

100390

Low Power Single Supply Hex ECL-to-TTL Translator

General Description

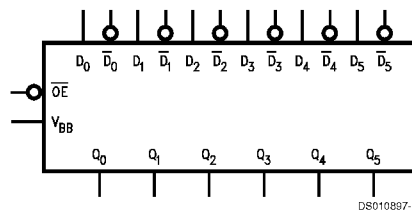
The 100390 is a hex translator for converting F100K logic levels to TTL logic levels. Unlike other level translators, the 100390 operates using only one +5V supply. Differential inputs allow each circuit to be used as an inverting, noninverting, or differential receiver. An internal reference generator provides V_{BB} for single-ended operation. The standard FAST® 3-STATE outputs are enabled by a common active low TTL compatible \overline{OE} input. Partitioned V_{CC} s on chip are brought out on separate power pins, allowing the noisy TTL

V_{CC} power plane to be isolated from the relatively quiet ECL V_{CC} . The 100390 is ideal for applications limited to a single +5V supply, allowing for easy ECL to TTL interfacing.

Features

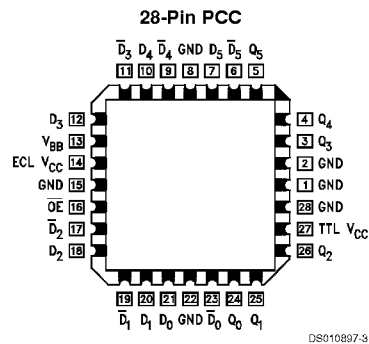
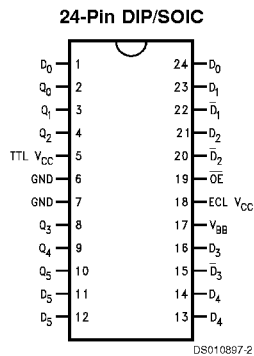
- Operates from a single +5V supply
- 3-STATE outputs
- 2000V ESD protection
- V_{BB} supplied for single-ended operation

Logic Symbol



Pin Names	Description
D_0 – D_5	Data Inputs (PECL)
\overline{D}_0 – \overline{D}_5	Inverting Data Inputs (PECL)
Q_0 – Q_5	Data Outputs (TTL)
\overline{OE}	Output Enable (TTL)
V_{BB}	Reference Voltage (PECL)

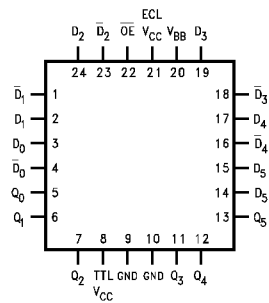
Connection Diagrams



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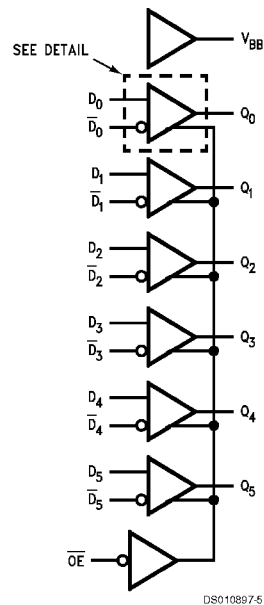
Connection Diagrams (Continued)

