

## S2D13782 Image Enhancement IC with Backlight Control

The S2D13782 is an image enhancement IC that meets the quality requirements for automotive designs. It provides 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 high contrast images 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) reduce 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.

The S2D13782 supports either I2C or SPI (3-line/4-line) CPU interfaces. Image data can be either 16/18/24-bit RGB interface, 16-bit YUV interface, or 8-bit YUV interface (ITU-R BT.656). To support LCD panels that require special horizontal/vertical synchronous signals, the S2D13782 incorporates a programmable timing controller that generates timing signals for up to 10 lines.

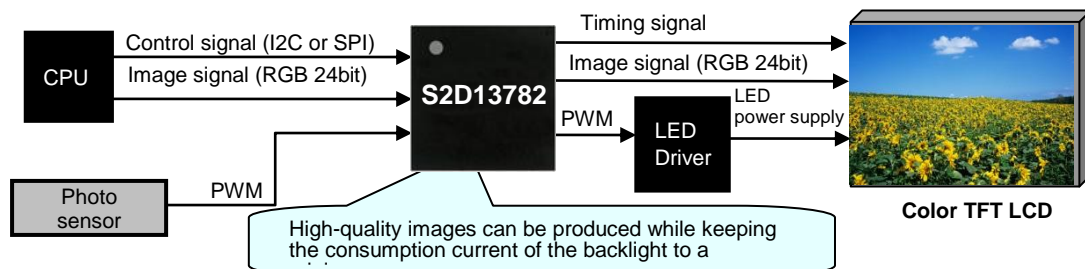
The S2D13782 allows the drive capability of the output terminals for the LCD panel to be selected so the quality of output signal waveforms can be optimized. It also incorporates a Spread Spectrum Clock Generator (SSCG), which greatly contributes to reducing the amount of electromagnetic interference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

### FEATURES

- I2C or SPI (3-line/4-line) CPU interface
- Low Operating Voltage
- AME2EX (Auto Movie Enhancement 2 Extended)
- NCX (Noise Canceller and Color Expander)
- ADS (Adaptive Sharpness)
- PCM (Pseudo Color Mode)
- Built-in SPI-Master for LCD control
- QFP15 100 pin package

### SYSTEM BLOCK DIAGRAM

#### Example 1: LCD display correction



#### Example 2: Camera image correction



## DESCRIPTION

### CPU Interface

- I2C
- SPI (3-line/4-line)

### Image IO Interface

- Selectable from:
  - 16/18/24-bit RGB interface
  - 16-bit YUV interface
  - 8-bit YUV interface (ITU-R BT.656).

### Miscellaneous

- Input PWM 1 channel for photo sensors
- Output PWM 1 channel for LCD control
- Unused pins can be used for GPIOs
- Built-in SPI-Master (3-line/4-line) for LCD control
- CLOCK: Max. 40 MHz, Built-in SSCG
- COREVDD: 1.80 ± 0.15V, IOVDD: 1.65 to 3.60V
- QFP15 100 pin package

### Image Correction

- AME2EX (Auto Movie Enhancement 2 Extended) includes the following features:
  - OPT: Color correction adapted for input images (brightness, contrast, color saturation, and gamma curves)
  - CCE: Color management (color hue and saturation)
  - SGAM: RGB independent gamma correction
- NCX (Noise Canceller and Color Expander): Reduces block noise, gradation noise and dot noise
- ADS (Adaptive Sharpness): Edge enhancement (sharpness) adapted for text and images
- PCM (Pseudo Color Mode): Pseudo gradation processing (24-bit ⇒ 16/18-bit conversion)

**JAPAN**  
**SEIKO EPSON CORPORATION**  
IC Sales & Marketing Department  
421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN  
Phone: +81-42-587-5816 FAX: +81-42-587-5117

**CHINA**  
**EPSON (CHINA) CO., LTD**  
4<sup>th</sup> Floor, Tower 1 of China Central Place, 81 Jianguo Road,  
Chaoyang District, Beijing 100025, CHINA  
Phone: +86-10-8522-1199 FAX: +86-10-8522-1120

**TAIWAN**  
**EPSON TAIWAN TECHNOLOGY & TRADING LTD.**  
14F, No. 7, Song Ren Road,  
Taipei 110, TAIWAN  
Phone: +886-2-8786-6688 FAX: +886-2-8786-6660

**AMERICA**  
**EPSON ELECTRONICS AMERICA, INC.**  
214 Devcon Drive, San Jose, CA 95112,  
USA  
Phone: +1-800-228-3964 FAX: +1-408-922-0238

**CHINA**  
**SHANGHAI Branch**  
Room 01 & 04 17F, Greenland Center II, 562 Dong An Road,  
Shanghai 200032, CHINA  
Phone: +86-21-5423-5577 FAX: +86-21-5423-4677

**SINGAPORE**  
**EPSON SINGAPORE PTE., LTD.**  
1 HarbourFront Place,  
#03-02 HarbourFront Tower One, SINGAPORE 098633  
Phone: +65-6586-5500 FAX: +65-6271-3182

**EUROPE**  
**EPSON EUROPE ELECTRONICS GmbH**  
Riesstrasse 15, 80992 Munich,  
GERMANY  
Phone: +49-89-14005-0 FAX: +49-89-14005-110

**CHINA**  
**SHENZHEN Branch**  
Room 804-805, 8<sup>th</sup> Floor, Tower 2, Ali Center,  
No.3331 Keyuan South RD (Shenzhen bay), Nanshan District,  
Shenzhen 518054, CHINA  
Phone: +86-10-3299-0588 FAX: +86-10-3299-0560

**KOREA**  
**SEIKO EPSON CORP.**  
19F, KLI 63 Bldg., 60 Yoido-dong,  
Youngdeungpo-Ku, Seoul 150-763, KOREA  
Phone: +82-2-784-6027 FAX: +82-2-767-3677

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