



**FCC CFR47 PART 15 SUBPART E
CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

802.11A/B/G MINI PCI CARD

MODEL NUMBER: PA3297U-1MPC

FCC ID: CJ6UPA3297WL

REPORT NUMBER: 03U2199-2

ISSUE DATE: OCTOBER 21, 2003

Prepared for

**TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9 SUEHIRO-CHO, OME
TOKYO, 198-8710, JAPAN**

Prepared by

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1. TEST RESULT CERTIFICATION

COMPANY NAME: TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9 SUEHIRO-CHO, OME
TOKYO, 198-8710, JAPAN

EUT DESCRIPTION: 802.11A/B/G MINI PCI CARD

MODEL: PA3297U-1MPC

DATE TESTED: OCTOBER 16 - 21, 2003

| APPLICABLE STANDARDS | |
|-----------------------|-------------------------|
| STANDARD | TEST RESULTS |
| FCC PART 15 SUBPART E | NO NON-COMPLIANCE NOTED |

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Note: The 5.2 GHz band is applicable to this report; other bands of operation (2.4 and 5.8 GHz) are documented in a separate report.

Approved & Released For CCS By:

Tested By:



MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The Class II Permissive Change is to add portable operation in the Toshiba Tablet PC, model PPM20U-AAAA2, including co-location with the Toshiba PA3232U-1BTM Bluetooth radio card.

The 802.11a/b WLAN transmitter has a maximum peak conducted output power as follows:

| Frequency Band (MHz) | Mode | Output Power (mW) | Output Power (dBm) |
|----------------------|---------|-------------------|--------------------|
| 5180 - 5250 | 802.11a | 48.00 | 16.81 |
| 5250 - 5320 | 802.11a | 47.00 | 16.72 |

The WLAN radio utilizes two identical internal dipole antennas for diversity, with a maximum gain of 4.8 dBi.

The Bluetooth radio card has a modular approval, FCC ID: CJ6UPA3232BT. The Bluetooth radio utilizes a film antenna with a maximum gain of 1.22 dBi.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. FACILITIES AND ACCREDITATION

The open area test sites and conducted measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.



No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| | |
|-------------------------------------|----------------|
| Radiated Emission, 30 to 200 MHz | +/- 3.3 dB |
| Radiated Emission, 200 to 1000 MHz | +4.5 / -2.9 dB |
| Radiated Emission, 1000 to 2000 MHz | +4.5 / -2.9 dB |
| Power Line Conducted Emission | +/- 2.9 dB |

Uncertainty figures are valid to a confidence level of 95%.

5.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST AND MEASUREMENT EQUIPMENT LIST | | | | |
|-------------------------------------|--------------|-------------|---------------|----------------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due Date |
| EMI Test Receiver | R & S | ESHS 20 | 827129/006 | 7/17/2004 |
| LISN, 10 kHz ~ 30 MHz | FCC | 50/250-25-2 | 114 | 9/6/2004 |
| Spectrum Analyzer | AGILENT | E4446A | US42070220 | 1/13/04 |
| Pre-amplifier | MITEQ | NSP2600-SP | 924341 | 4/25/04 |
| Horn Antenna | EMCO | 3115 | 6717 | 2/04/04 |
| Power Meter | AGILENT | E4416A | 0841291160 | 11/07/04 |
| Power Sensor | Agilent | E9327A | US40440755 | 11/07/04 |
| Antenna, Biconical | Eaton | 94455-1 | 1214 | 3/06/04 |
| Antenna, Log Periodic | EMCO | 3146 | 9107-3163 | 3/06/04 |
| Preamplifier | Miteq | NSP10023988 | 646456 | 4/26/04 |
| 7.6GHz HPF | Microwave | HP7600-9SS | NA | NCR |
| | | | | |

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|-----------------------------------|----------------|---------------------|-----------------|------------|
| Device Type | Manufacturer | Model | Serial Number | FCC ID |
| Laptop | Toshiba | PPM20U-AAAA2 | 93010025 | DoC |
| AC adapter | Toshiba | ADP-60RH A | 0394336 | DoC |

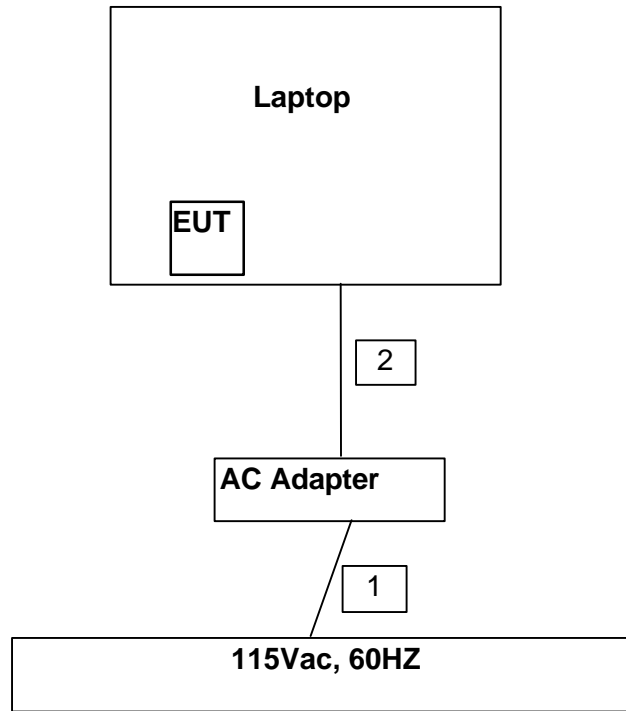
I/O CABLES

| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
|-----------|-----------|----------------------|----------------|-------------------|--------------|-----------|
| 1 | AC | 1 | US115 | Unshielded | 1.8m | No |
| 2 | DC | 1 | DC Jack | Unshielded | 1.8m | No |

TEST SETUP

The EUT is installed in the host laptop.

SETUP DIAGRAM



7. APPLICABLE RULES AND TEST RESULTS

7.1. RADIATED EMISSIONS

7.1.1. TRANSMITTER SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | (²) |
| 13.36 - 13.41 | | | |

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 30 - 88 | 100 ** | 3 |
| 88 - 216 | 150 ** | 3 |
| 216 - 960 | 200 ** | 3 |
| Above 960 | 500 | 3 |

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

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

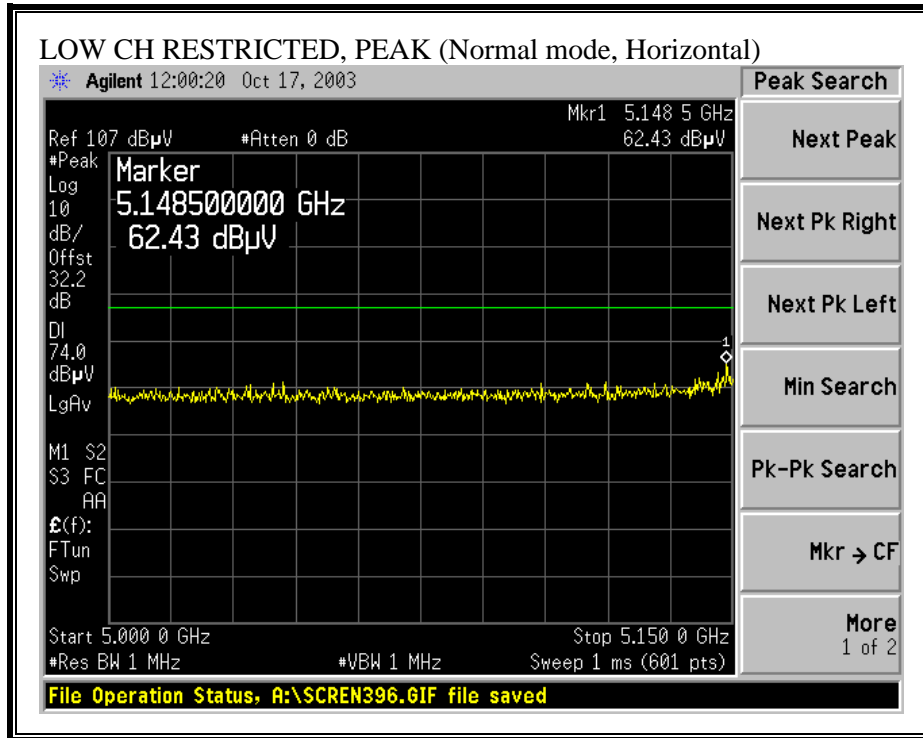
The configuration and orientation of the EUT was varied to determine the worst-case. The EUT was first configured as a typical laptop notebook PC resting on the turntable in a normal operating condition. It was then configured as a tablet PC, and evaluated in X, Y and Z orientations. The worst-case condition was observed with the EUT in the laptop configuration. Worst-case results are reported.

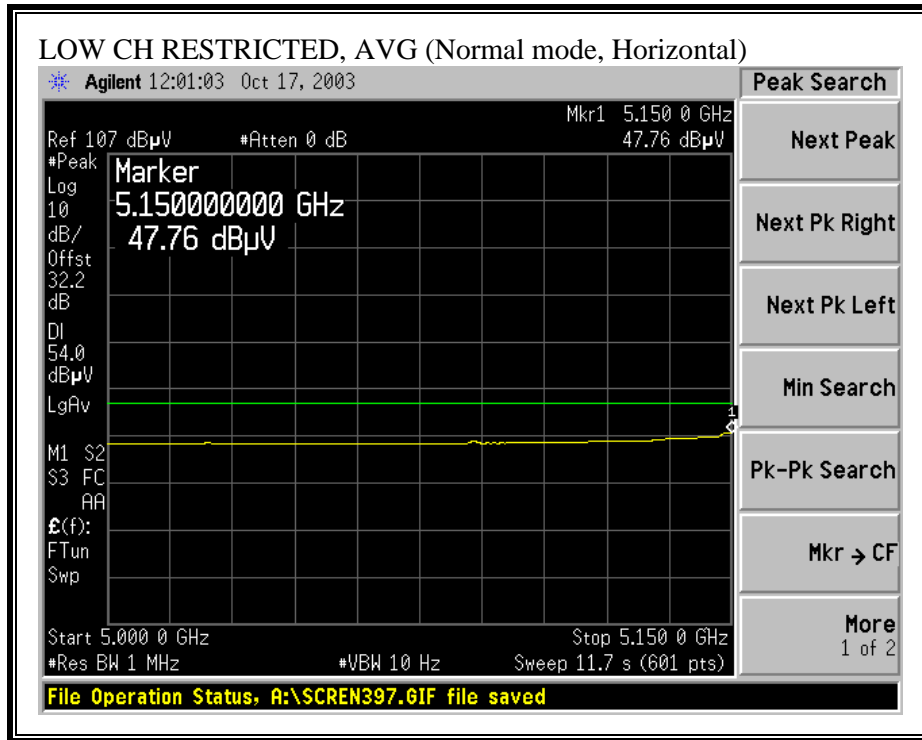
RESULTS

No non-compliance noted:

