

ET 10-253

**COPY**

POCKET FILE COPY ORIGINAL

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

In the Matter of )  
 )  
**ROBERT BOSCH, GmbH** )  
 )  
Request for Waiver of Section 15.510(b) of the )  
Commission's Rules to Permit the Marketing, )  
Sale and Operation of Ultra-Wideband )  
Through-Wall Imaging Device )

FILED/ACCEPTED

NOV 15 2010

Federal Communications Commission  
Office of the Secretary

To: The Chief, Office of Engineering and Technology  
Via: Office of the Secretary

**REQUEST FOR WAIVER**

Robert Bosch, GmbH (Bosch), by and through counsel and pursuant to Sections 1.3 and 1.925 of the Commission's Rules (47 C.F.R. §§ 1.3 and 1.925), hereby respectfully requests that the Commission waive Section 15.510(b) [47 C.F.R. §15.510(b)] and/or Section 15.503(h) or (i) [47 C.F.R. §15.503(h) or (i)] of the Commission's Rules governing the operation of Ultra-Wideband (UWB) devices, so as to permit Bosch to market and sell in the United States, and for its customers to operate, a UWB wall imaging device for use by skilled professional workers in the building and construction trades, by building inspection professionals and by structural engineers. The issues sought to be addressed by this waiver request are: (1) the definition of a UWB wall imaging system; and/or (2) the eligibility limitations applicable to the use of through-wall imaging UWB devices. The Bosch product is a tool for skilled professional deployment in the construction trade, for detection of ferrous and non-ferrous metals, electric cables, wooden beams, plastic pipes, and structural flaws within construction materials. The device is presently in use in Europe, Canada, and Asia. In the interest of the public in

deploying this new and useful technology in the United States,<sup>1</sup> (which will have no predicted adverse effect on licensed or unlicensed terrestrial telecommunications systems and facilities), and in support of the instant waiver request, Bosch states as follows:

### I. Introduction

1. Bosch is a multinational corporation which manufactures, among many other products, high-quality tools and products for skilled workers to deploy in the construction and building trades, in a wide variety of commercial and industrial applications. Bosch has developed a device called the *Wallscanner D-TECT 150 Professional*, which is a UWB radar scanner system for detection, accurate to the millimeter, of ferrous and non-ferrous metals, electrical cables, wooden beams and plastic pipes such as floor and heating pipes within various types of building materials.<sup>2</sup> This device is approved for use, and is marketed, sold and deployed in Canada, Asia and Europe and meets *all technical requirements of the Commission's Part 15 rules applicable to UWB devices* (as well as all applicable CEPT ECC requirements). The product is not accurately described as a "wall-imaging system" *as that term is defined in Section 15.503(h) of the Commission's Rules*, though its function is entirely consistent with and is limited to the purposes of a

---

<sup>1</sup> It is respectfully requested that the Commission expedite its review and processing of this Waiver request. Bosch first presented this issue to the Office of Engineering and Technology in June of this year. Bosch was advised at that time to not submit a waiver request, but instead to submit a letter requesting an interpretation of the rules to accommodate the marketing and sale of this product. After careful consideration of the matter by the Commission's staff, Bosch was advised in early November that it would in fact be necessary to submit the instant waiver request. While Bosch is grateful for the OET staff's review and attention to the issue, the delay in resolving the concerns, and the Commission's historical, methodical analysis of UWB issues has caused significant delay in Bosch's ability to market this device in the United States, and for users to have the benefit of it. It is approved for marketing, sale and use in Canada, Europe and Asia, but not in the United States. The device has substantial public safety applications, including use by building inspectors and structural engineers to determine the structural integrity and safety of bridges, tunnel walls, and other aging American infrastructure. Therefore, it is of substantial urgency to permit the use of this innovative and effective device in the United States without further delay.

<sup>2</sup> The device is also marketed by HILTI Corporation. The HILTI device is identical to the Bosch *Wallscanner D-TECT 150 Professional* with the exception of the external housing. Bosch requests that the waiver granted for the *Wallscanner D-TECT 150 Professional* apply as well to different versions of the same device, provided that they meet the requirements for Class I or Class II permissive changes.

wall imaging system.<sup>3</sup> It is a device which, as specified in that rule section, is a field disturbance sensor that is “designed to detect the location of objects contained in a wall or other structure.” However, it is not *necessarily* the case that the wall or other structure being scanned by the Bosch device will in all cases be dense enough and thick enough to absorb *the entirety* of the radio signal transmitted by the imaging system. As that rule section specifically disclaims the inclusion of “stud locator” type devices which are designed to locate objects within gypsum, plaster, or other walls which are not necessarily capable of absorbing the entire transmitted UWB signal, the definition of “wall imaging systems” does not apply to the Bosch device.<sup>4</sup> Furthermore, the Bosch device includes as one of its operating modes a “stud locator” function. Therefore, it specifically cannot, without a waiver, be certified as a UWB wall imaging system.

2. Instead, the Bosch *Wallscanner D-tect 150 Professional* is most easily classified for *United States regulatory purposes* as a “through-wall imaging system” as such devices are defined in Section 15.503(i) of the Rules. Indeed, that definition specifically *includes* “stud locator” type devices. However, that category of devices was never intended to apply to wall imaging systems that examine properties or materials within walls. Rather, through-wall imaging systems were clearly intended to apply to a

---

<sup>3</sup> The reason for this is that Section 15.503(h) defines a “wall imaging system” in terms of the wall measured. This is a very awkward means of defining an RF product, because, using that metric, a device can be certified, manufactured, imported, marketed, sold and used for one purpose but not for another, and the differences between permissible and impermissible applications are subjective. Section 15.503(h) states that a wall imaging system is a field disturbance sensor that is designed to detect the location of objects within a wall, or to determine the physical properties within a wall. The term “wall” in this context is a concrete structure, the side of a mine or bridge or other physical structure that is dense or thick enough to absorb “the majority” (sic) of the signal transmitted by the imaging system. However, the rule specifically excludes “stud locator” devices that are designed to locate objects behind gypsum, plaster or similar walls that are not capable of absorbing the transmitted signal.

<sup>4</sup> This is an anomaly, because the definition of “wall imaging devices” in the rules clearly should *include* devices which function as does Bosch’s *Wallscanner D-tect 150 Professional*. The rules applicable to UWB wall imaging systems include among authorized users those associated with law enforcement, fire fighting, emergency rescue, scientific research, commercial mining, or construction. See, Section 15.509(b).

very different type of product, such as field disturbance sensors that are designed and intended to detect the movement of persons or objects that are located on the *other side* of an opaque structure such as a wall or ceiling. Yet, the Commission specifically *included* “stud locator” systems in the definition of through-wall devices in Section 15.503(i). Stud locator systems are most likely to be utilized by professionals in the building and construction trades. Ironically, however, the rule governing eligibility to use UWB “through-wall imaging systems,” Section 15.510(b) of the Commission’s Rules, restricts users of those devices to law enforcement, emergency rescue or firefighting organizations that are under the authority of a local or state government, and *excludes* the construction trade.<sup>5</sup> While these first responders most certainly have important uses for UWB *through-wall* imaging systems, the fact that the definition includes devices such as Bosch’s *Wallscanner D-tect 150 Professional* device, which is specifically intended for professionals in the construction trade and which has a great deal of utility in such a capacity excludes the universe of potential users of the device, and thus precludes the marketing of the device as a through-wall scanner.<sup>6</sup> It is therefore not subject to a grant of equipment authorization in either regulatory category and a waiver is therefore required.

3. The *Wallscanner D-tect 150 Professional* is in no wise a consumer device. Its retail cost and function are such that it will *not* be considered a consumer tool. It is intended for, is marketed to, and is deployed in Asia, Europe and elsewhere in the world

---

<sup>5</sup> Presently, Section 15.510(b) of the Rules limits the operation of UWB through-wall imaging devices to Part 90 eligibles that are “law enforcement, emergency rescue or firefighting organizations that are under the authority of a local or state government.”

<sup>6</sup> To the extent that the definitional and eligibility exclusion of UWB wall imaging devices which incorporate “stud locator” functions signals an intention on the Commission’s part to simply disallow such devices, the rules should be re-examined. Devices should be excluded, if at all, on the basis of interference potential, not on definitional grounds. There is nothing in the Commission’s UWB orders that candidly states any intention to disallow all UWB stud locator devices, but the rules effectively do so.

by professionals in the building and construction trades, and by building inspectors and structural engineers.

4. Because the purpose of the rule (i.e. to prevent interference from UWB devices *ex ante* to licensed terrestrial RF users by limiting deployment of through-wall devices to those having a need for an imaging system to penetrate walls to search for objects) would not be frustrated by grant of the waiver, and because the product developed by Bosch stands to substantially enhance, expedite and improve construction, inspection, and maintenance of buildings and transportation infrastructure in the United States, it is urged that the waiver be granted as delineated herein without delay.

## II. Waiver Standards

5. The Commission may waive a rule for good cause shown. 47 C.F.R. § 1.3. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. *Northeast Cellular*, 897 F. 2d 1164, 1166 (D.C. Cir. 1990). Generally, the Commission may grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest. *WAIT Radio v. FCC*, 418 F2d 1153, (DC Cir 1969); *Dominion Video Satellite, Inc., Order and Authorization*, 14 FCC Rcd 8182 (Int'l Bur. 1999). In *WAIT Radio*, it was held that even if 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. 418 F. 2d at 1157. In discussing the treatment of requests for waivers of established rules, the court in *WAIT Radio* emphasized that the

agency's discretion in applying general rules is intimately linked to the existence of "a safety valve procedure" to permit consideration of an application for exemption based on special circumstances. *Id.* Indeed, the court considered a rule most likely to be undercut if it does not take into account "consideration of hardship, equity, or more effective implementation of overall policy..." *Id.* at 1159.<sup>7</sup> The Commission's waiver authority, per Section 1.925 of the Commission's Rules, 47 C.F.R. § 1.925, allows the Commission to grant a waiver if it is shown that (a) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and grant of the requested waiver would be in the public interest; or (b) if there are unique or unusual factual circumstances in a specific case where application of the rule would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative. In this case, the latter rationale is specifically applicable to the Bosch *Wallscanner D-tect 150 Professional* product and its HILTI counterpart. The Commission has in this case created two regulatory classes of UWB wall scanning devices, one of which excludes the Bosch device by definition, and the other precludes the use of the device by eligibility. Whether or not this was done intentionally to preclude the use of UWB wall scanning devices with the functions of the *Wallscanner D-tect 150 Professional*, this device can and should be authorized in the public interest, and it can be done without risk of interference to licensed radio services.

---

<sup>7</sup> The Commission, when it adopted its UWB rules, shortly thereafter issued an Order, 17 FCC Rcd. 13522 (2002) grandfathering the operation of certain UWB wall imaging devices. In so doing, the Commission stated that it was "clear that several public safety benefits result from the continued operation of existing.. wall imaging systems currently in use. It is equally clear that existing devices may not comply with the UWB regulations that were adopted in the Order. Further, we are not aware of any reports of harmful interference resulting from the long-term use of ... wall imaging systems in the past. Accordingly, we believe that permitting the continued operation of these devices is precisely the type of special circumstance for which the "safety valve procedure" cited by the courts should be applied.

### III. The Ultra-Wideband Rules

6. The Commission relatively recently adopted rules governing various types of UWB devices. In its *First Report and Order*, FCC 02-48, 17 FCC Rcd. 7435 (2002), the Commission, proceeding “cautiously,” established what it referred to as a potentially “overprotective” regulatory scheme for the nascent UWB technology, which nonetheless was found to offer “significant benefits” for public safety, businesses and consumers:

UWB technology holds great promise for a vast array of new applications that we believe will provide significant benefits for public safety, businesses and consumers. With appropriate technical standards, UWB devices can operate using spectrum occupied by existing radio services without causing interference, thereby permitting scarce spectrum resources to be used more efficiently. This First Report and Order (“Order”) includes standards designed to ensure that existing and planned radio services, particularly safety services, are adequately protected. We are proceeding cautiously in authorizing UWB technology, based in large measure on standards that the National Telecommunications and Information Administration (“NTIA”) found to be necessary to protect against interference to vital federal government operations. These UWB standards will apply to UWB devices operating in shared or in non-government frequency bands, including UWB devices operated by U.S. Government agencies in such bands. We are concerned, however, that the standards we are adopting may be overprotective and could unnecessarily constrain the development of UWB technology. Accordingly, within the next six to twelve months we intend to review the standards for UWB devices and issue a further rule making to explore more flexible technical standards and to address the operation of additional types of UWB operations and technology.

*(First Report and Order, 17 FCC Rcd. at 7435)*

7. The reason that the Commission proceeded so cautiously in authorizing this new technology was that the docket proceeding was contentious, and the commenting parties were not able to agree on emission levels necessary to protect various radio systems from harmful interference. The Commission therefore was emphatic that the standards contained in the *First Report and Order* were “extremely conservative” and

that they may change in the future as the Commission continued to collect data regarding UWB operations. *Id.*, at 7436.

8. Among the UWB systems authorized by the rule were Imaging Systems, Ground Penetrating Radar Systems, Wall Imaging Systems, Through-wall Imaging Systems, Surveillance Systems, Medical Systems, Vehicular Radar Systems, and Communications and Measurement Systems. Of these categories, the Bosch *Wallscanner D-tect 150 Professional* would likely be classified as a Through-wall Imaging device. One might expect, given its purpose and function,<sup>8</sup> that it would fall within the Wall Imaging Systems category. The Commission, however, established specific regulations for Wall Imaging Systems as follows:

Wall imaging systems must be operated below 960 MHz or in the frequency band 3.1-10.6 GHz. Wall-imaging systems are designed to detect the location of objects contained within a “wall,” such as a concrete structure, the side of a bridge, or the wall of a mine. Operation is restricted to law enforcement, fire and rescue organizations, to scientific research institutions, to commercial mining companies, and to construction companies.

The Bosch device meets these conditions and is designed to provide the functions that are enumerated in the above quote from the UWB First Report and Order, and it would operate well below the maximum radiated emission level established by the Commission, which is an EIRP of -43.1 dBm in the band 3,100-10,600 MHz.<sup>9</sup> However, though its intended purpose is to facilitate construction, determine building safety and the integrity of infrastructure such as bridges and overpasses, and to detect certain types of materials

---

<sup>8</sup> See Exhibit A attached, which comprises excerpts from the operators' manual for the device.

<sup>9</sup> The device is permitted to operate in, *inter alia*, Europe, where the emissions are restricted to an RMS average limit of -50 dBm/MHz EIRP—a much more stringent limit than in the United States. Attached hereto as Exhibit B is a graph comparing the regulations for UWB wall scanning devices and those required by CEPT ECC Decision ECC/DEC/(07)01, amended June 26, 2009. This ECC Decision addresses specific material sensing devices using UWB technology. The Bosch device was developed with reference as well to ETSI EN 302 435-1 V1.3.1 (2009-2012). This includes technical characteristics for short range equipment using UWB technology. It addresses Building Material Analysis and classification of equipment operating in the band 2.2 to 8.5 GHz.

in walls, it would not be accurate to claim that the walls that are scanned with the device will at all times be those which are thick or dense enough to absorb all of the radiated radiofrequency energy from the device. The devices are capable of, for example, detecting rebar or water pockets (indicating flaws) in concrete up to 15 cm deep. As such, the device is properly classified under the Commission's definitions as a Through-wall Imaging device. While the Bosch *Wallscanner D-tect 150 Professional* does include as one of its operating modes a stud finding type device, and while, on information and belief, one of the Commission's intentions in creating the definitional and operational distinctions between wall imaging devices and thorough-wall imaging devices was to exclude stud finding type devices, the Bosch *Wallscanner D-tect 150 Professional* is not simply a stud finding device, and it is quite distinct from those in several respects. First, its capabilities greatly exceed those of a mere stud finding device. Second, stud finding devices are in essence consumer tools and would be expected to proliferate. The *Wallscanner D-tect 150 Professional* is, as mentioned above, in no wise a consumer device. Rather, it would be used and useful only to those engaged professionally in building and construction and by building inspectors and professional structural engineers.

9. In the *Memorandum Opinion and Order and Further Notice of Proposed Rule Making*, FCC 03-33, released March 12, 2003 in the UWB Docket (the *MO&O/FNPRM*), the Commission liberalized the frequency limits and emission levels applicable to through-wall imaging systems.<sup>10</sup> In so doing, the Commission noted the very small chance of any actual interference from such devices:

---

<sup>10</sup> No changes were made to the type of UWB devices permitted to operate under the regulations or the authorized operators of the devices. The frequency bands within which UWB devices are constrained to

We agree with the request from Time Domain to permit through-wall imaging systems to operate at a lower frequency and a subsequently higher emission level. We believe that the potential for using UWB devices to save the lives of firefighters, emergency rescue personnel and law enforcement officers and to assist those parties in saving the lives of the public clearly outweighs the relatively low risk that these devices, even operating under the worst possible scenarios, may cause interference to GPS receivers located a few meters away. We concur that the imaging system envisioned by Time Domain should be allowed to be implemented under our regulations. We also believe that any potential increase in harmful interference would be minimal, occurring only within a few meters of the UWB device... Further, due to the extremely close range at which interference could occur it is highly likely that any radio systems receiving interference would be under the direct control of the licensed public safety personnel operating the UWB equipment. This would permit the UWB operator to determine, based on the conditions unique to each emergency situation, the specific radio equipment that is most viable to protect the lives of both the public and the emergency personnel involved and to manage the operation of that equipment. As these same public safety operators also employ GPS and other communications systems, they will be aware of any possible interactions between these systems and are in the best position to determine if the UWB system should be employed. While we are continuing to follow a conservative approach in the implementation of standards for UWB operations, we believe that the safety-of-life applications of this UWB equipment, combined with the limitation that operation must be by licensed public safety radio operators who can temper any possible adverse equipment interactions, justify the adoption of Time Domain's proposal.

(MO&O/FNPRM, at ¶ 11)

10. The Commission did, after the *First Report and Order* in the UWB docket proceeding, address the eligible users of Ground Penetrating Radar (GPR)<sup>11</sup> and wall imaging devices. In an *Order*, 17 FCC Rcd. 13522, released July 12, 2002, the

---

operate were not changed except as follows: Ground Penetrating Radars were allowed to operate on any frequency, and through-wall imaging systems were permitted to operate with a center frequency between 1990 MHz and 10,600 MHz. The emission limits applicable to UWB devices were not changed except as follows: the emissions from through-wall imaging systems were relaxed by 7 dB, to an RMS average limit of -46.3 dBm/MHz EIRP, within the band 960-1610 MHz and by 10 dB, to an RMS average limit of -41.3 dBm/MHz EIRP, within the band 1610-1990 MHz.

<sup>11</sup> GPRs are radar devices that are designed to obtain the images of buried objects or to determine the physical properties within the ground. Wall imaging systems are functionally identical to GPRs except that they are used to detect these features within walls or ceilings. GPRs and wall imaging systems have been used for many years to perform critical safety services. Common applications include inspections of highways, bridges and runways, and determining the location of gas pipelines. Other applications include uses in forensic and archaeological studies, and in construction and building trades.

Commission noted that the regulations require that GPRs and wall imaging systems be used only by law enforcement, fire and emergency rescue organizations, by scientific research institutes, by commercial mining companies, and by construction companies. In the *MO&O/FNPRM*, the Commission held that GPRs and wall imaging systems could be used for one of the purposes described in the regulations without being physically controlled by one of the described parties. For example, a subcontractor may operate GPRs and wall imaging systems to inspect buildings, roadways, and bridges to determine if construction or repair is required. As another example, the Commission held that a GPR could be operated by a private company investigating forensic evidence for a local police department. The Commission held that its interpretation of the eligibility requirements for GPRs and wall imaging devices should not increase the usage of these devices beyond the levels at which experience has already demonstrated a lack of interference problems. It also noted that these devices have been used for many years (even with attached GPS receivers) without a single incidence of reported harmful interference. The Commission has not since the UWB *First Report and Order*, however, addressed eligibility requirements for operation of *through-wall* imaging devices.<sup>12</sup>

11. In the *First Report and Order* in the UWB proceeding, beginning at paragraph 122, the Commission analyzed an extensive study by the National Telecommunications Information Administration (NTIA) of the interference potential of UWB terrestrial operation to various government telecommunications and electronic systems. The

---

<sup>12</sup> The Commission, in its July 12, 2002 *Order*, stated that “[a]t this time, we are not providing similar interpretations to the operating restrictions for UWB imaging systems other than GPRs and wall imaging systems. We are not aware of any existing UWB surveillance systems or through-wall imaging systems for which the new rules would have an adverse impact. We also believe that the operation of surveillance systems and through-wall imaging systems should be limited until more experience has been obtained regarding these devices.

purpose was to determine appropriate UWB radiated emission levels which could be permitted without causing interference to those systems. The ultimate conclusion was that, because UWB devices would in the worst case create noise-type interference due to increases in the apparent noise floor, the interference potential at the radiated emission levels permitted by the Commission's rules would result in adequate protection for government communications systems from UWB devices. This was especially important because, of necessity, UWB systems (as unlicensed devices operating under Part 15 of the Commission's Rules, and hence on the condition that no harmful interference can be caused to licensed services) would operate on wide swaths of spectrum. Many frequency bands, including many government allocations, are not available for use by Part 15 unlicensed devices due to interference potential. The NTIA study was therefore important in order to determine the proper radiated emission levels from UWBs that would operate in, *inter alia*, the so-called "restricted bands" without a predictable interference potential. However, it was quite clear that the Commission was not satisfied that its rules were sufficiently flexible to permit the development of useful products and systems using this new technology:

We find that there is sufficient information in the record to make initial decisions at this time that provide for the introduction of UWB technology based on standards that are extremely conservative in protecting radio services against harmful interference. We recognize, however, that as this technology develops and we gain experience with the potential interference of UWB devices, it is appropriate to reexamine these rules. Accordingly, within the next six to twelve months we intend to review the standards for UWB devices and issue a further rule making to explore more flexible technical standards and to address the operation of additional types of UWB operations and technology.

*(First Report and Order, 17 FCC Rcd. at 7525)*

12. The Commission did in fact peripherally revisit the UWB rules in a *Second Report and Order and Second Memorandum Opinion and Order*, (*Second R&O*), FCC 04-285, 19 FCC Rcd. 24558 (released December 16, 2004). This followed the *MO&O/FNPRM* [18 FCC Rcd 3857 (2003)]. The stated purpose of the *Second R&O* was to “amend Part 15 of [the] rules to provide greater flexibility for the introduction of new wide-bandwidth devices and systems.” However, there was not any amendment of the specific rules applicable to UWB devices, but rather amendment of the general Part 15 rules. The Commission again expressed reluctance to “change the existing UWB rules until we have more experience with UWB devices (footnote omitted). We continue to believe that any major changes to the rules for existing UWB product categories at this early stage would be disruptive to current industry product development efforts.” *Id.*, 19 FCC Rcd. at 24560. Thus, the *Second R&O* merely adopted rules dealing with wide-bandwidth part 15 devices.

13. There has not, in fact, been any comprehensive review of the UWB rules, since the adoption of the *Report and Order* in Docket 98-153. Bosch does not dispute that the Commission properly, in a somewhat controversial rulemaking proceeding, proceeded cautiously and conservatively in adopting initial rules which would (1) encourage the development of new UWB applications, while at the same time (2) clearly protect, *ex ante*, incumbent licensed and government radio services against interference. However, it has now been eight years since the adoption of the UWB rules governing eligibility for operation of through-wall imaging devices. As far as Bosch can determine, there are no documented instances of interference from any UWB device to a licensed radio service, and the rules are, at least in this instance, standing as an obstacle to the

implementation by Bosch of useful UWB technology which can enhance and facilitate building and construction efforts substantially, improve public safety, and save costs and time. The Commission's rules, which the Commission expressly labeled "overprotective," are now subject to re-evaluation. Bosch would urge that grant of the instant waiver request is a reasonable step toward expanding the opportunities for product development using this nascent technology, consistent with the absolute need to protect licensed non-government and government radio services against interference.

**IV. The Bosch *Wallscanner D-tect 150 Professional* Should be Permitted a Waiver to Permit Operation by Construction Workers and Builders, and by Building Inspectors and Structural Engineers**

14. As discussed above, the Bosch *Wallscanner D-tect 150 Professional* is a UWB device which is uniquely caught between two definitional regulatory limitations, each of which preclude its marketing, sale and operation in the United States. The device is not a wall imaging device, inasmuch as the walls scanned by the device are *not in every case* sufficiently thick or dense as to attenuate all of the radiofrequency energy emitted by the device and because the device incorporates a stud locator function.<sup>13</sup> Though the rules governing UWB wall imaging devices clearly anticipate that products such as the *Wallscanner D-tect 150 Professional*, which is intended to detect materials *within* walls, ceilings and floors, can be used in the construction and building trades, the limit on the

---

<sup>13</sup> It is not intended to provide imaging *through* walls or to identify or profile objects on the other side of walls. It is well understood that devices with the emission levels needed to perform these functions generally require higher power levels than those required for wall imaging devices, and that the eligibility to operate through-wall imaging devices is for that reason understandably restricted to first responder and related public safety entities, and prohibited to construction companies. While one might argue that classifying "stud finder" type devices as through-wall imaging devices is therefore disingenuous, the fact is that the Commission has done this, and as the result, it has "stranded" the *Wallscanner D-tect 150 Professional* between two regulatory categories.

applications for such devices in terms of the signal attenuation exclude the *Wallscanner D-tect 150 Professional* specifically.

15. On the other hand, the Bosch device does not provide the functions envisioned by the rules for UWB through-wall imaging devices. It is not intended to provide imaging *through* walls or to identify or profile objects on the other side of walls. It is well understood that devices with the emission levels needed to perform these functions generally require higher power levels than those required for wall imaging devices, and that the eligibility to operate through-wall imaging devices is for that reason restricted to first responder and related public safety entities, and prohibited to construction companies. While one might reasonably argue that classifying “stud locator” type devices as through-wall imaging devices is disingenuous, the fact is that the Commission has done this (probably in order to keep consumer stud locators out of the marketplace, in an overly conservative effort based on eight-year-old UWB rules to protect licensed radio systems against interference) and as the result, has “stranded” the *Wallscanner D-tect 150 Professional* between two regulatory categories.

16. This is, therefore, precisely the situation that the Court in *Wait Radio* held to justify grant of a waiver -- “a safety valve procedure” -- to permit consideration of an application for exemption based on special circumstances. The Commission should take into account here “consideration[s] of hardship, equity, [and] more effective implementation of overall policy...” *Wait Radio*, at 1159 and as well the public interest in having access to a product with proven success in deployment outside the United States and which has obviously beneficial applications in facilitating and in insuring safety in building construction and in evaluating the integrity of existing construction..

## VII. Conclusions and Request for Waiver

17. Therefore, Bosch requests that the Commission waive, for the *Wallscanner D-tect 150 Professional* and for functionally identical versions of that device, either (1) the requirement in Section 15.503(h) of the Commission's Rules applicable to Wall Imaging Systems that requires that the walls measured be thick or dense enough in every case to absorb "the majority" of the RF energy on the far side of the wall being measured, and which exclude "stud locator" devices; or (2) the eligibility requirements for operation of a through-wall UWB device to permit the operation of the *Wallscanner D-tect 150 Professional* by those engaged commercially in the construction or building trades, and for building inspectors and structural engineers in the United States. Bosch is willing to have this waiver conditioned on the absence of reported and unresolved interference to licensed services in the subject frequency band, and Bosch will include any necessary interference resolution obligations in the operating manual distributed with the product in the United States. Bosch will also comply with the product registration requirements for UWB devices at point of sale.

Therefore, the foregoing considered, Robert Bosch GmbH respectfully requests that the Commission grant to it a waiver of Sections 15.510(h) [47 C.F.R. §15.510(h)] and/or 15.510(b) [47 C.F.R. §15.510(b)] of the Commission's Rules governing the operation of Ultra-Wideband devices, so as to permit Bosch to market and sell, and for professionals in the construction industry to operate, the *Wallscanner D-tect 150*

*Professional* and functionally identical versions of the product marketed by HILTI Corporation in the United States.

Respectfully submitted,

**ROBERT BOSCH GmbH**

By: Christopher D. Imlay  
Christopher D. Imlay  
Its Counsel

Booth, Freret, Imlay & Tepper, P.C.  
14356 Cape May Road  
Silver Spring, MD 20904-6011  
(301) 384-5525  
BFITPC@AOL.COM

November 15, 2010

# EXHIBIT A

Bosch GmbH  
Power Tools Division  
745 Leinfelden-Echterdingen  
Germany

[www.bosch-pt.com](http://www.bosch-pt.com)

08 929 92300 (009107) T / 352 XXX



## D-tect 150 Professional



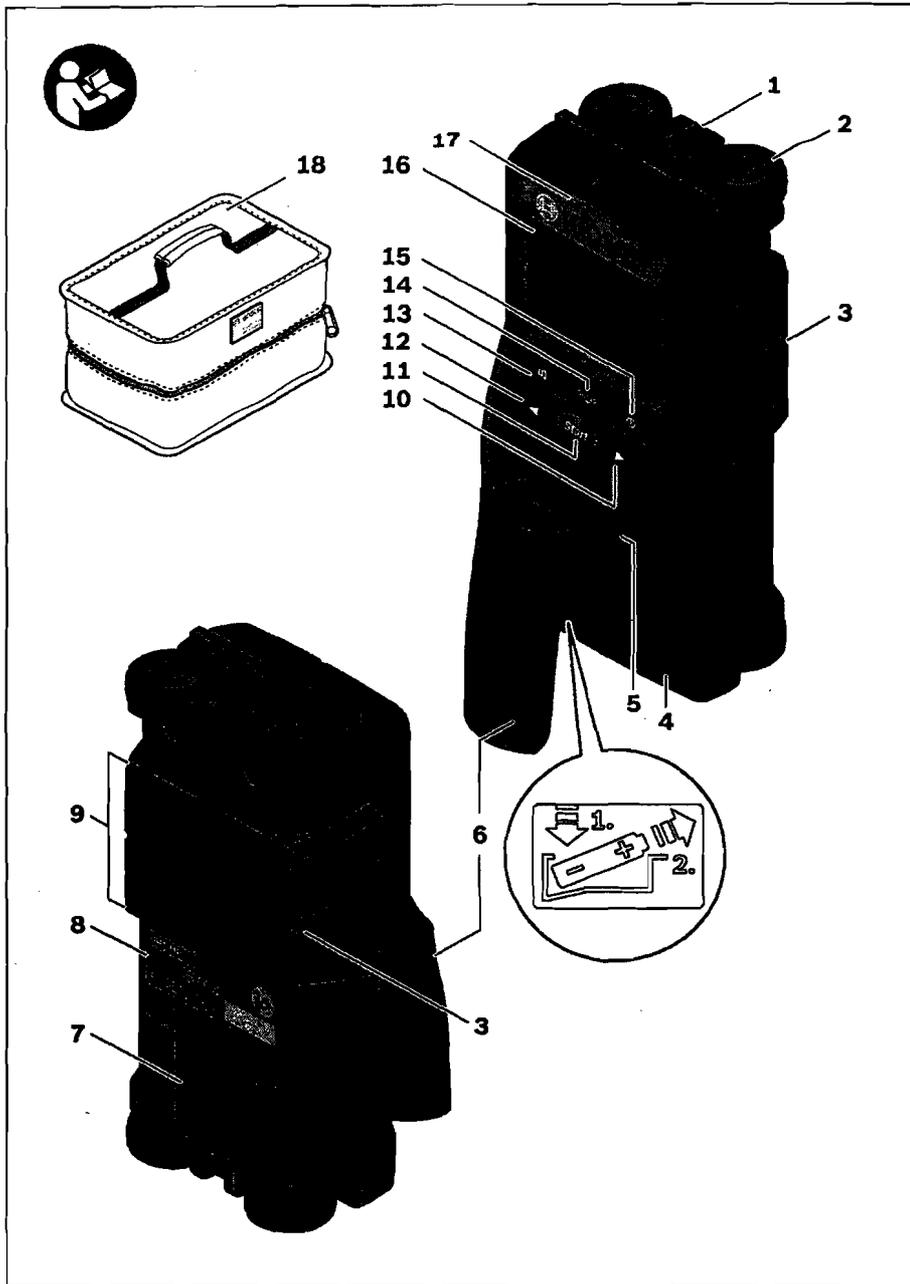
**BOSCH**

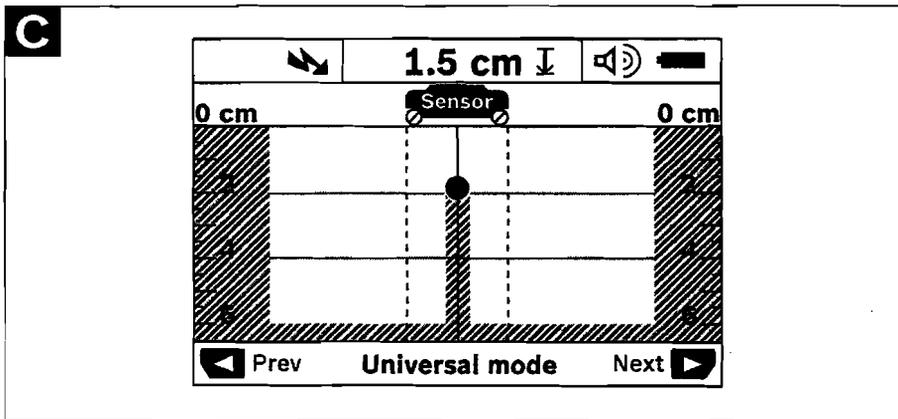
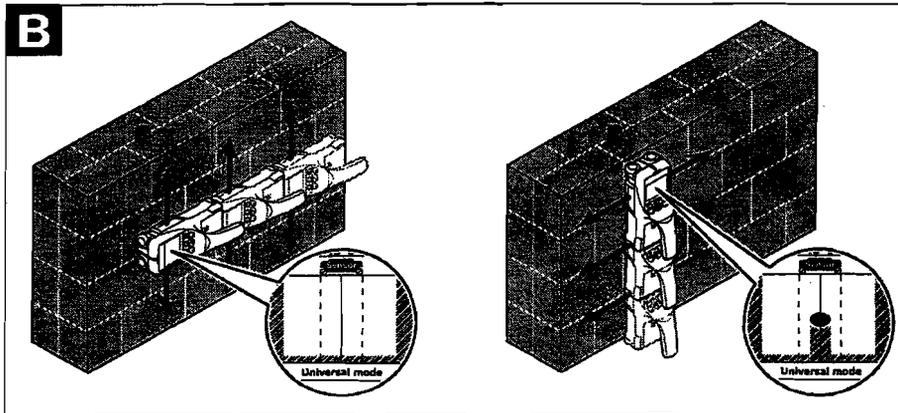
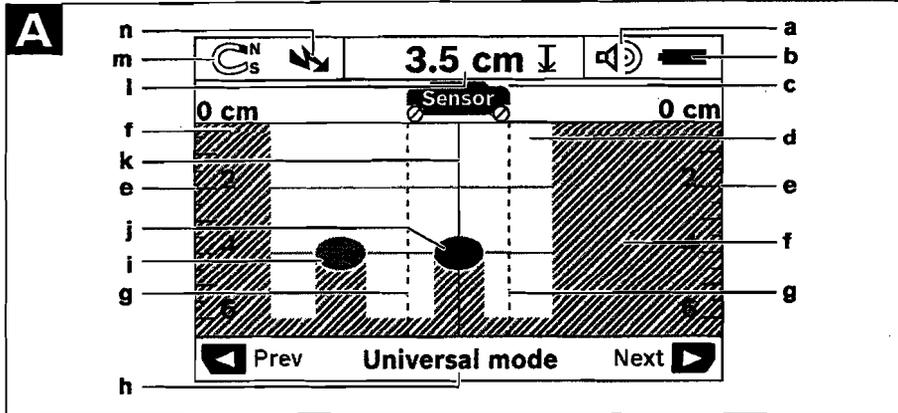
de Originalherstellereinschulung  
en Original manufacturer training  
fr Formation officielle  
es Formación oficial  
pt Formação oficial  
it Formazione ufficiale  
nl Oorspronkelijke  
ro Original  
ru Оригинальная  
sk Originálny  
sl Originalni  
sr Originalni  
uk Оригінальний  
pl Oryginalny  
pt Original  
ro Original  
ru Оригинальный  
sk Originálny  
sl Originalni  
sr Originalni  
uk Оригінальний  
pl Oryginalny

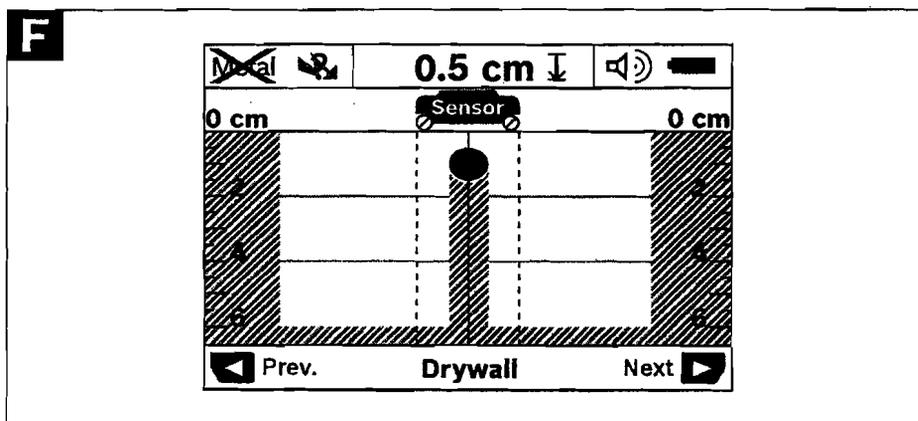
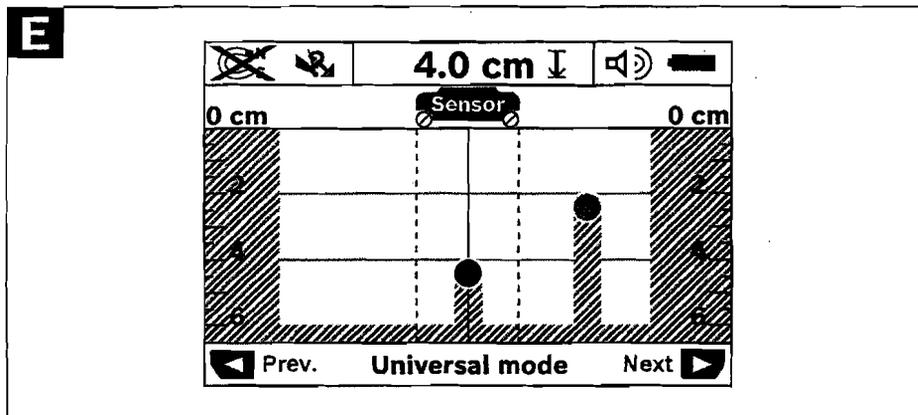
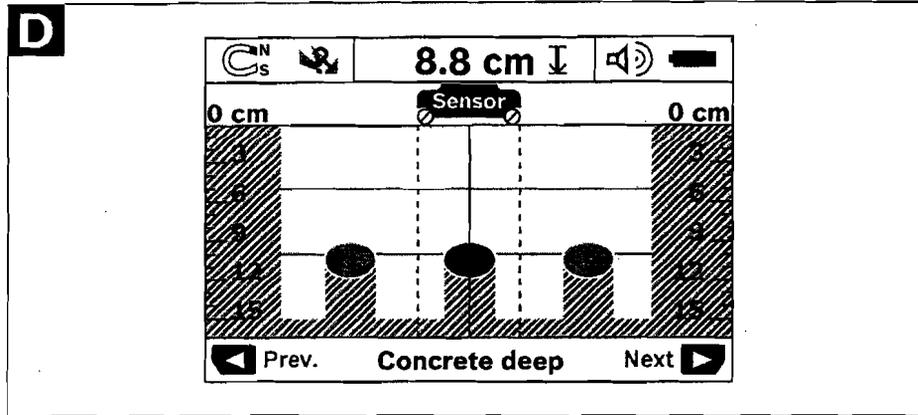
pl Sprawdzaj oryginalną  
cs Půjdi si navštívit původní  
sk Povedy navštíviť pôvodnú  
hu Eredeti készítői átvesztés  
ru Проверьте оригинал  
uk Довіряйте оригіналу  
es Pasa el tiempo original  
ro Împinge-te original  
ru Проверьте оригинал  
sk Povedy navštíviť pôvodnú  
sl Originalni proizvajalca  
sr Originalni proizvođača  
uk Оригінальний виробник  
pl Sprawdzaj oryginalnego

