

# MB87077

## 6-bit, 4-channel Electronic Volume Controller

The Fujitsu MB87077 is a 6-bit, 4-channel electronic volume controller. A digital signal input controls gain every 0.5 dB step from 0dB to -32dB. It has been fabricated in CMOS technology and designed to operate with low power. Its digital inputs and outputs are TTL compatible.

The MB87077 is available in a 24-pin plastic DIP or SOP package.

- Gain variable range: 0 dB to -32 dB by 0.5 dB or -∞
- Gain variable range is expanded to connect two channels serially (0 dB to -64 dB)
- Each channel gain can be set respectively
- Low power consumption: 12 mW at +5 V
- Easy microprocessor interface (6-bit parallel I/O)
- Test function is provided (to confirm internal data)
- Data is initialized by reset signal (all channels are set to 0db)
- Single power supply: +5 V
- Logic I/O is TTL compatible
- Package and ordering information:
  - 24-pin plastic DIP, order as MB87077P
  - 24-pin plastic SOP, order as MB87077PF

### ABSOLUTE MAXIMUM RATINGS

| Parameter               | Symbol    | Pin Name                | Value                            | Unit |
|-------------------------|-----------|-------------------------|----------------------------------|------|
| Positive Supply Voltage | $V_{DD}$  | $V_{DD}$                | -0.3 to +6                       | V    |
| Negative Supply Voltage | $V_{SS}$  | $V_{SS}$                | -6 to +0.3                       | V    |
| Digital Input Voltage   | $V_{DI}$  | All digital input pins  | -0.3 to $V_{DD} + 0.3$           | V    |
| Analog Input Voltage    | $V_{AI}$  | $A_{10}$ to $A_{13}$    | $V_{SS} - 0.3$ to $V_{DD} + 0.3$ | V    |
| Digital Output Voltage  | $V_{DO}$  | All digital output pins | -0.3 to $V_{DD} + 0.3$           | V    |
| Analog Output Voltage   | $V_{AO}$  | $A_{08}$ to $A_{03}$    | $V_{SS} - 0.3$ to $V_{DD} + 0.3$ | V    |
| Digital Output Current  | $I_{DO}$  | All digital output pins | -10 to 10                        | mA   |
| Analog Output Current   | $I_{AO}$  | $A_{00}$ to $A_{03}$    | -10 to 10                        | mA   |
| Storage Temperature     | $T_{STG}$ |                         | -40 to +125                      | °C   |

— Note —

Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



Plastic DIP  
(DIP-24P-M03)



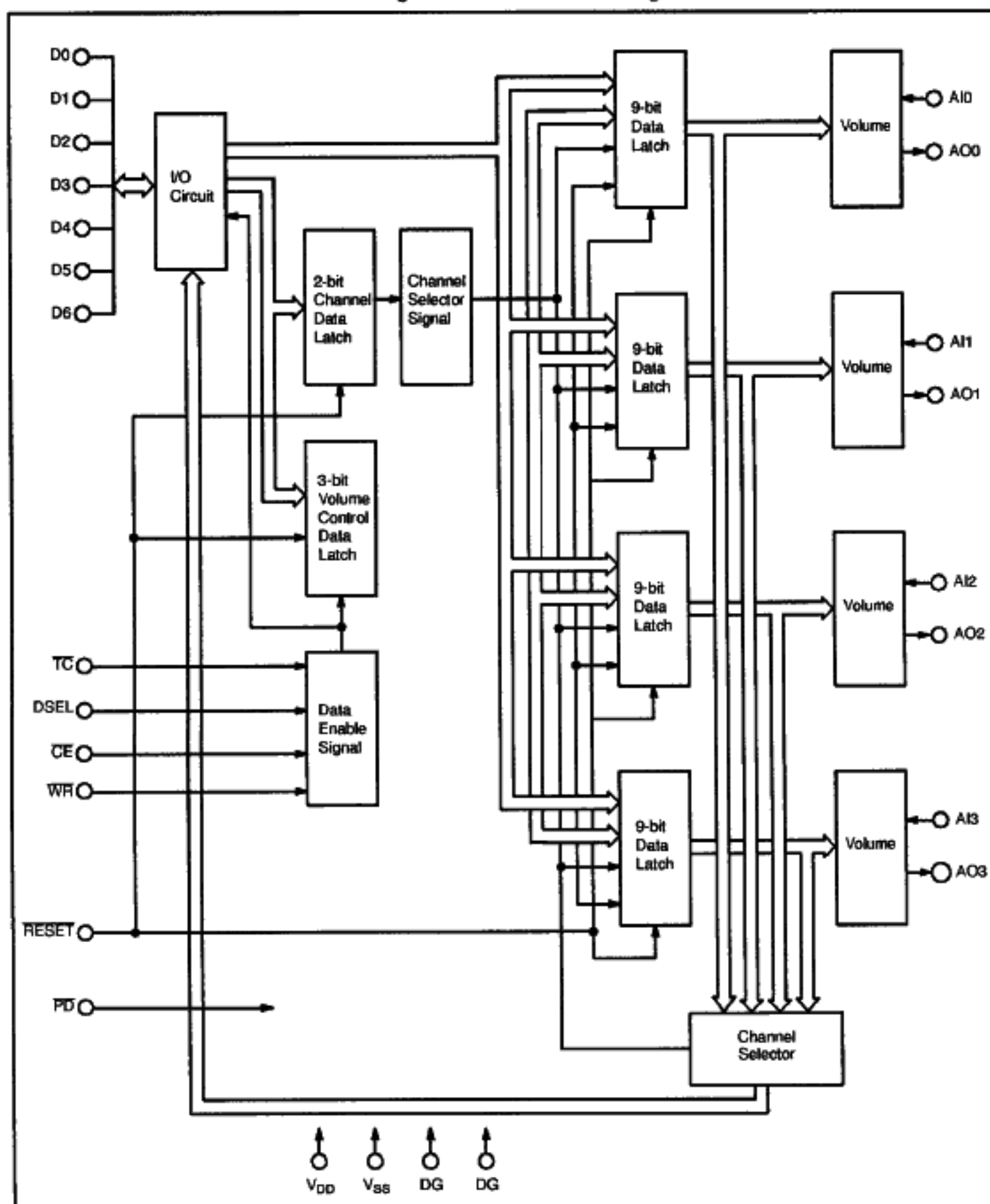
Plastic SOP  
(FPT-24P-M02)

