



Features

- Operating Frequency: 0MHz~200 MHz
- Low noise:<50fsrms
- low skew: < 50ps
- Fast rise/fall time: 1.0ns typ.
- Propagation delay: 2.5ns typ.
- Industrial temperature (−40°C to 85°C)
- 3.3V/2.5V/1.8V power supply
- Packaging (Pb-free & Green available)

Applications

- 33 MHz PCI-to- 133 MHz PCIX controllers
- 80 MHz for 10/100 Mbps Ethernet
- 125 MHz for Gigabit networking
- 155.520 MHz for Optical OC3/SDH/SONET

Block Diagram

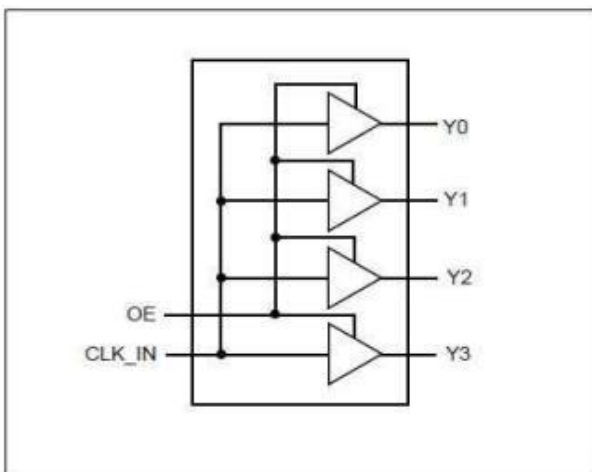


Figure 1 Block Diagram

Description

Raystar’s RS304 are low-skew, low- noise, high speed clock buffers and are ideal for computing, networking, and communication applications. Application examples include PCI(X) clock buffers in servers and workstations, PCI(X) Storage Area Network (SAN), and RAID controllers. They are used for networking and communications applications requiring 80 MHz for 10/100 Mbps Ethernet and 125 MHz for Gigabit networking clocks. To reduce EMI emission and power consumption, all outputs can be disabled to Low-state by asserting a low signal to the OE (Output Enable) pin. RS304 output impedance is 25-ohms.

Order Information

Part Number	Package
RS304WE	8-Pin SOIC
RS304UE	8-Pin MSOP
RS304TE	8-Pin TSSOP
RS304ZAE	8-Pin DFN8

Notes

- [1] E = Pb-free and Green



Pin Configuration

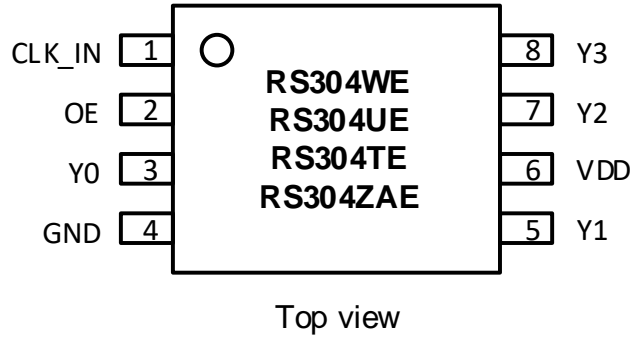


Table 1 Function table

INPUT		OUTPUT
CLK_IN	OE	Y[3:0]
X	L	L
L	H	L
H	H	H

Pin Description

Pin name	Pin No.	Type	Description
CLK_IN	1	Input	clock input
OE	2	Input	Active High Output Enable. Y[0-3] outputs will be Low Level when OE is low
Y[0:3]	3,5,7,8	Output	LVC MOS level outputs
GND	4	Ground	Ground
VDD	6	Power	3.3V/2.5V/1.8V Power Supply



Absolute Maximum Ratings

Parameter	Range
Supply Voltage (VDD)	-0.0V to +6.5V
Input Voltage	-0.5V to VDD+0.5V
Industrial Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature	150°C
Input ESD MIL- 883, method 3015, human body model	2KV

Recommended Operating Conditions

Symbol	Parameter	MIN	MAX	Unit
VDD	I/O Supply, Analog Core Supply	1.62	3.63	V
T _A	Industrial Ambient Temperature	-40	+85	° C

DC Electrical Characteristics

(T_A = -40~85°C, VCC = 3.3V ±0.3V)

