

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 I

THE FOLLOWING PAGES INCLUDE;

Average Radiated Spurious Emissions
Peak Radiated Spurious Emissions

Configuration

Radio within 6110 terminal
positioned horizontally.

T-Com 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: 0 dBi linear gain T-Com antenna within 6110, terminal placed HORIZONTAL

Cedar Rapids, IA

Test Date (mm/dd/yy): 05/07/01

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	7.8	1.9	23.6		33.3	70	-36.7
(DSP CLK)	Hor	7.2	1.9	23.6		32.7	70	-37.3
1201	Vert	17.7	1.9	23.7		43.3	70	-26.7
(VCO)	Hor	21.3	1.9	23.7		46.9	70	-23.1
2402	Vert		3.6	27.9				
(Fc)	Hor		3.6	27.9				
3603	Vert	23.2	4.3	31.8	34.0	25.3	70	-44.7
(Fc + VCO)	Hor	23.1	4.3	31.8	34.0	25.2	70	-44.8
4804	Vert	49.1	4.5	32.7	33.1	53.2	70	-16.8
(Fc * 2)	Hor	53.3	4.5	32.7	33.1	57.4	70	-12.6
7206	Vert	45.6	6.2	36.6	33.4	55.0	70	-15.0
(Fc * 3)	Hor	47.5	6.2	36.6	33.4	56.9	70	-13.1
9608	Vert	37.1	6.6	37.5	33.9	47.3	70	-22.7
(Fc * 4)	Hor	36.6	6.6	37.5	33.9	46.8	70	-23.2
12010	Vert	41.3	7.8	38.9	32.8	55.2	70	-14.8
(Fc * 5)	Hor	42.7	7.8	38.9	32.8	56.6	70	-13.4
14412	Vert	31.7	8.4	41.0	31.7	49.4	70	-20.6
(Fc * 6)	Hor	32.2	8.4	41.0	31.7	49.9	70	-20.1
16814	Vert	32.6	9.5	40.0	31.8	50.3	70	-19.7
(Fc * 7)	Hor	32.6	9.5	40.0	31.8	50.3	70	-19.7
19216	Vert	39.6	0.7	44.2	31.2	53.3	70	-16.7
(Fc * 8)	Hor	39.5	0.7	44.2	31.2	53.2	70	-16.8
21618	Vert	39.1	0.5	45.5	30.5	54.6	70	-15.4
(Fc * 9)	Hor	38.9	0.5	45.5	30.5	54.4	70	-15.6
24020	Vert	39.9	2.4	45.8	31.0	57.1	70	-12.9
(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	7.7	1.9	23.6		33.2	70	-36.8
(DSP CLK)	Hor	7.1	1.9	23.6		32.6	70	-37.4
1220.5	Vert	17.7	1.9	23.8		43.4	70	-26.6
(VCO)	Hor	21.3	1.9	23.8		47.0	70	-23.0
2441	Vert		1.2	27.9				
(Fc)	Hor		1.2	27.9				
3661.5	Vert	23.2	4.3	31.9	34.0	25.4	70	-44.6
(Fc + VCO)	Hor	23.1	4.3	31.9	34.0	25.3	70	-44.7
4882	Vert	49.0	4.5	32.4	33.1	52.8	70	-17.2
(Fc * 2)	Hor	47.6	4.5	32.4	33.1	51.4	70	-18.6
7323	Vert	47.8	6.0	36.8	33.4	57.2	70	-12.8
(Fc * 3)	Hor	47.8	6.0	36.8	33.4	57.2	70	-12.8
9764	Vert	39.5	6.2	37.8	33.8	49.7	70	-20.3
(Fc * 4)	Hor	34.9	6.2	37.8	33.8	45.1	70	-24.9
12205	Vert	49.1	7.3	39.0	32.6	62.8	70	-7.2
(Fc * 5)	Hor	48.7	7.3	39.0	32.6	62.4	70	-7.6
14646	Vert	31.8	8.4	40.7	31.8	49.1	70	-20.9
(Fc * 6)	Hor	32.5	8.4	40.7	31.8	49.8	70	-20.2
17087	Vert	32.0	9.6	40.9	31.7	50.8	70	-19.2
(Fc * 7)	Hor	32.1	9.6	40.9	31.7	50.9	70	-19.1
19528	Vert	47.1	1.1	44.5	31.4	61.3	70	-8.7
(Fc * 8)	Hor	41.0	1.1	44.5	31.4	55.2	70	-14.8
21969	Vert	39.6	1.9	45.5	30.8	56.2	70	-13.8
(Fc * 9)	Hor	39.5	1.9	45.5	30.8	56.1	70	-13.9
24410	Vert	40.2	3.2	46.3	31.4	58.3	70	-11.7
(Fc * 10)	Hor	40.3	3.2	46.3	31.4	58.4	70	-11.6

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

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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	7.9	1.9	23.6		33.4	70	-36.6
(DSP CLK)	Hor	7.3	1.9	23.6		32.8	70	-37.2
1240	Vert	13.6	1.9	23.9		39.4	70	-30.6
(VCO)	Hor	17.9	1.9	23.9		43.7	70	-26.3
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720	Vert	22.9	5.0	32.0	34.0	25.9	70	-44.1
(Fc + VCO)	Hor	23.0	5.0	32.0	34.0	26.0	70	-44.0
4960	Vert	53.7	4.6	32.9	33.1	58.1	70	-11.9
(Fc * 2)	Hor	49.9	4.6	32.9	33.1	54.3	70	-15.7
7440	Vert	50.9	6.3	37.2	33.4	61.0	70	-9.0
(Fc * 3)	Hor	47.8	6.3	37.2	33.4	57.9	70	-12.1
9920	Vert	36.8	6.2	38.0	33.6	47.4	70	-22.6
(Fc * 4)	Hor	40.3	6.2	38.0	33.6	50.9	70	-19.1
12400	Vert	45.0	7.2	39.1	32.5	58.8	70	-11.2
(Fc * 5)	Hor	41.8	7.2	39.1	32.5	55.6	70	-14.4
14880	Vert	32.0	8.5	40.1	31.9	48.7	70	-21.3
(Fc * 6)	Hor	32.4	8.5	40.1	31.9	49.1	70	-20.9
17360	Vert	33.3	11.5	43.3	31.0	57.1	70	-12.9
(Fc * 7)	Hor	33.6	11.5	43.3	31.0	57.4	70	-12.6
19840	Vert	50.3	0.6	44.7	31.7	63.9	70	-6.1
(Fc * 8)	Hor	45.8	0.6	44.7	31.7	59.4	70	-10.6
22320	Vert	39.5	0.9	45.6	31.0	55.0	70	-15.0
(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	39.9	2.3	46.6	31.8	57.0	70	-13.0

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: 0 dBi linear gain T-Com antenna within 6110, terminal placed HORIZONTAL

