

# HA19503ANT

T-SI-10-07

## 6-Bit D/A Converter with Clock Generation Circuit

The HA19503ANT is a high-speed, low-power 6-bit D/A converter with a built-in clock generator. Its digital inputs and clock outputs of this monolithic bipolar LSI are fully TTL compatible.

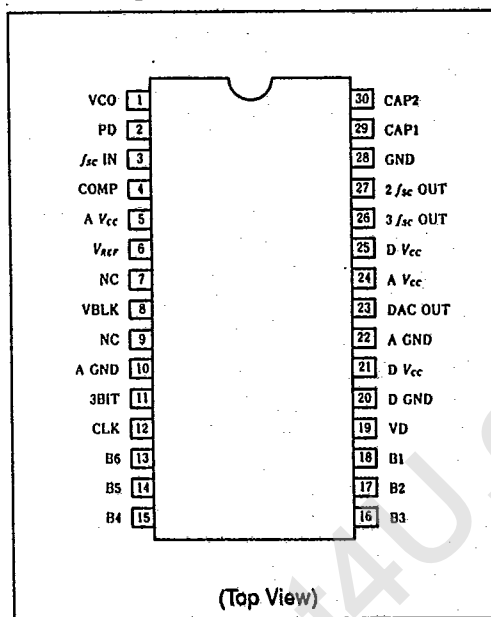
### Features

- $3 \times f_{sc}$  VCO circuit can be synchronized with an external  $f_{sc}$  input
- $2 \times f_{sc}$  and  $3 \times f_{sc}$  clocks are available for peripheral circuits
- High-precision 6-bit D/A conversion
- Single supply operation: 5V
- Clock outputs and digital inputs are TTL compatible

### Applications

- Secondary storage devices, etc.

### Pin Arrangement



### Ordering Information

| Type No.   | Package |
|------------|---------|
| HA19503ANT | DP-30S  |



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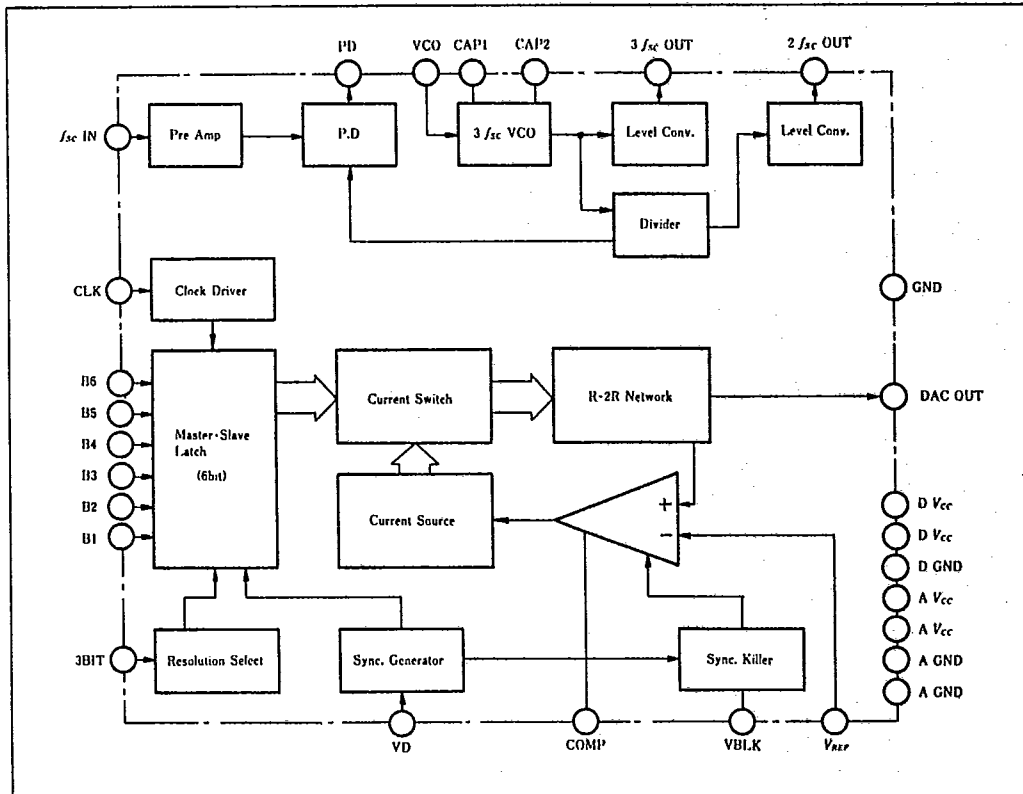
## Pin Descriptions

