



**QUAD/DUAL N-CHANNEL ENHANCEMENT MODE EPAD®  
MATCHED PAIR MOSFET ARRAY**

**V<sub>GS(th)</sub> = +0.8V**

**GENERAL DESCRIPTION**

ALD110808A/ALD110808/ALD110908A/ALD110908 are monolithic quad/dual N-Channel MOSFETs matched at the factory using ALD's proven EPAD® CMOS technology. These devices are intended for low voltage, small signal applications.

These MOSFET devices are built on the same monolithic chip, so they exhibit excellent temperature tracking characteristics. They are versatile as circuit elements and are useful design component for a broad range of analog applications. They are basic building blocks for current sources, differential amplifier input stages, transmission gates, and multiplexer applications. For most applications, connect V- and N/C pins to the most negative voltage potential in the system and V+ pin to the most positive voltage potential (or left open unused). All other pins must have voltages within these voltage limits.

ALD110808/ALD110908 devices are built for minimum offset voltage and differential thermal response, and they are suited for switching and amplifying applications in +1.0V to +10V (+/- 5 V) systems where low input bias current, low input capacitance and fast switching speed are desired. As these are MOSFET devices, they feature very large (almost infinite) current gain in a low frequency, or near DC, operating environment.

These devices are suitable for use in precision applications which require very high current gain, beta, such as current mirrors and current sources. The high input impedance and the high DC current gain of the Field Effect Transistors result from extremely low current loss through the control gate. The DC current gain is limited by the gate input leakage current, which is specified at 30pA at room temperature. For example, DC beta of the device at a drain current of 3mA and input leakage current of 30pA at 25°C is  $\beta = 3\text{mA}/30\text{pA} = 100,000,000$ .

**FEATURES**

- Enhancement-mode (normally off)
- Standard Gate Threshold Voltages: +0.8V
- Matched MOSFET to MOSFET characteristics
- Tight lot to lot parametric control
- Low input capacitance
- V<sub>GS(th)</sub> match to 2mV and 10mV
- High input impedance — 10<sup>12</sup>Ω typical
- Positive, zero, and negative V<sub>GS(th)</sub> temperature coefficient
- DC current gain >10<sup>9</sup>
- Low input and output leakage currents

**ORDERING INFORMATION**

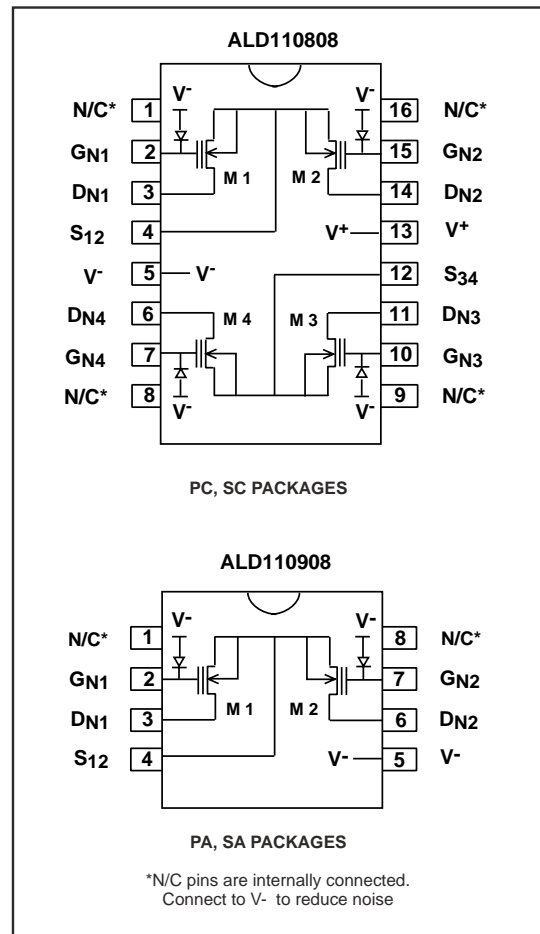
| Operating Temperature Range*     |                           | Operating Temperature Range*    |                         |
|----------------------------------|---------------------------|---------------------------------|-------------------------|
| 0°C to +70°C                     |                           | 0°C to +70°C                    |                         |
| 16-Pin<br>Plastic Dip<br>Package | 16-Pin<br>SOIC<br>Package | 8-Pin<br>Plastic Dip<br>Package | 8Pin<br>SOIC<br>Package |
| ALD110808APC                     | ALD110808ASC              | ALD110908APA                    | ALD110908ASA            |
| ALD110808 PC                     | ALD110808SC               | ALD110908PA                     | ALD110908SA             |

\* Contact factory for industrial or military temp. ranges or user-specified threshold voltage values.

