# AN8146FBQ

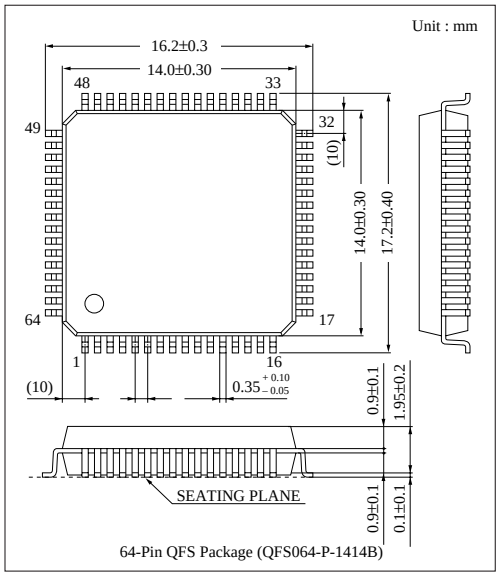
## 10-Bit 3-channel D/A Converter IC

### ■ Overview

The AN8146FBQ is a 10-bit D/A converter IC for TV image processing. It is a Bi-CMOS IC featuring low power consumption. It includes 3 channels of I/O. It is suitable for high-definition TV and computer monitor.

### ■ Features

- High-speed conversion : 50MSPS
- Low power consumption : 450mW
- 3 channels of I/O
- Input level : TTL level
- Single power supply : 5V
- Reference voltage source built-in

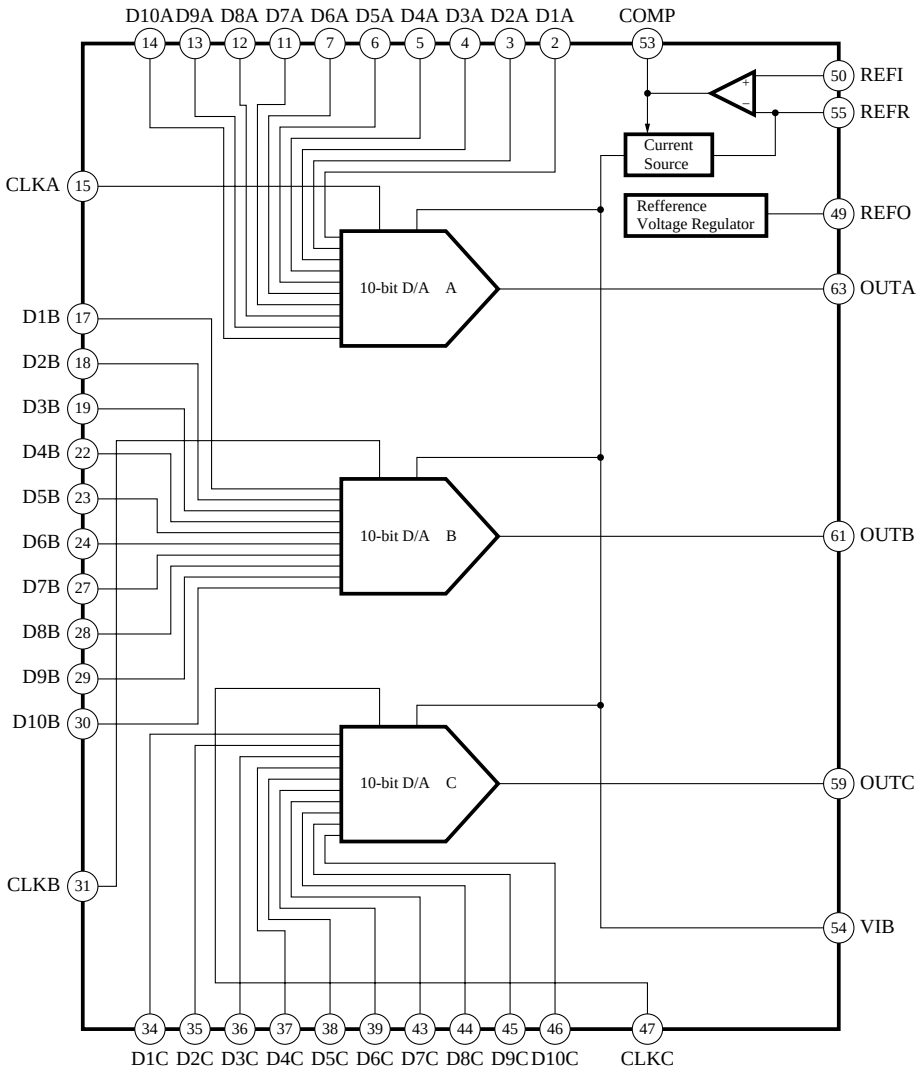


64-Pin QFS Package (QFS064-P-1414B)

