HMC784AMS8GE

v01.0117

GaAs MMIC 10 WATT T/R SWITCH DC - 4 GHz

Typical Applications

The HMC784AMS8GE is ideal for:

- Cellular/4G Infrastructure
- WiMAX, WiBro & Fixed Wireless
- Automotive Telematics
- Mobile Radio
- Test Equipment

Features

Input P1dB: +40 dBm @ Vdd = +8V

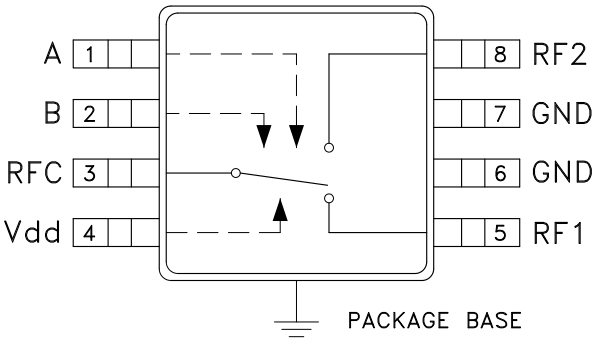
High Third Order Intercept: +60 dBm

Positive Control: +3 to +8 V

Low Insertion Loss: 0.3 dB

MSOP8G Package: 14.8 mm^2

Functional Diagram



General Description

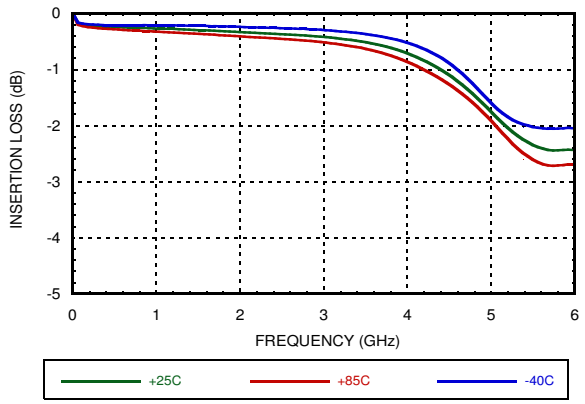
The HMC784AMS8GE is a high power SPDT switch in an 8-lead MSOPG package for use in transmit-receive applications which require very low distortion at high input signal power levels. The device can control signals from DC to 4 GHz. The design provides exceptional intermodulation performance; > +60 dBm third order intercept at +5V bias. RF1 and RF2 are reflective shorts when "OFF". On-chip circuitry allows single positive supply operation from +3 Vdc to +8 Vdc at very low DC current with control inputs compatible with CMOS logic families.

Electrical Specifications, T_A = +25° C, Vctl = 0/Vdd, Vdd = +5V (Unless Otherwise Stated), 50 Ohm System

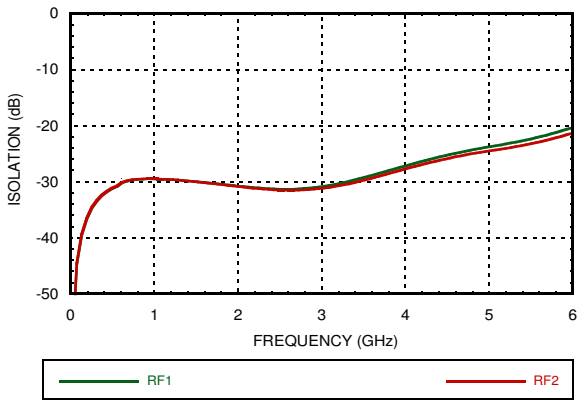
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 1.0 GHz		0.3	0.6	dB
	DC - 2.0 GHz		0.3	0.8	dB
	DC - 2.5 GHz		0.4	0.9	dB
	DC - 3.0 GHz		0.4	1.0	dB
	DC - 4.0 GHz		0.7	1.5	dB
Isolation	DC - 4.0 GHz	24	28		dB
Return Loss (On State)	DC - 1.0 GHz		30		dB
	DC - 2.0 GHz		26		dB
	DC - 3.0 GHz		20		dB
	DC - 4.0 GHz		14		dB
Input Power for 0.1dB Compression	Vdd = +3V	1.0 - 4.0 GHz	31		dBm
	Vdd = +5V		36		dBm
	Vdd = +8V		38		dBm
Input Power for 1dB Compression	Vdd = +3V	0.1 - 4.0 GHz	32	33	dBm
	Vdd = +5V		35	38	dBm
	Vdd = +8V		38	40	dBm
Input Third Order Intercept (Two-tone input power = +27 dBm each tone)	0.02 - 0.1 GHz			61	dBm
	0.1 - 2.0 GHz			62	dBm
	0.1 - 3.0 GHz			61	dBm
	0.1 - 4.0 GHz			60	dBm
Switching Characteristics					
tRISE, tFALL (10/90% RF)	DC - 4.0 GHz		82		ns
tON, tOFF (50% CTL to 10/90% RF)			112		ns

