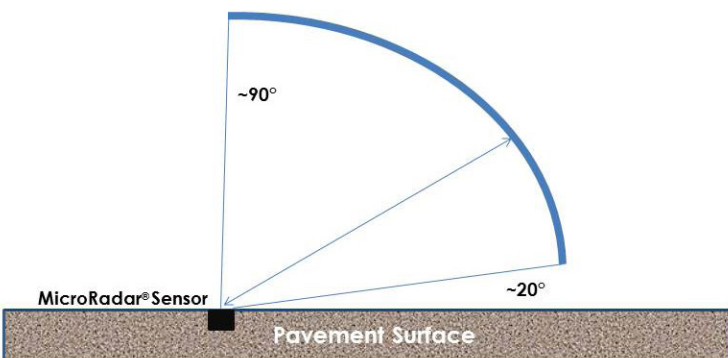


## VSN240-M MicroRadar® Sensor

**Sensys Networks VSN240-M MicroRadar®** sensor incorporates an extremely low power, wide-band radar with a Sensys Networks Nano-Power Protocol radio. The compact in-ground sensor works using the same principle as any other radar. High frequency RF pulses are transmitted, bounced off a target object, and the return pulses are measured by a time-gated RF mixer. RF reflections are analyzed to produce presence, distance, and motion measurements.

MicroRadar® sensors are installed very close to the roadway surface and are capable of detecting trains, cars, trucks, and bicycles. MicroRadar® sensors are also capable of detecting and distinguishing objects in motion from objects that are stationary, as well as large objects from small objects. MicroRadar® sensors have a programmable detection range between 4' (1.2 m) and 10' (3 m). The width of a detection zone is approximately 90 degrees and the default range is 6' (2 m).



### Advanced MicroRadar®-Based In-Road and Parking Detection

MicroRadar® sensors can detect bicycles that are stopped at a stop bar and differentiate between a vehicle and a bicycle. The basic method to differentiate bicycles from vehicles is based on measuring the breadth of the returned RF signal. Bicycles yield relatively small breadth values while vehicles generate both small and large values depending on the location of the vehicle.

MicroRadar® sensors can also detect vehicles parked on the street or in a parking lot. Since there is always the possibility of a person or a vehicle moving in or near the detection zone, a filter is applied during detection to eliminate the effects of nearby moving objects. The filter removes any short term variations so that detection is performed only on that part of the return signal that is long term stationary.



### Functions/Features

#### Fully wireless operation – no cable connections

- Battery powered
- Eight year battery life
- Low power consumption

#### Enhancement to VSN240 sensors

- MicroRadar® sensors can be used in conjunction with VSN240 magnetometer sensors, and can be used in both dedicated and shared lanes
- Installs seamlessly as a supplement to an existing primary detection system

#### In-road and parking detection

- In-road detection capable of detecting bicycles and vehicles
- Modes for in-road and parking detection
- Detection modes differentiate between vehicles, bicycles, and other objects
- Detects long term stationary, stopped, and slow moving vehicles

#### Detection area

- User programmable detection area
- 1 Hz sampling rate for in-road and parking detection
- Selectable sampling rate of 1/2, 1, 2, 4, and 8Hz

#### Simple installation

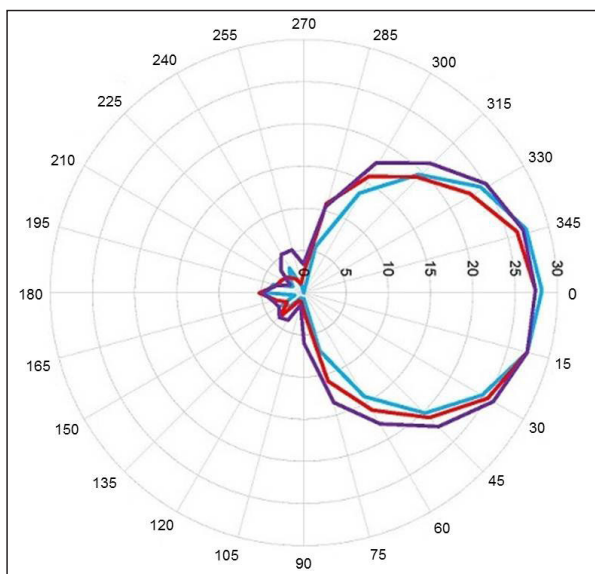
- Installs in less than 10 minutes using a hammer or core drill
- Installed flush to the road surface (no more than 1/4" (.6 cm) below the road surface)
- Covered with fast-drying epoxy
- Minimal lane closure time
- No saw cuts

