WAS4646

MIPI D-PHY 2.5Gbps, 4-Channel Differential, 2:1 Lane Switch

Http//: www.sh-willsemi.com

Descriptions

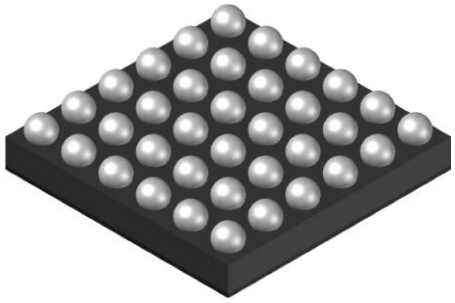
The WAS4646 is a four-data-lane MIPI, D-PHY switch. This single-pole double-throw (SPDT) switch is optimized for switch between two high-speed or low-power MIPI sources. The WAS4646 is designed for the specification and allows connection to a CSI or DSI module.

Features

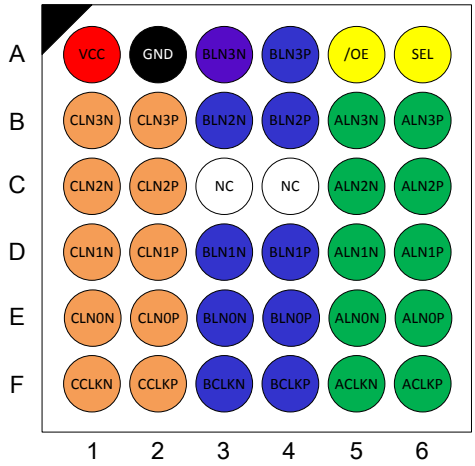
- Supply voltage :1.6 to 5.0 V
- Input Signals : 0 to 1.3 V
- R_{on} :7Ω Typical HS MIPI
  7Ω Typical LP MIPI
- ΔR_{ON} :0.1Ω Typical LP & HS MIPI
- R_{ON_FLAT} :0.9ΩTypical LP & HS MIPI
- I_{CCZ} :1μA Maximum
- I_{CC} : 35μA Maximum
- OIRR :-24 dB Typical@1.25G
- Bandwidth : 3000 MHz Typical
- X_{TALK} : -30 dB Typical
- WLCSP-36B package

Applications

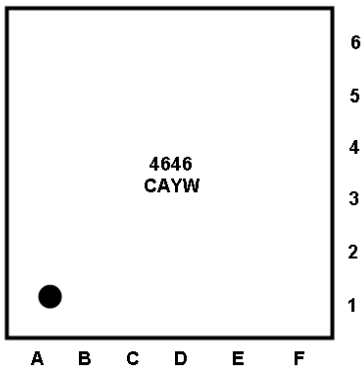
- Cellular Phones, Smart phones
- Tablets
- laptops
- Displays



WLCSP-36B (Bottom View)



Pin configuration (Top view)



Marking

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

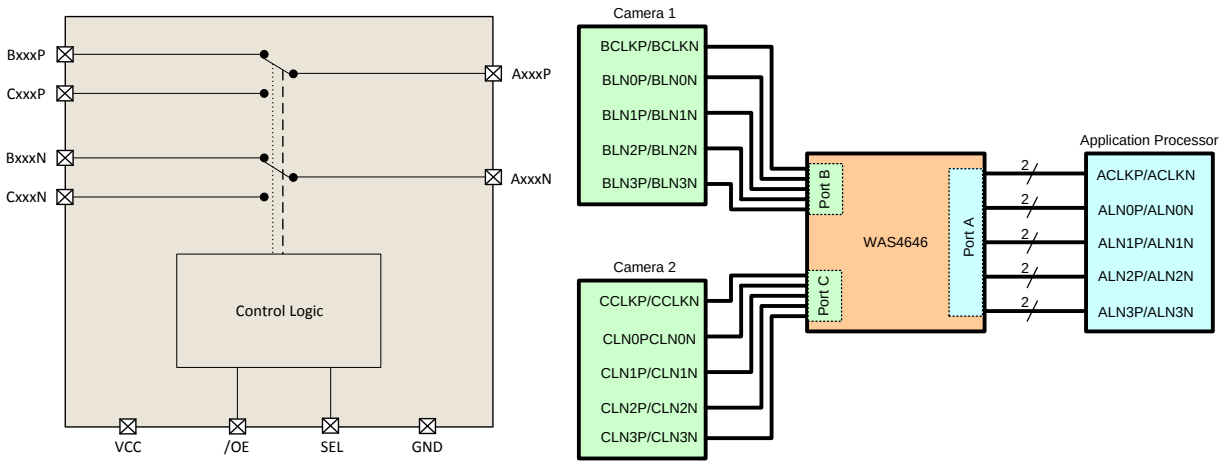
Order information

Device	Package	Shipping
WAS4646C-36/TR	WLCSP-36B	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



