GroupGets PureThermal 2

FLIR Lepton® Smart I/O Module

The PureThermal 2 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. We have also created an open source software application, GetThermal, to view Lepton data on x86 Linux and macOS platforms. GetThermal and PureThermal 2 (PT2) both support the *radiometric* mode of Lepton 2.5 & 3.5. Stay up to date with resources, video, and software for PT2 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
- PT2 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
- Open source reference firmware is on the GroupGets Github
- Device Firmware Upgrade (DFU) the STM32 ARM MCU over USB
- Debug via JTAG through a 6-Pin plug-of-Nails port using a Tag-Connect TC2030-IDC-NL, an ARM20-CTX, & ST-Link V/2.
- Powered via USB
- UART, I2C, and GPIO Expansion via standard 0.1" holes
- Compatible with all current 2.x and 3.x Lepton cores
- Compact 30 x 18mm form-factor that can be embedded into other modules or inconspicuously housed as a standalone web, research, or security camera
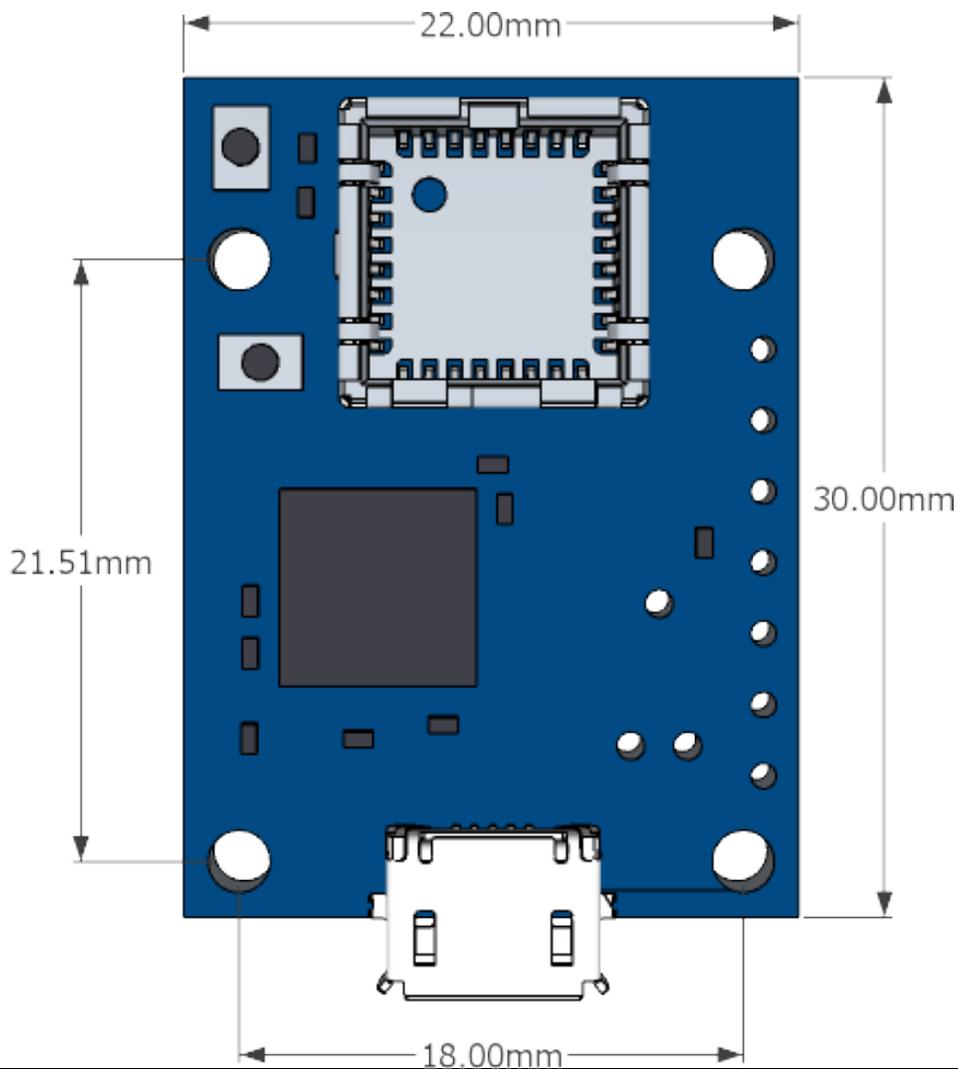
APPLICATIONS

