

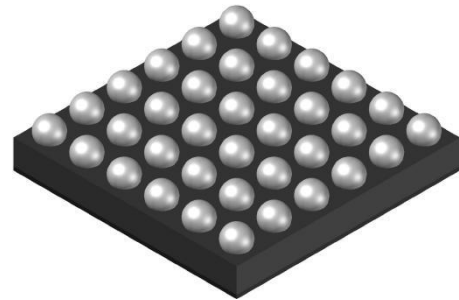
WAS4646C

2:1 MIPI D-PHY (2.5Gbps) 4-Data Lane & C-PHY (2.5Gbps) 3-Data Lane Switch

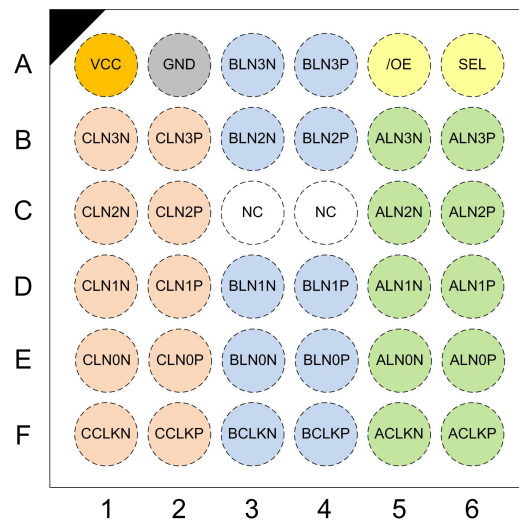
Http://: www.sh-willsemi.com

Descriptions

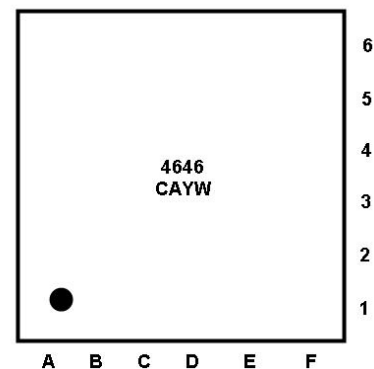
The WAS4646C is a four-data-lane MIPI, D-PHY or three-data-lane C-PHY MIPI switch. This single-pole, double-throw (SPDT) switch is optimized for switch between two high-speed or low-power MIPI sources. The WAS4646C is designed for the specification and allows connection to a CSI or DSI module.



CSP-36L (Bottom View)



Pin configuration (Top view)


Marking

4646 = Device Code
CA = Special Code
Y = Year Code
W = Week Code

Features

- Supply voltage : 1.6 to 5.0 V
- Input Signals : 0 to 1.3 V
- R_{on} : 7 Ω Typical HS MIPI
7 Ω Typical LP MIPI
- ΔR_{ON} : 0.1 Ω Typical LP & HS MIPI
- R_{ON_FLAT} : 0.5 Ω Typical LP & HS MIPI
- I_{CCZ} : 1 μ A Maximum
- I_{CC} : 40 μ A Maximum
- OIRR : -24 dB Typical@1.25G
- Bandwidth : 3000 MHz Typical
- X_{TALK} : -30 dB Typical
- Package : CSP-36L

Applications

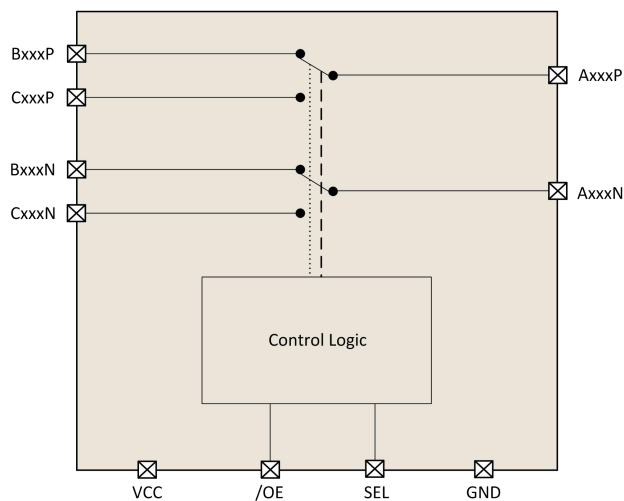
- Cellular Phones, Smart Phones
- Tablets
- Laptops
- Displays

