

# FCC PART 15 SUBPART C

## EMI Measurement and TEST REPORT



For

Proxim Corporation

935 Stewart Drive  
Sunnyvale, CA 94085

**FCC ID: HZB-A09UCF**

2003-08-11

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> UNII/ISM Radio Network Equipment
<b>Test Engineer:</b> Benjamin Jing / 	
<b>Report No.:</b> R0306091	
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**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.

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## 1 - GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

The FCC ID: HZB-A09UCF product is based on a previously approved wireless LAN product FCC ID: HZB-A13QBF. The hardware electronics of the two products before antenna connection are exactly identical. The only difference between the two products is after the antenna connection. The HZB-A13QBF uses an integrated antenna attached to the radio, while the HZB-A09UCF has a pigtail out of the radio card leading to an N type connector, which will be used for connection to an external antenna. The connection to the integrated antenna on the HZB-A09UCF is cut off even though the unused antenna module remains mounted on the product body.

The HZB-A09UCF product requires the use of external antennas and must be professionally installed. The radio has been tested with the maximum gain antenna of each antenna type that could potentially be used with the radio and a minimum gain antenna of all types for radiated emission.

Due to the identical internal design of HZB-A09UCF and HZB-A13QBF, the conducted emission out of the radio card is identical of both products.

The HZB-A09UCF product can be used to establish a point-to-point link or a point-to-multipoint wireless network with a base unit and one or multiple remote units. Depending on the firmware loaded into the product (which defines the features or the communication mode without changing the emission features), the same product hardware can be made at the factory to be either a base station unit, or a subscriber unit, or a residential subscriber unit. Therefore, all different models are covered by the HZB-A09UCF.

The following list includes the product kits marketable in the US:

5054-BSU-US	Tsunami MP.11a Base Station Unit 5 GHz US/CAN
5054-BSU-AU	Tsunami MP.11a Base Station Unit 5 GHz AUS
5054-SU-US	Tsunami MP.11a Subscriber Unit 5 GHz US/CAN
5054-SU-AU	Tsunami MP.11a Subscriber Unit 5 GHz AUS
5054-RSU-US	Tsunami MP.11a Residential Subscriber Unit 5 GHz US/CAN
5054-RSU-AU	Tsunami MP.11a Residential Subscriber Unit 5 GHz AUS
5054-RSU-US-MP	Tsunami MP.11a Residential Subscriber Unit 5 GHz US/CAN 5-pack
5054-RSU-AU-MP	Tsunami MP.11a Residential Subscriber Unit 5 GHz AUS 5-pack
5054-RSU-US-MP	Tsunami MP.11a Residential Subscriber Unit 5 GHz US/CAN 5-pack

Depending on future applications, market needs, or OEM opportunities, new kits may be generated from the same product platform.

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

## 1.2 Objective

This type approval report is prepared on behalf of *Proxim 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 the product compliance to FCC Part 15.407 when operating at 5.25-5.35GHz Band and to 15.247 when operating at 5.725-5.85 GHz Band 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)

ADT FCC report for FCC IDL HZB-A13QBF.

## 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**

Item #	Manufacturer	Description	Model	Serial Number	Cal. Due Date
1	HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30
2	HP	Amplifier	8447E	2944A07030	2003-06-28
3	HP	Quasi-Peak Adapter	85650A	2521A00718	2004-03-08
4	Com-Power	Biconical Antenna	AB-100	14012	2003-09-05
5	Com-Power	Log Periodic Antenna	AL-100	16005	2003-08-23
6	Com-Power	Log Periodic Antenna	AB-900	15049	2004-05-01
7	Agilent	Spectrum Analyzer (9KHz – 40GHz)	8564E	3943A01781	2003-08-01
8	Agilent	Spectrum Analyzer (9KHz – 50GHz)	8565EC	3946A00131	2004-05-03
9	HP	Amplifier (1-26.5GHz)	8449B	3147A00400	2004-03-14
10	A.H.System	Horn Antenna (700MHz-18GHz)	SAS-200/571	261	2003-05-31
11	HP	Peak Power Meter	432A	1507A	2003-09-16

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

**1.7 Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Laptop PC	PP05	N/A	N/A

**1.8 External I/O Cabling List and Details**

Cable Description	Length (M)	Port/From	To
Non-shielded Cable	1.0	RJ45 Port/EUT	RJ45 Port/ Laptop PC
Non-shielded Cable	1.0	RS232 Port/EUT	RS232 Port/ Laptop PC
Shielded RF Cable	1.0	RF Port/EUT	Antenna

**1.9 Power Supply Information**

Manufacturer	Description	Model	Serial Number	FCC ID
Proxim	AC/DC Power Adaptor	DSA0151F	None	None

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## **2 - SYSTEM TEST CONFIGURATION**

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### **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.