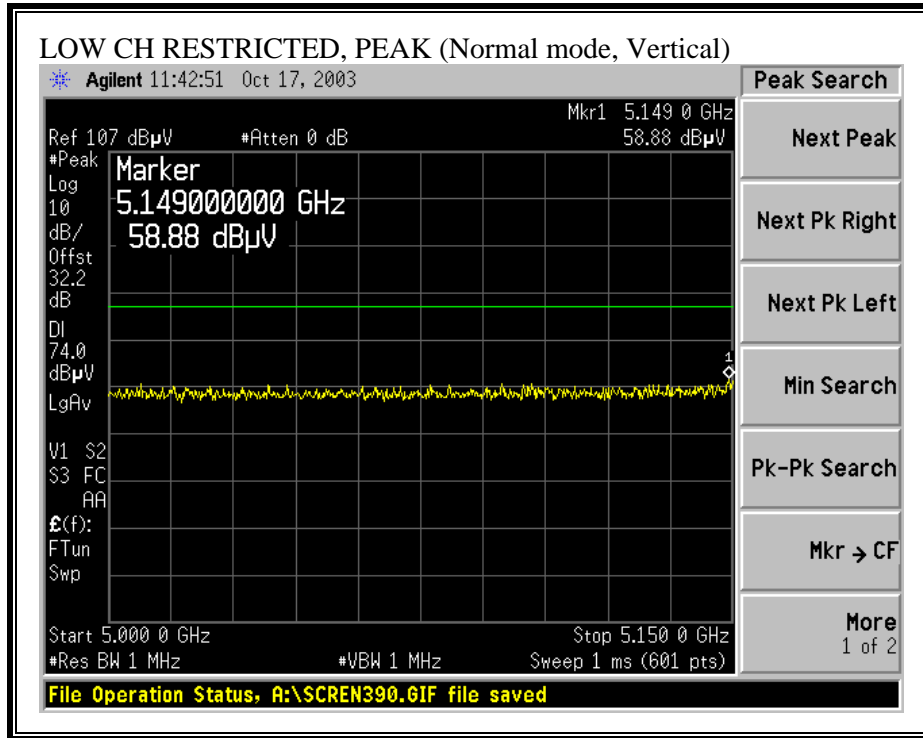
7.1.2. TRANSMITTER SPURIOUS EMISSIONS ABOVE 1 GHz

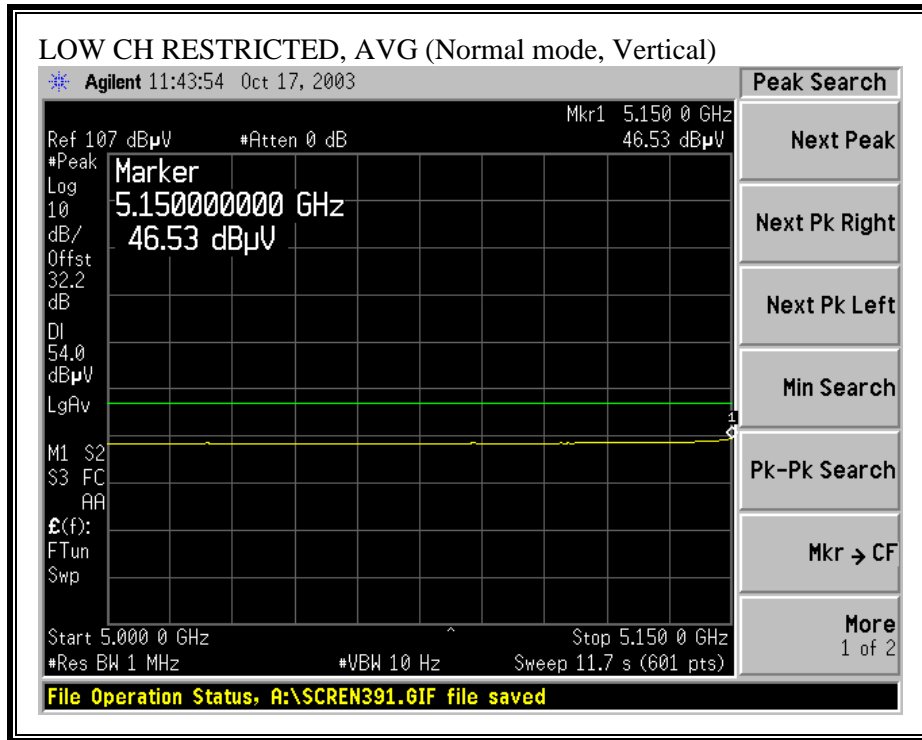
RESTRICTED BANDEDGE (NORMAL MODE, LOW CHANNEL, HORIZONTAL)



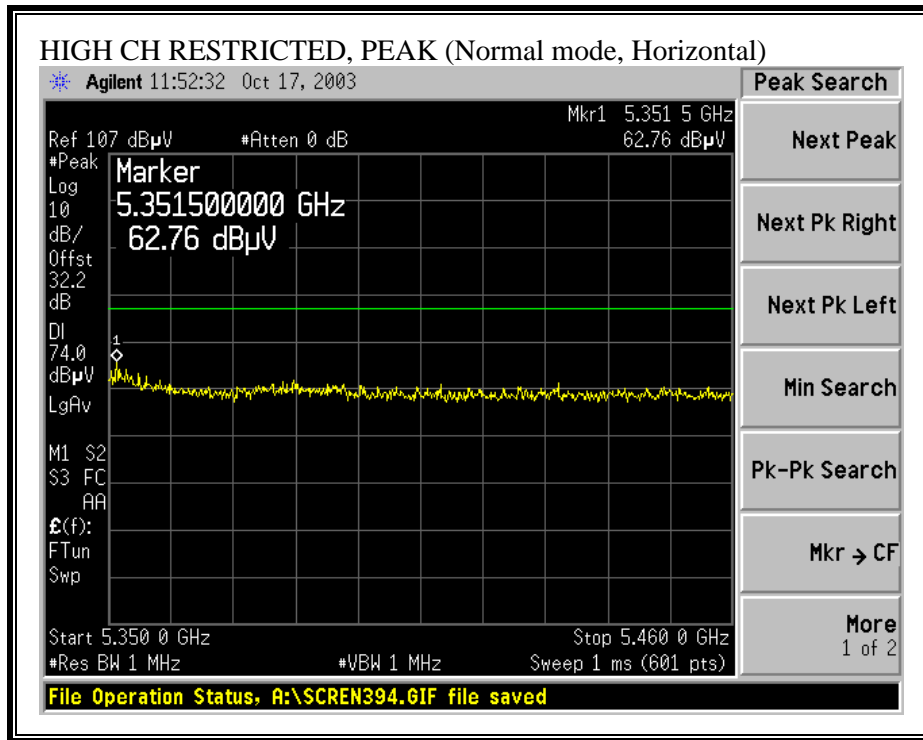


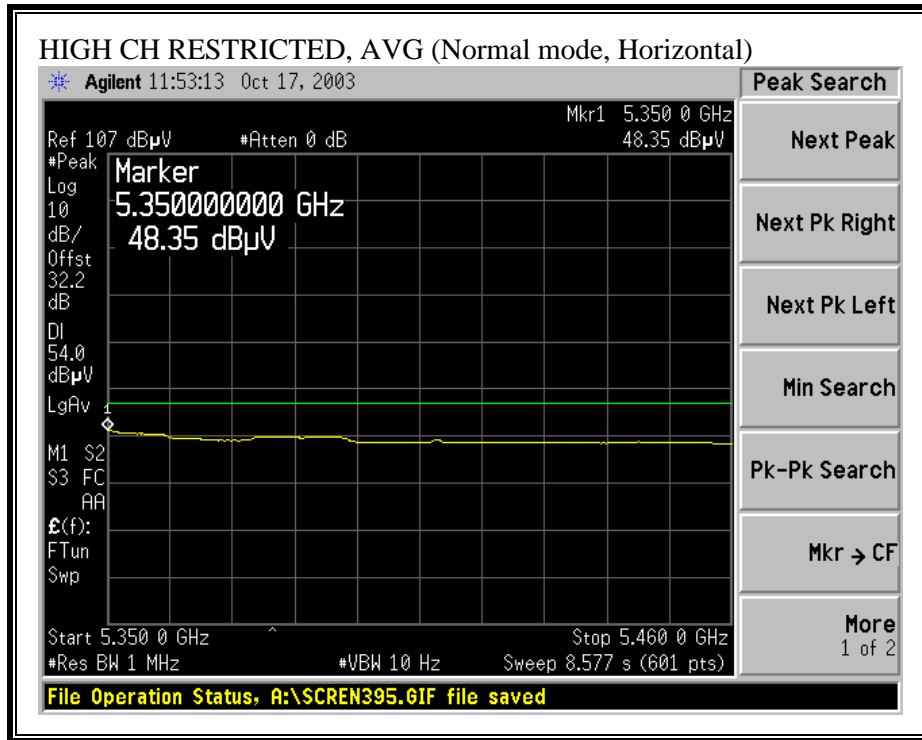
RESTRICTED BANDEDGE (NORMAL MODE, LOW CHANNEL, VERTICAL)



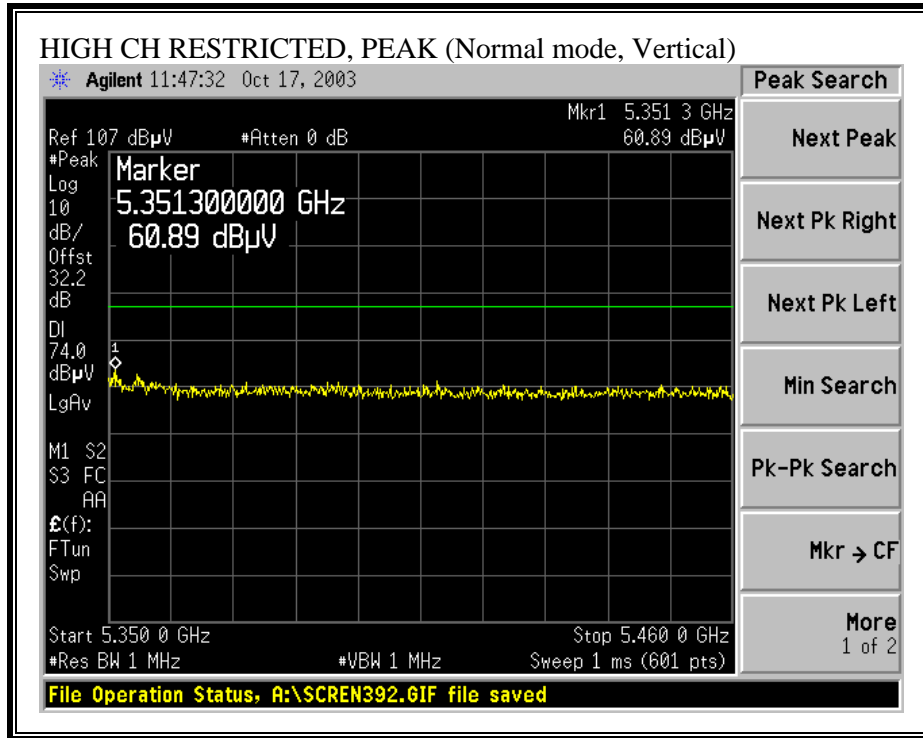


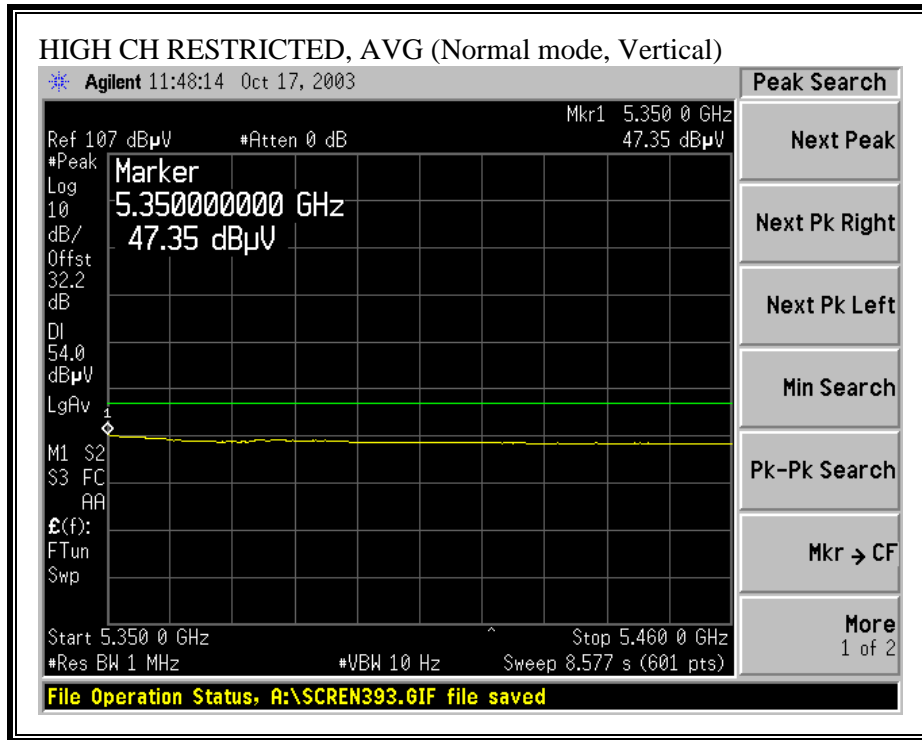
RESTRICTED BANDEDGE (NORMAL MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (NORMAL MODE, HIGH CHANNEL, VERTICAL)

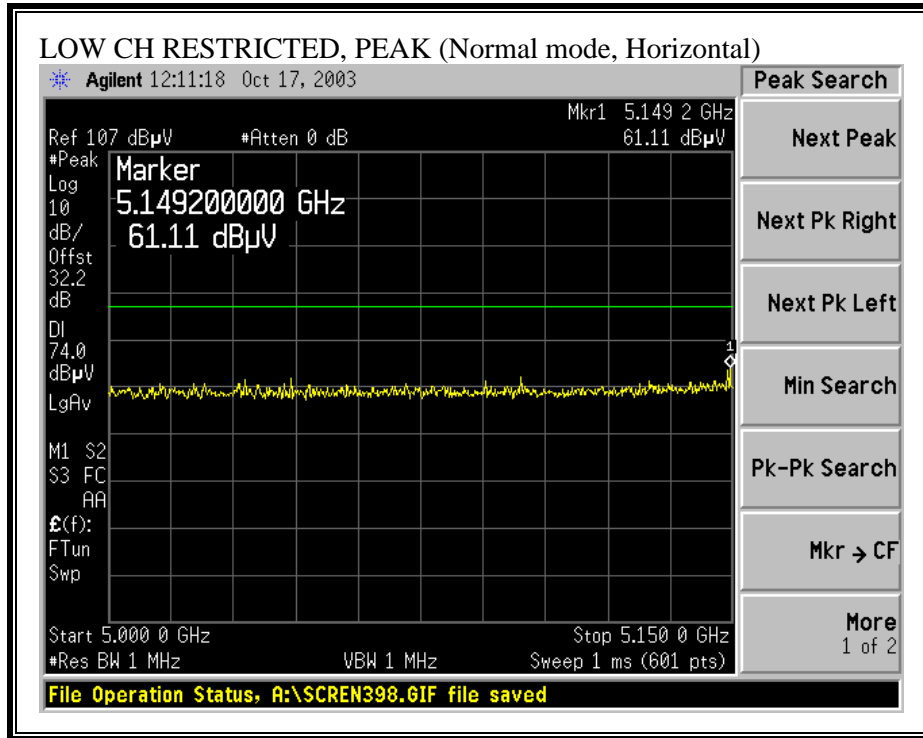


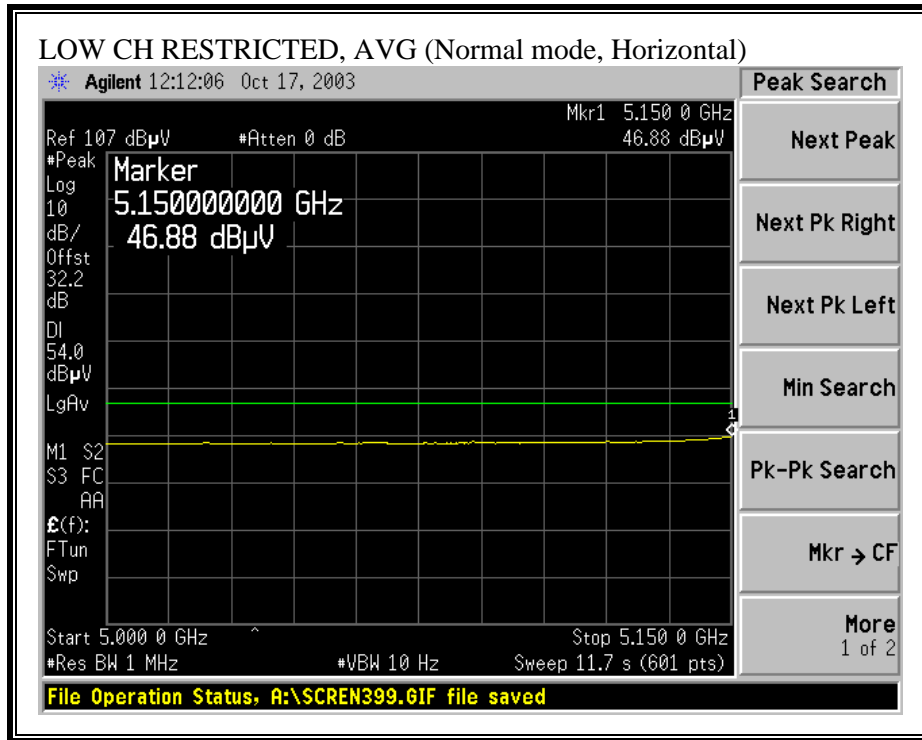


HARMONICS AND SPURIOUS EMISSIONS (NORMAL MODE)

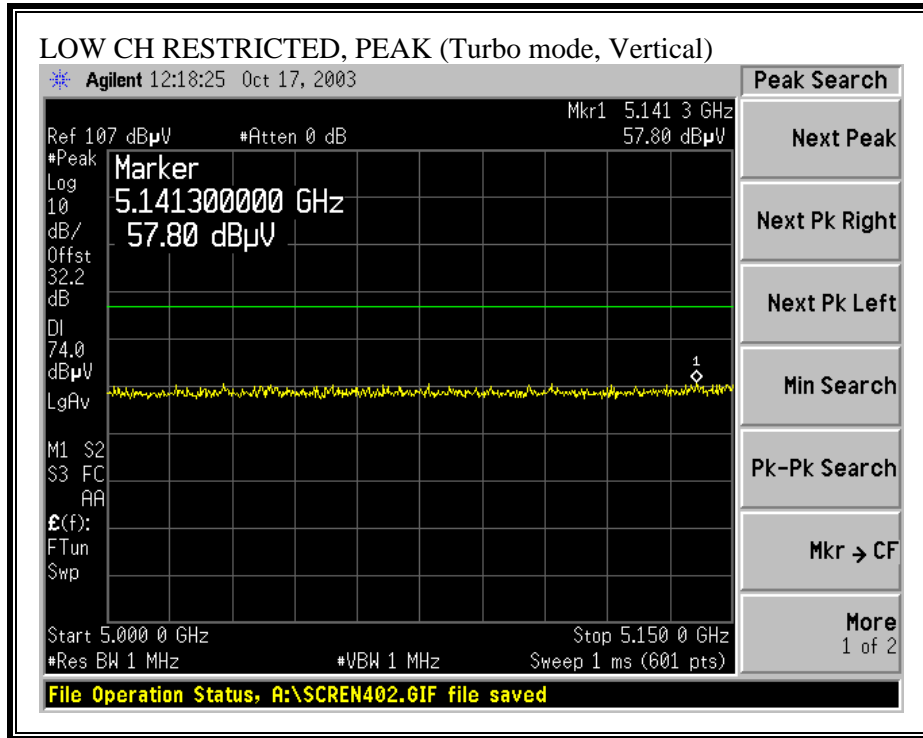
| 10/20/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: THANH NGUYEN Project #:03U2199 Company: TOSHIBA EUT Descrip.: 802.11 a/b/g Combo Module EUT M/N: PA3297U-1MPC (FCC ID : CJ6UPA3297WL) Test Target: FCC 15.205,207,209 Mode Oper: Tx L/M/H Normal. 5.2GHz Band Test Equipment: <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px; width: 20%;">EMCO Horn 1-18GHz T73; S/N: 6717 @3m</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Pre-amplifier 1-26GHz T86 Miteq 924341</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Spectrum Analyzer Agilent E4446A Analyzer</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Horn > 18GHz T87; ARA 18-26GHz; S/N:1049</div> </div> <div style="margin-top: 5px;"> Hi Frequency Cables <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft) </div> <div style="margin-top: 5px;"> Peak Measurements: Average Measurements: 1 MHz Resolution Bandwidth 1 MHz Resolution Bandwidth 1MHz Video Bandwidth 10Hz Video Bandwidth </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------------|--------------|--------------------------------|---------|------------------------------|--------|-----------|-----|-------------|------------|---------------|----------------|-----------|------------|----------------|---|-----------------------|-----|-------------|---------|------------------------------|------|---------------------|--------|------------------------------|--------|---------------------------|------|------------------|-----|------------------------------|---------|--------------------------|----|----------------|------|--------------------------------|--------|-----------------------|----|------------|-----|------------------|--|--|
| f GHz | Dist feet | Read Pk dBuV | Read Avg. dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | HPF | Peak dBuV/m | Avg dBuV/m | Pk Lim dBuV/m | Avg Lim dBuV/m | Pk Mar dB | Avg Mar dB | Notes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tx at low channel 5180 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.360 | 9.8 | 52.0 | 38.5 | 38.3 | 5.1 | -44.5 | 0.0 | 1.0 | 51.8 | 38.4 | 74.0 | 54.0 | -22.2 | -15.6 | V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.540 | 9.8 | 42.6 | 35.6 | 39.2 | 6.5 | -48.2 | 0.0 | 1.0 | 41.0 | 34.0 | 74.0 | 54.0 | -33.0 | -20.0 | V Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.360 | 9.8 | 46.6 | 36.0 | 38.3 | 5.1 | -44.5 | 0.0 | 1.0 | 46.4 | 35.8 | 74.0 | 54.0 | -27.6 | -18.2 | H /Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.540 | 9.8 | 44.9 | 35.7 | 39.2 | 6.5 | -48.2 | 0.0 | 1.0 | 43.3 | 34.1 | 74.0 | 54.0 | -30.7 | -19.9 | H /Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tx at MID channel 5260 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.520 | 9.8 | 45.8 | 35.6 | 38.3 | 5.2 | -44.3 | 0.0 | 1.0 | 45.8 | 33.8 | 74.0 | 54.0 | -28.2 | -20.2 | Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.520 | 9.8 | 49.3 | 33.7 | 38.3 | 5.2 | -44.3 | 0.0 | 1.0 | 49.3 | 35.6 | 74.0 | 54.0 | -24.7 | -18.4 | Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tx at High Channel 5320 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.640 | 9.8 | 43.5 | 33.2 | 38.3 | 5.2 | -44.2 | 0.0 | 1.0 | 43.7 | 33.4 | 74.0 | 54.0 | -30.3 | -20.6 | Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.960 | 9.8 | 48.4 | 39.1 | 38.2 | 6.6 | -48.4 | 0.0 | 1.0 | 45.8 | 36.5 | 74.0 | 54.0 | -28.2 | -17.5 | V Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.640 | 9.8 | 43.1 | 33.7 | 38.3 | 5.2 | -44.2 | 0.0 | 1.0 | 43.3 | 33.9 | 74.0 | 54.0 | -30.7 | -20.1 | H /Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.960 | 9.8 | 50.9 | 39.5 | 38.2 | 6.6 | -48.4 | 0.0 | 1.0 | 48.3 | 36.9 | 74.0 | 54.0 | -25.7 | -17.1 | H /Noise Floor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <td style="width: 15%;">f</td> <td style="width: 35%;">Measurement Frequency</td> <td style="width: 15%;">Amp</td> <td style="width: 15%;">Preamp Gain</td> <td style="width: 15%;">Avg Lim</td> <td style="width: 20%;">Average Field Strength Limit</td> </tr> <tr> <td>Dist</td> <td>Distance to Antenna</td> <td>D Corr</td> <td>Distance Correct to 3 meters</td> <td>Pk Lim</td> <td>Peak Field Strength Limit</td> </tr> <tr> <td>Read</td> <td>Analyzer Reading</td> <td>Avg</td> <td>Average Field Strength @ 3 m</td> <td>Avg Mar</td> <td>Margin vs. Average Limit</td> </tr> <tr> <td>AF</td> <td>Antenna Factor</td> <td>Peak</td> <td>Calculated Peak Field Strength</td> <td>Pk Mar</td> <td>Margin vs. Peak Limit</td> </tr> <tr> <td>CL</td> <td>Cable Loss</td> <td>HPF</td> <td>High Pass Filter</td> <td></td> <td></td> </tr> </table> | | | | | | | | | | | | | | | | f | Measurement Frequency | Amp | Preamp Gain | Avg Lim | Average Field Strength Limit | Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | Pk Lim | Peak Field Strength Limit | Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | Avg Mar | Margin vs. Average Limit | AF | Antenna Factor | Peak | Calculated Peak Field Strength | Pk Mar | Margin vs. Peak Limit | CL | Cable Loss | HPF | High Pass Filter | | |
| f | Measurement Frequency | Amp | Preamp Gain | Avg Lim | Average Field Strength Limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | Pk Lim | Peak Field Strength Limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | Avg Mar | Margin vs. Average Limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | Antenna Factor | Peak | Calculated Peak Field Strength | Pk Mar | Margin vs. Peak Limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CL | Cable Loss | HPF | High Pass Filter | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

