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# FSA2866 Dual-Host / Dual-SIM Card Crosspoint Analog Switch

#### Features

| Switch Type          | 2x2 Crosspoint Switch   |
|----------------------|---|
| Input Type           | Data  |
| Input Signal Range   | 0 to V <sub>CC</sub>  |
| V <sub>cc</sub>      | 1.65V to 4.30V  |
| R <sub>ON</sub>      | Data 2Ω (Typical)<br>VSIM 2Ω (Typical)                            |
| R <sub>FLAT</sub>    | 0.6Ω (Typical)  |
| ESD                  | IEC 61000-4-2 System  |
| ESD                  | Air 15kV, Contact 8kV   |
| CON                  | 28pF (Typical)  |
| C <sub>OFF</sub>     | 12pF (Typical)  |
| Package              | 20-Lead UMLP, 3 x 3 x<br>0.55mm, 0.40mm Pitch<br>with Exposed DAP |
| Ordering Information | FSA2866UMX  |

## Applications

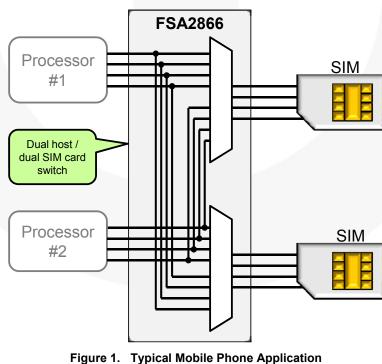
- MP3 Portable Media Players
- Cellular Phones, Smart Phones

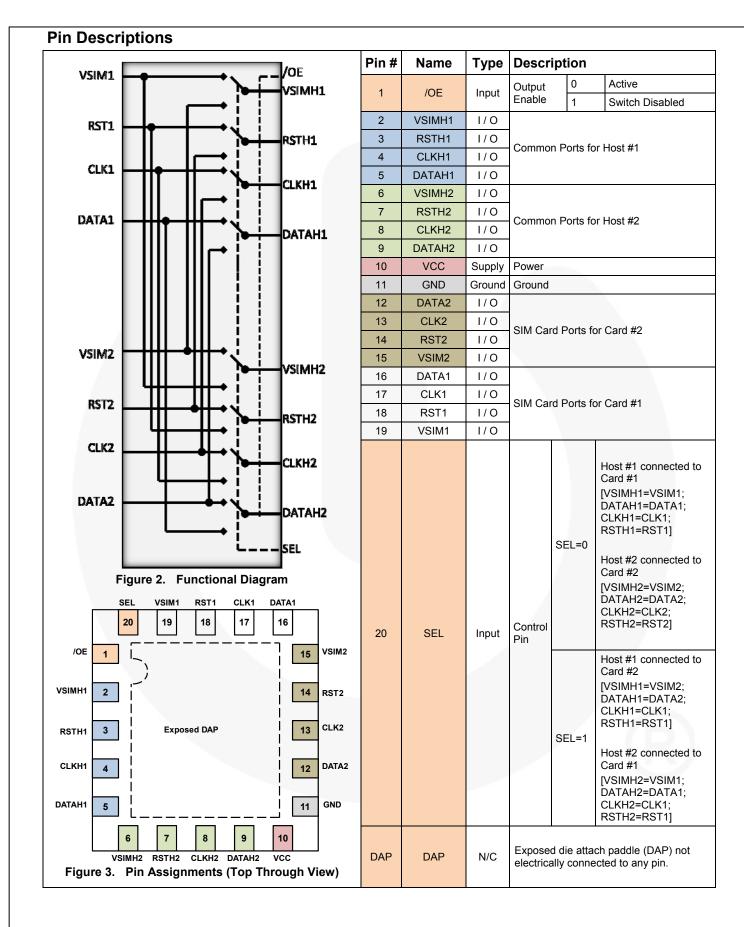
## Description

The FSA2866 is a dual-host, dual-SIM card analog switch designed specifically for cell phones that support two specific carrier services (for example, CDMA and GSM/3G).

