CKC LABORATORIES, INC. Testing the Future

ACCREDITED
Certicate Numbers
803.01 - 803.06
EMC/SAFETY

ADDENDUM TO FC03-070

FOR THE

THERMAL PRINTER WITH RFID, T5204E

FCC PART 15 SUBPART B SECTION 15.107
AND SUBPART C SECTIONS 15.207, 15.209 & 15.247

COMPLIANCE

DATE OF ISSUE: NOVEMBER 12, 2003

PREPARED FOR:

Printronix
P.O. Box 19559
Irvine, CA 92623-9559

PREPARED BY:

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CKC Laboratories, Inc.
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W.O. No.: 81380

Date of test: October 21-23, 2003

Report No.: FC03-070A

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	October 21-23, 2003
DATE OF RECEIPT:	October 21, 2003
PURPOSE OF TEST:	To demonstrate the compliance of the Thermal Printer with RFID, T5204e, with the requirements for FCC Part 15 Subpart B Section 15.107, Subpart C Section 15.207, 15.209 and 15.247 devices. **Addendum A** is to clarify the setup photos and antenna gain and to revise the MPE calculations.
TEST METHOD:	ANSI C63.4 (1992)
MANUFACTURER:	Printronix P.O. Box 19559 Irvine, CA 92623-9559
REPRESENTATIVE:	Josh Wiseman
TEST LOCATION:	CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92621

SUMMARY OF RESULTS

As received, the Printronix Thermal Printer with RFID, T5204e was found to be fully compliant with the following standards and specifications:

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS 210	5.5	47CFR	15.203	Antenna Connector Requirements
RSS 210	6.2.1	47CFR	15.209	General Radiated Emissions Requirement
RSS 210	6.3	47CFR	15.205	Restricted Bands of Operation
RSS 210	6.4	47CFR	15.215(c)	Frequency Stability Recommendation
RSS 210	6.5	47CFR	15.35(c)	Pulsed Operation
RSS 210	6.6	47CFR	15.207	AC Mains Conducted Emissions Requirement
RSS 210	6.2.2(o)(a1)	47CFR	15.247(a)(1)	Minimum Channel Bandwidth
RSS 210	6.2.2(o)(a1)	47CFR	15.247(g)	Hopping Sequence **– customer to provide**
RSS 210	6.2.2(o)(a1)	47CFR	15.247(h)	Incorporation of Intelligence**– customer to provide**
RSS 210	6.2.2(o)(a2)	47CFR	15.247(a)(1)(i)	Average Time of Occupancy
RSS 210	6.2.2(o)(a2)	47CFR	15.247(b)(2)	RF Power Output
RSS 210	6.2.2(o)(a3)	47CFR	15.247(b)(4)	Directional Gain Antennae **– customer to provide**
RSS 210	6.2.2(o)(e1)	47CFR	15.247(c)	Spurious Emissions
IC 3172-A		90473		Site File No.

Notes: Rule Sections for RSS 210 are in accordance with RSS 210 Issue 5 Amendment 1

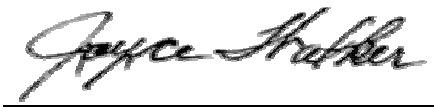
CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:

Chuck Kendall, EMC Test Engineer

FCC 15.31(e) Voltage Variations

FREQUENCY MHz	CORRECTED READING dBµV/m 85%	CORRECTED READING dBµV/m 100%	CORRECTED READING dBµV/m 115%	SPEC LIMIT dBµV/m
926.517	113.0	113.0	113.0	137.0

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.247(b)(1)/15.31(e)
Test Distance: 3 meters

FCC 15.31(m) Number Of Channels
This device operates on 50 channels.

FCC 15.33(a) Frequency Ranges Tested
15.107/15.207 Conducted: 150 kHz – 30 MHz
15.209/15.247 Radiated: 9 kHz – 10 GHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	10 GHz	1 MHz

FCC 15.203 Antenna Requirements
The customer will change the connector used during testing to a solder type, so it will be non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

FCC 15.205 Restricted Bands
The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules. Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

FCC 15.215 Additional Provisions to the General Radiated Emission Limitations
The fundamental frequency was kept within the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. Refer to Appendix B for the test equipment used and Appendix C for the occupied bandwidth plot(s).

Eut Operating Frequency
The EUT was operating at 902-928 MHz.
The EUT is a frequency hopping device operating in the 902 – 928 MHz.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit.

The following model has been tested by CKC Laboratories: **T5204e**

The following additional models are identical electrically to the one which was tested, or any differences between them do not affect their EMC characteristics, and therefore they comply to the level of testing equivalent to the tested models.

T5304e
***4400-004**

*The 4400-004 will show IBM for the Trademark/Company name.

EQUIPMENT UNDER TEST

Thermal Printer with RFID
Manuf: Printronix
Model: T5204e
Serial: 480329082260
FCC ID: E5A-ADRFID (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Laptop Computer
Manuf: Dell
Model: 66902 (Latitude)
Serial: 00066902-12800-82P-3038
FCC ID: DoC

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

REPORT OF MEASUREMENTS

The following tables report the six highest worst case levels recorded during the tests performed on the EUT. All readings taken are peak readings unless otherwise noted. The data sheets from which these tables were compiled are contained in Appendix C.

FCC 15.107/15.207 Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Lisn dB		Cable dB		CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
1.030108	43.7	0.0		0.1		43.8	46.0	-2.2	B
1.068385	43.6	0.0		0.1		43.7	46.0	-2.3	B
24.881560	46.5	0.0		0.3		46.8	50.0	-3.2	W
28.492560	46.2	0.0		0.3		46.5	50.0	-3.5	W
29.424430	47.4	0.0		0.3		47.7	50.0	-2.3	W
29.506660	46.2	0.0		0.3		46.5	50.0	-3.5	W

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Section 15.107/15.207

NOTES: B = Black Lead
W = White Lead

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz. Frequency range tested: 150 kHz – 30 MHz.

FCC 15.209 Six Highest Radiated Emission Levels: 9 kHz - 30 MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY	READING	Ant		Cable	Corr	READING	LIMIT	MARGIN	NOTES
MHz	dBµV	dB	dB	dB	dB	dBµV/m	dBµV/m	dB	
1.982	40.1	10.4		0.3	-40.0	10.8	29.5	-18.7	V
2.581	39.0	10.3		0.3	-40.0	9.6	29.5	-19.9	V
3.303	34.2	10.3		0.3	-40.0	4.8	29.5	-24.7	V
8.499	32.4	10.3		0.5	-40.0	3.2	29.5	-26.3	V
27.160	33.4	8.8		1.0	-40.0	3.2	29.5	-26.3	V
27.900	33.1	8.6		1.0	-40.0	2.7	29.5	-26.8	V

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

NOTES: V = Vertical Polarization

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

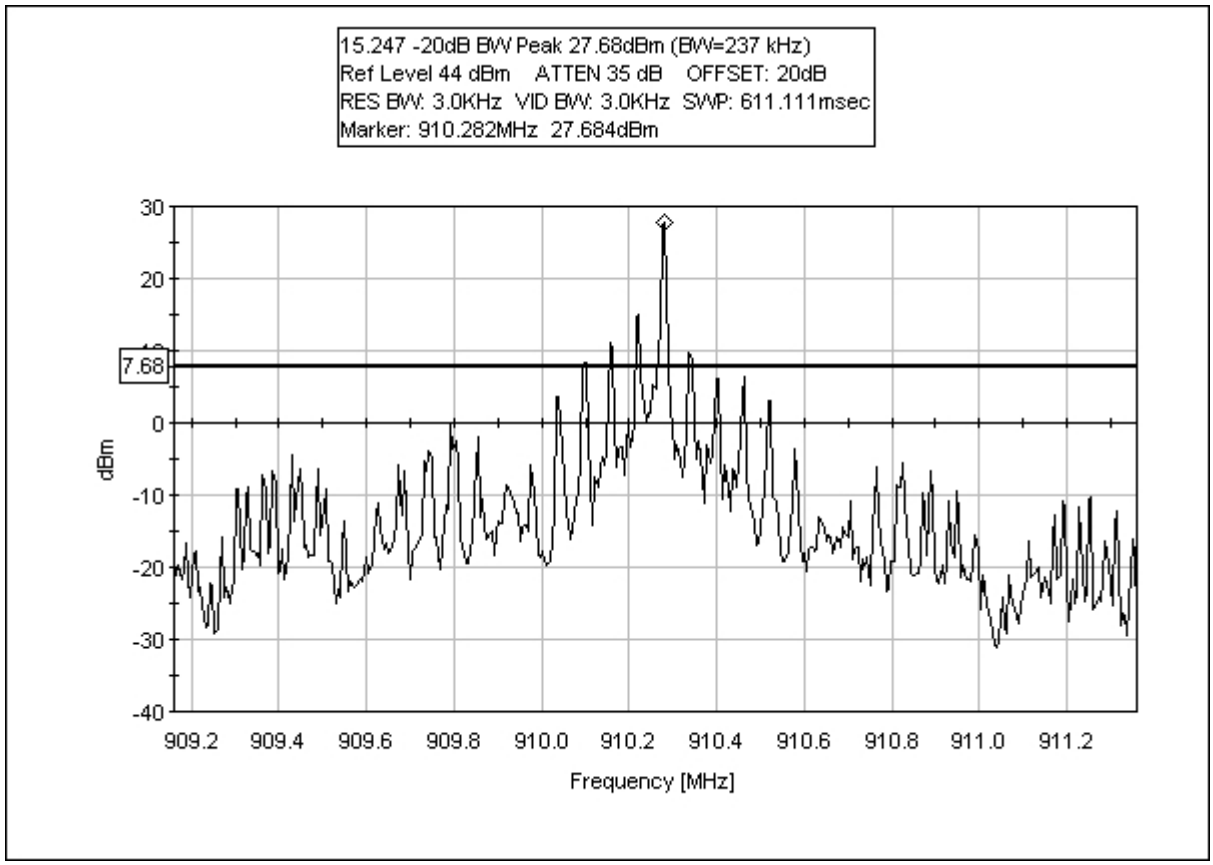
FCC 15.209 Six Highest Radiated Emission Levels: 30-1000 MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY	READING	Ant	Amp	Cable		READING	LIMIT	MARGIN	NOTES
MHz	dBµV	dB	dB	dB	dB	dBµV/m	dBµV/m	dB	
40.022	49.8	15.5	-28.5	1.2		38.0	40.0	-2.0	HQ
40.023	47.9	15.5	-28.5	1.2		36.1	40.0	-3.9	VQ
92.160	51.3	9.9	-28.5	1.9		34.6	43.5	-8.9	V
99.999	51.5	12.1	-28.4	2.0		37.2	43.5	-6.3	V
108.006	47.7	13.7	-28.4	2.1		35.1	43.5	-8.4	V
367.489	43.4	18.6	-28.3	3.9		37.6	46.0	-8.4	H

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

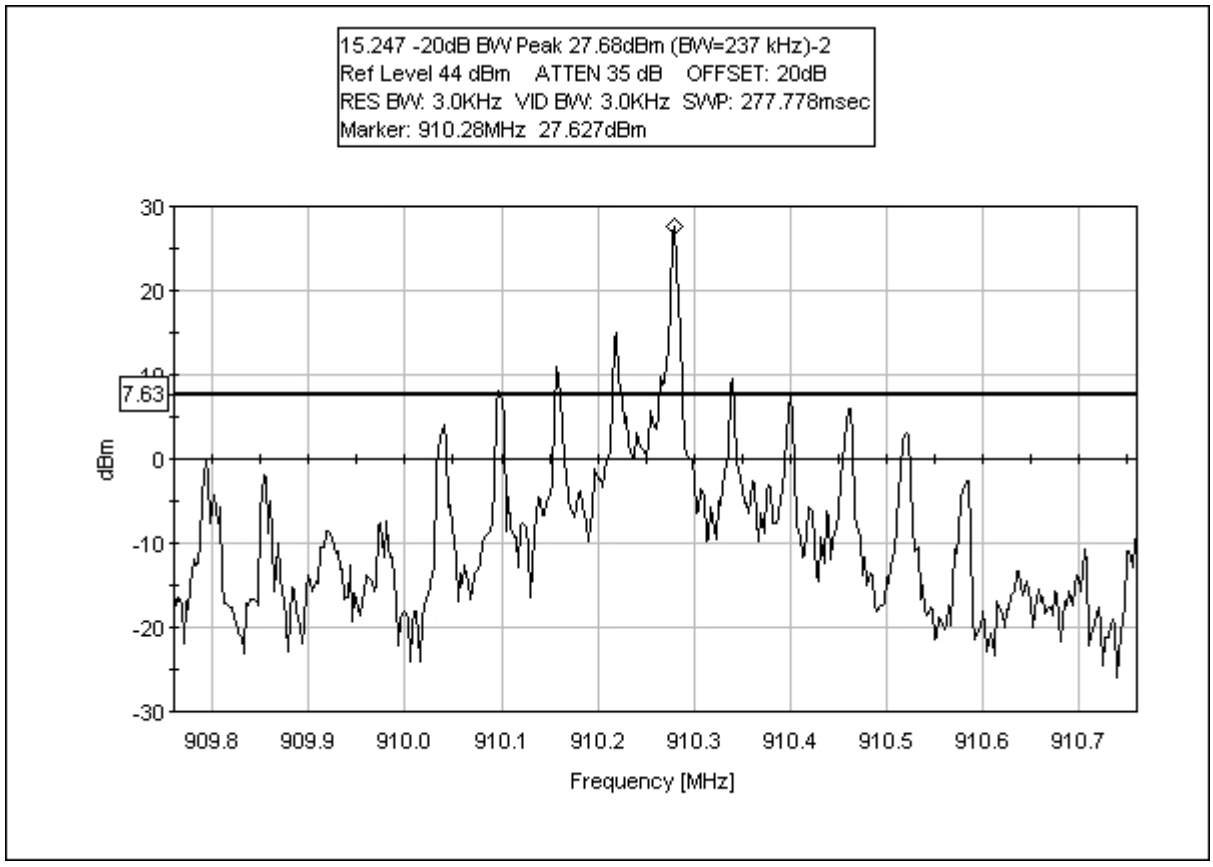
NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