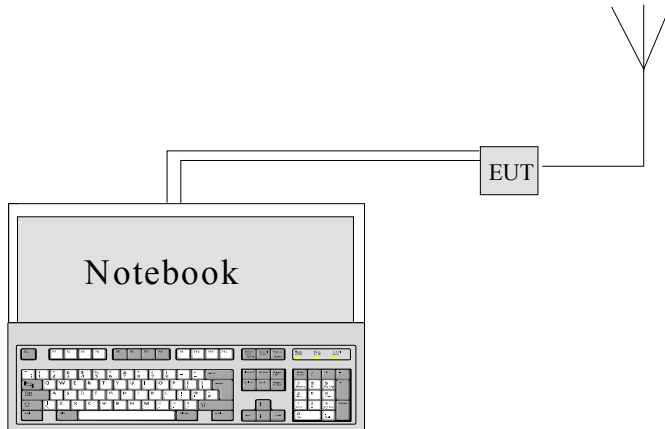
### **2.4 Schematics / Block Diagram**

Please refer to Appendix A.

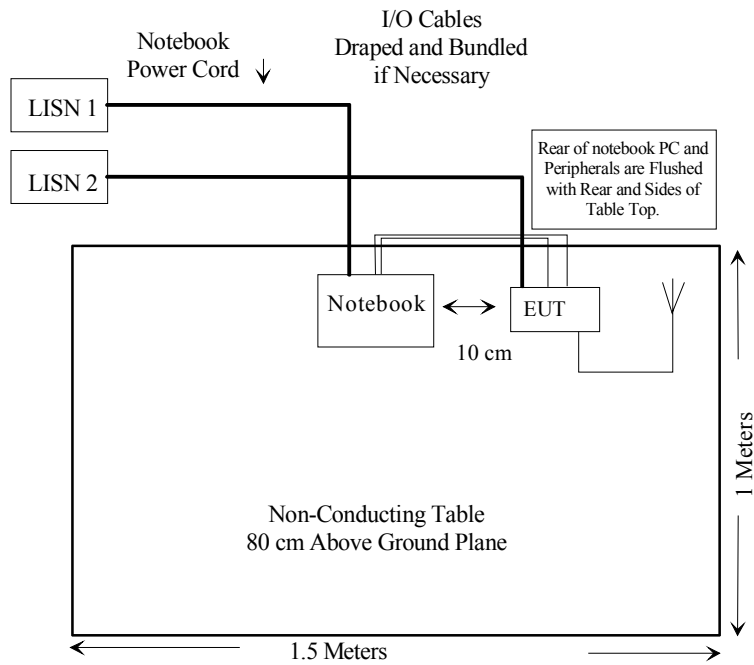
### **2.5 Equipment Modifications**

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 16
§ 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)	Conducted Emission	Compliant	Section 13
§ 15.407 (a)(2)	Power Spectral Density	Compliant	Section 6
§ 15.407 (a)(6)	Peak Excursion to Average Ratio	Compliant	Section 8
§ 15.407 (c)	Discontinue Transmission with Absence of Data of Failure of Operation	Compliant	See Provided Technical Manual
§ 15.407 (g)	Frequency Stability	Compliant	Section 15

## 4 - PEAK OUTPUT POWER MEASUREMENT

### 4.1 Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 5725-5850 MHz: 1 Watt

According to §15.407(a) (2), for the band 5.25~5.35 GHz, the peak power over the frequency band of operation shall not exceed the lesser of 250mW or 11dBm+10log B where B is the 26 dB emission bandwidth in MHz.

### 4.2 Measurement Procedure

#### 4.2.1 For 5250–5350 MHz Band

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 peak power meter.

