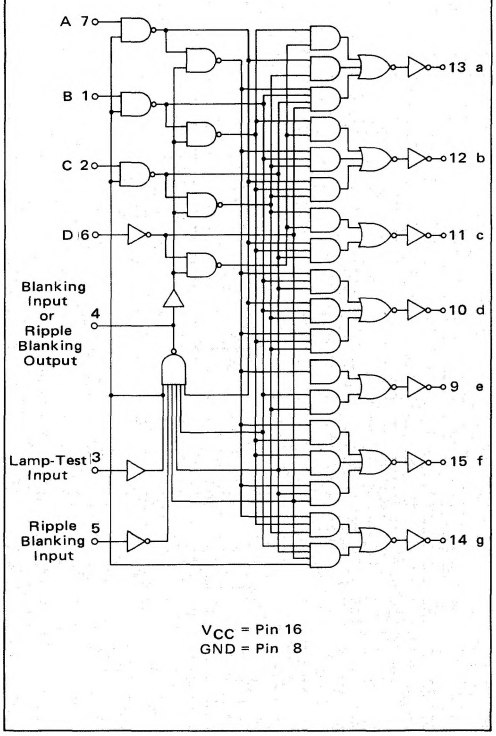
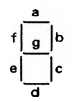
MC5446L • MC7446L, P*
MC5447L • MC7447L, P*

Compatible with MC5400/7400 Series devices.



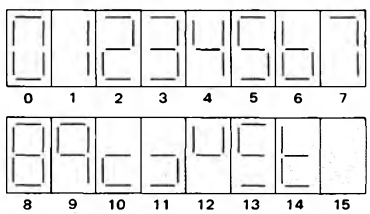
These devices decode 4-bit binary coded decimal data, dependent on the state of auxiliary inputs, and provide direct driving of incandescent, seven-segment, display indicators.

Ripple blanking inputs provide capability for suppression of non-significant zeros in a system. The blanking input can be used to control lamp intensity.



SEGMENT IDENTIFICATION

NUMERICAL DESIGNATION – SEGMENTS ILLUMINATED



Input Loading Factor:
BI/RBO = 2.6
Other Inputs = 1

Output Loading Factor:
BI/RBO = 5

Total Power Dissipation =
265 mW typ/pkg

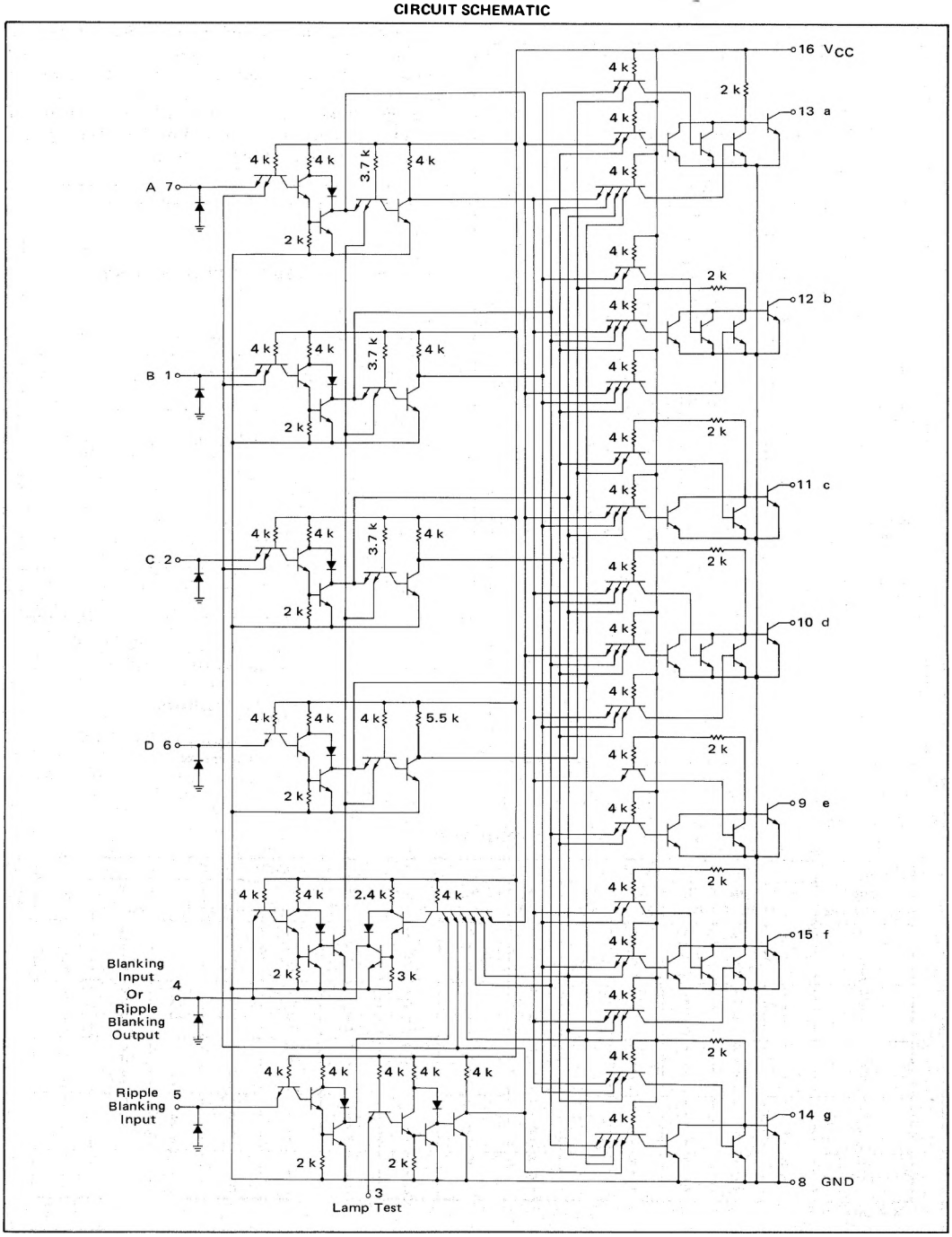
TRUTH TABLE

DIGIT OR FUNCTION	INPUT							OUTPUT						
	LT Pin 3	RBI Pin 5	D Pin 6	C Pin 2	B Pin 1	A Pin 7	BI/RBO Pin 4	a Pin 13	b Pin 12	c Pin 11	d Pin 10	e Pin 9	f Pin 15	g Pin 14
0	1	1	0	0	0	0	1	0	0	0	0	0	0	1
1	1	X	0	0	0	1	1	1	0	0	1	1	1	1
2	1	X	0	0	1	0	1	0	0	1	0	0	1	0
3	1	X	0	0	1	1	1	0	0	0	0	1	1	0
4	1	X	0	1	0	0	1	1	0	0	1	1	0	0
5	1	X	0	1	0	1	1	0	1	0	0	1	0	0
6	1	X	0	1	1	0	1	1	1	0	0	0	0	0
7	1	X	0	1	1	1	1	0	0	0	1	1	1	1
8	1	X	1	0	0	0	1	0	0	0	0	0	0	0
9	1	X	1	0	0	1	1	0	0	0	1	1	0	0
10	1	X	1	0	1	0	1	1	1	1	0	0	1	0
11	1	X	1	0	1	1	1	1	1	0	0	1	1	0
12	1	X	1	1	0	0	1	1	0	1	1	1	0	0
13	1	X	1	1	0	1	1	0	1	1	0	1	0	0
14	1	X	1	1	1	0	1	1	1	1	0	0	0	0
15	1	X	1	1	1	1	1	1	1	1	1	1	1	1
BI	X	X	X	X	X	X	0	1	1	1	1	1	1	1
RBI	1	0	0	0	0	0	0	1	1	1	1	1	1	1
LT	0	X	X	X	X	X	1	0	0	0	0	0	0	0

X = Don't care

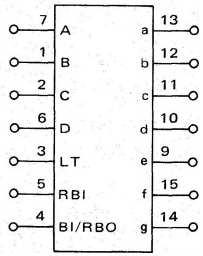
*L suffix = 16-pin dual in-line ceramic package (Case 620).
P suffix = 16-pin dual in-line plastic package (Case 612).

CIRCUIT SCHEMATIC



ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one data input and the blanking input, and for one driver output and the ripple blanking output. Test other inputs and outputs in the same manner according to the truth table. Test all input-output combinations according to the truth table.

