



MOTOROLA

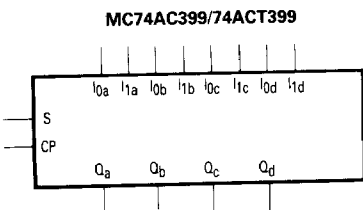
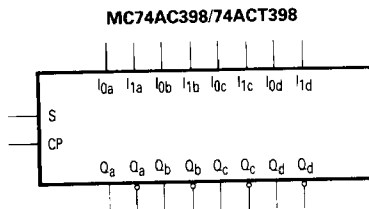
Product Preview

Quad 2-Port Register

The MC74AC398/74ACT398 and MC74AC399/74ACT399 are the logical equivalents of a quad 2-input multiplexer feeding into four edge-triggered flip-flops. A common Select input determines which of the two 4-bit words is accepted. The selected data enters the flip-flop on the rising edge of the clock. The MC74AC399/74ACT399 is the 16-pin version of the MC74AC398/74ACT398, with only the Q outputs of the flip-flops available.

- Select Inputs from Two Data Sources
- Fully Positive Edge-Triggered Operation
- Both True and Complement Outputs — MC74AC398/74ACT398
- Outputs Source/Sink 24 mA
- 'ACT398 and 'ACT399 Have TTL Compatible Inputs

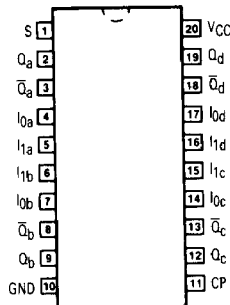
LOGIC SYMBOL



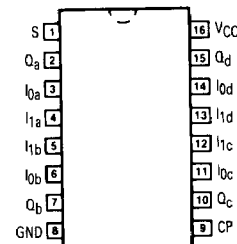
PIN NAMES

- S Common Select Input
- CP Clock Pulse
- I_{0a}-I_{0d} Data Inputs from Source 0
- I_{1a}-I_{1d} Data Inputs from Source 1
- Q_a-Q_d Register True Outputs
- Q_a-Q_d Register Complementary Outputs (MC74AC398/74ACT398)

MC74AC398/74ACT398

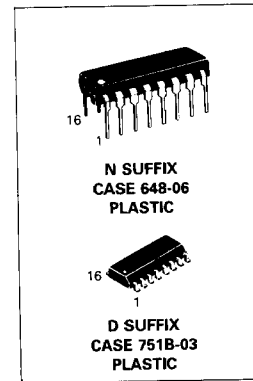
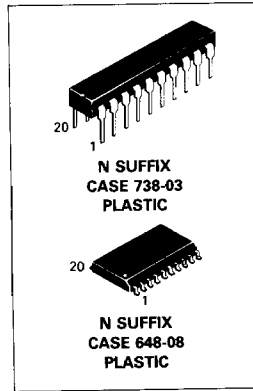


MC74AC399/74ACT399



**MC74AC398
MC74ACT398
MC74AC399
MC74ACT399**

**QUAD
2-PORT REGISTER**



This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

FUNCTIONAL DESCRIPTION

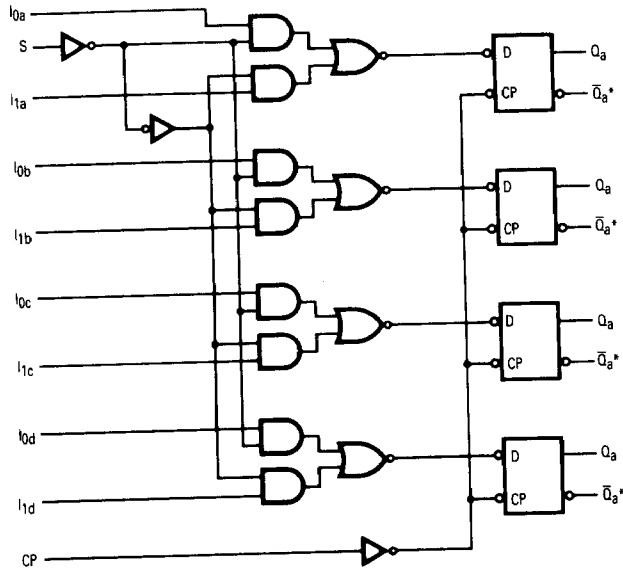
The MC74AC398/74ACT398 and MC74AC399/74ACT399 are high-speed quad 2-port registers. They select four bits of data from either of two sources (Ports) under control of a common Select input (S). The selected data is transferred to a 4-bit output register synchronous with the LOW-to-HIGH transition of the Clock input (CP). The 4-bit D-type output register is fully edge-triggered. The Data inputs (I_{0X} , I_{1X}) and Select input (S) must be stable only a setup time prior to and hold time after the LOW-to-HIGH transition of the Clock input for predictable operation. The MC74AC398/74ACT398 has both Q and \bar{Q} outputs.

