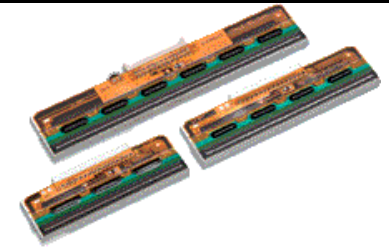


Thermal Printheads

- **What is a Thermal Printhead**
- **Applications of Thermal Printheads**
- **Types of Thermal Printing Methods**
- **Descriptions of Terms**
- **Reasons to Choose Kyocera's Thermal Printheads**

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What is a Thermal Printhead?



A thermal printhead is a key device used for the printing part of thermal type image output equipment.

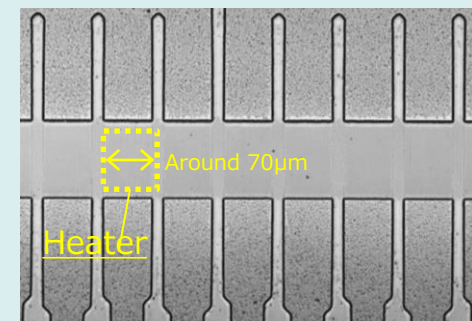
The thermal printing method is used for label prints and receipts at retail stores, logistics, food barcode labels, ID cards, air and railway tickets, X-ray films, and food date printing.

A thermal printhead has multiple heating elements (heaters) lined up in a row on a heat storage layer (glaze). It is a device that prints by transferring heat generated when electric current flows through the heater to the printing media (thermal paper or ink ribbon).

Product Characteristics

- Heater size is formed at the level of several tens of μm
- Heater temperature rises to several hundred degrees celsius momentarily
- ON/OFF of the heater can be controlled in the order of μsec
- Lined up multiple heaters can heat selectively

Heater appearance of 300dpi



Applications of Thermal Printheads



Types of Thermal Printing Methods

Thermal printing method is classified into 3 types; direct-thermal, melt thermal-transfer, and dye-diffusion thermal-transfer.

Thermal Printing Methods

Direct-Thermal

A method of printing on special paper that changes color when heated, such as thermal paper.

【Main applications】

POS receipts, train tickets, logistics labels

Thermal-Transfer

A method of transferring ink to image receiving paper by heating that ink ribbon (film with ink on one side) and image receiving paper transport while keeping close contact

【Main applications】

Date codes, display labels, logistics labels

Dye-Diffusion Thermal-Transfer

Basic mechanism is the same as the thermal transfer method.
A method in which only the ink in the ink layer is transferred and the transfer amount can be controlled according to the amount of heat.

【Main applications】

Seals, ID cards, photo printing

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■ Dot Density

Describes heater density.

Mainly showed;

Dots per 1mm. [dot/mm]

Dots per 1inch. [dot/inch = dpi]

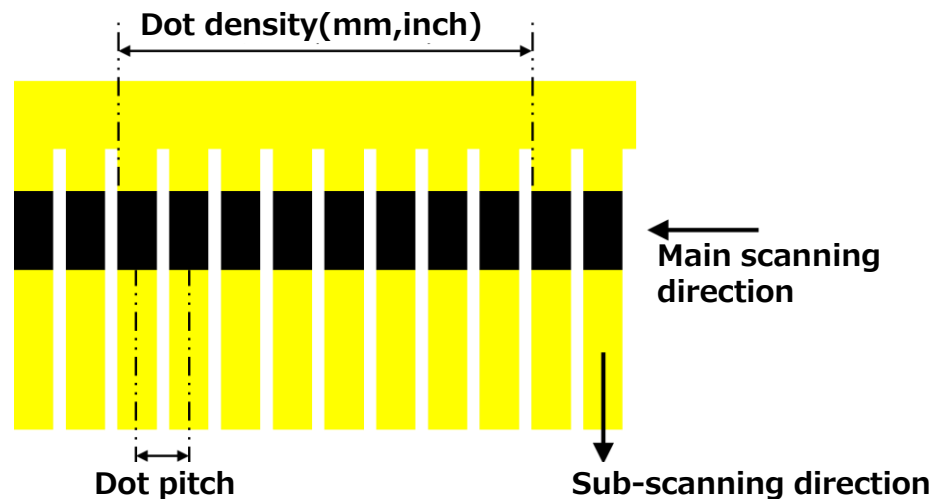
■ Dot Pitch

Describes the distance between each dot. The reciprocal of the dot density.

