

DM74LS469 8-Bit Up/Down Counter

General Description

The 'LS469 is an 8-bit synchronous up/down counter with parallel load and hold capability. Three function-select inputs (LD, UD, CBI) provide one of four operations which occur synchronously on the rising edge of the clock (CK).

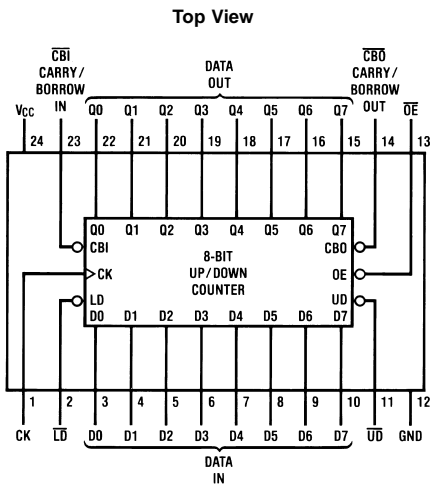
The LOAD operation loads the inputs (D₇-D₀) into the output register (Q₇-Q₀). The HOLD operation holds the previous value regardless of clock transitions. The INCREMENT operation adds one to the output register when the carry-in input is TRUE (CBI =LOW), otherwise the operation is a HOLD. The carry-out (CBO) is TRUE (CBO =LOW) when the output register (Q₇-Q₀) is all HIGHs, otherwise FALSE (CBO =HIGH). The DECREMENT operation subtracts one from the output register when the borrow-in input is TRUE (CBI =LOW), otherwise the operation is a HOLD. The borrow-out (CBO) is TRUE (CBO =LOW) when the output register (Q₇-Q₀) is all LOWs, otherwise FALSE (CBO =HIGH).

The output register (Q₇-Q₀) is enabled when \overline{OE} is LOW, and disabled (HI-Z) when \overline{OE} is HIGH. The output drivers will sink the 24 mA required for many bus-interface standards. Two or more 'LS469 octal up/down counters may be cascaded to provide larger counters.

Features/Benefits

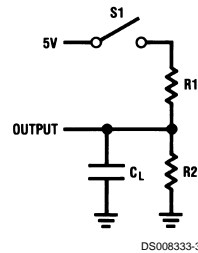
- 8-bit up/down counter for microprogram-counter, DMA controller and general-purpose counting applications
- 8 bits matches byte boundaries
- Bus-structured pinout
- 24-pin SKINNYDIP saves space
- 3-STATE outputs drive bus lines
- Low current PNP inputs reduce loading
- Expandable in 8-bit increments

Connection Diagram



Order Number DM54LS469J,
DM74LS469J or DM74LS469N
See Package Number J24F or N24C

Standard Test Load



Function Table

\overline{OE}	CK	\overline{LD}	\overline{UD}	\overline{CBI}	D7-D0	Q7-Q0	Operation
H	X	X	X	X	X	Z	HI-Z
L	↑	L	X	X	D	D	LOAD
L	↑	H	L	H	X	Q	HOLD
L	↑	H	L	L	X	Q plus 1	INCREMENT
L	↑	H	H	H	X	Q	HOLD
L	↑	H	H	L	X	Q minus 1	DECREMENT

Absolute Maximum Ratings (Note 1)

Supply Voltage V_{CC}
Input Voltage

7V
5.5V

Off-State Output Voltage
Storage Temperature

5.5V
-65°C to +150°C

Operating Conditions

Symbol	Parameter	Military			Commercial			Units
		Min	Typ	Max	Min	Typ	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
T_A	Operating Free-Air Temperature	-55		125 (Note 2)	0		75	°C
t_w	Width of Clock	Low	40		35	10		ns
		High	30		25			
t_{SU}	Set Up Time	60			50			ns
t_h	Hold Time	0	-15		0	-15		

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

Note 2: Case Temperature

Electrical Characteristics

Over Operating Conditions

Symbol	Parameter	Test Conditions	Min	Typ (Note 4)	Max	Units	
V_{IL}	Low-Level Input Voltage				0.8	V	
V_{IH}	High-Level Input Voltage		2			V	
V_{IC}	Input Clamp Voltage	$V_{CC}=\text{MIN}$ $I_I=-18\text{ mA}$			-1.5	V	
I_{IL}	Low-Level Input Current	$V_{CC}=\text{MAX}$ $V_I=0.4\text{V}$			-0.25	mA	
I_{IH}	High-Level Input Current	$V_{CC}=\text{MAX}$ $V_I=2.4\text{V}$			25	μA	
I_I	Maximum Input Current	$V_{CC}=\text{MAX}$ $V_I=5.5\text{V}$			1	mA	
V_{OL}	Low-Level Output Voltage	$V_{CC}=\text{MIN}$ $V_{IL}=0.8\text{V}$ $V_{IH}=2\text{V}$	MIL		$I_{OL}=12\text{ mA}$	0.5	V
		COM		$I_{OL}=24\text{ mA}$			
V_{OH}	High-Level Output Voltage	$V_{CC}=\text{MIN}$ $V_{IL}=0.8\text{V}$ $V_{IH}=2\text{V}$	MIL		$I_{OH}=-2\text{ mA}$	2.4	V
		COM		$I_{OH}=-3.2\text{ mA}$			
I_{OZL}	Off-State Output Current	$V_{CC}=\text{MAX}$ $V_{IL}=0.8\text{V}$ $V_{IH}=2\text{V}$			$V_O=0.4\text{V}$	-100	μA
I_{OZH}				$V_O=2.4\text{V}$	100	μA	
I_{OS}	Output Short-Circuit Current (Note 3)	$V_{CC}=5.0\text{V}$			$V_O=0\text{V}$	-30	mA
I_{CC}	Supply Current	$V_{CC}=\text{MAX}$		120	180	mA	

Note 3: No more than one output should be shorted at a time and duration of the short-circuit should not exceed one second

Note 4: All typical values are $V_{CC}=5\text{V}$, $T_A=25^\circ\text{C}$.