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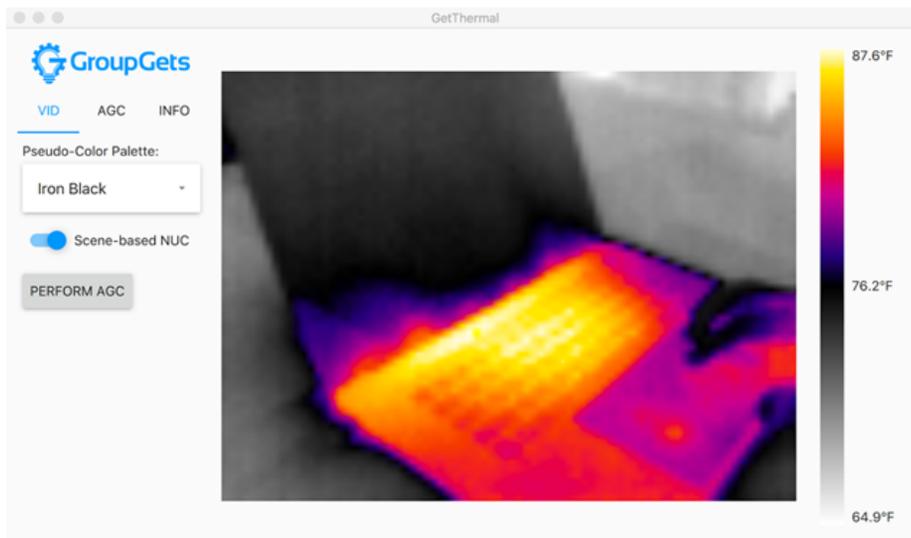- Night Vision
- Gesture Recognition

PureThermal 2 Specifications

Power Inputs	Micro USB
Maximum Input Voltage (LiPo/H1)	5.5v
Lepton Core Support	Lepton 2.x and 3.x
Expansion	I2C, UART, GPIO, JTAG
Processor	STM32F412 (1M Flash, 512K RAM)
Thermal Video Outputs	UVC over USB
PureThermal 2 Part Number	PURETHERMAL-2

Dimensions (mm)

Application Information

Programming PureThermal 2

To program the PureThermal 2 a ST-Link V2, Tag-Connect TC2030-IDC-NL, & a Tag-Connect ARM20-CTX 20-Pin to TC2030-IDC Adapter are required. The various firmware versions and instructions are available on our PureThermal GitHub page.
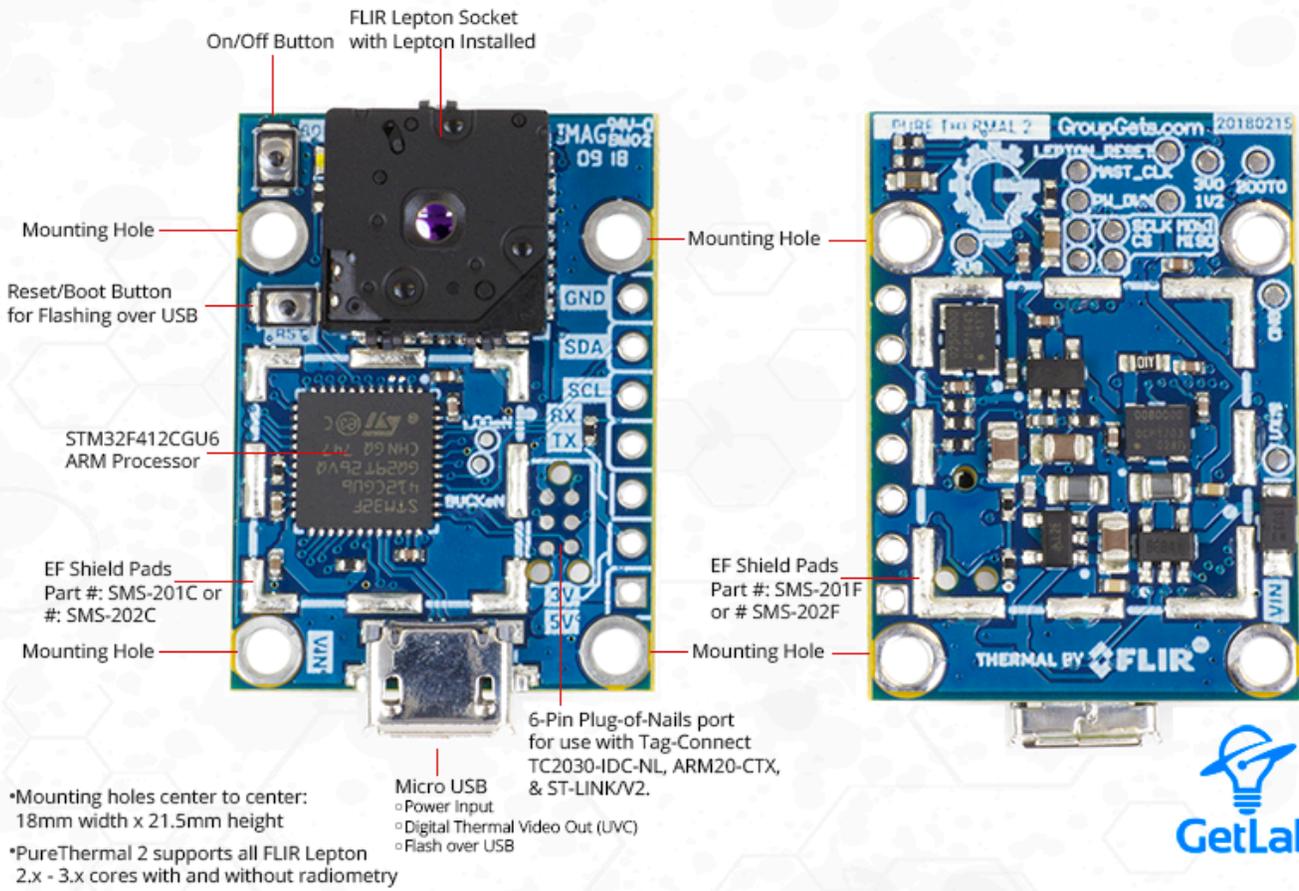
Release firmware version 1.10

Version 1.10 is the default PureThermal 2 firmware configuration as of June 27th 2018. It allows the PT2 to be recognized as a webcam on most computers and operating systems (USB Video Class – UVC) right out of the box. It has both Lepton 2.x and 3.x support determined at boot. It is compatible with both standard and radiometric Lepton cameras. Using the radiometry feature from a radiometric Lepton requires the use of specialized software to display such as our open source GetThermal application for macOS and Linux.

Debugging PureThermal 2
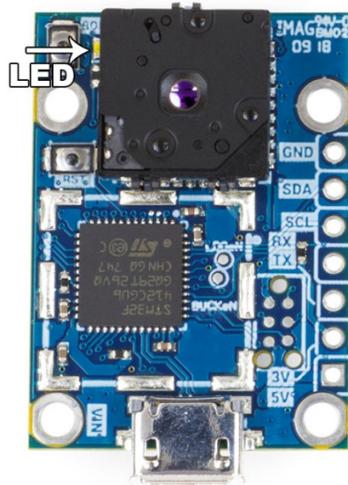
PureThermal 2 has an available UART port to aid debugging and app development. To use it, attach a standard 3V3 TTL-to-USB converter to the end of the ARM MCU JTAG adapter shown on the left.

PureThermal 2 Interface Diagram

PureThermal 2 Interface Diagram

On/Off Button

FLIR Lepton Socket with Lepton Installed

Mounting Hole

Mounting Hole

Reset/Boot Button for Flashing over USB

GND

SDA

SCL

RX

TX

STM32F412CGU6 ARM Processor

EF Shield Pads Part #: SMS-201C or #: SMS-202C

EF Shield Pads Part #: SMS-201F or # SMS-202F

Mounting Hole

Mounting Hole

LEPTON_RESET

MAST_CLX

PH_DIN

3V0

2V0

SCLK

CS

MOSI

MISO

3V0

1V2

THERMAL BY FLIR

• Mounting holes center to center: 18mm width x 21.5mm height

• PureThermal 2 supports all FLIR Lepton 2.x - 3.x cores with and without radiometry

6-Pin Plug-of-Nails port for use with Tag-Connect TC2030-IDC-NL, ARM20-CTX, & ST-LINK/V2.

Micro USB
◦ Power Input
◦ Digital Thermal Video Out (UVC)
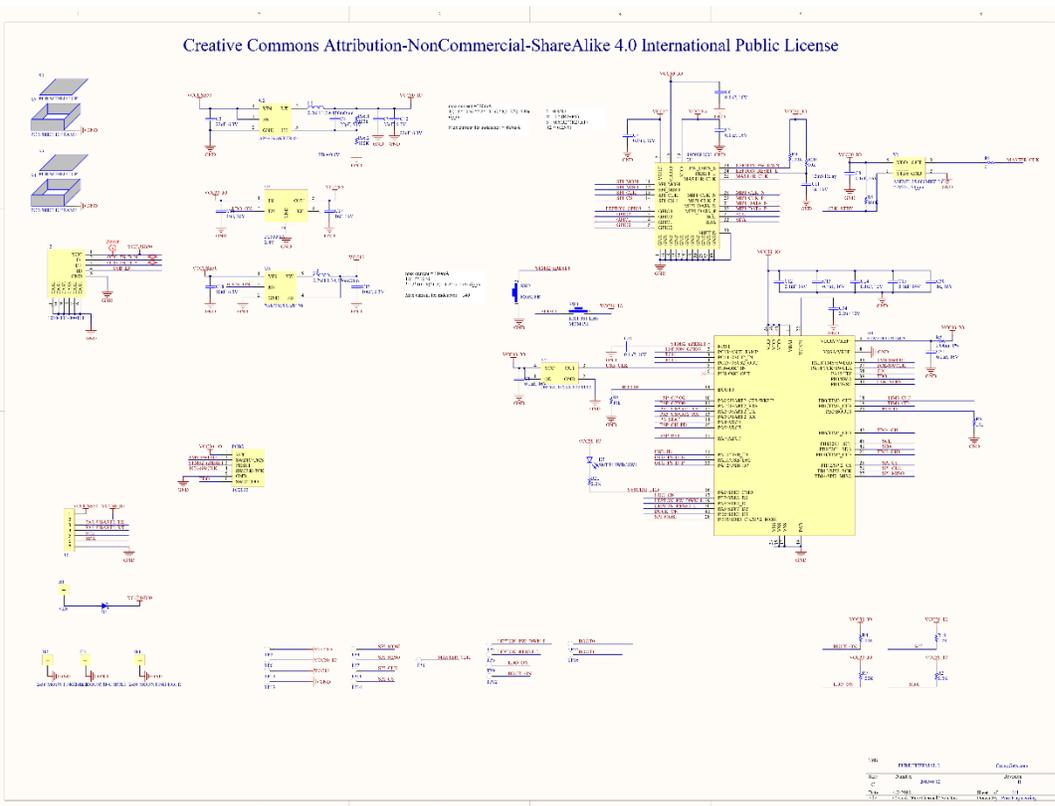◦ Flash over USB

GetLab

GroupGets

Functions

LED: When plugged in to micro-usb power and a Lepton is inserted in the socket LED will flash slowly. When video is being transmitted to the viewing program, LED will flash more rapidly.

Hardware Schematic

Downloadable .pdf version available here.

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