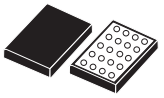
STSLVDSP27

8-bit low voltage serializer with 1.8V high speed dual differential line drivers and embedded DPLL

Features

- Sub-low voltage differential signaling:
  V_{OD} = 150mV with R_T = 100Ω, C_L = 10pF
- Clock range: 4 to 27 MHz in parallel mode, BYP = Gnd
- Operative frequency serial mode, BYP = V_{DD}; DIN0 to DOUT, CLKIN to CLKOUT, f_{OPR} = 1 to 208 MHz max
- Embedded DPLL requires no external components
- Output voltage rise and fall times
  t_{rVOD} = t_{fVOD} = 610ps typ at f_{OPR} = 208MHz
- High speed propagation delay times
  t_{pLH}~t_{pHL}= 2.1ns typ at V_{DD} = 3.0V; V_{IO} = 1.8V
- Operating voltage range:
  V_{DD} (OPR) = 2.5V to 3.6V
  V_{IO} (OPR) = 1.65V to 1.95V
- High impedance on driver outputs
  I_{OZ} = 1µA max; EN = Gnd; V_O = Gnd or V_{IO}
- Low voltage CMOS input threshold (DIN0-DIN7, CLKIN, EN, BYP, DVO, DV1)
  V_{IL} = 0.3 x V_{DD} max; V_{IH} = 0.7 x V_{DD} min
- 3.6V tolerant on all inputs (DIN0-DIN7, CLKIN, EN, BYP, DV0, DV1)
- Lead-free Flip-Chip package
- SMIA CCP1 (MIPI CSI-1) compatible PHY



Flip-Chip20

Description

The STSLVDSP27 is an 8:1 bit serializer with embedded DPLL. The dual differential line drivers implement the electrical characteristics of sub-low voltage differential signaling (subLVDS), bringing out the serialized data and related synchronous clock signal. The STSLVDSP27 serializer IC is provided with two power supply rails, V_{DD} and V_{IO}. The first supply is related to the logic levels of the input data (DIN0-DIN7, CLKIN) and Enables (EN, BYP, DV0, DV1) pins. V_{IO} provides the power supply to the output current drivers in the device. V_{IO} is always expected to be a nominal 1.8V. V_{DD} depends on the application, but will always be equal to or higher than V_{IO}. In order to minimize static current consumption, it is possible to shut down the transmitters when the interface is not used by setting a power-down (EN) pin. This operation reduces the maximum current consumption to 20µA, making this device ideal for portable applications like mobile phones and portable battery equipment. Simplified functionality can be reached using the BYP select pin, which disables the internal DPLL circuitry. When this pin is High the device can work with serialized signals from DIN0 input only. A synchronous CLKIN signal must be provided and it will be put-out using sub-LVDS level by CLKOUT port; the sub-LVDS data will be put-out by DOUT port at a maximum frequency of 208Mhz. This innovative device provides an optimized high-speed link solution from different CMOS sensor devices (parallel or serial outputs) to more advanced graphic controllers in mobile phone applications. All inputs and outputs are equipped with protection circuits against static discharge, providing ESD immunity from transient excess voltage. The STSLVDSP27 is designed for operation over the commercial temperature range -40°C to 85°C.

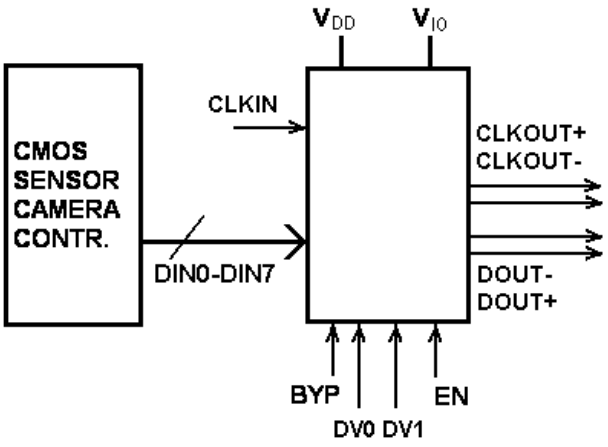
Order code

Part number	Temperature range	Package	Packaging
STSLVDSP27BJR	-40 to 85 °C	Flip-Chip20 (Tape & Reel)	3000 parts per reel

Contents

1 Block diagram

Figure 1. Simplified block diagram typical application



2 Pin configuration

Figure 2. Pin configuration and logic diagram (Top view - Bumps are on the other side)

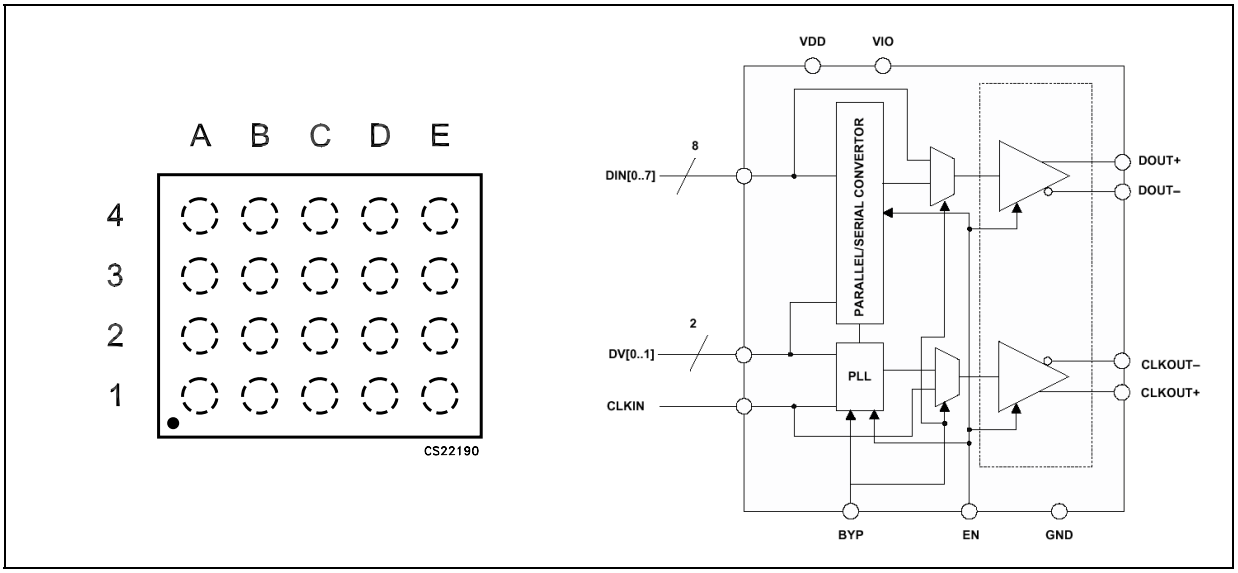


Table 1. Pin description

PIN N°	Symbol	Name and function
B1	DIN0	CMOS parallel/serial data inputs
A1, A2, A3, A4, B4, C4, D4	DIN1-DIN7	CMOS parallel data inputs
D1, C1	DOUT+, DOUT-	SubLVDS driver data outputs
B3	CLKIN	CMOS parallel/serial clock input
D3, C3	CLKOUT+, CLKOUT-	SubLVDS driver clock outputs
C2, D2	DV0, DV1	CMOS data valid inputs
B2	GND	Ground
E1	V_{DD}	Main power supply voltage
E2	V_{IO}	SubLVDS bus output supply voltage
E3	EN	CMOS main chip enable input
E4	BYP	CMOS by-pass select input

Table 2. Truth table (bypass functionality: DIN0 => DOUT, CLKIN => CLKOUT; main chip Enable(1) functionality)

Controls		Input					Differential outputs			
EN	BYP	DV0	DV1	DIN0	DIN1-7	CLKIN	DOUT+	DOUT-	CLKOUT+	CLKOUT-
L	X	X	X	X	X	X	Z	Z	Z	Z
H	H	X	X	L	X	L	L	H	L	H
H	H	X	X	L	X	H	L	H	H	L
H	H	X	X	H	X	L	H	L	L	H
H	H	X	X	H	X	H	H	L	H	L

1. All differential outputs are put in high impedance vs gnd only; the internal DPLL circuit is put in shutdown mode to obtain minimum power consumption.

Note: n:0..1; Z = High Impedance, X = Don't care

Table 3. Truth table (data valid functionality)

Controls		Input					Differential outputs			
EN	BYP	DV0(1)	DV1(1)	DIN0	DIN1-7	CLKIN	DOUT+	DOUT-	CLKOUT+	CLKOUT-
H	L	L	X	X	X	X	H	L	H	L
H	L	X	L	X	X	X	H	L	H	L

1. An AND gate is designed on Data Valid Inputs (DV0, DV1) to enable the standard functionality; only when the DV0=DV1="H" the device will work according to description in main page

Note: n:0..1; Z = High Impedance, X = Don't care

3 Maximum ratings

Table 4. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	-0.5 to 4.6	V
V_{IO}	SubLVDS bus supply voltage	-0.5 to 4.6	V
V_I	DC input voltage (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1)	-0.5 to 4.6	V
V_O	DC output voltage (DOUT+,DOUT-,CLKOUT+,CLKOUT-)	-0.5 to (V_{IO} + 0.5)	V
ESD	Electrostatic discharge protection IEC61000-4-2 Contact R = 330Ω, C = 150pF (All Pins vs GND)	± 2	KV
T_{STG}	Storage temperature range	-65 to +150	°C

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

Table 5. Recommended operating conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{DD}	Main supply voltage (1) (2)	2.5	3.0	3.6	V
V_{IO}	SubLVDS bus supply voltage	1.65	1.80	1.95	V
V_{DD_NOISE}	Peak-to-peak permitted main supply voltage noise (2)			100	mV
R_T	Termination resistance (per pair differential output line)	80	100	120	Ω
C_L	Termination capacitance (per line vs GND Pin)		10		pF
T_A	Operating ambient temperature range	-40		85	°C
T_J	Operating junction temperature range	-40		125	°C
t_R, t_F	Rise and fall time (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1; 10% to 90%; 90% to 10%)			10	ns

1. V_{DD} Main supply voltage in serial mode (BYP = V_{DD}) can be reduced down to 1.65V for typical 1.8V input signals
2. V_{DD} Main supply voltage in parallel mode (BYP = GND) can reach 2.5V when V_{DD_NOISE} = 100mV and V_{DD} = 2.55V

4 Electrical characteristics

Table 6. Electrical characteristics (over recommended operating conditions unless otherwise noted. All typical values are at T_A = 25°C, and V_{DD} = 3.0V, V_{IO} = 1.8V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{CM}	Common mode output voltage (*Figure 3.*)	R_T = 100Ω ± 1%	V_{IO}/2-0.1	V_{IO}/2	V_{IO}/2+0.1	V
$V_{CM(SS)}$	Common mode output voltage change between logic state ("L" and "H") (*Figure 5.*)	R_T = 100Ω ± 1%	-20		20	mV
$V_{CM(PP)}$	Common mode peak-to-peak output voltage change between logic state ("L" and "H") (*Figure 5.*)	R_T = 100Ω ± 1%	-40		40	mV
$\|V_{OD}\|$	Differential output voltage (*Figure 3.*)	R_T = 100Ω ± 1%	100	150	200	mV
ΔV_{OD}	Differential output voltage change between logic state ("L" and "H")	R_T = 100Ω ± 1%	-20		20	mV
DC_{VOD}	Clock duty cycle@208MHz differential output voltage CLKOUT+, CLKOUT-, DOUT+, DOUT-	R_T = 100Ω ± 1% BYP=V_{DD}; EN=V_{DD} f_{CLKIN} = 208MHz, f_{DIN0} = 208MHz	45	50	55	%
I_{IO}	Driver output current CLKOUT+, CLKOUT-, DOUT+, DOUT-	R_T = 100Ω ± 1%	1	1.5	2	mA
R_O	Driver output impedance (Single ended) CLKOUT+, CLKOUT-, DOUT+, DOUT- (*Figure 8.*)	V_{CM} = V_{IO}/2 + 100mV and V_{IO}/2 -100mV	40	100	140	Ω
D_{RO}	Driver output impedance mismatch between R_{ODOUT}, $R_{OCLKOUT}$				10	%

Table 6. Electrical characteristics (over recommended operating conditions unless otherwise noted. All typical values are at T_A = 25°C, and V_{DD} = 3.0V, V_{IO} = 1.8V)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_S	Supply current (I_{IO} + I_{DD})	EN=V_{DD}, BYP=V_{DD} or GND, DIN0-DIN7=V_{DD} or GND No load (R_T = ∞)			15	mA
		EN=V_{DD}, BYP=V_{DD} or GND, DIN0-DIN7=V_{DD} or GND R_T = 100Ω ± 1%			15	
		EN=V_{DD}, BYP=V_{DD}(DPLL="OFF") R_T = 100Ω ± 1%, C_L = 10pF per line, DV0=DV1=V_{DD}, $f_{DIN0\ and\ CLKIN}$ = 208 MHz (V_{IL} and V_{IH} levels)			12	
		EN=V_{DD}, BYP=Gnd(DPLL="ON") R_T = 100Ω ± 1%, C_L = 10pF per line, DV0 = DV1= V_{DD}, f_{CLKOUT} = 160MHz $f_{DIN0\text{-}DIN7,CLKIN}$ = 22 MHz (V_{IL} and V_{IH} levels)			20	
I_{SOFF}	Shutdown supply current (I_{IO} + I_{DD})	EN = GND, V_{DD} = 2.7V to 3.6V V_{IO} = 1.65V to 1.95V DIN0-DIN7, CLKIN, BYP = GND or V_{DD}			20	µA
V_{IH}	High level input voltage (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1)	V_{DD} = 2.7V to 3.6V, V_{IO} = 1.65V to 1.95V	0.7xV_{DD}		3.6	V
V_{IL}	Low level input voltage (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1)	V_{DD} = 2.7V to 3.6V, V_{IO} = 1.65V to 1.95V	0		0.3xV_{DD}	V
I_{IH}	High level input current (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1)	V_{IH} = 0.7 x V_{DD}			± 1	µA
I_{IL}	Low level input current (DIN0-DIN7, BYP, CLKIN, EN, DV0, DV1)	V_{IL} = 0.3 x V_{DD}			± 1	µA
I_{OZ}	High impedance output current CLKOUT+,CLKOUT-, DOUT+, DOUT-	V_O = 0 or V_{CC}			± 1	µA

