

Rev. V6

Features

- Exceptional Broadband Performance
- Suitable for Higher Power WiMax & WLAN Applications
- Lower Loss:

Tx = 0.40 dB @ 3.8 GHz, 22mA Rx = 0.60 dB @ 3.8 GHz, 22mA

· Higher Isolation:

Rx-Tx = 21 dB @ 3.8 GHz Tx-Rx = 26 dB @ 3.8 GHz

- Higher RF Input Power = 10 W C.W. (Tx-Ant Port)
- Higher IIP3 = 65 dBm (Tx-Ant Port).
- Lower EVM (OFDM):

< 1.0% @ 8W Pin, (Tx-Ant Port)

- Lead-Free 3 mm 16-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

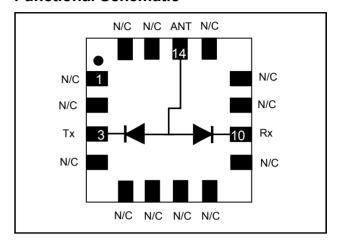
Description

MA-COM's MASW-000822-12770T is a Broadband, high linearity, common anode PIN diode SPDT switch in a lead-free 3 mm 16-lead PQFN package. The MASW-00822-1277OT is ideally suited for 0.05 - 6.0 GHz applications, including WiMax & WLAN.

This SP2T switch offers excellent isolation to loss ratio for both Tx and Rx states. The PIN diode provides exceptional 10 W C.W power handling coupled with 65 dBm IIP3 for maximum switch performance @ 3.8GHz.

This MASW-000822-1277OT incorporates a PIN diode die fabricated with M/A-COM's patented Silicon-Glass HMICTM process. This chip features two silicon pedestals embedded in a low loss, low dispersion glass. The diodes are formed on the top of each pedestal. The topside is fully encapsulated with silicon nitride and has an additional polymer passivation layer. These polymer protective coatings prevent damage and contamination during handling and assembly.

Functional Schematic



Pin Configuration ¹

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1 | N/C | 9 | N/C |
| 2 | N/C | 10 | Rx |
| 3 | Tx | 11 | N/C |
| 4 | N/C | 12 | N/C |
| 5 | N/C | 13 | N/C |
| 6 | N/C | 14 | Ant |
| 7 | N/C | 15 | N/C |
| 8 | N/C | 16 | N/C |

The exposed pad centered on the package bottom must be connected to RF and DC ground.

Ordering Information ²

| Part Number | Package | | |
|--------------------|-------------------------|--|--|
| MASW-000822-1277OT | 1000 piece reel, 7 inch | | |
| MASW-000822-001SMB | Sample Board | | |

^{2.} Reference Application Note M513 for reel size information.

^{*} Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

MASW-000822-1277OT



HMIC[™] PIN Diode SP2T 10 Watt Switch for 0.05 - 6.0 GHz Higher Power Applications

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Electrical Specifications: $T_A = 25^{\circ}C$, $P_{IN} = 0$ dBm, $Z_0 = 50 \Omega$

| Parameter | Conditions | Units | Min. | Тур. | Max. |
|---------------------------------|--|-------|----------------------|----------------------|----------------------|
| Insertion Loss, Rx | Rx = +5.0 V @ +22 mA, Tx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | _ _ _ | 0.55 0.60 0.80 | 0.70 0.75 0.90 |
| Insertion Loss, Tx | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | _ _ _ | 0.35 0.40 0.50 | 0.45 0.55 0.60 |
| Isolation, Tx to R _x | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | 27.0 24.5 21.0 | 29.5 26.5 21.5 | _ _ _ |
| Isolation, Rx to T _x | Rx = +5.0 V @ +22 mA, Tx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | 22.5 19.5 17.5 | 24.5 21.5 17.5 | _ _ _ |
| Input Return Loss Tx | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | _ _ _ | 17 18 18 | _ _ _ |
| Input Return Loss Rx | Rx = +5.0 V @ +22 mA, Tx =+12V @ 0 mA 2.3 - 2.7 GHz 3.3 - 3.8 GHz 4.9 - 5.9 GHz | dB | | 17 18 18 | |

Electrical Specifications: F = 3.5 GHz, T_A = 25°C, Z_0 = 50 $\Omega^{3,4,5}$

| Parameter | Conditions | Units | Min. | Тур. | Max. |
|---------------------------------------|--|-------|------|------|------|
| Tx Input P0.1dB | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Tx To Antenna | dBm | _ | 40 | |
| Tx Input P1dB | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Tx To Antenna | dBm | _ | 45 | _ |
| Tx 2nd Harmonic | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Pin = + 30 dBm | dBc | _ | -68 | _ |
| Tx 3rd Harmonic | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Pin = + 30 dBm | dBc | _ | -84 | _ |
| Tx Input 3rd Order Intercept Point | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Pin = + 10 dBm F1 = 3.500 GHz, F2 = 3.510 GHz | dBm | _ | 65 | _ |
| Tx C.W. Input Power | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, F= 4.0 GHz | dBm | _ | | 40 |
| Rx C.W. Input Power | Rx = +5.0 V @ +22 mA, Tx =+12V @ 0 mA, F= 4.0 GHz | dBm | _ | | 33 |
| Tx EVM (OFDM) | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Pin = +39 dBm | % | _ | 8.0 | _ |
| Tx EVM (OFDM) | Tx = +5.0 V @ +22 mA, Rx =+12V @ 0 mA, Pin = +40 dBm | % | _ | 1.2 | |
| Tx RF Switching Speed | (10-90% RF Voltage) Tx = +5.0 V@ +22 mA, Rx =+12V @ 0 mA 1MHz Rep Rate in Modulating Mode | ns | _ | <500 | _ |

^{3.} Data taken at device RF leads.

^{4.} Typical PIN diode forward voltage = +0.8 V @ 10 mA, +0.85 V @22 mA.

^{5.} Typical PIN diode reverse voltage = +12.0 V



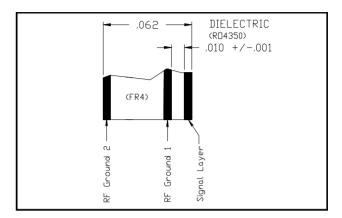
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Absolute Maximum Ratings ⁶

0 T_A = +25 °C (unless otherwise specified)

| Parameter | Absolute Maximum | | |
|------------------------|--------------------------|--|--|
| Forward Current | + 100 mA | | |
| Reverse Voltage | -100 V | | |
| Operating Temperature | -40 °C to +85 °C | | |
| Storage Temperature | -55 °C to +150 °C | | |
| Junction Temperature | +175 °C | | |
| Tx Incident C.W. Power | 10 W C.W. | | |
| Tx Peak Incident Power | 20 W, 3 μS P.W., 1% Duty | | |
| Rx Incident C.W. Power | 2 W C.W. | | |

Cross Section View of M/A-Com PCB

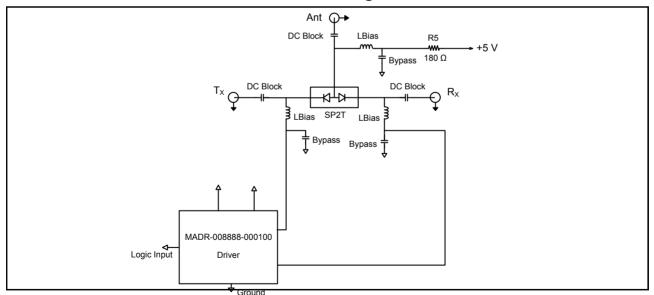


6. Exceeding these limits may cause permanent damage.

D.C. Bias to RF Truth Table

| RF State | TTL & D.C. Bias Conditions | Voltage at Common Anode |
|--------------------------------------|---|-------------------------|
| Low Loss Tx-Ant & Isolation Tx-Rx | TTL = 1 + 5V @ 22 mA (Tx), + 12V @ 0 mA (Rx) | + 0.9 V |
| Low Loss Ant-Rx & Isolation Rx-Tx | TTL = 0 + 5V @ 22 mA (Rx), + 12V @ 0 mA (Tx) | + 0.9 V |

Driver and SP2T Schematic with Positive Voltage 7,8,9,10,11



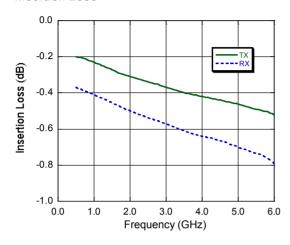
- 7. Forward Bias Diode Voltage, ΔVf @ 22 mA = + 0.9 V.
- 8. Reverse Bias Diode = | (+12 V +0.9 V) | = | 11.1 | V.



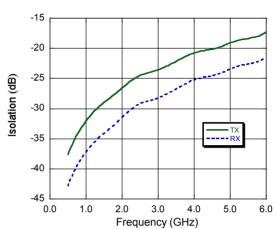
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Typical Performance Curves: $T_A = 25^{\circ}C$, $Z_0 = 50 \Omega$

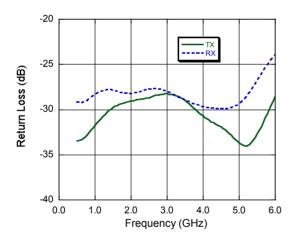
Insertion Loss



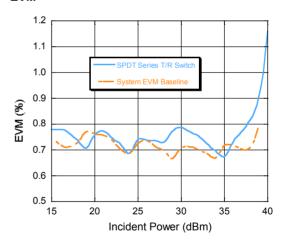
Isolation



Tx and RX Return Loss



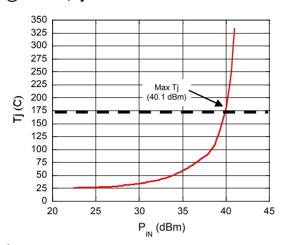
EVM





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Tx Diode Junction Temperature vs. C.W. Input Power @ 4.0 GHz , Tj = 175°C



This device is not for saturation power application. Exceeding power dissipation maximum rating might result in device failure.

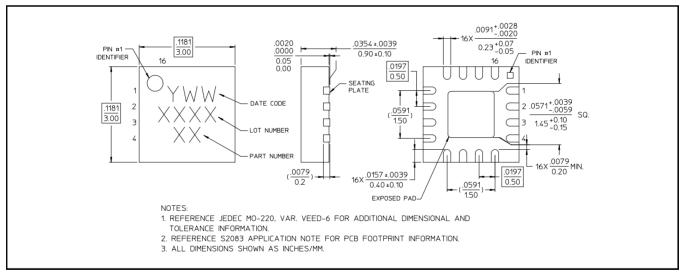
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These devices are rated at Class 1B Human Body. Proper ESD control techniques should be used when handling these devices.

Lead-Free 3 mm 16-Lead PQFN[†]



[†] Reference Application Note S2803 for lead-free solder reflow recommendations. Meets JEDEC moisture sensitivity level 1 requirements.

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