

# MN6557A, MN6557AS

Low-Power-Consumption CMOS 10-Bit D/A Converters for Image Processing

## ■ Overview

The MN6557A and MN6557AS are CMOS 10-bit D/A converters with a maximum conversion rate of 30 MSPS. High precision has been achieved by the combined use of a matrix cell system and weighted current system. They also feature low power consumption owing to the use of a CMOS process, and operate on a single power supply of 5V, and have a TTL input level.

These devices are suitable for digitalization of image processing in video, TV, and similar applications.

## ■ Features

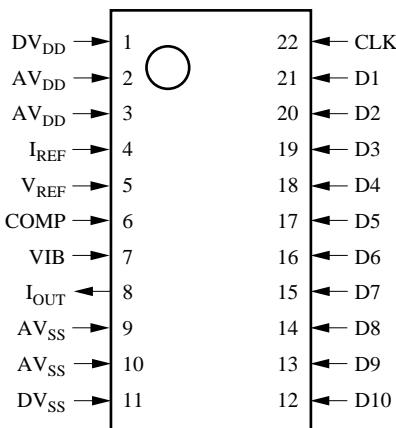
- Maximum conversion rate: 30 MSPS (min.)
- Linearity error:  $\pm 0.5$  LSB (typ.)
- Differential linearity error:  $\pm 0.3$  LSB (typ.)
- Power supply voltage:  $5.0 \pm 0.5$  V
- Power consumption: 125 mW (typ.)
- Full-scale current: 13 mA (typ.)

