



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.

FSA3259

Dual SP3T Analog Switch

General Description

The FSA3259 Dual Single Pole Triple Throw (SP3T) analog switch operates from a single 1.65V to 5.5V supply. It features a typical On Resistance (R_{ON}) of $<9\Omega$ at a +3.3V supply and 25°C. The device is fabricated with sub-micron CMOS technology to achieve fast switching speeds and is designed for break-before-make operation.

The FSA3259 also features wide-bandwidth ($>250\text{MHz}$), high Off Isolation and low crosstalk. The dual SP3T configuration allows for maximum design flexibility.

Features

- $<9\Omega$ typical On Resistance (R_{ON}) @ +3.3V
- Ideal for 3:1 Multiplex/Demultiplex cell phone applications
- Broad V_{CC} operating range: 1.65V to 5.5V
- 250MHz – 3dB Bandwidth
- Break-before-make enable circuitry

Applications

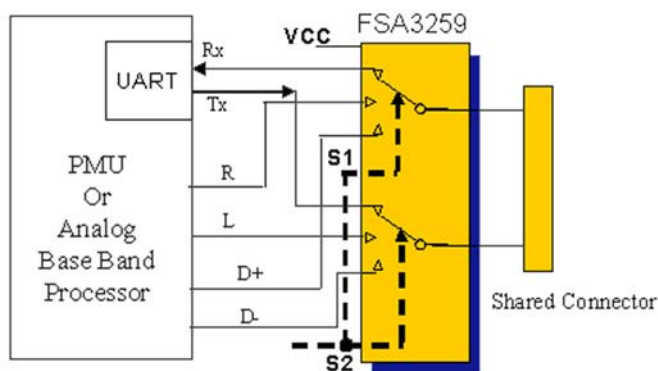
- Cell phone, PDA
- Video
- Multi-port USB

Ordering Code:

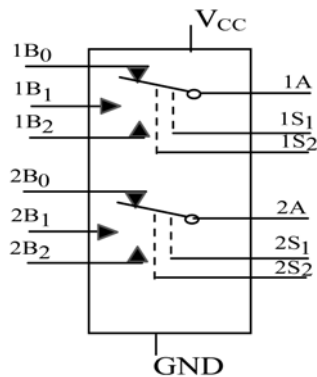
| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| FSA3259BQX | MLP016E | Pb-Free 16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241, 2.5 x 3.5mm |

Pb-Free package per JEDEC J-STD-020B.
DQFN package available in Tape and Reel only.

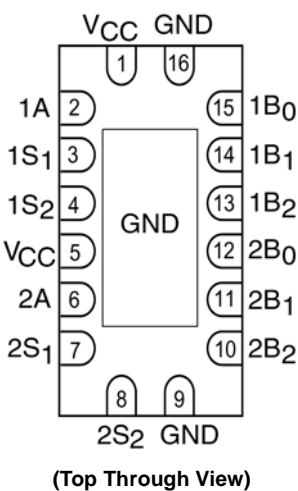
Application Diagram



Analog Symbol



Connection Diagram



Pin Descriptions

| Pin Name | Description |
|---|----------------|
| nA, nB ₀ , nB ₁ , nB ₂ | Data Ports |
| nS ₁ , nS ₂ | Control Inputs |

Truth Table

| Control Inputs (S ₁ , S ₂) | | Function |
|--|-----------------|---------------------------------|
| nS ₁ | nS ₂ | |
| L | L | No Connection |
| H | L | nB ₀ Connected to nA |
| L | H | nB ₁ Connected to nA |
| H | H | nB ₂ Connected to nA |

H = HIGH Logic Level L = LOW Logic Level

Absolute Maximum Ratings(Note 1)

| | |
|---|---------------------------|
| Supply Voltage (V_{CC}) | -0.5V to +7.0V |
| Switch Voltage (Note 2) | -0.5V to $V_{CC} + 0.05V$ |
| Input Voltage (V_{IN}) (Note 2) | -0.5V to +7.0V |
| Input Diode Current (I_{IK}) | -50 mA |
| Switch Current | 100 mA |
| Peak Switch Current (Pulsed at 1mS | |
| Duration, <10% Duty Cycle) | 150mA |
| Power Dissipation @ 85°C | TBD |
| Storage Temperature Range (T_{STG}) | -65°C to +150°C |
| Maximum Junction Temperature (T_J) | +150°C |
| Lead Temperature (T_L) | |
| (Soldering, 10 Seconds) | +260°C |
| ESD | |
| Human Body Model | 5000V |
| I/O to GND | 8000V |

Recommended Operating Conditions
(Note 3)

| | |
|---|----------------|
| Supply Voltage (V_{CC}) | 1.65V to 5.5V |
| Control Input Voltage (V_{IN}) (Note 3) | 0V to V_{CC} |
| Switch Input Voltage | 0V to V_{CC} |
| Operating Temperature | -40°C to 85°C |

Note 1: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The Recommended Operating Conditions tables will define the conditions for actual device operation.

Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 3: Unused control inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics (All Typical values are @ 25°C unless otherwise specified)

| Symbol | Parameter | V_{CC} (V) | $T_A = +25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | Units | Conditions |
|-----------------|---|-----------------|---------------------------|------|---------------------|---|---------------------|---------------|---|
| | | | Min | Typ | Max | Min | Max | | |
| V_{IH} | Input Voltage HIGH | 1.65 to 1.95 | $0.75 \cdot V_{CC}$ | | | $0.75 \cdot V_{CC}$ | | V | |
| | | 2.3 to 5.5 | $0.7 \cdot V_{CC}$ | | | $0.7 \cdot V_{CC}$ | | | |
| V_{IL} | Input Voltage LOW | 1.65 to 1.95 | | | $0.25 \cdot V_{CC}$ | | $0.25 \cdot V_{CC}$ | V | |
| | | 2.3 to 5.5 | | | $0.3 \cdot V_{CC}$ | | $0.3 \cdot V_{CC}$ | | |
| I_{IN} | Control Input Leakage | 0 to 5.5 | -0.1 | | 0.1 | -1.0 | 1.0 | μA | $V_{IN} = 0V \text{ to } 5.5V$ |
| $I_{NC(OFF)}$ | OFF-Leakage Current of Ports nB_0, nB_1, nB_2 , and nA | 1.65 to 5.5 | -0.1 | | 0.1 | -1.0 | 1.0 | μA | $0 < nA, nB_0, nB_1,$ |
| $I_{NO(OFF)}$ | | | | | | | | | $nB_2 < V_{CC}$ |
| R_{ON} | Switch On Resistance (Note 4) | 4.5 | | 5.0 | 7.0 | | 7.0 | Ω | $I_{OUT} = 30mA, V_{IN} = 0$ |
| | | | | 6.0 | 12.0 | | 12.0 | | $I_{OUT} = -30mA, V_{IN} = 2.4$ |
| | | | | 7.0 | 15.0 | | 15.0 | | $I_{OUT} = 30mA, V_{IN} = 4.5$ |
| | | 3.0 | | 6.5 | 9.0 | | 9.0 | | $I_{OUT} = 24mA, V_{IN} = 0$ |
| | | | | 9.0 | 20.0 | | 20.0 | | $I_{OUT} = -24mA, V_{IN} = 3.0$ |
| | | | | 8.0 | 12.0 | | 12.0 | | $I_{OUT} = 8mA, V_{IN} = 0$ |
| | | 2.3 | | 11.0 | 30.0 | | 30.0 | | $I_{OUT} = -8mA, V_{IN} = 2.3$ |
| | | | | 10.0 | 20.0 | | 20.0 | | $I_{OUT} = 4mA, V_{IN} = 0$ |
| | | | | 17.0 | 50.0 | | 50.0 | | $I_{OUT} = -4mA, V_{IN} = 1.65$ |
| | | | | | | | | | |
| ΔR_{ON} | On Resistance | 4.5 | | 0.15 | | | | Ω | $I_{OUT} = -30mA, nB_0, nB_1, nB_2 = 3.15V$ |
| | Matching between | 3.0 | | 0.22 | | | | | $I_{OUT} = -24mA, nB_0, nB_1, nB_2 = 2.1V$ |
| | Channels | 2.3 | | 0.31 | | | | | $I_{OUT} = -8mA, nB_0, nB_1, nB_2 = 1.6V$ |
| | (Note 5) | 1.65 | | 0.62 | | | | | $I_{OUT} = -4mA, nB_0, nB_1, nB_2 = 1.15V$ |
| $R_{FLAT(ON)}$ | On Resistance | 5.0 | | 6.0 | | | | Ω | $I_{nA} = -30mA, 0 \leq nB_0, nB_1, nB_2 \leq V_{CC}$ |
| | Flatness | 3.3 | | 12.0 | | | | | $I_{nA} = -24mA, 0 \leq nB_0, nB_1, nB_2 \leq V_{CC}$ |
| | (Note 6) | 2.5 | | 40.0 | | | | | $I_{nA} = -8mA, 0 \leq nB_0, nB_1, nB_2 \leq V_{CC}$ |
| | | 1.8 | | 140 | | | | | $I_{nA} = -4mA, 0 \leq nB_0, nB_1, nB_2 \leq V_{CC}$ |
| I_{CC} | Quiescent Supply Current | 5.5 | | 1.0 | 20.0 | | 20.0 | μA | $V_{IN} = 0 \text{ or } V_{CC}, I_{OUT} = 0$ |

