ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

November 13, 2000

Federal Communications Commission
Equipment Approval Services
P.O. Box 35815
Pittsburgh, PA 15251-3315

Applicant: INTERMEC TECHNOLOGIES CORPORATION
6001 36th Avenue West
Everett, WA 98203-9280
Phone: (505) 856-8054

RE: Correspondence Reference Number: 16801

Equipment: FCC ID: HN21555-900

Gentlemen:

Please find enclosed the response to request for additional information regarding the submittal for grant of certification of Intentional Radiators operated in the frequency range of 902 – 928 MHz. It has been requested that the information contained in the block diagrams, operational description and schematics of the application be held confidential per Section 0.459.

A copy of the information request has been reproduced here for reference.

To: Scot Rogers, Rogers Labs, Inc
From: Joe Dichoso
jdichoso@fcc.gov
FCC Application Processing Branch

Re: FCC ID HN21555-900
Applicant: Intermec Corporation
Correspondence Reference Number: 16801
731 Confirmation Number: EA98687

1) The block diagram, schematics, internal photo's and user manual were unreadable. Please resend them.

2) If the device is a Class B peripheral, it will require DOC approval or Certification. File a composite application for Certification or provide the DOC certificate and correct the label to include DOC label requirements.

3) The transmitter cannot coordinate its hopping sequence with the hopping sequence of other transmitters, or vice versa, for the purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters. Provide a description on how the device complies with this rule.

4) Each frequency must be used equally on the average by each transmitter.

Except for voice systems, each new transmission must start at a different point in the sequence so that on average the full sequence is used. Therefore, Describe where the next transmission starts when all frequencies are not used for a previous message. This is required because some transmissions may need only a few frequency hops to be completed. i.e. If the transmission started on the same frequency each time, this frequency would be used more than the others if many short transmissions were sent.

5) Section 15.247(a)1 indicates that the system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals. Please explain how the device complies with this rule when a packet is repeated or when multiple packets are sent. What is the receiver input bandwidth? How does the receiver shift frequencies and determine which frequency to shift to in order to synchronize with this transmitter?

6) What was the measured output power?

7) Please address the following RF safety questions and place in the RF exposure info folder.

Intermec, EA 98687 -

1. The field strengths on page 19 of the EMC report are is indicating less than 100 mW EIRP, but the filing is requesting for 1.0 W peak conducted output; please clarify the discrepancy.

2. The submitted manual info is indicating a separation distance of 4 cm for using this product. The MPE info is indicating about 16 cm separation. Please clarify discrepancies. In order to use MPE estimates, rules in 2.1091 require a minimum separation distance of 20 cm. Otherwise, SAR limit will be applied and this filing will be reviewed with respect to SAR requirements. Please either provide the supporting info for the 4 cm indicated in the manual or revise the info accordingly. It also needs to be indicated to users that this is a hand-held and hand operated only device (as done in several previous filings).

Note: Filing is requesting for 1.0 W for this hand-held tag reader ?

Kwok Chan

RESPONSE

1.) As requested the block diagram, schematics, internal photos and users manual, have been uploaded to the web site.

2.) This product is an RFID tag reader and is intended for use in business and industrial environments for inventory control and similar purposes. It does not have any residential applications. The device is NOT a class B computer peripheral and does not require additional FCC approval. The device has been tested for the requirements of class A equipment and has been correctly labeled to reflect this. The information that is required in part 15.19(a)(3), 15.21, and 15.105, are included in the owner's manual.

3 and 4.) The transmitter control is discussed in the following paragraphs:

Derivation of Pseudo-Random Hop Sequence

Hop Sequence

The hop sequence for 900 MHz RFID Reader (FCC ID: HN21555-900) is:

Table 1 Hopping sequence index and channel number

Hopping index	Channel number	Hopping index	Channel number	Hopping index	Channel number
1	7	21	10	41	26
2	34	22	56	42	59
3	11	23	27	43	42
4	50	24	60	44	20
5	23	25	36	45	46
6	61	26	16	46	1
7	38	27	47	47	30
8	21	28	3	48	12
9	48	29	35	49	52
10	4	30	13	50	28
11	29	31	53	51	62
12	9	32	22	52	39
13	54	33	58	53	15
14	24	34	40	54	44
15	63	35	17	55	5
16	41	36	49	56	31
17	18	37	6	57	14
18	43	38	32	58	55
19	2	39	8	59	25
20	33	40	51	60	57
				61	37
				62	19
				63	45

Basis of Hop Sequence

The pseudo random hop sequence of 63 channels is derived from two subsets of random patterns, which form the basis of the hop sequence. Subset A is comprised of nine elements, whereas Subset B is comprised of seven elements:

Table 2 Random elements of Subset A and Subset B.

Element number	Subset A element	Subset B element
[1]	0	7
[2]	4	6
[3]	1	4
[4]	7	1
[5]	3	2
[6]	8	5
[7]	5	3
[8]	2	
[9]	6	

Formation of Hop Sequence from Basis

The first channel of the hop sequence is formed by the first element of each subset using a simple relation, first channel = 7 * first element of A + first element of B.

The second channel of the hop sequence is similarly formed by the second element of each subset, second channel = 7 * second element of A+ second element of B.

Subsequent channels use subsequent elements from each subset. However, the eight channel of hop sequence has no corresponding eighth element in subset B because subset B only has 7 elements. In place of his non-existent eight element, the first element of B is used. Effectively, the elements of the subsets repeat as subsequent elements are needed.

The channel of the hop sequence can be mathematically stated using a "*modulo*" function:

$$k^{th} \text{ channel of hop sequence} = 7 * \text{Subset A } [\textit{modulo } (k/9)\,] \; + \; \text{Subset B } [\textit{modulo } (k/7)\,]$$

where the modulo function returns the remainder after an integral division.

Example of Hop Sequence Formula

Use of the mathematical relationship between the subsets and hop sequence is best illustrated with an example. Use of the formula for the 10^{th} channel, k=10, would be:

$$10^{th} \text{ channel} = 7 * \text{Subset A } [\textit{modulo } (10/9)\,] \; + \; \text{Subset B } [\textit{modulo } (10/7)\,]$$

And after the modulo function is applied, the 10^{th} channel would be:

$$10^{th} \text{ channel} = 7 * \text{Subset A } [\,1\,] \; + \; \text{Subset B } [\,3\,]$$

And using the specified element numbers from each subset:

$$10^{th} \text{ channel} = 7 * 0 \; + \; 4$$

Thus, the 10^{th} channel number of the hop sequence is channel 4 as indicated in the original hop sequence Table 2.

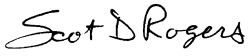
5.) The receiver tracks the transmitter as it is looking for reflections from the rf id tag. The receiver hopping sequence is therefore defined by the same sequence of events as the transmitter.

6.) The measured output power of this device is 128.0 dBµV per meter at 3 meters. This calculates to 0.9 W EIRP using a numeric gain of 2 for the antenna.

7.) The RF exposure information will be forwarded to the FCC as soon as it is available. The unit has been sent for SAR testing and a report of measurement will be made available.

1.) The field strength measurements reported on page 19 of the submittal reflected data taken on a unit with an inappropriate RF switch. Please accept the amended report pages depicting a properly functioning unit.

Should you require any further information, please contact the undersigned.
Thank you for your consideration in this matter.
Sincerely,



Scot Rogers
Rogers Labs, Inc.
Enclosures