ADDENDUM TO FC03-070B

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: MAY 28, 2004

PREPARED FOR:

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Date of test: October 21-23, 2003 and
April 26 - May 8, 2004

Report No.: FC03-070C

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	October 21-23, 2003 and April 26 - May 8, 2004
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. **Addendum B** is to add new 15.107 and 15.247(c) data after relocation of the transmitter board and installation of a new antenna. **Addendum C** is to add models SL5204e-MP and SL5304e-MP to the test report. A correction was also made to the test conditions on page 25.
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

Eddie Wong, EMC 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 – 9.28 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	9.28 GHz	1 MHz

FCC 15.203 Antenna Requirements
The antenna is an integral part of the EUT and is 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)
SL5204e-MP - this is identical to the T5204e
SL5304e-MP - this is identical to the T5304e

EQUIPMENT UNDER TEST

Thermal Printer with RFID

Manuf:	Printronix
Model:	T5204e
Serial:	480329082260
FCC ID:	E5A (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

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 Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS HPF dB	dB	dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.853202	41.4	0.2				41.6	46.0	-4.4	W
1.298047	40.3	0.2				40.5	46.0	-5.5	B
1.332071	40.4	0.2				40.6	46.0	-5.4	W
1.344830	41.8	0.2				42.0	46.0	-4.0	B
1.361842	40.2	0.2				40.4	46.0	-5.6	B
1.591504	41.7	0.1				41.8	46.0	-4.2	B

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

NOTES: B = Black Lead
W = White Lead

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: Hopping. 110 VAC, 60 Hz, 22°C, 31% relative humidity.

FCC 15.209 Six Highest Radiated Emission Levels: 9 kHz - 30 MHz									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	dB	Cable dB	Corr dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
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.

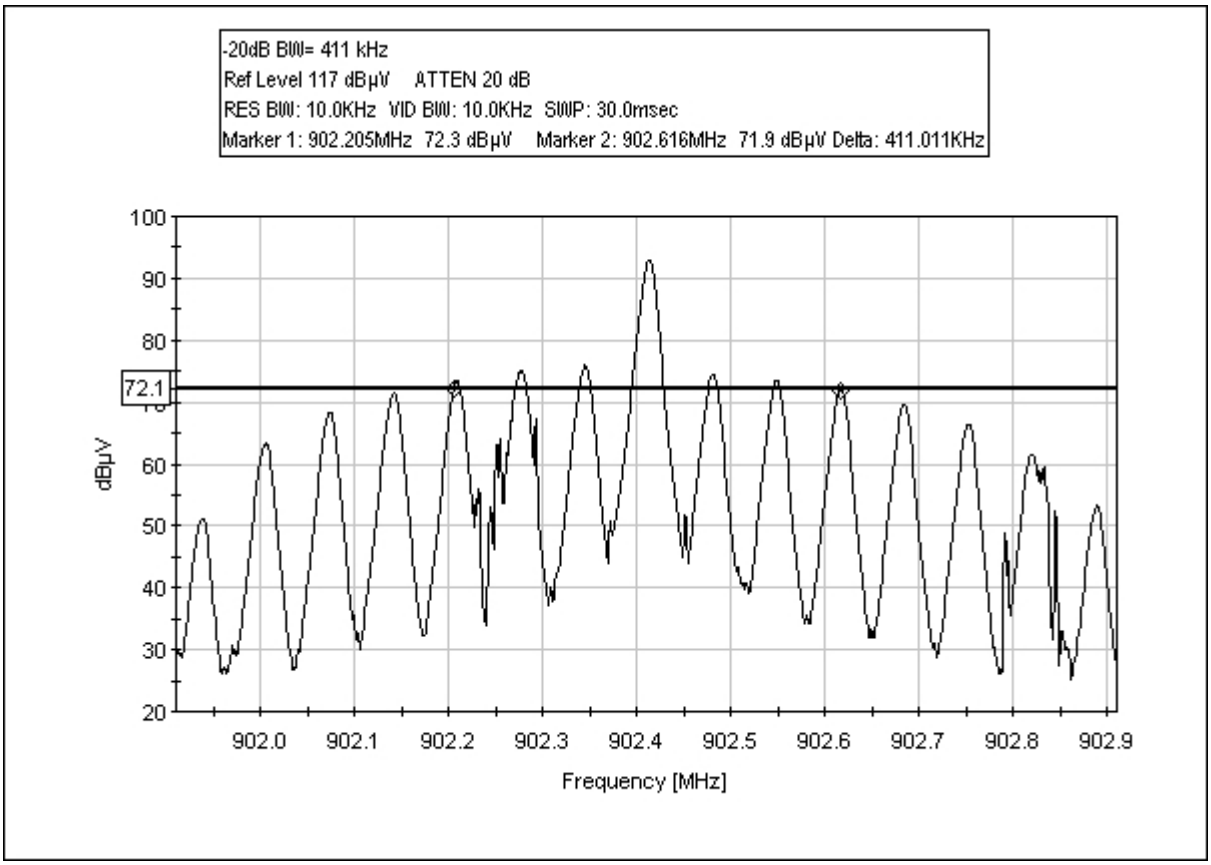
FCC 15.209 Six Highest Radiated Emission Levels: 30-1000 MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Ant dB	Amp dB	Cable dB	dB	READING dBµV/m	LIMIT dBµV/m	MARGIN dB	NOTES
40.022	49.8	15.5	-28.5	1.2		38.0	40.0	-2.0	HQ
40.023	47.9	15.5	-28.5	1.2		36.1	40.0	-3.9	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

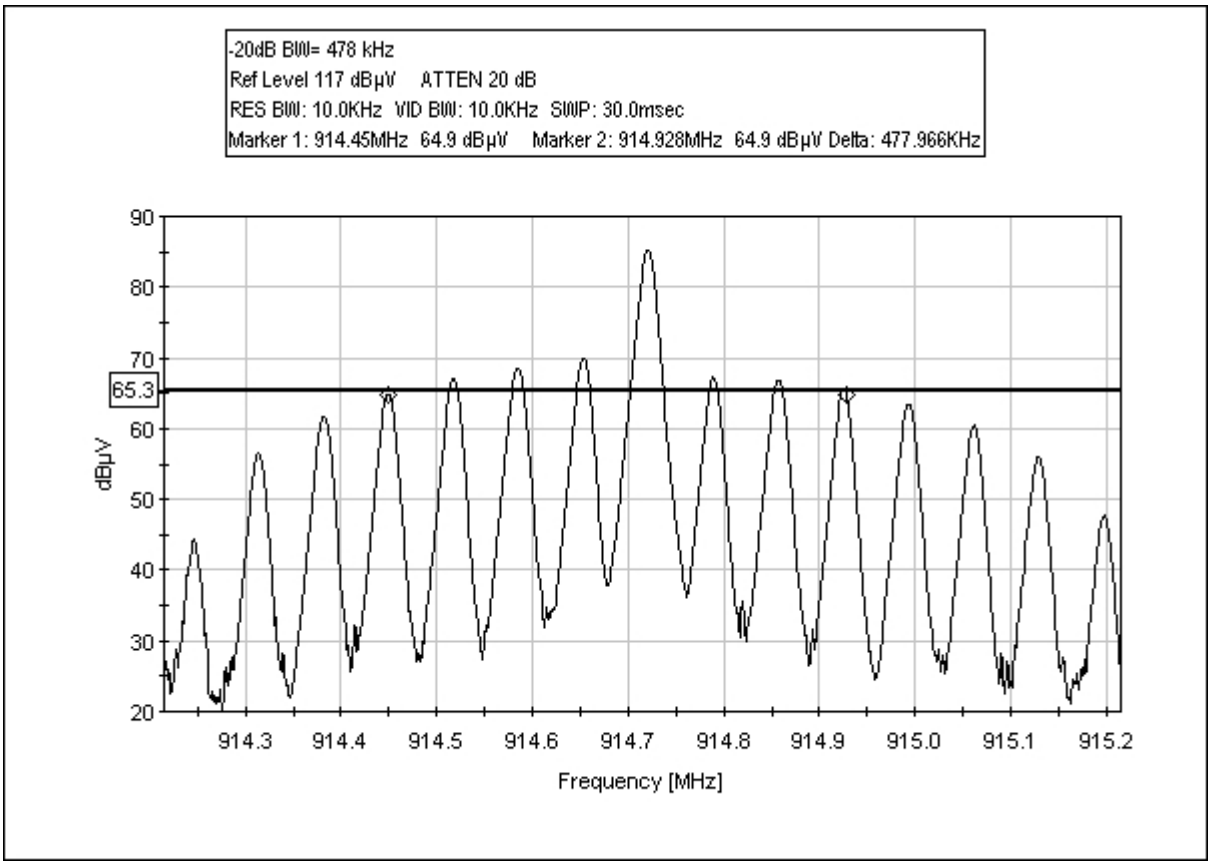
NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading

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.