#### 4.2.2 For 5725-5850 MHz Band

Refer to Section 4.9 – Maximum Peak Output Power of ADT report, test procedure shown on page 96, report number: RF911128H07

### 4.3 Equipment Lists

#### 4.3.1 For 5250–5350 MHz Band

Please refer to section 1.6 of this report. Test equipments used are: 7, 8, 11.

#### 4.3.2 For 5725-5850 MHz Band

Refer to Section 4.9 – Maximum Peak Output Power of ADT report, test instruments shown on page 95, report number: RF911128H07

### 4.4 Measurement Result

#### 4.4.1 For 5250-5350 MHz Band

Mode	Channel	Frequency MHz	RF Power dBm	Limit
Normal	6	5280	17.25	250mW (24 dBm)
Turbo	3	5290	12.13	250mW (24 dBm)
Turbo	3a	5300	14.76	250mW (24 dBm)
Normal	8	5320	14.82	250mW (24dBm)

Note: To compliance with FC 15.407(b)(2) requirement, the peak output power of channel 3 at 5290Mhz is limited to not exceed 12.13 dBm. Please also refer to the frequency selection statement from the manufacturer for more details.

#### **4.4.2 For 5725-5850 MHz Band**

Refer to Section 4.9 - Maximum Peak Output Power of ADT report, test results shown on page 97, report number: RF911128H07

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## **5 – 6 DB BANDWIDTH and 26 DB BANDWIDTH**

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### **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**

#### **5.2.1 For 5250–5350 MHz Band**

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 26 dB from the reference level. Record the frequency difference as the emission bandwidth. (26 dB bandwidth for UNII)
4. Repeat above procedures until all frequencies measured were complete.

#### **5.2.2 For 5725–5850 MHz Band**

Refer to Section 4.8 – 6dB Bandwidth Measurement of ADT report, test procedure shown on page 87, report number: RF911128H07

### **5.3 Test Equipment**

#### **5.3.1 For 5250–5350 MHz Band**

Please refer to section 1.6 of this report. Test equipments used are: 1, 2, 3, 7, 8.

#### **5.3.2 For 5725-5850 MHz Band**

Refer to Section 4.8 – 6dB Bandwidth Measurement of ADT report, test instruments shown on page 86, report number: RF911128H07

