



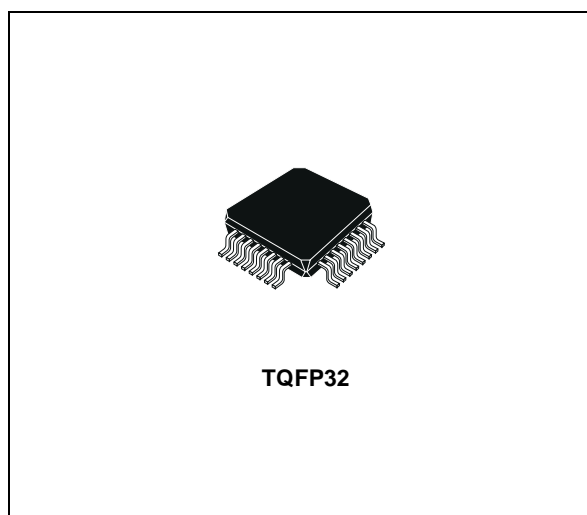
## DIFFERENTIAL LVDS CLOCK DRIVER

- 100ps PART-TO-PART SKEW
- 50ps BANK SKEW
- DIFFERENTIAL DESIGN
- MEETS LVDS SPEC. FOR DRIVER OUTPUTS AND RECEIVER INPUTS
- REFERENCE VOLTAGE AVAILABLE OUTPUT  $V_{BB}$
- LOW VOLTAGE  $V_{CC}$  RANGE OF 2.375V TO 2.625V
- HIGH SIGNALLING RATE CAPABILITY (EXCEEDS 700MHz)
- SUPPORT OPEN, SHORT, AND TERMINATED INPUT FAIL-SAFE (LOW OUTPUT STATE)
- PROGRAMMABLE DRIVERS POWER OFF CONTROL

### DESCRIPTION

The STLVD210 is a low skew programmable 1-to-5 dual differential LVDS driver, designed with clock distribution in mind. The LVDS input signals can be either differential or single-ended if the  $V_{BB}$  output is used.

The STLVD210 is provided with a 11 bit shift register with a serial in and a Control Register. The purpose is to enable or power off each output clock channel and to select the clock input. The



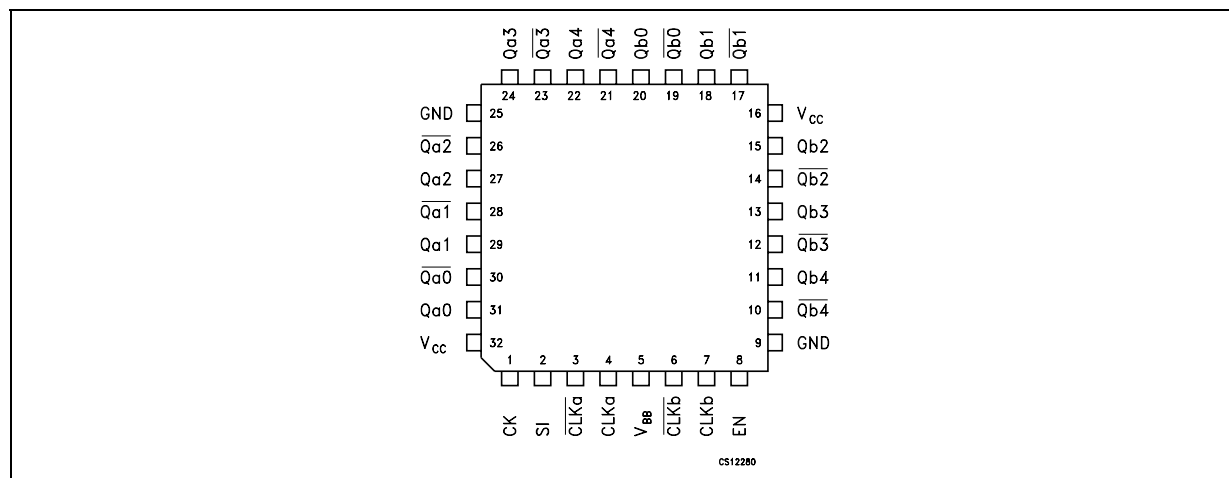
STLVD210 is specifically designed, modelled and produced with low skew as the key goal. Optimal design and layout serve to minimize gate to gate skew within a device. The net result is a dependable guaranteed low skew device.

The STLVD210 can be used for high performance clock distribution in 2.5V systems with LVDS levels. Designers can take advantage of the device's performance to distribute low skew clocks across the backplane or the board.

