



**THE DATASHEET OF  
FSA1208BQX**





ON Semiconductor®

# FSA1208

## Low-Power, Eight-Port, High-Speed Isolation Switch

### Features

- Low On Capacitance: 6 pF Typical
- Low On Resistance: 15 Ω Typical
- Low Power Consumption: 1 A Maximum
- 10 μA Maximum I<sub>CC</sub>T over an Expanded Voltage Range (V<sub>IN</sub>=2.3 V, V<sub>CC</sub>=4.3 V)
- Wide -3 dB Bandwidth: > 400 MHz
- Packaged in Space-Saving 20-Lead MLP (2.5 x 4.5 mm)
- 7.5 kV ESD Rating; >16 kV Power/GND ESD Rating
- Low C<sub>OFF</sub> Capacitance: 2.5 pF Typical

### Applications

- DIMM DDR Memory

### Description

The FSA1208 is a low-power, eight-port, high-speed switch. This part is configured as a single-pole, single-throw switch and is optimized for isolating a high-speed source, such as a DDR memory bus. The FSA1208 features an extremely low on capacitance (C<sub>ON</sub>) of 6 pF. Superior channel-to-channel crosstalk minimizes interference.

The FSA1208 contains special circuitry on the A & B pins that allows the device to withstand an over-voltage condition. This device is also designed to minimize current consumption even when the control voltage applied to the /OE pin is lower than the supply voltage (V<sub>CC</sub>). Applications include port isolation and switching in DDR memory modules, portable cell phones, PDAs, digital cameras, printers, and notebook computers.

### Ordering Information

Part Number	Top Mark	Operating Temperature Range	Package
FSA1208BQX	F1208	-40 to +85°C	20-Lead, Quad, Molded Leadless Package (MLP), 2.5 x 4.5 mm

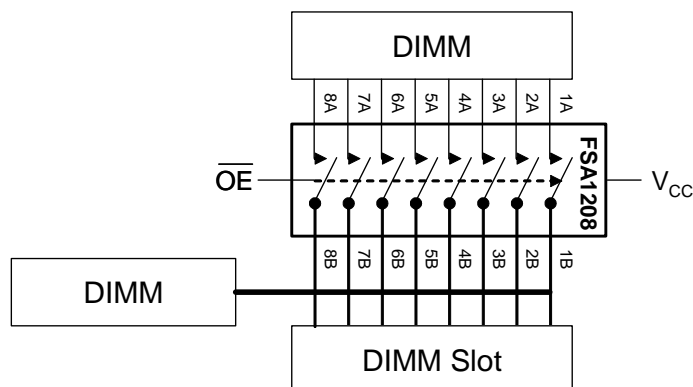


Figure 1. Analog Symbol

## Pin Configurations

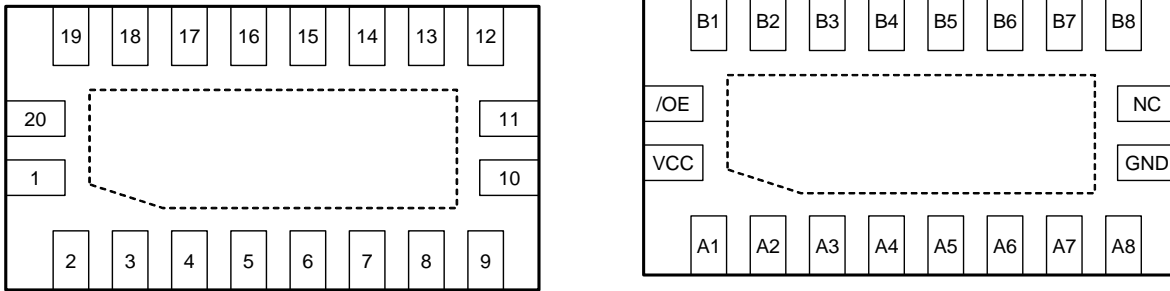


Figure 2. Pin Assignments for MLP (Top Through View)

## Pin Definitions

Pin #	Name	Description
20	/OE	Switch Enable
2-9	A1-A8	A Side of Bus
12-19	B8-B1	B Side of Bus
11	NC	No Connection
1	VCC	Power
10	GND	Ground

## Truth Table

/OE	Function
HIGH	Disconnect
LOW	A1-A8=B1-B8

## 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	-0.50	+5.25	V	
$V_{CNTRL}$	DC Input Voltage (/OE) <sup>(1)</sup>	-0.50	$V_{CC}$	V	
$V_{SW}$	DC Switch I/O Voltage <sup>(1)</sup>	-0.50	5.25	V	
$I_{IK}$	DC Input Diode Current	-50		mA	
$I_{OUT}$	DC Output Current		50	mA	
$T_{STG}$	Storage Temperature	-65	+150	°C	
ESD	Human Body Model, JEDEC: JESD22-A114	All Pins		7.5	kV
		I/O to GND		8	
		Power to GND		16	
	Charged Device Model, JEDEC: JESD22-C101			2	

**Note:**

- The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.

## 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. ON Semiconductor does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Unit
$V_{CC}$	Supply Voltage	2.3	4.3	V
$V_{CNTRL}^{(2)}$	Control Input Voltage (S, /OE)	0	$V_{CC}$	V
$V_{SW}$	Switch I/O Voltage	-0.5	$V_{CC}$	V
$T_A$	Operating Temperature	-40	+85	°C

**Note:**

- The control input must be held HIGH or LOW; it must not float.

## DC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> =- 40°C to +85°C			Units
				Min.	Typ.	Max.	
V <sub>IK</sub>	Clamp Diode Voltage	I <sub>IN</sub> =18 mA	2.5			-1.2	V
V <sub>IH</sub>	Input Voltage High		2.3 to 3.6	1.3			V
			4.3	1.7			V
V <sub>IL</sub>	Input Voltage Low		2.3 to 3.6			0.5	V
			4.3			0.7	V
I <sub>IN</sub>	Control Input Leakage	V <sub>SW</sub> =0 to V <sub>CC</sub>	4.3	-1		1	μA
I <sub>OZ</sub>	Off State Leakage	0 ≤ A, B ≤ 3.6 V	4.3	-2		2	μA
R <sub>ON</sub>	Switch On Resistance <sup>(3)</sup>	V <sub>SW</sub> =0 V, I <sub>ON</sub> =-10 mA Figure 3	2.5		7		Ω
		V <sub>SW</sub> =1.8 V, I <sub>ON</sub> =-10 mA Figure 3	2.5		15		Ω
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> =0 or V <sub>CC</sub> , I <sub>OUT</sub> =0	4.3			1	μA
I <sub>CC</sub> T	Increase in I <sub>CC</sub> Current Per Control Voltage and V <sub>CC</sub>	V <sub>IN</sub> =1.8 V	2.7			10	μA

### Note:

3. Measured by the voltage drop between A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltage on the two (A or B) ports).

## AC Electrical Characteristics

All typical values are for V<sub>CC</sub>=2.5 V at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> =- 40°C to +85°C			Units
				Min.	Typ.	Max.	
t <sub>on</sub>	Turn-On Time, /OE to Output	R <sub>L</sub> =50 Ω, C <sub>L</sub> =5 pF V <sub>SW</sub> =1.8 V Figure 4, Figure 5	2.3 to 3.6		15	34	ns
t <sub>off</sub>	Turn-Off Time, /OE to Output	R <sub>L</sub> =50 Ω, C <sub>L</sub> =5 pF V <sub>SW</sub> =1.8 V Figure 4, Figure 5	2.3 to 3.6		12	25	ns
t <sub>ad</sub>	Propagation Delay <sup>(4)</sup>	R <sub>L</sub> =50 Ω, C <sub>L</sub> =5 pF Figure 4, Figure 6	3.3		0.35		ns
O <sub>IRR</sub>	Off Isolation	R <sub>L</sub> =50 Ω, f=400 MHz Figure 11	2.3 to 3.6		-40		dB
Xtalk	Non-Adjacent Channel Crosstalk	R <sub>L</sub> =50 Ω, f=100 MHz Figure 12	2.3 to 3.6		-40		dB
BW	-3dB Bandwidth	R <sub>L</sub> =50 Ω, C <sub>L</sub> =0 pF Figure 10	2.3 to 3.6		1000		MHz
		R <sub>L</sub> =50 Ω, C <sub>L</sub> =5 pF Figure 10			750		MHz