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

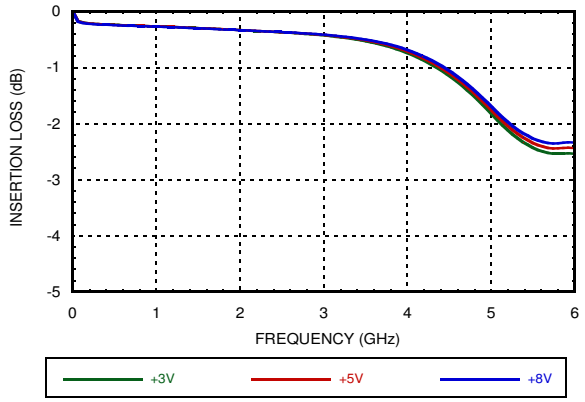
Insertion Loss vs. Temperature



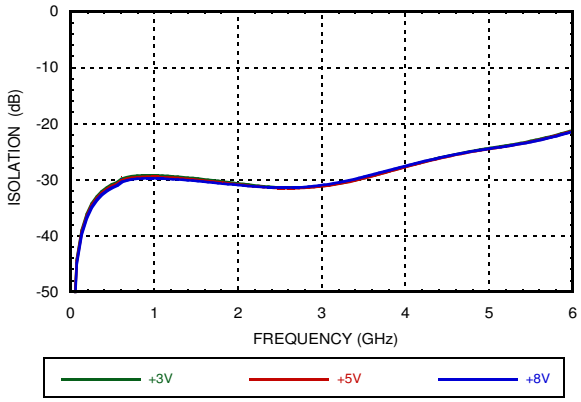
Isolation



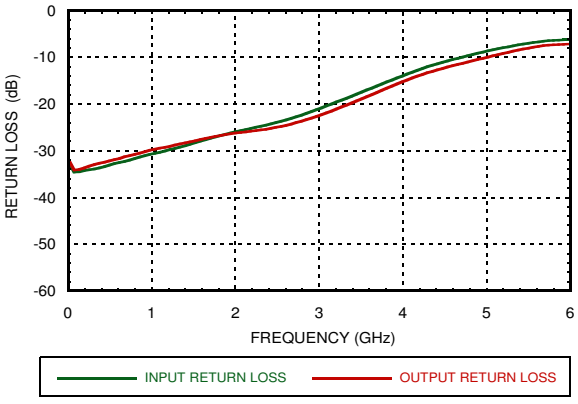
Insertion Loss vs. Vdd



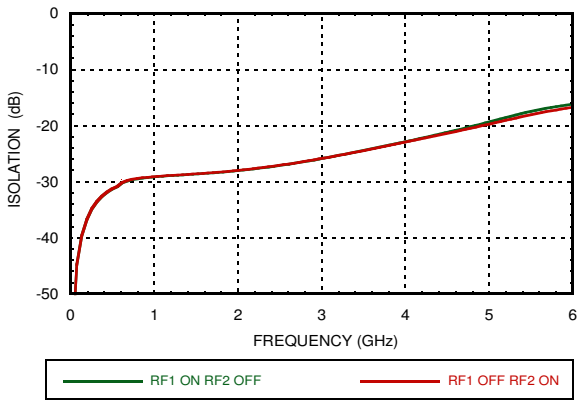
Isolation vs. Vdd



