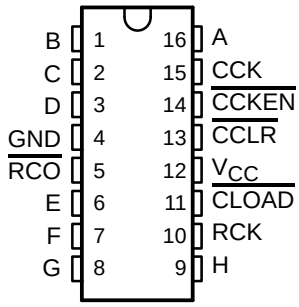
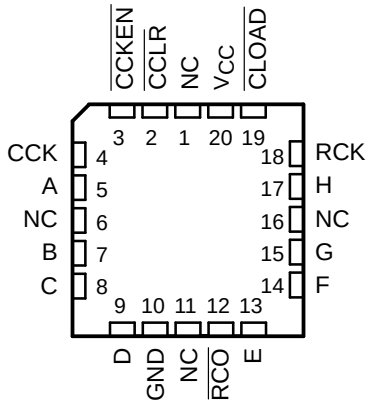
- **Parallel 3-State I/O: Register Inputs/Counter Outputs**
- **Counter Has Direct Overriding Load and Clear**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**
- **Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

54AC11592 . . . J PACKAGE
74AC11592 . . . D OR N PACKAGE
(TOP VIEW)



54AC11592 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The ’AC11592 consists of a parallel input and an 8-bit storage register feeding an 8-bit binary counter. Both the register and the counter have individual positive edge-triggered clocks.

The counter ($\overline{RCO}$) input has direct load and clear functions. A low-going $\overline{RCO}$ pulse will be obtained when the counter reaches the hex word FF.

Expansion is easily accomplished for two stages by connecting $\overline{RCO}$ of the first stage to $\overline{CCKEN}$ of the second stage. Cascading for larger count chains can be accomplished by connecting $\overline{RCO}$ of each stage to CCK of the following stage.

The 54AC11592 is characterized for operation over the full military temperature range of –55°C to 125°C. The 74AC11592 is characterized for operation from –40°C to 85°C.

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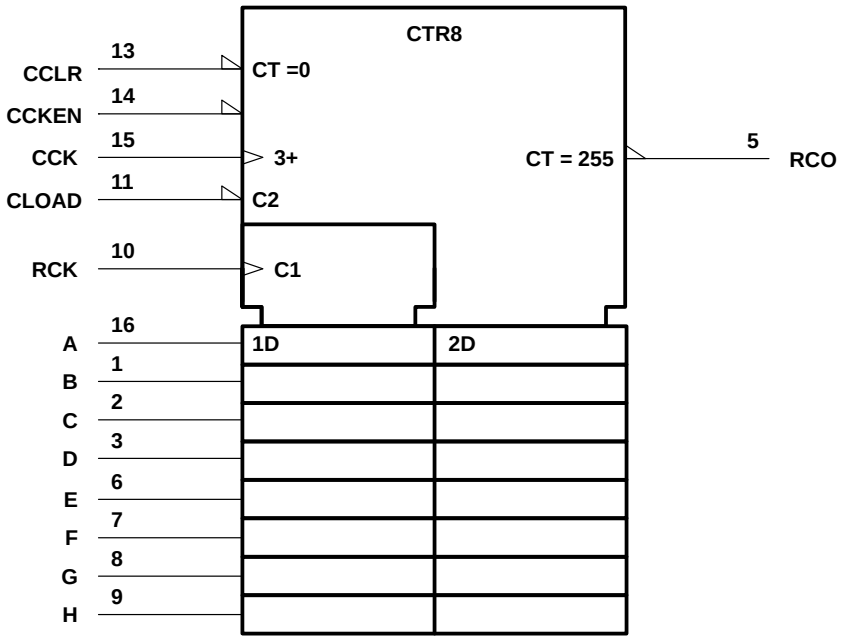
logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

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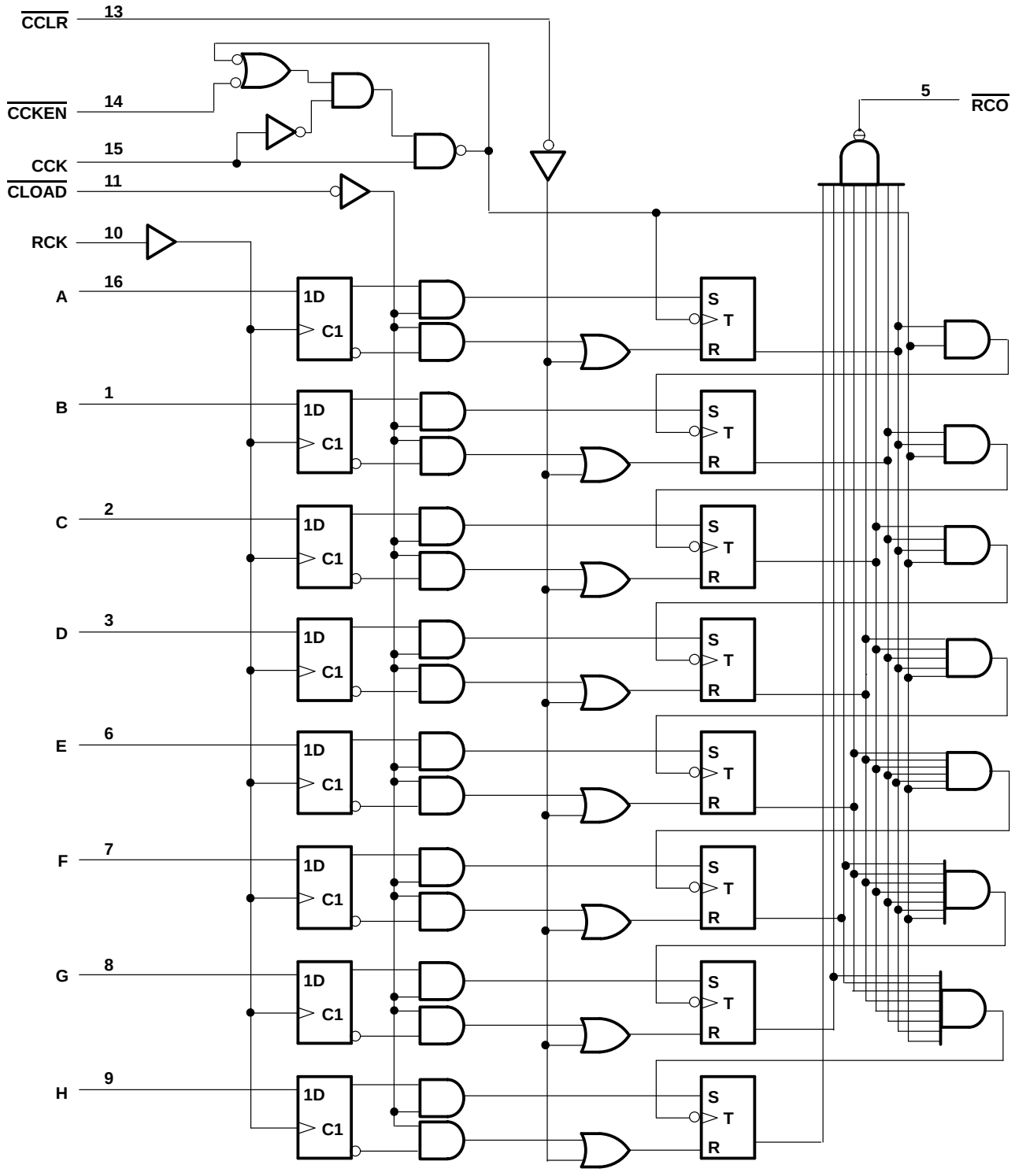
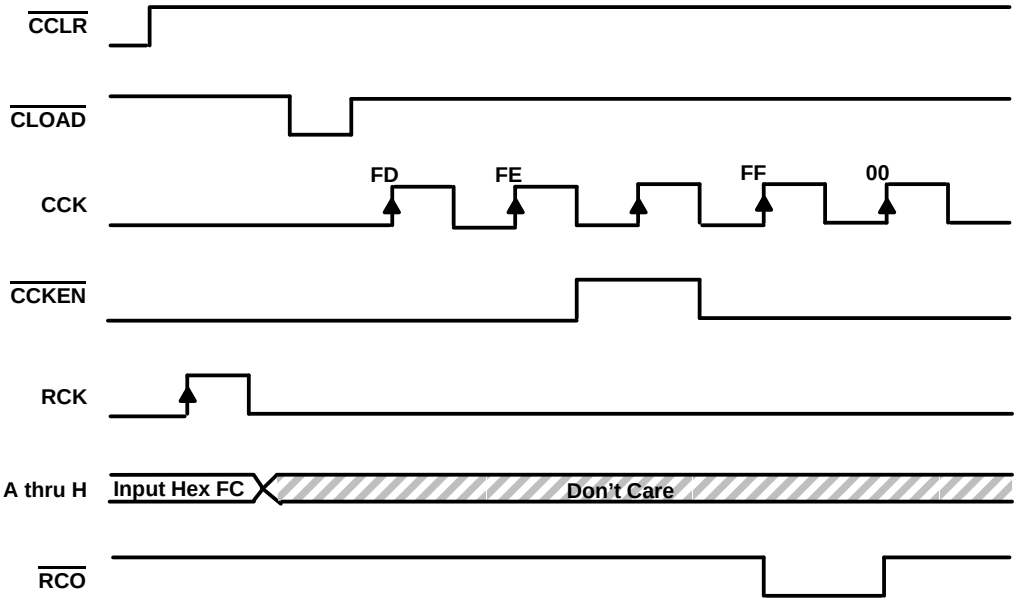
logic diagram (positive logic)



