

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 H

THE FOLLOWING PAGES INCLUDE;

Average Radiated Spurious Emissions
Peak Radiated Spurious Emissions

Configuration

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

Z-Comm 5.0 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 HORIZONTAL, Z-Comm antenna 5 dBi linear gain

Cedar Rapids, IA

Test Date (mm/dd/yy): 05/03/01

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)		(=g-h)
Low Channel 02		2402.000	MHz					
1152	Vert	10.5	1.9	23.6		36.0	70	-34.0
(DSP CLK)	Hor	8.3	1.9	23.6		33.8	70	-36.2
1201	Vert	32.5	1.9	23.7		58.1	70	-11.9
(VCO)	Hor	33.9	1.9	23.7		59.5	70	-10.5
2402	Vert	101.4	3.6	27.9				
(Fc)	Hor	103.2	3.6	27.9				
3603	Vert	31.4	4.3	31.8	34.0	33.5	70	-36.5
(Fc + VCO)	Hor	34.2	4.3	31.8	34.0	36.3	70	-33.7
4804	Vert	53.9	4.5	32.7	33.1	58.0	70	-12.0
(Fc * 2)	Hor	56.5	4.5	32.7	33.1	60.6	70	-9.4
7206	Vert	48.0	6.2	36.6	33.4	57.4	70	-12.6
(Fc * 3)	Hor	43.1	6.2	36.6	33.4	52.5	70	-17.5
9608	Vert	41.4	6.6	37.5	33.9	51.6	70	-18.4
(Fc * 4)	Hor	40.5	6.6	37.5	33.9	50.7	70	-19.3
12010	Vert	41.3	7.8	38.9	32.8	55.2	70	-14.8
(Fc * 5)	Hor	40.6	7.8	38.9	32.8	54.5	70	-15.5
14412	Vert	32.5	8.4	41.0	31.7	50.2	70	-19.8
(Fc * 6)	Hor	32.1	8.4	41.0	31.7	49.8	70	-20.2
16814	Vert	32.0	9.5	40.0	31.8	49.7	70	-20.3
(Fc * 7)	Hor	32.5	9.5	40.0	31.8	50.2	70	-19.8
19216	Vert	39.9	0.7	44.2	31.2	53.6	70	-16.4
(Fc * 8)	Hor	40.1	0.7	44.2	31.2	53.8	70	-16.2
21618	Vert	39.4	0.5	45.5	30.5	54.9	70	-15.1
(Fc * 9)	Hor	39.5	0.5	45.5	30.5	55.0	70	-15.0
24020	Vert	39.2	2.4	45.8	31.0	56.4	70	-13.6
(Fc * 10)	Hor	40.0	2.4	45.8	31.0	57.2	70	-12.8

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)		(=g-h)
Middle Channel 41		2441.000	MHz					
1152	Vert	10.6	1.9	23.6		36.1	70	-33.9
(DSP CLK)	Hor	8.4	1.9	23.6		33.9	70	-36.1
1220.5	Vert	30.7	1.9	23.8		56.4	70	-13.6
(VCO)	Hor	28.5	1.9	23.8		54.2	70	-15.8
2441	Vert	102.6	1.2	27.9				
(Fc)	Hor	103.4	1.2	27.9				
3661.5	Vert	31.0	4.3	31.9	34.0	33.2	70	-36.8
(Fc + VCO)	Hor	32.7	4.3	31.9	34.0	34.9	70	-35.1
4882	Vert	55.1	4.5	32.4	33.1	58.9	70	-11.1
(Fc * 2)	Hor	51.0	4.5	32.4	33.1	54.8	70	-15.2
7323	Vert	47.9	6.0	36.8	33.4	57.3	70	-12.7
(Fc * 3)	Hor	42.3	6.0	36.8	33.4	51.7	70	-18.3
9764	Vert	39.5	6.2	37.8	33.8	49.7	70	-20.3
(Fc * 4)	Hor	35.6	6.2	37.8	33.8	45.8	70	-24.2
12205	Vert	44.9	7.3	39.0	32.6	58.6	70	-11.4
(Fc * 5)	Hor	43.2	7.3	39.0	32.6	56.9	70	-13.1
14646	Vert	31.8	8.4	40.7	31.8	49.1	70	-20.9
(Fc * 6)	Hor	31.7	8.4	40.7	31.8	49.0	70	-21.0
17087	Vert	31.9	9.6	40.9	31.7	50.7	70	-19.3
(Fc * 7)	Hor	31.9	9.6	40.9	31.7	50.7	70	-19.3
19528	Vert	39.9	1.1	44.5	31.4	54.1	70	-15.9
(Fc * 8)	Hor	39.8	1.1	44.5	31.4	54.0	70	-16.0
21969	Vert	39.7	1.9	45.5	30.8	56.3	70	-13.7
(Fc * 9)	Hor	39.7	1.9	45.5	30.8	56.3	70	-13.7
24410	Vert	40.1	3.2	46.3	31.4	58.2	70	-11.8
(Fc * 10)	Hor	40.0	3.2	46.3	31.4	58.1	70	-11.9