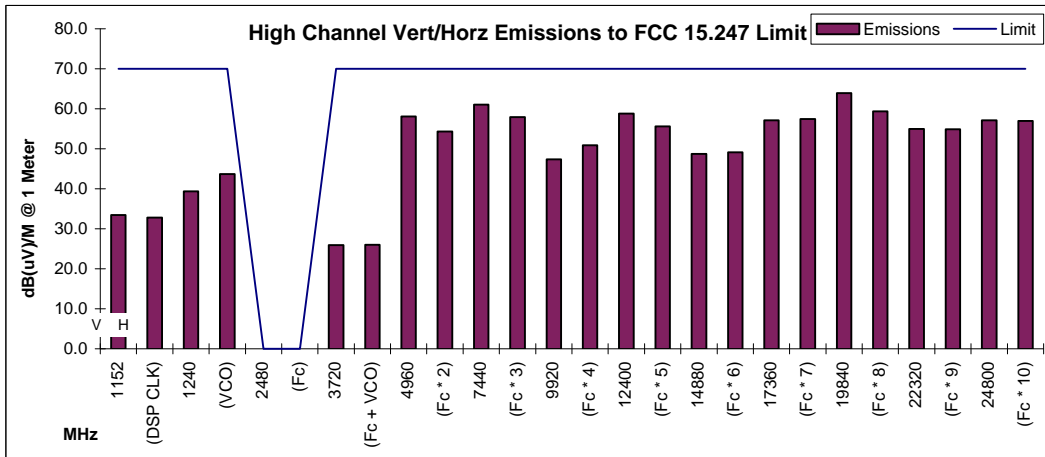
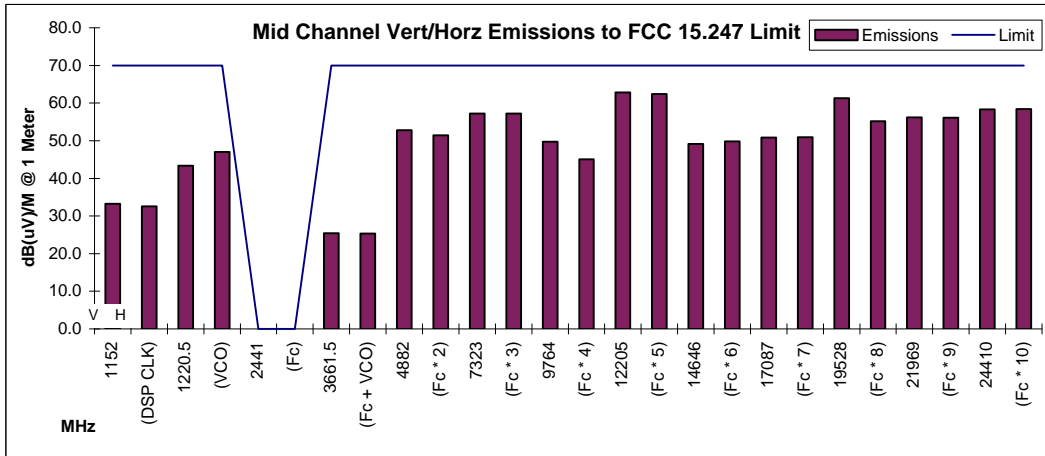
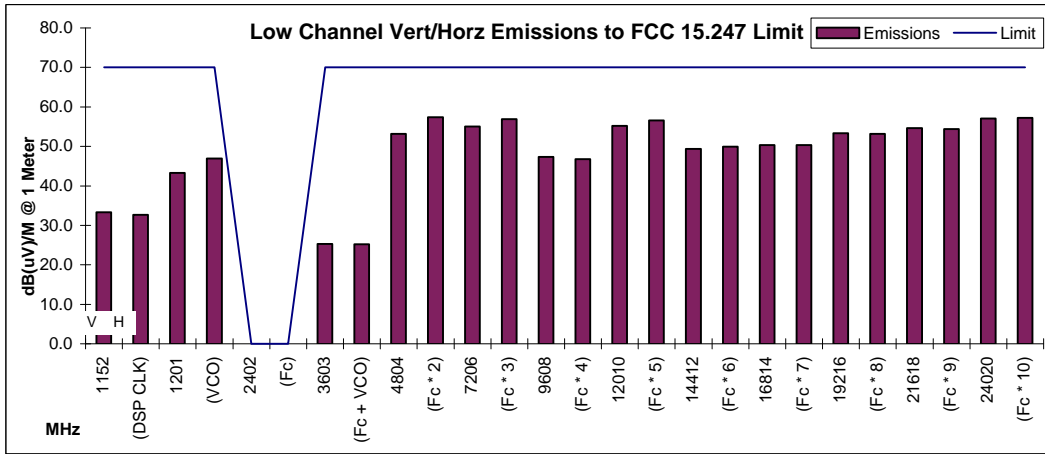
Cedar Rapids, IA

Test Date (mm/dd/yy): 05/07/01

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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EMC Test Laboratory

