



U74LVC138

CMOS IC

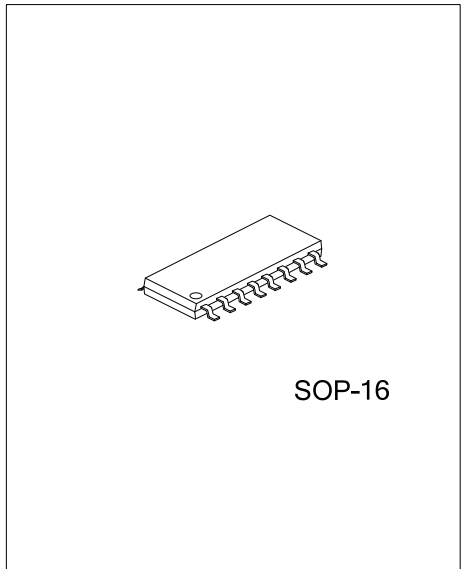
3-LINE TO 8-LINE DECODERS DEMULTIPLEXERS

DESCRIPTION

The **U74LVC138** is a 3 to 8 line decoder / demultiplexer. designed for 1.65V to 3.6V V_{CC} operation.

FEATURES

- * Operate From 1.65V to 3.6V
- * Inputs Accept Voltages to 5.5V
- * Max t_{PD} of 5.8 ns at 3.3V

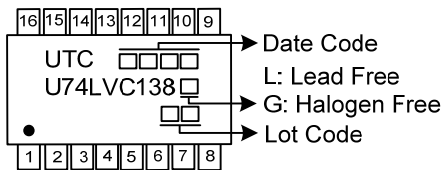


ORDERING INFORMATION

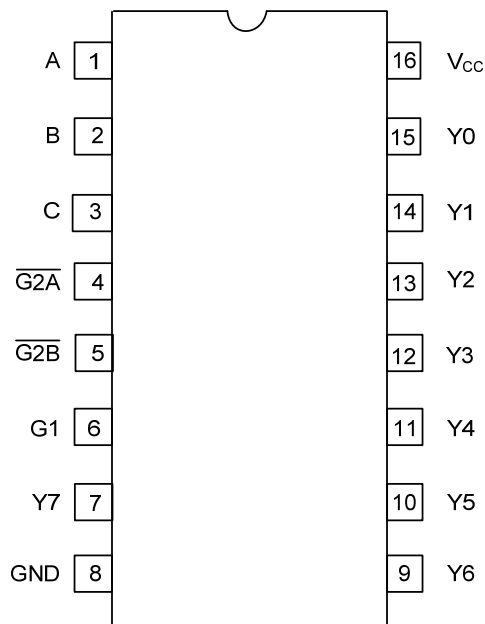
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC138L-S16-R	U74LVC138G-S16-R	SOP-16	Tape Reel

<p>U74LVC138G-S16-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S16: SOP-16</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



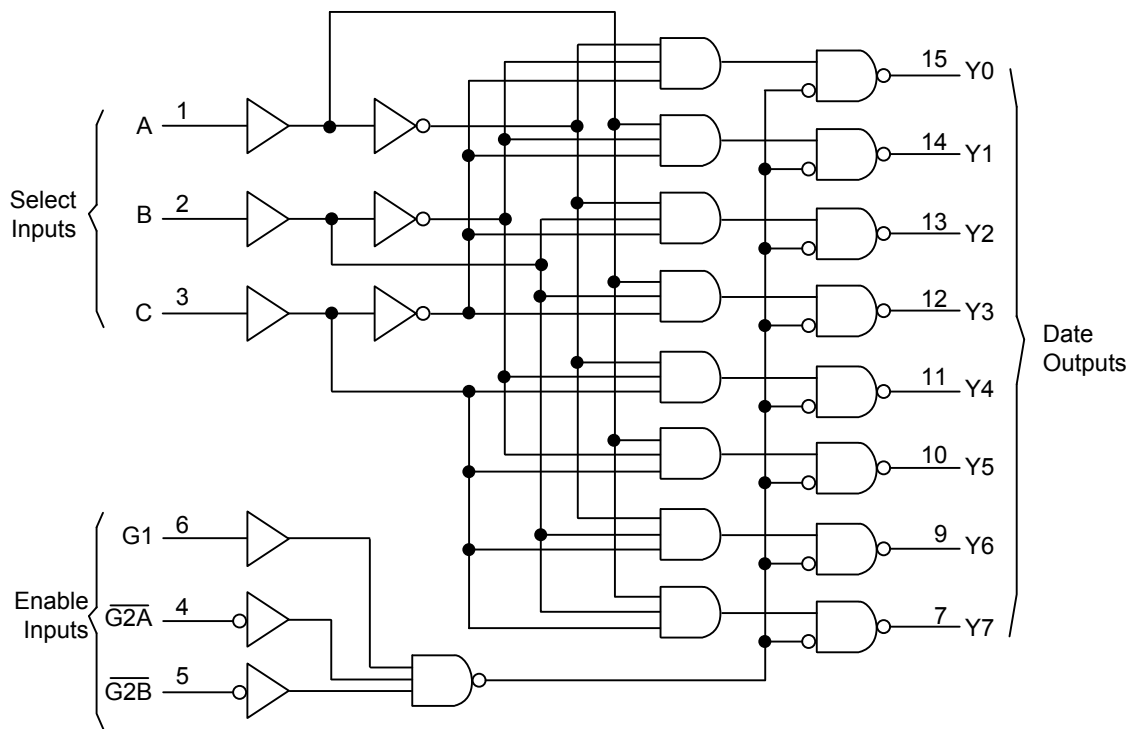
■ PIN CONFIGURATION



■ FUNCTION TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

■ LOGIC SYMBOL



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■ ABSOLUTE MAXIMUM RATING (T_A=25°C , unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V _{CC}		-0.5 ~ +6.5	V
Input Voltage (Note)	V _I		-0.5 ~ +6.5	V
Output Voltage	V _{OUT}	Output in the high or low state	-0.5 ~ V _{CC} +0.5	V
Continuous V _{CC} or GND Current	I _{CC}		±100	mA
Continuous Output Current	I _{OUT}		±50	mA
Input Clamp Current	I _{IK}	V _{IN} <0V	-50	mA
Output Clamp Current	I _{OK}	V _{OUT} <0V	-50	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	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V _{CC}	Operating	1.65		3.6	V
		Data Retention Only	1.5			V
Input Voltage	V _{IN}		0		5.5	V
Output Voltage	V _{OUT}		0		V _{CC}	V
Operating Temperature	T _A		-40		+125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note 1)	MAX	UNIT
High-level Input Voltage	V _{IH}	V _{CC} =1.8V±0.15V	0.65×V _{CC}			V
		V _{CC} =2.5V±0.2V	1.7			V
		V _{CC} =3.3V±0.3V	2.0			V
Low-level Input Voltage	V _{IL}	V _{CC} =1.8V±0.15V			0.35×V _{CC}	V
		V _{CC} =2.5V±0.2V			0.7	V
		V _{CC} =3.3V±0.3V			0.8	V
High-Level Output Voltage	V _{OH}	V _{CC} =1.65V ~ 3.6V, I _{OH} =-100μA	V _{CC} -0.2			V
		V _{CC} =1.65V, I _{OH} =-4mA	1.2			V
		V _{CC} =2.3V, I _{OH} =-8mA	1.7			V
		V _{CC} =2.7V, I _{OH} =-12mA	2.2			V
		V _{CC} =3.0V, I _{OH} =-12mA	2.4			V
Low-Level Output Voltage	V _{OL}	V _{CC} =1.65V ~ 3.6V, I _{OL} =100μA			0.2	V
		V _{CC} =1.65V, I _{OL} =4mA			0.45	V
		V _{CC} =2.3V, I _{OL} =8mA			0.7	V
		V _{CC} =2.7V, I _{OL} =12mA			0.4	V
		V _{CC} =3.0V, I _{OL} =24mA			0.55	V
Input Leakage Current	I _{I(LEAK)}	V _{CC} =3.6V, V _I =5.5V or GND			±5	μA
Quiescent Supply Current	I _{CC}	V _{CC} =3.6V, V _I =V _{CC} or GND, I _{OUT} =0			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI _{CC}	V _{CC} =2.7~3.6V, One Input at V _{CC} -0.6V, Other Inputs at V _{CC} or GND			500	μA
Input Capacitance	C _I	V _{CC} =3.3V, V _I = V _{CC} or GND		5		pF