AVERAGE TRANSMITTER RADIATED SPURIOUS EMISSIONS

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

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EMC Test Laboratory

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Cedar Rapids, IA

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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)		(=g-h)
High Channel 80	2480.000	MHz						
1152	Vert	10.4	1.9	23.6		35.9	70	-34.1
(DSP CLK)	Hor	8.2	1.9	23.6		33.7	70	-36.3
1240	Vert	27.1	1.9	23.9		52.9	70	-17.1
(VCO)	Hor	25.1	1.9	23.9		50.9	70	-19.1
2480	Vert	103.0	4.0	28.0				
(Fc)	Hor	102.1	4.2	28.0				
3720	Vert	31.7	5.0	32.0	34.0	34.7	70	-35.3
(Fc + VCO)	Hor	32.5	5.0	32.0	34.0	35.5	70	-34.5
4960	Vert	55.9	4.6	32.9	33.1	60.3	70	-9.7
(Fc * 2)	Hor	48.9	4.6	32.9	33.1	53.3	70	-16.7
7440	Vert	49.7	6.3	37.2	33.4	59.8	70	-10.2
(Fc * 3)	Hor	46.6	6.3	37.2	33.4	56.7	70	-13.3
9920	Vert	35.9	6.2	38.0	33.6	46.5	70	-23.5
(Fc * 4)	Hor	35.7	6.2	38.0	33.6	46.3	70	-23.7
12400	Vert	40.9	7.2	39.1	32.5	54.7	70	-15.3
(Fc * 5)	Hor	38.2	7.2	39.1	32.5	52.0	70	-18.0
14880	Vert	32.2	8.5	40.1	31.9	48.9	70	-21.1
(Fc * 6)	Hor	32.2	8.5	40.1	31.9	48.9	70	-21.1
17360	Vert	32.3	11.5	43.3	31.0	56.1	70	-13.9
(Fc * 7)	Hor	32.4	11.5	43.3	31.0	56.2	70	-13.8
19840	Vert	40.2	0.6	44.7	31.7	53.8	70	-16.2
(Fc * 8)	Hor	40.6	0.6	44.7	31.7	54.2	70	-15.8
22320	Vert	39.7	0.9	45.6	31.0	55.2	70	-14.8
(Fc * 9)	Hor	39.8	0.9	45.6	31.0	55.3	70	-14.7
24800	Vert	40.4	2.3	46.6	31.8	57.5	70	-12.5
(Fc * 10)	Hor	40.3	2.3	46.6	31.8	57.4	70	-12.6

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 HORIZONTAL, Z-Comm antenna 5 dBi linear gain