### Pin Assignment

|     |    |    |       |
|-----|----|----|-------|
| D0  | 1  | 24 | TC    |
| D1  | 2  | 23 | WR    |
| D2  | 3  | 22 | CE    |
| D3  | 4  | 21 | DSEL  |
| D4  | 5  | 20 | RESET |
| D5  | 6  | 19 | PD    |
| DG  | 7  | 18 | VDD   |
| VSS | 8  | 17 | AG    |
| A10 | 9  | 16 | AO3   |
| AO0 | 10 | 15 | A13   |
| A11 | 11 | 14 | AO2   |
| AO1 | 12 | 13 | A12   |

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

Figure 1. MB87077 Block Diagram



## PIN DESCRIPTIONS

|               | Pin No. | Pin Name        | Description                                                                                                                                                                                                                                                          |
|---------------|---------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Supply  | 18      | V <sub>DD</sub> | Positive supply voltage, +5V                                                                                                                                                                                                                                         |
|               | 8       | V <sub>SS</sub> | Negative supply voltage, -5V                                                                                                                                                                                                                                         |
|               | 17      | AG              | Ground for analog circuitry                                                                                                                                                                                                                                          |
|               | 7       | DG              | Ground for digital circuitry                                                                                                                                                                                                                                         |
| Digital Input | 21      | DSEL            | Data select input (TTL interface).<br>When this pin is set at high level, DSC1, DSC2, EN, C0 and C32 are in the write enable mode. When this pin is set at low level, GD0 to GD5 are in the write enable mode.                                                       |
|               | 22      | CE              | Chip enable input (TTL interface). When this pin is set at low level, data input/output is available.<br>When this pin is at high level, data input/output is inhibited and the pin is set to a high impedance state.<br>This pin is pulled up by a high resistance. |
|               | 23      | WR              | Data write clock input (TTL interface).<br>Data is written at every rising edge of this clock.                                                                                                                                                                       |
|               | 24      | TC              | Digital signal input/output select input (TTL interface).<br>When this pin is at high level, data can be written through D0 to D5. When this pin is at low level, data can be read output from D0 to D5.<br>This pin is pulled up by a high resistance.              |
|               | 19      | PD              | Power down select input (TTL interface).<br>When this pin is at low level, the power down mode is selected. When this pin is at high level, the operation mode is selected.<br>This pin is pulled up by a high resistance.                                           |
|               | 20      | RESET           | Reset input (TTL interface).<br>When this pin is at low level, the data latches for all channels are initialized and the value is set as 0 dB.<br>This pin is pulled up by a high resistance.                                                                        |

