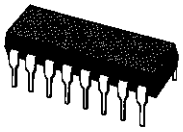
上海双岭电子有限公司

CC4553

BCD-TO-7 SEGMENT LATCH/DECODER/LCD DRIVER

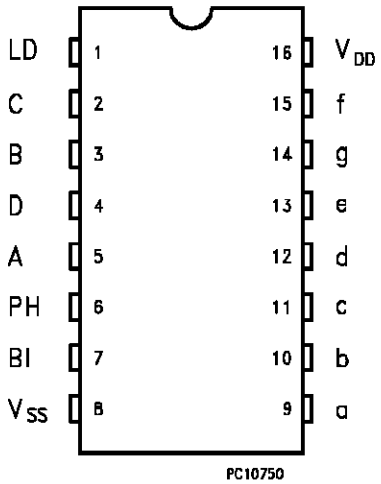
- DISPLAY BLANKING OF ALL ILLEGAL INPUT COMBINATIONS
- LATCH STORAGE OF CODE
- CAPABILITY OF DRIVING TWO LOW POWER TTL LOADS, TWO HTL LOADS, OR ONE LOW POWER SCHOTTKY LOAD OVER THE FULL RATED-TEMPERATURE RANGE
- PIN-FOR-PIN REPLACEMENT FOR THE HCF4056B (with pin 7 tied to V_{SS})
- DIRECT LED DRIVING CAPABILITY
- 100% TESTED FOR QUIESCENT CURRENT AT 20V
- MAXIMUM INPUT CURRENT OF 1A AT 18V OVER FULL PACKAGE-TEMPERATURE RANGE ; 100nA AT 18V AND 25°C
- NOISE MARGIN (full package-temperature range) = 1V AT V_{DD} = 5V
  2V AT V_{DD} = 10V
  2.5V AT V_{DD} = 15V
- 5-V, 10-V, AND 15-V PARAMETRIC RATINGS



Applications :

- INSTRUMENT DISPLAY DRIVER
- DASHBOARD DISPLAY DRIVER
- COMPUTER/CALCULATOR DISPLAY DRIVER
- TIMING DEVICE DRIVER (clocks, watches, timers)

PIN CONNECTION (top view)



