

Features

- Industry standard driver replacement
- Improved response times
- Matched rise and fall times
- Reduced clock skew
- Low output impedance
- Low input capacitance
- High noise immunity
- Improved clocking rate
- Low supply current
- Wide operating voltage range

Applications

- Clock/line drivers
- CCD Drivers
- Ultra-sound transducer drivers
- Power MOSFET drivers
- Switch mode power supplies
- Class D switching amplifiers
- Ultrasonic and RF generators
- Pulsed circuits

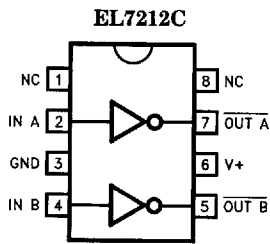
Ordering Information

Part No.	Temp. Range	Pkg.	Outline #
EL7202CN	-40°C to +85°C	8-Pin P-DIP	MDP0031
EL7202CS	-40°C to +85°C	8-Pin SO	MDP0027
EL7212CN	-40°C to +85°C	8-Pin P-DIP	MDP0031
EL7212CS	-40°C to +85°C	8-Pin SO	MDP0027
EL7222CN	-40°C to +85°C	8-Pin P-DIP	MDP0031
EL7222CS	-40°C to +85°C	8-Pin SO	MDP0027

General Description

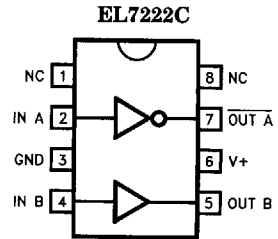
The EL7202C/EL7212C/EL7222C ICs are matched dual-drivers ICs that improve the operation of the industry standard DS0026 clock drivers. The Elantec Versions are very high speed drivers capable of delivering peak currents of 2.0 amps into highly capacitive loads. The high speed performance is achieved by means of a proprietary "Turbo-Driver" circuit that speeds up input stages by tapping the wider voltage swing at the output. Improved speed and drive capability are enhanced by matched rise and fall delay times. These matched delays maintain the integrity of input-to-output pulse-widths to reduce timing errors and clock skew problems. This improved performance is accompanied by a 10 fold reduction in supply currents over bipolar drivers, yet without the delay time problems commonly associated with CMOS devices. Dynamic switching losses are minimized with non-overlapped drive techniques.

Connection Diagrams



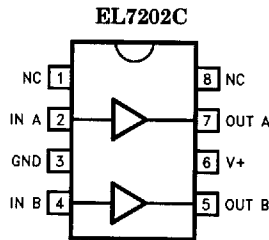
Inverting Drivers

7202-1



Complementary Drivers

7202-2



Non-Inverting Drivers

7202-3

Manufactured under U.S. Patent Nos. 5,334,883, #5,341,047

EL7202C/EL7212C/EL7222C

High Speed, Dual Channel Power MOSFET Drivers

Absolute Maximum Ratings

Supply (V+ to Gnd)	16.5V	Operating Junction Temperature	125°C
Input Pins	-0.3V to +0.3V above V+	Power Dissipation	
Combined Peak Output Current	4A	SOIC	570 mW
Storage Temperature Range	-65°C to +150°C	PDIP	1050 mW
Ambient Operating Temperature	-40°C to +85°C		

Important Note:

All parameters having Min/Max specifications are guaranteed. The Test Level column indicates the specific device testing actually performed during production and Quality inspection. Elantec performs most electrical tests using modern high-speed automatic test equipment, specifically the LTX77 Series system. Unless otherwise noted, all tests are pulsed tests, therefore $T_J = T_C = T_A$.

Test Level	Test Procedure
I	100% production tested and QA sample tested per QA test plan QCX0002.
II	100% production tested at $T_A = 25^\circ\text{C}$ and QA sample tested at $T_A = 25^\circ\text{C}$, T_{MAX} and T_{MIN} per QA test plan QCX0002.
III	QA sample tested per QA test plan QCX0002.
IV	Parameter is guaranteed (but not tested) by Design and Characterization Data.
V	Parameter is typical value at $T_A = 25^\circ\text{C}$ for information purposes only.

DC Electrical Characteristics $T_A = 25^\circ\text{C}$, $V = 15\text{V}$ unless otherwise specified

Parameter	Description	Test Conditions	Min	Typ	Max	Test Level	Units
Input							
V_{IH}	Logic "1" Input Voltage		2.4			I	V
I_{IH}	Logic "1" Input Current	@V+		0.1	10	I	μA
V_{IL}	Logic "0" Input Voltage				0.8	I	V
I_{IL}	Logic "0" Input Current	@0V		0.1	10	I	μA
V_{HVS}	Input Hysteresis			0.3		V	V
Output							
R_{OH}	Pull-Up Resistance	$I_{OUT} = -100\text{ mA}$		3	6	I	Ω
R_{OL}	Pull-Down Resistance	$I_{OUT} = +100\text{ mA}$		4	6	I	Ω
I_{PK}	Peak Output Current	Source Sink		2 2		IV	A
I_{DC}	Continuous Output Current	Source/Sink	100			I	mA
Power Supply							
I_S	Power Supply Current	Inputs High/7202 Inputs High/7212 Inputs High/7222		4.5 1 2.5	7.5 2.5 5.0	I I I	mA
V_S	Operating Voltage		4.5		15	I	V

■ 3129557 0005178 259 ■

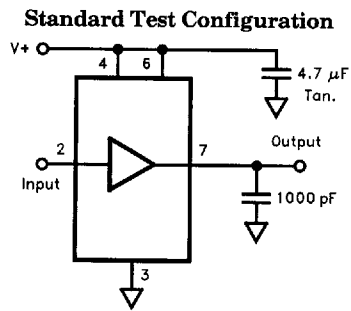
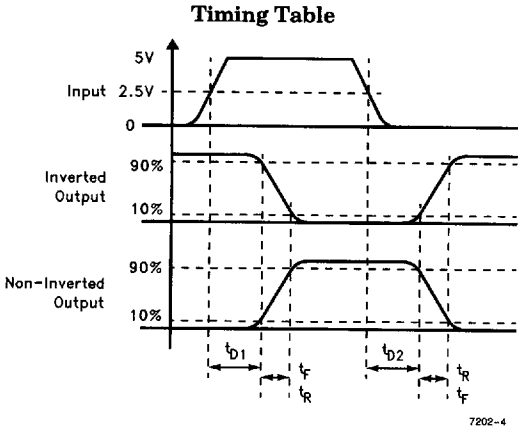
EL7202C/EL7212C/EL7222C

High Speed, Dual Channel Power MOSFET Drivers

EL7202C/EL7212C/EL7222C

AC Electrical Characteristics $T_A = 25^\circ\text{C}$, $V = 15\text{V}$ unless otherwise specified

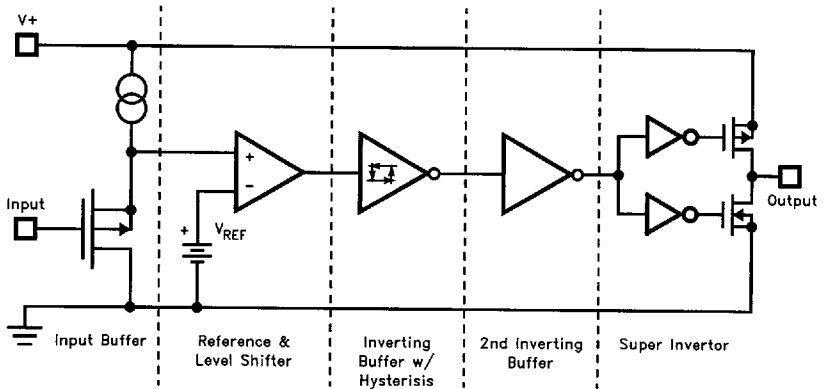
Parameter	Description	Test Conditions	Min	Typ	Max	Test Level	Units
t_R	Rise Time	$C_L = 500\text{ pF}$ $C_L = 1000\text{ pF}$		7.5 10	20	IV	ns
t_F	Fall Time	$C_L = 500\text{ pF}$ $C_L = 1000\text{ pF}$		10 13	20	IV	ns
t_{D1}	Turn-On Delay Time	See Timing Table		18	25	IV	ns
t_{D2}	Turn-Off Delay Time	See Timing Table		20	25	IV	ns



7202-19

5

Simplified Schematic



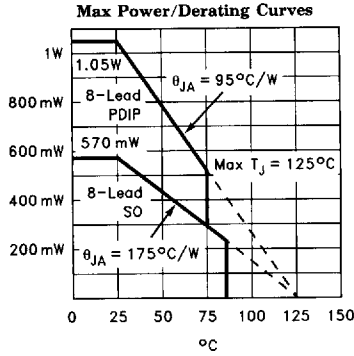
7202-5

■ 3129557 0005179 195 ■

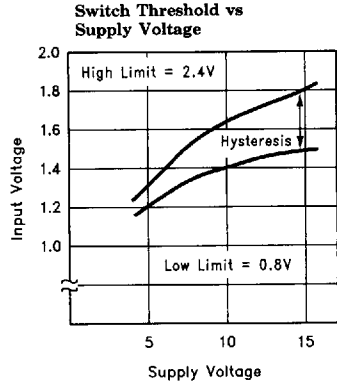
EL7202C/EL7212C/EL7222C

High Speed, Dual Channel Power MOSFET Drivers

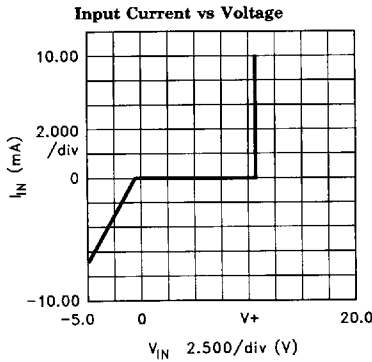
Typical Performance Curve



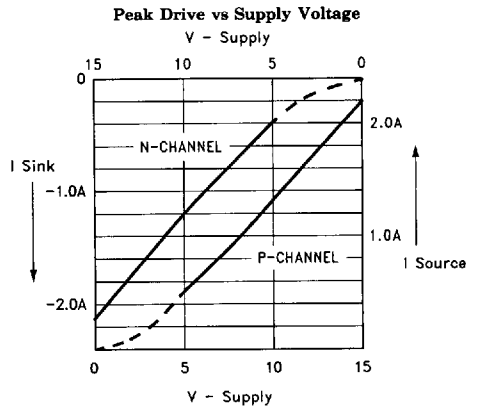
7202-6



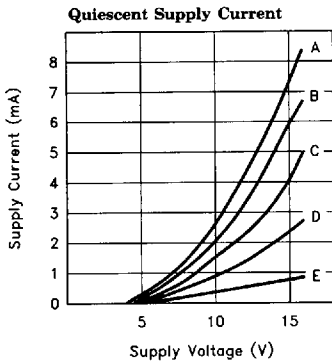
7202-7



7202-8

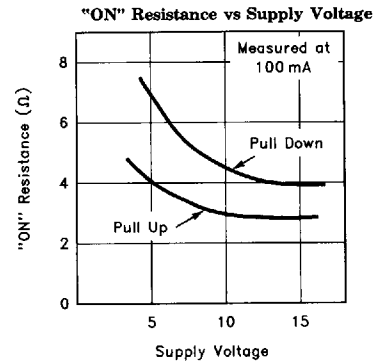


7202-9



CASE:

Device	Input Level	Curve
EL7202	GND	A
EL7202	GND, V+	B
EL7202	V+	C
EL7212	GND	C
EL7212	GND, V+	D
EL7212	V+	E
EL7222	GND	B
EL7222	GND, V+	C
EL7222	V+	D



7202-10

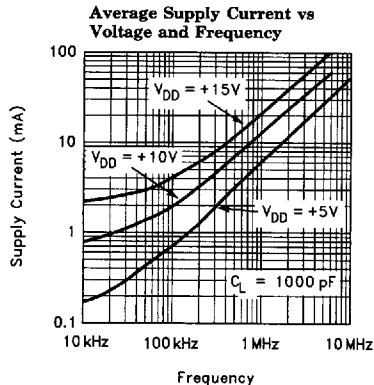
7202-11

EL7202C/EL7212C/EL7222C

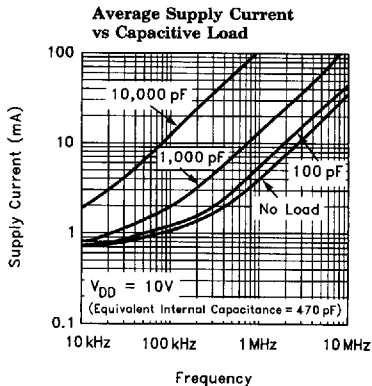
High Speed, Dual Channel Power MOSFET Drivers

EL7202C/EL7212C/EL7222C

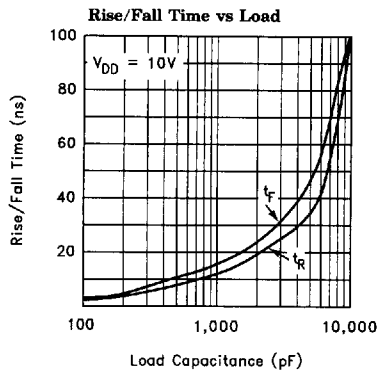
Typical Performance Curve — Contd.



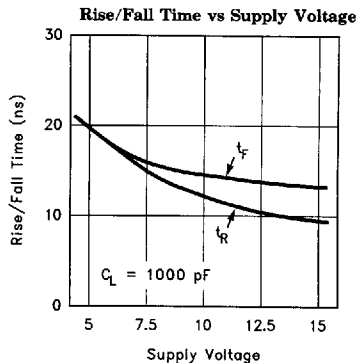
7202-12



7202-13



7202-14



7202-15

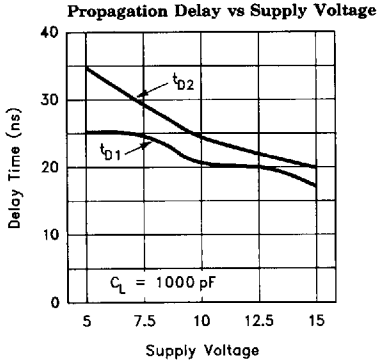
5

3129557 0005181 843

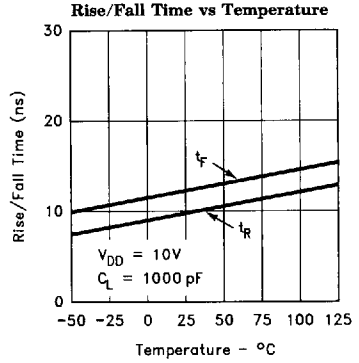
EL7202C/EL7212C/EL7222C

High Speed, Dual Channel Power MOSFET Drivers

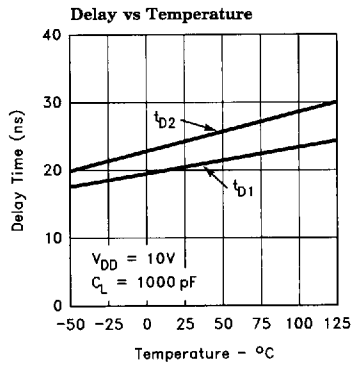
Typical Performance Curve — Contd.



7202-16



7202-17



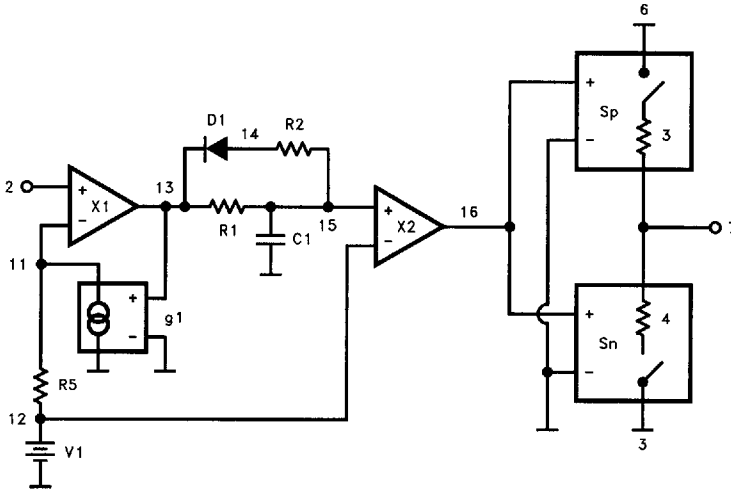
7202-18

EL7202C/EL7212C/EL7222C

High Speed, Dual Channel Power MOSFET Drivers

EL7202C/EL7212C/EL7222C

EL7212 Macro Model



7202-20

**** EL7212 model ****

```

*          input
*          |
*          | gnd
*          |
*          | Vsupply
*          |
*          | Vout
*          |
.subckt M7212 2      3      6      7
V1 12 3 1.6
R1 13 15 1k
R2 14 15 5k
R5 11 12 100
C1 15 3 43.3 pF
D1 14 13 dmod
X1 13 11 2 3 comp1
X2 16 12 15 3 comp1
sp 6 7 16 3 spmod
sn 7 3 16 3 snrmod
g1 11 0 13 0 938µ
.model dmod d
.model spmod vswitch ron=3 roff=2meg von=1 voff=1.5
.model snrmod vswitch ron=4 roff=2meg von=3 voff=2
.ends M7212

.subckt comp1 out inp inm vss
e1 out vss table { (v(inp)-v(inm))* 5000 } = (0,0) (3.2,3.2)
Rout out vss 10meg
Rinp inp vss 10meg
Rinm inm vss 10meg
.ends comp1
    
```

5

■ 3129557 0005183 616 ■

Soldering Packages to PC Boards

DIP Packages

Wave soldering is recommended for DIP packages. Solder plated boards are recommended. Rosin mildly activated (RMA) flux is needed. Wave soldering using a dual wave system at $250^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for two seconds per wave is preferable. Thorough cleaning of boards after soldering is required.

Hand soldering, Elantec's DIP packages will survive a peak temperature of 300°C (at leads) for a maximum period of 10 seconds.

Surface Mount Packages

Wave soldering and vapor phase or infrared (IR) reflow can be used for soldering surface mount packages to PC boards. Solder plated boards are recommended for wave soldering and vapor phase or IR reflow methods.

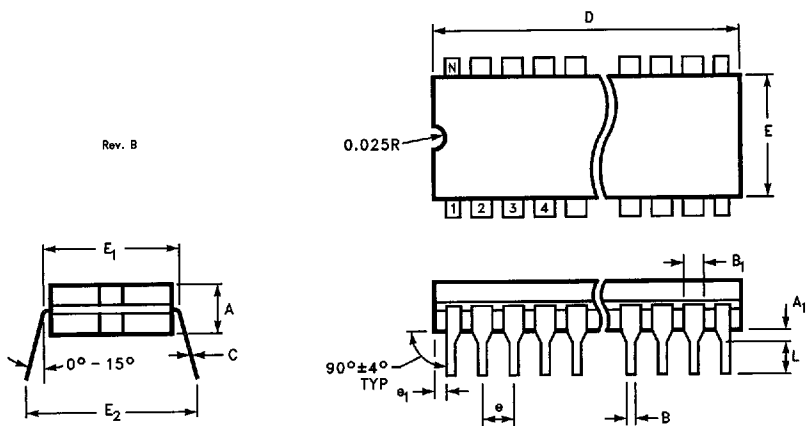
Wave Soldering: Adhesive is used to hold components on the boards during wave soldering. Place components on the board and cure adhesive

before wave soldering. Rosin mildly activated (RMA) flux or organic flux is needed. Wave soldering using a dual wave system at $250^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for a maximum of two seconds per wave is preferable. Thorough cleaning of boards after soldering is required.

