

FCC PART 15 TEST REPORT

For

AMBIT Microsystems Corporation

4-1, Ming Shen Street, Tu Chen Industrial District.
Tu Chen, Taipei Hsien 236, Taiwan, R.O.C.

FCC ID: MCLT60H677

February 11, 2003

This Report Concerns: ☒ Original Report	Equipment Type: MiniPCI 802.11a/b Combo Module
Test Engineer: Benjamin Jing	
Report No.: R0301172	
Test Date: January 27, 2003	
Reviewed By: Hans Mellberg	
Prepared By: Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164	

Note: This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

1 - GENERAL INFORMATION.....	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
1.2 OBJECTIVE	4
1.3 RELATED SUBMITTAL(S)/GRANT(S).....	4
1.4 TEST METHODOLOGY	4
1.5 TEST FACILITY	4
1.6 TEST EQUIPMENT LIST	5
1.7 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS.....	5
1.8 EXTERNAL I/O CABLING LIST AND DETAILS.....	5
2 - SYSTEM TEST CONFIGURATION.....	6
2.1 JUSTIFICATION	6
2.2 EUT EXERCISE SOFTWARE.....	6
2.3 SPECIAL ACCESSORIES.....	6
2.4 SCHEMATICS / BLOCK DIAGRAM	6
2.5 EQUIPMENT MODIFICATIONS.....	6
2.6 CONFIGURATION OF TEST SYSTEM.....	7
2.7 TEST SETUP BLOCK DIAGRAM.....	7
3 - SUMMARY OF TEST RESULTS	8
4 - PEAK OUTPUT POWER MEASUREMENT.....	9
4.1 STANDARD APPLICABLE.....	9
4.2 MEASUREMENT PROCEDURE	9
4.3 MEASUREMENT RESULT	9
5 – 6 DB BANDWIDTH AND 26 DB BANDWIDTH.....	16
5.1 STANDARD APPLICABLE.....	16
5.2 MEASUREMENT PROCEDURE	16
5.3 MEASUREMENT RESULT	16
6 - POWER SPECTRAL DENSITY.....	21
6.1 STANDARD APPLICABLE.....	21
6.2 MEASUREMENT PROCEDURE	21
6.3 MEASUREMENT RESULTS.....	21
7 - 100 KHZ BANDWIDTH OF BAND EDGES.....	27
7.1 STANDARD APPLICABLE.....	27
7.2 MEASUREMENT PROCEDURE	27
7.3 MEASURE RESULTS.....	27
8 - PEAK EXCURSION TO AVERAGE RATIO	29
8.1 STANDARD APPLICABLE.....	29
8.2 TEST PROCEDURE	29
8.3 TEST RESULT FOR 15.407	29
9 - OUT OF BAND EMISSION FOR 15.407.....	33
9.1 STANDARD APPLICABLE.....	33
9.2 TEST PROCEDURE	33
9.3 TEST RESULT	33
10 - SPURIOUS EMISSION.....	37
10.1 STANDARD APPLICABLE.....	37
10.2 MEASUREMENT PROCEDURE	37
10.3 MEASUREMENT RESULT	37
11 - ANTENNA REQUIREMENT.....	41
11.1 STANDARD APPLICABLE.....	41
11.2 ANTENNA CONNECTED CONSTRUCTION.....	41

12 - SPURIOUS RADIATED EMISSION	41
12.1 MEASUREMENT UNCERTAINTY.....	42
12.2 EUT SETUP	43
12.3 SPECTRUM ANALYZER SETUP	43
12.4 TEST PROCEDURE	44
12.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	44
12.6 SUMMARY OF TEST RESULTS.....	45
13 - CONDUCTED EMISSIONS	65
13.1 MEASUREMENT UNCERTAINTY.....	65
13.2 EUT SETUP	65
13.3 SPECTRUM ANALYZER SETUP	65
13.4 TEST PROCEDURE	65
13.5 SUMMARY OF TEST RESULTS.....	66
13.6 CONDUCTED EMISSIONS TEST DATA	66
13.7 PLOT OF CONDUCTED EMISSIONS TEST DATA.....	66
14 - DISCONTINUE TRANSMITTING WITH ABSENCE OF DATA OR OPERATIONAL FAILURE.....	67
15 - FREQUENCY STABILITY.....	68
16.1 STANDARD APPLICABLE	68
16.2 MEASUREMENT RESULT	68

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *AMBIT Microsystems Corporation's*, model: *T60H677*, or the "EUT" as referred to in this report MiniPCI 802.11a/b Combo Module which measures approximately 2.4"L x 1.7"W x 0.1"H.

** The test data gathered is from typical production samples provided by the manufacturer.*

1.2 Objective

This type approval report is prepared on behalf of. *AMBIT Microsystems Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A , C, and E of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth and 26 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Out of Band Emission, Spurious Emission, Conducted and Spurious Radiated Emission, Discontinue Transmitting with Absence of Data or Operational Failure, Peak Excursion to Average Ratio and Frequency Stability.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method – 47 CFR Part – Digital Devices, CISPER 22: 1997: Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment test methods.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/03
HP	Spectrum Analyzer	8593B	2919A00242	12/20/03
HP	Amplifier	8349B	2644A02662	12/20/03
HP	Quasi-Peak Adapter	85650A	917059	12/6/03
HP	Amplifier	8447E	1937A01046	12/6/03
A.H. System	Horn Antenna	SAS0200/571	261	12/27/03
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/03
Com-Power	Biconical Antenna	AB-100	14012	11/2/03
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/03
Com-Power	LISN	LI-200	12208	12/20/03
Com-Power	LISN	LI-200	12005	12/20/03
BACL	Data Entry Software	DES1	0001	12/20/03

*** Statement of Traceability:** Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using suitable standards traceable to the NIST.

1.7 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
ACER	Notebook PC	SKU-4	N/A	DoC
HP	Printer	2225C	2821S14783	DOC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Printer Cable	2.0	Parallel Port/Notebook PC	Printer

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing in a typical fashion (as normally used by a typical user).

The EUT was tested in the normal (native) operating mode to represent *worst-case* results during the final qualification test.

2.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components in a manner similar to a typical use. The test software, provided by the customer, is started the Windows terminal program under the Windows 98/2000/ME/XP operating system.

Once loaded, set the Tx channel to low, mid and high for testing.

2.3 Special Accessories

As shown in section 2.7, all interface cables used for compliance testing are shielded. The host PC and the peripherals featured shielded metal connectors.

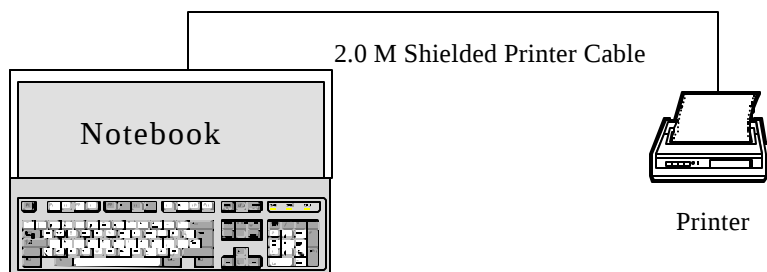
2.4 Schematics / Block Diagram

Please refer to Appendix A.

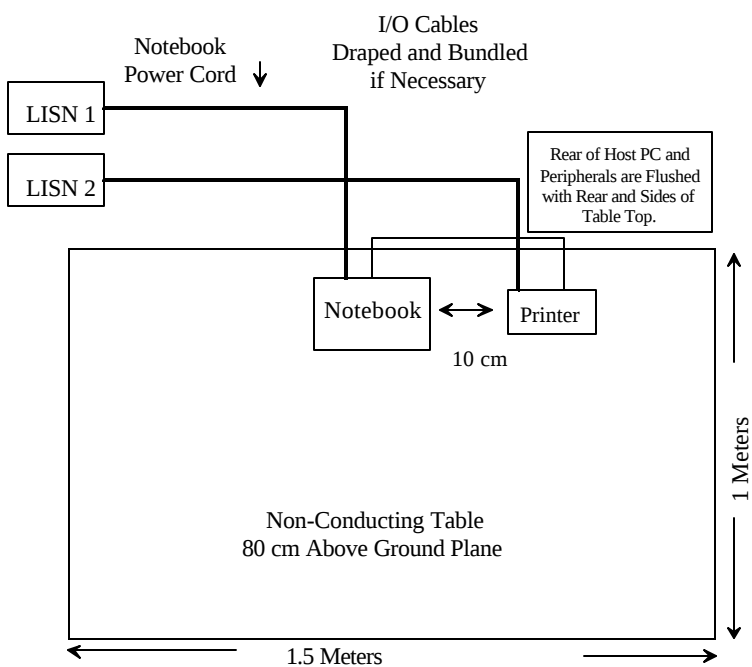
2.5 Equipment Modifications

No modifications were made by BACL to ensure the EUT to comply with the applicable limits and requirements.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	REFERENCE
§ 15.203	Antenna Requirement	Compliant	Section 11
§ 15.205, § 15.407 (b)(6)	Restricted Bands	Compliant	Section 12
§ 15.209 (a), § 15.407 (b)(5)	Radiated Emission	Compliant	Section 12
§ 15.209 (f)	Spurious Emission	Compliant	Section 10
§ 15.247 (a)(2)	6 dB Bandwidth	Compliant	Section 5
§ 15.247 (b)(1), § 15.407(a)(2)	Maximum Peak Output Power	Compliant	Section 4
§ 15.247(b)(4), § 15.407 (f)	RF Exposure Requirement	Compliant	Section 14
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant	Section 7
§ 15.247 (d)	Peak Power Spectral Density	Compliant	Section 6
§ 15.207 (a)	For an intentional radiator which 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 frequency within the band 450 kHz to 30 MHz shall not exceed 250 micromvolts.	Compliant	Section 13
§ 15.407 (a)(2)	The peak power spectral density shall not exceed 11dBm in any 1 MHz band	Compliant	Section 6
§ 15.407 (a)(6)	The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.	Compliant	Section 8
§ 15.407 (c)	The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the user of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application a description of how this requirement is met.	Compliant	See Provided Technical Manual
§ 15.407 (g)	The responsibility for manufacturer to ensure U-NII device frequency stability	Compliant	Section 16

4 - PEAK OUTPUT POWER MEASUREMENT

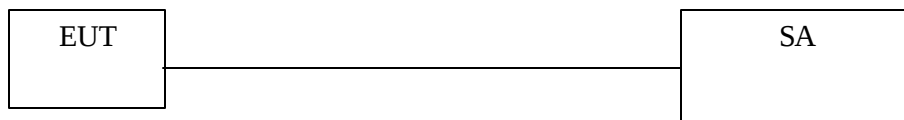
4.1 Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt.

According to §15.407(b) (3), for the band 5.725~5.825 GHz, all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

4.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.



4.3 Measurement Result

4.3.1 RF Output Power (15.247) for 802.11b

Port	Channel	Frequency (MHz)	Output Power (dBm)	Correction Factor (dB)	Corrected Output Power (dBm)	Corrected Output Power (mW)	Standard (W)	Result
J1	Low	2412	9.5	7.2	16.7	46.8	≤ 1W	Compliant
	Mid	2437	9.17	7.2	16.37	43.4	≤ 1W	Compliant
	High	3462	8.67	7.2	15.87	38.6	≤ 1W	Compliant
J2	Low	2412	-9.00	7.2	-1.8	0.66	≤ 1W	Compliant
	Mid	2437	-13.50	7.2	-6.3	0.23	≤ 1W	Compliant
	High	2462	-14.17	7.2	-6.9	0.21	≤ 1W	Compliant

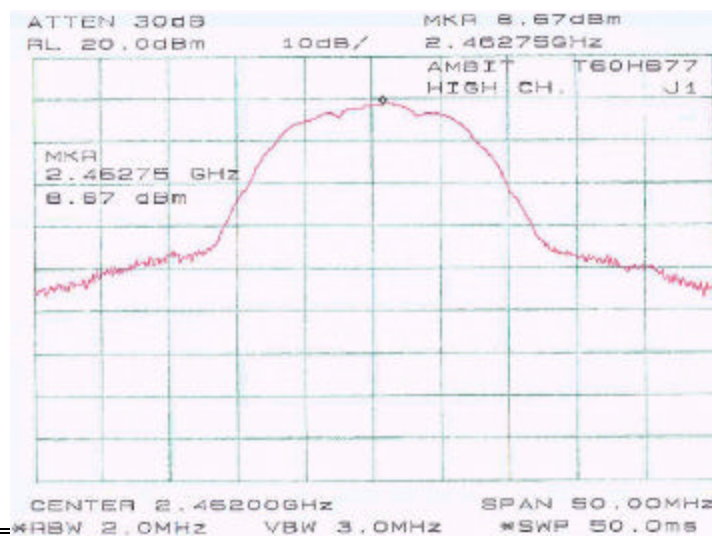
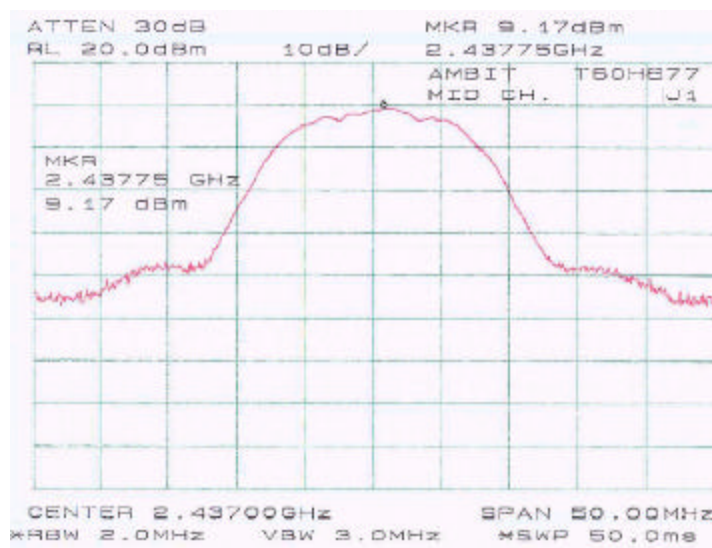
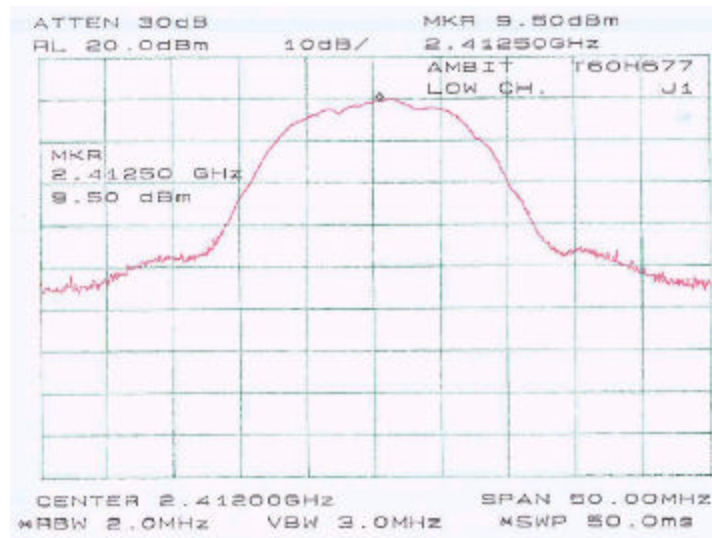
Note: Correction Factor = $10\log(\text{BW}_{6\text{dB}}/\text{RBW}) = 10\log(10.5/2) = 7.2\text{dB}$

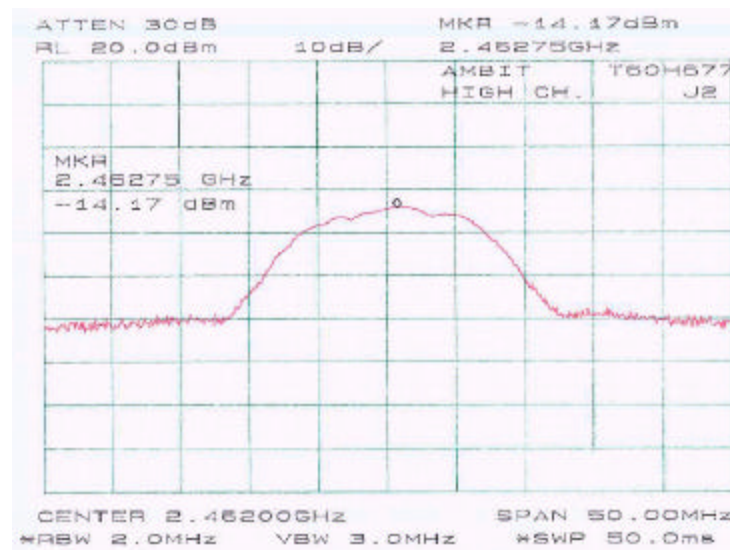
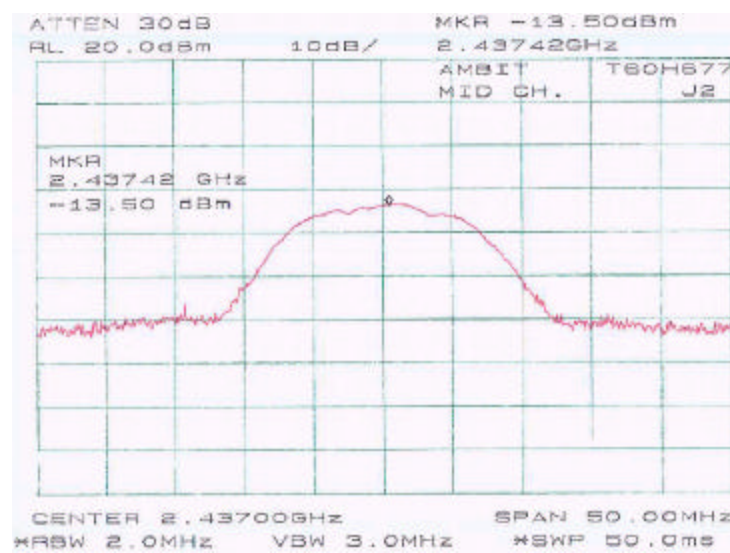
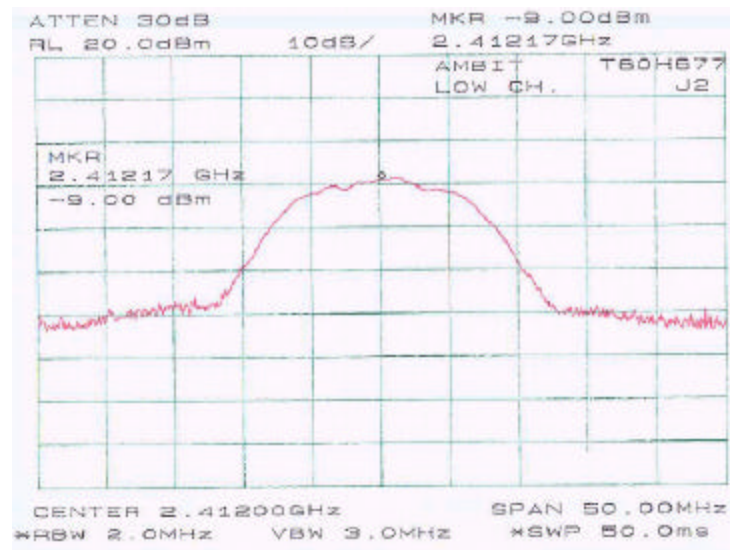
4.3.2 RF Output Power (15.407) for 802.11a

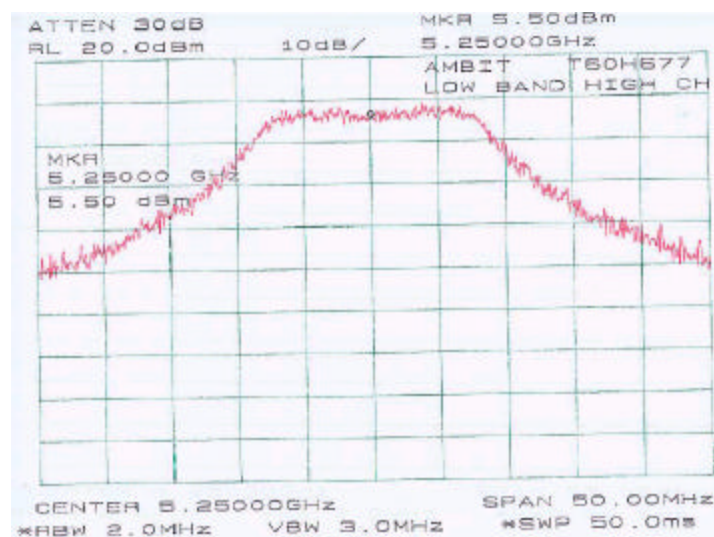
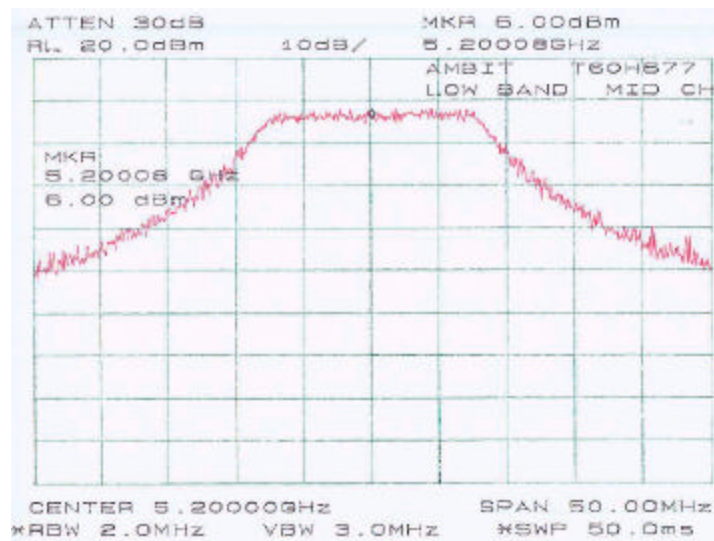
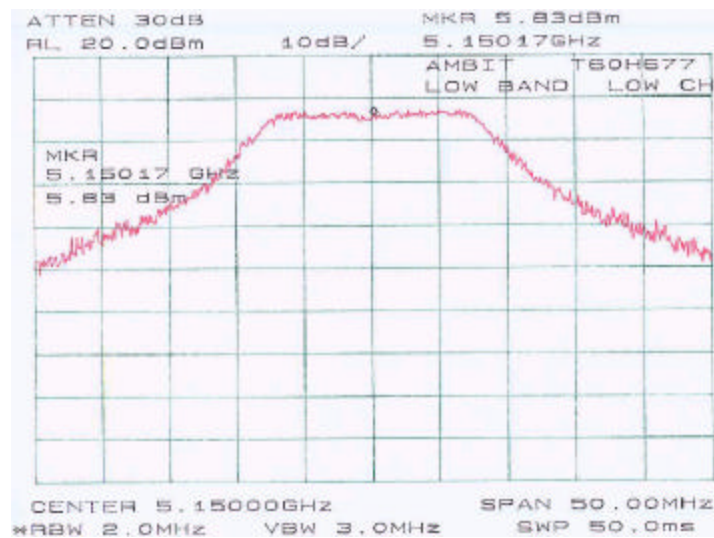
Band	Channel (MHz)	Frequency (MHz)	Output Power (dBm)	Correction Factor (dB)	Corrected Output Power (dBm)	Output Power (mW)	Standard (mW)	Result
Low	Low	5150	5.83	10.7	16.53	44.9	<50	Compliant
	Mid	5200	6	10.7	16.7	46.8	<50	Compliant
	High	5250	5.5	10.7	16.2	41.7	<50	Compliant
Mid	Low	5250	5.5	10.7	16.2	41.7	<50	Compliant
	Mid	5300	5.33	10.7	16.03	40.1	<50	Compliant
	High	5330	5.83	10.7	16.53	44.9	<50	Compliant
High	Low	5745	5.33	10.7	16.03	40.1	<50	Compliant
	Mid	5775	5.67	10.7	16.37	43.4	<50	Compliant
	High	5810	5.83	10.7	16.53	44.9	<50	Compliant

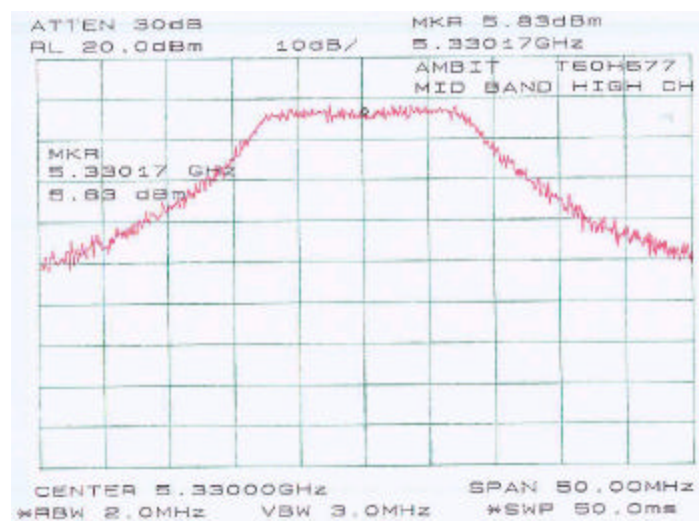
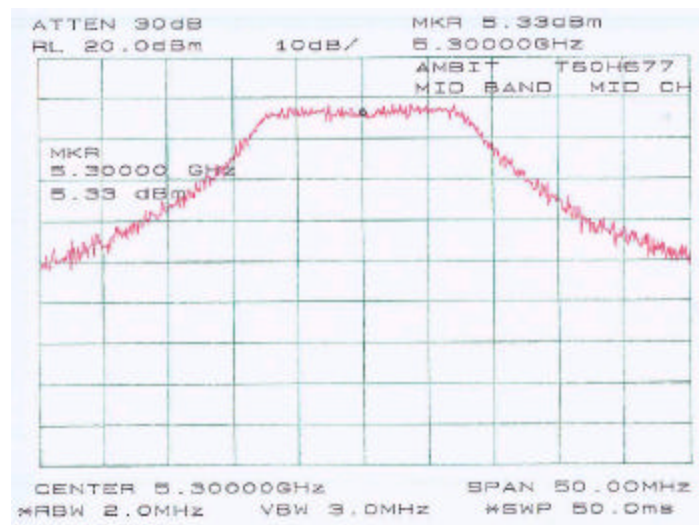
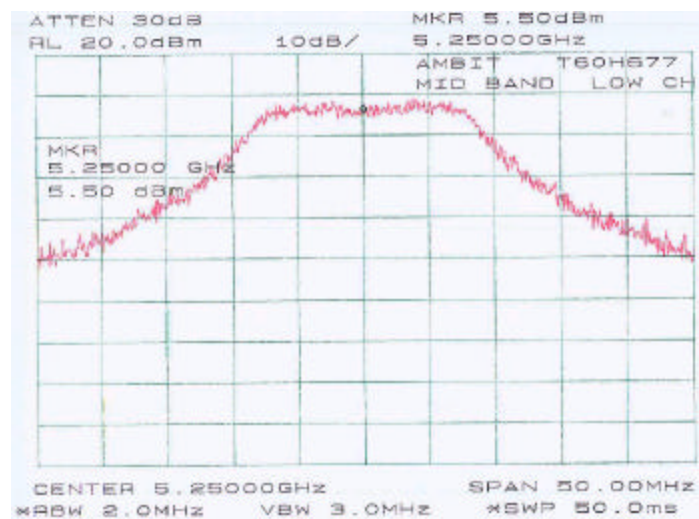
Note: Correction Factor = $10\log(\text{BW}26\text{dB}/\text{RBW}) = 10\log(23.83/2) = 10.7\text{dB}$

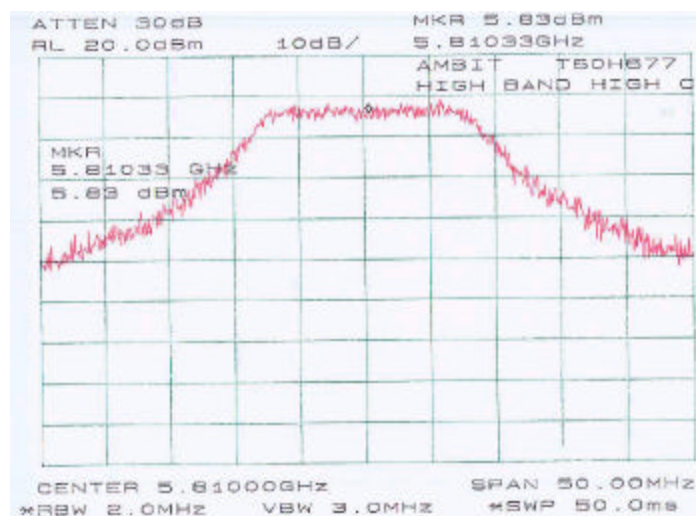
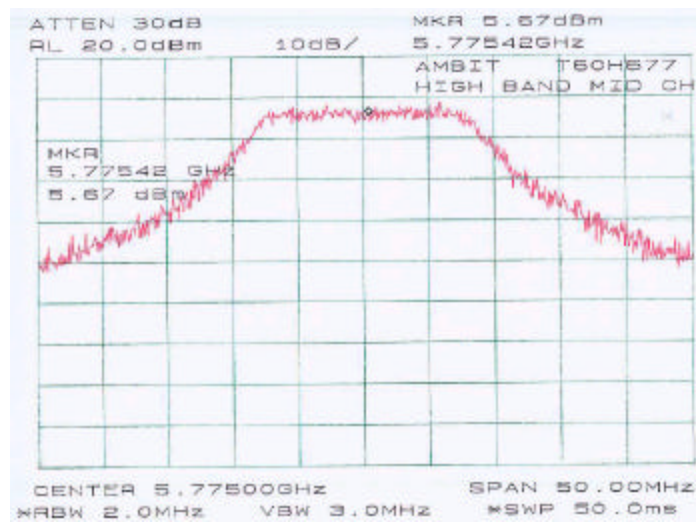
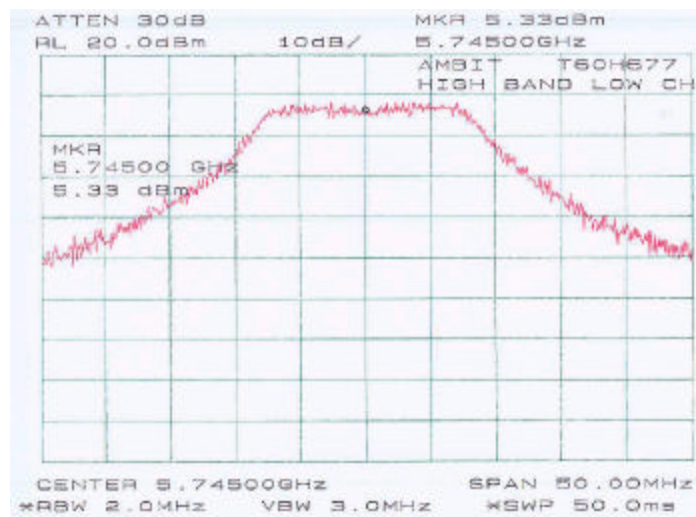
Test mode: target power = 15.0, ext pw detector = 1, xpdgain = 6, ob = 1, db = 2, b-ob = 1











5 – 6 DB BANDWIDTH and 26 DB BANDWIDTH

5.1 Standard Applicable

According to §15.247(a)(2), for direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz. According to §15.407, 26dB Bandwidth should be shown.

5.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth. (6 dB bandwidth for DSSS)
4. Same as (3) expect 26 dB. (26dB bandwidth for UNII)
5. Repeat above procedures until all frequencies measured were complete.

5.3 Measurement Result

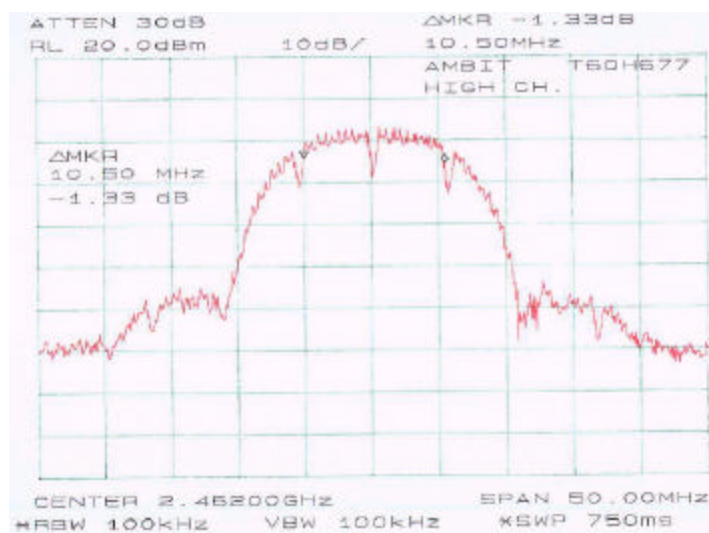
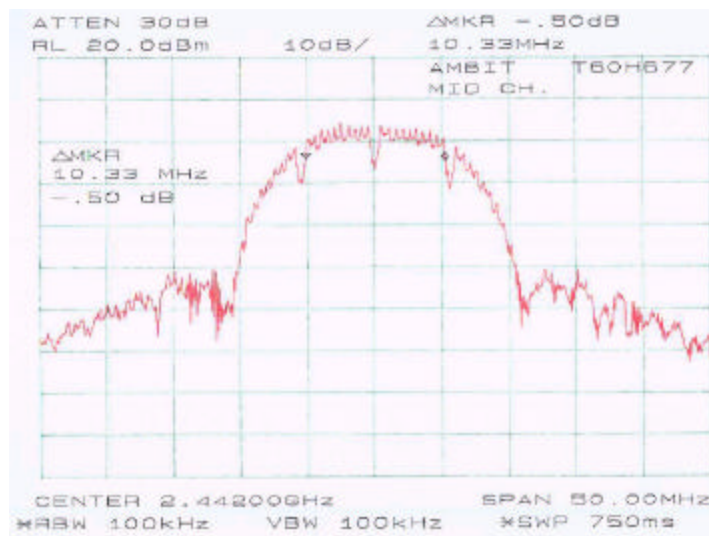
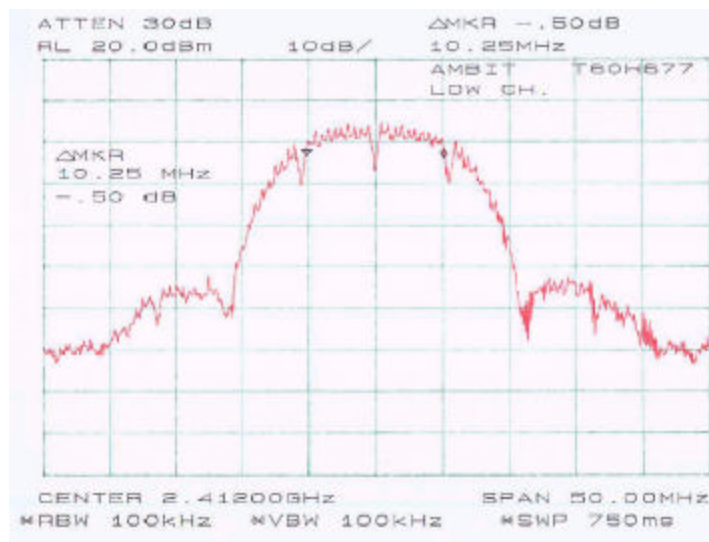
5.3.1 Test Result for 5736 ~ 5836 MHz Band (15.247)

Frequency	Measured	Standard (kHz)	Result
Low	10.25 MHz	≥ 500	Compliant
Mid	10.33 MHz	≥ 500	Compliant
High	10.50 MHz	≥ 500	Compliant

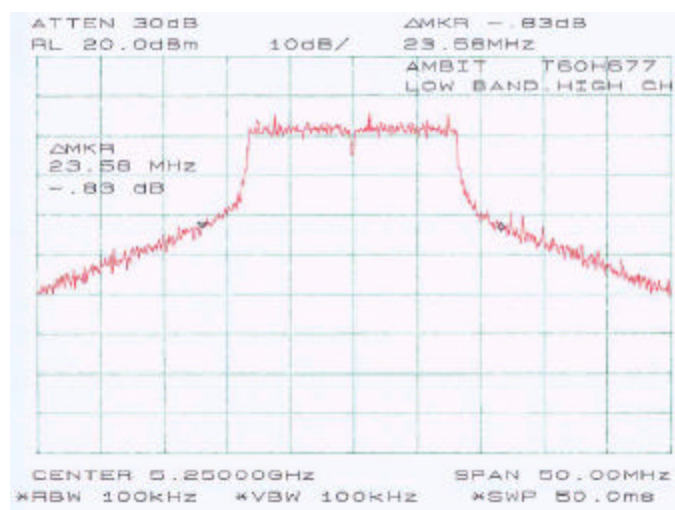
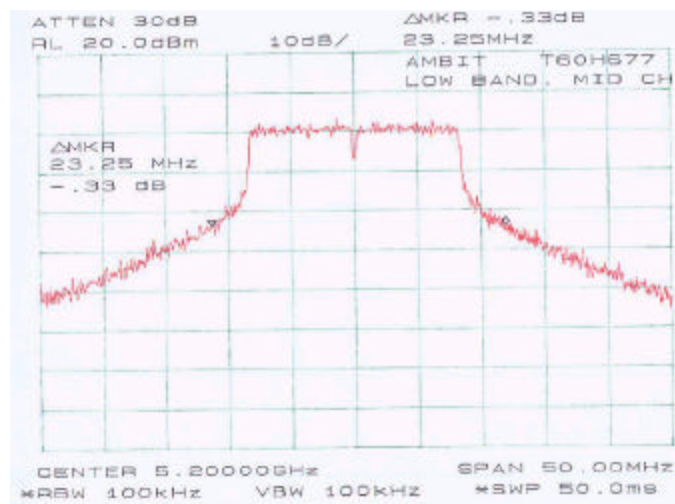
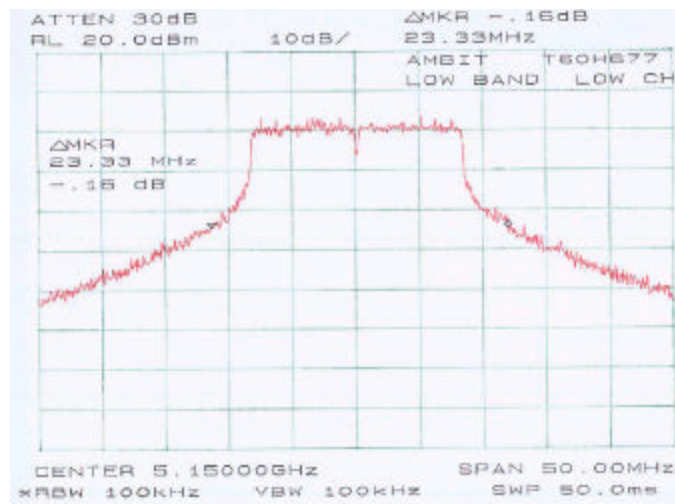
5.3.2 Test Result for 5260 ~ 5340 MHz Band (15.407)

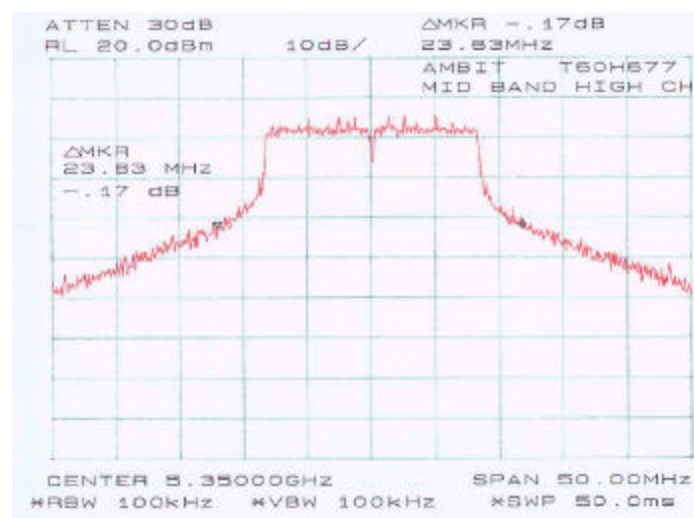
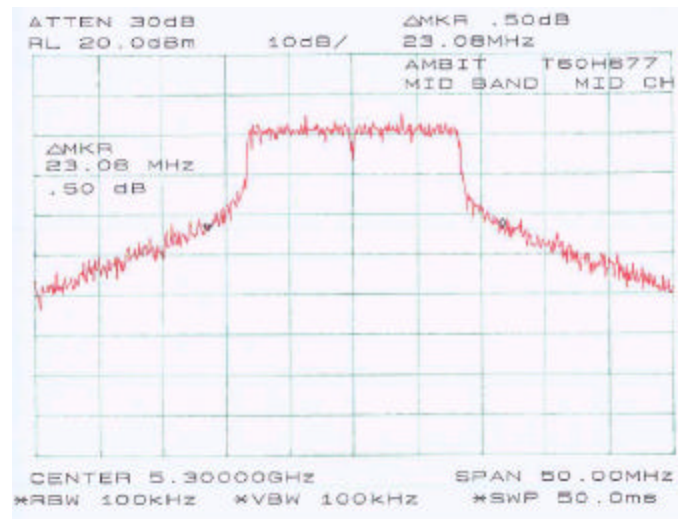
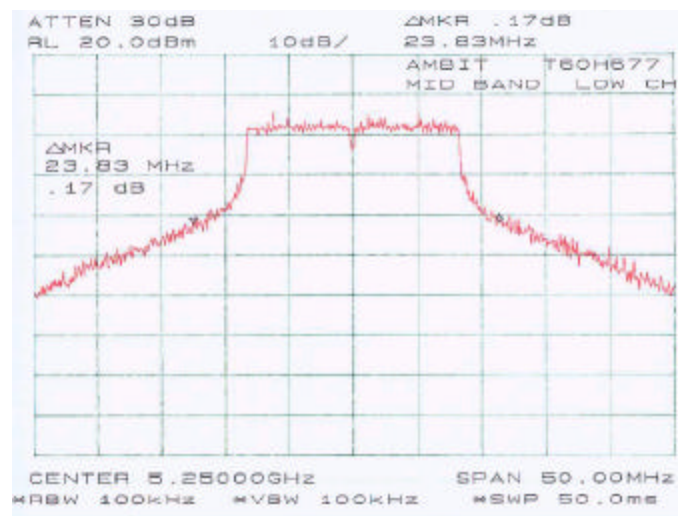
Band	Channel	Measured (MHz)
Low	Low	23.33
	Mid	23.25
	High	23.58
Mid	Low	23.83
	Mid	23.08
	High	23.83
High	Low	23.00
	Mid	23.75
	High	23.50

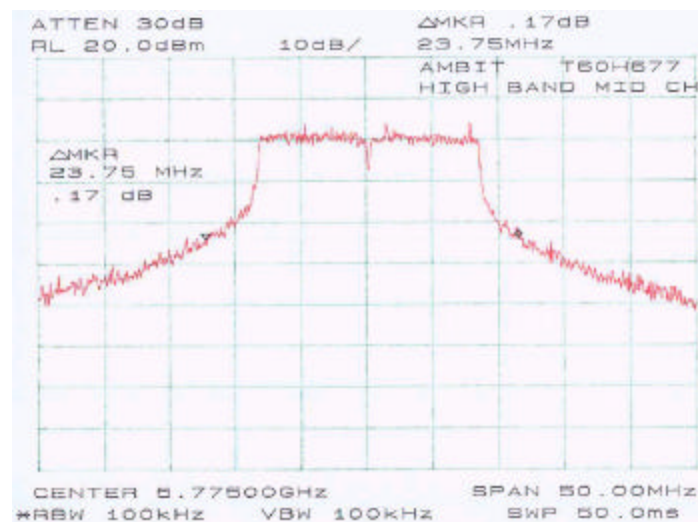
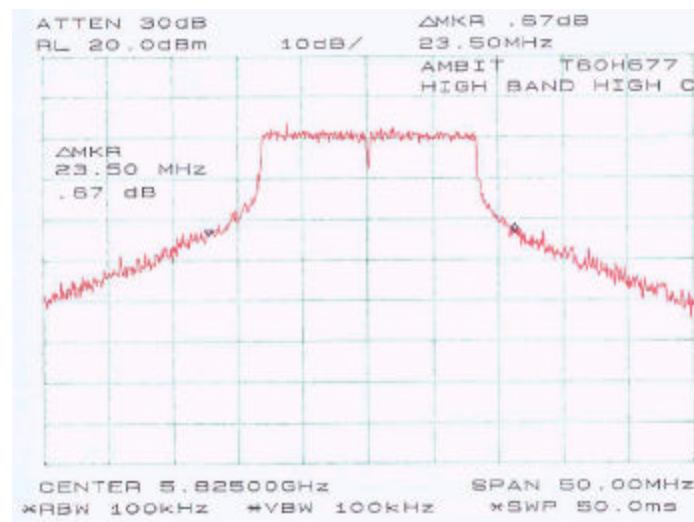
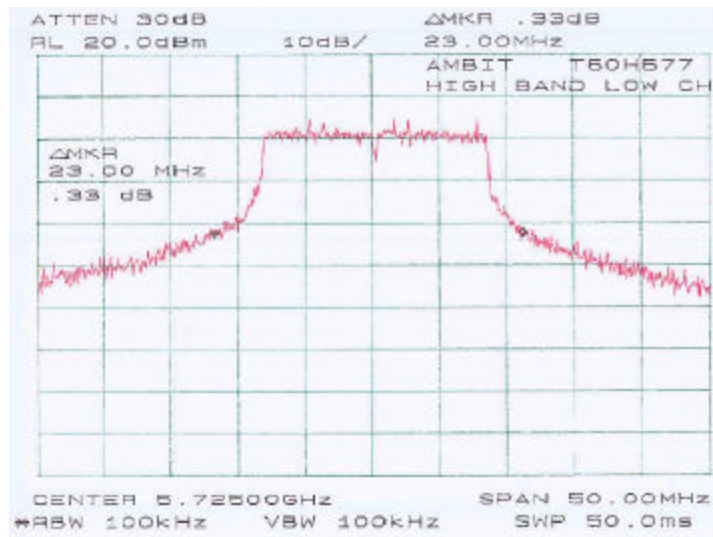
Plots of 6dB Band Width (15.247)



Plots of Band Width (15.407)







6 - POWER SPECTRAL DENSITY

6.1 Standard Applicable

According to §15.247 (d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.407(a) (2), the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

6.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 6MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DSSS)
4. Adjust the center frequency of SA on any frequency be measured and set SA to 50MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (UNII)
5. Repeat above procedures until all frequencies measured were complete.

6.3 Measurement Results

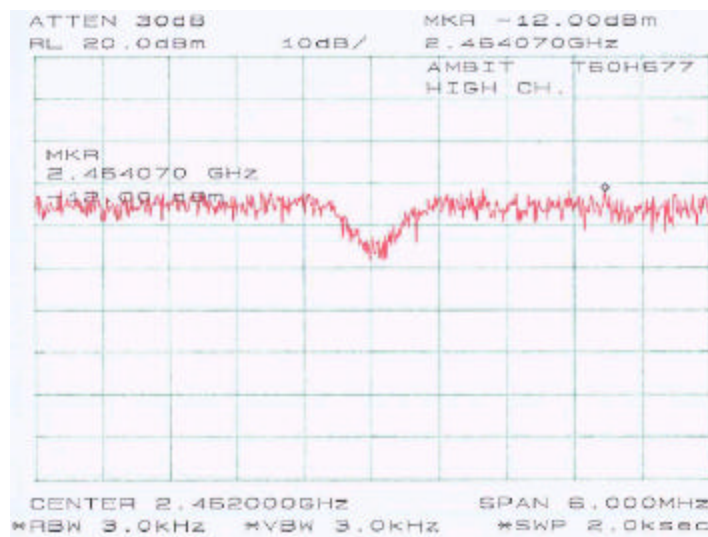
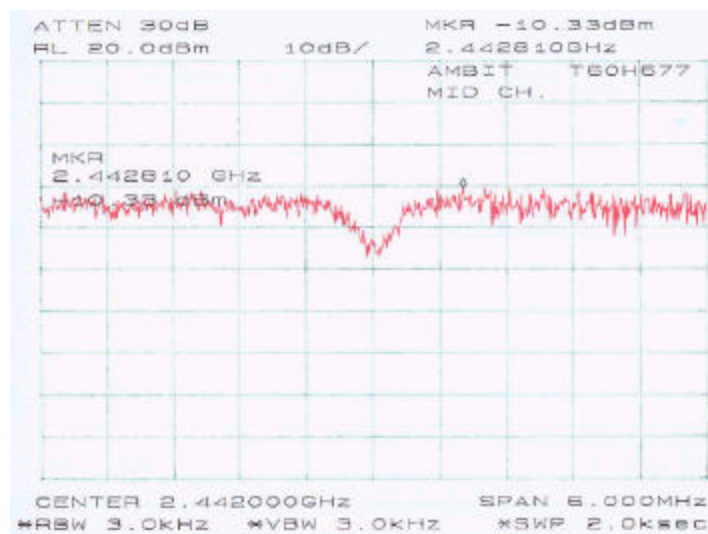
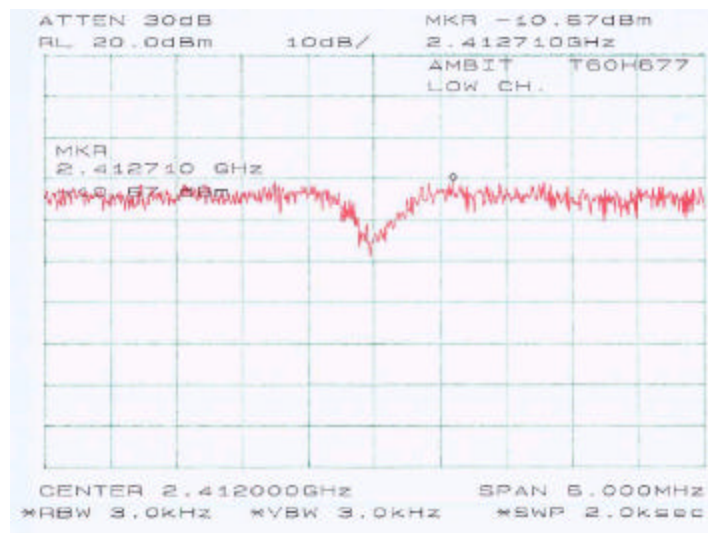
6.3.1 Test Result (15.247)

Frequency	Peak Power Spectral Density (dBm)	Standard (dBm)	Result
Low	-10.67	≤ 8	Compliant
Mid	-10.33	≤ 8	Compliant
High	-12.00	≤ 8	Compliant

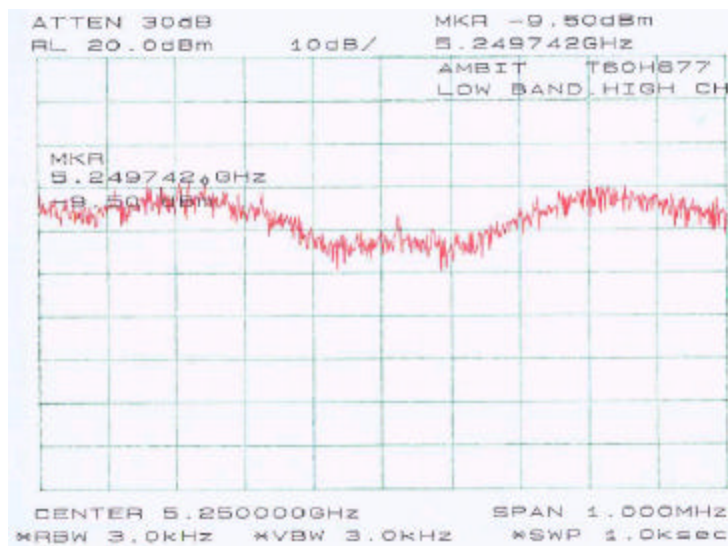
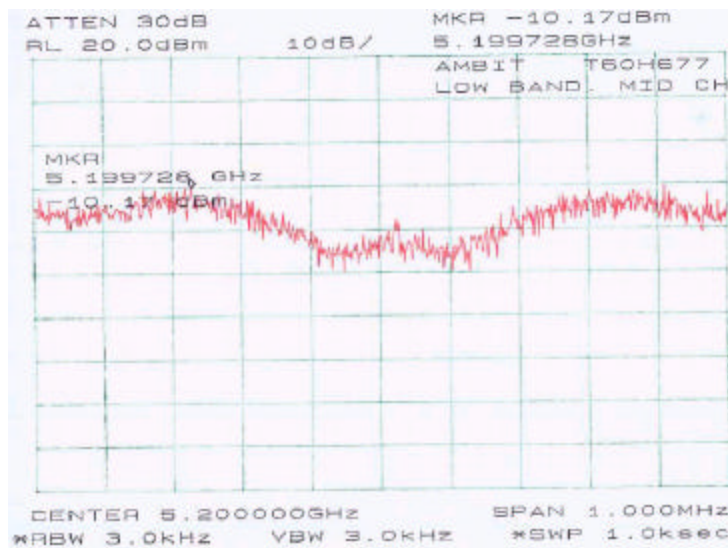
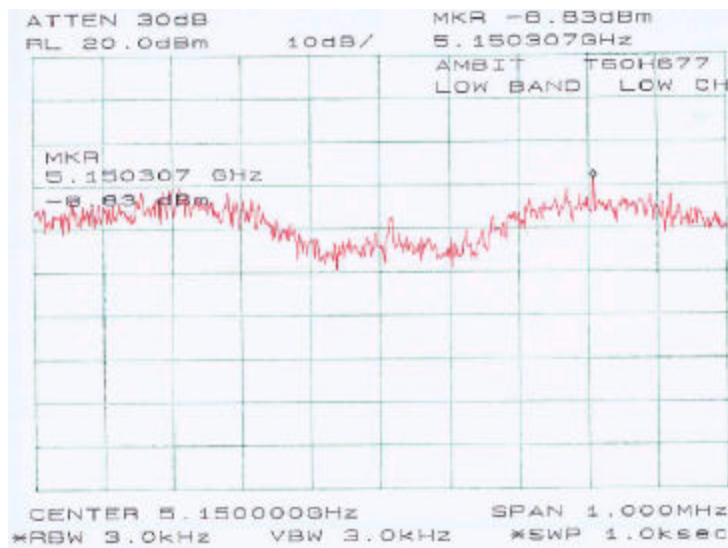
6.3.2 Test Result (15.407)

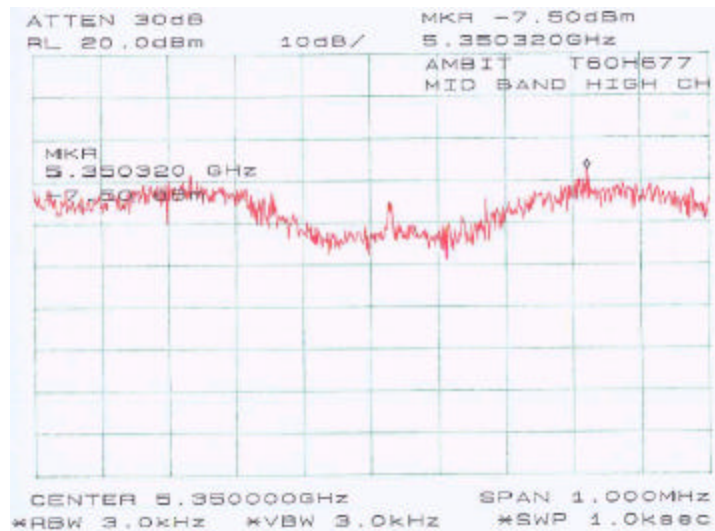
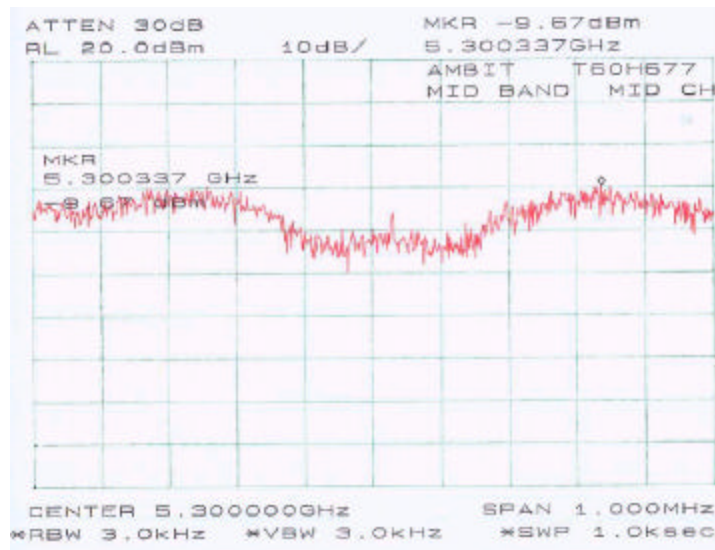
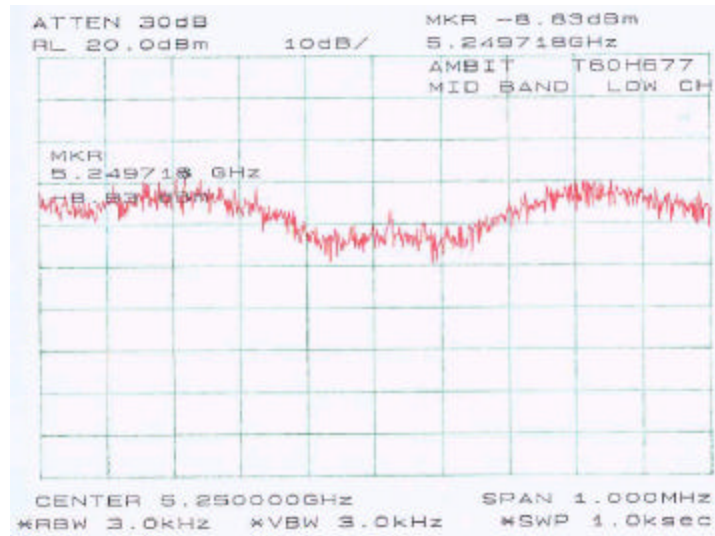
Band	Frequency	Peak Power Spectral Density (dBm)	Standard (dBm)	Result
Low	Low	-8.83	≤ 4	Compliant
	Mid	-10.17	≤ 4	Compliant
	High	-9.50	≤ 4	Compliant
Mid	Low	-8.83	≤ 11	Compliant
	Mid	-9.67	≤ 11	Compliant
	High	-7.50	≤ 11	Compliant
High	Low	-8.17	≤ 17	Compliant
	Mid	-9.83	≤ 17	Compliant
	High	-10.00	≤ 17	Compliant

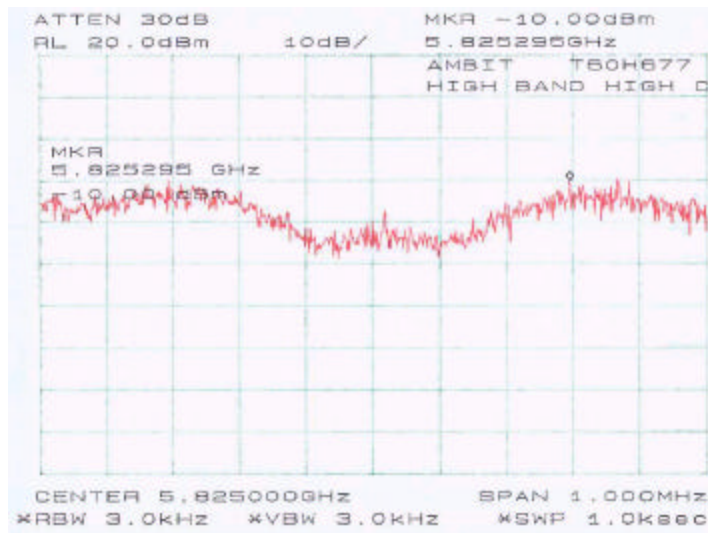
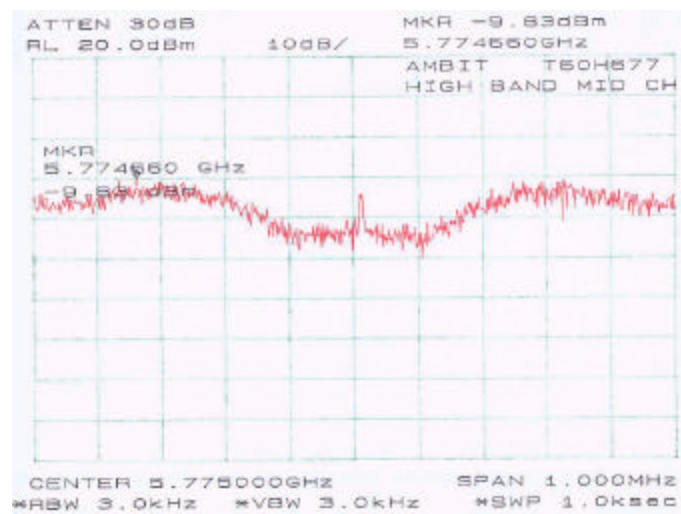
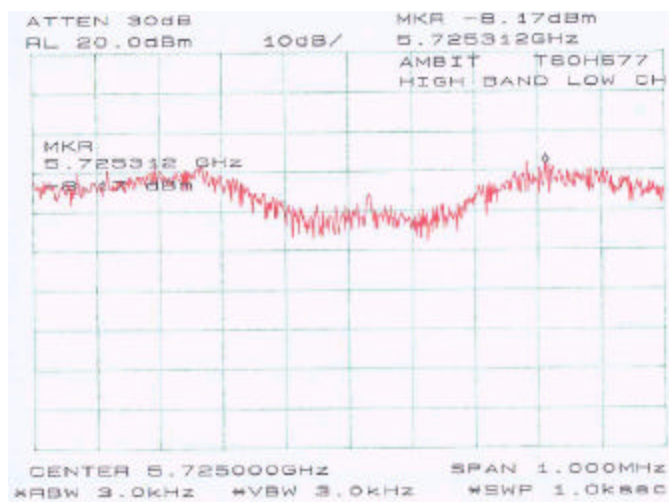
Plots of Spectral Density (15.247)



Plots of Spectral Density (15.407)







7 - 100 KHZ BANDWIDTH OF BAND EDGES

7.1 Standard Applicable

According to §15.247(c), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) see §15.205(c)).

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

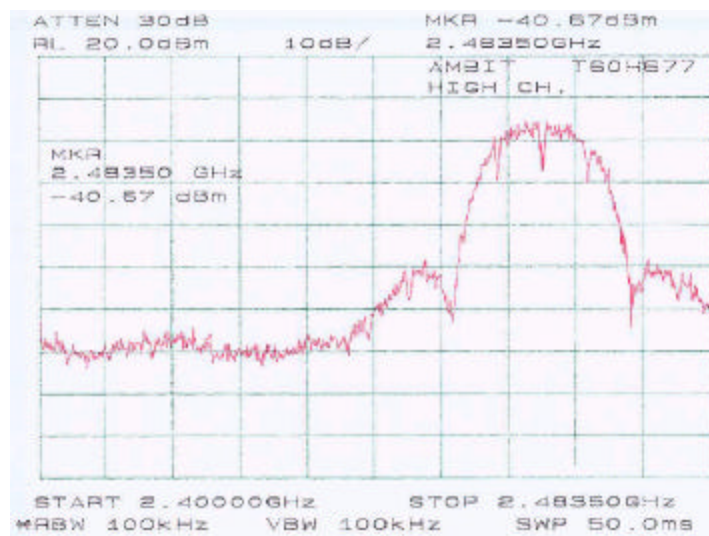
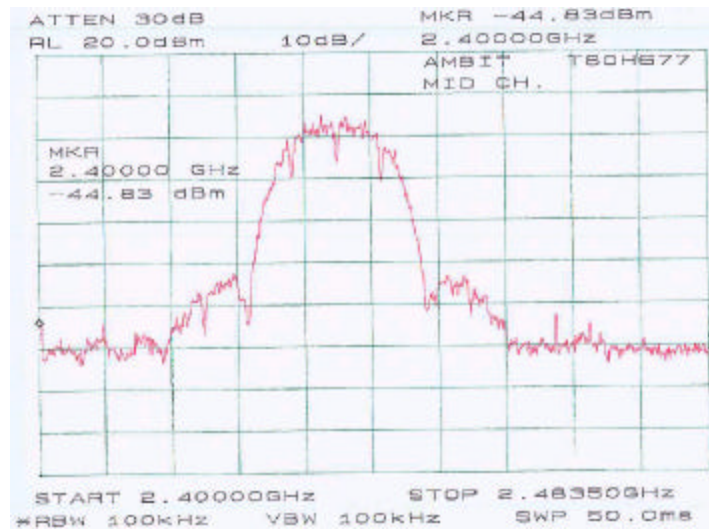
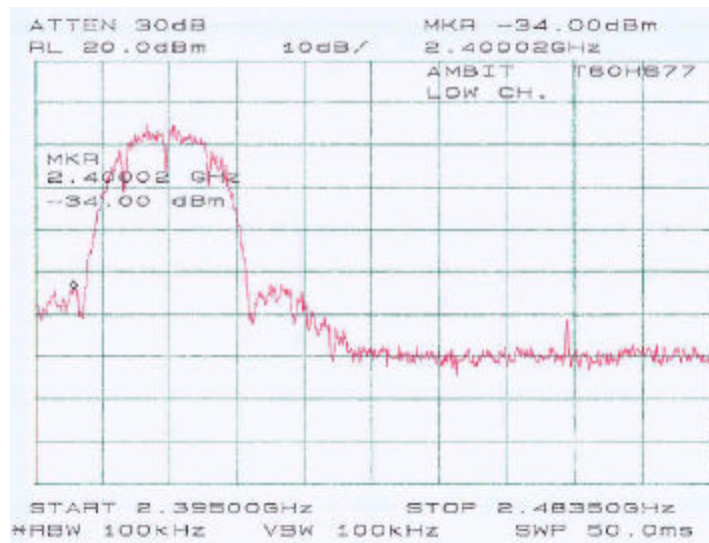
7.3 Measure Results

7.3.1 Test Result (15.247)

Frequency	Standard (dBm)	Result
Low	≤ 20	Compliant
Mid	≤ 20	Compliant
High	≤ 20	Compliant

Please refer to following pages for plots of band edge.

Plots for 15.247



8 - Peak Excursion To Average Ratio

8.1 Standard Applicable

According to §15.407(a)(6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less.

8.2 Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP2.0 plug test cable, so output power levels were calculated from conducted emission levels.

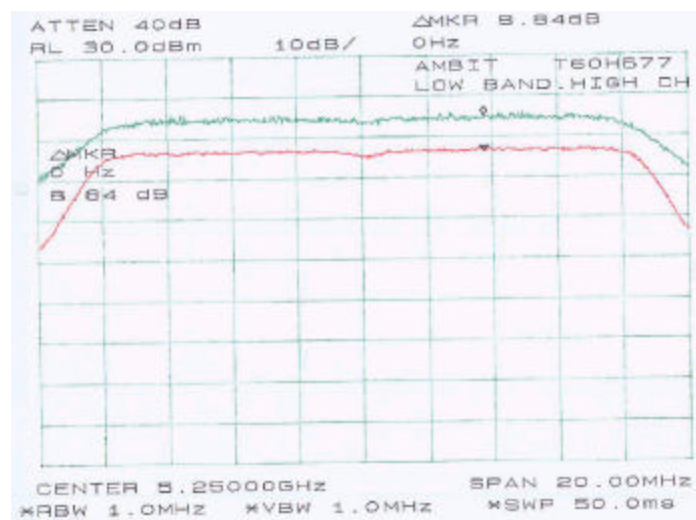
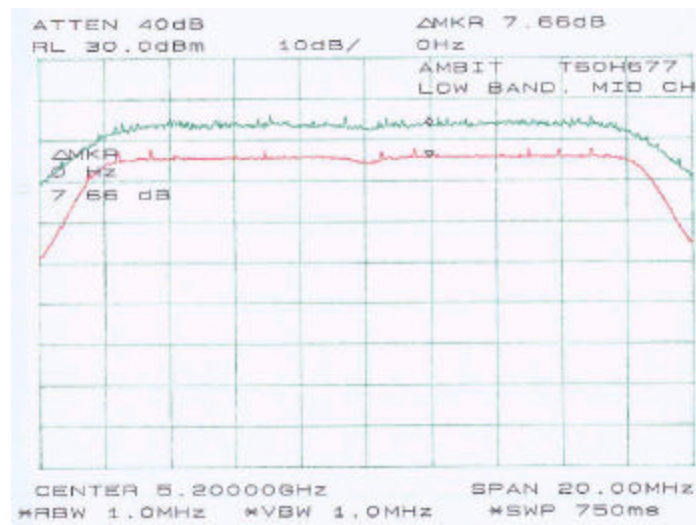
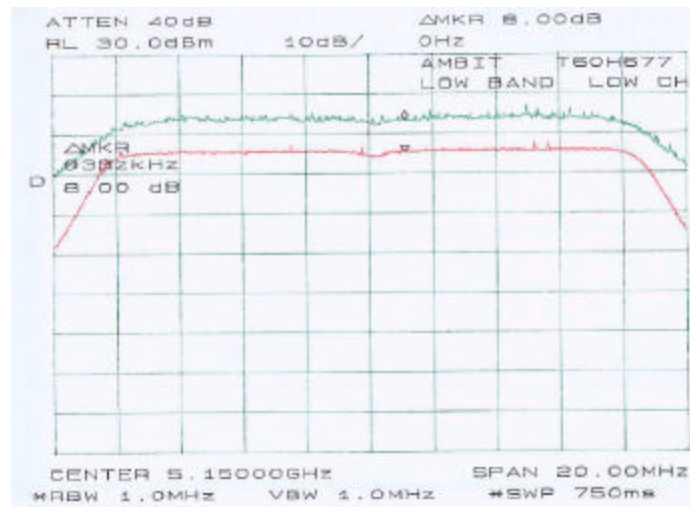
The analyzer center frequency was set to the EUT carrier frequency. For the peak value trace A, the analyzer resolution and video bandwidth were set to 1MHz. Do a MAX HOLD, then VIEW. For the average value trace B, the analyzer resolution bandwidth was set to 1MHz, the video bandwidth was set to 30kHz. MAX HOLD then VIEW trace B also.

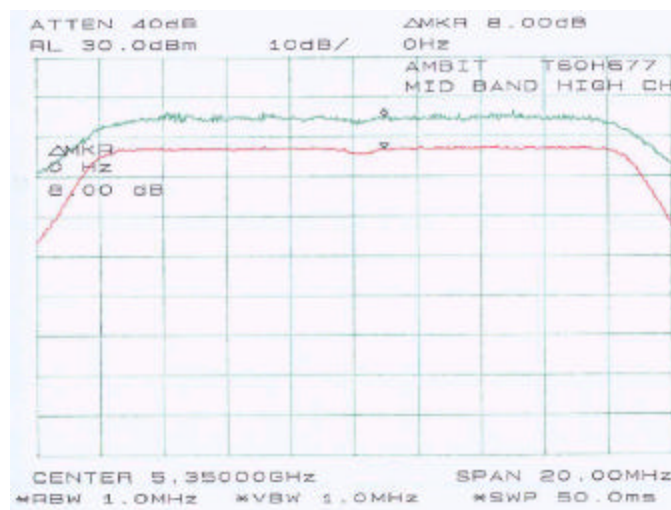
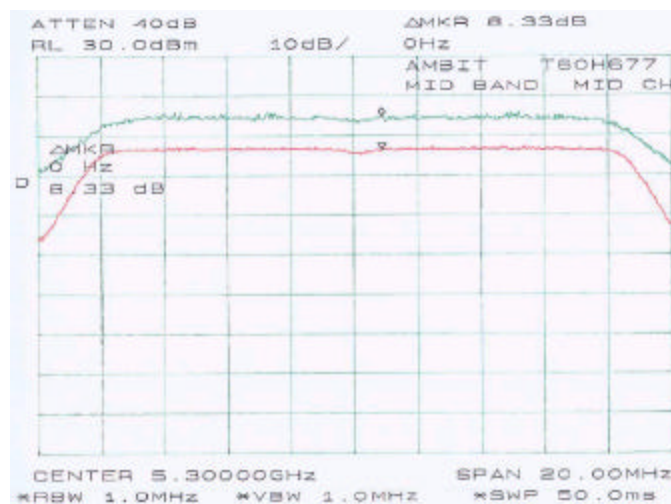
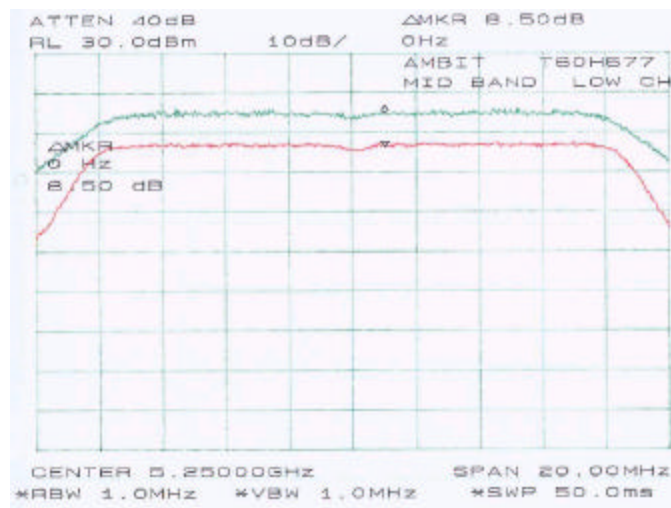
The delta from the peak value trace and the Average should not exceed 13dBm across any 1MHz bandwidth.

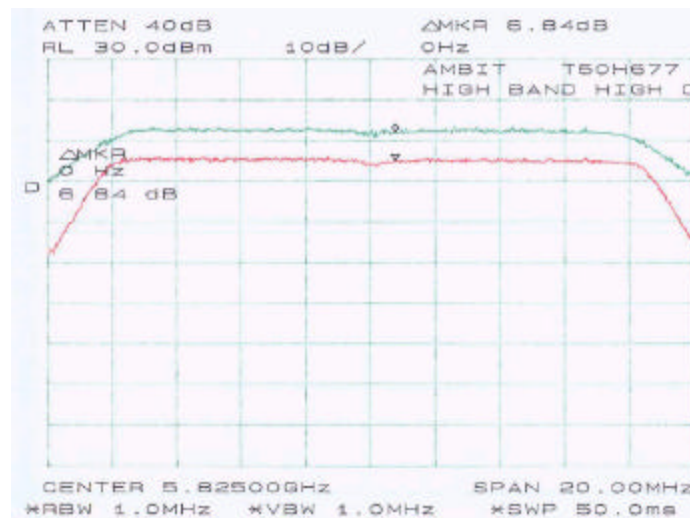
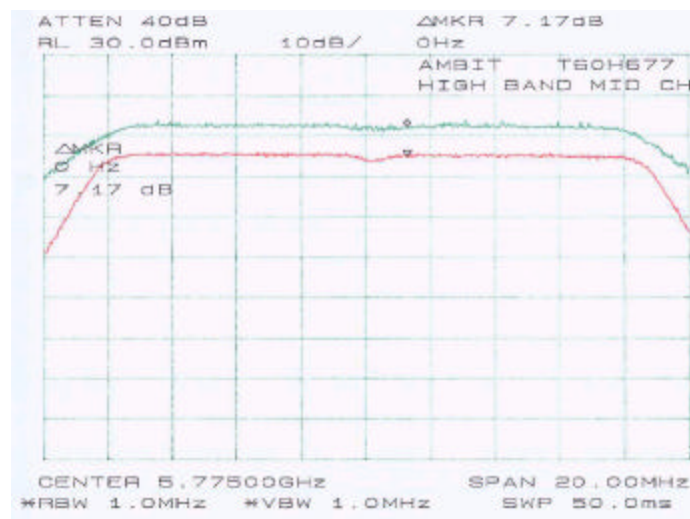
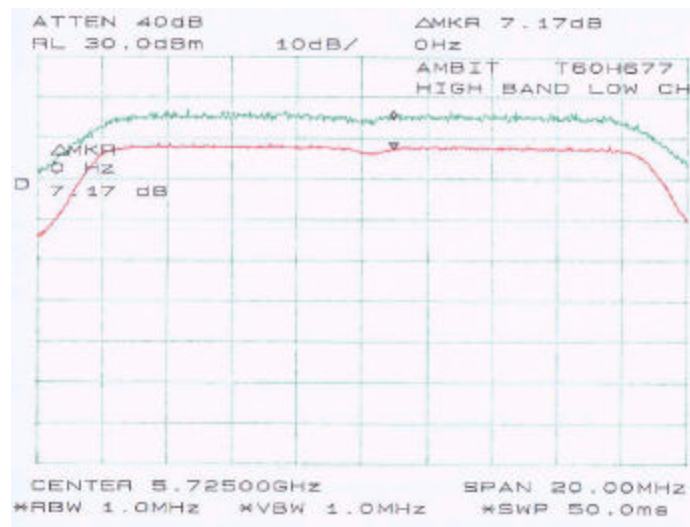
8.3 Test Result for 15.407

Band	Frequency	Reading (dB)	Limit (dBm)	Result
Low	Low	8.00	13	Compliant
	Mid	7.66	13	Compliant
	High	8.84	13	Compliant
Mid	Low	8.50	13	Compliant
	Mid	8.33	13	Compliant
	High	8.00	13	Compliant
High	Low	7.17	13	Compliant
	Mid	7.17	13	Compliant
	High	6.84	13	Compliant

Please see the hereinafter plots for more detail.







9 - Out Of Band Emission for 15.407

9.1 Standard Applicable

§15.407 (b), undesirable emission limits: except as shown in paragraph (b)(6) of this section, the peak emission outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

§15.407 (b)(2), for transmitters operating in the 5.25 – 5.35 GHz band: all emissions outside of the 5.15 – 5.25 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25 – 5.35 GHz band that generate emissions in the 5.15 – 5.25 GHz band must meet all applicable technical requirements for operation in the 5.15 – 5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15 – 5.25 GHz band.

§15.407 (b)(3), for transmitters operating in the 5.725 – 5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emission shall not exceed an EIRP of –27 dBm/MHz.