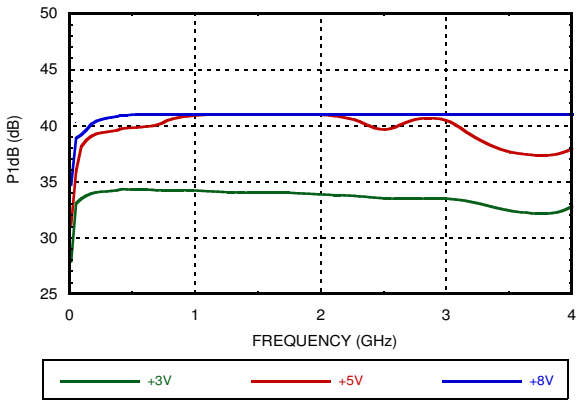
Return Loss



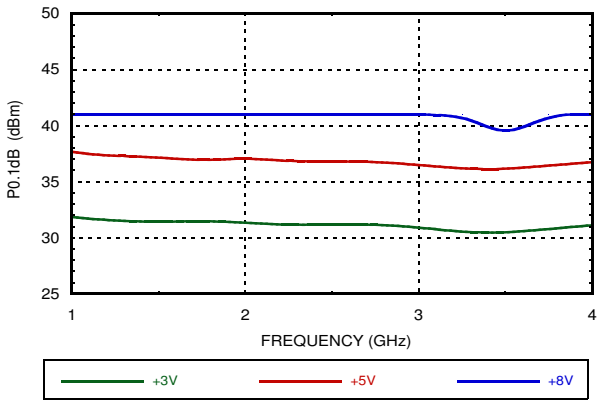
RF1 to RF2 Isolation



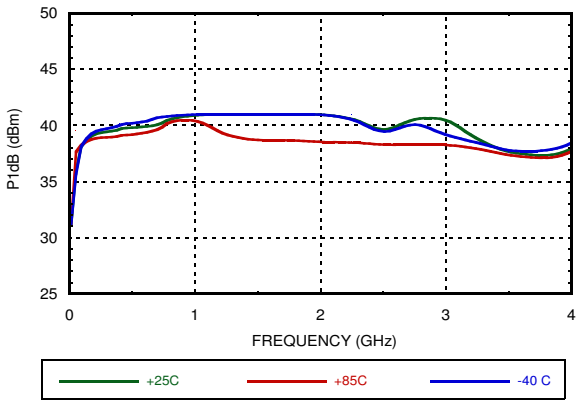
Input P1dB vs. Vdd



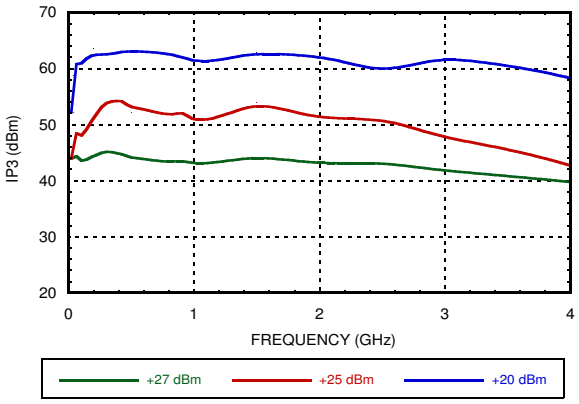
Input P0.1dB vs. Vdd



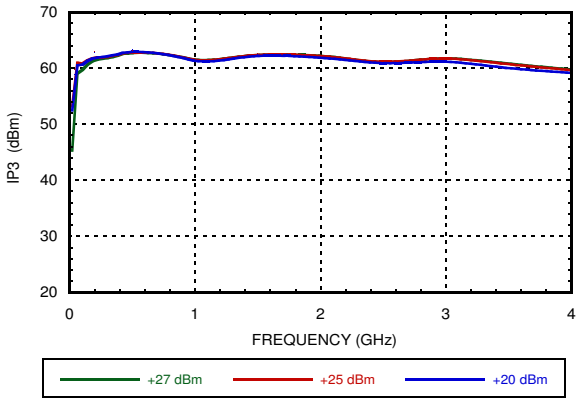
Input P1dB vs. Temperature @ Vdd = +5V