### Note:

4. Guaranteed by characterization.

### High-Speed-Related AC Electrical Characteristics

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> =- 40°C to +85°C			Units
				Min.	Typ.	Max.	
t <sub>SK(O)</sub>	Channel-to-Channel Skew <sup>(5)</sup>	C <sub>L</sub> =5 pF	3.3		40	80	ps
t <sub>SK(P)</sub>	Skew of Opposite Transitions of the Same Output <sup>(5)</sup>	C <sub>L</sub> =5 pF	3.3		15	40	ps
t <sub>SK(PKG)</sub>	Package-to-Package Skew <sup>(5)</sup>	C <sub>L</sub> =5 pF	3.3		60	100	ps

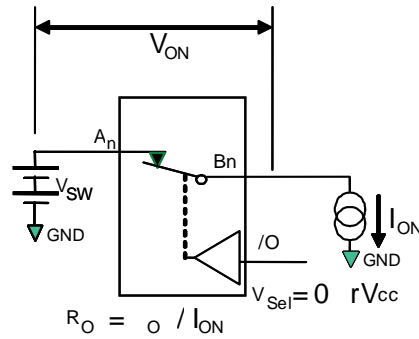
**Note:**

5. Guaranteed by characterization.

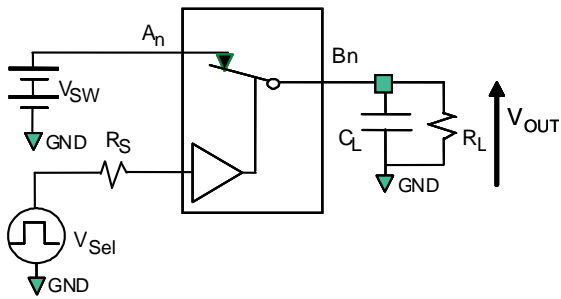
### Capacitance

Symbol	Parameter	Conditions	T <sub>A</sub> =- 40°C to +85°C			Units
			Min.	Typ.	Max.	
C <sub>IN</sub>	Control Pin Input Capacitance	V <sub>CC</sub> =0.2 V, f=1 MHz		2.0		pF
C <sub>ON</sub>	D+/D- On Capacitance	V <sub>CC</sub> =2.5 V, /OE=0 V, f=1 MHz Figure 9		6.0		
C <sub>OFF</sub>	D1n, D2n Off Capacitance	V <sub>CC</sub> and /OE=2.5 V, f=1 MHz Figure 8		2.5		

## Test Diagrams

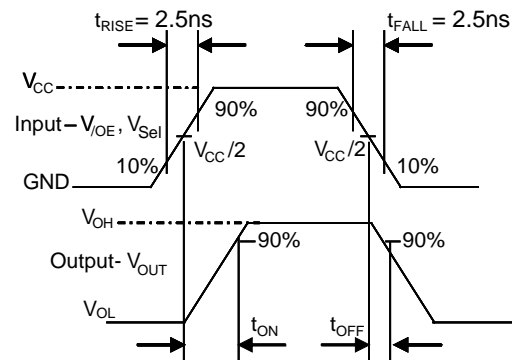


**Figure 3. On Resistance**

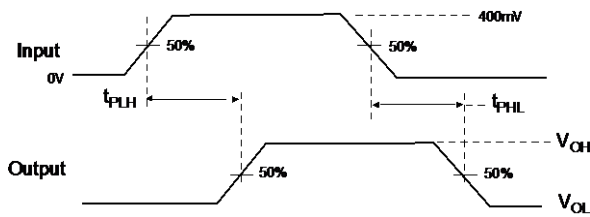


$R_L$ ,  $R_S$ , and  $C_L$  are functions of the application environment (see AC tables for specific values).  $C_L$  includes test fixture and stray capacitance.

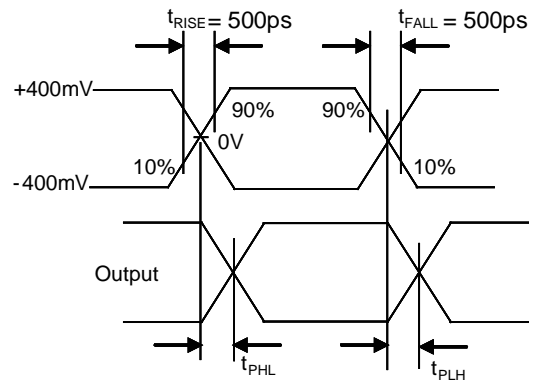
**Figure 4. AC Test Circuit Load**



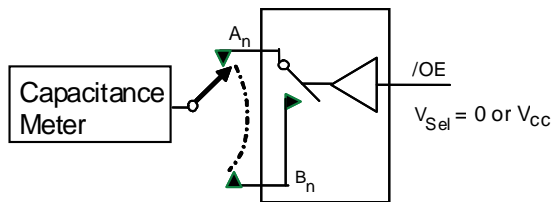
**Figure 5. Turn-On / Turn-Off Waveforms**



