Technologies Corporation
EMC Test Laboratory
Cedar Rapids, IA

MEASUREMENT/TECHNICAL REPORT

Intermec Technologies Corporation
IV6 Transmitter Co-Location of
FCC ID: EHARFID915PCC-6 (IC: 1223A-RFIDPCC6)
And
FCC ID: HN2-C30XX (IC: 1223A-C30XX)

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Appendix D

RF EXPOSURE, MPE CALCULATION

Page 2-4 Collocated RF Exposure Calculations

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Ref. FCC ID: EHARFID915PCC-6
FCC ID: HN2-C30XX
IC: 1223A-RFIDPCC6
IC: 1223A-C30XX

To Whom It May Concern:

Intermec Technologies Corporation hereby declares that our Model IV6 for Radio Frequency Identification (RFID) FHSS transceiver operating at 902 MHz with internal 2.4 GHz FHSS transceiver, is described as the equipment under test (EUT). This EUT is categorically excluded from routine environmental evaluation for RF exposure by its classification as a Part 15.247 mobile radio. Their exclusion is listed in 47 CFR 1.1307, therefore the EUT is categorically excluded from routine environmental evaluation per 47 CFR 2.1091(c).

The attached tables show MPE evaluation of the IV6. Each radio band has specific a maximum permissible exposure (MPE) as stated in 47 CFR 1.1310. Refer to the limits shown in the calculation tables for details.

The general calculation for exposure at a distance of 20-cm (8-inch) distance is shown in the equation below.

$S = (PG)/4 \pi R^2$
Where: S = power density (mW/cm^2)
P = power input to the antenna (mW)
G = linear power gain relative to an isotropic radiator
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)

Solving for S, the maximum power densities 20 cm from the transmitting antennas are contained within the following pages.

Sincerely,

Dave Fry
EMC Engineer

EIRP Calculation of RF Exposure

FCC ID: EHARFID915PCC-6 Antenna worst case EIRP.
IC: 1223A-RFIDPCC6
915 MHZ RFID Radio Calculation for exposure at 20cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm^2	Pwr Density Limit mW/cm^2	Power Density Ratio
Kathrien	panel	NA	915	1000.0	4.4	0.5479	0.61	0.8983

FCC ID: HN2-C30XX Integral antenna of the radio worst case EIRP.
IC: 1223A-C30XX
Mitsumi C30XX Bluetooth Calculation for exposure at 20cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm^2	Pwr Density Limit mW/cm^2	Power Density Ratio
Internal	chip	NA	2450	26.7	2.17	0.0088	1.0	0.0088

Co-Located Transmitter Calculation of RF Exposure

Per FCC TCB Training April 3, 2002
"Devices operating in multiple frequency bands
When RF exposure evaluation is required for TCB approval

Separate antennas – estimated minimum separation distances may be considered for the frequency bands that do not require evaluation or TCB approval, however, the estimated distance should take into account the effect of co-located transmitters. (Note 24)

Note 24 According to multiple frequency exposure criteria, the ratio of field strength or power density to the applicable exposure limit at the exposure location should be determined for each transmitter and the sum of these ratios must not exceed 1.0 for the location to be compliant."

Worst Case Exposure for IV6 when using internal co-located transmitters.
Calculation for exposure at 20cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm^2	Pwr Density Limit mW/cm^2	Power Density Ratio
FCC ID: EHARFID915PCC-6 RFID panel	panel	NA	915	1000.0	4.4	0.5479	0.61	0.8983
FCC ID: HN2-C30XX Internal	chip	NA	2450	26.7	2.17	0.0088	1.0	0.0088
							ratio limit	
Total							1.0	0.9070

Worst Case Exposure for IV6 when using internal co-located transmitters.
EIRP is **measured** for Part 15.247. EIRP is caculated for RFID and BT transmitters.
Calculation for exposure at 20cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	EIRP Power (mW)		Pwr Density @ 20cm mW/cm^2	Pwr Density Limit mW/cm^2	Power Density Ratio
FCC ID: EHARFID915PCC-6 RFID panel	panel	NA	915	2745.2	0	0.5461	0.61	0.8953
FCC ID: HN2-C30XX Internal	chip	NA	2450	44.0	0	0.0088	1.0	0.0088
Total				2789.2		0.5549		
							ratio limit	
Total							1.0	0.9041

The worst case configuration for all combinations of co-located transmitters and antennas are shown.
In all cases the ratio of exposure compared the limit when totaled does not exceed 1.0.

ERP Calculation of RF Exposure

ERP is sometimes preferred. The calculation as the Sum of the ERP of the co-located transmitters is in the table below. ERP TX1 + ERP TX2

Worst Case Exposure for IV6 when using internal co-located transmitters.
Calculation for exposure at 20cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	ERP Power (mW)		Pwr Density @ 20cm mW/cm^2	Pwr Density Limit mW/cm^2	Power Density Ratio
FCC ID: EHARFID915PCC-6 RFID panel	panel	NA	915	1677.3	0	0.3337	0.61	0.5470
FCC ID: HN2-C30XX Internal	chip	NA	2450	26.7	0	0.0053	1.0	0.0053
Total				1704.0		0.3390		
							ratio limit	
Total							1.0	0.5524

The worst case configuration for ERP combinations of co-located transmitters and antennas is shown.
The ratio of exposure compared the limit when totaled does not exceed 1.0.

Please note that EIRP = ERP x 1.64, so EIRP data presented is worst case.