



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

FSA646

Description

The FSA646 is a four-data-lane D-PHY or three-data-lane C-PHY, MIPI switch. This single-pole, double-throw (SPDT) switch is optimized for switching between two high-speed or low-power MIPI sources. The FSA646 is designed for the MIPI specification and allows connection to a SCI or DSI module.

Features

Switch Type: SPDT (10x)

Signal Types:

MIPI, D-PHY & C-PHY

V_{CC}: 1.5 to 5.0 V

Input Signals: 0 to 1.3 V

R_{ON}:

6 Ω Typical HS MIPI

6 Ω Typical LP MIPI

ΔR_{ON}: 0.1 Ω Typical LP & HS MIPI

ΔR_{ON_FLAT}: 0.9 Ω Typical LP & HS MIPI

I_{CCZ}: 1 μA Maximum

I_{CC}: 32 μA Typical

O_{IRR}: -24 dB Typical

Bandwidth: 4.1 GHz Typical

Xtalk: -30 dB Typical

C_{ON}: 1.5 pF Typical

Skew (P), Skew (O): 6 ps Typical

This is a Pb-Free Device

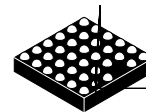
Applications

Cellular Phones, Smart Phones

Tablets

Laptops

Displays



WLCSP36, 2.43x2.43x0.4
CASE 567WJ

MARKING DIAGRAM

GS = Specific Device Code
KK = Assembly Lot
X = Year
Y = Work Week
Z = Assembly Location
J- = X- Coordinates with dash as separator*
P = Y Coordinates*
UU = Two Digit Wafer ID*
*For onsemi internal use only.

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.



Figure 1. Typical D-PHY Application

PIN DESCRIPTIONS



Figure 2. Analog Symbol

PIN DEFINITIONS



Figure 3. Top Through View

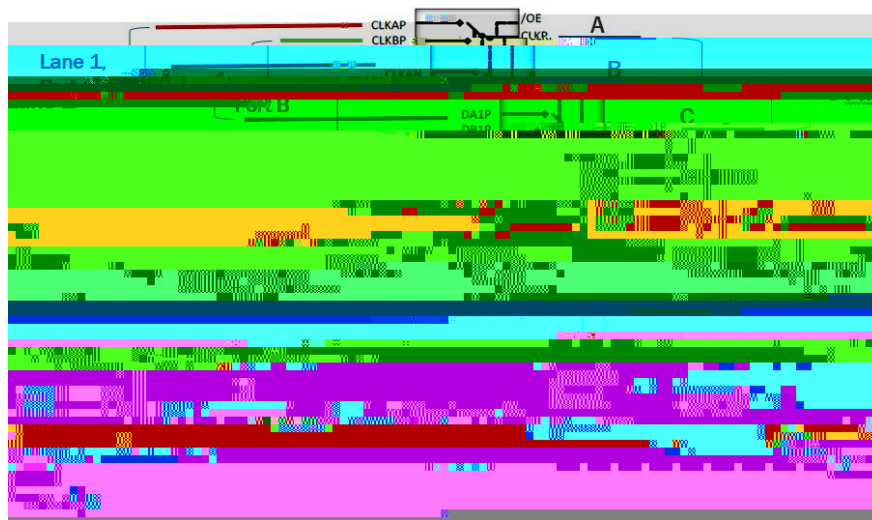


Figure 4. Recommended C-PHY Configuration

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Table 1. BALL-TO-PIN MAPPINGS

Ball	Pin Name	Ball	Pin Name	Ball	Pin Name
A1	V _{CC}	C1	DB3N	E1	DB1N
A2	GND	C2	DB3P	E2	DB1P
A3	DA4N	C3	NC	E3	DA1N
A4	DA4P	C4	NC	E4	DA1P
A5	/OE	C5	D3N	E5	D1N
A6	SEL	C6	D3P	E6	D1P
B1	DB4N	D1	DB2N	F1	CLKBN
B2	DB4P	D2	DB2P	F2	CLKBP
B3	DA3N	D3	DA2N	F3	CLKAN
B4	DA3P	D4	DA2P	F4	CLKAP
B5	D4N	D5	D2N	F5	CLKN
B6	D4P	D6	D2P	F6	CLKP

TRUTH TABLE

SEL	/OE	Function
LOW	LOW	CLK _P = CLKA _P , CLK _N = CLKA _N , Dn(P/N) = DAN(P/N)
HIGH	LOW	CLK _P = CLKB _P , CLK _N = CLKB _N , Dn(P/N) = DBn(P/N)
X	HIGH	Clock and Data Ports High Impedance

