



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.



FSA2567 — Low-Power, Dual SIM Card Analog Switch

Features

- Low On Capacitance for Data Path: 10 pF Typical
- Low On Resistance for Data Path: 6 Ω Typical
- Low On Resistance for Supply Path: 0.4 Ω Typical
- Wide V_{CC} Operating Range: 1.65 V to 4.3 V
- Low Power Consumption: 1 μA Maximum
 - 15 μA Maximum I_{CCT} Over Expanded Voltage Range ($V_{IN}=1.8$ V, $V_{CC}=4.3$ V)
- Wide -3 db Bandwidth: > 160 MHz
- Packaged in:
 - Pb-free 16-Lead MLP & 16-Lead UMLP
- 3 kV ESD Rating, >12 kV Power/GND ESD Rating

Applications

- Cell phone, PDA, Digital Camera, and Notebook
- LCD Monitor, TV, and Set-Top Box

Description

The FSA2567 is a bi-directional, low-power, dual double-pole, double-throw (4PDT) analog switch targeted at dual SIM card multiplexing. It is optimized for switching the WLAN-SIM data and control signals and dedicates one channel as a supply-source switch.

The FSA2567 is compatible with the requirements of SIM cards and features a low on capacitance (C_{ON}) of 10 pF to ensure high-speed data transfer. The V_{SIM} switch path has a low R_{ON} characteristic to ensure minimal voltage drop in the dual SIM card supply paths.

The FSA2567 contains special circuitry that minimizes current consumption when the control voltage applied to the SEL pin is lower than the supply voltage (V_{CC}). This feature is especially valuable in ultra-portable applications, such as cell phones; allowing direct interface with the general-purpose I/Os of the baseband processor. Other applications include switching and connector sharing in portable cell phones, PDAs, digital cameras, printers, and notebook computers.

Ordering Information

Part Number	Top Mark	Operating Temperature Range	Package
FSA2567MPX	FSA2567	-40 to +85°C	16-Lead, Molded Leadless Package (MLP) Quad, JEDEC MO-220, 3 mm Square
FSA2567UMX	GX		16-Lead, Quad, Ultrathin Molded Leadless Package (UMLP), 1.8 x 2.6 mm

For Fairchild's definition of Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

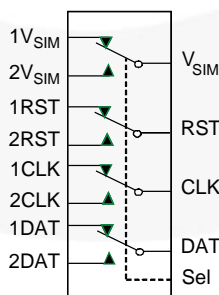


Figure 1. Analog Symbol

Pin Assignments

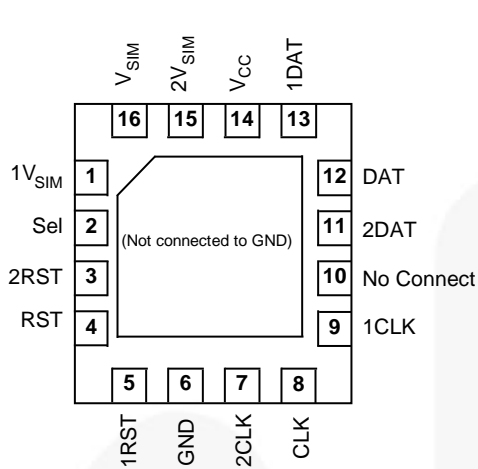


Figure 2. Pad Assignment MLP16 (Top Through View)

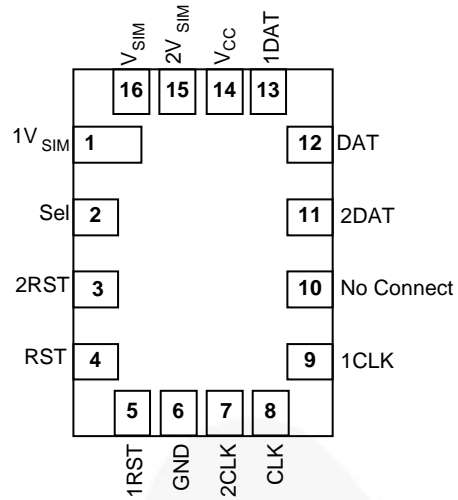


Figure 3. Pad Assignment UMLP16 (Top Through View)

Pin Definitions

Pin	Description
nDAT, nRST, nCLK	Multiplexed Data Source Inputs
nV _{SIM}	Multiplexed SIM Supply Inputs
V _{SIM} , DAT, RST, CLK	Common SIM Ports
Sel	Switch Select