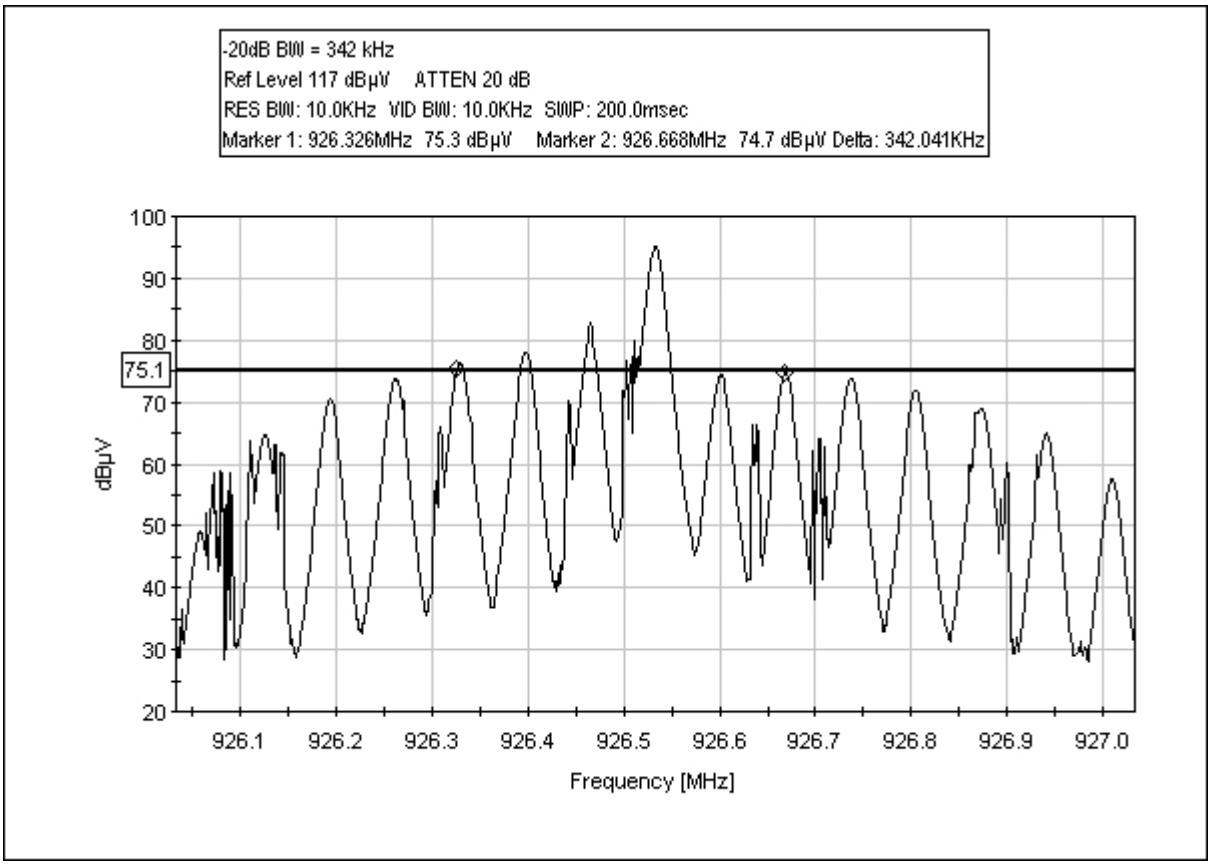
FCC 15.247 20dB BANDWIDTH LOW



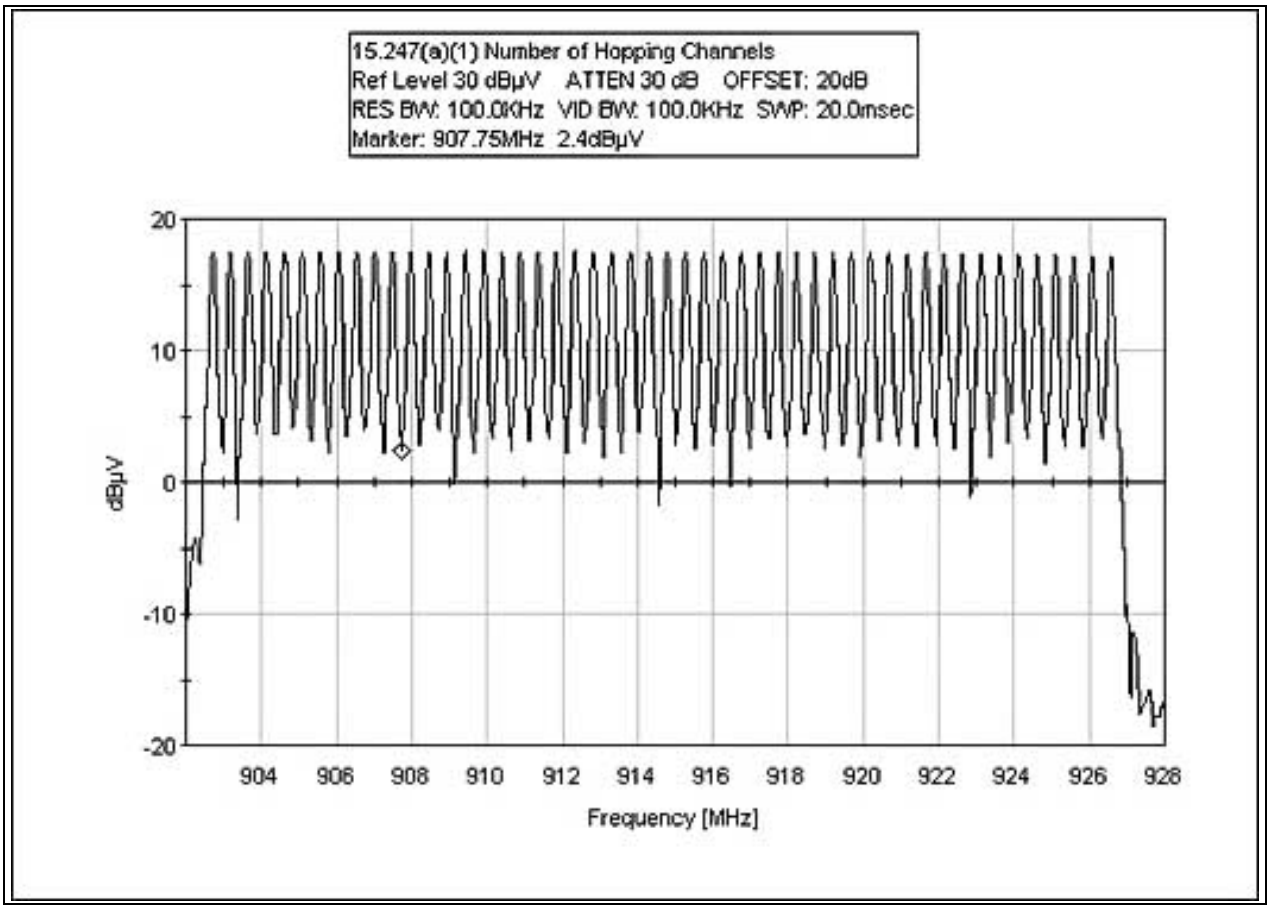
FCC 15.247 20dB BANDWIDTH MID



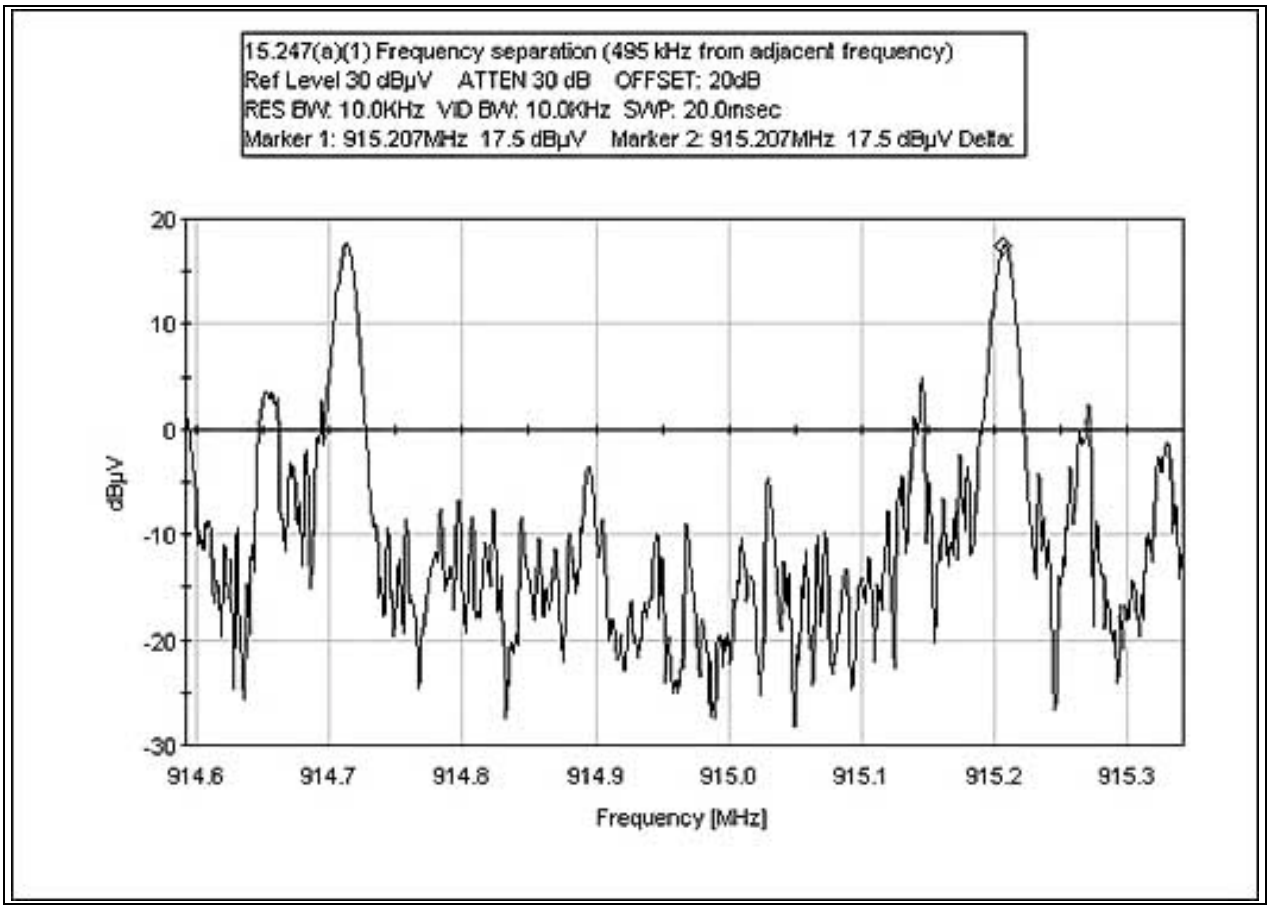
FCC 15.247 20dB BANDWIDTH HIGH



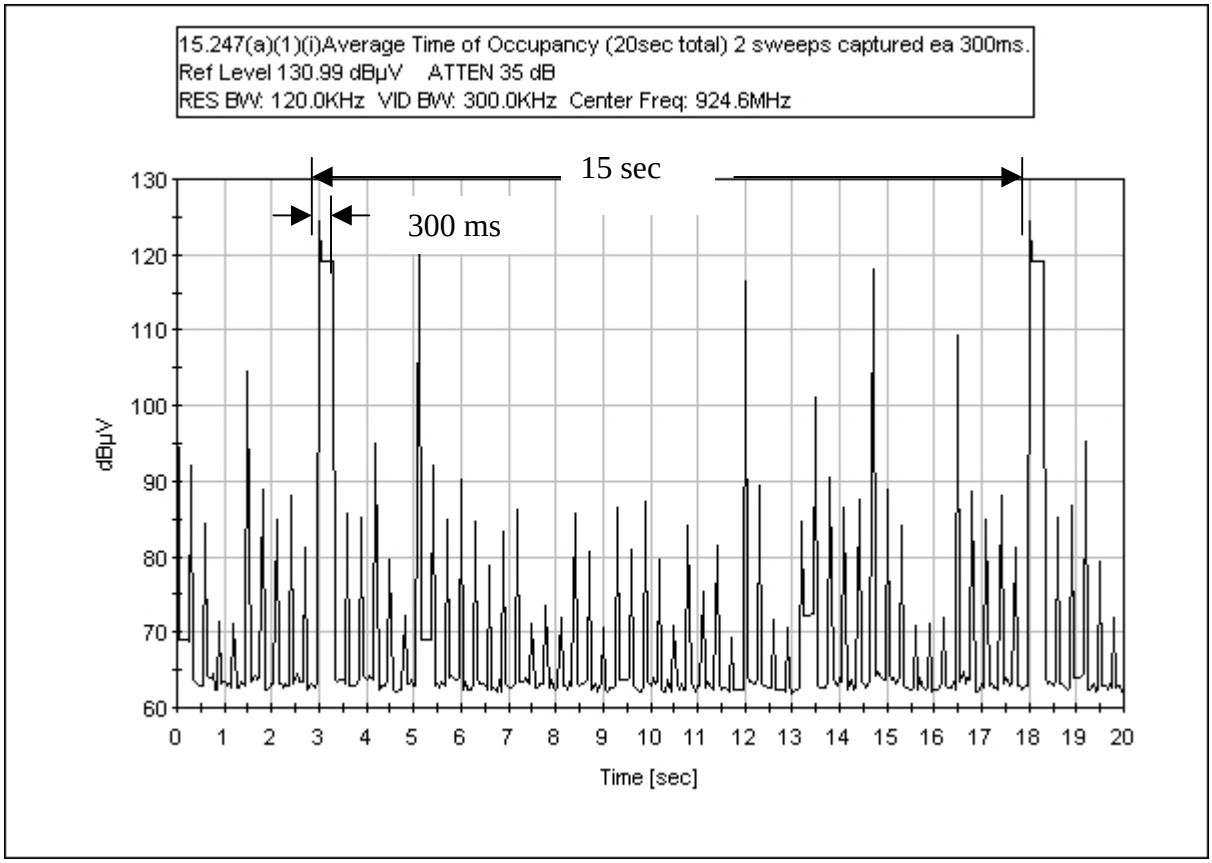
FCC 15.247(a)(1) NUMBER OF HOPPING CHANNELS



FCC 15.247(a)(1) FREQUENCY SEPARATION

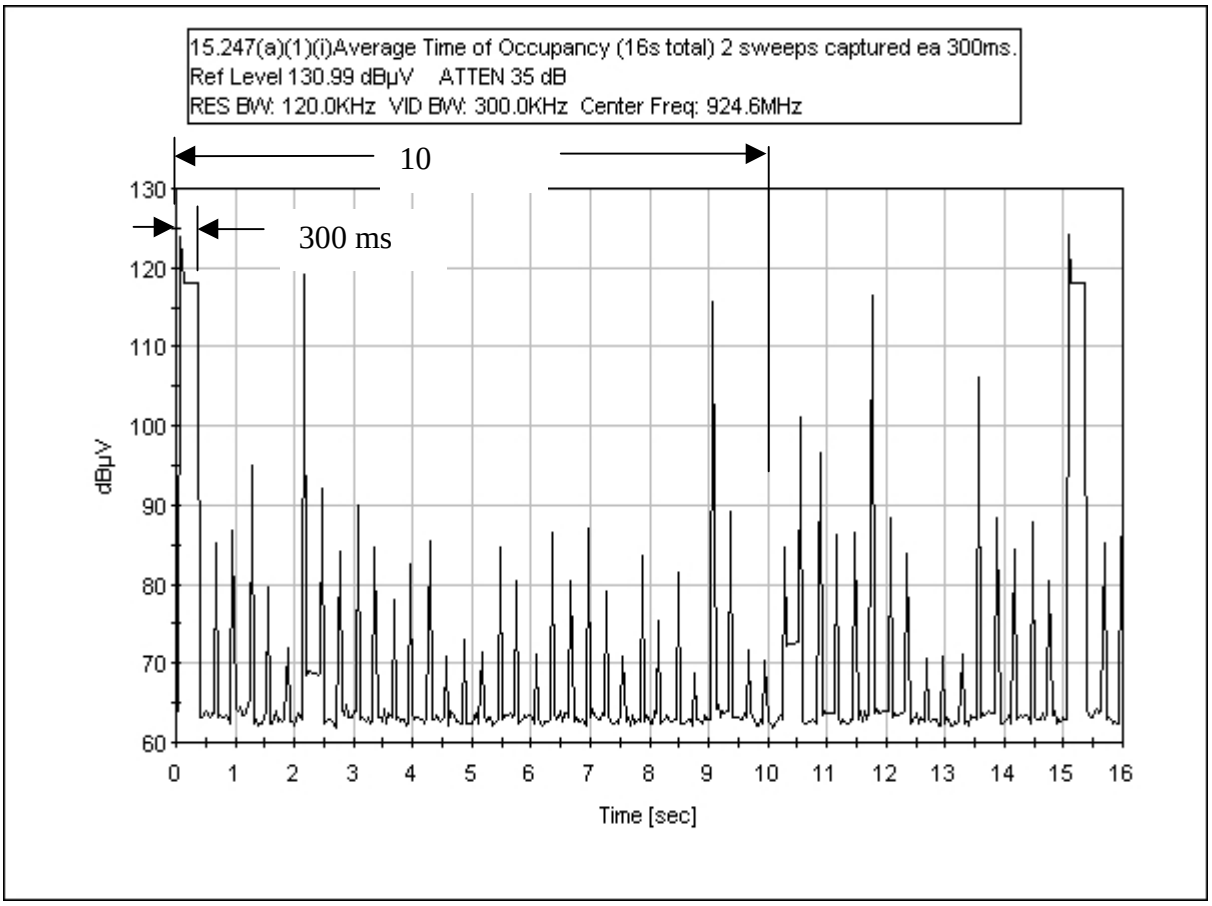


FCC 15.247(a)(1)(i) AVERAGE TIME OF OCCUPANCY



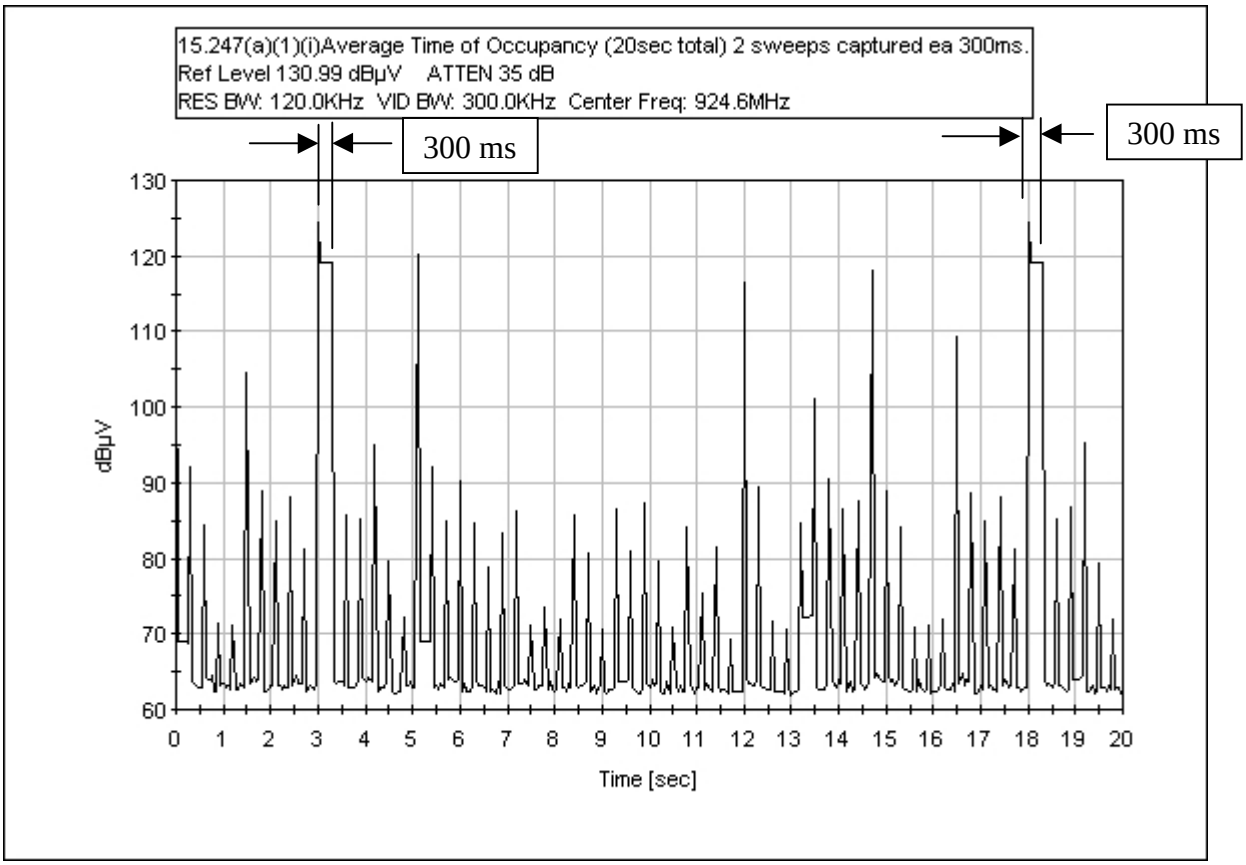
As can be seen in the diagram above the on time at 924.6 MHz is approximately 300 ms per 15 seconds or 300/15 ms or 200 ms/10 seconds. Expressing this in seconds, it is 0.2 seconds for a 10 second period. This is less than 0.41 seconds per 10 second interval.

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



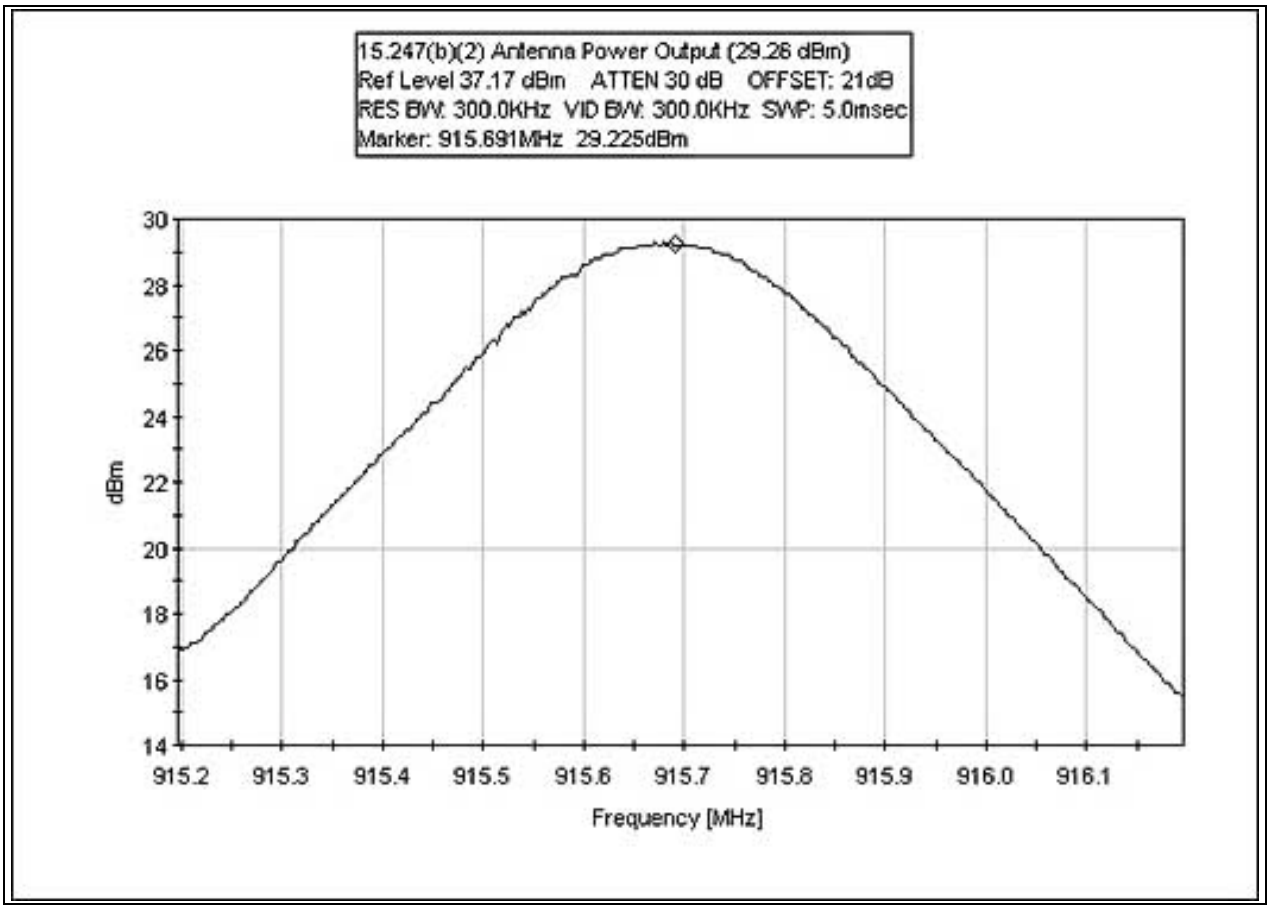
As shown above in a 10 second period the frequency is occupied for approximately 300 ms totally.

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

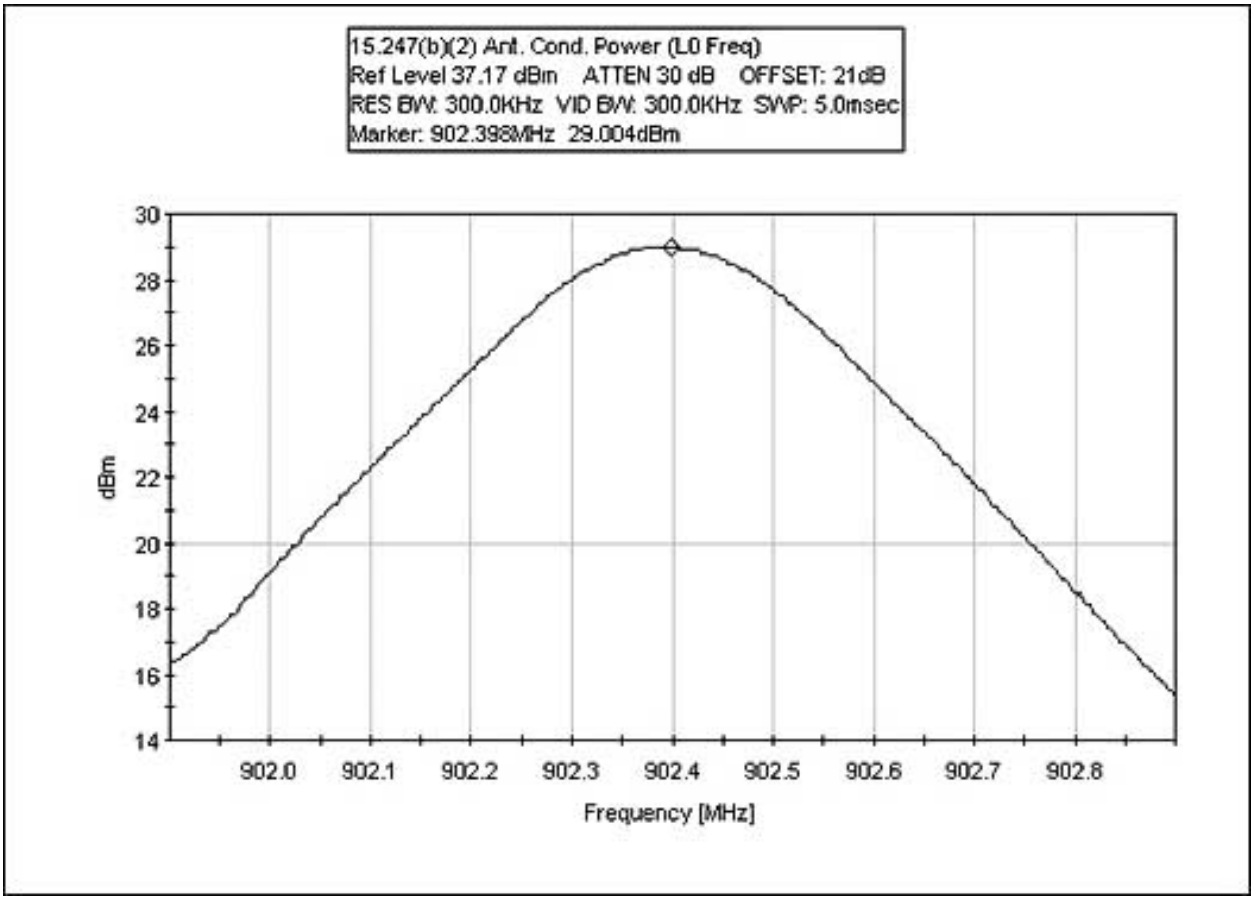


As can be seen in the above 20 second period in zero frequency span, the 924.6 MHz frequency was on twice in a 20 second period. This is an average of 300 ms dwell on this frequency in a ten second period, which is below the 410 ms requirement of the 15.247(a)(1)(i)

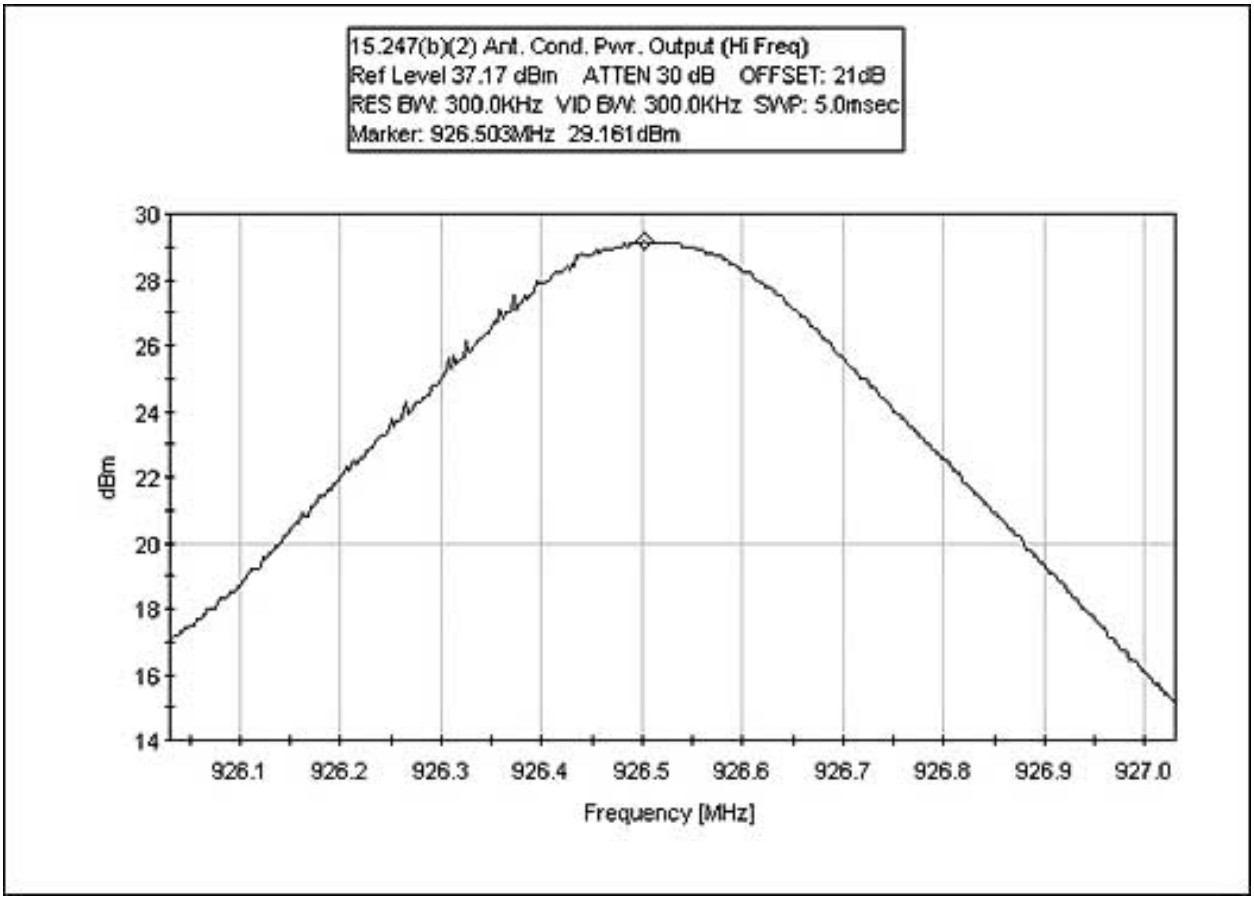
FCC 15.247(b)(2) ANTENNA CONDUCTED POWER OUTPUT 29.26 dBm



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



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



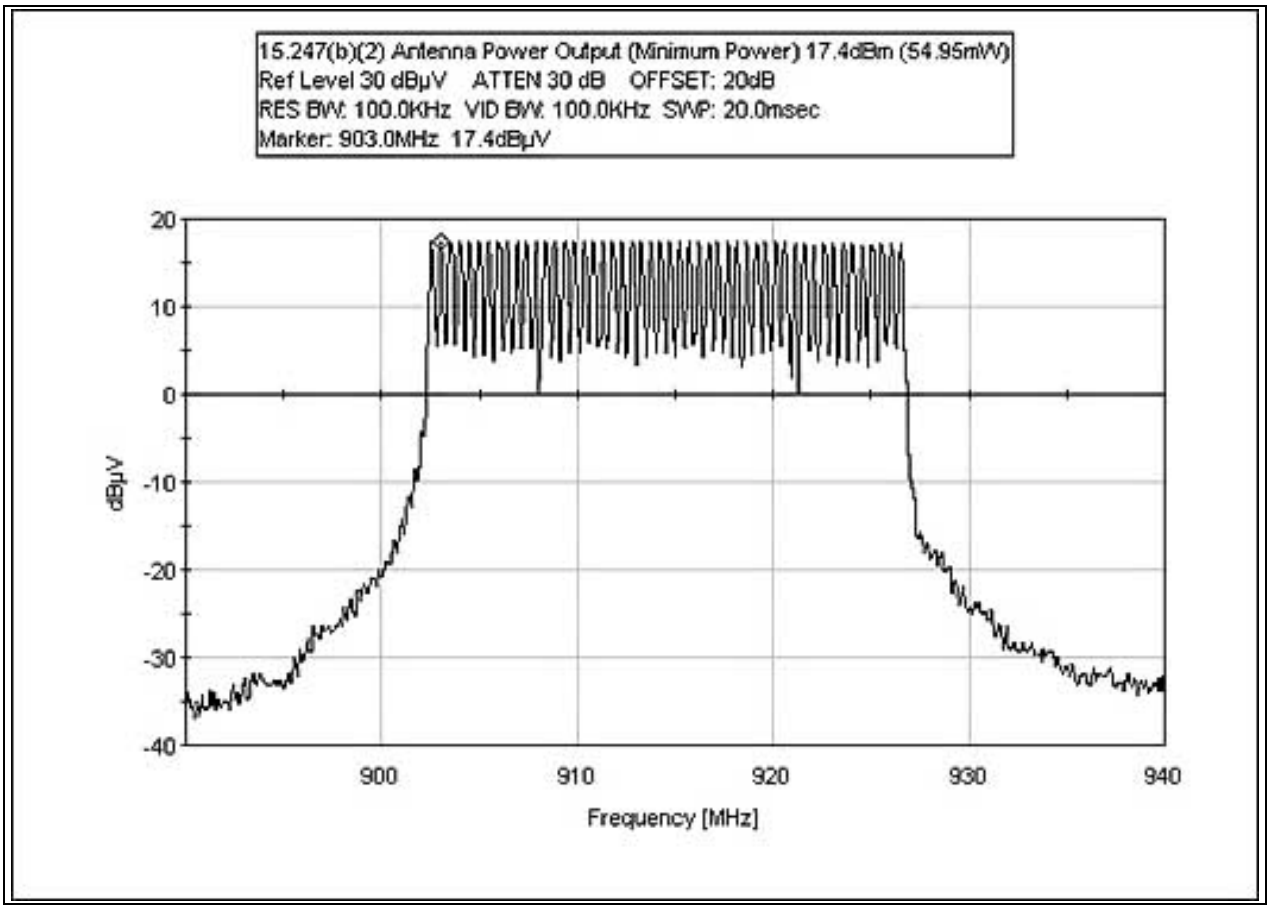
FCC 15.247(b)(2) Power Output									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	dB	Cable dB	dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
902.392	75.1	24.0		6.6		105.7	137.0	-31.3	V
902.410	75.7	24.0		6.6		106.3	137.0	-30.7	H
915.177	78.6	24.1		6.6		109.3	137.0	-27.7	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

