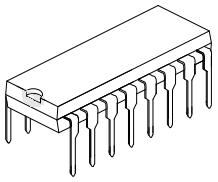
UCD4028B **Preliminary** ***CMOS IC***

BCD-TO-DECIMAL DECODER
BINARY-TO-OCTAL DECODER



DIP-16

■ DESCRIPTION

The UTC **UCD4028B** decoder is constructed so that an 8421 BCD code on the four inputs provides a decimal (one-of-ten) decoded output, while a 3-bit binary input provides a decoded octal (one-of-eight) code output with D forced to a logic “0”. Expanded decoding such as binary-to-hexadecimal (one-of-sixteen), etc., can be achieved by using other UTC **UCD4028B** devices. The part is useful for code conversion, address decoding, memory selection control, demultiplexing, or readout decoding.

■ FEATURES

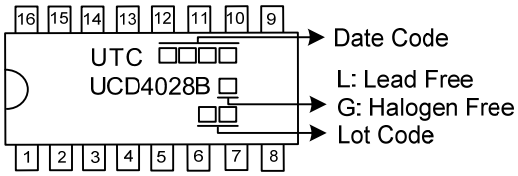
* Diode Protection on All Inputs
* Supply Voltage Range = 3V to 15V
* Capable of Driving Two Low-power TTL Loads or One Low-Power Schottky TTL Load Over the Rated Temperature Range.
* Positive Logic Design
* Low Outputs on All Illegal Input Combinations

■ ORDERING INFORMATION

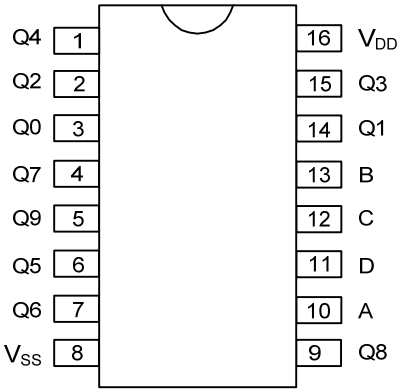
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCD4028BL-D16-T	UCD4028BG-D16-T	DIP-16	Tube

UCD4028BG-D16-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) D16: DIP-16 (3) G: Halogen Free and Lead Free, L: Lead Free

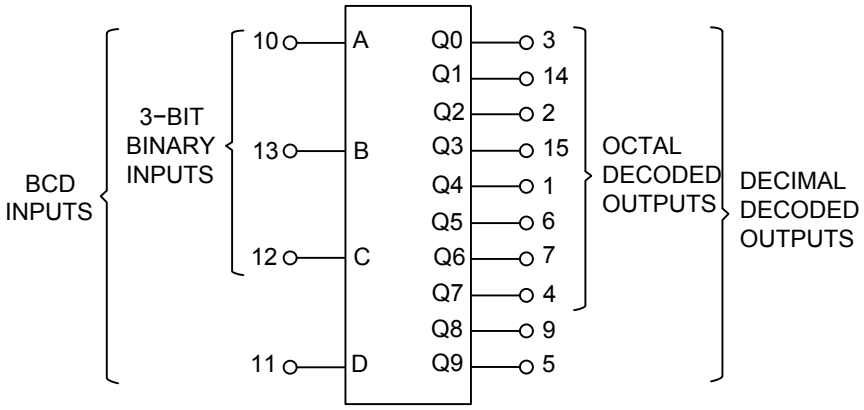
■ MARKING



■ PIN CONFIGURATION

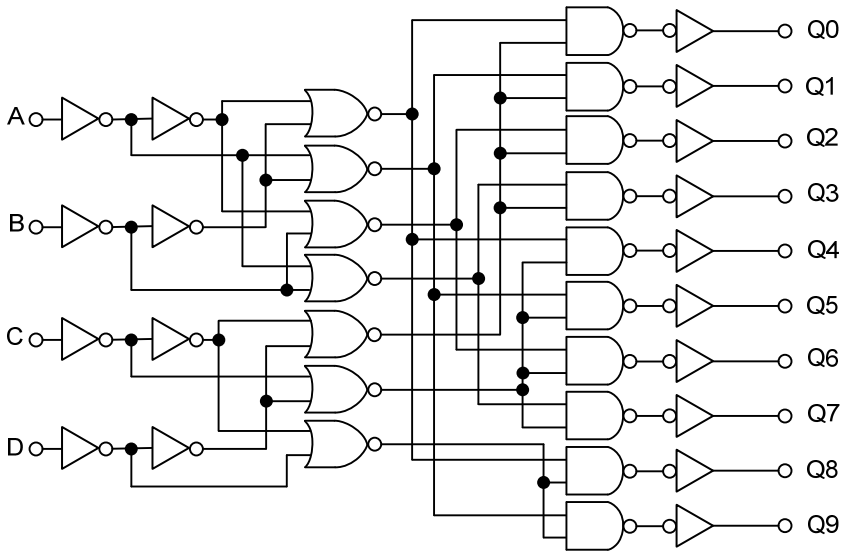


■ BLOCK DIAGRAM



V_{DD} = PIN 16
V_{SS} = PIN 8

■ LOGIC DIAGRAMS



■ TRUTH TABLE

D	C	B	A	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
L	L	L	L	L	L	L	L	L	L	L	L	L	H
L	L	L	H	L	L	L	L	L	L	L	L	H	L
L	L	H	L	L	L	L	L	L	L	L	H	L	L
L	L	H	H	L	L	L	L	L	L	H	L	L	L
L	H	L	L	L	L	L	L	L	H	L	L	L	L
L	H	L	H	L	L	L	L	H	L	L	L	L	L
L	H	H	L	L	L	L	H	L	L	L	L	L	L
L	H	H	H	L	L	H	L	L	L	L	L	L	L
H	L	L	L	L	H	L	L	L	L	L	L	L	L
H	L	L	H	H	L	L	L	L	L	L	L	L	L
H	L	H	L	L	L	L	L	L	L	L	L	L	L
H	L	H	H	L	L	L	L	L	L	L	L	L	L
H	H	L	L	L	L	L	L	L	L	L	L	L	L
H	H	L	H	L	L	L	L	L	L	L	L	L	L
H	H	H	L	L	L	L	L	L	L	L	L	L	L
H	H	H	H	L	L	L	L	L	L	L	L	L	L

Note: H: HIGH voltage level; L: LOW voltage level.

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
DC Supply Voltage Range	V_{DD}	-0.5 ~ +18	V
Input or Output Voltage Range (DC or Transient)	V_{IN}, V_{OUT}	-0.5 ~ V_{DD}+0.5	V
Input or Output Current (DC or Transient) per Pin	I_{IN}, I_{OUT}	±10	mA
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	3 ~ 15	V
Operating Temperature	T_A	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note)	MAX	UNIT
High-level Input Voltage	V_{IH}	V_{DD}=5.0V, V_O=0.5V or 4.5V	3.5			V
		V_{DD}=10V, V_O=1.0V or 9.0V	7.0			V
		V_{DD}=15V, V_O=1.5V or 13.5V	11			V
Low-level Input Voltage	V_{IL}	V_{DD}=5.0V, V_O=0.5V or 4.5V			1.5	V
		V_{DD}=10V, V_O=1.0V or 9.0V			3.0	V
		V_{DD}=15V, V_O=1.5V or 13.5V			4.0	V
High-level Output Voltage	V_{OH}	V_{DD}=5V, V_{IN}=0 or V_{DD}	4.95	5.0		V
		V_{DD}=10V, V_{IN}=0 or V_{DD}	9.95	10		V
		V_{DD}=15V, V_{IN}=0 or V_{DD}	14.95	15		V
Low-level Output Voltage	V_{OL}	V_{DD}=5V, V_{IN}=0 or V_{DD}		0	0.05	V
		V_{DD}=10V, V_{IN}=0 or V_{DD}		0	0.05	V
		V_{DD}=15V, V_{IN}=0 or V_{DD}		0	0.05	V
High-Level Output Current	I_{OH}	V_{DD}=5.0V, V_{OH}=2.5V	-1.6	-3.2		mA
		V_{DD}=5.0V, V_{OH}=4.6V	-0.51	1		mA
		V_{DD}=10V, V_{OH}=9.5V	-1.3	-2.6		mA
		V_{DD}=15V, V_{OH}=13.5V	-3.4	-6.8		mA
Low-Level Output Current	I_{OL}	V_{DD}=5.0V, V_{OL}=0.4V	0.51	1		mA
		V_{DD}=10V, V_{OL}=0.5V	1.3	2.6		mA
		V_{DD}=15V, V_{OL}=1.5V	3.4	6.8		mA
Input Current	I_{IN}	V_{DD}=15V			± 0.1	μA
Quiescent Current	I_{DD}	V_{DD}=5.0V			5.0	μA
		V_{DD}=10V			10	μA
		V_{DD}=15V			20	μA

Note: Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

■ SWITCHING CHARACTERISTICS

(C_L= 50pF, R_L= 200kΩ, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note)	MAX	UNIT
Transition Time	t_{TLH} / t_{THL}	V_{DD}=5V		90	200	ns
		V_{DD}=10V		55	100	ns
		V_{DD}=15V		40	80	ns
Propagation Delay Time	t_{PLH} / t_{PHL}	V_{DD}=5V		125	600	ns
		V_{DD}=10V		75	260	ns
		V_{DD}=15V		60	180	ns

