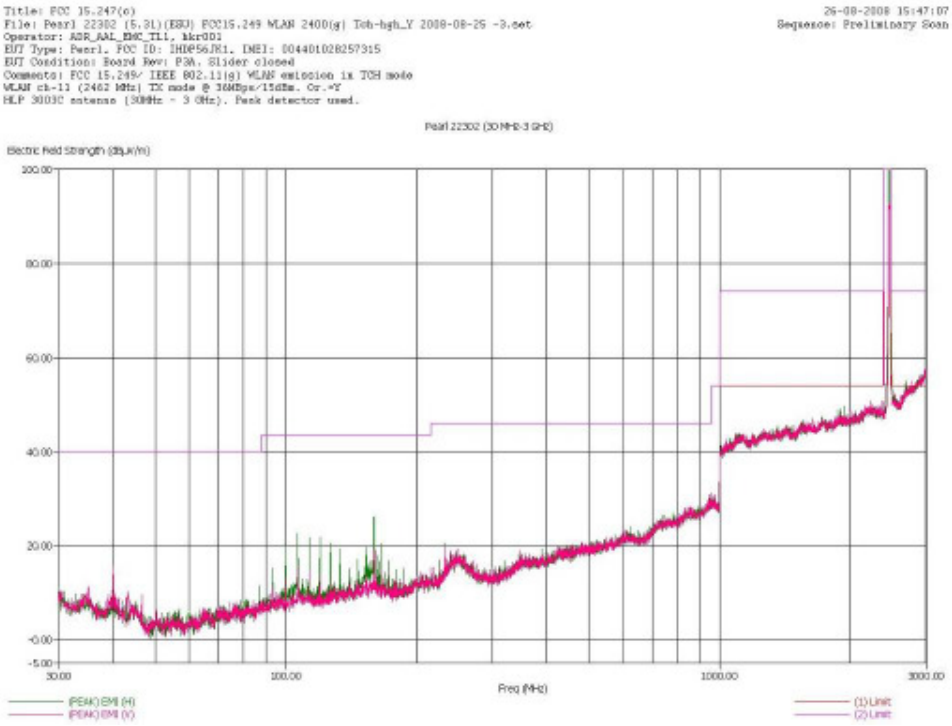
Only one worst case plot for each test frequency are shown in the below plots in the range from 30 MHz – 3000 MHz.



30 - 3000MHz Low Channel Dual Polarization Y



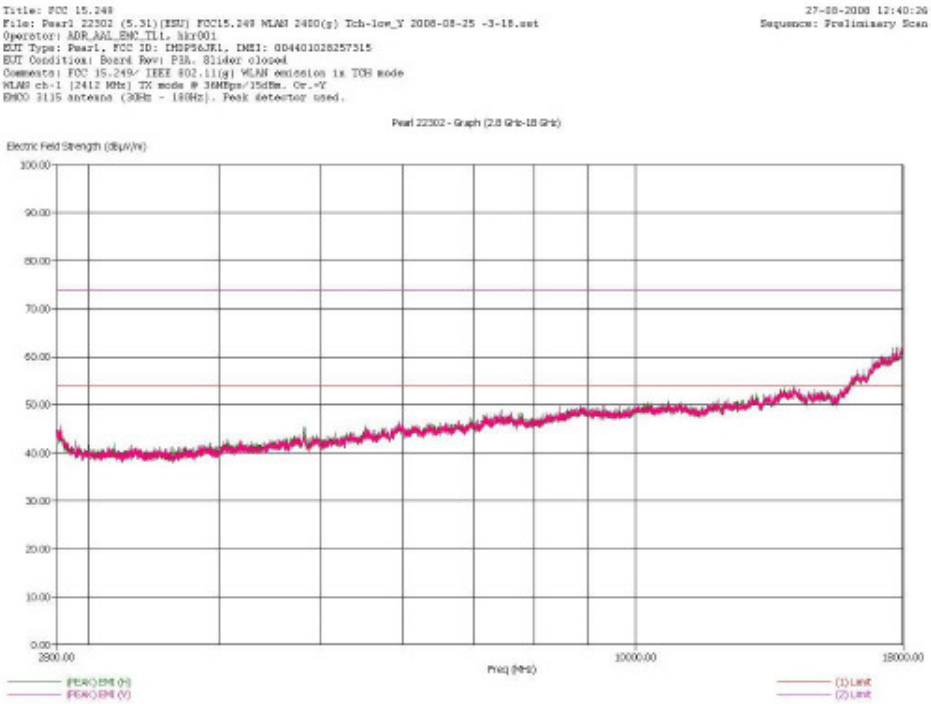
30 - 3000MHz Middle Channel Dual Polarization Y



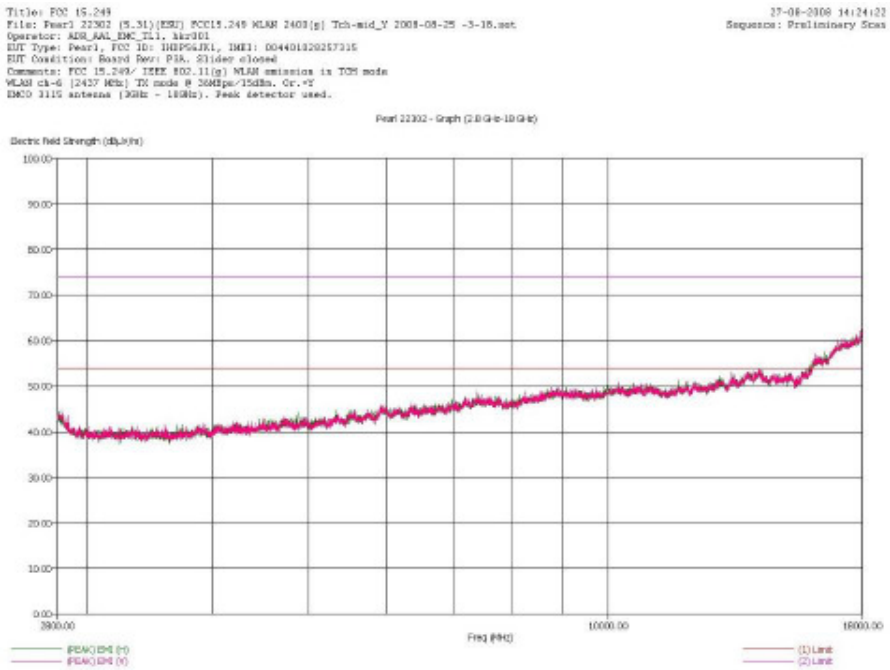
30 - 3000MHz High Channel Dual Polarization Y

There were no discernible emissions above the noise floor for 3-18 GHz for Low, Mid and High Channels and all polarizations in WLAN band (g).

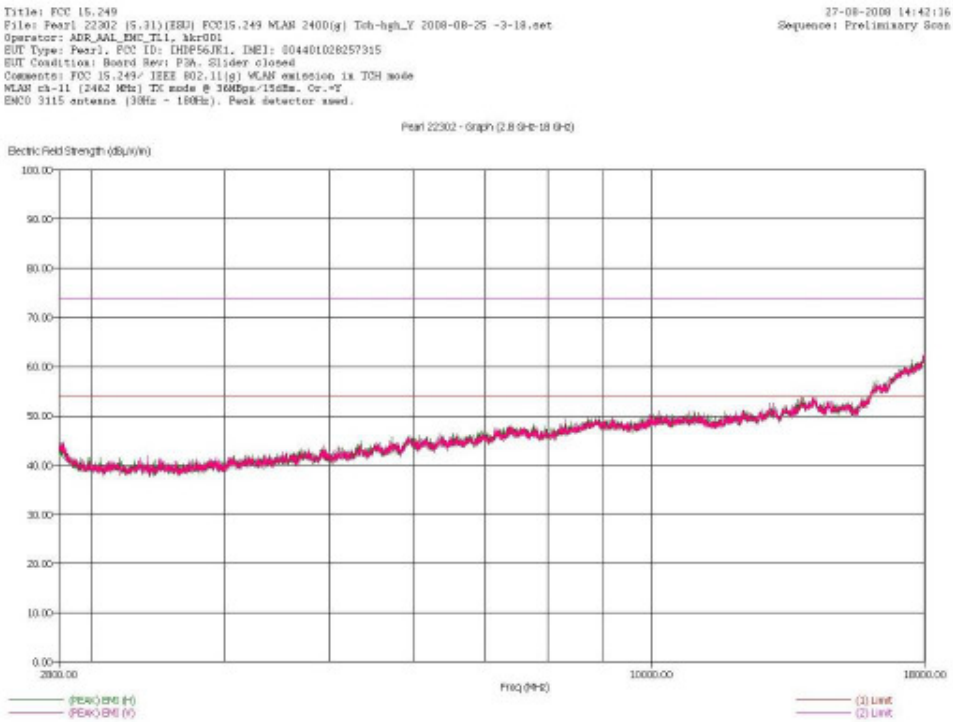
Only one worst case plot for each test frequency are shown in the below plots in the range from 3 GHz – 18 GHz.