| Pin | Symbol                | Function                                      |
|-----|-----------------------|---|
| 1   | VCO                   | $3 \times f_{sc}$ VCO frequency control input |
| 2   | PD                    | $f_{sc}$ phase detector output                |
| 3   | $f_{sc}IN$            | Subcarrier ( $f_{sc}$ ) input                 |
| 4   | COMP                  | OP AMP phase compensation                     |
| 5   | AVcc                  | Analog power supply (+5V)                     |
| 6   | VREF                  | Reference voltage input                       |
| 7   | NC                    | No connected                                  |
| 8   | VBLK                  | Block synchronizing signal input              |
| 9   | NC                    | No connected                                  |
| 10  | AGND                  | Analog ground                                 |
| 11  | 3BIT                  | DAC resolution 3-bit/6-bit select             |
| 12  | CLK                   | DAC clock input                               |
| 13  | B6                    | DAC digital input (MSB)                       |
| 14  | B5                    | DAC digital input                             |
| 15  | B4                    | DAC digital input                             |
| 16  | B3                    | DAC digital input                             |
| 17  | B2                    | DAC digital input                             |
| 18  | B1                    | DAC digital input (LSB)                       |
| 19  | VD                    | Add synchronizing signal input                |
| 20  | DGND                  | Digital ground                                |
| 21  | DVcc                  | Digital power supply (+5V)                    |
| 22  | AGND                  | Analog ground                                 |
| 23  | DACOUT                | DAC output                                    |
| 24  | AVcc                  | Analog power supply (+5V)                     |
| 25  | DVcc                  | Digital power supply (+5V)                    |
| 26  | $3 \times f_{sc} OUT$ | $3 \times f_{sc}$ signal output               |
| 27  | $2 \times f_{sc} OUT$ | $2 \times f_{sc}$ signal output               |
| 28  | GND                   | Ground  |
| 29  | CAP1                  | $3 \times f_{sc}$ VCO capacitor               |
| 30  | CAP2                  | $3 \times f_{sc}$ VCO capacitor               |



Block Diagram

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Absolute Maximum Ratings (Ta = 25°C, unless otherwise specified)

| Parameter             | Symbol | Rating      | Unit |
|-----------------------|--------|-------------|------|
| Power supply voltage  | Vcc    | +7.0        | V    |
| Input signal voltage  | VIN    | 0 to Vcc    | V    |
| Digital input voltage | Vi     | 0 to Vcc    | V    |
| Power dissipation     | Pr     | 600         | mW   |
| Operating temperature | Topr   | 0 to +70    | °C   |
| Storage temperature   | Tstg   | -55 to +125 | °C   |



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Electrical Characteristics (Ta = 25°C, VCC = 5.0V)

• VCO Block

| Parameter                  | Symbol            | Min | Typ  | Max  | Unit | Test Conditions                         |
|----------------------------|-------------------|-----|------|------|------|---|
| Pin 3 input voltage        | V <sub>in 3</sub> | 100 | —    | —    | mV   | Input voltage level required by the PLL |
| Pin 3 impedance            | Z <sub>in 3</sub> | —   | 10   | —    | kΩ   |   |
| Digital output voltage "H" | V <sub>OH</sub>   | 3.2 | 3.5  | —    | V    | I <sub>OH</sub> = -0.4mA                |
| Digital output voltage "L" | V <sub>OL</sub>   | —   | 0.3  | 0.55 | V    | I <sub>OL</sub> = 2mA                   |
| Duty cycle, pin 26         | DTY 26            | —   | 50   | —    | %    |   |
| Duty cycle, pin 27         | DTY 27            | —   | 67   | —    | %    |   |
| VCO free run frequency     | f <sub>o</sub>    | —   | 10.7 | —    | MHz  | No input on pin 3                       |
| Lead-in range (top)        | +Δf <sub>o</sub>  | —   | +500 | —    | kHz  |   |
| Lead-in range (bottom)     | -Δf <sub>o</sub>  | —   | -500 | —    | kHz  |   |

• DAC Block

| Parameter                     | Symbol                   | Min                                      | Typ        | Max                  | Unit | Test Conditions        |
|-------------------------------|--------------------------|--|------------|----------------------|------|------------------------|
| Resolution                    |                          | —  | 6          | —                    | bit  |                        |
| Digital input voltage H-level | V <sub>IH</sub>          | 2.0                                      | —          | V <sub>CC</sub>      | V    |                        |
| Digital input voltage L-level | V <sub>IL</sub>          | 0  | —          | 0.8                  | V    |                        |
| Digital input current H-level | I <sub>IH</sub>          | -0.4                                     | —          | 0.4                  | mA   | V <sub>IH</sub> = 2.7V |
| Digital input current L-level | I <sub>IL</sub>          | -0.8                                     | —          | 0.4                  | mA   | V <sub>IL</sub> = 0.4V |
| DAC output voltage            | Full scale<br>Zero scale | V <sub>FS 23</sub><br>V <sub>ZS 23</sub> | —<br>4.015 | V <sub>CC</sub><br>— | V    |                        |
| DAC output impedance          | Z <sub>o 23</sub>        | —  | 80         | —                    | Ω    |                        |
| Pin 6 reference voltage       | V <sub>REF</sub>         | —  | 4.0        | —                    | V    |                        |
| Pin 6 input impedance         | Z <sub>in 6</sub>        | —  | 100        | —                    | kΩ   |                        |
| Conversion rate               | f <sub>SPL</sub>         | 12                                       | 20         | —                    | MSPS |                        |

