National Semiconductor

PRELIMINARY

CGS64/74B2529
550 ps 1 to 10 Minimum Skew Clock Driver

General Description

This minimum skew clock driver is designed for Clock Generation and Support (CGS) applications operating from 33 MHz to 80 MHz. The devices guarantee minimum output skew across the outputs of a given device.

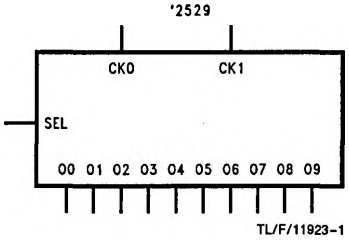
Skew parameters are also provided as a means to measure duty cycle requirements as those found in high speed clocking systems. The '2529 is a minimum skew clock driver with two selectable inputs driving ten outputs

The SEL pin is used to determine which CKn will have an active effect on the outputs of the circuit. When SEL = 1, the CK1 input is selected and when SEL = 0, the CK0 input is selected. The non-selected CKn input will not have any effect on the logical output level of the circuit. The output pins act as a single entity and will follow the state of the CK inputs.

Features

- Clock Generation and Support (CGS) devices
- Ideal for high frequency signal generation or clock distribution applications
- CGS74B version features National's Advanced Bipolar FAST® LSI process
- 1-to-10 low skew clock distribution
- 550 ps pin-to-pin output skew (V package)
- Specification for transition skew to meet duty cycle requirements
- 20-center pin V_{CC} and GND configuration or PLCC to minimize high speed switching noise
- Current sourcing 48 mA and current sinking of 64 mA
- Low dynamic power consumption above 20 MHz
- Guaranteed 4 kV ESD protection

Logic Symbols



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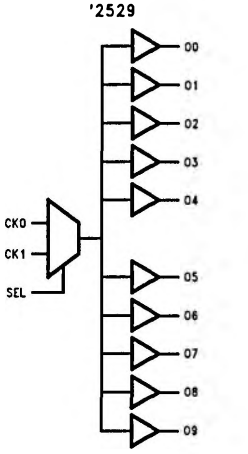

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Pin Description

Pin Names	Description
CK0, CK1	Clock Input ('2529)
O0–O9	Outputs
SEL	Clock Select ('2529)

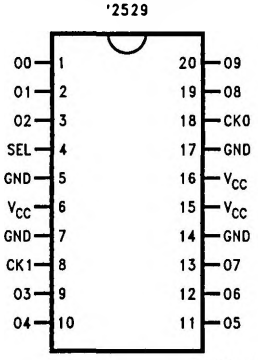
'2529

Inputs			Outputs
CK0	CK1	SEL	O0–O9
L	X	L	L
H	X	L	H
X	L	H	L
X	H	H	H

L = Low Logic Level
H = High Logic Level
X = Immaterial

Connection Diagrams

Pin Assignment PDIP and SOIC



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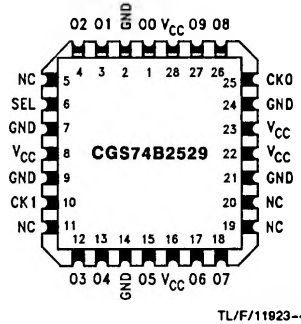
Pin Assignment for PCC



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Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	7.0V
Input Voltage (V_I)	7.0V
Operating Temperature	
64 Grade	−40°C to +85°C
74 Grade	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Typical θ_{JA}	Airflow	M	N	V	
	0 LFM	89	71	64	°C/W
	225 LFM	71	57	52	°C/W
	500 LFM	63	48	45	°C/W

Recommended Operating Conditions

Supply Voltage (V_{CC})	4.5V to 5.5V
High Level Input Voltage (V_{IH})	2V
Low Level Input Voltage (V_{IL})	0.8V
High Level Output Current (I_{OH})	−48 mA
Low Level Output Current (I_{OL})	64 mA
Free Air Operating Temperature (T_A)	
64 Grade	−40°C to +85°C
74 Grade	0°C to +70°C

Note: *The Absolule Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the DC and AC Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The Recommended Operating Conditions will define the conditions for actual device operation.*

DC Electrical Characteristics

Over recommended operating free air temprature range. All typical values are measured at V_{CC} = 5V, T_A = 25°C

Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{IK}	Input Clamp Voltage	V_{CC} = 4.5V, I_I = −18 mA				−1.2	V
V_{OH}	High Level Output Voltage	I_{OH} = −3 mA, V_{CC} = 4.5V		2.4			V
		I_{OH} = 48 mA, V_{CC} = 4.5V		2.0			
V_{OL}	Low Level Output Voltage	V_{CC} = 4.5V, I_{OL} = 64 mA			0.35	0.5	V
I_I	Input Current @ Max Input Voltage	V_{CC} = 5.5V, V_{IH} = 7V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = 5.5V, V_{IH} = 2.7V				20	μA
I_{IL}	Low Level Input Current	V_{CC} = 5.5V, V_{IL} = 0.4V			−0.5	−0.75	mA
I_O	Output Drive Current	V_{CC} = 5.5V, V_O = 2.25V		−50		−150	mA
I_{CC}	Supply Current '2528	V_{CC} = 5.5V	Outputs High		24	35	mA
			Outputs Low		45	65	mA
C_{IN}	Input Capacitance	V_{CC} = 5.5V			5		pF

AC Electrical Characteristics

Over recommended operating free air temperature range. All typical values are measured at V_{CC} = 5V, T_A = 25°C

Symbol	Parameter		V_{CC} = 4.5V to 5.5V C_L = 50 pF R_L = 500Ω			Units
			Min	Typ	Max	
f_{MAX}	Frequency Maximum			80		MHz
t_{PLH}	Low-to-High Propagation Delay CK0,1 to O_n	M, N	3.0	5.5	7.0	ns
	Low-to-High Propagation Delay CK0,1 to O_n	V	2.5	5.5	6.0	
t_{PHL}	High-to-Low Propagation Delay CK0,1 to O_n	M, N	3.0	5.5	7.0	ns
	High-to-Low Propagation Delay CK0,1 to O_n	V	2.5	5.5	6.0	

Extended AC Electrical Characteristics

Over recommended operating free air temperature range. All typical values are measured at V_{CC} = 5V, T_A = 25°C

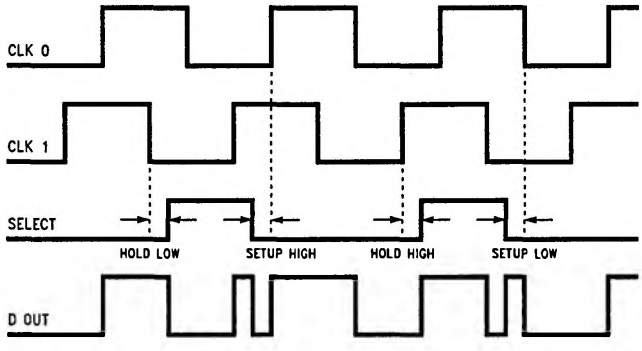
Symbol	Parameter	Package	V_{CC}* (V)	V_{CC} = 4.5V to 5.5V C_L = 50 pF R_L = 500Ω			Units
				Min	Typ	Max	
t_{OSHL}	Maximum Skew Common Edge Output-to-Output Variation	N M V	5.0		0.15	800 650 500	ps
t_{OSLH}	Maximum Skew Common Edge Output-to-Output Variation	N M V	5.0		0.15	800 650 500	ps
t_{PS}	Maximum Skew Pin (Signal) Transition Variation	N M V	5.0		0.6	750 750 850	ps
t_{Set}**	Setup Time High Select to CLK0 or 1 Setup Time Low Select to CLK0 or 1	All	5.0	−2.0 −2.0			ns
t_{Hold}**	Hold Time High Select to CLK0 or 1 Hold Time Low Select to CLK0 or 1	All	5.0	2.0 4.0			ns
t_{rise}, t_{fail}	Rise/Fall Time (from 0.8V/2.0V to 2.0V/0.8V)	CGS74	5.0			1.5	ns
		CGS64	5.0			1.75	

Note: t_{OSHL} and t_{OSLH} parameters are being tested and guaranteed at 1 MHz for V package. In addition, V package is guaranteed by design at 66 MHz until Oct. 1993, when it will be fully production tested.

*Voltage Range 5.0 is 5.0V ±0.5V

**A negative setup time indicates that the correct logic levels may be initiated sometimes after the active transition of the timing pulse.

Timing Diagram for the CGS74/64B2529



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