### ORDERING CODES

Type	Temperature Range	Package	Comments
STLVD210BF	-40 to 85 °C	TQFP32 (Tray)	250 parts per Tray
STLVD210BFR	-40 to 85 °C	TQFP32 (Tape & Reel)	2400 parts per reel

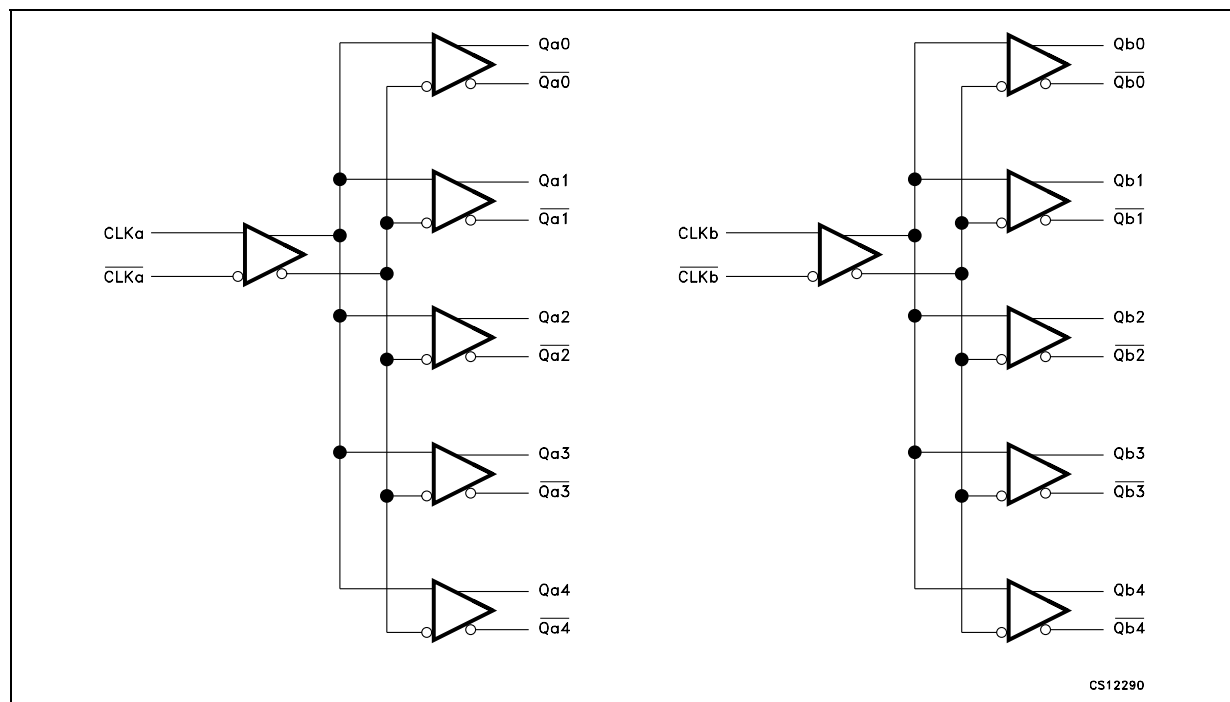
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	CK	Control Register Clock
2	SI	Control Register Serial IN/CLK_SEL
3, 4, 6, 7	CLKn/CLKn	LVDS CLK Inputs
5	V <sub>BB</sub>	Reference Voltage Output
8	EN	Device Enable/Program
9, 25	GND	GROUND
10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31	Qn0:4/Qn0:4	LVDS
16, 32	V <sub>CC</sub>	Supply Voltage

## LOGIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	-0.3 to 2.8	V
$V_I$	Input Voltage	-0.2 to ( $V_{CC}+0.2$ )	V
$V_O$	Output Voltage	-0.2 to ( $V_{CC}+0.2$ )	V
$I_{OSD}$	Driver Short Circuit Current	Continuous	
ESD	Electrostatic Discharge (HBM 1.5K $\Omega$ , 100pF)	>2	KV

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

## THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{TJ-C}$	Thermal Resistance Junction-Case	13	°C/W

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	TYP	Max	Unit
$V_{CC}$	Supply Voltage	2.375		2.625	V
$V_{IC}$	Receiver Common Mode Input Voltage	0.5( $V_{ID}$ )		2-0.5( $V_{ID}$ )	V
$T_{OPR}$	Operating Free-Air Temperature Range	-40		85	°C
$T_J$	Operating Junction Temperature	-40		105	°C

