High Power GaAs DPDT Diversity Switch
DC-4.0 GHz

## Features

- Ideal for high power diversity switch applications including WiMax, WLAN MESH Networks, and Fixed Wireless Access
- Broadband Performance: DC - 4.0 GHz
- Low Insertion Loss: $0.8 \mathrm{~dB} @ 2.5 \mathrm{GHz}$ and $1.2 \mathrm{~dB} @ 3.5 \mathrm{GHz}$
- High P1dB Compression: 39.5 dBm @ 5 V
- Fast Settling for Low Gate Lag Requirements
- Lead-Free 3 mm 12-Lead PQFN Package
- 100\% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and $260^{\circ} \mathrm{C}$ Reflow Compatible


## Description

M/A-COM's MASW-007587 is a broadband GaAs PHEMT MMIC diversity switch available in a leadfree 3 mm 12-lead PQFN package. The MASW007587 is ideally suited for applications where very small size and high linear power are required.

Typical applications include 2.5 \& 3.5 GHz WiMax, WLAN MESH networks, fixed wireless access, and other higher power systems. Designed for high power, this DPDT switch maintains high linearity up to 4.0 GHz .

The MASW-007587 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

## Ordering Information ${ }^{1}$

| Part Number | Package |
| :---: | :---: |
| MASW-007587-TR3000 | 3000 piece reel |
| MASW-007587-000SMB | Sample Test Board <br> (Includes 5 Samples) |

1. Reference Application Note M513 for reel size information.

## Functional Schematic



## Pin Configuration

| Pin No. | Pin Name | Description |
| :---: | :---: | :---: |
| 1 | GND | Ground |
| 2 | GND | Ground |
| 3 | V 11 | Control 1 |
| 4 | ANT1 | Antenna Port 1 |
| 5 | GND | Ground |
| 6 | ANT2 | Antenna Port 2 |
| 7 | V 2 | Control 2 |
| 8 | GND | Ground |
| 9 | GND | Ground |
| 10 | Rx | Receive Port |
| 11 | GND | Ground |
| 12 | Tx | Transmit Port |
| 13 | Paddle ${ }^{2}$ | RF and DC Ground |

2. The exposed pad centered on the package bottom must be connected to RF and DC ground.
[^0]Electrical Specifications: $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, \mathrm{Z}_{0}=50 \Omega, \mathrm{~V}_{\mathrm{C}}=0 \mathrm{~V} / 3 \mathrm{~V}, 39 \mathrm{pF}$ Capacitor ${ }^{3}$

| Parameter | Test Conditions | Units | Min. | Тур. | Max. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Insertion Loss ${ }^{4}$ | $\begin{gathered} 0.5-1 \mathrm{GHz} \\ 1-2 \mathrm{GHz} \\ 2-3 \mathrm{GHz} \\ 2.45 \mathrm{GHz} \\ 3-4 \mathrm{GHz} \end{gathered}$ | dB <br> dB <br> dB <br> dB <br> dB | - — — | $\begin{aligned} & 0.6 \\ & 0.7 \\ & 0.8 \\ & 0.8 \\ & 1.2 \end{aligned}$ | $\begin{aligned} & - \\ & - \\ & 1.2 \end{aligned}$ |
| Isolation (on/off or off/on) <br> Iso @ Tx when IL from Ant 2 to Rx <br> Iso @ Rx when IL from Ant 1 to Tx | $\begin{gathered} 0.5-1 \mathrm{GHz} \\ 1-2 \mathrm{GHz} \\ 2-3 \mathrm{GHz} \\ 2.45 \mathrm{GHz} \\ 3-4 \mathrm{GHz} \end{gathered}$ | dB <br> dB <br> dB <br> dB <br> dB | $\begin{aligned} & - \\ & - \\ & 24 \end{aligned}$ | $\begin{gathered} 41.5 \\ 35 \\ 30 \\ 30 \\ 27 \end{gathered}$ | - - - |
| Isolation (on/off or off/on) <br> Iso @ Tx when IL from Ant 1 to Rx Iso @ Rx when IL from Ant 2 to Tx | $\begin{gathered} 0.5-1 \mathrm{GHz} \\ 1-2 \mathrm{GHz} \\ 2-3 \mathrm{GHz} \\ 2.45 \mathrm{GHz} \\ 3-4 \mathrm{GHz} \end{gathered}$ | dB <br> dB <br> dB <br> dB <br> dB | $\bar{Z}$ | $\begin{gathered} 46.5 \\ 43 \\ 38 \\ 38 \\ 32 \end{gathered}$ | - — - |
| Return Loss | $\begin{gathered} 0.5-1 \mathrm{GHz} \\ 1-2 \mathrm{GHz} \\ 2-3 \mathrm{GHz} \\ 3-4 \mathrm{GHz} \end{gathered}$ | dB <br> dB <br> dB <br> dB | - - - | $\begin{gathered} 14 \\ 15 \\ 19.5 \\ 14 \end{gathered}$ | — — — |
| IP3 | Two Tone, $+15 \mathrm{dBm} /$ Tone, 5 MHz Spacing, 2.4 GHz $\begin{aligned} & \mathrm{V}_{\mathrm{C}}=3 \mathrm{~V} \\ & \mathrm{~V}_{\mathrm{C}}=5 \mathrm{~V} \\ & \mathrm{~V}_{\mathrm{C}}=8 \mathrm{~V} \end{aligned}$ | dBm dBm dBm | — | $\begin{gathered} 57.5 \\ 59 \\ 60 \\ \hline \end{gathered}$ | - |
| Input P1dB | $\begin{aligned} & 2.4 \mathrm{GHz}, \mathrm{~V}_{\mathrm{C}}=3 \mathrm{~V} \\ & 2.4 \mathrm{GHz}, \mathrm{~V}_{\mathrm{C}}=5 \mathrm{~V} \\ & 2.4 \mathrm{GHz}, \mathrm{~V}_{\mathrm{C}}=8 \mathrm{~V} \end{aligned}$ | dBm <br> dBm <br> dBm | — | $\begin{gathered} 34 \\ 39.5 \\ 41 \end{gathered}$ | - |
| $2^{\text {nd }}$ Harmonic | 2.4 GHz, Pin $=15 \mathrm{dBm}$ | dBc | - | -86 | - |
| $3{ }^{\text {rd }}$ Harmonic | 2.4 GHz, Pin $=15 \mathrm{dBm}$ | dBc | - | -91 | - |
| Trise, Tfall | 10\% to 90\% RF 90\% to $10 \%$ RF | $\begin{aligned} & \mathrm{nS} \\ & \mathrm{nS} \end{aligned}$ | - | $\begin{aligned} & 64 \\ & 80 \end{aligned}$ | - |
| Ton, Toff | 50\% control to 90\% RF and 50\% control to 10\% RF | nS | - | 90 | - |
| Transients | - | mV | - | 5 | - |
| Control Current | - | $\mu \mathrm{A}$ | - | 5 | 10 |