### ■ Pin Descriptions

| Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name |
|---|---|---|---|---|---|---|---|
| 1 | Analog GND | 17 | Digital input 1 bit (MSB) B | 33 | Analog GND | 49 | Reference voltage output |
| 2 | Digital input 1 bit (MSB) A | 18 | Digital input 2 bit B | 34 | Digital input 1 bit (MSB) C | 50 | Reference voltage input |
| 3 | Digital input 2 bit A | 19 | Digital input 3 bit B | 35 | Digital input 2 bit C | 51 | Analog GND |
| 4 | Digital input 3 bit A | 20 | Analog GND | 36 | Digital input 3 bit C | 52 | Analog GND |
| 5 | Digital input 4 bit A | 21 | Analog GND | 37 | Digital input 4 bit C | 53 | To a compensation capacitor |
| 6 | Digital input 5 bit A | 22 | Digital input 4 bit B | 38 | Digital input 5 bit C | 54 | Stabilizing |
| 7 | Digital input 6 bit A | 23 | Digital input 5 bit B | 39 | Digital input 6 bit C | 55 | Reference resistance |
| 8 | Analog GND | 24 | Digital input 6 bit B | 40 | Analog GND | 56 | Analog GND |
| 9 | Analog GND | 25 | Analog GND | 41 | Analog GND | 57 | Analog GND |
| 10 | Analog GND | 26 | Analog GND | 42 | Analog GND | 58 | Analog GND |
| 11 | Digital input 7 bit A | 27 | Digital input 7 bit B | 43 | Digital input 7 bit C | 59 | Analog output C |
| 12 | Digital input 8 bit A | 28 | Digital input 8 bit B | 44 | Digital input 8 bit C | 60 | Analog power supply |
| 13 | Digital input 9 bit A | 29 | Digital input 9 bit B | 45 | Digital input 9 bit C | 61 | Analog output B |
| 14 | Digital input 10 bit (LSB) A | 30 | Digital input 10 bit B | 46 | Digital input 10 bit C | 62 | Analog power supply |
| 15 | Clock input A | 31 | Clock input B | 47 | Clock input C | 63 | Analog output B |
| 16 | Digital GND | 32 | Digital power supply | 48 | Analog GND | 64 | Analog GND |

■ Block Diagram



## ■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | – 0.3 to + 7.0 | V |
| Supply current | $I_{CC}$ | 210 | mA |
| Power dissipation Note 2) | $P_D$ | 585 | mW |
| Operating ambient temperature Note 1) | $T_{opr}$ | – 20 to + 70 | ˚C |
| Storage temperature Note 1) | $T_{stg}$ | – 55 to + 125 | ˚C |

Note 1) Ta =25˚C except operating ambient temperature and storage temperature.
Note 2) Allowable power dissipation of the package at Ta =70˚C.

## ■ Recommended Operating Range (Ta = 25˚C)

| Parameter | Symbol | Range |
|---|---|---|
| Operating supply voltage range | $V_{CC}$ | 4.75V to 5.25V |

## ■ Electrical Characteristics ($AV_{CC}$= $DV_{CC}$= 5.0V, Ta= 25±2˚C)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Supply current | $I_{CC}$ | | — | 90 | 150 | mA |
| Digital input leak current | $I_{DI}$ | $V_{IN}$ = 5V ($H_I$), $V_{IN}$ = 0V ($L_O$) | — | — | ± 30 | µA |
| REF leak current | $I_{REFI}$ | $V_{IN}$ = 5V ($H_I$), $V_{IN}$ = 0V ($L_O$) | — | — | ± 30 | µA |
| Reference supply output voltage | $V_{REFO}$ | $I_{REFO}$ = 3.0mA | 2.06 | 2.7 | 3.24 | V |
| Resolution | $R_{ES}$ | | — | 10 | — | Bit |
| Linearity error | $E_L$ | | — | ± 0.5 | ±1.0 | LSB |
| Differential linearity error | $E_D$ | | — | ± 0.5 | ±1.0 | LSB |
| Full scale output voltage | $V_{FS}$ | $R_{REF}$ = 350Ω<br>$R_O$ = 75Ω<br>$V_{REFO}$ – $V_{REFI}$ = 1.4V | 4.9 | 5.0 | 5.1 | V |
| Zero scale output voltage | $V_{ZS}$ | | 3.8 | 4.0 | 4.2 | V |
| Maximum conversion rate | $F_{CMAX}$ | | 50 | — | — | MSPS |
| Zero scale matching | $M_Z$ | $V_{ZS}$ = 4.0V | — | — | ± 4 | % |
| 2nd harmonics level | D | $f_{OUT}$ = 10MHz | — | (– 38) | — | dB |
| Crosstalk | CT | $f_{OUT}$ = 10MHz | — | (– 43) | — | dB |

