

System Assessment and Validation for Emergency Responders (SAVER)

Passive Millimeter Wave Detectors Market Survey Report

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**Homeland
Security**

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System Assessment and Validation for Emergency Responders

Prepared by Space and Naval Warfare Systems Center Atlantic

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FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community. The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency response equipment; and
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency response equipment.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: “What equipment is available?” and “How does it perform?” These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. As a SAVER Program Technical Agent, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic has been tasked to provide expertise and analysis on key subject areas, including communications, sensors, security, weapon detection, and surveillance, among others. In support of this tasking SPAWARSYSCEN Atlantic developed this report to provide emergency responders with information gathered during a market survey of commercially available passive millimeter wave detectors, which fall under AEL reference number 15SC-00-PPSS titled Passive Millimeter Wave Detection.

Visit the SAVER website on First Responder.gov (<http://www.firstresponder.gov/SAVER>) for more information on the SAVER Program or to view additional reports on passive millimeter wave detectors or other technologies.

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1. INTRODUCTION

Passive millimeter wave (PMMW) detectors are used in security environments to screen people for concealed weapons and contraband. Unlike the X-ray and metal detection products currently on the market, PMMW detectors can identify suspect items without emitting electromagnetic waves. Though differing in design and functionality, these products provide similar benefits to law enforcement and security professionals seeking a safe and effective means of detecting and distinguishing among a variety of materials including metals, ceramics, plastics, liquids, gels, and powders.

This market survey report is based on information gathered from January to May 2014 from Internet research, industry publications, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website. For inclusion in this report, the PMMW detectors had to meet the following criteria:

- The product is classified as commercially available; and
- The product provides users with passive millimeter wave detection capabilities.

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. TECHNOLOGY OVERVIEW

Millimeter waves, as shown in Figure 2-1, are naturally occurring forms of electromagnetic energy ranging in frequency from approximately 30 to 300 gigahertz (GHz). With a length of one millimeter to two centimeters, these energy waves are longer than those in the visible light spectrum and able to pass through clothing.

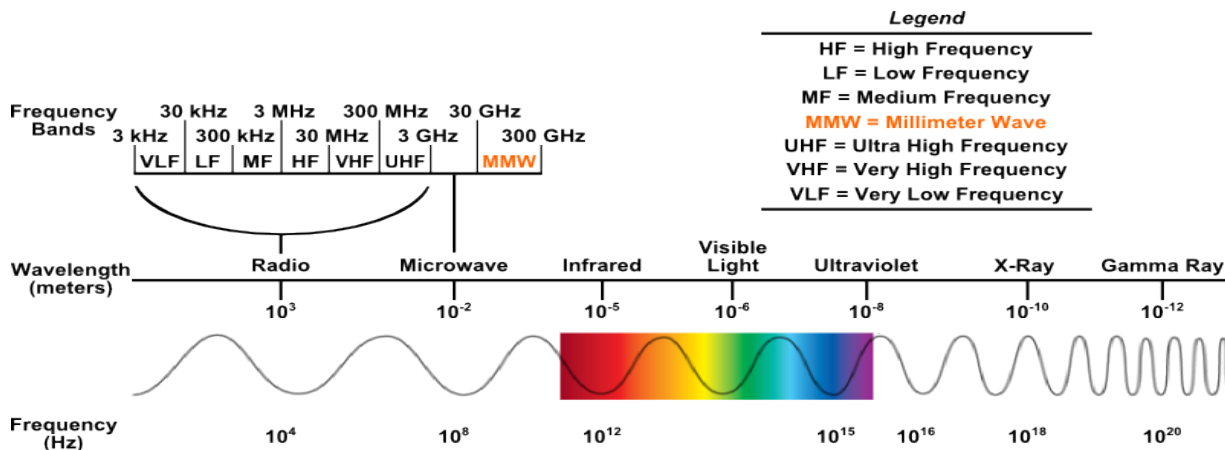


Figure 2-1. Electromagnetic Spectrum

Image courtesy of Scientific Research Corporation

Millimeter wave detectors can be either active or passive. Active detectors send low-intensity electromagnetic waves in the millimeter spectrum toward a person being screened, commonly referred to as the subject, and then receive and analyze the energy reflected back to the system. Alternatively, passive systems do not transmit electromagnetic waves. Instead, they detect and

analyze differences in the natural energy of people, objects, and the surrounding environment to identify a potential threat.