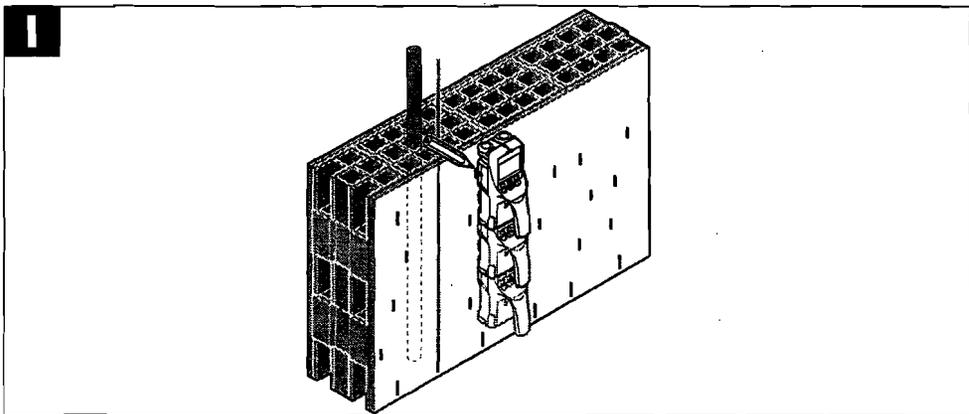
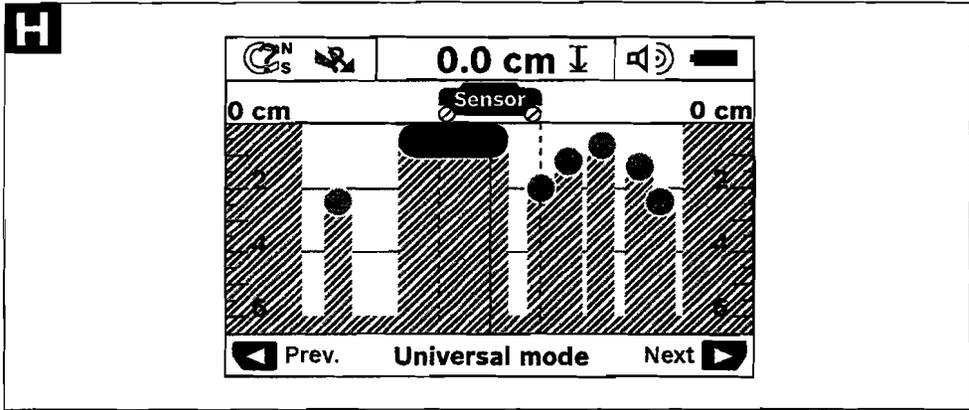
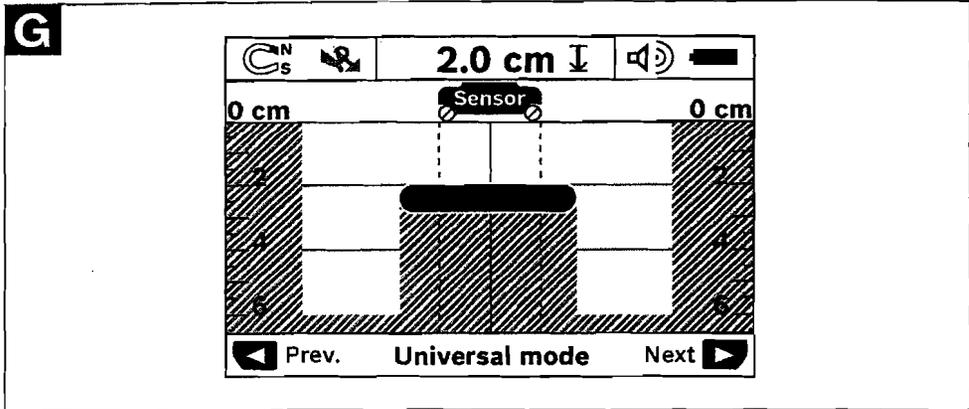
pl Sprawdzaj oryginalną  
cs Půjdi si navštívit původní  
sk Povedy navštíviť pôvodnú  
hu Eredeti készítői átvesztés  
ru Проверьте оригинал  
uk Довіряйте оригіналу  
es Pasa el tiempo original  
ro Împinge-te original  
ru Проверьте оригинал  
sk Povedy navštíviť pôvodnú  
sl Originalni proizvajalca  
sr Originalni proizvođača  
uk Оригінальний виробник  
pl Sprawdzaj oryginalnego

Deutsch .....	Seite	7
English .....	Page	18
Français .....	Page	30
Español .....	Página	41
Português .....	Página	52
Italiano .....	Pagina	63
Nederlands .....	Pagina	74
Dansk .....	Side	85
Svenska .....	Sida	96
Norsk .....	Side	107
Suomi .....	Sivu	118
Ελληνικά .....	Σελίδα	129
Türkçe .....	Sayfa	140
Polski .....	Strona	151
Česky .....	Strana	162
Slovensky .....	Strana	173
Magyar .....	Oldal	184
Русский .....	Страница	195
Українська .....	Сторінка	206
Română .....	Pagina	217
Български .....	Страница	228
Srpski .....	Strana	239
Slovensko .....	Stran	250
Hrvatski .....	Stranica	261
Eesti .....	Lehekülg	272
Latviešu .....	Lappuse	283
Lietuviškai .....	Puslapis	294
中文 .....	页	305
中文 .....	頁	314
한국어 .....	면	323
عربي .....	صفحة	332
فارسی .....	صفحه	341









18 English

## Safety Notes



**Read and observe all instructions. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.**

- ▶ **Have the measuring tool repaired only through qualified specialists using original spare parts.** This ensures that the safety of the measuring tool is maintained.
- ▶ **Do not operate the measuring tool in explosive environments, such as in the presence of flammable liquids, gases or dusts.** Sparks can be created in the measuring tool which may ignite the dust or fumes.
- ▶ **Measuring values can be impaired through certain ambient conditions. These include, e.g., the proximity of other equipment that produce strong magnetic or electromagnetic fields, moisture, metallic building materials, foil-laminated insulation materials or conductive wallpaper or tiles.** Therefore, please also observe other information sources (e.g. construction plans) before drilling, sawing or routing into walls, ceilings or floors.

## Functional Description

Please unfold the fold-out page with the representation of the measuring tool and leave it unfolded while reading the operating instructions.

## Intended Use

The measuring tool is intended for detecting objects in walls, ceilings and floors. Depending on material and condition of the structural surface, metal objects, wooden beams, plastic pipes, wiring and cables can be detected. For objects detected, the allowable drilling depth to the surface of the object is determined.

The measuring tool complies with the limit values according to EN 302435. Based on this, it must be clarified whether the measuring tool may be used in, e.g., hospitals, nuclear power plants and in close vicinity to airports, or mobile phone stations.

## Product Features

The numbering of the product features shown refers to the illustration of the measuring tool on the graphic page.

- 1 Marking aid, top
- 2 Wheel
- 3 Marking aid, left and right
- 4 Battery lid
- 5 Latch of battery lid
- 6 Handle
- 7 Maintenance flap
- 8 Serial number
- 9 Sensor area
- 10 Selection button, right 
- 11 Start button 
- 12 Selection button, left 
- 13 Audio signal button 
- 14 Setup button 
- 15 On/Off button 
- 16 Display
- 17 LED
- 18 Protective pouch

**The accessories illustrated or described are not included as standard delivery.**



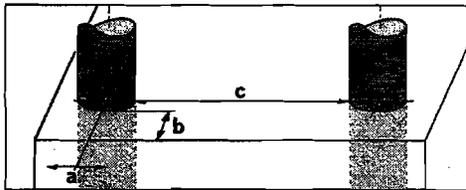
**Display Elements**

- a Audio signal indicator
- b Battery indicator
- c Sensor-range indicator
- d Area already detected
- e Measuring scale for allowable drilling depth
- f Area not yet detected
- g Outer edges, to be marked left and right via marking aid 3
- h Operating-mode indication
- i Grey: Found object outside of the sensor range
- j Black: Found object within the sensor range
- k Centre line, corresponds with the marking aid 1
- l Indication of the allowable drilling depth
- m Indication of the object material
- n "Live" wire indicator

**Technical Data**

Universal Detector	D-tect 150 Professional
Article number	3 601 K10 005
Measuring accuracy to the object centre a <sup>2)</sup>	±5 mm
Accuracy of the indicated allowable drilling depth b <sup>2)</sup>	±5 mm
Minimum distance between two neighbouring objects c <sup>2)</sup>	4 cm
Operating temperature	10 ... +50 °C
Storage temperature	20 ... +70 °C
Batteries	4 x 1.5 V LPO (AA)
Rechargeable batteries	4 x 1.2 V NiMH (AA)
Operating life time, approx.	
- Batteries (alkali-manganese)	5 h
- Rechargeable batteries (2500 mAh)	7 h
Degree of protection	IP 54 (dust and splash water protected)
Dimensions	22 x 9.7 x 12 cm
Weight according to EPTA-Procedure 01/2003	0.7 kg

1) Depending on size and type of object as well as material and condition of the base material  
 2) See graphic



Please observe the article number on the type plate of your measuring tool. The trade names of the individual measuring tools may vary.

The measuring tool can be clearly identified with the serial number 8 on the type plate.

20 English

## Declaration of Conformity

We declare under our sole responsibility that the product described under "Technical Data" is in conformity with the following standards or standardization documents: EN 61010-1, EN 55022, EN 55024, EN 302435-1, EN 302435-2 according to the provisions of the directives 1999/5/EC, 2004/108/EC.

Dr. Egbert Schneider  
Senior Vice President  
Engineering

Dr. Eckerhard Strötgen  
Head of Product  
Certification

*Dr. Egbert Schneider* *Dr. Eckerhard Strötgen*

Robert Bosch GmbH, Power Tools Division  
D-70745 Leinfelden-Echterdingen  
Leinfelden, 19.05.2009

To remove the batteries/rechargeable batteries, press on the rear end of a battery as indicated in the figure on the battery lid (1.). The front end of the battery/rechargeable battery is released from the battery compartment (2.), so that the battery/rechargeable battery can easily be removed.

Replace all batteries/rechargeable batteries at the same time. Do not use different brands or types of batteries/rechargeable batteries together.

- ▶ **Remove the batteries/rechargeable batteries from the measuring tool when not using it for longer periods.** When storing for longer periods, the batteries/rechargeable batteries can corrode and discharge themselves.

## Assembly

### Inserting/Replacing the Battery

To open the battery lid 4, press the latch 5 in the direction of the arrow and remove the battery lid. Insert the batteries/rechargeable batteries. When inserting, pay attention to the correct polarity according to the representation on the inside of the battery compartment.

The battery indicator **b** in the upper status line on the display **16** indicates the charge condition of the batteries/rechargeable batteries.

**Note:** Pay attention to the changing battery symbol so that the batteries/rechargeable batteries are replaced in time.



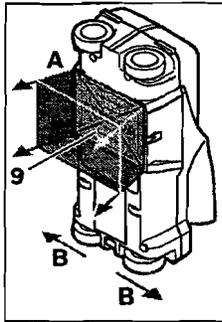
When the "Please change batteries" warning indication is indicated on the display **16**, the settings are saved and the measuring tool switches off

automatically. Measurements are no longer possible. Change the batteries/rechargeable batteries.

