



QUAD/DUAL P-CANNEL MATCHED MOSFET ARRAY

GENERAL DESCRIPTION

The ALD1107/ALD1117 are monolithic quad/dual P-channel enhancement mode matched MOSFET transistor arrays intended for a broad range of precision analog applications. The ALD1107/ALD1117 offer high input impedance and negative current temperature coefficient. The transistor pairs are matched for minimum offset voltage and differential thermal response, and they are designed for precision analog switching and amplifying applications in +2V to +12V systems where low input bias current, low input capacitance and fast switching speed are desired. These MOSFET devices feature very large (almost infinite) current gain in a low frequency, or near DC operating environment. The ALD1107/ALD1117 are building blocks for differential amplifier input stages, transmission gates, multiplexer applications, current sources, current mirrors and other precision analog circuits.

FEATURES

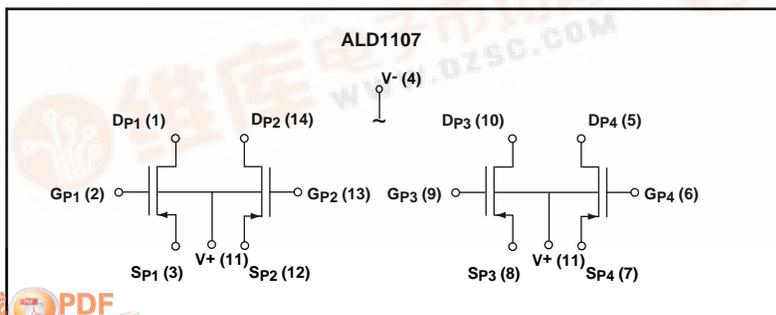
- Low threshold voltage of -0.7
- Low input capacitance
- Low Vos 2mV typical
- High input impedance -- 10¹⁴Ω typical
- Low input and output leakage currents
- Negative current (IDS) temperature coefficient
- Enhancement-mode (normally off)
- DC current gain 10⁹
- Low input and output leakage currents

ORDERING INFORMATION

| Operating Temperature Range* | | |
|------------------------------|----------------------------|---------------------|
| -55°C to +125°C | 0°C to +70°C | 0°C to +70°C |
| 8-Pin CERDIP Package | 8-Pin Plastic Dip Package | 8-Pin SOIC Package |
| ALD1117 DA | ALD1117PA | ALD1117 SA |
| 14-Pin CERDIP Package | 14-Pin Plastic Dip Package | 14-Pin SOIC Package |
| ALD1107 DB | ALD1107 PB | ALD1107 SB |

* Contact factory for industrial temperature range.

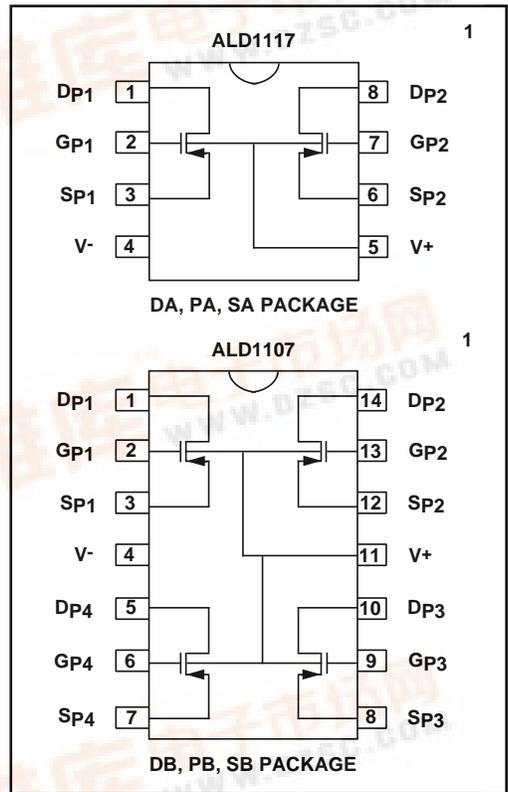
BLOCK DIAGRAM



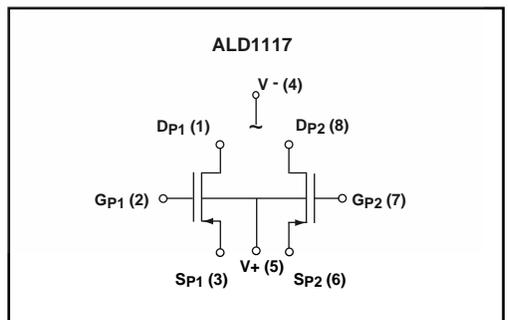
APPLICATIONS

- Precision current sources
- Precision current mirrors
- Voltage Choppers
- Differential amplifier input stage
- Voltage comparator
- Data converters
- Sample and Hold
- Precision analog signal processing

PIN CONFIGURATION



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Drain-source voltage, V_{DS} _____ -13.2V
 Gate-source voltage, V_{GS} _____ -13.2V
 Power dissipation _____ 500 mW
 Operating temperature range PA, SA, PB, SB package _____ 0°C to +70°C
 DA, DB package _____ -55°C to +125°C
 Storage temperature range _____ -65°C to +150°C
 Lead temperature, 10 seconds _____ +260°C

OPERATING ELECTRICAL CHARACTERISTICS

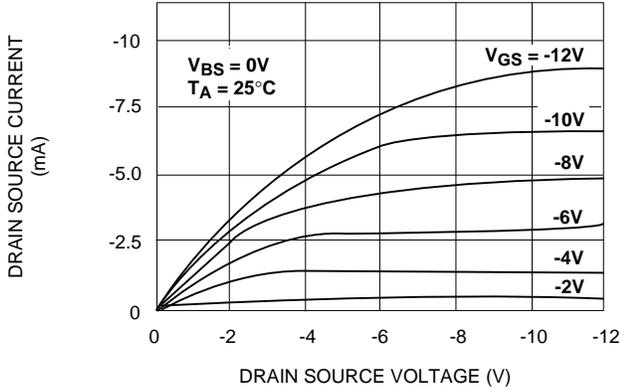
$T_A = 25^\circ\text{C}$ unless otherwise specified

| Parameter | Symbol | ALD1107 | | | ALD1117 | | | Unit | Test Conditions |
|---|---------------------|---------|------|----------|---------|------|----------|-----------------|--|
| | | Min | Typ | Max | Min | Typ | Max | | |
| Gate Threshold Voltage | V_T | -0.4 | -0.7 | -1.0 | -0.4 | -0.7 | -1.0 | V | $I_{DS} = -1.0\mu\text{A}$ $V_{GS} = V_{DS}$ |
| Offset Voltage $V_{GS1}-V_{GS2}$ | V_{OS} | | 2 | 10 | | 2 | 10 | mV | $I_{DS} = -10\mu\text{A}$ $V_{GS} = V_{DS}$ |
| Gate Threshold Temperature Drift ² | TC_{VT} | | -1.3 | | | -1.3 | | mV/°C | |
| On Drain Current | $I_{DS(ON)}$ | -1.3 | -2 | | -1.3 | -2 | | mA | $V_{GS} = V_{DS} = -5\text{V}$ |
| Transconductance | G_{IS} | 0.25 | 0.67 | | 0.25 | 0.67 | | mmho | $V_{DS} = -5\text{V}$ $I_{DS} = -10\text{mA}$ |
| Mismatch | ΔG_{IS} | | 0.5 | | | 0.5 | | % | |
| Output Conductance | G_{OS} | | 40 | | | 40 | | μmho | $V_{DS} = -5\text{V}$ $I_{DS} = -10\text{mA}$ |
| Drain Source On Resistance | $R_{DS(ON)}$ | | 1200 | 1800 | | 1200 | 1800 | Ω | $V_{DS} = -0.1\text{V}$ $V_{GS} = -5\text{V}$ |
| Drain Source On Resistance Mismatch | $\Delta R_{DS(ON)}$ | | 0.5 | | | 0.5 | | % | $V_{DS} = -0.1\text{V}$ $V_{GS} = -5\text{V}$ |
| Drain Source Breakdown Voltage | BV_{DSS} | -12 | | | -12 | | | V | $I_{DS} = -1.0\mu\text{A}$ $V_{GS} = 0\text{V}$ |
| Off Drain Current ¹ | $I_{DS(OFF)}$ | | 10 | 400 4 | | 10 | 400 4 | pA nA | $V_{DS} = -12\text{V}$ $V_{GS} = 0\text{V}$ $T_A = 125^\circ\text{C}$ |
| Gate Leakage Current | I_{GSS} | | 0.1 | 10 1 | | 0.1 | 10 1 | pA nA | $V_{DS} = 0\text{V}$ $V_{GS} = -12\text{V}$ $T_A = 125^\circ\text{C}$ |
| Input Capacitance ² | C_{ISS} | | 1 | 3 | | 1 | 3 | pF | |