9.2 Test Procedure

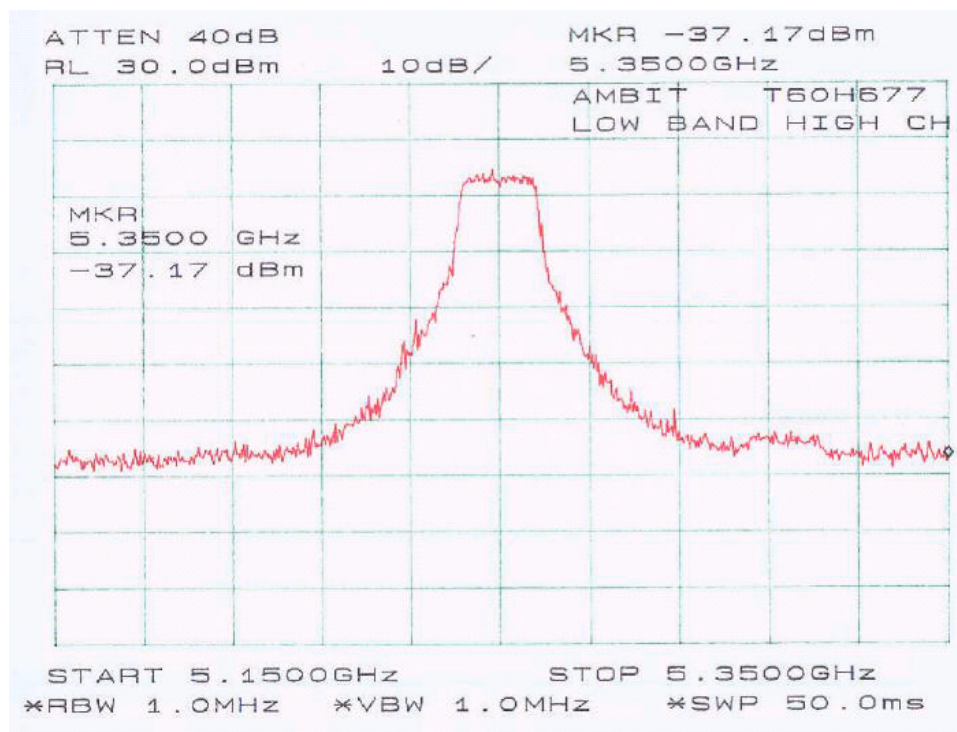
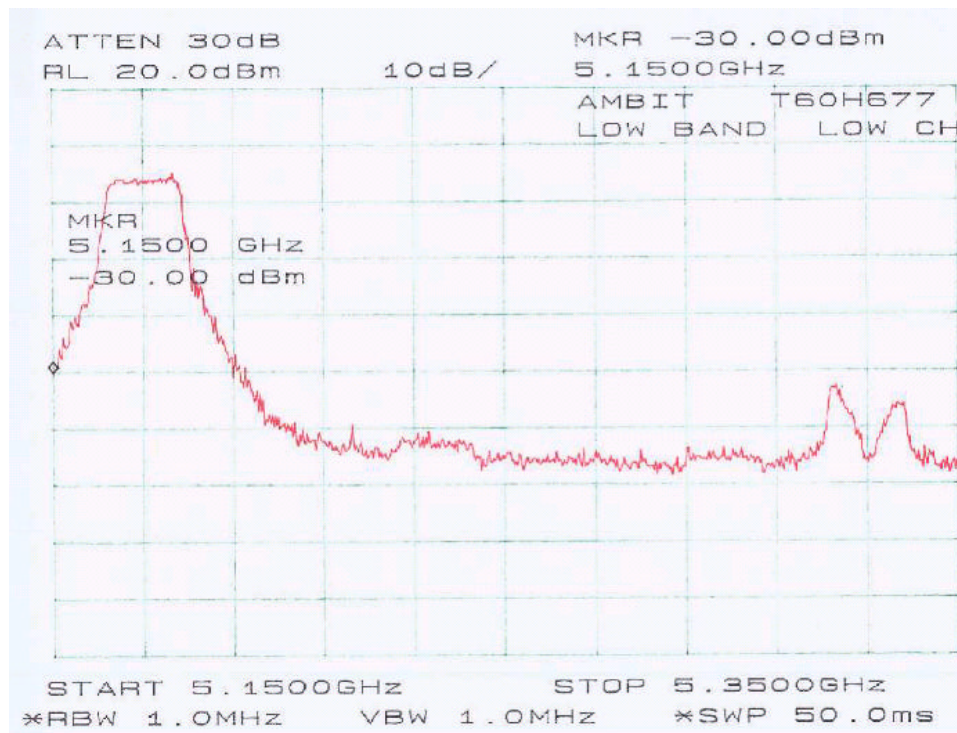
For this test, the EUT's antenna was removed and replaced with a low loss cable, so output power levels were calculated from conducted emission levels.

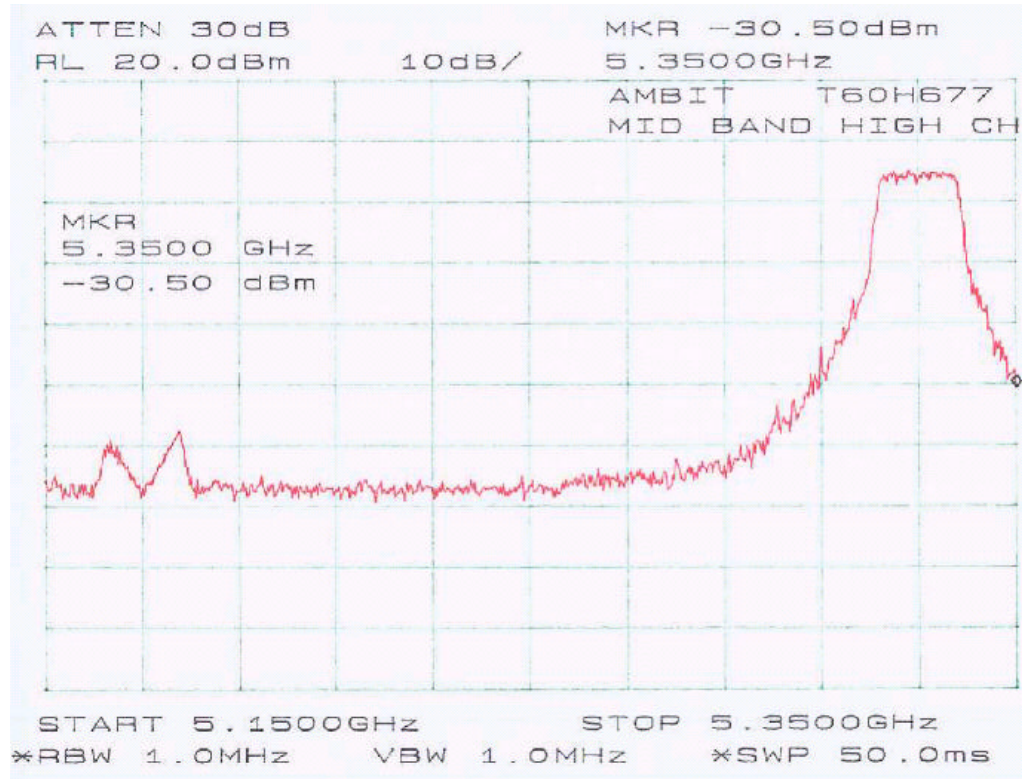
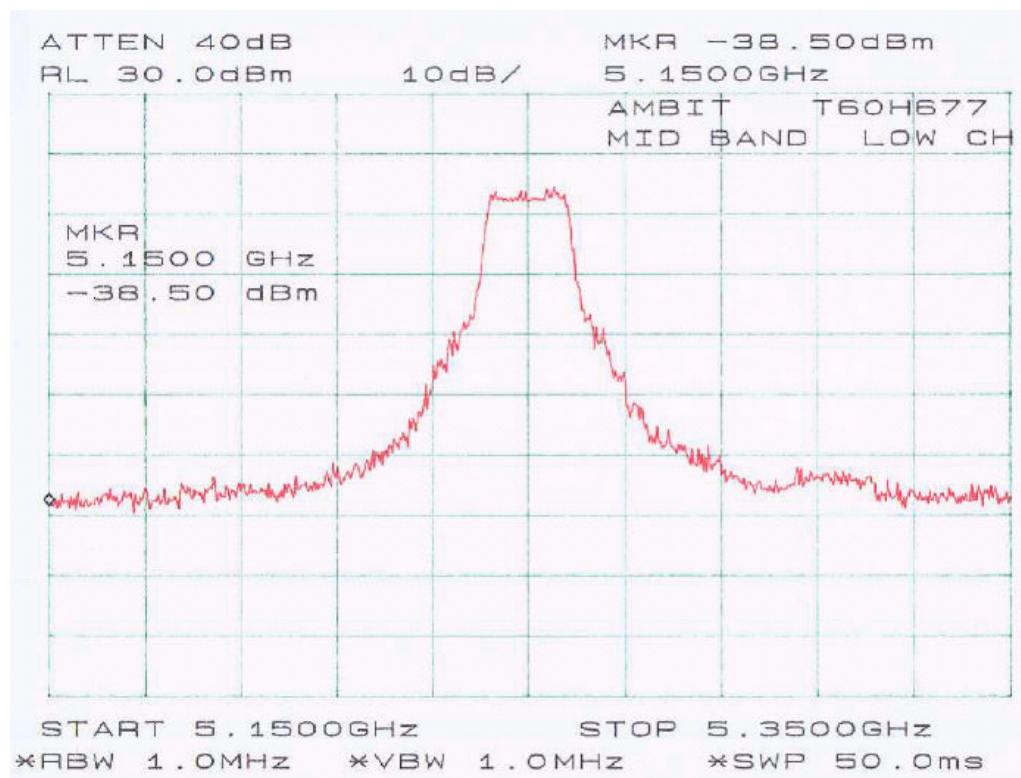
The analyzer center frequency was set to the EUT carrier frequency. The analyzer resolution and video bandwidth were set to 1MHz. The entire band from 30kHz to 40GHz was investigated.

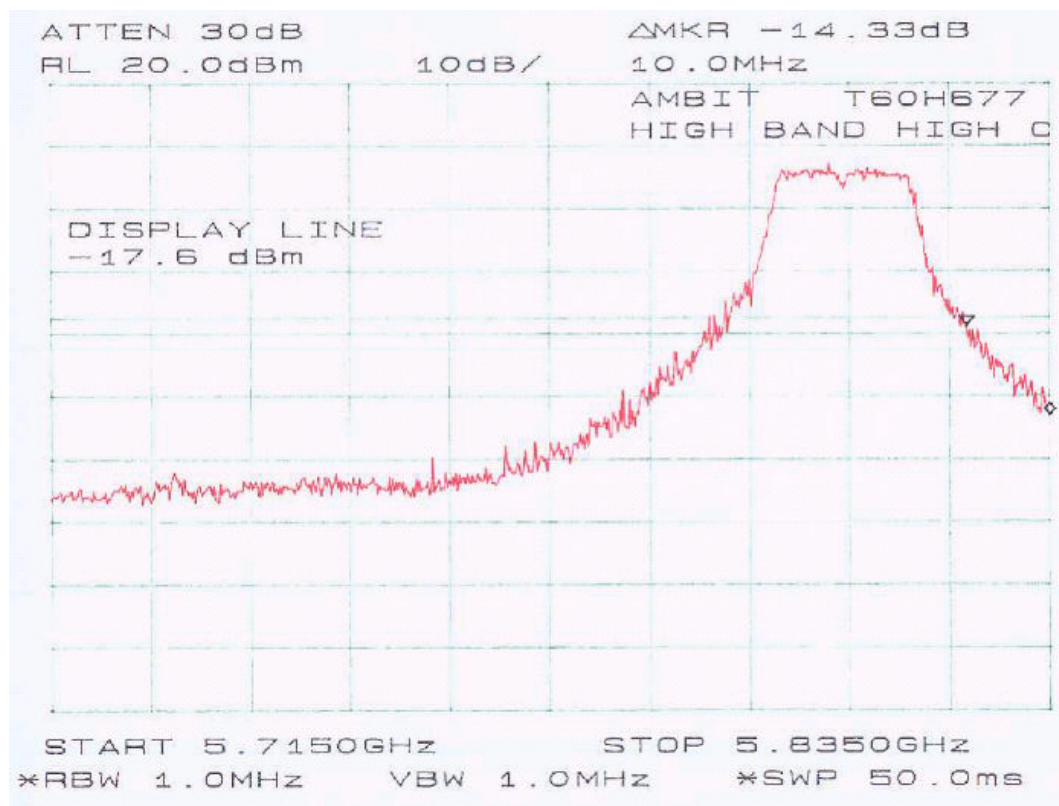
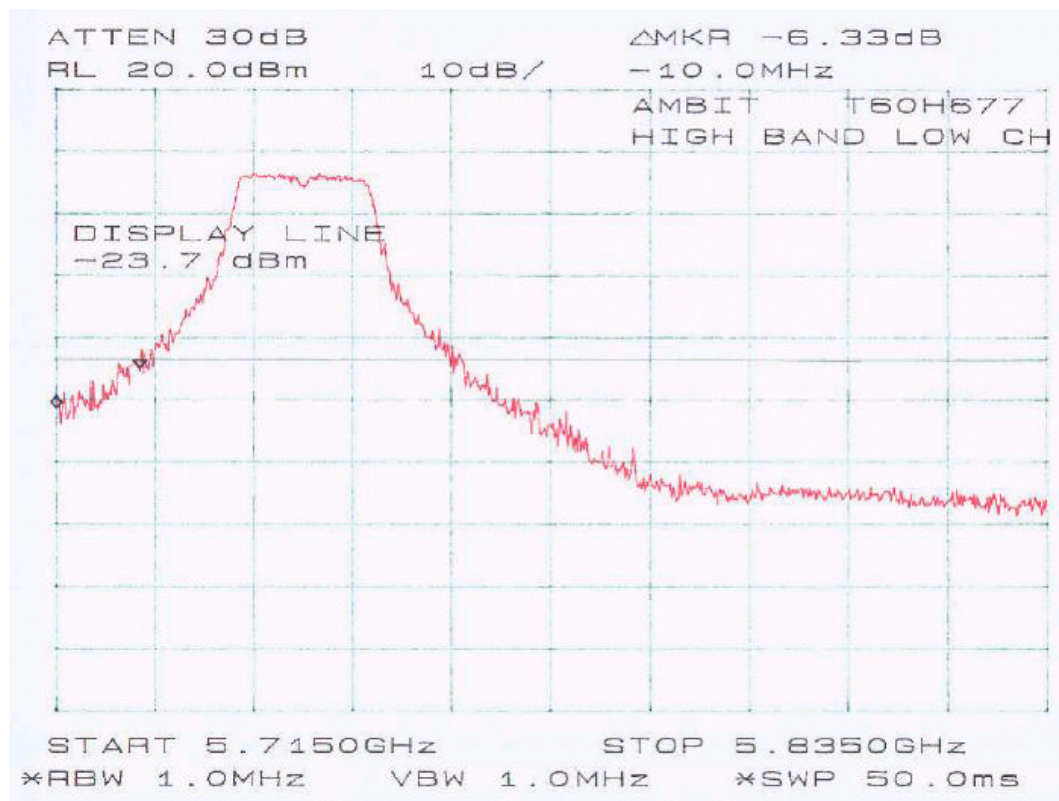
Every suspected signal was also investigated through radiated emission. Refer to section 15.205 restricted bands of operation.

9.3 Test Result

Please refer to the following plots.







10 - SPURIOUS EMISSION

10.1 Standard Applicable

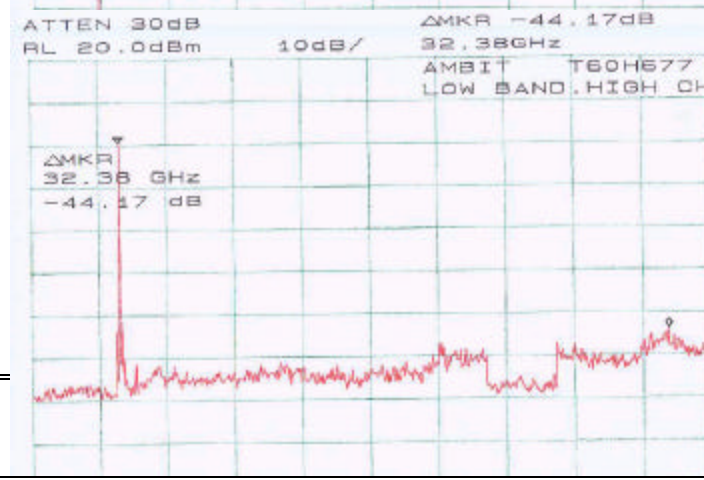
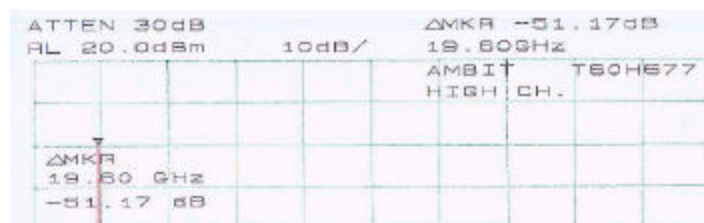
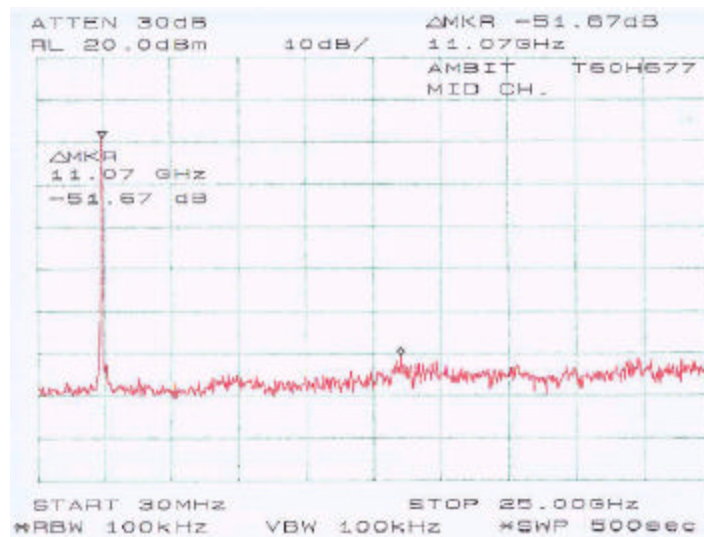
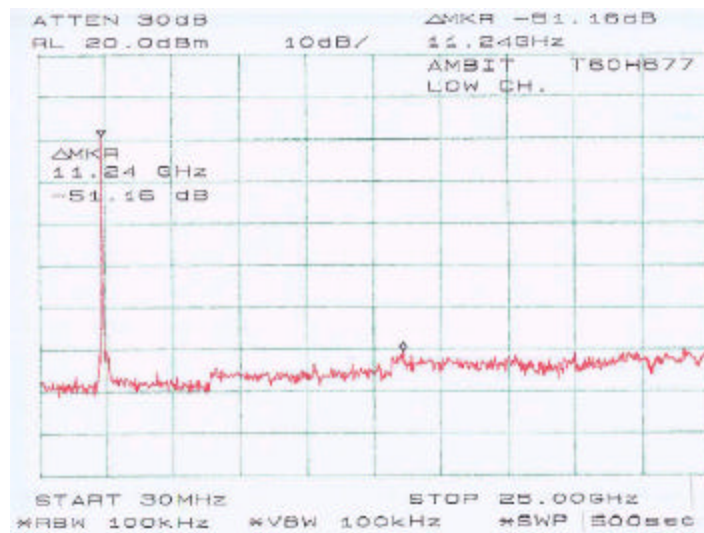
According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