Order information

Device	Package	Shipping
WAS4646C-36/TR	CSP-36L	3000

Pin descriptions

Pin Number	Symbol	Descriptions
F3, F4 E3, E4 D3, D4 B3, B4 A3, A4	BCLKN, BCLKP BLN0N, BLN0P BLN1N, BLN1P BLN2N, BLN2P BLN3N, BLN3P	Port B for MIPI 1-Clock and 4-Lane differential signal
F1, F2 E1, E2 D1, D2 C1, C2 B1, B2	CCLKN, CCLKP CLN0N, CLN0P CLN1N, CLN1P CLN2N, CLN2P CLN3N, CLN3P	Port C for MIPI 1-Clock and 4-Lane differential signal
F5, F6 E5, E6 D5, D6 C5, C6 B5, B6	ACLKN, ACLKP ALN0N, ALN0P ALN1N, ALN1P ALN2N, ALN2P ALN3N, ALN3P	Port A for MIPI 1-Clock and 4-Lane differential signal
A5	/OE	/OE=LOW ,Output Enable /OE=HIGH ,All Path Impedance
A6	SEL	Port selection control, SEL=0, Port A = Port B SEL=1, Port A = Port C
A1	VCC	Power supply
A2	GND	Ground
C3, C4	NC	Not Connected

