

Dennis Ward

From: dward ATCB [dward@americantcb.com]
Sent: Monday, May 24, 2004 12:28 PM
To: 'Michael Nikishin'
Cc: 'Marina Chernyavsky'; William Graff
Subject: RE: PIDAIRSPAN-700_ATCB001341

Hi Michael, pleasure to meet you

Item 1 in your email is addressed below

Please note that the FCC rules are specific in this area. When a specific rule part changes the requirements of part 2 then the specific rule part is used. If the specific rule part does not change part 2 then the requirements of part 2 are mandatory. Please note that part 27 does not change the modulation requirements for radiated spurious emissions under part 2 rules. Consequently, part 2 must be followed.

Please note that part 2 radiated spurious emissions requirements states that radiated emissions is to be tested in a normal operating condition (see 47CFR reference below). Also, this device under normal operating conditions would most likely never be unmodulated as there would not appear to be any unusable or practical purpose in an unmodulated state. Please note that the purpose of the part 2.1053 requirements is to see what the device itself does to the spectrum when in normal use. An unmodulated signal at the same operating frequency of the device does not do this.

Please also note that the FCC has stated that a licensed device is to be tested under all modulation types. However, for this test, I think it can be assumed that test data provided showing radiated emissions measurements using the highest bit rate would suffice. It would be intrinsically better to have lowest and highest data rates, but for expediency and practicality the highest is adequate. Please provide this data.

In any event, an unmodulated signal is inappropriate and does not show compliance to the 2.1053 requirements.

2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements *under normal conditions of installation and operation.*

Item 2 in your email is addressed below

The FCC rules for devices such as this has required environmental assessment evaluations for quit some time. If this device was under the power limits stated in 2.1091 for part 27 devices then MPE calculations would be sufficient. However, please note that the power of this device exceeds the 1.5 W ERP limits for frequencies under 1.5 GHz and thus is subject to routine (measured) environmental procedures (see 47CFR reference below) Please note that this is an FCC requirement for certification in the TCB program. Please note that while a fixed base station would address rf safety at the time of licensing, a mobile CPE would not and therefore must be shown to comply with the mobile device MPE requirements stated in 2.1091 prior to certification.

While I understand the limitations of MPE measurements using an OATS, none the less, measurements of rf safety for MPE of mobile devices must be provided. However, as an OATS is as you state, and as fully anechoic chambers are typically too small at this frequency to do far field measurements of power density, the FCC has accepted a other methods of reporting MPE these devices. As there is no approved FCC test procedure for this requirement, the FCC has accepted power density measurements in a reasonable manner justified by the test lab. The FCC has so far only required

- 1 that a reasonable approach to MPE measurements be taken by the applicant
- 2 a proper justification for that method be provided
- 3 the report shows compliance to the MPE at the defined distance stated by the manufacturer
- 4 the applicant provide the necessary MPE warning labels and statements pertinent to the device

Your client has two choices

- 1 perform MPE measurements
- 2 the ERP of the device would have to be reduced to under 1.5W. If the source-based time-averaged power of the device reduces the power to below 31.7dBm (1.5W), then calculated MPE could be used. Please note that time-averaging methods may not be used and source-based time-average based on the intrinsic properties of the device must be lower than 1.5W – i.e 1.49 etc not exactly 1.5W ERP as this would still require measured MPE.

47CFR 1.1307(b) (2) Mobile and portable transmitting devices that operate in the Cellular Radiotelephone Service, the Personal Communications Services (PCS), the Satellite Communications Services, the General Wireless Communications Service, the Wireless Communications Service, the Maritime Services (ship earth stations only) and the Specialized Mobile Radio Service authorized under Subpart H of parts 22, 24, 25, 26, 27, 80, and 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use, as specified in §§2.1091 and 2.1093 of this chapter.

47CFR 2.1091 c) Mobile devices that operate in the Cellular Radiotelephone Service, the Personal Communications Services, the Satellite Communications Services, the General Wireless Communications Service, the Wireless Communications Service, the Maritime Services, the 4.9 GHz Band Service and the Specialized Mobile Radio Service authorized under subpart H of part 22 of this chapter, part 24 of this chapter, part 25 of this chapter, part 26 of this chapter, ***part 27*** of this chapter, part 80 of this chapter (ship earth stations devices only) and part 90 of this chapter ***are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more***, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more.

Thanks
Dennis

From: Michael Nikishin [mailto:nikishin@hermonlabs.com]
Sent: Monday, May 24, 2004 11:52 AM
To: 'dward@americantcb.com'
Cc: Marina Chernyavsky
Subject: FW: PIDAIRSPAN-700_ATCB001341

Hello Denis,

Let me introduce myself. My name is Michael and I am a responsible for radio testing in Hermon labs. As I understand we have two open issues in the Airspan Networks applications.