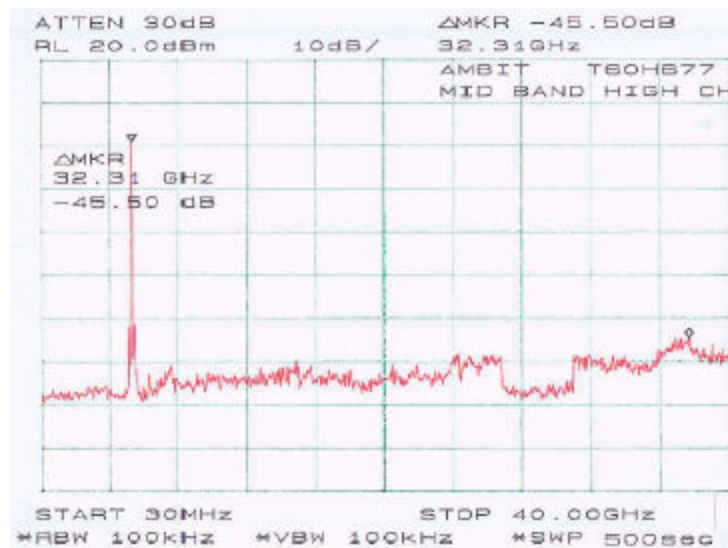
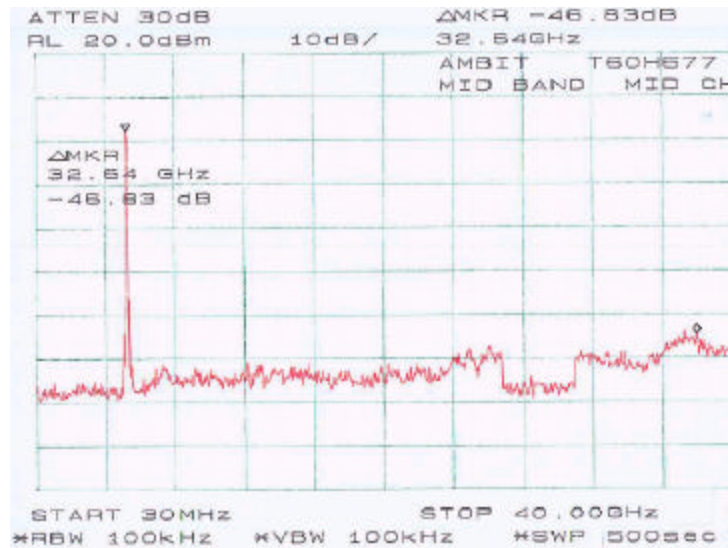
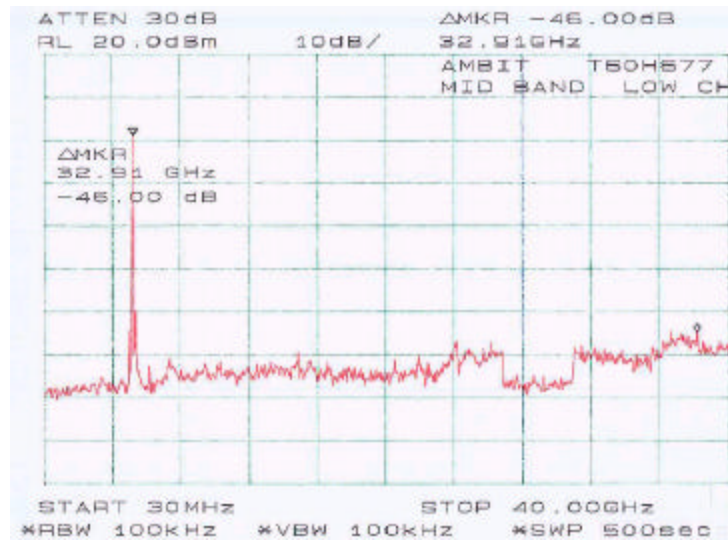
10.2 Measurement Procedure

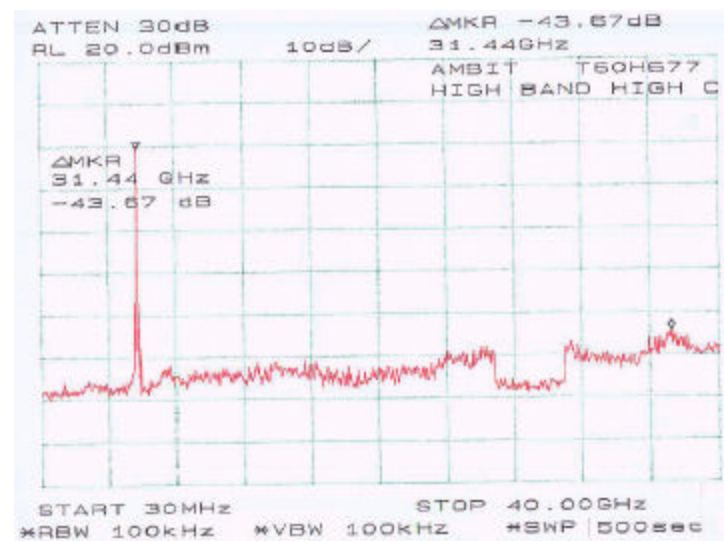
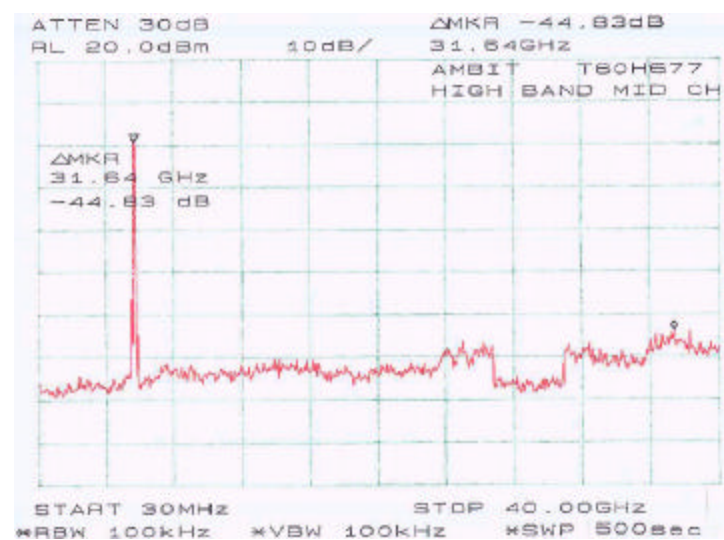
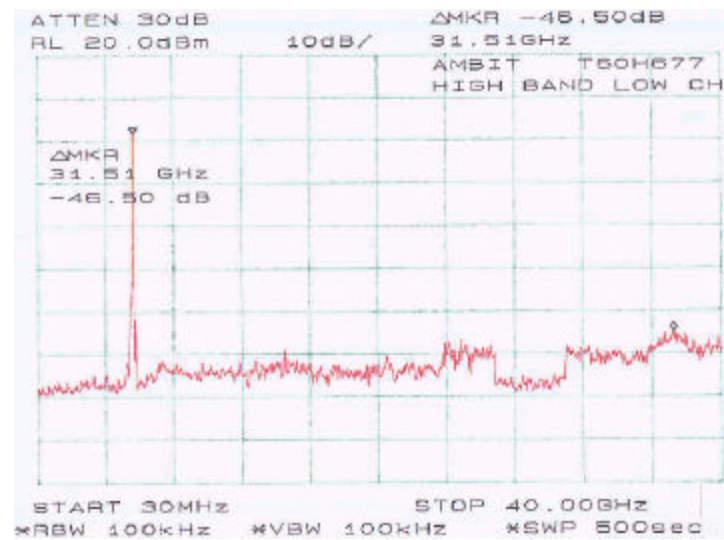
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

10.3 Measurement Result

Please refer to following pages for plots of spurious emission.







11 - ANTENNA REQUIREMENT

11.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to § 15.407 (d), any U-NII device shall use a transmitting antenna that is an integral part of the device.

Refer to statement below for compliance.

“The antenna for the device is an integral antenna that the end user cannot access. Further the device is for outdoor use as detailed in the Users Manual and Operational Description, which are included in this application.”

11.2 Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

12 - SPURIOUS RADIATED EMISSION

12.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

According to §15.205, 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 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	(²)

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

² Above 38.6

Except as provided in paragraph (d) and (e), the filed 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 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, 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.

According to §15.209, the device shall meet radiated emission general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	dB (dB _m V/meter)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

12.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-1992. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host PC system was connected with 110Vac/60Hz power source.

12.3 Spectrum Analyzer Setup

According to FCC CFR 47, Section 15.31, the EUT was tested to 60GHz. During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency30 MHz
 Stop Frequency60GHz
 Sweep Speed.....Auto
 IF Bandwidth.....1 MHz
 Video Bandwidth1 MHz
 Quasi-Peak Adapter Bandwidth120 kHz
 Quasi-Peak Adapter Mode.....Normal
 Resolution Bandwidth.....1MHz

12.4 Test Procedure

For the radiated emissions test, the Host PC system power cord was connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "Qp" in the data table.

12.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Subpart C. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Subpart C Limit}$$

12.6 Summary of Test Results

According to the data in section 11.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

ZI1S Antenna, 30MHz – 25GHz, 15.247:

- 11.2 dB at 2412.30 MHz in the **Vertical** polarization, Low Channel
- 10.8 dB at 7314.30 MHz in the **Vertical** polarization, Middle Channel
- 11.5 dB at 7386.60 MHz in the **Vertical** polarization, High Channel
- 1.3 dB at 208.41 MHz in the **Vertical** polarization, Unwanted Emission

ZG1S Antenna, 30MHz – 25GHz, 15.247:

- 10.7 dB at 4824.60 MHz in the **Vertical** polarization, Low Channel
- 10.9 dB at 4884.00 MHz in the **Vertical** polarization, Middle Channel
- 11.1 dB at 7386.60 MHz in the **Vertical** polarization, High Channel
- 1.7 dB at 208.41 MHz in the **Vertical** polarization, Unwanted Emission

Compal Antenna, 30MHz – 25GHz, 15.247:

- 11.1 dB at 4824.60 MHz in the **Vertical** polarization, Low Channel
- 10.8 dB at 4884.00 MHz in the **Vertical** polarization, Middle Channel
- 11.1 dB at 7386.60 MHz in the **Vertical** polarization, High Channel
- 1.9 dB at 208.41 MHz in the **Vertical** polarization, Unwanted Emission

ZI1S Antenna, 1 – 50GHz, 15.407:

- 11.7 dB at 10340.00 MHz in the **Vertical** polarization, Low Band, Low Channel
- 11.4 dB at 10400.00 MHz in the **Vertical** polarization, Low Band, Mid Channel
- 11.8 dB at 10500.00 MHz in the **Vertical** polarization, Low Band, High Channel
- 11.8 dB at 10500.00 MHz in the **Vertical** polarization, Mid Band, Low Channel
- 11.6 dB at 10600.00 MHz in the **Vertical** polarization, Mid Band, Mid Channel
- 11.7 dB at 10660.00 MHz in the **Vertical** polarization, Mid Band, High Channel
- 11.9 dB at 11490.00 MHz in the **Vertical** polarization, High Band, Low Channel
- 10.6 dB at 11550.00 MHz in the **Vertical** polarization, High Band, Mid Channel
- 11.9 dB at 11620.00 MHz in the **Vertical** polarization, High Band, High Channel

-4.3 dB at 408.01 MHz in the **Vertical** polarization, Unwanted Emission

ZG1S Antenna, 1 – 50GHz, 15.407:

-10.9 dB at 10300.00 MHz in the **Vertical** polarization, Low Band, Low Channel

-11.0 dB at 10400.00 MHz in the **Vertical** polarization, Low Band, Mid Channel

-11.2 dB at 10500.00 MHz in the **Vertical** polarization, Low Band, High Channel

-11.2 dB at 10500.00 MHz in the **Vertical** polarization, Mid Band, Low Channel

-10.6 dB at 10600.00 MHz in the **Vertical** polarization, Mid Band, Mid Channel

-9.9 dB at 10700.00 MHz in the **Vertical** polarization, Mid Band, High Channel

-11.4 dB at 11450.00 MHz in the **Vertical** polarization, High Band, Low Channel

-11.6 dB at 11550.00 MHz in the **Vertical** polarization, High Band, Mid Channel

-11.0 dB at 11650.00 MHz in the **Vertical** polarization, High Band, High Channel

-4.1 dB at 480.01 MHz in the **Vertical** polarization, Unwanted Emission

Compal Antenna, 1 – 50GHz, 15.407:

-11.0 dB at 10300.00 MHz in the **Vertical** polarization, Low Band, Low Channel

-11.1 dB at 10400.00 MHz in the **Vertical** polarization, Low Band, Mid Channel

-11.3 dB at 10500.00 MHz in the **Vertical** polarization, Low Band, High Channel

-11.3 dB at 10300.00 MHz in the **Vertical** polarization, Mid Band, Low Channel

-11.3 dB at 10600.00 MHz in the **Vertical** polarization, Mid Band, Mid Channel

-11.4 dB at 10700.00 MHz in the **Vertical** polarization, Mid Band, High Channel

-11.8 dB at 11450.00 MHz in the **Vertical** polarization, High Band, Low Channel

-11.6 dB at 11550.00 MHz in the **Vertical** polarization, High Band, Mid Channel

-11.8 dB at 11650.00 MHz in the **Vertical** polarization, High Band, High Channel

-4.2 dB at 480.01 MHz in the **Vertical** polarization, Unwanted Emission

12.6.1 Final test data, ZI1S Antenna, 30MHz – 25GHz (15.247)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Low Channel, 1-25GHz											
2412.30	106.5	FUND.	0	1.2	v	28.1	3.4	30.0	108.0	/	/
2412.30	100.4	FUND.	90	1.5	h	28.1	3.4	30.0	101.9	/	/
7236.90	32.1	Avg.	210	1.2	v	35.1	5.6	30.0	42.8	54	-11.2
7236.90	31.3	Avg.	230	1.5	h	35.1	5.6	30.0	42.0	54	-12.0
4824.60	32.8	Avg.	150	1.2	v	32.5	4.9	30.0	40.2	54	-13.8
4824.60	31.1	Avg.	180	1.5	h	32.5	4.9	30.0	38.5	54	-15.5
7236.90	42.8	Peak	210	1.2	v	35.1	5.6	30.0	53.5	74	-20.5
7236.90	40.5	Peak	230	1.5	h	35.1	5.6	30.0	51.2	74	-22.8
4824.60	43.6	Peak	150	1.2	v	32.5	4.9	30.0	51.0	74	-23.0
4824.60	41.2	Peak	180	1.5	h	32.5	4.9	30.0	48.6	74	-25.4
Middle Channel, 1-25GHz											
2442.00	110.9	FUND	0	1.2	v	28.1	3.4	30.0	112.4	/	/
2442.00	100.2	FUND	30	1.5	h	28.1	3.4	30.0	101.7	/	/
7314.30	32.5	Avg.	270	1.5	v	35.1	5.6	30.0	43.2	54	-10.8
7314.30	31.2	Avg.	210	1.2	h	35.1	5.6	30.0	41.9	54	-12.1
4884.00	33.1	Avg.	340	1.5	v	32.5	4.9	30.0	40.5	54	-13.5
4884.00	30.9	Avg.	30	1.2	h	32.5	4.9	30.0	38.3	54	-15.7
7314.30	42.9	Peak	270	1.5	v	35.1	5.6	30.0	53.6	74	-20.4
4884.00	43.8	Peak	340	1.5	v	32.5	4.9	30.0	51.2	74	-22.8
7314.30	40.2	Peak	210	1.2	h	35.1	5.6	30.0	50.9	74	-23.1
4884.00	41.1	Peak	30	1.2	h	32.5	4.9	30.0	48.5	74	-25.5
High Channel, 1-25GHz											
2462.20	105.7	FUND	0	1.5	v	28.1	3.4	30.0	107.2	/	/
2462.20	99.6	FUND	0	1.5	h	28.1	3.4	30.0	101.1	/	/
7386.60	31.8	Avg.	230	1.2	v	35.1	5.6	30.0	42.5	54	-11.5
7386.60	31.2	Avg.	250	1.2	h	35.1	5.6	30.0	41.9	54	-12.1
4924.40	32.5	Avg.	90	1.5	v	32.5	4.9	30.0	39.9	54	-14.1
4924.40	30.7	Avg.	120	1.5	h	32.5	4.9	30.0	38.1	54	-15.9
7386.60	42.5	Peak	230	1.2	v	35.1	5.6	30.0	53.2	74	-20.8
7386.60	40.3	Peak	250	1.2	h	35.1	5.6	30.0	51.0	74	-23.0
4924.40	43.3	Peak	90	1.5	v	32.5	4.9	30.0	50.7	74	-23.3
4924.40	40.9	Peak	120	1.5	h	32.5	4.9	30.0	48.3	74	-25.7

Unwanted Emission, 30 – 1000MHz											
208.41	50.2	/	270	1.8	v	12.4	4.6	25.0	42.2	43.5	-1.3
480.01	46.7	/	0	1.5	v	18.7	2.5	25.0	42.9	46	-3.1
225.90	50.6	/	225	1.5	h	12.1	3.9	25.0	41.6	46	-4.4
192.00	44.7	/	270	1.0	v	14.4	2.7	25.0	36.8	43.5	-6.7
576.10	40.1	/	225	1.0	h	20.1	3.4	25.0	38.6	46	-7.4
128.00	46.3	/	45	1.0	v	12.3	1.8	25.0	35.4	43.5	-8.1

12.6.2 Final test data, ZG1S Antenna, 30MHz – 25GHz (15.247)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Low Channel, 1-25GHz											
2412.30	104.1	FUND.	330	1.2	v	28.1	3.4	30.0	105.6	/	/
2412.30	99.2	FUND.	0	1.8	h	28.1	3.4	30.0	100.7	/	/
4824.60	35.9	Avg.	110	1.5	v	32.5	4.9	30.0	43.3	54	-10.7
7236.90	31.4	Avg.	260	1.0	v	35.1	5.6	30.0	42.1	54	-11.9
7236.90	30.8	Avg.	290	1.2	h	35.1	5.6	30.0	41.5	54	-12.5
4824.60	33.1	Avg.	130	1.2	h	32.5	4.9	30.0	40.5	54	-13.5
4824.60	40.7	Peak	110	1.5	v	32.5	4.9	30.0	48.1	74	-25.9
7236.90	36.3	Peak	260	1.0	v	35.1	5.6	30.0	47.0	74	-27.0
7236.90	35.4	Peak	290	1.2	h	35.1	5.6	30.0	46.1	74	-27.9
4824.60	38.5	Peak	130	1.2	h	32.5	4.9	30.0	45.9	74	-28.1
Middle Channel, 1-25GHz											
2442.00	101.2	FUND	270	1.2	v	28.1	3.4	30.0	102.7	/	/
2442.00	98.1	FUND	0	1.5	h	28.1	3.4	30.0	99.6	/	/
4884.00	35.7	Avg.	30	1.5	v	32.5	4.9	30.0	43.1	54	-10.9
7314.30	31.3	Avg.	230	1.5	v	35.1	5.6	30.0	42.0	54	-12.0
7314.30	30.6	Avg.	250	1.5	h	35.1	5.6	30.0	41.3	54	-12.7
4884.00	32.9	Avg.	60	1.2	h	32.5	4.9	30.0	40.3	54	-13.7
4884.00	40.5	Peak	30	1.5	v	32.5	4.9	30.0	47.9	74	-26.1
7314.30	36.2	Peak	230	1.5	v	35.1	5.6	30.0	46.9	74	-27.1
4884.00	38.4	Peak	60	1.2	h	32.5	4.9	30.0	45.8	74	-28.2
7314.30	35.1	Peak	250	1.5	h	35.1	5.6	30.0	45.8	74	-28.2
High Channel, 1-25GHz											
2462.20	100.6	FUND	270	1.5	v	28.1	3.4	30.0	102.1	/	/
2462.20	97.5	FUND	310	1.2	h	28.1	3.4	30.0	99.0	/	/
4924.40	35.5	Avg.	270	1.3	v	32.5	4.9	30.0	42.9	54	-11.1
7386.60	31.1	Avg.	160	1.5	v	35.1	5.6	30.0	41.8	54	-12.2
7386.60	30.5	Avg.	190	1.2	h	35.1	5.6	30.0	41.2	54	-12.8
4924.40	32.7	Avg.	90	1.5	h	32.5	4.9	30.0	40.1	54	-13.9
4924.40	40.3	Peak	270	1.3	v	32.5	4.9	30.0	47.7	74	-26.3
7386.60	35.9	Peak	160	1.5	v	35.1	5.6	30.0	46.6	74	-27.4
4924.40	38.2	Peak	90	1.5	h	32.5	4.9	30.0	45.6	74	-28.4
7386.60	34.7	Peak	190	1.2	h	35.1	5.6	30.0	45.4	74	-28.6

Unwanted Emission, 30 – 1000MHz											
208.41	49.8	/	270	1.5	v	12.4	4.6	25.0	41.8	43.5	-1.7
480.01	46.5	/	0	1.5	v	18.7	2.5	25.0	42.7	46	-3.3
225.90	50.4	/	225	1.5	h	12.1	3.9	25.0	41.4	46	-4.6
192.00	44.6	/	270	1.0	v	14.4	2.7	25.0	36.7	43.5	-6.8
576.10	39.7	/	225	1.2	h	20.1	3.4	25.0	38.2	46	-7.8
128.00	46.1	/	45	1.0	v	12.3	1.8	25.0	35.2	43.5	-8.3