People emit and reflect a measurably different amount of thermal energy compared to metals, plastics, or composite materials that are frequently used in weapons. Human skin, for example, is highly emissive, meaning it gives off its own energy but reflects very little of the energy present in the surrounding environment. By comparison, an object made from materials such as steel or ceramics (e.g., a knife) is less emissive and therefore reflects a greater amount of ambient energy. Using these inherent variations in emissivity along with the millimeter waves generated from the thermal energy of people, objects, and their environment, PMMW detectors are able to distinguish between the body temperature of a subject and the temperature of a suspect item.

2.1 System Design and Components

PMMW detectors vary in size, shape, and design. They range from handheld units weighing only a few pounds to walk-through/portals weighing more than a thousand pounds. Figure 2-2 shows three types of detectors: handheld, standoff, and walk-through/portal.



Figure 2-2. Examples of Passive Millimeter Wave Detection Systems

Images courtesy of Microsemi Corporation, Digital Barriers, and Millivision Technologies

While all systems use PMMW sensors as a detection mechanism, many include additional hardware components such as a computer, video camera, and built-in display screen. Products with computers typically provide specialized software, which includes algorithms to analyze the energy waves received by the sensors and translate these signals into data and/or images of the subject. This information may be enhanced or overlaid with images from a video camera and displayed on a monitoring screen to reveal the location of a suspect item. Products can also operate as standalone units or be integrated as a supplemental layer of detection into an existing security infrastructure (e.g., closed-circuit television).

2.2 Subject Positioning

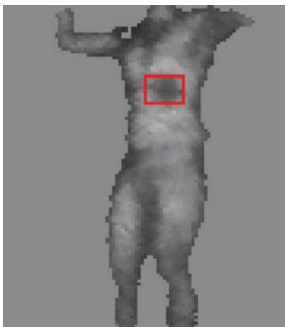
To perform viable scans, PMMW detectors may require subjects to position themselves, or move, in certain ways; however, most obtain the best images when people directly face the sensors. A handheld device, for example, typically requires a person to stand still during a scan and may require the operator to perform multiple scans in order to compile a full-body analysis. In contrast, standoff models require the person to walk or stand in front of the detection unit, while walk-through/portals require the person to step inside the detection unit.

Depending on the position of the sensors within standoff and walk-through/portal models, a person may have to rotate 360 degrees for the system to capture a full-body scan, although some standoff products can perform a full-body scan using two or four sensors. In this case, sensors are positioned in opposition to one another, either at the front and back of the screening area or at various angles, and can capture multiple perspectives of the subject.

2.3 Images and Alerts

Images and alerts also vary among products. Displayed images can be millimeter wave images, photographic overlays from a component video camera, or a combination of the two. Figure 2-3 shows examples of millimeter wave, video imaging, and a visual image with an indication of a suspect object.

Millimeter Wave Image



**Video Image with
Visual Indicator**



**Visual Image with
Heat Map**



Figure 2-3. Examples of Passive Millimeter Wave and Video Images

Images courtesy of Millivision Technologies and Digital Barriers

As the images demonstrate, systems can alert operators to the general location of a suspect item by using highlighted boxes, heat maps, or other visual and audible signals. Some alerts associated with standoff and walk-through/portal systems do not provide detailed information about what the detected item is or where it is located and may require operators to conduct further investigation to ascertain its source. Alternatively, a handheld device with light-emitting diode (LED), audible, and vibration alarms enable operators to pinpoint the location of a suspect item but require further investigation to determine the type of item that has been detected. Factors influencing the detectability of concealed weapons and contraband include their size, type, shape, location and positioning, and the speed at which a subject moves past the sensors.

2.4 Benefits

PMMW detectors provide a distinct safety advantage over other scanning products. Unlike X-ray systems, they do not emit radiation, and unlike metal detection and active millimeter wave products, they emit no electromagnetic energy. Other benefits associated with using PMMW technology include:

- The ability to detect metals, ceramics, plastics, liquids, gels, powders, paper currency, drugs, media, etc.;
- Real-time threat detection;

- Fast, non-interactive identification of subjects requiring additional screening; and
- Less need for conducting random searches.

2.5 Applications

PMMW detectors can be used in any area requiring security screening. With their screening throughput capabilities and real-time imaging, many of these detectors are designed to process large numbers of people and are suitable for settings such as transportation hubs, border security checkpoints, correctional facilities, and courthouses. They may also be used for loss prevention operations in which companies screen employees as they enter and exit a facility in order to deter property theft.

2.6 Challenges

Most PMMW detection products provide images of suspect items under a person's clothing. While these visuals are not as detailed as those generated by other imaging technologies, some individuals and organizations have expressed privacy concerns over the use of these products. In an effort to address these concerns, manufacturers have developed scanning algorithms and other imaging options that can blur anatomical details. Blurring, however, may diminish image clarity when trying to identify a suspect item.