**APPLICATIONS**

- Precision current mirrors
- Precision current sources
- Voltage choppers
- Differential amplifier input stage
- Voltage comparator
- Voltage bias circuits
- Sample and Hold
- Analog inverter
- Level shifters
- Source followers and buffers
- Current multipliers
- Analog switches / multiplexers

**PIN CONFIGURATION**



## ABSOLUTE MAXIMUM RATINGS

|  |                 |
|--|-----------------|
| Drain-Source voltage, $V_{DS}$                     | 10.6V           |
| Gate-Source voltage, $V_{GS}$                      | 10.6V           |
| Power dissipation                                  | 500 mW          |
| Operating temperature range PA, SA, PC, SC package | 0°C to +70°C    |
| Storage temperature range                          | -65°C to +150°C |
| Lead temperature, 10 seconds                       | +260°C          |

## OPERATING ELECTRICAL CHARACTERISTICS

**V+ = +5V (or open) V- = GND TA = 25°C unless otherwise specified**

**CAUTION:** ESD Sensitive Device. Use static control procedures in ESD controlled environment.

| Parameter                                 | Symbol              | ALD110808A / ALD110908A |             |                     | ALD110808 / ALD110908 |             |                     | Unit               | Test Condition   |
|---|---------------------|-------------------------|-------------|---------------------|-----------------------|-------------|---------------------|--------------------|--|
|   |                     | Min                     | Typ         | Max                 | Min                   | Typ         | Max                 |                    |  |
| Gate Threshold Voltage                    | $V_{GS(th)}$        | 0.78                    | 0.80        | 0.82                | 0.78                  | 0.80        | 0.82                | V                  | $I_{DS} = 1\mu A$<br>$V_{DS} = 0.1V$                                 |
| Offset Voltage<br>$V_{GS1} - V_{GS2}$     | $V_{OS}$            |                         | 1           | 2                   |                       | 3           | 10                  | mV                 | $I_{DS} = 1\mu A$  |
| $V_{GS1} - V_{GS2}$ Tempco                | $\Delta V_{OS}$     |                         | 5           |                     |                       | 5           |                     | $\mu V / ^\circ C$ | $V_{DS1} = V_{DS2}$  |
| GateThreshold Tempco                      | $\Delta V_{GS(th)}$ |                         |             | -1.7<br>0.0<br>+1.6 |                       |             | -1.7<br>0.0<br>+1.6 | mV/ °C             | $I_D = 1\mu A$<br>$I_D = 20\mu A$ $V_{DS} = 0.1V$<br>$I_D = 40\mu A$ |
| On Drain Current                          | $I_{DS(ON)}$        |                         | 12.0<br>3.0 |                     |                       | 12.0<br>3.0 |                     | mA                 | $V_{GS} = +10.3V$<br>$V_{GS} = +4.8V$<br>$V_{DS} = +5V$              |
| Forward Transconductance                  | $G_{FS}$            |                         | 1.4         |                     |                       | 1.4         |                     | mmho               | $V_{GS} = +4.8V$<br>$V_{DS} = +9.8V$                                 |
| Transconductance Mismatch                 | $\Delta G_{FS}$     |                         | 1.8         |                     |                       | 1.8         |                     | %                  |  |
| Output Conductance                        | $G_{OS}$            |                         | 68          |                     |                       | 68          |                     | $\mu mho$          | $V_{GS} = +4.8V$<br>$V_{DS} = +9.8V$                                 |
| Drain Source On Resistance                | $R_{DS(ON)}$        |                         | 500         |                     |                       | 500         |                     | $\Omega$           | $V_{DS} = 0.1V$<br>$V_{GS} = +4.8V$                                  |
| Drain Source On Resistance Mismatch       | $\Delta R_{DS(ON)}$ |                         | 0.5         |                     |                       | 0.5         |                     | %                  |  |
| Drain Source Breakdown Voltage            | $BV_{DSX}$          | 10                      |             |                     | 10                    |             |                     | V                  | $I_{DS} = 1.0\mu A$<br>$V_{GS} = -0.2V$                              |
| Drain Source Leakage Current <sup>1</sup> | $I_{DS(OFF)}$       |                         | 10          | 100<br>4            |                       | 10          | 100<br>4            | pA<br>nA           | $V_{GS} = -0.2V$<br>$V_{DS} = 10V, T_A = 125^\circ C$                |
| Gate Leakage Current <sup>1</sup>         | $I_{GSS}$           |                         | 3           | 30<br>1             |                       | 3           | 30<br>1             | pA<br>nA           | $V_{DS} = 0V$ $V_{GS} = 10V$<br>$T_A = 125^\circ C$                  |
| Input Capacitance                         | $C_{ISS}$           |                         | 2.5         |                     |                       | 2.5         |                     | pF                 |  |
| Transfer Reverse Capacitance              | $C_{RSS}$           |                         | 0.1         |                     |                       | 0.1         |                     | pF                 |  |
| Turn-on Delay Time                        | $t_{on}$            |                         | 10          |                     |                       | 10          |                     | ns                 | $V^+ = 5V$ $R_L = 5K\Omega$  |
| Turn-off Delay Time                       | $t_{off}$           |                         | 10          |                     |                       | 10          |                     | ns                 | $V^+ = 5V$ $R_L = 5K\Omega$  |
| Crosstalk                                 |                     |                         | 60          |                     |                       | 60          |                     | dB                 | $f = 100KHz$   |

Notes: <sup>1</sup> Consists of junction leakage currents