Continued on next page

## PIN DESCRIPTIONS (continued)

|                  | Pin No. | Pin Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
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| Digital I/O Pins | 1       | D0       | When TC = H is at CE = L, data can be written through D0 to D5. When TC = L is at CE = L, data can be read out from D0 to D5.<br>When DSEL is at high level, DSC1, DSC2, EN, C0 and C32 are in the read/write enable modes. When DSEL is at low level, GD0 to GD5 are in the read/write enable modes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | 2       | D1       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | 3       | D2       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | 4       | D3       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | 5       | D4       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | 6       | D5       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  |         |          | <b>Channel Setting</b> <table><tr><th>DSC2</th><th>DSC1</th><th>Channel</th></tr><tr><td>L</td><td>L</td><td>0</td></tr><tr><td>L</td><td>H</td><td>1</td></tr><tr><td>H</td><td>L</td><td>2</td></tr><tr><td>H</td><td>H</td><td>3</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DSC2  | DSC1 | Channel | L   | L                    | 0     | L         | H  | 1         | H | L         | 2   | H   | H   | 3   |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| DSC2             | DSC1    | Channel  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| L                | L       | 0        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| L                | H       | 1        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| H                | L       | 2        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| H                | H       | 3        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  |         |          | <b>Digital I/O Setting</b> <table><tr><th>TC</th><th>DSEL</th><th>D0</th><th>D1</th><th>D2</th><th>D3</th><th>D4</th><th>D5</th><th>I/O Modes</th></tr><tr><td rowspan="2">H</td><td>H</td><td>DSC</td><td>DSC</td><td>EN</td><td>C0</td><td>C32</td><td>X</td><td rowspan="2">Input mode (setting)</td></tr><tr><td>L</td><td>GD0</td><td>GD1</td><td>GD2</td><td>GD3</td><td>GD4</td><td>GD5</td></tr><tr><td rowspan="2">L</td><td>H</td><td>DSC</td><td>DSC</td><td>EN</td><td>C0</td><td>C32</td><td>L</td><td rowspan="2">Output mode (check)</td></tr><tr><td>L</td><td>GD0</td><td>GD1</td><td>GD2</td><td>GD3</td><td>GD4</td><td>GD5</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TC    | DSEL | D0      | D1  | D2                   | D3    | D4        | D5 | I/O Modes | H | H         | DSC | DSC | EN  | C0  | C32 | X   | Input mode (setting) | L  | GD0 | GD1   | GD2 | GD3 | GD4 | GD5 | L | H | DSC | DSC | EN | C0 | C32 | L | Output mode (check) | L | GD0 | GD1 | GD2 | GD3 | GD4 | GD5 |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| TC               | DSEL    | D0       | D1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | D2    | D3   | D4      | D5  | I/O Modes            |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| H                | H       | DSC      | DSC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | EN    | C0   | C32     | X   | Input mode (setting) |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | L       | GD0      | GD1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | GD2   | GD3  | GD4     | GD5 |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| L                | H       | DSC      | DSC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | EN    | C0   | C32     | L   | Output mode (check)  |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  | L       | GD0      | GD1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | GD2   | GD3  | GD4     | GD5 |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  |         |          | <b>Electrical Volume Setting</b> <table><tr><th colspan="10">Data*</th><th rowspan="2">Gain (dB)</th></tr><tr><th>GD5</th><th>GD4</th><th>GD3</th><th>GD2</th><th>GD1</th><th>GD0</th><th>EN</th><th>C0</th><th>C32</th><th>D (G)</th></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>63</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>62</td><td>-0.5</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>61</td><td>-1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>60</td><td>-1.5</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>59</td><td>-2</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>58</td><td>-2.5</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>57</td><td>-3</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>56</td><td>-3.5</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>32</td><td>-15.5</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>31</td><td>-16</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>7</td><td>-28</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>6</td><td>-28.5</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>5</td><td>-29</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>4</td><td>-29.5</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>3</td><td>-30</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>2</td><td>-30.5</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>-31</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>-31.5</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>1</td><td>X</td><td>1</td><td>-</td><td>-32</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>1</td><td>1</td><td>0</td><td>-</td><td>0</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>0</td><td>X</td><td>X</td><td>-</td><td>-∞</td></tr></table> | Data* |      |         |     |                      |       |           |    |           |   | Gain (dB) | GD5 | GD4 | GD3 | GD2 | GD1 | GD0 | EN                   | C0 | C32 | D (G) | 1   | 1   | 1   | 1   | 1 | 1 | 1   | 0   | 0  | 63 | 0   | 1 | 1                   | 1 | 1   | 1   | 0   | 1   | 0   | 0   | 62 | -0.5 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 61 | -1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 60 | -1.5 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 59 | -2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 58 | -2.5 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 57 | -3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 56 | -3.5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 32 | -15.5 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 31 | -16 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 7 | -28 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 6 | -28.5 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 5 | -29 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 4 | -29.5 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | -30 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | -30.5 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | -31 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | -31.5 | X | X | X | X | X | X | 1 | X | 1 | - | -32 | X | X | X | X | X | X | 1 | 1 | 0 | - | 0 | X | X | X | X | X | X | 0 | X | X | - | -∞ |
| Data*            |         |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |      |         |     |                      |       | Gain (dB) |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| GD5              | GD4     | GD3      | GD2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | GD1   | GD0  | EN      | C0  | C32                  | D (G) |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 1    | 1       | 0   | 0                    | 63    | 0         |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 0    | 1       | 0   | 0                    | 62    | -0.5      |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 1    | 1       | 0   | 0                    | 61    | -1        |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 0    | 1       | 0   | 0                    | 60    | -1.5      |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 1    | 1       | 0   | 0                    | 59    | -2        |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 0    | 1       | 0   | 0                    | 58    | -2.5      |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 1    | 1       | 0   | 0                    | 57    | -3        |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 1       | 1        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 0    | 1       | 0   | 0                    | 56    | -3.5      |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 1                | 0       | 0        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 0    | 1       | 0   | 0                    | 32    | -15.5     |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 1       | 1        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 1    | 1       | 0   | 0                    | 31    | -16       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 1    | 1       | 0   | 0                    | 7     | -28       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 0    | 1       | 0   | 0                    | 6     | -28.5     |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 1    | 1       | 0   | 0                    | 5     | -29       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 0    | 1       | 0   | 0                    | 4     | -29.5     |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 1    | 1       | 0   | 0                    | 3     | -30       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1     | 0    | 1       | 0   | 0                    | 2     | -30.5     |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 1    | 1       | 0   | 0                    | 1     | -31       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| 0                | 0       | 0        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0     | 0    | 1       | 0   | 0                    | 0     | -31.5     |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| X                | X       | X        | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | X     | X    | 1       | X   | 1                    | -     | -32       |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| X                | X       | X        | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | X     | X    | 1       | 1   | 0                    | -     | 0         |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
| X                | X       | X        | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | X     | X    | 0       | X   | X                    | -     | -∞        |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|                  |         |          | * X = don't care.<br>When data is reset, data is set at 0 dB (code 111111100)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |      |         |     |                      |       |           |    |           |   |           |     |     |     |     |     |     |                      |    |     |       |     |     |     |     |   |   |     |     |    |    |     |   |                     |   |     |     |     |     |     |     |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |   |   |   |   |    |      |   |   |   |   |   |   |   |   |   |    |       |   |   |   |   |   |   |   |   |   |    |     |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |

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## PIN DESCRIPTIONS (continued)

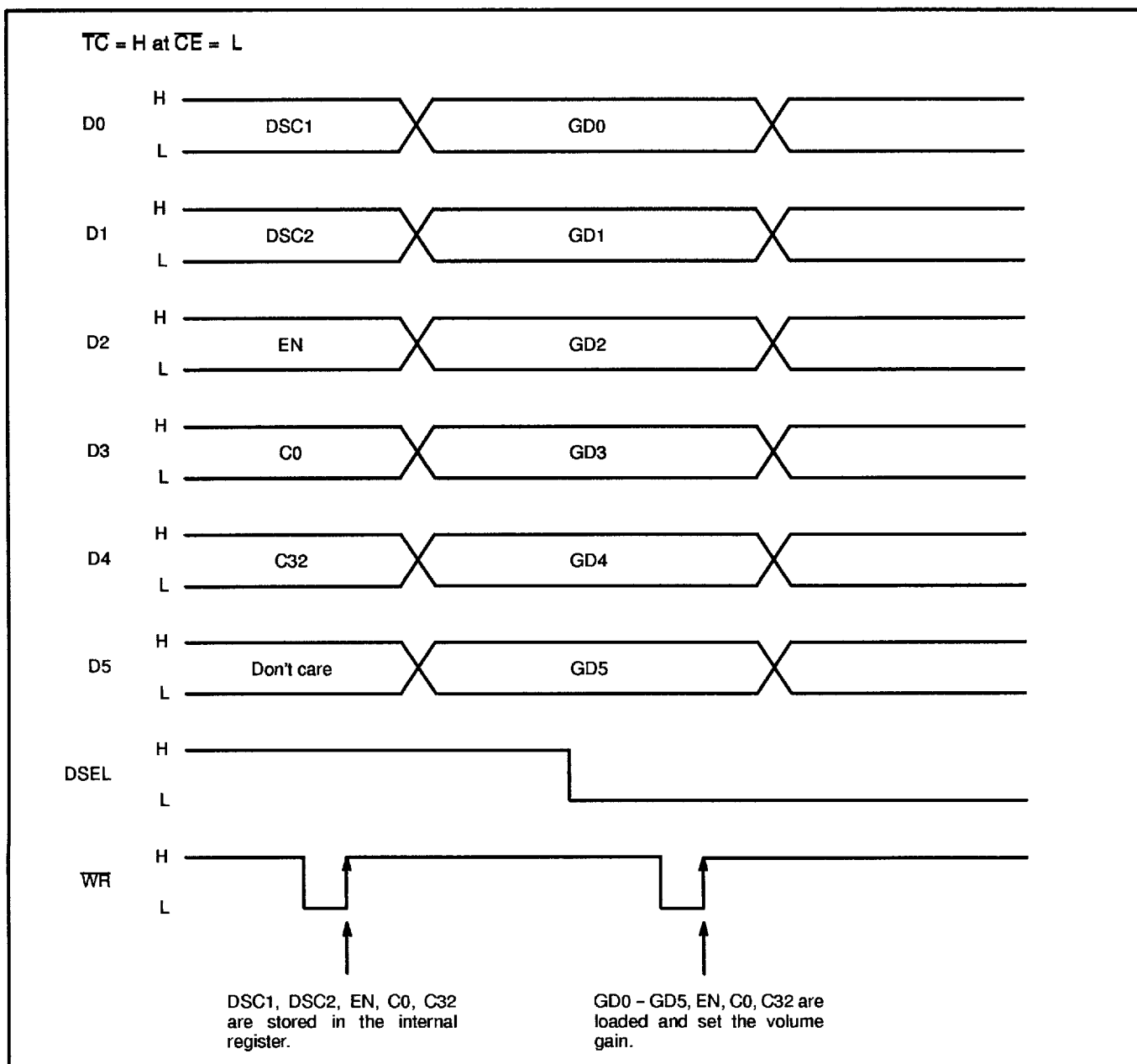
|               | Pin No. | Pin Name | Description                                                                                             |
|---------------|---------|----------|---------------------------------------------------------------------------------------------------------|
| Analog Input  | 9       | AI0      | Analog input of channel 0.                                                                              |
|               | 11      | AI1      | Analog input of channel 1.                                                                              |
|               | 13      | AI2      | Analog input of channel 2.                                                                              |
|               | 15      | AI3      | Analog input of channel 3.                                                                              |
| Analog Output | 10      | AO0      | Analog output of channel 0.<br>When in a power down mode, this pin is pulled down by a high resistance. |
|               | 12      | AO1      | Analog output of channel 1.<br>When in a power down mode, this pin is pulled down by a high resistance. |
|               | 14      | AO2      | Analog output of channel 2.<br>When in a power down mode, this pin is pulled down by a high resistance. |
|               | 16      | AO3      | Analog output of channel 3.<br>When in a power down mode, this pin is pulled down by a high resistance. |

## TRUTH TABLE

| PD | RESET | CE | TC | DSEL | WR                                                                                  | D0 to D5                                                | Operator Mode       |
|----|-------|----|----|------|-------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------|
| 0  | X     | X  | X  | X    | X                                                                                   |                                                         | Power down mode     |
| 1  | 0     | X  | X  | X    | X                                                                                   |                                                         | Gain is initialized |
| 1  | 1     | 1  | X  | X    | X                                                                                   | Inhibit data input/output<br>(high impedance)           |                     |
| 1  | 1     | 0  | 0  | 1    | X                                                                                   | Data stored in SCH1, SCH2,<br>EN, C0 and C32 are output | Data output mode    |
| 1  | 1     | 0  | 0  | 0    | X                                                                                   | Data stored in D0 to D5 are output                      | Data output mode    |
| 1  | 1     | 0  | 1  | 1    |  | Data stored in SCH1, SCH2, EN,<br>C0 and C32 are input  | Data output mode    |
| 1  | 1     | 0  | 1  | 0    |  | Data stored in D0 to D5 are input                       | Data output mode    |

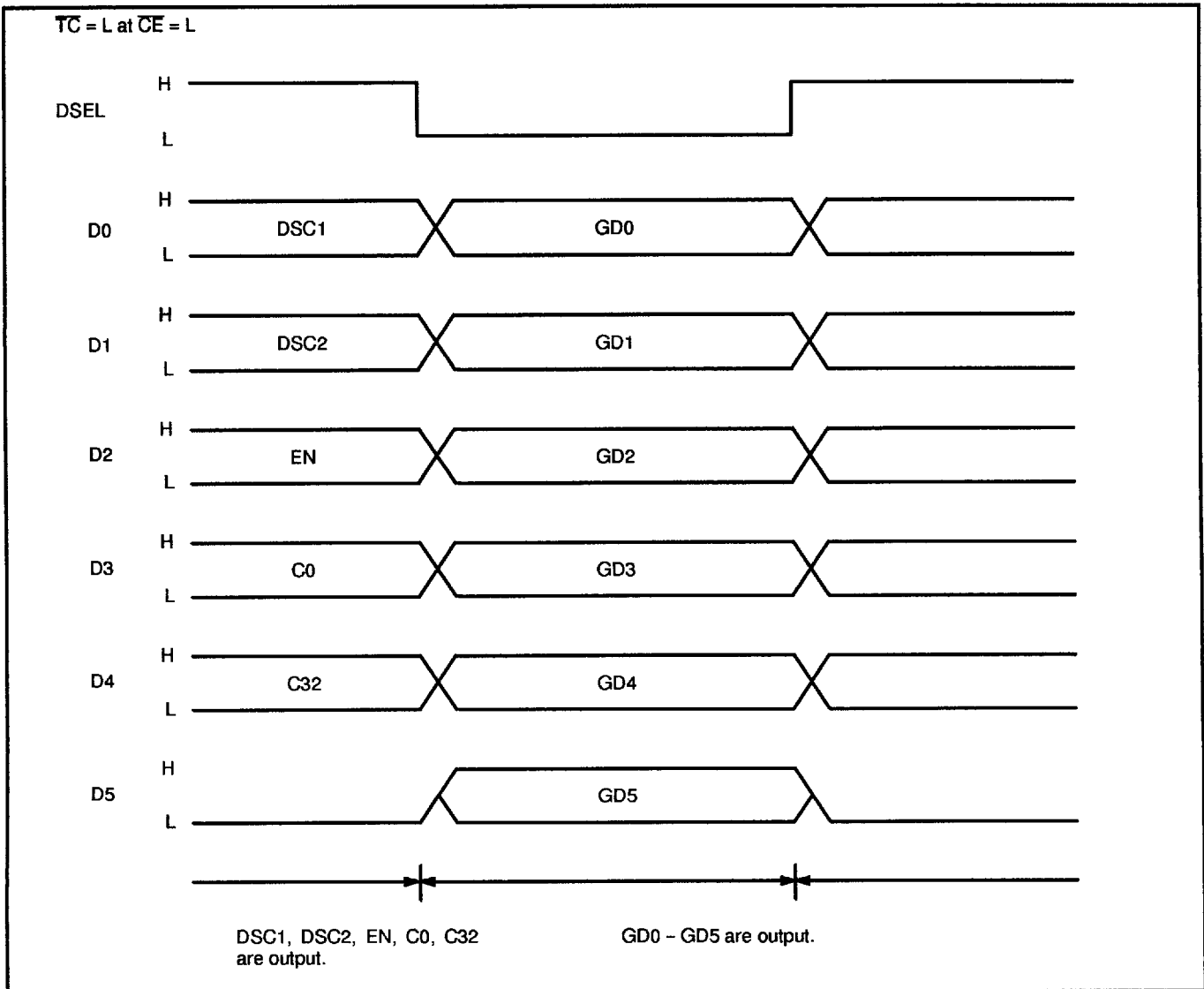
Note: X = don't care.

Figure 2. Volume Data Setting Timing Diagram



Continued on next page

Figure 2. Volume Data Setting Timing Diagram (continued)



## RECOMMENDED OPERATING CONDITIONS

| Parameter                      | Symbol          | Pin Name               | Value                      |      |                 | Unit       |
|--------------------------------|-----------------|------------------------|----------------------------|------|-----------------|------------|
|                                |                 |                        | Min                        | Typ  | Max             |            |
| Positive Supply Voltage        | V <sub>DD</sub> | V <sub>DD</sub>        | 4.75                       | 5.0  | 5.25            | V          |
| Negative Supply Voltage        | V <sub>SS</sub> | V <sub>SS</sub>        | -5.25                      | -5.0 | -4.75           | V          |
| Digital Input Voltage          | V <sub>DI</sub> | All digital input pins | 0                          |      | V <sub>DD</sub> | V          |
| Analog Input Voltage           | V <sub>AI</sub> | AI0<br>AI1             | $\pm 5\text{ V } \pm 10\%$ | -2.5 | 2.5             | V          |
|                                |                 | AI2<br>AI3             | $\pm 5\text{ V } \pm 5\%$  | -3.0 | 3.0             | V          |
| Analog Output Load Resistance  | R <sub>AL</sub> | AO0 – AO3              | 30                         |      |                 | k $\Omega$ |
| Analog Output Load Capacitance | C <sub>AL</sub> | AO0 – AO3              |                            |      | 50              | pF         |
| Operating Temperature          | T <sub>A</sub>  |                        | -20                        |      | 70              | °C         |
| Analog Input Frequency         | f <sub>AI</sub> |                        | 0                          |      | 20              | kHz        |

## ELECTRICAL CHARACTERISTICS

(V<sub>DD</sub> = +5 V +5%, V<sub>SS</sub> = -5 V + 5%, T<sub>A</sub> = -20 to +70°C, dBm referenced to 600  $\Omega$ )

| Parameter                        | Symbol             | Pin Name                                 | Condition                                              |                    | Value |      |                 | Unit |
|----------------------------------|--------------------|------------------------------------------|--------------------------------------------------------|--------------------|-------|------|-----------------|------|
|                                  |                    |                                          |                                                        |                    | Min   | Typ  | Max             |      |
| Positive Supply Current          | I <sub>DD1</sub>   | V <sub>DD</sub>                          | No Load                                                | P <sub>D</sub> = H |       | 1.2  | 2.0             | mA   |
|                                  | P <sub>D</sub> = L |                                          |                                                        |                    |       | 0.5  | mA              |      |
| Negative Supply Current          | I <sub>SS1</sub>   | V <sub>SS</sub>                          |                                                        | P <sub>D</sub> = H | -2.0  | -1.2 |                 | mA   |
|                                  | P <sub>D</sub> = L |                                          |                                                        | -0.5               |       |      | mA              |      |
| Digital Input Low Voltage        | V <sub>IL</sub>    | All digital input pins                   |                                                        |                    | 0     |      | 0.8             | V    |
| Digital Input High Voltage       | V <sub>IH</sub>    |                                          |                                                        |                    | 2.2   |      | V <sub>DD</sub> | V    |
| Digital Input Low Current        | I <sub>IL</sub>    | D0 – D5<br>WR, DSEL                      | V <sub>I</sub> = GND                                   |                    | -10   |      | 10              | μA   |
| Digital Input High Current       | I <sub>IH</sub>    |                                          | V <sub>I</sub> = V <sub>DD</sub>                       |                    | -10   |      | 10              | μA   |
| Digital Output Low Voltage       | V <sub>OL</sub>    | All digital output pins                  | I <sub>OL</sub> = 2mA                                  |                    | 0     |      | 0.4             | V    |
| Digital Output High Voltage      | V <sub>OH</sub>    |                                          | I <sub>OH</sub> = 2mA                                  |                    | 2.6   |      | V <sub>DD</sub> | V    |
| Supply Deviation Rejection Ratio | S <sub>VRD</sub>   | V <sub>DD</sub> , All analog output pins | Supply Voltage Deviation<br>ΔV <sub>SV</sub> = +150 mA |                    | 60    |      |                 | dB   |
|                                  | S <sub>VRS</sub>   | V <sub>SS</sub> , All analog output pins |                                                        |                    | 60    |      |                 | dB   |

