LSI/CSI

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LS7272B
LS7272B-20

30 VOLT QUAD-CHANNEL DIFFERENTIAL LINE DRIVER

May 2022

FEATURES:

- More feature-rich and cost-effective than the OL7272
- Pin for pin replaceable with the OL7272
- Push-Pull or Open-Drain output drivers
- Voltage Range: 4.5V – 30V (VDD – VSS)
- 1A peak dynamic Sink/Source output drive
- Operating frequency up to 2 MHz
- Thermal shutdown protection for output driver overload
- Enable input with Thermal Shutdown disconnect feature
- Outputs RS422A compatible
- Inputs CMOS/TTL compatible with hysteresis
- Output drivers fully connected or high-impedance state

PART NUMBER ORDERING INFORMATION:
This part is available in three package styles, DIP, SOIC, and TSSOP.
For DIP packages: LS7272B, LS7272B-20
For SOIC packages: LS7272B-S, LS7272B-S20
For TSSOP packages: LS7272B-TS, LS7272B-TS20

PIN ASSIGNMENT – TOP VIEW

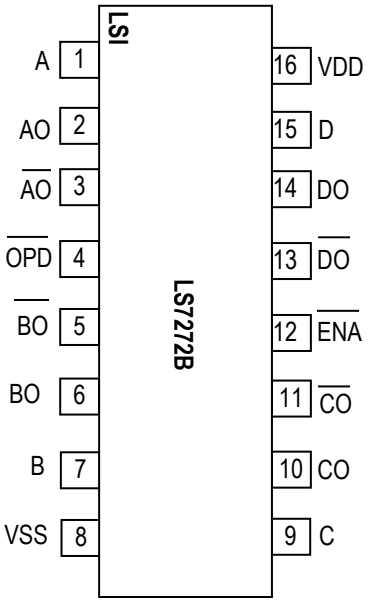


Fig 1

DESCRIPTION:

The **LS7272B** is short-circuit proof Quad Differential Industrial Power Line Drivers. They can operate up to 30V and have a selectable thermal shutdown feature.

The Data inputs are TTL/CMOS compatible and can also be driven up to the supply voltage V_{DD}. The ENA input can be used to place all the outputs in a high impedance state. The $\overline{OPD}$ input is used to configure the outputs as push-pull drivers or open-drain drivers, where the outputs can be returned through external loads to a maximum voltage of V_{DD}. LS7272B-20 does not have $\overline{OPD}$ pin and its outputs are always in push-pull configuration.

An internal 5V regulated supply is used to power the logic and level converter blocks.

The thermal shutdown block located in the center of the IC can be disabled by setting the $\overline{ENA}$ input, Pin 12, to a voltage between 7.5V and 12V.

Upon power-up, a Power-On-Reset (POR) circuit block forces all output drivers to the high-impedance state until the power supply voltage reaches a nominal 3.9V. Included in the POR circuit block is a hysteresis of 200mV such that if the power supply drops below 3.7V all output drivers are forced to the high-impedance state until the voltage rises above 3.9V. There is a built-in 5µs delay for disabling the output drivers should the power supply drop below 3.7V. The output drivers are immediately enabled when the voltage rises above 3.9V.

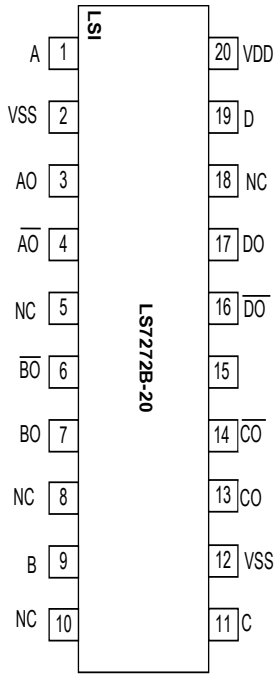


Fig 2

INPUT/OUTPUT DESCRIPTION:

A, B, C, D
These are CMOS/TTL data inputs that can also operate with input levels up to the V_{DD} power supply. All data input blocks contain hysteresis.

