

# 3-channel, 8-bit D / A converter

## BU3616K

The BU3616K, a CMOS IC, is a high-speed, low-power-consumption 3-channel 8-bit D / A converter. Its internal reference voltage source eliminates the need for an external reference voltage source.

### ●Applications

Video CDs, CD-V, CD karaoke

### ●Features

- 1) 8-bit resolution.
- 2) Current output.
- 3) Low power consumption (typically 75mW).
- 4) High-speed operation.
- 5) Internal reference voltage circuit.
- 6) TTL input.

### ●Absolute maximum ratings (Ta = 25°C)

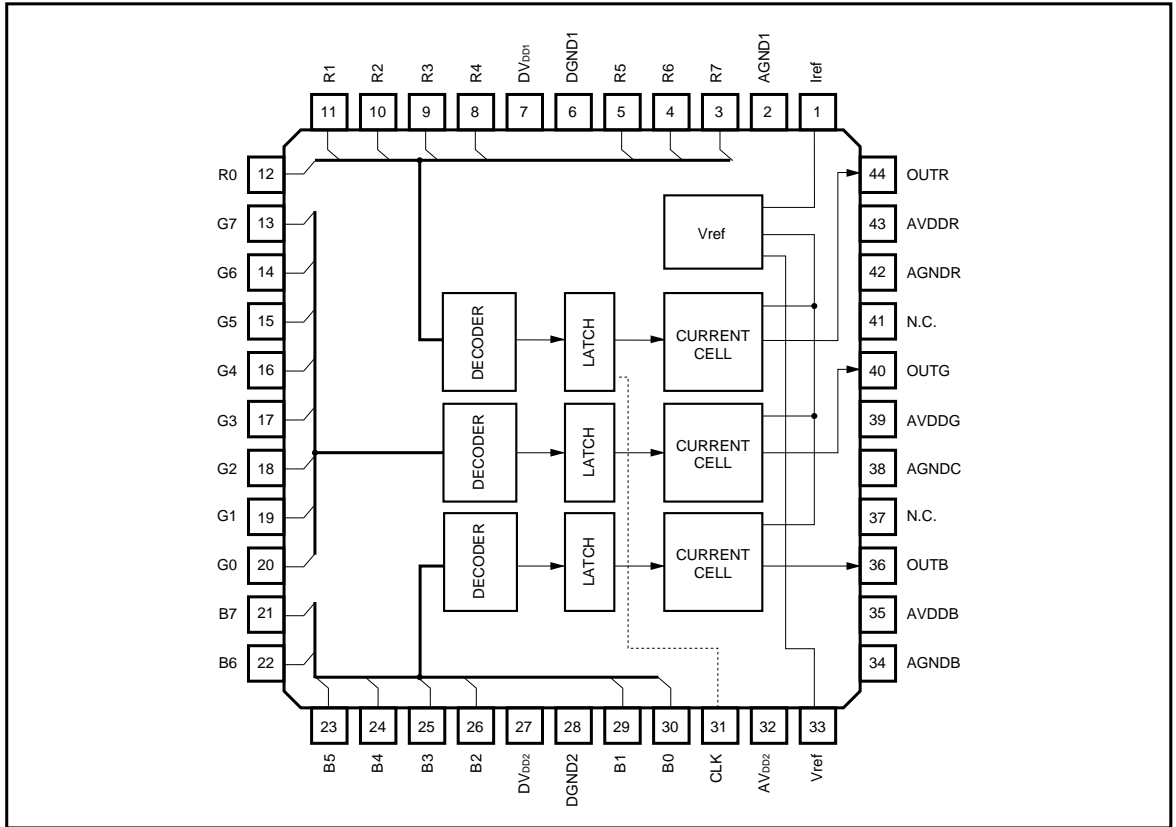
| Parameter                   | Symbol           | Limits                                          | Unit |
|-----------------------------|------------------|-------------------------------------------------|------|
| Power supply voltage        | DV <sub>DD</sub> | - 0.5 ~ + 7.0                                   | V    |
| Analog power supply voltage | AV <sub>DD</sub> | DV <sub>DD</sub> - 0.3 ~ DV <sub>DD</sub> + 0.3 | V    |
| Input voltage               | V <sub>IN</sub>  | - 0.5 ~ DV <sub>DD</sub> + 0.5                  | V    |
| Output voltage              | V <sub>OUT</sub> | - 0.5 ~ DV <sub>DD</sub> + 0.5                  | V    |
| Storage temperature         | T <sub>stg</sub> | - 55 ~ + 125                                    | °C   |
| Power dissipation*1         | P <sub>D</sub>   | 500                                             | mW   |

\*1 Reduced by 5.0mW for each increase in Ta of 1°C over 25°C.

