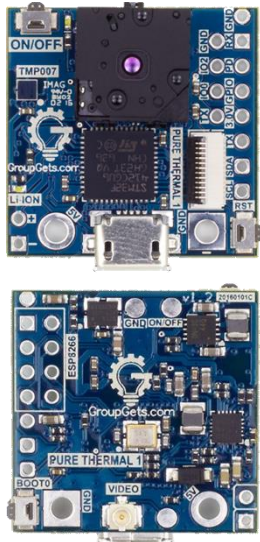


# GroupGets PureThermal 1

## FLIR Lepton® Smart I/O Module v1.3



The PureThermal 1 FLIR Lepton Smart I/O Module is a hackable thermal webcam module for the FLIR Lepton Longwave Infrared (LWIR) camera core. It ships pre-configured to operate as a plug-and-play UVC 1.0 USB thermal webcam that will work with standard webcam apps such as VLC Media Player on PC, Linux, Mac, and Android. For developers, it's reference firmware and hardware schematic are open source for customized applications and alternate command, control, and video output channels such as analog. We have also created an open source software application, GetThermal, to view Lepton data on x86 Linux and macOS platforms. GetThermal and PureThermal 1 (PT1) both support the *radiometric* mode of Lepton 2.5. Stay up to date with resources, video, and software for PT1 at its [resource page](#).

## FEATURES

- Get Thermal video over USB right out of the box using freeware apps like VLC on Mac, Linux, Windows, or Android
- PT1 can do 9 Hz color video over usb using the [USB UVC class](#)
- STM32F412 ARM microprocessor. Execute on-board image processing without the need for an external system
- Through-holes for GPIO and peripheral breakouts to easily attach other devices
- TMP007 IR Thermopile contactless temperature sensor for manual Lepton calibration
- Open source reference firmware is on the [GroupGets Github](#)
- Flash the STM32 ARM MCU over JTAG through a debug ZIF socket and [breakout adapter](#).
- USB powered with optional LiPo input. Battery through-holes are provided along with an on-board Li-ion charger IC
- UART, I2C, and GPIO Expansion via standard 0.1" holes
- Compatible with all current 2.x and 3.0 Lepton cores
- Compact 1" x 1" form-factor that can be embedded into other modules or inconspicuously housed as a standalone web, research, or security camera
- 4-bit Analog Video Output (with alternate firmware)

