# GaAs IC 4 x 2 Switch Matrix 0.7–3.0 GHz

SKYWORKS

**AS212-93**

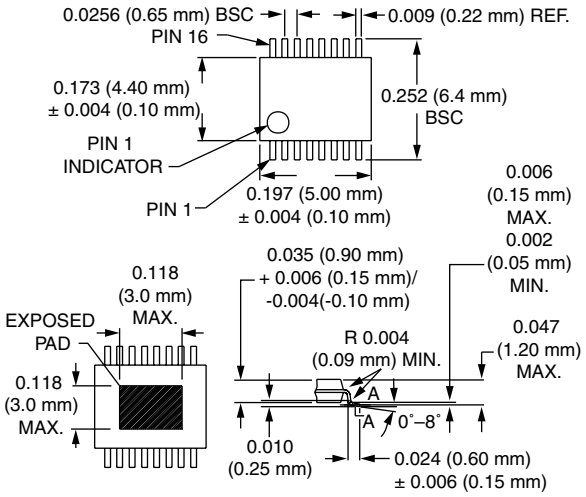
## Applications:

- DBS Switching Applications, Cable Modems, Cable TV

## Features

- Four Inputs, Two Output Switches
- Any Input Can Be Directed To Either Output
- Only Requires 4 Control Lines
- Low DC Power Consumption
- Small Low Cost TSSOP-16 Plastic Package
- High Isolation Between Ports

## TSSOP-16




## Description

The AS212-93 is an IC FET 4 x 2 matrix switch in a low cost TSSOP-16 exposed paddle plastic package. The exposed paddle should be grounded. The AS212-93 enables 16 states directing any of the four inputs to any of the two outputs. DC block capacitors are required at each RF port. States are selected by 4 positive controls. All ports are absorptive. The AS212-93 switch is suitable for DBS switching applications.

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## Electrical Specifications at 25°C (0, +5 V)

| Parameter[1] | Frequency | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Insertion Loss | 0.70–0.95<br>0.95–1.45<br>1.45–2.15<br>2.15–3.00 | | 6.50<br>6.50<br>6.75<br>7.00 | 7.00<br>7.00<br>7.30<br>7.50 | dB<br>dB<br>dB<br>dB |
| Insertion Loss Flatness | 0.70–3.00 | | 1.0 | 2.0 | dB |
| Isolation | 0.70–0.95<br>0.95–1.45<br>1.45–2.15<br>2.15–3.00 | 25.0<br>23.0<br>22.5<br>19.5 | 33.0<br>28.5<br>28.5<br>25.5 | | dB<br>dB<br>dB<br>dB |
| Return Loss Insertion Loss State | 0.70–3.00 | 9 | 11 | | dB |
| Return Loss Isolation State | 0.70–3.00 | 9 | 11 | | dB |

## Operating Characteristics at 25°C (0, +5 V)

| Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $P_{-1\ dB}$ | 0, +5 V | | 12 | | dBm |
| $V_{CC}$ | @ 400 µA Max. | 4.5 | | 5.5 | V |
| Control Voltages $V_1$, $V_2$, $V_3$, $V_4$ | Low @ 50 µA Max.<br>High @ 50 µA Max. | 0<br>2.5 | | 0.2<br>$V_{CC}$ | V<br>V |

1. All measurements made in a 50 Ω system.



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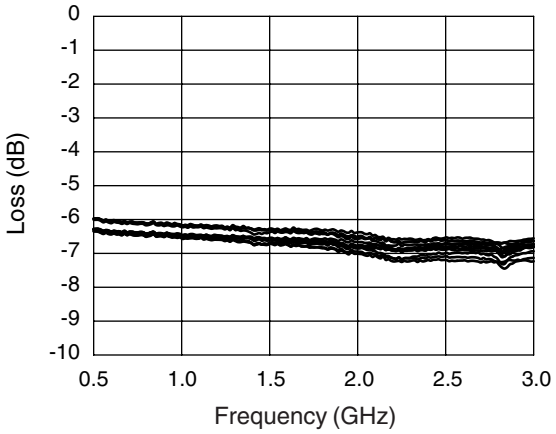
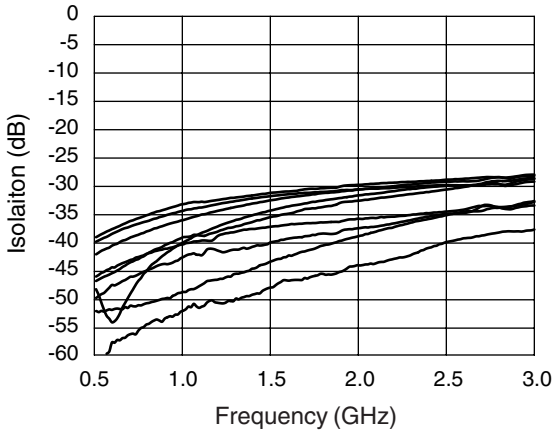
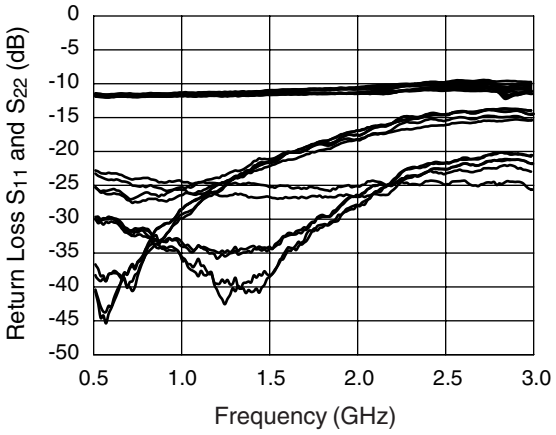
## Typical Performance Data (0, +3 V)



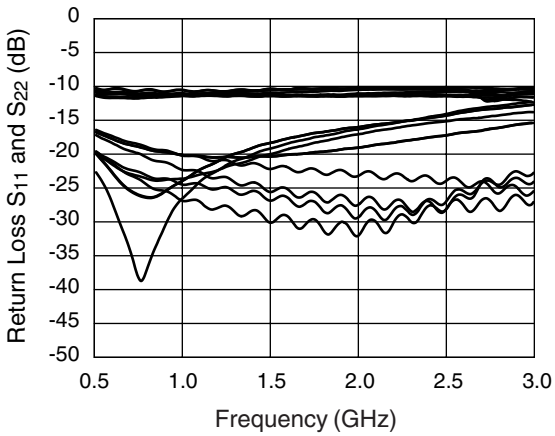

**Typical Insertion Loss (Various States Shown)**




**Typical Isolation (Including Worst Case)**




**Return Loss Insertion Loss State**




**Return Loss Isolation State**

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## Absolute Maximum Ratings

| Characteristic | Value |
|---|---|
| RF Input Power | 15 dBm |
| Supply Voltage | +6 V |
| Control voltage | +6 V |
| Operating Temperature | -40 to +85°C |
| Storage Temperature | -65 to +150°C |

Note: Exceeding these parameters may cause irreversible damage.


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## Truth Table

| | | Controls | | | |
|---|---|---|---|---|---|
| | | For LO (Left Output) | | For RO (Right Output) | |
| State # | Signal Path (Insertion Loss Path)[1] | SW A1 | SW A2 | SW B1 | SW B2 |
| 0 | I1->LO & I1->RO | 0 | 0 | 0 | 0 |
| 1 | I1->LO & I2->RO | 0 | 0 | 0 | 1 |
| 2 | I1->LO & I3->RO | 0 | 0 | 1 | 0 |
| 3 | I1->LO & I4->RO | 0 | 0 | 1 | 1 |
| 4 | I2->LO & I1->RO | 0 | 1 | 0 | 0 |
| 5 | I2->LO & I2->RO | 0 | 1 | 0 | 1 |
| 6 | I2->LO & I3->RO | 0 | 1 | 1 | 0 |
| 7 | I2->LO & I4->RO | 0 | 1 | 1 | 1 |
| 8 | I3->LO & I1->RO | 1 | 0 | 0 | 0 |
| 9 | I3->LO & I2->RO | 1 | 0 | 0 | 1 |
| 10 | I3->LO & I3->RO | 1 | 0 | 1 | 0 |
| 11 | I3->LO & I4->RO | 1 | 0 | 1 | 1 |
| 12 | I4->LO & I1->RO | 1 | 1 | 0 | 0 |
| 13 | I4->LO & I2->RO | 1 | 1 | 0 | 1 |
| 14 | I4->LO & I3->RO | 1 | 1 | 1 | 0 |
| 15 | I4->LO & I4->RO | 1 | 1 | 1 | 1 |