Truth Table

Sel	Function
Logic LOW	1DAT = DAT, 1RST = RST, 1CLK = CLK, 1V _{SIM} = V _{SIM}
Logic HIGH	2DAT = DAT, 2RST = RST, 2CLK = CLK, 2V _{SIM} = V _{SIM}

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	+5.5	V
V_{CNTRL}	DC Input Voltage (Sel) ⁽¹⁾	-0.5	V_{CC}	V
V_{SW}	DC Switch I/O Voltage ⁽¹⁾	-0.5	$V_{CC} + 0.3$	V
I_{IK}	DC Input Diode Current	-50		mA
I_{SIM}	DC Output Current - V_{SIM}		350	mA
I_{OUT}	DC Output Current – DAT, CLK, RST		35	mA
T_{STG}	Storage Temperature	-65	+150	°C
ESD	Human Body Model, JEDEC: JESD22-A114	All Pins	3	kV
		I/O to GND	12	
	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. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	1.65	4.30	V
V_{CNTRL}	Control Input Voltage (Sel) ⁽²⁾	0	V_{CC}	V
V_{SW}	Switch I/O Voltage	-0.5	V_{CC}	V
I_{SIM}	DC Output Current - V_{SIM}		150	mA
I_{OUT}	DC Output Current – DAT, CLK, RST		25	mA
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, 3.3 V V_{CC} unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			Units
				Min.	Typ.	Max.	
V_{IK}	Clamp Diode Voltage	$I_{IN} = -18 \text{ mA}$	2.7			-1.2	V
V_{IH}	Input Voltage High		1.65 to 2.3	1.1			V
			2.7 to 3.6	1.3			
			4.3	1.7			
V_{IL}	Input Voltage Low		1.65 to 2.3			0.4	V
			2.7 to 3.6			0.5	
			4.3			0.7	
I_{IN}	Control Input Leakage	$V_{SW} = 0 \text{ to } V_{CC}$	4.3	-1		1	μA
$I_{nc(off)}, I_{no(off)}$	Off State Leakage	$nRST, nDAT, nCLK, nV_{SIM} = 0.3 \text{ V}$ or 3.6 V Figure 10	4.3	-60		60	nA
R_{OND}	Data Path Switch On Resistance ⁽³⁾	$V_{SW} = 0, 1.8 \text{ V}, I_{ON} = -20 \text{ mA}$ Figure 9	1.8		7.0	12.0	Ω
			$V_{SW} = 0, 2.3 \text{ V}, I_{ON} = -20 \text{ mA}$ Figure 9	2.7		6.0	
R_{ONV}	V_{SIM} Switch On Resistance ⁽³⁾	$V_{SW} = 0, 1.8 \text{ V}, I_{ON} = -100 \text{ mA}$ Figure 9	1.8		0.5	0.7	Ω
			$V_{SW} = 0, 2.3 \text{ V}, I_{ON} = -100 \text{ mA}$ Figure 9	2.7		0.4	
ΔR_{OND}	Data Path Delta On Resistance ⁽⁴⁾	$V_{SW} = 0 \text{ V}, I_{ON} = -20 \text{ mA}$	2.7		0.2		Ω
I_{CC}	Quiescent Supply Current	$V_{CTRL} = 0 \text{ or } V_{CC}, I_{OUT} = 0$	4.3			1.0	μA
I_{CCT}	Increase in I_{CC} Current Per Control Voltage and V_{CC}	$V_{CTRL} = 2.6 \text{ V}, V_{CC} = 4.3 \text{ V}$	4.3		5.0	10.0	μA
		$V_{CTRL} = 1.8 \text{ V}, V_{CC} = 4.3 \text{ V}$	4.3		7.0	15.0	μA

Notes:

3. Measured by the voltage drop between nDAT, nRST, nCLK and relative common port pins at the indicated current through the switch. On resistance is determined by the lower of the voltage on the relative ports.
4. Guaranteed by characterization.