Pin numbers shown are for D, J, and N packages.

typical operating sequence



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC} . . . . . –0.5 V to 7 V
Input voltage range, V_I (see Note 1) . . . . . –0.5 V to V_{CC} + 0.5 V
Output voltage range, V_O (see Note 1) . . . . . –0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{CC}) . . . . . ±20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) . . . . . ±50 mA
Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . . ±50 mA
Continuous current through V_{CC} or GND pins . . . . . ±100 mA
Storage temperature range . . . . . –65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

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recommended operating conditions (see Note 2)

			54AC11592			74AC11592			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		3	5	5.5	3	5	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 3 V	2.1			2.1			V
		V_{CC} = 4.5 V	3.15			3.15			
		V_{CC} = 5.5 V	3.85			3.85			
V_{IL}	Low-level input voltage	V_{CC} = 3 V			0.9			0.9	V
		V_{CC} = 4.5 V			1.35			1.35	
		V_{CC} = 5.5 V			1.65			1.65	
V_I	Input voltage		0		V_{CC}	0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	0		V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 3 V			– 4			– 4	mA
		V_{CC} = 4.5 V			–24			–24	
		V_{CC} = 5.5 V			–24			–24	
I_{OL}	Low-level output current	V_{CC} = 3 V			12			12	mA
		V_{CC} = 4.5 V			24			24	
		V_{CC} = 5.5 V			24			24	
$\Delta t/\Delta v$	Input transition rise or fall rate		0		10	0		10	ns/V
T_A	Operating free-air temperature		– 55		125	–40		85	°C

NOTE 2: Unused or floating inputs must be held high or low.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V_{CC}	TA = 25°C			54AC11592		74AC11592		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = – 50 µA	3 V	2.9			2.9		2.9		V
		4.5 V	4.4			4.4		4.4		
		5.5 V	5.4			5.4		5.4		
	I_{OH} = – 4 mA	3 V	2.58			2.4		2.48		
	I_{OL} = – 24 mA	4.5 V	3.94			3.7		3.8		
	I_{OL} = – 24 mA	5.5 V	4.94			4.7		4.8		
	I_{OH} = – 50 mA†	5.5 V				3.85				
	I_{OH} = – 75 mA†	5.5 V						3.85		
V_{OL}	I_{OL} = 50 µA	3 V			0.1		0.1		0.1	V
		4.5 V			0.1		0.1		0.1	
		5.5 V			0.1		0.1		0.1	
	I_{OL} = 12 mA	3 V			0.36		0.5		0.44	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
	I_{OL} = 50 mA†	5.5 V					1.65			
	I_{OL} = 75 mA†	5.5 V							1.65	
I_I	V_I = V_{CC} or GND	5.5 V			±0.1		±1		±1	µA
I_{OZ}	V_O = V_{CC} or GND	5.5 V			±0.5		±10		±5	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V			8		160		80	µA
C_i	V_I = V_{CC} or GND	5 V		4.5						pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted)

			T_A = 25°C		54AC11592		74AC11592		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency, CCK OR RCK								MHz
t_w	Pulse duration	CCK high or low							ns
		RCK high or low							
		$\overline{CCLR}$ low							
		$\overline{CLOAD}$ low							
t_{su}	Setup time	$\overline{CCKEN}$ low before CCK↑							ns
		$\overline{CCLR}$ high before CCK↑							
		$\overline{CLOAD}$ high before CCK↑							
		RCK↑ before $\overline{CLOAD}$↑†							
		Data A thru H before RCK↑							
t_h	Hold time	Data A thru H after RCK↑							ns
		All others							

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted)

			T_A = 25°C		54AC11592		74AC11592		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency, CCK OR RCK								MHz
t_w	Pulse duration	CCK high or low							ns
		RCK high or low							
		$\overline{CCLR}$ low							
		$\overline{CLOAD}$ low							
t_{su}	Setup time	$\overline{CCKEN}$ low before CCK↑							ns
		$\overline{CCLR}$ high before CCK↑							
		$\overline{CLOAD}$ high before CCK↑							
		RCK↑ before $\overline{CLOAD}$↑†							
		Data A thru H before RCK↑							
t_h	Hold time	Data A thru H after RCK↑							ns
		All others							

† This time insures the data saved by RCK↑ will also be loaded into the counter.