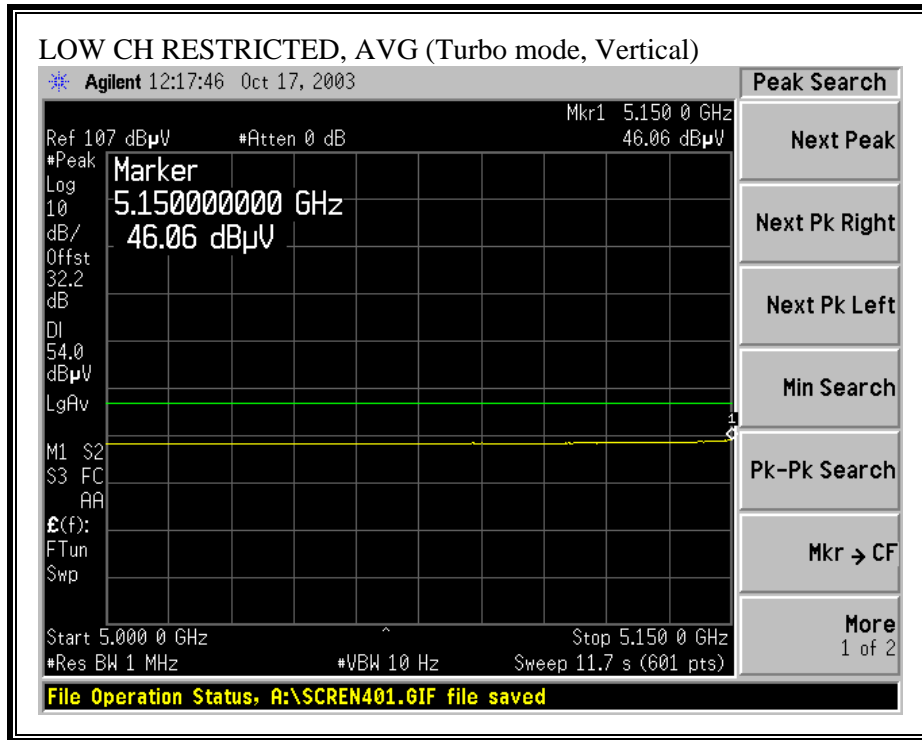
RESTRICTED BANDEDGE (TURBO MODE, LOW CHANNEL, HORIZONTAL)



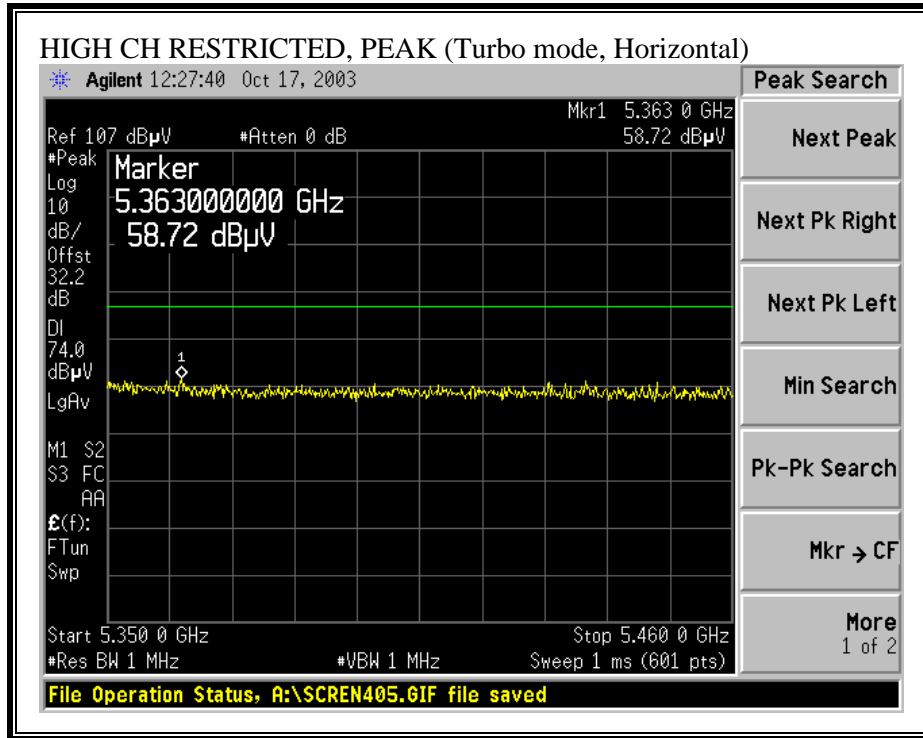


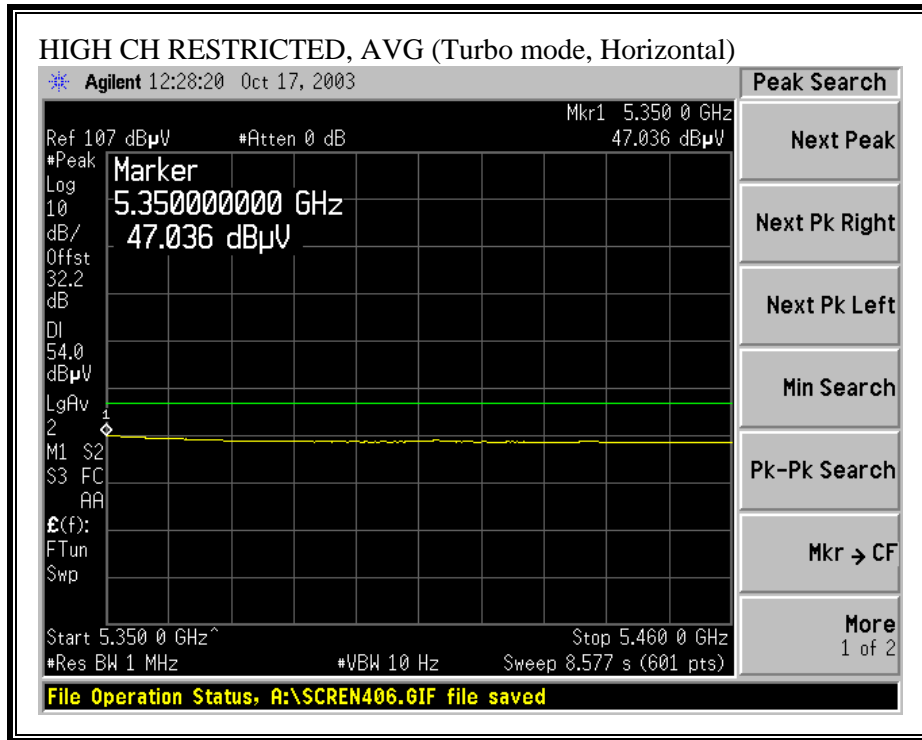
RESTRICTED BANDEGE (TURBO MODE, LOW CHANNEL, VERTICAL)



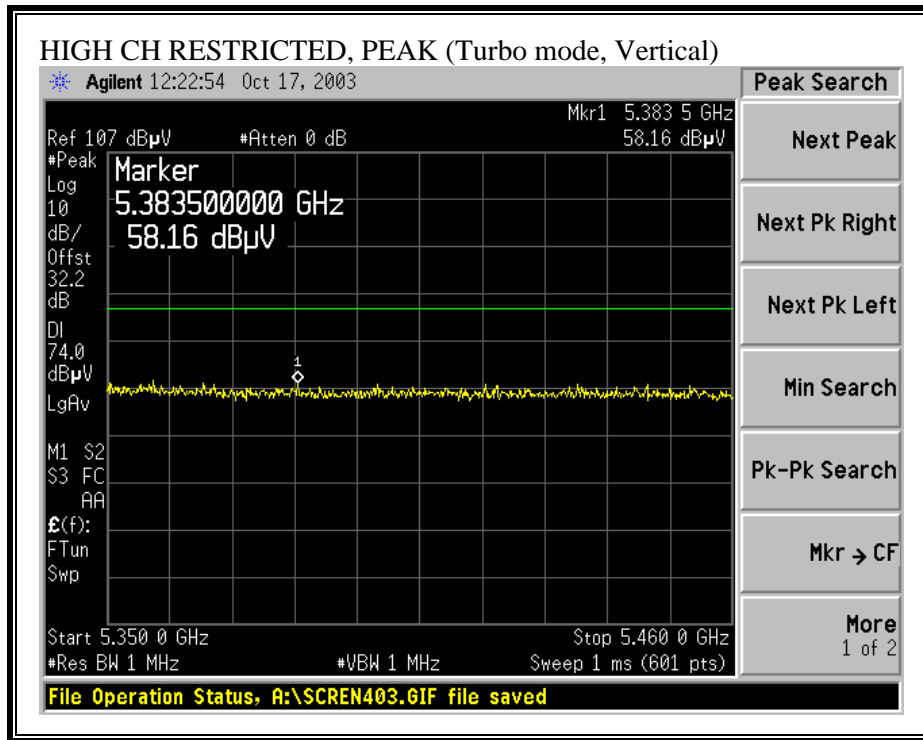


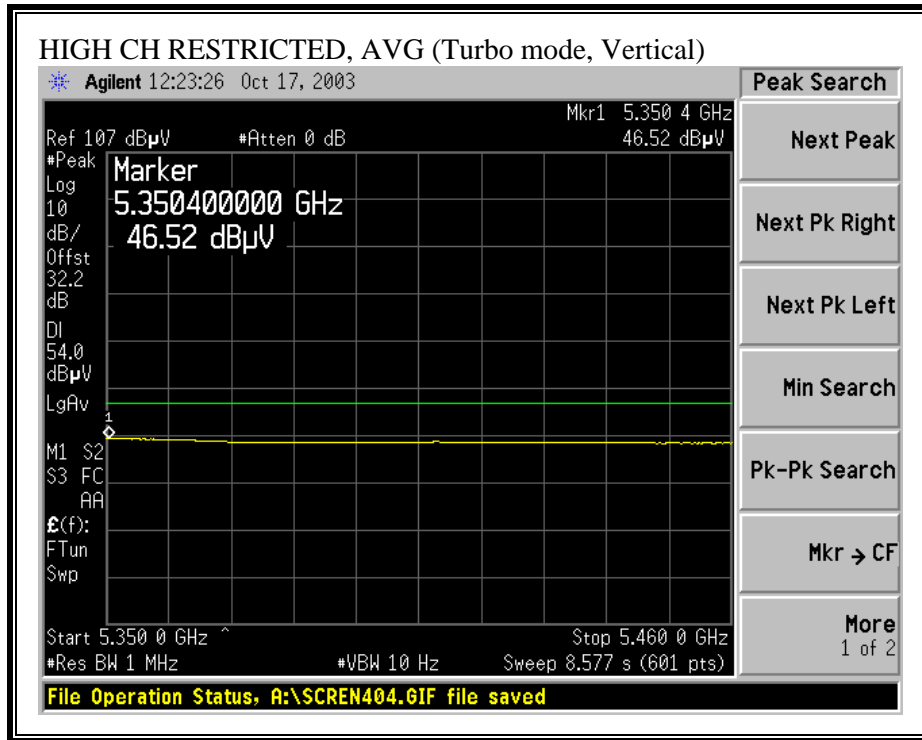
RESTRICTED BANDEDGE (TURBO MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (TURBO MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (TURBO MODE)

| 10/20/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: THANH NGUYEN Project #:03U2199 Company: TOSHIBA EUT Descrip.: 802.11 a/b/g Combo Module EUT M/N: PA3297U-1MPC (FCC ID : CJ6UPA3297WL) Test Target: FCC 15.205,207,209 Mode Oper: Tx L/M/H TURBO 5.2GHz Band Test Equipment: <table style="width:100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 2px;">EMCO Horn 1-18GHz T73; S/N: 6717 @3m</td> <td style="border: 1px solid black; padding: 2px;">Pre-amplifier 1-26GHz T86 Miteq 924341</td> <td style="border: 1px solid black; padding: 2px;">Spectrum Analyzer Agilent E4446A Analyzer</td> <td style="border: 1px solid black; padding: 2px;">Horn > 18GHz T87; ARA 18-26GHz; S/N:1049</td> </tr> </table> <p>Hi Frequency Cables: <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft)</p> <p>Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth</p> | | | | | | | | | | | | | | | | EMCO Horn 1-18GHz T73; S/N: 6717 @3m | Pre-amplifier 1-26GHz T86 Miteq 924341 | Spectrum Analyzer Agilent E4446A Analyzer | Horn > 18GHz T87; ARA 18-26GHz; S/N:1049 |
|---|---|--|---|---------|-------|--------|--------------------------------|-----|-------------|------------|---------------|----------------|------------------------------|------------|----------------|---|---|--|---|
| EMCO Horn 1-18GHz T73; S/N: 6717 @3m | Pre-amplifier 1-26GHz T86 Miteq 924341 | Spectrum Analyzer Agilent E4446A Analyzer | Horn > 18GHz T87; ARA 18-26GHz; S/N:1049 | | | | | | | | | | | | | | | | |
| f GHz | Dist feet | Read Pk dBuV | Read Avg. dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | HPF | Peak dBuV/m | Avg dBuV/m | Pk Lim dBuV/m | Avg Lim dBuV/m | Pk Mar dB | Avg Mar dB | Notes | | | | |
| Tx at low channel 5210 MHz | | | | | | | | | | | | | | | | | | | |
| 10.420 | 9.8 | 46.4 | 35.9 | 38.3 | 5.1 | -44.4 | 0.0 | 1.0 | 46.3 | 35.8 | 74.0 | 54.0 | -27.7 | -18.2 | V | | | | |
| 15.630 | 9.8 | 48.2 | 39.1 | 39.0 | 6.5 | -48.3 | 0.0 | 1.0 | 46.4 | 37.3 | 74.0 | 54.0 | -27.6 | -16.7 | V Noise Floor | | | | |
| 10.420 | 9.8 | 44.0 | 35.4 | 38.3 | 5.1 | -44.4 | 0.0 | 1.0 | 43.9 | 35.3 | 74.0 | 54.0 | -30.1 | -18.7 | H | | | | |
| 15.630 | 9.8 | 46.2 | 38.2 | 39.0 | 6.5 | -48.3 | 0.0 | 1.0 | 44.4 | 36.4 | 74.0 | 54.0 | -29.6 | -17.6 | H /Noise Floor | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | |
| Tx at MID channel 5250 MHz | | | | | | | | | | | | | | | | | | | |
| 10.500 | 9.8 | 43.1 | 34.1 | 38.3 | 5.1 | -44.4 | 0.0 | 1.0 | 43.1 | 33.7 | 74.0 | 54.0 | -30.9 | -20.3 | H/Noise Floor | | | | |
| 15.750 | 9.8 | 49.3 | 33.7 | 38.7 | 6.6 | -48.3 | 0.0 | 1.0 | 47.2 | 32.0 | 74.0 | 54.0 | -26.8 | -22.0 | H/Noise Floor | | | | |
| 10.500 | 9.8 | 44.3 | 33.8 | 38.3 | 5.1 | -44.4 | 0.0 | 1.0 | 44.3 | 37.3 | 74.0 | 54.0 | -29.7 | -16.7 | V/Noise Floor | | | | |
| 15.750 | 9.8 | 45.5 | 37.3 | 38.7 | 6.6 | -48.3 | 0.0 | 1.0 | 43.5 | 31.7 | 74.0 | 54.0 | -30.5 | -22.3 | V/Noise Floor | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | |
| Tx at High Channel 5290MHz | | | | | | | | | | | | | | | | | | | |
| 10.580 | 9.8 | 41.7 | 33.1 | 38.3 | 5.2 | -44.3 | 0.0 | 1.0 | 41.8 | 33.2 | 74.0 | 54.0 | -32.2 | -20.8 | V Noise Floor | | | | |
| 15.870 | 9.8 | 44.4 | 34.4 | 38.4 | 6.6 | -48.3 | 0.0 | 1.0 | 42.1 | 32.1 | 74.0 | 54.0 | -31.9 | -21.9 | V Noise Floor | | | | |
| 10.580 | 9.8 | 42.3 | 32.6 | 38.3 | 5.2 | -44.3 | 0.0 | 1.0 | 42.4 | 32.8 | 74.0 | 54.0 | -31.6 | -21.2 | H /Noise Floor | | | | |
| 15.870 | 9.8 | 43.5 | 34.4 | 38.4 | 6.6 | -48.3 | 0.0 | 1.0 | 41.2 | 32.1 | 74.0 | 54.0 | -32.8 | -21.9 | H /Noise Floor | | | | |
| No other emission was detected after 3rd Harmonic. | | | | | | | | | | | | | | | | | | | |
| f | Measurement Frequency | | | | | Amp | Preamp Gain | | | | | Avg Lim | Average Field Strength Limit | | | | | | |
| Dist | Distance to Antenna | | | | | D Corr | Distance Correct to 3 meters | | | | | Pk Lim | Peak Field Strength Limit | | | | | | |
| Read | Analyzer Reading | | | | | Avg | Average Field Strength @ 3 m | | | | | Avg Mar | Margin vs. Average Limit | | | | | | |
| AF | Antenna Factor | | | | | Peak | Calculated Peak Field Strength | | | | | Pk Mar | Margin vs. Peak Limit | | | | | | |
| CL | Cable Loss | | | | | HPF | High Pass Filter | | | | | | | | | | | | |

7.1.3. CO-LOCATED TRANSMITTER SPURIOUS EMISSIONS

SUPPLEMENTAL TEST PROCEDURE

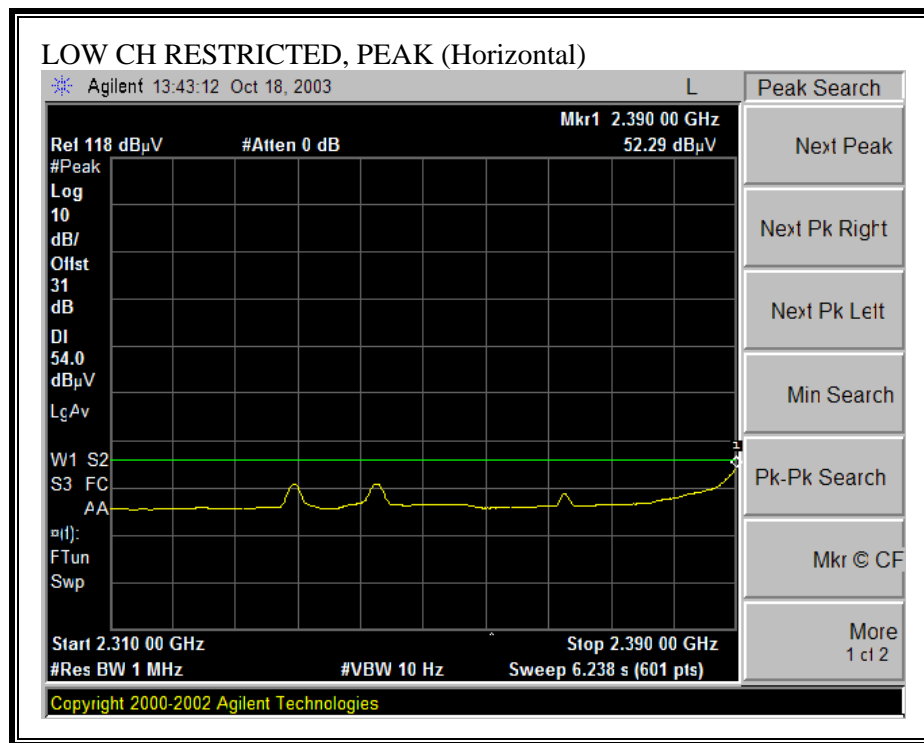
The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. Worst case results are reported.

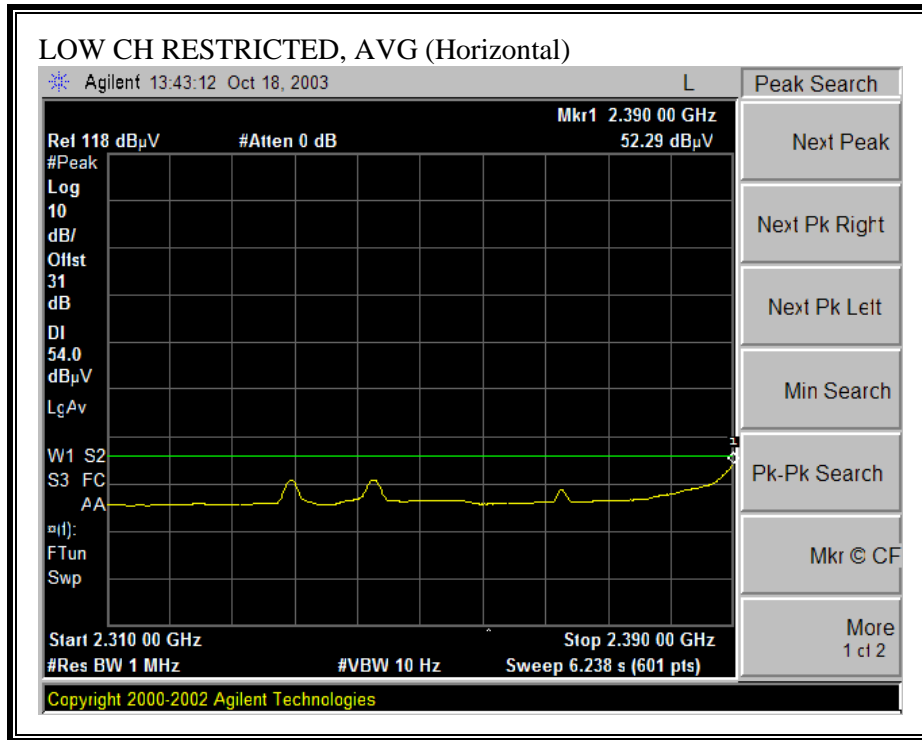
RESULTS

The 2.4 GHz transmitter is dominant.