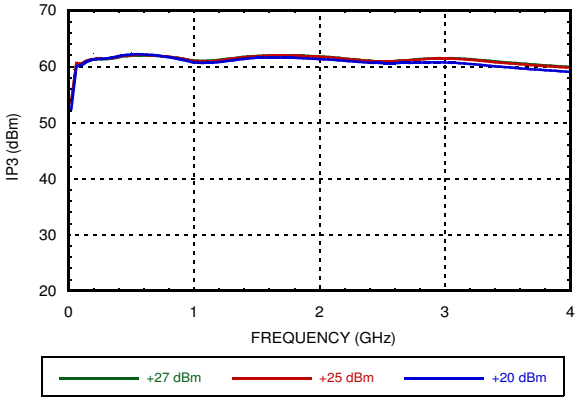
Input IP3 vs. Tone Power @ Vdd = +3V



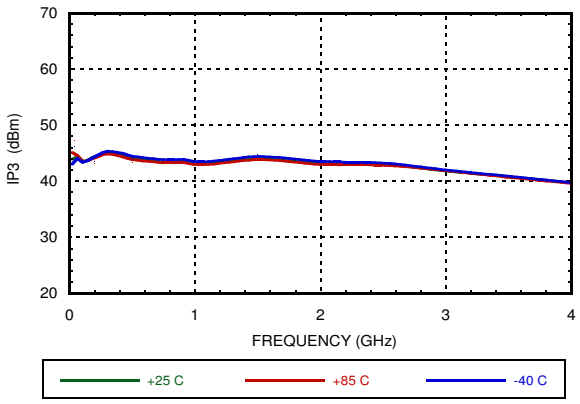
Input IP3 vs. Tone Power @ Vdd = +5V



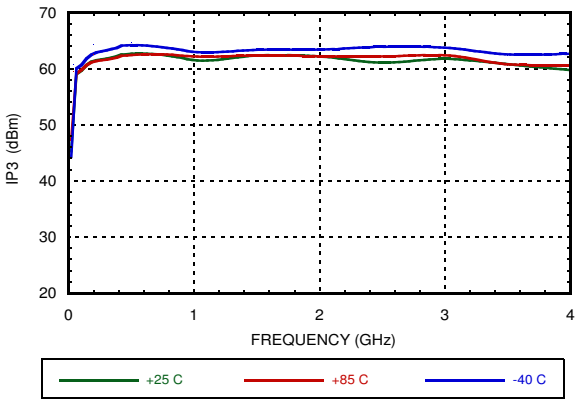
Input IP3 vs. Tone Power @ Vdd = +8V



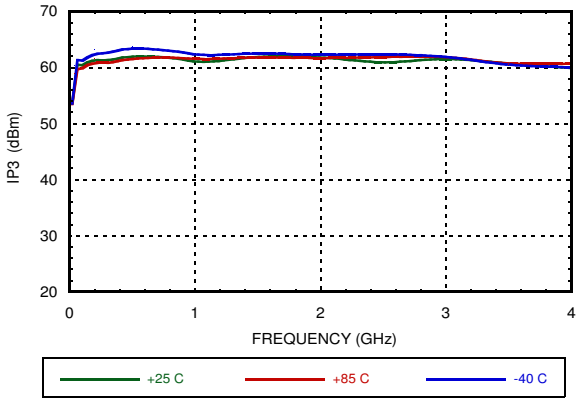
Input IP3 vs. Temperature 27 dBm Tones, Vdd = +3V