Block Diagram & Typical Applications

Figure 1 Block Diagram

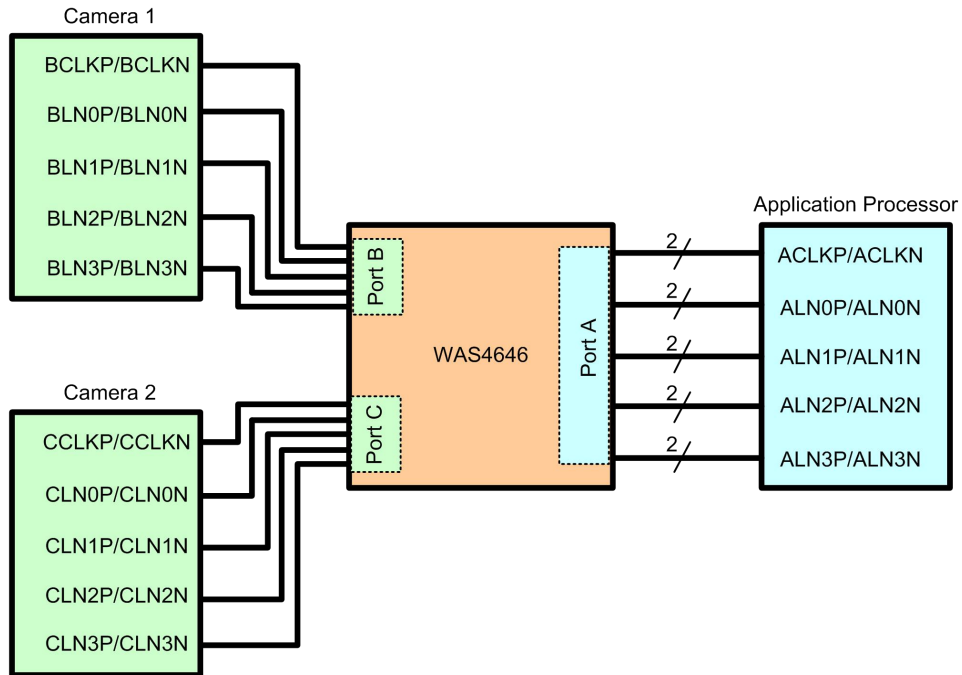


Figure 2 Recommended D-PHY Configuration

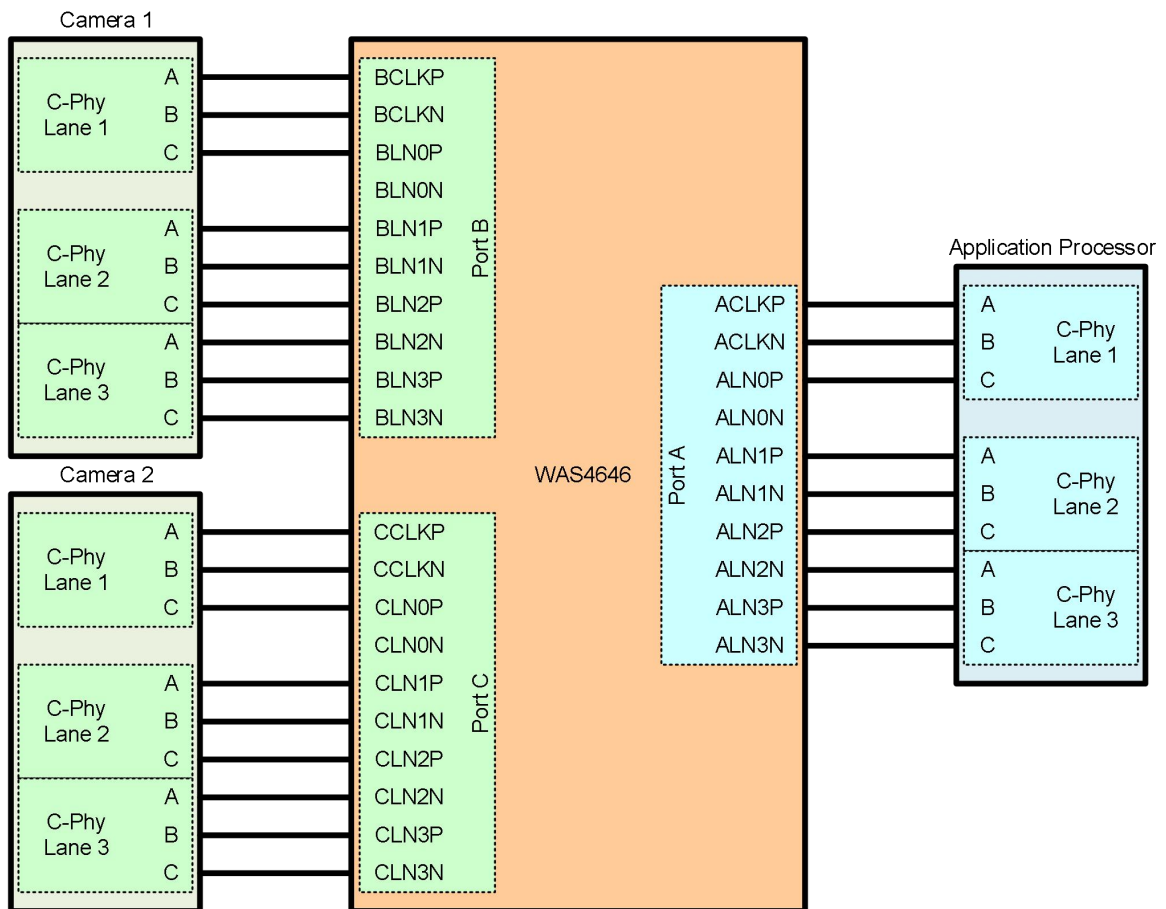


Figure 3 Recommended C-PHY Configuration

Absolute maximum ratings

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	-0.5~6.0	V
DC Input Voltage (/OE, SEL) (Note 1)		V_{CTRL}	-0.5~ V_{CC}	V
DC Switch I/O Voltage (Note 1,2)		V_{SW}	-0.3~ V_{CC}	V
DC Input Diode Current		I_{IK}	-50(Min.)	mA
DC Output Current		I_{OUT}	25(Max.)	mA
Storage Temperature		T_{STG}	-65~+150	°C
Human Body Model, JEDEC: JESD22-A114 All Pins		ESD	4.0	kV
Charged Device Model, JEDEC: JESD22-C101			2.0	kV
IEC 61000-4-2 System (V_{CC} to V_{SS})	Contact		8	kV
	Air Gap		15	kV

Recommend operating ratings

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	1.6~5.0	V
Control Input Voltage (/OE, SEL) (Note 3)		V_{CTRL}	0~ V_{CC}	V
Switch I/O Voltage (A,B,C)CLK(P,N),(A,B,C)LNn(P,N)	V_{SW}	-HS Mode	0~0.3	V
		-LP Mode	0~1.3	V
Operating Temperature		T_A	-40~+85	°C

Note:

- 1) "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
- 2) The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
- 3) Control input (/OE, SEL) must be held HIGH or LOW, it must no float.

DC and Transient Characteristics($T_a=25^{\circ}\text{C}$, $V_{CC}=3.3\text{V}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Clamp Diode Voltage (/OE, SEL)	V_{IK}	$I_{IN} = 18\text{mA}$, $V_{CC}=1.6\text{V}$	-1.0		-0.55	V
Input Voltage High	V_{IH}	/OE, SEL, $V_{CC}=1.6\sim 5\text{V}$	1.3			V
Input Voltage Low	V_{IL}	/OE, SEL, $V_{CC}=1.6\sim 5\text{V}$			0.5	V
Control Input Leakage (/OE, SEL)	I_{IN}	$V_{CTRL} = 0$ to V_{CC} , $V_{CC}=5\text{V}$	-0.5		1	μA
Off Leakage Current of Port CCLKn, CLNn, BCLKn and BLNn	$I_{NO(OFF)}$ $I_{NC(OFF)}$	$V_{SW} = 0.0 \leq \text{DATA} \leq 1.3\text{V}$, $V_{CC}=5\text{V}$	-0.5		0.5	μA
On Leakage Current of Common Ports (ACLKn, ALNn)	$I_{A(ON)}$	$V_{SW} = 0.0 \leq \text{DATA} \leq 1.3\text{V}$, $V_{CC}=5\text{V}$	-0.5		0.5	μA
Off-State Leakage	I_{OZ}	$V_{SW} = 0.0 \leq \text{DATA} \leq 1.3\text{V}$, /OE = HIGH, $V_{CC}=5\text{V}$	-0.5		0.5	μA
Switch On Resistance for HS MIPI	$R_{ON_MIPI_HS}$	$I_{ON} = -50\text{mA}$, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 0.2V, $V_{CC}=1.6\sim 5\text{V}$	6.2	7.0	7.5	Ω
Switch On Resistance For LP MIPI	$R_{ON_MIPI_LP}$	$I_{ON} = -50\text{mA}$, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 1.2 V, $V_{CC}=1.6\sim 5\text{V}$	6.5	7.0	8.0	Ω
On Resistance Matching Between HS MIPI Channels	$\Delta R_{ON_MIPI_HS}$	$I_{ON} = -50\text{mA}$, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 0.2 V, $V_{CC}=1.6\sim 5\text{V}$		0.1	0.22	Ω
On Resistance Matching Between LP MIPI Channels	$\Delta R_{ON_MIPI_LP}$	$I_{ON} = -50\text{mA}$, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 1.2 V, $V_{CC}=1.6\sim 5\text{V}$		0.1	0.22	Ω
On Resistance Flatness for HS MIPI Signals	$R_{ON_FLAT_MIPI_HS}$	$I_{ON} = -50\text{mA}$, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 0 to 0.3 V, $V_{CC}=1.6\sim 5\text{V}$		0.05	0.1	Ω

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On Resistance Flatness for LP MIPI Signals	$R_{ON_FLAT_MIPI_LP}$	$I_{ON} = -50\text{mA}$, $/OE = 0\text{V}$, $SEL = V_{CC}$ or 0V , $CCLK_n$, $BCLK_n, CLN_n$ or $BLN_n = 0$ to 1.3V , $V_{CC} = 1.6\sim 5\text{V}$		0.6	0.9	Ω
Quiescent Supply Current (Includes Charge Pump)	I_{CC}	$SEL = 0$ or V_{CC} , $I_{OUT} = 0$, $/OE = 0\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$		20	40	μA
Quiescent Supply Current (High Impedance)	I_{CCZ}	$SEL = 0$ or V_{CC} , $I_{OUT} = 0$, $/OE = V_{CC} = 5\text{V}$		0.5	1.0	μA

