Quad TTL to MECL Translator

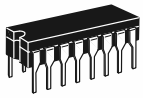
MC10124

The MC10124 is a quad translator for interfacing data and control signals between a saturated logic section and the MECL section of digital systems. The MC10124 has TTL compatible inputs, and MECL complementary open–emitter outputs that allow use as an inverting/ non–inverting translator or as a differential line driver. When the common strobe input is at the low logic level, it forces all true outputs to a MECL low logic state and all inverting outputs to a MECL high logic state.

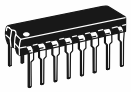
Power supply requirements are ground, +5.0 Volts, and –5.2 Volts. Propagation delay of the MC10124 is typically 3.5 ns. The dc levels are standard or Schottky TTL in, MECL 10,000 out.

An advantage of this device is that TTL level information can be transmitted differentially, via balanced twisted pair lines, to the MECL equipment, where the signal can be received by the MC10115 or MC10116 differential line receivers. The MC10124 is useful in computers, instrumentation, peripheral controllers, test equipment, and digital communications systems.

P_D = 380 mW typ/pkg (No Load)
t_{pd} = 3.5 ns typ (+ 1.5 Vdc in to 50% out)
t_r, t_f = 2.5 ns typ (20%–80%)



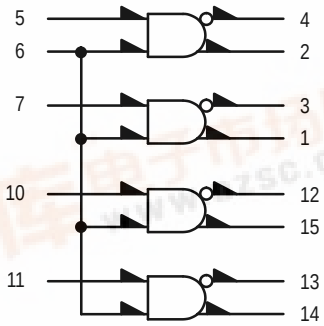
L SUFFIX
CERAMIC PACKAGE
CASE 620–10



P SUFFIX
PLASTIC PACKAGE
CASE 648–08

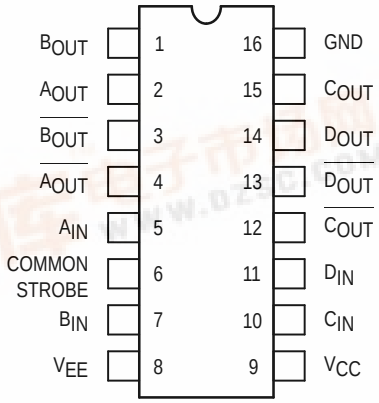
FN SUFFIX
PLCC
CASE 775–02

LOGIC DIAGRAM



Gnd = PIN 16
V_{CC} (+5.0Vdc) = PIN 9
V_{EE} (–5.2Vdc) = PIN 8

DIP PIN ASSIGNMENT



Pin assignment is for Dual–in–Line Package.
For PLCC pin assignment, see the Pin Conversion Tables on page 6–11 of the Motorola MECL Data Book (DL122/D).