### **5.4 Measurement Result**

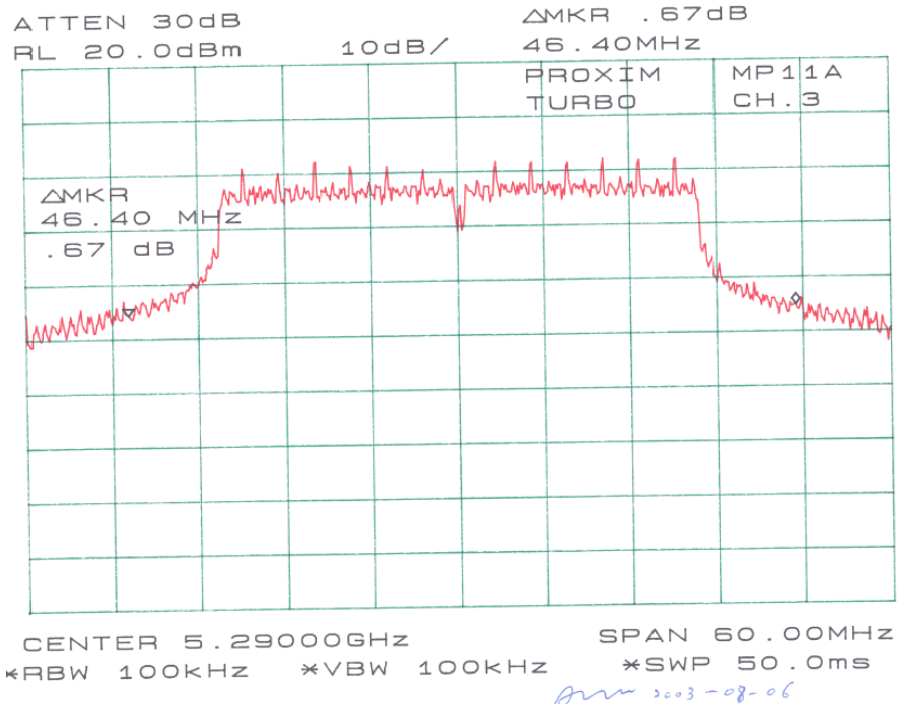
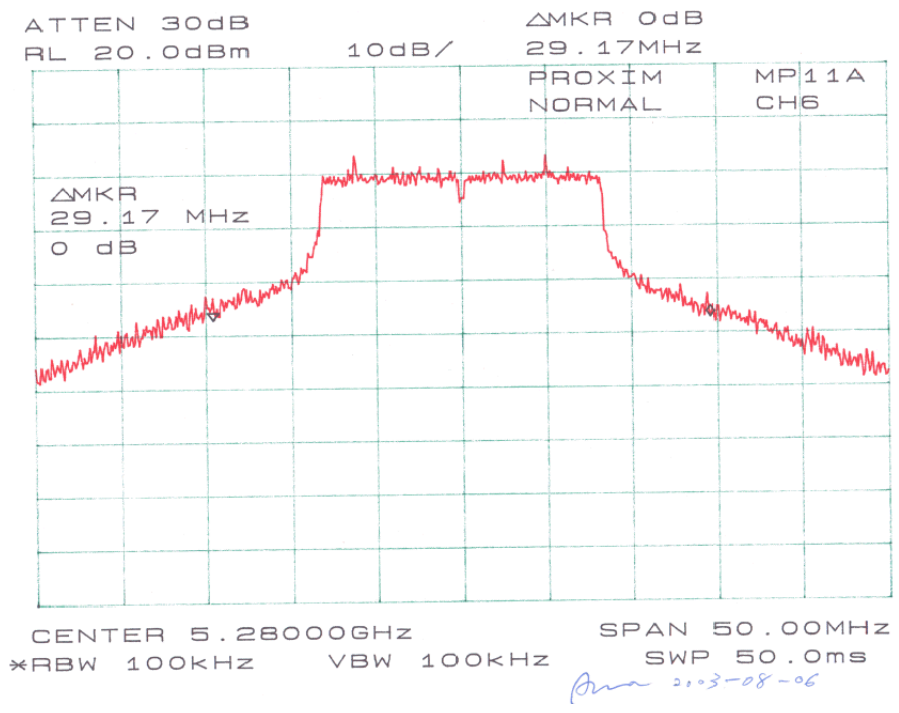
#### **5.4.1 For 5250-5350 MHz Band**

