



QUAD/DUAL N-CHANNEL MATCHED PAIR MOSFET ARRAY

GENERAL DESCRIPTION

The ALD1106/ALD1116 are monolithic quad/dual N-channel enhancement mode matched MOSFET transistor arrays intended for a broad range of precision analog applications. The ALD1106/ALD1116 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 +10V 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 ALD1106/ALD1116 are building blocks for differential amplifier input stages, transmission gates, multiplexer applications, current sources and many precision analog circuits.

FEATURES

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

ORDERING INFORMATION ("L" suffix denotes lead-free (RoHS))

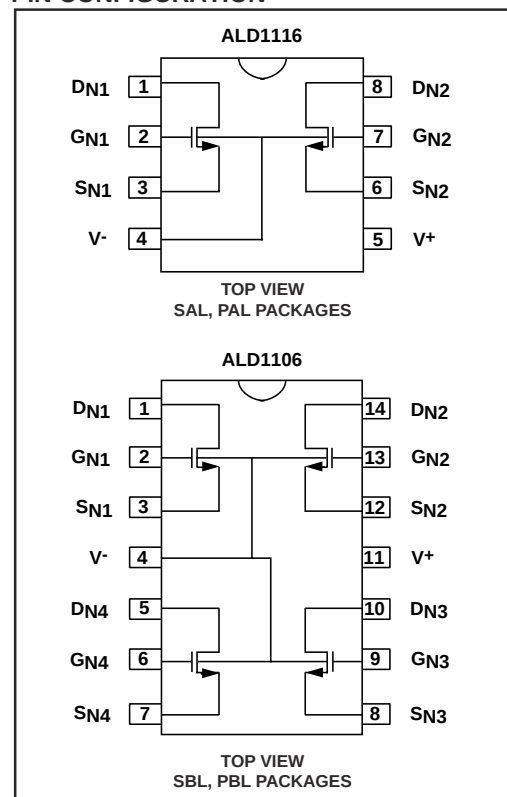
Operating Temperature Range*	
0°C to +70°C	0°C to +70°C
8-Pin SOIC Package	8-Pin Plastic Dip Package
ALD1116SAL	ALD1116PAL
14-Pin SOIC Package	14-Pin Plastic Dip Package
ALD1106SBL	ALD1106PBL

* Contact factory for high temperature versions.

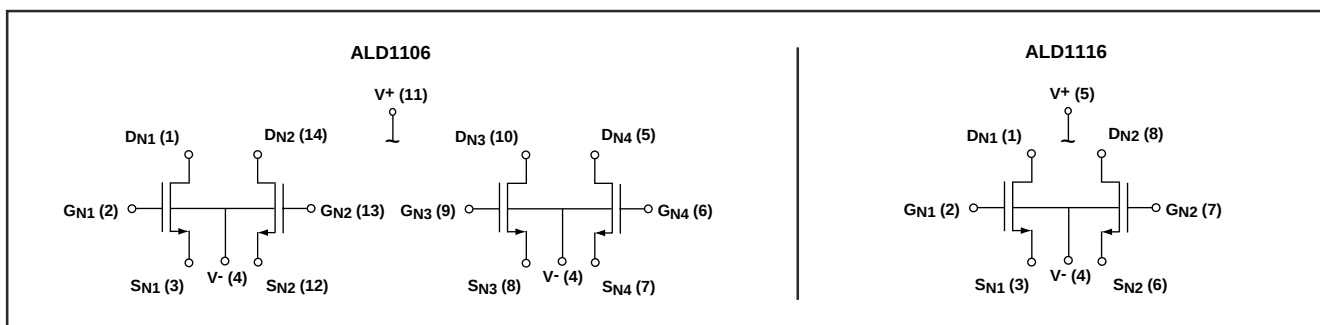
APPLICATIONS

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

PIN CONFIGURATION



BLOCK DIAGRAMS



ABSOLUTE MAXIMUM RATINGS

Drain-source voltage, V_{DS} _____ 10V
 Gate-source voltage, V_{GS} _____ 10V
 Power dissipation _____ 500mW
 Operating temperature range SAL, PAL, SBL, PBL packages _____ 0°C to +70°C
 Storage temperature range _____ -65°C to +150°C
 Lead temperature, 10 seconds _____ +260°C

