



## QUAD/DUAL P-CANNEL MATCHED PAIR 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

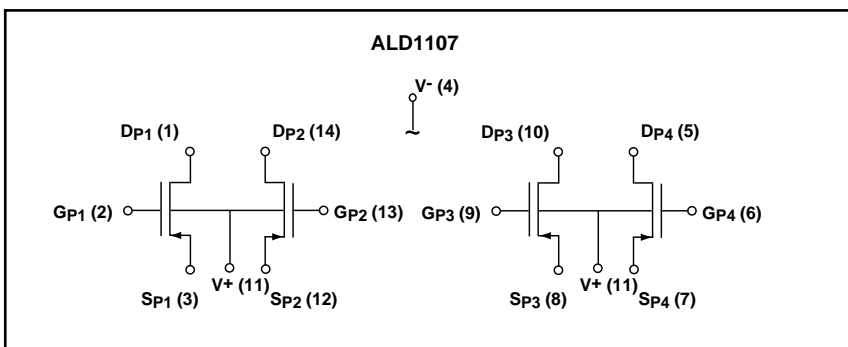
- Low threshold voltage of -0.7
- Low input capacitance
- Low Vos 2mV typical
- High input impedance --  $10^{14}\Omega$  typical
- Low input and output leakage currents
- Negative current ( $I_{DS}$ ) temperature coefficient
- Enhancement-mode (normally off)
- DC current gain  $10^9$
- Low input and 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.