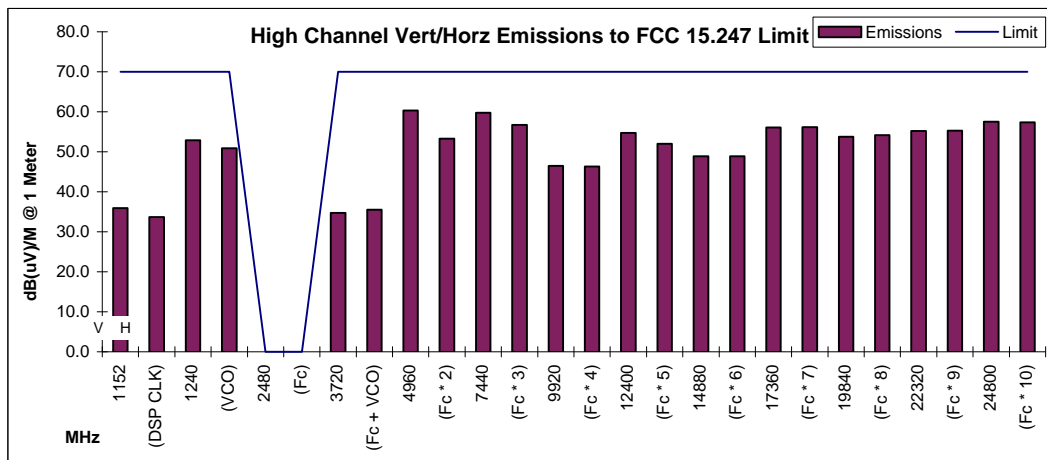
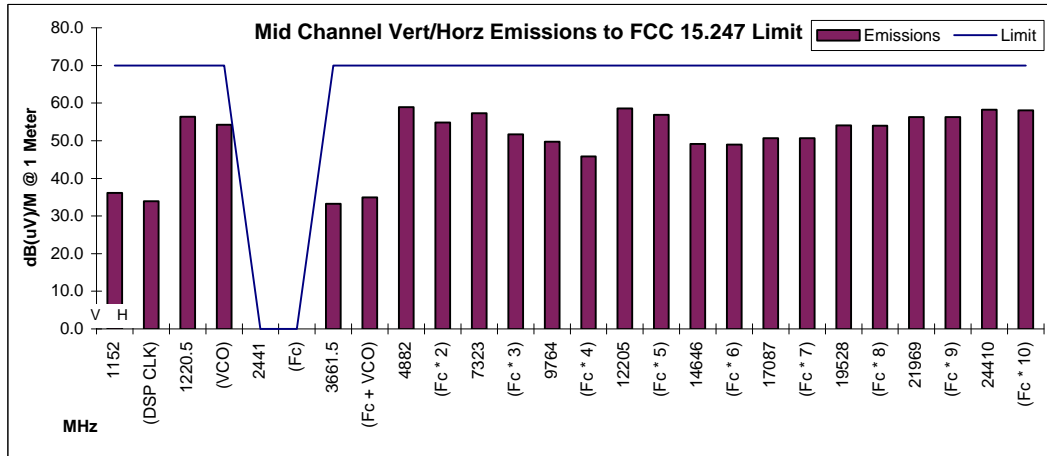
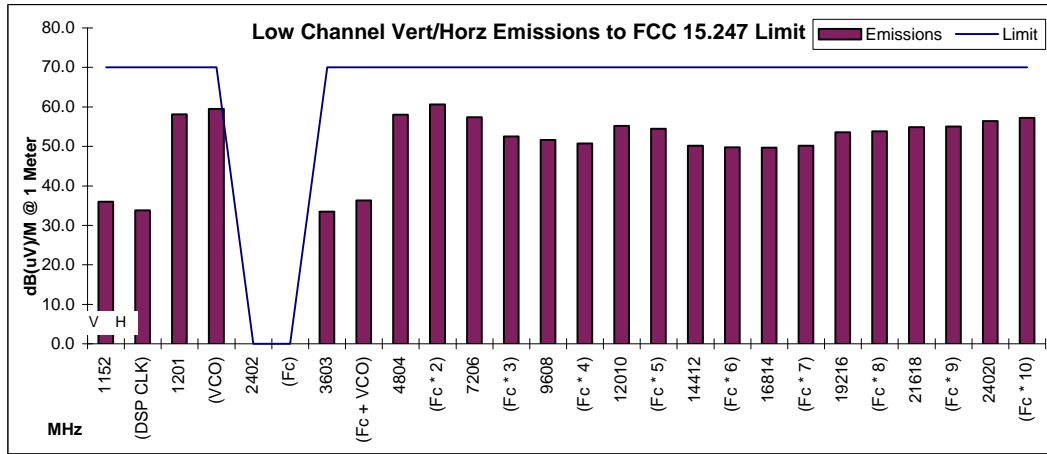
Cedar Rapids, IA

