

# RAW DATA FILES STRUCTURE

REV 07

This guide describes how to interpret the raw data files (\*.DAT), which are created by the device for each saved image and video / time-lapse frame on the internal storage. The referred code files are on the Github.

The structure of the file is define as following - see "method "SaveRawData" in "Thermal/Save.h" as reference:

- **Lepton raw values** - 9600 byte (Lepton2) or 38400 byte (Lepton3)
  - 4800 / 19200 raw values for the Lepton2 / Lepton3, split to two bytes, MSB first, then LSB
  - Raw value is 14-bit (0 ... 16383) for each pixel, equivalent to infrared intensity
  - Difference can be made by the total file size (10005 byte Lepton2 vs. 38805 Lepton3)
- **Minimum temp** - 2 byte
  - 14-bit minimum raw value to apply the color scheme, could be fixed if in manual mode
  - Split to two bytes, MSB first, then LSB. Reconstruction analog to the lepton raw values
- **Maximum temp** - 2 byte
  - 14-bit maximum raw value, same format than the minimum temperature value
- **Spot sensor temp** - 4 byte
  - Object temperature measured by the spot sensor; Float, split to four bytes, LSB first
  - Format is Celsius or Fahrenheit, depending on the set temperature format
- **Color scheme** - 1 byte
  - Number of the color scheme, the image was created with
  - Number definitions can be looked up in the file "General/GlobalDefines.h"
- **Temperature format** - 1 byte
  - The temperature format is applied to all absolute temperatures
  - Celsius (0) or Fahrenheit (1)
- **Show spot** - 1 byte
  - Display the MLX90614 spot temperature information in an image or not
  - Disabled (0) or Enabled (1)
- **Show color bar** - 1 byte
  - Display the radiometric color bar in an image or not
  - Disabled (0) or Enabled (1), Disabled when in warmup (first 60 seconds)
- **Show minimum / maximum point** - 1 byte
  - Show the minimum and / or maximum temperature point(s) in an image or not
  - Disabled (0), Min only (1), Max only (2), Min & Max (3)
- **Calibration offset** - 4 byte
  - Offset for the raw-to-abs temperature conversion
  - Float, split to four bytes, LSB first. Reconstruction analog to the spot sensor temp
- **Calibration slope** - 4 byte
  - Slope for the raw-to-abs temperature conversion
  - Float, split to four bytes, LSB first. Reconstruction analog to the spot sensor temp

The absolute temperature can be calculated out of each raw value by using the following formula:

$absTemp = rawValue * calibrationSlope + calibrationOffset$

- **Temperature points** - 384 byte
  - 96 different temperature points, containing the index position and lepton raw value
  - They are manually defined by the user and could be skipped if not utilized
  - The first two bytes are the index position, second two bytes are the lepton raw value
  - Index position: (0,0) = 1; (159, 119) = 19200; 0 = not set, otherwise set; MSB first, then LSB