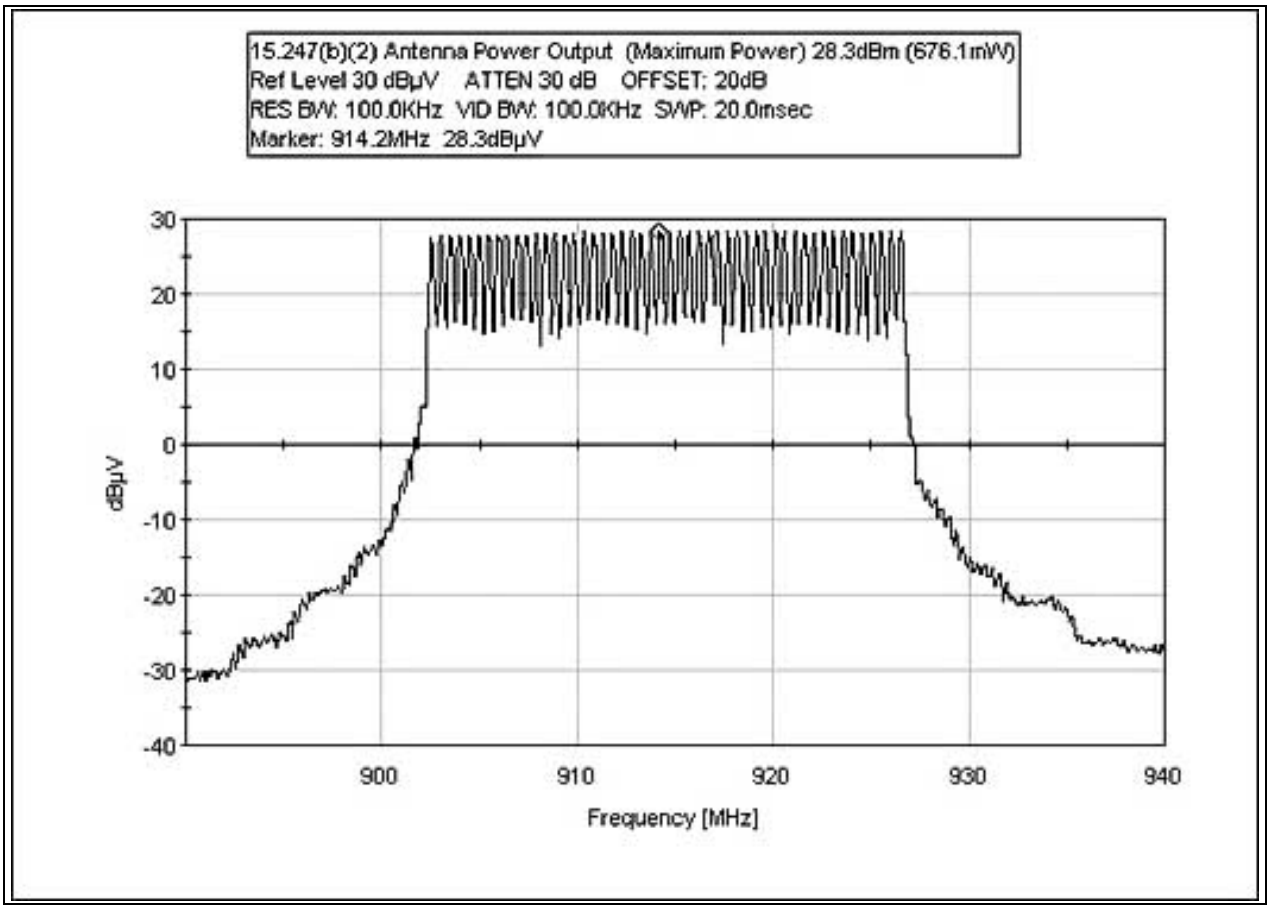
NOTES: H = Horizontal Polarization
V = Vertical Polarization

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



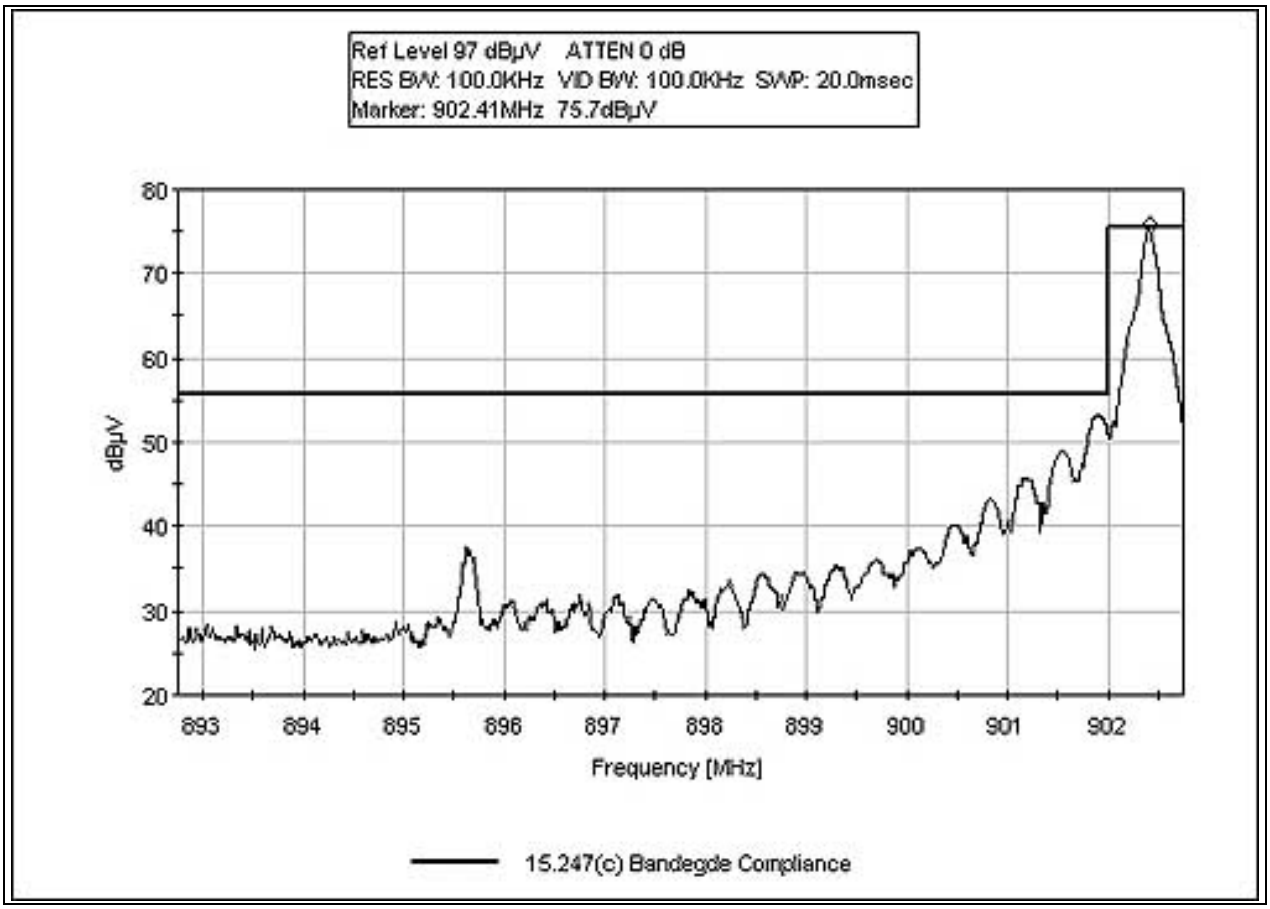
FCC 15.247(c) Six Highest Radiated Emission Levels									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
79.770	56.4	7.8	-28.5	1.9		37.6	40.0	-2.4	VQ-2
80.880	55.2	8.0	-28.5	1.9		36.6	40.0	-3.4	VQ-1
86.973	55.5	9.1	-28.5	2.0		38.1	40.0	-1.9	VQ-3
199.248	56.6	9.8	-28.4	3.0		41.0	43.5	-2.5	HQ-1
1831.000	61.8	24.7	-38.4	2.6		50.7	54.0	-3.3	H-2
2745.570	61.4	27.0	-38.7	3.5		53.2	54.0	-0.8	VA-2

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

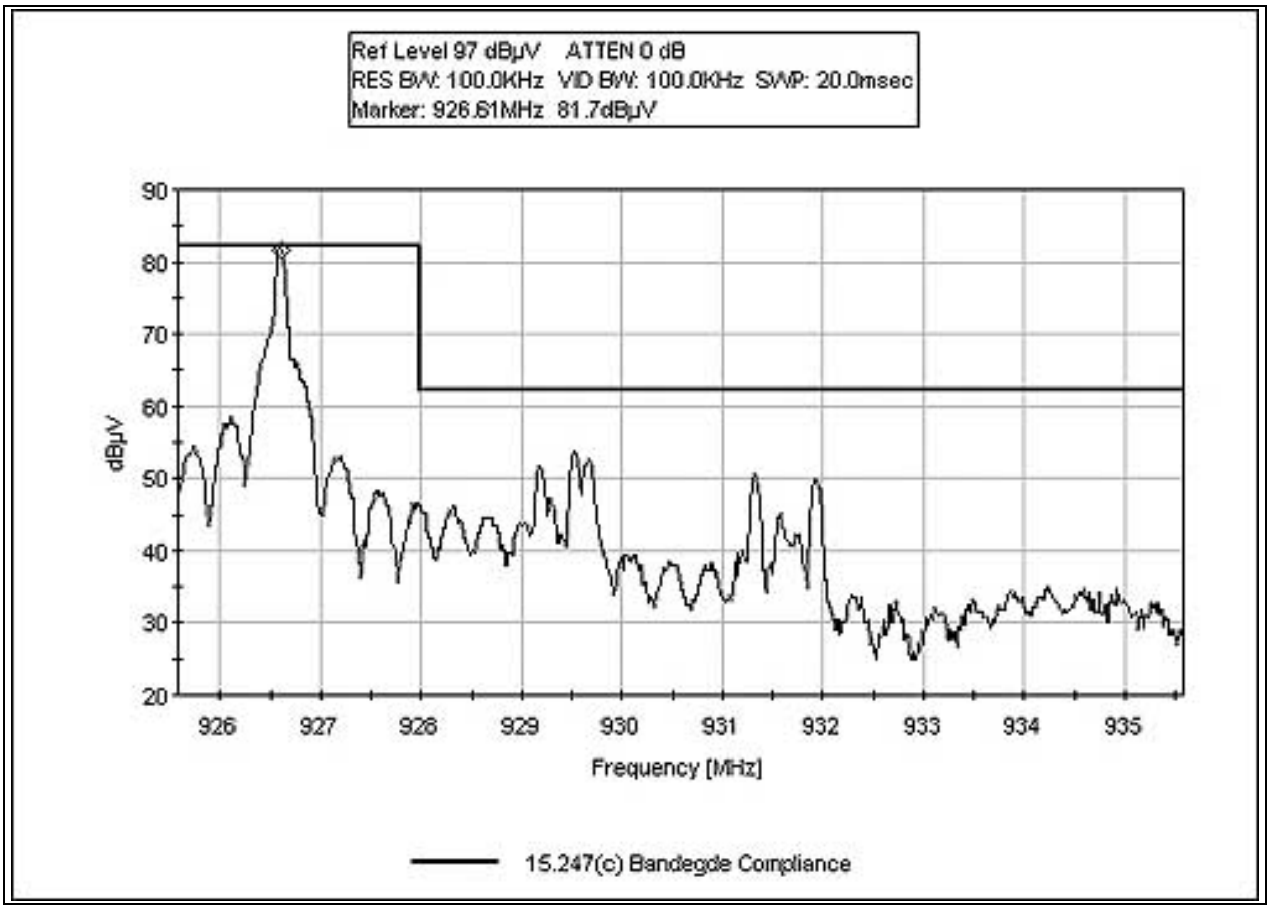
NOTES:
H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading
A = Average Reading
1 = 902 MHz
2 = 915.25 MHz
3 = 928 MHz

COMMENTS: Transmitter is installed in the printer and transmitting info to the tag. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: 902 MHz, 915.25 MHz and 928 MHz. Frequency range of measurement = 9 kHz - 9.28 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 9280 MHz RBW=1 MHz, VBW=1 MHz. 110Vac, 60 Hz, 22°C, 31% relative humidity. Modification: RFID tag printing direction is in the center and perpendicular to the radiating antenna.

FCC 15.247(C) BANDEDGE LO 100 kHz



FCC 15.247(C) BANDEDGE HI 100 kHz



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

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Side View

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.

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View - Loop Antenna

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

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.