Absolute maximum ratings

Parameter		Symbol	Value.	Unit
Supply Voltage		V_{CC}	-0.5~6.0	V
DC Input Voltage (/OE, SEL) (1)		V_{CTRL}	-0.5~ V_{CC}	V
DC Switch I/O Voltage (1,2)		V_{SW}	-0.3~ V_{CC}	V
DC Input Diode Current		I_{LK}	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 (VCC to VSS)	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 (SEL, /OE) (3)		V_{CTRL}	0~ V_{CC}	V
Switch I/O Voltage (A,B,C)CLK(P,N),(A,B,C)LNn(P,N)	VSW	-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 not float.

DC and Transient Characteristics(Ta=25°C, V_{CC}=3.3V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Clamp Diode Voltage (/OE, SEL)	V_{LK}	I_{IN} = 18mA, VCC=1.6V	-1.0		-0.6	V
Input Voltage High	V_{IH}	SEL, /OE, V_{CC}=1.6~5V	1.3			V
Input Voltage Low	V_{IL}	SEL, /OE, V_{CC}=1.6~5V			0.5	V
Control Input Leakage (SEL, /OE)	I_{IN}	V_{CTRL} = 0 to V_{CC}, V_{CC}=5V	-0.5		1	μA
Off Leakage Current of Port CCLKn.CLNn, BCLKn and BLNn	$I_{NO(OFF)}$ $I_{NC(OFF)}$	V_{SW} = 0.0 ≤ DATA ≤ 1.3V, V_{CC}=5V	-0.5		0.5	μA
On Leakage Current of Common Ports (ACLKn,ALNn)	$I_{A(ON)}$	V_{SW} = 0.0 ≤ DATA ≤ 1.3V, V_{CC}=5V	-0.5		0.5	μA
Off-State Leakage	I_{OZ}	V_{SW} = 0.0 ≤ DATA ≤ 1.3V, /OE = High, V_{CC}=5V	-0.5		0.5	μA
Switch On Resistance for HS MIPI	$R_{ON_MIPI_HS}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 0.2V, V_{CC}=1.6~5V		7.0		Ω
Switch On Resistance For LP MIPI	$R_{ON_MIPI_LS}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn , CLNn or BLNn = 1.2 V, V_{CC}=1.6~5V		7.0		Ω
On Resistance Matching Between HS MIPI Channels	$\Delta R_{ON_MIPI_HS}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn,BCLKn, CLNn or BLNn = 0.2 V, V_{CC}=1.6~5V		0.1		Ω
On Resistance Matching Between LP MIPI Channels	$\Delta R_{ON_MIPI_HS}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn = 1.2 V, V_{CC}=1.6~5V		0.1		Ω
On Resistance Flatness for HS MIPI Signals	$R_{ON_FLAT_MIPI_HS}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn, CLNn or BLNn =0 to 0.3 V, V_{CC}=1.6~5V		0.1		Ω

Parameter	Symbol	Conditions	VCC	Min.	Typ.	Max.	Unit
On Resistance Flatness for LP MIPI Signals	$R_{ON_FLAT_MIPI_LP}$	I_{ON} = -8mA, /OE = 0 V, SEL = V_{CC} or 0V, CCLKn, BCLKn,CLNn or BLNn= 0 to 1.3 V	1.6		0.9		Ω
			3.3				
			4.2				
			5				
Quiescent Supply Current (Includes Charge Pump)	I_{CC}	V_{SEL}= 0 or V_{CC}, I_{OUT} = 0, /OE = 0 V	1.6		18	35	μA
			3.3		19		
			4.2		22		
			5		26		
Quiescent Supply Current (High impedance)	I_{CCZ}	V_{SEL}= 0 or V_{CC}, I_{OUT} = 0, /OE = V_{CC}	5		0.5	1	μA

