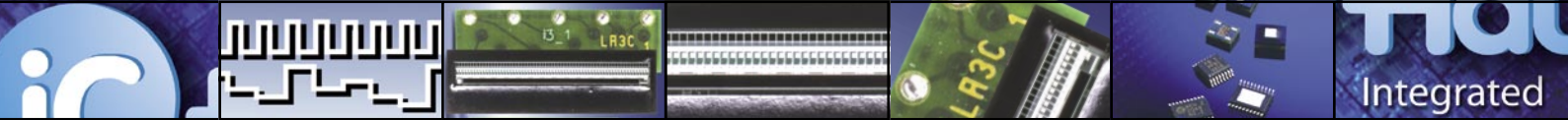


# iC-LA, iC-LF 1401, iC-LFL 1402 CMOS LINEAR IMAGE SENSORS



**iC-LA** is an integrating light-to-voltage converter with 64x1 pixels at a 200  $\mu\text{m}$  pitch. Each pixel consists of a 183  $\mu\text{m}$  x 200  $\mu\text{m}$  photodiode with integration capacitor and a track-and-hold circuit.

Photocurrent integration is started simultaneously for all pixels with the rising edge of the clock signal when DIN is high. If input DIN is still high at the end of a completed integration cycle, all integration capacitors are automatically reset and a new integration cycle is initiated (continuous operation).

In hold mode, the pixels are subsequently fed to the multiplexer which selects the odd or even bus line for the output buffer. This dual line configuration allows a high working speed. Input DNU determines the shift direction of the multiplexer. With DNU low the pixels are switched in ascending order to AOUT, starting at pixel 1; with DNU high in descending order starting at pixel 64.

## Applications

- Optical linear sensors
- CCD substitute
- Distance measurement (triangulation)
- Spectroscopy

## Features

### iC-LA

- 64 photosensors with 200  $\mu\text{m}$  pitch (127 DPI)
- Internal bi-directional shift register
- Extendable data I/O supports cascading
- On-chip temperature sensor

### iC-LF1401

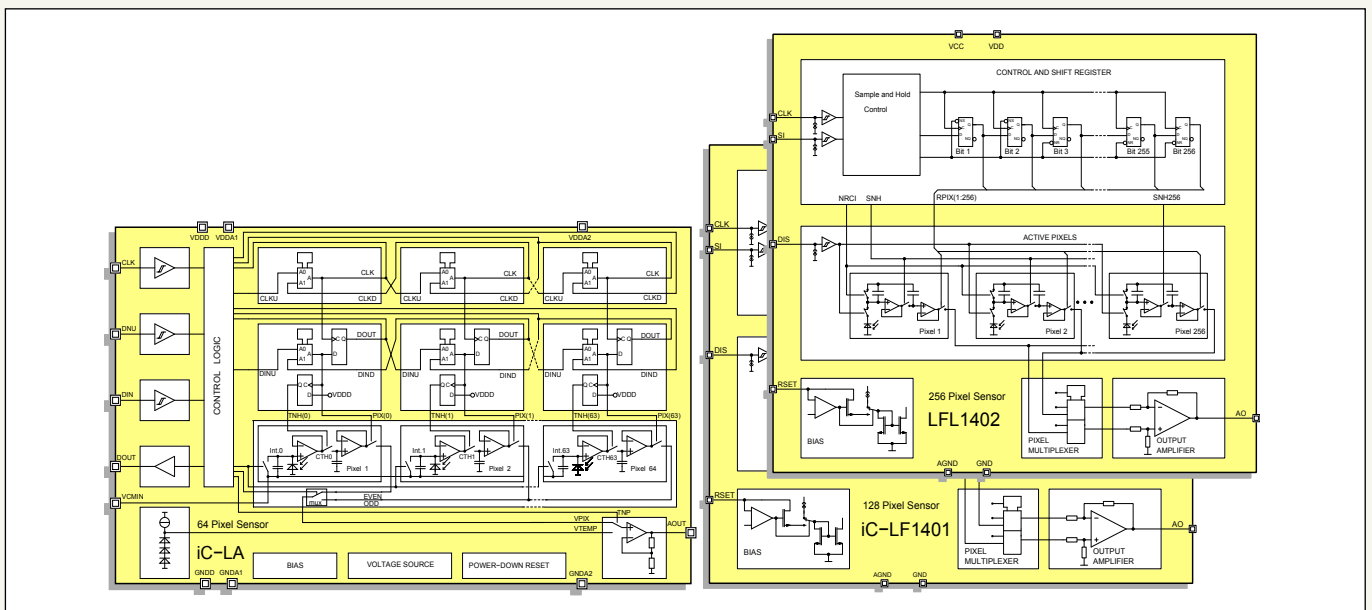
- 128 active photo pixels with 63.5  $\mu\text{m}$  pitch (400 DPI)
- Pin-to-pin compatible with TSL1401
- Only 128 clocks required for readout