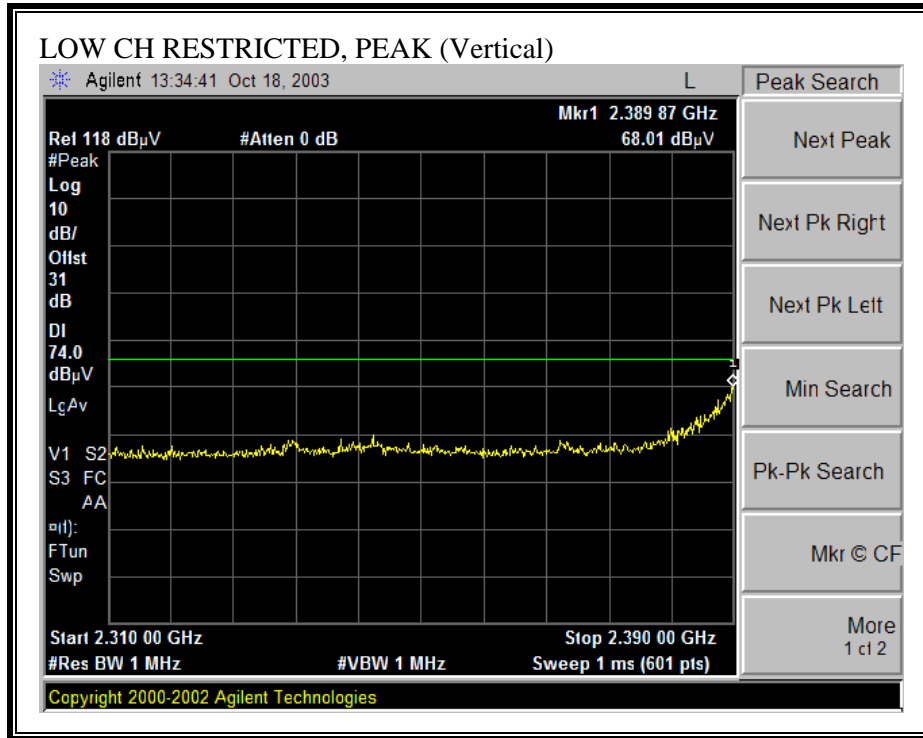
No non-compliance noted:

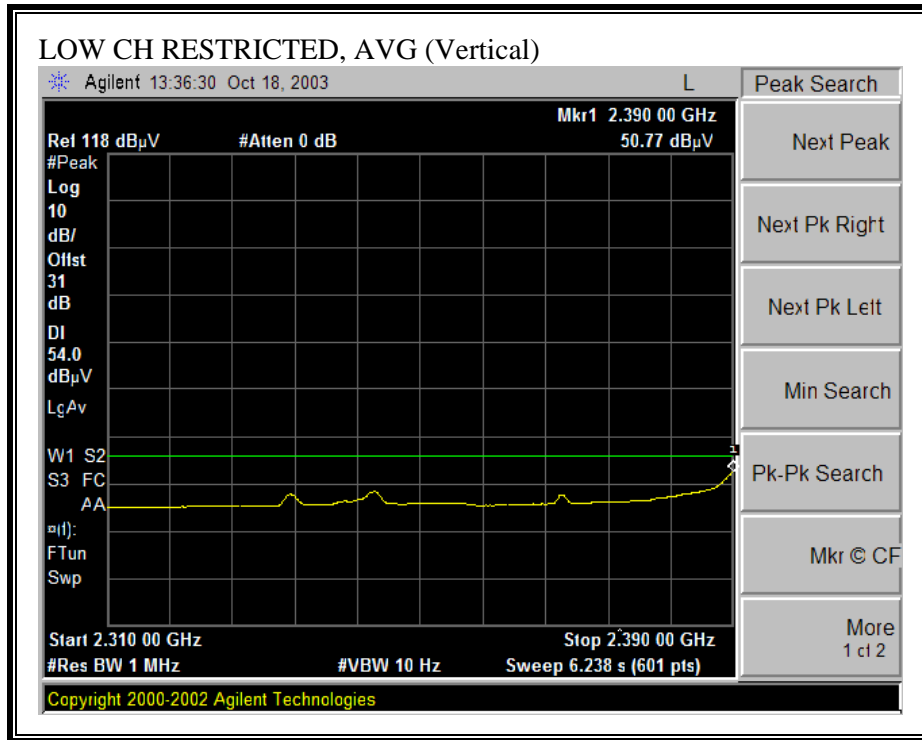
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



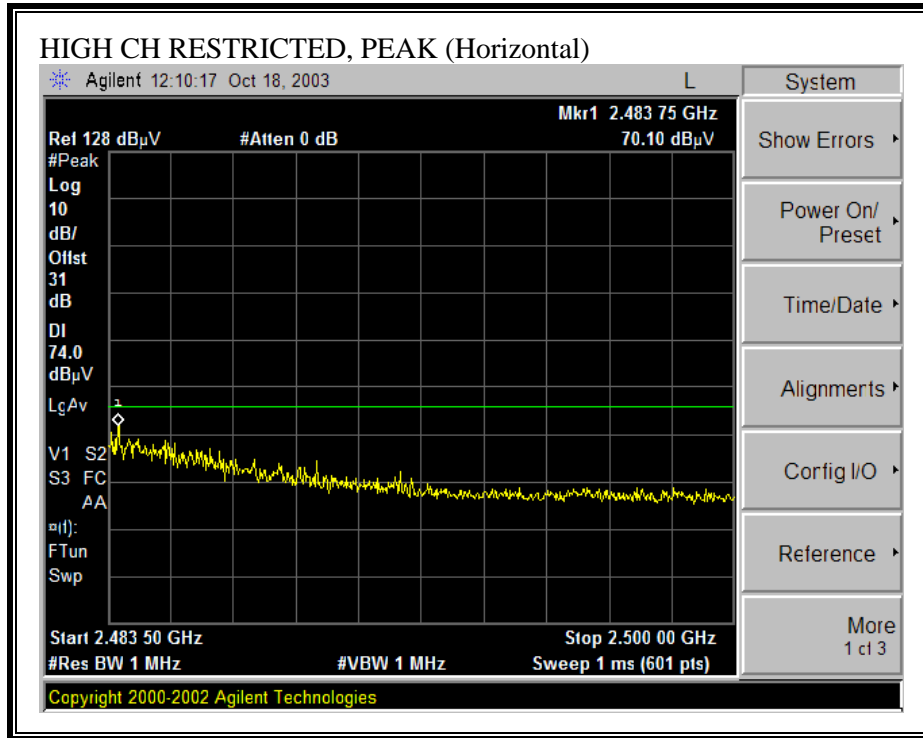


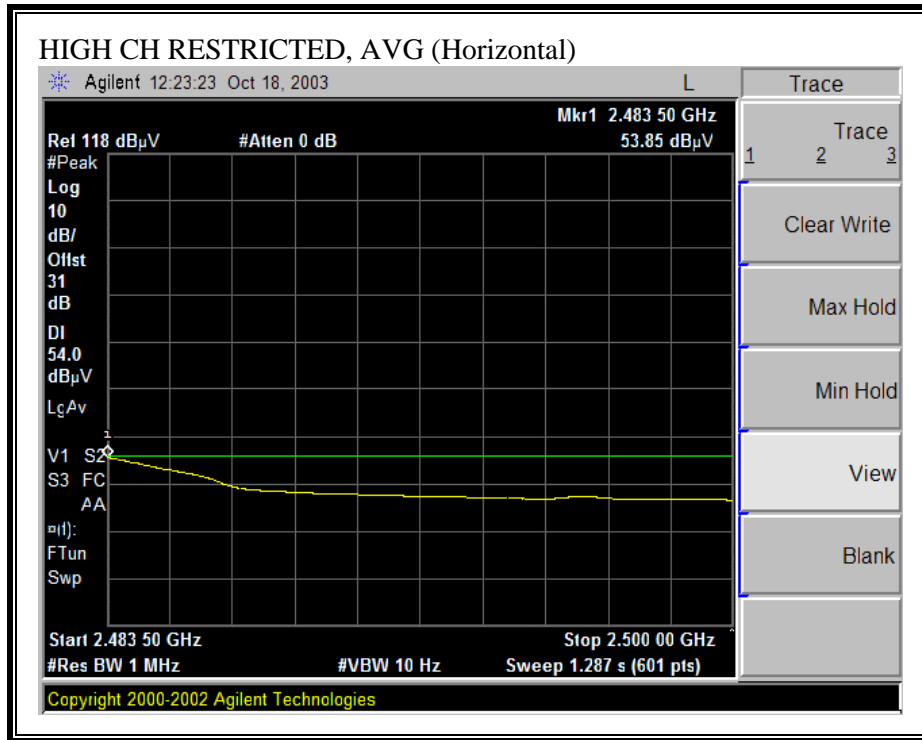
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



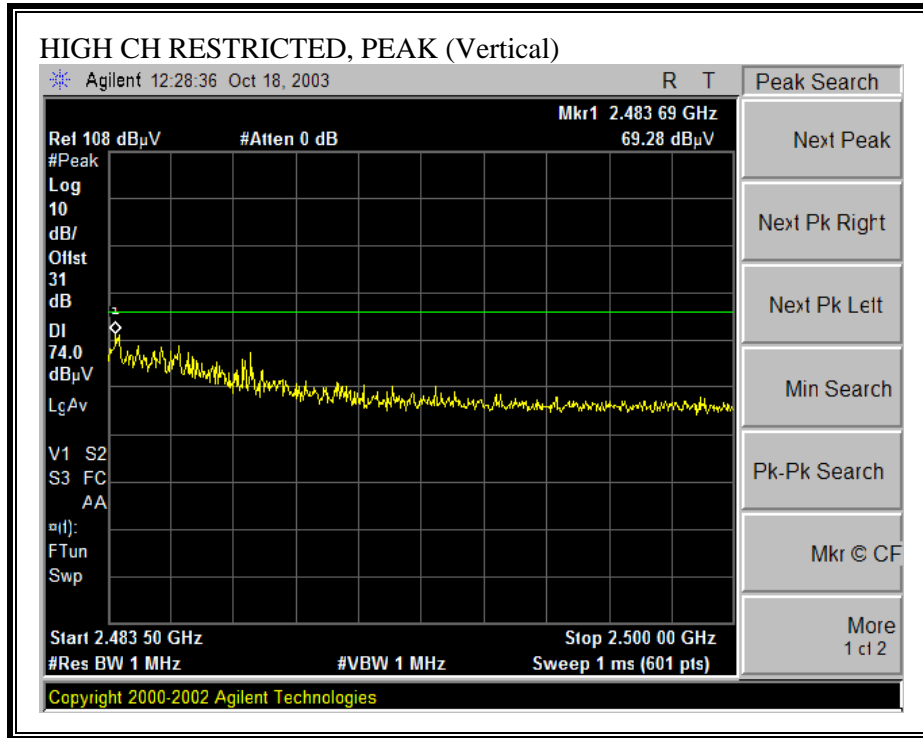


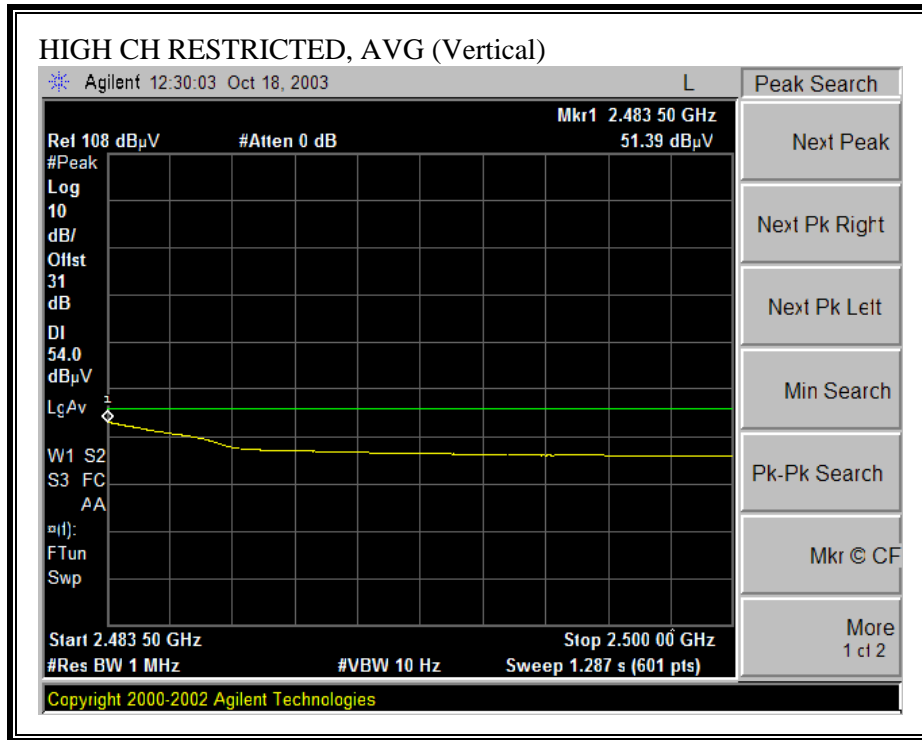
WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

10/20/03 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: THANH NGUYEN
 Project #: 03U2199
 Company: TOSHIBA AMERICA INFORMATION SYSTEMS, INC.
 EUT Descrip.: 802.11 a/b/g Combo Module(MB21ag In Firebolt 10, w/Colocation
 EUT M/N: PA3297U-1MPC (FCC ID: CJ6UPA3297WL)
 Test Target: FCC 15.247
 Mode Oper: 2.4GHz. CO-LOCATED

Test Equipment:

| | | | |
|---|---|--|---|
| EMCO Horn 1-18GHz T73; S/N: 6717 @3m | Pre-amplifier 1-26GHz T86 Miteq 924341 | Spectrum Analyzer Agilent E4446A Analyzer | Horn > 18GHz T87; ARA 18-26GHz; S/N:1049 |
|---|---|--|---|

Hi Frequency Cables: (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)

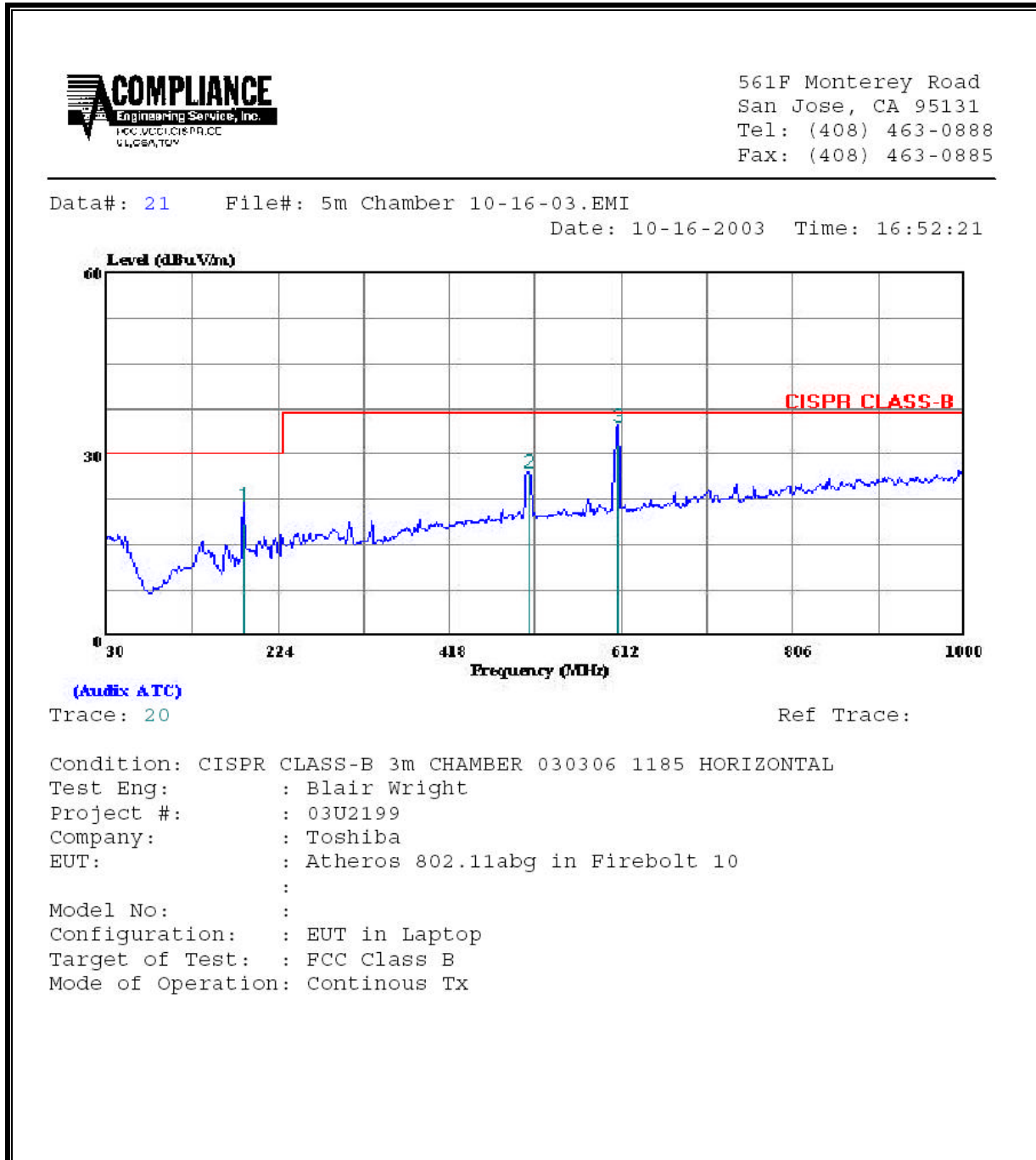
Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth
Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth

| f GHz | Dist feet | Read Pk dBuV | Read Avg. dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | HPF | Peak dBuV/m | Avg dBuV/m | Pk Lim dBuV/m | Avg Lim dBuV/m | Pk Mar dB | Avg Mar dB | Notes |
|--|-----------|--------------|----------------|---------|-------|--------|-----------|-----|-------------|------------|---------------|----------------|-----------|------------|-------------|
| Tx at 2.4CO-LOCATED Harmonics and spuriuos Emissions. | | | | | | | | | | | | | | | |
| 4.874 | 9.8 | 49.1 | 37.8 | 33.4 | 3.2 | -45.6 | 0.0 | 1.0 | 41.0 | 29.7 | 74.0 | 54.0 | -33.0 | -24.3 | Noise floor |
| 7.311 | 9.8 | 50.3 | 40.3 | 35.8 | 4.1 | -46.6 | 0.0 | 1.0 | 44.6 | 34.6 | 74.0 | 54.0 | -29.4 | -19.4 | V |
| 9.748 | 9.8 | 47.7 | 36.3 | 38.5 | 4.9 | -45.1 | 0.0 | 1.0 | 46.9 | 35.5 | 74.0 | 54.0 | -27.1 | -18.5 | Noise floor |
| 4.874 | 9.8 | 47.0 | 38.2 | 33.4 | 3.2 | -45.6 | 0.0 | 1.0 | 38.9 | 30.1 | 74.0 | 54.0 | -35.1 | -23.9 | Noise floor |
| 7.311 | 9.8 | 50.9 | 41.0 | 35.8 | 4.1 | -46.6 | 0.0 | 1.0 | 45.2 | 35.3 | 74.0 | 54.0 | -28.8 | -18.7 | H |
| 9.748 | 9.8 | 44.7 | 36.0 | 38.5 | 4.9 | -45.1 | 0.0 | 1.0 | 43.9 | 35.3 | 74.0 | 54.0 | -30.1 | -18.7 | Noise floor |
| No more Spurious emissions was detected above 3rd Harmonic for both V&H Antenna. | | | | | | | | | | | | | | | |

| | | | | | |
|------|-----------------------|--------|--------------------------------|---------|------------------------------|
| f | Measurement Frequency | Amp | Preamp Gain | Avg Lim | Average Field Strength Limit |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | Pk Lim | Peak Field Strength Limit |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | Avg Mar | Margin vs. Average Limit |
| AF | Antenna Factor | Peak | Calculated Peak Field Strength | Pk Mar | Margin vs. Peak Limit |
| CL | Cable Loss | HPF | High Pass Filter | | |

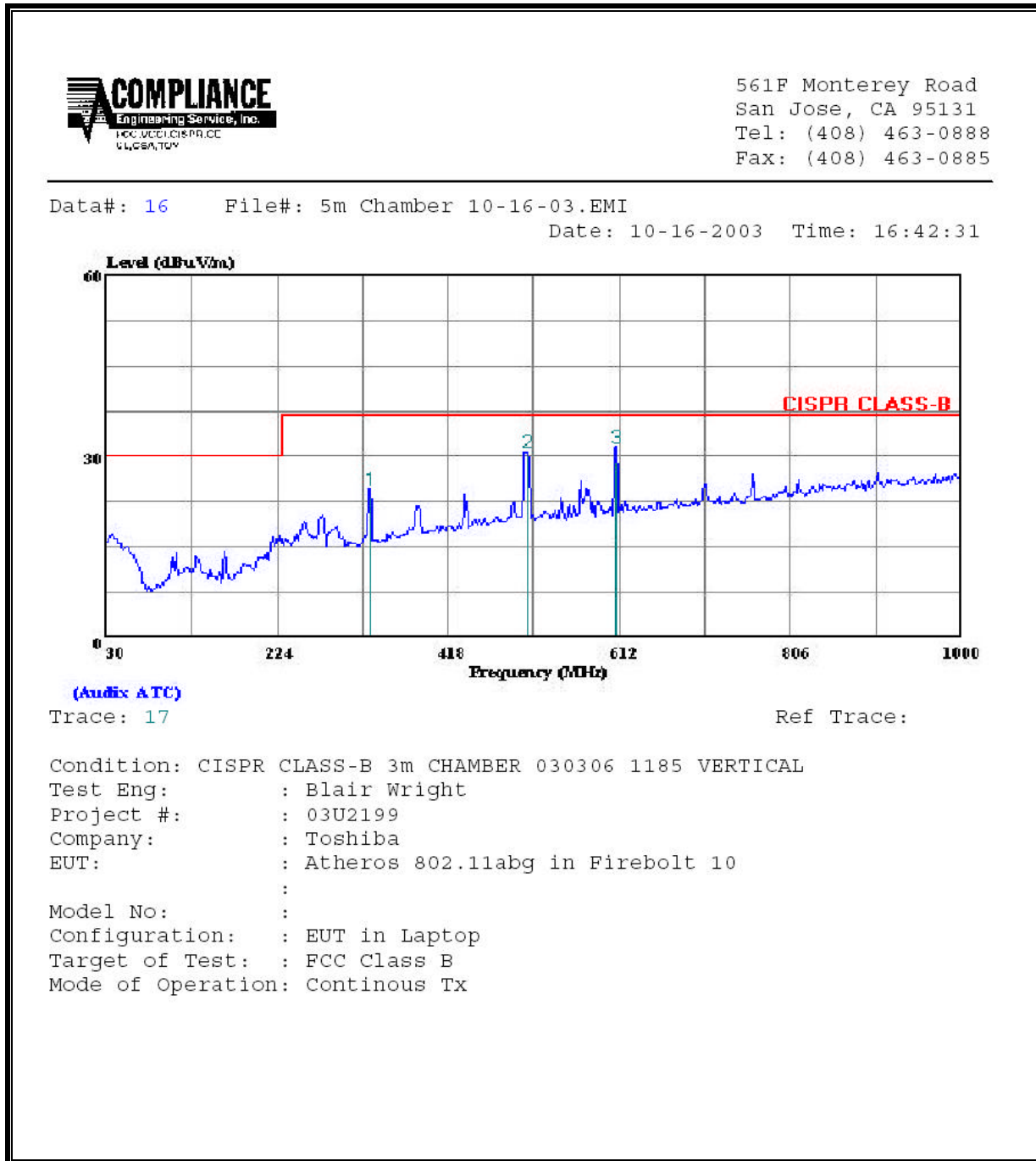
7.1.4. WORST-CASE SPURIOUS EMISSIONS BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



| | Freq | Read Level | Probe Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---------|------------|--------------|------------|--------|------------|------------|--------|
| | MHz | dBuV | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 185.200 | 11.24 | 8.97 | 1.35 | 21.56 | 30.00 | -8.44 | Peak |
| 2 | 507.240 | 8.13 | 16.63 | 2.31 | 27.07 | 37.00 | -9.93 | Peak |
| 3 | 608.120 | 14.30 | 17.77 | 2.54 | 34.61 | 37.00 | -2.39 | Peak |

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



| | Freq | Read Level | Probe Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---------|------------|--------------|------------|--------|------------|------------|--------|
| | MHz | dBuV | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 329.730 | 9.80 | 12.85 | 1.83 | 24.48 | 37.00 | -12.52 | Peak |
| 2 | 507.240 | 11.71 | 16.63 | 2.31 | 30.65 | 37.00 | -6.35 | Peak |
| 3 | 608.120 | 11.19 | 17.77 | 2.54 | 31.50 | 37.00 | -5.50 | Peak |

7.2. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|-----------------------------|------------------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

