Low-Voltage CMOS Quad 2-Input Multiplexer

With 5 V-Tolerant Inputs and Outputs (3-State, Inverting)

The MC74LCX258 is a high performance, quad 2–input inverting multiplexer with 3–state outputs operating from a 2.3 to 3.6 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance. A $V_{\rm I}$ specification of 5.5 V allows MC74LCX258 inputs to be safely driven from 5 V devices.

Four bits of data from two sources can be selected using the Select input. The four outputs present the selected data in the inverted form. The outputs may be switched to a high impedance state by placing a logic HIGH on the Output Enable (\overline{OE}) input. Current drive capability is 24 mA at the outputs.

Features

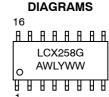
- Designed for 2.3 to 3.6 V V_{CC} Operation
- 5 V Tolerant Interface Capability With 5 V TTL Logic
- Supports Live Insertion and Withdrawal
- I_{OFF} Specification Guarantees High Impedance When $V_{CC} = 0 \text{ V}$
- TTL Compatible
- CMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current in all Three Logic States (10 μA)
 Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500 mA
- ESD Performance:
 - ♦ Human Body Model >2000 V
 - ♦ Machine Model >200 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



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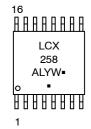
http://onsemi.com





MARKING





A = Assembly Location

WL, L = Wafer Lot Y = Year WW, W = Work Week G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

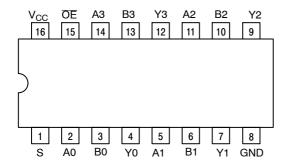


Figure 1. Pinout: 16-Lead Plastic Package (Top View)

PIN NAMES

Pins	Function
An	Source 0 Data Inputs
Bn	Source B Data Inputs
ŌĒ	Enable Input
S	Select Input
Yn	Outputs

TRUTH TABLE

Inp	Inputs			
Output Enable	Select	Y0-Y3		
Н	Х	Z		
L	L	A0-A3		
L	Н	B0-B3		

X = Don't Care

A0-A3, B0-B3 = The levels of the respective Data-Word Inputs

PIN DESCRIPTIONS

INPUTS

A0-A3 (Pins 2, 5, 11, 14)

Nibble A inputs. The data present on these pins is transferred to the outputs when the Select input is at a low level and the Output Enable input is at a low level. The data is presented to the outputs in inverted form for the LCX258.

B0-B3 (Pins 3, 6, 10, 13)

Nibble B inputs. The data present on these pins is transferred to the outputs when the Select input is at a high level and the Output Enable input is at a low level. The data is presented to the outputs in inverted form for the LCX258.

OUTPUTS

Y0-Y3 (Pins 4, 7, 9, 12)

Data outputs. The selected input nibble is presented at these outputs when the Output Enable input is at a low level. The data present on these pins is in its inverted form for the LCX258. For the Output Enable input at a high level, the outputs are at a high level for the LCX258.

Select (Pin 1)

Nibble select. This input determines the data word to be transferred to the outputs. A low level on this input selects the A inputs and a high level selects the B inputs.

CONTROL INPUTS

Output Enable (Pin 15)

Output Enable input. A low level on this input allows the selected data to be presented at the outputs. A high level on this input sets all of the outputs to 3-state off.