3-18GHz Low Channel Dual Polarization Y-Orientation



3-18GHz Middle Channel Dual Polarization Y-Orientation



Title: FCC 15.247(c)
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(g) Tch-hgh_Y 2008-08-25 -AV -17.975GHz.set
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A. Slider closed
Comments: FCC 15.249/ IEEE 802.11(g) WLAN emission in TCH mode
WLAN ch-11 (2462 MHz) TX mode @ 36MBps/15dBm. Or.=Y
EMCO 3115 antenna (3GHz - 18GHz). AV detector used.

27-08-2008 15:27:58
Sequence: Final Measurements

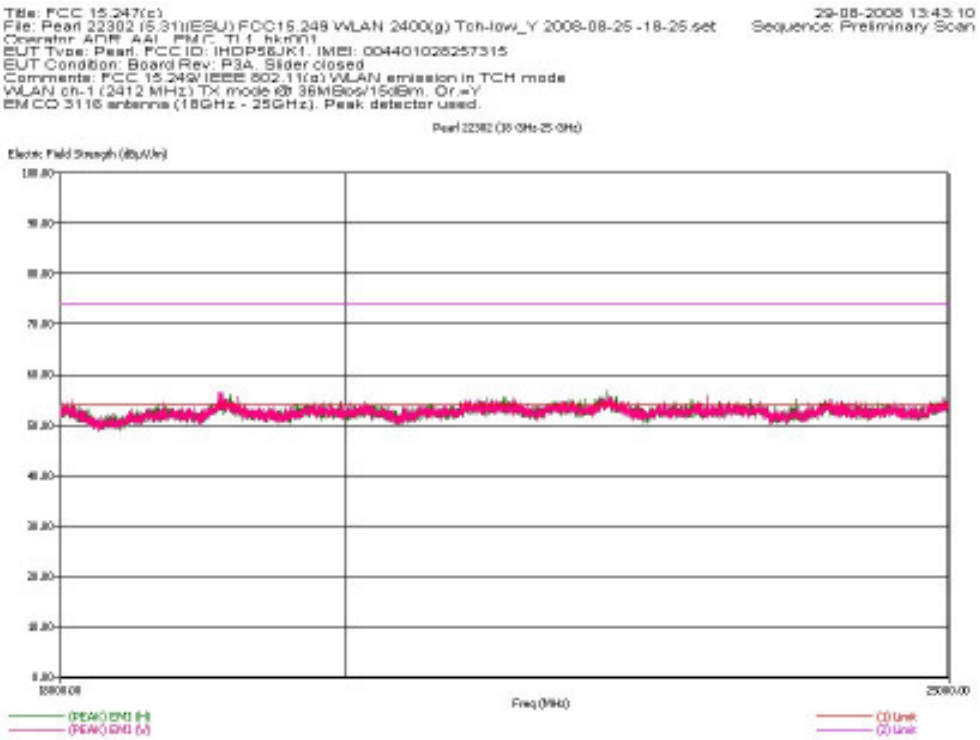
Pearl 22302 - Table

Freq (MHz)	Freq (Max) (MHz)	(AVG) EMI (dBµV/m)	(1) Limit (dBµV/m)	(AVG) Margin Lim1 (dB)	Tbl Agl (deg)	Pol
17975.00	17967.42	49.26	54.00	-4.74	192.40	H
17975.00	17970.42	49.71	54.00	-4.29	1.40	V

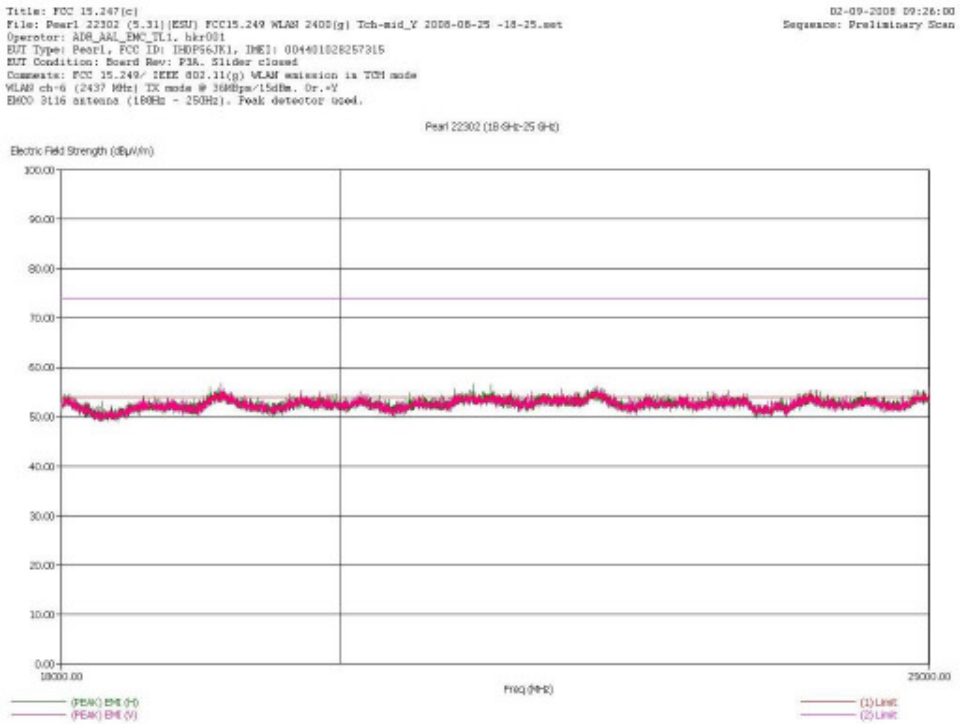
3-18GHz High Channel Dual Polarization Y-Orientation

There were no discernible emissions above the noise floor for 18-26 GHz for Low, Mid and High Channels and all polarizations in Bluetooth band

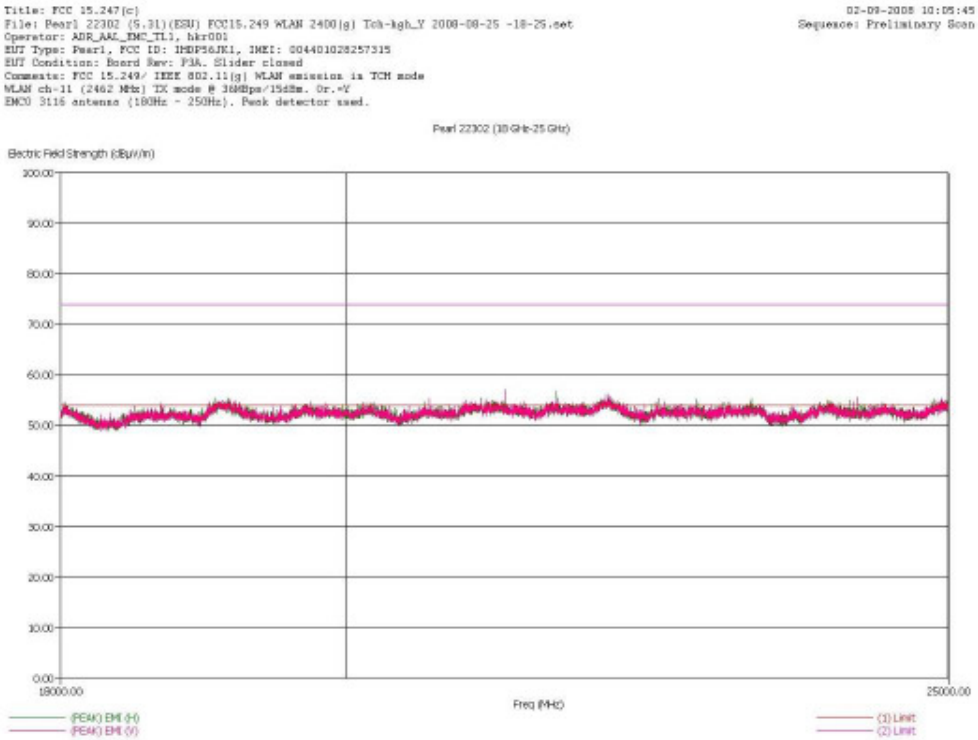
Only one worst case plot for each test frequency are shown in the below plots in the range from 18 GHz – 26 GHz.



18-25 GHz Low Channel Dual Polarization Y-Orientation



18-25 GHz Middle Channel Dual Polarization Y-Orientation



18-25 GHz High Channel Dual Polarization Y-Orientation

BAND-EDGE COMPLIANCE OF RF RADIATED EMISSIONS

CFR 47 Part 15.247

Measurement Procedure

The test sample is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

Field Strength (dBµV/m) = EMI Receiver Level (dBµV) + Cable Loss (dB) + Filter Loss (dB) - Amplifier Gain (dB) + Antenna Correction Factor (3/m)

The test sample WLAN transmitter was enabled using a test script.

A fully charged battery was used for the supply voltage.

Measurement Results

Comments:
The band edge measurements crossing the corner for the low/high channel with respect to the average limit line but not the peak limit line is acceptable when applying the FCC rule specified in CFR 47 part 15.35(b) for the use of peak detector above 1 GHz.