24-Pin Quad Cerpak



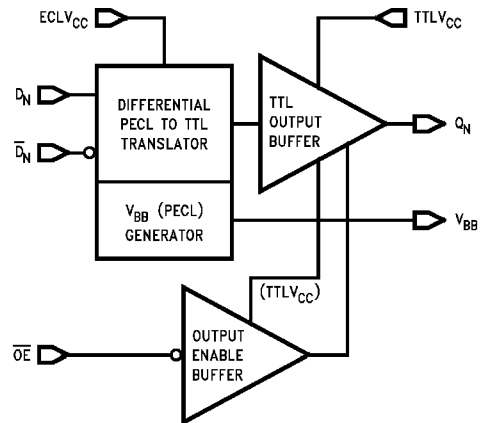
DS010897-4

Logic Diagram



DS010897-5

Detail



DS010897-11

Truth Table

Data Inputs (PECL)		Control Input (TTL)	TTL Outputs	Comments
D_n	\overline{D}_n	\overline{OE}	Q_n	
X	X	H	Z	Outputs Disable
L	H	L	L	Differential Operation
H	L	L	H	Differential Operation
L	L	L	U	Invalid Input States
H	H	L	U	Invalid Input States
OPEN	OPEN	L	U	Invalid Input States
L	V_{BB}	L	L	Single Ended Operation
H	V_{BB}	L	H	Single Ended Operation
V_{BB}	L	L	H	Single Ended Operation
V_{BB}	H	L	L	Single Ended Operation
V_{BB}	OPEN	L	H	Single Ended Operation
OPEN	V_{BB}	L	L	Single Ended Operation

H = HIGH Voltage Level
 L = LOW Voltage Level
 Z = HIGH Impedance
 U = Undefined

Absolute Maximum Ratings (Note 1)

Storage Temperature	-65°C to +150°C
Maximum Junction Temperature	
Ceramic	+175°C
Plastic	+150°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
TTL Input Voltage (Note 2)	-0.5V to +7.0V
TTL Input Current (Note 2)	-30 mA to +5.0 mA
V _{BB} Output Current	-5.0 mA to +1.0 mA
ECL Input Potential	GND to ECL V _{CC} + 0.5V
V _{CC} Differential ECL V _{CC} to TTL V _{CC}	-1.0V to +1.0V
Voltage Applied to Output	

in High State (with V _{CC} = 0V)	
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in Low State (Max)	Twice the Rated I _{OL} (mA)
ESD Last Passing Voltage (Min)	2000V

Recommended Operating Conditions

Case Temperature	0°C to +85°C
Supply Voltage	+4.75V to +5.25V

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

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

ECL V_{CC} = +5.0V ±5%, TTL V_{CC} = +5.0V ±5%, GND = 0V

Symbol	Parameter		Min	Max	Units	Conditions
V _{IH}	Input HIGH Voltage	Data	ECL V _{CC} - 1.165	ECL V _{CC} - 0.870	V	Guaranteed HIGH Signal for ALL Inputs (with One Input Tied to V _{BB})
		\overline{OE}	2.0		V	Guaranteed HIGH Signal (TTL)
V _{IL}	Input LOW Voltage	Data	ECL V _{CC} - 1.830	ECL V _{CC} - 1.475	V	Guaranteed LOW Signal for ALL Inputs (with One Input Tied to V _{BB})
		\overline{OE}		0.8	V	Guaranteed LOW Signal (TTL)
V _{BB}	Output Reference Voltage		ECL V _{CC} - 1.38	ECL V _{CC} - 1.26	V	I _{BB} = 0.0 mA or -1.0 mA
V _{OH}	Output HIGH Voltage (TTL)		2.7		V	I _{OH} = -3 mA
V _{OL}	Output LOW Voltage (TTL)			0.5	V	I _{OL} = 24 mA
I _{IH}	Input HIGH Current	Data		50	μA	V _{IN} = V _{IH} (Max), D ₀ -D ₅ = V _{BB} , $\overline{D_0}-\overline{D_5}$ = V _{IL} (Min)
		\overline{OE}		20	μA	V _{IN} = 2.7V (TTL)
I _{IL}	Input LOW Current	\overline{OE}		-200	μA	V _{IN} = 0.5V (TTL)
I _{BVI}	Input Breakdown Current	\overline{OE}		10	μA	V _{IN} = 7.0V (TTL)
I _{CBO}	Input Leakage Current		-10		μA	V _{IN} = GND, D ₀ -D ₅ = V _{BB} , $\overline{D_0}-\overline{D_5}$ = V _{IL} (Min)
I _{OZH}	3-STATE Current Output HIGH			50	μA	V _{OUT} = +2.7V
I _{OZL}	3-STATE Current Output LOW			-50	μA	V _{OUT} = +0.5V
I _{CC}	ECL Supply Current		13	30	mA	
I _{CCZ}	TTL Supply Current		10	20	mA	3-STATE
I _{CCL}	TTL Supply Current		8	17	mA	Low State
I _{CCH}	TTL Supply Current HIGH		0.4	2.0	mA	HIGH State
I _{OS}	Output Short-Circuit Current		-150	-60	mA	V _{OUT} = 0.0V, V _{CC} = +5.25
V _{Diff}	Differential Input Voltage		150		mV	Required for Full Output Swing
V _{CM}	Common Mode Voltage		ECL V _{CC} - 2.0	ECL V _{CC} - 0.5	V	
V _{CD}	Clamp Diode Voltage			-1.2	V	I _{IN} = -18 mA