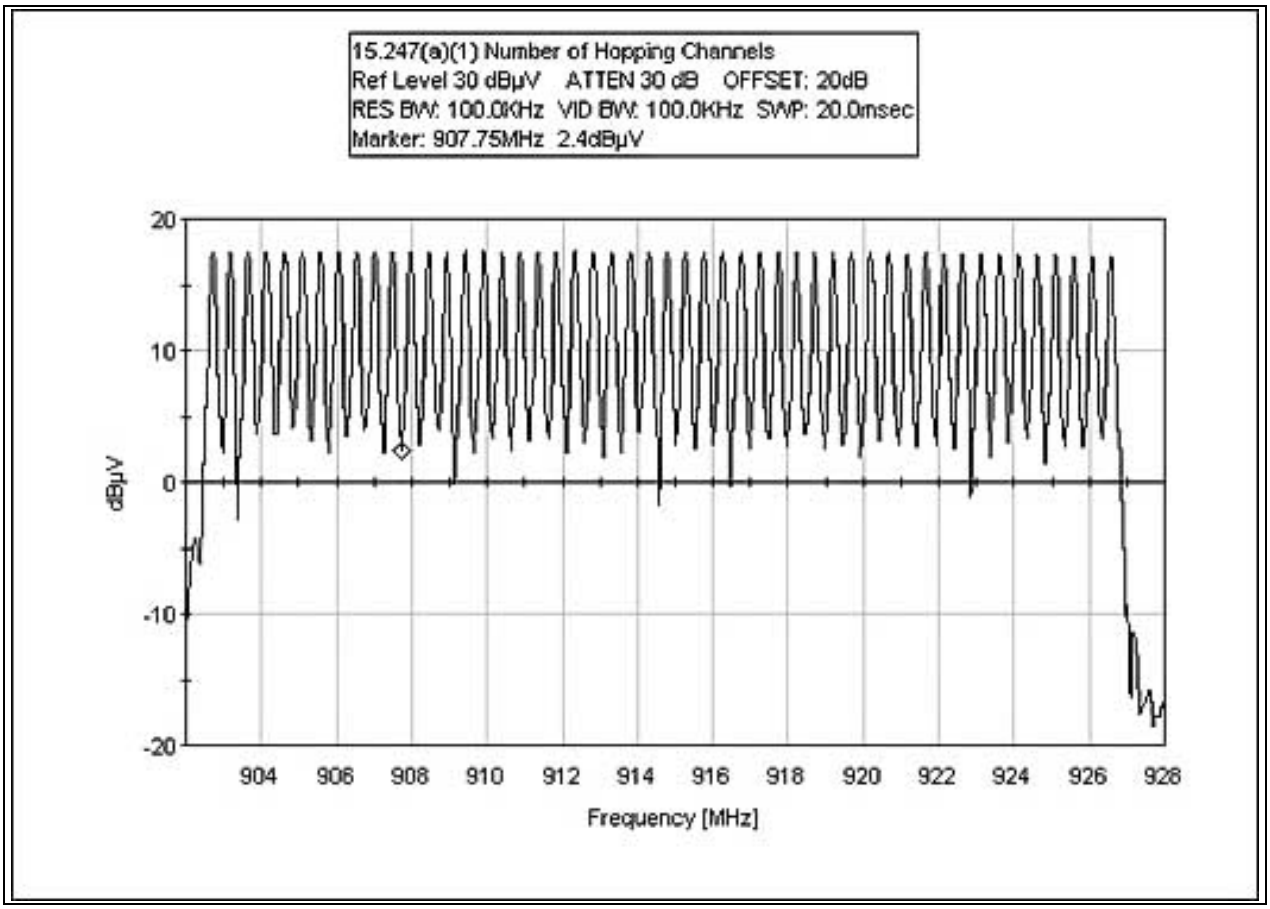
FCC 15.247 20dB BANDWIDTH



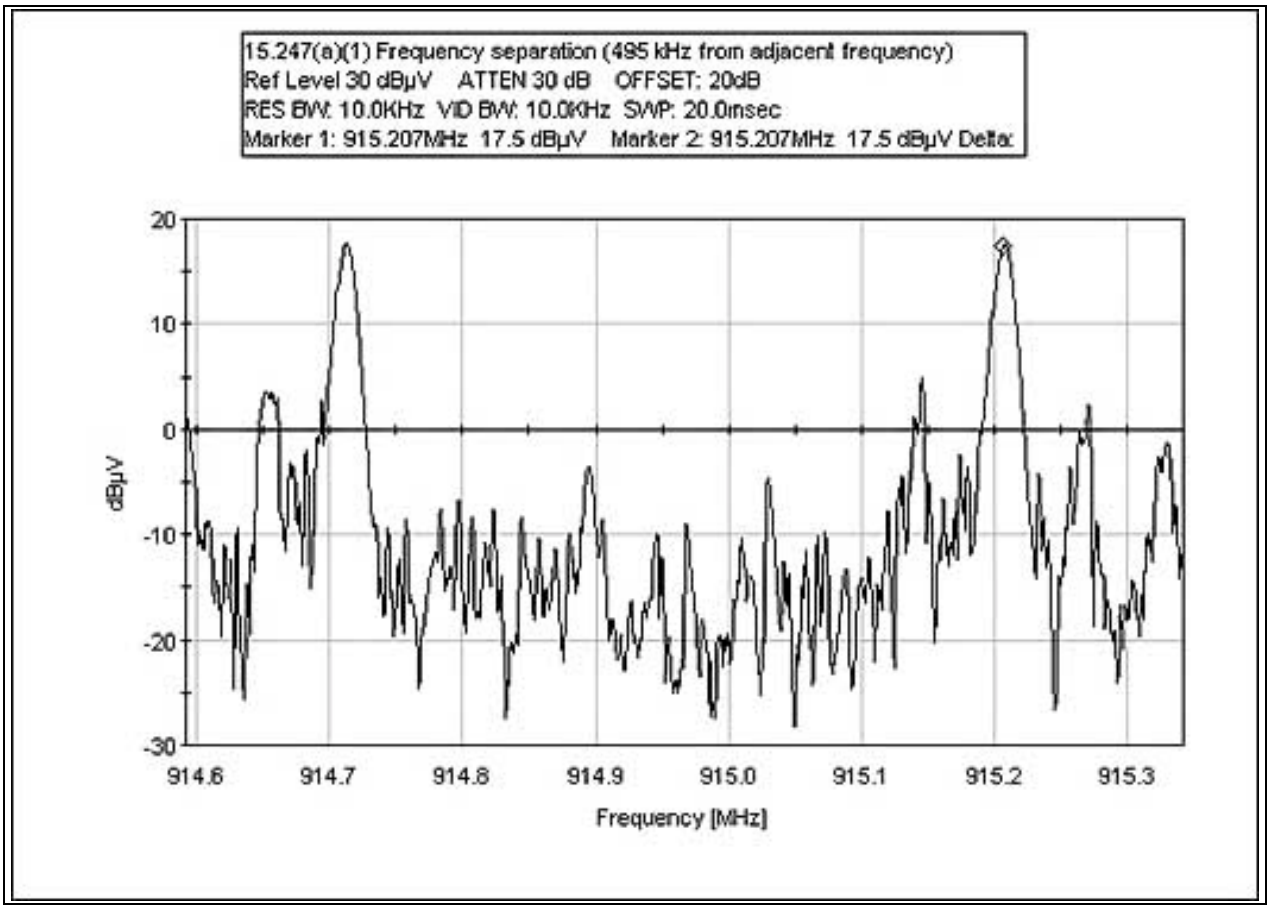
FCC 15.247 20dB BANDWIDTH



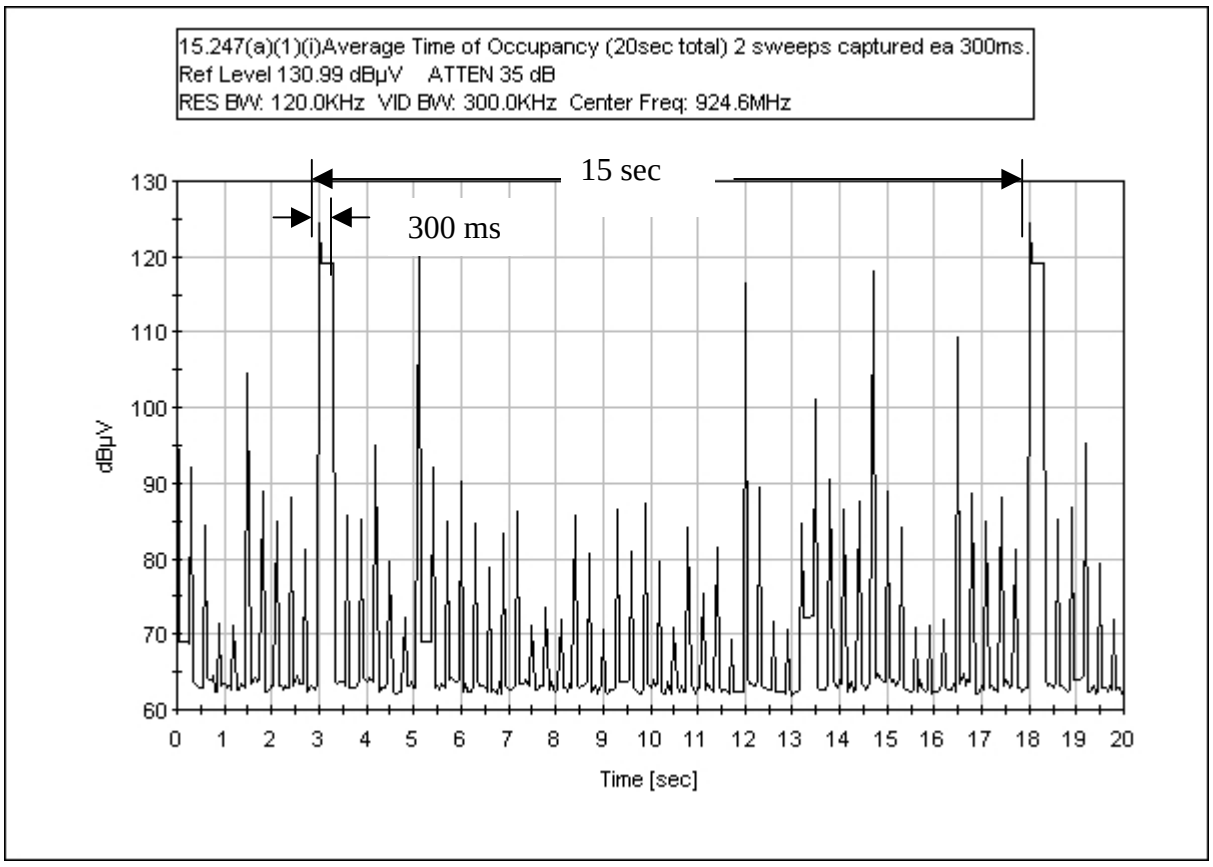
FCC 15.247(a)(1) NUMBER OF HOPPING CHANNELS



FCC 15.247(a)(1) FREQUENCY SEPARATION

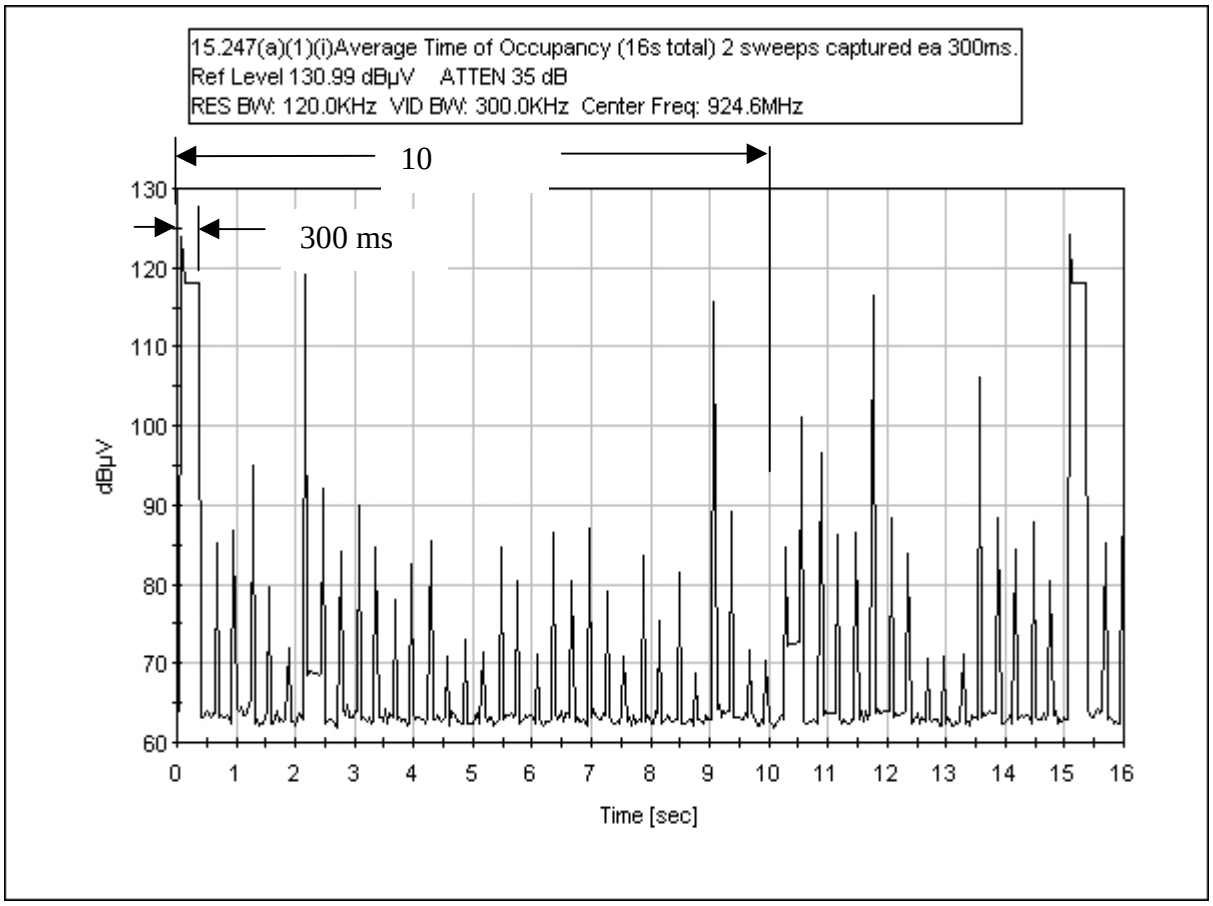


FCC 15.247(a)(1)(i) AVERAGE TIME OF OCCUPANCY



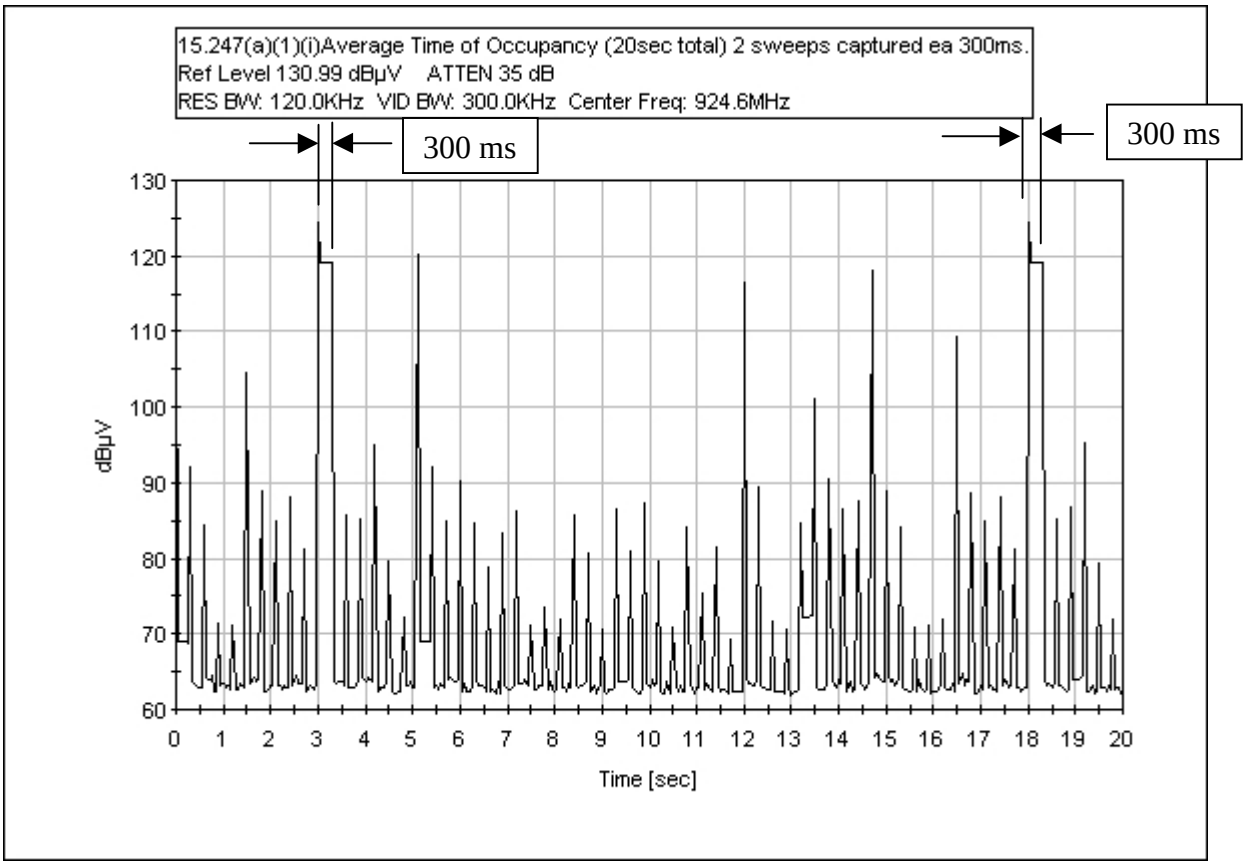
As can be seen in the diagram above the on time at 924.6 MHz is approximately 300 ms per 15 seconds or 300/15 ms or 200 ms/10 seconds. Expressing this in seconds, it is 0.2 seconds for a 10 second period. This is less than 0.41 seconds per 10 second interval.

FCC 15.247(a)(1)(i) AVERAGE TIME OF OCCUPANCY



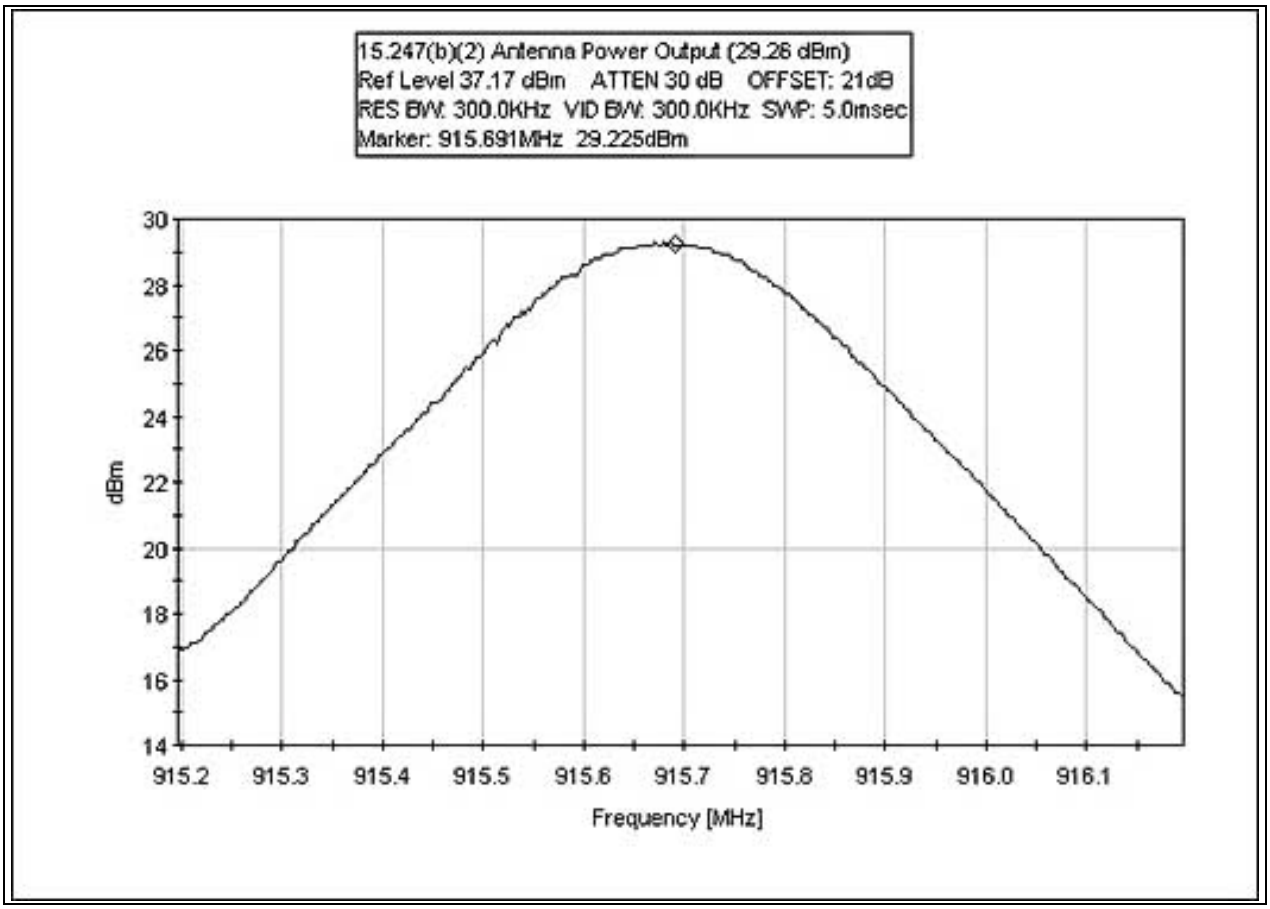
As shown above in a 10 second period the frequency is occupied for approximately 300 ms totally.

FCC 15.247(a)(1)(i) AVERAGE TIME OF OCCUPANCY

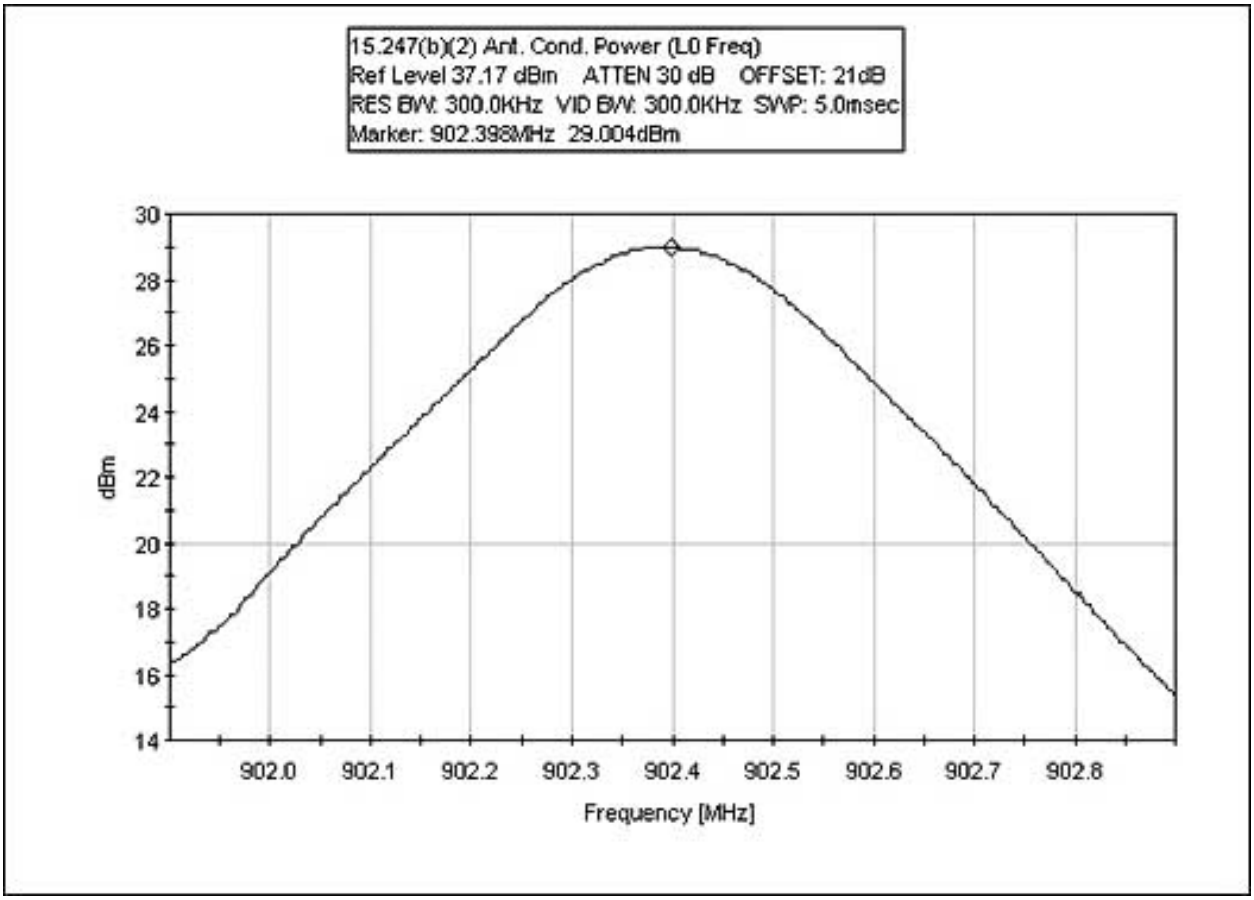


As can be seen in the above 20 second period in zero frequency span, the 924.6 MHz frequency was on twice in a 20 second period. This is an average of 300 ms dwell on this frequency in a ten second period, which is below the 410 ms requirement of the 15.247(a)(1)(i)

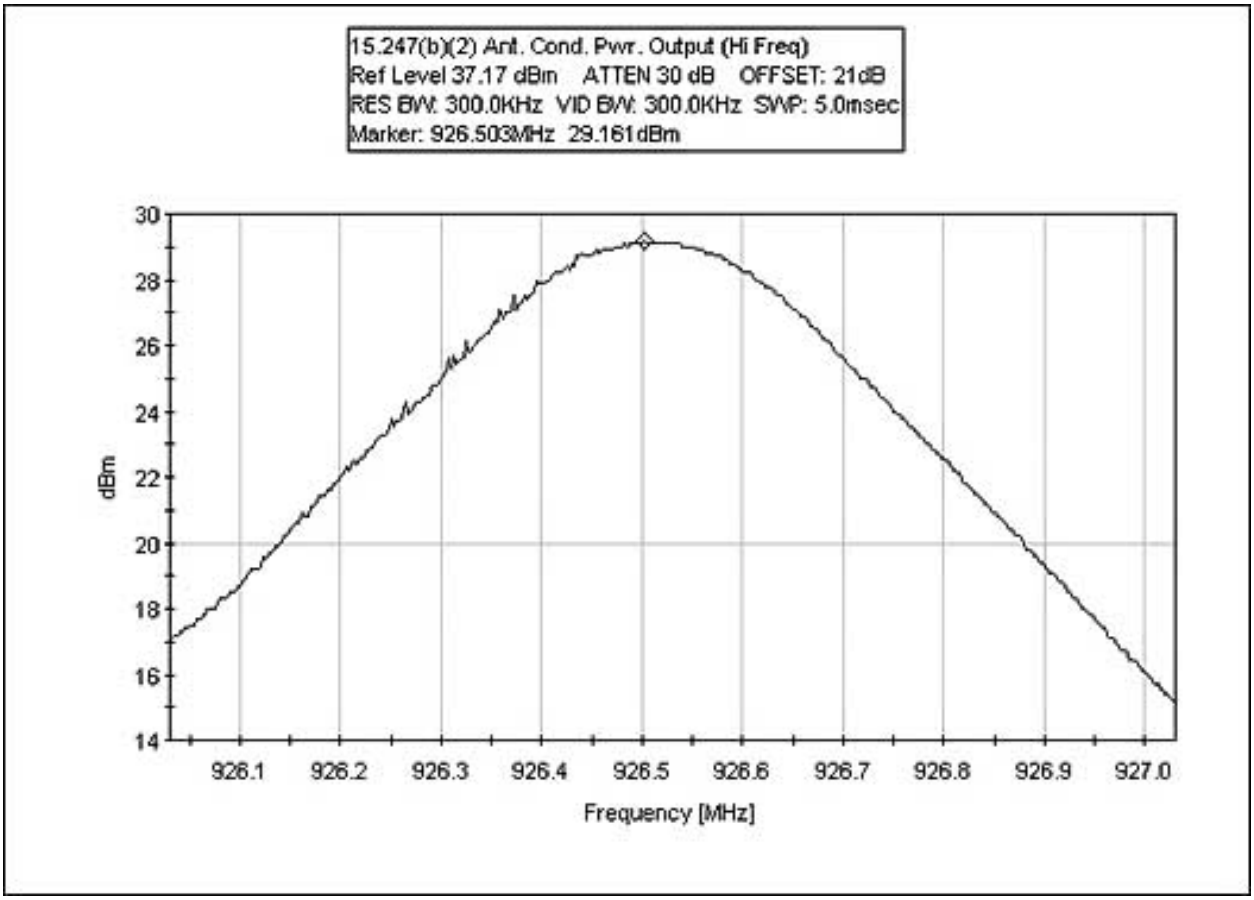
FCC 15.247(b)(2) ANTENNA CONDUCTED POWER OUTPUT 29.26 dBm



FCC 15.247(b)(2) ANTENNA CONDUCTED POWER OUTPUT LOW FREQUENCY



FCC 15.247(b)(2) ANTENNA CONDUCTED POWER OUTPUT HIGH FREQUENCY



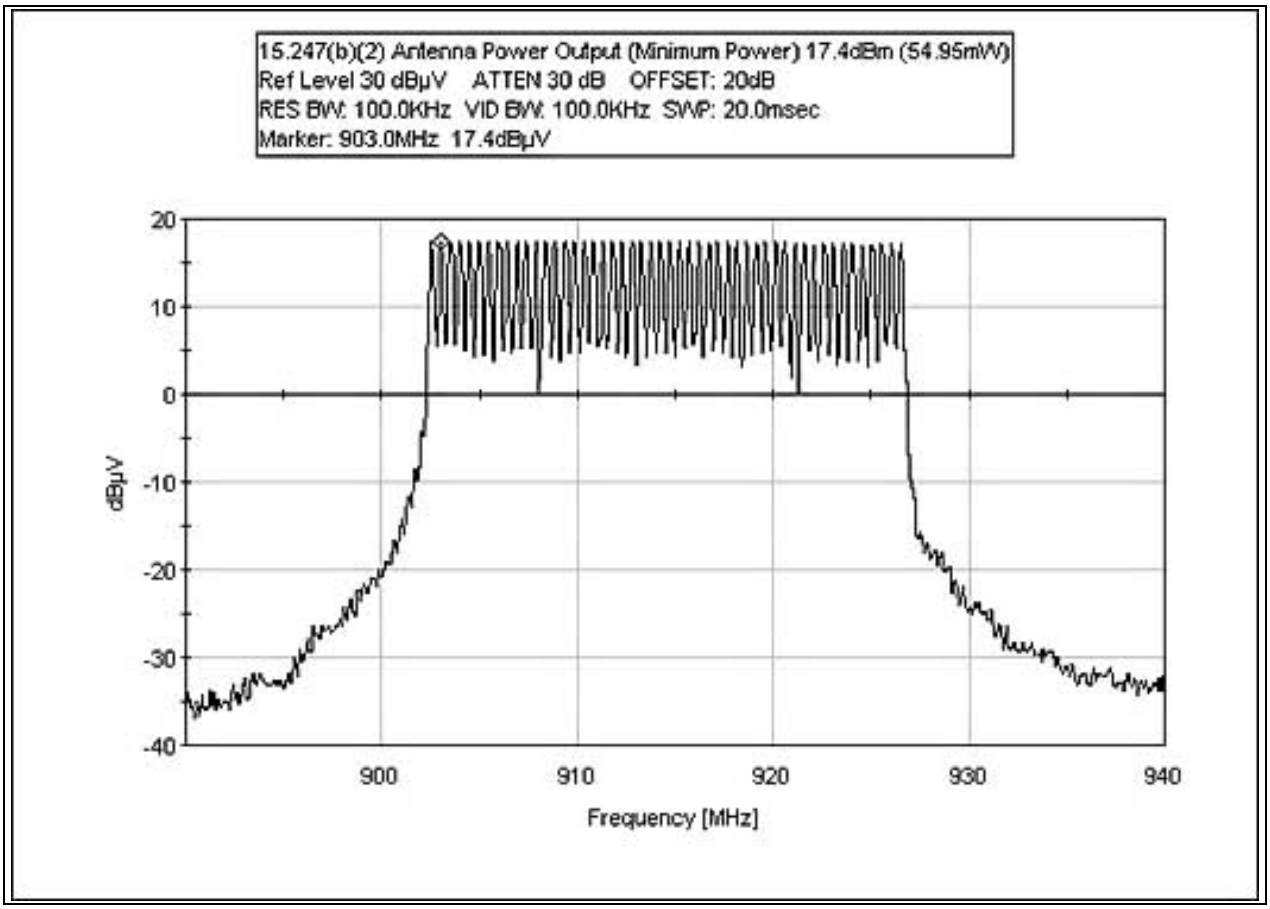
FCC 15.247(b)(2) Power Output									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB		Cable dB		CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
902.392	75.1	24.0		6.6		105.7	137.0	-31.3	V
902.410	75.7	24.0		6.6		106.3	137.0	-30.7	H
915.177	78.6	24.1		6.6		109.3	137.0	-27.7	H
915.192	78.1	24.1		6.6		108.8	137.0	-28.2	V
926.517	82.1	24.2		6.7		113.0	137.0	-24.0	V
926.518	80.2	24.2		6.7		111.1	137.0	-25.9	V

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.247(b)(2)
Test Distance: 3 Meters

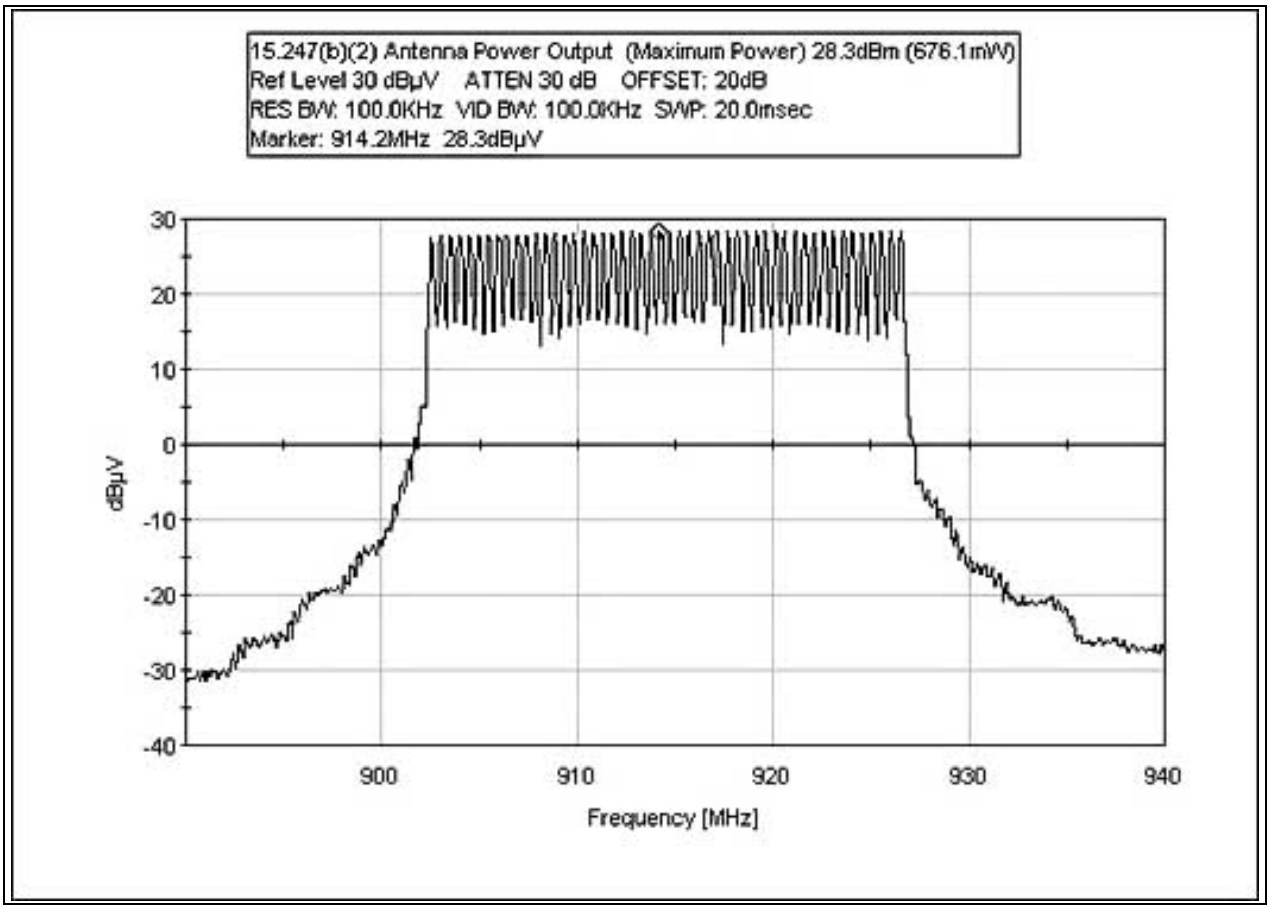
NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

FCC 15.247(b)(2) POWER OUTPUT MIN



FCC 15.247(b)(2) POWER OUTPUT MAX



FCC 15.247 (b)(5)Maximum Permissible Exposure Calculations

Calculations prepared for:

Printronix
PO Box 19559
Irvine, CA 92623-9559

Calculations prepared by:

Mike Wilkinson
CKC Laboratories, Inc.
5473A Clouds Rest Road
Mariposa, CA 95338

Model Number: T5204e

Fundamental Operating Frequency: 902MHz – 928MHz

Maximum Rated Output Power: 1.00 Watt
Measured Output Power: 836.57 mW

MPE Limit in accordance with 1.1310(b): Limits for general population/uncontrolled exposure

MPE Limit = .601 (mW/cm^2)

EIRP (mW)	Distance (cm)	Power Density (mW/cm^2)	Result
836.57mW	**10.52**	**.601**	**Pass**

$$PowerDensity(mW/cm^2) = \frac{EIRP}{4\pi d^2}$$ Given: **EIRP** in *mW* and **d** in *cm*

Under normal operating conditions, the antenna is designed to maintain a separation distance of greater than 20cm from all persons. As can be seen from the MPE results, this device passes the limits specified in 1.1310 at a distance of 10.52cm and at a output power of 836.57 mW.

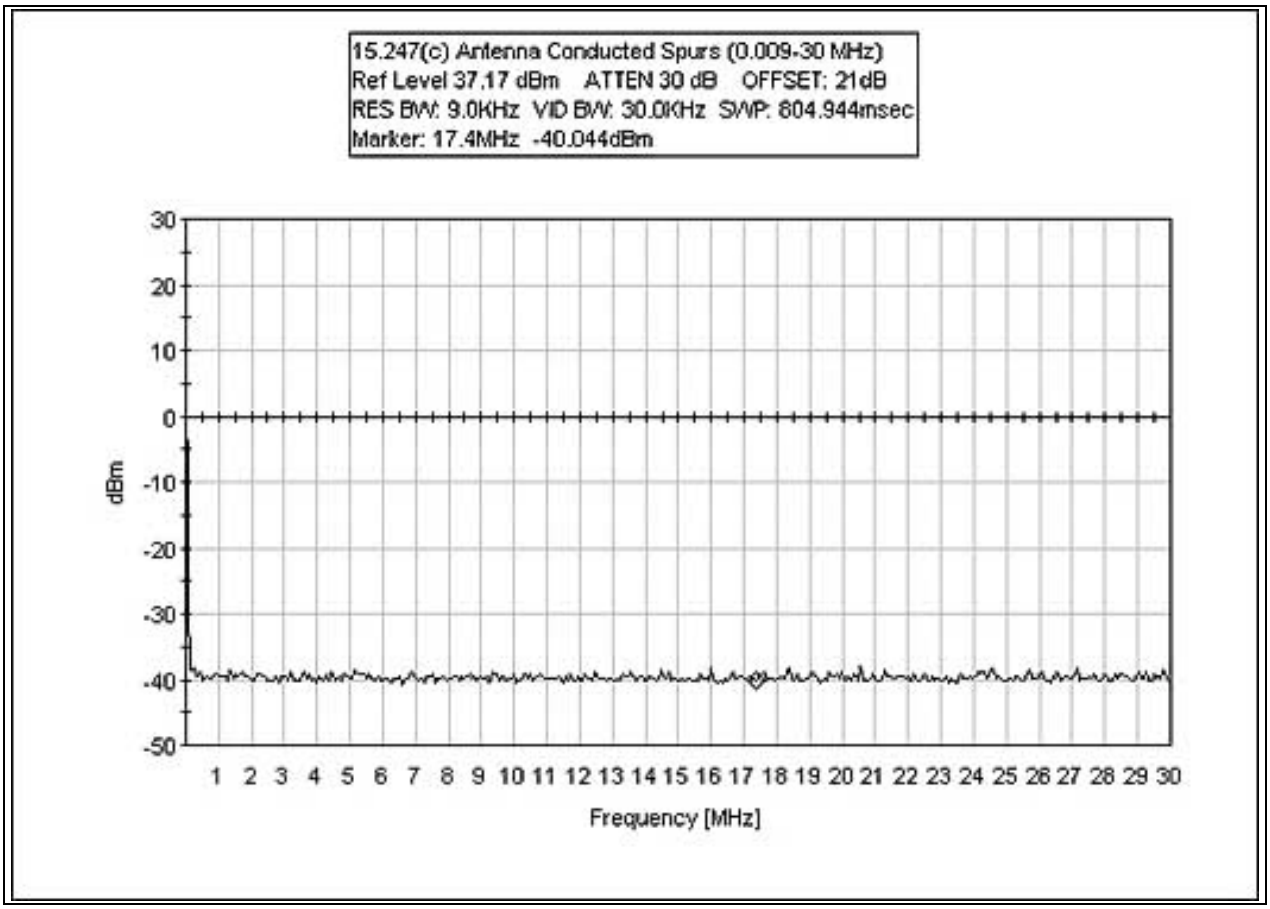
FCC 15.247(c) Six Highest Radiated Emission Levels: 1-10 GHz									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
2490.000	48.3	28.6	-37.8	3.4		42.5	54.0	-11.5	VA
2820.090	49.2	30.2	-38.9	3.2		43.7	54.0	-10.3	VA
4259.310	46.1	33.3	-39.5	4.7		44.6	54.0	-9.4	VA
5496.680	38.6	34.3	-36.7	5.6		41.8	54.0	-12.2	HA
5570.000	38.6	34.1	-36.7	5.6		41.6	54.0	-12.4	HA
6429.530	38.2	33.5	-34.9	5.9		42.7	54.0	-11.3	HA