The test was repeated in 22.5 degree angular step size when the band edge crossing is measured to be +6 dB or more above the AVG limit line to determine if the FCC rule specified in CFR 47 part 15.247(d) should be applied.

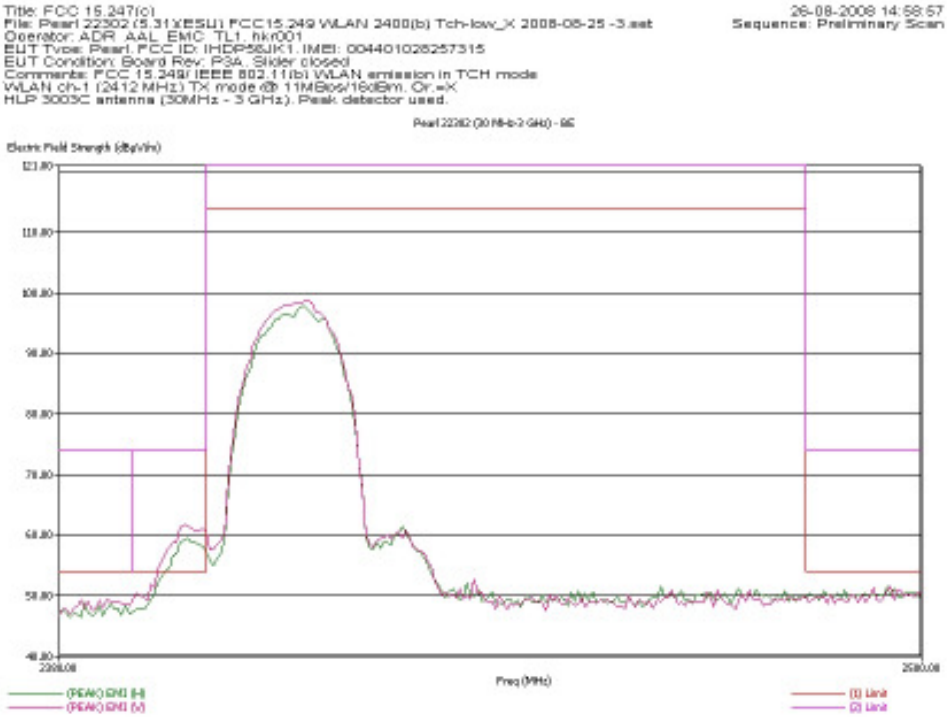
The average detector was applied for band edge crossing the restricted band at 2390 MHz with +6 dB or more above the AVG limit line. A vertical line on the graphs indicates the restricted band frequency 2390 MHz. The test is performed with RBW=1MHz (6 dB) and if applicable repeated with RBW=120 kHz (6 dB) to evaluate the restricted band performance

The peak detector limit line has been added to the graphical plots.
Note: No WLAN band notch filters were used.

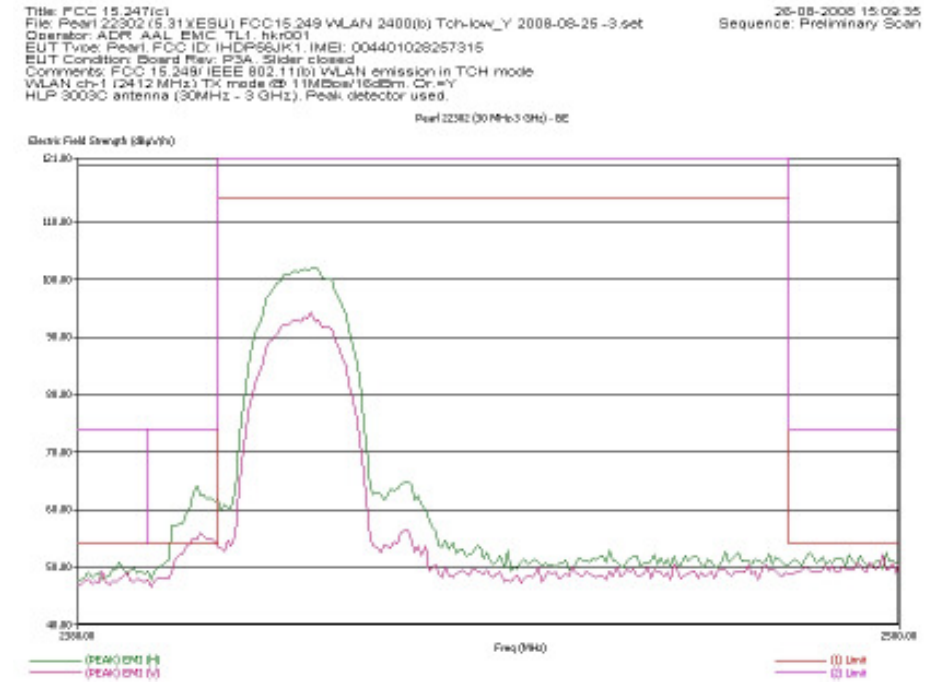
See Attached:

WLAN Band (b)

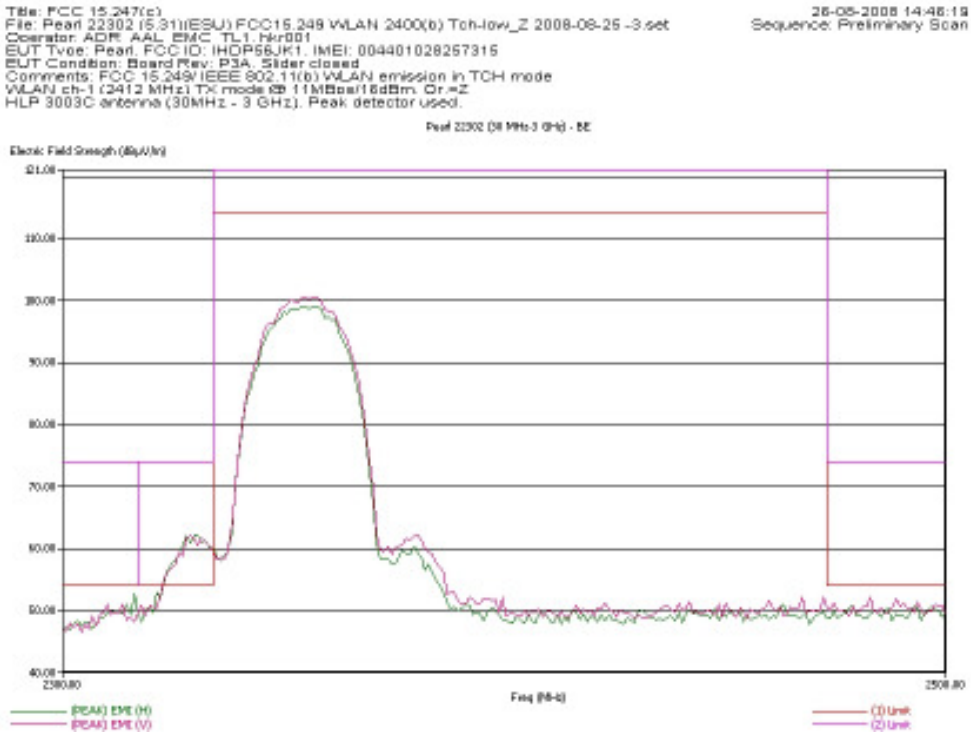
Only the worst band edge is displayed for WLAN band (b).



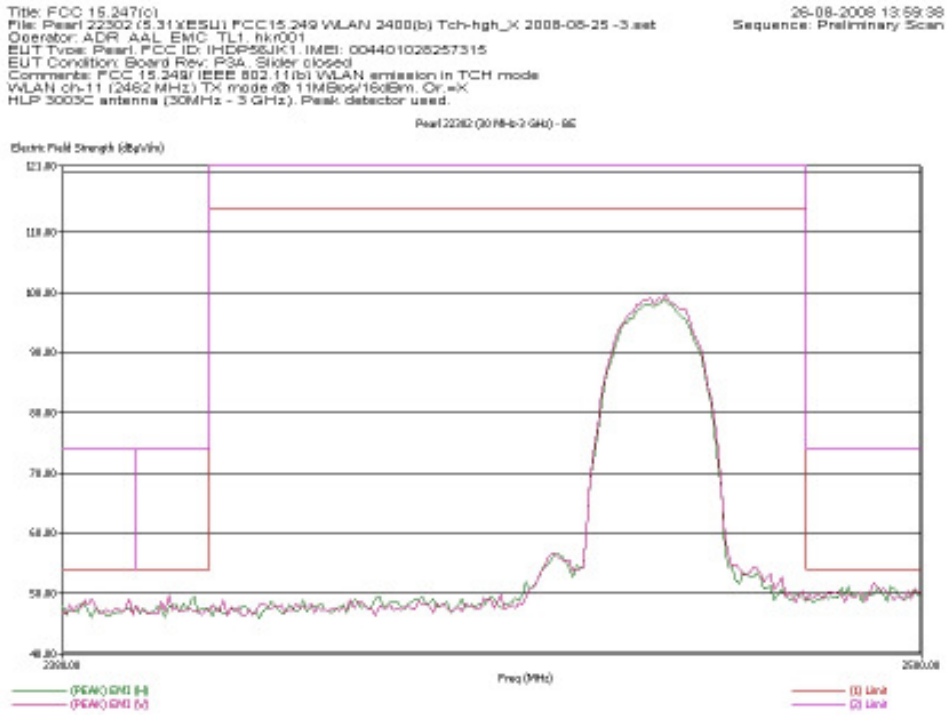
Low Band Edge X-Orientation



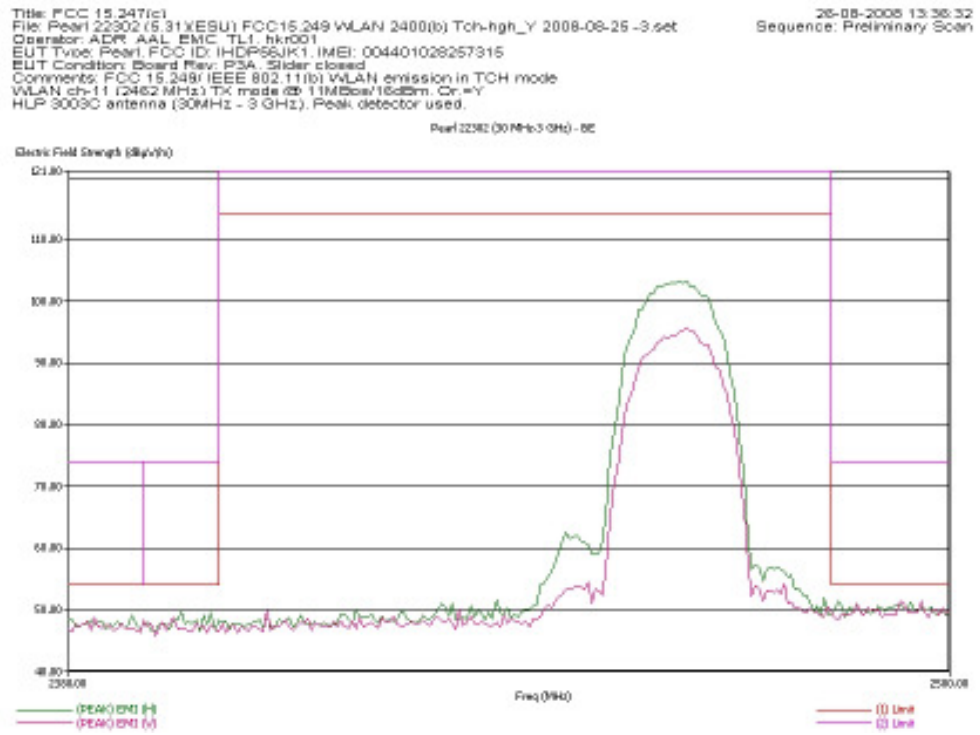
Low Band Edge Y-Orientation



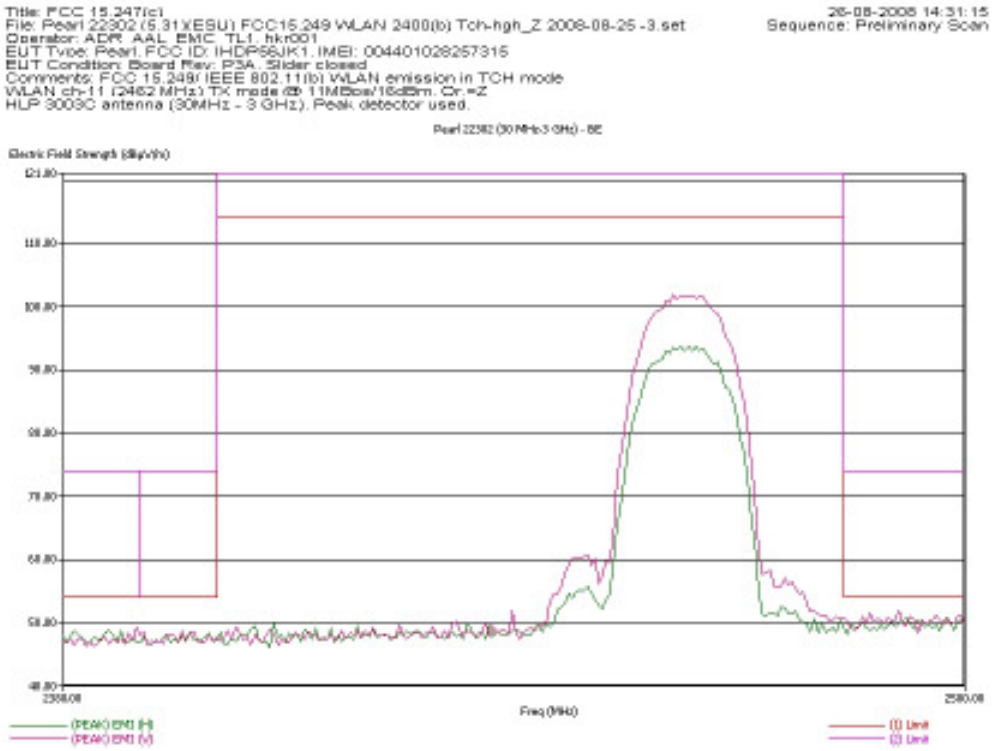
Low Band Edge Z-Orientation



High Band Edge X-Orientation



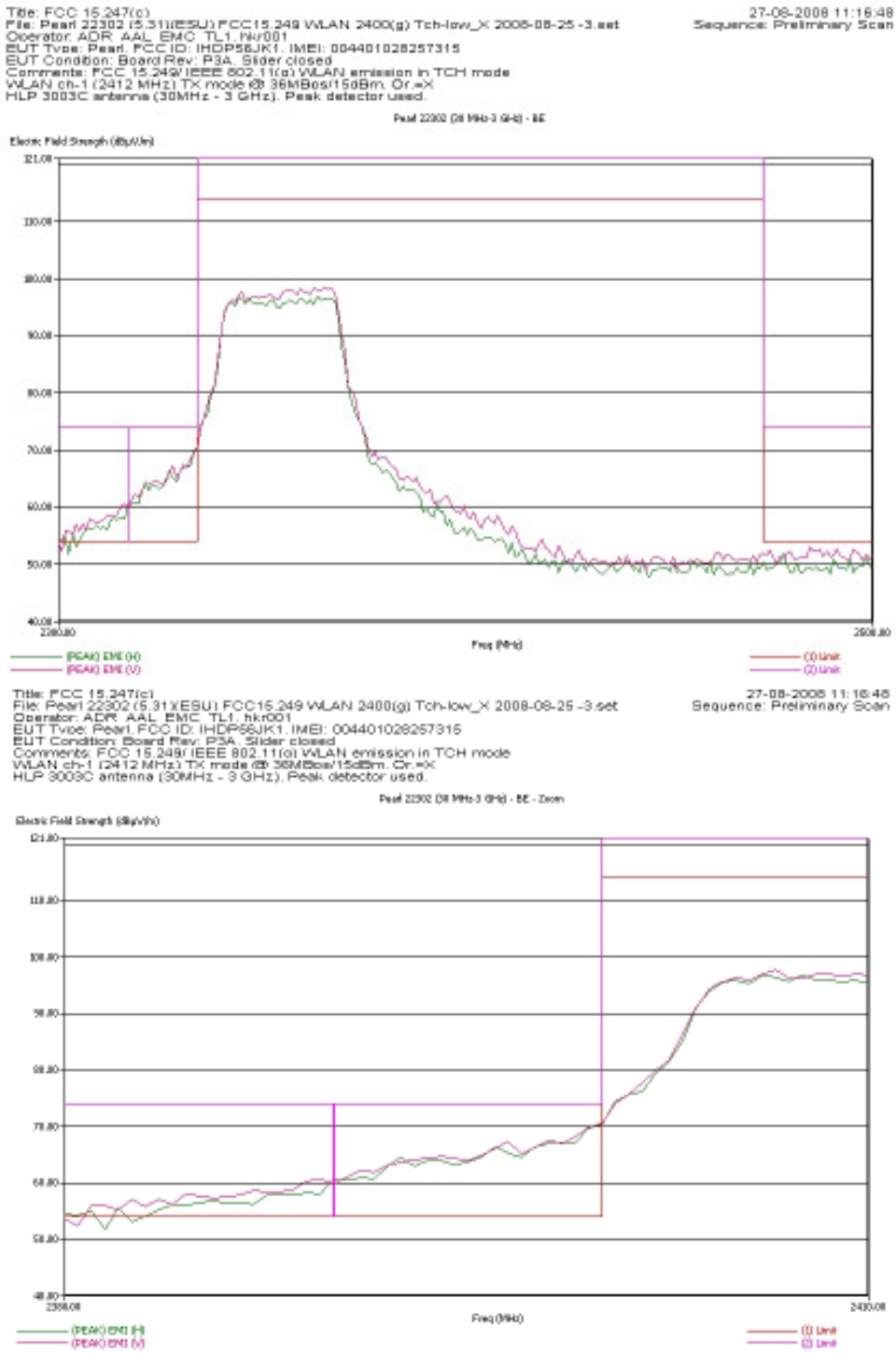
High Band Edge Y-Orientation



High Band Edge Z-Orientation

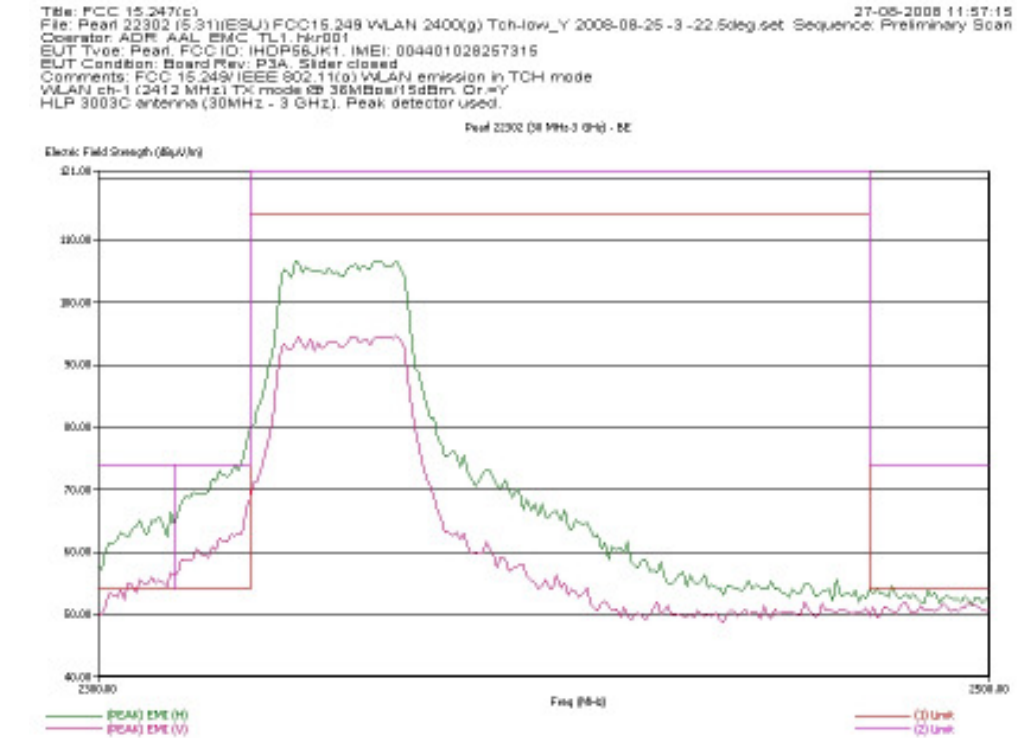
WLAN Band (g)

Only the worst band edge is displayed for WLAN band (g).



Low Band Edge X-Orientation

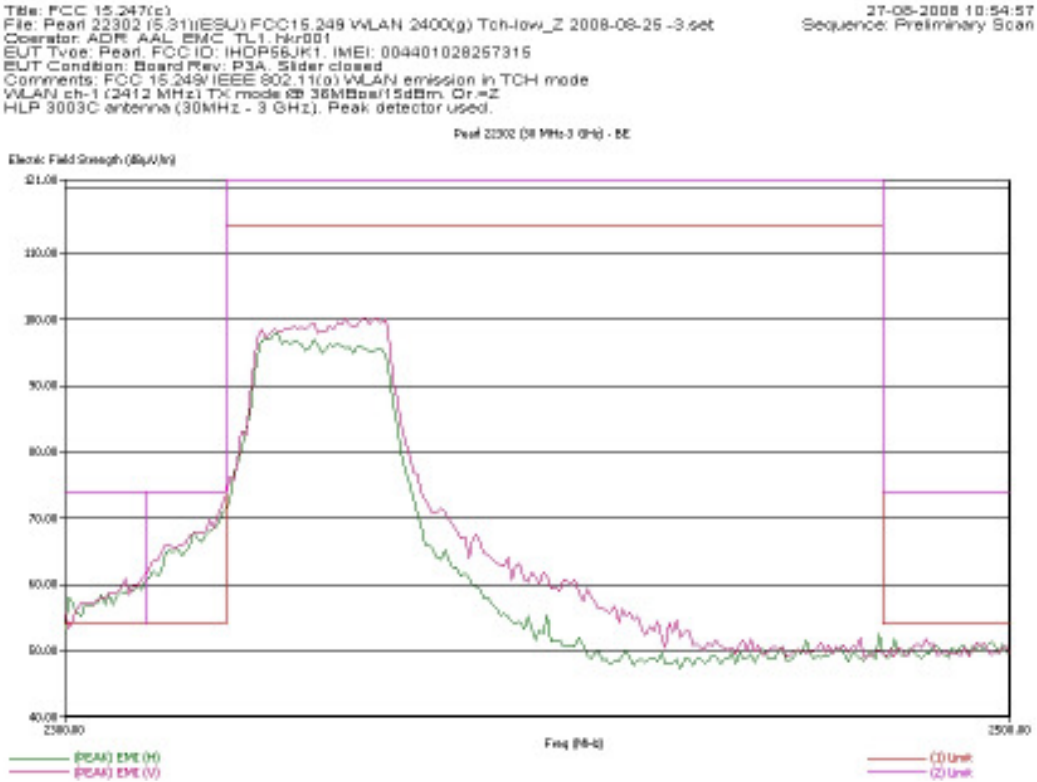
(See Appendix 1 and Appendix 3)

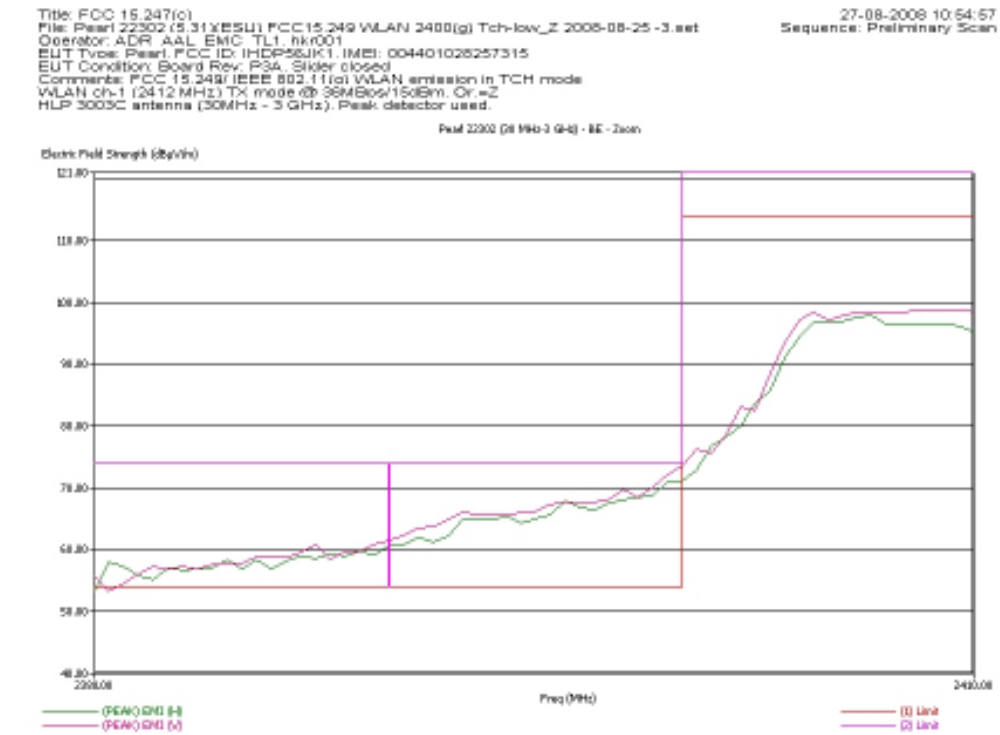


Title: FCC 15.247(c)
27-08-2008 11:57:15
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(g) Tch-low_Y 2008-08-25 -3 -22.5deg.set Sequence: Preliminary Scan
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A, Slider closed
Comments: FCC 15.249/ IEEE 802.11(g) WLAN emission in TCH mode
WLAN ch-1 (2412 MHz) TX mode @ 36MBps/15dBm. Or.=Y
HLP 3003C antenna (30MHz - 3 GHz). Peak detector used.
Pearl 22302 (30 MHz-3 GHz) - BE - Zoom
Electric Field Strength (dBµV/m)
121.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
2380.00
2410.00
Freq (MHz)
(PEAK) EMI (H)
(PEAK) EMI (V)
(1) Limit
(2) Limit

Low Band Edge Y-Orientation

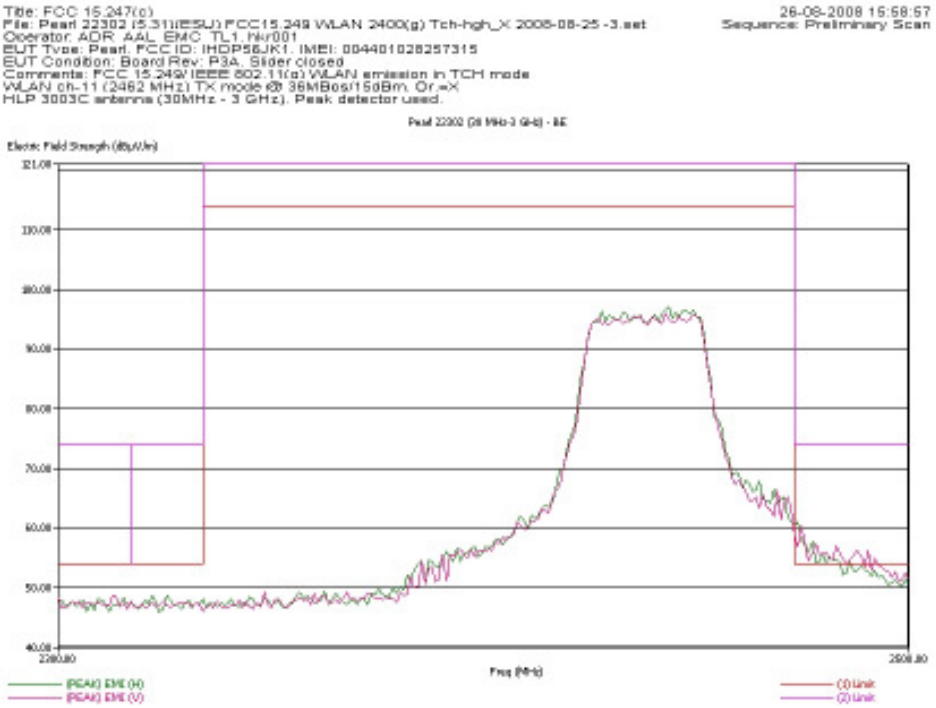
(See Appendix 1 and Appendix 3)





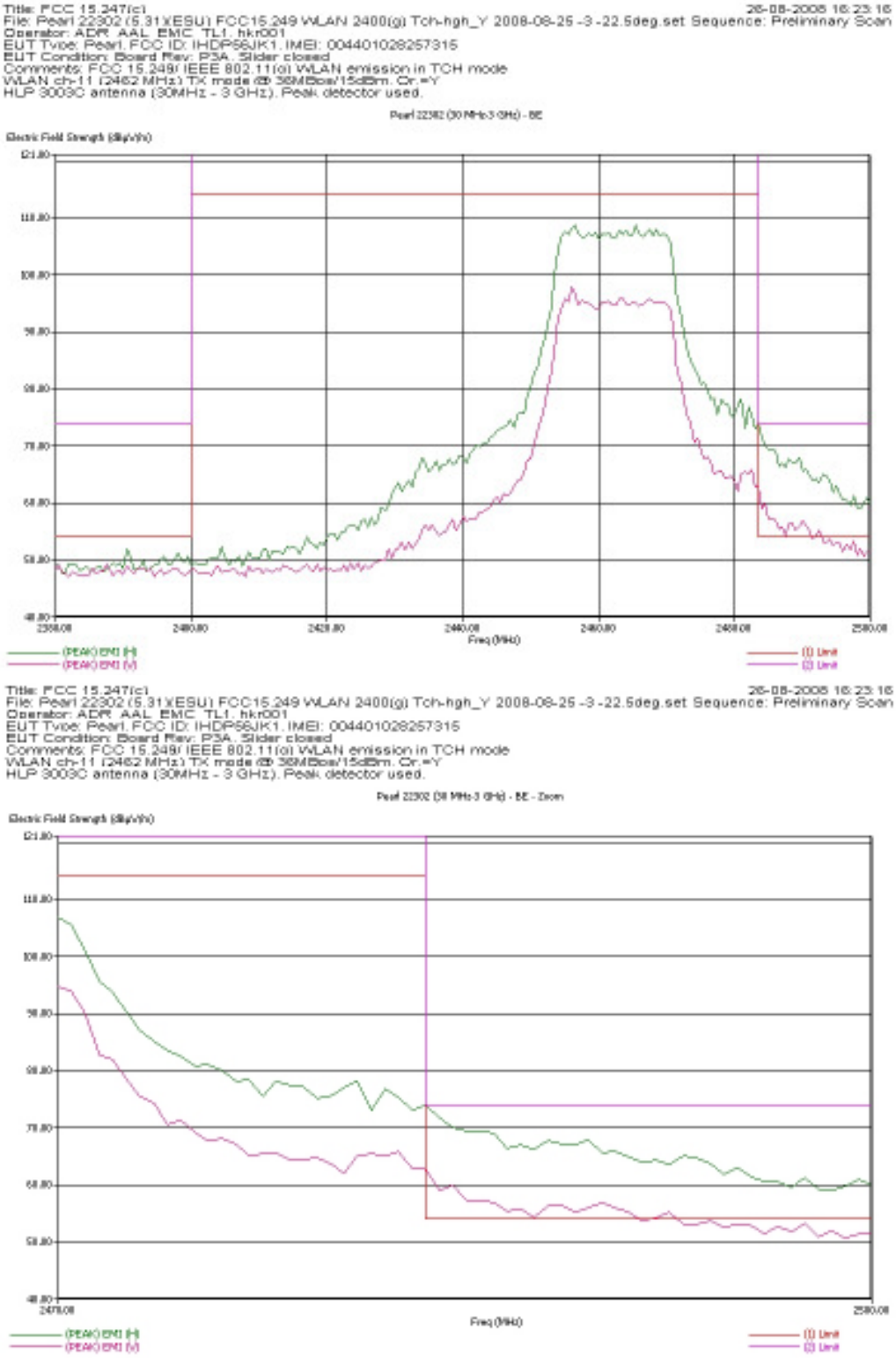
Low Band Edge Z-Orientation

(See Appendix 1 and Appendix 3)



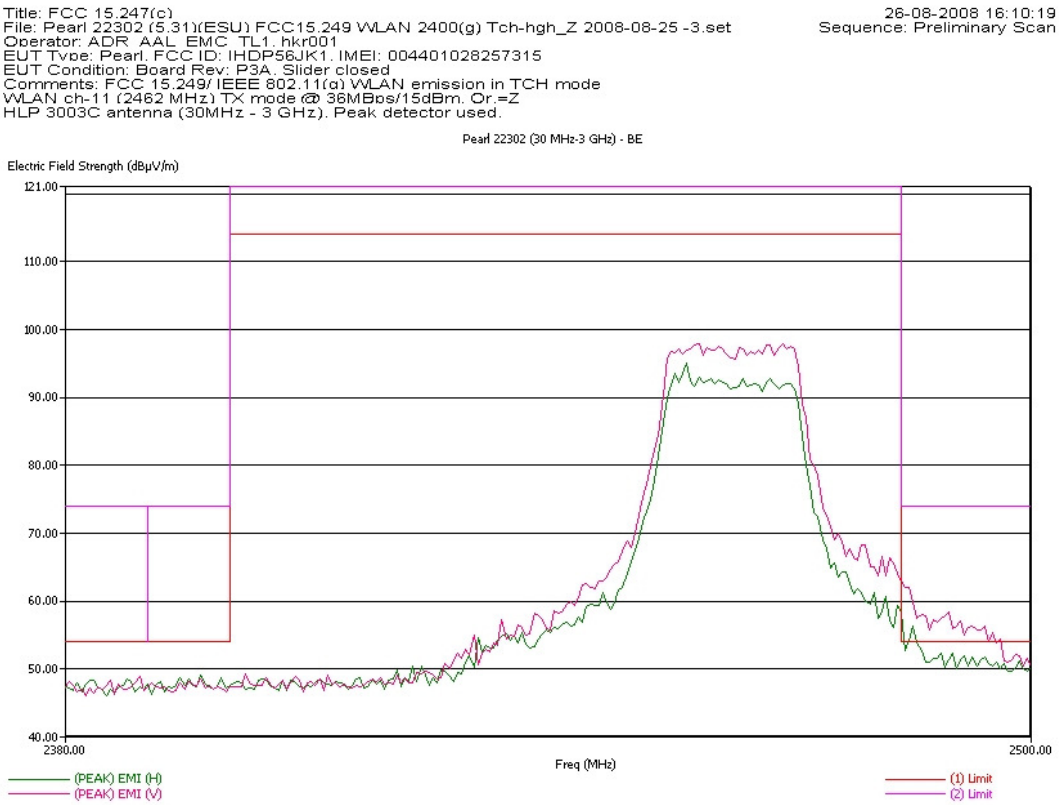
High Band Edge X-Orientation

(See Appendix 2)



High Band Edge Y-Orientation

(See Appendix 2)



High Band Edge Z-Orientation
(See Appendix 2)

PICTURES

The pictures related to the above test results are placed in the associated report denoted as EXHIBIT 7A2.

APPENDIX

APPENDIX- 1 Out of band emission – band edge

The WLAN band (g) low channel band edge performance is further evaluated using the described method in FCC part 15.247(d).