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.

## ■ Operation Descriptions

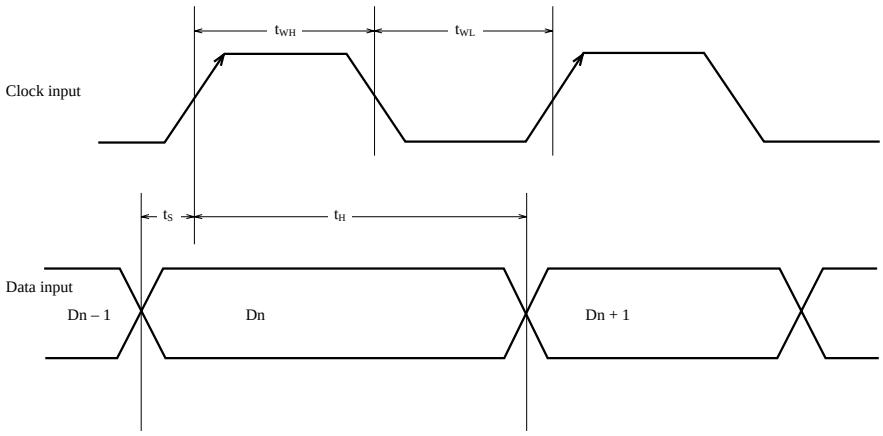
### • Recommended Operating Conditions ($AV_{CC}$= $DV_{CC}$= 5.0V, Ta= 25±5˚C)

| Parameter | Symbol | Conditions | min | typ | max | Unit | Note |
|---|---|---|---|---|---|---|---|
| Reference voltage | $V_{REFI}$ | | — | 1.3 | — | V | — |
| Output load resistance | $R_O$ | | — | 75 | — | Ω | — |
| Digital input voltage | $V_{IH}$ | | 2.4 | — | $DV_{CC}$ | V | — |
| Digital input voltage | $V_{IL}$ | | 0 | — | 0.8 | V | — |
| Clock pulse width | $t_{WH}$ | Refer to the timing chart. | 8 | — | — | ns | 1 |
| Clock pulse width | $t_{WL}$ | Refer to the timing chart. | 8 | — | — | ns | 1 |
| Set-up time | $t_S$ | Refer to the timing chart. | 5 | — | — | ns | — |
| Holding time | $t_H$ | Refer to the timing chart. | 1 | — | — | ns | — |
| Reference voltage input voltage | $V_{REF1}$ | | – 0.3 | — | $AV_{CC}$ | V | 2 |
| Analog output current | $I_{OUT}$ | | 0 | — | 30 | mA | 2 |
| Reference power supply output current | $I_{REFO}$ | | –10 | — | 0 | mA | 2 |

Note 1) $t_{WH} + t_{WL} \geq 20$ns
Note 2) Use it under the condition : $AV_{CC} = DV_{CC}$, and AGND = DGND

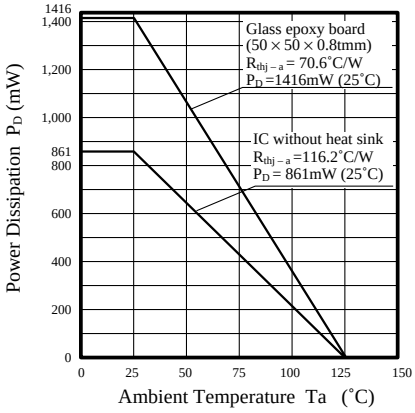
(Cautions on surge)
Comparing with the other pins, Pin50 has a lower negative-surge resistance (Approx. –190V at 200pF).
Therefore, particular care must be taken when it is used.

### • Operational Timing




## ■ Reference

Power Dissipation on Package
$P_D$ – Ta



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