### ●Recommended operating conditions

| Parameter                       | Symbol           | Min. | Typ. | Max. | Unit | Conditions |
|---------------------------------|------------------|------|------|------|------|------------|
| Power supply voltage            | DV <sub>DD</sub> | 4.5  | 5.0  | 5.5  | V    |            |
| Analog power supply voltage     | AV <sub>DD</sub> | 4.5  | 5.0  | 5.5  | V    |            |
| Transfer clock width            | TCK              | 58.8 | —    | —    | ns   |            |
| Transfer clock width, low level | TCKL             | 15   | —    | —    | ns   |            |
| RGB setup time                  | TS               | 5    | —    | —    | ns   |            |
| RGB hold time                   | TH               | 10   | —    | —    | ns   |            |
| Input voltage, low level        | V <sub>IL</sub>  | —    | —    | 0.8  | V    |            |
| Input voltage, high level       | V <sub>IH</sub>  | 2.2  | —    | —    | V    |            |
| Operating temperature           | T <sub>OPR</sub> | - 10 | —    | 70   | °C   |            |

●Block diagram



●Electrical characteristics (unless otherwise noted, Ta = 25°C, DVDD = 5.0V, AVDD = 5.0V, RREF = 6.8kΩ, RL = 470Ω, FCK = 15MHz)

| Parameter                    | Symbol           | Min. | Typ. | Max. | Unit | Conditions              |
|------------------------------|------------------|------|------|------|------|-------------------------|
| Current dissipation          | I <sub>CC</sub>  | —    | 15   | 30   | mA   |                         |
| Differential linearity error | ED               | -0.5 | —    | 0.5  | LSB  | DVDD = 5.0V AVDD = 5.0V |
| Linearity error              | EL               | -1.0 | —    | 1.0  | LSB  | RREF = 6.8kΩ RL = 470Ω  |
| Full-scale voltage           | FS               | 1.29 | 1.44 | 1.58 | V    | FCK = 15MHz             |
| RGB output voltage ratio     | F <sub>SCR</sub> | 0    | 0.5  | 5.0  | %    |                         |
| Output delay time            | T <sub>D</sub>   | —    | 30   | —    | ns   | CL = 15pF               |
| Settling time                | T <sub>SET</sub> | —    | 40   | —    | ns   | CL = 15pF               |

## ●Pin descriptions

| Pin No. | I / O | Pin name           | Function                                                   |
|---------|-------|--------------------|------------------------------------------------------------|
| 1       | —     | Iref               | Output current adjustment resistor connection, Vref output |
| 2       | —     | AGND 1             | Analog ground 1                                            |
| 3       | I     | R7                 | RED data input (bit 7, MSB)                                |
| 4       | I     | R6                 | RED data input (bit 6)                                     |
| 5       | I     | R5                 | RED data input (bit 5)                                     |
| 6       | —     | DGND1              | Digital ground 1                                           |
| 7       | —     | DV <sub>DD</sub> 1 | Digital power supply 1                                     |
| 8       | I     | R4                 | RED data input (bit 4)                                     |
| 9       | I     | R3                 | RED data input (bit 3)                                     |
| 10      | I     | R2                 | RED data input (bit 2)                                     |
| 11      | I     | R1                 | RED data input (bit 1)                                     |
| 12      | I     | R0                 | RED data input (bit 0, LSB)                                |
| 13      | I     | G7                 | GREEN data input (bit 7, MSB)                              |
| 14      | I     | G6                 | GREEN data input (bit 6)                                   |
| 15      | I     | G5                 | GREEN data input (bit 5)                                   |
| 16      | I     | G4                 | GREEN data input (bit 4)                                   |
| 17      | I     | G3                 | GREEN data input (bit 3)                                   |
| 18      | I     | G2                 | GREEN data input (bit 2)                                   |
| 19      | I     | G1                 | GREEN data input (bit 1)                                   |
| 20      | I     | G0                 | GREEN data input (bit 0, LSB)                              |
| 21      | I     | B7                 | BLUE data input (bit 7, MSB)                               |
| 22      | I     | B6                 | BLUE data input (bit 6)                                    |
| 23      | I     | B5                 | BLUE data input (bit 5)                                    |
| 24      | I     | B4                 | BLUE data input (bit 4)                                    |
| 25      | I     | B3                 | BLUE data input (bit 3)                                    |
| 26      | I     | B2                 | BLUE data input (bit 2)                                    |
| 27      | —     | DV <sub>DD</sub> 2 | Digital power supply 2                                     |
| 28      | —     | DGND2              | Digital ground 2                                           |
| 29      | I     | B1                 | BLUE data input (bit 1)                                    |
| 30      | I     | B0                 | BLUE data input (bit 0, LSB)                               |
| 31      | I     | CLK                | System lock                                                |
| 32      | —     | AV <sub>DD</sub> 2 | Analog power supply 2                                      |
| 33      | O     | Vref               | Attached capacitance-adding pin (C = 0.1 μF)               |
| 34      | —     | AGNDB              | Analog ground B                                            |
| 35      | —     | AV <sub>DD</sub> B | Analog power supply B                                      |
| 36      | O     | OUTB               | BLUE output                                                |
| 37      | —     | N.C.               | —                                                          |

