

Intermec Technologies Corporation

EMC Test Laboratory

DOC. NO.: 577-500-979

2450 PC Card Radio Module, FCC 15.247, Canada RSS-210, RSS-102

APPENDIX G, TX radiated emissions data, module vert, Huber Suhner 3.5 dBi antenna

REPORT NO: 010312-1

DATE: March 12, 2001

Page 1 of 7

FCC ID: EHARFID2450PCC-5

MEASUREMENT/TECHNICAL REPORT



Technologies Corporation

EMC Test Laboratory

Cedar Rapids, IA

Intermec Technologies Corporation RF Identification (RFID) 2450 PC Card –5 2.4 GHz Spread Spectrum Transmitter

REPORT NO: 010312-1

DATE: March 12, 2001

APPENDIX G

THE FOLLOWING PAGES INCLUDE;

Average Radiated Spurious Emissions

Peak Radiated Spurious Emissions

Configuration

Radio as a module positioned vertically
on a PCMCIA extender card.

Huber Suhner 3.5 dBi antenna

AVERAGE TRANSMITTER RADIATED SPURIOUS EMISSIONS

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

Product: Intermec 2450 MHz PCMCIA RFID Radio, PCB 144-886-003

EMC Test Laboratory

Set Up: Extended as a module placed VERTICAL, Huber Schuner 3.5 dBi linear gain

Cedar Rapids, IA

Test Date (mm/dd/yy): 05/08/01

Standard: FCC 15.247

Measurement System Calibration Date: 4/18/00

Span 100 MHz, Res. B.W. 1 MHz, Video B.W. 3 kHz

Frequency (MHz)	Antenna Polarity	Spurious Measured dB(uV)	H.P.filter + Cable Loss (dB)	Antenna Correction Factor dB/M	Amplifier Gain (dB)	Calculated Result dB(uV)/M	AVERAGE Limit @ 1 Meter dB(uV)/Meter 50% duty cycle correction of 6dB	Margin (dB)
a	b	c	d	e	f	g	g	i
(formula)						(=c+d+e-f)	(=64+6)	(=g-h)
Low Channel 02		2402.000	MHz					
1152	Vert	10.5	1.9	23.6		36.0	70	-34.0
(DSP CLK)	Hor	10.6	1.9	23.6		36.1	70	-33.9
1201.0	Vert	21.5	1.9	23.7		47.1	70	-22.9
(VCO)	Hor	32.4	1.9	23.7		58.0	70	-12.0
2402	Vert		3.6	27.9				
(Fc)	Hor		3.6	27.9				
3603.0	Vert	23.0	4.3	31.8	34.0	25.1	70	-44.9
(Fc + VCO)	Hor	23.3	4.3	31.8	34.0	25.4	70	-44.6
4804	Vert	48.9	4.5	32.7	33.1	53.0	70	-17.0
(Fc * 2)	Hor	44.6	4.5	32.7	33.1	48.7	70	-21.3
7206	Vert	43.2	6.2	36.6	33.4	52.6	70	-17.4
(Fc * 3)	Hor	41.7	6.2	36.6	33.4	51.1	70	-18.9
9608	Vert	40.1	6.6	37.5	33.9	50.3	70	-19.7
(Fc * 4)	Hor	37.6	6.6	37.5	33.9	47.8	70	-22.2
12010	Vert	37.8	7.8	38.9	32.8	51.7	70	-18.3
(Fc * 5)	Hor	39.1	7.8	38.9	32.8	53.0	70	-17.0
14412	Vert	32.0	8.4	41.0	31.7	49.7	70	-20.3
(Fc * 6)	Hor	33.1	8.4	41.0	31.7	50.8	70	-19.2
16814	Vert	31.6	9.5	40.0	31.8	49.3	70	-20.7
(Fc * 7)	Hor	31.9	9.5	40.0	31.8	49.6	70	-20.4
19216	Vert	40.1	0.7	44.2	31.2	53.8	70	-16.2
(Fc * 8)	Hor	39.6	0.7	44.2	31.2	53.3	70	-16.7
21618	Vert	39.2	0.5	45.5	30.5	54.7	70	-15.3
(Fc * 9)	Hor	39.0	0.5	45.5	30.5	54.5	70	-15.5
24020	Vert	39.0	2.4	45.8	31.0	56.2	70	-13.8
(Fc * 10)	Hor	38.9	2.4	45.8	31.0	56.1	70	-13.9

Frequency (MHz)	Antenna Polarity	Spurious Measured dB(uV)	H.P.filter + Cable Loss (dB)	Antenna Correction Factor dB/M	Amplifier Gain (dB)	Calculated Result dB(uV)/M	AVERAGE Limit @ 1 Meter dB(uV)/Meter 50% duty cycle correction of 6dB	Margin (dB)
a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)	(=64+6)	(=g-h)
Middle Channel 41		2441.000	MHz					
1152	Vert	10.4	1.9	23.6		35.9	70	-34.1
(DSP CLK)	Hor	10.5	1.9	23.6		36.0	70	-34.0
1220.5	Vert	19.9	1.9	23.8		45.6	70	-24.4
(VCO)	Hor	28.8	1.9	23.8		54.5	70	-15.5
2441	Vert		1.2	27.9				
(Fc)	Hor		1.2	27.9				
3661.5	Vert	23.1	4.3	31.9	34.0	25.3	70	-44.7
(Fc + VCO)	Hor	23.0	4.3	31.9	34.0	25.2	70	-44.8
4882	Vert	52.0	4.5	32.4	33.1	55.8	70	-14.2
(Fc * 2)	Hor	41.4	4.5	32.4	33.1	45.2	70	-24.8
7323	Vert	43.6	6.0	36.8	33.4	53.0	70	-17.0
(Fc * 3)	Hor	43.6	6.0	36.8	33.4	53.0	70	-17.0
9764	Vert	37.1	6.2	37.8	33.8	47.3	70	-22.7
(Fc * 4)	Hor	37.0	6.2	37.8	33.8	47.2	70	-22.8
12205	Vert	44.4	7.3	39.0	32.6	58.1	70	-11.9
(Fc * 5)	Hor	44.5	7.3	39.0	32.6	58.2	70	-11.8
14646	Vert	31.6	8.4	40.7	31.8	48.9	70	-21.1
(Fc * 6)	Hor	31.7	8.4	40.7	31.8	49.0	70	-21.0
17087	Vert	32.0	9.6	40.9	31.7	50.8	70	-19.2
(Fc * 7)	Hor	32.0	9.6	40.9	31.7	50.8	70	-19.2
19528	Vert	40.1	1.1	44.5	31.4	54.3	70	-15.7
(Fc * 8)	Hor	40.0	1.1	44.5	31.4	54.2	70	-15.8
21969	Vert	39.5	1.9	45.5	30.8	56.1	70	-13.9
(Fc * 9)	Hor	39.4	1.9	45.5	30.8	56.0	70	-14.0
24410	Vert	39.6	3.2	46.3	31.4	57.7	70	-12.3
(Fc * 10)	Hor	39.6	3.2	46.3	31.4	57.7	70	-12.3