Table 7. Serial switching characteristics (DPLL = "OFF", R_T = 100Ω ±1%, C_L = 10pF, over recommended operating conditions unless otherwise noted. Typical values are referred to T_A = 25°C and V_{DD} = 3.0V, V_{IO} = 1.8V)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{rVOD}	Rise time differential output voltage (20% to 80%) (*Figure 4.*)	t_{rDIN} = 4.9ns (10% to 90%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	400	610	1000	ps
t_{fVOD}	Fall time differential output voltage (80% to 20%) (*Figure 4.*)	t_{rDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	400	610	1000	ps
t_{PLHD}	Differential propagation delay time (DIN to DOUT) (Low to High) (*Note: 1*) (*Figure 4.*)	t_{rDIN} = 4.9ns (10% to 90%); t_{fDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	1.0	2.1	2.8	ns
t_{PHLD}	Differential propagation delay time (DIN to DOUT) (Low to High) (*Note: 1*) (*Figure 4.*)	t_{fDIN} = 4.2ns (10% to 90%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	1.0	2.1	2.8	ns
t_{EN}	Enable delay time (EN to DOUT: t_{PLZ}, t_{PHZ}) (*Figure 7.*)	t_{rEN} = 2.0ns (10% to 90%); t_{fEN} = 2.0ns (90% to 10%)			20	µs
t_{DIS}	Disable delay time (EN to DOUT: t_{PLZ}, t_{PHZ}) (*Figure 7.*)	t_{rEN} = 2.0ns (10% to 90%); t_{fEN} = 2.0ns (90% to 10%)			1000	ns
f_{OPR}	Operating frequency serial mode without DPLL	BYP = V_{DD} $t_{rDIN0,CLKIN}$=1ns (10% to 90%); $t_{fDIN0,CLKIN}$=1ns (90% to 10%) $f_{DIN0,CLKIN}$ = 208MHz $PulseWidth_{DIN0,CLKIN}$ = 2.4ns	1		208	MHz
t_{SKEW1}	Differential skew between signals on each differential pair (t_{PLHD} - t_{PHLD})	t_{rDIN} = 4.9ns (10% to 90%); t_{fDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns			150	ps
t_{SKEW2}	Channel to channel skew between any two signals on each different differential pair (*Figure 6.*)	t_{rDIN} = 4.9ns (10% to 90%); t_{fDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns			200	ps

Note: 1 50% V_{DIN} to 50% V_{DOUT}

Table 8. Parallel switching characteristics (DPLL = "ON", R_T = 100Ω ±1%, C_L = 10pF, over recommended operating conditions unless otherwise noted. Typical values are referred to T_A = 25°C and V_{DD} = 3.0V, V_{IO} = 1.8V)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{rVOD}	Rise time differential output voltage (20% to 80%) (*Figure 4.*)	t_{rDIN} = 4.9ns (10% to 90%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	400	610	1000	ps
t_{fVOD}	Fall time differential output voltage (80% to 20%) (*Figure 4.*)	t_{rDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, $PulseWidth_{DIN}$ = 50ns	400	610	1000	ps
$t_{PLHDIN0}$	Differential propagation delay time DIN0 (CLKIN to DOUT) (Low to High) (*Note 2*) (*Figure 10.*)	$t_{rDIN0-DIN7,CLKIN}$=4.9ns (10% to 90%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=22MHz, $PulseWidth_{DIN}$ = 50ns		8		ns
$t_{PHLDIN0}$	Differential propagation delay time DIN0 (CLKIN to DOUT) (High to Low) (*Note 2*) (*Figure 10.*)	$t_{rDIN0-DIN7,CLKIN}$=4.2ns (90% to 10%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=22MHz, $PulseWidth_{DIN}$ = 50ns		8		ns
$t_{PLHDIN7}$	Differential propagation delay time DIN7 (CLKIN to DOUT) (Low to High) (*Note 2*) (*Figure 10.*)	$t_{rDIN0-DIN7,CLKIN}$=4.9ns (10% to 90%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=22MHz, $PulseWidth_{DIN}$ = 50ns		53		ns
$t_{PHLDIN7}$	Differential propagation delay time DIN7 (CLKIN to DOUT) (High to Low) (*Note 2*) (*Figure 10.*)	$t_{rDIN0-DIN7,CLKIN}$=4.2ns (90% to 10%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=10MHz, $PulseWidth_{DIN}$ = 50ns		53		ns
t_{OCD}	Differential propagation delay time (CLKIN to DOUT first positive edge) (Low to High) (*Figure 10.*)	$t_{rDIN0-DIN7,CLKIN}$=4.9ns (10% to 90%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=10MHz, $PulseWidth_{DIN}$ = 50ns		11		ns
t_{SU_CLK}	Set-up time (DIN0-DIN7, DV to CLKIN) (LH or HL to positive CLKIN edge) (*Figure 11.*)	$t_{rDIN0-DIN7,CLKIN}$=4.9ns (10% to 90%); $t_{fDIN0-DIN7,CLKIN}$= 4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=4 to 22MHz, $PulseWidth_{DIN}$ = 50ns	12			ns
t_{H_CLK}	Hold time (CLKIN to DIN0-DIN7, DV) (positive CLKIN edge to LH or HL DIN,DV transition) (*Figure 11.*)	$t_{rDIN0-DIN7,CLKIN}$=4.9ns (10% to 90%); $t_{fDIN0-DIN7,CLKIN}$=4.2ns (90% to 10%); $f_{DIN0-DIN7,CLKIN}$=4 to 22MHz, $PulseWidth_{DIN}$ = 50ns	10			ns
t_{EN}	Enable delay time (EN to DOUT: t_{PLZ}, t_{PHZ}) (*Figure 7.*)	t_{rEN} = 2.0ns (10% to 90%); t_{fEN} = 2.0ns (90% to 10%)			20	µs
t_{DIS}	Disable delay time (EN to DOUT: t_{PLZ}, t_{PHZ}) (*Figure 7.*)	t_{rEN} = 2.0ns (10% to 90%); t_{fEN} = 2.0ns (90% to 10%)			1000	ns
f_{OPR}	Operating frequency parallel mode with DPLL	BYP = GND, $f_{DIN0-DIN7,CLKIN}$=4 to 27MHz $PulseWidth_{DIN0,CLKIN}$ = 50% $t_{rDIN0,CLKIN}$=3ns (10% to 90%); $t_{fDIN0,CLKIN}$=3ns (90% to 10%)	4		27	MHz

Table 8. Parallel switching characteristics (DPLL = "ON", R_T = 100Ω ±1%, C_L = 10pF, over recommended operating conditions unless otherwise noted. Typical values are referred to T_A = 25°C and V_{DD} = 3.0V, V_{IO} = 1.8V)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
f_{CLKOUT}	CLKOUT frequency parallel mode with DPLL	BYP = GND, $f_{DIN0\text{-}DIN7,CLKIN}$=4 to 27MHz PulseWidth$_{DIN0,CLKIN}$ = 50% $t_{rDIN0,CLKIN}$=3ns (10% to 90%); $t_{fDIN0,CLKIN}$=3ns (90% to 10%)	32		216	MHz
t_{SKEW1}	Differential skew between signals on each differential pair (t_{PLHD} - t_{PHLD})	t_{rDIN} = 4.9ns (10% to 90%); t_{fDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, PulseWidth$_{DIN}$ = 50ns			150	ps
t_{SKEW2}	Channel to channel skew between any two signals on each different differential pair (*Figure 6.*)	t_{rDIN} = 4.9ns (10% to 90%); t_{fDIN} = 4.2ns (90% to 10%); f_{DIN} = 10MHz, PulseWidth$_{DIN}$ = 50ns			200	ps
t_{DV}	Data valid before CLKOUT time (*Figure 12.*)	BYP = GND, $f_{DIN0\text{-}DIN7,CLKIN}$=4 to 27MHz PulseWidth$_{DIN0,CLKIN}$ = 50% $t_{rDIN0,CLKIN}$=3ns (10% to 90%); $t_{fDIN0,CLKIN}$=3ns (90% to 10%)	1			ns
t_{DH}	Data valid hold after CLKOUT time (*Figure 12.*)	BYP = GND, $f_{DIN0\text{-}DIN7,CLKIN}$=4 to 27MHz PulseWidth$_{DIN0,CLKIN}$ = 50% $t_{rDIN0,CLKIN}$=3ns (10% to 90%); $t_{fDIN0,CLKIN}$=3ns (90% to 10%)	2			ns
t_{PLLS}	DPLL settling time (EN to CLKOUT) 50% LH EN to 50% CLKOUT (first negative edge) (*Figure 9.*)	t_{rEN} =2.0ns (10% to 90%) t_{fEN} =2.0ns (90% to 10%) DV0=DV1=V_{DD}; BYP= Gnd; DIN1-DIN7=V_{DD} or Gnd; f_{CLKIN} =4 to 27MHz		70		µs
$J_{CY\text{-}CY}$	RMS cycle-to-cycle jitter between CLKIN and CLKOUT signals	t_{rCLKIN} = 4.9ns (10% to 90%); t_{fCLKIN} = 4.2ns (90% to 10%); f_{CLKIN} = 4 to 27MHz, PulseWidth$_{CLKIN}$ =50%		100		ps
	Peak cycle-to-cycle jitter between CLKIN and CLKOUT signals	t_{rCLKIN} = 4.9ns (10% to 90%); t_{fCLKIN} = 4.2ns (90% to 10%); f_{CLKIN} = 4 to 27MHz, PulseWidth$_{CLKIN}$ =50%		600		

Note: 1 50% V_{DIN} to 50% V_{DOUT}

2 50% CLKIN (positive edge) to 50% V_{DOUT} (DIN0 will be referred to CLKOUT first positive edge; DIN7 will be referred to CLKOUT eighth positive edge)

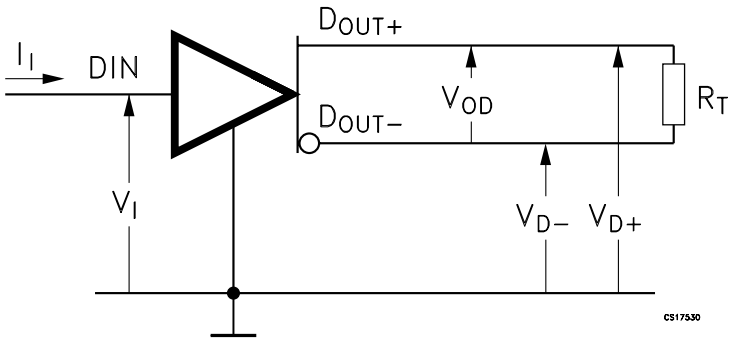
3 Power down can be guaranteed when V_{IO} =1.8V, EN = GND, if low impedance < 1MΩ vs GND is guaranteed on V_{DD} pin

Table 9. Capacitive characteristics

Symbol	Parameter	Test condition		Value			Unit
		V_{DD} (V)		T_A = 25°C			
				Min.	Typ.	Max.	
C_{IN}	Input capacitance (DIN0-DIN7, CLKIN, EN, BYP, DV0, DV1)	2.7 to 3.6	V_{IO} = 1.65V to 1.95V, V_I = GND or V_{DD}		4		pF

5 Test circuits and timing diagram

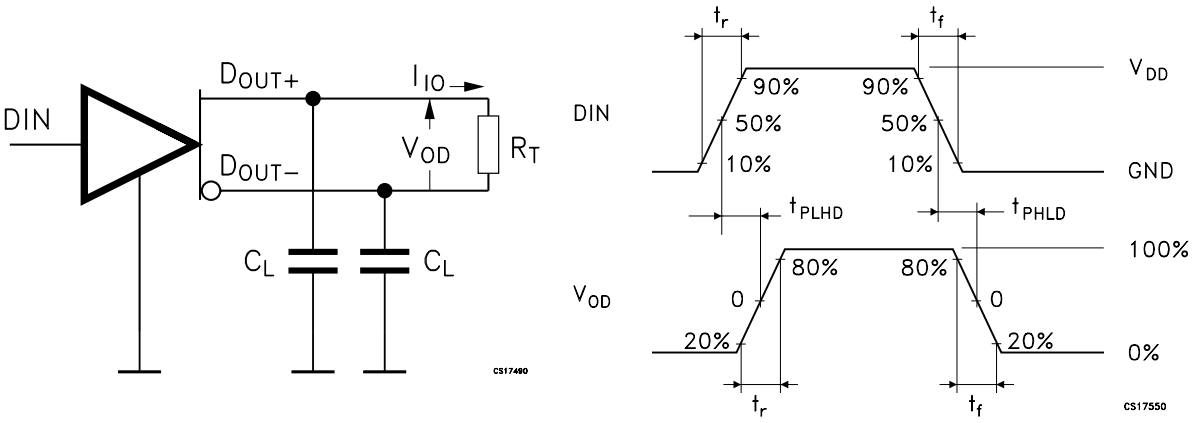
Figure 3. Voltage and input current definition



$V_{CM} = (V_{D+} + V_{D-})/2$

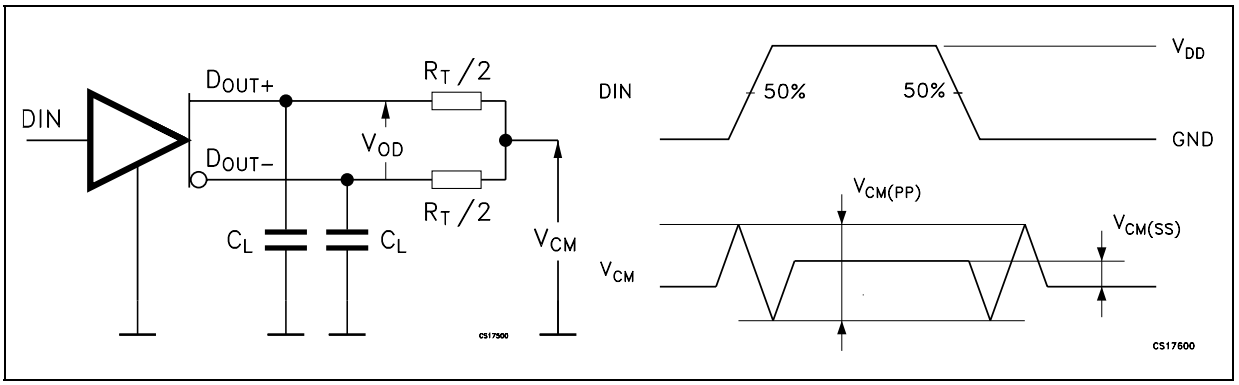
Note: $R_T = 100\,\Omega \pm 1\%$

Figure 4. Test circuit, timing and voltage definitions for differential output signal