Note 4: On Resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.

Note 5: $\Delta R_{ON} = R_{ONmax} - R_{ONmin}$ measured at identical V_{CC} , temperature and voltage.

Note 6: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specific range of conditions.

AC Electrical Characteristics (All Typical value are @ 25°C unless otherwise specified)

| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Units | Conditions | Figure Number |
|--|---|--|--------------------------|--------------------------|----------------------------|---------------------------------|-----------------------------|-------|--|---------------|
| | | | Min | Typ | Max | Min | Max | | | |
| t _{PLH} t _{PHL} | Propagation Delay Bus-to-Bus | 1.65 - 1.95 2.3 - 2.7 3.0 - 3.6 4.5 - 5.5 | | 2.0 1.1 0.7 0.4 | | | | ns | V _I = Open R _L = R _{L1} = 500Ω, C _L = 50pF | Figures 1, 2 |
| t _{ON} (t _{PZL} , t _{PZH}) | Turn ON Time (nA to nB _n) | 1.65 - 1.95 2.3 - 2.7 3.0 - 3.6 4.5 - 5.5 | 5.0 3.0 2.0 1.5 | | 32.0 15.0 9.5 6.5 | 5.0 3.0 2.0 1.5 | 34.0 16.5 11.0 7.0 | ns | V _I = 2*V _{CC} for t _{PZL} V _I = 0 for t _{PZH} R _L = R _{L1} = 500Ω C _L = 50pF | Figures 1, 2 |
| t _{OFF} (t _{PLZ} , t _{PHZ}) | Turn OFF Time (nA to nB _n) | 1.65 - 1.95 2.3 - 2.7 3.0 - 3.6 4.5 - 5.5 | 3.0 2.0 1.5 0.8 | | 14.0 7.2 5.1 3.7 | 3.0 2.0 1.5 0.8 | 14.5 7.8 5.5 4.0 | ns | V _I = 2*V _{CC} for t _{PLZ} V _I = 0 for t _{PHZ} R _L = R _{L1} = 500Ω C _L = 50pF | Figures 1, 2 |
| t _{B-M} | Break-Before-Make Time | 1.65 - 5.5 | 0.5 | | | 0.5 | | ns | nB ₀ or nB ₁ = 1.5V, R _L = 50Ω, C _L = 35pF | Figure 3 |
| Q | Charge Injection | 5.0 3.3 | | 3.0 2.0 | | | | pC | C _L = 0.1 nF, V _{GEN} = 0V, R _{GEN} = 0Ω | Figure 4 |
| OIRR | OFF-Isolation | 1.65 - 5.5 | | -58.0 | | | | dB | f = 10MHz, R _L = 50Ω | Figure 5 |
| Xtalk | Crosstalk | 1.65 - 5.5 | | -60.0 | | | | dB | f = 10MHz, R _L = 50Ω | Figure 6 |
| BW | -3dB Bandwidth | 1.65 - 5.5 | | 250 | | | | MHz | R _L = 50Ω | Figure 9 |
| THD | Total Harmonic Distortion | 5.0 | | 0.01 | | | | % | R _L = 600Ω, V _{IN} = 0.5V _{RMS} , f = 600Hz to 20kHz | |