DESCRIPTION

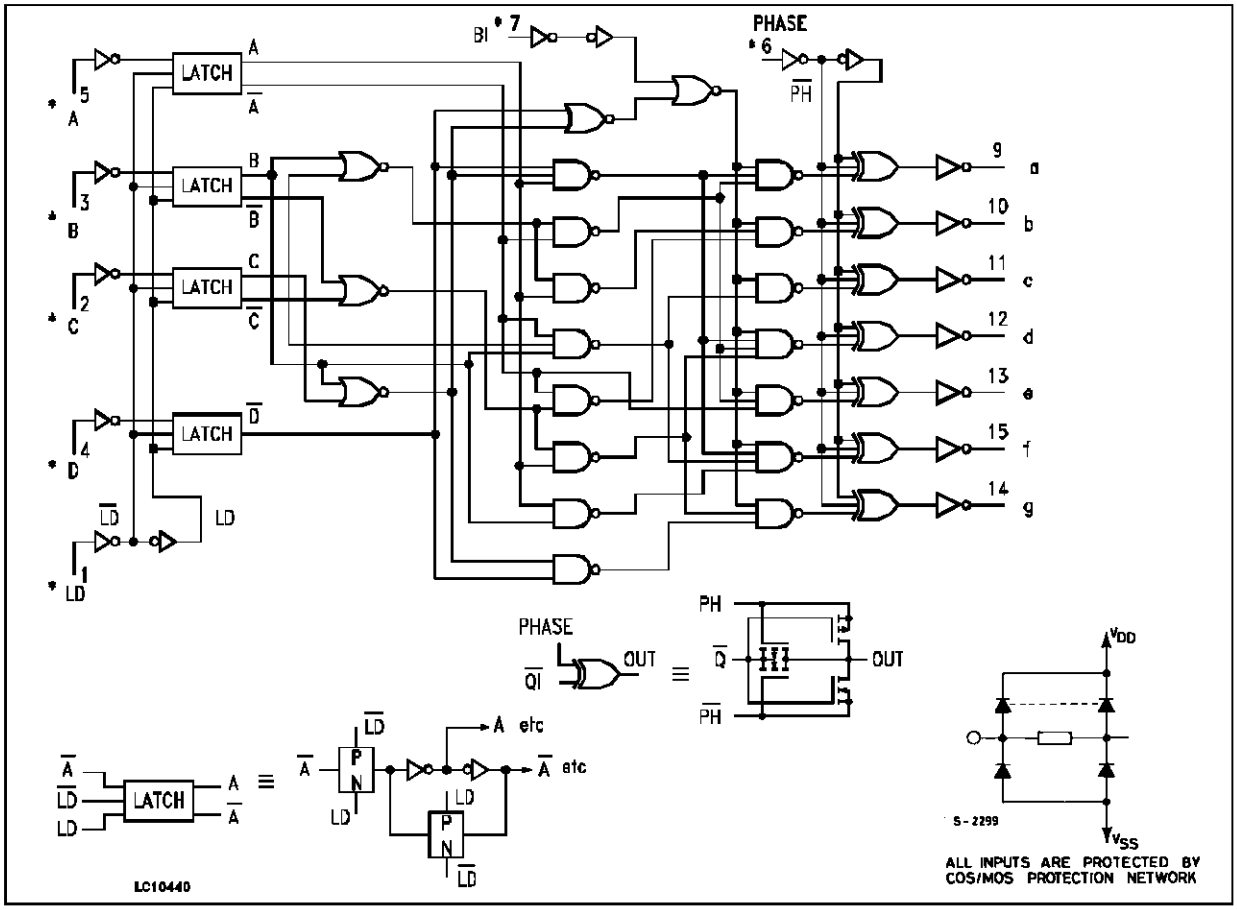
The CC4553 is a BCD-to-seven segment latch/decoder/driver designed primarily for liquid-crystal display (LCD) applications. It is also capable of driving light emitting diode (LED), incandescent, gas-discharge, and fluorescent displays. This device is functionally similar to and serves as direct replacement for the CC4056 when pin 7 is connected to V_{SS}. It differs from the HCF4056B in that it has a display blanking capability instead of a level-shifting function and requires only one power supply. When the CC4056 is used in the level shifting mode, two power supplies are required. When the CC4553 is used for LCD applications, a square wave must be applied to the PHASE input and the backplane of the LCD device. For LED applications a logic 1 is required at the PHASE input for common-cathode devices ; a logic 0 is required for common-anode devices (see truth table).

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}*	Supply voltage :	– 0.5 to + 20	V
V_i	Input Voltage	– 0.5 to V_{DD} + 0.5	V
I_I	DC Input Current (any one input)	± 10	mA
P_{tot}	Total Power Dissipation (per package) Dissipation per Output Transistor for T_{op} = Full Package-temperature Range	200 100	mW mW
T_{op}	Operating Temperature :	– 55 to + 125	°C
T_{stg}	Storage Temperature	– 65 to + 150	°C

* All Voltage Values are referred to V_{SS} pin voltage.

LOGIC DIAGRAM (1/2 of device shown)



RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage :	3 to + 18	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature :	– 55 to + 125	°C

TRUTH TABLE

INPUT CODE							OUTPUT STATE							DISPLAY CHARACTER
LD	BI	Ph*	D	C	B	A	a	b	c	d	e	f	g	
X	**1**	**0**	**X**	**X**	**X**	**X**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
1	0	0	0	0	0	0	1	1	1	1	1	1	0	0
1	0	0	0	0	0	1	0	1	1	0	0	0	0	1
1	0	0	0	0	1	0	1	1	0	1	1	0	1	2
1	0	0	0	0	1	1	1	1	1	1	0	0	1	3
1	0	0	0	1	0	0	0	1	1	0	0	1	1	4
1	0	0	0	1	0	1	1	0	1	1	0	1	1	5
1	0	0	0	1	1	0	1	0	1	1	1	1	1	6
1	0	0	0	1	1	1	1	1	1	0	0	0	0	7
1	0	0	1	0	0	0	1	1	1	1	1	1	1	8
1	0	0	1	0	0	1	1	1	1	1	0	1	1	9
1	0	0	1	0	1	0	0	0	0	0	0	0	0	Blank
1	0	0	1	0	1	1	0	0	0	0	0	0	0	Blank
1	0	0	1	1	0	0	0	0	0	0	0	0	0	Blank
1	0	0	1	1	0	1	0	0	0	0	0	0	0	Blank
1	0	0	1	1	1	0	0	0	0	0	0	0	0	Blank
1	0	0	1	1	1	1	0	0	0	0	0	0	0	Blank
0	0	0	X	X	X	X	**							**
•	•	•	•				Inverse of Output Combinations Above							Display as above

X = Don't care.
• = Above combinations
* = For liquid-crystal readouts, apply a square wave to Ph.
For common cathode LED readouts, select Ph = 0.
For common anode LED readouts, select Ph = 1.
** = Depends upon the BCD code previously applied when LD = 1.

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter		Test Conditions				Value							Unit
			V_I (V)	V_O (V)	I_O (μA)	V_{DD} (V)	T_{Low}		25°C			T_{High}		
							Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_L	Quiescent Current	Types	0/5			5		5		0.04	5		150	μA
			0/10			10		10		0.04	10		300	
			0/15			15		20		0.04	20		600	
			0/18			18		100		0.08	100		3000	
V_{OH}	Output High Voltage		0/5		< 1	5	4.95		4.95			4.95		V
			0/10		< 1	10	9.95		9.95			9.95		
			0/15		< 1	15	14.95		14.95			14.95		
V_{OL}	Output Low Voltage		5/0		< 1	5		0.05			0.05		0.05	V
			10/0		< 1	10		0.05			0.05		0.05	
			15/0		< 1	15		0.05			0.05		0.05	
V_{IH}	Input High Voltage			0.5/4.5	< 1	5	3.5		3.5			3.5		V
				1/9	< 1	10	7		7			7		
				1.5/13.5	< 1	15	11		11			11		
V_{IL}	Input Low Voltage			4.5/0.5	< 1	5		1.5			1.5		1.5	V
				9/1	< 1	10		3			3		3	
				13.5/1.5	< 1	15		4			4		4	
I_{OH}	Output Drive Current	Types	0/5	2.5		5	– 1.6		– 1.3	– 2.6		– 0.9		mA
			0/5	4.6		5	– 0.46		– 0.37	– 0.75		– 0.26		
			0/10	9.5		10	– 0.98		– 0.8	– 1.6		– 0.55		
			0/15	13.5		15	– 3.33		– 2.7	– 5.4		– 1.9		
I_{OL}	Output Sink Current	Types	0/5	0.4		5	0.64		0.51	1		0.36		mA
			0/10	0.5		10	1.6		1.3	2.6		0.9		
			0/15	1.5		15	4.2		3.4	6.8		2.4		
I_{IH}, I_{IL}	Input Leakage Current	types	0/18	Any Input		18		± 0.1		$\pm 10^{-5}$	± 0.1		± 1	μA

DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200kΩ, typical temperature coefficient for all V_{DD} values is 0.3%/°C, all input rise and fall time = 20ns)

Symbol	Parameter	Test Conditions V_{DD} (V)	Limits All packages			Unit
			Min.	Typ.	Max.	
t_{PHL}	Propagation Delay Time	5 10 15		600 200 150	1200 400 300	ns
t_{PLH}		5 10 15		500 200 150	1000 400 300	
t_{THL}	Transition Time	5 10 15		180 90 65	360 180 130	
t_{TLH}		5 10 15		180 90 65	360 180 130	
t_{WH}	Latch Disable Pulse Width	5 10 15	250 100 80	125 50 40		
t_{SU}	Address Setup Time	5 10 15	60 20 10	15 – 5 – 5		
t_H	Address Hold Time	5 10 15	25 20 20	-5 10 0		
C_{IN}	Input Capacitance	Any Input		5	7.5	pF

BCD-to-seven-segment latch/decoder/driver functional diagram