

## High Speed Triple Line Receiver

The MC10216 is a high speed triple differential amplifier designed for use in sensing differential signals over long lines. The base bias supply ( $V_{BB}$ ) is made available at pin 11 to make the device useful as a Schmitt trigger, or in other applications where a stable reference voltage is necessary.

Active current sources provide the MC10216 with excellent common mode noise rejection. If any amplifier in a package is not used, one input of that amplifier must be connected to  $V_{BB}$  (pin 11) to prevent upsetting the current source bias network.

Complementary outputs are provided to allow driving twisted pair lines, to enable cascading of several amplifiers in a chain, or simply to provide complement outputs of the input logic function.

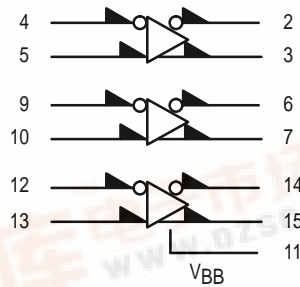
$$P_D = 100 \text{ mW typ/pkg (No Load)}$$

$$t_{pd} = 1.8 \text{ ns typ (Single ended)}$$

$$= 1.5 \text{ ns typ (Differential)}$$

$$t_r, t_f = 1.5 \text{ ns typ (20\%–80\%)}$$

### LOGIC DIAGRAM

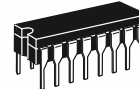


$V_{CC1} = \text{PIN 1}$   
 $V_{CC2} = \text{PIN 16}$   
 $V_{EE} = \text{PIN 8}$

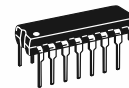
\* $V_{BB}$  to be used to supply bias to the MC10216 only and bypassed (when used) with 0.01  $\mu\text{F}$  to 0.1  $\mu\text{F}$  capacitor.

When the input pin with bubble goes positive, it's respective output pin with bubble goes positive.

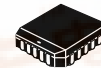
## MC10216



**L SUFFIX**  
 CERAMIC PACKAGE  
 CASE 620-10

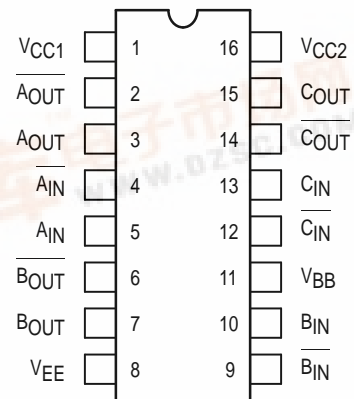


**P SUFFIX**  
 PLASTIC PACKAGE  
 CASE 648-08



**FN SUFFIX**  
 PLCC  
 CASE 775-02

### DIP PIN ASSIGNMENT



Pin assignment is for Dual-in-Line Package.  
 For PLCC pin assignment, see the Pin Conversion  
 Tables on page 6-36 of the Motorola MECL Data  
 Book (DL122/D).

# MC10216

## ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	Test Limits							Unit
			-30°C		+25°C			+85°C		
			Min	Max	Min	Typ	Max	Min	Max	
Power Supply Drain Current	$I_E$	8		27		20	25		27	mAdc
Input Current	$I_{inH}$	4		180			115		115	$\mu$ Adc
	$I_{CBO}$	4 9		1.5 1.5			1.0 1.0		1.0 1.0	$\mu$ Adc
Output Voltage Logic 1	$V_{OH}$	2	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	Vdc
		3	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	
Output Voltage Logic 0	$V_{OL}$	2	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	Vdc
		3	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	
Threshold Voltage Logic 1	$V_{OHA}$	2	-1.080		-0.980			-0.910		Vdc
		3	-1.080		-0.980			-0.910		
Threshold Voltage Logic 0	$V_{OLA}$	2		-1.655			-1.630		-1.595	Vdc
		3		-1.655			-1.630		-1.595	
Reference Voltage	$V_{BB}$	11	-1.420	-1.280	-1.350		-1.230	-1.295	-1.150	Vdc
Switching Times (50 $\Omega$ Load)										ns
Propagation Delay	$t_{4+2+}$	2	1.0	2.6	1.0	1.8*	2.5	1.0	2.8	
	$t_{4-2-}$	2	1.0	2.6	1.0	1.8*	2.5	1.0	2.8	
	$t_{4+3-}$	3	1.0	2.6	1.0	1.8*	2.5	1.0	2.8	
	$t_{4-3+}$	3	1.0	2.6	1.0	1.8*	2.5	1.0	2.8	
Rise Time (20 to 80%)	$t_{2+}$	2	1.0	2.6	1.0	1.5	2.5	1.0	2.8	
	$t_{3+}$	3	1.0	2.6	1.0	1.5	2.5	1.0	2.8	
Fall Time (20 to 80%)	$t_{2-}$	2	1.0	2.6	1.0	1.5	2.5	1.0	2.8	
	$t_{3-}$	3	1.0	2.6	1.0	1.5	2.5	1.0	2.8	

\* Delay is 1.5ns when inputs are driven differentially.  
 Delay is 1.8ns when inputs are driven single ended.

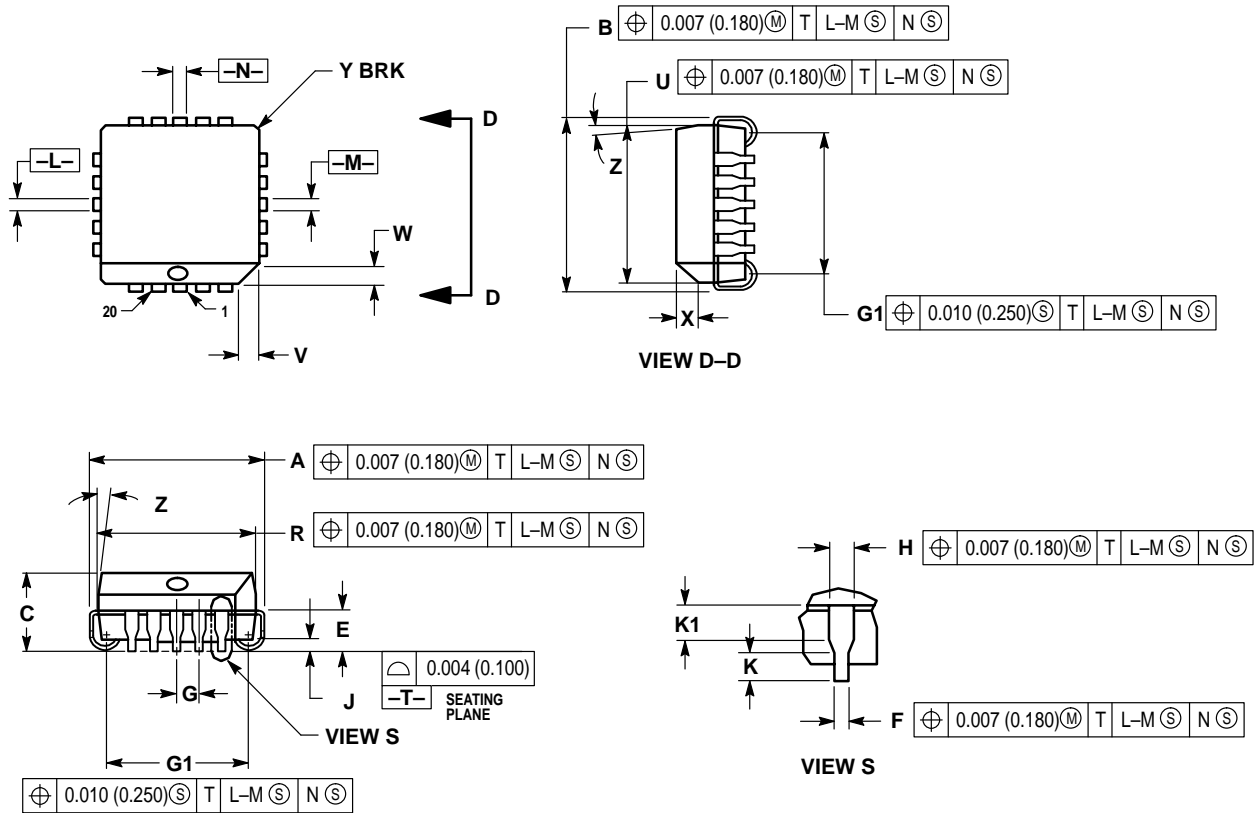
## ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)							
			V <sub>IHmax</sub>	V <sub>ILmin</sub>	V <sub>IHAmin</sub>	V <sub>ILAmax</sub>	V <sub>BB</sub>	V <sub>EE</sub>		
@ Test Temperature										
			-30°C	-0.890	-1.890	-1.205	-1.500	From Pin 11	-5.2	
			+25°C	-0.810	-1.850	-1.105	-1.475		-5.2	
			+85°C	-0.700	-1.825	-1.035	-1.440		-5.2	
Characteristic	Symbol	Pin Under Test	TEST VOLTAGE APPLIED TO PINS LISTED BELOW						(V <sub>CC</sub> ) Gnd	
			V <sub>IHmax</sub>	V <sub>ILmin</sub>	V <sub>IHAmin</sub>	V <sub>ILAmax</sub>	V <sub>BB</sub>	V <sub>EE</sub>		
Power Supply Drain Current	I <sub>E</sub>	8	4, 9, 12					5, 10, 13	8	1, 16
Input Current	I <sub>inH</sub>	4	4	9, 12				5, 10, 13	8	1, 16
	I <sub>CBO</sub>	4 9		9, 12 4, 12				5, 10, 13 5, 10, 13	8, 4 8, 9	1, 16
Output Voltage	Logic 1	V <sub>OH</sub>	2	4	9, 12			5, 10, 13	8	1, 16
			3	9, 12	4			5, 10, 13	8	1, 16
Output Voltage	Logic 0	V <sub>OL</sub>	2	9, 12	4			5, 10, 13	8	1, 16
			3	4	9, 12			5, 10, 13	8	1, 16
Threshold Voltage	Logic 1	V <sub>OHA</sub>	2		9, 12	4		5, 10, 13	8	1, 16
			3	9, 12		4	4	5, 10, 13	8	1, 16
Threshold Voltage	Logic 0	V <sub>OLA</sub>	2		9, 12		4	5, 10, 13	8	1, 16
			3	9, 12		4	4	5, 10, 13	8	1, 16
Reference Voltage	V <sub>BB</sub>	11						5, 10, 13	8	1, 16
Switching Times	(50Ω Load)					Pulse In	Pulse Out		-3.2 V	+2.0 V
Propagation Delay	t <sub>4+2+</sub> t <sub>4-2-</sub> t <sub>4+3-</sub> t <sub>4-3+</sub>	2				4	2	5, 10, 13	8	1, 16
		2				4	2	5, 10, 13	8	1, 16
		3				4	3	5, 10, 13	8	1, 16
		3				4	3	5, 10, 13	8	1, 16
Rise Time	(20 to 80%)	t <sub>2+</sub> t <sub>3+</sub>	2			4	2	5, 10, 13	8	1, 16
			3			4	3	5, 10, 13	8	1, 16
Fall Time	(20 to 80%)	t <sub>2-</sub> t <sub>3-</sub>	2			4	2	5, 10, 13	8	1, 16
			3			4	3	5, 10, 13	8	1, 16

Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50-ohm resistor to -2.0 volts. Test procedures are shown for only one gate. The other gates are tested in the same manner.

OUTLINE DIMENSIONS

FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 775-02  
ISSUE C



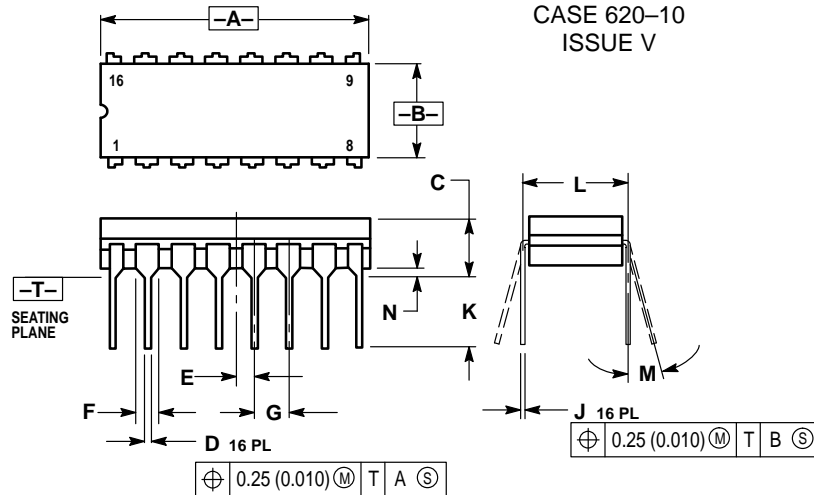
NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.385	0.395	9.78	10.03
B	0.385	0.395	9.78	10.03
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	—	0.51	—
K	0.025	—	0.64	—
R	0.350	0.356	8.89	9.04
U	0.350	0.356	8.89	9.04
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	—	0.020	—	0.50
Z	2°	10°	2°	10°
G1	0.310	0.330	7.88	8.38
K1	0.040	—	1.02	—

OUTLINE DIMENSIONS

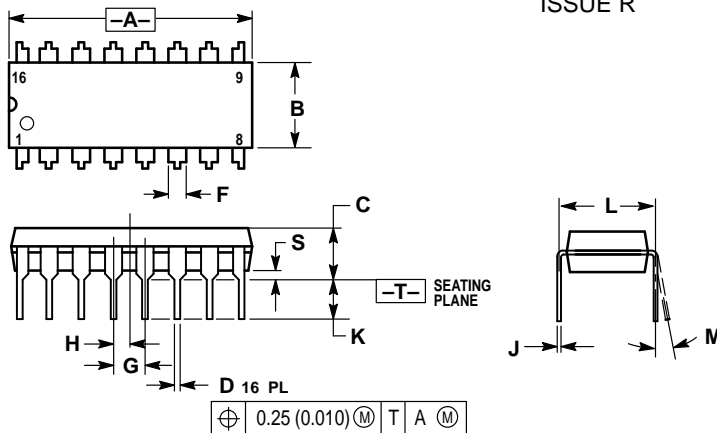
L SUFFIX  
CERAMIC DIP PACKAGE  
CASE 620-10  
ISSUE V



- 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 F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.750	0.785	19.05	19.93
B	0.240	0.295	6.10	7.49
C	—	0.200	—	5.08
D	0.015	0.020	0.39	0.50
E	0.050 BSC		1.27 BSC	
F	0.055	0.065	1.40	1.65
G	0.100 BSC		2.54 BSC	
H	0.008	0.015	0.21	0.38
K	0.125	0.170	3.18	4.31
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

P SUFFIX  
PLASTIC DIP PACKAGE  
CASE 648-08  
ISSUE R



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

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