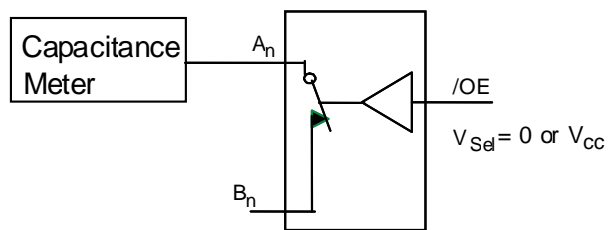
**Figure 6. Propagation Delay**  
( $t_{r, t_o} = 500ps$ )



**Figure 7. Intra-Pair Skew Test  $t_{SK}(P)$**

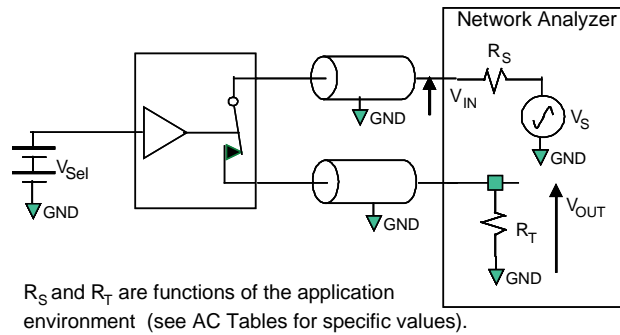


**Figure 8. Channel Off Capacitance**

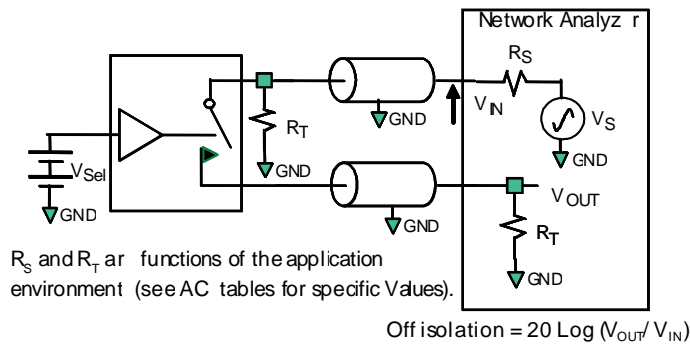


**Figure 9. Channel On Capacitance**

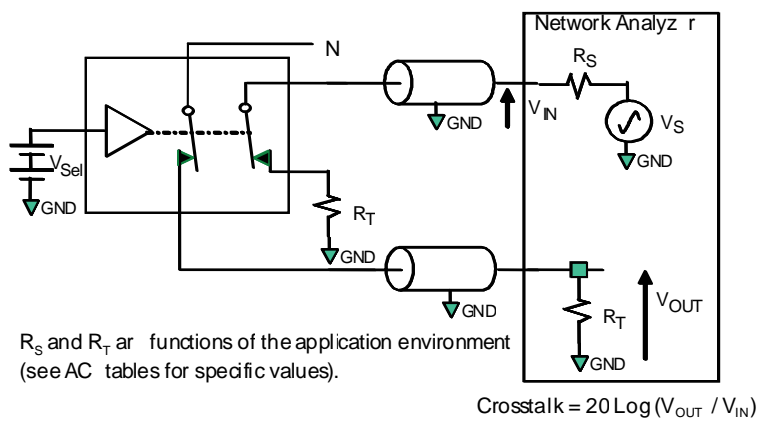
**Test Diagrams** (Continued)



**Figure 10. Bandwidth**



**Figure 11. Channel Off Isolation**



**Figure 12. Non-Adjacent Channel-to-Channel Crosstalk**



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](http://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](mailto: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](http://www.onsemi.com)

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

For additional information, please contact your local  
Sales Representative

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View FSA1208BQX on WIN SOURCE](#)
- ⊖ [Fairchild/ON Semiconductor Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management