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TSC380/381
BCD-to-Decade Decoder/Drivers
- Lamp Driver
- Logic Driver

Features

- IDEAL LAMP DRIVER (380)
- NO AMBIGUOUS OUTPUTS
- OPEN COLLECTOR OUTPUTS OPERATE UP TO 24V (380)
- EACH OUTPUT CAN SINK UP TO 30 mA (380)
- USEFUL AS OCTAL DECODER, DEMULTIPLEXER AND COMMUTATOR
- COLLECTOR OR'ABLE

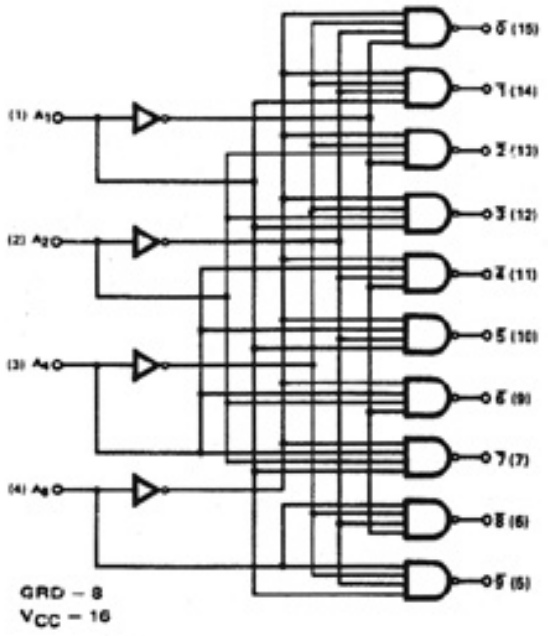
General Descriptions

The 380 decodes BCD inputs (1-2-4-8 code) and drives lamps and other devices requiring decoder outputs with high sink current at moderately high voltage.

The 381 decodes BCD inputs and provides active low outputs for low current lamps. Open collector outputs make the 381 useful in "wire-OR" logic systems and for interfacing with other logic families.

Since the 380/381 produce no ambiguous outputs, input codes for 10 to 15 will hold all outputs high. The 381 should be used with a pullup resistor. The outputs of the 371 decade counter are ideal 380/381 inputs. For high performance applications, use the 380 device.

Logic Diagram

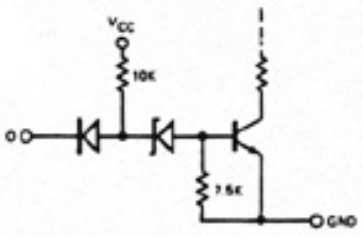


Truth Table

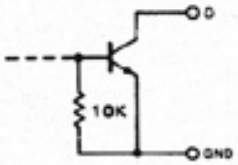
INPUTS				OUTPUTS									
A_1	A_2	A_4	A_8	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	1	1	1	1	1	1	1	1	1
1	0	0	0	1	0	1	1	1	1	1	1	1	1
0	1	0	0	1	1	0	1	1	1	1	1	1	1
1	1	0	0	1	1	1	0	1	1	1	1	1	1
0	0	1	0	1	1	1	1	0	1	1	1	1	1
1	0	1	0	1	1	1	1	1	0	1	1	1	1
0	1	1	0	1	1	1	1	1	1	0	1	1	1
1	1	1	0	1	1	1	1	1	1	1	0	1	1
0	0	0	1	1	1	1	1	1	1	1	1	0	1
1	0	0	1	1	1	1	1	1	1	1	1	1	0
0	1	0	1	1	1	1	1	1	1	1	1	1	1
1	1	0	1	1	1	1	1	1	1	1	1	1	1
0	0	1	1	1	1	1	1	1	1	1	1	1	1
1	0	1	1	1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1

Equivalent Circuits

TYPICAL INPUT



TYPICAL OUTPUT



Specifications

380

I_{CC} (WORST-CASE)	24 mA @ 13V, 31 mA @ 16V

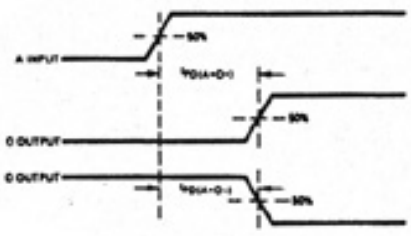
NOTE:
I_{CC} is tested at V_{CC} +1 Volt (+13V for C type and +16V for A type) and is guaranteed across the applicable temp range.
See page 12 for electrical summary data.