Test Date (mm/dd/yy): 05/03/01

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

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Set Up: Extended as a module placed HORIZONTAL, Z-Comm antenna 5 dBi linear gain

Cedar Rapids, IA

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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	19.0	1.9	23.6		44.5	84	-39.5
(DSP CLK)	Hor	19.0	1.9	23.6		44.5	84	-39.5
1201	Vert	33.3	1.9	23.7		58.9	84	-25.1
(VCO)	Hor	34.5	1.9	23.7		60.1	84	-23.9
2402	Vert	101.4	3.6	27.9				
(Fc)	Hor	103.2	3.6	27.9				
3603	Vert	42.1	4.3	31.8	34.0	44.2	84	-39.8
(Fc + VCO)	Hor	42.1	4.3	31.8	34.0	44.2	84	-39.8
4804	Vert	54.7	4.5	32.7	33.1	58.8	84	-25.2
(Fc * 2)	Hor	56.9	4.5	32.7	33.1	61.0	84	-23.0
7206	Vert	50.1	6.2	36.6	33.4	59.5	84	-24.5
(Fc * 3)	Hor	46.6	6.2	36.6	33.4	56.0	84	-28.0
9608	Vert	46.5	6.6	37.5	33.9	56.7	84	-27.3
(Fc * 4)	Hor	46.7	6.6	37.5	33.9	56.9	84	-27.1
12010	Vert	45.7	7.8	38.9	32.8	59.6	84	-24.4
(Fc * 5)	Hor	46.1	7.8	38.9	32.8	60.0	84	-24.0
14412	Vert	43.3	8.4	41.0	31.7	61.0	84	-23.0
(Fc * 6)	Hor	43.2	8.4	41.0	31.7	60.9	84	-23.1
16814	Vert	42.9	9.5	40.0	31.8	60.6	84	-23.4
(Fc * 7)	Hor	43.3	9.5	40.0	31.8	61.0	84	-23.0
19216	Vert	52.1	0.7	44.2	31.2	65.8	84	-18.2
(Fc * 8)	Hor	52.0	0.7	44.2	31.2	65.7	84	-18.3
21618	Vert	50.5	0.5	45.5	30.5	66.0	84	-18.0
(Fc * 9)	Hor	50.6	0.5	45.5	30.5	66.1	84	-17.9
24020	Vert	50.7	2.4	45.8	31.0	67.9	84	-16.1
(Fc * 10)	Hor	50.0	2.4	45.8	31.0	67.2	84	-16.8