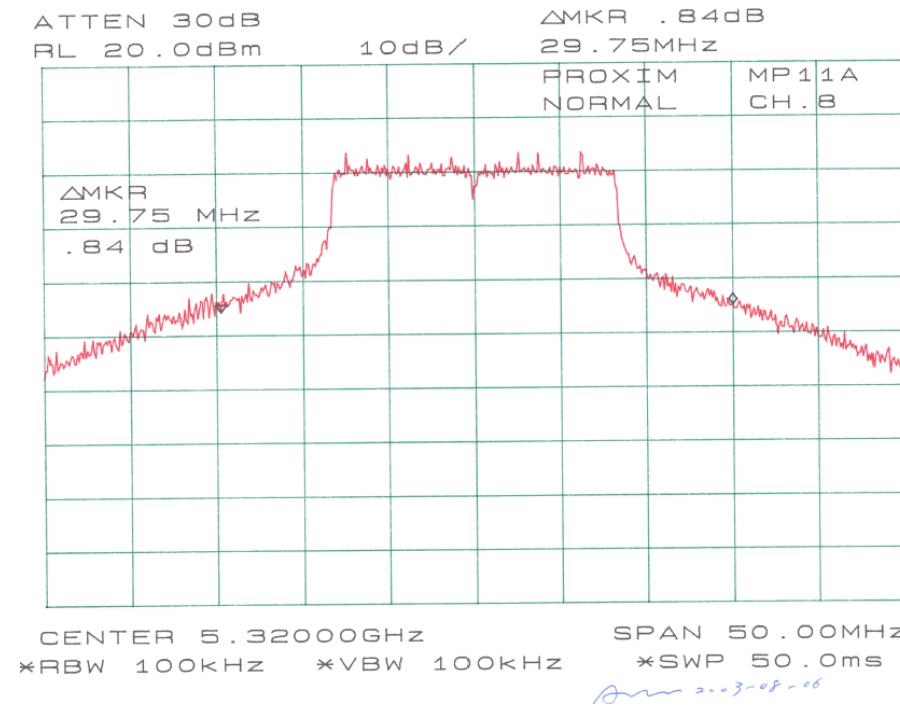
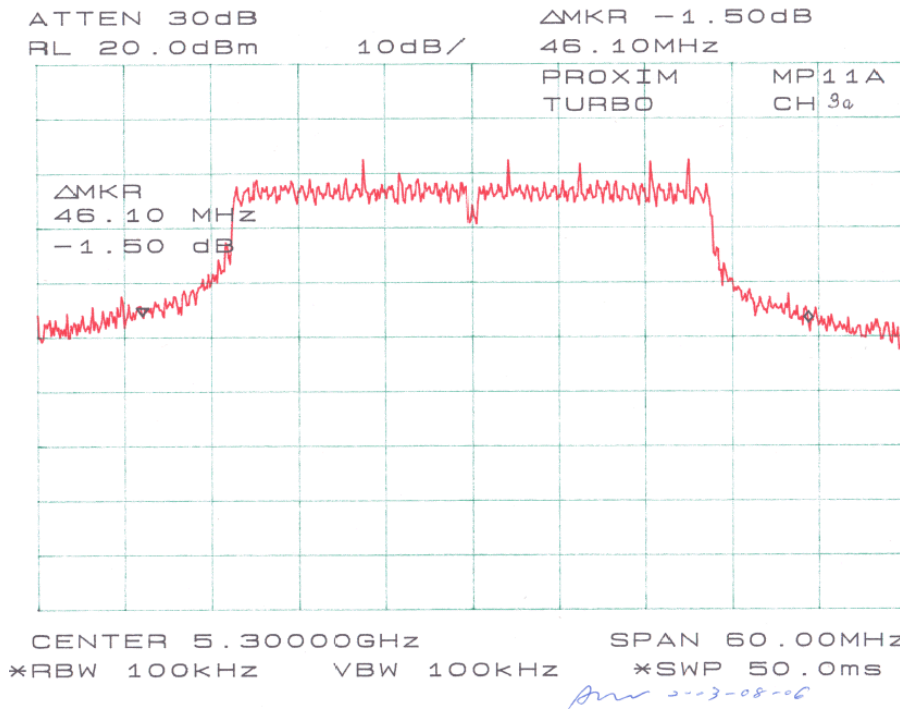
Please refer to the plots in the following page(s).

#### **5.4.2 For 5725-5850 MHz Band**

Refer to Section 4.8 – 6dB Bandwidth Measurement of ADT report, test results shown on page 88 & 92, report number: RF911128H07

Plots of 26dB Bandwidth





## 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. (DTS)
4. Adjust the center frequency of SA on any frequency be measured and set SA to 1MHz 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 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