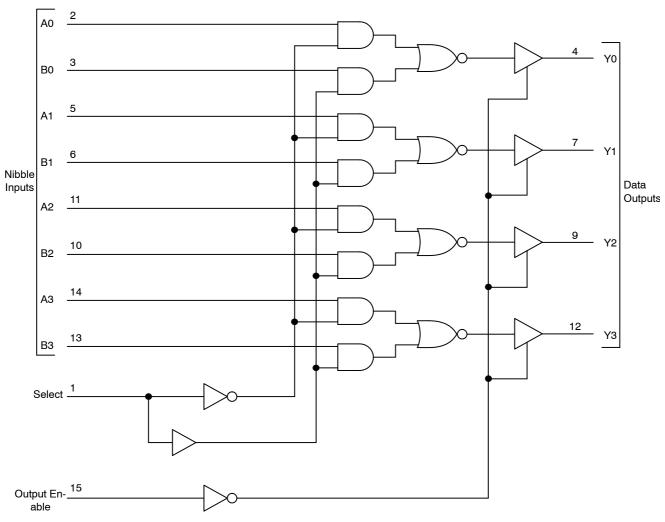


Figure 2. Expanded Logic Diagram

MAXIMUM RATINGS

Symbol	Parameter	Value	Condition	Units
V _{CC}	DC Supply Voltage	-0.5 to +7.0		V
VI	DC Input Voltage	$-0.5 \le V_{I} \le +7.0$		V
Vo	DC Output Voltage	$-0.5 \le V_O \le V_{CC} + 0.5$	Note 1	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
lok	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	mA
Io	DC Output Source/Sink Current	±50		mA
I _{CC}	DC Supply Current Per Supply Pin	±100		mA
I _{GND}	DC Ground Current Per Ground Pin	±100		mA
T _{STG}	Storage Temperature Range	-65 to +150		°C
MSL	Moisture Sensitivity		Level 1	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Тур	Max	Units
V _{CC}	Supply Voltage Operating Data Retention Only	2.0 1.5	2.3 to 3.3	3.6 3.6	V
VI	Input Voltage	0		5.5	V
Vo	Output Voltage (HIGH or LOW State)	0		V _{CC}	V
I _{OH}	HIGH Level Output Current $V_{CC} = 3.0 \text{ V} - 3.6 \text{ V}$ $V_{CC} = 2.7 \text{ V} - 3.0 \text{ V}$ $V_{CC} = 2.3 \text{ V} - 2.7 \text{ V}$			-24 -12 -8	mA
l _{OL}	LOW Level Output Current V _{CC} = 3.0 V - 3.6 V V _{CC} = 2.7 V - 3.0 V V _{CC} = 2.3 V - 2.7 V			+24 +12 +8	mA
T _A	Operating Free-Air Temperature	-40		+85	°C
Δt/ΔV	Input Transition Rise or Fall Rate, V_{IN} from 0.8 V to 2.0 V, $V_{CC} = 3.0 \text{ V}$	0		10	ns/V

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74LCX258DR2G	SOIC-16 (Pb-Free)	2500 / Tape & Reel
MC74LCX258DTG	TSSOP-16 (Pb-Free)	96 Units / Rail
MC74LCX258DTR2G	TSSOP-16 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

^{1.} Output in HIGH or LOW State. I_O absolute maximum rating must be observed.

DC ELECTRICAL CHARACTERISTICS

			T _A = -40°C	to +85°C	
Symbol	Characteristic	Condition	Min	Max	Units
V _{IH}	Minimum HIGH Level Input Voltage (Note 2)	$\begin{array}{c} 2.3 \text{ V} \leq \text{V}_{CC} \leq 2.7 \text{ V} \\ 2.7 \text{ V} \leq \text{V}_{CC} \leq 3.0 \text{ V} \\ 3.0 \text{ V} \leq \text{V}_{CC} \leq 3.6 \text{ V} \end{array}$	1.7 2.0 2.0		V
V _{IL}	Maximum LOW Level Input Voltage (Note 2)	$\begin{array}{c} 2.3 \text{ V} \leq \text{V}_{CC} \leq 2.7 \text{ V} \\ 2.7 \text{ V} \leq \text{V}_{CC} \leq 3.0 \text{ V} \\ 3.0 \text{ V} \leq \text{V}_{CC} \leq 3.6 \text{ V} \end{array}$		0.7 0.8 0.8	V
V _{OH}	Minimum HIGH Level Output Voltage	$\begin{array}{c} 2.3 \text{ V} \leq \text{V}_{CC} \leq 3.6 \text{ V; } I_{OH} = -100 \mu\text{A} \\ \text{V}_{CC} = 2.3 \text{ V; } I_{OH} = -8 \text{ mA} \\ \text{V}_{CC} = 2.7 \text{ V; } I_{OH} = -12 \text{ mA} \\ \text{V}_{CC} = 3.0 \text{ V; } I_{OH} = -18 \text{ mA} \\ \text{V}_{CC} = 3.0 \text{ V; } I_{OH} = -24 \text{ mA} \end{array}$	V _{CC} - 0.2 1.7 2.2 2.4 2.2		V
V _{OL}	Maximum LOW Level Output Voltage	$\begin{array}{c} 2.3 \ V \leq V_{CC} \leq 3.6 \ V; \ I_{OH} = 100 \ \mu A \\ V_{CC} = 2.3 \ V; \ I_{OH} = 8 \ mA \\ V_{CC} = 2.7 \ V; \ I_{OH} = 12 \ mA \\ V_{CC} = 3.0 \ V; \ I_{OH} = 16 \ mA \\ V_{CC} = 3.0 \ V; \ I_{OH} = 24 \ mA \end{array}$		0.2 0.7 0.4 0.4 0.55	V
I _{OZ}	3-State Output Current	$V_{CC} = 3.6 \text{ V}, V_{IN} = V_{IH} \text{ or } V_{IL}, V_{OUT} = 0 \text{ to } 5.5 \text{ V}$		±5	μΑ
I _{OFF}	Power Off Leakage Current	V _{CC} = 0, V _{IN} = 5.5 V or V _{OUT} = 5.5 V		10	μΑ
I _{IN}	Input Leakage Current	V _{CC} = 3.6 V, V _{IN} = 5.5 V or GND		±5	μΑ
I _{CC}	Quiescent Supply Current	V _{CC} = 3.6 V, V _{IN} = 5.5 V or GND		10	μΑ
ΔI_{CC}	Increase in I _{CC} per Input	$2.3 \text{ V} \le \text{V}_{CC} \le 3.6 \text{ V}; \text{V}_{IH} = \text{V}_{CC} - 0.6 \text{ V}$		500	μΑ

