



Is Now Part of



ON Semiconductor®

**To learn more about ON Semiconductor, please visit our website at
www.onsemi.com**

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



September 2016

FSA660—2:1 MIPI C-PHY (5.7 Gbps) 1-Data Lane Switch

Features

- Switch Type: SPDT(3x)
- Signal Types:
 - MIPI, C-PHY
- V_{CC} : 1.5 to 5.0 V
- Input Signals: 0 to 2.1 V
- R_{ON} : 5.4 Ω Typical
- ΔR_{ON} : 0.1 Ω Typical
- R_{ON_FLAT} : 0.9 Ω Typical
- I_{CCZ} : 1 μ A Maximum
- I_{CC} : 12 μ A Typical
- O_{IRR} : -28 dB Typical
- Bandwidth: 5G Hz Typical
- I_L : -1.0 dB Typical
- Xtalk: -44 dB Typical
- C_{ON} : 0.8 pF Typical

Description

The FSA660 is a one-data-lane MIPI, C-PHY switch. This Single-Pole, Double-Throw (SPDT) switch is optimized for switching between two high-speed or low-power MIPI sources. The FSA660 is designed for the MIPI specification and allows connection to a CSI or DSI module.

Applications

- Smart phones
- Tablets
- Laptops
- Displays

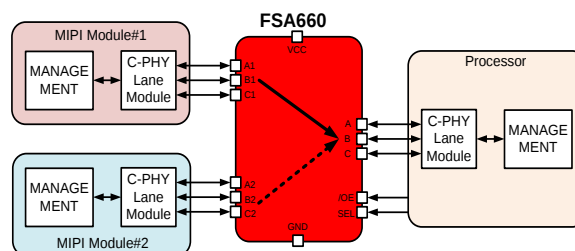


Figure 1. Typical Application

Ordering Information

Part Number	Operating Temperature Range	Package	Top Mark
FSA660TMX	-40 to +85°C	18-Lead, Quad, Ultra-ultrathin Molded Leadless Package (TMLP), 2.0 mm x 2.8 mm x 0.375 mm	LS

Pin Descriptions

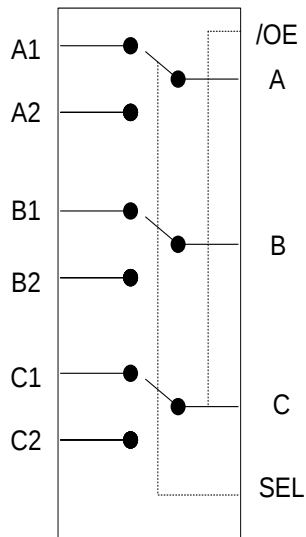


Figure 2. Analog Symbol

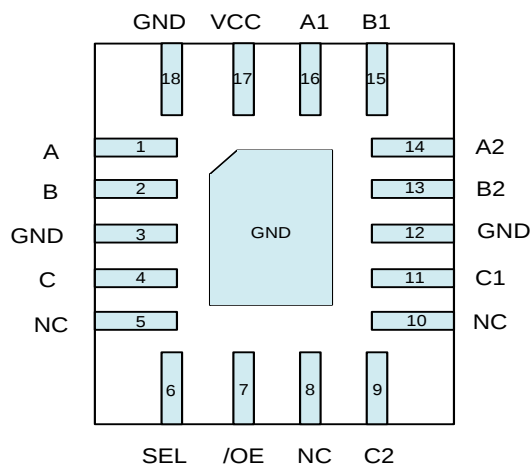


Figure 3. Pin Assignment (Top Through View)

Pin Definitions

Pin Name	Description		
A1	1-Side Data Path A		
B1	1-Side Data Path B		
C1	1-Side Data Path C		
A2	2-Side Data Path A		
B2	2-Side Data Path B		
C2	2-Side Data Path C		
A	Common Data Path A		
B	Common Data Path B		
C	Common Data Path C		
/OE	Output Enable		
SEL	Control Pin	SEL=0	A=A1,B=B1,C=C1
		SEL=1	A=A2,B=B2,C=C2
VCC	Power		
GND	Ground		
NC	No Connect		