Continued on next page

## ELECTRICAL CHARACTERISTICS (continued)

| Parameter                      | Symbol           | Pin Name                  | Condition                                                                        | Value                 |         |                     | Unit    |      |
|--------------------------------|------------------|---------------------------|----------------------------------------------------------------------------------|-----------------------|---------|---------------------|---------|------|
|                                |                  |                           |                                                                                  | Min                   | Typ     | Max                 |         |      |
| Pull up Current                | I <sub>PLU</sub> | RESET, TC<br>PD, CE       | V <sub>I</sub> = GND                                                             | -100                  | -50     | -25                 | μA      |      |
| Analog Input Resistance        | R <sub>AIN</sub> | All Analog<br>Output Pins |                                                                                  | 100                   | 150     | 300                 | kΩ      |      |
| Analog Output Voltage          | V <sub>AO</sub>  |                           | Offset Voltage                                                                   |                       | -25     | 0                   | 25      | mV   |
|                                |                  |                           | AC<br>Volt.                                                                      | +5 V ±10%             | 0       |                     | 5       | Vp-p |
|                                |                  |                           |                                                                                  | +5 V ±5%              | 0       |                     | 6       | Vp-p |
| Analog Output<br>Maximum Gain  | G <sub>MAX</sub> |                           | Analog<br>Input<br>5Vp-p                                                         | Gain code<br>"111111" | -0.5    | 0                   | +0.5    | dB   |
| Analog Output Step             | ΔG               |                           |                                                                                  |                       |         | 0.25                | 0.5     | 0.75 |
| Analog Output Gain             | G                |                           | Below<br>20 kHz                                                                  | 63>D(G)≥0             | (Typ)-1 | $\frac{D(G)-63}{2}$ | (Typ)+1 | dB   |
| Harmonic Noise                 | N <sub>HH</sub>  |                           | Input = 5Vp-p<br>1 kHz, G = 0dB                                                  |                       | 60      | 80                  |         | dB   |
| Output Noise                   | N <sub>IC1</sub> |                           | Input = GND,<br>G = 0dB<br>BW = 0.3 kHz – 20 kHz                                 |                       |         |                     | -65     | dBm  |
|                                | N <sub>IC2</sub> |                           | Input = GND,<br>G = 0dB<br>BW = 0.3 kHz – 3.4 kHz                                |                       |         |                     | -70     | dBm  |
| Cross Talk between<br>Channels | N <sub>CT</sub>  |                           | 1 channel<br>AIN = 5Vp-p<br>Remains channels<br>AIN = GND<br>G = 0dB (N = 0 – 3) |                       | 70      | 80                  |         | dB   |