^{2.} These values of V_I are used to test DC electrical characteristics only.

AC ELECTRICAL CHARACTERISTICS

				Lir	nits				
			T _A = -40°C to +85°C						
		V _{CC} = 3.0	V to 3.6 V	V _{CC} =	= 2.7 V	V _{CC} = 2.3	V to 2.7 V	1	
		C _L =	50 pF	C _L =	C _L = 50 pF		30 pF	1	
Symbol	Parameter	Min	Max	Min	Max	Min	Max	Units	
t _{PLH} t _{PHL}	Propagation Delay A to B to Y	1.0 1.0	6.5 6.5	1.0 1.0	7.5 7.5	1.0 1.0	8.5 8.5	ns	
t _{PLH} t _{PHL}	Propagation Delay S to Y	1.0 1.0	7.0 7.0	1.0 1.0	8.0 8.0	1.0 1.0	9.0 9.0	ns	
t _{PZL} t _{PZH}	Propagation Delay OE to Y	1.0 1.0	7.0 7.0	1.0 1.0	8.0 8.0	1.0 1.0	9.0 9.0	ns	
t _{PLZ} t _{PHZ}	Propagation Delay OE to Y	1.0 1.0	6.0 6.0	1.0 1.0	7.0 7.0	1.0 1.0	8.0 8.0	ns	
t _{OSHL} t _{OSLH}	Output-to-Output Skew		1.0 1.0					ns	

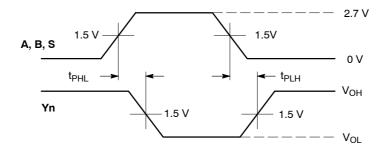
DYNAMIC SWITCHING CHARACTERISTICS

			T _A = +25°C			
Symbol	Characteristic	Condition	Min	Тур	Max	Units
V _{OLP}	Dynamic LOW Peak Voltage (Note 3)	$V_{CC} = 3.3 \text{ V}, C_L = 50 \text{ pF}, V_{IH} = 3.3 \text{ V}, V_{IL} = 0 \text{ V}$		8.0		V
V _{OLV}	Dynamic LOW Valley Voltage (Note 3)	$V_{CC} = 3.3 \text{ V}, C_L = 50 \text{ pF}, V_{IH} = 3.3 \text{ V}, V_{IL} = 0 \text{ V}$		0.8		V

^{3.} Number of outputs defined as "n". Measured with "n–1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

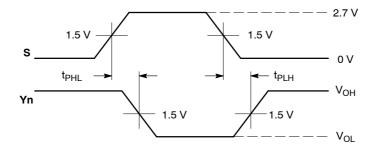
CAPACITIVE CHARACTERISTICS

Symbol	Parameter Condition		Typical	Units
C _{IN}	Input Capacitance	$V_{CC} = 3.3 \text{ V}, V_I = 0 \text{ V or } V_{CC}$	7	pF
C _{OUT}	Output Capacitance	$V_{CC} = 3.3 \text{ V}, V_I = 0 \text{ V or } V_{CC}$	8	pF
C _{PD}	Power Dissipation Capacitance	10 MHz, V_{CC} = 3.3 V, V_{I} = 0 V or V_{CC}	25	pF



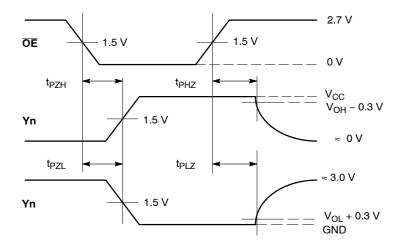
WAVEFORM 1 - NONINVERTING PROPAGATION DELAYS

 $t_R = t_F = 2.5 \text{ ns}, 10\% \text{ to } 90\%; f = 1 \text{ MHz}; t_W = 500 \text{ ns}$



WAVEFORM 2 - INVERTING PROPAGATION DELAYS

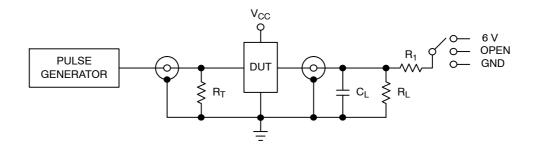
 $t_R = t_F = 2.5 \text{ ns}, 10\% \text{ to } 90\%; f = 1 \text{ MHz}; t_W = 500 \text{ ns}$



WAVEFORM 3 - OUTPUT ENABLE AND DISABLE TIMES

 $t_R = t_F = 2.5 \text{ ns}, 10\% \text{ to } 90\%; f = 1 \text{ MHz}; t_W = 500 \text{ ns}$

Figure 3. AC Waveforms



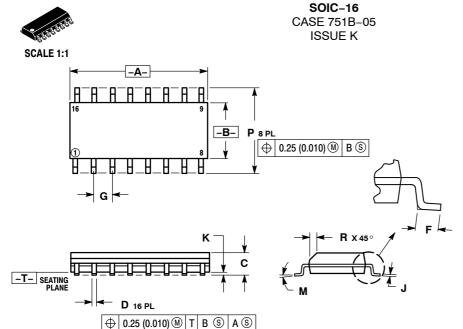
Test	Switch
t _{PLH} , t _{PHL}	Open
t _{PZL} , t _{PLZ}	6 V
Open Collector/Drain t _{PLH} and t _{PHL}	6 V
t _{PZH} , t _{PHZ}	GND

 C_L = 50 pF or equivalent (Includes jig and probe capacitance) R_L = R_1 = 500 Ω or equivalent R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

MECHANICAL CASE OUTLINE





DATE 29 DEC 2006

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. CONTROLLING DIMENSION: MILLIMETER.
- DIMENSIONS A AND B DO NOT INCLUDE MOLD
- DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.

 MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION. SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIN	IETERS	INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	9.80	10.00	0.386	0.393	
В	3.80	4.00	0.150	0.157	
C	1.35	1.75	0.054	0.068	
D	0.35	0.49	0.014	0.019	
F	0.40	1.25	0.016	0.049	
G	1.27	BSC	0.050	BSC	
J	0.19	0.25	0.008	0.009	
K	0.10	0.25	0.004	0.009	
M	0°	7°	0°	7°	
Р	5.80	6.20	0.229	0.244	
R	0.25	0.50	0.010	0.019	

STYLE 1: PIN 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	COLLECTOR BASE EMITTER NO CONNECTION EMITTER BASE COLLECTOR COLLECTOR BASE EMITTER NO CONNECTION	2. 3. 4. 5. 6. 7. 8. 9.	CATHODE CATHODE ANODE	STYLE 3: PIN 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	COLLECTOR, DYE #1 BASE, #1 EMITTER, #1 COLLECTOR, #1 COLLECTOR, #2 BASE, #2 EMITTER, #2 COLLECTOR, #2 COLLECTOR, #3 BASE, #3 EMITTER, #3	STYLE 4: PIN 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	COLLECTOR, #4 BASE, #4 EMITTER, #4	1	
12.	EMITTER		CATHODE	12.	COLLECTOR, #3	12.	,		
13.	BASE	13.		13.	COLLECTOR, #4	13.			
14.	COLLECTOR	14.		14.	BASE, #4	14.	,	SOLDERING	FOOTPRINT
15.	EMITTER	15.		15.	EMITTER, #4	15.	BASE, #1	,	
16.	COLLECTOR	16.	CATHODE	16.	COLLECTOR, #4	16.			BX
10.	COLLECTOR	10.	OMMODE	10.	COLLEGION, #4	10.	LIMITTER, #1	6.	.40
									16X 1.12 < ➤
STYLE 5:		STYLE 6:		STYLE 7:					10X 1.12
PIN 1.	DRAIN, DYE #1		CATHODE	PIN 1.	SOURCE N-CH	_		<u> </u>	10 -
2.	DRAIN, #1		CATHODE	2.	COMMON DRAIN (OUTPUT			_	16
3.	DRAIN, #2	3.	CATHODE	3.	COMMON DRAIN (OUTPUT	Γ)		<u>¥</u>	
4.	DRAIN, #2	4.	CATHODE	4.	GATE P-CH	_			
5.	DRAIN, #3	5.	CATHODE	5.	COMMON DRAIN (OUTPUT		16X		
6.	DRAIN, #3	6.	CATHODE	6.	COMMON DRAIN (OUTPUT		0.58	3 -	:
7.	DRAIN, #4	7.	CATHODE	7.	COMMON DRAIN (OUTPUT	Γ)			<u> </u>
8.	DRAIN, #4		CATHODE	8.	SOURCE P-CH				
9.	GATE, #4	9.	ANODE	9.	SOURCE P-CH				
10.	SOURCE, #4	10.		10.	COMMON DRAIN (OUTPUT				
11.	GATE, #3	11.		11.	COMMON DRAIN (OUTPUT				
12.	SOURCE, #3	12.	ANODE	12.	COMMON DRAIN (OUTPUT	Γ)			
13.	GATE, #2	13.		13.	GATE N-CH				
14.	SOURCE, #2	14.		14.	COMMON DRAIN (OUTPUT				PITCH
15.	GATE, #1	15.	ANODE	15.	COMMON DRAIN (OUTPUT	Γ)			<u> </u>
16.	SOURCE, #1	16.	ANODE	16.	SOURCE N-CH				
								8	9 ++ 7
									DIMENSIONS: MILLIMETERS

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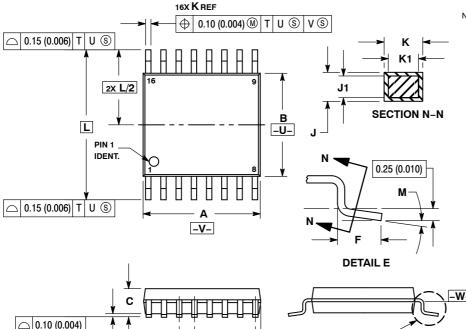
-T- SEATING PLANE

D



TSSOP-16 CASE 948F-01 ISSUE B

DATE 19 OCT 2006



NOTES:

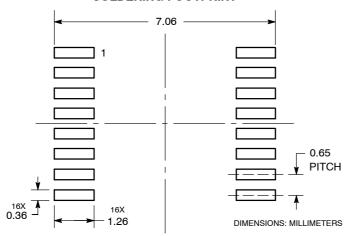
- 1. DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.

 DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION.
- DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
 DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR
- DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
- 7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-

	MILLIN	IETERS	INCHES	
DIM	MIN	MAX	MIN	MAX
Α	4.90	5.10	0.193	0.200
В	4.30	4.50	0.169	0.177
C		1.20		0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
Н	0.18	0.28	0.007	0.011
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
Κ	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
М	u °	ρ°	٥°	a o

SOLDERING FOOTPRINT

G



GENERIC MARKING DIAGRAM*

16 FFFFFFFF XXXX XXXX o ALYW

XXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot

Y = Year
W = Work Week
G or = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb–Free indicator, "G" or microdot " ■", may or may not be present.

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NTE4028B NTE4514B NTE4515B NTE4543B NTE4547B NTE74LS249 NLV74HC4851AMNTWG MC74LVX257DG
M74HCT4851ADWR2G AP4373AW5-7-01 NL7SZ19DBVT1G MC74LVX257DTR2G 74VHC4066AFT(BJ) 74VHCT138AFT(BJ)
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