Radiated Emissions FCC 15.247 Retest

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	02462	HP	8568B	2928A04874	031103	031105
Spectrum Analyzer Display Section	02472	HP	85662A	3001A18430	031103	031105
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
FCC 15.247 (c) Spurious Emission 30 – 1000MHz						
Biconilog Antenna	01995	Chase	CBL6111C	2451	040804	040806
Pre-amp	00309	HP	8447D	1937A02548	082303	082304
Antenna cable	NA	NA	RG214	Cable#15	123003	123004
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	070802	070804
FCC 15.247 (c) Spurious Emission 1000 – 9280MHz						
Horn Antenna	0849	EMCO	3115	6246	091002	091004
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091104
¼” Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	073103	073104
Heliax Antenna cable	NA	Andrew	LDF1-50	Cable#20	101303	101304
24” SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012305
150kHz-30MHz						
Loop Antenna	00314	EMCO	6502	2014	072302	072304
1.5 GHz HPF	02116	HP	84300-80037	3643A00027	060603	060605

Conducted Emissions FCC 15.209 Retest

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	02462	HP	8568B	2928A04874	031103	031105
Spectrum Analyzer Display Section	02472	HP	85662A	3001A18430	031103	031105
QP Adapter	01437	HP	85650A	3303A01884	092702	092704
Conducted Cable	NA	Harbour Ind	RG142	Cable # 21	072302	072304
LISN	00847	EMCO	3816/2NM	1104	010403	010405
LISN	00276, 00277, 00278	Solar	8028-50-TS-24BNC	B2	101403	101405
150kHZ HPF	02610	TTE	HB9615-150k-50-720	07766	041604	041605

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:	04/29/2004
Test Type:	**Conducted Emissions**	Time:	08:32:52
Equipment:	**Printer**	Sequence#:	4
Manufacturer:	Printronix	Tested By:	Eddie Wong
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
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. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: Hopping. 110 VAC, 60 Hz, 22°C, 31% relative humidity.

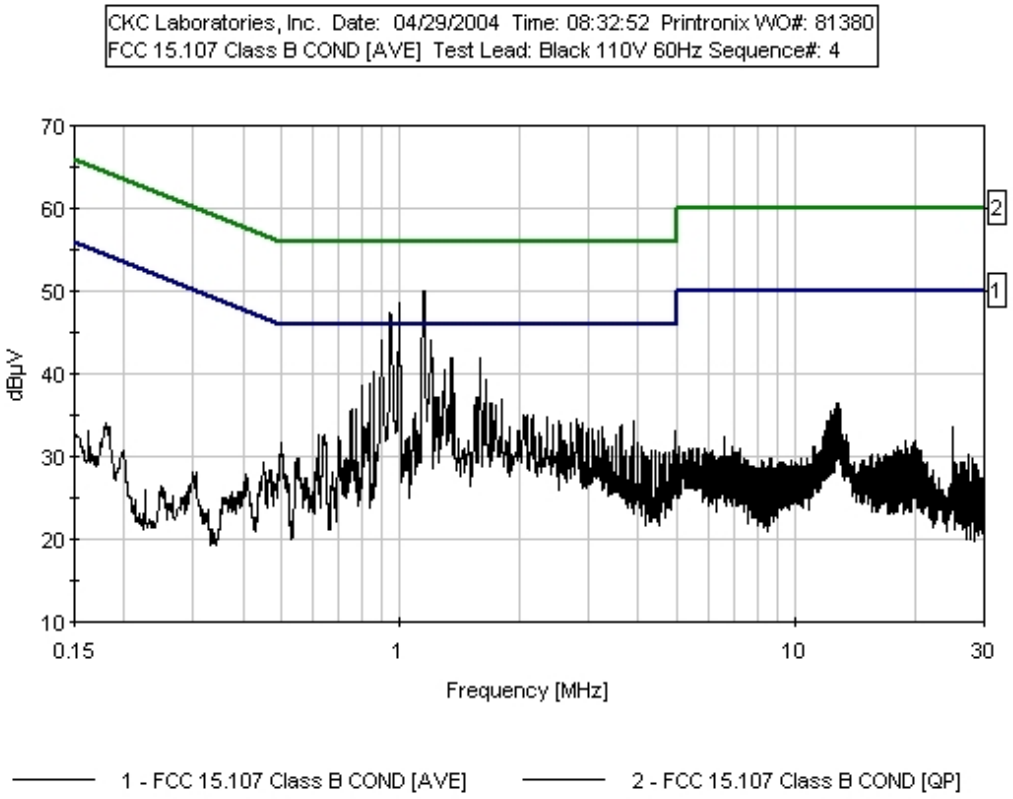
Transducer Legend:

T1=150kHz HPF 041605

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	1.345M	41.8	+0.2				+0.0	42.0	46.0	-4.0	Black
2	1.592M	41.7	+0.1				+0.0	41.8	46.0	-4.2	Black
3	1.298M	40.3	+0.2				+0.0	40.5	46.0	-5.5	Black
4	1.362M	40.2	+0.2				+0.0	40.4	46.0	-5.6	Black
5	861.202k	40.0	+0.2				+0.0	40.2	46.0	-5.8	Black
6	1.647M	39.2	+0.1				+0.0	39.3	46.0	-6.7	Black
7	837.204k	38.5	+0.2				+0.0	38.7	46.0	-7.3	Black
8	800.117k	38.3	+0.2				+0.0	38.5	46.0	-7.5	Black
9	1.277M	37.7	+0.2				+0.0	37.9	46.0	-8.1	Black
10	1.247M	37.0	+0.2				+0.0	37.2	46.0	-8.8	Black

11 Ave	945.000k	35.0	+0.2		+0.0	35.2	46.0	-10.8	Black
^	945.048k	47.1	+0.2		+0.0	47.3	46.0	+1.3	Black
13 Ave	996.000k	33.7	+0.2		+0.0	33.9	46.0	-12.1	Black
^	996.084k	48.4	+0.2		+0.0	48.6	46.0	+2.6	Black
15 Ave	1.145M	32.2	+0.2		+0.0	32.4	46.0	-13.6	Black
^	1.145M	49.9	+0.2		+0.0	50.1	46.0	+4.1	Black
17 Ave	1.196M	28.2	+0.2		+0.0	28.4	46.0	-17.6	Black
^	1.196M	43.9	+0.2		+0.0	44.1	46.0	-1.9	Black
19 Ave	898.000k	28.0	+0.2		+0.0	28.2	46.0	-17.8	Black
^	898.265k	43.8	+0.2		+0.0	44.0	46.0	-2.0	Black



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:	04/29/2004
Test Type:	**Conducted Emissions**	Time:	08:38:52
Equipment:	**Printer**	Sequence#:	5
Manufacturer:	Printronix	Tested By:	Eddie Wong
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
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. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: Hopping. 110 VAC, 60 Hz, 22°C, 31% relative humidity.

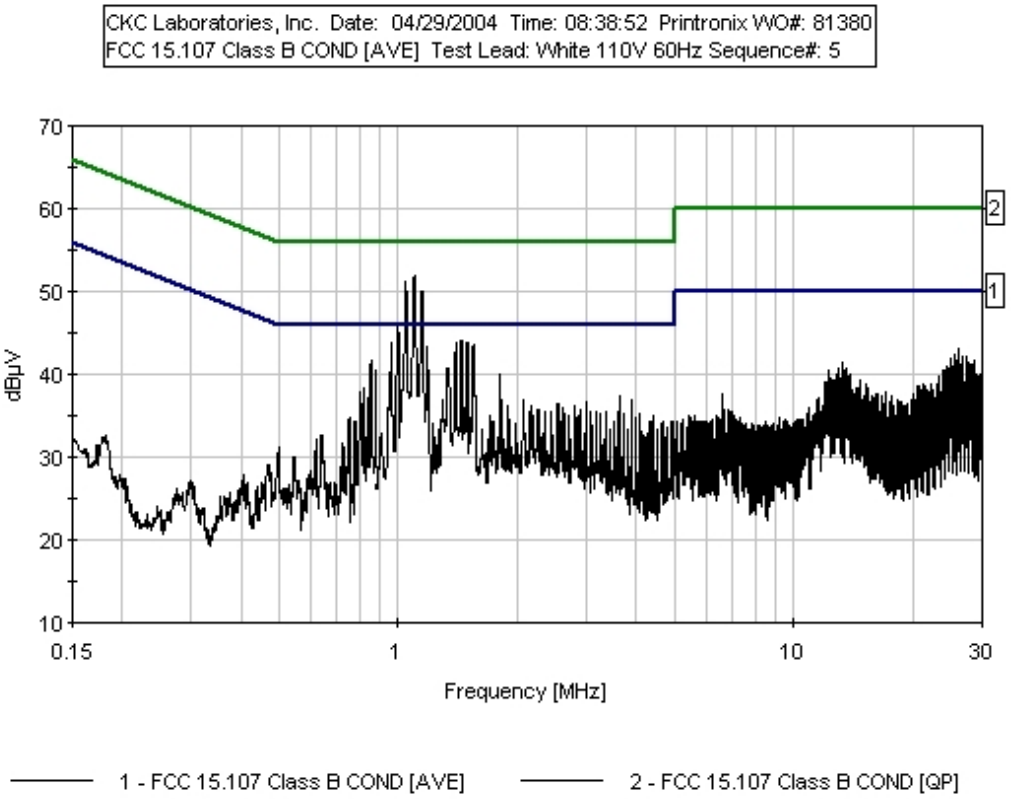
Transducer Legend:

T1=150kHz HPF 041605

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	853.202k	41.4	+0.2				+0.0	41.6	46.0	-4.4	White
2	1.332M	40.4	+0.2				+0.0	40.6	46.0	-5.4	White
3	1.808M	39.9	+0.1				+0.0	40.0	46.0	-6.0	White
4	26.074M	43.0	+0.2				+0.0	43.2	50.0	-6.8	White
5	25.533M	42.3	+0.2				+0.0	42.5	50.0	-7.5	White
6	1.047M Ave	36.0	+0.2				+0.0	36.2	46.0	-9.8	White
^	1.047M	51.0	+0.2				+0.0	51.2	46.0	+5.2	White
8	1.098M Ave	35.8	+0.2				+0.0	36.0	46.0	-10.0	White
^	1.098M	51.7	+0.2				+0.0	51.9	46.0	+5.9	White
10	996.000k Ave	35.2	+0.2				+0.0	35.4	46.0	-10.6	White
^	996.084k	45.7	+0.2				+0.0	45.9	46.0	-0.1	White

12 Ave	1.145M	34.3	+0.2		+0.0	34.5	46.0	-11.5	White
^	1.145M	49.7	+0.2		+0.0	49.9	46.0	+3.9	White
14 Ave	1.443M	29.9	+0.1		+0.0	30.0	46.0	-16.0	White
^	1.443M	43.9	+0.1		+0.0	44.0	46.0	-2.0	White
16 Ave	1.443M	29.6	+0.1		+0.0	29.7	46.0	-16.3	White



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	-24.0	Vert
									Reading did not change during voltage swings from 102-138 VAC.		
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	-27.7	Horiz
									Reading did not change during voltage swings from 102-138 VAC.		
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	-30.7	Horiz
									Reading did not change during voltage swings from 102-138 VAC.		
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:	05/07/2004
Test Type:	**Maximized emission**	Time:	16:31:31
Equipment:	**Printer**	Sequence#:	1
Manufacturer:	Printronix	Tested By:	Eddie Wong
Model:	T5204e		
S/N:	480329082260		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8568B		10/23/2003	10/23/2003	02472

***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. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: 902 MHz Frequency range of measurement = 9 kHz - 9.28 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 9280 MHz RBW=1 MHz, VBW=1 MHz. 110Vac, 60 Hz, 22°C, 31% relative humidity. Modification: RFID tag printing direction is in the center and perpendicular to the radiating antenna. Pulsed sample average correction factor applied to all reading above 1GHz.

Transducer Legend:

T1=Biconalog, SN 2451 040804	T2=Cable #10 070804
T3=Cable# 15 123004	T4=Preamp 8447D 082304
T5=----------	T6=Horn 6246_091004
T7=HP83017A Preamp 091104	T8=Cable#20 Heliax 48ft 101304
T9=SMA Cable 1-40GHz AN2604_012305	T10=HPF_AN02116_1.5GHz_060605
T11=Pulsed Sample Average Correction factor	

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	199.248M QP	56.6	+9.8	+0.2	+2.8	-28.4	+0.0	41.0	43.5	-2.5	Horiz
^	199.248M	59.3	+9.8	+0.2	+2.8	-28.4	+0.0	43.7	43.5	+0.2	Horiz

3	80.880M QP	55.2	+8.0	+0.2	+1.7	-28.5	+0.0	36.6	40.0	-3.4	Vert
^	80.880M	58.7	+8.0	+0.2	+1.7	-28.5	+0.0	40.1	40.0	+0.1	Vert
5	1804.800M	61.7	+0.0 +0.0 +0.5	+0.0 +27.0 +0.8	+0.0 -38.3 -3.6	+0.0 +2.5	+0.0	50.6	54.0	-3.4	Horiz
6	2707.150M Ave	58.0	+0.0 +0.0 +0.5	+0.0 +29.5 +0.3	+0.0 -38.5 -3.6	+0.0 +3.7	+0.0	49.9	54.0	-4.1	Vert
^	2707.150M	61.6	+0.0 +0.0 +0.5	+0.0 +29.5 +0.3	+0.0 -38.5 -3.6	+0.0 +3.7	+0.0	53.5	54.0	-0.5	Vert
8	4511.910M	53.7	+0.0 +0.0 +0.7	+0.0 +33.2 +0.4	+0.0 -39.8 -3.6	+0.0 +4.9	+0.0	49.5	54.0	-4.5	Horiz
9	200.410M QP	54.5	+9.8	+0.2	+2.8	-28.4	+0.0	38.9	43.5	-4.6	Vert
^	200.425M	54.8	+9.8	+0.2	+2.8	-28.4	+0.0	39.2	43.5	-4.3	Vert
11	233.810M	53.8	+12.4	+0.2	+2.9	-28.3	+0.0	41.0	46.0	-5.0	Horiz
12	170.623M	53.2	+10.6	+0.2	+2.5	-28.4	+0.0	38.1	43.5	-5.4	Horiz
13	906.000M	36.8	+24.2	+0.7	+6.2	-27.4	+0.0	40.5	46.0	-5.5	Horiz
14	199.086M	53.5	+9.8	+0.2	+2.8	-28.4	+0.0	37.9	43.5	-5.6	Vert
15	200.400M QP	53.5	+9.8	+0.2	+2.8	-28.4	+0.0	37.9	43.5	-5.6	Horiz
^	200.418M	56.7	+9.8	+0.2	+2.8	-28.4	+0.0	41.1	43.5	-2.4	Horiz
17	75.630M QP	53.6	+7.4	+0.2	+1.7	-28.5	+0.0	34.4	40.0	-5.7	Vert
^	75.630M	56.8	+7.4	+0.2	+1.7	-28.5	+0.0	37.6	40.0	-2.4	Vert
19	5414.500M	47.4	+0.0 +0.0 +0.8	+0.0 +33.9 +0.6	+0.0 -36.9 -3.6	+0.0 +5.5	+0.0	47.7	54.0	-6.3	Vert