Capacitance

| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Units | Conditions |
|------------------|--|------------------------|------------------------|------|-----|---------------------------------|-----|-------|-------------------------|
| | | | Min | Typ | Max | Min | Max | | |
| C _{IN} | Control Pin (nS _n) Input Capacitance | 0 | | 2.0 | | | | pF | f = 1MHz (see Figure 7) |
| C _{OFF} | nB _n Port OFF Capacitance | 5.0 | | 3.6 | | | | pF | f = 1MHz (see Figure 7) |
| C _{ON} | nA Port ON Capacitance | 5.0 | | 14.5 | | | | pF | f = 1MHz (see Figure 8) |

AC Loading and Waveforms

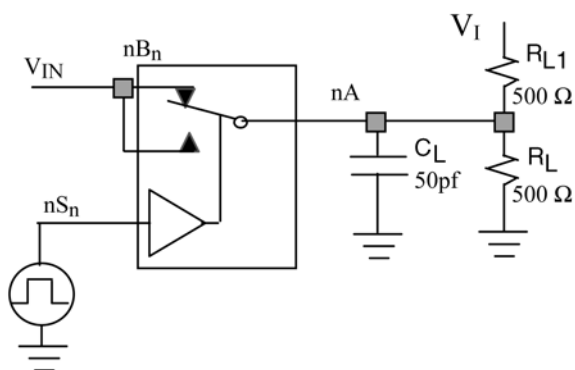


FIGURE 1. AC Test Circuit

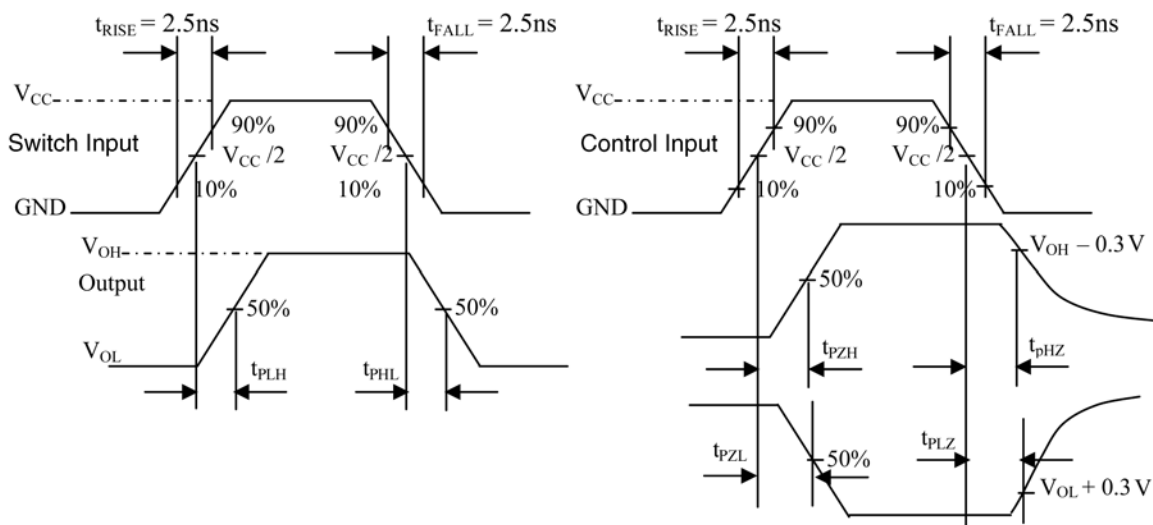


FIGURE 2. AC Waveforms and Measure Points

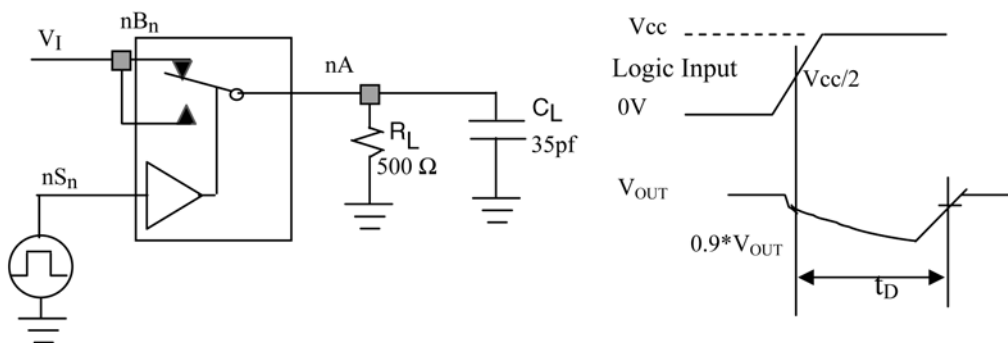


FIGURE 3. Break-Before-Make Interval Timing

AC Loading and Waveforms (continued)

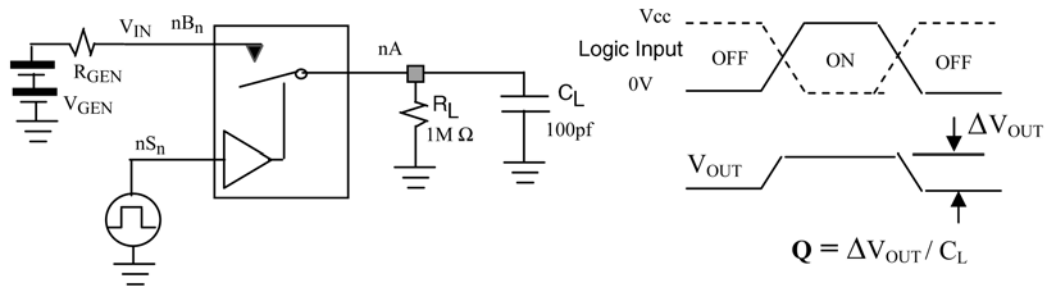


FIGURE 4. Charge Injection Testing

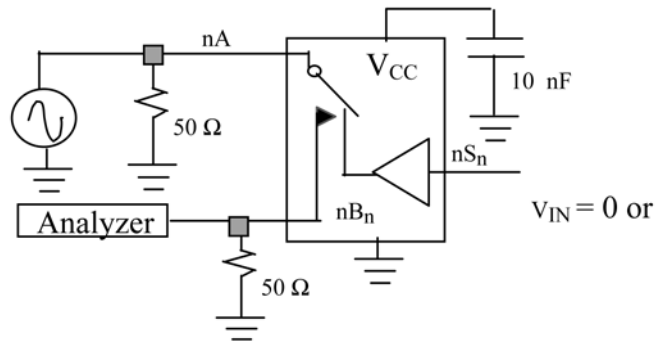


FIGURE 5. OFF Isolation

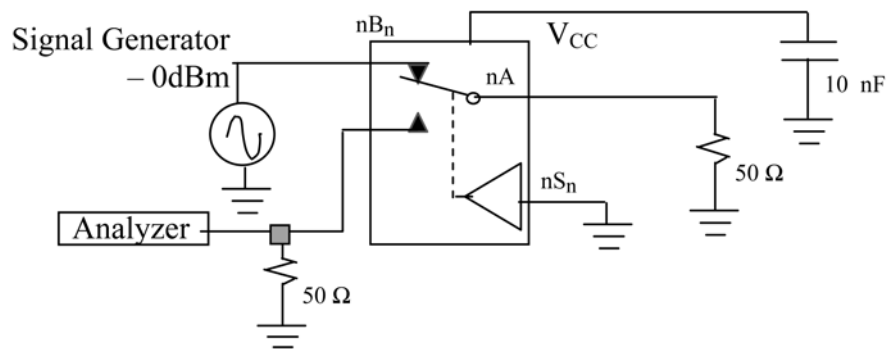


FIGURE 6. Crosstalk

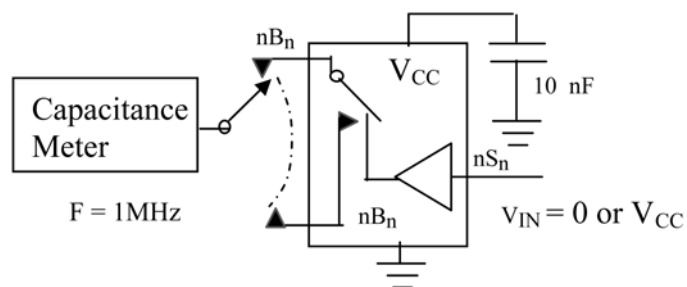


FIGURE 7. Channel OFF Capacitance

AC Loading and Waveforms (continued)