EX) Dot density 8dot/mm = $1/8 =$ Dot pitch 0.125mm

■ Heater Size

Describes the main scanning direction × sub-scanning direction.



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High Resolution Printing & Wide Application Range Available Worldwide

■ Features of Kyocera's Thermal Printheads

1. Thin film uniformed heater enables high heat efficiency (Quick temperature rise & fall), high speed and high-resolution printing.
2. Various thermal printhead construction structures enable high resolution printing under various speed (low to high) and for various media (soft-hard).
3. Variety in standard specification line up

	Flat Type	Corner Edge Type	True Edge Type
Construction			
Feature	<p>Widely Used Variety of standard specification line up</p>	<p>Straight Pass High speed printing with high heat efficiency</p>	<p>Straight Pass Enables printing on hard surfaced media prior to tone printing</p>

Pursuit of High Speed, High Quality, and High Reliability

■ How we make our thermal printheads quickly

Thermal printheads with thin film have excellent thermal response. For increasing printing speed, the glaze shape, overcoat and heat dissipation structure are optimized to take advantage of thin film feature.

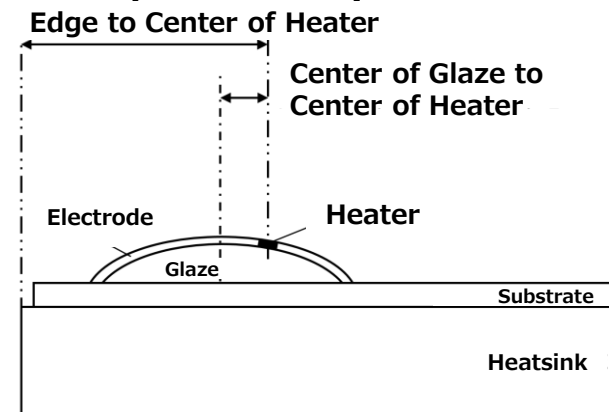
■ How we ensure high thermal printhead quality

The higher image quality of cameras built into smartphones and the Internet has led to more opportunities to handle digital images. In particular, the sublimation thermal transfer method*1 can achieve image quality comparable to that of conventional photographic methods. Uniformity of heater temperature and control technology are pursued for high image quality.

*1: Sublimates a dye to form an image on an image-receiving paper

■ How we make our thermal printheads highly precise

The thermal printhead is a key component in a printer. With the demand for higher image quality, high positional accuracy is required when installing the equipment. The heater position accuracy is improved in order to reduce the burden of position adjustment when the printer is installed.



Pursuit of High Speed, High Image Quality, and High Reliability

■ How we make our thermal printheads highly reliable

1. Energy Resistance

Energy resistance refers to the durability of the heater under the energy conditions which drive the thermal printheads. Kyocera has a structure and process to improve energy resistance.

2. Abrasion Resistance

Thermal printheads can be used together with a printing media such as thermal paper or ink ribbon. Since the printing is done by directly touching thermal paper or ink ribbon, the surface will be worn out during the printing, especially for industrial barcode printers at high speeds. Abrasion resistance is an important requirement factor that affects the life of printers because improved oil resistance and scratching resistance performance for media are also required. Kyocera has a lineup of overcoats that meet various required performances.

3. Environmental Resistance

In recent years, thermal printheads have become more and more familiar and closer to our daily lives. For example, ticket machines at parking lots. Thermal printers are used in a places exposed to wind, rain, and other harsh conditions for printers. Therefore, high environmental resistance is required as an important factor. Kyocera is working to improve environmental resistance by devising overcoat materials and processing conditions under printing.

THE NEW VALUE FRONTIER



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