FUNCTION TABLE

S	Inputs			Outputs	
	I_0	I_1	CP	Q	\bar{Q}^*
L	L	X	┐	L	H
L	H	X	┐	H	L
H	X	L	┐	L	H
H	X	H	┐	H	L

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 ┐ = LOW-to-HIGH Clock Transition
 * = MC74AC398/74ACT398 only

LOGIC DIAGRAM



*MC74AC398/74ACT398

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

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MC74AC398 • MC74ACT398 • MC74AC399 • MC74ACT399

DC CHARACTERISTICS (unless otherwise specified)

Symbol	Parameter	Value	Units	Test Conditions
I _{CC}	Maximum Quiescent Supply Current	80	μA	V _{IN} = V _{CC} or Ground, V _{CC} = 5.5 V, T _A = Worst Case
I _{CC}	Maximum Quiescent Supply Current	8.0	μA	V _{IN} = V _{CC} or Ground, V _{CC} = 5.5 V, T _A = 25°C
I _{CC(T)}	Maximum Additional I _{CC} /Input (*ACT398/399)	1.5	mA	V _{IN} = V _{CC} - 2.1 V, V _{CC} = 5.5 V, T _A = Worst Case

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Units	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
f _{max}	Maximum Clock Frequency	3.3 5.0		180 160			MHz	3-3	
t _{PLH}	Propagation Delay CP to Q ₀ or \bar{Q}	3.3 5.0		9.5 7.0			ns	3-6	
t _{PHL}	Propagation Delay CP to Q ₀ or \bar{Q}	3.3 5.0		8.5 6.0			ns	3-6	

*Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Symbol	Parameter	V _{CC} * (V)	74AC		74AC		Units	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Typ	Guaranteed Minimum				
t _s	Setup Time, HIGH or LOW I _n to CP	3.3 5.0	4.5 3.0				ns	3-9
t _h	Hold Time, HIGH or LOW I _n to CP	3.3 5.0	0 0				ns	3-9
t _s	Setup Time, HIGH or LOW S to CP (*398)	3.3 5.0	4.5 3.0				ns	3-9
t _s	Setup Time, HIGH or LOW S to CP (*399)	3.3 5.0	4.5 3.0				ns	3-9
t _h	Hold Time, HIGH or LOW S to CP	3.3 5.0	-1.5 -1.0				ns	3-9
t _w	CP Pulse Width HIGH or LOW	3.3 5.0	5.5 4.0				ns	3-6

*Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Units	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
f _{max}	Input Clock Frequency	5.0		160				MHz	3-3
t _{PLH}	Propagation Delay CP to Q _n or \bar{Q}	5.0		7.0				ns	3-6
t _{PHL}	Propagation Delay CP to Q _n or \bar{Q}	5.0		6.0				ns	3-6

*Voltage Range 5.0 is 5.0 V ± 0.5 V

AC OPERATING REQUIREMENTS

Symbol	Parameter	V _{CC} * (V)	74ACT		74ACT		Units	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Typ	Guaranteed Minimum				
t _s	Setup Time, HIGH or LOW I _n to CP	5.0	3.0				ns	3-9
t _h	Hold Time, HIGH or LOW I _n to CP	5.0	0				ns	3-9
t _s	Setup Time, HIGH or LOW S to CP ('398)	5.0	3.0				ns	3-9
t _s	Setup Time, HIGH or LOW S to CP ('399)	5.0	3.0				ns	3-9
t _h	Hold Time, HIGH or LOW S to CP	5.0	-1.0				ns	3-9
t _w	CP Pulse Width HIGH or LOW	5.0	5.5				ns	3-6