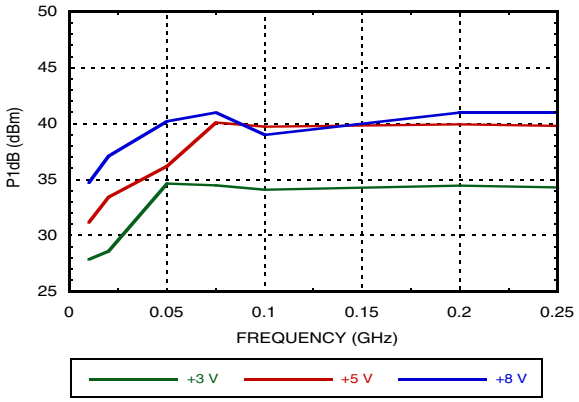
Input IP3 vs. Temperature 27 dBm Tones, Vdd = +5V



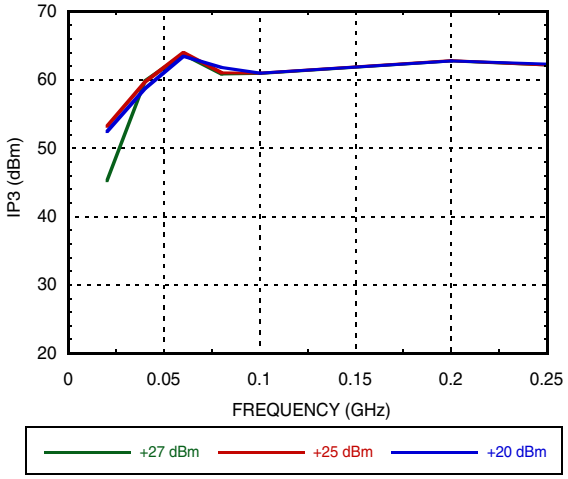
Input IP3 vs. Temperature 27 dBm Tones, Vdd = +8V



Input P1dB vs. Vdd



Input IP3 vs. Tone Power @ Vdd = +5V



Bias Voltage & Current

Vdd (V)	Typical Idd (µA)
+3	0.5
+5	2
+8	20

Control Voltages & Currents

State	Vdd = +3V (µA)	Vdd = +5V (µA)	Vdd = +8V (µA)
Low (0 to +0.2V)	0.5	2.0	20
High (Vdd ±0.2V)	0.1	0.1	0.1

Truth Table

Control Input (Vctl)		Signal Path State	
A	B	RFC to RF1	RFC to RF2
High	Low	Off	On
Low	High	On	Off

