

## PUBLIC-INTEREST FINDING FOR PROPRIETARY-MATERIAL USE

ROUTE: VARDES NO: VAR

PROJECT NO: VAR COUNTY: VAR

PROJECT DESCRIPTION: Programmatic approval.

FHWA OVERSIGHT:  YES  NO

PROPRIETARY MATERIAL:

SmartSensor SS105 (microwave radar);

SmartSensor HD SS125

Manufactured by Wavetronix LLC

and

Remote Traffic Microwave Sensor (RTMS) G4

Manufactured by Image Sensing Systems, Inc.

### 1. Description of Need:

The ITS Technology Deployment Division of the Indiana Department of Transportation is seeking approval for equipment important to the detection and measurement of the traffic on Indiana roadways.

Desired materials are non-intrusive radar-based vehicle sensors. Installed on the side of the road, they provide capability to detect, count, determine speeds of passing vehicles, and, in some configurations, classified them.

Required functionality includes:

- Provide ability to monitor 8-12 user defined zones (lanes of traffic).
- Provide ability to detect presence of vehicle in the detection zone, count vehicles passing through the zone, determine speeds of vehicles, and classify vehicles.
- Provide ability to monitor up to 250 ft of road surface (across the lanes).
- Provide interface with existing network (TMC).
- Provide accurate, per-line data.

### 2. Product History:

These devices have been in use in Indiana for over 8 years. Over 400 of SS105, SS125, and RTMS G4 devices are currently being used in Indiana. They demonstrate very high reliability (over 96% uptime) and maintainability. Desired product is currently listed on INDOT Approved Materials List for Traffic Signal and ITS Control Equipment under ITS AFP Controller. Testing was conducted according the ITM No. 953-10P

**3. Product Availability:** SmartSensors, manufactured by Wavetronix LLC and RTMS G4 by Image Sensing Systems, Inc. are only products on the market, meeting all requirements.

Although there are many vehicle detecting microwave radar sensors, most of them are designed for different purposes. There were no attempts by the manufacturers to present their products to be tested to **ITM No. 953-10P**.

**4. Product Cost:** There is no equipment on the market, meeting the requirements, to make a cost comparison with. The next closest product is Microwave Vehicle Motion Sensor TC26-B manufactured by MS SEDCO and priced \$3300.00. However, this device is not capable of counting, speed detection, and classification of the vehicles.

**5. Project Compatibility:** Desired products are the only products on the market that meet INDOT requirements for the vehicle detection and data compatibility with currently used Data Bases..

**6. Maintenance:** Desired equipment is very reliable. Current system allows for remote monitoring of the detection sites which drives the maintenance costs down. Training is available on line in Wiki Notes, accessible for tech personnel from any location in Indiana. Low failure rate (less then 5% including "acts of God") and short order turn around time results in the minimal storage requirement.

**7. Engineering Analysis:** This application is programmatic by nature and unique not to a specific ITS project, but to the ITS architecture that is already in place. Microwave radar sensors are essential components that allow monitoring of the live traffic volumes, speed, and classification. The specifications are needed for synchronization with existing system and not unique to the specific project.

**8. Expanded Economic Analysis:** Due to the fact, that there is no equipment on the market to do comparison life cycle analysis, it may be stated that actual yearly maintenance cost is low. The average life cycle of the desired product is evaluated as 5 years. There are units currently in service installed in 2008. Annual replacement rate, including damage done by lightning, is 8 units with approximately 200 units being now in service.

**9. Contractual or Performance Implications:** Use of desired items does not impose any restrictions on the use of other items on the contracts.

**10. Attach Supplemental Documentation:** Attached are:

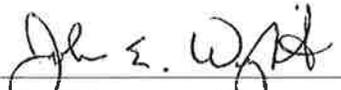
- a) INDOT ITS Architecture;
- b) ITM # 953-10P Microwave Vehicle Radar.