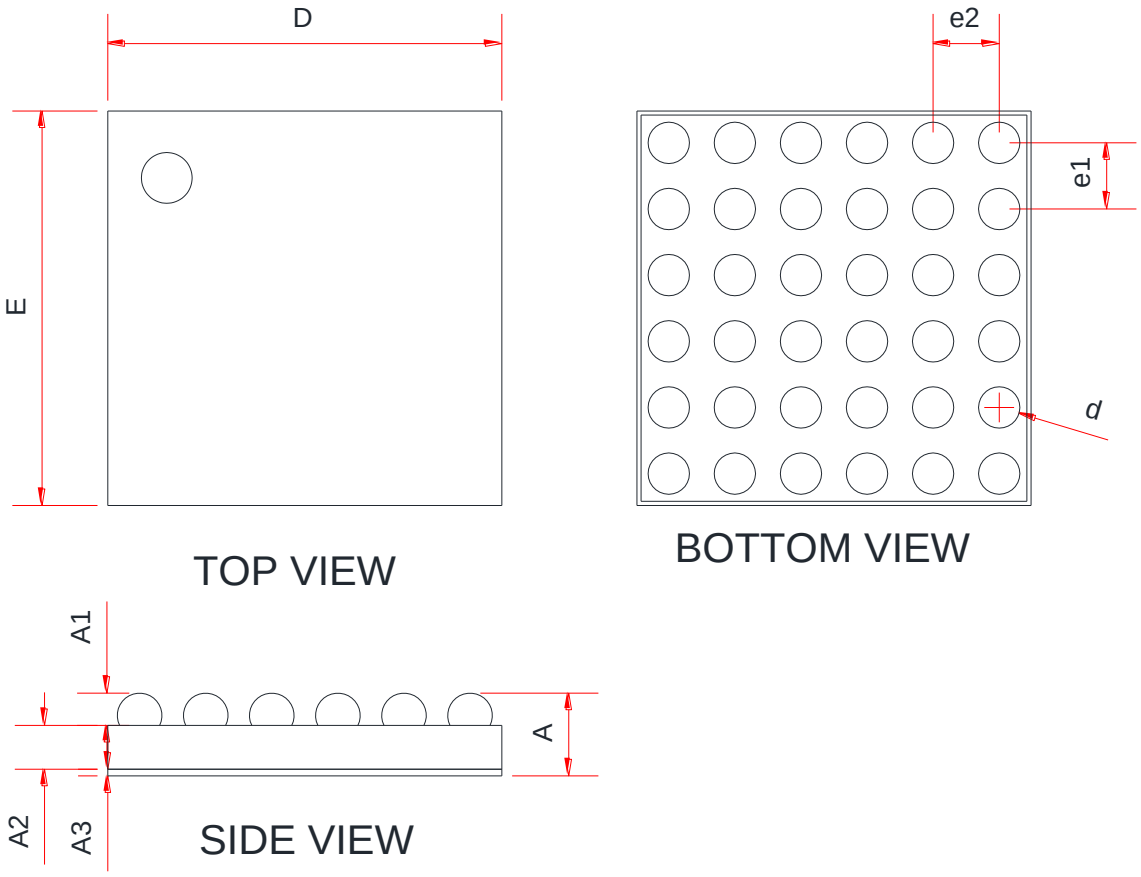
AC Electrical Characteristics(Ta=25°C, VCC=3.3V, unless otherwise noted)

Parameter	Symbol	Conditions	VCC	Min.	Typ.	Max.	Units
Initialization Time VCC to Output	T_{INIT}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		260		μs
			3.3		220		
			4.2		190		
			5		150		
Enable Time /OE to Output	T_{EN}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		230		μs
			3.3		170		
			4.2		150		
			5		130		
Disable Time /OE to Output	T_{DIS}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		230		ns
			3.3		110		
			4.2		90		
			5		80		
Turn-On Time SEL to Output	T_{ON}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		440		ns
			3.3		380		
			4.2		370		
			5		360		
Turn-Off Time SEL to Output	T_{OFF}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		320		ns
			3.3		300		
			4.2		290		
			5		280		