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	Supply Voltage	-0.5	6.0	V
V _{CNTRL}	DC Input Voltage (/OE, SEL) (Note 1)	-0.5	V _{CC}	V
V _{SW}	DC Switch I/O Voltage (Note 1,2)	-0.3	1.8	V
I _{IK}	DC Input Diode Current	-50		mA
I _{OUT}	DC Output Current		25	mA
T _{STG}	Storage Temperature	-65	+150	C
ESD	Human Body Model, JEDEC: JESD22-A114	All Pins	2.0	kV
	Charged Device Model, JEDEC: JESD22-C101		1.0	
	IEC 61000-4-2 System	Contact	8.0	
		Air Gap	15.0	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.
- V_{SW} refers to analog data switch paths.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit	
V _{CC}	Supply Voltage	1.5	5.0	V	
V _{CNTRL}	Control Input Voltage (SEL, /OE) (Note 3)	0	V _{CC}	V	
V _{SW}	Switch I/O Voltage (CLKn, Dn, CLKA _n , CLKB _n , DAN, DBn)	-HS Mode	0	0.3	V
		-LS Mode	0	1.3	V
T _A	Operating Temperature	-40	+85	C	

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

- The control inputs must be held HIGH or LOW; they must not float.

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DC AND TRANSIENT CHARACTERISTICS (T_A = 25 °C unless otherwise specified)

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
V _{IK}	Clamp Diode Voltage (/OE, SEL)	I _{IN} = -18 mA	1.5	-1.2		-0.6	V
V _{IH}	Input Voltage High	SEL, /OE	1.5 to 5	1.3			V
V _{IL}	Input Voltage Low	SEL, /OE	1.5 to 5			0.5	V
I _{IN}	Control Input Leakage (/OE, SEL)	V _{CTRL} = 0 to V _{CC}	5	-0.5		0.5	μA
I _{NO(OFF)} I _{NC(OFF)}	Off Leakage Current of Port CLKAn, Dan, CLKBn and DBn	V _{SW} = 0.0 DATA 1.3 V	5	-0.5		0.5	μA
I _{A(ON)}	ON Leakage Current of Common Ports (CLKn, Dn)	V _{SW} = 0.0 DATA 1.3 V	5	-0.5		0.5	μA
I _{OFF}	Power-Off Leakage Current (All I/O Ports)	V _{SW} = 0.0 or 1.3 V	0	-0.5		0.5	μA
I _{OZ}	Off-State Leakage	V _{SW} = 0.0 DATA 1.3 V /OE = High	5	-0.5		0.5	μA
R _{ON_MIPi_HS}	Switch On Resistance for HS MIPI Applications (Note 4)	I _{ON} = -8 mA, /OE = 0 V, SEL = V _{CC} or 0 V, CLKA, CLKB, DB _N or DA _N = 0.2 V	1.5		6		Ω
			2.5				
			3.3				
			5				
R _{ON_MIPi_LP}	Switch On Resistance for LP MIPI Applications (Note 4)	I _{ON} = -8 mA, /OE = 0 V, SEL = V _{CC}					

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DC AND TRANSIENT CHARACTERISTICS ($T_A = 25$ C unless otherwise specified) (continued)

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = -40$ to $+85^\circ\text{C}$			Unit
				Min.	Typ.	Max.	

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CAPACITANCE

Symbol	Parameter	Conditions	T _A = -40 to +85°C			Unit
			Min.	Typ.	Max.	
C _{IN}	Control Pin Input Capacitance (Note 7)	V _{CC} = 0 V, f = 1 MHz		2.1		pF
C _{ON}	On Capacitance (Note 7)	V _{CC} = 3.3 V, /OE = 0 V, f = 1250 MHz (in HS common value)		1.5		
C _{OFF}	On Capacitance (Note 7)	V _{CC} and /OE = 3.3 V, f = 1250 MHz (both sides in HS common value)		0.9		

7. Guaranteed by characterization.

The table below pertains to the Packaging information on the following page.

ORDERING INFORMATION

Part Number	Top Marking	Package	Top Mark
FSA646UCX	-40 to +85 C	36-Ball WLCSP, Non-JEDEC 2.43 x 2.43 mm, 0.4 mm Pitch	GS

WLCSP36 2.43x2.43x0.488
CASE 567WJ
ISSUE A

DATE 03 OCT 2018

EXTENSION: MILLIMETER.
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