

impulse **RADAR**

User's Manual Raptor®45-Tx



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Introduction

The Raptor®45-Tx is an Ultra-Wide-Band transmitter intended to be used together with the Raptor®45-Rx receiver for normal GPR-applications and, especially, for applications needing variable Rx-Tx distances.

The nominal center frequency of this unit is 450MHz.

Regulatory information

General

In Europe, GPR-instruments are operated under the ETSI-standards and emission limits, in the US the FCC-limits apply and in Canada the IC-limits apply. The Raptor®45-Tx meets all requirements for each of these markets, although we have only certified it for the EC, FCC-certification is pending at the time of this writing.

Common to all these regulations are that GPR-equipment should be used only by professionals and while attending to strict rules for operation, including:

- 1) The UWB-transmitters should always be used in as proximity to ground, or the material under investigation.
- 2) When not in use, the data collection should be stopped, and the units switched off.
- 3) The transmitters should not be directed upwards, only towards the investigation body.

Receivers from ImpulseRadar are passive digital devices, requiring no certifications (FCC part 15.103c).

Information to users in the US

Operation of this device is restricted to law enforcement, fire and rescue officials, scientific research institutes, commercial mining companies and construction companies. Operation by any other party is a violation of 47U.S.C.301 and could subject the operator to Serious legal penalties.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- 1) This device may not cause harmful Interferences and
- 2) This device must accept any interference Received. Including interference that may cause undesired operation

Connectors

The unit has 3 external connectors:

- 1) Power, 12V, 0.4A
- 2) Trig input 1, coaxial TTL-levels
- 3) Trig input 2, coaxial TTL-levels

Both trig inputs require some drive capabilities on the trig-unit end, by using receivers from ImpulseRadar, proper drive current is guaranteed. If other trig devices are used, please refer to further information under the Operations section. Note that both trig inputs are identical, active high-signals on both will cause the unit to output an impulse of electromagnetic energy, however, trigs must always be separated by at least 3.2us, stipulated by the maximum trig-rate.

Operation

Single-receiver

The unit is protected against water, however, it's not water-proof, for this reason it should be protected from direct exposure to rain.

When operated together with a Raptor®45-Rx receiver, proper operation is always guaranteed. If the unit, for some reason, is connected to a function generator or other device capable of delivering trig-signals, means of ensuring that the nominal trig-rate is not exceeded must be taken. The unit is designed, and certified, for operation at 312.5kHz trig-rate, maximum. Higher trig-rates are likely to permanently damage internal circuitry, and will in any case not give higher output power, since the internal circuitry will not have time to charge between every trig event.

In normal operation, the unit is connected to power, 12V 0.4A, and one of the coaxial inputs are connected to the trig output of the Raptor®-45 receiver, see figure 1 below.

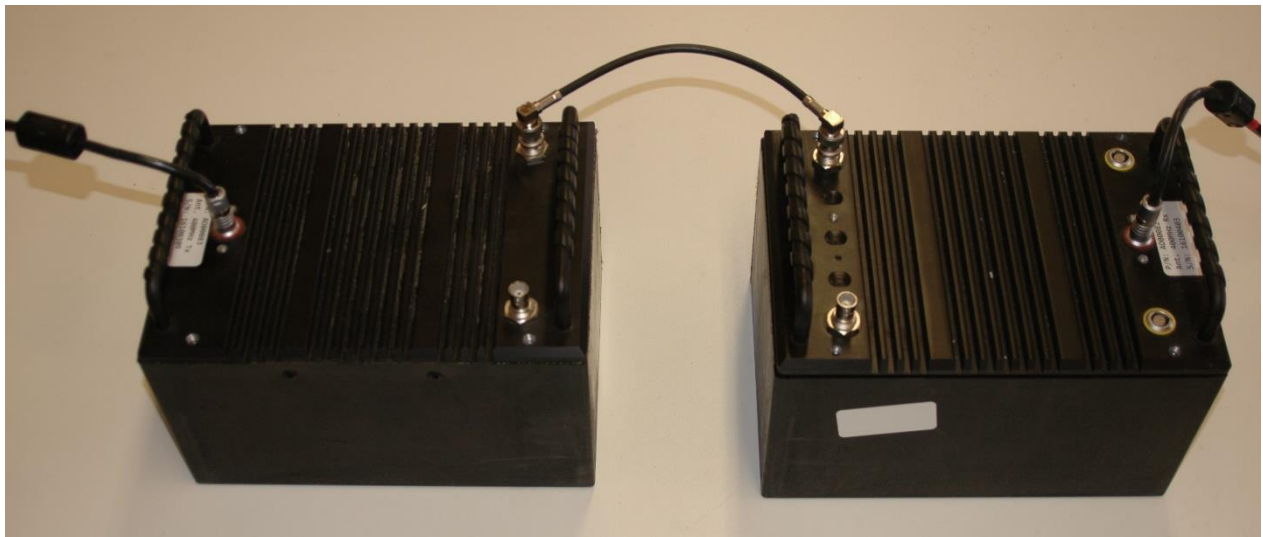


Figure 1, A Raptor®45-Tx connected to a receiver.

The coaxial cable connecting the unit to the receiver can be of any length, however, we have only tested up to 10m, so far. Also, not that by using different length of trig cables the first arrival in the radargram will move, downwards if longer cable is used, and upwards if shorter cables are used.

Normal survey

During normal surveying the combined package of receiver and transmitter is moved over the area of investigation while the receiver controls data collection by means of an attached odometer wheel. Time-controlled data collection including time stamping with GPS-time may also be used as well as manual triggering.

Other survey methods include applications where only one of the units are moved, so called warr-surveys. The primary purpose of these surveys is to gather information about material properties, such as moisture content.

Another type of survey would be tomographic measurements, in which the transmitter and receiver are placed on adjacent sides of the body under investigation. This application, as well as some others described above, are highly specialized and are usually conducted by scientist only.

Shared operation

By using a second receiver and connect one of its trig outputs to the free trig input of the transmitter, two receivers may share the same transmitter. For this to work, the two receivers must be interconnected with a special cable, so that they do not trig the transmitter avertedly. Also, the receivers must now be connected to the PC by means of an Ethernet switch, in order to gather data from both simultaneously.

Note that shared operation can only be done with receivers from ImpulseRadar, as otherwise, the trig-rate and separation in time of the trig signals may not be guaranteed.

Service & Support

Service and repair as well as applicatin support may be obtained from our head office in Sweden. Please contact us at:

support@impulseradar.se

Or call: +46 953 100 08

ImpulseRadar Sweden AB
Storgatan 78
SE-930 70 Malå
Sweden

Specifications

Raptor®45-Tx specifications

Weight:	2.1[kg]
Size:	23x16.5x16[cm]
Power:	0.4A@12V
Temperature range:	-20 - +60 degC
Center frequency:	450MHz
Compatibility:	Raptor®45-Rx receivers