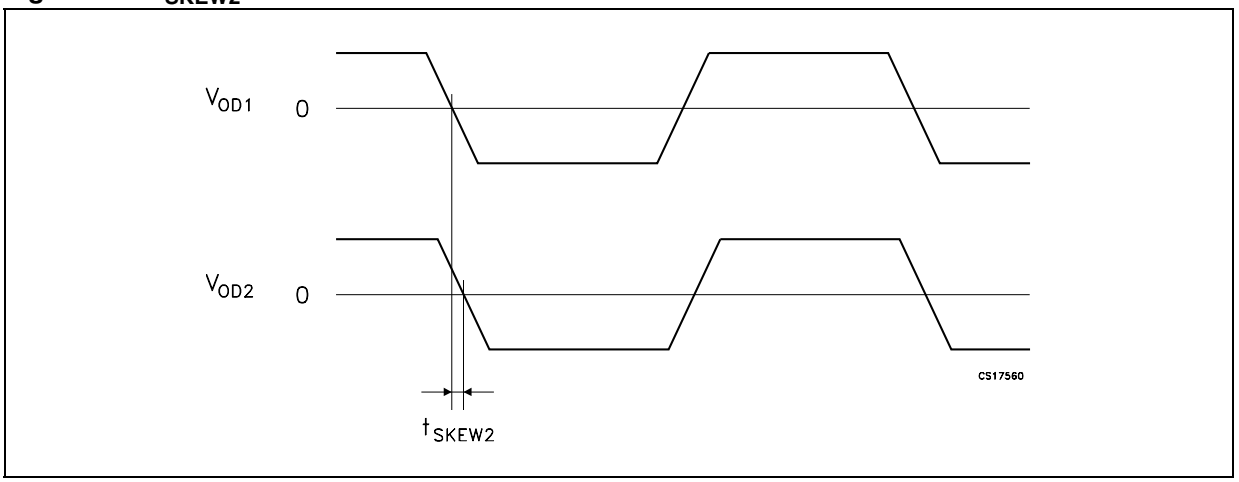
Note: $R_T = 100\,\Omega \pm 1\%$; $C_L = 10pF$; $t_{rDIN} = 4.9ns$; $t_{fDIN} = 4.2ns$; $f_{DIN} = 10MHz$; $PulseWidth_{DIN} = 50ns$.

Figure 5. Test circuit and definitions for the driver common mode output voltage



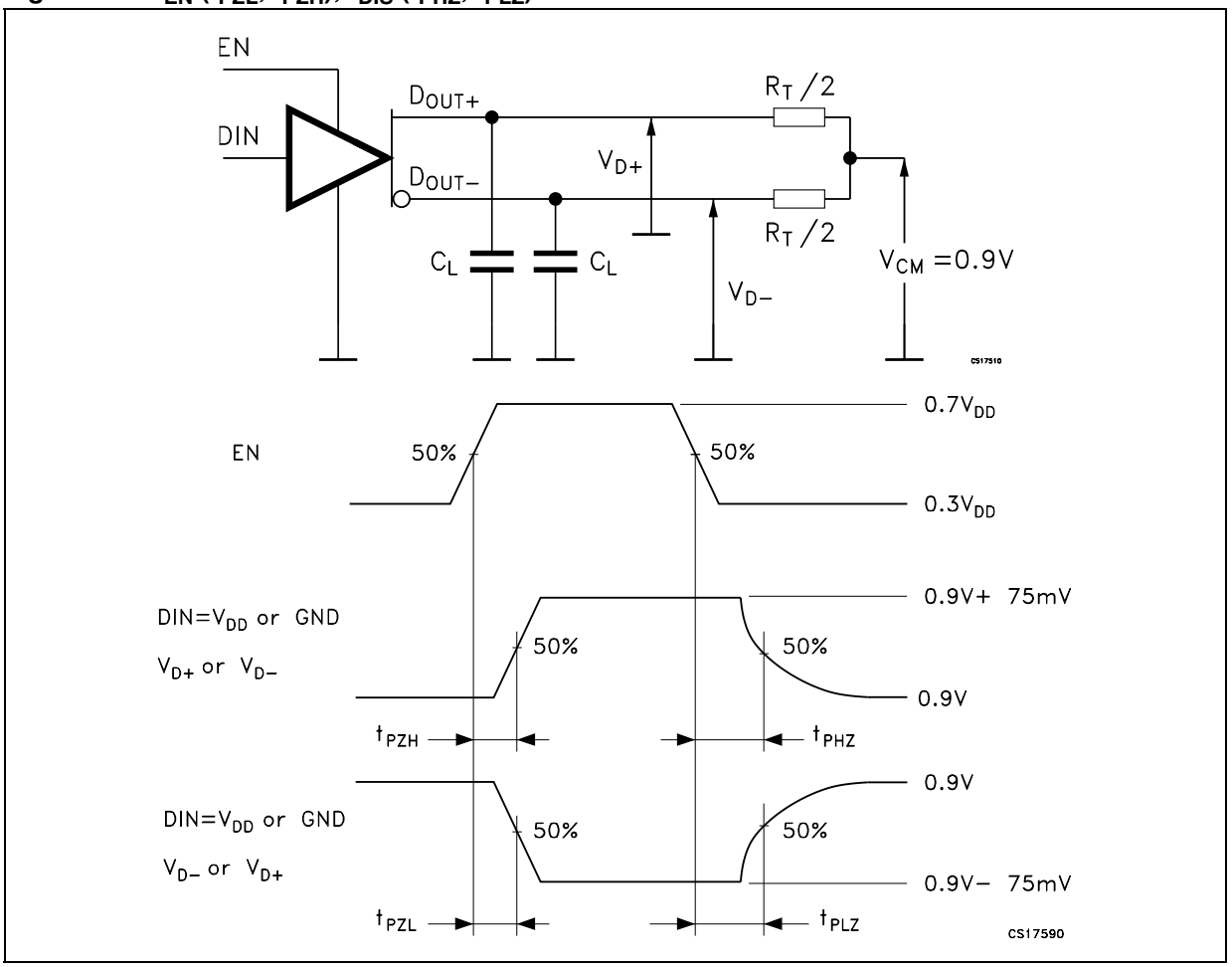
Note: *R_T = 100 Ω ±1%; C_L = 10pF; t_{rDIN} = 4.9ns; t_{fDIN} = 4.2ns; f_{DIN} = 10MHz; $PulseWidth_{DIN}$ = 50ns.*

Figure 6. t_{SKEW2}



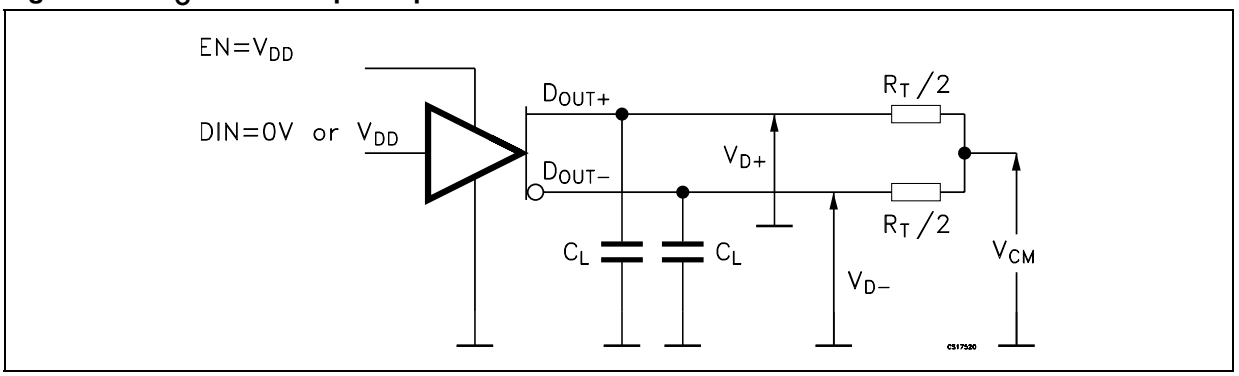
Note: *R_T = 100 Ω ±1%; C_L = 10pF; t_{rDIN} = 4.9ns; t_{fDIN} = 4.2ns; f_{DIN} = 10MHz; $PulseWidth_{DIN}$ = 50ns*

Figure 7. t_{EN} (t_{PZL}, t_{PZH}); t_{DIS} (t_{PHZ}, t_{PLZ})



Note: $R_T = 100\,\Omega \pm 1\%$; $C_L = 10pF$; $t_{rDIN} = 2.0ns$; $t_{fDIN} = 2.0ns$; $f_{EN} = 1MHz$; $PulseWidth_{DIN} = 500ns$

Figure 8. R_O: Driver output impedance

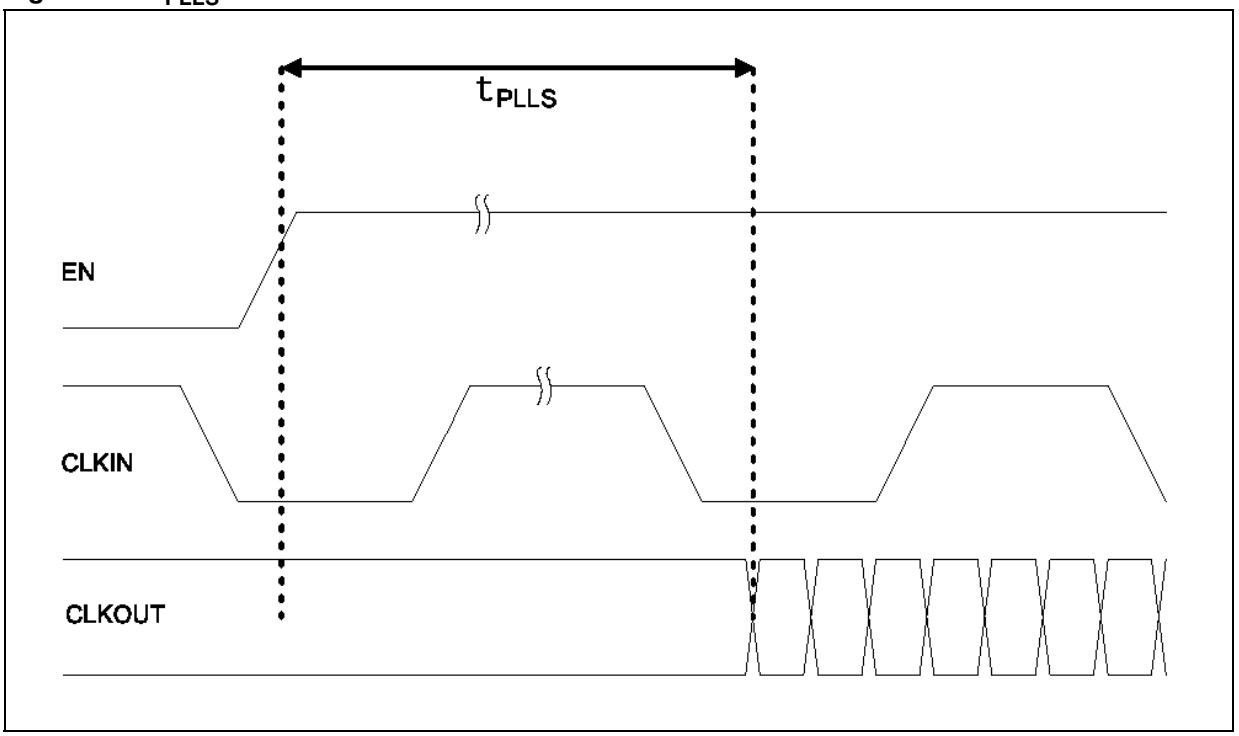


Note: $R_T = 100\,\Omega \pm 1\%$; $C_L = 10pF$

$\Delta V_{X+} = V_{D+(VCM=1.0V)} - V_{D+(VCM=0.8V)}$; $\Delta V_{X-} = V_{D-(VCM=1.0V)} - V_{D-(VCM=0.8V)}$;

$R_{0+} = (R_T/2 \times \Delta V_{X+})/(200mV - \Delta V_{X+})$; $R_{0-} = (R_T/2 \times \Delta V_{X-})/(200mV - \Delta V_{X-})$

Figure 9. t_{PLLS}



Note: During t_{PLLS} test DV0=DV1=V_{DD}

Figure 10. General timing diagram (parallel mode)

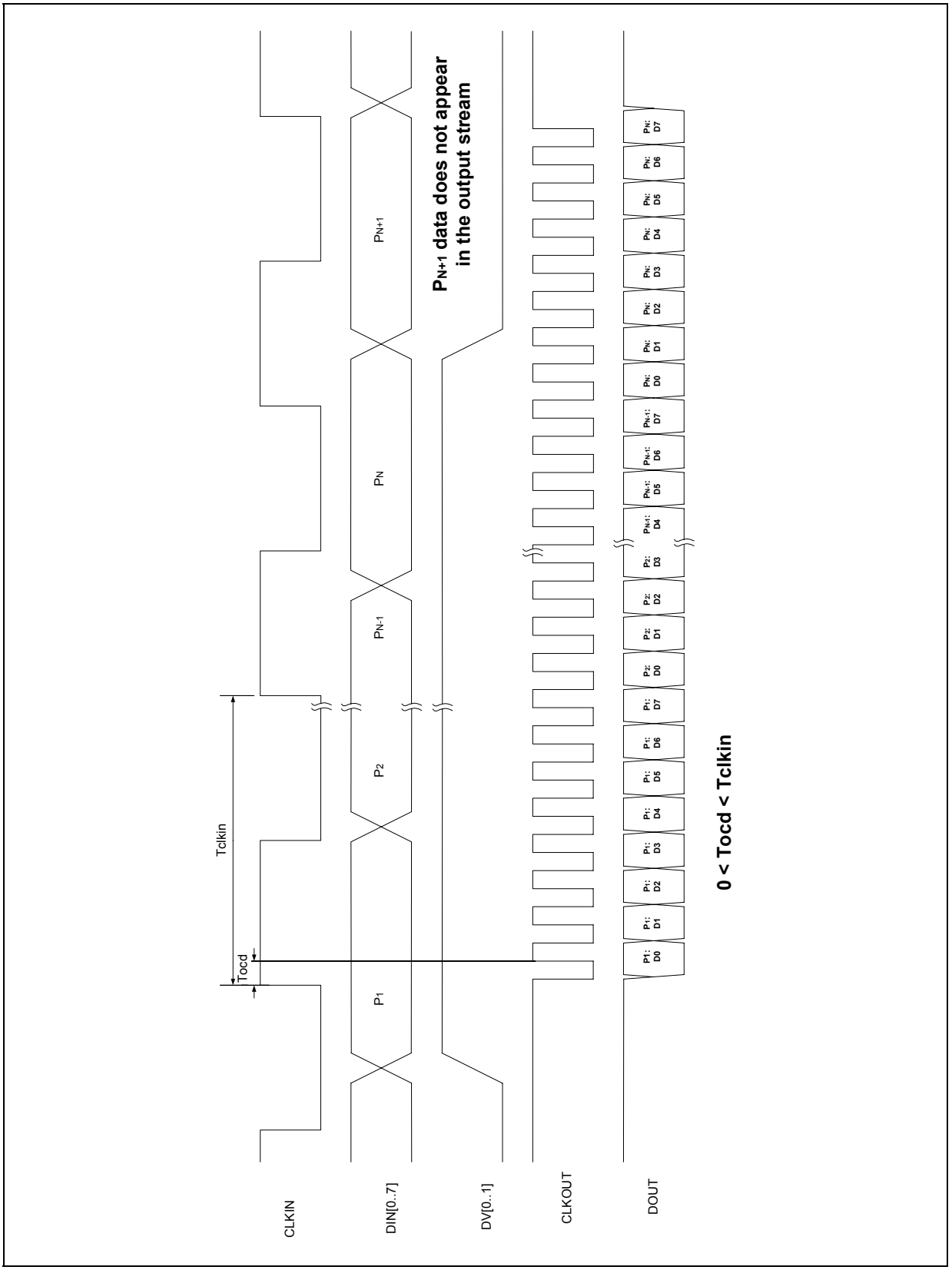
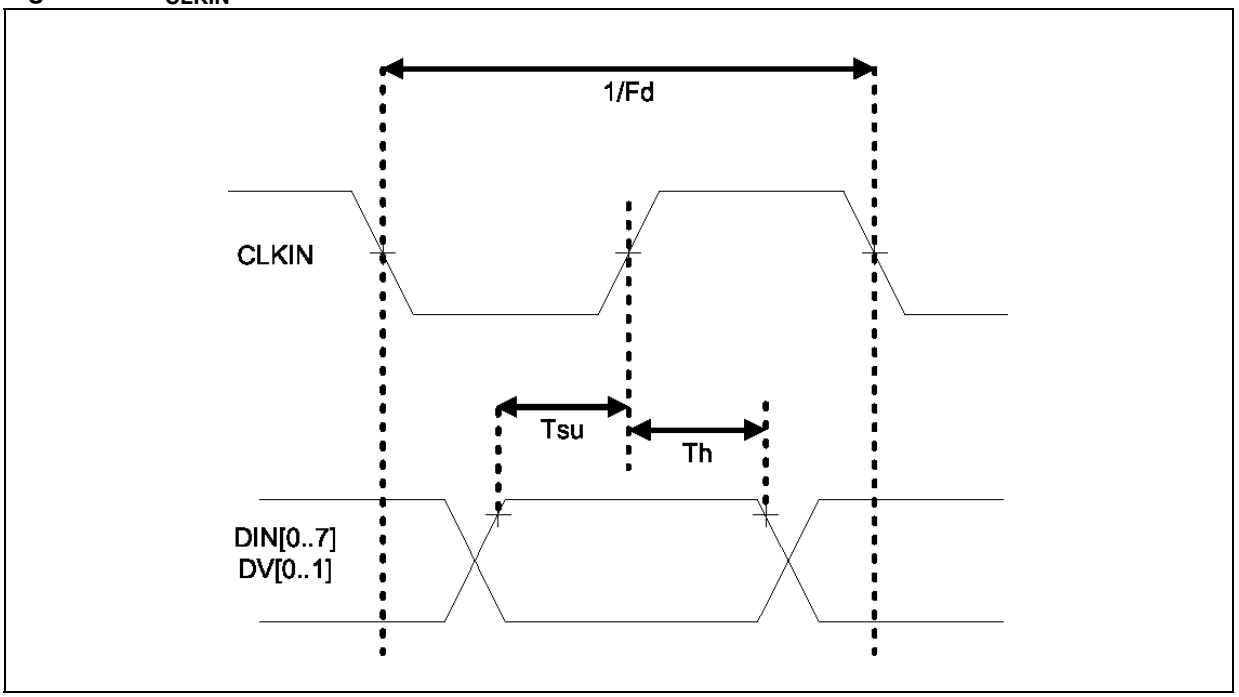
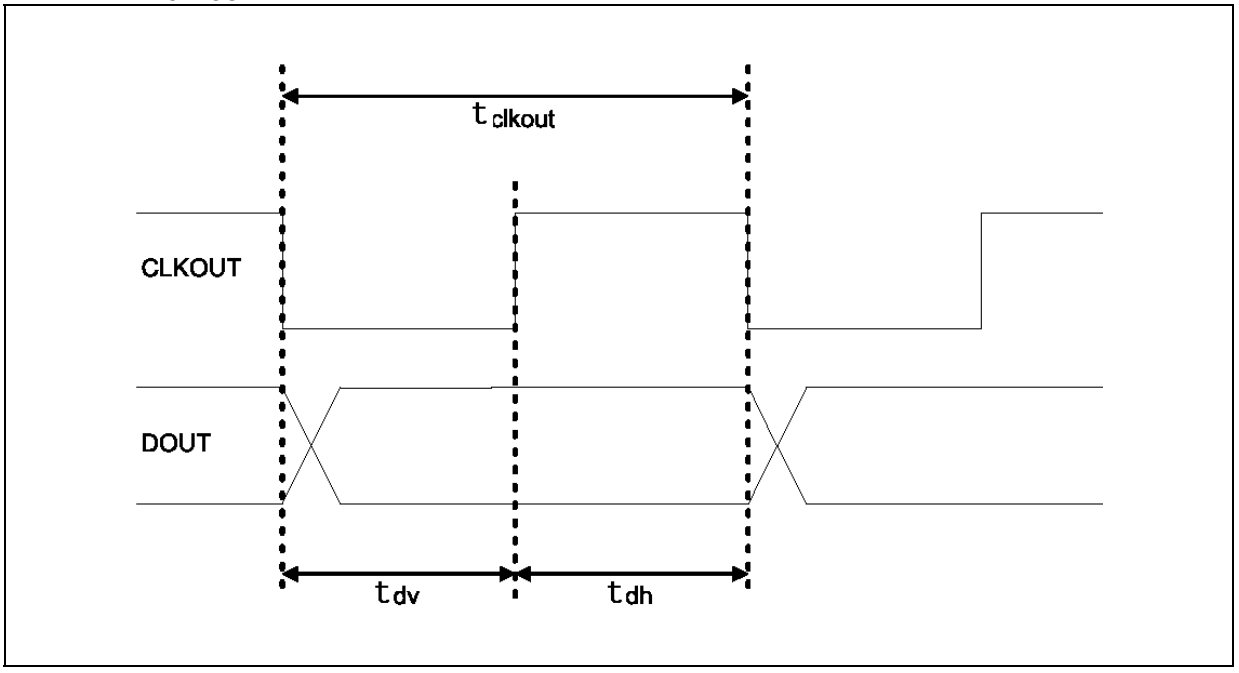