Truth Table

SEL	/OE	Function
HIGH	LOW	A=A2,B=B2,C=C2
LOW	LOW	A=A1,B=B1,C=C1
X	HIGH	A,B,C Data Ports High Impedance

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V _{CC}	Supply Voltage		-0.5	6.0	V
V _{CNTRL}	DC Input Voltage (SEL, /OE) ⁽¹⁾		-0.5	V _{CC}	V
V _{SW}	DC Switch I/O Voltage ^(1,2)		-0.3	2.1	V
I _{IK}	DC Input Diode Current		-50		mA
I _{SW}	DC Switch Current			25	mA
T _{STG}	Storage Temperature		-65	+150	°C
MSL	Moisture Sensitivity Level (JEDEC J-STD-020A)			1	
ESD	Human Body Model, JEDEC: JESD22-A114	All Pins	2		kV
	IEC 61000-2-4, Level 4, for Switch Pins	Contact	8		
		Air	15		
	Charged Device Model, JESD22-C101		1		

Notes:

- 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

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter		Min.	Max.	Unit
V _{CC}	Supply Voltage		1.5	5.0	V
V _{CNTRL}	Control Input Voltage (SEL, /OE) ⁽³⁾		0	5.0	V
V _{SW}	Switch I/O Voltage	HS Mode	0	0.54	V
		LP Mode	0	1.3	
T _A	Operating Temperature		-40	+85	°C

Note:

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

DC and Transient Characteristics

All typical values are at $T_A=25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			Unit
				Min.	Typ.	Max.	
V_{IK}	Clamp Diode Voltage SEL, /OE	$I_{IN} = -18\text{ mA}$	1.5	-1.2		-0.6	V
I_{IK}	Clamp Diode Current (Switch Pins)	$V_{IN} = -0.3\text{ V}$	0			18	μA
V_{IH}	Control Input Voltage High	SEL, /OE	1.5	1.3			V
		SEL, /OE	3.6	1.4			V
		SEL, /OE	5.0	1.5			V
V_{IL}	Control Input Voltage Low	SEL, /OE	1.5			0.4	V
		SEL, /OE	3.6			0.4	V
		SEL, /OE	5.0			0.4	V
I_{IN}	Control Input Leakage	$V_{SW} = 0\text{ to } 2.0\text{ V}$ $V_{CNTRL} = 0\text{ to } V_{CC}$	5.0	-500		500	nA
I_{OZ}	Off-State Leakage for Open Data Paths	$V_{SW} = 0.0 \leq \text{DATA} \leq 2.0\text{ V}$	5.0	-500		500	nA
I_{CL}	On-State Leakage for Closed Data Paths ⁽⁴⁾	$V_{SW} = 0.0 \leq \text{DATA} \leq 2.0\text{ V}$	5.0	-500		500	nA
I_{OFF}	Power-Off Leakage Current (All I/O Ports)	$V_{SW} = 0.0\text{ V to } 2.0\text{ V}$	0	-500		500	nA
R_{ON}	Switch On Resistance	$V_{SW} = 0\text{ V}$, $I_{ON} = -8\text{ mA}$	1.5		5.4	8.0	Ω
ΔR_{ON}	Difference in R_{ON} Between Positive-Negative	$V_{SW} = 0\text{ V}$, $I_{ON} = -8\text{ mA}$,	1.5		0.1		Ω
R_{ON_FLAT}	Flatness for R_{ON}	$V_{SW} = 0 \leq \text{DATA} \leq 2.0\text{ V}$, $I_{ON} = -8\text{ mA}$	1.5		0.9		Ω
I_{CC}	Quiescent Supply Current	$V_{IOE} = 0$, $V_{SEL} = 0\text{ or } V_{CC}$, $I_{OUT} = 0$	5.0		12	30	μA
I_{CCZ}	Quiescent Supply Current (High Impedance)	$V_{SEL} = X$, $V_{IOE} = V_{CC}$, $I_{OUT} = 0$	5.0			1	μA
I_{CCT}	Increase in Quiescent Supply Current	$V_{SEL} = X$, $V_{IOE} = 1.5\text{ V}$	5.0		5	15	μA

Note:

4. For this test, the data switch is closed with the respective switch pin floating.

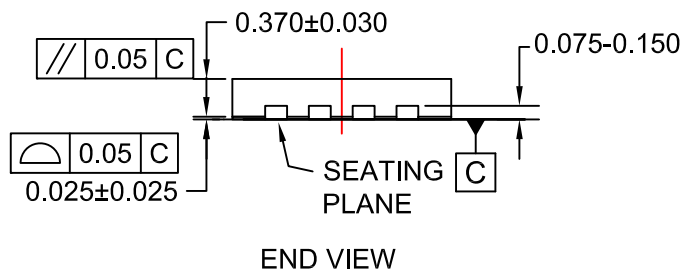
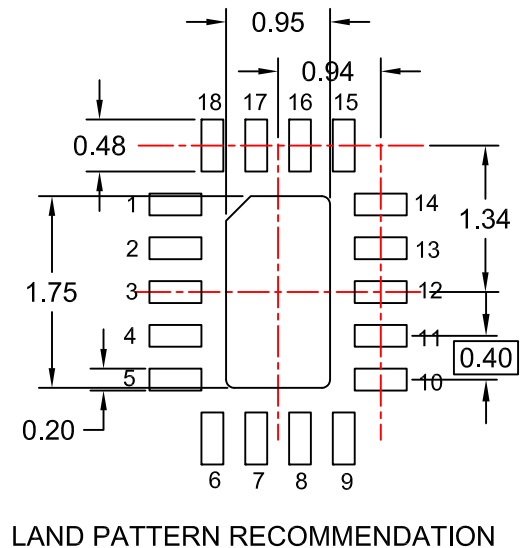
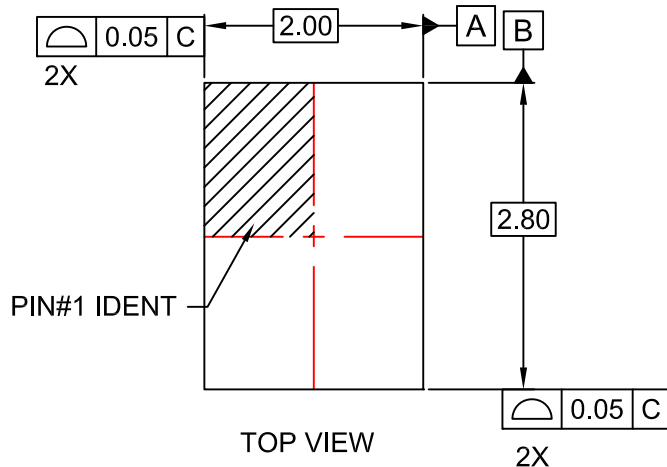
AC Electrical Characteristics

All typical value are for $V_{CC} = 3.6\text{ V}$ and $T_A = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$			Unit
				Min.	Typ.	Max.	
t_{ON}	Turn-On Time, SEL to Output	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, $V_{SW} = 0\text{ V}$, $V_{SW} = 0.6\text{ V}$	1.5 to 5.0 V		350	600	ns
t_{OFF}	Turn-Off Time, SEL to Output	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, $V_{SW} = 0\text{ V}$, $V_{SW} = 3.3\text{ V}$	1.5 to 5.0 V		125	300	ns
t_{PD}	Propagation Delay ⁽⁵⁾	$C_L =$, $C_L = 0\text{ pF}$, $R_L = 50\ \Omega$,	1.5 to 5.0 V		0.25		ns
t_{BBM}	Break-Before-Make ⁽⁵⁾	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, $V_{SW1} = 0.6\text{ V}$, $V_{SW2} = -0.6\text{ V}$,	1.5 to 5.0 V	100		350	ns
t_{PEN}	Enable Time, /OE to Output	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, $V_{SW} = 0.6\text{ V}$	1.5 to 5.0 V		60	150	μs
t_{PDISEN}	Disable Time, /OE to Output	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, $V_{SW} = 0.6\text{ V}$	1.5 to 5.0 V		35	240	ns
O_{IRR}	Off Isolation ⁽⁵⁾	$V_S = 0\text{ dBm}$, $R = 50\ \Omega$, $f = 2.5\text{ GHz}$	3.6 V		-28		dB
Xtalk	Channel Crosstalk ⁽⁵⁾	$V_S = 0\text{ dBm}$, $R = 50\ \Omega$, $f = 2.5\text{ GHz}$	3.6 V		-44		dB
IL	Insertion Loss ⁽⁵⁾	$V_S = 0\text{ dBm}$, $f = 2.5\text{ GHz}$, $R_L = 50\ \Omega$, $C_L = 0\text{ pF}$	3.6V		-1.0		dB
BW	-3 db Bandwidth ⁽⁵⁾	$V_{IN} = 1\text{ V}_{pk-pk}$, $R_L = 50\ \Omega$, $C_L = 0\text{ pF}$ (All Data Paths)	3.6 V		5		GHz
$t_{SK(P)}$	Skew of Transitions of the Output ⁽⁵⁾	$R_{PU} = 50\ \Omega$ to V_{CC} , $f = 2.5\text{ GHz}$, $C_L = 0\text{ pF}$	3.6 V		6		ps
C_{IN}	Control Pin Input Capacitance ⁽⁵⁾	$V_{CC} = 0\text{ V}$, $f = 1\text{ MHz}$			2.7		pF
C_{ON}	On Capacitance ⁽⁵⁾	$V_{CC} = 3.3\text{ V}$, $f = 2.5\text{ GHz}$			0.8		pF
C_{OFF}	Off Capacitance ⁽⁵⁾	$V_{CC} = 3.3\text{ V}$, $f = 2.5\text{ GHz}$			0.6		pF

