

## 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 J

THE FOLLOWING PAGES INCLUDE;

Average Radiated Spurious Emissions  
Peak Radiated Spurious Emissions

### **Configuration**

Radio within 6110 terminal  
positioned vertically.

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 VERTICAL

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)		(=g-h)
<b>Low Channel 02</b>		<b>2402.000</b>	<b>MHz</b>					
1152	Vert	7.7	1.9	23.6		33.2	70	-36.8
(DSP CLK)	Hor	7.3	1.9	23.6		32.8	70	-37.2
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	23.0	4.3	31.8	34.0	25.1	70	-44.9
(Fc + VCO)	Hor	23.2	4.3	31.8	34.0	25.3	70	-44.7
4804	Vert	47.7	4.5	32.7	33.1	51.8	70	-18.2
(Fc * 2)	Hor	51.8	4.5	32.7	33.1	55.9	70	-14.1
7206	Vert	45.4	6.2	36.6	33.4	54.8	70	-15.2
(Fc * 3)	Hor	43.6	6.2	36.6	33.4	53.0	70	-17.0
9608	Vert	35.4	6.6	37.5	33.9	45.6	70	-24.4
(Fc * 4)	Hor	34.5	6.6	37.5	33.9	44.7	70	-25.3
12010	Vert	39.7	7.8	38.9	32.8	53.6	70	-16.4
(Fc * 5)	Hor	40.2	7.8	38.9	32.8	54.1	70	-15.9
14412	Vert	33.7	8.4	41.0	31.7	51.4	70	-18.6
(Fc * 6)	Hor	32.5	8.4	41.0	31.7	50.2	70	-19.8
16814	Vert	33.3	9.5	40.0	31.8	51.0	70	-19.0
(Fc * 7)	Hor	31.8	9.5	40.0	31.8	49.5	70	-20.5
19216	Vert	41.5	0.7	44.2	31.2	55.2	70	-14.8
(Fc * 8)	Hor	41.3	0.7	44.2	31.2	55.0	70	-15.0
21618	Vert	39.3	0.5	45.5	30.5	54.8	70	-15.2
(Fc * 9)	Hor	39.4	0.5	45.5	30.5	54.9	70	-15.1
24020	Vert	39.2	2.4	45.8	31.0	56.4	70	-13.6
(Fc * 10)	Hor	39.5	2.4	45.8	31.0	56.7	70	-13.3

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)
<b>Middle Channel 41</b>		<b>2441.000</b>	<b>MHz</b>					
1152	Vert	7.6	1.9	23.6		33.1	70	-36.9
(DSP CLK)	Hor	7.2	1.9	23.6		32.7	70	-37.3
1220.5	Vert	16.5	1.9	23.8		42.2	70	-27.8
(VCO)	Hor	20.9	1.9	23.8		46.6	70	-23.4
2441	Vert		1.2	27.9				
(Fc)	Hor		1.2	27.9				
3661.5	Vert	22.9	4.3	31.9	34.0	25.1	70	-44.9
(Fc + VCO)	Hor	23.0	4.3	31.9	34.0	25.2	70	-44.8
4882	Vert	49.6	4.5	32.4	33.1	53.4	70	-16.6
(Fc * 2)	Hor	48.8	4.5	32.4	33.1	52.6	70	-17.4
7323	Vert	48.0	6.0	36.8	33.4	57.4	70	-12.6
(Fc * 3)	Hor	46.9	6.0	36.8	33.4	56.3	70	-13.7
9764	Vert	38.8	6.2	37.8	33.8	49.0	70	-21.0
(Fc * 4)	Hor	38.0	6.2	37.8	33.8	48.2	70	-21.8
12205	Vert	48.6	7.3	39.0	32.6	62.3	70	-7.7
(Fc * 5)	Hor	47.0	7.3	39.0	32.6	60.7	70	-9.3
14646	Vert	32.0	8.4	40.7	31.8	49.3	70	-20.7
(Fc * 6)	Hor	31.7	8.4	40.7	31.8	49.0	70	-21.0
17087	Vert	31.6	9.6	40.9	31.7	50.4	70	-19.6
(Fc * 7)	Hor	31.6	9.6	40.9	31.7	50.4	70	-19.6
19528	Vert	42.3	1.1	44.5	31.4	56.5	70	-13.5
(Fc * 8)	Hor	41.4	1.1	44.5	31.4	55.6	70	-14.4
21969	Vert	39.7	1.9	45.5	30.8	56.3	70	-13.7
(Fc * 9)	Hor	39.5	1.9	45.5	30.8	56.1	70	-13.9
24410	Vert	40.0	3.2	46.3	31.4	58.1	70	-11.9
(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**

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

**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)		(=g-h)
<b>High Channel 80</b>	<b>2480.000</b>	<b>MHz</b>						
1152	Vert	7.8	1.9	23.6		33.3	70	-36.7
(DSP CLK)	Hor	7.4	1.9	23.6		32.9	70	-37.1
1240	Vert	15.4	1.9	23.9		41.2	70	-28.8
(VCO)	Hor	17.6	1.9	23.9		43.4	70	-26.6
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720	Vert	23.2	5.0	32.0	34.0	26.2	70	-43.8
(Fc + VCO)	Hor	23.0	5.0	32.0	34.0	26.0	70	-44.0
4960	Vert	49.6	4.6	32.9	33.1	54.0	70	-16.0
(Fc * 2)	Hor	49.8	4.6	32.9	33.1	54.2	70	-15.8
7440	Vert	47.4	6.3	37.2	33.4	57.5	70	-12.5
(Fc * 3)	Hor	43.3	6.3	37.2	33.4	53.4	70	-16.6
9920	Vert	38.1	6.2	38.0	33.6	48.7	70	-21.3
(Fc * 4)	Hor	39.2	6.2	38.0	33.6	49.8	70	-20.2
12400	Vert	47.2	7.2	39.1	32.5	61.0	70	-9.0
(Fc * 5)	Hor	44.8	7.2	39.1	32.5	58.6	70	-11.4
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	32.7	11.5	43.3	31.0	56.5	70	-13.5
(Fc * 7)	Hor	32.6	11.5	43.3	31.0	56.4	70	-13.6
19840	Vert	42.3	0.6	44.7	31.7	55.9	70	-14.1
(Fc * 8)	Hor	40.4	0.6	44.7	31.7	54.0	70	-16.0
22320	Vert	39.4	0.9	45.6	31.0	54.9	70	-15.1
(Fc * 9)	Hor	39.5	0.9	45.6	31.0	55.0	70	-15.0
24800	Vert	40.2	2.3	46.6	31.8	57.3	70	-12.7
(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: 0 dBi linear gain T-Com antenna within 6110, terminal placed VERTICAL

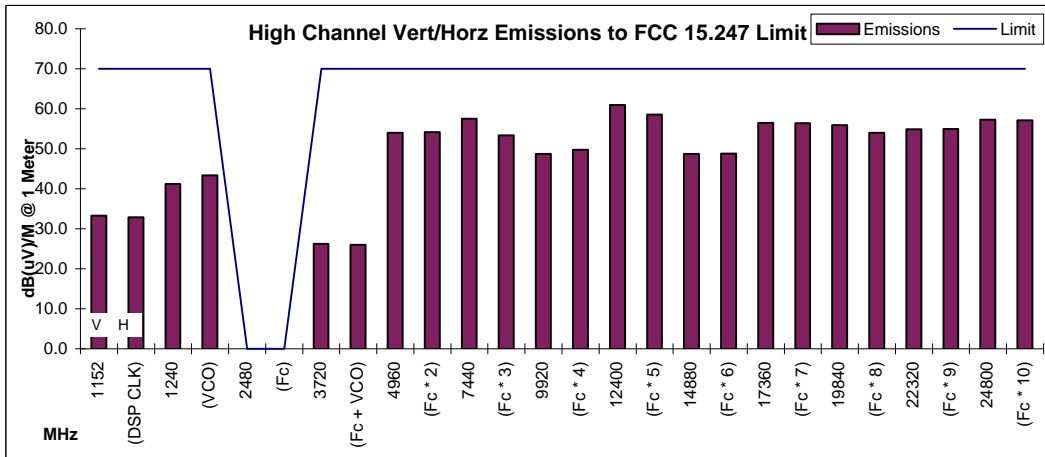
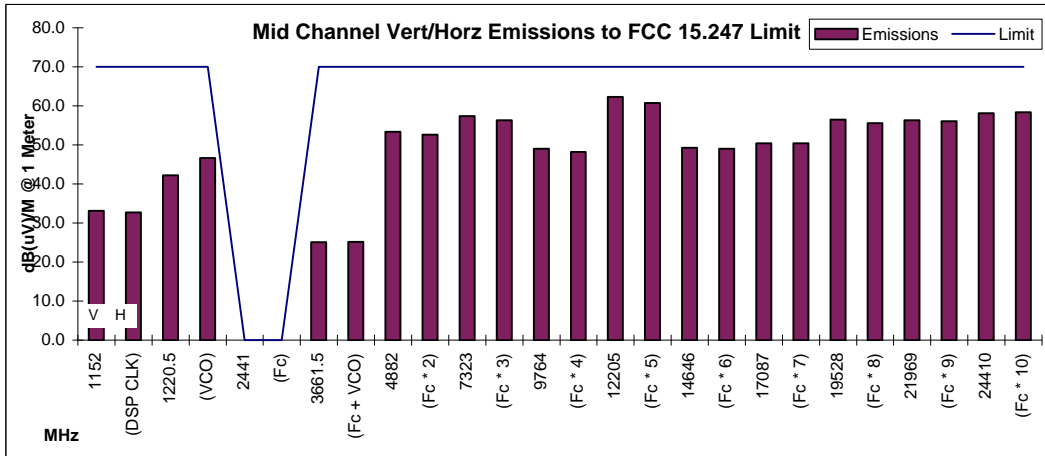
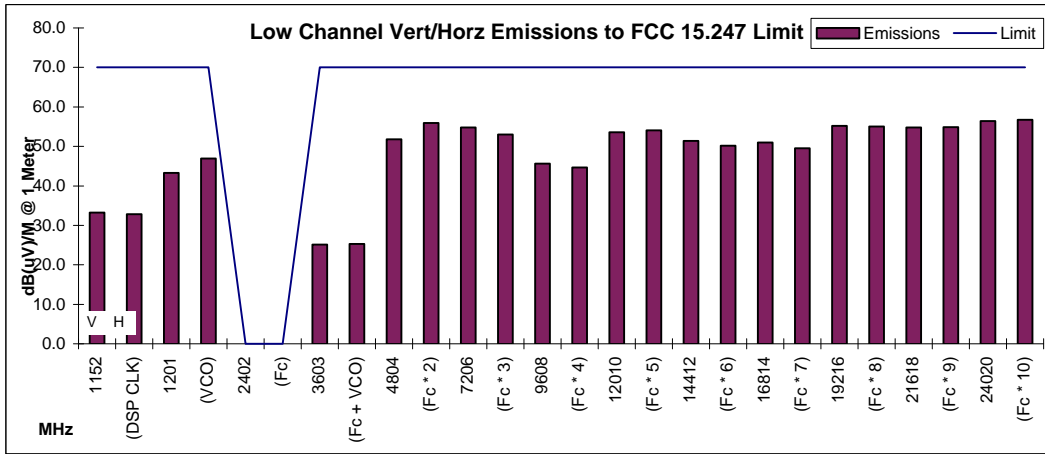
Cedar Rapids, IA

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

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)
<b>Low Channel 02</b>		<b>2402.000</b>	<b>MHz</b>					
1152	Vert	16.8	1.9	23.6		42.3	84	-41.7
(DSP CLK)	Hor	15.8	1.9	23.6		41.3	84	-42.7
1201	Vert	21.5	1.9	23.7		47.1	84	-36.9
(VCO)	Hor	24.3	1.9	23.7		49.9	84	-34.1
2402	Vert		3.6	27.9				
(Fc)	Hor		3.6	27.9				
3603	Vert	41.4	4.3	31.8	34.0	43.5	84	-40.5
(Fc + VCO)	Hor	41.3	4.3	31.8	34.0	43.4	84	-40.6
4804	Vert	50.0	4.5	32.7	33.1	54.1	84	-29.9
(Fc * 2)	Hor	53.0	4.5	32.7	33.1	57.1	84	-26.9
7206	Vert	48.6	6.2	36.6	33.4	58.0	84	-26.0
(Fc * 3)	Hor	47.2	6.2	36.6	33.4	56.6	84	-27.4
9608	Vert	43.1	6.6	37.5	33.9	53.3	84	-30.7
(Fc * 4)	Hor	42.9	6.6	37.5	33.9	53.1	84	-30.9
12010	Vert	45.6	7.8	38.9	32.8	59.5	84	-24.5
(Fc * 5)	Hor	45.7	7.8	38.9	32.8	59.6	84	-24.4
14412	Vert	43.1	8.4	41.0	31.7	60.8	84	-23.2
(Fc * 6)	Hor	43.2	8.4	41.0	31.7	60.9	84	-23.1
16814	Vert	43.4	9.5	40.0	31.8	61.1	84	-22.9
(Fc * 7)	Hor	43.3	9.5	40.0	31.8	61.0	84	-23.0
19216	Vert	50.1	0.7	44.2	31.2	63.8	84	-20.2
(Fc * 8)	Hor	49.9	0.7	44.2	31.2	63.6	84	-20.4
21618	Vert	49.9	0.5	45.5	30.5	65.4	84	-18.6
(Fc * 9)	Hor	49.8	0.5	45.5	30.5	65.3	84	-18.7
24020	Vert	50.2	2.4	45.8	31.0	67.4	84	-16.6
(Fc * 10)	Hor	50.1	2.4	45.8	31.0	67.3	84	-16.7