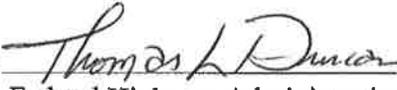
**11. Length of Time that Approval is Effective:** 3/1/2014 to 3/1/2017

Prepared By: Konstantin Veygman

Field Engineer

INDOT-ITS Technology Deployment Division

APPROVED:  Date: 2/7/14  
INDOT Director of Engineering Services and Design Support

APPROVED:  Date: 2/10/14  
Federal Highway Administration

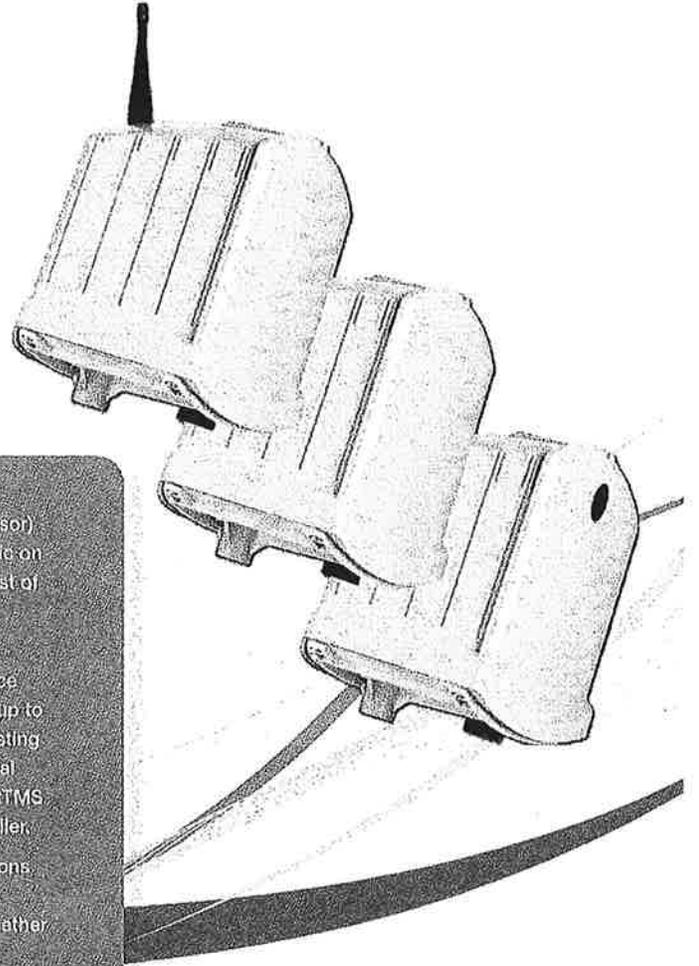


# RTMS<sup>SM</sup> G4<sup>SM</sup>

The non-intrusive, radar-based RTMS<sup>SM</sup> (Remote Traffic Microwave Sensor) G4<sup>SM</sup> is an advanced sensor for the detection and measurement of traffic on roadways. It is all-weather accurate and virtually maintenance-free. Best of all, RTMS is renowned for long-term, worry-free reliability.

The RTMS G4 is a small roadside pole-mounted radar, operating in the microwave band. Simultaneously, the sensor provides per-lane presence as well as volume, occupancy, speed and classification information in up to 12 user-defined detection zones. Output information is provided to existing controllers via contact closure and to other computing systems by serial port, IP communication port or by an optional radio modem. A single RTMS can replace multiple inductive loop detectors and the attendant controller.

The G4 combines a high resolution radar and a variety of communications options including wireless solutions all in a single enclosure. This sleek cabinet-free detection station is simple to integrate into any system whether urban signal control or highway traffic management.



## APPLICATIONS

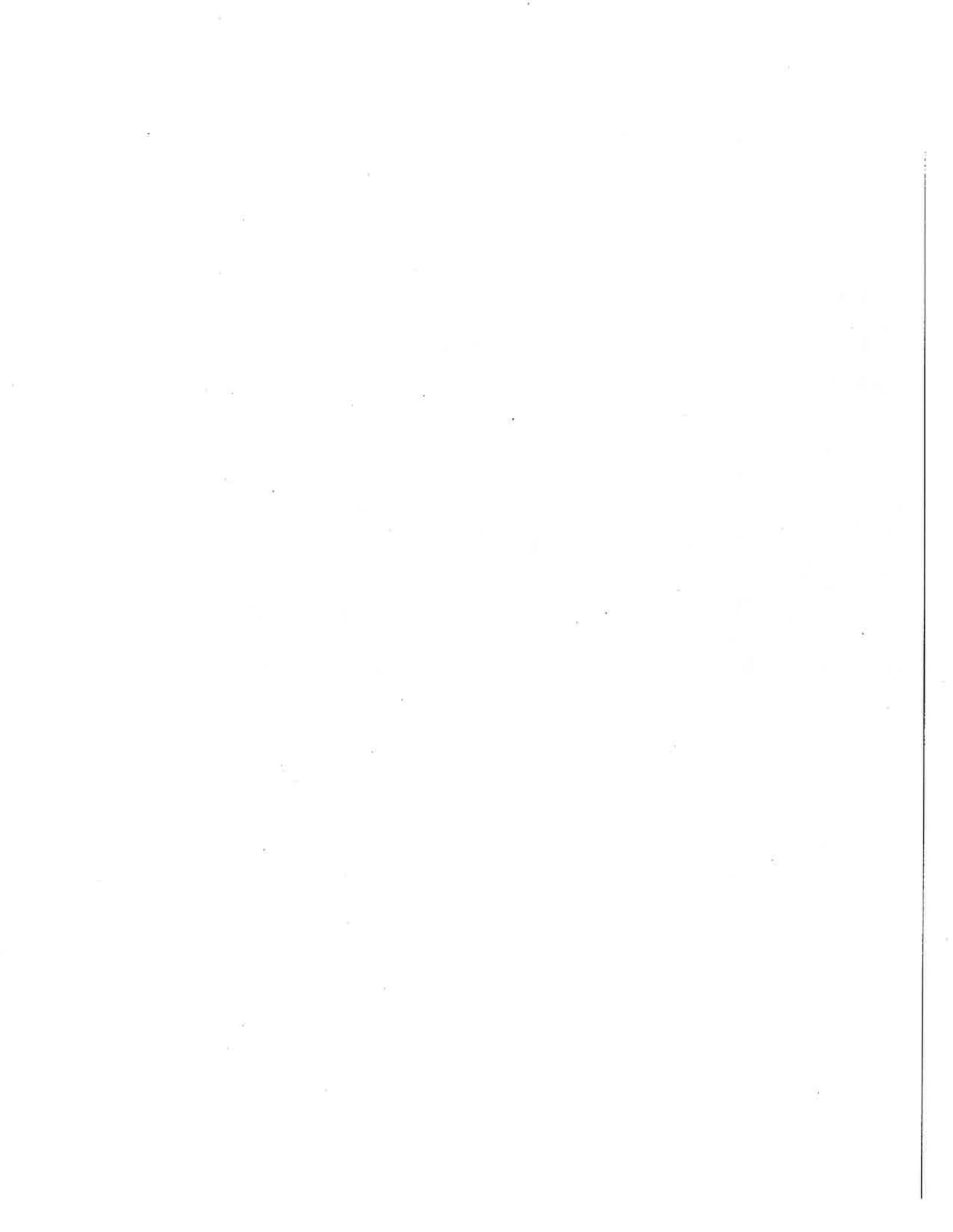
- > Mid-block detection for intersections (system, advance detection)
- > Freeway traffic management and incident detection systems
- > Traveler Information and travel time
- > Ramp metering
- > Queue detection
- > Work zone safety systems
- > Permanent and mobile traffic counting stations
- > Enforcement of speed violation
- > Loop replacement (single or dual loop emulation)

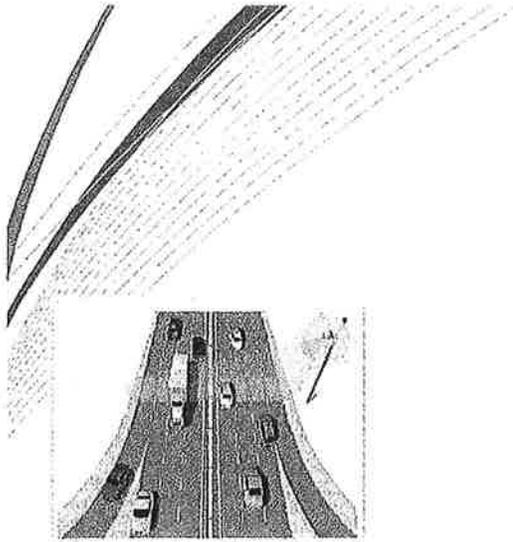
## FEATURES

- > Provides presence indication and accurate measurements of volume, occupancy, speed and classification in up to 12 separate zones (lanes) up to 76 m (250 ft) away
- > Fully programmable to support multiple applications using simple intuitive software on a Notebook PC
- > True-presence: detects stationary and fast moving vehicles; single or dual loop emulation
- > Reliable all-weather performance
- > Backwards compatible with all previous RTMS Protocols
- > Low life-cycle cost with no routine maintenance procedures and high reliability. Typical MTBF -- 13 years
- > Easy to calibrate by fast, automatic set-up wizard
- > Bluetooth remote setup and verification