DIP AC Electrical Characteristics

$V_{CC} = 5.0V \pm 5\%$; $T_C = 0^\circ C$ to $+85^\circ C$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Fig. No.
		Min	Max	Min	Max	Min	Max		
F_{MAX}	Maximum Clock Frequency	100		100		100		MHz	
t_{PLH}	Propagation Delay	3.5	7.2	3.5	6.8	3.5	6.7	ns	Figure 1
t_{PHL}	Data to Output								
t_{PZH}	Output Enable Time	2.7	4.8	2.7	4.8	3.0	5.1	ns	Figure 2
t_{PZL}		2.4	4.0	2.4	4.0	2.6	4.2		
t_{PHZ}	Output Disable Time	2.9	5.8	2.9	5.4	2.7	5.1	ns	Figure 2
t_{PLZ}		2.3	3.9	2.2	3.9	2.2	3.9		

SOIC, Cerpak and PCC Package AC Electrical Characteristics

$V_{CC} = 5.0V \pm 5\%$; $T_C = 0^\circ C$ to $+85^\circ C$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Fig. No.
		Min	Max	Min	Max	Min	Max		
F_{MAX}	Maximum Clock Frequency	100		100		100		MHz	
t_{PLH}	Propagation Delay	3.5	7.0	3.5	6.6	3.5	6.5	ns	Figure 1
t_{PHL}	Data to Output								
t_{PZH}	Output Enable Time	2.7	4.6	2.7	4.6	3.0	4.9	ns	Figure 2
t_{PZL}		2.4	3.8	2.4	3.8	2.6	4.0		
t_{PHZ}	Output Disable Time	2.9	5.6	2.9	5.2	2.7	4.9	ns	Figure 2
t_{PLZ}		2.3	3.7	2.2	3.7	2.2	3.7		

Switching Waveforms

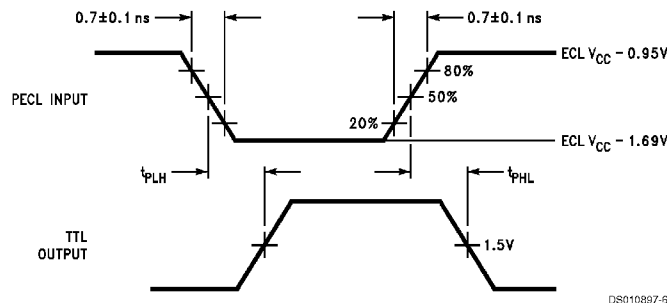


FIGURE 1. Data to Output Propagation Delay

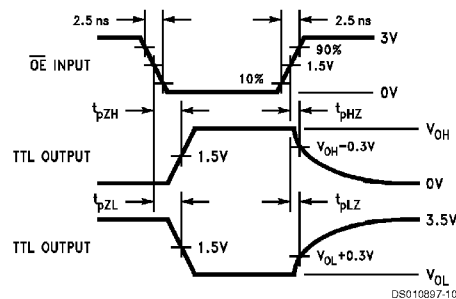


FIGURE 2. Enable/Disable Propagation Delay

Application Notes (Continued)