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	19.1	1.9	23.6		44.6	84	-39.4
(DSP CLK)	Hor	18.9	1.9	23.6		44.4	84	-39.6
1220.5	Vert	31.3	1.9	23.8		57.0	84	-27.0
(VCO)	Hor	29.3	1.9	23.8		55.0	84	-29.0
2441	Vert	102.6	1.2	27.9				
(Fc)	Hor	103.4	1.2	27.9				
3661.5	Vert	41.7	4.3	31.9	34.0	43.9	84	-40.1
(Fc + VCO)	Hor	42.1	4.3	31.9	34.0	44.3	84	-39.7
4882	Vert	55.9	4.5	32.4	33.1	59.7	84	-24.3
(Fc * 2)	Hor	52.2	4.5	32.4	33.1	56.0	84	-28.0
7323	Vert	50.2	6.0	36.8	33.4	59.6	84	-24.4
(Fc * 3)	Hor	46.1	6.0	36.8	33.4	55.5	84	-28.5
9764	Vert	44.8	6.2	37.8	33.8	55.0	84	-29.0
(Fc * 4)	Hor	43.9	6.2	37.8	33.8	54.1	84	-29.9
12205	Vert	47.7	7.3	39.0	32.6	61.4	84	-22.6
(Fc * 5)	Hor	45.8	7.3	39.0	32.6	59.5	84	-24.5
14646	Vert	42.8	8.4	40.7	31.8	60.1	84	-23.9
(Fc * 6)	Hor	42.7	8.4	40.7	31.8	60.0	84	-24.0
17087	Vert	42.6	9.6	40.9	31.7	61.4	84	-22.6
(Fc * 7)	Hor	42.5	9.6	40.9	31.7	61.3	84	-22.7
19528	Vert	51.3	1.1	44.5	31.4	65.5	84	-18.5
(Fc * 8)	Hor	51.0	1.1	44.5	31.4	65.2	84	-18.8
21969	Vert	50.9	1.9	45.5	30.8	67.5	84	-16.5
(Fc * 9)	Hor	51.1	1.9	45.5	30.8	67.7	84	-16.3
24410	Vert	50.7	3.2	46.3	31.4	68.8	84	-15.2
(Fc * 10)	Hor	50.3	3.2	46.3	31.4	68.4	84	-15.6

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	19.2	1.9	23.6		44.7	84	-39.3
(DSP CLK)	Hor	19.2	1.9	23.6		44.7	84	-39.3
1240	Vert	28.4	1.9	23.9		54.2	84	-29.8
(VCO)	Hor	26.5	1.9	23.9		52.3	84	-31.7
2480	Vert	103.0	4.0	28.0				
(Fc)	Hor	102.1	4.2	28.0				
3720	Vert	41.8	5.0	32.0	34.0	44.8	84	-39.2
(Fc + VCO)	Hor	42.5	5.0	32.0	34.0	45.5	84	-38.5
4960	Vert	56.3	4.6	32.9	33.1	60.7	84	-23.3
(Fc * 2)	Hor	50.3	4.6	32.9	33.1	54.7	84	-29.3
7440	Vert	51.4	6.3	37.2	33.4	61.5	84	-22.5
(Fc * 3)	Hor	48.7	6.3	37.2	33.4	58.8	84	-25.2
9920	Vert	42.5	6.2	38.0	33.6	53.1	84	-30.9
(Fc * 4)	Hor	43.8	6.2	38.0	33.6	54.4	84	-29.6
12400	Vert	45.5	7.2	39.1	32.5	59.3	84	-24.7
(Fc * 5)	Hor	43.7	7.2	39.1	32.5	57.5	84	-26.5
14880	Vert	43.0	8.5	40.1	31.9	59.7	84	-24.3
(Fc * 6)	Hor	43.5	8.5	40.1	31.9	60.2	84	-23.8
17360	Vert	42.9	11.5	43.3	31.0	66.7	84	-17.3
(Fc * 7)	Hor	43.4	11.5	43.3	31.0	67.2	84	-16.8
19840	Vert	50.2	0.6	44.7	31.7	63.8	84	-20.2
(Fc * 8)	Hor	51.1	0.6	44.7	31.7	64.7	84	-19.3
22320	Vert	51.2	0.9	45.6	31.0	66.7	84	-17.3
(Fc * 9)	Hor	51.1	0.9	45.6	31.0	66.6	84	-17.4
24800	Vert	51.0	2.3	46.6	31.8	68.1	84	-15.9
(Fc * 10)	Hor	50.7	2.3	46.6	31.8	67.8	84	-16.2

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