Set Up: 0 dBi linear gain T-Com antenna within 6110, terminal placed HORIZONTAL

Cedar Rapids, IA

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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	17.0	1.9	23.6		42.5	84	-41.5
(DSP CLK)	Hor	16.2	1.9	23.6		41.7	84	-42.3
1201	Vert	21.6	1.9	23.7		47.2	84	-36.8
(VCO)	Hor	23.3	1.9	23.7		48.9	84	-35.1
2402	Vert		3.6	27.9				
(Fc)	Hor		3.6	27.9				
3603	Vert	41.6	4.3	31.8	34.0	43.7	84	-40.3
(Fc + VCO)	Hor	42.2	4.3	31.8	34.0	44.3	84	-39.7
4804	Vert	50.9	4.5	32.7	33.1	55.0	84	-29.0
(Fc * 2)	Hor	54.3	4.5	32.7	33.1	58.4	84	-25.6
7206	Vert	48.6	6.2	36.6	33.4	58.0	84	-26.0
(Fc * 3)	Hor	49.6	6.2	36.6	33.4	59.0	84	-25.0
9608	Vert	43.6	6.6	37.5	33.9	53.8	84	-30.2
(Fc * 4)	Hor	43.6	6.6	37.5	33.9	53.8	84	-30.2
12010	Vert	45.7	7.8	38.9	32.8	59.6	84	-24.4
(Fc * 5)	Hor	46.7	7.8	38.9	32.8	60.6	84	-23.4
14412	Vert	42.8	8.4	41.0	31.7	60.5	84	-23.5
(Fc * 6)	Hor	43.1	8.4	41.0	31.7	60.8	84	-23.2
16814	Vert	42.5	9.5	40.0	31.8	60.2	84	-23.8
(Fc * 7)	Hor	42.7	9.5	40.0	31.8	60.4	84	-23.6
19216	Vert	50.9	0.7	44.2	31.2	64.6	84	-19.4
(Fc * 8)	Hor	50.5	0.7	44.2	31.2	64.2	84	-19.8
21618	Vert	50.0	0.5	45.5	30.5	65.5	84	-18.5
(Fc * 9)	Hor	50.1	0.5	45.5	30.5	65.6	84	-18.4
24020	Vert	50.1	2.4	45.8	31.0	67.3	84	-16.7
(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	16.9	1.9	23.6		42.4	84	-41.6
(DSP CLK)	Hor	16.1	1.9	23.6		41.6	84	-42.4
1220.5	Vert	20.2	1.9	23.8		45.9	84	-38.1
(VCO)	Hor	23.6	1.9	23.8		49.3	84	-34.7
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	41.4	4.3	31.9	34.0	43.6	84	-40.4
4882	Vert	50.7	4.5	32.4	33.1	54.5	84	-29.5
(Fc * 2)	Hor	49.6	4.5	32.4	33.1	53.4	84	-30.6
7323	Vert	50.1	6.0	36.8	33.4	59.5	84	-24.5
(Fc * 3)	Hor	50.1	6.0	36.8	33.4	59.5	84	-24.5
9764	Vert	42.9	6.2	37.8	33.8	53.1	84	-30.9
(Fc * 4)	Hor	42.2	6.2	37.8	33.8	52.4	84	-31.6
12205	Vert	50.6	7.3	39.0	32.6	64.3	84	-19.7
(Fc * 5)	Hor	50.7	7.3	39.0	32.6	64.4	84	-19.6
14646	Vert	42.8	8.4	40.7	31.8	60.1	84	-23.9
(Fc * 6)	Hor	43.3	8.4	40.7	31.8	60.6	84	-23.4
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	52.9	1.1	44.5	31.4	67.1	84	-16.9
(Fc * 8)	Hor	51.0	1.1	44.5	31.4	65.2	84	-18.8
21969	Vert	50.8	1.9	45.5	30.8	67.4	84	-16.6
(Fc * 9)	Hor	50.7	1.9	45.5	30.8	67.3	84	-16.7
24410	Vert	50.6	3.2	46.3	31.4	68.7	84	-15.3
(Fc * 10)	Hor	50.9	3.2	46.3	31.4	69.0	84	-15.0

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	17.1	1.9	23.6		42.6	84	-41.4
(DSP CLK)	Hor	16.3	1.9	23.6		41.8	84	-42.2
1240	Vert	18.9	1.9	23.9		44.7	84	-39.3
(VCO)	Hor	21.5	1.9	23.9		47.3	84	-36.7
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720	Vert	41.6	5.0	32.0	34.0	44.6	84	-39.4
(Fc + VCO)	Hor	42.2	5.0	32.0	34.0	45.2	84	-38.8
4960	Vert	56.2	4.6	32.9	33.1	60.6	84	-23.4
(Fc * 2)	Hor	55.1	4.6	32.9	33.1	59.5	84	-24.5
7440	Vert	56.6	6.3	37.2	33.4	66.7	84	-17.3
(Fc * 3)	Hor	54.0	6.3	37.2	33.4	64.1	84	-19.9
9920	Vert	43.5	6.2	38.0	33.6	54.1	84	-29.9
(Fc * 4)	Hor	44.3	6.2	38.0	33.6	54.9	84	-29.1
12400	Vert	41.6	7.2	39.1	32.5	55.4	84	-28.6
(Fc * 5)	Hor	41.2	7.2	39.1	32.5	55.0	84	-29.0
14880	Vert	43.0	8.5	40.1	31.9	59.7	84	-24.3
(Fc * 6)	Hor	43.2	8.5	40.1	31.9	59.9	84	-24.1
17360	Vert	43.1	11.5	43.3	31.0	66.9	84	-17.1
(Fc * 7)	Hor	43.0	11.5	43.3	31.0	66.8	84	-17.2
19840	Vert	55.2	0.6	44.7	31.7	68.8	84	-15.2
(Fc * 8)	Hor	52.6	0.6	44.7	31.7	66.2	84	-17.8
22320	Vert	50.2	0.9	45.6	31.0	65.7	84	-18.3
(Fc * 9)	Hor	50.3	0.9	45.6	31.0	65.8	84	-18.2
24800	Vert	51.2	2.3	46.6	31.8	68.3	84	-15.7
(Fc * 10)	Hor	51.0	2.3	46.6	31.8	68.1	84	-15.9

PEAK TRANSMITTER RADIATED SPURIOUS EMISSIONS

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