

RF Safety Requirements of WIT2400 module with M/A-Com Dipole, Mobile Mark 12dB omni, and Mobile Mark 14dB corner reflector

We have calculated the minimum safe exposure distance for the three antennas we are requesting certification for when connected to a transmitting WIT2400. Those results are listed below.

OD12-2400PTA Omnidirectional antenna from Mobile Mark

The OD12 has 12 dBi of antenna gain. The maximum transmitted power from a WIT2400 is 100mW. Maximum permitted average MPE is $1\text{mW}/\text{cm}^2$. Working with equation 3 from OET Bulletin 65 and solving for distance, we obtain a minimum safe distance of 11.2cm between personnel and antenna.

SCR14-2400PTA Corner Reflector from Mobile Mark

The SCR14 has 14 dBi of antenna gain. The maximum transmitted power from a WIT2400 is 100mW. Maximum permitted average MPE is $1\text{mW}/\text{cm}^2$. Working again with equation 3 of OET Bulletin 65, we find the minimum safe distance between personnel and antenna to be 14cm.

AND-C-107-1 Dipole from M/A-Com

The AND-C-107-1 dipole has a gain of 2.1dBi. The maximum EIRP of the WIT2400 in conjunction with this dipole (22dBm or 158mW) falls below the unofficial 200mW lower limit mentioned by Kwok Chan in previous telephone conversations (9/8/97) and therefore does not require a warning statement.

The WIT2400 module is currently certified with 4 gain antennas and one dipole. The WIT2400 integration guide already includes a statement identifying possible radiation hazards when employing these gain antennas with the WIT2400. That statement is listed below for your convenience.

Notice to Wit2400 users/installers using the 24dBi parabolic dish, 15dBi Yagi, 11dBi patch, or 9dBi Omni-directional antennas in conjunction with the WIT2400 module. The field strength radiated by any one of these antennas, when connected to a transmitting WIT2400 module, may exceed FCC mandated RF exposure limits. FCC rules require professional installation of these antennas in such a way that the general public will not be closer than 45cm from the radiating aperture of any of these antennas. End users of these systems must also be informed that RF exposure limits may be exceeded if personnel come closer than 45cm to the apertures of any of these antennas.

I propose simply amending the above statement to include the 12dBi omni-directional and the 14dBi corner reflector antenna in the list of gain antennas. The 45cm distance was calculated for a 24dBi parabolic dish for our previous certification. Since this

distance exceeds that calculated for the 12dBi omni and the 14dBi corner reflector, I propose that we continue to use the same 45cm value for the minimum safe distance as shown in the integration guide. The new amended statement will be as follows.

Notice to Wit2400 users/installers using the 24dBi parabolic dish, 15dBi Yagi, 14dBi corner reflector, 12dBi Omni-directional, 11dBi patch, or 9dBi Omni-directional antennas in conjunction with the WIT2400 module. The field strength radiated by any one of these antennas, when connected to a transmitting WIT2400 module, may exceed FCC mandated RF exposure limits. FCC rules require professional installation of these antennas in such a way that the general public will not be closer than 45cm from the radiating aperture of any of these antennas. End users of these systems must also be informed that RF exposure limits may be exceeded if personnel come closer than 45cm to the apertures of any of these antennas.

Question; how do the new antennas comply with Section 15.203?

12dBi omni and 14dBi corner reflector

We propose attaching reverse-sex TNC connectors to the 12dBi omni and the 14dBi corner reflector antennas to ensure 15.203 compliance. Mobile Mark manufactures both of these antennas and will provide them with reverse TNC connectors. The part numbers of the reverse-sex TNC modified antennas are as follows.

Mobile Mark 12dBi omni-directional	OD12-2400PTA-RTNC
Mobile Mark 14dBi corner reflector	SCR14-2400PTA-RTNC

We will use the same system for antenna procurement as the one outlined in our current certification. Any customer with a WIT2400 module and desiring to use one of these antennas will first contact Digital Wireless. We will provide them with the part number of one of these modified antennas. The customer can either purchase these antennas from Mobile Mark or Digital Wireless.

The customer then purchases an adapter cable from Digital Wireless that connects the MMCX port on our module to the reverse-sex connector of the antenna. No other type of commercially available antenna will attach to this reverse-sex TNC. Given the nonstandard nature of the interconnect between the module and these two antennas and the difficulty involved in circumventing that connection, we believe that this procedure meets the requirements called out in 15.203.

M/A-Com Dipole

We are requesting certification of our module with this particular antenna at the request of a specific customer – Leica Surveying Group. Leica does not want to use our currently certified dipole for their application and have requested us to obtain certification of our module with the M/A-Com device. They also desire to use a standard SMA connector for this antenna as the procurement of adapter cables between the antenna and module is more difficult when nonstandard connectors are involved.

As the name implies, Leica Surveying Group produces surveying systems for the civil engineering industry. The WIT2400 module and M/A-Com antenna comprise one end of a communications link for a remotely operated surveying system. The module and antenna are located inside a weatherproof enclosure and are not accessible to the end user of the equipment. Forced access by the user to change out the antenna attached to the module will result in damage to the surveying instrument and voiding of the warranty.

Professional surveying crews will only operate this system. The cost of this instrument is too expensive for the average individual to purchase and too complicated to operate for any but the intended user. Since these surveying instruments will be manufactured by Leica and sold directly to end users (surveying companies, civil engineering companies,

etc.) we feel that there is sufficient control in the process to invoke the professional installation clause of 15.203.

From a technical standpoint, there is also no good rationale for anyone trying to clandestinely change out the M/A-Com antenna to a different one in order to obtain longer range for the system. In the field, only a few hundred feet separates surveying instruments since they require visual line of sight while making measurements. The WIT2400 in combination with the M/A-Com dipole has more than enough range to cover any practical line-of-sight condition. This situation obviates the need to forcibly break into the instrument and change out the antenna to a higher gain unit.

In addition, since we have spent the money to test this antenna with our module, Digital Wireless would also like to reserve the right to qualify this antenna for use with our module to our other customers. Since we cannot ensure that the end use of this antenna/module combination would meet the professional installation requirements, we propose using lock-tight to attach the M/A-Com antenna to our adapter cables when selling this antenna to any customer other than Leica Surveying Group.