SINGLE/DUAL PRECISION HIGH SPEED MICROPOWER TIMER

GENERAL DESCRIPTION

The ALD1502/ALD2502 timers are high performance single/dual monolithic timing circuits built with advanced silicon gate CMOS technology. They offer the benefits of high input impedance, thereby allowing smaller timing capacitors and a longer timing cycle; high speed, with typical cycle time of 400ns; low power dissipation for battery operated environment; reduced supply current spikes, allowing smaller and lower cost decoupling capacitors.

Each timer is capable of producing accurate time delays and oscillations in both monostable and astable operation, and operates in the one-shot (monostable) mode or 50% duty cycle free running oscillation mode with a single resistor and one capacitor. The inputs and outputs are fully compatible with CMOS, NMOS or TTL logic.

There are three matched internal resistors (approximately 200KΩ each) that set the threshold and trigger levels at two-thirds and one-third respectively of V^+. These levels can be adjusted by using the control terminal. When the trigger input is below the trigger level, the output is in the high state and sourcing 2mA. When the threshold input is above the threshold level at the same time the trigger input is above the trigger level, the internal flip-flop is reset, the output goes to the low state and sinks up to 10mA. The reset input overrides all other inputs and when it is active (reset voltage less than 1V), the output is in the low state.

FEATURES

- High speed operation -- 2.5MHz typical oscillation at 5V
- High discharge sinking current of 80mA at 5V
- Guaranteed low operating supply voltage of 2V to 12V
- Functional equivalent to and same pin-out as NE555/NE556 with greatly expanded high and low frequency ranges
- High speed, low power, monolithic CMOS technology
- Low supply current: 50μA typical for ALD1502 and100μA typical for ALD2502
- Extremely low trigger, threshold and reset currents: 10pA typical
- Operates in both monostable and astable modes
- Fixed 50% duty cycle or adjustable duty cycle
- CMOS, NMOS and TTL compatible input/output
- Low supply current spikes

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

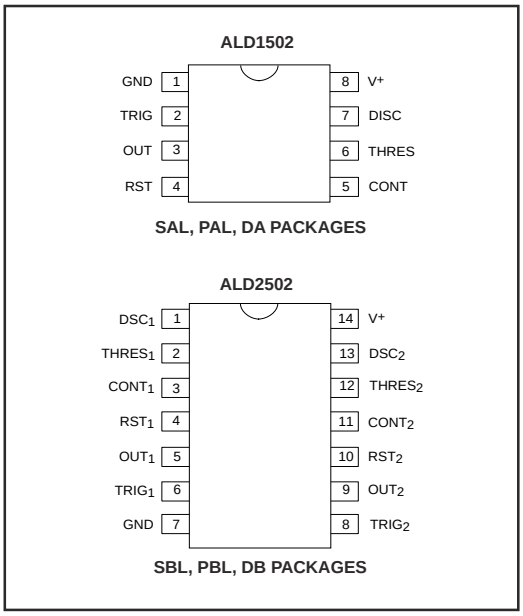
Operating Temperature Range *		
0°C to +70°C	0°C to +70°C	-55°C to +125°C
8-Pin Small Outline Package (SOIC) ALD1502SAL	8-Pin Plastic DIP Package ALD1502PAL	8-Pin CERDIP Package ALD1502DA
14-Pin Small Outline Package (SOIC) ALD2502SBL	14-Pin Plastic DIP Package ALD2502PBL	14-Pin CERDIP Package ALD2502DB

* Contact factory for leaded (non-RoHS) or high temperature versions.

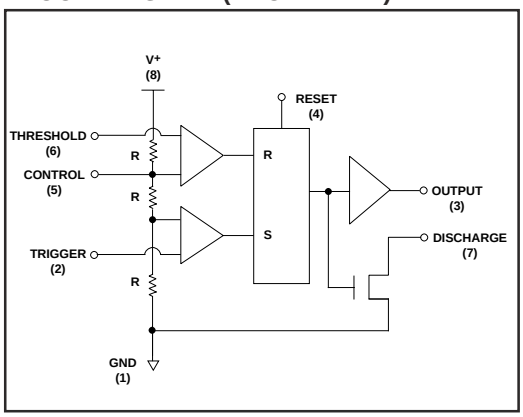
APPLICATIONS

- High speed one-shot (monostable) pulse generation
- Precision timing
- Sequential timing
- Long delay timer
- Pulse width and pulse position modulation
- Missing pulse detector
- Frequency divider
- Synchronized timer

PIN CONFIGURATION



BLOCK DIAGRAM (EACH TIMER)



ABSOLUTE MAXIMUM RATINGS

Supply voltage, V^+ — 13.2V
Input voltage range — -0.3V to V^+ +0.3V
Power dissipation — 600 mW
Operating temperature range SAL, SBL, PAL, PBL packages — 0°C to + 70°C
DA, DB packages — -55°C to +125°C
Storage temperature range — -65°C to +150°C
Lead temperature, 10 seconds — +260°C

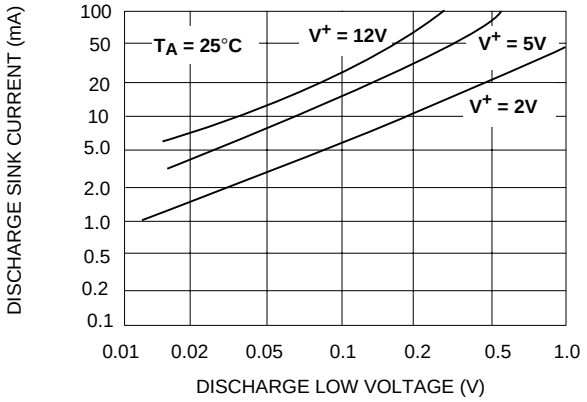
OPERATING ELECTRICAL CHARACTERISTICS
T_A = 25°C V^+ = +5V unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Supply Voltage	V^+	2		12	V	
Supply Current ALD1502 Supply Current ALD2502	I_S I_S		50 100	90 180	μA μA	Outputs Unloaded
Timing error / Astable mode Initial Accuracy	t_{err}		1.0	2.2	%	C = 0.1μF
Drift with Temperature [1] Drift with Supply Voltage [1]	$\Delta t/\Delta T$ $\Delta t/\Delta V^+$		10.0 0.2		ppm/°C %/V	R_A = 1KΩ R_B = 1KΩ
Threshold Voltage	V_{TH}	3.233	3.333	3.433	V	
Trigger Voltage	V_{TRIG}	1.567	1.667	1.767	V	
Trigger Current [2]	I_{TRIG}		.01	0.4	nA	
Reset Voltage	V_{RST}	0.4	0.7	1.0	V	
Reset Current [2]	I_{RST}		.01	0.4	nA	
Threshold Current [2]	I_{TH}		.01	0.4	nA	
Control Voltage Level	V_{CONT}	3.233	3.333	3.433	V	
Output Voltage Drop (Low)	V_{OL}		0.2	0.4	V	I_{SINK} = 10mA
Output Voltage Drop (High)	V_{OH}	4.2	4.6		V	I_{SOURCE} = -2mA
Rise Time of Output [1]	t_r		10	20	ns	R_L = 10MΩ
Fall Time of Output [1]	t_f		10	20	ns	C_L = 10pF
Discharge Transistor Leakage Current	I_{DL}		.01		nA	
Discharge Voltage Drop	V_{DISC}		0.5 0.2	1.0 0.4	V V	$I_{DISCHARGE}$ = 80mA $I_{DISCHARGE}$ = 30mA
Maximum Frequency Astable Mode	f_{MAX}	1.5	2.5		MHz	R_A = 470Ω R_B = 200Ω C_T =100pF
Minimum Trigger Pulse Width[1]	t_{TRIG}		50	100	ns	

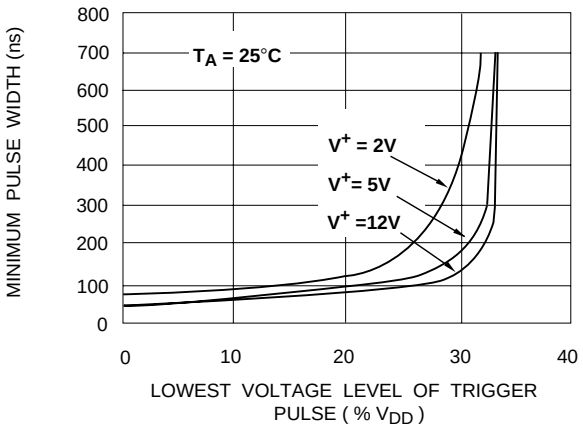
Notes: [1] Sample tested parameters.
[2] Consists of junction leakage currents with strong temperature dependence.