AO, BO, CO, DO, $\overline{AO}$, $\overline{BO}$, $\overline{CO}$, $\overline{DO}$
Outputs AO and $\overline{AO}$ are level shifted true and complement outputs of A input. Same relationships apply to BO, $\overline{BO}$, CO, $\overline{CO}$ and DO, $\overline{DO}$ outputs with respect to B, C and D inputs respectively. These outputs can be selected to be push-pull or open-drain using the $\overline{OPD}$ input pin (LS7272 only). When in push-pull mode, outputs switch between VDD and VSS.

$\overline{ENA}$
$\overline{ENA}$ input has the dual function of enabling or disabling the driver outputs and also enabling or disabling the thermal shutdown. These operations are achieved by setting the $\overline{ENA}$ input voltage levels for the respective functions according to the following table.

$\overline{ENA}$ (volts)	Data Outputs	Thermal shutdown
0 to 1.6	enabled	enabled
>1.6 to 7.1	disabled	enabled
>7.1 to 12.1 (VDD > 12V)	enabled	disabled
>12.1 (VDD > 12V)	disabled	enabled

$\overline{OPD}$ (LS7272B only)
A logic low on this input configures the outputs as open-drain drivers. If this input is left floating or connected to logic high, the outputs are configured as push-pull drivers.

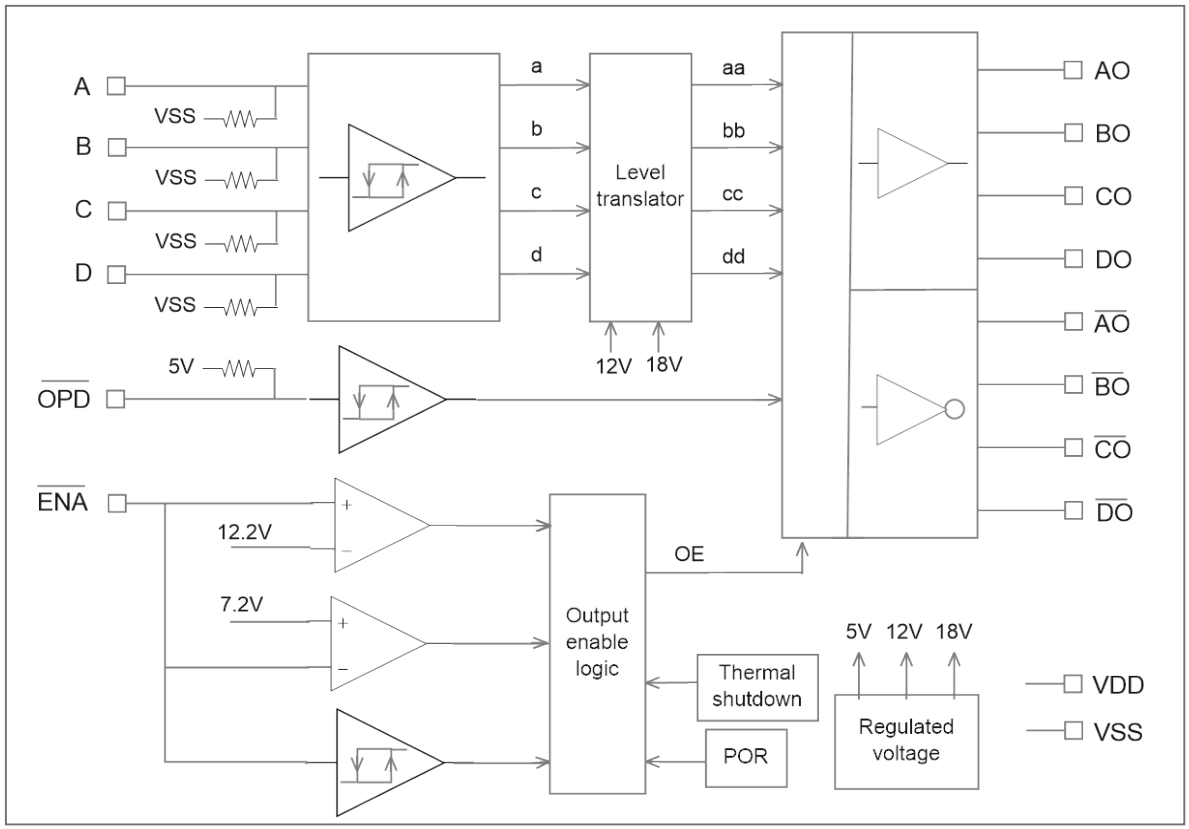


Fig 3. LS7272B Block diagram

Absolute Maximum Ratings:

Parameter	Symbol	Value	Unit	Conditions
Supply Voltage	VDD	35	Volts	Unsustained peak
Data output voltage	Vout	VDD + 0.3	Volts	
Data output sink dissipation	Posnk	1.6	Watts	Per output
Data output source dissipation	Posrc	3.5	Watts	Per output
All input voltages	Vin	VDD + 0.3	Volts	
Operating temperature	Ta	-55 to 125	°C	
Storage temperature	Ts	-65 to 150	°C	

Recommended Operating Conditions:

Parameter	Symbol	Value	Unit
Supply Voltage	VDD	4.5 to 30	Volts
Data Input Voltage	Vid	0 to VDD	Volts
$\overline{\text{ENA}}$ Input Voltage	Vie	0 to VDD	Volts
$\overline{\text{OPD}}$ Input Voltage	Vio	0 to VDD	Volts
Data Output Voltage	Vod	0 to VDD	Volts
Data output Source/Sink	Iosrc/Iosnk	-100/100	mA
Operating Temperature	To	-40 to 125	°C

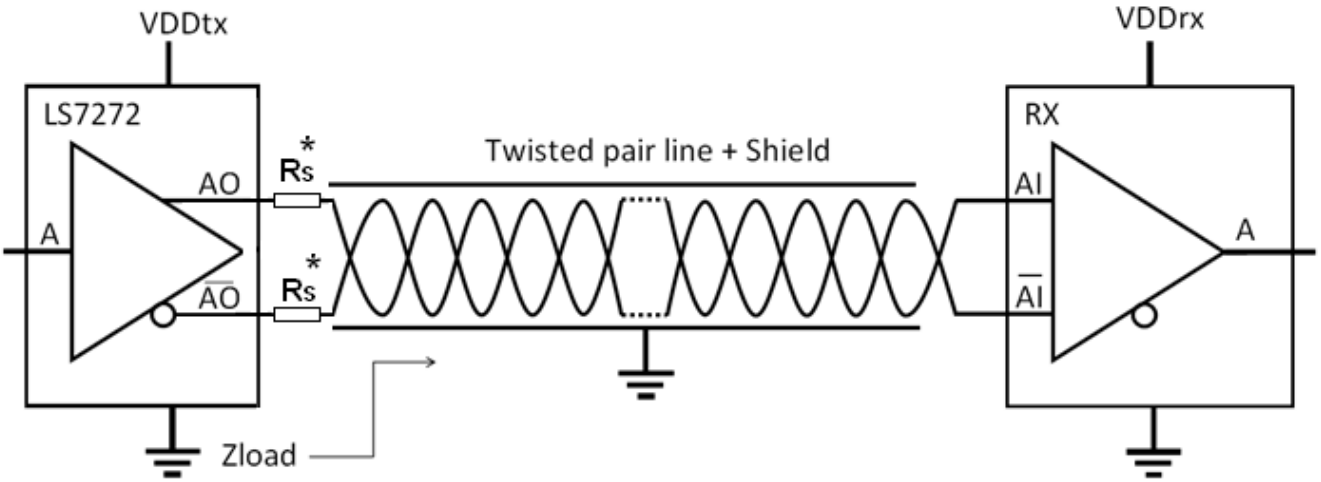
Switching Characteristics (Ta = 27°C, Output Load Capacitance = 1000pF)

Parameter	Symbol	Typ	Max	Unit	Remarks
Data input High transition to Data Output Propagation Delay,	Tplh	80	110	ns	VDD = 5V
		80	120	ns	VDD = 12V
		80	160	ns	VDD = 24V
Data input Low transition to Data Output Propagation delay	Tphl	80	120	ns	VDD = 5V
		80	130	ns	VDD = 12V
		80	170	ns	VDD = 24V
Data Output Rise time	Tr	18	60	ns	VDD = 5V
		18	40	ns	VDD = 12V
		18	40	ns	VDD = 24V
Data Output Fall Time	Tf	18	40	ns	VDD = 5V to 24V
$\overline{\text{ENA}}$ enable delay	Tne	35	75	ns	VDD = 5V to 24V
$\overline{\text{ENA}}$ disable delay	Tnd	70	130	ns	VDD = 5V to 24V
POR turn-on delay	Tdpor	5	-	us	POR on delay when VDD drops below 3.7V