12.6.3 Final test data, Compal Antenna, 30MHz – 25GHz (15.247)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Low Channel, 1-25GHz											
2412.30	101.2	FUND.	0	1.2	v	28.1	3.4	30.0	102.7	/	/
2412.30	97.2	FUND.	180	1.2	h	28.1	3.4	30.0	98.7	/	/
4824.60	35.5	Avg.	210	1.5	v	32.5	4.9	30.0	42.9	54	-11.1
7236.90	31.0	Avg.	90	1.2	v	35.1	5.6	30.0	41.7	54	-12.3
7236.90	30.3	Avg.	110	1.0	h	35.1	5.6	30.0	41.0	54	-13.0
4824.60	32.9	Avg.	250	1.5	h	32.5	4.9	30.0	40.3	54	-13.7
4824.60	40.4	Peak	210	1.5	v	32.5	4.9	30.0	47.8	74	-26.2
7236.90	35.8	Peak	90	1.2	v	35.1	5.6	30.0	46.5	74	-27.5
4824.60	38.5	Peak	250	1.5	h	32.5	4.9	30.0	45.9	74	-28.1
7236.90	34.9	Peak	110	1.0	h	35.1	5.6	30.0	45.6	74	-28.4
Middle Channel, 1-25GHz											
2442.00	101.7	FUND	0	1.2	v	28.1	3.4	30.0	103.2	/	/
2442.00	93.6	FUND	90	1.5	h	28.1	3.4	30.0	95.1	/	/
4884.00	35.8	Avg.	0	1.5	v	32.5	4.9	30.0	43.2	54	-10.8
7314.30	31.6	Avg.	250	1.5	v	35.1	5.6	30.0	42.3	54	-11.7
7314.30	30.2	Avg.	290	1.5	h	35.1	5.6	30.0	40.9	54	-13.1
4884.00	32.2	Avg.	30	1.2	h	32.5	4.9	30.0	39.6	54	-14.4
4884.00	40.9	Peak	0	1.5	v	32.5	4.9	30.0	48.3	74	-25.7
7314.30	36.1	Peak	250	1.5	v	35.1	5.6	30.0	46.8	74	-27.2
4884.00	38.1	Peak	30	1.2	h	32.5	4.9	30.0	45.5	74	-28.5
7314.30	34.3	Peak	290	1.5	h	35.1	5.6	30.0	45.0	74	-29.0
High Channel, 1-25GHz											
2462.20	100.6	FUND	330	1.8	v	28.1	3.4	30.0	102.1	/	/
2462.20	91.8	FUND	180	1.5	h	28.1	3.4	30.0	93.3	/	/
4924.40	35.5	Avg.	130	1.3	v	32.5	4.9	30.0	42.9	54	-11.1
7386.60	31.1	Avg.	240	1.5	v	35.1	5.6	30.0	41.8	54	-12.2
7386.60	30.2	Avg.	270	1.2	h	35.1	5.6	30.0	40.9	54	-13.1
4924.40	32.1	Avg.	90	1.5	h	32.5	4.9	30.0	39.5	54	-14.5
4924.40	40.3	Peak	130	1.3	v	32.5	4.9	30.0	47.7	74	-26.3
7386.60	35.9	Peak	240	1.5	v	35.1	5.6	30.0	46.6	74	-27.4
4924.40	37.8	Peak	90	1.5	h	32.5	4.9	30.0	45.2	74	-28.8
7386.60	33.7	Peak	270	1.2	h	35.1	5.6	30.0	44.4	74	-29.6

Unwanted Emission, 30 – 1000MHz											
208.41	49.6	/	270	1.5	v	12.4	4.6	25.0	41.6	43.5	-1.9
480.01	46.1	/	0	1.5	v	18.7	2.5	25.0	42.3	46	-3.7
225.90	50.2	/	225	1.5	h	12.1	3.9	25.0	41.2	46	-4.8
192.00	44.5	/	270	1.0	v	14.4	2.7	25.0	36.6	43.5	-6.9
128.00	46.6	/	45	1.0	v	12.3	1.8	25.0	35.7	43.5	-7.8
576.10	39.2	/	225	1.2	h	20.1	3.4	25.0	37.7	46	-8.3

12.6.4 Final test data, ZI1S Antenna (15.407)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Low Band, Low Channel, 1-50GHz											
5170.00	83.40	FUND	45	1.2	v	33.9	5.2	30.0	92.5	/	/
5170.00	80.3	FUND	240	1.8	h	33.9	5.2	30.0	89.4	/	/
10340.00	31.6	avg	180	1.2	v	35.1	5.6	30.0	42.3	54	-11.7
10340.00	30.4	avg	45	1.5	h	35.1	5.6	30.0	41.1	54	-12.9
15510.00	29.7	avg	0	1.2	v	35.1	5.6	30.0	40.4	54	-13.6
15510.00	28.5	avg	30	1.2	h	35.1	5.6	30.0	39.2	54	-14.8
10340.00	37.3	Peak	180	1.2	v	35.1	5.6	30.0	48.0	74	-26.0
10340.00	35.2	Peak	45	1.5	h	35.1	5.6	30.0	45.9	74	-28.1
15510.00	34.4	Peak	0	1.2	v	35.1	5.6	30.0	45.1	74	-28.9
15510.00	33.5	Peak	30	1.2	v	35.1	5.6	30.0	44.2	74	-29.8
Low Band, Middle Channel, 1-50GHz											
5200.00	85.8	FUND	45	1.2	v	33.9	5.2	30.0	94.9	/	/
5200.00	81.2	FUND	180	1.5	h	33.9	5.2	30.0	90.3	/	/
10400.00	31.9	avg	90	1.0	v	35.1	5.6	30.0	42.6	54	-11.4
10400.00	30.6	avg	130	1.2	h	35.1	5.6	30.0	41.3	54	-12.7
15600.00	29.8	avg	0	1.5	v	35.1	5.6	30.0	40.5	54	-13.5
15600.00	28.7	avg	30	1.5	h	35.1	5.6	30.0	39.4	54	-14.6
10400.00	37.5	Peak	90	1.0	v	35.1	5.6	30.0	48.2	74	-25.8
10400.00	35.4	Peak	130	1.2	h	35.1	5.6	30.0	46.1	74	-27.9
15600.00	34.6	Peak	0	1.5	v	35.1	5.6	30.0	45.3	74	-28.7
15600.00	33.7	Peak	30	1.5	h	35.1	5.6	30.0	44.4	74	-29.6
Low Band, High Channel, 1-50GHz											
5250.00	82.9	FUND	90	1.2	v	33.9	5.2	30.0	92.0	/	/
5250.00	80.3	FUND	180	1.5	h	33.9	5.2	30.0	89.4	/	/
10500.00	31.5	avg	45	1.5	v	35.1	5.6	30.0	42.2	54	-11.8
10500.00	30.3	avg	180	1.4	h	35.1	5.6	30.0	41.0	54	-13.0
15750.00	29.5	avg	150	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
15750.00	28.5	avg	90	1.5	h	35.1	5.6	30.0	39.2	54	-14.8
10500.00	37.2	Peak	45	1.5	v	35.1	5.6	30.0	47.9	74	-26.1
10500.00	35.1	Peak	180	1.4	h	35.1	5.6	30.0	45.8	74	-28.2
15750.00	34.2	Peak	150	1.5	v	35.1	5.6	30.0	44.9	74	-29.1
15750.00	33.5	Peak	90	1.5	h	35.1	5.6	30.0	44.2	74	-29.8

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED A MPLITUDE	FCC 15 SUBPART C	
Frequency	Ampl.	Comments	Angle	Height	Polar	Antenna	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m		Degree	Meter	H/ V	dBμV/m	DB	DB	dBμV/m	dBμV/ m	dB
Mid Band, Low Channel, 1-50GHz											
5250.00	82.9	FUND	90	1.2	v	33.9	5.2	30.0	92.0	/	/
5250.00	80.3	FUND	180	1.5	h	33.9	5.2	30.0	89.4	/	/
10500.00	31.5	avg	45	1.5	v	35.1	5.6	30.0	42.2	54	-11.8
10500.00	30.3	avg	180	1.4	h	35.1	5.6	30.0	41.0	54	-13.0
15750.00	29.5	avg	150	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
15750.00	28.5	avg	90	1.5	h	35.1	5.6	30.0	39.2	54	-14.8
10500.00	37.2	Peak	45	1.5	v	35.1	5.6	30.0	47.9	74	-26.1
10500.00	35.1	Peak	180	1.4	h	35.1	5.6	30.0	45.8	74	-28.2
15750.00	34.2	Peak	150	1.5	v	35.1	5.6	30.0	44.9	74	-29.1
15750.00	33.5	Peak	90	1.5	h	35.1	5.6	30.0	44.2	74	-29.8
Mid Band, Middle Channel, 1-50GHz											
5300.00	85.4	FUND	45	1.2	v	33.9	5.2	30.0	94.5	/	/
5300.00	82.3	FUND	0	1.2	h	33.9	5.2	30.0	91.4	/	/
10600.00	31.7	avg	90	1.0	v	35.1	5.6	30.0	42.4	54	-11.6
10600.00	30.8	avg	130	1.2	h	35.1	5.6	30.0	41.5	54	-12.5
15900.00	29.7	avg	0	1.5	v	35.1	5.6	30.0	40.4	54	-13.6
15900.00	28.8	avg	30	1.5	h	35.1	5.6	30.0	39.5	54	-14.5
10600.00	37.4	Peak	90	1.0	v	35.1	5.6	30.0	48.1	74	-25.9
10600.00	35.6	Peak	130	1.2	h	35.1	5.6	30.0	46.3	74	-27.7
15900.00	34.5	Peak	0	1.5	v	35.1	5.6	30.0	45.2	74	-28.8
15900.00	33.8	Peak	30	1.5	h	35.1	5.6	30.0	44.5	74	-29.5
Mid Band, High Channel, 1-50GHz											
5330.00	85.2	FUND	90	1.5	v	33.9	5.2	30.0	94.3	/	/
5330.00	82.6	FUND	0	1.5	h	33.9	5.2	30.0	91.7	/	/
10660.00	31.6	avg	45	1.5	v	35.1	5.6	30.0	42.3	54	-11.7
10660.00	30.9	avg	180	1.4	h	35.1	5.6	30.0	41.6	54	-12.4
15990.00	29.5	avg	150	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
15990.00	29.1	avg	90	1.5	h	35.1	5.6	30.0	39.8	54	-14.2
10660.00	37.2	Peak	45	1.5	v	35.1	5.6	30.0	47.9	74	-26.1
10660.00	35.8	Peak	180	1.4	h	35.1	5.6	30.0	46.5	74	-27.5
15990.00	34.4	Peak	150	1.5	v	35.1	5.6	30.0	45.1	74	-28.9
15990.00	33.9	Peak	90	1.5	h	35.1	5.6	30.0	44.6	74	-29.4

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Band, Low Channel, 1-50GHz											
5745.00	84.90	FUND	90	1.2	v	34.1	5.4	30.0	94.4	/	/
5745.00	83.7	FUND	30	1.5	h	34.1	5.4	30.0	93.2	/	/
11490.00	31.4	avg	180	1.2	v	35.1	5.6	30.0	42.1	54	-11.9
11490.00	31.1	avg	45	1.5	h	35.1	5.6	30.0	41.8	54	-12.2
17235.00	29.3	avg	0	1.2	v	35.1	5.6	30.0	40.0	54	-14.0
17235.00	29.1	avg	30	1.2	h	35.1	5.6	30.0	39.8	54	-14.2
11490.00	36.9	Peak	180	1.2	v	35.1	5.6	30.0	47.6	74	-26.4
11490.00	36.1	Peak	45	1.5	h	35.1	5.6	30.0	46.8	74	-27.2
17235.00	34.3	Peak	0	1.2	v	35.1	5.6	30.0	45.0	74	-29.0
17235.00	34.0	Peak	30	1.2	h	35.1	5.6	30.0	44.7	74	-29.3
High Band, Middle Channel, 1-50GHz											
5775.00	81.2	FUND	90	1.2	v	34.1	5.4	30.0	90.7	/	/
5775.00	76.1	FUND	90	1.2	h	34.1	5.4	30.0	85.6	/	/
11550.00	32.7	avg	90	1.0	v	35.1	5.6	30.0	43.4	54	-10.6
11550.00	30.1	avg	130	1.2	h	35.1	5.6	30.0	40.8	54	-13.2
17325.00	29.3	avg	0	1.5	v	35.1	5.6	30.0	40.0	54	-14.0
17325.00	28.4	avg	30	1.5	h	35.1	5.6	30.0	39.1	54	-14.9
11550.00	37.0	Peak	90	1.0	v	35.1	5.6	30.0	47.7	74	-26.3
11550.00	34.9	Peak	130	1.2	h	35.1	5.6	30.0	45.6	74	-28.4
17325.00	33.9	Peak	0	1.5	v	35.1	5.6	30.0	44.6	74	-29.4
17325.00	32.7	Peak	30	1.5	h	35.1	5.6	30.0	43.4	74	-30.6
High Band, High Channel, 1-50GHz											
5810.00	83.7	FUND	90	1.2	v	34.1	5.4	30.0	93.2	/	/
5810.00	76.2	FUND	180	1.2	h	34.1	5.4	30.0	85.7	/	/
11620.00	31.4	avg	45	1.5	v	35.1	5.6	30.0	42.1	54	-11.9
11620.00	30.1	avg	180	1.4	h	35.1	5.6	30.0	40.8	54	-13.2
17340.00	29.5	avg	150	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
17340.00	28.3	avg	90	1.5	h	35.1	5.6	30.0	39.0	54	-15.0
11620.00	36.9	Peak	45	1.5	v	35.1	5.6	30.0	47.6	74	-26.4
11620.00	35.1	Peak	180	1.4	h	35.1	5.6	30.0	45.8	74	-28.2
17340.00	34.1	Peak	150	1.5	v	35.1	5.6	30.0	44.8	74	-29.2
17340.00	32.9	Peak	90	1.5	h	35.1	5.6	30.0	43.6	74	-30.4

Unwanted Emission, 30 – 1000MHz											
480.01	45.3	/	0	1.4	v	18.3	3.1	25.0	41.7	46	-4.3
225.90	50.1	/	220	1.5	h	11.8	2.2	25.0	39.1	46	-6.9
208.41	46.5	/	270	1.5	v	11.5	2.2	25.0	35.2	43.5	-8.3
192.00	44.2	/	270	1.2	v	13.7	2.1	25.0	35.0	43.5	-8.5
576.10	39.7	/	220	1.5	h	19.3	3.4	25.0	37.4	46	-8.6
128.00	45.6	/	45	1.2	v	11.9	1.6	25.0	34.1	43.5	-9.4

12.6.5 Final test data, ZG1S Antenna (15.407)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Low Band, Low Channel, 1-50GHz											
5150.00	92.30	FUND	0	1.5	v	33.9	5.2	30.0	101.4	/	/
5150.00	81.8	FUND	45	1.8	h	33.9	5.2	30.0	90.9	/	/
10300.00	32.4	avg	180	1.2	v	35.1	5.6	30.0	43.1	54	-10.9
10300.00	31.3	avg	45	1.5	h	35.1	5.6	30.0	42.0	54	-12.0
15450.00	30.5	avg	0	1.2	v	35.1	5.6	30.0	41.2	54	-12.8
15450.00	29.6	avg	30	1.2	h	35.1	5.6	30.0	40.3	54	-13.7
10300.00	38.9	Peak	180	1.2	v	35.1	5.6	30.0	49.6	74	-24.4
10300.00	37.7	Peak	45	1.5	h	35.1	5.6	30.0	48.4	74	-25.6
15450.00	36.4	Peak	0	1.2	v	35.1	5.6	30.0	47.1	74	-26.9
15450.00	35.1	Peak	30	1.2	v	35.1	5.6	30.0	45.8	74	-28.2
Low Band, Middle Channel, 1-50GHz											
5200.00	92.2	FUND	330	1.8	v	33.9	5.2	30.0	101.3	/	/
5200.00	85.1	FUND	0	2.0	h	33.9	5.2	30.0	94.2	/	/
10400.00	32.3	avg	90	1.0	v	35.1	5.6	30.0	43.0	54	-11.0
10400.00	31.5	avg	130	1.2	h	35.1	5.6	30.0	42.2	54	-11.8
15600.00	30.4	avg	0	1.5	v	35.1	5.6	30.0	41.1	54	-12.9
15600.00	29.8	avg	30	1.5	h	35.1	5.6	30.0	40.5	54	-13.5
10400.00	38.7	Peak	90	1.0	v	35.1	5.6	30.0	49.4	74	-24.6
10400.00	37.9	Peak	130	1.2	h	35.1	5.6	30.0	48.6	74	-25.4
15600.00	36.2	Peak	0	1.5	v	35.1	5.6	30.0	46.9	74	-27.1
15600.00	35.5	Peak	30	1.5	h	35.1	5.6	30.0	46.2	74	-27.8
Low Band, High Channel, 1-50GHz											
5250.00	90.7	FUND	180	1.8	v	33.9	5.2	30.0	99.8	/	/
5250.00	83.9	FUND	0	1.8	h	33.9	5.2	30.0	93.0	/	/
10500.00	32.1	avg	45	1.5	v	35.1	5.6	30.0	42.8	54	-11.2
10500.00	31.3	avg	180	1.4	h	35.1	5.6	30.0	42.0	54	-12.0
15750.00	30.2	avg	150	1.5	v	35.1	5.6	30.0	40.9	54	-13.1
15750.00	29.5	avg	90	1.5	h	35.1	5.6	30.0	40.2	54	-13.8
10500.00	38.4	Peak	45	1.5	v	35.1	5.6	30.0	49.1	74	-24.9
10500.00	37.5	Peak	180	1.4	h	35.1	5.6	30.0	48.2	74	-25.8
15750.00	35.9	Peak	150	1.5	v	35.1	5.6	30.0	46.6	74	-27.4
15750.00	35.2	Peak	90	1.5	h	35.1	5.6	30.0	45.9	74	-28.1

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Mid Band, Low Channel, 1-50GHz											
5250.00	90.7	FUND	180	1.8	v	33.9	5.2	30.0	99.8	/	/
5250.00	83.9	FUND	0	1.8	h	33.9	5.2	30.0	93.0	/	/
10500.00	32.1	avg	45	1.5	v	35.1	5.6	30.0	42.8	54	-11.2
10500.00	31.3	avg	180	1.4	h	35.1	5.6	30.0	42.0	54	-12.0
15750.00	30.2	avg	150	1.5	v	35.1	5.6	30.0	40.9	54	-13.1
15750.00	29.5	avg	90	1.5	h	35.1	5.6	30.0	40.2	54	-13.8
10500.00	38.4	Peak	45	1.5	v	35.1	5.6	30.0	49.1	74	-24.9
10500.00	37.5	Peak	180	1.4	h	35.1	5.6	30.0	48.2	74	-25.8
15750.00	35.9	Peak	150	1.5	v	35.1	5.6	30.0	46.6	74	-27.4
15750.00	35.2	Peak	90	1.5	h	35.1	5.6	30.0	45.9	74	-28.1
Mid Band, Middle Channel, 1-50GHz											
5300.00	91.8	FUND	0	1.5	v	33.9	5.2	30.0	100.9	/	/
5300.00	85.2	FUND	160	1.5	h	33.9	5.2	30.0	94.3	/	/
10600.00	32.7	avg	90	1.0	v	35.1	5.6	30.0	43.4	54	-10.6
10600.00	31.9	avg	130	1.2	h	35.1	5.6	30.0	42.6	54	-11.4
15900.00	31.1	avg	0	1.5	v	35.1	5.6	30.0	41.8	54	-12.2
15900.00	29.8	avg	30	1.5	h	35.1	5.6	30.0	40.5	54	-13.5
10600.00	38.8	Peak	90	1.0	v	35.1	5.6	30.0	49.5	74	-24.5
15900.00	36.2	Peak	0	1.5	v	35.1	5.6	30.0	46.9	74	-27.1
10600.00	35.6	Peak	130	1.2	h	35.1	5.6	30.0	46.3	74	-27.7
15900.00	35.6	Peak	30	1.5	h	35.1	5.6	30.0	46.3	74	-27.7
Mid Band, High Channel, 1-50GHz											
5350.00	93.4	FUND	0	1.5	v	33.9	5.2	30.0	102.5	/	/
5350.00	78.2	FUND	210	1.8	h	33.9	5.2	30.0	87.3	/	/
10700.00	33.4	avg	45	1.5	v	35.1	5.6	30.0	44.1	54	-9.9
16050.00	31.9	avg	150	1.5	v	35.1	5.6	30.0	42.6	54	-11.4
10700.00	30.7	avg	180	1.4	h	35.1	5.6	30.0	41.4	54	-12.6
16050.00	29.3	avg	90	1.5	h	35.1	5.6	30.0	40.0	54	-14.0
10700.00	39.2	Peak	45	1.5	v	35.1	5.6	30.0	49.9	74	-24.1
16050.00	36.8	Peak	150	1.5	v	35.1	5.6	30.0	47.5	74	-26.5
10700.00	34.3	Peak	180	1.4	h	35.1	5.6	30.0	45.0	74	-29.0
16050.00	33.5	Peak	90	1.5	h	35.1	5.6	30.0	44.2	74	-29.8