TYPICAL PERFORMANCE CHARACTERISTICS

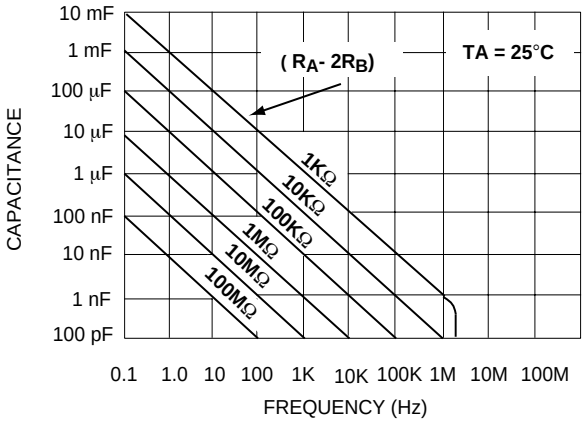
DISCHARGE OUTPUT SINK CURRENT AS A FUNCTION OF DISCHARGE LOW VOLTAGE



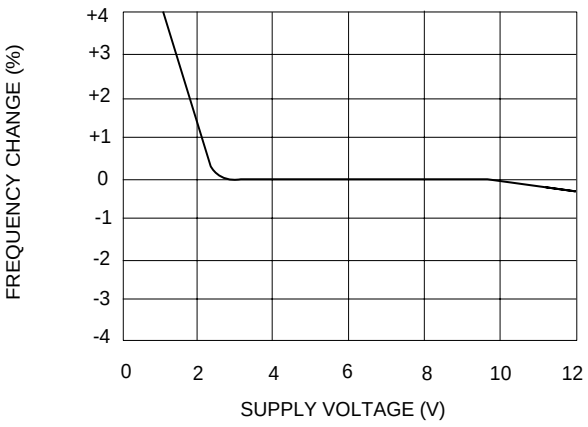
MINIMUM PULSE WIDTH REQUIRED FOR TRIGGERING



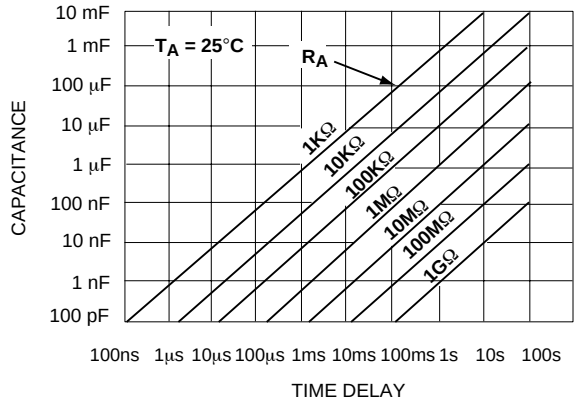
FREE RUNNING FREQUENCY AS A FUNCTION OF R_A, R_B AND C



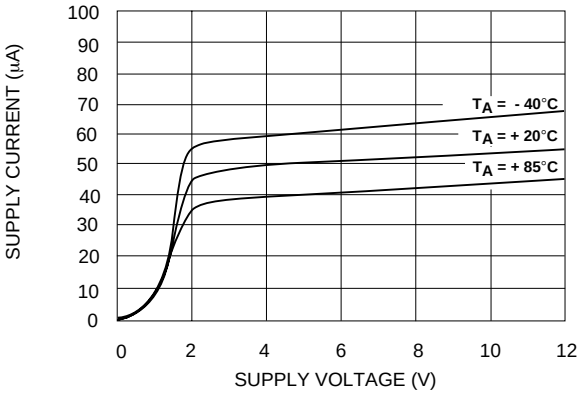
FREQUENCY CHANGE IN THE ASTABLE MODE AS A FUNCTION OF SUPPLY VOLTAGE



TIME DELAY IN THE MONOSTABLE MODE AS A FUNCTION OF R_A AND C

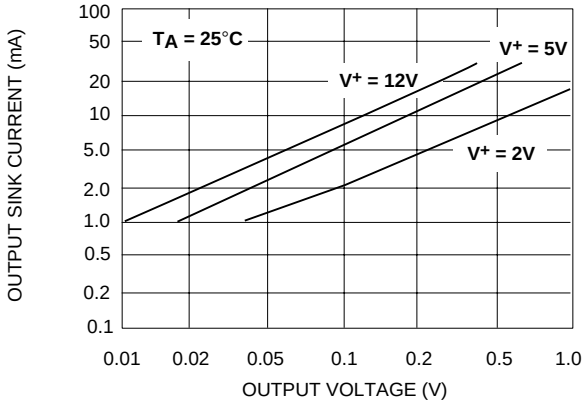


SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE

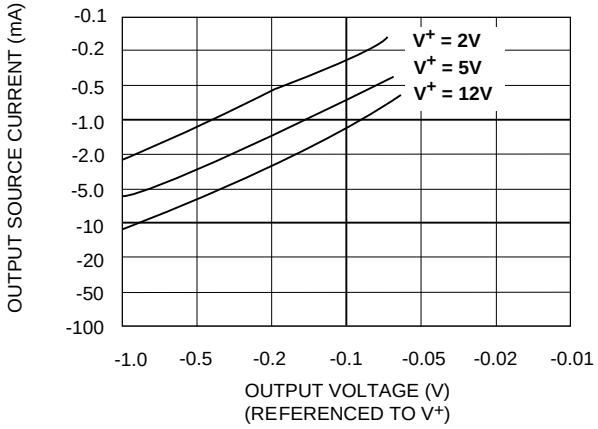


TYPICAL PERFORMANCE CHARACTERISTICS (cont'd)

OUTPUT SINK CURRENT AS A FUNCTION OF OUTPUT VOLTAGE

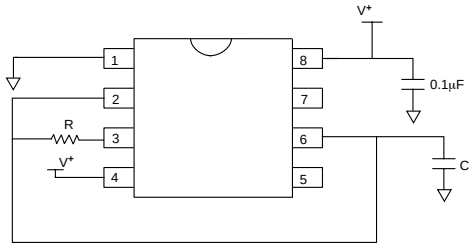


OUTPUT SOURCE CURRENT AS A FUNCTION OF OUTPUT VOLTAGE



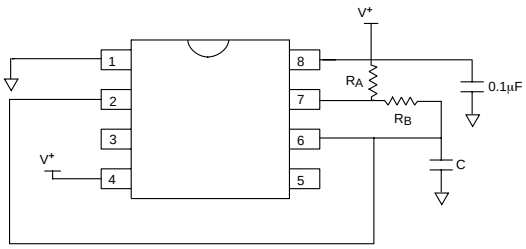
TYPICAL APPLICATIONS (EACH TIMER)

ASTABLE MODE OPERATION 50% DUTY CYCLE



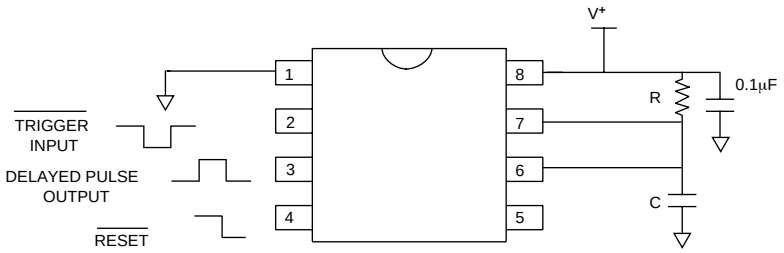
Frequency f = 1/ (1.4 R_C)

ASTABLE MODE OPERATION (FREE RUNNING OSCILLATOR)



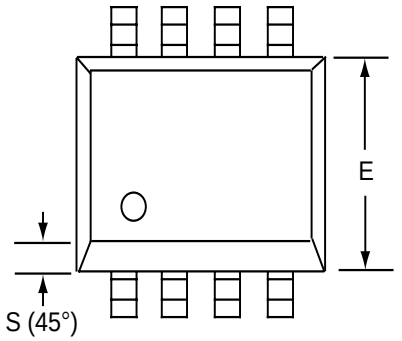
Frequency f = 1.46 / (R_A + 2R_B)C
Duty Cycle DC = R_B / (R_A + 2R_B)

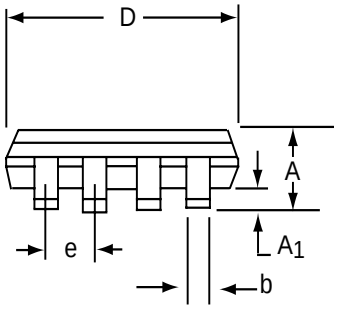
MONOSTABLE MODE OPERATION (ONE SHOT PULSE)
Pulse Delay t_d = 1.1 R_C

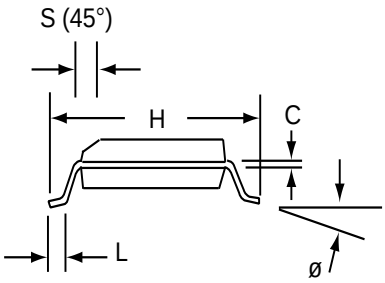


SOIC-8 PACKAGE DRAWING

8 Pin Plastic SOIC Package



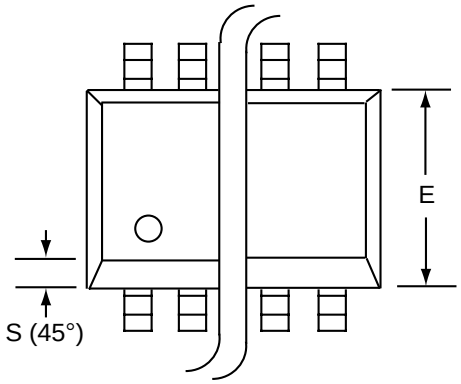


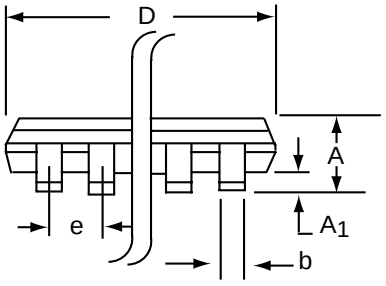


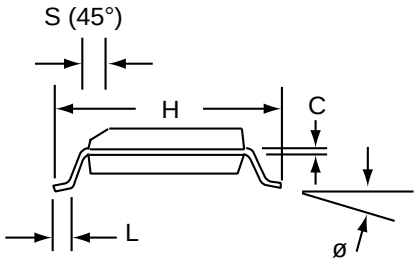
Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A_1	0.10	0.25	0.004	0.010
b	0.35	0.45	0.014	0.018
C	0.18	0.25	0.007	0.010
D-8	4.69	5.00	0.185	0.196
E	3.50	4.05	0.140	0.160
e	1.27 BSC		0.050 BSC	
H	5.70	6.30	0.224	0.248
L	0.60	0.937	0.024	0.037
Ø	0°	8°	0°	8°
S	0.25	0.50	0.010	0.020