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

OPERATING ELECTRICAL CHARACTERISTICS

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

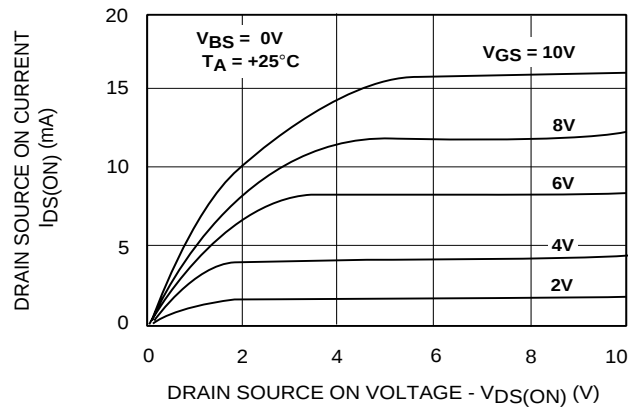
Parameter	Symbol	ALD1106			ALD1116			Unit	Test Conditions
		Min	Typ	Max	Min	Typ	Max		
Gate Threshold Voltage	V_T	0.4	0.7	1.0	0.4	0.7	1.0	V	$I_{DS} = 1.0\mu\text{A}$ $V_{GS} = V_{DS}$
Offset Voltage $V_{GS1}-V_{GS2}$	V_{OS}		2	10		2	10	mV	$I_{DS} = 10\mu\text{A}$ $V_{GS} = V_{DS}$
Gate Threshold Temperature Drift ²	TC_{VT}		-1.2			-1.2		mV/°C	
On Drain Current	$I_{DS(ON)}$	3.0	4.8		3.0	4.8		mA	$V_{GS} = V_{DS} = 5\text{V}$
Transconductance	G_{IS}	1.0	1.8		1.0	1.8		mmho	$V_{DS} = 5\text{V}$ $I_{DS} = 10\text{mA}$
Mismatch	ΔG_{IS}		0.5			0.5		%	
Output Conductance	G_{OS}		200			200		μmho	$V_{DS} = 5\text{V}$ $I_{DS} = 10\text{mA}$
Drain Source On Resistance	$R_{DS(ON)}$		350	500		350	500	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}	10			10			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	$V_{DS} = 10\text{V}$ $V_{GS} = 0\text{V}$ $T_A = 125^\circ\text{C}$
Gate Leakage Current	I_{GSS}		1	100 1		1	100 1	pA nA	$V_{DS} = 0\text{V}$ $V_{GS} = 10\text{V}$ $T_A = 125^\circ\text{C}$
Input Capacitance ²	C_{ISS}		1	3		1	3	pF	