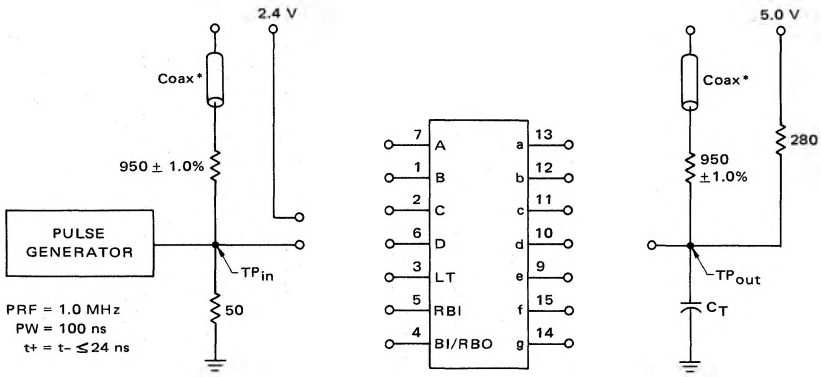


	TEST CURRENT/VOLTAGE VALUES (All Temperatures)												
	mA				Volts								
	I_{OL1}	I_{OL2}	I_{OH}	I_{CEX}	V_{IL}	V_{IH}	V_{IHH}	$V_{th\,1}$	$V_{th\,0}$	V_{CC}	V_{CCL}	V_{CCH}	V_{IHX}
MC5446, MC5447	20	8.0	-0.2	0.25	0.4	2.4	5.5	2.0	0.8	5.0	4.5	5.5	2.4
MC7446, MC7447	20	8.0	-0.2	0.25	0.4	2.4	5.5	2.0	0.8	5.0	4.75	5.25	2.4

Characteristic	Symbol	Pin Under Test	MC5446/MC5447 Test Limits -55 to +125°C			MC7446/MC7447 Test Limits 0 to +70°C			TEST CURRENT/VOLTAGE APPLIED TO PINS LISTED BELOW:												Gnd
			Min	Max	Unit	Min	Max	Unit	I_{OL1}	I_{OL2}	I_{OH}	I_{CEX}	V_{IL}	V_{IH}	V_{IHH}	$V_{th\,1}$	$V_{th\,0}$	V_{CC}	V_{CCL}	V_{CCH}	V_{IHX}	
Input																					
Forward Current	I_F	1	–	-1.6	mAdc	–	-1.6	mAdc	–	–	–	–	1	3	–	–	–	–	–	16	–	8
		4	–	-4.2	mAdc	–	-4.2	mAdc	–	–	–	–	4	–	–	–	–	–	–	16	–	8
Leakage Current	I_{R1}	1	–	40	µAdc	–	40	µAdc	–	–	–	–	–	1	–	–	–	–	–	16	–	3,8
	I_{R2}	1	–	1.0	mAdc	–	1.0	mAdc	–	–	–	–	–	–	1	–	–	–	–	16	–	3,8
Output																					
Output Voltage	V_{OL}	9*	–	0.4	Vdc	–	0.4	Vdc	9	–	–	–	–	–	–	3,4,5	1,2,6,7	–	16	–	–	8
		4**	–	0.4	Vdc	–	0.4	Vdc	–	4	–	–	–	–	–	3	1,2,5,6,7	–	16	–	–	8
	V_{OH}	4**	2.4	–	Vdc	2.4	–	Vdc	–	–	4	–	–	–	–	3,5	1,2,6,7	–	16	–	–	8
MC5446/7446	V_{CEX}	9*	30	–	Vdc	30	–	Vdc	–	–	–	9	–	–	–	3,4,7	1,2,6	–	–	16	–	8
MC5447/7447		9*	15	–	Vdc	15	–	Vdc	–	–	–	9	–	–	–	3,4,7	1,2,6	–	–	16	–	8
Short-Circuit Current	I_{SC}	4	–	-4.0	mAdc	–	-4.0	mAdc	–	–	–	–	–	–	–	3,5	1,2,6,7	–	–	16	–	4,8
Power Requirements (Total Device)																					
Power Supply Drain	I_{PD}	16	–	76	mAdc	–	90	mAdc	–	–	–	–	–	–	–	1,2,3,4,5,6,7	–	–	–	16	–	8
Switching Parameters									Pulse In		Pulse Out										
Turn-On Delay	t_{pd-1}	7,9	–	100#	ns	–	100#	ns	7		9		–	–	–	–	–	16	–	–	1,2,3,4,5	6,8
Turn-Off Delay	t_{pd+1}	7,9	–	100#	ns	–	100#	ns	7		9		–	–	–	–	–	16	–	–	3,4,5	1,2,6,8
Turn-On Delay	t_{pd-2}	4,5,13	–	100#	ns	–	100#	ns	4,5		13		–	–	–	–	–	16	–	–	3	1,2,6,7,8
Turn-Off Delay	t_{pd+2}	4,5,13	–	100#	ns	–	100#	ns	4,5		13		–	–	–	–	–	16	–	–	3	1,2,6,7,8

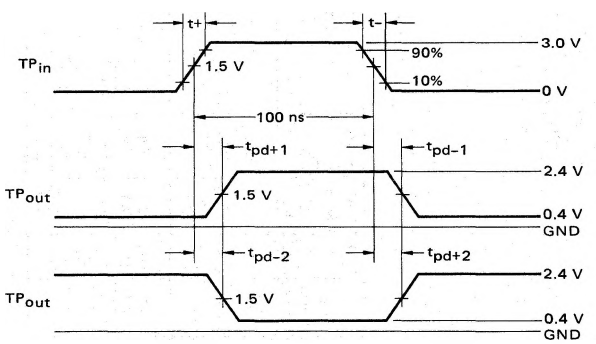
*Test procedure for outputs a thru g.
**Test procedure for BI/RBO only.
#Tested only at 25°C.