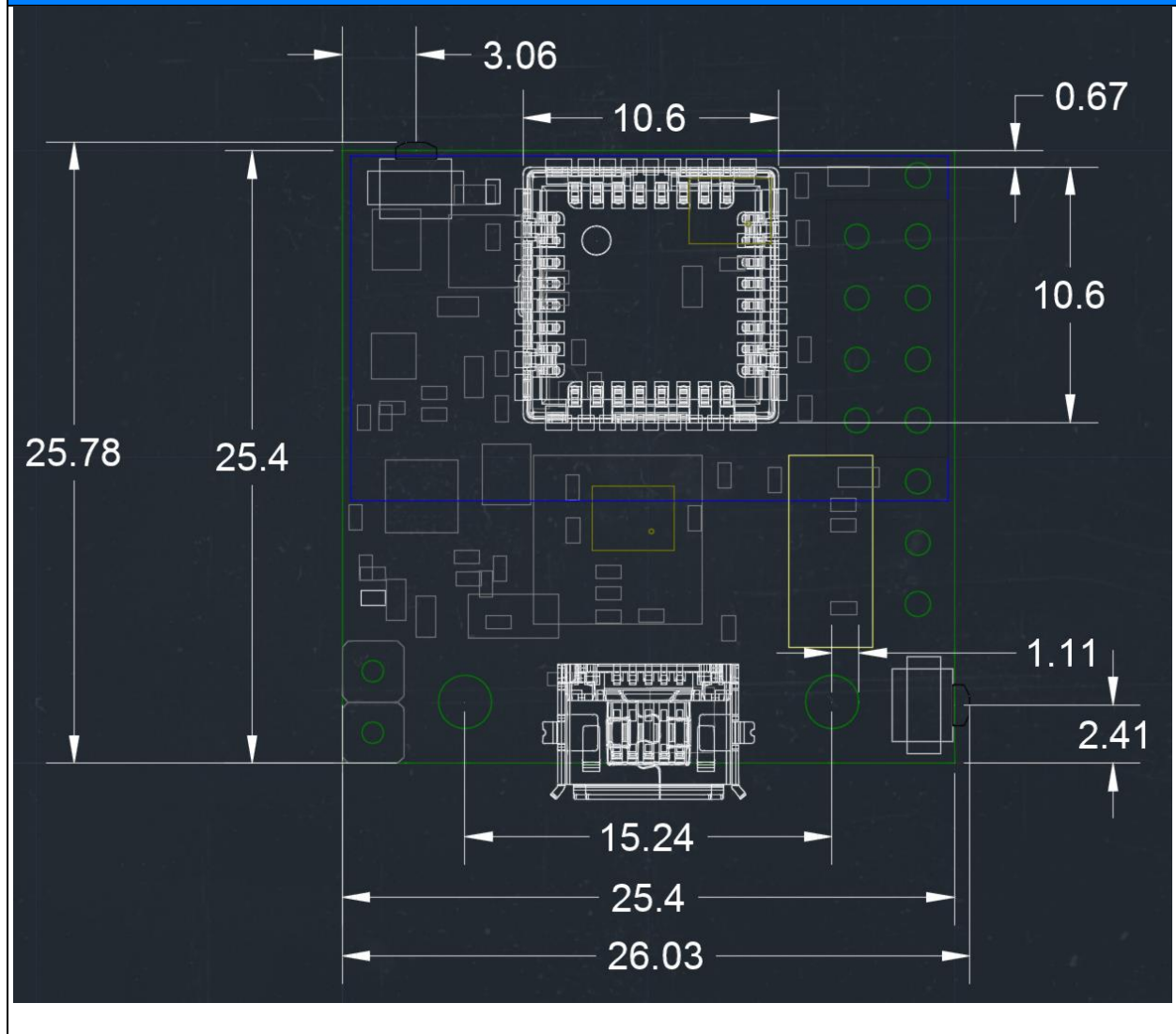
## APPLICATIONS

- Thermal Imaging
- Non-contact temperature measurements
- Motion Sensing
- Night Vision
- Gesture Recognition

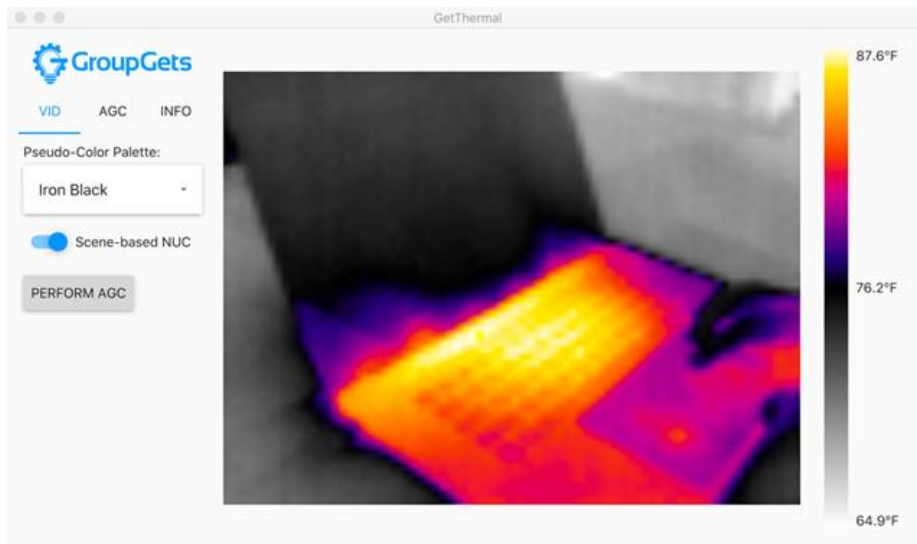
## PureThermal 1 Specifications

Power Inputs	Micro USB, Battery Holes for a LiPo
Lepton Core Support	Lepton 2.x and 3.0
Expansion	I2C, UART, GPIO, JTAG
Processor	STM32F412 (1M Flash, 512K RAM)
Thermal Video Outputs	UVC over USB, 4-bit Analog

### Dimensions (mm)



## Application Information



### Programming PureThermal 1

To program the PureThermal 1 a [ST-Link V2](#) and [ARM MCU JTAG Adapter](#) for PureThermal 1 is required. The various firmware versions and instructions are available on our [PureThermal1 GitHub page](#).

### Release firmware version 0.99.2

Version 0.99.2 is the default PureThermal 1 firmware configuration. It allows the PT1 to be recognized as a webcam on most computers and operating systems (USB Video Class – UVC) right out of the box. This is the easiest to use firmware and is compatible with all 2.x FLIR Leptons.