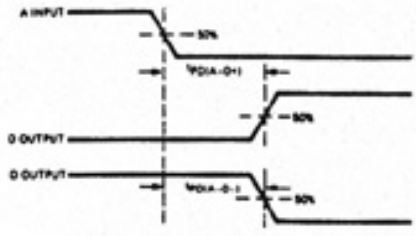
381

I_{CC} (WORST-CASE)	30 mA @ 13V, 38 mA @ 16V			
t_{PD} I/O FUNCTION FOR t_{PD}	500 ns A+Q+	400 ns A-Q+	500 ns A-Q-	300 ns A+Q-

NOTE:
I_{CC} is tested at V_{CC} +1 Volt (+13V for C type and +16V for A type) and is guaranteed across the applicable temp range. t_{PD} os guaranteed at V_{CC} ±1V and across the applicable temp range with the output loaded with 8 unit loads.

Switching Time Waveforms





Loading Tables

380

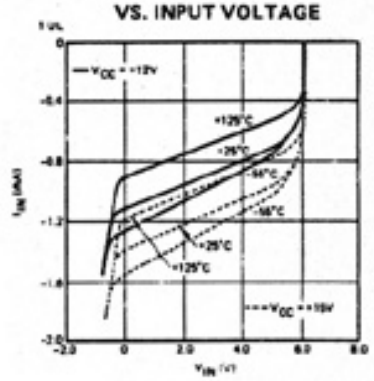
PINS	FUNCTION	LOADING
A 0-9	BCD inputs Outputs	1 UL Unit loading does not apply

381

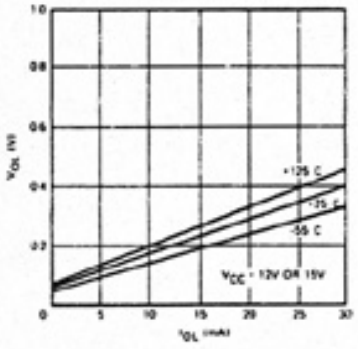
PINS	FUNCTION	LOADING
A O	BCD inputs Outputs	1 UL 8 UL with 8.2 KΩ pullup resistor

Typical Performance Characteristics

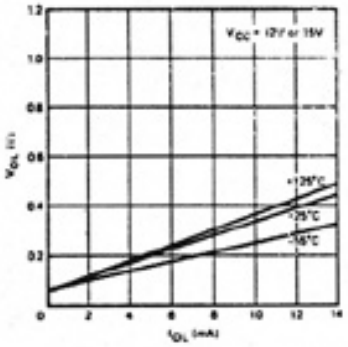
INPUT CURRENT VS. INPUT VOLTAGE



OUTPUT CURRENT VS OUTPUT VOLTAGE OUTPUT LOW 380



OUTPUT CURRENT VS OUTPUT VOLTAGE OUTPUT LOW 381

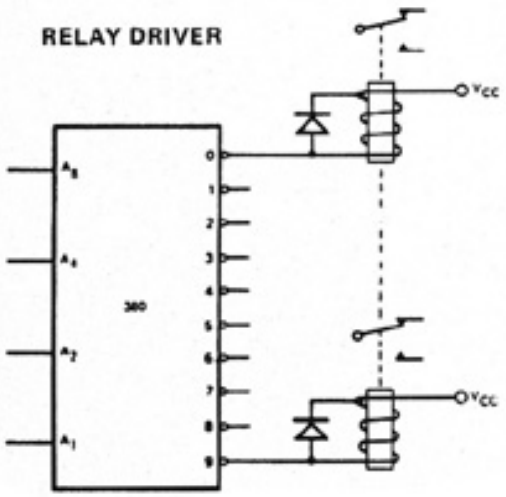


Typical Applications

The typical input and output circuits may be used to calculate interface designs. General instructions for using external resistors and calculating fanout with collectors OR'd are given in the applications notes. External resistors may be connected to a voltage other than V_{CC} to adjust the output voltage level.

