

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the matter of )  
Proceq USA Inc. )  
Request for Waiver of Part 15 of the )  
Commission's Rules Applicable to Ultra- )  
Wideband Devices )

**ORDER**

**Adopted: March 14, 2018**

**Released: March 14, 2018**

By the Chief, Office of Engineering and Technology:

1. By this Order, we grant a request by Proceq USA Inc. (Proceq), for a waiver of our rules governing unlicensed ultra-wideband (UWB) devices to permit the certification and marketing of its ground penetrating radar (GPR) device.<sup>1</sup> Proceq is a manufacturer of devices that enable the non-destructive testing of materials such as concrete, metals, rock and composites. We find that this device operating under the specified waiver conditions poses no greater risk of causing harmful interference to communication services than those devices already permitted under the existing rules and that grant of the waiver will serve the public interest.

2. In 2002, the Commission adopted regulations to permit the operation of UWB transmitters, including GPR systems.<sup>2</sup> These transmitters operate using spectrum that is allocated to various radio services, including frequency bands that are allocated to both Federal and to non-Federal operations.<sup>3</sup> They also operate in several restricted frequency bands within which the operation of other types of Part 15 transmitters are prohibited.<sup>4</sup> As with all unlicensed devices, these UWB devices share these frequency bands with authorized radio services on a sufferance basis and may not cause harmful interference to authorized radio services.<sup>5</sup> Our specific UWB technical and operational rules are designed to ensure that UWB GPR devices do not cause harmful interference to authorized radio services, including Federal services. We note that Section 15.509(b) limits the operation of GPR devices to systems operated for purposes associated with law enforcement, fire fighting, emergency rescue, scientific

<sup>1</sup> Petition of Proceq USA Inc. for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices (filed September 11, 2017 (Proceq Waiver Request)). *See also* Amendment to Request for Waiver (filed February 27, 2018). *See also* 47 C.F.R. §§ 15.503(d), 15.521(d).

<sup>2</sup> *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, First Report and Order, 17 FCC Rcd 7435 (2002) (1<sup>st</sup> R&O); *See also* Erratum, 17 FCC Rcd 10505 (2002); Memorandum Opinion and Order and Further Notice of Proposed Rule Making, 18 FCC Rcd 3857 (2003); Second Report and Order and Second Memorandum Opinion and Order, 19 FCC Rcd 24525 (2004) (2<sup>nd</sup> R&O). The UWB rules are codified at 47 C.F.R. §§ 15.501-15.525.

<sup>3</sup> The operation of Federal radio stations is regulated by the National Telecommunications and Information Administration (NTIA), while operation of stations by non-Federal entities (i.e. commercial enterprises, state and local governments, and the general public) is regulated by the Commission.

<sup>4</sup> 47 C.F.R. § 15.205.

<sup>5</sup> 47 C.F.R. § 15.5.

research, commercial mining, or construction.<sup>6</sup>

3. On September 11, 2017, Proceq filed a waiver request to allow the marketing and operation of a fast-stepping continuous-wave ground penetrating radar device that is claimed to provide increased performance in determining the safety and stability of materials. Proceq states that its GPR device implements an algorithm that is based on stepped frequency continuous-wave (CW) modulation to suppress RF interference from Wi-Fi and GSM sources that it asserts can often impede the performance of conventional GPR devices.<sup>7</sup> To accommodate this system design, Proceq seeks a waiver of our rules pertaining to the definition and measurement procedure.

4. We are authorized to grant a waiver under Section 1.3 of the Commission's rules if the petitioner demonstrates good cause for such action.<sup>8</sup> Good cause, in turn, may be found and a waiver granted “where particular facts would make strict compliance inconsistent with the public interest.”<sup>9</sup> To make this public interest determination, the waiver cannot undermine the purpose of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.<sup>10</sup> We find that this standard has been met.

5. Section 15.503(d) of the Commission’s rules defines a UWB transmitter as a device that “at any point in time” has an UWB bandwidth equal to or greater than 500 megahertz or a fractional bandwidth equal to or greater than 0.20. The Proceq device steps a narrow signal through the 200 to 4000 MHz range. Each of these individual transmissions is less than 500 megahertz in bandwidth “at any point in time” and Proceq’s device does not have a 0.20 or greater fractional bandwidth. Thus, even though the device has a total bandwidth that exceeds 500 megahertz, it would not meet the definitional requirement for operation under the UWB rules.<sup>11</sup>

6. The UWB imaging rules were designed to accommodate devices that emit impulsive or transient-like signals that are spread across a very wide bandwidth to produce an image of objects within the ground or other materials.<sup>12</sup> The primary difference between the Proceq device and other UWB GPR devices provided for in the rules is that the Proceq GPR device uses stepped frequency CW modulation—*i.e.*, an array of closely spaced transmitting/receiving antennas that transmit sequentially over a large band of spectrum—to gather all the needed data. This modulation scheme is functionally equivalent to other types of UWB GPR devices in that it uses transient-like signals spread across a wide bandwidth. The risk of interference from the Proceq GPR device in this scenario is no greater than that from other such UWB

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<sup>6</sup> 47 C.F.R. § 15.509(b)

<sup>7</sup> See Proceq Waiver request at 2. Among other things, Proceq claims that its device provides better power density control across the entire GPR bandwidth, simplified electronics in terms of pulse generation and sampling, optimal power consumption, and includes general efficiencies in design and use.

<sup>8</sup> 47 C.F.R. § 1.3. See also *ICO Global Communications (Holdings) Limited v. FCC*, 428 F.3d 264 (D.C. Cir. 2005); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

<sup>9</sup> *Northeast Cellular*, 897 F.2d at 1166; see also *ICO Global Communications*, 428 F.3d at 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59.

<sup>10</sup> See, e.g., *WAIT Radio*, 418 F.2d at 1157 (stating that even though the overall objectives of a general rule have been adjudged to be in the public interest, it is possible that application of the rule to a specific case may not serve the public interest if an applicant's proposal does not undermine the public interest policy served by the rule); *Northeast Cellular*, 897 F.2d at 1166 (stating that in granting a waiver, an agency must explain why deviation from the general rule better serves the public interest than would strict adherence to the rule).

<sup>11</sup> Stepped and swept frequency devices like Proceq’s have a difficult time complying with our rules because the large bandwidth is achieved by stepping or sweeping a narrow signal through the broader frequency range, and therefore won’t be instantaneously wide enough to meet the rules’ specific requirements.

<sup>12</sup> See 1<sup>st</sup> R&O, 17 FCC Rcd at 7437-7440, 7450, 7476 and 7494.

GPR devices. Accordingly, we find that a waiver will not undermine the intent of our rule.

7. Section 15.31(c) of the Commission's rules, sets forth the measurement standards for unlicensed devices to demonstrate compliance with applicable emissions limits. This rule requires that swept frequency equipment measurements shall be made with the frequency sweep stopped. Section 15.521(d) of the Commission's rules, 47 C.F.R. § 15.521(d), sets forth the measurement procedures for UWB devices to demonstrate compliance with applicable emissions limits. For emissions above 960 MHz, this rule requires that, if pulse gating is used and the transmitter is quiescent for longer intervals than the nominal pulse repetition interval, measurements are made with the pulse train gated on. Proceq observes that, since this rule was adopted, the Commission has permitted other UWB transmitters operating above 960 MHz that use frequency stepping techniques to be measured using an average detector with the transmitter operating in its normal mode, *i.e.*, with the stepping function active, and asserts that there is no reason to require it to conduct measurements with the stepping function stopped.<sup>13</sup> Proceq claims that its GPR device will meet all other emission limits and technical requirements under the UWB rules when measured with the stepping function active.

8. Prior waivers of the measurement procedures for UWB transmitters that permitted emissions to be measured with the transmitter operating in its normal transmission mode recognized that the interference aspects of a transmitter employing frequency hopping, frequency stepping, or gating are quite similar, as viewed by a receiver, in that transmitters using these burst formats appear to the receiver to emit for a short period of time followed by a quiet period.<sup>14</sup> The Commission concluded that any requirement to stop the frequency hopping, band sequencing, or system gating serves only to add another unnecessary level of conservatism to already stringent UWB standards.<sup>15</sup> In conjunction with the National Telecommunications and Information Administration (NTIA), we have further determined that allowing stepped frequency devices to be measured with the stepping function on would not increase the interference potential of the device above that of impulse UWB devices if all other emission limits and technical requirements are met.<sup>16</sup>