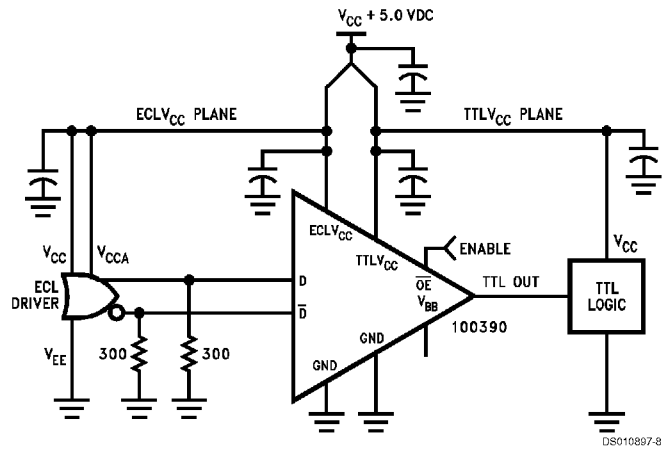


FIGURE 4.

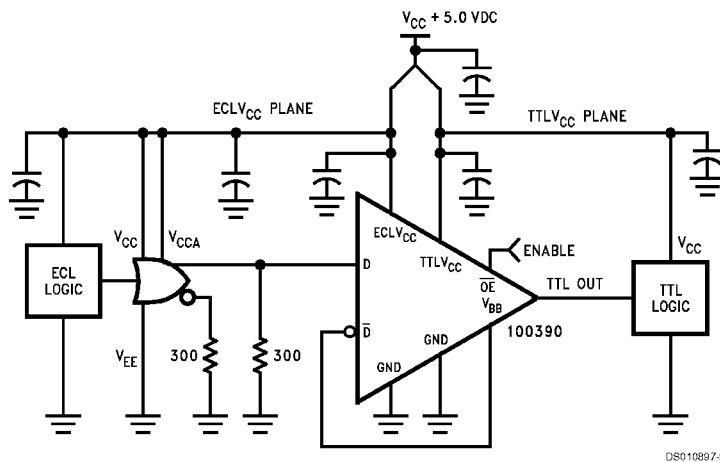
