

Re: FCC ID: 2AEIVE10G-7282-2512

Applicant: EMClarity Pty Ltd
Correspondence Reference Number: 46812
Form 731 Confirmation Number: EA585220
Date of Original E-mail: 05/29/2015

And

Re: FCC ID: 2AEMLE10G-7282-2506

Applicant: EMClarity Pty Ltd
Correspondence Reference Number: 46809
Form 731 Confirmation Number: EA147388
Date of Original E-mail: 05/29/2015

The following questions were posed with reference to the above applications by Mr Stan Lyles in email to David White and Richard Harris on the 29th of May 2015.

Please accept the following information in red as EMClarity's response.

1. Explain why did you file under two different grantee codes? ■■

The two different grantID codes relate to two different versions of the product which have somewhat different designs and emission characteristics. At the time of submitting the applications it was thought that using different Grant ID's was the correct method of making the separate applications.

For more information on the differences between the two product variants please see discussion below.

2. This application should be DXX and not TNB for the Equipment Code. ■■

The beacon transmitted on the 24Ghz band (ref discussion below for explanation) could be described as DXX as it is used for radiolocation purposes, however the primary purpose of the product is as an E band high data-rate link so the TNB code is seem as most appropriate.

3. The fee will change for DXX Equipment Code. ■■

We are happy to pay the relevant and correct fees expeditiously.

4. These applications contain only test reports for 15.249 in 24-24.25 GHz band. ■■

This is an error on our part as we were advised by the test house (EMC Services) that the unintentional radiation test report was all that is required for FCC registration. The

detailed report on the E band and 24GHz intentional radiation for the product has been added to the list of attachments to the application.

5. Please explain why if this device is E-band (70-76 GHz and 81-86 GHz), there is no data in the test report for this band ■■

This is an error on our part as we were advised by the test house (EMC Services) that the unintentional radiation test report was all that is required for FCC registration. The detailed report on the E band and 24GHz intentional radiation for the product has been added to the list of attachments to the application.

6. What is the function of this device in the 24-24.5 GHz band? ■■

The 24 GHz functionality allows the high gain E band antenna to be accurately and dynamically pointed. The large 4 foot eband antenna can not be practically used without active steering. With the use of the 24 GHz beacon transmitted from the remote end, the 4 foot version of the product actively steers the antenna to within 10 milli-degrees of bore site, thus allowing all the gain of the large antenna to be productively used. For a more complete description of the 2 foot and 4 foot products see discussion below.

7. Please explain why the 24-24.5 GHz signal exceeds the limit?

The 24GHz transmission is very low power as discussed below. The measured field strength as documented in the test reports is below 250millivolts/metre in EMC Report 141207 section 4 . This is believed to be in accordance with the intentional emission requirements of 15.249 (a).

The report shows during testing some observed emissions above the limit (ref Figures (1a, 1b, 2a and 2b). However in all cases this was ambient radiation and not associated with the product and is believed common of a free air test range. Please refer to the note on the bottom of all figures with limits exceeding the limit, and to Section 6.1 of EMC Report 141207. All ambient emissions were thoroughly investigated and confirmed not associated with the equipment.

The note "The signal exceeding the limit at 24Ghz is the intentional emitter" on Figures 5a, 5b, 6a and 6b is in reference to the intentional 24Ghz emission from the product exceeding the non-intentional emission limit - which is the subject of this test. However the measured level of the intentional emission as stated does not exceed the intentional emission limit of 250mV/m as documented in section 4. And all non-intentional emission as below the limit.

Further Discussion on the E10G 2 foot and 4 foot products.

FCC ID: 2AEMLE10G-7282-2506
FCC ID: 2AEIVE10G-7282-2512

General

The two different grantID codes used in the applications relate to two different versions of the same product that have somewhat different designs and emission characteristics. At the time of submitting the applications it was thought that using different Grant ID's was the correct method of making the separate applications.

In common between the two product versions is a high data rate E band radio which operates at 5 Gbps using a 2.1 GHz channel.

The two different designs associated with the grantyID codes are the 2 foot (600mm) antenna based product (FCC ID: 2AEIVE10G-7282-2506) and the 4 foot (1200mm) antenna based product (FCC ID: 2AEIVE10G-7282-2512).

The Four Foot Version

The 4 foot version is highly evolutionary. The antenna is mounted on a gimbal and is actively steered using motors. The need for pointing comes from the 4 foot antenna which has large gain and very small beam-width. Without an active pointing system, the 4 foot antenna is very difficult to use in practice. With the pointing system it can be used on any platform. It may even be deployed on a very flexible mast that can move violently in wind.

The method of steering is monopulse. This technique uses a beacon transmitted from the remote terminal end. The monopulse technique measures the direction of the beacon with a phased array of receive antennae. The system then steers the antenna towards the beacon. The final steering accuracy is below 10milli-degree.

For the 4 foot system to operate the remote end must transmit a pointing beacon. The system was designed with a highly accurate GPS stabilized clock. Therefore the exact frequency of the beacon can be set within 10's of hertz. The remote end looks for this beacon within a tiny conversion bandwidth and the resultant processing gain means that the beacon EIRP can be very small and still be usefully received over paths up to and exceeding 15 miles. . The 24-24.5 GHz band was chosen as a very convenient band for the beacon due to the relaxed licensing requirements, the beacon's low EIRP requirements and roughly similar propagation effects as E band.

The 4 foot system therefore intentionally radiates a 24Ghz beacon along with the E band signal so it may operate in pair with other 4 foot antenna of the same type. The 4 foot system also has a highly complex beacon receiver and down converter system, motor control and servo system for steering. These system impacts on the unintentional radiation characteristics of the product. As such it was decided to test and register it under a separate grantee code application to the simpler 2 foot system which does not have all these sub-systems.

The Two Foot Version

The two foot system was designed to work in a network with 4 foot antennas of the type described above.

The 2 foot system is typical of E band products. It includes an E band radio identical to the 4 foot system but no with automatic pointing system. It does not include a gimbal or motors or motor control equipment.

As is typical in Eband, the 2 foot system can be used only on solid platforms. It has a static fixed mount.

However in order to work with a 4 foot system (which requires to be able to receive a beacon transmitted from the remote end), the 2 foot system needs to transmit a suitable beacon.

As a result, in addition to the normal E band transceiver, the 2 foot system also includes a 24Ghz beacon transmitter. It does not include however a beacon receiver, motor control and servo system.

It therefore has quite similar intentional radiation characteristics, but quite different non-intentional characteristics. Specifically the 2 foot system does not have a 24 GHz beacon receiver, motor control, or servos of the 4 foot system.