SWITCHING TIME TEST CIRCUIT AND VOLTAGE WAVEFORMS



C_T = 15 pF = total parasitic capacitance, which includes probe and wiring capacitances.

*The coax delays from input to scope and output to scope must be matched. The scope must be terminated in 50-ohm impedance. The 950-ohm resistor and the scope termination impedance constitute a 20:1 attenuator probe. Coax shall be CT-070-50 or equivalent.



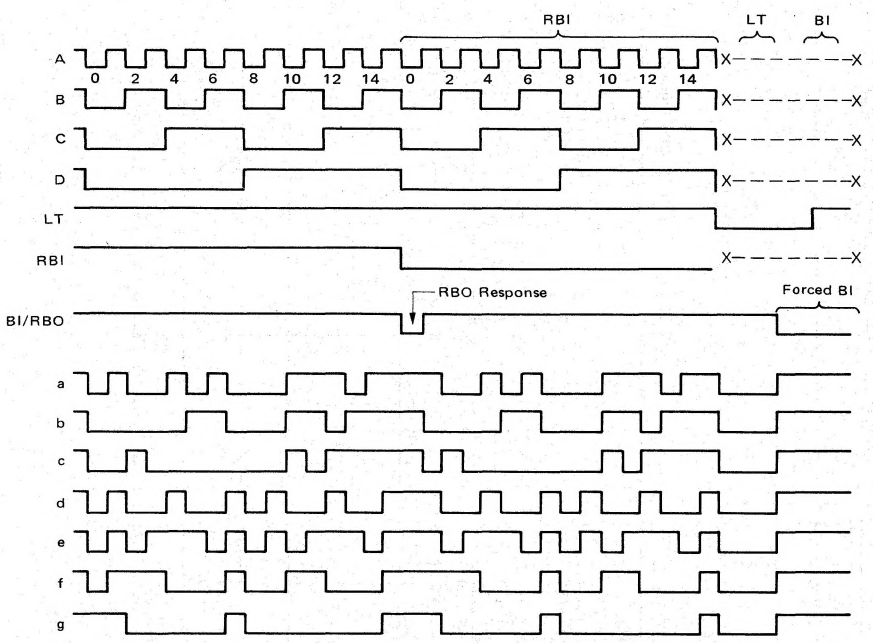
OPERATING CHARACTERISTICS

These monolithic integrated circuits provide the logic necessary to decode a BCD input and drive a seven-segment numerical indicator. Input buffers give an input loading factor of 1 on all but the BI/RBO input. High-sink-current outputs, designed to withstand the relatively high voltages of incandescent seven-segment indicators, permit direct driving of the indicators. Both devices will draw a maximum reverse current of 250 microamperes at the maximum output voltage (30 volts for the MC5446/7446 and 15 volts for the MC5447/7447).

Pin 4 serves as both a blanking input and a ripple blanking output (BI/RBO). For displaying digits 0 thru 15 the blanking input must be held at a logic "1" or open (see the truth table). For a decimal 0 output the ripple blanking input (RBI) must also be at a logic "1" or open.

When a logic "0" is applied to BI, outputs a thru g go to a logic "1" regardless of the state of any other input. With RBI at a logic "0" and A = B = C = D also at a logic "0", outputs a thru g go to a logic "1" and RBO goes to a logic "0". When a logic "0" is applied to lamp-test and BI/RBO is open or held at a logic "1", outputs a thru g go to a logic "0".

INPUT/OUTPUT VOLTAGE WAVEFORMS



TYPICAL APPLICATION

This 6-digit display provides blanking of non-significant zeros in the two most-significant and two least-significant decades. This causes the number 6.3 to be displayed instead 006.300. Blanking is achieved by grounding input RBI of the most-significant and least-significant decades and connecting the BI/RBO terminal of these two decades to input RBI of the adjacent decades. The RBI inputs of the decades on either side of the fixed decimal point are inhibited by connecting them to a 5.0-volt source, causing zeros to be retained in these positions.

Lamp intensity control is achieved by modulating input BI with a multivibrator.