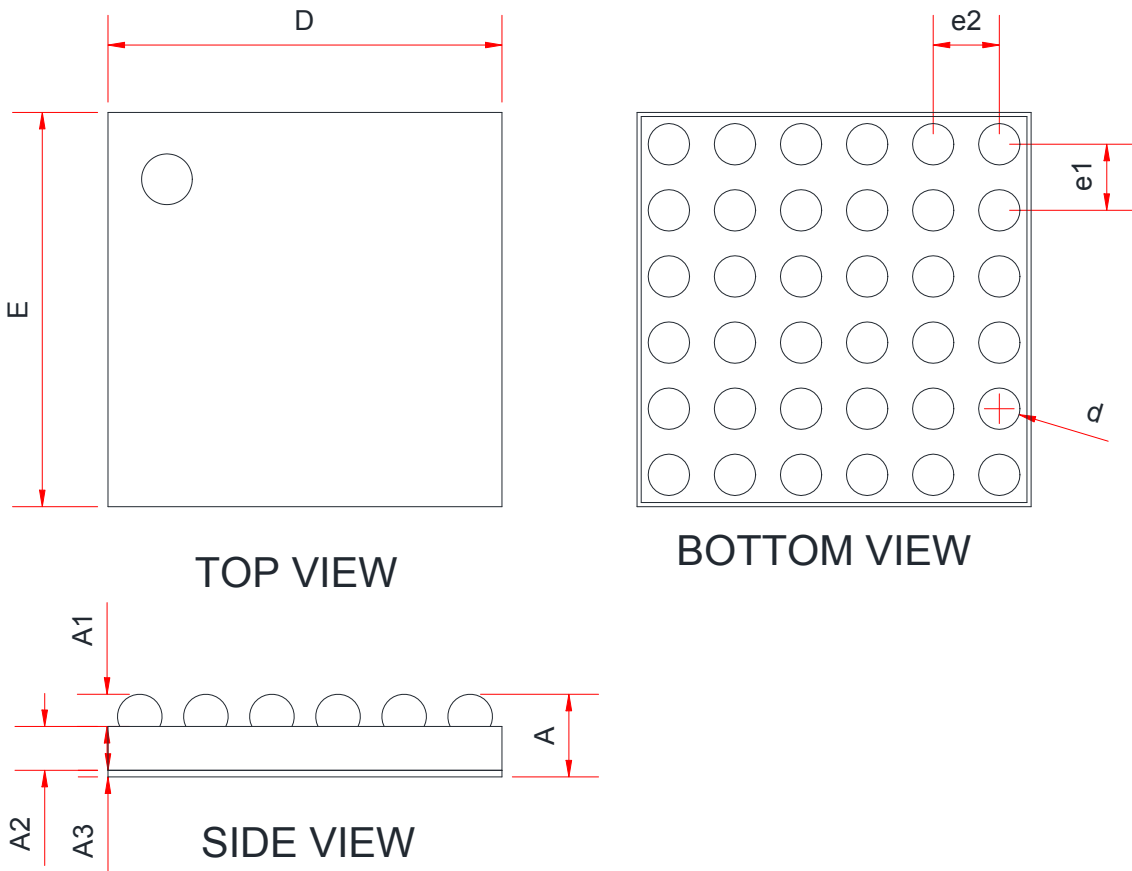
AC Electrical Characteristics ($T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Initialization Time V_{CC} to Output (note 4)	T_{INIT}	$R_L = 50\Omega$, $C_L = 0\text{pF}$, $V_{SW} = 0.6\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$	50		200	μs
Enable Time $/OE$ to Output	T_{EN}	$R_L = 50\Omega$, $C_L = 0\text{pF}$, $V_{SW} = 0.6\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$	50		200	μs
Disable Time $/OE$ to Output	T_{DIS}	$R_L = 50\Omega$, $C_L = 0\text{pF}$, $V_{SW} = 0.6\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$	70		350	ns
Turn-On Time SEL to Output	T_{ON}	$R_L = 50\Omega$, $C_L = 0\text{pF}$, $V_{SW} = 0.6\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$	220		600	ns
Turn-Off Time SEL to Output	T_{OFF}	$R_L = 50\Omega$, $C_L = 0\text{pF}$, $V_{SW} = 0.6\text{V}$, $V_{CC} = 1.6\sim 5\text{V}$	200		400	ns