## Functional Specifications

### Radio Specifications

<b>over-the-air protocol</b>	Sensys Networks NanoPower (SNP) protocol (TDMA)
<b>physical layer protocol</b>	IEEE 802.15.4 PHY
<b>modulation</b>	Direct Sequence Spread Spectrum Offset Quadrature Phase-Shift Keying (DSSS O-QPSK)
<b>transmit/receive bit rate</b>	250 kbps
<b>frequency band</b>	2400 to 2483.5 MHz (ISM unlicensed band)
<b>frequency channels</b>	16
<b>channel bandwidth</b>	2 MHz
<b>antenna type</b>	ceramic patch antenna (mounted below top surface of sensor)
<b>antenna field of view</b>	±60° (azimuth & elevation)
<b>nominal output power</b>	+3 dBm
<b>spurious emissions</b>	<ul style="list-style-type: none"> <li>30 - 1000 MHz: &lt; -56 dBm</li> <li>1 - 12.75 GHz: &lt; -44 dBm</li> <li>1.8 - 1.9 GHz: &lt; -56 dBm</li> <li>5.15 - 5.3 GHz: &lt; -51 dBm</li> </ul>
<b>typical receive sensitivity</b>	-101 dBm

### Radar Antenna Pattern



### Compliance

<b>safety</b>	2006/95/EC
<b>EMC</b>	<ul style="list-style-type: none"> <li>FCC: 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.</li> <li>2004/108/EC</li> </ul>

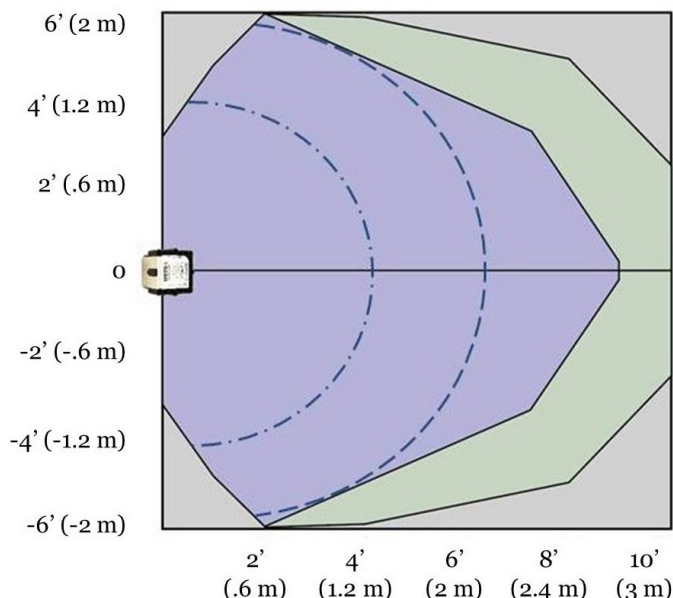
### Radar Specifications

<b>frequency</b>	6.3 GHz
<b>bandwidth</b>	>500 MHz
<b>radiated power</b>	within FCC class B limits
<b>maximum range</b>	4' (1.2 m) to 10' (3 m) (selectable)
<b>calibration</b>	self calibrating
<b>sample rate</b>	1/2, 1, 2, 4, and 8Hz (selectable)

### Power, Physical, & Environment

<b>power supply</b>	<ul style="list-style-type: none"> <li>non-replaceable primary Li-SOCl<sub>2</sub> 3.6V battery pack</li> <li>7.2 Ah (nominal capacity)</li> </ul>
<b>dimensions</b>	2.9" x 2.9" x 2.3" (7.4 cm x 7.4 cm x 5.8 cm)
<b>weight</b>	0.6 pounds / 0.3 kg
<b>environment</b>	<ul style="list-style-type: none"> <li>designed for in-pavement mounting</li> <li>performance diminishes in standing water and in slushy conditions</li> <li>NEMA Type 6P enclosure</li> <li>IP67 ingress protection</li> </ul>
<b>operating temp</b>	-40°F to 176° / -40°C to +85°C

### In-Road Detection Zone



Adjustable radar detection zone. The purple area depicts the sensor detection zone for all vehicles (including bicycles). The green area depicts the sensor detection zone for large vehicles. The 4' (1.2 m) and 6' (2 m) arcs represent detection distance settings.

**Local Distributor**