3. PRODUCT INFORMATION—VENDOR PROVIDED

This section provides information on 11 commercially available PMMW detection products, which consisted of 1 handheld, 8 standoff, and 2 walk-through/portal.

Table 3-1 provides general product specifications and the following sections provide product specific information. Product information presented in this section was obtained from an RFI, vendors, and their websites. The information has not been independently verified by the SAVER program. Clarification on certain specifications in Table 3-1 is provided below, listed in alphabetical order:

Dimensions refers to the dimensions of a detector measured in inches as length (L), width (W), and height (H).

Maximum Detection Distance refers to the maximum distance, measured in feet, from which a detector can sense the presence of a suspect item.

Product Type refers to whether the detector is handheld, standoff, or walk-through/portal.

Remote Operation refers to whether the system can be operated in a different location from where a person is being scanned.

Scan and Process Time refers to the time needed to scan a person and, when applicable, process an image, measured in seconds.

Table 3-1. Product Comparison Matrix

Vendor	Product	Product Type	MSRP	Dimensions (inches)	Weight (pounds)	Maximum Detection Distance (feet)	Scan and Process Time (seconds)	Remote Operation
Alfa Imaging S.A.	ALFA3	Standoff	RQ	55.1x39.4x59.1	551	65	NP	✓
Digital Barriers	TS4A	Standoff	RQ	25.8x21.9x8.0	52.9	32.8	Continuous (Optimal: 1.5)	✓
	TS4C	Standoff	RQ	26.0x21.5x8.4	52.9	11.5 (full-height imaging)	Continuous (Optimal: 3 per pose)	✓
	TS5	Standoff	RQ	37.4x26.9x12.2	110	50	Continuous (Optimal: 3)	✓
	TS8	Standoff	RQ	52.2x24.8x52.2	257.9	46	Continuous (Optimal: 1.5)	✓
Microsemi Corporation	AllClear	Handheld	\$19,900	18.38x3.54x2.83	1.47	0.5	Immediate	N/A
	GEN 2	Standoff	\$99,500	33.0x13.5x13.7	86	20	Immediate	✓
	MobileScan	Standoff	\$125,000	53.0x16.0x31.0	220	20	Immediate	✓
Millivision Technologies	S350	Walk-Through/Portal	RQ	132.0x96.0x90.0	700	See note ¹	5-10 (Scan is real-time)	✓
	X350	Walk-Through/Portal	RQ	136.0x76.0x104.0	1450	See note ¹	5-10 (Scan is real-time)	✓

Vendor	Product	Product Type	MSRP	Dimensions (inches)	Weight (pounds)	Maximum Detection Distance (feet)	Scan and Process Time (seconds)	Remote Operation
QinetiQ UK	SPO-7R	Standoff	\$200,000	16.0x10.0 ²	132	50	1/10	✓
<p>Notes:</p> <p>¹Millivision Technologies S350 and X350 have fixed detection distances because subject screening takes place inside the detection unit.</p> <p>²The dimensions of the SPO-7R are presented in length x diameter.</p> <p>✓—system is equipped with corresponding feature</p> <p>RQ—request quote</p> <p>N/A—not applicable</p> <p>NP—information not provided</p> <p>Dimensions—length (L); width (W); height (H)</p>								

Information in the table is based on data gathered from vendors and their websites from January to May 2014.

3.1 Alfa Imaging S.A. ALFA3

The ALFA3, as shown in Figure 3-1, is a standoff system designed for both fixed and mobile applications. A price quote can be obtained from Alfa Imaging S.A. and includes a 1-year warranty on parts and labor. An optional service agreement is also available. Alfa Imaging S.A. provides 2 days of on-site operator training, and product support is available by telephone and e-mail.

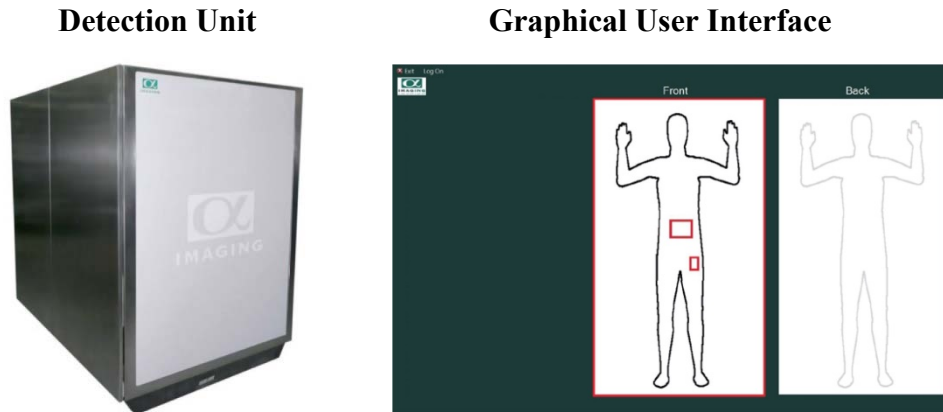


Figure 3-1. Alfa Imaging S.A. ALFA3

Additional specifications for the ALFA3 Series include:

Operating Frequency:	80-100 GHz
System Sensors:	Not provided
Additional Imaging Components:	Video camera
Subject Positioning Requirements:	No need to stop; positioning depends on system deployment requirements and number of imagers used
Set-Up Time:	30 minutes
Automatic Indicator Types:	Loss of power, system malfunction
Operating Temperature:	14-122°F
Operating Humidity Range:	0-100%, condensing (outdoor use)
Power Source:	100-240 VAC, 47-63 Hz
Power Consumption:	2000 W
Interfaces:	Network: 10/100 base-T Ethernet and Wi-Fi Display: HDMI Peripherals: USB

3.2 Digital Barriers TS4A

The TS4A, as shown in Figure 3-2, is a standoff system that can be mounted to walls or ceilings or made portable by placing the detection unit on a floor stand. A price quote can be obtained from Digital Barriers and includes a 2-year warranty on parts and labor. An optional service agreement is also available. Digital Barriers provides operator and supervisor training and will train agency staff to train other employees. Product support is available by telephone, e-mail, and the Internet as well as on-site.

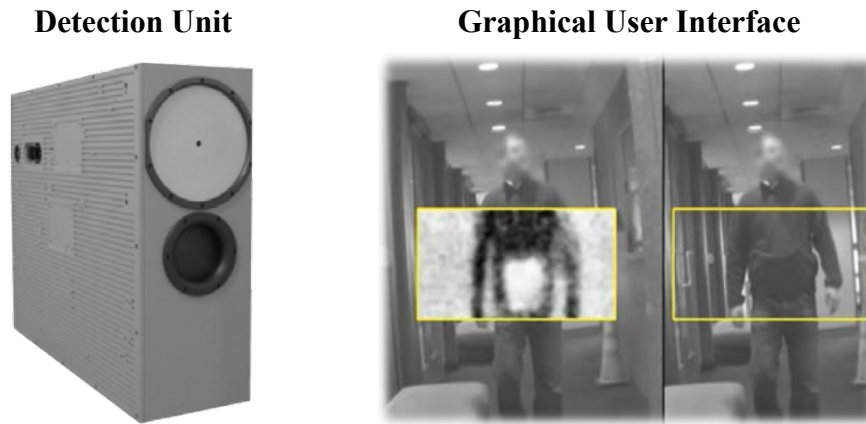


Figure 3-2. Digital Barriers TS4A

Additional specifications for the TS4A include:

Operating Frequency:	250 GHz
System Sensors:	8 channel passive sensing array with a 40 GHz bandwidth
Additional Imaging Components:	Bore-sighted color closed-circuit television (CCTV) camera
Subject Positioning Requirements:	None
Set-Up Time:	5 minutes
Automatic Indicator Types:	Loss of power, loss of communications, incorrect scanning, over-temperature
Operating Temperature:	41-113°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	90-264 VAC, 47-63 Hz or 20-28 VDC
Power Consumption:	80 W
Interfaces:	Network: Not provided Display: Not provided Peripherals: Not provided

3.3 Digital Barriers TS4C

The TS4C, as shown in Figure 3-3, is a standoff system that can be used as a fixed or portable solution. The detection unit rests on a floor pole and is designed to be angled at 25 degrees to enable full-height screening. A price quote can be obtained from Digital Barriers and includes a 2-year warranty on parts and labor. An optional service agreement is also available. Digital Barriers provides operator and supervisor training and will train agency staff to train other employees. Product support is available by telephone, e-mail, and the Internet as well as on-site.