20	133.623M	50.9	+12.1	+0.2	+2.1	-28.3	+0.0	37.0	43.5	-6.5	Horiz
21	199.992M	52.6	+9.8	+0.2	+2.8	-28.4	+0.0	37.0	43.5	-6.5	Vert
22	101.295M	52.4	+11.0	+0.2	+1.7	-28.4	+0.0	36.9	43.5	-6.6	Horiz
23	6317.000M	45.8	+0.0 +0.0 +0.9	+0.0 +33.2 +0.4	+0.0 -35.3 -3.6	+0.0 +6.0	+0.0	47.4	54.0	-6.6	Horiz
24	440.379M	45.1	+18.0	+0.4	+4.0	-28.3	+0.0	39.2	46.0	-6.8	Horiz
25	5414.000M	46.8	+0.0 +0.0 +0.8	+0.0 +33.9 +0.6	+0.0 -36.9 -3.6	+0.0 +5.5	+0.0	47.1	54.0	-6.9	Horiz
26 QP	898.570M	35.7	+23.9	+0.7	+6.2	-27.4	+0.0	39.1	46.0	-6.9	Vert
^	898.532M	40.1	+23.9	+0.7	+6.2	-27.4	+0.0	43.5	46.0	-2.5	Vert
28	6317.000M	45.3	+0.0 +0.0 +0.9	+0.0 +33.2 +0.4	+0.0 -35.3 -3.6	+0.0 +6.0	+0.0	46.9	54.0	-7.1	Vert
29	4511.950M	51.1	+0.0 +0.0 +0.7	+0.0 +33.2 +0.4	+0.0 -39.8 -3.6	+0.0 +4.9	+0.0	46.9	54.0	-7.1	Vert
30	39.776M	45.3	+14.4	+0.1	+1.2	-28.5	+0.0	32.5	40.0	-7.5	Vert
31	287.904M	48.9	+13.9	+0.3	+3.3	-28.3	+0.0	38.1	46.0	-7.9	Horiz
32 QP	46.210M	48.0	+10.8	+0.2	+1.2	-28.4	+0.0	31.8	40.0	-8.2	Vert
^	46.210M	52.3	+10.8	+0.2	+1.2	-28.4	+0.0	36.1	40.0	-3.9	Vert
34	101.368M	50.7	+11.0	+0.2	+1.7	-28.4	+0.0	35.2	43.5	-8.3	Vert
35	70.016M	51.5	+6.8	+0.2	+1.6	-28.5	+0.0	31.6	40.0	-8.4	Vert
36	895.951M	33.9	+23.8	+0.7	+6.2	-27.4	+0.0	37.2	46.0	-8.8	Vert

37	3610.000M	51.1	+0.0 +0.0 +0.6	+0.0 +32.4 +0.3	+0.0 -39.9 -3.6	+0.0 +4.3	+0.0	45.2	54.0	-8.8	Horiz
38	156.056M	48.8	+11.8	+0.2	+2.3	-28.4	+0.0	34.7	43.5	-8.8	Horiz
39	120.242M	48.0	+12.0	+0.2	+1.9	-28.3	+0.0	33.8	43.5	-9.7	Horiz
40	816.054M	34.9	+22.2	+0.6	+5.8	-27.5	+0.0	36.0	46.0	-10.0	Horiz
41	897.811M	32.3	+23.8	+0.7	+6.2	-27.4	+0.0	35.6	46.0	-10.4	Horiz
42	3609.650M	49.4	+0.0 +0.0 +0.6	+0.0 +32.4 +0.3	+0.0 -39.9 -3.6	+0.0 +4.3	+0.0	43.5	54.0	-10.5	Vert
43	658.548M	36.7	+20.8	+0.5	+5.0	-27.5	+0.0	35.5	46.0	-10.5	Vert
44	801.310M	34.6	+22.0	+0.6	+5.6	-27.5	+0.0	35.3	46.0	-10.7	Vert
45	372.591M	43.5	+15.9	+0.4	+3.7	-28.3	+0.0	35.2	46.0	-10.8	Horiz
46	300.618M	45.4	+14.0	+0.3	+3.3	-28.3	+0.0	34.7	46.0	-11.3	Horiz
47	524.983M	37.8	+19.7	+0.5	+4.6	-28.0	+0.0	34.6	46.0	-11.4	Horiz
48	161.250M	45.9	+11.5	+0.2	+2.4	-28.4	+0.0	31.6	43.5	-11.9	Horiz
49	223.813M	47.6	+11.7	+0.2	+2.8	-28.3	+0.0	34.0	46.0	-12.0	Horiz
50	457.282M	39.1	+18.4	+0.4	+4.1	-28.3	+0.0	33.7	46.0	-12.3	Horiz
51	816.024M	32.6	+22.2	+0.6	+5.8	-27.5	+0.0	33.7	46.0	-12.3	Vert
52	389.562M	41.4	+16.2	+0.4	+3.8	-28.2	+0.0	33.6	46.0	-12.4	Horiz
53	558.358M	36.0	+20.2	+0.5	+4.7	-27.9	+0.0	33.5	46.0	-12.5	Vert

54	423.398M	40.0	+17.3	+0.4	+3.9	-28.2	+0.0	33.4	46.0	-12.6	Horiz
55	279.164M	44.3	+13.8	+0.3	+3.2	-28.2	+0.0	33.4	46.0	-12.6	Horiz
56	96.905M	46.7	+10.5	+0.2	+1.8	-28.4	+0.0	30.8	43.5	-12.7	Vert
57	338.743M	42.4	+15.1	+0.4	+3.5	-28.3	+0.0	33.1	46.0	-12.9	Horiz
58	194.748M	46.2	+9.8	+0.2	+2.8	-28.4	+0.0	30.6	43.5	-12.9	Horiz
59	406.460M	40.1	+16.7	+0.4	+3.9	-28.2	+0.0	32.9	46.0	-13.1	Horiz
60	355.637M	41.7	+15.5	+0.4	+3.5	-28.3	+0.0	32.8	46.0	-13.2	Horiz
61	118.555M	44.6	+11.9	+0.2	+1.9	-28.3	+0.0	30.3	43.5	-13.2	Vert
62	773.062M	32.2	+21.9	+0.6	+5.5	-27.5	+0.0	32.7	46.0	-13.3	Horiz
63	304.864M	43.3	+14.1	+0.3	+3.3	-28.3	+0.0	32.7	46.0	-13.3	Horiz
64	321.803M	42.5	+14.6	+0.3	+3.4	-28.3	+0.0	32.5	46.0	-13.5	Horiz
65	474.205M	37.4	+18.6	+0.4	+4.2	-28.2	+0.0	32.4	46.0	-13.6	Horiz
66	400.829M	39.9	+16.4	+0.4	+3.9	-28.2	+0.0	32.4	46.0	-13.6	Horiz
67	140.055M	43.7	+12.2	+0.2	+2.1	-28.4	+0.0	29.8	43.5	-13.7	Vert
68	525.009M	35.3	+19.7	+0.5	+4.6	-28.0	+0.0	32.1	46.0	-13.9	Vert
69	491.163M	36.5	+18.9	+0.4	+4.4	-28.1	+0.0	32.1	46.0	-13.9	Vert
70	423.381M	38.4	+17.3	+0.4	+3.9	-28.2	+0.0	31.8	46.0	-14.2	Vert

71	400.684M	39.3	+16.4	+0.4	+3.9	-28.2	+0.0	31.8	46.0	-14.2	Vert
72	586.990M	34.3	+19.8	+0.5	+4.8	-27.8	+0.0	31.6	46.0	-14.4	Vert
73	82.495M	43.6	+8.3	+0.2	+1.8	-28.5	+0.0	25.4	40.0	-14.6	Horiz
74	498.503M	35.4	+19.0	+0.4	+4.5	-28.1	+0.0	31.2	46.0	-14.8	Horiz
75	109.500M	43.6	+11.4	+0.2	+1.8	-28.4	+0.0	28.6	43.5	-14.9	Horiz
76	237.093M	43.7	+12.6	+0.2	+2.9	-28.3	+0.0	31.1	46.0	-14.9	Vert
77	615.602M	33.1	+20.0	+0.5	+4.9	-27.6	+0.0	30.9	46.0	-15.1	Vert
78	206.310M	43.4	+10.3	+0.2	+2.8	-28.4	+0.0	28.3	43.5	-15.2	Horiz
79	484.305M	35.4	+18.8	+0.4	+4.3	-28.2	+0.0	30.7	46.0	-15.3	Horiz
80	272.003M	41.5	+13.7	+0.3	+3.2	-28.2	+0.0	30.5	46.0	-15.5	Horiz
81	474.193M	35.4	+18.6	+0.4	+4.2	-28.2	+0.0	30.4	46.0	-15.6	Vert
82	528.027M	33.5	+19.7	+0.5	+4.6	-28.0	+0.0	30.3	46.0	-15.7	Horiz
83	450.752M	35.7	+18.3	+0.4	+4.0	-28.3	+0.0	30.1	46.0	-15.9	Horiz
84	386.967M	37.9	+16.2	+0.4	+3.8	-28.2	+0.0	30.1	46.0	-15.9	Horiz
85	334.036M	39.6	+15.0	+0.4	+3.4	-28.3	+0.0	30.1	46.0	-15.9	Vert
86	78.738M	42.9	+7.7	+0.2	+1.7	-28.5	+0.0	24.0	40.0	-16.0	Horiz
87	123.065M	41.6	+12.0	+0.2	+2.0	-28.3	+0.0	27.5	43.5	-16.0	Vert

88	144.008M	41.0	+12.3	+0.2	+2.2	-28.4	+0.0	27.3	43.5	-16.2	Horiz
89	547.785M	32.3	+20.2	+0.5	+4.6	-27.9	+0.0	29.7	46.0	-16.3	Horiz
90	377.767M	37.8	+16.0	+0.4	+3.7	-28.2	+0.0	29.7	46.0	-16.3	Horiz
91	338.730M	38.9	+15.1	+0.4	+3.5	-28.3	+0.0	29.6	46.0	-16.4	Vert
92	422.210M	36.1	+17.3	+0.4	+3.9	-28.2	+0.0	29.5	46.0	-16.5	Horiz
93	254.017M	41.0	+13.5	+0.2	+3.0	-28.3	+0.0	29.4	46.0	-16.6	Vert
94	509.439M	33.2	+19.3	+0.4	+4.5	-28.1	+0.0	29.3	46.0	-16.7	Horiz
95	254.060M	40.9	+13.5	+0.2	+3.0	-28.3	+0.0	29.3	46.0	-16.7	Horiz
96	480.024M	34.0	+18.7	+0.4	+4.3	-28.2	+0.0	29.2	46.0	-16.8	Vert
97	440.328M	34.9	+17.9	+0.4	+4.0	-28.3	+0.0	28.9	46.0	-17.1	Vert
98	282.914M	39.7	+13.8	+0.3	+3.2	-28.2	+0.0	28.8	46.0	-17.2	Horiz
99	457.279M	34.2	+18.4	+0.4	+4.1	-28.3	+0.0	28.8	46.0	-17.2	Vert
100	304.840M	39.4	+14.1	+0.3	+3.3	-28.3	+0.0	28.8	46.0	-17.2	Vert
101	191.998M	41.6	+9.8	+0.2	+2.7	-28.4	+0.0	25.9	43.5	-17.6	Vert
102	320.035M	38.3	+14.6	+0.3	+3.4	-28.3	+0.0	28.3	46.0	-17.7	Horiz
103	389.525M	35.6	+16.2	+0.4	+3.8	-28.2	+0.0	27.8	46.0	-18.2	Vert
104	321.776M	37.6	+14.6	+0.3	+3.4	-28.3	+0.0	27.6	46.0	-18.4	Vert

105	367.354M	35.9	+15.8	+0.4	+3.6	-28.3	+0.0	27.4	46.0	-18.6	Horiz
106	355.664M	35.9	+15.5	+0.4	+3.5	-28.3	+0.0	27.0	46.0	-19.0	Vert
107	367.590M	35.3	+15.8	+0.4	+3.6	-28.3	+0.0	26.8	46.0	-19.2	Vert
108	267.223M	37.8	+13.7	+0.3	+3.1	-28.2	+0.0	26.7	46.0	-19.3	Vert
109	343.612M	35.6	+15.2	+0.4	+3.5	-28.3	+0.0	26.4	46.0	-19.6	Horiz
110	320.009M	36.3	+14.6	+0.3	+3.4	-28.3	+0.0	26.3	46.0	-19.7	Vert
111	280.593M	37.0	+13.8	+0.3	+3.2	-28.2	+0.0	26.1	46.0	-19.9	Vert
112	360.773M	34.1	+15.6	+0.4	+3.6	-28.3	+0.0	25.4	46.0	-20.6	Vert
113	372.590M	33.6	+15.9	+0.4	+3.7	-28.3	+0.0	25.3	46.0	-20.7	Vert
114	229.064M	35.3	+12.0	+0.2	+2.8	-28.3	+0.0	22.0	46.0	-24.0	Vert
115	240.511M	34.0	+12.9	+0.2	+2.9	-28.3	+0.0	21.7	46.0	-24.3	Vert
116	1804.800M	65.1	+0.0 +0.0 +0.5	+0.0 +27.0 +0.8	+0.0 -38.3 -3.6	+0.0 +2.5	+0.0	54.0	80.0 Not in restricted band	-26.0	Vert

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

Customer:	**Printronix**		
Specification:	**FCC 15.247 (c) (FCC 15.205)**		
Work Order #:	**81380**	Date:	05/07/2004
Test Type:	**Maximized emission**	Time:	16:53:05
Equipment:	**Printer**	Sequence#:	2
Manufacturer:	Printronix	Tested By:	Eddie Wong
Model:	T5204e		
S/N:	480329082260		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8568B		10/23/2003	10/23/2003	02472

***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. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: 915.25 MHz. Frequency range of measurement = 9 kHz – 9.28 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 9280 MHz RBW=1 MHz, VBW=1 MHz. 110Vac, 60 Hz, 22°C, 31% relative humidity. Modification: RFID tag printing direction is in the center and perpendicular to the radiating antenna. Pulsed sample average correction factor applied to all reading above 1GHz.