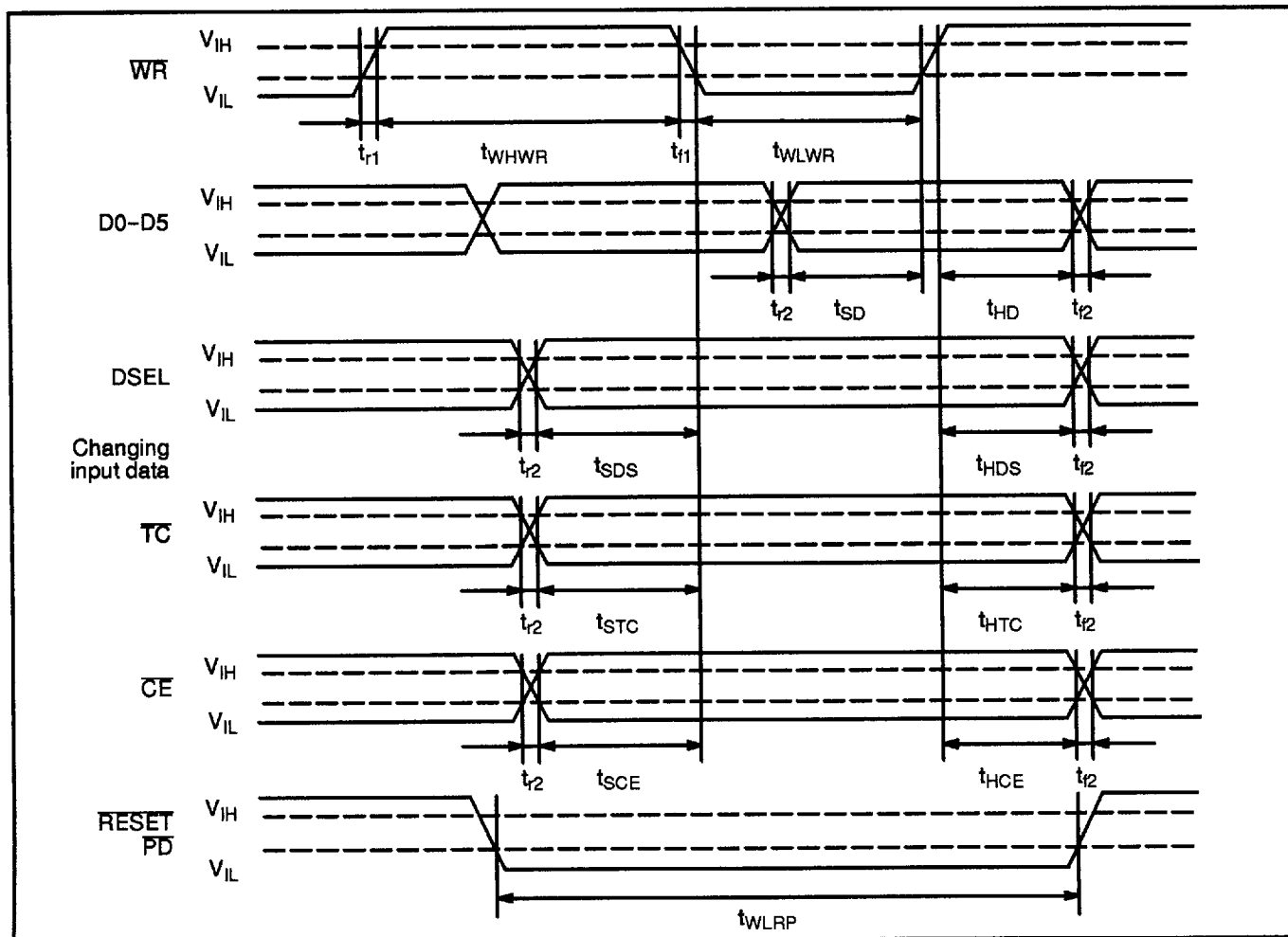
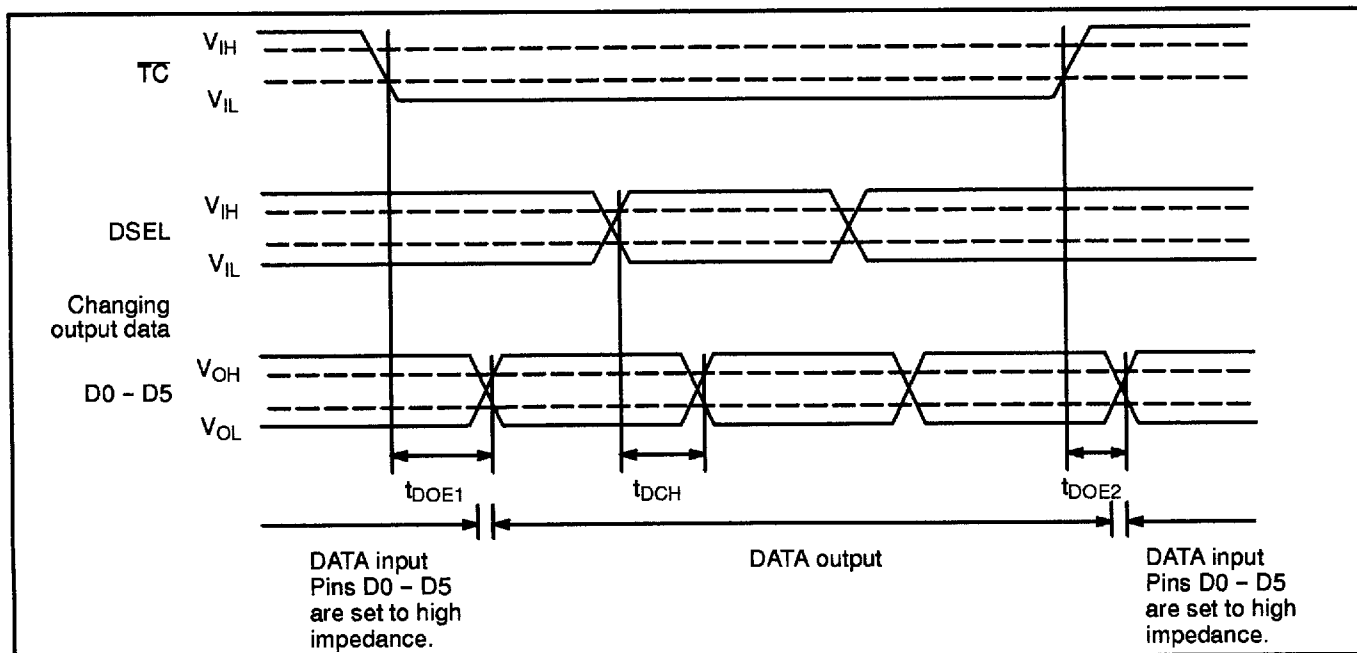
## AC CHARACTERISTICS

(V<sub>DD</sub> = +5 V +5%, V<sub>SS</sub> = -5 V +5%, T<sub>A</sub> = -20 to +70°C, dBm referenced to 600 Ω)