The carrier is measured using a 100 kHz RBW (6 dB).

WLAN band (g):

Title: FCC 15.249 27-08-2008 12:19:55
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(g) Tch-low_Y 2008-08-25 -PK Carrier RBW=100KHz -H.set Sequence: Final Measurements
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, IMEI: 004401028257315
EUT Condition: Board Rev: P3A. Slider closed
Comments: FCC 15.249/ IEEE 802.11(g) WLAN emission in TCH mode
WLAN ch-1 (2412 MHz) TX mode @ 36MBps/15dBm. Or.-Y
HLP 3003C antenna (30MHz - 3 GHz). Peak detector used. RBW=100KHz, VBW=Auto. Measured at max angle 227deg.

Pearl 22302 - Table 100KHz RBW

Freq (MHz)	Freq (Max) (MHz)	(PEAK) EMI (dBµV/m)	Tbl Adj (deg)	Pol
2405.00	2406.10	95.50	227.00	H
2406.00	2406.35	95.60	227.00	H
2407.00	2407.61	96.05	227.00	H
2408.00	2407.61	96.08	227.00	H
2409.00	2410.11	96.07	227.00	H
2410.00	2410.10	96.07	227.00	H
2411.00	2410.11	96.08	227.00	H
2412.00	2412.96	96.20	227.00	H
2413.00	2412.95	96.24	227.00	H
2414.00	2415.13	96.61	227.00	H
2415.00	2415.13	96.61	227.00	H
2416.00	2415.13	96.59	227.00	H
2417.00	2416.35	96.55	227.00	H
2418.00	2419.21	96.85	227.00	H
2419.00	2419.21	96.77	227.00	H

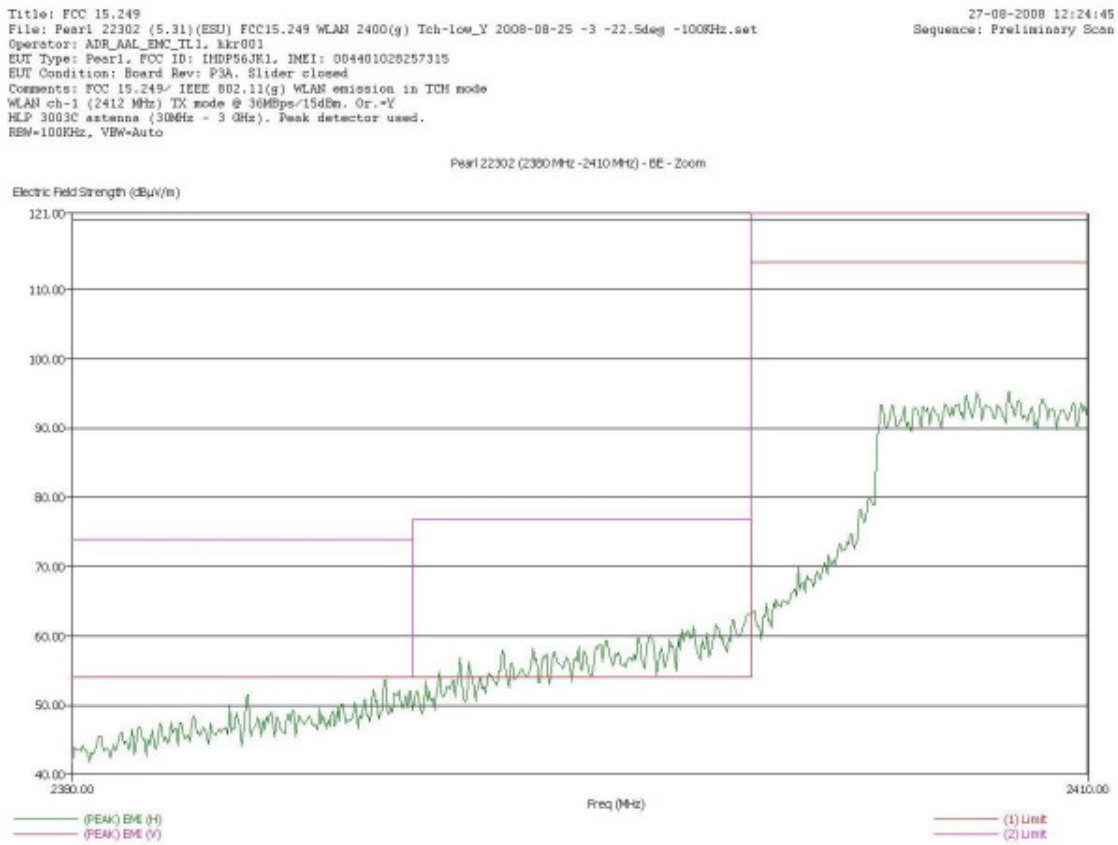
Carrier Low Channel Y-Orientation-RBW = 100 kHz (6 dB)

The peak value of the carrier field strength is measured to: 96.85 dBµV/m

The new out of band emission limit line for emissions that does not fall inside any restricted band as defined in FCC part 15.205 and is limited to the frequency band 2390 MHz to 2400 MHz is:

96.85 dBµV/m – 20dB = 76.85 dBµV/m.

A test with this modified limit line included is performed.



Band Edge Low Channel Y-Orientation-RBW = 100 kHz (6 dB)

The band edge performance in the out of band emission frequency range from 2390 MHz to 2400 MHz is attenuated by more than 20 dB with respect to the carrier.

APPENDIX- 2 Marker-Delta Method

The WLAN high channel band edge performance is further evaluated using the Marker-Delta Method described in FCC guideline DA 00-705.

The in-band field strength was measured as described in Step-1 using and RBW (6 dB)=VBW=1MHz – Peak detector or RBW(6 dB)=VBW=1MHz – Average detector.

Title: FCC 15.249 28-08-2008 14:26:04
File: Pearl 22302 (5.31)(ESU) FCC15.249 WLAN 2400(g) Tch-hgh_Y 2008-08-25 -PK Carrier (15) H.set Sequence: Final Measurements
Operator: ADR_AAL_EMC_TL1, hkr001
EUT Type: Pearl, FCC ID: IHDP56JK1, INEI: 004401028257315
EUT Condition: Board Rev: P3A, Slider closed
Comments: FCC 15.249/ IEEE 802.11(g) WLAN emission in TCH mode
WLAN ch-11 (2437 MHz) TX mode @ 36MBps/15dBm. Or.=Y
HLP 3003C antenna (30MHz - 3 GHz). Peak detector used. RBW=1MHz, VBW=Auto. Measured at max angle 227deg.