Transducer Legend:

T1=Biconalog, SN 2451 040804	T2=Cable #10 070804
T3=Cable# 15 123004	T4=Preamp 8447D 082304
T5=Horn 6246_091004	T6=SMA Cable 1-40GHz AN2604_012305
T7=HP83017A Preamp 091104	T8=Cable#20 Heliax 48ft 101304
T9=HPF_AN02116_1.5GHz_060605	T10=Pulsed Sample Average Correction factor

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2745.570M	61.4	+0.0	+0.0	+0.0	+0.0	+0.0	53.2	54.0	-0.8	Vert
	Ave		+29.7	+0.6	-38.7	+3.5					
			+0.3	-3.6							
^	2745.590M	65.8	+0.0	+0.0	+0.0	+0.0	+0.0	57.6	54.0	+3.6	Vert
			+29.7	+0.6	-38.7	+3.5					
			+0.3	-3.6							

3	79.770M QP	56.4	+7.8 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	37.6	40.0	-2.4	Vert
^	79.770M	58.1	+7.8 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	39.3	40.0	-0.7	Vert
5	1831.000M	61.8	+0.0 +27.1 +0.7	+0.0 +0.5 -3.6	+0.0 -38.4	+0.0 +2.6	+0.0	50.7	54.0	-3.3	Horiz
6	6406.300M	48.4	+0.0 +33.2 +0.4	+0.0 +0.9 -3.6	+0.0 -35.0	+0.0 +5.9	+0.0	50.2	54.0	-3.8	Horiz
7	2745.560M	58.3	+0.0 +29.7 +0.3	+0.0 +0.6 -3.6	+0.0 -38.7	+0.0 +3.5	+0.0	50.1	54.0	-3.9	Horiz
8	83.080M	54.2	+8.4 +0.0 +0.0	+0.2 +0.0 +0.0	+1.8 +0.0	-28.5 +0.0	+0.0	36.1	40.0	-3.9	Horiz
9	142.080M	52.8	+12.2 +0.0 +0.0	+0.2 +0.0 +0.0	+2.1 +0.0	-28.4 +0.0	+0.0	38.9	43.5	-4.6	Horiz
10	76.020M QP	53.7	+7.4 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	34.5	40.0	-5.5	Vert
^	76.020M	57.0	+7.4 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	37.8	40.0	-2.2	Vert
12	72.296M	53.8	+7.0 +0.0 +0.0	+0.2 +0.0 +0.0	+1.6 +0.0	-28.5 +0.0	+0.0	34.1	40.0	-5.9	Vert
13	199.990M QP	53.2	+9.8 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.4 +0.0	+0.0	37.6	43.5	-5.9	Horiz
^	199.990M	59.0	+9.8 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.4 +0.0	+0.0	43.4	43.5	-0.1	Horiz
15	287.905M	50.8	+13.9 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	40.0	46.0	-6.0	Horiz
16	6406.000M	45.8	+0.0 +33.2 +0.4	+0.0 +0.9 -3.6	+0.0 -35.0	+0.0 +5.9	+0.0	47.6	54.0	-6.4	Vert
17	44.975M	49.4	+11.1 +0.0 +0.0	+0.2 +0.0 +0.0	+1.2 +0.0	-28.4 +0.0	+0.0	33.5	40.0	-6.5	Vert
18	5491.000M	46.7	+0.0 +34.0 +0.6	+0.0 +0.8 -3.6	+0.0 -36.7	+0.0 +5.6	+0.0	47.4	54.0	-6.6	Horiz
19	61.565M	52.6	+7.5 +0.0 +0.0	+0.2 +0.0 +0.0	+1.4 +0.0	-28.4 +0.0	+0.0	33.3	40.0	-6.7	Vert

20	4576.000M	50.6	+0.0 +33.2 +0.5	+0.0 +0.7 -3.6	+0.0 -39.5	+0.0 +5.1	+0.0	47.0	54.0	-7.0	Vert
21	90.318M	53.2	+9.7 +0.0 +0.0	+0.2 +0.0 +0.0	+1.9 +0.0	-28.5 +0.0	+0.0	36.5	43.5	-7.0	Vert
22	4576.000M	50.3	+0.0 +33.2 +0.5	+0.0 +0.7 -3.6	+0.0 -39.5	+0.0 +5.1	+0.0	46.7	54.0	-7.3	Horiz
23	801.694M	37.9	+22.0 +0.0 +0.0	+0.6 +0.0 +0.0	+5.6 +0.0	-27.5 +0.0	+0.0	38.6	46.0	-7.4	Horiz
24	138.470M	49.8	+12.2 +0.0 +0.0	+0.2 +0.0 +0.0	+2.1 +0.0	-28.4 +0.0	+0.0	35.9	43.5	-7.6	Horiz
25	333.937M	47.7	+15.0 +0.0 +0.0	+0.4 +0.0 +0.0	+3.4 +0.0	-28.3 +0.0	+0.0	38.2	46.0	-7.8	Vert
26	200.398M	51.0	+9.8 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.4 +0.0	+0.0	35.4	43.5	-8.1	Vert
27	159.968M	49.5	+11.6 +0.0 +0.0	+0.2 +0.0 +0.0	+2.4 +0.0	-28.4 +0.0	+0.0	35.3	43.5	-8.2	Horiz
28	909.473M	33.7	+24.3 +0.0 +0.0	+0.7 +0.0 +0.0	+6.2 +0.0	-27.4 +0.0	+0.0	37.5	46.0	-8.5	Vert
29	270.958M	48.2	+13.7 +0.0 +0.0	+0.3 +0.0 +0.0	+3.2 +0.0	-28.2 +0.0	+0.0	37.2	46.0	-8.8	Horiz
30	5491.000M	44.2	+0.0 +34.0 +0.6	+0.0 +0.8 -3.6	+0.0 -36.7	+0.0 +5.6	+0.0	44.9	54.0	-9.1	Vert
31	372.572M	44.6	+15.9 +0.0 +0.0	+0.4 +0.0 +0.0	+3.7 +0.0	-28.3 +0.0	+0.0	36.3	46.0	-9.7	Horiz
32	338.700M	45.4	+15.1 +0.0 +0.0	+0.4 +0.0 +0.0	+3.5 +0.0	-28.3 +0.0	+0.0	36.1	46.0	-9.9	Vert
33	333.944M	45.3	+15.0 +0.0 +0.0	+0.4 +0.0 +0.0	+3.4 +0.0	-28.3 +0.0	+0.0	35.8	46.0	-10.2	Horiz
34	304.849M	46.4	+14.1 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	35.8	46.0	-10.2	Horiz
35	233.811M	48.6	+12.4 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	35.8	46.0	-10.2	Horiz
36	99.568M	48.9	+10.9 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.4 +0.0	+0.0	33.3	43.5	-10.2	Horiz

37	586.944M	38.2	+19.8 +0.0 +0.0	+0.5 +0.0 +0.0	+4.8 +0.0	-27.8 +0.0	+0.0	35.5	46.0	-10.5	Vert
38	801.701M	34.4	+22.0 +0.0 +0.0	+0.6 +0.0 +0.0	+5.6 +0.0	-27.5 +0.0	+0.0	35.1	46.0	-10.9	Vert
39	668.387M	36.2	+20.8 +0.0 +0.0	+0.5 +0.0 +0.0	+5.1 +0.0	-27.5 +0.0	+0.0	35.1	46.0	-10.9	Vert
40	440.353M	41.0	+18.0 +0.0 +0.0	+0.4 +0.0 +0.0	+4.0 +0.0	-28.3 +0.0	+0.0	35.1	46.0	-10.9	Vert
41	399.973M	42.3	+16.4 +0.0 +0.0	+0.4 +0.0 +0.0	+3.9 +0.0	-28.2 +0.0	+0.0	34.8	46.0	-11.2	Horiz
42	78.548M	47.7	+7.7 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	28.8	40.0	-11.2	Horiz
43	300.625M	45.4	+14.0 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	34.7	46.0	-11.3	Horiz
44	279.172M	45.6	+13.8 +0.0 +0.0	+0.3 +0.0 +0.0	+3.2 +0.0	-28.2 +0.0	+0.0	34.7	46.0	-11.3	Horiz
45	54.014M	46.7	+8.9 +0.0 +0.0	+0.2 +0.0 +0.0	+1.3 +0.0	-28.4 +0.0	+0.0	28.7	40.0	-11.3	Vert
46	237.083M	47.2	+12.6 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	34.6	46.0	-11.4	Horiz
47	3661.000M	47.6	+0.0 +32.6 +0.3	+0.0 +0.6 -3.6	+0.0 -39.8	+0.0 +4.3	+0.0	42.0	54.0	-12.0	Vert
48	266.703M	45.0	+13.7 +0.0 +0.0	+0.3 +0.0 +0.0	+3.1 +0.0	-28.2 +0.0	+0.0	33.9	46.0	-12.1	Horiz
49	99.708M	47.0	+10.9 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.4 +0.0	+0.0	31.4	43.5	-12.1	Vert
50	355.636M	42.2	+15.5 +0.0 +0.0	+0.4 +0.0 +0.0	+3.5 +0.0	-28.3 +0.0	+0.0	33.3	46.0	-12.7	Horiz
51	816.067M	32.2	+22.2 +0.0 +0.0	+0.6 +0.0 +0.0	+5.8 +0.0	-27.5 +0.0	+0.0	33.3	46.0	-12.7	Vert
52	3661.000M	46.4	+0.0 +32.6 +0.3	+0.0 +0.6 -3.6	+0.0 -39.8	+0.0 +4.3	+0.0	40.8	54.0	-13.2	Horiz
53	615.588M	35.0	+20.0 +0.0 +0.0	+0.5 +0.0 +0.0	+4.9 +0.0	-27.6 +0.0	+0.0	32.8	46.0	-13.2	Vert

54	389.510M	40.3	+16.2 +0.0 +0.0	+0.4 +0.0 +0.0	+3.8 +0.0	-28.2 +0.0	+0.0	32.5	46.0	-13.5	Horiz
55	51.751M	44.0	+9.5 +0.0 +0.0	+0.2 +0.0 +0.0	+1.2 +0.0	-28.4 +0.0	+0.0	26.5	40.0	-13.5	Vert
56	287.920M	42.9	+13.9 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	32.1	46.0	-13.9	Vert
57	276.492M	42.8	+13.8 +0.0 +0.0	+0.3 +0.0 +0.0	+3.2 +0.0	-28.2 +0.0	+0.0	31.9	46.0	-14.1	Horiz
58	74.839M	45.1	+7.3 +0.0 +0.0	+0.2 +0.0 +0.0	+1.7 +0.0	-28.5 +0.0	+0.0	25.8	40.0	-14.2	Horiz
59	249.974M	43.0	+13.5 +0.0 +0.0	+0.2 +0.0 +0.0	+3.0 +0.0	-28.3 +0.0	+0.0	31.4	46.0	-14.6	Horiz
60	480.014M	36.1	+18.7 +0.0 +0.0	+0.4 +0.0 +0.0	+4.3 +0.0	-28.2 +0.0	+0.0	31.3	46.0	-14.7	Horiz
61	423.371M	37.9	+17.3 +0.0 +0.0	+0.4 +0.0 +0.0	+3.9 +0.0	-28.2 +0.0	+0.0	31.3	46.0	-14.7	Horiz
62	626.659M	33.2	+20.3 +0.0 +0.0	+0.5 +0.0 +0.0	+4.9 +0.0	-27.6 +0.0	+0.0	31.3	46.0	-14.7	Vert
63	830.351M	29.8	+22.4 +0.0 +0.0	+0.6 +0.0 +0.0	+6.0 +0.0	-27.6 +0.0	+0.0	31.2	46.0	-14.8	Vert
64	240.011M	43.6	+12.8 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	31.2	46.0	-14.8	Vert
65	658.556M	32.3	+20.8 +0.0 +0.0	+0.5 +0.0 +0.0	+5.0 +0.0	-27.5 +0.0	+0.0	31.1	46.0	-14.9	Vert
66	457.275M	36.1	+18.4 +0.0 +0.0	+0.4 +0.0 +0.0	+4.1 +0.0	-28.3 +0.0	+0.0	30.7	46.0	-15.3	Horiz
67	360.779M	39.2	+15.6 +0.0 +0.0	+0.4 +0.0 +0.0	+3.6 +0.0	-28.3 +0.0	+0.0	30.5	46.0	-15.5	Horiz
68	215.911M	42.2	+11.1 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.3 +0.0	+0.0	28.0	43.5	-15.5	Horiz
69	547.775M	32.7	+20.2 +0.0 +0.0	+0.5 +0.0 +0.0	+4.6 +0.0	-27.9 +0.0	+0.0	30.1	46.0	-15.9	Horiz
70	215.914M	41.8	+11.1 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.3 +0.0	+0.0	27.6	43.5	-15.9	Vert

71	406.434M	36.5	+16.7 +0.0 +0.0	+0.4 +0.0 +0.0	+3.9 +0.0	-28.2 +0.0	+0.0	29.3	46.0	-16.7	Horiz
72	428.758M	35.5	+17.5 +0.0 +0.0	+0.4 +0.0 +0.0	+4.0 +0.0	-28.3 +0.0	+0.0	29.1	46.0	-16.9	Horiz
73	237.101M	41.6	+12.6 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	29.0	46.0	-17.0	Vert
74	350.028M	37.9	+15.4 +0.0 +0.0	+0.4 +0.0 +0.0	+3.5 +0.0	-28.3 +0.0	+0.0	28.9	46.0	-17.1	Vert
75	300.629M	39.5	+14.0 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	28.8	46.0	-17.2	Vert
76	349.978M	37.7	+15.4 +0.0 +0.0	+0.4 +0.0 +0.0	+3.5 +0.0	-28.3 +0.0	+0.0	28.7	46.0	-17.3	Horiz
77	314.970M	38.7	+14.4 +0.0 +0.0	+0.3 +0.0 +0.0	+3.4 +0.0	-28.3 +0.0	+0.0	28.5	46.0	-17.5	Horiz
78	242.899M	39.7	+13.0 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	27.5	46.0	-18.5	Horiz
79	229.135M	40.6	+12.1 +0.0 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0	-28.3 +0.0	+0.0	27.4	46.0	-18.6	Horiz
80	321.777M	37.1	+14.6 +0.0 +0.0	+0.3 +0.0 +0.0	+3.4 +0.0	-28.3 +0.0	+0.0	27.1	46.0	-18.9	Horiz
81	304.821M	37.1	+14.1 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	26.5	46.0	-19.5	Vert
82	320.668M	36.4	+14.6 +0.0 +0.0	+0.3 +0.0 +0.0	+3.4 +0.0	-28.3 +0.0	+0.0	26.4	46.0	-19.6	Horiz
83	308.599M	36.7	+14.3 +0.0 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0	-28.3 +0.0	+0.0	26.3	46.0	-19.7	Horiz
84	242.872M	38.4	+13.0 +0.0 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0	-28.3 +0.0	+0.0	26.2	46.0	-19.8	Vert
85	372.620M	33.8	+15.9 +0.0 +0.0	+0.4 +0.0 +0.0	+3.7 +0.0	-28.3 +0.0	+0.0	25.5	46.0	-20.5	Vert
86	186.302M	36.4	+9.8 +0.0 +0.0	+0.2 +0.0 +0.0	+2.7 +0.0	-28.4 +0.0	+0.0	20.7	43.5	-22.8	Vert
87	1830.400M	65.8	+0.0 +27.1 +0.7	+0.0 +0.5 -3.6	+0.0 -38.4	+0.0 +2.6	+0.0	54.7	80.0 Not in restricted band	-25.3	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:	05/05/2004
Test Type:	**Maximized emission**	Time:	19:23:13
Equipment:	**Printer**	Sequence#:	3
Manufacturer:	Printronix	Tested By:	Eddie Wong
Model:	T5204e		
S/N:	480329082260		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8568B		10/23/2003	10/23/2003	02472

***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. The Laptop is sending all "H's Pattern" to the printer via Centronics interface cable. EUT is in operating mode. Freq: 928 MHz Frequency range of measurement = 9 kHz - 9.28 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 9280 MHz RBW=1 MHz, VBW=1 MHz. 110Vac, 60 Hz, 22°C, 31% relative humidity. Modification: RFID tag printing direction in the center and perpendicular to the radiating antenna. Pulsed sample average correction factor applied to all reading above 1GHz.

Transducer Legend:

T1=Biconalog, SN 2451 040804	T2=Cable #10 070804
T3=Cable# 15 123004	T4=Preamp 8447D 082304
T5=----------	T6=Horn 6246_091004
T7=SMA Cable 1-40GHz AN2604_012305	T8=HP83017A Preamp 091104
T9=Cable#20 Heliax 48ft 101304	T10=HPF_AN02116_1.5GHz_060605
T11=Pulsed Sample Average Correction factor	

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	86.973M QP	55.5	+9.1	+0.2	+1.8	-28.5	+0.0	38.1	40.0	-1.9	Vert
^	86.973M	56.1	+9.1	+0.2	+1.8	-28.5	+0.0	38.7	40.0	-1.3	Vert

3	2779.610M Ave	57.7	+0.0 +0.0 +3.4	+0.0 +29.9 +0.2	+0.0 +0.6 -3.6	+0.0 -38.8	+0.0	49.4	54.0	-4.6	Horiz
^	2779.530M	60.1	+0.0 +0.0 +3.4	+0.0 +29.9 +0.2	+0.0 +0.6 -3.6	+0.0 -38.8	+0.0	51.8	54.0	-2.2	Horiz
5	145.580M	52.4	+12.3	+0.2	+2.2	-28.4	+0.0	38.7	43.5	-4.8	Vert
6	96.170M QP	54.2	+10.5	+0.2	+1.8	-28.4	+0.0	38.3	43.5	-5.2	Vert
^	96.170M	57.4	+10.5	+0.2	+1.8	-28.4	+0.0	41.5	43.5	-2.0	Vert
8	2779.550M	57.0	+0.0 +0.0 +3.4	+0.0 +29.9 +0.2	+0.0 +0.6 -3.6	+0.0 -38.8	+0.0	48.7	54.0	-5.3	Vert
9	237.099M	52.7	+12.6	+0.2	+2.9	-28.3	+0.0	40.1	46.0	-5.9	Horiz
10	76.500M	53.0	+7.5	+0.2	+1.7	-28.5	+0.0	33.9	40.0	-6.1	Vert
11	199.986M	52.8	+9.8	+0.2	+2.8	-28.4	+0.0	37.2	43.5	-6.3	Vert
12	70.500M	53.5	+6.9	+0.2	+1.6	-28.5	+0.0	33.7	40.0	-6.3	Vert
13	132.804M	50.8	+12.1	+0.2	+2.1	-28.3	+0.0	36.9	43.5	-6.6	Horiz
14	148.750M	50.5	+12.2	+0.2	+2.2	-28.4	+0.0	36.7	43.5	-6.8	Vert
15	69.735M	53.1	+6.8	+0.2	+1.6	-28.5	+0.0	33.2	40.0	-6.8	Vert
16	200.430M	51.9	+9.8	+0.2	+2.8	-28.4	+0.0	36.3	43.5	-7.2	Vert
17	102.005M	51.7	+11.0	+0.2	+1.7	-28.4	+0.0	36.2	43.5	-7.3	Horiz
18	6485.900M	44.6	+0.0 +0.0 +5.8	+0.0 +33.3 +0.4	+0.0 +0.9 -3.6	+0.0 -34.7	+0.0	46.7	54.0	-7.3	Vert
19	4632.550M	49.4	+0.0 +0.0 +5.2	+0.0 +33.3 +0.5	+0.0 +0.7 -3.6	+0.0 -39.3	+0.0	46.2	54.0	-7.8	Horiz

20	2779.550M	54.0	+0.0 +0.0 +3.4	+0.0 +29.9 +0.2	+0.0 +0.6 -3.6	+0.0 -38.8	+0.0	45.7	54.0	-8.3	Vert
21	4632.600M	48.8	+0.0 +0.0 +5.2	+0.0 +33.3 +0.5	+0.0 +0.7 -3.6	+0.0 -39.3	+0.0	45.6	54.0	-8.4	Vert
22	5559.300M	45.0	+0.0 +0.0 +5.6	+0.0 +33.9 +0.6	+0.0 +0.8 -3.6	+0.0 -36.7	+0.0	45.6	54.0	-8.4	Horiz
23	200.413M	50.6	+9.8	+0.2	+2.8	-28.4	+0.0	35.0	43.5	-8.5	Horiz
24	134.880M	48.8	+12.2	+0.2	+2.1	-28.3	+0.0	35.0	43.5	-8.5	Vert
25	586.991M	40.0	+19.8	+0.5	+4.8	-27.8	+0.0	37.3	46.0	-8.7	Vert
26	1853.000M Ave	55.6	+0.0 +0.0 +2.7	+0.0 +27.2 +0.7	+0.0 +0.5 -3.6	+0.0 -38.4	+0.0	44.7	54.0	-9.3	Vert
^	1853.000M	61.5	+0.0 +0.0 +2.7	+0.0 +27.2 +0.7	+0.0 +0.5 -3.6	+0.0 -38.4	+0.0	50.6	54.0	-3.4	Vert
28	457.283M	41.8	+18.4	+0.4	+4.1	-28.3	+0.0	36.4	46.0	-9.6	Horiz
29	491.118M	40.7	+18.9	+0.4	+4.4	-28.1	+0.0	36.3	46.0	-9.7	Horiz
30	6485.900M	42.1	+0.0 +0.0 +5.8	+0.0 +33.3 +0.4	+0.0 +0.9 -3.6	+0.0 -34.7	+0.0	44.2	54.0	-9.8	Horiz
31	280.604M	46.9	+13.8	+0.3	+3.2	-28.2	+0.0	36.0	46.0	-10.0	Horiz
32	146.662M	47.2	+12.3	+0.2	+2.2	-28.4	+0.0	33.5	43.5	-10.0	Horiz
33	3706.100M	49.2	+0.0 +0.0 +4.3	+0.0 +32.7 +0.3	+0.0 +0.6 -3.6	+0.0 -39.7	+0.0	43.8	54.0	-10.2	Vert
34	474.211M	40.7	+18.6	+0.4	+4.2	-28.2	+0.0	35.7	46.0	-10.3	Horiz
35	1853.000M	54.1	+0.0 +0.0 +2.7	+0.0 +27.2 +0.7	+0.0 +0.5 -3.6	+0.0 -38.4	+0.0	43.2	54.0	-10.8	Horiz
36	525.023M	38.4	+19.7	+0.5	+4.6	-28.0	+0.0	35.2	46.0	-10.8	Horiz

37	99.734M	48.2	+10.9	+0.2	+1.7	-28.4	+0.0	32.6	43.5	-10.9	Horiz
38	467.494M	39.7	+18.6	+0.4	+4.2	-28.2	+0.0	34.7	46.0	-11.3	Horiz
39	399.995M	41.9	+16.4	+0.4	+3.9	-28.2	+0.0	34.4	46.0	-11.6	Horiz
40	801.709M	33.7	+22.0	+0.6	+5.6	-27.5	+0.0	34.4	46.0	-11.6	Vert
41	423.386M	40.9	+17.3	+0.4	+3.9	-28.2	+0.0	34.3	46.0	-11.7	Horiz
42	159.999M	46.0	+11.6	+0.2	+2.4	-28.4	+0.0	31.8	43.5	-11.7	Horiz
43	3706.150M	47.6	+0.0 +0.0 +4.3	+0.0 +32.7 +0.3	+0.0 +0.6 -3.6	+0.0 -39.7	+0.0	42.2	54.0	-11.8	Horiz
44	233.803M	46.6	+12.4	+0.2	+2.9	-28.3	+0.0	33.8	46.0	-12.2	Horiz
45	203.234M	46.6	+10.1	+0.2	+2.8	-28.4	+0.0	31.3	43.5	-12.2	Horiz
46	467.485M	38.6	+18.6	+0.4	+4.2	-28.2	+0.0	33.6	46.0	-12.4	Vert
47	830.349M	31.8	+22.4	+0.6	+6.0	-27.6	+0.0	33.2	46.0	-12.8	Horiz
48	389.504M	41.0	+16.2	+0.4	+3.8	-28.2	+0.0	33.2	46.0	-12.8	Horiz
49	272.007M	44.2	+13.7	+0.3	+3.2	-28.2	+0.0	33.2	46.0	-12.8	Horiz
50	524.971M	36.2	+19.7	+0.5	+4.6	-28.0	+0.0	33.0	46.0	-13.0	Vert
51	5559.100M Ave	39.9	+0.0 +0.0 +5.6	+0.0 +33.9 +0.6	+0.0 +0.8 -3.6	+0.0 -36.7	+0.0	40.5	54.0	-13.5	Vert
^	5559.100M	46.5	+0.0 +0.0 +5.6	+0.0 +33.9 +0.6	+0.0 +0.8 -3.6	+0.0 -36.7	+0.0	47.1	54.0	-6.9	Vert
53	372.580M	40.8	+15.9	+0.4	+3.7	-28.3	+0.0	32.5	46.0	-13.5	Horiz

54	169.347M	45.0	+10.7	+0.2	+2.5	-28.4	+0.0	30.0	43.5	-13.5	Horiz
55	466.666M	37.4	+18.5	+0.4	+4.2	-28.2	+0.0	32.3	46.0	-13.7	Horiz
56	816.015M	30.6	+22.2	+0.6	+5.8	-27.5	+0.0	31.7	46.0	-14.3	Horiz
57	457.275M	36.9	+18.4	+0.4	+4.1	-28.3	+0.0	31.5	46.0	-14.5	Vert
58	440.928M	37.1	+18.0	+0.4	+4.0	-28.3	+0.0	31.2	46.0	-14.8	Horiz
59	321.813M	41.2	+14.6	+0.3	+3.4	-28.3	+0.0	31.2	46.0	-14.8	Horiz
60	350.027M	40.1	+15.4	+0.4	+3.5	-28.3	+0.0	31.1	46.0	-14.9	Horiz
61	338.742M	40.2	+15.1	+0.4	+3.5	-28.3	+0.0	30.9	46.0	-15.1	Horiz
62	480.027M	35.5	+18.7	+0.4	+4.3	-28.2	+0.0	30.7	46.0	-15.3	Horiz
63	113.482M	42.7	+11.7	+0.2	+1.9	-28.3	+0.0	28.2	43.5	-15.3	Vert
64	304.826M	41.2	+14.1	+0.3	+3.3	-28.3	+0.0	30.6	46.0	-15.4	Horiz
65	558.325M	32.9	+20.2	+0.5	+4.7	-27.9	+0.0	30.4	46.0	-15.6	Horiz
66	186.318M	43.4	+9.8	+0.2	+2.7	-28.4	+0.0	27.7	43.5	-15.8	Horiz
67	110.552M	42.2	+11.5	+0.2	+1.8	-28.4	+0.0	27.3	43.5	-16.2	Vert
68	180.005M	42.8	+9.8	+0.2	+2.6	-28.4	+0.0	27.0	43.5	-16.5	Horiz
69	372.608M	37.1	+15.9	+0.4	+3.7	-28.3	+0.0	28.8	46.0	-17.2	Vert
70	284.469M	39.5	+13.9	+0.3	+3.2	-28.2	+0.0	28.7	46.0	-17.3	Horiz

71	458.119M	33.8	+18.4	+0.4	+4.1	-28.3	+0.0	28.4	46.0	-17.6	Horiz
72	319.992M	38.1	+14.6	+0.3	+3.4	-28.3	+0.0	28.1	46.0	-17.9	Horiz
73	254.026M	39.4	+13.5	+0.2	+3.0	-28.3	+0.0	27.8	46.0	-18.2	Vert
74	304.866M	38.2	+14.1	+0.3	+3.3	-28.3	+0.0	27.6	46.0	-18.4	Vert
75	46.000M	37.6	+10.8	+0.2	+1.2	-28.4	+0.0	21.4	40.0	-18.6	Vert
76	280.595M	38.2	+13.8	+0.3	+3.2	-28.2	+0.0	27.3	46.0	-18.7	Vert
77	501.111M	31.3	+19.0	+0.4	+4.5	-28.1	+0.0	27.1	46.0	-18.9	Vert
78	367.334M	35.3	+15.8	+0.4	+3.6	-28.3	+0.0	26.8	46.0	-19.2	Vert
79	287.958M	37.4	+13.9	+0.3	+3.3	-28.3	+0.0	26.6	46.0	-19.4	Vert
80	214.739M	37.8	+11.0	+0.2	+2.8	-28.3	+0.0	23.5	43.5	-20.0	Vert
81	360.762M	34.2	+15.6	+0.4	+3.6	-28.3	+0.0	25.5	46.0	-20.5	Vert
82	320.010M	34.9	+14.6	+0.3	+3.4	-28.3	+0.0	24.9	46.0	-21.1	Vert
83	267.401M	35.9	+13.7	+0.3	+3.1	-28.2	+0.0	24.8	46.0	-21.2	Vert
84	321.807M	34.7	+14.6	+0.3	+3.4	-28.3	+0.0	24.7	46.0	-21.3	Vert
85	249.981M	35.5	+13.5	+0.2	+3.0	-28.3	+0.0	23.9	46.0	-22.1	Vert
86	237.094M	35.5	+12.6	+0.2	+2.9	-28.3	+0.0	22.9	46.0	-23.1	Vert
87	303.120M	33.0	+14.1	+0.3	+3.3	-28.3	+0.0	22.4	46.0	-23.6	Horiz