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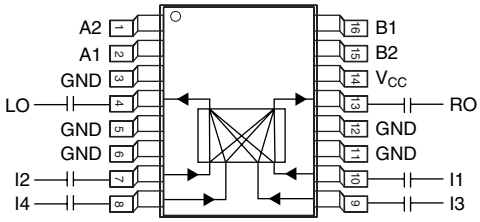
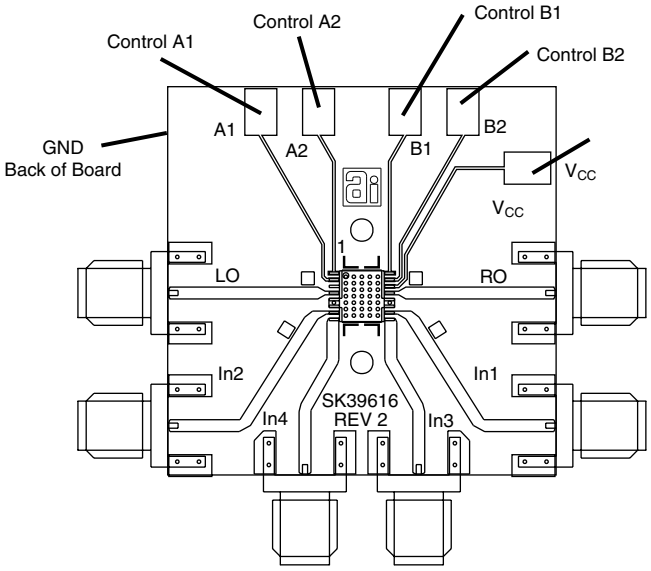
1. All other paths are in isolation.
"1" = 5 V.
"0" = 0 V.

## Pin Out




Unused leads and package bottom should be well grounded.
All paths are bidirectional.

## Test Board




Bias $V_{CC}$ before applying bias to control lines.
Control lines need to be grounded for "0 V".
Control lines can not be left open circuit.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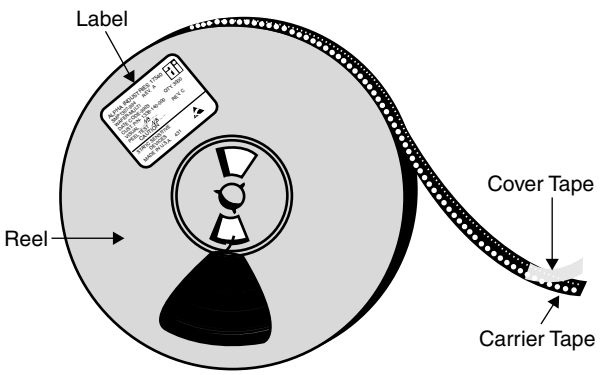
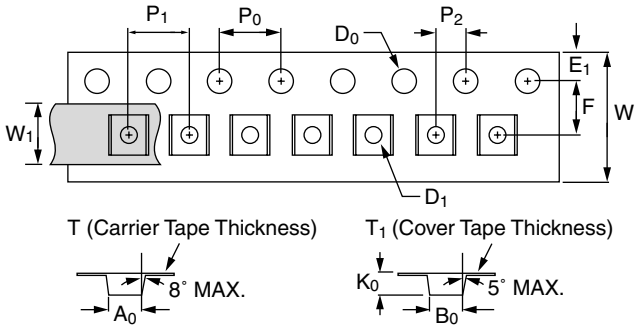



## Tape Dimensions




| Description | Symbol | TSSOP-16 |
|---|---|---|
| **Cavity** | | |
| Length | $A_0$ | 0.80±0.10 |
| Width | $B_0$ | 5.40±0.10 |
| Depth | $K_0$ | 1.60±0.10 |
| Pitch | $P_1$ | 8.00±0.10 |
| Bottom Hole Diameter | $D_1$ | 1.60±0.10 |
| **Perforation** | | |
| Diameter | $D_0$ | 1.50±0.10 |
| Pitch | $P_0$ | 4.00±0.10 |
| Position | $E_1$ | 1.75±0.10 |
| **Carrier Tape** | | |
| Width | W | 12.0±0.30 |
| Thickness | T | 0.30±0.05 |
| **Cover Tape** | | |
| Width | $W_1$ | 9.20±0.10 |
| Tape Thickness | $T_1$ | 0.062±0.01 |
| **Distance** | | |
| Cavity to Perforation (Width Direction) | F | 7.50±0.10 |
| Cavity to Perforation (Length Direction) | $P_2$ | 2.00±0.1 |

Note: All dimensions are in mm.

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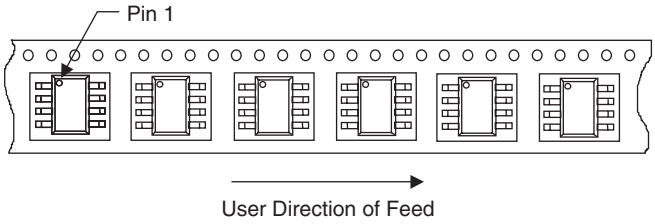
## SOIC, MSOP, QSOP, SSOP and TSSOP Devices

### 8, 10, 14, 16, 20, 28 Leads




| Standard Reel Size | 7" | 13" |
|---|---|---|
| Standard Reel Quantity | 1,000 | 3,000 |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