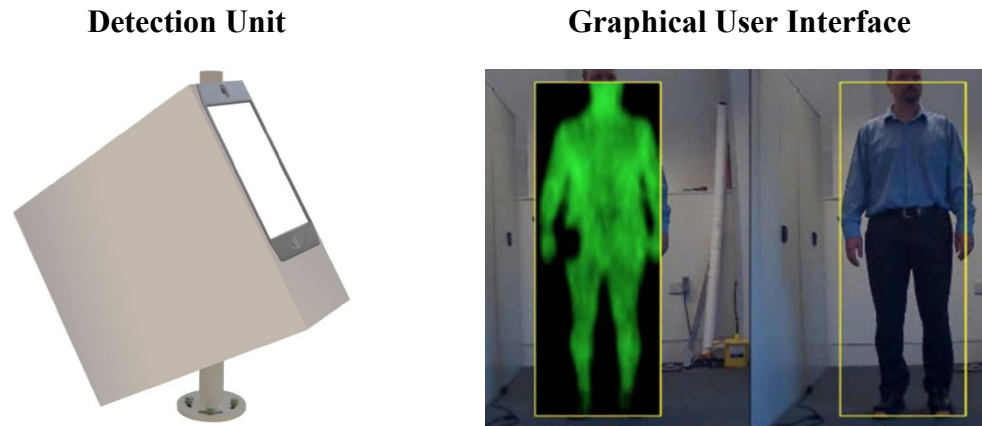


Figure 3-3. Digital Barriers TS4C

Additional specifications for the TS4C include:

Operating Frequency:	250 GHz
System Sensors:	8 channel passive sensing array with a 40 GHz bandwidth
Additional Imaging Components:	Off-axis color CCTV camera
Subject Positioning Requirements:	Compliant, stationary, rotate 360°
Set-Up Time:	5 minutes
Automatic Indicator Types:	Loss of power, loss of communications, incorrect scanning, over-temperature
Operating Temperature:	41-113°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	90-264 VAC, 47-63 Hz or 20-28 VDC
Power Consumption:	80 W
Interfaces:	Network: Not provided Display: Not provided Peripherals: Not provided

3.4 Digital Barriers TS5

The TS5, as shown in Figure 3-4, is a standoff system that can be used in outdoor settings for security, corporate, and military applications. It can detect smaller suspect items up to 20 feet away and larger suspect items up to 50 feet away. A price quote can be obtained from Digital Barriers and includes a 2-year warranty on parts and labor. An optional service agreement is also available. Digital Barriers provides operator and supervisor training and will train agency staff to train other employees. Product support is available by telephone, e-mail, and the Internet as well as on-site.

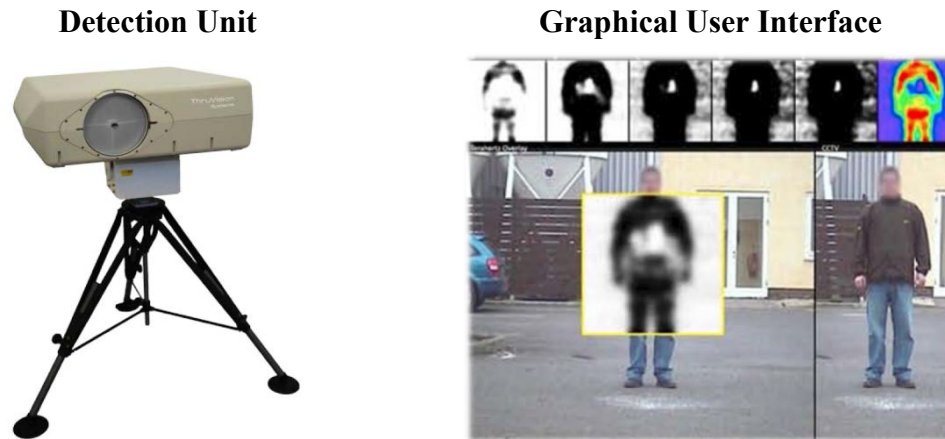


Figure 3-4. Digital Barriers TS5

Additional specifications for the TS5 include:

Operating Frequency:	250 GHz
System Sensors:	8 channel passive sensing array with a 40 GHz bandwidth
Additional Imaging Components:	Bore-sighted color CCTV camera
Subject Positioning Requirements:	None
Set-Up Time:	5 minutes
Automatic Indicator Types:	Loss of power, loss of communications, incorrect scanning, over-temperature
Operating Temperature:	14-131°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	20-28 VDC
Power Consumption:	80 W
Interfaces:	Network: Not provided Display: Not provided Peripherals: Not provided

3.5 Digital Barriers TS8

The TS8, as shown in Figure 3-5, is a standoff system designed to detect handguns in outdoor scenarios at up to 46 feet away. A price quote can be obtained from Digital Barriers and includes a 2-year warranty on parts and labor. An optional service agreement is also available. Digital Barriers provides operator and supervisor training and will train agency staff to train other employees. Product support is available by telephone, e-mail, and the Internet as well as on-site.