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
V _{IL}	Low Input Voltage				0.8	V
V _{IH}	High Input Voltage		2.0			
I _{IL}	Low Input Current	V _{IN} = 0V			5	μA
I _{IH}	High Input Current	V _{IN} = VDD			5	
V _{OL}	Low Output Voltage	I _{OL} = 12mA			0.4	V
V _{OH}	High Output Voltage	I _{OH} = -12mA	2.4			
C _O	Output Capacitance			3	7	pF
C _I	Input Capacitance			3	5	
I _{DD}	Supply Current	CL = 33pF/33MHz		20		mA
		CL = 33pF/66MHz		40		
		CL = 22pF/80MHz		35		
		CL = 15pF/100MHz		32		
		CL = 10pF/125MHz		28		
		CL = 10pF/155MHz		41		
Z _O	Output Impedance			25		Ω
L	Pin Inductance				7	nH



AC Characteristics

(TA = -40~85°C, VCC = 3.3V ±0.3V, 33pF/66MHz and 10pF/160MHz)

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
F _{IN}	Input frequency		0		200	MHz
T _{PLH}	Low-to-high propagation delay	CLK_IN to Y[0:3] rising edges @ 1.5V	1.0	1.7	3.0	ns
T _{PHL}	High-to-low propagation delay	CLK_IN to Y[0:3] falling edges @ 1.5V	1.0	1.7	3.0	
T _{SK(O)}	Output skew	@ 1.5V			150	ps
T _{SK(P)}	Pulse skew	@ 1.5V			300	
T _{SK(T)}	Package skew (1)	@ 1.5V			500	
T _{R,TF}	Rise, Fall time	0.65V~2.65V		0.7	1.4	ns
T _{PZL,TPZH}	Output enable time				5	
T _{PLZ,TPHZ}	Output disable time				10	
T _{DC}	Output duty cycle	T _{DC} = t _H / t _{cy} , t _H = High Pulse Width	45		55	%

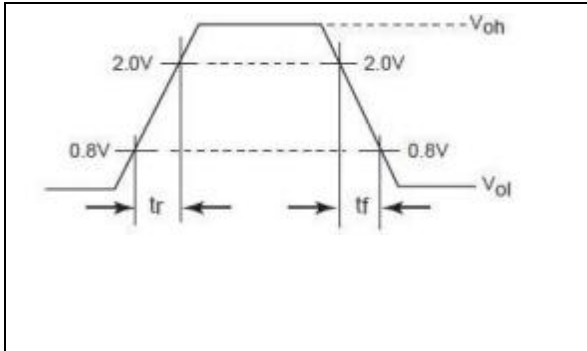
Note:

1. Identical traces, loads, power supply.
2. Maximum Output Skew is 100ps when frequency is below 125MHz with 10pF loading.

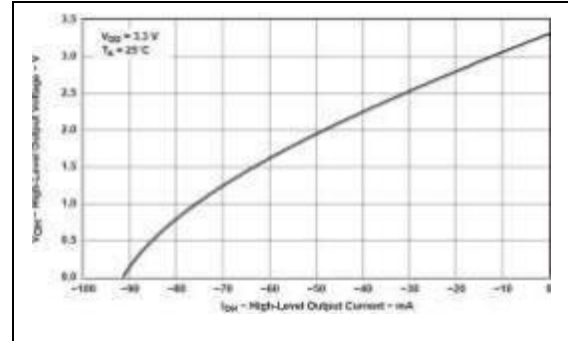


Typical Characteristics

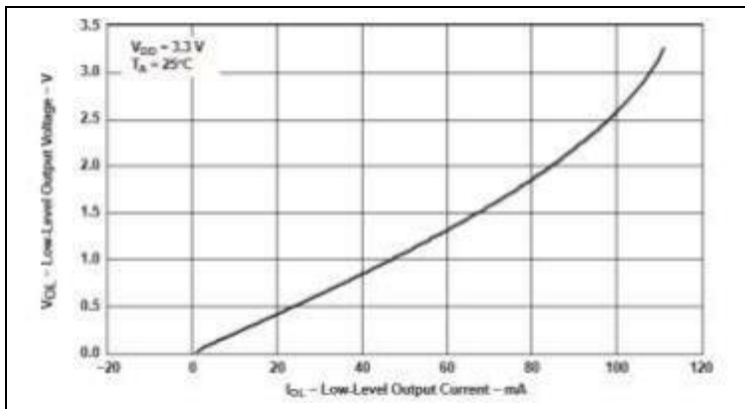
Rise/Fall Time



High-Level Output Voltage VS High-Level Output Current

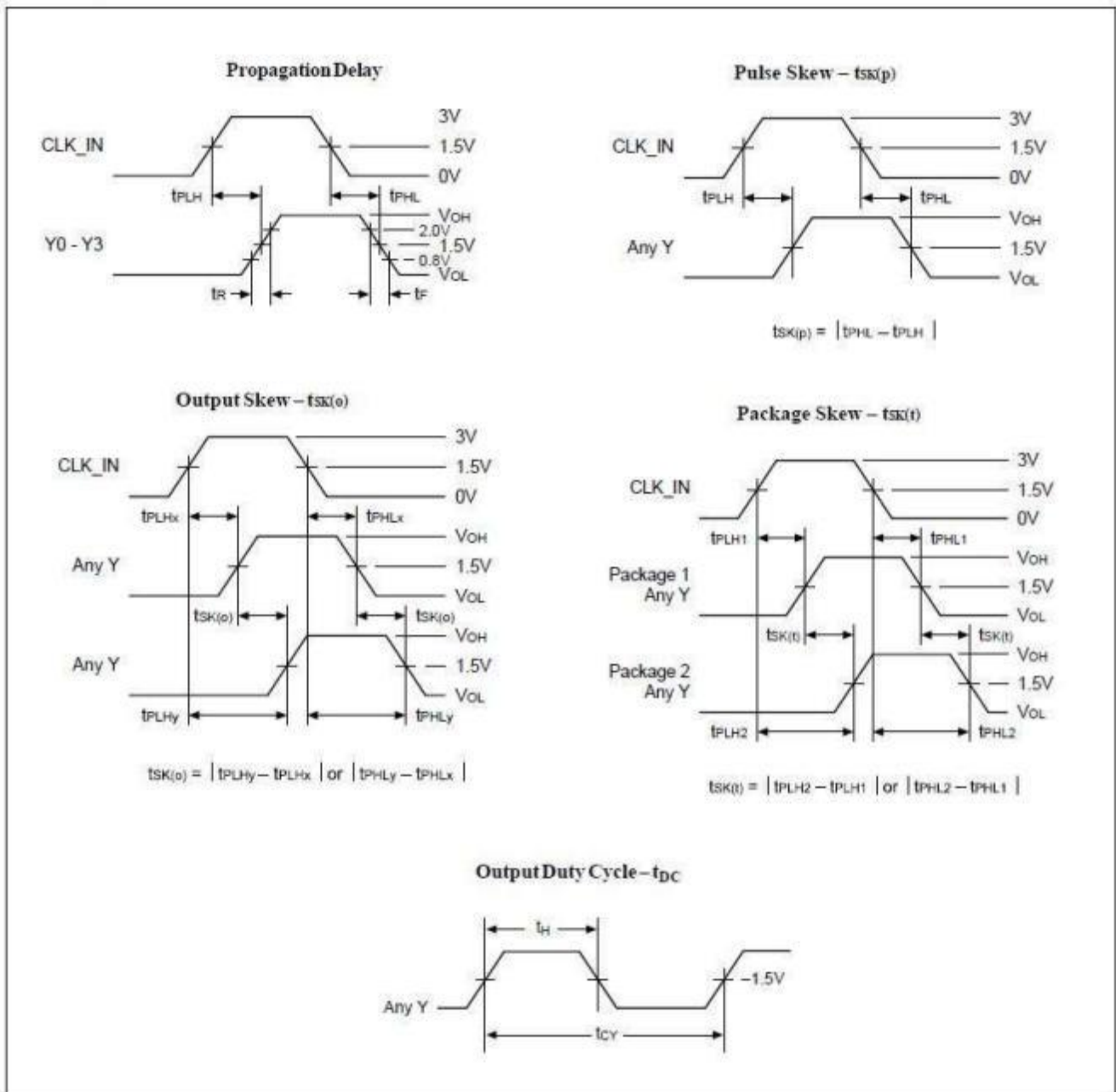


Low-Level Output Voltage vs. Low-Level Output Current





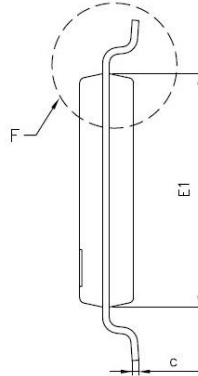
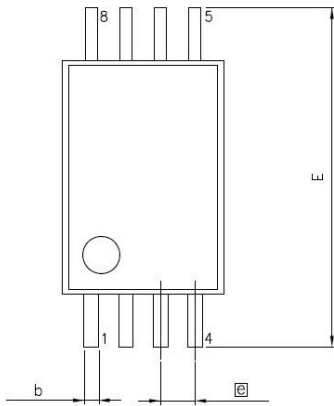
Switching Waveforms





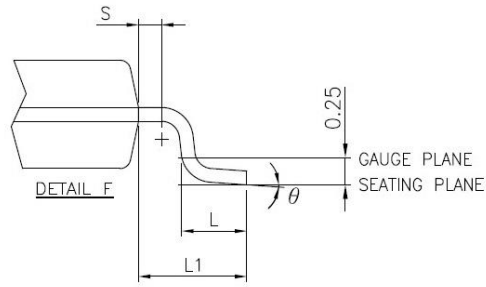
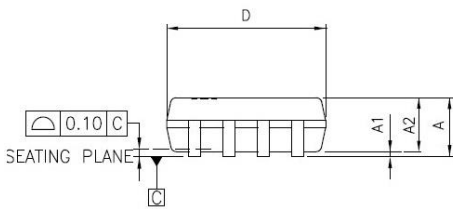
Package Information

8-Pin TSSOP (T)



SYMBOLS	MIN.	NOM.	MAX.
A	—	—	1.20
A1	0.05	—	0.15
A2	0.80	1.00	1.05
b	0.19	—	0.30
c	0.09	—	0.20
D	2.90	3.00	3.10
E	6.20	6.40	6.60
e	0.65 BSC		
E1	4.30	4.40	4.50
L	0.45	0.60	0.75
L1	1.00 REF		
S	0.20	—	—
θ^*	0	—	8

UNIT : MM



- Notes:**
1. All dimensions are in mm. Angles in degrees.
 2. Refer JEDEC MO-153F
 3. Dimensions exclude burrs, mold flash or protrusions.

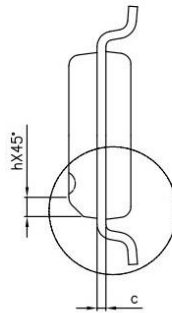
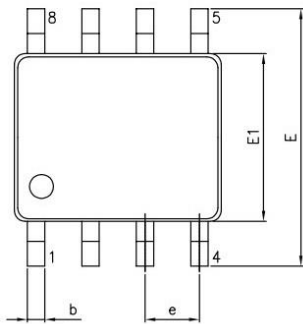
TSSOP08 POD Rev.0



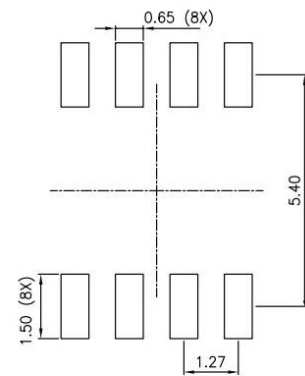
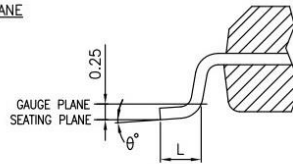
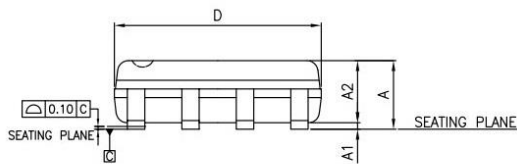
Raystar Microelectronics Technology Inc.



8-Pin SOIC (W)



SYMBOLS	MIN.	NOM.	MAX.
A	—	—	1.75
A1	0.10	—	0.25
A2	1.25	—	—
b	0.31	—	0.51
c	0.10	—	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.40	—	1.27
h	0.25	—	0.50
θ°	0	—	8



Recommended Land Pattern

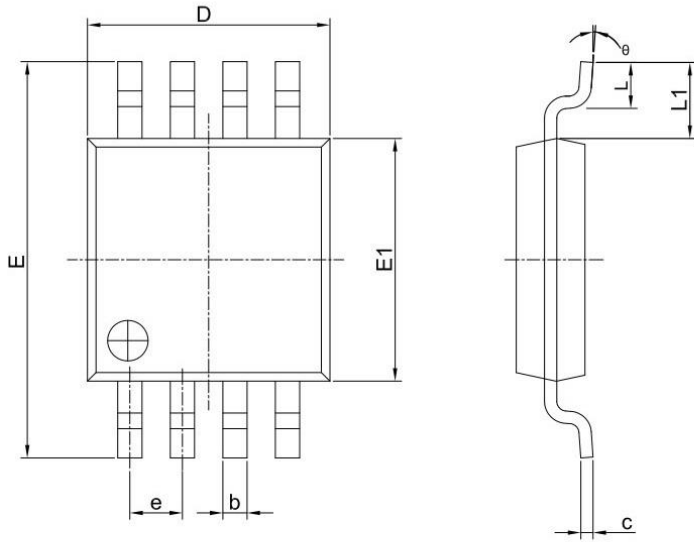
Note:

1. All dimensions are in mm. Angles in degrees.
2. Dimensions exclude burrs, mold flash or protrusions.
3. Refer Jeduc MS-012
4. Recommended land pattern is for reference only.





8-Pin MSOP (U)



PKG DIMENSIONS(MM)		
SYMBOL	Min.	Max.
A	--	1.10
A1	0.00	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.08	0.23
D	2.80	3.20
E	4.65	5.15
E1	2.80	3.20
e	0.65 BSC	
L	0.40	0.80
L1	0.95 REF	
theta	0°	8°

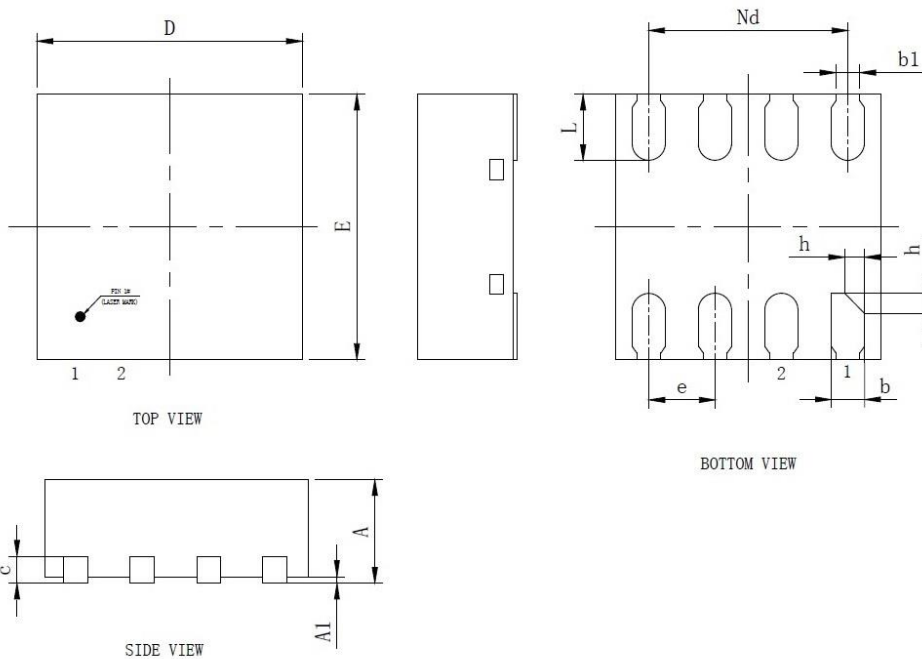
Note:

- 1.All dimensions are in mm. Angels in degrees.
- 2.Refer Jedec MO-187
- 3.Dimensions exclude burrs, mold flash or protrusions.





8-Pin DFN8 (ZA)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.18	0.25	0.30
b1	0.18REF		
c	0.203REF		
D	1.90	2.00	2.10
e	0.50BSC		
Nd	1.50BSC		
E	1.90	2.00	2.10
L	0.45	0.50	0.55
h	0.10	0.15	0.20

Notes:

1. All dimensions are in mm. Angles in degrees.
2. Refer JEDEC MO-229
3. Dimensions exclude burrs, mold flash or protrusions.





Revision History

Revision	Description	Date
V1.4	1. Add ordering code RS304ZAE of DFN8 package 2. Applcate formatted document 3. Change TSSOP8, SOP8, MSOP8 package figure	2023/6/16
V1.5	1. Modify $V_{IH} (MAX) = 0.8V$. Delete the typical value. 2. Modify I_{IL} test condition.	2024/4/11