

# GaAs IC Receive Diversity T/R Switch DC–2 GHz



AS149-59

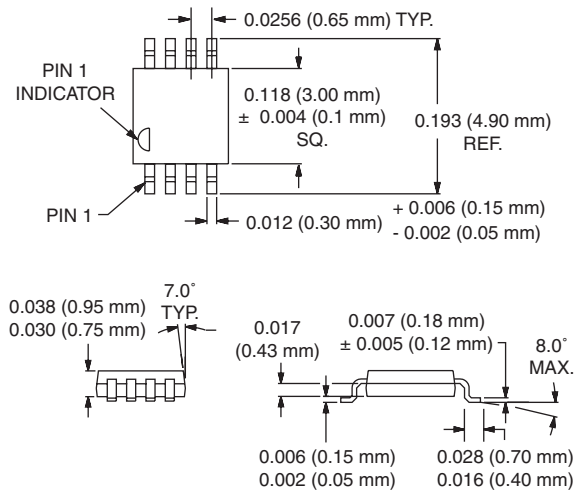
## Features

- PDC Antenna Switch
- Transmit to Main Antenna
- Receive from Dual Antenna Ports
- Operates with Positive, Negative or Differential Voltages
- Low DC Power Consumption

## Description

The AS149-59 is a GaAs MMIC T/R Switch with receive diversity ideal for use in PDC handsets and low power base stations. It can be operated with positive or negative 3 V or differential biasing for high linearity. The switch is packaged in a low cost, miniature MSOP-8 package.

## MSOP-8



## Electrical Specifications at 25°C (-2.75, +2.75 V)

On Path	Parameter <sup>1</sup>	Frequency <sup>2</sup>	Min.	Typ.	Max.	Unit
T <sub>X</sub> to M-Ant.	Insertion Loss <sup>3</sup>	DC–1.0 GHz		0.35	0.5	dB
		DC–2.0 GHz		0.50	0.7	dB
	R <sub>X</sub> to M-Ant. Iso.	DC–1.0 GHz	23	26		dB
		DC–2.0 GHz	15	19		dB
R <sub>X</sub> to M-Ant.	Insertion Loss	DC–1.0 GHz		0.65	0.8	dB
		DC–2.0 GHz		0.9	1.1	dB
	T <sub>X</sub> to M-Ant. Iso.	DC–1.0 GHz	15	18		dB
		DC–2.0 GHz	9	12		dB
	R <sub>X</sub> to S-Ant. Iso.	DC–1.0 GHz	20	23		dB
		DC–2.0 GHz	12	15		dB
R <sub>X</sub> to S-Ant.	Insertion Loss	DC–1.0 GHz		0.5	0.6	dB
		DC–2.0 GHz		0.9	1.1	dB
	T <sub>X</sub> to M-Ant. Iso.	DC–1.0 GHz	20	24		dB
		DC–2.0 GHz	12	15		dB
	VSWR <sup>4</sup>	DC–1.0 GHz		1.5:1		
		DC–2.0 GHz		1.7:1		

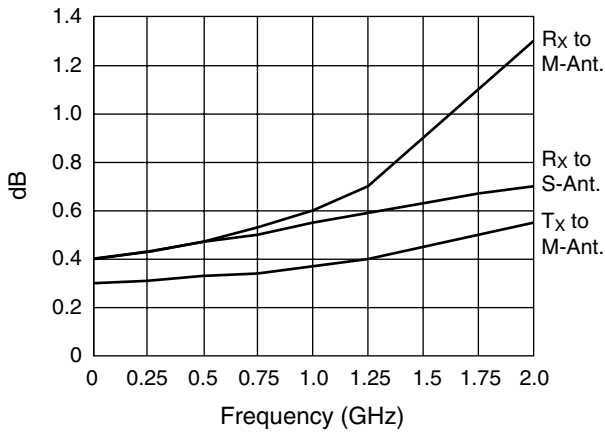
1. All measurements made in a 50 Ω system, unless otherwise specified.  
 2. DC = 300 kHz.  
 3. Insertion loss changes by 0.003 dB/°C.  
 4. Insertion loss state.

**Operating Characteristics at 25°C (-2.75, +2.75 V)**

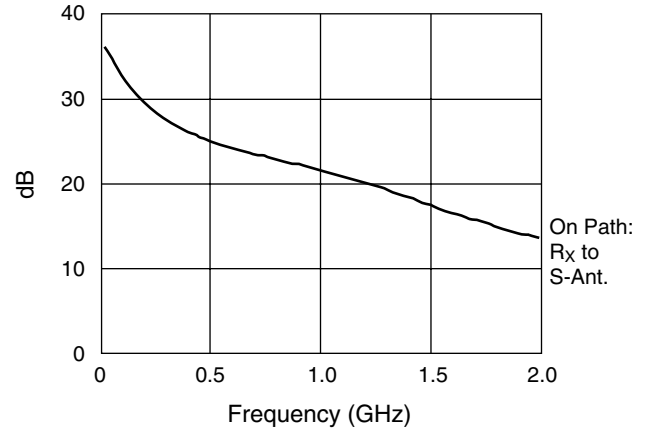
Parameter <sup>1</sup>	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics	Rise, Fall Time On, Off Time			75 150		ns ns
Input Power for 1 dB Compression	T <sub>X</sub> to M-Ant. R <sub>X</sub> to M-Ant. R <sub>X</sub> to S-Ant.	0.9 GHz		+38 +33 +33		dBm dBm dBm
Intermodulation Intercept Point	For Two-tone Input Power at +13 dBm T <sub>X</sub> to M-Ant. R <sub>X</sub> to M-Ant.	0.9 GHz		+49 +48		dBm dBm
Adjacent Channel Power Performance	T <sub>X</sub> to M-Ant. (PDC Standard, 30 dBm Input, 100 kHz Detune)			+69		dBm
Harmonic Channel Power Performance	30 dBm Input 2nd Harmonic 3rd Harmonic	0.9 GHz		+67 +82		dBc dBc
Control Voltages	V <sub>Low</sub> = -2.8 V ≤ V <sub>Low</sub> ≤ -4.8 V, 500 μA Max. V <sub>High</sub> = -0.2 V ≤ V <sub>High</sub> ≤ +3.2 V, 500 μA Max. Differential = +2.6 V ≤ (V <sub>High</sub> - V <sub>Low</sub> ) ≤ +8 V					

1. All measurements made in a 50 Ω system, unless otherwise specified.

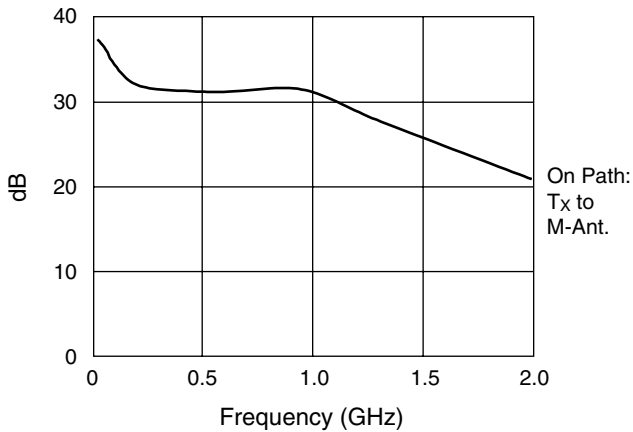
**Typical Performance Data (-2.75, +2.75 V)**



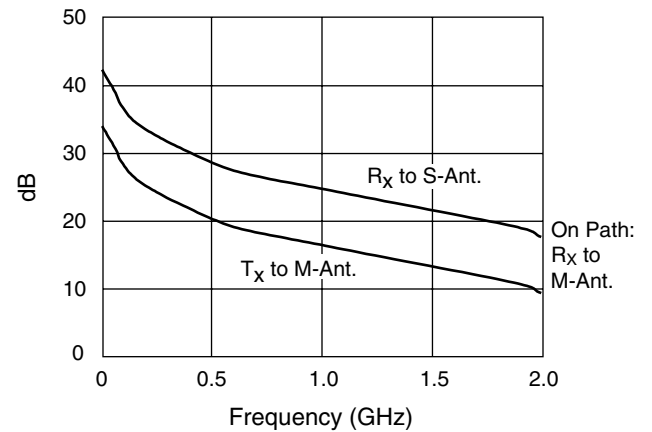
**Insertion Loss vs. Frequency**



**R<sub>X</sub> to M-Ant. Isolation vs. Frequency**



**R<sub>X</sub> to M-Ant. Isolation vs. Frequency**



**T<sub>X</sub> to M-Ant. and R<sub>X</sub> to S-Ant. Isolation vs. Frequency**

## Absolute Maximum Ratings

Characteristic	Value
RF Input Power	6 W > 500 MHz, 0/-10 V
Positive Voltage Differential Bias	$3\text{ V} \leq (V_{\text{High}} - V_{\text{Low}}) \leq 10.0\text{ V}$
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
$\Theta_{\text{JC}}$	25°C/W

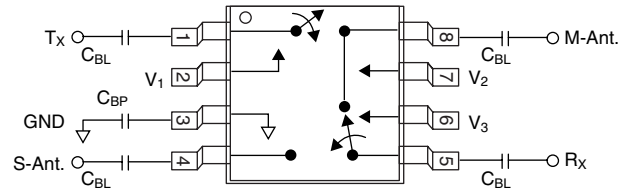
Note: Exceeding these parameters may cause irreversible damage.

## Truth Table

V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	T <sub>X</sub> M-Ant.	R <sub>X</sub> M-Ant.	R <sub>X</sub> S-Ant.
V <sub>High</sub>	V <sub>Low</sub>	V <sub>Low</sub>	Insertion Loss	Isolation	Isolation
V <sub>Low</sub>	V <sub>High</sub>	V <sub>Low</sub>	Isolation	Insertion Loss	Isolation
V <sub>Low</sub>	V <sub>Low</sub>	V <sub>High</sub>	Isolation	Isolation	Insertion Loss

V<sub>Low</sub> = -2.8 to -4.8 V.  
V<sub>High</sub> = -0.2 to +3.2 V.

## Pin Out



DC blocking ( $C_{\text{BL}}$ ) and bypass ( $C_{\text{BP}}$ ) capacitors must be supplied externally only if  $V_{\text{High}} > 0\text{ V}$ .

$C_{\text{BL}} = 100\text{ pF}$ ,  $C_{\text{BP}} = 1000\text{ pF}$  for operation >500 MHz.