AVERAGE TRANSMITTER RADIATED SPURIOUS EMISSIONS

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

Product: Intermec 2450 MHz PCMCIA RFID Radio, PCB 144-886-003

EMC Test Laboratory

Set Up: Extended as a module placed VERTICAL, Huber Schuner 3.5 dBi linear gain

Cedar Rapids, IA

Test Date (mm/dd/yy): 05/08/01

Standard: FCC 15.247

Measurement System Calibration Date: 4/18/00

Span 100 MHz, Res. B.W. 1 MHz, Video B.W. 3 kHz

Frequency (MHz)	Antenna Polarity	Spurious Measured dB(uV)	H.P.filter + Cable Loss (dB)	Antenna Correction Factor dB/M	Amplifier Gain (dB)	Calculated Result dB(uV)/M	AVERAGE Limit @ 1 Meter dB(uV)/Meter 50% duty cycle correction of 6dB	Margin (dB)
a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)	(=64+6)	(=g-h)
High Channel 80	2480.000	MHz						
1152	Vert	10.6	1.9	23.6		36.1	70	-33.9
(DSP CLK)	Hor	10.7	1.9	23.6		36.2	70	-33.8
1240.0	Vert	20.2	1.9	23.9		46.0	70	-24.0
(VCO)	Hor	27.7	1.9	23.9		53.5	70	-16.5
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720.0	Vert	23.2	5.0	32.0	34.0	26.2	70	-43.8
(Fc + VCO)	Hor	23.1	5.0	32.0	34.0	26.1	70	-43.9
4960	Vert	53.2	4.6	32.9	33.1	57.6	70	-12.4
(Fc * 2)	Hor	45.0	4.6	32.9	33.1	49.4	70	-20.6
7440	Vert	43.2	6.3	37.2	33.4	53.3	70	-16.7
(Fc * 3)	Hor	44.9	6.3	37.2	33.4	55.0	70	-15.0
9920	Vert	38.5	6.2	38.0	33.6	49.1	70	-20.9
(Fc * 4)	Hor	38.2	6.2	38.0	33.6	48.8	70	-21.2
12400	Vert	42.1	7.2	39.1	32.5	55.9	70	-14.1
(Fc * 5)	Hor	41.6	7.2	39.1	32.5	55.4	70	-14.6
14880	Vert	32.0	8.5	40.1	31.9	48.7	70	-21.3
(Fc * 6)	Hor	32.1	8.5	40.1	31.9	48.8	70	-21.2
17360	Vert	32.1	11.5	43.3	31.0	55.9	70	-14.1
(Fc * 7)	Hor	32.0	11.5	43.3	31.0	55.8	70	-14.2
19840	Vert	40.2	0.6	44.7	31.7	53.8	70	-16.2
(Fc * 8)	Hor	40.1	0.6	44.7	31.7	53.7	70	-16.3
22320	Vert	39.4	0.9	45.6	31.0	54.9	70	-15.1
(Fc * 9)	Hor	39.4	0.9	45.6	31.0	54.9	70	-15.1
24800	Vert	40.0	2.3	46.6	31.8	57.1	70	-12.9
(Fc * 10)	Hor	40.0	2.3	46.6	31.8	57.1	70	-12.9