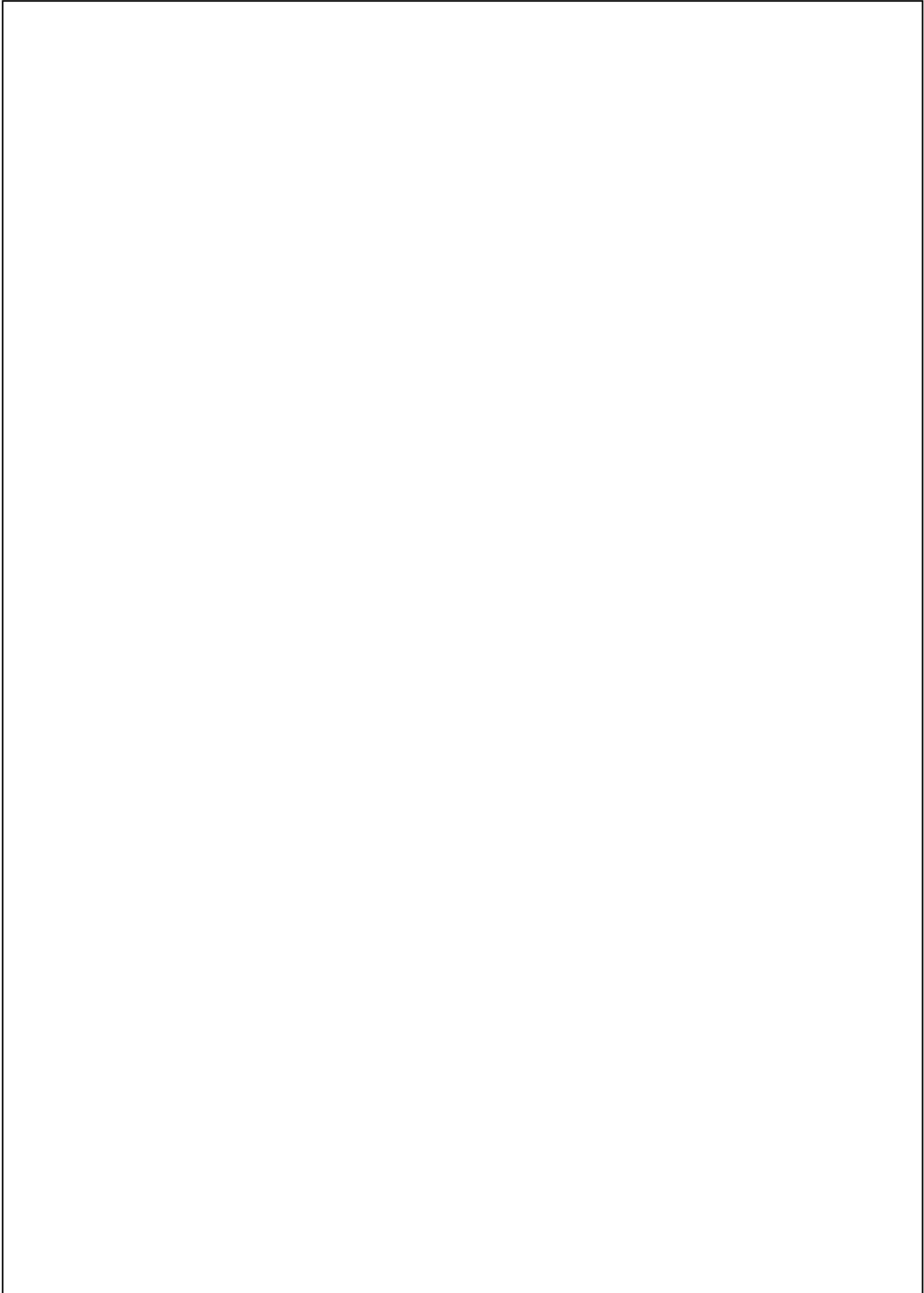
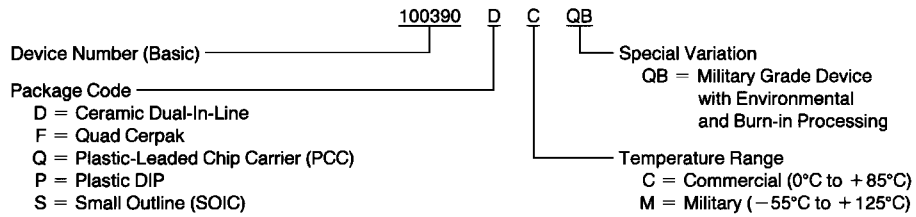


FIGURE 5.