Break-Before-Make Time	T_{BBM}	RL=50Ω, CL=0pF, V_{SW}=0.6V V_{CC}=1.6~5V	1.6		230		ns
			3.3		190		
			4.2		180		
			5		180		
Propagation Delay	T_{PD}	RL=50Ω, CL=0pF V_{CC}=1.6~5V				0.25	ns
Off Isolation for MIPI	OIRR	RL=50Ω, f=1250MHz, /OE=HIGH, V_{SW}=0.2VPP V_{CC}=1.6~5V			-24		dB
Crosstalk for MIPI	X_{TALK}	RL=50Ω, f=1250MHz, SEL =HIGH, V_{SW}=0.2VPP			-30		dB
		RL=50Ω, f=1250MHz, SEL =LOW, V_{SW}=0.2VPP			-30		
-3dB Bandwidth	BW (Insertion Loss)	RL=50Ω, CL=0pF, V_{SW}=0.2VPP V_{CC}=1.6~5V			3000		MHz

PACKAGE OUTLINE DIMENSIONS

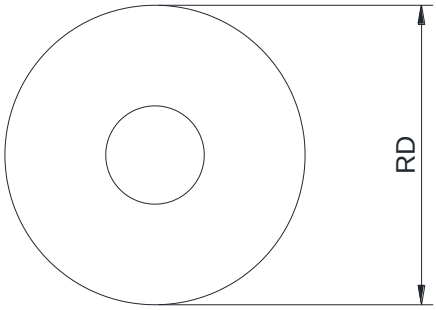
CSP-36L



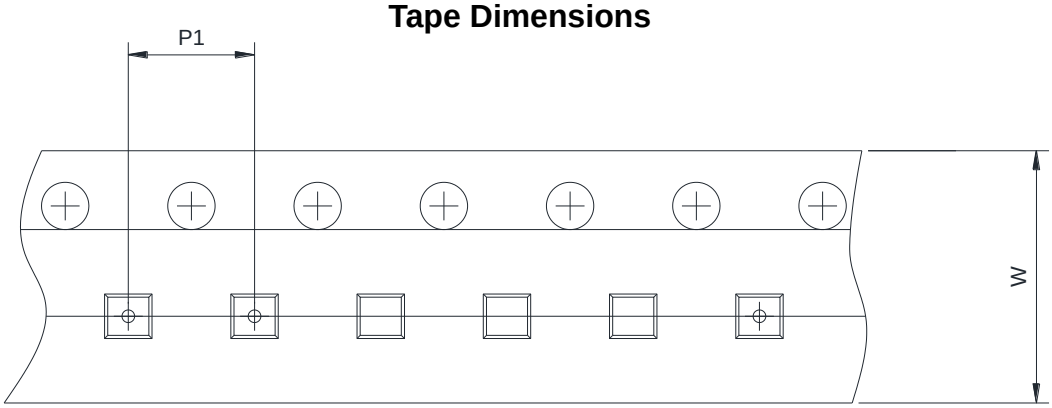
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.455	0.500	0.545
A1	0.175	0.195	0.215
A2	0.255	0.280	0.305
A3		0.025	
D	2.370	2.390	2.410
E	2.370	2.390	2.410
e1		0.400	
e2		0.400	
d	0.250	0.270	0.290

TAPE AND REEL INFORMATION

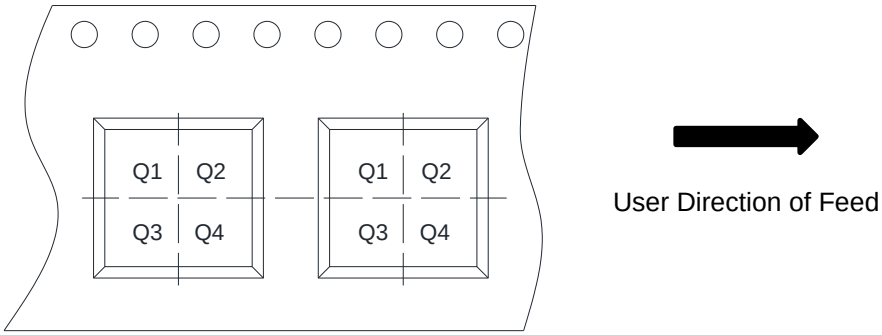
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☑ 7inch ☐ 13inch
W	Overall width of the carrier tape	☑ 8mm ☐ 12mm ☐ 16mm
P1	Pitch between successive cavity centers	☐ 2mm ☑ 4mm ☐ 8mm
Pin1	Pin1 Quadrant	☑ Q1 ☐ Q2 ☐ Q3 ☐ Q4