

# S2D13782

## Image Enhancement IC with LCD Backlight Control Function

### ■ OVERVIEW

The S2D13782 is an image enhancement IC that meets the quality requirements for in-vehicle ICs. It has color correction, noise reduction, edge enhancement (sharpness) and other features. The S2D13782 also generates LCD panel control signals and incorporates a backlight control function.

The Auto Movie Enhancement 2 Extended – Optimizer (AME2EX-OPT) can reduce the power consumption by 30% to 50% by adjusting the backlight of the LCD panel to an optimum luminous intensity. In conjunction with backlight control, AME2EX-OPT can display colorful images with a high contrast by automatically adjusting input images to optimum brightness, contrast, gamma curves and color saturation.

The color management function of the Auto Movie Enhancement 2 Extended - Color Converter Engine (AME2EX-CCE) allows color hue and saturation to be freely adjusted in manual mode so that colors can be reproduced faithfully according to the characteristics of the LCD panel connected.

The Noise Canceller and Color Expander (NCX) reduces block noise specific to digital images such as 1-Seg broadcasting, and gradation noise that is likely to occur when input images have low gradations (16-bit, 18-bit).

Adaptive Sharpness (ADS) automatically identifies the text and image areas of input images and performs optimal edge enhancement processing for each area.

For the CPU interface, either I2C or SPI (3-line/4-line) can be selected. For the image I/O interface, the 16/18/24-bit RGB interface, 16-bit YUV interface or 8-bit YUV interface (ITU-R BT.656) can be selected. Moreover, to support LCDs that require special horizontal/vertical synchronous signals, the S2D13782 incorporates a programmable timing controller that generates timing signals for up to 10 lines.

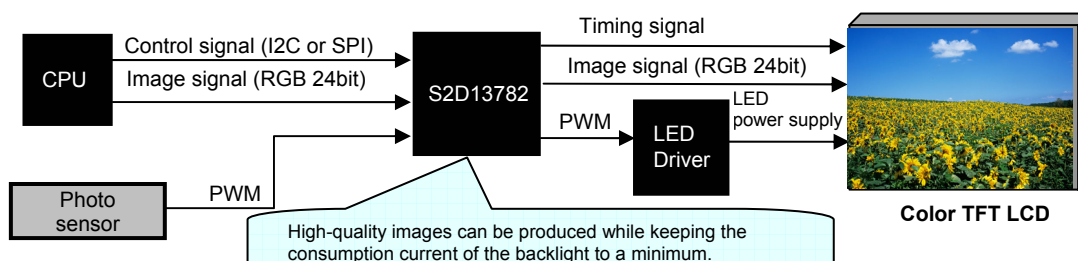
The S2D13782 allows the drive capability of the output terminals for the LCD panel to be selected, the quality of output signal waveforms can be optimized. It also incorporates a Spread Spectrum Clock Generator (SSCG), which greatly contributes to reducing the amount of electromagnetic interference (EMI) radiated by the display system.

### ■ FEATURES

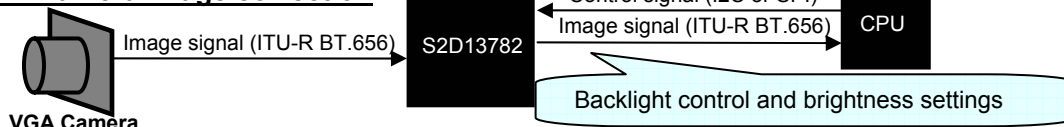
- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• Image correction function<ul style="list-style-type: none"><li>AME2EX (Auto Movie Enhancement 2 Extended)<ul style="list-style-type: none"><li>OPT: Color correction adapted for input images (brightness, contrast, color saturation, and gamma curves)</li><li>CCE: Color management (color hue and saturation)</li><li>SGAM: RGB independent gamma correction</li></ul></li><li>NCX(Noise Canceller and Color Expander)<ul style="list-style-type: none"><li>Reduces block noise, gradation noise and dot noise.</li></ul></li><li>ADS (Adaptive Sharpness):<ul style="list-style-type: none"><li>Edge enhancement (sharpness) adapted for text and images</li></ul></li><li>PCM (Pseudo Color Mode):<ul style="list-style-type: none"><li>Pseudo gradation processing (24-bit ⇒ 16/18-bit conversion)</li></ul></li></ul></li><li>• Image I/O interface<ul style="list-style-type: none"><li>Can be selected from the 16/18/24-bit RGB interface, 16-bit YUV interface or 8-bit YUV interface (ITU-R BT.656).</li></ul></li></ul> | <ul style="list-style-type: none"><li>• CPU interface<ul style="list-style-type: none"><li>Can be selected from I2C and SPI (3-line/4-line).</li></ul></li><li>• PWM<ul style="list-style-type: none"><li>Input PWM 1ch for photo sensors</li><li>Output PWM 1ch for LCD control (input PWM + input image adaptation. Pulses can be output in manual mode.)</li></ul></li><li>• Other<ul style="list-style-type: none"><li>Unused pins can be used for GPIO.</li><li>Built-in SPI-Master (3-line/4-line) for LCD control</li></ul></li><li>• Clock<ul style="list-style-type: none"><li>Max. 40 MHz, Built-in SSCG</li></ul></li><li>• Power supply<ul style="list-style-type: none"><li>Core: 1.80 ± 0.15V, IO: 1.65 to 3.60V</li></ul></li><li>• Package<ul style="list-style-type: none"><li>QFP15-100 (14x14x1.7mm, 100pin, 0.5mm pitch)</li></ul></li></ul> |
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### ■ CONNECTION EXAMPLES

#### Example 1: LCD display correction



#### Example 2: Camera image correction

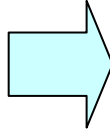


# S2D13782

## ■ IMAGE CORRECTION EXAMPLES

### AME2EX-OPT (Backlight control and brightness settings)

Original images, backlight 100%

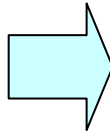
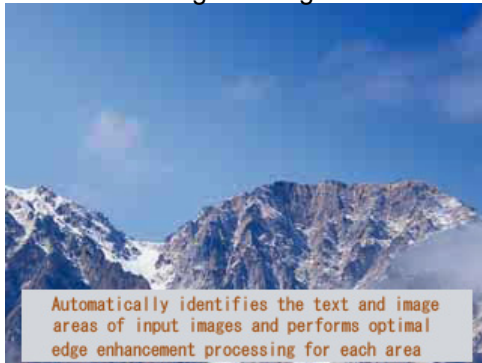


Corrected images, backlight 50%



### NCX, ADS (Reduced block noise and improved text visibility)

Original images



Corrected images



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