AC Electrical Characteristics

All typical value are for $V_{CC}=3.3V$ at $25^{\circ}C$ unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A=-40^{\circ}C$ to $+85^{\circ}C$			Units
				Min.	Typ.	Max.	
t_{OND}	Turn-On Time Sel to Output (DAT,CLK,RST)	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW} = 1.5$ V Figure 11, Figure 12	$1.8^{(5)}$		65	95	ns
			2.7 to 3.6		42	60	ns
t_{OFFD}	Turn-Off Time Sel to Output (DAT,CLK,RST)	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW} = 1.5$ V Figure 11, Figure 12	$1.8^{(5)}$		30	50	ns
			2.7 to 3.6		20	40	ns
t_{ONV}	Turn-On Time Sel to Output (V_{SIM})	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW} = 1.5$ V Figure 11, Figure 12	$1.8^{(5)}$		55	80	ns
			2.7 to 3.6		35	55	ns
t_{OFFV}	Turn-Off Time Sel to Output (V_{SIM})	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW} = 1.5$ V Figure 11, Figure 12	$1.8^{(5)}$		35	50	
			2.7 to 3.6		22	40	ns
t_{PD}	Propagation Delay ⁽⁵⁾ (DAT,CLK,RST)	$C_L = 35$ pF, $R_L = 50 \Omega$ Figure 11, Figure 13	3.3		0.25		ns
t_{BBMD}	Break-Before-Make ⁽⁵⁾ (DAT,CLK,RST)	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW1} = V_{SW2} = 1.5$ V Figure 15	2.7 to 3.6	3	18		ns
t_{BBMV}	Break-Before-Make ⁽⁵⁾ (V_{SIM})	$R_L = 50 \Omega$, $C_L = 35$ pF $V_{SW1} = V_{SW2} = 1.5$ V Figure 15	2.7 to 3.6	3	12		ns
Q	Charge Injection (DAT,CLK,RST)	$C_L = 50$ pF, $R_{GEN} = 0 \Omega$, $V_{GEN} = 0$ V	2.7 to 3.6		10		pC
O_{IRR}	Off Isolation (DAT,CLK,RST)	$R_L = 50 \Omega$, $f = 10$ MHz Figure 17	2.7 to 3.6		-60		dB
Xtalk	Non-Adjacent Channel Crosstalk (DAT,CLK,RST)	$R_L = 50 \Omega$, $f = 10$ MHz Figure 18	2.7 to 3.6		-60		dB
BW	-3 db Bandwidth (DAT,CLK,RST)	$R_L = 50 \Omega$, $C_L = 5$ pF Figure 16	2.7 to 3.6		475		MHz

Note:

- Guaranteed by characterization.

Capacitance

Symbol	Parameter	Conditions	T _A = -40°C to +85°C			Units
			Min.	Typ.	Max.	
C _{IN}	Control Pin Input Capacitance	V _{CC} = 0 V		1.5		pF
C _{OND}	RST, CLK, DAT On Capacitance ⁽⁶⁾	V _{CC} = 3.3 V, f = 1 MHz Figure 20		10	12	
C _{ONV}	V _{SIM} On Capacitance ⁽⁶⁾	V _{CC} = 3.3 V, f = 1 MHz Figure 20		110	150	
C _{OFFD}	RST, CLK, DAT Off Capacitance	V _{CC} = 3.3 V, Figure 19		3		
C _{OFFV}	V _{SIM} Off Capacitance	V _{CC} = 3.3 V, Figure 19		40		

Note:

6. Guaranteed by characterization.

Typical Performance Characteristics

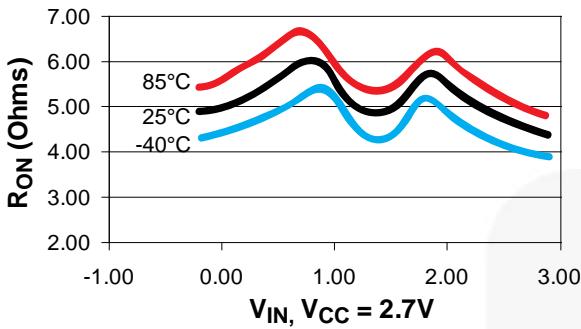


Figure 4. R_{ON} Data Path

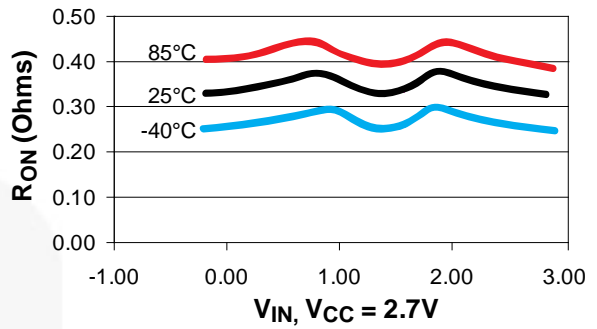


Figure 5. R_{ON} V_{SIM}

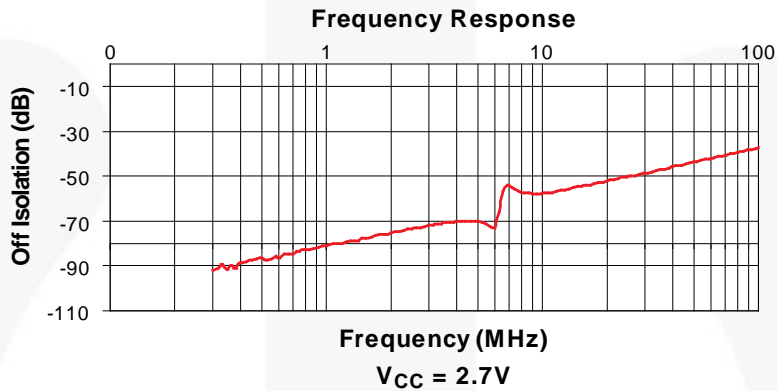


Figure 6. Off Isolation

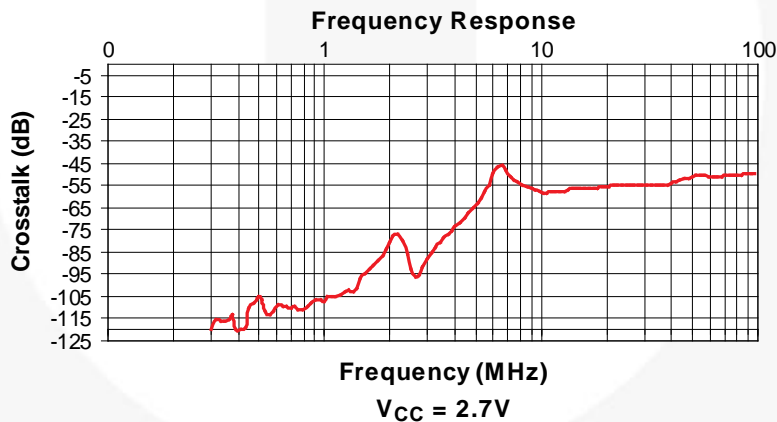


Figure 7. Crosstalk

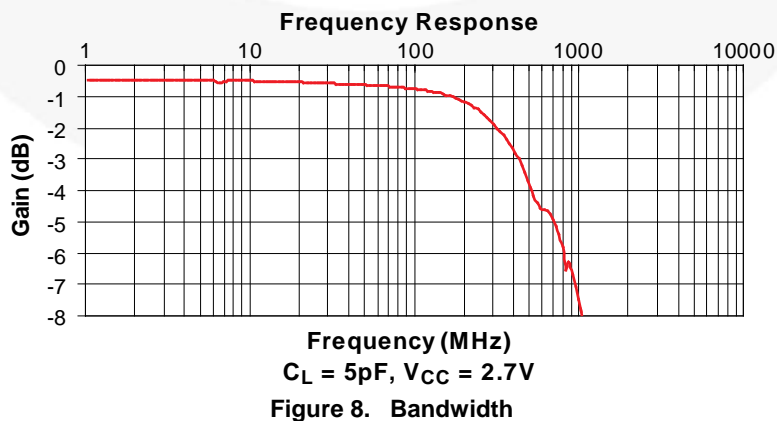


Figure 8. Bandwidth

Test Diagrams

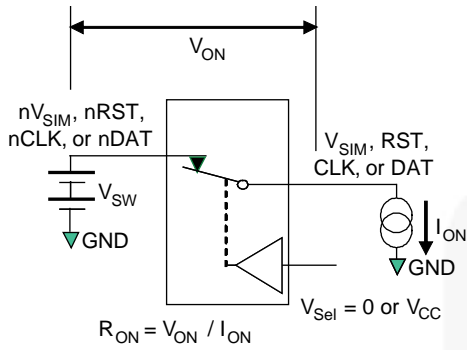


Figure 9. On Resistance

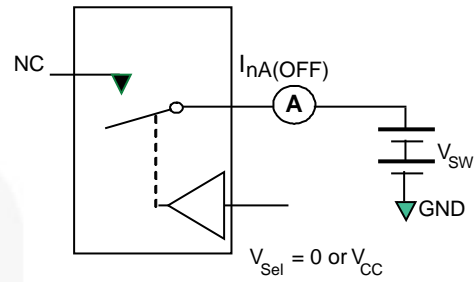
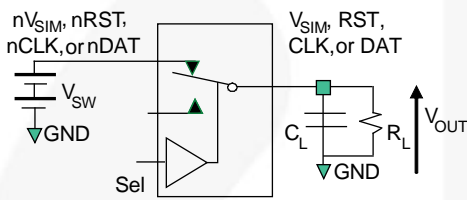


Figure 10. Off Leakage



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

Figure 11. AC Test Circuit Load

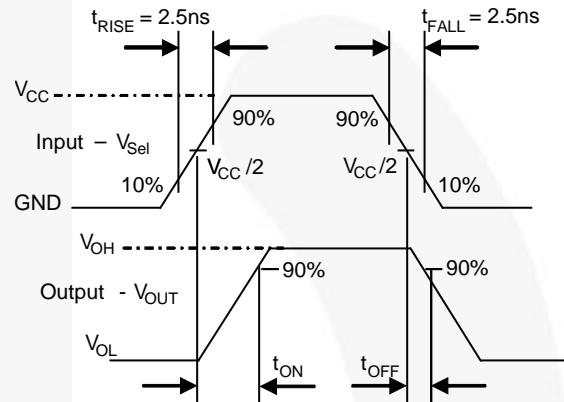


Figure 12. Turn-On / Turn-Off Waveforms

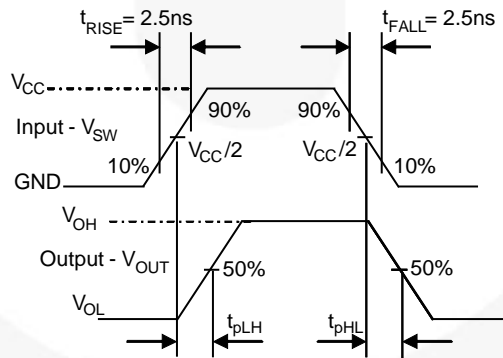


Figure 13. Propagation Delay

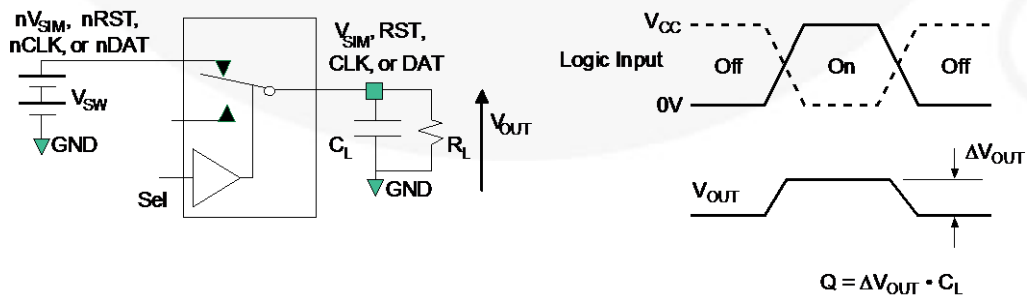
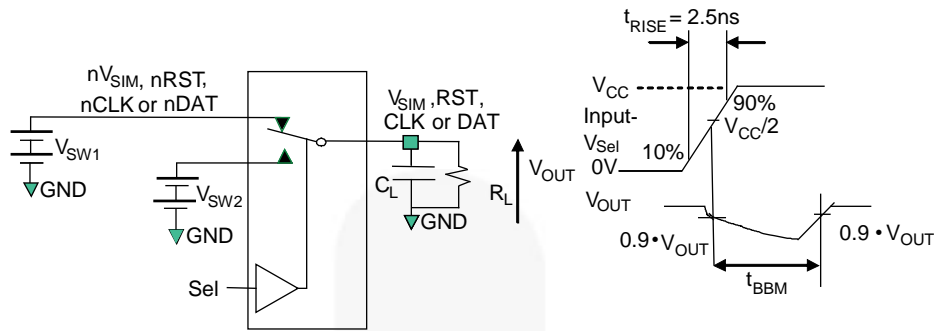


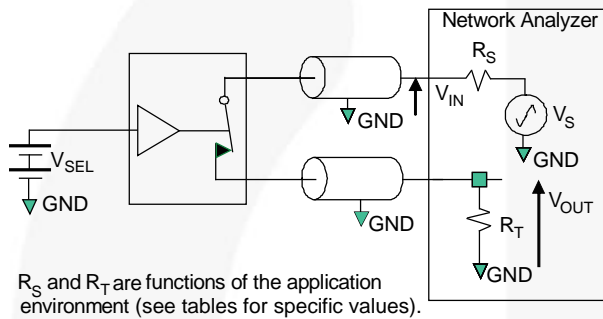
Figure 14. Charge Injection

Test Diagrams (Continued)



