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GRANT GILLESPIE
EXECUTIVE DIRECTOR

THE DIVISION OF PROCUREMENT SERVICES

DELBERT H. SINGLETON, JR.
DIVISION DIRECTOR
(803) 734-8018

MICHAEL B. SPICER
INFORMATION TECHNOLOGY MANAGEMENT OFFICER
(803) 737-0600
FAX: (803) 737-0639

Protest Decision

Matter of: Allied Services of America LP dba SFI Electronics, LLC
Norfolk Wire and Electronics, Inc.

Case No.: 2017-148 (Allied)
2017-149 (Norfolk)

Posting Date: June 13, 2017

Contracting Entity: South Carolina Department of Corrections

Solicitation No.: 5400013323

Description: Thermal Cameras

DIGEST

Protest of award alleging apparent successful bid is not responsive is denied. SFI (Allied Universal Protection) and Norfolk Wire and Electronics (Norfolk) raise the same issues of protest in the same order and their letters of protest are included by reference. [Attachments 1 and 2 respectively]

AUTHORITY

The Chief Procurement Officer¹ conducted an administrative review pursuant to S.C. Code Ann. §11-35-4210(4). This decision is based on documents in the record and applicable law and precedents.

BACKGROUND

<i>Event</i>	<i>Date</i>
Solicitation Issued	04/13/2017
Intent to Award Posted	05/22/2017
SFI Protest Received	05/24/2017
Norfolk Protest Received	05/25/2017

This Invitation for Bids was issued by the DOC for Ganz thermal cameras manufactured by CBC Americas Corp. or equals. The Scope of Work consisted of a single paragraph comprising the manufacturer's part number, specifications, and instructions to bidders:

ZNT1-HAT24G22A Fixed Thermal, 17um, 50 NETD, 640x480 resolution, 30 fps, 37 degree, DRS thermal processor, ONVIF Compliance Profile S, Profile G, Detection Type Uncooled Vanadium Oxide Microbolometer, HFOV, NTSC/PAL, VCA with embedded analytics (Advanced tracking algorithm, low false alarm rate, Intuitive web browser interface, Multi-segment polygons and lines, Real-time display of tracking data and events, Detect camera tampering, Detect presence of an object, Direction and Dwell filters, Perspective corrected size, speed filters and calibration) Analytic display imbedded in video. Must be compatible with Vicon VMS. Vendors may bid and equal. Equal must be compatible with Vicon VMS and equal must be an exact equal. EQUAL WILL BE DETERMINED BY SCDC DIVISION OF FACILITIES MANAGEMENT. If bidding an equal Vendor must submit the latest detailed descriptive literature. Failure to submit the latest detailed literature will result in you bid being deemed NON-RESPONSIVE. ALL ITEMS MUST BE DELIVERED AND INVOICED BY JUNE 30, 2017. FUNDING CANNOT BE CARRIED OVER TO NEXT FISCAL YEAR THEREFORE, ALL ITEMS MUST BE RECEIVED AND INVOICED BY JUNE 30, 2017.

[Solicitation, Page 11]

¹ The Materials Management Officer delegated the administrative review of this protest to the Chief Procurement Officer for Information Technology.

This same information was printed in the bidding schedule as follows:

<p>Item Description: ZNT1-HAT24G22A Ganz Thermal Camera-Fixed</p> <p>Tendering Text: ZNT1-HAT24G22A Fixed Thermal, 17um, 50 NETD, 640x480 resolution, 30 fps, 37 degree, DRS thermal processor, ONVIF Compliance Profile S, Profile G, Detection Type Uncooled Vanadium Oxide Microbolometer, HFOV, NTSC/PAL, VCA with embedded analytics (Advanced tracking algorithm, low false alarm rate, Intuitive web browser interface, Multi-segment polygons and lines, Real-time display of tracking data and events, Detect camera tampering, Detect presence of an object, Direction and Dwell filters, Perspective corrected size, speed filters and calibration) Analytic display imbedded in video. Must be compatible with Vicon VMS.</p> <p>Vendors may bid and equal.</p> <p>Equal must be compatible with Vicon VMS and equal must be an exact equal.</p> <p>EQUAL WILL BE DETERMINED BY SCDC DIVISION OF FACILITIES MANAGEMENT.</p> <p>If bidding an equal Vendor must submit the latest detailed descriptive literature. Failure to submit the latest detailed literature will result in you bid being deemed NON-RESPONSIVE.</p> <p>ALL ITEMS MUST BE DELIVERED AND INVOICED BY JUNE 30, 2017. FUNDING CANNOT BE CARRIED OVER TO NEXT FISCAL YEAR THEREFORE, ALL ITEMS MUST BE RECEIVED AND INVOICED BY JUNE 30, 2017.</p>