**DRIVER ELECTRICAL CHARACTERISTICS** ( $T_A = -40$  to  $85$  °C,  $V_{CC} = 2.5V \pm 5\%$ , unless otherwise noted. Typical values are at  $T_A = 25^\circ\text{C}$ ) (Note 1)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{OD}$	Output Differential Voltage	$R_L = 100\ \Omega$	400	500	600	mV
$\Delta V_{OD}$	$V_{OD}$ Magnitude Change				30	mV
$V_{OS}$	Offset Voltage		1.05	1.15	1.25	V
$\Delta V_{OS}$	$V_{OS}$ Magnitude Change				30	mV
$I_{OS}$	Output Short Circuit Current	$V_O = 0V$		15	30	mA
		$V_{OD} = 0V$		7	15	

NOTE 1: All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.

**RECEIVER ELECTRICAL CHARACTERISTICS** ( $T_A = -40$  to  $85$  °C,  $V_{CC} = 2.5V \pm 5\%$ , unless otherwise noted. Typical values are at  $T_A = 25^\circ\text{C}$ ) (Note 1)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{IDH}$	Input Threshold High				100	mV
$V_{IDL}$	Input Threshold Low		-100			mV
$I_{IN}$	Input Current	$V_I = 0V$		42	100	$\mu\text{A}$
		$V_I = V_{CC}$		2	10	

NOTE 1: All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.

**DRIVER ELECTRICAL CHARACTERISTICS** ( $T_A = -40$  to  $85$  °C,  $V_{CC} = 2.5V \pm 5\%$ , unless otherwise noted. Typical values are at  $T_A = 25^\circ\text{C}$ ) (Note 1)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{BB}$	Output Reference Voltage	$V_{CC} = 2.5\text{ V}$ $I_{BB} = 0.5\text{ mA}$	1.15	1.25	1.35	V
$I_{CCD}$	Power Supply Current	All driver enabled and loaded		125	180	mA
		All driver disabled		18	25	
$C_{IN}$	Input Capacitance	$V_I = 0V$ to $V_{CC}$		5		pF
$C_{OUT}$	Output Capacitance			5		pF
$V_{IH}$	Logic Input High Threshold	$V_{CC} = 2.5\text{ V}$	2			V
$V_{IL}$	Logic Input Low Threshold	$V_{CC} = 2.5\text{ V}$			0.8	V
$I_I$	Logic Input Current	$V_{CC} = 2.5\text{ V}$ , $V_{IN} = V_{CC}$ or GND			$\pm 10$	$\mu\text{A}$

NOTE 1: All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.

**LVDS TIMING CHARACTERISTICS** ( $T_A = -40$  to  $85\text{ }^{\circ}\text{C}$ ,  $V_{CC} = 2.5\text{V} \pm 5\%$ , unless otherwise noted. Typical values are at  $T_A = 25^{\circ}\text{C}$ ) (Note 1)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
$t_{TLH}$	Transition Time Low to High	$R_L = 100\ \Omega$ , $C_L = 5\text{ pF}$		220	300	ps
$t_{THL}$	Transition Time High to Low			220	300	ps
$t_{PHL}$ , $t_{PLH}$	Propagation Delay to Output			2	2.5	ns
$f_{MAX}$	Maximum Input Frequency		700	900		MHz
$t_{SKEW}$	Bank Skew			50		ps
	Part-to-Part Skew			100		
	Pulse Skew			60		

NOTE 1: All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.

### SPECIFICATION OF CONTROL REGISTER

The STLVD210 is provided with a 11 bit shift register with a Serial In and a Control Register. The purpose is to enable or power of each output clock channel. The STLVD210 provides two working modality:




#### PROGRAMMED MODE (EN=1)

The shift register have a serial input to load the working configuration. Once the configuration is loaded with 11-clock pulse, another clock pulse loads the configuration into the control register. The first bit on the serial input line enables the outputs Qb4 and Qb4, the second bit enables the outputs Qb3 and Qb3 and so on. The last bit is the fewer significations. To restart the configuration of the shift register a reset of the state machine must be done with a clock pulse on CK and the EN set to Low. The control register can be configured on time after each reset.

#### STANDARD MODE (EN=0)

In Standard Mode the STLVD210 isn't programmable, all the clock outputs are enabled.

### TRUTH TABLE OF STATE MACHINE INPUTS

EN	SI	CK	OUTPUT
L	X	X	All Outputs Enable
H	L		First stage stores "L", other stages store the data of previous stage
H	H		First stage stores "H", other stages store the data of previous stage
L	X		Reset of the state machine, Shift register and Control Register

### SERIAL INPUT SEQUENCE

BIT#10	BIT#9	BIT#8	BIT#7	BIT#6	BIT#5	BIT#4	BIT#3	BIT#2	BIT#1	BIT#0
N.A.	Qa0	Qa1	Qa2	Qa3	Qa4	Qb0	Qb1	Qb2	Qb3	Qb4

## TRUTH TABLE OF SEQUENCE

BIT#10	BIT#(0-4)	Qb(0-4)
X	L	OFF
X	H	ON

BIT#10	BIT#(5-9)	Qa(0-4)
X	L	OFF
X	H	ON

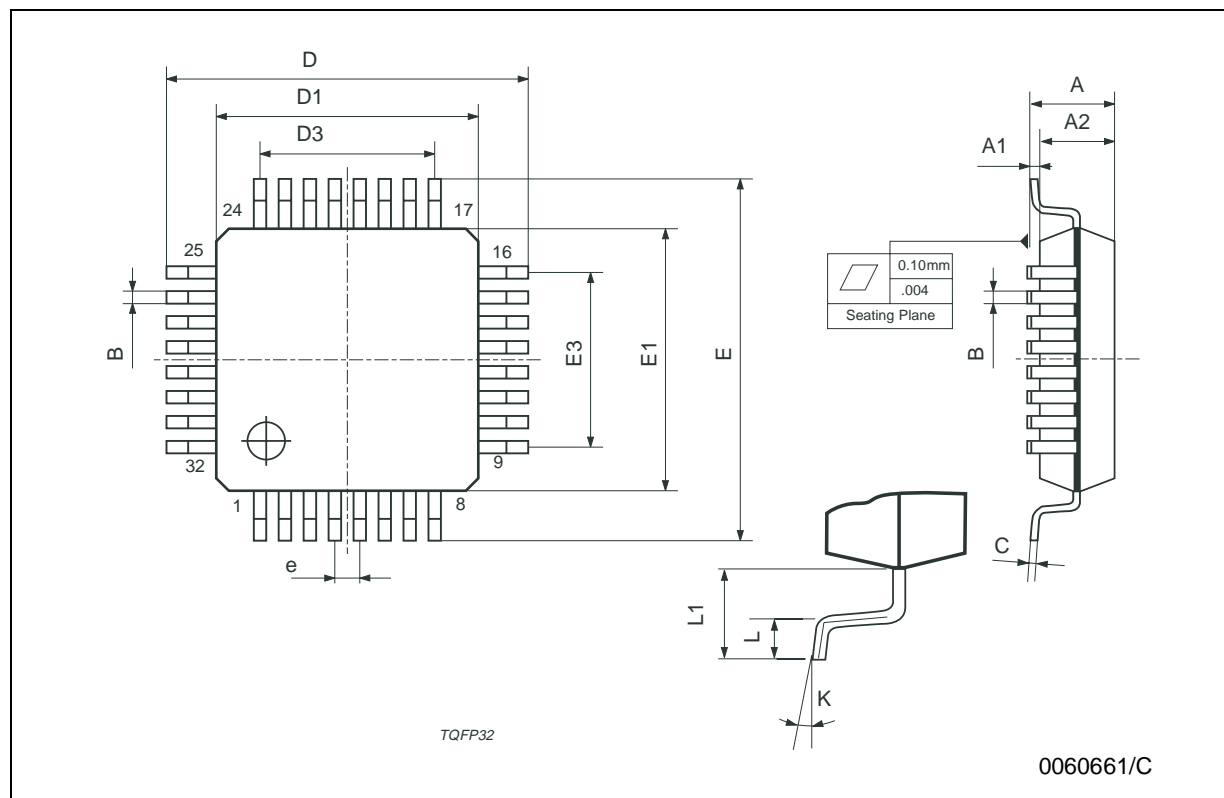
## TRUTH TABLE

CLKa	$\overline{\text{CLKa}}$	Qa (0-4)	$\overline{\text{Qa (0-4)}}$
H	L	H	L
L	H	L	H

CLKb	$\overline{\text{CLKb}}$	Qb (0-4)	$\overline{\text{Qb (0-4)}}$
H	L	H	L
L	H	L	H

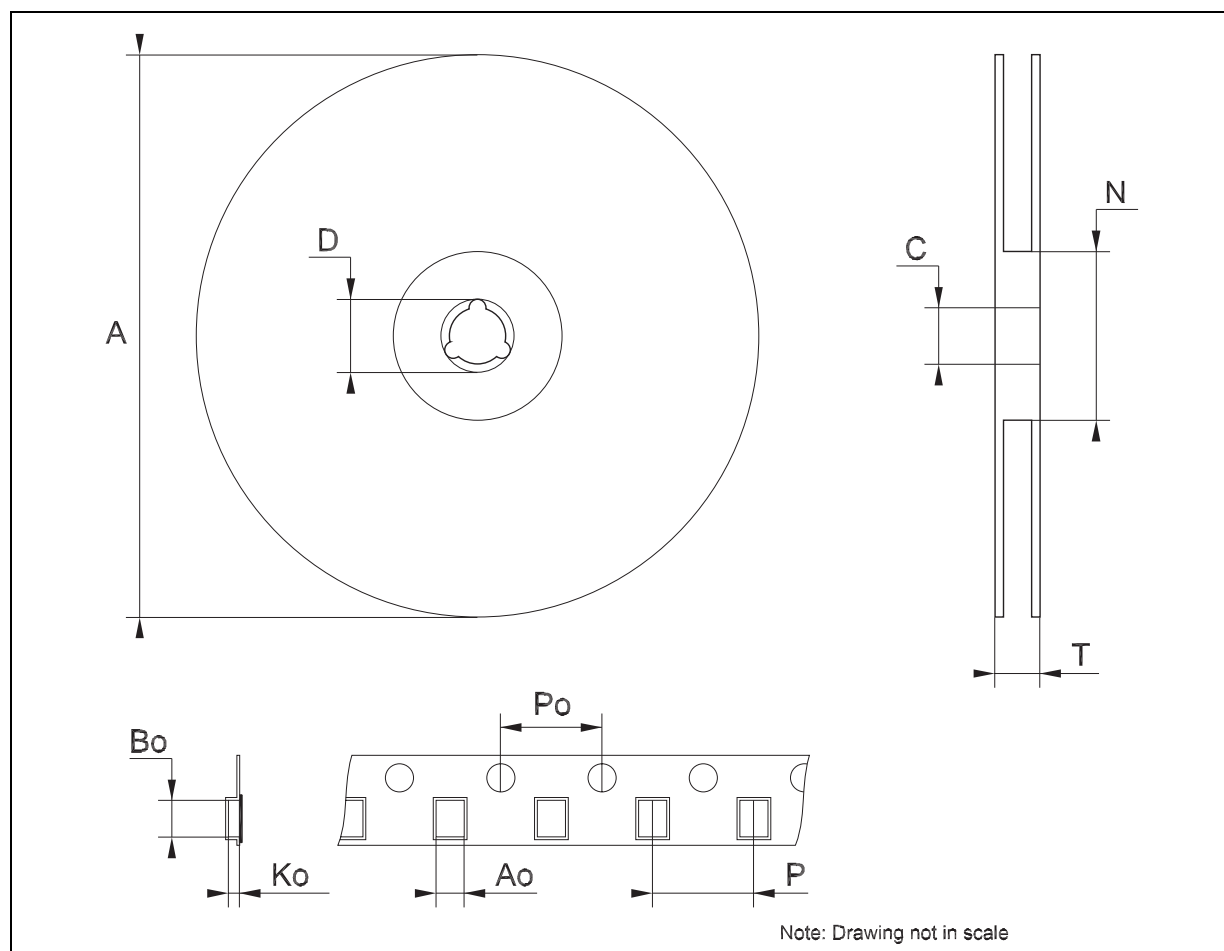
## TQFP32 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.6			0.063
A1	0.05		0.15	0.002		0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
B	0.30	0.37	0.45	0.012	0.015	0.018
C	0.09		0.20	0.0035		0.0079
D		9.00			0.354	
D1		7.00			0.276	
D3		5.60			0.220	
E		0.80			0.031	
E		9.00			0.354	
E1		7.00			0.276	
E3		5.60			0.220	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1.00			0.039	
K	0°	3.5°	7°	0°	3.5°	7°



## Tape &amp; Reel TQFP32 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	9.5		9.7	0.374		0.382
Bo	9.5		9.7	0.374		0.382
Ko	2.1		2.3	0.083		0.091
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476





Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>

