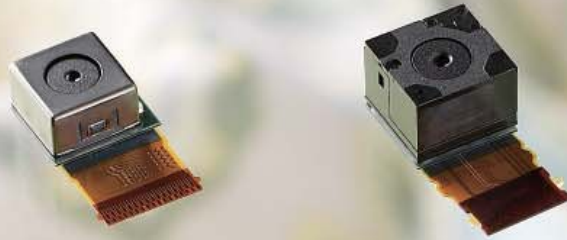


# IU046F/IU060F

## Compact, Low Profile Lens Modules for 8M and 12M-Pixel 1.4 $\mu\text{m}$ Unit Pixel Cellular Phone Cameras



Along with the recent trend towards higher pixel counts in the cameras included in cellular phones, with the inclusion of video imaging and autofocus functions, these products are also approaching compact digital still cameras in functionality.

Sony has now developed two compact, low profile lens modules, the IU046F and IU060F, which include Sony's latest 1.4  $\mu\text{m}$  unit pixel CMOS sensors.

Sony has optimized the lens used to achieve high resolution imaging while holding the module height to a minimum.

- Newly-developed lenses achieve high resolution
- Low-power autofocus piezo\*1 actuator adopted
- Individual difference information stored in built-in EEPROM
- Wide angle lens (28 mm equivalent) (IU060F)

\*1 Electronic devices that have the property that they expand or contract when an electrical potential is applied.

### Miniature Package Lens Module

The IU046F and IU060F are lens modules with 1.4  $\mu\text{m}$  unit pixel CMOS sensors and actuators for autofocus operation. They feature a newly-developed high-resolution 4-element/4-group plastic lens. These modules achieve a roughly 47% (IU046F) or 28% (IU060F) volume reduction compared to the existing IU043F. In working to miniaturize these modules, Sony not only optimized the optical design of the lens, but also strove for even thinner form factors in the material units that make up the module. As a result, these modules achieve the industry's smallest size and lowest profile.

The IU046F and IU060F adopt a low-power

piezo actuator for autofocus drive. Since it is necessary to continually apply autofocus during video imaging, this low-power piezo actuator can reduce end product power consumption. Furthermore, since they include a driver IC to control this piezo actuator, these modules can contribute to reduced parts counts in end products and increasing design flexibility for cellular phones in which stylish design is an important consideration. (See figure 1.)

Furthermore, the IU046F and IU060F include a built-in, large-capacity EEPROM as part of the lens module. This EEPROM makes it possible to acquire consistent picture quality by storing individual difference information, such as sensor R/G and B/G sensitivity ratios and lens actuator speed data, in this EEPROM at end product assembly time.

### High-Speed Interface Support

To allow the IU046F and IU060F to support high-speed interfaces with bit rates of 650 Mbps or higher, Sony optimized the wiring impedances and the values of the capacitors used in the module to achieve stable sensor operation and low noise. The IU046F can read out all 8M pixels at 15 frame/s and the IU060F can read out all 12M pixels at 10 frame/s.

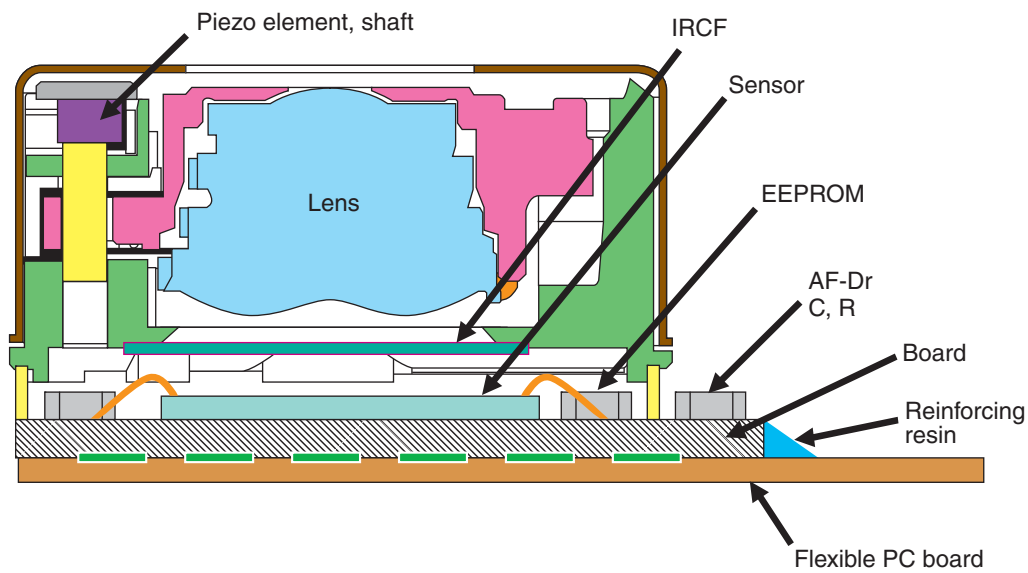
### Wide Angle Lens

The IU060F responds to the market needs to be able to take photographs at wide angles and at close distances by adopting a wide angle lens. In designing this lens, Sony optimized the position of the aperture and despite reducing the module height to be 0.2 mm lower than that of the existing wide-angle lens product (IU043F), achieved the same equivalent focal length of 28 mm (35 mm film equivalent).

### VOICE

Although performance and size are usually conflicting goals, by both individual optimizations at the component level and overall optimizations at the module level, we were able to take full advantage of the sensors included in these modules. We hope that as many people as possible will be able to try these products, which can conveniently capture cherished scenes. We strongly recommend that you look into these modules.

**Figure 1** Module Structure (IU046F)



**Table 1** Device Structure

Item	IU046F	IU060F
Unit cell size	1.4 $\mu$ m (H) $\times$ 1.4 $\mu$ m(V)	1.4 $\mu$ m (H) $\times$ 1.4 $\mu$ m(V)
Number of effective pixels	Approx. 8.11M pixels	Approx. 12.25M pixels
Module size *2	11.5 (W) $\times$ 9.5 (D) $\times$ 6.5 (H) mm	10.5 (W) $\times$ 11.0 (D) $\times$ 8.5 (H) mm
AF actuator	Piezo	
Lens structure	Plastic, 4 elements in 4 groups	
F number	F2.8	
Focal length [35 mm film equivalent]	32 mm	28 mm
Camera output signal format	Sub-LVDS (2 ch) *3	CSI2 (2 lane)
Autofocus driver	Included in module	
EEPROM capacity	32k bits	
TV resolution (Typ.: center/70% of image height)	1600 lines/1150 lines	2100 lines/1500 lines *4

\*2 Excluding the flexible PC board height  
 \*3 Mass production of the CSI2 IF version is planned for July 2009.  
 \*4 Design target values