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.247(c)
Test Distance: 3 Meters

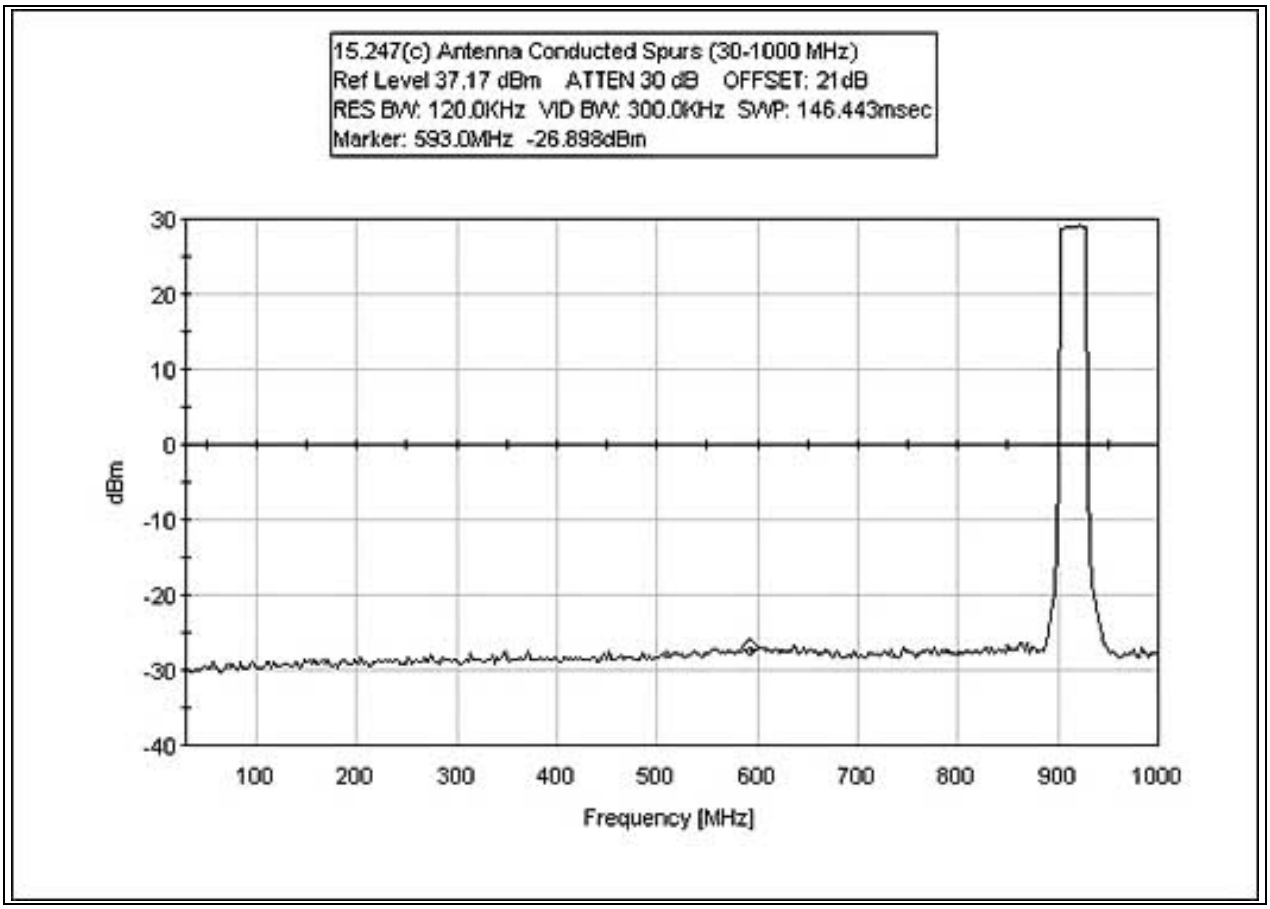
NOTES: H = Horizontal Polarization
V = Vertical Polarization
A = Average Reading

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

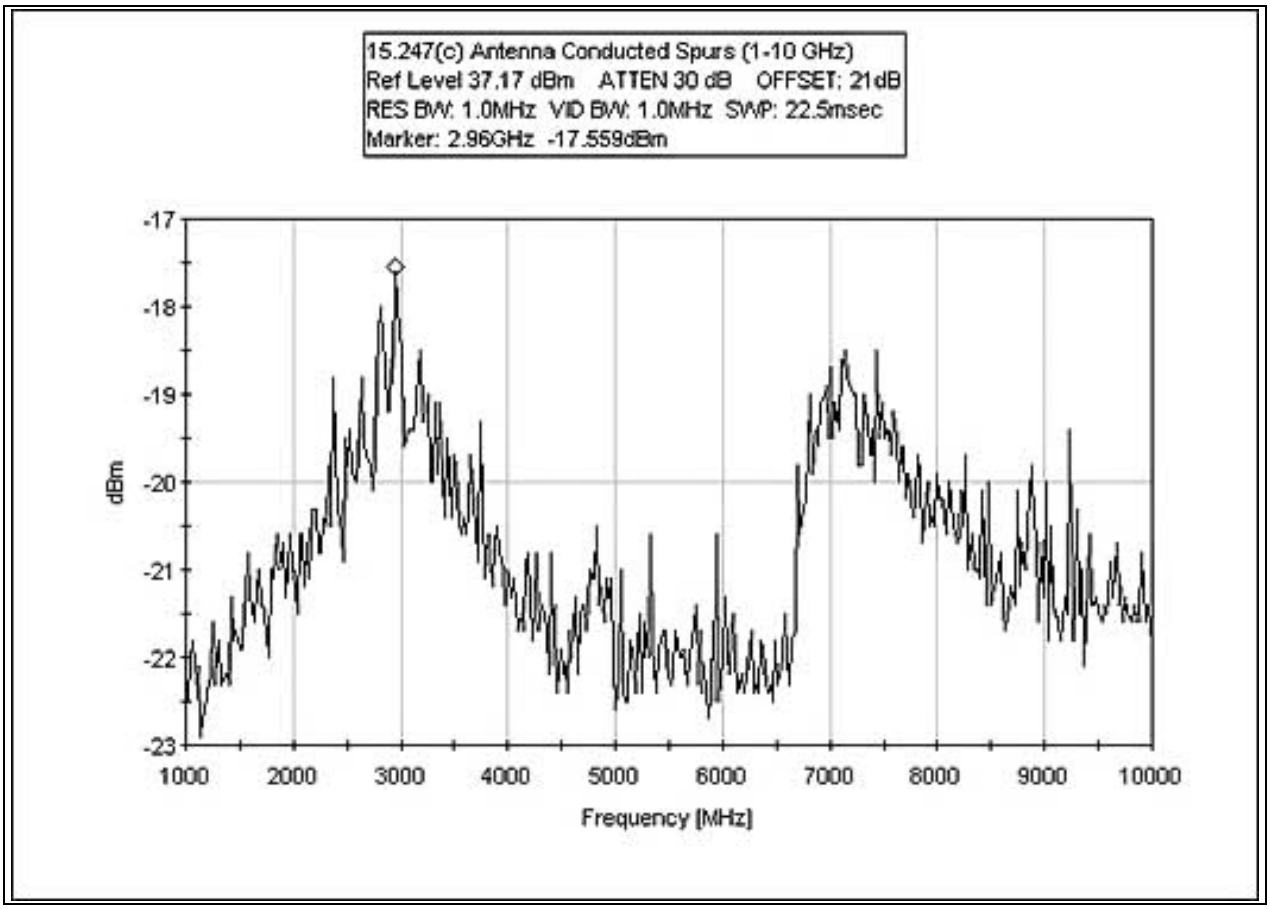
FCC 15.247(c) ANTENNA CONDUCTED SPURIOUS EMISSIONS: 9 kHz - 30 MHz



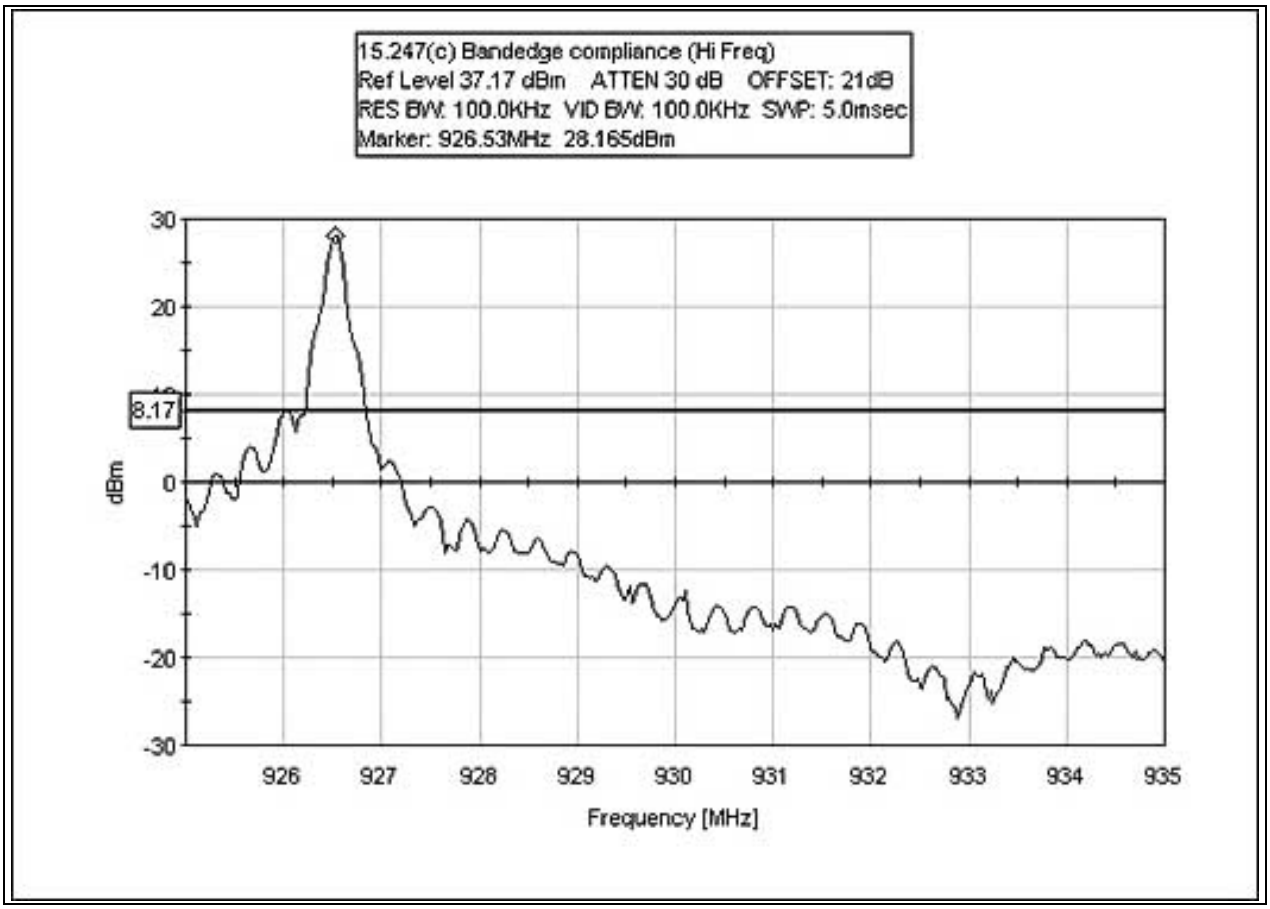
FCC 15.247(c) ANTENNA CONDUCTED SPURIOUS EMISSIONS: 30-1000 MHz



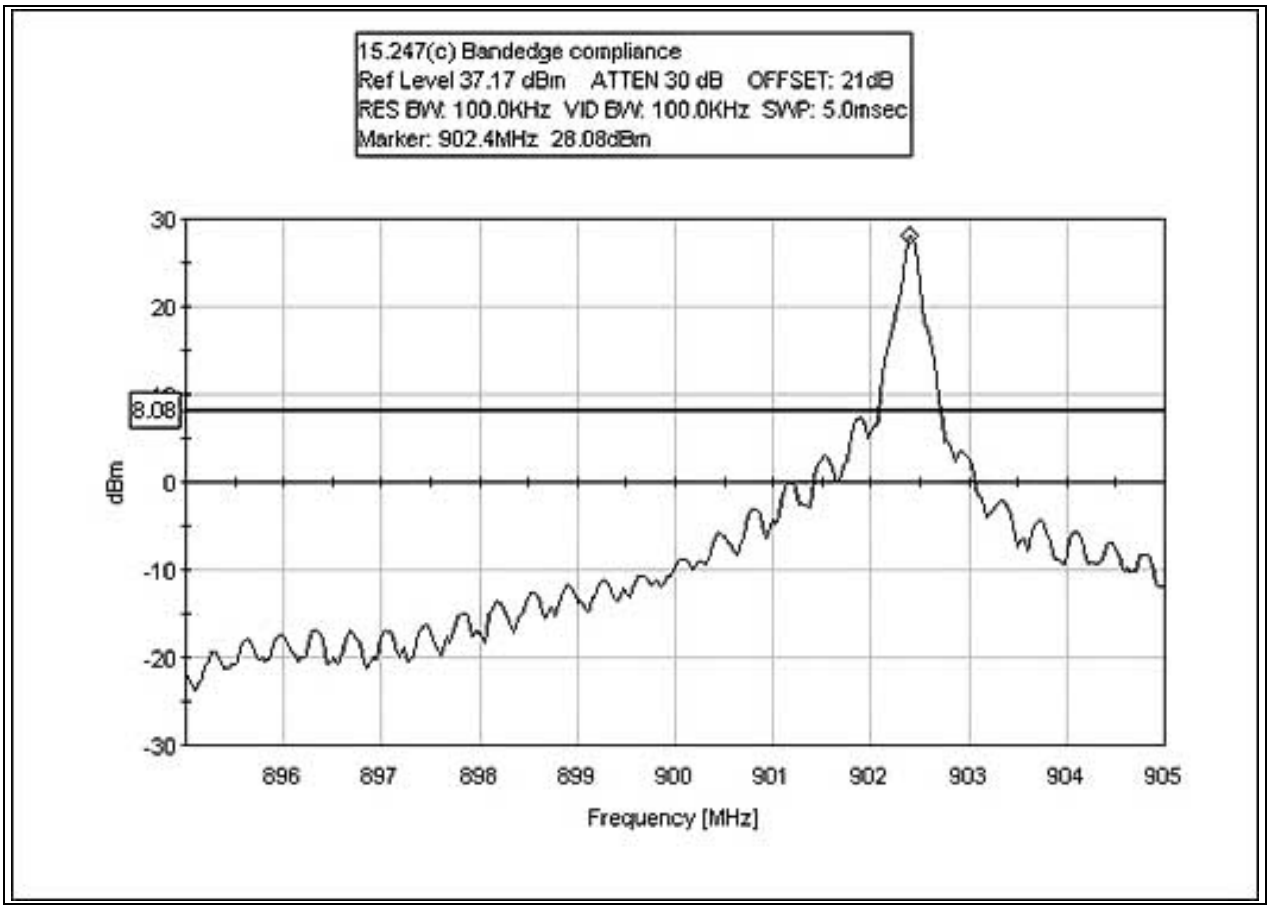
FCC 15.247(c) ANTENNA CONDUCTED SPURIOUS EMISSIONS: 1-10 GHz



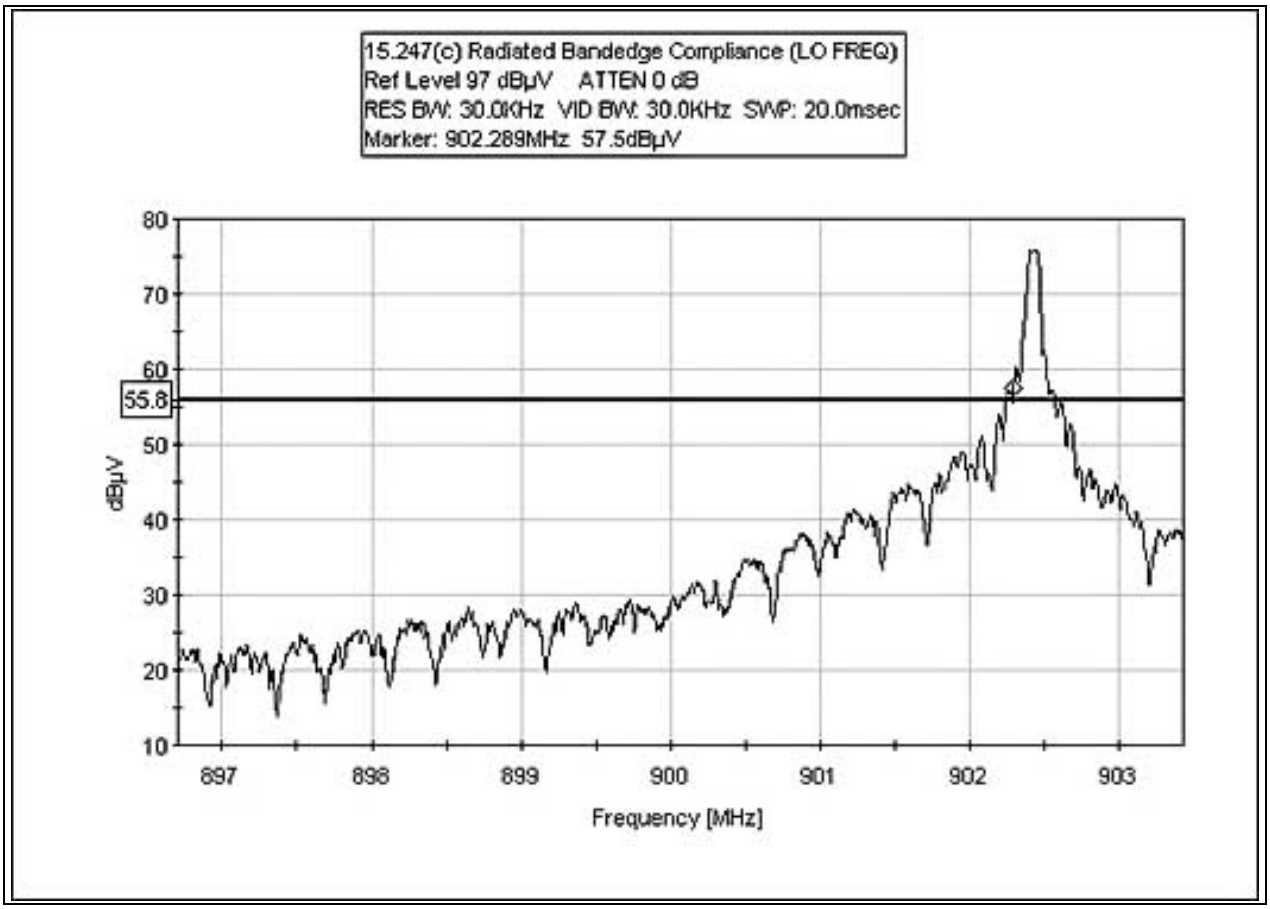
FCC 15.247(c) BANDEDGE HIGH FREQUENCY



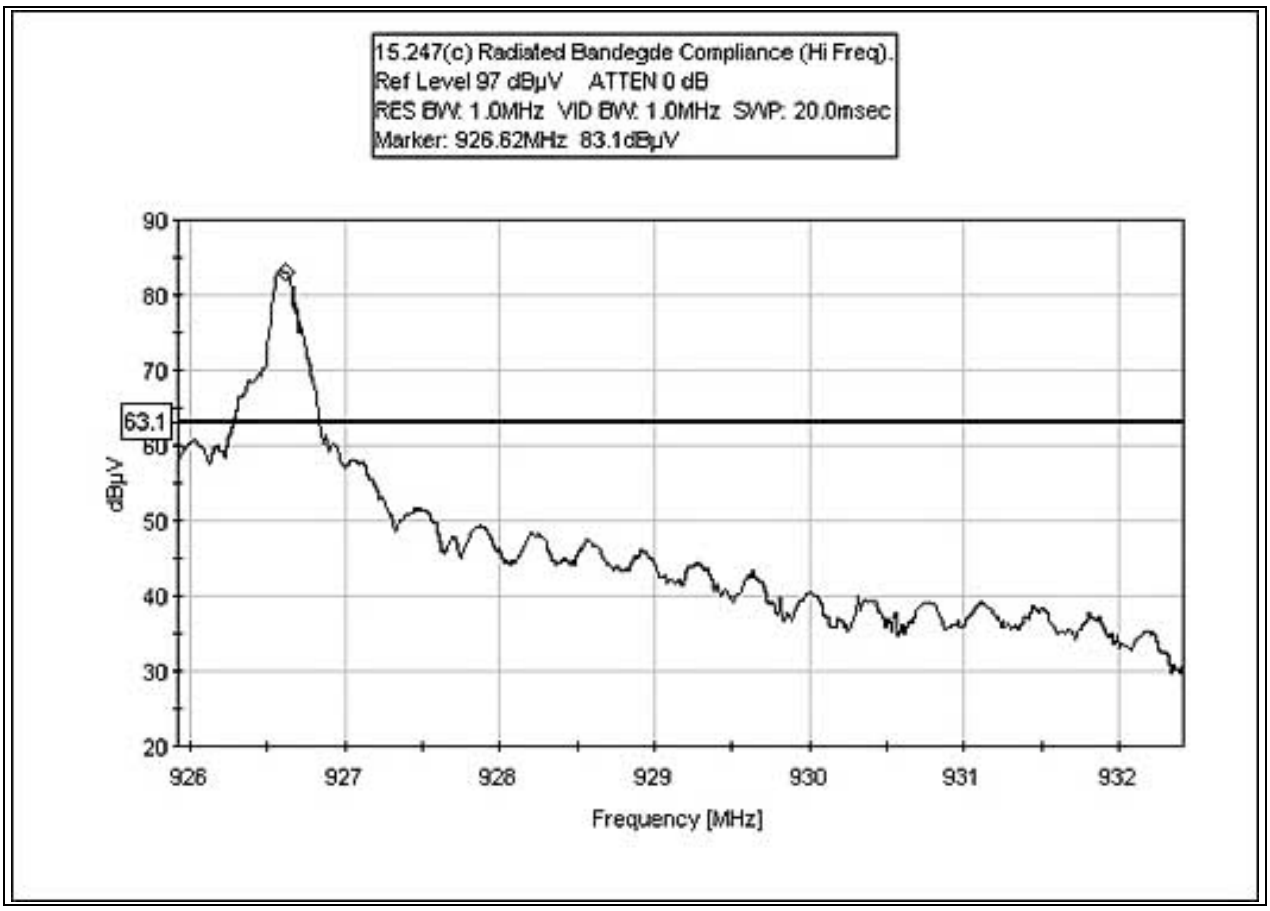
FCC 15.247(c) BANDEDGE



FCC 15.247(c) RADIATED BANDEDGE LOW FREQUENCY



FCC 15.247(c) RADIATED BANDEDGE HIGH FREQUENCY



ANTENNA GAIN

The antenna gain measured was found to be < -3 dBi.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The radiated and conducted emissions data of the EUT was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS

	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect both the radiated and conducted emissions data for the EUT. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. The horn antenna was used for frequencies above 1000 MHz. All antennas were located at a distance of 3 meters from the edge of the EUT. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

The LISNs used were 50 µH-/+50 ohms. Above 150 kHz, a 0.15 µF series capacitor was added in-line prior to connecting the analyzer to restore the proper impedance for the range. A 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 500 kHz, and 500 kHz to 30 MHz. All readings within 20 dB of the limit were recorded, and those within 6 dB of the limit were examined with additional measurements using a slower sweep time.

Antenna Conducted Emissions

For measuring the signal strength on the RF output port of the EUT, the spectrum analyzer was connected directly to the EUT. The sweep time of the analyzer was adjusted so that the spectrum analyzer readings were always in a calibrated range. All readings within 20 dB of the limit were recorded.

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. For frequencies exceeding 1000 MHz, the horn antenna was used. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	RFID reader software version 1.4H
CRT was displaying:	Printing All “H” pattern via parallel
Power Supply Manufacturer:	Speedy Tech Electronics
Power Supply Part Number:	
AC Line Filter Manufacturer:	
AC Line Filter Part Number:	

I/O PORTS	
Type	#
Parallel (Centronics)	1

CRYSTAL OSCILLATORS	
Type	Freq In MHz
Crystal	18, 18.432, 40

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
RFID Reader	AWID	18		
Controller	Printronix	18.432, 40		

CABLE INFORMATION

Cable #:	1	Cable(s) of this type:	1
Cable Type:	RS232	Shield Type:	None
Construction:	Modular	Length In Meters:	1
Connected To End (1):	RFID Reader	Connected To End (2):	RS232
Connector At End (1):	RJ11	Connector At End (2):	RJ11/DB25
Shield Grounded At (1):	N/A	Shield Grounded At (2):	N/A
Part Number:	177559	Number of Conductors:	6
Notes and/or description:			

Cable #:	2	Cable(s) of this type:	1
Cable Type:	Parallel	Shield Type:	Foil
Construction:	Parallel Cable	Length In Meters:	2
Connected To End (1):	Laptop	Connected To End (2):	Printer
Connector At End (1):	DB40	Connector At End (2):	Centronics
Shield Grounded At (1):	Laptop	Shield Grounded At (2):	Printer
Part Number:		Number of Conductors:	36
Notes and/or description:			

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Front View

Note: The EUT was measured at 40 cm from the vertical plane. The setup is a mock-up of the test setup used. The laptop was remotely located during actual testing.

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Side View

Note: The EUT was measured at 40 cm from the vertical plane. The setup is a mock-up of the test setup used. The laptop was remotely located during actual testing.

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View

Note: The setup is a mock-up of the test setup used. The laptop was remotely located during actual testing.

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

Note: The setup is a mock-up of the test setup used. The laptop was remotely located during actual testing.

APPENDIX B

TEST EQUIPMENT LIST

Radiated Emissions from 9 kHz to 30 MHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Pre-amp	00309	HP	8447D	1937A02548	082303	082304
Antenna cable	NA	NA	RG214	Cable#15	123002	123004
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071403	071504
Loop Antenna	00314	EMCO	3115	6246	091002	091004

Radiated Emissions from 30 MHz to 1000 MHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Bicon Antenna	306	AH	SAS200/540	220	092302	092304
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092304
Pre-amp	00309	HP	8447D	1937A02548	082303	082304
Antenna cable	NA	NA	RG214	Cable#15	123002	123004
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071403	071504

Conducted Emissions from 150 kHz to 30 MHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
LISN	02128	EMCO	3816/2NM	9809-1090	040403	040404
LISN	00847	EMCO	3816/2NM	1104	010403	010404

Radiated and Antenna Conducted Power & Spurious Emissions from 9 kHz to 1000 MHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Antenna cable	NA	NA	RG214	Cable#15	123002	123003
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071403	071504

Antenna Conducted Spurious Emissions from 1 GHz to 12.5 GHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033104
Horn Antenna	0849	EMCO	3115	6246	091002	091004
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091104
Heliax Antenna cable	NA	Andrew	LDF1-50	Cable#20	091102	091103
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603

Radiated Power Measurements (in-band) from 902 MHz to 928 MHz:

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092304
Antenna cable	NA	NA	RG214	Cable#15	123002	123004
*****Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071403	071504

These instruments were used for measurements: radiated –20dBc Bandwidths, dwell times (time of occupancy), variations of input voltages on output power, radiated power output, frequency separation, -20dBc band-edges, number of hopping frequencies, and antenna gain plots.