Notes: ¹ Consists of junction leakage currents

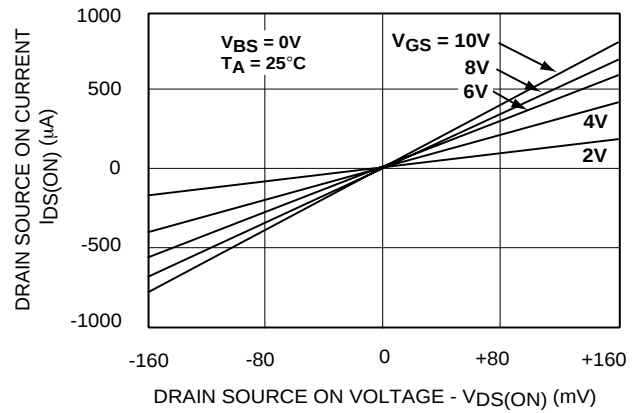
² Sample tested parameters

TYPICAL PERFORMANCE CHARACTERISTICS

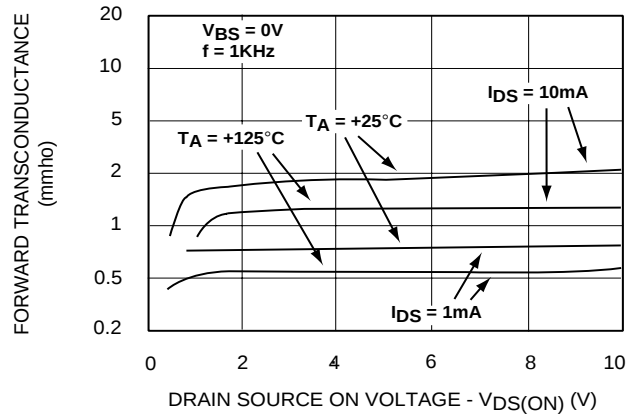
OUTPUT CHARACTERISTICS



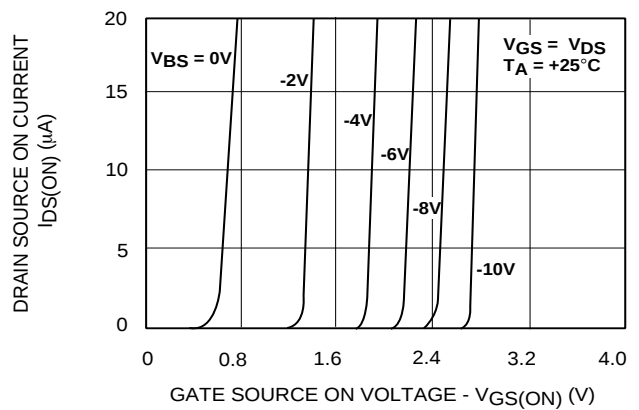
LOW VOLTAGE OUTPUT CHARACTERISTICS



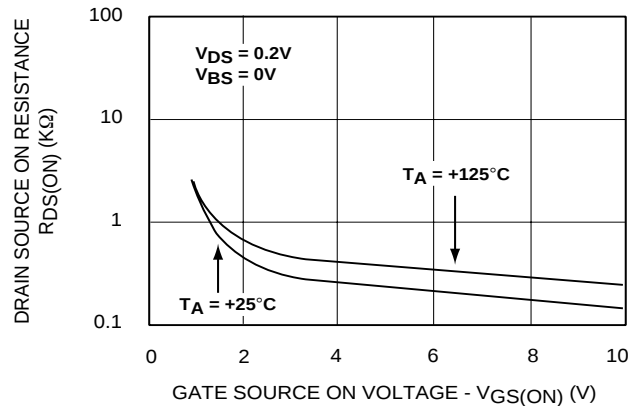
FORWARD TRANSCONDUCTANCE vs. DRAIN-SOURCE VOLTAGE



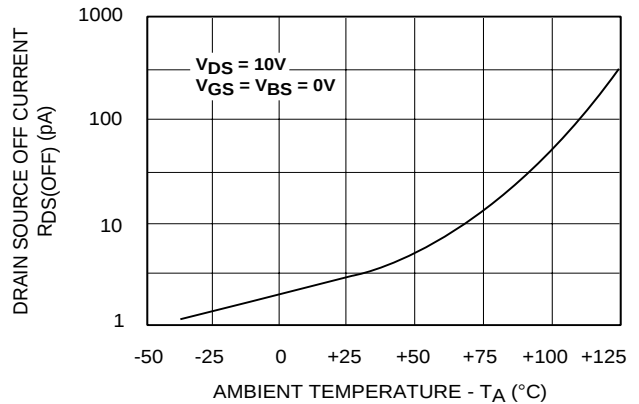
TRANSFER CHARACTERISTIC WITH SUBSTRATE BIAS



DRAIN SOURCE ON RESISTANCE vs. GATE-SOURCE VOLTAGE

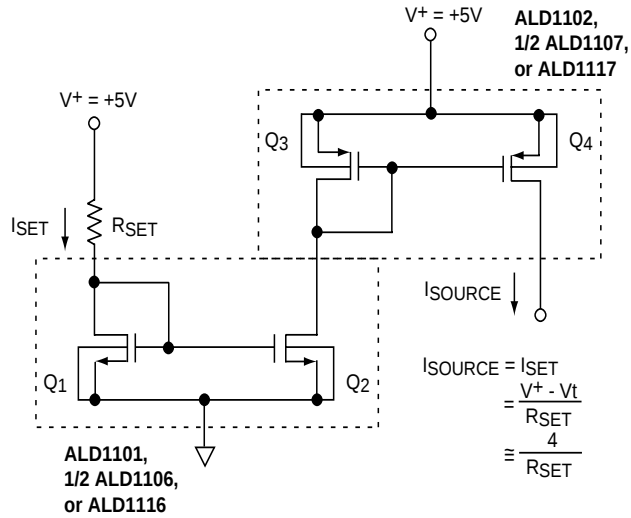


