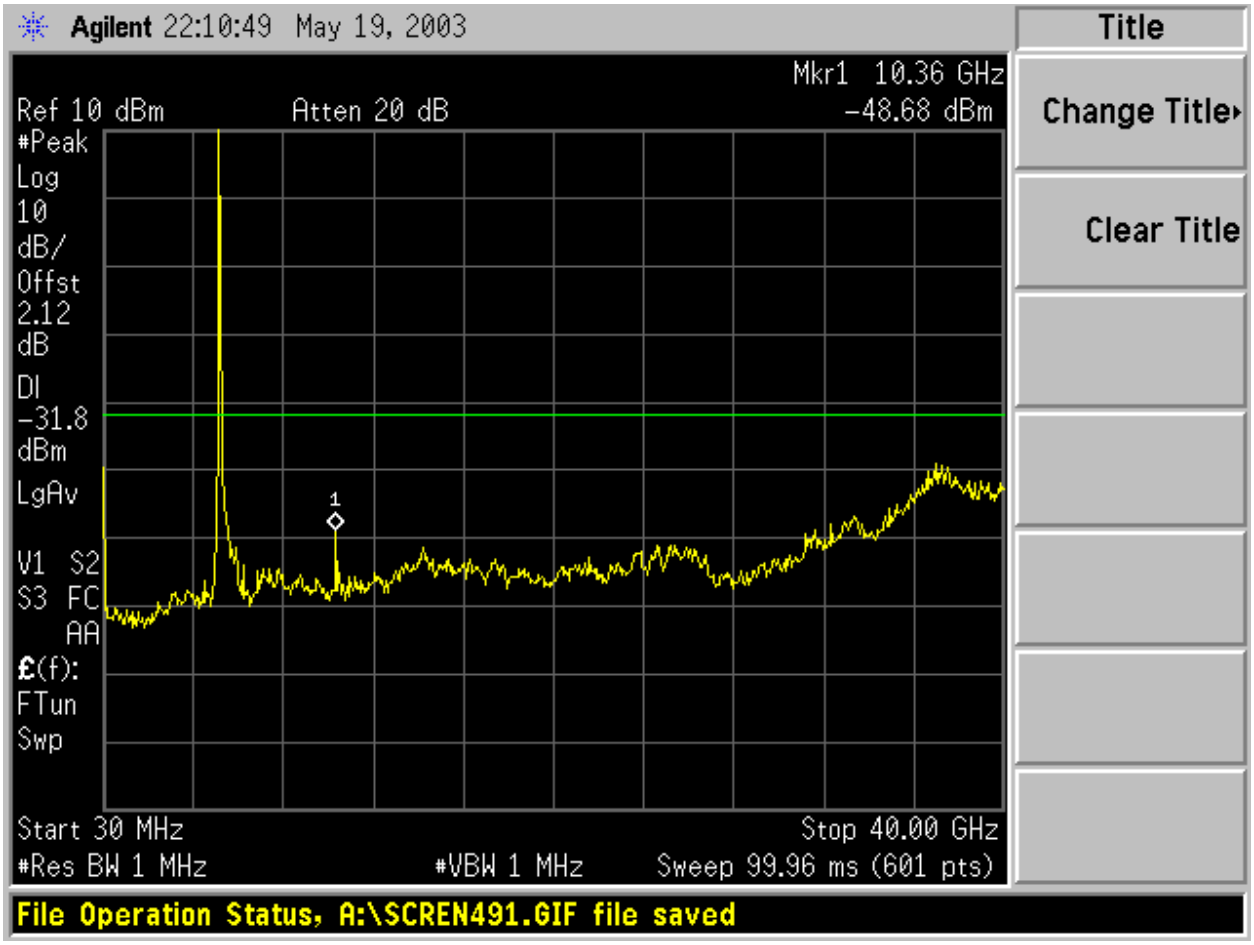
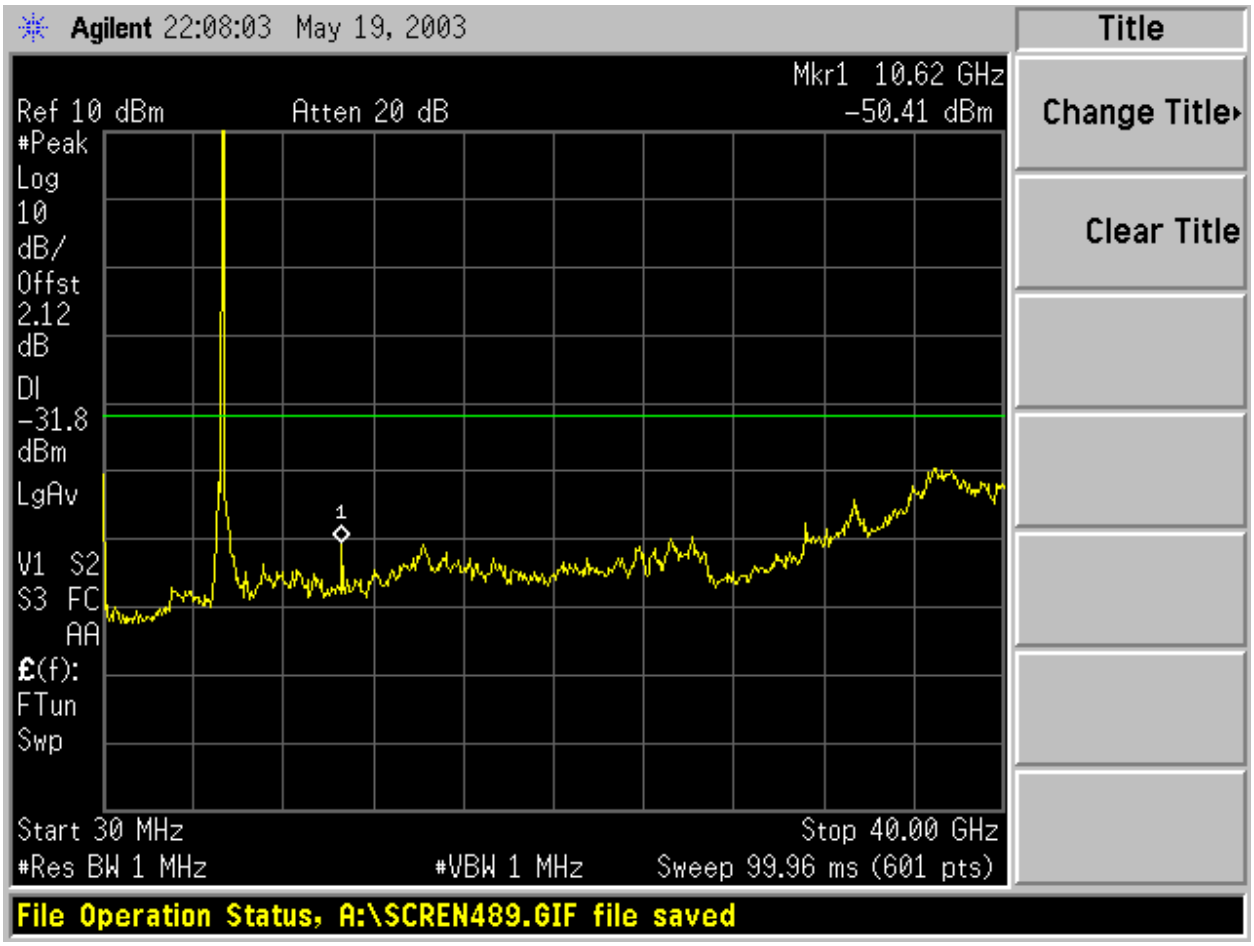
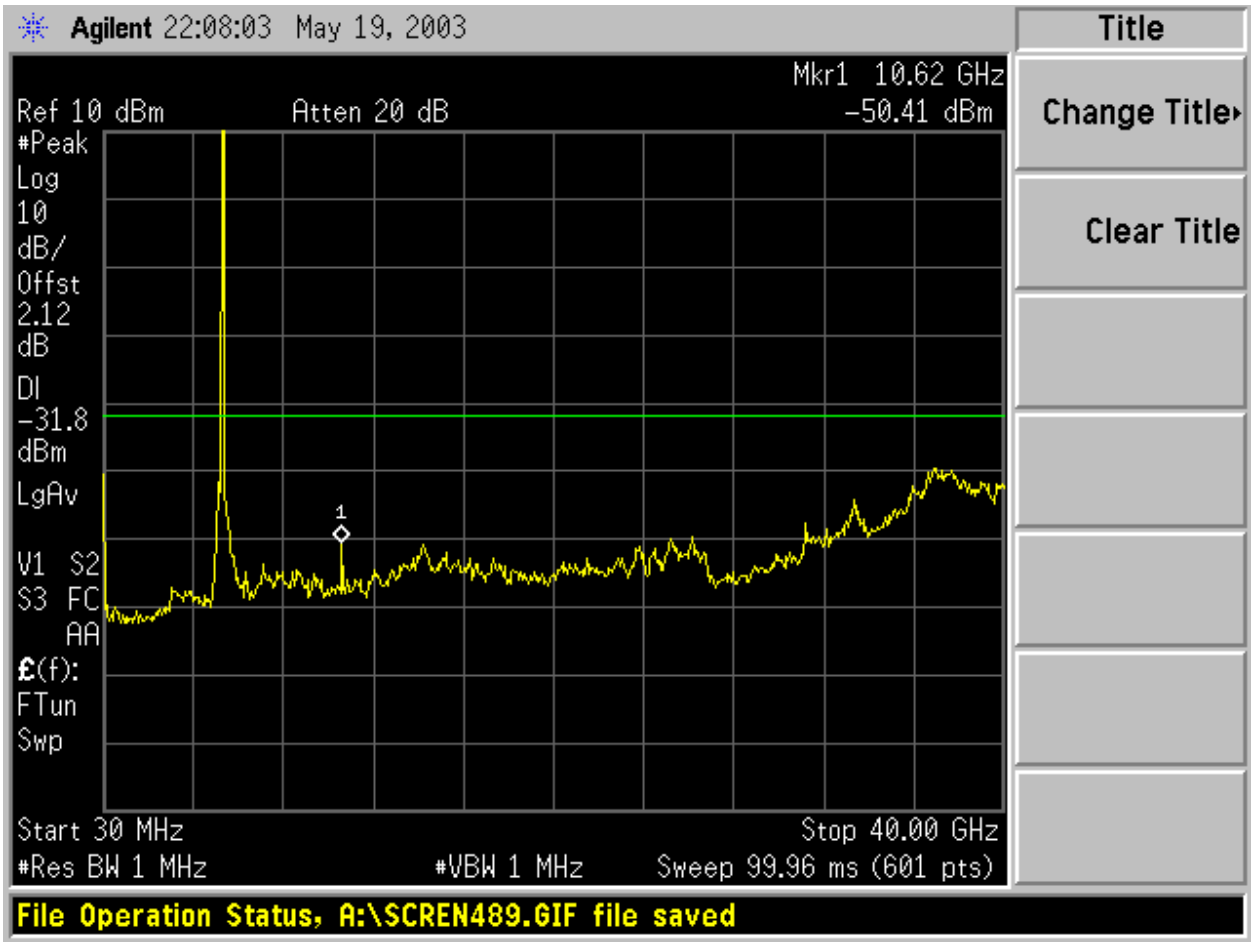
**CONDUCTED SPURIOUS EMISSIONS (BASE MODE)**




