MN86074

Image Processing LSI

■ Overview

The MN86074 boosts image quality by applying various image processing techniques to the analog signal from an image sensor. Features include correction of laser printer dot spreading at the pixel level, processing to enhance the compression ratio, reproduction of halftone images with 64-gradation, two-dimensional MTF correction using moire suppression, and infinite shading for all pixels using a division technique. These combine to yield top image reproduction quality.

■ Features

- Image processing that yields top image quality
  - Infinite shading for all pixels using a division technique
  - Error dispersion processing that reproduces halftone images with 64-gradation
    User-programmable gamma curve
  - Two dimensional MTF correction
  - High-quality reduction with a user-specified scaling factor
    Preserves halftone gradation
    Preserves fine black lines for text
- High-speed processing requiring only 2 ms per line for an A3 page at 200 dpi
- Built-in analog processing circuits: offset correction circuit, gain correction circuit, and 8-bit analog-to-digital converter
- Drive signal generator for CCDs, CISs, and other image sensors

■ Brief Specifications

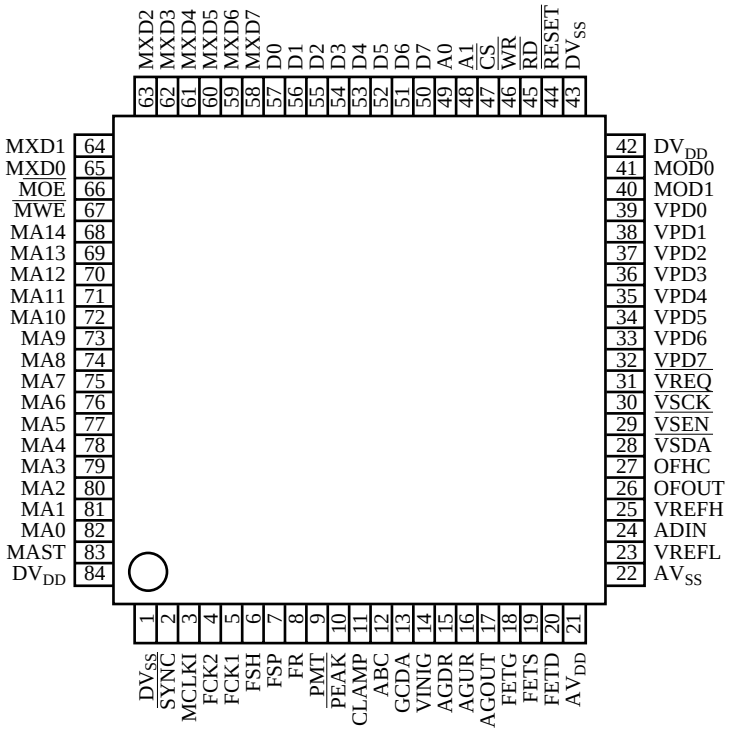
- Image processing speed: 0.1 to 1.5 million pixels per second
- Pixels per line: max. 8192 pixels-blanking pixels
  1-line interval: max. 8192 pixels
- Offset correction: negative feedback to preamplifier
  The chip controls the feedback voltage using A/D conversion data from black pixel runs.
  Built-in circuits: Feedback voltage control circuit + source follower circuit
- Gain control: Analog control using an external operational amplifier and the built-in field effect transistor (FET)
  An external resistor determines the follow-up range.
  (The standard range is from +6 dB to –12 dB.)
  Built-in circuits: Gain control circuit + FET
- A/D converter: Half flash converter
  Number of bits: 8
  Conversion speed: 0.1 to 1.5 MHz
- Shading correction
  - Infinite shading for all pixels using a division technique
    Distortion correction levels relative to A/D converter's dynamic range
    0 – 75%····· 6-bit precision
    75 – 87.5%····· 5-bit precision
    87.5 – 93.8%····· 4-bit precision
- MTF correction:
  - Laplacian transforms (processing for text images)
    Reference to five pixels
- Halftone processing
  - Error dispersion processing: Reproduction of 64-gradation using 6-bit processing
- Gamma correction:
  - User-definable by loading a conversion curve
    Conversion levels: 6 bits to 6
- Binary coded:
  - Fixed slice
    Slice level: User-specified 5-bit value
- Reduction in primary scanning direction:
  - Decimation with image clock or line enable
    Reduction ratio in primary scanning direction:
    Binary coded 0.78% to 100%
    Halftone processing: 50 to 100%
    (in 0.78% increments)
- Reduction correction in primary scanning direction
  - Black pixel preservation (for reduction in primary scanning direction)