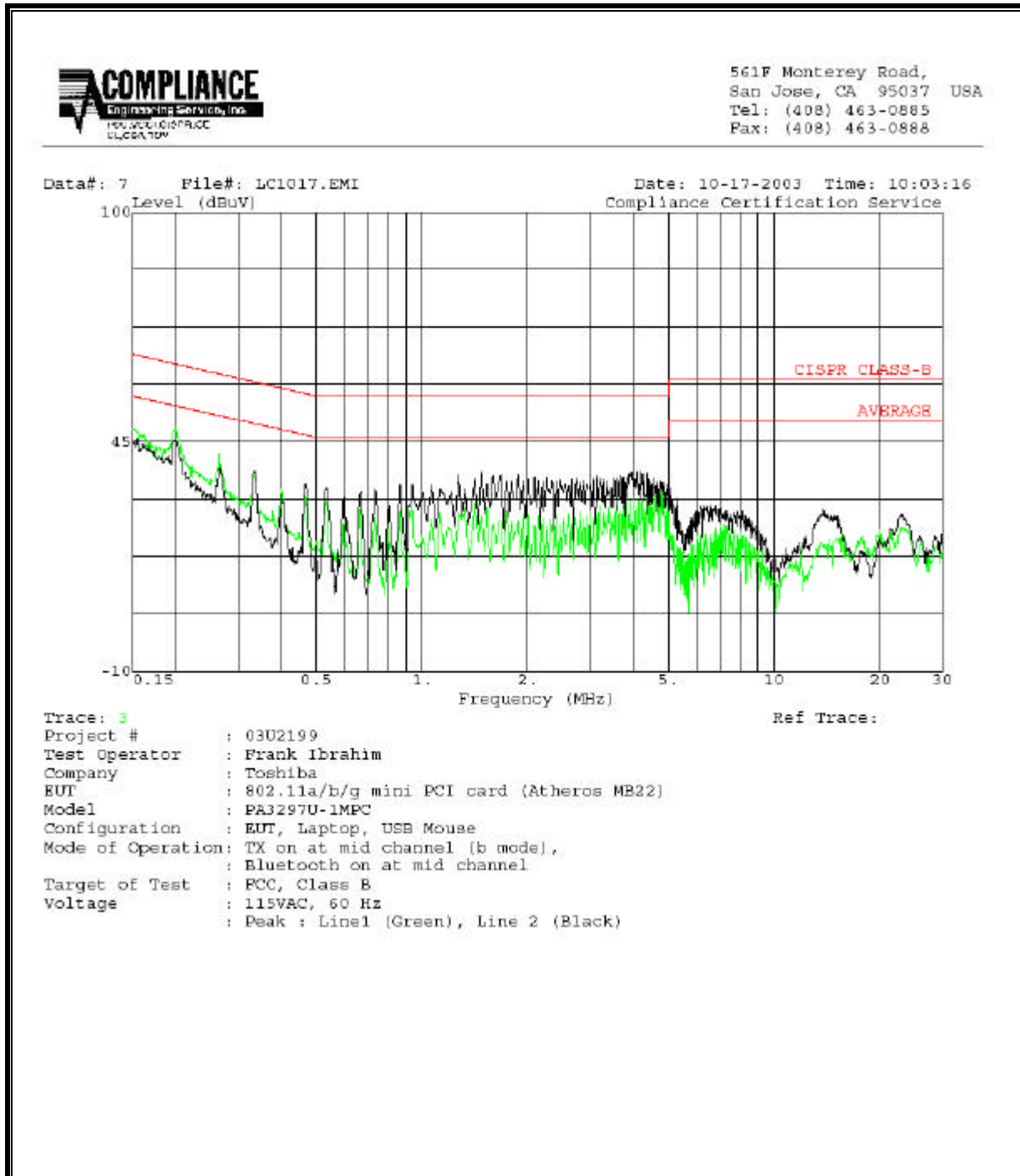
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

| CONDUCTED EMISSIONS DATA (115VAC 60Hz) | | | | | | | | | | |
|--|-----------|-----------|-----------|---------------|-------------|-------|---------|---------|----|-------------------|
| Freq. (MHz) | Reading | | | Class (dB) | Limit QP | EN_B | | Margin | | Remark L1 / L2 |
| | PK (dBuV) | QP (dBuV) | AV (dBuV) | | | AV | QP (dB) | AV (dB) | | |
| 0.15 | 47.98 | -- | -- | 0.00 | 66.00 | 56.00 | -18.02 | -8.02 | L1 | |
| 0.20 | 47.98 | -- | -- | 0.00 | 64.60 | 54.60 | -16.62 | -6.62 | L1 | |
| 0.26 | 42.10 | -- | -- | 0.00 | 62.74 | 52.74 | -20.64 | -10.64 | L1 | |
| 0.15 | 47.14 | -- | -- | 0.00 | 66.00 | 56.00 | -18.86 | -8.86 | L2 | |
| 0.20 | 45.36 | -- | -- | 0.00 | 64.57 | 54.57 | -19.21 | -9.21 | L2 | |
| 0.27 | 38.74 | -- | -- | 0.00 | 62.69 | 52.69 | -23.95 | -13.95 | L2 | |
| 6 Worst Data | | | | | | | | | | |

LINE 1 AND LINE 2 RESULTS



8. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP

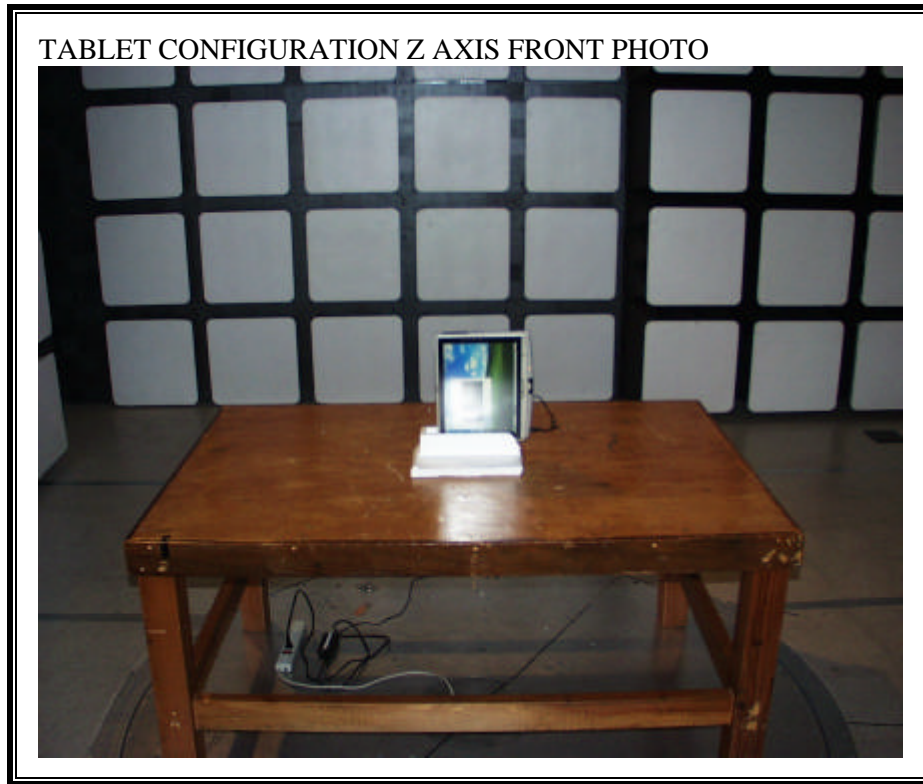


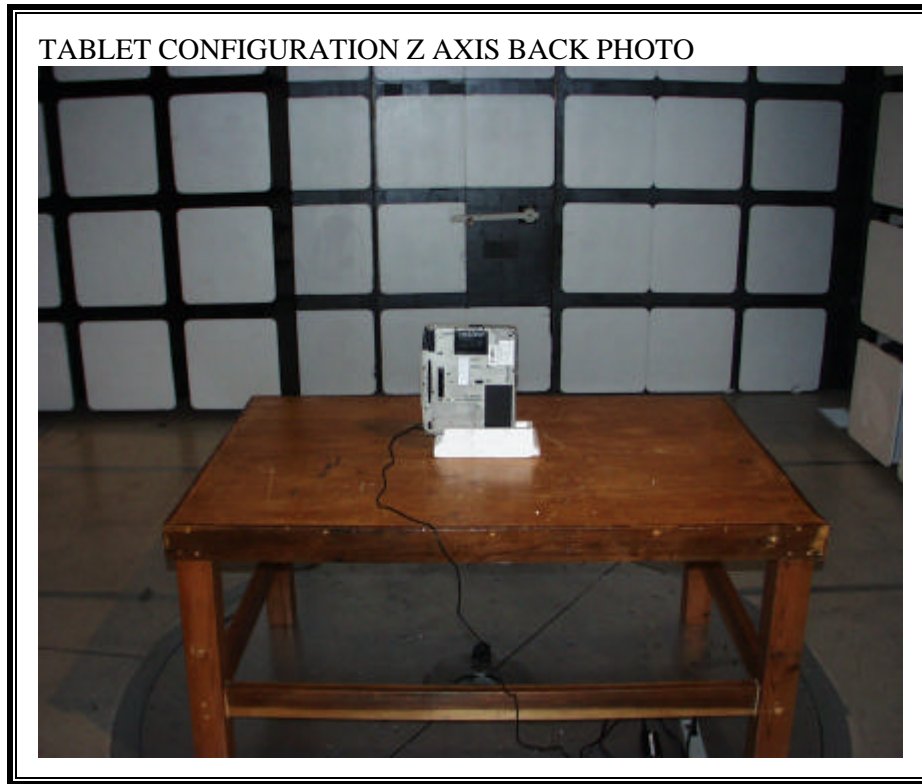




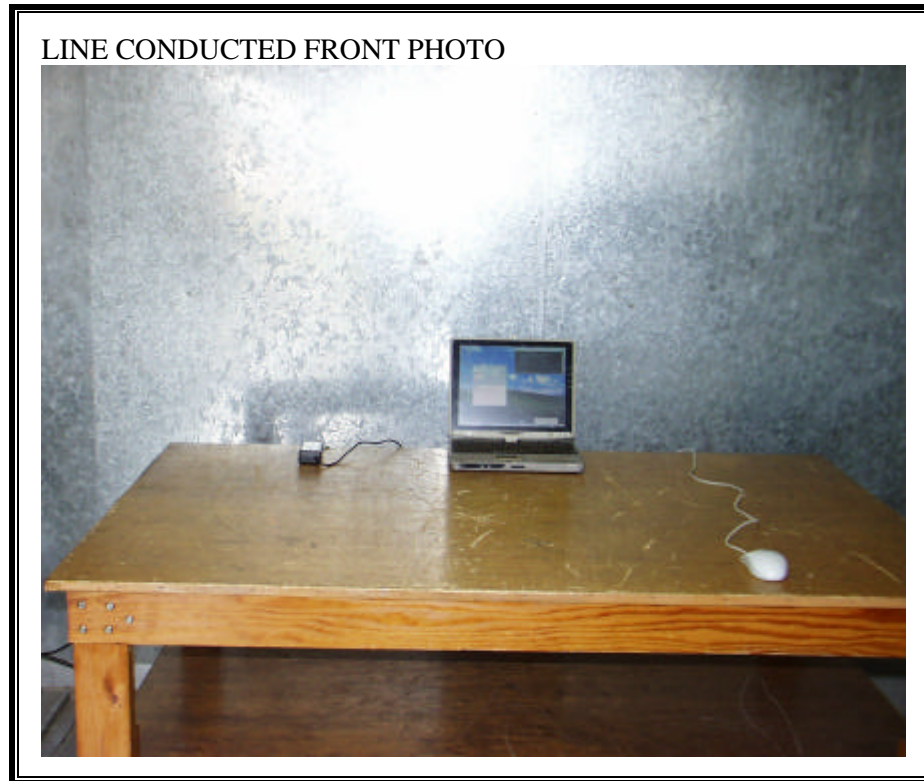








POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





END OF REPORT