RIM
RESEARCH IN MOTION

Document
R857D-2-5 DATATAC PROTON RADIO DEVICE FCC
APPLICATION FOR CERTIFICATION

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Masud S. Attayi	June 13, 2000	02464-CERT-FCC-OPER-010
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		010_OPER MOD.doc

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,
CFR 47, PART 2, 15 AND 90

SUB-PART

2.1033 (c)   TECHNICAL DESCRIPTION OF EQUIPMENT

(4)   TYPE OF EMISSION :

20K0F1D

THE FORMAT IS DIGITAL NON-VOICE DATA ONLY,
CONTINUOUS FREQUENCY, CONTINUOUS PHASE,
FREQUENCY SHIFT KEYING, NARROW BAND FREQUENCY
MODULATION

(5)   FREQUENCY RANGE :

RX : 851 MHz TO 870 MHz, WITH 12.5 KHz DISCRETE CHANNEL
STEPS AND 25 KHz CHANNEL BANDWIDTH
TX : 806 MHz TO 825 MHz, WITH 12.5 KHz DISCRETE CHANNEL
STEPS AND 25 KHz CHANNEL BANDWIDTH

(6)   OPERATING POWER OUTPUT LEVELS :

2000 mW (MILLIWATTS) (33 dBm)
NOT USER ADJUSTABLE.

(7)   MAXIMUM POWER RATING :

AS DEFINED IN THE APPLICABLE PARTS OF THE RULES
90.205 (i) and 90.635 (d) - MAXIMUM ALLOWABLE : 100 WATTS
(20 dBW)
AUTHORIZATION REQUESTED (MAXIMUM) : 2.00 WATTS (3.00
dBW).

(8)   VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R.F.
AMPLIFYING DEVICE :

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FINAL R.F. AMPLIFYING DEVICE IS A SEALED SOLID STATE MOSFET HYBRID POWER AMPLIFIER MODULE. THE MODULE GENERATES ABOUT 25% MORE POWER THAN REQUIRED AT THE OUTPUT TERMINAL TO OVERCOME RF PATH LOSS BETWEEN THE MODULE AND THE OUTPUT TERMINAL. BIAS POINTS ARE FOR RATED OUTPUT POWER AT THE OUTPUT TERMINAL. THE MODULE HAS A SUPPLY LINE WITH BIAS V_s AND I_s, AND A GAIN CONTROL LINE WITH BIAS V_c AND I_c.

2000 mW : V_c = 2.470 V, I_c = 2.229 mA, V_s = 3.998 V, I_s= 1.858 A

NECESSARY BANDWIDTH CALCULATION :

THE RADIO SUPPORTS TWO MODULATION FORMATS BOTH FORMATS ARE DIGITAL NON-VOICE DATA ONLY, CONTINUOUS FREQUENCY, CONTINUOUS PHASE, FREQUENCY SHIFT KEYING, NARROW BAND FREQUENCY MODULATION.
THE FIRST FORMAT IS FOR THE MDC-4800 PROTOCOL WHICH IS A 2 LEVEL FSK WITH THE BASEBAND SIGNAL FILTERED BY A 5 POLE LINEAR PHASE FILTER WITH EQUIRIPPLE ERROR. THE EMISSION TYPE FOR THIS FORMAT IS 10K8F1D.
B=4800, M=2400, D=2500, K=1.2
Bn=2M+2DK=10K8

THE SECOND FORMAT IS FOR THE RD-LAP 19200 PROTOCOL WHICH IS A 4 LEVEL FSK WITH THE BASEBAND SIGNAL FILTERED BY A SQUARE ROOT SPECTRAL RAISED COSINE LINEAR PHASE FILTER. THE FOLLOWING IS THE BANDWIDTH CALCULATION BASED ON K=1.2
B=9600, M=4800, D=5600
Bn=2M+2DK=23K0
BASED ON K=1.0, Bn = 20K8.

HOWEVER THE SYSTEM USES DATA ENCODING TO FURTHER REDUCE THE BANDWIDTH. THIS IS SUPPORTED BY THE ATTACHED PLOTS SHOWING A RANDOM PATTERN MODULATED WAVEFORM AND ITS OCCUPIED BANDWIDTH. HENCE, THE EMISSION TYPE FOR THIS FORMAT IS 20K0F1D.

THE MEASUREMENTS WERE MADE USING THE HP8563E SPECTRUM ANALYZER SERIAL NUMBER 3745A08112, HP6632A DC POWER SUPPLY SERIAL NUMBER US37472299, A NAT-20 MINI CIRCUITS 20 dB ATTENUATOR PART NUMBER 20-32000-000, AND A COAXIAL CABLE.
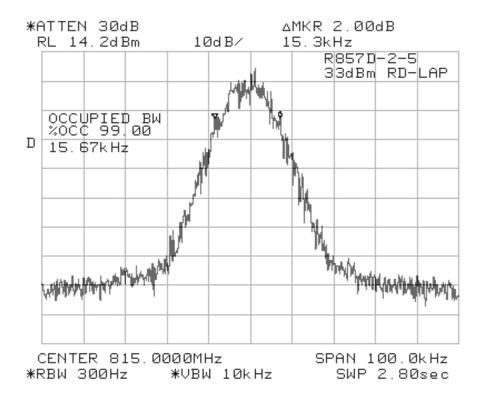
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OCCUPIED BW RD-LAP


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*ATTEN 30dB              ΔMKR 2.00dB
 RL 14.2dBm     10dB/    15.3kHz

                              R857D-2-5
                              33dBm RD-LAP

   OCCUPIED BW
   %OCC 99.00
D  15.67kHz



 CENTER 815.0000MHz          SPAN 100.0kHz
*RBW 300Hz      *VBW 10kHz    SWP 2.80sec
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OCCUPIED BW MDC


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✳ATTEN 30dB                    ΔMKR 0dB
  RL 14.2dBm        10dB/      8.5kHz
                              R857D-2-5
                              33dBm MDC

 OCCUPIED BW
 %OCC 99.00
D
 8.833kHz




 CENTER 815.0000MHz        SPAN 100.0kHz
✳RBW 300Hz     ✳VBW 10kHz    SWP 2.80sec
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