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switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			54AC11592		74AC11592		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}										MHz
t_{PLH}	CCK	RCO								ns
t_{PHL}										
t_{PLH}	CLOAD	RCO								ns
t_{PHL}										
t_{PHL}	$\overline{CCLR}$	$\overline{RCO}$								ns
t_{PLH}	RCK	RCO								ns
t_{PHL}										

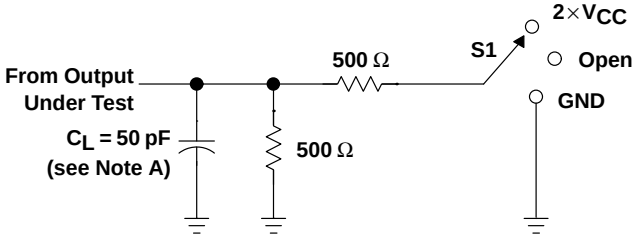
switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			54AC11592		74AC11592		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}										MHz
t_{PLH}	CCK	RCO								ns
t_{PHL}										
t_{PLH}	CLOAD	RCO								ns
t_{PHL}										
t_{PHL}	$\overline{CCLR}$	$\overline{RCO}$								ns
t_{PLH}	RCK	RCO								ns
t_{PHL}										

operating characteristics, V_{CC} = 5 V, T_A = 25°C

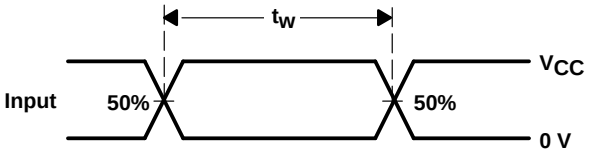
PARAMETER			TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	Outputs enabled	C_L = 50 pF, f = 1 MHz		pF
		Outputs disabled			

PARAMETER MEASUREMENT INFORMATION

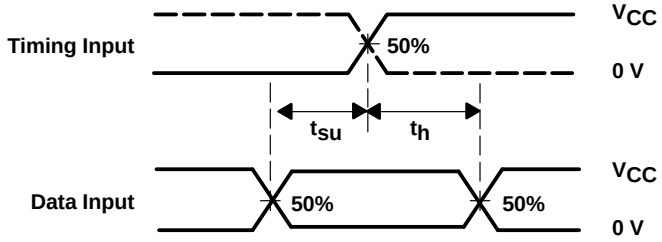


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND

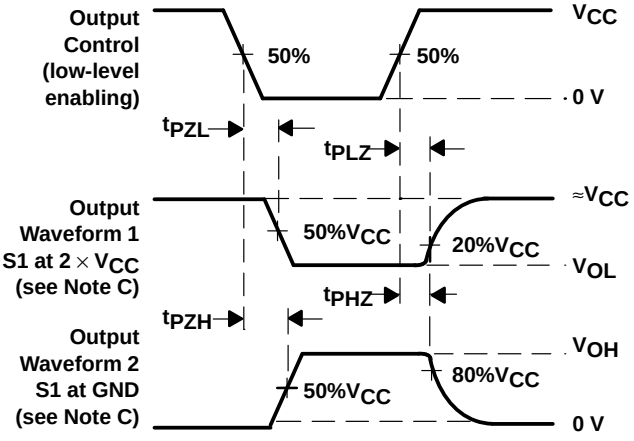
LOAD CIRCUIT FOR OUTPUTS



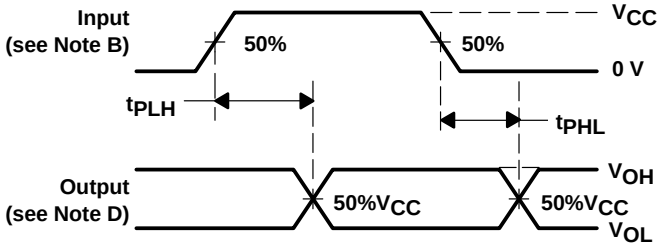
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns. For testing pulse duration: $t_r = t_f$ = 1 to 3 ns. Pulse polarity can be either high-to-low-to-high or low-to-high-to-low.
C. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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