### iC-LF1402

- 256 active photo pixels with a gap and distortion free 63.5  $\mu\text{m}$  pitch (400 DPI)
- Function equivalent to TSL1402 (serial mode)
- Only 256 clocks required for readout

### iC-LF Series

- Shutter function enables flexible exposure times
- High pixel clock rate of up to 5 MHz
- Glitch-free push-pull output amplifier



# iC-LA, iC-LF 1401, iC-LFL 1402

## CMOS LINEAR IMAGE SENSORS

**iC-LF1401** and **iC-LFL1402** are integrating light-to-voltage converters with 128x1 resp. 256x1 pixels at a 63.5  $\mu\text{m}$  pitch. Due to the monolithic integration there is no pixel-gap or pitch distortion whatsoever. Each pixel consists of a 56.4  $\mu\text{m}$  x 200  $\mu\text{m}$  photodiode, an integration capacitor and a sample-and-hold circuit.

The integrated control logic makes operation very simple, with only a start and clock signal necessary. A third control input (DIS) allows the integration to be halted at any time (electronic shutter).

With the start of integration signal (SI = hi) the hold mode is activated for all pixels simultaneously at the next rising clock edge; starting with pixel 1 the pixel voltages are sequentially switched to the push-pull output amplifier. The second clock pulse resets all integration capacitors and the integration period starts again in the background during the output phase.

**iC-LF1401** and **iC-LFL1402** are suitable for high clock rates of up to 5 MHz. If this is not required the supply current can be reduced via the external bias setting (current into pin RSET).

### Pin Functions iC-LA

No.	Name	Function
1	VDDA	+5 V Analogue Supply Voltage
2	VDDD	+5 V Digital Supply Voltage
3	DIN	Data Input
4	VCMIN	Offset Voltage Input for Integration Capacitor
5	AOUT	Analog Output
6	CLK	Clock Input
7	DNU	Down-Not-Up Input
8	DOUT	Data Output
9	GNDD	Digital Ground
10	GNDA	Analog Ground

### Pin Functions iC-LF, iC-LFL

No.	Name	Function
1	SI	Start Integration Input
2	CLK	Clock Input
3	AO	Analog Output
4	VCC	+5 V Supply Voltage
5	RSET	Bias Current (connected to GND for internal bias = default; resistor from VCC to RSET for reduced current consumption)
6	AGND	Analog Ground
7	GND	Digital Ground
8	DIS	Hold Integration Input

### Key Specifications

iC-LA	
Supply Voltage at VDDA, VDDD	5 V $\pm$ 5%
Supply Current in VDDA, VDDD f(CLK) $\leq$ 5 MHz	20 mA max.
Sensitivity	typ. 4.19 V/pWs @ 880 nm typ. 7.78 V/pWs @ 660 nm
Spectral Sensitivity	typ. 0.335 A/W @ 680 nm
Spectral Application Range	400 to 950 nm
Pixel Clock Rate	5 MHz max.

iC-LF, iC-LFL	
Supply Voltage at VCC, VDD	5 V $\pm$ 10%
Supply Current in VDD @ f(CLK) = 1 MHz iC-LF iC-LFL	typ. 200 $\mu\text{A}$ typ. 390 $\mu\text{A}$
Supply Current in VCC iC-LF iC-LFL	typ. 8 mA typ. 11.5 mA
Sensitivity	typ. 2.88 V/pWs @ 680 nm
Spectral Sensitivity	0.5 A/W @ 680 nm
Spectral Application Range	400 to 980 nm
Pixel Clock Rate	5 MHz max.

### Pin Configurations