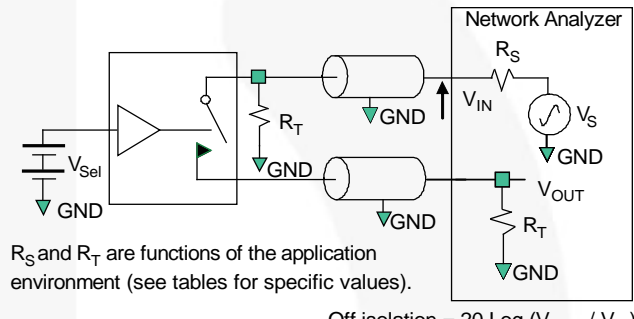
R_L and C_L are functions of the application environment (see tables for specific values). C_L includes test fixture and stray capacitance.

Figure 15. Break-Before-Make Interval Timing



R_S and R_T are functions of the application environment (see tables for specific values).

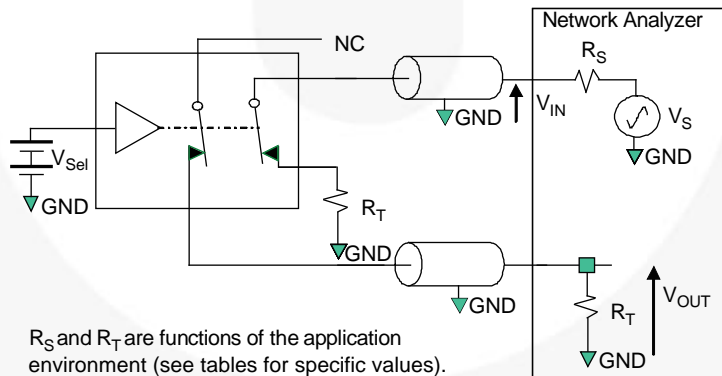
Figure 16. Bandwidth



R_S and R_T are functions of the application environment (see tables for specific values).

Off isolation = $20 \text{ Log } (V_{OUT} / V_{IN})$

Figure 17. Channel Off Isolation



R_S and R_T are functions of the application environment (see tables for specific values).