[Solicitation, Page 22]

DOC opened five bids on May 2, 2017. SFI bid a Ganz model ZNT6-HAT2FN32-N, Norfolk, Absolute Technologies, LLC, and Anixter, Inc. bid the Ganz ZNT1-HAT24G22A, and Wholesale Industrial Electronics bid a Flir Model FC-632ID. DOC's Department of Facilities Management reviewed the specifications for the Flir Model FC-632ID and determined it to be equal to the Ganz specified product. (Attachment 3) An Intent to Award was posted to Wholesale on May 22, 2017. SFI and Norfolk protest the intended award identifying the following issues in the same order:

- a. The processing sensor in the Flir is not the same as the patented DRS sensor which is spelled out in the specifications for a thermal camera.
- b. The Flir FC632ID does not offer the ICE (image contrast enhancement) feature found in the Ganz that allows image edge to edge enhancement under severe video conditions.
- c. VCA Technologies video analytics is on the Ganz camera and not the Flir. VCA analytic software has 3D behavior, this allows for perspective corrected size, speed filters and calibration.
- d. Embedded Video Stabilization is [] another VCA software feature on the **ZNT1-HAT24G22G** and not on the Flir FC632ID.

ANALYSIS

An invitation for bids must be issued in an efficient and economical manner and must include specifications and all contractual terms and conditions applicable to the procurement. S.C. Code Ann. § 11-34-1520(2). A specification is defined by § 11-35-2610 as “any technical or purchase description or other description of the physical or functional characteristics, or of the nature of a supply, service, or construction item.....” *See also* Regulation 19-445.2140(A)(4). Section 11-35-2730 requires that “[a]ll specifications shall be drafted so as to assure cost effective procurement of the state’s actual needs and shall not be unduly restrictive.” The purpose of a specification is set forth in Regulation 19-445.2140(B) as:

The purpose of a specification is to serve as a basis for obtaining a supply, service, information technology, or construction item adequate and suitable for the State’s needs in a cost effective manner, taking into account, to the extent practicable, the cost of ownership and operation as well as initial acquisition costs. It is the policy of the State that specifications permit maximum practicable competition consistent with this purpose. Specification shall be drafted with the objective of clearly describing the State’s requirements. All specifications shall be written in a non restrictive manner as to describe the requirements to be met.

(emphasis added) Regulation 19-445.2140(C) states:

Specifications shall, to the extent practicable, emphasize functional or performance criteria while limiting design or other detailed physical descriptions to those necessary to meet the needs of the State. To facilitate the use of such

criteria, using agencies shall endeavor to include as a part of their purchase requisitions the principal functional or performance needs to be met....

The specifications included in this solicitation were brand name or equal specifications as defined by Regulation 19-445.2140(A)(2):

“Brand Name or Equal Specification” means a specification which uses one or more manufacturer’s names or catalogue numbers to describe the standard of quality, performance, and other characteristics needed to meet state requirements, and which provides for the submission of equivalent products.

In *Appeal by General Sales Company, Inc.*, Panel Case 1983-5, the South Carolina Procurement Review Panel observed that:

It should always be clear that a Brand-Name or Equal description is intended to be descriptive not restrictive and is merely to indicate the quality and characteristics of the product that will be satisfactory and acceptable. Products offered as equal must, of course, meet fully the salient characteristics and product requirements listed in the Invitation for Bids.

Similarly, in *Appeal by Davis and Geck, Inc.*, Panel Case No. 1986-9, the Panel wrote:

A “Brand Name or Equal” specification is a specification which uses one or more manufacturers’ names or catalog numbers to describe the standard of quality, performance, and other characteristics needed to meet the State’s requirements and which provides for the submission of equivalent products.... When this purchase specification is used, bidders must be given the opportunity to offer products other than those specifically referenced if those other products will meet the needs of the State in essentially the same manner as those referenced.

This solicitation specified the Ganz Thermal Camera model ZNT1-HAT24G22A or a product of equal functionality. The Ganz camera is manufactured by CBC Americas Corp. The solicitation included specifications for the Ganz camera one of which was a DRS thermal processor. The Southeast Regional Sales Manager of CBC Americas explains that:

The **ZNT1-HAT24G22A** camera uses the DRS patented processing sensor also known as Advanced-Absorber Microbolometer Superstructure. This sensor is the heart of the thermal imaging process. It is the major component of Ganz Thermal cameras. This insures our quality and reliability of image. The Flir FC632ID does not use the DRS sensor but its own processor. I’m not aware if the Flir sensor design is patented or not but it is not the DRS patented process.

