XTRALIS VIS-IR™ THEORETICAL SPOT SIZE RATIO CALCULATOR USER GUIDE

VIS-IR THERMOGRAPHY DETECTOR

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The following typographic conventions are used in this document.

Convention	Description
Bold	Used to denote: emphasis Used for names of menus, menu options, toolbar buttons
Italics	Used to denote: references to other parts of this document or other documents. Used for the result of an action

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Glossary

CNPP	Centre National de Prévention et de Protection (France)
DFOV	Diagonal Field of View
FOV	Field of View
FTD	Failsafe Thermography Detector
HFOV	Horizontal Field of View
IFOV	Instantaneous Field of View
mrad	Milliradian
VFOV	Vertical Field of View

Contents

1 Introduction

This document is a reference guideline for using the *36224 VIS-IR Theoretical Spot Size Ratio Calculator* spreadsheet. The calculator will assist to determine FOV, distance, lenses and the number of detectors required for the job. It is advised to do so prior to the installation of the VIS-IR series Thermography detectors.

This document describes the theoretical approach.

Note!

Make sure you also carefully read and apply the **Detector Location** section in the *36219 VIS-IR Installation Sheet* and in the *36218 VIS-IR Product Guide*. These sections deal with the practical side of the installation.

2 Determining the Type and Number of Detectors and Their Location

2.1 Data Gathering

Before starting a calculation, several data need to be known/agreed:

- What is the distance of the detector to the target?
- What is the minimum size of the target area above/below the alarm temperature that needs to be detected?
- If no specific target size is requested, is the installation to be CNPP approved (5x5 pixels) or not (3x3 pixels)?

2.2 Understanding the Theoretical Spot Size Calculator

2.2.1 Definitions

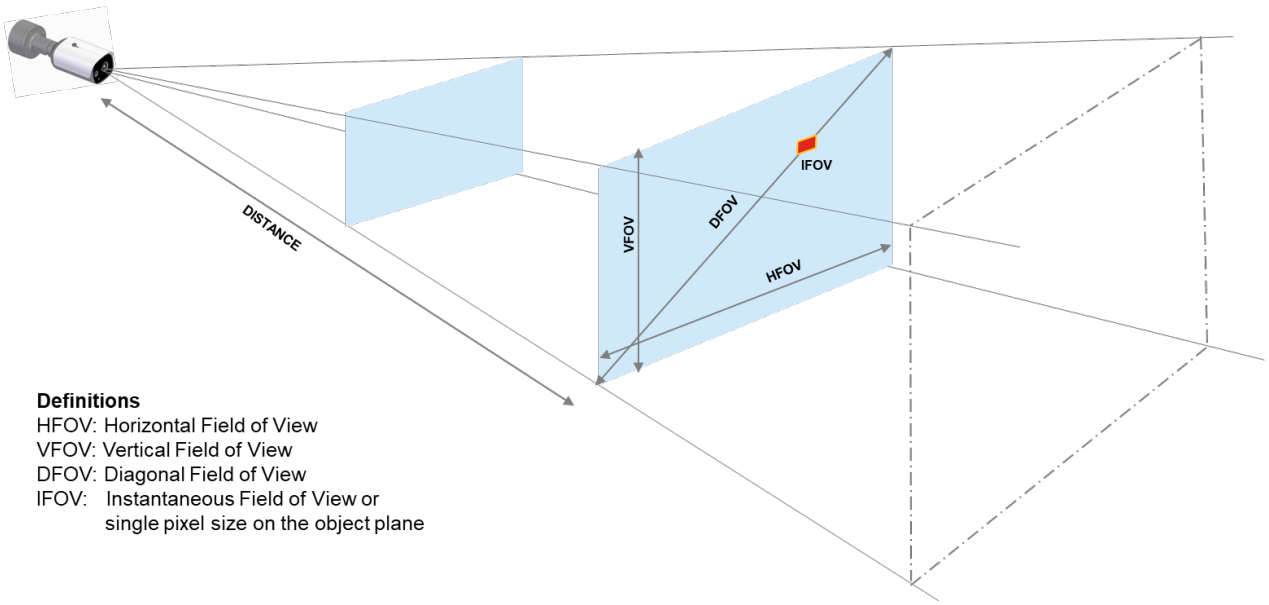

Figure 1: Definition of the various FOV

2.2.2 Explanation of the Various Cells

INPUT		RESULTS	
Detector resolution		IFOV	
Hor	384		# Pixels square
Vert	288		5
FOV		mrad	
HFOV (°)	22	1.00	5.00
VFOV (°)	16	mm	
Distance		100	**50.0**
in m	100	Theoretical max. distance (m)	
		100	
		D max	"n" cm
		60	30.0
Horizontal FOV (m)		**38.9**	
Vertical FOV (m)		**28.1**	

Figure 2: Overview of the Theoretical Spot Size Calculator

There are two blocks, an **Input** part, and the **Result** part.