AVERAGE TRANSMITTER RADIATED SPURIOUS EMISSIONS

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

Product: Intermec 2450 MHz PCMCIA RFID Radio, PCB 144-886-003

EMC Test Laboratory

Set Up: Extended as a module placed VERTICAL, Huber Schuner 3.5 dBi linear gain

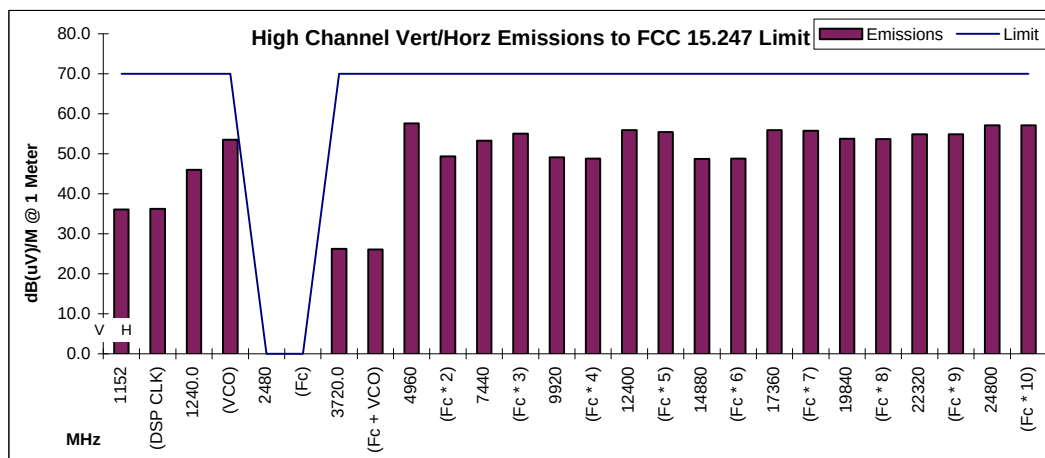
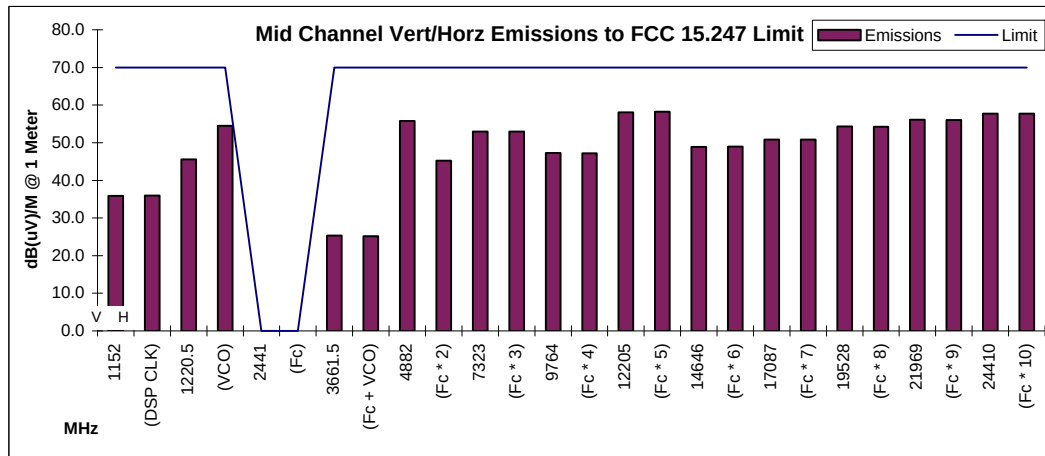
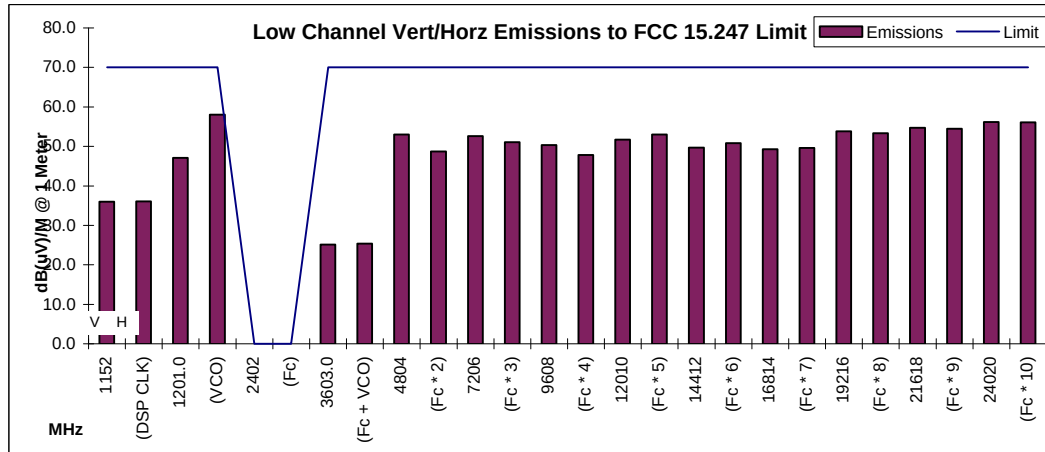
Cedar Rapids, IA

Test Date (mm/dd/yy): 05/08/01

Standard: FCC 15.247

Measurement System Calibration Date: 4/18/00

Span 100 MHz, Res. B.W. 1 MHz, Video B.W. 3 kHz



PEAK TRANSMITTER RADIATED SPURIOUS EMISSIONS

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

Product: Intermec 2450 MHz PCMCIA RFID Radio, PCB 144-886-003

EMC Test Laboratory

Set Up: Extended as a module placed VERTICAL, Huber Schuner 3.5 dBi linear gain

Cedar Rapids, IA

Test Date (mm/dd/yy): 05/08/01

Standard: FCC 15.247

Measurement System Calibration Date: 4/18/00

Span 100 MHz, Res. B.W. 1 MHz, Video B.W. 1 MHz

Frequency (MHz)	Antenna Polarity	Spurious Measured dB(uV)	H.P.filter + Cable Loss (dB)	Antenna Correction Factor dB/M	Amplifier Gain (dB)	Calculated Result dB(uV)/M	PEAK Limit @ 1 Meter dB(uV)/Meter	Margin (dB)
a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)		(=g-h)
Low Channel 02		2402.000	MHz					
1152	Vert	19.3	1.9	23.6		44.8	84	-39.2
(DSP CLK)	Hor	18.2	1.9	23.6		43.7	84	-40.3
1201.0	Vert	21.5	1.9	23.7		47.1	84	-36.9
(VCO)	Hor	32.4	1.9	23.7		58.0	84	-26.0
2402	Vert		3.6	27.9				
(Fc)	Hor		3.6	27.9				
3603.0	Vert	42.4	4.3	31.8	34.0	44.5	84	-39.5
(Fc + VCO)	Hor	42.2	4.3	31.8	34.0	44.3	84	-39.7
4804	Vert	50.3	4.5	32.7	33.1	54.4	84	-29.6
(Fc * 2)	Hor	47.8	4.5	32.7	33.1	51.9	84	-32.1
7206	Vert	47.2	6.2	36.6	33.4	56.6	84	-27.4
(Fc * 3)	Hor	46.3	6.2	36.6	33.4	55.7	84	-28.3
9608	Vert	46.4	6.6	37.5	33.9	56.6	84	-27.4
(Fc * 4)	Hor	43.6	6.6	37.5	33.9	53.8	84	-30.2
12010	Vert	44.2	7.8	38.9	32.8	58.1	84	-25.9
(Fc * 5)	Hor	44.8	7.8	38.9	32.8	58.7	84	-25.3
14412	Vert	42.7	8.4	41.0	31.7	60.4	84	-23.6
(Fc * 6)	Hor	43.2	8.4	41.0	31.7	60.9	84	-23.1
16814	Vert	43.0	9.5	40.0	31.8	60.7	84	-23.3
(Fc * 7)	Hor	43.2	9.5	40.0	31.8	60.9	84	-23.1
19216	Vert	51.1	0.7	44.2	31.2	64.8	84	-19.2
(Fc * 8)	Hor	50.7	0.7	44.2	31.2	64.4	84	-19.6
21618	Vert	50.1	0.5	45.5	30.5	65.6	84	-18.4
(Fc * 9)	Hor	50.2	0.5	45.5	30.5	65.7	84	-18.3
24020	Vert	50.0	2.4	45.8	31.0	67.2	84	-16.8
(Fc * 10)	Hor	49.9	2.4	45.8	31.0	67.1	84	-16.9