3. For positive voltage control, external DC blocking capacitors are required on all RF ports.
4. Insertion loss can be optimized by varying the DC blocking capacitor value. For use above $2.5 \mathrm{GHz}, \mathrm{M} / \mathrm{A}-\mathrm{COM}$ recommends using smaller capacitor values. For example, use 5 pF for 3.2 GHz .

- North America Tel: 800.366.2266 / Fax: 978.366.2266
- Europe Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- Asia/Pacific Tel: 81.44.844.8296 / Fax: 81.44.844.8298

Visit ww.macomtech.com for additional data sheets and product information.

## Evaluation Board for 3 mm 12-Lead PQFN



## Absolute Maximum Ratings ${ }^{5,6}$

| Parameter | Absolute <br> Maximum |
| :---: | :---: |
| Input Power @ 3 V Control | +35 dBm CW |
| Input Power @ 5 V Control | +37 dBm CW |
| Voltage | $\leq 8$ volts |
| Operating Temperature | $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$ |
| Storage Temperature | $-65^{\circ} \mathrm{C}$ to $+150^{\circ} \mathrm{C}$ |

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. M/A-COM does not recommend sustained operation near these survivability limits.

## Application Schematic



[^1]
## Truth Table ${ }^{7,8}$

| Control <br> $\mathbf{V}_{\mathbf{c}} \mathbf{1}$ | Control <br> $\mathbf{V}_{\mathbf{c}} \mathbf{2}$ | ANT 1 <br> $\mathbf{- ~ R x}$ | ANT 1 <br> $\mathbf{- ~ T x}$ | ANT 2 <br> $\mathbf{- ~ T x}$ | ANT 2 <br> $\mathbf{- ~ R x}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0 | On | Off | On | Off |
| 0 | 1 | Off | On | Off | On |

7. Differential voltage, V (state 1 ) - V (state 0 ), must be +2.7 V minimum and must not exceed 8.0 V .
8. $1=+2.9 \mathrm{~V}$ to $+8 \mathrm{~V}, 0=0 \mathrm{~V}+0.2 \mathrm{~V}$.

## Qualification

Qualified to M/A-COM specification REL-201, Process Flow -2.

## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

[^2]
## Typical Performance Curves

## Insertion Loss, 4 pF Capacitors



Isolation, 4 pF Capacitors


S11,


Insertion Loss, 39 pF Capacitors


Isolation, 39 pF Capacitors


S11,


4

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## Lead-Free 3 mm 12-Lead PQFN ${ }^{\dagger}$


$\dagger$ Reference Application Note M538 for lead-free solder reflow recommendations.

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typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available.
Commitment to produce in volume is not guaranteed.


[^0]:    * Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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