

# High Sensitivity 4-Line Spacing 3-Line Color Linear Sensor CCD Linear Sensor

## ILX533K ILX535K ILX536K ILX537K

Color image scanners are now the focus of attention as a rapidly growing section of the personal computer peripheral market. The ILX533K and ILX536K, for 300 dpi A4 size scanning, and the ILX535K and ILX537K, for 600-dpi A4 size scanning, are optimal 3-line color linear sensors for color image scanners.

These CCDs feature a much higher sensitivity than current 3-line color linear sensors and a line spacing reduced to 1/2 that (to a line spacing of 4 lines) of current products. This reduces the amount of external memory required for data collation and makes these CCDs easy to use.

- n 8-mm pitch, 4-line spacing
- n Ultra-high sensitivity
- n Ultra-low image lag
- n Good linearity
- n Built-in clamp circuit
- n Single-sided readout

### 8-mm Pitch, 4-Line Spacing

Table 1 provides an overview of these four products. The effective pixel size of all four products is 8 mm · 8 mm with an 8-mm sensor pitch. The ILX533K and ILX536K provide 2700 pixels and the ILX535K and ILX537K provide 5300 pixels. The line spacing between each of the sensor is 4 lines (32 mm), which is the world's narrowest 3-line color linear sensor. Figure 1 shows the block diagram of the ILX533K. Since the sensor line spacing was reduced to 4 lines, one-half that of earlier Sony linear sensors, the amount of external memory required for data collation is also reduced by one half. Additionally, since clamp circuits are included on chip, the number of peripheral circuits can be reduced significantly. Figure 2 shows an application circuit for the ILX533K.

### Ultra-high Sensitivity, Ultra-low Image Lag, and Good Linearity

Table 2 presents the electro-optical characteristics of these devices. To respond to our customers' needs, these devices achieve the industry's top class sensitivity, which allows power consumption in the end product light source to be reduced. Since the signal charge in the sensor block is completely read out, there are no image lags and they achieve good linearity even in the small-signal range.

### Single-Sided Readout

Linear sensors can be divided into two types: those that read out the sensor signal charges for the even and odd pixels in opposite directions (the double-sided readout method) and those that read on the sensor signal charges for all pixels in the same direction (the single-sided readout method). In the double-sided readout method, the CCD analog shift register transfer pulse frequency is set to 1/2 that of the reset pulse frequency, and a data rate that is 1/2 the clock pulse frequency exists within the device. As a result, a DC level difference is created between the even and odd pixels. The ILX533K, ILX535K, ILX536K, and ILX537K adopt the single-sided readout method used by the current Sony products that have been in mass production since 1995. In this method, there are no differences between the characteristics of the even and odd pixels.

### Single-Output 3-Line Color Linear Sensor (ILX536K and ILX537K)

Figure 3 shows the block diagram of the ILX536K. This device includes built-in analog switches (controlled by the SW1 and SW2 pins) that allow the RGB line sequential outputs to be provided. This allows the external circuits to be simplified significantly.

## V O I C E

These products, which are high-sensitivity versions of the ILX524K and ILX518K, which have been well received in the image scanner market, are my first designs. Given the current rapid growth in the image scanner market, I am hopeful that these CCDs will be used in a wide variety of products.