## ■ Applications

- Digital TV
- Digital video
- Digital signal processing equipment

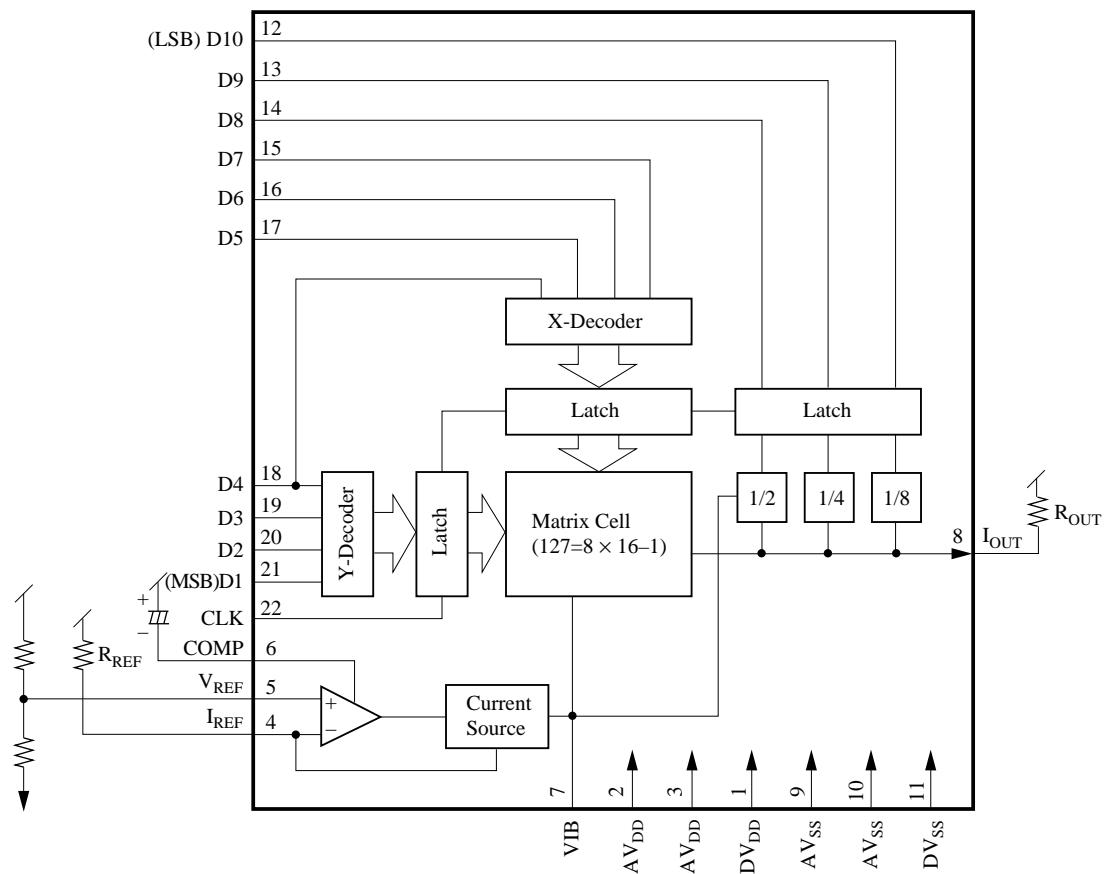
## ■ Pin Assignment

MN6557A DIP022-P-0400  
 MN6557AS SOP022-P-0375



(TOP VIEW)

## ■ Block Diagram



## ■ Pin Descriptions

| Pin No. | Symbol           | Function Description             |
|---------|------------------|----------------------------------|
| 1       | DV <sub>DD</sub> | Power supply for digital section |
| 2       | AV <sub>DD</sub> | Power supply for analog section  |
| 3       | AV <sub>DD</sub> | Power supply for analog section  |
| 4       | I <sub>REF</sub> | Full-scale adjustment resistor   |
| 5       | V <sub>REF</sub> | Reference voltage input          |
| 6       | COMP             | Phase compensation               |
| 7       | VIB              | Capacitor connection             |
| 8       | I <sub>OUT</sub> | Analog current output            |
| 9       | AV <sub>SS</sub> | Analog GND                       |
| 10      | AV <sub>SS</sub> | Analog GND                       |
| 11      | DV <sub>SS</sub> | Digital GND                      |
| 12      | D10              | Digital input (LSB)              |
| 13      | D9               | Digital input                    |
| 14      | D8               | Digital input                    |
| 15      | D7               | Digital input                    |
| 16      | D6               | Digital input                    |
| 17      | D5               | Digital input                    |
| 18      | D4               | Digital input                    |
| 19      | D3               | Digital input                    |
| 20      | D2               | Digital input                    |
| 21      | D1               | Digital input (MSB)              |
| 22      | CLK              | Sampling clock                   |

■ Absolute Maximum Ratings  $T_a=25^\circ\text{C}$ 

| Parameter                            | Symbol           | Rating   | Unit |
|--------------------------------------|------------------|--|------|
| Digital-section power supply voltage | DV <sub>DD</sub> | –0.3 to +7.0                                     | V    |
| Analog-section power supply voltage  | AV <sub>DD</sub> | –0.3 to +7.0                                     | V    |
| Input voltage                        | V <sub>I</sub>   | DV <sub>SS</sub> – 0.3 to DV <sub>DD</sub> + 0.3 | V    |
| Output voltage                       | V <sub>O</sub>   | AV <sub>SS</sub> – 0.3 to AV <sub>DD</sub> + 0.3 | V    |
| Operating ambient temperature        | T <sub>opr</sub> | –20 to +70                                       | °C   |
| Storage temperature                  | T <sub>stg</sub> | –55 to +125                                      | °C   |