Figure 11. t_{CLKIN}



Note: t_{CLKIN}

Figure 12. t_{CLKOUT}



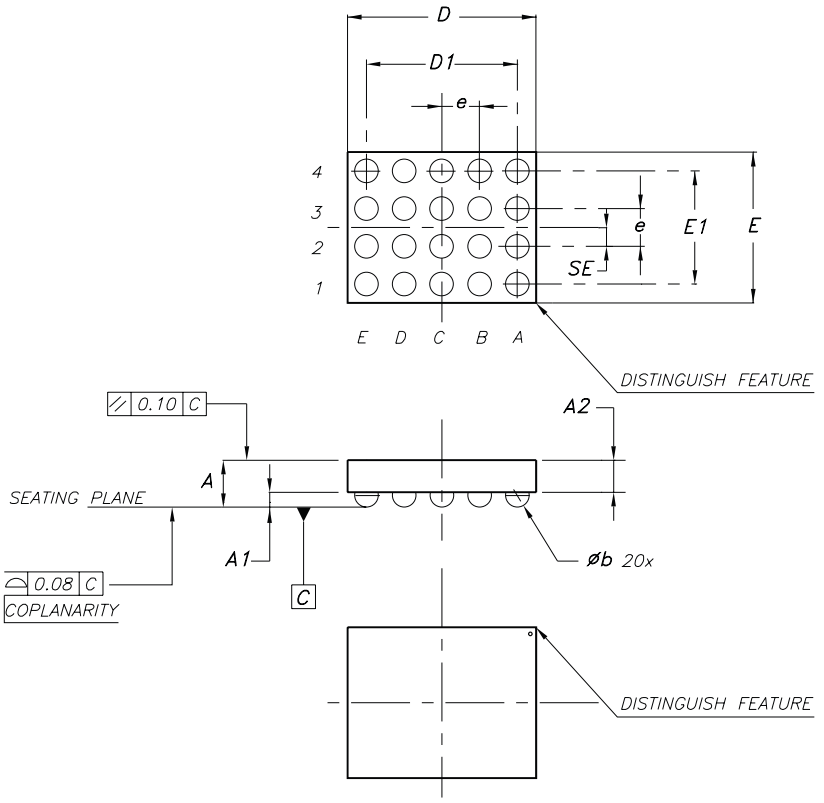
Note: t_{CLKOUT}

6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

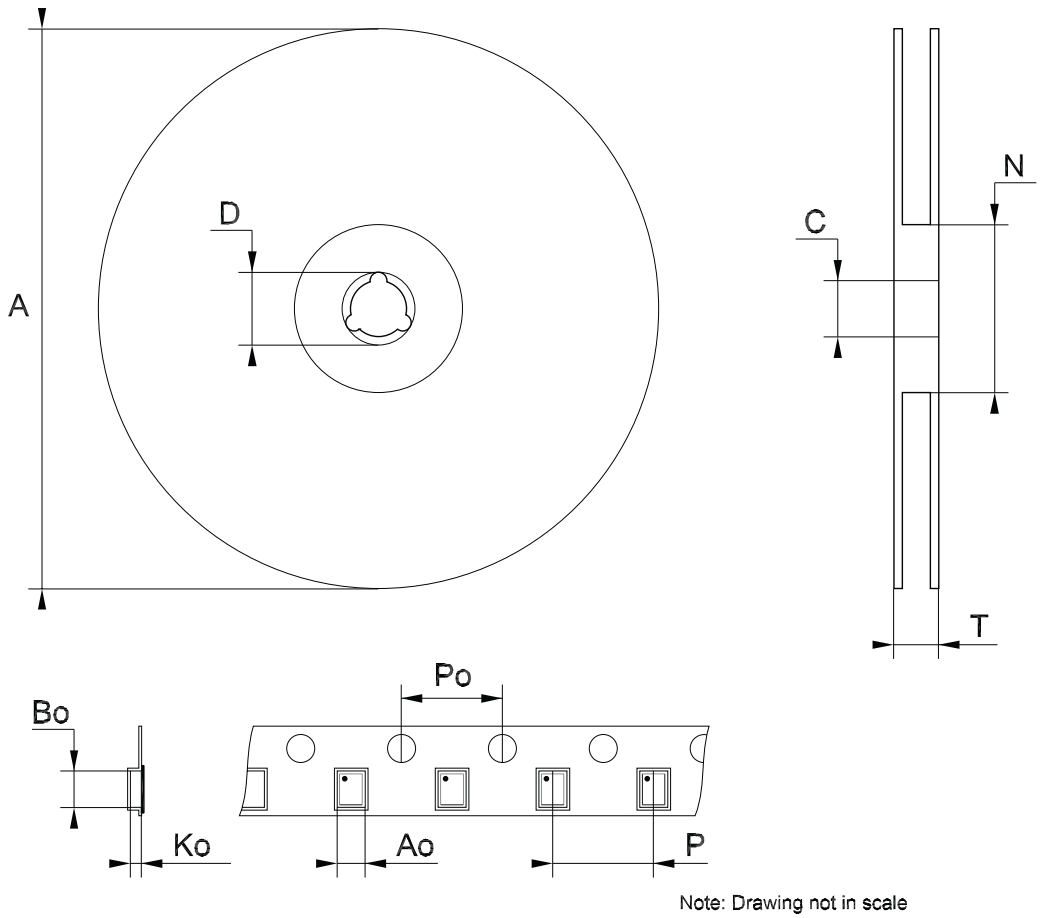
Flip-Chip20 Mechanical Data

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.81	0.89	1.00	31.9	35.0	39.4
A1	0.15	0.24	0.35	5.9	9.4	13.8
A2		0.65			25.6	
b	0.25	0.30	0.35	9.8	11.8	13.8
D	2.41	2.46	2.51	94.9	96.9	98.8
D1		2.00			78.7	
E	1.93	1.98	2.03	76.0	78.0	79.9
E1		1.5			59.1	
e		0.50			19.7	
SE		0.25			9.8	



Tape & Reel Flip-Chip20 Mechanical Data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			180			7.086
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	2.13	2.23	2.33	0.084	0.088	0.092
Bo	2.62	2.72	2.82	0.103	0.107	0.111
Ko	1.05	1.15	1.25	0.041	0.045	0.049
Po	3.9		4.1	0.153		0.161
P	3.9		4.1	0.153		0.161



Note: Drawing not in scale

7 Revision history

Table 10. Revision history

Date	Revision	Changes
01-Jun-2007	1	Initial release.

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