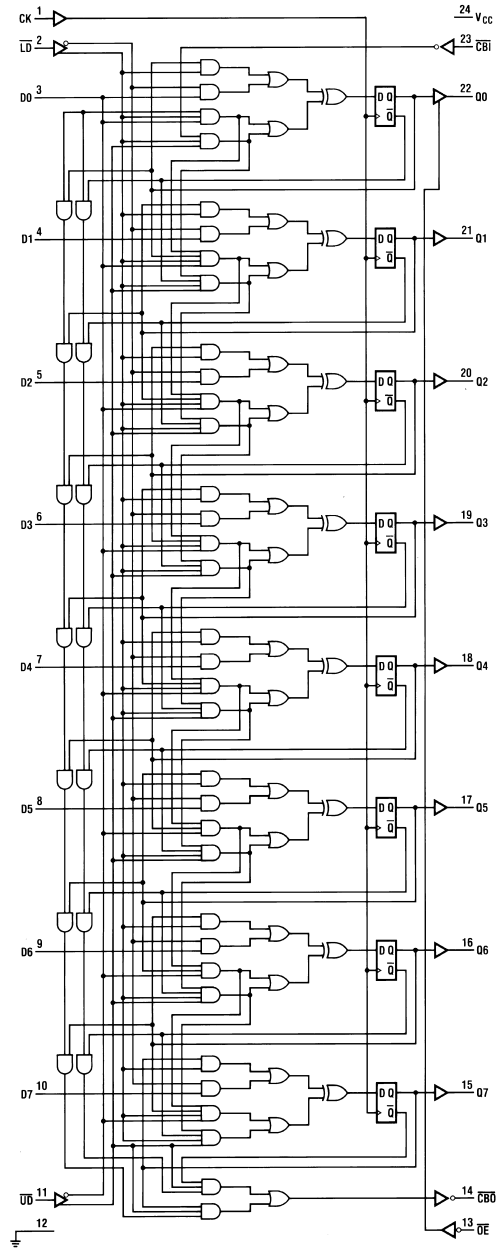
Switching Characteristics

Over Operating Conditions

Symbol	Parameter	Test Conditions (See Test Load/Waveforms)	Military			Commercial			Units
			Min	Typ	Max	Min	Typ	Max	
f_{MAX}	Maximum Clock Frequency	$C_L = 50 \text{ pF}$ $R_1 = 200\Omega$ $R_2 = 390\Omega$	10.5			12.5			MHz
t_{PD}	CBI to CBO Delay			35	60		35	50	ns
t_{PD}	Clock to Q			20	35		20	30	ns
t_{PD}	Clock to CBO			55	95		55	80	ns
t_{PZX}	Output Enable Delay			20	45		20	35	ns
t_{PXZ}	Output Disable Delay			20	45		20	35	ns

Logic Diagram

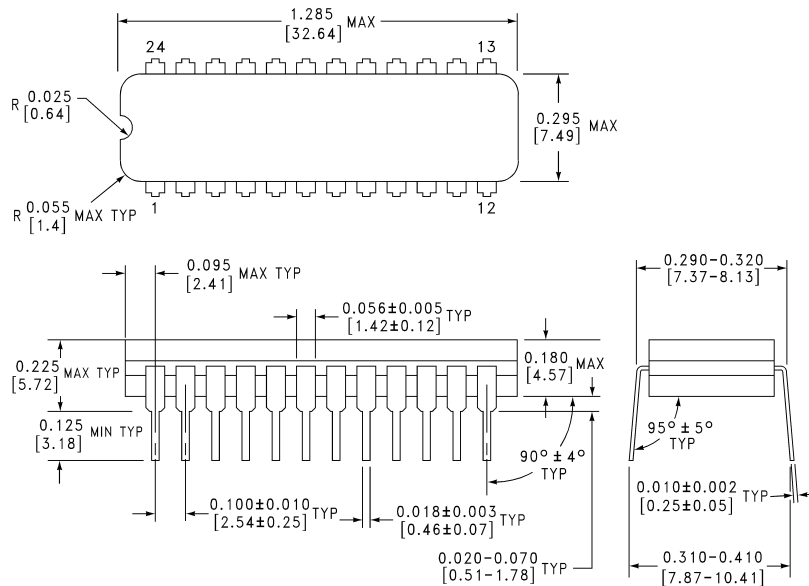
LS469



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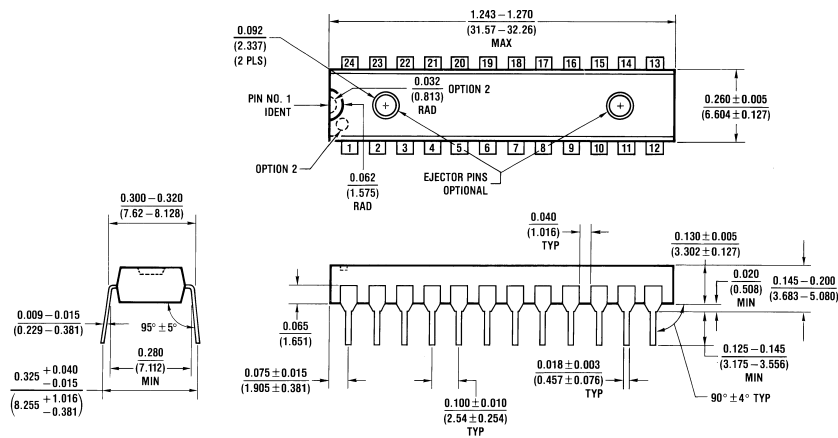


Physical Dimensions inches (millimeters) unless otherwise noted



J24F (REV. H)

24-Pin Narrow Ceramic Dual-In-Line Package (J)
Order Number DM54LS469J or DM74LS469J
Package Number J24F



N24C (REV F)

24-Pin Narrow Plastic Dual-In-Line Package (N)
Order Number DM74LS469N
Package Number N24C

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