**LOW CHANNEL NORMAL**

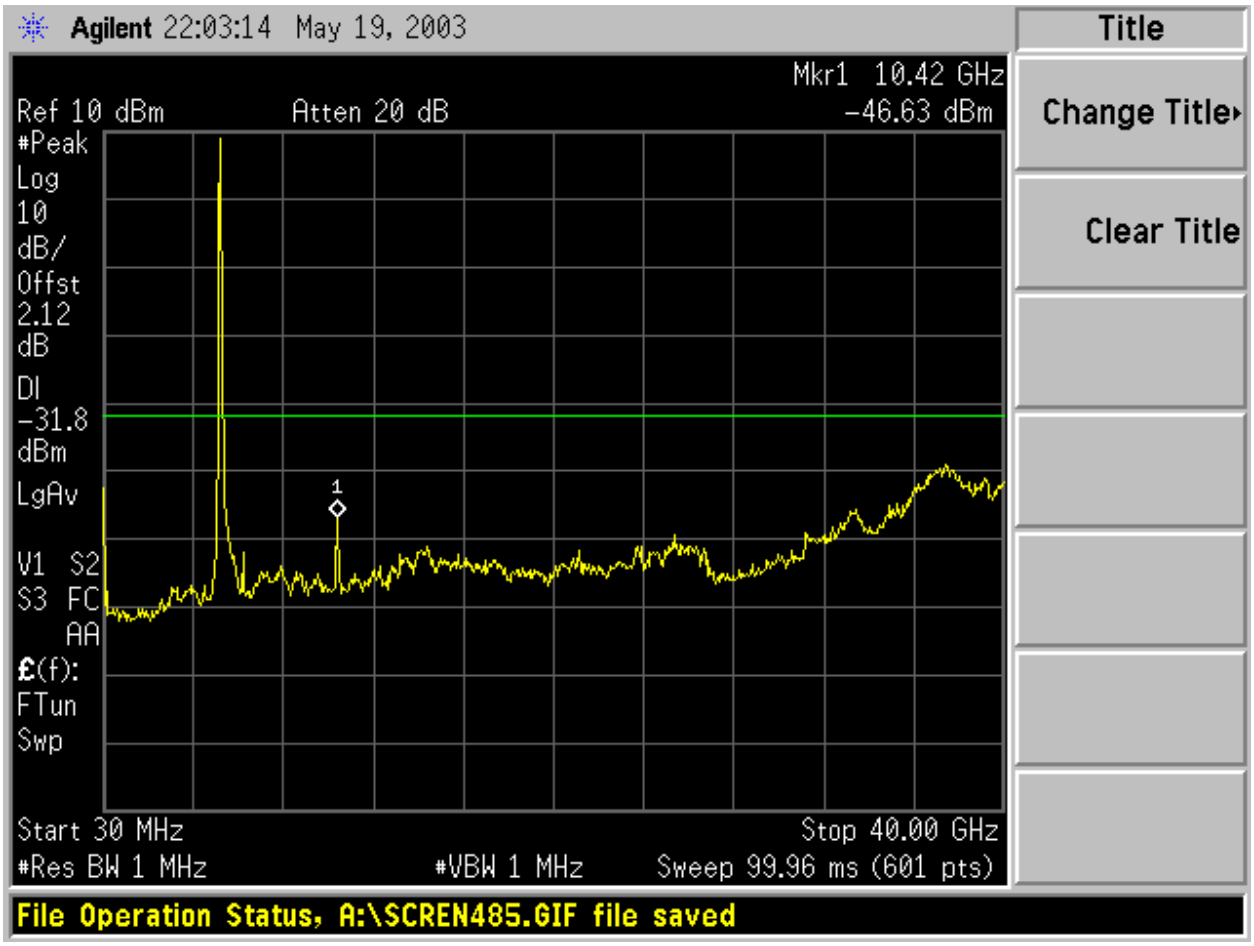



**MID CHANNEL NORMAL**

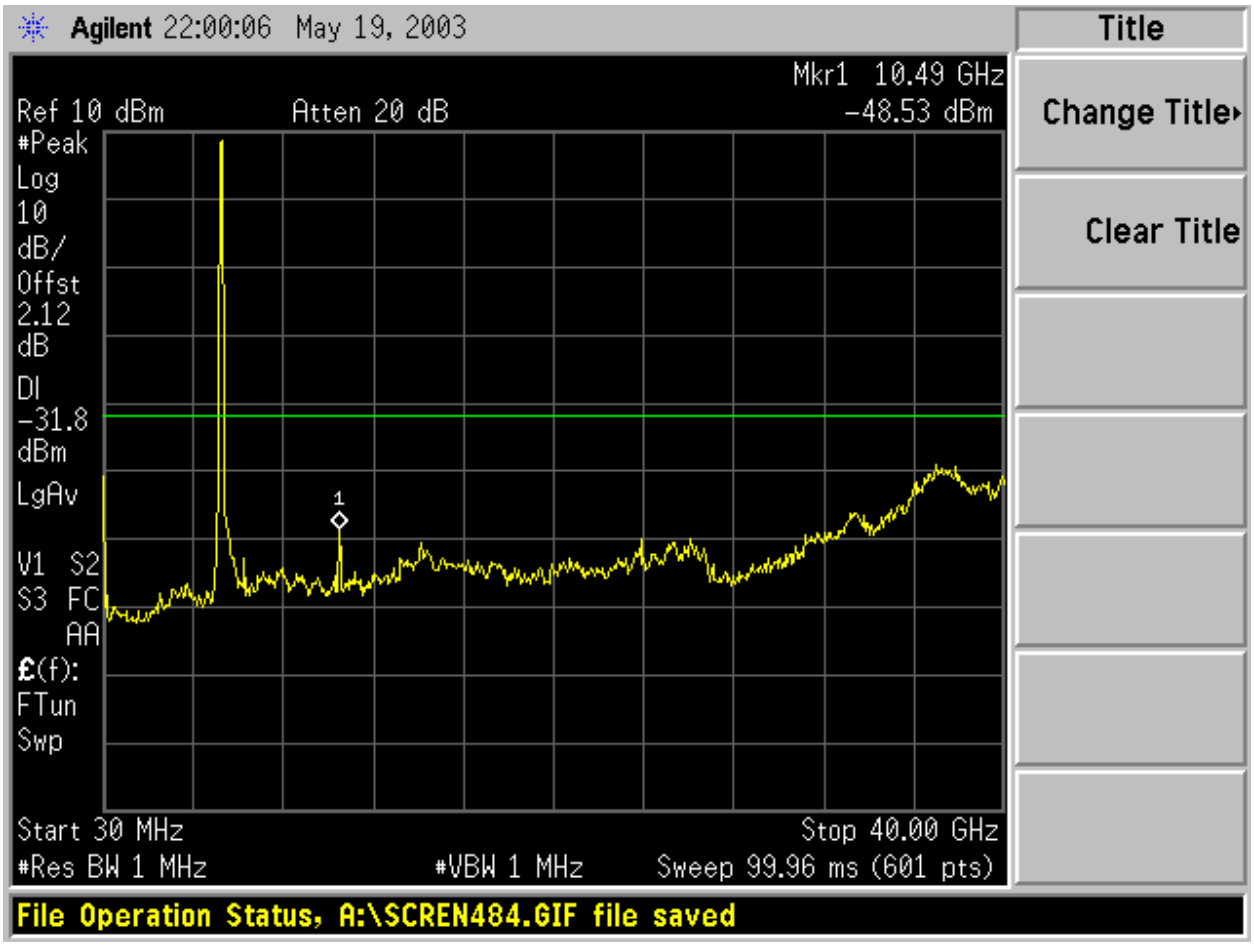



**HIGH CHANNEL_NORMAL**

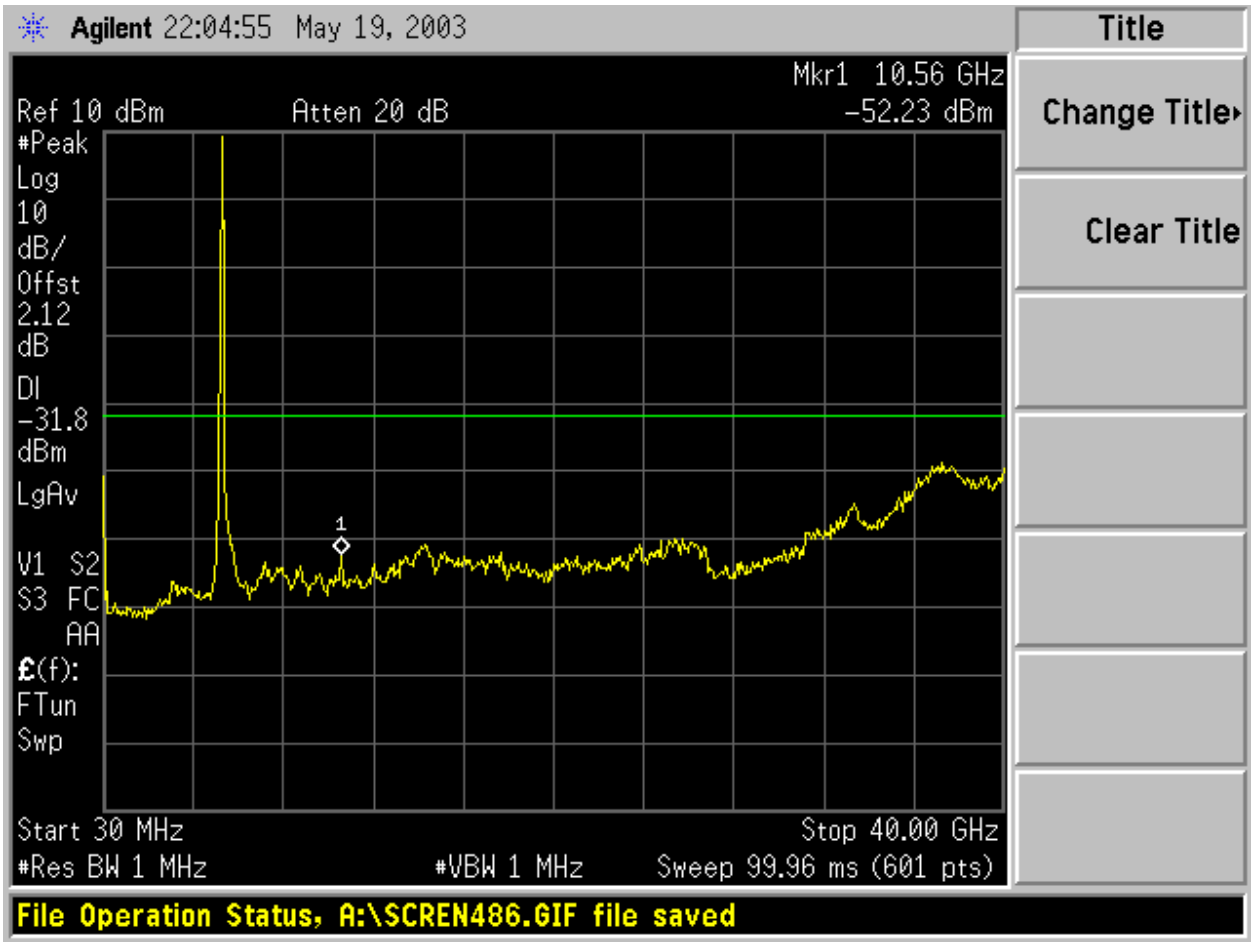
**CONDUCTED SPURIOUS EMISSIONS (TURBO MODE)**




**LOW CHANNEL_TURBO**




**MID CHANNEL TURBO**




**HI CHANNEL TURBO**

## 7.11. RADIATED EMISSION

**LIMIT**

§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 the wooden table. 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, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

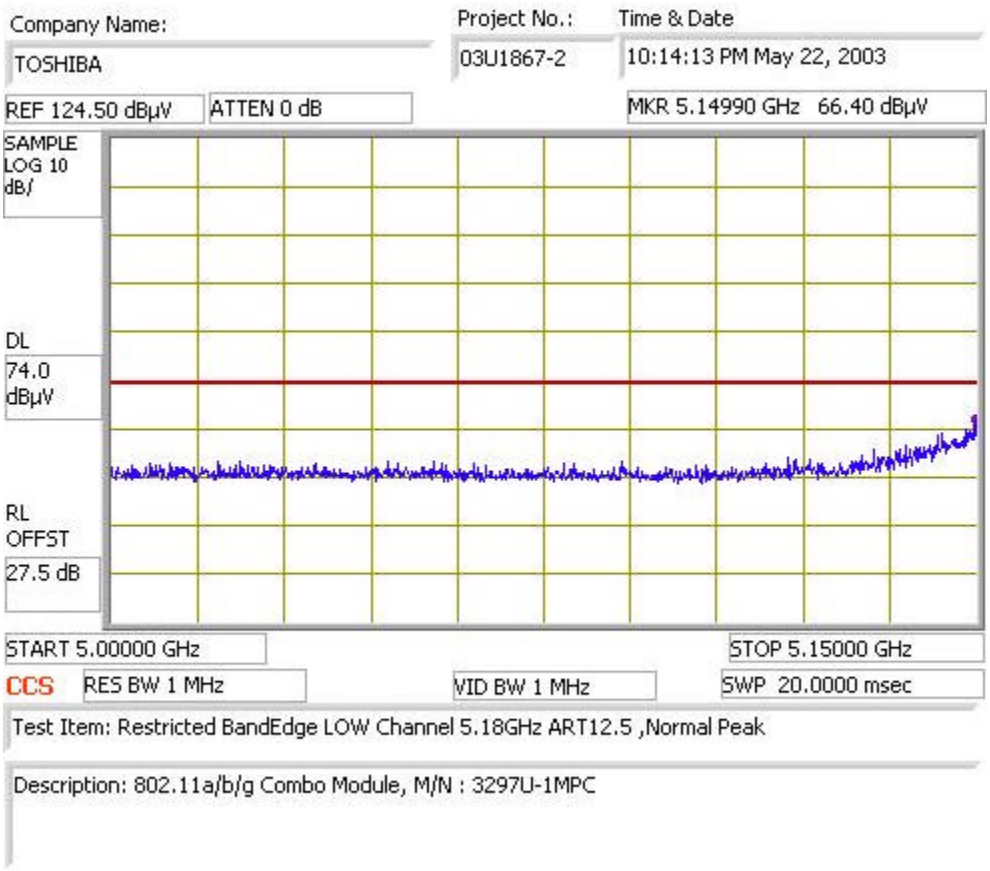
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. 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 suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

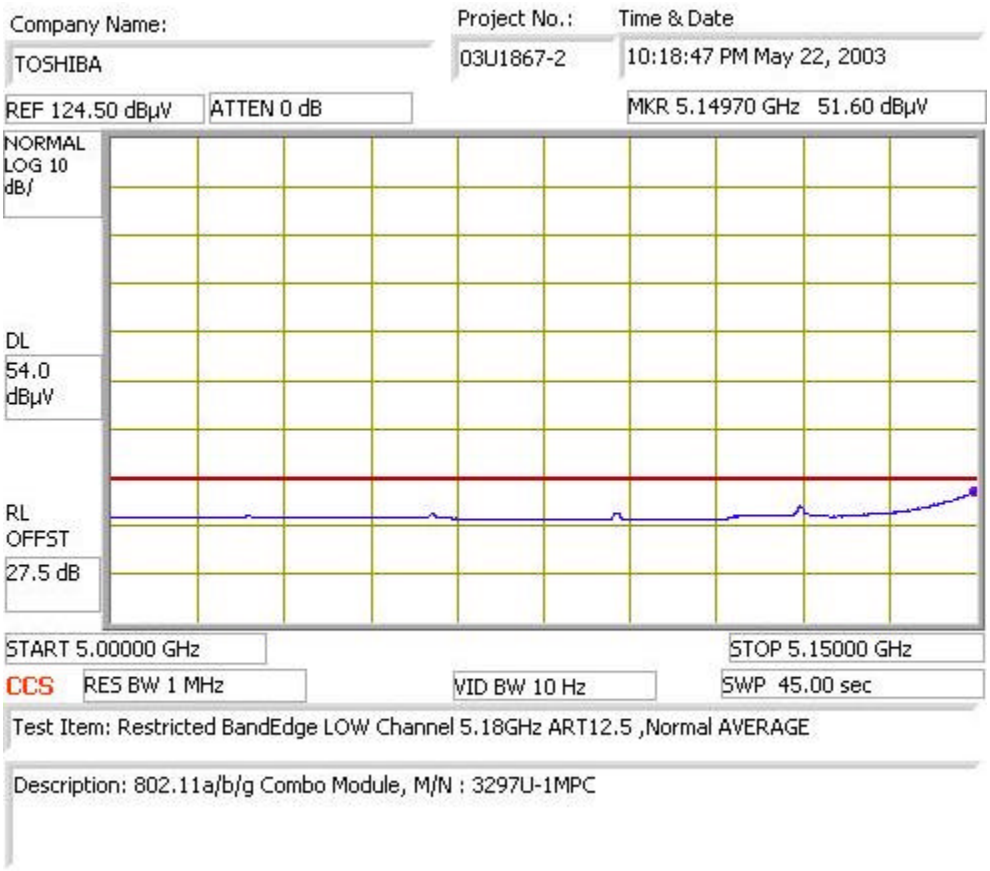
## RESULTS

No non-compliance noted:

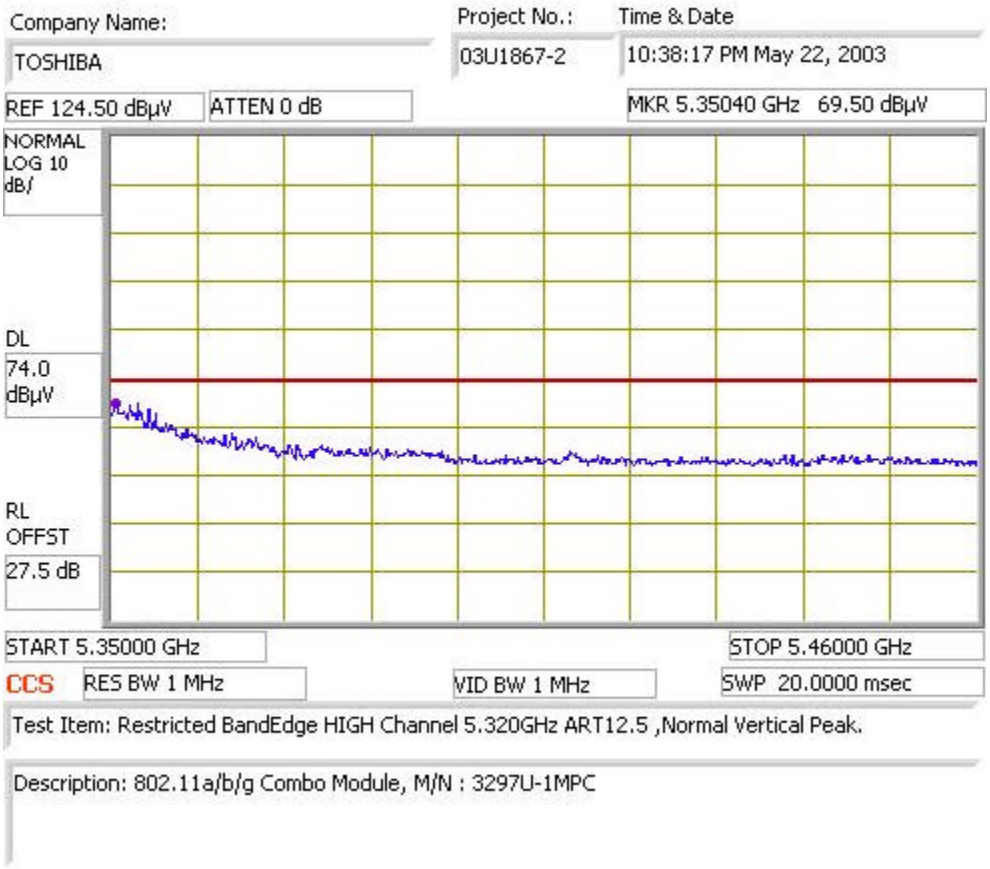
**LOW ADJACENT RESTRICTED BANDEDGE – NORMAL - PEAK**



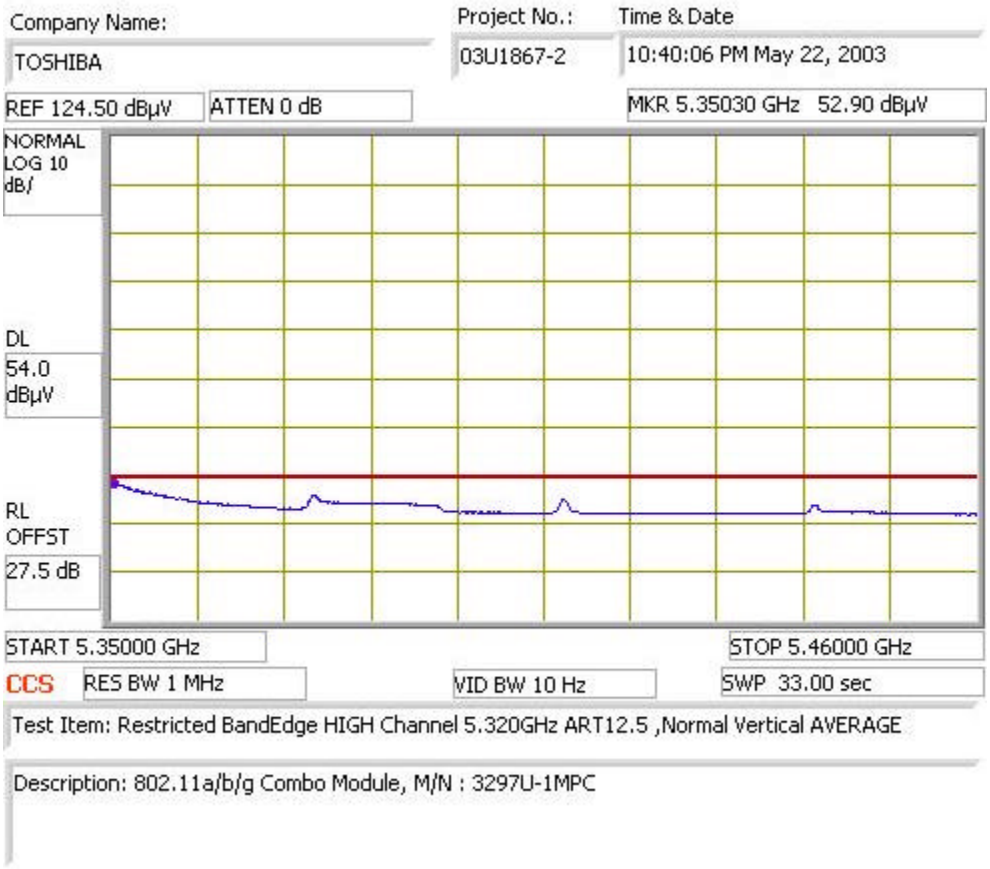
**LOW ADJACENT RESTRICTED BANDEDGE – NORMAL - AVERAGE**



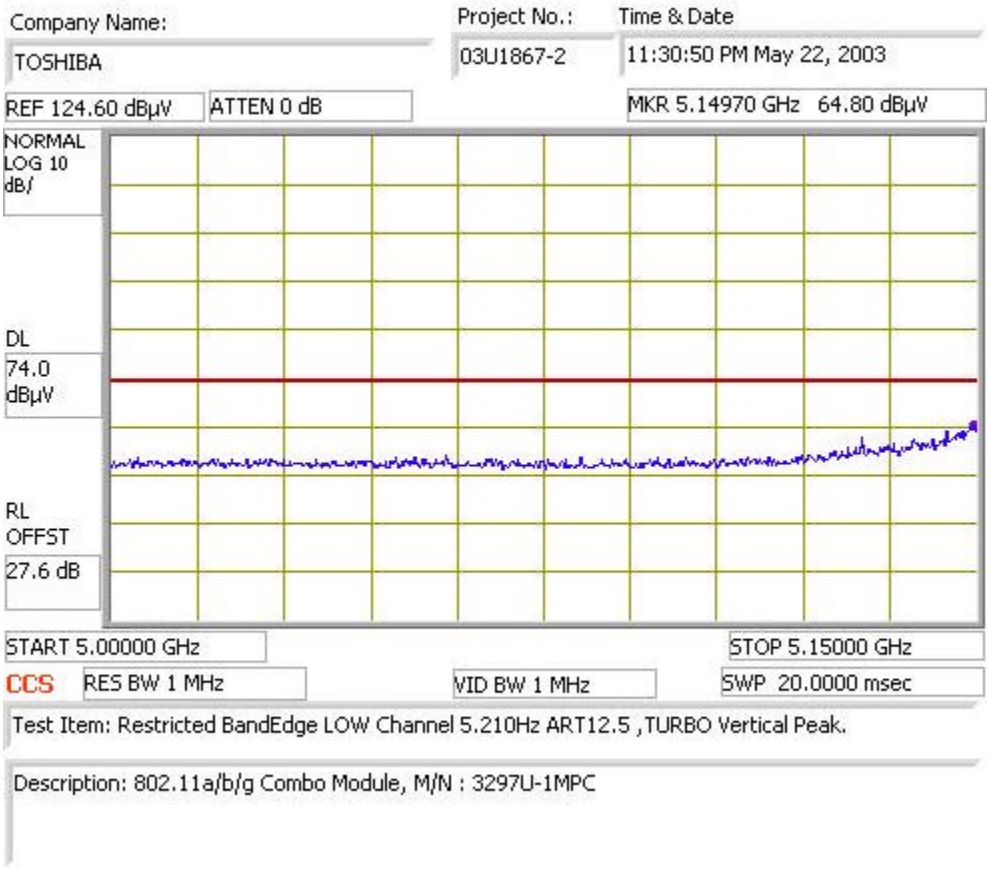
**HIGH ADJACENT RESTRICTED BANDEDGE – NORMAL - PEAK**



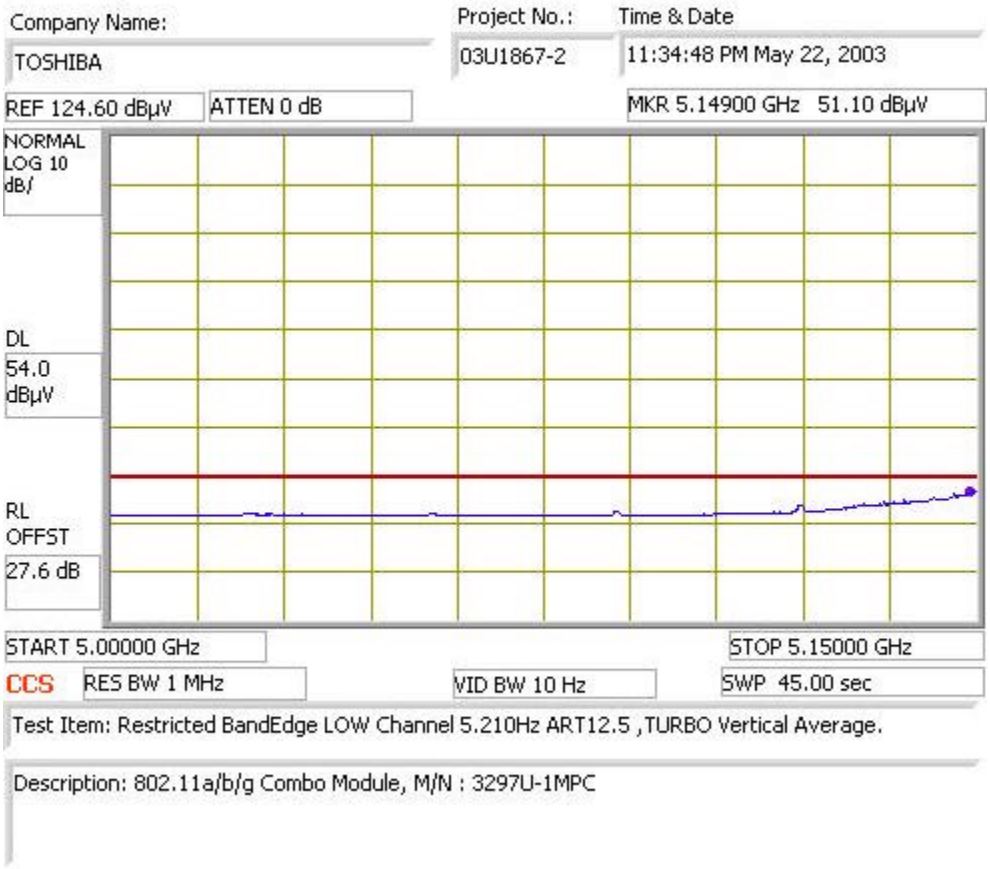
**HIGH ADJACENT RESTRICTED BANDEDGE – NORMAL - AVERAGE**



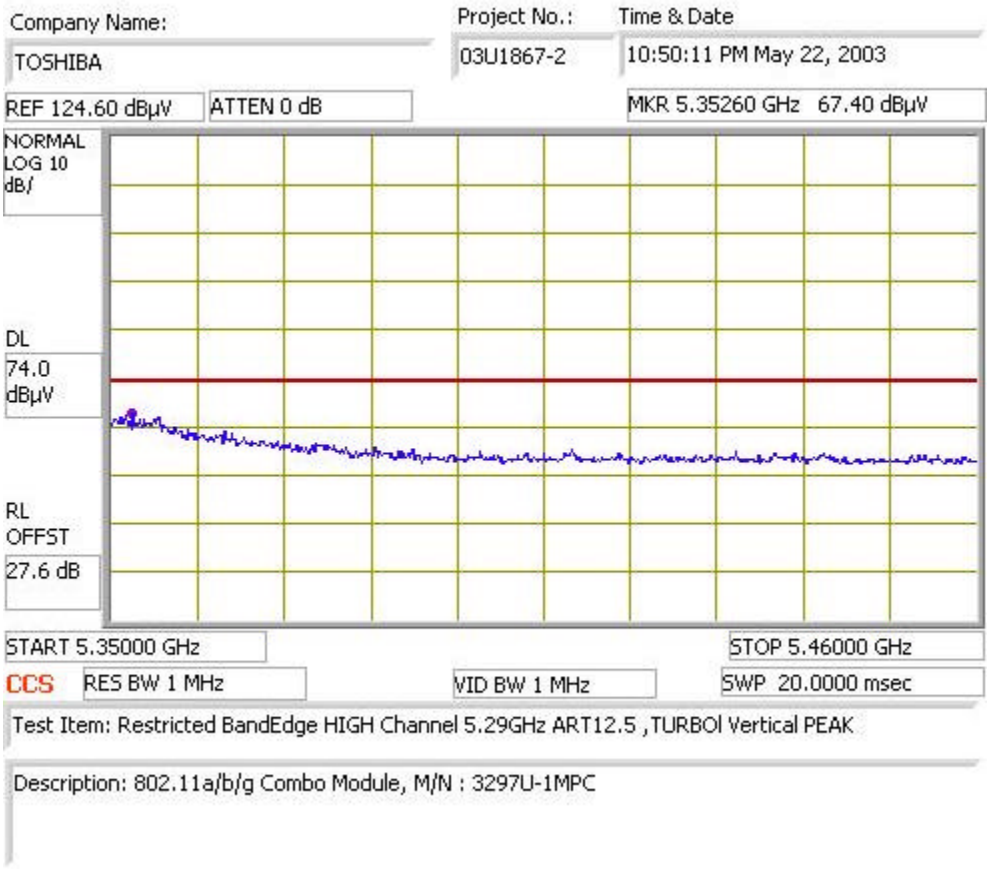
**LOW ADJACENT RESTRICTED BANDEDGE – TURBO - PEAK**



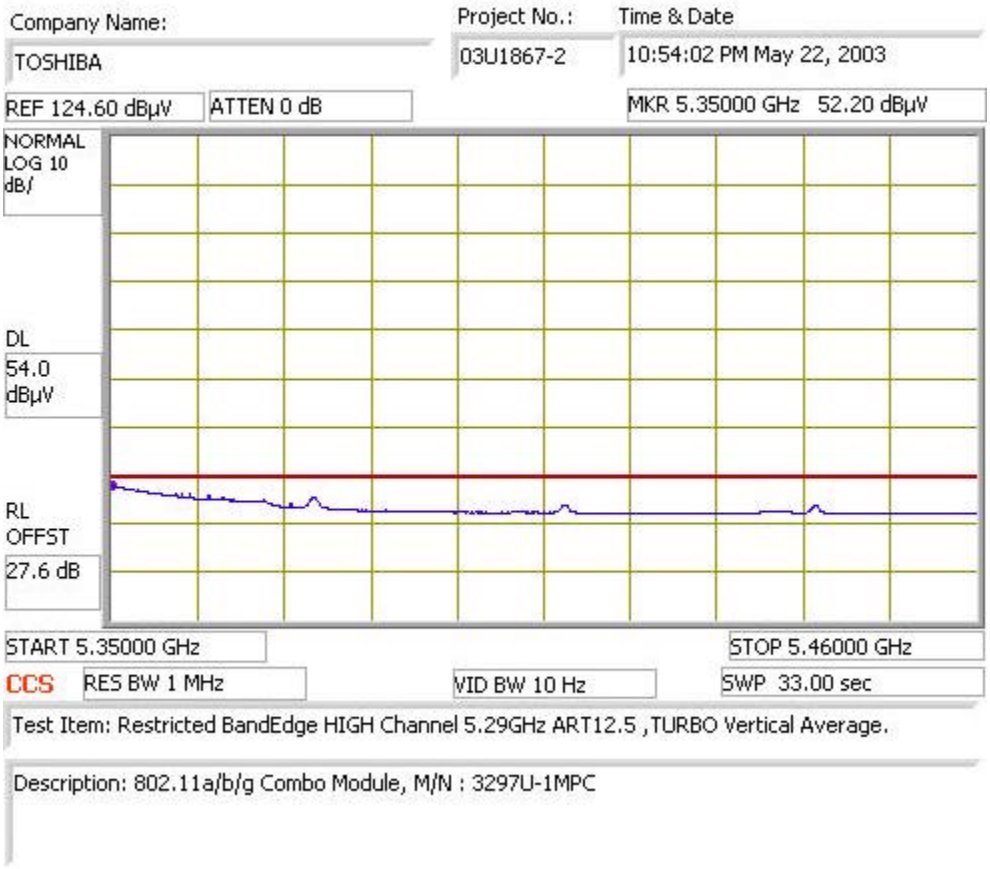
**LOW ADJACENT RESTRICTED BANDEDGE – TURBO – AVERAGE**



**HIGH ADJACENT RESTRICTED BANDEDGE – TURBO - PEAK**



**HIGH ADJACENT RESTRICTED BANDEDGE – TURBO - AVERAGE**



## HARMONIC AND SPURIOUS RADIATED EMISSIONS (NORMAL MODE)

05/02/03 **High Frequency Measurement**
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr: VIEN TRAN**
**Project #: 03U1867-2**
**Company: TOSHIBA**
**EUT Descrip.: 802.11a/b/g Combo Module**
**EUT M/N: M/N3297U-1MPC**
**Test Target: FCC 15.247**
**Mode Oper: Harmonic snd Spur Tx at L/M/H _ Normal 5.2GHz Band**

**Test Equipment:**

| EMCO Horn 1-18GHz | Pre-amplifer 1-26GHz | Spectrum Analyzer | Horn > 18GHz |
|---|---|---|---|
| T60; S/N: 2238 @3m | T34 HP 8449B | HP 8566B Analyzer | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOW CH 5.18GHz NORMAL MODE: | | | | | | | | | | | | | | | |
| 15.540 | 9.8 | 51.1 | 38.8 | 39.4 | 7.1 | -33.9 | 0.0 | 1.0 | 64.6 | 52.3 | 74.0 | 54.0 | -9.4 | -1.7 | V |
| 15.540 | 9.8 | 50.0 | 37.8 | 39.4 | 7.1 | -33.9 | 0.0 | 1.0 | 63.5 | 51.3 | 74.0 | 54.0 | -10.5 | -2.7 | H |
| NO OTHER EMISSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| MID CH 5.26GHz NORMAL MODE: | | | | | | | | | | | | | | | |
| 15.780 | 9.8 | 51.3 | 37.6 | 38.7 | 7.2 | -33.9 | 0.0 | 1.0 | 64.3 | 50.6 | 74.0 | 54.0 | -9.7 | -3.4 | V |
| 15.780 | 9.8 | 50.4 | 37.0 | 38.7 | 7.2 | -33.9 | 0.0 | 1.0 | 63.4 | 50.0 | 74.0 | 54.0 | -10.6 | -4.0 | H |
| NO OTHER EMISSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| HI CH 5.32GHz NORMAL MODE: | | | | | | | | | | | | | | | |
| 10.640 | 9.8 | 47.7 | 34.9 | 38.2 | 5.5 | -34.3 | 0.0 | 1.0 | 58.1 | 45.3 | 74.0 | 54.0 | -15.9 | -8.7 | V |
| 15.960 | 9.8 | 49.9 | 37.2 | 38.3 | 7.2 | -33.8 | 0.0 | 1.0 | 62.5 | 49.8 | 74.0 | 54.0 | -11.5 | -4.2 | V |
| 10.610 | 9.8 | 50.6 | 39.0 | 38.2 | 5.5 | -34.3 | 0.0 | 1.0 | 61.0 | 49.4 | 74.0 | 54.0 | -13.0 | -4.6 | H, spur |
| 10.640 | 9.8 | 45.9 | 34.3 | 38.2 | 5.5 | -34.3 | 0.0 | 1.0 | 56.3 | 44.7 | 74.0 | 54.0 | -17.7 | -9.3 | H |
| 15.960 | 9.8 | 49.7 | 37.5 | 38.3 | 7.2 | -33.8 | 0.0 | 1.0 | 62.3 | 50.1 | 74.0 | 54.0 | -11.7 | -3.9 | H |
| NO OTHER EMISSION FOUND 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 | | |

## HARMONIC AND SPURIOUS RADIATED EMISSIONS (TURBO MODE)

05/02/03 **High Frequency Measurement**
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr: VIEN TRAN**
**Project #: 03U1867-2**
**Company: TOSHIBA**
**EUT Descrip.: 802.11a/b/g Combo Module**
**EUT M/N: M/N3297U-1MPC**
**Test Target: FCC 15.247**
**Mode Oper: Harmonic snd Spur Tx at L/M/H _ Turbo Mode_5.2GHz Band**

**Test Equipment:**

| EMCO Horn 1-18GHz | Pre-amplifer 1-26GHz | Spectrum Analyzer | Horn > 18GHz |
|---|---|---|---|
| T60; S/N: 2238 @3m | T34 HP 8449B | HP 8566B Analyzer | 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

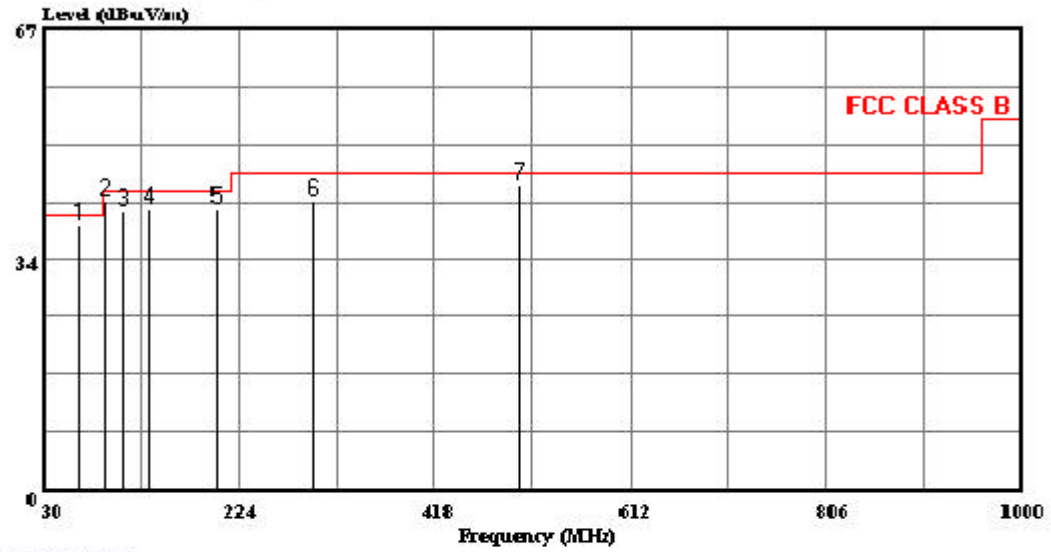
| f GHz | Dist feet | Read Pk dBuV | Read Avg. dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | HPF | Peak dBuV/m | Avg dBuV/m | Pk Lim dBuV/m | Avg Lim dBuV/m | Pk Mar dB | Avg Mar dB | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LOW CH 5.21GHz TURBO MODE:** | | | | | | | | | | | | | | | |