## Operation

- ▶ **Protect the measuring tool against moisture and direct sun light.**
- ▶ **Do not subject the measuring tool to extreme temperatures or variations in temperature. In case of large variations in temperature, allow the measuring tool to adjust to the ambient temperature before switching it on.** In case of extreme temperatures or variations in temperature, the accuracy of the measuring tool and the display indication can be impaired.
- ▶ **Do not attach any stickers or name-plates to the sensor area 9 on the back of the measuring tool.** Especially metal name-plates affect the measuring results.
- ▶ **Use or operation of transmitting systems, such as WLAN, UMTS, radar, transmitter masts or microwaves, in the close proximity can influence the measuring function.**

### Method of Operation (see figure B)



The measuring tool checks the base material of sensor area 9 in measurement direction A to the displayed measuring depth. Measurement is possible only during movement of the measuring tool in the direction of travel B and for a measuring distance of at least 10 cm. **Move the**

**measuring tool in a straight line with light pressure over the wall so that the wheels remain in contact with the wall. Objects are detected that differ from the material of the wall. The allowable drilling depth and, if possible, the object material, are indicated on the display.**

Optimum results are achieved when the measured distance is at least 40 cm and the measuring tool is moved slowly over the entire location to be checked. The tool's method of operation ensures reliable detection of outer object edges that run transverse to the measuring tool's movement direction.

**Therefore, always move crossways over the area to be checked.**

If several objects are located one over the other in the wall, the object that is indicated in the display is the one nearest to the surface.

The representation of the properties of detected objects in the display 16 can deviate from the actual object properties. This applies particularly for very thin objects, which are represented thicker in the display. Large cylindrical objects (e.g. plastic or water pipes) can appear in the display smaller than they actually are.

### Detectable Objects

- Plastic pipes (e.g. water-carrying plastic pipes, as used in floor/wall-heating systems, with at least 10 mm in diameter; empty pipes with at least 20 mm in diameter)
- Electrical wiring (independent of whether carrying voltage or not)
- Three-phase mains wiring (e.g. to the stove)
- Low-voltage wiring (e.g. for door bell, telephone)
- Metal pipes, bars, beams of any type (e.g. steel, copper, aluminium)
- Reinforcing steel
- Wooden beams
- Hollow spaces

### Measurements possible

- In brickwork (bricks, porous concrete, foam concrete, aerated concrete, lime-sand brick)
- In concrete/reinforced concrete
- In light construction walls
- Under surfaces such as stucco, tiles, wall-paper, parquet flooring, carpet
- Behind wood, gypsum board

### Special Measuring Cases

Based on the measuring principle, unfavourable conditions can influence the measuring result, for example:

- Multi-layered walls
- Empty plastic pipes and wood beams in hollow spaces and light construction walls
- Objects running inclined in walls
- Metal surfaces and damp areas; in walls, these can possibly be indicated as an object (e.g. when the water content is high). Please observe that concrete requires several months to dry completely.
- Hollow spaces in a wall; these can be indicated as objects.
- Closeness to equipment that generates strong magnetic or electromagnetic fields, e.g. radio base stations or generators.

### Initial Operation

- ▶ **Protect the measuring tool against moisture and direct sun light.**

### Switching On and Off

- ▶ **Before switching the measuring tool on, make sure that the sensor area 9 is not moist.** If required, dry the measuring tool using a soft cloth.
- ▶ **If the measuring tool was subject to an extreme temperature change, allow it to adjust to the ambient temperature before switching on.**

### Switching On

- To **switch on** the measuring tool, press the On/Off button **15** or the start button **11**.
- LED **17** lights up green and the start display is indicated for 4 s on display **16**.
- When no measurement is carried out and no button is pressed for 5 minutes, the measuring tool switches off automatically. This **"Cut-off time"** can be changed in the "Settings" menu (see "Cut-off Time", page 25).

### Switching Off

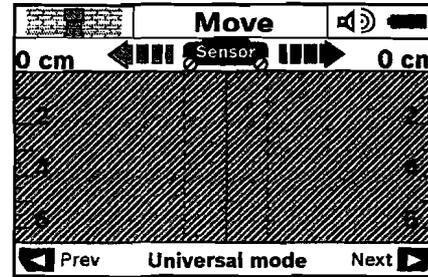
- To **switch** the measuring tool **off**, press the On/Off button **15**.
- When switching off the measuring tool, all settings are retained in the menus.

### Switching the Audio Signal On/Off

The audio signal can be switched on/off with the audio signal button **13**. This **"Tone signal"** can be changed in the "Settings" submenu (see "Tone Signals", page 25).

### Measuring Procedure

Switch the measuring tool on. The "standard start display" appears on display **16**.



Position the measuring tool against the wall and move it over the wall in the direction of travel (see "Method of Operation", page 21). Measured results are indicated on display **16** after a minimum measuring distance of 10 cm. To ensure correct measurement results, move the measuring tool slowly and completely over the assumed object in the wall.

If the measuring tool is lifted away from the wall during a measurement, the last measured result remains on the display. **"Hold"** appears on the sensor-range indicator **c**. When the measuring tool is placed against the wall again, moved on or when the start button **11** is pressed, the measurement starts anew.

When LED **17** lights up red, an object is in the sensor range. When LED **17** lights up green, no object is in the sensor range. When LED **17** flashes, a "live" object is in the sensor range.

### Display Elements (see figure A)

If an object is under the sensor, it will appear in the sensor range  $c$  of the display. Depending on size and depth of the object, identification of the material is possible. The allowable drilling depth  $l$  to the upper edge of the found object is indicated in the status line.

**Note:** Both the indication of the allowable drilling depth  $l$  as well as the material property  $m$  refer to the object pictured black in the sensor.

The indication of the object material  $m$  can represent the following characteristics:

-  Magnetic, e.g. reinforcing steel
-  Non-magnetic, but metal, e.g. copper pipe
-  Non-metal, e.g. wood or plastic
-  Material property unknown

The indication of "live" wires  $n$  can represent the following characteristics:

-  "Live"
- **Note:** For "live" objects, no further characteristic is displayed.
-  Not definite whether "live" or voltage-free

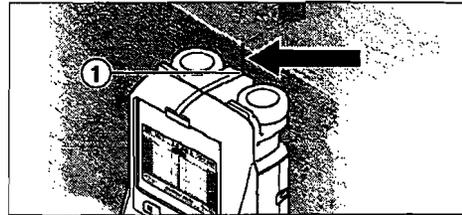
**Note:** Three-phase mains wiring are possibly not detected as "live" conductors.

### Localisation of Objects

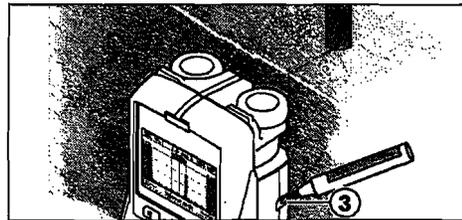
To localise objects, moving over the measuring path once is sufficient.

When no object has been found, repeat the motion perpendicular to the initial measuring direction (see "Method of Operation", page 21).

For precise localisation and marking of an object, move the measuring tool back over the measuring path.



When an object is indicated centrally below the centre line  $k$  in display **16**, as in the example, you can mark it coarsely with the top marking aid **1**. This mark, however, will only be precise, when the object is positioned exactly vertical in the wall, as the sensor range is located somewhat below the top marking aid.



For exact marking of the object on the wall, move the measuring tool left or right until the found object is positioned below one of the outer edges. When the found object, as an example, is indicated central below the dashed right-hand line  $g$  in display **16**, you can mark it precisely with the right marking aid **3**.

The direction of a found object in a wall can be determined by carrying out several offset measurements one after another (see figure I and "Examples for Measuring Results", page 26). Mark and connect the respective measuring points.

By pressing the start button **11**, the display of the objects found can be deleted at any time and a new measurement started.

## Changing the Operating Modes

Changing between different operating modes is possible with selection buttons **10** and **12**.

- Briefly press selection button **10** to select the next operating mode.
- Briefly press selection button **12** to select the previous operating mode.

By selecting the operating modes, you can adapt the measuring tool to different wall materials and suppress insignificant objects (e.g. hollow spaces in brickwork). The current setting is always shown in the operating-mode indication **h** of the display.

### Universal Mode (default setting)

“**Universal mode**” is suitable for most applications in brickwork or concrete. Plastic and metal objects as well as electrical wiring are displayed. Hollow spaces in brickwork or empty plastic pipes with a diameter of less than 2 cm are possibly not displayed. The maximum measuring depth is 6 cm.

### Concrete Deep

“**Concrete deep**” mode is particularly suitable for concrete applications. Reinforcing steel, plastic and metal pipes, as well as electrical wiring are displayed. The maximum measuring depth is 15 cm.

### Panel Heating

The operating mode “**Panel heating**” is particularly suitable for detecting metal, metal-composite and water-filled plastic pipes, as well as for electrical wiring. Empty plastic pipes are not displayed. The maximum measuring depth is 8 cm.

### Drywall

The operating mode “**Drywall**” is suitable for finding wooden beams, metal framing and electrical wiring in drywalls (wood, gypsum board, etc.). Filled plastic pipes and wooden beams are displayed identically. Empty plastic pipes are not detected. The maximum measuring depth is 6 cm.

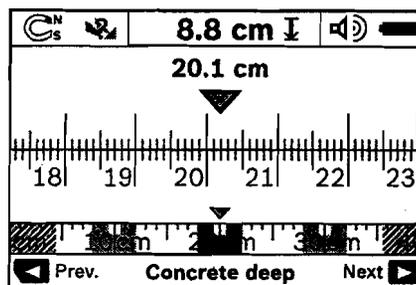
## Hollow Block

The operating mode “**Hollow block**” is suitable for walls with many air pockets. Metal objects and “live” conductors are detected. Plastic tubes and voltage-free conductors are not detected. The maximum detection depth is 6 cm.

## Changing the Display Modes

**Note:** Changing the display modes is possible in any operating mode.

To switch from the standard start display to rule mode, press and hold selection button **10** or **12**.



In the example, rule mode shows the same situation as in figure D: Three steel bars equally apart. In rule mode, the clearance between the detected object centres can be determined.

The measuring distance covered from the starting point (in the example 20.1 cm) is displayed under the indication of the allowable drilling depth **l**.

The three objects are displayed as rectangles in the small rule above the operating-mode indication **h**.