Crosstalk = $20 \text{ Log } (V_{OUT} / V_{IN})$

Figure 18. Non-Adjacent Channel-to-Channel Crosstalk

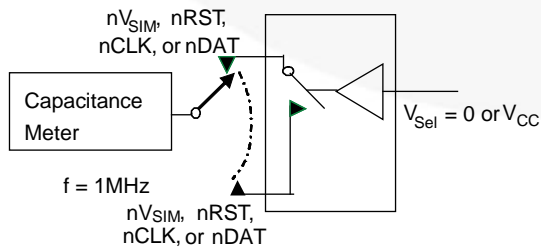


Figure 19. Channel Off Capacitance

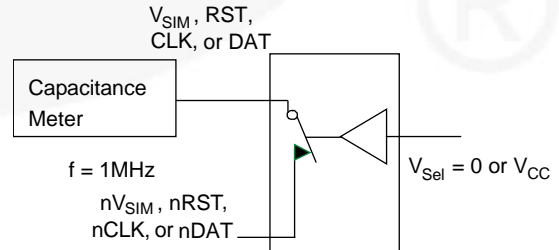
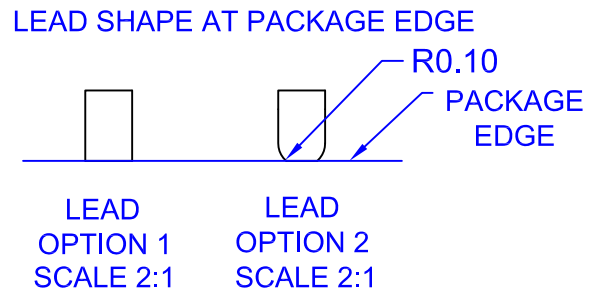
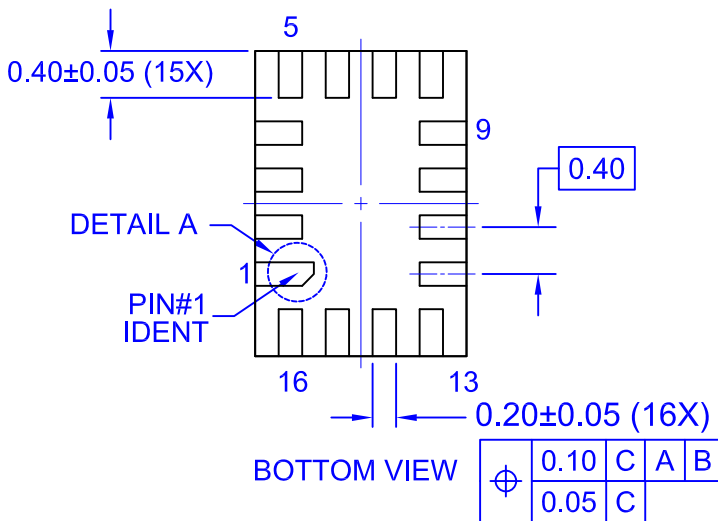
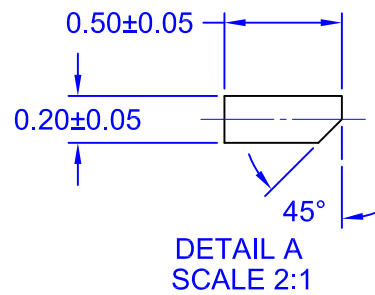
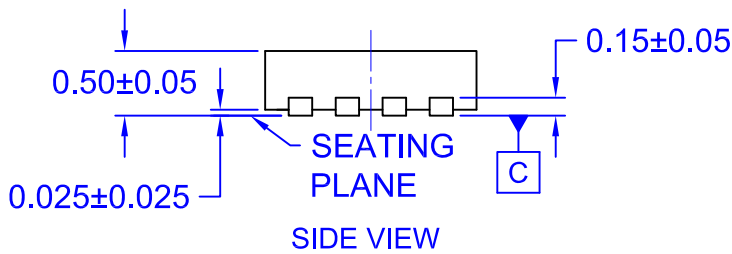
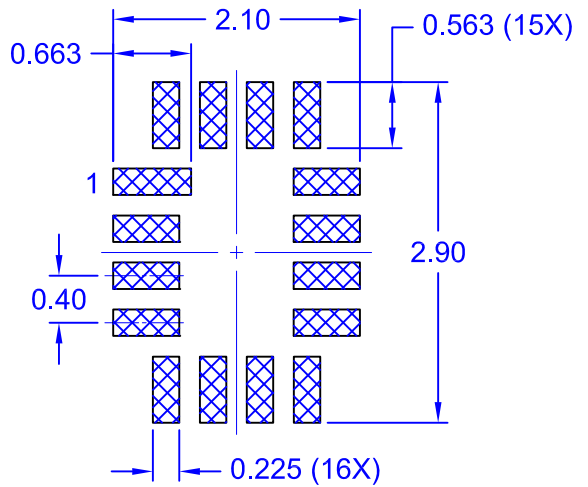
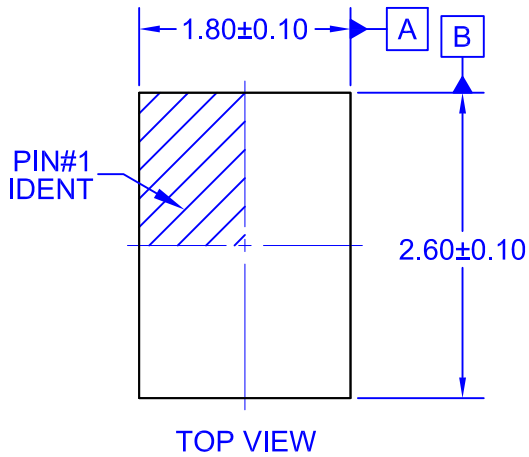