| 15.630 | 9.8 | 50.9 | 37.9 | 39.1 | 2.0 | -33.9 | 0.0 | 1.0 | 59.1 | 46.1 | 74.0 | 54.0 | -14.9 | -7.9 | V |
| 15.630 | 9.8 | 50.1 | 37.5 | 39.1 | 2.0 | -33.9 | 0.0 | 1.0 | 58.3 | 45.7 | 74.0 | 54.0 | -15.7 | -8.3 | H |
| NO OTHER EMISSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| **MID CH 5.25GHz TURBO MODE:** | | | | | | | | | | | | | | | |
| 15.750 | 9.8 | 50.7 | 37.5 | 38.8 | 2.0 | -33.9 | 0.0 | 1.0 | 58.6 | 45.4 | 74.0 | 54.0 | -15.4 | -8.6 | V |
| 15.750 | 9.8 | 50.3 | 37.7 | 38.8 | 2.0 | -33.9 | 0.0 | 1.0 | 58.2 | 45.6 | 74.0 | 54.0 | -15.8 | -8.4 | H |
| NO OTHER EMISSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| **HI CH 5.29GHz TURBO MODE:** | | | | | | | | | | | | | | | |
| 15.870 | 9.8 | 50.8 | 37.3 | 38.5 | 2.0 | -33.8 | 0.0 | 1.0 | 58.4 | 44.9 | 74.0 | 54.0 | -15.6 | -9.1 | V |
| 10.640 | 9.8 | 54.3 | 41.9 | 38.2 | 1.5 | -34.3 | 0.0 | 1.0 | 60.7 | 48.3 | 74.0 | 54.0 | -13.3 | -5.7 | H |
| 15.870 | 9.8 | 49.5 | 37.6 | 38.5 | 2.0 | -33.8 | 0.0 | 1.0 | 57.1 | 45.2 | 74.0 | 54.0 | -16.9 | -8.8 | H |
| NO OTHER EMISSION FOUND 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 | | |

## SPURIOUS EMISSIONS BELOW 1 GHZ (WORST-CASE CONFIGURATION, HORIZONTAL)

561F Monterey Road
Morgan Hill, CA 95037, U.S.A.
Tel: (408) 463-0885
Fax:(408) 463-0888

Data#: 6 File#: 051203_aMode.EMI Date: 05-12-2003 Time: 18:08:18




(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 HORIZONTAL
Company : TOSHIBA AMERICA INFORMATION SYSTEMS, INC
EUT Description : 802.11a Combo Module
Model Number : PA3297U-1MPC (FCC ID: CJ6UPA3297WL
Test Configuration: EUT is Plug in the extended card to LapT
Test Target : FCC Class B
Mode of Operation: Transmit worst Case
Project No : 03U1876-2

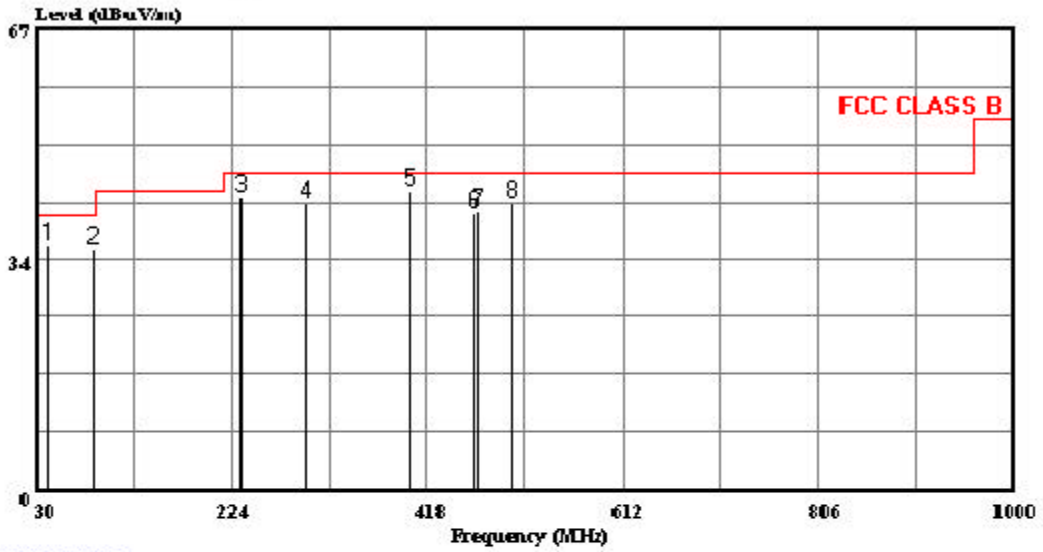
Page: 1

| | Freq | Read Level | Probe Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 65.890 | 28.41 | 9.38 | 0.77 | 0.00 | 38.56 | 40.00 | -1.44 | Peak |
| 2 | 90.140 | 33.05 | 8.03 | 0.91 | 0.00 | 41.99 | 43.50 | -1.51 | Peak |
| 3 | 109.540 | 29.77 | 9.71 | 1.01 | 0.00 | 40.49 | 43.50 | -3.01 | Peak |
| 4 | 133.790 | 30.34 | 9.40 | 1.11 | 0.00 | 40.85 | 43.50 | -2.65 | Peak |
| 5 | 201.690 | 30.34 | 9.00 | 1.38 | 0.00 | 40.80 | 43.50 | -2.70 | Peak |
| 6 | 298.690 | 28.34 | 12.05 | 1.73 | 0.00 | 42.12 | 46.00 | -3.88 | Peak |
| 7 | 502.390 | 25.59 | 16.57 | 2.31 | 0.00 | 44.47 | 46.00 | -1.53 | Peak |

**SPURIOUS EMISSIONS BELOW 1 GHZ (WORST-CASE CONFIGURATION, VERTICAL)**

561F Monterey Road
Morgan Hill, CA 95037, U.S.A.
Tel: (408) 463-0885
Fax:(408) 463-0888

Data#: 3 File#: 051203_aMode.EMI Date: 05-12-2003 Time: 18:00:55




(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 VERTICAL
Company : TOSHIBA AMERICA INFORMATION SYSTEMS, INC
EUT Description : 802.11a Combo Module
Model Number : PA3297U-1MPC (FCC ID: CJ6UPA3297WL
Test Configurtion: EUT is Plug in the extended card to LapT
Test Target : FCC Class B
Mode of Operation: Transmit worst Case
Project No : 03U1876-2

Page: 1

| | Freq | Read Level | Probe Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 41.640 | 18.70 | 16.48 | 0.62 | 0.00 | 35.81 | 40.00 | -4.19 | Peak |
| 2 | 87.230 | 26.68 | 7.58 | 0.86 | 0.00 | 35.12 | 40.00 | -4.88 | Peak |
| 3 | 232.730 | 30.38 | 10.85 | 1.50 | 0.00 | 42.73 | 46.00 | -3.27 | Peak |
| 4 | 298.690 | 27.85 | 12.05 | 1.73 | 0.00 | 41.63 | 46.00 | -4.37 | Peak |
| 5 | 400.540 | 26.94 | 14.45 | 2.01 | 0.00 | 43.40 | 46.00 | -2.60 | Peak |
| 6 | 463.590 | 22.33 | 15.84 | 2.22 | 0.00 | 40.39 | 46.00 | -5.61 | Peak |
| 7 | 468.440 | 22.37 | 15.94 | 2.22 | 0.00 | 40.53 | 46.00 | -5.47 | Peak |
| 8 | 502.390 | 22.87 | 16.57 | 2.31 | 0.00 | 41.75 | 46.00 | -4.25 | Peak |

## 7.12. CO-LOCATED RADIATED EMISSIONS

**TEST SETUP**

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4.

Both transmitters in the EUT are set to transmit simultaneously in a continuous mode.

**TEST PROCEDURE**

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.

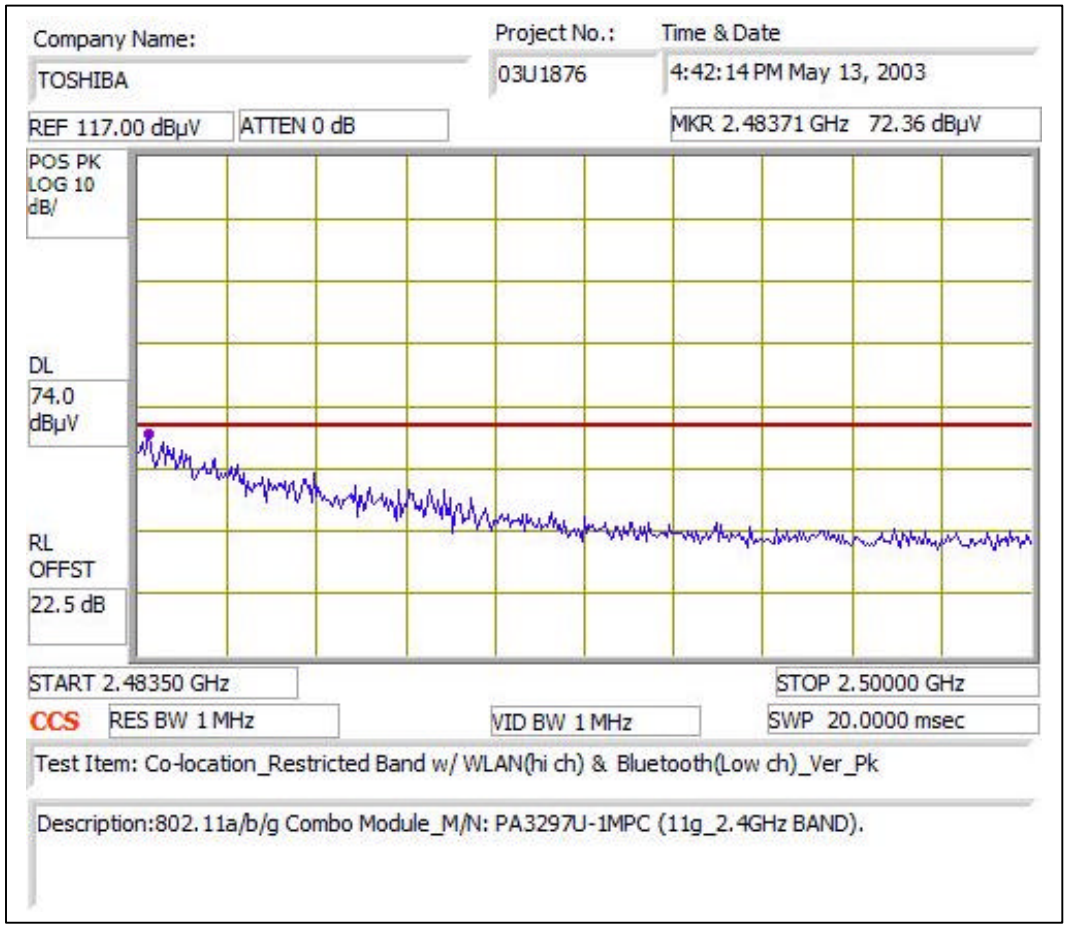
For measurements above 1 GHz within restricted bands, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. 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 suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

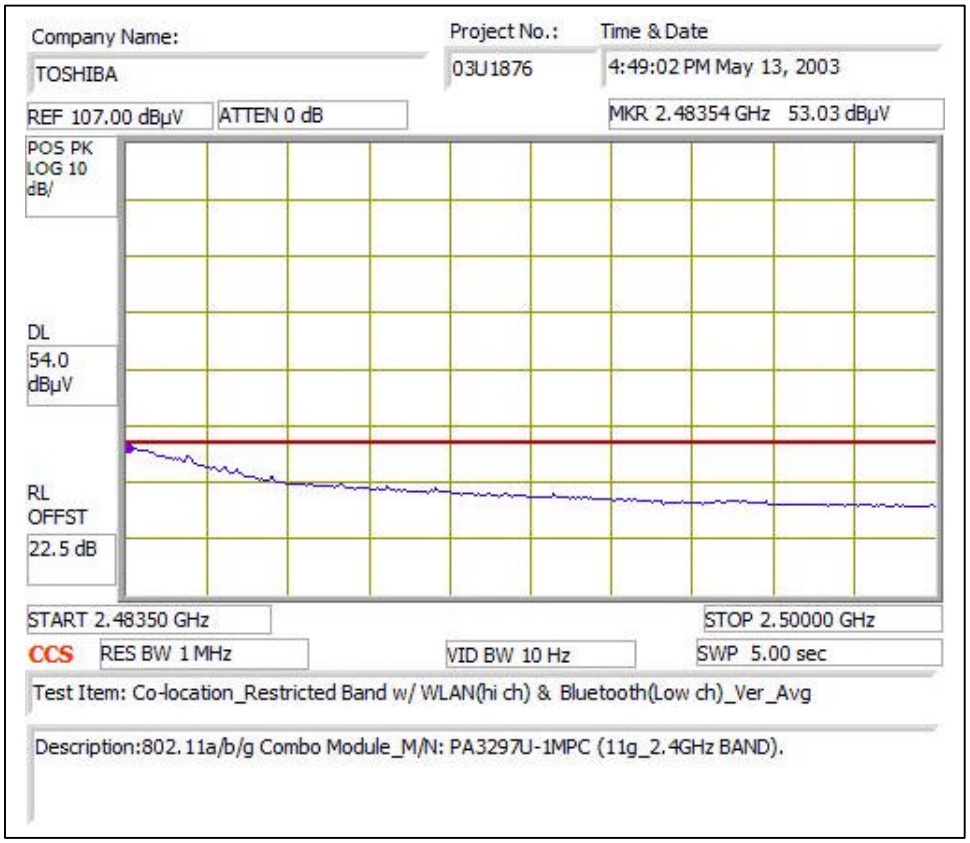
**TEST RESULTS**

Worst-case results are reported. No non-compliance noted:

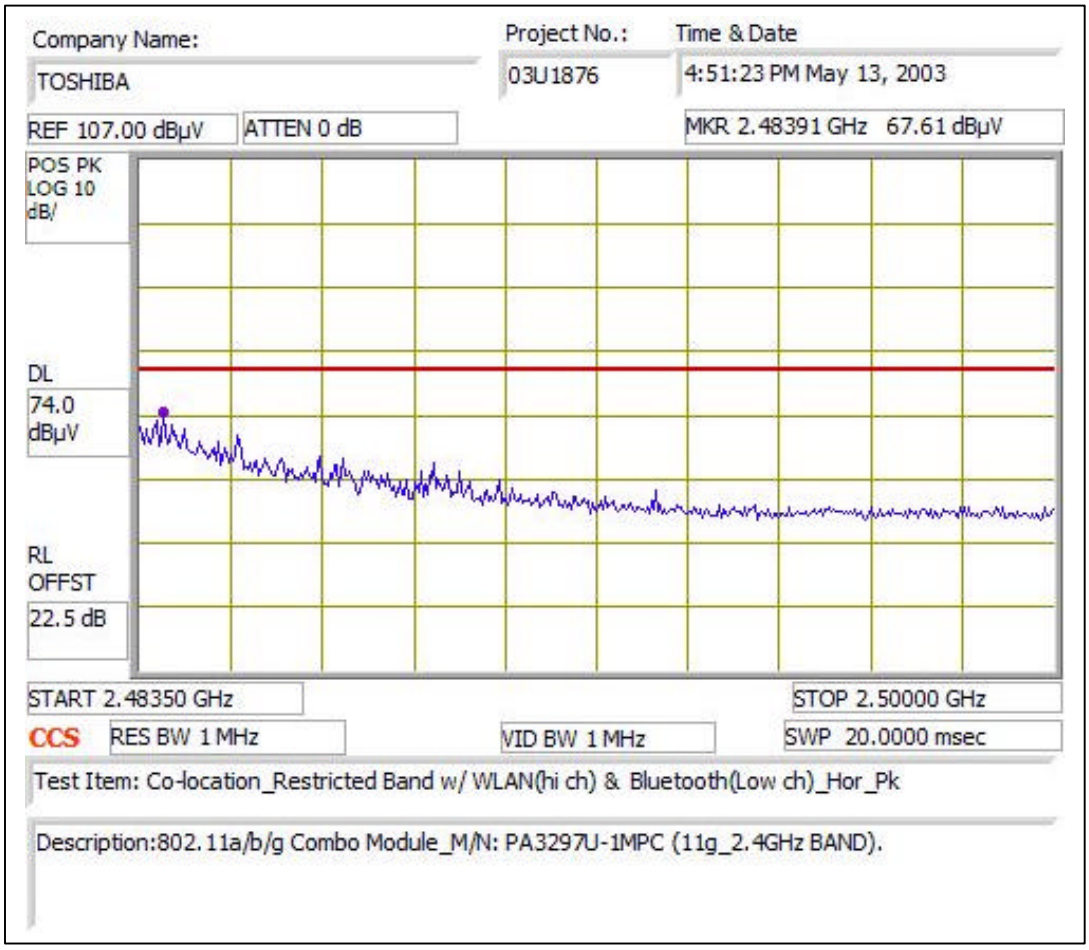
**WORST CASE LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – VERTICAL PEAK**



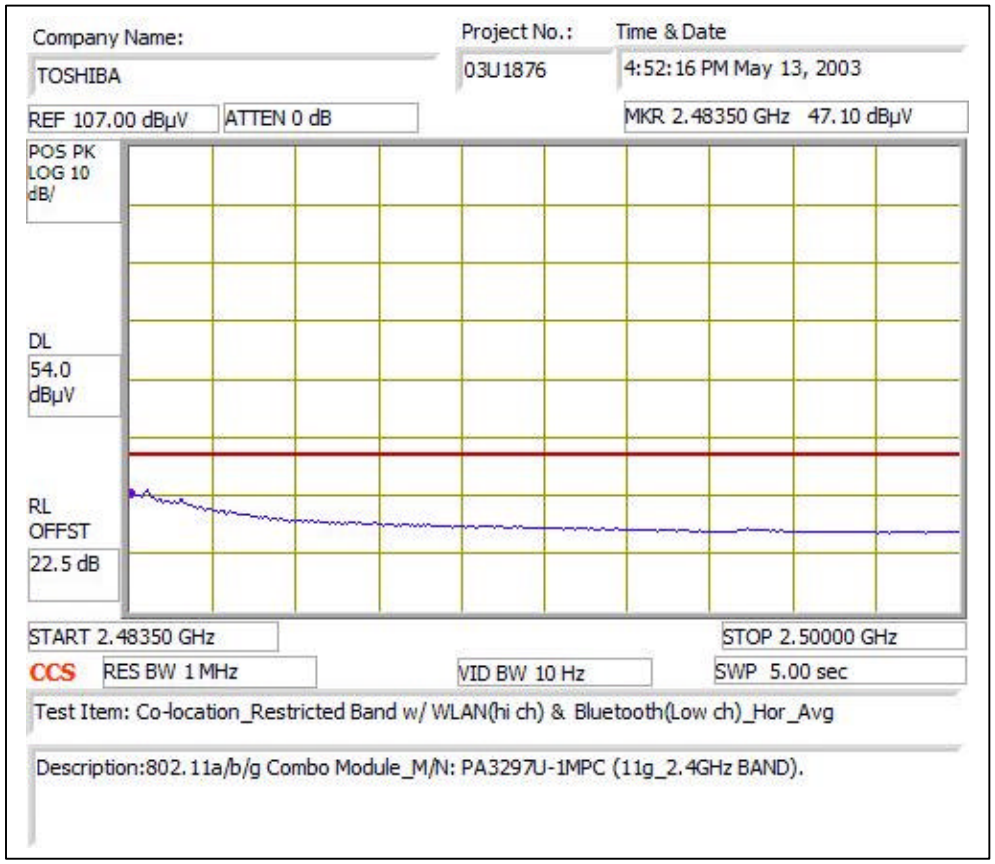
**WORST CASE LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – VERTICAL AVERAGE**



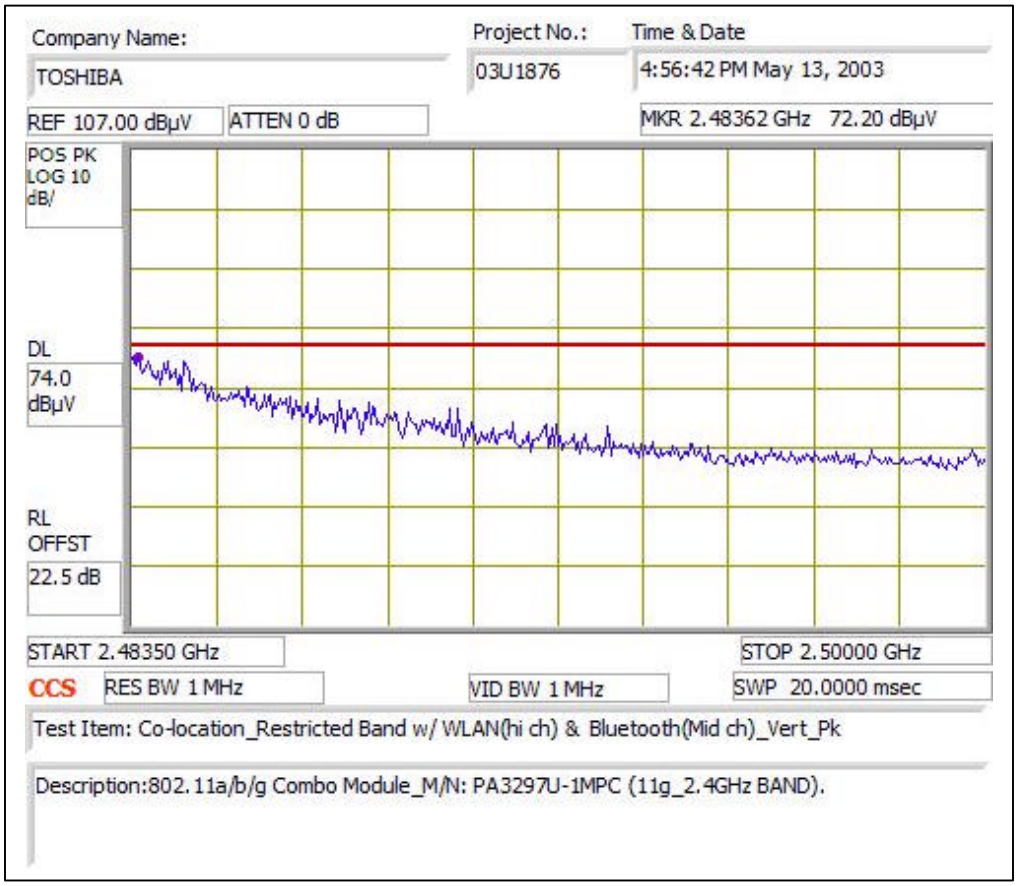
**WORST CASE LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – HORIZONTAL PEAK**



