Dual 1-to-8 Low Voltage Clock Buffer/Translator

Description

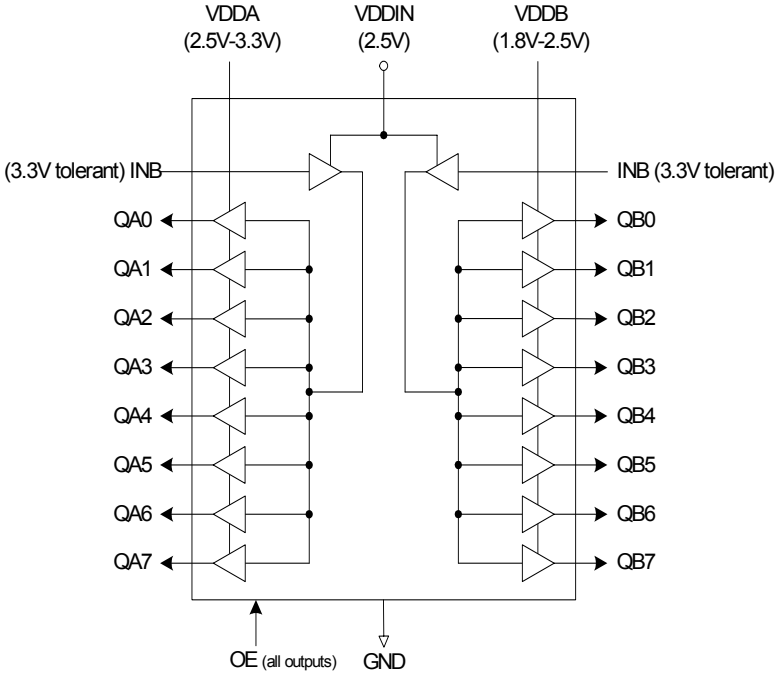
The ICSLV218 is a high-speed clock buffer consisting of two independent single-input to eight-output low-skew, non-inverting clock drivers.

The ICSLV218 has three independent supply rails: The input supply rail, VDDIN, operates from a fixed 2.5 V supply, while the output supply rails, VDDA and VDDB, operate from 2.5 V-3.3 V and 1.8 V-2.5 V supplies respectively. This configuration, combined with 3.3 V tolerance on the INA and INB inputs, allows for many different possibilities of up and/or down voltage translation.

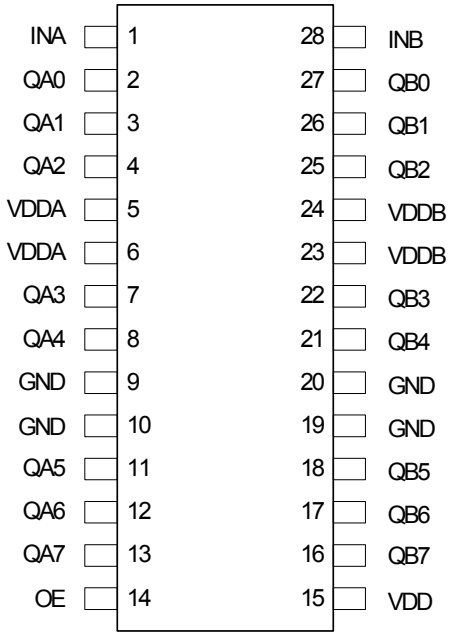
Features

- Dual 1:8 clock drivers
- Pin-compatible with MK74CB218
- Independent supply rails on input and output banks for voltage translation
- 3.3 V input tolerance
- Low skew outputs within same bank (150 ps)
- Output Enable tri-states both banks of eight
- Clock speeds up to 200 MHz
- Industrial temperature range (-40 to 85°C)
- 28-pin SSOP (150 mil body) Pb (lead) free package

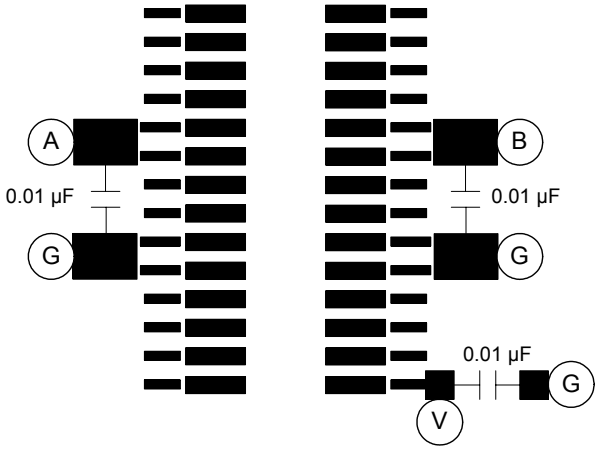
Block Diagram



Pin Assignment



Suggested Layout



NOTE: 33 ohm series termination resistors for each output are essential for operation.
For simplicity, series termination resistors are not shown for the outputs, but should be placed as close to the device as possible. It is most critical to have the 0.01 µF decoupling capacitors closest.

(A) = connect to VDDA
(B) = connect to VDDB
(V) = connect to VDD
(G) = connect to low inductance ground plane

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	INA	Input	Clock input for eight A outputs. 3.3 V tolerant.
2, 3, 4	QA0, QA1, QA2	Output	Clock A outputs.
5, 6	VDDA	Power	Power supply for QA outputs. Connect to a voltage from 2.5 V to 3.3 V.
7, 8	QA3, QA4	Output	Clock A outputs.
9, 10	GND	Power	Connect to ground.
11, 12, 13	QA5, QA6, QA7	Output	Clock A outputs.
14	OE	Input	Output Enable. Tri-states all clock outputs when this input is low. Internal pull-up to VDDIN.
15	VDD	Power	Power supply for inputs. Connect to 2.5 V.
16, 17, 18	QB7, QB6, QB5	Output	Clock B outputs.
19, 20	GND	Power	Connect to ground.
21, 22	QB4, QB3	Output	Clock B outputs.
23, 24	VDDB	Power	Power supply for QB outputs. Connect to a voltage from 1.8 V to 2.5 V.
25, 26, 27	QB2, QB1, QB0	Output	Clock B outputs.
28	INB	Input	Clock input for eight B outputs. 3.3 V tolerant.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICSLV218. 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 Voltages, VDDIN, VDDA, or VDDB (referenced to GND)	5 V
Inputs INA and INB (referenced to GND)	-0.5 V to 3.6 V
Outputs	-0.5 V to VDDA+0.5 V or VDDB+0.5 V
Ambient Operating Temperature	-40 to +85°C
Storage Temperature	-65°C to 150°C
Soldering Temperature	260°C (max. of 20 seconds)

DC Electrical Characteristics

Unless stated otherwise, **VDDIN = VDDA = VDDB = 2.5 V ±10%,** Ambient Temperature = -40 to 85°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDDIN		2.375	2.5	2.75	V
	VDDA		2.375		3.63	V
	VDDB		1.62		2.75	V
Operating Supply Current	IDDIN	All outputs at 100 MHz, No load		25		µA
	IDDA	All outputs at 100 MHz, No load		17		mA
	IDDB	All outputs at 100 MHz, No load		17		mA
Input High Voltage	V_{IH}	INA, INB, OE pins	1.7			V
Input Low Voltage	V_{IL}	INA, INB, OE pins			0.7	V
Output High Voltage, QA0-QA7	V_{OH}	VDDA=3.3 V, I_{OH} = -25 mA	2.0			V
		VDDA=2.5 V, I_{OH} = -16 mA	2.0			V
Output Low Voltage, QA0-QA7	V_{OL}	I_{OL} = 25 mA			0.4	V
		VDDA=2.5 V, I_{OL} = 16 mA			0.4	V
Output High Voltage, QB0-QB7	V_{OH}	VDDB = 2.5 V, I_{OH} = -16 mA	2			V
		VDDB = 1.8 V, I_{OH} = -8 mA	VDD-0.45			V
Output Low Voltage, QB0-QB7	V_{OL}	VDDB = 2.5 V, I_{OL} = 16 mA			0.4	V
		VDDB = 1.8 V, I_{OL} = 8 mA			0.45	V
Output Impedance				15		Ω
Short Circuit Current		Each output, VOUT=GND or VDD		±100		mA
Input Capacitance	C_{IN}			7		pF
On-chip Pull-up Resistor	R_{PU}	OE		250		kΩ

Note: Short circuits may be applied indefinitely, but only one output may be shorted at a time to prevent exceeding the power dissipation rating of this package.

AC Electrical Characteristics

Unless stated otherwise, **VDDIN = VDDA = VDDB = 2.5 V ±10%,** Ambient Temperature = -40 to 85°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Clock Frequency	F_{IN}	INA or INB, Note 3	0		200	MHz
Propagation Delay, INA to QA0-QA7		C_L = 10 pF			5	ns
Propagation Delay, INB to QB0-QB7		C_L = 10 pF			5	ns
Output Clock Rise Time		20% to 80%, C_L=10 pF			2.5	ns
Output Clock Fall Time		80% to 20%, C_L=10 pF			2.5	ns
Output Duty Cycle		C_L=10 pF	45	48	55	%
Output to Output Skew		Measured on rising edge at VDD/2, Note 1		100	150	ps
Output Clock A to B Skew		At VDD/2, Note 2			1500	ps
Output Enable Time		OE high to output on			20	ns
Output Disable Time		OE low to tri-state			20	ns

Notes:

1. Between any two A outputs, or any two B outputs, with equal loading.

2. Between any clock A output and any clock B output with INA connected to INB, and equal loading.

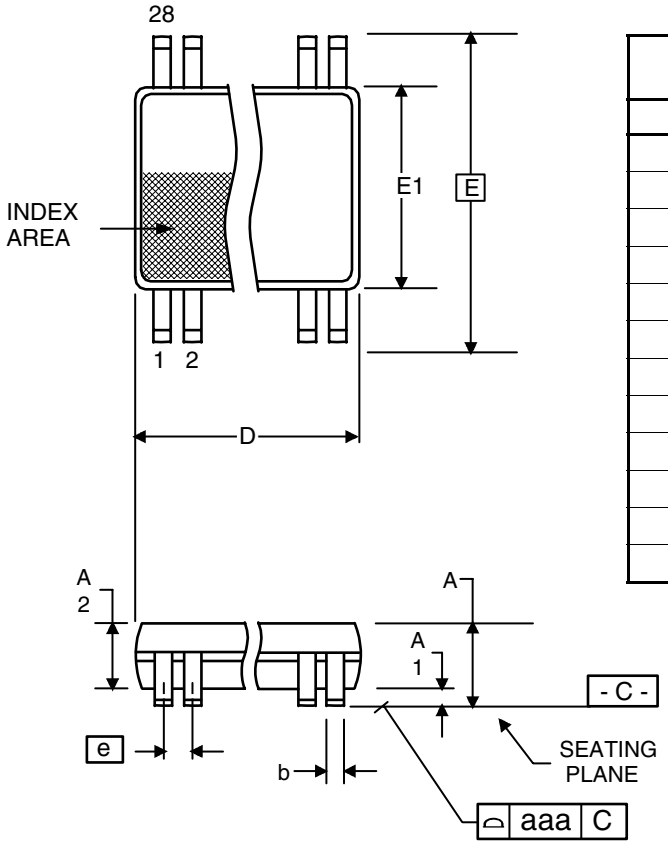
3. Care must be taken not to exceed the absolute maximum junction temperature or power dissipation rating of the package: Power dissipated = (16 outputs x frequency x VDD^2 x C_L) < [(Tj - Ta) / θ_{JA}].

Thermal Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Ambient	θ_{JA}	Still air		100		°C/W
	θ_{JA}	1 m/s air flow		80		°C/W
	θ_{JA}	3 m/s air flow		67		°C/W
Thermal Resistance Junction to Case	θ_{JC}			60		°C/W

Package Outline and Package Dimensions (28-pin SSOP, 150 mil Body)

Package dimensions are kept current with JEDEC Publication No. 95, MO-153



	Millimeters		Inches	
Symbol	**Min**	**Max**	**Min**	**Max**
A	1.35	1.75	.053	.069
A1	0.10	0.25	.0040	.010
A2	--	1.50	--	.059
b	0.20	0.30	.008	.012
C	0.18	0.25	.007	.010
D	9.80	10.00	.386	.394
E	5.80	6.20	.228	.244
E1	3.80	4.00	.150	.157
e	0.635 Basic		0.025 Basic	
L	0.40	1.27	.016	.050
α	0°	8°	0°	8°
aaa	--	0.10	--	0.004

Ordering Information

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
ICSLV218RILF	ICSLV218RILF	Tubes	28-pin SSOP	-40 to +85°C
ICSLV218RILFT	ICSLV218RILF	Tape and Reel	28-pin SSOP	-40 to +85°C

Parts that are ordered with a "LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant.