Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

FAIRCHILD
SEMICONDUCTOR™

March 1998

100316
Low Power Quad Differential Line Driver with Cut-Off

General Description

The 100316 is a quad differential line driver with output cut-off capability. The outputs are designed to drive a doubly terminated 50Ω transmission line (25Ω equivalent impedance) in an ECL backplane. The 100316 is ideal for driving low noise, differential ECL backplanes. A LOW on the output enable (OE) will set both the true and complementary outputs into a high impedance or cut-off state, isolating them from the backplane. The cut-off state is designed to be more negative than a normal ECL LOW state.

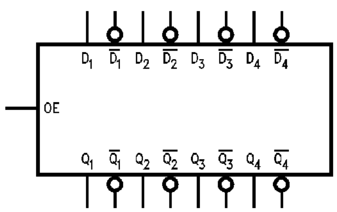
Unlike most 100K devices, the data inputs (D_n, $\overline{D}_n$) do not have input pull-down resistors. An internal reference supply (V_{BB}) is available for single-ended operation.

Features

- Differential inputs and outputs
- Output cut-off capability
- Drives 25Ω load
- V_{BB} available for single-ended operation
- 2000V ESD protection
- Voltage compensated operating range = −4.2V to −5.7V
- Available to industrial grade temperature range

Ordering Code:

Logic Symbol



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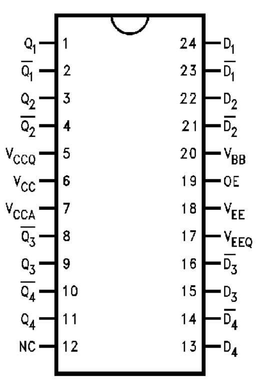
Pin Names	Description
D_n	Data Inputs
Q_n	Data Outputs
$\overline{Q}_n$	Complementary Data Outputs
OE	Output Enable

Connection Diagrams

24-Pin PCC



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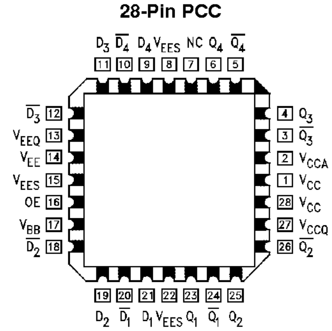
28-Pin PCC



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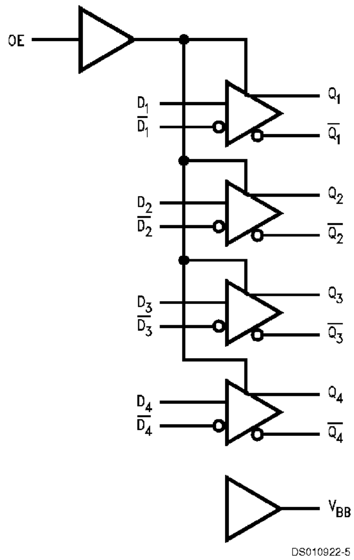
Logic Diagram



Truth Table

Inputs			Outputs	
D_n	$\overline{D}_n$	OE	Q_n	$\overline{Q}_n$
L	H	H	L	H
H	L	H	H	L
X	X	L	Cut-Off	Cut-Off

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Cut-Off = Lower-than-Low State

Absolute Maximum Ratings (Note 1)

Storage Temperature (T_{STG})	−65°C to +150°C
Maximum Junction Temperature (T_J)	
Ceramic	+175°C
Plastic	+150°C
Pin Potential to Ground Pin (V_{EE})	−7.0V to 0.5V
Input Voltage (DC)	V_{EE} to +0.5V
Output Current (DC Output HIGH)	−100 mA
ESD (Note 2)	≥2000V

Recommended Operating Conditions

Case Temperature (T_C)	
Commercial	0°C to +85°C
Industrial	−40°C to +85°C
Military	−55°C to +125°C
Supply Voltage (V_{EE})	−5.7V to −4.2V

Note 1: Absolute maximum ratings are those values beyond which the device may be damaged or have its useful life impaired. Function operation under these conditions is not implied.

Note 2: ESD testing conforms to MIL-STD-883, Method 3015.

Commercial Version DC Electrical Characteristics

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
V_{OH}	Output HIGH Voltage	−1025	−955	−870	mV	$V_{IN} = V_{IH\ (Max)}$	Loading with
V_{OL}	Output LOW Voltage	−1830	−1705	−1620	mV	or $V_{IL\ (Min)}$	25Ω to −2.0V
V_{OHC}	Output HIGH Voltage	−1035			mV	$V_{IN} = V_{IH\ (Min)}$	Loading with
V_{OLC}	Output LOW Voltage			−1610	mV	or $V_{IL\ (Max)}$	25Ω to −2.0V
V_{OLZ}	Cut-Off LOW Voltage			−1950	mV	$V_{IN} = V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	OE = LOW
V_{BB}	Output Reference Voltage	−1380	−1320	−1260	mV	I_{VBB} = −1 mA	
V_{DIFF}	Input Voltage Differential	150			mV	Required for Full Output Swing	
V_{CM}	Common Mode Voltage	V_{CC} − 2.0		V_{CC} − 0.5	V		
V_{IH}	Single-Ended Input High Voltage	−1110		−870	mV	Guaranteed HIGH Signal for All Inputs (with one input tied to V_{BB}) $V_{BB\ (Max)} + V_{DIFF}$	
V_{IL}	Single-Ended Input Low Voltage	−1830		−1530	mV	Guaranteed LOW Signal for All Inputs (with one input tied to V_{BB}) $V_{BB\ (Min)} - V_{DIFF}$	
I_{IL}	Input LOW Current	0.50			µA	$V_{IN} = V_{IL\ (Min)}$	
I_{IH}	Input HIGH Current D_N			250	µA	$V_{IN} = V_{IH\ (Max)}$, $D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{IHZ}	Input HIGH Current OE			360	µA	$V_{IN} = V_{IH\ (Max)}$, $D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{CBO}	Input Leakage Current	−10			µA	$V_{IN} = V_{EE}$, $D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{EE}	Power Supply Current, Normal	−85		−30	mA	$D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{EEZ}	Power Supply Current, Cut-Off	−152		−75	mA	D_1–$D_4 = V_{BB}$, $\overline{D}_1$–$\overline{D}_4 = V_{IL\ (Min)}$, OE = LOW	

Note 3: The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

Commercial Version
DIP AC Electrical Characteristics

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.65	2.30	0.65	2.30	0.65	2.30	ns	*Figures 1, 2*
t_{PZH} t_{PHZ}	Propagation Delay OE to Output	1.80 1.20	4.20 3.10	1.80 1.20	4.20 3.10	1.80 1.20	4.20 3.10	ns	
t_{TLH} t_{THL}	Transition Time, D_N to Q_N 20% to 80%, 80% to 20%	0.45	1.70	0.45	1.70	0.45	1.70	ns	

PCC AC Electrical Characteristics

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.65	2.10	0.65	2.10	0.65	2.10	ns	*Figures 1, 2*
t_{PZH} t_{PHZ}	Propagation Delay OE to Output	1.8 1.2	4.00 2.90	1.8 1.2	4.00 2.90	1.8 1.2	4.00 2.90	ns	
t_{TLH} t_{THL}	Transition Time, D_N to Q_N 20% to 80%, 80% to 20%	0.45	1.50	0.45	1.50	0.45	1.50	ns	

Industrial Version
PCC DC Electrical Characteristics

V_{EE} = –4.2V to –5.7V, V_{CC} = V_{CCA} = GND (Note 4)

Symbol	Parameter	T_C = –40°C		T_C = 0°C to +85°C		Units	Conditions	
		Min	Max	Min	Max			
V_{OH}	Output HIGH Voltage	–1085	–870	–1025	–870	mV	$V_{IN} = V_{IH\ (Max)}$	Loading with
V_{OL}	Output LOW Voltage	–1830	–1585	–1830	–1620	mV	or $V_{IL\ (Min)}$	25Ω to –2.0V
V_{OHC}	Output HIGH Voltage	–1095		–1035		mV	$V_{IN} = V_{IH\ (Min)}$	Loading with
V_{OLC}	Output LOW Voltage		–1575		–1610	mV	or $V_{IL\ (Max)}$	25Ω to –2.0V
V_{OLZ}	Cut-Off LOW Voltage		–1900		–1950	mV	OE = LOW, $V_{IN} = V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	
V_{BB}	Output Reference Voltage	–1395	–1255	–1380	–1260	mV	I_{VBB} = –1 mA	
V_{DIFF}	Input Voltage Differential	150		150		mV	Required for Full Output Swing	
V_{CM}	Common Mode Voltage	V_{CC} – 2.0	V_{CC} – 0.5	V_{CC} – 2.0	V_{CC} – 0.5	V		
V_{IH}	Single-Ended Input High Voltage	–1115	–870	–1110	–870	mV	Guaranteed HIGH Signal for All Inputs (with one input tied to V_{BB}) $V_{BB\ (Max)} + V_{DIFF}$	
V_{IL}	Single-Ended Input Low Voltage	–1830	–1535	–1830	–1530	mV	Guaranteed LOW Signal for All Inputs (with one input tied to V_{BB}) $V_{BB\ (Min)} - V_{DIFF}$	
I_{IL}	Input LOW Current	0.50		0.50		μA	$V_{IN} = V_{IL\ (Min)}$	
I_{IH}	Input HIGH Current, D_N		240		240	μA	$V_{IN} = V_{IH\ (Max)}$, $D_1 = V_{BB}$,	
I_{IHZ}	Input HIGH Current, OE		360		360		$\overline{D}_1 = V_{IL\ (Min)}$	
I_{CBO}	Input Leakage Current	–10		–10		μA	$V_{IN} = V_{EE}$, $D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{EE}	Power Supply Current, Normal	–85	–30	–85	–30	mA	$D_1 = V_{BB}$, $\overline{D}_1 = V_{IL\ (Min)}$	
I_{EEZ}	Power Supply Current, Cut-Off	–152	–75	–152	–75	mA	D_1–D_4 = V_{BB}, $\overline{D}_1$–$\overline{D}_4$ = $V_{IL\ (Min)}$, OE = LOW	

Note 4: The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

PCC AC Electrical Characteristics

V_{EE} = –4.2V to –5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = –40°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.65	2.10	0.65	2.10	0.65	2.10	ns	*Figures 1, 2*
t_{PZH}	Propagation Delay	1.80	4.00	1.80	4.00	1.80	4.00	ns	
t_{PHZ}	OE to Output	1.20	2.90	1.20	2.90	1.20	2.90		
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.45	1.50	0.45	1.50	0.45	1.50	ns	

Military Version—Preliminary
DC Electrical Characteristics (Note 7)

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	Min	Typ	Max	Units	T_C	Conditions		Notes
V_{OH}	Output HIGH Voltage	−1025		−870	mV	0°C to +125°C	V_{IN} = $V_{IH\ (Max)}$ or $V_{IL\ (Min)}$	Loading with 25Ω to −2.0V	(Notes 5, 6, 7)
		−1085		−870	mV	−55°C			
V_{OL}	Output LOW Voltage	−1830		−1620	mV	0°C to +125°C			
		−1830		−1555	mV	−55°C			
V_{OHC}	Output HIGH Voltage	−1035			mV	0°C to +125°C	V_{IN} = $V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	Loading with 25Ω to −2.0V	(Notes 5, 6, 7)
		−1085			mV	−55°C			
V_{OLC}	Output LOW Voltage			−1610	mV	0°C to +125°C			
				−1555	mV	−55°C			
V_{OLZ}	Cut-Off LOW Voltage			−1900	mV	0°C to +125°C	OE = LOW V_{IN} = $V_{IH\ (Min)}$ or $V_{IL\ (Max)}$		(Notes 5, 6, 7)
				−1950	mV	−55°C			
V_{BB}	Output Reference Voltage			−1260	mV	0°C to +125°C	I_{VBB} = 0 μA, V_{EE} = 4.2V		(Notes 5, 6, 7)
		−1380	−1320	−1260	mV	0°C to +125°C	I_{VBB} = −250 μA, V_{EE} = −5.7V		(Notes 5, 6, 7)
		−1396			mV	−55°C	I_{VBB} = −350 μA, V_{EE} = −5.7V		
V_{DIFF}	Input Voltage Differential	150			mV	−55°C to +125°C	Required for Full Output Swing		(Notes 5, 6, 7)
V_{CM}	Common Mode Voltage	V_{CC} − 2.0		V_{CC} − 0.5	V	−55°C to +125°C			(Notes 5, 6, 7)
V_{IH}	Single-Ended Input High Voltage	−1165		−870	mV	−55°C to +125°C	Guaranteed HIGH Signal for All Inputs (with $\overline{D_n}$ tied to V_{BB})		(Notes 5, 6, 7, 8)
V_{IL}	Single-Ended Input Low Voltage	−1830		−1475	mV	−55°C to +125°C	Guaranteed LOW Signal for All Inputs (with $\overline{D_n}$ tied to V_{BB})		(Notes 5, 6, 7, 8)
I_{IH}	Input HIGH Current, D_N			75	μA	0°C to +125°C	V_{IN} = $V_{IH\ (Max)}$, D_1 = V_{BB}, $\overline{D}_1$ = $V_{IL\ (Min)}$		(Notes 5, 6, 7)
				95	μA	−55°C			
I_{IHZ}	Input HIGH Current, OE			360	μA	−55°C to +125°C	V_{IN} = $V_{IH\ (Max)}$, D_1 = V_{BB}, $\overline{D}_1$ = $V_{IL\ (Min)}$		(Notes 5, 6, 7)
I_{CBO}	Input Leakage Current	−10			μA	−55°C to +125°C	V_{IN} = V_{EE}, D_1 = V_{BB}, $\overline{D}_1$ = $V_{IL\ (Min)}$		(Notes 5, 6, 7)
I_{EE}	Power Supply Current, Normal	−90		−30	mA	−55°C to +125°C	D_1 = V_{BB}, $\overline{D}_1$ = $V_{IL\ (Min)}$		(Notes 5, 6, 7)
I_{EEZ}	Power Supply Current, Cut-Off	−180		−75	mA	−55°C to +125°C	D_1–D_2 = V_{BB}, $\overline{D}_1$–$\overline{D}_2$ = $V_{IL\ (Min)}$, OE = LOW		(Notes 5, 6, 7)

Note 5: F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals −55°C), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

Note 6: Screen tested 100% on each device at −55°C, +25°C, and +125°C, Subgroups 1, 2, 3, 7, and 8.

Note 7: Sample tested (Method 5005, Table I) on each manufactured lot at −55°C, +25°C, and +125°C, Subgroups A1, 2, 3, 7, and 8.

Note 8: Guaranteed by applying specified input condition and testing V_{OH}/V_{OL}.

Military Version—Preliminary
AC Electrical Characteristics

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = −55˚C		T_C = +25˚C		T_C = +125˚C		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.40	2.50	0.50	2.40	0.50	2.90	ns	*Figures 1, 2*	(Notes 9, 10, 11)
t_{PZH} t_{PHZ}	Propagation Delay OE to Output	0.70 0.70	4.20 3.20	0.70 0.70	4.20 3.20	0.70 0.70	4.20 3.20	ns		
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.20	1.70	0.20	1.70	0.20	1.50	ns		(Note 12)

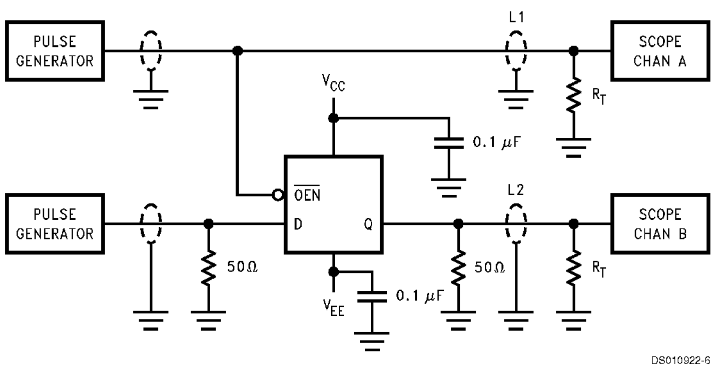
Note 9: F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals −55˚C), then testing immediately after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

Note 10: Screen tested 100% on each device at +25˚C temperature only, Subgroup A9.

Note 11: Sample tested (Method 5005, Table I) on each manufactured lot at +25˚C, Subgroup A9, and at +125˚C and −55˚C temperatures, Subgroups A10 and A11.