SOIC-14 PACKAGE DRAWING

14 Pin Plastic SOIC Package



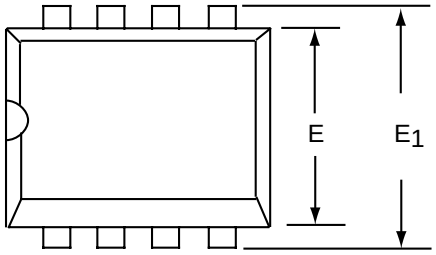


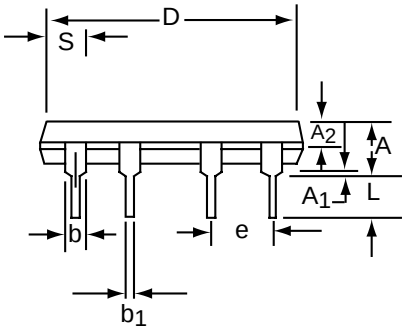


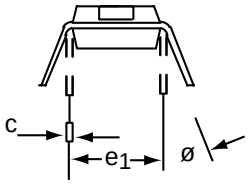
Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A_1	0.10	0.25	0.004	0.010
b	0.35	0.45	0.014	0.018
C	0.18	0.25	0.007	0.010
D-14	8.55	8.75	0.336	0.345
E	3.50	4.05	0.140	0.160
e	1.27 BSC		0.050 BSC	
H	5.70	6.30	0.224	0.248
L	0.60	0.937	0.024	0.037
ø	0°	8°	0°	8°
S	0.25	0.50	0.010	0.020

PDIP-8 PACKAGE DRAWING

8 Pin Plastic DIP Package



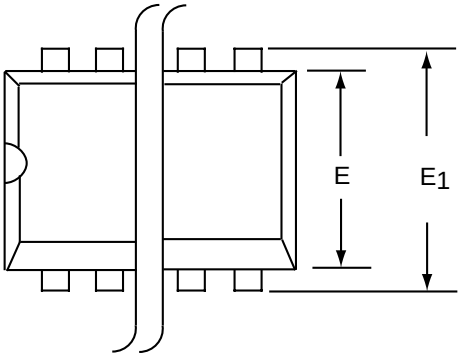


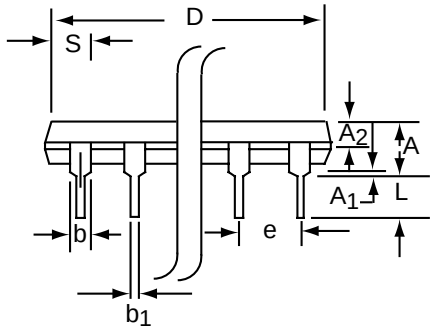


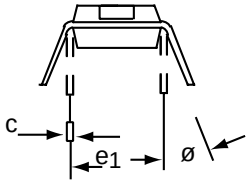
Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.81	5.08	0.105	0.200
A_1	0.38	1.27	0.015	0.050
A_2	1.27	2.03	0.050	0.080
b	0.89	1.65	0.035	0.065
b_1	0.38	0.51	0.015	0.020
c	0.20	0.30	0.008	0.012
D-8	9.40	11.68	0.370	0.460
E	5.59	7.11	0.220	0.280
E_1	7.62	8.26	0.300	0.325
e	2.29	2.79	0.090	0.110
e_1	7.37	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°