- Line density correction in secondary scanning direction
  - Three-line OR processing (for line density conversion in secondary scanning direction from 7.7 line/mm to 3.85)
- Clock inputs · Image clock × 16
  · Image clock × 8
- Sensor interfaces
  - CCD sensor
    Generates the following drive signals: FSH (øSH), FCK1, 2 (ø1, 2), FR (øR), FSP (øSP)
  - Contacting image sensor
    Generates the following drive signals: FSH (SI), FSP (CLK).
    FSP (CLK): 75% or 87.5%.
- Memory interfaces
  - Line lengths up to 2048 pixels 64-Kbit SRAM × 1
  - Line lengths of 2049 to 4096 pixels
    64-Kbit SRAM × 2
    or 256-Kbit SRAM × 1
  - Line lengths of 4097 to 8192 pixels
    256-Kbit SRAM × 1
- Image bus interface
  - Serial mode with request ($\overline{\text{VREQ}}$) input and enable ($\overline{\text{VSEN}}$), clock ($\overline{\text{VSCK}}$), and data ($\overline{\text{VSDA}}$) outputs
- Scanning modes
  - Free scanning
  - Cycle scanning
- System interface
  - Interface to 8-bit microprocessors (Intel format)
- Image data I/O function
  - Image data output after shading correction (8 bits)
  - Image data output after multivalue smoothing (6 bits)
  - Image data input sent from external A/D converter (8 bits)
- Output ports
  - 8 pins (pins double as image data I/O pins)
- Mechanism drive interface
  - User-defined timing pulse output
- Power supply
  - Digital circuits, DV_{DD}: 5.0 V
  - Analog circuits, AV_{DD}: 5.0 V
  - A/D converter reference voltages
    V_{REFH}: 5.0 to 3.0V
    V_{REFL}: 2.0 to 0.0V

■ Applications

- Facsimile equipment

■ Pin Assigment



(TOP VIEW)