DRAIN SOURCE OFF CURRENT vs. AMBIENT TEMPERATURE



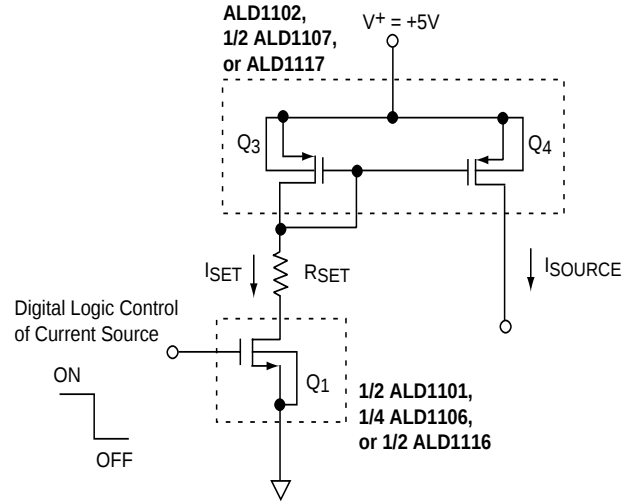
TYPICAL APPLICATIONS

CURRENT SOURCE MIRROR



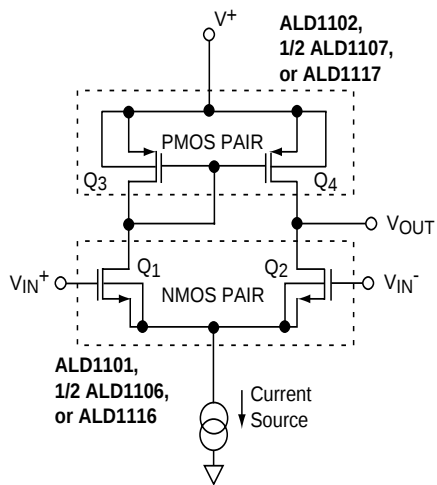
Q1, Q2: N-Channel MOSFET
Q3, Q4: P-Channel MOSFET

CURRENT SOURCE WITH GATE CONTROL



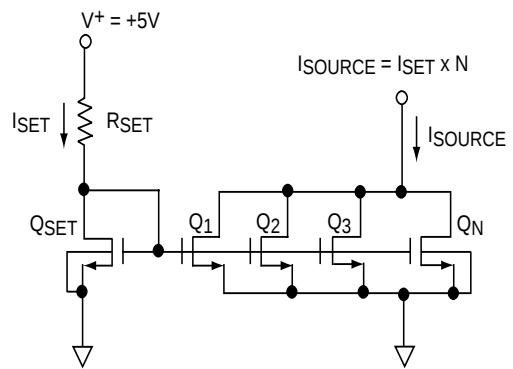
Q1 : N-Channel MOSFET
Q3, Q4: P-Channel MOSFET

DIFFERENTIAL AMPLIFIER



Q1, Q2: N-Channel MOSFET
Q3, Q4: P-Channel MOSFET

CURRENT SOURCE MULTIPLICATION

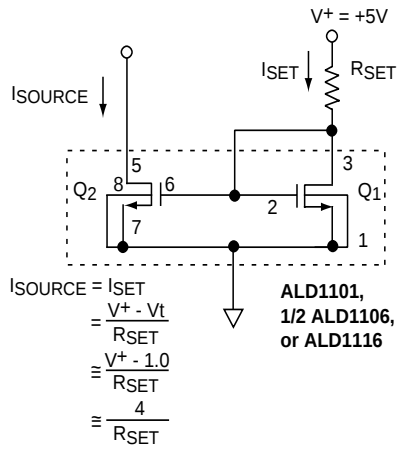


QSET, Q1..QN: ALD1101, ALD1106, or ALD1116
N-Channel MOSFET

TYPICAL APPLICATIONS (cont.)