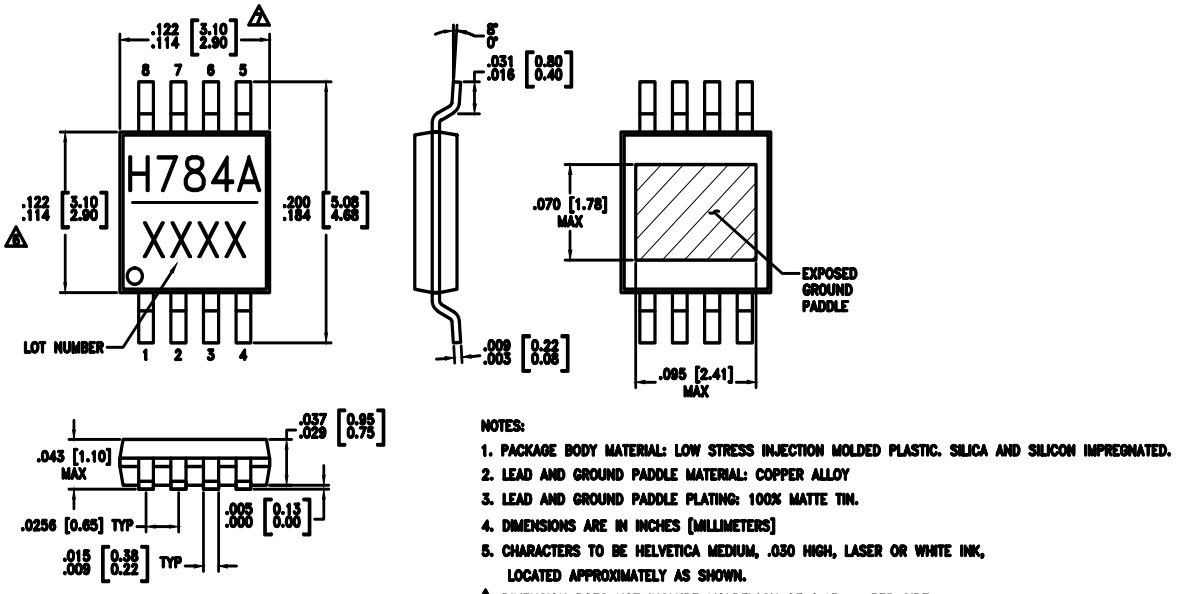
Absolute Maximum Ratings

RF Input Power (Vdd = +8V, 50 Ohm source & load impedances)	+39 dBm (T = +85 °C)
Supply Voltage Range (Vdd) (Vctl = 0V)	-0.2 to +9V
Control Voltage Range (A & B)	-0.2 to Vdd +0.5V
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 25 mW/°C above 85 °C)	1.217 W
Thermal Resistance (Channel to ground paddle)	53.4 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Rating	Class 1A HBM

Note: DC blocking capacitors are required at ports RFC, RF1 and RF2. Their value will determine the lowest transmission frequency.

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC. SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS]
5. CHARACTERS TO BE HELVETICA MEDIUM, .030 HIGH, LASER OR WHITE INK, LOCATED APPROXIMATELY AS SHOWN.

⚠6 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.

⚠7 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.

8. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

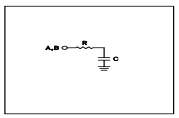
Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [1]
HMC784AMS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H784A XXXX

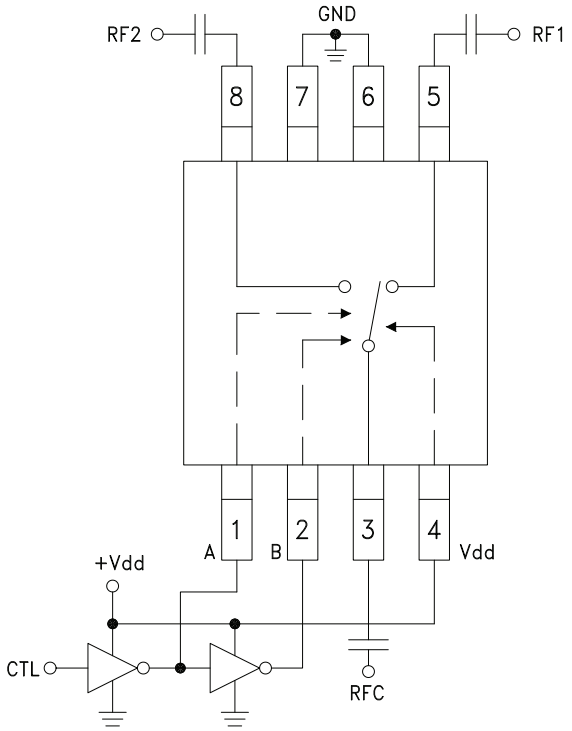
[1] 4-Digit lot number XXXX

[2] Max peak reflow temperature of 260 °C

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	A	See truth table and control voltage table.	
2	B	See truth table and control voltage table.	
3, 5, 8	RFC, RF1, RF2	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
4	Vdd	Supply Voltage	
6, 7	GND	Package bottom must also be connected to PCB RF ground.	

Typical Application Circuit



Notes:

1. Set logic gate and switch Vdd:
   For Vdd = +3V to +7V, use HCT series logic to provide a TTL driver interface.
   For Vdd = +3V to +8V, use NXP Hex Inverter, HEF 4069UB or similar.
2. Control inputs A/B can be driven directly with CMOS logic with Vdd of +3 to +8 Volts applied to the CMOS logic gates and to pin 4 of the RF switch.
3. DC Blocking capacitors are required for each RF port as shown. Capacitor value determines lowest frequency of operation.
4. Highest RF signal power capability is achieved with V set to +8V. The switch will operate properly (but at lower RF power capability) at bias voltages down to +3V.