Frequency (MHz)	Antenna Polarity	Spurious Measured dB(uV)	H.P.filter + Cable Loss (dB)	Antenna Correction Factor dB/M	Amplifier Gain (dB)	Calculated Result dB(uV)/M	PEAK Limit @ 1 Meter dB(uV)/Meter	Margin (dB)
a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)		(=g-h)
Middle Channel 41		2441.000	MHz					
1152	Vert	19.2	1.9	23.6		44.7	84	-39.3
(DSP CLK)	Hor	18.1	1.9	23.6		43.6	84	-40.4
1220.5	Vert	22.9	1.9	23.8		48.6	84	-35.4
(VCO)	Hor	29.6	1.9	23.8		55.3	84	-28.7
2441	Vert		1.2	27.9				
(Fc)	Hor		1.2	27.9				
3661.5	Vert	41.2	4.3	31.9	34.0	43.4	84	-40.6
(Fc + VCO)	Hor	41.9	4.3	31.9	34.0	44.1	84	-39.9
4882	Vert	54.1	4.5	32.4	33.1	57.9	84	-26.1
(Fc * 2)	Hor	45.9	4.5	32.4	33.1	49.7	84	-34.3
7323	Vert	47.8	6.0	36.8	33.4	57.2	84	-26.8
(Fc * 3)	Hor	47.3	6.0	36.8	33.4	56.7	84	-27.3
9764	Vert	44.4	6.2	37.8	33.8	54.6	84	-29.4
(Fc * 4)	Hor	44.0	6.2	37.8	33.8	54.2	84	-29.8
12205	Vert	47.3	7.3	39.0	32.6	61.0	84	-23.0
(Fc * 5)	Hor	47.8	7.3	39.0	32.6	61.5	84	-22.5
14646	Vert	43.4	8.4	40.7	31.8	60.7	84	-23.3
(Fc * 6)	Hor	42.8	8.4	40.7	31.8	60.1	84	-23.9
17087	Vert	42.9	9.6	40.9	31.7	61.7	84	-22.3
(Fc * 7)	Hor	43.3	9.6	40.9	31.7	62.1	84	-21.9
19528	Vert	51.6	1.1	44.5	31.4	65.8	84	-18.2
(Fc * 8)	Hor	51.4	1.1	44.5	31.4	65.6	84	-18.4
21969	Vert	50.7	1.9	45.5	30.8	67.3	84	-16.7
(Fc * 9)	Hor	50.8	1.9	45.5	30.8	67.4	84	-16.6
24410	Vert	50.7	3.2	46.3	31.4	68.8	84	-15.2
(Fc * 10)	Hor	51.0	3.2	46.3	31.4	69.1	84	-14.9

PEAK TRANSMITTER RADIATED SPURIOUS EMISSIONS

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a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)		(=g-h)
High Channel 80	2480.000	MHz						
1152	Vert	19.4	1.9	23.6		44.9	84	-39.1
(DSP CLK)	Hor	18.3	1.9	23.6		43.8	84	-40.2
1240.0	Vert	23.2	1.9	23.9		49.0	84	-35.0
(VCO)	Hor	28.8	1.9	23.9		54.6	84	-29.4
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720.0	Vert	42.3	5.0	32.0	34.0	45.3	84	-38.7
(Fc + VCO)	Hor	41.7	5.0	32.0	34.0	44.7	84	-39.3
4960	Vert	54.1	4.6	32.9	33.1	58.5	84	-25.5
(Fc * 2)	Hor	48.0	4.6	32.9	33.1	52.4	84	-31.6
7440	Vert	47.7	6.3	37.2	33.4	57.8	84	-26.2
(Fc * 3)	Hor	48.5	6.3	37.2	33.4	58.6	84	-25.4
9920	Vert	44.9	6.2	38.0	33.6	55.5	84	-28.5
(Fc * 4)	Hor	44.2	6.2	38.0	33.6	54.8	84	-29.2
12400	Vert	46.0	7.2	39.1	32.5	59.8	84	-24.2
(Fc * 5)	Hor	45.6	7.2	39.1	32.5	59.4	84	-24.6
14880	Vert	42.9	8.5	40.1	31.9	59.6	84	-24.4
(Fc * 6)	Hor	43.3	8.5	40.1	31.9	60.0	84	-24.0
17360	Vert	42.9	11.5	43.3	31.0	66.7	84	-17.3
(Fc * 7)	Hor	42.9	11.5	43.3	31.0	66.7	84	-17.3
19840	Vert	51.5	0.6	44.7	31.7	65.1	84	-18.9
(Fc * 8)	Hor	51.8	0.6	44.7	31.7	65.4	84	-18.6
22320	Vert	50.3	0.9	45.6	31.0	65.8	84	-18.2
(Fc * 9)	Hor	50.2	0.9	45.6	31.0	65.7	84	-18.3
24800	Vert	51.0	2.3	46.6	31.8	68.1	84	-15.9
(Fc * 10)	Hor	51.2	2.3	46.6	31.8	68.3	84	-15.7

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