Reflow Soldering: Screen solder paste on board and attach components to board. Solder paste with RMA flux is recommended. Bake boards at 65°C – 90°C for 15 minutes. Preheat boards to within 60°C – 70°C of the solder temperature. To reflow solder paste with vapor phase method, the solder paste temperature must be maintained at or above 200°C for at least 30 seconds. The components temperature can not exceed 215°C . For the IR reflow method, the solder paste temperature must be maintained at or above 200°C for at least 30 seconds. The components temperature can not exceed 220°C . The temperature/time ramp-up during vapor phase or IR reflow shall be no greater than $2^{\circ}\text{C}/\text{sec}$.

Hand soldering, Elantec's surface mount packages will survive a peak temperature of 260°C (at leads) for a maximum period of 10 seconds.

Package Outlines



Rev. B

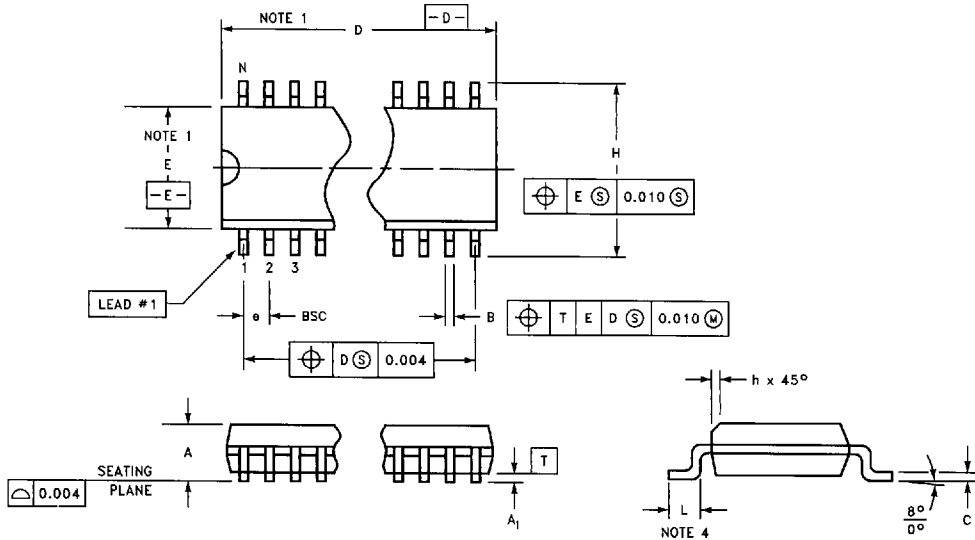
MDP0016 Rev. B

CerDIP Package

Lead Finish (Coml)—Tin Plate or Hot Solder DIP

Lead Finish (Mil)—Hot Solder DIP

Common Dimensions	Min	Max	Min	Max	Min	Max	Min	Max
A	0.140	0.160	0.140	0.160	0.140	0.160	0.140	0.160
A ₁	0.115	0.055	0.020	0.050	0.015	0.060	0.020	0.050
B	0.016	0.023	0.016	0.021	0.014	0.026	0.016	0.021
B ₁	0.050	0.065	0.050	0.060	0.038	0.068	0.050	0.060
C	0.008	0.012	0.008	0.012	0.008	0.018	0.008	0.012
D	0.375	0.395	0.760	0.785	0.940	0.960	1040.925	1.060
E	0.245	0.265	0.220	0.291	0.220	0.310	0.2780	0.298
E ₁	0.300	0.320	0.300	0.320	0.290	0.320	0.300	0.320
E ₂	0.340	0.390	0.340	0.390	0.360	0.410	0.340	0.390
e	0.090	0.110	0.090	0.110	0.090	0.110	0.090	0.110
e ₁	0.020	0.055	0.078	0.098	0.068	0.098	0.078	0.098
L	0.125	0.150	0.125	0.150	0.125	0.150	0.130	0.150
N	8-Lead		14-Lead		18-Lead		20-Lead	