### 6.4 Measurement Results

#### 6.4.1 Test Result for 5725-5850MHz (15.247)

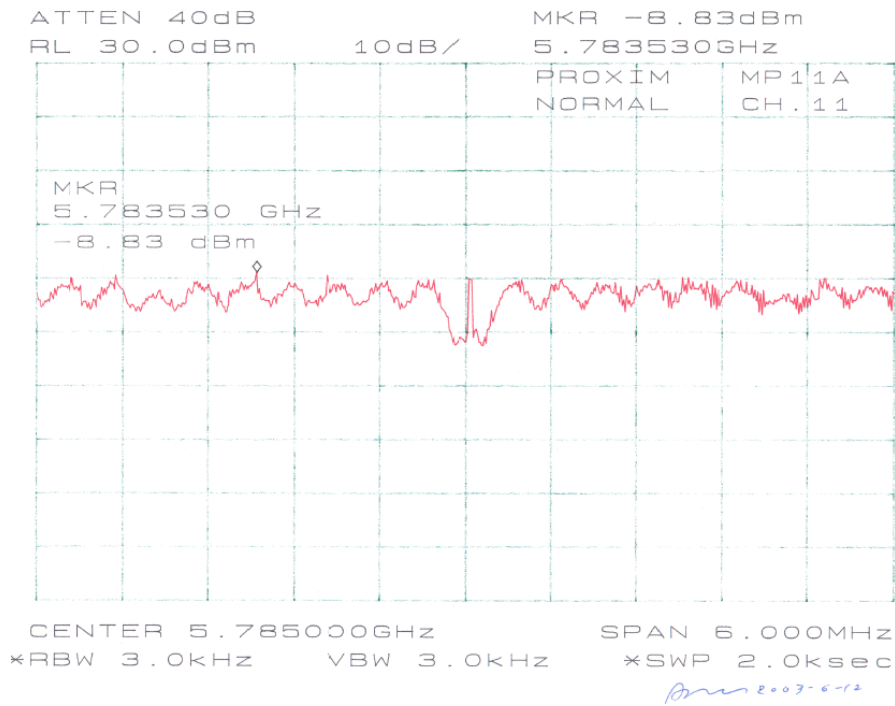
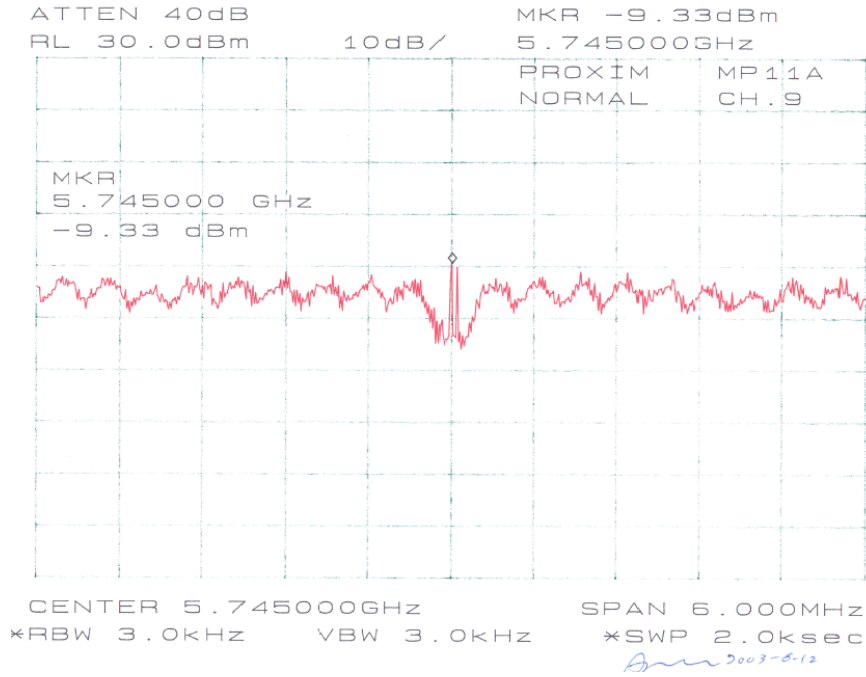
Mode	Channel	Frequency (MHz)	Peak Power Spectral Density (dBm)	Standard (dBm)	Result
Normal	9	5745	-9.33	≤ 8	Compliant
Turbo	11	5785	-8.83	≤ 8	Compliant
Normal	13	5825	-10.67	≤ 8	Compliant

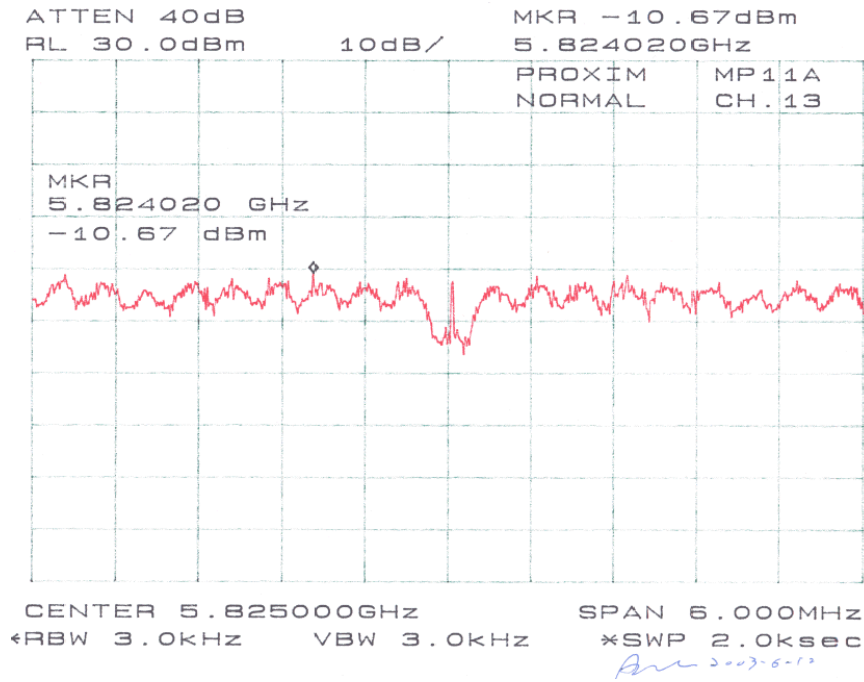
**6.4.2 Test Result for 5250-5350MHz (15.407)**

Mode	Channel	Frequency (MHz)	Peak Power Spectral Density (dBm)	Standard (dBm)	Result
Normal	6	5280	-10.33	$\leq 11$	Compliant
Turbo	3	5290	-11.83	$\leq 11$	Compliant
Turbo	3a	5300	-9.33	$\leq 11$	Compliant
Normal	8	5320	-6.50	$\leq 11$	Compliant

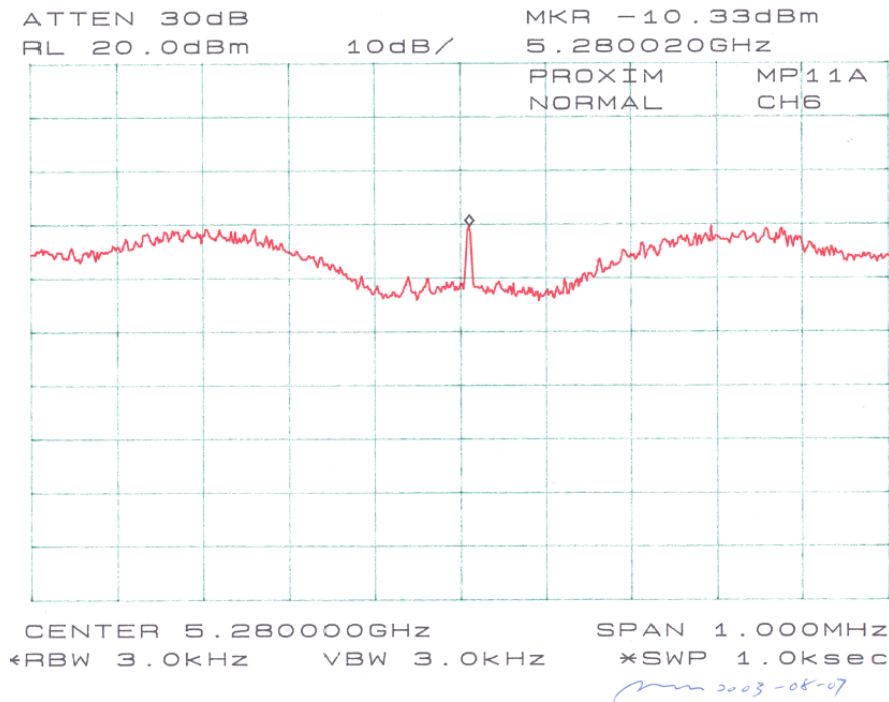


Plots of Power Spectral Density for 5725-5850MHz (15.247)





Plots of Spectral Density for 5250-5350MHz (15.407)







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## **7 - 100 KHZ BANDWIDTH OF BAND EDGES**

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### **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**

Refer to Section 4.11 – Band Edges Measurement of ADT report, test procedure shown on page 107, report number: RF911128H07

### **7.3 Test Equipment**

Refer to Section 4.11 – Band Edges Measurement of ADT report, test instruments shown on page 107, report number: RF911128H07

### **7.4 Measure Results**

Refer to Section 4.11 – Band Edges Measurement of ADT report, test results shown on page 109-112, report number: RF911128H07

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## **8 - Peak Excursion To Average Ratio**

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### **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 Equipment**

Please refer to section 1.6 of this report. Test equipments used are: 1, 2, 3, 7, 8.

### **8.4 Test Result for 15.407**

Please refer to the following plots.