PDIP-14 PACKAGE DRAWING

14 Pin Plastic DIP Package



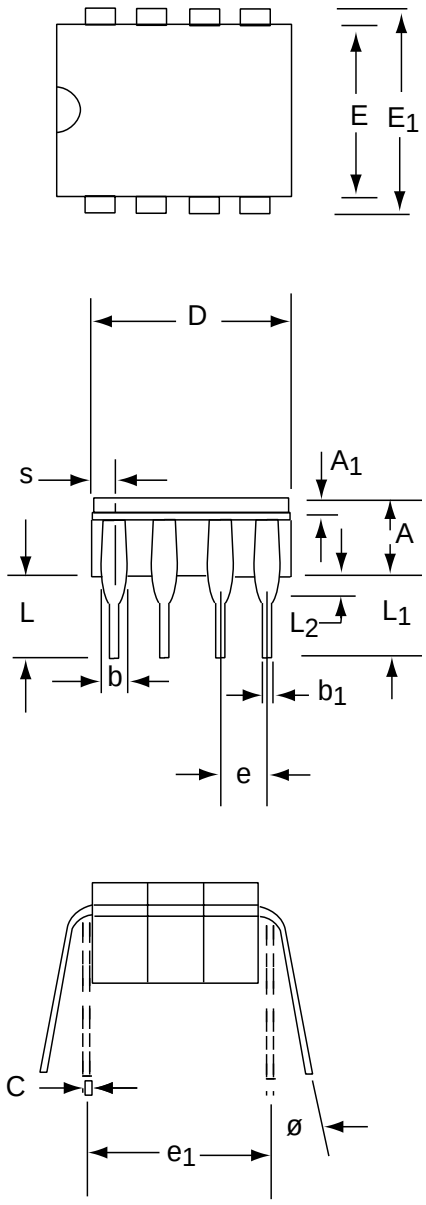




Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.81	5.08	0.105	0.200
A_1	0.38	1.27	0.015	0.050
A_2	1.27	2.03	0.050	0.080
b	0.89	1.65	0.035	0.065
b_1	0.38	0.51	0.015	0.020
c	0.20	0.30	0.008	0.012
D-14	17.27	19.30	0.680	0.760
E	5.59	7.11	0.220	0.280
E_1	7.62	8.26	0.300	0.325
e	2.29	2.79	0.090	0.110
e_1	7.37	7.87	0.290	0.310
L	2.79	3.81	0.110	0.150
S-14	1.02	2.03	0.040	0.080
ø	0°	15°	0°	15°

CERDIP-8 PACKAGE DRAWING

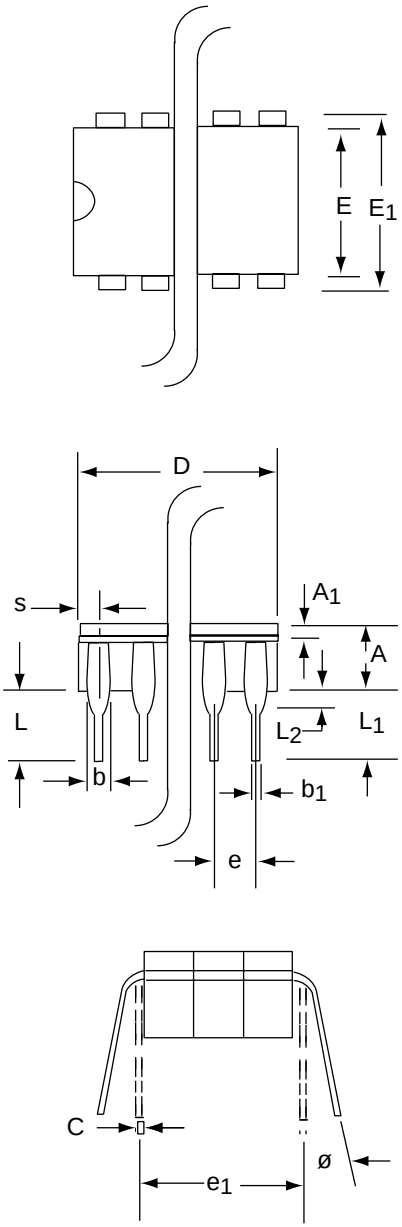
8 Pin CERDIP Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.55	5.08	0.140	0.200
A_1	1.27	2.16	0.050	0.085
b	0.97	1.65	0.038	0.065
b_1	0.36	0.58	0.014	0.023
C	0.20	0.38	0.008	0.015
D-8	--	10.29	--	0.405
E	5.59	7.87	0.220	0.310
E_1	7.73	8.26	0.290	0.325
e	2.54 BSC		0.100 BSC	
e_1	7.62 BSC		0.300 BSC	
L	3.81	5.08	0.150	0.200
L_1	3.18	--	0.125	--
L_2	0.38	1.78	0.015	0.070
S	--	2.49	--	0.098
Ø	0°	15°	0°	15°

CERDIP-14 PACKAGE DRAWING

14 Pin CERDIP Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.55	5.08	0.140	0.200
A_1	1.27	2.16	0.050	0.085
b	0.97	1.65	0.038	0.065
b_1	0.36	0.58	0.014	0.023
C	0.20	0.38	0.008	0.015
D-14	--	19.94	--	0.785
E	5.59	7.87	0.220	0.310
E_1	7.73	8.26	0.290	0.325
e	2.54 BSC		0.100 BSC	
e_1	7.62 BSC		0.300 BSC	
L	3.81	5.08	0.150	0.200
L_1	3.18	--	0.125	--
L_2	0.38	1.78	0.015	0.070
S	--	2.49	--	0.098
Ø	0°	15°	0°	15°