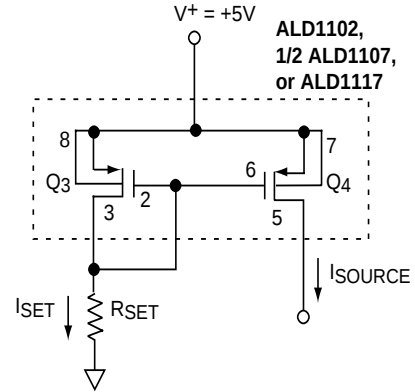
BASIC CURRENT SOURCES

N-CHANNEL CURRENT SOURCE



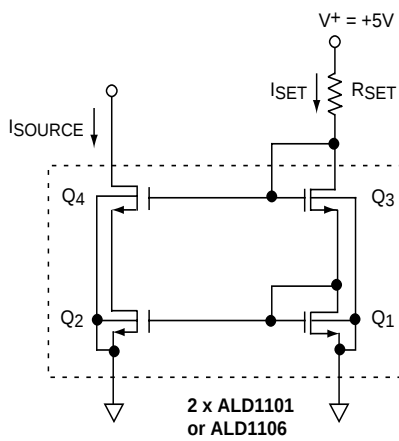
Q1, Q2: N-Channel MOSFET

P-CHANNEL CURRENT SOURCE

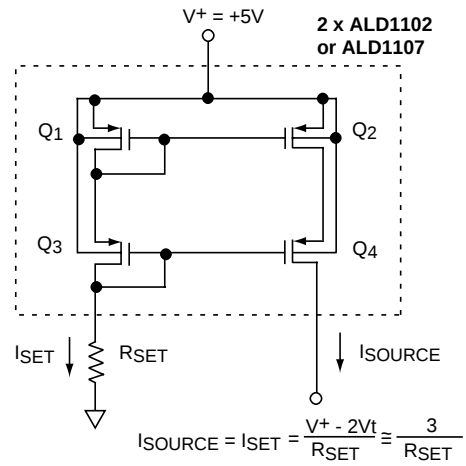


Q3, Q4: P-Channel MOSFET

CASCODE CURRENT SOURCES



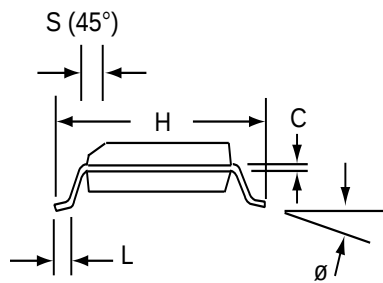
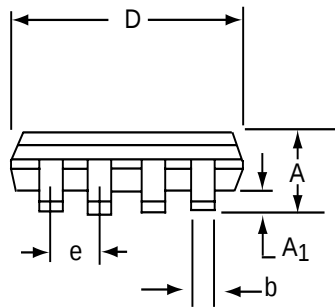
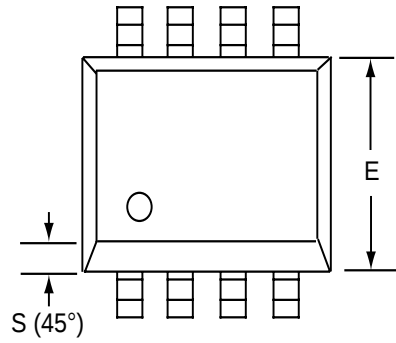
Q1, Q2, Q3, Q4: N-Channel MOSFET
(ALD1101 or ALD1103)



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

SOIC-8 PACKAGE DRAWING

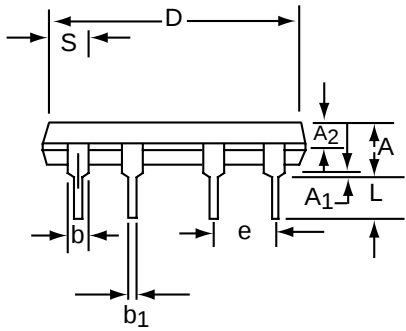
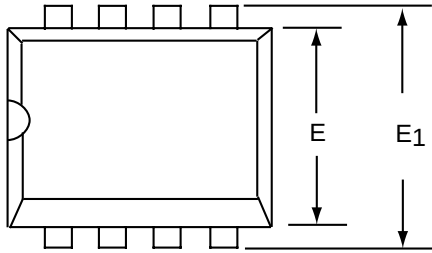
8 Pin Plastic SOIC Package



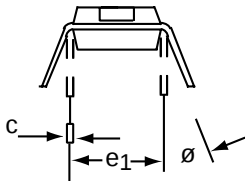
Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.25	0.004	0.010
b	0.35	0.45	0.014	0.018
C	0.18	0.25	0.007	0.010
D-8	4.69	5.00	0.185	0.196
E	3.50	4.05	0.140	0.160
e	1.27 BSC		0.050 BSC	
H	5.70	6.30	0.224	0.248
L	0.60	0.937	0.024	0.037
Ø	0°	8°	0°	8°
S	0.25	0.50	0.010	0.020

PDIP-8 PACKAGE DRAWING

8 Pin Plastic DIP Package

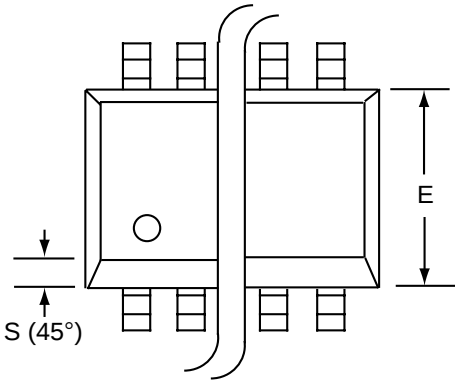


Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.81	5.08	0.105	0.200
A ₁	0.38	1.27	0.015	0.050
A ₂	1.27	2.03	0.050	0.080
b	0.89	1.65	0.035	0.065
b ₁	0.38	0.51	0.015	0.020
c	0.20	0.30	0.008	0.012
D-8	9.40	11.68	0.370	0.460
E	5.59	7.11	0.220	0.280
E ₁	7.62	8.26	0.300	0.325
e	2.29	2.79	0.090	0.110
e ₁	7.37	7.87	0.290	0.310
L	2.79	3.81	0.110	0.150
S-8	1.02	2.03	0.040	0.080
Ø	0°	15°	0°	15°

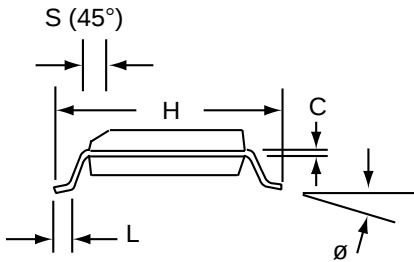
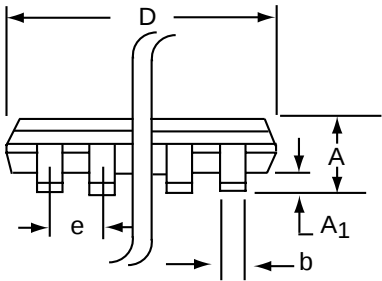


SOIC-14 PACKAGE DRAWING

14 Pin Plastic SOIC Package

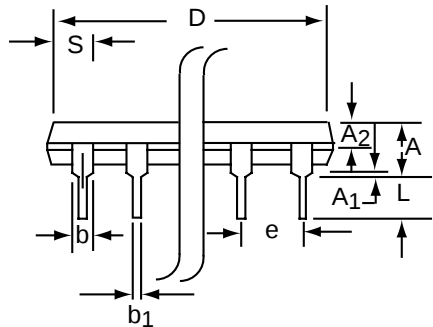
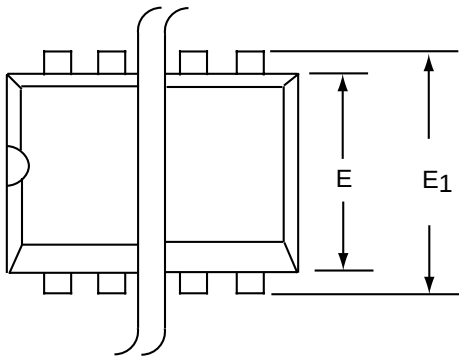


Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.25	0.004	0.010
b	0.35	0.45	0.014	0.018
C	0.18	0.25	0.007	0.010
D-14	8.55	8.75	0.336	0.345
E	3.50	4.05	0.140	0.160
e	1.27 BSC		0.050 BSC	
H	5.70	6.30	0.224	0.248
L	0.60	0.937	0.024	0.037
Ø	0°	8°	0°	8°
S	0.25	0.50	0.010	0.020



PDIP-14 PACKAGE DRAWING

14 Pin Plastic DIP Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.81	5.08	0.105	0.200
A1	0.38	1.27	0.015	0.050
A2	1.27	2.03	0.050	0.080
b	0.89	1.65	0.035	0.065
b1	0.38	0.51	0.015	0.020
c	0.20	0.30	0.008	0.012
D-14	17.27	19.30	0.680	0.760
E	5.59	7.11	0.220	0.280
E1	7.62	8.26	0.300	0.325
e	2.29	2.79	0.090	0.110
e1	7.37	7.87	0.290	0.310
L	2.79	3.81	0.110	0.150
S-14	1.02	2.03	0.040	0.080
ø	0°	15°	0°	15°