Ordering Information

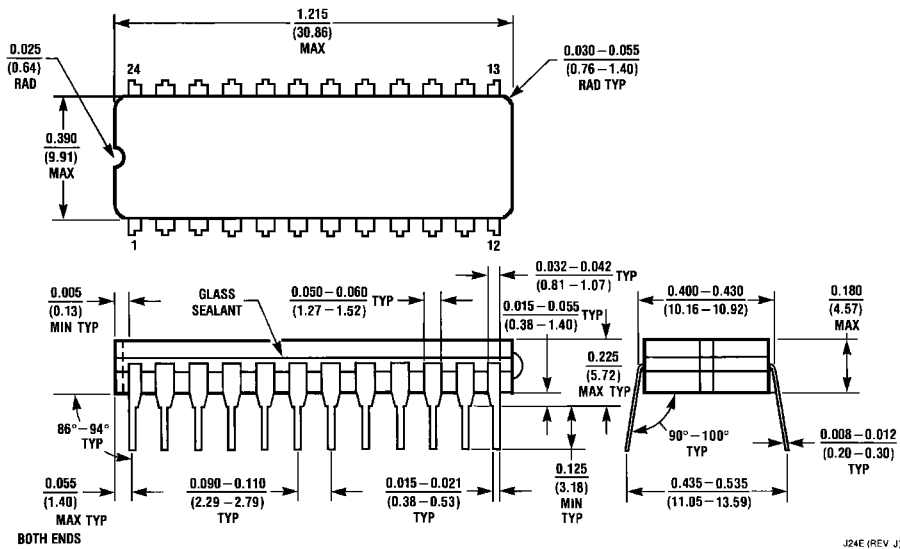
The device number is used to form part of a simplified purchasing code where a package type and temperature range are defined as follows:



DS010897-12

Physical Dimensions

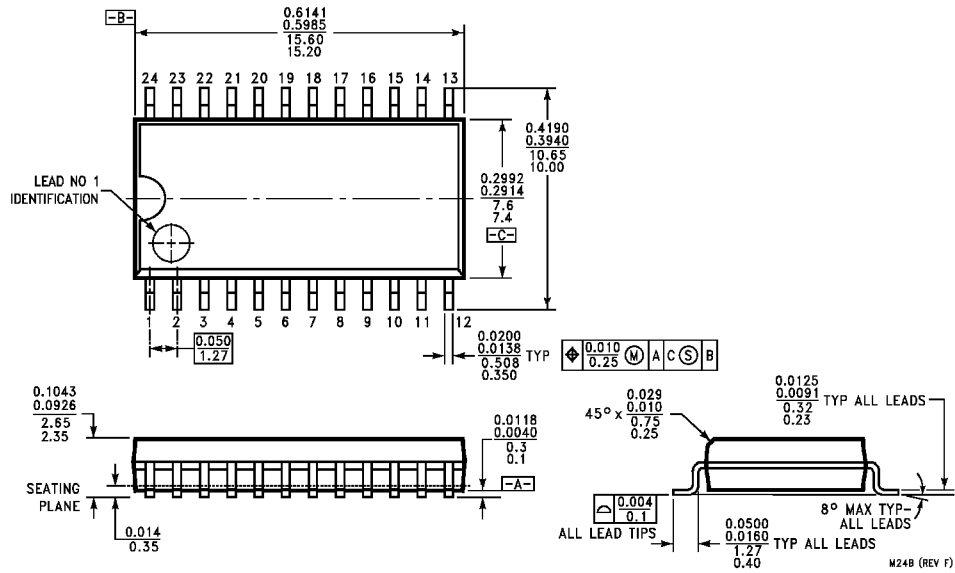
inches (millimeters) unless otherwise noted



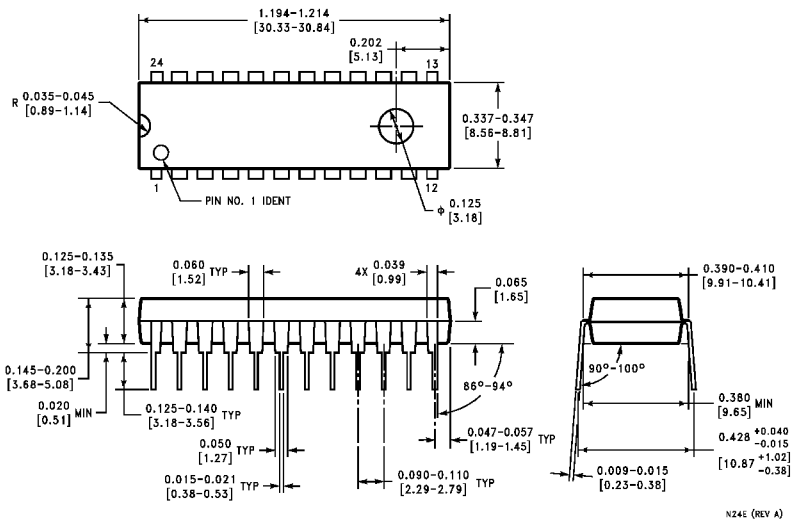
J24E (REV. J)