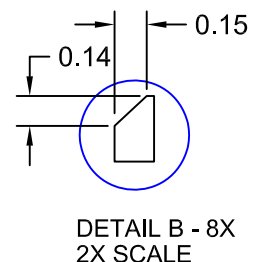
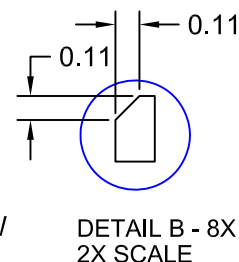
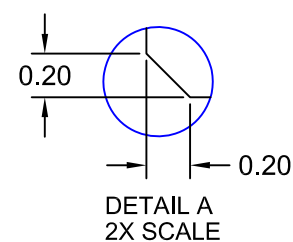
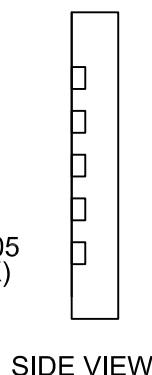
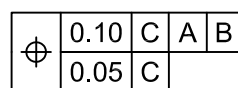
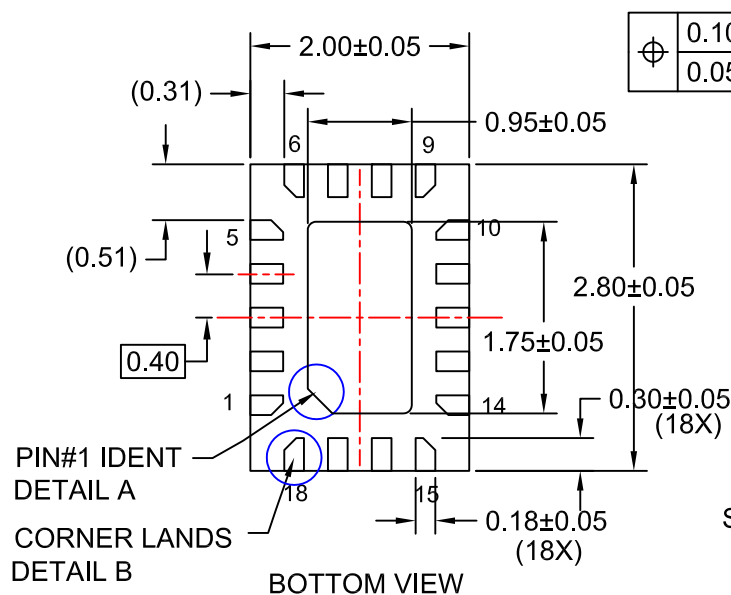
Note:

5. Guaranteed by characterization and design. Not production tested.



NOTES:

- A. NO INDUSTRY STANDARD APPLIES.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS A FAIRCHILD DESIGN.
- E. DRAWING FILENAME: MKT-TMLP18Arev2



LEADTIP SHAPE VARIATION BY SUPPLIER



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative