



PreView Side Defender® II

SDII87 and SDII97

Sensor Operating Manual



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FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference.

INDUSTRY CANADA STATEMENT

Per RSS-Gen, Section 8.4 This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Par RSS - Gen, Section 8.4 Cet appareil est conforme à Industrie Canada exempts de licence standards RSS. Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

REGULATORY COMPLIANCE

The PreView Side Defender®II sensor is compliant with the following countries/regions and their regulations as of the published date of this manual. The sensor may be compliant in other countries/regions. Please check your local regulations.

- **United States** - FCC- Part 15.249
 - **FCC ID: SDII87:** OXZJCKP2016 **SDII97:** OXZTHUN2019
- **Canada** - RSS-210 Radio Standards Specification
 - **IC ID: SDII87:** 20379-PREVIEW24 **SDII97:** 20379-PREVIEWTH
- **European Union** - E-Mark: E13 10R-05 15387
- **Australia/New Zealand** - AS/NZ 4268:2017 Radio Equipment and Services – Short Range Devices
- **Japan MIC:** SDII97: R005-1017



PATENTS

US patents; 7088284, 7215278, 7324278 and additional foreign patent family members. This document may be amended, corrected, and enhanced in keeping with the sensor development progress. The most recent version can be found at sensata.com

TRADEMARKS

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Safety


NOTICE

Storage and Location of These Instructions

This operating manual should be stored in a safe place and be referred to when maintaining and/or reinstalling the system.

Warning and Safety Instructions in This Operating Manual

 WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury
 CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury
NOTICE	Indicates information considered important, but not hazard-related

 WARNING	<p><i>Installation, mounting and electrical connection may only be carried out by a trained specialist in accordance with information in this operating manual.</i></p> <p><i>The PreView® system is intended as an Object Detection System and should not be relied upon as the first line of defense for the safe operation of the equipment. The system does not apply braking, steering or any other vehicle control. It should be used in conjunction with established safety programs and procedures to augment the safe operation of the equipment, ground personnel, and adjacent property.</i></p> <p><i>The driver must have the authorization to drive the vehicle and have read and understood this manual. They must also be fit to drive, i.e., not be under the influence of alcohol, drugs and/or narcotics or exceed the statutory driving times.</i></p>
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Sensor Models

The sensor has multiple models with predefined parameters.

The Side Defender®II model numbering system is as follows:

Model: SDIIABXY-Z, where:

A defines the bandwidth used – 8: 250MHz / 9: 200MHz

B defines the connection type – 7: is for Deutsch (only connector type)

X defines the low speed detection – 0: will detect moving object when vehicle speed <10mph (16km/h) / 1: will not detect when vehicle speed <10mph (16km/h)

Y defines the side of the vehicle sensor is located – 3: right side / 9: left side

Z defines the CAN ID (Source Address) of the sensor

Example: Model SDII8703-3 describes a sensor using 250MHz with a Deutsch connector, detects at low speeds and to be installed on the right side of the vehicle with a CAN ID of 3.

Note: visit sensata.com/products/blind-spot-monitoring-systems for the most current data on radar sensor models.

The frequency band used is legal throughout most of the world but check with Sensata Technologies or your country's regulations before purchasing.

Product Description

The PreView Side Defender®II is a FMCW (Frequency Modulated Continuous Waveform) radar object detection sensor designed to alert drivers of medium and heavy-duty vehicles to the presence of moving vehicles and VRUs (Vulnerable Road Users) in their side blind zone and reports these detections via a J1939 CAN bus message to the chosen HMI (Human Machine Interface).



Figure 1 - PreView Side Defender®II Radar Sensor

Sensor Description

The Side Defender®II is a small, rugged short-range radar sensor designed and made by Sensata Technologies in the USA for use in heavy-duty applications such as trucks, busses, waste vehicles and/or other applications requiring a robust, high-performance side blind-zone radar.

The sensor transmits and receives low power 24 GHz (narrow band) radar signals. Using FMCW technology the sensor processes any returned signals to determine the presence of an object and decide if it's moving or stationary. The sensor is designed to process and report detections within 300 ms (milliseconds) allowing the operator to quickly respond.

Sensor Operation

The sensor has a wide horizontal field of view up to 150° ($\pm 75^{\circ}$) providing side blind zone coverage along the length of the vehicle. It is designed to ignore stationary objects such as guardrails and parked cars while alerting on moving objects such as bicyclists and vehicles in the adjacent lane. The detection zone when the vehicle is stationary is approx. 16 ft (5 m) fore and 16 ft (5 m) aft of the sensor out to 10 ft (3 m) from the side of the vehicle. When in motion, the detection zone expands to approx. 19 ft (6 m) fore and 19 ft (6 m) aft of the sensor out to 10 ft (3 m) from the side.

Vulnerable Road User Operation

At speeds of 19 mph (30 km/h) or less, the sensor prioritizes alerting the driver of moving bicyclists in the detection zone. A visual alert is provided on the in-cab display when a moving object is detected while both an audible and visual alert are provided when the turn signal is active. Stationary objects such as street signs and parked cars are ignored to minimize 'nuisance alerts.' This mode is optimized for use in an urban environment.

Lane Change Assist Operation

When vehicle speed is above 19 mph (30 km/h), the sensor prioritizes alerting on moving vehicles in the adjacent lane. Stationary objects such as guardrails or concrete barriers are ignored to minimize 'nuisance alerts.' This mode is optimized for blind zone collision mitigation during lane changes and merging.

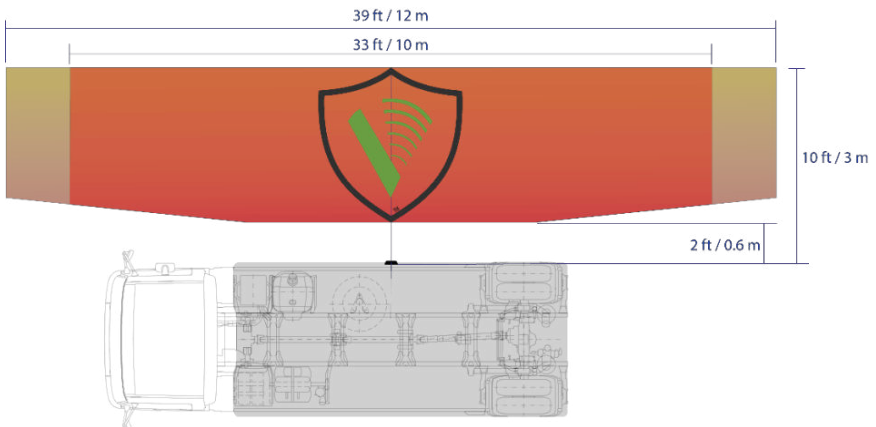


Figure 2 - Horizontal Detection Zone

Other Sensor Features

The sensor has a continuous Built-In-Self-Test (BIST) that notifies the operator via the in-cab display of sensor failure within a fraction of a second. This test functions by monitoring the transmit and receive performance as well as other internal operations. The sensor can also determine if the face of the sensor is blocked with excessive ice, mud, or snow that is impeding proper operation. This blockage is then reported to the operator via the display.

The self-test and blockage detection features are important to a fail-safe operation.

Object Detection Capability

A certain amount of the sensor's transmitted RF energy that strikes an object will reflect back to the sensor. If the returned energy is of sufficient magnitude, it is used to indicate the presence of an object. The sensor can detect most objects within the detection zone. However, there are some instances where objects can go undetected. Object composition, orientation, relative location, shape and size are all factors determining if, when, and where an object is detected.

The amount of energy returned is based on a few factors:

Angle – an object flat side perpendicular to the sensor will reflect more energy than an object at an angle. See Figure 3 for an example of how angle can affect return energy.

Composition – a metal object typically reflects more energy than a non-metallic object.

Scattering – a solid object reflects more energy than a non-solid object such as tree branches, gravel, bushes, etc.

Shape – complex shapes cause energy to be returned in a very non-uniform way. Small variations or movement can change detection status.

Size – a larger object usually reflects more energy than a smaller object.

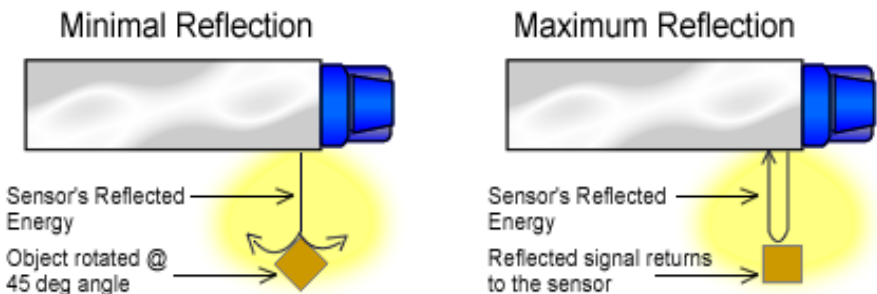


Figure 3 - Object Reflection

Sensor Installation



If the PreView® system is not installed properly, it may not operate as intended, which could result in a failure to warn the operator of a hazardous situation.

Before you Begin

Prior to installing the PreView® Object Detection System take time to familiarize yourself with all documentation, theory of operation, and system components.

Sensor Location

The sensor mounting location is **IMPORTANT** for proper system operation. The sensor should be mounted on the side of the vehicle with the bottom of the radar no lower than 24 in (60 cm) and the top of the radar no more than 39 in (100 cm) above the ground and between 138 in (350 cm) and 197 in (500 cm) back from the front edge of the vehicle. The sensor face should be perpendicular to the ground and oriented as shown in Figure 4 . Select a location that will provide some protection from impact and debris while allowing an unobstructed view of the target area of interest. Refer to the Keep Out/Interference Zones in Figure 5 for required clearance information.

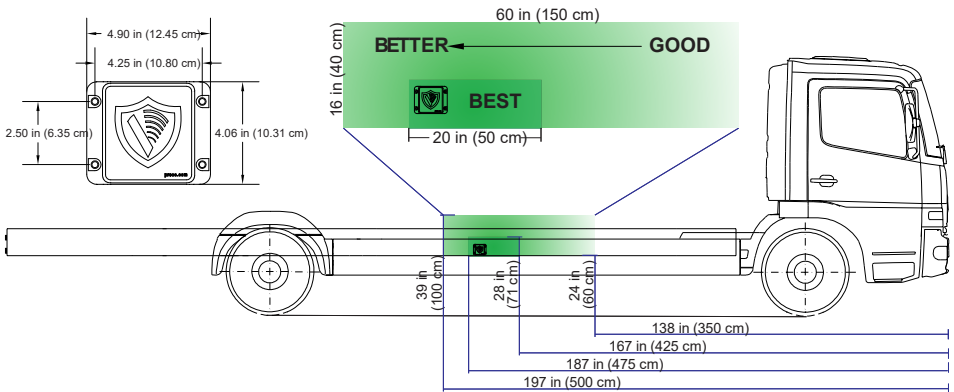


Figure 4 - Sensor Position on Vehicle

Keep Out/Interference Zones



For optimal performance, the sensor should protrude beyond any other portion of the vehicle. Metallic and other strong radar reflecting objects must remain outside of the Keep Out Zones defined in Figure 5. Radar reflecting objects within these areas may affect operation. If those objects cannot be removed, testing must be performed to determine the influence on the system's performance.

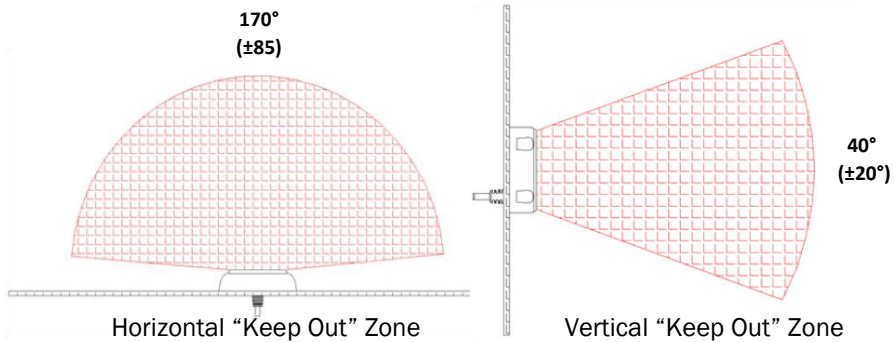


Figure 5 - Keep Out Zones



Before permanently installing the sensor on the vehicle, verify that the selected sensor mounting location provides a clear detection zone. Take the vehicle to a clear area, temporarily attach the sensor in the proposed mounting location, apply power to the system, and verify that nothing is being detected.

The sensor's performance is not affected by other PreView[®] Sensors or similar sensors operating in close proximity with each other.

Mounting Tolerances

For optimal performance, the horizontal angle (side/side) tolerance is $\pm 2^\circ$ and the fore/aft angle tolerance is $\pm 2^\circ$. The vertical angle (up/down) tolerances are $+5^\circ$ (up) and -2° (down).

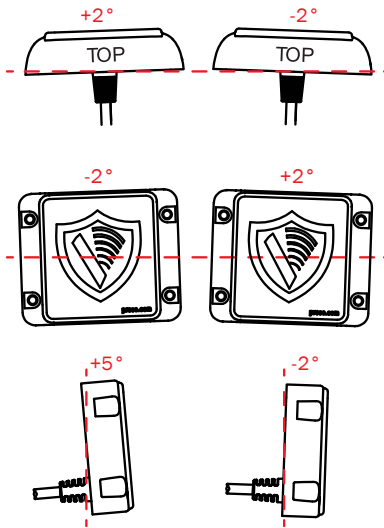


Figure 6 - Mounting Angle Tolerances

The performance of the sensor can be negatively impacted if the sensor is angled beyond what is recommended. Any time the sensor is not perpendicular to the ground, the performance should be tested.

If using a bracket to mount the sensor to the vehicle, ensure it is rigid enough it does not cause extra sensor vibration or bouncing.

Sensor Mounting

1. Select the appropriate location to mount the sensor.
2. The standard mounting configuration is with the 'shield' logo upright, as shown in Figure 4 .
3. Using the provided sensor drill template, scribe position marks through the holes. Drill four 0.25 in (6 mm) holes centered on the marks.
4. Using the same drill template, drill a 1.5 in (38 mm) hole for the sensor's connector.
5. Secure the sensor to the equipment using the supplied hardware, with a maximum 22 in-lbs. (2.5N-m) torque.

Sensor Interfaces and Configuration

Speed Message

The sensor requires knowing the speed and direction (forward or reverse) of the vehicle it is installed on to properly ignore stationary objects. The PreView® v2 Display provides the needed speed message in two different ways. The G2000 version of the display generates the speed message through its integrated GPS receiver. The D2002 version of the display is designed to connect to and monitor the speed message from the vehicle's J1939 CAN bus.

Contact Sensata Technologies for more information about how the D2002 can be used.



Incorrectly connecting to a vehicle CAN bus can cause erratic and possible dangerous vehicle behavior.

Do not connect the sensor directly to the vehicle CAN bus. Always use a gateway such as the D2002 display (with the SD810B0 cable) designed to ensure the connection allows one-way communication only from the vehicle CAN. It is not recommended to allow the sensor's J1939 message to be transmitted on the vehicle CAN bus.

If using a gateway other than the D2002 display to connect to the vehicle CAN bus, the sensor's baud rate must match the gateway's baud rate.

Turn Signal Input

The sensor requires a turn signal input for proper in-cab display operation. When the turn signal is active, the display's audible alert will sound when a moving object is detected. Refer to the System Wiring Connections Figure 7 for connection information.

Reverse Signal Input

The sensor also requires a reverse signal input for proper in-cab display operation. The sensor needs to know the direction of travel to properly ignore stationary objects while in reverse. Refer to the System Wiring Connections Figure 7 for connection information.

Auxiliary Output

The sensor provides an auxiliary output signal that can be used to provide additional alerts. The output is switched from a high impedance state to ground when active and is protected against an over-current or electrical short condition. One example use of this output is to drive an LED indicator in a side mirror when there is an object in the side blind zone. Contact Sensata Technologies for more information.

System Connections



WARNING

If the PreView® system is not wired properly, it may not operate as intended, which may result in a failure to warn the operator of a hazardous situation.

Locate the vehicle's ignition power to connect the red wire on the body harness (SOD510T), connect the black wire to ground.

Locate the vehicle's turn signal wire associated with the turn signal lamp on the sensor side to connect the dark blue wire on the body harness. On some vehicles the hazards will activate the turn signal lamp.

Locate the vehicle's reverse signal wire to connect the light blue wire on the breakout cable (SD810B0). If it is necessary to extend the wires on the supplied harnesses, use 20 AWG wire as a minimum.

Locate the vehicle's J1939 CAN-bus to connect the yellow (CAN H) and green (CAN L) wires on the breakout cable.



WARNING

Be sure the PreView® v2 display provides 5 beeps ONLY when the turn signal is active, and a moving object is detected by the sensor.

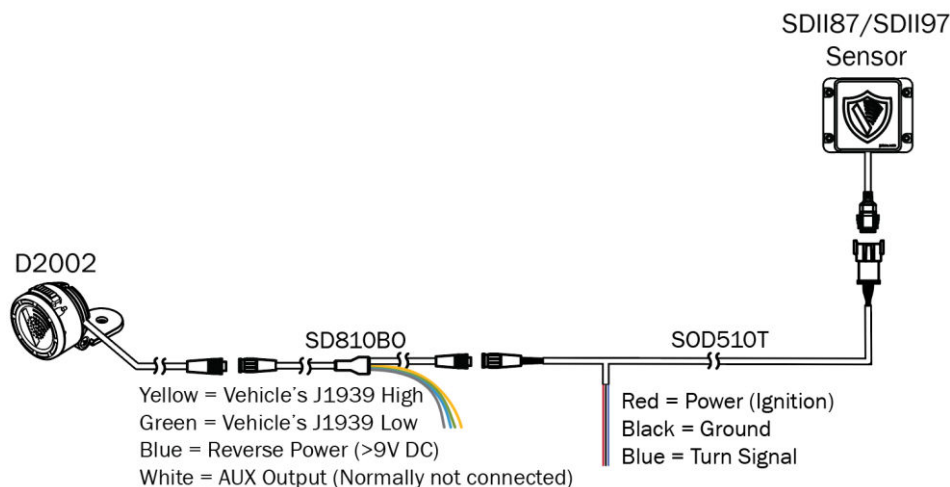


Figure 7 - System Wiring Connections

Maintenance and Testing



If the PreView® system is not maintained properly, it may not operate as intended, which may result in a failure to warn the operator of a hazardous situation.

A walk around test shall be performed every day to verify proper function of the system and to familiarize the operator with the zone of detection. More frequent inspections should be performed when:

- The equipment is operating in a particularly dirty or harsh environment.*
- The operator has reason to suspect the system has been damaged.*

Although the sensor performs well in harsh environments (high temperature, fog, rain, snow, etc.) it is still recommended that the sensor face be cleaned periodically as you would your equipment lights. The sensor is sealed to meet IP69K, can withstand high vibration and shock levels, and is virtually maintenance free.

This test should be performed with two people, the operator who remains in the cab, and the assistant who walks through the sensor's detection zone.

1. Clean the sensor face of any accumulation of dirt, mud, snow, ice, or debris.
2. Move the vehicle to an open field larger than the detection zone to test
3. Visually inspect the wiring and cables to verify that they are properly secured, not chafing or dangling free where they could become snagged and damaged. Inspect the Sensor and Operator Display and verify that they are securely attached to the equipment.
4. Place the sensor in active mode. Make sure the vehicle has been secured and remains stationary.
5. Verify the sensor is operational with a green Power LED illuminated on the PreView® v2 display.
6. Assure the detection zone has been cleared of all objects. Any objects in the detection zone may interfere with the test.
7. Engage the corresponding turn signal (same side as sensor).
8. The assistant should start straight out from the sensor outside of the detection zone and walk in at a normal pace (approx. 3 mph, 5 km/h) towards the sensor. When the warning activates, the operator should signal to the assistant so the location of detection can be marked/noted.
9. The assistant should start outside of the detection zone, move a meter to the left of the sensor and walk straight towards the vehicle and again, mark/note the location of detection.

10. Repeat the step 9 by moving out another meter to the left and walking towards the vehicle. Continue this step until the assistant is no longer detected.
11. Repeat steps 9 and 10 for the right side.
12. The results will provide a basic outline of the detection zone.
13. Finally, after the test, the operator and the assistant need to communicate the details about the detection zone.

Safety Message

Safety Message to Vehicle Operators with PreView® Radar Systems

1. Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death. It is necessary to read, understand and follow all instructions shipped with the product.
2. The equipment operator must check for proper operation at the beginning of every shift or safety inspection period.
3. The PreView® system is intended as an Object Detection System and should not be relied upon as your first line of defense for the safe operation of the equipment. It should be used in conjunction with established safety programs/procedures to augment the safe operation of the equipment and to protect ground personnel and adjacent property.
4. People's lives depend on the proper installation of this product in conformance with these instructions. Should the system become inoperative, it could jeopardize the safety or lives of those who utilize the system.
5. The PreView® Object Detection System is intended for commercial use. Proper installation of the object detection system requires a good understanding of equipment electrical systems and procedures, along with proficiency in the installation.
6. Store these instructions in a safe place and refer to them when maintaining and/or reinstalling the system.