Note 12: Not tested at +25˚C, +125˚C and −55˚C temperature (design characterization data).

Test Circuitry



Notes:
V_{CC}, V_{CCA} = +2V, V_{EE} = −2.5V
L1 and L2 = equal length 50Ω impedance lines
R_T = 50Ω terminator internal to scope
Decoupling 0.1 µF from GND to $V_{CC}$and V_{EE}
All unused outputs are loaded with 25Ω to GND
C_L = Fixture and stray capacitance ≤ 3 pF

FIGURE 1. AC Test Circuit

Switching Waveforms

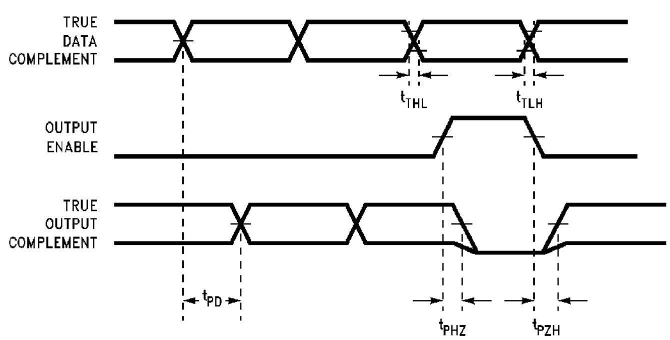
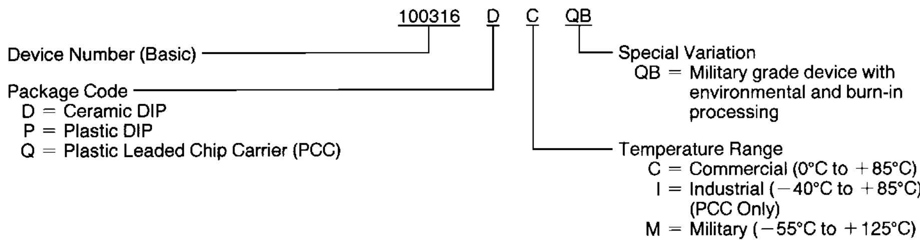


FIGURE 2. Propagation Delay, Cut-Off and Transition Times

Ordering Information

The device number is used to form part of a simplified purchasing code where a package type and temperature range are defined as follows:



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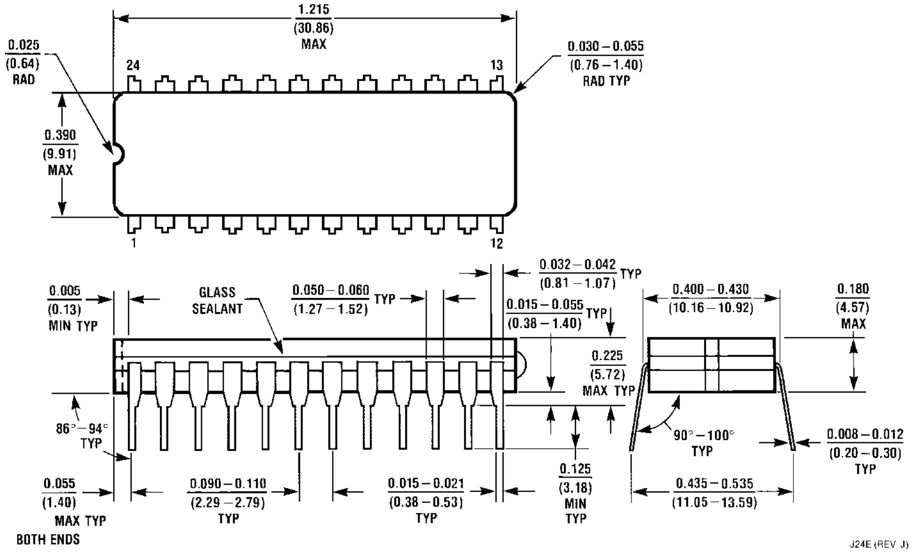
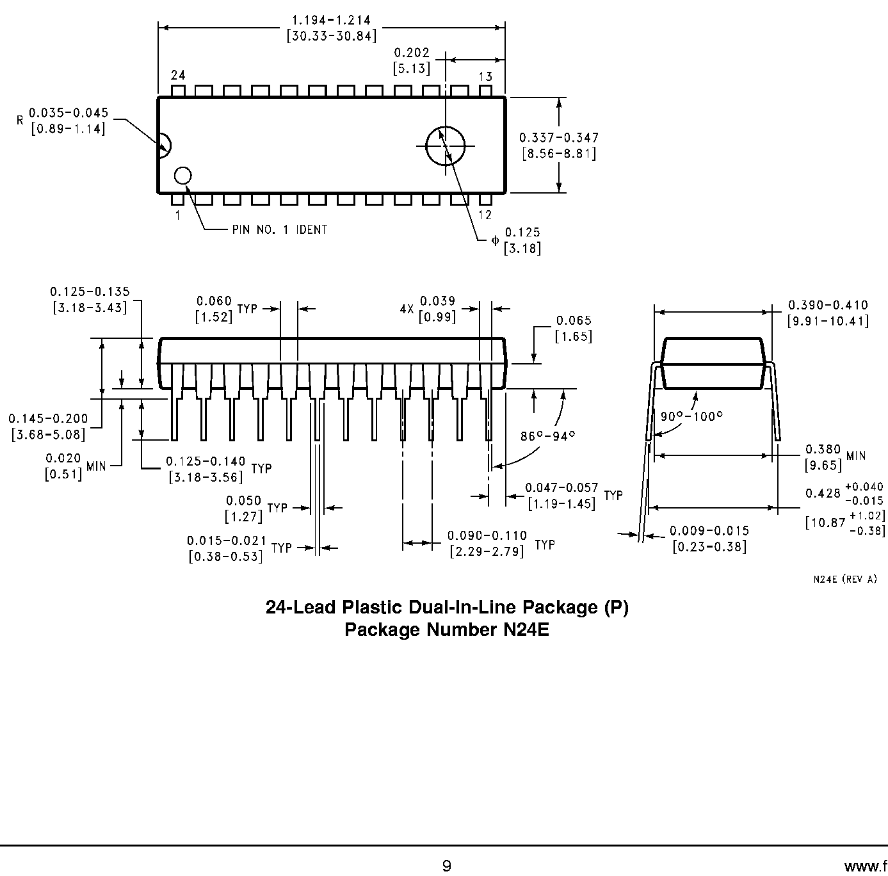
Physical Dimensions inches (millimeters) unless otherwise noted

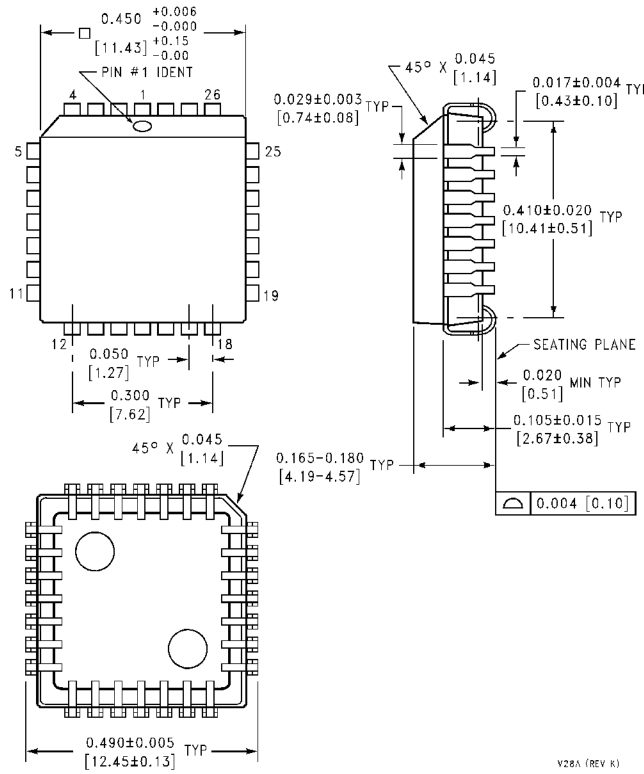


24-Lead Ceramic Dual-In-Line Package (0.400" Wide) (D)
Package Number J24E



24-Lead Plastic Dual-In-Line Package (P)
Package Number N24E

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



28-Lead Plastic Chip Carrier (Q)
Package Number V28A

LIFE SUPPORT POLICY

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