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Band, Low Channel, 1-50GHz											
5725.00	87.10	FUND	30	1.8	v	34.1	5.4	30.0	96.6	/	/
5725.00	81.3	FUND	290	1.5	h	34.1	5.4	30.0	90.8	/	/
11450.00	31.9	avg	180	1.2	v	35.1	5.6	30.0	42.6	54	-11.4
11450.00	30.8	avg	45	1.5	h	35.1	5.6	30.0	41.5	54	-12.5
11450.00	37.4	Peak	180	1.2	v	35.1	5.6	30.0	48.1	74	-25.9
11450.00	35.5	Peak	45	1.5	h	35.1	5.6	30.0	46.2	74	-27.8
17175.00	29.7	avg	0	1.2	v	35.1	5.6	30.0	40.4	54	-13.6
17175.00	28.8	avg	30	1.2	h	35.1	5.6	30.0	39.5	54	-14.5
17175.00	34.6	Peak	0	1.2	v	35.1	5.6	30.0	45.3	74	-28.7
17175.00	33.9	Peak	30	1.2	v	35.1	5.6	30.0	44.6	74	-29.4
High Band, Middle Channel, 1-50GHz											
5775.00	85.2	FUND	110	1.8	v	34.1	5.4	30.0	94.7	/	/
5775.00	81.2	FUND	90	1.5	h	34.1	5.4	30.0	90.7	/	/
11550.00	31.7	avg	90	1.0	v	35.1	5.6	30.0	42.4	54	-11.6
11550.00	30.6	avg	130	1.2	h	35.1	5.6	30.0	41.3	54	-12.7
11550.00	37.2	Peak	90	1.0	v	35.1	5.6	30.0	47.9	74	-26.1
11550.00	35.4	Peak	130	1.2	h	35.1	5.6	30.0	46.1	74	-27.9
17325.00	29.5	avg	0	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
17325.00	28.7	avg	30	1.5	h	35.1	5.6	30.0	39.4	54	-14.6
17325.00	34.2	Peak	0	1.5	v	35.1	5.6	30.0	44.9	74	-29.1
17325.00	33.7	Peak	30	1.5	h	35.1	5.6	30.0	44.4	74	-29.6
High Band, High Channel, 1-50GHz											
5825.00	87.3	FUND	180	1.8	v	34.1	5.4	30.0	96.8	/	/
5825.00	81.6	FUND	270	1.8	h	34.1	5.4	30.0	91.1	/	/
11650.00	32.3	avg	45	1.5	v	35.1	5.6	30.0	43.0	54	-11.0
11650.00	31.1	avg	180	1.4	h	35.1	5.6	30.0	41.8	54	-12.2
11650.00	37.6	Peak	45	1.5	v	35.1	5.6	30.0	48.3	74	-25.7
11650.00	35.7	Peak	180	1.4	h	35.1	5.6	30.0	46.4	74	-27.6
17475.00	30.1	avg	150	1.5	v	35.1	5.6	30.0	40.8	54	-13.2
17475.00	29.4	avg	90	1.5	h	35.1	5.6	30.0	40.1	54	-13.9
17475.00	34.6	Peak	150	1.5	v	35.1	5.6	30.0	45.3	74	-28.7
17475.00	33.9	Peak	90	1.5	h	35.1	5.6	30.0	44.6	74	-29.4

Unwanted Emission, 30 – 1000MHz											
480.01	45.5	/	0	1.4	v	18.3	3.1	25.0	41.9	46	-4.1
225.90	50.2	/	220	1.5	h	11.8	2.2	25.0	39.2	46	-6.8
208.41	46.7	/	270	1.5	v	11.5	2.2	25.0	35.4	43.5	-8.1
192.00	44.3	/	270	1.2	v	13.7	2.1	25.0	35.1	43.5	-8.4
576.10	39.6	/	220	1.5	h	19.3	3.4	25.0	37.3	46	-8.7
128.00	45.9	/	45	1.2	v	11.9	1.6	25.0	34.4	43.5	-9.1

12.6.6 Final test data, Compal Antenna (15.407)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Band, Low Channel, 1-50GHz											
5150.00	87.20	FUND	30	1.2	v	33.9	5.2	30.0	96.3	/	/
5150.00	84.1	FUND	90	1.2	h	33.9	5.2	30.0	93.2	/	/
10300.00	32.3	avg	180	1.2	v	35.1	5.6	30.0	43.0	54	-11.0
10300.00	31.4	avg	45	1.5	h	35.1	5.6	30.0	42.1	54	-11.9
15450.00	30.1	avg	0	1.2	v	35.1	5.6	30.0	40.8	54	-13.2
15450.00	29.8	avg	30	1.2	h	35.1	5.6	30.0	40.5	54	-13.5
10300.00	37.7	Peak	180	1.2	v	35.1	5.6	30.0	48.4	74	-25.6
10300.00	35.9	Peak	45	1.5	h	35.1	5.6	30.0	46.6	74	-27.4
15450.00	34.5	Peak	0	1.2	v	35.1	5.6	30.0	45.2	74	-28.8
15450.00	34.1	Peak	30	1.2	v	35.1	5.6	30.0	44.8	74	-29.2
Low Band, Middle Channel, 1-50GHz											
5200.00	87.1	FUND	90	1.8	v	33.9	5.2	30.0	96.2	/	/
5200.00	84.6	FUND	90	1.5	h	33.9	5.2	30.0	93.7	/	/
10400.00	32.2	avg	90	1.0	v	35.1	5.6	30.0	42.9	54	-11.1
10400.00	31.5	avg	130	1.2	h	35.1	5.6	30.0	42.2	54	-11.8
15600.00	30.2	avg	0	1.5	v	35.1	5.6	30.0	40.9	54	-13.1
15600.00	29.9	avg	30	1.5	h	35.1	5.6	30.0	40.6	54	-13.4
10400.00	37.7	Peak	90	1.0	v	35.1	5.6	30.0	48.4	74	-25.6
10400.00	36.1	Peak	130	1.2	h	35.1	5.6	30.0	46.8	74	-27.2
15600.00	34.4	Peak	0	1.5	v	35.1	5.6	30.0	45.1	74	-28.9
15600.00	34.2	Peak	30	1.5	h	35.1	5.6	30.0	44.9	74	-29.1
Low Band, High Channel, 1-50GHz											
5250.00	86.4	FUND	0	1.5	v	33.9	5.2	30.0	95.5	/	/
5250.00	83.9	FUND	0	1.5	h	33.9	5.2	30.0	93.0	/	/
10500.00	32.0	avg	45	1.5	v	35.1	5.6	30.0	42.7	54	-11.3
10500.00	31.1	avg	180	1.4	h	35.1	5.6	30.0	41.8	54	-12.2
15750.00	30.1	avg	150	1.5	v	35.1	5.6	30.0	40.8	54	-13.2
15750.00	29.6	avg	90	1.5	h	35.1	5.6	30.0	40.3	54	-13.7
10500.00	37.5	Peak	45	1.5	v	35.1	5.6	30.0	48.2	74	-25.8
10500.00	35.9	Peak	180	1.4	h	35.1	5.6	30.0	46.6	74	-27.4
15750.00	34.3	Peak	150	1.5	v	35.1	5.6	30.0	45.0	74	-29.0
15750.00	33.5	Peak	90	1.5	h	35.1	5.6	30.0	44.2	74	-29.8

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Mid Band, Low Channel, 1-50GHz											
5250.00	86.4	FUND	0	1.5	v	33.9	5.2	30.0	95.5	/	/
5250.00	83.9	FUND	0	1.5	h	33.9	5.2	30.0	93.0	/	/
10300.00	32.0	avg	45	1.5	v	35.1	5.6	30.0	42.7	54	-11.3
10300.00	31.1	avg	180	1.4	h	35.1	5.6	30.0	41.8	54	-12.2
15450.00	30.1	avg	150	1.5	v	35.1	5.6	30.0	40.8	54	-13.2
15450.00	29.6	avg	90	1.5	h	35.1	5.6	30.0	40.3	54	-13.7
10300.00	37.5	Peak	45	1.5	v	35.1	5.6	30.0	48.2	74	-25.8
10300.00	35.9	Peak	180	1.4	h	35.1	5.6	30.0	46.6	74	-27.4
15450.00	34.3	Peak	150	1.5	v	35.1	5.6	30.0	45.0	74	-29.0
15450.00	33.5	Peak	90	1.5	h	35.1	5.6	30.0	44.2	74	-29.8
Mid Band, Middle Channel, 1-50GHz											
5300.00	86.2	FUND	90	1.2	v	33.9	5.2	30.0	95.3	/	/
5300.00	85.9	FUND	0	1.2	h	33.9	5.2	30.0	95.0	/	/
10600.00	32.0	avg	90	1.0	v	35.1	5.6	30.0	42.7	54	-11.3
10600.00	31.3	avg	130	1.2	h	35.1	5.6	30.0	42.0	54	-12.0
15900.00	30.1	avg	0	1.5	v	35.1	5.6	30.0	40.8	54	-13.2
15900.00	29.8	avg	30	1.5	h	35.1	5.6	30.0	40.5	54	-13.5
10600.00	37.4	Peak	90	1.0	v	35.1	5.6	30.0	48.1	74	-25.9
10600.00	36.2	Peak	130	1.2	h	35.1	5.6	30.0	46.9	74	-27.1
15900.00	34.2	Peak	0	1.5	v	35.1	5.6	30.0	44.9	74	-29.1
15900.00	33.9	Peak	30	1.5	h	35.1	5.6	30.0	44.6	74	-29.4
Mid Band, High Channel, 1-50GHz											
5350.00	85.8	FUND	15	1.2	v	33.9	5.2	30.0	94.9	/	/
5350.00	84.6	FUND	90	1.2	h	33.9	5.2	30.0	93.7	/	/
10700.00	31.9	avg	45	1.5	v	35.1	5.6	30.0	42.6	54	-11.4
10700.00	30.7	avg	180	1.4	h	35.1	5.6	30.0	41.4	54	-12.6
16050.00	30.0	avg	150	1.5	v	35.1	5.6	30.0	40.7	54	-13.3
16050.00	29.6	avg	90	1.5	h	35.1	5.6	30.0	40.3	54	-13.7
10700.00	37.2	Peak	45	1.5	v	35.1	5.6	30.0	47.9	74	-26.1
10700.00	35.8	Peak	180	1.4	h	35.1	5.6	30.0	46.5	74	-27.5
16050.00	34.1	Peak	150	1.5	v	35.1	5.6	30.0	44.8	74	-29.2
16050.00	33.6	Peak	90	1.5	h	35.1	5.6	30.0	44.3	74	-29.7

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Band, Low Channel, 1-50GHz											
5725.00	83.10	FUND	110	1.2	v	34.1	5.4	30.0	92.6	/	/
5725.00	82.7	FUND	15	1.2	h	34.1	5.4	30.0	92.2	/	/
11450.00	31.5	avg	180	1.2	v	35.1	5.6	30.0	42.2	54	-11.8
11450.00	30.7	avg	45	1.5	h	35.1	5.6	30.0	41.4	54	-12.6
17175.00	29.8	avg	0	1.2	v	35.1	5.6	30.0	40.5	54	-13.5
17175.00	28.7	avg	30	1.2	h	35.1	5.6	30.0	39.4	54	-14.6
11450.00	37.2	Peak	180	1.2	v	35.1	5.6	30.0	47.9	74	-26.1
11450.00	35.5	Peak	45	1.5	h	35.1	5.6	30.0	46.2	74	-27.8
17175.00	34.4	Peak	0	1.2	v	35.1	5.6	30.0	45.1	74	-28.9
17175.00	33.8	Peak	30	1.2	v	35.1	5.6	30.0	44.5	74	-29.5
High Band, Middle Channel, 1-50GHz											
5775.00	85.2	FUND	45	1.2	v	34.1	5.4	30.0	94.7	/	/
5775.00	81.6	FUND	90	1.2	h	34.1	5.4	30.0	91.1	/	/
11550.00	31.7	avg	90	1.0	v	35.1	5.6	30.0	42.4	54	-11.6
11550.00	30.7	avg	130	1.2	h	35.1	5.6	30.0	41.4	54	-12.6
17325.00	29.5	avg	0	1.5	v	35.1	5.6	30.0	40.2	54	-13.8
17325.00	28.9	avg	30	1.5	h	35.1	5.6	30.0	39.6	54	-14.4
11550.00	37.2	Peak	90	1.0	v	35.1	5.6	30.0	47.9	74	-26.1
11550.00	35.6	Peak	130	1.2	h	35.1	5.6	30.0	46.3	74	-27.7
17325.00	34.2	Peak	0	1.5	v	35.1	5.6	30.0	44.9	74	-29.1
17325.00	33.8	Peak	30	1.5	h	35.1	5.6	30.0	44.5	74	-29.5
High Band, High Channel, 1-50GHz											
5825.00	84.9	FUND	45	1.2	v	34.1	5.4	30.0	94.4	/	/
5825.00	81.6	FUND	0	1.5	h	34.1	5.4	30.0	91.1	/	/
11650.00	31.5	avg	45	1.5	v	35.1	5.6	30.0	42.2	54	-11.8
11650.00	30.7	avg	180	1.4	h	35.1	5.6	30.0	41.4	54	-12.6
17475.00	29.4	avg	150	1.5	v	35.1	5.6	30.0	40.1	54	-13.9
17475.00	28.9	avg	90	1.5	h	35.1	5.6	30.0	39.6	54	-14.4
11650.00	37.1	Peak	45	1.5	v	35.1	5.6	30.0	47.8	74	-26.2
11650.00	35.6	Peak	180	1.4	h	35.1	5.6	30.0	46.3	74	-27.7
17475.00	34.1	Peak	150	1.5	v	35.1	5.6	30.0	44.8	74	-29.2
17475.00	33.8	Peak	150	1.5	v	35.1	5.6	30.0	44.5	74	-29.5

Unwanted Emission, 30 – 1000MHz											
480.01	45.4	/	0	1.4	v	18.3	3.1	25.0	41.8	46	-4.2
225.90	50.2	/	220	1.5	h	11.8	2.2	25.0	39.2	46	-6.8
208.41	46.6	/	270	1.5	v	11.5	2.2	25.0	35.3	43.5	-8.2
192.00	43.9	/	270	1.2	v	13.7	2.1	25.0	34.7	43.5	-8.8
576.10	39.4	/	220	1.5	h	19.3	3.4	25.0	37.1	46	-8.9
128.00	45.7	/	45	1.2	v	11.9	1.6	25.0	34.2	43.5	-9.3

13 - CONDUCTED EMISSIONS

13.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

13.2 EUT Setup

The measurement was performed at the **Open Area Test Site**, using the same setup per ANSI C63.4-1992 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host PC system was connected with 110Vac/60Hz power source.

13.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed.....	Auto
IF Bandwidth.....	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth.....	9 kHz
Quasi-Peak Adapter Mode.....	Normal

13.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB μ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

13.5 Summary of Test Results

According to the data in section 11.6, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

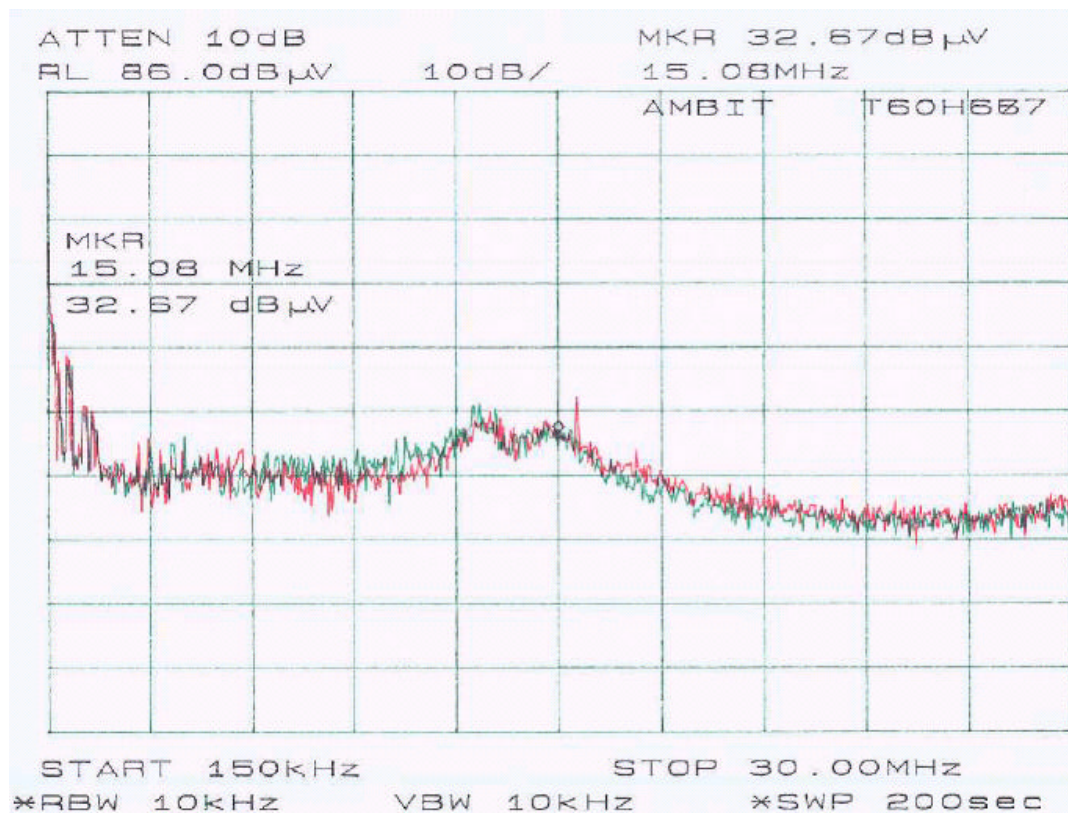
-3.9 dB μ V at 0.150 MHz in the Neutral mode

13.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
0.150	62.1	QP	Neutral	66	-3.9
0.150	51.8	AVE	Neutral	56	-4.2
0.210	48.7	AVE	Line	53	-4.3
0.210	56.2	QP	Line	63	-6.8
0.760	44.2	QP	Neutral	56	-11.8
0.770	41.9	QP	Line	56	-14.1
15.620	38.4	QP	Neutral	60	-21.6
12.590	37.2	QP	Line	60	-22.8

13.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.



14 - Discontinue Transmitting With Absence Of Data Or Operational Failure

According to § 15.407 (c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the user of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application a description of how this requirement is met.

Please refer to respective technical description.

15 - Frequency Stability

16.1 Standard Applicable

According to §15.407 (g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation .

16.2 Measurement Result

Please refer to following pages for plots of spurious emission.