For questions, call +1.866.977.7326 toll free in the USA. Call +1.208.323.1000 or send a fax request to +1.208.323.1034 for outside the USA, or submit an online request at sensata.com/contact-us-technical-support

Troubleshooting

NOTICE

For troubleshooting assistance, please reference your specific display manual.

Visit our manuals online at:

sensata.com/blindspotmonitoring/manuals

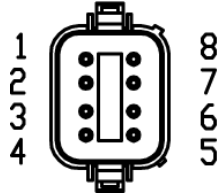
Or

Scan the code below for quick access:



Sensor Pinout

CONNECTOR END VIEW DEUTSCH DT06-08SA-E008



CONNECTOR PIN OUT	
PIN	SIGNAL NAME
1	INPUT POWER (+)
2	GROUND
3	CAN HIGH
4	CAN LOW
5	DISPLAY POWER OUTPUT (+)
6	DISPLAY GROUND
7	AUXILIARY OUTPUT (ACTIVE LOW)
8	TRIGGER INPUT (TURN SIGNAL)

Figure 8 - Deutsch Connector Pin Out

Sensor Specifications

NOTICE

Transmitter	FMCW Radar - 24 GHz Narrow Band
Connector:	Deutsch DT06-08SA-E008, See Figure 8
Protection Rating:	IP69K
Housing Material:	Polycarbonate radome
Dimensions:	4.90" w x 4.06" h x 1.28" d (12.4 cm x 10.3 cm x 3.25 cm)
Weight:	1.15 lb (0.52 kg)

Operating Temperature:	-40 °C to +85 °C
Storage Temperature:	-55 °C to +105 °C
Vibration:	25 G, random, all three axis
Shock:	50 G
Mounting:	Four 0.22" (5.6 mm) diameter mounting holes.

Operating Characteristic	
Range:	Detection Zone - 10' (3 m) x 39' (12 m), see Figure 2
Range Accuracy:	0.3 m
Azimuth Field of View:	±75° (10 dBsm target)
Elevation Field of View:	±10° (10 dBsm target)
Angle Accuracy:	±2° @ ±10° FoV, ±5° @ ±30° FoV, ±10° @ ±75° FoV
Velocity Range:	± 30 m/sec (± 69 mph)
Velocity Accuracy:	0.2 m/sec (0.5 mph)
Target Resolution:	1.4 m for static targets, nearing 0.3 m for dynamic targets
Cycle Time:	120 ms (a CAN bus target message is provided in every cycle)
Target Detection Time:	300 ms
Power On to Active Time:	300 ms

Electrical Specifications

Frequency:	SDII87: 24.00 – 24.25 GHz. SDII97: 24.05 – 24.25 GHz
Power Supply:	9 – 33 VDC, Reverse polarity and over-voltage protection
Current:	<0.5 A

Communications Interface

J1939 CAN Bus Baud Rate:	250 Kbits/sec, not terminated
Auxiliary Output	Active - Switch to ground, sink up to 1 A, over current protection Inactive – High Impedance

Regulatory Compliance

Compliant with FCC part 15.429

SDII87:	UK CA	FCC ID:	OXZJCKP2016
		IC:	20379-PREVIEW24
		'CE' 'E' mark:	E13 10R05-15387
		AS/NZ:	4268 2017

SDII97:	FCCID:	OXZTHUN2019
	IC:	20379-PREVIEWTH
	'CE' 'E' mark:	E13 10R05-15387
	Japan MIC:	R005-101717

PRODUCT MANUFACTURED IN THE USA

Warranty Information

MANUFACTURER STANDARD LIMITED WARRANTY AND LIMITATION OF LIABILITY

Manufacturer warrants that on the Date of Purchase this Product will conform to Manufacturer's published specifications for the product, which are available from Manufacturer on request, and Manufacturer warrants that the product is free from defects in materials and workmanship. This Limited Warranty for the sensor extends for sixty (60) months from the date of shipment. Manufacturer will, at its option, repair or replace any product found by Manufacturer to be defective and subject to this Limited Warranty.

This Limited Warranty does not apply to parts or products that are misused; abused; modified; damaged by accident, fire or other hazard; improperly installed or operated; or not maintained in accordance with the maintenance procedures set forth in Manufacturer's Installation and Operating Instructions.

To obtain warranty service, you must ship the product(s) to the specified Manufacturer location within thirty (30) days from expiration of the warranty period. To obtain warranty service, call Customer Service at +1.866.977.7236 or +1.208.323.1000 or fax your request to +1.208.323.1034. Customer Service will issue warranty authorization and further instructions. You must prepay shipping charges and use the original shipping container or equivalent.

EXCLUSION OF OTHER WARRANTIES: MANUFACTURER MAKES NO OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY. THE IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED AND SHALL NOT APPLY TO THE PRODUCT. BUYER'S SOLE AND EXCLUSIVE REMEDY IN CONTRACT, TORT OR UNDER ANY OTHER THEORY AGAINST MANUFACTURER RESPECTING THE PRODUCT AND ITS USE SHALL BE THE REPLACEMENT OR REPAIR OF THE PRODUCT AS DESCRIBED ABOVE.

LIMITATION OF LIABILITY: IN THE EVENT OF LIABILITY FOR DAMAGES ARISING OUT OF THIS LIMITED WARRANTY OR ANY OTHER CLAIM RELATED TO MANUFACTURER'S PRODUCTS, MANUFACTURER'S LIABILITY FOR DAMAGES SHALL BE LIMITED TO THE AMOUNT PAID FOR THE PRODUCT AT THE TIME OF ORIGINAL PURCHASE. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR LOST PROFITS, THE COST OF SUBSTITUTE EQUIPMENT OR LABOR, PROPERTY DAMAGE, OR OTHER SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES BASED UPON ANY CLAIM FOR BREACH OF CONTRACT, NEGLIGENCE OR OTHER CLAIM, EVEN IF MANUFACTURER OR A MANUFACTURER'S REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Manufacturer shall have no further obligation or liability with respect to the product or its sale, operation and use, and Manufacturer neither assumes nor authorizes the assumption of any other obligation or liability in connection with such product.

This Limited Warranty gives you specific legal rights, and you may also have other legal rights, which vary, from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.

Any oral statements or representations about the product, which may have been made by salesmen or Manufacturer representatives, do not constitute warranties. This Limited Warranty may not be amended, modified or enlarged, except by a written agreement signed by an authorized official of Manufacturer that expressly refers to this Limited Warranty.

More PreView® Safety Products

PreView® Radar Blind Spot Monitoring

- **Sentry®** – 150° fully adjustable detection zone. Detects distance, relative velocity, and angle of up to 16 objects simultaneously from 0 to 30 m (98') away.
- **Side Defender®** – 150° intelligent side object detection radar. Ignores stationary objects while warning of other vehicles in your side blind spots when traveling > 10 mph (16 km/h) and warns of stationary and moving objects when traveling < 10 mph (16 km/h).
- **Sentry®X** – Designed with a narrower FOV than the Sentry®, Sentry®X supports installations that must be inset, such as large haul trucks.

PreView® Camera Monitor Solutions

- **PreView® Plus** – 7" IP67 monitor supports 1 to 4 cameras with 1 to 24 radar sensors providing combined camera and radar technologies to deliver the most complete active blind spot monitoring solution available.
- **Monitor 5 HD** – 5" heavy-duty IP67 monitor supports up to 3 cameras.
- **Monitor 5 LD** – 5" monitor for closed cabs. Supports a single camera.
- **Mini Cam** – Compact cameras with 120°, 150°, or 180° field of view.
- **Heavy-Duty Cam** – IP67 Heavy-Duty camera with 118° field of view, IR LEDs, and built-in heater.

PreView® VideoLink – Make your existing camera system an active safety resource by adding visual and audible alerts from a PreView® Radar sensor to your in-cab monitor.

PreView® PRECOLink – Wirelessly connects your PreView® Radar sensor(s) to your in-cab display, providing versatility and ease of installation for a wide range of applications.

PreView® Software

Configuration Tool – Allows the end user to configure various settings for the Sentry®, Sentry®X, Side Defender®, Side Defender®II, v2 Displays, and CD6102 and SOD displays.

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