(Attachment 4)

Strict adherence to a requirement that the camera must include the patented DRS thermal processor would limit competition to Ganz cameras manufactured by CBC Americas in contradiction to the intent of the solicitation and actions by the agency to consider products providing the same functionality. CBC acknowledges that the Flir camera has its own processor and the agency determined that the functionality it provided was acceptable. This issue of protest is denied.

SFI and Norfolk's second issue of protest is that:

- b. The Flir FC632ID does not offer the ICE (image contrast enhancement) feature found in the Ganz that allows image edge to edge enhancement under severe video conditions.

The Southeast Regional Sales Manager of CBC Americas explains that:

The ICE (image contrast enhancement) feature allows image edge to edge enhancement under severe video conditions. Example: fire, severe backlighting, sun blockage, etc. Another KEY element to our thermal video picture process. Flir FC632ID does not offer this image enhancement. The **ZNT1-HAT24G22A** has this feature, which is part of the DRS sensor design.

Since the ICE feature is part of the patented DRS sensor design, strict adherence to this as a mandatory specification would unduly limit competition and nullify the intent of the solicitation and agency to allow maximum practicable competition. This issue of protest is denied.

SFI and Norfolk's third and fourth issues of protest point out that the Flir camera does not utilize video analytics manufactured by VCA Technologies:

- c. VCA Technologies video analytics is on the Ganz camera and not the Flir. VCA analytic software has 3D behavior, this allows for perspective corrected size, speed filters and calibration.
- d. Embedded Video Stabilization is a another VCA software feature on the ZNT1-HAT24G22G and not on the Flir FC632ID.

SFI and Norfolk do not allege that the Flir camera does not provide similar functionality, perhaps through a different process. The agency reviewed the Flir functionality and found it acceptable. Strict adherence to this as a mandatory specification would unduly limit competition and nullify the intent of the solicitation and agency to allow maximum practicable competition. These issues of protest are denied.

The agency is reminded that the identification of manufacturer specific, patented, or copyrighted features in a brand name or equal solicitation is inconsistent with Regulation 19-445.2140(C):

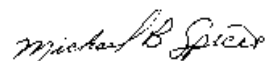
Specifications shall, to the extent practicable, emphasize functional or performance criteria while limiting design or other detailed physical descriptions to those necessary to meet the needs of the State. To facilitate the use of such criteria, using agencies shall endeavor to include as a part of their purchase requisitions the principal functional or performance needs to be met.

(emphasis added); *see Appeal by Harris-Lanier, Inc.*, Panel Case No. 1987-4 (“...the determination of the most important feature of this equipment was made after the bid was submitted. This sort of after-the-fact determination does not further the purposes and policies of the Procurement Code....”)

DECISION

For the reasons stated above, the protests of Allied Services of America LP dba SFI Electronics, LLC and Norfolk Wire and Electronics, Inc. are denied.

For the Materials Management Office



Michael B. Spicer
Chief Procurement Officer

Attachment 1

From: Casey Mitchell
Sent: Wednesday, May 24, 2017 9:09:21 AM (UTC-05:00) Eastern Time (US & Canada)
To: Protest-MMO
Subject: Solicitation 5400013323

Allied Universal Protection is filing an official protest for awarding the Flir FC632ID as to meeting the specification of the bid spec for solicitation 5400013323.

There are several major differences in the Flir model vs the Ganz Thermal Camera. A significant difference is in the processing sensor. The ZNT1-HAT24G22A camera uses the DRS patented processing sensor also known as **Advanced-Absorber Microbolometer Superstructure**. This sensor is the heart of the thermal imaging process. This insures quality and reliability of image with a patented process of layering. The Flir FC632ID does not use the DRS sensor but its own processor which does not use this process. You can also find more detail information on DRS resource website:

<http://www.drsinfrared.com/ResourcesSupport/WhitePapers.aspx>

Another major difference in the Flir camera and Ganz is the DRS ICE feature. The ICE (image contrast enhancement) feature allows image edge to edge enhancement under severe video conditions. Another KEY element to the thermal video picture process. Flir FC632ID does not offer this image enhancement. The ZNT1-HAT24G22G Ganz camera has this feature due to the DRS processing sensor.

VCA Technologies video analytics is also feature on the Ganz camera and not the Flir. The Ganz ZNT1-HAT24G22G offers VCA's Multi-segment polygons and lines allowing for precise and numerous zone detections.