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	Test Limits							Unit
			–30°C		+25°C			+85°C		
			Min	Max	Min	Typ	Max	Min	Max	
Negative Power Supply Drain Current	I_E	8		72			66		72	mAdc
Positive Power Supply Drain Current	I_{CCH}	9		16			16		18	mAdc
	I_{CCL}	9		25			25		25	mAdc
Reverse Current	I_R	6 7		200 50			200 50		200 50	μAdc
Forward Current	I_F	6 7		–12.8 –3.2			–12.8 –3.2		–12.8 –3.2	mAdc
Input Breakdown Voltage	BV_{in}	6 7	5.5 5.5		5.5 5.5			5.5 5.5		Vdc
Clamp Input Voltage	V_I	6 7		–1.5 –1.5			–1.5 –1.5		–1.5 –1.5	Vdc
High Output Voltage	V_{OH}	1 3	–1.060 –1.060	–0.890 –0.890	–0.960 –0.960		–0.810 –0.810	–0.890 –0.890	–0.700 –0.700	Vdc
Low Output Voltage	V_{OL}	1 3	–1.890 –1.890	–1.675 –1.675	–1.850 –1.850		–1.650 –1.650	–1.825 –1.825	–1.615 –1.615	Vdc
High Threshold Voltage	V_{OHA}	1 3	–1.080 –1.080		–0.980 –0.980			–0.910 –0.910		Vdc
Low Threshold Voltage	V_{OLA}	1 3		–1.655 –1.655			–1.630 –1.630		–1.595 –1.595	Vdc
Switching Times (50Ω Load)										ns
Propagation Delay (+3.5Vdc to 50%)[1]	t_{6+1+} t_{6-1-} t_{7+1+} t_{7-1-} t_{7+3-} t_{7-3+}	1 1 1 1 3 3	1.5 1.0 1.5 1.0 1.5 1.0	6.8 6.0 6.8 6.0 6.8 6.0	1.0 1.0 1.0 1.0 1.0 1.0	3.5 3.5 3.5 3.5 3.5 3.5	6.0 6.0 6.0 6.0 6.0 6.0	1.0 1.5 1.0 1.5 1.0 1.5	6.0 6.8 6.0 6.8 6.0 6.8	
Rise Time (20 to 80%)	t_{1+}	1	1.0	4.2	1.1	2.5	3.9	1.1	4.3	
Fall Time (20 to 80%)	t_{1-}	1	1.0	4.2	1.1	2.5	3.9	1.1	4.3	

1. See switching time test circuit. Propagation delay for this circuit is specified from +1.5Vdc in to the 50% point on the output waveform. The +3.5Vdc is shown here because all logic and supply levels are shifted 2 volts positive.

ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)					
		@ Test Temperature	V_{IH}	V_{ILmax}	$V_{IHA'}$	$V_{ILA'}$	V_F	
		–30°C	+4.0	+0.40	+2.00	+1.10	+0.40	
		+25°C	+4.0	+0.40	+1.80	+1.10	+0.40	
		+85°C	+4.0	+0.40	+1.80	+0.90	+0.40	
Characteristic	**Symbol**	**Pin Under Test**	**TEST VOLTAGE APPLIED TO PINS LISTED BELOW**					
			V_{IH}	V_{ILmax}	$V_{IHA'}$	$V_{ILA'}$	V_F	**Gnd**
Negative Power Supply Drain Current	I_E	8						16
Positive Power Supply Drain Current	I_{CCH}	9	5,6,7,10,11					16
	I_{CCL}	9						5,6,7,10,11,16
Reverse Current	I_R	6 7					5,7,10,11 6	16 16
Forward Current	I_F	6 7	5,7,10,11 6				6 7	16 16
Input Breakdown Voltage	BV_{in}	6 7						5,7,10,11,16 6,16
Clamp Input Voltage	V_I	6 7						16 16
High Output Voltage	V_{OH}	1 3	6,7	6,7				16 16
Low Output Voltage	V_{OL}	1 3	6,7	6,7				16 16
High Threshold Voltage	V_{OHA}	1 3	6 6		7	7		16 16
Low Threshold Voltage	V_{OLA}	1 3	6 6		7	7		16 16
Switching Times (50Ω Load)			**+6.0 V**	**Pulse In**	**Pulse Out**			**+2.0 V**
Propagation Delay (+3.5Vdc to 50%)[1]	t_{6+1+}	1	7	6	1			16
	t_{6-1-}	1	7	6	1			16
	t_{7+1+}	1	6	7	1			16
	t_{7-1-}	1	6	7	1			16
	t_{7+3-}	3	6	7	3			16
	t_{7-3+}	3	6	7	3			16
Rise Time (20 to 80%)	t_{1+}	1	6	7	1			16
Fall Time (20 to 80%)	t_{1-}	1	6	7	1			16

1. See switching time test circuit. Propagation delay for this circuit is specified from +1.5Vdc in to the 50% point on the output waveform. The +3.5Vdc is shown here because all logic and supply levels are shifted 2 volts positive.