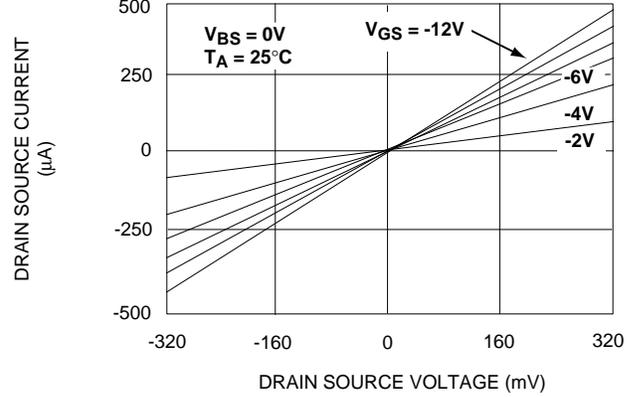
Notes: ¹ Consists of junction leakage currents
² Sample tested parameters

TYPICAL PERFORMANCE CHARACTERISTICS

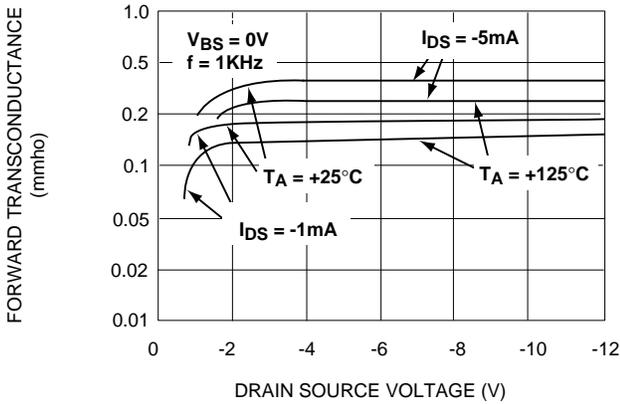
OUTPUT CHARACTERISTICS



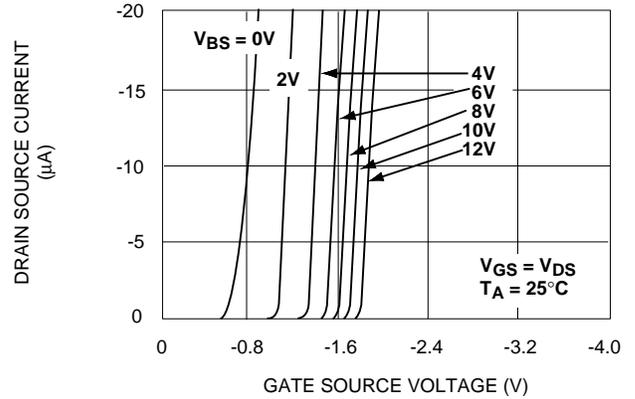
LOW VOLTAGE OUTPUT CHARACTERISTICS



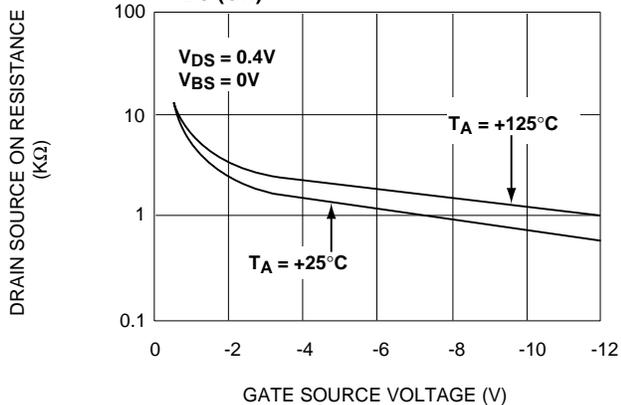
FORWARD TRANSCONDUCTANCE vs. DRAIN SOURCE VOLTAGE



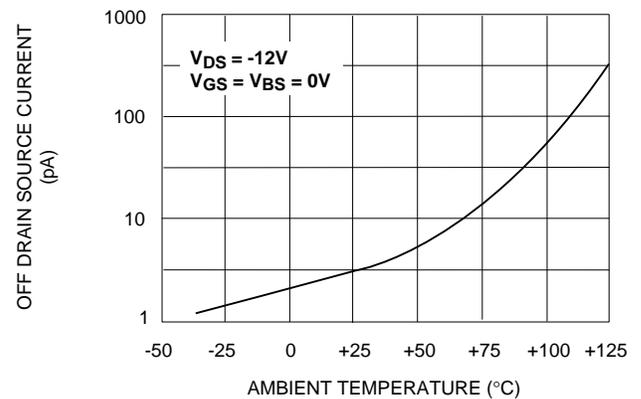
TRANSFER CHARACTERISTIC WITH SUBSTRATE BIAS