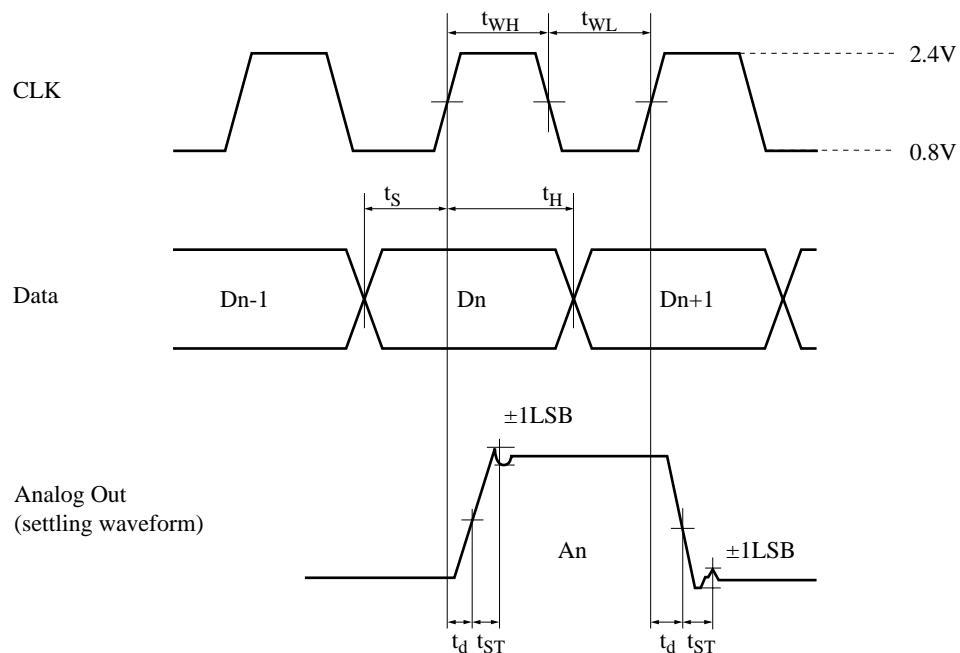
■ Recommended Operating Conditions  $V_{DD}=AV_{DD}=DV_{DD}=5.0V$ ,  $V_{SS}=AV_{SS}=DV_{SS}=0V$ ,  $Ta=25^{\circ}C$ 

| Parameter                         |                 | Symbol     | min      | typ  | max      | Unit     |
|-----------------------------------|-----------------|------------|----------|------|----------|----------|
| Power supply voltage              |                 | $V_{DD}$   | 4.5      | 5.0  | 5.5      | V        |
| Reference voltage                 |                 | $V_{REF}$  |          | 2.95 |          | V        |
| Reference resistance              |                 | $R_{REF}$  |          | 680  |          | $\Omega$ |
| External compensating capacitance |                 | $C_{COMP}$ |          | 1    |          | $\mu F$  |
| Output load resistance            |                 | $R_{OUT}$  |          | 75   |          | $\Omega$ |
| Digital input voltage             | "H" level       | $V_{IH}$   | 2.4      |      | $V_{DD}$ | V        |
|                                   | "L" level       | $V_{IL}$   | $V_{SS}$ |      | 0.8      | V        |
| Clock                             | "H" pulse width | $t_{WH}$   | 13       |      |          | ns       |
|                                   | "L" pulse width | $t_{WL}$   | 13       |      |          | ns       |

■ Electrical Characteristics  $DV_{DD}=AV_{DD}=5.0V$ ,  $DGND=AGND=0V$ ,  $Ta=25^{\circ}C$ 