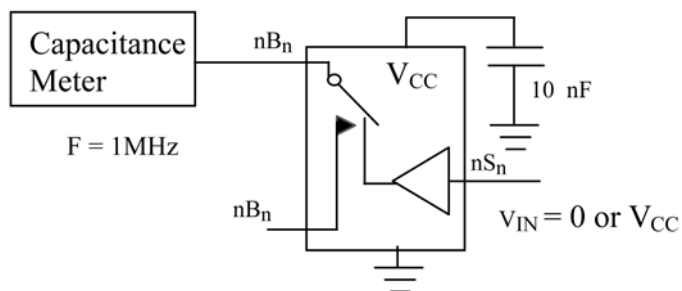


FIGURE 8. Channel ON Capacitance

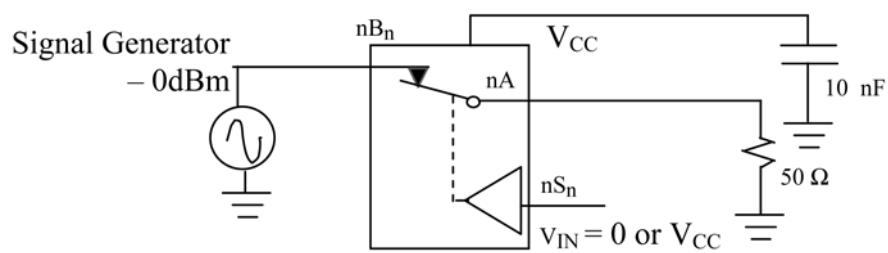


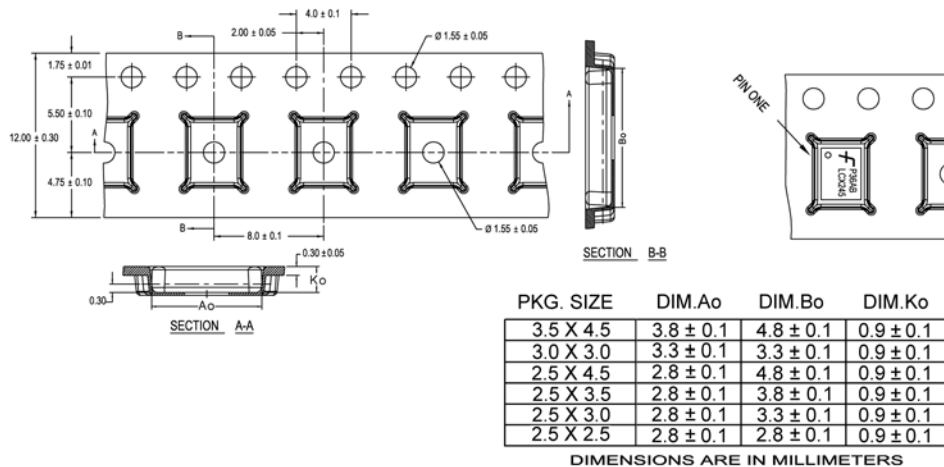
FIGURE 9. Bandwidth

Tape and Reel Specification

Tape Format for DQFN

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| BQX | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 2500/3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

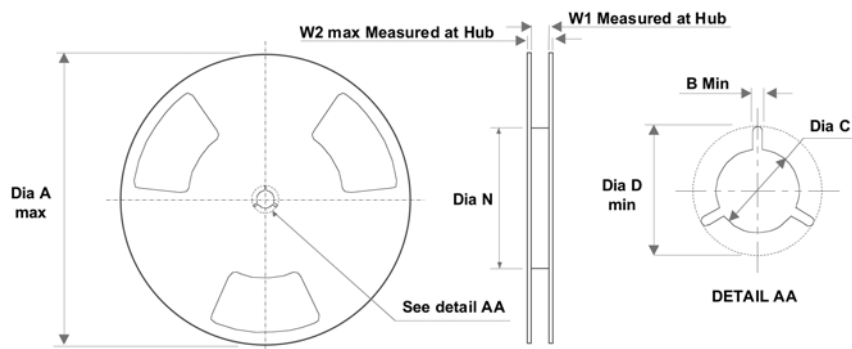
TAPE DIMENSIONS inches (millimeters)