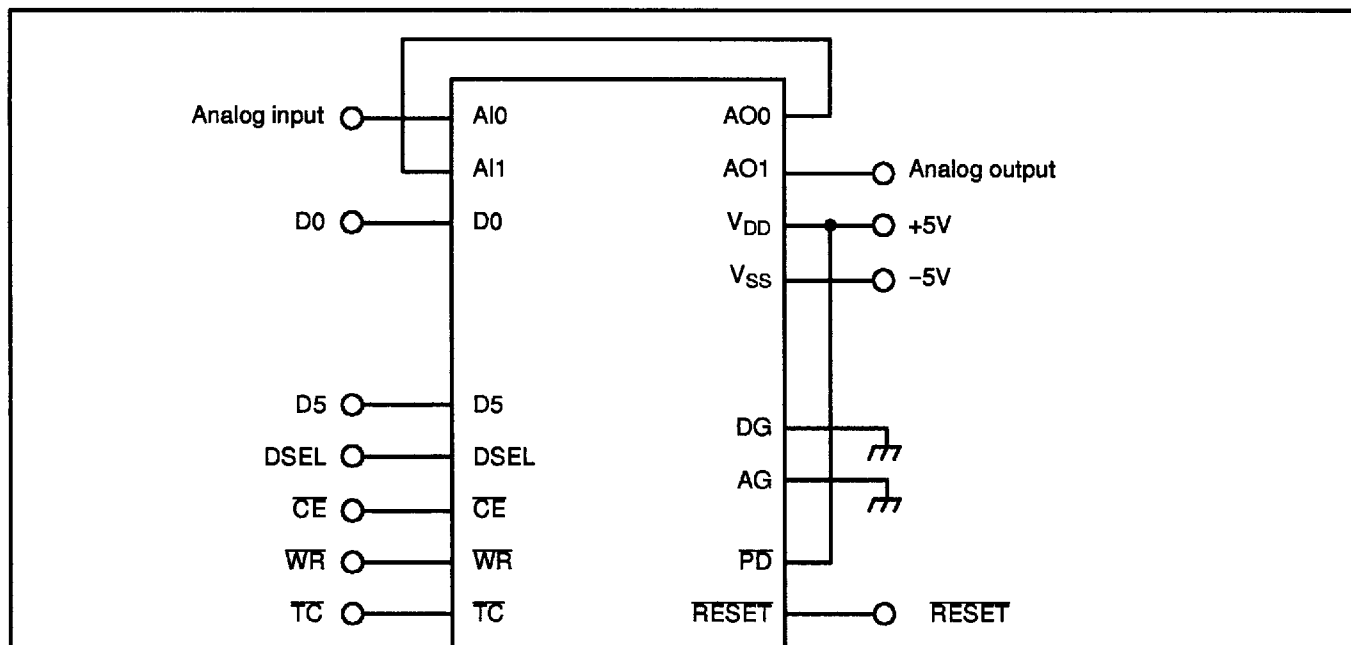
| Parameter                           | Symbol            | Pin Name                 | Value |     |     | Unit |
|-------------------------------------|-------------------|--------------------------|-------|-----|-----|------|
|                                     |                   |                          | Min   | Typ | Max |      |
| WR High Width                       | t <sub>WHWR</sub> | WR                       | 500   |     |     | ns   |
| WR Low Width                        | t <sub>WLWR</sub> | WR                       | 500   |     |     | ns   |
| DATA Set up Time                    | t <sub>SD</sub>   | D0 - D5, WR              | 200   |     |     | ns   |
| DSEL Set up Time                    | t <sub>SDS</sub>  | DSEL, WR                 | 200   |     |     | ns   |
| TC Set up Time                      | t <sub>STC</sub>  | TC, WR                   | 200   |     |     | ns   |
| CE Set up Time                      | t <sub>SCE</sub>  | CE, WR                   | 200   |     |     | ns   |
| DATA Hold Time                      | t <sub>HD</sub>   | D0 - D5, WR              | 200   |     |     | ns   |
| DSEL Hold Time                      | t <sub>HDS</sub>  | DSEL, WR                 | 200   |     |     | ns   |
| TC Hold Time                        | t <sub>HTC</sub>  | TC, WR                   | 200   |     |     | ns   |
| CE Hold Time                        | t <sub>HCE</sub>  | CE, WR                   | 200   |     |     | ns   |
| Rise Time 1                         | t <sub>r1</sub>   | WR                       | 0     |     | 20  | ns   |
| Fall Time 1                         | t <sub>f1</sub>   | WR                       | 0     |     | 20  | ns   |
| Rise Time 2                         | t <sub>r2</sub>   | D0 - D5,<br>CE, TC, DSEL | 0     |     | 20  | ns   |
| Fall Time 2                         | t <sub>f2</sub>   | D0 - D5,<br>CE, TC, DSEL | 0     |     | 20  | ns   |
| Digital Input Low Width             | t <sub>WLRP</sub> | RESET, PD                | 1     |     |     | μs   |
| DATA Output Enable Switching Time 1 | t <sub>DOE1</sub> | TC,<br>D0 - D5           |       |     | 500 | ns   |
| DATA Output Enable Switching Time 2 | t <sub>DOE2</sub> | TC,<br>D0 - D5           |       |     | 500 | ns   |
| DATA Output Switching Time          | t <sub>DCH</sub>  | DSEL<br>D0 - D5          |       |     | 500 | ns   |

**Note:** Please refer to the timing diagram for test conditions.

Figure 3. Timing Diagram

Figure 4. Timing Diagram ( $\overline{CE} = L$ )

Gain variable range is expanded (0 db to -64 dB by 0.5 dB steps) if two channels are connected in series.



Setting Data

| Setting Gain (dB) | Data Set (channel 0) |     |     |     |     |     |    |    |     |     | Data Set (channel 1) |     |     |     |     |    |    |     |  |  |
|-------------------|----------------------|-----|-----|-----|-----|-----|----|----|-----|-----|----------------------|-----|-----|-----|-----|----|----|-----|--|--|
|                   | GD5                  | GD4 | GD3 | GD2 | GD1 | GD0 | EN | C0 | C32 | GD5 | GD4                  | GD3 | GD2 | GD1 | GD0 | EN | C0 | C32 |  |  |
| 0                 | X                    | X   | X   | X   | X   | X   | 1  | 1  | 0   | 1   | 1                    | 1   | 1   | 1   | 1   | 1  | 0  | 0   |  |  |
| -0.5              | X                    | X   | X   | X   | X   | X   | 1  | 1  | 0   | 1   | 1                    | 1   | 1   | 1   | 0   | 1  | 0  | 0   |  |  |
| -1.0              | X                    | X   | X   | X   | X   | X   | 1  | 1  | 0   | 1   | 1                    | 1   | 1   | 0   | 1   | 1  | 0  | 0   |  |  |
| ⋮                 | ⋮                    |     |     |     |     |     |    |    |     |     | ⋮                    |     |     |     |     |    |    |     |  |  |
| -31.0             | X                    | X   | X   | X   | X   | X   | 1  | 1  | 0   | 0   | 0                    | 0   | 0   | 0   | 1   | 1  | 0  | 0   |  |  |
| -31.5             | X                    | X   | X   | X   | X   | X   | 1  | 1  | 0   | 0   | 0                    | 0   | 0   | 0   | 0   | 1  | 0  | 0   |  |  |
| -32.0             | 1                    | 1   | 1   | 1   | 1   | 1   | 1  | 0  | 0   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |
| -32.5             | 1                    | 1   | 1   | 1   | 1   | 0   | 1  | 0  | 0   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |
| -33.0             | 1                    | 1   | 1   | 1   | 0   | 1   | 1  | 0  | 0   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |
| ⋮                 | ⋮                    |     |     |     |     |     |    |    |     |     | ⋮                    |     |     |     |     |    |    |     |  |  |
| -63.0             | 0                    | 0   | 0   | 0   | 0   | 1   | 1  | 0  | 0   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |
| -63.5             | 0                    | 0   | 0   | 0   | 0   | 0   | 1  | 0  | 0   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |
| -64.0             | X                    | X   | X   | X   | X   | X   | 1  | 0  | 1   | X   | X                    | X   | X   | X   | X   | 1  | 0  | 1   |  |  |

Figure 5. Application Example

Note: X = don't care.

## PACKAGE DIMENSIONS

