ICS553

Low Skew 1 to 4 Clock Buffer

Description

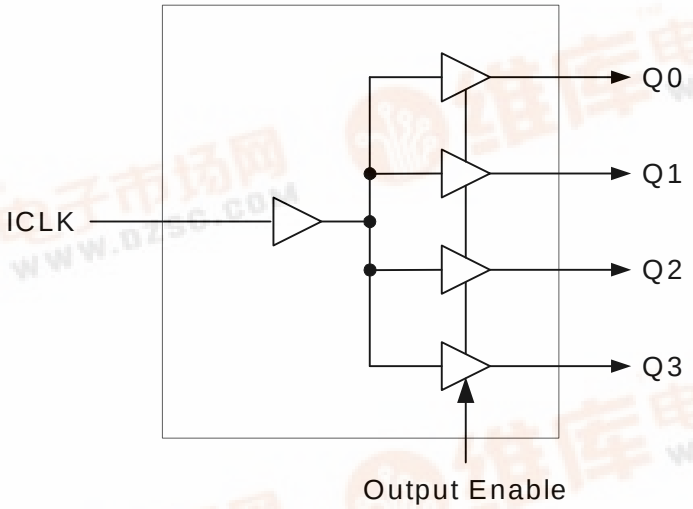
The ICS553 is a low skew, single input to four output, clock buffer. Part of ICS' Clock Blocks™ family, this is our lowest skew, small clock buffer. See the ICS552-02 for a 1 to 8 low skew buffer. For more than 8 outputs see the MK74CBxxx Buffalo™ series of clock drivers.

ICS makes many non-PLL and PLL based low skew output devices as well as Zero Delay Buffers to synchronize clocks. Contact us for all of your clocking needs.

Features

- Extremely low skew outputs (50ps maximum)
- Packaged in 8 pin SOIC
- Low power CMOS technology
- Operating Voltages of 2.5 to 5V
- Output Enable pin tri-states outputs
- 5V tolerant input clock

Block Diagram



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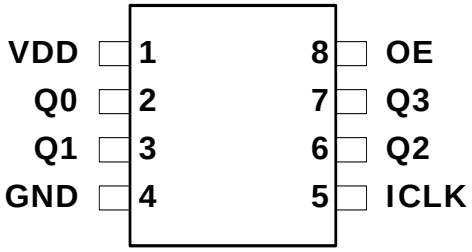
Pin Assignment



8 Pin (150 mil) SOIC

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	VDD	Power	Connect to +2.5V, +3.3V or +5.0V.
2	Q0	Output	Clock Output 0
3	Q1	Output	Clock Output 1
4	GND	Power	Ground
5	ICLK	Input	Clock Input. 5V tolerant input.
6	Q2	Output	Clock Output 2
7	Q3	Output	Clock Output 3
8	OE	Input	Output Enable. Tri-states outputs when low.

External Components

A minimum number of external components are required for proper operation. A decoupling capacitor of 0.01 µF should be connected between VDD on pin 1 and GND on pin 4, as close to the device as possible. A 33 Ω series terminating resistor may be used on each clock output if the trace is longer than 1 inch.

To achieve the low output skew that the ICS553 is capable of, careful attention must be paid to board layout. Essentially, all 4 outputs must have identical terminations, identical loads and identical trace geometries. If they do not, the output skew will be degraded. For example, using a 30Ω series termination on one output (with 33Ω on the others) will cause at least 15ps of skew.

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Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS553. These ratings, which are standard values for ICS commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

Item	Rating
Supply Voltage, VDD	7V
All Inputs and Outputs	-0.5V to VDD+0.5V
Ambient Operating Temperature	0 to +70°C
Storage Temperature	-65 to +150°C
Junction Temperature	175°C
Soldering Temperature	260°C

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Units
Ambient Operating Temperature	0	–	+70	°C
Power Supply Voltage (measured in respect to GND)	+2.375		+5.25	V

DC Electrical Characteristics

VDD=2.5V ±5%, Ambient temperature 0 to +70°C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		2.375		2.625	V
Input High Voltage, ICLK	V_{IH}	Note 1	VDD/2+0.5		5.5	V
Input Low Voltage, ICLK	V_{IL}	Note 1			VDD/2-0.5	V
Input High Voltage, OE	V_{IH}		2		VDD	V
Input Low Voltage, OE	V_{IL}				0.4	V
Output High Voltage	V_{OH}	I_{OH} = -16 mA	2			V
Output Low Voltage	V_{OL}	I_{OL} = 16 mA			0.5	V
Operating Supply Current	IDD	No load, 135 MHz		25		mA
Short Circuit Current	I_{OS}			±28		mA

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DC Electrical Characteristics (continued)

VDD=3.3V ±5% , Ambient temperature 0 to +70°C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.15		3.45	V
Input High Voltage, ICLK	V_{IH}	Note 1	VDD/2+0.7		5.5	V
Input Low Voltage, ICLK	V_{IL}	Note 1			VDD/2-0.7	V
Input High Voltage, OE	V_{IH}		2		VDD	V
Input Low Voltage, OE	V_{IL}				0.4	V
Output High Voltage	V_{OH}	I_{OH} = -25 mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 25 mA			0.8	V
Output High Voltage (CMOS Level)	V_{OH}	I_{OH} = -12 mA	VDD-0.4			V
Operating Supply Current	IDD	No load, 135 MHz		35		mA
Short Circuit Current	I_{OS}			±50		mA

