54190/74190 Synchronous Up/Down Decade Counter with Down/Up Mode Control

	Schottky TTL					High-Speed TTL					Low-Power Schottky TTL					Standard TTL					Low-Power TTL				
	Device Type	Package				Device Type	Package				Device Type	Package				Device Type	Package				Device Type	Package			
		C	P	M	CF		C	P	M	CF		C	P	M	CF		C	P	M	CF		C	P	M	CF
T. I.											SN54LS190	J①			W①	SN54190	J①			W①					
											SN74LS190	J①	N①			SN74190	J①	N①							
FAIRCHILD											FM54LS190/FM93LS190	D①			F①	FM54190/FM93190	D①								
											FC74LS190/FC93LS190	D①	P①		F①	FC74190/FC93190	D①	P①							
MOTOROLA																									
											SN74LS190		P①			MC74190		P①							
N. S. C.											DM54LS190		①			DM54190	J①			W①					
											DM74LS190		①			DM74190	J①	N①		W①					
PHILIPS																									
											N74LS190		①			N74190		①							
SIGNETICS																S54190	F①	B①		W①					
											N74LS190		A①			N74190	F①	B①		W①					
SIEMENS																									
																FLJ201		①							
FUJITSU																									
											74LS190		M①			MB457	①	M①							
HITACHI																									
											HD74LS190		P①			HD74190	①	P①							
MITSUBISHI																									
											M74LS190		P①			M53390		P①							
NEC																									
AMD											Am54LS190		①												
											Am74LS190		①												

Electrical Characteristics SN54LS190/SN74LS190

absolute maximum ratings over operating free-air temperature range

Supply voltage, V_{CC}	7V	Operating free-air temperature range	SN54LS	−55°C to 125°C
Input voltage	7V		SN74LS	0°C to 70°C
		Storage temperature range		−65°C to 150°C

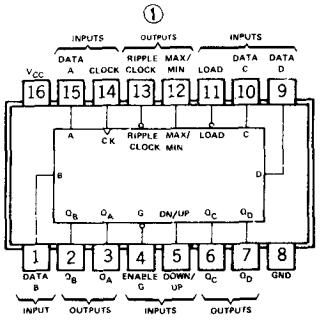
recommended operating conditions

	SN54LS190			SN74LS190			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			−400			−400	μA
Low-level output current, I_{OL}			4			8	mA
Input clock frequency, f_{clock}	0		20	0		20	MHz
Width of clock input pulse, $t_{w(clock)}$	25			25			ns
Width of load input pulse, $t_{w(load)}$	35			35			ns
Data setup time, t_{setup}	20			20			ns
Data hold time, t_{hold}	0			0			ns
Operating free-air temperature, T_A	55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range

PARAMETER *			TEST CONDITIONS †		MIN	TYP ‡	MAX	UNIT
V_{IH}	High-level input voltage				2			V
V_{IL}	Low-level input voltage						0.8	V
V_I	Input clamp voltage		V_{CC}=MIN, I_I=−18mA				−1.5	V
V_{OH}	High-level output voltage		V_{CC}=MIN, V_{IH}=2V, V_{IL}=0.8V, I_{OH}=−400μA		2.7	3.4		V
V_{OL}	Low-level output voltage		V_{CC}=MIN, V_{IH}=2V, V_{IL}=0.8V, I_{OL}=8mA			0.35	0.5	V
I_I	High-level input current at maximum input voltage	Enable	V_{CC}=MAX, V_I=7V				0.3	mA
		Others					0.1	
I_{IH}	High-level input current at any input except enable		V_{CC}=MAX, V_I=2.7V				20	μA
I_{IH}	High-level input current at enable input						60	μA
I_{IL}	Low-level input current at any input except enable		V_{CC}=MAX, V_I=0.4V				−0.4	mA
I_{IL}	Low-level input current at enable input						−1.2	mA
I_{OS}	Short-circuit output current ◆		V_{CC}=MAX	SN54LS	−20		−100	mA
				SN74LS	−20		−100	
I_{CC}	Supply current		V_{CC}=MAX See Note	SN54LS		20	35	mA
				SN74LS		20	35	
f_{max}	maximum clock frequency		V_{CC}=5V, T_A=25°C, C_C=15pF, R_L=2kΩ		20	25		MHz
t_{PLH}	from Load to output Q_A, Q_B, Q_C, Q_D					22	33	ns
t_{PHL}						33	50	
t_{PLH}	from Data A, B, C, D to output Q_A, Q_B, Q_C, Q_D					20	32	ns
t_{PHL}						27	40	
t_{PLH}	from Clock to output Ripple Clock					13	20	ns
t_{PHL}						16	24	
t_{PLH}	from Clock to output Q_A, Q_B, Q_C, Q_D					16	24	ns
t_{PHL}						24	36	
t_{PLH}	from Clock to output Max/Min					28	42	ns
t_{PHL}						37	52	
t_{PLH}	from Down/Up to output Ripple Clock					30	45	ns
t_{PHL}						30	45	
t_{PLH}	from Down/Up to output Max/Min					21	33	ns
t_{PHL}						22	33	

Pin Assignment (Top View)



asynchronous inputs: Low input to load sets Q_A=A, Q_B = B, Q_C = C, and Q_D = D

NOTE: I_{CC} is measured with all inputs grounded and all outputs open.

†For conditions shown as MAX or MIN, use appropriate value specified under recommended operating conditions for the applicable device type.
‡All typical values are at V_{CC}=5V, T_A=25°C. ◆Not more than one output should be shorted at a time.
*t_{PLH}=propagation delay time, low-to-high-level output t_{PHL}=propagation delay time, high-to-low-level output

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