A World First[1] Development

Introducing Avio's New Model

R300SR Infrared Thermography Camera

with Onboard "Multi-frame Super Resolution Processing Technology"

that Effectively Enhances Detector Pixel Image Resolution by 4x Times!

(1): As of 2012 November 14th according to our research.
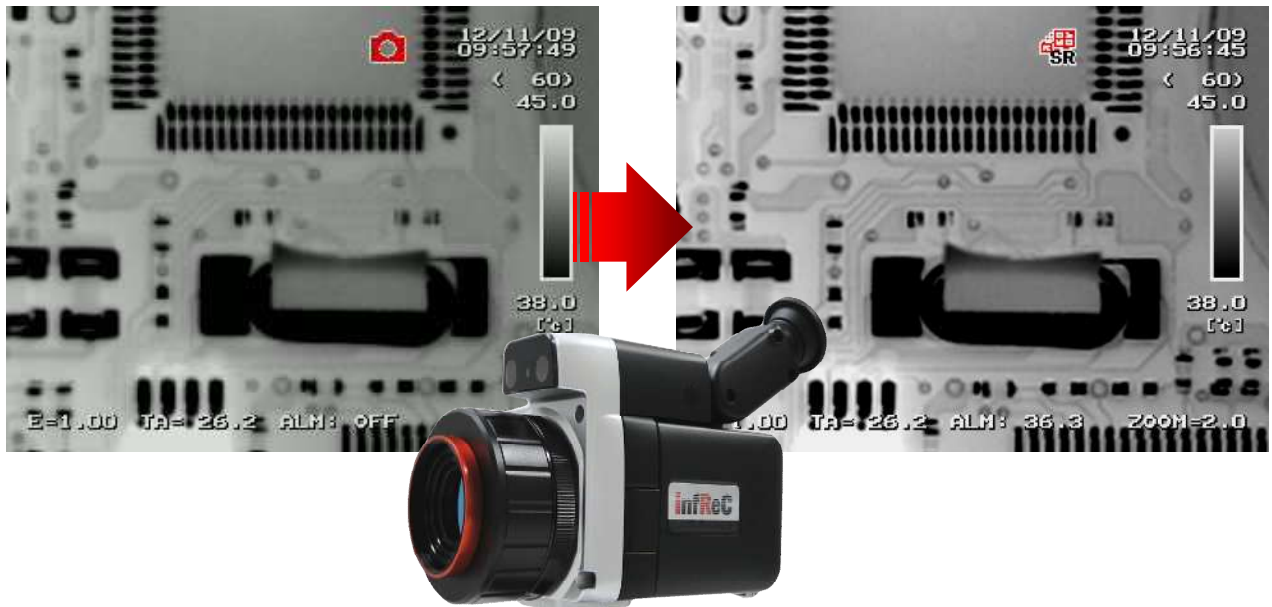
Nippon Avionics Co., Ltd. (Head office: Tokyo, Japan, hereinafter Avio) introduced today the new Model R300SR series of High Image Quality, High Sensitivity Thermography Cameras to their popular R300 Series of Infrared Thermography Cameras.   The new Model R300SR series cameras are equipped with a unique "onboard" function to realize the latest image processing technology called "multi-frame super resolution processing" developed by NEC Central Research Laboratories. Providing this feature inside the camera is a world first development.

The new Model R300SR series Super Resolution Technology improves the spatial resolution of the thermal image by increasing the pixel count to four times the pixel count of the detector by software processing of multiple frames of image information. This feature provides the customer's with "high quality thermal images at low cost" for applications such as the detection of damaged areas within a facility by temperature differences.

Model R300SR Series External Appearance

Model R300SR Series Lineup

Frame rate	Model	Features
60 Hz	R300SR	Standard model
	R300SR-H	High temperature measurement model
	R300SR-S	High resolution model
8.5 Hz	R300SR-D	Standard model
	R300SR-HD	High temperature measurement model
	R300SR-SD	High resolution model

Main Features of the New Model "R300SR" Series and Improvements of the Original R300

1) By use of the super resolution photographing mode, pixel count of the thermal image is improved by four (4) times, and spatial resolution is improved by approximately 1.5 times.

- Normal record mode: 320 x 240 pixels; spatial resolution = 1.2mrad
- Super Resolution record mode: 640 x 480 pixels; spatial resolution = equivalent to 0.8mrad

2) With Avio's onboard Super Resolution Processing, vivid thermal images are generated and displayed on the camera; there is no need to use a PC and special accessory analysis software.

- The analysis software named "InfReC Analyzer NS9500" installed within the R300SR series thermal cameras includes the additional Super Resolution feature which enables edge enhancement of the captured object's thermal image. Edge enhancement creates clearer images making it easier to see small temperature differences such as one might find near a tiny crack.

3) Auto synthesis accuracy in thermal image panoramic photographing mode is enhanced.

- By applying super resolution technology, characteristic points are extracted from six continuous frames of an image from which highly accurate panoramic synthesis is realized. (Horizontally equivalent to approximately 70°, and vertically equivalent to approximately 53°)
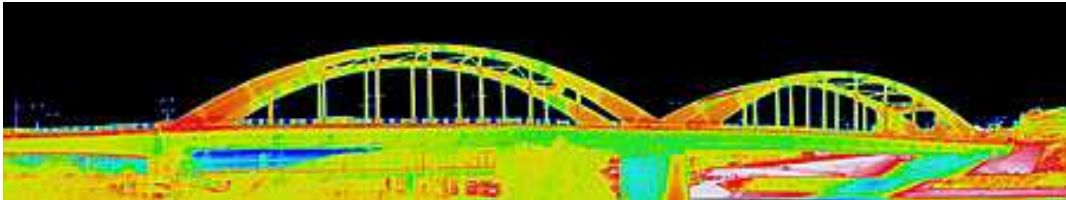
4) Scroll function during digital zoom is added. (with a scroll indicator)

- Both super resolution image data and panoramic image data can be displayed in continuous zoom up to 4 times.
- Image can be enlarged while checking any desired position by the scroll indicator.

5) 3 models are available depending on the temperature range and temperature resolution.

- R300SR : Standard model suitable to various applications.
  Temperature resolution: 0.03°C; Measured temperature range: -40°C to +500°C

- R300SR-H : High temperature measurement model measurable up to +2,000°C.
  Temperature resolution 0.03°C; Measured temperature range: -40°C to +2,000°C.

- R300SR-S : High temperature resolution model with the highest level of temperature resolution of its class.
  Temperature resolution 0.025°C; Measured temperature range: -40°C to +120°C

Note：As a result of introducing R300SR/R300SR-S/R300SR-H, R300/R300S will be discontinued.

R300Z will continue to be available but does not accommodate the use of Super Resolution feature.

6) Affordable Optional Lenses
New low cost lens technology is now offered with the R300SR series IR cameras：
- 2x times Telephoto Lens
- 2x times Wide Angle Lens
- Close-up Lens (72 um)

In order to strengthen the competitiveness of our infrared/measurement device business and to improve business efficiency, such as acceleration of the decision making process, we recently absorbed NEC Avio Infrared Technologies Co., Ltd., one of our subsidiaries, into our newly created Infrared & Measurement Equipment Division. We shall endeavor to offer variety of products and services for further improvement of quality and development of the business. Our continuing goal is to become a company contributing to the safety and security of society based on our unique technology in the field of infrared and to offer ever improving, quality products while so doing. Your continued support as we march toward that challenging goal is very much appreciated.

For Further Information, Please Contact;

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Specifications

Features		R300SR	R300SR-H	R300SR-S
Basic Performance	Measuring range	-40 ℃ - 500°C	-40°C - 2000°C	-40°C - 120°C
	Resolution	0.03 ℃ at 30°C (in S/N improvement)		0.025°C at 30°C (in S/N imp.)
	Accuracy	± 1°C or ± 1% *1		± 2°C or ± 2%
	Frame rate	60 Hz (8.5 Hz version is also available; no export license is required)		
	Pixels	Standard: 320 (H) x 240 (V), Super Resolution (SR mode): 640 (H) x 480 (V) *2		
	Field of View	22° (H) x 17° (V)		
	Spatial resolution	Standard: 1.2 mrad, Super Resolution: 0.8 mrad *3		
	Focal distance	10cm - ∞ (with standard lens) *4		
Measuring Functions	Auto function	Auto-focus, Auto-scale, Full-auto		
	Point temperature	Movable point x 10, Temperature search : max/min x 1 each, Delta T		
	Line profile	Horizontal, Vertical or Horizontal/vertical		
	Areal measurement	Box x 5 (max, min and average in each box)		
	Alarm function	Alarm sound, Alarm display, Color alarm, Ext alarm output, Alarm recording		
	Temperature	Emissivity, Environment/background, Distance, Drift		
	Emissivity correction	Multi-point correction, Emissivity reverse calculation, Emissivity table		
Image Display	Color palette	Olive, Rainbow, Iris, Brightness, Hot iron, Hot white, Hot black, Gradation (8/16/32/256 tones)		
	Visible camera	CMOS camera 3.1 mega pixel		
	Visible/thermal fusion	Parallel, Fusion, Picture-in-picture, Transparent (transparency changeable)		
	Display function	1- 4 times zoom (with scroll), Grid display, 9 images multi image display (static)		
	Image improvement	Averaging (with ghost rejection), Filtering, Edge enhancement		
Storage	Data storage	Statistics mode, Panorama mode (horizontal/vertical), Super resolution, Movie mode (max 10 fps in SD card), Interval mode (3 s – 60 min), Alarm recording, External trigger recording, Voice recording (30 sec play/replay), Text memo		
	Data format	Static image : JPEG with temperature data (14 bit), movie : SVX file (exclusive)		
	Storage media	SD card, Conform to SDHC		
Others	Interface	USB2.0 (mass-storage/image transfer), Video output (NTSC/PAL), External trigger input (pulse signal), Alarm output (No-voltage make contact signal input)		
	Display	3.5' LCD monitor (tilt and brightness adjustment available), Color view finder (tilt mechanism)		
	Supplement function	Wired remote controller, Laser pointer (class 2), LED light		
	Operating	-15°C - 50°C、90%RH		
	Vibration & shock	29.4 m/sec2 (3G), 294 m/sec2 (30G)		
	Dust & splash proof	Protection class IP54 equivalent		
	Battery operation	2 hours (4 hours with optional long time battery)		
	AC power	100 V - 220 V AC, 50/60 Hz		

Dimension	Approx. H 121 mm x W 105 mm x D193 mm（excluding projection）	
Weight	1.3 kg or less　*with battery	
Standard accessories	Carrying case x 1, AC adaptor x 1, Battery pack x 1, Battery charger x 1, SD card x 1, USB cable x 1, Wired remote controller x 1, Grip belt x 1, Shoulder strap x 1, Lens cap x 1, Software x 1	
Standard software	NS9500Pro	NS9500STD

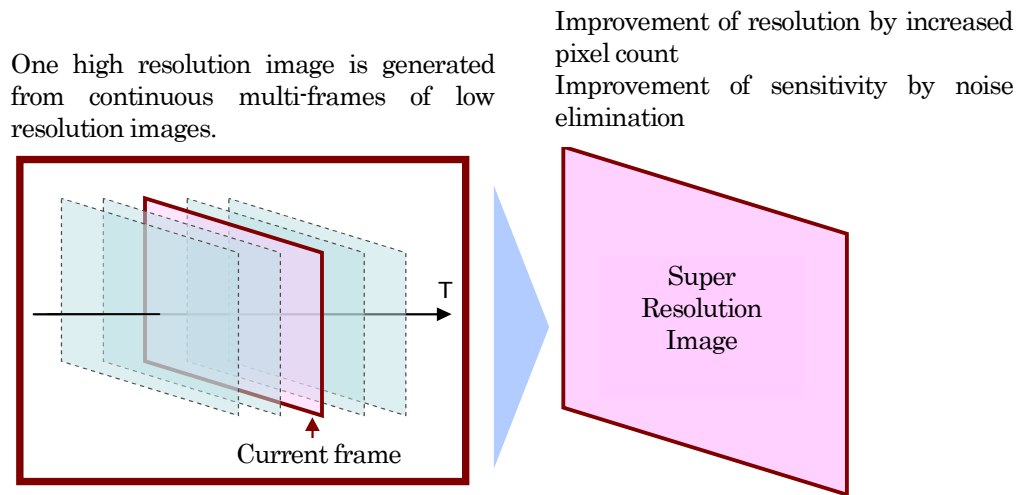*1 Environmental temperature：10‐40°C one range only, others are ±2°C or±2%

*2 Static image only.

*3 This increased resolution results from detecting characteristic points within all frames acquired by the SR process and removing such effects as those caused by hand vibration.
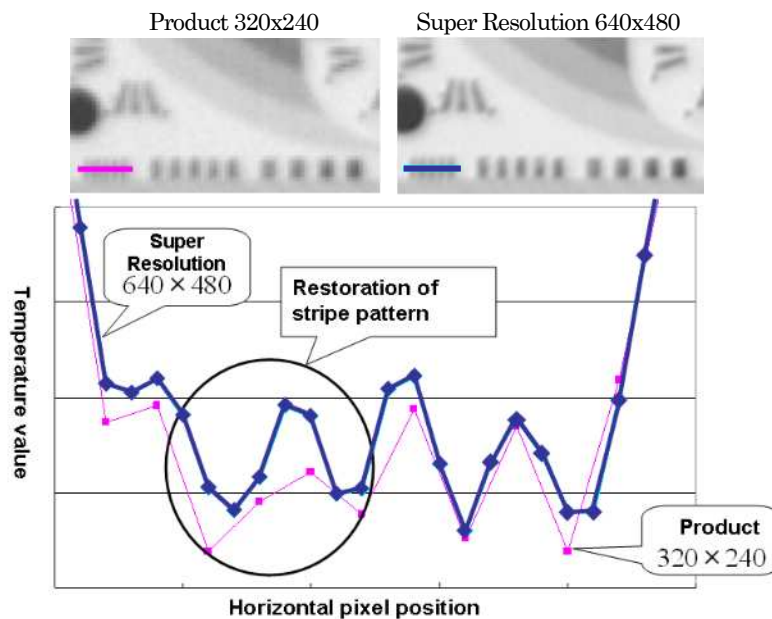
*4 Temperature measuring accuracy is at 30cm or over (less then：±3°C or ±3% either greater)

What is multi-frame Super Resolution Processing Technology ?

Multi-frame Super Resolution Processing is a technology that restores the details originally inherent to the object while enhancing the resolution and minimizing fuzziness and noise of the image.   This is accomplished by performing sophisticated calculations on continuous multi-frames of the image. During this process multiple images are evaluated for misalignment caused, for example, by hand tremor.   The software then interpolates the information between images to detect and correct misalignments within one (1) pixel.   While high resolution image data can be obtained using the existing sensor resolution, high-speed PC CPU and memory are required to perform extremely sophisticated calculations.   With the Super Resolution Processing Technology jointly developed with NEC Central Research Laboratories for the Model R300SR series, this difficult to implement feature can now be incorporated within the camera firmware by shortening the process time through calculation optimization.   As a result, the details inherent to the object can be restored at high speed and with high definition at the photographing site.

One high resolution image is generated from continuous multi-frames of low resolution images.

Improvement of resolution by increased pixel count
Improvement of sensitivity by noise elimination

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Current frame

Super Resolution Image

What is multi-frame Super Resolution Processing ?

Product 320x240   Super Resolution 640x480

Super Resolution 640 × 480

Restoration of stripe pattern

Temperature value

Product 320 × 240

Horizontal pixel position

Effect of multi-frames super resolution processing

<u>Features of Avio's Super Resolution Technology</u>

1. **High speed calculation of approximately two (2) seconds processing time within the camera main body!**

High speed calculation method which reduces the processing time to 1/10 or less is newly developed. Incorporation of the function in the camera firmware is enabled by substantially reducing the processing time which used to be enormous requiring high speed PC CPU and memory.

2. **Highly accurate calculation maintaining temperature accuracy of the thermography!**

A newly developed, highly accurate calculation process ensures temperature accuracy is not lost even in the image data after the super resolution processing. Details inherent to the original object are now accurately restored while avoiding degradation of temperature accuracy by employment of image processing technique such as the edge enhancement.


<u>Expected effect from multi-frames Super Resolution process</u>

1. 640 x 480 pixel high resolution image is obtained from the conventional 320 x 240 pixel sensor!
2. Spatial resolution and slit response are improved.   As a result, target image fine lines or small holes can be seen.
3. Edge effect is high, resulting in an overall sharp image.
4. By superposition of multiple frames of an image, random noise is reduced and S/N ratio is improved.
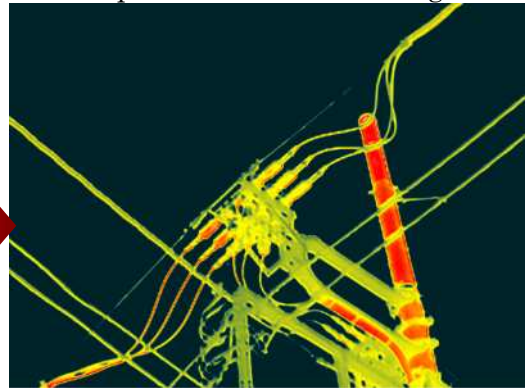
Examples of images using multi-frame Super Resolution Processing Technology

Power pole:

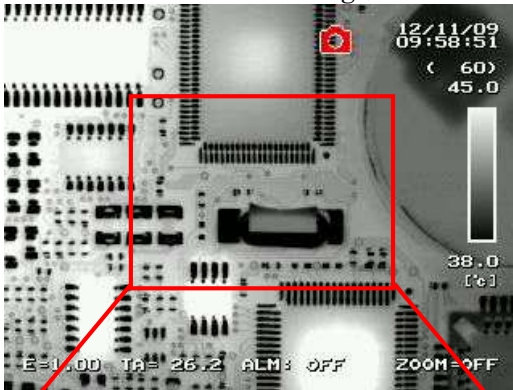320 x 240 pixels
(sensor format image)
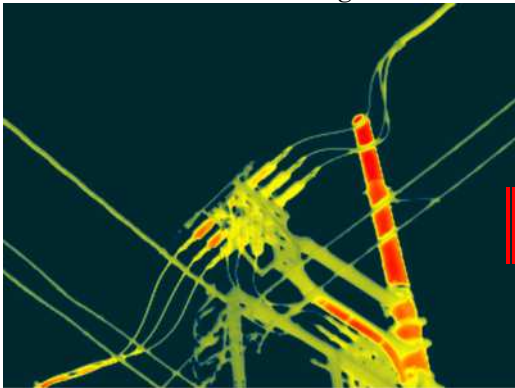
640 x 480 pixels
(Super Resolution mode image)

Printed circuit board:

320 x 240 pixels
(sensor format image)

640 x 480 pixels
(Super Resolution mode image)