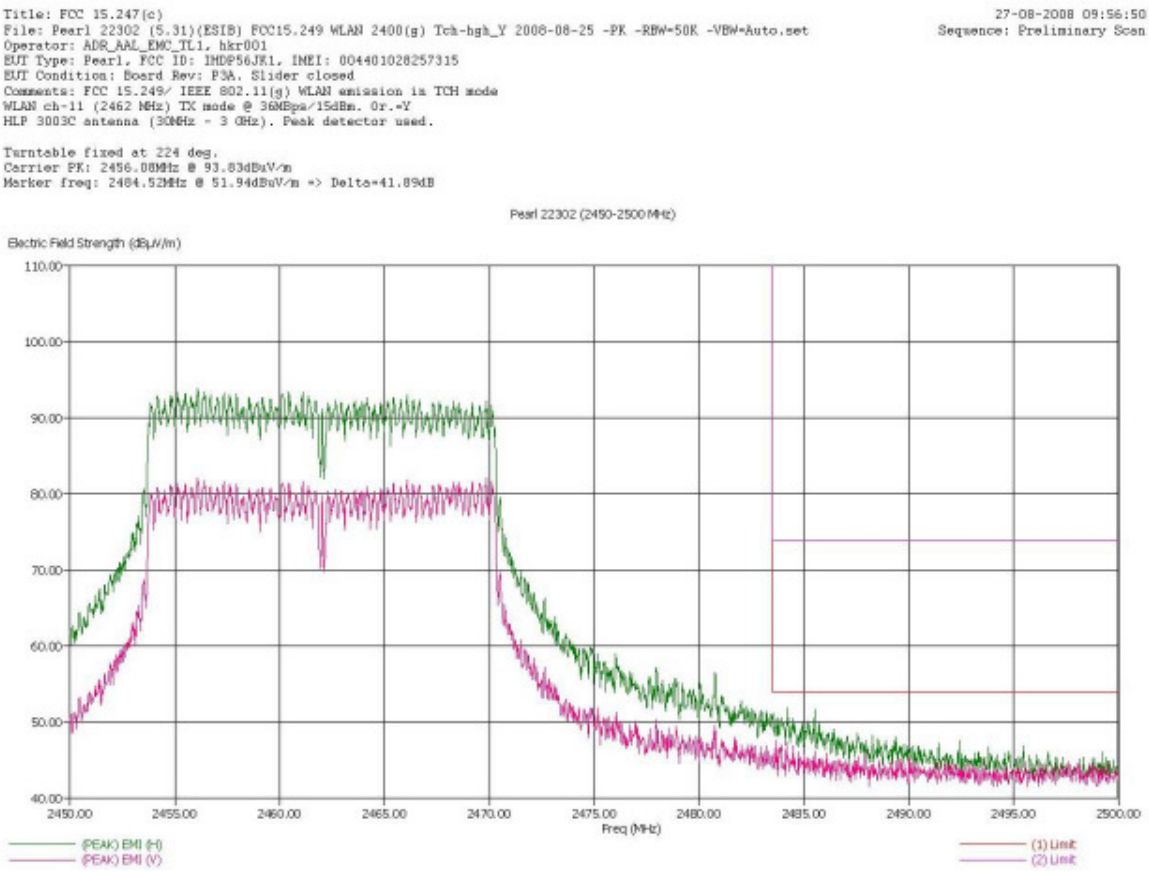
Pearl 22302 - Table

Freq (MHz)	Freq (Max) (MHz)	(PEAK) EMI (dBµV/m)	Ttbl Agl (deg)	Pol
2455.00	2455.86	107.66	227.00	H
2456.00	2455.88	107.63	227.00	H
2457.00	2455.86	107.63	227.00	H
2458.00	2457.54	105.54	227.00	H
2459.00	2458.73	105.39	227.00	H
2460.00	2458.80	105.40	227.00	H
2461.00	2461.11	105.19	227.00	H
2462.00	2463.19	105.29	227.00	H
2463.00	2463.20	105.32	227.00	H
2464.00	2465.13	105.76	227.00	H
2465.00	2465.09	105.78	227.00	H
2466.00	2465.06	105.76	227.00	H
2467.00	2467.21	105.07	227.00	H
2468.00	2467.16	105.07	227.00	H
2469.00	2468.05	105.01	227.00	H

Carrier Y-Orientation-RBW(6 dB)=VBW=1MHz – PK detector

The frequency 2455.86 was selected as peak reference point in order to minimize the span of the Step-2 measurement.

In Step-2 the band edge is measured from 2483.5 MHz – 2485.5 MHz, using an RBW of 1% equals 60 kHz, so the RBW(6 dB)=50kHz, VBW=Auto were selected for the measurement.
The carrier peak was detected and the delta marker function was used to record the maximum peak in the frequency range from 2483.5 MHz to 2485.5 MHz.



Marker-Delta Y-Orientation-RBW (6 dB)=50kHz, VBW=Auto – Max hold

Reading the graph indicates the worst case value to -41.89 dBc in the frequency range from 2483.5 MHz – 2485.5 MHz.

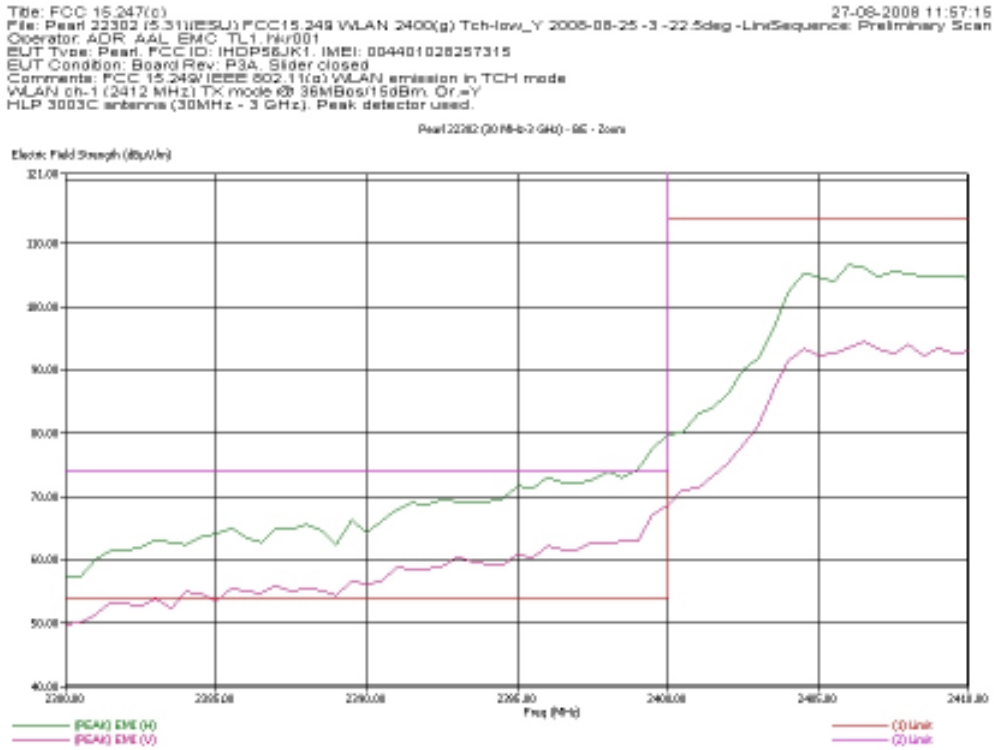
The maximum peak field strength in the frequency band from 2483.5 MHz to 2485.5 MHz is then 107.66 dBµV/m – 41.89 dB = 65.77 dBµV/m.

APPENDIX- 3 Restricted Band Performance – Low band edge

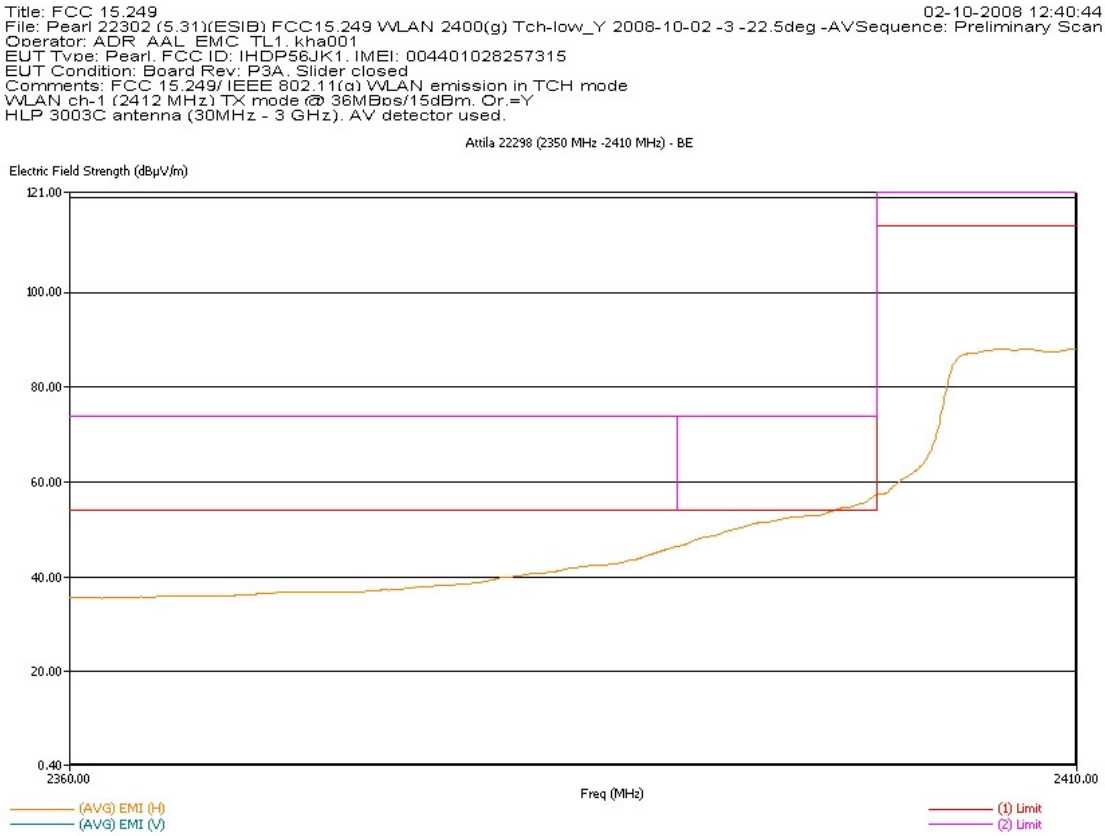
The low band edge in orientation X and Z was further evaluated with respect to the performance in the restricted band below 2390 MHz.

The test was repeated with RBW=1 MHz (6 dB) and a step size of 50 kHz to increase the resolution. The test is performed over 16 angels – 22.5 degrees apart.

The worst case restricted band performance was found to be in horizontal polarity. The horizontal polarity was measured with the Average detector using the RBW settings of 1 MHz (6 dB).



Low Band Edge X-Orientation – Restricted band performance, PK
(Peak detector and vertical limit line at 2390 MHz)



Low Band Edge X-Orientation – Restricted band performance, AVG

(Top graph: RBW=1 MHz (6 dB), Bottom graph: RBW=120 kHz (6 dB))

Reading the graph (RBW=1 MHz (6 dB)) at 2390 MHz Average level = 46.44 dBµV/m in orientation X which is 7.56 dB below the average limit line at 54 dBµV/m.

End of Test Report