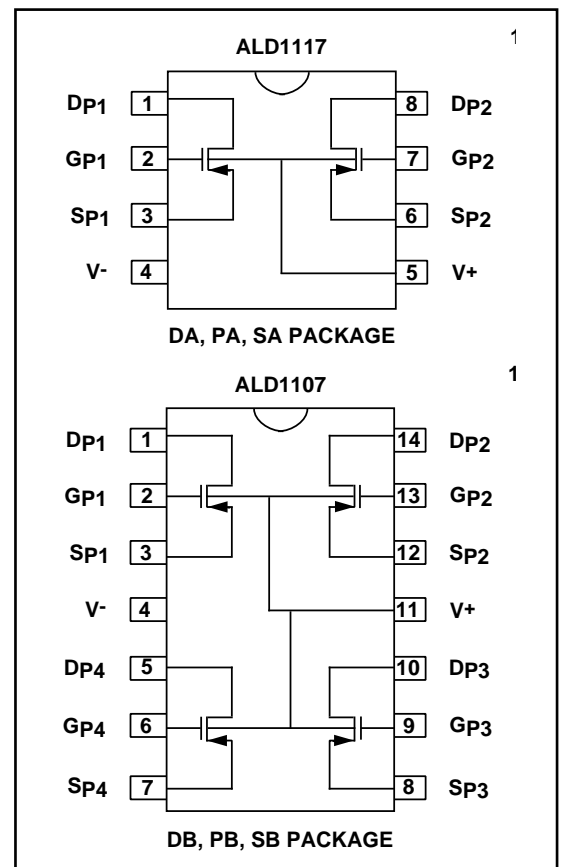
### BLOCK DIAGRAM



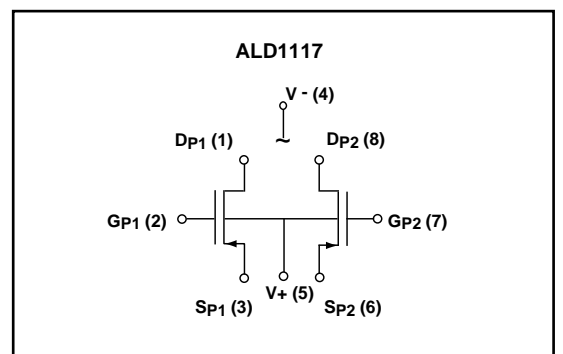
### APPLICATIONS

- 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

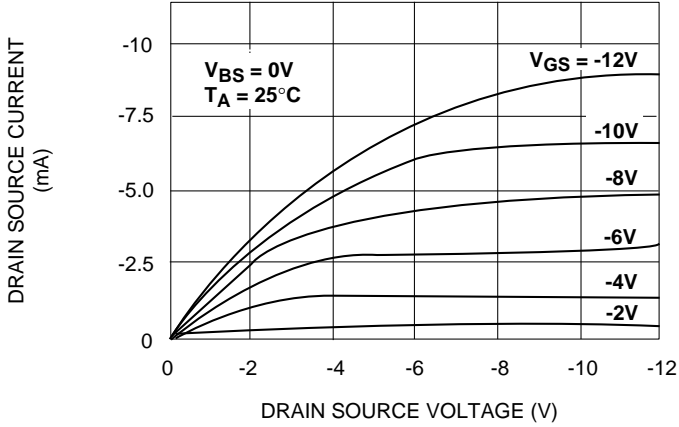
Parameter	Symbol	ALD1107			ALD1117			Unit	Test Conditions
		Min	Typ	Max	Min	Typ	Max		
Gate Threshold Voltage	$V_T$	-0.4	-0.7	-1.0	-0.4	-0.7	-1.0	V	$I_{DS} = -1.0\mu\text{A}$ $V_{GS} = V_{DS}$
Offset Voltage $V_{GS1} - V_{GS2}$	$V_{OS}$		2	10		2	10	mV	$I_{DS} = -10\mu\text{A}$ $V_{GS} = V_{DS}$
Gate Threshold Temperature Drift <sup>2</sup>	$TC_{VT}$		-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	$\Delta G_{fs}$		0.5			0.5		%	
Output Conductance	$G_{OS}$		40			40		$\mu\text{mho}$	$V_{DS} = -5\text{V}$ $I_{DS} = -10\text{mA}$
Drain Source On Resistance	$R_{DS(ON)}$		1200	1800		1200	1800	$\Omega$	$V_{DS} = -0.1\text{V}$ $V_{GS} = -5\text{V}$
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 <sup>1</sup>	$I_{DS(OFF)}$		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 <sup>2</sup>	$C_{ISS}$		1	3		1	3	pF	