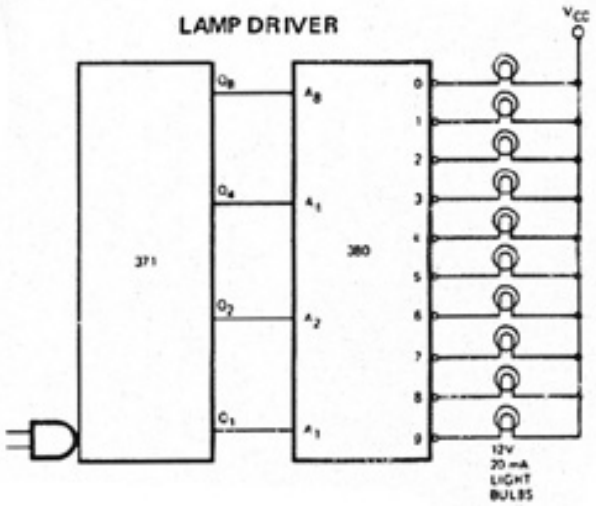
In addition to straightforward BCD to decimal decoding, the 381 is useful in applications such as hexadecimal (1 of 16) decoding, octal decoding, demultiplexing, and controlling MOS analog switches. Its high noise immunity and adjustable output level makes it an excellent interface on noisy data communications lines.

RELAY DRIVER

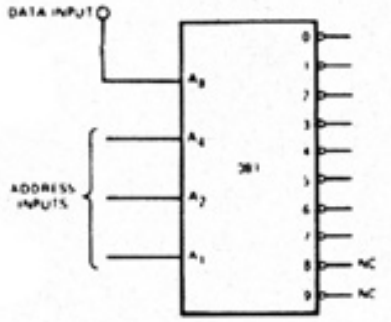


Typical Applications (contd.)

LAMP DRIVER

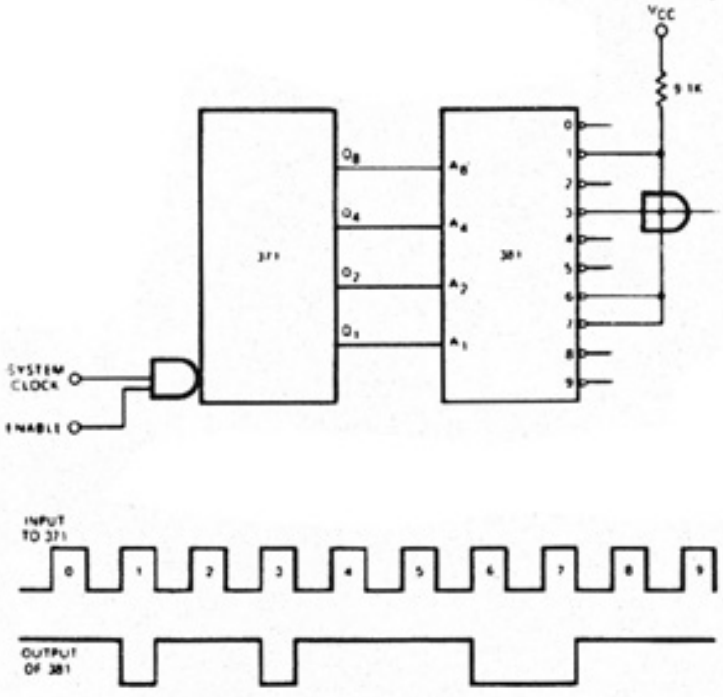


EIGHT-CHANNEL DEMULTIPLEXER



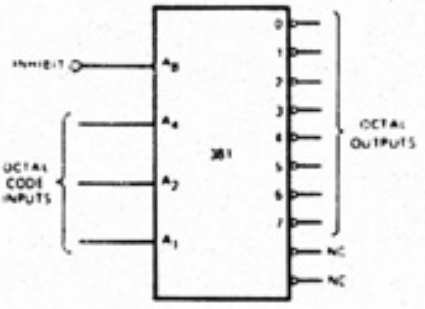
If data is applied to the A_8 input in the octal decoding mode, the outputs 0 through 7 selected by A_1, A_2 and A_4 will have the same states as the data. Thus, the serial output of an 8-channel multiplexer may be demultiplexed by using A_1—A_4 as address inputs synchronized with the multiplexer channel-select signals.

MINTERM AND TIMING PULSE GENERATORS



When several outputs of the 381 are collector-OR'd a low level on any of the OR'd outputs will produce a low output. Thus, it operates as a minterm generator governed by the states of the A_1 through A_8 inputs. If the inputs are cycled by a counter, as shown above, the 381 generates pulse trains with pulse trains with lengths governed by the clock frequency and the number of adjacent outputs OR'd. This is an extremely flexible way of generating odd combinations of control timing pulses.

OCTAL DECODER



Since outputs 8 and 9 are continuously high if the A_8 input is low, grounding A_8 converts the 381 to an octal decoder.