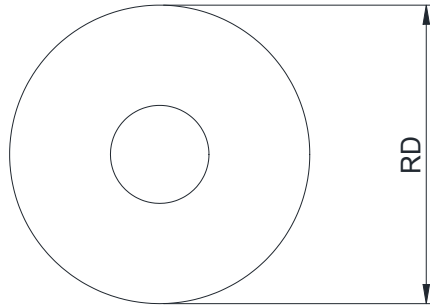
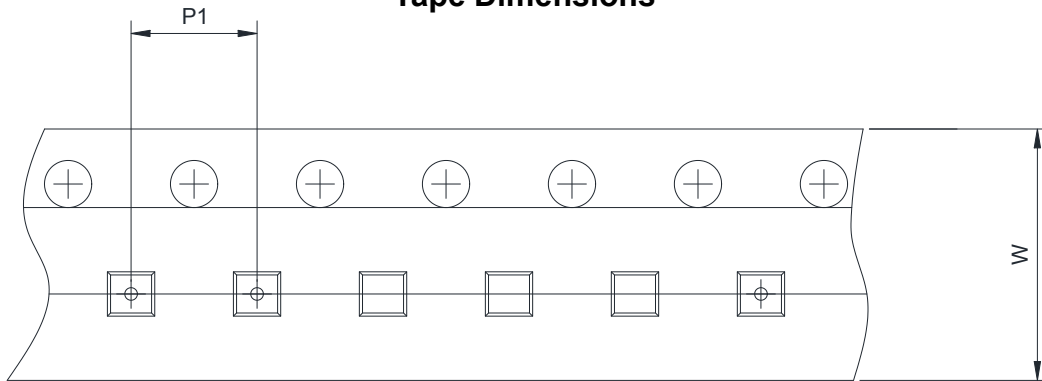
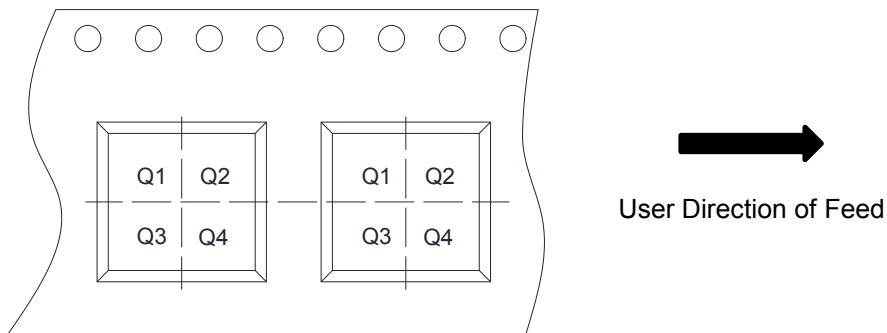
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Break-Before-Make Time	T_{BMM}	$R_L=50\Omega$, $C_L=0pF$, $V_{SW}=0.6V$, $V_{CC}=1.6\sim 5V$	75		370	ns
HS Mode Skew of Opposite Transitions of the Same Output (note 4)	$T_{SK(P)}$	$/OE = 0 V$, $V_{SW} = 0.3 V$, $R_L = 50\Omega$, $C_L = 0pF$, $V_{CC} = 1.6\sim 5V$		1	3	ps
HS Mode Skew of Channel-to-Channel Single-Ended Skew (note 4)	$T_{SK(O)}$	$/OE = 0 V$, $V_{SW} = 0.3 V$, $R_L = 50\Omega$, $C_L = 0 pF$, $V_{CC} = 1.6\sim 5V$		3	6	ps
Propagation Delay (note 4)	T_{PD}	$R_L=50\Omega$, $C_L=0pF$, $V_{CC}=1.6\sim 5V$		40	100	ps
Off Isolation for MIPI (note 4)	OIRR	$R_L=50\Omega$, $f=1250MHz$, $/OE=HIGH$, $V_{SW}=0.2V_{PP}$ $V_{CC}=1.6\sim 5V$		-24	-20	dB
Crosstalk for MIPI (note 4)	X_{TALK}	$R_L=50\Omega$, $f=1250MHz$, $SEL =HIGH$, $V_{SW}=0.2V_{PP}$		-30	-25	dB
		$R_L=50\Omega$, $f=1250MHz$, $SEL =LOW$, $V_{SW}=0.2V_{PP}$		-30	-25	
-3dB Bandwidth (note 4)	BW	$R_L=50\Omega$, $C_L=0pF$, $V_{SW}=0.2V_{PP}$, $V_{CC}=1.6\sim 5V$	2.5	3.0		GHz
Insertion Loss (note 4)	I_{LOSS}	$/OE = 0 V$, $R_L = 50\Omega$, $f=750MHz$, $C_L = 0pF$, $V_{SW} = 0.2 V_{PP}$, $V_{CC} = 1.6\sim 5V$		-0.65		dB
Off Capacitance (note 4)	C_{OFF}	$/OE = V_{CC}$, $f = 1250 MHz$ (in HS common value), $V_{CC} = 3.3 V$		1.2		pF
On Capacitance (note 4)	C_{ON}	$/OE = 0 V$, $f = 1250 MHz$ (in HS common value), $V_{CC} = 3.3 V$		1.2		pF

Note:

4) Guaranteed by characterization.

PACKAGE OUTLINE DIMENSIONS
CSP-36L


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.455	0.500	0.545
A1	0.175	0.195	0.215
A2	0.255	0.280	0.305
A3	0.025		
D	2.370	2.390	2.410
E	2.370	2.390	2.410
e1	0.400		
e2	0.400		
d	0.250	0.270	0.290

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4

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[TS5A3157DBVR\(UMW\)](#) [SN74LVC1G66DBVR](#)