The first one is spurious emissions test which had been performed with unmodulated signal. The device under test may operate under 5 different bit rates which leads to different power density of spurious and in other to save test time and money it was tested under the worst test conditions- unmodulated as it yields the maximum power density. Additional verification was performed to check the unmodulated transmitter produces spurious emissions not better than when normally modulated and no transients due to hopping were observed. That is why it was tested only once under the most unfavorable conditions. The effect of modulation was also observed at the assigned band edges as provided in our test report.

The second one is MPE evaluation. The procedure you suggest is test site dependent as well as the specific installation condition of the tested transmitter which will hardly represent the normal installation. The calculation we provided for MPE evaluation is based on physical constants, equations, RF output power and antenna gain measurements. We use the same procedure for MPE evaluation over 8 years slightly changed depending on the result we are looking for: minimum separation distance or RF exposure, throughout our experience in transmitter approvals with FCC and later with ATCB. Please let me know if the FCC approach to the MPE evaluation changed in the last few weeks since our prior radio application. Hopefully you'll find our answers satisfied.

Best regards.
Michael Nikishin,
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-----Original Message-----

From: Marina Chernyavsky
Sent: Sunday, May 23, 2004 8:45 AM
To: Michael Nikishin
Subject: FW: PIDAIRSPAN-700_ATCB001341

-----Original Message-----

From: dward ATCB [mailto:dward@americantcb.com]
Sent: Monday, May 17, 2004 6:22 PM
To: 'Marina Chernyavsky'
Cc: William Graff
Subject: RE: PIDAIRSPAN-700_ATCB001341

Hi Marina

Fixed base stations in the licensed bands can generally address MPE at the time of licensing. However, this particular device is used both as a base station and as a CPE (Customer Premises Equipment). As such, site MPE cannot generally be done. Also, 2.1091 states part 27 devices are "subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more."

As this device exceeds 1.5 watts ERP, MPE must be done under the "routine environmental evaluation" method. Simply put, this means measured MPE evaluation instead of calculated MPE.

Unfortunately there is no prescribed MPE measurement process. However, on the good side, the FCC allows the applicant to provide a reasonable method of measurements. This would typically be done using a calibrated field probe set at the specified minimum distance and a measuring receiver. The EUT would then be rotated 360 degrees in all three orthogonal planes. If a reasonable projection of where the maximum rf exposure would take place can be provided, then the testing can be minimized to show that plane and angle.

Because these are typically near field power density measurements, care must be taken in the measurement process. Special calibrated probes may have to be used. The report and engineering judgments should address this near field condition. In some cases it may even be simpler to over estimate and test at a greater minimum distance.

The report then provides the engineering assumptions/judgments that led to the final measurements. The rf exposure limits must be met at the prescribed minimum distance defined by the manufacturer and this minimum distance must be clearly stated in the user and installer documentation. The report is then provided as an MPE report as part of the application exhibits.

Hope this helps
Dennis

From: dward ATCB [mailto:dward@americantcb.com]
Sent: Monday, May 17, 2004 9:47 AM
To: 'Marina Chernyavsky'
Cc: William Graff
Subject: RE: PIDAIRSPAN-700_ATCB001341

Hi again Marina

5/24/2004

This is to address other items in your email.

You state that the device was FSK modulated for band edge measurements. Please note that 2.1053(a) states, "Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation."

Please note that 27.53 requirements for out of band emissions is the same for band edge as for all other out of band frequencies except that 30kHz may be used within 100kHz of the band edges. Please also note that part 27 does not exempt devices from the modulating requirements of 2.1053(a). This then means that a properly modulated signal representative of normal use would be used. This means that the device would need to be operating in a normal fashion (hopping on and an FSK modulated carrier). While band edge measurements might be acceptable with the hopping stopped at the upper and lower frequencies, the radiated spurious emissions of a licensed device would be measured in a normal operation mode as described.

All other responses seem to be OK. I will be looking at the uploaded exhibits soon to make sure.

Thanks
Dennis

From: Marina Chernyavsky [mailto:Marina@hermonlabs.com]
Sent: Monday, May 17, 2004 12:21 AM
To: 'dward@americantcb.com'
Subject: RE: PIDAIRSPAN-700_ATCB001341

Dear Dennis,

Please find attached our reply.

Many thanks in advance.

Regards,

Marina Cherniavsky
Hermon Labs