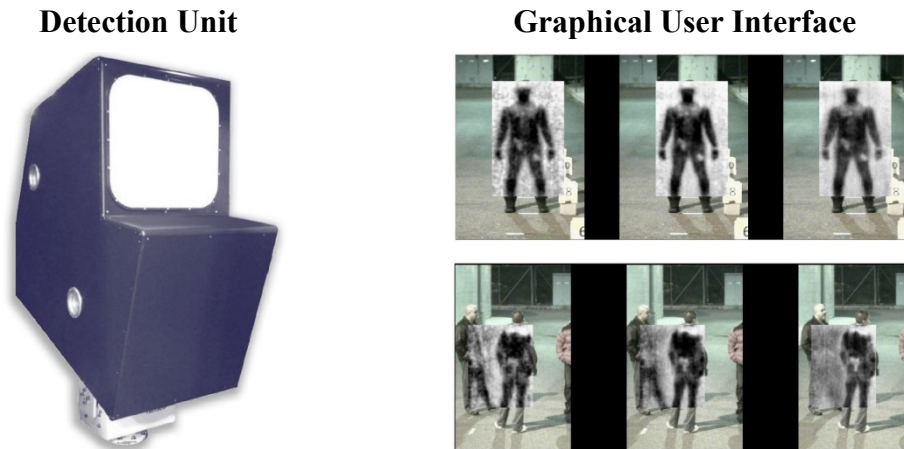


Figure 3-5. Digital Barriers TS8

Additional specifications for the TS8 include:

Operating Frequency:	250 GHz
System Sensors:	16-channel passive sensing array
Additional Imaging Components:	Off-axis color CCTV camera
Subject Positioning Requirements:	None
Set-Up Time:	5 minutes
Automatic Indicator Types:	Loss of power, loss of communications, incorrect scanning, over-temperature
Operating Temperature:	41-113°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	20-28 VDC
Power Consumption:	130 W
Interfaces:	Network: Not provided Display: Not provided Peripherals: Not provided

3.6 Microsemi Corporation AllClear

The AllClear, as shown in Figure 3-6, is a handheld, battery-powered device designed to provide an alternative to pat-downs. A base model costs \$19,900, which includes a 1-year warranty on parts and labor. An optional 1-year extended warranty is also available. Device training is provided through a video and user guide, and product support is available by the Internet.

Due to its design and intended use, the AllClear does not integrate with other system components and therefore does not have an associated graphical user interface.

Detection Unit



Figure 3-6. Microsemi AllClear

Additional specifications for the AllClear include:

Operating Frequency: W-band, 94 GHz center frequency

System Sensors: Seven radiometric PMMW sensors

Additional Imaging Components: N/A

Subject Positioning Requirements: None

Set-Up Time: None

Automatic Indicator Types: Power on, battery status, charging status, device zeroing.

Operating Temperature: 32-115°F

Operating Humidity Range: 0-90%, non-condensing

Power Source: Internal 3.7-volt lithium-ion battery pack, 5800 mAh, battery life up to 16 hours

Power Consumption: 20 W maximum

Interfaces: Network: None
Display: None
Peripherals: USB

3.7 Microsemi Corporation GEN 2

The GEN 2, as shown in Figure 3-7, is a stationary standoff system designed for indoor use at security checkpoints. A base model costs \$99,500, which includes a 1-year warranty on parts and labor. An optional 1-year extended warranty is also available. Training is provided when the system is installed. A user guide is also provided, and product support is available by the Internet.

Detection Unit



Graphical User Interface

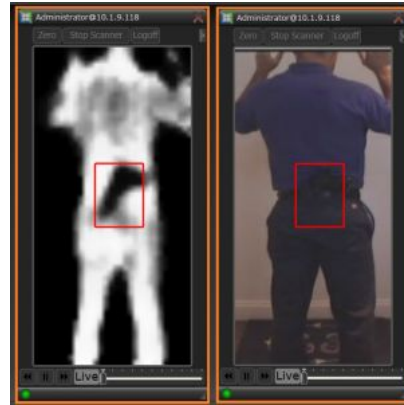


Figure 3-7. Microsemi GEN 2

Additional specifications for the GEN 2 include:

Operating Frequency:	W-band, 94 GHz center frequency
System Sensors:	16 radiometric passive sensors
Additional Imaging Components:	Visible CCD Sensor
Subject Positioning Requirements:	Situation dependent
Set-Up Time:	Not provided
Automatic Indicator Types:	Automatic anomaly detection, extensive system status monitoring
Operating Temperature:	32-122°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	120 VAC or 240 VAC
Power Consumption:	75-100 W
Interfaces:	Network: 10/100 base-T Ethernet Display: VGA, DVI with adapter Peripherals: USB, FireWire, composite video output, audio output

3.8 Microsemi Corporation MobileScan

The MobileScan, as shown in Figure 3-8, is a mobile standoff system designed for indoor use at security checkpoints. A base model costs \$125,000, which includes a 1-year warranty on parts and labor. An optional 1-year extended warranty is also available. Training is provided when the system is installed. A user guide is also provided, and product support is available by the Internet.

Detection Unit



Graphical User Interface



Figure 3-8. Microsemi MobileScan

Additional specifications for the MobileScan include:

Operating Frequency:	W-band, 94 GHz center frequency
System Sensors:	16 radiometric passive sensors
Additional Imaging Components:	Visible CCD Sensor
Subject Positioning Requirements:	Situation dependent
Set-Up Time:	A few minutes
Automatic Indicator Types:	Automatic anomaly detection, extensive system status monitoring
Operating Temperature:	32-122°F
Operating Humidity Range:	0-95%, non-condensing
Power Source:	120 VAC or 240 VAC
Power Consumption:	75-100 W
Interfaces:	Network: 10/100 base-T Ethernet and Wi-Fi Display: VGA, DVI with adapter Peripherals: USB, FireWire, composite video output, audio output

3.9 Millivision Technologies S350

The S350, as shown in Figure 3-9, is a walk-through/portal system designed to detect reflective objects and contraband. A price quote can be obtained from Millivision Technologies and includes a 1-year warranty on parts and labor. An optional service agreement is also available. Millivision offers a variety of training options and, depending on the contract, provides product support by telephone, e-mail, and the Internet.

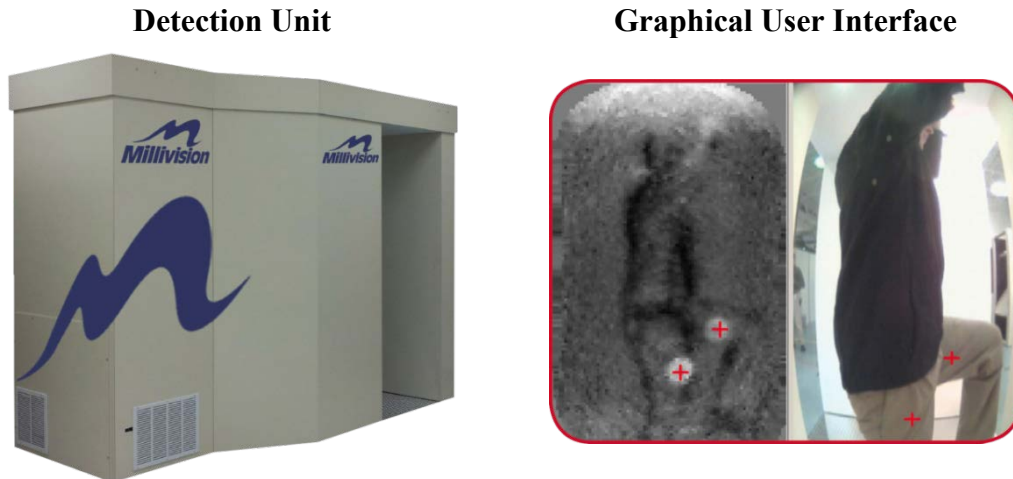


Figure 3-9. Millivision Technologies S350

Additional specifications for the S350 include:

Operating Frequency:	80-100 GHz
System Sensors:	One imager containing 64 radiometric sensors, operating at high sensitivity, mechanically scanned to produce moving images at 10 frames per second
Additional Imaging Components:	Video camera
Subject Positioning Requirements:	Enter detection unit, raise hands, rotate 360 degrees, exit detection unit
Set-Up Time:	Approximately 2 hours
Automatic Indicator Types:	The operator is notified of system problems via the graphical user interface. Any system problem is indicated by bold message.
Operating Temperature:	50-80°F
Operating Humidity Range:	0-90%, non-condensing
Power Source:	120 VAC, 60 Hz or 230 VAC, 50 Hz
Power Consumption:	Less than 1200 W
Interfaces:	Network: 100 base-T Ethernet Display: HDMI Peripherals: USB

3.10 Millivision Technologies X350

The X350, as shown in Figure 3-10, is a walk-through/portal system designed to detect reflective and non-reflective objects and contraband at body temperature and in environments up to 80°F. A price quote can be obtained from Millivision Technologies and includes a 1-year warranty on parts and labor. An optional service agreement is also available. Millivision Technologies offers a variety of training options and, depending on the contract, provides product support by telephone, e-mail, and the Internet.