### **Related Resources**

- For samples and questions, please contact: <u>Analog.Switch@fairchildsemi.com</u>.
- FSA2866 Evaluation Board





#### **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 |
|--------------------|--|----------------------------|-------|-----------------------|------|
| Vcc                | Supply Voltage                                 |                            | -0.50 | +5.5                  | V    |
| V <sub>CNTRL</sub> | DC Input Voltage (SEL,/OE)                     |                            | -0.5  | V <sub>cc</sub>       | V    |
| V <sub>SW</sub>    | DC Switch I/O Voltage - DATAHn, CLKHn, CLKn, F | RSTHn, RSTn                | -0.5  | V <sub>CC</sub> + 0.3 | V    |
| I <sub>IK</sub>    | DC Input Diode Current                         |                            | -50   |                       | mA   |
| I <sub>SIM</sub>   | DC Output Current – VSIMHn, VSIMn              |                            |       | 100                   | mA   |
| louт               | DC Output Current – DATAHn, CLKHn, CLKn, RST   | Hn, RSTn                   |       | 35                    | mA   |
| T <sub>STG</sub>   | Storage Temperature                            |                            | -65   | +150                  | °C   |
|                    |  | All Pins                   | 8     |                       |      |
|                    | Human Body Model, JEDEC: JESD22-A114           | I/O to GND, Card Side Pins | 16    |                       |      |
| ESD                |  | Power to GND               | 9     |                       | k) / |
| ESD                | Charged Device Model, JEDEC: JESD22-C101       |                            | 2     |                       | kV   |
|                    | IEC 61000 4.2 System Lovel                     | Contact                    | 8     |                       |      |
|                    | IEC 61000-4-2 System-Level                     | Air Gap                    | 15    |                       |      |

## **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 these ratings or designing to Absolute Maximum Ratings.

| Symbol             | Symbol Parameter  |     |  | Max. | Unit |
|--------------------|---|-----|--|------|------|
| V <sub>cc</sub>    | Supply Voltage  |     |  | 4.3  | V    |
| V <sub>CNTRL</sub> | Control Input Voltage (SEL, /OE)                          | 0   |  | Vcc  | V    |
| V <sub>SW</sub>    | Switch I/O Voltage - DATAHn, CLKHn, CLKn, RSTHn, RSTn     | 0   |  | Vcc  | V    |
| I <sub>SIM</sub>   | DC Output Current – VSIMHn, VSIMn                         |     |  | 30   | mA   |
| I <sub>OUT</sub>   | IouT DC Output Current – DATAHn, CLKHn, CLKn, RSTHn, RSTn |     |  | 10   | mA   |
| T <sub>A</sub>     | Operating Temperature                                     | -40 |  | +85  | °C   |

## **DC Electrical Characteristics**

 $T_A {=} 25^\circ C$  and  $V_{CC} {=} 3.0 V$  unless otherwise noted.

| Symbol                                       | Parameter   | Conditions  | V <sub>cc</sub> (V) | T <sub>A</sub> =- 40°C to<br>+85°C |                |      | Unit |
|--|---|---|---------------------|------------------------------------|----------------|------|------|
| -  |   |   |                     | Min.                               | in. Ty p. Max. |      |      |
| VIK  | Clamp Diode Voltage   | I <sub>IN</sub> =-18mA  | 2.7                 |                                    |                | -1.2 | V    |
|  |   |   | 1.65 to 2.30        | 1.1                                |                |      |      |
| VIH  | Input Voltage High  |   | 2.7 to 3.6          | 1.3                                |                |      | V    |
|  |   |   | 4.3                 | 1.7                                |                |      |      |
|  |   |   | 1.65 to 2.30        |                                    |                | 0.4  |      |
| VIL  | Input Voltage Low   |   | 2.7 to 3.6          |                                    |                | 0.5  | V    |
|  |   |   | 4.3                 |                                    |                | 0.7  |      |
| I <sub>IN</sub>                              | Control Input Leakage<br>(SEL,/OE)                                      | V <sub>SW</sub> =0 to V <sub>CC</sub>   | 4.3                 | -1                                 |                | 1    | μA   |
| I <sub>NO(OFF)</sub><br>I <sub>NC(OFF)</sub> | Off Leakage Current of Ports<br>RSTn, DATAn, CLKn, VSIMn                | VSIMHn=DATAHn=CLKHn=RSTHn=0.3 V, $V_{CC}$ -0.3V; RSTn, CLKn, DATAn, or VSIMn= $V_{CC}$ -0.3V, 0.3V, or Floating | 4.3                 | -100                               |                | 100  | nA   |
| I <sub>A(ON)</sub>                           | On Leakage Current of<br>Common Ports – RSTHn,<br>DATAHn, CLKHn, VSIMHn | Common=0.3V, V <sub>CC</sub> -0.3V;<br>VSIMHn=DATAHn=CLKHn=RSTHn=<br>V <sub>CC</sub> -0.3V, 0.3V, or Floating   | 4.3                 | -100                               |                | 100  | nA   |
| I <sub>OFF</sub>                             | Power-Off Leakage Current   | VSIMHn or DATAHn or CLKHn or RSTHn $V_{IN}$ =0V to 4.3V, $V_{CC}$ =0V   | 0                   | -2                                 |                | 2    | μA   |
| loz  | Off-State Leakage   | VSIMHn or DATAHn or CLKHn or RSTHn $V_{IN}$ =0.3V to 4.3V, /OE= $V_{CC}$  | 4.3                 | -5                                 |                | 5    | μΑ   |
| R <sub>on_data</sub>                         | Switch On Resistance for<br>Data Paths                                  | I <sub>ON</sub> =-20mA; /OE=0V; SEL=V <sub>CC</sub> or 0V;<br>RSTn, CLKn, DATAn, or VSIMn=0<br>or 2.7V          | 2.7                 |                                    | 2.0            | 3.5  | Ω    |
| R <sub>ON_VSIM</sub>                         | Switch On Resistance for<br>VSIM Paths                                  | $I_{ON}$ =- 50mA; /OE=0V; SEL=V <sub>CC</sub> or 0V;<br>RSTn, CLKn, DATAn, or VSIMn=0<br>or 2.7V                | 2.7                 |                                    | 2.0            | 3.5  | Ω    |
| $\Delta R_{ON_{DATA}}$                       | On Resistance Matching<br>Between Data Channels                         | I <sub>ON</sub> =-20mA; /OE=0V; SEL=V <sub>CC</sub> or 0V;<br>RSTn, CLKn, or DATAn=0V                           | 2.7                 |                                    | 0.10           | 0.25 | Ω    |
| R <sub>ON_FLAT</sub>                         | On Resistance Flatness Data<br>Path Signals                             | I <sub>ON</sub> =-20mA, /OE=0V,SEL=V <sub>CC</sub> or 0V,<br>RSTn, CLKn or DATAn=0 to V <sub>CC</sub>           | 2.7                 |                                    | 0.6            | 0.8  | Ω    |
| Icc  | Quiescent Supply Current  | V <sub>IN</sub> =0 or V <sub>CC</sub> , I <sub>OUT</sub> =0   | 4.3                 |                                    |                | 1    | μA   |
| I <sub>CCT</sub>                             | Increase in $I_{CC}$ Current Per Control Voltage and $V_{CC}$           | V <sub>IN</sub> =1.65V, V <sub>CC</sub> =4.3V   | 4.3                 |                                    | 7              | 9.5  | μΑ   |

Notes:

- 1. Guaranteed by characterization; not production tested.
- 2. On resistance is determined by the voltage drop between the D+/D- and D+/R, D-/L pins at the indicated current through the switch.
- 3.  $\Delta R_{ON} = R_{ON\_max} R_{ON\_min}$  measured at identical V<sub>CC</sub>, temperature, and voltage.