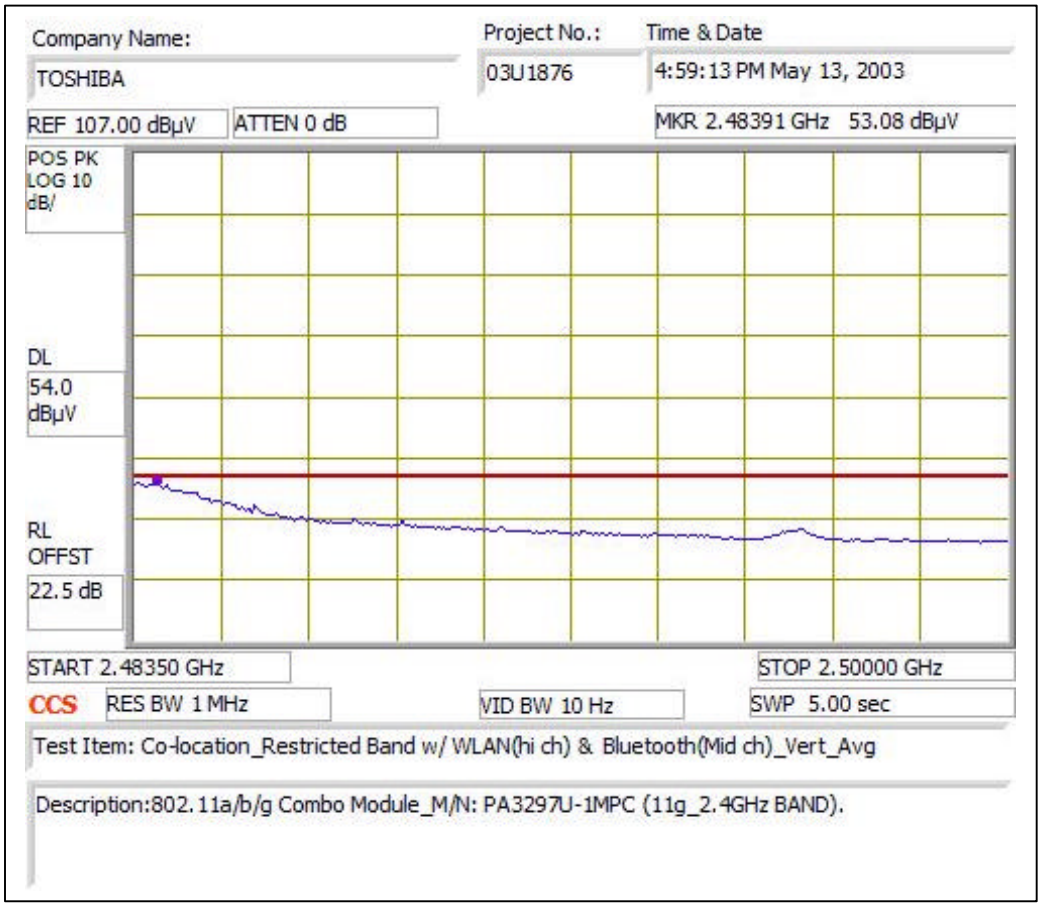
**WORST CASE LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – HORIZONTAL AVERAGE**



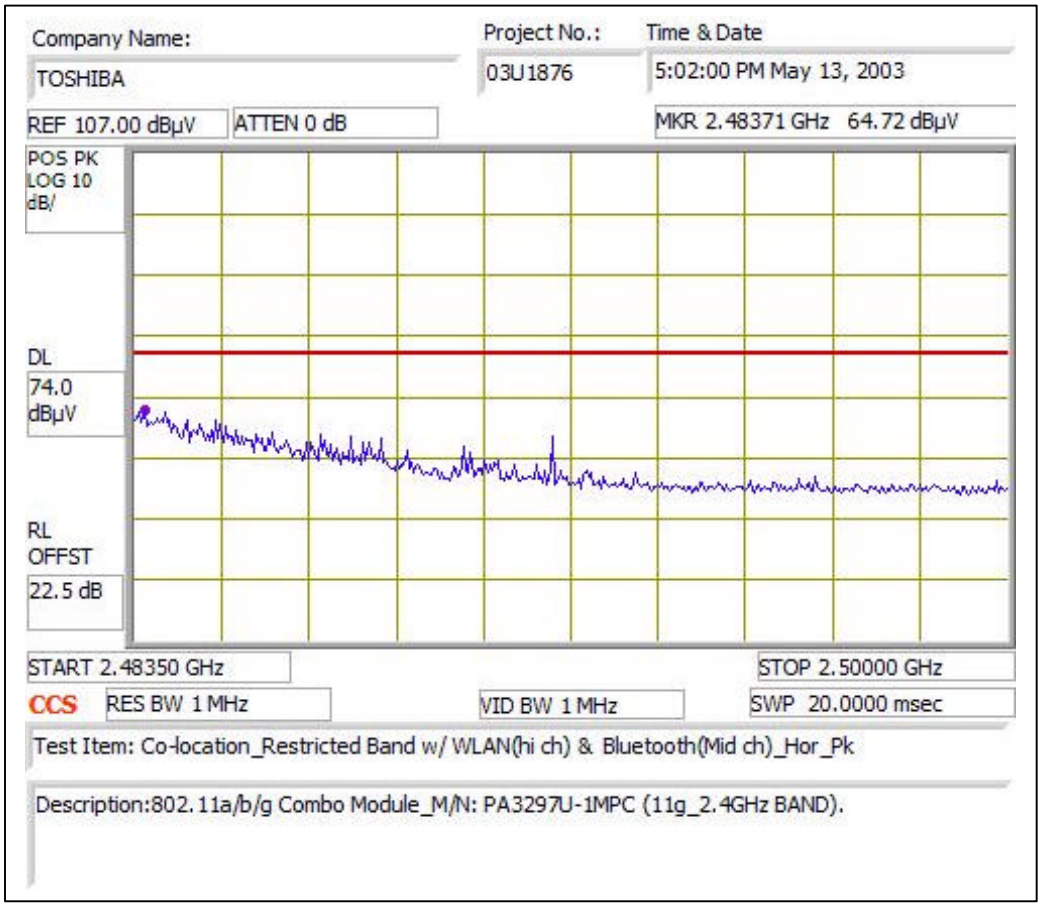
**WORST CASE MIDDLE RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL PEAK**



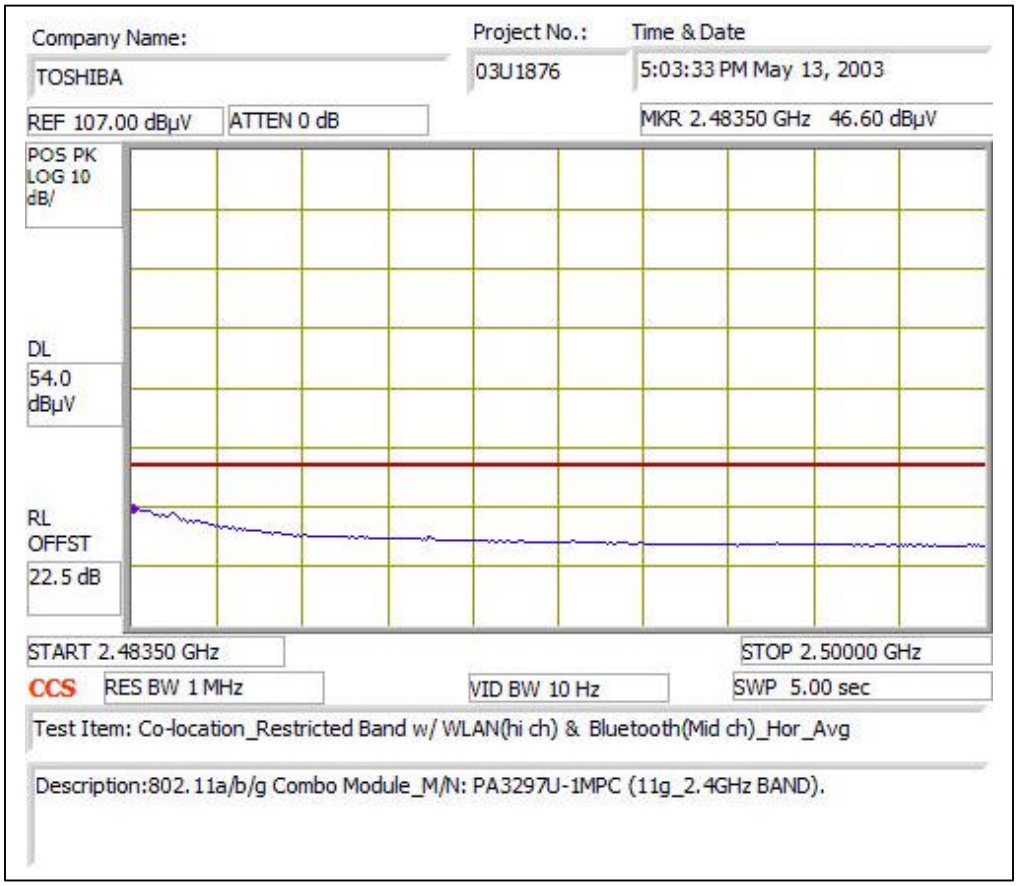
**WORST CASE MIDDLE RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL AVERAGE**



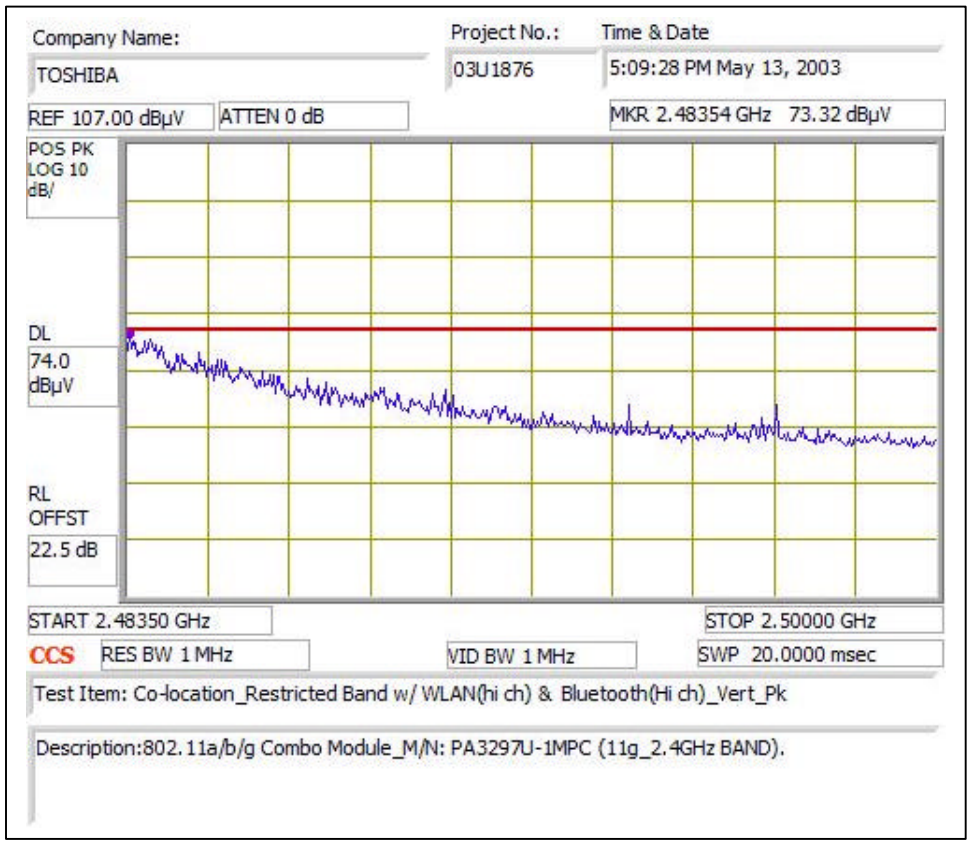
**WORST CASE MIDDLE RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL PEAK**



