MB8450 Car Detection Sensor

USB Ultrasonic Proximity Sensor

*The MB8450 Car Detection Sensor is a high performance, low-cost USB ultrasonic proximity sensor designed to detect the side of a vehicle in a drive thru. The MB8450 Car Detection Sensor features a simultaneous multi-sensor design which allows the sensor to operate even in the presence of other ultrasonic sensors. The sensors utilize a USB Micro-B connector for simple interfacing. Users can integrate many sensors into one system with little to no effect from the sensor-to-sensor interference which can occur with other ultrasonic sensor solutions. The MB8450 Car Detection Sensor features a True/False output and an optional range output. Deploying a network of ultrasonic sensors is simple and easy with the USB interface. *Factory calibration and testing is standard.*

Features

- USB interface for simple computer connection and installation
- Simple True/False output and optional range output
- ~4.0 second object acquire time[1]
- ~5.0 second object release time[1]
- Filtered proximity output allows for multi-sensor operation
- IP67 Rated transducer
- Continually checks and outputs proximity information
- Learns nearby environment
- Sensor operates at 42KHz
- Range data from 50 cm to 500 cm

Benefits

- USB interface for easy integration
- USB Micro-B connector matches most smartphones
- Easily deploy network-based IT solutions with integrated ultrasonic sensors
- Reliable proximity information
- Sensor is a rangefinder/proximity sensor with a detection zone to the preset range to 150 cm
- Mounting holes provided
- Excellent for multiple sensor systems

Applications & Uses

- Drive thru ATMs
- Drive thru's
- Automated displays and advertising
- Proximity zone detection
- Kiosks and booths
- Multi-sensor arrays
- Car park signs
- Smart parking meters
- Parked car detection

Notes:
[1] Custom acquire and release times

About Ultrasonic Sensors

Our ultrasonic sensors are non-contact object detection and ranging sensors that detect objects in air, within an area. These sensors are not affected by color or other visual characteristics of the detected object. Ultrasonic sensors use high frequency sound to detect and localize objects in a variety of environments. Ultrasonic sensors measure the time of flight for sound that has been transmitted to and reflected back from nearby objects. Based upon the time of flight, the sensor then outputs a range reading.

Close Range Operation

Applications requiring 100% reading-to-reading reliability should not use MaxSonar sensors at a distance closer than 50cm. Although most users find MaxSonar sensors to work reliably from 0 to 50cm for detecting objects in many applications, MaxBotix Inc., does not guarantee operational reliability for objects closer than the minimum reported distance. Because of ultrasonic physics, these sensors are unable to achieve 100% reliability at close distances.

Warning: Personal Safety Applications

We do not recommend or endorse this product be used as a component in any personal safety applications. This product is not designed, intended or authorized for such use. These sensors and controls do not include the self-checking redundant circuitry needed for such use. Such unauthorized use may create a failure of the MaxBotix Inc., product which may result in personal injury or death. MaxBotix Inc., will not be held liable for unauthorized use of this component.

General Description of Operation

The sensors utilize a USB Micro-B connector for interfacing. Each sensor is small in size with holes on the PCB for easy mounting. Each MB8450 Car Detection Sensor sends serial data to the user's operating system (OS) which can then be read from the registered COM port (or equivalent) using a terminal program or read directly from the OS by using the appropriate software functions.

Each MB8450 Car Detection Sensor is powered by the USB connection and begins operating after the USB handshaking has occurred. Range data and proximity information is sent continuously to the user's OS and is available to be read at any time.

Connection is handled automatically by device drivers that are available for most OSs (Windows XP and later, Linux Kernel 2.6 and later, Mac OS X and later.) The steps taken to perform the configuration vary slightly by the target OS, however, the general operation and the data sent by the sensor remains the same.

Serial Output Format

The sensor output is provided over the COM port (or equivalent) in an ASCII character format. If a target is detected at 30 centimeters the output appears as follows: "R050 P1<carriage return>". The output is an ASCII capital "R", followed by three ASCII character digits representing the range in centimeters up to a maximum of 500 centimeters. This is followed by an ASCII space and the ASCII character "P", followed by one ASCII digit "1 or 0" corresponding to the "True or False" proximity information, followed by a carriage return. A proximity value of "1" signifies that a target is present in the detection zone. A proximity value of "0" signifies that no target has been detected in the detection zone.

The MB8450 Car Detection Sensor has a set trigger distance of ~150 cm. Objects closer than this distance that fall within the sensor detection zone will charge the proximity timer. ~4.0 seconds later the sensor will begin sending the appropriate proximity information.

When the detected object then leaves the detection zone the sensor will "release" the target ~5.0 seconds later. Release time can be influenced by other nearby sensors and may appear to be longer in applications with many nearby sensors. The MB8450 Car Detection Sensor also doubles as an ultrasonic range finder. Range information is provided for reference and may experience noise when a large number of sensors (5+ depending on sensor mounting) are running in the same environment. The range reading will report the range to an object to the maximum range of the sensor of 500 cm. When no object is detected by the sensor, the sensor will report R500.

Using Multiple Sensors in a Single System

The MB8450 Car Detection Sensor is designed to function with other ultrasonic sensors operating in the same space at the same time on the same frequency. Our industry leading firmware allows users to connect multiple sensors across a single space without worrying about sensor interference (cross-talk). Each sensor is rated to work with a limited number of sensors within a space. For users working with large open environments or environments where sensors point in different directions, it is likely that the recommended number of sensors can be exceeded with little or no effect on user performance.

Sensor Calibration & Pairing

Each MB8450 Car Detection Sensor is shipped as a PCB and transducer pair. Each MB8450 Car Detection Sensor-PCB and MB8450 Car Detection Sensor-Transducer has received a custom calibration that matches and pairs the PCB and transducer performance. Installing a new or different transducer into a MB8450 Car Detection Sensor-PCB may result in unreliable performance. While it is understood that the transducer must be unplugged from the PCB to allow for installation, it is important for installation that the transducer and PCB remain as a pair for functional calibration.

WARNING - While it is understood that the transducer must be unplugged from the PCB to allow for installation, it is important for installation that the transducer and PCB remain as a pair for functional calibration.

The matching components of the MB8450 Car Detection Sensor are shipped together and are designed to be mounted in the final sign as a PCB and transducer pair.

Terminal Configuration

Windows OS Configuration

The MB8450 Car Detection Sensor inside Windows OS is a plug and play device. When the MB8450 ultrasonic proximity sensor is connected to a computer running Windows XP or a newer, Windows will typically install and configure the device drivers automatically. This configuration may take several minutes, but the device configuration will only occur once.

Computers running Windows XP and older have HyperTerminal included in the OS. Computers running Windows Vista and newer require the installation of software that is able to communicate with a communication port.

To configure the MB8450 Car Detection Sensor on computer systems running Windows, use the following directions.

1. Download a terminal program. A simple terminal program is available for download at www.maxbotix.com/terminal.htm
2. Unzip the terminal program to a folder of your choice, if using the provided program.
3. Connect the MB8450 ultrasonic proximity sensor to a computer with a Micro-B USB cable.
4. Allow Windows time to automatically configure MB8450 drivers
5. Run the terminal program of preference. If using the provided program, run the .exe file. The program provided should look for the first available proximity sensor.
6. For users who operate with a different terminal program, set the configuration to the settings provided.

Warning
Removing the sensor before Windows has configured drivers may result in drivers being corrupted. Please allow time for Windows to fully install and configure drivers for the MB8450 Car Detection Sensor.

If the provided software does not automatically find the first available MB8450 ultrasonic proximity sensor, use the following directions.

1. Click the “Settings” option.
2. In the “Serial port settings” window, change the “Port” option to the COM port number assigned to the MB8450 ultrasonic proximity sensor.

	Value
Baud	57600
Data bits	8
Parity	0 / none
Stop Bit	1
Flow Control	0 / none

For multiple sensor operation, use the following instruction set.

1. Open a terminal window.
2. Click settings, if using the software provided for the MB8450 ultrasonic proximity sensor.
3. Change the “Port” menu to match the newest “COM#”
4. Click ok.

Other Operating Systems

For users that need drivers, drivers may be available for your system at http://www.ftdichip.com/FTDrivers.htm.

Linux OS Configuration

(NOTE: Written with Ubuntu 12.10 & MoSerial Terminal Software)

1. Download and install a terminal program. A recommended program is available at http://www.maxbotix.com/terminal.htm
2. Configure the MB8450 Car Detection Sensor
3. Click “Port Setup”
4. Configure the following port settings
   A. “Device” menu as “dev/ttyUSB0”
   B. Set Baud, Data Bits, Parity, and Stop Bits to match provided settings for the Windows configuration
   C. Turn off all “Handshake” options
   D. Click OK
5. Click “Connect”
6. Click the tab that says “Received ASCII”

	Value
Baud	57600
Data bits	8
Parity	0 / none
Stop Bit	1
Flow Control	0 / none

Apple OS Configuration

To configure the MB8450 Car Detection Sensor in Mac OS X operating systems use the following instruction set.

1. Download and install a terminal program. A recommended program is available at http://www.maxbotix.com/terminal.htm
2. Open settings
3. Click “Modem Preferences”
4. Select “usbserial0” for the MB8450 sensor.
5. Set Baud, Data Bits, Parity, and Stop Bits to match provided settings for the Windows configuration
6. Remove check boxes from “Flow Control” options
7. Set “Service Name” to a name of preference
8. “Phone Number”, “Pre-dial init", and “Password” options can be left blank.

	Value
Baud	57600
Data bits	8
Parity	0 / none
Stop Bit	1
Flow Control	0 / none

USB Latency

Computer USB ports have latency and buffer sizes which can change the time between the range readings reported by the MB8450 Car Detection Sensor ultrasonic proximity sensors. This time delay can be caused by the USB hardware on the computer’s system board, the chipset managing USB communication ports, the age of the computer hardware, the number of devices using USB communication and by the computer’s OS.

When multiple USB connections are working in parallel, such as a mouse, keyboard and flash-drive, the bandwidth is shared among the devices. When bandwidth is shared between devices, the buffer and latency is increased due to the extra demand of resources from the computer chipset.

Low Latency Configuration

Windows Users (Advanced Low Latency Configuration)

For advanced Windows users, this instruction set will allow the use of a low-latency mode of operation for the MB8450 Car Detection Sensor.