### Release firmware version 0.99.2.Y16

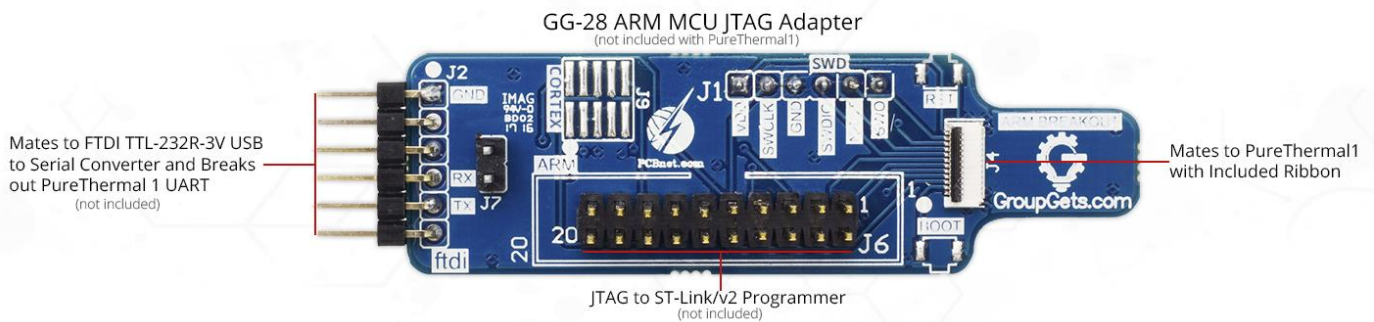
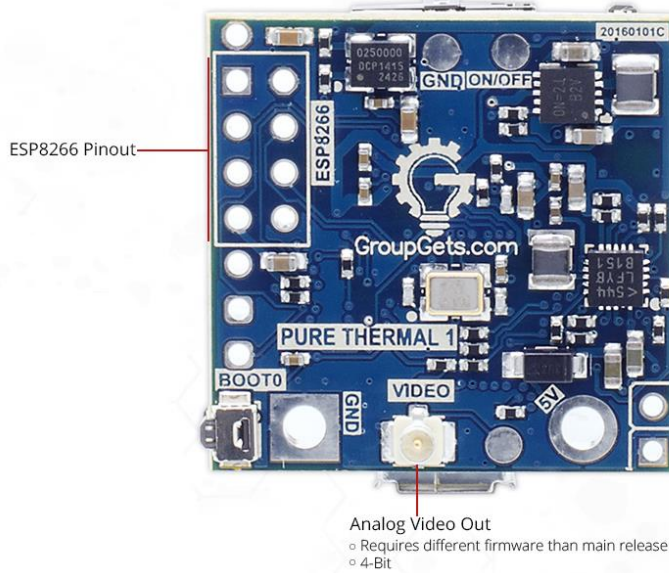
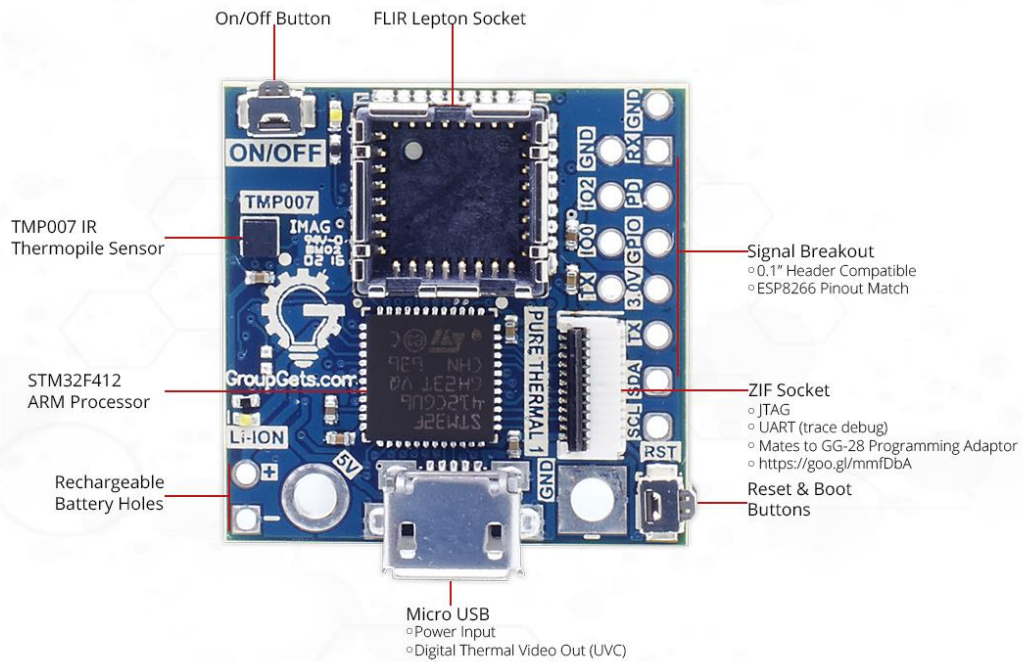
The Y16 firmware uses the Y16 UVC data type, which will contain raw 14-bit lepton data. This firmware is meant to only be used with radiometric FLIR Leptons (Currently the FLIR Lepton 2.5). Y16 firmware allows for the temperature to be read from each pixel on the Lepton, but it requires the use of specialized software to display such as our open source [GetThermal](#) application for MacOS and Linux.



### Debugging PureThermal 1

PureThermal 1 has an available UART port to aid debugging and app development. To use it, attach a standard [3V3 TTL-to-USB converter](#) to the end of the ARM MCU JTAG adapter shown on the left.

# PureThermal 1 Interface Diagram



# Hardware Schematic

Downloadable .pdf version available: [https://files.groupergets.com/purethermal/PureThermal1\\_sch.PDF](https://files.groupergets.com/purethermal/PureThermal1_sch.PDF)