VCA analytic software on the Ganz Thermal camera also offer: 3D behavior, this allows for perspective corrected size, speed filters and calibration. This enhancement is in addition to the standard setup menu. Flir FC632ID does not offer this enhancement feature.

Embedded Video Stabilization is a another VCA software feature on the ZNT1-HAT24G22G and not on the Flir FC632ID. This feature is important when deploying cameras outdoors on pole in potentially harsh environments. This feature enables the camera video to adjust for movement. High winds for example would cause shaking and destabilization of the video. Video Stabilization is a feature

necessary when deploying a camera in potentially difficult environments. The stabilization can adjust for camera movement and provides a steady video stream.

Casey Mitchell
Systems Engineer
Allied Universal Security Systems
121 Shields Park Dr. Suite A
Kernersville, NC 27284
336.420.9868 Cell
336.993.0800 Office
336.993.0560 Fax



Please consider our environment- minimize printing

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Attachment 2

05.25.2017

Procurement Officer

MMO

1201 Main Street, Suite 600

Columbia, SC 29201

RE: Solicitation 5400013323 – Thermal Imaging Cameras

To whom it may concern:

Norfolk Wire and Electronics is filing an official protest on bid spec for solicitation 5400013323. It is our contention that the Flir FC632ID does not meet the specifications required on the bid.

There major differences in the Flir model vs the Ganz Thermal Camera. The processing sensor is not the same as the patented DRS sensor which is spelled out in the specifications for a thermal camera. The **ZNT1-HAT24G22A** camera uses the **DRS patented processing sensor** also known as **Advanced-Absorber Microbolometer Superstructure**. This patented process is the major component of a thermal imaging process. The patented process of layering provides the thermal image which insures the quality and reliability of the image. The Flir FC632ID uses its own processor which does not use this process. Please refer to the DRS resource website: <http://www.drsinfrared.com/ResourcesSupport/WhitePapers.aspx> for more detail description of this process.

Other differences in the Flir camera and Ganz.

ICE (image contrast enhancement) feature allows image edge to edge enhancement under severe video conditions. Flir FC632ID does not offer this image enhancement. The **ZNT1-HAT24G22G** Ganz camera has this feature due to the DRS processing sensor. This process is implemented on the DRS sensor, which is an important element to the thermal video picture process. Harsh conditions such as direct sunlight, smoke and fire, glaring from light...etc.

VCA Technologies video analytics is on the Ganz camera and not the Flir. The Ganz **ZNT1-HAT24G22G** has Multi-segment polygons and lines which allows numerous zone detections and precise measurements and zone designs. This VCA feature allows for a greater variety of designs for zone protection.

VCA analytic software has 3D behavior, this allows for perspective corrected size, speed filters and calibration. This enhancement allows the setup to place a 3D image over the field of view to give accurate perspective for the contour of land and objects. Flir FC632ID does not offer this enhancement feature.

Embedded Video Stabilization is another VCA Technology analytic feature on the **ZNT1-HAT24G22G** and not on the Flir FC632ID. This feature is used when deploying cameras in potentially harsh environments. This feature enables the camera video to adjust for movement. High winds for example would cause shaking and destabilization of the video if mounted on a pole for example. Video Stabilization is a necessary when deploying a camera in environments where the camera can potential move due to weather or general conditions not directed by normal camera operations. Cameras without this feature are more likely to have video with an unsteady view.

Thanks for your consideration. We just feel that the FLIR product did not meet the specifications for the Solicitation for the reasons listed above. We are also a FLIR distributor, and realized it did not meet the spec. If you have any questions feel free to contact me at 864.676.1771 or email ted@norfolkwire.com.

Best Regards:

Ted Watson, Jr

Attachment 3

Brittany Driggers (C053362)

From: Bill Zeigler (C004779)
Sent: Thursday, May 25, 2017 5:20 PM
To: Ruthie Bishop (C045688)
Cc: John Bogdany (Bogdany); Colie Rushton (RushtCo); Antonio Sojourner (C053530); John Douglas (C046849); Kendyl Hudgens (C056236); Trina Free (Freetri); Brittany Driggers (C053362); Kensey Collins (C055992)
Subject: Ganz Protest

Antonio Sojourner, John Douglas and I compared the specifications from the bid to the Flir thermal camera specifications and we feel they are compatible. We broke it down phrase by phrase and acronym by acronym and could not distinguish a difference.

Thank you

Bill Zeigler
Electrical Services Shop Manager, Facilities Management
SC Department of Corrections
4322 Broad River Road
Columbia, SC 29210
803-896-1695 Office, 803-529-8298 Mobile, 803-896-1703 Fax
Zeigler.bill@doc.sc.gov

The week of May 1st , I placed a call to the electrical shop at Facilities Management. I was unable to reach Mr. Douglas or Mr. Sojourner about Solicitation 5400013323. I then contacted Kendyl Hudgens. She informed me that Mr. Douglas was out of town for a couple of weeks and that she could not reach Mr. Sojourner. She eventually got in contact with Mr. Trezevant and sent him to my office to look at the specifications. I presented Mr. Trezevant with the specifications of the FLIR camera and the specifications sent to us by Facilities Management when entering the shopping cart. Mr. Trezevant spent about ten minutes going over the specifications and then let me know the FLIR camera was considered an equal. He also made the comment that SCDC has used the FLIR cameras in the past. I took the specification sheets from him and asked him to send me an email when he got back to the office, confirming the FLIR cameras were an equal. Mr. Trezevant sent me an email on May 9, 2017 at 8:08 am confirming that we could proceed with the award.

Attachment 4



CBC AMERICAS Corp
NC: 2000 Regency Pkwy, St
CA: 21241 S. Western Ave.,
ganzsecurity.com

Chief Procurement Officer
Materials Management Office
South Carolina Department of Corrections

May 24, 2017

This letter is in response to SCDC Solicitation #5400013323 awarding FLIR Model FC-632ID as an equivalent to the CBC Ganz **ZNT1-HAT24G22A** fixed thermal camera. CBC America Corp. is disputing this claim. There are several differences in the Flir model vs the Ganz Thermal Camera. The most significant difference is in the processing sensor. The **ZNT1-HAT24G22A** camera uses the DRS patented processing sensor also known as Advanced-Absorber Microbolometer Superstructure. This sensor is the heart of the thermal imaging process. It is the major component of Ganz Thermal cameras. This insures our quality and reliability of image. The Flir FC632ID does not use the DRS sensor but its own processor. I'm not aware if the Flir sensor design is patented or not but it is not the DRS patented process. I've attached to this note a document from DRS expanding on their patented sensor design technology to better illustrate the difference and importance. You can also find this article on the DRS resource website: <http://www.drsinfrared.com/ResourcesSupport/WhitePapers.aspx>

Below are short excerpts from the article.

To address the performance demands of its uncooled thermal offering with greater sensitivity and reliability, the DRS Technologies engineering team focused their attention to evaluating the common microbolometer construct, which eventually provided the ground work for laboratory research and the success of the Advanced-Absorber Superstructure.

Infrared Absorbing Material: There are a variety of infrared absorbing materials used within the industry. Vanadium Oxide (VOx) and Amorphous Silicon (a-Si) are among the most prevalent in uncooled sensor production. DRS Technologies is one of the world's premier providers of Vox based detectors, pioneering thin films development. Thus, the Advanced-Absorber Superstructure contains a Vox infrared absorbent material.

DRS' patented Advanced-Absorber Microbolometer Superstructure is the catalyst of integrity in thermal image quality. The design allows for greater sensitivity and its unique packaging provides DRS with proprietary advantages for further product development, be it smaller pixel pitch, varying resolutions, custom calibrations, or smaller packaging. In review, the Advanced-Absorber Superstructure separates DRS from the pack with greater responsivity, better contrast with lower noise and improved resistance – all resulting in superior image quality and reliability.

There are other differences in the Flir FC632ID vs the Ganz **ZNT1-HAT24G22A**. The ICE (image contrast enhancement) feature allows image edge to edge enhancement under severe video conditions. Example: fire, severe backlighting, sun blockage, etc. Another KEY element





to our thermal video picture process. Flir FC632ID does not offer this image enhancement. The **ZNT1-HAT24G22A** has this feature, which is part of the DRS sensor design.

Multiple power resources allowing for lower cabling cost and versatility.
12VDC, 24VAC, PoE /max 10W@12VDC, 24VAC, PoE

The Flir FC632ID does not offer VCA Technologies analytics. VCA Technologies is a worldwide leader in security and business video analytics. The Ganz **ZNT1-HAT24G22A** offers VCA's unique Multi-segment polygons and lines allowing for precise (personalized) and numerous detection zone.

Another unique feature from VCA Technologies which is not on the FC632ID and is on the Ganz Thermal cameras: 3D behavior, this allows for perspective corrected size, speed filters and calibration.

Embedded Video Stabilization: another VCA software feature on the **ZNT1-HAT24G22A** and not on the Flir FC632ID. This feature is particularly important when deploying cameras outdoors on a pole. This feature enables the camera video to adjust for movement. Such as a pole mount moving due to high winds. This is a feature we believe is necessary when deploying any camera outdoors in potentially difficult environments. The stabilization adjusts for camera movement and provides a steady video stream.