NOTES: unless otherwise specified

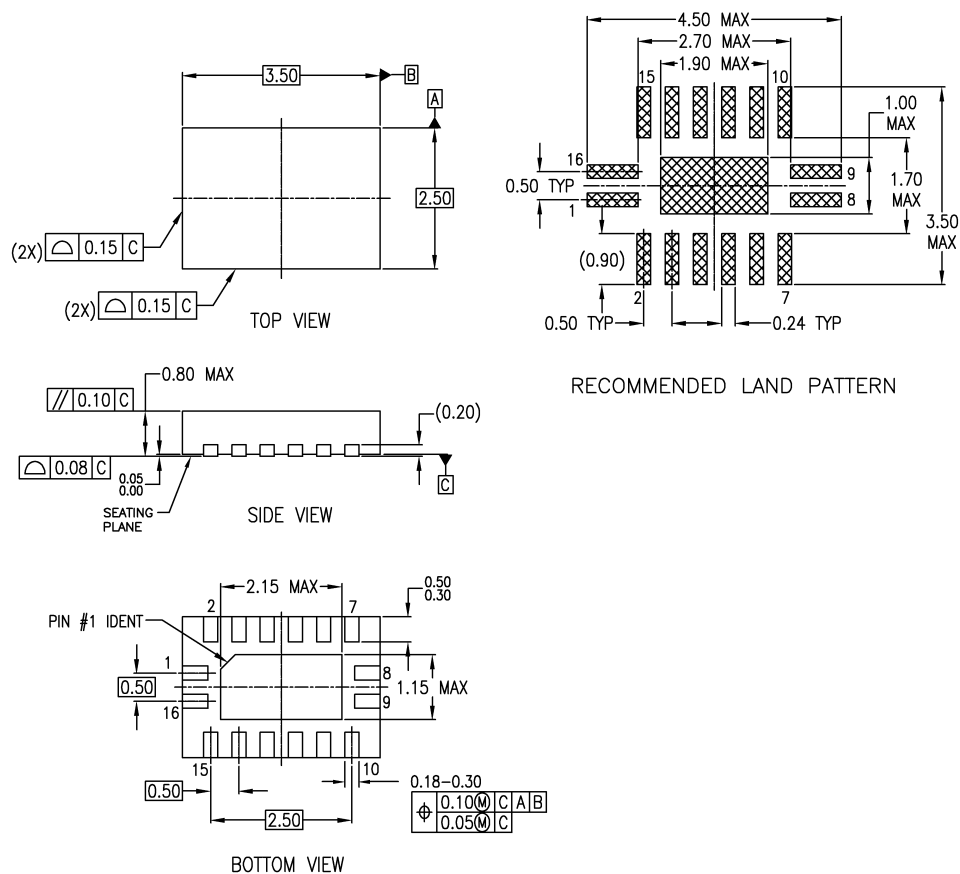
1. Cumulative pitch for feeding holes and cavities (chip pockets) not to exceed 0.008[0.20] over 10 pitch span.
2. Smallest allowable bending radius.
3. Thru hole inside cavity is centered within cavity.
4. Tolerance is $\pm 0.002[0.05]$ for these dimensions on all 12mm tapes.
5. Ao and Bo measured on a plane 0.120[0.30] above the bottom of the pocket.
6. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
7. Pocket position relative to sprocket hole measured as true position of pocket. Not pocket hole.
8. Controlling dimension is millimeter. Dimension in inches rounded.

REEL DIMENSIONS inches (millimeters)



| Tape Size | A | B | C | D | N | W1 | W2 |
|-----------|---------------|-----------------|------------------|------------------|----------------|-----------------|-----------------|
| 12 mm | 13.0 (330) | 0.059 (1.50) | 0.512 (13.00) | 0.795 (20.20) | 7.008 (178) | 0.488 (12.4) | 0.724 (18.4) |

Physical Dimensions inches (millimeters) unless otherwise noted



NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-241, VARIATION AB
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP016ErevA

**Pb-Free 16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241, 2.5 x 3.5mm
Package Number MLP016E**

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use


provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|------------------------|---|
| Advance Information | Formative or In Design | This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. |
| Preliminary | First Production | This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design. |
| No Identification Needed | Full Production | This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design. |
| Obsolete | Not In Production | This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only. |

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