The green cells are the only ones that need to be used to get the insight of the installation.

The light grey cells show the generated results.

Other cells are headings or formulas.

Formula cells are blocked but visible in case the formula is to be checked.

Detector resolution	
Hor	384
Vert	288

The resolution is fixed, because all VIS-IR-abcd-S detectors have the same imager.

Do not change these cells.

FOV	
HFOV (°)	22
VFOV (°)	16

Select the horizontal and vertical FOV of the specific detector you select. The FOV is determined by the lens.

The horizontal and vertical FOV are captured in the detector code, Hor. = ab, Vert. = cd.

The example used here refers to the VIS-IR-2216-S.

If the detector is to be deployed on its side, i.e. turned 90°, then invert Hor. and Vert. FOV values in the cells.

Distance	
in m	100

Put in the furthest distance between the detector and the target.

IFOV
mrad
1.00
mm
100

These cells calculate the IFOV (Instantaneous Field of View), used to generate the results.

The formulas are:

IFOV (mrad) = Hor. FOV/Hor. Resolution [1] x 3.14 (Pi)/180 x 1000 [2] mrad

IFOV (mm) = (IFOV (mrad) /1000) x Distance to target in mm

Pixels square
5
5.00
50.0

The pixels, 5 in this example, represent the minimum size of an area that can be reliably detected. For *CNPP* Certified installations, 5 x 5 pixels is the minimum area that needs to be detected. From a detector performance point of view, 3x3 pixels is the minimum acceptable.

The result, 50 cm in this example, means that 50 x 50 cm can be detected at 100m distance with a 22° HFOV lens.

Theoretical max. distance (m)	
100	

The number represents the maximum allowed distance to detect a 5x5 pixels area with the given lens and imager.

In this particular case we are OK because our selected Distance of 100m is equal or less than the *theoretical max. distance* of 100m.

The is *theoretical max*. *distance* calculated based on the lens and imager and not affected by the *Distance* number that was put in.

D max	"n" cm
60	30.0

This formula gives a quick calculation of what is the maximum distance, based on the chosen amount of pixels (5), if the customer wants to see a smaller area size, 30 x 30 cm, than the 50x50 cm for a CNPP approved installation. In this case the approved maximum distance will be reduced from 100 m to 60 m.

Horizontal FOV (m)	**38.9**
Vertical FOV (m)	**28.1**

This result provides the Hor. and Vert. FOV with the chosen lens (abcd) and at the chosen Distance. This is the area that the detector can cover at the chosen *Distance*.

[1] Use the number of pixels that matches the direction (horizontal/vertical) of the FOV.
[2] 1 m in mm

Summary sheet

Below is a summary overview of the maximum distances, based on the different lenses at 5x5 and 3x3 pixel selection.

There is also an overview of the different FOVs, based on the maximum distances at a 5x5 pixel selection.

	Hor. FOV	Max. distance (m)		Max. distance (ft)	
		5x5 pixels	3x3 pixels	5x5 pixels	3x3 pixels
FTD-2216-S	22°	100	167	328.1	547.9
FTD-4231-S	42°	52	87	170.6	285.4
FTD-8865-S	88°	25	42	82.0	137.8
	@5x5 max D.	HOR FOV Meter	VERT FOV Meter	HOR FOV Feet	VERT FOV Feet
FTD-2216-S	22°	38.9	28.1	127.6	92.2
FTD-4231-S	42°	39.9	28.8	130.9	94.5
FTD-8865-S	88°	48.3	31.9	158.5	104.7

3 Using the Theoretical Spot Size Calculator

1. The selection of the detector is mainly a trade-off between distance and target coverage. Unless the end-user has specific requirements about minimum size of detectable area, start with selecting a 5x5 or 3x3 pixel solution.
2. Next step is to select a detector.
3. The table above gives you a quick feel of what detector is best fit for the job.
4. Now put in the detector's HFOV and VFOV data.
5. Mind that the wider the FOV, the more surface you cover, but at a closer distance.
6. Next, put in the distance target <–> detector, based on where the detector is most likely to be mounted.
7. Now verify that the chosen distance is within *the Theoretical max. distance*.

The *Horizontal FOV (m) and Vertical FOV (m)* indicate what surface can be detected.

This determines, based on the total to be supervised area, how many detectors are required.

Obviously, there can be trade-offs on distance and/or minimum detected area.