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)
<b>Middle Channel 41</b>		<b>2441.000</b>	<b>MHz</b>					
1152	Vert	16.9	1.9	23.6		42.4	84	-41.6
(DSP CLK)	Hor	15.9	1.9	23.6		41.4	84	-42.6
1220.5	Vert	20.9	1.9	23.8		46.6	84	-37.4
(VCO)	Hor	23.3	1.9	23.8		49.0	84	-35.0
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	41.0	4.3	31.9	34.0	43.2	84	-40.8
4882	Vert	51.2	4.5	32.4	33.1	55.0	84	-29.0
(Fc * 2)	Hor	49.3	4.5	32.4	33.1	53.1	84	-30.9
7323	Vert	50.0	6.0	36.8	33.4	59.4	84	-24.6
(Fc * 3)	Hor	49.3	6.0	36.8	33.4	58.7	84	-25.3
9764	Vert	45.5	6.2	37.8	33.8	55.7	84	-28.3
(Fc * 4)	Hor	44.1	6.2	37.8	33.8	54.3	84	-29.7
12205	Vert	50.6	7.3	39.0	32.6	64.3	84	-19.7
(Fc * 5)	Hor	49.6	7.3	39.0	32.6	63.3	84	-20.7
14646	Vert	43.1	8.4	40.7	31.8	60.4	84	-23.6
(Fc * 6)	Hor	42.7	8.4	40.7	31.8	60.0	84	-24.0
17087	Vert	42.5	9.6	40.9	31.7	61.3	84	-22.7
(Fc * 7)	Hor	42.8	9.6	40.9	31.7	61.6	84	-22.4
19528	Vert	51.1	1.1	44.5	31.4	65.3	84	-18.7
(Fc * 8)	Hor	51.0	1.1	44.5	31.4	65.2	84	-18.8
21969	Vert	50.5	1.9	45.5	30.8	67.1	84	-16.9
(Fc * 9)	Hor	50.2	1.9	45.5	30.8	66.8	84	-17.2
24410	Vert	51.1	3.2	46.3	31.4	69.2	84	-14.8
(Fc * 10)	Hor	50.7	3.2	46.3	31.4	68.8	84	-15.2

**PEAK TRANSMITTER RADIATED SPURIOUS EMISSIONS**

FCC ID: EHARFID2450PCC-5

Intermec Technologies Corporation

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EMC Test Laboratory

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a	b	c	d	e	f	g	h	i
(formula)						(=c+d+e-f)		(=g-h)
<b>High Channel 80</b>	<b>2480.000</b>	<b>MHz</b>						
1152	Vert	16.9	1.9	23.6		42.4	84	-41.6
(DSP CLK)	Hor	15.8	1.9	23.6		41.3	84	-42.7
1240	Vert	20.2	1.9	23.9		46.0	84	-38.0
(VCO)	Hor	21.8	1.9	23.9		47.6	84	-36.4
2480	Vert		4.0	28.0				
(Fc)	Hor		4.2	28.0				
3720	Vert	41.7	5.0	32.0	34.0	44.7	84	-39.3
(Fc + VCO)	Hor	41.7	5.0	32.0	34.0	44.7	84	-39.3
4960	Vert	51.3	4.6	32.9	33.1	55.7	84	-28.3
(Fc * 2)	Hor	51.6	4.6	32.9	33.1	56.0	84	-28.0
7440	Vert	50.1	6.3	37.2	33.4	60.2	84	-23.8
(Fc * 3)	Hor	47.2	6.3	37.2	33.4	57.3	84	-26.7
9920	Vert	44.1	6.2	38.0	33.6	54.7	84	-29.3
(Fc * 4)	Hor	43.8	6.2	38.0	33.6	54.4	84	-29.6
12400	Vert	49.8	7.2	39.1	32.5	63.6	84	-20.4
(Fc * 5)	Hor	47.5	7.2	39.1	32.5	61.3	84	-22.7
14880	Vert	43.1	8.5	40.1	31.9	59.8	84	-24.2
(Fc * 6)	Hor	43.4	8.5	40.1	31.9	60.1	84	-23.9
17360	Vert	43.3	11.5	43.3	31.0	67.1	84	-16.9
(Fc * 7)	Hor	42.6	11.5	43.3	31.0	66.4	84	-17.6
19840	Vert	50.8	0.6	44.7	31.7	64.4	84	-19.6
(Fc * 8)	Hor	50.5	0.6	44.7	31.7	64.1	84	-19.9
22320	Vert	50.6	0.9	45.6	31.0	66.1	84	-17.9
(Fc * 9)	Hor	50.9	0.9	45.6	31.0	66.4	84	-17.6
24800	Vert	50.8	2.3	46.6	31.8	67.9	84	-16.1
(Fc * 10)	Hor	51.1	2.3	46.6	31.8	68.2	84	-15.8

### PEAK TRANSMITTER RADIATED SPURIOUS EMISSIONS

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EMC Test Laboratory

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