REV. C

12

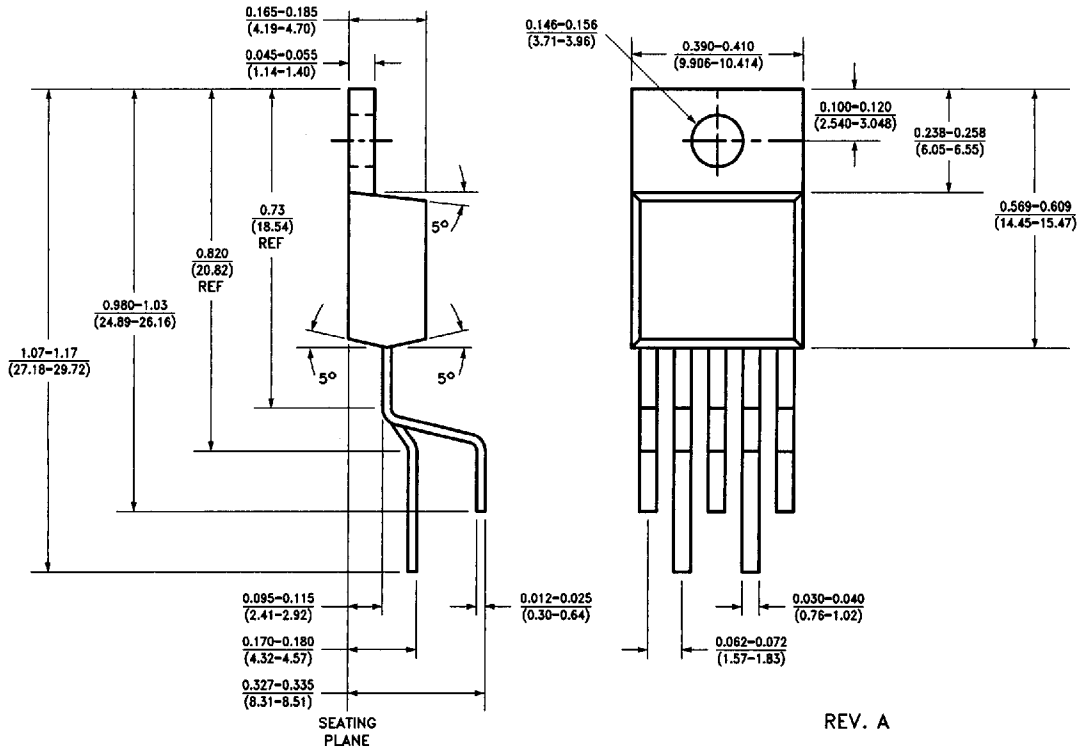
- Note 1: These dimensions do not include mold flash or protrusions. Mold flash protrusion shall not exceed .006" on any side.
- Note 2: SO-8, SO-14, SO-16 packages are narrow body (0.150").
- Note 3: Dimensions and tolerancing per ANSI Y14.5M-1982.
- Note 4: Flat area of lead foot.
- Note 5: SOL-24T2 (thermal package) has 2 fused leads on each side of package.
- Note 6: SOL-20T (thermal package) has 4 fused leads on each side of package.
- Note 7: SOL-28T contains a thermal metal slug.

MDP0027 Rev. C
Package Outline—SOIC
 Lead Finish—Solder Plate

Symbol	Lead Count													
	SOL-28		SOL-20		SOL-16		SO-16		SO-14		SO-8		SOL-24	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	0.096	0.104	0.096	0.104	0.096	0.104	0.061	0.068	0.061	0.068	0.061	0.068	0.096	0.104
A ₁	0.004	0.011	0.004	0.011	0.004	0.011	0.004	0.010	0.004	0.010	0.004	0.010	0.004	0.011
B	0.014	0.019	0.014	0.019	0.014	0.019	0.014	0.019	0.014	0.019	0.014	0.019	0.014	0.019
C	0.009	0.012	0.009	0.012	0.009	0.012	0.008	0.010	0.008	0.010	0.008	0.010	0.009	0.012
D	0.696	0.712	0.498	0.510	0.397	0.430	0.386	0.394	0.337	0.344	0.189	0.196	0.598	0.614
E	0.291	0.299	0.291	0.299	0.291	0.299	0.150	0.157	0.150	0.157	0.150	0.157	0.291	0.299
e	0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC	
H	0.398	0.414	0.398	0.414	0.398	0.414	0.230	0.244	0.230	0.244	0.230	0.244	0.398	0.414
h	0.010	0.016	0.010	0.016	0.010	0.016	0.010	0.016	0.010	0.016	0.010	0.016	0.010	0.016
L	0.016	0.024	0.016	0.024	0.016	0.024	0.016	0.024	0.016	0.024	0.016	0.024	0.016	0.024

3129557 0005559 T20

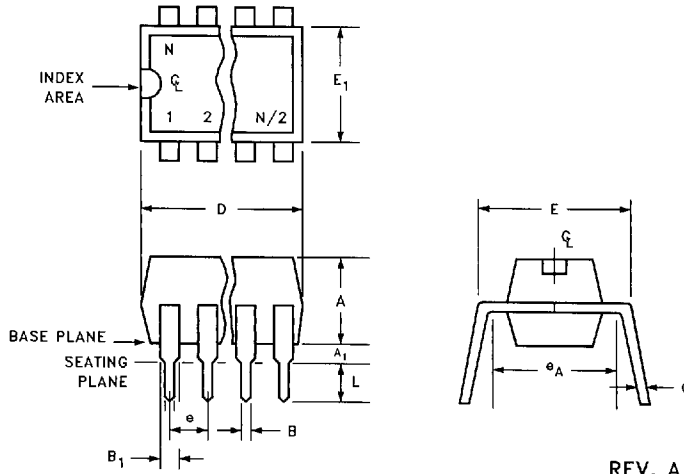
Package Outlines



REV. A

MDP0028 Rev. A
5-Lead TO-220
 Lead Finish—Solder Plate

3129557 0005560 742



REV. A

MDP0031 Rev. A
Plastic Package
Lead Finish—Hot Solder DIP

Common Dimensions	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A ₁	0.020	0.040	0.020	0.040	0.020	0.040	0.020	0.040	0.020	0.040
A	0.125	0.145	0.125	0.145	0.125	0.145	0.125	0.145	0.125	0.145
B	0.016	0.020	0.016	0.020	0.016	0.020	0.016	0.020	0.015	0.021
B ₁	0.050	0.070	0.050	0.070	0.050	0.070	0.050	0.070	0.050	0.070
C	0.008	0.012	0.008	0.012	0.008	0.012	0.008	0.012	0.008	0.012
D	0.350	0.385	0.745	0.755	0.745	0.755	0.875	0.905	0.925	1.045
E	0.295	0.320	0.295	0.320	0.295	0.320	0.295	0.320	0.295	0.320
E ₁	0.245	0.255	0.245	0.255	0.245	0.255	0.245	0.255	0.245	0.255
e	0.100 Typ		0.100 Typ		0.100 Typ		0.100 Typ		0.100 Typ	
e _A	0.300 Ref		0.300 Ref		0.300 Ref		0.300 Ref		0.300 Ref	
L	0.115	0.135	0.115	0.135	0.115	0.135	0.115	0.135	0.115	0.135
N	8		14		16		18		20	

Note: Package outline exclusive of any mold flashes. Mold flash protrusion shall not exceed 0.006" on any side.