DRAIN SOURCE ON RESISTANCE $R_{DS(ON)}$ vs. GATE SOURCE VOLTAGE

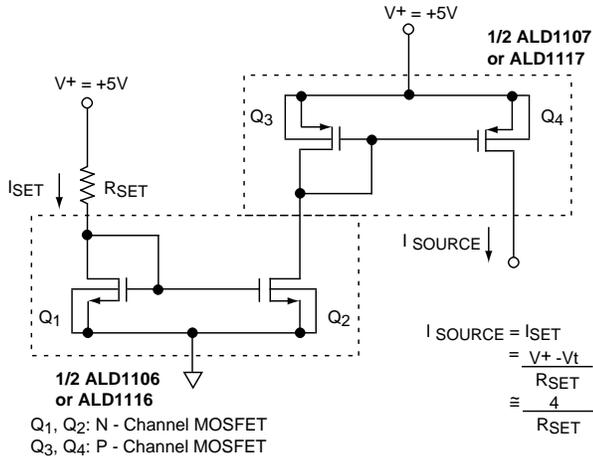


OFF DRAIN CURRENT vs. AMBIENT TEMPERATURE

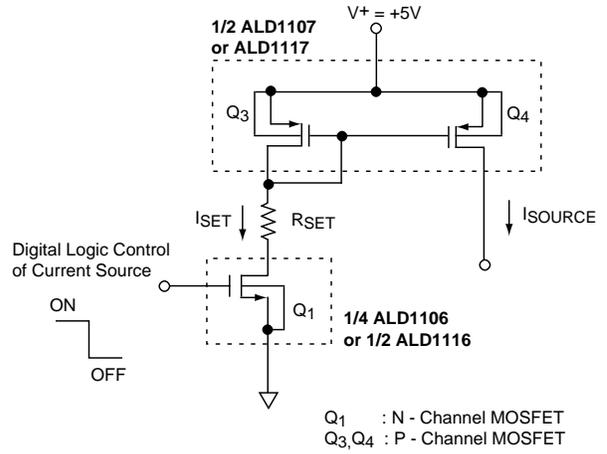


TYPICAL APPLICATIONS

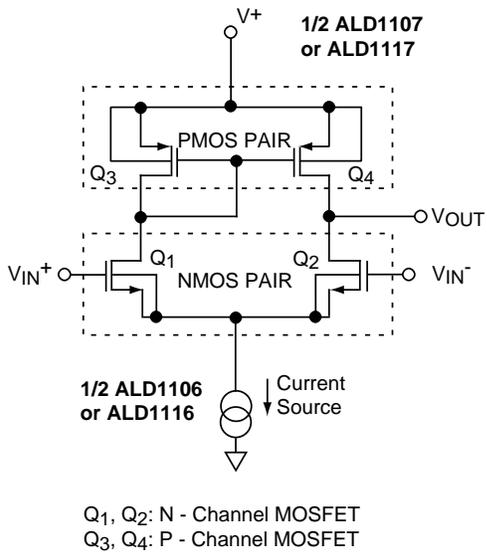
CURRENT SOURCE MIRROR



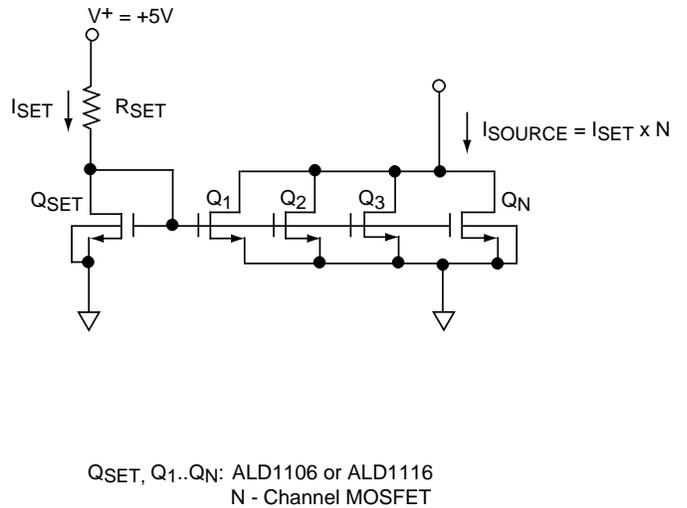
CURRENT SOURCE WITH GATE CONTROL



DIFFERENTIAL AMPLIFIER



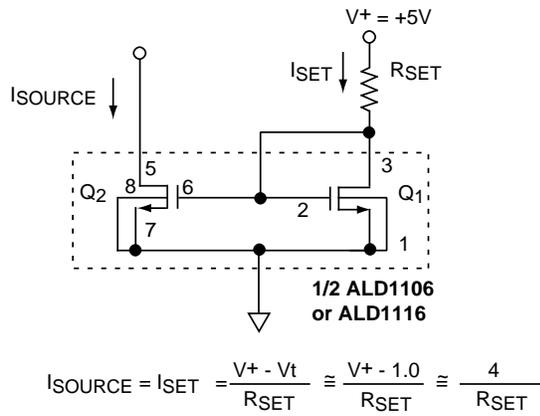
CURRENT SOURCE MULTIPLICATION



TYPICAL APPLICATIONS