## **AC Electrical Characteristics**

 $T_A{=}25^\circ\text{C}$  and  $V_{\text{CC}}{=}3.0\text{V}$  unless otherwise noted.

| Cumb al           | Deveryater                                    | Conditions V <sub>cc</sub> (V)   | Conditions $V_{A} = -40^{\circ}C$ |      | 40°C to | 0°C to +85°C |     |
|-------------------|---|--|-----------------------------------|------|---------|--------------|-----|
| Symbol            | mbol Parameter Conditions V <sub>cc</sub> (V) | V <sub>cc</sub> (V)  | Min.                              | Тур. | Max.    | Unit         |     |
| +                 |   | R <sub>L</sub> =50Ω, C <sub>L</sub> =30pF, V <sub>SW</sub> =0.8V   | 2.8 to 4.3                        |      | 55      | 75           |     |
| t <sub>ON</sub>   | Turn-On Time, /OE to Output                   | Figure 4   | 1.8                               |      |         | 110          | ns  |
| +                 |   | R <sub>L</sub> =50Ω, C <sub>L</sub> =30pF, V <sub>SW</sub> =0.8V   | 2.8 to 4.3                        |      | 24      | 75           | 20  |
| t <sub>OFF</sub>  | Turn-Off Time, /OE to Output                  | Figure 4   | 1.8                               |      |         | 110          | ns  |
| t <sub>BBM</sub>  | Break-Before-Make Time                        | $R_L$ =50 $\Omega$ , $C_L$ =30pF, $V_{SW}$ =0.8V<br>Figure 5   |                                   | 2    | 35      |              | ns  |
| O <sub>IRR</sub>  | Off Isolation                                 | $\begin{array}{l} R_L = 50\Omega, \ f = 100 \ KHz, \ /OE = V_{CC}, \\ V_{SW} = 13 \ dBm \ (3V_{pp}) \\ Figure \ 6 \end{array}$ | 1.8 to 4.3                        |      | 90      |              | dB  |
| X <sub>TALK</sub> | Crosstalk                                     | $R_L$ =50Ω, f=100KHz,<br>V <sub>SW</sub> =13dBm (3V <sub>pp</sub> )<br>Figure 6  | 1.8 to 4.3                        |      | 85      |              | dB  |
|                   |   | $R_L$ =50 $\Omega$ , $C_L$ =0pF, Figure 8  |                                   |      | 210     |              |     |
| D\M               | BW I-3db Bandwidth                            | $R_L$ =50 $\Omega$ , $C_L$ =5 $pF$ , Figure 8  | 3.0                               |      | 198     |              | MHz |
| DVV               |   | $R_L$ =50 $\Omega$ , $C_L$ =30pF, Figure 8   | 3.0                               |      | 120     |              |     |
|                   |   | $R_L$ =50 $\Omega$ , $C_L$ =50pF, Figure 8   |                                   |      | 78      |              |     |

#### Note:

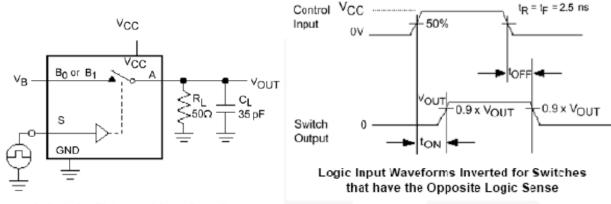
4. Guaranteed by characterization; not production tested.

## Capacitance

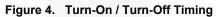
 $T_A$ =25°C unless otherwise noted.

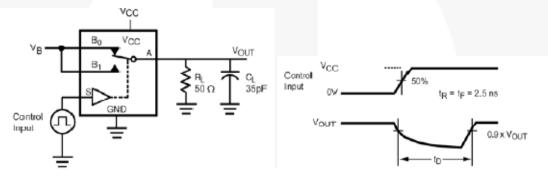
| Symbol Parameter |                               | Conditions                                     |          | T <sub>A</sub> =- 40°C to +85°C |      |      |
|------------------|-------------------------------|--|----------|---------------------------------|------|------|
| Symbol           | Parameter                     | Conditions                                     | Min. T   | ур.                             | Max. | Unit |
| C <sub>IN</sub>  | Control Pin Input Capacitance | V <sub>CC</sub> =0V, f=1MHz                    |          | 2                               | 1    | pF   |
| C <sub>ON</sub>  | On Capacitance                | $V_{CC}$ =3.3V, /OE=0V, f=1MHz, Figure 7       | <u>_</u> | 28                              |      | pF   |
| COFF             | Off Capacitance               | $V_{\text{CC}}$ and /OE=3.3V, f=1MHz, Figure 7 |          | 12                              |      | pF   |

#### **AC Loadings and Waveforms**



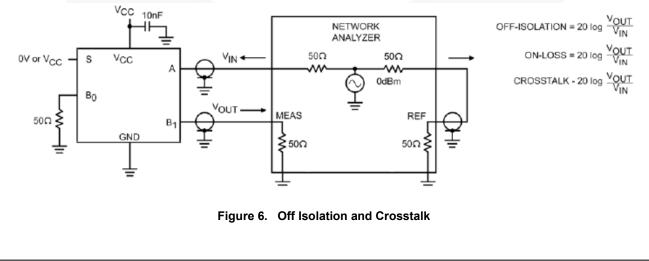
CL includes Fixture and Stray Capacitance



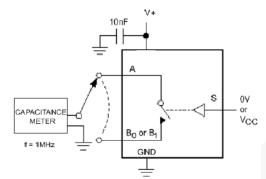


CL Includes Fixture and Stray Capacitance

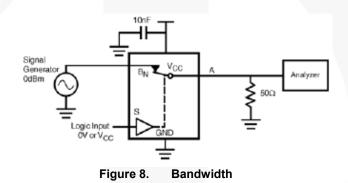
Figure 5. Break-Before-Make Timing



## AC Loadings and Waveforms (Continued)







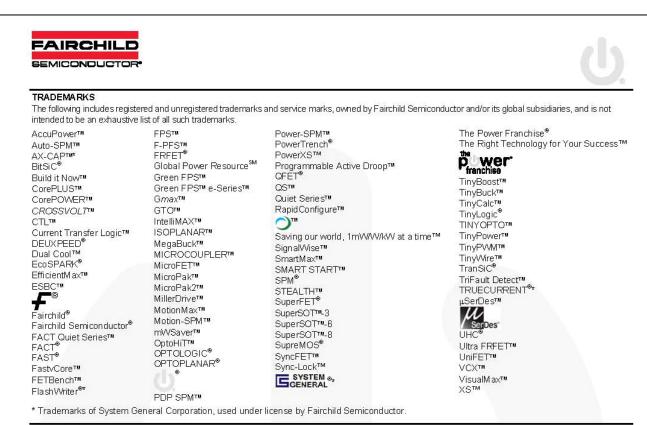
#### **Physical Dimensions** 0.10 C 3.00 Α 2X 3.00 В PIN1 1 80 IDENT 3.00 [.... .... **—** 3.00 1.80 ------0.10 C F. 2X 0.80 20X TOP VIEW 0.40 0.20 20X 0.08 C 0.55 MAX // 0.10 C RECOMMENDED LAND PATTERN (0.15) 0.05 Ċ 0.00 SIDE VIEW SEATING PLANE NOTES: 1.75 1.65 A. PACKAGE CONFORMS TO JEDEC MO-248 VARIATION UEEE. B. DIMENSIONS ARE IN MILLIMETERS. 10 C. DIMENSIONS AND TOLERANCES PER 0.25 0.15 20X 5 ASME Y14.5M, 1994. 11 D. LAND PATTERN RECOMMENDATION IS 1.75 1.65 FROM PCB MATRIX CALCULATOR V2009. $\subset$ E. DRAWING FILENAME: MKT-UMLP20Brev1. 15 PIN 1 20 16 IDENT 0.45 0.35 20X 0.40 0.10 C A B $\oplus$ 0.05(M) C BOTTOM VIEW



| Order Number | Operating<br>Temperature Range | Package Description                              | Packing<br>Method |
|--------------|--------------------------------|--|-------------------|
| FSA2866UMX   | -40 to 85°C                    | 20-Lead Ultrathin Molded Leadless Package (UMLP) | Tape & Reel       |

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