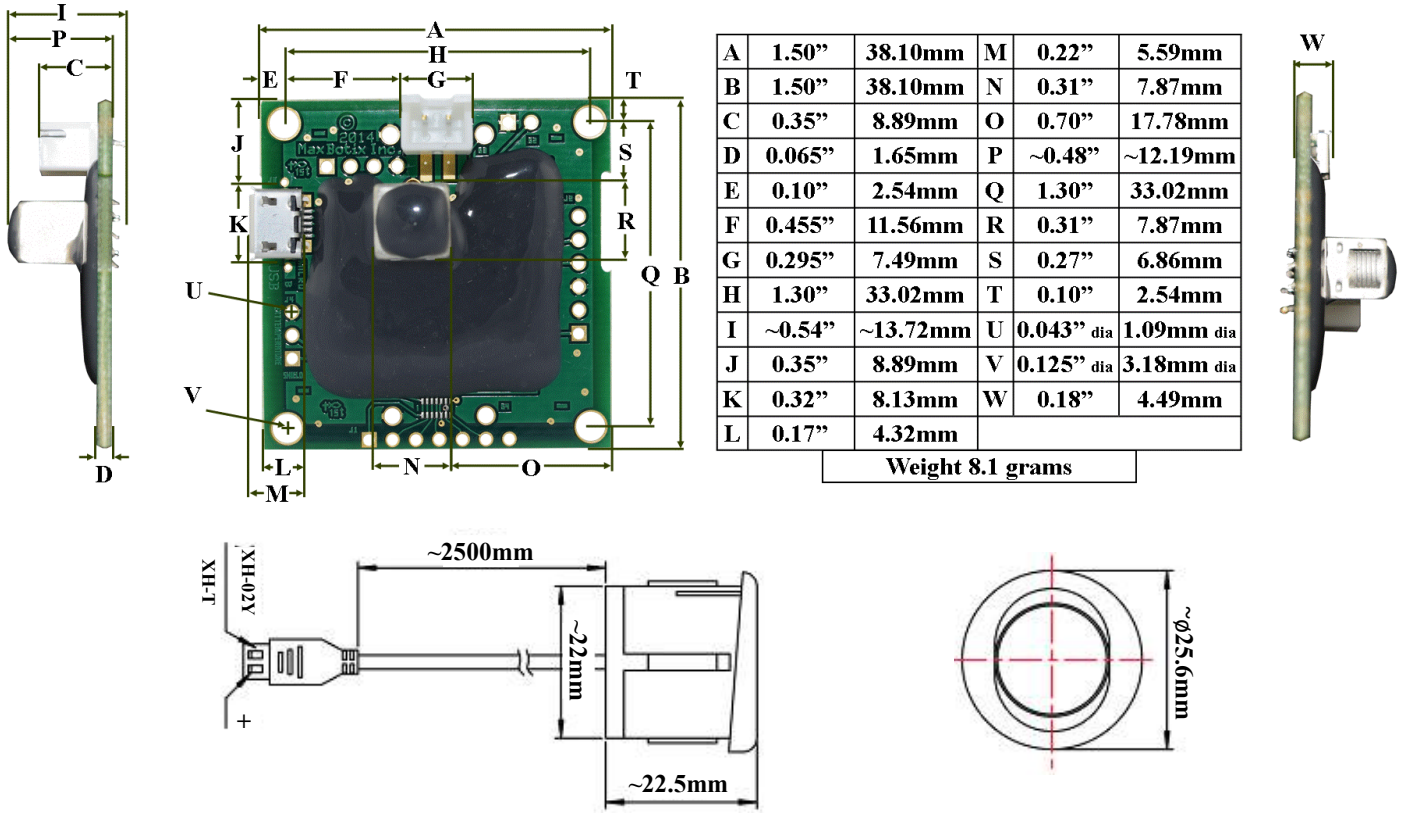
1. Open Windows' "Device Manager" This can often be accessed from the Windows' Control Panel
2. Expand the "Ports (COM & LPT)" menu
3. Select the COM port that is assigned to the MB8450 Car Detection Sensor.
4. Right click on the COM port and go down to "Properties" on the new menu
5. On the Communications Port Properties window select the "Port Settings" Tab
6. Click on the option that says "Advanced"
7. Set the "Receive (Bytes)" option to 512
8. Set the "Transmit (Bytes)" option to 512
9. Set the "Latency Timer (msec)" option to 2
10. The "Serial Enumerator" option should be checked. This setting makes Windows remember the COM port assigned to the device When this is unchecked, Windows will assign it the first available Com Port

Linux Users (Advanced Low Latency Configuration)

For advanced Linux users who want to operate in low-latency with the MB8450 Car Detection Sensor please use the following directions. While operating in low-latency mode, the USB buffer delay will be reduced to 128mS at most.

1. Open xTerm window
2. Type the following command: $ dmesg | grep FTDI. a line that looks like "/dev/ttyUSB#" will be output
3. Enter the following command. $ setserial /dev/ttyUSB# -g. The # sign will be the USB port assigned to the MB8450. Information will be output that looks like"/dev/ttyUSB#, UART: unk, PORT:0X0000, IRQ:0".
4. Enter the low latency command: $ setserial /dev/ttyUSB# low_latency. This command will set the MB8450 into low-latency mode.
5. It is recommended to test that the configuration has been confirmed. To do this enter the command $ setserial /dev/ttyUSB# -g. The low-latency flag should be appended as follows: "/dev/ttyUSB#, UART: unk, PORT: 0X0000, IRQ: 0, Flags: low_latency".