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

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

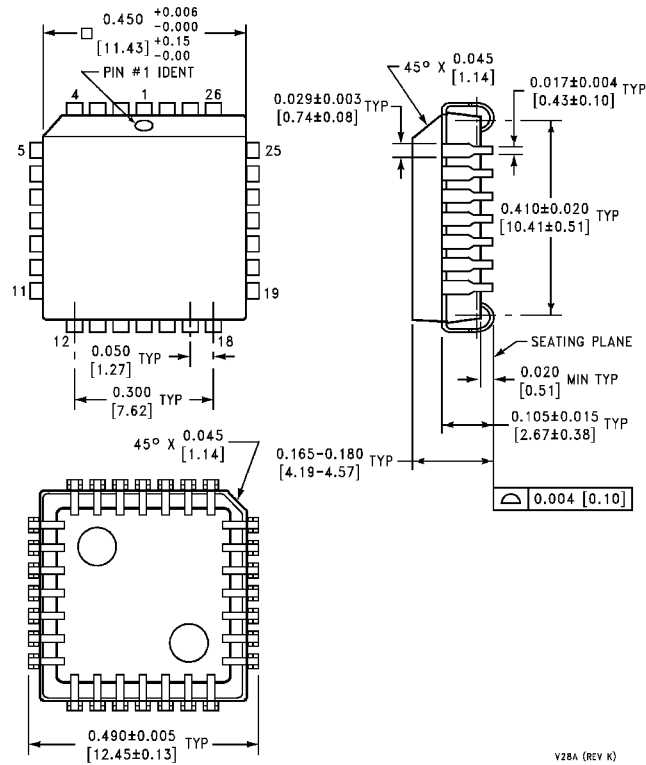


**24-Lead Molded Package
(0.300" Wide) (S)
Package Number M24B**



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

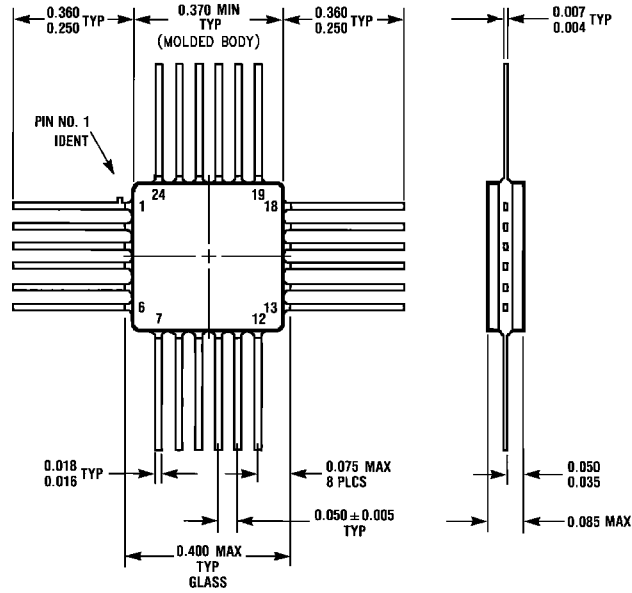
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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

V28A (REV K)

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



W24B (REV D)

**24-Lead Quad Cerpak (F)
Package Number W24B**

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Fairchild Semiconductor Corporation
Americas
Customer Response Center
Tel: 1-888-522-5372

Fairchild Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 8 141-35-0
English Tel: +44 (0) 1 793-85-68-56
Italy Tel: +39 (0) 2 57 5631

Fairchild Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: +852 2737-7200
Fax: +852 2314-0061

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

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