**Note:** Both the indication of the allowable drilling depth **l** as well as the material property **m** refer to the object pictured black in the sensor.

To return to the standard start display, briefly press selection button **10** or **12**.

**Note:** Only the display is reset, not the measuring mode!

## “Settings” Menu

To access the “Settings” menu, press the setup button **14**.

To exit the menu, press the start button **11**. The current settings are saved. The standard start display for the measuring process is activated.

### Navigating in the Menu

Press the setup button **14** to scroll down.

Press the selection buttons **10** and **12** to select the values:

- Selection button **10** will select the right-hand or next value.
- Selection button **12** will select the left-hand or previous value.

### Language

In the “Language” menu, you can change the language of the menu navigation. The default setting is “English”.

### Cut-off Time

In the “Cut-off time” menu, you can set certain time intervals after which the measuring tool shall automatically shut off when no measurements are taken or settings are carried out. The default setting is “5 min”.

### Display Illumination

In the “Display illum.” menu, you can set a time interval within which the display **16** shall be illuminated. The default setting is “30 s”.

### Brightness

In the “Brightness” menu, you can adjust the brightness of the display backlight. The default setting is “Max”.

## Tone Signals

In the “Tone signal” menu, you can limit when the measuring tool shall emit an audio signal. The precondition for this is that the signal has not been switched off via the audio signal button **13**.

- The default setting is “Wallobjects”: An audio signal sounds after each button press, and whenever a wall object is under the sensor range. Additionally, a short-beat warning signal is given for “live” wires.
- With the setting “Live wire”, an audio signal sounds after each button press, as does the warning signal for “live” wires (short-beat signal), when the measuring tool indicates a power line.
- With the setting “Keyclick”, a tone signal only sounds after a button press.

## Default Mode

In the “Defaultmode” menu, you can set the default operating mode that is to be pre-set after switching on the measuring tool. The default setting is “Universal mode”.

## “Extended Settings” Menu

To access the “Extended settings” menu, press the setup button **14** and the On/Off button **15** at the same time when the measuring tool is switched off.

To exit the menu, press the start button **11**. The standard start display for the measuring process is activated and the settings are saved.

### Navigating in the Menu

Press the setup button **14** to scroll down.

Press the selection buttons **10** and **12** to select the values:

- Selection button **10** will select the right-hand or next value.
- Selection button **12** will select the left-hand or previous value.

## Device Information

In the “Device info” menu, you can access information on the measuring tool, e.g. the “Operation Time”.

In the “Restore Settings” menu, you can restore the factory settings.

## Examples for Measuring Results

**Note:** In the following examples, the audio signal on the measuring tool is switched on.

Depending on the size and depth of the object under the sensor range, it is not always possible to positively determine whether this object is "live" or voltage-free. In this case, the  symbol will appear in indicator n.

### "Live" Wire (see figure C)

A "live", metal object (e.g. a power cable) is within the sensor range. The allowable drilling depth is 1.5 cm. The measuring tool emits the warning signal for "live" conductors as soon as the power cable is detected by the sensor.

### Steel Bar (see figure D)

A magnetic object (e.g. a steel bar) is within the sensor range. Further objects are also located to the left and right, outside of the sensor range. The allowable drilling depth is 8.8 cm. The measuring tool emits an audio signal.

### Copper Pipe (see figure E)

A metal object (e.g. a copper pipe) is within the sensor range. The allowable drilling depth is 4 cm. The measuring tool emits an audio signal.

### Plastic or Wooden Object (see figure F)

A non-metal object is within the sensor range. The object is plastic or wooden, and close to the surface. The measuring tool emits an audio signal.

### Large Surface (see figure G)

A metal, large surface (e.g. a metal plate) is within the sensor range. The allowable drilling depth is 2 cm. The measuring tool emits an audio signal.

### Many Unclear Signals (see figures H-I)

When many objects are shown in the standard start display, the wall probably consists of many hollow spaces (hollow blocks). To broadly block out the hollow spaces, switch to the "**Hollow block**" operating mode. When there are still too many objects being shown, carry out several height-offset measurements and mark the detected objects on the wall. Offset marks are an indication for hollow spaces, whereas marks on a line indicate an object.

## Maintenance and Service

### Maintenance and Cleaning

- **Check the measuring tool each time before use.** In case of visible damage or loose components inside the measuring tool, safe function can no longer be ensured.

Keep the measuring tool clean and dry at all times to ensure proper and safe working.

Do not immerse the measuring tool in water or other fluids.

Wipe away debris or contamination with a dry, soft cloth. Do not use cleaning agents or solvents.



Pay attention that the maintenance flap 7 is always properly closed. The maintenance flap may only be opened by an authorised after-sales service centre for Bosch power tools.

If the measuring tool should fail despite the care taken in manufacturing and testing procedures, repair should be carried out by an authorised after-sales service centre for Bosch power tools. Do not open the measuring tool yourself.

In all correspondence and spare parts orders, please always include the 10-digit article number given on the type plate of the measuring tool.

Store and transport the measuring tool only in the supplied protective pouch.

In case of repairs, send in the measuring tool packed in its protective pouch 18.

### After-sales Service and Customer Assistance

Our after-sales service responds to your questions concerning maintenance and repair of your product as well as spare parts. Exploded views and information on spare parts can also be found under:

[www.bosch-pt.com](http://www.bosch-pt.com)

Our customer service representatives can answer your questions concerning possible applications and adjustment of products and accessories.

**Great Britain**

Robert Bosch Ltd. (B.S.C.)  
P.O. Box 98  
Broadwater Park  
North Orbital Road  
Denham  
Uxbridge  
UB 9 5HJ  
Tel. Service: +44 (0844) 736 0109  
Fax: +44 (0844) 736 0146  
E-Mail: SPT-Technical.de@de.bosch.com

**Ireland**

Origo Ltd.  
Unit 23 Magna Drive  
Magna Business Park  
City West  
Dublin 24  
Tel. Service: +353 (01) 4 66 67 00  
Fax: +353 (01) 4 66 68 88

**Australia, New Zealand and Pacific Islands**

Robert Bosch Australia Pty. Ltd.  
Power Tools  
Locked Bag 66  
Clayton South VIC 3169  
Customer Contact Center  
Inside Australia:  
Phone: +61 (01300) 307 044  
Fax: +61 (01300) 307 045  
Inside New Zealand:  
Phone: +64 (0800) 543 353  
Fax: +64 (0800) 428 570  
Outside AU and NZ:  
Phone: +61 (03) 9541 5555  
www.bosch.com.au

**Republic of South Africa**

**Customer service**  
Hotline: +27 (011) 6 51 96 00

**Gauteng – BSC Service Centre**  
35 Roper Street, New Centre  
Johannesburg  
Tel.: +27 (011) 4 93 93 75  
Fax: +27 (011) 4 93 01 26  
E-Mail: bsctools@icon.co.za

**KZN – BSC Service Centre**

Unit E, Almar Centre  
143 Crompton Street  
Pinetown  
Tel.: +27 (031) 7 01 21 20  
Fax: +27 (031) 7 01 24 46  
E-Mail: bsc.dur@za.bosch.com

**Western Cape – BSC Service Centre**

Democracy Way, Prosperity Park  
Milnerton  
Tel.: +27 (021) 5 51 25 77  
Fax: +27 (021) 5 51 32 23  
E-Mail: bsc@zsd.co.za

**Bosch Headquarters**

Midrand, Gauteng  
Tel.: +27 (011) 6 51 96 00  
Fax: +27 (011) 6 51 98 80  
E-Mail: rbsa-hq.pts@za.bosch.com

**People's Republic of China**

Website: www.bosch-pt.com.cn

**China Mainland**

Bosch Power Tools (China) Co., Ltd.  
567, Bin Kang Road  
Bin Jiang District 310052  
Hangzhou, P.R.China  
Service Hotline: 800 8 20 84 84  
Tel.: +86 (571) 87 77 43 38  
Fax: +86 (571) 87 77 45 02

**HK and Macau Special Administrative Regions**

Robert Bosch Hong Kong Co. Ltd.  
21st Floor, 625 King's Road  
North Point, Hong Kong  
Customer Service Hotline: +852 (21) 02 02 35  
Fax: +852 (25) 90 97 62  
E-Mail: info@hk.bosch.com  
www.bosch-pt.com.cn

**Indonesia**

PT. Multi Tehaka  
Kawasan Industri Pulogadung  
Jalan Rawa Gelam III No. 2  
Jakarta 13930  
Indonesia  
Tel.: +62 (21) 4 60 12 28  
Fax: +62 (21) 46 82 68 23  
E-Mail: sales@multitehaka.co.id  
www.multitehaka.co.id

### Philippines

Robert Bosch, Inc.  
Zuellig Building  
Sen. Gil Puyat Avenue  
Makati City 1200, Metro Manila  
Philippines  
Tel.: +63 (2) 8 17 32 31  
www.bosch.com.ph

### Malaysia

Robert Bosch (SEA.) Pte. Ltd.  
No. 8a, Jalan 13/6  
46200 Petaling Jaya,  
Selangor,  
Malaysia  
Tel.: +6 (03) 7966 3000  
Fax: +6 (03) 7958 3838  
E-Mail: hengsiang.yu@my.bosch.com  
Toll Free Tel.: 1 800 880 188  
Fax: +6 (03) 7958 3838  
www.bosch.com.sg

### Thailand

Robert Bosch Ltd.  
Liberty Square Building  
No. 287, 11 Floor  
Silom Road, Bangrak  
Bangkok 10500  
Tel.: +66 (2) 6 31 18 79 – 18 88 (10 lines)  
Fax: +66 (2) 2 38 47 83  
Robert Bosch Ltd., P. O. Box 2054  
Bangkok 10501, Thailand

Bosch Service – Training Centre  
2869-2869/1 Soi Ban Kluay  
Rama IV Road (near old Paknam Railway)  
Prakanong District  
10110 Bangkok  
Thailand

Tel.: +66 (2) 6 71 78 00 – 4  
Fax: +66 (2) 2 49 42 96  
Fax: +66 (2) 2 49 52 99

### Singapore

Robert Bosch (SEA.) Pte. Ltd.  
38 C Jalan Pemimpin  
Singapore 915701  
Republic of Singapore  
Tel.: +65 (3) 50 54 94  
Fax: +65 (3) 50 53 27  
www.bosch.com.sg

### Vietnam

Robert Bosch (SEA) Pte. Ltd – Vietnam  
Representative Office  
Saigon Trade Center, Suite 1206  
37 Ton Duc Thang Street,  
Ben Nghe Ward, District 1  
HCMC  
Vietnam  
Tel.: +84 (8) 9111 374 – 9111 375  
Fax: +84 (8) 9111376

### Disposal

Measuring tools, accessories and packaging should be sorted for environmental-friendly recycling.

