Accessible version (HTML): amperis.com/en/accesible/sf-series-eng/

SF Series Infrared Module

Thermal imaging cameras

Three thermal cores: SF641, SF643 and SF740 at 120 Hz

SF SERIES

640 × 512 thermal modules for OEM integration

amperis

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Uncooled 640 × 512 thermal cores ready to build into drones, robots and embedded systems.

Product overview

SF series module with athermalised lens

One detector, three integration formats

The SF series modules share an uncooled VOx detector of 640 × 512 with 12 µm pixel pitch over the 8-14 µm band, athermalised focus-free lenses and the same image processing. They differ in how they connect to the host system and in frame rate, so the right core can be chosen for each platform.

SF641: analogue video and the widest lens choice

≤ 30 mK at 50 Hz in 26 × 26 mm and 22 g without lens, one PAL or NTSC analogue video channel plus 16-bit digital video, six fixed lenses from 9 to 75 mm and operation from -40 °C to +70 °C; the SF641R variant keeps the compact 9, 13 and 25 mm set and works from -20 °C to +60 °C.

SF643: LVCMOS and MIPI outputs at 1 W

Same 26 × 26 mm and 22 g footprint, ≤ 40 mK and 1 W of consumption, with LVCMOS (BT656) and MIPI CSI-2 digital outputs, analogue PAL/NTSC and USB Type-C through an expansion board.

SF740: 120 Hz for fast-moving targets

A 120 Hz frame rate for automation, robotics and quality control, 14 palettes, image flip, scheduled calibration and operation down to -40 °C.

Common features

- DDE digital detail enhancement and 1-8× digital zoom.
- Automatic non-uniformity correction at power-on, plus manual calibration.
- UART control (TTL 3.3 V) with reserved user I/O.
- Single 5 V DC supply.

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Applications and model selection

Applications

- Drones and airborne inspection platforms.
- Industrial temperature monitoring and process control.
- Robotics, automation and quality control with fast-moving targets (SF740).
- Security, surveillance and outdoor observation.
- Handheld and embedded equipment with tight volume and power budgets (SF641, SF643).

Which module to choose

The SF641 suits systems that take analogue video and need long focal lengths up to 75 mm. The SF643 shares its 26 × 26 mm size and adds standard LVCMOS and MIPI CSI-2 digital outputs at 1 W for direct connection to a processor. The SF740 is the choice when the scene moves fast: it raises the frame rate from 50 to 120 Hz and adds scheduled calibration for continuous operation.

What the integrator adds

The modules are thermal cores, not finished cameras: they provide the detector, the image processing and the interfaces, and the integrator adds the housing, the power supply and the application electronics. The USB expansion board of the SF643 and the SF740 speeds up evaluation and development on a PC.

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SF SERIES — PERFORMANCE AND IMAGE

	SF641	SF643	SF740
Detector	Uncooled VOx microbolometer, 640 × 512, 12 µm pixel pitch		
Spectral range	8-14 µm		
Thermal sensitivity (NETD)	≤ 30 mK	≤ 40 mK	—
Frame rate	50 Hz	50 Hz	120 Hz
Lenses (athermalised, focus-free)	9, 13, 25, 35, 50 or 75 mm (SF641R: 9, 13 or 25 mm)	9, 13, 25 or 35 mm (50 and 70 mm on request)	9.1, 13, 25 or 35 mm
Detail enhancement	Digital detail enhancement (DDE)		
Brightness, gain and contrast	Manual; auto brightness with manual gain; fully automatic	Manual; auto brightness with manual gain; fully automatic	Brightness and contrast, manual or automatic
Polarity, palettes, flip	Polarity switch	Polarity switch	Colour reversal; 14 palettes; vertical, horizontal and mirror flip
Digital zoom	1-8×	1-8×	1-8×, continuous
Non-uniformity correction	Manual, plus automatic at power-on	Manual, plus automatic at power-on	Manual, automatic at power-on and scheduled during operation (interval settable)
Noise reduction	Yes	Yes	—

— Not specified for this model. Specifications subject to change without notice.

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SF SERIES — INTERFACES, POWER AND MECHANICS

	SF641	SF643	SF740
Analogue video	1 channel, PAL or NTSC	1 channel, PAL or NTSC	—
Digital video	16-bit digital video	LVCMOS (TTL 1.8 V, BT656), 16-bit YUV or 14-bit RAW; MIPI CSI-2, 16-bit YUV or 14-bit RAW	LVCMOS, 16-bit YUV or 14-bit RAW; MIPI, 16-bit YUV or 14-bit RAW
USB	—	USB Type-C with expansion board	USB 3.x Type-C with expansion board
Control	UART (TTL 3.3 V)		
User I/O	Reserved	Reserved	Reserved, configurable to the application
Connector and mounting	Single interface: power, analogue video, 16-bit digital video and user I/O	—	Board-to-board connector (DF40C-70DP-0.4V); 8 × M1.6 threaded holes on 4 sides
Power supply	5 V DC	5 V DC	5 V DC (4-5 V; 4-6 V with USB expansion board)
Power consumption	—	1 W (without expansion board)	1.4 W (without expansion board)
Operating temperature	-40 °C to +70 °C (SF641R: -20 °C to +60 °C)	-20 °C to +60 °C (-40 °C on request)	-40 °C to +60 °C
Storage temperature	-45 °C to +75 °C	-45 °C to +70 °C	-45 °C to +70 °C
Size (without lens)	26 × 26 mm	26 × 26 mm	32 × 32 mm; depth 34.6 / 37.1 / 48.8 / 60.8 mm with 9.1 / 13 / 25 / 35 mm lens
Weight (without lens)	22 g	22 g	30 g (also without lens mount)
Shock and vibration	—	—	GB/T 2423.5-2019 and GB/T 2423.10-2019

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