M/A-COM

# 3 Watt Cellular T/R and Antenna Changeover Switch, DC - 3.0 GHz

## Features

- Low Cost Plastic SOT-26 Package
- Low Insertion Loss <0.6dB @ 1900 MHz
- Low Power Consumption <20µA @ +3V
- Very High Intercept Point: 53 dBm $IP_3$
- Both Positive and Negative 2.5 to 8 V Control
- For CDMA, W-CDMA, TDMA, GSM, PCS and DCS Applications

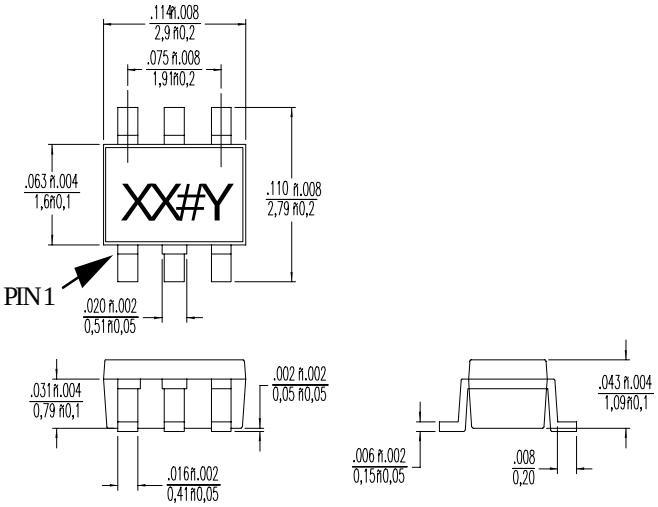


## Description

M/A-COM's SW-425 is a GaAs monolithic switch in a low cost SOT-26 surface mount plastic package. The SW-425 is ideally suited for applications where very low power consumption (<10µA@5V), low intermodulation products and very small size are required. Typical applications include Internal/External antenna select switch for portable telephones and data radios. In addition, because of its low loss, good isolation and inherent speed, the SW-425 can be used as a conventional T/R switch or as an antenna diversity switch. The SW-425 can be used in power applications up to 3 watts in systems such as celluar PCS, CDMA, W-CDMA, TDMA, GSM and other analog/digital wireless communications systems.

The SW-425 is fabricated using a new 0.5 micron gate length GaAs PHEMT process. The process features full chip passivation for increased performance and reliability.

## SOT-26 Plastic Package




## Ordering Information

| Part Number | Package |
|---|---|
| SW-425 PIN | SOT-26 Plastic Package |
| SW-425TR | Forward Tape and Reel [1] |
| SW-425RTR | Reverse Tape and Reel [1] |

1. Reference Application Note M513 for reel size information.

## Electrical Specifications $T_A$ = 25°C

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Insertion Loss | DC - 1 GHz | dB | | 0.4 | 0.5 |
| Insertion Loss | 1- 2 GHz | dB | | 0.55 | 0.65 |
| Insertion Loss | 2 - 3 GHz | dB | | 0.7 | 0.8 |
| Isolation | DC - 1 GHz | dB | 18 | 20 | |
| Isolation | 1 - 2 GHz | dB | 13 | 15 | |
| Isolation | 2 - 3 GHz | dB | 10 | 12 | |
| VSWR | DC - 3 GHz | | | 1.2:1 | 1.4:1 |
| $P_{1dB}$ (3V supply) | 500 MHz - 3 GHz | dBm | 32 | 34 | |
| $P_{1dB}$ (5V supply) | 500 MHz - 3 GHz | dBm | 34 | 36 | |
| Input $IP_2$ | 2-Tone, 5 MHz spacing, 0.9 GHz<br>+10 dBm (+13 dBm total) $V_{CTL}$=3V | dBm | 62 | 70 | |
| Input $IP_3$ | 2-Tone, 5 MHz spacing, 0.9 GHz<br>+10 dBm (+13 dBm total) $V_{CTL}$=3V | dBm | 48 | 53 | |
| Harmonics 2nd<br>3rd | Pin 30 dBm $\|V_{CTL}\|$ = 3V | dBc | 65<br>45 | 70<br>48 | |
| Harmonics 2nd<br>3rd | Pin 33 dBm $\|V_{CTL}\|$ = 5V | dBc | 65<br>65 | 75<br>75 | |
| $T_{rise}$, $T_{fall}$<br>$T_{on}$, $T_{off}$<br>Transients | 10% to 90% RF, 90% to 10% RF<br>50% Control to 90% RF, Control to 10% RF<br>In-Band | nS<br>nS<br>mV | | 60<br>20<br>20 | |
| Gate Leakage Current | $V_{CTL}$ = 3 V | µA | | 10 | 20 |

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## Absolute Maximum Ratings[1]

| Parameter | Absolute Maximum |
|---|---|
| Max. Input Power (0.5 - 3.0 GHz) | |
| 3 V Control | +36 dBm |
| 5 V Control | +38 dBm |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |

1. Exceeding any one or combination of these limits may cause permanent damage.



## Truth Table

| Mode (Control) | Control A | Control B | RFC - RF1 | RFC - RF2 |
|---|---|---|---|---|
| Positive[1] | 0±0.2V | +2.5 to +8V | Off | On |
| | +2.5 to +8V | 0±0.2V | On | Off |
| Postitive/ | -Vc±0.2V | +Vc | Off | On |
| Negative[1,2] | +Vc | -Vc±0.2V | On | Off |
| Negative[3] | 0±0.2V | -2.5V to -8V | On | Off |
| | -2.5V to -8V | 0±0.2V | Off | On |

1. External DC blocking capacitors are required on all RF ports. 39pF capacitors used for positive control voltage.
2. $|-V_{CTL}|$, $V_{CTL} \leq 8$ V
3. If negative control is used, DC blocking capacitors are not required on RF Ports.

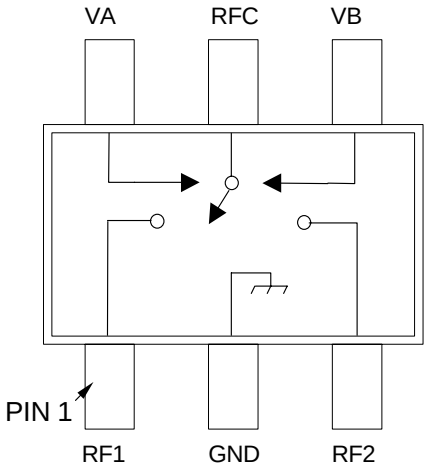
## Handling Procedures

The following precautions should be observed to avoid damage:

### Static Sensitivity

Gallium arsenide Integrated Circuits are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

## Functional Diagram




## PIN Configuration

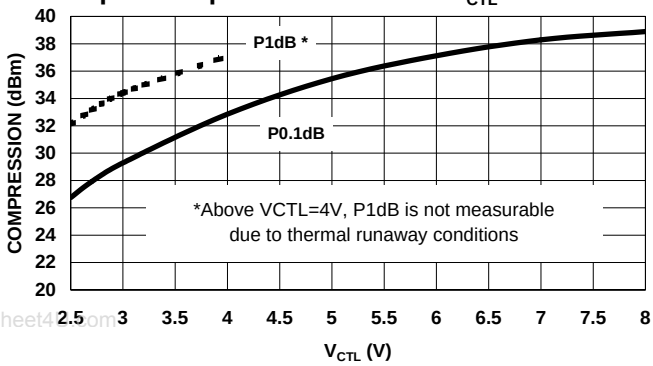
| PIN No. | Function | Description |
|---|---|---|
| 1 | RF1 | RF in/out |
| 2 | GND | RF Ground |
| 3 | RF2 | RF in/out |
| 4 | VB | V Control B |
| 5 | RFC | RF COMMON |
| 6 | VA | V Control A |



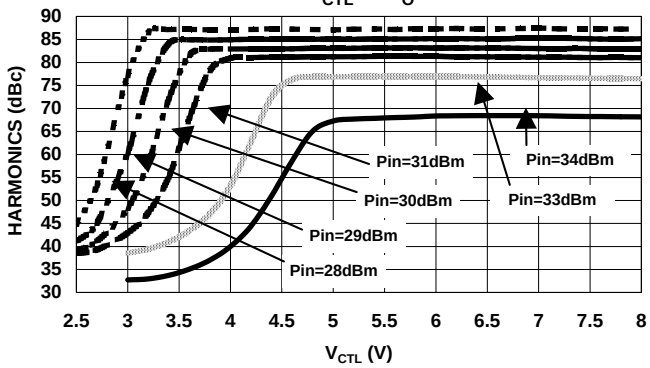
M/A-COM Division of AMP Incorporated ■ North America: Tel. (800) 366-2266, Fax (800) 618-8883 ■ Asia/Pacific: Tel.+85 2 2111 8088, Fax +85 2 2111 8087
■ Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

## Typical Performance Curves

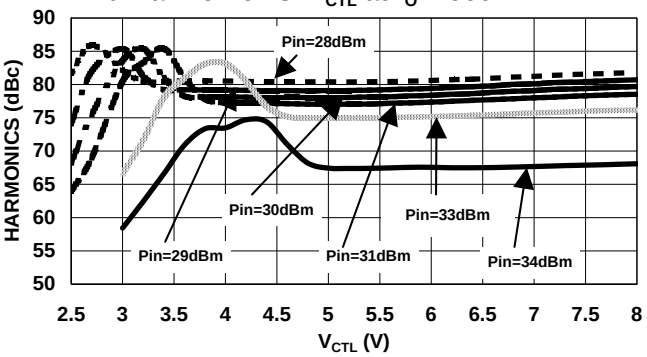
### Input Compression Point vs. $V_{CTL}$ at 900 MHz



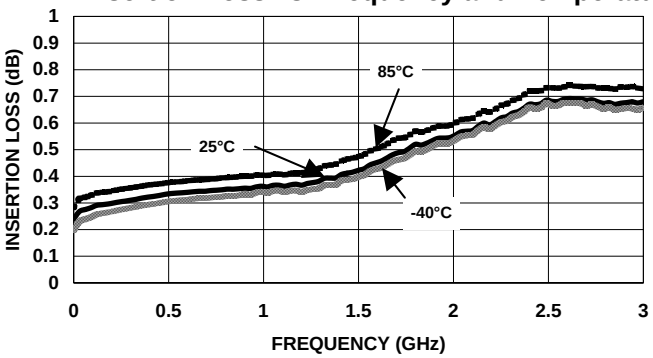

### 3rd Harmonic vs. $V_{CTL}$ at $f_O$ = 900 MHz



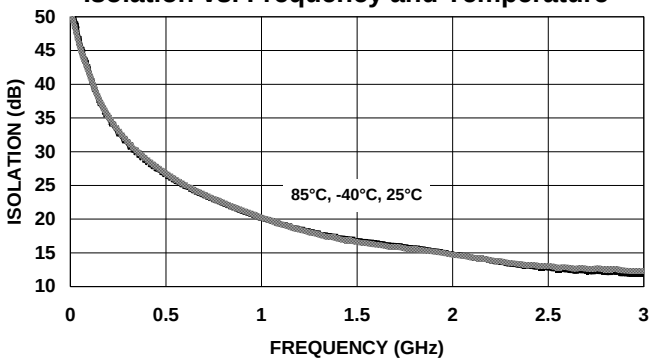

### 2nd Harmonic vs. $V_{CTL}$ at $f_O$ = 900 MHz



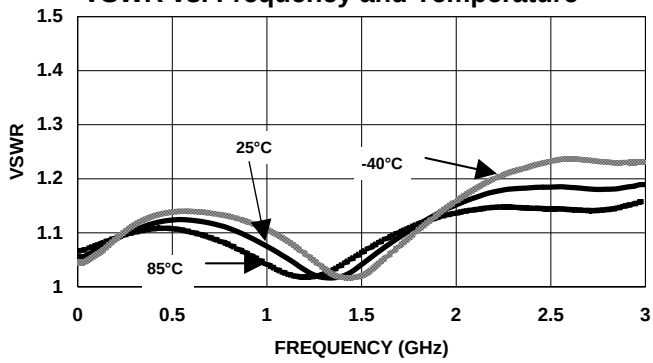

### Insertion Loss vs. Frequency and Temperature




### Isolation vs. Frequency and Temperature




### VSWR vs. Frequency and Temperature



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