*No preamp was used-this cable was connected with a type N barrel to cable #15 for these measurements (in order to extend the length to the SA).

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033104
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603

These devices were used for the following measurements: Antenna Conducted(–20dBc Bandwidths), Antenna Conducted Spurious Emissions, Antenna Conducted Output Power Plots and any plot that is labeled in dBm.

APPENDIX C
MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **FCC 15.107/15.207 Class B COND [AVE]**
Work Order #: **81380** Date: 10/21/2003
Test Type: **Conducted Emissions** Time: 14:47:23
Equipment: **Printer** Sequence#: 4
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e 110V 60Hz
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

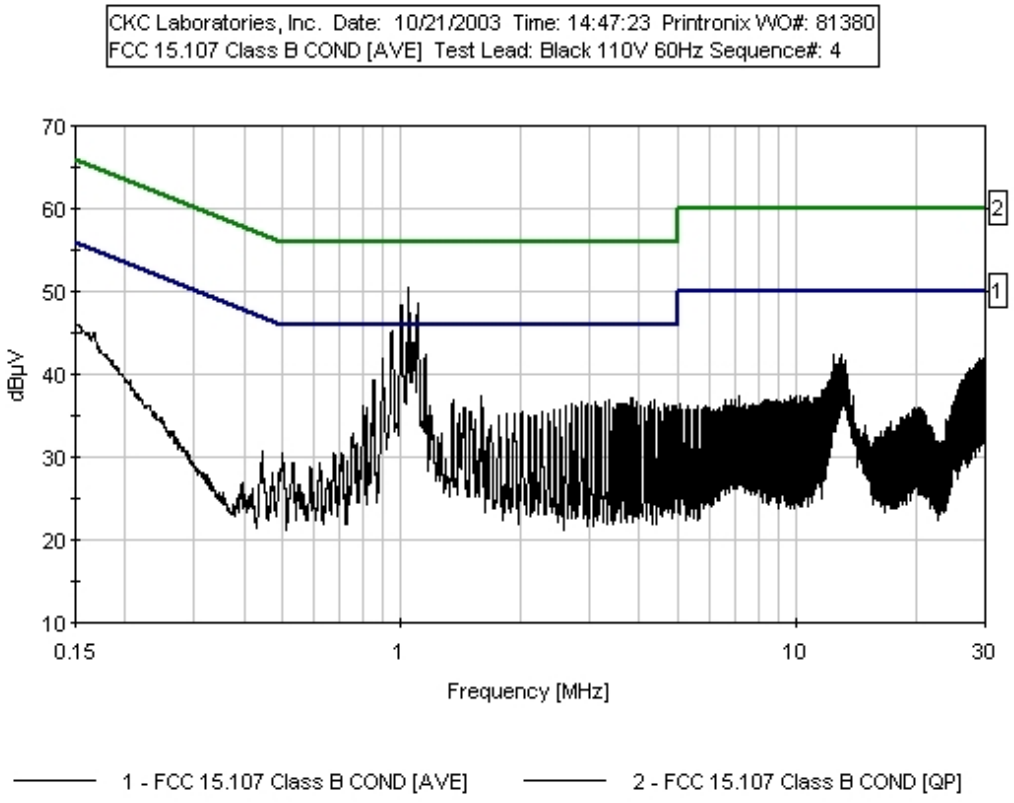
Transducer Legend:

T1=Cable #21 BNC

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1.030M	43.7	+0.1				+0.0	43.8	46.0	-2.2	Black
2	1.068M	43.6	+0.1				+0.0	43.7	46.0	-2.3	Black
3	1.149M	42.3	+0.1				+0.0	42.4	46.0	-3.6	Black
4	898.265k	41.9	+0.1				+0.0	42.0	46.0	-4.0	Black
5	852.475k	39.3	+0.1				+0.0	39.4	46.0	-6.6	Black
6	1.047M Ave	38.5	+0.1				+0.0	38.6	46.0	-7.4	Black
^	1.047M	50.4	+0.1				+0.0	50.5	46.0	+4.5	Black
8	13.049M	42.2	+0.2				+0.0	42.4	50.0	-7.6	Black
9	12.463M	42.1	+0.2				+0.0	42.3	50.0	-7.7	Black
10	12.797M	41.8	+0.2				+0.0	42.0	50.0	-8.0	Black
11	29.109M	41.7	+0.3				+0.0	42.0	50.0	-8.0	Black
12	29.774M	41.6	+0.3				+0.0	41.9	50.0	-8.1	Black

13	29.020M	41.5	+0.3		+0.0	41.8	50.0	-8.2	Black
14	29.527M	41.5	+0.3		+0.0	41.8	50.0	-8.2	Black
15	29.945M	41.5	+0.3		+0.0	41.8	50.0	-8.2	Black
16	29.445M	41.4	+0.3		+0.0	41.7	50.0	-8.3	Black
17	13.220M	41.4	+0.2		+0.0	41.6	50.0	-8.4	Black
18	29.609M	41.3	+0.3		+0.0	41.6	50.0	-8.4	Black
19	29.856M	41.3	+0.3		+0.0	41.6	50.0	-8.4	Black
20	29.356M	41.2	+0.3		+0.0	41.5	50.0	-8.5	Black
21	1.596M	37.3	+0.1		+0.0	37.4	46.0	-8.6	Black
22	28.767M	41.1	+0.3		+0.0	41.4	50.0	-8.6	Black
23	29.185M	41.0	+0.3		+0.0	41.3	50.0	-8.7	Black
24	29.692M	41.0	+0.3		+0.0	41.3	50.0	-8.7	Black
25	12.544M	41.0	+0.2		+0.0	41.2	50.0	-8.8	Black
26	12.716M	41.0	+0.2		+0.0	41.2	50.0	-8.8	Black
27	12.878M	41.0	+0.2		+0.0	41.2	50.0	-8.8	Black
28	28.938M	40.9	+0.3		+0.0	41.2	50.0	-8.8	Black
29	1.098M Ave	36.3	+0.1		+0.0	36.4	46.0	-9.6	Black
^	1.098M	48.4	+0.1		+0.0	48.5	46.0	+2.5	Black
31	1.000M Ave	35.3	+0.1		+0.0	35.4	46.0	-10.6	Black
^	1.000M	48.3	+0.1		+0.0	48.4	46.0	+2.4	Black
33	949.000k Ave	32.8	+0.1		+0.0	32.9	46.0	-13.1	Black
^	949.301k	45.1	+0.1		+0.0	45.2	46.0	-0.8	Black


CKC Laboratories, Inc. Date: 10/21/2003 Time: 14:47:23 Printronix WO#: 81380
FCC 15.107 Class B COND [AVE] Test Lead: Black 110V 60Hz Sequence#: 4
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
1 - FCC 15.107 Class B COND [AVE]
2 - FCC 15.107 Class B COND [QP]

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **FCC 15.107/15.207 Class B COND [AVE]**
Work Order #: **81380** Date: 10/21/2003
Test Type: **Conducted Emissions** Time: 14:33:20
Equipment: **Printer** Sequence#: 3
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e 110V 60Hz
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

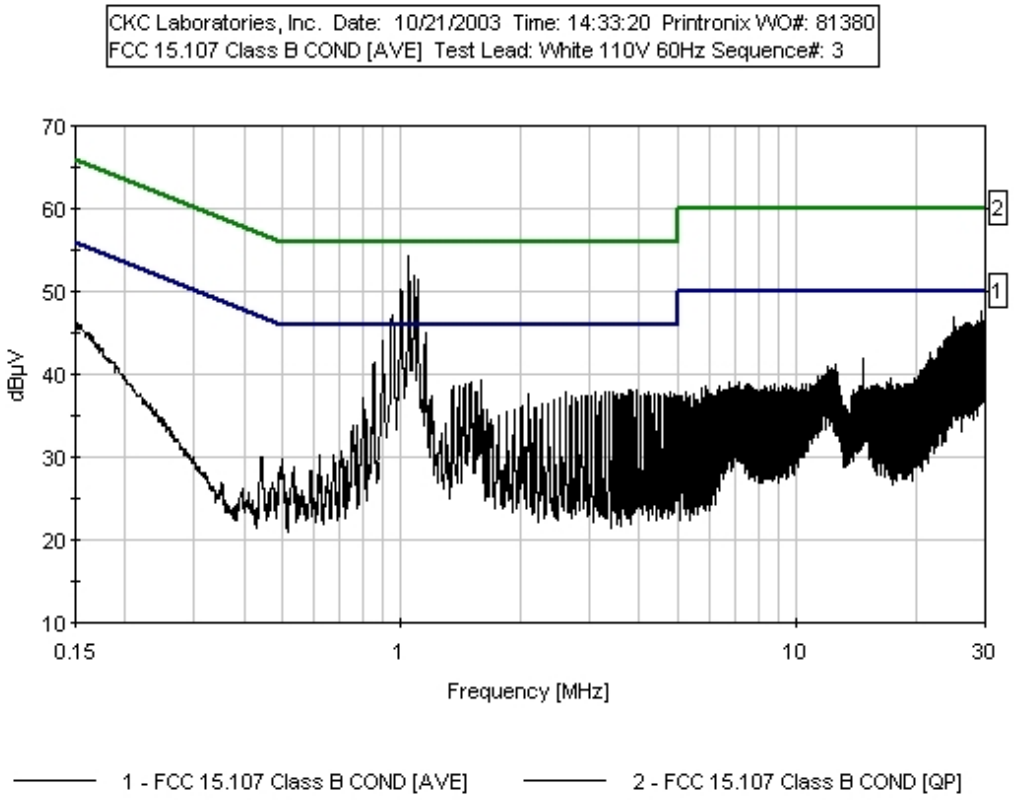
Transducer Legend:

T1=Cable #21 BNC

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	29.424M	47.4	+0.3				+0.0	47.7	50.0	-2.3	White
2	24.882M	46.5	+0.3				+0.0	46.8	50.0	-3.2	White
3	28.493M	46.2	+0.3				+0.0	46.5	50.0	-3.5	White
4	29.507M	46.2	+0.3				+0.0	46.5	50.0	-3.5	White
5	29.582M	46.2	+0.3				+0.0	46.5	50.0	-3.5	White
6	28.917M	46.0	+0.3				+0.0	46.3	50.0	-3.7	White
7	29.082M	46.0	+0.3				+0.0	46.3	50.0	-3.7	White
8	29.253M	45.9	+0.3				+0.0	46.2	50.0	-3.8	White
9	29.671M	45.9	+0.3				+0.0	46.2	50.0	-3.8	White
10	29.842M	45.9	+0.3				+0.0	46.2	50.0	-3.8	White
11	29.925M	45.9	+0.3				+0.0	46.2	50.0	-3.8	White
12	26.896M	45.8	+0.3				+0.0	46.1	50.0	-3.9	White

13	27.156M	45.8	+0.3	+0.0	46.1	50.0	-3.9	White
14	27.239M	45.8	+0.3	+0.0	46.1	50.0	-3.9	White
15	27.492M	45.8	+0.3	+0.0	46.1	50.0	-3.9	White
16	27.746M	45.7	+0.3	+0.0	46.0	50.0	-4.0	White
17	28.335M	45.7	+0.3	+0.0	46.0	50.0	-4.0	White
18	28.664M	45.7	+0.3	+0.0	46.0	50.0	-4.0	White
19	29.000M	45.7	+0.3	+0.0	46.0	50.0	-4.0	White
20	29.335M	45.7	+0.3	+0.0	46.0	50.0	-4.0	White
21	26.320M	45.6	+0.3	+0.0	45.9	50.0	-4.1	White
22	27.067M	45.6	+0.3	+0.0	45.9	50.0	-4.1	White
23	27.321M	45.6	+0.3	+0.0	45.9	50.0	-4.1	White
24	1.047M Ave	41.6	+0.1	+0.0	41.7	46.0	-4.3	White
^	1.047M	54.1	+0.1	+0.0	54.2	46.0	+8.2	White
26	1.098M Ave	39.1	+0.1	+0.0	39.2	46.0	-6.8	White
^	1.098M	51.3	+0.1	+0.0	51.4	46.0	+5.4	White
28	996.000k Ave	38.1	+0.1	+0.0	38.2	46.0	-7.8	White
^	996.084k	50.2	+0.1	+0.0	50.3	46.0	+4.3	White
30	949.000k Ave	35.0	+0.1	+0.0	35.1	46.0	-10.9	White
^	949.301k	47.1	+0.1	+0.0	47.2	46.0	+1.2	White
32	1.149M Ave	32.4	+0.1	+0.0	32.5	46.0	-13.5	White
^	1.149M	45.0	+0.1	+0.0	45.1	46.0	-0.9	White
34	898.000k Ave	31.6	+0.1	+0.0	31.7	46.0	-14.3	White
^	898.265k	44.0	+0.1	+0.0	44.1	46.0	-1.9	White
36	1.077M Ave	29.6	+0.1	+0.0	29.7	46.0	-16.3	White
^	1.077M	51.9	+0.1	+0.0	52.0	46.0	+6.0	White


CKC Laboratories, Inc. Date: 10/21/2003 Time: 14:33:20 Printronix WO#: 81380
FCC 15.107 Class B COND [AVE] Test Lead: White 110V 60Hz Sequence#: 3
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
1 - FCC 15.107 Class B COND [AVE]
2 - FCC 15.107 Class B COND [QP]

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **FCC 15.209 (9 kHz- 30 MHz)**
Work Order #: **81380** Date: 10/21/2003
Test Type: **Maximized emission** Time: 13:53:14
Equipment: **Printer** Sequence#: 2
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

Transducer Legend:

T1=Cable# 15 123003	T2=Cable #10 070804
T3=6502 Active Loop Antenna	T4=15.31 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	1.982M	40.1	+0.3	+0.0	+10.4	-40.0	+0.0	10.8	29.5	-18.7	Vert
2	2.581M	39.0	+0.3	+0.0	+10.3	-40.0	+0.0	9.6	29.5	-19.9	Vert
3	3.303M	34.2	+0.3	+0.0	+10.3	-40.0	+0.0	4.8	29.5	-24.7	Vert
4	27.160M	33.4	+0.9	+0.1	+8.8	-40.0	+0.0	3.2	29.5	-26.3	Vert
5	8.499M	32.4	+0.5	+0.0	+10.3	-40.0	+0.0	3.2	29.5	-26.3	Vert
6	27.900M	33.1	+0.9	+0.1	+8.6	-40.0	+0.0	2.7	29.5	-26.8	Vert
7	4.082M	31.1	+0.4	+0.0	+10.3	-40.0	+0.0	1.8	29.5	-27.7	Vert
8	21.500M	30.2	+0.7	+0.1	+10.1	-40.0	+0.0	1.1	29.5	-28.4	Vert
9	29.820M	31.2	+1.0	+0.1	+8.1	-40.0	+0.0	0.4	29.5	-29.1	Vert
10	14.080M	28.8	+0.7	+0.1	+10.2	-40.0	+0.0	-0.2	29.5	-29.7	Vert
11	5.060M	29.1	+0.4	+0.0	+10.3	-40.0	+0.0	-0.2	29.5	-29.7	Vert

12	26.780M	29.4	+0.9	+0.1	+8.9	-40.0	+0.0	-0.7	29.5	-30.2	Vert
13	20.260M	27.5	+0.7	+0.1	+10.3	-40.0	+0.0	-1.4	29.5	-30.9	Vert
14	24.220M	27.6	+0.8	+0.1	+9.5	-40.0	+0.0	-2.0	29.5	-31.5	Vert
15	28.880M	28.3	+1.0	+0.1	+8.4	-40.0	+0.0	-2.2	29.5	-31.7	Vert
16	9.164M	26.6	+0.5	+0.0	+10.3	-40.0	+0.0	-2.6	29.5	-32.1	Vert
17	21.780M	26.2	+0.7	+0.1	+10.0	-40.0	+0.0	-3.0	29.5	-32.5	Vert
18	24.620M	26.5	+0.8	+0.1	+9.5	-40.0	+0.0	-3.1	29.5	-32.6	Vert
19	22.620M	25.6	+0.8	+0.1	+9.8	-40.0	+0.0	-3.7	29.5	-33.2	Vert
20	19.220M	25.1	+0.7	+0.1	+10.4	-40.0	+0.0	-3.7	29.5	-33.2	Vert
21	25.040M	25.9	+0.8	+0.1	+9.4	-40.0	+0.0	-3.8	29.5	-33.3	Vert
22	6.571M	25.4	+0.4	+0.0	+10.3	-40.0	+0.0	-3.9	29.5	-33.4	Vert
23	26.060M	25.8	+0.8	+0.1	+9.1	-40.0	+0.0	-4.2	29.5	-33.7	Vert
24	29.300M	26.2	+1.0	+0.1	+8.3	-40.0	+0.0	-4.4	29.5	-33.9	Vert
25	7.673M	24.8	+0.5	+0.0	+10.3	-40.0	+0.0	-4.4	29.5	-33.9	Vert
26	7.359M	24.5	+0.5	+0.0	+10.3	-40.0	+0.0	-4.7	29.5	-34.2	Vert
27	30.000M	25.9	+1.0	+0.1	+8.1	-40.0	+0.0	-4.9	29.5	-34.4	Vert
28	25.420M	24.3	+0.8	+0.1	+9.3	-40.0	+0.0	-5.5	29.5	-35.0	Vert
29	23.580M	20.7	+0.8	+0.1	+9.7	-40.0	+0.0	-8.7	29.5	-38.2	Vert
30	426.900k	43.6	+0.1	+0.0	+10.1	-80.0	+0.0	-26.2	15.0	-41.2	Vert
31	56.500k	59.6	+0.1	+0.0	+10.8	-80.0	+0.0	-9.5	32.6	-42.1	Vert
32	304.000k	45.0	+0.1	+0.0	+10.1	-80.0	+0.0	-24.8	17.9	-42.7	Vert
33	101.100k	53.5	+0.1	+0.0	+10.2	-80.0	+0.0	-16.2	27.5	-43.7	Vert
34	39.500k	60.4	+0.1	+0.0	+11.4	-80.0	+0.0	-8.1	35.7	-43.8	Vert
35	47.200k	59.1	+0.1	+0.0	+11.0	-80.0	+0.0	-9.8	34.1	-43.9	Vert

36	20.800k	63.4	+0.1	+0.0	+13.5	-80.0	+0.0	-3.0	41.2	-44.2	Vert
37	32.700k	58.9	+0.1	+0.0	+11.9	-80.0	+0.0	-9.1	37.3	-46.4	Vert
38	132.000k	45.1	+0.1	+0.0	+10.1	-80.0	+0.0	-24.7	25.2	-49.9	Vert
39	147.000k	43.5	+0.1	+0.0	+10.0	-80.0	+0.0	-26.4	24.3	-50.7	Vert
40	10.000k	51.8	+0.0	+0.0	+0.0	-80.0	+0.0	-28.2	47.6	-75.8	Vert

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **FCC 15.209 30-1000 MHz**
Work Order #: **81380** Date: 10/21/2003
Test Type: **Maximized emission** Time: 12:31:09
Equipment: **Printer** Sequence#: 1
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

Transducer Legend:

T1=Cable# 15 123003	T2=Cable #10 070804
T3=Log antenna, SN331 092304	T4=Bicon SN220 092304
T5=Preamp 8447D 082304	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	40.022M QP	49.8	+1.1 -28.5	+0.1	+0.0	+15.5	+0.0	38.0	40.0	-2.0	Horiz
^	40.000M	50.0	+1.1 -28.5	+0.1	+0.0	+15.5	+0.0	38.2	40.0	-1.8	Horiz
3	40.023M QP	47.9	+1.1 -28.5	+0.1	+0.0	+15.5	+0.0	36.1	40.0	-3.9	Vert
^	40.000M	49.1	+1.1 -28.5	+0.1	+0.0	+15.5	+0.0	37.3	40.0	-2.7	Vert
5	99.999M	51.5	+1.8 -28.4	+0.2	+0.0	+12.1	+0.0	37.2	43.5	-6.3	Vert
6	367.489M	43.4	+3.5 -28.3	+0.4	+18.6	+0.0	+0.0	37.6	46.0	-8.4	Horiz
7	108.006M	47.7	+1.9 -28.4	+0.2	+0.0	+13.7	+0.0	35.1	43.5	-8.4	Vert
8	129.027M	44.2	+2.0 -28.3	+0.2	+0.0	+16.5	+0.0	34.6	43.5	-8.9	Horiz
9	92.160M	51.3	+1.7 -28.5	+0.2	+0.0	+9.9	+0.0	34.6	43.5	-8.9	Vert
10	147.494M	42.8	+2.2 -28.4	+0.2	+0.0	+17.7	+0.0	34.5	43.5	-9.0	Horiz

11	110.594M	45.4	+1.9 -28.4	+0.2	+0.0	+14.1	+0.0	33.2	43.5	-10.3	Horiz
12	400.000M	42.9	+3.6 -28.2	+0.4	+16.9	+0.0	+0.0	35.6	46.0	-10.4	Horiz
13	160.251M	40.7	+2.2 -28.4	+0.2	+0.0	+18.4	+0.0	33.1	43.5	-10.4	Vert
14	89.902M	48.9	+1.7 -28.5	+0.2	+0.0	+9.3	+0.0	31.6	43.5	-11.9	Horiz
15	360.000M	39.4	+3.4 -28.3	+0.4	+19.0	+0.0	+0.0	33.9	46.0	-12.1	Horiz
16	90.036M	48.2	+1.7 -28.5	+0.2	+0.0	+9.3	+0.0	30.9	43.5	-12.6	Vert
17	456.029M	38.2	+3.8 -28.3	+0.4	+18.6	+0.0	+0.0	32.7	46.0	-13.3	Horiz
18	167.952M	37.4	+2.3 -28.4	+0.2	+0.0	+18.4	+0.0	29.9	43.5	-13.6	Vert
19	140.014M	38.7	+2.1 -28.4	+0.2	+0.0	+17.2	+0.0	29.8	43.5	-13.7	Vert
20	110.592M	42.0	+1.9 -28.4	+0.2	+0.0	+14.1	+0.0	29.8	43.5	-13.7	Vert
21	159.999M	35.2	+2.2 -28.4	+0.2	+0.0	+18.4	+0.0	27.6	43.5	-15.9	Vert
22	129.024M	36.6	+2.0 -28.3	+0.2	+0.0	+16.5	+0.0	27.0	43.5	-16.5	Vert
23	147.456M	31.9	+2.2 -28.4	+0.2	+0.0	+17.7	+0.0	23.6	43.5	-19.9	Vert

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **15.247(b)(2)**
Work Order #: **81380** Date: 10/23/2003
Test Type: **Maximized emission** Time: 13:33:53
Equipment: **Printer** Sequence#: 8
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Lap Top Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

Transducer Legend:

T1=Cable #10 070804	T2=Cable# 15 123003
T3=Log antenna, SN331 092304	T4=Cable P1510 13' GoreTex SMA

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	926.517M	82.1	+0.7	+6.0	+24.2		+0.0	113.0	137.0 Reading did not change during voltage swings from 102-138 VAC.	-24.0	Vert
2	926.518M	80.2	+0.7	+6.0	+24.2		+0.0	111.1	137.0	-25.9	Vert
3	915.177M	78.6	+0.7	+5.9	+24.1		+0.0	109.3	137.0 Reading did not change during voltage swings from 102-138 VAC.	-27.7	Horiz
4	915.192M	78.1	+0.7	+5.9	+24.1		+0.0	108.8	137.0	-28.2	Vert
5	902.410M	75.7	+0.7	+5.9	+24.0		+0.0	106.3	137.0 Reading did not change during voltage swings from 102-138 VAC.	-30.7	Horiz
6	902.392M	75.1	+0.7	+5.9	+24.0		+0.0	105.7	137.0	-31.3	Vert

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Printronix**
Specification: **FCC 15.247(c)**
Work Order #: **81380** Date: 10/23/2003
Test Type: **Maximized emission** Time: 09:56:02
Equipment: **Printer** Sequence#: 7
Manufacturer: Printronix Tested By: Chuck Kendall
Model: T5204e
S/N: 480329082260

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Printer*	Printronix	T5204e	480329082260

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Dell	66902 (Latitude)	00066902-12800-82P-3038

Test Conditions / Notes:

Transmitter is installed in the printer and transmitting info to the tag. Laptop computer is sending all "H Patterns" to the printer via Centronics interface cable. AC power is 120 Volts at 60 Hz. Clocks: 18 MHz, 18.432 MHz, 20 MHz.

Transducer Legend:

T1=Cable#20 Heliax 48ft 101304	T2=Horn 6246_091004
T3=HP83017A Preamp 091104	T4=HPF 1.5GHz

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	4259.310M Ave	46.1	+4.7	+33.3	-39.5		+0.0	44.6	54.0	-9.4	Vert
^	4259.310M	47.8	+4.7	+33.3	-39.5		+0.0	46.3	54.0	-7.7	Vert
3	2820.090M Ave	49.2	+3.2	+30.2	-38.9		+0.0	43.7	54.0	-10.3	Vert
^	2820.090M	49.6	+3.2	+30.2	-38.9	+0.4	+0.0	44.5	54.0	-9.5	Vert
5	6429.530M Ave	38.2	+5.9	+33.3	-34.9	+0.2	+0.0	42.7	54.0	-11.3	Horiz
^	6429.530M	47.2	+5.9	+33.3	-34.9	+0.2	+0.0	51.7	54.0	-2.3	Horiz
7	2490.000M Ave	48.3	+3.4	+28.3	-37.8	+0.3	+0.0	42.5	54.0	-11.5	Vert
^	2490.000M	52.6	+3.4	+28.3	-37.8	+0.3	+0.0	46.8	54.0	-7.2	Vert
9	5496.680M Ave	38.6	+5.6	+34.0	-36.7	+0.3	+0.0	41.8	54.0	-12.2	Horiz
^	5496.680M	47.4	+5.6	+34.0	-36.7	+0.3	+0.0	50.6	54.0	-3.4	Horiz

11	5570.000M Ave	38.6	+5.6	+33.9	-36.7	+0.2	+0.0	41.6	54.0	-12.4	Horiz
^	5570.000M	47.8	+5.6	+33.9	-36.7		+0.0	50.6	54.0	-3.4	Horiz
13	4580.330M Ave	40.4	+5.1	+33.2	-39.5	+0.3	+0.0	39.5	54.0	-14.5	Vert
^	4580.330M	49.3	+5.1	+33.2	-39.5		+0.0	48.1	54.0	-5.9	Vert
15	5050.000M Ave	37.3	+5.1	+33.5	-38.0		+0.0	37.9	54.0	-16.1	Vert
^	5050.000M	47.6	+5.1	+33.5	-38.0		+0.0	48.2	54.0	-5.8	Vert
17	6429.530M Ave	31.5	+5.9	+33.2	-35.0		+0.0	35.6	54.0	-18.4	Vert
^	6429.530M	47.6	+5.9	+33.3	-34.9	+0.2	+0.0	52.1	54.0	-1.9	Vert
19	2779.480M Ave	39.6	+3.4	+29.9	-38.8	+0.4	+0.0	34.5	54.0	-19.5	Horiz
^	2779.480M	50.2	+3.4	+29.9	-38.8	+0.4	+0.0	45.1	54.0	-8.9	Horiz
21	2746.500M Ave	39.0	+3.5	+29.7	-38.7	+0.3	+0.0	33.8	54.0	-20.2	Horiz
^	2746.500M	48.7	+3.5	+29.7	-38.7	+0.3	+0.0	43.5	54.0	-10.5	Horiz
23	3360.020M Ave	37.3	+4.1	+31.8	-39.9		+0.0	33.3	54.0	-20.7	Vert
^	3360.020M	48.7	+4.1	+31.8	-39.9		+0.0	44.7	54.0	-9.3	Vert
25	1830.100M Ave	39.6	+2.6	+27.1	-38.4	+0.7	+0.0	31.6	54.0	-22.4	Horiz
^	1830.100M	50.6	+2.6	+27.1	-38.4	+0.7	+0.0	42.6	54.0	-11.4	Horiz