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

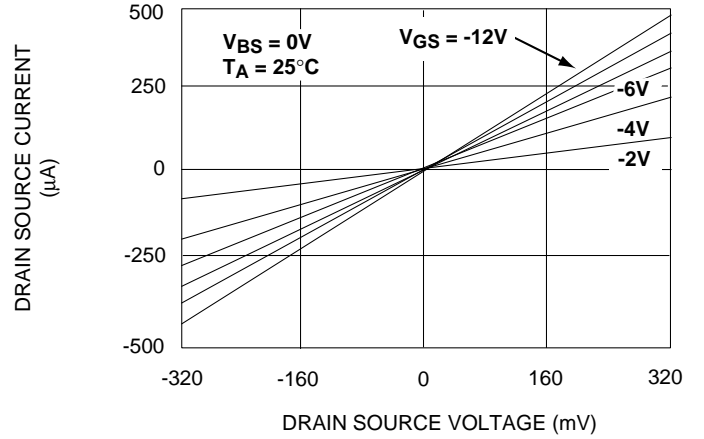
<sup>2</sup> Sample tested parameters

# TYPICAL PERFORMANCE CHARACTERISTICS

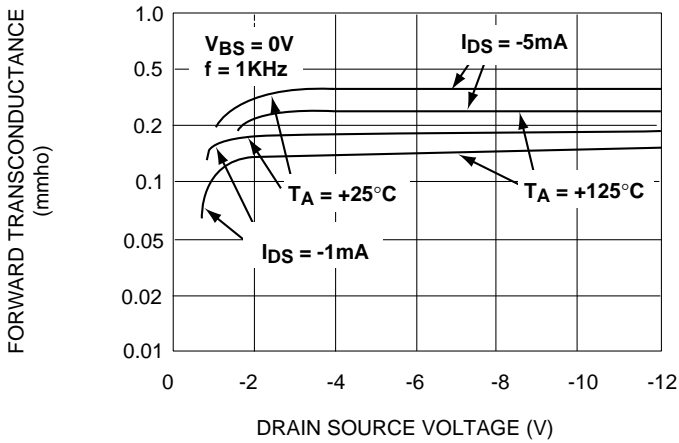
## OUTPUT CHARACTERISTICS



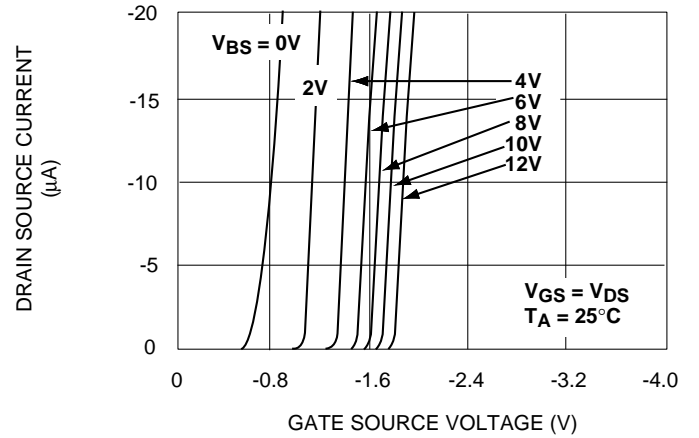
## LOW VOLTAGE OUTPUT CHARACTERISTICS



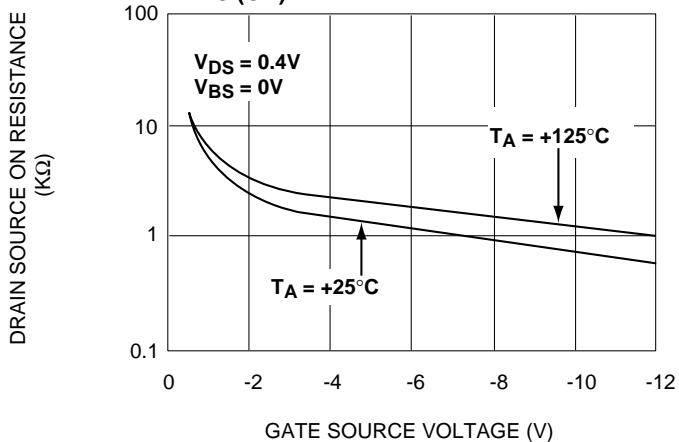
## FORWARD TRANSCONDUCTANCE vs. DRAIN SOURCE VOLTAGE



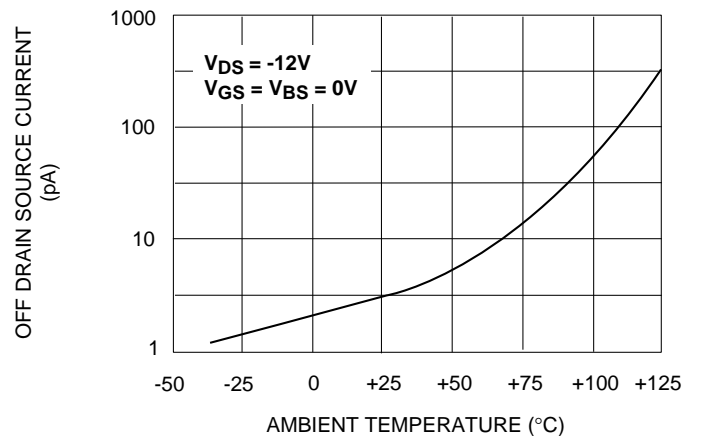
## TRANSFER CHARACTERISTIC WITH SUBSTRATE BIAS



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

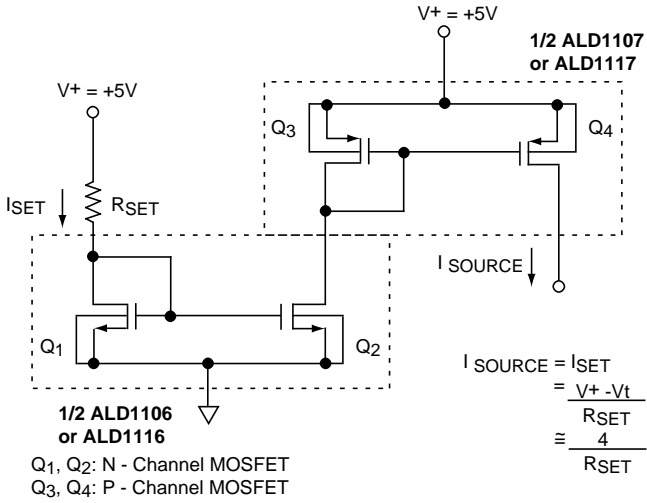


## OFF DRAIN CURRENT vs. AMBIENT TEMPERATURE

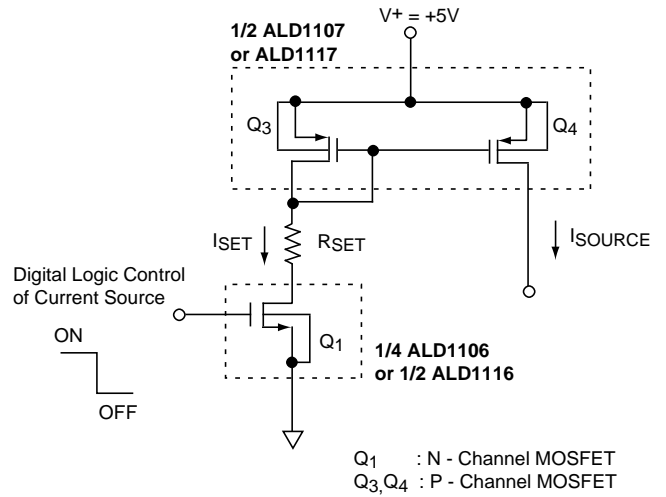


# TYPICAL APPLICATIONS

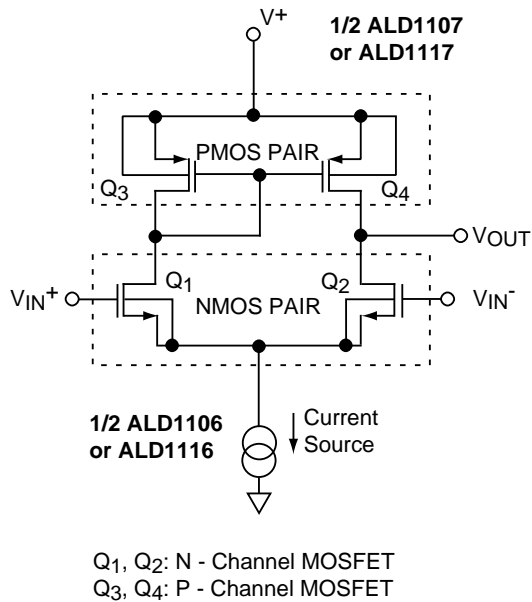
## CURRENT SOURCE MIRROR



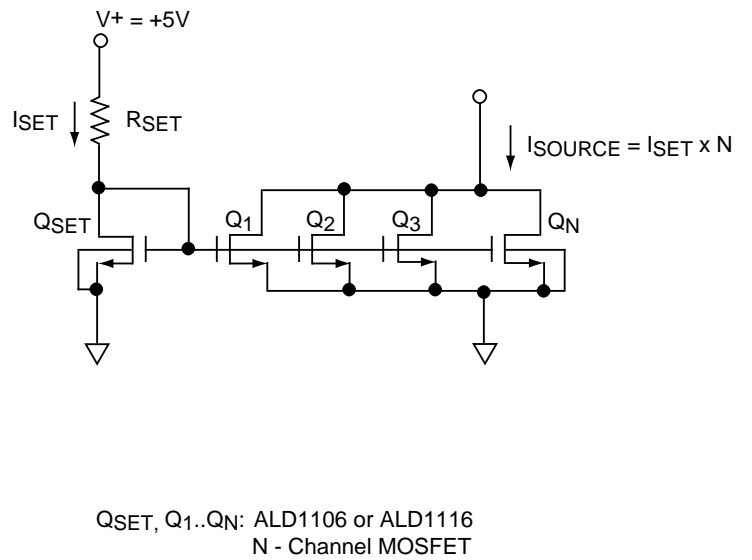
## CURRENT SOURCE WITH GATE CONTROL



## DIFFERENTIAL AMPLIFIER



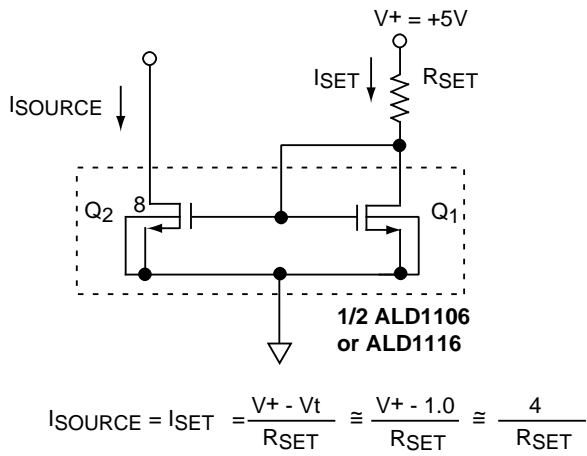
## CURRENT SOURCE MULTIPLICATION



# TYPICAL APPLICATIONS

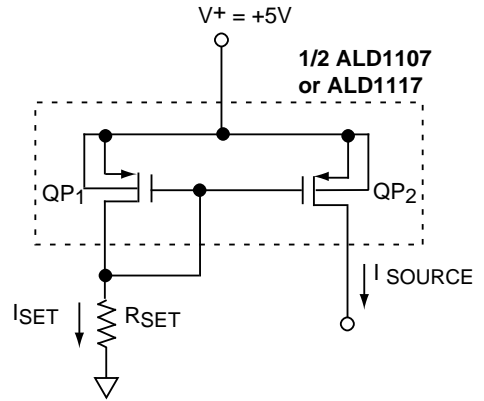
## BASIC CURRENT SOURCES

### N- CHANNEL CURRENT SOURCE



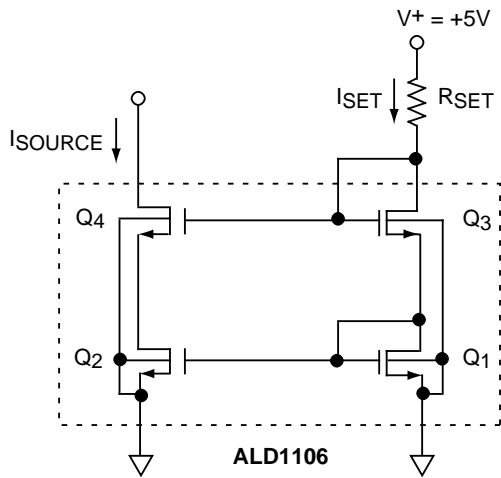
Q<sub>1</sub>, Q<sub>2</sub> : N - Channel MOSFET

### P- CHANNEL CURRENT SOURCE

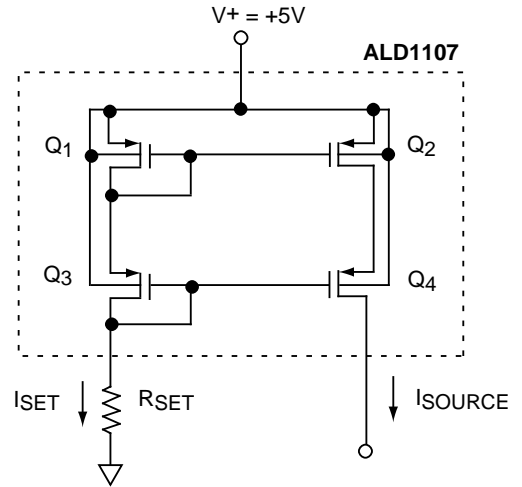


QP<sub>1</sub>, QP<sub>2</sub>: P - Channel MOSFET

## CASCODE CURRENT SOURCES



Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>3</sub>, Q<sub>4</sub>: N - Channel MOSFET



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

Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>3</sub>, Q<sub>4</sub>: P - Channel MOSFET