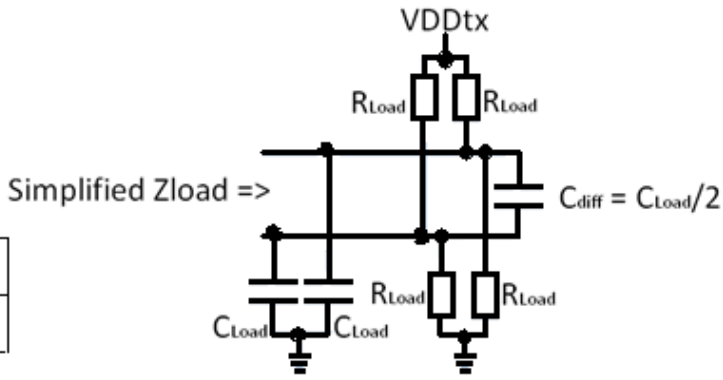
Electrical Characteristics. (VDD = 12V, T = 27°C, unless specified otherwise):

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data input high	Vdhi	-	1.7	2.4	Volts	
Data input low	Vdlo	0.8	1.2	-	Volts	
Data input hysteresis	Vdhy	-	0.5	-	Volts	
$\overline{OPD}$ input high	Vphi	-	1.7	2.4	Volts	
$\overline{OPD}$ input low	Vplo	0.8	1.2	-	Volts	
$\overline{OPD}$ input hysteresis	Vphy	-	0.5	-	Volts	
Input current: Data input: high	Iidh	-	4.0	5.0	uA	Vdhi = 12V, VDD = 12V
Input current: Data input: low	Iidl	-	0	0	uA	Vdlo = 0, VDD = 12V
Input current: $\overline{OPD}$ input: high	Iphi	-	-	7.0	pA	Vphi = 12V, VDD = 12V
Input current: $\overline{OPD}$ input: low	Iplo	-	-6.0	-17	uA	Vplo = 0, VDD = 12V
Input current: $\overline{ENA}$ input	Iena	-	Vena/320e3	Vena/230e3	uA	Vena = 0 to 30V
Supply current	Idd	-	450	600	uA	All I/Os floating, VDD = 12V
Data output voltage: high: Sourcing current	Vodh	-	VDD – 0.5	-	Volts	Iload = -20mA, VDD = 5V
		-	VDD – 0.5	-	Volts	Iload = -30mA, VDD = 30V
		-	VDD – 1.8	-	Volts	Iload = -120mA, VDD = 30V
Data output voltage: low: Sinking current	Vodl	-	0.3	-	Volts	Iload = 20mA, VDD = 5V
		-	0.4	-	Volts	Iload = 30mA, VDD = 30V
		-	1.4	-	Volts	Iload = 120mA, VDD = 30V
Data output leakage current	Iodoff	-3	-	3	uA	Output disabled
POR high threshold	Vfpor	-	3.9	4.2	Volts	POR off @ VDD = 3.9V
POR low threshold	Vnpor	-	3.7	4.0	Volts	POR on @ VDD = 3.7V
POR hysteresis	Vhpor	-	200	-	mV	
Thermal shutdown turn-on	Tjn	-	140	145	°C	Data outputs are disabled
Thermal shutdown turn-off	Tjf	120	125	-	°C	Data outputs enabled
Thermal shutdown hysteresis	Tjh	-	20	-	°C	

Typical Differential Driver Load Characteristics:



$VDDtx/R_L$ = ~30mA



VDDtx	5V	12V	24V	30V
RLoad	120Ω	330Ω	680Ω	820Ω

***NOTE:** Add series resistors (Rs) in case of abnormal situation where any of the LS7272's outputs are subject to voltages when either power pins are not connected. See table below.*

VDD	Rs
≤ 10V	≥ 10Ω
10V ≤ VDD ≤ 15V	≥ 25Ω
15V ≤ VDD ≤ 30V	≥ 50Ω