We firmly believe our protest and challenge to the FC632ID meeting the Ganz **ZNT1-HAT24G22A** thermal camera on SCDC Solicitation #5400013323 is a valid claim. We believe the specifications on the DRS processor alone would disqualify their claim of equal to our **ZNT1-HAT24G22A** thermal camera. If you would like more information or to discuss this matter with us please contact me at: 1-770-519-7377.

Sincerely,

David Dunlap
Southeast Regional Sales Manager, Imaging & Information Technology Division
CBC Americas Corp.





DRS Technologies patented sensor technology revealed **Released 2015**

Since the inception of infrared sensor integration and the first Forward Looking Infrared equipment in the 1960s, thermal technology development has matured at unprecedented rates, garnering wide-spanning adoption from the defense and aerospace industries initially progressing to commercial applications in present day. The key drivers of market adoption for thermal imaging products lies in four basic requirements; (1) Size (2) Weight (3) Power consumption (4)

Cost This is also referred to as SWaP-C. The most significant development in the production of infrared sensors and their ability to affect improvements to SWaP-C requirements stems from the introduction of uncooled focal plane array (FPA) designs. Uncooled sensor technology, by the nature of its material makeup and manufacturing processes, is a far more affordable option for infrared sensor development. In contrast to infrared imaging material such as Mercury Cadmium Telluride (HgCdTe) and Indium Antimonide (InSb) which require a cryogenic cooling device to maintain core temperatures and minimize background noise, uncooled infrared packages can be manufactured in much smaller form factor, meeting requirements for smaller size, lower weight and power input, for more flexible integration. Beyond specialized military applications such as thermal weapon sights and night vision enhancers, the progress of uncooled infrared sensor development has paved the way for a host of applications spanning multiple industries, to include commercial and civilian. Still, the growth in these markets is tied to the manufacturer's ability to provide even smaller, lighter and more cost effective uncooled devices without compromising image quality and effectiveness. As businesses evaluate the incorporation of these specialized sensors into their systems, a high degree of confidence must be established, ensuring that the sensor selected is a viable solution that will address current and future performance goals. When establishing a consideration set for evaluating uncooled thermal camera applications, many businesses have come to realize that not all detector offerings deliver the same performance - and not all providers have a viable roadmap to support future demands. DRS Technologies is committed to delivering state-of-the-art uncooled thermal technology for a broad range of applications and has the pedigree to support such a demand. DRS efforts to meet and exceed requirements for improved size, weight and power have not derailed the company from its legacy of providing best-in-class, high performance infrared products. Therein lies the delicate balance between SWaP-C advancement and maintaining the integrity of the sensor's imaging capability. Through years of persistent development efforts against rigorous quality standards, DRS' patented Advanced-Absorber Microbolometer Superstructure offers equilibrium to this balancing act.

Back to Basics - Asking the Pivotal Question To address the performance demands of its uncooled thermal offering with greater sensitivity and reliability, the DRS Technologies team led by Principal Staff Scientist, Dr. George Skidmore, PhD, focused their attentions to evaluating the common microbolometer construct, the micro-machined device inside the uncooled FPA. Microbolometers measure the fluctuations in temperature and transduces radiant-heat energy from the scene onto a thermal image. Critical to the microbolometer's performance is the absorbent nature of material used and its ability to effectively generate electrical resistance. Could this vital component be enhanced for heightened performance? This question provided the ground work for years of laboratory research and the eventual success of the Advanced-Absorber





Superstructure. To fully appreciate the incredible innovation behind this structure, a baseline understanding of standard microbolometers is required.

Conventional Microbolometer Structures Microbolometers are made up of a pixel array, where each pixel contains several material deposits. Common microbolometer are comprised of: 1. Silicon substrate and readout integrated circuit (ROIC) 2. Electrical contact deposits 3. Reflector 4. Infrared absorbing material

Infrared Absorbing Material: There are a variety of infrared absorbing materials used within the industry. Vanadium Oxide (VOx) and Amorphous Silicon (a-Si) are among the most prevalent in uncooled sensor production. DRS Technologies is one of the world's premier providers of VOx based detectors, pioneering thin films development. Thus, the Advanced-Absorber Superstructure contains a VOx infrared absorbent material.

Single vs. Double-Layer Structures: Beyond the infrared absorbing material used, microbolometers can be further categorized by their basic layering structure. There are two types of microbolometers commonly utilized in uncooled infrared sensor builds; single and double-layer.