Mechanical Dimensions



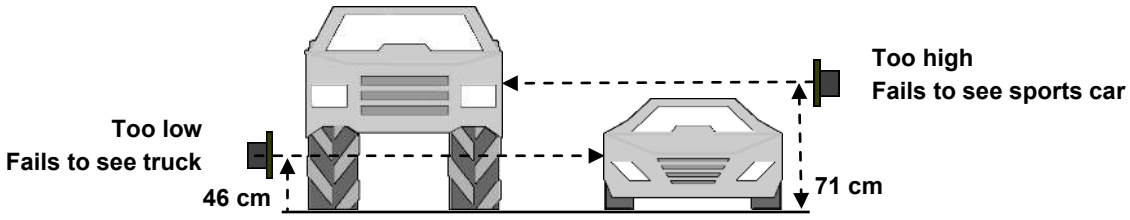
A	1.50”	38.10mm	M	0.22”	5.59mm
B	1.50”	38.10mm	N	0.31”	7.87mm
C	0.35”	8.89mm	O	0.70”	17.78mm
D	0.065”	1.65mm	P	~0.48”	~12.19mm
E	0.10”	2.54mm	Q	1.30”	33.02mm
F	0.455”	11.56mm	R	0.31”	7.87mm
G	0.295”	7.49mm	S	0.27”	6.86mm
H	1.30”	33.02mm	T	0.10”	2.54mm
I	~0.54”	~13.72mm	U	0.043” dia	1.09mm dia
J	0.35”	8.89mm	V	0.125” dia	3.18mm dia
K	0.32”	8.13mm	W	0.18”	4.49mm
L	0.17”	4.32mm			

Weight 8.1 grams

The recommended operating and storage temperature of the MB8450 Car Detection Sensor is –40C to +75C.

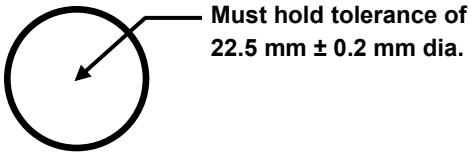
Mounting Height

When mounting the MB8450 Car Detection Sensor, the recommended placement height of the transducer is between 46.5 cm and 70.5 cm above the ground. This range in mounting height helps to ensure that the sensor will be pointed at the side panel of most vehicle makes and models for more accurate detection information. Mountings lower than 46 cm may cause the sensor to fail to detect vehicles with high ground clearance such as trucks, and mountings that place the transducer higher than 71 cm may cause the sensor to fail to detect lower profile vehicles such as sports cars.



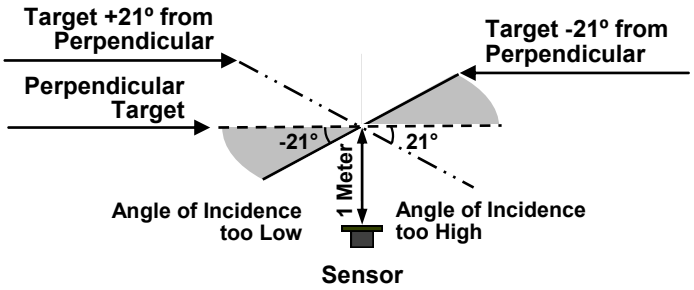
Transducer Mounting Hole

For proper performance the transducer must be mounted into a flat plate within a 22.5 mm ±0.2 mm hole. To fully stake the transducer also apply a small amount of electronic grade RTV (Loctite 5145 or comparable).



Angle of Incidence

The functional angle of incidence for the MB8450 Car Detection Sensor is ±21º at one meter to a work target. The angle of incidence will decrease as the range to the target increases or as the target size decreases.



The MB8450 Detection Zone

Different applications require different sensors. Each sensor is matched to provide the approximate detection zone shown in this datasheet. This allows end users to select the part number that matches their given sensing application. Each part number has a consistent field of detection so additional units of the same part number will have similar detection zones. The beam patterns are provided to help identify an estimated detection zone for an application based on the acoustic properties of a target versus the plotted beam patterns.

Each detection zone is a 2D representation of the detection area of the sensor. The detection zone is actually shaped like a 3D cone (having the same detection pattern both vertically and horizontally). Detection patterns for dowels are used to show the detection zone of each sensor. Dowels are long cylindrical targets of a given diameter. The dowels provide consistent target detection characteristics for a given size target which allows for easy comparison of one MB8450 another MB8450 Car Detection Sensor.

For each part number, the four patterns (A, B, C and D) represent the detection zone for a given target size. Each beam pattern shown is determined by the sensor's part number and target size.

The actual beam angle changes over the full range. Use the detection zone for a specific target at any given distance to calculate the beam angle for that target at the specific distance. Generally, smaller targets are detected over a narrower beam angle and a shorter distance. Larger targets are detected over a wider beam angle and a longer range.

MB8450 Car Detection Sensor

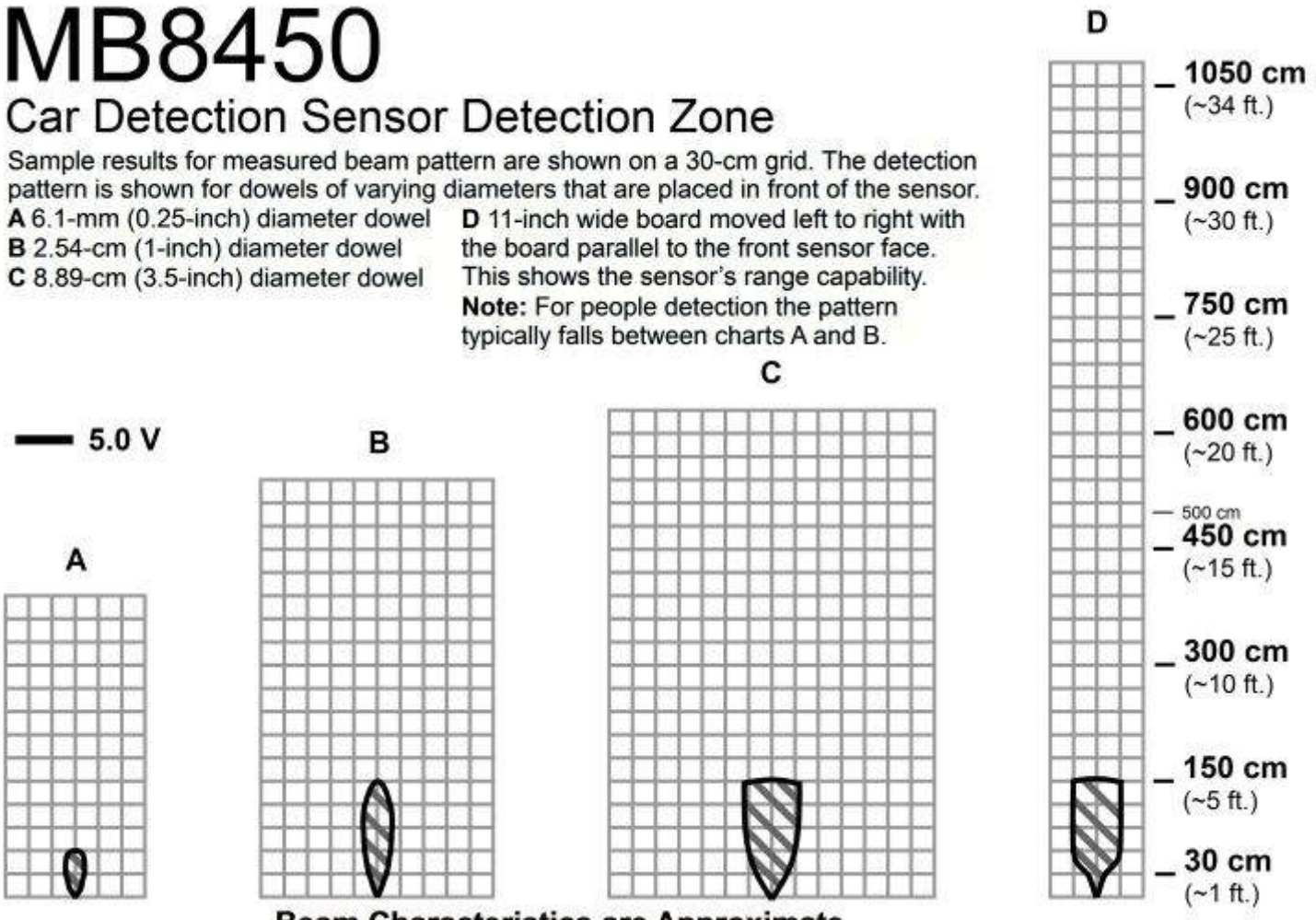
The MB8450 Car Detection Sensor has a long proximity detection zone of 150 cm.

MB8450

Car Detection Sensor Detection Zone

Sample results for measured beam pattern are shown on a 30-cm grid. The detection pattern is shown for dowels of varying diameters that are placed in front of the sensor.

A 6.1-mm (0.25-inch) diameter dowel
B 2.54-cm (1-inch) diameter dowel
C 8.89-cm (3.5-inch) diameter dowel
D 11-inch wide board moved left to right with the board parallel to the front sensor face. This shows the sensor's range capability.
Note: For people detection the pattern typically falls between charts A and B.



Beam Characteristics are Approximate

Beam Patterns drawn to a 1:95 scale for easy comparison to our other products.

MaxBotix Inc., products are engineered and assembled in the USA.

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MB8450 Car Detection Sensor

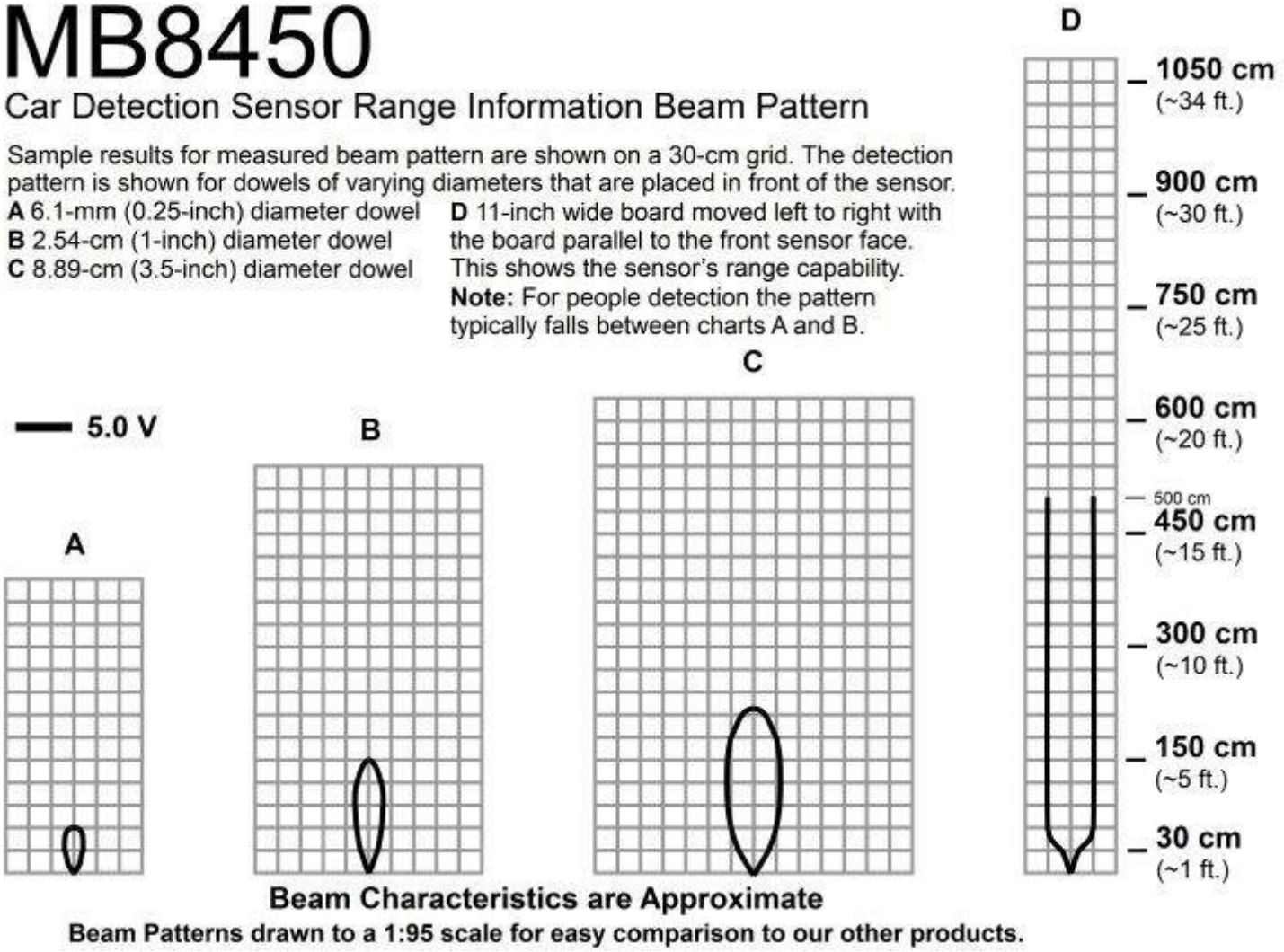
The MB8450 Car Detection Sensor outputs range information to a maximum range of 5 meters. The beam pattern below shows the beam pattern for the range information that is output by the sensor in the serial data string.

MB8450

Car Detection Sensor Range Information Beam Pattern

Sample results for measured beam pattern are shown on a 30-cm grid. The detection pattern is shown for dowels of varying diameters that are placed in front of the sensor.

A 6.1-mm (0.25-inch) diameter dowel
B 2.54-cm (1-inch) diameter dowel
C 8.89-cm (3.5-inch) diameter dowel
D 11-inch wide board moved left to right with the board parallel to the front sensor face. This shows the sensor's range capability.
Note: For people detection the pattern typically falls between charts A and B.



Beam Characteristics are Approximate

Beam Patterns drawn to a 1:95 scale for easy comparison to our other products.

Have the right sensor for your application?

Select from this product list for Protected and Non-Protected Environments.

Protected Environments

1 mm Resolution
HRLV-MaxSonar-EZ

1 in Resolution
LV-MaxSonar-EZ
LV-ProxSonar-EZ

1 cm Resolution
XL-MaxSonar-EZ
XL-MaxSonar-AE
XL-MaxSonar-EZL
XL-MaxSonar-AEL

1 mm Resolution
HRUSB-MaxSonar-EZ

1 in Resolution
USB-ProxSonar-EZ

Non-Protected Environments

1 mm Resolution
HRXL-MaxSonar-WR
HRXL-MaxSonar-WRS
HRXL-MaxSonar-WRT
HRXL-MaxSonar-WRM
HRXL-MaxSonar-WRMT
HRXL-MaxSonar-WRL
HRXL-MaxSonar-WRLT
HRXL-MaxSonar-WRLS
HRXL-MaxSonar-WRLST
SCXL-MaxSonar-WR
SCXL-MaxSonar-WRS
SCXL-MaxSonar-WRT
SCXL-MaxSonar-WRM
SCXL-MaxSonar-WRMT
SCXL-MaxSonar-WRL
SCXL-MaxSonar-WRLT
SCXL-MaxSonar-WRLS
SCXL-MaxSonar-WRLST
4-20HR-MaxSonar-WR

1 cm Resolution
XL-MaxSonar-WR
XL-MaxSonar-WRL
XL-MaxSonar-WRA
XL-MaxSonar-WRLA
I2CXL-MaxSonar-WR

1 mm Resolution
HRXL-MaxSonar-WRC
HRXL-MaxSonar-WRCT

1 cm Resolution
XL-MaxSonar-WRC
XL-MaxSonar-WRCA
I2CXL-MaxSonar-WRC

1 cm Resolution
UCXL-MaxSonar-WR
UCXL-MaxSonar-WRC
I2C-UCXL-MaxSonar-WR

Chemical Shield

F-Option. Available for WR models except UCXL. For additional protection when necessary in hazardous chemical environments.

Accessories — More information is online.

MB7954 — Shielded Cable

The MaxSonar Connection Wire is used to reduce interference caused by electrical noise on the lines. This cable is a great solution to use when running the sensors at a long distance or in an area with a lot of EMI and electrical noise.

MB7950 — XL-MaxSonar-WR Mounting Hardware

The MB7950 Mounting Hardware is selected for use with our outdoor ultrasonic sensors. The mounting hardware includes a steel lock nut and two O-ring (Buna-N and Neoprene) each optimal for different applications.

MB7955 / MB7956 / MB7957 / MB7958 / MB7972 — HR-MaxTemp

The HR-MaxTemp is an optional accessory for the HR-MaxSonar. The HR-MaxTemp connects to the HR-MaxSonar for automatic temperature compensation without self heating.

MB7961 — Power Supply Filter

The power supply filter is recommended for applications with unclean power or electrical noise.

MB7962 / MB7963 / MB7964 / MB7965 — Micro-B USB Connection Cable

The MB7962, MB7963, MB7964 and MB7965 Micro-B USB cables are USB 2.0 compliant and backwards compatible with USB 1.0 standards. Varying lengths.

MB7973 — CE Lightning/Surge Protector

The MB7973 adds protection required to meet the Lightning/Surge IEC61000-4-5 specification.