Figure 20. Channel On Capacitance

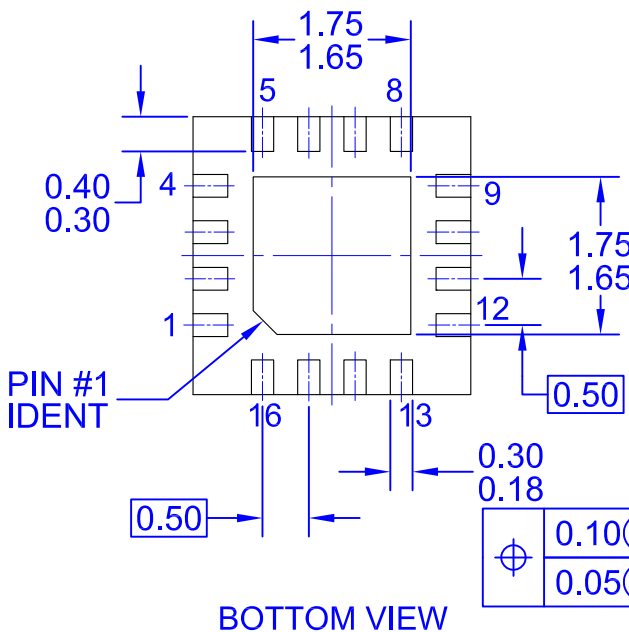
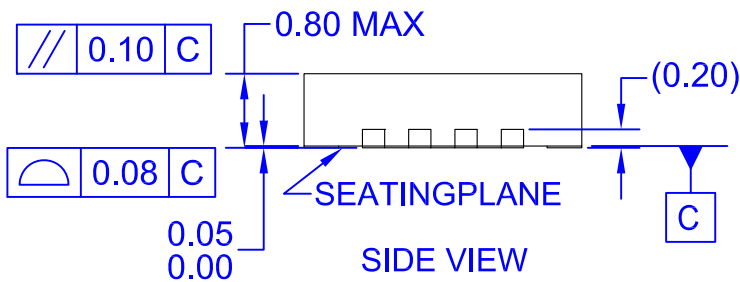
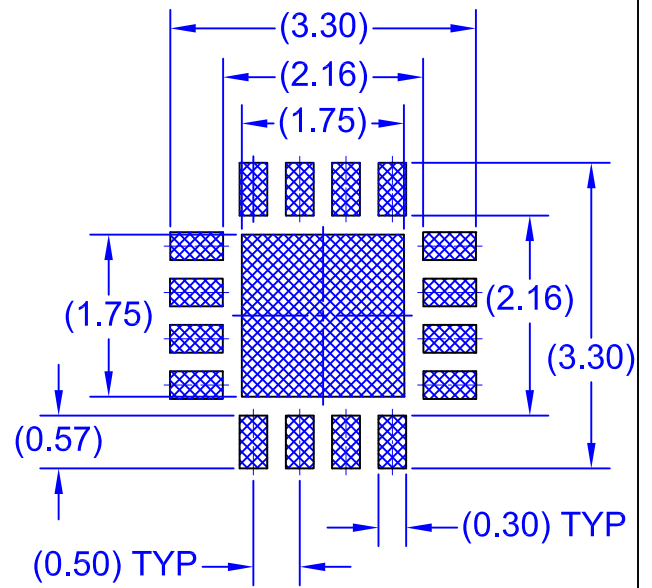
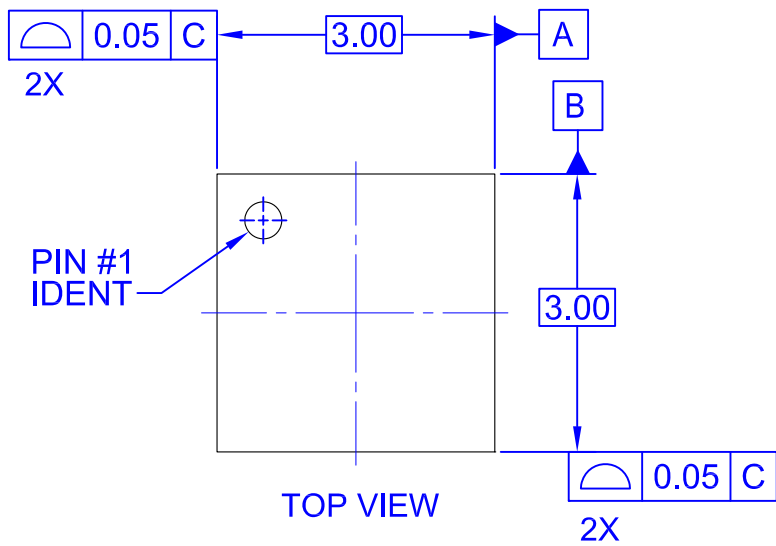


NOTES:

- A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC STANDARD.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- D. DRAWING FILENAME: MKT-UMLP16ArevG.
- E. TERMINAL SHAPE MAY VARY ACCORDING TO PACKAGE SUPPLIER, SEE TERMINAL SHAPE VARIANTS.

ON Semiconductor





- NOTES:
- CONFORMS TO JEDEC REGISTRATION MO-220
 - DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009
 - DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 - DRAWING FILE NAME: MKT-MLP16Brev3



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