## BENEFITS

- > Speedy, safe installation, typically on existing road-side poles, with no traffic disruptions
- > Compatible with all RTMS integrated solutions including detection station, counting, urban traffic control, event reporting, data collection, and flow monitoring
- > Highly flexible: suitable for any road and pole type, with various built-in communications options, including contact pairs, radio modems and a video camera with TCP/IP
- > Zero setback capability means most poles will be suitable for installation
- > Low power requirement allows continuous operation with a cost-effective solar system





## Contacts

Image Sensing Systems, Inc.  
Headquarters  
500 Spruce Tree Centre  
1600 University Avenue West  
St. Paul, Minnesota 55104-3826 USA

Phone +1 651 603 7700  
Fax +1 651 205 6402  
stpaul@imagesensing.com  
imagesensing.com

Image Sensing Systems  
Canada Limited  
150 Bridgeland Ave, Suite 204  
Toronto, Ontario M8A 1Z5  
Canada

Phone +1 416 785 9248  
Fax +1 416 785 9332  
info@imagesensingca.com  
imagesensingca.com

Image Sensing Systems  
Europe Limited  
City Park  
Swiffields  
Welwyn Garden City, Hertfordshire  
AL7 11Y United Kingdom

Phone +44 1707 378870  
Fax +44 1707 378876  
enquiries@imagesensingeu.com  
imagesensingeu.com

Flow Traffic Limited  
Suite 1813, 18th Floor, Chevalier Centre  
No. 8 Wang Hoi Road  
Kowloon Bay  
Hong Kong  
Phone +852 2827 1123  
Fax +852 2827 0056  
hongkong@flowtraffic.com  
flowtraffic.com.cn

## SPECIFICATIONS

### Area Coverage (Radar)

The RTMS detection field of view covers the area defined by:

- > Elevation angle
  - 50 degrees
- > Azimuth
  - 12 degrees
- > Range
  - 0 to 76 m (0 to 250 ft)

### Measurement Resolution

- > Detection zones
  - up to 12 zones
- > Detection range (increment)
  - 0.4 m (1.3 ft)
- > Zone width
  - 2 to 7 m (7 - 20 ft)
- > Time events
  - 1.3 msec

### Frequency Bands

- > K band, model G4 operates at high resolution in the 24 GHz band

### Regulatory

- > FCC
- > CE EN 60215, EN 301 489-1, EN 301 489-3, EN 300 440-1, EN 300 440-2
- > Canadian CSA C108.8 - M1983

### Interface

- > Single MS type connector provides multiple options of power and output signals
- > Data: volume, occupancy, speed, gap or headway, six vehicle classes, 85th percentile
- > 8MB built-in memory for data collection
- > Optically isolated configurable RS232/RS-485 port provides vehicle presence, per vehicle and statistical data
- > Bluetooth communication for setup, calibration and data access

### Configuration Options

- > Base unit (as configured above)
- > Option 1: Base unit plus second serial port (RS-232/422)
- > Option 2: Base unit plus DSS radio modem (900 MHz band)

- > Option 3: Base unit plus IP Camera with TCP/IP

\*Note: All 3 options include 8 optically isolated output pairs rated for 100mA and 350V for presence indication and speed

### Mechanical

- > Unit is encased in a rugged, water-tight NEMA 4X IP-67 polycarbonate enclosure
- > Mounted on a universal bracket, enabling securing of unit to poles, tilting in both axes, and quick locking
- > Size
  - 21 x 21 x 16 cm (8 x 8 x 6 in)
- > Weight
  - 1.5 kg (3.5 lbs)

### Power

- > Operates on 12 - 24 VAC or VDC
  - 3W max standard
  - 12W max with IP camera option
- > Surge protection IEC 1000-4-5 and EN 61000-4-5 built-in on all external connections

### Maintainability

- > Ultra reliable: MTBF (mean time between failures) designed for 114,000 hours (13 years)
- > Shop repairable and expandable
- > Self-test diagnostic software
- > 15 minute replacement time
- > Firmware field upgradable

### Environmental Conditions

- > Temperature range
  - -40° to +74°C (-40° to 165°F)
- > Vibration
  - 0.5 g up to 300 Hz
- > Shock
  - 10 g 11 msec half sine wave
- > Wind
  - Up to 161 km/hr (100 mph)
- > IP 67 compliant

### Warranty

- > Two-year warranty

ISO 9001: 2000 Registered

**imagesensing.com**

*Due to ISS' continuous efforts to develop the products that are most responsive to our customers needs, the above specifications are subject to change.*



©2011 Image Sensing Systems, Inc.  
Part Number: 2190 Rev. 111101