9. Proceq's request represents an analogous situation. Because a waiver of the measurement procedures in Sections 15.31(c) and 15.521(d) will not increase the potential for harmful interference to authorized services, permitting Proceq to demonstrate compliance with the UWB GPR emission limits with the stepping function active will not undermine the purpose of the rule.<sup>17</sup> To ensure that the Proceq GPR device does not emit in any individual 10 MHz, 20 MHz, or 40 MHz narrow band continuously, we are conditioning this waiver so that the dwell time during any step shall not exceed 0.04 percent of the device's minimum scan/cycle rate.<sup>18</sup> In sum, we find that Proceq's GPR device operating under the conditions specified below poses no greater risk of causing harmful interference to radio communications services than any other UWB imaging system operating under our rules.

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<sup>13</sup> See Proceq Waiver Request at 9-10 (citing *Petition for Waiver of the Part 15 UWB Regulations Filed by the Multi-band OFDM Alliance Special Interest Group*, ET Docket No. 04-352, Order, 20 FCC Rcd 5528 (2005) (MBOA-SIG Waiver), as well as *Curtiss-Wright Controls Inc. Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 10-167, Order, 27 FCC Rcd 234, (OET 2012) (CWCI Waiver) and *Kyma Medical Technologies Ltd., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 15-119, Order, 31 FCC Rcd 9705 (OET 2016) (Kyma Waiver)).

<sup>14</sup> See, *e.g.*, MBOA-SIG Waiver, 20 FCC Rcd at 5535.

<sup>15</sup> *Id.*, 20 FCC Rcd at 5534.

<sup>16</sup> See CWCI Waiver, 27 FCC Rcd at 242. See also, MBOA-SIG Waiver, 20 FCC Rcd at 5531-5536.

<sup>17</sup> Our reliance on the MBOA-SIG Waiver and the CWCI Waiver decision in this instance is only relative to the measurement procedure in Section 15.521(d).

<sup>18</sup> Additional constraints beyond those already designed into the system do not appear to be warranted. Proceq provides the dwell time for its GPR on any one frequency as 2 microseconds. See Proceq Waiver Request at 12.

10. We also find that granting a waiver is in the public interest. GPRs have a wide variety of applications for locating objects under ground. Providing for a variety of GPR technologies will increase competition, enabling potential users to have more choices to obtain the products that best meet their needs.

11. Our waiver is limited to the Proceq GPR device and its use as described in the waiver request and applies to: 1) The “at any point in time” requirement of Section 15.503(d) which would require the Proceq transmitter to have a fractional bandwidth equal to or greater than 0.20 or UWB bandwidth equal to or greater than 500 MHz; and 2) the requirements in Sections 15.31(c) and 15.521(d) which directs that the emissions from the Proceq GPR device to be measured with the transmitter operating with the stepping function stopped. The waiver is also subject to the following conditions:

- The Proceq GPR device shall be certified by the Commission.<sup>19</sup>
- The Proceq GPR device shall operate with stepped frequency CW modulation in 10, 20 or 40 megahertz steps between 200 and 4000 MHz.
- The Proceq GPR device dwell time on any one frequency shall not exceed 2 microseconds.
- The dwell time during any step of the Proceq GPR shall not exceed 0.04 percent of the devices minimum scan/cycle rate.
- For certification testing, the measurement of emissions from the Proceq GPR device shall be conducted with the stepping function active for all possible frequency step sizes.
- The Proceq GPR device will comply with all other technical and operational requirements applicable to UWB GPR devices under Part 15, Subpart F of the Commission’s rules.
- The entities permitted to operate the Proceq GPR device are limited to those specified in Section 15.509(b) of the Commission’s rules.
- The conditions established for this waiver are not applicable to mass marketed UWB GPR devices where further analysis would be necessary to assess the potential impact to authorized users.

12. Accordingly, pursuant to authority in Sections 0.31, 0.241, and 1.3 of the Commission’s rules, 47 C.F.R. §§ 0.21, 0.241, and 1.3, and Sections 4(i), 302, 303(e), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 302, 303(e), and 303(r), IT IS ORDERED that the Request for Waiver filed by Proceq USA Inc., IS GRANTED, consistent with the terms of this Order. This action is effective upon release of this Order.

FEDERAL COMMUNICATIONS COMMISSION

Julius P. Knapp  
Chief, Office of Engineering and Technology

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<sup>19</sup> The filing for certification should include a copy of this waiver order.