



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.

FSAL200 — Wide Bandwidth Quad 2:1 Analog Multiplexer / De-multiplexer Switch

Features

- Typical 6Ω Switch Connection Between Two Ports
- Minimal Propagation Delay Through the Switch
- Low I_{CC}
- Zero Bounce in Flow-Through Mode
- Control Inputs Compatible with TTL Level
- Rail-to-Rail Signal Handling
- Route Communications Signals Include:
 - 10/100 Ethernet
 - 100VG—AnyLAN
 - ATM25
 - SONET OC1 51.8Mbps
 - USB1.1
 - T1/E1
 - Token Ring 4/16Mbps

Description

The Fairchild Switch FSAL200 is a rail-to-rail quad 2:1 high-speed CMOS TTL-compatible analog multiplexer / de-multiplexer switch. The low on resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

When OE is low, the select pin connects the A Port to the selected B Port output. When OE is high, the switch is open and a high-impedance state exists between the two ports.

Ordering Information

| Part Number | Package Description | Packing Method |
|-------------|--|----------------|
| FSAL200MTC | 16-Lead Thin Shrink Small Outline Package(TSSOP), JEDEC MO-153, 4.4mm Wide | Rails |
| FSAL200MTCX | 16-Lead Thin Shrink Small Outline Package(TSSOP), JEDEC MO-153, 4.4mm Wide | Tape and Reel |
| FSAL200QSC | 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide | Rails |
| FSAL200QSCX | 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide | Tape and Reel |



All packages are Pb-free per JEDEC standard J-SDD-020B.

Pin Configurations

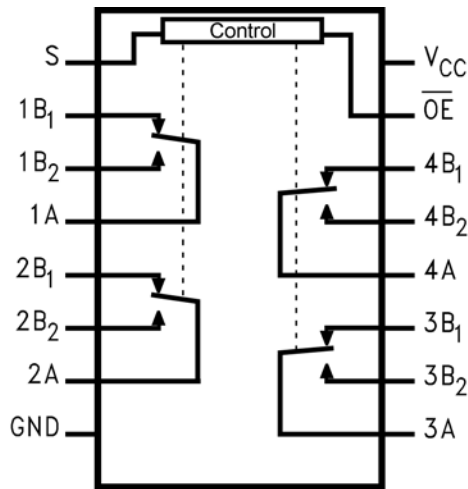


Figure 1. Analog Symbol

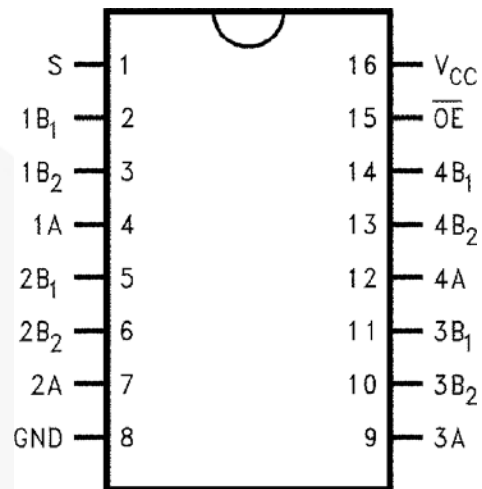


Figure 2. Connection Diagram

| Control Input(s) | \overline{OE} | Function |
|------------------|-----------------|--------------|
| X | High | Disconnected |
| Low | Low | A=B1 |
| High | Low | A=B2 |

Pin Descriptions

| Pin Names | Function |
|-----------------|---------------|
| \overline{OE} | Switch Enable |
| S | Select Input |
| A, B1, B2 | Data Ports |

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 | 7.0 | V |
| V_{SW} | DC Switch Voltage ⁽¹⁾ | -0.5 | 0.5 | V |
| V_{IN} | DC Input Voltage ⁽¹⁾ | -0.5 | 7.0 | V |
| I_{IK} | DC Input Diode Current at (I_{IK}) $V_{IN} < 0V$ | | -50 | mA |
| I_{OUT} | DC Output Current | | 120 | mA |
| I_{CC}/I_{GND} | DC V_{CC} or Ground Current | | ±100 | mA |
| P_D | Power Dissipation at 85°C | | 0.5 | W |
| T_{STG} | Storage Temperature Range | -65 | +150 | °C |
| T_A | Ambient Temperature with Power Applied | -40 | +85 | °C |

Note:

1. Input and output negative ratings may be exceeded if 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 | 3.0 | 5.5 | V | |
| V_{IN} | Control Input Voltage ⁽²⁾ | 0 | V_{CC} | V | |
| V_{SW} | Switch Input Voltage | | V_{CC} | V | |
| V_{OUT} | Output Voltage | | V_{CC} | V | |
| T_A | Operating Temperature | -40 | +85 | °C | |
| t_r, t_f | Input Rise and Fall Time | Control Input $V_{CC}=2.3V -3.6V$ | 0 | 10 | ns/V |
| | | Control Input $V_{CC}=4.5V -5.5V$ | 0 | 5 | |
| θ_{JA} | Thermal Resistance in Still Air | | | °C/W | |

Note:

2. Control input must be held HIGH or LOW and it must not float.

DC Electrical Characteristics

Typical values are at 25°C unless otherwise specified.

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A =-40°C to +85°C | | | Units |
|-----------------------|---|--|---------------------|--------------------------------|------|-----------------|-------|
| | | | | Min. | Typ. | Max. | |
| V _{IH} | Input Voltage High | | 4.5 to 5.5 | 2.0 | | | V |
| | | | 3.0 to 3.6 | 2.0 | | | |
| V _{IL} | Input Voltage Low | | 4.5 to 5.5 | -0.5 | | 0.8 | V |
| | | | 3.0 to 3.6 | -0.5 | | 0.8 | |
| I _{OZ} | Off State Leakage Current | 0 ≤ V _{IN} ≤ 5.5V | 0 to 5.5 | | | 100 | μA |
| R _{ON} | Switch On Resistance ⁽³⁾ | I _{ON} =10 -30mA | 4.5 to 5.5 | | 6 | 12 | Ω |
| | | I _{ON} =10 -30mA | 3.0 to 3.6 | | 15 | 22 | |
| I _{IN} | Control Input Leakage | V _{IN} =V _{CC} or GND | 5.5 | | | ±1 | μA |
| | | V _{IN} =V _{CC} or GND | 3.6 | | | ±1 | |
| I _{CC} | Quiescent Supply Current, All Channels Off | V _{IN} =V _{CC} or GND, I _{OUT} =0 | 5.5 | | | 1 | μA |
| | Analog Signal Range | | V _{CC} | 0 | | V _{CC} | V |
| ΔR _{ON} | On Resistance Matching Between Channels ⁽³⁾⁽⁴⁾ | I _A =-30 mA, V _{BN} =3.15 | 4.5 to 5.5 | | 0.4 | 2.0 | Ω |
| | | I _A =-10 mA, V _{BN} =2.1 | 3.0 to 3.6 | | 1.0 | 3.0 | |
| I _O | Output Current | B _n , B _n , S-0V to 5V | 4.5 to 5.5 | 100 | | | mA |
| | | | 3.0 to 3.6 | 80 | | | |
| R _{FLAT(ON)} | On Resistance Flatness ⁽³⁾⁽⁵⁾ | A ₁ , B ₁ , B ₂ =0V to 5V | 4.5 to 5.5 | | 3 | | Ω |
| | | A ₁ , B ₁ , B ₂ =0V to 5V | 3.0 to 3.6 | | 7 | | |

Notes:

3. Measured by the voltage drop between the A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the two (A or B ports).
4. ΔR_{ON} = R_{ON} maximum – R_{ON} minimum measured at identical V_{CC}, temperature, and voltage levels.
5. Flatness is defined as the difference between the maximum and minimum value of on resistance over the specified range of conditions.

AC Electrical Characteristics

Typical values are at 25°C unless otherwise specified.

| Symbol | Parameter | Conditions | V _{CC} (V) | Min. | Typ. | Max. | Units | Figure |
|------------------|---------------------|--|---------------------|------|------|------|-------|----------|
| t _{ON} | Turn-On Time | V _{Bn} =3V | 4.5 to 5.5 | | 10 | 20 | ns | Figure 3 |
| | | V _{Bn} =1.5V | 3.0 to 3.6 | | 28 | 40 | | Figure 4 |
| t _{OFF} | Turn-Off Time | V _{Bn} =-3V | 4.5 to 5.5 | | 5 | 10 | ns | Figure 3 |
| | | V _{Bn} =1.5V | 3.0 to 3.6 | | 4 | 20 | | Figure 4 |
| Q | Charge Injection | C _L =0.1nF, V _{GEN} =0 R _{GEN} =0Ω | 5.0 | | 7 | | pC | Figure 5 |
| | | | 3.3 | | 3 | | | |
| OIRR | Off Isolation | R _L =100Ω, f=30MHz | 4.5 to 5.5 | | -55 | | dB | Figure 6 |
| | | R _L =50Ω, f=1MHz | 3.0 to 3.6 | | -75 | | | |
| Xtalk | Crosstalk | R _L =100Ω, f=30MHz | 4.5 to 5.5 | | -70 | | dB | Figure 7 |
| | | R _L =50Ω, f=1MHz | 3.0 to 3.6 | | -75 | | | |
| BW | -3db Bandwidth | R _L =100Ω | 4.5 to 5.5 | | 137 | | MHz | Figure 9 |
| | | R _L =50Ω | 3.0 to 3.6 | | 110 | | | |
| D | ΔR _{ON/RL} | R _L =100Ω | 4.5 to 5.5 | | 2 | | % | Figure 9 |
| | | | 3.0 to 3.6 | | 3 | | | |

Notes:

6. Guaranteed by design.
7. Off Isolation = 20 log₁₀ [V_A / V_{Bn}].

Capacitance

T_A=+25°C, f=1MHz. Capacitance is characterized, but not tested in production.

| Symbol | Parameter | Conditions | Typ. | Units | Figure |
|-------------------|-------------------------------|--------------------------------|------|-------|-----------|
| C _{IN} | Control Pin Input Capacitance | V _{CC} =0V | 2.3 | pF | |
| C _{IO-B} | B Port Off Capacitance | V _{CC} =5.0V and 3.0V | 8 | pF | Figure 10 |
| | A Port Off Capacitance | V _{CC} =5.0V and 3.0V | 13 | | Figure 10 |
| C _{ON} | Channel On Capacitance | V _{CC} =5.0V and 3.0V | 15 | pF | Figure 7 |

AC Loadings and Waveforms

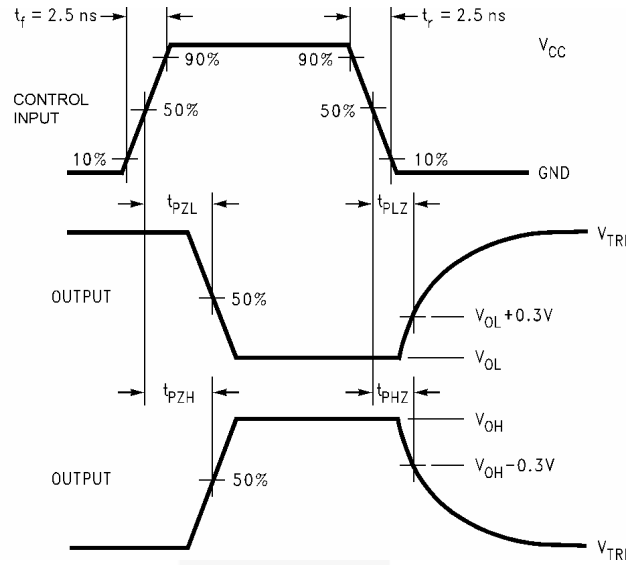


Figure 3. AC Waveforms

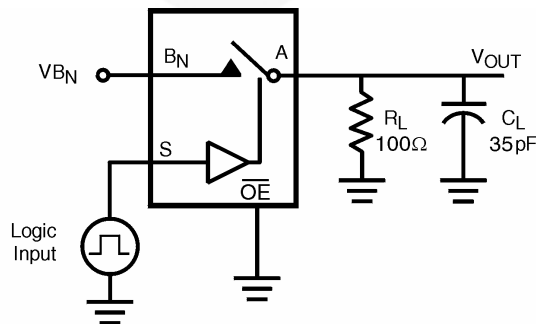


Figure 4. t_{on} , t_{off} Loading

AC Loadings and Waveforms (Continued)

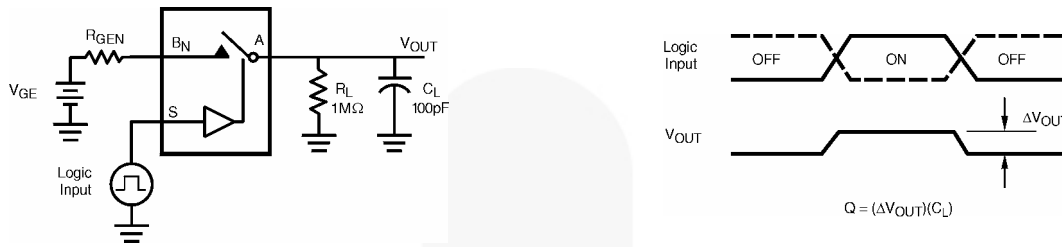


Figure 5. Charge Injection Test

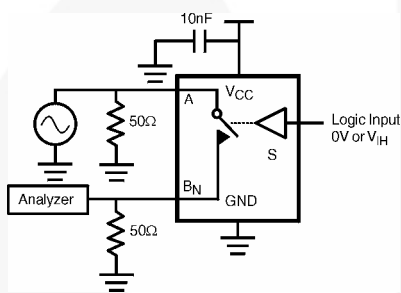


Figure 6. Off Isolation

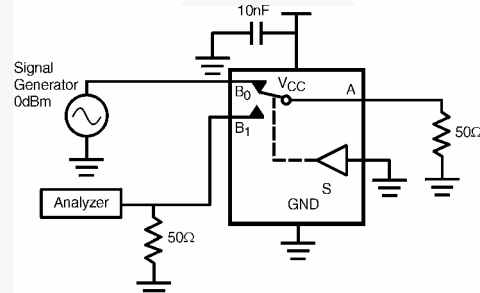


Figure 7. Channel On Capacitance

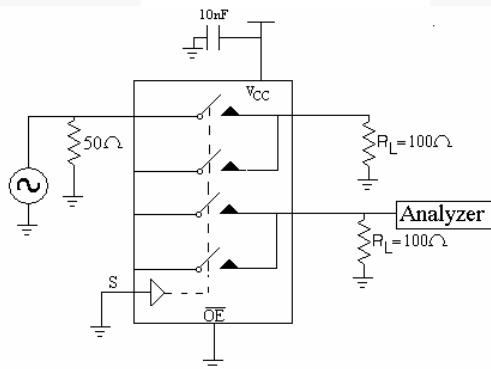


Figure 8. Crosstalk

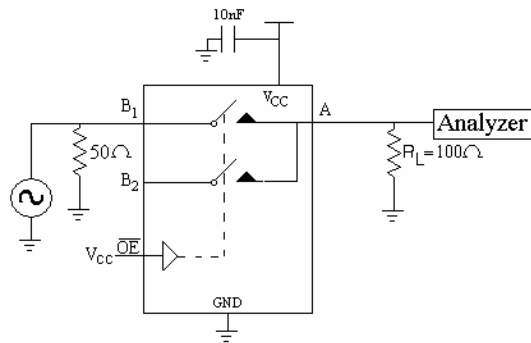


Figure 9. Bandwidth

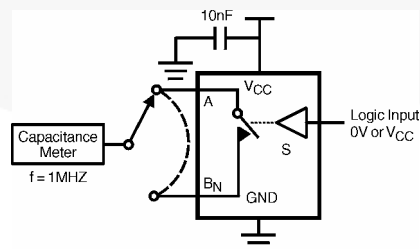
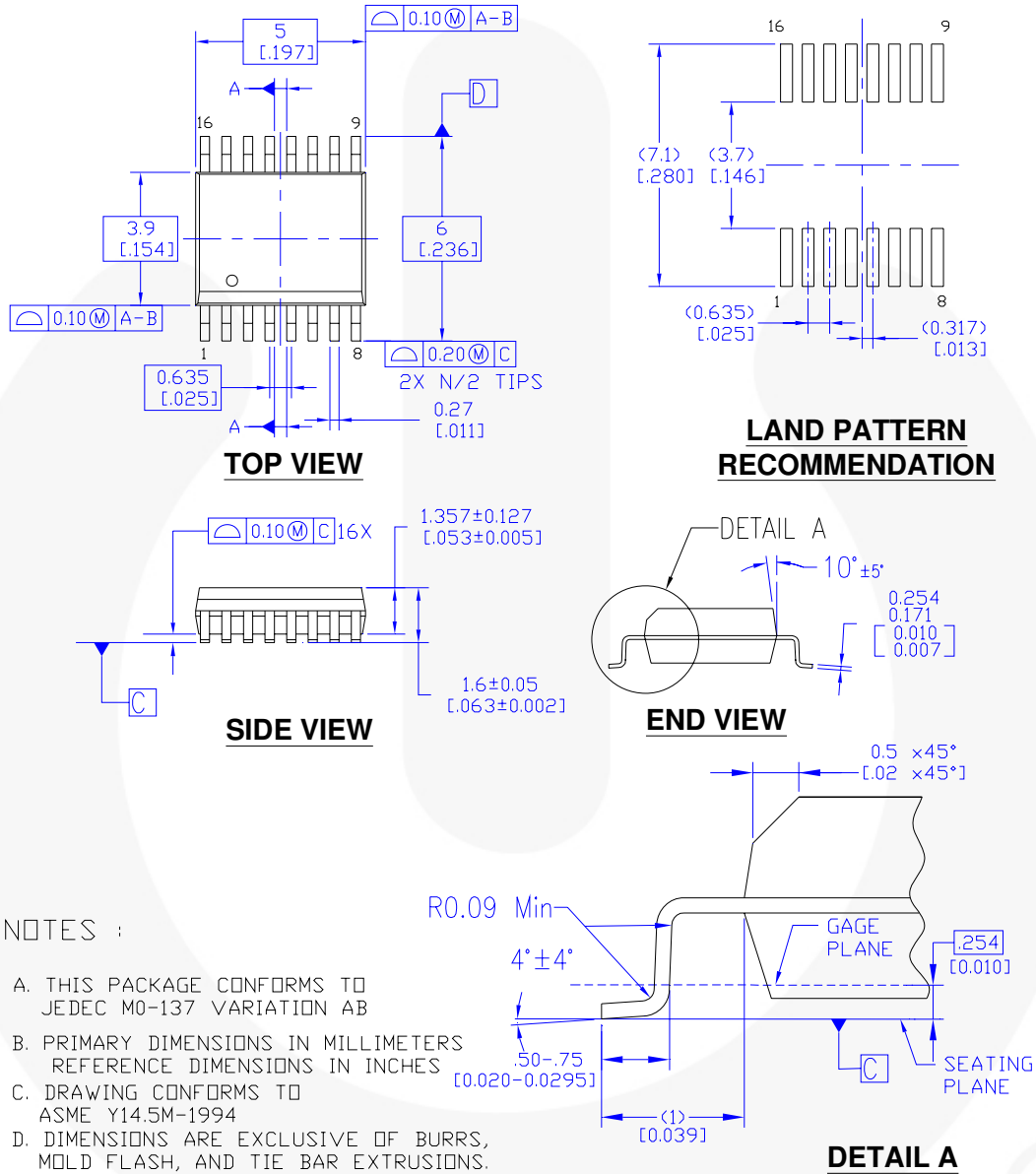


Figure 10. Channel Off Capacitance

Physical Dimensions



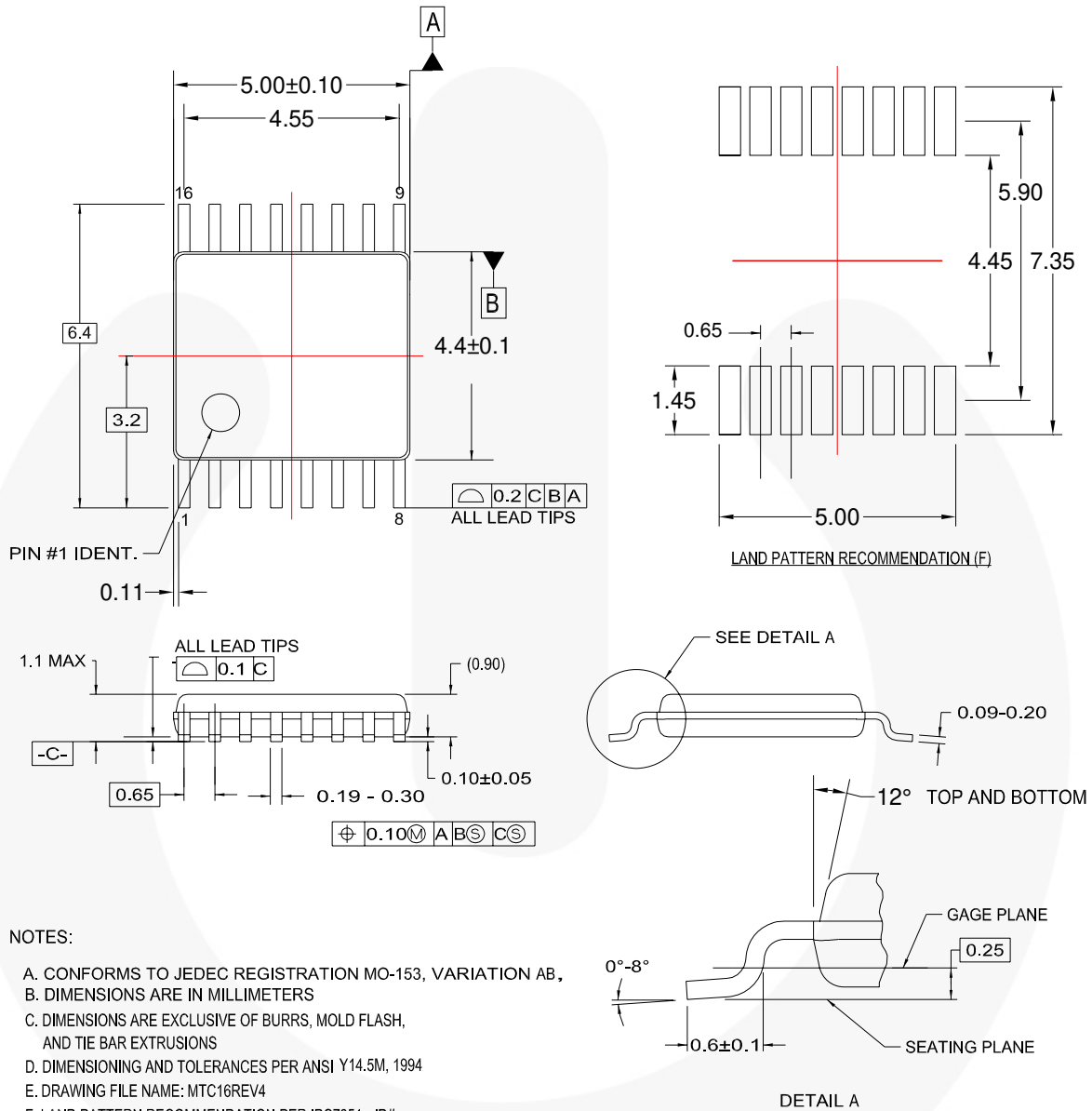
MQA16AREVB

Figure 11. 16-lead, Quarter Size Outline Package (QSOP), JEDEC MO-137. 0.150" wide

Click here for tape and reel specifications, available at:

http://www.fairchildsemi.com/products/analog/pdf/qsop16_tr.pdf

Physical Dimensions (Continued)



NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB,
- B. DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
- D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1994
- E. DRAWING FILE NAME: MTC16REV4
- F. LAND PATTERN RECOMMENDATION PER IPC7351 - ID# TSOP65P640X110-16N

MTC16rev4

Figure 12. 16-lead, Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm wide


[Click here for tape and reel specifications, available at:](#)

http://www.fairchildsemi.com/products/analog/pdf/tssop16_tr.pdf



TRADEMARKS

The following are registered and unregistered trademarks and service marks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

| | | | |
|--------------------------------------|--|--|----------------------------------|
| ACEx [®] | Green FPS [™] | Power247 [®] | SuperSOT [™] -8 |
| Build it Now [™] | Green FPS [™] e-Series [™] | POWEREDGE [®] | SyncFET [™] |
| CorePLUS [™] | GTO [™] | Power-SPM [™] | The Power Franchise [®] |
| CROSSVOLT [™] | <i>i-Lo</i> [™] | PowerTrench [®] | the power [™] |
| CTL [™] | IntelliMAX [™] | Programmable Active Droop [™] | franchise |
| Current Transfer Logic [™] | ISOPLANAR [™] | QFET [®] | TinyBoost [™] |
| EcoSPARK [®] | MegaBuck [™] | QS [™] | TinyBuck [™] |
| F [®] | MICROCOUPLER [™] | QT Optoelectronics [™] | TinyLogic [®] |
| Fairchild [®] | MicroFET [™] | Quiet Series [™] | TINYOPTO [™] |
| Fairchild Semiconductor [®] | MicroPak [™] | RapidConfigure [™] | TinyPower [™] |
| FACT Quiet Series [™] | MillerDrive [™] | SMART START [™] | TinyPWM [™] |
| FACT [®] | Motion-SPM [™] | SPM [®] | TinyWire [™] |
| FAST [®] | OPTOLOGIC [®] | STEALTH [™] | μSerDes [™] |
| FastvCore [™] | OPTOPLANAR [®] | SuperFET [™] | UHC [®] |
| FPS [™] |  [®] | SuperSOT [™] -3 | UniFET [™] |
| FRFET [®] | PDP-SPM [™] | SuperSOT [™] -6 | VCX [™] |
| Global Power Resource SM | Power220 [®] | | |

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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

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, and (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 a significant injury of the user.
2. A critical component in 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; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice 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 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. |

Rev. I31



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