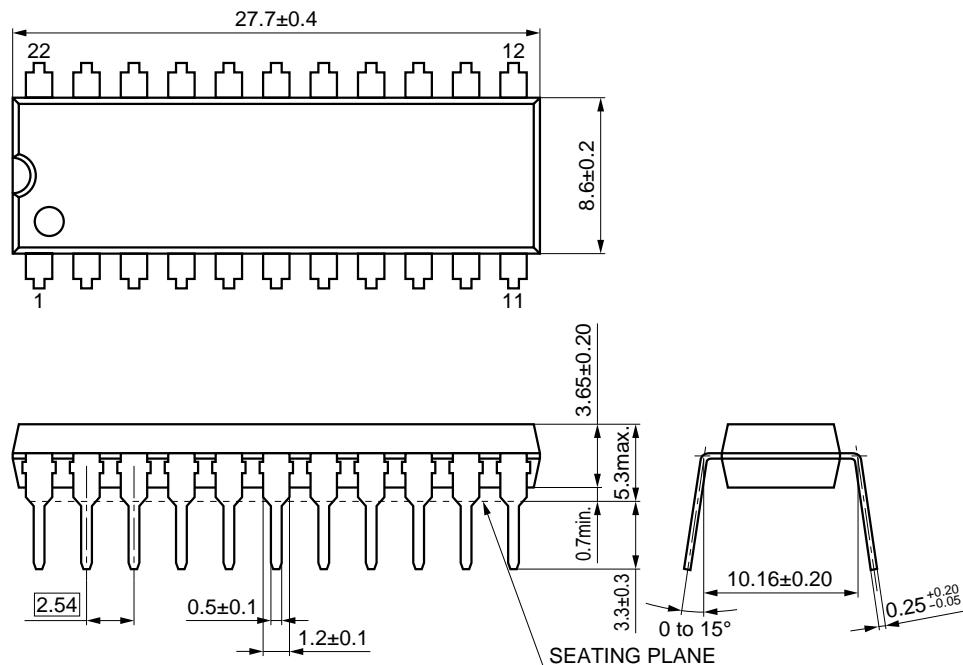
| Parameter                    | Symbol        | Condition                                | min | typ       | max       | Unit |
|------------------------------|---------------|--|-----|-----------|-----------|------|
| Power supply current         | $I_{DD}$      | $R_{REF}=680\Omega$ , $V_{REF}=2.95V$    |     | 25        | 50        | mA   |
| Resolution                   | RES           |  |     | 10        |           | bit  |
| Linearity error              | $E_L$         | $R_{OUT}=75\Omega$ , $R_{REF}=680\Omega$ |     | $\pm 0.5$ | $\pm 1.0$ | LSB  |
| Differential linearity error | $E_D$         | $V_{REF}=2.95V$                          |     | $\pm 0.3$ | $\pm 1.0$ | LSB  |
| Full-scale current           | $I_{FS}$      | $R_{REF}=680\Omega$ , $V_{REF}=2.95V$    |     | 13        |           | mA   |
| Hold time                    | $t_H$         |  | 10  |           |           | ns   |
| Setup time                   | $t_S$         |  | 10  |           |           | ns   |
| Settling time                | $t_{ST}$      | $R_{OUT}=75\Omega$ , $R_{REF}=680\Omega$ |     | 20        | 33        | ns   |
| Maximum conversion rate      | $F_{C(max.)}$ | $V_{REF}=2.95V$                          | 30  | 50        |           | MSPS |

## ■ Timing Chart

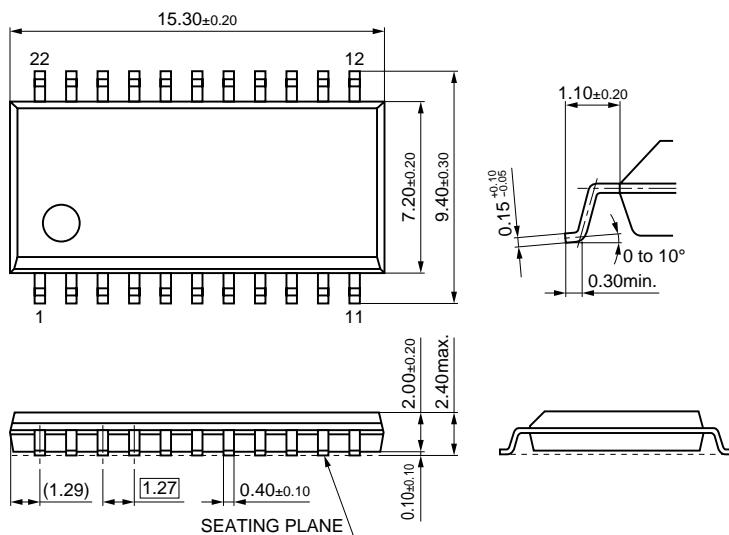


## ■ Package Dimensions (Unit: mm)

- MN6557A DIP022-P-0400



- MN6557AS SOP022-P-0375



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