

SEP 17 2012

FCC-GBG MAILROOM

**GUIDANCE
MICROWAVE**



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RADASCAN MINI RESPONDER FCC WAIVER REQUEST

1. INTRODUCTION

We have developed a new active Responder to operate with our range of RadaScan Marine position reference sensors operating in the band 9.2GHz to 9.3GHz. The RadaScan sensor links into ship Dynamic Positioning systems and allows the ship to manoeuvre accurately relative to a known Responder position. Typically, the active Responder is located on an Oil Rig and the RadaScan sensor measures range and bearing to the Responder. The Responder can also be used for ship to ship tracking to aid Replenish At Sea operations.

DP systems in safety critical areas (like Oil Rig supply) require a high level of redundancy and therefore a number of independent technology position sensors, typically using GPS and lasers for two of the sensor types. Both of these systems are vulnerable to poor weather conditions and GPS is susceptible to shadowing from large structures, multipath reflections and GPS outages during solar storms; Radar technology is ideal as a reliable, all weather Position Sensor.

We wish to apply for FCC approval for our active Responder; the RadaScan Mini Responder. Details of the Mini Responder can be found in our online inquiry references 418995 and 397862. This Responder does not contain a transmitting source of its own and as such does not generate any Microwave signals. It is designed to receive the Microwave signal from the RadaScan sensor, amplify it, modulate it with a frequency in the range 1MHz to 3MHz and re-transmit the signal back to the sensor with a cross polarized antenna. Essentially, the Responder appears as a flashing corner reflector of less than 13cm in length. The maximum EIRP from the Mini Responder is 13dBm from a limiting output power of 4dBm and a transmit antenna gain of 9dBi. At a range of greater than 1m from the Responder, the field strength transmitted by the Responder is less than that arriving at it. More information on the Mini Responder can be found in CMR-1141, RadaScan Mini Responder Technical Description.

This is very similar to our competitor's product, Radius (FCC ID Q8IKSXRADIUS), which has FCC approval for 80.375(d) in the band 5470-5650MHz. Radius uses a very similar active Responder with similar modulation.

GRANTED

For the reasons stated below

[Signature]



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It is understood that the Responder operates a little like a standard active Radar Responder Enhancer (RTE) as described by ITU-R.M 1176. However, such a device would be of little or no use positioned on a large ship or oil rig since the rig or vessel itself has a significantly larger Radar Cross Section than either a large passive Responder or an active RTE. Hence the need to add modulating signals to allow the Responder to be detected against the background clutter. Similarly, the use of cross polarisation improves the Responder discrimination against background clutter. These features also reduce the visibility of our Responder to standard radars; the cross polarisation will give a minimum of 6dB attenuation, more typically 15dB and the modulation signal will tend to shift the signal outside of the Doppler signal processing (1MHz is equivalent to over 36,000mph). These Responders have been operating in Europe for over 5 years with no reported interference with Radar systems (or any other system for that matter).

We understand our Responder to be a radiodetermination device as covered by 80.375(d) but we wish to use the frequency band of 9200MHz to 9300MHz to avoid interference from standard high power pulse radars operating from 9300MHz to 9500MHz. Therefore we request a waiver of 80.375(d).



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2. PROPOSED TESTING

The following is the proposed testing against the requirements of FCC part 80 for Radiodetermination devices, largely based on the approvals testing performed for the Radius system.

2.1 Class of Emissions

80.207 (d): Radiodetermination 2.4-9.6GHz, Class PON

2.2 Radiated Power

80.215 (n) (3): Maximum of 20W EIRP.

Apply a signal of 9.25GHz with a power density of -8dBW/m^2 (high enough to ensure the maximum power output from the Responder) and measure the mean power radiated by the Responder. This is expected to measure around 20mW EIRP, 30dB below the allowed maximum.

2.3 Emissions Limitations

80.211 (f): 50% to 100% offset $>25\text{dB}$, 100% to 250% offset $>35\text{dB}$ and 250% offset $>43+10\log(\text{mean})\text{ dB}$.

Apply signals of 9.20GHz, 9.25GHz and 9.3GHz with a power density of at least -8dBW/m^2 and measure spurious emissions from 0.4GHz to 40GHz.

2.4 Frequency Tolerance

80.209(c): To be specified in the licence.

The Responder has no transmitting source and so takes the frequency tolerance of the sensor used with it. Apply a signal at 9.25GHz and measure that the retransmitted frequency is the same as that received plus the modulation frequency (1.75MHz to 3MHz).

2.5 Modulation Requirements

80.213(g): Any type of modulation consistent with the bandwidth requirements of 80.209(b).

The modulation bandwidth applied by the Responder is a maximum of 6MHz ($\pm 3\text{MHz}$). Apply a signal of 9.25GHz with a power density of -8dBW/m^2 and measure the retransmitted modulation bandwidth.



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We request a waiver of 80.375(d) for the Mini Responder subject to filing of the complete test report and the usual documentation.

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Regards



Dave Patrick

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