Single-Layer: A single-layer microbolometer is comprised of a transducer element, which is the heart of the measurement that registers the change in temperature, and a leg structure. In order for the device to effectively measure the temperature change, it must be isolated thermally from the Readout Integrated Circuit (ROIC). To do so, the leg structure, a thin connecting element, creates a raised void. A critical shortfall of the single layer design is that some of the space needs to be devoted to the leg structure and the balance of available radiation falls on the leg, which isn't consumed or converted. The only way to be accurately measured is if it falls on the transducer structure.

Double-Layer: A double-layer microbolometer consists of a space-filling metal/dielectric sandwich layer designed to fill the available area and capture a maximum amount of incoming radiant heat energy. The end result is a structure over the pixel that resembles an umbrella. A critical advantage to the double layer umbrella structure is that the second layer can fill space over the top and ensures approximately 95% of radiation from the 8-14 micron spectrum is absorbed. The double-layer structure would provide the fundamental architecture of DRS' Advanced-Absorber Superstructure.

Thermal Isolation: A key component of any microbolometer structure is the intentional gap between the infrared absorbing material and the silicon substrate/ROIC. This structure is in place to account for the energy that is passed through the infrared absorbent layer. The reflecting material then redirects some of the lost energy back to the absorber. This gap is created with components that act like legs suspending the absorber above the ROIC. It is in this component of the microbolometer structure that DRS would affect significant improvements with its Advanced-Absorber Superstructure.

A Simple Concept for a competitive Edge:



Armed with the initiative to investigate existing microbolometer structures in the hopes of uncovering new methods or structures that may yield greater sensitivity, the DRS discovery team developed a simple hypothesis for experiment.

A double-layer microbolometer structure could potentially be further optimized to reduce the amount of radiant energy lost through reflections and transmissions, increasing absorption. The resulting discovery would push forward a concept that, until then, would have been viewed as a counter-intuitive bolometer design. Recall the comparison of the double-layer design to an umbrella over the pixel. Put simply, the patented Advanced Absorber Superstructure sought to alter the double-layer device by puncturing holes in the space-filling umbrella layer. This layer is responsible for radiant heat absorption. The reason this would have been viewed as "counterintuitive" is that the umbrella layer of a standard double layer microbolometer is thought to have been designed with an optimized (or maximized) surface area to capture more of the radiation, and puncturing this layer would decrease its measurable surface area and mass.

So, why would a punctured umbrella layer positively affect sensitivity and performance? The design improves performance through increased absorption and faster temperature rise. The fact is, even though the umbrella absorber layer has less solid surface mass, it is better able to capture incoming radiant energy. Because the thermal mass of the umbrella has been reduced by the holes, the radiant energy heats the umbrella faster, for better responsivity. The holes of its umbrella layer are a sub-micron size, which are smaller than the incoming long-wave radiant energy, affording the Advanced-Absorber Superstructure the ability to better capture this energy. A traditional solid umbrella structure is prone to higher reflection rates typically measured at 20% reflectance, whereas the Advanced Absorber Superstructure with precision recesses reduces reflection by a factor of four, producing an average of 5% reflectance.

Manufacturing a Competitive Advantage:

Manufacturers of infrared sensors will continue to push the envelope for new advantages in SWaP-C requirements. Adjustments to these market drivers will only add to the flexibility of infrared imaging and lead to greater induction in new products and systems. While these advancements are vital to the growth of infrared imaging, SWaP-C improvements often come at the expense of image quality, reliability and performance. DRS' patented Advanced Absorber Microbolometer Superstructure is the catalyst of integrity in thermal image quality. The design allows for greater sensitivity and its unique packaging provides DRS with proprietary advantages for further product development, be it smaller pixel pitch, varying resolutions, custom calibrations, or smaller packaging. In review, the Advanced-Absorber Superstructure separates DRS from the pack with greater responsivity, better contrast with lower noise and improved resistance - all resulting in superior image quality and reliability. .

Expedient Response Requested: The device's ability to convert the incoming radiation into an electrical signal is enhanced as the umbrella layer maximizes fill factor and delivers faster heat transfer.

Maximized Contrast with Minimized Noise: The submicron holes in umbrella maximize absorption and the temperature rise of the traducer. The transducer layer is then uniquely optimized for minimum thermal conductivity to the substrate. The net effect is better image contrast without disturbances to the signal.



Path of Least Resistance: The Advanced-Absorber Superstructure offers lower resistance to room temperature variances. Decreasing resistance leads to lower power requirements. Devices with higher resistance also adversely output greater noise levels. The Advanced-Absorber Superstructure is optimized with lower resistance to help mitigate noise and decrease power input.

DRS Technologies / Commercial Infrared Systems
13532 N. Central Expwy, Dallas, TX. 75243
Tel: 855-230-2372



STATEMENT OF RIGHT TO FURTHER ADMINISTRATIVE REVIEW

Protest Appeal Notice (Revised November 2016)

The South Carolina Procurement Code, in Section 11-35-4210, subsection 6, states:

(6) Finality of Decision. A decision pursuant to subsection (4) is final and conclusive, unless fraudulent or unless a person adversely affected by the decision requests a further administrative review by the Procurement Review Panel pursuant to Section 11-35-4410(1) within ten days of posting of the decision in accordance with subsection (5). The request for review must be directed to the appropriate chief procurement officer, who shall forward the request to the panel or to the Procurement Review Panel, and must be in writing, setting forth the reasons for disagreement with the decision of the appropriate chief procurement officer. The person also may request a hearing before the Procurement Review Panel. The appropriate chief procurement officer and an affected governmental body shall have the opportunity to participate fully in a later review or appeal, administrative or judicial.

Copies of the Panel’s decisions and other additional information regarding the protest process is available on the internet at the following web site: <http://procurement.sc.gov>

FILE BY CLOSE OF BUSINESS: Appeals must be filed by 5:00 PM, the close of business. *Protest of Palmetto Unilect, LLC*, Case No. 2004-6 (dismissing as untimely an appeal emailed prior to 5:00 PM but not received until after 5:00 PM); *Appeal of Pee Dee Regional Transportation Services, et al.*, Case No. 2007-1 (dismissing as untimely an appeal faxed to the CPO at 6:59 PM).

FILING FEE: Pursuant to Proviso 111.1 of the 2016 General Appropriations Act, “[r]equests for administrative review before the South Carolina Procurement Review Panel shall be accompanied by a filing fee of two hundred and fifty dollars (\$250.00), payable to the SC Procurement Review Panel. The panel is authorized to charge the party requesting an administrative review under the South Carolina Code Sections 11-35-4210(6), 11-35-4220(5), 11-35-4230(6) and/or 11-35-4410...Withdrawal of an appeal will result in the filing fee being forfeited to the panel. If a party desiring to file an appeal is unable to pay the filing fee because of financial hardship, the party shall submit a completed Request for Filing Fee Waiver form at the same time the request for review is filed. The Request for Filing Fee Waiver form is attached to this Decision. If the filing fee is not waived, the party must pay the filing fee within fifteen days of the date of receipt of the order denying waiver of the filing fee. Requests for administrative review will not be accepted unless accompanied by the filing fee or a completed Request for Filing Fee Waiver form at the time of filing.” PLEASE MAKE YOUR CHECK PAYABLE TO THE “SC PROCUREMENT REVIEW PANEL.”

LEGAL REPRESENTATION: In order to prosecute an appeal before the Panel, business entities organized and registered as corporations, limited liability companies, and limited partnerships must be represented by a lawyer. Failure to obtain counsel will result in dismissal of your appeal. *Protest of Lighting Services*, Case No. 2002-10 (Proc. Rev. Panel Nov. 6, 2002) and *Protest of The Kardon Corporation*, Case No. 2002-13 (Proc. Rev. Panel Jan. 31, 2003); and *Protest of PC&C Enterprises, LLC*, Case No. 2012-1 (Proc. Rev. Panel April 2, 2012). However, individuals and those operating as an individual doing business under a trade name may proceed without counsel, if desired.

**South Carolina Procurement Review Panel
Request for Filing Fee Waiver
1205 Pendleton Street, Suite 473, Columbia, SC 29201**

Name of Requestor

Address

City

State

Zip

Business Phone

1. What is your/your company's monthly income? _____

2. What are your/your company's monthly expenses? _____

3. List any other circumstances which you think affect your/your company's ability to pay the filing fee:

To the best of my knowledge, the information above is true and accurate. I have made no attempt to misrepresent my/my company's financial condition. I hereby request that the filing fee for requesting administrative review be waived.

Sworn to before me this

_____ day of _____, 20_____

Notary Public of South Carolina

Requestor/Appellant

My Commission expires: _____

For official use only: _____ Fee Waived _____ Waiver Denied

Chairman or Vice Chairman, SC Procurement Review Panel

This _____ day of _____, 20_____
Columbia, South Carolina

NOTE: If your filing fee request is denied, you will be expected to pay the filing fee within fifteen (15) days of the date of receipt of the order denying the waiver.