| Pin No. | I / O | Pin name | Function              |
|---------|-------|----------|-----------------------|
| 38      | —     | AGNDG    | Analog ground G       |
| 39      | —     | AVDDG    | Analog power supply G |
| 40      | O     | OUTG     | GREEN output          |
| 41      | —     | N.C.     | —                     |
| 42      | —     | AGNDR    | Analog ground R       |
| 43      | —     | AVDDR    | Analog power supply R |
| 44      | O     | OUTR     | RED output            |

●Input / output circuits

| Pin No.                    | Pin name                         | Equivalent circuit |
|----------------------------|----------------------------------|--------------------|
| 3 ~ 5<br>8 ~ 26<br>29 ~ 31 | R0 ~ R7, G0 ~ G7<br>B0 ~ B7, CLK |                    |
| 36, 40, 44                 | OUTR, OUTG<br>OUTB               |                    |
| 1, 33                      | Iref, Vref                       |                    |

●Application example

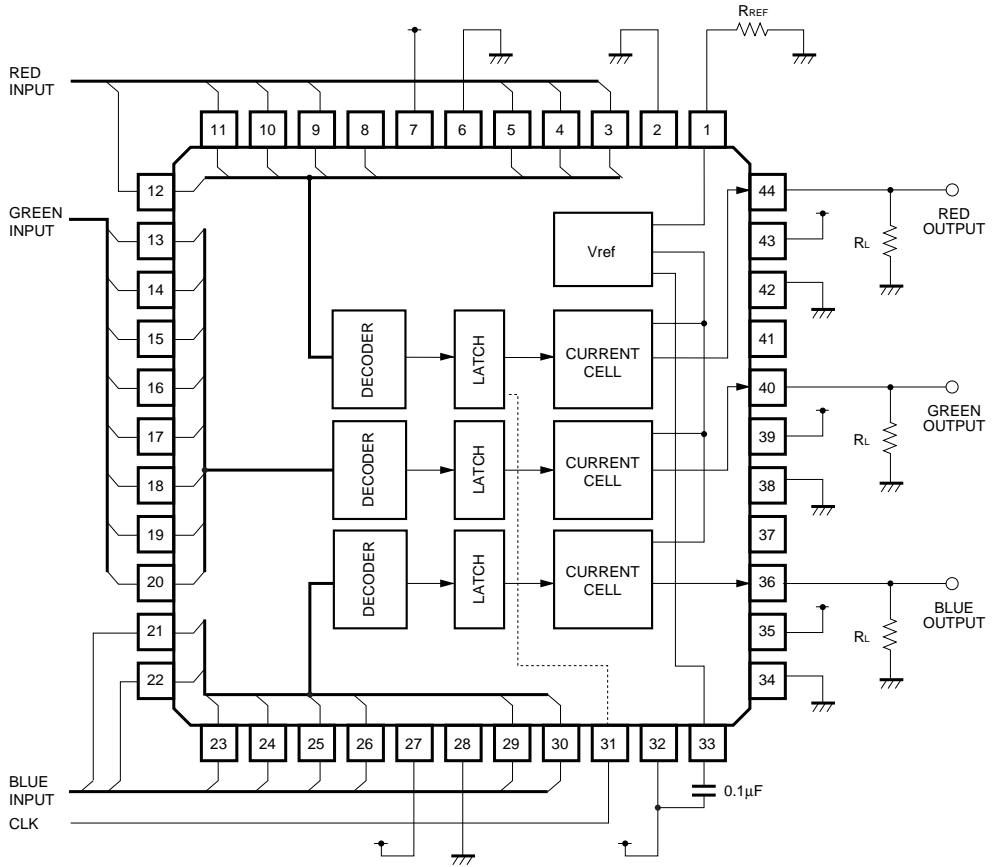


Fig.1

●External dimensions (Units: mm)