Note: All typical values are at V_{CC}=3.3V, T_A=25°C.

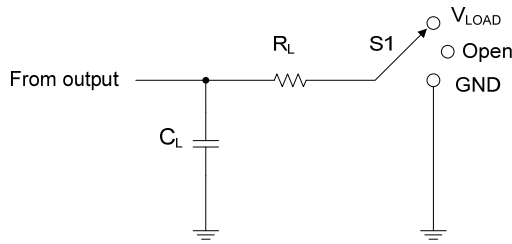
■ SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Propagation delay from Input(A or B or C) to Output (Y)	t_{PD}	$V_{CC}=1.8V\pm 0.15V$	1.0	22	ns
		$V_{CC}=2.5V\pm 0.2V$	1.0	9.9	ns
		$V_{CC}=3.3V\pm 0.3V$	1.0	6.7	ns
Propagation delay from Input($\overline{G2A}$ or $\overline{G2B}$ or G1) to Output (Y)	t_{PD}	$V_{CC}=1.8V\pm 0.15V$	1.0	21	ns
		$V_{CC}=2.5V\pm 0.2V$	1.0	9.4	ns
		$V_{CC}=3.3V\pm 0.3V$	1.0	7.4	ns

■ OPERATING CHARACTERISTICS ($f=10\text{MHz}$, $T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC}=1.8V$		25		pF
		$V_{CC}=2.5V$		26		pF
		$V_{CC}=3.3V$		27		pF

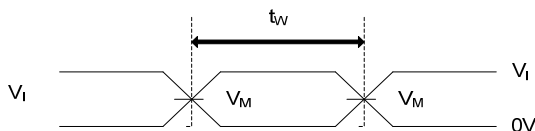
TEST CIRCUIT AND WAVEFORMS



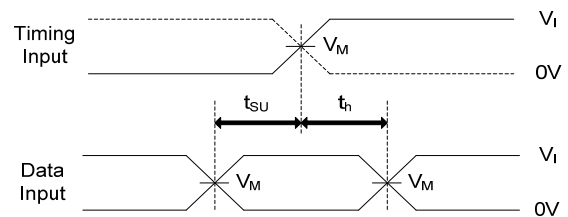
TEST	S1
t_{PLH}/t_{PHL}	Open

Test Circuit

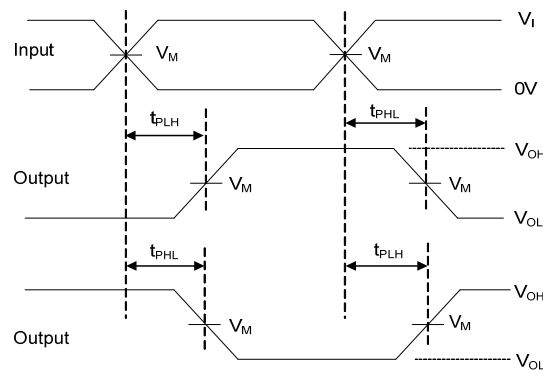
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_{IN}	t_R/t_F					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1K Ω	0.15V
2.3V	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
2.7V	2.7V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$3.3V \pm 0.3V$	2.7V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V



VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



Voltage Waveforms Propagation Delay Times

Notes: 1. C_L includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR $\leq 10MHz$, $Z_0 = 50\Omega$.

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