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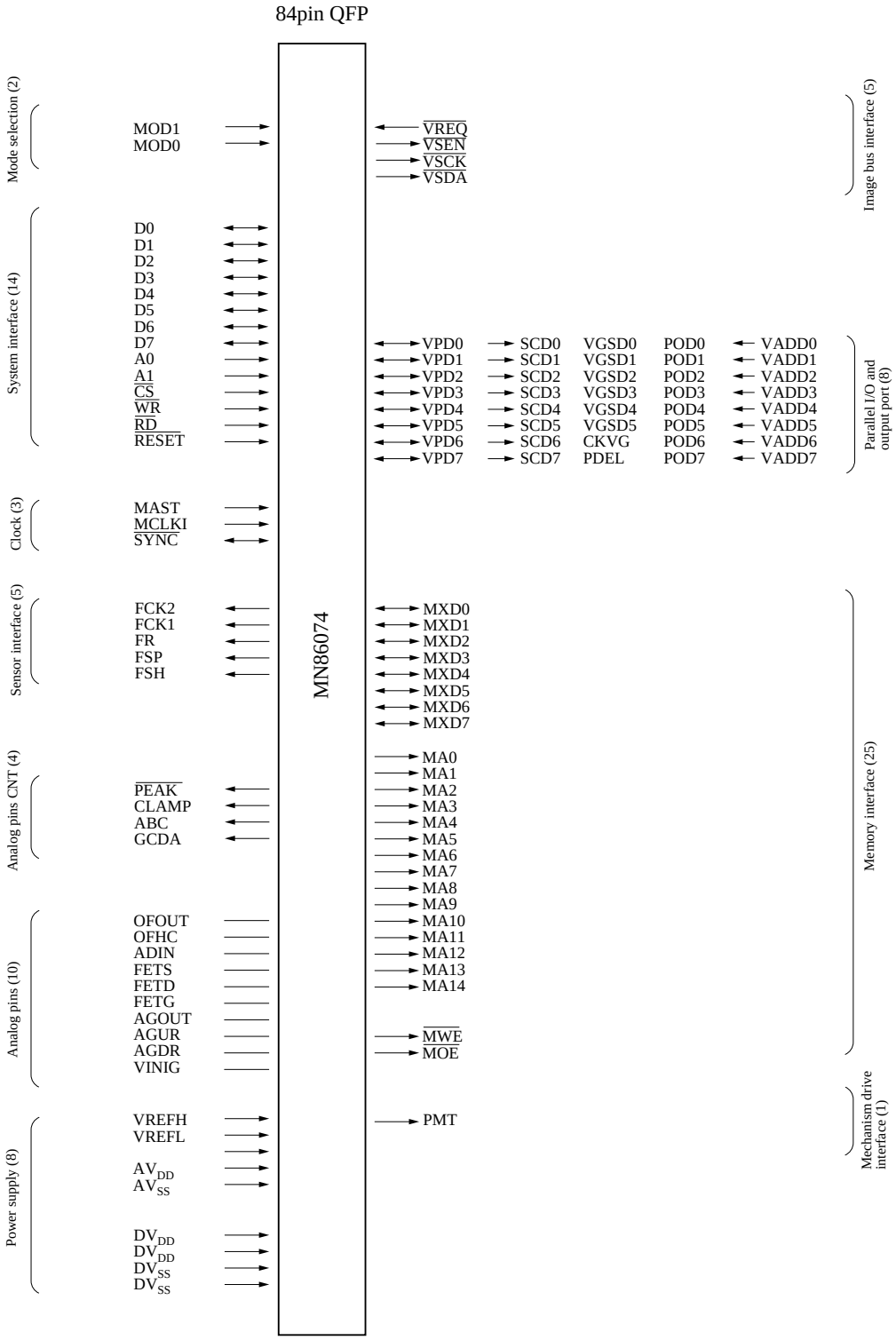
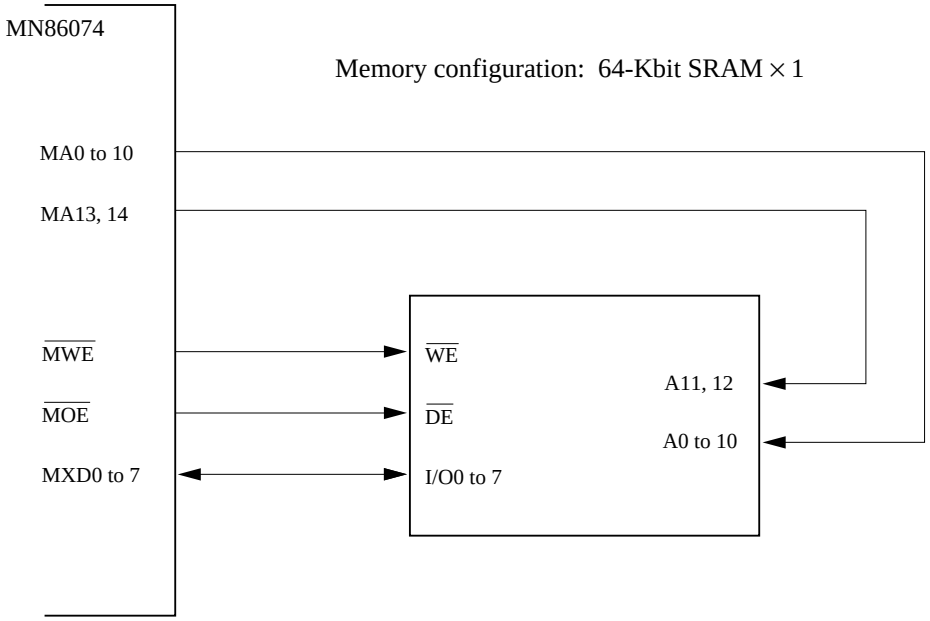
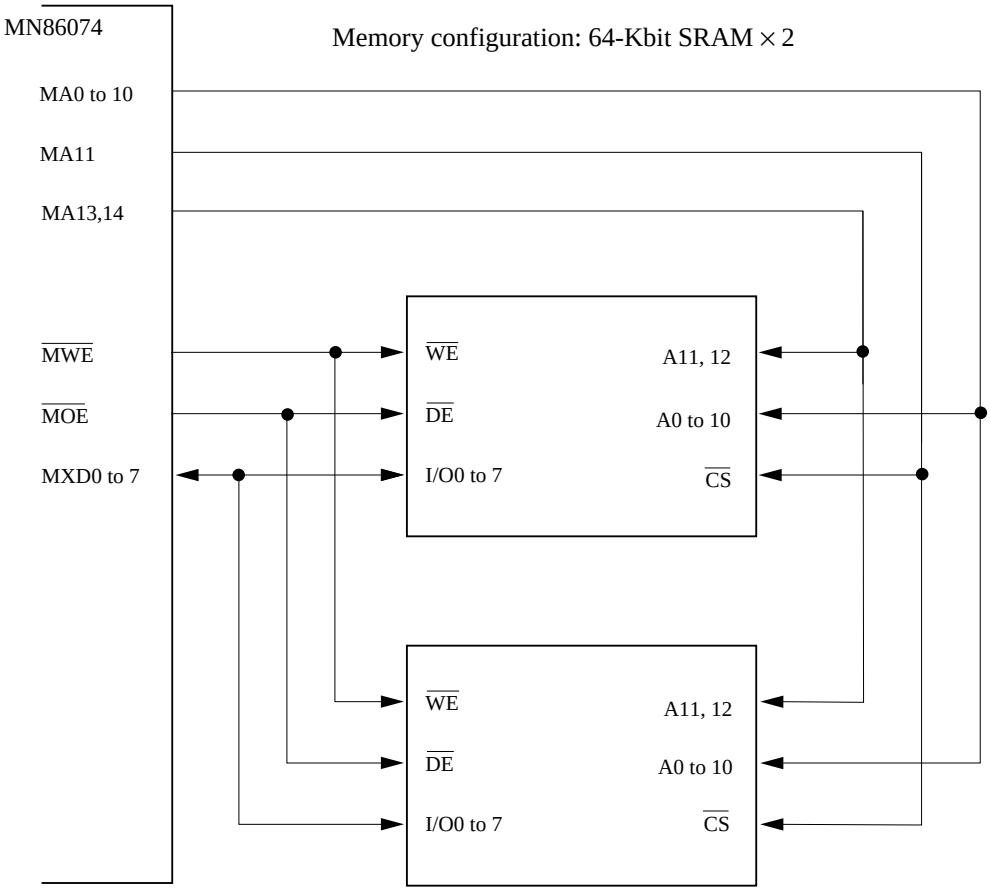
■ Pin Function Chart