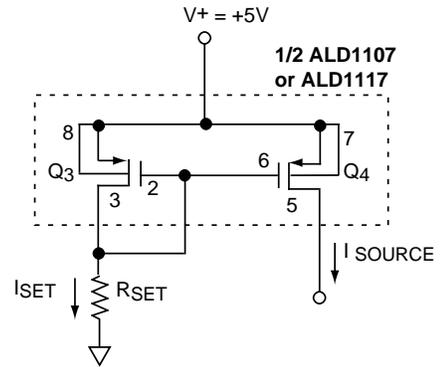
BASIC CURRENT SOURCES

N- CHANNEL CURRENT SOURCE



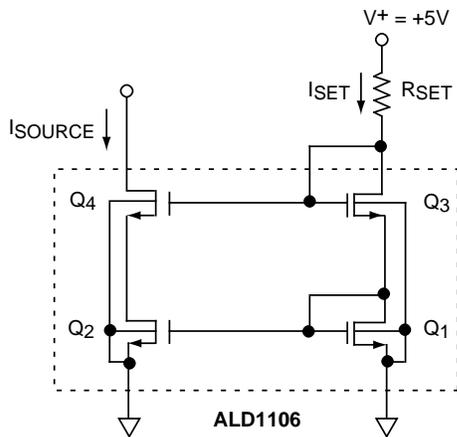
Q1, Q2 : N - Channel MOSFET

P- CHANNEL CURRENT SOURCE

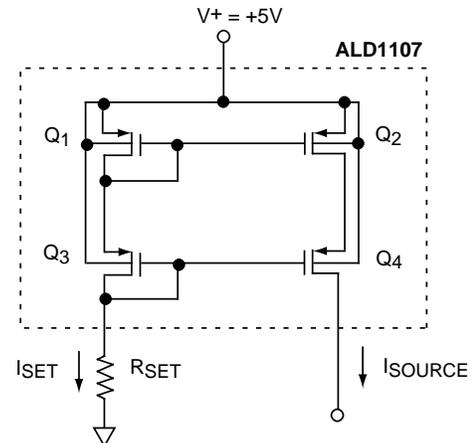


Q3, Q4: P - Channel MOSFET

CASCODE CURRENT SOURCES



Q1, Q2, Q3, Q4: N - Channel MOSFET
(ALD1101 or ALD1103)



$$I_{SOURCE} = I_{SET} = \frac{V^+ - 2V_t}{R_{SET}} \approx \frac{3}{R_{SET}}$$

Q1, Q2, Q3, Q4: P - Channel MOSFET
(ALD1102 or ALD1103)