New  
Products

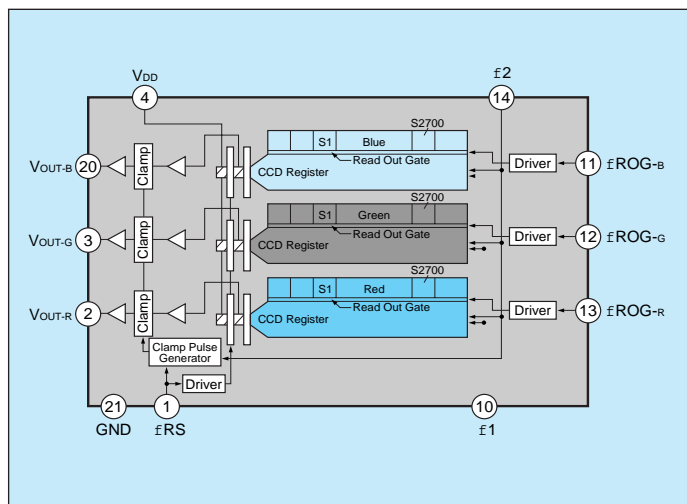


Figure 1 ILX533K Block Diagram

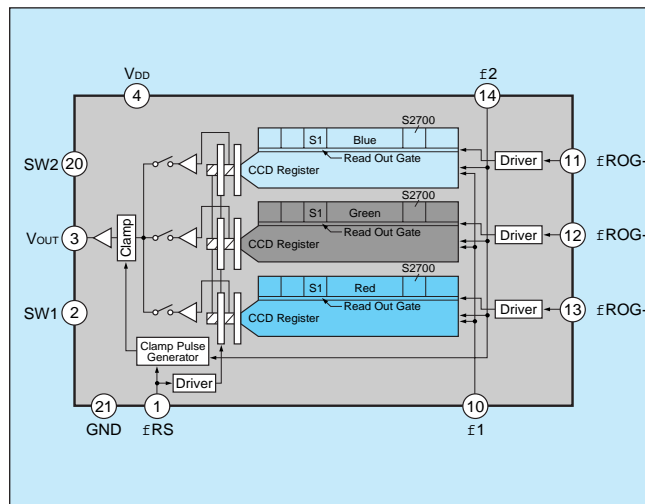


Figure 3 ILX536K Block Diagram

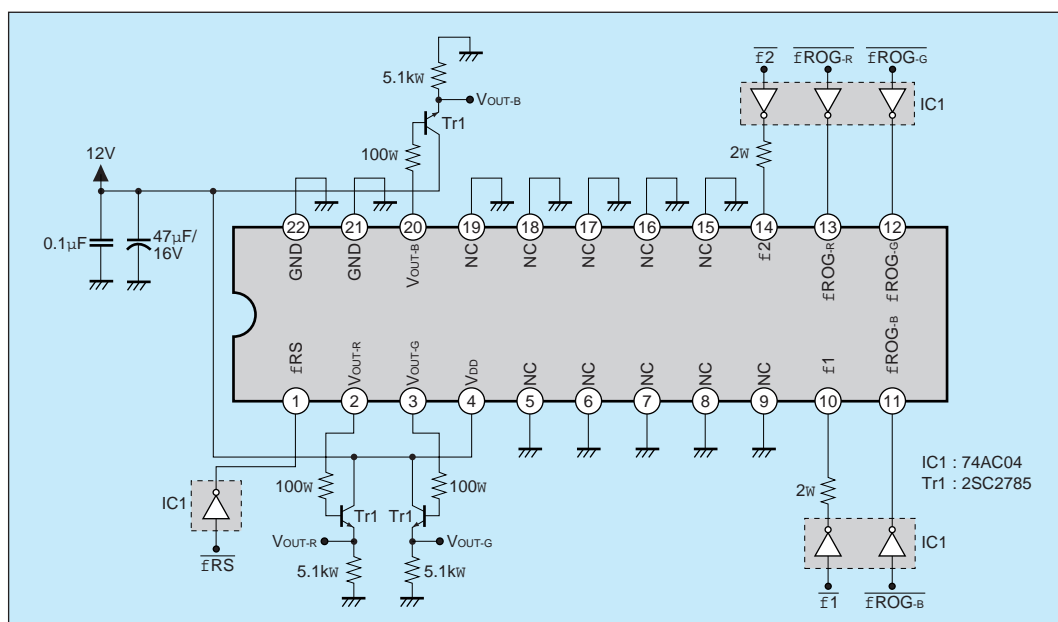


Figure 2 ILX533K Application Circuit Example

Table 1 Product Line Overview

	ILX533K	ILX535K	ILX536K	ILX537K
Number of effective pixels	2700 pixels · 3	5300 pixels · 3	2700 pixels · 3	5300 pixels · 3
Effective pixel size	8µm · 8µm			
Pixel pitch	8µm			
Line spacing	4 lines (32 µm)			
Number of outputs	3		1	
Resolution	300DPI (A4)	600DPI (A4)	300DPI (A4)	600DPI (A4)
Supply voltage	Single 12-V power supply			
Package	22-pin Cer-DIP			

Table 2 Electro-Optical Characteristics

Item	Typical value	Unit
Sensitivity	R	9.5
	G	19
	B	11.5
Sensitivity ununiformity	4	%
Saturation output level	2.5	V
Residual image	0.02	%
Total transfer efficiency	98	%
Current consumption	30	mA
Maximum operating frequency	3	MHz/color