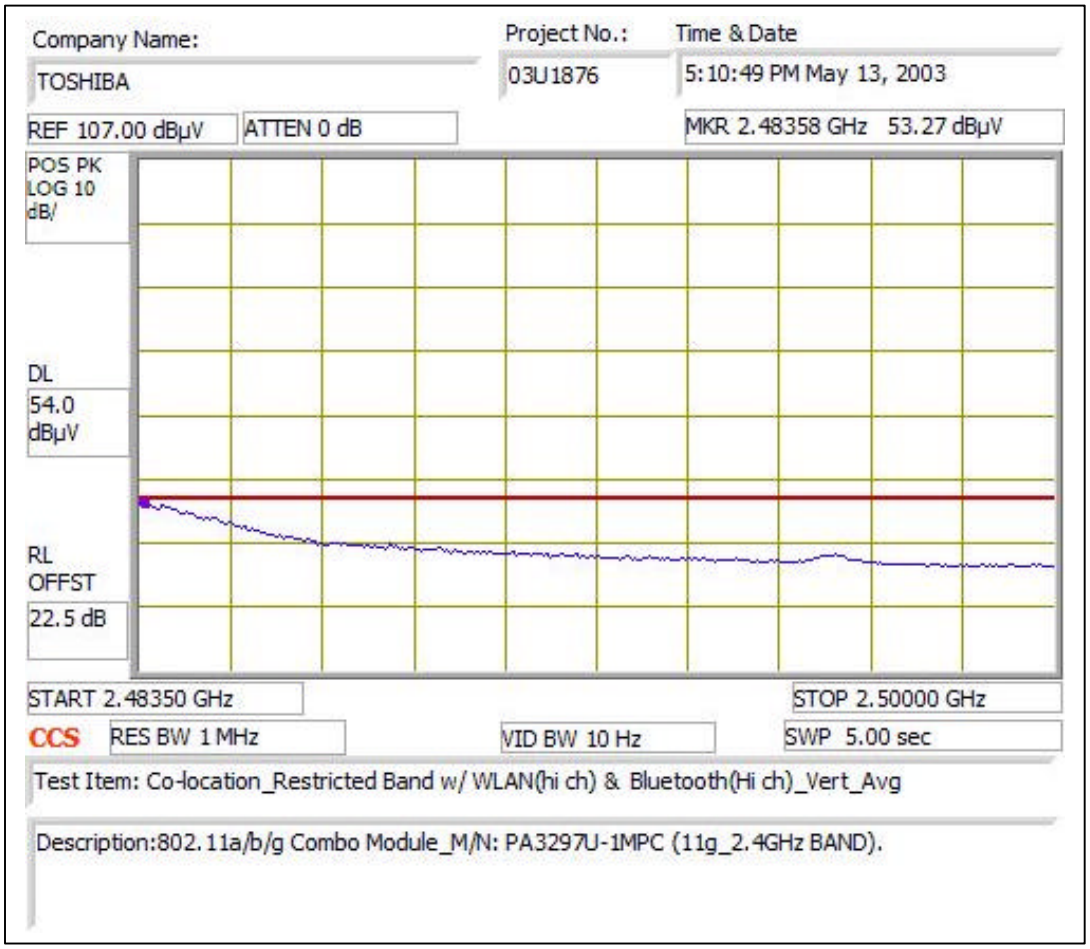
**WORST CASE MIDDLE RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL AVERAGE**



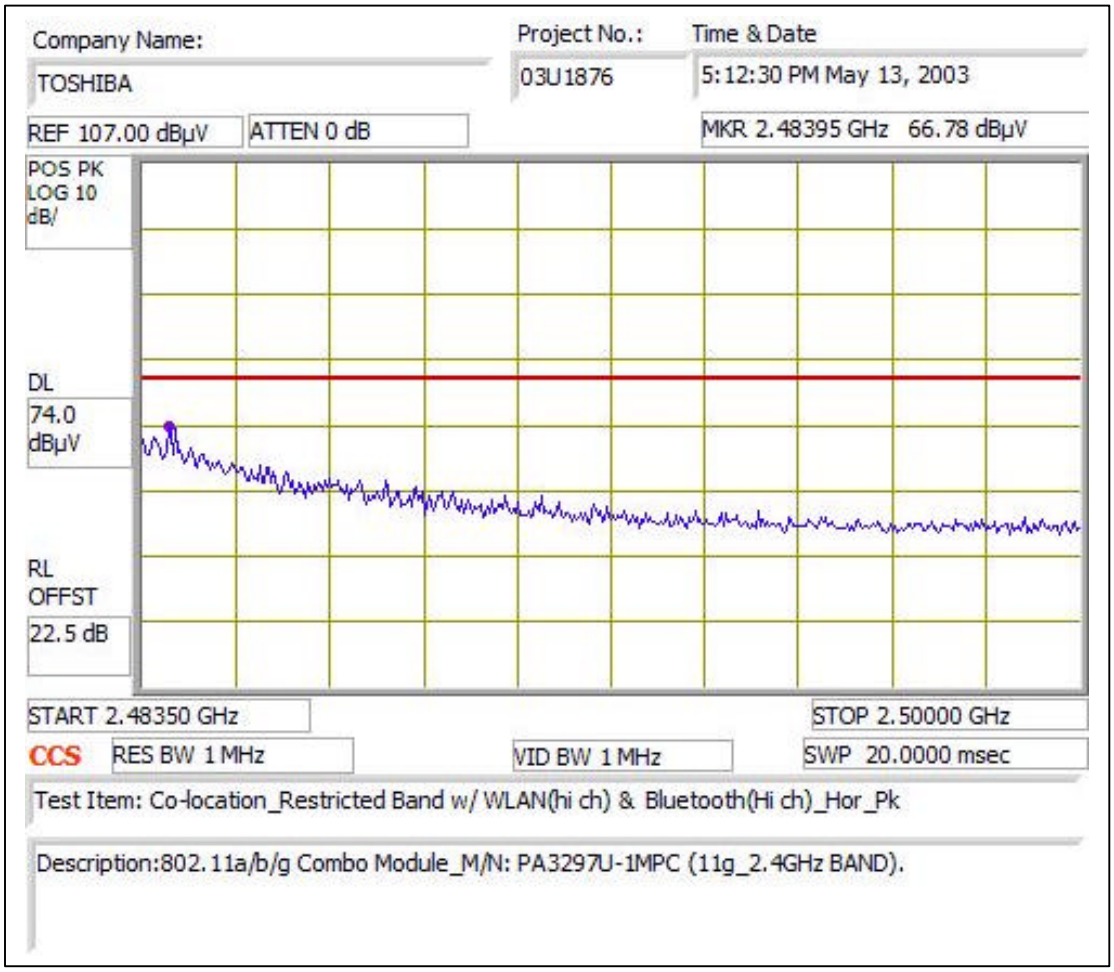
**WORST CASE UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL -- PEAK**



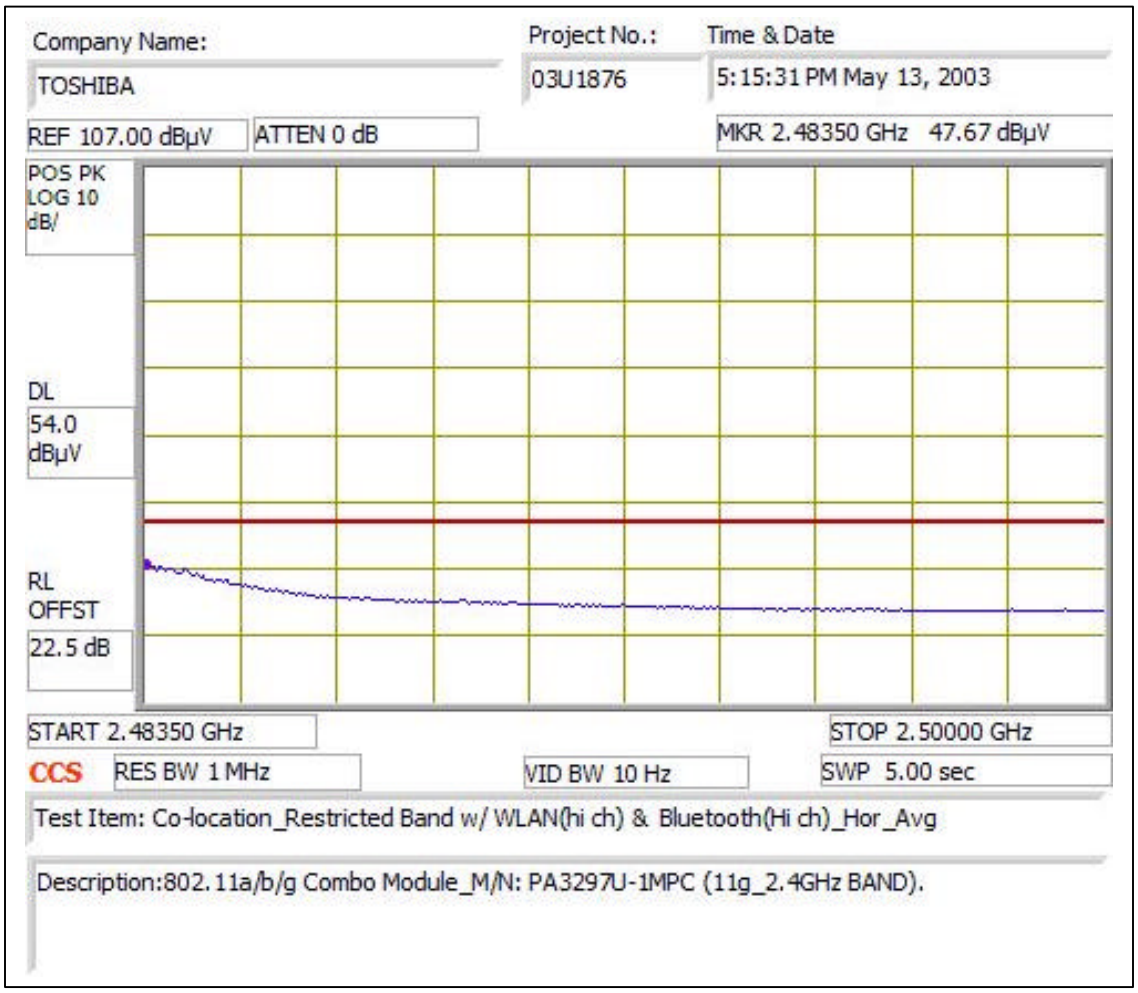
**WORST CASE UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL AVERAGE**



**WORST CASE UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL PEAK**



**WORST CASE UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL AVERAGE**



## WORST CASE HARMONICS AND SPURIOUS WITH CO-LOCATED BLUETOOTH AND WLAN

05/13/03 **High Frequency Measurement**
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr: VIEN TRAN**
**Project #: 03U1867-2**
**Company: TOSHIBA**
**EUT Descrip.: 802.11a/b/g Combo Module**
**EUT M/N: M/N3297U-1MPC**
**Test Target: FCC 15.247 (Co-Location)**
**Mode Oper: Tx at H Channel (Worst case Harmonics and Spurious) _11g Hi channel 2.4GHz**

**Test Equipment:**

| EMCO Horn 1-18GHz | Pre-amplifer 1-26GHz | Spectrum Analyzer | Horn > 18GHz |
|---|---|---|---|
| T73; S/N: 6717 @3m | Miteq NSP2600-44 | 8593EM Analyzer | |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WLAN WORST-CASE CH (2.462GHz) WITH BLUETOOTH LOW CH (2.402GHz) | | | | | | | | | | | | | | | |
| 4.924 | 9.8 | 47.0 | 33.1 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 48.8 | 34.9 | 74.0 | 54.0 | -25.2 | -19.1 | V |
| 7.386 | 9.8 | 46.7 | 32.3 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 51.9 | 37.4 | 74.0 | 54.0 | -22.1 | -16.6 | V |
| 4.924 | 9.8 | 46.1 | 33.4 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 47.9 | 35.2 | 74.0 | 54.0 | -26.1 | -18.8 | H |
| 7.386 | 9.8 | 45.6 | 33.0 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 50.8 | 38.1 | 74.0 | 54.0 | -23.2 | -15.9 | H |
| NO OTHER EMSSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| WLAN WORST-CASE CH (2.462GHz) WITH BLUETOOTH MID CH (2.441GHz) | | | | | | | | | | | | | | | |
| 4.924 | 9.8 | 45.4 | 32.5 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 47.2 | 34.3 | 74.0 | 54.0 | -26.8 | -19.7 | V |
| 7.386 | 9.8 | 46.0 | 32.7 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 51.1 | 37.8 | 74.0 | 54.0 | -22.9 | -16.2 | V |
| 4.924 | 9.8 | 43.2 | 30.7 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 45.0 | 32.5 | 74.0 | 54.0 | -29.0 | -21.5 | H |
| 7.386 | 9.8 | 42.0 | 29.1 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 47.2 | 34.2 | 74.0 | 54.0 | -26.8 | -19.8 | H |
| NO OTHER EMSSION FOUND AFTER 3rd HARMONIC | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| WLAN WORST-CASE CH (2.462GHz) WITH BLUETOOTH HIGH CH (2.480GHz) | | | | | | | | | | | | | | | |
| 4.924 | 9.8 | 45.1 | 32.7 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 46.9 | 34.5 | 74.0 | 54.0 | -27.1 | -19.5 | V |
| 7.386 | 9.8 | 45.9 | 33.1 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 51.1 | 38.2 | 74.0 | 54.0 | -22.9 | -15.8 | V |
| 4.924 | 9.8 | 42.1 | 29.1 | 33.5 | 3.5 | -36.1 | 0.0 | 1.0 | 43.9 | 30.9 | 74.0 | 54.0 | -30.1 | -23.1 | H |
| 7.386 | 9.8 | 43.8 | 32.0 | 36.0 | 4.4 | -36.2 | 0.0 | 1.0 | 48.9 | 37.1 | 74.0 | 54.0 | -25.1 | -16.9 | H |
| NO OTHER EMSSION FOUND 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 | | |

## 7.13. 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 µH/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 frequencies 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 wooden table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane on the floor.

The EUT is set to transmit in a continuous mode.

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**

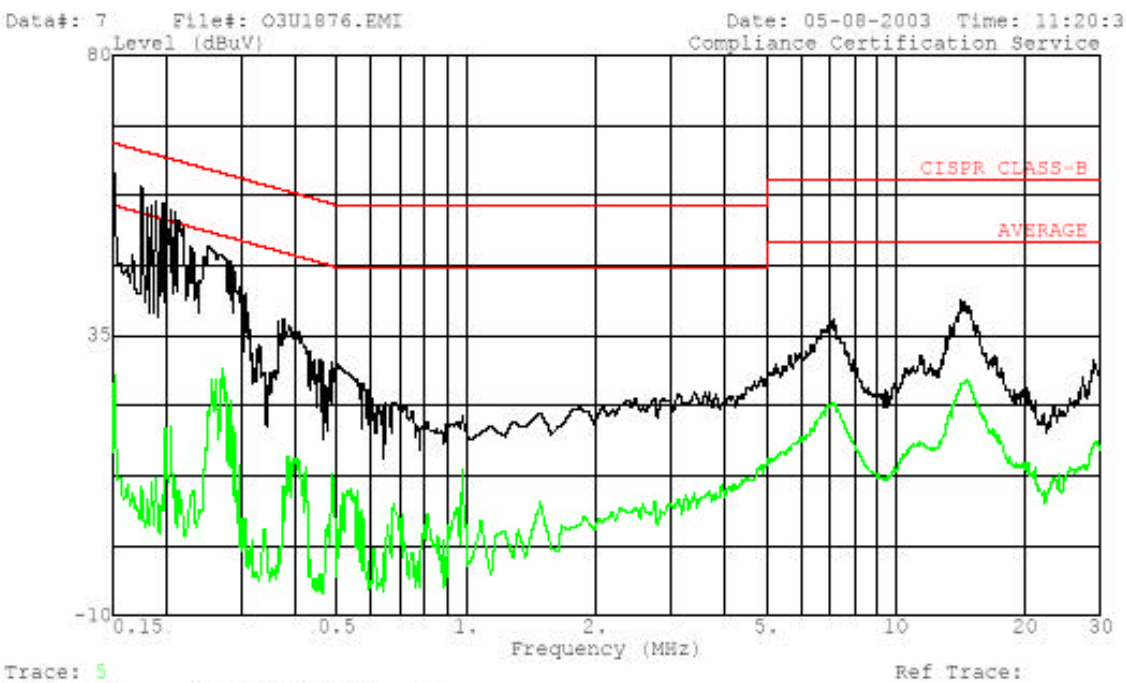
No non-compliance noted:

## AC MAINS LINE CONDUCTED _ FCC

**CONDUCTED EMISSIONS DATA (115VAC 60Hz)**

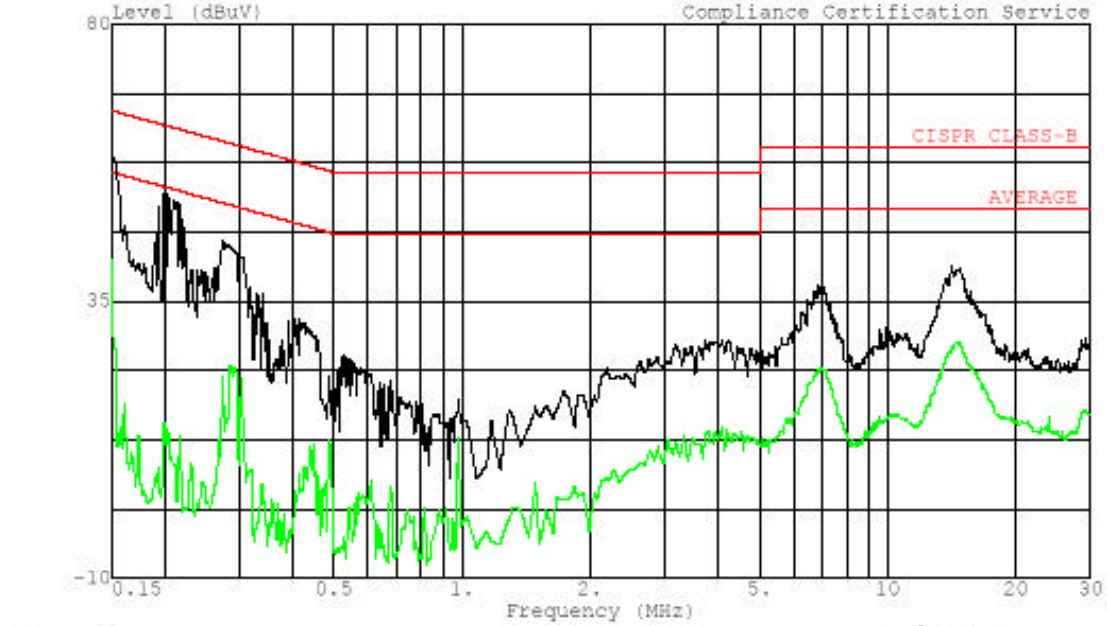
| Freq. | Reading | | | Closs | Limit | EN_B | Margin | | Remark |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB) | QP | AV | QP (dB) | AV (dB) | L1 / L2 |
| 0.15 | 61.18 | -- | 29.00 | 0.00 | 65.94 | 55.94 | -4.76 | -26.94 | L1 |
| 0.26 | 49.27 | -- | 30.77 | 0.00 | 62.86 | 52.86 | -13.59 | -22.09 | L1 |
| 14.36 | 40.20 | -- | 24.80 | 0.00 | 60.00 | 50.00 | -19.80 | -25.20 | L1 |
| 0.15 | 59.34 | -- | 41.70 | 0.00 | 65.94 | 55.94 | -6.60 | -14.24 | L2 |
| 0.26 | 45.26 | -- | 24.45 | 0.00 | 62.86 | 52.86 | -17.60 | -28.41 | L2 |
| 14.36 | 40.98 | -- | 28.39 | 0.00 | 60.00 | 50.00 | -19.02 | -21.61 | L2 |
| 6 Worst Data | | | | | | | | | |

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



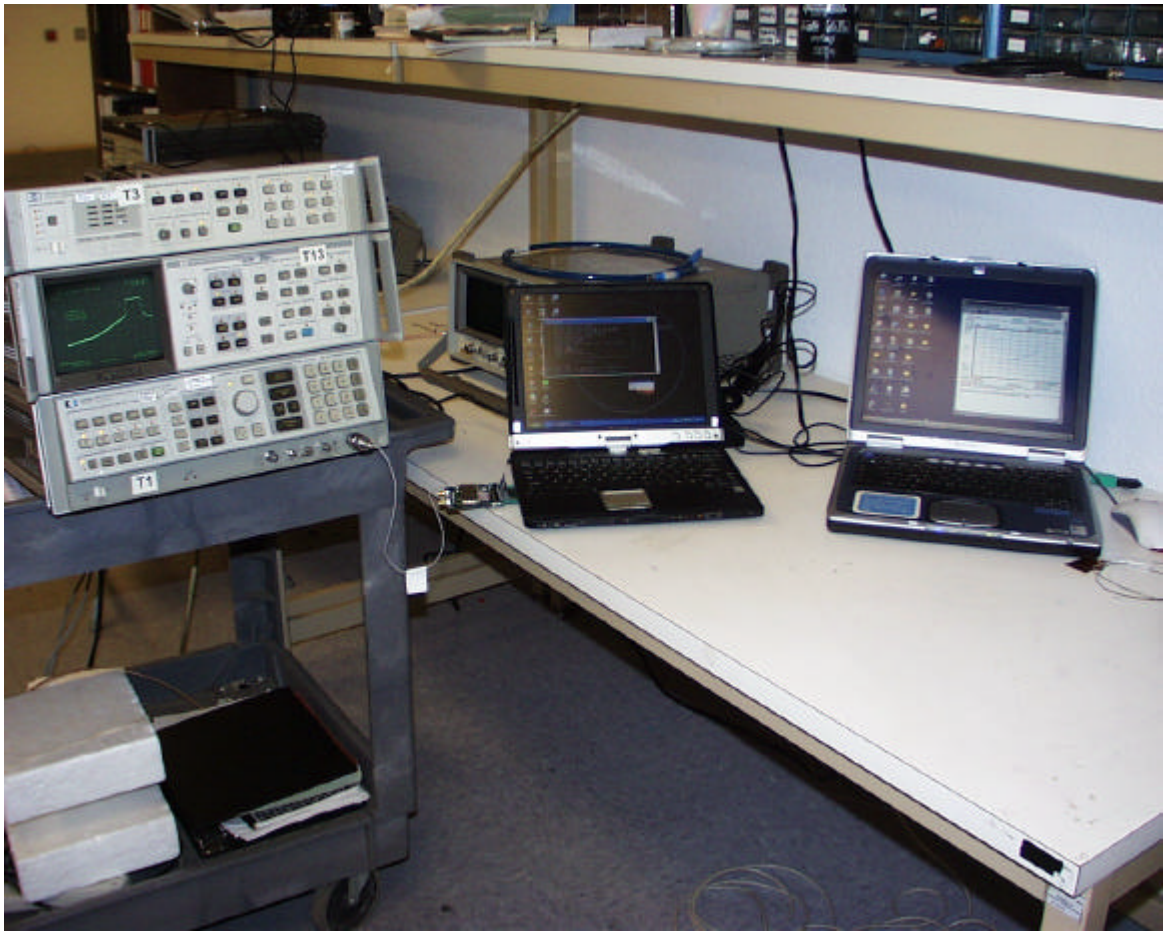

Trace: 5 Ref Trace:
Project # : 03U1876-1,2,3 _ L1
Test Engineer : Vien Tran
Company : Toshiba
EUT : 802.11a/b/g Combo Module
Model : PA3297U-1MPC
Configuration : EUT with external antenna
Target of Test: EN55022 Class B
: L1: Peak (Black), Average (Green)
: 115Vac, 60Hz

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

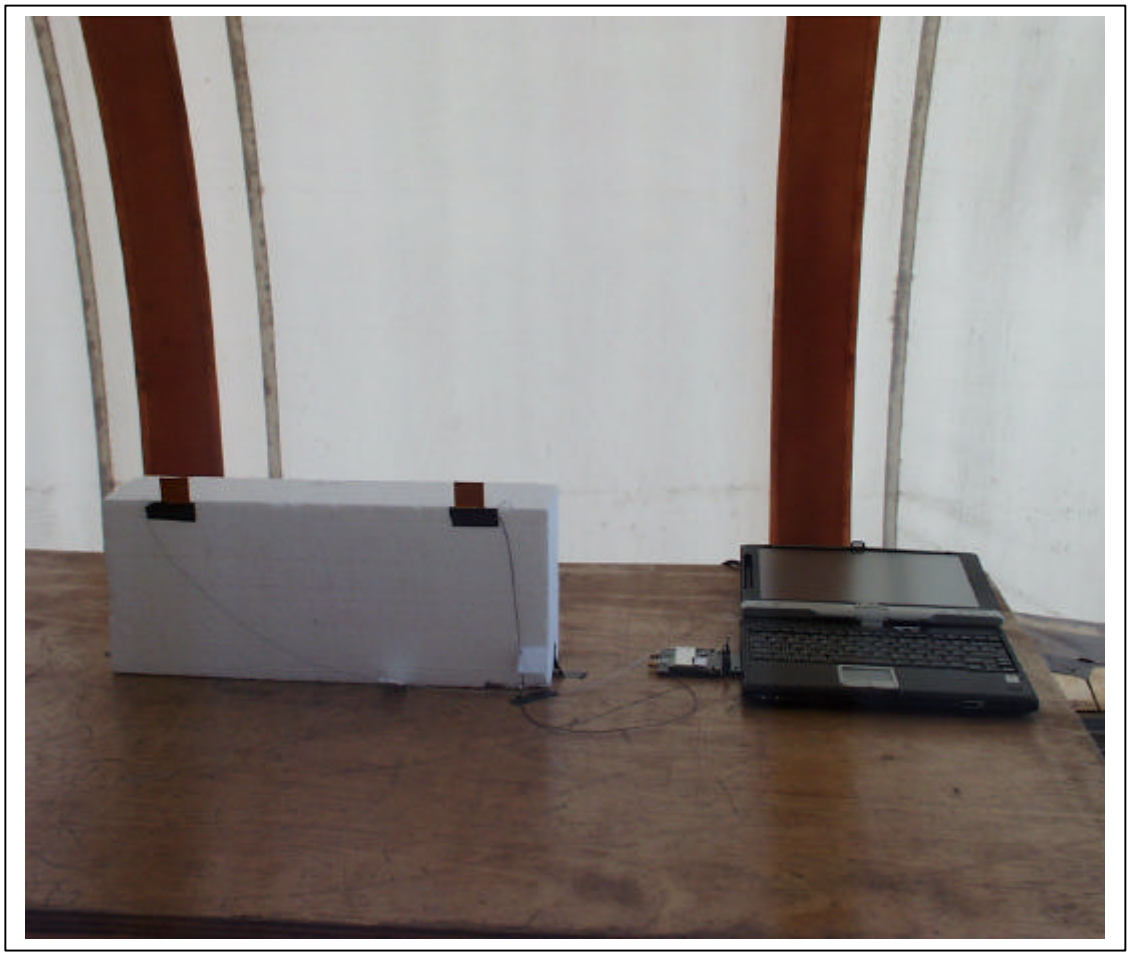


## 8.3. SETUP PHOTOS

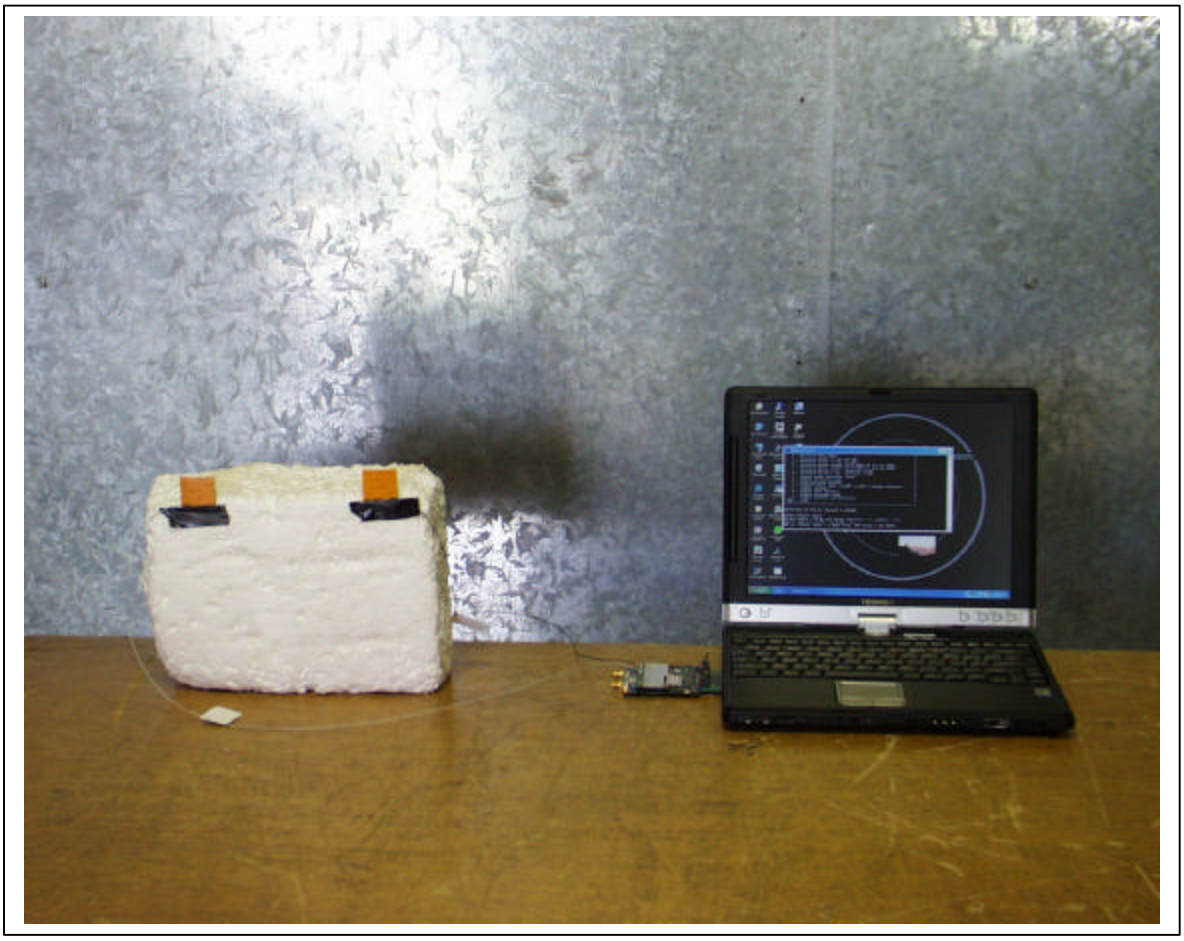
**ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP**



**RADIATED RF MEASUREMENT SETUP**



**POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP**



# END OF REPORT