Note: Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

■ OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}			5.0		pF

■ DYNAMIC SIGNAL WAVEFORMS

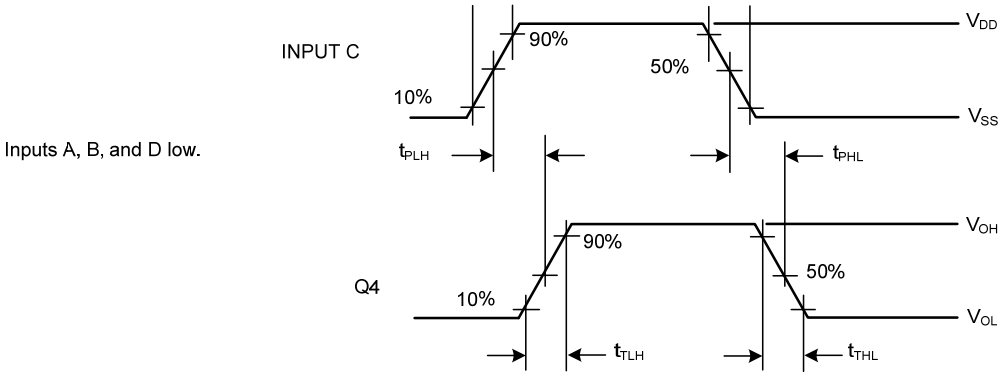


Figure 1. Dynamic Signal Waveforms

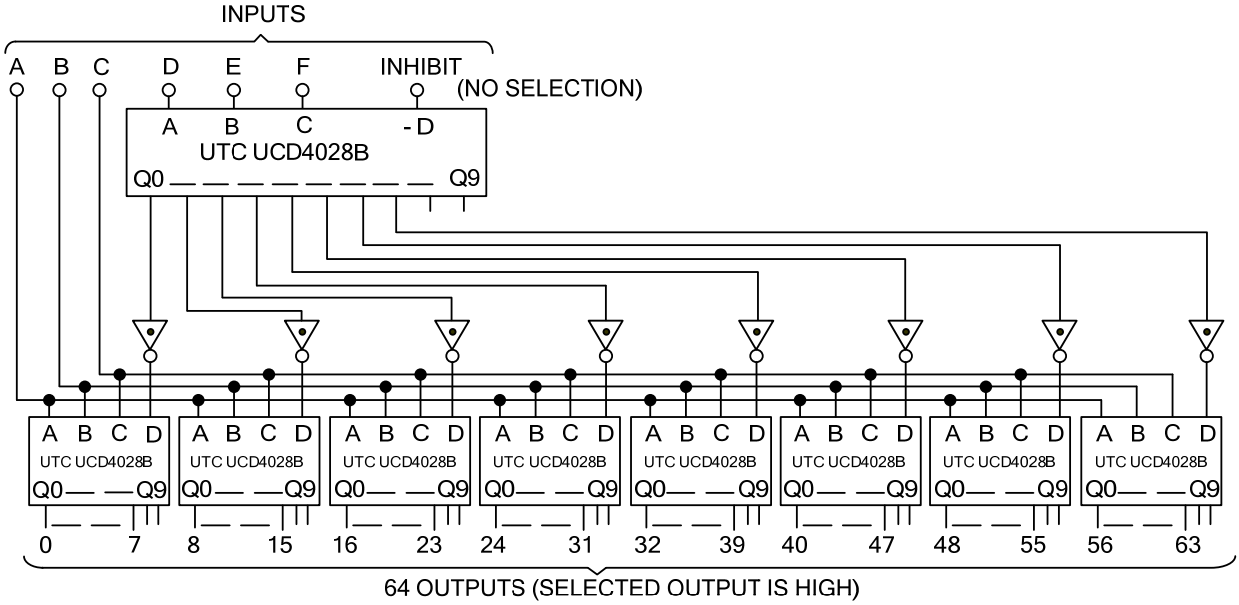


Figure 2. Six-Bit Binary 1-of-64 Decoder

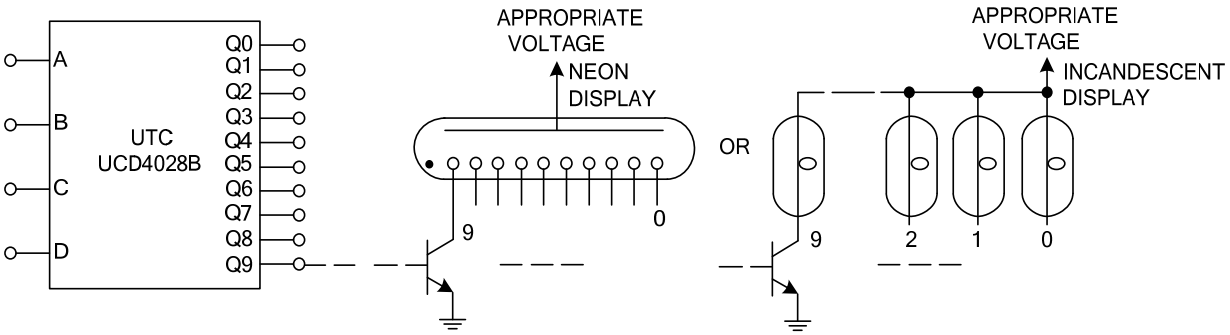


Figure 3. Decimal Digit Display Application