*Voltage Range 5.0 is 5.0 V ± 0.5 V

CAPACITANCE

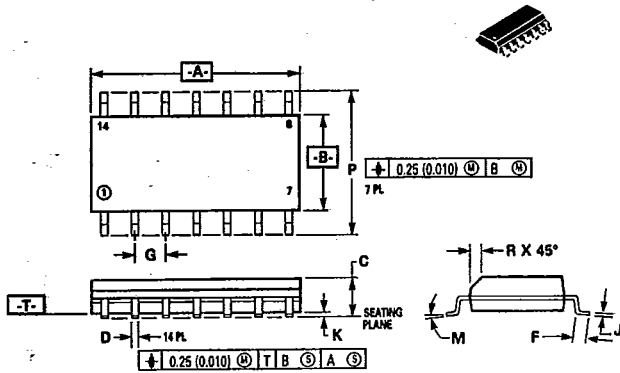
Symbol	Parameter	Value Typ	Units	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
CPD	Power Dissipation Capacitance		pF	V _{CC} = 5.0 V

T-90-20

PACKAGE OUTLINES

SOIC

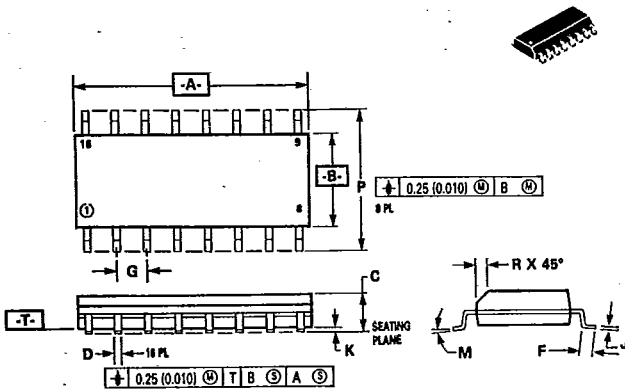
Case 751A-02 D Suffix
14-Pin Plastic
SO-14



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. CONTROLLING DIMENSION: MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

Case 751B-03 D Suffix
16-Pin Plastic
SO-16



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. CONTROLLING DIMENSION: MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

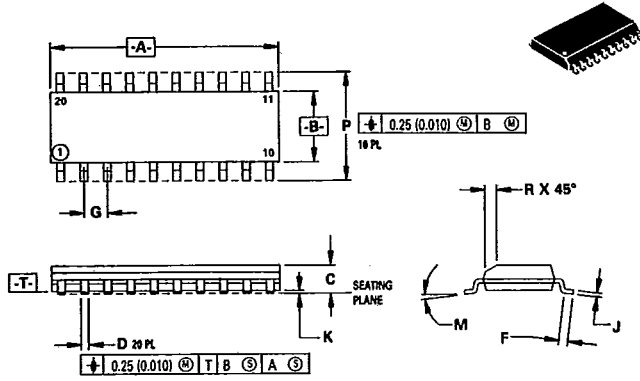
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FACT DATA

T-90-20

SOIC (continued)

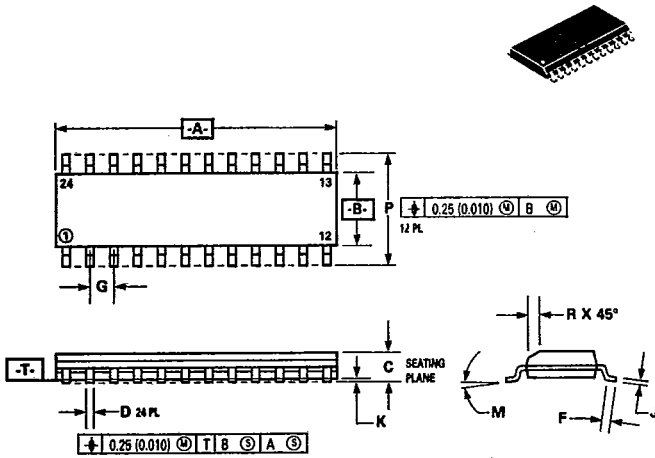
Case 751D-03 DW Suffix
20-Pin Plastic
SO-20



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. CONTROLLING DIMENSION: MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

Case 751E-02 DW Suffix
24-Pin Plastic
SO-24



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. CONTROLLING DIMENSION: MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	15.25	15.50	0.601	0.610
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