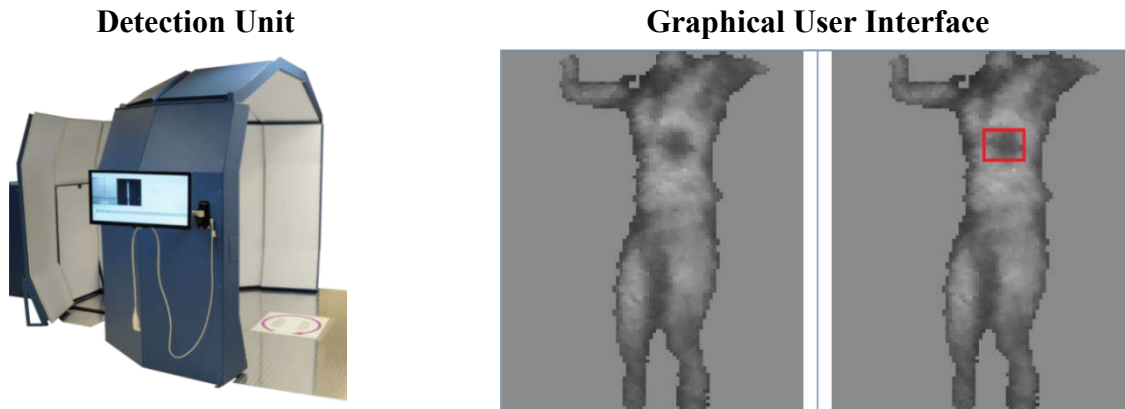


Figure 3-10. Millivision Technologies X350

Additional specifications for the X350 include:

Operating Frequency:	80-100 GHz
System Sensors:	One imager containing 128 radiometric sensors, operating at high sensitivity, mechanically scanned to produce moving images at 10 frames per second
Additional Imaging Components:	Video camera
Subject Positioning Requirements:	Enter detection unit, raise hands, rotate 360 degrees, exit detection unit
Set-Up Time:	Approximately 6 hours
Automatic Indicator Types:	The operator is notified of system problems via the graphical user interface. Any system problem is indicated by bold message.
Operating Temperature:	50-80°F
Operating Humidity Range:	0-90%, non-condensing
Power Source:	120VAC 30 A or 230 VAC 16 A
Power Consumption:	Less than 2400 W for the main system; the display subsystem consumes less than 900 W
Interfaces:	Network: 100 base-T Ethernet Display: HDMI Peripherals: USB

3.11 QinetiQ UK SPO-7R

The SPO-7R is a tripod-mounted standoff system designed primarily for temporary situational use. A base model costs \$200,000, which includes a 1-year warranty on parts and labor. An optional service agreement is also available. Training on the system can be completed in less than a day, and product support is available by telephone and e-mail as well as through the original equipment manufacturer based in the United States.

Additional specifications for the SPO-7R include:

Operating Frequency:	183 GHz
System Sensors:	Passive
Additional Imaging Components:	Video camera
Subject Positioning Requirements:	Subject does not need to stand still or rotate; the detection unit screens subjects “on the move”
Set-Up Time:	20 minutes
Automatic Indicator Types:	Loss of power, system malfunction
Hardware Operating Temperature:	Up to 104°F
Operating Humidity Range:	0-90%, non-condensing
Power Source:	Not provided
Power Consumption:	60 W
Interfaces:	None

4. VENDOR CONTACT INFORMATION

Additional information on the PMMW detectors included in this market survey report can be obtained from the vendors listed in Table 4-1.

Table 4-1. Vendor Contact Information

Vendor	Phone Number	Website/E-Mail Address
Alfa Imaging S.A.	011-34-915 159 416	www.alfaimaging.com info@alfaimaging.com
Digital Barriers	(703) 567 1858	http://www.digitalbarriers.com info@digitalbarriers.com
Microsemi Corporation	(800) 713-4113	http://www.microsemi.com http://www.microsemi.com/products/0
Millivision Technologies	(413) 397-8200	http://www.millivision.com http://www.millivision.com/contact.html
QinetiQ UK	011-44-1684 89 4000	http://www.qinetiq.com

5. SUMMARY

This market survey report provides information on 11 PMMW detectors. The products for which pricing data was available range in cost from \$19,900 to \$200,000, and though they vary in size, weight, and operation, each uses passive sensors to detect concealed weapons and contraband composed of materials such as metals, ceramics, plastics, liquids, gels, and powders.

Subject positioning requirements also vary among the products. The walk-through/portal models require a person to enter the unit in order to be scanned, while the handheld device has a maximum detection distance of 6 inches and the standoff models have maximum detection distances ranging from 11.5 to 65 feet. Except for the handheld device, all of the products provide remote operation capabilities and graphical user interfaces for viewing both millimeter wave and video images.

Additionally, all of the products come with limited warranties on parts and labor as well as various training and technical support options. Information regarding specific model features and performance capabilities can be obtained from the vendors listed in Table 4-1.

Emergency responder agencies that consider purchasing PMMW detectors should carefully research each product's overall capabilities and limitations in relation to their agency's operational needs.