VDD=5V ±5% , Ambient temperature 0 to +70°C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		4.75		5.25	V
Input High Voltage, ICLK	V_{IH}	Note 1	VDD/2+1		5.5	V
Input Low Voltage, ICLK	V_{IL}	Note 1			VDD/2-1	V
Input High Voltage, OE	V_{IH}		2		VDD	V
Input Low Voltage, OE	V_{IL}				0.4	V
Output High Voltage	V_{OH}	I_{OH} = -45 mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 45 mA			0.8	V
Output High Voltage (CMOS Level)	V_{OH}	I_{OH} = -12 mA	VDD-0.4			V
Operating Supply Current	IDD	No load, 135 MHz		50		mA
Short Circuit Current	I_{OS}			±80		mA

Notes: 1. Nominal switching threshold is VDD/2

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AC Electrical Characteristics

VDD = 2.5V ±5%, Ambient Temperature 0 to +70° C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time	t_{OR}	0.8 to 2.0V, C_L=15pF			1.5	ns
Output Fall Time	t_{OF}	2.0 to 0.8V, C_L=15pF			1.5	ns
Propagation Delay	Note 1			3		ns
Output to output skew	Note 2	Rising edges at VDD/2		0	50	ps

VDD = 3.3V ±5%, Ambient Temperature 0 to +70° C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time	t_{OR}	0.8 to 2.0V, C_L=15pF			1.0	ns
Output Fall Time	t_{OF}	2.0 to 0.8V, C_L=15pF			1.0	ns
Propagation Delay	Note 1			2.6		ns
Output to output skew	Note 2	Rising edges at VDD/2		0	50	ps

VDD = 5V ±5%, Ambient Temperature 0 to +70° C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency			0		200	MHz
Output Rise Time	t_{OR}	0.8 to 2.0V, C_L=15pF			0.7	ns
Output Fall Time	t_{OF}	2.0 to 0.8V, C_L=15pF			0.7	ns
Propagation Delay	Note 1			2.5		ns
Output to output skew	Note 2	Rising edges at VDD/2		0	50	ps

Notes: 1. With rail to rail input clock

2. Between any 2 outputs with equal loading.

3. Duty cycle on outputs will match incoming clock duty cycle. Consult ICS for tight duty cycle clock generators.

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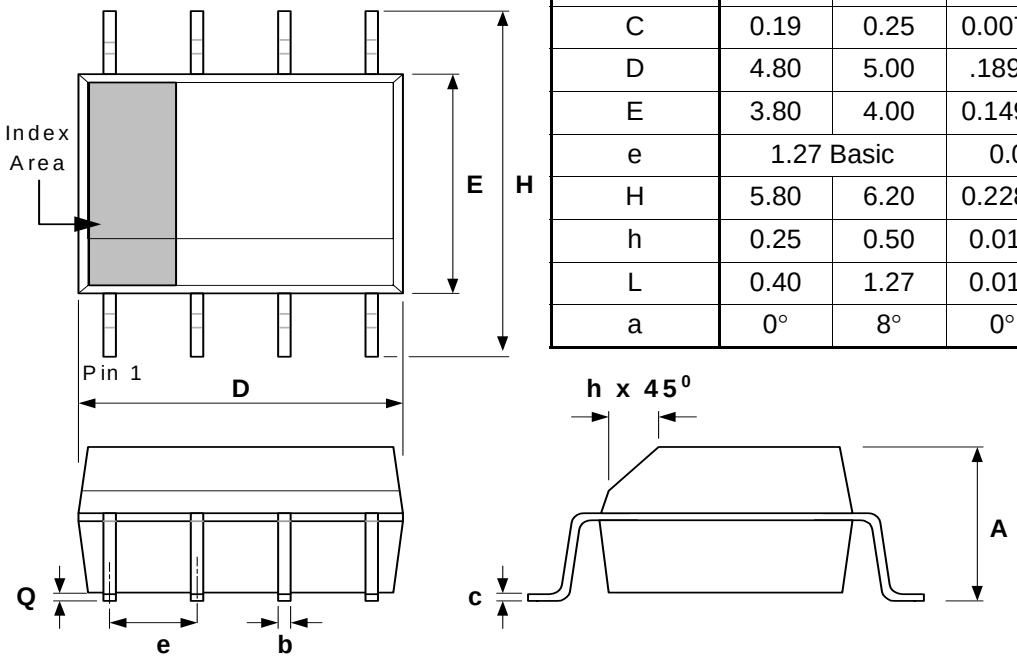
Package Outline and Package Dimensions (8 pin SOIC, 150 Mil. Narrow Body)

Package dimensions are kept current with JEDEC Publication No. 95



	Millimeters		Inches	
Symbol	**Min**	**Max**	**Min**	**Max**
A	1.35	1.75	0.0532	0.0688
A1	1.10	0.25	0.0040	0.0098
B	0.33	0.51	0.013	0.020
C	0.19	0.25	0.0075	0.0098
D	4.80	5.00	.1890	.1968
E	3.80	4.00	0.1497	0.1574
e	1.27 Basic		0.050 Basic	
H	5.80	6.20	0.2284	0.2440
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
a	0°	8°	0°	8°

Ordering Information

Part / Order Number	Marking	Shipping packaging	Package	Temperature
ICS553M	ICS553M	Tubes	8 pin SOIC	0 to +70° C
ICS553MT	ICS553M	Tape and Reel	8 pin SOIC	0 to +70° C