#### Only for EC countries:



Do not dispose of measuring tools into household waste!

According the European Guideline 2002/96/EC for Waste Electrical and Electronic Equipment and its implementation into national

right, measuring tools that are no longer usable must be collected separately and disposed of in an environmentally correct manner.

#### Battery packs/batteries:

Do not dispose of battery packs/batteries into household waste, fire or water. Battery packs/batteries should be collected, recycled or disposed of in an environmental-friendly manner.

#### Only for EC countries:

Defective or dead out battery packs/batteries must be recycled according the guideline 91/157/EEC.

Battery packs/batteries no longer suitable for use can be directly returned at:

#### Great Britain

Robert Bosch Ltd. (B.S.C.)  
P.O. Box 98  
Broadwater Park  
North Orbital Road  
Denham  
Uxbridge  
UB 9 5HJ  
Tel. Service: +44 (0844) 736 0109  
Fax: +44 (0844) 736 0146  
E-Mail: SPT-Technical.de@de.bosch.com

### Troubleshooting – Causes and Corrective Measures

Error	Cause	Corrective Measure
Measuring tool cannot be switched on	Batteries empty	Replace batteries
	Batteries incorrectly inserted (wrong polarity)	Check if the batteries are inserted correctly
Measuring tool switched on but does not react		Take out batteries and reinsert again
	Measuring tool too warm or too cold	Wait until operating temperature range is reached
Display indication: <b>"Slipping Wheel"</b>	Wheel losing contact with the surface	Press the start button <b>11</b> and take care that the two bottom wheels have contact with the wall while moving the measuring tool; in case of uneven walls, position a thin piece of cardboard between the wheels and the wall
Display indication: <b>"Speeding"</b>	Measuring tool has been moved to quickly	Press the start button <b>11</b> and move measuring tool slowly over the wall
	<b>"Temperature over range"</b>	Wait until operating temperature range is reached
	<b>"Temperature under range"</b>	Wait until operating temperature range is reached
	<b>"Strong radio signal detected"</b>	Measuring tool switches off automatically. If possible, eliminate the interfering radio waves, e.g. WLAN, UMTS, radar, transmitter masts or micro-waves, then switch the measuring tool on again.

Subject to change without notice.

# EXHIBIT B

# regulated UWB emissions for wallscanner devices

## Comparison between

- amended ECC DEC (07)01 BMA device with LBT function
- FCC Part 15.509 GPR/WPR device

Difference 1,3dB

The ECC limit is less stringent than FCC limit in range 2200 to 3100MHz

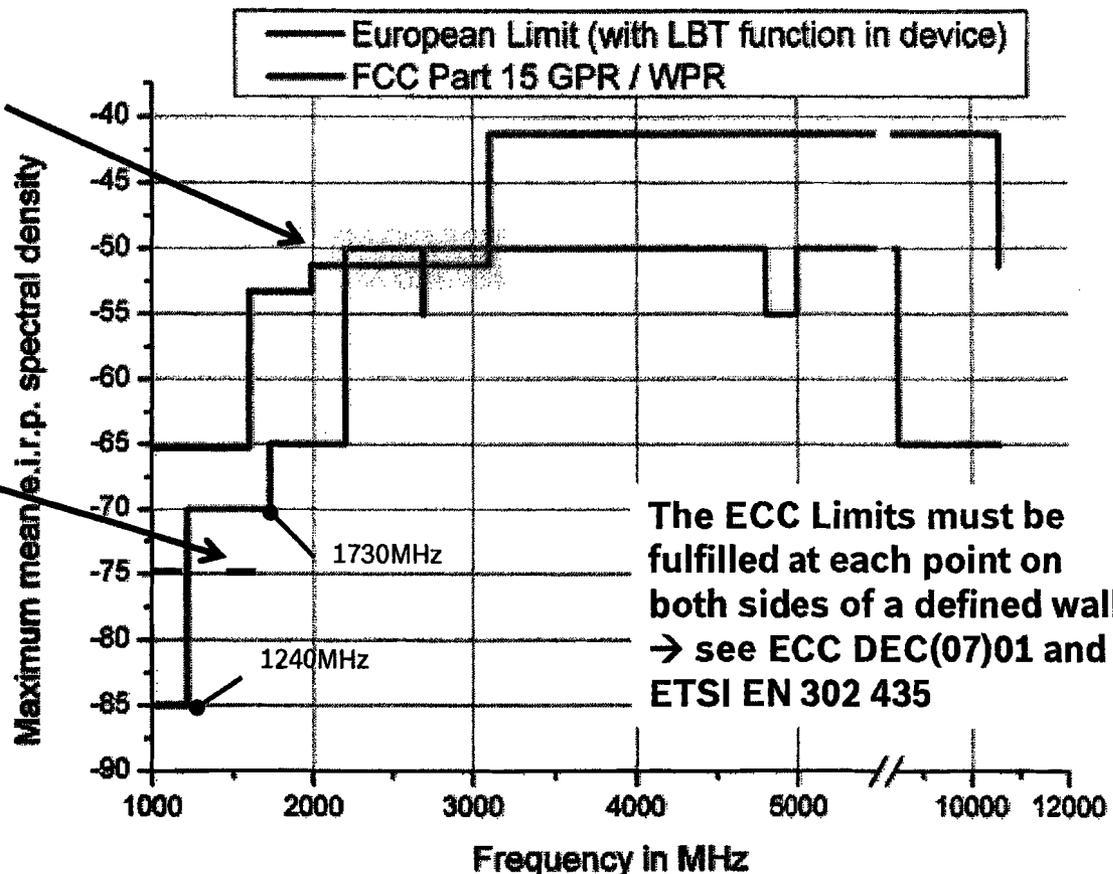
## Additional FCC requirement

Frequency in MHz	EIRP in dBm
1164-1240 .....	-75.3
1559-1610 .....	-75.3

Limits can not compared directly! Measurement BW for additional FCC limit:<1KHz

### Note:

The normal conformance emission measurement has to be done with a receiver BW of 1MHz (ECC and FCC)



**BOSCH**

# regulated UWB emissions for wallscanner devices

horizontal measurement plane / max emissions

Messung bei theta = 0°

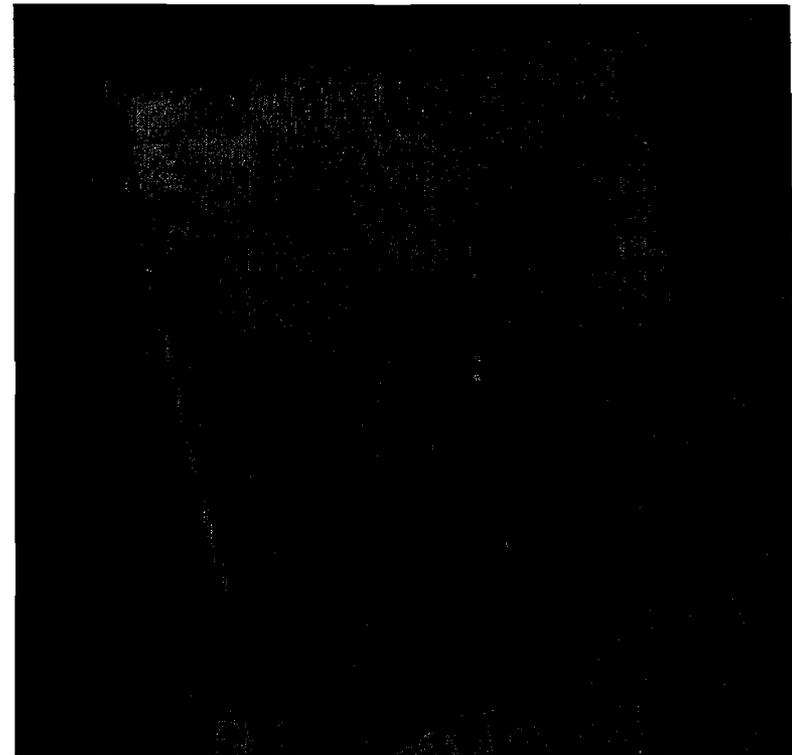
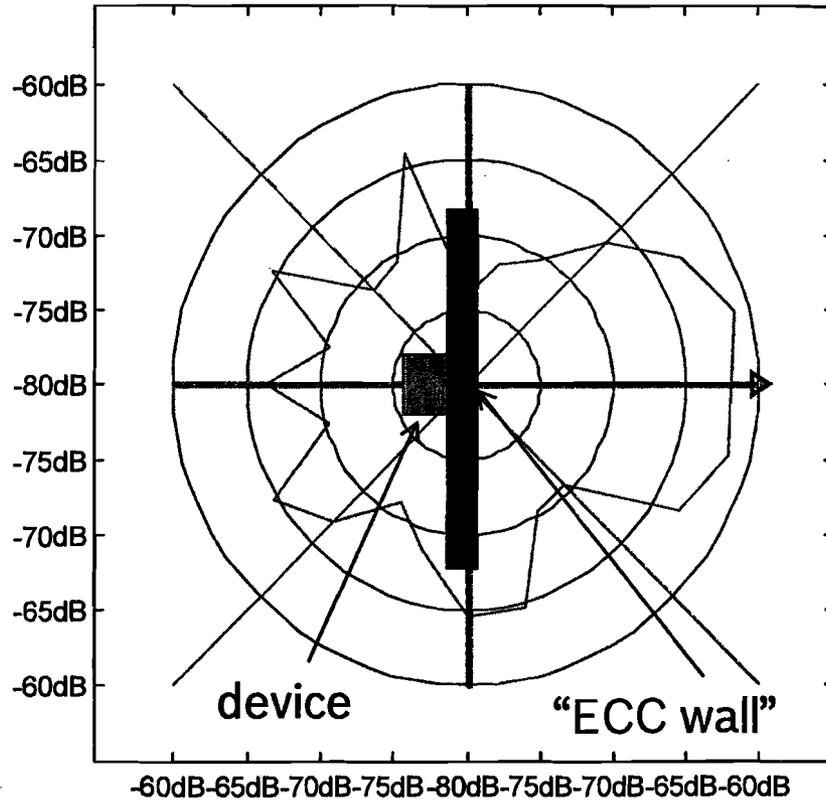


Figure: measurement setup (ECC and ETSI)