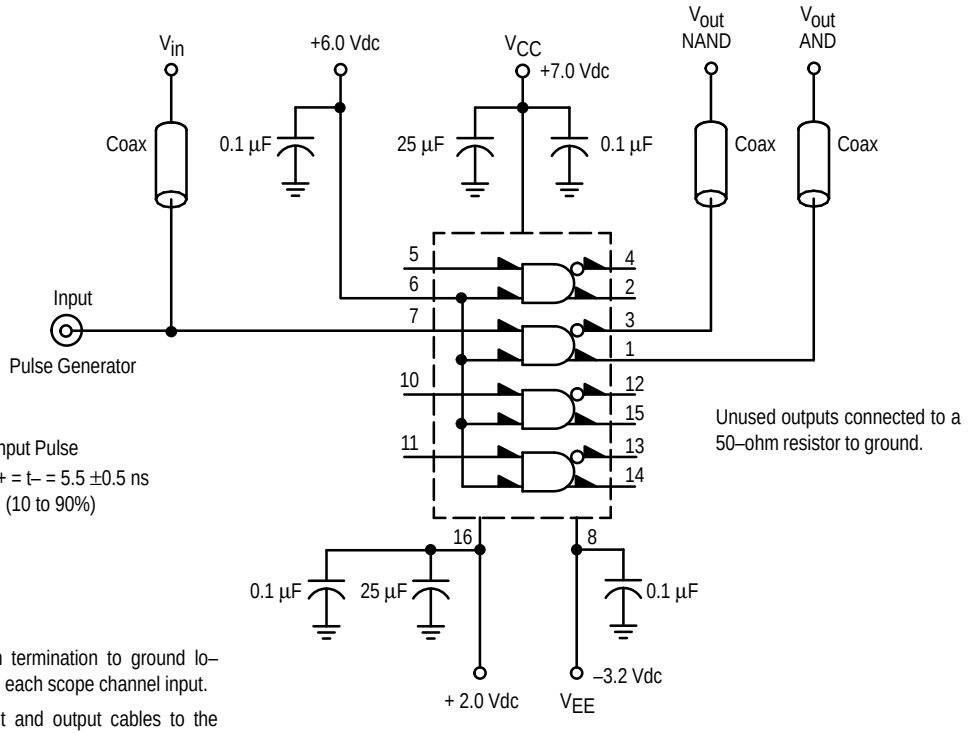
ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)			(mA)		
		@ Test Temperature	V_R	V_{CC}	V_{EE}	I_I	I_{in}	
		–30°C	+2.40	+5.00	–5.2	–10	+1.0	
		+25°C	+2.40	+5.00	–5.2	–10	+1.0	
		+85°C	+2.40	+5.00	–5.2	–10	+1.0	
Characteristic	**Symbol**	**Pin Under Test**	**TEST VOLTAGE APPLIED TO PINS LISTED BELOW**					
			V_R	V_{CC}	V_{EE}	I_I	I_{in}	**Gnd**
Negative Power Supply Drain Current	I_E	8		9	8			16
Positive Power Supply Drain Current	I_{CCH}	9		9	8			16
	I_{CCL}	9		9	8			5,6,7,10,11,16
Reverse Current	I_R	6 7	6 7	9 9	8 8			16 16
Forward Current	I_F	6 7		9 9	8 8			16 16
Input Breakdown Voltage	BV_{in}	6 7		9 9	8 8		6 7	5,7,10,11,16 6,16
Clamp Input Voltage	V_I	6 7		9 9	8 8	6 7		16 16
High Output Voltage	V_{OH}	1 3		9 9	8 8			16 16
Low Output Voltage	V_{OL}	1 3		9 9	8 8			16 16
High Threshold Voltage	V_{OHA}	1 3		9 9	8 8			16 16
Low Threshold Voltage	V_{OLA}	1 3		9 9	8 8			16 16
Switching Times (50Ω Load)				**+7.0 V**	**–3.2 V**			**+2.0 V**
Propagation Delay (+3.5Vdc to 50%)[1]	t_{6+1+} t_{6-1-} t_{7+1+} t_{7-1-} t_{7+3-} t_{7-3+}	1 1 1 1 3 3		9 9 9 9 9 9	8 8 8 8 8 8			16 16 16 16 16 16
Rise Time (20 to 80%)	t_{1+}	1		9	8			16
Fall Time (20 to 80%)	t_{1-}	1		9	8			16

1. See switching time test circuit. Propagation delay for this circuit is specified from +1.5Vdc in to the 50% point on the output waveform. The +3.5Vdc is shown here because all logic and supply levels are shifted 2 volts positive.

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.

SWITCHING TIME TEST CIRCUIT



Input Pulse
t+ = t– = 5.5 ±0.5 ns
(10 to 90%)

Unused outputs connected to a 50–ohm resistor to ground.

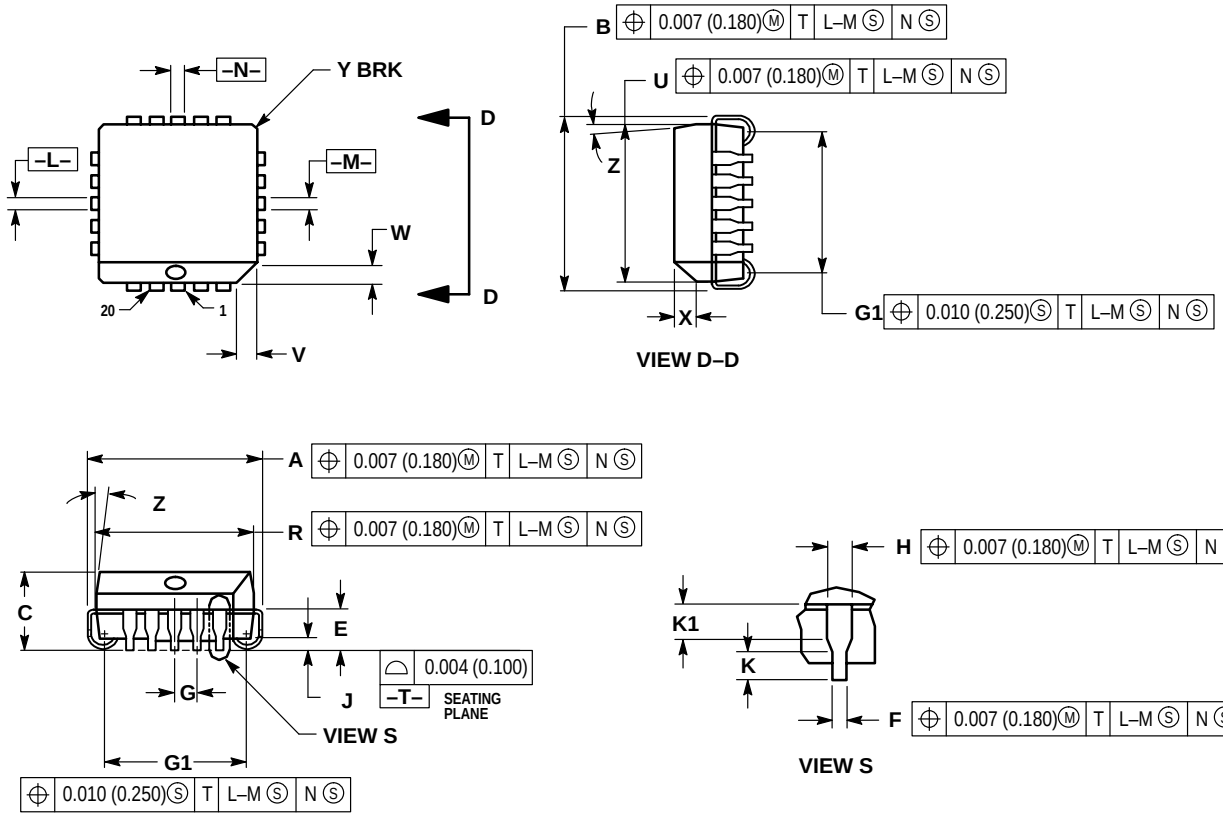
50–ohm termination to ground located in each scope channel input.

All input and output cables to the scope are equal lengths of 50–ohm coaxial cable. Wire length should be < 1/4 inch from TP_{in} to input pin and TP_{out} to output pin.

NOTE: All power supply and logic levels are shown shifted 2 volts positive.

OUTLINE DIMENSIONS

FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 775–02
ISSUE C

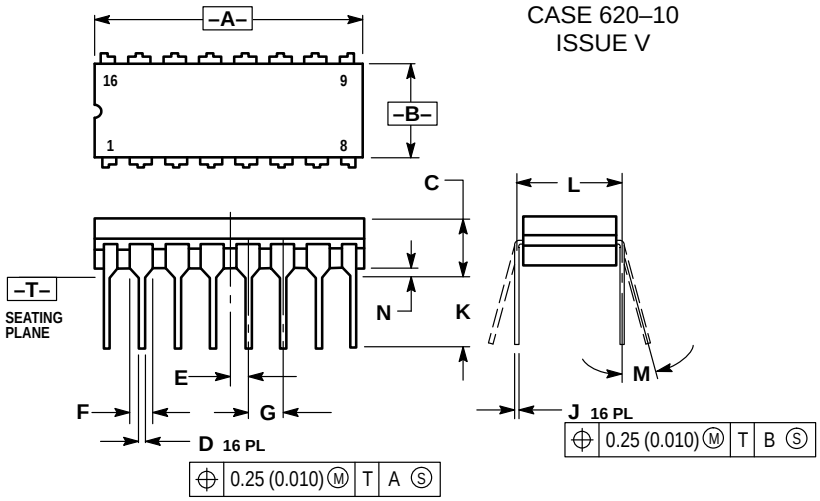


NOTES:
1. DATUMS –L–, –M–, AND –N– DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM –T–, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. 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.
7. 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).

	INCHES		MILLIMETERS	
DIM	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

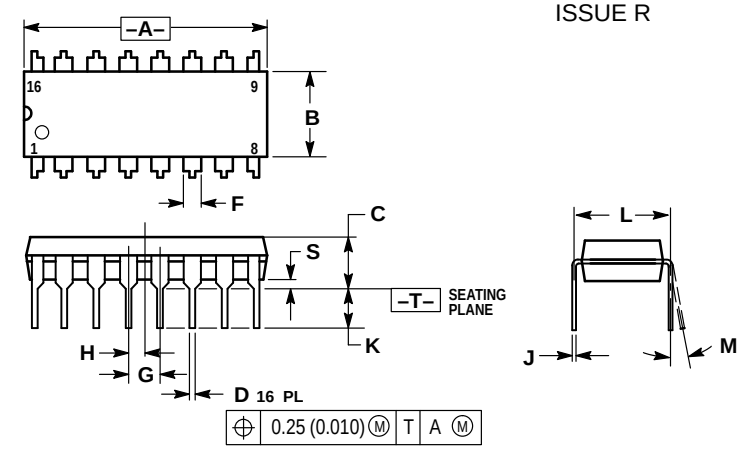
L SUFFIX
CERAMIC DIP PACKAGE
CASE 620–10
ISSUE V



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.

	INCHES		MILLIMETERS	
DIM	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.

	INCHES		MILLIMETERS	
DIM	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

How to reach us:
USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 303–675–2140 or 1–800–441–2447

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 81–3–3521–8315

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298