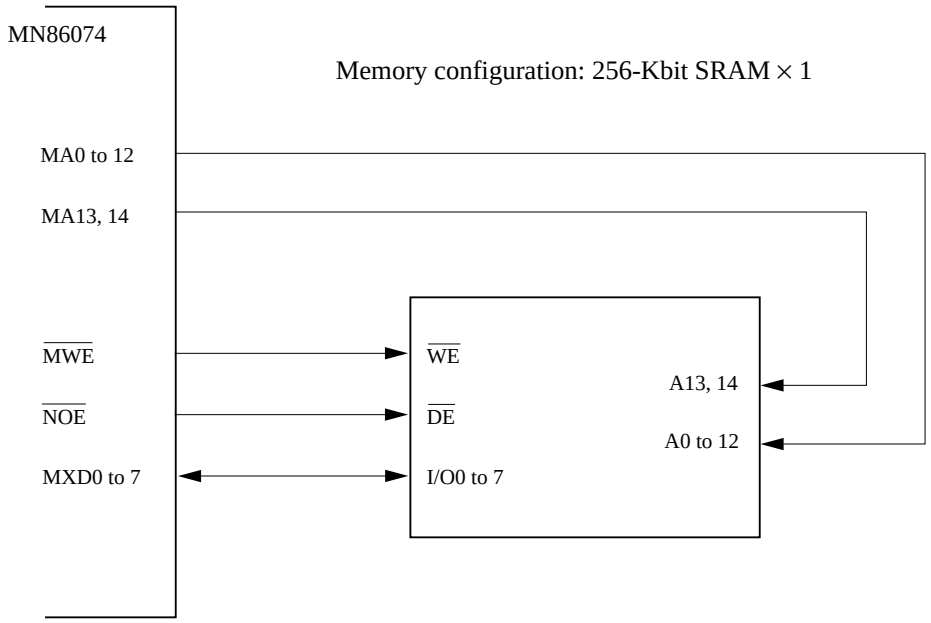
■ Application Circuit Example #1: Line lengths up to 2048 pixels



■ Application Circuit Example #2: Line lengths of 2049 to 4096 pixels



■ Application Circuit Example #3: Line lengths of 4097 to 8192 pixels



■ Package Dimensions (Unit: mm)

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