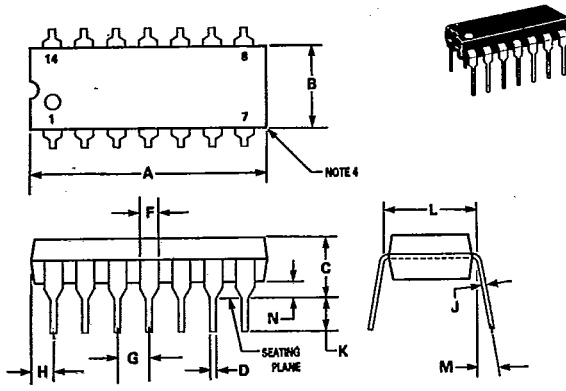
FACT DATA

T-90-20

PLASTIC DUAL-IN-LINE

Case 646-06 N Suffix
14-Pin Plastic

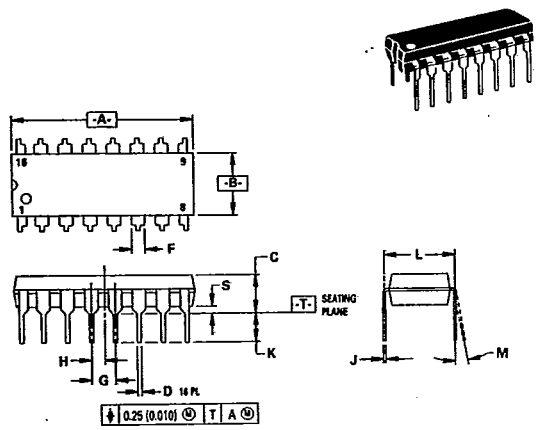
- NOTES:
- LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
 - DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
 - DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
 - ROUNDED CORNERS OPTIONAL.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.16	19.56	0.715	0.770
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.32	2.41	0.052	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.39	1.01	0.015	0.039

Case 648-08 N Suffix
16-Pin Plastic

- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 - CONTROLLING DIMENSION: INCH.
 - DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
 - DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
 - ROUNDED CORNERS OPTIONAL.



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	19.55	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.90	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

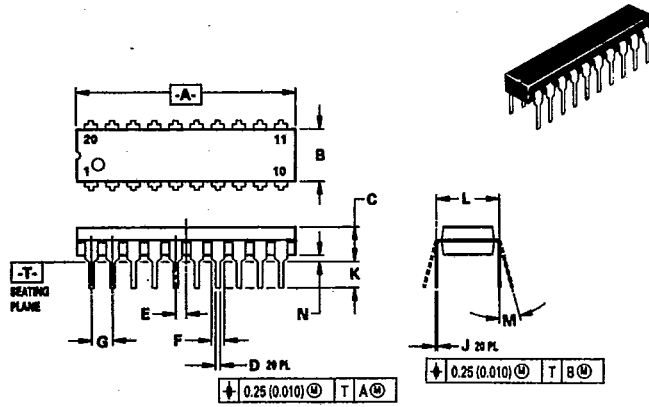
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FACT DATA

T-90-20

PLASTIC DUAL-IN-LINE (continued)

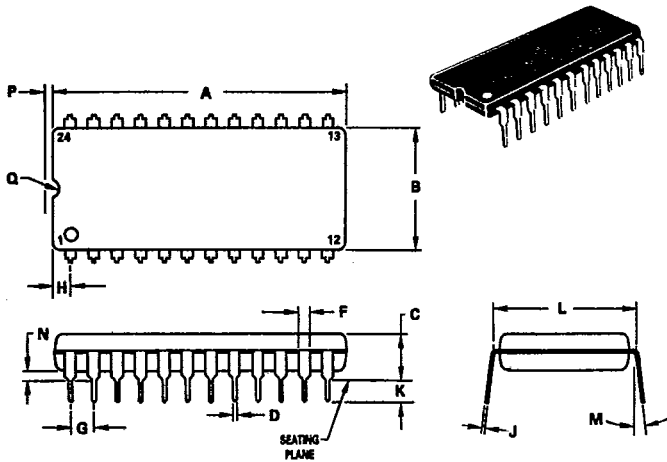
Case 738-03 N Suffix
20-Pin Plastic



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION "L" TO CENTER OF LEAD WHEN FORMED PARALLEL.
 4. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	25.65	27.17	1.010	1.070
B	6.10	6.60	0.240	0.260
C	3.81	4.57	0.150	0.180
D	0.39	0.55	0.015	0.022
E	1.27 BSC		0.050 BSC	
F	1.27	1.77	0.050	0.070
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.55	0.110	0.140
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

Case 649-03 N Suffix
24-Pin Plastic



- NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
 2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.50	32.13	1.240	1.265
B	13.21	13.72	0.520	0.540
C	4.70	5.21	0.185	0.205
D	0.38	0.51	0.015	0.020
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.65	2.16	0.065	0.085
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	14.99	15.49	0.590	0.610
M		10°		10°
N	0.51	1.02	0.020	0.040
P	0.13	0.38	0.005	0.015
Q	0.51	0.76	0.020	0.030

FACT DATA